January 1985

MOSPOWER DATABOOK

Siliconix

PREFACE

WHY MOSPOWER...?

There are reasons for the recent dramatic growth of MOSPOWER (DMOS, double-diffused MOS) technology: it is faster, easier to drive, and suffers neither secondary breakdown nor current sharing problems. In motor control or switching power supply applications, these advantages can result in significant parts-count reductions and higher overall efficiency. In replacing relays or contactors, MOSPOWER eliminates contact wear and bounce, yet maintains high voltage protection and significantly higher levels of reliability. Telecommunication applications require strict impedance control when interfacing with signal lines, and MOSPOWER makes solid state switching possible with increased reliability over traditional reed relays. By eliminating the power required to drive magnetic coils, MOSPOWER interfaces bridge the gap between logic or microprocessor control signals and high power drives-without adding bias supplies, extra components, or incurring efficiency penalties.

WHY SILICONIX...?

...product breadth, quality and experience. Whether you are developing a new design or looking for a second-source supplier, Siliconix probably has the MOSPOWER device to solve your application problem. In this catalog you will find over 200 innovative Siliconix parts to suit your needs. Another 130 are industry second sources, guaranteed equivalent or superior to many commonly used parts. (We also use the original manufacturer's part number.) In addition, there are forty-one standard JEDEC "2N" devices available in commercial, industrial, or several military levels of reliability assurance. All products are available with or without special processing—as required in your application.

Siliconix offers the most extensive range of product capabilities available from a single source. Discrete MOSPOWER devices may be selected for DC currents up to 60 amps and channel "on" resistance down to .055 ohms. Breakdown voltages are available from 20-650 Volts. Several combinations of N-and P-Channel devices may be selected in quad DIP form (4 devices in one package). If you need to handle large amounts of power, Siliconix offers devices guaranteed for operation to 200 degrees C. and power dissipation capabilities up to 250 Watts. Siliconix fully supports military designs with optional /750, /883, and JAN process flows on hermetic packages.

IN THIS CATALOG...

You will find several selection guides in the first section: industry part number cross references as well as parametric selection guides within the Siliconix product line. Each part number (or series) available from Siliconix is described with its own datasheet in Sections two through five according to its type (N- or P-Channel, JEDEC, PROELECTRON, or Special Devices). In addition, more detailed typical parametric performance curves and transient thermal response data is shown in Section 6 (Design Curves). The specific family of curves for a given device is shown on the detailed datasheet, as well as on the first page of each family of curves. Test circuits, package dimensional outlines, and standard processing flows are shown in detail in sections 7 through 9. If your specific needs require packages or processing other than these, please contact one of the field sales offices (as listed in the last section, number 12) for more information.

Inasmuch as MOSPOWER is only one of Siliconix's product lines, you will find a short selection guide to other products (analog switches, junction-FETs, and IC products) in Section 10. A guide to Siliconix application notes appears in Section 11.

Table of Contents

Section 0. Introduction

Alpha-Numeric Index

How to Use the MOSPOWER Selector Guides

SHORT FORM MOSPOWER SELECTOR GUIDE (PRIME PRODUCTS):

This selector guide is designed to quickly identify the appropriate product family (data sheet) by separating the MOSPOWER product line by package type, breakdown voltage and current handling capability. This selector guide only shows prime products. For more cost effective selections, refer to the full line selector guide or the appropriate data sheet.

MOSPOWER SELECTOR GUIDE (FULL LINE):

This selector guide lists the complete MOSPOWER product line by package type, breakdown voltage, $R_{DS(on)}$, $I_{D(continuous)}$, power dissipation, and part number. For complete electrical characteristics and power ratings, refer to the appropriate data sheet listed in the Table of Contents.

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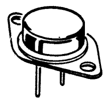
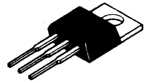
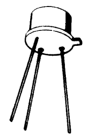
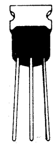
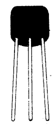
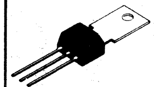
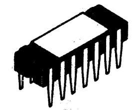
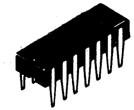
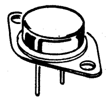
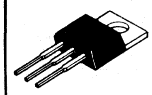
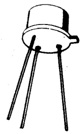
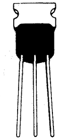
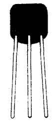
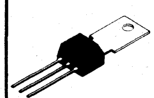
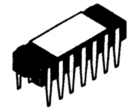
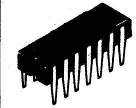
MOSPOWER Prime Product Selector Guide

P-CHANNEL

Packages:								
BV_{DSS} (Volts)	T0–3	T0–220	T0–39	T0–237	T0–92	T0–202	Quad Side Braze	Quad Plastic
600–650	VNT013A 11.7A, 0.55Ω, 650V	VNT008D 6A, 1.5Ω, 650V						
	VNT008A 6A, 1.5Ω, 650V							
450–500	VNP006A 20A, 0.3Ω, 500V	IRF840 8A, 0.85Ω, 500V	IRFF430 2.5A, 1.5Ω, 400V					
	IRF450 13A, 0.4Ω, 500V	VN5001D/IRF830 4.5A, 1.5Ω, 500V						
	BUZ46 9.6A, 0.6Ω, 500V	IRF820 2.5A, 3Ω, 500V						
	IRF440 8A, 0.85Ω, 500V							
	VNP002A† 6.5A, 1.5Ω, 500V							
	VN5001A/IRF430 4.5A, 1.5Ω, 500V							
	IRF420 2.5A, 3Ω, 500V							
350–400	VNM005A 25A, 0.2Ω, 400V	IRF740 10A, 0.55Ω, 400V	IRFF330 3.4A, 1Ω, 400V					
	IRF350 15A, 0.3Ω, 400V	VN4000D/IRF730 5.5A, 1Ω, 400V	IRFF320 2.1A, 1.8Ω, 400V					
	BUZ64 10.5A, 0.4Ω, 400V	IRF720 3A, 1.8Ω, 400V	IRFF310 1.4A, 3.6Ω, 400V					
	IRF340 10A, 0.55Ω, 400V	IRF710 1.5A, 3.6Ω, 400V						
	VNM001A† 8A, 1Ω, 400V							
	BUZ69 8A, 1Ω, 400V							
	VN4000A/IRF330 5.5A, 1Ω, 400V							
	IRF320 3A, 1.8Ω, 400V							

Packages:								
BV_{DSS} (Volts)	T0–3	T0–220	T0–39	T0–237	T0–92	T0–202	Quad Side Braze	Quad Plastic
120–240	VNJ004A 45A, 0.06Ω, 200V	VN2406D 1.4A, 6Ω, 240V	VN2406B 0.8A, 6Ω, 240V	VN2406M 0.3A, 6Ω, 240V	VN2406L 0.21A, 6Ω, 240V			
	IRF250 30A, 0.085Ω, 200V	IRF640 18A, 0.18Ω, 200V	IRFF230 5.5A, 0.4Ω, 200V	VN2410M 0.25A, 10Ω, 240V	VN2410L 0.16A, 10Ω, 240V			
	BUZ36 22A, 0.12Ω, 200V	IRF630 9A, 0.4Ω, 200V	IRFF220 3.5A, 0.8Ω, 200V	BSR72 0.25A, 10Ω, 170V	BS107 0.1A, 28Ω, 200V			
	IRF240 18A, 0.18Ω, 200V	BUZ32 9.5A, 0.4Ω, 200V	IRFF210 2.2A, 1.5Ω, 200V	BSR76 0.25A, 10Ω, 120V				
	BUZ35 9.9A, 0.4Ω, 200V	IRF620 5A, 0.8Ω, 200V						
	IRF230 9A, 0.4Ω, 200V	IRF610 2.5A, 1.5Ω, 200V						
	IRF220 5A, 0.8Ω, 200V							
60–100	VNE003A 60A, 0.035Ω, 100V	IRF540 27A, 0.085Ω, 100V	IRFF130 8A, 0.18Ω, 100V	VP1008M 0.37A, 5Ω, –100V	VP1008L 0.23A, 5Ω, –100V	VN88AF 1.5A, 4Ω, 80V	VQ1006P 0.40A, 4.5Ω, 90V	VQ1006J 0.40A, 4.5Ω, 90V
	IRF150 40A, 0.055Ω, 100V	VN1000D/IRF530 12A, 0.18Ω, 100V	IRFF120 6A, 0.30Ω, 100V	VN0808M 0.35A, 4Ω, 80V	2N7000 0.20A, 5Ω, 60V	VN80AF 1.3A, 5Ω, 80V	VQ2006P 0.41A, 5Ω, –90V	VQ2006J 0.41A, 5Ω, –90V
	BUZ24 32A, 0.06Ω, 100V	BUZ72A 9A, 0.25Ω, 100V	IRFF110 3.7A, 0.6Ω, 100V	VN0606M 0.4A, 3Ω, 60V	VN0610L* 0.2A, 5Ω, 60V	VN66AF 1.7A, 3Ω, 60V	VQ1004P 0.46A, 3.5Ω, 60V	VQ1004J 0.46A, 3.5Ω, 60V
	IRF140 27A, 0.085Ω, 100V	IRF520 8A, 0.30Ω, 100V	VNE011B 4A, 0.5Ω, 100V	VN10KM* 0.3A, 5Ω, 60V	VN0610LL 0.2A, 5Ω, 60V	VN67AF 1.6A, 3.5Ω, 60V	VQ1000P 0.225A, 5.5Ω, 60V	VQ1000J 0.225A, 5.5Ω, 60V
	VN1000A/IRF130 12A, 0.18Ω, 100V	IRF510 2.5A, 0.6Ω, 100V	VP1008B 0.9A, 5Ω, –100V	VN10LM 0.3A, 5Ω, 60V	BS170 0.2A, 5Ω, 60V		VQ2004P 0.41A, 5Ω, –60V	VQ2004J 0.41A, 5Ω, –60V
	IRF120 8A, 0.3Ω, 100V	VN88AD 1.7A, 4Ω, 80V	2N6661** 0.9A, 4Ω, 90V	VN2222LM 0.25A, 7.5Ω, 60V	VN2222L* 0.15A, 7.5Ω, 60V			
	VN0600A 16A, 0.12Ω, 60V	VN0600D 16A, 0.12Ω, 60V	2N6660 1.1A, 3Ω, 60V		VN2222LL 0.15A, 7.5Ω, 60V			
		VN66AD 1.9A, 3Ω, 60V						
30–50	VN0400A 16A, 0.12Ω, 40V	VN0400D 16A, 0.12Ω, 40V	2N6659 1.4A, 1.8Ω, 35V	VN0300M 0.7A, 1.2Ω, 30V	BS250 0.1A, 14Ω, –45V	VN46AF 1.6A, 3Ω, 40V	VQ1001P 0.85A, 1Ω, 30V	VQ1001J 0.85A, 1Ω, 30V
	2N6656 2A, 1.8Ω, 35V	BUZ10/BUZ71 12A, 0.1Ω, 50V	VP0300B 1.3A, 2.5Ω, –30V	VP0300M 0.48A, 2.5Ω, –30V	VP0300L 0.3A, 2.5Ω, –30V	VN40AF 1.3A, 5Ω, 40V	VQ2001P 0.60A, 2Ω, –30V	VQ2001J 0.60A, 2Ω, –30V
		VN0300D 2.5A, 1.5Ω, 30V						
Specialty Products (N- and P-Channel Quad Arrays)							VQ3001P ±30V, 3Ω Total	VQ3001J ±30V, 3Ω Total
							VQ7254P ±20V, 3Ω Total	VQ7254J ±20V, 3Ω Total

*Zener Protected Gate **JAN/JANTX/JANTXV QPL

† 200°C Operating Temperature Rating

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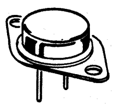
MOSPOWER Selector Guide

N-Channel MOSPOWER

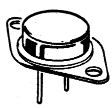


TO-3

Device	Breakdown Voltage (Volts)	$r_{DS(on)}$ (ohms)	I_D Continuous (Amps)	Power Dissipation (Watts)	Part Number
	650	0.550	11.700	176	VNT013A
	650	0.750	9.300	150	VNT012A
	650	1.500	5.700	125	VNT008A
	650	2.000	5.000	125	VNT009A
	600	0.550	11.700	176	VNS013A
	600	0.750	9.300	150	VNS012A
	600	1.500	5.700	125	VNS008A
	600	2.000	5.000	125	VNS009A
	500	0.300	20.000	250	VNP006A
	500	0.400	13.000	150	IRF450
	500	0.400	12.000	150	2N6770
	500	0.500	12.000	150	IRF452
	500	0.600	9.600	125	BUZ45
	500	0.850	8.000	125	IRF440
	500	1.100	7.000	125	IRF442
	500	1.500	6.500	175	BUP71
	500	1.500	6.500	75	IRF430
	500	1.500	4.500	75	2N6762
	500	1.500	4.500	100	BUP66
	500	1.500	4.500	100	VN5001A
	500	1.500	4.500	175	VNP002A
	500	2.000	4.200	78	BUZ46
	500	2.000	4.000	100	BUP67
	500	2.000	4.000	75	IRF432
	500	2.000	4.000	100	VN5002A
	500	3.000	2.500	40	IRF420
	500	4.000	2.000	40	IRF422
	450	0.300	20.000	250	VNN006A
	450	0.400	13.000	150	IRF451
	450	0.500	11.000	150	2N6769
	450	0.500	12.000	150	IRF453
	450	0.850	8.000	125	IRF441
	450	1.100	7.000	125	IRF443
	450	1.500	6.500	175	BUP70
	450	1.500	6.500	75	IRF431
	450	1.500	4.500	100	BUP64
	450	1.500	4.500	100	VN4501A
	450	1.500	4.500	175	VNN002A
	450	2.000	4.000	75	2N6761
	450	2.000	4.000	100	BUP65
	450	2.000	4.000	75	IRF433
	450	2.000	4.000	175	VN4502A
	450	3.000	2.500	40	IRF421
	450	4.000	2.000	40	IRF423
	400	0.200	25.000	250	VNM005A
	400	0.300	15.000	150	IRF350
	400	0.300	14.000	150	2N6768
	400	0.400	13.000	150	IRF352
	400	0.400	10.500	125	BUZ64
	400	0.550	10.000	125	IRF340
	400	0.800	8.000	125	IRF342
	400	1.000	8.000	175	BUP69
	400	1.000	8.000	75	IRF330
	400	1.000	6.000	125	BUP62
	400	1.000	6.000	125	VN4000A
	400	1.000	5.500	75	2N6760
	400	1.000	5.900	75	BUZ63
	400	1.000	5.500	175	VNM001A
	400	1.500	5.000	125	BUP63
	400	1.500	5.000	75	IRF332
	400	1.500	4.500	125	VN4001A
	400	1.800	3.000	40	IRF320
	400	2.500	2.500	40	IRF322
	350	0.200	25.000	250	VNL005A
	350	0.300	15.000	150	IRF351
	350	0.400	13.000	150	IRF353
	350	0.400	12.000	150	2N6767
	350	0.550	10.000	125	IRF341

MOSPOWER Selector Guide (Cont'd)

N-Channel MOSPOWER (Cont'd)

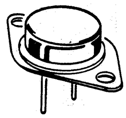
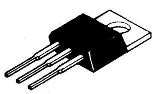


TO-3

Device	Breakdown Voltage (Volts)	$r_{DS\,(on)}$ (ohms)	I_D Continuous (Amps)	Power Dissipation (Watts)	Part Number
TO-3	350	0.800	8.000	125	IRF343
	350	1.000	8.000	175	BUP68
	350	1.000	8.000	75	IRF331
	350	1.000	6.000	125	BUP60
	350	1.000	6.000	125	VN3500A
	350	1.000	5.500	175	VNL001A
	350	1.500	5.000	125	BUP61
	350	1.500	5.000	75	IRF333
	350	1.500	4.500	75	2N6759
	350	1.500	4.500	125	VN3501A
	350	1.800	3.000	40	IRF321
	350	2.500	2.500	40	IRF323
	200	0.060	47.000	250	VNJ004A
	200	0.085	30.000	150	2N6766
	200	0.085	30.000	150	IRF250
	200	0.120	25.000	150	IRF252
	200	0.120	22.000	125	BUZ36
	200	0.180	18.000	125	IRF240
	200	0.220	16.000	125	IRF242
	200	0.400	9.900	78	BUZ35
	200	0.400	9.000	75	2N6758
	200	0.400	9.000	75	IRF230
	200	0.600	8.000	75	IRF232
	200	0.800	5.000	40	IRF220
	200	1.200	4.000	40	IRF222
	150	0.060	47.000	250	VNG004A
	150	0.085	30.000	150	IRF251
	150	0.120	25.000	150	2N6765
	150	0.120	25.000	150	IRF253
	150	0.180	18.000	125	IRF241
	150	0.220	16.000	125	IRF243
	150	0.400	9.000	75	IRF231
	150	0.600	8.000	75	2N6757
	150	0.600	8.000	75	IRF233
	150	0.800	5.000	40	IRF221
	150	1.200	4.000	40	IRF223
	120	0.180	14.000	75	VN1200A
	120	0.250	12.000	100	VN1201A
	100	0.035	65.000	250	VNE003A
	100	0.055	40.000	150	IRF150
	100	0.055	38.000	150	2N6764
	100	0.060	32.000	125	BUZ24
	100	0.080	27.000	125	IRF140
	100	0.085	33.000	150	IRF152
	100	0.110	24.000	125	IRF142
	100	0.180	14.000	75	IRF130
	100	0.180	14.000	100	VN1000A
	100	0.180	14.000	75	2N6756
	100	0.200	10.000	78	BUZ23
	100	0.250	12.000	75	IRF132
	100	0.250	12.000	100	VN1001A
	100	0.300	8.000	40	IRF120
	100	0.400	7.000	40	IRF122
	90	4.000	1.900	25	2N6658
	90	4.500	1.800	25	VN99AA
	90	5.000	1.700	25	VN90AA
	80	0.180	14.000	100	VN0800A
	80	0.250	12.000	100	VN0801A
	60	0.035	60.000	250	VNC003A
	60	0.055	40.000	150	IRF151
	60	0.080	33.000	150	IRF153
	60	0.080	31.000	150	2N6763
	60	0.085	27.000	125	IRF141
	60	0.110	24.000	125	IRF143
	60	0.120	18.000	100	VN0600A
	60	0.150	16.000	100	VN0601A
	60	0.180	14.000	75	IRF131

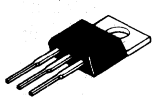
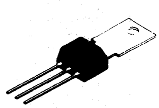
MOSPOWER Selector Guide (Cont'd)

N-Channel MOSPOWER (Cont'd)

Device	Breakdown Voltage (Volts)	$r_{DS(on)}$ (ohms)	I_D Continuous (Amps)	Power Dissipation (Watts)	Part Number
 TO-3	60	0.250	12.000	75	2N6755
	60	0.250	12.000	75	IRF133
	60	0.300	8.000	40	IRF121
	60	0.400	10.000	80	VN64GA
	60	0.400	7.000	40	IRF123
	60	3.000	2.000	25	2N6657
	60	3.500	2.000	25	VN67AA
	40	0.120	18.000	100	VN0400A
	40	0.150	16.000	100	VN0401A
	35	1.800	2.000	25	2N6656
	35	2.500	2.000	25	VN35AA
 TO-220	650	1.500	6.000	125	VNT008D
	650	2.000	5.000	125	VNT009D
	600	1.500	5.700	125	VNS008D
	600	2.000	5.000	125	VNS009D
	500	0.850	8.000	125	IRF840
	500	1.100	7.000	125	IRF842
	500	1.500	4.500	75	IRF830
	500	1.500	4.500	75	VN5001D
	500	2.000	4.000	75	BUZ42
	500	2.000	4.000	75	IRF832
	500	2.000	4.000	75	VN5002D
	500	3.000	2.500	40	IRF820
	500	3.000	2.400	40	BUZ74
	500	4.000	2.000	40	IRF822
	450	0.850	8.000	125	IRF841
	450	1.100	7.000	125	IRF843
	450	1.500	4.500	75	IRF831
	450	1.500	4.500	75	VN4501D
	450	2.000	4.000	75	IRF833
	450	2.000	4.000	75	VN4502D
	450	3.000	2.500	40	IRF821
	450	4.000	2.000	40	IRF823
	400	0.550	10.000	125	IRF740
	400	0.800	8.000	125	IRF742
	400	1.000	6.000	75	VN4000D
	400	1.000	5.500	75	BUZ60
	400	1.000	5.500	75	IRF730
	400	1.500	5.000	75	VN4001D
	400	1.500	4.500	75	IRF732
	400	1.800	3.000	40	BUZ76
	400	1.800	3.000	40	IRF720
	400	2.500	2.500	40	IRF722
	400	3.600	1.500	20	IRF710
	400	5.000	1.300	20	IRF712
	350	0.550	10.000	125	IRF741
	350	0.800	8.000	125	IRF743
	350	1.000	6.000	75	VN3500D
	350	1.000	5.500	75	IRF731
	350	1.500	5.000	75	VN3501D
	350	1.500	4.500	75	IRF733
	350	1.800	3.000	40	IRF721
	350	2.500	2.500	40	IRF723
	350	3.600	1.500	20	IRF711
	350	5.000	1.300	20	IRF713
	240	6.000	1.400	20	VN2406D
	200	0.180	18.000	125	IRF640
	200	0.220	16.000	125	IRF642
	200	0.400	9.500	75	BUZ32
	200	0.400	9.000	75	IRF630
	200	0.600	8.000	75	IRF632
	200	0.800	5.000	40	IRF620
	200	1.200	4.000	40	IRF622
	200	1.500	2.500	20	IRF610
	200	2.400	2.000	20	IRF612

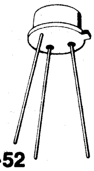
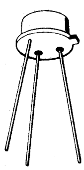
MOSPOWER Selector Guide (Cont'd)

N-Channel MOSPOWER (Cont'd)

Device	Breakdown Voltage (Volts)	$r_{DS(on)}$ (ohms)	I_D Continuous (Amps)	Power Dissipation (Watts)	Part Number
 TO-220	170	6.000	1.400	20	VN1706D
	150	0.180	18.000	125	IRF641
	150	0.220	16.000	125	IRF643
	150	0.400	9.000	75	IRF631
	150	0.600	8.000	75	IRF633
	150	0.800	5.000	40	IRF621
	150	1.200	4.000	40	IRF623
	150	1.500	2.500	20	IRF611
	150	2.400	2.000	20	IRF613
	120	0.180	14.000	45	VN1200D
	120	0.250	12.000	75	VN1201D
	120	6.000	1.400	20	VN1206D
	100	0.085	27.000	125	IRF540
	100	0.110	24.000	125	IRF542
	100	0.180	14.000	75	IRF530
	100	0.180	14.000	75	VN1000D
	100	0.200	12.000	75	BUZ20
	100	0.250	12.000	75	IRF532
	100	0.250	12.000	75	VN1001D
	100	0.250	9.000	40	BUZ72A
	100	0.300	8.000	40	IRF520
	100	0.400	7.000	40	IRF522
	100	0.600	2.500	20	IRF510
	100	0.800	2.000	20	IRF512
	80	0.180	14.000	75	VN0800D
	80	0.250	12.000	75	VN0801D
	80	4.000	1.700	20	BSR82
	80	4.000	1.700	20	VN88AD
	80	4.500	1.600	20	VN89AD
	60	0.085	27.000	125	IRF541
	60	0.110	24.000	125	IRF543
	60	0.120	18.000	75	VN0600D
	60	0.150	16.000	75	VN0601D
	60	0.180	14.000	75	IRF531
	60	0.250	12.000	75	IRF533
	60	0.300	8.000	40	IRF521
	60	0.400	7.000	40	IRF523
	60	0.600	2.500	20	IRF511
	60	0.800	2.000	20	IRF513
	60	3.000	1.900	20	VN66AD
	60	3.500	1.800	20	VN67AD
	50	0.100	19.300	75	BUZ10
	50	0.100	12.000	40	BUZ71
	40	0.120	18.000	75	VN0400D
	40	0.150	16.000	75	VN0401D
	40	3.000	1.900	20	BSR80
	40	3.000	1.900	20	VN46AD
	40	5.000	1.500	20	VN40AD
	30	1.200	2.500	20	VN0300D
 TO-202	80	4.000	1.500	15	VN88AF
	80	4.500	1.400	15	VN89AF
	80	5.000	1.300	15	VN80AF
	60	3.000	1.700	15	VN66AF
	60	3.500	1.600	15	VN67AF
	40	3.000	1.600	15	VN46AF
	40	5.000	1.300	15	VN40AF

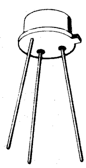
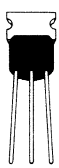
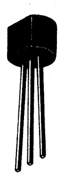
MOSPOWER Selector Guide (Cont'd)

N-Channel MOSPOWER (Cont'd)

Device	Breakdown Voltage (Volts)	$r_{DS(on)}$ (ohms)	I_D Continuous (Amps)	Power Dissipation (Watts)	Part Number
 TO-52	60	5.000	0.200	0.315	VN10KE
	60	5.000	0.200	0.315	VN10LE
 TO-39	500	1.500	2.500	25	2N6802
	500	1.500	2.500	75	IRFF430
	500	2.000	2.230	75	IRFF432
	500	3.000	1.600	40	IRFF420
	500	3.000	1.500	20	2N6794
	500	4.000	1.400	40	IRFF422
	450	1.500	2.500	25	2N6801
	450	1.500	2.500	75	IRFF431
	450	2.000	2.230	75	IRFF433
	450	3.000	1.600	40	IRFF421
	450	3.000	1.500	20	2N6793
	450	4.000	1.400	40	IRFF423
	400	1.000	3.370	25	IRFF330
	400	1.000	3.000	25	2N6800
	400	1.500	2.750	25	IRFF332
	400	1.800	2.090	20	IRFF320
	400	1.800	2.000	20	2N6792
	400	2.500	1.770	20	IRFF322
	400	3.600	1.350	15	IRFF310
	400	3.600	1.250	15	2N6786
	400	5.000	1.150	15	IRFF312
	350	1.000	3.370	25	IRFF331
	350	1.000	3.000	25	2N6799
	350	1.500	2.750	25	IRFF333
	350	1.800	2.090	20	IRFF321
	350	1.800	2.000	20	2N6791
	350	2.500	1.770	20	IRFF323
	350	3.600	1.350	15	IRFF311
	350	3.600	1.250	15	2N6785
	350	5.000	1.150	15	IRFF313
	240	6.000	0.800	6.25	VN2406B
	200	0.400	5.500	25	2N6798
	200	0.400	5.500	25	IRFF230
	200	0.600	4.500	25	IRFF232
	200	0.800	3.500	20	2N6790
	200	0.800	3.500	20	IRFF220
	200	1.200	2.800	20	IRFF222
	200	1.500	2.250	15	2N6784
	200	1.500	2.200	15	IRFF210
	200	2.400	1.800	15	IRFF212
	170	6.000	0.800	6.25	VN1706B
	150	0.400	5.500	25	2N6797
	150	0.400	5.500	25	IRFF231
	150	0.600	4.500	25	IRFF233
	150	0.800	3.500	20	2N6789
	150	0.800	3.500	20	IRFF221
	150	1.200	2.800	20	IRFF223
	150	1.500	2.250	15	2N6783
	150	1.500	2.200	15	IRFF211
	150	2.400	1.800	15	IRFF213
	150	4.500	0.500	15	NOS100B
	120	4.500	0.500	15	NOS101B
	120	6.000	0.800	6.25	VN1206B
	100	0.180	8.000	25	2N6796
	100	0.180	8.000	25	IRFF130
	100	0.250	7.000	25	IRFF132
	100	0.300	6.000	20	2N6788

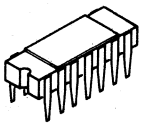
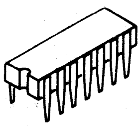
MOSPOWER Selector Guide (Cont'd)

N-Channel MOSPOWER (Cont'd)

Device	Breakdown Voltage (Volts)	$r_{DS(on)}$ (ohms)	I_D Continuous (Amps)	Power Dissipation (Watts)	Part Number
 TO-39	100	0.300	6.000	20	IRFF120
	100	0.400	5.000	20	IRFF122
	100	0.500	4.000	15	VNE010B
	100	0.500	4.000	15	VNE011B
	100	0.600	3.680	15	IRFF110
	100	0.600	3.500	15	2N6782
	100	0.800	2.010	15	IRFF112
	90	4.000	0.900	75	2N6661
	90	4.500	0.900	6.25	VN99AB
	90	5.000	0.800	6.25	VN90AB
	80	0.500	4.000	15	VND010B
	80	0.500	4.000	15	VND011B
	80	4.500	0.800	15	NOS102B
	60	0.180	8.000	25	2N6795
	60	0.180	8.000	25	IRFF131
	60	0.250	7.000	25	IRFF133
	60	0.300	6.000	20	2N6787
	60	0.300	6.000	20	IRFF121
	60	0.400	5.000	20	IRFF123
	60	0.500	4.000	15	VNC010B
	60	0.500	4.000	15	VNC011B
	60	0.600	3.500	15	2N6781
	60	0.600	3.680	15	IRFF111
	60	0.800	2.010	15	IRFF113
	60	3.000	1.100	6.25	2N6660
	60	3.500	1.000	6.25	VN67AB
	35	1.800	1.400	6.25	2N6659
	35	2.500	1.200	6.25	VN35AB
	30	1.200	0.350	6.25	VN0300B
 TO-237	240	6.000	0.300	1.0	VN2406M
	240	10.000	0.250	1.0	BSR76
	240	10.000	0.250	1.0	VN2410M
	170	6.000	0.300	1.0	VN1706M
	170	10.000	0.250	1.0	BSR72
	170	10.000	0.250	1.0	VN1710M
	170	24.000	0.080	1.0	VN1720M
	120	6.000	0.300	1.0	VN1206M
	120	10.000	0.250	1.0	BSR70
	120	10.000	0.250	1.0	VN1210M
	80	4.000	0.350	1.0	BSR67
	80	4.000	0.350	1.0	VN0808M
	60	3.000	0.400	1.0	BSR66
	60	3.000	0.400	1.0	VN0606M
	60	5.000	0.300	1.0	VN10KM
	60	5.000	0.300	1.0	VN10LM
	60	7.500	0.300	1.0	BSR65
	60	7.500	0.250	1.0	BSR64
	60	7.500	0.250	1.0	VN2222KM
	60	7.500	0.250	1.0	VN2222LM
	30	1.200	0.700	1.0	VN0300M
 TO-92	240	6.000	0.210	0.4	VN2406L
	240	10.000	0.160	0.4	VN2410L
	240	24.000	0.080	0.4	VN2420L
	200	24.000	0.080	0.4	VN2020L
	200	28.000	0.100	0.4	BS107
	170	6.000	0.210	0.4	VN1706L
	170	10.000	0.160	0.4	VN1710L
	120	5.000	0.230	0.4	VP1008L
	120	6.000	0.210	0.4	VN1206L
	120	10.000	0.160	0.4	VN1210L
	60	5.000	0.200	0.4	VN0610L
	60	5.000	0.200	0.4	VN0610LL
	60	5.000	0.179	0.4	BS170
	60	7.500	0.150	0.4	VN2222L

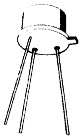
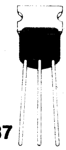
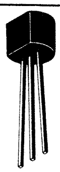
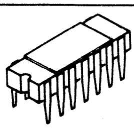
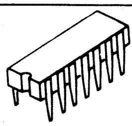
MOSPOWER Selector Guide (Cont'd)

N-Channel MOSPOWER (Cont'd)

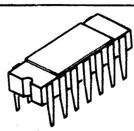
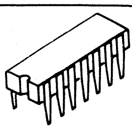
Device	Breakdown Voltage (Volts)	$r_{DS(on)}$ (ohms)	I_D Continuous (Amps)	Power Dissipation (Watts)	Part Number
 TO-92	60	7.500	0.150	0.4	VN2222LL
	30	1.200	0.350	0.4	VN0300L
 14-Pin Dual-In-Line (Side Brazed)	90	4.500	0.400	1.3	VQ1006P
	60	3.500	0.460	1.3	VQ1004P
	60	5.500	0.225	1.3	VQ1000P
	30	1.000	0.850	1.3	VQ1001P
 14-Pin Dual-In-Line (Plastic)	90	4.500	0.400	1.3	VQ1006J
	60	3.500	0.460	1.3	VQ1004J
	60	5.500	0.225	1.3	VQ1000J
	30	1.000	0.850	1.3	VQ1001J

MOSPOWER Selector Guide (Cont'd)

P-Channel MOSPOWER

Device	Breakdown Voltage (Volts)	$r_{DS\,(on)}$ (ohms)	I_D Continuous (Amps)	Power Dissipation (Watts)	Part Number
 TO-39	-100	5.0	-0.90	6.25	VP1008B
	-80	5.0	-0.9	6.25	VP0808B
	-30	2.5	-1.3	6.25	VP0300B
 TO-237	-100	5.0	-0.37	1.0	VP1008M
	-80	5.0	-0.37	1.0	VP0808M
	-40	2.5	-0.48	1.0	VP0300M
	-30	2.5	-0.48	1.0	BSR78
 TO-92	-80	5.0	-0.23	0.4	VP0808L
	-45	14.0	-0.107	0.4	BS250
	-30	2.5	-0.30	0.4	VP0300L
 14-Pin Dual-In-Line (Side Brazed)	-90	5.0	-0.4	1.3	VQ2006P
	-60	5.0	-0.4	1.3	VQ2004P
	-40	2.0	-0.6	1.3	VQ2001P
 14-Pin Dual-In-Line (Plastic)	-90	5.0	-0.4	1.3	VQ2006J
	-60	5.0	-0.4	1.3	VQ2004J
	-40	2.0	-0.6	1.3	VQ2001J

N- and P-Channel Quad MOSPOWER

Device	Breakdown Voltage (Volts)	$r_{DS\,(on)}$ (ohms)	I_D Continuous (Amps)	Power Dissipation (Watts)	Part Number
 14-Pin Dual-In-Line (Side Brazed)	30	3.0**	N-0.85 P-0.60	1.3	VQ3001P
	20	3.0**	N-2.0 P-2.0	1.75	VQ7254P
 14-Pin Dual-In-Line (Plastic)	30	3.0**	N-0.85 P-0.60	1.3	VQ3001J
	20	3.0**	N-2.0 P-2.0	1.75	VQ7254J

**Total (N + P)

0

How to Use the MOSPOWER Industry Cross Reference List

EXAMPLE 1: Siliconix equivalent is directly interchangeable with an industry part number.

Industry Part Number	Siliconix Equivalent
IRF120	IRF120
BS170	BS170
BUZ45	BUZ45

Siliconix offers the direct replacement with electrical characteristics and ratings which meet or exceed the standards of industry part number.

EXAMPLE 2: Siliconix equivalent which is not identical to the industry part number.

Industry Part Number	Siliconix Equivalent
MTM15N50	VNP006A
IVN5201TNH	VNE010B
D84DR1	VN4501D
RFN12N08	VN0800A

Siliconix equivalents referenced in the cross reference list are functional equivalents in similar package types which nearly meet or exceed the critical device ratings (BV_{DSS}, $R_{DS(on)}$, $I_{D(on)}$) of the industry part number.

MOSPOWER Cross Reference List

AMPEREX

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
BST70	80	4.0	0.5	TO-92	—
BST70A	80	4.0	0.5	TO-92	—
BST72	100	10.0	0.3	TO-92	VN1210L
BST72A	100	10.0	0.3	TO-92	VN1210L
BST74	200	5.0	0.4	TO-92	VN2406L*
BST74A	200	5.0	0.4	TO-92	VN2406L*
BST76	200	5.0	0.6	TO-92	VN2406L*
BST76A	200	5.0	0.6	TO-92	VN2406L*
BST78	450	14.0	0.75	TO-126	VN4205D*
BS170	60	5.0	0.5	TO-92	BS170
BUZ10	50	0.1	12.0	TO-220	BUZ10
BUZ10A	50	0.12	12.0	TO-220	BUZ10
BUZ11	50	0.04	30.0	TO-220	BUZ10
BUZ11A	50	0.06	25.0	TO-220	BUZ10
BUZ14	50	0.04	39.0	TO-3	VNC003A*
BUZ15	50	0.03	45.0	TO-3	VNC003A*
BUZ20	100	0.2	12.0	TO-220	BUZ20
BUZ21	100	0.1	18.0	TO-220	IRF540
BUZ23	100	0.2	10.0	TO-3	BUZ23
BUZ24	100	0.06	32.0	TO-3	BUZ24
BUZ25	100	0.1	19.0	TO-3	IRF140
BUZ30	200	0.75	7.0	TO-220	IRF632
BUZ31	200	0.2	12.5	TO-220	IRF640
BUZ32	200	0.4	9.5	TO-220	BUZ32
BUZ33	200	0.75	7.2	TO-3	IRF232
BUZ34	200	0.2	17.0	TO-3	IRF240
BUZ35	200	0.4	9.9	TO-3	BUZ35
BUZ36	200	0.12	22.0	TO-3	BUZ36
BUZ40	500	4.5	2.5	TO-220	IRF822
BUZ41A	500	1.5	4.5	TO-220	IRF830
BUZ42	500	2.0	4.0	TO-220	BUZ42
BUZ43	500	4.5	2.8	TO-3	IRF422
BUZ44A	500	1.5	4.8	TO-3	IRF430
BUZ45	500	0.6	9.6	TO-3	BUZ45
BUZ45A	500	0.8	8.3	TO-3	IRF452
BUZ45B	500	0.5	10.0	TO-3	IRF452
BUZ45C	450	0.5	10.0	TO-3	IRF453
BUZ46	500	2.0	4.2	TO-3	BUZ46
BUZ50A	1000	5.0	2.5	TO-220	—
BUZ50B	1000	8.0	2.0	TO-220	—
BUZ53A	1000	5.0	2.6	TO-3	—
BUZ54	1000	2.0	5.3	TO-3	—
BUZ54A	1000	2.6	4.6	TO-3	—
BUZ60	400	1.0	5.5	TO-220	BUZ60
BUZ60B	400	1.5	4.5	TO-220	BUZ60
BUZ63	400	1.0	5.9	TO-3	BUZ63
BUZ63B	400	1.5	4.5	TO-3	VN4001A
BUZ64	400	0.4	10.5	TO-3	BUZ64
BUZ71	50	0.1	12.0	TO-220	BUZ71
BUZ71A	50	0.12	12.0	TO-220	BUZ71
BUZ72	100	0.2	10.0	TO-220	BUZ20
BUZ72A	100	0.25	9.0	TO-220	BUZ72
BUZ73A	200	0.6	5.8	TO-220	IRF632
BUZ74	500	3.0	2.4	TO-220	BUZ74
BUZ74A	500	3.0	2.0	TO-220	IRF820
BUZ76	400	1.8	3.0	TO-220	BUZ76
BUZ76A	400	2.5	2.6	TO-220	IRF722
BUZ80	800	4.0	2.6	TO-220	—
BUZ80A	800	3.0	3.0	TO-220	—
BUZ83	800	4.0	2.9	TO-3	—
BUZ83A	800	3.0	3.4	TO-3	—
BUZ84	800	2.0	5.3	TO-3	—
BUZ84A	800	1.5	6.0	TO-3	—

MOSPOWER Cross Reference List (Cont'd)

FERRANTI

Industry Part No.	BV_{DSS} (Volts)	$R_{DS(on)}$ (Ohms)	$I_{D(on)}$ (Amps)	Package	Siliconix Replacement
ZVN01A2A	20	2.0	1.0	TO-92	VN0300L
ZVN01A2B	20	2.0	3.0	TO-39	IRFF113
ZVN01A2L	20	2.0	3.0	TO-220	VN0300D
ZVN01A2L	20	2.0	3.0	TO-220	VN0300L
ZVN01A3B	30	2.0	3.0	TO-39	VN0300B
ZVN01A3L	30	2.0	3.0	TO-220	VN0300D
ZVN0104A	40	4.0	1.0	TO-92	VN0610LL*
ZVN0104B	40	4.0	3.0	TO-39	VN67AB
ZVN0104K	40	4.0	2.0	TO-202	VN46AF
ZVN0104L	40	4.0	3.0	TO-220	VN46AD
ZVN0106A	60	4.0	1.0	TO-92	VN0610LL*
ZVN0106B	60	4.0	3.0	TO-39	VNC011B
ZVN0106K	60	4.0	2.0	TO-202	VN66AF
ZVN0106L	60	4.0	3.0	TO-220	VN66AD
ZVN0108A	80	4.0	1.0	TO-92	VN1206L
ZVN0108B	80	4.0	3.0	TO-39	VND0118B
ZVN0108K	80	4.0	2.0	TO-202	VN88AF
ZVN0108L	80	4.0	3.0	TO-220	VN88AD
ZVN0109A	90	4.0	1.0	TO-92	VN1206L*
ZVN0109B	90	4.0	3.0	TO-39	2N6661
ZVN0109K	90	4.0	2.0	TO-202	VN1206L*
ZVN0109L	90	4.0	3.0	TO-220	—
ZVN0110A	100	8.0	1.0	TO-92	VN1206L
ZVN0110B	100	8.0	3.0	TO-39	VN1206B
ZVN0110L	100	8.0	1.0	TO-220	VN1206D
ZVN0114A	140	8.0	1.0	TO-92	VN1706L
ZVN0114B	140	8.0	3.0	TO-39	NOS100B
ZVN0114L	140	8.0	3.0	TO-220	IRF613
ZVN0116A	160	16.0	1.0	TO-92	VN1710L
ZVN0116B	160	16.0	3.0	TO-39	VN1706B
ZVN0116L	160	16.0	3.0	TO-220	VN1706D
ZVN0120A	200	16.0	1.0	TO-92	VN2410L
ZVN0120B	200	16.0	3.0	TO-39	IRF212
ZVN0120L	200	16.0	3.0	TO-220	IRF612
ZVN02A2B	20	1.0	4.0	TO-39	IRFF113
ZVN02A2L	20	1.0	4.0	TO-220	VN0601D
ZVN02A2M	20	1.0	6.0	TO-3	VN0401A
ZVN02A3B	30	1.0	4.0	TO-39	IRFF113
ZVN02A3L	30	1.0	4.0	TO-220	VN0601D
ZVN02A3M	30	1.0	6.0	TO-3	VN0401A
ZVN0204B	40	2.0	4.0	TO-39	IRFF113
ZVN0204L	40	2.0	4.0	TO-220	VN0601D
ZVN0204M	40	2.0	6.0	TO-3	VN0401A
ZVN0206B	60	2.0	4.0	TO-39	IRFF113
ZVN0206L	60	2.0	4.0	TO-220	IRF513
ZVN0206M	60	2.0	6.0	TO-3	VN64GA
ZVN0208B	80	2.0	4.0	TO-39	VND010B
ZVN0208L	80	2.0	4.0	TO-220	VN0800D
ZVN0208M	80	2.0	6.0	TO-3	VN0801A
ZVN0209B	90	2.0	4.0	TO-39	IRFF112
ZVN0209L	90	2.0	4.0	TO-220	IRF512
ZVN0209M	90	2.0	6.0	TO-3	VN1001A
ZVN0210B	100	4.0	5.0	TO-39	IFF112
ZVN0210L	100	4.0	5.0	TO-220	IRF540
ZVN0210M	100	4.0	6.0	TO-3	VN1001A
ZVN0214B	140	4.0	5.0	TO-39	IRFF213
ZVN0214L	140	4.0	5.0	TO-220	IRF613
ZVN0214M	140	4.0	6.0	TO-3	IRF223
ZVN0216B	160	8.0	5.0	TO-39	VN1706B
ZVN0216L	160	8.0	5.0	TO-220	VN1706D
ZVN0216M	160	8.0	6.0	TO-3	IRF222

MOSPOWER Cross Reference List (Cont'd)

FERRANTI (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS(on)}$ (Ohms)	$I_{D(on)}$ (Amps)	Package	Siliconix Replacement
ZVN0220B	200	8.0	5.0	TO-39	IRF212
ZVN0220L	200	8.0	5.0	TO-220	IRF612
ZVN0220M	200	8.0	6.0	TO-3	IRF222
ZVN0330B	300	3.0	6.0	TO-39	IRFF323
ZVN0330L	300	3.0	6.0	TO-220	IRF723
ZVN0330M	300	3.0	6.0	TO-3	IRF323
ZVN0335B	350	3.0	6.0	TO-39	IRFF323
ZVN0335L	350	3.0	6.0	TO-220	IRF723
ZVN0335M	350	3.0	6.0	TO-3	IRF323
ZVN0340B	400	3.0	6.0	TO-39	IRFF322
ZVN0340L	400	3.0	6.0	TO-220	IRF722
ZVN0340M	400	3.0	6.0	TO-3	IRF322
ZVN0345B	450	3.0	6.0	TO-39	2N6793
ZVN0345L	450	3.0	6.0	TO-220	IRF821
ZVN0345M	450	3.0	6.0	TO-3	IRF421
ZVN0350B	500	6.0	6.0	TO-39	IRFF422
ZVN0350L	500	6.0	6.0	TO-220	IRFF822
ZVN0350M	500	6.0	6.0	TO-3	IRFF422
ZVN0355B	550	6.0	6.0	TO-39	—
ZVN0355L	550	6.0	6.0	TO-220	VNS009D
ZVN0355M	550	6.0	6.0	TO-3	VNS009A
ZVN0360B	600	6.0	6.0	TO-39	—
ZVN0360L	600	6.0	6.0	TO-220	VNS009D
ZVN0360M	600	6.0	6.0	TO-3	VNS009A
ZVN0365B	650	6.0	6.0	TO-39	—
ZVN0365L	650	6.0	6.0	TO-220	VNT009D
ZVN0365M	650	6.0	6.0	TO-3	VNT012A
ZVN0430M	300	1.0	16.0	TO-3	VN3500A
ZVN0435M	350	1.0	16.0	TO-3	VN3500A
ZVN0440M	400	1.0	16.0	TO-3	VN4000A
ZVN0445M	450	1.0	16.0	TO-3	IRF441
ZVN0450M	500	2.0	16.0	TO-3	VNS002A
ZVN0455M	550	2.0	16.0	TO-3	VNS009A
ZVN0460M	600	2.0	16.0	TO-3	VNS009A
ZVN0465M	650	2.0	16.0	TO-3	VNT009A
ZVN0530A	300	80.0	1.0	TO-92	—
ZVN0530B	300	80.0	1.0	TO-39	IRFF313
ZVN0530L	300	80.0	2.0	TO-3	IRFF323
ZVN0535A	350	80.0	1.0	TO-92	—
ZVN0535B	350	80.0	1.0	TO-39	IRFF313
ZVN0535L	350	80.0	2.0	TO-220	IRF713
ZVN0540A	400	80.0	1.0	TO-92	—
ZVN0540B	400	80.0	1.0	TO-39	IRFF312
ZVN0540L	400	80.0	2.0	TO-220	IRFF712
ZVN0545A	450	80.0	1.0	TO-92	—
ZVN0545B	450	80.0	1.0	TO-39	IRFF421
ZVN0545L	450	80.0	2.0	TO-220	IRF823
ZVN11A2B	20	0.5	5.0	TO-39	VNC011B
ZVN11A2L	20	0.5	5.0	TO-220	—
ZVN11A2M	20	0.5	8.0	TO-3	VN0401A
ZVN11A3B	30	0.5	5.0	TO-39	VNC010B
ZVN11A3L	30	0.5	5.0	TO-220	VN0401D
ZVN11A3M	30	0.5	8.0	TO-3	VN0401A
ZVN1104B	40	1.0	5.0	TO-39	IRFF113
ZVN1104L	40	1.0	5.0	TO-220	VN0401D
ZVN1104M	40	1.0	8.0	TO-3	VN0401A
ZVN1106B	60	1.0	5.0	TO-39	IRFF113
ZVN1106L	60	1.0	5.0	TO-220	IRF513
ZVN1106M	60	1.0	8.0	TO-3	VN64GA
ZVN1108B	80	1.0	5.0	TO-39	VND011B
ZVN1108L	80	1.0	5.0	TO-220	VN0801D
ZVN1108M	80	1.0	8.0	TO-3	VN0801A
ZVN1109B	90	1.0	5.0	TO-39	IRFF112

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MOSPOWER Cross Reference List (Cont'd)

FERRANTI (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
ZVN1109L	90	1.0	5.0	TO-220	IRF512
ZVN1109M	90	1.0	8.0	TO-3	VN1001A
ZVN1110B	100	2.0	5.0	TO-39	IRFF112
ZVN1110L	100	2.0	5.0	TO-220	IRF512
ZVN1110M	100	2.0	8.0	TO-3	VN1001D
ZVN1114B	140	2.0	5.0	TO-39	2N6783
ZVN1114L	140	2.0	5.0	TO-220	IRF611
ZVN1114M	140	2.0	8.0	TO-3	IRF223
ZVN1116B	160	4.0	5.0	TO-39	IRFF212
ZVN1116L	160	4.0	5.0	TO-220	IRF612
ZVN1116M	160	4.0	8.0	TO-3	IRF222
ZVN1120B	200	4.0	5.0	TO-39	IRF212
ZVN1120L	200	4.0	5.0	TO-220	IRF612
ZVN1120M	200	4.0	8.0	TO-3	IRF222
ZVN1130B	300	4.0	5.0	TO-39	IRFF311
ZVN1130L	300	4.0	5.0	TO-220	IRF711
ZVN1130M	300	4.0	8.0	TO-3	IRF323
ZVN1135B	300	4.0	8.0	TO-39	IRFF311
ZVN1135L	350	4.0	5.0	TO-220	IRF711
ZVN1135M	350	4.0	8.0	TO-3	IRF323
ZVN1140B	400	4.0	5.0	TO-39	IRFF310
ZVN1140L	400	4.0	5.0	TO-220	IRF710
ZVN1140M	400	4.0	8.0	TO-3	IRF322
ZVN1145B	450	4.0	5.0	TO-39	IRFF423
ZVN1145L	450	4.0	5.0	TO-220	IRF823
ZVN1145M	450	4.0	8.0	TO-3	IRF423
ZVN12A2B	20	0.25	8.0	TO-39	IRFF133
ZVN12A2L	20	0.25	16.0	TO-220	VN0401D
ZVN12A2M	20	0.25	16.0	TO-3	VN0401A
ZVN12A3B	30	0.25	8.0	TO-39	IRFF133
ZVN12A3L	30	0.25	16.0	TO-220	VN0401D
ZVN12A3M	30	0.25	16.0	TO-3	VN0401A
ZVN1204B	40	0.4	8.0	TO-39	IRFF123
ZVN1204L	40	0.4	16.0	TO-220	VN0401D
ZVN1204M	40	0.4	16.0	TO-3	VN0401A
ZVN1206B	60	0.4	8.0	TO-39	IRFF123
ZVN1206L	60	0.4	16.0	TO-220	IRFF523
ZVN1206M	60	0.4	16.0	TO-3	VN64GA
ZVN1208B	80	0.4	8.0	TO-39	IRFF122
ZVN1208L	80	0.4	16.0	TO-220	VN0801D
ZVN1208M	80	0.4	16.0	TO-3	VN0801A
ZVN1209B	90	0.4	8.0	TO-39	IRFF122
ZVN1209L	90	0.4	16.0	TO-220	IRF522
ZVN1209M	90	0.4	16.0	TO-3	IRF122
ZVN1210B	100	0.75	8.0	TO-39	VNE010B
ZVN1210L	100	0.75	16.0	TO-220	IRF510
ZVN1210M	100	0.75	16.0	TO-3	IRF122
ZVN1214B	140	0.75	8.0	TO-39	IRFF233
ZVN1214L	140	0.75	16.0	TO-220	IRF633
ZVN1214M	140	0.75	16.0	TO-3	IRF233
ZVN1216B	160	2.0	8.0	TO-39	2N6784
ZVN1216L	160	2.0	16.0	TO-220	IRF610
ZVN1216M	160	2.0	16.0	TO-3	IRF222
ZVN1220B	200	2.0	8.0	TO-39	2N6784
ZVN1220L	200	2.0	16.0	TO-220	IRF610
ZVN1220M	200	2.0	16.0	TO-3	IRF222
ZVN1304A	40	10.0	1.0	TO-92	VN2222L
ZVN1304B	40	10.0	1.5	TO-39	VN67AB
ZVN1306A	60	10.0	1.0	TO-92	VN0610L
ZVN1306B	60	10.0	1.5	TO-39	VN67AB

MOSPOWER Cross Reference List (Cont'd)

FERRANTI (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
ZVN1308A	80	10.0	1.0	TO-92	VN1210L
ZVN1308B	80	10.0	1.5	TO-39	VN90AB
ZVN1309A	90	10.0	1.0	TO-92	VN1210L
ZVN1309B	90	10.0	1.5	TO-39	VN90AB
ZVN1310A	100	20.0	1.0	TO-92	VN1206L
ZVN1310B	100	20.0	1.5	TO-39	VN1206B
ZVN1314A	140	20.0	1.0	TO-92	VN1710L
ZVN1314B	140	20.0	1.5	TO-39	NOS100B
ZVN1316A	160	40.0	1.0	TO-92	VN1710L
ZVN1316B	160	40.0	1.5	TO-39	VN1706B
ZVN1320A	200	40.0	1.0	TO-92	BS107
ZVN1320B	200	40.0	1.5	TO-39	IRFF212
ZVN1404A	40	250	1.0	TO-92	VN0610L
ZVN1404B	40	250	0.1	TO-39	VN67AB
ZVN1406A	60	250	0.1	TO-92	VN0610L
ZVN1406B	60	250	0.1	TO-39	VN67AB
ZVN1408A	80	250	0.1	TO-92	VN1210L
ZVN1408B	80	250	0.1	TO-39	VN90AB
ZVN1409A	90	250	0.1	TO-92	VN1210L
ZVN1409B	90	250	0.1	TO-39	VN90AB
ZVN1410A	100	500	0.1	TO-92	VN1206L
ZVN1410B	100	500	0.1	TO-39	VN1206B
ZVN1414A	140	500	0.1	TO-92	VN1710L
ZVN1414B	140	500	0.1	TO-39	NOS100B
ZVN1416A	160	1000	0.1	TO-92	VN1710L
ZVN1416B	160	1000	0.1	TO-39	VN1706B
ZVN1420A	200	1000	0.1	TO-92	VN2020L
ZVN1420B	200	1000	0.1	TO-39	IRFF212

GEN. ELECT.

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
D84BK2	60	0.6	4.0	TO-220	IRF511
D84BL2	100	0.6	4.0	TO-220	IRF510
D84BM2	150	1.5	2.5	TO-220	IRF611
D84BN2	200	1.5	2.5	TO-220	IRF610
D84BQ1	350	3.6	1.5	TO-220	IRF711
D84BQ2	400	3.6	1.5	TO-220	IRF710
D84CK2	60	0.3	8.0	TO-220	IRF521
D84CL2	100	0.3	8.0	TO-220	VN1001D
D84CM2	150	0.8	5.0	TO-220	IRF621
D84CN2	200	0.8	5.0	TO-220	IRF620
D84CQ1	350	1.8	2.0	TO-220	IRF721
D84CQ2	400	1.8	2.0	TO-220	IRF720
D84CR1	450	3.0	2.5	TO-220	IRF821
D84CR2	500	3.0	2.5	TO-220	VN5002D
D84DK2	60	0.18	5.0	TO-220	IRF543
D84DL2	100	0.18	14.0	TO-220	IRF621
D84DM1	120	0.4	8.0	TO-220	VN1201D
D84DM2	150	0.4	8.0	TO-220	IRF631
D84DN2	200	0.4	8.0	TO-220	IRF630
D84DQ1	350	1.0	5.5	TO-220	VN3500D
D84DQ2	400	1.0	5.5	TO-220	BUZ60
D84DR1	450	1.5	4.5	TO-220	VN4501D
D84DR2	500	1.5	4.5	TO-220	VN5001D
D84EK2	60	0.085	27.0	TO-220	IRF541
D84EL2	100	0.085	27.0	TO-220	IRF540
D84EM2	150	0.18	18.0	TO-220	IRF641
D84EN2	200	0.18	18.0	TO-220	IRF640
D84EQ1	350	0.55	10.0	TO-220	IRF741
D84EQ2	400	0.55	10.0	TO-220	IRF740
D84ER1	450	0.85	8.0	TO-220	IRF841

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MOSPOWER Cross Reference List (Cont'd)

GEN. ELECT. (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
D84ER2	500	0.85	8.0	TO-220	IRF840
D86DK2	60	0.18	14.0	TO-204	BUZ24
D86DL2	100	0.18	14.0	TO-204	BUZ24
D86DM2	150	0.18	14.0	TO-204	BUZ36
D86DN2	200	0.4	9.0	TO-204	BUZ35
D86DQ1	350	1.0	8.0	TO-204	BUZ63
D86DQ2	400	1.0	8.0	TO-204	BUZ63
D86DR1	450	1.5	6.5	TO-204	BUZ45
D86DR2	500	1.5	6.5	TO-204	BUZ45
D86EK2	60	0.085	27.0	TO-204	BUZ24
D86EL2	100	0.085	27.0	TO-204	BUZ24
D86EM2	150	0.18	18.0	TO-204	BUZ36
D86EN2	200	0.18	18.0	TO-204	BUZ36
D86EQ1	350	0.55	10.0	TO-204	BUZ63
D86EQ2	400	0.55	10.0	TO-204	BUZ63
D86ER1	450	0.85	8.0	TO-204	BUZ45
D86ER2	500	0.85	8.0	TO-204	BUZ45
D86FK2	60	0.055	40.0	TO-204	BUZ24
D86FL2	100	0.055	40.0	TO-204	BUZ24
D86FM2	150	0.085	40.0	TO-204	BUZ24
D86FN2	200	0.085	30.0	TO-204	BUZ35
D86FQ1	350	0.3	15.0	TO-204	—
D86FQ2	400	0.3	15.0	TO-204	—
D86FR1	450	0.4	13.0	TO-204	—
D86FR2	500	0.4	13.0	TO-39	—
IRFF110	100	0.6	3.5	TO-39	IRFF110
IRFF111	60	0.6	3.5	TO-39	IRFF111
IRFF112	100	0.8	3.0	TO-39	IRFF112
IRFF113	60	0.8	3.0	TO-39	IRFF113
IRFF120	100	0.3	6.0	TO-39	IRFF120
IRFF121	60	3.0	6.0	TO-39	IRFF121
IRFF122	100	0.4	5.0	TO-39	IRFF122
IRFF123	60	0.4	5.0	TO-39	IRFF123
IRFF130	100	0.18	8.0	TO-39	IRFF130
IRFF131	60	0.18	8.0	TO-39	IRFF131
IRFF132	100	0.25	7.0	TO-39	IRFF132
IRFF133	60	0.25	7.0	TO-39	IRFF133
IRFF210	200	1.5	2.2	TO-39	IRFF210
IRFF211	150	1.5	2.2	TO-39	IRFF211
IRFF212	200	2.4	1.8	TO-39	IRFF212
IRFF213	150	2.4	1.8	TO-39	IRFF213
IRFF220	200	0.8	3.5	TO-39	IRFF220
IRFF221	150	0.8	3.5	TO-39	IRFF121
IRFF222	200	1.2	3.0	TO-39	IRFF222
IRFF223	150	1.2	3.0	TO-39	IRFF223
IRFF230	200	0.4	5.5	TO-39	IRFF230
IRFF231	150	0.4	5.5	TO-39	IRFF231
IRFF232	200	0.6	4.5	TO-39	IRFF232
IRFF233	150	0.6	4.5	TO-39	IRFF233
IRFF310	400	3.6	1.35	TO-39	IRFF310
IRFF311	350	3.6	1.35	TO-39	IRFF311
IRFF312	400	5.0	1.15	TO-39	IRFF312
IRFF313	350	5.0	1.15	TO-39	IRFF313
IRFF320	400	1.8	2.5	TO-39	IRFF320
IRFF321	350	1.8	2.5	TO-39	IRFF321
IRFF322	400	2.5	2.0	TO-39	IRFF322
IRFF323	350	2.5	2.0	TO-39	IRFF323
IRFF330	400	1.0	3.5	TO-39	IRFF330
IRFF331	350	1.0	3.5	TO-39	IRFF331
IRFF332	400	1.5	3.0	TO-39	IRFF332

MOSPOWER Cross Reference List (Cont'd)

GEN. ELECT. (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
IRFF333	350	1.5	3.0	TO-39	IRFF333
IRFF420	500	3.0	1.6	TO-39	IRFF420
IRFF421	450	3.0	1.6	TO-39	IRFF421
IRFF422	500	4.0	1.4	TO-39	IRFF422
IRFF423	450	4.0	1.4	TO-39	IRFF423
IRFF430	500	1.5	2.75	TO-39	IRFF430
IRFF431	450	1.5	2.75	TO-39	IRFF431
IRFF432	500	2.0	2.25	TO-39	IRFF432
IRFF433	450	2.0	2.25	TO-39	IRFF433
IRF130	100	0.18	14.0	TO-204	IRF130
IRF131	60	0.18	14.0	TO-204	IRF131
IRF132	100	0.25	12.0	TO-204	IRF132
IRF133	60	0.25	12.0	TO-204	IRF133
IRF140	100	0.085	27.0	TO-204	IRF140
IRF141	60	0.085	27.0	TO-204	IRF141
IRF142	100	0.11	24.0	TO-204	IRF142
IRF143	60	0.11	24.0	TO-204	IRF143
IRF150	100	0.055	40.0	TO-204	IRF150
IRF151	60	0.055	40.0	TO-204	IRF151
IRF152	100	0.08	33.0	TO-204	IRF152
IRF153	60	0.08	33.0	TO-204	IRF153
IRF230	200	0.4	9.0	TO-204	IRF230
IRF231	150	0.4	9.0	TO-204	IRF231
IRF232	200	0.6	8.0	TO-204	IRF232
IRF233	150	0.6	8.0	TO-204	IRF233
IRF240	200	0.18	18.0	TO-204	IRF240
IRF241	150	0.18	18.0	TO-204	IRF241
IRF242	200	0.22	16.0	TO-204	IRF242
IRF243	150	0.22	16.0	TO-204	IRF243
IRF250	200	0.085	30.0	TO-204	IRF250
IRF251	150	0.085	30.0	TO-204	IRF251
IRF252	200	0.12	25.0	TO-204	IRF252
IRF253	150	0.12	25.0	TO-204	IRF253
IRF330	400	1.0	5.5	TO-204	IRF330
IRF331	350	1.0	5.5	TO-204	IRF331
IRF332	400	1.5	4.5	TO-204	IRF332
IRF333	350	1.5	4.5	TO-204	IRF333
IRF340	400	0.55	10.0	TO-204	IRF340
IRF341	350	0.55	10.0	TO-204	IRF341
IRF342	400	0.8	8.0	TO-204	IRF342
IRF343	350	0.8	8.0	TO-204	IRF343
IRF350	400	0.3	15.0	TO-204	IRF350
IRF351	350	0.3	15.0	TO-204	IRF351
IRF352	400	0.4	13.0	TO-204	IRF352
IRF353	350	0.4	13.0	TO-204	IRF353
IRF430	500	1.5	4.5	TO-204	IRF430
IRF431	450	1.5	4.5	TO-204	IRF431
IRF432	500	2.0	4.0	TO-204	IRF432
IRF433	450	2.0	4.0	TO-204	IRF433
IRF440	500	0.85	8.0	TO-204	IRF440
IRF441	450	0.85	8.0	TO-204	IRF441
IRF442	500	1.1	7.0	TO-204	IRF442
IRF443	450	1.1	7.0	TO-204	IRF443
IRF450	500	0.4	13.0	TO-204	IRF450
IRF451	450	0.4	13.0	TO-204	IRF451
IRF452	500	0.5	12.0	TO-204	IRF452
IRF453	450	0.5	12.0	TO-204	IRF453
IRF510	100	0.6	4.0	TO-220	IRF510
IRF511	60	0.6	4.0	TO-220	IRF511
IRF512	100	0.8	3.5	TO-220	IRF512

MOSPOWER Cross Reference List (Cont'd)

GEN. ELECT. (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS(on)}$ (Ohms)	$I_{D(on)}$ (Amps)	Package	Siliconix Replacement
IRF513	60	0.8	3.5	TO-220	IRF513
IRF520	100	0.3	8.0	TO-220	IRF520
IRF521	60	0.3	8.0	TO-220	IRF521
IRF522	100	0.4	7.0	TO-220	IRF522
IRF523	60	0.4	7.0	TO-220	IRF523
IRF530	100	0.18	14.0	TO-220	IRF530
IRF531	60	0.18	14.0	TO-220	IRF531
IRF532	100	0.25	12.0	TO-220	IRF532
IRF533	60	0.25	12.0	TO-220	IRF533
IRF540	100	0.085	27.0	TO-220	IRF540
IRF541	60	0.085	27.0	TO-220	IRF541
IRF542	100	0.11	24.0	TO-220	IRF542
IRF543	60	0.11	24.0	TO-220	IRF543
IRF610	200	1.5	2.5	TO-220	IRF610
IRF611	150	1.5	2.5	TO-220	IRF611
IRF612	200	2.4	2.0	TO-220	IRF612
IRF613	150	2.4	2.0	TO-220	IRF613
IRF620	200	0.8	5.0	TO-220	IRF620

GEN. INST.

Industry Part No.	BV_{DSS} (Volts)	$R_{DS(on)}$ (Ohms)	$I_{D(on)}$ (Amps)	Package	Siliconix Replacement
PM1001L	100	4.0	0.36	TO-92	—
PM1001R	100	4.0	1.08	TO-202	—
PM1001T	100	4.0	1.08	TO-202	—
PM1002L	100	2.5	0.46	TO-92	—
PM1002R	100	2.5	1.37	TO-202	—
PM1002T	100	2.5	1.37	TO-202	—
PM1003P	100	1.0	4.0	TO-220	IRF512
PM1003R	100	1.0	4.0	TO-202	—
PM1003T	100	1.0	4.0	TO-202	—
PM1004P	100	0.75	5.0	TO-220	IRF510
PM1004R	100	0.75	5.0	TO-202	—
PM1004T	100	0.75	5.0	TO-202	—
PM1006M	100	0.4	10.0	TO-3	IRF122
PM1006P	100	0.4	10.0	TO-220	IRF522
PM1010M	100	0.25	12.0	TO-3	VN1201A
PM1010P	100	0.25	12.0	TO-220	IRF532
PM1201L	120	4.0	0.36	TO-92	—
PM1201R	120	4.0	1.08	TO-202	—
PM1201T	120	4.0	1.08	TO-202	—
PM1202L	120	2.5	0.46	TO-92	—
PM1202R	120	2.5	1.37	TO-202	—
PM1202T	120	2.5	1.37	TO-202	—
PM1203P	120	1.0	4.0	TO-220	VN1201D
PM1203R	120	1.0	4.0	TO-202	—
PM1203T	120	1.0	4.0	TO-202	—
PM1204P	120	0.75	5.0	TO-220	VN1201D
PM1204R	120	0.75	5.0	TO-202	—
PM1204T	120	0.75	5.0	TO-202	—
PM1206M	120	0.4	10.0	TO-3	VN1201A
PM1206P	120	0.4	10.0	TO-220	IRF631
PM1210M	120	0.25	12.0	TO-3	VN1201A
PM1210P	120	0.25	12.0	TO-220	VN1201D
PM1503P	150	1.6	3.4	TO-220	IRF611
PM1503R	150	1.6	2.4	TO-202	—
PM1503T	150	1.6	2.4	TO-202	—
PM1504P	150	1.2	4.0	TO-220	IRF623
PM1504R	150	1.2	2.8	TO-202	—
PM1504T	150	1.2	2.8	TO-202	—
PM1506M	150	0.5	8.0	TO-3	IRF231
PM1506P	150	0.5	8.0	TO-220	IRF631

MOSPOWER Cross Reference List (Cont'd)

GEN. INST. (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
PM1510M	150	0.35	10.0	TO-3	IRF243
PM1510P	150	0.35	10.0	TO-202	IRF643
PM503L	50	2.0	0.52	TO-92	—
PM503R	50	2.0	1.5	TO-202	—
PM503T	50	2.0	1.5	TO-202	—
PM506L	50	1.2	0.67	TO-92	—
PM506R	50	1.2	2.0	TO-202	—
PM506T	50	1.2	2.0	TO-202	—
PM509P	50	0.5	6.0	TO-220	IRF523
PM509R	50	0.5	4.0	TO-202	—
PM509T	50	0.5	4.0	TO-202	—
PM510P	50	0.36	7.0	TO-220	BUZ10/BUZ71
PM510R	50	0.36	5.0	TO-202	—
PM510T	50	0.36	5.0	TO-202	—
PM512M	50	0.2	14.0	TO-3	IRF131
PM512P	50	0.2	14.0	TO-220	BUZ10/BUZ71
PM518M	50	0.12	18.0	TO-3	VN0600A
PM518P	50	0.12	18.0	TO-220	BUZ10/BUZ71
PM601L	60	3.0	0.42	TO-92	—
PM601R	60	3.0	1.25	TO-202	VN66AF*
PM601T	60	3.0	1.25	TO-202	—
PM602L	60	1.8	0.54	TO-92	—
PM602R	60	1.8	1.6	TO-202	—
PM602T	60	1.8	1.6	TO-202	—
PM603L	60	2.0	0.52	TO-92	—
PM603R	60	2.0	1.5	TO-202	—
PM603T	60	2.0	1.5	TO-202	—
PM604P	60	0.8	4.5	TO-220	IRF513
PM604R	60	0.8	4.5	TO-202	—
PM604T	60	0.8	4.5	TO-202	—
PM605P	60	0.55	6.0	TO-220	IRF523
PM605R	60	0.55	6.0	TO-202	—
PM605T	60	0.55	6.0	TO-202	—
PM606L	60	1.2	0.67	TO-92	—
PM606R	60	1.2	2.0	TO-202	—
PM606T	60	1.2	2.0	TO-202	—
PM608M	60	0.3	12.0	TO-3	IRF121
PM608P	60	0.3	12.0	TO-220	IRF521
PM609P	60	0.5	6.0	TO-220	IRF523
PM609R	60	0.5	4.0	TO-202	—
PM609T	60	0.5	4.0	TO-202	—
PM610P	60	0.36	7.0	TO-220	IRF521
PM610R	60	0.36	5.0	TO-202	—
PM610T	60	0.36	5.0	TO-202	—
PM612M	60	0.2	14.0	TO-3	IRF131
PM612P	60	0.2	14.0	TO-220	IRF531
PM614M	60	0.18	16.0	TO-3	IRF131
PM614P	60	0.18	16.0	TO-220	IRF543
PM618M	60	0.12	18.0	TO-3	VN0600A
PM618P	60	0.12	18.0	TO-220	VN0600D
PM801L	80	3.0	0.42	TO-92	—
PM801R	80	3.0	1.25	TO-202	—
PM801T	80	3.0	1.25	TO-202	—
PM802L	80	1.8	0.54	TO-92	—
PM802R	80	1.8	1.6	TO-202	—
PM802T	80	1.8	1.6	TO-202	—
PM804P	80	0.8	4.5	TO-220	VN0801D
PM804R	80	0.8	4.5	TO-202	—
PM804T	80	0.8	4.5	TO-202	—
PM805P	80	0.55	6.0	TO-220	VN0801D

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MOSPOWER Cross Reference List (Cont'd)

GEN. INST. (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
PM805R	80	0.55	6.0	TO-202	—
PM805T	80	0.55	6.0	TO-202	—
PM808M	80	0.3	12.0	TO-3	VN0801A
PM808P	80	0.3	12.0	TO-220	VN0801D
PM814M	80	0.18	16.0	TO-3	VN0800A
PM814P	80	0.18	16.0	TO-220	VN0800D

HITACHI

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
HS8707	180	1.6	8.0	RFPAK	—
HS8709	35	3.0	1.5	SPECIAL	—
HS8711	35	1.0	5.0	SPECIAL	—
2SJ100	-160	0.5	-8.0	HPAK	—
2SJ101	-40	0.4	-5.0	TO-220	—
2SJ102	-60	0.4	-5.0	TO-220	—
2SJ112	-100	0.3	-10.0	TO-3	—
2SJ113	-100	0.3	-10.0	TO-3	—
2SJ114	-200	0.8	-8.0	TO-3	—
2SJ116	-400	2.25	-8.0	TO-3	—
2SJ117	-400	7.0	-2.0	TO-220	—
2SJ118	-140	0.5	-8.0	TO-3	—
2SJ119	-160	0.5	-8.0	TO-3	—
2SJ120	-40	1.5	-2.0	DPAK	—
2SJ121	-20	0.5	-5.0	TO-220	—
2SJ122	-60	0.2	-10.0	TO-220	—
2SJ48	-120	1.7	-7.0	TO-3	—
2SJ49	-140	1.7	-7.0	TO-3	—
2SJ50	-160	1.7	-7.0	TO-3	—
2SJ55	-180	1.7	-8.0	TO-3	—
2SJ56	-200	1.7	-8.0	TO-3	—
2SJ56H	-200	1.7	-8.0	TO-3	—
2SJ76	-140	200.0	-0.5	TO-220	—
2SJ77	-160	200.0	-0.5	TO-220	—
2SJ78	-180	200.0	-0.5	TO-220	—
2SJ79	-200	200.0	-0.5	TO-220	—
2SJ79K	-200	200.0	-0.5	TO-220	—
2SJ81	-120	1.7	-7.0	HPAK	—
2SJ82	-140	1.7	-7.0	HPAK	—
2SJ83	-160	1.7	-7.0	HPAK	—
2SJ96	-60	0.8	-8.0	HPAK	—
2SJ99	-140	0.5	-8.0	HPAK	—
2SK133	120	1.7	7.0	TO-3	IRF223
2SK134	140	1.7	7.0	TO-3	IRF223
2SK135	160	1.7	7.0	TO-3	IRF222
2SK175	180	1.7	8.0	TO-3	IRF222
2SK176	200	1.7	8.0	TO-3	IRF222
2SK176H	200	1.7	8.0	TO-3	IRF222
2SK196H	160	15.0	0.5	TO-39	VN1706B
2SK213	140	8.0	0.5	TO-220	—
2SK214	160	8.0	0.5	TO-220	VN1706D
2SK215	180	8.0	0.5	TO-220	IRF612
2SK216	200	8.0	0.5	TO-220	IRF612
2SK216K	200	8.0	0.5	TO-220	IRF612
2SK220	160	1.5	8.0	TO-3	IRF222
2SK221	200	1.5	8.0	TO-3	IRF222
2SK225	120	1.7	7.0	HPAK	—
2SK226	140	1.7	7.0	HPAK	—
2SK227	160	1.7	7.0	HPAK	—
2SK258	250	1.1	8.0	TO-3	IRF331

MOSPOWER Cross Reference List (Cont'd)

HITACHI (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
2SK259	350	3.0	5.0	TO-3	IRF323
2SK260	400	3.0	5.0	TO-3	IRF332
2SK286	60	0.8	8.0	HPAK	—
2SK287K	60	0.6	8.0	HPAK	—
2SK288K	80	0.6	8.0	HPAK	—
2SK294	80	0.56	5.0	TO-220	VN0801D
2SK295	100	0.56	5.0	TO-220	IRF522
2SK296	300	4.0	5.0	TO-220	IRF711
2SK298	400	1.75	1.0	TO-3	IRF332
2SK299	450	1.75	8.0	TO-3	IRF431
2SK308	120	0.3	10.0	TO-3	VN1201A
2SK310	400	4.0	3.0	TO-220	IRF710
2SK311	450	4.0	3.0	TO-220	IRF823
2SK312	400	0.9	12.0	TO-3	IRF342
2SK313	450	0.9	12.0	TO-3	IRF441
2SK317	180	1.5	8.0	RFPAK	—
2SK318	180	3.0	4.0	RFPAK	—
2SK319	400	1.83	5.0	TO-220	IRF720
2SK320	450	1.83	5.0	TO-220	IRF831
2SK343	140	0.5	8.0	HPAK	—
2SK344	160	0.5	8.0	HPAK	—
2SK345	40	0.4	5.0	TO-220	VN0401D
2SK346	60	0.4	5.0	TO-220	IRF523
2SK347	400	12.0	1.0	DPAK	—
2SK349	400	0.9	10.0	TO-3P	—
2SK350	450	0.9	10.0	TO-3P	—
2SK351	800	3.0	5.0	TO-3	—
2SK352	250	0.3	50.0	TO-126	—
2SK382	500	4.0	2.0	TO-220	IRF822
2SK383	100	0.18	10.0	TO-220	IRF530
2SK384	500	0.3	50.0	DPAK	—
2SK398	100	0.25	10.0	TO-3	IRF132
2SK399	100	0.25	10.0	TO-3P	—
2SK400	200	0.7	8.0	TO-3P	—
2SK401	250	0.4	10.0	TO-3	IRF353
2SK402	400	1.75	8.0	TO-3P	—
2SK403	450	1.75	8.0	TO-3P	—
2SK408	180	9.0	2.0	TO-220	IRF612
2SK409	180	9.0	2.0	TO-220	IRF612
2SK410	180	1.5	8.0	RFPAK	—
2SK411	600	3.0	5.0	TO-3	VNS009A
2SK412	250	0.4	10.0	TO-3P	—
2SK413	140	0.5	8.0	TO-3P	—
2SK414	160	0.5	8.0	TO-3P	—
2SK415	800	6.0	3.0	TO-3P	—
2SK416	40	0.8	2.0	DPAK	—
2SK428	60	0.15	10.0	TO-220	VN0601D
2SK429	100	0.7	3.0	DPAK	—
2SK430	150	1.0	3.0	DPAK	—
2SK440	200	0.5	6.0	TO-220	IRF630
2SK441	500	50.0	0.3	TO-39	IRFF422

INTERSIL

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
IVN5000AND	40	2.5	0.7	TO-237	VN0606M*
IVN5000ANE	60	2.5	0.7	TO-237	VN0606M*
IVN5000ANF	80	2.5	0.7	TO-237	VN0808M*
IVN5000ANH	100	2.5	0.7	TO-237	VN1206M*
IVN5000SND	40	2.5	0.9	TO-52	—

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MOSPOWER Cross Reference List (Cont'd)

INTERSIL (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
IVN5000SNE	60	2.5	0.9	TO-52	—
IVN5000SNF	80	2.5	0.9	TO-52	—
IVN5000SNH	100	2.5	0.9	TO-52	—
IVN5000TND	40	2.5	1.2	TO-39	IRFF113
IVN5000TNE	60	2.5	1.2	TO-39	IRFF113
IVN5000TNF	80	2.5	1.2	TO-39	VND011B
IVN5000TNH	100	2.5	1.2	TO-39	VNE010B
IVN5001AND	40	2.5	2.0	TO-237	VN0606M*
IVN5001ANE	60	2.5	2.0	TO-237	VN0606M*
IVN5001ANF	80	2.5	2.0	TO-237	VN0808M*
IVN5001ANH	100	2.5	2.0	TO-237	VN1206M*
IVN5001SND	40	2.5	3.0	TO-52	—
IVN5001SNE	60	2.5	3.0	TO-52	—
IVN5001SNF	80	2.5	3.0	TO-52	—
IVN5001SNH	100	2.5	3.0	TO-52	—
IVN5001TND	40	2.5	3.0	TO-39	IRFF113
IVN5001TNE	60	2.5	3.0	TO-39	IRFF113
IVN5001TNF	80	2.5	3.0	TO-39	VND010B
IVN5001TNH	100	2.5	3.0	TO-39	VNE010B
IVN5200HND	40	0.5	5.0	TO-220	VN0401D
IVN5200HNE	60	0.5	5.0	TO-220	VN0601D
IVN5200HNF	80	0.5	5.0	TO-220	VN0801D
IVN5200HNH	100	0.5	5.0	TO-220	VN1001D
IVN5200KND	40	0.5	5.0	TO-220	VN0401D
IVN5200KNE	60	0.5	5.0	TO-220	VN0801D
IVN5200KNF	80	0.5	5.0	TO-220	VN1001D
IVN5200KNH	100	0.5	5.0	TO-220	VN0601D
IVN5200TND	40	0.5	4.0	TO-39	VNC010B
IVN5200TNE	60	0.5	4.0	TO-39	VNC010B
IVN5200TNH	100	0.5	4.0	TO-39	VNE011B
IVN5201CND	40	0.5	5.0	TO-220	VN0400D
IVN5201CNE	60	0.5	5.0	TO-220	IRF523
IVN5201CNF	80	0.5	5.0	TO-220	VN0801D
IVN5201CNH	100	0.5	5.0	TO-220	IRF522
IVN5201HND	40	0.5	5.0	TO-66	VN0601A*
IVN5201HNE	60	0.5	5.0	TO-66	VN0601A*
IVN5201HNF	80	0.5	5.0	TO-66	VN0801A*
IVN5201HNH	100	0.5	5.0	TO-66	VN1001A*
IVN5201KND	40	0.5	5.0	TO-3	VN0401A
IVN5201KNE	60	0.5	5.0	TO-3	IRF123
IVN5201KNF	80	0.5	5.0	TO-3	VN0801A
IVN5201KNH	100	0.5	5.0	TO-3	IRF122
IVN5201TND	40	0.5	4.0	TO-39	VNC011B
IVN5201TNE	60	0.5	4.0	TO-39	VNC011B
IVN5201TNF	80	0.5	4.0	TO-39	VND010B
IVN5201TNH	100	0.5	4.0	TO-39	VNE010B
IVN6000CNE	60	0.5	5.0	TO-220	IRF523
IVN6000CNF	80	0.5	5.0	TO-220	VN1001D
IVN6000CNH	100	1.5	4.5	TO-220	IRF512
IVN6000CNR	395	5.0	1.75	TO-220	IRF710
IVN6000CNS	400	3.5	2.0	TO-220	IRF722
IVN6000CNT	450	3.5	2.0	TO-220	IRF821
IVN6000CNU	500	4.0	1.75	TO-220	IRF822
IVN6000KNE	60	0.5	6.0	TO-3	IRF123
IVN6000KNF	80	0.5	6.0	TO-3	VN0801A
IVN6000KNH	100	0.5	5.0	TO-3	IRF122
IVN6000KNR	395	5.0	2.0	TO-3	IRF322
IVN6000KNS	400	3.0	2.5	TO-3	IRF322
IVN6000KNT	450	3.0	2.5	TO-3	IRF421
IVN6000KNU	500	4.0	2.0	TO-3	IRF422

MOSPOWER Cross Reference List (Cont'd)

INTERSIL (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
IVN6000TNE	60	1.5	3.0	TO-39	IRFF113
IVN6000TNF	80	1.5	3.0	TO-39	VND010B
IVN6000TNH	100	1.5	3.0	TO-39	IRFF112
IVN6000TNR	395	4.0	1.0	TO-39	IRFF310
IVN6000TNS	400	3.5	1.0	TO-39	IRFF322
IVN6000TNT	450	3.5	1.0	TO-39	IRFF431
IVN6000TNU	500	4.0	0.9	TO-39	IRFF422
IVN6001CNE	60	0.5	5.0	TO-220	IRF523
IVN6001CNF	80	0.5	5.0	TO-220	VN0801D
IVN6001CNH	100	1.5	4.5	TO-220	VN1201D
IVN6001KNE	60	0.5	6.0	TO-3	IRF123
IVN6001KNF	80	0.5	6.0	TO-3	VN0801A
IVN6001KNH	100	0.5	5.0	TO-3	IRF122
IVN6001TNE	60	0.5	3.0	TO-39	VNC011B
IVN6001TNF	80	0.5	3.0	TO-39	VND010B
IVN6001TNH	100	0.5	3.0	TO-39	VNE010B
IVN6002CND	40	0.5	4.5	TO-220	VN40AD
IVN6002KND	40	0.5	5.0	TO-3	VN0401A
IVN6002TND	40	1.5	3.0	TO-39	IRFF113
IVN6100TNS	400	15.0	0.3	TO-39	IRFF312
IVN6100TNT	450	15.0	0.3	TO-39	IRFF423
IVN6100TNU	500	15.0	0.3	TO-39	IRFF422
IVN6200ANE	60	0.2	10.0	TO-220	IRF531
IVN6200ANF	80	0.2	10.0	TO-220	VN0800D
IVN6200ANH	100	0.2	10.0	TO-220	BUZ20
IVN6200ANM	200	0.5	10.0	TO-220	BUZ32
IVN6200ANP	250	0.5	10.0	TO-220	IRF741
IVN6200ANS	400	1.5	5.0	TO-220	IRF732
IVN6200ANT	450	1.5	5.0	TO-220	IRF831
IVN6200ANU	500	1.5	5.0	TO-220	IRF830
IVN6200ANW	700	5.0	3.0	TO-220	—
IVN6200ANX	800	6.0	2.5	TO-220	—
IVN6200CND	40	0.35	10.0	TO-220	VN0401D
IVN6200CNE	60	0.25	10.0	TO-220	VN0601D
IVN6200CNF	80	0.25	10.0	TO-220	VN0800D
IVN6200CNH	100	0.25	10.0	TO-220	BUZ20
IVN6200CNM	200	0.5	8.0	TO-220	IRF630
IVN6200CNP	250	0.5	8.0	TO-220	IRF721
IVN6200CNR	395	2.5	4.0	TO-220	IRF740*
IVN6200CNS	400	1.5	5.0	TO-220	VN4001D
IVN6200CNT	450	1.5	5.0	TO-220	VN4501D
IVN6200CNU	500	2.0	4.0	TO-220	VN5001D
IVN6200CNW	700	5.0	3.0	TO-220	—
IVN6200CNX	800	6.0	2.0	TO-220	—
IVN6200KNE	60	0.25	10.0	TO-3	IRF131
IVN6200KNF	80	0.25	10.0	TO-3	VN0800A
IVN6200KNH	100	0.25	10.0	TO-3	IRF130
IVN6200KNM	200	0.5	10.0	TO-3	IRF230
IVN6200KNP	250	0.5	10.0	TO-3	IRF353
IVN6200KNR	395	2.5	5.0	TO-3	IRF320
IVN6200KNS	400	1.5	5.0	TO-3	IRF332
IVN6200KNT	450	1.5	5.0	TO-3	IRF431
IVN6200KNU	500	2.0	5.0	TO-3	IRF430
IVN6200KNW	700	5.0	3.0	TO-3	—
IVN6200KNX	800	6.0	2.5	TO-3	—
IVN6300ANE	60	7.5	0.25	TO-237	VN67AA
IVN6300ANF	80	7.5	0.25	TO-237	VN90AA
IVN6300ANH	100	7.5	0.25	TO-237	VN1001A
IVN6300ANM	200	25.0	0.12	TO-237	—
IVN6300ANP	250	25.0	0.12	TO-237	—
IVN6300ANS	400	75.0	0.1	TO-237	—
IVN6300ANT	450	75.0	0.1	TO-237	—
IVN6300ANU	500	75.0	3.0	TO-237	—

MOSPOWER Cross Reference List (Cont'd)

INTERSIL (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
IVN6300SNE	60	7.5	0.25	TO-52	—
IVN6300SNF	80	7.5	0.25	TO-52	—
IVN6300SNH	100	7.5	0.25	TO-52	—
IVN6300SNM	200	25.0	0.12	TO-52	—
IVN6300SNP	250	25.0	0.12	TO-52	—
IVN6300SNS	400	75.0	0.1	TO-52	—
IVN6300SNT	450	75.0	0.1	TO-52	—
IVN6300SNU	500	75.0	0.1	TO-52	—
IVN6660	60	3.0	1.2	TO-39	2N6660
IVN6661	90	4.0	1.2	TO-39	2N661

INT. RECT.

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
IRFF110	100	0.6	3.5	TO-39	IRFF110
IRFF111	60	0.6	3.5	TO-39	IRFF111
IRFF112	100	0.8	3.0	TO-39	IRFF112
IRFF113	60	0.8	3.0	TO-39	IRFF113
IRFF120	100	0.3	6.0	TO-39	IRFF120
IRFF121	60	0.3	6.0	TO-39	IRFF121
IRFF122	100	0.4	5.0	TO-39	IRFF122
IRFF123	60	0.4	5.0	TO-39	IRFF123
IRFF130	100	0.18	8.0	TO-39	IRFF130
IRFF131	60	0.18	8.0	TO-39	IRFF131
IRFF132	100	0.25	7.0	TO-39	IRFF132
IRFF210	200	1.5	2.2	TO-39	IRFF210
IRFF211	150	1.5	2.2	TO-39	IRFF211
IRFF212	200	2.4	1.8	TO-39	IRFF212
IRFF213	150	2.4	1.8	TO-39	IRFF213
IRFF220	200	0.8	3.5	TO-39	IRFF220
IRFF221	150	0.8	3.5	TO-39	IRFF221
IRFF222	200	1.2	2.8	TO-39	IRFF222
IRFF223	150	1.2	2.8	TO-39	IRFF223
IRFF230	200	0.4	5.5	TO-39	IRFF230
IRFF231	150	0.4	5.5	TO-39	IRFF231
IRFF232	200	0.6	4.5	TO-39	IRFF232
IRFF233	150	0.6	4.5	TO-39	IRFF233
IRFF310	400	1.35	3.6	TO-39	IRFF310
IRFF311	350	1.35	3.6	TO-39	IRFF311
IRFF312	400	5.0	1.15	TO-39	IRFF312
IRFF313	350	5.0	1.15	TO-39	IRFF313
IRFF320	400	1.8	2.5	TO-39	IRFF320
IRFF321	350	1.8	2.5	TO-39	IRFF321
IRFF322	400	2.5	2.0	TO-39	IRFF322
IRFF323	350	2.5	2.0	TO-39	IRFF323
IRFF330	400	1.0	3.5	TO-39	IRFF330
IRFF331	350	1.0	3.5	TO-39	IRFF331
IRFF332	400	1.5	3.0	TO-39	IRFF332
IRFF333	350	1.5	3.0	TO-39	IRFF333
IRFF420	500	3.0	1.6	TO-39	IRFF420
IRFF421	450	3.0	1.6	TO-39	IRFF421
IRFF422	500	4.0	1.4	TO-39	IRFF422
IRFF423	450	4.0	1.4	TO-39	IRFF423
IRFF430	500	0.85	8.0	TO-39	IRFF430
IRFF431	450	0.85	8.0	TO-39	IRFF431
IRFF432	500	1.1	7.0	TO-39	IRFF432
IRFF433	450	1.1	7.0	TO-39	IRFF433
IRF120	100	0.3	8.0	TO-3	IRF120
IRF121	60	0.3	8.0	TO-3	IRF121

MOSPOWER Cross Reference List (Cont'd)

INT. RECT. (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
IRF122	100	0.4	7.0	TO-3	IRF122
IRF123	60	0.4	7.0	TO-3	IRF123
IRF130	100	0.18	14.0	TO-3	IRF130
IRF131	60	0.18	14.0	TO-3	IRF131
IRF132	100	0.25	12.0	TO-3	IRF132
IRF133	60	0.25	12.0	TO-3	IRF133
IRF140	100	0.085	27.0	TO-3	IRF140
IRF141	60	0.085	27.0	TO-3	IRF141
IRF142	100	0.11	24.0	TO-3	IRF142
IRF143	60	0.11	24.0	TO-3	IRF143
IRF150	100	0.055	40.0	TO-3	IRF150
IRF151	60	0.055	40.0	TO-3	IRF151
IRF152	100	0.08	33.0	TO-3	IRF152
IRF153	60	0.08	33.0	TO-3	IRF153
IRF220	200	0.8	5.0	TO-3	IRF220
IRF221	150	0.8	5.0	TO-3	IRF221
IRF222	200	1.2	4.0	TO-3	IRF222
IRF223	150	1.2	4.0	TO-3	IRF223
IRF230	200	0.4	9.0	TO-3	IRF230
IRF231	150	0.4	9.0	TO-3	IRF231
IRF232	200	0.6	8.0	TO-3	IRF232
IRF233	150	0.6	8.0	TO-3	IRF233
IRF240	200	0.18	18.0	TO-3	IRF240
IRF241	150	0.18	18.0	TO-3	IRF241
IRF242	200	0.22	16.0	TO-3	IRF242
IRF243	150	0.22	16.0	TO-3	IRF243
IRF250	200	0.085	30.0	TO-3	IRF250
IRF251	150	0.085	30.0	TO-3	IRF251
IRF252	200	0.12	25.0	TO-3	IRF252
IRF253	150	0.12	25.0	TO-3	IRF253
IRF320	400	1.8	3.0	TO-3	IRF320
IRF321	350	1.8	3.0	TO-3	IRF321
IRF322	400	2.5	2.5	TO-3	IRF322
IRF323	350	2.5	2.5	TO-3	IRF323
IRF330	400	1.0	5.5	TO-3	IRF330
IRF331	350	1.0	5.5	TO-3	IRF331
IRF332	400	1.5	4.5	TO-3	IRF332
IRF333	350	1.5	4.5	TO-3	IRF333
IRF340	400	0.55	10.0	TO-3	IRF340
IRF341	350	0.55	10.0	TO-3	IRF341
IRF342	400	0.8	8.0	TO-3	IRF342
IRF343	350	0.8	8.0	TO-3	IRF343
IRF350	400	0.3	15.0	TO-3	IRF350
IRF351	350	0.3	15.0	TO-3	IRF351
IRF352	400	0.4	13.0	TO-3	IRF352
IRF353	350	0.4	13.0	TO-3	IRF353
IRF420	500	3.0	2.5	TO-3	IRF420
IRF421	450	3.0	2.5	TO-3	IRF421
IRF422	500	4.0	2.0	TO-3	IRF422
IRF423	450	4.0	2.0	TO-3	IRF423
IRF430	500	1.5	4.5	TO-3	IRF430
IRF431	450	1.5	4.5	TO-3	IRF431
IRF432	500	2.0	4.0	TO-3	IRF432
IRF433	450	2.0	4.0	TO-3	IRF433
IRF440	500	0.85	8.0	TO-3	IRF440
IRF441	450	0.85	8.0	TO-3	IRF441
IRF442	500	1.1	7.0	TO-3	IRF442
IRF443	450	1.1	7.0	TO-3	IRF443
IRF450	500	0.4	13.0	TO-3	IRF450
IRF451	450	0.4	13.0	TO-3	IRF451
IRF452	500	0.5	12.0	TO-3	IRF452

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MOSPOWER Cross Reference List (Cont'd)

INT. RECT. (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
IRF453	450	0.5	12.0	TO-3	IRF453
IRF510	100	0.6	4.0	TO-220	IRF510
IRF511	60	0.6	4.0	TO-220	IRF511
IRF512	100	0.8	3.5	TO-220	IRF512
IRF513	60	0.8	3.5	TO-220	IRF513
IRF520	100	0.3	8.0	TO-220	IRF520
IRF521	60	0.3	8.0	TO-220	IRF521
IRF522	100	0.4	7.0	TO-220	IRF522
IRF523	60	0.4	7.0	TO-220	IRF523
IRF530	100	0.18	14.0	TO-220	IRF530
IRF531	60	0.18	14.0	TO-220	IRF531
IRF532	100	0.25	12.0	TO-220	IRF532
IRF533	60	0.25	12.0	TO-220	IRF533
IRF540	100	0.085	27.0	TO-220	IRF540
IRF541	60	0.085	27.0	TO-220	IRF541
IRF542	100	0.11	24.0	TO-220	IRF542
IRF543	60	0.11	24.0	TO-220	IRF543
IRF610	200	1.5	2.5	TO-220	IRF610
IRF611	150	1.5	2.5	TO-220	IRF611
IRF612	200	2.4	2.0	TO-220	IRF612
IRF613	150	2.4	2.0	TO-220	IRF613
IRF620	200	0.8	5.0	TO-220	IRF620
IRF621	150	0.8	5.0	TO-220	IRF621
IRF622	200	1.2	4.0	TO-220	IRF622
IRF623	150	1.2	4.0	TO-220	IRF623
IRF630	200	0.4	9.0	TO-220	IRF630
IRF631	150	0.4	9.0	TO-220	IRF631
IRF632	200	0.6	8.0	TO-220	IRF632
IRF633	150	0.6	8.0	TO-220	IRF633
IRF640	200	0.18	18.0	TO-220	IRF640
IRF641	150	0.18	18.0	TO-220	IRF641
IRF642	200	0.22	16.0	TO-220	IRF642
IRF643	150	0.22	16.0	TO-220	IRF643
IRF710	400	3.6	1.5	TO-220	IRF710
IRF711	350	3.6	1.5	TO-220	IRF711
IRF712	400	5.0	1.3	TO-220	IRF712
IRF713	350	5.0	1.3	TO-220	IRF713
IRF720	400	1.8	3.0	TO-220	IRF720
IRF721	350	1.8	3.0	TO-220	IRF721
IRF722	400	2.5	2.5	TO-220	IRF722
IRF723	350	2.5	2.5	TO-220	IRF723
IRF730	400	1.0	5.5	TO-220	IRF730
IRF731	350	1.0	5.5	TO-220	IRF731
IRF732	400	1.5	4.5	TO-220	IRF732
IRF733	350	1.5	4.5	TO-220	IRF733
IRF740	400	0.55	10.0	TO-220	IRF740
IRF741	350	0.55	10.0	TO-220	IRF741
IRF742	400	0.8	8.0	TO-220	IRF742
IRF743	350	0.8	8.0	TO-220	IRF743
IRF820	500	3.0	2.5	TO-220	IRF820
IRF821	450	3.0	2.5	TO-220	IRF821
IRF822	500	4.0	2.0	TO-220	IRF822
IRF823	450	4.0	2.0	TO-220	IRF823
IRF830	500	1.5	4.5	TO-220	IRF830
IRF831	450	1.5	4.5	TO-220	IRF831
IRF832	500	2.0	4.0	TO-220	IRF832
IRF833	450	2.0	4.0	TO-220	IRF833
IRF840	500	0.85	8.0	TO-220	IRF840
IRF841	450	0.85	8.0	TO-220	IRF841
IRF842	500	1.1	7.0	TO-220	IRF842
IRF843	450	1.1	7.0	TO-220	IRF843

MOSPOWER Cross Reference List (Cont'd)

MOTOROLA

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
BUZ10	50	0.1	12.0	TO-220	BUZ10
IRF120	100	0.3	8.0	TO-204	IRF120
IRF121	60	0.3	8.0	TO-204	IRF121
IRF122	100	0.4	7.0	TO-204	IRF122
IRF123	60	0.4	7.0	TO-204	IRF123
IRF130	100	0.18	14.0	TO-204	IRF130
IRF131	60	0.18	14.0	TO-204	IRF131
IRF132	100	0.25	12.0	TO-204	IRF132
IRF133	60	0.25	12.0	TO-204	IRF133
IRF140	100	0.085	27.0	TO-204	IRF140
IRF141	60	0.85	27.0	TO-204	IRF141
IRF142	100	0.11	24.0	TO-204	IRF142
IRF143	60	0.11	24.0	TO-204	IRF143
IRF150	100	0.055	40.0	TO-204	IRF150
IRF151	60	0.055	40.0	TO-204	IRF151
IRF152	100	0.08	33.0	TO-204	IRF152
IRF153	60	0.08	33.0	TO-204	IRF153
IRF220	200	0.8	5.0	TO-204	IRF220
IRF221	150	0.8	5.0	TO-204	IRF221
IRF222	200	1.2	4.0	TO-204	IRF222
IRF223	150	1.2	4.0	TO-204	IRF223
IRF230	200	0.4	9.0	TO-204	IRF230
IRF231	150	0.4	9.0	TO-204	IRF231
IRF232	200	0.6	8.0	TO-204	IRF232
IRF233	150	0.6	8.0	TO-204	IRF233
IRF240	200	0.18	18.0	TO-204	IRF240
IRF241	150	0.18	18.0	TO-204	IRF241
IRF242	200	0.22	16.0	TO-204	IRF242
IRF243	150	0.22	16.0	TO-204	IRF243
IRF250	200	0.085	30.0	TO-204	IRF250
IRF251	150	0.085	30.0	TO-204	IRF251
IRF252	200	0.12	25.0	TO-204	IRF252
IRF253	150	0.12	25.0	TO-204	IRF253
IRF330	400	1.0	5.5	TO-204	IRF330
IRF331	350	1.0	5.5	TO-204	IRF331
IRF332	400	1.5	4.5	TO-204	IRF332
IRF333	350	1.5	4.5	TO-204	IRF333
IRF430	500	1.5	4.5	TO-204	IRF430
IRF431	450	1.5	4.5	TO-204	IRF431
IRF432	500	2.0	4.0	TO-204	IRF432
IRF433	450	2.0	4.0	TO-204	IRF433
IRF510	100	0.6	4.0	TO-220	IRF510
IRF511	60	0.6	4.0	TO-220	IRF511
IRF512	100	0.8	3.5	TO-220	IRF512
IRF513	60	0.8	3.5	TO-220	IRF513
IRF520	100	0.3	8.0	TO-220	IRF520
IRF521	60	0.3	8.0	TO-220	IRF521
IRF522	100	0.4	7.0	TO-220	IRF522
IRF523	60	0.4	7.0	TO-220	IRF523
IRF530	100	0.18	14.0	TO-220	IRF530
IRF531	60	0.18	14.0	TO-220	IRF531
IRF532	100	0.25	12.0	TO-220	IRF532
IRF533	60	0.25	12.0	TO-220	IRF533
IRF540	100	0.085	27.0	TO-220	IRF540
IRF541	60	0.085	27.0	TO-220	IRF541
IRF542	100	0.11	24.0	TO-220	IRF542
IRF543	60	0.11	24.0	TO-220	IRF543
IRF610	200	1.5	2.5	TO-220	IRF610
IRF611	150	1.5	2.5	TO-220	IRF611
IRF612	200	2.4	2.0	TO-220	IRF612
IRF613	150	2.4	2.0	TO-220	IRF613
IRF620	200	0.8	5.0	TO-220	IRF620
IRF621	150	0.8	4.0	TO-220	IRF621
IRF622	200	1.2	4.0	TO-220	IRF622

MOSPOWER Cross Reference List (Cont'd)

MOTOROLA (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
IRF623	150	1.2	4.0	TO-220	IRF623
IRF630	200	0.4	9.0	TO-220	IRF630
IRF631	150	0.4	9.0	TO-220	IRF631
IRF632	200	0.6	8.0	TO-220	IRF632
IRF633	150	0.6	8.0	TO-220	IRF633
IRF640	200	0.18	18.0	TO-220	IRF640
IRF641	150	0.18	18.0	TO-220	IRF641
IRF642	200	0.22	16.0	TO-220	IRF642
IRF643	150	0.22	16.0	TO-220	IRF643
IRF730	400	1.0	5.5	TO-220	IRF730
IRF731	350	1.0	5.5	TO-220	IRF731
IRF732	400	1.5	4.5	TO-220	IRF732
IRF733	350	1.5	4.5	TO-220	IRF733
IRF830	500	1.5	4.5	TO-220	IRF830
IRF831	450	1.5	4.5	TO-220	IRF831
IRF832	500	2.0	4.0	TO-220	IRF832
IRF833	450	2.0	4.0	TO-220	IRF833
MTA4N18	180	1.2	4.0	TO-225	—
MTA4N20	200	1.2	4.0	TO-225	—
MTA5N12	120	1.2	5.0	TO-225	—
MTA5N15	150	0.9	5.0	TO-225	—
MTA6N08	80	0.6	6.0	TO-225	—
MTAT6N10	100	0.6	6.0	TO-225	—
MTAT7N05	50	0.4	7.0	TO-225	—
MTAT7N06	60	0.4	7.0	TO-225	—
MTH15N18	180	0.16	15.0	TO-218	IRF640*
MTH15N20	200	0.16	15.0	TO-218	IRF640*
MTH20N12	120	0.12	20.0	TO-218	IRF641*
MTH20N15	150	0.12	20.0	TO-218	IRF641*
MTH25N08	80	0.07	25.0	TO-218	VN0800D*
MTH25N10	100	0.07	25.0	TO-218	—
MTH35N05	50	0.055	35.0	TO-218	—
MTH35N06	60	0.055	35.0	TO-218	—
MTH6N55	550	1.2	6.0	TO-218	—
MTH6N60	600	1.2	6.0	TO-218	—
MTH7N45	450	0.8	7.0	TO-218	—
MTH7N50	500	0.8	7.0	TO-218	—
MTH8N35	350	0.55	8.0	TO-218	—
MTH8N40	400	0.55	8.0	TO-218	—
MTM1N100	1000	10.0	1.0	TO-204	—
MTM1N95	950	10.0	1.0	TO-204	—
MTM10N05	50	0.28	10.0	TO-204	BUZ23
MTM10N06	60	0.28	10.0	TO-204	BUZ23
MTM10N08	80	0.33	10.0	TO-204	BUZ24
MTM10N10	100	0.33	10.0	TO-204	BUZ23
MTM10N12	120	0.3	10.0	TO-204	BUZ36
MTM10N15	150	0.3	10.0	TO-204	BUZ36
MTM10N25	250	0.5	10.0	TO-204	BUZ45
MTM12N05	60	0.2	12.0	TO-204	BUZ23
MTM12N06	50	0.2	12.0	TO-204	BUZ23
MTM12N08	80	0.18	12.0	TO-204	BUZ24
MTM12N10	100	0.18	12.0	TO-204	BUZ24
MTM12N18	180	0.35	12.0	TO-204	BUZ36
MTM12N20	200	0.35	12.0	TO-204	BUZ36
MTM15N05	50	0.16	15.0	TO-204	BUZ24
MTM15N06	60	0.16	15.0	TO-204	BUZ24
MTM15N12	120	0.25	15.0	TO-204	BUZ36
MTM15N15	150	0.25	15.0	TO-204	BUZ36
MTM15N18	180	0.16	15.0	TO-204	BUZ36
MTM15N20	200	0.16	15.0	TO-204	BUZ36

MOSPOWER Cross Reference List (Cont'd)

MOTOROLA (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
MTM15N35	350	0.3	15.0	TO-204	IRF350
MTM15N40	400	0.3	15.0	TO-204	VNM005A
MTM15N45	450	0.4	15.0	TO-204	IRF451
MTM15N50	500	0.4	15.0	TO-204	VNP006A
MTM2N45	450	4.0	2.0	TO-204	BUZ46
MTM2N50	500	4.0	2.0	TO-204	BUZ46
MTM2N85	850	8.0	2.0	TO-204	—
MTM2N90	900	8.0	2.0	TO-204	—
MTM2P45	-450	6.0	-2.0	TO-204	VN4502A
MTM2P50	-500	6.0	-2.0	TO-204	VN5002A
MTM20N08	80	0.15	20.0	TO-204	BUZ24
MTM20N10	100	0.15	20.0	TO-204	BUZ24
MTM20N12	120	0.12	20.0	TO-204	IRF223
MTM20N15	150	0.12	20.0	TO-204	BUZ36
MTM25N05	50	0.08	25.0	TO-204	BUZ24
MTM25N06	60	0.08	25.0	TO-204	BUZ24
MTM25N08	80	0.07	25.0	TO-204	IRF150
MTM25N10	100	0.07	25.0	TO-204	BUZ24
MTM3N35	350	3.3	3.0	TO-204	BUZ63
MTM3N40	400	3.3	3.0	TO-204	BUZ63
MTM3N55	550	2.5	3.0	TO-204	VNS009A
MTM3N60	600	2.5	3.0	TO-204	VNS009A
MTM35N05	50	0.055	35.0	TO-204	IRF151
MTM35N06	60	0.055	35.0	TO-204	IRF151
MTM4N45	450	1.5	4.0	TO-204	BUZ45
MTM4N50	500	1.5	4.0	TO-204	BUZ45
MTM40N18	180	0.08	40.0	TO-204	IRF252*
MTM40N20	200	0.08	40.0	TO-204	IRF250*
MTM45N12	120	0.06	45.0	TO-204	VNG004A
MTM45N15	150	0.06	45.0	TO-204	VNG004A
MTM5N18	180	1.0	5.0	TO-204	BUZ35
MTM5N20	200	1.0	5.0	TO-204	BUZ35
MTM5N35	350	1.0	5.0	TO-204	BUZ63
MTM5N40	400	1.0	5.0	TO-204	BUZ63
MTM55N08	80	0.04	55.0	TO-204	VNE003A
MTM55N10	100	0.04	55.0	TO-204	VNE003A
MTM6N55	550	1.2	6.0	TO-204	VNS012A
MTM6N60	600	1.2	6.0	TO-204	VNS012A
MTM60N06	50	0.028	60.0	TO-204	VNC0003A*
MTM7N12	120	0.7	7.0	TO-204	BUZ35
MTM7N15	150	0.7	7.0	TO-204	BUZ35
MTM7N18	180	0.7	7.0	TO-204	BUZ35
MTM7N20	200	0.7	7.0	TO-204	BUZ35
MTM7N45	450	0.8	7.0	TO-204	BUZ45
MTM7N50	500	0.8	7.0	TO-204	BUZ45
MTM8N08	80	0.5	8.0	TO-204	BUZ23
MTM8N10	100	0.5	8.0	TO-204	BUZ23
MTM8N12	120	0.5	8.0	TO-204	BUZ36
MTM8N15	150	0.5	8.0	TO-204	BUZ36
MTM8N18	180	0.4	8.0	TO-204	BUZ35
MTM8N20	200	0.4	8.0	TO-204	BUZ35
MTM8N35	350	0.55	8.0	TO-204	BUZ64
MTM8N40	400	0.55	8.0	TO-204	BUZ64
MTM8P08	-80	0.4	-8.0	TO-204	—
MTM8P10	-100	0.4	-8.0	TO-204	—
MTP1N100	1000	10.0	1.0	TO-220	—
MTP1N45	450	8.0	1.0	TO-220	IRF823
MTP1N50	500	8.0	1.0	TO-220	IRF822
MTP1N55	550	12.0	1.0	TO-220	VNS009D
MTP1N60	600	12.0	1.0	TO-220	VNS009D

MOSPOWER Cross Reference List (Cont'd)

MOTOROLA (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
MTP1N95	950	10.0	1.0	TO-220	—
MTP10N05	50	0.28	10.0	TO-220	IRF533
MTP10N06	60	0.28	10.0	TO-220	IRF532
MTP10N08	80	0.33	10.0	TO-220	VN0801D
MTP10N10	100	0.33	10.0	TO-220	IRF520
MTP10N12	120	0.3	10.0	TO-220	VN1201D
MTP10N15	150	0.3	10.0	TO-220	IRF643
MTP10N25	250	0.5	10.0	TO-220	IRF740*
MTP12N05	50	0.2	12.0	TO-220	BUZ71
MTP12N06	60	0.2	12.0	TO-220	IRF531
MTP12N08	80	0.18	12.0	TO-220	VN0800D
MTP12N10	100	0.18	12.0	TO-220	VN1000D
MTP12N18	180	0.35	12.0	TO-220	IRF642
MTP12N20	200	0.35	12.0	TO-220	IRF642
MTP15N05	50	0.16	15.0	TO-220	BUZ71
MTP15N06	60	0.16	15.0	TO-220	VN0601D
MTP15N12	120	0.25	15.0	TO-220	VN1201D
MTP15N15	150	0.25	15.0	TO-220	IRF643
MTP2N18	180	1.8	2.0	TO-220	IRF610
MTP2N20	200	1.8	2.0	TO-220	IRF610
MTP2N25	250	2.0	2.0	TO-220	VN3501D
MTP2N35	350	5.0	2.0	TO-220	IRF713
MTP2N40	400	5.0	2.0	TO-220	IRF740*
MTP2N45	450	4.0	2.0	TO-220	IRF823
MTP2N50	500	4.0	2.0	TO-220	IRF822
MTP2N85	850	8.0	2.0	TO-220	—
MTP2N90	900	8.0	2.0	TO-220	—
MTP2P45	450	6.0	-2.0	TO-220	—
MTP2P50	500	6.0	-2.0	TO-220	—
MTP20N08	80	0.15	20.0	TO-220	VN1000D
MTP20N10	100	0.15	20.0	TO-220	IRF542
MTP25N05	50	0.08	25.0	TO-220	IRF541*
MTP25N06	60	0.08	25.0	TO-220	IRF541*
MTP3N12	120	1.3	3.0	TO-220	IRF623
MTP3N15	150	1.3	3.0	TO-220	IRF623
MTP3N35	350	3.3	3.0	TO-220	IRF723
MTP3N40	400	3.3	3.0	TO-220	IRF723
MTP3N55	550	2.5	3.0	TO-220	VNS009D
MTP3N60	600	2.5	3.0	TO-220	VNS009D
MTP4N08	80	0.8	4.0	TO-220	IRF512
MTP4N10	100	0.8	4.0	TO-220	IRF512
MTP4N45	450	1.5	4.0	TO-220	IRF831
MTP4N50	500	1.5	4.0	TO-220	IRF830
MTP5N05	50	0.8	5.0	TO-220	IRF513
MTP5N06	60	0.6	5.0	TO-220	IRF511
MTP5N18	180	1.0	5.0	TO-220	IRF632
MTP5N20	200	1.0	5.0	TO-220	IRF620
MTP5N35	350	1.0	5.0	TO-220	IRF731
MTP5N40	400	1.0	5.0	TO-220	IRF730
MTP7N12	120	0.7	7.0	TO-220	VN1201D
MTP7N15	150	0.7	7.0	TO-220	IRF633
MTP7N18	180	0.7	7.0	TO-220	IRF632
MTP7N20	200	0.7	7.0	TO-220	IRF632
MTP8N08	80	0.5	8.0	TO-220	IRF522
MTP8N10	100	0.5	8.0	TO-220	IRF522
MTP8N12	120	0.5	8.0	TO-220	VN1201D
MTP8N15	150	0.5	8.0	TO-220	IRF631
MTP8N18	180	0.4	8.0	TO-220	BUZ32
MTP8N20	200	0.4	8.0	TO-220	BUZ32
MTP8P08	-80	0.4	-8.0	TO-220	—

MOSPOWER Cross Reference List (Cont'd)

MOTOROLA (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
MTP8P10	-100	0.4	-8.0	TO-220	—
2N6755	60	0.25	12.0	TO-220	2N6755
2N6756	100	0.18	14.0	TO-220	2N6756
2N6757	150	0.6	8.0	TO-220	2N6757
2N6758	200	0.4	9.0	TO-220	2N6758
2N6759	350	1.5	4.5	TO-220	2N6759
2N6760	400	1.0	5.5	TO-220	2N6760
2N6761	450	2.0	4.0	TO-220	2N6761
2N6762	500	1.5	4.5	TO-220	2N6762

RCA

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
IRF130	100	0.18	14.0	TO-3	IRF130
IRF131	60	0.18	14.0	TO-3	IRF131
IRF132	100	0.25	12.0	TO-3	IRF132
IRF133	60	0.25	12.0	TO-3	IRF133
IRF251	150	0.085	30.0	TO-3	IRF251
IRF252	150	0.12	25.0	TO-3	IRF252
IRF420	500	3.0	2.5	TO-3	IRF420
IRF421	400	3.0	2.5	TO-3	IRF421
IRF422	500	4.0	2.0	TO-3	IRF422
IRF423	400	4.0	2.0	TO-3	IRF423
IRF510	100	0.6	4.0	TO-220	IRF510
IRF511	60	0.6	4.0	TO-220	IRF511
IRF512	100	0.8	3.5	TO-220	IRF512
IRF513	60	0.8	3.5	TO-220	IRF513
IRF520	100	0.3	8.0	TO-220	IRF520
IRF521	60	0.3	8.0	TO-220	IRF521
IRF522	100	0.4	7.0	TO-220	IRF522
IRF523	60	0.4	7.0	TO-220	IRF523
IRF530	100	0.18	14.0	TO-220	IRF530
IRF531	60	0.18	14.0	TO-220	IRF531
IRF532	100	0.25	12.0	TO-220	IRF532
IRF533	60	0.25	12.0	TO-220	IRF533
RFK10N45	450	0.85	10.0	TO-3	IRF441
RFK10N50	500	0.85	10.0	TO-3	IRF440
RFK12N35	350	0.5	12.0	TO-3	IRF353
RFK12N40	400	0.5	12.0	TO-3	IRF352
RFK25N18	180	0.15	25.0	TO-3	IRF252
RFK25N20	200	0.15	25.0	TO-3	IRF252
RFK25P08	-80	0.2	-25.0	TO-3	—
RFK25P10	-100	0.2	-25.0	TO-3	—
RFK30N12	120	0.085	30.0	TO-3	IRF251
RFK30N15	150	0.085	30.0	TO-3	IRF251
RFK35N08	80	0.06	35.0	TO-3	VNE003A
RFK35N10	100	0.06	35.0	TO-3	IRF150
RFK45N05	50	0.04	45.0	TO-3	VNC003A
RFK45N06	60	0.04	45.0	TO-3	VNC003A
RFL1N08	80	1.25	1.0	TO-39	VND010B
RFL1N10	100	1.25	1.0	TO-39	IRFF112
RFL1N12	120	2.0	1.0	TO-39	IRFF211
RFL1N15	150	2.0	1.0	TO-39	IRFF211
RFL1N18	180	3.0	1.0	TO-39	IRFF212
RFL1N20	200	3.0	1.0	TO-39	IRFF212
RFL1P08	-80	3.5	-1.0	TO-39	—
RFL1P10	-100	3.5	-1.0	TO-39	—
RFL2N05	50	0.8	2.0	TO-39	IRFF113
RFL2N06	60	0.8	2.0	TO-39	IRFF113
RFL4N12	120	0.3	4.0	TO-39	IRFF231
RFL4N15	150	0.3	4.0	TO-39	IRFF231
RFM10N12	120	0.3	10.0	TO-3	VN1201A
RFM10N15	150	0.3	10.0	TO-3	IRF243

MOSPOWER Cross Reference List (Cont'd)

RCA (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
RFM10P12	-120	0.5	-10.0	TO-3	—
RFM10P15	-150	0.5	-10.0	TO-3	—
RFM12N08	80	0.2	12.0	TO-3	VN0800A
RFM12N10	100	0.2	12.0	TO-3	VN1000A
RFM12N18	180	0.25	12.0	TO-3	IRF242
RFM12N20	200	0.25	12.0	TO-3	IRF242
RFM12P08	-80	0.3	-12.0	TO-3	—
RFM12P10	-100	0.3	-12.0	TO-3	—
RFM15N05	50	0.15	15.0	TO-3	VN0601A
RFM15N06	60	0.15	15.0	TO-3	VN0601A
RFM15N12	120	0.15	15.0	TO-3	IRF253
RFM15N15	150	0.15	15.0	TO-3	IRF253
RFM18N08	80	0.12	18.0	TO-3	IRF142
RFM18N10	100	0.12	18.0	TO-3	IRF142
RFM25N05	50	0.085	25.0	TO-3	IRF141
RFM25N06	60	0.085	25.0	TO-3	IRF141
RFM3N45	450	3.0	3.0	TO-3	IRF421
RFM3N50	500	3.0	3.0	TO-3	IRF420
RFM4N35	350	2.0	4.0	TO-3	IRF321
RFM4N40	400	2.0	4.0	TO-3	IRF320
RFM5P12	-120	1.0	-5.0	TO-3	—
RFM5P15	-150	1.0	-5.0	TO-3	—
RFM6N45	450	1.5	6.0	TO-3	VN4501A
RFM6N50	500	1.5	6.0	TO-3	VN5001A
RFM6P08	-80	0.6	-6.0	TO-3	—
RFM6P10	-100	0.6	-6.0	TO-3	—
RFM7N35	350	1.0	7.0	TO-3	VN3500A
RFM7N40	400	1.0	7.0	TO-3	VN4000A
RFM8N18	180	0.6	8.0	TO-3	IRF232
RFM8N20	200	0.6	8.0	TO-3	IRF232
RFM8P08	-80	0.4	-8.0	TO-3	—
RFM8P10	-100	0.4	-8.0	TO-3	—
RFP1N35	350	9.0	1.0	TO-220	IRF713
RFP1N40	400	9.0	1.0	TO-220	IRF712
RFP10N12	-120	0.3	10.0	TO-220	VN1201D
RFP10N15	-150	0.3	10.0	TO-220	IRF643
RFP10P12	-120	0.5	-10.0	TO-220	—
RFP10P15	-150	0.5	-10.0	TO-220	—
RFP12N08	80	0.2	12.0	TO-220	VN0800D
RFP12N10	100	0.2	12.0	TO-220	BUZ20
RFP12N18	180	0.25	12.0	TO-220	IRF642
RFP12N20	200	0.25	12.0	TO-220	IRF642
RFP12P08	-80	0.3	-12.0	TO-220	—
RFP12P10	-100	0.3	-12.0	TO-220	—
RFP15N05	50	0.15	15.0	TO-220	VN0601D
RFP15N06	60	0.15	15.0	TO-220	VN0601D
RFP15N12	120	0.15	15.0	TO-220	—
RFP15N15	150	0.15	15.0	TO-220	—
RFP18N08	80	0.12	18.0	TO-220	IRF542
RFP18N10	100	0.12	18.0	TO-220	IRF542
RFP2N08	80	1.25	2.0	TO-220	VN0801D
RFP2N10	100	1.25	2.0	TO-220	BUZ72A
RFP2N12	120	2.0	2.0	TO-220	IRF611
RFP2N15	150	2.0	2.0	TO-220	IRF611
RFP2N18	180	3.0	2.0	TO-220	IRF612
RFP2N20	200	3.0	2.0	TO-220	IRF612
RFP2P08	-80	3.5	-2.0	TO-220	—
RFP2P10	-100	3.5	-2.0	TO-220	—
RFP25N05	50	0.085	25.0	TO-220	IRF541
RFP25N06	60	0.085	25.0	TO-220	IRF541

MOSPOWER Cross Reference List (Cont'd)

RCA (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
RFP3N45	450	3.0	3.0	TO-220	IRF821
RFP3N50	500	3.0	3.0	TO-220	IRF820
RFP4N05	50	0.8	4.0	TO-220	—
RFP4N06	60	0.8	4.0	TO-220	IRF513
RFP4N35	350	2.0	4.0	TO-220	IRF721
RFP4N40	400	2.0	4.0	TO-220	VN4001D
RFP5P12	-120	1.0	-5.0	TO-220	—
RFP5P15	-150	1.0	-5.0	TO-220	—
RFP6N45	450	1.5	6.0	TO-220	VN4501D
RFP6N50	500	1.5	6.0	TO-220	VN5001D
RFP6P08	-80	0.6	-6.0	TO-220	—
RFP6P10	-100	0.6	-6.0	TO-220	—
RFP7N35	350	1.0	7.0	TO-220	VN3500D
RFP7N40	400	1.0	7.0	TO-220	VN4000D
RFP8N18	180	0.6	8.0	TO-220	IRF632
RFP8N20	200	0.6	8.0	TO-220	IRF630
RFP8P08	-80	0.4	-8.0	TO-220	—
RFP8P10	-100	0.4	-8.0	TO-220	—

SGS

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
SGSP111	100	0.3	7.0	TO-39	IRFF120
SGSP112	80	0.3	7.0	TO-39	IRFF120
SGSP151	100	0.6	5.0	TO-39	IRFF110
SGSP152	80	0.6	5.0	TO-39	IRFF110
SGSP311	100	0.3	7.0	TO-220	BUZ20
SGSP312	80	0.3	7.0	TO-220	VN0801D
SGSP317	200	1.2	6.0	TO-220	IRF622
SGSP318	550	4.5	2.0	TO-220	VNS009D
SGSP319	500	3.8	2.0	TO-220	IRF820
SGSP322	50	0.10	12.0	TO-220	BUZ10
SGSP330	450	3.0	3.0	TO-220	IRF821
SGSP331	400	2.5	3.0	TO-220	IRF722
SGSP351	100	0.6	5.0	TO-220	IRF510
SGSP352	80	0.6	5.0	TO-220	IRF510
SGSP354	450	6.5	1.5	TO-220	VN4502D
SGSP355	400	5.0	1.5	TO-220	IRF712
SGSP361	100	0.1	15.0	TO-220	IRF540
SGSP362	80	0.1	15.0	TO-220	IRF540
SGSP364	450	1.5	6.0	TO-220	VN4501D
SGSP365	400	1.2	6.0	TO-220	VN4000D
SGSP367	200	0.6	12.0	TO-220	IRF632
SGSP368	550	2.20	5.0	TO-220	VNT009D
SGSP369	500	1.75	5.0	TO-220	VN5001D
SGSP381	60	0.06	24.0	TO-220	IRF541*
SGSP471	100	0.07	30.0	TO-3	IRF150
SGSP475	400	0.5	12.0	TO-218	IRF340*
SGSP477	200	0.26	24.0	TO-3	IRF242
SGSP479	500	0.75	10.0	TO-3	IRF450
SGSP491	60	0.03	40.0	TO-3	VNC003A*
SGSP511	100	0.30	7.0	TO-3	IRF120
SGSP512	80	0.3	7.0	TO-3	VNF0801A
SGSP517	200	0.75	6.0	TO-3	IRF232
SGSP518	250	1.20	6.0	TO-3	VNL001A
SGSP519	500	3.8	2.0	TO-3	IRF420
SGSP530	450	3.0	3.0	TO-3	IRF421
SGSP531	400	2.5	3.0	TO-3	IRF322
SGSP561	100	0.1	15.0	TO-3	IRF140
SGSP562	80	0.1	15.0	TO-3	IRF140
SGSP563	250	0.45	12.0	TO-3	IRF353
SGSP564	450	1.5	6.0	TO-3	IRF431

MOSPOWER Cross Reference List (Cont'd)

SGS (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
SGSP565	400	1.2	6.0	TO-3	VNM001A
SGSP567	200	0.33	12.0	TO-3	IRF242
SGSP568	550	2.5	5.0	TO-3	VNS009A
SGSP569	500	1.75	5.0	TO-3	VNP002A
SGSP571	100	0.07	30.0	TO-3	IRF150
SGSP572	80	0.07	30.0	TO-3	IRF150
SGSP573	250	0.26	24.0	TO-3	VNL005A
SGSP574	450	0.70	12.0	TO-3	IRF453
SGSP575	400	0.5	12.0	TO-3	IRF352
SGSP577	200	0.26	24.0	TO-3	IRF242
SGSP578	550	1.20	10.0	TO-3	VNS012A
SGSP579	500	0.75	10.0	TO-3	VNS012A
SGSP591	60	0.03	40.0	TO-3	VNC003A*

SIEMENS

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
BUZ10	50	0.1	12.0	TO-220	BUZ10
BUZ10A	50	0.12	12.0	TO-220	BUZ10
BUZ11	50	0.04	30.0	TO-220	—
BUZ11A	50	0.06	25.0	TO-220	—
BUZ14	50	0.04	39.0	TO-3	VNC003A
BUZ15	50	0.03	45.0	TO-3	VNC003A*
BUZ17	50	0.04	32.0	TO-238	—
BUZ18	50	0.03	37.0	TO-238	—
BUZ20	100	0.2	12.0	TO-220	BUZ20
BUZ21	100	0.1	19.0	TO-220	IRF540
BUZ23	100	0.2	10.0	TO-3	BUZ23
BUZ24	100	0.06	32.0	TO-3	BUZ24
BUZ25	100	0.1	19.0	TO-3	IRF140
BUZ27	100	0.06	26.0	TO-238	—
BUZ28	100	0.1	18.0	TO-238	—
BUZ30	200	0.75	7.0	TO-220	IRF632
BUZ31	200	0.2	12.5	TO-220	IRF640
BUZ32	200	0.4	9.5	TO-220	BUZ32
BUZ33	200	0.75	7.2	TO-3	IRF232
BUZ34	200	0.2	14.0	TO-3	IRF240
BUZ35	200	0.4	9.9	TO-3	BUZ35
BUZ36	200	0.12	22.0	TO-3	BUZ36
BUZ37	200	0.2	13.0	TO-238	—
BUZ38	200	0.12	18.0	TO-238	—
BUZ40	500	4.5	2.5	TO-220	IRF822
BUZ41A	500	1.5	4.5	TO-220	IRF830
BUZ42	500	2.0	4.0	TO-220	BUZ42
BUZ43	500	4.5	2.8	TO-3	IRF422
BUZ44A	500	1.5	4.8	TO-3	IRF430
BUZ45	500	0.6	9.6	TO-3	BUZ45
BUZ45A	500	0.8	8.3	TO-3	IRF452
BUZ45B	500	0.5	10.0	TO-3	IRF450
BUZ46	500	2.0	4.2	TO-3	BUZ46
BUZ48	500	0.6	7.8	TO-238	—
BUZ48A	500	0.6	6.8	TO-238	—
BUZ50A	1000	5.0	2.5	TO-220	—
BUZ50B	1000	8.0	2.0	TO-220	—
BUZ53A	1000	5.0	2.6	TO-3	—
BUZ54	1000	2.0	5.3	TO-3	—
BUZ54A	1000	2.6	4.6	TO-3	—
BUZ57A	1000	5.0	2.5	TO-238	—
BUZ58	1000	2.0	4.3	TO-238	—
BUZ58A	1000	2.6	3.7	TO-238	—
BUZ60	400	1.0	5.5	TO-220	BUZ60
BUZ60B	400	1.5	4.5	TO-220	VN4001D

MOSPOWER Cross Reference List (Cont'd)

SIEMENS (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
BUZ63	400	1.0	5.9	TO-3	BUZ63
BUZ63B	400	1.5	4.5	TO-3	VN4001A
BUZ64	400	0.4	10.5	TO-3	BUZ64
BUZ67	400	0.4	9.6	TO-238	—
BUZ71	50	0.1	12.0	TO-220	BUZ71
BUZ71A	50	0.12	12.0	TO-220	BUZ20
BUZ72A	100	0.25	9.0	TO-220	BUZ72A
BUZ73A	200	0.6	5.8	TO-220	IRF632
BUZ74	500	3.0	2.4	TO-220	BUZ74
BUZ74A	500	4.0	2.0	TO-220	IRF822
BUZ76	400	1.8	3.0	TO-220	BUZ76
BUZ76A	400	2.5	2.6	TO-220	IRF722
BUZ80	800	4.0	2.6	TO-220	—
BUZ80A	800	3.0	3.0	TO-220	—
BUZ83	800	4.0	2.9	TO-3	—
BUZ83A	800	3.4	3.0	TO-3	—
BUZ84	800	2.0	5.3	TO-3	—
BUZ84A	800	1.5	6.0	TO-3	—
BUZ88	800	2.0	4.3	TO-238	—
BUZ88A	800	1.5	5.0	TO-238	—

SUPERTEX

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
TN0106N2	60	3.0	0.8	TO-39	VNC011B
TN0106N3	60	3.0	0.5	TO-92	—
TN0110N2	100	3.0	0.8	TO-39	VNE010B
TN0110N3	100	3.0	0.5	TO-92	—
TN0520N2	200	10.0	0.7	TO-39	IRFF212
TN0520N3	200	10.0	0.3	TO-92	VN2410L
TN0524N2	240	10.0	0.7	TO-39	VN2406B
TN0524N3	240	10.0	0.3	TO-92	VN2410L
VM1210N1	100	0.3	12.0	TO-3	IRF120
VN0104N2	40	3.0	0.8	TO-39	VNC011B
VN0104N3	40	3.0	0.5	TO-92	—
VN0104N5	40	3.0	1.5	TO-220	BSR80
VN0104N6	40	3.0	0.7	PDIP	VQ2001J
VN0104N7	40	3.0	0.7	CDIP	VQ2001P
VN0104N9	40	3.0	0.5	TO-52	2N6660*
VN0106N2	60	3.0	0.8	TO-39	VNC011B
VN0106N3	60	3.0	0.5	TO-92	—
VN0106N5	60	3.0	1.5	TO-220	VN66AD
VN0106N6	60	3.0	0.7	PDIP	—
VN0106N7	60	3.0	0.7	PDIP	VQ1004J*
VN0106N9	60	3.0	0.5	TO-52	2N6660*
VN0109N2	90	3.0	0.8	TO-39	IRFF120
VN0109N3	90	3.0	0.5	TO-92	—
VN0109N5	90	3.0	1.5	TO-220	VN1001D
VN0109N9	90	3.0	0.5	TO-52	IRFF120
VN0116N2	160	10.0	0.35	TO-39	IRFF212
VN0116N3	160	10.0	0.25	TO-92	VN1710L
VN0116N5	160	10.0	0.7	TO-220	VN1706D
VN0120N2	200	10.0	0.35	TO-39	IRFF212
VN0120N3	200	10.0	0.25	TO-92	VN2406L
VN0120N5	200	10.0	0.7	TO-220	IRF612
VN0204N2	40	2.0	1.5	TO-39	IRFF113
VN0204N5	40	2.0	3.0	TO-220	VN0401D
VN0204N6	40	2.0	1.0	PDIP	VQ2001J
VN0204N7	40	2.0	1.0	CDIP	—
VN0206N2	60	2.0	1.5	TO-39	VNC011B
VN0206N3	60	2.0	0.8	TO-92	VN10LM*
VN0206N5	60	2.0	3.0	TO-220	VN66AD*
VN0206N6	60	2.0	1.0	PDIP	VQ1004J*
VN0206N7	60	2.0	1.0	CDIP	VQ1004P*

MOSPOWER Cross Reference List (Cont'd)

SUPERTEX (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
VN0210N2	100	2.0	1.5	TO-39	VNE010B*
VN0210N3	100	2.0	0.8	TO-92	—
VN0210N5	100	2.0	3.0	TO-220	VN1001D
VN0216N2	160	6.0	0.7	TO-39	VN1706B
VN0216N3	160	6.0	0.4	TO-92	VN1706L
VN0216N5	160	6.0	1.5	TO-220	VN1706D
VN0220N2	200	6.0	0.7	TO-39	IRFF212
VN0220N3	200	6.0	0.4	TO-92	VN2406L
VN0220N5	200	6.0	1.5	TO-220	VN2406D
VN0335N1	350	2.5	3.5	TO-3	IRF323
VN0335N2	350	2.5	1.0	TO-39	IRFF323
VN0335N5	350	2.5	2.1	TO-220	IRF723
VN0340N1	400	2.5	3.5	TO-3	IRF322
VN0340N2	400	2.5	1.0	TO-39	IRFF322
VN0340N5	400	2.5	2.1	TO-220	IRF722
VN0345N1	450	4.0	2.5	TO-3	IRF423
VN0345N2	450	4.0	0.35	TO-39	IRFF423
VN0345N5	450	4.0	1.5	TO-220	IRF823
VN0350N1	500	4.0	2.5	TO-3	IRF442
VN0350N2	500	4.0	0.35	TO-39	IRFF422
VN0350N5	500	4.0	1.5	TO-220	IRF822
VN0355N1	550	6.0	2.5	TO-3	VNS009A
VN0355N5	550	6.0	1.5	TO-220	VNS009D
VN0360N1	600	6.0	2.5	TO-3	VNS009A
VN0360N5	600	6.0	1.5	TO-220	VNS009D
VN0535N2	350	35.0	0.25	TO-39	IRFF313
VN0535N3	350	35.0	0.1	TO-92	IRF713*
VN0540N2	400	35.0	0.25	TO-39	IRFF312
VN0540N3	400	35.0	0.1	TO-92	IRFF312*
VN0545N2	450	60.0	0.1	TO-39	—
VN0545N3	450	60.0	0.05	TO-92	—
VN0550N2	500	60.0	0.1	TO-39	—
VN0550N3	500	60.0	0.05	TO-92	—
VN10KN3	60	5.0	0.3	TO-92	BS170
VN1106N1	60	0.7	9.0	TO-3	IRF252
VN1106N2	60	0.7	2.5	TO-39	IRFF111
VN1106N5	60	0.7	7.0	TO-220	IRF511
VN1110N1	100	0.7	9.0	TO-3	IRF122
VN1110N5	100	0.7	7.0	TO-220	IRF510
VN1116N1	160	3.0	3.0	TO-3	IRF222
VN1116N2	160	3.0	1.0	TO-39	IRFF212
VN1116N5	160	3.0	2.0	TO-220	IRF612
VN1120N1	200	3.0	3.0	TO-3	IRF220
VN1120N2	200	3.0	1.0	TO-39	IRFF212
VN1120N5	200	3.0	2.0	TO-220	IRF612
VN1204N1	40	0.3	12.0	TO-3	VN0401A
VN1204N2	40	0.3	3.5	TO-39	IRFF121
VN1204N5	40	0.3	9.0	TO-220	BUZ10
VN1206N1	60	0.3	12.0	TO-3	IRF121
VN1206N2	60	0.3	3.5	TO-39	IRFF121
VN1206N5	60	0.3	9.0	TO-220	IRF521
VN1210N2	100	0.3	3.5	TO-39	IRFF120
VN1210N5	100	0.3	9.0	TO-220	IRF520
VN1216N1	160	1.0	6.0	TO-3	IRF220
VN1216N2	160	1.0	3.0	TO-39	IRFF220
VN1216N5	160	1.0	4.5	TO-220	IRF620
VN1220N1	200	1.0	6.0	TO-3	IRF220
VN1220N2	200	1.0	3.0	TO-39	IRFF220
VN1220N5	200	1.0	4.5	TO-220	IRF620
VN1304N2	40	8.0	0.4	TO-39	VN67AB

MOSPOWER Cross Reference List (Cont'd)

SUPERTEX (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS(on)}$ (Ohms)	$I_{D(on)}$ (Amps)	Package	Siliconix Replacement
VN1304N3	40	8.0	0.25	TO-92	VN2222LL
VN1304N6	40	8.0	0.4	PDIP	VQ2001J
VN1304N7	40	8.0	0.4	CDIP	VQ2001P
VN1306N2	60	8.0	0.4	TO-39	VN67AB
VN1306N3	60	8.0	0.25	TO-92	VN2222L
VN1306N6	60	8.0	0.4	PDIP	VQ2004J
VN1306N7	60	8.0	0.4	CDIP	—
VN1310N2	100	8.0	0.4	TO-39	VN1206B
VN1310N3	100	8.0	0.25	TO-92	VN1206L
VN1316N2	160	40.0	0.15	TO-39	VN1706B
VN1316N3	160	40.0	0.1	TO-92	VN1710L
VN1320N2	200	40.0	0.15	TO-39	IRFF210
VN1320N3	200	40.0	0.1	TO-92	BS107
VN2306N1	60	0.11	30.0	TO-3	IRF143
VN2306N5	60	0.11	20.0	TO-220	IRF543
VN2310N1	100	0.11	30.0	TO-3	IRF142
VN2310N5	100	0.11	20.0	TO-220	IRF542
VN2316N1	160	0.25	18.0	TO-3	IRF242
VN2316N5	160	0.25	12.0	TO-220	IRF642
VN2320N1	200	0.25	18.0	TO-3	IRF242
VN2320N5	200	0.25	12.0	TO-220	IRF642
VN2335N1	350	0.7	8.0	TO-3	IRF341
VN2335N5	350	0.7	6.0	TO-220	IRF741
VN2340N1	400	0.7	8.0	TO-3	IRF340
VN2340N5	400	0.7	6.0	TO-220	IRF740
VN2345N1	450	1.4	6.0	TO-3	IRF443
VN2345N5	450	1.4	4.0	TO-220	IRF843
VN2350N1	500	1.4	6.0	TO-3	IRF442
VN2350N5	500	1.4	4.0	TO-220	IRF842
VP0104N2	-40	8.0	-0.5	TO-39	VP0808B
VP0104N3	-40	8.0	-0.4	TO-92	VP0808L
VP0104N5	-40	8.0	-1.0	TO-220	—
VP0104N6	-40	8.0	-0.4	PDIP	—
VP0104N7	-40	8.0	-0.4	CDIP	—
VP0104N9	-40	8.0	-0.4	TO-52	—
VP0106N2	-60	8.0	-0.5	TO-39	—
VP0106N3	-60	8.0	-0.4	TO-92	—
VP0106N5	-60	8.0	-1.0	TO-220	—
VP0106N6	-60	8.0	-0.4	PDIP	—
VP0106N7	-60	8.0	-0.4	CDIP	—
VP0106N9	-60	8.0	-0.4	TO-52	—
VP0109N2	-90	8.0	-0.5	TO-39	—
VP0109N3	-90	8.0	-0.4	TO-92	—
VP0109N5	-90	8.0	-1.0	TO-220	—
VP0109N9	-90	8.0	-0.4	TO-52	—
VP0116N2	-160	25.0	-0.2	TO-39	—
VP0116N3	-160	25.0	-0.1	TO-92	—
VP0116N5	-160	25.0	-0.425	TO-220	—
VP0120N2	-200	25.0	-0.2	TO-39	—
VP0120N3	-200	25.0	-0.1	TO-92	—
VP0120N5	-200	25.0	-0.425	TO-220	—
VP0204N2	-40	4.0	-0.8	TO-39	—
VP0204N5	-40	4.0	-2.0	TO-220	—
VP0204N6	-40	4.0	-0.4	PDIP	—
VP0204N7	-40	4.0	-0.4	CDIP	—
VP0206N2	-60	4.0	-0.8	TO-39	—
VP0206N3	-60	4.0	-0.4	TO-92	—
VP0206N5	-60	4.0	-2.0	TO-220	—
VP0206N6	-60	4.0	-0.4	PDIP	—
VP0206N7	-60	4.0	-0.4	CDIP	—

MOSPOWER Cross Reference List (Cont'd)

SUPERTEX (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
VP0210N2	-100	4.0	-0.8	TO-39	—
VP0210N3	-100	4.0	-0.4	TO-92	—
VP0210N5	-100	4.0	-2.0	TO-220	—
VP0216N2	-160	16.0	-0.35	TO-39	—
VP0216N3	-160	16.0	-0.2	TO-92	—
VP0216N5	-160	16.0	-0.8	TO-220	—
VP0220N2	-200	16.0	-0.35	TO-39	—
VP0220N3	-200	16.0	-0.2	TO-92	—
VP0220N5	-200	16.0	-0.8	TO-220	—
VP0335N1	-350	6.0	-2.7	TO-3	—
VP0335N2	-350	6.0	-0.7	TO-39	—
VP0335N5	-350	6.0	-1.6	TO-220	—
VP0340N1	-400	6.0	-2.7	TO-3	—
VP0340N2	-400	6.0	-0.7	TO-39	—
VP0340N5	-400	6.0	-1.6	TO-220	—
VP0345N1	-450	7.5	-1.5	TO-3	—
VP0345N2	-450	7.5	-0.4	TO-39	—
VP0345N5	-450	7.5	-1.0	TO-220	—
VP0350N1	-500	7.5	-1.5	TO-3	—
VP0350N2	-500	7.5	-0.4	TO-39	—
VP0350N5	-500	7.5	-1.0	TO-220	—
VP0535N2	-350	75.0	-0.2	TO-39	—
VP0535N3	-350	75.0	-0.1	TO-92	—
VP0540N2	-400	75.0	-0.2	TO-39	—
VP0540N3	-400	75.0	-0.1	TO-92	—
VP0545N2	-450	125.0	-0.125	TO-39	—
VP0545N3	-450	125.0	-0.07	TO-92	—
VP0550N2	-500	125.0	-0.125	TO-39	—
VP0550N3	-500	125.0	-0.07	TO-92	—
VP1106N1	-60	2.0	-6.0	TO-3	—
VP1106N2	-60	2.0	-1.5	TO-39	—
VP1106N5	-60	2.0	-4.0	TO-220	—
VP1110N1	-100	2.0	-6.0	TO-3	—
VP1110N2	-100	2.0	-1.5	TO-39	—
VP1110N5	-100	2.0	-4.0	TO-220	—
VP1116N1	-160	5.0	-2.5	TO-3	—
VP1116N2	-160	5.0	-0.8	TO-39	—
VP1116N5	-160	5.0	-1.8	TO-220	—
VP1120N1	-200	5.0	-2.5	TO-3	—
VP1120N2	-200	5.0	-0.8	TO-39	—
VP1120N5	-200	5.0	-1.8	TO-220	—
VP1216N1	-160	2.5	-4.5	TO-3	—
VP1216N2	-160	2.5	-2.0	TO-39	—
VP1216N5	-160	2.5	-3.5	TO-220	—
VP1220N1	-200	2.5	-4.5	TO-3	—
VP1220N2	-200	2.5	-3.5	TO-220	—
VP1220N5	-200	2.5	-2.0	TO-39	—
VP1316N2	-160	100.0	-0.1	TO-39	—
VP1316N3	-160	100.0	-0.06	TO-92	—
VP1320N2	-200	100.0	-0.1	TO-39	—
VP1320N3	-200	100.0	-0.06	TO-92	—
VP2306N1	-60	0.2		TO-3	—
VP2306N5	-60	0.2		TO-220	—
VP2310N1	-100	0.2		TO-3	—
VP2310N5	-100	0.2		TO-220	—
VP2316N1	-160	0.4		TO-3	—
VP2316N5	-160	0.4		TO-220	—
VP2320N1	-200	0.4		TO-3	—
VP2320N5	-200	0.4		TO-220	—
VP2335N1	-350	1.5		TO-3	—

MOSPOWER Cross Reference List (Cont'd)

SUPERTEX (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
VP2335N5	-350	1.5		TO-220	—
VP2340N1	-400	1.5		TO-3	—
VP2340N5	-400	1.5		TO-220	—
VP2345N1	-450	3.0		TO-3	—
VP2345N5	-450	3.0		TO-220	—
VP2350N1	-500	3.0		TO-3	—
VP2350N5	-500	3.0		TO-220	—
VQ1000N6	60	5.5	0.5	PDIP	VQ1000J
VQ1000N7	60	5.5	0.5	CDIP	VQ1004P*
VQ7254N6	20	3.0	0.85	PDIP	VQ7254J
VQ7254N7	20	3.0	0.64	CDIP	—
2N6660	60	3.0	1.1	TO-39	2N6660
2N6661	90	4.0	0.9	TO-39	2N6661

UNITRODE

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
UFNA11	60	1.5	1.0	TO-92	—
UFNA12	100	1.5	1.0	TO-92	—
UFND1Z0	100	2.4	0.5	DIL-4	—
UFND1Z3	60	3.2	0.4	DIL-4	—
UFND110	100	0.6	1.0	DIL-4	—
UFND113	60	0.8	0.8	DIL-4	—
UFND120	100	0.3	1.3	DIL-4	—
UFND123	60	0.4	1.1	DIL-4	—
UFND210	200	1.5	0.6	DIL-4	—
UFND213	150	2.4	0.45	DIL-4	—
UFNF110	100	0.6	3.5	TO-39	IRFF110
UFNF111	60	0.6	3.5	TO-39	IRFF111
UFNF112	100	0.8	3.0	TO-39	IRFF112
UFNF113	60	0.8	3.0	TO-39	IRFF113
UFNF120	100	0.3	6.0	TO-39	IRFF120
UFNF121	60	0.3	6.0	TO-39	IRFF121
UFNF122	100	0.4	5.0	TO-39	IRFF122
UFNF123	60	0.4	5.0	TO-39	IRFF123
UFNF130	100	0.18	8.0	TO-39	IRFF130
UFNF131	60	0.18	8.0	TO-39	IRFF131
UFNF132	100	0.25	7.0	TO-39	IRFF132
UFNF133	60	0.25	7.0	TO-39	IRFF133
UFNF210	200	1.5	2.2	TO-39	IRFF210
UFNF211	150	1.5	2.2	TO-39	IRFF211
UFNF212	200	2.4	1.8	TO-39	IRFF212
UFNF213	150	2.4	1.8	TO-39	IRFF213
UFNF220	200	0.8	3.5	TO-39	IRFF220
UFNF221	150	0.8	3.5	TO-39	IRFF221
UFNF222	200	1.2	3.0	TO-39	IRFF222
UFNF223	150	1.2	3.0	TO-39	IRFF223
UFNF230	200	0.4	5.5	TO-39	IRFF230
UFNF231	150	0.4	5.5	TO-39	IRFF231
UFNF232	200	0.6	4.5	TO-39	IRFF232
UFNF233	150	0.6	4.5	TO-39	IRFF233
UFNF310	400	3.6	1.35	TO-39	IRFF310
UFNF311	350	3.6	1.35	TO-39	IRFF311
UFNF312	400	5.0	1.15	TO-39	IRFF312
UFNF313	350	5.0	1.15	TO-39	IRFF313
UFNF320	400	1.8	2.5	TO-39	IRFF320
UFNF321	350	1.8	2.5	TO-39	IRFF321
UFNF322	400	2.5	2.0	TO-39	IRFF322
UFNF323	350	2.5	2.0	TO-39	IRFF323
UFNF330	400	1.0	3.5	TO-39	IRFF330
UFNF331	350	1.0	3.5	TO-39	IRFF331
UFNF332	400	1.5	3.0	TO-39	IRFF332

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MOSPOWER Cross Reference List (Cont'd)

UNITRODE (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
UFNF333	350	1.5	3.0	TO-39	IRFF333
UFNF420	500	3.0	1.6	TO-39	IRFF420
UFNF421	450	3.0	1.6	TO-39	IRFF421
UFNF422	500	4.0	1.4	TO-39	IRFF422
UFNF423	450	4.0	1.4	TO-39	IRFF423
UFNF430	500	1.5	2.75	TO-39	IRFF430
UFNF431	450	1.5	2.75	TO-39	IRFF431
UFNF432	500	2.0	2.25	TO-39	IRFF432
UFNF433	450	2.0	2.25	TO-39	IRFF433
UFN120	100	0.3	8.0	TO-3	IRF120
UFN121	60	0.3	8.0	TO-3	IRF121
UFN122	100	0.4	7.0	TO-3	IRF122
UFN123	60	0.4	7.0	TO-3	IRF123
UFN130	100	0.18	14.0	TO-3	IRF130
UFN131	60	0.18	14.0	TO-3	IRF131
UFN132	100	0.25	12.0	TO-3	IRF132
UFN133	60	0.25	12.0	TO-3	IRF133
UFN140	100	0.085	27.0	TO-3	IRF140
UFN141	60	0.085	27.0	TO-3	IRF141
UFN142	100	0.11	24.0	TO-3	IRF142
UFN143	60	0.11	24.0	TO-3	IRF143
UFN150	100	0.055	40.0	TO-3	IRF150
UFN151	60	0.055	40.0	TO-3	IRF151
UFN152	100	0.08	33.0	TO-3	IRF152
UFN153	60	0.08	33.0	TO-3	IRF153
UFN220	200	0.8	5.0	TO-3	IRF220
UFN221	150	0.8	5.0	TO-3	IRF221
UFN222	200	1.2	4.0	TO-3	IRF222
UFN223	150	1.2	4.0	TO-3	IRF223
UFN230	200	0.4	9.0	TO-3	IRF230
UFN231	150	0.4	9.0	TO-3	IRF231
UFN232	200	0.6	8.0	TO-3	IRF232
UFN233	150	0.6	8.0	TO-3	IRF233
UFN240	200	0.18	18.0	TO-3	IRF240
UFN241	150	0.18	18.0	TO-3	IRF241
UFN242	200	0.22	16.0	TO-3	IRF242
UFN243	150	0.22	16.0	TO-3	IRF243
UFN250	200	0.085	30.0	TO-3	IRF250
UFN251	150	0.085	30.0	TO-3	IRF251
UFN252	200	0.12	25.0	TO-3	IRF252
UFN253	150	0.12	25.0	TO-3	IRF253
UFN320	400	1.8	3.0	TO-3	IRF320
UFN321	350	1.8	3.0	TO-3	IRF321
UFN322	400	2.5	2.5	TO-3	IRF322
UFN323	350	2.5	2.5	TO-3	IRF323
UFN330	400	1.0	5.5	TO-3	IRF330
UFN331	350	1.0	5.5	TO-3	IRF331
UFN332	400	1.5	4.5	TO-3	IRF332
UFN333	350	1.5	4.5	TO-3	IRF333
UFN340	400	0.55	10.0	TO-3	IRF340
UFN341	350	0.55	10.0	TO-3	IRF341
UFN342	400	0.8	8.0	TO-3	IRF342
UFN343	350	0.8	8.0	TO-3	IRF343
UFN350	400	0.3	15.0	TO-3	IRF350
UFN351	350	0.3	15.0	TO-3	IRF351
UFN352	400	0.4	13.0	TO-3	IRF352
UFN353	350	0.4	13.0	TO-3	IRF353
UFN420	500	3.0	2.5	TO-3	IRF420
UFN421	450	3.0	2.5	TO-3	IRF421
UFN422	500	4.0	2.0	TO-3	IRF422

MOSPOWER Cross Reference List (Cont'd)

UNITRODE (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
UFN423	450	4.0	2.0	TO-3	IRF423
UFN430	500	1.5	4.5	TO-3	IRF430
UFN431	450	1.5	4.5	TO-3	IRF431
UFN432	500	2.0	4.0	TO-3	IRF432
UFN433	450	2.0	4.0	TO-3	IRF433
UFN440	500	0.85	8.0	TO-3	IRF440
UFN441	450	0.85	8.0	TO-3	IRF441
UFN442	500	1.1	7.0	TO-3	IRF442
UFN443	450	1.1	7.0	TO-3	IRF443
UFN450	500	0.4	13.0	TO-3	IRF450
UFN451	450	0.4	13.0	TO-3	IRF451
UFN452	500	0.5	12.0	TO-3	IRF452
UFN453	450	0.5	12.0	TO-3	IRF453
UFN510	100	0.6	4.0	TO-220	IRF510
UFN511	60	0.6	4.0	TO-220	IRF511
UFN512	100	0.8	3.5	TO-220	IRF512
UFN513	60	0.8	3.5	TO-220	IRF513
UFN520	100	0.3	8.0	TO-220	IRF520
UFN521	60	0.3	8.0	TO-220	IRF521
UFN522	100	0.4	7.0	TO-220	IRF522
UFN523	60	0.4	7.0	TO-220	IRF523
UFN530	100	0.18	14.0	TO-220	IRF530
UFN531	60	0.18	14.0	TO-220	IRF531
UFN532	100	0.25	12.0	TO-220	IRF532
UFN533	60	0.25	12.0	TO-220	IRF533
UFN540	100	0.085	27.0	TO-220	IRF540
UFN541	60	0.085	27.0	TO-220	IRF541
UFN542	100	0.11	24.0	TO-220	IRF542
UFN543	60	0.11	24.0	TO-220	IRF542
UFN610	200	1.5	2.5	TO-220	IRF610
UFN611	150	1.5	2.5	TO-220	IRF611
UFN612	200	2.4	2.0	TO-220	IRF612
UFN613	150	2.4	2.0	TO-220	IRF613
UFN620	200	0.8	5.0	TO-220	IRF620
UFN621	150	0.8	5.0	TO-220	IRF621
UFN622	200	1.2	4.0	TO-220	IRF622
UFN623	150	1.2	4.0	TO-220	IRF623
UFN630	200	0.4	9.0	TO-220	IRF630
UFN631	150	0.4	9.0	TO-220	IRF631
UFN632	200	0.6	8.0	TO-220	IRF632
UFN633	150	0.6	8.0	TO-220	IRF633
UFN640	200	0.18	18.0	TO-220	IRF640
UFN641	150	0.18	18.0	TO-220	IRF641
UFN642	200	0.22	16.0	TO-220	IRF642
UFN643	150	0.22	16.0	TO-220	IRF643
UFN710	400	3.6	1.5	TO-220	IRF710
UFN711	350	3.6	1.5	TO-220	IRF711
UFN712	400	5.0	1.3	TO-220	IRF712
UFN713	350	5.0	1.3	TO-220	IRF713
UFN720	400	1.8	3.0	TO-220	IRF720
UFN721	350	1.8	3.0	TO-220	IRF721
UFN722	400	2.5	2.5	TO-220	IRF722
UFN723	350	2.5	2.5	TO-220	IRF723
UFN730	400	1.0	5.5	TO-220	IRF730
UFN731	350	1.0	5.5	TO-220	IRF731
UFN732	400	1.5	4.5	TO-220	IRF732
UFN733	350	1.5	4.5	TO-220	IRF733
UFN740	400	0.55	10.0	TO-220	IRF740
UFN741	350	0.55	10.0	TO-220	IRF741
UFN742	400	0.8	8.0	TO-220	IRF742

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MOSPOWER Cross Reference List (Cont'd)

UNITRODE (Cont'd)

Industry Part No.	BV_{DSS} (Volts)	$R_{DS}(on)$ (Ohms)	$I_D(on)$ (Amps)	Package	Siliconix Replacement
UFN743	350	0.8	8.0	TO-220	IRF743
UFN820	500	3.0	2.5	TO-220	IRF820
UFN821	450	3.0	2.5	TO-220	IRF821
UFN822	500	4.0	2.0	TO-220	IRF822
UFN823	450	4.0	2.0	TO-220	IRF823
UFN830	500	1.5	4.5	TO-220	IRF830
UFN831	450	1.5	4.5	TO-220	IRF831
UFN832	500	2.0	4.0	TO-220	IRF832
UFN833	450	2.0	4.0	TO-220	IRF833
UFN840	500	0.85	8.0	TO-220	IRF840
UFN841	450	0.85	8.0	TO-220	IRF841
UFN842	500	1.1	7.0	TO-220	IRF842
UFN843	450	1.1	7.0	TO-220	IRF843

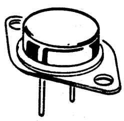
IRF120 ■ IRF121 ■ IRF122 ■ IRF123

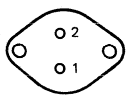
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers





BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF120	100	0.3	T0–204AA
IRF121	60	0.3	T0–204AA
IRF122	100	0.4	T0–204AA
IRF123	60	0.4	T0–204AA

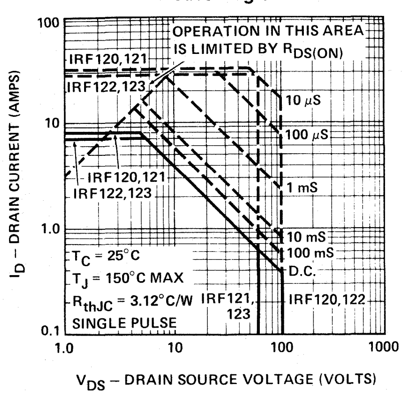
For Additional Curves
See Section 5: VNDD10

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

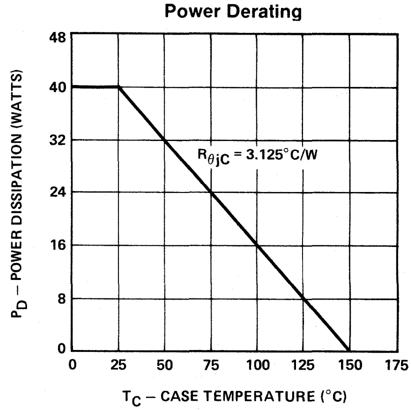
	Parameter	IRF120	IRF121	IRF122	IRF123	Units
V_{DS}	Drain-Source Voltage	100	60	100	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	60	100	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±8	±8	±7	±7	A
I_D @ T_C = 100° C	Continuous Drain Current	±5	±5	±4	±4	A
I_{DM}	Pulsed Drain Current[1]	±32	±32	±28	±28	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	40	40	40	40	W
P_D @ T_C = 100°C	Max. Power Dissipation	16	16	16	16	W
Junction to Case	Linear Derating Factor	0.32	0.32	0.32	0.32	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF120,122	100			V	V_{GS} = 0, I_D = 250 μA
		IRF121,123	60			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS} = Max. Rating x 0.8, V_{GS}=0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF120,121	8.0			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF122,123	7.0			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF120,121		1.0	1.2	V	V_{GS} = 10V, I_D = 4.0A
		IRF122,123		1.2	1.6	V	V_{GS} = 10V, I_D = 4.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF120,121		0.25	0.3	Ω	V_{GS} = 10V, I_D = 4.0A
		IRF122,123		0.3	0.4	Ω	V_{GS} = 10V, I_D = 4.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF120,121		0.5	0.60	Ω	V_{GS} =10V, I_D =4.0A T_C = 125°C
		IRF122,123		0.6	0.80	Ω	V_{GS} =10V, I_D =4.0A T_C = 125°C

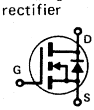
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1.5	2.5		S (℧)	$V_{DS} \geqslant V_{DS(ON)}$, I_D = 4.0A
C_{iss}	Input Capacitance	All		370	600	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		160	400	pF	
C_{rss}	Reverse Transfer Capacitance	All		70	100	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	40	ns	V_{DD} = 30V, $I_D \cong$ 4.0A, R_g = 25Ω, R_L = 7.0Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		35	70	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		60	100	ns	
t_f	Fall Time	All		30	70	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			3.125	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF120,121			−8	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRF122,123			−7	A	
I_{SM}	Source Current[1] (Body Diode)	IRF120,121			−32	A	
		IRF122,123			−28	A	
V_{SD}	Diode Forward Voltage[1]	IRF120,121			−2.5	V	T_C = 25°C, I_S =−8A, V_{GS} = 0
		IRF122,123			−2.3	V	T_C = 25°C, I_S =−7A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		280		ns	T_J =150°C, I_F = I_S, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDD10

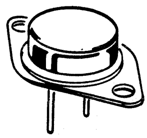
IRF130 ■ IRF131 ■ IRF132 ■ IRF133

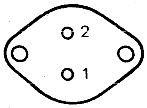
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers





BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF130	100	0.18	T0–204AA
IRF131	60	0.18	T0–204AA
IRF132	100	0.25	T0–204AA
IRF133	60	0.25	T0–204AA

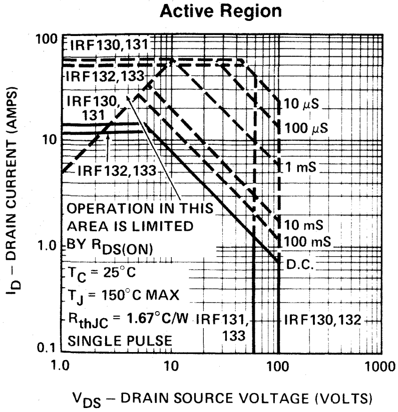
For Additional Curves
See Section 5: VNDE10

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

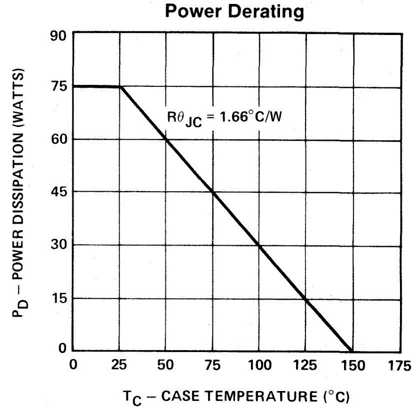
	Parameter	IRF130	IRF131	IRF132	IRF133	Units
V_{DS}	Drain-Source Voltage	100	60	100	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	60	100	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±14	±14	±12	±12	A
I_D @ T_C = 100° C	Continuous Drain Current	±9	±9	±8	±8	A
I_{DM}	Pulsed Drain Current[1]	±56	±56	±48	±48	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	75	75	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	30	30	30	W
Junction to Case	Linear Derating Factor[1]	0.6	0.6	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 Pulse Test: Pulsewidth ⩽ 300µsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF130,132	100			V	V_{GS} = 0, I_D = 250μA
		IRF131,133	60			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		4	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS} = 0.8, Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF130,131	14			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF132,133	12			A	V_{GS} = 10V, V_{DS} = 25V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF130,131		1.2	1.44	V	V_{GS} = 10V, I_D = 8A
		IRF132,133		1.6	2.0	V	V_{GS} = 10V, I_D = 8A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF130,131		0.15	0.18	Ω	V_{GS} = 10V, I_D = 8A
		IRF132,133		0.2	0.25	Ω	V_{GS} = 10V, I_D = 8A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF130,131			0.31	Ω	V_{GS} =10V, I_D =8A, T_C =125°C
		IRF132,133			0.42	Ω	V_{GS} =10V, I_D =8A, T_C =125°C

DYNAMIC

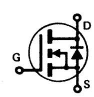
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	4.0			S (℧)	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D =8A
C_{iss}	Input Capacitance	All		750	800	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		250	500	pF	
C_{rss}	Reverse Transfer Capacitance	All		100	150	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	30	ns	V_{DD} = 30V, $I_D \cong$ 8.0A, R_g = 7.5Ω, R_L = 4.3Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		35	75	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		38	40	ns	
t_f	Fall Time	All		23	45	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.66	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF130,131			–14	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRF132,133			–12	A	
I_{SM}	Source Current[1] (Body Diode)	IRF130,131			–56	A	
		IRF132,133			–48	A	
V_{SD}	Diode Forward Voltage[1]	IRF130,131			–2.5	V	T_C=25°C, I_S=–14A, V_{GS} = 0
		IRF132,133			–2.3	V	T_C=25°C, I_S=–12A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		360		ns	T_J =150°C, I_F = I_S, dI_F/ds =100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE10

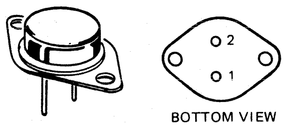
IRF140 ■ IRF141 ■ IRF142 ■ IRF143

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AE (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF140	100	0.085	T0–204AE
IRF141	60	0.085	T0–204AE
IRF142	100	0.11	T0–204AE
IRF143	60	0.11	T0–204AE

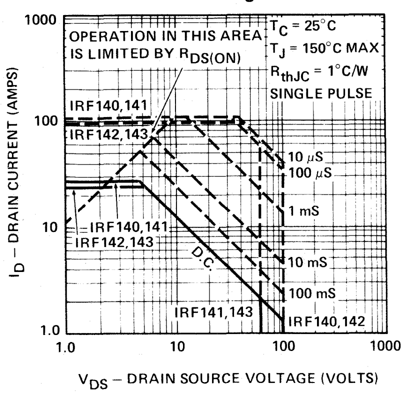
For Additional Curves
See Section 5: VNDC10

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

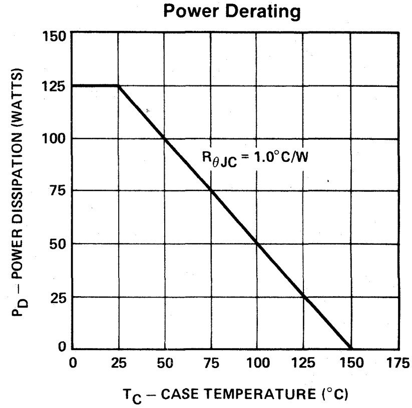
	Parameter	IRF140	IRF141	IRF142	IRF143	Units
V_{DS}	Drain-Source Voltage	100	60	100	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	60	100	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±27	±27	±24	±24	A
I_D @ T_C = 100° C	Continuous Drain Current	±17	±17	±15	±15	A
I_{DM}	Pulsed Drain Current[1]	±108	±108	±96	±96	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	125	125	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	50	50	W
Junction to Case	Linear Derating Factor	1.0	1.0	1.0	1.0	W/° C
Junction to Ambient	Linear Derating Factor	0.033	0.033	0.033	0.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF140,142	100			V	V_{GS} = 0, I_D = 250 μA
		IRF141,143	60			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		4	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS}= 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF140,141	27			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF142,143	24			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF140,141		1.05	1.275	V	V_{GS} = 10V, I_D = 15A
		IRF142,143		1.35	1.65	V	V_{GS} = 10V, I_D = 15A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF140,141		0.07	0.085	Ω	V_{GS} = 10V, I_D = 15A
		IRF142,143		0.09	0.11	Ω	V_{GS} = 10V, I_D = 15A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF140,141		0.119	0.145	Ω	V_{GS} =10V, I_D =15A, T_C =125°C
		IRF142,143		0.153	0.187	Ω	V_{GS} =10V, I_D =15A, T_C =125°C

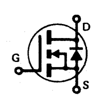
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	6.0	7.2		S (℧)	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D = 15A
C_{iss}	Input Capacitance	All		1275	1600	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		550	800	pF	
C_{rss}	Reverse Transfer Capacitance	All		160	300	pF	
$t_{d(on)}$	Turn-On Delay Time	All		16	30	ns	V_{DD} = 30V, $I_D \cong$ 15A, R_g = 5Ω, R_L = 2Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		19	60	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		42	80	ns	
t_f	Fall Time	All		24	30	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.0	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF140,141			−27	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRF142,143			−24	A	
I_{SM}	Source Current[1] (Body Diode)	IRF140,141			−108	A	
		IRF142,143			−96	A	
V_{SD}	Diode Forward Voltage[1]	IRF140,141			−2.5	V	T_C=25°C, I_S=−27A, V_{GS} = 0
		IRF142,143			−2.3	V	T_C=25°C, I_S=−24A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C, I_F = I_S, dI_F/ds = 100 A/μs

1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC10

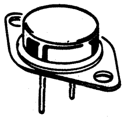
IRF150 ■ IRF151 ■ IRF152 ■ IRF153

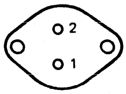
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers





BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AE (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF150	100	0.055	T0–204AE
IRF151	60	0.055	T0–204AE
IRF152	100	0.08	T0–204AE
IRF153	60	0.08	T0–204AE

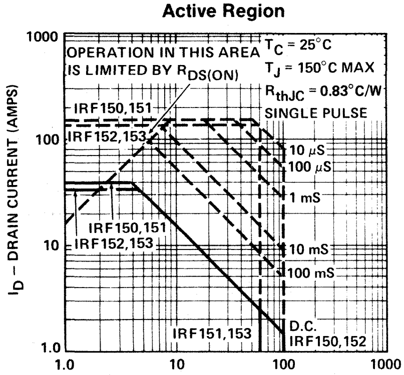
For Additional Curves
See Section 5: VNDC10–2

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

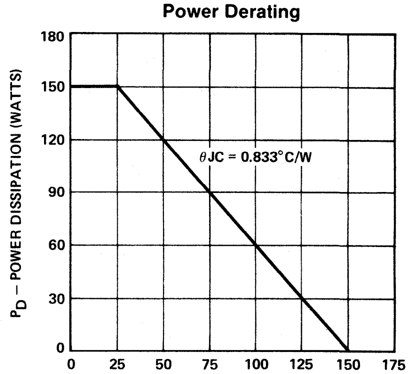
	Parameter	IRF150	IRF151	IRF152	IRF153	Units
V_{DS}	Drain-Source Voltage	100	60	100	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	60	100	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±40	±40	±33	±33	A
I_D @ T_C = 100° C	Continuous Drain Current	±25	±25	±20	±20	A
I_{DM}	Pulsed Drain Current[1]	±160	±160	±132	±132	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	150	150	150	150	W
P_D @ T_C = 100°C	Max. Power Dissipation	60	60	60	60	W
Junction to Case	Linear Derating Factor	1.2	1.2	1.2	1.2	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 Pulse Test: Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF150,152	100			V	V_{GS} = 0 I_D = 250 μA
		IRF151,153	60			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS}= 0.8 Max. Rating, V_{GS} = 0 T_C = 125° C
$I_{D(on)}$	On-State Drain Current[1]	IRF150,151	40			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF152,153	33			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF150,151		0.9	1.1	V	V_{GS} = 10V , I_D = 20A
		IRF152,153		1.2	1.6	V	V_{GS} = 10V , I_D = 20A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF150,151		0.045	0.055	Ω	V_{GS} = 10V , I_D = 20A
		IRF152,153		0.06	0.08	Ω	V_{GS} = 10V , I_D = 20A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF150,151		0.08	0.1	Ω	V_{GS} =10V, I_D =20A, T_C =125°C
		IRF152,153		0.11	0.14	Ω	V_{GS} =10V, I_D =20A, T_C =125°C

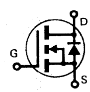
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	9.0	10		S (℧)	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D = 20A
C_{iss}	Input Capacitance	All		2700	3000	pF	V_{GS} = 0 ,V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		1300	1500	pF	
C_{rss}	Reverse Transfer Capacitance	All		470	500	pF	
$t_{d(on)}$	Turn-On Delay Time	All		28	35	ns	V_{DD} = 30V , $I_D \cong$ 20A R_g = 5Ω , R_L = 1.5Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		45	100	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		100	125	ns	
t_f	Fall Time	All		50	100	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			0.83	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF150,151			−40	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRF152,153			−33	A	
I_{SM}	Source Current[1] (Body Diode)	IRF150,151			−160	A	
		IRF152,153			−132	A	
V_{SD}	Diode Forward Voltage[1]	IRF150,151			−2.5	V	T_C=25°C, I_S=−40A, V_{GS} = 0
		IRF152,153			−2.3	V	T_C=25°C, I_S=−33A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J = 150°C , I_F = I_S, dI_F/ds = 100 A/μs

1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC10–2

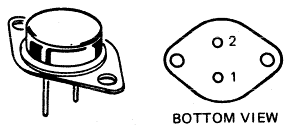
IRF220 ■ IRF221 ■ IRF222 ■ IRF223

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF220	200	0.8	T0–204AA
IRF221	150	0.8	T0–204AA
IRF222	200	1.2	T0–204AA
IRF223	150	1.2	T0–204AA

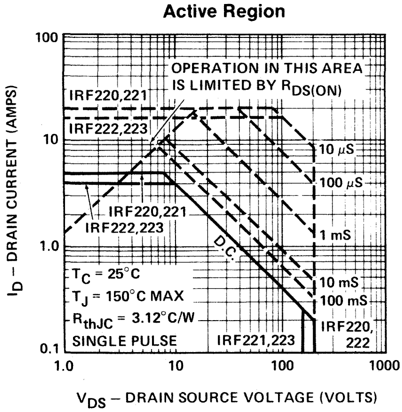
For Additional Curves
See Section 5: VNDD20

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

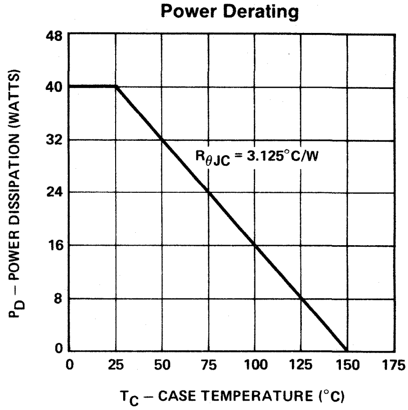
	Parameter	IRF220	IRF221	IRF222	IRF223	Units
V_{DS}	Drain-Source Voltage	200	150	200	150	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	200	150	200	150	V
I_D @ T_C = 25° C	Continuous Drain Current	±5	±5	±4	±4	A
I_D @ T_C = 100° C	Continuous Drain Current	±3	±3	±2.5	±2.5	A
I_{DM}	Pulsed Drain Current[1]	±20	±20	±16	±16	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	40	40	40	40	W
P_D @ T_C = 100°C	Max. Power Dissipation	16	16	16	16	W
Junction to Case	Linear Derating Factor	0.32	0.32	0.32	0.32	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF220,222	200			V	V_{GS} = 0, I_D = 250 μA
		IRF221,223	150			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		4	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS}= 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF220,221	5.0			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF222,223	4.0			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF220,221		1.25	2.0	V	V_{GS} = 10V, I_D = 2.5A
		IRF222,223		2.0	3.0	V	V_{GS} = 10V, I_D = 2.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF220,221		0.5	0.8	Ω	V_{GS} = 10V, I_D = 2.5A
		IRF222,223		0.8	1.2	Ω	V_{GS} = 10V, I_D = 2.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF220,221		0.9	1.52	Ω	V_{GS} =10V, I_D =2.5A T_C =125°C
		IRF222,223		1.44	2.28	Ω	V_{GS} =10V, I_D =2.5A T_C =125°C

DYNAMIC

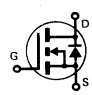
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1.3	1.6		S (℧)	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D = 2.5A
C_{iss}	Input Capacitance	All		300	600	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		125	300	pF	
C_{rss}	Reverse Transfer Capacitance	All		50	80	pF	
$t_{d(on)}$	Turn-On Delay Time	All		9.0	40	ns	V_{DD} = 75V, $I_D \cong$ 2.5A, R_g = 25Ω, R_L = 30Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		30	60	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		40	60	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			3.125	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF220,221			−5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRF222,223			−4	A	
I_{SM}	Source Current[1] (Body Diode)	IRF220,221			−20	A	
		IRF222,223			−16	A	
V_{SD}	Diode Forward Voltage[1]	IRF220,221			−2	V	T_C =25°C, I_S =−5A, V_{GS} = 0
		IRF222,223			−1.8	V	T_C =25°C, I_S =−4A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		250		ns	T_J =150°C, I_F = I_S, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDD20

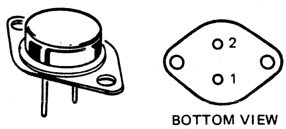
IRF230 ■ IRF231 ■ IRF232 ■ IRF233

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA(T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF230	200	0.4	T0–204AA
IRF231	150	0.4	T0–204AA
IRF232	200	0.6	T0–204AA
IRF233	150	0.6	T0–204AA

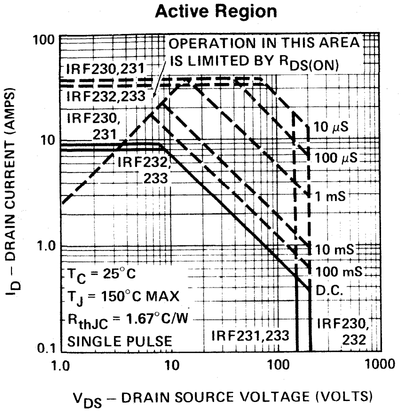
For Additional Curves
See Section 5: VNDE20

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

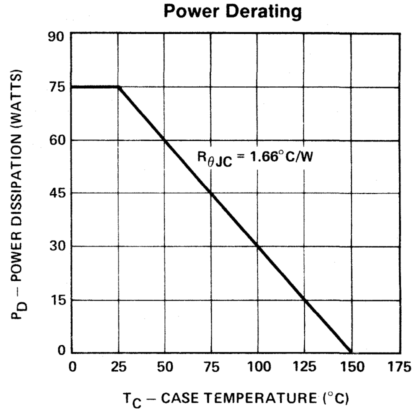
	Parameter	IRF230	IRF231	IRF232	IRF233	Units
V_{DS}	Drain-Source Voltage	200	150	200	150	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	200	150	200	150	V
I_D @ T_C = 25° C	Continuous Drain Current	±9	±9	±8	±8	A
I_D @ T_C = 100° C	Continuous Drain Current	±6	±6	±5	±5	A
I_{DM}	Pulsed Drain Current[1]	±36	±36	±32	±32	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	75	75	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	30	30	30	W
Junction to Case	Linear Derating Factor	0.6	0.6	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ≤ 300µsec, Duty Cycle ≤ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF230,232	200			V	V_{GS} = 0 I_D = 250 μA
		IRF231,233	150			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF230,231	9.0			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF232,233	8.0			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF230,231		1.25	2.0	V	V_{GS} = 10V , I_D = 5.0A
		IRF232,233		2.0	3.0	V	V_{GS} = 10V , I_D = 5.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF230,231		0.25	0.4	Ω	V_{GS} = 10V , I_D = 5.0A
		IRF232,233		0.4	0.6	Ω	V_{GS} = 10V , I_D = 5.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF230,231		0.54	0.76	Ω	V_{GS} =10V, I_D =5.0A, T_C = 125°C
		IRF232,233		0.86	1.14	Ω	V_{GS} =10V, I_D =5.0A, T_C = 125°C

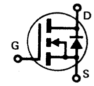
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3.0	5.8		S (℧)	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D = 5.0A
C_{iss}	Input Capacitance	All		780	800	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		150	450	pF	
C_{rss}	Reverse Transfer Capacitance	All		55	150	pF	
$t_{d(on)}$	Turn-On Delay Time	All		9.0	30	ns	V_{DD} = 75V , $I_D \cong$ 5.0A R_g = 7.5Ω , R_L = 15Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		18	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		45	50	ns	
t_f	Fall Time	All		27	40	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.67	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF230,231			−9	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRF232,233			−8	A	
I_{SM}	Source Current[1] (Body Diode)	IRF230,231			−36	A	
		IRF232,233			−32	A	
V_{SD}	Diode Forward Voltage[1]	IRF230,231			−2	V	T_C = 25°C , I_S = −9A, V_{GS} = 0
		IRF232,233			−1.8	V	T_C = 25°C , I_S = −8A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		250		ns	T_J =150°C , $I_F = I_S$, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE20

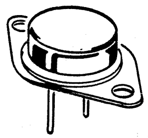
IRF240 ■ IRF241 ■ IRF242 ■ IRF243

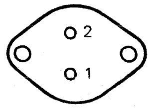
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers





BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AE (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF240	200	0.18	T0–204AE
IRF241	150	0.18	T0–204AE
IRF242	200	0.22	T0–204AE
IRF243	150	0.22	T0–204AE

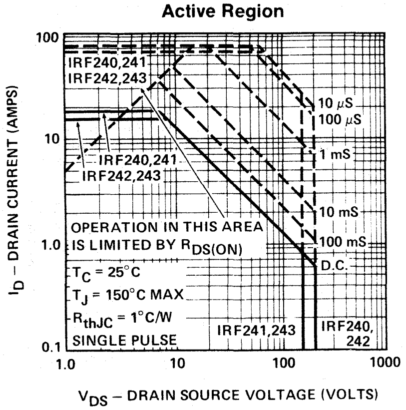
For Additional Curves See Section 5: VNDC20

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

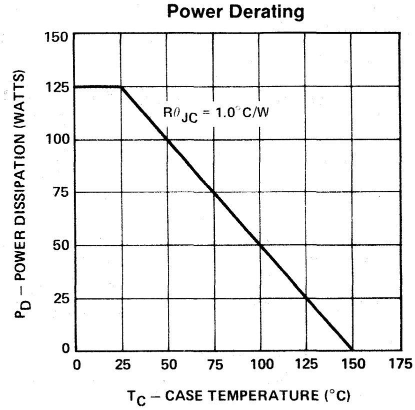
	Parameter	IRF240	IRF241	IRF242	IRF243	Units
V_{DS}	Drain-Source Voltage	200	150	200	150	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	200	150	200	150	V
I_D @ T_C = 25° C	Continuous Drain Current	±18	±18	±16	±16	A
I_D @ T_C = 100° C	Continuous Drain Current	±11	±11	±10	±10	A
I_{DM}	Pulsed Drain Current[1]	±72	±72	±64	±64	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	125	125	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	50	50	W
Junction to Case	Linear Derating Factor	1.0	1.0	1.0	1.0	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF240,242	200			V	V_{GS} = 0, I_D = 250μA
		IRF241,243	150			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS}= 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF240,241	18			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
		IRF242,243	16			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF240,241		1.4	1.8	V	V_{GS} = 10V, I_D = 10A
		IRF242,243		2.0	2.2	V	V_{GS} = 10V, I_D = 10A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF240,241		0.14	0.18	Ω	V_{GS} = 10V, I_D = 10A
		IRF242,243		0.2	0.22	Ω	V_{GS} = 10V, I_D = 10A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF240,241		0.28	0.36	Ω	V_{GS} =10V, I_D =10A, T_C =125°C
		IRF242,243		0.40	0.44	Ω	V_{GS} =10V, I_D =10A, T_C =125°C

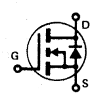
DYNAMIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	6.0	9		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 10A
C_{iss}	Input Capacitance	All		1000	1600	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		250	750	pF	
C_{rss}	Reverse Transfer Capacitance	All		100	300	pF	
$t_{d(on)}$	Turn-On Delay Time	All		17	30	ns	V_{DD} = 75V, $I_D \cong$ 10A, R_g = 5Ω, R_L = 7.3Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		52	60	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		36	80	ns	
t_f	Fall Time	All		30	60	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF240,241			–18	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRF242,243			–16	A	
I_{SM}	Source Current[1] (Body Diode)	IRF240,241			–72	A	
		IRF242,243			–64	A	
V_{SD}	Diode Forward Voltage[1]	IRF240,241			–2	V	T_C=25°C, I_S=–18A, V_{GS} = 0
		IRF242,243			–1.9	V	T_C=25°C, I_S=–16A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		350		ns	T_J =150°C, I_F = I_S, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

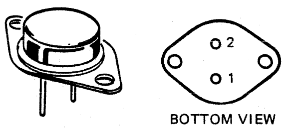
Data Sheet Curves: VNDC20

IRF250 ■ IRF251 ■ IRF252 ■ IRF253

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS
- Switching Regulators
- Converters
- Motor Drivers



BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AE (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF250	200	.085	T0–204AE
IRF251	150	.085	T0–204AE
IRF252	200	0.12	T0–204AE
IRF253	150	0.12	T0–204AE

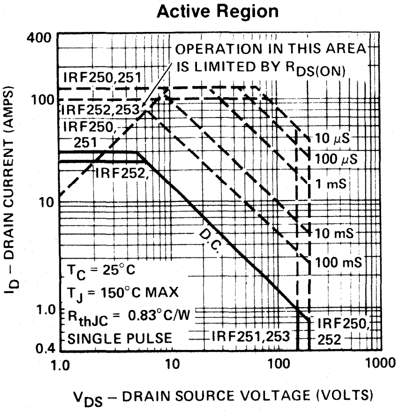
For Additional Curves
See Section 5: VNDC20–2

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

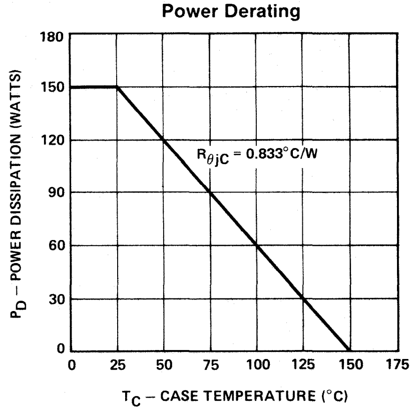
	Parameter	IRF250	IRF251	IRF252	IRF253	Units
V_{DS}	Drain-Source Voltage	200	150	200	150	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	200	150	200	150	V
I_D @ T_C = 25° C	Continuous Drain Current	± 30	± 30	±25	±25	A
I_D @ T_C = 100° C	Continuous Drain Current	±19	±19	±16	±16	A
I_{DM}	Pulsed Drain Current[1]	±120	±120	±100	±100	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	150	150	150	150	W
P_D @ T_C = 100°C	Max. Power Dissipation	60	60	60	60	W
Junction to Case	Linear Derating Factor	1.2	1.2	1.2	1.2	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF250,252	200			V	V_{GS} = 0, I_D = 250 μA
		IRF251,253	150			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1	mA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF250,251	30			A	$V_{DS} \geq 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF252,253	25			A	$V_{DS} \geq 2\ V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF250,251		1.12	1.36	V	V_{GS} = 10V, I_D = 16A
		IRF252,253		1.44	1.92	V	V_{GS} = 10V, I_D = 16A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF250,251		0.07	0.085	Ω	V_{GS} = 10V, I_D = 16A
		IRF252,253		0.09	0.12	Ω	V_{GS} = 10V, I_D = 16A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF250,251		0.13	0.16	Ω	V_{GS} =10V, I_D =16A, T_C =125°C
		IRF252,253		0.17	0.23	Ω	V_{GS} =10V, I_D =16A, T_C =125°C

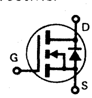
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	8.0	12.5		S (℧)	$V_{DS} \geq 2\ V_{DS(ON)}$, I_D = 16A
C_{iss}	Input Capacitance	All		2400	3000	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		600	1200	pF	
C_{rss}	Reverse Transfer Capacitance	All		250	500	pF	
$t_{d(on)}$	Turn-On Delay Time	All		25	35	ns	V_{DD} = 75V, $I_D \cong$ 16A, R_g = 5Ω, R_L = 4.5Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		60	100	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		85	125	ns	
t_f	Fall Time	All		38	100	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			0.83	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF250,251			−30	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRF252,253			−25	A	
I_{SM}	Source Current[1] (Body Diode)	IRF250,251			−120	A	
		IRF252,253			−100	A	
V_{SD}	Diode Forward Voltage[1]	IRF250,251			−2	V	T_C=25°C, I_S=−30A, V_{GS} = 0
		IRF252,253			−1.8	V	T_C=25°C, I_S=−25A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		350		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDC20–2

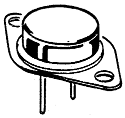
IRF320 ■ IRF321 ■ IRF322 ■ IRF323

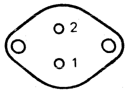
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers





BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF320	400	1.8	T0–204AA
IRF321	350	1.8	T0–204AA
IRF322	400	2.5	T0–204AA
IRF323	350	2.5	T0–204AA

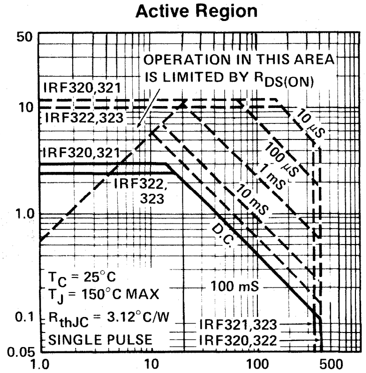
For Additional Curves
See Section 5: VNDD40

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

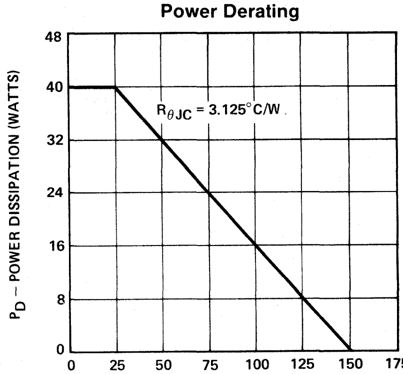
	Parameter	IRF320	IRF321	IRF322	IRF323	Units
V_{DS}	Drain-Source Voltage	400	350	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±3	±3	±2.5	±2.5	A
I_D @ T_C = 100° C	Continuous Drain Current	±2	±2	±1.5	±1.5	A
I_{DM}	Pulsed Drain Current[1]	±12	±12	±10	±10	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	40	40	40	40	W
P_D @ T_C = 100° C	Max. Power Dissipation	16	16	16	16	W
Junction to Case	Linear Derating Factor	0.32	0.32	0.32	0.32	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	.033	.033	W/° C
T_J / Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS ($T_C = 25°C$ unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF320,322	400			V	$V_{GS} = 0$, $I_D = 250\mu A$
		IRF321,323	350			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	$V_{DS} = V_{GS}$, $I_D = 1$ mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	$V_{GS} = 20$
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	$V_{GS} = -20V$
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, $V_{GS} = 0$
		All		0.2	1.0	mA	V_{DS} = 0.8 Max. Rating, $V_{GS} = 0$, $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	IRF320,321	3.0			A	$V_{DS} \geq 2V_{DS(ON)}$, $V_{GS} = 10V$
		IRF322,323	2.5			A	$V_{DS} \geq 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF320,321		2.25	2.7	V	$V_{GS} = 10V$, $I_D = 1.5A$
		IRF322,323		2.7	3.75	V	$V_{GS} = 10V$, $I_D = 1.5A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF320,321		1.5	1.8	Ω	$V_{GS} = 10V$, $I_D = 1.5A$
		IRF322,323		1.8	2.5	Ω	$V_{GS} = 10V$, $I_D = 1.5A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF320,321		2.96	3.55	Ω	$V_{GS} = 10V$, $I_D = 1.5A$, $T_C = 125°C$
		IRF322,323		3.55	4.93	Ω	$V_{GS} = 10V$, $I_D = 1.5A$, $T_C = 125°C$

DYNAMIC

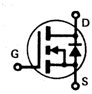
g_{fs}	Forward Transductance[1]	All	1.0	1.2		S (℧)	$V_{DS} \geq 2\ V_{DS}$, $I_D = 1.5A$
C_{iss}	Input Capacitance	All		350	600	pF	$V_{GS} = 0$, $V_{DS} = 25V$, f = 1 MHz
C_{oss}	Output Capacitance	All		40	200	pF	
C_{rss}	Reverse Transfer Capacitance	All		20	40	pF	
$t_{d(on)}$	Turn-On Delay Time	All		12	40	ns	$V_{DD} = 200V$, $I_D \cong 1.5A$, $R_g = 25\Omega$, $R_L = 130\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		8	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		25	50	ns	

THERMAL RESISTANCE

R_{thJC}	Junction-to-Case	All			3.125	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)	IRF320,321			−3	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRF322,323			−2.5	A	
I_{SM}	Source Current[1] (Body Diode)	IRF320,321			−12	A	
		IRF322,323			−10	A	
V_{SD}	Diode Forward Voltage[1]	IRF320,321			−1.6	V	$T_C = 25°C$, $I_S = -3A$, $V_{GS} = 0$
		IRF322,323			−1.5	V	$T_C = 25°C$, $I_S = -2.5A$, $V_{GS} = 0$
t_{rr}	Reverse Recovery Time	All		250		ns	$T_J = 150°C$, $I_F = I_S$, $dI_F/ds = 100\ A/\mu s$



1 **Pulse Test:** Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDD40

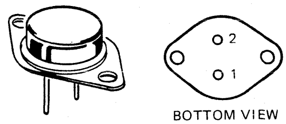
IRF330 ■ IRF331 ■ IRF332 ■ IRF333

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF330	400	1.0	T0–204AA
IRF331	350	1.0	T0–204AA
IRF332	400	1.5	T0–204AA
IRF333	350	1.5	T0–204AA

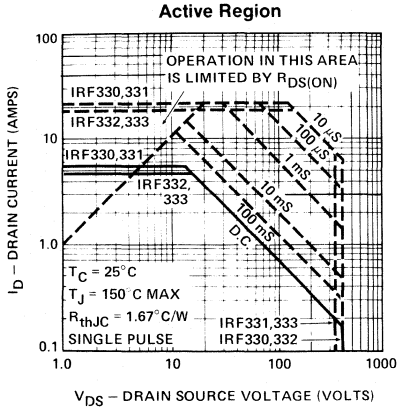
For Additional Curves
See Section 5: VNDE40

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

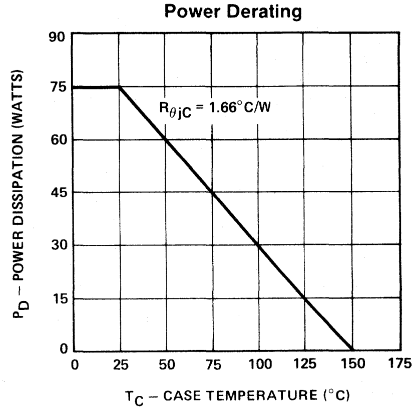
	Parameter	IRF330	IRF331	IRF332	IRF333	Units
V_{DS}	Drain-Source Voltage	400	350	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±5.5	±5.5	±4.5	±4.5	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.5	±3.5	±3	±3	A
I_{DM}	Pulsed Drain Current[1]	±22	±22	±18	±18	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	75	75	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	30	30	30	W
Junction to Case	Linear Derating Factor	0.6	0.6	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF330,332	400			V	V_{GS} = 0, I_D = 250μA
		IRF331,333	350			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1	mA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0, T_C = 125° C
$I_{D(on)}$	On-State Drain Current[1]	IRF330,331	5.5			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		IRF332,333	4.5			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF330,331		2.4	3.0	V	V_{GS} = 10V, I_D = 3.0A
		IRF332,333		3.9	4.5	V	V_{GS} = 10V, I_D = 3.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF330,331		0.8	1.0	Ω	V_{GS} = 10V, I_D = 3.0A
		IRF332,333		1.3	1.5	Ω	V_{GS} = 10V, I_D = 3.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF330,331		1.6	2.0	Ω	V_{GS} =10V, I_D =3.0A T_C =125° C
		IRF332,333		2.6	3.0	Ω	V_{GS} =10V, I_D =3.0A T_C =125° C

DYNAMIC

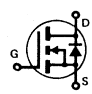
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3.0	3.6		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 3.0A
C_{iss}	Input Capacitance	All		700	900	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		70	300	pF	
C_{rss}	Reverse Transfer Capacitance	All		20	80	pF	
$t_{d(on)}$	Turn-On Delay Time	All		18	30	ns	V_{DD} =175V $I_D \cong$ 3.0A, R_g = 10Ω, R_L = 50Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	35	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		40	55	ns	
t_f	Fall Time	All		25	35	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.66	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF330,331			–5.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRF332,333			–4.5	A	
I_{SM}	Source Current[1] (Body Diode)	IRF330,331			–22	A	
		IRF332,333			–18	A	
V_{SD}	Diode Forward Voltage[1]	IRF330,331			–1.6	V	T_C=25° C, I_S=–5.5A, V_{GS} = 0
		IRF332,333			–1.5	V	T_C=25° C, I_S=–4.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		300		ns	T_J =150° C, I_F = I_S, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE40

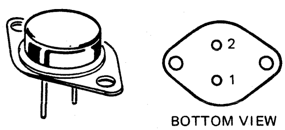
IRF340 ■ IRF341 ■ IRF342 ■ IRF343

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF340	400	0.55	T0–204AA
IRF341	350	0.55	T0–204AA
IRF342	400	0.8	T0–204AA
IRF343	350	0.8	T0–204AA

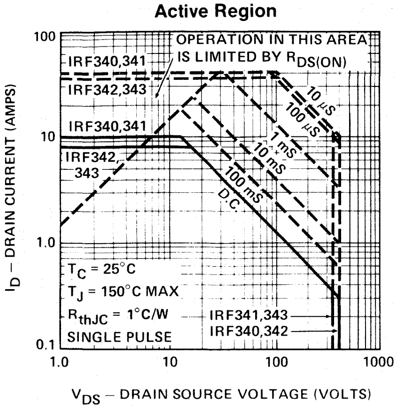
For Additional Curves
See Section 5: VNDC40

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

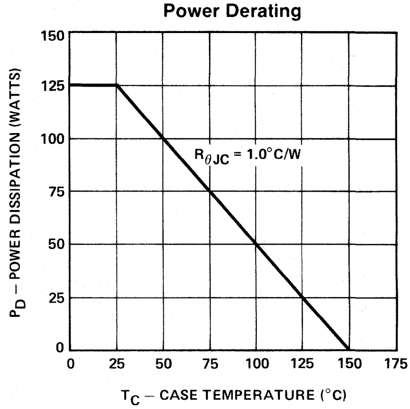
	Parameter	IRF340	IRF341	IRF342	IRF343	Units
V_{DS}	Drain-Source Voltage	400	350	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±10	±10	±8	±8	A
I_D @ T_C = 100° C	Continuous Drain Current	±6	±6	±5	±5	A
I_{DM}	Pulsed Drain Current[1]	±40	±40	±32	±32	A
V_{GS}	Gate-Source Voltage	±40	± 40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	125	125	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	50	50	W
Junction to Case	Linear Derating Factor	1.0	1.0	1.0	1.0	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	.033	.033	W/° C
T_J / Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF340,342	400			V	V_{GS} = 0, I_D = 250 μA
		IRF341,343	350			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF340,341	10			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF342,343	8.0			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF340,341		2.35	2.75	V	V_{GS} = 10V, I_D = 5.0A
		IRF342,343		3.40	4.00	V	V_{GS} = 10V, I_D = 5.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF340,341		0.47	0.55	Ω	V_{GS} = 10V, I_D = 5.0A
		IRF342,343		0.68	0.80	Ω	V_{GS} = 10V, I_D = 5.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF340,341		0.93	1.10	Ω	V_{GS} =10V, I_D =5.0A T_C =125°C
		IRF342,343		1.40	1.60	Ω	V_{GS} =10V, I_D =5.0A T_C =125°C

DYNAMIC

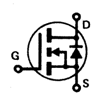
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	4.0	4.4		S (℧)	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D = 5.0A
C_{iss}	Input Capacitance	All		1150	1600	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		165	450	pF	
C_{rss}	Reverse Transfer Capacitance	All		70	150	pF	
$t_{d(on)}$	Turn-On Delay Time	All		17	35	ns	V_{DD} =175V, $I_D \cong$ 5.0A, R_g = 5Ω, R_L = 35Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		12	15	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		45	90	ns	
t_f	Fall Time	All		30	35	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.0	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF340,341			−10	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRF342,343			−8	A	
I_{SM}	Source Current[1] (Body Diode)	IRF340,341			−40	A	
		IRF342,343			−32	A	
V_{SD}	Diode Forward Voltage[1]	IRF340,341			−2	V	T_C=25°C, I_S=−10A, V_{GS} = 0
		IRF342,343			−1.9	V	T_C =25°C, I_S =−8A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC40

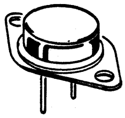
IRF350 ■ IRF351 ■ IRF352 ■ IRF353

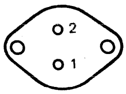
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers





BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF350	400	0.3	T0–204AA
IRF351	350	0.3	T0–204AA
IRF352	400	0.4	T0–204AA
IRF353	350	0.4	T0–204AA

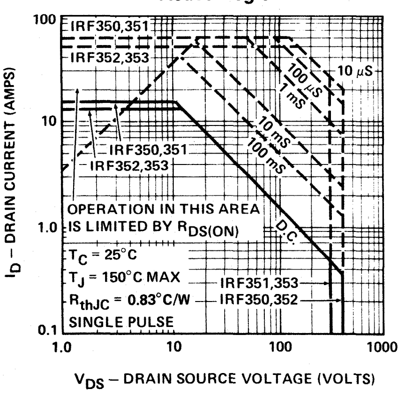
For Additional Curves
See Section 5: VNDC40–2

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

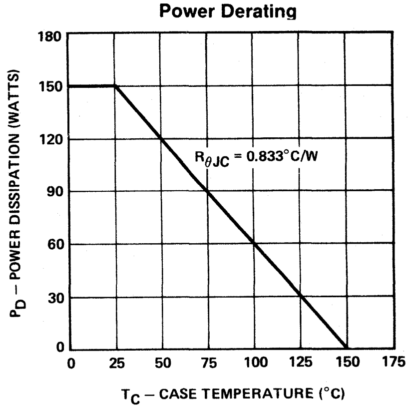
	Parameter	IRF350	IRF351	IRF352	IRF353	Units
V_{DS}	Drain-Source Voltage	400	350	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±15	±15	±13	±13	A
I_D @ T_C = 100° C	Continuous Drain Current	±9	±9	±8	±8	A
I_{DM}	Pulsed Drain Current[1]	±60	±60	±52	±52	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	150	150	150	150	W
P_D @ T_C = 100°C	Max. Power Dissipation	60	60	60	60	W
Junction to Case	Linear Derating Factor	1.2	1.2	1.2	1.2	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF350,352	400			V	V_{GS} = 0 I_D = 250 μA
		IRF351,353	350			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS}= 0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF350,351	15			A	$V_{DS} \geq 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF352,353	13			A	$V_{DS} \geq 2\ V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF350,351		2.0	2.4	V	V_{GS} = 10V , I_D = 8.0A
		IRF352,352		2.4	3.2	V	V_{GS} = 10V , I_D = 8.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF350,351		0.25	0.3	Ω	V_{GS} = 10V , I_D = 8.0A
		IRF352,353		0.3	0.4	Ω	V_{GS} = 10V , I_D = 8.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF350,351		0.50	0.60	Ω	V_{GS} = 10V, I_D =8.0A, T_C =125°C
		IRF352,353		0.60	0.80	Ω	V_{GS} = 10V, I_D =8.0A T_C =125°C

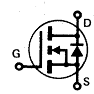
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	8.0	9.6		S (℧)	$V_{DS} \geq 2\ V_{DS(ON)}$, I_D = 8.0A
C_{iss}	Input Capacitance	All		2900	3000	pF	V_{GS} = 0 ,V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		450	600	pF	
C_{rss}	Reverse Transfer Capacitance	All		150	200	pF	
$t_{d(on)}$	Turn-On Delay Time	All		30	35	ns	V_{DD} =200V, $I_D \cong$ 8.0A R_g = 5Ω , R_L = 25Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		40	65	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		80	150	ns	
t_f	Fall Time	All		30	75	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			0.83	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF350,351			−15	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRF352,353			−13	A	
I_{SM}	Source Current[1] (Body Diode)	IRF350,351			−60	A	
		IRF352,353			−52	A	
V_{SD}	Diode Forward Voltage[1]	IRF350,351			−1.6	V	T_C=25°C, I_S=−15A, V_{GS} = 0
		IRF352,353			−1.5	V	T_C=25°C, I_S=−13A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =100°C , $I_F = I_S$, dI_F/ds = 100 A/μs

1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC40–2

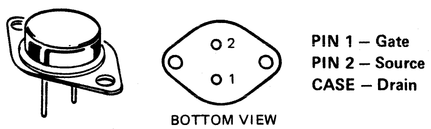
IRF420 ■ IRF421 ■ IRF422 ■ IRF423

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF420	500	3.0	T0–204AA
IRF421	450	3.0	T0–204AA
IRF422	500	4.0	T0–204AA
IRF423	450	4.0	T0–204AA

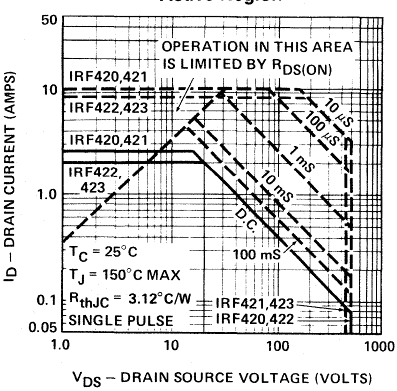
For Additional Curves
See Section 5: VNDD50

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

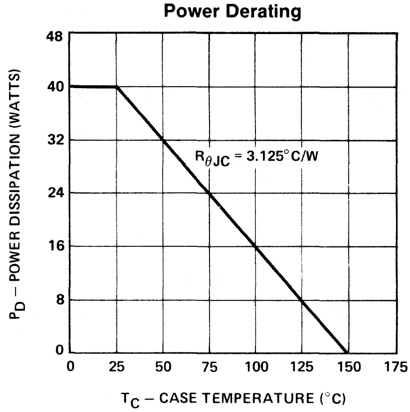
	Parameter	IRF420	IRF421	IRF422	IRF423	Units
V_{DS}	Drain-Source Voltage	500	450	500	450	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500		500	450	V
I_D @ T_C = 25° C	Continuous Drain Current	±2.5	±2.5	±2	±2	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.5	±1.5	±1	±1	A
I_{DM}	Pulsed Drain Current[1]	±10	±10	±8	±8	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	40		40	40	W
P_D @ T_C = 100°C	Max. Power Dissipation	16	16	16	16	W
Junction to Case	Linear Derating Factor	0.32	0.32	0.32	0.32	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF420,422	500			V	V_{GS} = 0, I_D = 250 μA
		IRF421,423	450			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF420,421	2.5			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF422,423	2.0			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF420,421		2.5	3.0	V	V_{GS} = 10V, I_D = 1.0A
		IRF422,423		3.0	4.0	V	V_{GS} = 10V, I_D = 1.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF420,421		2.5	3.0	Ω	V_{GS} = 10V, I_D = 1.0A
		IRF422,423		3.0	4.0	Ω	V_{GS} = 10V, I_D = 1.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF420,421		4.8	5.7	Ω	V_{GS} =10V, I_D =1.0A, T_C =125°C
		IRF422,423		5.7	7.6	Ω	V_{GS} =10V, I_D =1.0A, T_C =125°C

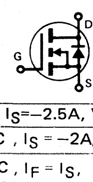
DYNAMIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1.0	1.4		S (℧)	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D = 1.0A
C_{iss}	Input Capacitance	All		330	400	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		75	150	pF	
C_{rss}	Reverse Transfer Capacitance	All		32	40	pF	
$t_{d(on)}$	Turn-On Delay Time	All		9	60	ns	V_{DD} =250V, $I_D \cong$ 1.0A, R_g = 25Ω, R_L = 246Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		18	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		41	60	ns	
t_f	Fall Time	All		27	30	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			3.12	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF420,421			−2.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRF422,423			−2	A	
I_{SM}	Source Current[1] (Body Diode)	IRF420,421			−10	A	
		IRF422,423			−8	A	
V_{SD}	Diode Forward Voltage[1]	IRF420,421			−1.4	V	T_C=25°C, I_S=−2.5A, V_{GS} = 0
		IRF422,423			−1.3	V	T_C = 25°C, I_S = −2A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		150		ns	T_J =150°C, I_F = I_S, dI_F/ds = 100 A/μs

1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDD50

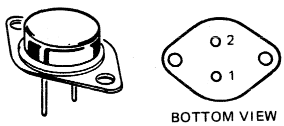
IRF430 ■ IRF431 ■ IRF432 ■ IRF433

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF430	500	1.5	T0–204AA
IRF431	450	1.5	T0–204AA
IRF432	500	2.0	T0–204AA
IRF433	450	2.0	T0–204AA

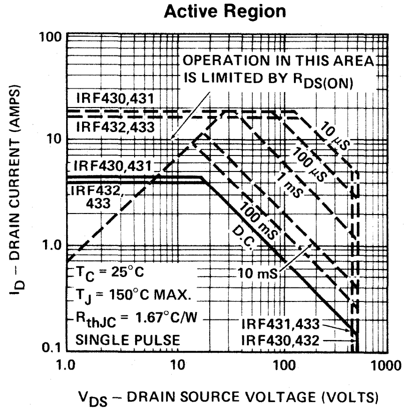
For Additional Curves
See Section 5: VNDE50

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

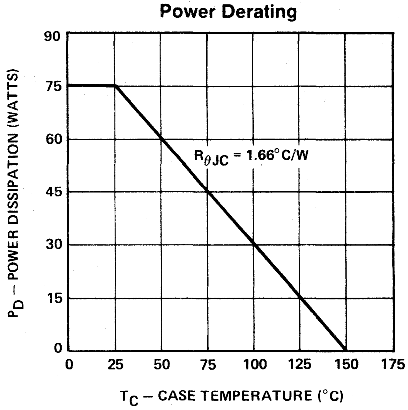
	Parameter	IRF430	IRF431	IRF432	IRF433	Units
V_{DS}	Drain-Source Voltage	500	450	500	450	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500	450	500	450	V
I_D @ T_C = 25° C	Continuous Drain Current	±4.5	±4.5	±4	±4	A
I_D @ T_C = 100° C	Continuous Drain Current	±3	±3	±2.5	±2.5	A
I_{DM}	Pulsed Drain Current[1]	±18	±18	±16	±16	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	75	75	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	30	30	30	W
Junction to Case	Linear Derating Factor	0.6	0.6	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF430,432	500			V	V_{GS} = 0, I_D = 250 μA
		IRF431,433	450			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS}= 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF430,431	4.5			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF432,433	4.0			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF430,431		3.25	3.75	V	V_{GS} = 10V , I_D = 2.5A
		IRF432,433		3.75	5.0	V	V_{GS} = 10V , I_D = 2.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF430,431		1.3	1.5	Ω	V_{GS} = 10V , I_D = 2.5A
		IRF432,433		1.5	2.0	Ω	V_{GS} = 10V , I_D = 2.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF430,431		2.9	3.3	Ω	V_{GS} =10V, I_D =2.5A T_C =125°C
		IRF432,433		3.3	4.4	Ω	V_{GS} =10V, I_D =2.5A T_C =125°C

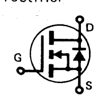
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	2.8		S (℧)	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D = 2.5A
C_{iss}	Input Capacitance	All		700	800	pF	V_{GS} = 0 ,V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		90	200	pF	
C_{rss}	Reverse Transfer Capacitance	All		30	60	pF	
$t_{d(on)}$	Turn-On Delay Time	All		18	30	ns	V_{DD} =225V $I_D \cong$ 2.5A, R_g = 7.5Ω , R_L = 88Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	30	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		42	55	ns	
t_f	Fall Time	All		25	30	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.66	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF430,431			−4.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRF432,433			−4	A	
I_{SM}	Source Current[1] (Body Diode)	IRF430,431			−18	A	
		IRF432,433			−16	A	
V_{SD}	Diode Forward Voltage[1]	IRF430,431			−1.4	V	T_C=25°C, I_S=−4.5A, V_{GS} = 0
		IRF432,433			−1.3	V	T_C = 25°C , I_S =−4A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		300		ns	T_J =150°C , I_F = I_S, dI_F/ds = 100 A/μs

1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE50

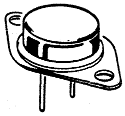
IRF440 ■ IRF441 ■ IRF442 ■ IRF443

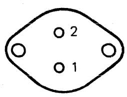
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers





BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF440	500	0.85	T0–204AA
IRF441	450	0.85	T0–204AA
IRF442	500	1.1	T0–204AA
IRF443	450	1.1	T0–204AA

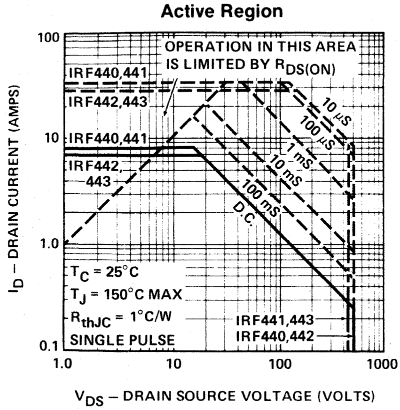
For Additional Curves
See Section 5: VNDC50

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

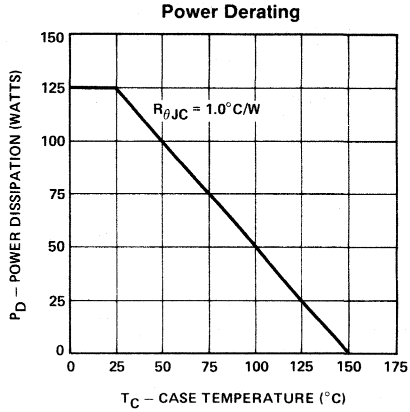
	Parameter	IRF440	IRF441	IRF442	IRF443	Units
V_{DS}	Drain-Source Voltage	500	450	500	450	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500	450	500	450	V
I_D @ T_C = 25° C	Continuous Drain Current	±8	±8	±7	±7	A
I_D @ T_C = 100° C	Continuous Drain Current	±5	±5	±4	±4	A
I_{DM}	Pulsed Drain Current[1]	±32	±32	±28	±28	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	125	125	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	50	50	W
Junction to Case	Linear Derating Factor	1.0	1.0	1.0	1.0	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF440,442	500			V	V_{GS} = 0, I_D = 250μA
		IRF441,443	450			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS}= 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF440,441	8.0			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		IRF442,443	7.0			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF440,441		3.2	3.4	V	V_{GS} = 10V, I_D = 4.0A
		IRF442,443		4.0	4.4	V	V_{GS} = 10V, I_D = 4.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF440,441		0.8	0.85	Ω	V_{GS} = 10V, I_D = 4.0A
		IRF442,443		1.0	1.1	Ω	V_{GS} = 10V, I_D = 4.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF440,441		1.50	1.65	Ω	V_{GS} =10V, I_D =4.0A T_C =125°C
		IRF442,443		1.95	2.15	Ω	V_{GS} =10V, I_D =4.0A T_C =125°C

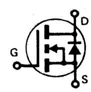
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	4.0	4.8		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 4.0A
C_{iss}	Input Capacitance	All		1225	1600	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		200	350	pF	
C_{rss}	Reverse Transfer Capacitance	All		85	150	pF	
$t_{d(on)}$	Turn-On Delay Time	All		17	35	ns	V_{DD} = 200V $I_D \cong$ 4.0A, R_g = 5Ω, R_L = 49Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		5	15	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		42	90	ns	
t_f	Fall Time	All		14	30	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.0	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF440,441			−8	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRF442,443			−7	A	
I_{SM}	Source Current[1] (Body Diode)	IRF440,441			−32	A	
		IRF442,443			−28	A	
V_{SD}	Diode Forward Voltage[1]	IRF440,441			−2	V	T_C = 25°C, I_S = −8A, V_{GS} = 0
		IRF442,443			−1.9	V	T_C = 25°C, I_S = −7A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs

1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC50

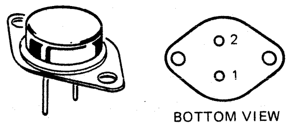
IRF450 ■ IRF451 ■ IRF452 ■ IRF453

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF450	500	0.4	T0–204AA
IRF451	450	0.4	T0–204AA
IRF452	500	0.5	T0–204AA
IRF453	450	0.5	T0–204AA

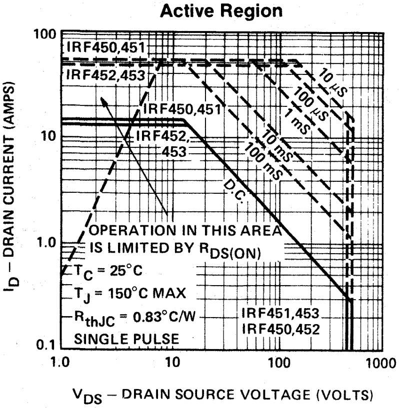
For Additional Curves
See Section 5: VNDC50–2

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

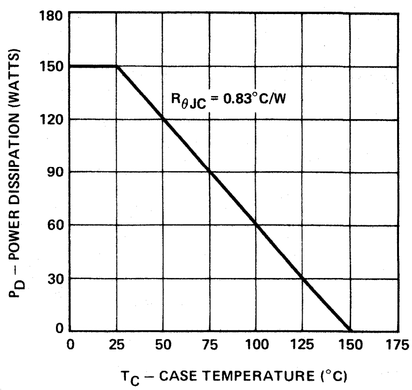
	Parameter	IRF450	IRF451	IRF452	IRF453	Units
V_{DS}	Drain-Source Voltage	500	450	500	450	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500	450	500	450	V
I_D @ T_C = 25° C	Continuous Drain Current	±13	±13	±12	±12	A
I_D @ T_C = 100° C	Continuous Drain Current	±8	±8	±7	±7	A
I_{DM}	Pulsed Drain Current[1]	±52	±52	±48	±48	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	150	150	150	150	W
P_D @ T_C = 100°C	Max. Power Dissipation	60	60	60	60	W
Junction to Case	Linear Derating Factor	1.2	1.2	1.2	1.2	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 Pulse Test: Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF450,452	500			V	V_{GS} = 0, I_D = 250μA
		IRF451,453	450			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS}= 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF450,451	13			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
		IRF452,453	12			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF450,451		2.1	2.8	V	V_{GS} = 10V, I_D = 7.0A
		IRF452,453		2.8	3.5	V	V_{GS} = 10V, I_D = 7.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF450,451		0.3	0.4	Ω	V_{GS} = 10V, I_D = 7.0A
		IRF452,453		0.4	0.5	Ω	V_{GS} = 10V, I_D = 7.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF450,451		0.66	0.88	Ω	V_{GS} =10V, I_D =7.0A, T_C =125°C
		IRF452,453		0.88	1.10	Ω	V_{GS} =10V, I_D =7.0A, T_C =125°C

DYNAMIC

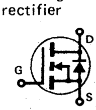
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	6.0	7.2		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 7.0A
C_{iss}	Input Capacitance	All		2600	3000	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		280	600	pF	
C_{rss}	Reverse Transfer Capacitance	All		40	200	pF	
$t_{d(on)}$	Turn-On Delay Time	All		33	35	ns	V_{DD} =210V $I_D \cong$ 7.0A, R_g = 5Ω, R_L = 30Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		46	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		75	150	ns	
t_f	Fall Time	All		31	70	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			0.83	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF450,451			–13	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRF452,453			–12	A	
I_{SM}	Source Current[1] (Body Diode)	IRF450,451			–52	A	
		IRF452,453			–48	A	
V_{SD}	Diode Forward Voltage[1]	IRF450,451			–1.4	V	T_C=25°C, I_S=–13A, V_{GS} = 0
		IRF452,453			–1.3	V	T_C=25°C, I_S=–12A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDC50–2

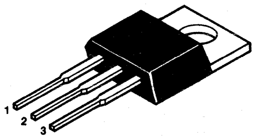
IRF510 ■ IRF511 ■ IRF512 ■ IRF513

Siliconix
PRELIMINARY

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Power Supplies
- Motor Controls
- Inverters



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF510	100	0.6	T0–220AB
IRF511	60	0.6	T0–220AB
IRF512	100	0.8	T0–220AB
IRF513	60	0.8	T0–220AB

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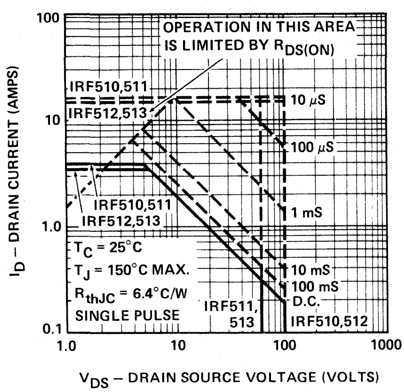
ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

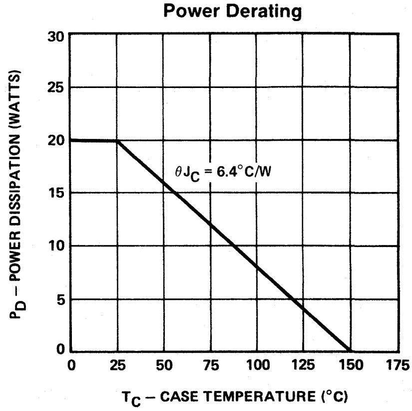
	Parameter	IRF510	IRF511	IRF512	IRF513	Units
V_{DS}	Drain-Source Voltage	100	60	100	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	60	100	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±4	±4	±3.5	±3.5	A
I_D @ T_C = 100° C	Continuous Drain Current	±2.5	±2.5	±2	±2	A
I_{DM}	Pulsed Drain Current[1]	±16	±16	±14	±14	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20	20	20	20	W
P_D @ T_C = 100°C	Max. Power Dissipation	8	8	8	8	W
Junction to Case	Linear Derating Factor	0.156	0.156	0.156	0.156	W/° C
Junction to Ambient	Linear Derating Factor	0.013	0.013	0.013	0.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	−55 To +150	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF510,512	100			V	V_{GS} = 0, I_D = 250 μA
		IRF511,513	60			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		4	V	$V_{DS} = V_{GS}$, I_D = 1mA
I_{GSSF}	Gate-Body Leakage Forward	All			500	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–500	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All			250	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All			1000	μA	V_{DS}=0.8Max. Rating, V_{GS}=0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF510,511	4			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		IRF512,513	3.5			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF510,511		1	1.2	V	V_{GS} = 10V, I_D = 2A
		IRF512,513		1.2	1.6	V	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF510,511		0.5	0.6	Ω	V_{GS} = 10V, I_D = 2A
		IRF512,513		0.6	0.8	Ω	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF510,511		0.88	1.05	Ω	V_{GS} =10V, I_D =2A, T_C =125°C
		IRF512,513		1.05	1.40	Ω	V_{GS} =10V, I_D =2A, T_C =125°C

DYNAMIC

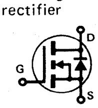
g_{fs}	Forward Transductance[1]	All	1	1.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 2A
C_{iss}	Input Capacitance	All		135	200	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		80	100	pF	
C_{rss}	Reverse Transfer Capacitance	All		20	25	pF	
$t_{d(on)}$	Turn-On Delay Time	All		10	20	ns	V_{DD} =0.5BV, $I_D \cong$ 2A, R_g = 25Ω, R_L =15Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		15	25	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		15	25	ns	
t_f	Fall Time	All		10	20	ns	

THERMAL RESISTANCE

R_{thJC}	Junction-to-Case	All			6.4	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)	IRF510,511			–4	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRF512,513			–3.5	A	
I_{SM}	Source Current[1] (Body Diode)	IRF510,511			–16	A	
		IRF512,513			–14	A	
V_{SD}	Diode Forward Voltage[1]	IRF510,511			–2.5	V	T_C = 25°C, I_S =–4A, V_{GS} = 0
		IRF512,513			–2	V	T_C=25°C, I_S=–3.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		230		ns	T_J =150°C, I_F = I_S, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

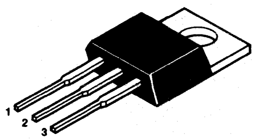
IRF520 ■ IRF521 ■ IRF522 ■ IRF523

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF520	100	0.3	T0–220AB
IRF521	60	0.3	T0–220AB
IRF522	100	0.4	T0–220AB
IRF523	60	0.4	T0–220AB

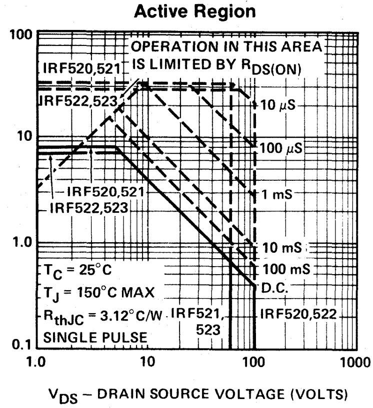
For Additional Curves
See Section 5: VNDD10

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

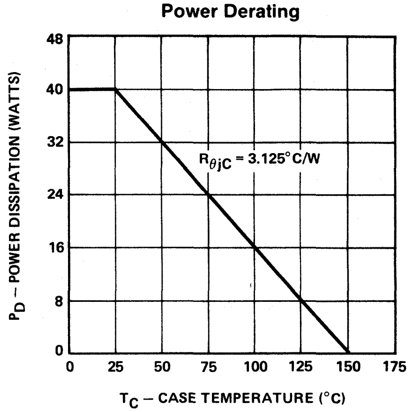
	Parameter	IRF520	IRF521	IRF522	IRF523	Units
V_{DS}	Drain-Source Voltage	100	60	100	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	60	100	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±8	±8	±7	±7	A
I_D @ T_C = 100° C	Continuous Drain Current	±5	±5	±4	±4	A
I_{DM}	Pulsed Drain Current[1]	±32	±32	±28	±28	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	40	40	40	40	W
P_D @ T_C = 100°C	Max. Power Dissipation	16	16	16	16	W
Junction to Case	Linear Derating Factor	0.32	0.32	0.32	0.32	W/° C
Junction to Ambient	Linear Derating Factor	.013	.013	.013	.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF520,522	100			V	V_{GS} = 0, I_D = 250 μA
		IRF521,523	60			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS}= 0.8 Max. Rating, V_{GS} = 0, T_C = 125° C
$I_{D(on)}$	On-State Drain Current[1]	IRF520,521	8.0			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF522,523	7.0			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF520,521		1.0	1.2	V	V_{GS} = 10V , I_D = 4.0A
		IRF522,523		1.2	1.6	V	V_{GS} = 10V , I_D = 4.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF520,521		0.25	0.3	Ω	V_{GS} = 10V , I_D = 4.0A
		IRF522,523		0.3	0.4	Ω	V_{GS} = 10V , I_D = 4.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF520,521		0.4	0.5	Ω	V_{GS} =10V, I_D =4.0A, T_C =125°C
		IRF522,523		0.5	0.65	Ω	V_{GS} =10V, I_D =4.0A, T_C =125°C

DYNAMIC

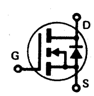
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1.5	2.5		S (℧)	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D = 4.0A
C_{iss}	Input Capacitance	All		370	600	pF	V_{GS} = 0 ,V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		160	400	pF	
C_{rss}	Reverse Transfer Capacitance	All		70	100	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	40	ns	V_{DD} = 30V , $I_D \cong$ 4.0A, R_g = 25Ω , R_L = 7Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		35	70	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		60	100	ns	
t_f	Fall Time	All		30	70	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			3.125	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF520,521			−8	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRF522,523			−7	A	
I_{SM}	Source Current[1] (Body Diode)	IRF520,521			−32	A	
		IRF522,523			−28	A	
V_{SD}	Diode Forward Voltage[1]	IRF520,521			−2.5	V	T_C =25°C , I_S =−8A, V_{GS} = 0
		IRF522,523			−2.3	V	T_C = 25°C , I_S = −7A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		280		ns	T_J =150°C , I_F = I_S, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDD10

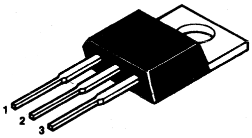
IRF530 ■ IRF531 ■ IRF532 ■ IRF533

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF530	100	0.18	T0–220AB
IRF531	60	0.18	T0–220AB
IRF532	100	0.25	T0–220AB
IRF533	60	0.25	T0–220AB

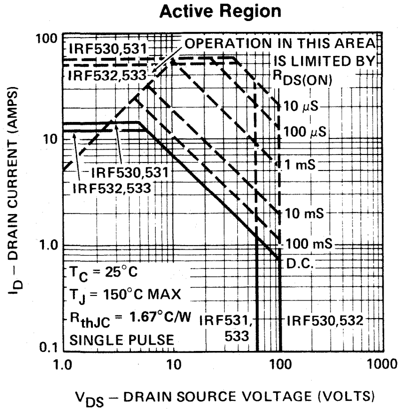
For Additional Curves
See Section 5: VNDE10

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

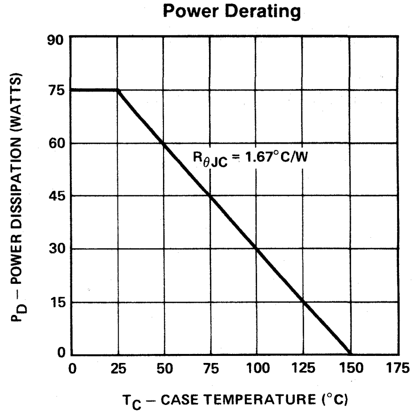
	Parameter	IRF530	IRF531	IRF532	IRF533	Units
V_{DS}	Drain-Source Voltage	100	60	100	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	60	100	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±14	±14	±12	±12	A
I_D @ T_C = 100° C	Continuous Drain Current	±9	±9	±8	±8	A
I_{DM}	Pulsed Drain Current[1]	±56	±56	±48	±48	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	75	75	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	30	30	30	W
Junction to Case	Linear Derating Factor	0.6	0.6	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	.0125	.0125	.0125	.0125	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 Pulse Test: Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF530,532	100			V	V_{GS} = 0, I_D = 250 μA
		IRF531,533	60			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		4	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS}= 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF530,531	14			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF532,533	12			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF530,531		1.2	1.44	V	V_{GS} = 10V, I_D = 8.0 A
		IRF532,533		1.6	2.0	V	V_{GS} = 10V, I_D = 8.0 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF530,531		0.15	0.18	Ω	V_{GS} = 10V, I_D = 8.0 A
		IRF532,533		0.2	0.25	Ω	V_{GS} = 10V, I_D = 8.0 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF530,531			0.31	Ω	V_{GS} =10V, I_D =8.0A, T_C =125°C
		IRF532,533			0.43	Ω	V_{GS} =10V, I_D =8.0A, T_C =125°C

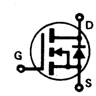
DYNAMIC

g_{fs}	Forward Transductance[1]	All	4.0	4.4		S (℧)	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D = 8.0A
C_{iss}	Input Capacitance	All		750	800	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		185	500	pF	
C_{rss}	Reverse Transfer Capacitance	All		100	150	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	30	ns	V_{DD} = 30V, $I_D \cong$ 8.0 A, R_g = 7.5Ω, R_L = 4.3Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		35	75	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		38	40	ns	
t_f	Fall Time	All		23	45	ns	

THERMAL RESISTANCE

R_{thJC}	Junction-to-Case	All			1.67	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)	IRF530,531			−14	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRF532,533			−12	A	
I_{SM}	Source Current[1] (Body Diode)	IRF530,531			−56	A	
		IRF532,533			−48	A	
V_{SD}	Diode Forward Voltage[1]	IRF530,531			−2.5	V	T_C=25°C, I_S=−14A, V_{GS} = 0
		IRF532,533			−2.3	V	T_C=25°C, I_S=−12A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		260		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs

1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE10

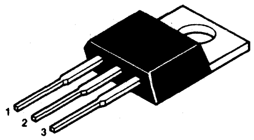
IRF540 ■ IRF541 ■ IRF542 ■ IRF543

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF540	100	0.085	T0–220AB
IRF541	60	0.085	T0–220AB
IRF542	100	0.11	T0–220AB
IRF543	60	0.11	T0–220AB

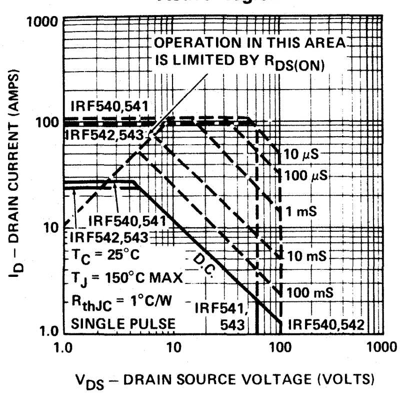
For Additional Curves
See Section 5: VNDC10

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

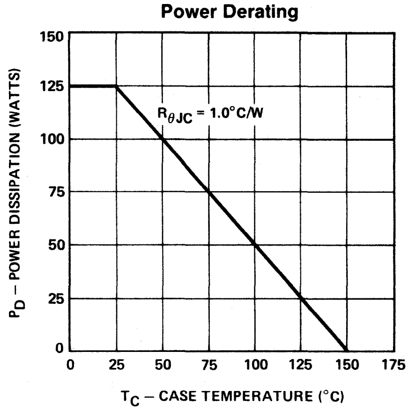
	Parameter	IRF540	IRF541	IRF542	IRF543	Units
V_{DS}	Drain-Source Voltage	100	60	100	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	60	100	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±27	±27	±24	±24	A
I_D @ T_C = 100° C	Continuous Drain Current	±17	±17	±15	±15	A
I_{DM}	Pulsed Drain Current[1]	±108	±108	±96	±96	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	125	125	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	50	50	W
Junction to Case	Linear Derating Factor	1.0	1.0	1.0	1.0	W/° C
Junction to Ambient	Linear Derating Factor	0.013	0.013	0.013	0.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF540,542	100			V	V_{GS} = 0 I_D = 250μA
		IRF541,543	60			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		4	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS}= 0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRG540,541	27			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		IRF542,543	24			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF540,541		1.05	1.275	V	V_{GS} = 10V , I_D = 15A
		IRF542,543		1.35	1.65	V	V_{GS} = 10V , I_D = 15A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF540,541		0.07	0.085	Ω	V_{GS} = 10V , I_D = 15A
		IRF542,543		0.09	0.11	Ω	V_{GS} = 10V , I_D = 15A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF540,541		0.119	0.144	Ω	V_{GS} =10V, I_D =15A, T_C =125°C
		IRF542,543		0.153	0.187	Ω	V_{GS} =10V, I_D =15A, T_C =125°C

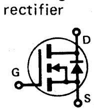
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	6.0	22		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 15A
C_{iss}	Input Capacitance	All		1275	1600	pF	V_{GS} = 0 ,V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		450	800	pF	
C_{rss}	Reverse Transfer Capacitance	All		160	300	pF	
$t_{d(on)}$	Turn-On Delay Time	All		18	30	ns	V_{DD} = 30V , $I_D \cong$ 15A R_g = 5Ω , R_L = 2Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	60	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		45	80	ns	
t_f	Fall Time	All		24	30	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF540,541			–27	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRF542,543			–24	A	
I_{SM}	Source Current[1] (Body Diode)	IRF540,541			–108	A	
		IRF542,543			–96	A	
V_{SD}	Diode Forward Voltage[1]	IRF540,541			–2.5	V	T_C=25°C, I_S=–27A, V_{GS} = 0
		IRF542,543			–2.3	V	T_C=25°C, I_S=–24A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C, I_F = I_S, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDC10

IRF610 ■ IRF611 ■ IRF612 ■ IRF613

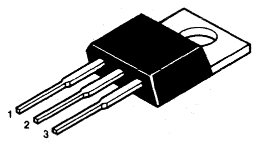
Siliconix

PRELIMINARY

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Motor Drivers
- Converters



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

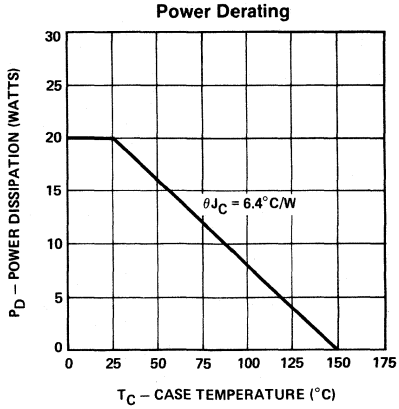
Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF610	200	1.5	T0–220AB
IRF611	150	1.5	T0–220AB
IRF612	200	2.4	T0–220AB
IRF613	150	2.4	T0–220AB

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	IRF610	IRF611	IRF612	IRF613	Units
V_{DS}	Drain-Source Voltage	200	150	200	150	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	200	150	200	150	V
I_D @ T_C = 25° C	Continuous Drain Current	±2.5	±2.5	±2	±2	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.5	±1.5	±1.25	±1.25	A
I_{DM}	Pulsed Drain Current[1]	±10	±10	±8	±8	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20	20	20	20	W
P_D @ T_C = 100°C	Max. Power Dissipation	8	8	8	8	W
Junction to Case	Linear Derating Factor	0.156	0.156	0.156	0.156	W/° C
Junction to Ambient	Linear Derating Factor	0.0125	0.0125	0.0125	0.0125	W/° C
T_J T_{stg}	Operating and Storage Temperature Range	–55 To +150	–55 To +150	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 Pulse Test: Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF610,612	200			V	V_{GS} = 0, I_D = 250 μA
		IRF611,613	150			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		4	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			500	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–500	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All			250	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All			1000	μA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF610,611	2.5			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		IRF612,613	2			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF610,611		1.25	1.88	V	V_{GS} = 10V, I_D = 1.25A
		IRF612,613		1.88	3	V	V_{GS} = 10V, I_D = 1.25A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF610,611		1	1.5	Ω	V_{GS} = 10V, I_D = 1.25A
		IRF612,613		1.5	2.4	Ω	V_{GS} = 10V, I_D = 1.25A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF610,611		1.85	2.78	Ω	V_{GS} =10V, I_D =1.25A T_C =125°C
		IRF612,613		2.78	4.44	Ω	V_{GS} =10V, I_D =1.25A T_C =125°C

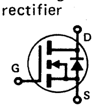
DYNAMIC

		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	0.8	1.3		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 1.25A
C_{iss}	Input Capacitance	All		135	200	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		60	80	pF	
C_{rss}	Reverse Transfer Capacitance	All		16	25	pF	
$t_{d(on)}$	Turn-On Delay Time	All		8	15	ns	V_{DD} =75V, $I_D \cong$ 1.25A, R_g = 25Ω, R_L = 60Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		15	25	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		10	15	ns	
t_f	Fall Time	All		8	15	ns	

THERMAL RESISTANCE

		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			6.4	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF610,611			–2.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRF612,613			–2	A	
I_{SM}	Source Current[1] (Body Diode)	IRF610,611			–10	A	
		IRF612,613			–8	A	
V_{SD}	Diode Forward Voltage[1]	IRF610,611			–2	V	T_C=25°C, I_S=–2.5A, V_{GS} = 0
		IRF612,613			–1.8	V	T_C = 25°C, I_S =–2A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		290		ns	T_J =150°C, I_F = I_S, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

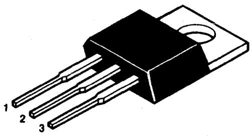
IRF620 ■ IRF621 ■ IRF622 ■ IRF623

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF620	200	0.8	T0–220AB
IRF621	150	0.8	T0–220AB
IRF622	200	1.2	T0–220AB
IRF623	150	1.2	T0–220AB

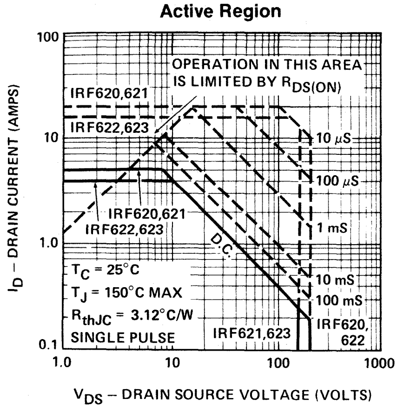
For Additional Curves
See Section 5: VNDD20

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

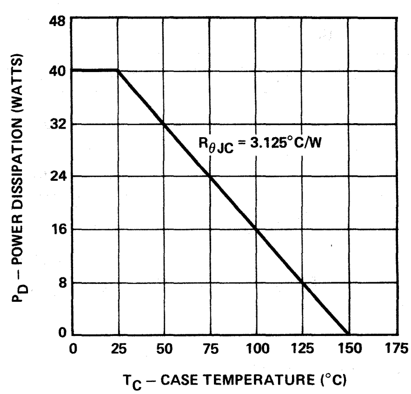
	Parameter	IRF620	IRF621	IRF622	IRF623	Units
V_{DS}	Drain-Source Voltage	200	150	200	150	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	200	150	200	150	V
I_D @ T_C = 25° C	Continuous Drain Current	±5	±5	±4	±4	A
I_D @ T_C = 100° C	Continuous Drain Current	±3	±3	±2.5	±2.5	A
I_{DM}	Pulsed Drain Current[1]	±20	±20	±16	±16	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	40	40	40	40	W
P_D @ T_C = 100°C	Max. Power Dissipation	16	16	16	16	W
Junction to Case	Linear Derating Factor	0.32	0.32	0.32	0.32	W/° C
Junction to Ambient	Linear Derating Factor	.013	.013	.013	.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To 150	−55 To 150	−55 To 150	−55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF620,622	200			V	V_{GS} = 0, I_D = 250μA
		IRF621,623	150			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS}= 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF620,621	5.0			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF622,623	4.0			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF620,621		1.25	2.0	V	V_{GS} = 10V, I_D = 2.5A
		IRF622,623		2.0	3.0	V	V_{GS} = 10V, I_D = 2.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF620,621		0.5	0.8	Ω	V_{GS} = 10V, I_D = 2.5A
		IRF622,623		0.8	1.2	Ω	V_{GS} = 10V, I_D = 2.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF620,621		0.9	1.52	Ω	V_{GS} =10V, I_D =2.5A, T_C =125°C
		IRF622,623		1.44	2.28	Ω	V_{GS} =10V, I_D =2.5A, T_C =125°C

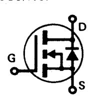
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1.3	1.6		S (℧)	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D = 2.5A
C_{iss}	Input Capacitance	All		300	600	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		125	300	pF	
C_{rss}	Reverse Transfer Capacitance	All		50	80	pF	
$t_{d(on)}$	Turn-On Delay Time	All		9.0	40	ns	V_{DD} = 75V, $I_D \cong$ 2.5A, R_g = 25Ω, R_L = 30Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		30	60	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		40	60	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			3.125	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF620,621			−5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRF622,623			−4	A	
I_{SM}	Source Current[1] (Body Diode)	IRF620,621			−20	A	
		IRF622,623			−16	A	
V_{SD}	Diode Forward Voltage[1]	IRF620,621			−1.8	V	T_C = 25°C, I_S =−5A, V_{GS} = 0
		IRF622,623			−1.4	V	T_C = 25°C, I_S =−4A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		250		ns	T_J = 150°C, I_F = I_S, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDD20

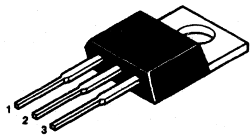
IRF630 ■ IRF631 ■ IRF632 ■ IRF633

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Motor Drivers
- Converters



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF630	200	0.4	T0–220AB
IRF631	150	0.4	T0–220AB
IRF632	200	0.6	T0–220AB
IRF633	150	0.6	T0–220AB

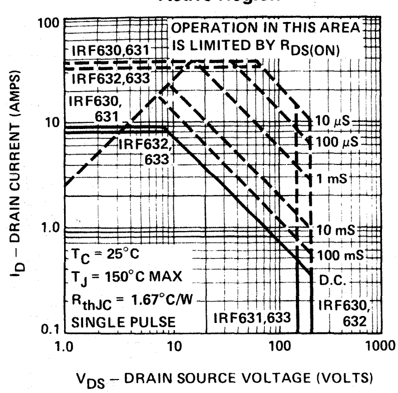
For Additional Curves
See Section 5: VNDE20

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

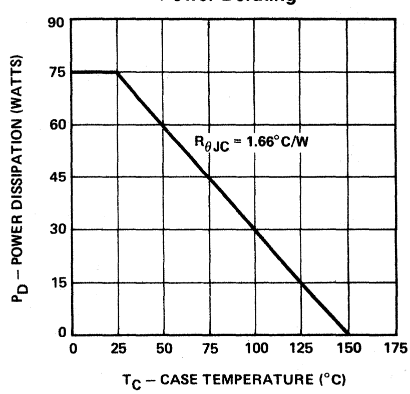
	Parameter	IRF630	IRF631	IRF632	IRF633	Units
V_{DS}	Drain-Source Voltage	200	150	200	150	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	200	150	200	150	V
I_D @ T_C = 25° C	Continuous Drain Current	±9	±9	±8	±8	A
I_D @ T_C = 100° C	Continuous Drain Current	±6	±6	±5	±5	A
I_{DM}	Pulsed Drain Current[1]	±36	±36	±32	±32	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	75	75	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	30	30	30	W
Junction to Case	Linear Derating Factor	0.6	0.6	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	0.013	0.013	0.013	0.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF630,632	200			V	V_{GS} = 0, I_D = 250 µA
		IRF631,633	150			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF630,631	9.0			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF632,633	8.0			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF630,631		1.25	2.0	V	V_{GS} = 10V, I_D = 5.0A
		IRF632,633		2.0	3.0	V	V_{GS} = 10V, I_D = 5.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF630,631		0.25	0.4	Ω	V_{GS} = 10V, I_D = 5.0A
		IRF632,633		0.4	0.6	Ω	V_{GS} = 10V, I_D = 5.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF630,631		0.54	0.76	Ω	V_{GS} =10V, I_D =5.0A, T_C =125°C
		IRF632,633		0.86	1.14	Ω	V_{GS} =10V, I_D =5.0A, T_C =125°C

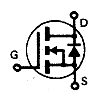
DYNAMIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3.0	5		S (℧)	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D = 5.0A
C_{iss}	Input Capacitance	All		780	800	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		150	450	pF	
C_{rss}	Reverse Transfer Capacitance	All		95	150	pF	
$t_{d(on)}$	Turn-On Delay Time	All		9.0	30	ns	V_{DD} = 75V, $I_D \cong$ 5.0A, R_g = 7.5Ω, R_L = 15Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		18	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		45	50	ns	
t_f	Fall Time	All		27	40	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.66	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF630,631			−9	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRF632,633			−8	A	
I_{SM}	Source Current[1] (Body Diode)	IRF630,631			−36	A	
		IRF632,633			−32	A	
V_{SD}	Diode Forward Voltage[1]	IRF630,631			−2	V	T_C = 25°C, I_S =−9A, V_{GS} = 0
		IRF632,633			−1.8	V	T_C = 25°C, I_S =−8A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		250		ns	T_J =150°C, I_F = I_S, dI_F/ds = 100 A/µs

1 **Pulse Test:** Pulse Width ⩽ 300 µsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE20

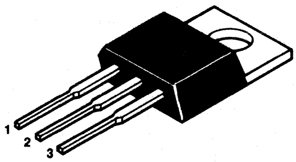
IRF640 ■ IRF641 ■ IRF642 ■ IRF643

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Choppers
- Audio Amplifiers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF640	200	0.18	T0–220AB
IRF641	150	0.18	T0–220AB
IRF642	200	0.22	T0–220AB
IRF643	150	0.22	T0–220AB

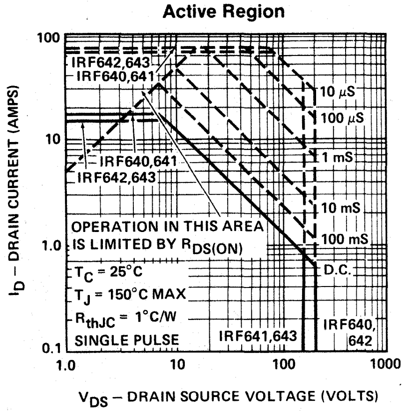
For Additional Curves
See Section 5: VNDC20

ABSOLUTE MAXIMUM RATINGS ($T_C = 25°C$ unless otherwise noted)

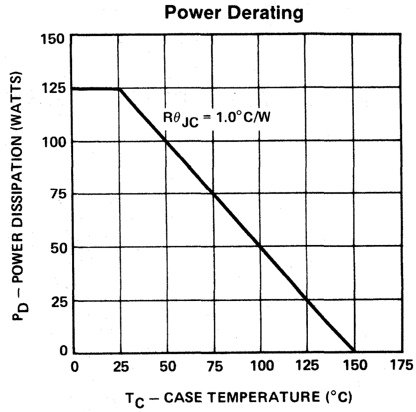
	Parameter	IRF640	IRF641	IRF642	IRF643	Units
V_{DS}	Drain-Source Voltage	200	150	200	150	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	200	150	200	150	V
I_D @ T_C = 25° C	Continuous Drain Current	±18	±18	±16	±16	A
I_D @ T_C = 100° C	Continuous Drain Current	±11	±11	±10	±10	A
I_{DM}	Pulsed Drain Current[1]	±72	±72	±64	±64	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	125	125	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	50	50	W
Junction to Case	Linear Derating Factor	1.0	1.0	1.0	1.0	W/° C
Junction to Ambient	Linear Derating Factor	.013	.013	.013	.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF640,642	200			V	V_{GS} = 0, I_D = 250μA
		IRF641,643	150			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS}= 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF640,641	18			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF642,643	16			A	V_{GS} = 10V, V_{DS} = 25V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF640,641		1.4	1.8	V	V_{GS} = 10V, I_D = 10A
		IRF642,643		2.0	2.2	V	V_{GS} = 10V, I_D = 10A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF640,641		0.14	0.18	Ω	V_{GS} = 10V, I_D = 10A
		IRF642,643		0.2	0.22	Ω	V_{GS} = 10V, I_D = 10A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF640,641		0.28	0.36	Ω	V_{GS} =10V, I_D =10A, T_C =125°C
		IRF642,643		0.40	0.44	Ω	V_{GS} =10V, I_D =10A, T_C =125°C

DYNAMIC

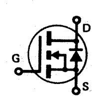
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	6.0	7.2		S (℧)	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D = 10A
C_{iss}	Input Capacitance	All		1100	1600	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		250	750	pF	
C_{rss}	Reverse Transfer Capacitance	All		100	300	pF	
$t_{d(on)}$	Turn-On Delay Time	All		17	30	ns	V_{DD} = 75V, $I_D \cong$ 10A, R_g = 5Ω, R_L = 7.3Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		55	60	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		36	80	ns	
t_f	Fall Time	All		30	60	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF640,641			−18	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRF642,643			−16	A	
I_{SM}	Source Current[1] (Body Diode)	IRF640,641			−72	A	
		IRF642,643			−64	A	
V_{SD}	Diode Forward Voltage[1]	IRF640,641			−2	V	T_C=25°C, I_S=−18A, V_{GS} = 0
		IRF642,643			−1.9	V	T_C=25°C, I_S=−16A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		350		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC20

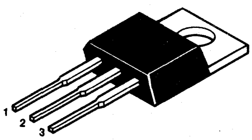
IRF710 ■ IRF711 ■ IRF712 ■ IRF713

Siliconix
PRELIMINARY

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Motor Controls
- Switching PSU's



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF710	400	3.6	T0–220AB
IRF711	350	3.6	T0–220AB
IRF712	400	5	T0–220AB
IRF713	350	5	T0–220AB

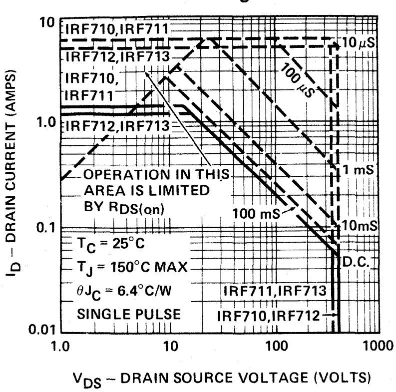
1

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

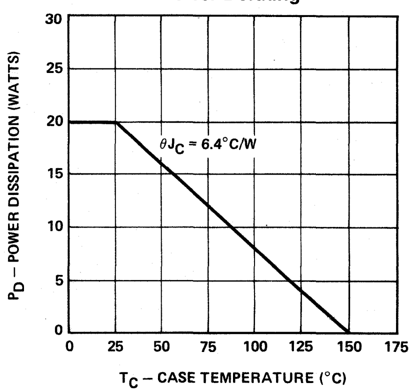
	Parameter	IRF710	IRF711	IRF712	IRF713	Units
V_{DS}	Drain-Source Voltage	400	350	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±1.5	±1.5	±1.3	±1.3	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.99	±0.99	±0.84	±0.84	A
I_{DM}	Pulsed Drain Current[1]	±6	±6	±5	±5	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20	20	20	20	W
P_D @ T_C = 100°C	Max. Power Dissipation	7.8	7.8	7.8	7.8	W
Junction to Case	Linear Derating Factor	0.156	0.156	0.156	0.156	W/° C
Junction to Ambient	Linear Derating Factor	0.012	0.012	0.012	0.012	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	−55 To +150	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 Pulse Test: Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF710,712	400			V	V_{GS} = 0, I_D = 250 μA
		IRF711,713	350			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		4	V	$V_{DS} = V_{GS}$, I_D = 250 μA
I_{GSSF}	Gate-Body Leakage Forward	All			500	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–500	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All			250	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All			1000	μA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF710,711	1.5			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		IRF712,713	1.3			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF710,711		2	2.88	V	V_{GS} = 10V, I_D = 0.8A
		IRF712,713		2.88	4	V	V_{GS} = 10V, I_D = 0.8A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF710,711		2.6	3.6	Ω	V_{GS} = 10V, I_D = 0.8A
		IRF712,713		3.6	5	Ω	V_{GS} = 10V, I_D = 0.8A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF710,711		6.1	6.7	Ω	V_{GS} =10V, I_D =0.8A, T_C =125°C
		IRF712,713		6.7	9.3	Ω	V_{GS} =10V, I_D =0.8A, T_C =125°C

DYNAMIC

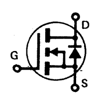
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	0.5	1.2		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.8A
C_{iss}	Input Capacitance	All		135	200	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		35	50	pF	
C_{rss}	Reverse Transfer Capacitance	All		8	15	pF	
$t_{d(on)}$	Turn-On Delay Time	All		3	10	ns	V_{DD} =200V, $I_D \cong$ 0.8A, R_g = 25Ω, R_L = 250Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		10	20	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		5	10	ns	
t_f	Fall Time	All		8	15	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			6.4	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF710,711			–1.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRF712,713			–1.3	A	
I_{SM}	Source Current[1] (Body Diode)	IRF710,711			–6	A	
		IRF712,713			–5	A	
V_{SD}	Diode Forward Voltage[1]	IRF710,711			–1.6	V	T_C=25°C, I_S=–1.5A, V_{GS} = 0
		IRF712,713			–1.5	V	T_C=25°C, I_S=–1.3A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		380		ns	T_J =150°C, $I_F = I_S$, dI_F/ds =100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

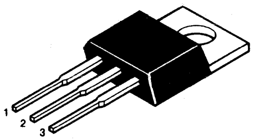
IRF720 ■ IRF721 ■ IRF722 ■ IRF723

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Inverters



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF720	400	1.8	T0–220AB
IRF721	350	1.8	T0–220AB
IRF722	400	2.5	T0–220AB
IRF723	350	2.5	T0–220AB

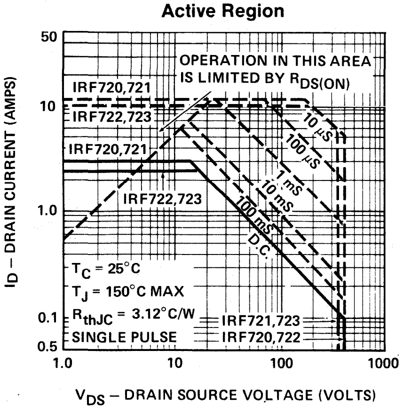
For Additional Curves
See Section 5: VNDD40

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

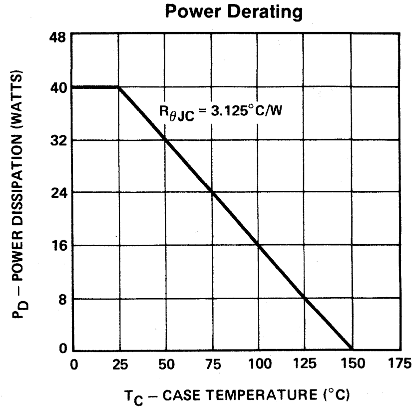
	Parameter	IRF720	IRF721	IRF723	IRF722	Units
V_{DS}	Drain-Source Voltage	400	350	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±3	±3	±2.5	±2.5	A
I_D @ T_C = 100° C	Continuous Drain Current	±2	±2	±1.5	±1.5	A
I_{DM}	Pulsed Drain Current[1]	±12	±12	±10	±10	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	40	40	40	40	W
P_D @ T_C = 100°C	Max. Power Dissipation	16	16	16	16	W
Junction to Case	Linear Derating Factor	0.32	0.32	0.32	0.32	W/° C
Junction to Ambient	Linear Derating Factor	.013	.013	.013	.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To 150	−55 To 150	−55 To 150	−55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF720,722	400			V	V_{GS} = 0, I_D = 250μA
		IRF721,723	350			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS}= 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF720,721	3.0			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		IRF722,723	2.5			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF720,721		2.25	2.7	V	V_{GS} = 10V, I_D = 1.5A
		IRF722,723		2.7	3.75	V	V_{GS} = 10V, I_D = 1.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF720,721		1.5	1.8	Ω	V_{GS} = 10V, I_D = 1.5A
		IRF722,723		1.8	2.5	Ω	V_{GS} = 10V, I_D = 1.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF720,721		2.96	3.55	Ω	V_{GS} = 10V, I_D =1.5A T_C =125°C
		IRF722,723		3.55	4.93	Ω	V_{GS} = 10V, I_D =1.5A T_C =125°C

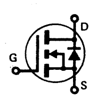
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1.0	1.2		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 1.5A
C_{iss}	Input Capacitance	All		330	600	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		40	200	pF	
C_{rss}	Reverse Transfer Capacitance	All		7	40	pF	
$t_{d(on)}$	Turn-On Delay Time	All		12	40	ns	V_{DD} =200V $I_D \cong$ 1.5A, R_g = 25Ω, R_L = 130Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		8	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		25	50	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			3.125	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF720,721			−3	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRF722,723			−2.5	A	
I_{SM}	Source Current[1] (Body Diode)	IRF720,721			−12	A	
		IRF722,723			−10	A	
V_{SD}	Diode Forward Voltage[1]	IRF720,721			−1.6	V	T_C = 25°C, I_S =−3A, V_{GS} = 0
		IRF722,723			−1.5	V	T_C=25°C, I_S=−2.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		250		ns	T_J =150°C, I_F = I_S, dI_F/ds = 100 A/μs

1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDD40

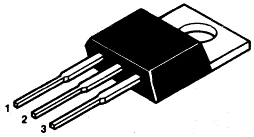
IRF730 ■ IRF731 ■ IRF732 ■ IRF733

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF730	400	1.0	T0–220AB
IRF731	350	1.0	T0–220AB
IRF732	400	1.5	T0–220AB
IRF733	350	1.5	T0–220AB

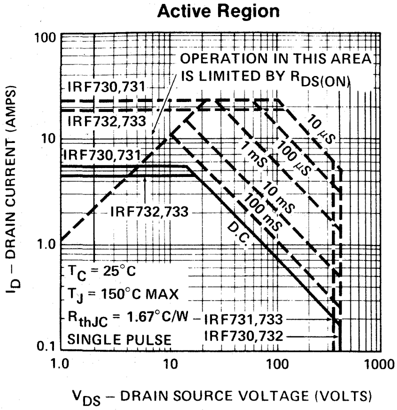
For Additional Curves
See Section 5: VNDE40

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

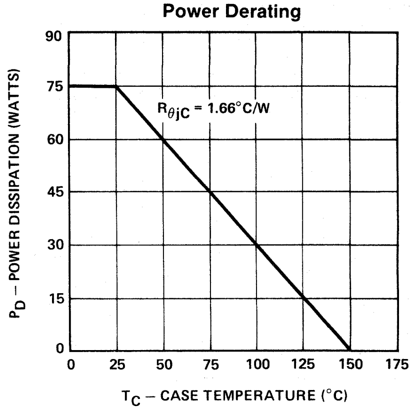
	Parameter	IRF730	IRF731	IRF732	IRF733	Units
V_{DS}	Drain-Source Voltage	400	350	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±5.5	±5.5	±4.5	±4.5	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.5	±3.5	±3	±3	A
I_{DM}	Pulsed Drain Current[1]	±22	±22	±18	±18	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	75	75	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	30	30	30	W
Junction to Case	Linear Derating Factor	0.6	0.6	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	.013	.013	.013	.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF730,732	400			V	V_{GS} = 0, I_D = 250μA
		IRF731,733	350			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1	mA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF730,731	5.5			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
		IRF732,733	4.5			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF730,731		2.4	3.0	V	V_{GS} = 10V, I_D = 3.0A
		IRF732,733		3.0	4.5	V	V_{GS} = 10V, I_D = 3.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF730,731		0.8	1.0	Ω	V_{GS} = 10V, I_D = 3.0A
		IRF732,733		1	1.5	Ω	V_{GS} = 10V, I_D = 3.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF730,731		1.6	2.0	Ω	V_{GS} = 10V, I_D = 3.0A T_C = 125°C
		IRF732,733		2.0	3.0	Ω	V_{GS} = 10V, I_D = 3.0A T_C = 125°C

DYNAMIC

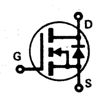
Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3.0	3.6		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 3.0A
C_{iss}	Input Capacitance	All		700	800	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		70	300	pF	
C_{rss}	Reverse Transfer Capacitance	All		20	80	pF	
$t_{d(on)}$	Turn-On Delay Time	All		18	30	ns	V_{DD} = 175V $I_D \cong$ 3.0, R_g = 7.5Ω, R_L = 56Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	35	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		40	55	ns	
t_f	Fall Time	All		25	35	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.66	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF730,731			–5.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRF732,733			–4.5	A	
I_{SM}	Source Current[1] (Body Diode)	IRF730,731			–22	A	
		IRF732,733			–18	A	
V_{SD}	Diode Forward Voltage[1]	IRF730,731			–1.6	V	T_C=25°C, I_S=–5.5A, V_{GS} = 0
		IRF732,733			–1.5	V	T_C=25°C, I_S=–4.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		300		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE40

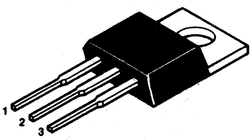
IRF740 ■ IRF741 ■ IRF742 ■ IRF743

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF740	400	0.55	T0–220AB
IRF741	350	0.55	T0–220AB
IRF742	400	0.80	T0–220AB
IRF743	350	0.80	T0–220AB

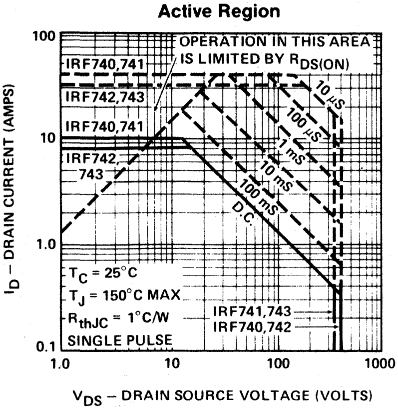
For Additional Curves
See Section 5: VNDC40

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

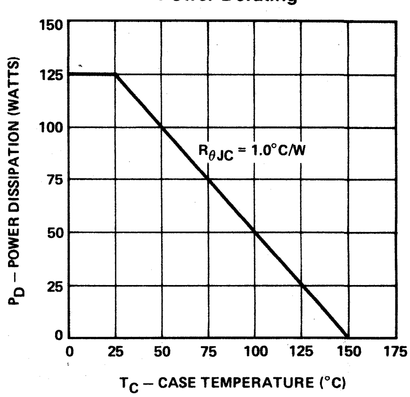
	Parameter	IRF740	IRF741	IRF742	IRF743	Units
V_{DS}	Drain-Source Voltage	400	350	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±10	±10	±8	±8	A
I_D @ T_C = 100° C	Continuous Drain Current	±6	±6	±5	±5	A
I_{DM}	Pulsed Drain Current[1]	±40	±40	±32	±32	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	125	125	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	50	50	W
Junction to Case	Linear Derating Factor	1.0	1.0	1.0	1.0	W/° C
Junction to Ambient	Linear Derating Factor	.013	.013	.013	.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	−55 To +150	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 Pulse Test: Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF740,742	400			V	V_{GS} = 0, I_D = 250 μA
		IRF741,743	350			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All			0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All			1.0	mA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF740,741	10			A	$V_{DS} \geq 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF742,743	8.0			A	$V_{DS} \geq 2\ V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF740,741		2.35	2.75	V	V_{GS} = 10V, I_D = 5.0A
		IRF742,743		3.40	4.00	V	V_{GS} = 10V, I_D = 5.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF740,741		0.47	0.55	Ω	V_{GS} = 10V, I_D = 5.0A
		IRF742,743		0.68	0.80	Ω	V_{GS} = 10V, I_D = 5.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF740,741		0.93	1.10	Ω	V_{GS} = 10V, I_D = 5.0A, T_C = 125°C
		IRF742,743		1.40	1.60	Ω	V_{GS} = 10V, I_D = 5.0A, T_C = 125°C

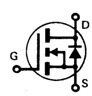
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	4.0	4.4		S (℧)	$V_{DS} \geq V_{DS(ON)}$, I_D = 5.0A
C_{iss}	Input Capacitance	All		1150	1600	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		165	450	pF	
C_{rss}	Reverse Transfer Capacitance	All		70	150	pF	
$t_{d(on)}$	Turn-On Delay Time	All		17	35	ns	V_{DD} = 175V, $I_D \cong$ 5.0A, R_g = 5Ω, R_L = (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		12	15	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		45	90	ns	
t_f	Fall Time	All		30	35	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.0	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF740,741			−10	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRF742,743			−8	A	
I_{SM}	Source Current[1] (Body Diode)	IRF740,741			−40	A	
		IRF742,743			−32	A	
V_{SD}	Diode Forward Voltage[1]	IRF740,741			−2	V	T_C = 25°C, I_S = −10A, V_{GS} = 0
		IRF742,743			−1.9	V	T_C = 25°C, I_S = −8A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC40

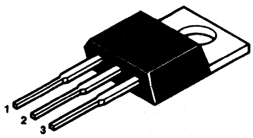
IRF820 ■ IRF821 ■ IRF822 ■ IRF823

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF820	500	3.0	T0–220AB
IRF821	450	3.0	T0–220AB
IRF822	500	4.0	T0–220AB
IRF823	450	4.0	T0–220AB

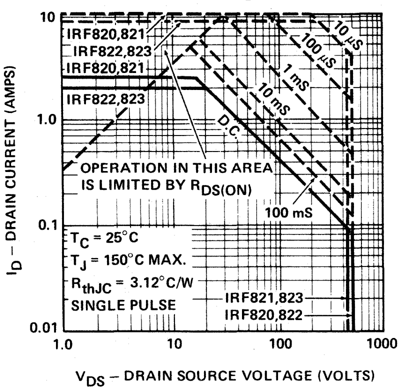
For Additional Curves
See Section 5: VNDD50

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

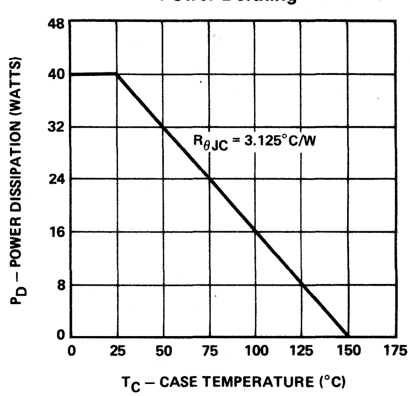
	Parameter	IRF820	IRF821	IRF822	IRF823	Units
V_{DS}	Drain-Source Voltage	500	450	500	450	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500	450	500	450	V
I_D @ T_C = 25° C	Continuous Drain Current	±2.5	±2.5	±2	±2	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.5	±1.5	±1	±1	A
I_{DM}	Pulsed Drain Current[1]	±10	±10	±8	±8	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	40	40	40	40	W
P_D @ T_C = 100°C	Max. Power Dissipation	16	16	16	16	W
Junction to Case	Linear Derating Factor	0.32	0.32	0.32	0.32	W/° C
Junction to Ambient	Linear Derating Factor	013	.013	.013	.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF820,822	500			V	V_{GS} = 0 I_D = 250 μA
		IRF821,823	450			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0 T_C = 125° C
$I_{D(on)}$	On-State Drain Current[1]	IRF820,821	2.5			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
		IRF822,823	2.0			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF820,821		2.5	3.0	V	V_{GS} = 10V , I_D = 1.0A
		IRF822,823		3.0	4.0	V	V_{GS} = 10V , I_D = 1.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF820,821		2.5	3.0	Ω	V_{GS} = 10V , I_D = 1.0A
		IRF822,823		3.0	4.0	Ω	V_{GS} = 10V , I_D = 1.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF820,821		4.8	5.0	Ω	V_{GS} =10V, I_D =1.0A, T_C =125°C
		IRF822,823		5.7	7.6	Ω	V_{GS} =10V, I_D =1.0A, T_C =125°C

DYNAMIC

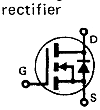
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1.0	1.4		S (℧)	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D = 1.0A
C_{iss}	Input Capacitance	All		330	400	pF	V_{GS} = 0 ,V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		75	150	pF	
C_{rss}	Reverse Transfer Capacitance	All		32	40	pF	
$t_{d(on)}$	Turn-On Delay Time	All		9	60	ns	V_{DD} =250V, $I_D \cong$ 1.0A R_g = 25Ω , R_L = 246Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		18	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		41	60	ns	
t_f	Fall Time	All		27	30	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			3.12	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF820,821			−2.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRF822,823			−2	A	
I_{SM}	Source Current[1] (Body Diode)	IRF820,821			−10	A	
		IRF822,823			−8	A	
V_{SD}	Diode Forward Voltage[1]	IRF820,821			−1.6	V	T_C=25°C, I_S=−2.5A, V_{GS} = 0
		IRF822,823			−1.5	V	T_C = 25°C , I_S = −2A V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		150		ns	T_J =150°C , I_F = I_S, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDD50

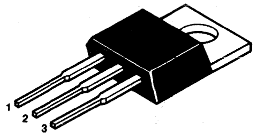
IRF830 ■ IRF831 ■ IRF832 ■ IRF833

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Motor Drivers
- Converters
- Inverters
- Audio Amplifiers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF830	500	1.5	T0–220AB
IRF831	450	1.5	T0–220AB
IRF832	500	2.0	T0–220AB
IRF833	450	2.0	T0–220AB

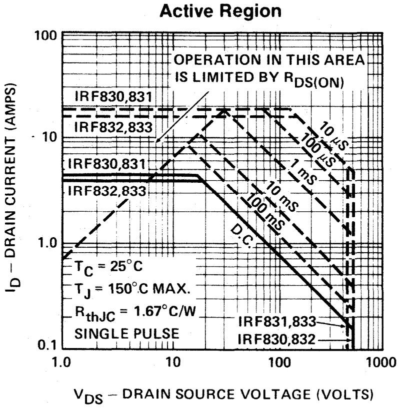
For Additional Curves
See Section 5: VNDE50

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

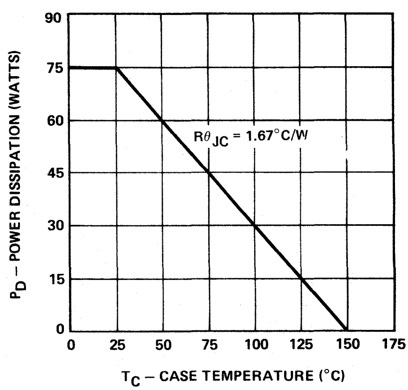
	Parameter	IRF830	IRF831	IRF832	IRF833	Units
V_{DS}	Drain-Source Voltage	500	450	500	450	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500	450	500	450	V
I_D @ T_C = 25° C	Continuous Drain Current	±4.5	±4.5	±4	±4	A
I_D @ T_C = 100° C	Continuous Drain Current	±3	±3	±2.5	±2.5	A
I_{DM}	Pulsed Drain Current[1]	±18	±18	±16	±16	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	75	75	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	30	30	30	W
Junction to Case	Linear Derating Factor	0.6	0.6	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	0.013	0.013	0.013	0.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To 150	−55 To 150	−55 To 150	−55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 Pulse Test: Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF830,832	500			V	V_{GS} = 0, I_D = 250 μA
		IRF831,833	450			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF830,831	4.5			A	$V_{DS} \geq 2\ V_{DS(ON)}$, V_{DS} = 10V
		IRF832,833	4.0			A	V_{GS} = 25V, V_{DS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF830,831		3.25	3.75	V	V_{GS} = 10V, I_D = 2.5A
		IRF832,833		3.75	5.0	V	V_{GS} = 10V, I_D = 2.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF830,831		1.3	1.5	Ω	V_{GS} = 10V, I_D = 2.5A
		IRF832,833		1.5	2.0	Ω	V_{GS} = 10V, I_D = 2.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF830,831		2.9	3.3	Ω	V_{GS} =10V, I_D =2.5A, T_C =125°C
		IRF832,833		3.3	4.4	Ω	V_{GS} =10V, I_D =2.5A, T_C =125°C

DYNAMIC

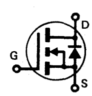
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	2.6		S (℧)	$V_{DS} \geq 2\ V_{DS(ON)}$, I_D = 2.5A
C_{iss}	Input Capacitance	All		700	800	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		65	200	pF	
C_{rss}	Reverse Transfer Capacitance	All		20	60	pF	
$t_{d(on)}$	Turn-On Delay Time	All		18	30	ns	V_{DD} =225V, $I_D \cong$ 2.5A, R_g = 7.5Ω, R_L = 88Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	30	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		32	55	ns	
t_f	Fall Time	All		25	30	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.67	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRF830,831			−4.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRF832,833			−4	A	
I_{SM}	Source Current[1] (Body Diode)	IRF830,831			−18	A	
		IRF832,833			−16	A	
V_{SD}	Diode Forward Voltage[1]	IRF830,831			−1.6	V	T_C=25°C, I_S=−4.5A, V_{GS} = 0
		IRF832,833			−1.5	V	T_C = 25°C, I_S =−4A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		300		ns	T_J = 150°C, I_F = I_S, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE50

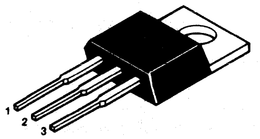
IRF840 ■ IRF841 ■ IRF842 ■ IRF843

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Motor Drivers
- Switching Regulators
- Converters
- Inverters
- Audio Amplifiers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRF840	500	0.85	T0–220AB
IRF841	450	0.85	T0–220AB
IRF842	500	1.1	T0–220AB
IRF843	450	1.1	T0–220AB

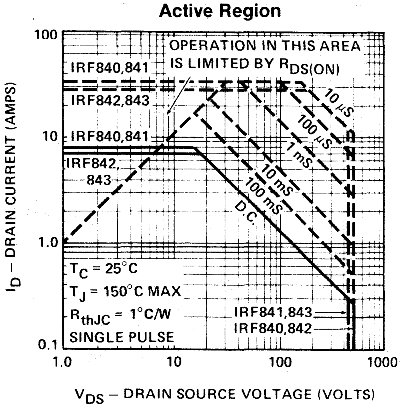
For Additional Curves
See Section 5: VNDC50

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

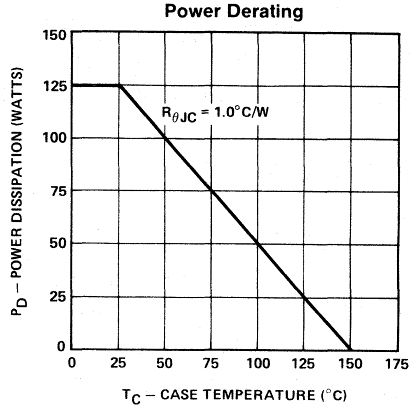
	Parameter	IRF840	IRF841	IRF842	IRF843	Units
V_{DS}	Drain-Source Voltage	500	450	500	450	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500	450	500	450	V
I_D @ T_C = 25° C	Continuous Drain Current	±8	±8	±7	±7	A
I_D @ T_C = 100° C	Continuous Drain Current	±5	±5	±4	±4	A
I_{DM}	Pulsed Drain Current[1]	±32	±32	±28	±28	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	125	125	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	50	50	W
Junction to Case	Linear Derating Factor	1.0	1.0	1.0	1.0	W/° C
Junction to Ambient	Linear Derating Factor	0.013	0.013	0.013	0.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To 150	−55 To 150	−55 To 150	−55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRF840,842	500			V	V_{GS} = 0 I_D = 250μA
		IRF841,843	450			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	$V_{DS} = V_{GS}$, I_D = 1.0 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRF840,841	8.0			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		IRF842,843	7.0			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRF840,841		3.2	3.4	V	V_{GS} = 10V , I_D = 4.0A
		IRF842,843		4.0	4.4	V	V_{GS} = 10V , I_D = 4.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF840,841		0.8	0.85	Ω	V_{GS} = 10V , I_D = 4.0A
		IRF842,843		1.0	1.1	Ω	V_{GS} = 10V , I_D = 4.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRF840,841		1.50	1.65	Ω	V_{GS} =10V, I_D =4.0A T_C = 125°C
		IRF842,843		1.95	2.15	Ω	V_{GS} =10V, I_D =4.0A T_C = 125°C

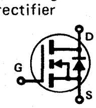
DYNAMIC

g_{fs}	Forward Transductance[1]	All	4.0	4.8		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 4.0A
C_{iss}	Input Capacitance	All		1225	1600	pF	V_{GS} = 0 ,V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		200	350	pF	
C_{rss}	Reverse Transfer Capacitance	All		85	150	pF	
$t_{d(on)}$	Turn-On Delay Time	All		17	35	ns	V_{DD} =200V $I_D \cong$ 4.0A $R_g \cong 5\Omega$, R_L = 49Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		5	15	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		42	90	ns	
t_f	Fall Time	All		14	30	ns	

THERMAL RESISTANCE

R_{thJC}	Junction-to-Case	All			1.0	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)	IRF840,841			–8	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRF842,843			–7	A	
I_{SM}	Source Current[1] (Body Diode)	IRF840,841			–32	A	
		IRF842,843			–28	A	
V_{SD}	Diode Forward Voltage[1]	IRF840,841			–2	V	T_C = 25°C , I_S =–8A, V_{GS} = 0
		IRF842,843			–1.9	V	T_C = 25°C , I_S =–7A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C , I_F = I_S, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC50

IRFF110 ■ IRFF111 ■ IRFF112 ■ IRFF113

Siliconix

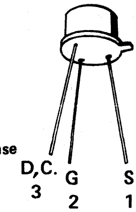
PRELIMINARY

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Power Converters
- Solenoid Drivers
- Relay Drivers

PIN 1 — Source
PIN 2 — Gate
PIN 3 — Drain, Case



TO–205AF (TO–39)

PRODUCT SUMMARY

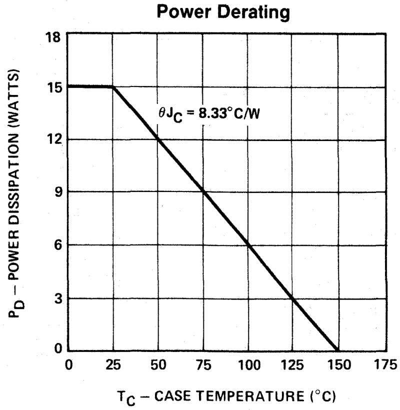
Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRFF110	100	0.6	TO–205AF
IRFF111	60	0.6	TO–205AF
IRFF112	100	0.8	TO–205AF
IRFF113	60	0.8	TO–205AF

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	IRFF110	IRFF111	IRFF112	IRFF113	Units
V_{DS}	Drain-Source Voltage	100	60	100	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	60	100	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±3.5	±3.5	±3	±3	A
I_D @ T_C = 100° C	Continuous Drain Current	±2.33	±2.33	±2.01	±2.01	A
I_{DM}	Pulsed Drain Current[1]	±14	±14	±12	±12	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	15	15	15	15	W
P_D @ T_C = 100°C	Max. Power Dissipation	6	6	6	6	W
Junction to Case	Linear Derating Factor	0.12	0.12	0.12	0.12	W/° C
Junction to Ambient	Linear Derating Factor	0.005	0.005	0.005	0.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRFF110,112	100			V	V_{GS} = 0, I_D = 250 μA
		IRFF111,113	60			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		4	V	V_{DS} = V_{GS}, I_D =1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All			250	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All			1000	μA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRFF110,111	3.5			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		IRFF112,113	3			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRFF110,111		0.75	0.9	V	V_{GS} = 10V , I_D = 1.5A
		IRFF112,113		0.9	1.2	V	V_{GS} = 10V , I_D = 1.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF110,111		0.5	0.6	Ω	V_{GS} = 10V , I_D = 1.5A
		IRFF112,113		0.6	0.8	Ω	V_{GS} = 10V , I_D = 1.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF110,111			1	Ω	V_{GS} =10V, I_D =1.5A T_C =125°C
		IRFF112,113			1.4	Ω	V_{GS} =10V, I_D =1.5A T_C =125°C

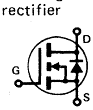
DYNAMIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1	1.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 1.5A
C_{iss}	Input Capacitance	All		135	200	pF	V_{GS} = 0 ,V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		80	100	pF	
C_{rss}	Reverse Transfer Capacitance	All		20	25	pF	
$t_{d(on)}$	Turn-On Delay Time	All		10	20	ns	V_{DD} = 30V , $I_D \cong$ 1.5A R_g = 25Ω , R_L = 19Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		15	25	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		15	25	ns	
t_f	Fall Time	All		10	20	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			8.33	°C/W	
R_{thJA}	Junction-to-Ambient	All			175	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRFF110,111			−3.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRFF112,113			−3	A	
I_{SM}	Source Current[1] (Body Diode)	IRFF110,111			−14	A	
		IRFF112,113			−12	A	
V_{SD}	Diode Forward Voltage[1]	IRFF110,111			−2.5	V	T_C=25°C, I_S=−3.5A, V_{GS} = 0
		IRFF112,113			−2	V	T_C = 25°C , I_S =−3A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		200		ns	T_J =150°C , I_F = I_S, dI_F/ds =100 A/μs

1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

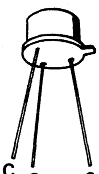
IRFF120 ■ IRFF121 ■ IRFF122 ■ IRFF123

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRFF120	100	0.3	T0–205AF
IRFF121	60	0.3	T0–205AF
IRFF122	100	0.4	T0–205AF
IRFF123	60	0.4	T0–205AF

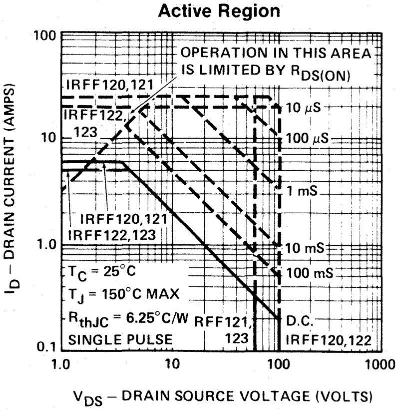
For Additional Curves
See Section 5: VNDD10

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

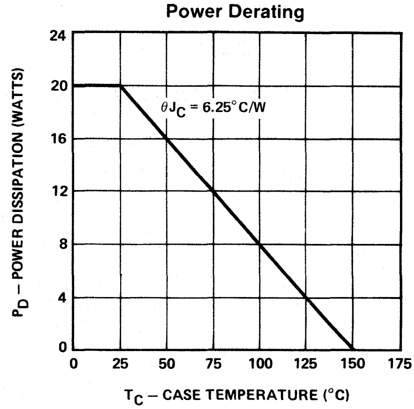
	Parameter	IRFF120	IRFF121	IRFF122	IRFF123	Units
V_{DS}	Drain-Source Voltage	100	60	100	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	60	100	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±6	±6	±5.21	±5.21	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.8	±3.8	±3.29	±3.29	A
I_{DM}	Pulsed Drain Current[1]	±24	±24	±20	±20	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20	20	20	20	W
P_D @ T_C = 100°C	Max. Power Dissipation	8	8	8	8	W
Junction to Case	Linear Derating Factor	0.16	0.16	0.16	0.16	W/° C
Junction to Ambient	Linear Derating Factor	0.005	0.005	0.005	0.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300		° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRFF120,122	100			V	V_{GS} = 0, I_D = 250 μA
		IRFF121,123	60			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		4	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1	mA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRFF120,121	6			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		IRFF122,123	5			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRFF120,121		0.75	0.9	V	V_{GS} = 10V, I_D = 3A
		IRFF122,123		0.9	1.2	V	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF120,121		0.25	0.3	Ω	V_{GS} = 10V, I_D = 3A
		IRFF122,123		0.3	0.4	Ω	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF120,121		0.42	0.54	Ω	V_{GS} =10V, I_D =3A, T_C =125°C
		IRFF122,123		0.5	0.7	Ω	V_{GS} =10V, I_D =3A, T_C =125°C

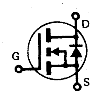
DYNAMIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1.5	2.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 3 A
C_{iss}	Input Capacitance	All		400	600	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		100	400	pF	
C_{rss}	Reverse Transfer Capacitance	All		60	100	pF	
$t_{d(on)}$	Turn-On Delay Time	All		11	40	ns	V_{DD} = 30V, $I_D \cong$ 3A, R_g = 25Ω, R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		26	70	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		38	100	ns	
t_f	Fall Time	All		25	70	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			6.25	°C/W	
R_{thJA}	Junction-to-Ambient	All			175	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRFF120,121			–6	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRFF122,123			–5	A	
I_{SM}	Source Current[1] (Body Diode)	IRFF120,121			–24	A	
		IRFF122,123			–20	A	
V_{SD}	Diode Forward Voltage[1]	IRFF120,122			–2.5	V	T_C = 25°C, I_S = –6A, V_{GS} = 0
		IRFF122,123			–2.3	V	T_C = 25°C, I_S = –5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		230		ns	T_J = 150°C, I_F = I_S, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDD10

IRFF130 ■ IRFF131 ■ IRFF132 ■ IRFF133

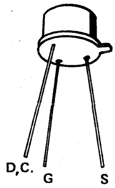
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Power Supplies
- Motor Controllers
- Inverters
- Audio Amplifiers

PIN 1 – Gate
PIN 2 – Source
PIN 3 – Drain, Case



T0–205AF (T0–39)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRFF130	100	0.18	T0–205AF
IRFF131	60	0.18	T0–205AF
IRFF132	100	0.25	T0–205AF
IRFF133	60	0.25	T0–205AF

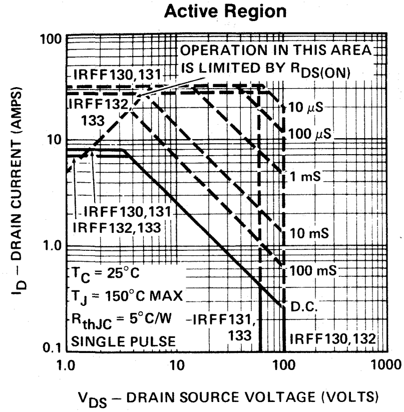
For Additional Curves
See Section 5: VNDE10

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

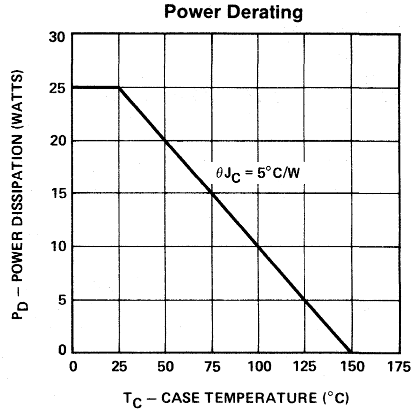
	Parameter	IRFF130	IRFF131	IRFF132	IRFF133	Units
V_{DS}	Drain-Source Voltage	100	60	100	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	60	100	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±8.68	±8.68	±7.37	±7.37	A
I_D @ T_C = 100° C	Continuous Drain Current	±5.49	±5.49	±4.66	±4.66	A
I_{DM}	Pulsed Drain Current[1]	±32	±32	±28	±28	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	25	25	25	25	W
P_D @ T_C = 100°C	Max. Power Dissipation	10	10	10	10	W
Junction to Case	Linear Derating Factor	0.2	0.2	0.2	0.2	W/° C
Junction to Ambient	Linear Derating Factor	0.005	0.005	0.005	0.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRFF130,132	100			V	V_{GS} = 0, I_D = 250 μA
		IRFF131,133	60			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		4	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All			250	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All			1000	μA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRFF130,131	8			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
		IRFF132,133	7			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRFF130,131		0.56	0.72	V	V_{GS} = 10V, I_D = 4 A
		IRFF132,133		0.8	1	V	V_{GS} = 10V, I_D = 4 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF130,131		0.14	0.18	Ω	V_{GS} = 10V, I_D = 4 A
		IRFF132,133		0.20	0.25	Ω	V_{GS} = 10V, I_D = 4 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF130,131			0.31	Ω	V_{GS} =10V, I_D = 4 A, T_C = 125°C
		IRFF132,133			0.43	Ω	V_{GS} =10V, I_D = 4 A, T_C = 125°C

DYNAMIC

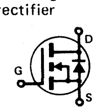
Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	4	5.5		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 4 A
C_{iss}	Input Capacitance	All		760	800	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		240	500	pF	
C_{rss}	Reverse Transfer Capacitance	All		55	150	pF	
$t_{d(on)}$	Turn-On Delay Time	All		14	50	ns	V_{DD} = 30V, $I_D \cong$ 4 A, R_g = 25Ω, R_L = 8.6Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		30	150	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		40	100	ns	
t_f	Fall Time	All		22	150	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			5	°C/W	
R_{thJA}	Junction-to-Ambient	All			175	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRFF130,131			–8	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRFF132,133			–7	A	
I_{SM}	Source Current[1] (Body Diode)	IRFF130,131			–32	A	
		IRFF132,133			–28	A	
V_{SD}	Diode Forward Voltage[1]	IRFF130,131			–2.5	V	T_C = 25°C, I_S = –8A, V_{GS} = 0
		IRFF132,133			–2.3	V	T_C = 25°C, I_S = –7A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		300		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDE10

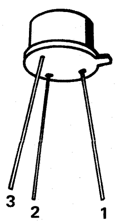
IRFF210 ■ IRFF211 ■ IRFF212 ■ IRFF213

Siliconix
PRELIMINARY

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Source
PIN 2 — Gate
PIN 3 & CASE — Drain

T0–205AF (T0–39)

PRODUCT SUMMARY

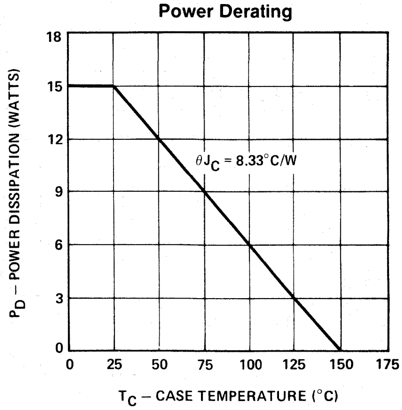
Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRFF210	200	1.5	T0–205AF
IRFF211	150	1.5	T0–205AF
IRFF212	200	2.4	T0–205AF
IRFF213	150	2.4	T0–205AF

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	IRFF210	IRFF211	IRFF212	IRFF213	Units
V_{DS}	Drain-Source Voltage	200	150	200	150	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	200	150	200	150	V
I_D @ T_C = 25° C	Continuous Drain Current	±2.2	±2.2	±1.8	±1.8	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.4	±1.4	±1.1	±1.1	A
I_{DM}	Pulsed Drain Current[1]	±9	±9	±7.5	±7.5	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	15	15	15	15	W
P_D @ T_C = 100°C	Max. Power Dissipation	6	6	6	6	W
Junction to Case	Linear Derating Factor	0.12	0.12	0.12	0.12	W/° C
Junction to Ambient	Linear Derating Factor	0.006	0.006	0.006	0.006	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	−55 To +150	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRFF210,212	200			V	V_{GS} = 0 I_D = 250 μA
		IRFF211,213	150			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		4	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All			250	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All			1000	μA	V_{DS} = 0.8 Max Rating, V_{GS} = 0 T_C = 125° C
$I_{D(on)}$	On-State Drain Current[1]	IRFF210,211	2.2			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		IRFF212,213	1.8			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRFF210,211		1.25	1.88	V	V_{GS} = 10V , I_D = 1.25A
		IRFF212,213		1.88	3	V	V_{GS} = 10V , I_D = 1.25A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF210,211		1	1.5	Ω	V_{GS} = 10V , I_D = 1.25A
		IRFF212,213		1.5	2.4	Ω	V_{GS} = 10V , I_D = 1.25A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF210,211		2.1	3.2	Ω	V_{GS}=10V, I_D=1.25A, T_C=125°C
		IRFF212,213		3.2	5.1	Ω	V_{GS}=10V, I_D=1.25A, T_C=125°C

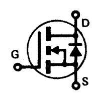
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	0.8	1.3		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D=1.25A
C_{iss}	Input Capacitance	All		135	200	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		60	80	pF	
C_{rss}	Reverse Transfer Capacitance	All		16	25	pF	
$t_{d(on)}$	Turn-On Delay Time	All		8	15	ns	V_{DD} = 75 , $I_D \cong$ 1.25A R_g = 25Ω , R_L = 60Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		15	25	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		10	15	ns	
t_f	Fall Time	All		8	15	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			8.33	°C/W	
R_{thJA}	Junction-to-Ambient	All			175	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRFF210,211			−2.2	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRFF212,213			−1.8	A	
I_{SM}	Source Current[1] (Body Diode)	IRFF210,211			−9	A	
		IRFF212,213			−7.5	A	
V_{SD}	Diode Forward Voltage[1]	IRFF210,211			−2	V	T_C=25°C, I_S=−2.2A, V_{GS} = 0
		IRFF212,213			−1.8	V	T_C=25°C, I_S=−1.8A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		290		ns	T_J = 150°C , $I_F = I_S$, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

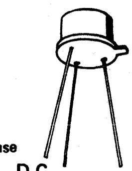
IRFF220 ■ IRFF221 ■ IRFF222 ■ IRFF223

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Power Converters
- Solenoid Drivers
- Relay Drivers



TO–205AF (TO–39)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRFF220	200	0.8	T0–205AF
IRFF221	150	0.8	T0–205AF
IRFF222	200	1.2	T0–205AF
IRFF223	150	1.2	T0–205AF

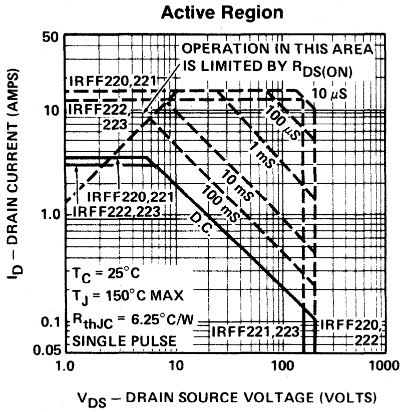
For Additional Curves
See Section 5: VNDD20

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

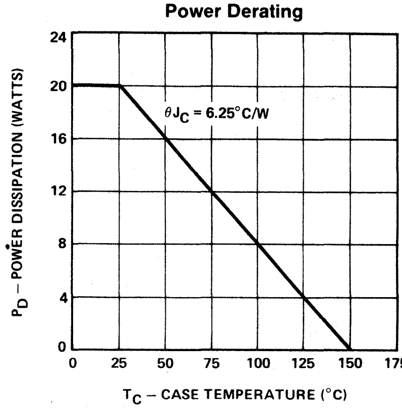
	Parameter	IRFF220	IRFF221	IRFF222	IRFF223	Units
V_{DS}	Drain-Source Voltage	200	150	200	150	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	200	150	200	150	V
I_D @ T_C = 25° C	Continuous Drain Current	±3.5	±3.5	±3	±3	A
I_D @ T_C = 100° C	Continuous Drain Current	±2	±2	±1.8	±1.8	A
I_{DM}	Pulsed Drain Current[1]	±14	±14	±12	±12	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20	20	20	20	W
P_D @ T_C = 100°C	Max. Power Dissipation	8	8	8	8	W
Junction to Case	Linear Derating Factor	0.16	0.16	0.16	0.16	W/° C
Junction to Ambient	Linear Derating Factor	0.005	0.005	0.005	0.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRFF220,222	200			V	V_{GS} = 0 I_D = 250 μA
		IRFF221,223	150			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		4	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1.0	mA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRFF220,221	3.5			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		IRFF222,223	3			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRFF220,221		1	1.6	V	V_{GS} = 10V , I_D = 2A
		IRFF222,223		1.6	2.4	V	V_{GS} = 10V , I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF220,221		0.5	0.8	Ω	V_{GS} = 10V , I_D = 2A
		IRFF222,223		0.8	1.2	Ω	V_{GS} = 10V , I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF220,221			1.5	Ω	V_{GS} =10V, I_D =2A , T_C =125°C
		IRFF222,223			2.2	Ω	V_{GS} =10V, I_D =2A , T_C =125°C

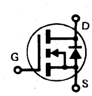
DYNAMIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1.5	2.25		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 2A
C_{iss}	Input Capacitance	All		450	600	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		150	300	pF	
C_{rss}	Reverse Transfer Capacitance	All		40	80	pF	
$t_{d(on)}$	Turn-On Delay Time	All		20	40	ns	V_{DD} = 100V $I_D \cong$ 2A R_g = 25Ω , R_L = 50Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		30	60	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		30	60	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			6.25	°C/W	
R_{thJA}	Junction-to-Ambient	All			175	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRFF220,221			–5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRFF222,223			–4	A	
I_{SM}	Source Current[1] (Body Diode)	IRFF220,221			–20	A	
		IRFF222,223			–16	A	
V_{SD}	Diode Forward Voltage[1]	IRFF220,221			–2	V	T_C = 25°C , I_S = –5A, V_{GS} = 0
		IRFF222,223			–1.8	V	T_C = 25°C , I_S = –4A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		350		ns	T_J = 150°C , $I_F = I_S$, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDD20

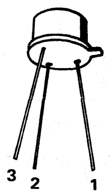
IRFF230 ■ IRFF231 ■ IRFF232 ■ IRFF233

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Power Converters
- Solenoid Drivers
- Relay Drivers



PIN 1 — Source
PIN 2 — Gate
PIN 3 & CASE — Drain

T0—205AF (T0—39)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRFF230	200	0.4	T0—205AF
IRFF231	150	0.4	T0—205AF
IRFF232	200	0.6	T0—205AF
IRFF233	150	0.6	T0—205AF

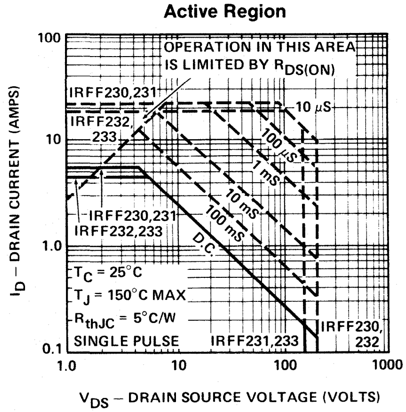
For Additional Curves See Section 5: VNDE20

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

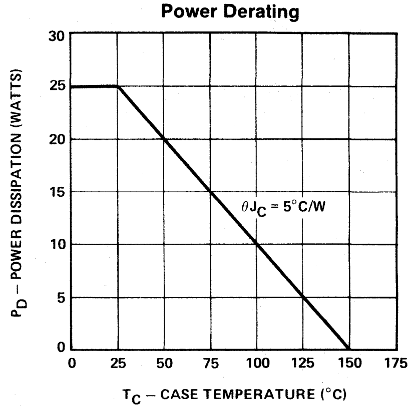
	Parameter	IRFF230	IRFF231	IRFF232	IRFF233	Units
V_{DS}	Drain-Source Voltage	200	150	200	150	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	200	150	200	150	V
I_D @ T_C = 25° C	Continuous Drain Current	±5.73	±5.73	±4.68	±4.68	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.62	±3.62	±2.96	±2.96	A
I_{DM}	Pulsed Drain Current[1]	±22	±22	±18	±18	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	25	25	25	25	W
P_D @ T_C = 100°C	Max. Power Dissipation	10	10	10	10	W
Junction to Case	Linear Derating Factor	0.2	0.2	0.2	0.2	W/° C
Junction to Ambient	Linear Derating Factor	0.005	0.005	0.005	0.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRFF230,232	200	220		V	V_{GS} = 0 I_D = 250 μA
		IRFF231,233	150	190		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	3	4	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1	mA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRFF230,231	5.5			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
		IRFF232,233	4.5			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRFF230,231		0.75	1.2	V	V_{GS} = 10V , I_D = 3A
		IRFF232,233		1.2	1.8	V	V_{GS} = 10V , I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF230,231		0.25	0.4	Ω	V_{GS} = 10V , I_D = 3A
		IRFF232,233		0.4	0.6	Ω	V_{GS} = 10V , I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF230,231			0.75	Ω	V_{GS} = 10V, I_D = 3A , T_C = 125°C
		IRFF232,233			1	Ω	V_{GS} = 10V, I_D = 3A , T_C = 125°C

DYNAMIC

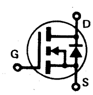
Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	4.5		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 3A
C_{iss}	Input Capacitance	All		750	800	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		170	450	pF	
C_{rss}	Reverse Transfer Capacitance	All		100	150	pF	
$t_{d(on)}$	Turn-On Delay Time	All			30	ns	V_{DD} = 75V , $I_D \cong$ 3A R_g = 7.5Ω , R_L = 25Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			50	ns	
t_f	Fall Time	All			40	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			5	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRFF230,231			−5.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRFF232,233			−4.5	A	
I_{SM}	Source Current[1] (Body Diode)	IRFF230,231			−22	A	
		IRFF232,233			−18	A	
V_{SD}	Diode Forward Voltage[1]	IRFF230,231			−2	V	T_C=25°C, I_S=−5.5A, V_{GS} = 0
		IRFF232,233			−1.8	V	T_C=25°C, I_S=−4.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		650		ns	T_J = 150°C , I_F = I_S, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE20

IRFF310 ■ IRFF311 ■ IRFF312 ■ IRFF313

Siliconix
PRELIMINARY

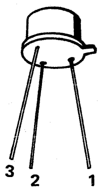
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PIN 1 — Source
PIN 2 — Gate
PIN 3 & CASE — Drain

T0—205AF (T0—39)



PRODUCT SUMMARY

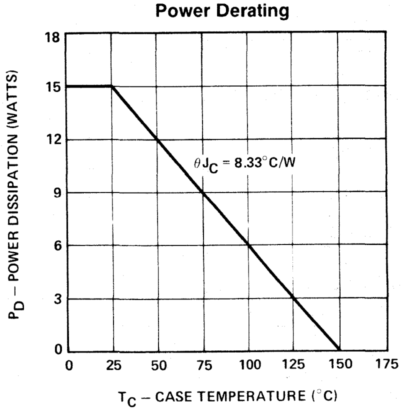
Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRFF310	400	3.6	T0—205AF
IRFF311	350	3.6	T0—205AF
IRFF312	400	5	T0—205AF
IRFF313	350	5	T0—205AF

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	IRFF310	IRFF311	IRFF312	IRFF313	Units
V_{DS}	Drain-Source Voltage	400	350	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±1.35	±1.35	±1.15	±1.15	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.86	±0.86	±0.73	±0.73	A
I_{DM}	Pulsed Drain Current[1]	±5.5	±5.5	±4.5	±4.5	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	15	15	15	15	W
P_D @ T_C = 100°C	Max. Power Dissipation	6	6	6	6	W
Junction to Case	Linear Derating Factor	0.12	0.12	0.12	0.12	W/° C
Junction to Ambient	Linear Derating Factor	0.006	0.006	0.006	0.006	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	−55 To +150	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRFF310,312	400			V	V_{GS} = 0 I_D = 250 μA
		IRFF311,313	350			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		4	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All			250	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All			1000	μA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRFF310,311	1.35			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		IRFF312,313	1.15			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRFF310,311		2.64	2.88	V	V_{GS} =10V , I_D = 0.8A
		IRFF312,313		2.88	4	V	V_{GS} =10V , I_D = 0.8A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF310,311		3.3	3.6	Ω	V_{GS} =10V , I_D = 0.8A
		IRFF312,313		3.6	5	Ω	V_{GS} =10V , I_D = 0.8A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF310,311		7.43	8.1	Ω	V_{GS} =10V, I_D =0.8A, T_C =125°C
		IRFF312,313		8.1	11.25	Ω	V_{GS} =10V, I_D =0.8A, T_C =125°C

DYNAMIC

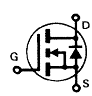
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	0.5	1.2		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.8A
C_{iss}	Input Capacitance	All		135	200	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		35	50	pF	
C_{rss}	Reverse Transfer Capacitance	All		8	15	pF	
$t_{d(on)}$	Turn-On Delay Time	All		3	10	ns	V_{DD} =175V, $I_D \cong$ 0.8A R_g = 25Ω , R_L = 220Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		10	20	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		5	10	ns	
t_f	Fall Time	All		8	15	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			8.33	°C/W	
R_{thJA}	Junction-to-Ambient	All			175	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRFF310,311			–1.35	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		IRFF312,313			–1.15	A	
I_{SM}	Source Current[1] (Body Diode)	IRFF310,311			–5.5	A	
		IRFF312,313			–4.5	A	
V_{SD}	Diode Forward Voltage[1]	IRFF310,311			–1.6	V	T_C=25°C, I_S=–1.35A, V_{GS} = 0
		IRFF312,313			–1.5	V	T_C=25°C, I_S=–1.15A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		380		ns	T_J =150°C , I_F = I_S, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

IRFF320 ■ IRFF321 ■ IRFF322 ■ IRFF323

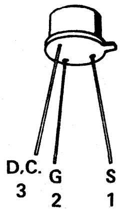
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Off-Line Switching Regulators
- Converters
- Solenoid Drivers
- Relay Drivers

PIN 1 – Source
PIN 2 – Gate
PIN 3 – Drain, Case



T0–205AF (T0–39)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRFF320	400	1.8	T0–205AF
IRFF321	350	1.8	T0–205AF
IRFF322	400	2.5	T0–205AF
IRFF323	350	2.5	T0–205AF

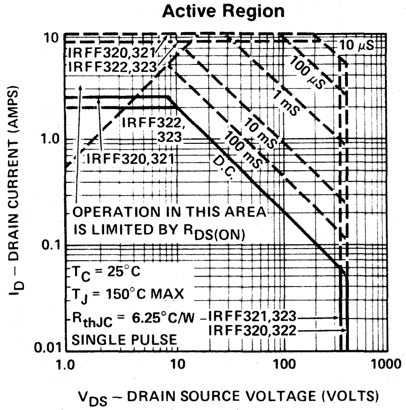
For Additional Curves
See Section 5: VNDD40

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

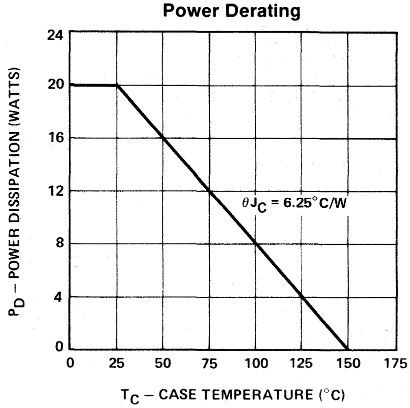
	Parameter	IRFF320	IRFF321	IRFF322	IRFF323	Units
V_{DS}	Drain-Source Voltage	400	350	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±2.5	±2.5	±2	±2	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.6	±1.6	±1.27	±1.27	A
I_{DM}	Pulsed Drain Current[1]	±10	±10	±8	±8	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20	20	20	20	W
P_D @ T_C = 100°C	Max. Power Dissipation	8	8	8	8	W
Junction to Case	Linear Derating Factor	0.16	0.16	0.16	0.16	W/° C
Junction to Ambient	Linear Derating Factor	0.005	0.005	0.005	0.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRFF320,322	400			V	V_{GS} = 0 I_D = 250 μA
		IRFF321,323	350			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		4	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	1	mA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRFF320,321	2.5			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
		IRFF322,323	2			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRFF320,321		1.88	2.25	V	V_{GS} = 10V , I_D = 1.25A
		IRFF322,323		2.25	3.13	V	V_{GS} = 10V , I_D = 1.25A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF320,321		1.5	1.8	Ω	V_{GS} = 10V , I_D = 1.25A
		IRFF322,323		1.8	2.5	Ω	V_{GS} = 10V , I_D = 1.25A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF320,321		3.3	3.9	Ω	V_{GS}=10V, I_D=1.25A, T_C=125°C
		IRFF322,323		3.9	5.5	Ω	V_{GS}=10V, I_D=1.25A, T_C=125°C

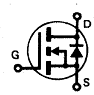
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1	2		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 1.25A
C_{iss}	Input Capacitance	All		450	600	pF	V_{GS} = 0 ,V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		100	200	pF	
C_{rss}	Reverse Transfer Capacitance	All		20	40	pF	
$t_{d(on)}$	Turn-On Delay Time	All		20	40	ns	V_{DD} =200V, $I_D \cong$ 1.25A R_g = 25Ω , R_L = 160Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		25	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		25	50	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			6.25	°C/W	
R_{thJA}	Junction-to-Ambient	All			175	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRFF320,321			–2.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRFF322,323			–2	A	
I_{SM}	Source Current[1] (Body Diode)	IRFF320,321			–10	A	
		IRFF322,323			–8	A	
V_{SD}	Diode Forward Voltage[1]	IRFF320,321			–1.6	V	T_C=25°C, I_S=–2.5A, V_{GS} = 0
		IRFF322,323			–1.5	V	T_C = 25°C , I_S = –2A ,V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C , $I_F = I_S$, dI_F/ds =100 A/μs

1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDD40

IRFF330 ■ IRFF331 ■ IRFF332 ■ IRFF333

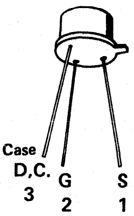
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Off-Line Switching Regulators
- Converters
- Solenoid Drivers
- Relay Drivers

PIN 1 – Source
PIN 2 – Gate
PIN 3 – Drain and Case



T0–205AF (T0–39)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRFF330	400	1	T0–205AF
IRFF331	350	1	T0–205AF
IRFF332	400	1.5	T0–205AF
IRFF333	350	1.5	T0–205AF

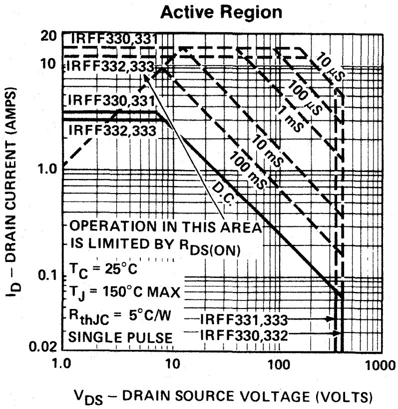
For Additional Curves
See Section 5: VNDE40

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

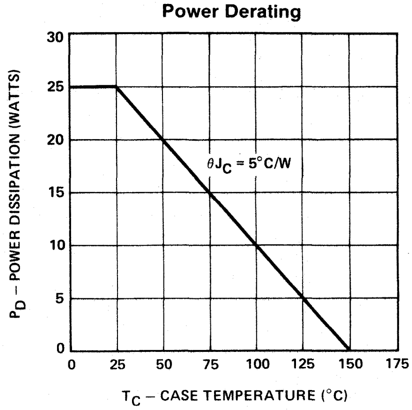
	Parameter	IRFF330	IRFF331	IRFF332	IRFF333	Units
V_{DS}	Drain-Source Voltage	400	350	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±3.5	±3.5	±3	±3	A
I_D @ T_C = 100° C	Continuous Drain Current	±2.2	±2.2	±1.9	±1.9	A
I_{DM}	Pulsed Drain Current[1]	±14	±14	±12	±12	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	25	25	25	25	W
P_D @ T_C = 100°C	Max. Power Dissipation	10	10	10	10	W
Junction to Case	Linear Derating Factor	0.2	0.2	0.2	0.2	W/° C
Junction to Ambient	Linear Derating Factor	0.005	0.005	0.005	0.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	–55 To 150	–55 To 150	–55 To 150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRFF330,332	400			V	V_{GS} = 0 I_D = 250 μA
		IRFF331,333	350			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	3.3	4	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		10	100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All		–10	–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	0.25	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.5	1	mA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	IRFF330,331	3.5	8		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		IRFF332,333	3	8		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRFF330,331		1.8	2	V	V_{GS} = 10V, I_D = 2A
		IRFF332,333		2.4	3	V	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF330,331		0.9	1	Ω	V_{GS} = 10V, I_D = 2A
		IRFF332,333		1.2	1.5	Ω	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF330,331			2	Ω	V_{GS} =10V, I_D = 2A, T_C =125°C
		IRFF332,333			3	Ω	V_{GS} =10V, I_D = 2A, T_C =125°C

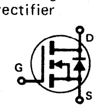
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2	3.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 2A
C_{iss}	Input Capacitance	All		700	900	pF	V_{GS} = 0, V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		150	300	pF	
C_{rss}	Reverse Transfer Capacitance	All		40	80	pF	
$t_{d(on)}$	Turn-On Delay Time	All			30	ns	V_{DD} = 175V $I_D \cong$ 2A R_g = 7.5Ω, R_L = 88Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			35	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			55	ns	
t_f	Fall Time	All			35	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			5	°C/W	
R_{thJA}	Junction-to-Ambient	All			175	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRFF330,331			–3.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRFF332,333			–3	A	
I_{SM}	Source Current[1] (Body Diode)	IRFF330,331			–14	A	
		IRFF332,333			–12	A	
V_{SD}	Diode Forward Voltage[1]	IRFF330,331			–1.6	V	T_C=25°C, I_S=–3.5A, V_{GS} = 0
		IRFF332,333			–1.5	V	T_C = 25°C, I_S = –3A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE40

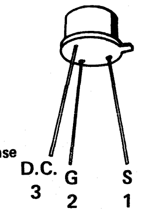
IRFF430 ■ IRFF431 ■ IRFF432 ■ IRFF433

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Off Line Switching Regulators
- Converters
- Solenoid Drivers
- Relay Drivers



PIN 1 — Source
PIN 2 — Gate
PIN 3 — Drain, Case

T0–205AF (T0–39)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
IRFF430	500	1.5	T0–205AF
IRFF431	450	1.5	T0–205AF
IRFF432	500	2	T0–205AF
IRFF433	450	2	T0–205AF

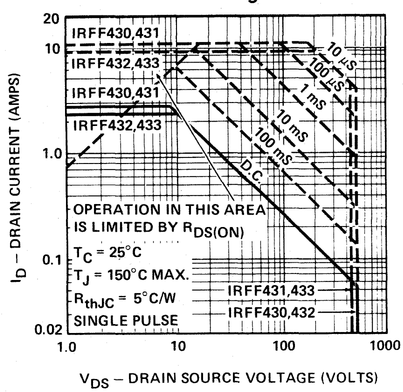
For Additional Curves
See Section 5: VNDE50

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

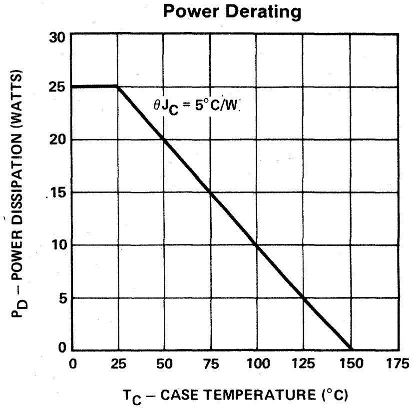
	Parameter	IRFF430	IRFF431	IRFF432	IRFF433	Units
V_{DS}	Drain-Source Voltage	500	450	500	450	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500	450	500	450	V
I_D @ T_C = 25° C	Continuous Drain Current	±2.75	±2.75	±2.25	±2.25	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.98	±1.98	±1.71	±1.71	A
I_{DM}	Pulsed Drain Current[1]	±11	±11	±9	±9	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	25	25	25	25	W
P_D @ T_C = 100°C	Max. Power Dissipation	10	10	10	10	W
Junction to Case	Linear Derating Factor	0.2	0.2	0.2	0.2	W/° C
Junction to Ambient	Linear Derating Factor	0.005	0.005	0.005	0.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To 150	−55 To 150	−55 To 150	−55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	IRFF430,432	500			V	$V_{GS} = 0$ $I_D = 250\ \mu A$
		IRFF431,433	450			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		4	V	$V_{DS} = V_{GS}$, $I_D = 1$ mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	$V_{GS} = 20V$
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	$V_{GS} = -20V$
I_{DSS}	Zero Gate Voltage Drain Current	All			0.25	mA	V_{DS} = Max. Rating, $V_{GS} = 0$
		All			1	mA	V_{DS} = 0.8 Max. Rating, $V_{GS} = 0$ $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	IRFF430,431	2.75			A	$V_{DS} \geqslant 2V_{DS(ON)}$, $V_{GS} = 10V$
		IRFF432,433	2.25			A	$V_{DS} \geqslant 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	IRFF430,431		1.95	2.25	V	$V_{GS} = 10V$, $I_D = 1.5A$
		IRFF432,433		2.25	3	V	$V_{GS} = 10V$, $I_D = 1.5A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF430,431		1.3	1.5	Ω	$V_{GS} = 10V$, $I_D = 1.5A$
		IRFF432,433		1.5	2	Ω	$V_{GS} = 10V$, $I_D = 1.5A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	IRFF430,431		2.8	3.3	Ω	$V_{GS} = 10V$, $I_D = 1.5A$, $T_C = 125°C$
		IRFF432,433		3.3	4.4	Ω	$V_{GS} = 10V$, $I_D = 1.5A$, $T_C = 125°C$

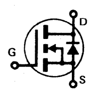
DYNAMIC

		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1.5	3.2		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, $I_D = 1.5A$
C_{iss}	Input Capacitance	All		700	800	pF	$V_{GS} = 0$, $V_{DS} = 25V$ f = 1 MHz
C_{oss}	Output Capacitance	All		100	200	pF	
C_{rss}	Reverse Transfer Capacitance	All		30	60	pF	
$t_{d(on)}$	Turn-On Delay Time	All		16	30	ns	$V_{DD} = 225V$, $I_D \cong 1.5A$ $R_g = 7.5\Omega$, $R_L = 150\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	30	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		43	55	ns	
t_f	Fall Time	All		27	30	ns	

THERMAL RESISTANCE

		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			5	°C/W	
R_{thJA}	Junction-to-Ambient	All			175	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	IRFF430,431			−2.75	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		IRFF432,433			−2.25	A	
I_{SM}	Source Current[1] (Body Diode)	IRFF430,431			−11	A	
		IRFF432,433			−9	A	
V_{SD}	Diode Forward Voltage[1]	IRFF430,431			−1.4	V	$T_C = 25°C$, $I_S = -2.75A$, $V_{GS} = 0$
		IRFF432,433			−1.3	V	$T_C = 25°C$, $I_S = -2.25A$, $V_{GS} = 0$
t_{rr}	Reverse Recovery Time	All		400		ns	$T_J = 150°C$, $I_F = I_S$, $dI_F/ds = 100\ A/\mu s$

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE50

VN0300B

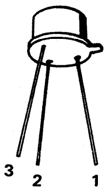
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PIN 1 — Source
PIN 2 — Gate
PIN 3 & CASE — Drain



T0–205AD (T0–39)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN0300B	30	1.2	T0–205AD

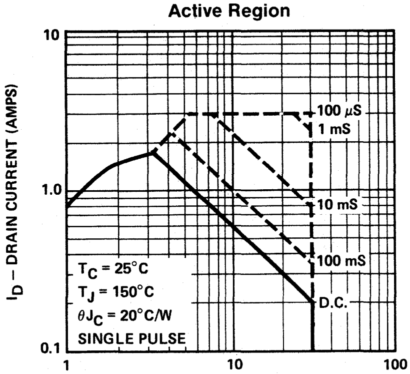
For Additional Curves
See Section 5: VNMH03

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

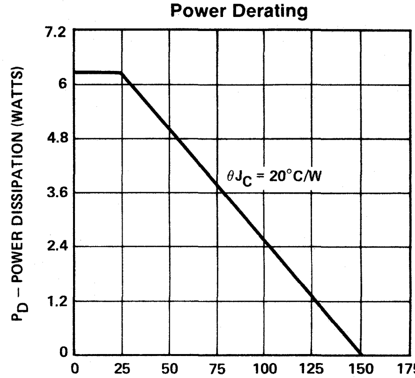
	Parameter	VN0300B	Units
V_{DS}	Drain-Source Voltage	30	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	30	V
I_D @ T_C = 25° C	Continuous Drain Current	±1.86	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.2	A
I_{DM}	Pulsed Drain Current[1]	±3	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	6.25	W
P_D @ T_C = 100°C	Max. Power Dissipation	2.5	W
Junction to Case	Linear Derating Factor	0.05	W/° C
Junction to Ambient	Linear Derating Factor	0.006	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN0300B	30	40		V	V_{GS} = 0, I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	VN0300B	0.8	1.5	2.5	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	VN0300B		1	100	nA	V_{GS} = +30V, V_{DS} = 0
I_{GSSR}	Gate-Body Leakage Reverse	VN0300B		−1	−100	nA	V_{GS} = −30V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	VN0300B		1	10	μA	V_{DS} = Max. Rating, V_{GS} = 0
		VN0300B		50	500	μA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	VN0300B	1	3.2		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VN0300B		0.5	1	V	V_{GS} = 5V, I_D = 0.3A
		VN0300B		0.75	1.2	V	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN0300B		1.67	3.3	Ω	V_{GS} = 5V, I_D = 0.3A
		VN0300B		0.75	1.2	Ω	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN0300B		1.03	1.65	Ω	V_{GS} = 10V, I_D = 1A, T_C = 125°C

DYNAMIC

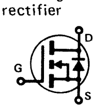
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	VN0300B	200	500		mS	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	VN0300B		85	100	pF	V_{GS} = 0, V_{DS} = 15V, f = 1 MHz
C_{oss}	Output Capacitance	VN0300B		80	95	pF	
C_{rss}	Reverse Transfer Capacitance	VN0300B		18	25	pF	
$t_{d(on)}$	Turn-On Delay Time	VN0300B		20	30	ns	V_{DD} = 25V, $I_D \cong$ 1A, R_g = 25Ω, R_L = 24Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{d(off)}$	Turn-Off Delay Time	VN0300B		20	30	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	VN0300B			20	°C/W	
R_{thJA}	Junction-to-Ambient	VN0300B			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN0300B			−1.86	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	VN0300B			−3	A	
V_{SD}	Diode Forward Voltage[1]	VN0300B		−0.9		V	T_C=25°C, I_S=−1.86A, V_{GS} = 0



1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNMH03

VN0300D

Siliconix

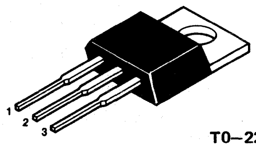
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN0300D	30	1.2	T0–220AB



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

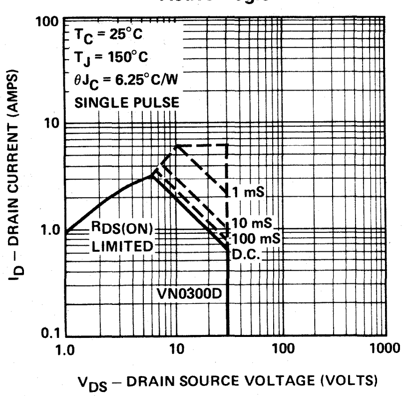
For Additional Curves
See Section 5: VNMH03

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

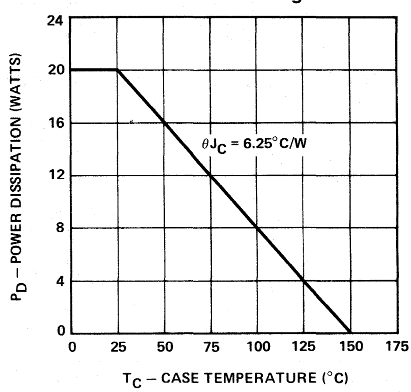
	Parameter	VN0300D	Units
V_{DS}	Drain-Source Voltage	30	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	30	V
I_D @ T_C = 25° C	Continuous Drain Current	±3.33	A
I_D @ T_C = 100° C	Continuous Drain Current	±2.11	A
I_{DM}	Pulsed Drain Current[1]	±6	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20	W
P_D @ T_C = 100°C	Max. Power Dissipation	8	W
Junction to Case	Linear Derating Factor	0.16	W/° C
Junction to Ambient	Linear Derating Factor	0.0125	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN0300D	30	40		V	$V_{GS} = 0$, $I_D = 10\ \mu A$
$V_{GS(th)}$	Gate-Threshold Voltage	VN0300D	0.8	1.5	2.5	V	$V_{DS} = V_{GS}$, $I_D = 1$ mA
I_{GSSF}	Gate-Body Leakage Forward	VN0300D		1 10	10 100	nA	$V_{GS} = +15V$, $V_{DS} = 0$ $V_{GS} = +15V$, $V_{DS}=0$, @T_A = 125°C
I_{GSSR}	Gate-Body Leakage Reverse	VN0300D		−1	−10	nA	$V_{GS} = -15V$, $V_{DS} = 0$
I_{DSS}	Zero Gate Voltage Drain Current	VN0300D		1	10	μA	V_{DS} = Max. Rating, $V_{GS} = 0$
		VN0300D		50	500	μA	V_{DS} = Max. Rating, $V_{GS} = 0$ T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	VN0300D	2	3.2		A	$V_{DS} \geq 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VN0300D		0.5	1	V	$V_{GS} = 5V$, $I_D = 0.3A$
		VN0300D		0.75	1.2	V	$V_{GS} = 10V$, $I_D = 1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN0300D		1.67	3.3	Ω	$V_{GS} = 5V$, $I_D = 0.3A$
		VN0300D		0.75	1.2	Ω	$V_{GS} = 10V$, $I_D = 1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN0300D		1.03	1.65	Ω	$V_{GS} = 10V$, $I_D = 1A$, T_C = 125°C

DYNAMIC

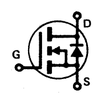
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	VN0300D	200	500		mS	$V_{DS} \geq 2V_{DS(ON)}$, $I_D = 0.5A$
C_{iss}	Input Capacitance	VN0300D		85	100	pF	$V_{GS} = 0$, $V_{DS} = 15V$ f = 1 MHz
C_{oss}	Output Capacitance	VN0300D		80	95	pF	
C_{rss}	Reverse Transfer Capacitance	VN0300D		18	25	pF	
t_{ON}	Turn-On Time	VN0300D		20	30	ns	$V_{DD} = 15V$, $I_D \cong 0.6A$ $R_g = 25\Omega$, $R_L = 24\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	VN0300D		20	30	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	VN0300D			6.25	°C/W	
R_{thJA}	Junction-to-Ambient	VN0300D			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN0300D			−3.33	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	VN0300D			−6	A	
V_{SD}	Diode Forward Voltage[1]	VN0300D		−0.9		V	T_C=25°C, I_S=−3.3A, $V_{GS} = 0$



1 **Pulse Test:** Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNMH03

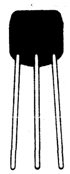
VN0300L

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN0300L	30	1.2	T0–92

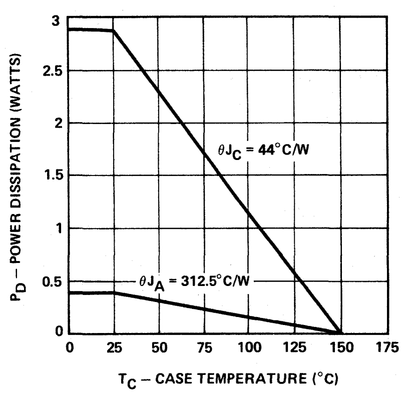
For Additional Curves
See Section 5: VNMH03

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	VN0300L	Units
V_{DS}	Drain-Source Voltage	30	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	30	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.63	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.4	A
I_{DM}	Pulsed Drain Current[1]	±3	A
V_{GS}	Gate-Source Voltage	±40	V
P_D	Max Continuous Power Dissipation	0.4	W
P_D	Max Pulse[2] Power Dissipation	2.8	W
Junction to Case	Linear Derating Factor	0.023	W/° C
Junction to Ambient	Linear Derating Factor	0.0032	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300µsec, Duty Cycle ⩽ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



ELECTRICAL CHARACTERISTICS ($T_C = 25°C$ unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN0300L	30	40		V	$V_{GS} = 0$, $I_D = 10\ \mu A$
$V_{GS(th)}$	Gate-Threshold Voltage	VN0300L	0.8	1.5	2.5	V	$V_{DS} = V_{GS}$, $I_D = 1\ mA$
I_{GSSF}	Gate-Body Leakage Forward	VN0300L		1	100	nA	$V_{GS} = +30V$
I_{GSSR}	Gate-Body Leakage Reverse	VN0300L		−1	−100	nA	$V_{GS} = -30V$
I_{DSS}	Zero Gate Voltage Drain Current	VN0300L		1	10	μA	V_{DS} = Max. Rating, $V_{GS} = 0$
		VN0300L		50	500	μA	V_{DS} = Max. Rating, $V_{GS} = 0$, $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	VN0300L	1	3.2		A	$V_{DS} \geq 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VN0300L		0.5	1	V	$V_{GS} = 5V$, $I_D = 0.3A$
		VN0300L		0.75	1.2	V	$V_{GS} = 10V$, $I_D = 1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN0300L		1.67	3.3	Ω	$V_{GS} = 5V$, $I_D = 0.3A$
		VN0300L		0.75	1.2	Ω	$V_{GS} = 10V$, $I_D = 1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN0300L		1.03	1.65	Ω	$V_{GS} = 10V$, $I_D = 1A$, $T_C = 125°C$

DYNAMIC

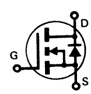
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	VN0300L	200	500		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, $I_D = 0.5A$
C_{iss}	Input Capacitance	VN0300L		85	100	pF	$V_{GS} = 0$, $V_{DS} = 15V$, f = 1 MHz
C_{oss}	Output Capacitance	VN0300L		80	95	pF	
C_{rss}	Reverse Transfer Capacitance	VN0300L		18	25	pF	
t_{ON}	Turn-On Time	VN0300L		20	30	ns	$V_{DD} = 15V$, $I_D \cong 0.6A$, $R_g = 25\Omega$, $R_L = 24\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	VN0300L		20	30	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	VN0300L		36.6	44	°C/W	
R_{thJA}	Junction-to-Ambient	VN0300L			312.5	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN0300L			−0.63	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	VN0300L			−3	A	
V_{SD}	Diode Forward Voltage[1]	VN0300L		−0.9		V	$T_C = 25°C$, $I_S = -0.63A$, $V_{GS} = 0$



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMH03

VN0300M

Siliconix

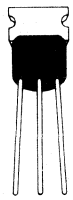
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PIN 1 – Source
PIN 2 – Gate
PIN 3 & TAB – Drain

T0–237



PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN0300M	30	1.2	T0–237

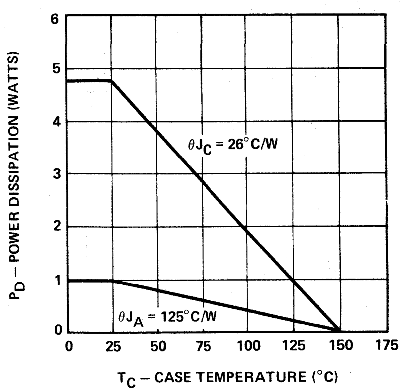
For Additional Curves
See Section 5: VNMH03

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	VN0300M	Units
V_{DS}	Drain-Source Voltage	30	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	30	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.75	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.47	A
I_{DM}	Pulsed Drain Current[1]	±3	A
V_{GS}	Gate-Source Voltage	±40	V
P_D	Max Continuous Power Dissipation	1	W
P_D	Max Pulse[2] Power Dissipation	4.8	W
Junction to Case	Linear Derating Factor	0.038	W/° C
Junction to Ambient	Linear Derating Factor	0.008	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN0300M	30	40		V	$V_{GS} = 0$, $I_D = 10\ \mu A$
$V_{GS(th)}$	Gate-Threshold Voltage	VN0300M	0.8	1.5	2.5	V	$V_{DS} = V_{GS}$, $I_D = 1$ mA
I_{GSSF}	Gate-Body Leakage Forward	VN0300M		1	100	nA	$V_{GS} = +30V$, $V_{DS} = 0$
I_{GSSR}	Gate-Body Leakage Reverse	VN0300M		−1	−100	nA	$V_{GS} = -30V$, $V_{DS} = 0$
I_{DSS}	Zero Gate Voltage Drain Current	VN0300M		1	10	μA	V_{DS} = Max. Rating, $V_{GS} = 0$
		VN0300M		50	500	μA	V_{DS} = Max. Rating, $V_{GS} = 0$, $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	VN0300M	1	3.2		A	$V_{DS} \geq 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VN0300M		0.5	1	V	$V_{GS} = 5V$, $I_D = 0.3A$
		VN0300M		0.75	1.2	V	$V_{GS} = 10V$, $I_D = 1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN0300M		1.67	3.3	Ω	$V_{GS} = 5V$, $I_D = 0.3A$
		VN0300M		0.75	1.2	Ω	$V_{GS} = 10V$, $I_D = 1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN0300M		1.03	1.65	Ω	$V_{GS} = 10V$, $I_D = 1A$, $T_C = 125°C$

DYNAMIC

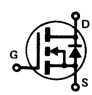
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	VN0300M	200	500		mS	$V_{DS} \geq 2V_{DS(ON)}$, $I_D = 0.5A$
C_{iss}	Input Capacitance	VN0300M		85	100	pF	$V_{GS} = 0$, $V_{DS} = 15V$, f = 1 MHz
C_{oss}	Output Capacitance	VN0300M		80	95	pF	
C_{rss}	Reverse Transfer Capacitance	VN0300M		18	25	pF	
t_{ON}	Turn-On Time	VN0300M		20	30	ns	$V_{DD} = 25V$, $I_D \cong 1A$, $R_g = 25\Omega$, $R_L = 24\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	VN0300M		20	30	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	VN0300M		22	26	°C/W	
R_{thJA}	Junction-to-Ambient	VN0300M			125	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN0300M			−0.75	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	VN0300M			−3	A	
V_{SD}	Diode Forward Voltage[1]	VN0300M		−0.9		V	$T_C = 25°C$, $I_S = -0.75A$, $V_{GS} = 0$



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMH03

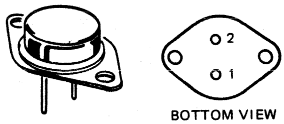
VN0600A ■ VN0400A

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN0600A	60	0.12	T0–204AA
VN0400A	40	0.12	T0–204AA

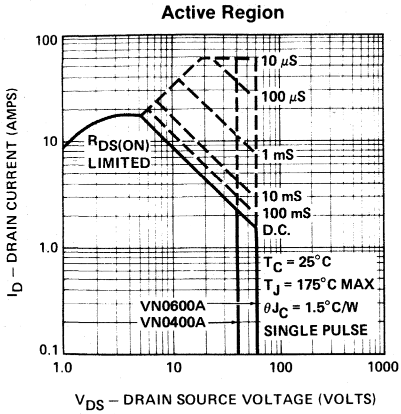
For Additional Curves
See Section 5: VNDA06

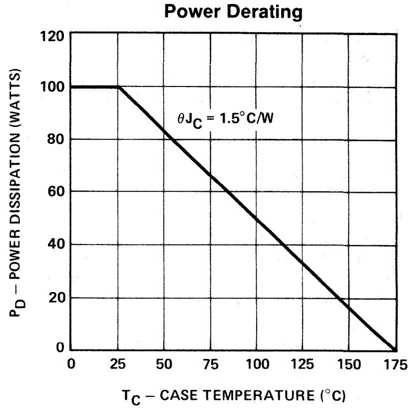
1

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	VN0600A	VN0400A	Units
V_{DS}	Drain-Source Voltage	60	40	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	40	V
I_D @ T_C = 25° C	Continuous Drain Current	±17.9	±17.9	A
I_D @ T_C = 100° C	Continuous Drain Current	±12.7	±12.9	A
I_{DM}	Pulsed Drain Current[1]	±60	±60	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	100	100	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	W
Junction to Case	Linear Derating Factor	0.67	0.67	W/° C
Junction to Ambient	Linear Derating Factor	0.034	0.034	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +175	–55 To +175	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%





ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN0600A	60	70		V	V_{GS} = 0 I_D = 1 mA
		VN0400A	40	50		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	2.4	4.5	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.2	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.8	4	mA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	18	32		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1	1.44	V	V_{GS} = 10V , I_D = 12A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.08	0.12	Ω	V_{GS} = 10V , I_D = 12A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.14	0.21	Ω	V_{GS} =10V, I_D =12A, T_C =125°C

DYNAMIC

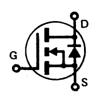
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3	5		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 12A
C_{iss}	Input Capacitance	All		1000	1200	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		400	500	pF	
C_{rss}	Reverse Transfer Capacitance	All		150	200	pF	
$t_{d(on)}$	Turn-On Delay Time	All		25	30	ns	V_{DD} = 30V , $I_D \cong$ 12A R_g = 10Ω , R_L = 2.4Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		100	150	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		85	100	ns	
t_f	Fall Time	All		85	100	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.5	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−18	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−60	A	
V_{SD}	Diode Forward Voltage[1]	All		−0.8		V	T_C=25°C, I_S=−18A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		300		ns	T_J =150°C , $I_F = I_S$, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDA06

VN0600D ■ VN0400D

Siliconix

N-Channel Enhancement Mode

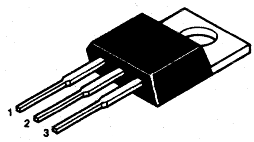
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN0600D	60	0.12	T0–220AB
VN0400D	40	0.12	T0–220AB



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

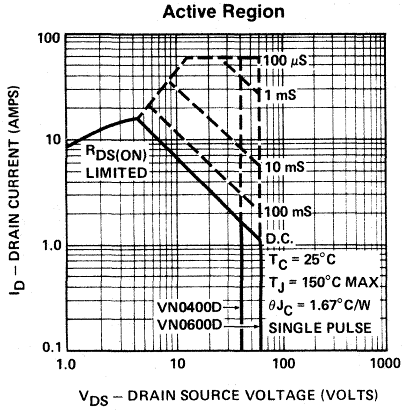
For Additional Curves
See Section 5: VNDA06

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

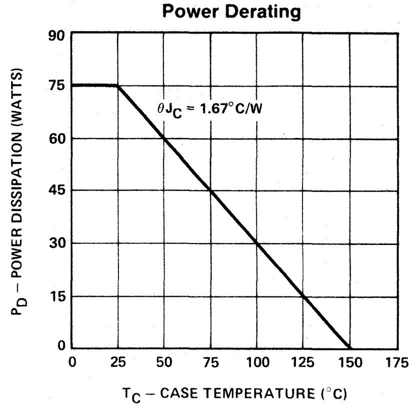
	Parameter	VN0600D	VN0400D	Units
V_{DS}	Drain-Source Voltage	60	40	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	40	V
I_D @ T_C = 25° C	Continuous Drain Current	±17.89	±17.89	A
I_D @ T_C = 100° C	Continuous Drain Current	±11.31	±11.31	A
I_{DM}	Pulsed Drain Current[1]	±60	±60	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	30	W
Junction to Case	Linear Derating Factor	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	0.0125	0.0125	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN0600D	60	70		V	V_{GS} = 0, I_D = 1 mA
		VN0400D	40	50		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	2.4	4.5	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.2	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.8	4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	18	32		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1	1.44	V	V_{GS} = 10V , I_D = 12A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.08	0.12	Ω	V_{GS} = 10V , I_D = 12A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.14	0.21	Ω	V_{GS} =10V, I_D =12A, T_C =125°C

DYNAMIC

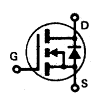
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3	5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 12A
C_{iss}	Input Capacitance	All		1000	1200	pF	V_{GS} = 0 , V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		400	500	pF	
C_{rss}	Reverse Transfer Capacitance	All		150	200	pF	
$t_{d(on)}$	Turn-On Delay Time	All		25	30	ns	V_{DD} = 30V , $I_D \cong$ 12A, R_g = 10Ω , R_L = 2.4Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		100	150	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		85	100	ns	
t_f	Fall Time	All		85	100	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.67	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−18	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−60	A	
V_{SD}	Diode Forward Voltage[1]	All		−0.8		V	T_C=25°C, I_S=−18A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		300		ns	T_J =150°C , $I_F = I_S$, dI_F/ds = 100 A/µs



1 **Pulse Test:** Pulse Width ⩽ 300 µsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDA06

VN0601A ■ VN0401A

Siliconix

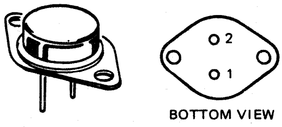
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN0601A	60	0.15	T0–204AA
VN0401A	40	0.15	T0–204AA



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

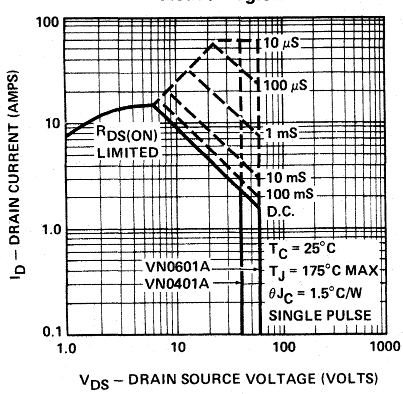
For Additional Curves
See Section 5: VNDA06

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

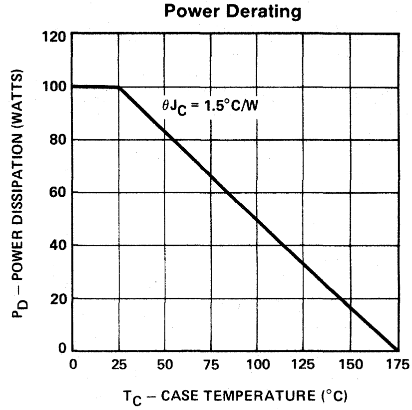
	Parameter	VN0601A	VN0401A	Units
V_{DS}	Drain-Source Voltage	60	40	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	40	V
I_D @ T_C = 25° C	Continuous Drain Current	±16	±16	A
I_D @ T_C = 100° C	Continuous Drain Current	±11.3	±11.3	A
I_{DM}	Pulsed Drain Current[1]	±60	±60	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	100	100	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	W
Junction to Case	Linear Derating Factor	0.67	0.67	W/° C
Junction to Ambient	Linear Derating Factor	0.034	0.034	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +175	–55 To +175	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN0601A	60	70		V	V_{GS} = 0, I_D = 1 mA
		VN0401A	40	50		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	2.4	4.5	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.2	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.8	4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	18	32		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1.2	1.8	V	V_{GS} = 10V, I_D = 12A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.1	0.15	Ω	V_{GS} = 10V, I_D = 12A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.18	0.26	Ω	V_{GS} = 10V, I_D = 12A, T_C = 125°C

DYNAMIC

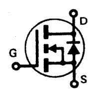
Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3	5		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 12A
C_{iss}	Input Capacitance	All		1000	1200	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		400	500	pF	
C_{rss}	Reverse Transfer Capacitance	All		150	200	pF	
$t_{d(on)}$	Turn-On Delay Time	All		25	30	ns	V_{DD} = 30V, $I_D \cong$ 12A, R_g = 10Ω, R_L = 2.4Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		100	150	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		85	100	ns	
t_f	Fall Time	All		85	100	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.5	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−16	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−60	A	
V_{SD}	Diode Forward Voltage[1]	All		−0.8		V	T_C=25°C, I_S=−16A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		300		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDA06

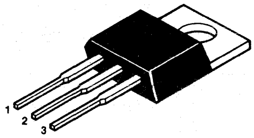
VN0601D ■ VN0401D

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN0601D	60	0.15	T0–220AB
VN0401D	40	0.15	T0–220AB

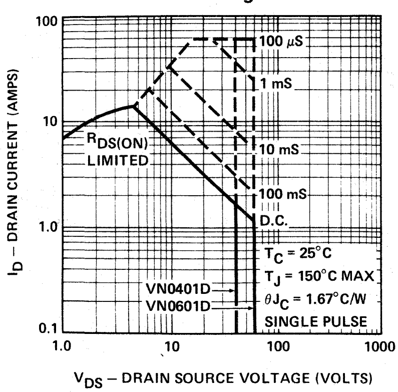
For Additional Curves
See Section 5: VNDA06

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

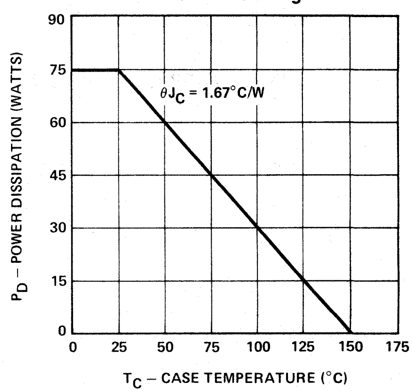
	Parameter	VN0601D	VN0401D	Units
V_{DS}	Drain-Source Voltage	60	40	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	40	V
I_D @ T_C = 25° C	Continuous Drain Current	±16	±16	A
I_D @ T_C = 100° C	Continuous Drain Current	±10.12	±10.12	A
I_{DM}	Pulsed Drain Current[1]	±60	±60	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	30	W
Junction to Case	Linear Derating Factor	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	0.034	0.034	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN0601D	60	70		V	V_{GS} = 0, I_D = 1 mA
		VN0401D	40	50		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	2.4	4.5	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.2	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.8	4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	18	32		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1.2	1.8	V	V_{GS} = 10V, I_D = 12A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.1	0.15	Ω	V_{GS} = 10V, I_D = 12A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.18	0.26	Ω	V_{GS} =10V, I_D =12A, T_C =125°C

DYNAMIC

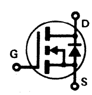
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3	5		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 12A
C_{iss}	Input Capacitance	All		1000	1200	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		400	500	pF	
C_{rss}	Reverse Transfer Capacitance	All		150	200	pF	
$t_{d(on)}$	Turn-On Delay Time	All		25	30	ns	V_{DD} = 30V, $I_D \cong$ 12A, R_g = 10Ω, R_L = 2.4Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		100	150	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		85	100	ns	
t_f	Fall Time	All		85	100	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.67	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−16	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−60	A	
V_{SD}	Diode Forward Voltage[1]	All		−0.8		V	T_C=25°C, I_S=−16A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		300		ns	T_J =150°C, I_F = I_S, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDA06

VN0606M

Siliconix

N-Channel Enhancement Mode
MOSPOWER

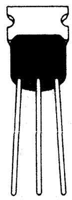
APPLICATIONS

- Switching Regulators
- Converters

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN0606M	60	3	T0–237

PIN 1 — Source
PIN 2 — Gate
PIN 3 & TAB — Drain



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T0–237

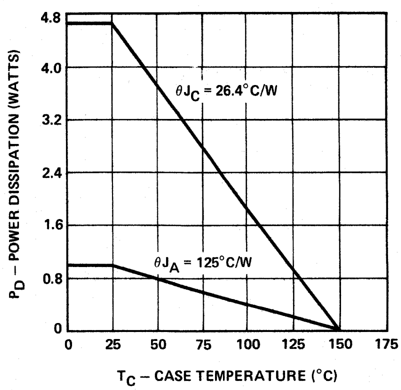
For Additional Curves
See Section 5: VNMA06

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	VN0606M	Units
V_{DS}	Drain-Source Voltage	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.47	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.30	A
I_{DM}	Pulsed Drain Current[1]	±2	A
V_{GS}	Gate-Source Voltage	±40	V
P_D	Max Continuous Power Dissipation	1	W
P_D	Max Pulse[2] Power Dissipation	4.7	W
Junction to Case	Linear Derating Factor	0.038	W/° C
Junction to Ambient	Linear Derating Factor	0.008	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN0606M	60	100		V	V_{GS} = 0 I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	VN0606M	0.8	1.5	2	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	VN0606M		1	100	nA	V_{GS} = +15V
I_{GSSR}	Gate-Body Leakage Reverse	VN0606M		−1	−100	nA	V_{GS} = −15V
I_{DSS}	Zero Gate Voltage Drain Current	VN0606M		0.1	10	μA	V_{DS} = Max. Rating, V_{GS} = 0
				5	500	μA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	VN0606M	1.5	1.7		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VN0606M		2.7	3	V	V_{GS} = 10V , I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN0606M		2.7	3	Ω	V_{GS} = 10V , I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN0606M		3.8	4.2	Ω	V_{GS} = 10V, I_D = 1A , T_C = 125°C

DYNAMIC

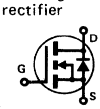
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	VN0606M	170	195		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	VN0606M		35	50	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	VN0606M		33	40	pF	
C_{rss}	Reverse Transfer Capacitance	VN0606M		2	10	pF	
$t_{(on)}$	Turn-On Time	VN0606M		8	10	ns	V_{DD} = 25V , $I_D \cong$ 1A R_g = 25Ω , R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{(off)}$	Turn-Off Time	VN0606M		8	10	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	VN0606M		22	26.4	°C/W	
R_{thJA}	Junction-to-Ambient	VN0606M			125	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN0606M			−0.47	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	VN0606M			−2	A	
V_{SD}	Diode Forward Voltage[1]	VN0606M		−1.2		V	T_C=25°C, I_S=−0.47, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMA06

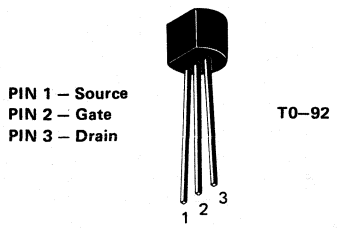
VN0610L ■ VN2222L

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN0610L	60	5	T0–92
VN2222L	60	7.5	T0–92

For Additional Curves
See Section 5: VNMK06

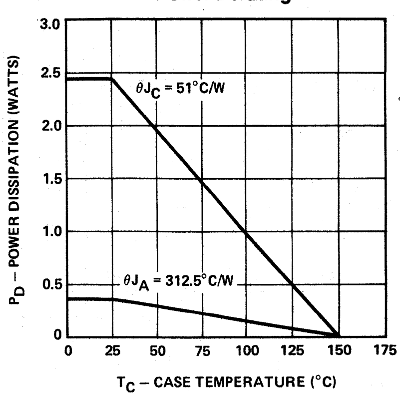
ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	VN0610L	VN2222L	Units
V_{DS}	Drain-Source Voltage	60	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.19	±0.15	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.12	±0.099	A
I_{DM}	Pulsed Drain Current[1]	±1	±1	A
V_{GS}	Gate-Source Voltage	+15, –0.3	+15, –0.3	V
P_D	Max Continuous Power Dissipation	0.4	0.4	W
P_D	Max Pulse[2] Power Dissipation	2.45	2.45	W
Junction to Case	Linear Derating Factor	0.02	0.02	W/° C
Junction to Ambient	Linear Derating Factor	0.0032	0.0032	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

2 1 Sec Continuous Power Single Pulse

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	All	60	120		V	V_{GS} = 0 I_D = 100 μA
$V_{GS(th)}$	Gate-Threshold Voltage	VN0610L VN2222L	0.8 0.6	1.5 1.5	2.5 2.5	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +15V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	10	μA	V_{DS} = 50V , V_{GS} = 0
		All		50	500	μA	V_{DS} = 50V , V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	0.75	1.5		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1.2	1.5	V	V_{GS} = 5V , I_D = 0.2A
		VN0610L VN2222L		2 3	2.5 3.75	V	V_{GS} = 10V , I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		6	7.5	Ω	V_{GS} = 5V , I_D = 0.2A
		VN0610L VN2222L		4 6	5 7.5	Ω	V_{GS} = 10V , I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN0610L		7.2	9	Ω	V_{GS} =10V, I_D =0.5A, T_C =125°C
		VN2222L		10.8	13.5	Ω	V_{GS} =10V, I_D =0.5A, T_C =125°C

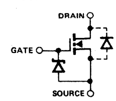
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	100			mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		40	60	pF	V_{GS} = 0 ,V_{DS} = 15V f = 1 MHz
C_{oss}	Output Capacitance	All		17	25	pF	
C_{rss}	Reverse Transfer Capacitance	All		3	5	pF	
$t_{(on)}$	Turn-On Time	All		7	10	ns	V_{DD} = 15V , $I_D \cong$ 0.6A R_g = 25Ω , R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{(off)}$	Turn-Off Time	All		7	10	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All		42.5	51	°C/W	
R_{thJA}	Junction-to-Ambient	All			312.5	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN0610L			−0.2	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		VN2222L			−0.15	A	
I_{SM}	Source Current[1] (Body Diode)	All			−1	A	
V_{SD}	Diode Forward Voltage[1]	All		−0.85		V	T_C=25°C, I_S=−0.2A, V_{GS} = 0

1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMK06

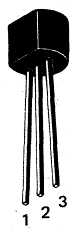
VN0610LL ■ VN2222LL

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters



PIN 1 — Source
PIN 2 — Gate
PIN 3 — Drain

T0–92

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN0610LL	60	5	T0–92
VN2222LL	60	7.5	T0–92

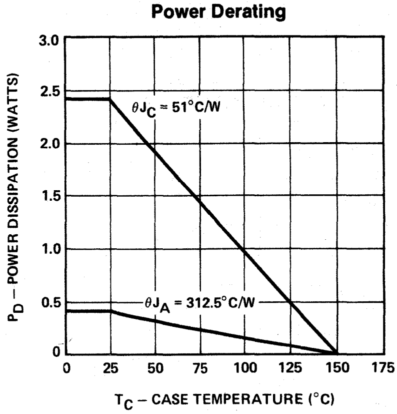
For Additional Curves
See Section 5: VNDF06

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	VN0610LL	VN2222LL	Units
V_{DS}	Drain-Source Voltage	60	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.19	±0.15	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.12	±0.099	A
I_{DM}	Pulsed Drain Current[1]	±1	±1	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D	Max Continuous Power Dissipation	0.4	0.4	W
P_D	Max Pulse[2] Power Dissipation	2.45	2.45	W
Junction to Case	Linear Derating Factor	0.02	0.02	W/° C
Junction to Ambient	Linear Derating Factor	0.0032	0.0032	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300µsec, Duty Cycle ⩽ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	All	60	80		V	V_{GS} = 0 I_D = 100 μA
$V_{GS(th)}$	Gate-Threshold Voltage	VN0610LL VN2222LL	0.8 0.6	1.8 1.8	2.5 2.5	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		5	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−5	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	10	μA	V_{DS} = 50V V_{GS} = 0
		All		5	500	μA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	0.75	1.5		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1	1.5	V	V_{GS} = 5V , I_D = 0.2A
		VN0610LL VN2222LL		1.5 2.25	2.5 3.75	V	V_{GS} = 10V , I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		5	7.5	Ω	V_{GS} = 5V , I_D = 0.2A
		VN0610LL VN2222LL		3 4.5	5 7.5	Ω	V_{GS} = 10V , I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN0610LL		5.4	9	Ω	V_{GS} = 10V, I_D = 0.5A, T_C = 125°C
		VN2222LL		8.1	13.5	Ω	V_{GS} = 10V, I_D = 0.5A, T_C = 125°C

DYNAMIC

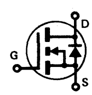
g_{fs}	Forward Transductance[1]	All	100			mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		30	60	pF	V_{GS} = 0 , V_{DS} = 15V f = 1 MHz
C_{oss}	Output Capacitance	All		14	25	pF	
C_{rss}	Reverse Transfer Capacitance	All		2	5	pF	
$t_{(on)}$	Turn-On Time	All		6	10	ns	V_{DD} = 15V , $I_D \cong$ 0.6A R_g = 25Ω , R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{(off)}$	Turn-Off Time	All		6	10	ns	

THERMAL RESISTANCE

R_{thJC}	Junction-to-Case	All		42.5	51	°C/W	
R_{thJA}	Junction-to-Ambient	All			312.5	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)	VN0610LL			−0.2	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		VN2222LL			−0.15	A	
I_{SM}	Source Current[1] (Body Diode)	All			1	A	
V_{SD}	Diode Forward Voltage[1]	VN0610LL		−0.85		V	T_C=25°C, I_S=−0.2A, V_{GS} = 0
		VN2222LL		−0.85		V	T_C=25°C, I_S=−0.15A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		160		ns	T_J = 150°C , I_F = I_S, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDF06

VN0808M

Siliconix

N-Channel Enhancement Mode
MOSPOWER

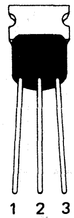
APPLICATIONS

- Switching Regulators
- Converters

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN0808M	80	4	T0–237

PIN 1 – Source
PIN 2 – Gate
PIN 3 & TAB – Drain



T0–237

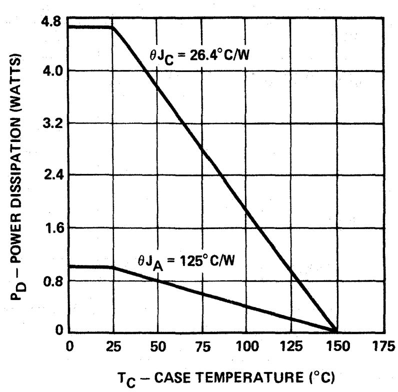
For Additional Curves
See Section 5: VNMA09

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	VN0808M	Units
V_{DS}	Drain-Source Voltage	80	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	80	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.4	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.26	A
I_{DM}	Pulsed Drain Current[1]	±2	A
V_{GS}	Gate-Source Voltage	±40	V
P_D	Max Continuous Power Dissipation	1	W
P_D	Max Pulse[2] Power Dissipation	4.7	W
Junction to Case	Linear Derating Factor	0.038	W/° C
Junction to Ambient	Linear Derating Factor	0.008	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN0808M	80	110		V	V_{GS} = 0, I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	VN0808M	0.8	1.5	2	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	VN0808M		1	100	nA	V_{GS} = +15V
I_{GSSR}	Gate-Body Leakage Reverse	VN0808M		−1	−100	nA	V_{GS} = −15V
I_{DSS}	Zero Gate Voltage Drain Current	VN0808M		1	10	μA	V_{DS} = Max. Rating, V_{GS} = 0
		VN0808M		50	500	μA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	VN0808M	1.5	1.7		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VN0808M		3	4	V	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN0808M		3	4	Ω	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN0808M		4.2	5.5	Ω	V_{GS} =10V, I_D = 1A, T_C =125°C

DYNAMIC

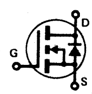
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	VN0808M	170	195		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	VN0808M		35	50	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	VN0808M		33	40	pF	
C_{rss}	Reverse Transfer Capacitance	VN0808M		2	10	pF	
$t_{(on)}$	Turn-On Time	VN0808M		8	10	ns	V_{DD} = 25V, $I_D \cong$ 1A, R_g = 25Ω, R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{(off)}$	Turn-Off Time	VN0808M		8	10	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	VN0808M		22	26.4	°C/W	
R_{thJA}	Junction-to-Ambient	VN0808M			125	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN0808M			−0.35	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	VN0808M			−2	A	
V_{SD}	Diode Forward Voltage[1]	VN0808M		−1.2		V	T_C=25°C, I_S=−0.35A, V_{GS} = 0



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMA09

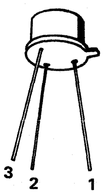
VN10KE

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Source
PIN 2 — Gate
PIN 3 & CASE — Drain

T0—52

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN10KE	60	5	T0—52

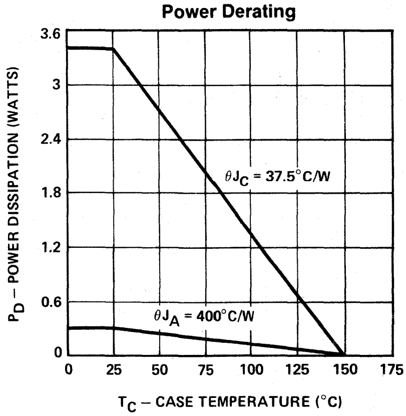
For Additional Curves See Section 5: VNMK06

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	VN10KE	Units
V_{DS}	Drain-Source Voltage	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.17	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.11	A
I_{DM}	Pulsed Drain Current[1]	±1	A
V_{GS}	Gate-Source Voltage	+15, −0.3	V
P_D	Max Continuous Power Dissipation	0.3	W
P_D	Max Pulse[2] Power Dissipation	3.4	W
Junction to Case	Linear Derating Factor	0.027	W/° C
Junction to Ambient	Linear Derating Factor	0.0025	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN10KE	60	120		V	$V_{GS} = 0$ $I_D = 100\ \mu A$
$V_{GS(th)}$	Gate-Threshold Voltage	VN10KE	0.8	1.5	2.5	V	$V_{DS} = V_{GS}$, $I_D = 1$ mA
I_{GSSF}	Gate-Body Leakage Forward	VN10KE		1	100	nA	$V_{GS} = 15V$, $V_{DS} = 0$
I_{DSS}	Zero Gate Voltage Drain Current	VN10KE		0.1	10	μA	$V_{DS} = 50V$
$I_{D(on)}$	On-State Drain Current[1]	VN10KE	0.75	1.5		A	$V_{DS} \geqslant 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VN10KE		1.2	1.5	V	$V_{GS} = 5V$, $I_D = 0.2A$
		VN10KE		2	2.5	V	$V_{GS} = 10V$, $I_D = 0.5A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN10KE		6	7.5	Ω	$V_{GS} = 5V$, $I_D = 0.2A$
		VN10KE		4	5	Ω	$V_{GS} = 10V$, $I_D = 0.5A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN10KE		7.2	9	Ω	$V_{GS} = 10V$, $I_D = 0.5A$, $T_C = 125°C$

DYNAMIC

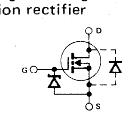
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	VN10KE	100	200		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, $I_D = 0.5A$
C_{iss}	Input Capacitance	VN10KE		40	60	pF	$V_{GS} = 0$, $V_{DS} = 25V$ f = 1 MHz
C_{oss}	Output Capacitance	VN10KE		17	25	pF	
C_{rss}	Reverse Transfer Capacitance	VN10KE		3	5	pF	
t_{ON}	Turn-On Time ime	VN10KE		7	10	ns	$V_{DD} = 15V$, $I_D \cong 0.6A$ $R_g = 25\Omega$, $R_L = 23\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time me	VN10KE		7	10	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	VN10KE		31.3	37.5	°C/W	
R_{thJA}	Junction-to-Ambient	VN10KE			400	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN10KE			−0.17	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	VN10KE			−1	A	
V_{SD}	Diode Forward Voltage[1]	VN10KE		−0.85		V	$T_C = 25°C$, $I_S = -0.17A$, $V_{GS} = 0$



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMK06

VN10KM ■ VN2222KM

Siliconix

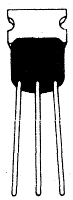
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PIN 1 – Source
PIN 2 – Gate
PIN 3 & TAB – Drain

T0–237



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PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN10KM	60	5	T0–237
VN2222KM	60	7.5	T0–237

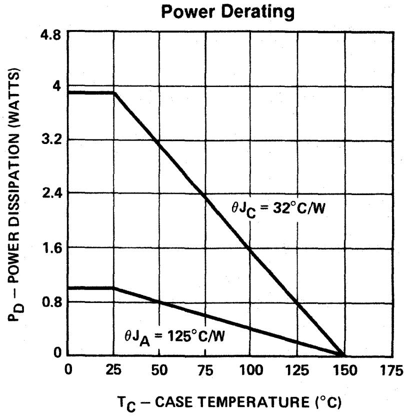
For Additional Curves
See Section 5: VNMK06

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	VN10KM	VN2222KM	Units
V_{DS}	Drain-Source Voltage	60	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.3	±0.25	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.2	±0.16	A
I_{DM}	Pulsed Drain Current[1]	±1	±1	A
V_{GS}	Gate-Source Voltage	+15, –0.3	+15, –0.3	V
P_D	Max Continuous Power Dissipation	1	1	
P_D	Max Pulse[2] Power Dissipation	3.9	3.9	W
Junction to Case	Linear Derating Factor	0.031	0.031	W/° C
Junction to Ambient	Linear Derating Factor	0.008	0.008	W/° C
T_J / Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	All	60	120		V	V_{GS} = 0, I_D = 100 μA
$V_{GS(th)}$	Gate-Threshold Voltage	VN10KM VN2222KM	0.8 0.6	1.5 1.5	2.5 2.5	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = 15V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	10	μA	V_{DS} = 45V , V_{GS} = 0
$I_{D(on)}$	On-State Drain Current[1]	All	0.75	1.5		A	V_{DS}≥2$V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1.2	1.5	V	V_{GS} = 5V , I_D = 0.2A
		VN10KM VN2222KM		2 3	2.5 3.75	V	V_{GS} = 10V , I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		6	7.5	Ω	V_{GS} = 5V , I_D = 0.2A
		VN10KM VN2222KM		4 6	5 7.5	Ω	V_{GS} =10V , I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN10KM		7.2	9	Ω	V_{GS} =10V, I_D =0.5A, T_C =125°C
		VN2222KM		10.8	13.5	Ω	V_{GS}=10V, I_D=0.5A, T_C=125°C

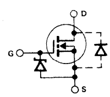
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	100	200		mS	V_{DS}≥2$V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		40	60	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		17	25	pF	
C_{rss}	Reverse Transfer Capacitance	All		3	5	pF	
t_{ON}	Turn-On Time ime	All		7	10	ns	V_{DD} =15V , I_D ≅ 0.6A R_g = 25Ω , R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
						ns	
t_{OFF}	Turn-Off Time Time	All		7	10	ns	
						ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All		26	32	°C/W	
R_{thJA}	Junction-to-Ambient	All			125	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN10KM			−0.3	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		VN2222KM			−0.25	A	
I_{SM}	Source Current[1] (Body Diode)	All			−1	A	
V_{SD}	Diode Forward Voltage[1]	VN10KM		−0.85		V	T_C=25°C, I_S=−0.3A, V_{GS} = 0
		VN2222KM		−0.85		V	T_C=25°C, I_S=−0.25A, V_{GS} = 0

1 **Pulse Test:** Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNMK06

VN10LE

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

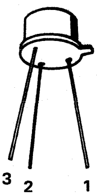
- Switching Regulators
- Converters
- Motor Drivers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN10LE	60	5	T0–52

PIN 1 — Source
PIN 2 — Gate
PIN 3 & CASE — Drain

T0–52



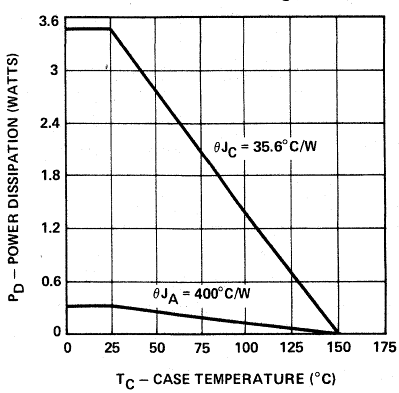
For Additional Curves
See Section 5: VNDF06

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	VN10LE	Units
V_{DS}	Drain-Source Voltage	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.17	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.1	A
I_{DM}	Pulsed Drain Current[1]	±0.6	A
V_{GS}	Gate-Source Voltage	±40	V
P_D	Max Continuous Power Dissipation	0.3	W
P_D	Max Pulse[2] Power Dissipation	3.5	W
Junction to Case	Linear Derating Factor	0.028	W/° C
Junction to Ambient	Linear Derating Factor	0.0025	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN10LE	60	80		V	$V_{GS} = 0$ $I_D = 100\ \mu A$
$V_{GS(th)}$	Gate-Threshold Voltage	VN10LE	0.8	1.8	2.5	V	$V_{DS} = V_{GS}$, $I_D = 1$ mA
I_{GSSF}	Gate-Body Leakage Forward	VN10LE		5	100	nA	$V_{GS} = 30V$
I_{GSSR}	Gate-Body Leakage Reverse	VN10LE		–5	–100	nA	$V_{GS} = -30V$
I_{DSS}	Zero Gate Voltage Drain Current	VN10LE		0.1	10	μA	$V_{DS} = 50V$, $V_{GS} = 0$
		VN10LE		5	500	μA	$V_{DS} = 50V$, $V_{GS} = 0$ $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	VN10LE	0.75	1.5		A	$V_{DS} \geqslant 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VN10LE		1	1.5	V	$V_{GS} = 5V$, $I_D = 0.2A$
		VN10LE		1.5	2.5	V	$V_{GS} = 10V$, $I_D = 0.5A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN10LE		3	7.5	Ω	$V_{GS} = 5V$, $I_D = 0.2A$
		VN10LE		4.5	5	Ω	$V_{GS} = 10V$, $I_D = 0.5A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN10LE		5.4	9	Ω	$V_{GS} = 10V$, $I_D = 0.5A$, $T_C = 125°C$

DYNAMIC

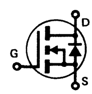
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	VN10LE	100	200		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, $I_D = 0.5A$
C_{iss}	Input Capacitance	VN10LE		30	60	pF	$V_{GS} = 0$, $V_{DS} = 25V$ f = 1 MHz
C_{oss}	Output Capacitance	VN10LE		14	25	pF	
C_{rss}	Reverse Transfer Capacitance	VN10LE		2	5	pF	
t_{ON}	Turn-On Time	VN10LE		6	10	ns	$V_{DD} = 15V$, $I_D \cong 0.6A$ $R_g = 25\Omega$, $R_L = 23\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	VN10LE		6	10	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	VN10LE		30	35.6	°C/W	
R_{thJA}	Junction-to-Ambient	VN10LE			400	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN10LE			–0.17	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	VN10LE			–0.6	A	
V_{SD}	Diode Forward Voltage[1]	VN10LE		–0.85		V	$T_C = 25°C$, $I_S = -0.17A$, $V_{GS} = 0$



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDF06

VN10LM ■ VN2222LM

Siliconix

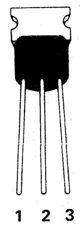
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PIN 1 — Source
PIN 2 — Gate
PIN 3 & TAB — Drain

T0–237



PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN10LM	60	5	T0–237
VN2222LM	60	7.5	T0–237

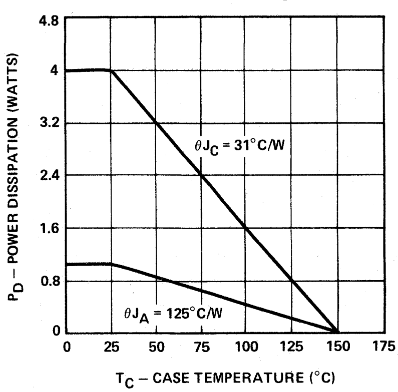
For Additional Curves
See Section 5: VNDF06

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	VN10LM	VN2222LM	Units
V_{DS}	Drain-Source Voltage	60	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.3	±0.25	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.23	±0.16	A
I_{DM}	Pulsed Drain Current[1]	±1	±1	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D	Max Continuous Power Dissipation	1	1	W
P_D	Max Pulse[2] Power Dissipation	4	4	W
Junction to Case	Linear Derating Factor	0.032	0.032	W/° C
Junction to Ambient	Linear Derating Factor	0.008	0.008	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN10LM	60	80		V	$V_{GS} = 0$, $I_D = 100\ \mu A$
		VN2222LM	60	80		V	
$V_{GS(th)}$	Gate-Threshold Voltage	VN10LM VN2222LM	0.8 0.6	1.8 1.8	2.5 2.5	V	$V_{DS} = V_{GS}$, $I_D = 1$ mA
I_{GSSF}	Gate-Body Leakage Forward	All		5	100	nA	$V_{GS} = +15V$
I_{GSSR}	Gate-Body Leakage Reverse	All		−5	−100	nA	$V_{GS} = -15V$
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	10	µA	$V_{DS} = 45V$, $V_{GS} = 0$
		All		5	500	µA	$V_{DS} = 45V$, $V_{GS} = 0$ $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	All	0.75	1.5		A	$V_{DS} \geqslant 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1	1.5	V	$V_{GS} = 5V$, $I_D = 0.2A$
		VN10LM VN2222LM		1.5 2.25	2.5 3.75	V	$V_{GS} = 10V$, $I_D = 0.5A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		5	7.5	Ω	$V_{GS} = 5V$, $I_D = 0.2A$
		VN10LM VN2222LM		3 4.5	5 7.5	Ω	$V_{GS} = 10V$, $I_D = 0.5A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN10LM		5.4	9	Ω	$V_{GS} = 10V$, $I_D = 0.5A$, $T_C = 125°C$
		VN2222LM		8.1	13.5	Ω	$V_{GS} = 10V$, $I_D = 0.5A$, $T_C = 125°C$

DYNAMIC

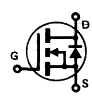
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	100	200		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, $I_D = 0.5A$
C_{iss}	Input Capacitance	All		30	60	pF	$V_{GS} = 0$, $V_{DS} = 25V$ f = 1 MHz
C_{oss}	Output Capacitance	All		14	25	pF	
C_{rss}	Reverse Transfer Capacitance	All		2	5	pF	
t_{ON}	Turn-On Time	All		6	10	ns	$V_{DD} = 15V$, $I_D \cong 0.6A$ $R_g = 25\Omega$, $R_L = 23\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	All		6	10	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			31	°C/W	
R_{thJA}	Junction-to-Ambient	All			125	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN10LM			−0.3	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		VN2222LM			−0.25	A	
I_{SM}	Source Current[1] (Body Diode)	All			−1	A	
V_{SD}	Diode Forward Voltage[1]	VN10LM		−0.85		V	$T_C = 25°C$, $I_S = -0.3A$, $V_{GS} = 0$
		VN2222LM		−0.85		V	$T_C = 25°C$, $I_S = -0.25A$, $V_{GS} = 0$



1 Pulse Test: Pulse Width ⩽ 300 µsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDF06

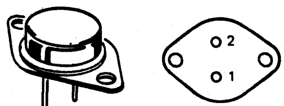
VN1200A ■ VN1000A ■ VN0800A

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN1200A	120	0.18	T0–204 AA
VN1000A	100	0.18	T0–204 AA
VN0800A	80	0.18	T0–204 AA

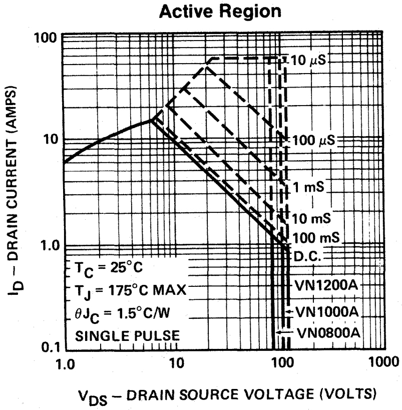
For Additional Curves
See Section 5: VNDA12

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

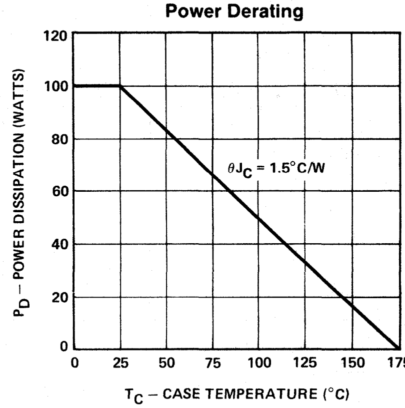
	Parameter	VN1200A	VN1000A	VN0800A	Units
V_{DS}	Drain-Source Voltage	120	100	80	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	120	100	80	V
I_D @ T_C = 25° C	Continuous Drain Current	±15.21	±15.21	±15.21	A
I_D @ T_C = 100° C	Continuous Drain Current	±10.76	±10.76	±10.76	A
I_{DM}	Pulsed Drain Current[1]	±56	±56	±56	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	100	100	100	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	50	W
Junction to Case	Linear Derating Factor	0.67	0.67	0.67	W/° C
Junction to Ambient	Linear Derating Factor	0.033	0.033	0.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +175	–55 To +175	–55 To +175	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN1200A VN1000A	120 100	130 115		V	V_{GS} = 0 I_D = 1 mA
		VN0800A	80	95		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	3	4.5	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		10	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−10	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.5	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	14	28		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1.9	2.16	V	V_{GS} = 10V , I_D = 12A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.16	0.18	Ω	V_{GS} = 10V , I_D = 12A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.35	0.39	Ω	V_{GS} =10V, I_D =12A, T_C =125°C

DYNAMIC

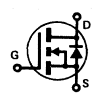
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3	5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 6A
C_{iss}	Input Capacitance	All		900	1200	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		480	600	pF	
C_{rss}	Reverse Transfer Capacitance	All		130	200	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	30	ns	V_{DD} = 60V , $I_D \cong$ 12A R_g = 10Ω , R_L = 5Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		70	150	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	100	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.5	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−14	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−56	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.5		V	T_C=25°C, I_S=−14A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		300		ns	T_J =150°C , $I_F = I_S$, dI_F/ds =100 A/µs



1 Pulse Test: Pulse Width ⩽ 300 µsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDA12

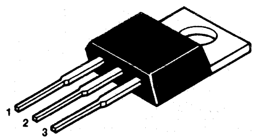
VN1200D ■ VN1000D ■ VN0800D

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0—220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN1200D	120	0.18	T0—220AB
VN1000D	100	0.18	T0—220AB
VN0800D	80	0.18	T0—220AB

For Additional Curves
See Section 5: VNDA12

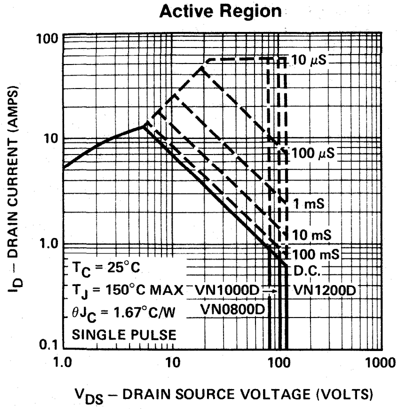
1

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

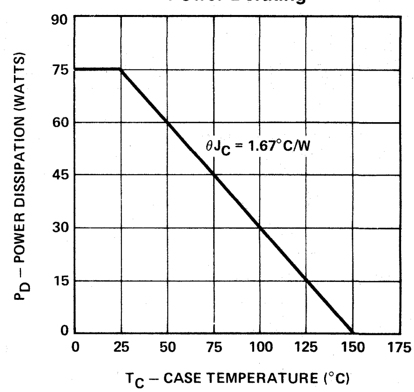
	Parameter	VN1200D	VN1000D	VN0800D	Units
V_{DS}	Drain-Source Voltage	120	100	80	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	120	100	80	V
I_D @ T_C = 25° C	Continuous Drain Current	±14.6	±14.6	±14.6	A
I_D @ T_C = 100° C	Continuous Drain Current	±9.24	±9.24	±9.24	A
I_{DM}	Pulsed Drain Current[1]	±56	±56	±56	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	75	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	30	30	W
Junction to Case	Linear Derating Factor	0.6	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	0.0125	0.0125	0.0125	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN1200D	120	135		V	V_{GS} = 0 I_D = 1 mA
		VN1000D	100	110			
		VN0800D	80	95		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	3	4.5	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +20V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	14	28		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1.92	2.16	V	V_{GS} = 10V , I_D = 12A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.16	0.18	Ω	V_{GS} = 10V , I_D = 12A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.35	0.39	Ω	V_{GS} =10V, I_D =12A, T_C =125°C

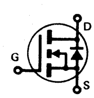
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3	5		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 6A
C_{iss}	Input Capacitance	All		900	1200	pF	V_{GS} = 0 ,V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		480	600	pF	
C_{rss}	Reverse Transfer Capacitance	All		130	200	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	30	ns	V_{DD} = 60V , $I_D \cong$ 12A R_g = 5Ω , R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		70	150	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	100	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.67	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−14	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
I_{SM}	Source Current[1] (Body Diode)	All			−56	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.5		V	T_C=25°C, I_S=−14A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		300		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/µs

1 **Pulse Test:** Pulse Width ≤ 300 µsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDA12

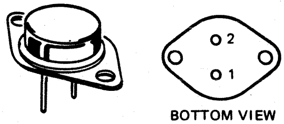
VN1201A ■ VN1001A ■ VN0801A

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

BOTTOM VIEW

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN1201A	120	0.25	T0–204AA
VN1001A	100	0.25	T0–204AA
VN0801A	80	0.25	T0–204AA

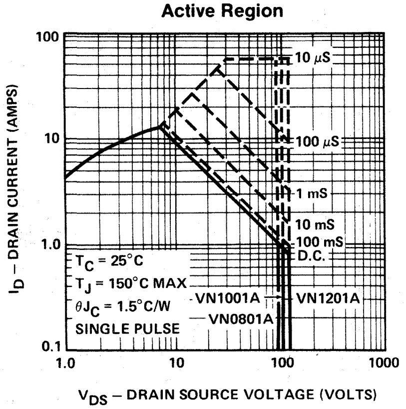
For Additional Curves
See Section 5: VNDA12

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

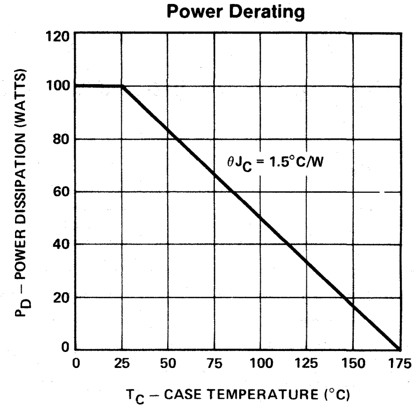
	Parameter	VN1201A	VN1001A	VN0801A	Units
V_{DS}	Drain-Source Voltage	120	100	80	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	120	100	80	V
I_D @ T_C = 25° C	Continuous Drain Current	±12.9	±12.9	±12.9	A
I_D @ T_C = 100° C	Continuous Drain Current	±9.13	±9.13	±9.13	A
I_{DM}	Pulsed Drain Current[1]	±56	±56	±56	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	100	100	100	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	50	W
Junction to Case	Linear Derating Factor	0.67	0.67	0.67	W/° C
Junction to Ambient	Linear Derating Factor	0.033	0.033	0.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +175	–55 To +175	–55 To +175	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN1201A	120	130		V	V_{GS} = 0, I_D = 1 mA
		VN1001A	100	115			
		VN0801A	80	95		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	3	4.5	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		10	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		–10	–100	nA	V_{GS} = –30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.5	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	14	28		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1.9	3	V	V_{GS} = 10V, I_D = 12A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.16	0.25	Ω	V_{GS} = 10V, I_D = 12A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.35	0.54	Ω	V_{GS} =10V, I_D =12A, T_C =125°C

DYNAMIC

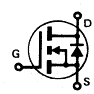
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3	5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 6A
C_{iss}	Input Capacitance	All		900	1200	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		480	600	pF	
C_{rss}	Reverse Transfer Capacitance	All		130	200	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	30	ns	V_{DD} = 60V, $I_D \cong$ 12A, R_g = 5Ω, R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		70	150	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	100	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.5	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			–12	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			–56	A	
V_{SD}	Diode Forward Voltage[1]	All		–1.5		V	T_C=25°C, I_S=–12A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		300		ns	T_J =150°C, I_F = I_S, dI_F/ds =100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDA12

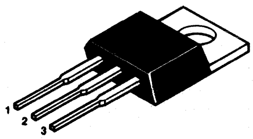
VN1201D ■ VN1001D ■ VN0801D

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN1201D	120	0.25	T0–220AB
VN1001D	100	0.25	T0–220AB
VN0801D	80	0.25	T0–220AB

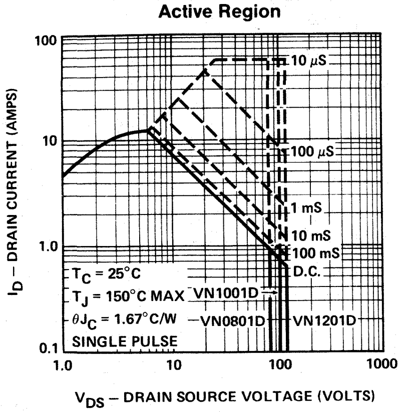
For Additional Curves
See Section 5: VNDA12

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

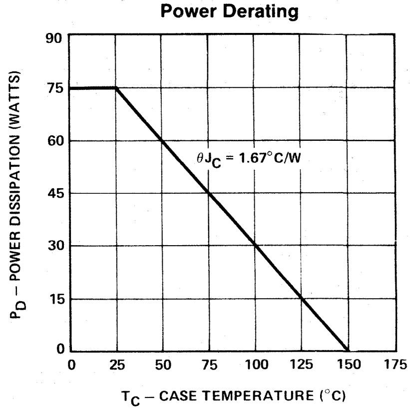
	Parameter	VN1201D	VN1001D	VN0801D	Units
V_{DS}	Drain-Source Voltage	120	100	80	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	120	100	80	V
I_D @ T_C = 25° C	Continuous Drain Current	±12.39	±12.39	±12.39	A
I_D @ T_C = 100° C	Continuous Drain Current	±7.83	±7.83	±7.83	A
I_{DM}	Pulsed Drain Current[1]	±56	±56	±56	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	75	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	30	30	W
Junction to Case	Linear Derating Factor	0.6	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	0.0125	0.0125	0.0125	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	±300	±300	±300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN1201D	120	135		V	V_{GS} = 0, I_D = 1 mA
		VN1001D	100	110			
		VN0801D	80	95		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	3	4.5	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125° C
$I_{D(on)}$	On-State Drain Current[1]	All	14	28		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		2.7	3	V	V_{GS} = 10V, I_D = 12A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.22	0.25	Ω	V_{GS} = 10V, I_D = 12A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.48	0.54	Ω	V_{GS} =10V, I_D =12A, T_C =125°C

DYNAMIC

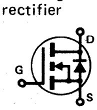
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3	5		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 6A
C_{iss}	Input Capacitance	All		900	1200	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		480	600	pF	
C_{rss}	Reverse Transfer Capacitance	All		130	200	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	30	ns	V_{DD} = 60V, $I_D \cong$ 12A, R_g = 10Ω, R_L = 5Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		70	150	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	100	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.67	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−12	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−56	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.5		V	T_C=25°C, I_S=−12A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		300		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDA12

VN1720M

N-Channel Enhancement Mode
MOSPOWER

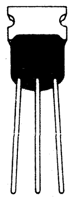
Siliconix

APPLICATIONS

- Loop Disconnect Switch
- CMOS To High Voltage Interface
- CMOS To High Current Interface
- Line Drivers
- Relay Drivers

PIN 1 — Source
PIN 2 — Gate
PIN 3 & TAB — Drain

T0–237



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PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN1720M	170	20	T0–237

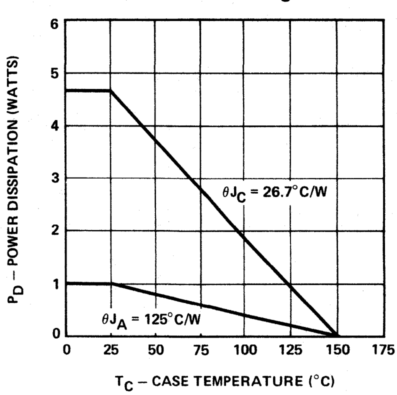
For Additional Curves
See Section 5: VNDB24

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	VN1720M	Units
V_{DS}	Drain-Source Voltage	170	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	170	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.14	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.09	A
I_{DM}	Pulsed Drain Current[1]	±1	A
V_{GS}	Gate-Source Voltage	±40	V
P_D	Max Continuous Power Dissipation	1	W
P_D	Max Pulse[2] Power Dissipation	4.7	W
Junction to Case	Linear Derating Factor	0.038	W/° C
Junction to Ambient	Linear Derating Factor	0.008	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN1720M	170	260		V	V_{GS} = 0, I_D = 100 μA
$V_{GS(th)}$	Gate-Threshold Voltage	VN1720M	0.8	1.5	2	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	VN1720M		1	100	nA	V_{GS} = +15V
I_{GSSR}	Gate-Body Leakage Reverse	VN1720M		−1	−100	nA	V_{GS} = −15V
I_{DSS}	Zero Gate Voltage Drain Current	VN1720M		1	10	μA	V_{DS} = 120V, V_{GS} = 0
		VN1720M		50	500	μA	V_{DS} = 120V, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	VN1720M	1	1.5		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VN1720M		0.8	1	V	V_{GS} = 2.5V, I_D = 0.1A
		VN1720M		2.5	10	V	V_{GS} = 10V, I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN1720M		8	10	Ω	V_{GS} = 2.5V, I_D = 0.1A
		VN1720M		5	20	Ω	V_{GS} = 10V, I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN1720M		12.3	49	Ω	V_{GS} = 10V, I_D = 0.5A, T_C = 125°C

DYNAMIC

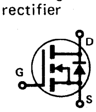
Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	VN1720M	300	375		mS	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	VN1720M		80	125	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	VN1720M		25	50	pF	
C_{rss}	Reverse Transfer Capacitance	VN1720M		5	20	pF	
$t_{d(on)}$	Turn-On Delay Time	VN1720M		5	10	ns	V_{DD} = 60V, $I_D \cong$ 0.1A, R_g = 25Ω, R_L = 600Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	VN1720M		5	10	ns	
$t_{d(off)}$	Turn-Off Delay Time	VN1720M		15	23	ns	
t_f	Fall Time	VN1720M		30	44	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	VN1720M		22.3	26.7	°C/W	
R_{thJA}	Junction-to-Ambient	VN1720M			125	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN1720M			−0.14	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	VN1720M			−1	A	
V_{SD}	Diode Forward Voltage[1]	VN1720M		−1.2		V	T_C = 25°C, I_S = −0.14A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDB24

VN2406B ■ VN1706B ■ VN1206B

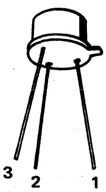
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PIN 1 — Source
PIN 2 — Gate
PIN 3 & CASE — Drain



T0–205AE (T0–39)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN2406B	240	6	T0–205AE
VN1706B	170	6	T0–205AE
VN1206B	120	6	T0–205AE

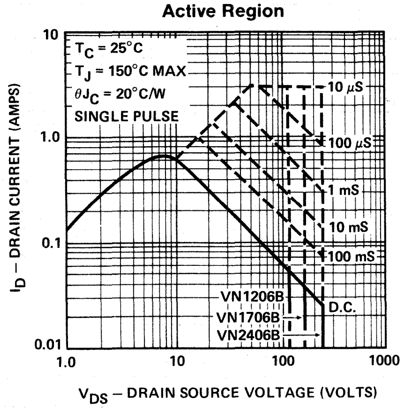
For Additional Curves
See Section 5: VNDB24

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

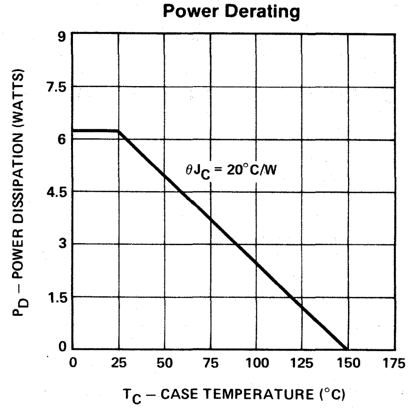
	Parameter	VN2406B	VN1706B	VN1206B	Units
V_{DS}	Drain-Source Voltage	240	170	120	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	240	170	120	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.63	±0.63	±0.63	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.4	±0.4	±0.4	A
I_{DM}	Pulsed Drain Current[1]	±3	±3	±3	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	6.25	6.25	6.25	W
P_D @ T_C = 100°C	Max. Power Dissipation	2.5	2.5	2.5	W
Junction to Case	Linear Derating Factor	0.05	0.05	0.05	W/° C
Junction to Ambient	Linear Derating Factor	0.006	0.006	0.006	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN2406B	240	260		V	V_{GS} = 0, I_D = 100 μA
		VN1706B	170	200		V	
		VN1206B	120	160		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.5	2	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +15V V_{DS} = 0
				5	500		V_{GS} = +15V, V_{DS} = 0, T_A = 125°C
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −15, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	All		0.5	10	μA	V_{DS} = 120V, V_{GS} = 0
		All		25	500	μA	V_{DS} = 120V, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	1	1.5		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		0.8	1	V	V_{GS} = 2.5V, I_D = 0.1A
		All		2.5	3	V	V_{GS} = 10V, I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		8	10	Ω	V_{GS} = 2.5V, I_D = 0.1A
		All		5	6	Ω	V_{GS} = 10V, I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		12.3	14.8	Ω	V_{GS} = 10V, I_D = 0.5A, T_C = 125°C

DYNAMIC

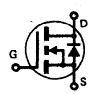
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	300	375		mS(℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		80	125	pF	V_{GS} = 0, V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		25	50	pF	
C_{rss}	Reverse Transfer Capacitance	All		5	20	pF	
$t_{d(on)}$	Turn-On Delay Time	All		4.5	8	ns	V_{DD} = 60V, $I_D \cong$ 0.4A R_g = 25Ω, R_L = 150Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		5	8	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		12	18	ns	
t_f	Fall Time	All		8	12	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			20	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−0.8	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
						A	
I_{SM}	Source Current[1] (Body Diode)	All			−3	A	
						A	
V_{SD}	Diode Forward Voltage[1]	All		−1.2		V	T_C=25°C, I_S=−0.8A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDB24

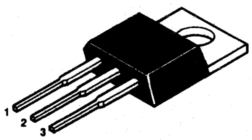
VN2406D ■ VN1706D ■ VN1206D

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN2406D	240	6	T0–220AB
VN1706D	170	6	T0–220AB
VN1206D	120	6	T0–220AB

For Additional Curves
See Section 5: VNDB24

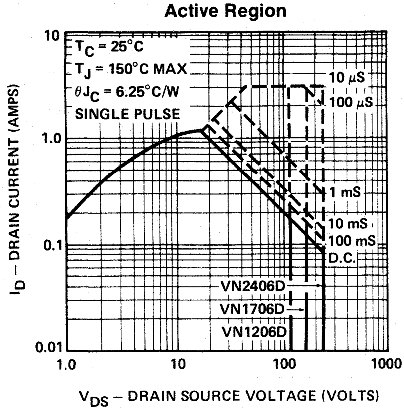
ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	VN2406D	VN1706D	VN1206D	Units
V_{DS}	Drain-Source Voltage	240	170	120	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	240	170	120	V
I_D @ T_C = 25° C	Continuous Drain Current	±1.12	±1.12	±1.12	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.7	±0.7	±0.7	A
I_{DM}	Pulsed Drain Current[1]	±3	±3	±3	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20	20	20	W
P_D @ T_C = 100°C	Max. Power Dissipation	8	8	8	W
Junction to Case	Linear Derating Factor	0.16	0.16	0.16	W/° C
Junction to Ambient	Linear Derating Factor	0.0125	0.0125	0.0125	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	° C

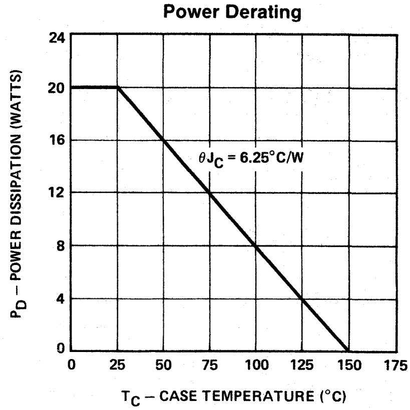
1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

1

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN2406D	240	260			V_{GS} = 0
		VN1706D	170	200		V	I_D = 100 μA
		VN1206D	120	160		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.5	2	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +15V, V_{DS} = 0
				5	500		V_{GS} = +15V T_A = 125°C
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −15V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	All		0.5	10	μA	V_{DS} = 120V, V_{GS} = 0
		All		25	500	μA	V_{DS} = 120V, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	1	1.5		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		0.8	1	V	V_{GS} = 2.5V, I_D = 0.1A
		All		2.5	3	V	V_{GS} = 10V, I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		8	10	Ω	V_{GS} = 2.5V, I_D = 0.1A
		All		5	6	Ω	V_{GS} = 10V, I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		12.3	14.8	Ω	V_{GS} = 10V, I_D = 0.5A, T_C = 125°C

DYNAMIC

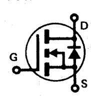
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	300	375		mS(℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		80	125	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		25	50	pF	
C_{rss}	Reverse Transfer Capacitance	All		5	20	pF	
$t_{d(on)}$	Turn-On Delay Time	All		6	9	ns	V_{DD} = 60V, $I_D \cong$ 0.7A, R_g = 25Ω, R_L = 85Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		10	15	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		11	17	ns	
t_f	Fall Time	All		9	14	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			6.25	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−1.4	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−3	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.2		V	T_C = 25°C, I_S = −1.4A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDB24

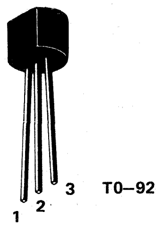
VN2406L ■ VN1706L ■ VN1206L

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Source
PIN 2 – Gate
PIN 3 – Drain

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN2406L	240	6	T0–92
VN1706L	170	6	T0–92
VN1206L	120	6	T0–92

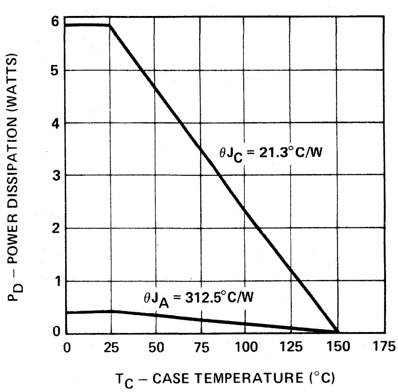
For Additional Curves
See Section 5: VNDB24

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	VN2406L	VN1706L	VN1206L	Units
V_{DS}	Drain-Source Voltage	240	170	120	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	240	170	120	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.158	±0.158	±0.158	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.101	±0.101	±0.101	A
I_{DM}	Pulsed Drain Current[1]	±0.60	±0.60	±0.60	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D	Max. Continuous Power Dissipation	0.4	0.4	0.4	W
P_D	Max. Pulse[2] Power Dissipation	5.9	5.9	5.9	W
Junction to Case	Linear Derating Factor	0.047	0.047	0.047	W/° C
Junction to Ambient	Linear Derating Factor	0.0032	0.0032	0.0032	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN2406L	240	260		V	V_{GS} = 0, I_D = 100 μA
		VN1706L	170	200		V	
		VN1206L	120	160		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.5	2	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +15V
				5	500		V_{GS} = +15V T_A = 125°C
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −15V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.5	10	μA	V_{DS} =120V, V_{GS} = 0
		All		50	500	μA	V_{DS} =120V, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	1	1.5		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		0.8	1	V	V_{GS} = 2.5V, I_D = 0.1A
		All		2.5	3	V	V_{GS} = 10V, I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		8	10	Ω	V_{GS} = 2.5V, I_D = 0.1A
		All		5	6	Ω	V_{GS} = 10V, I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		12.3	14.8	Ω	V_{GS} =10V, I_D =0.5A, T_C =125°C

DYNAMIC

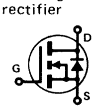
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	300	375		mS(℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		80	125	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		25	50	pF	
C_{rss}	Reverse Transfer Capacitance	All		5	20	pF	
$t_{d(on)}$	Turn-On Delay Time	All		5	8	ns	V_{DD} = 60V, $I_D \cong$ 0.1A, R_g = 25Ω, R_L = 600Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		5	8	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		15	23	ns	
t_f	Fall Time	All		30	34	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			21.3	°C/W	
R_{thJA}	Junction-to-Ambient	All			312.5	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−0.158	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−0.60	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.2		V	T_C=25°C, I_S=−0.158A, V_{GS} = 0



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDB24

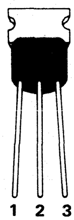
VN2406M ■ VN1706M ■ VN1206M

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Source
PIN 2 – Gate
PIN 3 & TAB – Drain

T0–237

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN2406M	240	6	T0–237
VN1706M	170	6	T0–237
VN1206M	120	6	T0–237

For Additional Curves
See Section 5: VNDB24

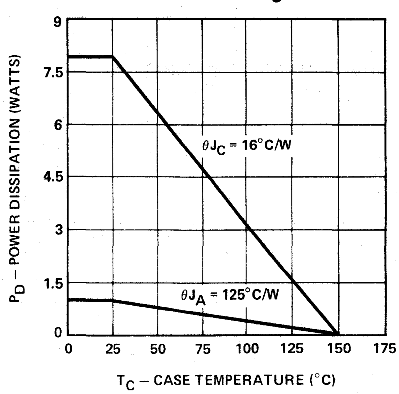
1

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	VN2406M	VN1706M	VN1206M	Units
V_{DS}	Drain-Source Voltage	240	170	120	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	240	170	120	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.25	±0.25	±0.25	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.16	±0.16	±0.16	A
I_{DM}	Pulsed Drain Current[1]	±0.7	±0.7	±0.7	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D	Max. Continuous Power Dissipation	1	1	1	W
P_D	Max. Pulse[2] Power Dissipation	7.9	7.9	7.9	W
Junction to Case	Linear Derating Factor	0.063	0.063	0.063	W/° C
Junction to Ambient	Linear Derating Factor	0.008	0.008	0.008	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN2406M	240	260		V	V_{GS} = 0, I_D = 100 µA
		VN1706M	170	200			
		VN1206M	120	170		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.5	2	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +15V
				5	500		V_{GS} = +15V, T_A = 125°C
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −15V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.5	10	µA	V_{DS} = 120V , V_{GS} = 0
		All		25	500	µA	V_{DS} = 120V , V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	1	1.5		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		0.8	1	V	V_{GS} = 2.5V , I_D = 0.1A
		All		2.5	3	V	V_{GS} = 10V , I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		8	10	Ω	V_{GS} = 2.5V , I_D = 0.1A
		All		5	6	Ω	V_{GS} = 10V , I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		12.3	14.8	Ω	V_{GS} = 10V, I_D = 0.5A, T_C = 125°C

DYNAMIC

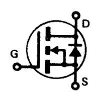
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	300	375		mS(℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		80	125	pF	V_{GS} = 0 , V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		25	50	pF	
C_{rss}	Reverse Transfer Capacitance	All		5	20	pF	
$t_{d(on)}$	Turn-On Delay Time	All		5	8	ns	V_{DD} = 60V , $I_D \cong$ 0.1A, R_g = 25Ω , R_L = 600Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		5	8	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		15	23	ns	
t_f	Fall Time	All		30	44	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			16	°C/W	
R_{thJA}	Junction-to-Ambient	All			125	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−0.25	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−0.7	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.2		V	T_C = 25°C, I_S = −0.25A, V_{GS} = 0



1 Pulse Test: Pulse Width ⩽ 300 µsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDB24

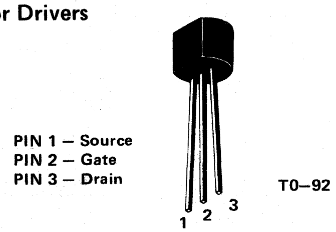
VN2410L ■ VN1710L ■ VN1210L

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN2410L	240	10	T0–92
VN1710L	170	10	T0–92
VN1210L	120	10	T0–92

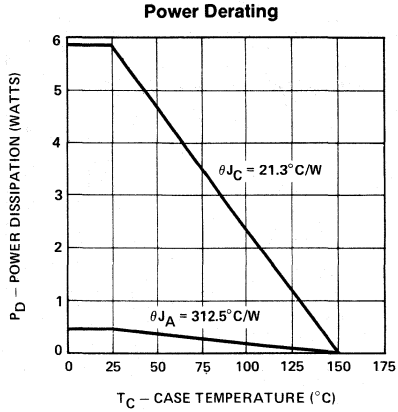
For Additional Curves
See Section 5: VNDB24

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	VN2410L	VN1710L	VN1210L	Units
V_{DS}	Drain-Source Voltage	240	170	120	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	240	170	120	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.12	±0.12	±0.12	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.07	±0.07	±0.07	A
I_{DM}	Pulsed Drain Current[1]	±0.47	±0.47	±0.47	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D	Max. Continuous Power Dissipation	0.4	0.4	0.4	W
P_D	Max. Pulse[2] Power Dissipation	5.9	5.9	5.9	W
Junction to Case	Linear Derating Factor	0.047	0.047	0.047	W/° C
Junction to Ambient	Linear Derating Factor	0.0032	0.0032	0.0032	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



ELECTRICAL CHARACTERISTICS ($T_C = 25°C$ unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN2410L	240	260		V	$V_{GS} = 0$, $I_D = 100\ \mu A$
		VN1710L	170	200			
		VN1210L	120	160		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.5	2	V	$V_{DS} = V_{GS}$, $I_D = 1$ mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	$V_{GS} = +15V$
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	$V_{GS} = -15V$
I_{DSS}	Zero Gate Voltage Drain Current	All		0.5	10	μA	$V_{DS} = 120V$, $V_{GS} = 0$
		All		25	500	μA	$V_{DS} = 120V$, $V_{GS} = 0$, $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	All	1	1.5		A	$V_{DS} \geqslant 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		0.8	1	V	$V_{GS} = 2.5V$, $I_D = 0.1A$
		All		4	5	V	$V_{GS} = 10V$, $I_D = 0.5A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		8	10	Ω	$V_{GS} = 2.5V$, $I_D = 0.1A$
		All		8	10	Ω	$V_{GS} = 10V$, $I_D = 0.5A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		19.8	24.7	Ω	$V_{GS} = 10V$, $I_D = 0.5A$, $T_C = 125°C$

DYNAMIC

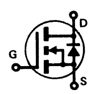
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	300	375		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, $I_D = 0.5A$
C_{iss}	Input Capacitance	All		80	125	pF	$V_{GS} = 0$, $V_{DS} = 25V$, f = 1 MHz
C_{oss}	Output Capacitance	All		25	50	pF	
C_{rss}	Reverse Transfer Capacitance	All		5	20	pF	
$t_{d(on)}$	Turn-On Delay Time	All		5	8	ns	$V_{DD} = 60V$, $I_D \cong 0.1A$, $R_g = 25\Omega$, $R_L = 600\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		5	8	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		15	23	ns	
t_f	Fall Time	All		30	34	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			21.3	°C/W	
R_{thJA}	Junction-to-Ambient	All			312.5	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−0.12	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
					−0.47		
I_{SM}	Source Current[1] (Body Diode)	All				A	
V_{SD}	Diode Forward Voltage[1]	All		−1.2		V	$T_C = 25°C$, $I_S = -0.12A$, $V_{GS} = 0$



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDB24

VN2410M ■ VN1710M ■ VN1210M

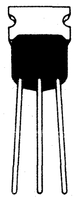
Siliconix

N-Channel Enhancement Mode

MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



1 2 3

PIN 1 — Source
PIN 2 — Gate
PIN 3 & TAB — Drain

T0–237

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN2410M	240	10	T0–237
VN1710M	170	10	T0–237
VN1210M	120	10	T0–237

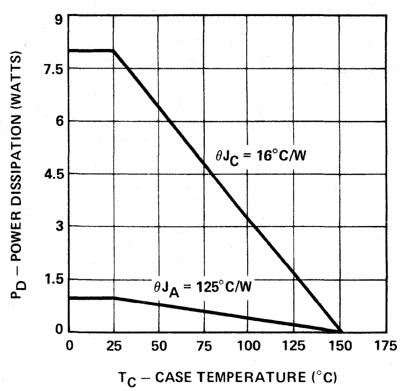
For Additional Curves
See Section 5: VNDB24

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	VN2410M	VN1710M	VN1210M	Units
V_{DS}	Drain-Source Voltage	240	170	120	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	240	170	120	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.19	±0.19	±0.19	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.12	±0.12	±0.12	A
I_{DM}	Pulsed Drain Current[1]	±0.54	±0.54	±0.54	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D	Max. Continuous Power Dissipation	1	1	1	W
P_D	Max. Pulse[2] Power Dissipation	7.9	7.9	7.9	W
Junction to Case	Linear Derating Factor	0.063	0.063	0.063	W/° C
Junction to Ambient	Linear Derating Factor	0.008	0.008	0.008	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	° C

1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN2410M VN1710M	240 170	260 200		V	V_{GS} = 0 I_D = 100 μA
		VN1210M	120	160		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.5	2	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +15V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −15V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.5	10	μA	V_{DS} = 120V , V_{GS} = 0
		All		25	500	μA	V_{DS} = 120V , V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	1	1.5		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		0.8	1	V	V_{GS} = 2.5V , I_D = 0.1A
		All		4	5	V	V_{GS} = 10V , I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		8	10	Ω	V_{GS} = 2.5V , I_D = 0.1A
		All		8	10	Ω	V_{GS} = 10V , I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		19.8	24.7	Ω	V_{GS} = 10V, I_D = 0.5A, T_C = 125°C

DYNAMIC

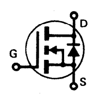
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	300	375		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		80	125	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		25	50	pF	
C_{rss}	Reverse Transfer Capacitance	All		5	20	pF	
$t_{d(on)}$	Turn-On Delay Time	All		5	8	ns	V_{DD} = 60V , $I_D \cong$ 0.1A R_g = 25Ω , R_L = 600Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		5	8	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		15	23	ns	
t_f	Fall Time	All		30	34	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			16	°C/W	
R_{thJA}	Junction-to-Ambient	All			125	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−0.19	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−0.54	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.2		V	T_C=25°C, I_S=−0.19A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDB24

VN2420L ■ VN2020L

Siliconix

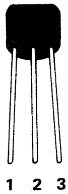
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Relay Drivers
- Telecommunications
- Converters

PIN 1 — Source
PIN 2 — Gate
PIN 3 & TAB — Drain

TO–92



PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN2420L	240	24	T0–92
VN2020L	200	24	T0–92

For Additional Curves
See Section 5: VNDF24

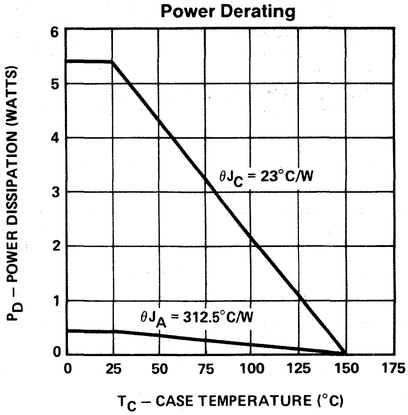
1

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	VN2420L	VN2020L	Units
V_{DS}	Drain-Source Voltage	240	200	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	240	200	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.08	±0.08	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.055	±0.055	A
I_{DM}	Pulsed Drain Current[1]	±0.5	±0.5	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D	Max Continuous Power Dissipation	0.4	0.4	W
P_D	Max Pulse[2] Power Dissipation	5.4	5.4	W
Junction to Case	Linear Derating Factor	0.044	0.044	W/° C
Junction to Ambient	Linear Derating Factor	0.0032	0.0032	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN2420L	240	260		V	V_{GS} = 0, I_D = 100 μA
		VN2020L	200	230		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.2	2	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	10	nA	V_{GS} = +40V
I_{GSSR}	Gate-Body Leakage Reverse	All		–1	–10	nA	V_{GS} = –40V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.2	0.5	μA	V_{DS} = 130V, V_{GS} = 0
$I_{D(on)}$	On-State Drain Current[1]	All	10			mA	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 2.8V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		0.4	0.48	V	V_{GS} = 10V, I_D = 20 mA
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		20	24	Ω	V_{GS} = 10V, I_D = 20 mA
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		35	40	Ω	V_{GS}=10V, I_D=20 mA, T_C=125°C

DYNAMIC

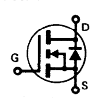
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	50	80		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 20 mA
C_{iss}	Input Capacitance	All		40	60	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		30	45	pF	
C_{rss}	Reverse Transfer Capacitance	All		8	15	pF	
t_{ON}	Turn-On Time	All		5	10	ns	V_{DD} = 15V, $I_D \cong$ 0.6A, R_g = 25Ω, R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	All		5	10	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All		19.5	23	°C/W	
R_{thJA}	Junction-to-Ambient	All			312.5	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			–0.08	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			–0.5	A	
V_{SD}	Diode Forward Voltage[1]	All		–1	–1.2	V	T_C=25°C, I_S=–0.08A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDF24

VN35AB

Siliconix

N-Channel Enhancement Mode
MOSPOWER

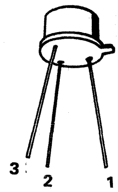
APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN35AB	35	2.5	T0–205AE

PIN 1 – Source
PIN 2 – Gate
PIN 3 & TAB – Drain



T0–205AE (T0–39)

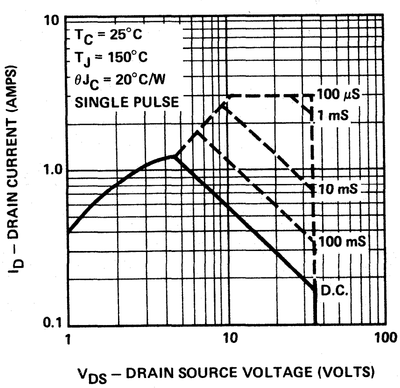
For Additional Curves
See Section 5: VNMA04

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

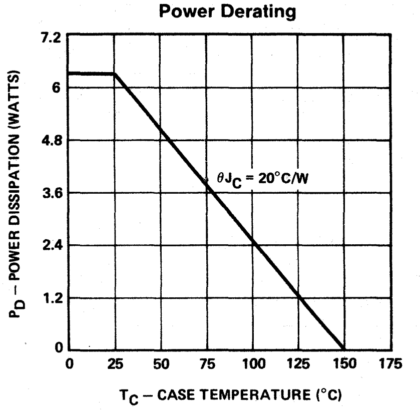
	Parameter	VN35AB	Units
V_{DS}	Drain-Source Voltage	35	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	35	V
I_D @ T_C = 25° C	Continuous Drain Current	±1.29	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.82	A
I_{DM}	Pulsed Drain Current[1]	±3	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	6.25	W
P_D @ T_C = 100°C	Max. Power Dissipation	2.5	W
Junction to Case	Linear Derating Factor	0.05	W/° C
Junction to Ambient	Linear Derating Factor	0.006	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 Pulse Test: Pulsewidth ⩽ 300µsec, Duty Cycle ⩽ 2%

Active Region



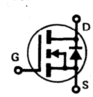
Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN35AB	35	50		V	$V_{GS} = 0$, $I_D = 10\ \mu A$
$V_{GS(th)}$	Gate-Threshold Voltage	VN35AB	0.8	1.5	2	V	$V_{DS} = V_{GS}$, $I_D = 1$ mA
I_{GSSF}	Gate-Body Leakage Forward	VN35AB		1	100	nA	$V_{GS} = 15V$, $V_{DS} = 0$
				5	500		$V_{GS} = 15V$, $V_{DS} = 0$, @$T_A = 125°C$
I_{GSSR}	Gate-Body Leakage Reverse	VN35AB		−1	−100	nA	$V_{GS} = -15V$, $V_{DS} = 0$
I_{DSS}	Zero Gate Voltage Drain Current	VN35AB		1	10	μA	V_{DS} = Max. Rating, $V_{GS} = 0$
		VN35AB		50	500	μA	V_{DS}=0.8 Max. Rating, $V_{GS} = 0$, $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	VN35AB	1.5	1.7		A	$V_{DS} \geq 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VN35AB		1.2	1.5	V	$V_{GS} = 5V$, $I_D = 0.3A$
		VN35AB		2.3	2.5	V	$V_{GS} = 10V$, $I_D = 1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN35AB		4	5	Ω	$V_{GS} = 5V$, $I_D = 0.3A$
		VN35AB		2.3	2.5	Ω	$V_{GS} = 10V$, $I_D = 1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN35AB		3	3.75	Ω	$V_{GS} = 10V$, $I_D = 1A$, $T_C = 125°C$
DYNAMIC							
g_{fs}	Forward Transductance[1]	VN35AB	170	195		mS	$V_{DS} \geq 2V_{DS(ON)}$, $I_D = 0.5A$
C_{iss}	Input Capacitance	VN35AB		35	50	pF	$V_{GS} = 0$, $V_{DS} = 25V$, f = 1 MHz
C_{oss}	Output Capacitance	VN35AB		48	65	pF	
C_{rss}	Reverse Transfer Capacitance	VN35AB		2	10	pF	
t_{ON}	Turn-On Time	VN35AB		8	10	ns	$V_{DD} = 25V$, $I_D \cong 1A$, $R_g = 25\Omega$, $R_L = 23\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	VN35AB		8	10	ns	
THERMAL RESISTANCE							
R_{thJC}	Junction-to-Case	VN35AB			20	°C/W	
R_{thJA}	Junction-to-Ambient	VN35AB			170	°C/W	Free Air Operation
BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS							
I_S	Continuous Source Current (Body Diode)	VN35AB			−1.2	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	VN35AB			−3	A	
V_{SD}	Diode Forward Voltage[1]	VN35AB		−0.9		V	$T_C=25°C$, $I_S=-1.2A$, $V_{GS} = 0$



1 **Pulse Test:** Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNMA04

VN4000A ■ VN3500A

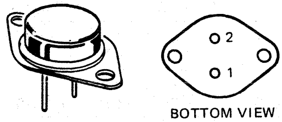
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS
- Switching Regulators
- Converters
- Motor Drivers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN4000A	400	1	T0–204AA
VN3500A	350	1	T0–204AA



BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

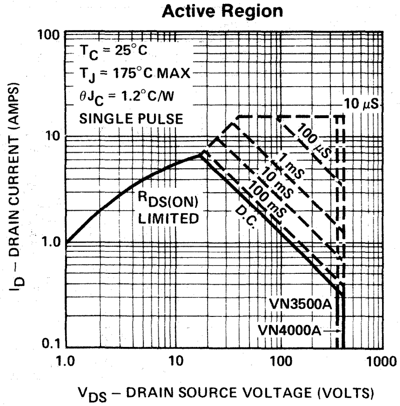
For Additional Curves
See Section 5: VNDA40

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

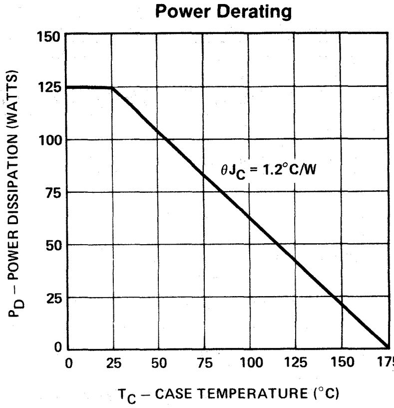
	Parameter	VN4000A	VN3500A	Units
V_{DS}	Drain-Source Voltage	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±6.80	±6.80	A
I_D @ T_C = 100° C	Continuous Drain Current	±4.81	±4.81	A
I_{DM}	Pulsed Drain Current[1]	±16	±16	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	62.5	62.5	W
Junction to Case	Linear Derating Factor	0.833	0.833	W/° C
Junction to Ambient	Linear Derating Factor	0.03	0.03	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +175	–55 To +175	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN4000A	400	420		V	V_{GS} = 0, I_D = 1 mA
		VN3500A	350	370		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	3	4	6	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.13	2.5	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	8	13		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		2.4	3	V	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.8	1	Ω	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		1.6	2	Ω	V_{GS} = 10V, I_D = 3A, T_C = 125°C

DYNAMIC

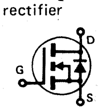
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	3.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 3A
C_{iss}	Input Capacitance	All		840	1000	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		150	220	pF	
C_{rss}	Reverse Transfer Capacitance	All		30	40	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	50	ns	V_{DD} = 200V, $I_D \cong$ 1A, R_g = 10Ω, R_L = 67Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	80	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.2	°C/W	
R_{thJA}	Junction-to-Ambient	All			33.4	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−6	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−16	A	
V_{SD}	Diode Forward Voltage[1]	All		−0.9		V	T_C = 25°C, I_S = −6A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J = 150°C, I_F = I_S, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDA40

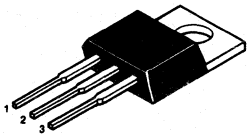
VN4000D ■ VN3500D

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN4000D	400	1	T0–220AB
VN3500D	350	1	T0–220AB

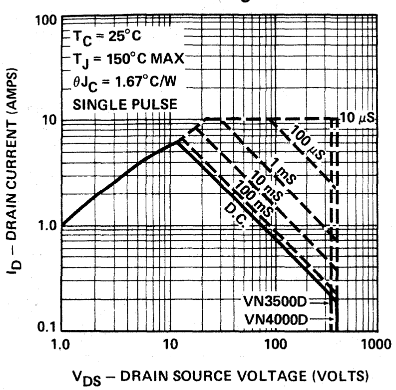
For Additional Curves
See Section 5: VNDA40

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

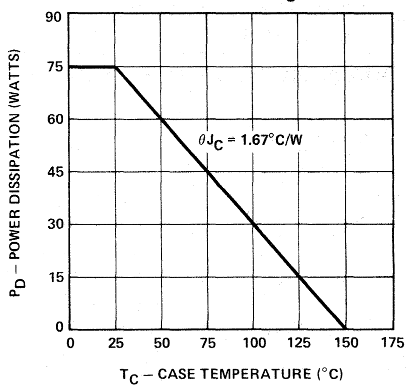
	Parameter	VN4000D	VN3500D	Units
V_{DS}	Drain-Source Voltage	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±5.7	±5.7	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.6	±3.6	A
I_{DM}	Pulsed Drain Current[1]	±10	±10	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	30	W
Junction to Case	Linear Derating Factor	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	0.0125	0.0125	W/° C
T_J / Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN4000D	400	420		V	V_{GS} = 0, I_D = 1 mA
		VN3500D	350	370		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	3	4	6	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		–1	–100	nA	V_{GS} = –30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.13	2.5	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	8	13		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		2.4	3	V	V_{GS} = 10V , I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.8	1	Ω	V_{GS} = 10V , I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		1.6	2	Ω	V_{GS} =10V, I_D = 3A , T_C =125°C

DYNAMIC

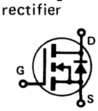
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	3.5		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 3A
C_{iss}	Input Capacitance	All		840	1000	pF	V_{GS} = 0 ,V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		150	220	pF	
C_{rss}	Reverse Transfer Capacitance	All		30	40	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	50	ns	V_{DD} =200V, $I_D \cong$ 1A, R_g = 10Ω , R_L = 67Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	80	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.67	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			–6	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			–10	A	
V_{SD}	Diode Forward Voltage[1]	All		–0.9		V	T_C = 25°C , I_S = –6A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C , $I_F = I_S$, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDA40

VN4001A ■ VN3501A

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

BOTTOM VIEW

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN4001A	400	1.5	T0–204AA
VN3501A	350	1.5	T0–204AA

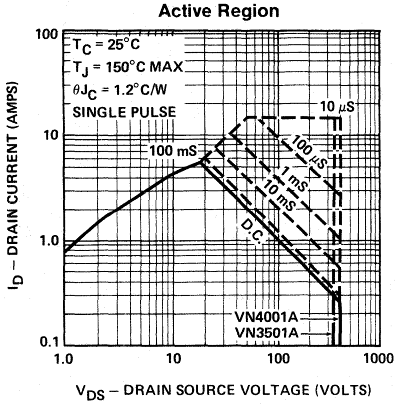
For Additional Curves
See Section 5: VNDA40

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

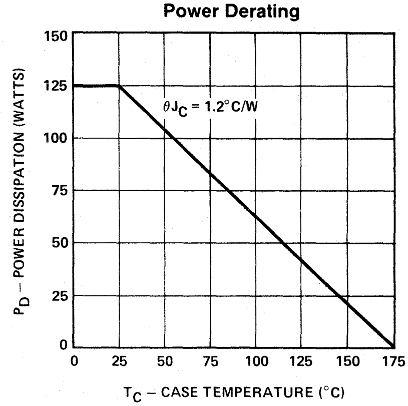
	Parameter	VN4001A	VN3501A	Units
V_{DS}	Drain-Source Voltage	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	±350	V
I_D @ T_C = 25° C	Continuous Drain Current	±5.56	±5.56	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.93	±3.93	A
I_{DM}	Pulsed Drain Current[1]	±16	±16	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	62.5	62.5	W
Junction to Case	Linear Derating Factor	0.833	0.833	W/° C
Junction to Ambient	Linear Derating Factor	0.033	0.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +175	–55 To +175	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN4001A	400	420		V	V_{GS} = 0, I_D = 1 mA
		VN3501A	350	370		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	3	4	6	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.13	2.5	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 150°C
$I_{D(on)}$	On-State Drain Current[1]	All	8	13		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		3.6	4.5	V	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		1.2	1.5	Ω	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		2.4	3	Ω	V_{GS} = 10V, I_D = 3A, T_C = 125°C

DYNAMIC

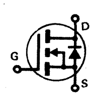
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	3.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 3A
C_{iss}	Input Capacitance	All		840	1000	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		150	220	pF	
C_{rss}	Reverse Transfer Capacitance	All		30	40	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	50	ns	V_{DD} = 200V, $I_D \cong$ 1A, R_g = 10Ω, R_L = 200Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	80	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.2	°C/W	
R_{thJA}	Junction-to-Ambient	All			33.4	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−16	A	
V_{SD}	Diode Forward Voltage[1]	All		−0.9		V	T_C = 25°C, I_S = −5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDA40

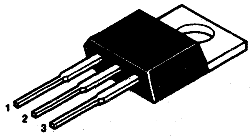
VN4001D ■ VN3501D

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN4001D	400	1.5	T0–220AB
VN3501D	350	1.5	T0–220AB

For Additional Curves
See Section 5: VNDA40

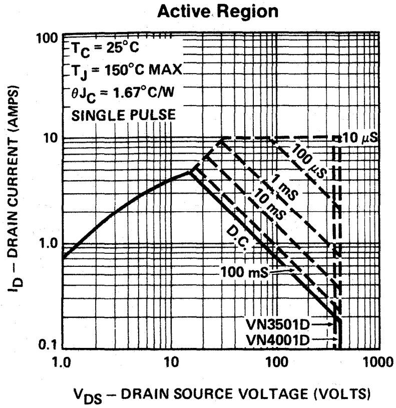
1

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

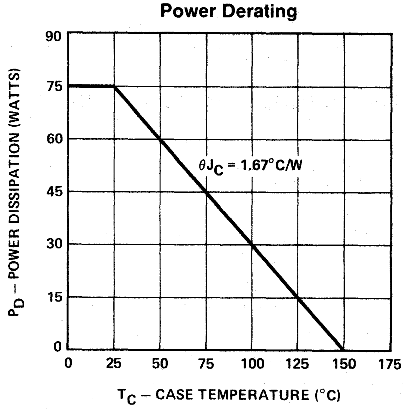
	Parameter	VN4001D	VN3501D	Units
V_{DS}	Drain-Source Voltage	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±4.66	±4.66	±A
I_D @ T_C = 100° C	Continuous Drain Current	±2.95	±2.95	±A
I_{DM}	Pulsed Drain Current[1]	±10	±10	±A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	30	W
Junction to Case	Linear Derating Factor	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	0.03	0.03	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

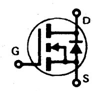
Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
STATIC							
BV_{DSS}	Drain-Source Breakdown Voltage	VN4001D	400	420		V	V_{GS} = 0, I_D = 1 mA
		VN3501D	350	370		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	3	4	6	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.13	2.5	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125° C
$I_{D(on)}$	On-State Drain Current[1]	All	8	13		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		3.6	4.5	V	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		1.2	1.5	Ω	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		2.4	3	Ω	V_{GS} =10V, I_D = 3A, T_C =125°C
DYNAMIC							
g_{fs}	Forward Transductance[1]	All	2.5	3.5		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 3A
C_{iss}	Input Capacitance	All		840	1000	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		150	220	pF	
C_{rss}	Reverse Transfer Capacitance	All		30	40	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	50	ns	V_{DD} =200V, $I_D \cong$ 1A, R_g = 10Ω, R_L = 67Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	80	ns	
THERMAL RESISTANCE							
R_{thJC}	Junction-to-Case	All			1.67	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation
BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS							
I_S	Continuous Source Current (Body Diode)	All			−5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
I_{SM}	Source Current[1] (Body Diode)	All			−10	A	
V_{SD}	Diode Forward Voltage[1]	All		−0.9		V	T_C = 25°C, I_S =−5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/µs

1 Pulse Test: Pulse Width ⩽ 300 µsec, Duty Cycle ⩽ 2%

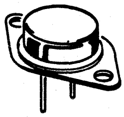
Data Sheet Curves: VNDA40

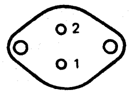
VN4501A ■ VN4502A

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS
- Switching Regulators
- Converters
- Motor Drivers





BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN4501A	450	1.5	T0–204AA
VN4502A	450	2	T0–204AA

For Additional Curves
See Section 5: VNDA50

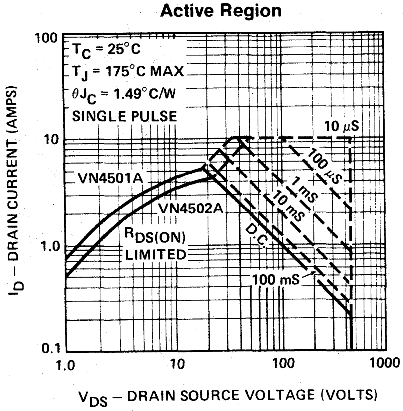
1

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

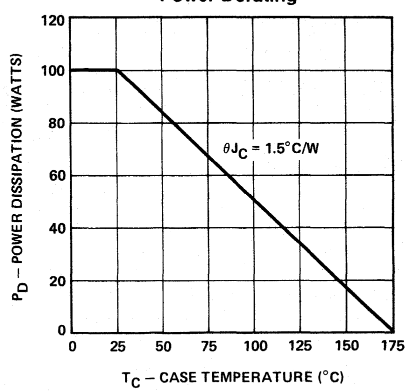
	Parameter	VN4501A	VN4502A	Units
V_{DS}	Drain-Source Voltage	450	450	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	450	450	V
I_D @ T_C = 25° C	Continuous Drain Current	±5.16	±4.47	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.65	±3.16	A
I_{DM}	Pulsed Drain Current[1]	±10	±10	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	100	100	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	W
Junction to Case	Linear Derating Factor	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	0.03	0.03	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +175	–55 To +175	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN4501A	450	490		V	V_{GS} = 0, I_D = 1 mA
		VN4502A	450	490		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	3	3.5	6	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	6	9		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VN4501A		2.4	3	V	V_{GS} = 10V, I_D = 2A
		VN4502A		3.2	4	V	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN4501A		1.2	1.5	Ω	V_{GS} = 10V, I_D = 2A
		VN4502A		1.6	2	Ω	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN4501A		2.16	2.7	Ω	V_{GS} =10V, I_D = 2A, T_C = 125°C
		VN4502A		2.4	3	Ω	V_{GS} =10V, I_D = 2A, T_C = 125°C

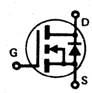
DYNAMIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	3.5		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 2A
C_{iss}	Input Capacitance	All		840	1000	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		140	200	pF	
C_{rss}	Reverse Transfer Capacitance	All		40	50	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	50	ns	V_{DD} =200V, $I_D \cong$ 2A, R_g = 10Ω, R_L = 100Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	100	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.5	°C/W	
R_{thJA}	Junction-to-Ambient	All			33.4	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN4501A			−4.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		VN4502A			−4	A	
I_{SM}	Source Current[1] (Body Diode)	All			−10	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.2		V	T_C=25°C, I_S=−4.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDA50

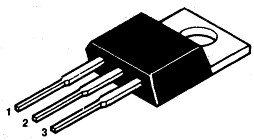
VN4501D ■ VN4502D

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN4501D	450	1.5	T0–220AB
VN4502D	450	2	T0–220AB

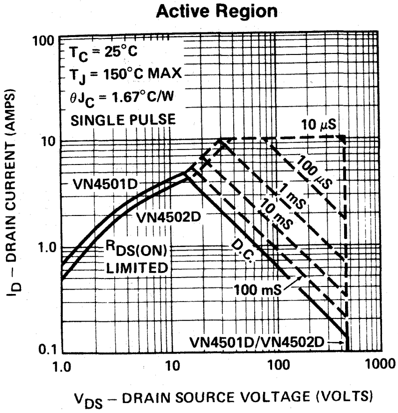
For Additional Curves
See Section 5: VNDA50

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

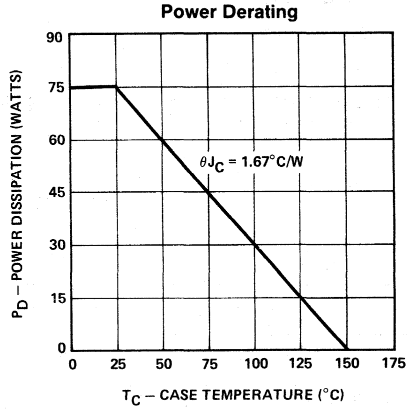
	Parameter	VN4501D	VN4502D	Units
V_{DS}	Drain-Source Voltage	450	450	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	450	450	V
I_D @ T_C = 25° C	Continuous Drain Current	±4.87	±4.22	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.08	±2.67	A
I_{DM}	Pulsed Drain Current[1]	±10	±10	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	30	W
Junction to Case	Linear Derating Factor	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	0.03	0.03	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN4501D	450	490		V	V_{GS} = 0, I_D = 1 mA
		VN4502D	450	490		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	3	3.5	6	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	6	9		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VN4501D		2.4	3	V	V_{GS} = 10V, I_D = 2A
		VN4502D		3.2	4	V	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN4501D		1.2	1.5	Ω	V_{GS} = 10V, I_D = 2A
		VN4502D		1.6	2	Ω	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN4501D		2.16	2.7	Ω	V_{GS} =10V, I_D = 2A, T_C = 125°C
		VN4502D		2.4	3	Ω	V_{GS} =10V, I_D = 2A, T_C = 125°C

DYNAMIC

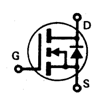
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	3.5		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 2A
C_{iss}	Input Capacitance	All		840	1000	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		140	200	pF	
C_{rss}	Reverse Transfer Capacitance	All		40	50	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	50	ns	V_{DD} =200V, $I_D \cong$ 2A, R_g = 10Ω, R_L = 100Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	100	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.67	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN4501D			−4.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		VN4502D			−4	A	
I_{SM}	Source Current[1] (Body Diode)	All			−10	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.2		V	T_C=25°C, I_S=−4.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDA50

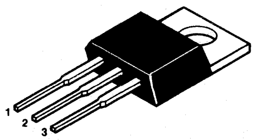
VN46AD ■ VN40AD

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

TO–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN46AD	40	3	TO–220AB
VN40AD	40	5	TO–220AB

For Additional Curves
See Section 5: VNMA06

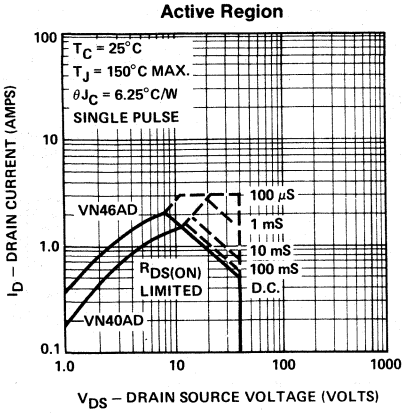
1

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

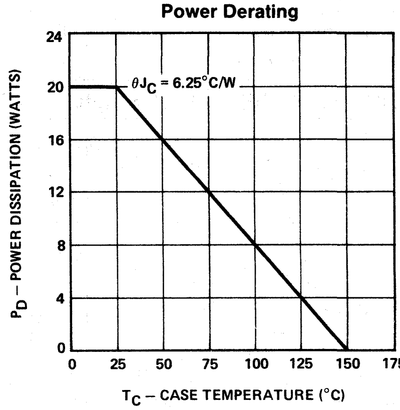
	Parameter	VN46AD	VN40AD	Units
V_{DS}	Drain-Source Voltage	40	40	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	40	40	V
I_D @ T_C = 25° C	Continuous Drain Current	±2.1	±1.63	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.34	±1.03	A
I_{DM}	Pulsed Drain Current[1]	±3	±3	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20	20	W
P_D @ T_C = 100°C	Max. Power Dissipation	8	8	W
Junction to Case	Linear Derating Factor	0.16	0.16	W/° C
Junction to Ambient	Linear Derating Factor	0.034	0.034	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	All	40	70		V	V_{GS} = 0 I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.5	2.5	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1 10	10 100	nA	V_{GS} = +15V V_{GS} = +15V, T_A = 125°C
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −15V
I_{DSS}	Zero Gate Voltage Drain Current	All		1	10	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All		50	500	μA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125° C
$I_{D(on)}$	On-State Drain Current[1]	All	1	1.7		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1.2	1.5	V	V_{GS} = 5V, I_D = 300 mA
		VN46AD VN40AD		2.5 3.7	3 5	V	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		4	5	Ω	V_{GS} = 5V, I_D = 300 mA
		VN46AD VN40AD		2.5 3.7	3 5	Ω	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN46AD		3.5	4.2	Ω	V_{GS} =10V, I_D = 1A, T_C =125°C
		VN40AD		5.1	6.9	Ω	V_{GS} =10V, I_D = 1A, T_C =125°C

DYNAMIC

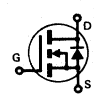
Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	170	195		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		35	50	pF	V_{GS} = 0, V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		33	40	pF	
C_{rss}	Reverse Transfer Capacitance	All		2	10	pF	
$t_{(on)}$	Turn-On Time	All		8	10	ns	V_{DD} = 25V, $I_D \cong$ 1A R_g = 25Ω, R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{(off)}$	Turn-Off Time	All		8	10	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			6.25	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN46AD			−2.1	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		VN40AD			−1.63	A	
I_{SM}	Source Current[1] (Body Diode)	All			−3	A	
V_{SD}	Diode Forward Voltage[1]	VN46AD		−1.2		V	T_C=25°C, I_S=−2.1A, V_{GS} = 0
		VN40AD		−1.2		V	T_C=25°C, I_S=−1.63A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMA06

VN46AF ■ VN40AF

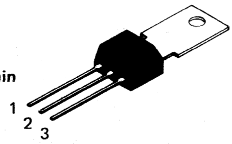
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PIN 1 — Source
PIN 2 — Gate
PIN 3 & TAB — Drain



T0—202AA

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN46AF	40	3	T0—202AA
VN40AF	40	5	T0—202AA

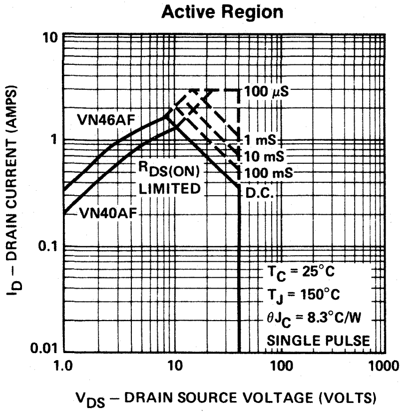
For Additional Curves
See Section 5: VNMA04

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

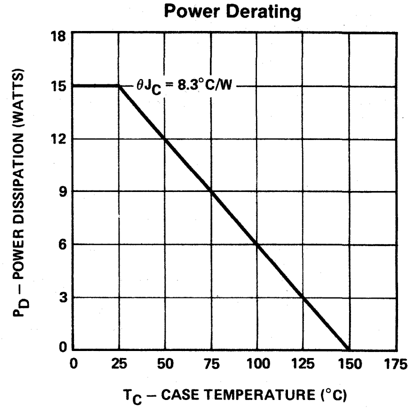
	Parameter	VN46AF	VN40AF	Units
V_{DS}	Drain-Source Voltage	40	40	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	40	40	V
I_D @ T_C = 25° C	Continuous Drain Current	±1.83	±1.42	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.16	±0.89	A
I_{DM}	Pulsed Drain Current[1]	±3	±3	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	15	15	W
P_D @ T_C = 100°C	Max. Power Dissipation	6	6	W
Junction to Case	Linear Derating Factor	0.12	0.12	W/° C
Junction to Ambient	Linear Derating Factor	0.016	0.016	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	All	40	55		V	V_{GS} = 0, I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.5	2.5	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +15V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −15V
I_{DSS}	Zero Gate Voltage Drain Current	All		1	10	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All		50	500	μA	V_{DS}= 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	1	1.5		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1.2	1.5	V	V_{GS} = 5V, I_D = 300 mA
		VN46AF VN40AF		2.2 3.7	3 5	V	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		4	5	Ω	V_{GS} = 5V, I_D = 300 mA
		VN46AF VN40AF		2.2 3.7	3 5	Ω	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN46AF		3	4.2	Ω	V_{GS} =10V, I_D = 1A, T_C =125°C
		VN40AF		5.1	6.9	Ω	V_{GS} =10V, I_D = 1A, T_C =125°C

DYNAMIC

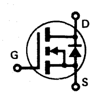
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	170	195		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		38	50	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		45	65	pF	
C_{rss}	Reverse Transfer Capacitance	All		7	10	pF	
$t_{(on)}$	Turn-On Time	All		8	10	ns	V_{DD} = 25V, $I_D \cong$ 1A, R_g = 25Ω, R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{(off)}$	Turn-Off Time	All		8	10	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All		5	8.3	°C/W	
R_{thJA}	Junction-to-Ambient	All			62.5	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN46AF			−1.83	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		VN40AF			−1.42	A	
I_{SM}	Source Current[1] (Body Diode)	All			−3	A	
V_{SD}	Diode Forward Voltage[1]	VN46AF		−1.2		V	T_C=25°C, I_S=−1.83A, V_{GS} = 0
		VN40AF		−1.2		V	T_C=25°C, I_S=−1.42A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMA04

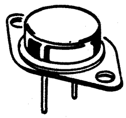
VN5001A ■ VN5002A

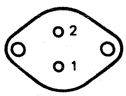
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers





BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN5001A	500	1.5	T0–204AA
VN5002A	500	2	T0–204AA

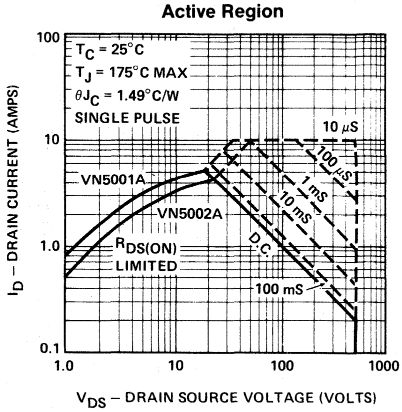
For Additional Curves
See Section 5: VNDA50

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

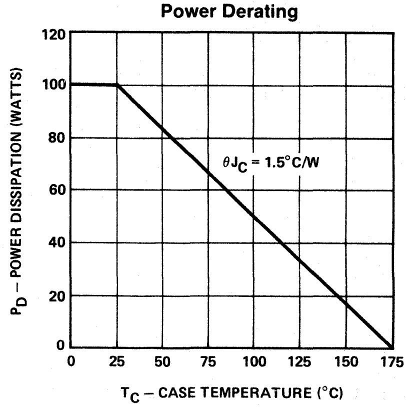
	Parameter	VN5001A	VN5002A	Units
V_{DS}	Drain-Source Voltage	500	500	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500	500	V
I_D @ T_C = 25° C	Continuous Drain Current	±5.16	±4.47	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.65	±3.16	A
I_{DM}	Pulsed Drain Current[1]	±10	±10	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	100	100	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	W
Junction to Case	Linear Derating Factor	0.67	0.67	W/° C
Junction to Ambient	Linear Derating Factor	0.03	0.03	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +175	–55 To +175	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN5001A	500	520		V	V_{GS} = 0, I_D = 1 mA
		VN5002A	500	520		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	3	3.5	6	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	6			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VN5001A		2.4	3	V	V_{GS} = 10V, I_D = 2A
		VN5002A		3.2	4	V	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN5001A		1.2	1.5	Ω	V_{GS} = 10V, I_D = 2A
		VN5002A		1.6	2	Ω	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN5001A		2.16	2.7	Ω	V_{GS} =10V, I_D = 2A, T_C =125°C
		VN5002A		2.4	3	Ω	V_{GS} =10V, I_D = 2A, T_C =125°C

DYNAMIC

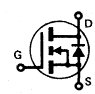
Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	3.5		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 2A
C_{iss}	Input Capacitance	All		840	1000	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		140	200	pF	
C_{rss}	Reverse Transfer Capacitance	All		40	50	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	50	ns	V_{DD} =200V, $I_D \cong$ 2A, R_g = 10Ω, R_L = 100Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	100	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.5	°C/W	
R_{thJA}	Junction-to-Ambient	All			33.4	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN5001A			−4.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		VN5002A			−4	A	
I_{SM}	Source Current[1] (Body Diode)	All			−10	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.2		V	T_C=25°C, I_S=−4.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C, $I_F = I_S$, dI_F/ds =100 A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDA50

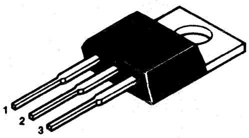
VN5001D ■ VN5002D

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN5001D	500	1.5	T0–220AB
VN5002D	500	2	T0–220AB

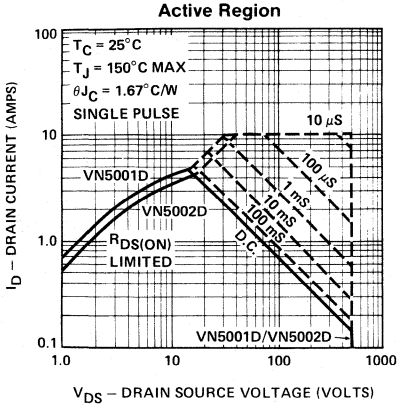
For Additional Curves
See Section 5: VNDA50

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

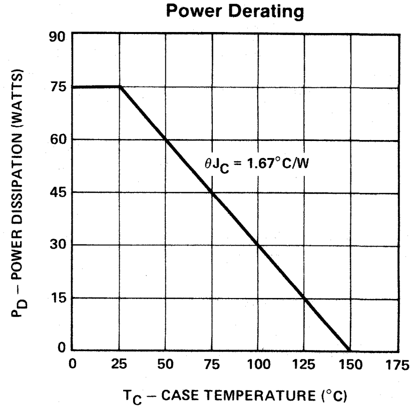
	Parameter	VN5001D	VN5002D	Units
V_{DS}	Drain-Source Voltage	500	500	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500	500	V
I_D @ T_C = 25° C	Continuous Drain Current	±4.87	±4.22	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.08	±2.67	A
I_{DM}	Pulsed Drain Current[1]	±10	±10	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	30	W
Junction to Case	Linear Derating Factor	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	0.034	0.034	W/° C
T_J Tstg	Operating and Storage Temperature Range	–40 To +150	–40 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN5001D	500	520		V	V_{GS} = 0, I_D = 1 mA
		VN5002D	500	520		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	3	3.5	6	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	6			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VN5001D		2.4	3	V	V_{GS} = 10V, I_D = 2A
		VN5002D		3.2	4	V	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN5001D		1.2	1.5	Ω	V_{GS} = 10V, I_D = 2A
		VN5002D		1.6	2	Ω	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN5001D		2.16	2.7	Ω	V_{GS} =10V, I_D = 2A, T_C =125°C
		VN5002D		2.4	3	Ω	V_{GS} =10V, I_D = 2A, T_C =125°C

DYNAMIC

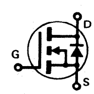
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	3.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 2A
C_{iss}	Input Capacitance	All		840	1000	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		140	200	pF	
C_{rss}	Reverse Transfer Capacitance	All		40	50	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	50	ns	V_{DD} =200V, $I_D \cong$ 2A, R_g = 10Ω, R_L = 100Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	100	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.67	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN5001D			−4.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		VN5002D			−4	A	
I_{SM}	Source Current[1] (Body Diode)	All			−10	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.2		V	T_C=25°C, I_S=−4.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDA50

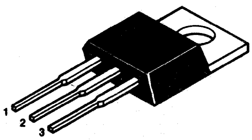
VN66AD ■ VN67AD

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN66AD	60	3	T0–220AB
VN67AD	60	3.5	T0–220AB

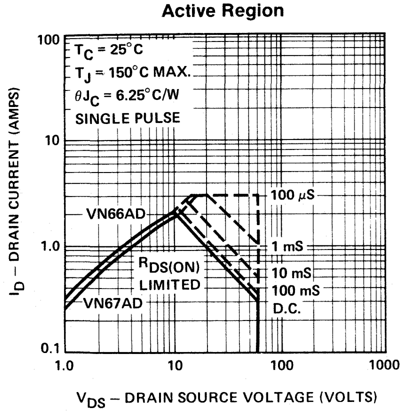
For Additional Curves
See Section 5: VNMA06

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

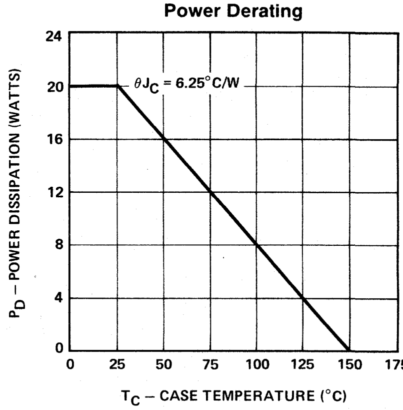
	Parameter	VN66AD	VN67AD	Units
V_{DS}	Drain-Source Voltage	60	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±2.1	±1.95	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.34	±1.24	A
I_{DM}	Pulsed Drain Current[1]	±3	±3	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20	20	W
P_D @ T_C = 100°C	Max. Power Dissipation	8	8	W
Junction to Case	Linear Derating Factor	0.16	0.16	W/° C
Junction to Ambient	Linear Derating Factor	0.0125	0.0125	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	All	60	100		V	V_{GS} = 0, I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.5	2.5	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	1	μA	V_{DS} = 48V, V_{GS} = 0
		All		1	10	μA	V_{DS} = 48V, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	1.5	1.7		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1.4	1.5	V	V_{GS} = 5V, I_D = 0.3A
		VN66AD		2.7	3	V	V_{GS} = 10V, I_D = 1A
		VN67AD		3.2	3.5		
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		4.7	5	Ω	V_{GS} = 5V, I_D = 0.3A
		VN66AD		2.7	3	Ω	V_{GS} = 10V, I_D = 1A
		VN67AD		3.2	3.5		
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN66AD		3.8	4.2	Ω	V_{GS} =10V, I_D = 1A, T_C =125°C
		VN67AD		4.5	4.9	Ω	V_{GS} =10V, I_D = 1A, T_C =125°C

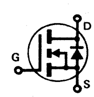
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	170	195		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		35	50	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		33	40	pF	
C_{rss}	Reverse Transfer Capacitance	All		2	10	pF	
$t_{(on)}$	Turn-On Time	All		8	10	ns	V_{DD} = 25V, $I_D \cong$ 1A, R_g = 25Ω, R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{(off)}$	Turn-Off Time	All		8	10	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			6.25	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN66AD			−2.1	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		VN67AD			−1.95	A	
I_{SM}	Source Current[1] (Body Diode)	All			−3	A	
V_{SD}	Diode Forward Voltage[1]	VN66AD		−1.2		V	T_C=25°C, I_S=−2.1A, V_{GS} = 0
		VN67AD		−1.2		V	T_C=25°C, I_S=−1.95A, V_{GS} = 0

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMA06

VN66AF ■ VN67AF

Siliconix

N-Channel Enhancement Mode
MOSPOWER

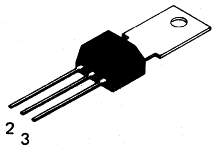
APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN66AF	60	3	T0–202AA
VN67AF	60	3.5	T0–202AA

PIN 1 — Source
PIN 2 — Gate
PIN 3 & TAB — Drain



T0–202AA

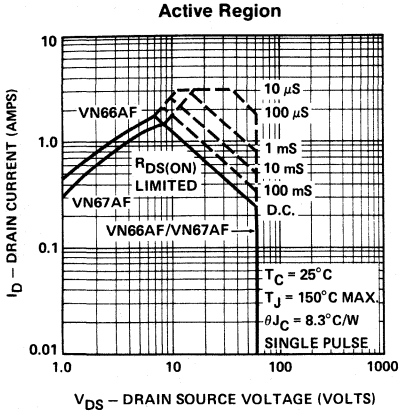
For Additional Curves
See Section 5: VNMA06

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

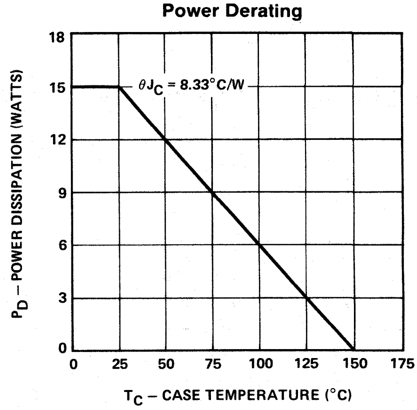
	Parameter	VN66AF	VN67AF	Units
V_{DS}	Drain-Source Voltage	60	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±1.83	±1.69	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.16	±1.07	A
I_{DM}	Pulsed Drain Current[1]	±3	±3	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	15	15	W
P_D @ T_C = 100°C	Max. Power Dissipation	6	6	W
Junction to Case	Linear Derating Factor	0.12	0.12	W/° C
Junction to Ambient	Linear Derating Factor	0.016	0.016	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	All	60	100		V	V_{GS} = 0, I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.5	2.5	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +15V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −15V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	10	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All		1	100	μA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	1.5	1.7		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1.4	1.5	V	V_{GS} = 5V, I_D = 0.3A
		VN66AF VN67AF		2.7 3.2	3 3.5	V	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		4.7	5	Ω	V_{GS} = 5V, I_D = 0.3A
		VN66AF VN67AF		2.7 3.2	3 3.5	Ω	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN66AF		3.8	4.2	Ω	V_{GS} =10V, I_D = 1A, T_C = 125°C
		VN67AF		4.5	4.9	Ω	V_{GS} =10V, I_D = 1A, T_C = 125°C

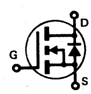
DYNAMIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	170	195		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		35	50	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		33	40	pF	
C_{rss}	Reverse Transfer Capacitance	All		2	10	pF	
$t_{d(on)}$	Turn-On Time	All		8	10	ns	V_{DD} = 25V, $I_D \cong$ 1A, R_g = 25Ω, R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{d(off)}$	Turn-Off Time	All		8	10	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			8.3	°C/W	
R_{thJA}	Junction-to-Ambient	All			62.5	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN66AF			−1.7	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		VN67AF			−1.6	A	
I_{SM}	Source Current[1] (Body Diode)	All			−3	A	
V_{SD}	Diode Forward Voltage[1]	VN66AF		−1.2		V	T_C=25°C, I_S=−1.7A, V_{GS} = 0
		VN67AF		−1.2		V	T_C=25°C, I_S=−1.6A, V_{GS} = 0

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMA06

VN67AB

Siliconix

N-Channel Enhancement Mode
MOSPOWER

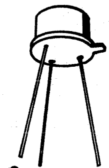
APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN67AB	60	3.5	T0–205AE

PIN 1 — Source
PIN 2 — Gate
PIN 3 & CASE — Drain



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T0–205AE (T0–39)

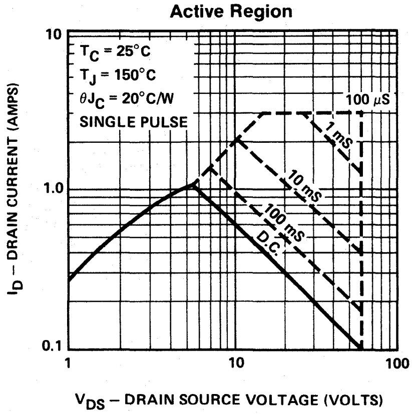
For Additional Curves
See Section 5: VNMA06

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

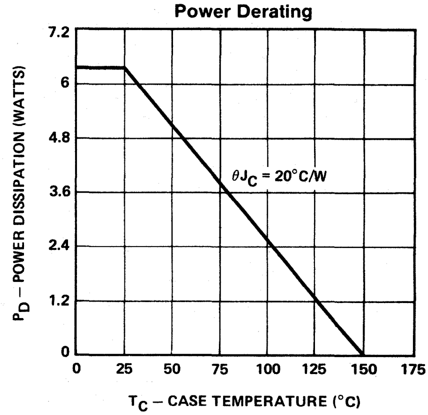
	Parameter	VN67AB	Units
V_{DS}	Drain-Source Voltage	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±1.09	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.69	A
I_{DM}	Pulsed Drain Current[1]	±3	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	6.25	W
P_D @ T_C = 100°C	Max. Power Dissipation	2.5	W
Junction to Case	Linear Derating Factor	0.05	W/° C
Junction to Ambient	Linear Derating Factor	0.006	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VN67AB	60	100		V	V_{GS} = 0, I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	VN67AB	0.8	1.5	2	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	VN67AB		1 5	100 500	nA	V_{GS} = +15V, V_{DS} = 0 V_{GS}=+15V, V_{DS}=0, @T_A=125°C
I_{GSSR}	Gate-Body Leakage Reverse	VN67AB		–1	–100	nA	V_{GS} = –15V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	VN67AB		1	10	mA	V_{DS} = Max. Rating, V_{GS} = 0
		VN67AB		50	500	mA	V_{DS}=0.8 Max. Rating, V_{GS}=0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	VN67AB	1.5	1.7		A	V_{DS}≥2$V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VN67AB		1.4	1.5	V	V_{GS} = 5V, I_D = 0.3A
		VN67AB		3.2	3.5	V	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN67AB		4.7	5	Ω	V_{GS} = 5V, I_D = 0.3A
		VN67AB		3.2	3.5	Ω	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN67AB		4.5	4.9	Ω	V_{GS} = 10V, I_D = 1A, T_C = 125°C

DYNAMIC

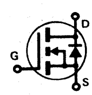
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	VN67AB	170	195		mS	V_{DS}≥2$V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	VN67AB		35	50	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	VN67AB		33	40	pF	
C_{rss}	Reverse Transfer Capacitance	VN67AB		2	10	pF	
$t_{d(on)}$	Turn-On Delay Time	VN67AB		8	10	ns	V_{DD} = 25V, I_D ≅ 1A, R_g = 25Ω, R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{d(off)}$	Turn-Off Delay Time	VN67AB		8	10	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	VN67AB			20	°C/W	
R_{thJA}	Junction-to-Ambient	VN67AB			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN67AB			–1	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	VN67AB			–3	A	
V_{SD}	Diode Forward Voltage[1]	VN67AB		–0.9		V	T_C = 25°C, I_S = –1A, V_{GS} = 0



1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNMA06

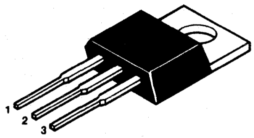
VN88AD ■ VN89AD

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN88AD	80	4	T0–220AB
VN89AD	80	4.5	T0–220AB

For Additional Curves
See Section 5: VNMA09

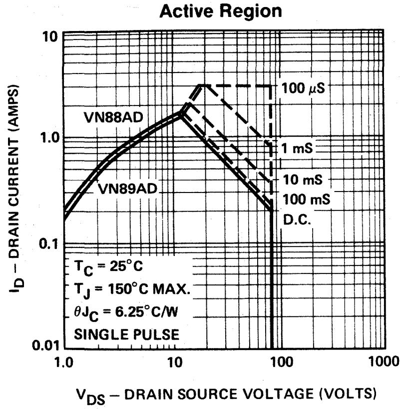
1

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

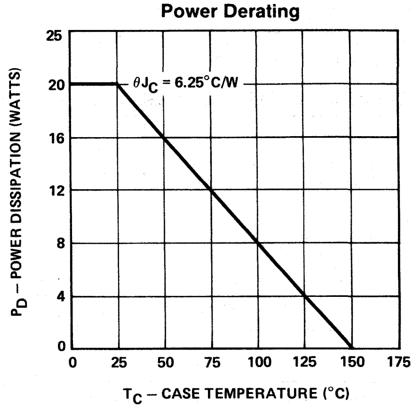
	Parameter	VN88AD	VN89AD	Units
V_{DS}	Drain-Source Voltage	80	80	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	80	80	V
I_D @ T_C = 25° C	Continuous Drain Current	±1.72	±1.6	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.08	±1	A
I_{DM}	Pulsed Drain Current[1]	±3	±3	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20	20	W
P_D @ T_C = 100°C	Max. Power Dissipation	8	8	W
Junction to Case	Linear Derating Factor	0.16	0.16	W/° C
Junction to Ambient	Linear Derating Factor	0.0125	0.0125	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	All	80	110		V	V_{GS} = 0 I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.5	2.5	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +15V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −15V
I_{DSS}	Zero Gate Voltage Drain Current	All		1	10	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All		50	500	μA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	1.5	2		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1	1.5	V	V_{GS} = 5V , I_D = 0.3A
		VN88AD VN89AD		3.2 3.3	4 4.5	V	V_{GS} = 10V , I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		3.6	5	Ω	V_{GS} = 5V , I_D = 0.3A
		VN88AD VN89AD		3.2 3.3	4 4.5	Ω	V_{GS} = 10V , I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN88AD		4	5.5	Ω	V_{GS} =10V, I_D = 1A , T_C = 125°C
		VN89AD		4.5	6.2	Ω	V_{GS} = 10V, I_D = 1A , T_C = 125°C

DYNAMIC

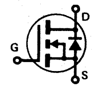
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	170	195		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		35	50	pF	V_{GS} = 0 ,V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		33	40	pF	
C_{rss}	Reverse Transfer Capacitance	All		2	10	pF	
$t_{(on)}$	Turn-On Time	All		8	10	ns	V_{DD} = 25V , $I_D \cong$ 1A R_g = 25Ω , R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{(off)}$	Turn-Off Time	All		8	10	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			6.25	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN88AD			−1.7	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		VN89AD			−1.6	A	
I_{SM}	Source Current[1] (Body Diode)	All			−3	A	
V_{SD}	Diode Forward Voltage[1]	VN88AD		−1.2		V	T_C=25°, I_S=−1.7A, V_{GS} = 0
		VN89AD		−1.2		V	T_C=25°C, I_S=−1.6A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMA09

VN88AF ■ VN89AF ■ VN80AF

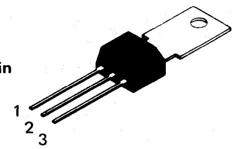
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PIN 1 — Source
PIN 2 — Gate
PIN 3 & TAB — Drain



T0–202AA

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN88AF	80	4	T0–202AA
VN89AF	80	4.5	T0–202AA
VN80AF	80	5	T0–202AA

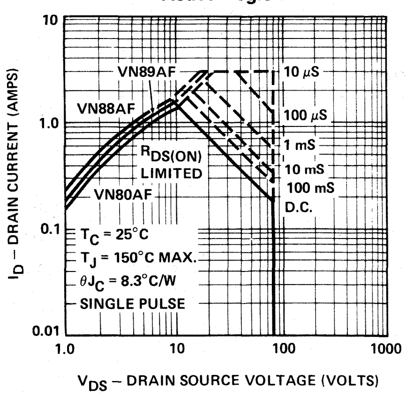
For Additional Curves
See Section 5: VNMA09

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

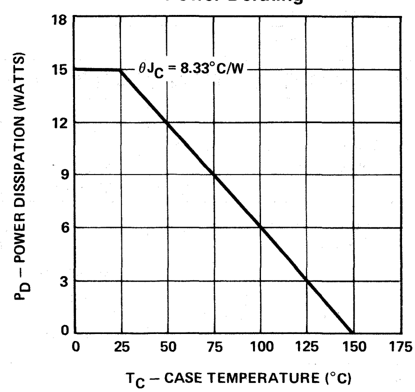
	Parameter	VN88AF	VN89AF	VN80AF	Units
V_{DS}	Drain-Source Voltage	80	80	80	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	80	80	80	V
I_D @ T_C = 25° C	Continuous Drain Current	±1.58	±1.49	±1.41	A
I_D @ T_C = 100° C	Continuous Drain Current	±1	±0.94	±0.9	A
I_{DM}	Pulsed Drain Current[1]	±3	±3	±3	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	15	15	15	W
P_D @ T_C = 100°C	Max. Power Dissipation	6	6	6	W
Junction to Case	Linear Derating Factor	0.12	0.12	0.12	W/° C
Junction to Ambient	Linear Derating Factor	0.016	0.016	0.016	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	All	80	110		V	V_{GS} = 0, I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.5	2.5	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +10V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −10V
I_{DSS}	Zero Gate Voltage Drain Current	All		1	10	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All		50	500	μA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	1.5	2		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1.3	1.7	V	V_{GS} = 5V, I_D = 0.3A
		VN88AF		2.8	4		V_{GS} = 10V, I_D = 1A
		VN89AF		3.2	4.5	V	V_{GS} = 10V, I_D = 1A
		VN80AF		3.6	5		
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		4.2	5.6	Ω	V_{GS} = 5V, I_D = 0.3A
		VN88AF		2.8	4		V_{GS} = 10V, I_D = 1A
		VN89AF		3.2	4.5	Ω	V_{GS} = 10V, I_D = 1A
		VN80AF		3.6	5		
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN88AF		3.5	5.5	Ω	V_{GS} = 10V, I_D = 1A, T_C = 125°C
		VN89AF		4.4	6.2	Ω	V_{GS} = 10V, I_D = 1A, T_C = 125°C
		VN80AF		5	6.9		

DYNAMIC

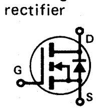
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	170	195		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		35	50	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		33	40	pF	
C_{rss}	Reverse Transfer Capacitance	All		2	10	pF	
$t_{(on)}$	Turn-On Time	All		8	10	ns	V_{DD} = 25V, $I_D \cong$ 1A, R_g = 25Ω, R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{(off)}$	Turn-Off Time	All		8	10	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			8.3	°C/W	
R_{thJA}	Junction-to-Ambient	All			62.5	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN88AF			−1.6	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		VN89AF			−1.5	A	
		VN80AF			−1.4		
I_{SM}	Source Current[1] (Body Diode)	All			−3	A	
V_{SD}	Diode Forward Voltage[1]	VN88AF	−1.2			V	T_C=25°C, I_S=−1.6A, V_{GS} = 0
		VN89AF	−1.2			V	T_C=25°C, I_S=−1.5A, V_{GS} = 0
		VN80AF	−1.2			V	T_C=25°C, I_S=−1.4A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMA09

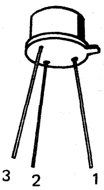
VN99AB ■ VN90AB

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Source
PIN 2 — Gate
PIN 3 & CASE — Drain

T0–205AD (T0–39)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VN99AB	90	4.5	T0–205AD
VN90AB	90	5	T0–205AD

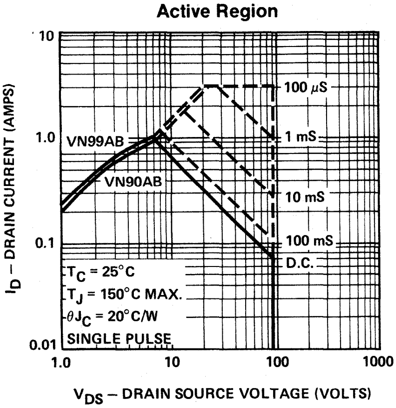
For Additional Curves
See Section 5: VNMA09

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

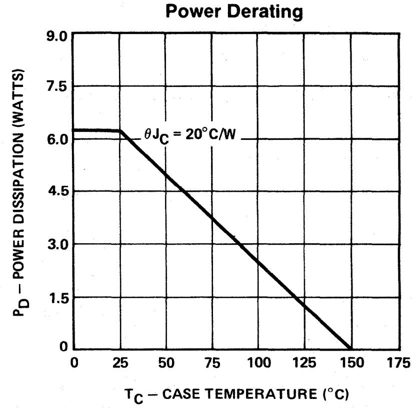
	Parameter	VN99AB	VN90AB	Units
V_{DS}	Drain-Source Voltage	90	90	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	90	90	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.96	±0.91	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.60	±0.57	A
I_{DM}	Pulsed Drain Current[1]	±3	±3	A
V_{GS}	Gate-Source Voltage	±30	±30	V
P_D @ T_C = 25° C	Max. Power Dissipation	6.25	6.25	W
P_D @ T_C = 100°C	Max. Power Dissipation	2.5	2.5	W
Junction to Case	Linear Derating Factor	0.05	0.05	W/° C
Junction to Ambient	Linear Derating Factor	0.006	0.006	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 Pulse Test: Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	All	90	110		V	V_{GS} = 0, I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.5	2	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1 5	100 500	nA	V_{GS} = +15V V_{GS} = +15V, T_A = 125°C
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −15V
I_{DSS}	Zero Gate Voltage Drain Current	All		1	10	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All		50	500	μA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	1.5			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1.2	1.6	V	V_{GS} = 5V, I_D = 0.3A
		VN99AB VN90AB		3.2 3.6	4.5 5	V	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		4	5.3	Ω	V_{GS} = 5V, I_D = 0.3A
		VN99AB VN90AB		3.2 3.6	4.5 5	Ω	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VN99AB		4.4	6.2	Ω	V_{GS} = 10V, I_D = 1A, T_C = 125°C
		VN90AB		5	6.9	Ω	V_{GS} = 10V, I_D = 1A, T_C = 125°C

DYNAMIC

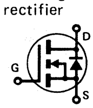
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	170	195		mS	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		35	50	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		33	40	pF	
C_{rss}	Reverse Transfer Capacitance	All		2	10	pF	
$t_{(on)}$	Turn-On Time	All		8	10	ns	V_{DD} = 25V, $I_D \cong$ 1A, R_g = 25Ω, R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{(off)}$	Turn-Off Time	All		8	10	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			20	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VN99AB			−0.96	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		VN90AB			−0.91	A	
I_{SM}	Source Current[1] (Body Diode)	All			−3	A	
V_{SD}	Diode Forward Voltage[1]	VN99AB		−1.2		V	T_C=25°C, I_S=−0.96A, V_{GS} = 0
		VN90AB		−1.2		V	T_C=25°C, I_S=−0.91A, V_{GS} = 0



1 Pulse Test: Pulse Width ⩽300 μsec, Duty Cycle ⩽ 2%

* JEDEC Device Meets $t_{d(ON)}$, t_r, $t_{d(OFF)}$, t_f, of 5ns Max Each

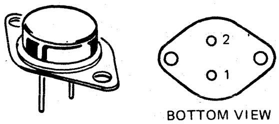
Data Sheet Curves: VNMA09

VNE003A ■ VNC003A

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS
- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AE (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VNE003A	100	0.035	T0–204AE
VNC003A	60	0.035	T0–204AE

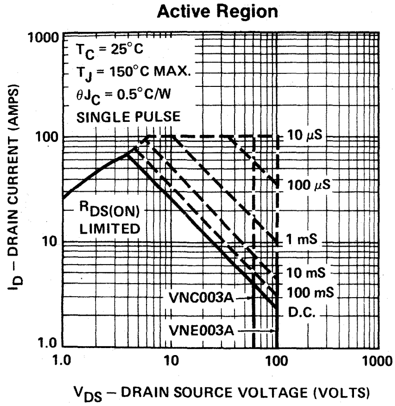
For Additional Curves
See Section 5: VNDC10–3

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

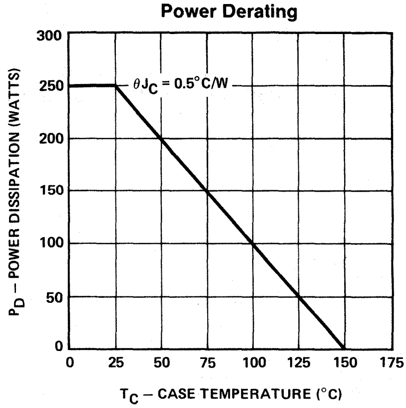
	Parameter	VNE003A	VNC003A	Units
V_{DS}	Drain-Source Voltage	100	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±65	±65	A
I_D @ T_C = 100° C	Continuous Drain Current	±41	±41	A
I_{DM}	Pulsed Drain Current[1]	±100	±100	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	250	250	W
P_D @ T_C = 100°C	Max. Power Dissipation	100	100	W
Junction to Case	Linear Derating Factor	2	2	W/° C
Junction to Ambient	Linear Derating Factor	0.034	0.034	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VNE003A	100	120		V	V_{GS} = 0, I_D = 2 mA
		VNC003A	60	90		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	3	5	V	$V_{DS} = V_{GS}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	All		20	100	nA	V_{GS} = +20V
I_{GSSR}	Gate-Body Leakage Reverse	All		−20	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.5	2	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		2	5	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	25	28		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All			0.7	V	V_{GS} = 10V, I_D = 20A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All			0.035	Ω	V_{GS} = 10V, I_D = 20A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All			0.053	Ω	V_{GS} = 10V, I_D = 20A, T_C = 125°C

DYNAMIC

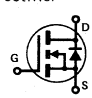
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	12			S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 20A
C_{iss}	Input Capacitance	All		5200	6000	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		1600	2000	pF	
C_{rss}	Reverse Transfer Capacitance	All		640	1000	pF	
$t_{d(on)}$	Turn-On Delay Time	All		14	30	ns	V_{DD} = 30V, $I_D \cong$ 30A, R_g = 1.5Ω, R_L = 1Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	175	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		130	150	ns	
t_f	Fall Time	All		50	120	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			0.5	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−65	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−100	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.8		V	T_C=25°C, I_S=−65A, V_{GS} = 0
		All		−1.1		V	T_C=125°C, I_S=−65A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		600		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDC10–3

VNE010B ■ VND010B ■ VNC010B

Siliconix

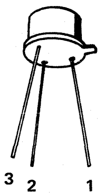
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PIN 1 — Source
PIN 2 — Gate
PIN 3 & CASE — Drain

T0—205AD (T0—39)



PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VNE010B	100	0.5	T0—205AD
VND010B	80	0.5	T0—205AD
VNC010B	60	0.5	T0—205AD

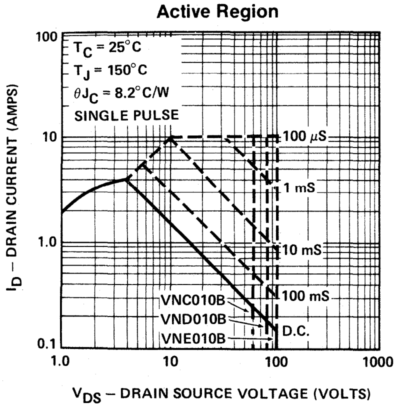
For Additional Curves
See Section 5: VNDG10

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

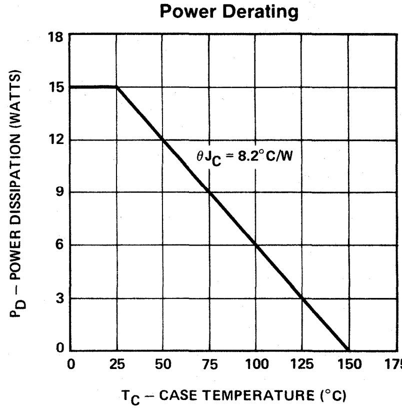
	Parameter	VNE010B	VND010B	VNC010B	Units
V_{DS}	Drain-Source Voltage	100	80	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	80	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±4	±4	±4	A
I_D @ T_C = 100° C	Continuous Drain Current	±2.5	±2.5	±2.5	A
I_{DM}	Pulsed Drain Current[1]	±10	±10	±10	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	15	15	15	W
P_D @ T_C = 100°C	Max. Power Dissipation	6	6	6	W
Junction to Case	Linear Derating Factor	0.12	0.12	0.12	W/° C
Junction to Ambient	Linear Derating Factor	0.006	0.006	0.006	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VNE010B	100	110		V	V_{GS} = 0, I_D = 100 μA
		VND010B	80	90			
		VNC010B	60	70		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.6	2	V	V_{DS} = V_{GS}, I_D = 5 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	20	nA	V_{GS} = 12V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−20	nA	V_{GS} = −12V
I_{DSS}	Zero Gate Voltage Drain Current	All		10	100	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.1	1	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	5	10		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		2	2.5	V	V_{GS} = 10V, I_D = 5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.4	0.5	Ω	V_{GS} = 10V, I_D = 5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.7	0.9	Ω	V_{GS} = 10V, I_D = 5A, T_C = 125°C

DYNAMIC

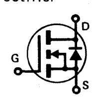
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1	1.8		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 5A
C_{iss}	Input Capacitance	All		210	250	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		160	200	pF	
C_{rss}	Reverse Transfer Capacitance	All		45	60	pF	
$t_{d(on)}$	Turn-On Delay Time	All		7	15	ns	V_{DD} = 50V, $I_D \cong$ 2A, R_g = 25Ω, R_L = 25Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		16	35	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		41	80	ns	
t_f	Fall Time	All		32	65	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All		6.8	8.2	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−4	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−10	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.5	−1.8	V	T_C = 25°C, I_S = −4A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		300		ns	T_J = 150°C, I_F = I_S, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDG10

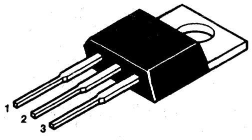
VNE010D ■ VND010D ■ VNC010D

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VNE010D	100	0.5	T0–220AB
VND010D	80	0.5	T0–220AB
VNC010D	60	0.5	T0–220AB

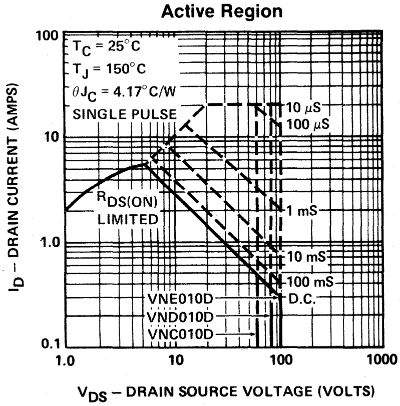
For Additional Curves
See Section 5: VNDG10

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

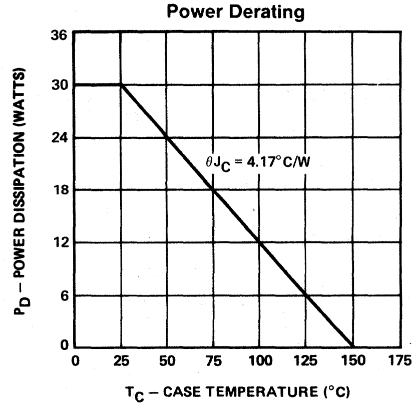
	Parameter	VNE010D	VND010D	VNC010D	Units
V_{DS}	Drain-Source Voltage	100	80	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	80	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±5	±5	±5	A
I_D @ T_C = 100° C	Continuous Drain Current	±3	±3	±3	A
I_{DM}	Pulsed Drain Current[1]	±21	±21	±21	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	30	30	30	W
P_D @ T_C = 100°C	Max. Power Dissipation	12	12	12	W
Junction to Case	Linear Derating Factor	0.24	0.24	0.24	W/° C
Junction to Ambient	Linear Derating Factor	0.0125	0.0125	0.0125	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VNE010D VND010D	100 80	110 90		V	V_{GS} = 0 I_D = 100 μA
		VNC010D	60	70		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.6	2	V	V_{DS} = V_{GS}, I_D = 5 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	20	nA	V_{GS} = +12V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−20	nA	V_{GS} = −12V
I_{DSS}	Zero Gate Voltage Drain Current	All		10	100	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.1	1	mA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(ON)}$	On-State Drain Current[1]	All	5	10		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		2	2.5	V	V_{GS} = 10V , I_D = 5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.4	0.5	Ω	V_{GS} = 10V , I_D = 5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.7	0.9	Ω	V_{GS} =10V , I_D =5A , T_C =125°C

DYNAMIC

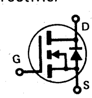
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1	1.8		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 5A
C_{iss}	Input Capacitance	All		210	250	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		160	200	pF	
C_{rss}	Reverse Transfer Capacitance	All		45	60	pF	
$t_{d(on)}$	Turn-On Delay Time	All		7	15	ns	V_{DD} = 50V , $I_D \cong$ 2A R_g = 25Ω , R_L = 25Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		16	35	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		41	80	ns	
t_f	Fall Time	All		32	65	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All		3.58	4.17	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−21	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.5	−1.8	V	T_C = 25°C , I_S = −5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		300		ns	T_J = 150°C , I_F = I_S, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDG10

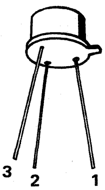
VNE011B ■ VND011B ■ VNC011B

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Source
PIN 2 — Gate
PIN 3 & GATE — Drain

T0–205AD (T0–39)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VNE011B	100	0.5	T0–205AD
VND011B	80	0.5	T0–205AD
VNC011B	60	0.5	T0–205AD

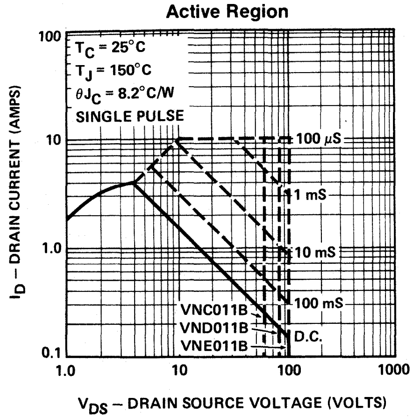
For Additional Curves
See Section 5: VNDG10

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

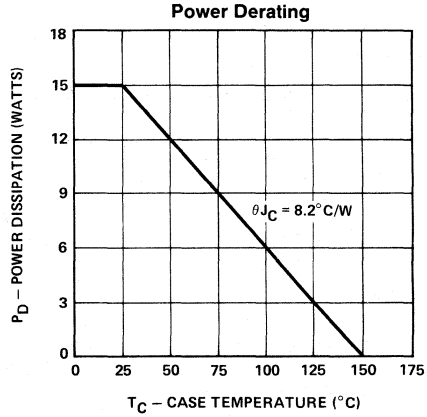
	Parameter	VNE011B	VND011B	VNC011B	Units
V_{DS}	Drain-Source Voltage	100	80	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	80	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±4	±4	±4	A
I_D @ T_C = 100° C	Continuous Drain Current	±2.5	±2.5	±2.5	A
I_{DM}	Pulsed Drain Current[1]	±10	±10	±10	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	15	15	15	W
P_D @ T_C = 100°C	Max. Power Dissipation	6	6	6	W
Junction to Case	Linear Derating Factor	0.012	0.012	0.012	W/° C
Junction to Ambient	Linear Derating Factor	0.006	0.006	0.006	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VNE011B	100	110		V	$V_{GS} = 0$, $I_D = 100\ \mu A$
		VND011B	80	90		V	
		VNC011B	60	70			
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	2.1	3.6	V	$V_{DS} = V_{GS}$, $I_D = 5$ mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	20	nA	$V_{GS} = 12V$
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−20	nA	$V_{GS} = -12V$
I_{DSS}	Zero Gate Voltage Drain Current	All		10	100	μA	V_{DS} = Max. Rating, $V_{GS} = 0$
		All		0.1	1	mA	V_{DS} = Max. Rating, $V_{GS} = 0$, $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	All	5	10		A	$V_{DS} \geqslant 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		2	2.5	V	$V_{GS} = 12V$, $I_D = 5A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.4	0.5	Ω	$V_{GS} = 12V$, $I_D = 5A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.7	0.9	Ω	$V_{GS} = 12V$, $I_D = 5A$, $T_C = 125°C$

DYNAMIC

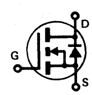
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1	1.8		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, $I_D = 5A$
C_{iss}	Input Capacitance	All		210	250	pF	$V_{GS} = 0$, $V_{DS} = 25V$, f = 1 MHz
C_{oss}	Output Capacitance	All		160	200	pF	
C_{rss}	Reverse Transfer Capacitance	All		45	60	pF	
$t_{d(on)}$	Turn-On Delay Time	All		7	15	ns	$V_{DD} = 50V$, $I_D \cong 2A$, $R_g = 25\Omega$, $R_L = 25\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		16	35	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		41	80	ns	
t_f	Fall Time	All		32	65	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All		6.8	8.2	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−4	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−2.5	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.5	−1.8	V	$T_C = 25°C$, $I_S = -4A$, $V_{GS} = 0$
t_{rr}	Reverse Recovery Time	All		300		ns	$T_J = 150°C$, $I_F = I_S$, $dI_F/ds = 100$ A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDG10

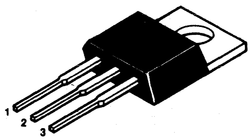
VNE011D ■ VND011D ■ VNC011D

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VNE011D	100	0.5	T0–220AB
VND011D	80	0.5	T0–220AB
VNC011D	60	0.5	T0–220AB

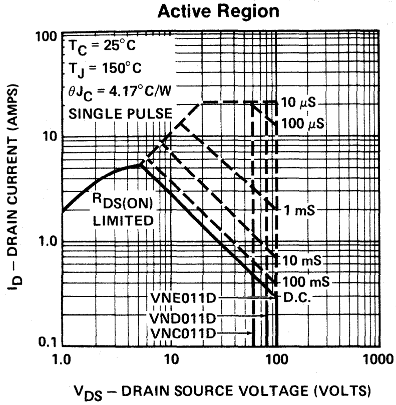
For Additional Curves
See Section 5: VNDG10

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

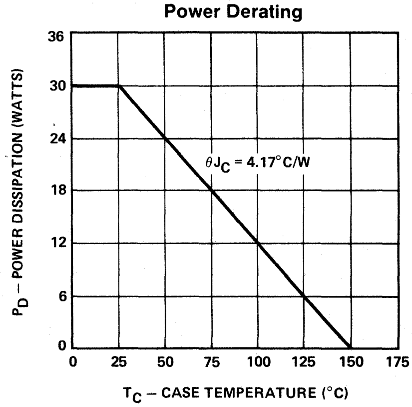
	Parameter	VNE011D	VND011D	VNC011D	Units
V_{DS}	Drain-Source Voltage	100	80	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	80	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±5	±5	±5	A
I_D @ T_C = 100° C	Continuous Drain Current	±3	±3	±3	A
I_{DM}	Pulsed Drain Current[1]	±21	±21	±21	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	30	30	30	W
P_D @ T_C = 100°C	Max. Power Dissipation	12	12	12	W
Junction to Case	Linear Derating Factor	0.24	0.24	0.24	W/° C
Junction to Ambient	Linear Derating Factor	0.0125	0.0125	0.0125	W/° C
T_J T_{stg}	Operating and Storage Temperature Range	−55 To +150	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VNE011D VND011D	100 80	110 90		V	$V_{GS} = 0$ $I_D = 100\ \mu A$
		VNC011D	60	70		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	2.1	3.6	V	$V_{DS} = V_{GS}$, $I_D = 5$ mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	20	nA	$V_{GS} = 12V$
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−20	nA	$V_{GS} = -12V$
I_{DSS}	Zero Gate Voltage Drain Current	All		10	100	μA	V_{DS} = Max. Rating, $V_{GS} = 0$
		All		0.1	1	mA	V_{DS} = Max. Rating, $V_{GS} = 0$ $T_C = 125°C$
IDSX	Biased Gate Voltage, Drain Current	All	5	10		A	$V_{DS} \geq 2V_{DS(ON)}$, $V_{GS} = 10V$
$I_{D(ON)}$	On-State Drain Current[1]						
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		2	2.5	V	$V_{GS} = 12V$, $I_D = 5A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.4	0.5	Ω	$V_{GS} = 12V$, $I_D = 5A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.7	0.9	Ω	$V_{GS} = 12V$, $I_D = 5A$, $T_C = 125°C$

DYNAMIC

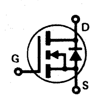
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1	1.8		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, $I_D = 5A$
C_{iss}	Input Capacitance	All		210	250	pF	$V_{GS} = 0$, $V_{DS} = 25V$ f = 1 MHz
C_{oss}	Output Capacitance	All		160	200	pF	
C_{rss}	Reverse Transfer Capacitance	All		45	60	pF	
$t_{d(on)}$	Turn-On Delay Time	All		7	15	ns	$V_{DD} = 50V$, $I_D \cong 2A$ $R_g = 25\Omega$, $R_L = 25\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		16	35	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		41	80	ns	
t_f	Fall Time	All		32	65	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All		3.58	4.17	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−21	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.5	−1.8	V	$T_C = 25°C$, $I_S = -5A$, $V_{GS} = 0$
t_{rr}	Reverse Recovery Time	All		300		ns	$T_J = 150°C$, $I_F = I_S$, $dI_F/ds = 100$ A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDG10

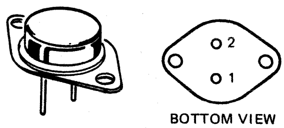
VNJ004A ■ VNG004A

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AE (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VNJ004A	200	0.06	T0–204AE
VNG004A	150	0.06	T0–204AE

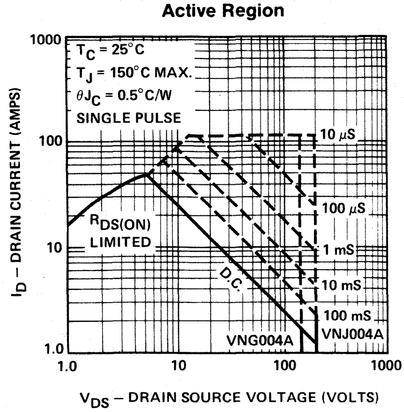
For Additional Curves See Section 5: VNDC20–3

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

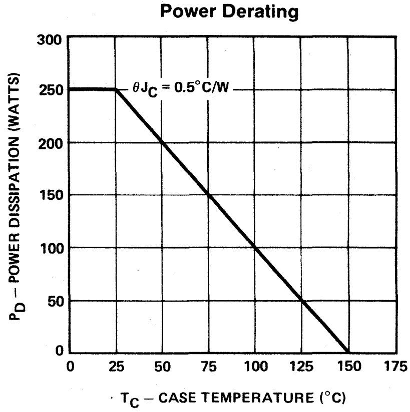
	Parameter	VNJ004A	VNG004A	Units
V_{DS}	Drain-Source Voltage	200	150	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	200	150	V
I_D @ T_C = 25° C	Continuous Drain Current	±47	±47	A
I_D @ T_C = 100° C	Continuous Drain Current	±29	±29	A
I_{DM}	Pulsed Drain Current[1]	±120	±120	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	250	250	W
P_D @ T_C = 100°C	Max. Power Dissipation	100	100	W
Junction to Case	Linear Derating Factor	2	2	W/° C
Junction to Ambient	Linear Derating Factor	0.034	0.034	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VNJ004A	200	220		V	V_{GS} = 0, I_D = 2 mA
		VNG004A	150	180		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	3.5	5	V	$V_{DS} = V_{GS}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	All		20	100	nA	V_{GS} = +20V
I_{GSSR}	Gate-Body Leakage Reverse	All		−20	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.3	2	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		2	5	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	25	28		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		0.68	0.9	V	V_{GS} = 10V, I_D = 15A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.045	0.06	Ω	V_{GS} = 10V, I_D = 15A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.08	0.11	Ω	V_{GS} = 10V, I_D = 15A, T_C = 125°C

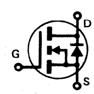
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	10			S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 15A
C_{iss}	Input Capacitance	All		4600	6000	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		600	1200	pF	
C_{rss}	Reverse Transfer Capacitance	All		200	300	pF	
$t_{d(on)}$	Turn-On Delay Time	All		25	40	ns	V_{DD} = 100V, $I_D \cong$ 15A, R_g = 6.7Ω, R_L = 6.7Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		45	90	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		300	450	ns	
t_f	Fall Time	All		90	150	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			0.5	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−47	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
I_{SM}	Source Current[1] (Body Diode)	All			−120	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.5		V	T_C=25°C, I_S=−47A, V_{GS} = 0
		All		−0.8		V	T_C=125°C, I_S=−47A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		600		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs

1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC20–3

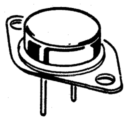
VNM001A ■ VNL001A

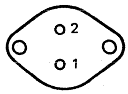
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers
- High Temperature Environments





BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VNM001A	400	1	T0–204AA
VNL001A	350	1	T0–204AA

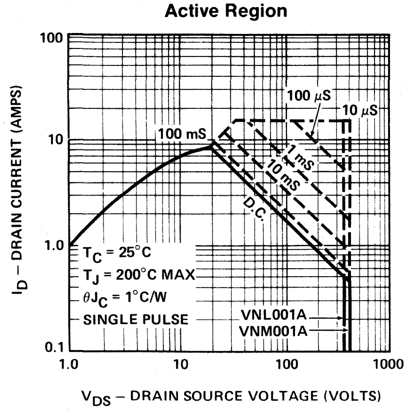
For Additional Curves
See Section 5: VNDA40

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

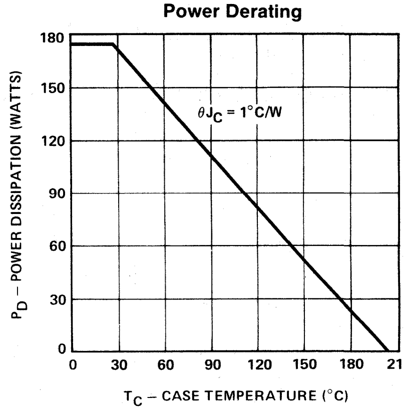
	Parameter	VNM001A	VNL001A	Units
V_{DS}	Drain-Source Voltage	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±7.93	±7.93	A
I_D @ T_C = 100° C	Continuous Drain Current	±6	±6	A
I_{DM}	Pulsed Drain Current[1]	±16	±16	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	175	175	W
P_D @ T_C = 100°C	Max. Power Dissipation	100	100	W
Junction to Case	Linear Derating Factor	1	1	W/° C
Junction to Ambient	Linear Derating Factor	0.033	0.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +200	–55 To +200	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VNM001A	400	420		V	V_{GS} = 0, I_D = 1 mA
		VNL001A	350	370		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	3	4	6	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.13	2.5	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125° C
$I_{D(on)}$	On-State Drain Current[1]	All	8	13		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1.6	2	V	V_{GS} = 10V , I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.8	1	Ω	V_{GS} = 10V , I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		1.6	2	Ω	V_{GS} =10V, I_D = 2A , T_C =125°C

DYNAMIC

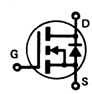
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	3.5		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 2A
C_{iss}	Input Capacitance	All		840	1000	pF	V_{GS} = 0 , V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		150	220	pF	
C_{rss}	Reverse Transfer Capacitance	All		30	40	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	50	ns	V_{DD} =200V, $I_D \cong$ 2A, R_g = 10Ω , R_L = 100Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	100	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1	°C/W	
R_{thJA}	Junction-to-Ambient	All			3	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−8	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−16	A	
V_{SD}	Diode Forward Voltage[1]	All		−0.9		V	T_C = 25°C , I_S = −8A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C , $I_F = I_S$, dI_F/ds =100 A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDA40

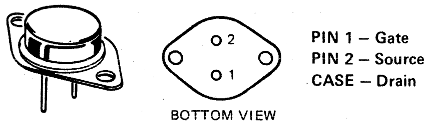
VNM005A ■ VNL005A

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



T0–204AE (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VNM005A	400	0.2	T0–204AE
VNL005A	350	0.2	T0–204AE

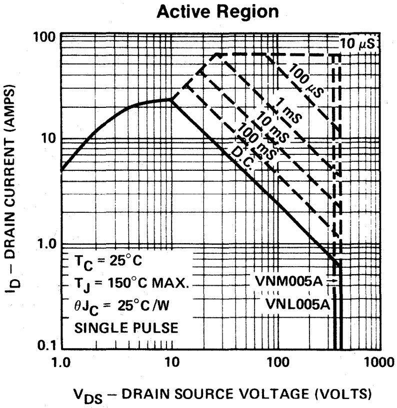
For Additional Curves
See Section 5: VNDC40–3

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

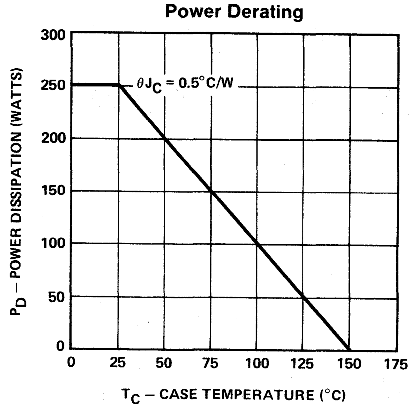
	Parameter	VNM005A	VNL005A	Units
V_{DS}	Drain-Source Voltage	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±24	±24	A
I_D @ T_C = 100° C	Continuous Drain Current	±15	±15	A
I_{DM}	Pulsed Drain Current[1]	±60	±60	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	250	250	W
P_D @ T_C = 100°C	Max. Power Dissipation	100	100	W
Junction to Case	Linear Derating Factor	2	2	W/° C
Junction to Ambient	Linear Derating Factor	0.034	0.034	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VNM005A	400	430		V	V_{GS} = 0, I_D = 2 mA
		VNL005A	350	380		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	3	5	V	$V_{DS} = V_{GS}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	All		20	100	nA	V_{GS} = +20V
I_{GSSR}	Gate-Body Leakage Reverse	All		−20	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.5	2	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		2	5	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	25	35		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1.8	2	V	V_{GS} = 10V, I_D = 10A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.18	0.2	Ω	V_{GS} = 10V, I_D = 10A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.35	0.38	Ω	V_{GS} = 10V, I_D = 10A, T_C = 125°C

DYNAMIC

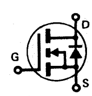
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	10			S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 10A
C_{iss}	Input Capacitance	All		4500	6000	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		500	1000	pF	
C_{rss}	Reverse Transfer Capacitance	All		100	300	pF	
$t_{d(on)}$	Turn-On Delay Time	All		47	60	ns	V_{DD} = 200V, $I_D \cong$ 20A, R_g = 10Ω, R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		100	200	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		140	180	ns	
t_f	Fall Time	All		62	150	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			0.5	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−24	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−60	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.5		V	T_C=25°C, I_S=−24A, V_{GS} = 0
		All		−0.8		V	T_C=125°C, I_S=−24A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		600		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDC40–3

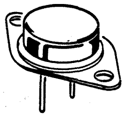
VNP002A ■ VNN002A

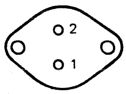
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers
- High Temperature Environments





BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VNP002A	500	1.5	T0–204AA
VNN002A	450	1.5	T0–204AA

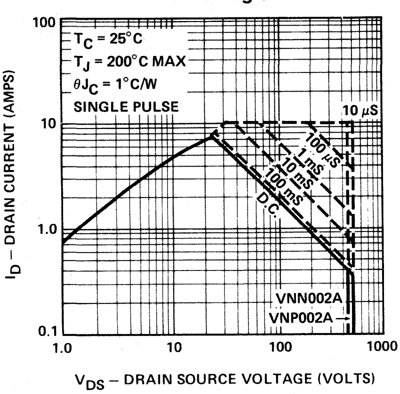
For Additional Curves
See Section 5: VNDA50

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

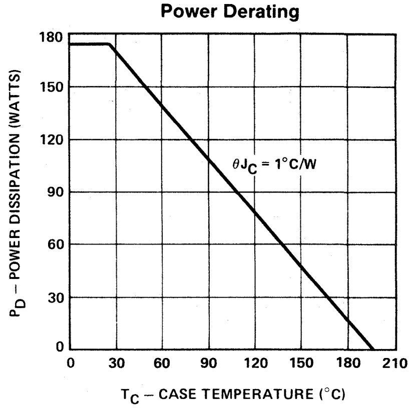
	Parameter	VNP002A	VNN002A	Units
V_{DS}	Drain-Source Voltage	500	450	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500	450	V
I_D @ T_C = 25° C	Continuous Drain Current	±6.48	±6.48	A
I_D @ T_C = 100° C	Continuous Drain Current	±4.90	±4.90	A
I_{DM}	Pulsed Drain Current[1]	±10	±10	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	175	175	W
P_D @ T_C = 100°C	Max. Power Dissipation	100	100	W
Junction to Case	Linear Derating Factor	1	1	W/° C
Junction to Ambient	Linear Derating Factor	0.034	0.034	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +200	−55 To +200	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VNP002A	500	520		V	V_{GS} = 0, I_D = 1 mA
		VNN002A	450	480		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	3	4	6	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.13	2.5	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	8	13		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		2.4	3	V	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		1.2	1.5	Ω	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		2.4	3	Ω	V_{GS} =10V, I_D = 2A, T_C =125°C

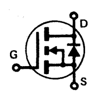
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	3.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 2A
C_{iss}	Input Capacitance	All		840	1000	pF	V_{GS} = 0, V_{DS} = 30V, f = 1 MHz
C_{oss}	Output Capacitance	All		150	220	pF	
C_{rss}	Reverse Transfer Capacitance	All		30	40	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	50	ns	V_{DD} =200V, $I_D \cong$ 2A, R_g = 10Ω, R_L = 100Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	100	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−6.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
I_{SM}	Source Current[1] (Body Diode)	All			−10	A	
V_{SD}	Diode Forward Voltage[1]	All		−0.9		V	T_C=25°C, I_S=−6.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

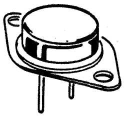
Data Sheet Curves: VNDA50

VNP006A ■ VNN006A

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS
- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

BOTTOM VIEW

T0–204AE (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VNP006A	500	0.3	T0–204AE
VNN006A	450	0.3	T0–204AE

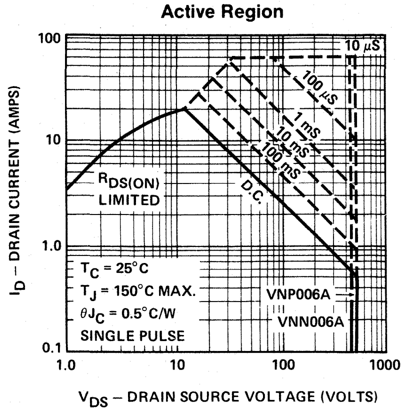
For Additional Curves
See Section 5: VNDC50–3

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

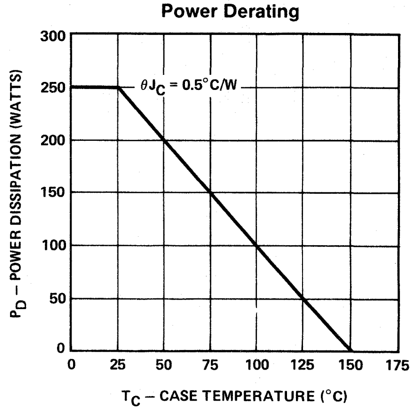
	Parameter	VNP006A	VNN006A	Units
V_{DS}	Drain-Source Voltage	500	450	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500	450	V
I_D @ T_C = 25° C	Continuous Drain Current	±20	±20	A
I_D @ T_C = 100° C	Continuous Drain Current	±12	±12	A
I_{DM}	Pulsed Drain Current[1]	±60	±60	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	250	250	W
P_D @ T_C = 100°C	Max. Power Dissipation	100	100	W
Junction to Case	Linear Derating Factor	2	2	W/° C
Junction to Ambient	Linear Derating Factor	0.034	0.034	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VNP006A	500	540		V	V_{GS} = 0, I_D = 2 mA
		VNN006A	450	480		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	3	5	V	V_{DS} = V_{GS}, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	All		20	100	nA	V_{GS} = +20V
I_{GSSR}	Gate-Body Leakage Reverse	All		−20	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.5	2	mA	V_{DS} = Max. Rating, V_{GS} = 0
				2	5	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	25	28		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		2.8	3	V	V_{GS} = 10V, I_D = 10A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.28	0.3	Ω	V_{GS} = 10V, I_D = 10A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.54	0.57	Ω	V_{GS} =10V, I_D =10A, T_C =125°C

DYNAMIC

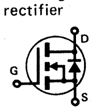
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	9			S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 10A
C_{iss}	Input Capacitance	All		4500	6000	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		500	1000	pF	
C_{rss}	Reverse Transfer Capacitance	All		100	300	pF	
$t_{d(on)}$	Turn-On Delay Time	All		35	70	ns	V_{DD} =200V, $I_D \cong$ 10A, R_g = 20Ω, R_L = 20Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		150	200	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		120	190	ns	
t_f	Fall Time	All		100	160	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			0.5	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−20	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−60	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.5		V	T_C=25°C, I_S=−18A, V_{GS} = 0
		All		−0.8		V	T_C=125°C, I_S=−18A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		600		ns	T_J =150°C, I_F = I_S, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC50–3

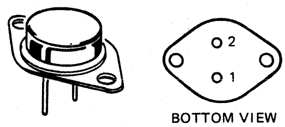
VNS008A ■ VNS009A

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VNS008A	600	1.5	T0–204AA
VNS009A	600	2	T0–204AA

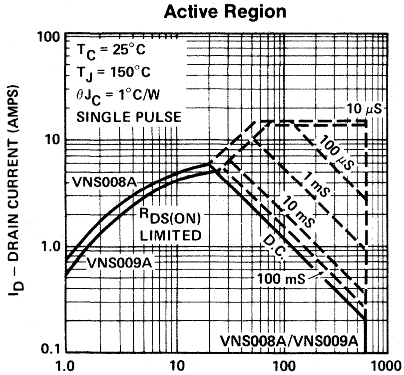
For Additional Curves
See Section 5: VNDC65

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

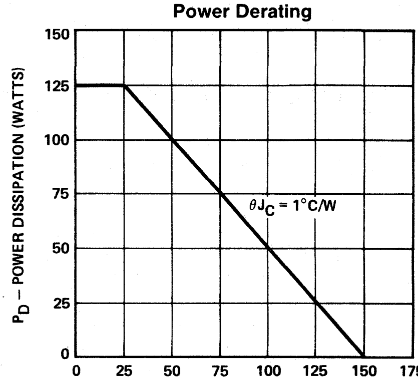
	Parameter	VNS008A	VNS009A	Units
V_{DS}	Drain-Source Voltage	600	600	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	600	600	V
I_D @ T_C = 25° C	Continuous Drain Current	±5.77	±5	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.65	±3.16	A
I_{DM}	Pulsed Drain Current[1]	±15	±14	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	W
Junction to Case	Linear Derating Factor	1	1	W/° C
Junction to Ambient	Linear Derating Factor	0.034	0.034	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VNS008A	600	640		V	V_{GS} = 0, I_D = 2 mA
		VNS009A	600	640		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	3	4	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		20	100	nA	V_{GS} = +20V, V_{DS} = 0
I_{GSSR}	Gate-Body Leakage Reverse	All		20	100	nA	V_{GS} = −20V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	All		0.5	2	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		2	5	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	5.7	8		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VNS008A		3.6	4.5	V	V_{GS} = 10V, I_D = 3A
		VNS009A		5.1	6	V	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VNS008A		1.2	1.5	Ω	V_{GS} = 10V, I_D = 3A
		VNS009A		1.7	2	Ω	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VNS008A		3	3.75	Ω	V_{GS} = 10V, I_D = 3A, T_C = 125°C
		VNS009A		4	5	Ω	V_{GS} = 10V, I_D = 3A, T_C = 125°C

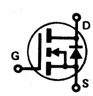
DYNAMIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3			S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 3A
C_{iss}	Input Capacitance	All		1300	1500	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		130	150	pF	
C_{rss}	Reverse Transfer Capacitance	All		40	50	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	20	ns	V_{DD} = 325V, $I_D \cong$ 2.5A, R_g = 10Ω, R_L = 130Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	25	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		80	85	ns	
t_f	Fall Time	All		45	50	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VNS008A			−5.7	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		VNS009A			−5	A	
I_{SM}	Source Current[1] (Body Diode)	VNS008A			−15	A	
		VNS009A			−14	A	
V_{SD}	Diode Forward Voltage[1]	All		−2		V	T_C = 25°C, I_S = −5.7A, V_{GS} = 0
		All		−1.6		V	T_C = 125°C, I_S = −5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		1100		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDC65

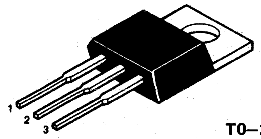
VNS008D ■ VNS009D

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VNS008D	600	1.5	T0–220AB
VNS009D	600	2	T0–220AB

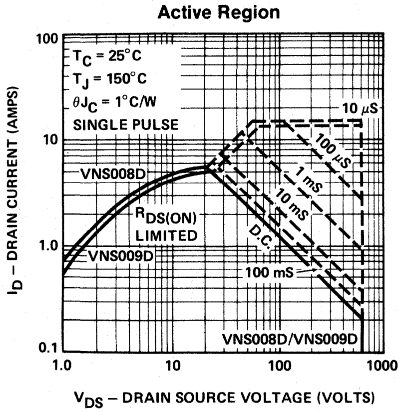
For Additional Curves
See Section 5: VNDC65

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

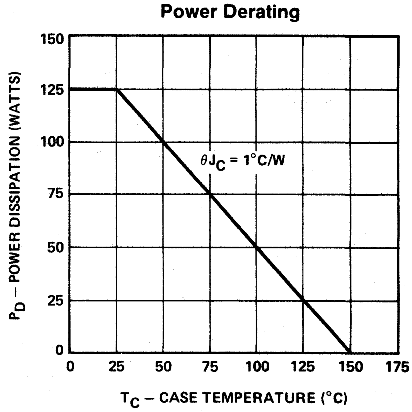
	Parameter	VNS008D	VNS009D	Units
V_{DS}	Drain-Source Voltage	600	600	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	600	600	V
I_D @ T_C = 25° C	Continuous Drain Current	±5.77	±5	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.65	±3.16	A
I_{DM}	Pulsed Drain Current[1]	±15	±14	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	W
Junction to Case	Linear Derating Factor	1	1	W/° C
Junction to Ambient	Linear Derating Factor	0.0125	0.0125	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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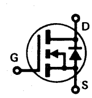
ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VNS008D	600	640		V	V_{GS} = 0, I_D = 2 mA
		VNS009D	600	640		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	3	4	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +20V, V_{DS} = 0
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −20V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	All		0.5	2	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		2	5	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	5.7	8		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VNS008D		3.6	4.5	V	V_{GS} = 10V, I_D = 3A
		VNS009D		5.1	6	V	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VNS008D		1.2	1.5	Ω	V_{GS} = 10V, I_D = 3A
		VNS009D		1.7	2	Ω	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VNS008D		3	3.75	Ω	V_{GS} = 10V, I_D = 3A, T_C = 125°C
		VNS009D		4	5	Ω	V_{GS} = 10V, I_D = 3A, T_C = 125°C
DYNAMIC							
g_{fs}	Forward Transductance[1]	All	3			S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 3A
C_{iss}	Input Capacitance	All		1300	1500	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		130	150	pF	
C_{rss}	Reverse Transfer Capacitance	All		40	50	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	20	ns	V_{DD} = 325V, $I_D \cong$ 2.5A, R_g = 10Ω, R_L = 130Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	25	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		80	85	ns	
t_f	Fall Time	All		45	50	ns	
THERMAL RESISTANCE							
R_{thJC}	Junction-to-Case	All			1	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation
BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS							
I_S	Continuous Source Current (Body Diode)	VNS008D			−5.7	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		VNS009D			−5	A	
I_{SM}	Source Current[1] (Body Diode)	All			−15	A	
V_{SD}	Diode Forward Voltage[1]	All		−2		V	T_C = 25°C, I_S = −5.7A, V_{GS} = 0
		All		−1.6		V	T_C = 125°C, I_S = −5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		600		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC65

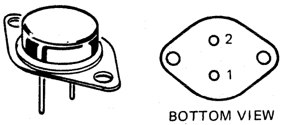
VNT008A ■ VNT009A

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VNT008A	650	1.5	T0–204AA
VNT009A	650	2	T0–204AA

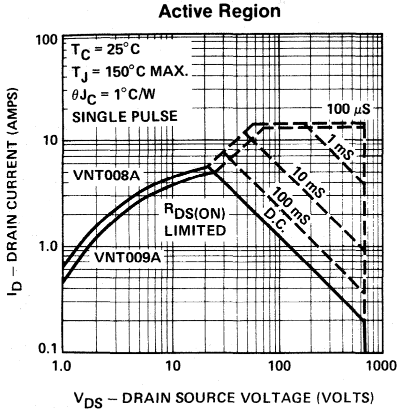
For Additional Curves
See Section 5: VNDC65

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

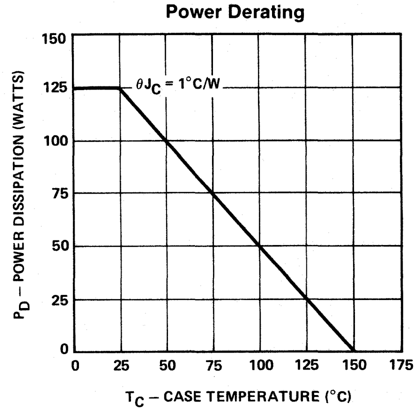
	Parameter	VNT008A	VNT009A	Units
V_{DS}	Drain-Source Voltage	650	650	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	650	650	V
I_D @ T_C = 25° C	Continuous Drain Current	±5.77	±5	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.65	±3.16	A
I_{DM}	Pulsed Drain Current[1]	±15	±14	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	W
Junction to Case	Linear Derating Factor	1	1	W/° C
Junction to Ambient	Linear Derating Factor	0.034	0.034	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VNT008A	650	660		V	V_{GS} = 0, I_D = 2 mA
		VNT009A	650	660		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	3	4	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		20	100	nA	V_{GS} = +20V
I_{GSSR}	Gate-Body Leakage Reverse	All		−20	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.5	2	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		2	5	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	5.7	8		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VNT008A		3.6	4.5	V	V_{GS} = 10V, I_D = 3A
		VNT009A		5.1	6	V	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VNT008A		1.2	1.5	Ω	V_{GS} = 10V, I_D = 3A
		VNT009A		1.7	2	Ω	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VNT008A		3	3.75	Ω	V_{GS} =10V, I_D = 3A, T_C = 125°C
		VNT009A		4	5	Ω	V_{GS} =10V, I_D = 3A, T_C = 125°C

DYNAMIC

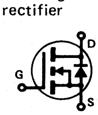
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3			S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 3A
C_{iss}	Input Capacitance	All		1300	1500	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		130	150	pF	
C_{rss}	Reverse Transfer Capacitance	All		40	50	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	20	ns	V_{DD} =325V, $I_D \cong$ 2.5A, R_g = 10Ω, R_L = 130Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	25	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		80	85	ns	
t_f	Fall Time	All		45	50	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VNT008A			−5.7	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		VNT009A			−5	A	
I_{SM}	Source Current[1] (Body Diode)	All			−15	A	
V_{SD}	Diode Forward Voltage[1]	All		−2		V	T_C=25°C, I_S=−5.7A, V_{GS} = 0
		All		−1.6		V	T_C =125°C, I_S = −5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		600		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC65

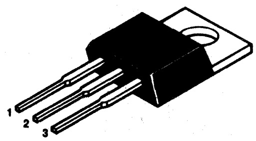
VNT008D ■ VNT009D

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VNT008D	650	1.5	T0–220AB
VNT009D	650	2	T0–220AB

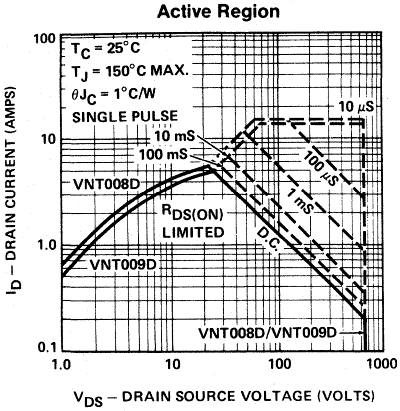
For Additional Curves
See Section 5: VNDC65

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

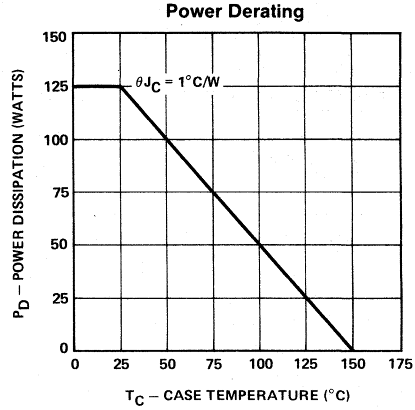
	Parameter	VNT008D	VNT009D	Units
V_{DS}	Drain-Source Voltage	650	650	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	650	650	V
I_D @ T_C = 25° C	Continuous Drain Current	±5.77	±5	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.65	±3.16	A
I_{DM}	Pulsed Drain Current[1]	±15	±14	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	W
Junction to Case	Linear Derating Factor	1	1	W/° C
Junction to Ambient	Linear Derating Factor	0.0125	0.0125	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	All	650	660		V	V_{GS} = 0, I_D = 2 mA
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	3	4	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +20V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.5	2	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		2	5	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125° C
$I_{D(on)}$	On-State Drain Current[1]	All	5.7	8		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VNT008D		3.6	4.5	V	V_{GS} = 10V, I_D = 3A
		VNT009D		5.1	6	V	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VNT008D		1.2	1.5	Ω	V_{GS} = 10V, I_D = 3A
		VNT009D		1.7	2	Ω	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VNT008D		3	3.75	Ω	V_{GS} =10V, I_D = 3A, T_C =125°C
		VNT009D		4	5	Ω	V_{GS} =10V, I_D = 3A, T_C =125°C

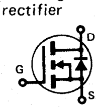
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3			S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D
C_{iss}	Input Capacitance	All		1300	1500	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		130	150	pF	
C_{rss}	Reverse Transfer Capacitance	All		40	50	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	20	ns	V_{DD} =325V, $I_D \cong$ 2.5A, R_g = 10Ω, R_L = 130Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	25	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		80	85	ns	
t_f	Fall Time	All		45	50	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1	°C/W	
R_{thJA}	Junction-to-Ambient	All			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VNT008D			−5.7	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		VNT009D			−5	A	
I_{SM}	Source Current[1] (Body Diode)	VNT008D			−15	A	
		VNT009D			−14	A	
V_{SD}	Diode Forward Voltage[1]	VNT008D		−2		V	T_C=25°C, I_S=−5.7A, V_{GS} = 0
		VNT009D		−1.6		V	T_C =125°C, I_S =−5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		600		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC65

VNT012A ■ VNS012A

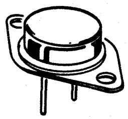
Siliconix

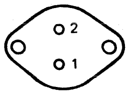
PRELIMINARY

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers





BOTTOM VIEW

PIN 1 — Gate
PIN 2 — Source
CASE — Drain

T0–204AE (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VNT012A	650	0.75	T0–204AE
VNS012A	600	0.75	T0–204AE

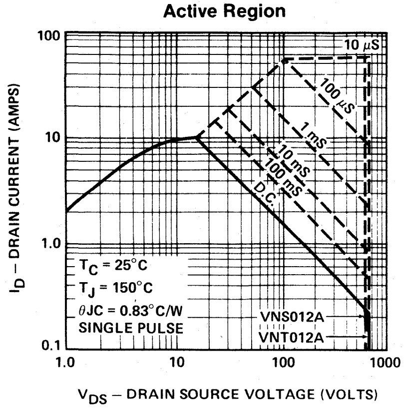
For Additional Curves
See Section 5: VNDC65–2

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

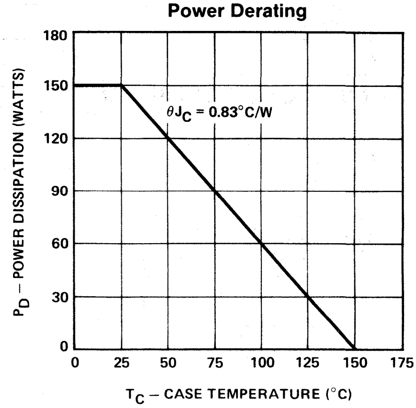
	Parameter	VNT012A	VNS012A	Units
V_{DS}	Drain-Source Voltage	650	600	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	650	600	V
I_D @ T_C = 25° C	Continuous Drain Current	±9.3	±9.3	A
I_D @ T_C = 100° C	Continuous Drain Current	±5.8	±5.8	A
I_{DM}	Pulsed Drain Current[1]	±56.7	±56.7	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	150	150	W
P_D @ T_C = 100°C	Max. Power Dissipation	60	60	W
Junction to Case	Linear Derating Factor	1.2	1.2	W/° C
Junction to Ambient	Linear Derating Factor	0.033	0.033	W/° C
T_J / Tstg	Operating and Storage Temperature Range	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300µsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VNS012A	600			V	V_{GS} = 0, I_D = 2 mA
		VNT012A	650			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		4	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.8	2	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		2	5	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	VNS012A	9.3			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		VNT012A	9.3			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VNS012A			3.75	V	V_{GS} = 10V, I_D = 5A
		VNT012A			3.75	V	V_{GS} = 10V, I_D = 5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VNS012A			0.75	Ω	V_{GS} = 10V, I_D = 5A
		VNT012A			0.75	Ω	V_{GS} = 10V, I_D = 5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VNS012A			1.6	Ω	V_{GS} = 10V, I_D = 5A, T_C = 125°C
		VNT012A			1.6	Ω	V_{GS} = 10V, I_D = 5A, T_C = 125°C

DYNAMIC

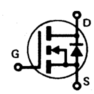
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	5			S (℧)	$V_{DS} \geqslant V_{DS(ON)}$, I_D = 5A
C_{iss}	Input Capacitance	All		2500	3600	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		600	800	pF	
C_{rss}	Reverse Transfer Capacitance	All		300	400	pF	
$t_{d(on)}$	Turn-On Delay Time	All		50	100	ns	V_{DD} = 325V, $I_D \cong$ 4.5A, R_g = 10Ω, R_L = 72Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		50	100	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		150	200	ns	
t_f	Fall Time	All		100	150	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			0.83	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−9.3	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−56	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.8		V	T_C=25°C, I_S=−9.3A, V_{GS} = 0
		All		−1.5		V	T_C =125°C, I_S=−9.3A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		800		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC65–2

VNT013A ■ VNS013A

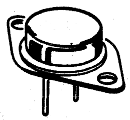
Siliconix

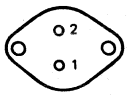
PRELIMINARY

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers





BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AE (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VNT013A	650	0.55	T0–204AE
VNS013A	600	0.55	T0–204AE

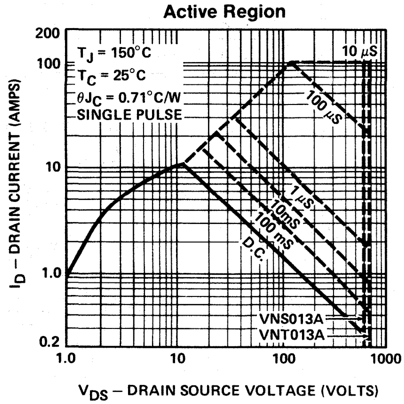
For Additional Curves
See Section 5: VNDC65–3

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

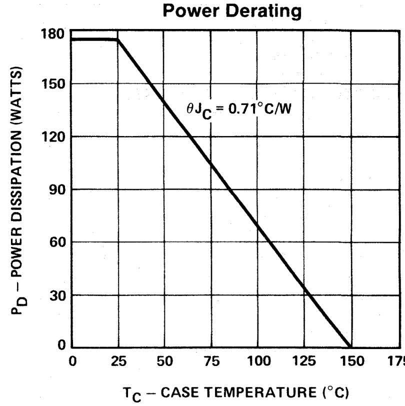
	Parameter	VNT013A	VNS013A	Units
V_{DS}	Drain-Source Voltage	650	600	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	650	600	V
I_D @ T_C = 25° C	Continuous Drain Current	11.7	11.7	A
I_D @ T_C = 100° C	Continuous Drain Current	7.4	7.4	A
I_{DM}	Pulsed Drain Current[1]	112	112	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	176	176	W
P_D @ T_C = 100° C	Max. Power Dissipation	70	70	W
Junction to Case	Linear Derating Factor	1.40	1.40	W/° C
Junction to Ambient	Linear Derating Factor	0.033	0.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 Pulse Test: Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VNT013A	650			V	V_{GS} = 0, I_D = 2 mA
		VNS013A	600			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2		5	V	$V_{DS} = V_{GS}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All			2	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All			4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	VNT013A	11.7			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
		VNS013A	11.7			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VNT013A			5	V	V_{GS} = 10V, I_D = 10A
		VNS013A			5	V	V_{GS} = 10V, I_D = 10A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VNT013A			0.5	Ω	V_{GS} = 10V, I_D = 10A
		VNS013A			0.5	Ω	V_{GS} = 10V, I_D = 10A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VNT013A			1.2	Ω	V_{GS} =10V, I_D =10A, T_C =125°C
		VNS013A			1.2	Ω	V_{GS} =10V, I_D =10A, T_C =125°C

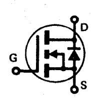
DYNAMIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	9			S (℧)	$V_{DS} \geq 2V_{DS}$, I_D = 10A
C_{iss}	Input Capacitance	All		4500	7000	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		500	1400	pF	
C_{rss}	Reverse Transfer Capacitance	All		100	600	pF	
$t_{d(on)}$	Turn-On Delay Time	All		50	100	ns	V_{DD} = 325V $I_D \cong$ 6A, R_g = 2.5Ω, R_L = 54Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		50	100	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		150	200	ns	
t_f	Fall Time	All		100	150	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			0.71	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VNT013A			–11.7	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		VNS013A			–11.7	A	
I_{SM}	Source Current[1] (Body Diode)	VNT013A			–112	A	
		VNS013A			–112	A	
V_{SD}	Diode Forward Voltage[1]	All		–1.8		V	T_C=25°C, I_S=–11.7A, V_{GS} = 0
		All		–1.5		V	T_C=125°C, I_S=–11.7A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		800		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC65–3

VP0300B

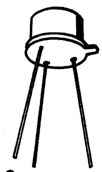
Siliconix

P-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PIN 1 — Source
PIN 2 — Gate
PIN 3 & CASE — Drain



T0–205AD (T0–39)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VP0300B	–30	2.5	T0–205AD

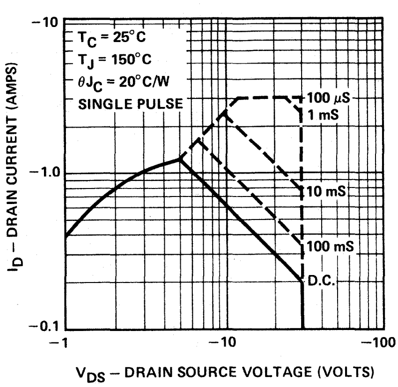
For Additional Curves
See Section 5: VPMH03

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

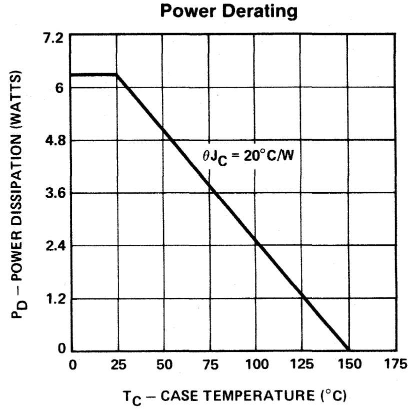
	Parameter	VP0300B	Units
V_{DS}	Drain-Source Voltage	–30	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	–30	V
I_D @ T_C = 25° C	Continuous Drain Current	±1.25	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.79	A
I_{DM}	Pulsed Drain Current[1]	±3	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	6.25	W
P_D @ T_C = 100°C	Max. Power Dissipation	2.5	W
Junction to Case	Linear Derating Factor	0.05	W/° C
Junction to Ambient	Linear Derating Factor	0.006	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 Pulse Test: Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VP0300B	−30	−45		V	V_{GS} = 0, I_D = −10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	VP0300B	−2	−3.4	−4.5	V	$V_{DS} = V_{GS}$, I_D = −1 mA
I_{GSSF}	Gate-Body Leakage Forward	VP0300B		−1	−100	nA	V_{GS} = −30V V_{DS} = 0
I_{GSSR}	Gate-Body Leakage Reverse	VP0300B		1	100	nA	V_{GS} = +30V V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	VP0300B		−1	−10	μA	V_{DS} = −25V, V_{GS} = 0
		VP0300B		−50	−500	μA	V_{DS} = −25V, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	VP0300B	−1.5	−1.7		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = −12V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VP0300B		−2.2	−2.5	V	V_{GS} = −12V, I_D = −1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VP0300B		2.2	2.5	Ω	V_{GS} = −12V, I_D = −1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VP0300B		3.2	3.63	Ω	V_{GS}=−12V, I_D=−1A, T_C=125°C

DYNAMIC

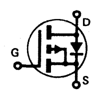
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	VP0300B	200	300		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = −0.5A
C_{iss}	Input Capacitance	VP0300B		125	150	pF	V_{GS} = 0, V_{DS} = −15V, f = 1 MHz
C_{oss}	Output Capacitance	VP0300B		92	100	pF	
C_{rss}	Reverse Transfer Capacitance	VP0300B		25	60	pF	
t_{ON}	Turn-On Time	VP0300B		20	30	ns	V_{DD} = −25V, $I_D \cong$ −1A, R_g = 25Ω, R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	VP0300B		20	30	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	VP0300B			20	°C/W	
R_{thJA}	Junction-to-Ambient	VP0300B			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VP0300B			1.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	VP0300B			3	A	
V_{SD}	Diode Forward Voltage[1]	VP0300B		1.2		V	T_C=25°C, I_S=1.5A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VPMH03

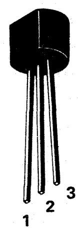
VP0300L

Siliconix

P-Channel Enhancement Mode Switch
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Totem–Pole Drives
- Complementary Pairs



PIN 1 – Source
PIN 2 – Gate
PIN 3 – Drain

T0–92

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VP0300L	–30	2.5	T0–92

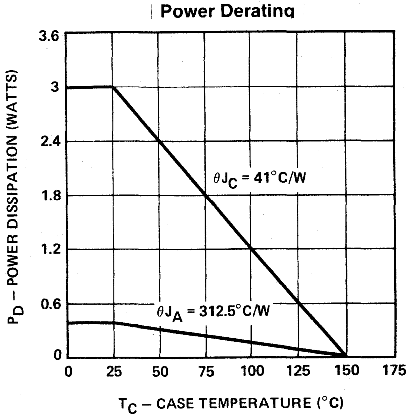
For Additional Curves
See Section 5: VPMH03

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	VP0300L	Units
V_{DS}	Drain-Source Voltage	–30	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	–30	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.32	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.2	A
I_{DM}	Pulsed Drain Current[1]	±0.87	A
V_{GS}	Gate-Source Voltage	±40	V
P_D	Max Continuous Power Dissipation	0.4	W
P_D	Max Pulse[2] Power Dissipation	3	W
Junction to Case	Linear Derating Factor	0.024	W/° C
Junction to Ambient	Linear Derating Factor	0.0032	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VP0300L	−30	−45		V	V_{GS} = 0 I_D = −10 µA
$V_{GS(th)}$	Gate-Threshold Voltage	VP0300L	−2	−3.4	−4.5	V	V_{DS} = V_{GS}, I_D = −1 mA
I_{GSSF}	Gate-Body Leakage Forward	VP0300L		−1	−100	nA	V_{GS} = −30V, V_{DS} = 0
I_{GSSR}	Gate-Body Leakage Reverse	VP0300L		+1	+100	nA	V_{GS} = +30V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	VP0300L		−1	−10	µA	V_{DS} = −25V , V_{GS} = 0
		VP0300L		−50	−500	µA	V_{DS} = −25V , V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	VP0300L	−1.5	−1.7		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = −12V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VP0300L		−2.2	−2.5	V	V_{GS} = −12V , I_D = −1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VP0300L		2.2	2.5	Ω	V_{GS} = −12V , I_D = −1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VP0300L		3.2	3.63	Ω	V_{GS}=−12V, I_D=−1A, T_C=125°C

DYNAMIC

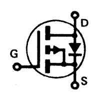
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	VP0300L	200	300		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = −0.5A
C_{iss}	Input Capacitance	VP0300L		125	150	pF	V_{GS} = 0 , V_{DS} = −15V f = 1 MHz
C_{oss}	Output Capacitance	VP0300L		92	100	pF	
C_{rss}	Reverse Transfer Capacitance	VP0300L		25	60	pF	
t_{ON}	Turn-On Time	VP0300L		20	30	ns	V_{DD} = −25V, $I_D \cong$ −1A R_g = 25Ω , R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	VP0300L		20	30	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	VP0300L		34	41	°C/W	
R_{thJA}	Junction-to-Ambient	VP0300L			312.5	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VP0300L			0.32	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	VP0300L			0.87	A	
V_{SD}	Diode Forward Voltage[1]	VP0300L		1.2		V	T_C=25°C, I_S=0.32A, V_{GS} = 0



1 Pulse Test: Pulse Width ⩽ 300 µsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VPMH03

VP0300M

Siliconix

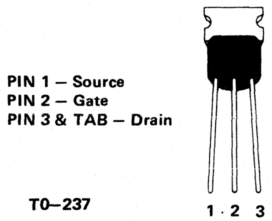
P-Channel Enhancement Mode Switch
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VP0300M	−30	2.5	TO−237

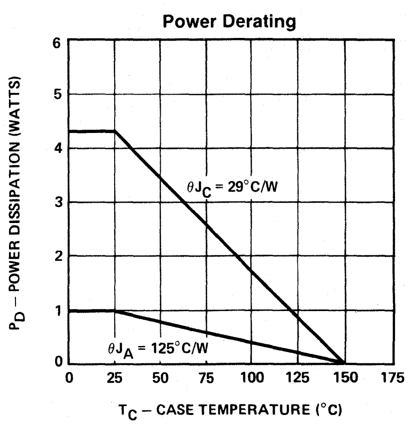


For Additional Curves
See Section 5: VPMH03

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	VP0300M	Units
V_{DS}	Drain-Source Voltage	−30	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	−30	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.5	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.32	A
I_{DM}	Pulsed Drain Current[1]	±3	A
V_{GS}	Gate-Source Voltage	±40	V
P_D	Max Continuous Power Dissipation	1	W
P_D	Max Pulse[2] Power Dissipation	4.3	W
Junction to Case	Linear Derating Factor	0.034	W/° C
Junction to Ambient	Linear Derating Factor	0.008	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 1 Sec Continuous Power Single Pulse



ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VP0300M	−30	−45		V	$V_{GS} = 0$, $I_D = -10\ \mu A$
$V_{GS(th)}$	Gate-Threshold Voltage	VP0300M	−2	−3.4	−4.5	V	$V_{DS} = V_{GS}$, $I_D = -1$ mA
I_{GSSF}	Gate-Body Leakage Forward	VP0300M		−1	−100	nA	$V_{GS} = -30V$, $V_{DS} = 0$
I_{GSSR}	Gate-Body Leakage Reverse	VP0300M		1	100	nA	$V_{GS} = +30V$, $V_{DS} = 0$
I_{DSS}	Zero Gate Voltage Drain Current	VP0300M		−1	−10	µA	$V_{DS} = -25V$, $V_{GS} = 0$
		VP0300M		−50	−500	µA	$V_{DS} = -25V$, $V_{GS} = 0$, $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	VP0300M	−1.5	−1.7		A	$V_{DS} \geqslant 2V_{DS(ON)}$, $V_{GS} = -12V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	VP0300M		−2.2	−2.5	V	$V_{GS} = -12V$, $I_D = -1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VP0300M		2.2	2.5	Ω	$V_{GS} = -12V$, $I_D = -1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VP0300M		3.2	3.63	Ω	$V_{GS} = -12V$, $I_D = -1A$, $T_C = 125°C$

DYNAMIC

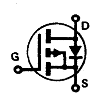
Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	VP0300M	200	300		mS(℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, $I_D = -0.5A$
C_{iss}	Input Capacitance	VP0300M		125	150	pF	$V_{GS} = 0$, $V_{DS} = -15V$, f = 1 MHz
C_{oss}	Output Capacitance	VP0300M		92	100	pF	
C_{rss}	Reverse Transfer Capacitance	VP0300M		25	60	pF	
$t_{d(on)}$	Turn-On Delay Time	VP0300M		20	30	ns	$V_{DD} = -25V$, $I_D \cong -1A$, $R_g = 25\Omega$, $R_L = 23\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
$t_{d(off)}$	Turn-Off Delay Time	VP0300M		20	30	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	VP0300M		24	29	°C/W	
R_{thJA}	Junction-to-Ambient	VP0300M			125	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VP0300M			0.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	VP0300M			3	A	
V_{SD}	Diode Forward Voltage[1]	VP0300M		1.2		V	$T_C = 25°C$, $I_S = 0.5A$, $V_{GS} = 0$



1 **Pulse Test:** Pulse Width ⩽ 300 µsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VPMH03

VP1008B ■ VP0808B

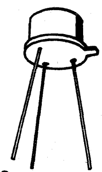
Siliconix

P-Channel Enhancement Mode Switch
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers
- Complementary Pairs

PIN 1 – Source
PIN 2 – Gate
PIN 3 & CASE – Drain



T0–205AF(T0–39)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VP1008B	–100	5	T0–205AF
VP0808B	–80	5	T0–205AF

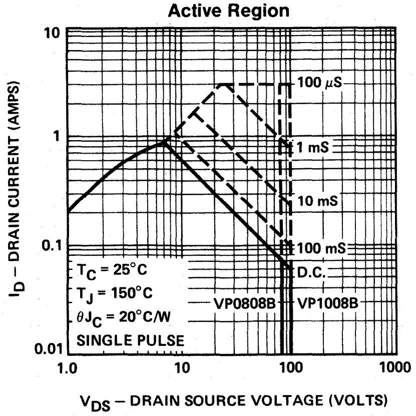
For Additional Curves
See Section 5: VPMH10

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

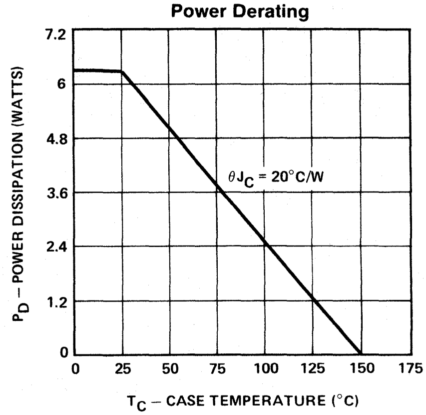
	Parameter	VP1008B	VP0808B	Units
V_{DS}	Drain-Source Voltage	–100	–80	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	–100	–80	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.88	±0.88	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.53	±0.53	A
I_{DM}	Pulsed Drain Current[1]	±3	±3	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	6.25	6.25	W
P_D @ T_C = 100°C	Max. Power Dissipation	2.5	2.5	W
Junction to Case	Linear Derating Factor	0.05	0.05	W/° C
Junction to Ambient	Linear Derating Factor	0.006	0.006	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VP1008B	−100	−120		V	V_{GS} = 0, I_D = −10 μA
		VP0808B	−80	−90		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	−2	−2.75	−4.5	V	$V_{DS} = V_{GS}$, I_D = −1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		−10	−100	nA	V_{GS} = −15V, V_{DS} = 0
I_{GSSR}	Gate-Body Leakage Reverse	All		10	100	nA	V_{GS} = +15V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	All		−0.5	−10	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		−25	−500	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	−1.1	−1.4		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = −10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		−4.2	−5	V	V_{GS} = −10V, I_D = −1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		4.2	5	Ω	V_{GS} = −10V, I_D = −1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		6.7	8	Ω	V_{GS}=−10V, I_D=−1A, T_C=125°C

DYNAMIC

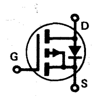
g_{fs}	Forward Transductance[1]	All	200	300		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = −0.5A
C_{iss}	Input Capacitance	All		125	150	pF	V_{GS} = 0, V_{DS} = −25V, f = 1 MHz
C_{oss}	Output Capacitance	All		47	60	pF	
C_{rss}	Reverse Transfer Capacitance	All		15	60	pF	
$t_{d(on)}$	Turn-On Delay Time	All		4.5	10	ns	V_{DD} = −25V, $I_D \cong$ −0.5A, R_g = 25Ω, R_L = 47Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		7.5	10	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		5	10	ns	
t_f	Fall Time	All		7	10	ns	

THERMAL RESISTANCE

R_{thJC}	Junction-to-Case	All			20	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)	All			0.9	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			3	A	
V_{SD}	Diode Forward Voltage[1]	All		1.2		V	T_C = 25°C, I_S = 0.9A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VPMH10

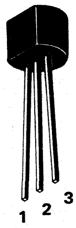
VP1008L ■ VP0808L

Siliconix

P-Channel Enhancement Mode Switch
MOSPOWER

APPLICATIONS
- Switching Regulators
- Converters
- Totem—Pole Drives
- Complementary Pairs

PIN 1 — Source
PIN 2 — Gate
PIN 3 — Drain



T0–92

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VP1008L	–100	5	T0–92
VP0808L	–80	5	T0–92

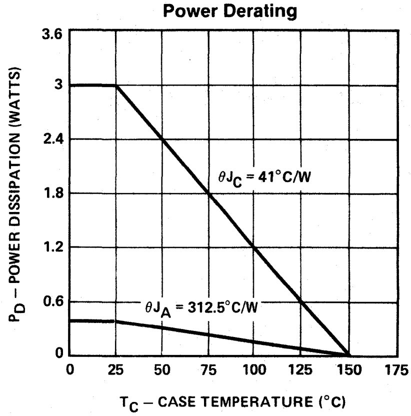
For Additional Curves
See Section 5: VPMH10

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	VP1008L	VP0808L	Units
V_{DS}	Drain-Source Voltage	–100	–80	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	–100	–80	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.21	±0.21	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.13	±0.13	A
I_{DM}	Pulsed Drain Current[1]	±3	±3	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D	Max Continuous Power Dissipation	0.4	0.4	W
P_D	Max Pulse[2] Power Dissipation	3	3	W
Junction to Case	Linear Derating Factor	0.024	0.024	W/° C
Junction to Ambient	Linear Derating Factor	0.003	0.003	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VP1008L	−100	−120		V	V_{GS} = 0 I_D = −10 μA
		VP0808L	−80	−90		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	−2	−2.75	−4.5	V	V_{DS} = V_{GS}, I_D = −1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		−10	−100	nA	V_{GS} = −30V, V_{DS} = 0
I_{GSSR}	Gate-Body Leakage Reverse	All		10	100	nA	V_{GS} = +30V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	All		−0.5	−10	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All		−25	−500	μA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	−1.1	−1.4		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		−4.2	−5	V	V_{GS} = −10V , I_D = −1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		4.2	5	Ω	V_{GS} = −10V , I_D = −1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		6.7	8	Ω	V_{GS}=−10V, I_D=−1A, T_C=125°C

DYNAMIC

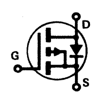
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	200	300		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = −0.5A
C_{iss}	Input Capacitance	All		125	150	pF	V_{GS} = 0 , V_{DS} = −25V f = 1 MHz
C_{oss}	Output Capacitance	All		47	60	pF	
C_{rss}	Reverse Transfer Capacitance	All		15	25	pF	
$t_{d(on)}$	Turn-On Delay Time	All		4.5	10	ns	V_{DD} = −25V, $I_D \cong$ −0.5A R_g = 25Ω , R_L = 45Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		7.5	15	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		5	10	ns	
t_f	Fall Time	All		7	15	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All		34	41	°C/W	
R_{thJA}	Junction-to-Ambient	All			312.5	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			0.21	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			3	A	
V_{SD}	Diode Forward Voltage[1]	All		1.2		V	T_C=25°C, I_S=0.21A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VPMH10

VP1008M ■ VP0808M

Siliconix

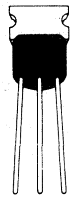
P-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PIN 1 — Source
PIN 2 — Gate
PIN 3 & TAB — Drain

T0—237



PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VP1008M	−100	5	T0—237
VP0808M	−80	5	T0—237

For Additional Curves
See Section 5: VPMH10

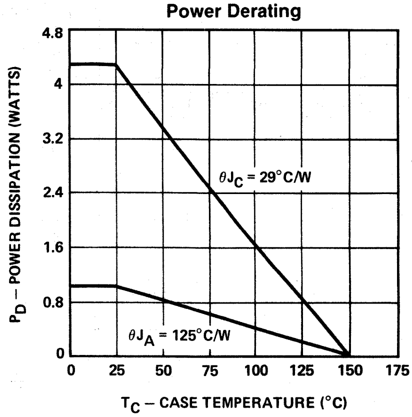
1

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	VP1008M	VP0808M	Units
V_{DS}	Drain-Source Voltage	−100	−80	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	−100	−80	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.33	±0.33	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.21	±0.21	A
I_{DM}	Pulsed Drain Current[1]	±3	±3	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D	Max Continuous Power Dissipation	1	1	W
P_D	Max Pulse[2] Power Dissipation	4.3	4.3	W
Junction to Case	Linear Derating Factor	0.034	0.034	W/° C
Junction to Ambient	Linear Derating Factor	0.008	0.008	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VP1008M	−100	−120		V	V_{GS} = 0, I_D = −10 μA
		VP0808M	−80	−90		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	−2	−2.75	−4.5	V	$V_{DS} = V_{GS}$, I_D = −1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		−10	−100	nA	V_{GS} = −30V, V_{DS} = 0
I_{GSSR}	Gate-Body Leakage Reverse	All		+10	+100	nA	V_{GS} = +30V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	All		−0.5	−10	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All		−25	−500	μA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	−1.1	−1.4		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = −10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		−4.2	−5	V	V_{GS} = −10V, I_D = −1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		4.2	5	Ω	V_{GS} = −10V, I_D = −1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		6.7	8	Ω	V_{GS}=−10V, I_D=−1A, T_C=125°C

DYNAMIC

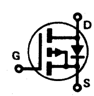
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	200	300		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = −0.5A
C_{iss}	Input Capacitance	All		125	150	pF	V_{GS} = 0, V_{DS} = −25V, f = 1 MHz
C_{oss}	Output Capacitance	All		47	60	pF	
C_{rss}	Reverse Transfer Capacitance	All		15	25	pF	
$t_{d(on)}$	Turn-On Delay Time	All		4.5	10	ns	V_{DD} = −25V, $I_D \cong$ −0.5A, R_g = 25Ω, R_L = 45Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		7.5	15	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		5	10	ns	
t_f	Fall Time	All		7	15	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All		24	29	°C/W	
R_{thJA}	Junction-to-Ambient	All			125	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			0.33	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			3	A	
V_{SD}	Diode Forward Voltage[1]	All		1.2		V	T_C=25°C, I_S=0.33A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VPMH10

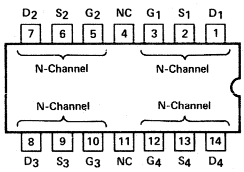
VQ1000P ■ VQ1000J

Siliconix

N-Channel Enhancement Mode
Quad MOSPOWER Array

APPLICATIONS

- High Frequency Inverters
- Line Drivers
- Small Motor Drives
- CMOS, TTL Direct Interfaces
- Analog Switching



TOP VIEW
14-PIN DIP

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VQ1000P	60	5.5	14–PIN DIP –SIDE BRAZE
VQ1000J	60	5.5	14–PIN DIP –PLASTIC

For Additional Curves
See Section 5: VNDF06

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	VQ1000P	VQ1000J	Units
V_{DS}	Drain-Source Voltage	60	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	60	V
I_D	Continuous Drain Current[1]	±0.225	±0.225	A
I_{DM}	Pulsed Drain Current[2]	±1	±1	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_A = 25°C	Max. Power Dissipation—Single	1.3	1.3	W
	Max. Power Dissipation—Quad	2	2	W
θ_{JA} Junction to Ambient (Free Air)	Linear Derating Factor—Single	10.4	10.4	W/° C
	Linear Derating Factor—Quad	16	16	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 Single Device Along. Package Limited
2 Pulse Test: Pulsewidth ⩽ 300 μsec, Duty Cycle ⩽ 1%

1

POWER RATINGS (T_A = 25°C)

Test	Single Transistor	All Four Transistors	Unit
Total Power Dissipation	1.3	2	W
Linear Derating Factor	10.4	16	mW/°C
Thermal Resistance	96.2	62.5	°C/W
Thermal Coupling Factor (K)–Q_1–Q_4 or Q_2–Q_3	60		%
Thermal Coupling Factor (K)–Q_1–Q_2–Q_3–Q_4 Q_1–Q_3 or Q_2–Q_4	50		%

THERMAL COUPLING AND EFFECTIVE THERMAL RESISTANCE

In multiple chip devices, coupling of heat between die occurs. The junction temperature can be calculated as follows:

(1) $\Delta T_{J1} = R_{\theta 1}\, P_{D1} + R_{\theta 2}\, K_{\theta}\, P_{D2} = R_{\theta 3}\, K_{\theta 3}\, P_{D3} + R_{\theta 4}\, K_{\theta 4}\, P_{D4}$

Where ΔT_{J1} is the change in junction temperature of die $R_{\theta 1-4}$ is the thermal resistance of die 1–4; P_{D1-4} is the power dissipated in die 1–4 and $K_{\theta 2-4}$ is the thermal coupling between die 1 and 2–4.

An effective package thermal resistance can be defined as follows:

(2) $R_{\theta(FF)} = \Delta T_{J1}/P_{DT}$

Where P_{DT} is the total package power dissipation.

Assuming equal thermal resistance for each die, equation (1) simplifies to:

(3) $\Delta T_{J1} = R_{\theta 1}\, (P_{D1} + K_{\theta 2}\, P_{D2} + K_{\theta 3}\, P_{D3} + K_{\theta 4}\, P_{D4})$

For the conditions where $P_{D1} = P_{D2} = P_{D3} = P_{D4}$; $P_{DT} = 4P_D$ Equation (3) can be further simplified and by substituting into equation (2) results in:

(4) $R_{\theta(EFF)} = R_{\theta 1}\, (1 + K_{\theta 2} + K_{\theta 3} + K_{\theta 4})/4$

Values for the coupling factors when the ambient is used as a reference are given in the table above. If significant power is to be dissipated in two die, die at the opposite ends of the package should be used so that lowest possible junction temperature will result.

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	All	60	80		V	$V_{GS} = 0$ $I_D = 100\ \mu A$
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.8	2.5	V	$V_{DS} = V_{GS}$, $I_D = 1$ mA
I_{GSSF}	Gate-Body Leakage Forward	All		5 25	100 500	nA	$V_{GS} = +10V$, $V_{DS} = 0$ $V_{GS} = +10V$, $V_{DS} = 0$, @$T_A = 125°C$
I_{GSSR}	Gate-Body Leakage Reverse	All		−5	−100	nA	$V_{GS} = -10V$, $V_{DS} = 0$
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	10	μA	V_{DS} = Max. Rating, $V_{GS} = 0$
		All		5	500	μA	V_{DS} = Max. Rating, $V_{GS} = 0$ $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	All	0.2	1		A	$V_{DS} \geqslant 2V_{DS(ON)}$, $V_{GS} = 5V$
		All	0.5	1.5		A	$V_{DS} \geqslant 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1	1.5	V	$V_{GS} = 5V$, $I_D = 0.2A$
		All		1.1	1.65	V	$V_{GS} = 10V$, $I_D = 0.3A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		5	7.5	Ω	$V_{GS} = 5V$, $I_D = 0.2A$
		All		3.7	5.5	Ω	$V_{GS} = 10V$, $I_D = 0.3A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		5	7.6	Ω	$V_{GS} = 10V$, $I_D = 0.3A$, $T_C = 125°C$

DYNAMIC

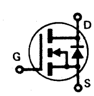
Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	100	200		mS (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, $I_D = 0.5A$
C_{iss}	Input Capacitance	All		30	60	pF	$V_{GS} = 0$, $V_{DS} = 25V$ f = 1 MHz
C_{oss}	Output Capacitance	All		14	25	pF	
C_{rss}	Reverse Transfer Capacitance	All		2	5	pF	
t_{ON}	Turn—On Time	All		6	10	ns	$V_{DD} = 15V$, $I_D \cong 0.6A$ $R_g = 25\Omega$, $R_L = 23\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn—Off Time	All		6	10	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All		32	38	°C/W	Single Channel
R_{thJA}	Junction-to-Ambient	All			96	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−0.225	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−1	A	
V_{SD}	Diode Forward Voltage[1]	All		−0.85		V	$T_C = 25°C$, $I_S = -0.5A$, $V_{GS} = 0$



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDF06

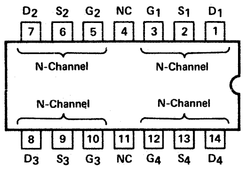
VQ1001P ■ VQ1001J

Siliconix

N-Channel Enhancement Mode
Quad MOSPOWER Array

APPLICATIONS

- High Frequency Inverters
- Line Drivers
- Small Motor Drives
- CMOS, TTL Direct Interfaces
- Analog Switching



TOP VIEW
14-PIN DIP

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VQ1001P	30	1	14—PIN DIP —SIDE BRAZE
VQ1001J	30	1	14—PIN DIP —PLASTIC

For Additional Curves
See Section 5: VNMH03

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	VQ1001P	VQ1001J	Units
V_{DS}	Drain-Source Voltage	30	30	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	30	30	V
I_D	Continuous Drain Current[1]	±0.85	±0.85	A
I_{DM}	Pulsed Drain Current[2]	±3	±3	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_A = 25°C	Max. Power Dissipation—Single	1.3	1.3	W
	Max. Power Dissipation—Quad	2	2	W
θ_{JA} Junction Ambient (Free Air)	Linear Derating Factor—Single	10.4	10.4	W/° C
	Linear Derating Factor—Quad	16	16	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 Single Device Alone, Package Limited
2 Pulse Test: Pulsewidth ⩽ 300 μsec, Duty Cycle ⩽ 1%

POWER RATINGS (T_A = 25°C)

Test	Single Transistor	All Four Transistors	Unit
Total Power Dissipation	1.3	2	W
Linear Derating Factor	10.4	16	mW/°C
Thermal Resistance	96.2	62.5	°C/W
Thermal Coupling Factor (K)—Q_1—Q_4 or Q_2—Q_3	60		%
Thermal Coupling Factor (K)—Q_1—Q_2—Q_3—Q_4 Q_1—Q_3 or Q_2—Q_4	50		%

THERMAL COUPLING AND EFFECTIVE THERMAL RESISTANCE

In multiple chip devices, coupling of heat between die occurs. The junction temperature can be calculated as follows:

(1) $\Delta T_{J1}=R_{\theta 1}\ P_{D1}+R_{\theta 2}\ K_{\theta}\ P_{D2}=R_{\theta 3}\ K_{\theta 3}\ P_{D3}+R_{\theta 4}\ K_{\theta 4}\ P_{D4}$

Where ΔT_{J1} is the change in junction temperature of die $R_{\theta 1-4}$ is the thermal resistance of die 1—4; P_{D1-4} is the power dissipated in die 1—4 and $K_{\theta 2-4}$ is the thermal coupling between die 1 and 2—4.

An effective package thermal resistance can be defined as follows:

(2) $R_{\theta(FF)} = \Delta T_{J1}/P_{DT}$

Where P_{DT} is the total package power dissipation.

Assuming equal thermal resistance for each die, equation (1) simplifies to:

(3) $\Delta T_{J1} = R_{\theta 1}\ (P_{D1} + K_{\theta 2}\ P_{D2} + K_{\theta 3}\ P_{D3} + K_{\theta 4}\ P_{D4})$

For the conditions where $P_{D1} = P_{D2} = P_{D3} = P_{D4}$; $P_{DT} = 4P_D$ Equation (3) can be further simplified and by substituting into equation (2) results in:

(4) $R_{\theta(EFF)} = R_{\theta 1}\ (1 + K_{\theta 2} + K_{\theta 3} + K_{\theta 4})/4$

Values for the coupling factors when the ambient is used as a reference are given in the table above. If significant power is to be dissipated in two die, die at the opposite ends of the package should be used so that lowest possible junction temperature will result.

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	All	30	40		V	V_{GS} = 0 I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.5	2.5	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1 5	100 500	nA	V_{GS} = +15V, V_{DS} = 0 V_{GS}=+15V, V_{DS} = 0, @T_A=125°C
I_{GSSR}	Gate-Body Leakage Reverse	All		–1	–100	nA	V_{GS} = –15V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	All		1	10	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All		50	500	μA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	2	3.2		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 12V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		0.25	0.35	V	V_{GS} = 5V , I_D = 0.2A
		All		0.7	1	V	V_{GS} = 12V , I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		1.25	1.75	Ω	V_{GS} = 5V , I_D = 0.2A
		All		0.7	1	Ω	V_{GS} = 12V , I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.98	1.4	Ω	V_{GS} = 12V, I_D = 1A , T_C = 125°C

DYNAMIC

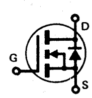
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	200	500		mS(℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		85	110	pF	V_{GS} = 0 , V_{DS} = 15V f = 1 MHz
C_{oss}	Output Capacitance	All		80	110	pF	
C_{rss}	Reverse Transfer Capacitance	All		18	35	pF	
t_{ON}	Turn–On Time	All			30	ns	V_{DD} = 15V , $I_D \cong$ 0.6A R_g = 25Ω , R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn–Off Time	All			30	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All		32	38	°C/W	Single Channel
R_{thJA}	Junction-to-Ambient	All			96.2	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			–0.85	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			–3	A	
V_{SD}	Diode Forward Voltage[1]	All		–0.9		V	T_C=25°C, I_S=–0.5A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMH03

VQ1004P ■ VQ1004J ■ VQ1006P ■ VQ1006J

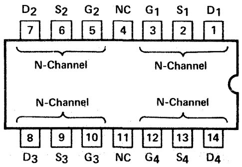
Siliconix

N-Channel Enhancement Mode

Quad MOSPOWER Array

APPLICATIONS

- High Frequency Inverters
- Line Drivers
- Small Motor Drives
- CMOS, TTL Direct Interfaces
- Analog Switching



TOP VIEW
14-PIN DIP

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VQ1004P	60	3.5	14—PIN DIP —SIDE BRAZE
VQ1004J	60	3.5	14—PIN DIP —PLASTIC
VQ1006P	90	4.5	14—PIN DIP —SIDE BRAZE
VQ1006J	90	4.5	14—PIN DIP —PLASTIC

For Additional Curves
See Section 5: VNMA06 (VQ1004J,P)
VNMA09 (VQ1006J,P)

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	VQ1004P	VQ1004J	VQ1006P	VQ1006J	Units
V_{DS}	Drain-Source Voltage	60	60	90	90	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	60	90	90	V
I_D	Continuous Drain Current[1]	±0.46	±0.46	±0.40	±0.40	A
I_{DM}	Pulsed Drain Current[2]	±2	±2	±2	±2	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_A = 25°C	Max. Power Dissipation—Single	1.3	1.3	1.3	1.3	W
	Max. Power Dissipation—Quad	2	2	2	2	W
θ_{JA} Junction Ambient (Free Air)	Linear Derating Factor—Single	10.4	10.4	10.4	10.4	W/° C
	Linear Derating Factor—Quad	16	16	16	16	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	−55 To +150	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 Single Device Alone. Package Limited
2 Pulse Width: Pulsewidth ⩽ 300 μsec, Duty Cycle ⩽ 1%

POWER RATINGS (T_A = 25°C)

Test	Single Transistor	All Four Transistors	Unit
Total Power Dissipation	1.3	2	W
Linear Derating Factor	10.4	16	mW/°C
Thermal Resistance	96.2	62.5	°C/W
Thermal Coupling Factor (K)—Q_1—Q_4 or Q_2—Q_3	60		%
Thermal Coupling Factor (K)—Q_1—Q_2—Q_3—Q_4 Q_1—Q_3 or Q_2—Q_4	50		%

THERMAL COUPLING AND EFFECTIVE THERMAL RESISTANCE

In multiple chip devices, coupling of heat between die occurs. The junction temperature can be calculated as follows:

(1) $\Delta T_{J1} = R_{\theta 1} P_{D1} + R_{\theta 2} K_{\theta} P_{D2} = R_{\theta 3} K_{\theta 3} P_{D3} + R_{\theta 4} K_{\theta 4} P_{D4}$

Where ΔT_{J1} is the change in junction temperature of die $R_{\theta 1-4}$ is the thermal resistance of die 1—4; P_{D1-4} is the power dissipated in die 1—4 and $K_{\theta 2-4}$ is the thermal coupling between die 1 and 2—4.

An effective package thermal resistance can be defined as follows:

(2) $R_{\theta(FF)} = \Delta T_{J1}/P_{DT}$

Where P_{DT} is the total package power dissipation.

Assuming equal thermal resistance for each die, equation (1) simplifies to:

(3) $\Delta T_{J1} = R_{\theta 1} (P_{D1} + K_{\theta 2} P_{D2} + K_{\theta 3} P_{D3} + K_{\theta 4} P_{D4})$

For the conditions where $P_{D1} = P_{D2} = P_{D3} = P_{D4}$; $P_{DT} = 4P_D$ Equation (3) can be further simplified and by substituting into equation (2) results in:

(4) $R_{\theta(EFF)} = R_{\theta 1} (1 + K_{\theta 2} + K_{\theta 3} + K_{\theta 4})/4$

Values for the coupling factors when the ambient is used as a reference are given in the table above. If significant power is to be dissipated in two die, die at the opposite ends of the package should be used so that lowest possible junction temperature will result.

1

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VQ1004P,J	60	80		V	V_{GS} = 0 I_D = 10 μA
		VQ1006P,J	90	105		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.5	2.5	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1 5	100 500	nA	V_{GS} = +15V, V_{DS} = 0 V_{GS}=+15V, V_{DS} = 0, T_A=125°C
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −15V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	All		0.5	1	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All		50	500	μA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	1.5	1.7		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1.4	1.5	V	V_{GS} = 5V , I_D = 0.3A
		VQ1004P,J VQ1006P,J		3.2 4.1	3.5 4.5	V	V_{GS} = 10V , I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		4.7	5	Ω	V_{GS} = 5V , I_D = 0.3A
		VQ1004P,J VQ1006P,J		3.2 4.1	3.5 4.5	Ω	V_{GS} = 10V , I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	VQ1004P,J		4.5	4.9	Ω	V_{GS} = 10V, I_D = 1A , T_C = 125°C
		VQ1006P,J		5.8	6.3	Ω	V_{GS} = 10V, I_D = 1A , T_C = 125°C

DYNAMIC

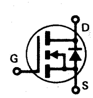
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	170	195		mS(℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		45	60	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		43	50	pF	
C_{rss}	Reverse Transfer Capacitance	All		5	10	pF	
$t_{d(on)}$	Turn-On Delay Time	All		8	10	ns	V_{DD} = 25V , $I_D \cong$ 1A R_g = 25Ω , R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{d(off)}$	Turn-Off Delay Time	All		8	10	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All		32	38	°C/W	Single Channel
R_{thJA}	Junction-to-Ambient	All			96	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	VQ1004P,J			−0.46	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		VQ1006P,J			−0.40	A	
I_{SM}	Source Current[1] (Body Diode)	All			−2	A	
V_{SD}	Diode Forward Voltage[1]	All		−0.9		V	T_C = 25°C , I_S = −1A , V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMA06 (VQ1004J,P), VNMA09 (VQ1006J,P)

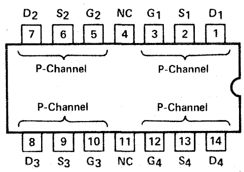
VQ2001P ■ VQ2001J

Siliconix

P-Channel Enhancement Mode
Quad MOSPOWER Array

APPLICATIONS

- High Frequency Inverters
- Line Drivers
- Small Motor Drives
- CMOS, TTL Direct Interfaces
- Analog Switching



TOP VIEW
14-PIN DIP

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VQ2001P	–30	2	14–PIN DIP –SIDE BRAZE
VQ2001J	–30	2	14–PIN DIP –PLASTIC

For Additional Curves
See Section 5: VPMH03

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	VQ2001P	VQ2001J	Units
V_{DS}	Drain-Source Voltage	–30	–30	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	–30	–30	V
I_D	Continuous Drain Current [1]	±0.6	±0.6	A
I_{DM}	Pulsed Drain Current [2]	±2	±2	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_A = 25°C	Max. Power Dissipation –Single	1.3	1.3	W
	Max. Power Dissipation–Quad	2	2	W
θ_{JA} Junction to Ambient (Free Air)	Linear Derating Factor–Single	10.4	10.4	W/° C
	Linear Derating Factor–Quad	16	16	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 Single Device Alone. Package Limited

2 Pulse Test: Pulsewidth ⩽ 300 μsec, Duty Cycle ⩽ 1%

POWER RATINGS (T_A = 25°C)

Test	Single Transistor	All Four Transistors	Unit
Total Power Dissipation	1.3	2	W
Linear Derating Factor	10.4	16	mW/°C
Thermal Resistance	96.2	62.5	°C/W
Thermal Coupling Factor (K)–Q_1–Q_4 or Q_2–Q_3	60		%
Thermal Coupling Factor (K)–Q_1–Q_2–Q_3–Q_4 Q_1–Q_3 or Q_2–Q_4	50		%

THERMAL COUPLING AND EFFECTIVE THERMAL RESISTANCE

In multiple chip devices, coupling of heat between die occurs. The junction temperature can be calculated as follows:

(1) $\Delta T_{J1} = R_{\theta 1} P_{D1} + R_{\theta 2} K_{\theta} P_{D2} = R_{\theta 3} K_{\theta 3} P_{D3} + R_{\theta 4} K_{\theta 4} P_{D4}$

Where ΔT_{J1} is the change in junction temperature of die $R_{\theta 1-4}$ is the thermal resistance of die 1–4; P_{D1-4} is the power dissipated in die 1–4 and $K_{\theta 2-4}$ is the thermal coupling between die 1 and 2–4.

An effective package thermal resistance can be defined as follows:

(2) $R_{\theta(FF)} = \Delta T_{J1}/P_{DT}$

Where P_{DT} is the total package power dissipation.

Assuming equal thermal resistance for each die, equation (1) simplifies to:

(3) $\Delta T_{J1} = R_{\theta 1} (P_{D1} + K_{\theta 2} P_{D2} + K_{\theta 3} P_{D3} + K_{\theta 4} P_{D4})$

For the conditions where $P_{D1} = P_{D2} = P_{D3} = P_{D4}$; $P_{DT} = 4P_D$ Equation (3) can be further simplified and by substituting into equation (2) results in:

(4) $R_{\theta(EFF)} = R_{\theta 1} (1 + K_{\theta 2} + K_{\theta 3} + K_{\theta 4})/4$

Values for the coupling factors when the ambient is used as a reference are given in the table above. If significant power is to be dissipated in two die, die at the opposite ends of the package should be used so that lowest possible junction temperature will result.

1

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	All	−30	−45		V	$V_{GS} = 0$ $I_D = -10\ \mu A$
$V_{GS(th)}$	Gate-Threshold Voltage	All	−2	−3.4	−4.5	V	$V_{DS} = V_{GS}$, $I_D = -1$ mA
I_{GSSF}	Gate-Body Leakage Forward	All		−1 −5	−100 −500	nA	$V_{GS} = -16V$, $V_{DS} = 0$ $V_{GS} = -16V$, $V_{DS} = 0$, $T_A = 125°C$
I_{GSSR}	Gate-Body Leakage Reverse	All		+1	+100	nA	$V_{GS} = +16V$, $V_{DS} = 0$
I_{DSS}	Zero Gate Voltage Drain Current	All		−1	−10	μA	V_{DS} = Max. Rating, $V_{GS} = 0$
		All		−50	−500	μA	V_{DS} = Max. Rating, $V_{GS} = 0$ $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	All	−1.5	−1.7		A	$V_{DS} \geq 2V_{DS(ON)}$, $V_{GS} = -12V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		−1.7	−2	V	$V_{GS} = -12V$, $I_D = -1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		1.7	2	Ω	$V_{GS} = -12V$, $I_D = -1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		3	3.6	Ω	$V_{GS} = -12V$, $I_D = -1A$, $T_C = 125°C$

DYNAMIC

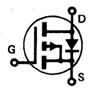
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	200	300		mS(℧)	$V_{DS} \geq 2V_{DS(ON)}$, $I_D = -0.5A$
C_{iss}	Input Capacitance	All		125	150	pF	$V_{GS} = 0$, $V_{DS} = -15V$ f = 1 MHz
C_{oss}	Output Capacitance	All		92	100	pF	
C_{rss}	Reverse Transfer Capacitance	All		25	60	pF	
t_{ON}	Turn–On Time	All		20	30	ns	$V_{DD} = -15V$, $I_D \cong -0.6A$ $R_g = 25\Omega$, $R_L = 23\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn–Off Time	All		20	30	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All		32	38	°C/W	Single Channel
R_{thJA}	Junction-to-Ambient	All			96	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			0.6	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			2	A	
V_{SD}	Diode Forward Voltage[1]	All		0.9		V	$T_C = 25°C$, $I_S = 0.5A$, $V_{GS} = 0$



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VPMH03

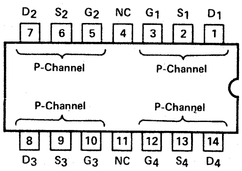
VQ2006P ■ VQ2006J ■ VQ2004P ■ VQ2004J

Siliconix

P-Channel Enhancement Mode
Quad MOSPOWER Array

APPLICATIONS

- High Frequency Inverters
- Line Drivers
- Small Motor Drives
- CMOS, TTL Direct Interfaces
- Analog Switching



TOP VIEW
14-PIN DIP

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VQ2006P	−90	5	14–PIN DIP –SIDE BRAZE
VQ2006J	−90	5	14–PIN DIP –PLASTIC
VQ2004P	−60	5	14–PIN DIP –SIDE BRAZE
VQ2004J	−60	5	14–PIN DIP –PLASTIC

For Additional Curves
See Section 5: VPMH10

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	VQ2006P	VQ2006J	VQ2004P	VQ2004J	Units
V_{DS}	Drain-Source Voltage	−90	−90	−60	−60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	−90	−90	−60	−60	V
I_D	Continuous Drain Current[1]	±0.41	±0.41	±0.41	±0.41	A
I_{DM}	Pulsed Drain Current[2]	±3	±3	±3	±3	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25°C	Max. Power Dissipation—Single	1.3	1.3	1.3	1.3	W
	Max. Power Dissipation—Quad	2	2	2	2	W
θ_{JA} Junction to Ambient (Free Air)	Linear Derating Factor—Single	10.4	10.4	10.4	10.4	W/° C
	Linear Derating Factor—Quad	16	16	16	16	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	−55 To +150	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 Single Device Alone. Package Limited

2 Pulse Test: Pulsewidth ⩽ 300 μsec, Duty Cycle ⩽ 1%

POWER RATINGS (T_A = 25°C)

Test	Single Transistor	All Four Transistors	Unit
Total Power Dissipation	1.3	2	W
Linear Derating Factor	10.4	16	mW/° C
Thermal Resistance	96.2	62.5	° C/W
Thermal Coupling Factor (K)—Q_1—Q_4 or Q_2—Q_3	60		%
Thermal Coupling Factor (K)—Q_1—Q_2—Q_3—Q_4 Q_1—Q_3 or Q_2—Q_4	50		%

THERMAL COUPLING AND EFFECTIVE THERMAL RESISTANCE

In multiple chip devices, coupling of heat between die occurs. The junction temperature can be calculated as follows:

(1) $\Delta T_{J1} = R_{\theta 1} P_{D1} + R_{\theta 2} K_{\theta} P_{D2} = R_{\theta 3} K_{\theta 3} P_{D3} + R_{\theta 4} K_{\theta 4} P_{D4}$

Where ΔT_{J1} is the change in junction temperature of die $R_{\theta 1-4}$ is the thermal resistance of die 1—4; P_{D1-4} is the power dissipated in die 1—4 and $K_{\theta 2-4}$ is the thermal coupling between die 1 and 2—4.

An effective package thermal resistance can be defined as follows:

(2) $R_{\theta}(FF) = \Delta T_{J1}/P_{DT}$

Where P_{DT} is the total package power dissipation.

Assuming equal thermal resistance for each die, equation (1) simplifies to:

(3) $\Delta T_{J1} = R_{\theta 1} (P_{D1} + K_{\theta 2} P_{D2} + K_{\theta 3} P_{D3} + K_{\theta 4} P_{D4})$

For the conditions where $P_{D1} = P_{D2} = P_{D3} = P_{D4}$; $P_{DT} = 4P_D$ Equation (3) can be further simplified and by substituting into equation (2) results in:

(4) $R_{\theta}(EFF) = R_{\theta 1} (1 + K_{\theta 2} + K_{\theta 3} + K_{\theta 4})/4$

Values for the coupling factors when the ambient is used as a reference are given in the table above. If significant power is to be dissipated in two die, die at the opposite ends of the package should be used so that lowest possible junction temperature will result.

1

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	VQ2006P VQ2006J	−90	−120		V	V_{GS} = 0 I_D = −10 μA
		VQ2004P VQ2004J	−60	−80		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	−2	−2.75	−4.5	V	V_{DS} = V_{GS}, I_D = −1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		−10 −50	−100 −500	nA	V_{GS} = −30V, V_{DS} = 0 V_{GS}=−30V, V_{DS} = 0, T_A=125°C
I_{GSSR}	Gate-Body Leakage Reverse	All		+10	100	nA	V_{GS} = +30V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	All		−0.5	−10	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All		−25	−500	μA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	−1	−1.4		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = −10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		−4.2	−5	V	V_{GS} = −10V , I_D = −1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		4.2	5	Ω	V_{GS} = −10V , I_D = −1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		6.7	8	Ω	V_{GS}=−10V, I_D=−1A, T_C=125°C

DYNAMIC

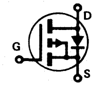
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	200	300		mS(℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = −0.5A
C_{iss}	Input Capacitance	All		125	150	pF	V_{GS} = 0 , V_{DS} = −25V f = 1 MHz
C_{oss}	Output Capacitance	All		47	60	pF	
C_{rss}	Reverse Transfer Capacitance	All		15	20	pF	
$t_{d(on)}$	Turn-On Delay Time	All		4.5	10	ns	V_{DD} = −25V, $I_D \cong$ −0.5A R_g = 25Ω , R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		7.5	15	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		5	10	ns	
t_f	Fall Time	All		7	15	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All		32	38	°C/W	Single Channel
R_{thJA}	Junction-to-Ambient	All			96.2	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			0.4	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			3	A	
V_{SD}	Diode Forward Voltage[1]	All		1.2		V	T_C = 25°C , I_S = 0.4A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

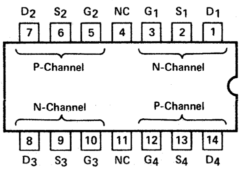
Data Sheet Curves: VPMH10

VQ3001P ■ VQ3001J

N and P-Channel Enhancement Mode
Quad MOSPOWER Array

APPLICATIONS

- High Frequency Inverters
- Line Drivers
- Small Motor Drives
- CMOS, TTL Direct Interfaces
- Analog Switching



TOP VIEW
14-PIN DIP

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
VQ3001P	+30/−30	N:1, P:2	14—PIN DIP —SIDE BRAZE
VQ3001J	+30/−30	N:1, P:2	14—PIN DIP —PLASTIC

For Additional Curves
See Section 5: VNMH03
VPMH03

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	VQ3001P		VQ3001J		Units
		N—Channel	P—Channel	N—Channel	P—Channel	
V_{DS}	Drain-Source Voltage	+30	−30	+30	−30	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	+30	−30	+30	−30	V
I_D @ T_C = 100° C	Continuous Drain Current	±0.85	±0.6	±0.85	±0.6	A
I_{DM}	Pulsed Drain Current[1]	±3	±2	±3	±2	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_A = 25°C	Max. Power Dissipation—Single	1.3	1.3	1.3	1.3	W
	Max. Power Dissipation—Quad	2	2	2	2	W
θ_{JA} Junction to Ambient (Free Air)	Linear Derating Factor—Single	10.4	10.4	10.4	10.4	mW/° C
	Linear Derating Factor—Quad	16	16	16	16	mW/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	−55 To +150	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	300	° C

1 Single Device Alone. Package Limited
2 Pulse Test: Pulsewidth ≤ 300 μsec, Duty Cycle ≤ 1%

1

POWER RATINGS (T_A = 25°C)

Test	Single Transistor	All Four Transistors	Unit
Total Power Dissipation	1.3	2	W
Linear Derating Factor	10.4	16	mW/°C
Thermal Resistance	96.2	62.5	°C/W
Thermal Coupling Factor (K)—Q_1—Q_4 or Q_2—Q_3	60		%
Thermal Coupling Factor (K)—Q_1—Q_2—Q_3—Q_4 Q_1—Q_3 or Q_2—Q_4	50		%

THERMAL COUPLING AND EFFECTIVE THERMAL RESISTANCE

In multiple chip devices, coupling of heat between die occurs. The junction temperature can be calculated as follows:

(1) $\Delta T_{J1} = R_{\theta 1} P_{D1} + R_{\theta 2} K_{\theta} P_{D2} = R_{\theta 3} K_{\theta 3} P_{D3} + R_{\theta 4} K_{\theta 4} P_{D4}$

Where ΔT_{J1} is the change in junction temperature of die $R_{\theta 1-4}$ is the thermal resistance of die 1—4; P_{D1-4} is the power dissipated in die 1—4 and $K_{\theta 2-4}$ is the thermal coupling between die 1 and 2—4.

An effective package thermal resistance can be defined as follows:

(2) $R_{\theta(FF)} = \Delta T_{J1}/P_{DT}$

Where P_{DT} is the total package power dissipation.

Assuming equal thermal resistance for each die, equation (1) simplifies to:

(3) $\Delta T_{J1} = R_{\theta 1} (P_{D1} + K_{\theta 2} P_{D2} + K_{\theta 3} P_{D3} + K_{\theta 4} P_{D4})$

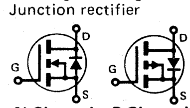
For the conditions where $P_{D1} = P_{D2} = P_{D3} = P_{D4}$; $P_{DT} = 4P_D$ Equation (3) can be further simplified and by substituting into equation (2) results in:

(4) $R_{\theta(EFF)} = R_{\theta 1} (1 + K_{\theta 2} + K_{\theta 3} + K_{\theta 4})/4$

Values for the coupling factors when the ambient is used as a reference are given in the table above. If significant power is to be dissipated in two die, die at the opposite ends of the package should be used so that lowest possible junction temperature will result.

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

Parameter		N-CHANNEL Min.	N-CHANNEL Typ.	N-CHANNEL Max.	P-CHANNEL Min.	P-CHANNEL Typ.	P-CHANNEL Max.	Units	TEST CONDITIONS (Reverse Polarity For P-Channel)
STATIC									
BV_{DSS}	Drain-Source Breakdown Voltage	30	40		–30	–45		V	V_{GS} = 0 I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	0.8	1.5	2.5	–2	–3.4	–4.5	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward		1 5	100 500		–1 –5	–100 –500	nA	V_{GS} = 16V, V_{DS} = 0 V_{GS} = 16V, V_{DS} = 0, T_A = 125° C
I_{GSSR}	Gate-Body Leakage Reverse		–1	–100		+1	100	nA	V_{GS} = –16V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current		1	10		–1	–10	μA	V_{DS} = 24V , V_{GS} = 0
			50	500		–5	–500	μA	V_{DS} = 24V , V_{GS} = 0 T_C = 125° C
$I_{D(on)}$	On-State Drain Current[1]	2	3.2		–1.5	–1.7		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]		0.26	0.35				V	V_{GS} = 5V , I_D = 200 mA
			0.75	1		–1.7	–2	V	V_{GS} = 12V , I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]		1.3	1.75				Ω	V_{GS} = 5V , I_D = 200 mA
			0.75	1		1.7	2	Ω	V_{GS} = 12V , I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]		1.3	1.75		3	3.5	Ω	V_{GS} = 12V, I_D = 1A , T_C = 125° C
DYNAMIC									
g_{fs}	Forward Transductance[1]	250	500		200	300		mS(℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance		85	110		125	150	pF	V_{GS} = 0 , V_{DS} = 15V f = 1 MHz
C_{oss}	Output Capacitance		80	110		92	100	pF	
C_{rss}	Reverse Transfer Capacitance		18	35		25	60	pF	
$t_{d(on)}$	Turn-On Delay Time		20	30		20	30	ns	V_{DD} = 15V , $I_D \cong$ 0.65A R_g = 25Ω , R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{d(off)}$	Turn-Off Delay Time		20	30		20	30	ns	
THERMAL RESISTANCE									
R_{thJC}	Junction-to-Case		32	38		32	38	°C/W	Single Channel
R_{thJA}	Junction-to-Ambient			96			96	°C/W	Free Air Operation
BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS									
I_S	Continuous Source Current (Body Diode)			–850			600	mA	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)			–3			2	A	
V_{SD}	Diode Forward Voltage[1]		–0.72			0.72		V	T_C=25° C, I_S=–50mA, V_{GS} = 0



N-Channel P-Channel

1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: N-Channel: VNMH03, P-Channel: VPMH03

VQ7254P ■ VQ7254J

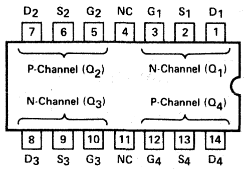
Siliconix

N and P-Channel Enhancement Mode

Quad MOSPOWER Array

APPLICATIONS

- Bubble Memory Coil Drivers
- Line Drivers
- Small Motor Drives
- CMOS, TTL Direct Interfaces
- Analog Switching



TOP VIEW
14-PIN DIP

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms) Q_1+Q_2 or Q_3+Q_4	Package
VQ7254P	+20/−20	3	14—PIN DIP —SIDE BRAZE
VQ7254J	+20/−20	3	14—PIN DIP —PLASTIC

For Additional Curves
See Section 5: VNMH03
VPMH03

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	VQ7254P N—Channel	VQ7254P P—Channel	VQ7254J N—Channel	VQ7254J P—Channel	Units
V_{DS}	Drain-Source Voltage	+20	−20	+20	−20	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	+20	−20	+20	−20	V
I_D	Continuous Drain Current[1]	±2	±2	±2	±2	A
I_{DM}	Pulsed Drain Current[2]	±3	±3	±3	±3	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_A = 25°C	Max. Power Dissipation—Single	1.75	1.75	1.75	1.75	W
P_D @ T_A = 80°C	Max. Power Dissipation—Single	1.05	1.05	1.05	1.05	W
θ_{JA} Junction to Ambient (Free Air)	Linear Derating Factor—Single	14	14	14	14	mW/° C
	Linear Derating Factor—Quad	21.6	21.6	21.6	21.6	mW/° C
T_J	Temperature Under Bias	−40 To +100	−40 To +100	−40 To +100	−40 To +100	° C
Tstg	Storage Temperature Range	−40 To +150	−40 To +150	−40 To +150	−40 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 Single Device Alone, Package Limited

2 Pulse Test: Pulsewidth ⩽ 300 μsec, Duty Cycle ⩽ 1%

POWER RATINGS (T_A = 25°C)

Test	Single Transistor	All Four Transistors	Unit
Total Power Dissipation	1.3	2	W
Linear Derating Factor	14	21.6	mW/°C
Thermal Resistance	96.2	62.5	°C/W
Thermal Coupling Factor (K)—Q_1—Q_4 or Q_2—Q_3	60		%
Thermal Coupling Factor (K)—Q_1—Q_2—Q_3—Q_4 Q_1—Q_3 or Q_2—Q_4	50		%

THERMAL COUPLING AND EFFECTIVE THERMAL RESISTANCE

In multiple chip devices, coupling of heat between die occurs. The junction temperature can be calculated as follows:

(1) $\Delta T_{J1}=R_{\theta 1}\ P_{D1}+R_{\theta 2}\ K_{\theta}\ P_{D2}=R_{\theta 3}\ K_{\theta 3}\ P_{D3}+R_{\theta 4}\ K_{\theta 4}\ P_{D4}$

Where ΔT_{J1} is the change in junction temperature of die $R_{\theta 1-4}$ is the thermal resistance of die 1−4; P_{D1-4} is the power dissipated in die 1−4 and $K_{\theta 2-4}$ is the thermal coupling between die 1 and 2−4.

An effective package thermal resistance can be defined as follows:

(2) $R_{\theta}(FF) = \Delta T_{J1}/P_{DT}$

Where P_{DT} is the total package power dissipation.

Assuming equal thermal resistance for each die, equation (1) simplifies to:

(3) $\Delta T_{J1} = R_{\theta 1}\ (P_{D1} + K_{\theta 2}\ P_{D2} + K_{\theta 3}\ P_{D3} + K_{\theta 4}\ P_{D4})$

For the conditions where $P_{D1} = P_{D2} = P_{D3} = P_{D4}$; $P_{DT} = 4P_D$ Equation (3) can be further simplified and by substituting into equation (2) results in:

(4) $R_{\theta}(EFF) = R_{\theta 1}\ (1 + K_{\theta 2} + K_{\theta 3} + K_{\theta 4})/4$

Values for the coupling factors when the ambient is used as a reference are given in the table above. If significant power is to be dissipated in two die, die at the opposite ends of the package should be used so that lowest possible junction temperature will result.

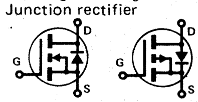
1

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Min.	Typ.	Max.	Units	Test Condition
$V_{DS(on)}$[2]	Total Static Drain-Source On-State Voltage[1] (Q_1+Q_2 or Q_3+Q_4)	2	2.5	3	V	V_{GS} = 11.4V, I_D = 1A
$R_{DS(on)}$[2]	Total Static Drain-Source On-State Resistance[1] (Q_1+Q_2 or Q_3+Q_4)	2	2.5	3	Ω	V_{GS} = 11.4V, I_D = 1A

Parameter		N-CHANNEL Min.	N-CHANNEL Typ.	N-CHANNEL Max.	P-CHANNEL Min.	P-CHANNEL Typ.	P-CHANNEL Max.	Units	TEST CONDITIONS (Reverse Polarity For P-Channel)
STATIC									
BV_{DSS}	Drain-Source Breakdown Voltage	20			−20	−45		V	V_{GS} = 0, I_D = 10 µA
$V_{GS(th)}$	Gate-Threshold Voltage	0.80 0.65			−0.80 −0.65			V	$V_{DS}=V_{GS}$, I_D=1 mA, T_A=25°C $V_{DS}=V_{GS}$, I_D=1 mA, T_A=85°C
I_{GSSF}	Gate-Body Leakage Forward		1	100		1	100	nA	V_{GS} = +12V, V_{DS} = 0
I_{GSSR}	Gate-Body Leakage Reverse		1	100		1	100	nA	V_{GS} = −12V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current			0.5			−0.5	µA	V_{DS} = 20V , V_{GS} = 0
DYNAMIC									
g_{fs}	Forward Transductance[1]	200	500		200	300		mS(℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance		85	175		125	190	pF	V_{GS} = 0 , V_{DS} = 12V f = 1 MHz
C_{oss}	Output Capacitance		80	95		92	100	pF	
C_{rss}	Reverse Transfer Capacitance		18	25		25	60	pF	
t_{ON}	Turn–On Time		20	30		20	30	ns	V_{DD} = 17V , $I_D \cong$ 1.1A R_g = 25Ω , R_L = 15Ω (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn–Off Time		20	30		20	30	ns	
THERMAL RESISTANCE									
R_{thJC}	Junction-to-Case		32	38		32	38	°C/W	Single Channel
R_{thJA}	Junction-to-Ambient			71.4			71.4	°C/W	Free Air Operation
BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS									
I_S	Continuous Source Current (Body Diode)			−2			2	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)			−3			3	A	
V_{SD}	Diode Forward Voltage[1]		−0.6	−0.75		0.6	0.75	V	T_C=25°C, I_S=50 mA, V_{GS} = 0
			−1	−1.2		1	1.2	V	T_C = 25°C , I_S = 1A , V_{GS} = 0



N-Channel P-Channel

1 Pulse Test: Pulse Width ⩽ 300 µsec, Duty Cycle ⩽ 2%
2 N-Channel and P-Channel not specified separately. Resistance is for both devices in equivalent series combination.

Data Sheet Curves: N-Channel VNMH03, P-Channel VPMH03

2N6659

Siliconix

N-Channel Enhancement Mode
MOSPOWER

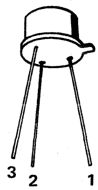
APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6659	35	1.8	T0–205AF

PIN 1 — Source
PIN 2 — Gate
PIN 3 & CASE — Drain



T0–205AF (T0–39)

For Additional Curves
See Section 5: VNMA06

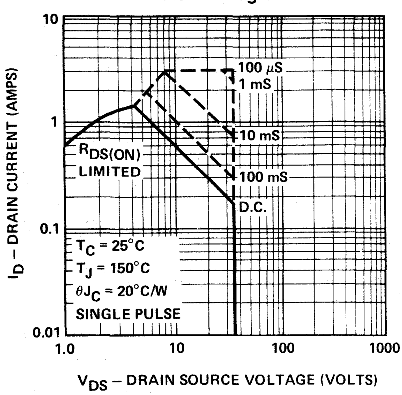
ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	2N6659	Units
V_{DS}	Drain-Source Voltage	35	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	35	V
I_D @ T_C = 25° C	Continuous Drain Current	±1.4	A
I_D @ T_C = 100° C	Continuous Drain Current	±1	A
I_{DM}	Pulsed Drain Current[1]	±3	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	6.25	W
P_D @ T_C = 100°C	Max. Power Dissipation	2.5	W
Junction to Case	Linear Derating Factor	0.05	W/° C
Junction to Ambient	Linear Derating Factor	0.006	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

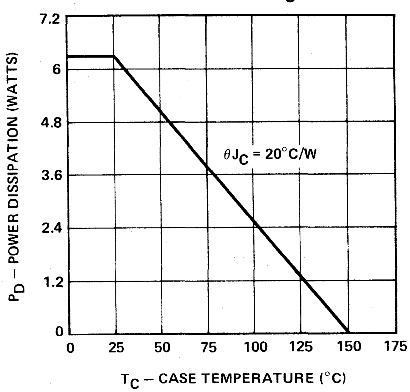
1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

2

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6659	35	50		V	V_{GS} = 0, I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	2N6659	0.8	1.5	2	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	2N6659		1 5	100 500	nA	V_{GS} = +15V, V_{DS} = 0 V_{GS}=+15V,V_{DS}=0,@T_A=125°C
I_{GSSR}	Gate-Body Leakage Reverse	2N6659		−1	−100	nA	V_{GS} = −15V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	2N6659		1	10	μA	V_{DS} = Max. Rating, V_{GS} = 0
		2N6659		50	500	μA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6659	1.5	1.7		A	V_{DS} ⩾2 $V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6659		1.2	1.5	V	V_{GS} = 5V , I_D = 0.3A
		2N6659		1.7	1.8	V	V_{GS} = 10V , I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6659		4	5	Ω	V_{GS} = 5V , I_D = 0.3A
		2N6659		1.7	1.8	Ω	V_{GS} = 10V , I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6659		2.5	2.7	Ω	V_{GS} =10V, I_D =1A , T_C =125°C

DYNAMIC

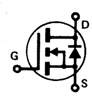
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	2N6659	170	195		mS (m℧)	V_{DS} = 24V, I_D = 0.5A
C_{iss}	Input Capacitance	2N6659		35	50	pF	V_{GS} = 0 ,V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	2N6659		48	65	pF	
C_{rss}	Reverse Transfer Capacitance	2N6659		2	10	pF	
t_{ON}	Turn-On Time	2N6659		8	10	ns	V_{DD} = 25V , I_D ≅ 1A R_g = 25Ω , R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	2N6659		8	10	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	2N6659			20	°C/W	
R_{thJA}	Junction-to-Ambient	2N6659			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6659			−1.4	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	2N6659			−3	A	
V_{SD}	Diode Forward Voltage[1]	2N6659		−0.9		V	T_C=25°C, I_S=−1.4A, V_{GS} = 0



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMA06

2N6660

Siliconix

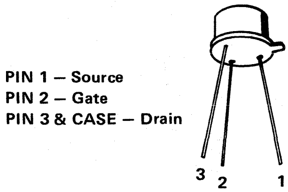
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6660	60	3	T0–205AF



T0–205AF (T0–39)

For Additional Curves
See Section 5: VNMA06

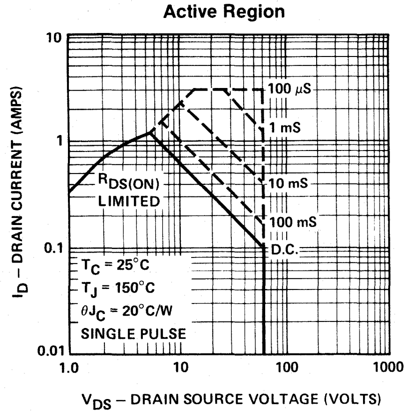
ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	2N6660	Units
V_{DS}	Drain-Source Voltage	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±1.1	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.8	A
I_{DM}	Pulsed Drain Current[1]	±3	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	6.25	W
P_D @ T_C = 100°C	Max. Power Dissipation	2.5	W
Junction to Case	Linear Derating Factor	0.05	W/° C
Junction to Ambient	Linear Derating Factor	0.006	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

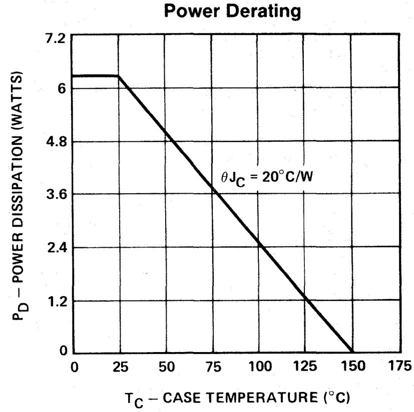
1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

2

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6660	60	100		V	V_{GS} = 0 I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	2N6660	0.8	1.5	2	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	2N6660		1 5	100 500	nA	V_{GS} = +15V, V_{DS} = 0 V_{GS}=+15V, V_{DS} = 0, T_A=125°C
I_{GSSR}	Gate-Body Leakage Reverse	2N6660		−1	−100	nA	V_{GS} = −15V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	2N6660		1	10	μA	V_{DS} = Max. Rating, V_{GS} = 0
		2N6660		50	500	μA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6660	1.5	1.7		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6660		1.4	1.5	V	V_{GS} = 5V , I_D = 0.3A
		2N6660		2.7	3	V	V_{GS} = 10V , I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6660		4.7	5	Ω	V_{GS} = 5V , I_D = 0.3A
		2N6660		2.7	3	Ω	V_{GS} = 10V , I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6660		3.9	4.2	Ω	V_{GS} =10V, I_D =1A , T_C =125°C

DYNAMIC

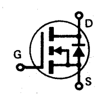
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	2N6660	170	195		mS	V_{DS} = 25V, I_D = 0.5A
C_{iss}	Input Capacitance	2N6660		35	50	pF	V_{GS} = 0 ,V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	2N6660		33	40	pF	
C_{rss}	Reverse Transfer Capacitance	2N6660		2	10	pF	
t_{ON}	Turn-On Time	2N6660		8	10	ns	V_{DD} =25V , $I_D \cong$ 1A R_g = 25Ω , R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	2N6660		8	10	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	2N6660			20	°C/W	
R_{thJA}	Junction-to-Ambient	2N6660			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6660			−1.1	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	2N6660			−3	A	
V_{SD}	Diode Forward Voltage[1]	2N6660		−0.9		V	T_C=25°C, I_S=−1.1A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMA06

2N6661

Siliconix

N-Channel Enhancement Mode
MOSPOWER

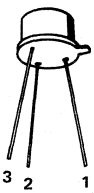
APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6661	90	4	T0–205AF

PIN 1 – Source
PIN 2 – Gate
PIN 3 & CASE – Drain



T0–205AF (T0–39)

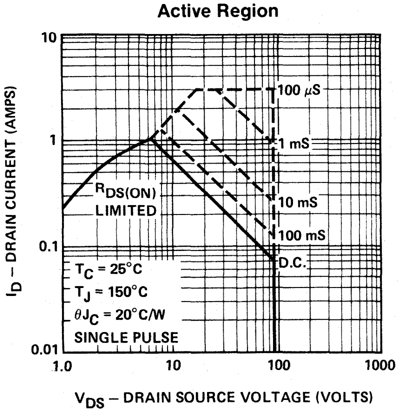
For Additional Curves
See Section 5: VNMA09

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

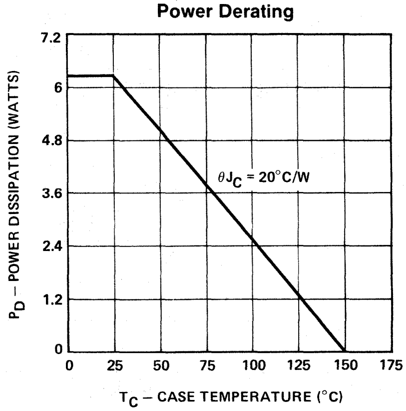
	Parameter	2N6661	Units
V_{DS}	Drain-Source Voltage	90	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	90	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.9	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.7	A
I_{DM}	Pulsed Drain Current[1]	±3	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	6.25	W
P_D @ T_C = 100° C	Max. Power Dissipation	2.5	W
Junction to Case	Linear Derating Factor	0.05	W/° C
Junction to Ambient	Linear Derating Factor	0.006	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6661	90	110		V	V_{GS} = 0 I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	2N6661	0.8	1.5	2	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	2N6661		1 5	100 500	nA	V_{GS} = +15V, V_{DS} = 0 V_{GS}=+15V, V_{DS} = 0, T_A=125°C
I_{GSSR}	Gate-Body Leakage Reverse	2N6661		−1	−100	nA	V_{GS} = −15V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	2N6661		1	10	μA	V_{DS} = Max. Rating, V_{GS} = 0
		2N6661		50	500	μA	V_{DS} = 0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6661	1.5	1.7		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6661		1.2	1.6	V	V_{GS} = 5V, I_D = 0.3A
		2N6661		3	4	V	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6661		4	5.3	Ω	V_{GS} = 5V, I_D = 0.3A
		2N6661		3	4	Ω	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6661		4.1	5.5	Ω	V_{GS} = 10V, I_D = 1A, T_C = 125°C

DYNAMIC

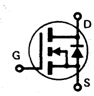
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	2N6661	170	195		mS (m℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	2N6661		35	50	pF	V_{GS} = 0, V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	2N6661		33	40	pF	
C_{rss}	Reverse Transfer Capacitance	2N6661		2	10	pF	
$t_{d(on)}$	Turn-On Delay Time	2N6661		8	10	ns	V_{DD} = 25V, $I_D \cong$ 1A R_g = 25Ω, R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{d(off)}$	Turn-Off Delay Time	2N6661		8	10	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	2N6661			20	°C/W	
R_{thJA}	Junction-to-Ambient	2N6661			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6661			−0.9	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	2N6661			−3	A	
V_{SD}	Diode Forward Voltage[1]	2N6661		−1.2		V	T_C=25°C, I_S=−0.9A, V_{GS} = 0



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMA09

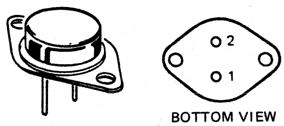
2N6755 ■ 2N6756

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6755	60	0.25	T0–204AA
2N6756	100	0.18	T0–204AA

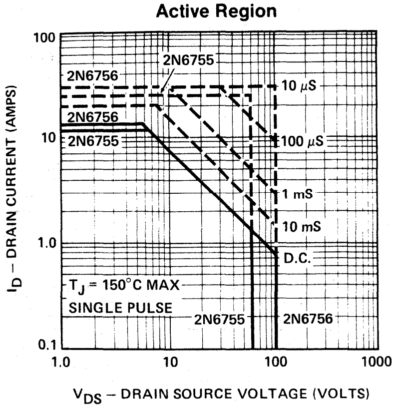
For Additional Curves
See Section 5: VNDE10

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

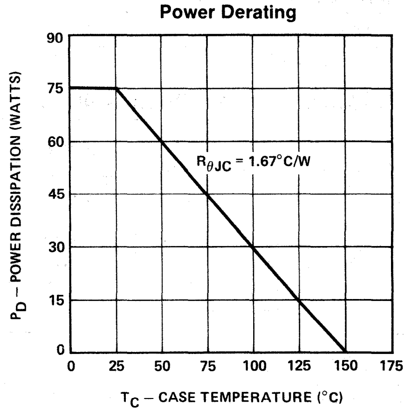
	Parameter	2N6755	2N6756	Units
V_{DS}	Drain-Source Voltage	60*	100*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60*	100*	V
I_D @ T_C = 25° C	Continuous Drain Current	±12*	±14*	A
I_D @ T_C = 100° C	Continuous Drain Current	±8*	±9*	A
I_{DM}	Pulsed Drain Current[1]	±25	±30	A
V_{GS}	Gate-Source Voltage[2]	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75*	75*	W
P_D @ T_C = 100°C	Max. Power Dissipation	30*	30*	W
Junction to Case	Linear Derating Factor	0.6*	0.6*	W/° C
Junction to Ambient	Linear Derating Factor	0.033	0.033	W/° C
T_J / Tstg	Operating and Storage Temperature Range	–55 To 150*	–55 To 150*	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300*	300*	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6755	60			V	V_{GS} = 0, I_D = 1 mA
		2N6756	100			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0*		4.0*	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100*	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100*	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	1.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	4.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6755	12			A	V_{GS} = 10V, V_{DS} = 15V
		2N6756	14			A	V_{GS} = 10V, V_{DS} = 15V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6755			3.0*	V	V_{GS} = 10V, I_D = 12A
		2N6756			2.52*	V	V_{GS} = 10V, I_D = 14A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6755		0.2	0.25*	Ω	V_{GS} = 10V, I_D = 8.0A
		2N6756		0.14	0.18*	Ω	V_{GS} = 10V, I_D = 9.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6755			0.45*	Ω	V_{GS} = 10V, I_D = 8.0A, T_C = 125°C
		2N6756			0.33*	Ω	V_{GS} = 10V, I_D = 9.0A, T_C = 125°C

DYNAMIC

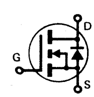
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	4.0*	5.5	12.0*	S (℧)	V_{DS} = 15V, I_D = 9.0A
C_{iss}	Input Capacitance	All	350*	600	800*	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All	150*	300	500*	pF	
C_{rss}	Reverse Transfer Capacitance	All	50*	100	150*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			30*	ns	V_{DD} = 36V, $I_D \cong$ 9.0A, R_g = 7.5Ω, R_L = 4.0Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			75*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			40*	ns	
t_f	Fall Time	All			45*	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.67*	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6755			−12*	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		2N6756			−14*	A	
I_{SM}	Source Current[1] (Body Diode)	2N6755			−25	A	
		2N6756			−30	A	
V_{SD}	Diode Forward Voltage[1]	2N6755	−0.85*		−1.7*	V	T_C = 25°C, I_S = −12A, V_{GS} = 0
		2N6756	−0.9*		−1.8*	V	T_C = 25°C, I_S = 14A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		300		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%
* JEDEC Registered Values

Data Sheet Curves: VNDE10

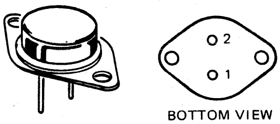
2N6757 ■ 2N6758

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Driver



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6757	150	0.6	T0–204AA
2N6758	200	0.4	T0–204AA

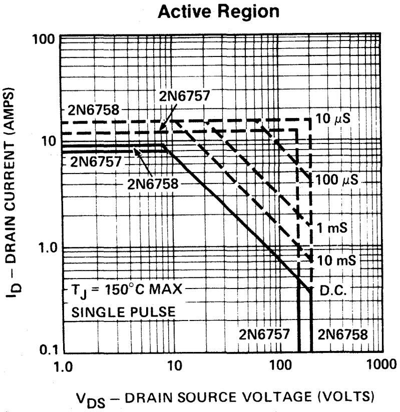
For Additional Curves See Section 5: VNDE20

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

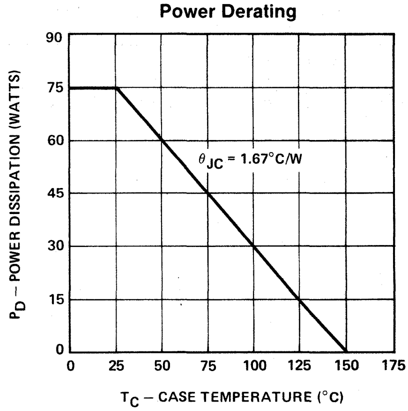
	Parameter	2N6757	2N6758	Units
V_{DS}	Drain-Source Voltage	150*	200*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	150*	200*	V
I_D @ T_C = 25° C	Continuous Drain Current	±8*	±9*	A
I_D @ T_C = 100° C	Continuous Drain Current	±5*	±6*	A
I_{DM}	Pulsed Drain Current[1]	±12	±15	A
V_{GS}	Gate-Source Voltage[2]	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75*	75*	W
P_D @ T_C = 100°C	Max. Power Dissipation	30*	30*	W
Junction to Case	Linear Derating Factor	0.6*	0.6*	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150*	–55 To 150*	° C
Lead Temperature	(1/16" from case for 10 secs.)	300*	300*	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



2

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6757	150			V	V_{GS} = 0, I_D = 1 mA
		2N6758	200			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0*		4.0*	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100*	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100*	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	1.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	4.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6757	8.0			A	V_{GS} = 10V, V_{DS} = 25V
		2N6758	9.0			A	V_{GS} = 10V, V_{DS} = 25V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6757			4.8*	V	V_{GS} = 10V, I_D = 8.0A
		2N6758			3.6*	V	V_{GS} = 10V, I_D = 9.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6757		0.4*	0.6*	Ω	V_{GS} = 10V, I_D = 5.0A
		2N6758		0.25*	0.4*	Ω	V_{GS} = 10V, I_D = 6.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6757			1.13*	Ω	V_{GS} =10V, I_D =5.0A, T_C =125°C
		2N6758			0.75*	Ω	V_{GS} =10V, I_D =6.0A, T_C =125°C

DYNAMIC

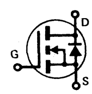
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3.0*	5.0	9.0*	S (℧)	V_{DS} = 15V, I_D = 6.0A
C_{iss}	Input Capacitance	All	350*	600	800*	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All	100*	250	450*	pF	
C_{rss}	Reverse Transfer Capacitance	All	40*	80	150*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			30*	ns	V_{DD} = 90V, $I_D \cong$ 6A, R_g = 15Ω, R_L = 15Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			50*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			50*	ns	
t_f	Fall Time	All			40*	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.67*	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6757			−8*	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		2N6758			−9*	A	
I_{SM}	Source Current[1] (Body Diode)	2N6757			−12	A	
		2N6758			−15	A	
V_{SD}	Diode Forward Voltage[1]	2N6757	−0.75*		−1.5*	V	T_C = 25°C, I_S =−8A, V_{GS} = 0
		2N6758	−0.8*		−1.6*	V	T_C = 25°C, I_S =−9A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		650		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/µs



1 Pulse Test: Pulse Width ⩽ 300 µsec, Duty Cycle ⩽ 2%
* JEDEC Registered Values

Data Sheet Curves: VNDE20

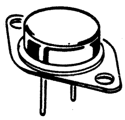
2N6759 ■ 2N6760

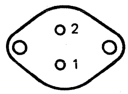
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers
- Motor Drivers





BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6759	350	1.5	T0–204AA
2N6760	400	1.0	T0–204AA

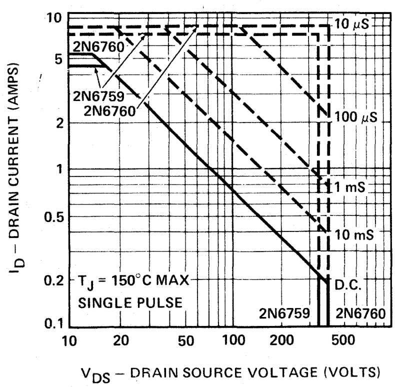
For Additional Curves
See Section 5: VNDE40

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

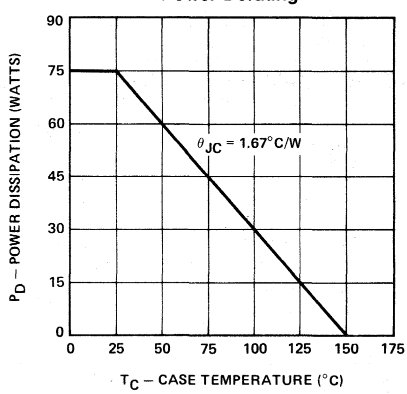
	Parameter	2N6759	2N6760	Units
V_{DS}	Drain-Source Voltage	350*	400*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	350*	400*	V
I_D @ T_C = 25° C	Continuous Drain Current	±4.5*	±5.5*	A
I_D @ T_C = 100° C	Continuous Drain Current	±3*	±3.5*	A
I_{DM}	Pulsed Drain Current[1]	±7*	±8*	A
V_{GS}	Gate-Source Voltage[2]	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75*	75*	W
P_D @ T_C = 100°C	Max. Power Dissipation	30*	30*	W
Junction to Case	Linear Derating Factor	0.6*	0.6*	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150*	–55 To 150*	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300*	300*	° C

1 Pulse Test: Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6759	350			V	V_{GS} = 0, I_D = 1 mA
		2N6760	400			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0*		4.0*	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100*	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100*	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	1.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	4.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6759	4.5			A	V_{GS} = 10V, V_{DS} = 25V
		2N6760	5.5			A	V_{GS} = 10V, V_{DS} = 25V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6759			7.0*	V	V_{GS} = 10V, I_D = 4.5A
		2N6760			6.7*	V	V_{GS} = 10V, I_D = 5.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6759		1.0	1.5*	Ω	V_{GS} = 10V, I_D = 3.0A
		2N6760		0.8	1.0*	Ω	V_{GS} = 10V, I_D = 3.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6759			3.3*	Ω	T_C = 125°C, V_{GS} =10V, I_D = 3.0A
		2N6760			2.2*	Ω	V_{GS} =10V, I_D = 3.5A, T_C = 125°C

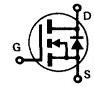
DYNAMIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3.0*	4.5	9.0*	S (℧)	V_{DS} = 15V, I_D = 3.5A
C_{iss}	Input Capacitance	All	350*	650	800*	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All	50*	120	300*	pF	
C_{rss}	Reverse Transfer Capacitance	All	20*	30	80*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			30*	ns	V_{DD} =175V, $I_D \cong$ 3.5A, R_g = 15Ω, R_L = 50Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			35*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			55*	ns	
t_f	Fall Time	All			35*	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.67*	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6759			−4.5*	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		2N6760			−5.5*	A	
I_{SM}	Source Current[1] (Body Diode)	2N6759			−7	A	
		2N6760			−8	A.	
V_{SD}	Diode Forward Voltage[1]	2N6759	−0.7*		−1.4*	V	T_C=25°C, I_S=−4.5A, V_{GS} = 0
		2N6760	−0.75*		−1.5*	V	T_C=25°C, I_S=−5.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		550		ns	T_J =150°C, I_F = I_S, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%
*JEDEC Registered Values

Data Sheet Curves: VNDE40

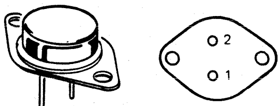
2N6761 ■ 2N6762

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6761	450	2.0	T0–204AA
2N6762	500	1.5	T0–204AA

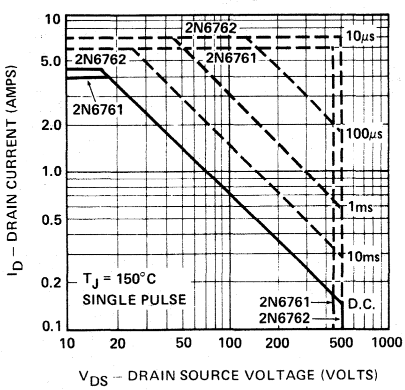
For Additional Curves
See Section 5: VNDE50

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

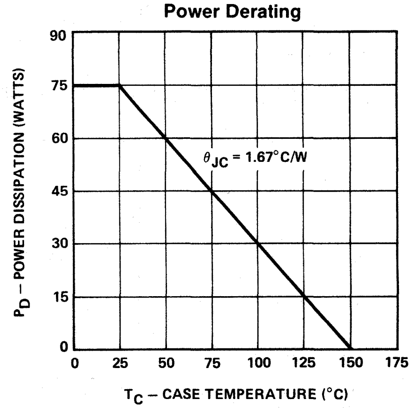
	Parameter	2N6761	2N6762	Units
V_{DS}	Drain-Source Voltage	450*	500*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	450*	500*	V
I_D @ T_C = 25° C	Continuous Drain Current	±4*	±4.5*	A
I_D @ T_C = 100° C	Continuous Drain Current	±2.5*	±3*	A
I_{DM}	Pulsed Drain Current[1]	±6*	±7*	A
V_{GS}	Gate-Source Voltage[2]	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75*	75*	W
P_D @ T_C = 100°C	Max. Power Dissipation	30*	30*	W
Junction to Case	Linear Derating Factor	0.6*	0.6*	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150*	–55 To 150*	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300*	300*	° C

1 Pulse Test: Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



2

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6761	450			V	V_{GS} = 0, I_D = 1 mA
		2N6762	500			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0*		4.0*	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100*	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100*	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	1.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	4.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6761	4.0			A	V_{GS} = 10V , V_{DS} = 25V
		2N6762	4.5			A	V_{GS} = 10V , V_{DS} = 25V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6761			8.0*	V	V_{GS} = 10V , I_D = 4.0A
		2N6762			7.7*	V	V_{GS} = 10V , I_D = 4.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6761		1.5	2.0*	Ω	V_{GS} = 10V , I_D = 2.5A
		2N6762		1.3	1.5*	Ω	V_{GS} = 10V , I_D = 3.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6761			4.4*	Ω	V_{GS} =10V, I_D =2.5A, T_C =125°C
		2N6762			3.3*	Ω	V_{GS} =10V, I_D =3.0A, T_C =125°C

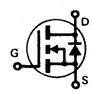
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5*	3.5	7.5*	S (℧)	V_{GS} = 15V, I_D = 3.0A
C_{iss}	Input Capacitance	All	350*	600	800*	pF	V_{GS} = 0 ,V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All	25*	150	200*	pF	
C_{rss}	Reverse Transfer Capacitance	All	15*	30	60*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			30*	ns	V_{DD} =225V, $I_D \cong$ 3.0A, R_g = 7.5Ω , R_L = 75Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			30*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			55*	ns	
t_f	Fall Time	All			30*	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.67*	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6761			−4*	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		2N6762			−4.5*	A	
I_{SM}	Source Current[1] (Body Diode)	2N6761			−6*	A	
		2N6762			−7*	A	
V_{SD}	Diode Forward Voltage[1]	2N6761	−0.65*		−1.3*	V	T_C=25°C, I_S=−4A, V_{GS} = 0
		2N6762	−0.7		−1.4*	V	T_C=25°C, I_S=−4.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		500		ns	T_J = 150°C , $I_F = I_S$, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%
* JEDEC Registered Values

Datasheet Curves: VNDE50

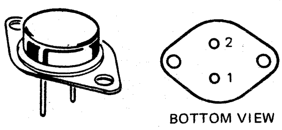
2N6763 ■ 2N6764

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AE (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6763	60	0.08	T0–204AE
2N6764	100	0.055	T0–204AE

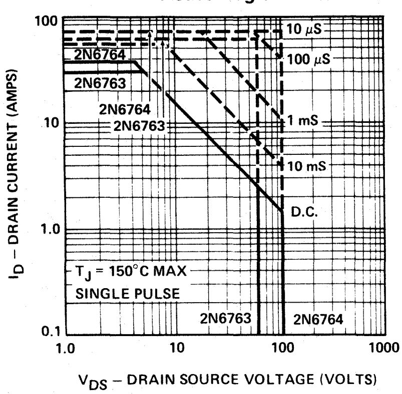
For Additional Curves
See Section 5: VNDC10–2

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

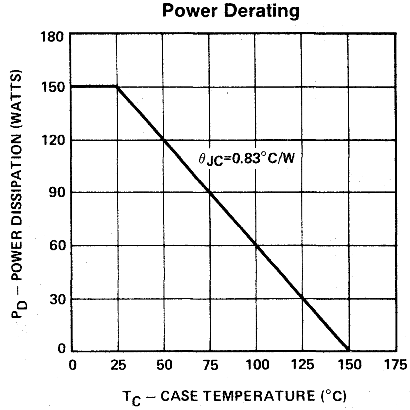
	Parameter	2N6763	2N6764	Units
V_{DS}	Drain-Source Voltage	60*	100*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60*	100*	V
I_D @ T_C = 25° C	Continuous Drain Current	±31*	±38*	A
I_D @ T_C = 100° C	Continuous Drain Current	±20*	±24*	A
I_{DM}	Pulsed Drain Current[1]	±60	±70	A
V_{GS}	Gate-Source Voltage[2]	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	150*	150*	W
P_D @ T_C = 100°C	Max. Power Dissipation	60*	60*	W
Junction to Case	Linear Derating Factor	1.2*	1.2*	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150*	–55 To 150*	° C
Lead Temperature	(1/16" from case for 10 secs.)	300*	300*	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6763	60			V	V_{GS} = 0, I_D = 1 mA
		2N6764	100			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0*		4.0*	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100*	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100*	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	1.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	4.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6763	31			A	V_{GS} = 10V, V_{DS} = 15V
		2N6764	38			A	V_{GS} = 10V, V_{DS} = 15V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6763			2.48*	V	V_{GS} = 10V, I_D = 31A
		2N6764			2.09*	V	V_{GS} = 10V, I_D = 38A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6763		0.06	0.08*	Ω	V_{GS} = 10V, I_D = 20A
		2N6764		0.045	0.055*	Ω	V_{GS} = 10V, I_D = 24A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6763			0.136*	Ω	T_C = 125°C, V_{GS} = 10V, I_D = 20A
		2N6764			0.094*	Ω	V_{GS} = 10V, I_D = 24A

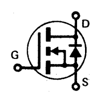
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	9.0*	12.5	27.0*	S (℧)	V_{DS} = 15V, I_D = 24A
C_{iss}	Input Capacitance	All	1000*	2000	3000*	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All	500*	1000	1500*	pF	
C_{rss}	Reverse Transfer Capacitance	All	150*	350	500*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			35*	ns	V_{DD} = 24V, $I_D \cong$ 24A, R_g = 2.35Ω, R_L = 1.0Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			100*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			125*	ns	
t_f	Fall Time	All			100*	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			0.833*	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6763			−31*	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		2N6764			−38*	A	
I_{SM}	Source Current[1] (Body Diode)	2N6763			−60	A	
		2N6764			−70	A	
V_{SD}	Diode Forward Voltage[1]	2N6763	−0.9*		−1.8*	V	T_C=25°C, I_S=−31A, V_{GS} = 0
		2N6764	−0.95*		−1.9*	V	T_C=25°C, I_S=−38A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		500		ns	T_J = 150°C, I_F = I_S, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%
* JEDEC Registered Values

Data Sheet Curves: VNDC10–2

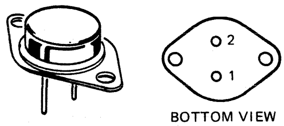
2N6765 ■ 2N6766

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AE (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6765	150V	0.120	T0–204AE
2N6766	200V	0.085	T0–204AE

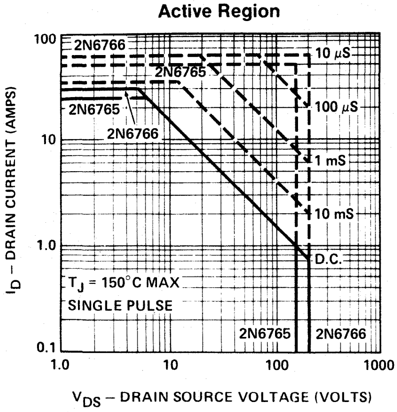
For Additional Curves
See Section 5: VNDC20–2

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

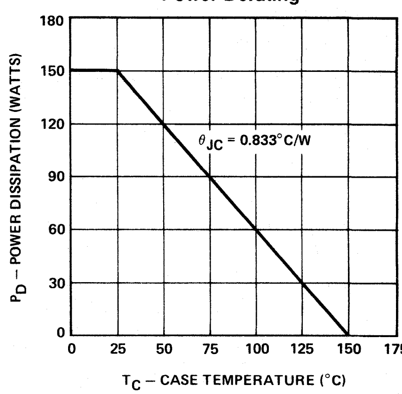
	Parameter	2N6765	2N6766	Units
V_{DS}	Drain-Source Voltage	150*	200*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	150*	200*	V
I_D @ T_C = 25° C	Continuous Drain Current	±25*	±30*	A
I_D @ T_C = 100° C	Continuous Drain Current	±16*	±19*	A
I_{DM}	Pulsed Drain Current[1]	±50	±60	A
V_{GS}	Gate-Source Voltage[2]	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	150*	150*	W
P_D @ T_C = 100°C	Max. Power Dissipation	60*	60*	W
Junction to Case	Linear Derating Factor	1.2*	1.2*	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	W/° C
T_J / Tstg	Operating and Storage Temperature Range	–55 To 150*	–55 To 150*	° C
Lead Temperature	(1/16" from case for 10 secs.)	300*	300*	° C

1 **Pulse Test:** Pulsewidth ≤ 300µsec, Duty Cycle ≤ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



2

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6765	150			V	$V_{GS} = 0$ $I_D = 1$ mA
		2N6766	200			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0*		4.0*	V	$V_{DS} = V_{GS}$, $I_D = 1$ mA
I_{GSSF}	Gate-Body Leakage Forward	All			100*	nA	$V_{GS} = 20V$
I_{GSSR}	Gate-Body Leakage Reverse	All			−100*	nA	$V_{GS} = -20V$
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	1.0*	mA	V_{DS} = Max. Rating, $V_{GS} = 0$
		All		0.2	4.0*	mA	V_{DS} = Max. Rating, $V_{GS} = 0$ $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	2N6765	25			A	$V_{GS} = 10V$, $V_{DS} = 15V$
		2N6766	30			A	$V_{GS} = 10V$, $V_{DS} = 15V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6765			3.0*	V	$V_{GS} = 10V$, $I_D = 25A$
		2N6766			2.7*	V	$V_{GS} = 10V$, $I_D = 30A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6765		0.09	0.12*	Ω	$V_{GS} = 10V$, $I_D = 16A$
		2N6766		0.07	0.085*	Ω	$V_{GS} = 10V$, $I_D = 19A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6765			0.216*	Ω	$T_C = 125°C$ $V_{GS} = 10V$, $I_D = 19A$
		2N6766			0.153*	Ω	$V_{GS} = 10V$, $I_D = 19A$, $T_C = 125°C$

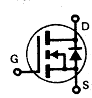
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	9.0*	15.5	27.0*	S (℧)	$V_{DS} = 15V$, $I_D = 19A$
C_{iss}	Input Capacitance	All	1000*	2000	3000*	pF	$V_{GS} = 0$, $V_{DS} = 25V$ f = 1 MHz
C_{oss}	Output Capacitance	All	450*	8000	1200*	pF	
C_{rss}	Reverse Transfer Capacitance	All	150*	300	500*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			35*	ns	$V_{DD} = 95V$, $I_D \cong 19A$ $R_g = 2.35Ω$, $R_L = 5.0Ω$ (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			100*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			125*	ns	
t_f	Fall Time	All			100*	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			0.833*	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6765			−25*	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		2N6766			−30*	A	
I_{SM}	Source Current[1] (Body Diode)	2N6765			−50	A	
		2N6766			−60	A	
V_{SD}	Diode Forward Voltage[1]	2N6765	−0.85*		−1.7	V	$T_C = 25°C$, $I_S = -25A$, $V_{GS} = 0$
		2N6766	−0.9*		−1.8	V	$T_C = 25°C$, $I_S = -30A$, $V_{GS} = 0$
t_{rr}	Reverse Recovery Time	All		500		ns	$T_J = 150°C$, $I_F = I_S$, $dI_F/ds = 100$ A/µs

1 Pulse Test: Pulse Width ⩽ 300 µsec, Duty Cycle ⩽ 2%
* JEDEC Registered Values

Data Sheet Curves: VNDC20–2

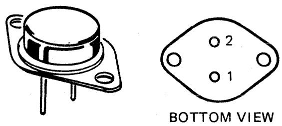
2N6767 ■ 2N6768

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6767	350	0.4	T0–204AA
2N6768	400	0.3	T0–204AA

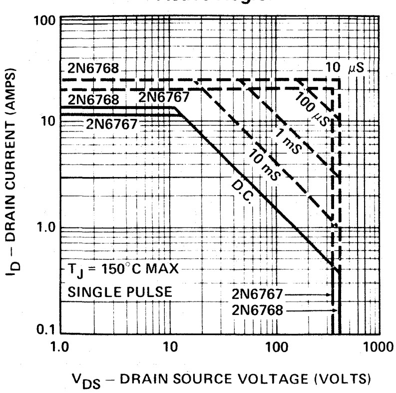
For Additional Curves
See Section 5: VNDC40–2

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

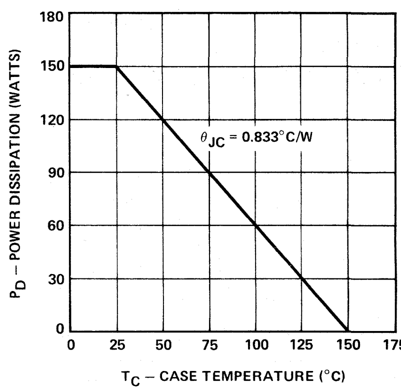
	Parameter	2N6767	2N6758	Units
V_{DS}	Drain-Source Voltage	350*	400*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	350*	400*	V
I_D @ T_C = 25° C	Continuous Drain Current	±12*	±14*	A
I_D @ T_C = 100° C	Continuous Drain Current	±7.75*	±9*	A
I_{DM}	Pulsed Drain Current[1]	±20	±25	A
V_{GS}	Gate-Source Voltage[2]	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	150*	150*	W
P_D @ T_C = 100°C	Max. Power Dissipation	60*	60*	W
Junction to Case	Linear Derating Factor	1.2*	1.2*	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150*	–55 To 150*	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300*	300*	° C

1 Pulse Test: Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6767	350			V	V_{GS} = 0, I_D = 1 mA
		2N6768	400			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0*		4.0*	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100*	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100*	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	1.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All			4.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6767	12			A	V_{GS} = 10V, V_{DS} = 15V
		2N6768	14			A	V_{GS} = 10V, V_{DS} = 15V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6767			5.4*	V	V_{GS} = 10V, I_D = 12A
		2N6768			5.6*	V	V_{GS} = 10V, I_D = 14A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6767		0.3	0.4*	Ω	V_{GS} = 10V, I_D = 7.75A
		2N6768		0.25	0.3*	Ω	V_{GS} = 10V, I_D = 9.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6767			0.88*	Ω	V_{GS} =10V, I_D =7.75A T_C = 125°C
		2N6768			0.66*	Ω	V_{GS} =10V, I_D = 9.0A T_C =125°C

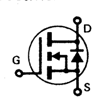
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	8.0*	11.0	24.0*	S (℧)	V_{DD} = 15V, I_D = 9.0A
C_{iss}	Input Capacitance	All	1000*	2200	3000*	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All	200*	400	600*	pF	
C_{rss}	Reverse Transfer Capacitance	All	50*	150	200*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			35*	ns	V_{DD} =180V, $I_D \cong$ 9.0A, R_g = 2.35Ω, R_L = 20Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			65*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			150*	ns	
t_f	Fall Time	All			75*	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			0.833*	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6767			−12*	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		2N6768			−14*	A	
I_{SM}	Source Current[1] (Body Diode)	2N6767			−20	A	
		2N6768			−25	A	
V_{SD}	Diode Forward Voltage[1]	2N6767	−0.8*		−1.6*	V	T_C=25°C, I_S=−12A, V_{GS} = 0
		2N6768	−0.85*		−1.7*	V	T_C=25°C, I_S=−14A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		1000		ns	T_J =150°C, $I_F = I_S$, dI_F/ds =100 A/μs

1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%
* JEDEC Registered Values

Data Curves: VNDC40−2

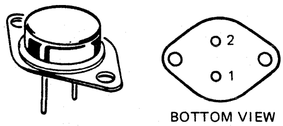
2N6769 ■ 2N6770

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6769	450	0.5	T0–204AA
2N6770	500	0.4	T0–204AA

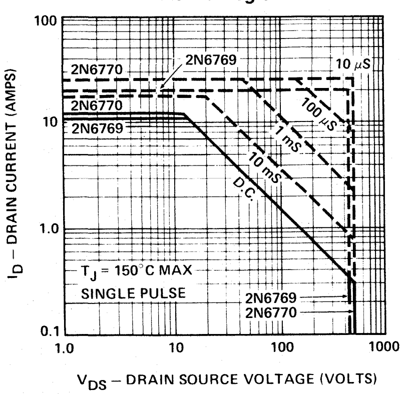
For Additional Curves
See Section 5: VNDC50–2

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

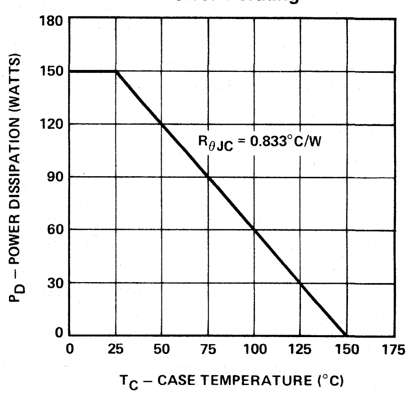
	Parameter	2N6769	2N6770	Units
V_{DS}	Drain-Source Voltage	450*	500*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	450*	500*	V
I_D @ T_C = 25° C	Continuous Drain Current	±11*	±12*	A
I_D @ T_C = 100° C	Continuous Drain Current	±7*	±7.75*	A
I_{DM}	Pulsed Drain Current[1]	±20	±25	A
V_{GS}	Gate-Source Voltage[2]	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	150*	150*	W
P_D @ T_C = 100°C	Max. Power Dissipation	60*	60*	W
Junction to Case	Linear Derating Factor	1.2*	1.2*	W/° C
Junction to Ambient	Linear Derating Factor	.033	.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150*	–55 To 150*	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300*	300*	° C

1 Pulse Test: Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6769	450			V	V_{GS} = 0 I_D = 4 mA
		2N6770	500			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0*		4.0*	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100*	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100*	nA	V_{GS} =−20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	1.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	4.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6769	11			A	V_{GS} = 10V , V_{DS} = 15V
		2N6770	12			A	V_{GS} = 10V , V_{DS} = 15V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6769			6.0*	V	V_{GS} = 10V , I_D = 11A
		2N6770			6.0*	V	V_{GS} = 10V , I_D = 12A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6769		0.4	0.5*	Ω	V_{GS} = 10V , I_D = 7.0A
		2N6770		0.3	0.4*	Ω	V_{GS} = 10V , I_D = 7.75A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6769			1.1*	Ω	V_{GS} =10V, I_D =7.0A, T_C =125°C
		2N6770			0.88*	Ω	V_{GS} =10V, I_D = 7.75A T_C = 125°C

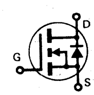
DYNAMIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	8.0*	12.0	24.0*	S (℧)	V_{DS} = 15V, I_D = 7.75A
C_{iss}	Input Capacitance	All	1000*	2000	3000*	pF	V_{GS} = 0 ,V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All	200*	400	600*	pF	
C_{rss}	Reverse Transfer Capacitance	All	50*	100	200*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			35*	ns	V_{DD} =210V, I_D ≅ 7.75A R_g = 2.35Ω , R_L = 27Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			50*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			150*	ns	
t_f	Fall Time	All			70*	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			0.833*	°C/W	
R_{thJA}	Junction-to-Ambient	All			30*	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6769			−11*	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		2N6770			−12*	A	
I_{SM}	Source Current[1] (Body Diode)	2N6769			−20	A	
		2N6770			−25	A	
V_{SD}	Diode Forward Voltage[1]	2N6769	−0.75*		−1.5*	V	T_C=25°C, I_S=−11A, V_{GS} = 0
		2N6770	−0.8*		−1.6*	V	T_C=25°C, I_S=−12A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =100°C , I_F = I_S, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%
* JEDEC Registered Values

Data Curves: VNDC50−2

2N6781 ■ 2N6782

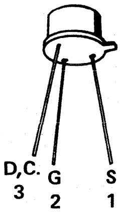
Siliconix
PRELIMINARY

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Fast Switching
- Motor Controls
- Power Supplies

PIN 1 — Source
PIN 2 — Gate
PIN 3 — Drain and Case



T0–205AF

PRODUCT SUMMARY

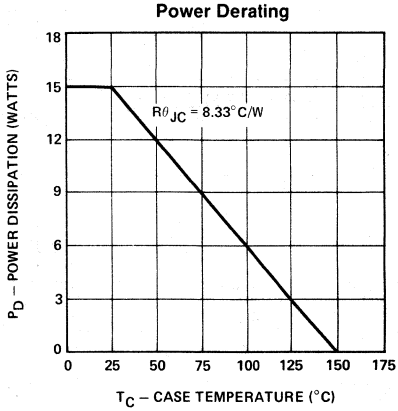
Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6781	60*	0.6	T0–205AF*
2N6782	100*	0.6	T0–205AF*

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	2N6781	2N6782	Units
V_{DS}	Drain-Source Voltage	60*	100*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60*	100*	V
I_D @ T_C = 25° C	Continuous Drain Current	±3.5*	±3.5*	A
I_D @ T_C = 100° C	Continuous Drain Current	±2.25*	±2.25*	A
I_{DM}	Pulsed Drain Current[1]	±8	±8	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	15*	15*	W
P_D @ T_C = 100°C	Max. Power Dissipation	6*	6*	W
Junction to Case	Linear Derating Factor	0.12*	0.12*	W/° C
Junction to Ambient	Linear Derating Factor	.005	.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55* To +150*	–55* To +150*	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300*	300*	° C

1 Pulse Test: Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6781	60*			V	V_{GS} = 0, I_D = 0.25 mA
		2N6782	100*			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2* 1*		4.0*	V	$V_{DS} = V_{GS}$, I_D = 0.5 mA $V_{DS}=V_{GS}$, I_D=0.5mA@T_A=125°C
I_{GSSF}	Gate-Body Leakage Forward	All			100* 200*	nA	V_{GS} = 20V V_{GS} = 20V @ T_A = 125°C
I_{GSSR}	Gate-Body Leakage Reverse	All			–100*	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All			0.25*	mA	V_{DS}= 0.8 Max. Rating, V_{GS} = 0
		All			1*	mA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6781	3.5			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		2N6782	3.5			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6781			2.1*	V	V_{GS} = 10V , I_D = 3.5A
		2N6782			2.1*	V	V_{GS} = 10V , I_D = 3.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6781			0.6*	Ω	V_{GS} = 10V , I_D = 2.25A
		2N6782			0.6*	Ω	V_{GS} = 10V , I_D = 2.25A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6781			1.08*	Ω	V_{GS} =10V, I_D =2.25A T_C =125°C
		2N6782			1.08*	Ω	V_{GS} =10V, I_D =2.25A T_C =125°C

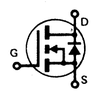
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1.0*		3.0*	S (℧)	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D = 2.25A
C_{iss}	Input Capacitance	All	60*		200*	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All	40*		100*	pF	
C_{rss}	Reverse Transfer Capacitance	All	10*		25*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			15*	ns	V_{DD} =34V , $I_D \cong$ 2.25A R_g = 25Ω , R_L = 15Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			25*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			25*	ns	
t_f	Fall Time	All			20*	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			8.33*	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6781			–3.5*	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		2N6782			–3.5*	A	
I_{SM}	Source Current[1] (Body Diode)	2N6781			–8	A	
		2N6782			–8	A	
V_{SD}	Diode Forward Voltage[1]	2N6781	–0.75*		–1.5*	V	T_C=25°C, I_S=–3.5A, V_{GS} = 0
		2N6782	–0.75*		–1.5*	V	T_C=25°C, I_S=–3.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		200		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%
***JEDEC Registered Values**

2N6783 ■ 2N6784

Siliconix
PRELIMINARY

N-Channel Enhancement Mode
MOSPOWER

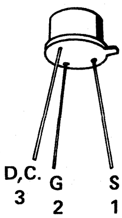
APPLICATIONS

- Fast Switching
- Motor Controls
- Power Supplies

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6783	150	2.81	T0–205AF*
2N6784	200	2.81	T0–205AF*

PIN 1 — Source
PIN 2 — Gate
PIN 3 — Drain and Case



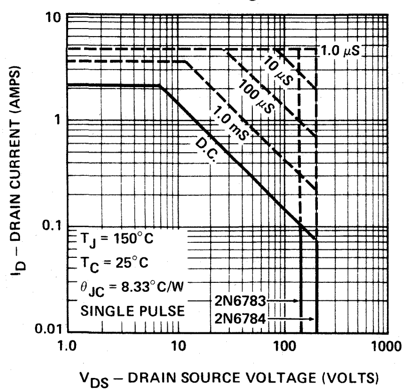
T0–205AF (T0–39)

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

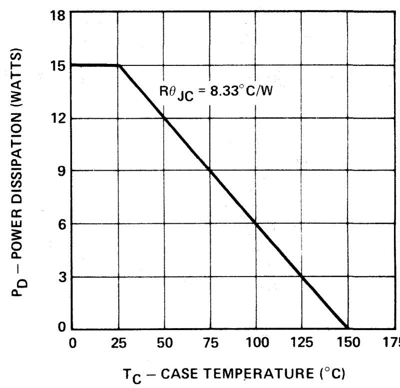
	Parameter	2N6783	2N6784	Units
V_{DS}	Drain-Source Voltage	150*	200*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	150*	200*	V
I_D @ T_C = 25° C	Continuous Drain Current	±2.25*	±2.25*	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.5*	±1.5*	A
I_{DM}	Pulsed Drain Current[1]	±5	±5	A
V_{GS}	Gate-Source Voltage[2]	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	15*	15*	W
P_D @ T_C = 100° C	Max. Power Dissipation	6*	6*	W
Junction to Case	Linear Derating Factor	0.12*	0.12*	W/° C
Junction to Ambient	Linear Derating Factor	.005	.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55* To +150*	−55* To +150*	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300*	300*	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



2

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6783	150*			V	V_{GS} = 0 I_D = 0.25 mA
		2N6784	200*			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2* 1*		4.0*	V	V_{DS} = V_{GS}, I_D = 0.5 mA V_{DS}=V_{GS},I_D=0.5mA@T_A=125° C
I_{GSSF}	Gate-Body Leakage Forward	All			100* 200*	nA	V_{GS} = 20V V_{GS}=20V, @T_A = 125°C
I_{GSSR}	Gate-Body Leakage Reverse	All			−100*	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All			0.25*	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All			1*	mA	V_{DS}=0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6783	2.25			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		2N6784	2.25			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6783			3.37*	V	V_{GS} = 10V , I_D = 2.25A
		2N6784			3.37*	V	V_{GS} = 10V , I_D = 2.25A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6783			1.5*	Ω	V_{GS} = 10V , I_D = 1.5A
		2N6784			1.5*	Ω	V_{GS} = 10V , I_D = 1.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6783			2.81*	Ω	V_{GS} =10V, I_D =1.5A, T_C = 125°C
		2N6784			2.81*	Ω	V_{GS} =10V, I_D =1.5A, T_C = 125°C

DYNAMIC

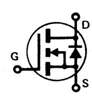
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	0.9*		2.7*	S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 1.5A
C_{iss}	Input Capacitance	All	60*		200*	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All	20*		80*	pF	
C_{rss}	Reverse Transfer Capacitance	All	5*		25*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			15*	ns	V_{DD} = 75V , $I_D \cong$ 1.5A R_g = 25Ω , R_L = 50Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			20*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			30*	ns	
t_f	Fall Time	All			20*	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			8.33*	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6783			−2.25*	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		2N6784			−2.25*	A	
I_{SM}	Source Current[1] (Body Diode)	2N6783			−5	A	
		2N6784			−5	A	
V_{SD}	Diode Forward Voltage[1]	2N6783	−0.7*		−1.5*	V	T_C=25°C, I_S=−2.25A, V_{GS} = 0
		2N6784	−0.7*		−1.5*	V	T_C=25°C, I_S=−2.25A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		280		ns	T_J =150°C , I_F = I_S, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%
***JEDEC Registered Values**

2N6785 ■ 2N6786

Siliconix
PRELIMINARY

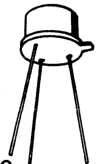
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Fast Switching
- Motor Controls
- Power Supplies

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6785	350	3.6	T0–205AF
2N6786	400	3.6	T0–205AF



PIN 1 — Source
PIN 2 — Gate
PIN 3 — Drain, Case

D,C. G S
3 2 1

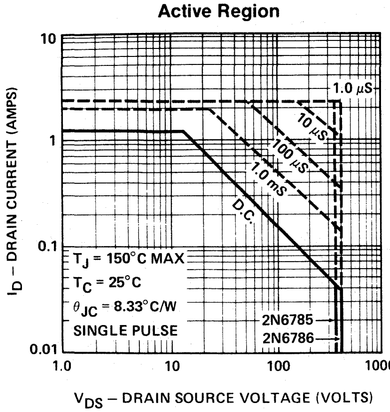
T0–205AF (T0–39)

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

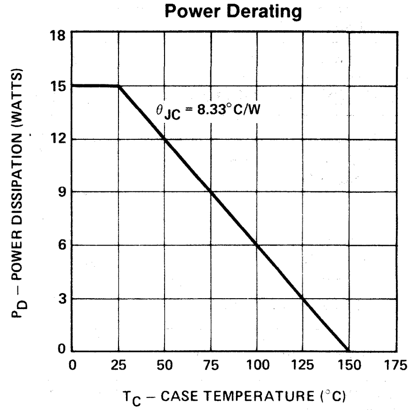
	Parameter	2N6785	2N6786	Units
V_{DS}	Drain-Source Voltage	350*	400*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	350*	400*	V
I_D @ T_C = 25° C	Continuous Drain Current	±1.25*	±1.25*	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.8*	±0.8*	A
I_{DM}	Pulsed Drain Current[1]	±2.5	±2.5	A
V_{GS}	Gate-Source Voltage[2]	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	15*	15*	W
P_D @ T_C = 100°C	Max. Power Dissipation	6*	6*	W
Junction to Case	Linear Derating Factor	0.12*	0.12*	W/° C
Junction to Ambient	Linear Derating Factor	.005	.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55* To +150*	–55* To +150*	° C
Lead Temperature	(1/16" from case for 10 secs.)	300*	300*	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



2

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6785	350			V	V_{GS} = 0 I_D = 0.25 mA
		2N6786	400			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2* 1*		4.0*	V	$V_{DS} = V_{GS}$, I_D = 0.5A $V_{DS}=V_{GS}$, I_D=0.5mA@T_A=125°C
I_{GSSF}	Gate-Body Leakage Forward	All			100* 200*	nA	V_{GS} = 20V V_{GS} = 20V, @T_A = 125°C
I_{GSSR}	Gate-Body Leakage Reverse	All			−100*	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All			0.25*	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All			1*	mA	V_{DS}=0.8 Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6785	1.25			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
		2N6786	1.25			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6785			4.5*	V	V_{GS} = 10V, I_D = 1.25
		2N6786			4.5*	V	V_{GS} = 10V, I_D = 1.25
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6785			3.6*	Ω	V_{GS} = 10V, I_D = 0.8A
		2N6786			3.6*	Ω	V_{GS} = 10V, I_D = 0.8A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6785			7.92*	Ω	V_{GS} =10V, I_D =0.8A, T_C =125°C
		2N6786			7.92*	Ω	V_{GS} =10V, I_D =0.8A, T_C =125°C

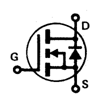
DYNAMIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	0.7*		2.1*	S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 0.8A
C_{iss}	Input Capacitance	All	60		200	pF	V_{GS} = 0, V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All	15		50	pF	
C_{rss}	Reverse Transfer Capacitance	All	2		15	pF	
$t_{d(on)}$	Turn-On Delay Time	All			15*	ns	V_{DD} =170V, $I_D \cong$ 0.8A R_g = 25Ω, R_L = 210Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			20*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			35*	ns	
t_f	Fall Time	All			30*	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			8.33*	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6785			−1.25*	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		2N6786			−1.25*	A	
I_{SM}	Source Current[1] (Body Diode)	2N6785			−2.5	A	
		2N6786			−2.5	A	
V_{SD}	Diode Forward Voltage[1]	2N6785	−0.6*		−1.4*	V	T_C=25°C, I_S=−1.25A, V_{GS}=0
		2N6786	−0.6*		−1.4*	V	T_C=25°C, I_S=−1.25A, V_{GS}=0
t_{rr}	Reverse Recovery Time	All		380		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs

1 **Pulse Test:** Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%
*JEDEC Registered Values

2N6787 ■ 2N6788

Siliconix

N-Channel Enhancement Mode
MOSPOWER

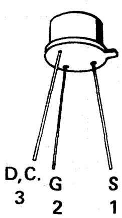
APPLICATIONS

- Fast Switching
- Motor Controls
- Power Supplies

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6787	60	0.3	T0–205AF
2N6788	100	0.3	T0–205AF

PIN 1 – Source
PIN 2 – Gate
PIN 3 – Drain, Case



T0–205AF (T0–39)

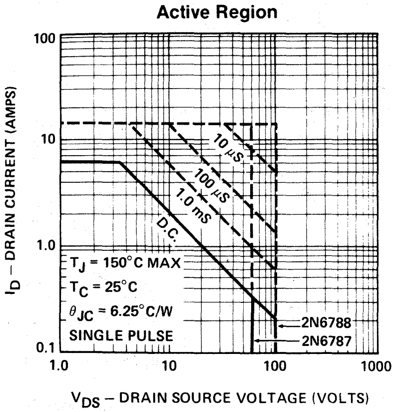
For Additional Curves See Section 5: VNDD10

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

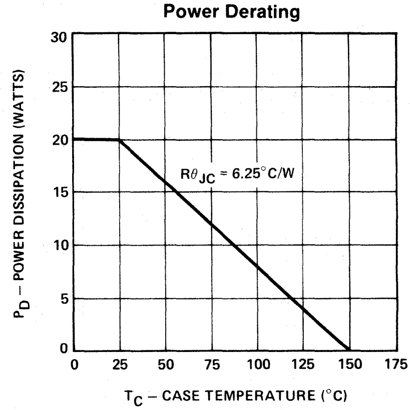
	Parameter	2N6787	2N6788	Units
V_{DS}	Drain-Source Voltage	60*	100*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60*	100*	V
I_D @ T_C = 25° C	Continuous Drain Current	±6*	±6*	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.5*	±3.5*	A
I_{DM}	Pulsed Drain Current[1]	±15	±15	A
V_{GS}	Gate-Source Voltage[2]	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20*	20*	W
P_D @ T_C = 100°C	Max. Power Dissipation	8*	8*	W
Junction to Case	Linear Derating Factor	0.16*	0.16*	W/° C
Junction to Ambient	Linear Derating Factor	.005	.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55* To +150*	–55* To +150*	° C
Lead Temperature	(1/16" from case for 10 secs.)	300*	300*	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



2

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6787	60			V	V_{GS} = 0, I_D = 1.0 mA
		2N6788	100			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0		4.0	V	$V_{DS} = V_{GS}$, I_D = 1.0 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All			1.0	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All			4.0	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6787	6.0			A	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 3.5A
		2N6788	6.0			A	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 3.5A
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6787			1.8*	V	V_{GS} = 10V, I_D = 6.0A
		2N6788			1.8*	V	V_{GS} = 10V, I_D = 6.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6787			.30*	Ω	V_{GS} = 10V, I_D = 3.5A
		2N6788			.30*	Ω	V_{GS} = 10V, I_D = 3.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6787			.54*	Ω	V_{GS} =10V, I_D =3.5A T_C =125°C
		2N6788			.54*	Ω	V_{GS} =10V, I_D =3.5A T_C =125°C

DYNAMIC

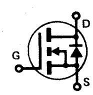
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1.5*		4.5*	S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 3.5A
C_{iss}	Input Capacitance	All	200*		600*	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All	100*		400*	pF	
C_{rss}	Reverse Transfer Capacitance	All	20*		100*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			40*	ns	V_{DD} = 35V, $I_D \cong$ 3.5A, R_g = 25Ω, R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			70*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			40*	ns	
t_f	Fall Time	All			70*	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			6.25*	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6787			–6*	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		2N6788			–6*	A	
I_{SM}	Source Current[1] (Body Diode)	2N6787			–15	A	
		2N6788			–15	A	
V_{SD}	Diode Forward Voltage[1]	2N6787	–0.8*		–1.8*	V	T_C = 25°C, I_S =–6, V_{GS} = 0
		2N6788	–0.8*		–1.8*	V	T_C = 25°C, I_S =–6, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		150		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%
*JEDEC Registered Values

Data Sheet Curves: VNDD10

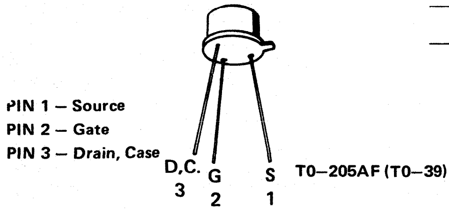
2N6789 ■ 2N6790

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Fast Switching
- Motor Controls
- Power Supplies



PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6789	150	0.8	T0–205AF
2N6790	200	0.8	T0–205AF

For Additional Curves
See Section 5: VNDD20

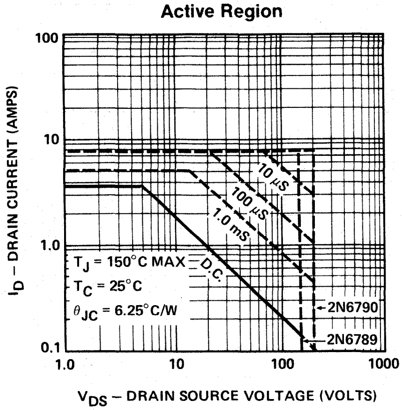
ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	2N6789	2N6790	Units
V_{DS}	Drain-Source Voltage	150*	200*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	150*	200*	V
I_D @ T_C = 25° C	Continuous Drain Current	±3.5*	±3.5*	A
I_D @ T_C = 100° C	Continuous Drain Current	±2.25*	±2.25*	A
I_{DM}	Pulsed Drain Current[1]	±7.50	±7.50	A
V_{GS}	Gate-Source Voltage[2]	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20*	20*	W
P_D @ T_C = 100°C	Max. Power Dissipation	8*	8*	W
Junction to Case	Linear Derating Factor	0.16*	0.16*	W/° C
Junction to Ambient	Linear Derating Factor	.005	.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55* To +150*	–55* To +150*	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

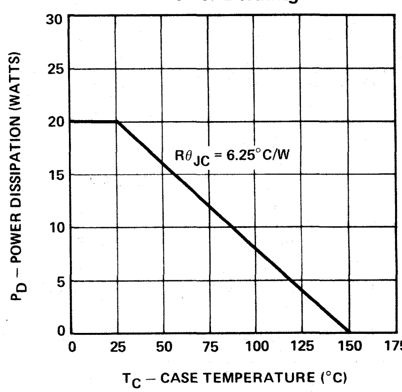
1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

2

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS ($T_C = 25°C$ unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6789	150*			V	$V_{GS} = 0$, $I_D = 1.0$ mA
		2N6790	200*			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0*		4.0*	V	$V_{DS} = V_{GS}$, $I_D = 1.0$ mA
I_{GSSF}	Gate-Body Leakage Forward	All			100*	nA	$V_{GS} = 20V$
I_{GSSR}	Gate-Body Leakage Reverse	All			−100*	nA	$V_{GS} = -20V$
I_{DSS}	Zero Gate Voltage Drain Current	All			1.0*	mA	V_{DS} = Max. Rating, $V_{GS} = 0$
		All			4.0*	mA	V_{DS} = Max. Rating, $V_{GS} = 0$, $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	2N6789	3.5			A	$V_{DS} \geqslant 2V_{DS(ON)}$, $V_{GS} = 10V$
		2N6790	3.5			A	$V_{DS} \geqslant 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6789			2.8*	V	$V_{GS} = 10V$, $I_D = 3.5A$
		2N6790			2.8*	V	$V_{GS} = 10V$, $I_D = 3.5A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6789			0.8*	Ω	$V_{GS} = 10V$, $I_D = 2.25A$
		2N6790			0.8*	Ω	$V_{GS} = 10V$, $I_D = 2.25A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6789			1.5*	Ω	$V_{GS} = 10V$, $I_D = 2.25A$ $T_C = 125°C$
		2N6790			1.5*	Ω	$V_{GS} = 10V$, $I_D = 2.25A$ $T_C = 125°C$

DYNAMIC

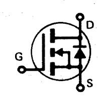
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1.5*		4.5*	S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, $I_D = 2.25A$
C_{iss}	Input Capacitance	All	200*		600*	pF	$V_{GS} = 0$, $V_{DS} = 25V$, f = 1 MHz
C_{oss}	Output Capacitance	All	60*		300*	pF	
C_{rss}	Reverse Transfer Capacitance	All	15*		80*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			40*	ns	$V_{DD} = 74V$, $I_D \cong 2.25A$, $R_g = 25\Omega$, $R_L = 32\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			50*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			50*	ns	
t_f	Fall Time	All			50*	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			6.25*	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6789			−3.5*	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		2N6790			−3.5*	A	
I_{SM}	Source Current[1] (Body Diode)	2N6789			−7.50	A	
		2N6790			−7.50	A	
V_{SD}	Diode Forward Voltage[1]	2N6789	−0.7		−1.5*	V	$T_C = 25°C$, $I_S = -3.5$, $V_{GS} = 0$
		2N6790	−0.7		−1.5*	V	$T_C = 25°C$, $I_S = -3.5$, $V_{GS} = 0$
t_{rr}	Reverse Recovery Time	All		450		ns	$T_J = 150°C$, $I_F = I_S$, $dI_F/ds = 100$ A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%
*JEDEC Registered Values

Data Sheet Curves: VNDD20

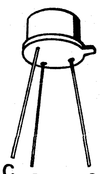
2N6791 ■ 2N6792

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Inverters
- Motor Control
- Choppers



PIN 1 — Source
PIN 2 — Gate
PIN 3 — Drain, Case

TO–205AF (TO–39)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6791	350	1.8	TO–205AF
2N6792	400	1.8	TO–205AF

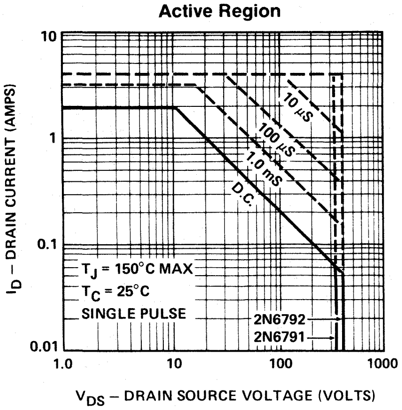
For Additional Curves See Section 5: VNDD40

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

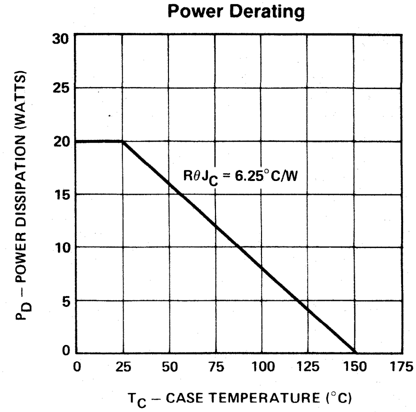
	Parameter	2N6791	2N6792	Units
V_{DS}	Drain-Source Voltage	350*	400*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	350*	400*	V
I_D @ T_C = 25° C	Continuous Drain Current	±2*	±2*	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.25*	±1.25*	A
I_{DM}	Pulsed Drain Current[1]	±4	±4	A
V_{GS}	Gate-Source Voltage[2]	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20*	20*	W
P_D @ T_C = 100°C	Max. Power Dissipation	8*	8*	W
Junction to Case	Linear Derating Factor	0.12*	0.12*	W/° C
Junction to Ambient	Linear Derating Factor	.006	.006	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55* To +150*	–55* To +150*	° C
Lead Temperature	(1/16" from case for 10 secs.)	300*	300*	° C

1 Pulse Test: Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



2

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6791	350*			V	V_{GS} = 0, I_D = 1.0 mA
		2N6792	400*			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0*		4.0*	V	V_{DS} = V_{GS}, I_D = 1.0 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100*	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100*	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All			1.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All			4.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6791	1.25			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		2N6792	1.25			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2A6791			3.6*	V	V_{GS} = 10V, I_D = 2.0A
		2N6792			3.6*	V	V_{GS} = 10V, I_D = 2.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6791			1.8*	Ω	V_{GS} = 10V, I_D = 1.25A
		2N6792			1.8*	Ω	V_{GS} = 10V, I_D = 1.25A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6791			4.0*	Ω	V_{GS} = 0, I_D =1.25A T_C =125°C
		2N6792			4.0*	Ω	V_{GS} = 0, I_D =1.25A T_C =125°C

DYNAMIC

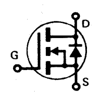
g_{fs}	Forward Transductance[1]	All	1.0*		3.0*	S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 1.25A
C_{iss}	Input Capacitance	All	200*		600*	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All	40*		200*	pF	
C_{rss}	Reverse Transfer Capacitance	All	5*		40*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			40*	ns	V_{DD} =175V, $I_D \cong$ 1.25A, R_g = 25Ω, R_L = 140Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			35*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			60*	ns	
t_f	Fall Time	All			35*	ns	

THERMAL RESISTANCE

R_{thJC}	Junction-to-Case	All			6.25*	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)	2N6791			−2*	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		2N6792			−2*	A	
I_{SM}	Source Current[1] (Body Diode)	2N6791			−4	A	
		2N6792			−4	A	
V_{SD}	Diode Forward Voltage[1]	2N6791	−0.6*		−1.4*	V	T_C = 25°C, I_S =−2A, V_{GS} = 0
		2N6792	−0.6*		−1.4*	V	T_C = 25°C, I_S =−2A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C, I_F = I_S, dI_F/ds = 100 A/µs



1 **Pulse Test:** Pulse Width ⩽ 300 µsec, Duty Cycle ⩽ 2%
* JEDEC Registered Values

Data Sheet Curves: VNDD40

2N6793 ■ 2N6794

Siliconix

N-Channel Enhancement Mode
MOSPOWER

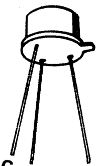
APPLICATIONS

- Fast Switching
- Motor Controls
- Power Supplies

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6793	450	3.0	T0–205AF
2N6794	500	3.0	T0–205AF

PIN 1 — Source
PIN 2 — Gate
PIN 3 — Drain, Case



T0–205AF (T0–39)

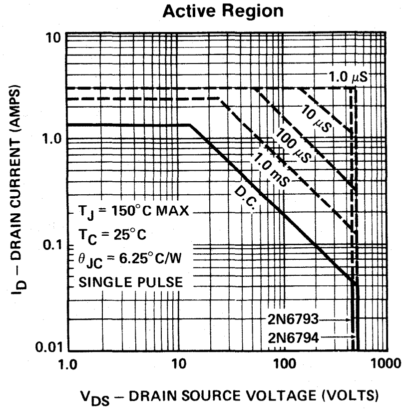
For Additional Curves
See Section 5: VNDD50

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

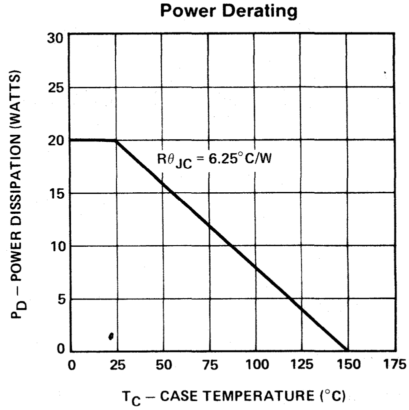
	Parameter	2N6793	2N6794	Units
V_{DS}	Drain-Source Voltage	450*	500*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	450*	500*	V
I_D @ T_C = 25° C	Continuous Drain Current	±1.5*	±1.5*	A
I_D @ T_C = 100° C	Continuous Drain Current	±1*	±1*	A
I_{DM}	Pulsed Drain Current[1]	±3	±3	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20*	20*	W
P_D @ T_C = 100°C	Max. Power Dissipation	8*	8*	W
Junction to Case	Linear Derating Factor	6.25*	6.25*	W/° C
Junction to Ambient	Linear Derating Factor	.005	.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55* To +150*	–55* To +150*	° C
Lead Temperature	(1/16" from case for 10 secs.)	300*	300*	° C

1 Pulse Test: Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



2

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6793	450*			V	V_{GS} = 0 I_D = 1.0 mA
		2N6794	500*			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0*		4.0*	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100*	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–100*	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All			1.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All			4.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125° C
$I_{D(on)}$	On-State Drain Current[1]	2N6793	1.5			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
		2N6794	1.5			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6793			4.5*	V	V_{GS} = 10V , I_D = 1.5A
		2N6794			4.5*	V	V_{GS} = 10V , I_D = 1.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6793			3*	Ω	V_{GS} = 10V , I_D = 1.0A
		2N6794			3*	Ω	V_{GS} = 10V , I_D = 1.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6793			6.6*	Ω	V_{GS} =10V, I_D =1.0A, T_C =125° C
		2N6794			6.6*	Ω	V_{GS} =10V, I_D =1.0A, T_C =125° C

DYNAMIC

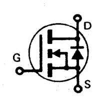
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1.0*		3.0*	S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 1A
C_{iss}	Input Capacitance	All	200*		600*	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All	30*		150*	pF	
C_{rss}	Reverse Transfer Capacitance	All	5*		40*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			40*	ns	V_{DD} =225V, $I_D \cong$ 1.0A R_g = 25Ω , R_L = 225Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			30*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			60*	ns	
t_f	Fall Time	All			30*	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			6.25*	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6793			–1.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		2N6794			–1.5	A	
I_{SM}	Source Current[1] (Body Diode)	2N6793			–3	A	
		2N6794			–3	A	
V_{SD}	Diode Forward Voltage[1]	2N6793	–0.6*		–1.2*	V	T_C=25°C, I_S=–1.5A, V_{GS} = 0
		2N6794	–0.6*		–1.2*	V	T_C=25°C, I_S=–1.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		200		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%
* JEDEC Registered Values

Data Sheet Curves: VNDD50

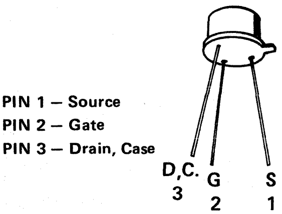
2N6795 ■ 2N6796

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Fast Switching
- Motor Controls
- Power Supplies



T0–205AF (T0–39)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6795	60	0.18	T0–205AF
2N6796	100	0.18	T0–205AF

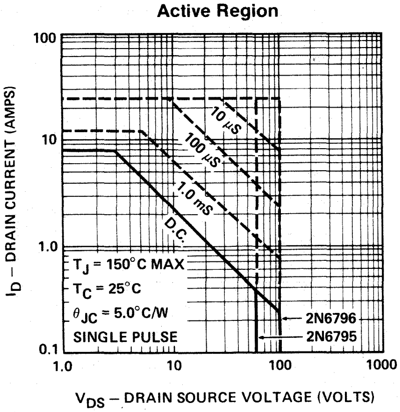
For Additional Curves
See Section 5: VNDE10

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

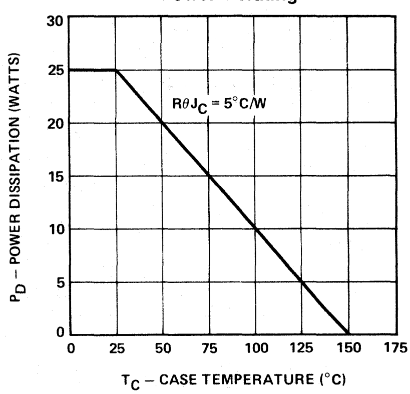
	Parameter	2N6795	2N6796	Units
V_{DS}	Drain-Source Voltage	60*	100*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60*	100*	V
I_D @ T_C = 25° C	Continuous Drain Current	±8*	±8*	A
I_D @ T_C = 100° C	Continuous Drain Current	±5*	±5*	A
I_{DM}	Pulsed Drain Current[1]	±25	±25	A
V_{GS}	Gate-Source Voltage[2]	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	25*	25*	W
P_D @ T_C = 100°C	Max. Power Dissipation	10*	10*	W
Junction to Case	Linear Derating Factor	0.2*	0.2*	W/° C
Junction to Ambient	Linear Derating Factor	.005	.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55* To +150*	–55 To +150*	° C
Lead Temperature	(1/16" from case for 10 secs.)	300*	300*	° C

1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



2

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6795	60*			V	V_{GS} = 0 I_D = 1.0 mA
		2N6796	100*			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0*		4.0*	V	$V_{DS} = V_{GS}$, I_D = 1.0 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100*	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100*	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All			1.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All			4.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6795	8.0			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
		2N6796	8.0			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6795			1.56*	V	V_{GS} = 10V , I_D = 8.0A
		2N6796			1.56*	V	V_{GS} = 10V , I_D = 8.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6795			0.18*	Ω	V_{GS} = 10V , I_D = 5.0A
		2N6796			0.18*	Ω	V_{GS} = 10V , I_D = 5.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6795			0.35*	Ω	V_{GS} =10V, I_D = 5A , T_C =125°C
		2N6796			0.35*	Ω	V_{GS} =10V, I_D = 5A , T_C =125°C

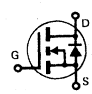
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	3.0*		9.0*	S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 5A
C_{iss}	Input Capacitance	All	350*		900*	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All	150*		500*	pF	
C_{rss}	Reverse Transfer Capacitance	All	50*		150*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			30*	ns	V_{DD} = 30V , $I_D \cong$ 5A R_g = 7.5Ω , R_L = 6Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			75*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			40*	ns	
t_f	Fall Time	All			45*	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			5.0*	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6795			−8*	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
		2N6796			−8*	A	
I_{SM}	Source Current[1] (Body Diode)	2N6795			−25	A	
		2N6796			−25	A	
V_{SD}	Diode Forward Voltage[1]	2N6795	−0.75*		−1.5*	V	T_C = 25°C , I_S =−8A , V_{GS} = 0
		2N6796	−0.75*		−1.5*	V	T_C = 25°C , I_S =−8A , V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		300		ns	T_J =150°C , $I_F = I_S$, dI_F/ds =100 A/μs

1 **Pulse Test:** Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%
*JEDEC Registered Values

Data Sheet Curves: VNDE10

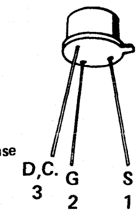
2N6797 ■ 2N6798

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Fast Switching
- Motor Controls
- Power Supplies



PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6797	150	0.4	T0–205AF
2N6798	200	0.4	T0–205AF

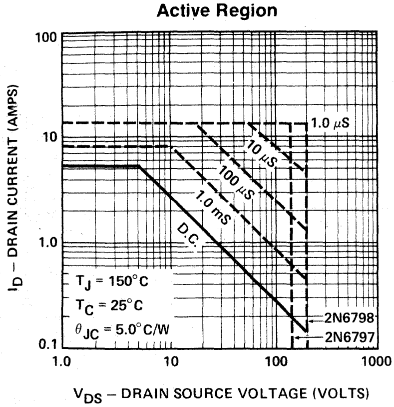
For Additional Curves
See Section 5: VNDE20

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

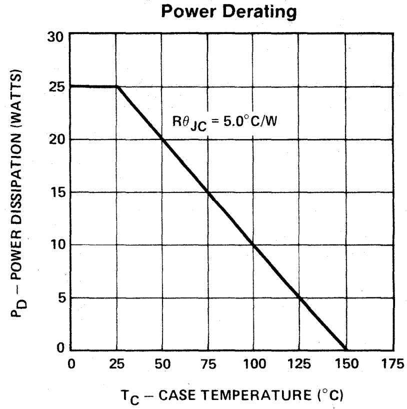
	Parameter	2N6797	2N6798	Units
V_{DS}	Drain-Source Voltage	150*	200*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	150*	200*	V
I_D @ T_C = 25° C	Continuous Drain Current	±5.5*	±5.5*	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.5*	±3.5*	A
I_{DM}	Pulsed Drain Current[1]	±12.5	±12.5	A
V_{GS}	Gate-Source Voltage[2]	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	25*	25*	W
P_D @ T_C = 100°C	Max. Power Dissipation	10*	10*	W
Junction to Case	Linear Derating Factor	0.2*	0.2*	W/° C
Junction to Ambient	Linear Derating Factor	.005	.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55* To +150*	−55* To +150*	° C
Lead Temperature	(1/16" from case for 10 secs.)	300*	300*	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6797	150*			V	V_{GS} = 0, I_D = 1 mA
		2N6798	200*			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0*		4.0*	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100*	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–100*	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All			1.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All			4.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6797	5.5			A	$V_{DS} \geqslant 2\ V_{DS}$, V_{GS} = 10V
		2N6798	5.5			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6797			2.2*	V	V_{GS} = 10V, I_D = 5.5A
		2N6798			2.2*	V	V_{GS} = 10V, I_D = 5.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6797			0.4*	Ω	V_{GS} = 10V, I_D = 3.5A
		2N6798			0.4*	Ω	V_{GS} = 10V, I_D = 3.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6797			0.75*	Ω	V_{GS} =10V, I_D =3.5A, T_C =125°C
		2N6798			0.75*	Ω	V_{GS} =10V, I_D =3.5A, T_C =125°C

DYNAMIC

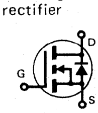
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5*		7.5*	S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 3.5A
C_{iss}	Input Capacitance	All	350*		900*	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All	100*		450*	pF	
C_{rss}	Reverse Transfer Capacitance	All	40*		150*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			30*	ns	V_{DD} = 77V, $I_D \cong$ 3.5A, R_g = 7.5Ω, R_L = 22Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			50*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			50*	ns	
t_f	Fall Time	All			40*	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			5.0*	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6797			–5.5*	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		2N6798			–5.5*	A	
I_{SM}	Source Current[1] (Body Diode)	2N6797			–12.5	A	
		2N6798			–12.5	A	
V_{SD}	Diode Forward Voltage[1]	2N6797	–0.75*		–1.5*	V	T_C=25°C, I_S=–5.5A, V_{GS} = 0
		2N6798	–0.75*		–1.5*	V	T_C=25°C, I_S=–5.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		650		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%
*JEDEC Registered Values

Data Sheet Curves: VNDE20

Siliconix

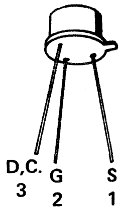
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Fast Switching
- Motor Controls
- Power Supplies

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6799	350	1.0	T0–205AF
2N6800	400	1.0	T0–205AF



PIN 1 — Source
PIN 2 — Gate
PIN 3 — Drain, Case

T0–205AF (T0–39)

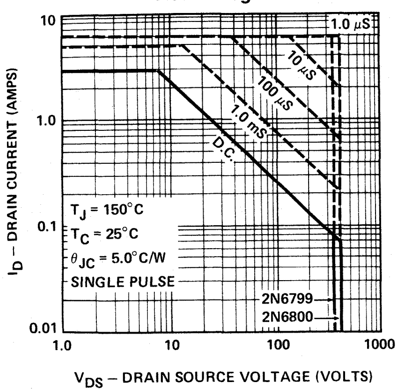
For Additional Curves
See Section 5: VNDE40

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

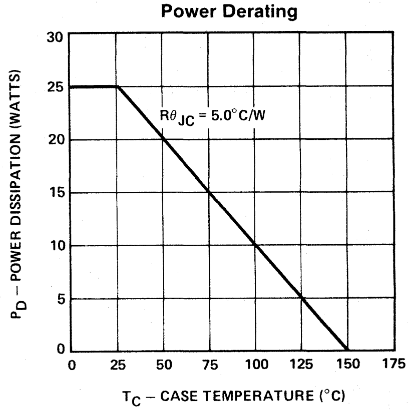
	Parameter	2N6799	2N6800	Units
V_{DS}	Drain-Source Voltage	350*	400*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	350*	400*	V
I_D @ T_C = 25° C	Continuous Drain Current	±3*	±3*	A
I_D @ T_C = 100° C	Continuous Drain Current	±2*	±2*	A
I_{DM}	Pulsed Drain Current[1]	±6	±6	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	25*	25*	W
P_D @ T_C = 100°C	Max. Power Dissipation	10*	10*	W
Junction to Case	Linear Derating Factor	0.2*	0.2*	W/° C
Junction to Ambient	Linear Derating Factor	.005	.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55* To +150*	–55* To +150*	° C
Lead Temperature	(1/16" from case for 10 secs.)	300*	300*	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6799	350*			V	V_{GS} = 0, I_D = 1.0 mA
		2N6800	400*			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0*		4.0*	V	$V_{DS} = V_{GS}$, I_D = 1.0 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100*	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			–100*	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All			1.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All			4.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6799	3.0			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
		2N6800	3.0			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6799			3.0*	V	V_{GS} = 10V, I_D = 3.0A
		2N6800			3.0*	V	V_{GS} = 10V, I_D = 3.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6799			1.0*	Ω	V_{GS} = 10V, I_D = 2.0A
		2N6800			1.0*	Ω	V_{GS} = 10V, I_D = 2.0A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6799			2.4*	Ω	V_{GS} = 10V, I_D = 2A, T_C = 125°C
		2N6800			2.4*	Ω	V_{GS} = 10V, I_D = 2A, T_C = 125°C

DYNAMIC

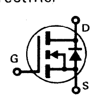
Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.0*		6.0*	S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 2A
C_{iss}	Input Capacitance	All	350*		900*	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All	50*		300*	pF	
C_{rss}	Reverse Transfer Capacitance	All	20*		60*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			30*	ns	V_{DD} = 176, $I_D \cong$ 2.0A, R_g = 7.5Ω, R_L = 88Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			35*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			55*	ns	
t_f	Fall Time	All			35*	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			5.0*	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6799			–3*	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		2N6800			–3*	A	
I_{SM}	Source Current[1] (Body Diode)	2N6799			–16	A	
		2N6800			–16	A	
V_{SD}	Diode Forward Voltage[1]	2N6799	–0.7*		–1.4*	V	T_C = 25°C, I_S = –3A, V_{GS} = 0
		2N6800	–0.7*		–1.4*	V	T_C = 25°C, I_S = –3A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%
*JEDEC Registered Values

Data Sheet Curves: VNDE40

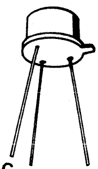
2N6801 ■ 2N6802

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Fast Switching
- Motor Controls
- Power Supplies



PIN 1 — Source
PIN 2 — Gate
PIN 3 — Drain, Case

D,C. 3 G 2 S 1 T0–205AF (T0–39)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N6801	450	1.5	T0–205AF
2N6802	500	1.5	T0–205AF

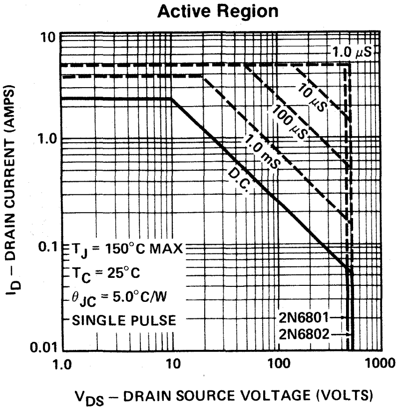
For Additional Curves
See Section 5: VNDE50

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

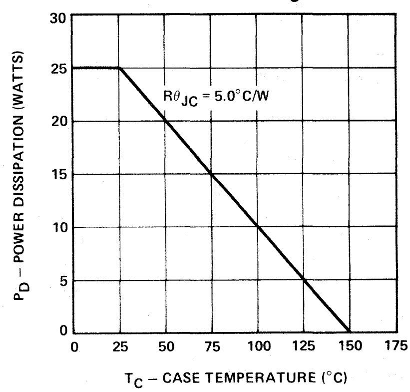
	Parameter	2N6801	2N6802	Units
V_{DS}	Drain-Source Voltage	450*	500*	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	450*	500*	V
I_D @ T_C = 25° C	Continuous Drain Current	±2.5*	±2.5*	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.5*	±1.5*	A
I_{DM}	Pulsed Drain Current[1]	±5	±5	A
V_{GS}	Gate-Source Voltage[2]	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	25*	25*	W
P_D @ T_C = 100°C	Max. Power Dissipation	10*	10*	W
Junction to Case	Linear Derating Factor	0.2*	0.2*	W/° C
Junction to Ambient	Linear Derating Factor	.005	.005	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55* To +150*	–55* To +150*	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300*	300*	° C

1 Pulse Test: Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



2

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N6801	450*			V	V_{GS} = 0, I_D = 1.0 mA
		2N6802	500*			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2.0*		4.0	V	V_{DS} = V_{GS}, I_D = 1.0 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100*	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All			1*	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All			4.0*	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N6801	2.5			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D = 1.5A
		2N6802	2.5			A	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D = 1.5A
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N6801			3.75*	V	V_{GS} = 10V, I_D = 2.5A
		2N6802			3.75*	V	V_{GS} = 10V, I_D = 2.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6801			1.5*	Ω	V_{GS} = 10V, I_D = 1.5A
		2N6802			1.5*	Ω	V_{GS} = 10V, I_D = 1.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N6801			3.5*	Ω	V_{GS} =10V, I_D =1.5A, T_C =125°C
		2N6802			3.5*	Ω	V_{GS} =10V, I_D =1.5A, T_C =125°C

DYNAMIC

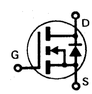
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	1.5*		4.5*	S (℧)	$V_{DS} \geqslant 2\ V_{DS(ON)}$, I_D = 1.5A
C_{iss}	Input Capacitance	All	350*		900*	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All	25*		200*	pF	
C_{rss}	Reverse Transfer Capacitance	All	15*		60*	pF	
$t_{d(on)}$	Turn-On Delay Time	All			30*	ns	V_{DD} =225V, $I_D \cong$ 1.5A, R_g = 7.5Ω, R_L = 150Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All			30*	ns	
$t_{d(off)}$	Turn-Off Delay Time	All			55*	ns	
t_f	Fall Time	All			30*	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			5.0*	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N6801			−5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		2N6802			−5	A	
I_{SM}	Source Current[1] (Body Diode)	2N6801			−2.5	A	
		2N6802			−2.5	A	
V_{SD}	Diode Forward Voltage[1]	2N6801	−0.7		−1.4*	V	T_C=25°C, I_S=−2.5A, V_{GS} = 0
		2N6802	−0.7		−1.4*	V	T_C=25°C, I_S=−2.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C, I_F = I_S, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE50

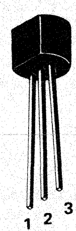
Siliconix

N-Channel Enhancement Mode

MOSPOWER FETlington™

APPLICATIONS

- CMOS or TTL Logic Compatible
- Bipolar Darlington Replacement
- Lamp, Relay Driver or Buffer
- Analog Signal Switching



PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
2N7000	60	5	T0–92

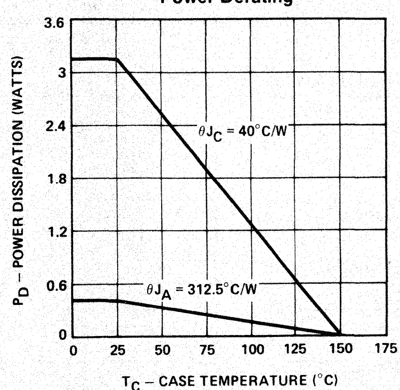
NEW LOGIC-TO-LOAD DESIGN
5 Volts in-100 mA out

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	2N7000	Units
V_{DS}	Drain-Source Voltage	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±200	mA
I_D @ T_C = 100° C	Continuous Drain Current	±123	mA
I_{DM}	Pulsed Drain Current[1]	±500	mA
V_{GS}	Gate-Source Voltage	±40	V
P_D	Max. Continuous Power Dissipation	400	mW
P_D	Max. Pulsed Power Dissipation[2]	3.125	W
Junction to Case	Linear Derating Factor	25	mW/° C
Junction to Ambient	Linear Derating Factor	3.2	mW/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%
2 One Second Single, Power Pulse

Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	2N7000	60	80		V	V_{GS} = 0 I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	2N7000	0.8	1.8	3	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	2N7000		1	10	nA	V_{GS} = +15V
I_{GSSR}	Gate-Body Leakage Reverse	2N7000		–1	–10	nA	V_{GS} = –15V
I_{DSS}	Zero Gate Voltage Drain Current	2N7000		0.1	1	μA	V_{DS} = 48V , V_{GS} = 0
		2N7000		0.1	1	mA	V_{DS} = 48V , V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	2N7000	75	100		mA	V_{GS} = 4.5V , V_{DS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	2N7000		1.2	2.5	V	V_{GS} = 10V , I_D = 0.5A
		2N7000			0.40	V	V_{GS} = 4.5V , I_D = 75 mA
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N7000		2.4	5	Ω	V_{GS} = 10V , I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	2N7000		4.3	9	Ω	V_{GS} = 10V, I_D = 0.5A, T_C = 125°C

DYNAMIC

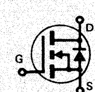
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	2N7000	100	200		mS(℧)	V_{DS} = 10V, I_D = 0.2A
C_{iss}	Input Capacitance	2N7000		30	60	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	2N7000		14	25	pF	
C_{rss}	Reverse Transfer Capacitance	2N7000		2	5	pF	
$t_{(ON)}$	Turn-On Time	2N7000		6	10	ns	V_{DD} = 15V , $I_D \cong$ 0.50A R_g = 25Ω , R_L = 25Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{(OFF)}$	Turn-Off Time	2N7000		6	10	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	2N7000		33	40	°C/W	
R_{thJA}	Junction-to-Ambient	2N7000			312.5	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	2N7000			–0.2	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	2N7000			–0.5	A	
V_{SD}	Diode Forward Voltage[1]	2N7000		–0.85		V	T_C = 25°C, I_S = –0.2A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Pro-Electron 3

BS107

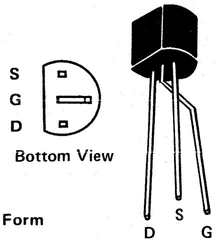
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Relay Contact Replacement
- Converters
- Analog Switches

PIN 1 — Source
PIN 2 — Gate
PIN 3 — Drain



T0–92 Lead Form

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BS107	200	28	T0–92

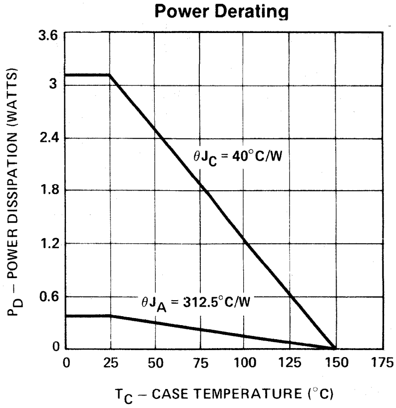
For Additional Curves
See Section 5: VNDF24

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	BS107	Units
V_{DS}	Drain-Source Voltage	200	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	200	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.082	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.052	A
I_{DM}	Pulsed Drain Current[1]	±0.23	A
V_{GS}	Gate-Source Voltage	±40	V
P_D	Max Continuous Power Dissipation	0.4	W
P_D	Max Pulse[2] Power Dissipation	3.125	W
Junction to Case	Linear Derating Factor	0.025	W/° C
Junction to Ambient	Linear Derating Factor	0.0032	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



3

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BS107	200	275		V	V_{GS} = 0 I_D = 100 μA
$V_{GS(th)}$	Gate-Threshold Voltage	BS107	0.8	1.2	3	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	BS107		1	10	nA	V_{GS} = +15V V_{DS} = 0
I_{GSSR}	Gate-Body Leakage Reverse	BS107		−1	−10	nA	V_{GS} = −15V V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	BS107		5	30	nA	V_{DS} = 130V , V_{GS} = 0
		BS107		0.1	1	μA	V_{DS} = 70V , V_{GS} = 0.2V
$I_{D(on)}$	On-State Drain Current[1]	BS107	100	350		mA	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BS107		0.4	0.56	V	V_{GS} = 2.8V , I_D = 20 mA
		BS107		1	1.40	V	V_{GS} = 10V , I_D = 50 mA
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BS107		20	28	Ω	V_{GS} = 2.8V , I_D = 20 mA
		BS107		20	28	Ω	V_{GS} = 10V , I_D = 50 mA
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BS107		46	65	Ω	V_{GS}=10V, I_D=50mA, T_C=125°C

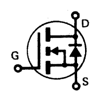
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BS107	50	80		mS(℧)	$V_{DS} \geqslant 10$V, I_D = 100 mA
C_{iss}	Input Capacitance	BS107		40	60	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	BS107		30	45	pF	
C_{rss}	Reverse Transfer Capacitance	BS107		8	15	pF	
t_{ON}	Turn-On Time	BS107		6	10	ns	V_{DD} = 15V , $I_D \cong$ 0.6A R_g = 25Ω , R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	BS107		6	10	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BS107		33	40	°C/W	
R_{thJA}	Junction-to-Ambient	BS107			312.5	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BS107			−0.082	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BS107			−0.23	A	
V_{SD}	Diode Forward Voltage[1]	BS107		−0.85		V	T_C=25°C, I_S=−0.082A, V_{GS} = 0

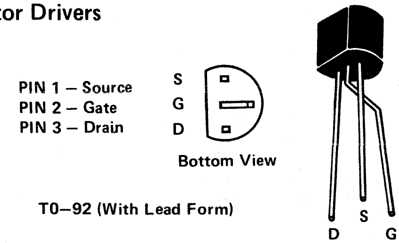
1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDF24

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS
- Switching Regulators
- Converters
- Motor Drivers



PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BS170	60	5	T0–92

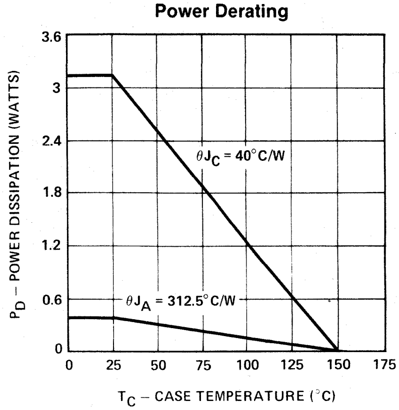
For Additional Curves
See Section 5: VNDF06

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	BS170	Units
V_{DS}	Drain-Source Voltage	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.195	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.123	A
I_{DM}	Pulsed Drain Current[1]	±0.545	A
V_{GS}	Gate-Source Voltage	±40	V
P_D	Max Continuous Power Dissipation	0.4	W
P_D	Max Pulse[2] Power Dissipation	3.125	W
Junction to Case	Linear Derating Factor	0.025	W/° C
Junction to Ambient	Linear Derating Factor	0.0032	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 1 Sec Single, Power Pulse

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BS170	60	80		V	V_{GS} = 0 I_D = 100 μA
$V_{GS(th)}$	Gate-Threshold Voltage	BS170	0.8	1.8	3	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	BS170		1	10	nA	V_{GS} = +15V
I_{GSSR}	Gate-Body Leakage Reverse	BS170		–1	–10	nA	V_{GS} = –15V
I_{DSS}	Zero Gate Voltage Drain Current	BS170		100	500	nA	V_{DS} = 25V , V_{GS} = 0
		BS170		0.1	0.5	mA	V_{DS} = 25V, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BS170	0.3	1.5		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BS170		0.6	1	V	V_{GS} = 10V , I_D = 0.2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BS170		3	5	Ω	V_{GS} = 10V , I_D = 0.2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BS170		5.4	9	Ω	V_{GS} = 10V, I_D = 0.2A, T_C = 125°C

DYNAMIC

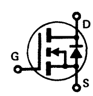
Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BS170	100	200		mS(℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 0.2A
C_{iss}	Input Capacitance	BS170		30	60	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	BS170		14	25	pF	
C_{rss}	Reverse Transfer Capacitance	BS170		2	5	pF	
t_{ON}	Turn-On Time	BS170		6	10	ns	V_{DD} = 15V , $I_D \cong$ 0.6A R_g = 25Ω , R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	BS170		6	10	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BS170		33	40	°C/W	
R_{thJA}	Junction-to-Ambient	BS170			312.5	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BS170			–0.4	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BS170			–0.545	A	
V_{SD}	Diode Forward Voltage[1]	BS170		–0.85		V	T_C=25°C, I_S=–0.4A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDF06

BS250

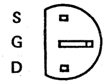
Siliconix

P-Channel Enhancement Mode
MOSPOWER

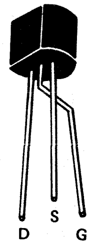
APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PIN 1 – Source
PIN 2 – Gate
PIN 3 – Drain



Bottom View



T0–92 Lead Form

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BS250	–45	14	T0–92

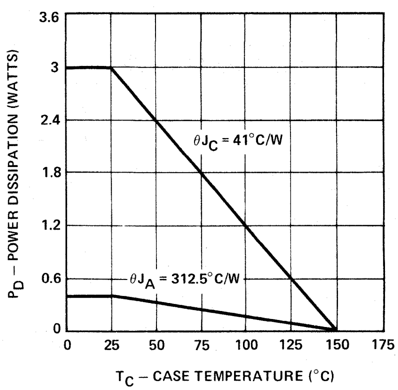
For Additional Curves
See Section 5: VPMH10

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	BS250	Units
V_{DS}	Drain-Source Voltage	–45	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	–45	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.13	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.08	A
I_{DM}	Pulsed Drain Current[1]	±0.35	A
V_{GS}	Gate-Source Voltage	±40	V
P_D	Max Continuous Power Dissipation	0.4	W
P_D	Max Pulse[2] Power Dissipation	3	W
Junction to Case	Linear Derating Factor	0.024	W/° C
Junction to Ambient	Linear Derating Factor	0.0032	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



3

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BS250	−45	−120		V	V_{GS} = 0, I_D = −100 μA
$V_{GS(th)}$	Gate-Threshold Voltage	BS250	−1	−2.75	−3.5	V	V_{DS} = V_{GS}, I_D = −1 mA
I_{GSSF}	Gate-Body Leakage Forward	BS250		−5	−20	nA	V_{GS} = −15V
I_{GSSR}	Gate-Body Leakage Reverse	BS250		+5	+20	nA	V_{GS} = +15V
I_{DSS}	Zero Gate Voltage Drain Current	BS250		−0.5	−500	nA	V_{DS} = −25V, V_{GS} = 0
		BS250		−25	−500	μA	V_{DS} = −25V, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BS250	−0.2	−0.5		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = −10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BS250		−2.4	−2.8	V	V_{GS} = −10V, I_D = −0.2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BS250		12	14	Ω	V_{GS} = −10V, I_D = −0.2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BS250		30	35	Ω	V_{GS}=−10V, I_D=−0.2A, T_C=125°C

DYNAMIC

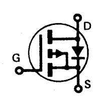
g_{fs}	Forward Transductance[1]	BS250	200	300		mS(℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = −0.2A
C_{iss}	Input Capacitance	BS250		125	150	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	BS250		47	60	pF	
C_{rss}	Reverse Transfer Capacitance	BS250		15	25	pF	
$t_{d(on)}$	Turn-On Delay Time	BS250		4.5	10	ns	V_{DD} = −25V, $I_D \cong$ −0.5A, R_g = 25Ω, R_L = 45Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BS250		7.5	10	ns	
$t_{d(off)}$	Turn-Off Delay Time	BS250		5	10	ns	
t_f	Fall Time	BS250		7	10	ns	

THERMAL RESISTANCE

R_{thJC}	Junction-to-Case	BS250		34	41	°C/W	
R_{thJA}	Junction-to-Ambient	BS250			312.5	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)	BS250			0.13	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BS250			0.35	A	
V_{SD}	Diode Forward Voltage[1]	BS250		1.2		V	T_C=25°C, I_S=0.13A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VPMH10

BSR65 ■ BSR64

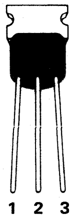
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PIN 1 — Source
PIN 2 — Gate
PIN 3 & TAB — Drain



T0–237

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BSR65	60	5	T0–237
BSR64	60	7.5	T0–237

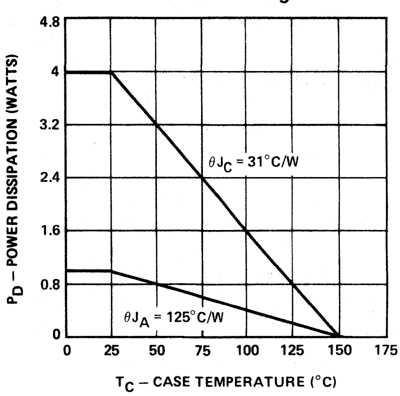
For Additional Curves
See Section 5: VNDF06

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	BSR65	BSR64	Units
V_{DS}	Drain-Source Voltage	60	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.3	±0.25	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.23	±0.16	A
I_{DM}	Pulsed Drain Current[1]	±1	±1	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D	Max Continuous Power Dissipation	1	1	W
P_D	Max Pulse[2] Power Dissipation	4	4	W
Junction to Case	Linear Derating Factor	0.032	0.032	W/° C
Junction to Ambient	Linear Derating Factor	0.008	0.008	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



3

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	All	60	80		V	V_{GS} = 0, I_D = 100 μA
$V_{GS(th)}$	Gate-Threshold Voltage	BSR65	0.8	1.8	2.5	V	V_{DS} = V_{GS}, I_D = 1 mA
		BSR64	0.6	1.8	2.5		
I_{GSSF}	Gate-Body Leakage Forward	All		5	100	nA	V_{GS} = +15V
I_{GSSR}	Gate-Body Leakage Reverse	All		−5	−100	nA	V_{GS} = −15V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	10	μA	V_{DS} = 45V, V_{GS} = 0
		All		5	500	μA	V_{DS} = 45V, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	0.75	1.5		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1	1.5	V	V_{GS} = 5V, I_D = 0.2A
		BSR65		1.5	2.5	V	V_{GS} = 10V, I_D = 0.5A
		BSR64		2.25	3.75		
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		5	7.5	Ω	V_{GS} = 5V, I_D = 0.2A
		BSR65		3	5	Ω	V_{GS} = 10V, I_D = 0.5A
		BSR64		4.5	7.5		
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BSR65		5.4	9	Ω	V_{GS} = 10V, I_D = 0.5A, T_C = 125°C
		BSR64		8.1	13.5	Ω	V_{GS} = 10V, I_D = 0.5A, T_C = 125°C

DYNAMIC

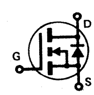
Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	100	200		mS (m℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		30	60	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		14	25	pF	
C_{rss}	Reverse Transfer Capacitance	All		2	5	pF	
t_{ON}	Turn-On Time	All		6	10	ns	V_{DD} = 15V, $I_D \cong$ 0.6A, R_g = 25Ω, R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	All		6	10	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			31	°C/W	
R_{thJA}	Junction-to-Ambient	All			125	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BSR65			−0.3	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		BSR64			−0.25	A	
I_{SM}	Source Current[1] (Body Diode)	All			−1	A	
V_{SD}	Diode Forward Voltage[1]	BSR65		−0.85		V	T_C=25°C, I_S=−0.3A, V_{GS} = 0
		BSR64		−0.85		V	T_C=25°C, I_S=−0.25A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDF06

Siliconix

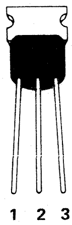
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PIN 1 — Source
PIN 2 — Gate
PIN 3 & TAB — Drain

TO–237



PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BSR66	60	3	T0–237

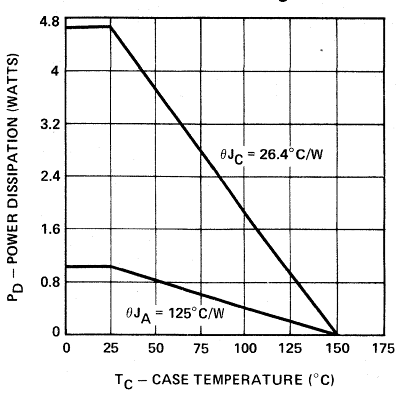
For Additional Curves
See Section 5: VNMA06

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	BSR66	Units
V_{DS}	Drain-Source Voltage	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.47	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.30	A
I_{DM}	Pulsed Drain Current[1]	±2	A
V_{GS}	Gate-Source Voltage	±40	V
P_D	Max Continuous Power Dissipation	1	W
P_D	Max Pulse[2] Power Dissipation	4.7	W
Junction to Case	Linear Derating Factor	0.038	W/° C
Junction to Ambient	Linear Derating Factor	0.008	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BSR66	60	100		V	V_{GS} = 0, I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	BSR66	0.8	1.5	2	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	BSR66		1	100	nA	V_{GS} = +15V
I_{GSSR}	Gate-Body Leakage Reverse	BSR66		−1	−100	nA	V_{GS} = −15V
I_{DSS}	Zero Gate Voltage Drain Current	BSR66		0.1	10	μA	V_{DS} = Max. Rating, V_{GS} = 0
$I_{D(on)}$	On-State Drain Current[1]	BSR66	1.5	1.7		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BSR66		2.7	3	V	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BSR66		2.7	3	Ω	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BSR66		3.7	4.1	Ω	V_{GS} = 10V, I_D = 1A, T_C = 125°C

DYNAMIC

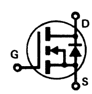
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BSR66	170	195		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	BSR66		35	50	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	BSR66		33	40	pF	
C_{rss}	Reverse Transfer Capacitance	BSR66		2	10	pF	
t_{ON}	Turn-On Time	BSR66		8	10	ns	V_{DD} = 25V, $I_D \cong$ 1A, R_g = 25Ω, R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	BSR66		8	10	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BSR66		22	26.4	°C/W	
R_{thJA}	Junction-to-Ambient	BSR66			125	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BSR66			−0.4	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BSR66			−2	A	
V_{SD}	Diode Forward Voltage[1]	BSR66		−1.2		V	T_C = 25°C, I_S = −0.4, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMA06

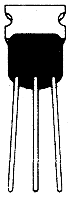
BSR67

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BSR67	80	4	T0–237

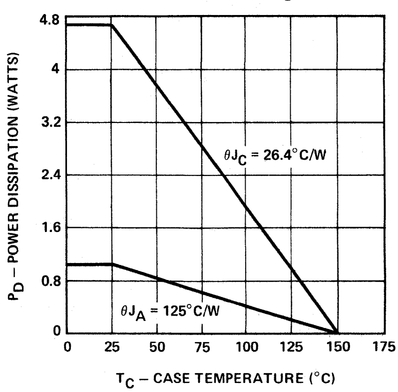
For Additional Curves
See Section 5: VNMA09

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	BSR67	Units
V_{DS}	Drain-Source Voltage	80	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	80	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.4	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.26	A
I_{DM}	Pulsed Drain Current[1]	±2	A
V_{GS}	Gate-Source Voltage	±40	V
P_D	Max Continuous Power Dissipation	1	W
P_D	Max Pulse[2] Power Dissipation	4.7	W
Junction to Case	Linear Derating Factor	0.038	W/° C
Junction to Ambient	Linear Derating Factor	0.008	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



3

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BSR67	80	110		V	V_{GS} = 0, I_D = 10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	BSR67	0.8	1.5	2	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	BSR67		1	100	nA	V_{GS} = +15V
I_{GSSR}	Gate-Body Leakage Reverse	BSR67		−1	−100	nA	V_{GS} = −15V
I_{DSS}	Zero Gate Voltage Drain Current	BSR67		1	10	μA	V_{DS} = Max. Rating, V_{GS} = 0
		BSR67		50	500	μA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BSR67	1.5	1.7		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BSR67		3	4	V	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BSR67		3	4	Ω	V_{GS} = 10V, I_D = 1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BSR67		4.2	5.5	Ω	V_{GS} = 10V, I_D = 1A, T_C = 125°C

DYNAMIC

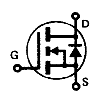
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BSR67	170	195		mS	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	BSR67		35	50	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	BSR67		33	40	pF	
C_{rss}	Reverse Transfer Capacitance	BSR67		2	10	pF	
t_{ON}	Turn-On Time	BSR67		8	10	ns	V_{DD} = 25V, $I_D \cong$ 1A, R_g = 25Ω, R_L = 23Ω (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	BSR67		8	10	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BSR67		22	26.4	°C/W	
R_{thJA}	Junction-to-Ambient	BSR67			125	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BSR67			−0.4	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BSR67			−2	A	
V_{SD}	Diode Forward Voltage[1]	BSR67		−1.2		V	T_C=25°C, I_S=−0.4A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMA09

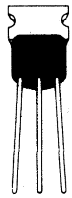
BSR76 ■ BSR72 ■ BSR70

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



1 2 3

PIN 1 – Source
PIN 2 – Gate
PIN 3 & TAB – Drain

TO–237

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BSR76	240	10	TO–237
BSR72	170	10	TO–237
BSR70	120	10	TO–237

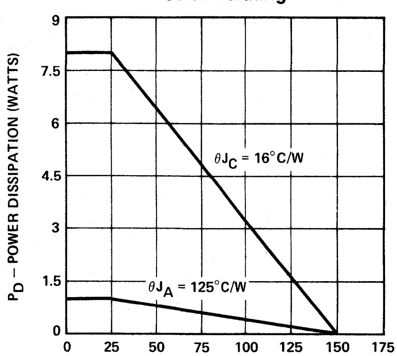
For Additional Curves
See Section 5: VNDB24

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	BSR76	BSR72	BSR70	Units
V_{DS}	Drain-Source Voltage	240	170	120	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	240	170	120	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.19	±0.19	±0.19	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.12	±0.12	±0.12	A
I_{DM}	Pulsed Drain Current[1]	±1	±1	±1	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D	Max Continuous Power Dissipation	1	1	1	W
P_D	Max Pulse[2] Power Dissipation	7.9	7.9	7.9	W
Junction to Case	Linear Derating Factor	0.063	0.063	0.063	W/° C
Junction to Ambient	Linear Derating Factor	0.008	0.008	0.008	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	–55 To +150	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



T_C – CASE TEMPERATURE (°C)

3

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BSR76 BSR72	240 170	260 200		V	V_{GS} = 0 I_D = 100 μA
		BSR70	120	160		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8	1.5	2	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} =+15V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} =−15V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.5	10	μA	V_{DS} =120V , V_{GS} = 0
		All		25	500	μA	V_{DS} =120V , V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	1	1.5		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		0.8	1	V	V_{GS} =2.5V , I_D = 0.1A
		All		4	5	V	V_{GS} =10V , I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		8	10	Ω	V_{GS} = 2.5V , I_D = 0.1A
		All		8	10	Ω	V_{GS} =10V , I_D = 0.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		19.8	24.7	Ω	V_{GS} =10V, I_D =0.5A, T_C =125°C

DYNAMIC

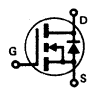
Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	300	375		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 0.5A
C_{iss}	Input Capacitance	All		80	125	pF	V_{GS} = 0 ,V_{DS} =25V f = 1 MHz
C_{oss}	Output Capacitance	All		25	50	pF	
C_{rss}	Reverse Transfer Capacitance	All		5	20	pF	
$t_{d(on)}$	Turn-On Delay Time	All		5	8	ns	V_{DD} =60V , $I_D \cong$ 0.1A R_g = 25Ω , R_L = 600Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		5	8	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		15	23	ns	
t_f	Fall Time	All		30	34	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			16	°C/W	
R_{thJA}	Junction-to-Ambient	All			125	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−0.19	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−1	A	
V_{SD}	Diode Forward Voltage[1]	All		−1.2		V	T_C=25°C, I_S=−0.19A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

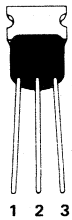
Data Sheet Curves: VNDB24

BSR78

P-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 — Source
PIN 2 — Gate
PIN 3 & TAB — Drain

T0–237

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BSR78	–30	2.5	T0–237

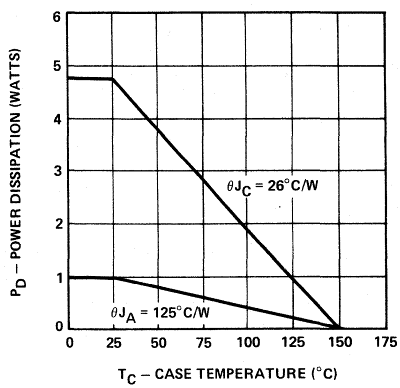
For Additional Curves
See Section 5: VPMH03

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	BSR78	Units
V_{DS}	Drain-Source Voltage	–30	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	–30	V
I_D @ T_C = 25° C	Continuous Drain Current	±0.5	A
I_D @ T_C = 100° C	Continuous Drain Current	±0.32	A
I_{DM}	Pulsed Drain Current[1]	±3	A
V_{GS}	Gate-Source Voltage	±40	V
P_D	Max Continuous Power Dissipation	1	W
P_D	Max Pulse[2] Power Dissipation	4.3	W
Junction to Case	Linear Derating Factor	0.034	W/° C
Junction to Ambient	Linear Derating Factor	0.008	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 1 Sec Continuous Power Single Pulse

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BSR78	−30	−45		V	V_{GS} = 0, I_D = −10 μA
$V_{GS(th)}$	Gate-Threshold Voltage	BSR78	−2	−3.4	−4.5	V	$V_{DS} = V_{GS}$, I_D = −1 mA
I_{GSSF}	Gate-Body Leakage Forward	BSR78		−1	−100	nA	V_{GS} = −30V, V_{DS} = 0
I_{GSSR}	Gate-Body Leakage Reverse	BSR78		1	100	nA	V_{GS} = 30V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	BSR78		−1	−10	μA	V_{DS} = −25V, V_{GS} = 0
$I_{D(on)}$	On-State Drain Current[1]	BSR78	−1.5	−1.7		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = −12V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BSR78		−2.2	−2.5	V	V_{GS} = −12V, I_D = −1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BSR78		2.2	2.5	Ω	V_{GS} = −12V, I_D = −1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BSR78		3.2	3.63	Ω	V_{GS}=−12V, I_D=−1A, T_C=125°C

DYNAMIC

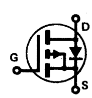
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BSR78	200	300		mS (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = −0.5A
C_{iss}	Input Capacitance	BSR78		125	150	pF	V_{GS} = 0, V_{DS} = −15V, f = 1 MHz
C_{oss}	Output Capacitance	BSR78		92	100	pF	
C_{rss}	Reverse Transfer Capacitance	BSR78		25	60	pF	
t_{ON}	Turn-On Time	BSR78		20	30	ns	V_{DD} = −25V, $I_D \cong$ −1A, R_g = 25Ω, R_L = 24Ω (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	BSR78		20	30	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BSR78		24	29	°C/W	
R_{thJA}	Junction-to-Ambient	BSR78			125	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BSR78			0.5A	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BSR78			3	A	
V_{SD}	Diode Forward Voltage[1]	BSR78		1.2		V	T_C = 25°C, I_S = 0.5A, V_{GS} = 0



1 **Pulse Test:** Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VPMH03

BSR80

Siliconix

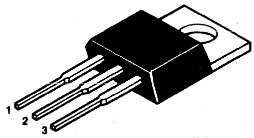
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BSR80	40	3	T0–220AB



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

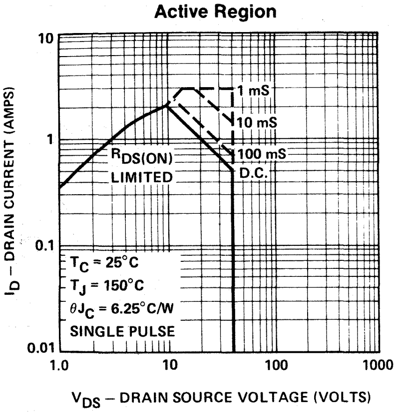
For Additional Curves
See Section 5: VNMA06

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

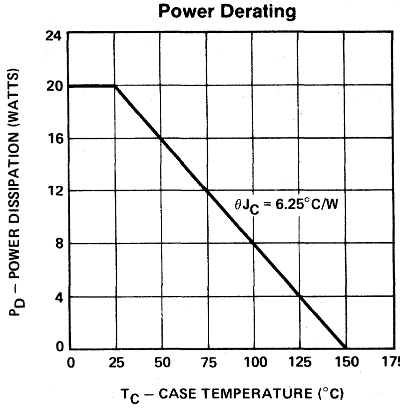
	Parameter	BSR80	Units
V_{DS}	Drain-Source Voltage	40	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	40	V
I_D @ T_C = 25° C	Continuous Drain Current	±2.1	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.34	A
I_{DM}	Pulsed Drain Current[1]	±3	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20	W
P_D @ T_C = 100°C	Max. Power Dissipation	8	W
Junction to Case	Linear Derating Factor	0.16	W/° C
Junction to Ambient	Linear Derating Factor	0.034	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BSR80	40	70		V	$V_{GS} = 0$ $I_D = 10\ \mu A$
$V_{GS(th)}$	Gate-Threshold Voltage	BSR80	0.8	1.5	2.5	V	$V_{DS} = V_{GS}$, $I_D = 1$ mA
I_{GSSF}	Gate-Body Leakage Forward	BSR80		1 10	10 100	nA	$V_{GS} = +15V$, $V_{DS} = 0$ $V_{GS} = +15V$, $V_{DS} = 0$, $T_A = 125°C$
I_{GSSR}	Gate-Body Leakage Reverse	BSR80		−1	−10	nA	$V_{GS} = -15V$ $V_{DS} = 0$
I_{DSS}	Zero Gate Voltage Drain Current	BSR80		1	10	µA	V_{DS} = Max. Rating, $V_{GS} = 0$
		BSR80		50	500	µA	V_{DS} = Max. Rating, $V_{GS} = 0$ $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	BSR80	1	1.7		A	$V_{DS} \geq 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BSR80		1.2	1.5	V	$V_{GS} = 5V$, $I_D = 0.3A$
		BSR80		2.5	3	V	$V_{GS} = 10V$, $I_D = 1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BSR80		4	5	Ω	$V_{GS} = 5V$, $I_D = 0.3A$
		BSR80		2.5	3	Ω	$V_{GS} = 10V$, $I_D = 1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BSR80		3	4.2	Ω	$V_{GS} = 10V$, $I_D = 1A$, $T_C = 125°C$

DYNAMIC

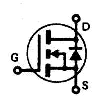
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BSR80	170	195		mS	$V_{DS} \geq 2V_{DS(ON)}$, $I_D = 0.5A$
C_{iss}	Input Capacitance	BSR80		35	50	pF	$V_{GS} = 0$, $V_{DS} = 25V$ f = 1 MHz
C_{oss}	Output Capacitance	BSR80		33	40	pF	
C_{rss}	Reverse Transfer Capacitance	BSR80		2	10	pF	
t_{ON}	Turn-On Time	BSR80		8	10	ns	$V_{DD} = 25V$, $I_D \cong 1A$ $R_g = 25\Omega$, $R_L = 23\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	BSR80		8	10	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BSR80			6.25	°C/W	
R_{thJA}	Junction-to-Ambient	BSR80			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BSR80			−2.1	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BSR80			−3	A	
V_{SD}	Diode Forward Voltage[1]	BSR80		−1.2		V	$T_C = 25°C$, $I_S = -2.1A$, $V_{GS} = 0$



1 **Pulse Test:** Pulse Width ≤ 300 µsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNMA06

BSR81

Siliconix

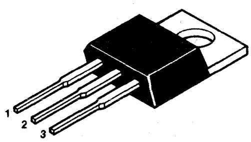
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BSR81	60	3	T0–220AB



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

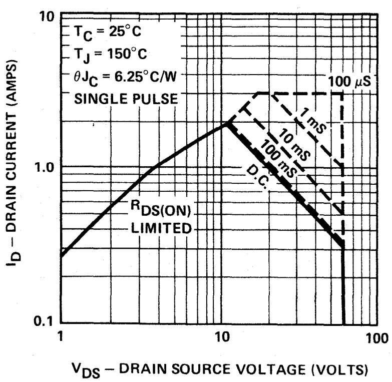
For Additional Curves
See Section 5: VNMA06

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

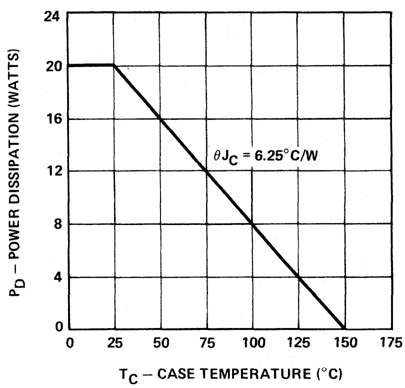
	Parameter	BSR81	Units
V_{DS}	Drain-Source Voltage	60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	60	V
I_D @ T_C = 25° C	Continuous Drain Current	±2.1	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.34	A
I_{DM}	Pulsed Drain Current[1]	±3	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20	W
P_D @ T_C = 100°C	Max. Power Dissipation	8	W
Junction to Case	Linear Derating Factor	0.16	W/° C
Junction to Ambient	Linear Derating Factor	0.0125	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



3

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BSR81	60	100		V	$V_{GS} = 0$, $I_D = 10\ \mu A$
$V_{GS(th)}$	Gate-Threshold Voltage	BSR81	0.8	1.5	2.5	V	$V_{DS} = V_{GS}$, $I_D = 1$ mA
I_{GSSF}	Gate-Body Leakage Forward	BSR81		1	100	nA	$V_{GS} = +30V$
I_{GSSR}	Gate-Body Leakage Reverse	BSR81		−1	−100	nA	$V_{GS} = -30V$
I_{DSS}	Zero Gate Voltage Drain Current	BSR81		0.1	1	μA	V_{DS} = Max. Rating, $V_{GS} = 0$
		BSR81		1	10	μA	V_{DS} = Max. Rating, $V_{GS} = 0$, $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	BSR81	1.5	1.7		A	$V_{DS} \geqslant 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BSR81		1.4	1.5	V	$V_{GS} = 5V$, $I_D = 0.3A$
		BSR81		2.7	3	V	$V_{GS} = 10V$, $I_D = 1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BSR81		4.7	5	Ω	$V_{GS} = 5V$, $I_D = 0.3A$
		BSR81		2.7	3	Ω	$V_{GS} = 10V$, $I_D = 1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BSR81		3.8	4.2	Ω	$V_{GS} = 10V$, $I_D = 1A$, $T_C = 125°C$

DYNAMIC

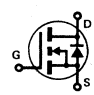
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BSR81	170	195		mS	$V_{DS} \geqslant 2V_{DS(ON)}$, $I_D = 0.5A$
C_{iss}	Input Capacitance	BSR81		35	50	pF	$V_{GS} = 0$, $V_{DS} = 25V$, f = 1 MHz
C_{oss}	Output Capacitance	BSR81		33	40	pF	
C_{rss}	Reverse Transfer Capacitance	BSR81		2	10	pF	
t_{ON}	Turn-On Time	BSR81		8	10	ns	$V_{DD} = 25V$, $I_D \cong 1A$, $R_g = 25\Omega$, $R_L = 23\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	BSR81		8	10	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BSR81			6.25	°C/W	
R_{thJA}	Junction-to-Ambient	BSR81			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BSR81			−1.7	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BSR81			−3	A	
V_{SD}	Diode Forward Voltage[1]	BSR81		−1.2		V	$T_C = 25°C$, $I_S = -1.7A$, $V_{GS} = 0$



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNMA06

BSR82

Siliconix

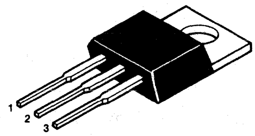
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BSR82	80	4	T0–220AB



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

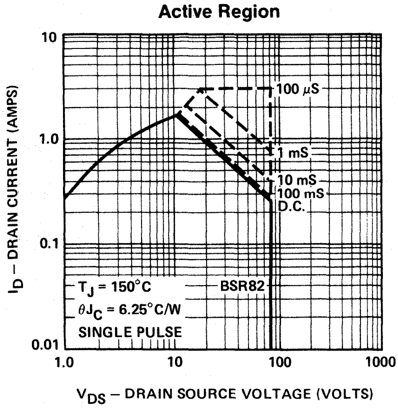
For Additional Curves
See Section 5: VNMA09

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

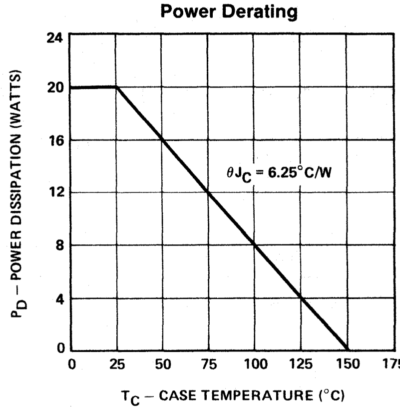
	Parameter	BSR82	Units
V_{DS}	Drain-Source Voltage	80	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	80	V
I_D @ T_C = 25° C	Continuous Drain Current	±1.72	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.08	A
I_{DM}	Pulsed Drain Current[1]	±3	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20	W
P_D @ T_C = 100°C	Max. Power Dissipation	8	W
Junction to Case	Linear Derating Factor	0.16	W/° C
Junction to Ambient	Linear Derating Factor	0.0125	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BSR82	80	110		V	$V_{GS} = 0$, $I_D = 10\ \mu A$
$V_{GS(th)}$	Gate-Threshold Voltage	BSR82	0.8	1.5	2.5	V	$V_{DS} = V_{GS}$, $I_D = 1$ mA
I_{GSSF}	Gate-Body Leakage Forward	BSR82		1	100	nA	$V_{GS} = +15V$
I_{GSSR}	Gate-Body Leakage Reverse	BSR82		−1	−100	nA	$V_{GS} = -15V$
I_{DSS}	Zero Gate Voltage Drain Current	BSR82		1	10	µA	V_{DS} = Max. Rating, $V_{GS} = 0$
		BSR82		50	500	µA	V_{DS} = Max. Rating, $V_{GS} = 0$, $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	BSR82	1.5	2		A	$V_{DS} \geq 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BSR82		1	1.5	V	$V_{GS} = 5V$, $I_D = 0.3A$
		BSR82		3.2	4	V	$V_{GS} = 10V$, $I_D = 1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BSR82		3.6	5	Ω	$V_{GS} = 5V$, $I_D = 0.3A$
		BSR82		3.2	4	Ω	$V_{GS} = 10V$, $I_D = 1A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BSR82		4	5.5	Ω	$V_{GS} = 10V$, $I_D = 1A$, $T_C = 125°C$

DYNAMIC

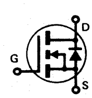
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BSR82	170	195		mS	$V_{DS} \geq 2V_{DS(ON)}$, $I_D = 0.5A$
C_{iss}	Input Capacitance	BSR82		35	50	pF	$V_{GS} = 0$, $V_{DS} = 25V$, f = 1 MHz
C_{oss}	Output Capacitance	BSR82		33	40	pF	
C_{rss}	Reverse Transfer Capacitance	BSR82		2	10	pF	
t_{ON}	Turn-On Time	BSR82		8	10	ns	$V_{DD} = 25V$, $I_D \cong 1A$, $R_g = 25\Omega$, $R_L = 23\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_{OFF}	Turn-Off Time	BSR82		8	10	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BSR82			6.25	°C/W	
R_{thJA}	Junction-to-Ambient	BSR82			80	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BSR82			−1.7	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BSR82			−3	A	
V_{SD}	Diode Forward Voltage[1]	BSR82		−1.2		V	$T_C = 25°C$, $I_S = -1.7A$, $V_{GS} = 0$



1 **Pulse Test:** Pulse Width ≤ 300 µsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNMA09

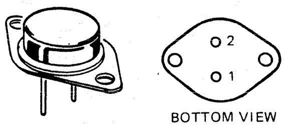
BUP62 ■ BUP60

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

BOTTOM VIEW

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUP62	400	1	T0–204AA
BUP60	350	1	T0–204AA

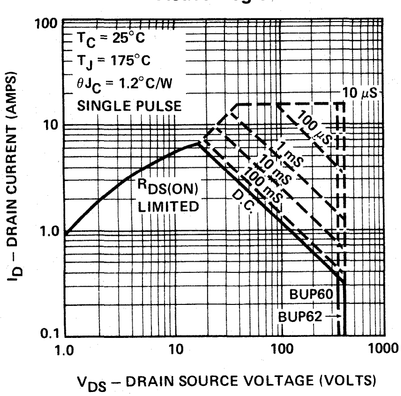
For Additional Curves
See Section 5: VNDA40

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

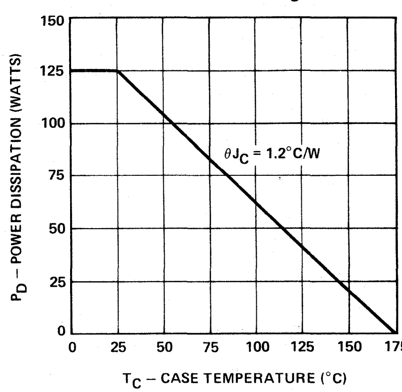
	Parameter	BUP62	BUP60	Units
V_{DS}	Drain-Source Voltage	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±6.80	±6.80	A
I_D @ T_C = 100° C	Continuous Drain Current	±4.81	±4.81	A
I_{DM}	Pulsed Drain Current[1]	±16	±16	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	62.5	62.5	W
Junction to Case	Linear Derating Factor	0.833	0.833	W/° C
Junction to Ambient	Linear Derating Factor	0.03	0.03	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +175	–55 To +175	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



3

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUP62	400	420		V	V_{GS} = 0 I_D = 1 mA
		BUP60	350	370		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	3	4	6	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.13	2.5	mA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 150°C
$I_{D(on)}$	On-State Drain Current[1]	All	8	13		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		2.4	3	V	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.8	1	Ω	V_{GS} = 10V, I_D = 3A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		1.6	2	Ω	V_{GS} = 10V, I_D = 3A, T_C = 125°C

DYNAMIC

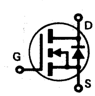
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	3.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 3A
C_{iss}	Input Capacitance	All		840	1000	pF	V_{GS} = 0, V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		150	220	pF	
C_{rss}	Reverse Transfer Capacitance	All		30	40	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	50	ns	V_{DD} = 200V, $I_D \cong$ 3A R_g = 10Ω, R_L = 67Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	80	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.2	°C/W	
R_{thJA}	Junction-to-Ambient	All			33.4	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−6.8	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−16	A	
V_{SD}	Diode Forward Voltage[1]	All		−0.9		V	T_C = 25°C, I_S = −6.8A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J = 150°C, I_F = I_S, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDA40

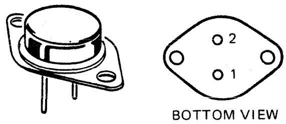
BUP63 ■ BUP61

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



T0–204AA (T0–3)

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUP63	400	1.5	T0–204AA
BUP61	350	1.5	T0–204AA

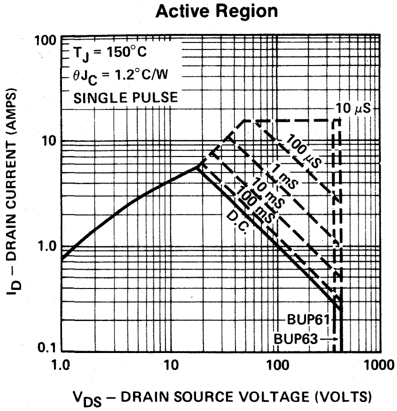
For Additional Curves
See Section 5: VNDA40

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

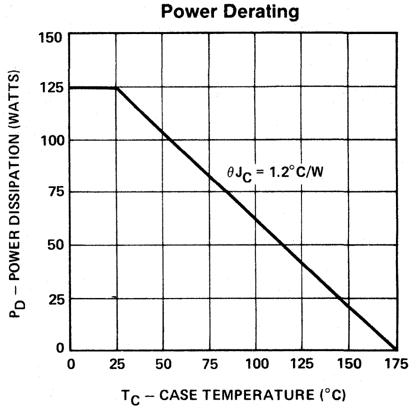
	Parameter	BUP63	BUP61	Units
V_{DS}	Drain-Source Voltage	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±5.56	±5.56	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.93	±3.93	A
I_{DM}	Pulsed Drain Current[1]	±16	±16	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	62.5	62.5	W
Junction to Case	Linear Derating Factor	0.833	0.833	W/° C
Junction to Ambient	Linear Derating Factor	0.033	0.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +175	–55 To +175	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



3

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUP63	400	420		V	$V_{GS} = 0$, $I_D = 1$ mA
		BUP61	350	370		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	3	4	6	V	$V_{DS} = V_{GS}$, $I_D = 1$ mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	$V_{GS} = +30V$
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	$V_{GS} = -30V$
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, $V_{GS} = 0$
		All		0.13	2.5	mA	V_{DS} = Max. Rating, $V_{GS} = 0$, $T_C = 150°C$
$I_{D(on)}$	On-State Drain Current[1]	All	8	13		A	$V_{DS} \geqslant 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		3.6	4.5	V	$V_{GS} = 10V$, $I_D = 3A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		1.2	1.5	Ω	$V_{GS} = 10V$, $I_D = 3A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		2.4	3	Ω	$V_{GS} = 10V$, $I_D = 3A$, $T_C = 125°C$

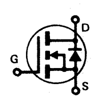
DYNAMIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	3.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, $I_D = 3A$
C_{iss}	Input Capacitance	All		840	1000	pF	$V_{GS} = 0$, $V_{DS} = 25V$, f = 1 MHz
C_{oss}	Output Capacitance	All		150	220	pF	
C_{rss}	Reverse Transfer Capacitance	All		30	40	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	50	ns	$V_{DD} = 200V$, $I_D \cong 3A$, $R_g = 10\Omega$, $R_L = 67\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	80	ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.2	°C/W	
R_{thJA}	Junction-to-Ambient	All			33.4	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−5.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
I_{SM}	Source Current[1] (Body Diode)	All			−16	A	
V_{SD}	Diode Forward Voltage[1]	All		−0.9		V	$T_C = 25°C$, $I_S = -5.5A$, $V_{GS} = 0$
t_{rr}	Reverse Recovery Time	All		400		ns	$T_J = 150°C$, $I_F = I_S$, $dI_F/ds = 100$ A/μs

1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDA40

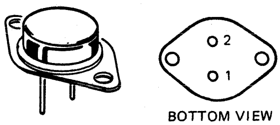
BUP64 ■ BUP65

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUP64	450	1.5	T0–204AA
BUP65	450	2	T0–204AA

For Additional Curves
See Section 5: VNDA50

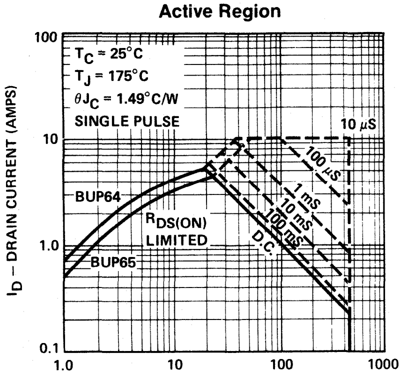
ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	BUP64	BUP65	Units
V_{DS}	Drain-Source Voltage	450	450	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	450	450	V
I_D @ T_C = 25° C	Continuous Drain Current	±5.16	±4.47	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.65	±3.16	A
I_{DM}	Pulsed Drain Current[1]	±10	±10	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	100	100	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	W
Junction to Case	Linear Derating Factor	0.6	0.6	W/° C
Junction to Ambient	Linear Derating Factor	0.03	0.03	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +175	–55 To +175	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

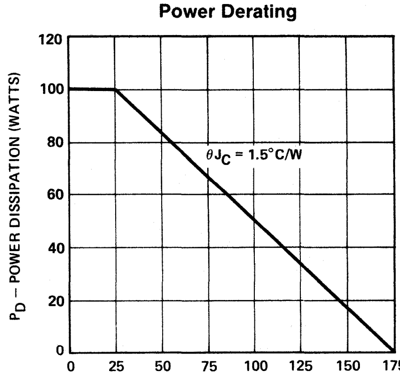
1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

3

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	All	450	490		V	$V_{GS} = 0$ $I_D = 1$ mA
$V_{GS(th)}$	Gate-Threshold Voltage	All	3	3.5	6	V	$V_{DS} = V_{GS}$, $I_D = 1$ mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	$V_{GS} = +30V$
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	$V_{GS} = -30V$
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, $V_{GS} = 0$
		All		0.2	4	mA	V_{DS} = Max. Rating, $V_{GS} = 0$ $T_C = 125°C$
$I_{D(on)}$	On-State Drain Current[1]	All	6	9		A	$V_{DS} \geq 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUP64		2.4	3	V	$V_{GS} = 10V$, $I_D = 2A$
		BUP65		3.2	4	V	$V_{GS} = 10V$, $I_D = 2A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUP64		1.2	1.5	Ω	$V_{GS} = 10V$, $I_D = 2A$
		BUP65		1.6	2	Ω	$V_{GS} = 10V$, $I_D = 2A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUP64		2.16	2.7	Ω	$V_{GS} = 10V$, $I_D = 2A$, $T_C = 125°C$
		BUP65		2.4	3	Ω	$V_{GS} = 10V$, $I_D = 2A$, $T_C = 125°C$

DYNAMIC

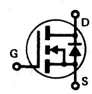
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	3.5		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, $I_D = 2A$
C_{iss}	Input Capacitance	All		840	1000	pF	$V_{GS} = 0$, $V_{DS} = 25V$ f = 1 MHz
C_{oss}	Output Capacitance	All		140	200	pF	
C_{rss}	Reverse Transfer Capacitance	All		40	50	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	50	ns	$V_{DD} = 200V$, $I_D \cong 2A$ $R_g = 10Ω$, $R_L = 100Ω$ (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	100	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.5	°C/W	
R_{thJA}	Junction-to-Ambient	All			33.4	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUP64			−5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		BUP65			−4.5	A	
I_{SM}	Source Current[1] (Body Diode)	All			−10	A	
V_{SD}	Diode Forward Voltage[1]	BUP64		−1.2		V	$T_C = 25°C$, $I_S = -5A$, $V_{GS} = 0$
		BUP65		−1.2		V	$T_C = 25°C$, $I_S = -4.5A$, $V_{GS} = 0$
t_{rr}	Reverse Recovery Time	All		400		ns	$T_J = 150°C$, $I_F = I_S$, $dI_F/ds = 100$ A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDA50

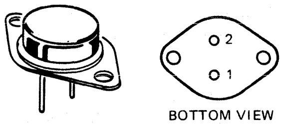
BUP66 ■ BUP67

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUP66	500	1.5	T0–204AA
BUP67	500	2	T0–204AA

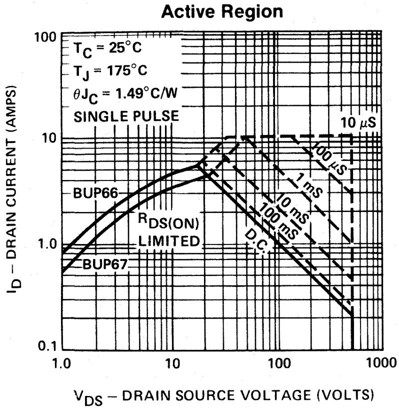
For Additional Curves See Section 5: VNDA50

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

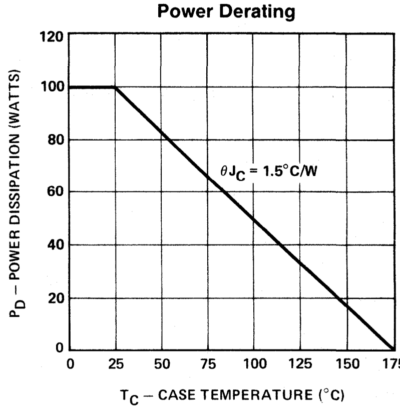
	Parameter	BUP66	BUP67	Units
V_{DS}	Drain-Source Voltage	500	500	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500	500	V
I_D @ T_C = 25° C	Continuous Drain Current	±5.16	±4.47	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.65	±3.16	A
I_{DM}	Pulsed Drain Current[1]	±10	±10	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	100	100	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	50	W
Junction to Case	Linear Derating Factor	0.67	0.67	W/° C
Junction to Ambient	Linear Derating Factor	0.03	0.03	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +175	–55 To +175	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	All	500	520		V	V_{GS} = 0, I_D = 1 mA
$V_{GS(th)}$	Gate-Threshold Voltage	All	3	3.5	6	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	6			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUP66		2.4	3	V	V_{GS} = 10V, I_D = 2A
		BUP67		3.2	4	V	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUP66		1.2	1.5	Ω	V_{GS} = 10V, I_D = 2A
		BUP67		1.6	2	Ω	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUP66		2.16	2.7	Ω	V_{GS} =10V, I_D =2A, T_C =125°C
		BUP67		2.4	3	Ω	V_{GS} =10V, I_D =2A, T_C =125°C

DYNAMIC

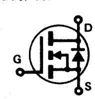
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	3.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 2A
C_{iss}	Input Capacitance	All		840	1000	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		140	200	pF	
C_{rss}	Reverse Transfer Capacitance	All		40	50	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	50	ns	V_{DD} =200V, $I_D \cong$ 2A, R_g = 10Ω, R_L =100Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	100	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1.5	°C/W	
R_{thJA}	Junction-to-Ambient	All			33.4	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUP66			−5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		BUP67			−4.5	A	
I_{SM}	Source Current[1] (Body Diode)	All			−10	A	
V_{SD}	Diode Forward Voltage[1]	BUP66		−1.2		V	T_C = 25°C, I_S −5A V_{GS} = 0
		BUP67		−1.2		V	T_C = 25°C, I_S = −4.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J =150°C, I_F = I_S, dI_F/ds =100 A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

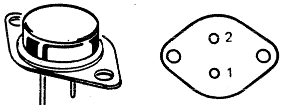
Data Sheet Curves: VNDA50

BUP69 ■ BUP68

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS
- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

BOTTOM VIEW

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUP69	400	1	T0–204AA
BUP68	350	1	T0–204AA

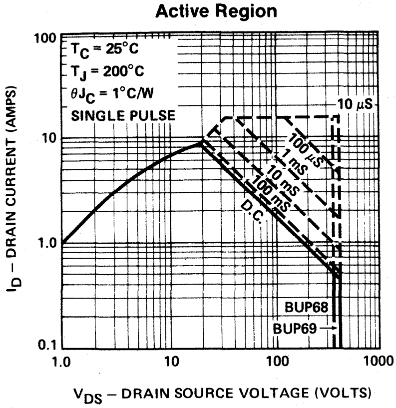
For Additional Curves
See Section 5: VNDA40

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

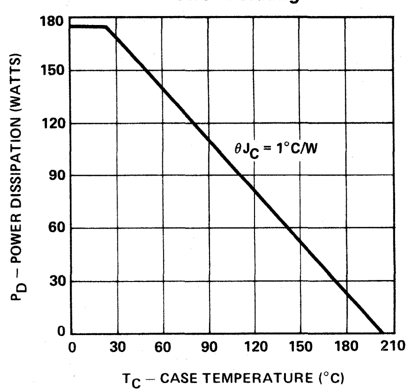
	Parameter	BUP69	BUP68	Units
V_{DS}	Drain-Source Voltage	400	350	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	350	V
I_D @ T_C = 25° C	Continuous Drain Current	±7.93	±7.93	A
I_D @ T_C = 100° C	Continuous Drain Current	±6	±6	A
I_{DM}	Pulsed Drain Current[1]	±16	±16	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	175	175	W
P_D @ T_C = 100°C	Max. Power Dissipation	100	100	W
Junction to Case	Linear Derating Factor	1	1	W/° C
Junction to Ambient	Linear Derating Factor	0.033	0.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +200	–55 To +200	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUP69	400	420		V	$V_{GS} = 0$ $I_D = 1$ mA
		BUP68	350	370		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	3	4	6	V	$V_{DS} = V_{GS}$, $I_D = 1$ mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	$V_{GS} = +30V$
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	$V_{GS} = -30V$
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, $V_{GS} = 0$
		All		0.13	2.5	mA	V_{DS} = Max. Rating, $V_{GS} = 0$ $T_C = 150°C$
$I_{D(on)}$	On-State Drain Current[1]	All	8	13		A	$V_{DS} \geqslant 2V_{DS(ON)}$, $V_{GS} = 10V$
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		1.6	2	V	$V_{GS} = 10V$, $I_D = 2A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		0.8	1	Ω	$V_{GS} = 10V$, $I_D = 2A$
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		1.6	2	Ω	$V_{GS} = 10V$, $I_D = 2A$, $T_C = 125°C$

DYNAMIC

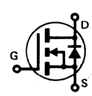
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	3.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, $I_D = 2A$
C_{iss}	Input Capacitance	All		840	1000	pF	$V_{GS} = 0$, $V_{DS} = 25V$ f = 1 MHz
C_{oss}	Output Capacitance	All		150	220	pF	
C_{rss}	Reverse Transfer Capacitance	All		30	40	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	50	ns	$V_{DD} = 200V$, $I_D \cong 2A$ $R_g = 10\Omega$, $R_L = 100\Omega$ (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	100	ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−8	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−16	A	
V_{SD}	Diode Forward Voltage[1]	All		−0.9		V	$T_C = 25°C$, $I_S = -8A$, $V_{GS} = 0$
t_{rr}	Reverse Recovery Time	All		400		ns	$T_J = 150°C$, $I_F = I_S$, $dI_F/ds = 100$ A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

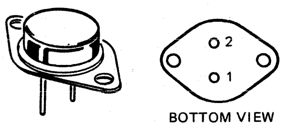
Data Sheet Curves: VNDA40

BUP71 ■ BUP70

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS
- Switching Regulators
- Converters
- Motor Drivers



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

BOTTOM VIEW

T0–204AA (T0–3)

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUP71	500	1.5	T0–204AA
BUP70	450	1.5	T0–204AA

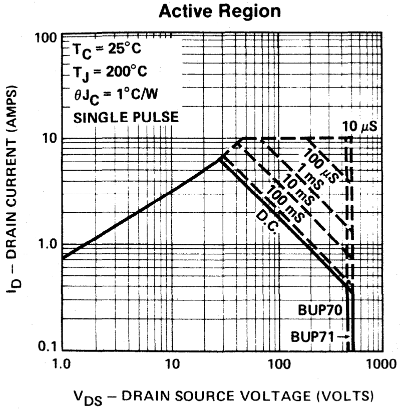
For Additional Curves See Section 5: VNDA40

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

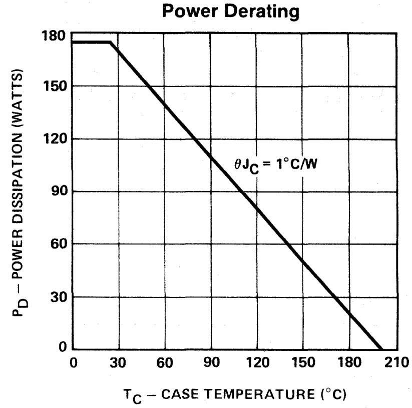
	Parameter	BUP71	BUP70	Units
V_{DS}	Drain-Source Voltage	500	450	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500	450	V
I_D @ T_C = 25° C	Continuous Drain Current	±6.48	±6.48	A
I_D @ T_C = 100° C	Continuous Drain Current	±4.90	±4.90	A
I_{DM}	Pulsed Drain Current[1]	±10	±10	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	175	175	W
P_D @ T_C = 100°C	Max. Power Dissipation	100	100	W
Junction to Case	Linear Derating Factor	1	1	W/° C
Junction to Ambient	Linear Derating Factor	0.034	0.034	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +200	–55 To +200	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300µsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



3

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUP71	500	520		V	V_{GS} = 0, I_D = 1 mA
		BUP70	450	480		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	3	4	6	V	V_{DS} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = +30V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −30V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.05	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		0.13	2.5	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	8	13		A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All		2.4	3	V	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		1.2	1.5	Ω	V_{GS} = 10V, I_D = 2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		2.4	3	Ω	V_{GS} = 10V, I_D = 2A, T_C = 125°C

DYNAMIC

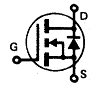
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All	2.5	3.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 2A
C_{iss}	Input Capacitance	All		840	1000	pF	V_{GS} = 0, V_{DS} = 30V, f = 1 MHz
C_{oss}	Output Capacitance	All		150	220	pF	
C_{rss}	Reverse Transfer Capacitance	All		30	40	pF	
$t_{d(on)}$	Turn-On Delay Time	All		15	50	ns	V_{DD} = 200V, $I_D \cong$ 2A, R_g = 10Ω, R_L = 100Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		20	50	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		50	100	ns	
t_f	Fall Time	All		50	100	ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			1	°C/W	
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All			−6.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			−10	A	
V_{SD}	Diode Forward Voltage[1]	All		−0.9		V	T_C = 25°C, I_S = −6.5A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		400		ns	T_J = 150°C, I_F = I_S, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDA40

BUZ 10

Siliconix

PRELIMINARY

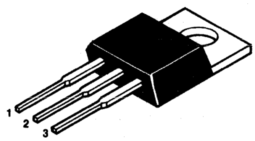
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Motor Controls
- Converters
- Switching Regulators

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUZ10	50	0.10	T0–220AB



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

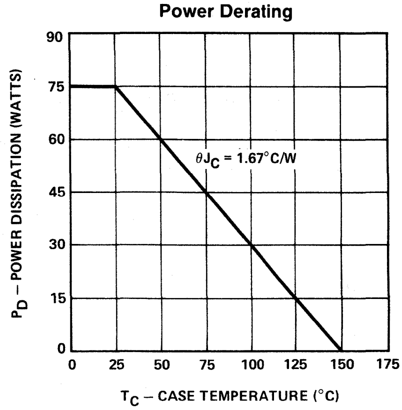
T0–220AB

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	BUZ10	Units
V_{DS}	Drain-Source Voltage	50	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	50	V
I_D @ T_C = 25° C	Continuous Drain Current	±19.3	A
I_D @ T_C = 100° C	Continuous Drain Current	±12.2	A
I_{DM}	Pulsed Drain Current[1]	±36	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	W
Junction to Case	Linear Derating Factor	0.59	W/° C
Junction to Ambient	Linear Derating Factor	0.033	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUZ10	50			V	V_{GS} = 0, I_D = 1 mA
$V_{GS(th)}$	Gate-Threshold Voltage	BUZ10	2.1		4	V	$V_{DS} = V_{GS}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	BUZ10			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	BUZ10			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	BUZ10			1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		BUZ10			4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BUZ10	19.3			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUZ10			0.60	V	V_{GS} = 10V, I_D = 6A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ10			0.1	Ω	V_{GS} = 10V, I_D = 6A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ10			0.175	Ω	V_{GS} =10V, I_D = 6A, T_C =125°C

DYNAMIC

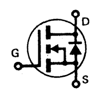
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BUZ10	3	4.8		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 6A
C_{iss}	Input Capacitance	BUZ10		1275		pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	BUZ10		400		pF	
C_{rss}	Reverse Transfer Capacitance	BUZ10		120		pF	
$t_{d(on)}$	Turn-On Delay Time	BUZ10		20		ns	V_{DD} = 30V, $I_D \cong$ 3A, R_g = 50Ω, R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BUZ10		60		ns	
$t_{d(off)}$	Turn-Off Delay Time	BUZ10		120		ns	
t_f	Fall Time	BUZ10		60		ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BUZ10			1.67	°C/W	
R_{thJA}	Junction-to-Ambient	BUZ10			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUZ10			−19.3	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BUZ10			−36	A	
V_{SD}	Diode Forward Voltage[1]	BUZ10			−1.8	V	T_C=25°C, I_S=−38.6A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	BUZ10		150		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

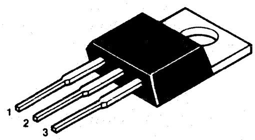
BUZ 20

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- DC/DC Converters
- DC Motor Control
- Stepper Motors



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUZ 20	100	0.2	T0–220AB

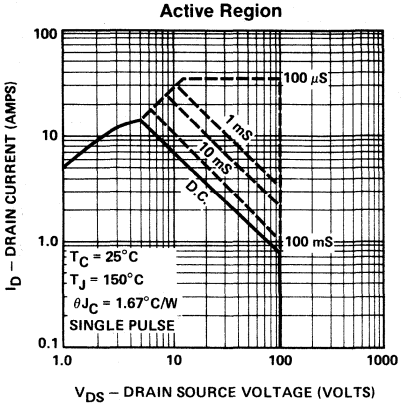
For Additional Curves
See Section 5: VNDE10

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

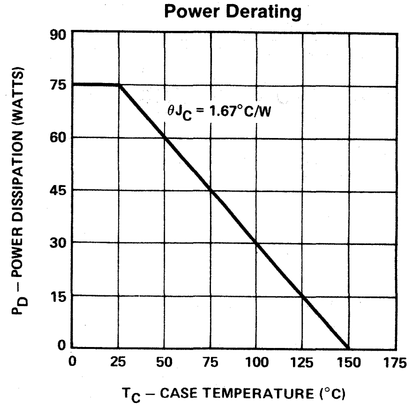
	Parameter	BUZ 20	Units
V_{DS}	Drain-Source Voltage	100	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	V
I_D @ T_C = 25° C	Continuous Drain Current	±14	A
I_D @ T_C = 100° C	Continuous Drain Current	±8.8	A
I_{DM}	Pulsed Drain Current[1]	±36	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	W
Junction to Case	Linear Derating Factor	0.598	W/° C
Junction to Ambient	Linear Derating Factor	0.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUZ 20	100			V	V_{GS} = 0, I_D = 1 mA
						V	
$V_{GS(th)}$	Gate-Threshold Voltage	BUZ 20	2.1	3	4	V	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	BUZ 20		10	100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	BUZ 20		−10	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	BUZ 20		0.1	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		BUZ 20		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BUZ 20	12			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUZ 20		0.96	1.2	V	V_{GS} = 10V, I_D = 6A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ 20		0.16	0.2	Ω	V_{GS} = 10V, I_D = 6A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ 20			0.35	Ω	V_{GS} = 10V, I_D = 6A, T_C = 125°C

DYNAMIC

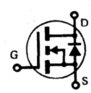
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BUZ 20	2.7	4		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 6A
C_{iss}	Input Capacitance	BUZ 20		960	1900	pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	BUZ 20		230	450	pF	
C_{rss}	Reverse Transfer Capacitance	BUZ 20		55	120	pF	
$t_{d(on)}$	Turn-On Delay Time	BUZ 20		27		ns	V_{DD} = 30V, $I_D \cong$ 2.9A, R_g = 50Ω, R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BUZ 20		82		ns	
$t_{d(off)}$	Turn-Off Delay Time	BUZ 20		140		ns	
t_f	Fall Time	BUZ 20		70		ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BUZ 20			1.67	°C/W	
R_{thJA}	Junction-to-Ambient	BUZ 20			75	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUZ 20			−12	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BUZ 20			−36	A	
V_{SD}	Diode Forward Voltage[1]	BUZ 20		−1.4	−1.8	V	T_C = 25°C, I_S = −24A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	BUZ 20		200		ns	T_J = 150°C, I_F = I_S, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE10

Siliconix

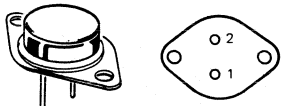
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- DC/DC Converters
- Motor Drivers
- Hi-Fi Output Stages

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUZ23	100	0.2	T0–204AA



BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

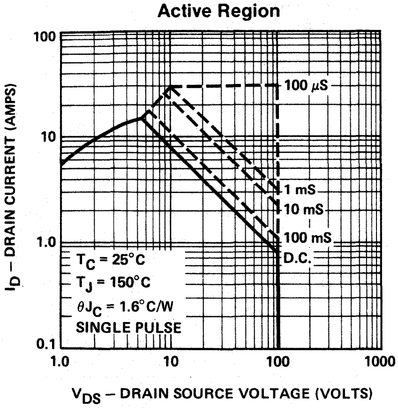
For Additional Curves See Section 5: VNDE10

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

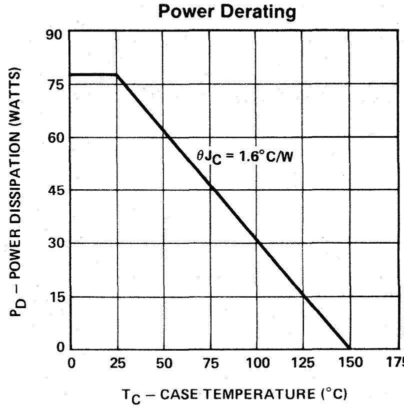
	Parameter	BUZ23	Units
V_{DS}	Drain-Source Voltage	100	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	V
I_D @ T_C = 25° C	Continuous Drain Current	±14	A
I_D @ T_C = 100° C	Continuous Drain Current	±9	A
I_{DM}	Pulsed Drain Current[1]	±30	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	78	W
P_D @ T_C = 100°C	Max. Power Dissipation	31	W
Junction to Case	Linear Derating Factor	0.625	W/° C
Junction to Ambient	Linear Derating Factor	0.029	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUZ23	100			V	V_{GS} = 0 I_D = 1 mA
$V_{GS(th)}$	Gate-Threshold Voltage	BUZ23	2.1	3	4	V	$V_{DS} = V_{GS}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	BUZ23		10	100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	BUZ23		–10	–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	BUZ23		0.1	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		BUZ23		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BUZ23	10			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUZ23		0.96	1.2	V	V_{GS} = 10V , I_D = 6A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ23		0.16	0.2	Ω	V_{GS} = 10V , I_D = 6A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ23		0.28	0.35	Ω	V_{GS} =10V, I_D =6A , T_C =125°C

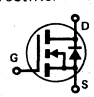
DYNAMIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BUZ23	2.7	4		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 6A
C_{iss}	Input Capacitance	BUZ23		960	1700	pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	BUZ23		230	450	pF	
C_{rss}	Reverse Transfer Capacitance	BUZ23		55	120	pF	
$t_{d(on)}$	Turn-On Delay Time	BUZ23		27		ns	V_{DD} = 30V, $I_D \cong$ 2.9A R_g = 50Ω , R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BUZ23		80		ns	
$t_{d(off)}$	Turn-Off Delay Time	BUZ23		140		ns	
t_f	Fall Time	BUZ23		70		ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BUZ23			1.6	°C/W	
R_{thJA}	Junction-to-Ambient	BUZ23			35	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUZ23			–10	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
						A	
I_{SM}	Source Current[1] (Body Diode)	BUZ23			–30	A	
						A	
V_{SD}	Diode Forward Voltage[1]	BUZ23		–1.3	–1.6	V	T_C=25°C, I_S=–20A, V_{GS} = 0
						V	
t_{rr}	Reverse Recovery Time	BUZ23		200		ns	T_J =150°C , $I_F = I_S$, dI_F/ds = 100 A/µs

1 **Pulse Test:** Pulse Width ⩽ 300 µsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE10

BUZ 24

Siliconix

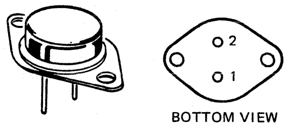
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUZ24	100	0.06	T0–204AE



PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AE (T0–3)

For Additional Curves
See Section 5: VNDC10–2

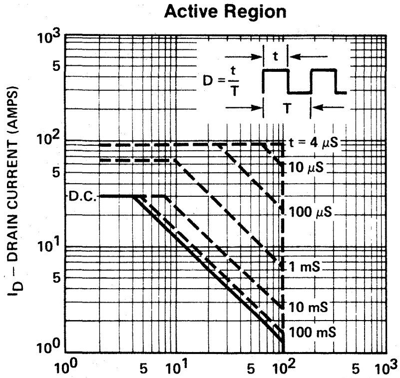
ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	BUZ24	Units
V_{DS}	Drain-Source Voltage	100	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	V
I_D @ T_C = 25° C	Continuous Drain Current	±32	A
I_D @ T_C = 100° C	Continuous Drain Current	±25	A
I_{DM}	Pulsed Drain Current[1]	±95	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	25	W
Junction to Case	Linear Derating Factor	1	W/° C
Junction to Ambient	Linear Derating Factor	0.029	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

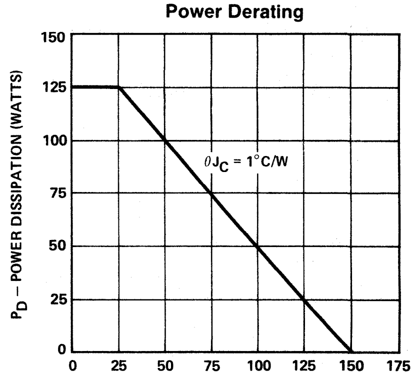
1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

3

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUZ24	100			V	V_{GS} = 0 I_D = 1 mA
$V_{GS(th)}$	Gate-Threshold Voltage	BUZ24	2.1	3	4	V	$V_{DS} = V_{GS}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	BUZ24			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	BUZ24			−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	BUZ24		0.1	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		BUZ24		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BUZ24	32			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUZ24			0.96	V	V_{GS} = 10V , I_D = 16A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ24			0.06	Ω	V_{GS} = 10V , I_D = 16A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ24			0.1	Ω	V_{GS} =10V, I_D =16A, T_C =125°C

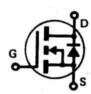
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BUZ24	6	10		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 16A
C_{iss}	Input Capacitance	BUZ24		1500		pF	V_{GS} = 0 ,V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	BUZ24		900		pF	
C_{rss}	Reverse Transfer Capacitance	BUZ24		500		pF	
$t_{d(on)}$	Turn-On Delay Time	BUZ24		32		ns	V_{DD} = 30V , $I_D \cong$ 3.0A R_g = 10Ω , R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BUZ24		65		ns	
$t_{d(off)}$	Turn-Off Delay Time	BUZ24		140		ns	
t_f	Fall Time	BUZ24		67		ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BUZ24			1	°C/W	
R_{thJA}	Junction-to-Ambient	BUZ24			35	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUZ24			−32	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
I_{SM}	Source Current[1] (Body Diode)	BUZ24			−9.5	A	
V_{SD}	Diode Forward Voltage[1]	BUZ24		−1.5	−2	V	T_C=25°C, I_S=−64A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	BUZ24		200		ns	T_J =150°C , $I_F = I_S$, dI_F/ds = 100 A/μs

1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC10–2

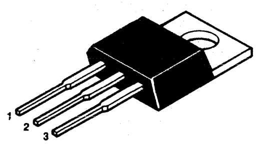
BUZ 32

Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- DC/DC Converters
- Motor Control



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

PRODUCT SUMMARY

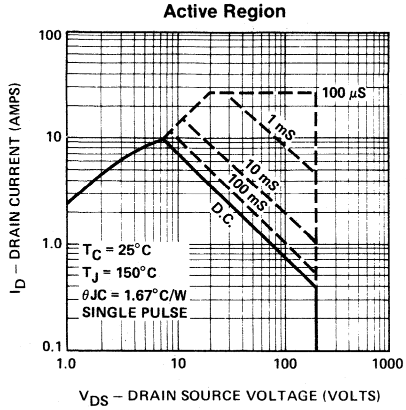
Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUZ 32	200	0.4	T0–220AB

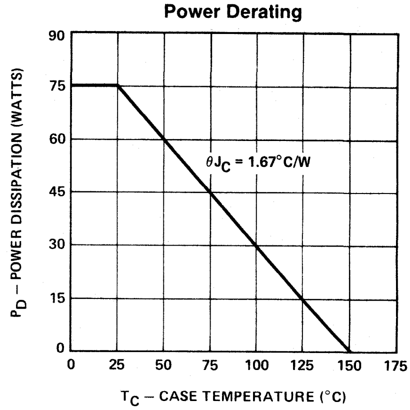
For Additional Curves
See Section 5: VNDE20

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	BUZ 32	Units
V_{DS}	Drain-Source Voltage	200	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	200	V
I_D @ T_C = 25° C	Continuous Drain Current	±9.5	A
I_D @ T_C = 100° C	Continuous Drain Current	±6.2	A
I_{DM}	Pulsed Drain Current[1]	±28	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	W
Junction to Case	Linear Derating Factor	0.59	W/° C
Junction to Ambient	Linear Derating Factor	0.0133	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%





3

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUZ 32	200			V	V_{GS} = 0, I_D = 1 mA
$V_{GS(th)}$	Gate-Threshold Voltage	BUZ 32	2.1	3	4	V	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	BUZ 32		10	100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	BUZ 32		−10	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	BUZ 32		0.1	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		BUZ 32		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BUZ 32	9.5			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUZ 32		1.5		V	V_{GS} = 10V, I_D = 4.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ 32		0.35	0.4	Ω	V_{GS} = 10V, I_D = 4.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ 32			0.7	Ω	V_{GS} = 10V, I_D = 4.5A T_C = 125°C

DYNAMIC

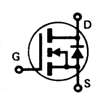
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BUZ 32	2.2	3.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 4.5A
C_{iss}	Input Capacitance	BUZ 32		800		pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	BUZ 32		240		pF	
C_{rss}	Reverse Transfer Capacitance	BUZ 32		100		pF	
$t_{d(on)}$	Turn-On Delay Time	BUZ 32		14		ns	V_{DD} = 30V, $I_D \cong$ 2.9A, R_g = 50Ω, R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BUZ 32		45		ns	
$t_{d(off)}$	Turn-Off Delay Time	BUZ 32		120		ns	
t_f	Fall Time	BUZ 32		60		ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BUZ 32			1.67	°C/W	
R_{thJA}	Junction-to-Ambient	BUZ 32			75	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUZ 32			−9.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BUZ 32			−28	A	
V_{SD}	Diode Forward Voltage[1]	BUZ 32		−1.3	−1.7	V	T_C=25°C, I_S=−19A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	BUZ 32		400		ns	T_J = 150°C, I_F = I_S, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDE20

BUZ 35

Siliconix

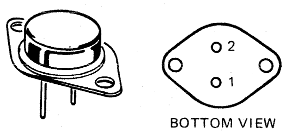
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- DC/DC Converters
- Communications Equipment
- Measuring and Control Equipment

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUZ35	200	0.4	T0–204AA



BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

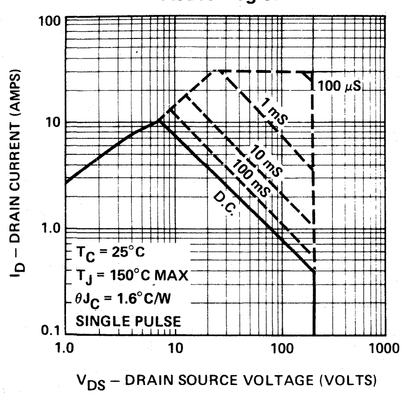
For Additional Curves
See Section 5: VNDE20

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

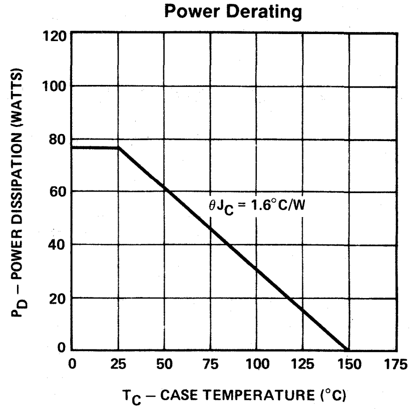
	Parameter	BUZ35	Units
V_{DS}	Drain-Source Voltage	200	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	200	V
I_D @ T_C = 25° C	Continuous Drain Current	±9.9	A
I_D @ T_C = 100° C	Continuous Drain Current	±6.3	A
I_{DM}	Pulsed Drain Current[1]	±29	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	78	W
P_D @ T_C = 100°C	Max. Power Dissipation	31	W
Junction to Case	Linear Derating Factor	0.625	W/° C
Junction to Ambient	Linear Derating Factor	0.029	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUZ35	200			V	V_{GS} = 0, I_D = 1 mA
$V_{GS(th)}$	Gate-Threshold Voltage	BUZ35	2.1	3	4	V	$V_{DS} = V_{GS}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	BUZ35		10	100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	BUZ35		–10	–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	BUZ35		0.1	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		BUZ35		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BUZ35	9.9			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUZ35		1.6	1.8	V	V_{GS} = 10V, I_D = 4.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ35		0.35	0.4	Ω	V_{GS} = 10V, I_D = 4.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ35		0.6	0.7	Ω	V_{GS} =10V, I_D =4.5A T_C =125°C

DYNAMIC

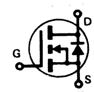
Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BUZ35	2.2	3.5		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 4.5A
C_{iss}	Input Capacitance	BUZ35		800		pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	BUZ35		300		pF	
C_{rss}	Reverse Transfer Capacitance	BUZ35		100		pF	
$t_{d(on)}$	Turn-On Delay Time	BUZ35		20		ns	V_{DD} = 30V, $I_D \cong$ 2.9A, R_g = 50Ω, R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BUZ35		60		ns	
$t_{d(off)}$	Turn-Off Delay Time	BUZ35		220		ns	
t_f	Fall Time	BUZ35		78		ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BUZ35			1.6	°C/W	
R_{thJA}	Junction-to-Ambient	BUZ35			35	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUZ35			–9.9	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BUZ35			–29	A	
V_{SD}	Diode Forward Voltage[1]	BUZ35		–1.3	–1.7	V	T_C=25°C, I_S=–19.8A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	BUZ35		400		ns	T_J =150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%

Data Sheet Curves: VNDE20

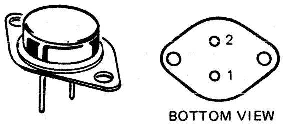
BUZ 36

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS
- DC/DC Converters
- Robots (Motor Control)
- Stepper Motors

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUZ 36	200	0.12	T0–204AE



BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AE (T0–3)

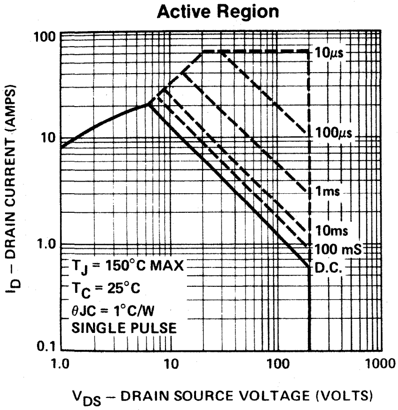
For Additional Curves
See Section 5: VNDC20–2

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

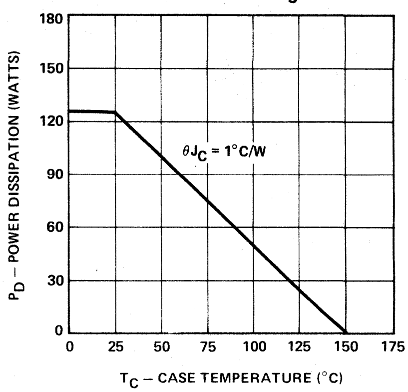
	Parameter	BUZ 36	Units
V_{DS}	Drain-Source Voltage	200	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	200	V
I_D @ T_C = 25° C	Continuous Drain Current	±22	A
I_D @ T_C = 100° C	Continuous Drain Current	±13	A
I_{DM}	Pulsed Drain Current[1]	±65	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	W
Junction to Case	Linear Derating Factor	1	W/° C
Junction to Ambient	Linear Derating Factor	0.029	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 Exceeds Jedec Values
* Jedec Registered Values

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUZ 36	200			V	V_{GS} = 0 I_D = 1 mA
$V_{GS(th)}$	Gate-Threshold Voltage	BUZ 36	2.1	3	4	V	$V_{DS} = V_{GS}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	BUZ 36		10	100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	BUZ 36		−10	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	BUZ 36		0.1	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		BUZ 36		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BUZ 36	22			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUZ 36			1.32	V	V_{GS} = 10V I_D = 11A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ 36			0.12	Ω	V_{GS} = 10V , I_D = 11A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ 36			0.21	Ω	V_{GS} =10V, I_D =11A, T_C =125°C

DYNAMIC

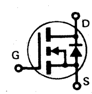
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BUZ 36	5	7.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 11A
C_{iss}	Input Capacitance	BUZ 36		1100		pF	V_{GS} = 0 ,V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	BUZ 36		240		pF	
C_{rss}	Reverse Transfer Capacitance	BUZ 36		75		pF	
$t_{d(on)}$	Turn-On Delay Time	BUZ 36		28		ns	V_{DD} =30V , $I_D \cong$ 3A R_g = 10Ω , R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BUZ 36		42		ns	
$t_{d(off)}$	Turn-Off Delay Time	BUZ 36		65		ns	
t_f	Fall Time	BUZ 36		40		ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BUZ 36			1	°C/W	
R_{thJA}	Junction-to-Ambient	BUZ 36			35	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUZ 36			−22	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BUZ 36			−65	A	
V_{SD}	Diode Forward Voltage[1]	BUZ 36		−1.2	−1.7	V	T_C=25°C, I_S=−44A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	BUZ 36		400		ns	T_J =150°C , $I_F = I_S$, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC20–2

BUZ 42

Siliconix

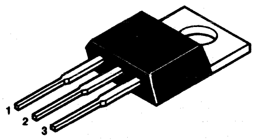
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Motor Controls
- Converters
- Switching Regulators

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUZ42	500	2	T0–220AB



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

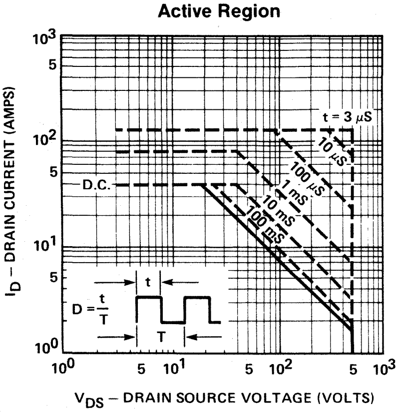
For Additional Curves
See Section 5: VNDE50

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

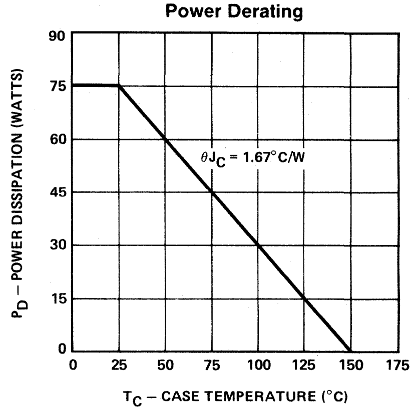
	Parameter	BUZ42	Units
V_{DS}	Drain-Source Voltage	500	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500	V
I_D @ T_C = 25° C	Continuous Drain Current	±4	A
I_D @ T_C = 100° C	Continuous Drain Current	±2.5	A
I_{DM}	Pulsed Drain Current[1]	±12	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	W
P_D @ T_C = 100° C	Max. Power Dissipation	30	W
Junction to Case	Linear Derating Factor	0.59	W/° C
Junction to Ambient	Linear Derating Factor	0.013	W/° C
T_J / Tstg	Operating and Storage Temperature Range	−55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



3

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUZ42	500			V	V_{GS} = 0, I_D = 1 mA
$V_{GS(th)}$	Gate-Threshold Voltage	BUZ42	2.1	3	4	V	V_{DS} = V_{GS}, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	BUZ42		10	100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	BUZ42		−10	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	BUZ42		0.1	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		BUZ42		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BUZ42	4			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUZ42			5	V	V_{GS} = 10V, I_D = 2.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ42		1.8	2	Ω	V_{GS} = 10V, I_D = 2.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ42			3.4	Ω	V_{GS} =10V, I_D =2.5A T_C =125°C

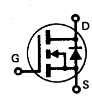
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BUZ42	1.5	2.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 2.5A
C_{iss}	Input Capacitance	BUZ42		730		pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	BUZ42		90		pF	
C_{rss}	Reverse Transfer Capacitance	BUZ42		30		pF	
$t_{d(on)}$	Turn-On Delay Time	BUZ42		30		ns	V_{DD} = 30V, $I_D \cong$ 2.5A, R_g = 50Ω, R_L = 12Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BUZ42		47		ns	
$t_{d(off)}$	Turn-Off Delay Time	BUZ42		100		ns	
t_f	Fall Time	BUZ42		50		ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BUZ42			1.67	°C/W	
R_{thJA}	Junction-to-Ambient	BUZ42			75	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUZ42			−4	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
I_{SM}	Source Current[1] (Body Diode)	BUZ42			−12	A	
V_{SD}	Diode Forward Voltage[1]	BUZ42		−1.1	−1.5	V	T_C = 25°C, I_S = −8A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	BUZ42		1200		ns	T_J = 150°C, I_F = I_S, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE50

BUZ 45

Siliconix

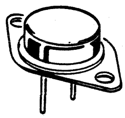
N-Channel Enhancement Mode
MOSPOWER

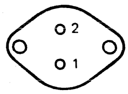
APPLICATIONS

- SMPS
- DC Motor Control
- Electronic Ballast

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUZ45	500	0.5	T0–204AA





BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

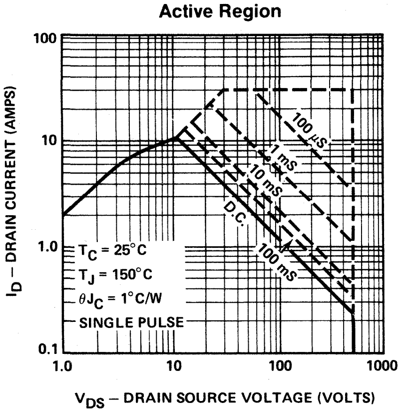
For Additional Curves
See Section 5: VNDC50–2

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

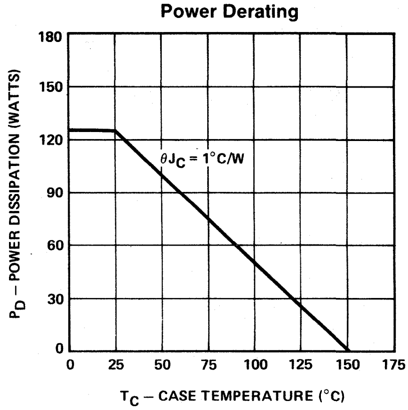
	Parameter	BUZ45	Units
V_{DS}	Drain-Source Voltage	500	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500	V
I_D @ T_C = 25° C	Continuous Drain Current	±10	A
I_D @ T_C = 100° C	Continuous Drain Current	±6.7	A
I_{DM}	Pulsed Drain Current[1]	±30	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	W
Junction to Case	Linear Derating Factor	1	W/° C
Junction to Ambient	Linear Derating Factor	0.029	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUZ45	500			V	V_{GS} = 0 I_D = 1 mA
$V_{GS(th)}$	Gate-Threshold Voltage	BUZ45	2.1	3	4	V	$V_{DS} = V_{GS}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	BUZ45		10	100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	BUZ45		−10	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	BUZ45		0.1	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		BUZ45		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BUZ45	10			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUZ45			3.6	V	V_{GS} = 10V , I_D = 5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ45			0.6	Ω	V_{GS} = 10V , I_D = 5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ45			1.2	Ω	V_{GS} =10V, I_D = 5A , T_C = 125°C

DYNAMIC

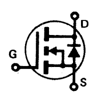
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BUZ45	2.7	5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 5.0A
C_{iss}	Input Capacitance	BUZ45		3000		pF	V_{GS} = 0 ,V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	BUZ45		300		pF	
C_{rss}	Reverse Transfer Capacitance	BUZ45		40		pF	
$t_{d(on)}$	Turn-On Delay Time	BUZ45		35		ns	V_{DD} = 30V , $I_D \cong$ 2.9A R_g = 10Ω , R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BUZ45		56		ns	
$t_{d(off)}$	Turn-Off Delay Time	BUZ45		160		ns	
t_f	Fall Time	BUZ45		44		ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BUZ45			1	°C/W	
R_{thJA}	Junction-to-Ambient	BUZ45			35	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUZ45			−10	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BUZ45			−30	A	
V_{SD}	Diode Forward Voltage[1]	BUZ45			−1.7	V	T_C=25°C, I_S=−20A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	BUZ45		400		ns	T_J = 150°C , $I_F = I_S$, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDC50−2

BUZ 46

Siliconix

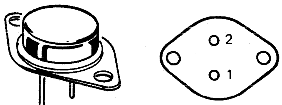
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- SMPS
- Arc Welding
- DC Motor Control

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUZ 46	500	2	T0–204AA



BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

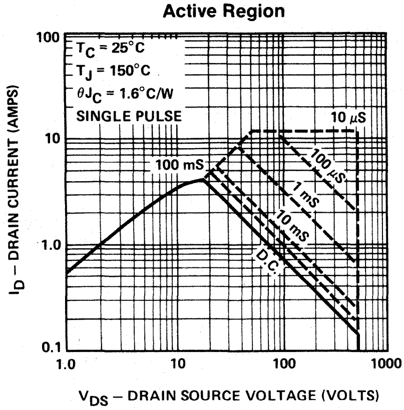
For Additional Curves
See Section 5: VNDE50

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

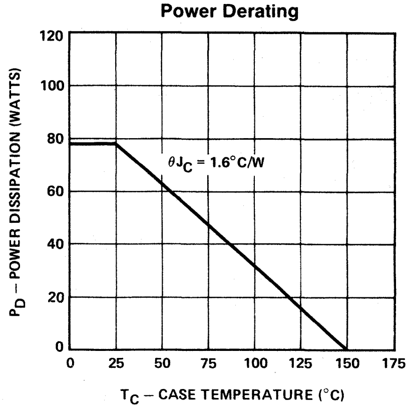
	Parameter	BUZ 46	Units
V_{DS}	Drain-Source Voltage	500	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500	V
I_D @ T_C = 25° C	Continuous Drain Current	±4.2	A
I_D @ T_C = 100° C	Continuous Drain Current	±2.6	A
I_{DM}	Pulsed Drain Current[1]	±12	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	78	W
P_D @ T_C = 100°C	Max. Power Dissipation	31	W
Junction to Case	Linear Derating Factor	0.625	W/° C
Junction to Ambient	Linear Derating Factor	0.029	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUZ 46	500			V	V_{GS} = 0 I_D = 1 mA
$V_{GS(th)}$	Gate-Threshold Voltage	BUZ 46	2.1	3	4	V	$V_{DS} = V_{GS}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	BUZ 46		10	100	nA	V_{GS} = 20
I_{GSSR}	Gate-Body Leakage Reverse	BUZ 46		−10	−100	nA	V_{GS} = −20
I_{DSS}	Zero Gate Voltage Drain Current	BUZ 46		0.1	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
				0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BUZ 46	4.2			A	$V_{DS} \geqslant 2\, V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUZ 46		4.5	5	V	V_{GS} = 10V , I_D = 2.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ 46		1.8	2	Ω	V_{GS} = 10V , I_D = 2.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ 46		3.6	4	Ω	V_{GS} = 10V, I_D = 2.5A T_C = 125°C

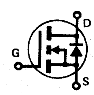
DYNAMIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BUZ 46	1.5	2.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 2.5A
C_{iss}	Input Capacitance	BUZ 46		1600		pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	BUZ 46		90		pF	
C_{rss}	Reverse Transfer Capacitance	BUZ 46		30		pF	
$t_{d(on)}$	Turn-On Delay Time	BUZ 46		30		ns	V_{DD} = 30V , $I_D \cong$ 2.5A R_g = 50Ω , R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BUZ 46		70		ns	
$t_{d(off)}$	Turn-Off Delay Time	BUZ 46		160		ns	
t_f	Fall Time	BUZ 46		100		ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BUZ 46			1.6	°C/W	
R_{thJA}	Junction-to-Ambient	BUZ 46			35	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUZ 46			−4.2	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
I_{SM}	Source Current[1] (Body Diode)	BUZ 46			−12	A	
V_{SD}	Diode Forward Voltage[1]	BUZ 46			−1.4	V	T_C = 25°C , I_S = −8A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	BUZ 46		400		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs

1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE50

BUZ 60

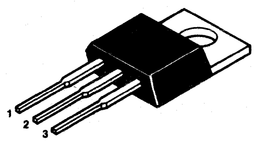
Siliconix

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS
- SMPS
- Motor Control

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUZ60	400	1	T0–220AB



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

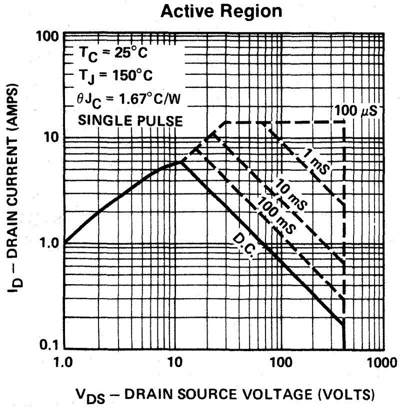
For Additional Curves
See Section 5: VNDE40

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

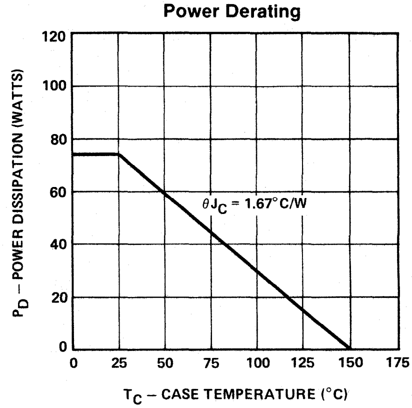
	Parameter	BUZ60	Units
V_{DS}	Drain-Source Voltage	400	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	V
I_D @ T_C = 25° C	Continuous Drain Current	±5.5	A
I_D @ T_C = 100° C	Continuous Drain Current	±3.7	A
I_{DM}	Pulsed Drain Current[1]	±16	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	75	W
P_D @ T_C = 100°C	Max. Power Dissipation	30	W
Junction to Case	Linear Derating Factor	0.599	W/° C
Junction to Ambient	Linear Derating Factor	0.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300µsec, Duty Cycle ⩽ 2%

Active Region



Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUZ60	400			V	V_{GS} = 0 I_D = 1 mA
$V_{GS(th)}$	Gate-Threshold Voltage	BUZ60	2.1	3	4	V	$V_{DS} = V_{GS}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	BUZ60		10	100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	BUZ60		−10	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	BUZ60		0.1	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		BUZ60		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BUZ60	5.5			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUZ60		2	2.5	V	V_{GS} = 10V , I_D = 2.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ60		0.8	1	Ω	V_{GS} = 10V , I_D = 2.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ60		1.52	1.9	Ω	V_{GS} =10V, I_D =2.5A T_C =125°C

DYNAMIC

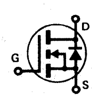
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BUZ60	1.7	2.5		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 2.5A
C_{iss}	Input Capacitance	BUZ60		640		pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	BUZ60		90		pF	
C_{rss}	Reverse Transfer Capacitance	BUZ60		30		pF	
$t_{d(on)}$	Turn-On Delay Time	BUZ60		30		ns	V_{DD} = 30V , $I_D \cong$ 2.7A R_g = 50Ω , R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BUZ60		70		ns	
$t_{d(off)}$	Turn-Off Delay Time	BUZ60		160		ns	
t_f	Fall Time	BUZ60		100		ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BUZ60			1.67	°C/W	
R_{thJA}	Junction-to-Ambient	BUZ60			75	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUZ60			−5.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BUZ60			−16	A	
V_{SD}	Diode Forward Voltage[1]	BUZ60		−1.2	−1.6	V	T_C=25°C, I_S=−11A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	BUZ60		400		ns	T_J =150°C , $I_F = I_S$, dI_F/ds =100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE40

BUZ 63

Siliconix

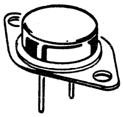
N-Channel Enhancement Mode
MOSPOWER

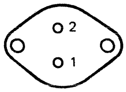
APPLICATIONS

- Motor Control
- SMPS

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUZ63	400	1	T0–204AA





BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

T0–204AA (T0–3)

For Additional Curves
See Section 5: VNDE40

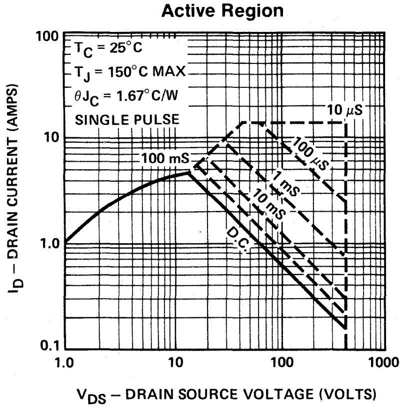
ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	BUZ63	Units
V_{DS}	Drain-Source Voltage	400	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	V
I_D @ T_C = 25° C	Continuous Drain Current	±7.5	A
I_D @ T_C = 100° C	Continuous Drain Current	±4.7	A
I_{DM}	Pulsed Drain Current[1]	±17	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	W
P_D @ T_C = 100°C	Max. Power Dissipation	50	W
Junction to Case	Linear Derating Factor	0.59	W/° C
Junction to Ambient	Linear Derating Factor	0.029	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

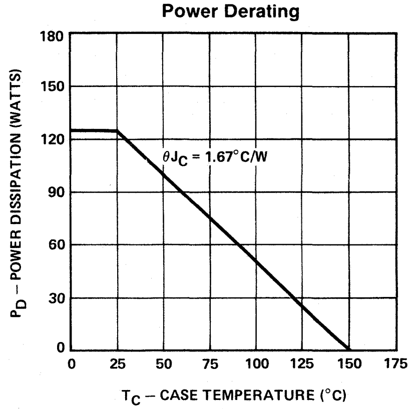
1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

3

Active Region



Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUZ63	400			V	V_{GS} = 0, I_D = 1 mA
$V_{GS(th)}$	Gate-Threshold Voltage	BUZ63	2.1	3	4	V	$V_{DS} = V_{GS}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	BUZ63		10	100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	BUZ63		−10	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	BUZ63		0.1	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		BUZ63		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BUZ63	5.9			A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUZ63		2	2.5	V	V_{GS} = 10V , I_D = 2.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ63		0.8	1	Ω	V_{GS} = 10V , I_D = 2.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ63		1.52	1.9	Ω	V_{GS} =10V, I_D =2.5A, T_C =125°C

DYNAMIC

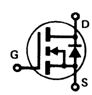
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BUZ63	1.7	2.5		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 2.5A
C_{iss}	Input Capacitance	BUZ63		670		pF	V_{GS} = 0 ,V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	BUZ63		78		pF	
C_{rss}	Reverse Transfer Capacitance	BUZ63		20		pF	
$t_{d(on)}$	Turn-On Delay Time	BUZ63		22		ns	V_{DD} = 30V , $I_D \cong$ 2.7A, R_g = 50Ω , R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BUZ63		55		ns	
$t_{d(off)}$	Turn-Off Delay Time	BUZ63		100		ns	
t_f	Fall Time	BUZ63		43		ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BUZ63			1.67	°C/W	
R_{thJA}	Junction-to-Ambient	BUZ63			35	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUZ63			−5.9	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BUZ63			−17	A	
V_{SD}	Diode Forward Voltage[1]	BUZ63		−1.2	−2.5	V	T_C=25°C, I_S=−11.8A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	BUZ63		400		ns	T_J =150°C , $I_F = I_S$, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Data Sheet Curves: VNDE40

BUZ 64

Siliconix

PRELIMINARY

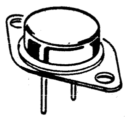
N-Channel Enhancement Mode
MOSPOWER

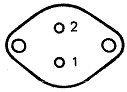
APPLICATIONS

- Motor Control
- SMPS

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUZ 64	400	0.4	T0–204AA (T0–3)





BOTTOM VIEW

PIN 1 – Gate
PIN 2 – Source
CASE – Drain

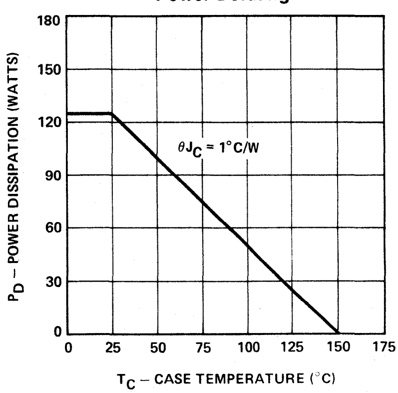
T0–204AA (T0–3)

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	BUZ 64	Units
V_{DS}	Drain-Source Voltage	400	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	V
I_D @ T_C = 25° C	Continuous Drain Current	±10.5	A
I_D @ T_C = 100° C	Continuous Drain Current	±8	A
I_{DM}	Pulsed Drain Current[1]	±31	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	125	W
P_D @ T_C = 100° C	Max. Power Dissipation	50	W
Junction to Case	Linear Derating Factor	1	W/° C
Junction to Ambient	Linear Derating Factor	0.029	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUZ 64	400			V	V_{GS} = 0, I_D = 1 mA
$V_{GS(th)}$	Gate-Threshold Voltage	BUZ 64	2.1	3	4	V	$V_{DS} = V_{GS}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	BUZ 64		10	100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	BUZ 64		−10	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	BUZ 64		0.1	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		BUZ 64		0.2	4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BUZ 64	10.5			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUZ 64			2	V	V_{GS} = 10V, I_D = 5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ 64			0.4	Ω	V_{GS} = 10V, I_D = 5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ 64			0.8	Ω	V_{GS} = 10V, I_D = 5A, T_C = 125°C

DYNAMIC

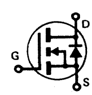
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BUZ 64	3.3	4.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 5A
C_{iss}	Input Capacitance	BUZ 64		2500		pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	BUZ 64		280		pF	
C_{rss}	Reverse Transfer Capacitance	BUZ 64		150		pF	
$t_{d(on)}$	Turn-On Delay Time	BUZ 64		36		ns	V_{DD} = 30V, $I_D \cong$ 2.9A, R_g = 10Ω, R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BUZ 64		55		ns	
$t_{d(off)}$	Turn-Off Delay Time	BUZ 64		120		ns	
t_f	Fall Time	BUZ 64		47		ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BUZ 64			1	°C/W	
R_{thJA}	Junction-to-Ambient	BUZ 64			35	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUZ 64			−10.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BUZ 64			−31	A	
V_{SD}	Diode Forward Voltage[1]	BUZ 64			−1.7	V	T_C=25°C, I_S=−21A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	BUZ 64		400		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

BUZ 71

Siliconix
PRELIMINARY

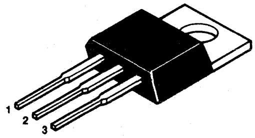
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- Automobile
- Ultrasonic Generators

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUZ 71	50	0.1	T0–220AB



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

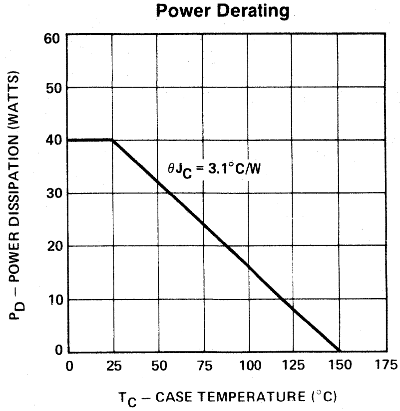
T0–220AB

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	BUZ 71	Units
V_{DS}	Drain-Source Voltage	50	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	50	V
I_D @ T_C = 25° C	Continuous Drain Current	±12	A
I_D @ T_C = 100° C	Continuous Drain Current	±9	A
I_{DM}	Pulsed Drain Current[1]	±36	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	40	W
P_D @ T_C= 100° C	Max. Power Dissipation	16	W
Junction to Case	Linear Derating Factor	0.323	W/° C
Junction to Ambient	Linear Derating Factor	0.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUZ 71	50			V	V_{GS} = 0, I_D = 1 mA
$V_{GS(th)}$	Gate-Threshold Voltage	BUZ 71	2.1	3.1	4	V	$V_{DS} = V_{GS}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	BUZ 71		10	100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	BUZ 71		−10	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	BUZ 71		25	250	μA	V_{DS} = Max. Rating, V_{GS} = 0
		BUZ 71		50	1000	μA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BUZ 71	12			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUZ 71			0.6	V	V_{GS} = 10V, I_D = 6A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ 71			0.1	Ω	V_{GS} = 10V, I_D = 6A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ 71			0.18	Ω	V_{GS} = 10V, I_D = 6A, T_C = 125°C

DYNAMIC

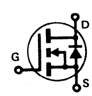
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BUZ 71	3	4.8		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 6A
C_{iss}	Input Capacitance	BUZ 71		480		pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	BUZ 71		280		pF	
C_{rss}	Reverse Transfer Capacitance	BUZ 71		160		pF	
$t_{d(on)}$	Turn-On Delay Time	BUZ 71		35		ns	V_{DD} = 30V, $I_D \cong$ 3A, R_g = 50Ω, R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BUZ 71		20		ns	
$t_{d(off)}$	Turn-Off Delay Time	BUZ 71		200		ns	
t_f	Fall Time	BUZ 71		150		ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BUZ 71			3.1	°C/W	
R_{thJA}	Junction-to-Ambient	BUZ 71			75	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUZ 71			−12	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BUZ 71			−36	A	
V_{SD}	Diode Forward Voltage[1]	BUZ 71			−2.2	V	T_C=25°C, I_S=−24A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	BUZ 71		120		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

Siliconix
PRELIMINARY

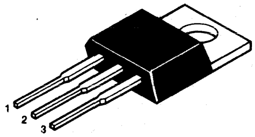
N-Channel Enhancement Mode MOSPOWER

APPLICATIONS

- DC/DC Converters
- Robots
- Printers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUZ72A	100	0.25	T0–220AB



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

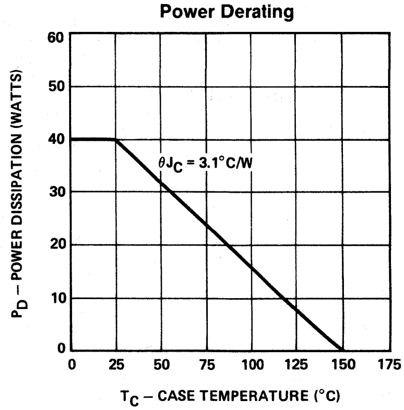
T0–220AB

ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	BUZ72A	Units
V_{DS}	Drain-Source Voltage	100	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	V
I_D @ T_C = 25° C	Continuous Drain Current	±9	A
I_D @ T_C = 100° C	Continuous Drain Current	±6	A
I_{DM}	Pulsed Drain Current[1]	±27	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	40	W
P_D @ T_C = 100°C	Max. Power Dissipation	16	W
Junction to Case	Linear Derating Factor	0.323	W/° C
Junction to Ambient	Linear Derating Factor	0.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUZ72A	100			V	V_{GS} = 0 I_D = 1 mA
$V_{GS(th)}$	Gate-Threshold Voltage	BUZ72A	2.1	3	4	V	V_{DS} = V_{GS}, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	BUZ72A		10	100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	BUZ72A		–10	–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	BUZ72A		25	250	μA	V_{DS} = Max. Rating, V_{GS} = 0
		BUZ72A		50	1000	μA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BUZ72A	9			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUZ72A		0.9	1.3	V	V_{GS} = 10V , I_D = 5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ72A		0.8	0.25	Ω	V_{GS} = 10V , I_D = 5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ72A		0.31	0.43	Ω	V_{GS} = 10V, I_D = 5A , T_C = 125°C

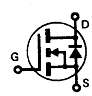
DYNAMIC

g_{fs}	Forward Transductance[1]	BUZ72A	2.7	3.8		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 5A
C_{iss}	Input Capacitance	BUZ72A		800		pF	V_{GS} = 0 ,V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	BUZ72A		500		pF	
C_{rss}	Reverse Transfer Capacitance	BUZ72A		150		pF	
$t_{d(on)}$	Turn-On Delay Time	BUZ72A		30		ns	V_{DD} = 30V , $I_D \cong$ 2.9A R_g = 50Ω , R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BUZ72A		80		ns	
$t_{d(off)}$	Turn-Off Delay Time	BUZ72A		120		ns	
t_f	Fall Time	BUZ72A		70		ns	

THERMAL RESISTANCE

R_{thJC}	Junction-to-Case	BUZ72A		1.8	3.1	°C/W	
R_{thJA}	Junction-to-Ambient	BUZ72A			75	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)	BUZ72A			–9	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
I_{SM}	Source Current[1] (Body Diode)	BUZ72A			–27	A	
V_{SD}	Diode Forward Voltage[1]	BUZ72A		–1.4	–2	V	T_C=25°C,I_S=–18A,V_{GS} = 0
t_{rr}	Reverse Recovery Time	BUZ72A		170		ns	T_J =150°C , I_F = I_S, dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

BUZ 74

Siliconix
PRELIMINARY

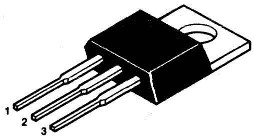
N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- SMPS
- Electronic Balast
- Data Monitors

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUZ 74	500	3.0	T0–220AB



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

T0–220AB

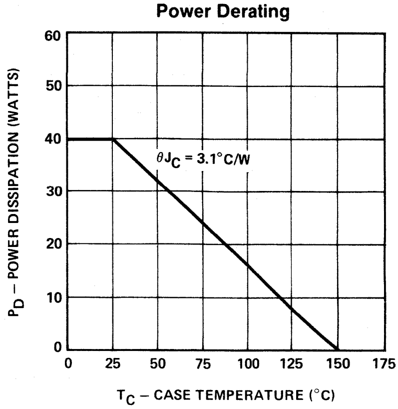
ABSOLUTE MAXIMUM RATINGS (T_C = 25° C unless otherwise noted)

	Parameter	BUZ 74	Units
V_{DS}	Drain-Source Voltage	500	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	500	V
I_D @ T_C = 25° C	Continuous Drain Current	±2.4	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.5	A
I_{DM}	Pulsed Drain Current[1]	±7	A
V_{GS}	Gate-Source Voltage	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	40	W
P_D @ T_C = 100°C	Max. Power Dissipation	16	W
Junction to Case	Linear Derating Factor	0.323	W/° C
Junction to Ambient	Linear Derating Factor	0.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

3

Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUZ 74	500			V	V_{GS} = 0, I_D = 1 mA
$V_{GS(th)}$	Gate-Threshold Voltage	BUZ 74	2.1	3	4	V	$V_{DS} = V_{GS}$, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	BUZ 74		10	100	nA	V_{GS} = 20
I_{GSSR}	Gate-Body Leakage Reverse	BUZ 74		−10	−100	nA	V_{GS} = −20
I_{DSS}	Zero Gate Voltage Drain Current	BUZ 74		25	250	μA	V_{DS} = Max. Rating, V_{GS} = 0
		BUZ 74		50	1000	μA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	BUZ 74	2.4			A	$V_{DS} \geqslant 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUZ 74		3.1	3.6	V	V_{GS} = 10V, I_D = 1.2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ 74		2.6	3	Ω	V_{GS} = 10V, I_D = 1.2A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ 74		4.9	5.7	Ω	V_{GS} = 10V, I_D = 1.2A T_C = 125°C

DYNAMIC

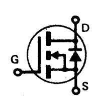
	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BUZ 74		2.5		S (℧)	$V_{DS} \geqslant 2V_{DS(ON)}$, I_D = 1.2A
C_{iss}	Input Capacitance	BUZ 74		350		pF	V_{GS} = 0, V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	BUZ 74		50		pF	
C_{rss}	Reverse Transfer Capacitance	BUZ 74		20		pF	
$t_{d(on)}$	Turn-On Delay Time	BUZ 74		15		ns	V_{DD} = 30V, $I_D \cong$ 2.3A, R_g = 50Ω, R_L = 10Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BUZ 74		30		ns	
$t_{d(off)}$	Turn-Off Delay Time	BUZ 74		30		ns	
t_f	Fall Time	BUZ 74		35		ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BUZ 74			3.1	°C/W	
R_{thJA}	Junction-to-Ambient	BUZ 74			75	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUZ 74			−2.4	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	BUZ 74			−7	A	
V_{SD}	Diode Forward Voltage[1]	BUZ 74		−1	−1.3	V	T_C=25°C, I_S=−2.4A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	BUZ 74		350		ns	T_J = 150°C, $I_F = I_S$, dI_F/ds = 100 A/μs



1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

BUZ76

N-Channel Enhancement Mode
MOSPOWER

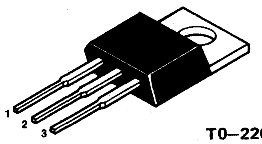
Siliconix
PRELIMINARY

APPLICATIONS

- Switching Regulators
- Converters
- Motor Drivers

PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
BUZ76	400	1.8	T0–220AB



PIN 1 — Gate
PIN 2 & TAB — Drain
PIN 3 — Source

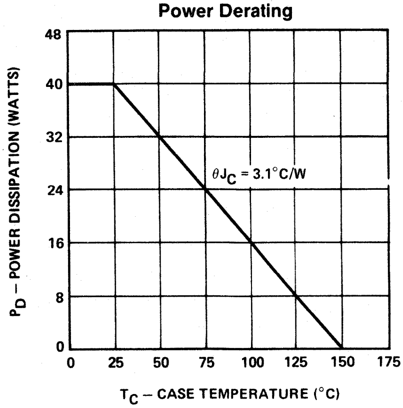
T0–220AB

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	BUZ76	Units
V_{DS}	Drain-Source Voltage	400	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	V
I_D @ T_C = 25° C	Continuous Drain Current	±3	A
I_D @ T_C = 100° C	Continuous Drain Current	±2	A
I_{DM}	Pulsed Drain Current[1]	±9	A
V_{GS}	Gate-Source Voltage	±20	V
P_D @ T_C = 25° C	Max. Power Dissipation	40	W
P_D @ T_C = 100°C	Max. Power Dissipation	16	W
Junction to Case	Linear Derating Factor	0.32	W/° C
Junction to Ambient	Linear Derating Factor	0.013	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To +150	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%

Power Derating



ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	BUZ76	400			V	V_{GS} = 0 I_D = 1 mA
$V_{GS(th)}$	Gate-Threshold Voltage	BUZ76	2.1	3	4	V	V_{DS} = V_{GS}, I_D = 10 mA
I_{GSSF}	Gate-Body Leakage Forward	BUZ76		10	100	nA	V_{GS} = +20V, V_{DS} = 0
I_{GSSR}	Gate-Body Leakage Reverse	BUZ76		–10	–100	nA	V_{GS} = –20V, V_{DS} = 0
I_{DSS}	Zero Gate Voltage Drain Current	BUZ76		25	250	μA	V_{DS} = Max. Rating, V_{GS} = 0
		BUZ76		50	1000	μA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125° C
$I_{D(on)}$	On-State Drain Current[1]	BUZ76		3		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	BUZ76			2.7	V	V_{GS} = 10V , I_D = 1.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ76			1.8	Ω	V_{GS} = 10V , I_D = 1.5A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	BUZ76			4	Ω	V_{GS} = 10V, I_D = 1.5A, T_C = 125° C

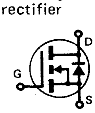
DYNAMIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	BUZ76		2.5		S	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 1.5A
C_{iss}	Input Capacitance	BUZ76		420		pF	V_{GS} = 0 , V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	BUZ76		60		pF	
C_{rss}	Reverse Transfer Capacitance	BUZ76		25		pF	
$t_{d(on)}$	Turn-On Delay Time	BUZ76		30		ns	V_{DD} = 30V , $I_D \cong$ 2.5A R_g = 10Ω , R_L = 50Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	BUZ76		100		ns	
$t_{d(off)}$	Turn-Off Delay Time	BUZ76		150		ns	
t_f	Fall Time	BUZ76		100		ns	

THERMAL RESISTANCE

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	BUZ76			3.1	°C/W	
R_{thJA}	Junction-to-Ambient	BUZ76			75	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	BUZ76			–3	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier 
I_{SM}	Source Current[1] (Body Diode)	BUZ76			–9	A	
V_{SD}	Diode Forward Voltage[1]	BUZ76		–1.1	–1.4	V	T_C = 25°C , I_S = –6A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	BUZ76		300			T_J = 25°C , I_F = –6A dI_F/ds = 100 A/μs

1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

BLS100 ■ BLS101

Common Source Bidirectional N-Channel Enhancement Mode Switch

MOSPOWER

Siliconix

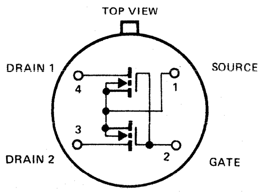
PRELIMINARY

APPLICATIONS

- Subscriber Line Switches
- Bidirectional Analog Switching
- Relay Replacements

PRODUCT SUMMARY

Part Number	V_{DD} Volts	$R_{DD(ON)}$ (ohms)	Package
BLS100	±200	15	T0–77
BLS101	±150	15	T0–77

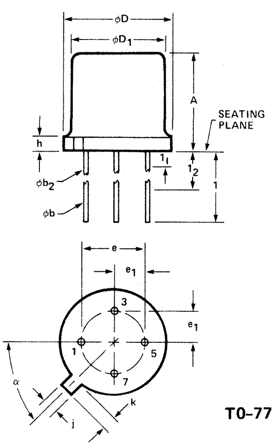


T0–77
BLS 100 Series Bilateral Switch

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	BLS100	BLS101	Units
V_{DD}	Drain-Drain Voltage(2)	±200	±150	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	±200	±150	V
$I_{DD(ON)}$ @ 25°C	Continuous Drain Current(2)	500	500	mA
$I_{DD(ON)}$ @ 100°C	Continuous Drain Current(2)	200	200	mA
$I_{DD(ON)}$	Pulsed Drain Current1(2)	2	2	A
V_{GS}	Gate-Source Voltage	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	6.25	6.25	W
P_D @ T_C = 100°C	Max. Power Dissipation	1.80	1.80	W
Junction to Case	Thermal Resistance	20	20	°C/W
Junction to Ambient	Thermal Resistance	170	170	°C/W
T_J Tstg	Operating and Storage Temperature Range	–55 To +150°C	–55 To +150°C	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 Gate and Source Connections Must Be Isolated From the Drain Voltages



T0–77

Symbol	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A	0.240	0.260	6.10	6.60
φb	0.016	0.021	0.406	0.533
φb2	0.016	0.019	0.406	0.483
φD	0.335	0.370	8.51	9.40
φD1	0.305	0.335	7.75	8.51
e	0.200 T.P.		5.08 T.P.	
e1	0.100 T.P.		2.54 T.P.	
h		0.040		1.02
j	0.028	0.034	0.711	0.864
k	0.029	0.045	0.737	1.14
1	0.500		12.70	
1		0.050		1.27
12	0.250		6.35	
α	45° T.P.		45° T.P.	

4

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
V_{DD}	Drain-Drain Breakdown Voltage[2]	BLS100	±200			V	V_{GS} = 0, I_{DD} = ±500 μA
		BLS101	±150			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	0.8		3	V	V_{D1} or V_{D2} = V_{GS}, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All			100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All			−100	nA	V_{GS} = −20V
$I_{DD(OFF)}$	Zero Gate Voltage Drain Current 2	All			±2	μA	V_{DD} = 120V , V_{GS} = 0
		All			±100	μA	V_{DD} = 120V , V_{GS} = 0, T_C = 125°C
$I_{DD(ON)}$	On-State Drain Current[1,2]	BLS100	0.5			A	V_{DD2} = 25V, V_{GS} = 10V
		BLS101	0.5			A	V_{DD2} = 25V, V_{GS} = 10V
$V_{DD(ON)}$	Static Drain-Drain On-State Voltage[1,2]	BLS100		0.80	1.5	V	V_{GS} = 10V , I_D = ±100 mA
		BLS101		0.80	1.5	V	V_{GS} = 10V , I_D = ±100 mA
$R_{DD(ON)}$	Static Drain-Drain On-State Resistance[1,2]	BLS100		8	15	Ω	V_{GS} = 10V , I_D = ±100 mA
		BLS101		8	15	Ω	V_{GS} = 10V , I_D = ±100 mA
$R_{DD(ON)}$	Static Drain-Drain On-State Resistance[1,2]	BLS100		15	30	Ω	V_{GS}=10V, I_D=±100mA, T_C=125°C
		BLS101		15	30	Ω	V_{GS}=10V, I_D=±100mA, T_C=125°C

DYNAMIC

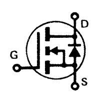
C_{iss}	Input Capacitance	All		47		pF	V_{GS} = 0 , V_{DD} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		17		pF	
C_{rss}	Reverse Transfer Capacitance	All		2		pF	
$t_{d(on)}$	Turn-On Delay Time	All		0.2		μS	V_{DD} = 25V , I_D ≅ 0.7A, R_g = 25Ω , R_L = 27Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		0.8		μS	
$t_{d(off)}$	Turn-Off Delay Time	All		0.8		μS	
t_f	Fall Time	All		1.7		μS	

THERMAL RESISTANCE

R_{thJC}	Junction-to-Case	All			20	°C/W	
R_{thJA}	Junction-to-Ambient	All			170	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)	BLS100			−500	mA	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		BLS101			−500	mA	
I_{SM}	Source Current[1] (Body Diode)	BLS100			−2	A	
		BLS101			−2	A	
V_{SD}	Diode Forward Voltage[1]	BLS100		−1.9		V	T_C=25°C, I_S=−0.1A, V_{GS} = 10V
		BLS101		−1.9		V	T_C=25°C, I_S=−0.1A, V_{GS} = 10V



1 **Pulse Test:** Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%
2 Gate and Source Connections Must Be Isolated From Drain Voltage

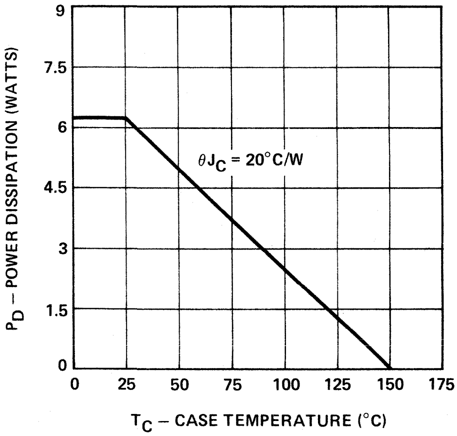
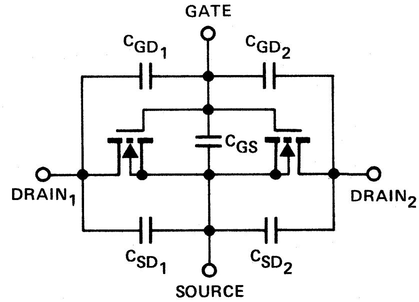


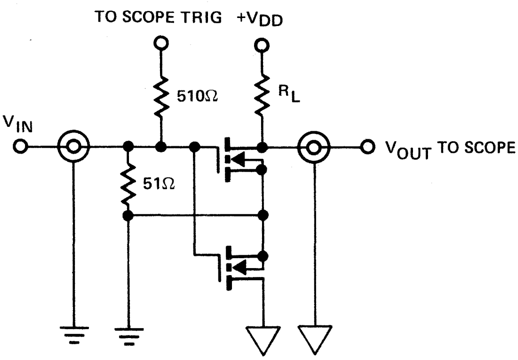
Figure 1. Power Derating



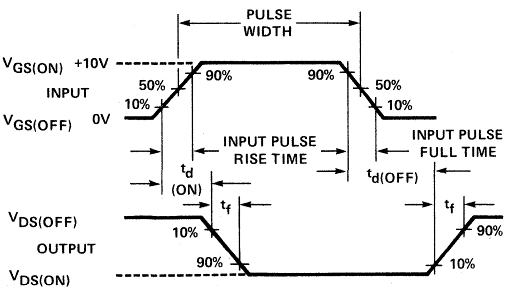
BLS 10X With Associated Capacitance

	C_{GD_X}	C_{GS}	C_{SD_X}	Conditions
TYP	1pF	45pF	16pF	V_{DS} = 25V V_{GS} = 0V f = 1 MHz

Figure 3. Device Capacitance Equivalent Circuit



Switching Test Circuit

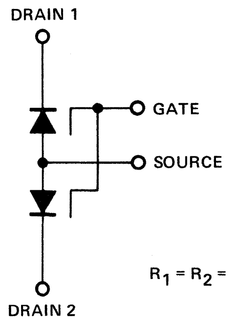


Switching Waveforms

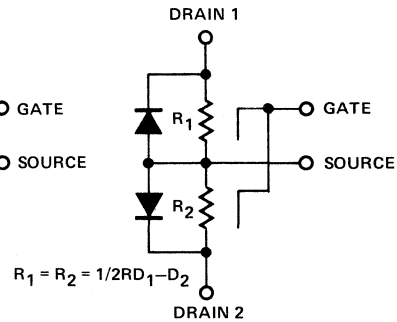
Figure 2

Theory of Operation

The BLS100 series consists of two bilateral switches with AC analog signal capability of up to ±200 volts for the BLS100 and ±150 volts for the BLS101. A bilateral switch consists of two matched N-Channel Enhancement-Mode D-MOS devices with common source and gate connections. As in all N-Channel Enhancement-Mode devices, the device is off when the gate to source (V_{GS}) voltage is zero volts. As this is a bilateral switch and either drain is allowed to have a positive or negative voltage with respect to the other drain, the source will follow the drain voltages when the device is "ON", the source voltage will track the difference in the voltages at the drain terminals. In the "OFF" mode the source will track the most negative drain (see equivalent circuits).



Equivalent DC "OFF" Circuit



Equivalent DC "ON" Circuit

Figure 4

4

MOD100 ■ MOD500

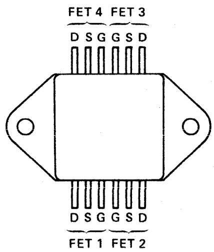
Siliconix

PRODUCT PREVIEW

N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

- H—Bridge Motor Controls
- Isolated Heat Sink Designs
- Switching Power Supplies
- Individual FETS or Paralleled for Additional Power



CASE: NO CONNECTION

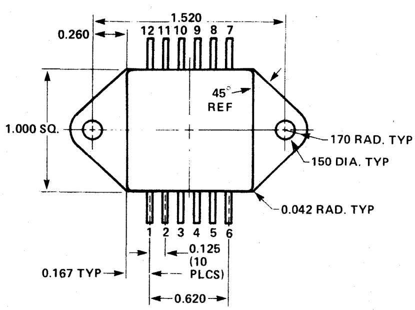
PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
MOD100	100	0.07	Hermetic Module
MOD500	500	0.42	Hermetic Module

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted, per FET)

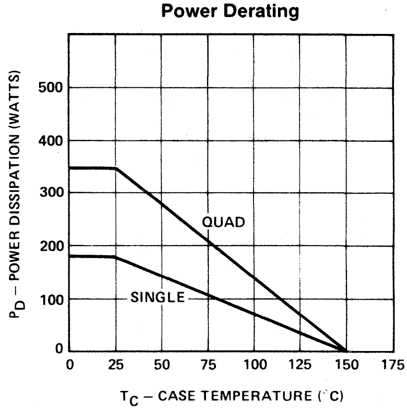
	Parameter	Single MOD100	Single MOD500	Quad MOD100	Quad MOD500	Units
V_{DS}	Drain-Source Voltage	100	500	100	500	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	100	500	100	500	V
I_D @ T_C = 25° C	Continuous Drain Current	±18	±14	±72	±41	A
I_D @ T_C = 100° C	Continuous Drain Current	±18	±9	±72	±26	A
I_{DM}	Pulsed Drain Current[1]	±78	±30	±236	±82	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	175	175	350	350	W
P_D @ T_C = 100°C	Max. Power Dissipation	70	70	142	142	W
Junction to Case	Linear Derating Factor	0.7	0.7	0.35	0.35	°C/W
Junction to Ambient	Linear Derating Factor	30	30	30	30	°C/W
T_J Tstg	Operating and Storage Temperature Range	−55 To 150	−55 To 150	−55 To 150	−55 To 150	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	300	° C

1 Pulse Test: Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%
2 Package Limited



NOTE: All FETs, Case Electrically Isolated From Each Other.

Power Derating



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ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	MOD100	100	120		V	V_{GS} = 0, I_D = 1 mA
		MOD500	500	520		V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	3	4	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		50	100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All		–50	–100	nA	V_{GS} = –20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	1	mA	V_{DS} = Max. Rating, V_{GS} = 0
		All		1	4	mA	V_{DS} = Max. Rating, V_{GS} = 0, T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	MOD100	18	40		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
		MOD500	14	20		A	$V_{DS} \geq 2V_{DS(ON)}$, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	MOD100			0.7	V	V_{GS} =10V , I_D =10A
		MOD500			2.94	V	V_{GS} =10V , I_D = 7A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	MOD100		0.06	0.07	Ω	V_{GS} = 10V , I_D = 10A
		MOD500		0.35	0.42	Ω	V_{GS} = 10V , I_D = 7A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	MOD100		0.11	0.126	Ω	V_{GS} =10V, I_D =10A , T_C =125°C
		MOD500		0.70	0.84	Ω	V_{GS} =10V, I_D =3.5A, T_C =125°C

DYNAMIC

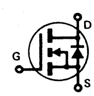
g_{fs}	Forward Transductance[1]	All	6	10		S (℧)	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 7A
C_{iss}	Input Capacitance	All		3000	3200	pF	V_{GS} = 0 ,V_{DS} = 25V, f = 1 MHz
C_{oss}	Output Capacitance	All		1500	1700	pF	
C_{rss}	Reverse Transfer Capacitance	All		500	700	pF	
$t_{d(on)}$	Turn-On Delay Time	All		50	80	ns	V_{DD} = 30V , $I_D \cong$ 10A, R_g = 5Ω , R_L = 3Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		100	125	ns	
$t_{d(off)}$	Turn-Off Delay Time	All		125	175	ns	
t_f	Fall Time	All		100	150	ns	

THERMAL RESISTANCE

R_{thJC}	Junction-to-Case	All		0.6	0.7	°C/W	Single Die
R_{thJA}	Junction-to-Ambient	All			30	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)	MOD100			–18	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
		MOD500			–14	A	
I_{SM}	Source Current[1] (Body Diode)	MOD100		–78		A	
		MOD500		–30		A	
V_{SD}	Diode Forward Voltage[1]	All		–1.4	–1.8	V	T_C=25°C, I_S=–18A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		350		ns	T_J = 25°C , $I_F = I_S$, dI_F/ds = 100 A/μs



1 Pulse Test: Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

MPP500 ■ MPP501 ■ MPP502

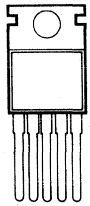
Siliconix

PRELIMINARY

P & N-Channel Enhancement Mode
MOSPOWER

APPLICATIONS

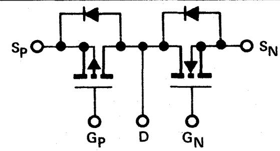
- Motor Control
- Floppy Disc and Winchester Head Drives
- Half H Bridge Component



PIN 1 – P–GATE
PIN 2 – P–SOURCE
PIN 3 – N/P DRAIN, TAB
PIN 4 – N–SOURCE
PIN 5 – N–GATE
T0–220 – 5 LEADS

PRODUCT SUMMARY

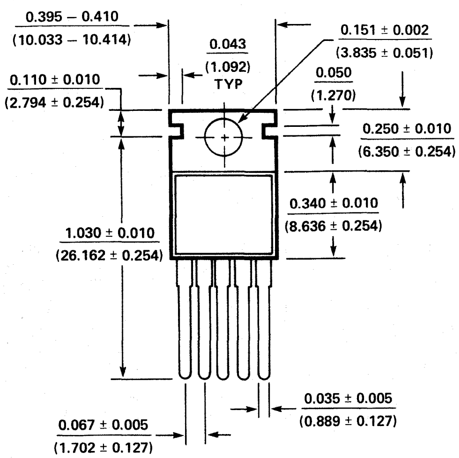
Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
MPP500	100	1.5/4	T0–220–5
MPP501	80	1.5/4	T0–220–5
MPP502	60	1.5/4	T0–220–5

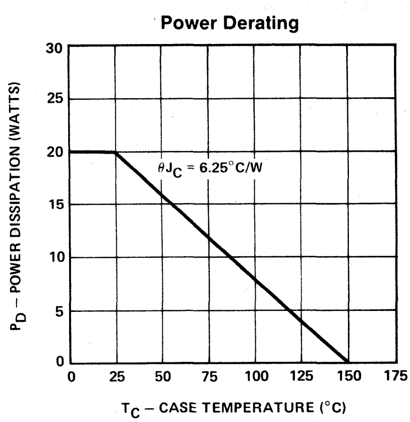


ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	MPP500	MPP501	MPP502	Units
V_{DS}	Drain-Source Voltage	±100	±80	±60	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	±100	±80	±60	V
I_D @ T_C = 25° C	Continuous Drain Current	±2.3	±2.3	±2.3	A
I_D @ T_C = 100° C	Continuous Drain Current	±1.7	±1.7	±1.7	A
I_{DM}	Pulsed Drain Current[1]	±7.7	±7.7	±7.7	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20	20	20	W
P_D @ T_C = 100°C	Max. Power Dissipation	8	8	8	W
Junction to Case	Linear Derating Factor	0.16	0.16	0.16	W/° C
Junction to Ambient	Linear Derating Factor	0.014	0.014	0.014	W/° C
T_J Tstg	Operating and Storage Temperature Range	–55 To 150°C	–55 To 150°C	–55 To 150°C	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%





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ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

STATIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	MPP500 MPP501	±100 ±80			V	V_{GS} = 0 I_D = ±10 mA
		MPP502	±60			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All		±2	±3.5	V	V_{DS} = V_{GS}, I_D = ±1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		10	100	nA	V_{GS} = ±20V
I_{GSSR}	Gate-Body Leakage Reverse	All		10	100	nA	V_{GS} = ±20V
I_{DSS}	Zero Gate Voltage Drain Current	All		±1	±10	μA	V_{DS} = Max. Rating, V_{GS} = 0
		All		±50	±500	μA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	±1	±2		A	V_{DS}≥15V, V_{GS} = ±10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All "N"		1	1.5	V	V_{GS} = 10V , I_D = 1 A
		All "P"		–3.5	–4	V	V_{GS} = –10V , I_D = –1 A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All "N"		1	1.5	Ω	V_{GS} =±10V , I_D = 1 A
		All "P"		3.5	4	Ω	V_{GS} =±10V , I_D = –1A
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All "N"		1.7	2.6	Ω	V_{GS} =±10V, I_D =1 A , T_C =125°C
		All "P"		6	6.8	Ω	V_{GS} =±10V, I_D =–1A, T_C =125°C

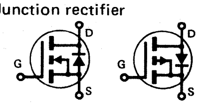
DYNAMIC

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	All		200		mS	V_{DS}≥15V, I_D = ±1 A
C_{iss}	Input Capacitance	All		175		pF	V_{GS} = 0 ,V_{DS} = ±25 f = 1 MHz
C_{oss}	Output Capacitance	All		75		pF	
C_{rss}	Reverse Transfer Capacitance	All		20		pF	
$t_{d(on)}$	Turn-On Delay Time	All		30		ns	V_{DD} = 15V , I_D ≅ 0.5 A R_g = 25Ω , R_L = 7.5Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		30		ns	
$t_{d(off)}$	Turn-Off Delay Time	All		30		ns	
t_f	Fall Time	All		30		ns	

THERMAL RESISTANCE

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	All			6.25	°C/W	
R_{thJA}	Junction-to-Ambient	All			70	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Symbol	Parameter	Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All "N"		–1.7		A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier  N-Channel P-Channel
		All "P"		+ 1.7		A	
I_{SM}	Source Current[1] (Body Diode)	All "N"		–7.7		A	
		All "P"		+ 7.7		A	
V_{SD}	Diode Forward Voltage[1]	All "N"		–1.2		V	T_C=25°C, I_S=–2.3A, V_{GS} = 0
		All "P"		+ 1.9		V	T_C = 25°C , I_S =2.3A, V_{GS} = 0
t_{rr}	Reverse Recovery Time	All		200		ns	T_J =125°C , I_F = I_S, dI_F/ds = 50 A/μs

1 **Pulse Test:** Pulse Width ⩽ 300 μsec, Duty Cycle ⩽ 2%

NOS100B ■ NOS101B ■ NOS102B

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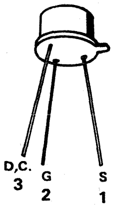
PRODUCT PREVIEW

N-Channel Depletion Mode
MOSPOWER

APPLICATIONS

- Current Regulators
- Normaly Closed Relay
- Telephone Line Switches
- Failsafe Systems



T0–205AF (T0–39)

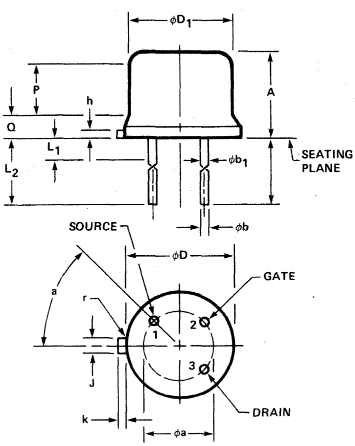
PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
N0S100B	150	4.5	T0–205AF
N0S101B	120	4.5	T0–205AF
N0S102B	80	4.5	T0–205AF

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	N0S100B	N0S101B	N0S102B	Units
V_{DS}	Drain-Source Voltage	150	120	80	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	150	120	80	V
I_D @ T_C = 25° C	Continuous Drain Current(2)	±500	±500	±500	mA
I_D @ T_C = 100° C	Continuous Drain Current(2)	±500	±500	±500	mA
I_{DM}	Pulsed Drain Current[1]	±1.8	±1.8	±1.8	A
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	20	20	20	W
P_D @ T_C = 100°C	Max. Power Dissipation	8	8	8	W
Junction to Case	Linear Derating Factor	0.16	0.16	0.16	W/° C
Junction to Ambient	Linear Derating Factor	5.7	5.7	5.7	mW/°C
T_J Tstg	Operating and Storage Temperature Range	−40 To 125°C	−40 To 125°C	−40 To 125°C	° C
Lead Temperature	(1/16" from case for 10 secs.)	300	300	300	° C

1 **Pulse Test:** Pulsewidth ≤ 300μsec, Duty Cycle ≤ 2%
2 Die Limits Current Capability



Ltr	Dimensions			
	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A	0.160	0.180	4.07	4.57
φa	0.200 TP		5.08 TP	
φb	0.016	0.021	0.41	0.53
φb1	0.016	0.019	0.41	0.48
φD	0.335	0.370	8.51	9.40
φD1	0.305	0.335	7.75	8.51
h	0.009	0.041	0.23	1.04
j	0.028	0.034	0.71	0.86
k	0.029	0.045	0.74	1.14
L	0.500	0.750	12.70	19.05
L1		0.050		1.27
L2	0.250		6.35	
P	0.100		2.54	
Q		0.050		1.27
r		0.010		0.25
α	45 TP		45 TP	

4

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSX}	Drain-Source Breakdown Voltage	N0S100B N0S101B	150 120			V	V_{GS} = –10V I_D = 1 mA
		N0S102B	100			V	
$V_{GS(OFF)}$	Gate-Source Cut Off Voltage	All		–4	–10	V	V_{DS} = 50V, I_D = 10 μA
I_{GSSF}	Gate-Body Leakage Forward	All		10	100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All		–10	–100	nA	V_{GS} = –20V
I_{DSX}	Drain-Source Off Current	All		1	10	μA	V_{DS} = 60V, V_{GS} = –10V
		All		0.5	1	mA	V_{DS} = 60V, V_{GS} = –10V T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	0.2			A	$V_{DS} \geq$ 15V, V_{GS} = 0
		All	1			A	$V_{DS} \geq$ 15V, V_{GS} = 10V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	All			0.45	V	V_{GS} = 0 , I_D = 100 mA
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		3.5	4.5	Ω	V_{GS} = 0 , I_D = 100 mA
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	All		5.3		Ω	V_{GS}=0, I_D=50mA , T_J=125°C

DYNAMIC

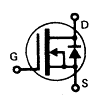
g_{fs}	Forward Transductance[1]	All		500		mS	$V_{DS} \geq 2V_{DS(ON)}$, I_D = 200 mA
C_{iss}	Input Capacitance	All		200		pF	V_{GS} = –10V, V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	All		100		pF	
C_{rss}	Reverse Transfer Capacitance	All		40		pF	
$t_{d(on)}$	Turn-On Delay Time	All		10		ns	V_{DD} = 60V , $I_D \cong$ 0.1A R_g = 25Ω , R_L = 700Ω (MOSFET switching times are essentially independent of operating temperature.)
t_r	Rise Time	All		15		ns	
$t_{d(off)}$	Turn-Off Delay Time	All		8		ns	
t_f	Fall Time	All				ns	

THERMAL RESISTANCE

R_{thJC}	Junction-to-Case	All		4.5	6.25	°C/W	
R_{thJA}	Junction-to-Ambient	All		130	175	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

I_S	Continuous Source Current (Body Diode)	All			–0.5	A	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All			–1.8	A	
V_{SD}	Diode Forward Voltage[1]	All		–0.35	–0.45	V	T_C=25°C, I_S=–0.1A, V_{GS} = 0



1 **Pulse Test:** Pulse Width $\leq$ 300 μsec, Duty Cycle $\leq$ 2%

SNO140NB ■ SNO130NB ■ SNO120NB

8-Channel Monolithic N-Channel Enhancement Mode MOSPOWER

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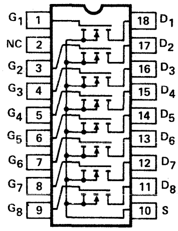
PRODUCT PREVIEW

APPLICATIONS

- Motor Drives
- Electrostatic Array Drivers
- Electroluminescent Displays
- Converters
- Multi-Channel Array Drivers



Pin 10: Common Source & Body

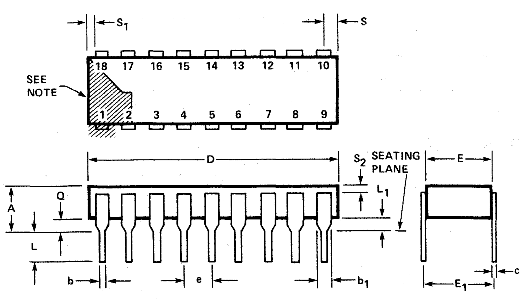
PRODUCT SUMMARY

Part Number	BV_{DSS} Volts	$r_{DS(ON)}$ (ohms)	Package
SN0140NB	400	350	18 Lead
SN0130NB	300	300	18 Lead
SN0120NB	200	300	18 Lead

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

	Parameter	SN0140NB	SN0130NB	SN0120NB	Units
V_{DS}	Drain-Source Voltage	400	300	200	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 1 MΩ)	400	300	200	V
I_D @ T_C = 25° C	Continuous Drain Current	±51	±55	±55	mA
I_D @ T_C = 100° C	Continuous Drain Current	±32	±35	±35	mA
I_{DM}	Pulsed Drain Current[1]	±75	±75	±75	mA
V_{GS}	Gate-Source Voltage	±40	±40	±40	V
P_D @ T_C = 25° C	Max. Power Dissipation	2	2	2	W
P_D @ T_j = 100°C	Max. Power Dissipation	0.8	0.8	0.8	W
Junction to Case	Linear Derating Factor	0.016	0.016	0.016	W/° C
Junction to Ambient	Linear Derating Factor	0.011	0.011	0.011	W/° C
T_J Tstg	Operating and Storage Temperature Range	−55 To 150°C	−55 To 150°C	−55 To 150°C	° C
Lead Temperature	(1/16″ from case for 10 secs.)	300	300	300	° C

1 **Pulse Test:** Pulsewidth ⩽ 300μsec, Duty Cycle ⩽ 2%



18-Lead Ceramic Side Brazed Package

Symbol	Inches		Millimeters	
	Min.	Max.	Min.	Max.
A		0.200		5.08
b	0.014	0.023	0.36	0.58
b_1	0.030	0.070	0.76	1.78
c	0.008	0.015	0.20	0.38
D		0.960		24.38
E	0.220	0.310	5.59	7.87
E_1	0.290	0.320	7.37	8.13
E_2	0.100		2.54	
E_3	0.050		1.27	
e	0.100 BSC		2.54 BSC	
L	0.125	0.200	3.18	5.08
L_1	0.150		3.81	
Q	0.015	0.060	0.38	1.52
Q_1	0.020		0.51	
S		0.098		2.49
S_1	0.005		0.13	
S_2	0.005		0.13	
α	0°	15°	0°	15°

NOTE:

Index area; a notch or a pin one identification mark shall be located adjacent to pin one and shall be located within the shaded area shown. The manufacturer's identification shall not be used as a pin one identification mark.

4

ELECTRICAL CHARACTERISTICS (T_C = 25° C unless otherwise noted)

STATIC

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
BV_{DSS}	Drain-Source Breakdown Voltage	SN0140NB SN0130NB	400 300			V	V_{GS} = 0 I_D = 100 µA
		SN0120NB	200			V	
$V_{GS(th)}$	Gate-Threshold Voltage	All	2	3.5	5.5	V	$V_{DS} = V_{GS}$, I_D = 1 mA
I_{GSSF}	Gate-Body Leakage Forward	All		1	100	nA	V_{GS} = 20V
I_{GSSR}	Gate-Body Leakage Reverse	All		−1	−100	nA	V_{GS} = −20V
I_{DSS}	Zero Gate Voltage Drain Current	All		0.1	1	µA	V_{DS} = Max. Rating, V_{GS} = 0
		All		1	10	µA	V_{DS} = Max. Rating, V_{GS} = 0 T_C = 125°C
$I_{D(on)}$	On-State Drain Current[1]	All	25	50		mA	V_{GS} = 10V , V_{DS} = 25V
$V_{DS(on)}$	Static Drain-Source On-State Voltage[1]	SN0140NB SN0130NB		2.8 2.5	3.5 3	V	V_{GS} = 10V , I_D = 10 mA
		SN0120NB		2.3	3	V	V_{GS} = 10V , I_D = 10 mA
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	SN0140NB SN0130NB		280 250	350 300	Ω	V_{GS} = 10V , I_D = 10 mA
		SN0120NB		230	300	Ω	V_{GS} = 10V , I_D = 10 mA
$R_{DS(on)}$	Static Drain-Source On-State Resistance[1]	SN0140NB SN0130NB		504 450	630 540	Ω	V_{GS}=10V,I_D=10mA,T_C=125°C
		SN0120NB		450	540	Ω	V_{GS}=10V,I_D=10mA,T_C=125°C

DYNAMIC

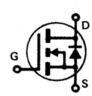
Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
g_{fs}	Forward Transductance[1]	ALL		8		mS	V_{DS} = 25V, I_D = 10 mA
C_{iss}	Input Capacitance	ALL		5		pF	V_{GS} = 0 ,V_{DS} = 25V f = 1 MHz
C_{oss}	Output Capacitance	ALL		3		pF	
C_{rss}	Reverse Transfer Capacitance	ALL		0.8		pF	
$t_{(ON)}$	Turn-On Time	ALL		6		ns	V_{DD} = 25V , $I_D \cong$ 10 mA R_g = 25Ω , R_L = 2500Ω (MOSFET switching times are essentially independent of operating temperature.)
$t_{(OFF)}$	Turn-Off Time	ALL		8		ns	

THERMAL RESISTANCE

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
R_{thJC}	Junction-to-Case	ALL			62.5	°C/W	
R_{thJA}	Junction-to-Ambient	ALL			90	°C/W	Free Air Operation

BODY-DRAIN DIODE RATINGS AND CHARACTERISTICS

Parameter		Type	Min.	Typ.	Max.	Units	Test Conditions
I_S	Continuous Source Current (Body Diode)	All		−50		mA	Modified MOSPOWER symbol showing the integral P-N Junction rectifier
I_{SM}	Source Current[1] (Body Diode)	All		−75		mA	
V_{SD}	Diode Forward Voltage[1]	All		−1.1	−1.3	V	T_C=25°C, I_S=−50mA, V_{GS} = 0
		All		−0.9	−1	V	T_C=125°C, I_S=−50mA, V_{GS} = 0



1 **Pulse Test:** Pulse Width ⩽ 300 µsec, Duty Cycle ⩽ 2%

FAMILY CURVE SELECTOR GUIDE

VNDA06
VN0400A
VN0400D
VN0401A
VN0401D
VN0600A
VN0600D
VN0601A
VN0601D

VNDA12
VN0800A
VN0800D
VN0801A
VN0801D
VN1000A
VN1000D
VN1001A
VN1001D
VN1200A
VN1200D
VN1201A
VN1201D

VNDA40
BUP60
BUP61
BUP62
BUP63
BUP68
BUP69
VN3500A
VN3500D
VN3501A
VN3501D
VN4000A
VN4000D
VN4001A
VN4001D
VNL001A
VNM001A

VNDA50
BUP64
BUP65
BUP66
BUP67
BUP70
BUP71
VN4501A
VN4501D
VN4502A
VN4502D
VN5001A
VN5001D
VN5002A
VN5002D
VNN002A
VNP002A

VNDB24
BSR70
BSR72
BSR76
VN1206B
VN1206D
VN1206L
VN1206M
VN1210L
VN1210M
VN1706B
VN1706D
VN1706L
VN1706M
VN1710L
VN1710M
VN1720M
VN2406B
VN2406D
VN2406L
VN2406M
VN2410L
VN2410M

VNDC10
BUZ10
BUZ71
IRF140
IRF141
IRF142
IRF143
IRF540
IRF541
IRF542
IRF543

VNDC10–2
BUZ24
IRF150
IRF151
IRF152
IRF153
2N6763
2N6764

VNDC10–3
VNC003A
VNE003A

VNDC20
IRF240
IRF241
IRF242
IRF243
IRF640
IRF641
IRF642
IRF643

VNDC20–2
BUZ36
IRF250
IRF251
IRF252
IRF253
2N6765
2N6766

VNDC20–3
VNG004A
VNJ004A

VNDC40
IRF340
IRF341
IRF342
IRF343
IRF740
IRF741
IRF742
IRF743

VNDC40–2
BUZ64
IRF350
IRF351
IRF352
IRF353
2N6767
2N6768

VNDC40–3
VNL005A
VNM005A

VNDC50
IRF440
IRF441
IRF442
IRF443
IRF840
IRF841
IRF842
IRF843

VNDC50–2
BUZ45
IRF450
IRF451
IRF452
IRF453
2N6769
2N6770

VNDC50–3
VNN006A
VNP006A

VNDC65
VNS008A
VNS008D
VNS009A
VNS009D
VNT008A
VNT008D
VNT009A
VNT009D

VNDC65–2
VNS012A
VNT012A

VNDC65–3
VNS013A
VNT013A

VNDD10
IRF120
IRF121
IRF122
IRF123
IRF520
IRF521
IRF522
IRF523
IRFF120
IRFF121
IRFF122
IRFF123
2N6787
2N6788

VNDD20
IRF220
IRF221
IRF222
IRF223
IRF620
IRF621
IRF622
IRF623
IRFF220
IRFF221
IRFF222
IRFF223
2N6789
2N6790

VNDD40
BUZ76
IRF320
IRF321
IRF322
IRF323
IRF720
IRF721
IRF722
IRF723
IRFF320
IRFF321
IRFF322
IRFF323
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2N6792

VNDD50
BUZ74
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IRF421
IRF422
IRF423
IRF820
IRF821
IRF822
IRF823
2N6793
2N6794

VNDE10
BUZ20
BUZ23
BUZ72A
IRF130
IRF131
IRF132
IRF133
IRF530
IRF531
IRF532
IRF533
IRFF130
IRFF131
IRFF132
IRFF133
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2N6756
2N6795
2N6796

VNDE20
BUZ32
BUZ35
IRF230
IRF231
IRF232
IRF233
IRF630
IRF631
IRF632
IRF633
IRFF230
IRFF231
IRFF232
IRFF233
2N6757

FAMILY CURVE SELECTOR GUIDE—Continued

VNDE20
continued
2N6758
2N6797
2N6798

VNDE40
BUZ60
BUZ63
IRF330
IRF331
IRF332
IRF333
IRF730
IRF731
IRF732
IRF733
IRFF330
IRFF331
IRFF332
IRFF333
2N6759
2N6760
2N6799
2N6800

VNDE50
BUZ42
BUZ46
IRF430
IRF431
IRF432
IRF433
IRF830
IRF831
IRF832
IRF833
IRFF430
IRFF431
IRFF432
IRFF433
2N6761
2N6762
2N6801
2N6802

VNDF06
BS170
BSR64
BSR65
VN0610LL
VN10LE
VN10LM
VN2222KM
VN2222LL
VN2222LM
VQ1000P
VQ1000J

VNDF24
BS107
VN2020L
VN2420L

VNDG10
VNC010B
VNC010D
VNC011B
VNC011D
VND010B
VND010D
VND011B
VND011D
VNE010B
VNE010D
VNE011B
VNE011D

VNMA06
BSR66
BSR80
BSR81
VN0606M
VN35AB
VN40AD
VN40AF
VN46AD
VN46AF
VN66AD
VN66AF
VN67AB
VN67AD
VN67AF
VQ1004P
VQ1004J
2N6656
2N6657
2N6659
2N6660

VNMA09
BSR67
BSR82
VN0808M
VN80AF
VN88AD
VN88AF
VN89AD
VN89AF
VN90AB
VN99AB
VQ1006P
VQ1006J
2N6658
2N6661

VNMH03
VN0300B
VN0300D
VN0300L
VN0300M
VQ1001J
VQ1001P
VQ3001J
VQ3001P
VQ7254J
VQ7254P

VNMK06
VN0610L
VN10KE
VN10KM
VN2222L

VPMH03
BSR78
VP0300B
VP0300L
VP0300M
VQ2001J
VQ2001P
VQ3001J
VQ3001P
VQ7254J
VQ7254P

VPMH10
BS250
VP0808B
VP0808L
VP0808M
VP1008B
VP1008L
VP1008M
VQ2004J
VQ2004P
VQ2006J
VQ2006P

TYPICAL PERFORMANCE CURVES (25°C unless otherwise noted)

VNDA/200°C

FIGURE 1. Ohmic Region

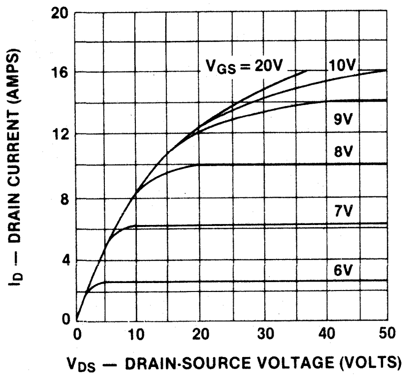


FIGURE 2. Transfer Characteristics

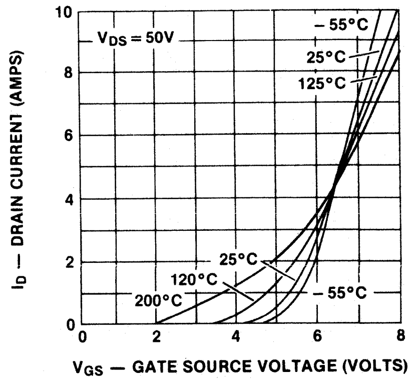


FIGURE 3. Temperature Effects on $r_{DS(on)}$

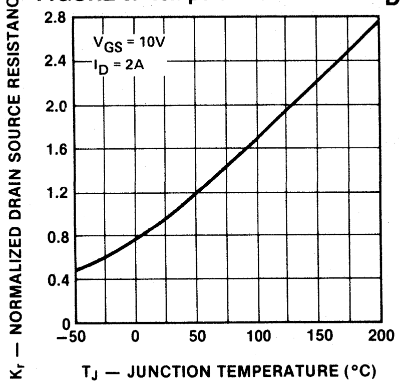


FIGURE 4. Output Characteristics

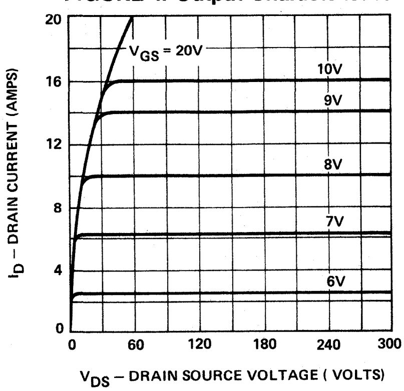
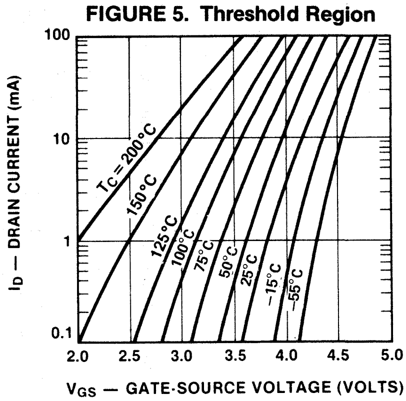


FIGURE 5. Threshold Region



5

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDA/200°C

FIGURE 6. Off-State Current

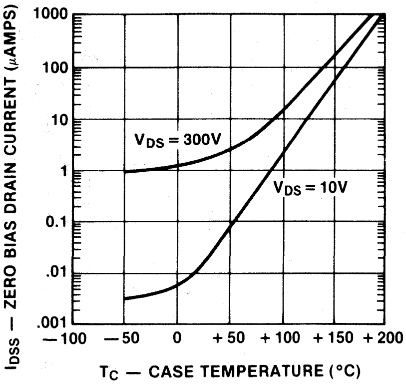


FIGURE 7. Capacitances

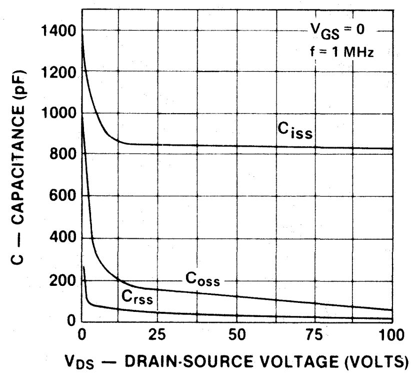


FIGURE 8. Effects of Load Conditions

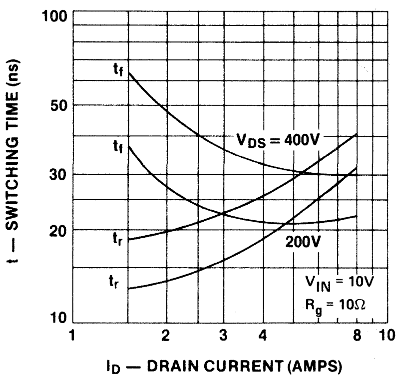


FIGURE 9. Effects of Drive Resistance

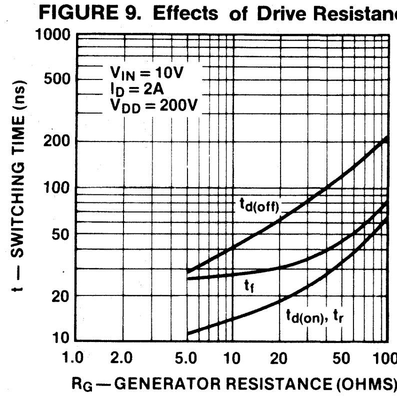
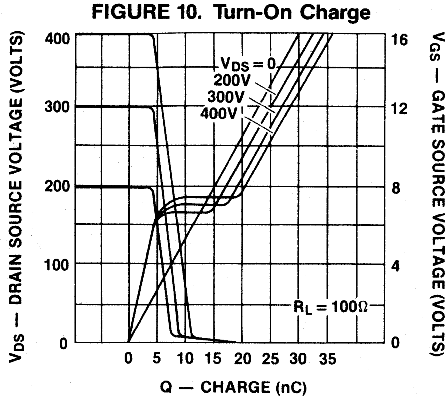


FIGURE 10. Turn-On Charge



TYPICAL PERFORMANCE CURVES (25°C unless otherwise noted)

VNDA06

FIGURE 1. Ohmic Region

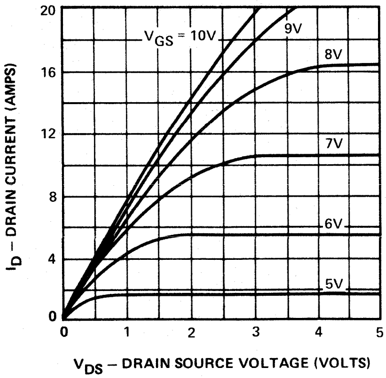


FIGURE 2. Transfer Characteristics

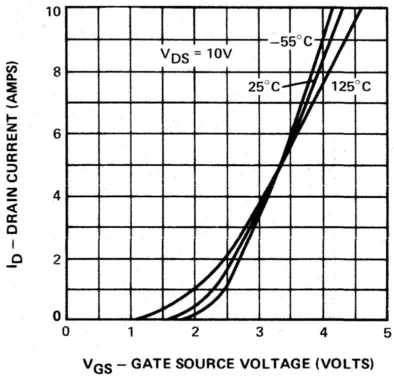


FIGURE 3. Temperature Effects on $r_{DS(on)}$

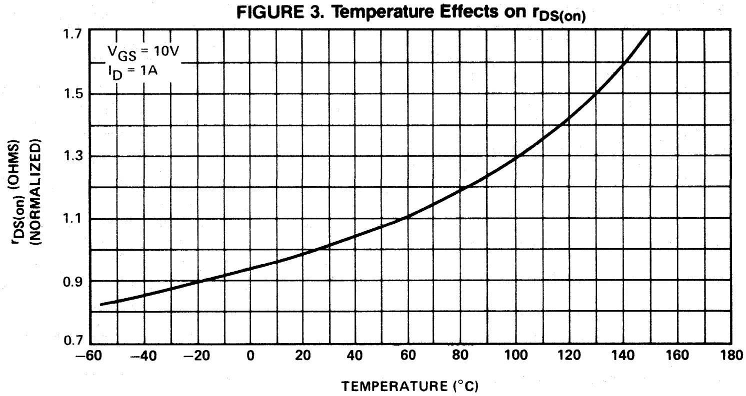


FIGURE 4. Output Characteristics

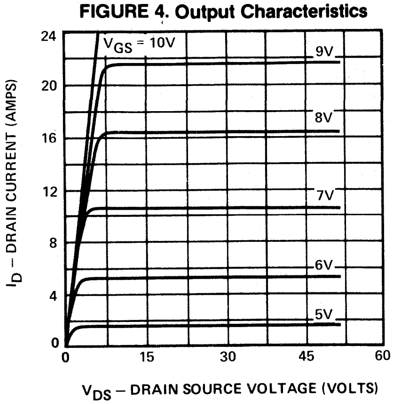
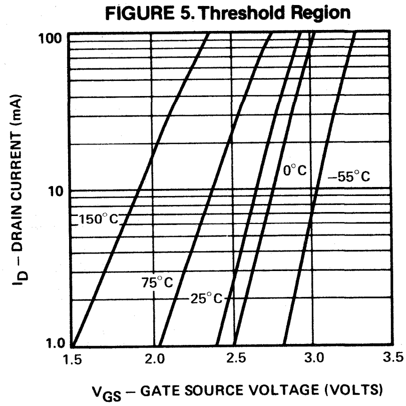


FIGURE 5. Threshold Region



5

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDA06

FIGURE 6. Off-State Current

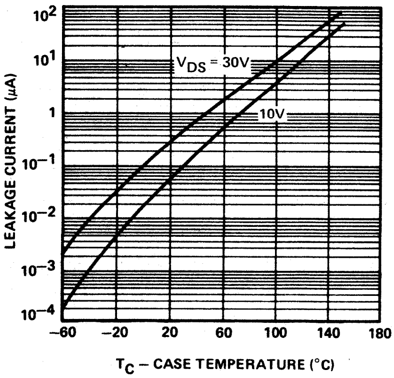


FIGURE 7. Capacitance

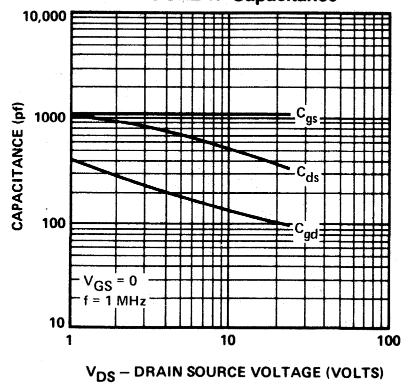


FIGURE 8. Effects on Load Conditions

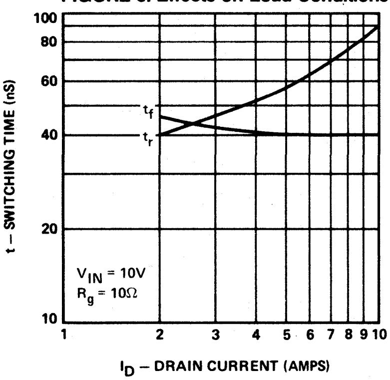


FIGURE 9. Effects of Drive Resistance

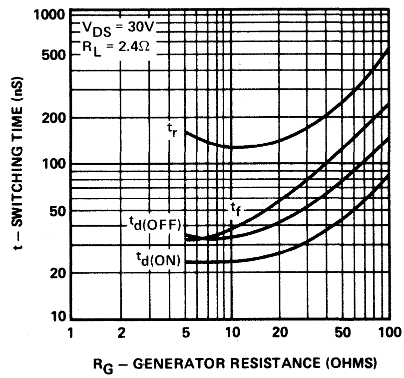
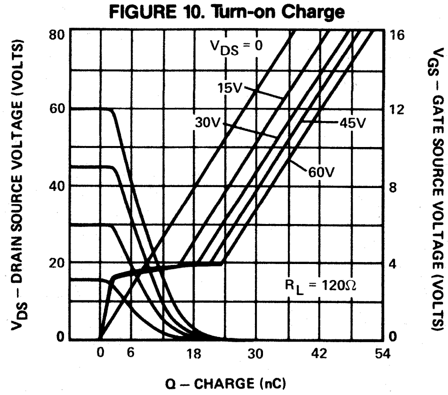


FIGURE 10. Turn-on Charge



TRANSIENT THERMAL RESPONSE CURVES

VNDA06

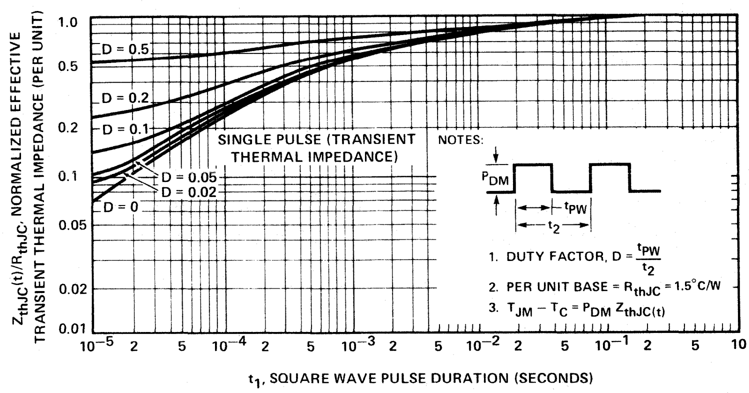


FIGURE 1. TO-3 Package

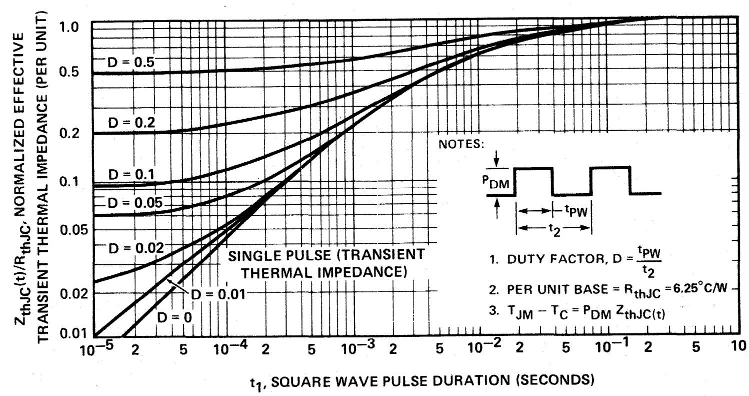


FIGURE 2. TO-220 Package

5

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)
VNDA12

FIGURE 1. Ohmic Region

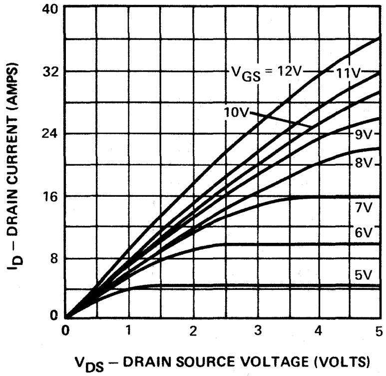


FIGURE 2. Transfer Characteristics

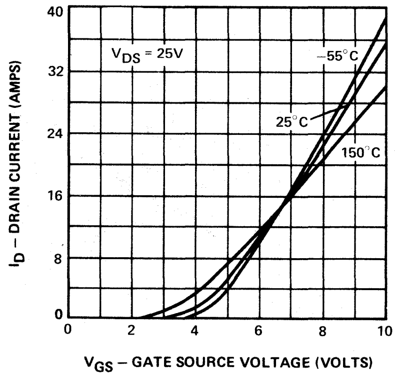


FIGURE 3. Temperature Effects on $r_{DS(on)}$

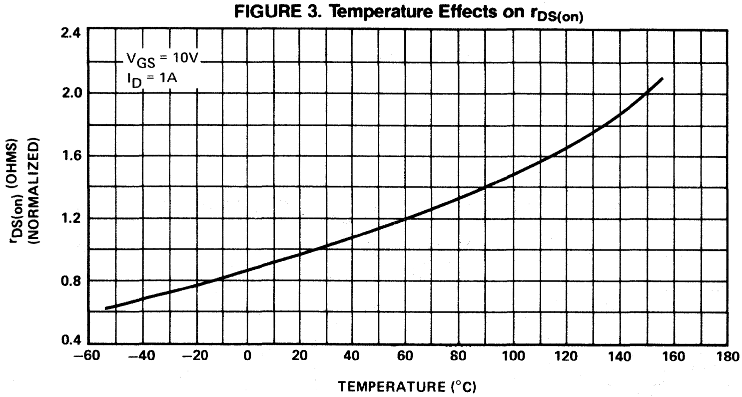


FIGURE 4. Output Characteristics

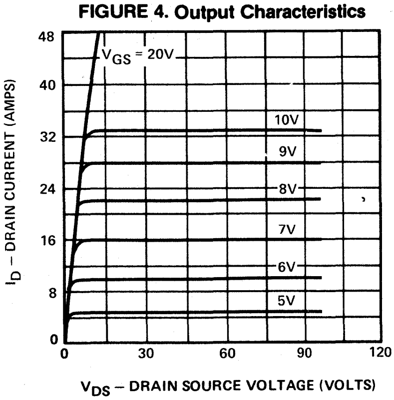
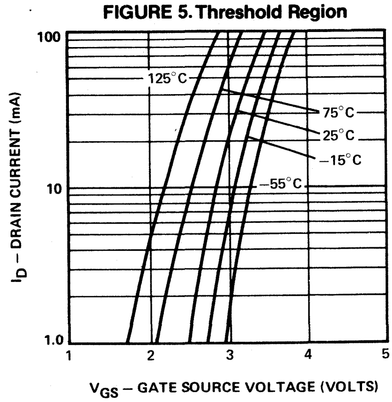


FIGURE 5. Threshold Region



TYPICAL PERFORMANCE CURVES (25°C unless otherwise noted)

VNDA12

FIGURE 6. Off-State Current

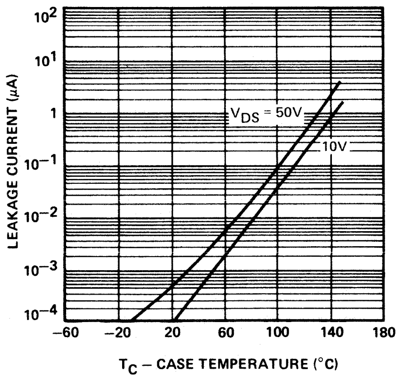


FIGURE 7. Capacitance

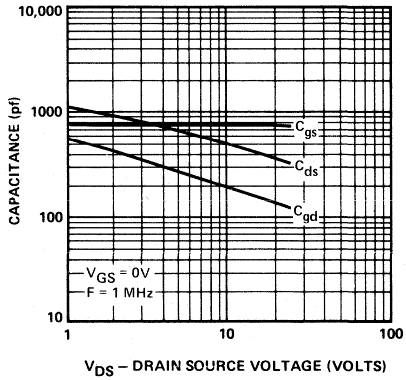


FIGURE 8. Effects on Load Conditions

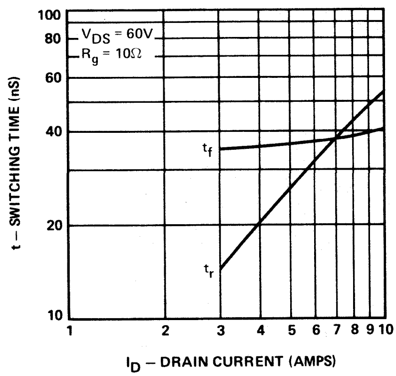


FIGURE 9. Effects of Drive Resistance

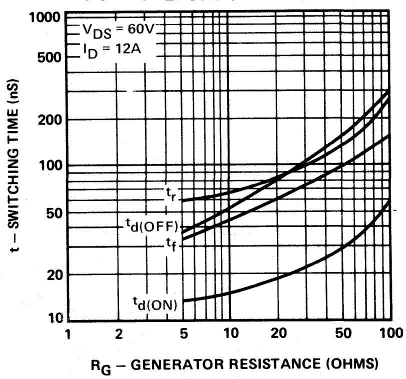
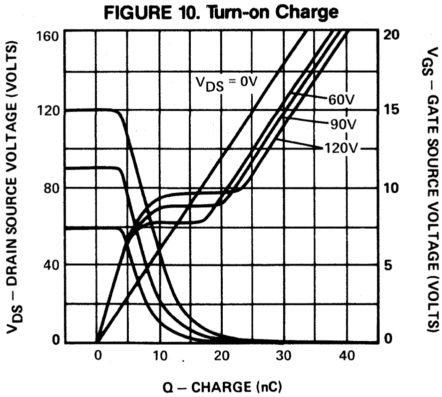


FIGURE 10. Turn-on Charge



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TRANSIENT THERMAL RESPONSE CURVES

VNDA12

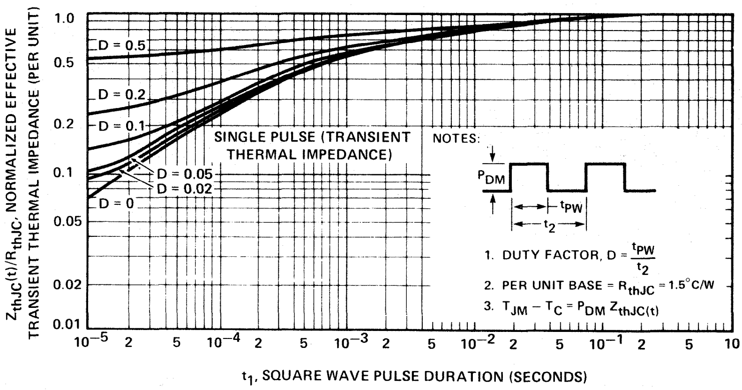


FIGURE 1. TO-3 Package

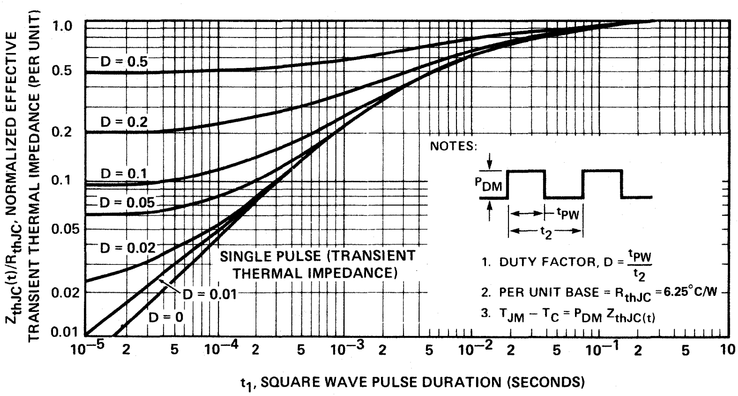


FIGURE 2. TO-220 Package

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDA40

FIGURE 1. Ohmic Region

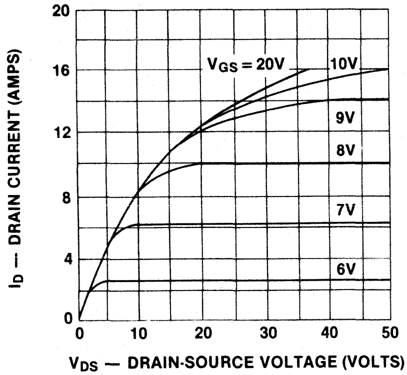


FIGURE 2. Transfer Characteristics

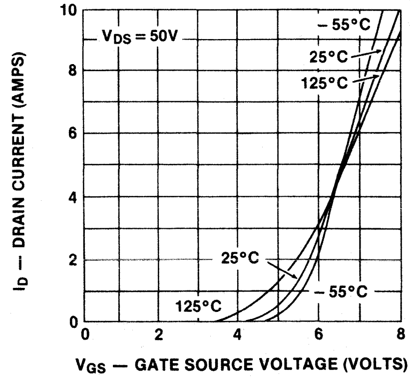


FIGURE 3. Temperature Effects on $r_{DS(on)}$

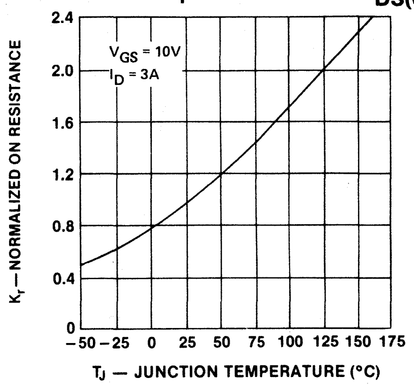


FIGURE 4. Output Characteristics

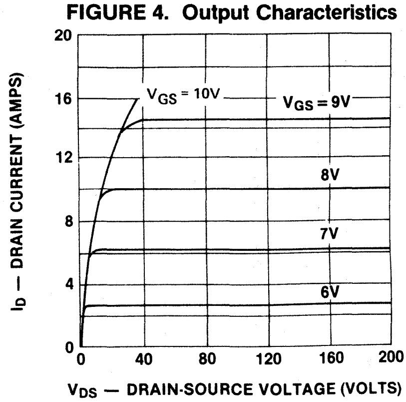
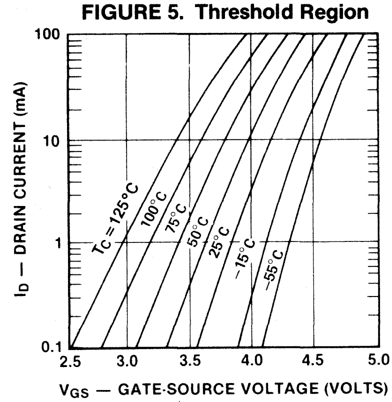


FIGURE 5. Threshold Region



5

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDA40

FIGURE 6. Off-State Current

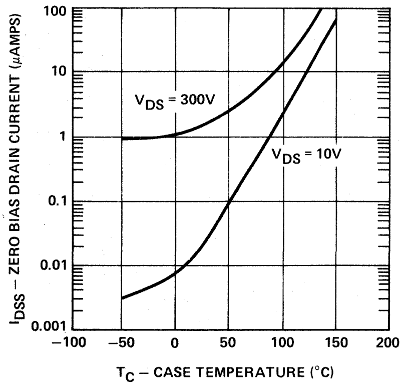


FIGURE 7. Capacitances

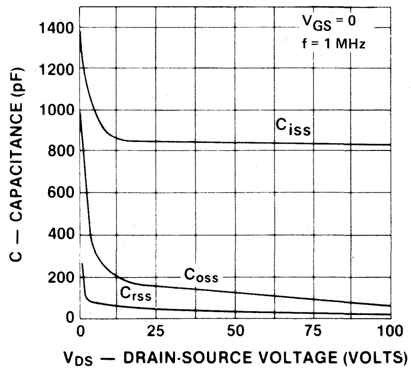


FIGURE 8. Effects of Load Conditions

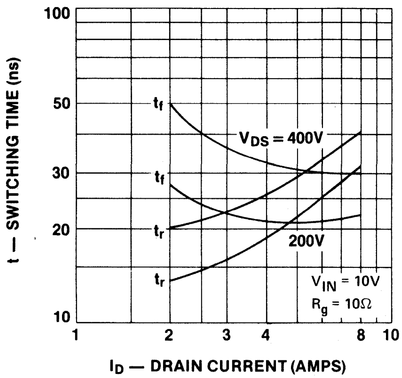


FIGURE 9. Effects of Drive Resistance

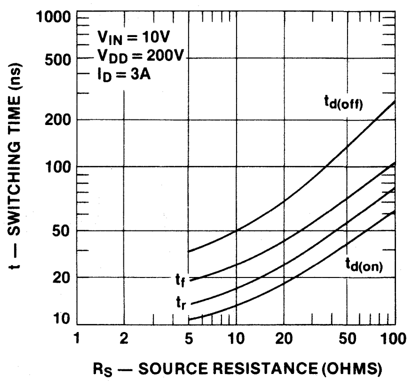
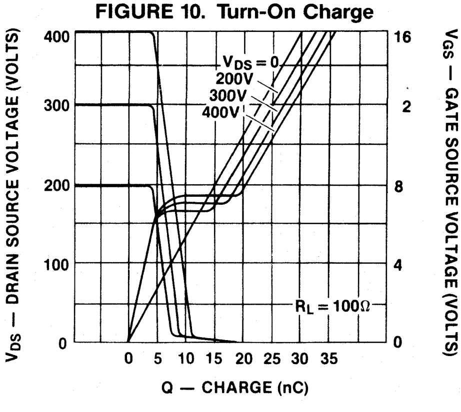


FIGURE 10. Turn-On Charge



TRANSIENT THERMAL RESPONSE CURVES

VNDA40

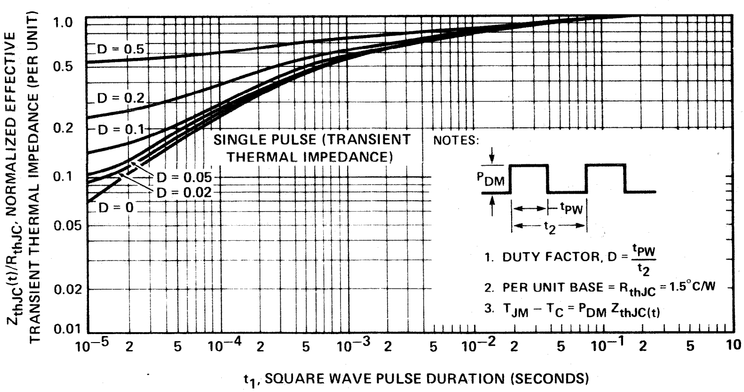


FIGURE 1. TO-3 Package

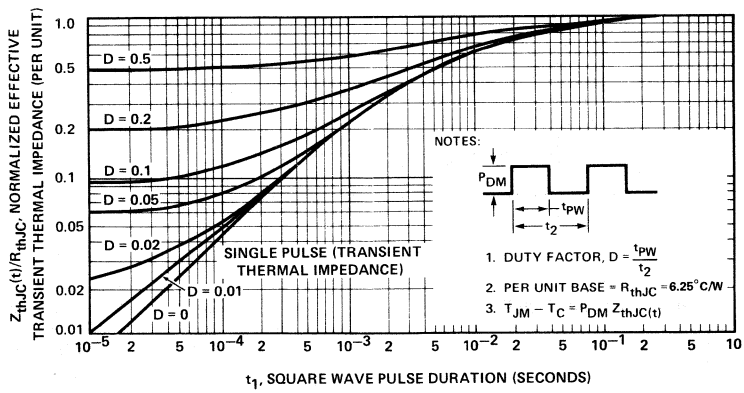


FIGURE 2. TO-220 Package

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FIGURE 1. Ohmic Region

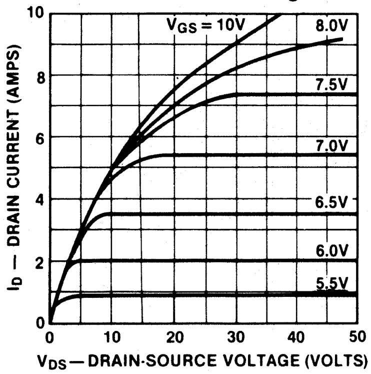


FIGURE 2. Transfer Characteristics

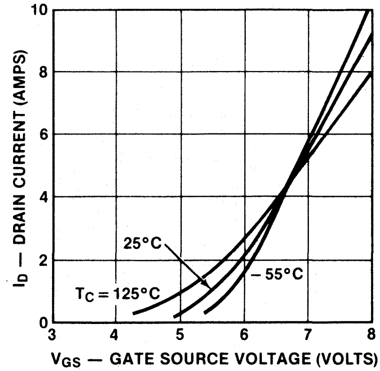


FIGURE 3. Temperature Effects on $r_{DS(on)}$

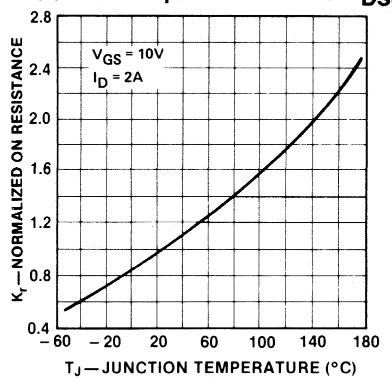


FIGURE 4. Output Characteristics

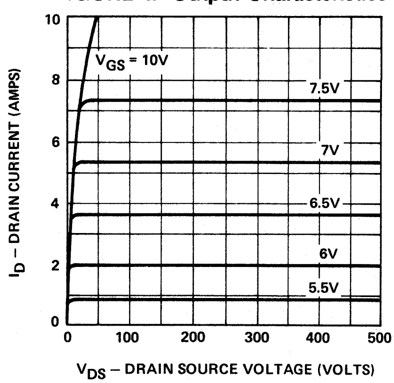
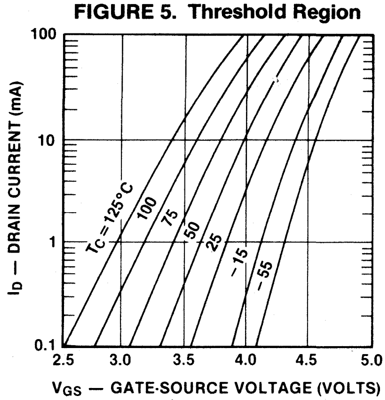


FIGURE 5. Threshold Region



TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDA50

FIGURE 6. Leakage Currents

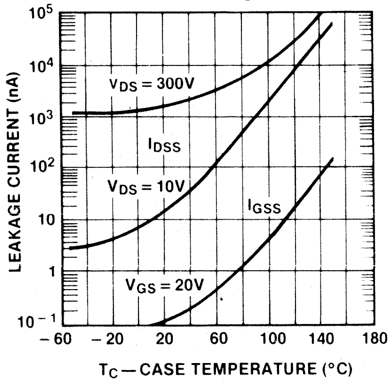


FIGURE 7. Capacitances

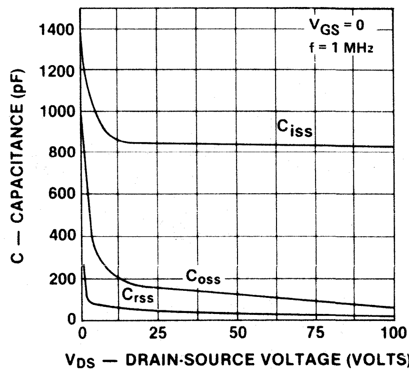


FIGURE 8. Effects of Load Conditions

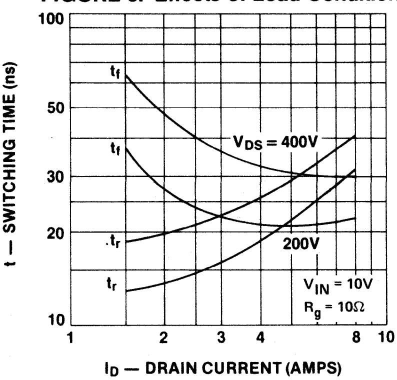


FIGURE 9. Effects of Drive Resistance

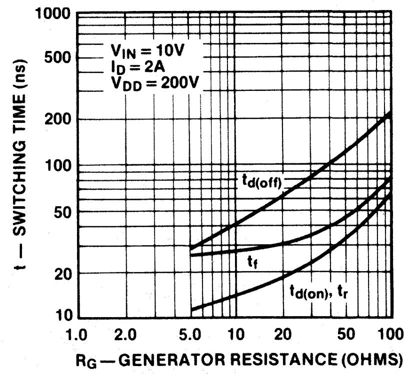
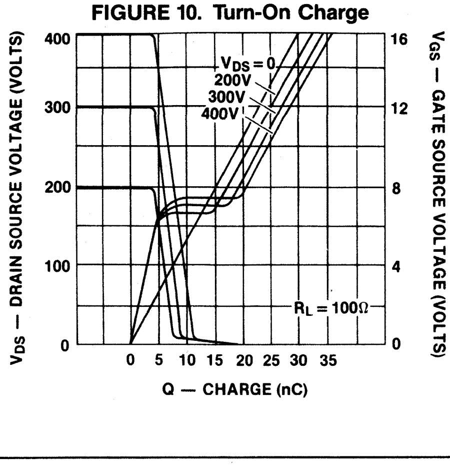


FIGURE 10. Turn-On Charge



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TRANSIENT THERMAL RESPONSE CURVES

VNDA50

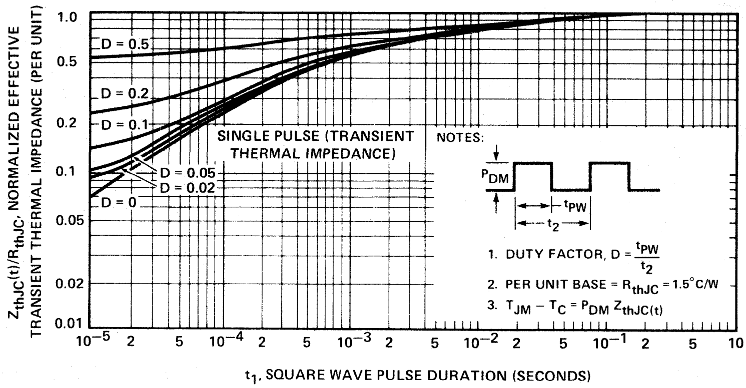


FIGURE 1. TO-3 Package

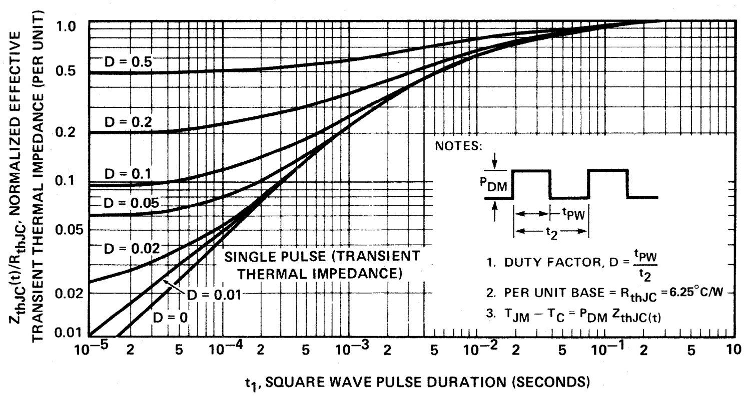


FIGURE 2. TO-220 Package

FIGURE 1. Ohmic Region

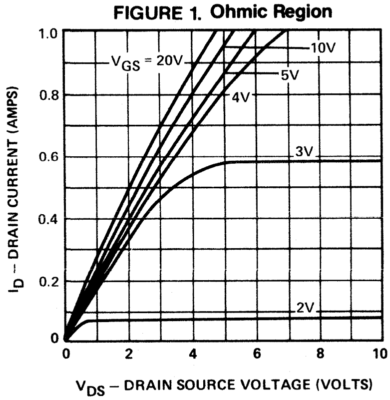


FIGURE 2. Transfer Characteristics

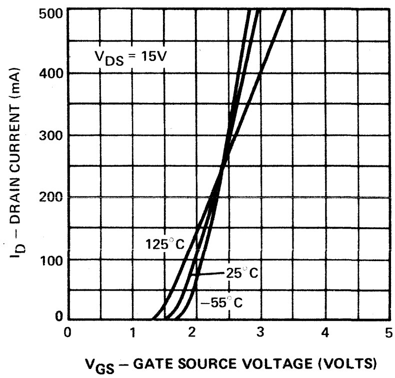


FIGURE 3. Temperature Effects on $r_{DS(on)}$

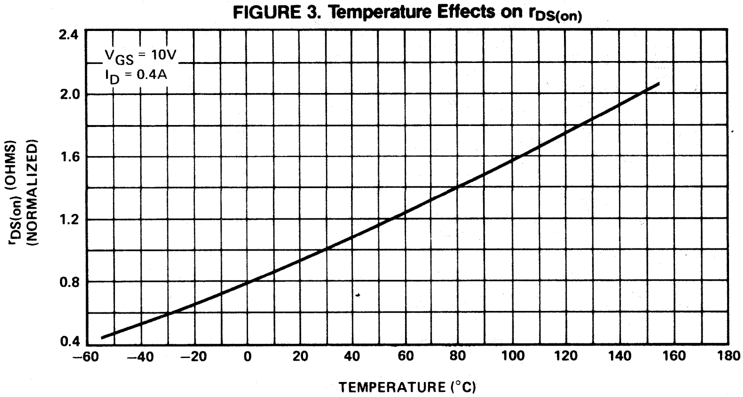


FIGURE 4. Threshold Region

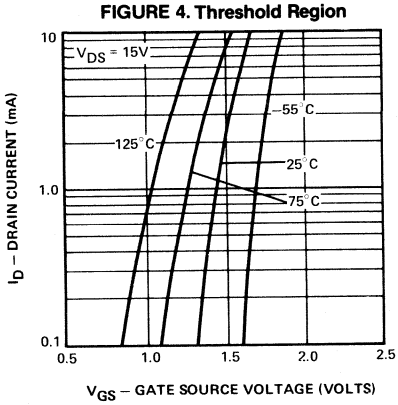
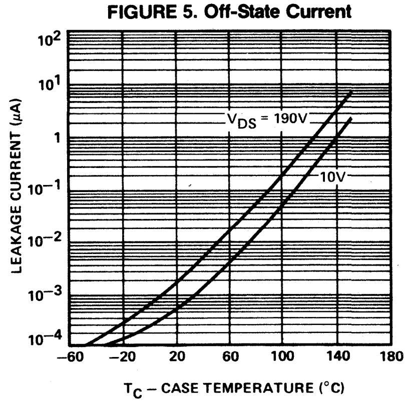


FIGURE 5. Off-State Current



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TRANSIENT THERMAL RESPONSE CURVES

VNDB24

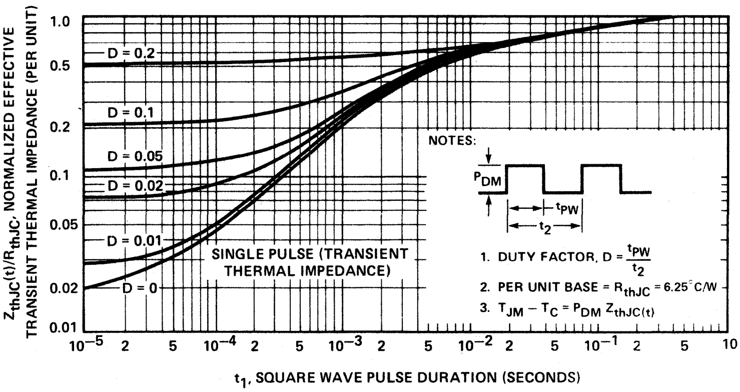


FIGURE 1. TO-220 Package

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDC10

FIGURE 1. Ohmic Region

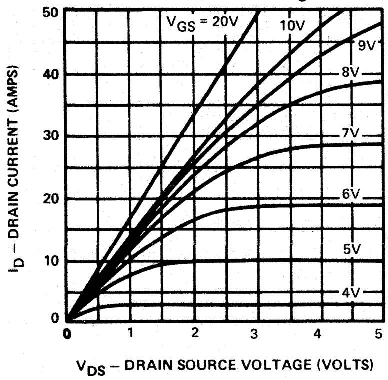


FIGURE 2. Transfer Characteristics

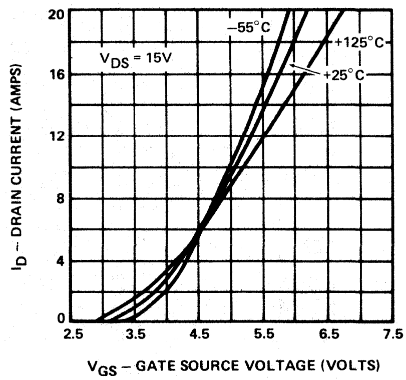


FIGURE 3. Temperature Effects on $r_{DS(on)}$

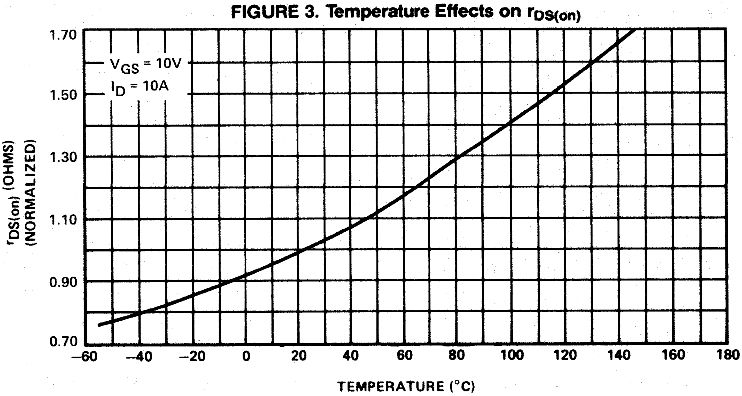


FIGURE 4. Output Characteristics

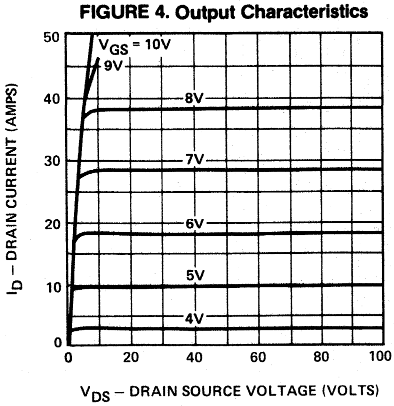
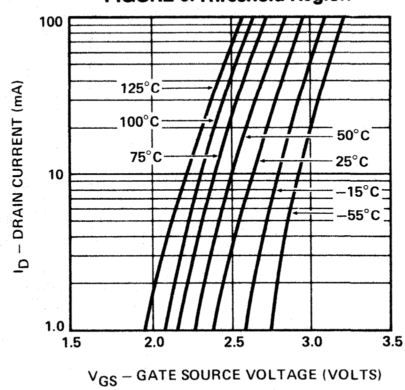


FIGURE 5. Threshold Region



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TYPICAL PERFORMANCE CURVES (25°C unless otherwise noted)

VNDC10

FIGURE 6. Off-State Current

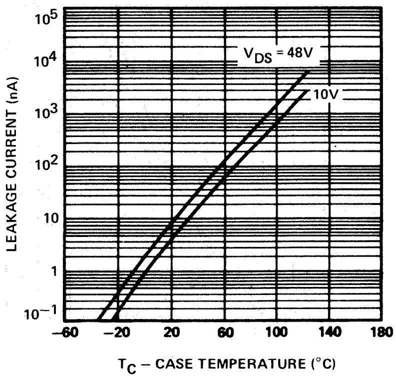


FIGURE 7. Capacitance

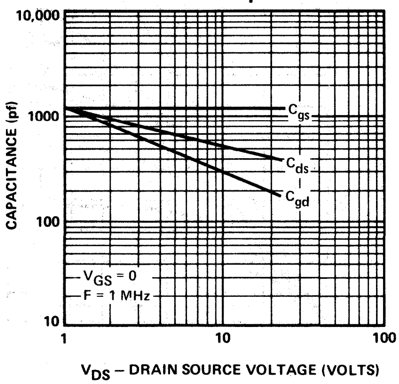


FIGURE 8. Effects on Load Conditions

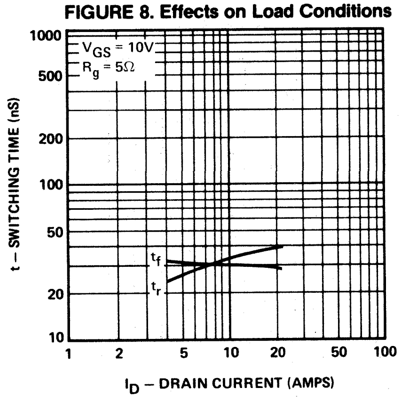


FIGURE 9. Effects of Drive Resistance

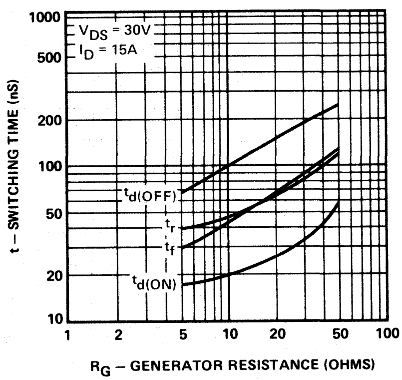
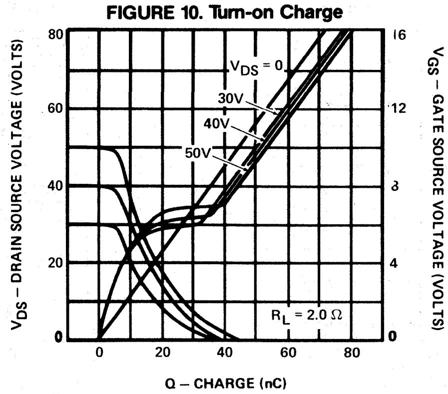


FIGURE 10. Turn-on Charge



TRANSIENT THERMAL RESPONSE CURVES

VNDC10

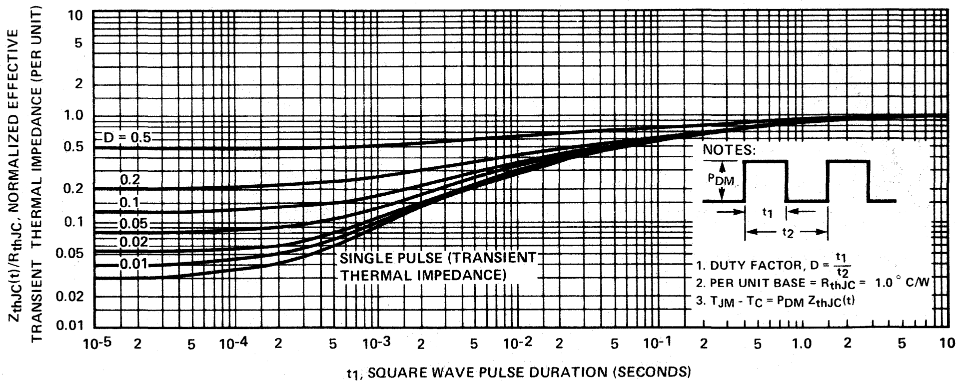


FIGURE 1. TO-3 Package

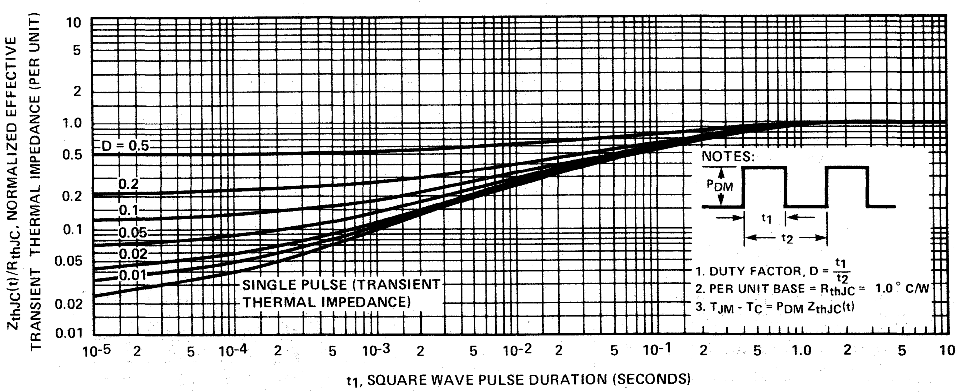


FIGURE 2. TO-220 Package

TYPICAL PERFORMANCE CURVES (25°C unless otherwise noted)
VNDC10–2

FIGURE 1. Ohmic Region

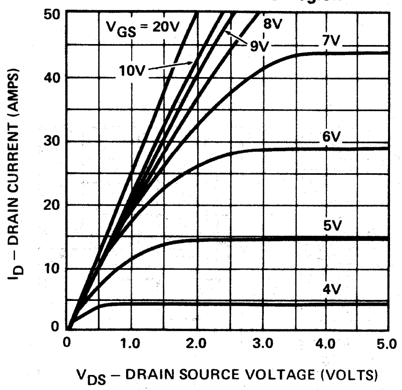


FIGURE 2. Transfer Characteristics

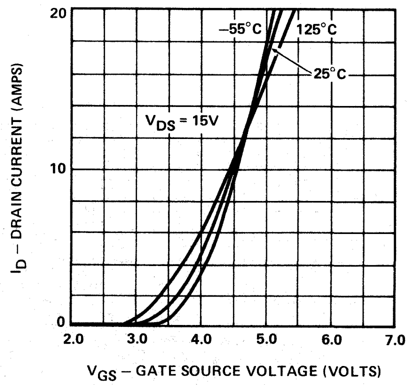


FIGURE 3. Temperature Effects on $r_{DS(on)}$

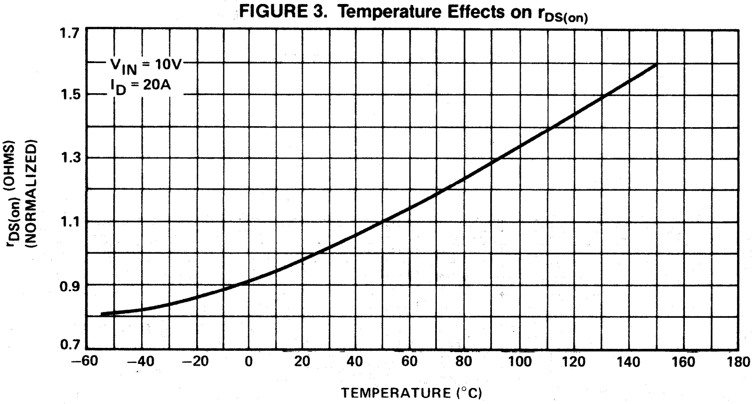


FIGURE 4. Output Characteristics

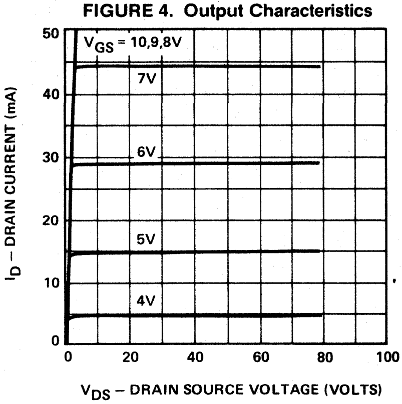


FIGURE 5. Threshold Region

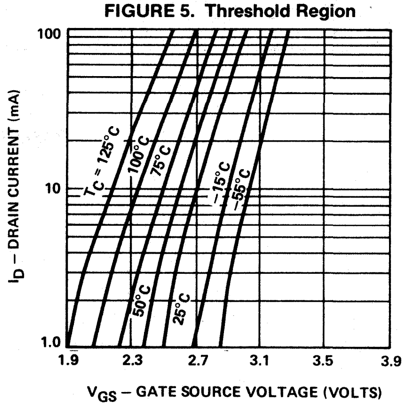


FIGURE 6. Off-State Current

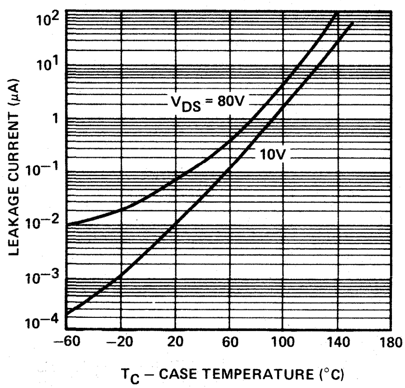


FIGURE 7. Capacitance

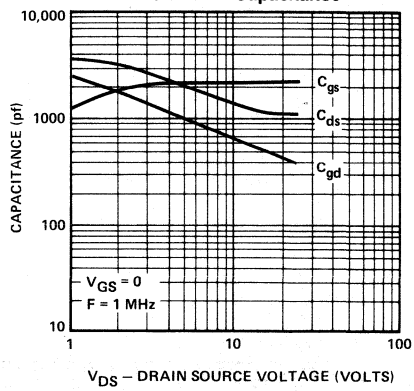


FIGURE 8. Effects on Load Conditions

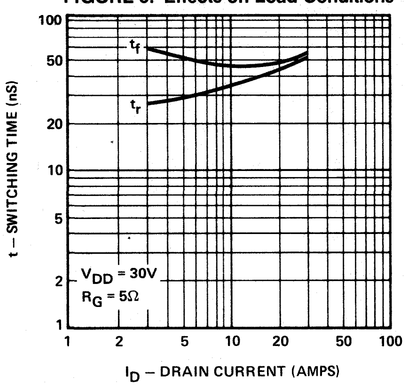


FIGURE 9. Effects of Drive Resistance

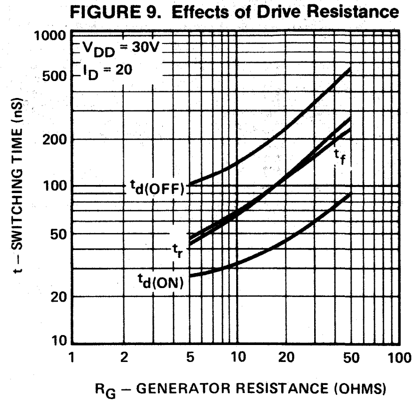
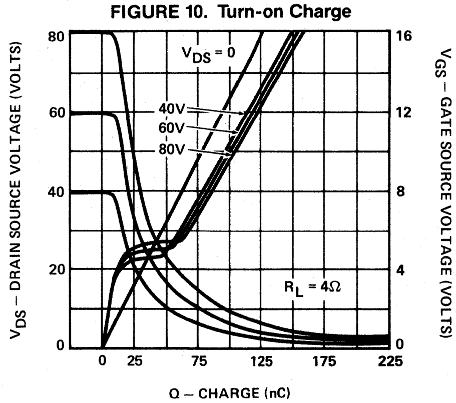


FIGURE 10. Turn-on Charge



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TRANSIENT THERMAL RESPONSE CURVES

VNDC10–2

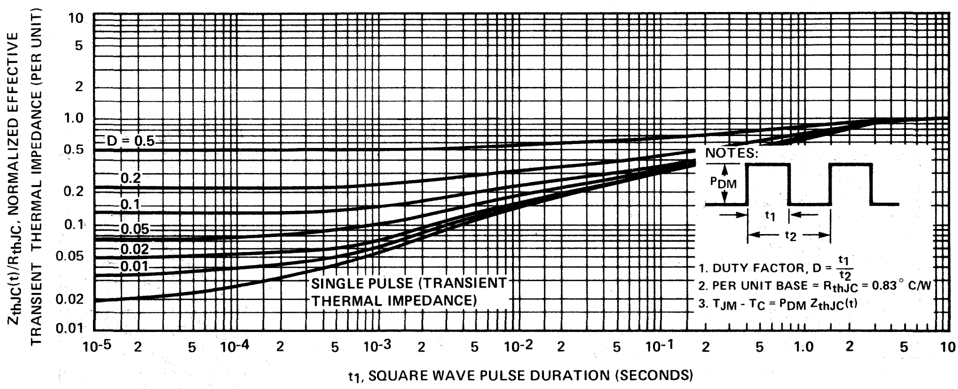


FIGURE 1. TO-3 Package

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDC10-3

FIGURE 1. Ohmic Region

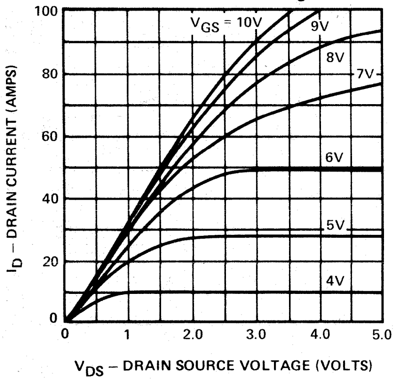


FIGURE 2. Transfer Characteristics

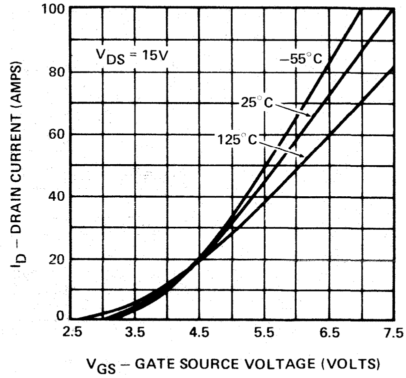


FIGURE 3. Temperature Effects on $r_{DS(on)}$

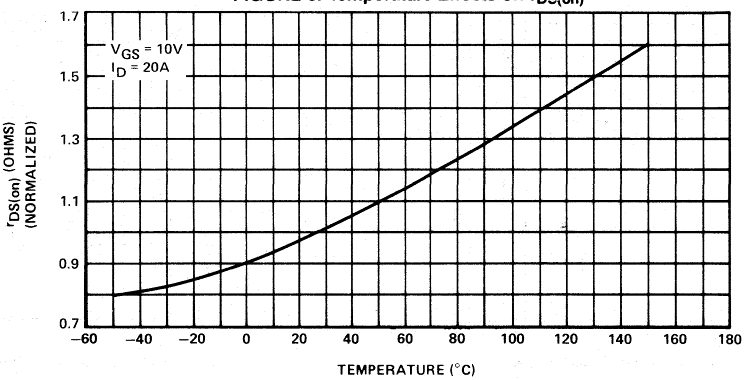


FIGURE 4. Output Characteristics

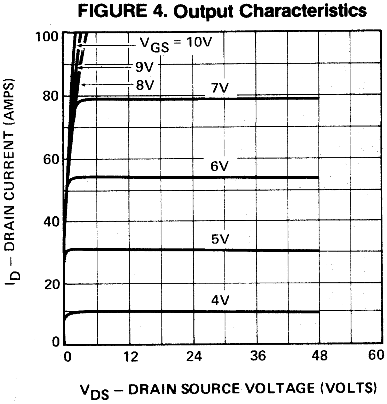
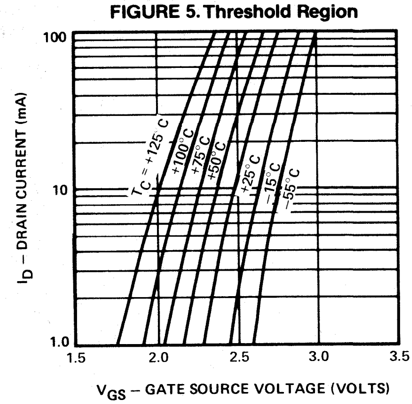


FIGURE 5. Threshold Region



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TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDC10-3

FIGURE 6. Off-State Current

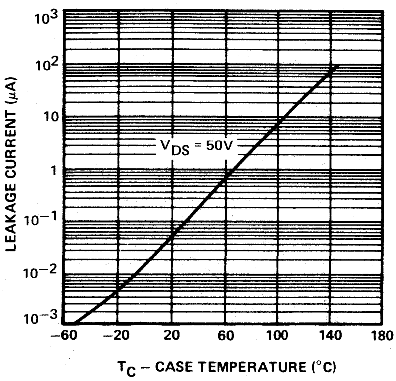


FIGURE 7. Capacitance

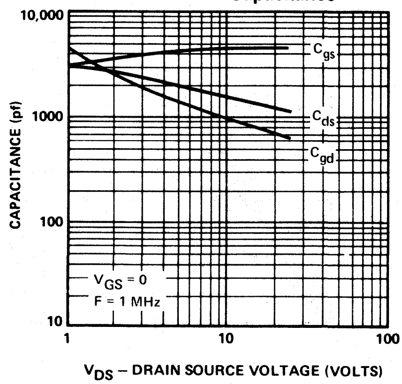


FIGURE 8. Effects on Load Conditions

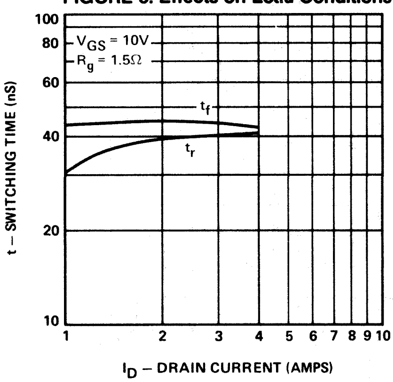


FIGURE 9. Effects of Drive Resistance

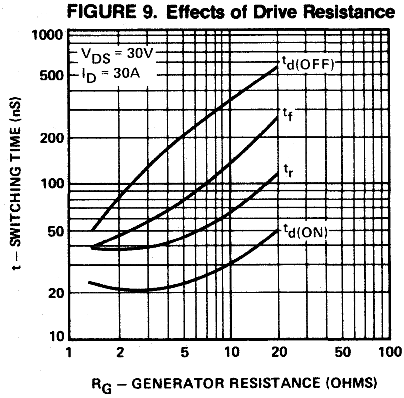
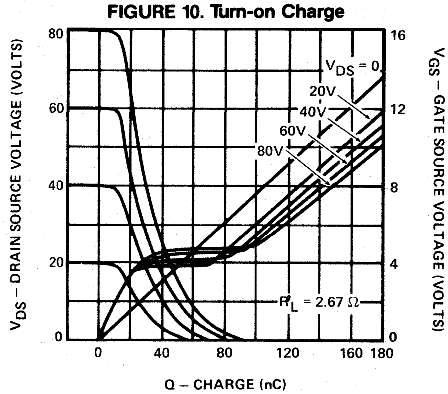


FIGURE 10. Turn-on Charge



TYPICAL PERFORMANCE CURVES—Continued

VNDC20

FIGURE 1. Ohmic Region

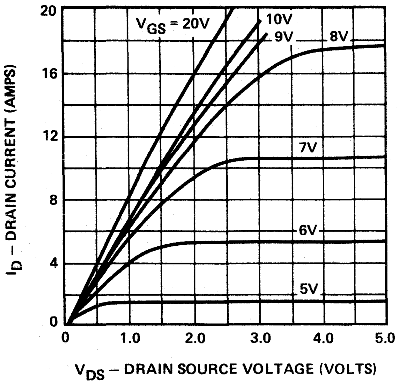


FIGURE 2. Transfer Characteristics

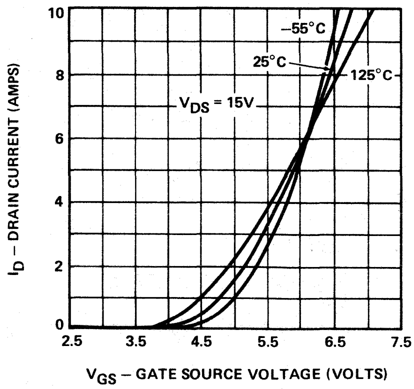


FIGURE 3. Temperature Effects on $r_{DS(on)}$

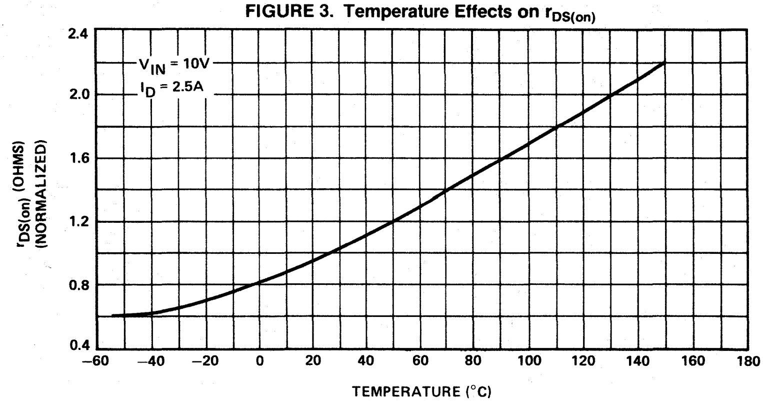


FIGURE 4. Output Characteristics

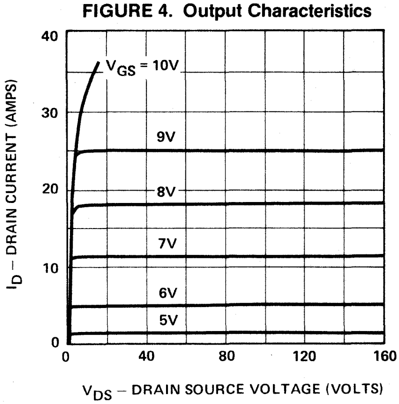
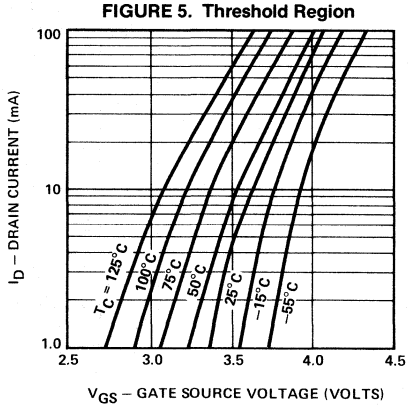


FIGURE 5. Threshold Region



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TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDC20

FIGURE 6. Off-State Current

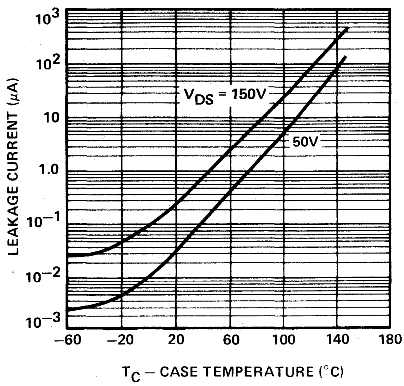


FIGURE 7. Capacitance

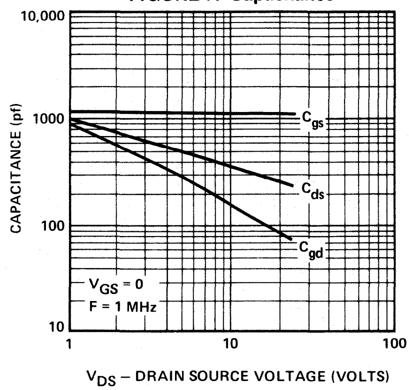


FIGURE 8. Effects on Load Conditions

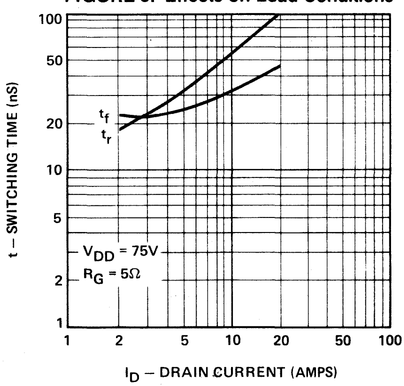


FIGURE 9. Effects of Drive Resistance

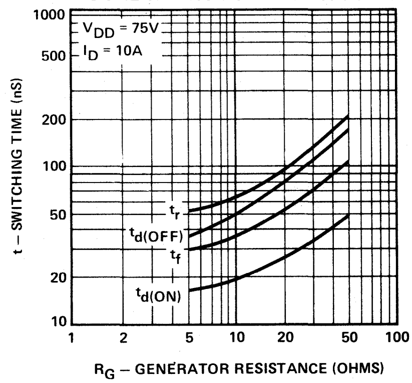
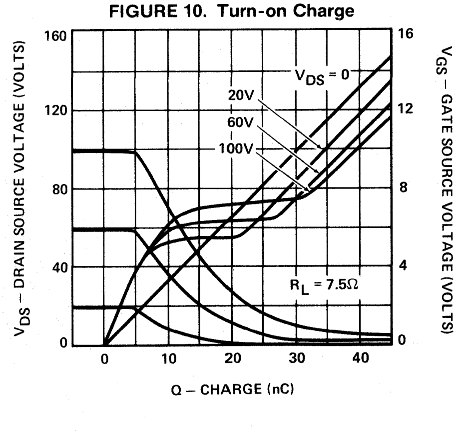


FIGURE 10. Turn-on Charge



TRANSIENT THERMAL RESPONSE CURVES

VNDC20

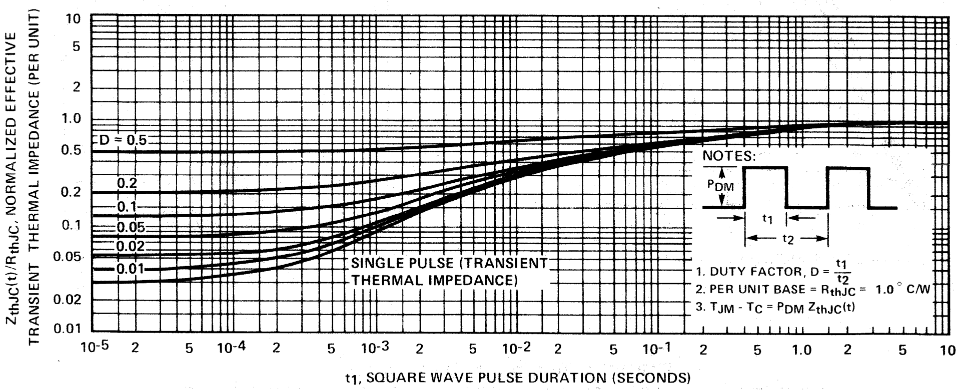


FIGURE 1. TO-3 Package

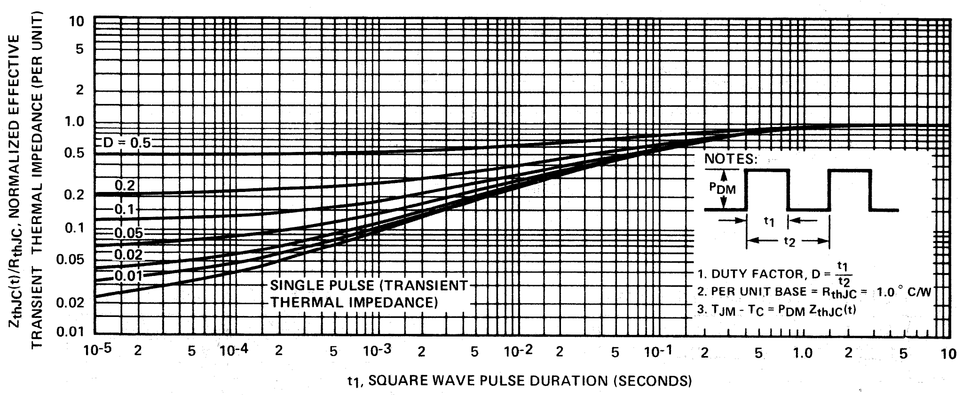


FIGURE 2. TO-220 Package

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDC20–2

FIGURE 1. Ohmic Region

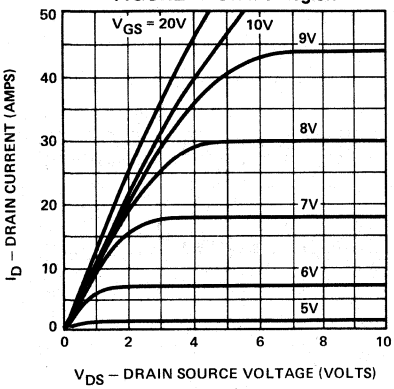


FIGURE 2. Transfer Characteristics

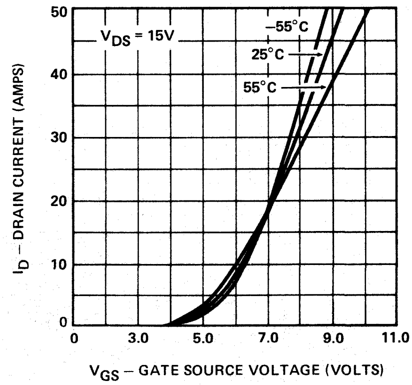


FIGURE 3. Temperature Effects on $r_{DS(on)}$

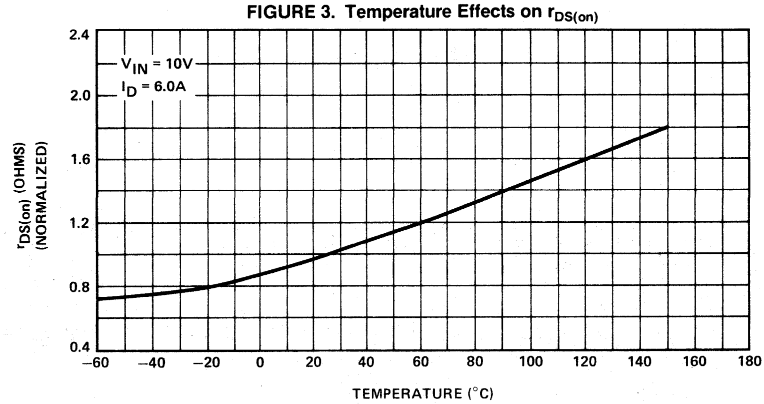


FIGURE 4. Output Characteristics

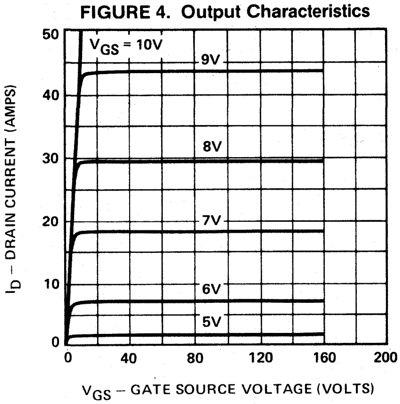
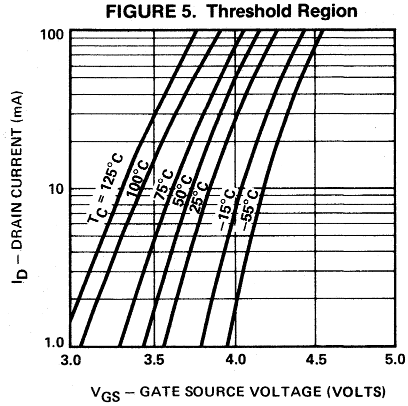


FIGURE 5. Threshold Region



TYPICAL PERFORMANCE CURVES—Continued

VNDC20–2

FIGURE 6. Off-State Current

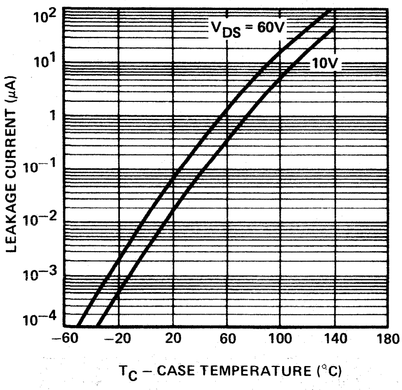


FIGURE 7. Capacitance

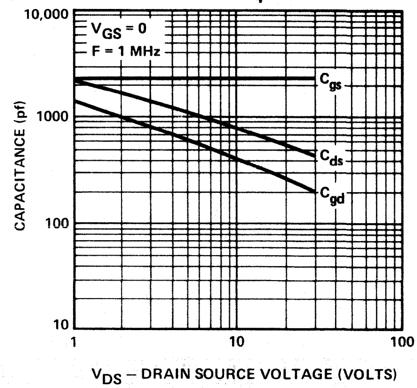


FIGURE 8. Effects on Load Conditions

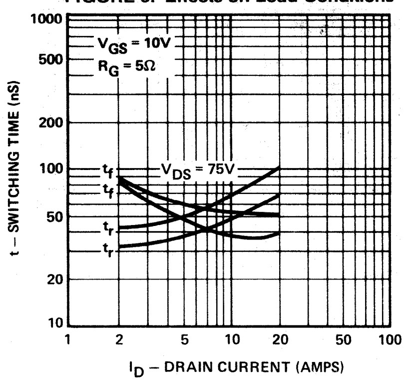


FIGURE 9. Effects of Drive Resistance

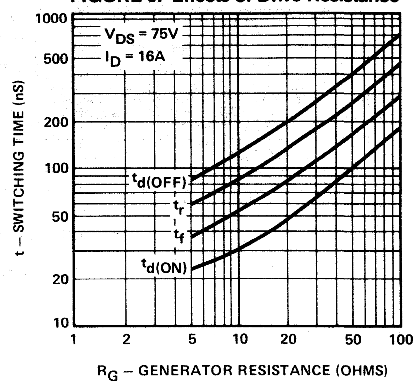
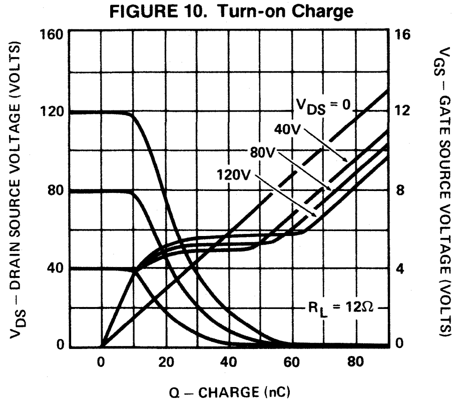


FIGURE 10. Turn-on Charge



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TRANSIENT THERMAL RESPONSE CURVES

VNDC20–2

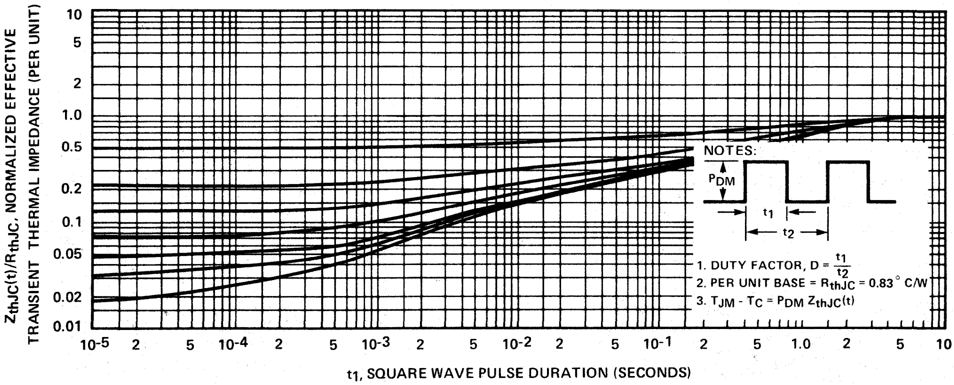


FIGURE 1. TO-3 Package

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDC20–3

FIGURE 1. Ohmic Region

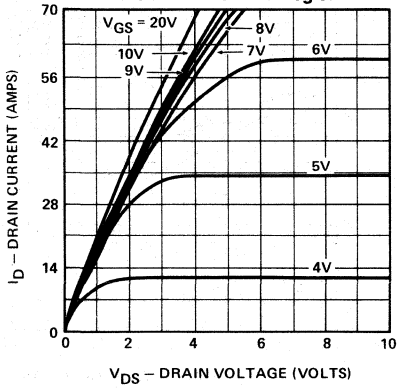


FIGURE 2. Transfer Characteristics

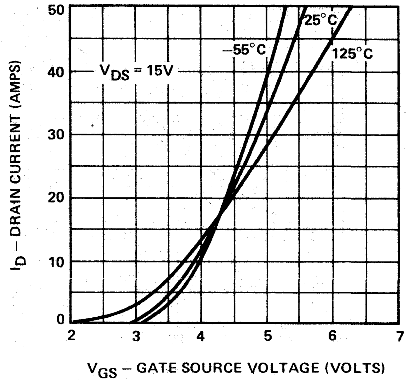


FIGURE 3. Temperature Effects on $r_{DS(on)}$

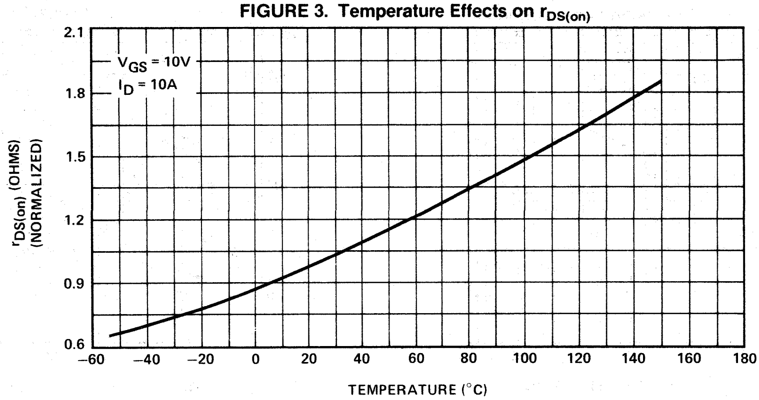


FIGURE 4. Output Characteristics

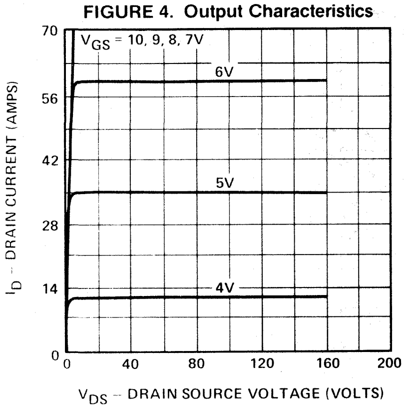
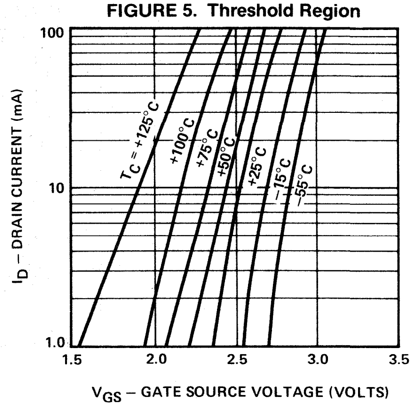


FIGURE 5. Threshold Region



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TYPICAL PERFORMANCE CURVES—Continued

VNDC20–3

FIGURE 6. Off-State Current

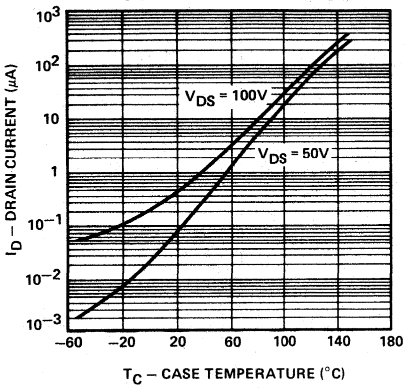


FIGURE 7. Capacitance

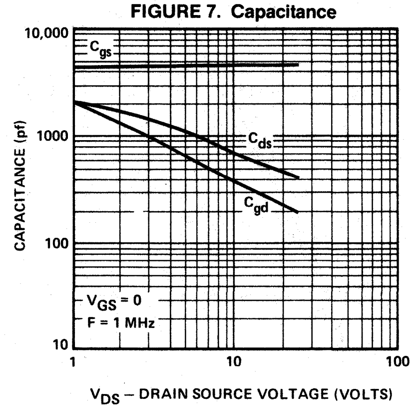


FIGURE 8. Effects on Load Conditions

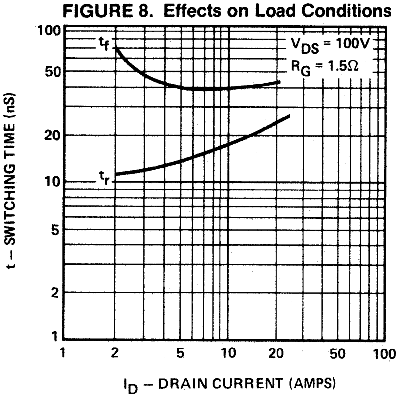


FIGURE 9. Effects of Drive Resistance

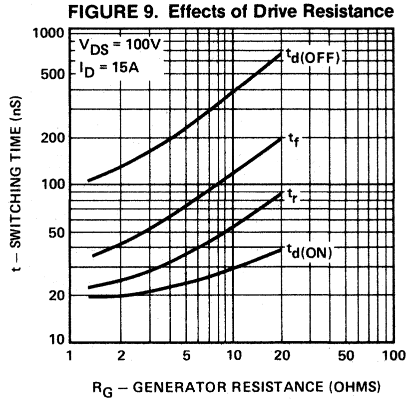
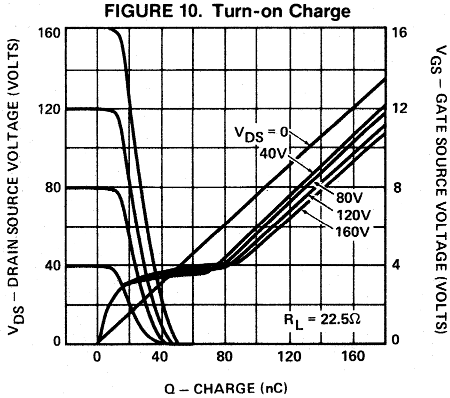


FIGURE 10. Turn-on Charge



TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDC40

FIGURE 1. Ohmic Region

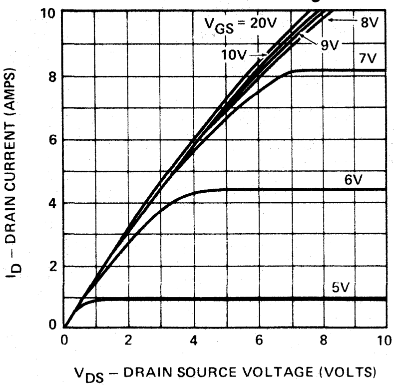


FIGURE 2. Transfer Characteristics

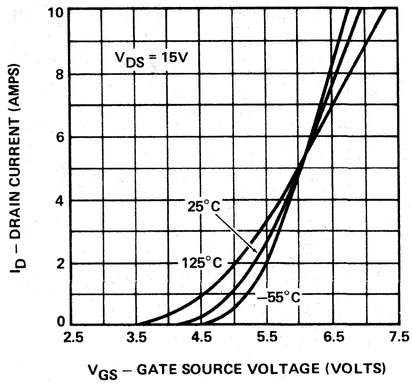


FIGURE 3. Temperature Effects on $r_{DS(on)}$

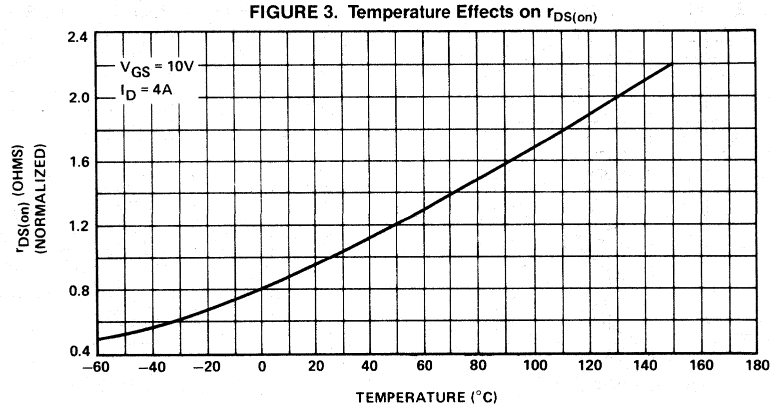


FIGURE 4. Output Characteristics

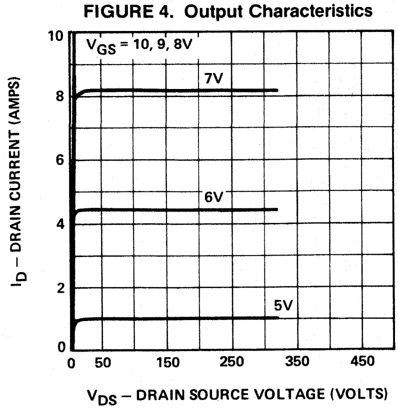
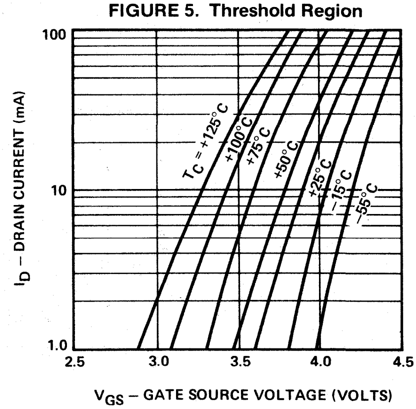


FIGURE 5. Threshold Region



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TYPICAL PERFORMANCE CURVES—Continued
VNDC40

FIGURE 6. Off-State Current

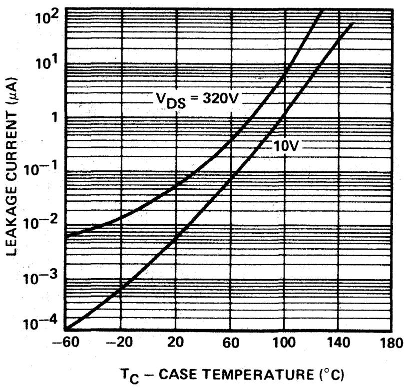


FIGURE 7. Capacitance

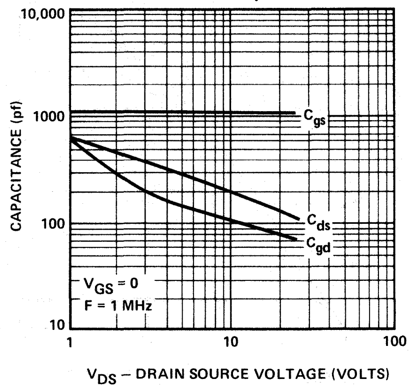


FIGURE 8. Effects on Load Conditions

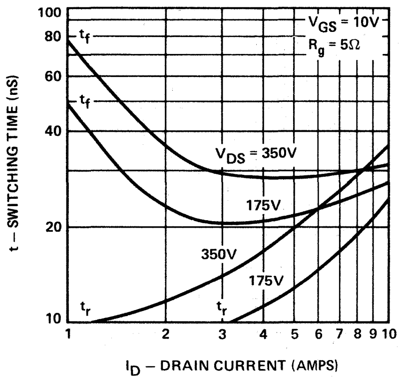


FIGURE 9. Effects of Drive Resistance

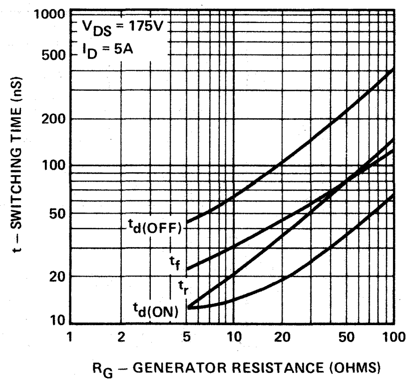
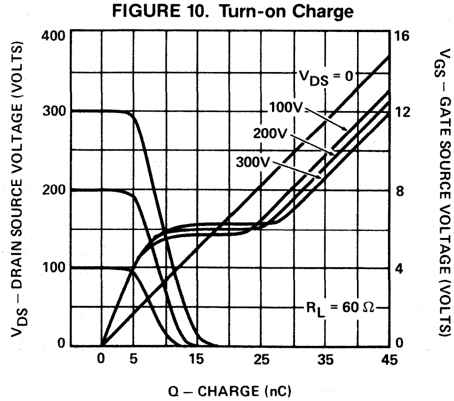


FIGURE 10. Turn-on Charge



TRANSIENT THERMAL RESPONSE CURVES

VNDC40

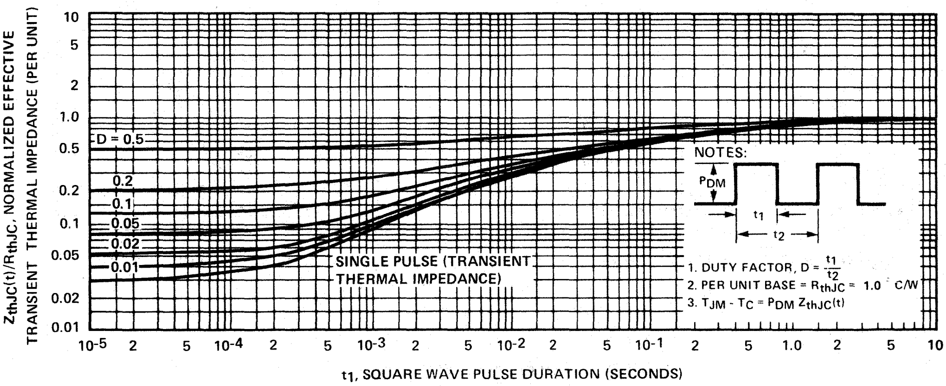


FIGURE 1. TO-3 Package

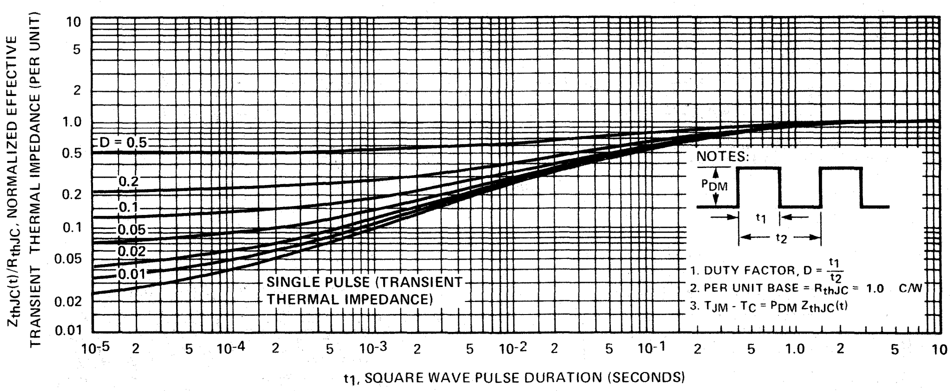


FIGURE 2. TO-220 Package

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TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)
VNDC40–2

FIGURE 1. Ohmic Region

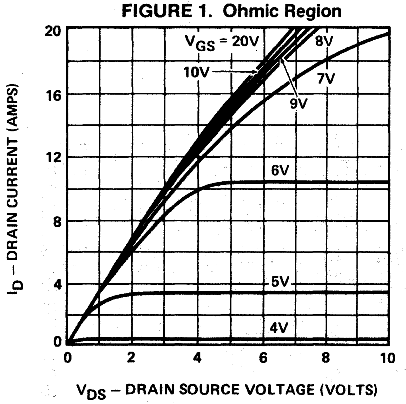


FIGURE 2. Transfer Characteristics

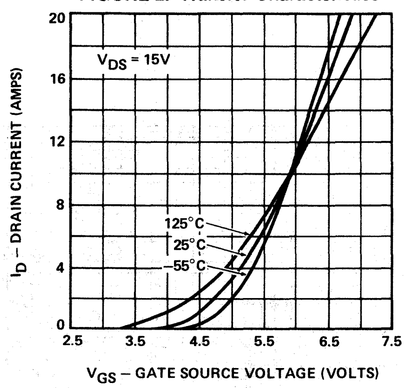


FIGURE 3. Temperature Effects on $r_{DS(on)}$

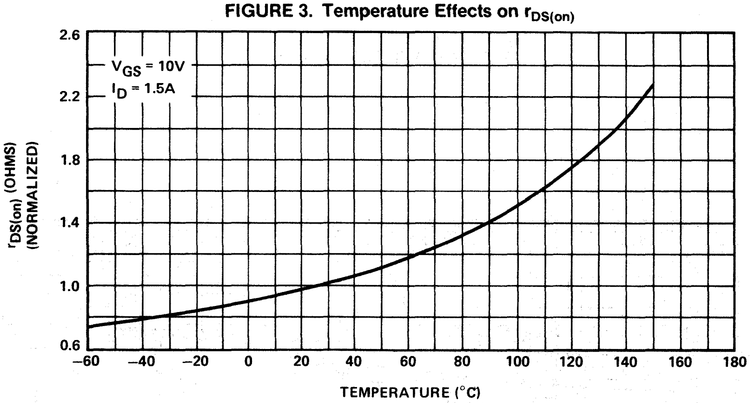


FIGURE 4. Output Characteristics

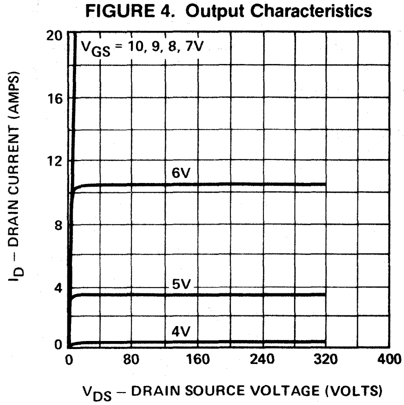
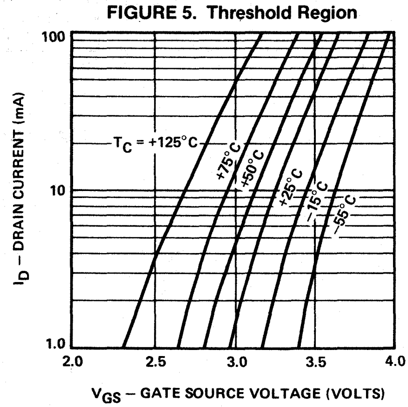


FIGURE 5. Threshold Region



TYPICAL PERFORMANCE CURVES—Continued

VNDC40–2

FIGURE 6. Off-State Current

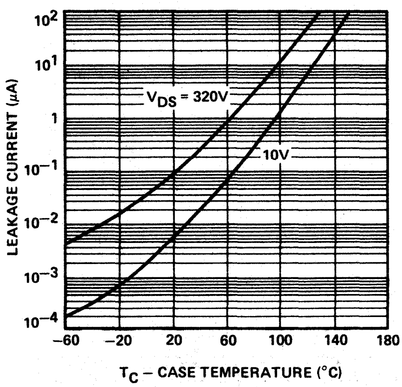


FIGURE 7. Capacitance

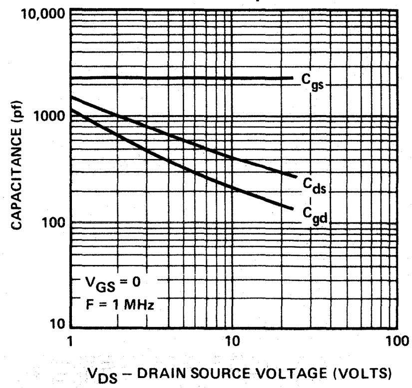


FIGURE 8. Effects on Load Conditions

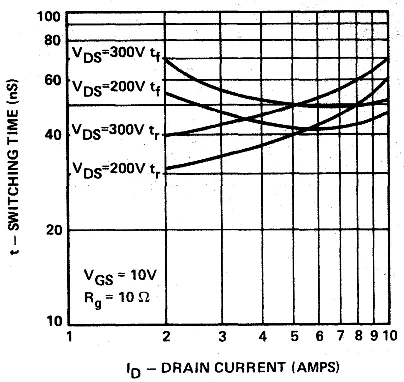


FIGURE 9. Effects of Drive Resistance

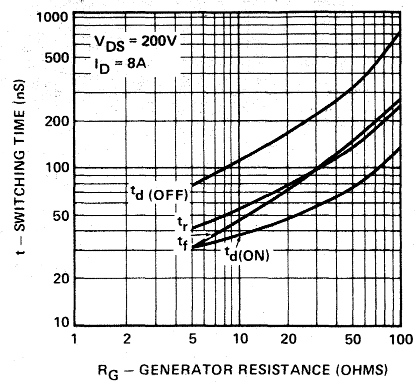


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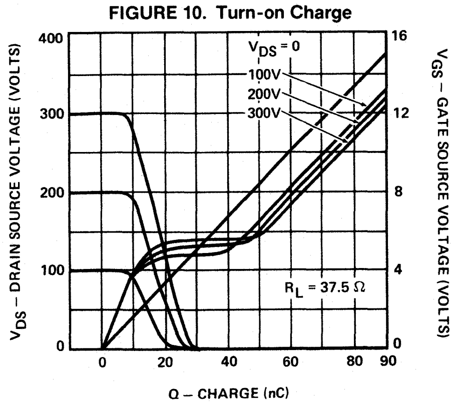
FIGURE 10. Turn-on Charge



TRANSIENT THERMAL RESPONSE CURVES

VNDC40–2

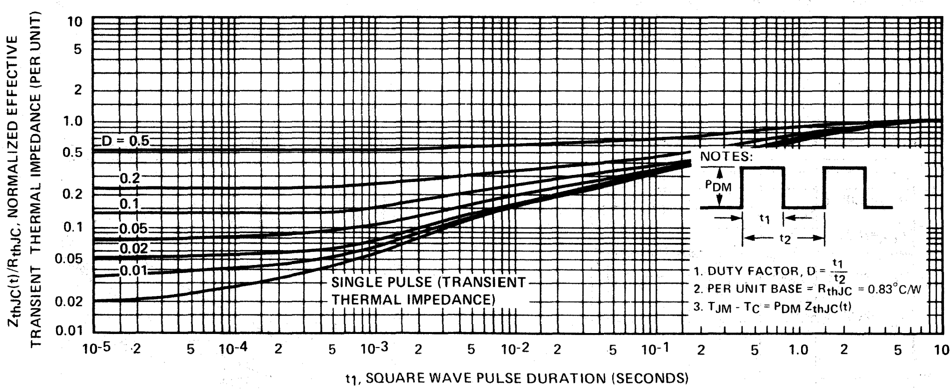


FIGURE 1. TO-3 Package

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDC40–3

FIGURE 1. Ohmic Region

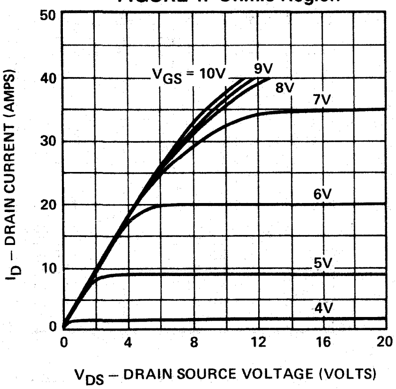


FIGURE 2. Transfer Characteristics

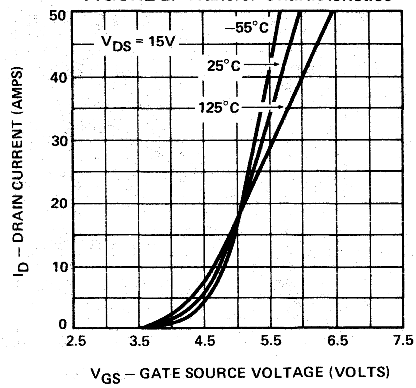


FIGURE 3. Temperature Effects on $r_{DS(on)}$

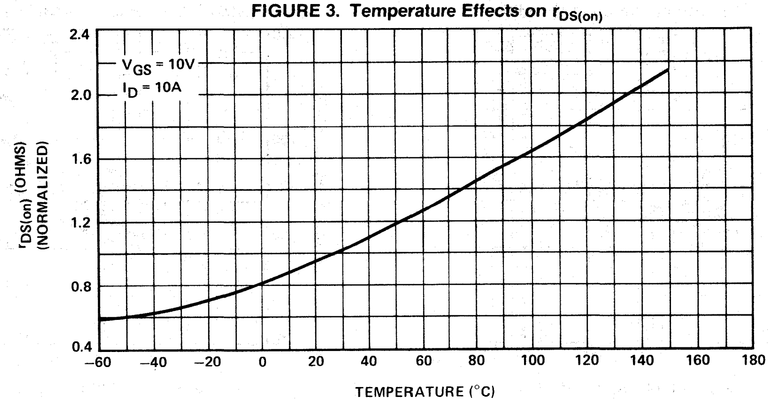


FIGURE 4. Output Characteristics

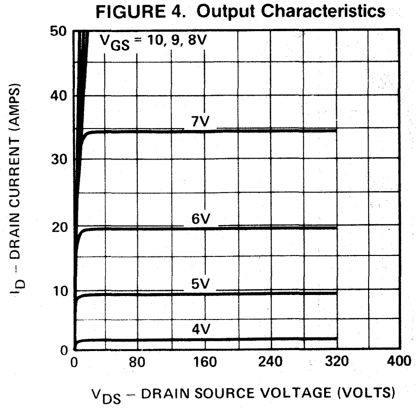
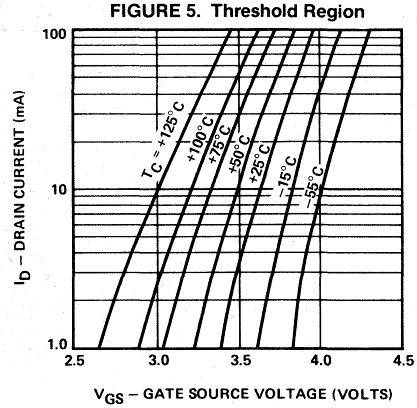


FIGURE 5. Threshold Region



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TYPICAL PERFORMANCE CURVES—Continued
VNDC40–3

FIGURE 6. Off-State Current

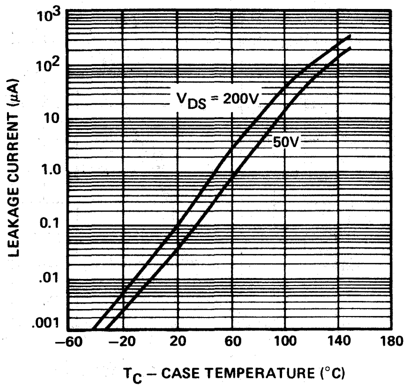


FIGURE 7. Capacitance

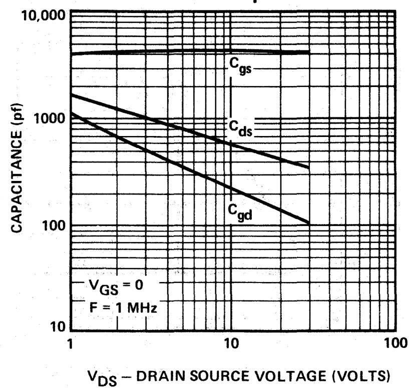


FIGURE 8. Effects on Load Conditions

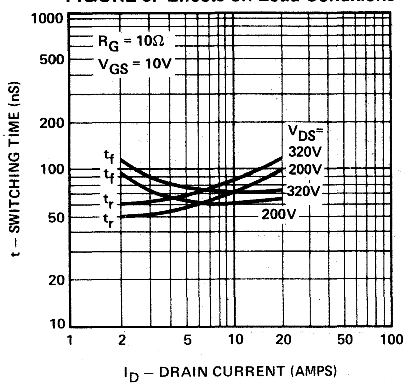


FIGURE 9. Effects of Drive Resistance

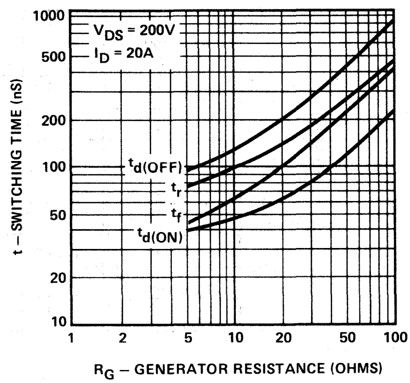
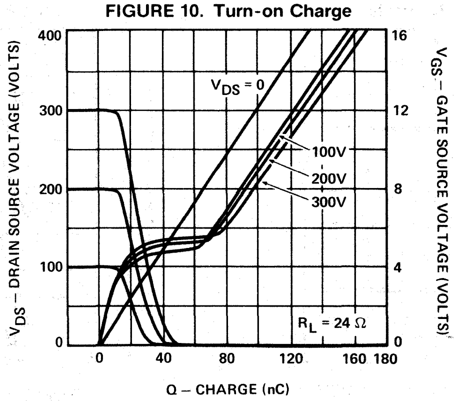


FIGURE 10. Turn-on Charge



TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)
VNDC50

FIGURE 1. Ohmic Region

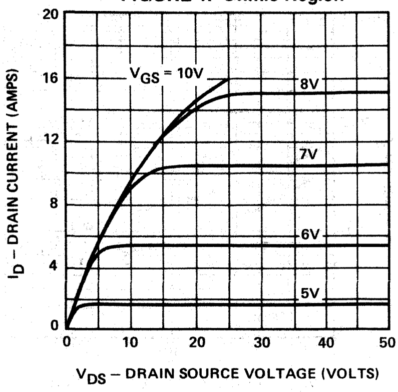


FIGURE 2. Transfer Characteristics

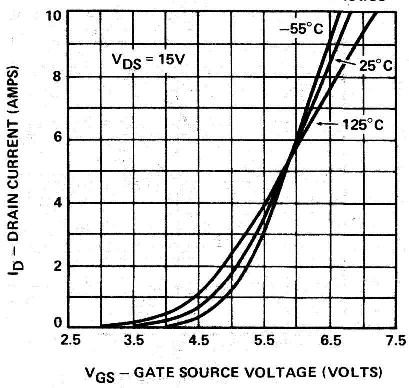


FIGURE 3. Temperature Effects on $r_{DS(on)}$

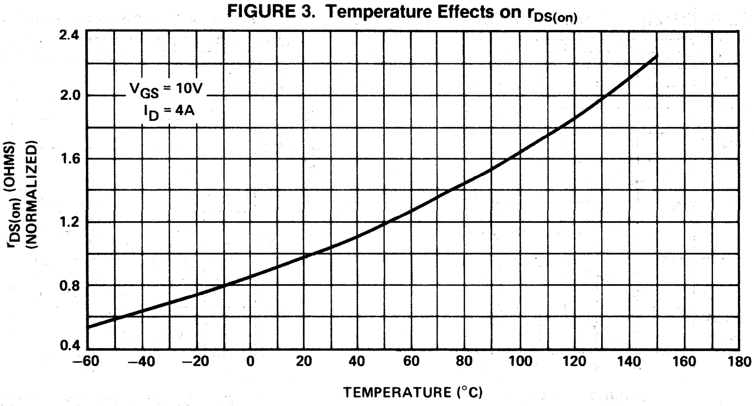


FIGURE 4. Output Characteristics

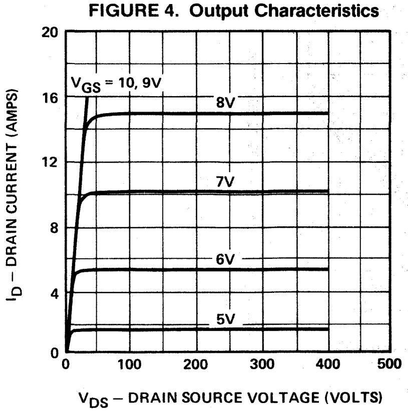
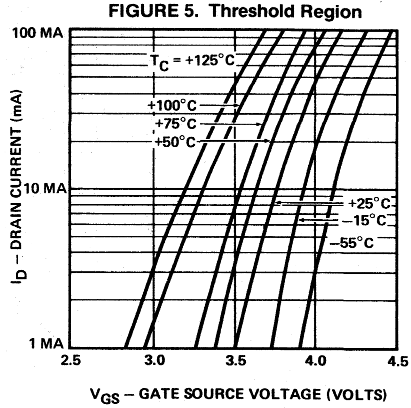


FIGURE 5. Threshold Region



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TYPICAL PERFORMANCE CURVES—Continued

VNDC50

FIGURE 6. Off-State Current

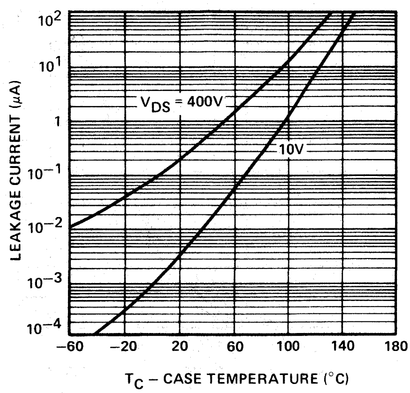


FIGURE 7. Capacitance

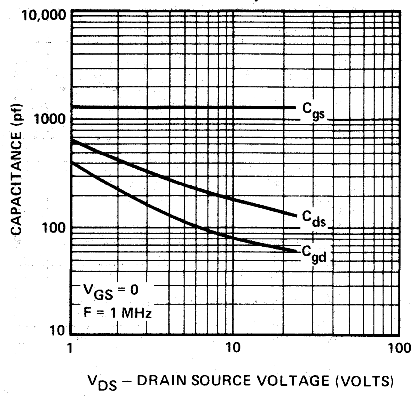


FIGURE 8. Effects on Load Conditions

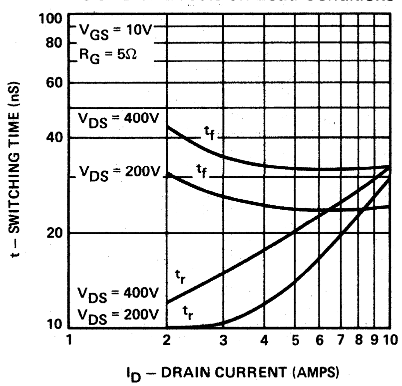


FIGURE 9. Effects of Drive Resistance

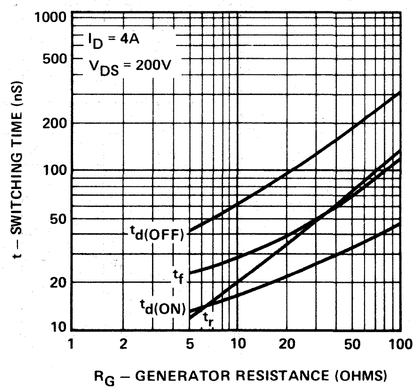
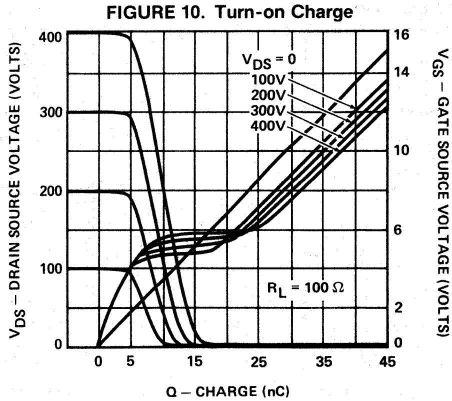


FIGURE 10. Turn-on Charge



TRANSIENT THERMAL RESPONSE CURVES

VNDC50

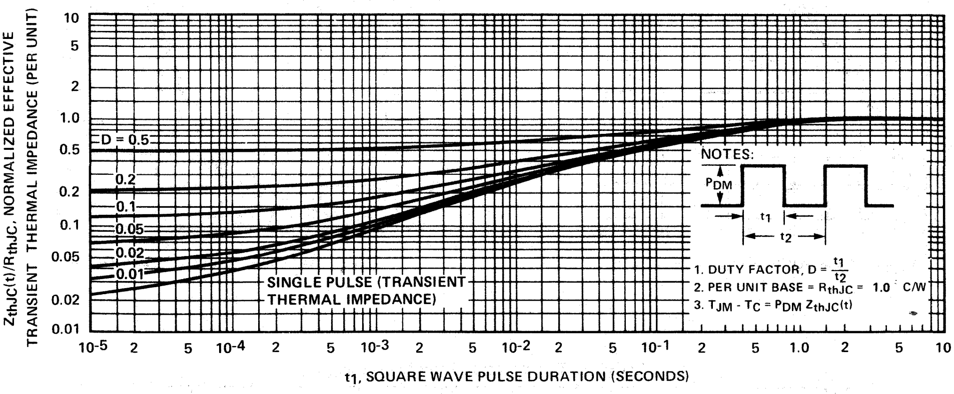


FIGURE 1. TO-3 Package

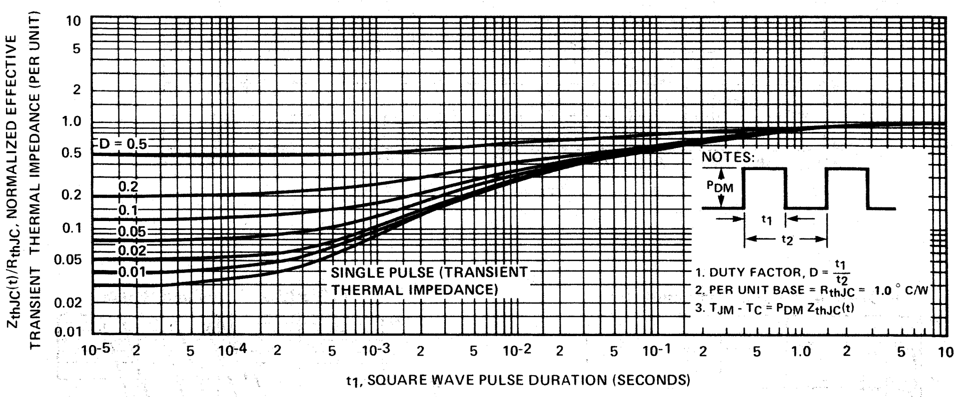


FIGURE 2. TO-220 Package

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TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)
VNDC50–2

FIGURE 1. Ohmic Region

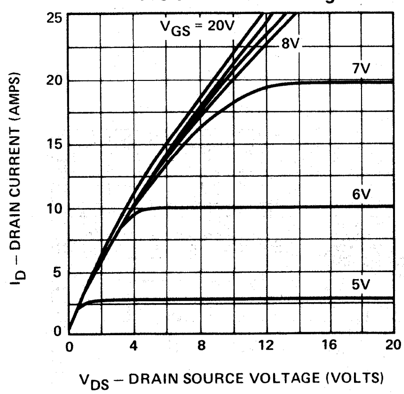


FIGURE 2. Transfer Characteristics

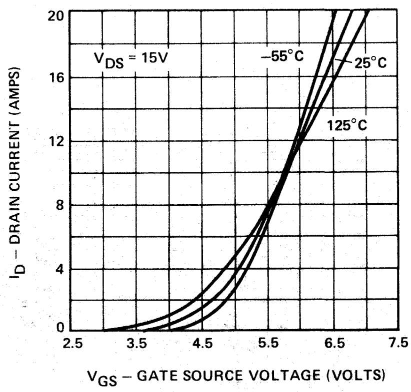


FIGURE 3. Temperature Effects on $r_{DS(on)}$

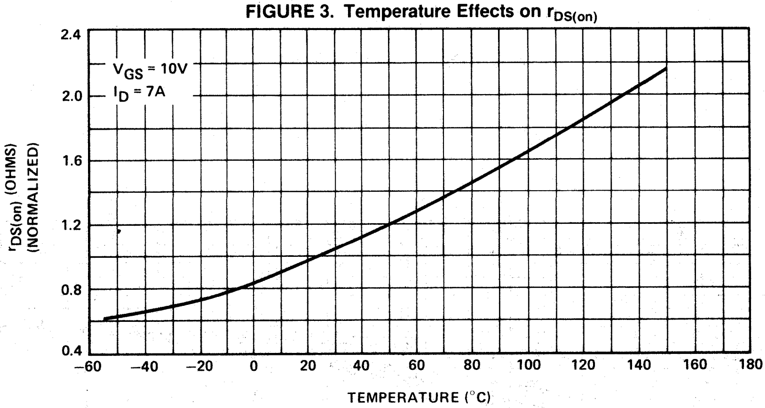


FIGURE 4. Output Characteristics

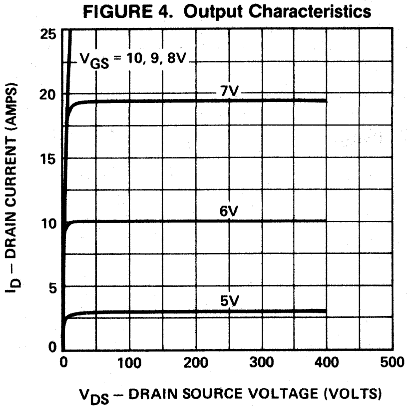
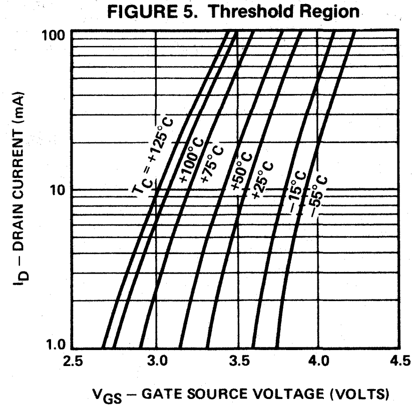


FIGURE 5. Threshold Region



TYPICAL PERFORMANCE CURVES—Continued

VNDC50–2

FIGURE 6. Off-State Current

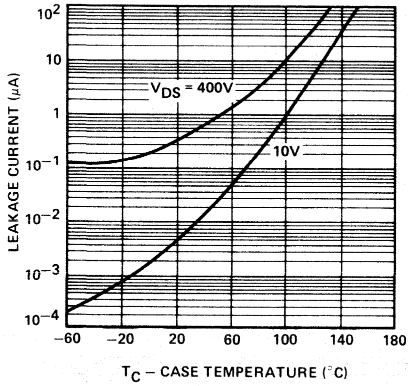


FIGURE 7. Capacitance

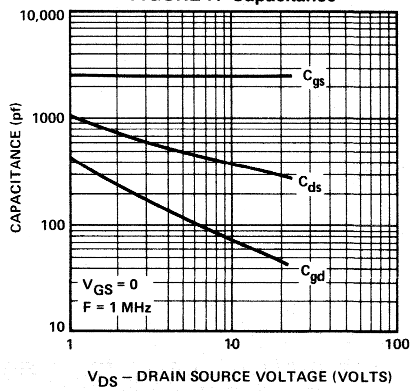


FIGURE 8. Effects on Load Conditions

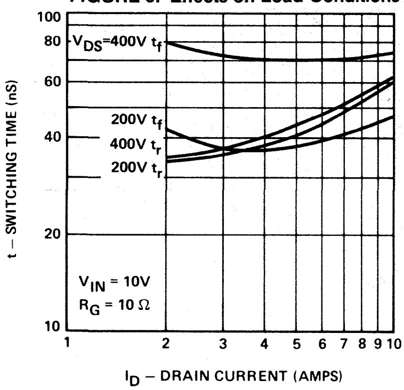


FIGURE 9. Effects of Drive Resistance

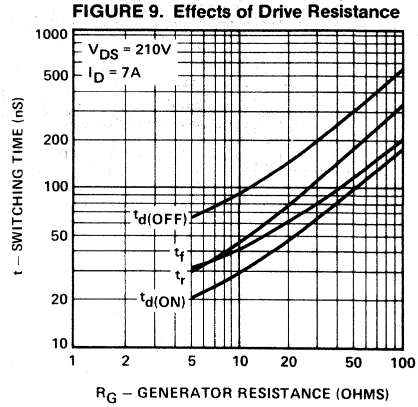
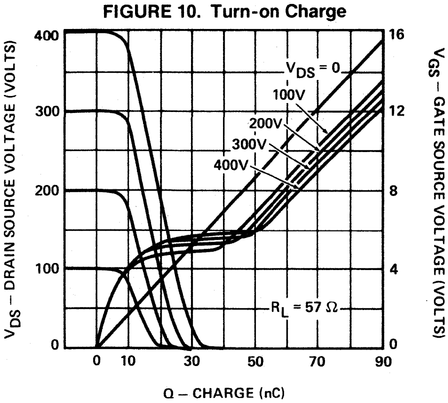


FIGURE 10. Turn-on Charge



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TRANSIENT THERMAL RESPONSE CURVES

VNDC50–2

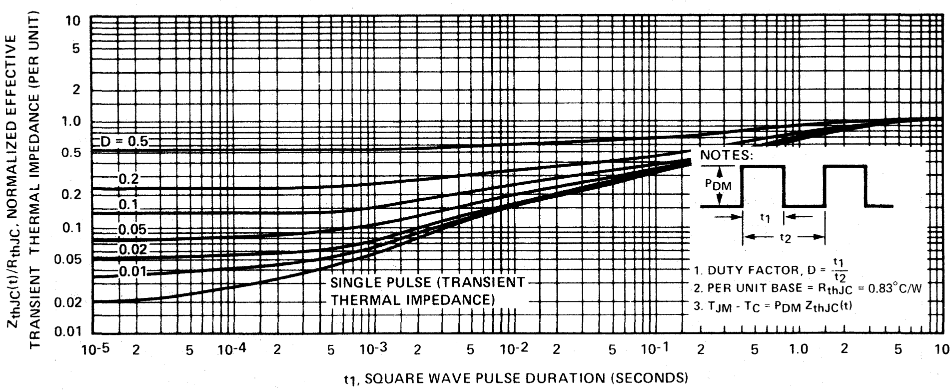


FIGURE 1. TO-3 Package

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDC50-3

FIGURE 1. Ohmic Region

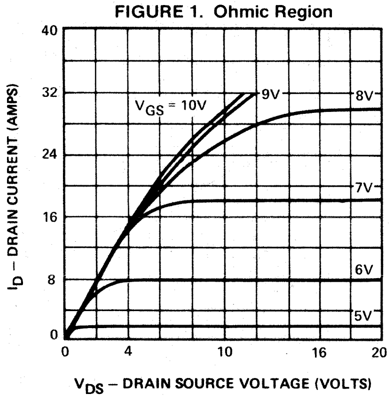


FIGURE 2. Transfer Characteristics

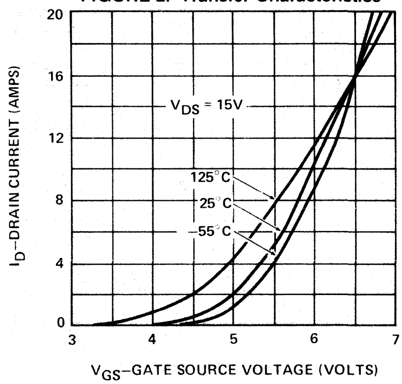


FIGURE 3. Temperature Effects on $r_{DS(on)}$

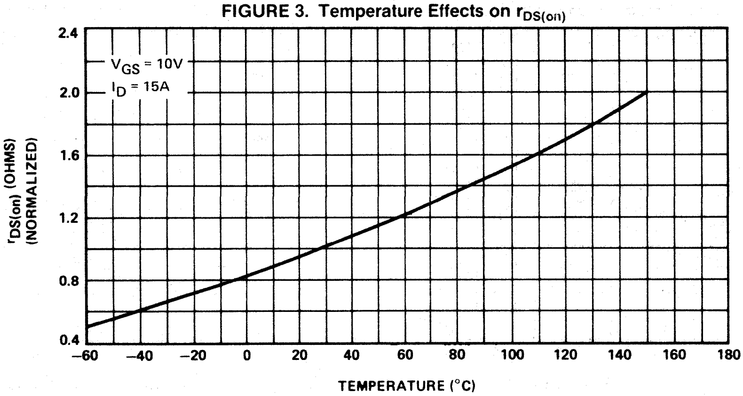


FIGURE 4. Output Characteristics

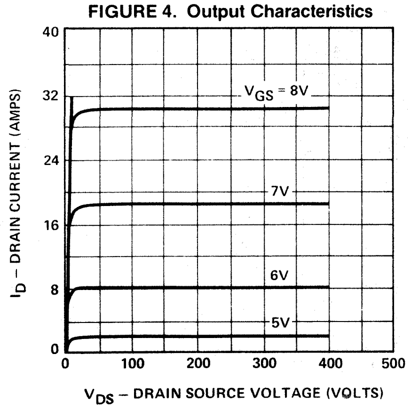
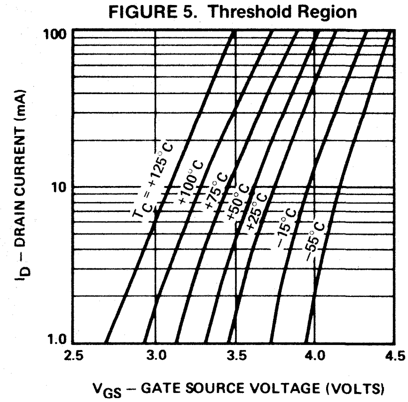


FIGURE 5. Threshold Region



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TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDC50-3

FIGURE 6. Off-State Current

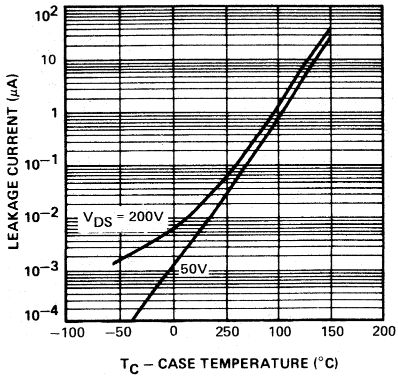


FIGURE 7. Capacitance

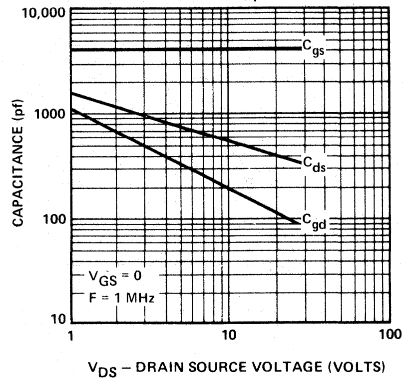


FIGURE 8. Effects on Load Conditions

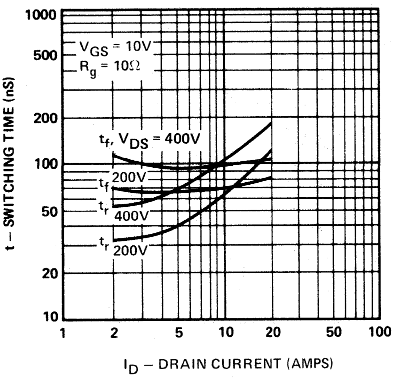


FIGURE 9. Effects of Drive Resistance

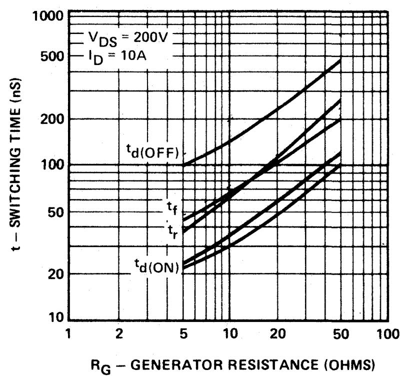
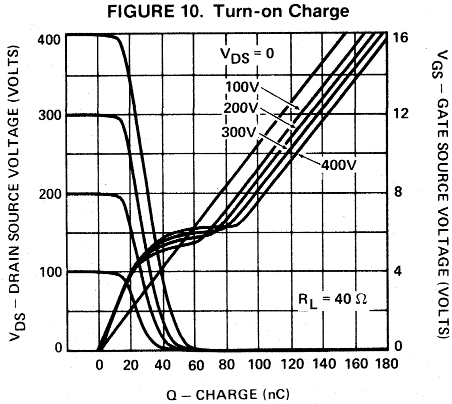


FIGURE 10. Turn-on Charge



TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)
VNDC65

FIGURE 1. Ohmic Region

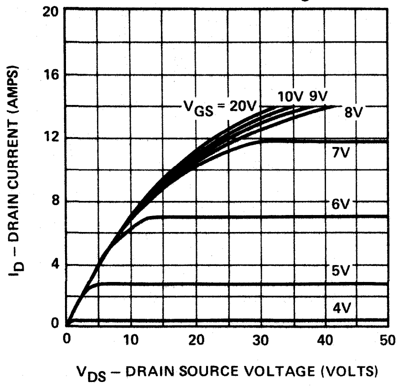


FIGURE 2. Transfer Characteristics

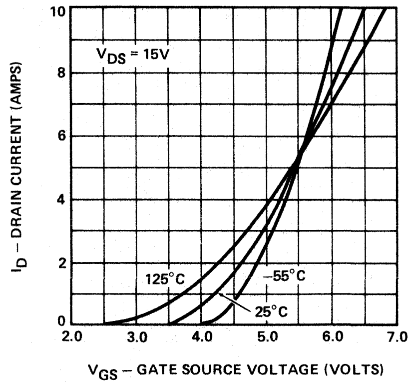


FIGURE 3. Temperature Effects on $r_{DS(on)}$

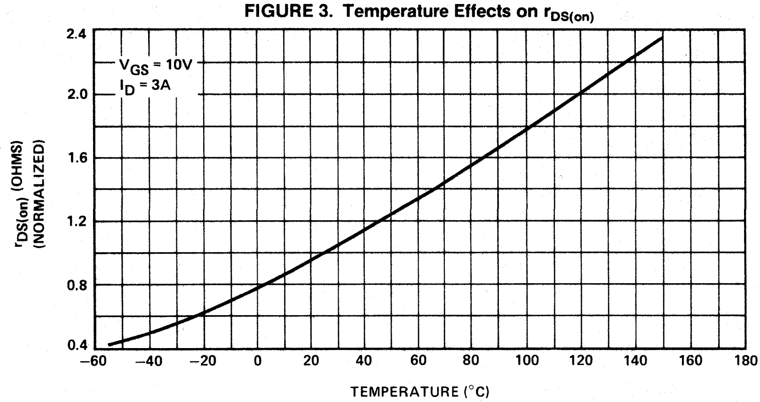


FIGURE 4. Output Characteristics

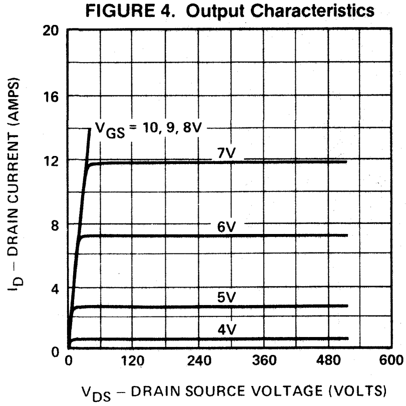
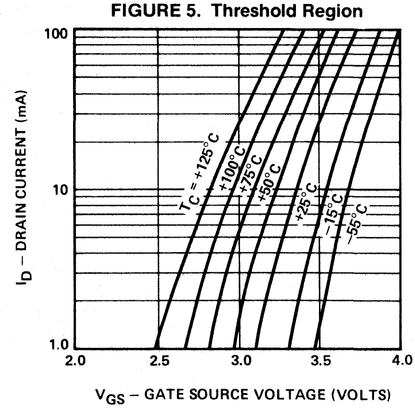


FIGURE 5. Threshold Region



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TYPICAL PERFORMANCE CURVES—Continued

VNDC65

FIGURE 6. Off-State Current

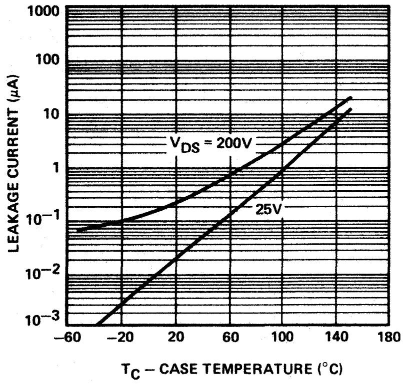


FIGURE 7. Capacitance

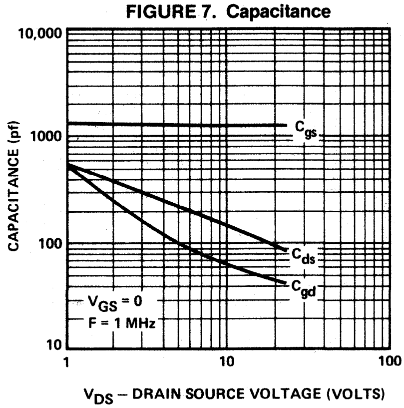


FIGURE 8. Effects on Load Conditions

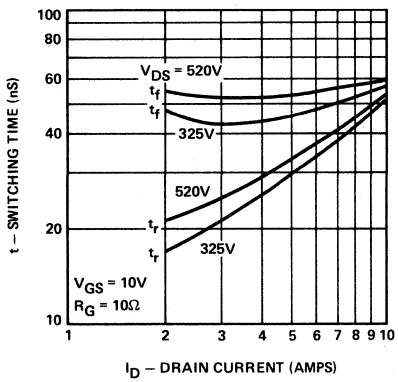


FIGURE 9. Effects of Drive Resistance

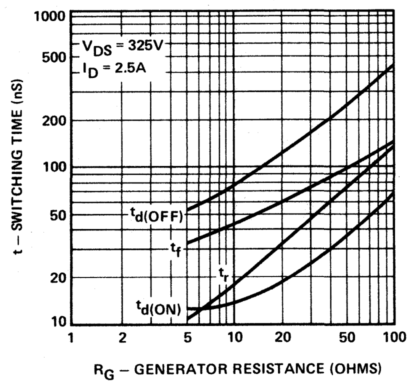
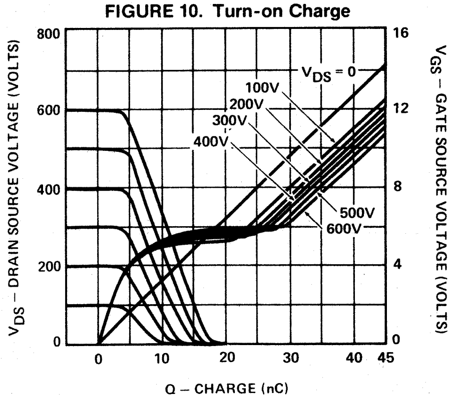


FIGURE 10. Turn-on Charge



TRANSIENT THERMAL RESPONSE CURVES

VNDC65

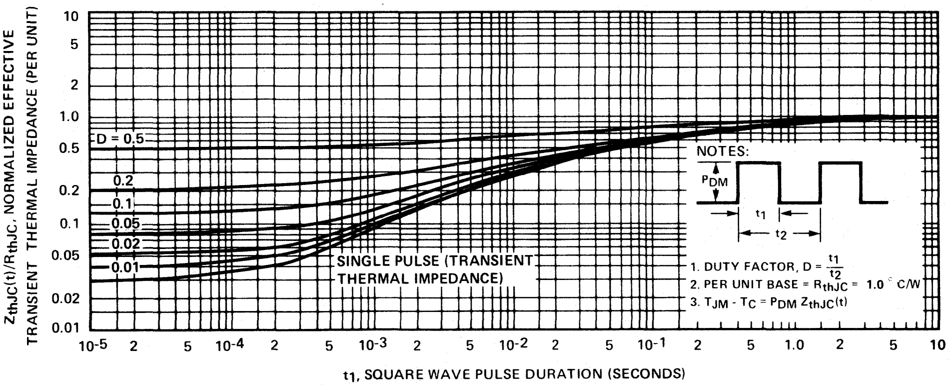


FIGURE 1. TO-3 Package

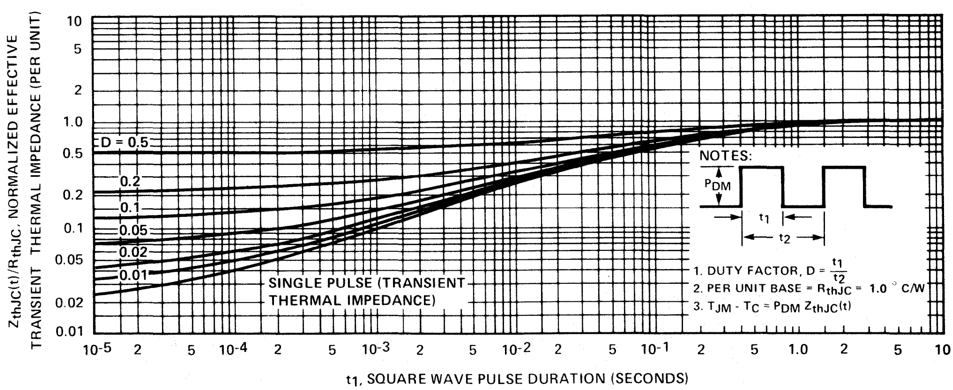


FIGURE 2. TO-220 Package

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDC65-2

FIGURE 1. Ohmic Region

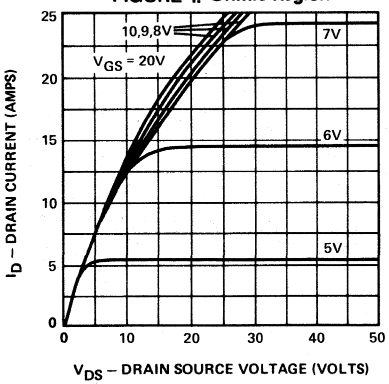


FIGURE 2. Transfer Characteristics

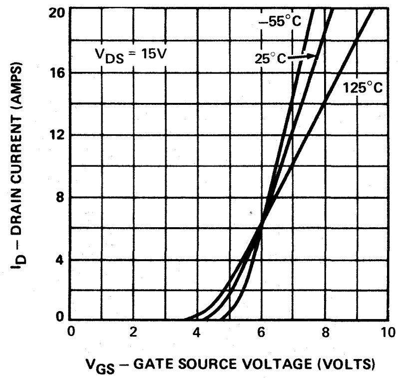


FIGURE 3. Temperature Effects on $r_{DS(on)}$

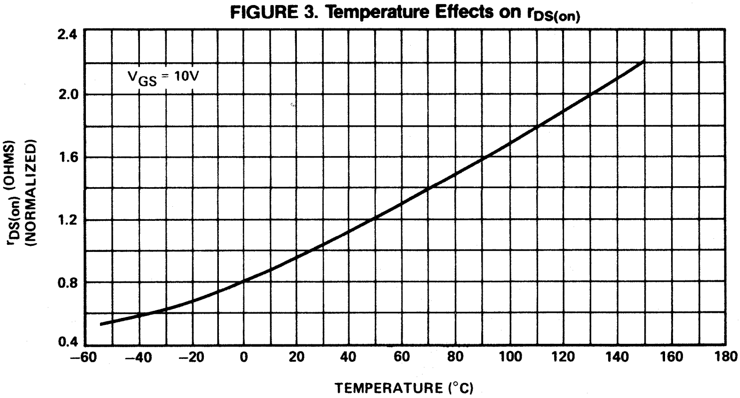


FIGURE 4. Output Characteristics

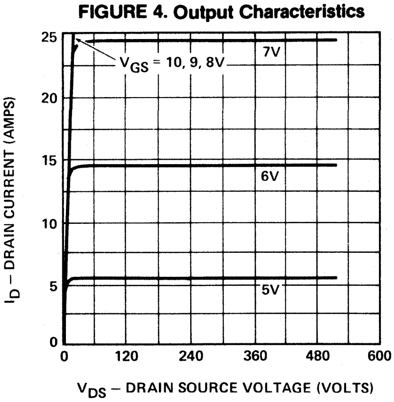
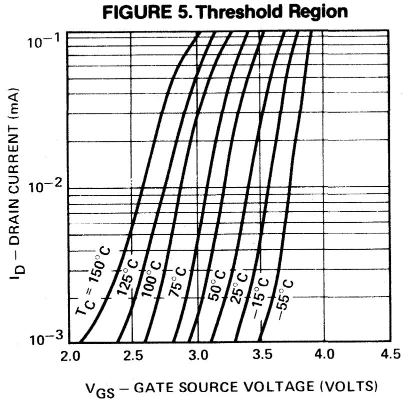


FIGURE 5. Threshold Region



TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDC65-2

FIGURE 6. Off-State Current

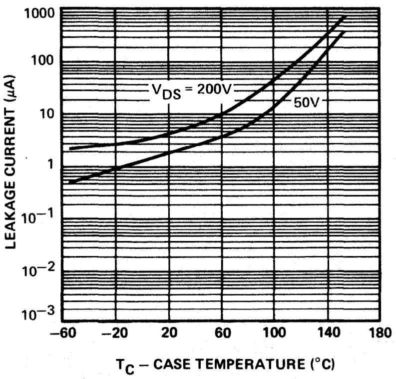


FIGURE 7. Capacitance

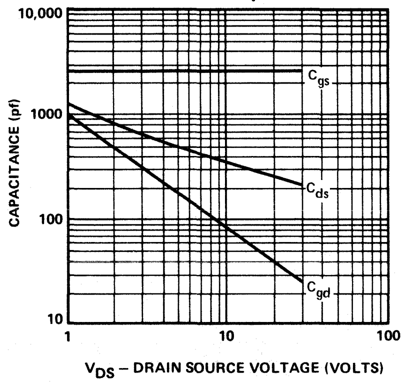


FIGURE 8. Effects on Load Conditions

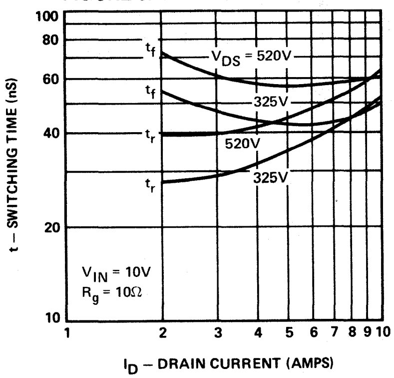


FIGURE 9. Effects of Drive Resistance

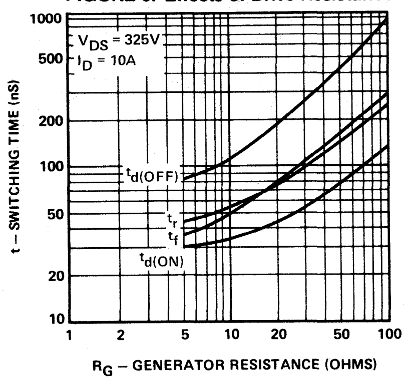
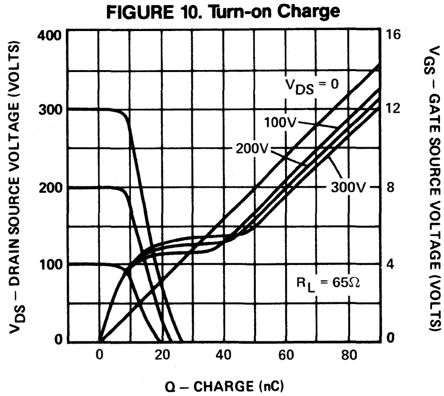


FIGURE 10. Turn-on Charge



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TRANSIENT THERMAL RESPONSE CURVES

VNDC65–2

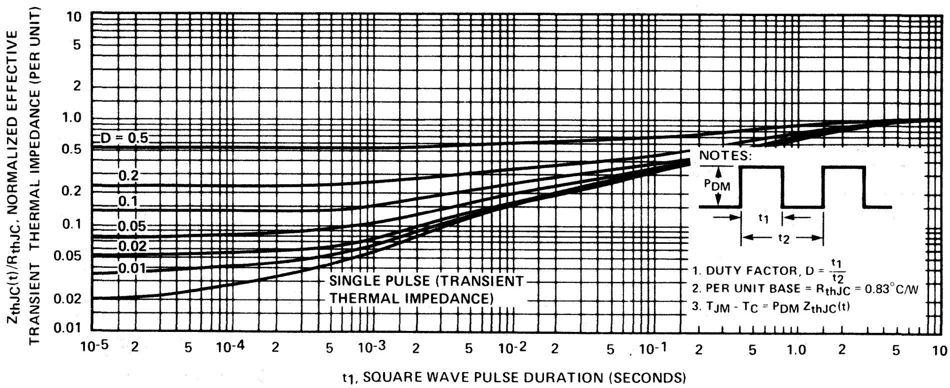


FIGURE 1. TO-3 Package

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDC65-3

FIGURE 1. Ohmic Region

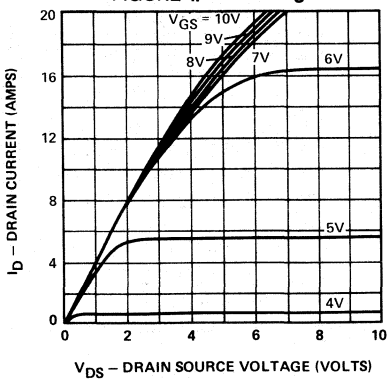


FIGURE 2. Transfer Characteristics

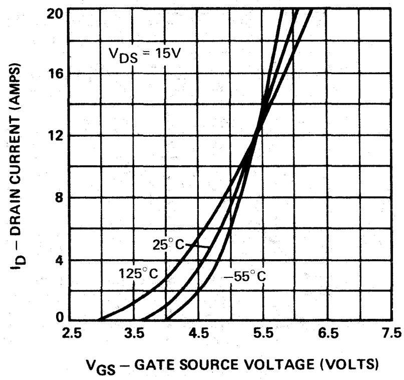


FIGURE 3. Temperature Effects on $r_{DS(on)}$

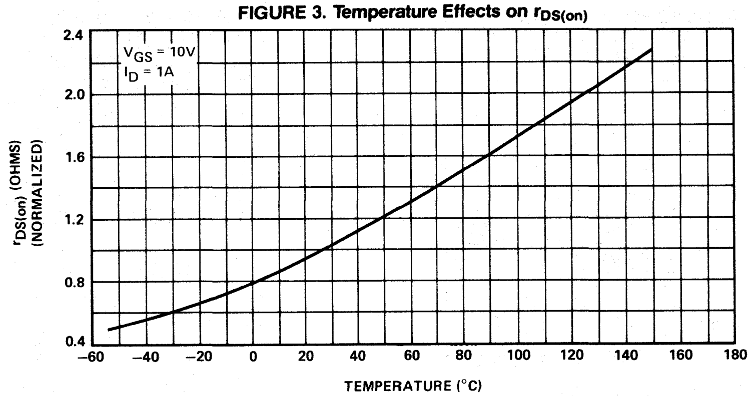


FIGURE 4. Output Characteristics

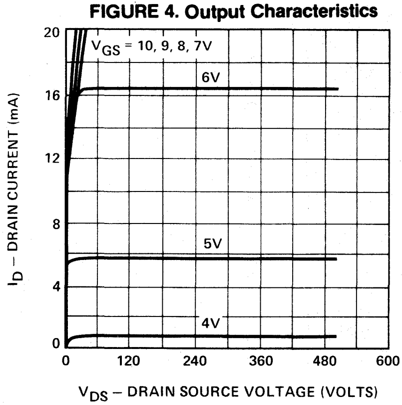
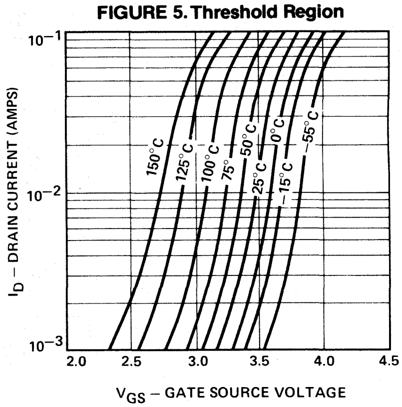


FIGURE 5. Threshold Region



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TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDC65-3

FIGURE 6. Off-State Current

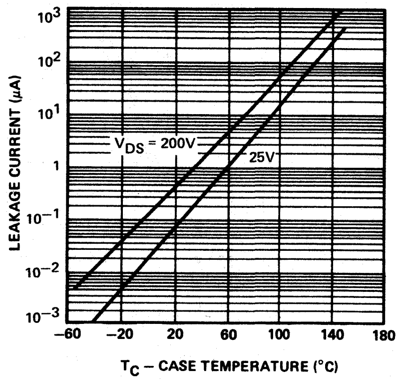


FIGURE 7. Capacitance

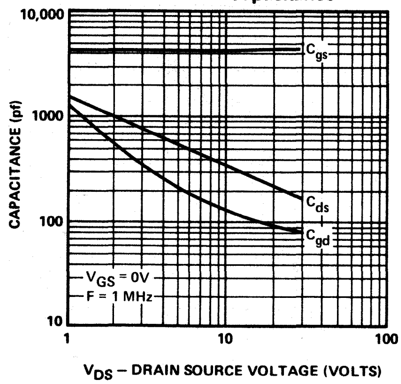


FIGURE 8. Effects on Load Conditions

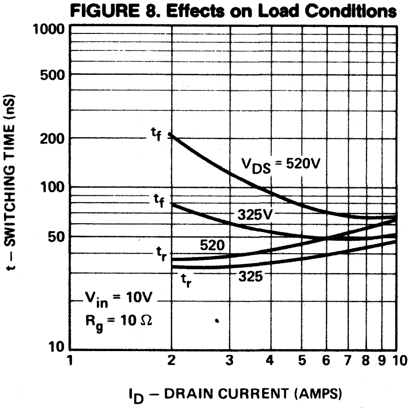


FIGURE 9. Effects of Drive Resistance

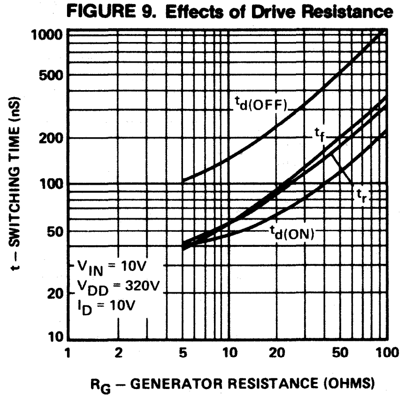
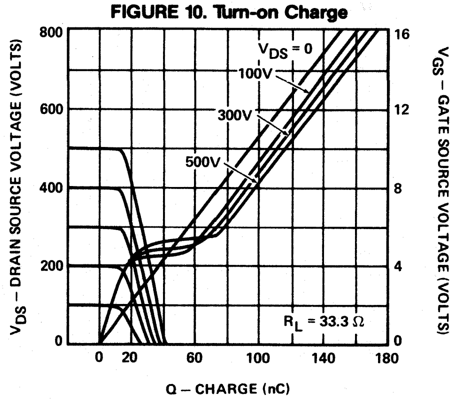


FIGURE 10. Turn-on Charge



TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDD10

FIGURE 1. Ohmic Region

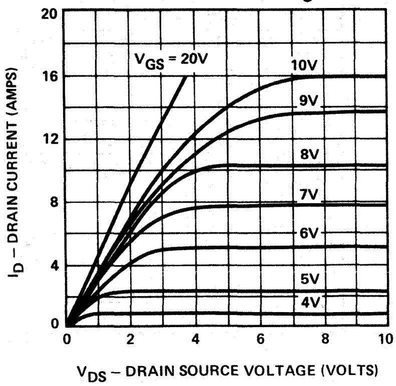


FIGURE 2. Transfer Characteristics

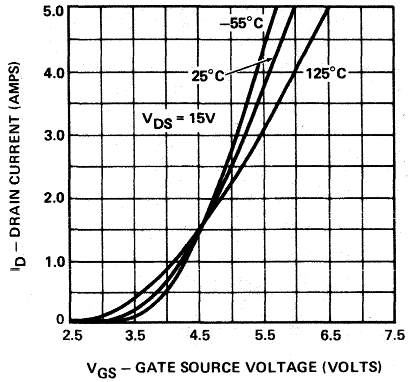


FIGURE 3. Temperature Effects on $r_{DS(on)}$

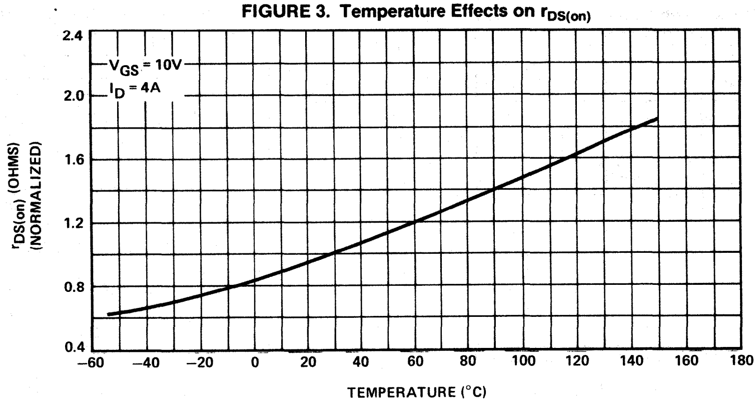


FIGURE 4. Output Characteristics

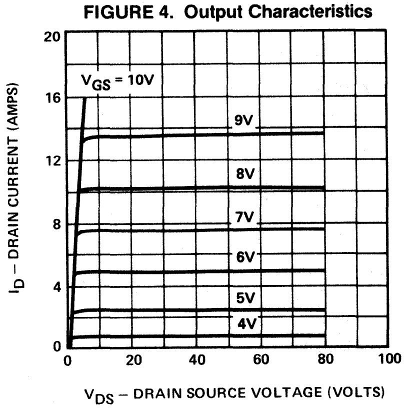


FIGURE 5. Threshold Region

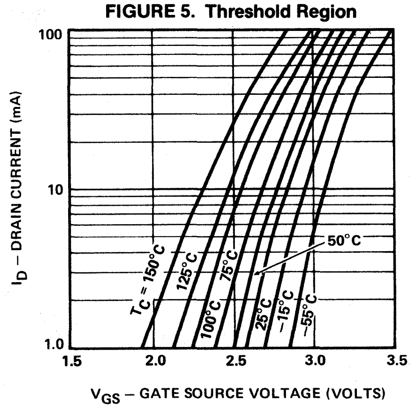


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FIGURE 6. Off-State Current

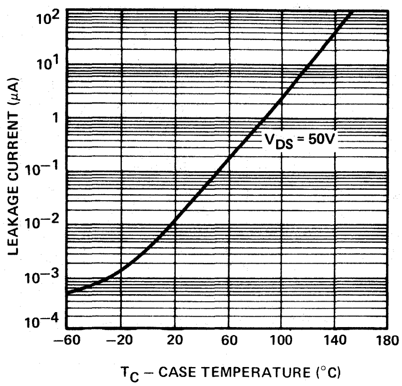


FIGURE 7. Capacitance

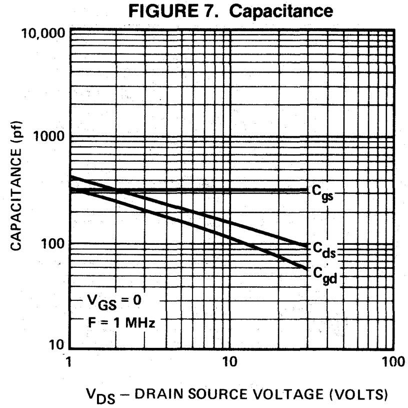


FIGURE 8. Effects on Load Conditions

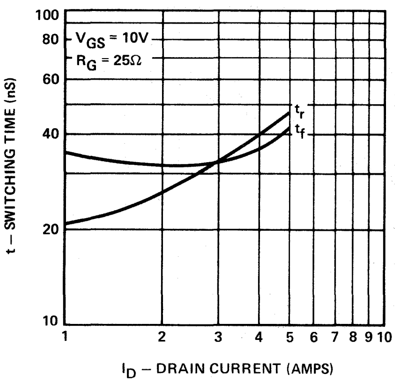


FIGURE 9. Effects of Drive Resistance

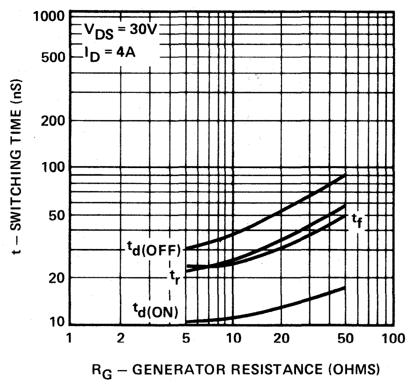
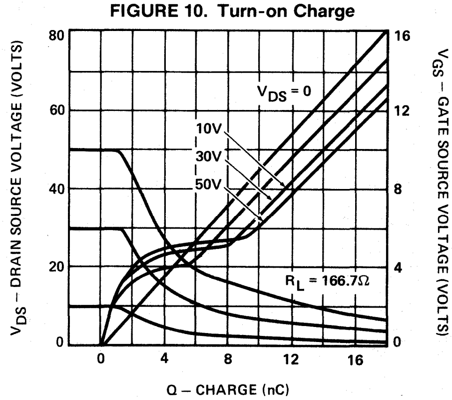


FIGURE 10. Turn-on Charge



TRANSIENT THERMAL RESPONSE CURVES

VNDD10

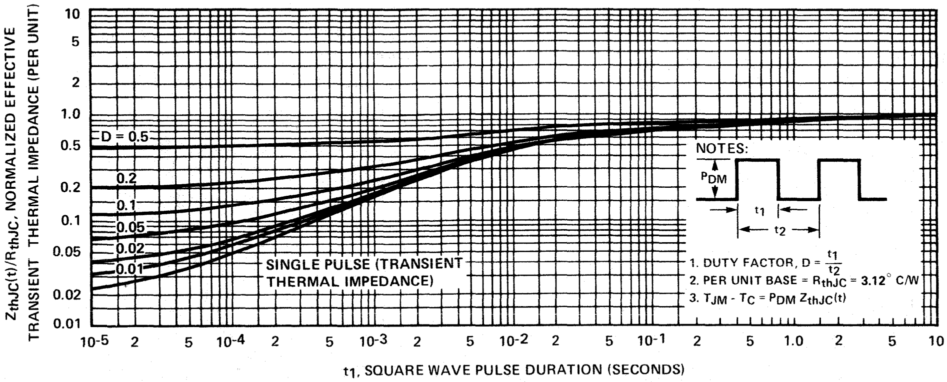


FIGURE 1. TO-3 Package

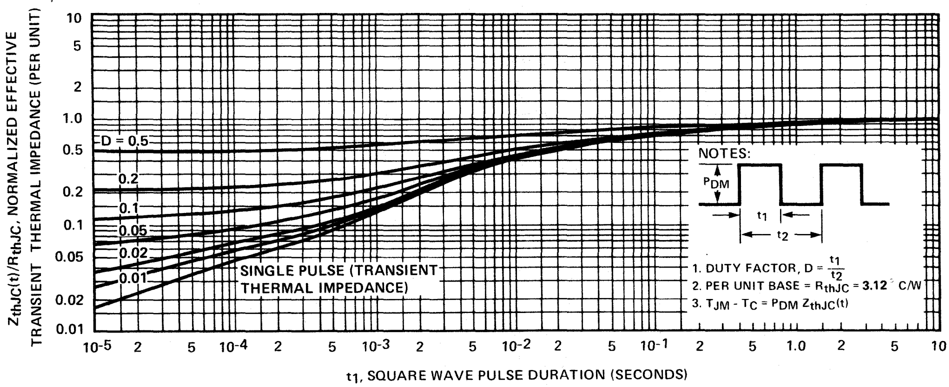


FIGURE 2. TO-220 Package

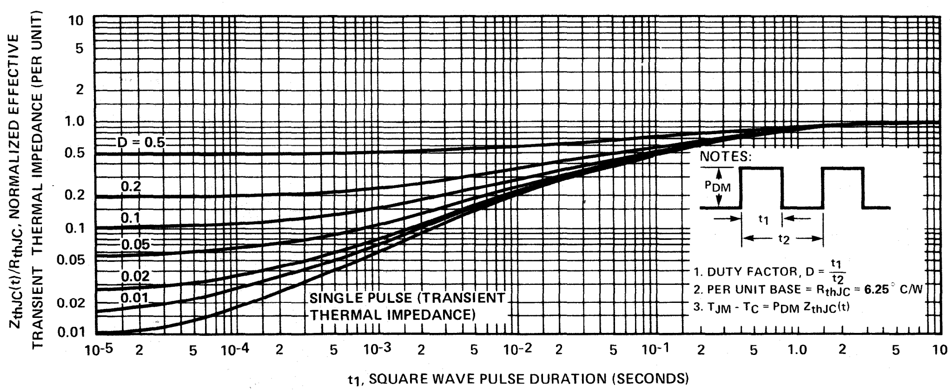


FIGURE 3. TO-39 Package

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TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)
VNDD20

FIGURE 1. Ohmic Region

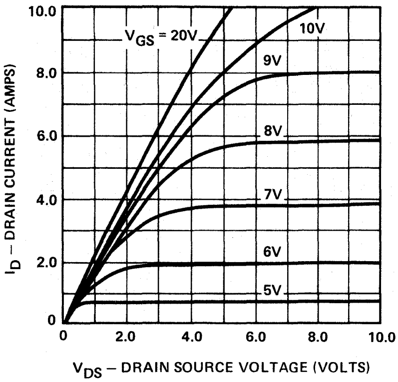


FIGURE 2. Transfer Characteristics

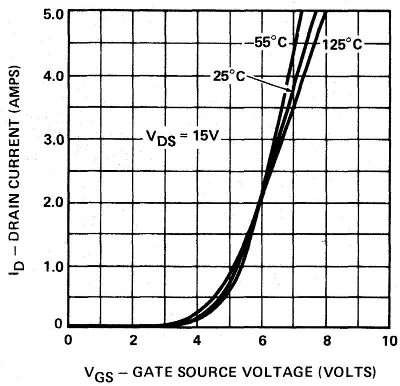


FIGURE 3. Temperature Effects on $r_{DS(on)}$

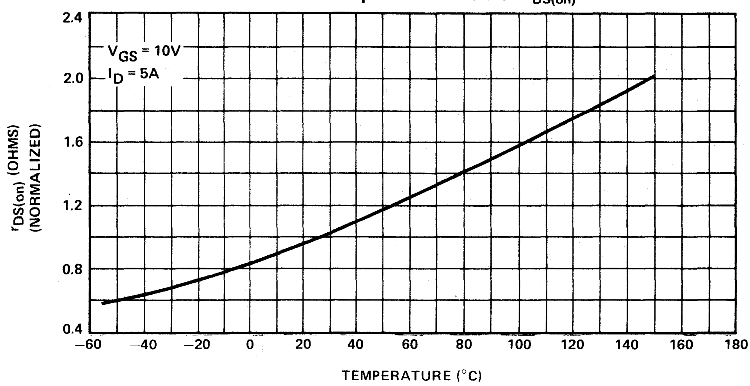


FIGURE 4. Output Characteristics

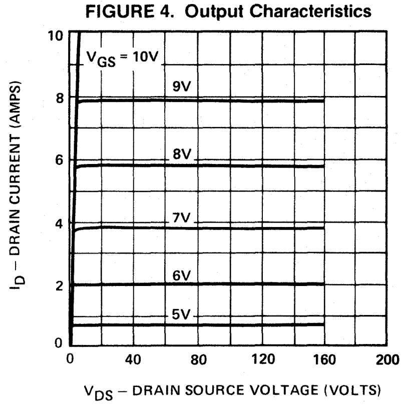
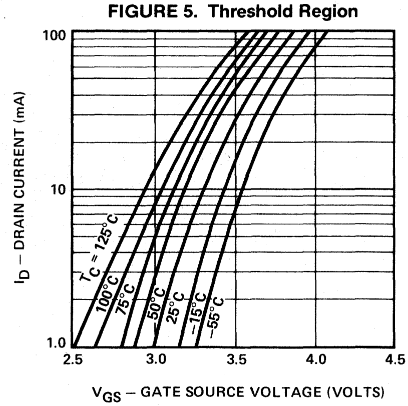


FIGURE 5. Threshold Region



TYPICAL PERFORMANCE CURVES—Continued
VNDD20

FIGURE 6. Off-State Current

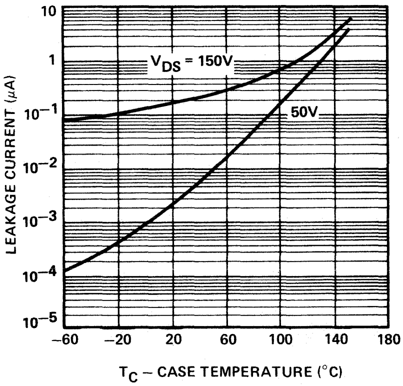


FIGURE 7. Capacitance

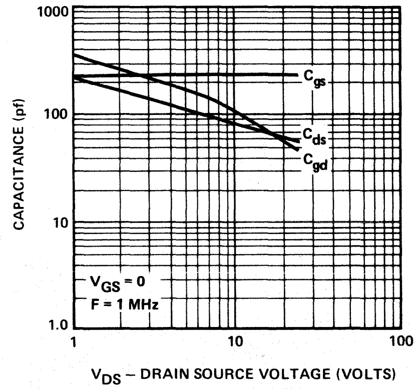


FIGURE 8. Effects on Load Conditions

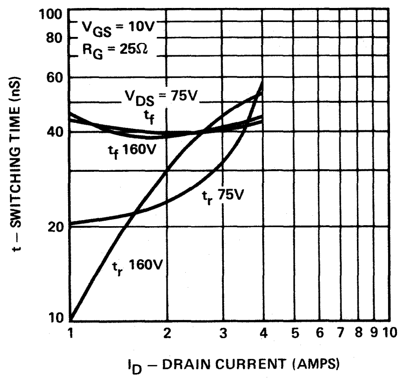


FIGURE 9. Effects of Drive Resistance

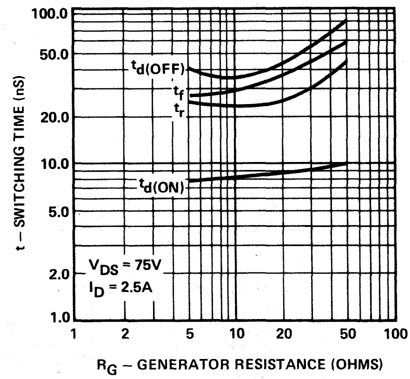
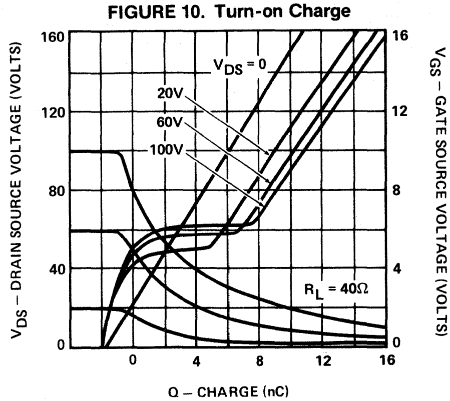


FIGURE 10. Turn-on Charge



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TRANSIENT THERMAL RESPONSE CURVES

VNDD20

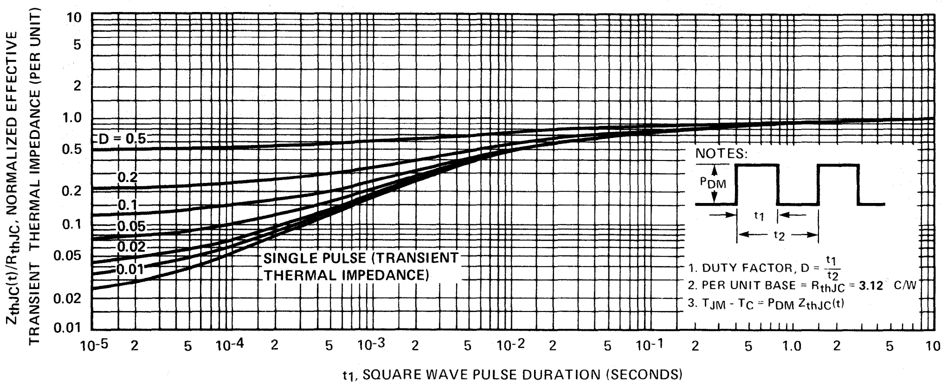


FIGURE 1. TO-3 Package

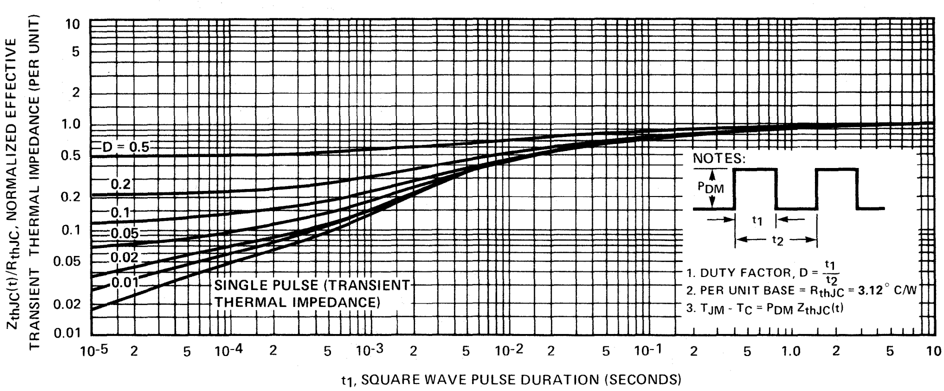


FIGURE 2. TO-220 Package

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDD40

FIGURE 1. Ohmic Region

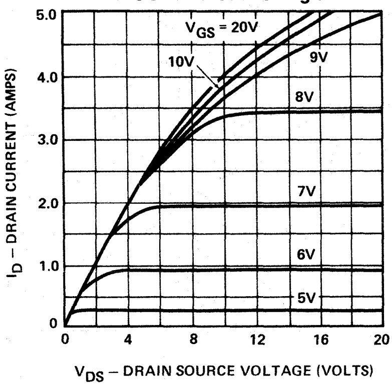


FIGURE 2. Transfer Characteristics

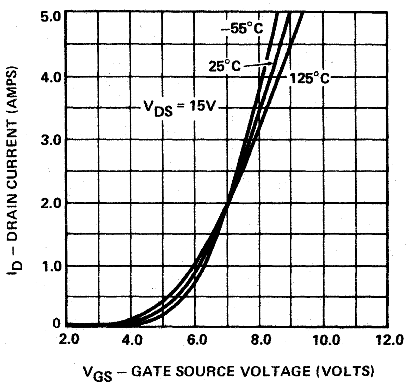


FIGURE 3. Temperature Effects on $r_{DS(on)}$

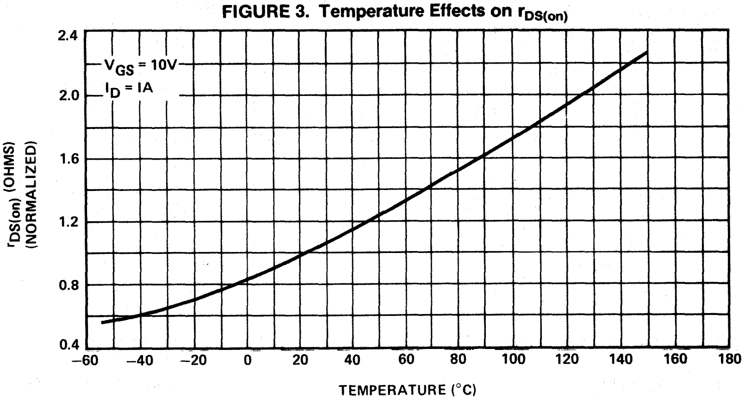


FIGURE 4. Output Characteristics

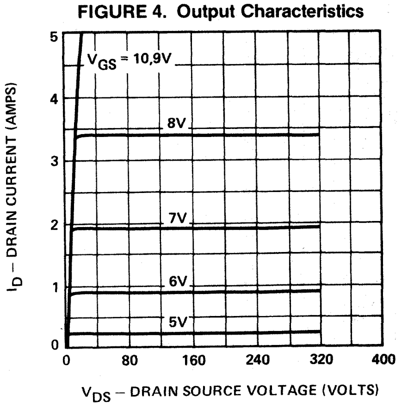
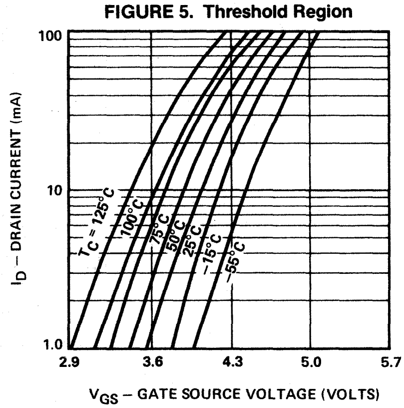


FIGURE 5. Threshold Region



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TYPICAL PERFORMANCE CURVES—Continued
VNDD40

FIGURE 6. Off-State Current

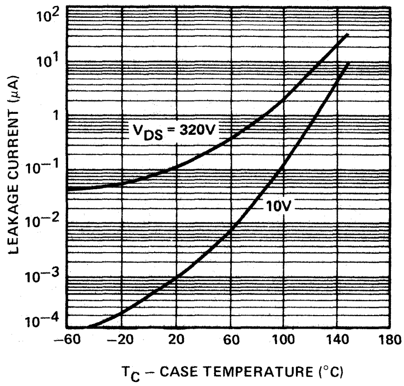


FIGURE 7. Capacitance

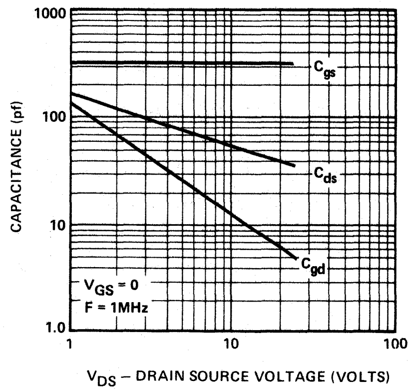


FIGURE 8. Effects on Load Conditions

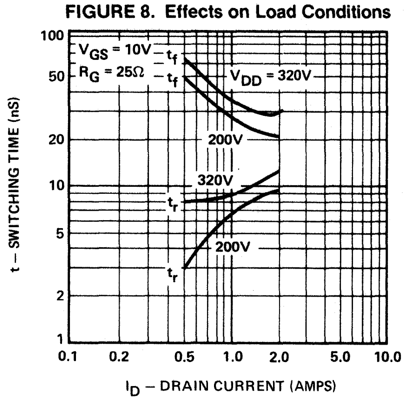


FIGURE 9. Effects of Drive Resistance

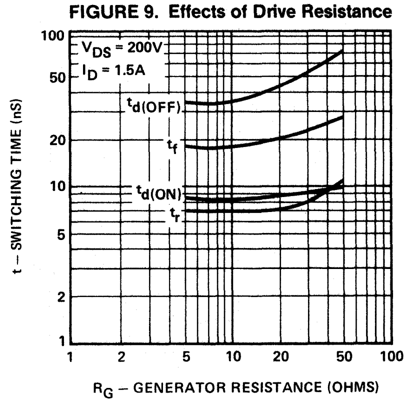
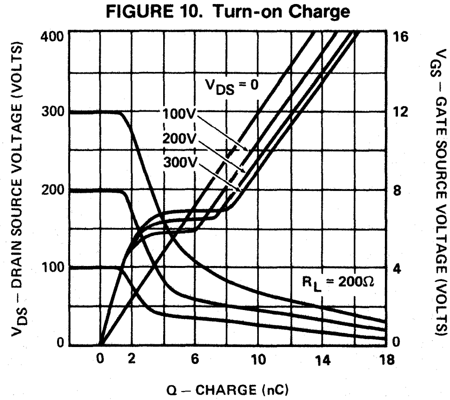


FIGURE 10. Turn-on Charge



TRANSIENT THERMAL RESPONSE CURVES

VNDD40

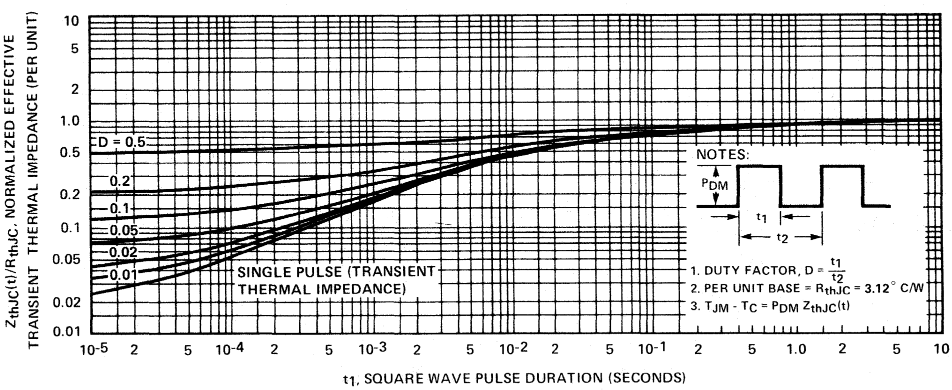


FIGURE 1. TO-3 Package

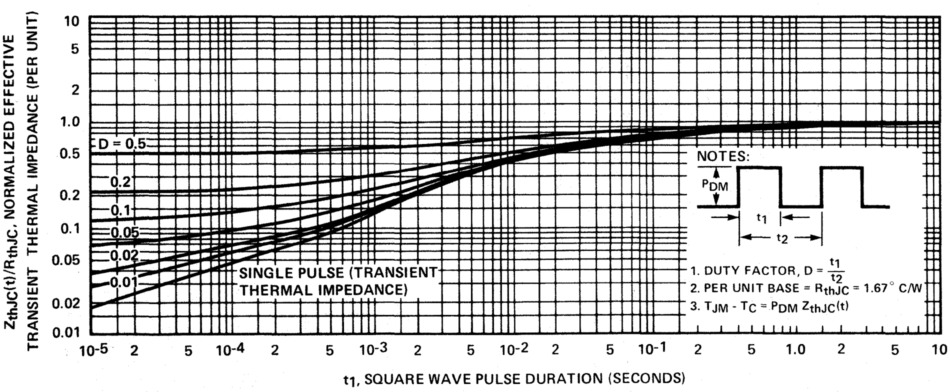


FIGURE 2. TO-220 Package

TYPICAL PERFORMANCE CURVES (25°C unless otherwise noted)

VNDD50

FIGURE 1. Ohmic Region

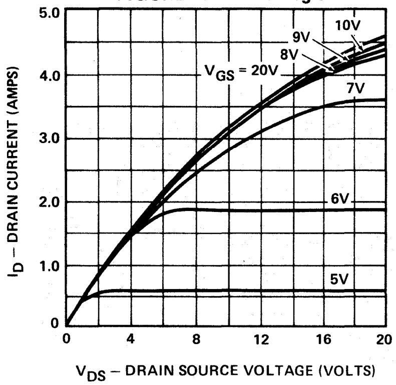


FIGURE 2. Transfer Characteristics

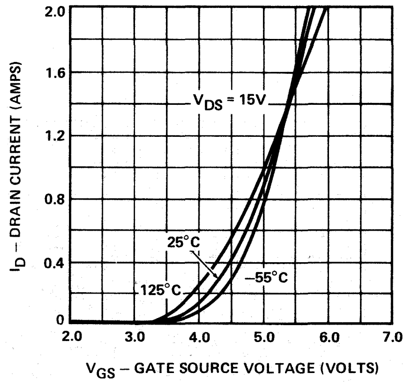


FIGURE 3. Temperature Effects on $r_{DS(on)}$

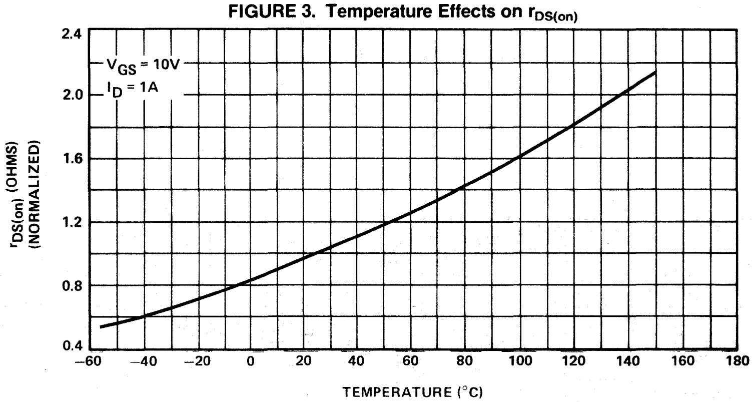


FIGURE 4. Output Characteristics

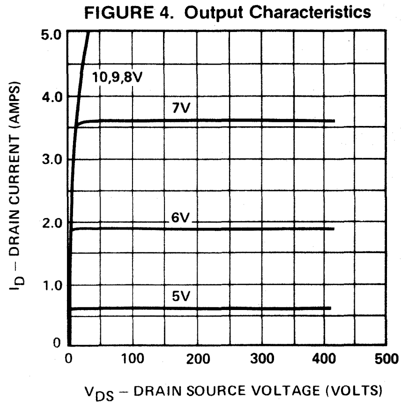
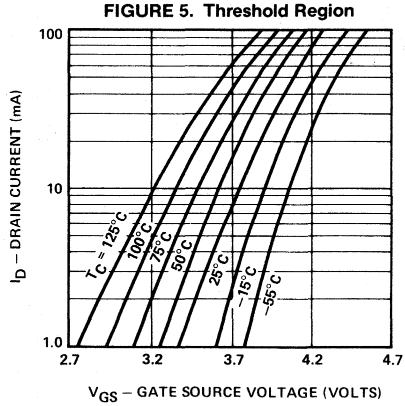


FIGURE 5. Threshold Region



TYPICAL PERFORMANCE CURVES—Continued

VNDD50

FIGURE 6. Off-State Current

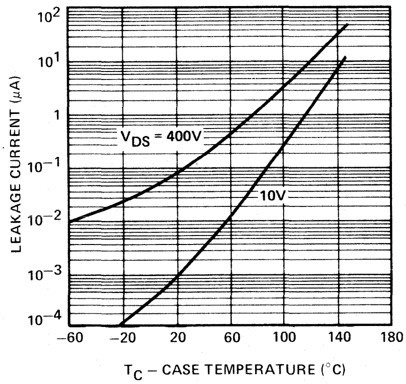


FIGURE 7. Capacitance

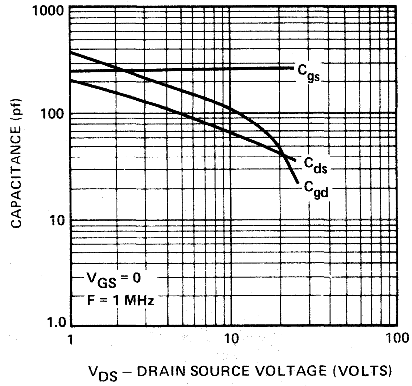


FIGURE 8. Effects on Load Conditions

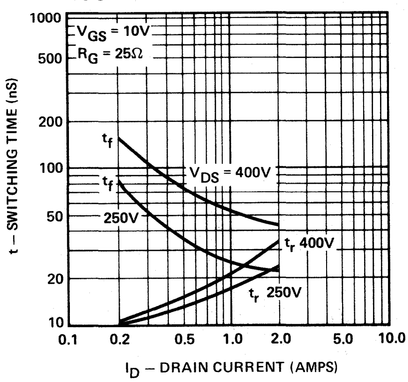


FIGURE 9. Effects of Drive Resistance

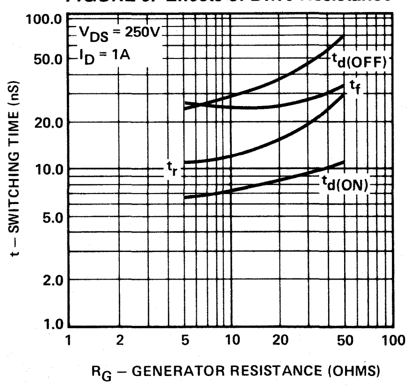
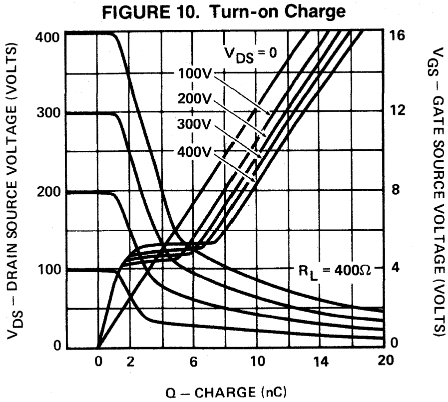


FIGURE 10. Turn-on Charge



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TRANSIENT THERMAL RESPONSE CURVES

VNDD50

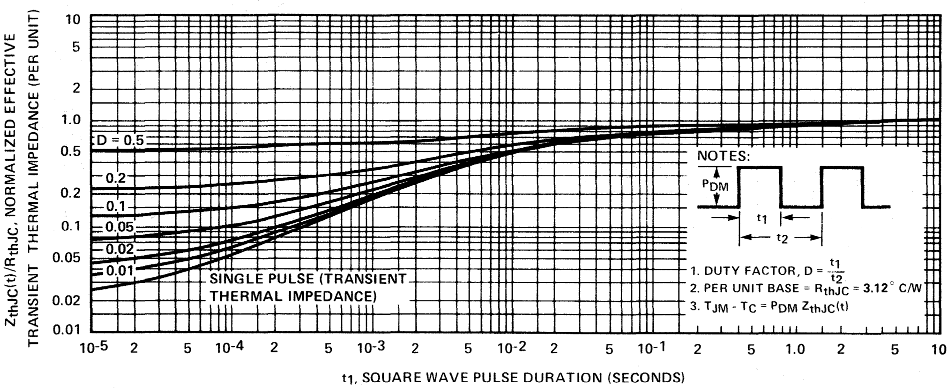


FIGURE 1. TO-3 Package

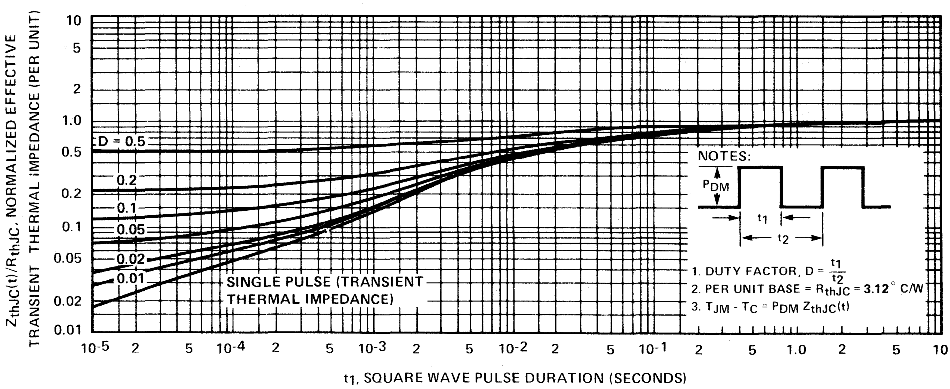


FIGURE 2. TO-220 Package

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDE10

FIGURE 1. Ohmic Region

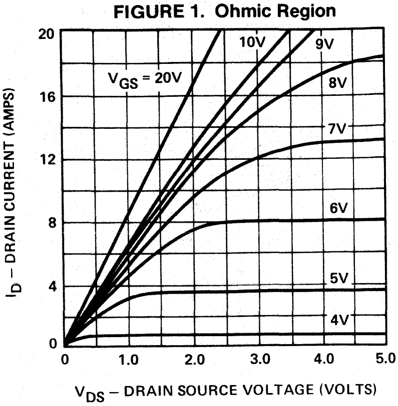


FIGURE 2. Transfer Characteristics

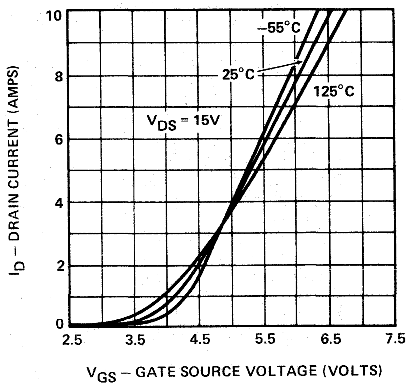


FIGURE 3. Temperature Effects on $r_{DS(on)}$

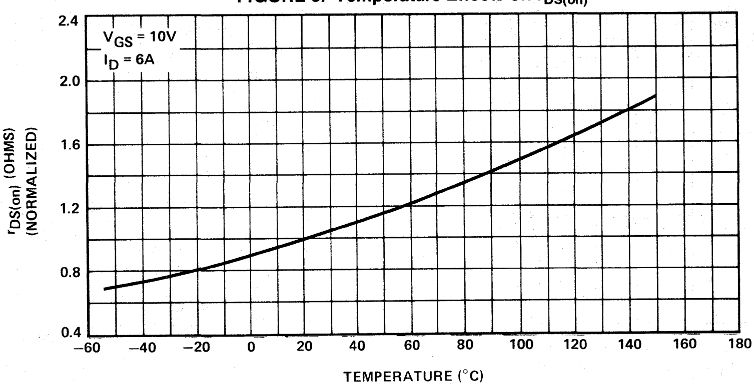


FIGURE 4. Output Characteristics

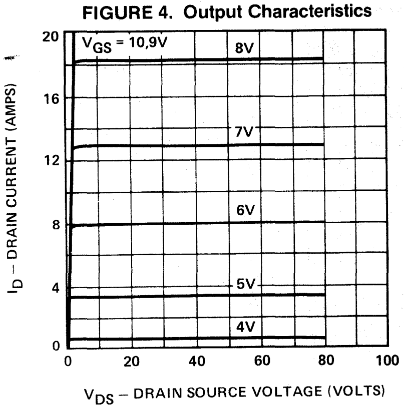
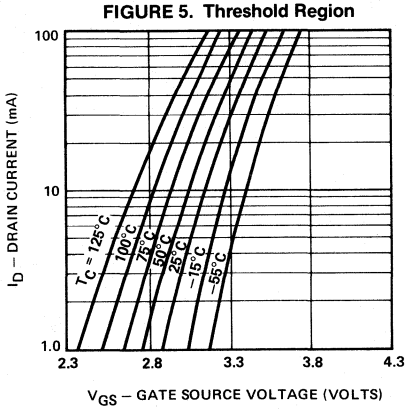


FIGURE 5. Threshold Region



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TYPICAL PERFORMANCE CURVES—Continued

VNDE10

FIGURE 6. Off-State Current

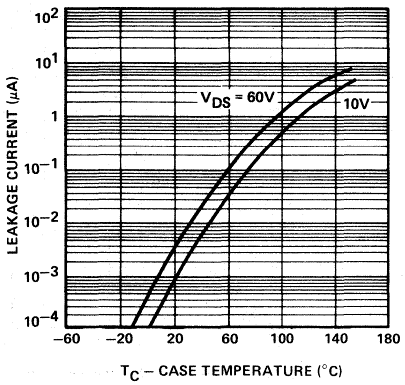


FIGURE 7. Capacitance

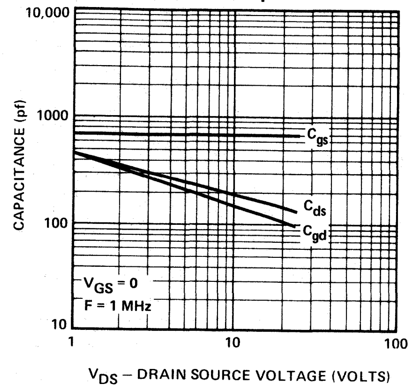


FIGURE 8. Effects on Load Conditions

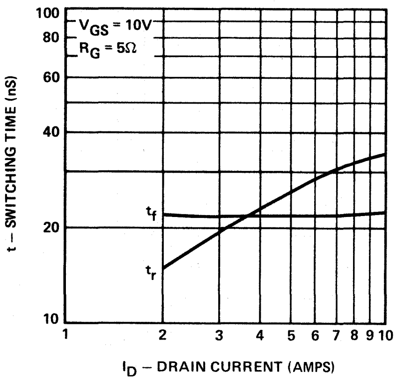


FIGURE 9. Effects of Drive Resistance

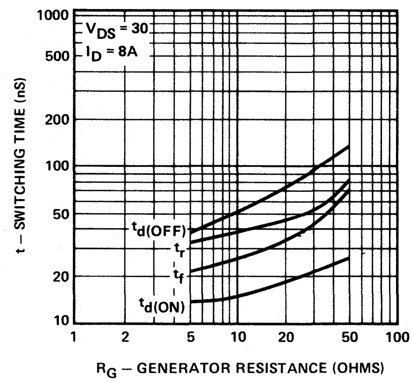
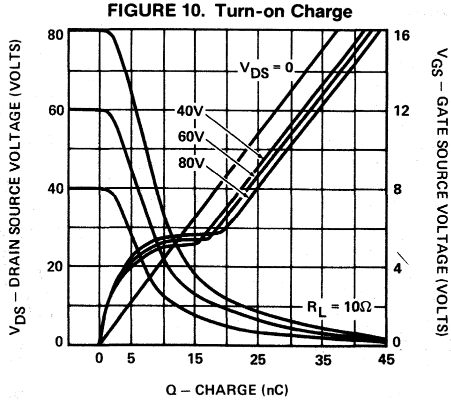


FIGURE 10. Turn-on Charge



TRANSIENT THERMAL RESPONSE CURVES

VNDE10

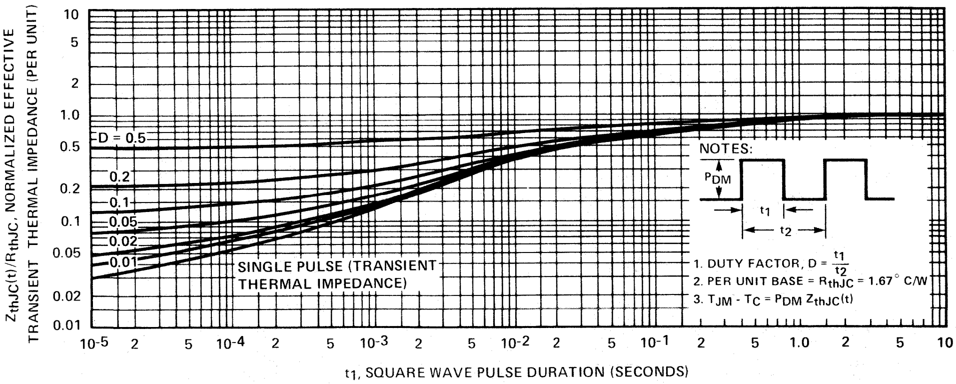


FIGURE 1. TO-3 Package

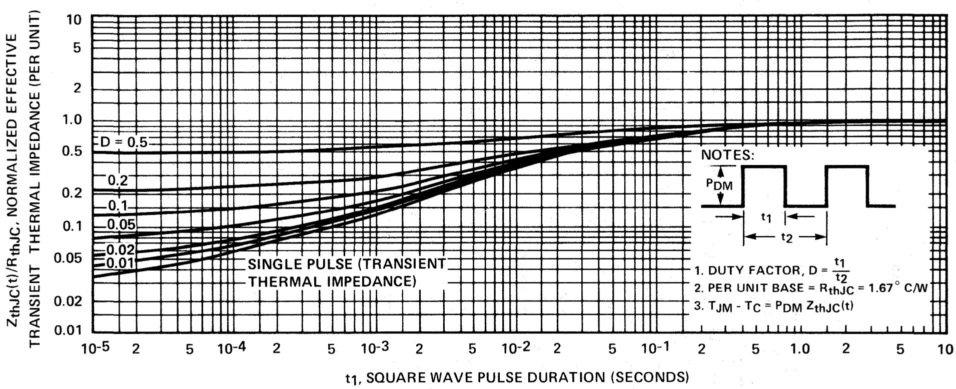


FIGURE 2. TO-220 Package

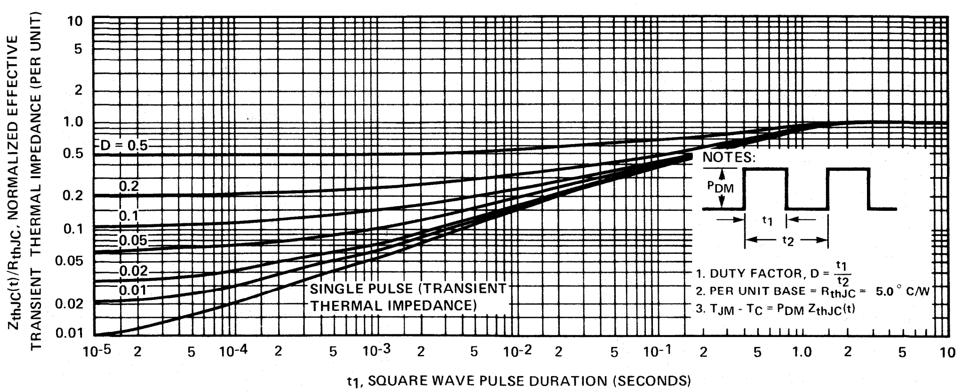


FIGURE 3. TO-39 Package

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TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)
VNDE20

FIGURE 1. Ohmic Region

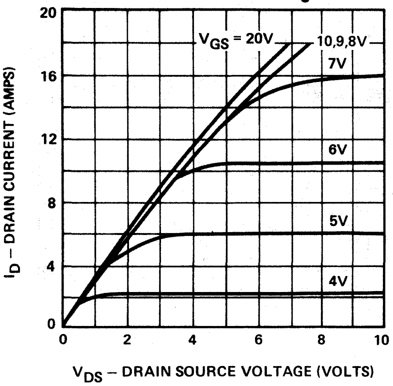


FIGURE 2. Transfer Characteristics

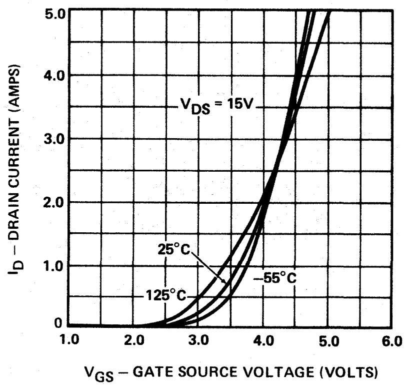


FIGURE 3. Temperature Effects on $r_{DS(on)}$

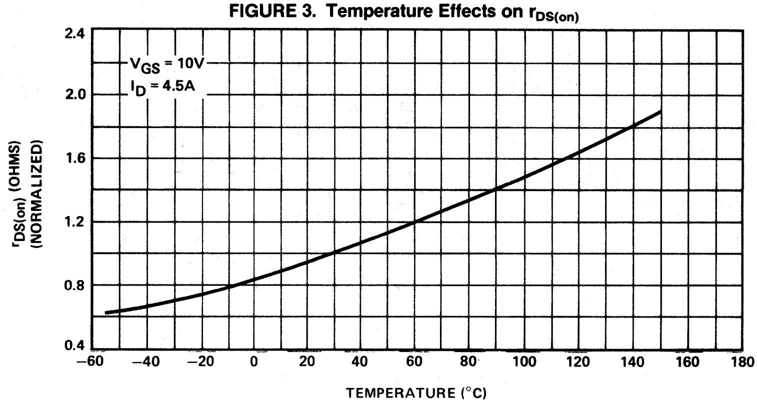


FIGURE 4. Output Characteristics

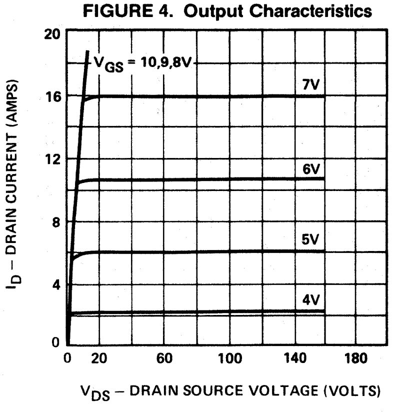
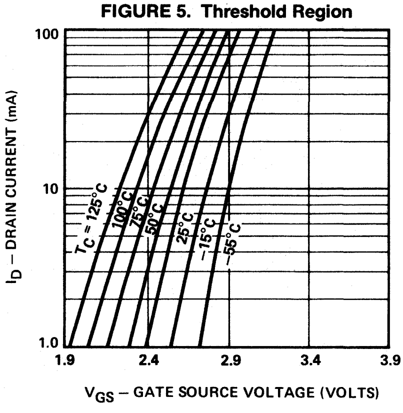


FIGURE 5. Threshold Region



TYPICAL PERFORMANCE CURVES—Continued
VNDE20

FIGURE 6. Off-State Current

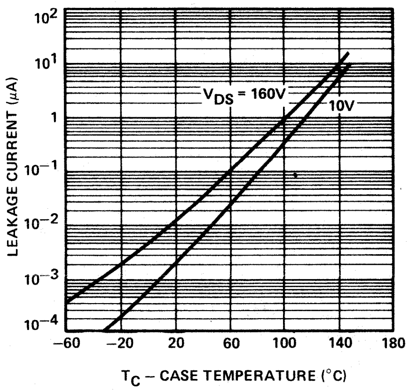


FIGURE 7. Capacitance

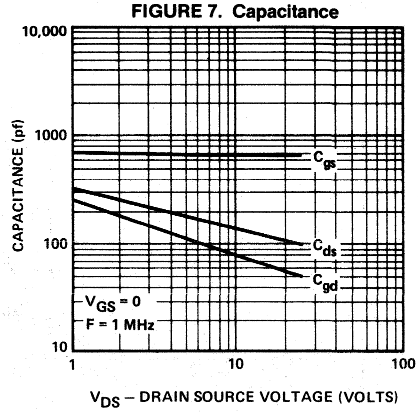


FIGURE 8. Effects on Load Conditions

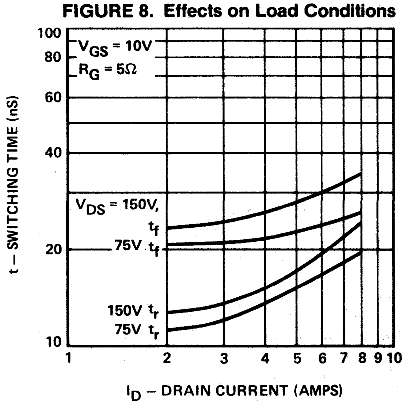


FIGURE 9. Effects of Drive Resistance

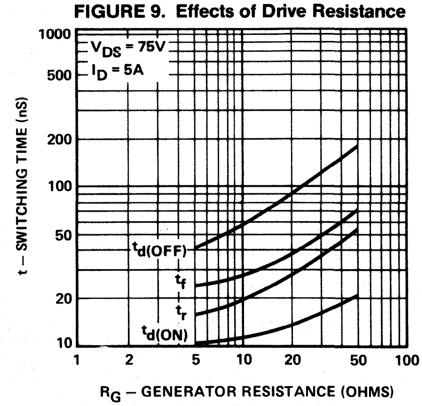
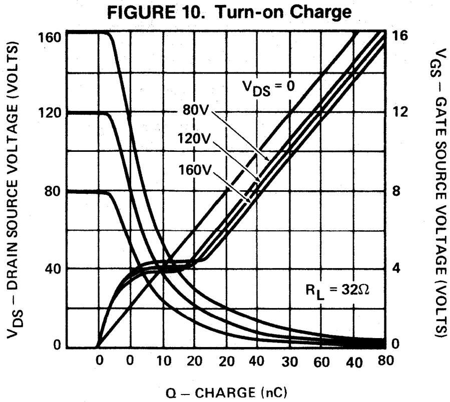


FIGURE 10. Turn-on Charge



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TRANSIENT THERMAL RESPONSE CURVES

VNDE20

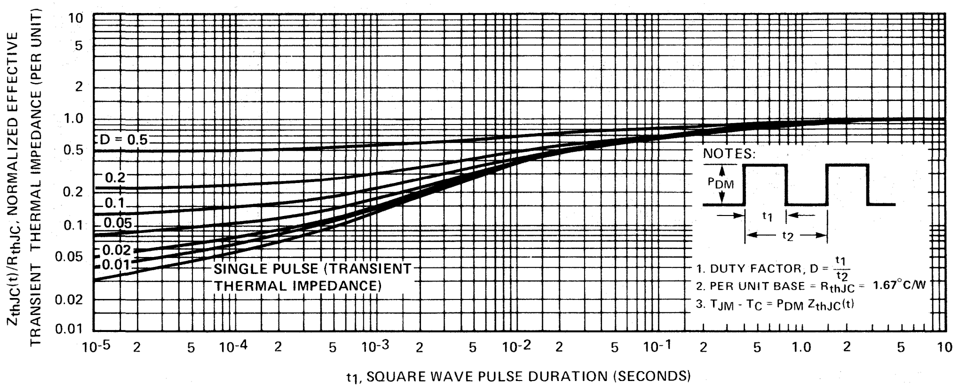


FIGURE 1. TO-3 Package

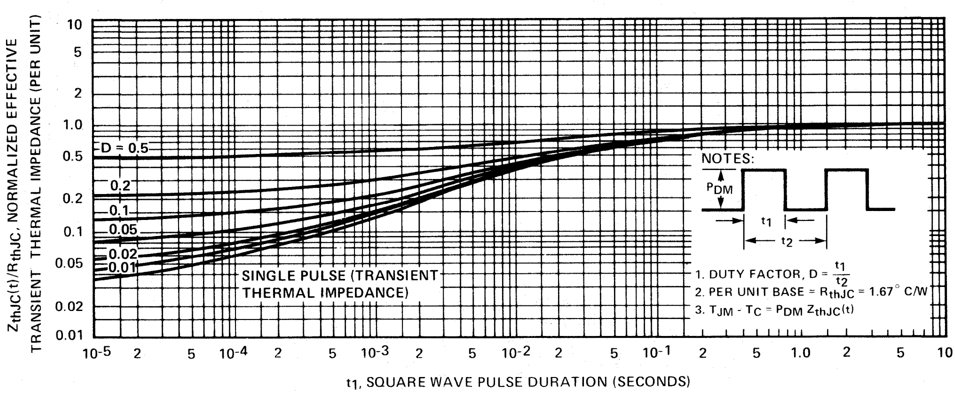


FIGURE 2. TO-220 Package

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)
VNDE40

FIGURE 1. Ohmic Region

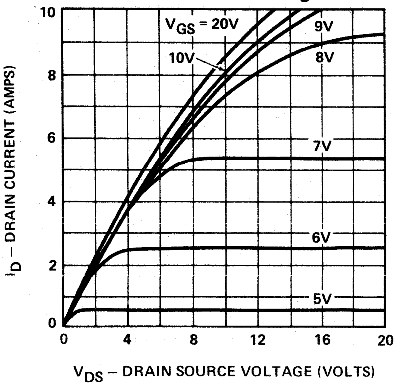


FIGURE 2. Transfer Characteristics

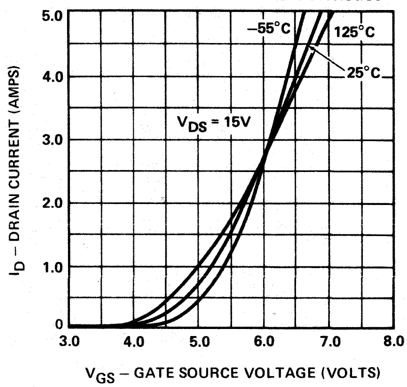


FIGURE 3. Temperature Effects on $r_{DS(on)}$

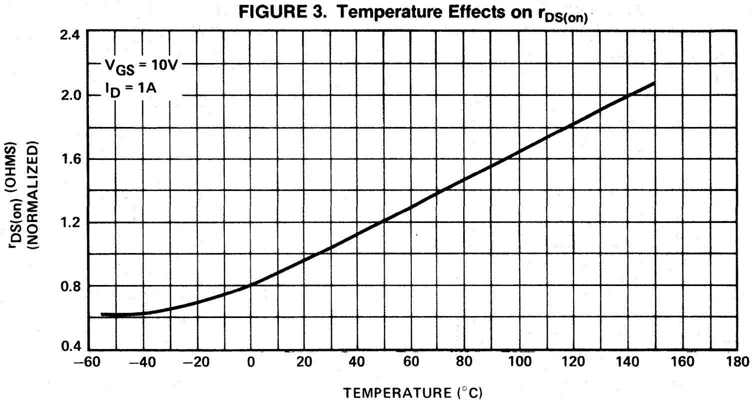


FIGURE 4. Output Characteristics

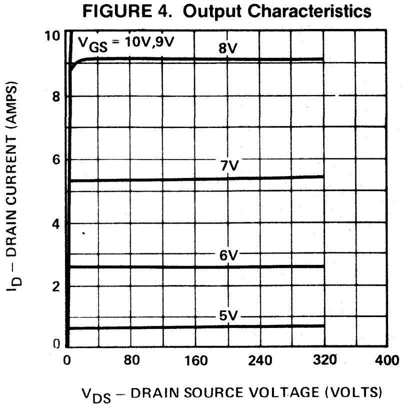
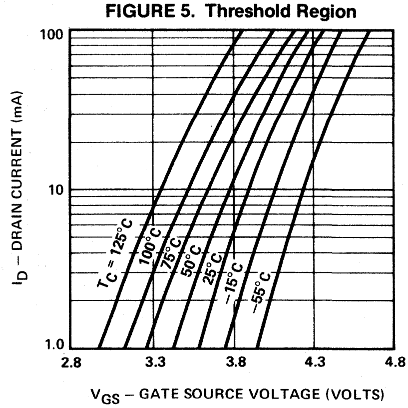


FIGURE 5. Threshold Region



5

TYPICAL PERFORMANCE CURVES—Continued
VNDE40

FIGURE 6. Off-State Current

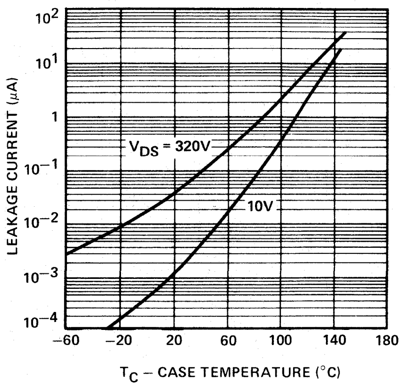


FIGURE 7. Capacitance

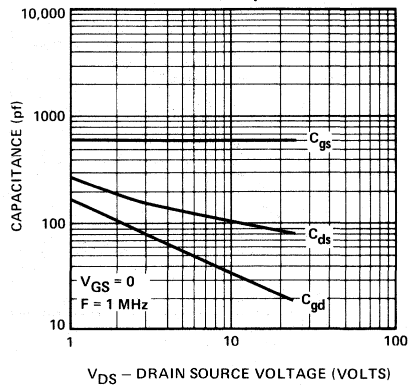


FIGURE 8. Effects on Load Conditions

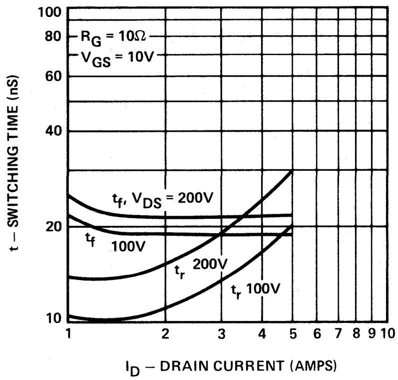


FIGURE 9. Effects of Drive Resistance

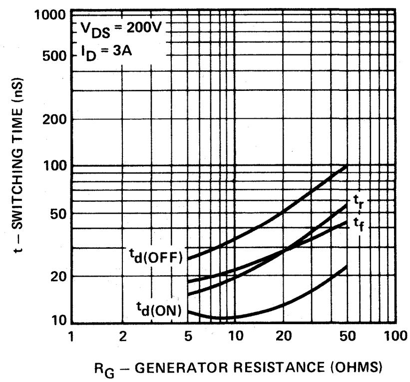
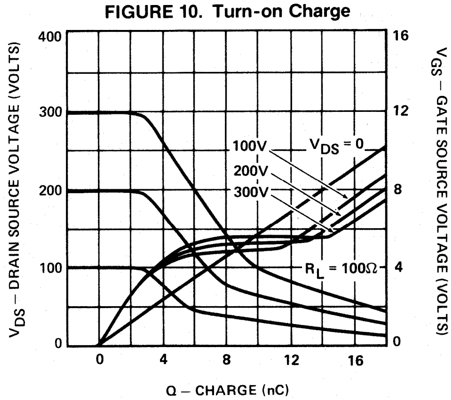


FIGURE 10. Turn-on Charge



TRANSIENT THERMAL RESPONSE CURVES

VNDE40

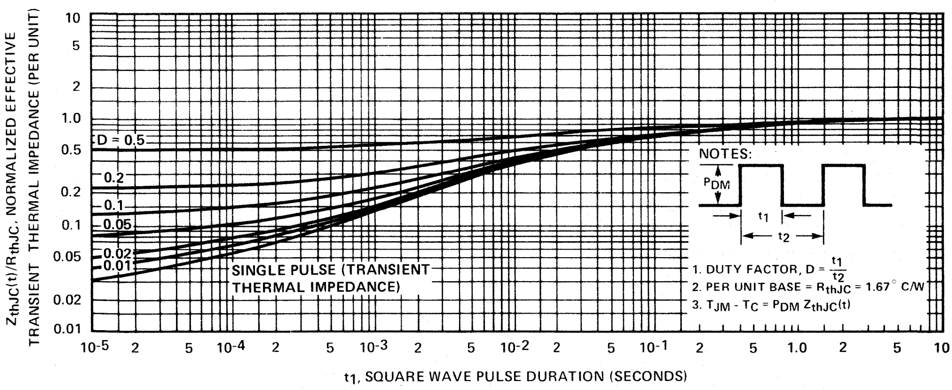


FIGURE 1. TO-3 Package

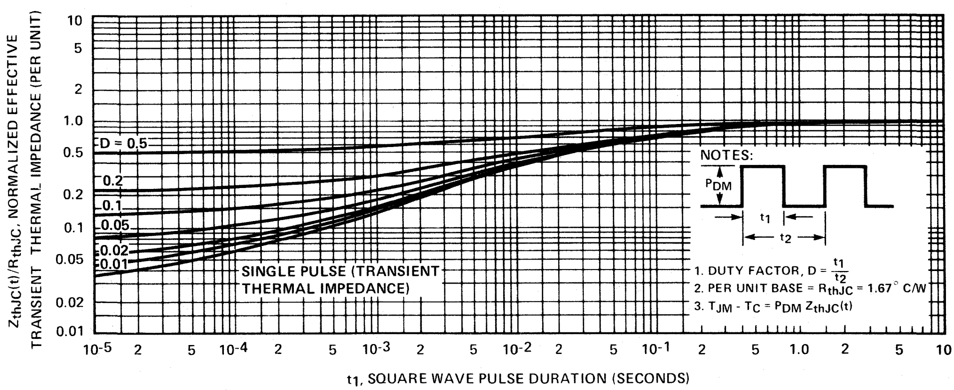


FIGURE 2. TO-220 Package

5

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)
VNDE50

FIGURE 1. Ohmic Region

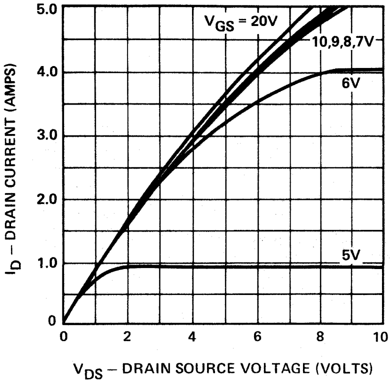


FIGURE 2. Transfer Characteristics

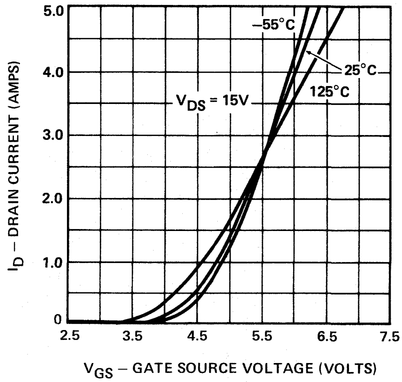


FIGURE 3. Temperature Effects on $r_{DS(on)}$

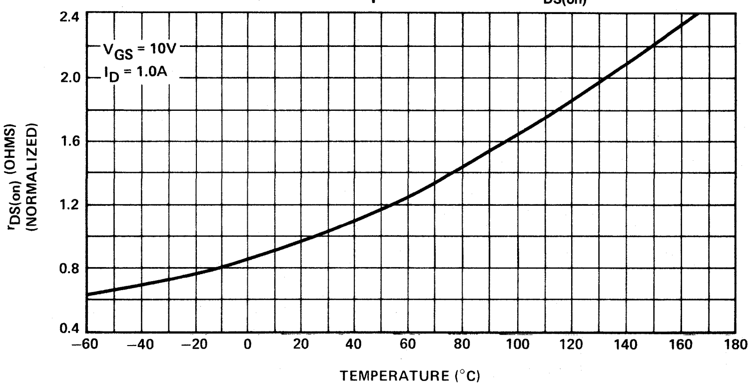


FIGURE 4. Output Characteristics

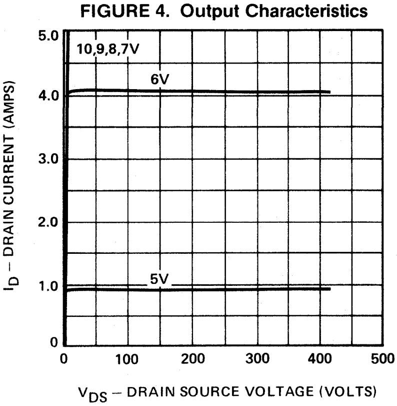
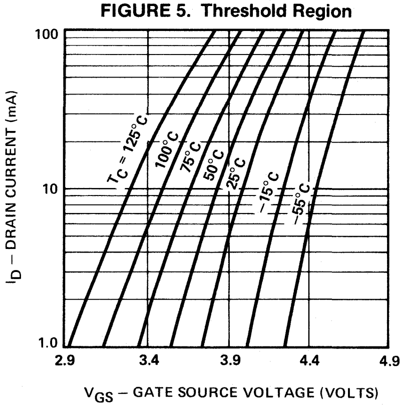


FIGURE 5. Threshold Region



TYPICAL PERFORMANCE CURVES—Continued

VNDE50

FIGURE 6. Off-State Current

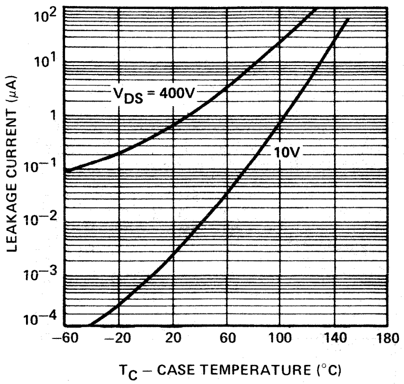


FIGURE 7. Capacitance

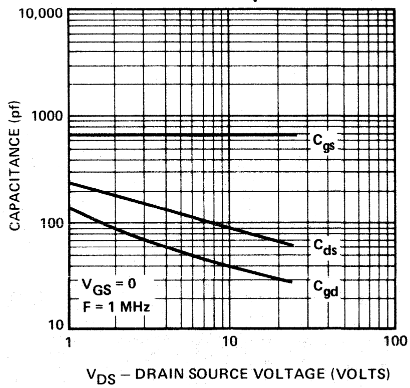


FIGURE 8. Effects on Load Conditions

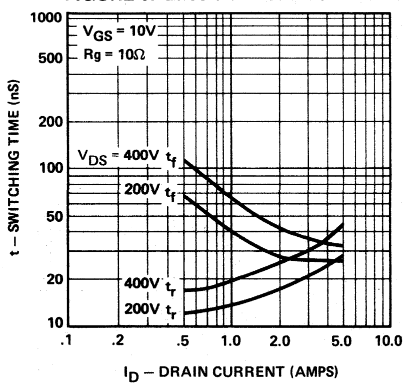


FIGURE 9. Effects of Drive Resistance

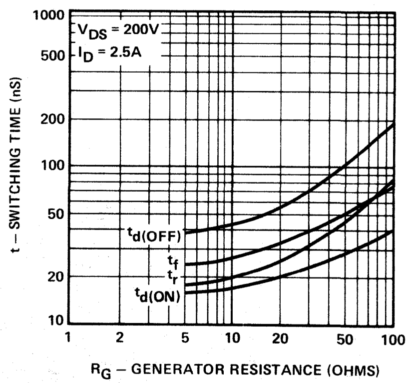


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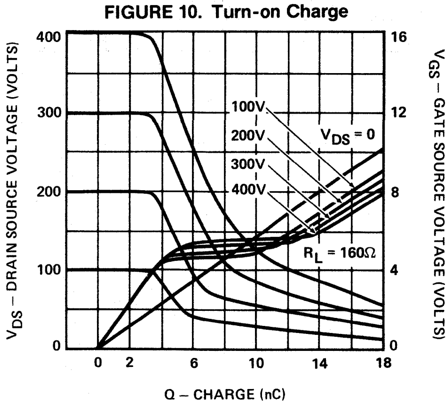
FIGURE 10. Turn-on Charge



TRANSIENT THERMAL RESPONSE CURVES

VNDE50

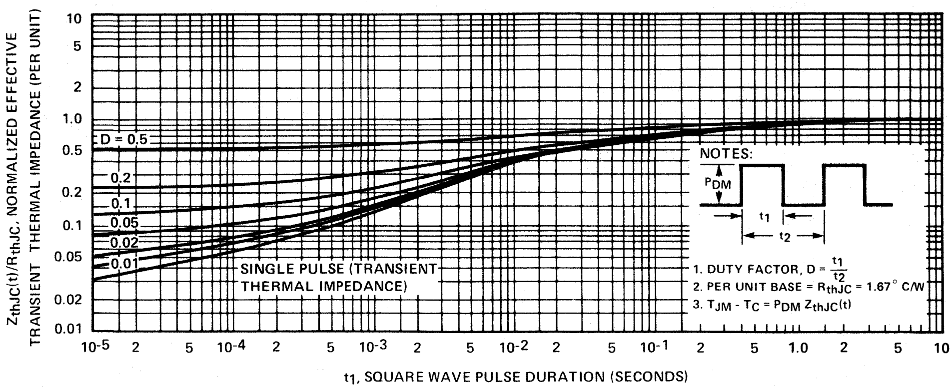


FIGURE 1. TO-3 Package

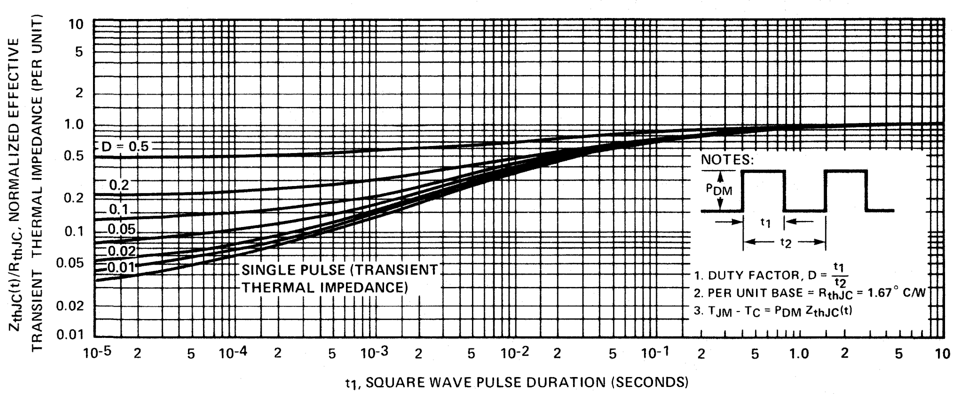


FIGURE 2. TO-220 Package

TYPICAL PERFORMANCE CURVES (25°C unless otherwise noted)
VNDF06

FIGURE 1. Ohmic Region

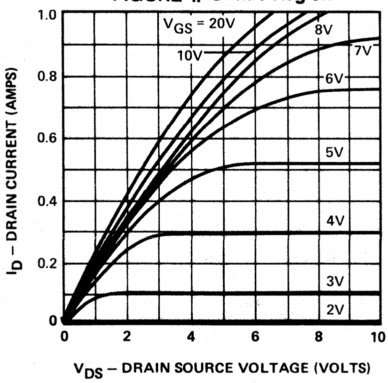


FIGURE 2. Transfer Characteristics

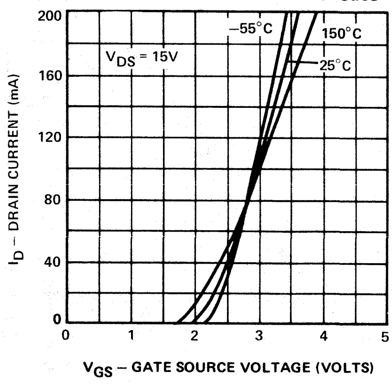


FIGURE 3. Temperature Effects on $r_{DS(on)}$

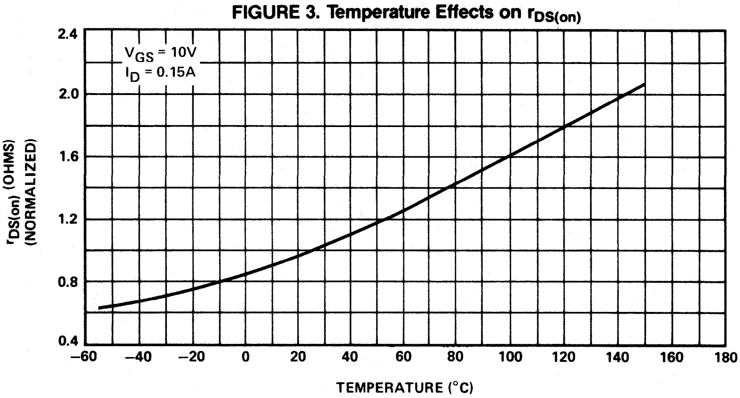


FIGURE 4. Threshold Region

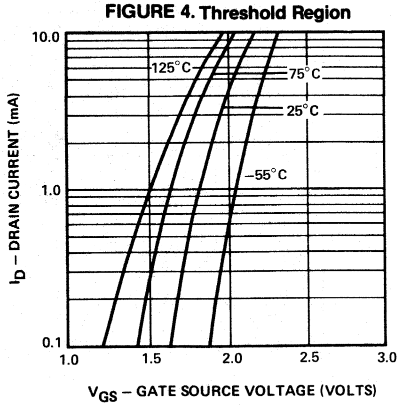
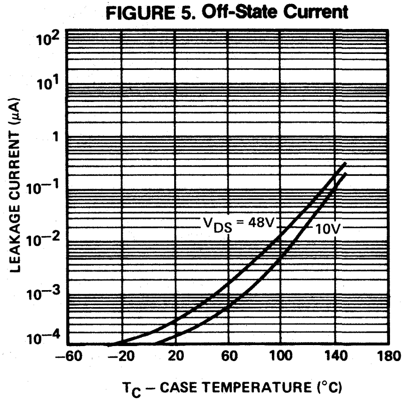


FIGURE 5. Off-State Current



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TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDF24

FIGURE 1. Ohmic Region

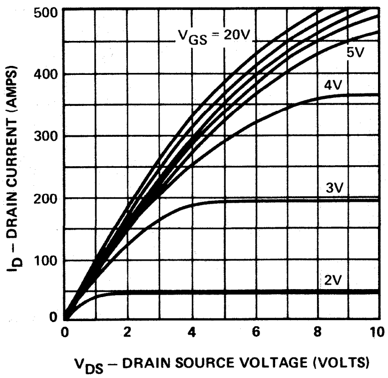


FIGURE 2. Transfer Characteristics

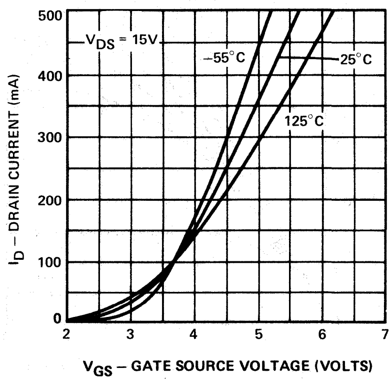


FIGURE 3. Temperature Effects on $r_{DS(on)}$

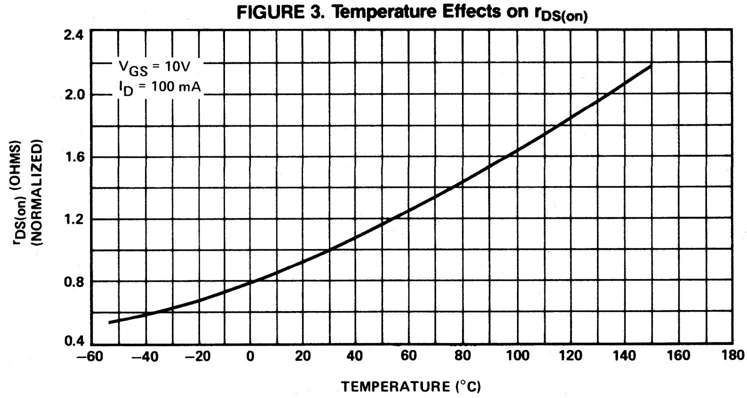


FIGURE 4. Threshold Region

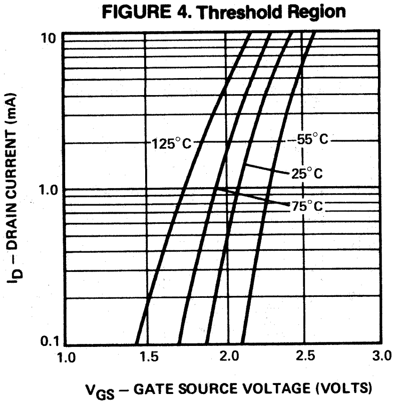
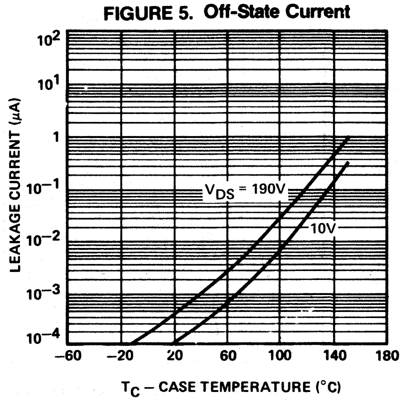


FIGURE 5. Off-State Current



TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNDG10

FIGURE 1. Ohmic Region

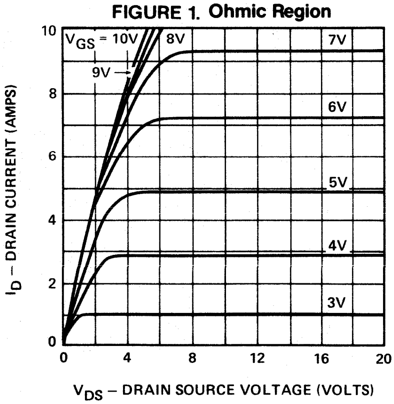


FIGURE 2. Transfer Characteristics

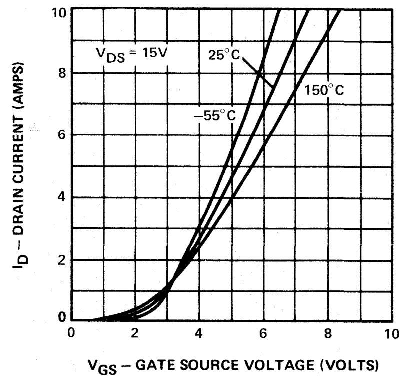


FIGURE 3. Temperature Effects on $r_{DS(on)}$

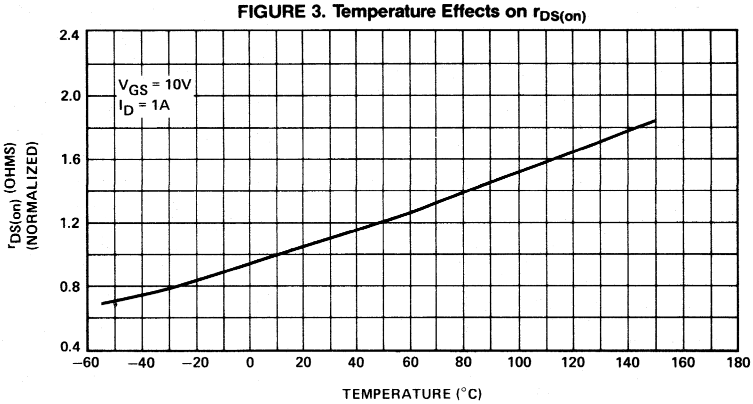


FIGURE 4. Output Characteristics

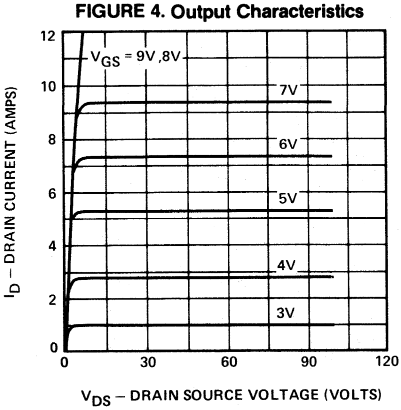
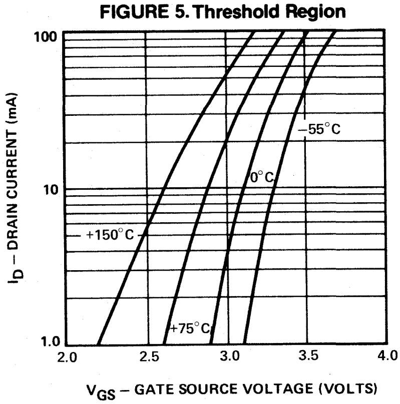


FIGURE 5. Threshold Region



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TYPICAL PERFORMANCE CURVES (25°C unless otherwise noted)

VNDG10

FIGURE 6. Off-State Current

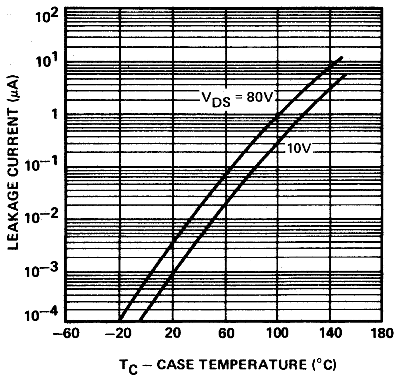


FIGURE 7. Capacitance

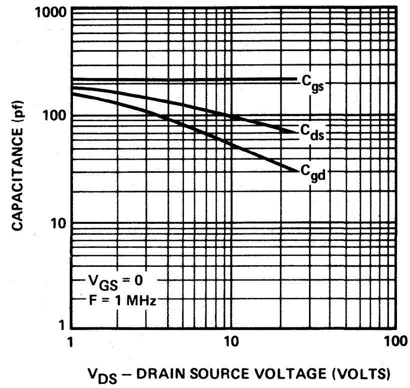


FIGURE 8. Effects on Load Conditions

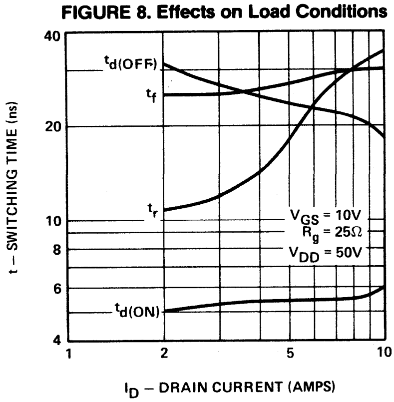


FIGURE 9. Effects of Drive Resistance

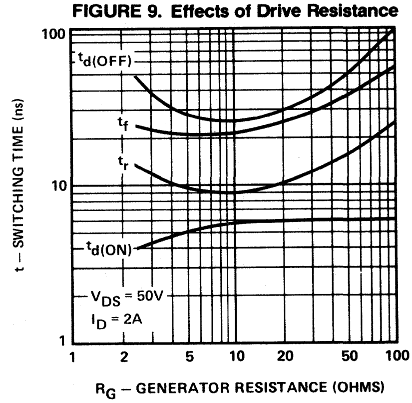
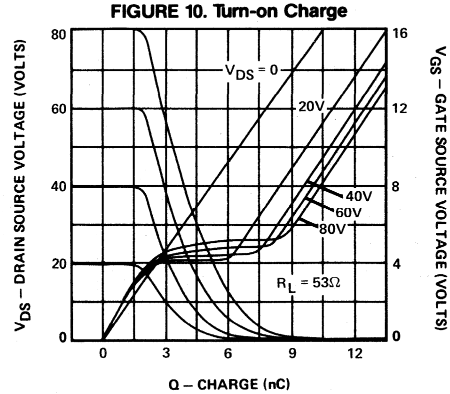


FIGURE 10. Turn-on Charge



TRANSIENT THERMAL RESPONSE CURVES

VNDG10

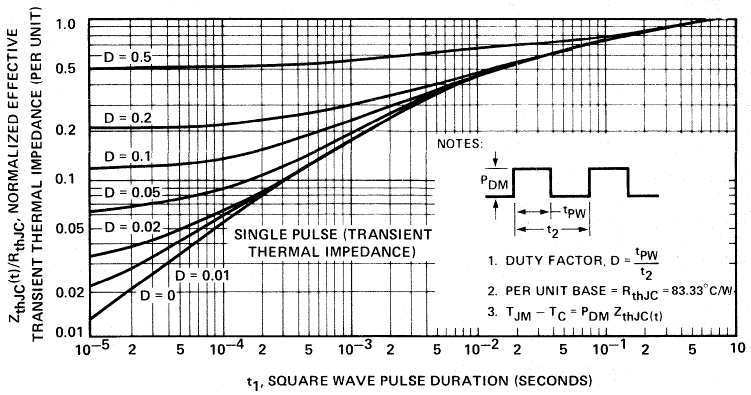


FIGURE 1. TO-39 Package

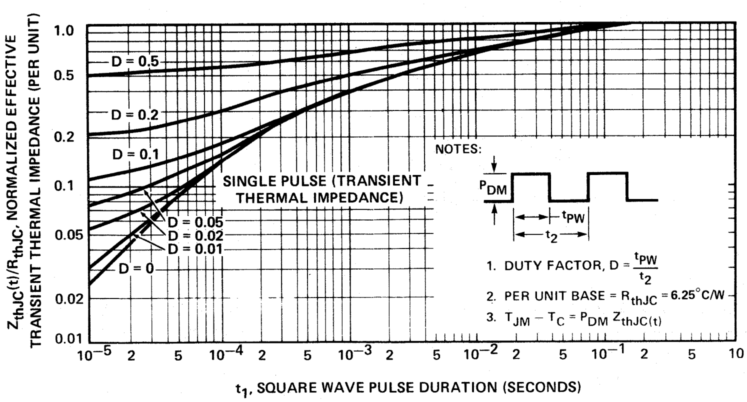


FIGURE 2. TO-220 Package

5

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNMA06

FIGURE 1. Ohmic Region

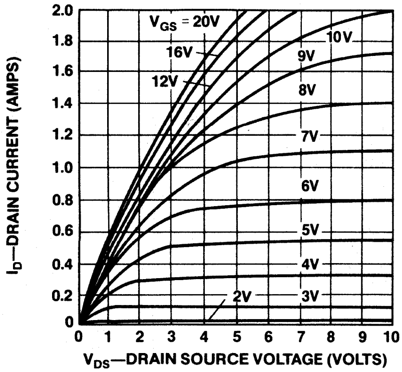


FIGURE 2. Transfer Characteristics

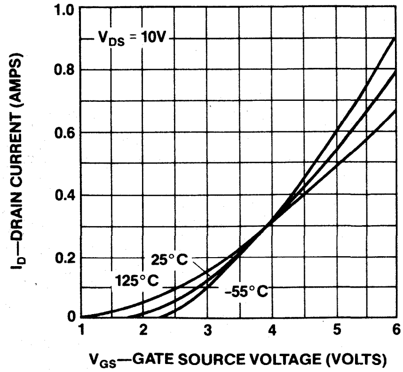


FIGURE 3. Temperature Effects on $r_{DS(on)}$

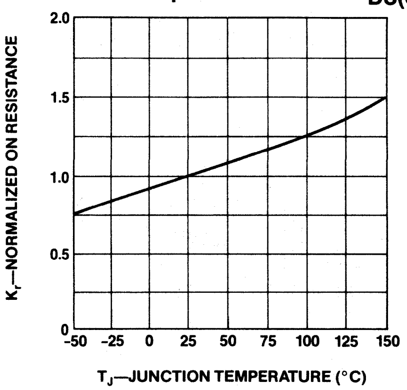


FIGURE 4. Threshold Region

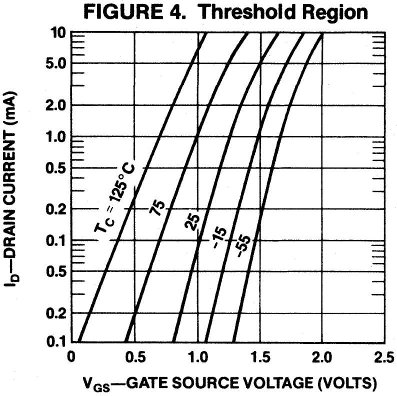
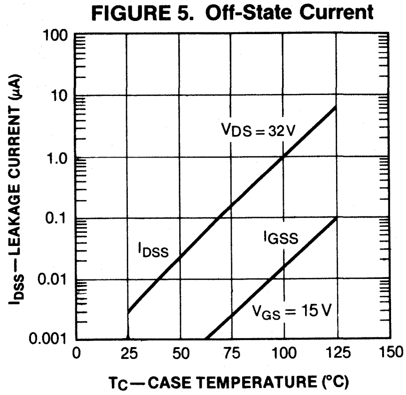


FIGURE 5. Off-State Current



TRANSIENT THERMAL RESPONSE CURVES

VNMA06

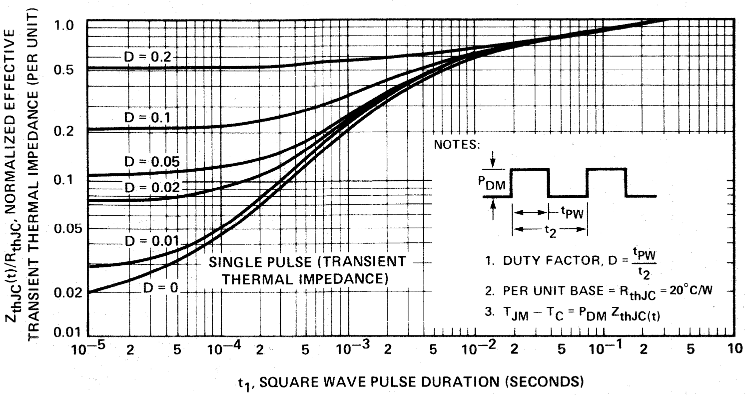


FIGURE 1. TO-39 Package

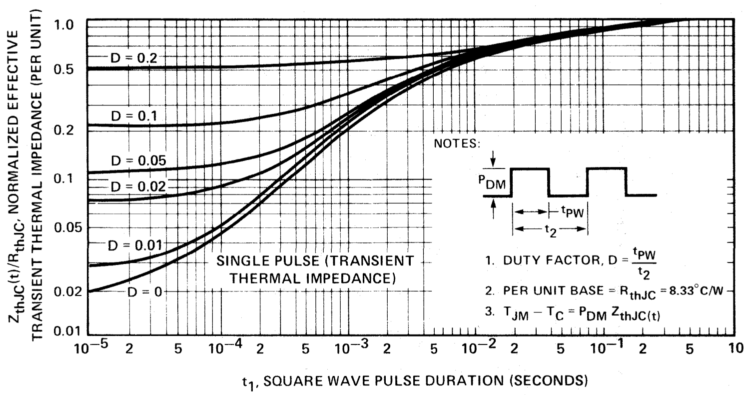


FIGURE 2. TO-202 Package

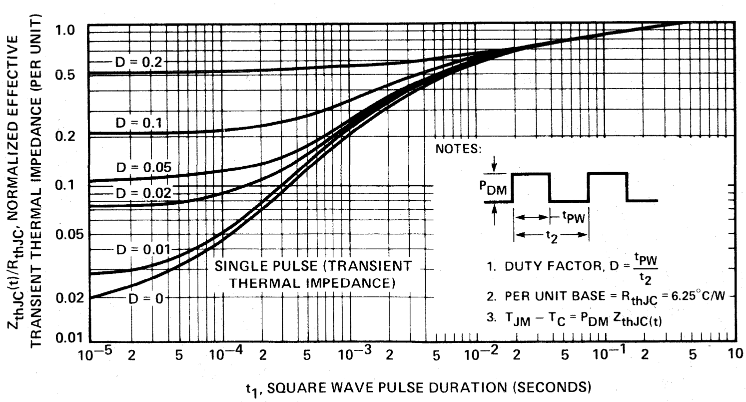


FIGURE 3. TO-220 Package

5

TYPICAL PERFORMANCE CURVES (25°C unless otherwise noted)
VNMA09

FIGURE 1. Ohmic Region

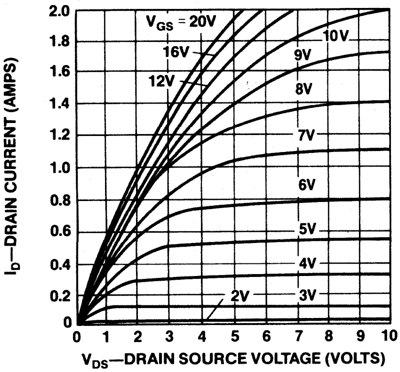


FIGURE 2. Transfer Characteristics

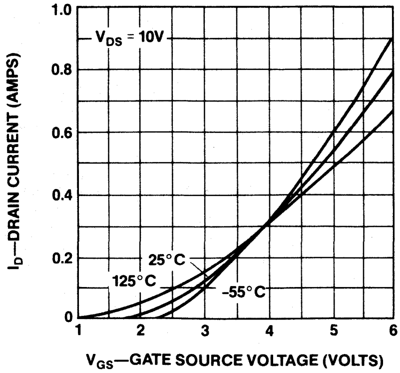


FIGURE 3. Temperature Effects on $r_{DS(on)}$

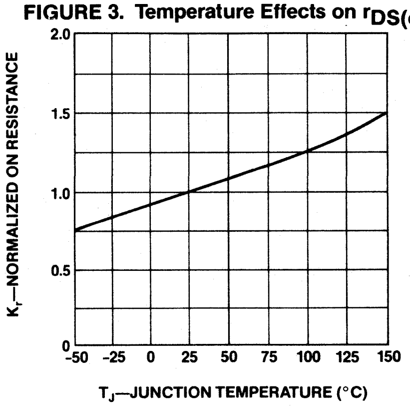


FIGURE 4. Threshold Region

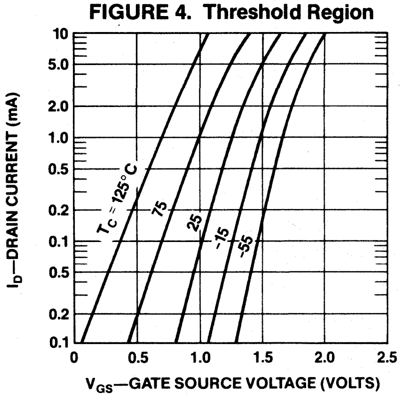
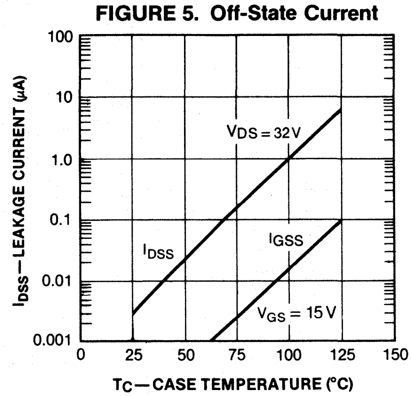


FIGURE 5. Off-State Current



TRANSIENT THERMAL RESPONSE CURVES

VNMA09

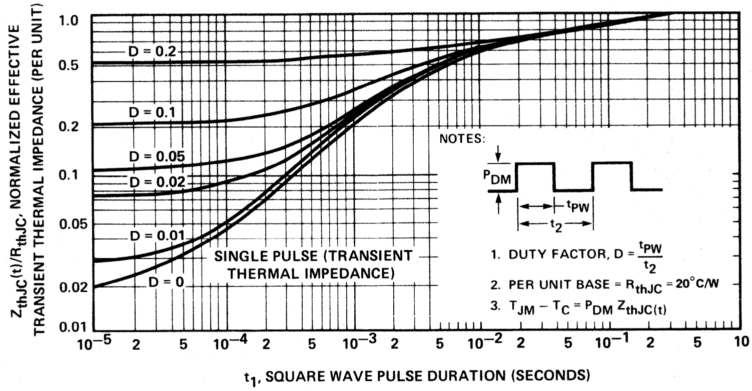


FIGURE 1. TO-39 Package

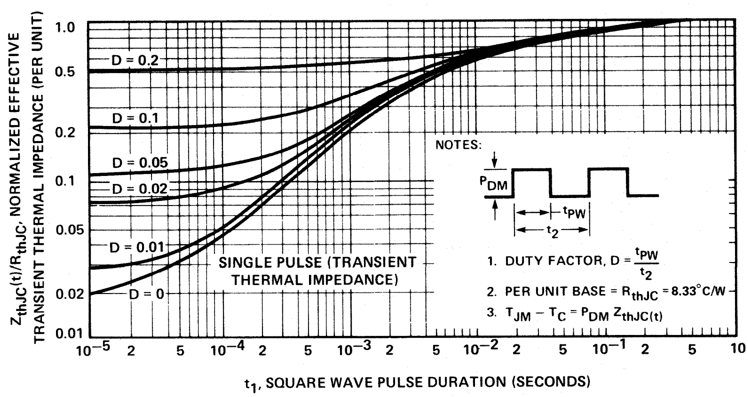


FIGURE 2. TO-202 Package

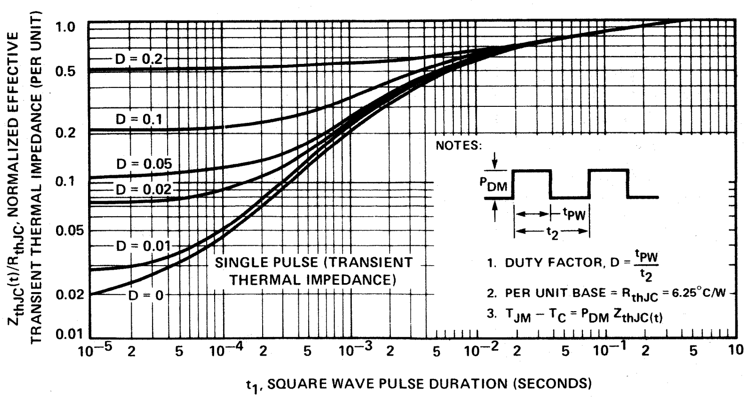


FIGURE 3. TO-220 Package

5

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)
VNMH03

FIGURE 1. Ohmic Region

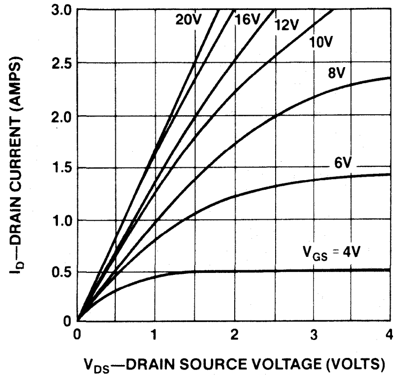


FIGURE 2. Transfer Characteristics

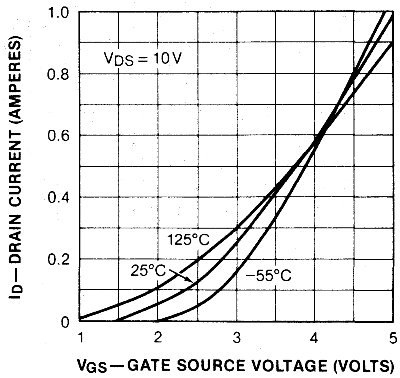


FIGURE 3. Temperature Effects on $r_{DS(on)}$

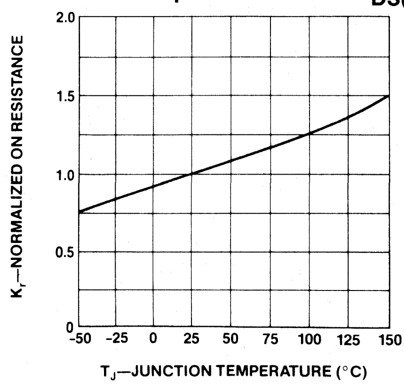


FIGURE 4. Threshold Region

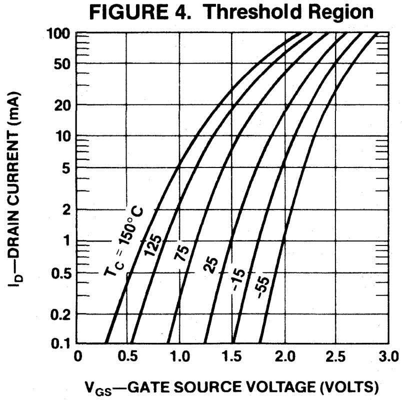
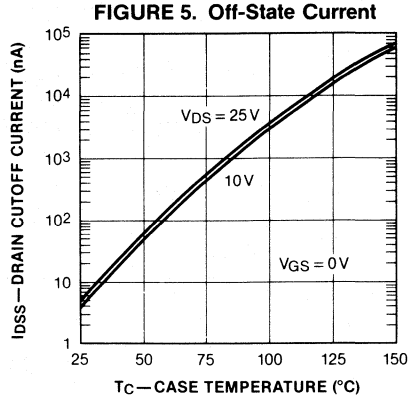


FIGURE 5. Off-State Current



TRANSIENT THERMAL RESPONSE CURVES

VNMH03

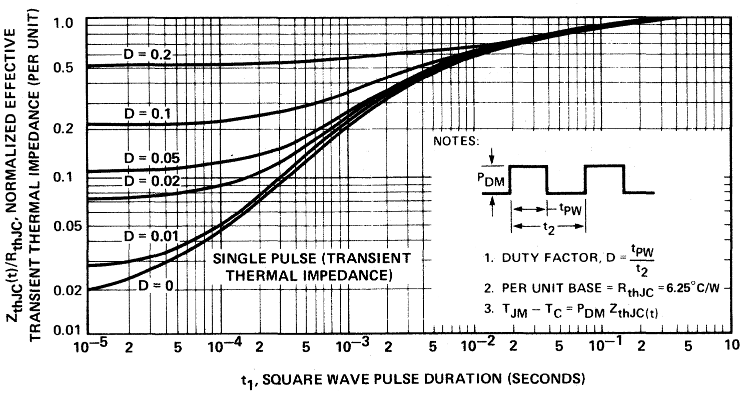


FIGURE 1. TO-220 Package

5

TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VNMK06

FIGURE 1. Ohmic Region

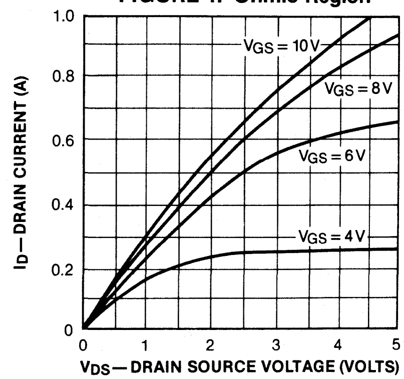


FIGURE 2. Transfer Characteristics

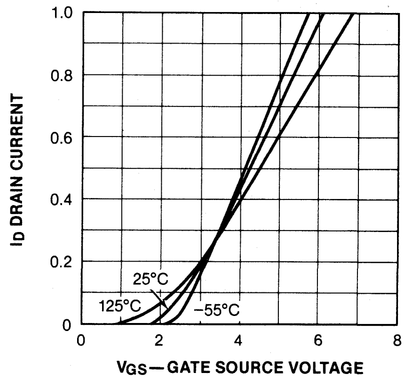


FIGURE 3. Temperature Effects on $r_{DS(on)}$

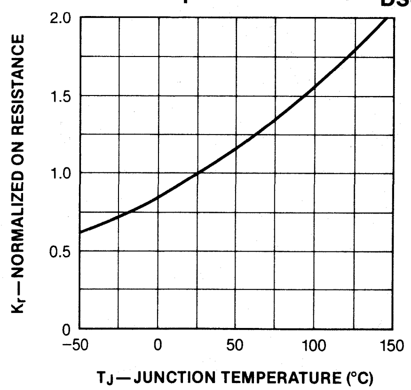


FIGURE 4. Threshold Region

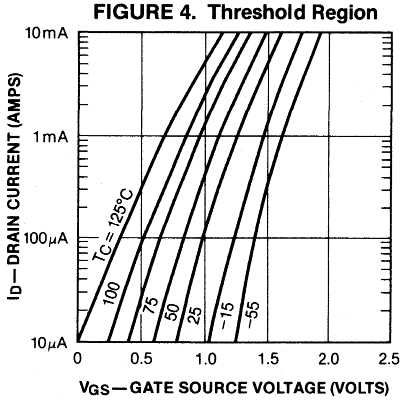
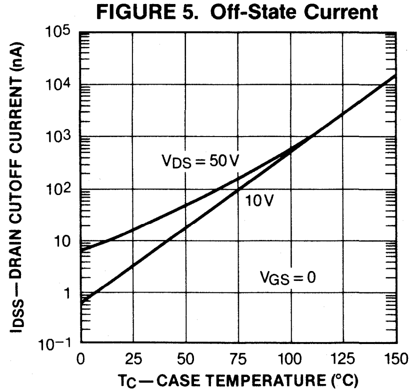


FIGURE 5. Off-State Current



TYPICAL PERFORMANCE CURVES (25° C unless otherwise noted)

VPMH03

FIGURE 1. Ohmic Region

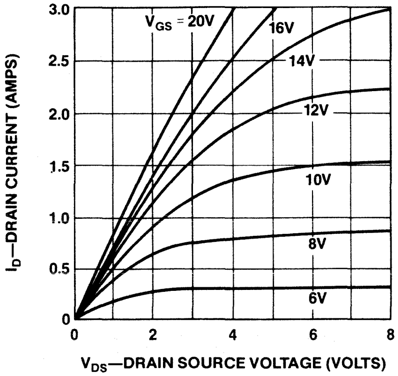


FIGURE 2. Transfer Characteristics

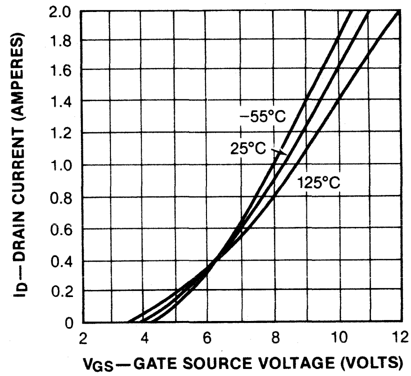


FIGURE 3. Temperature Effects on $r_{DS(on)}$

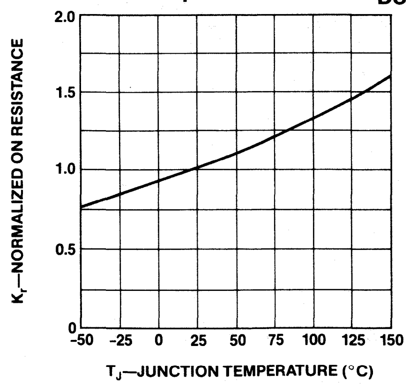


FIGURE 4. Threshold Region

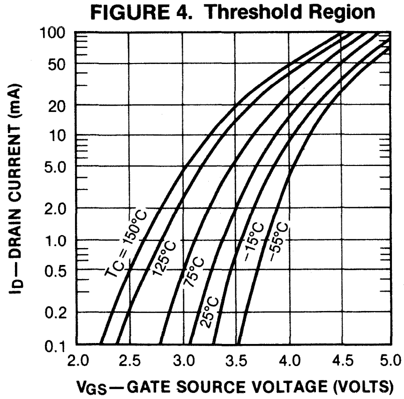
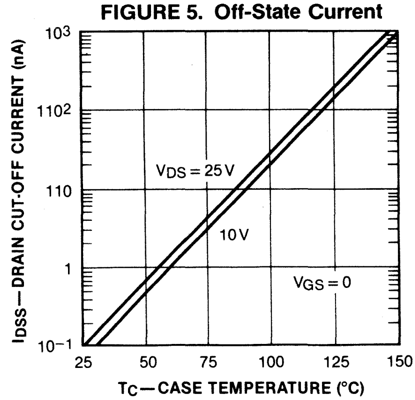


FIGURE 5. Off-State Current



TRANSIENT THERMAL RESPONSE CURVES

VPMH03

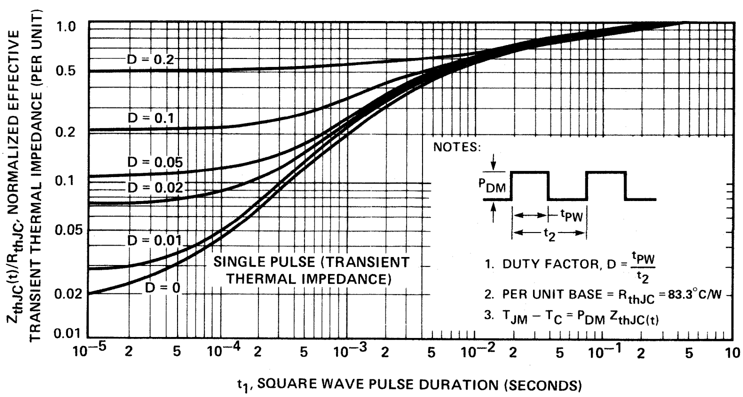


FIGURE 1. TO-39 Package

TYPICAL PERFORMANCE CURVES (25°C unless otherwise noted)

VPMH10

FIGURE 1. Ohmic Region

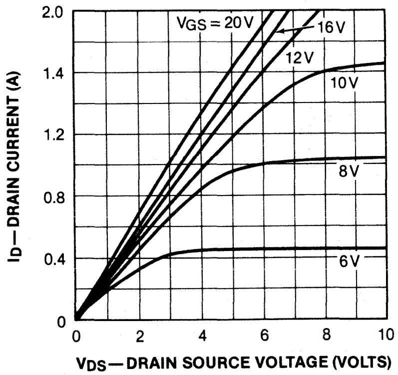


FIGURE 2. Transfer Characteristics

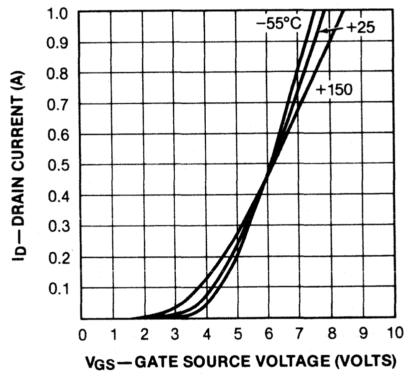


FIGURE 3. Temperature Effects on $r_{DS(on)}$

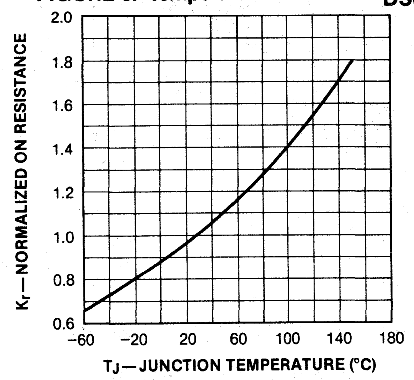


FIGURE 4. Threshold Region

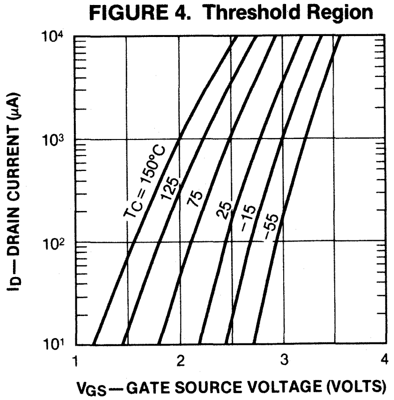
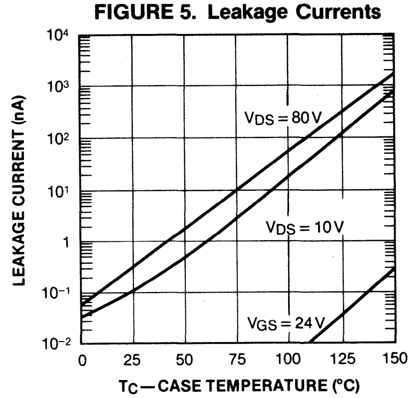


FIGURE 5. Leakage Currents



5

TRANSIENT THERMAL RESPONSE CURVES

VPMH10

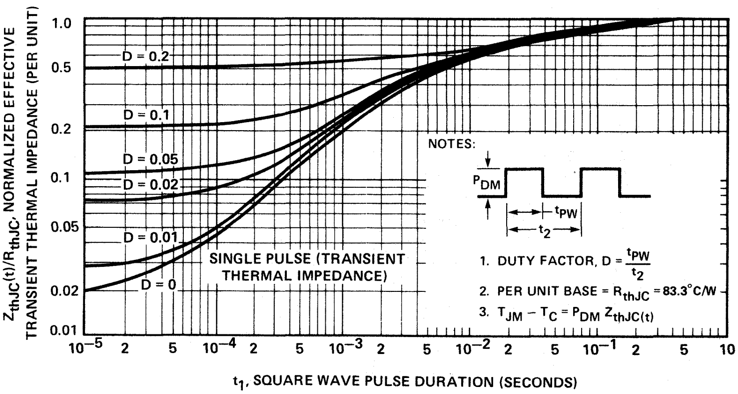
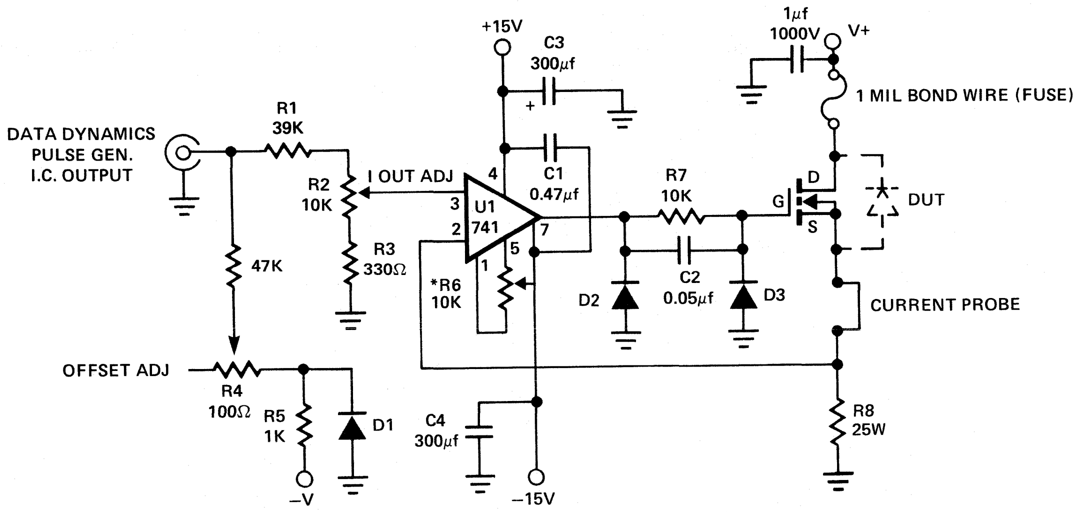


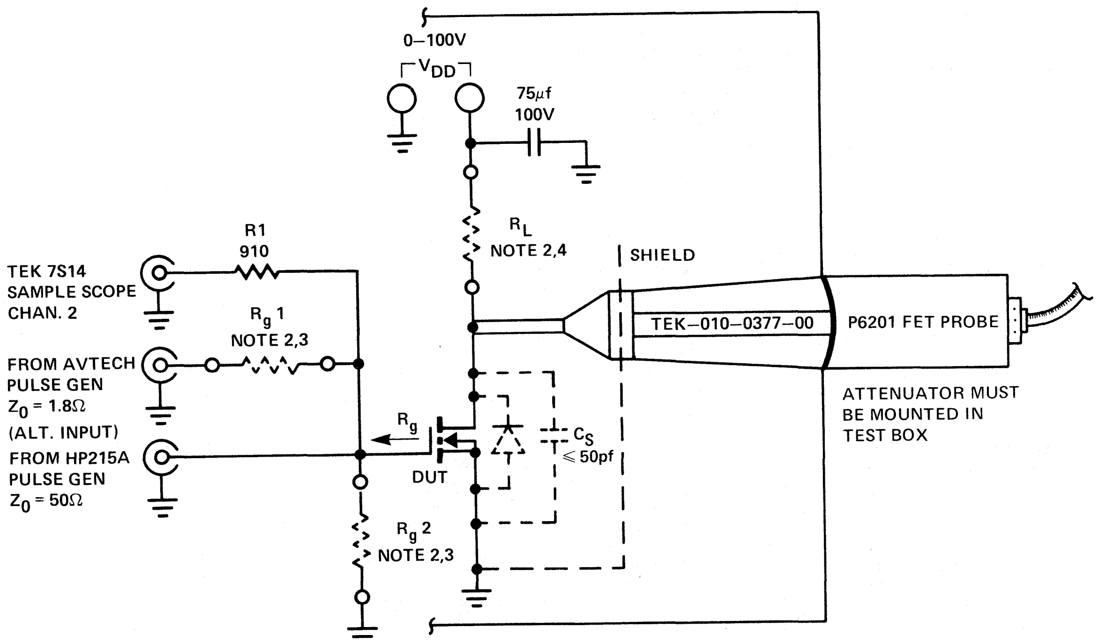
FIGURE 1. TO-39 Package

TEST CIRCUITS



NOTES:
1. ALL DIODES IN4148
2. *SET FOR NEGATIVE OUTPUT AT 0 VOLTS INPUT

Figure 1. Safe Operating Area Test Circuit (SOA)

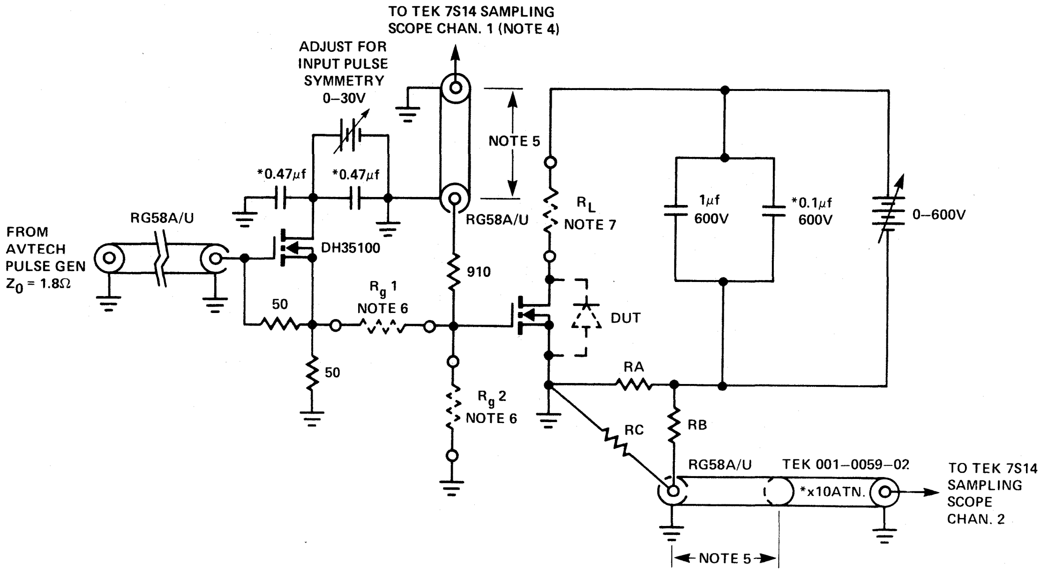


NOTES: UNLESS OTHERWISE INDICATED
1. ALL RESISTORS IN OHMS, 1/4W 5%.
2. RESISTORS MOUNTED ON PLUG–IN'S FOR EASY VALUE CHANGE.
3. $R_1 = 2\,R_g - Z_0$, $R_2 = 2\,R_g$ (SEE DATA SHEET FOR R_g VALUE).
4. SEE DATA SHEET FOR R_L VALUE.

Figure 2a. Low Power MOSPOWER Switching

6

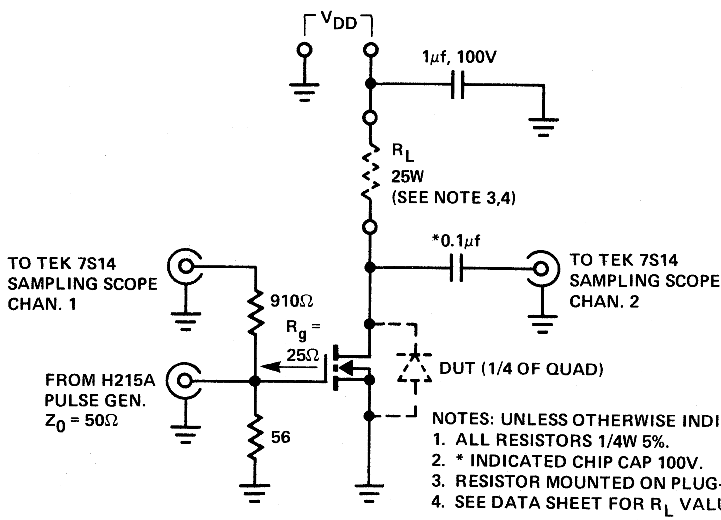
TEST CIRCUITS



NOTES: UNLESS OTHERWISE INDICATED
1. ALL RESISTORS IN OHMS, 1/4W 5%
2. * INDICATES 'CHIP CAPS'
3. ALL LEADS TO BE AS SHORT AS POSSIBLE
4. ADJUST AVTECH AMP. FOR 500mV PULSE OUT ON CHAN 1
5. CABLE LENGTH MUST BE EQUAL FROM TEST FIXTURE TO SAMPLING SCOPE INPUTS
6. RESISTORS MOUNTED ON PLUG–INS FOR EASY VALUE CHANGES. SEE DATA SHEET FOR R_g VALUE (R1 = R2 = 2RG)
7. RESISTOR 25W, MOUNTED ON PLUG–IN FOR EASY VALUE CHANGES. SEE DATA SHEET FOR R_L VALUE

	ID – RANGE		
	0.5–2A	0.5–5A	5–20A
RA 1/2W	2.2Ω	2.2Ω	0.5Ω
RB 1/4W	51Ω	100Ω	51Ω
RC 1/4W	N/A	100Ω	N/A

Figure 2b. High Voltage Switching Fixture



NOTES: UNLESS OTHERWISE INDICATED
1. ALL RESISTORS 1/4W 5%.
2. * INDICATED CHIP CAP 100V.
3. RESISTOR MOUNTED ON PLUG–IN'S FOR EASY VALUE CHANGE.
4. SEE DATA SHEET FOR R_L VALUE.

Figure 2c. MOSPOWER 'Quad' Switching Fixture

TEST CIRCUITS

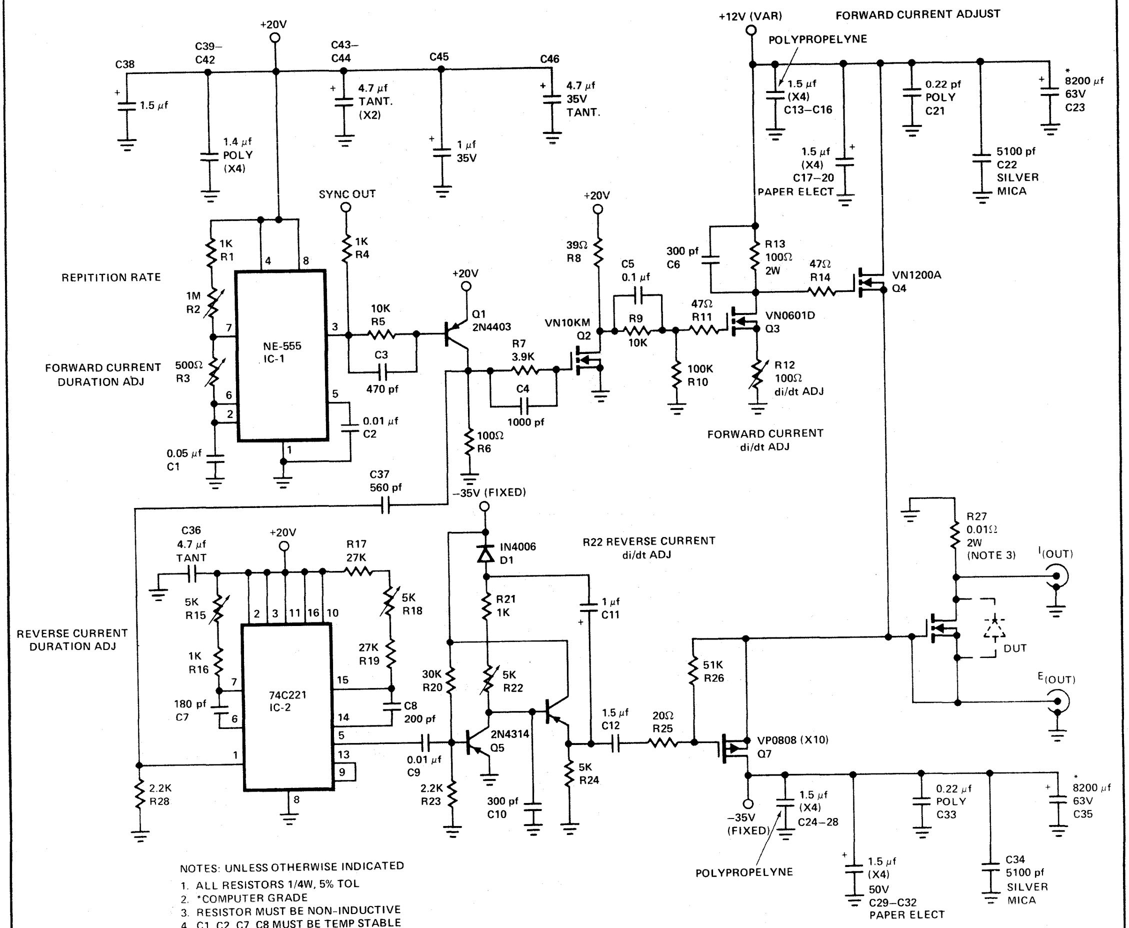
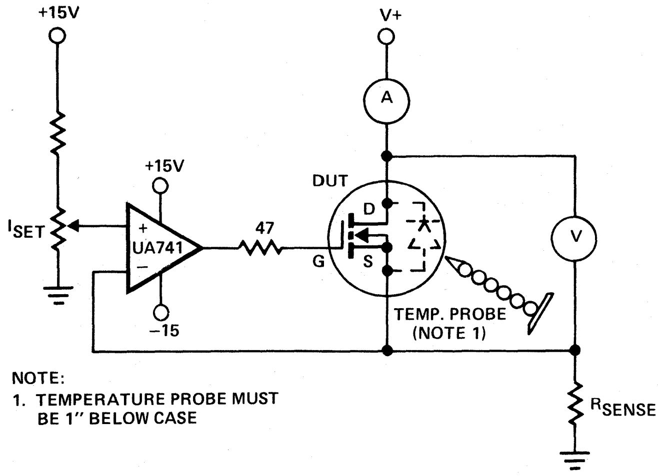


Figure 3. Reverse Recovery Circuit

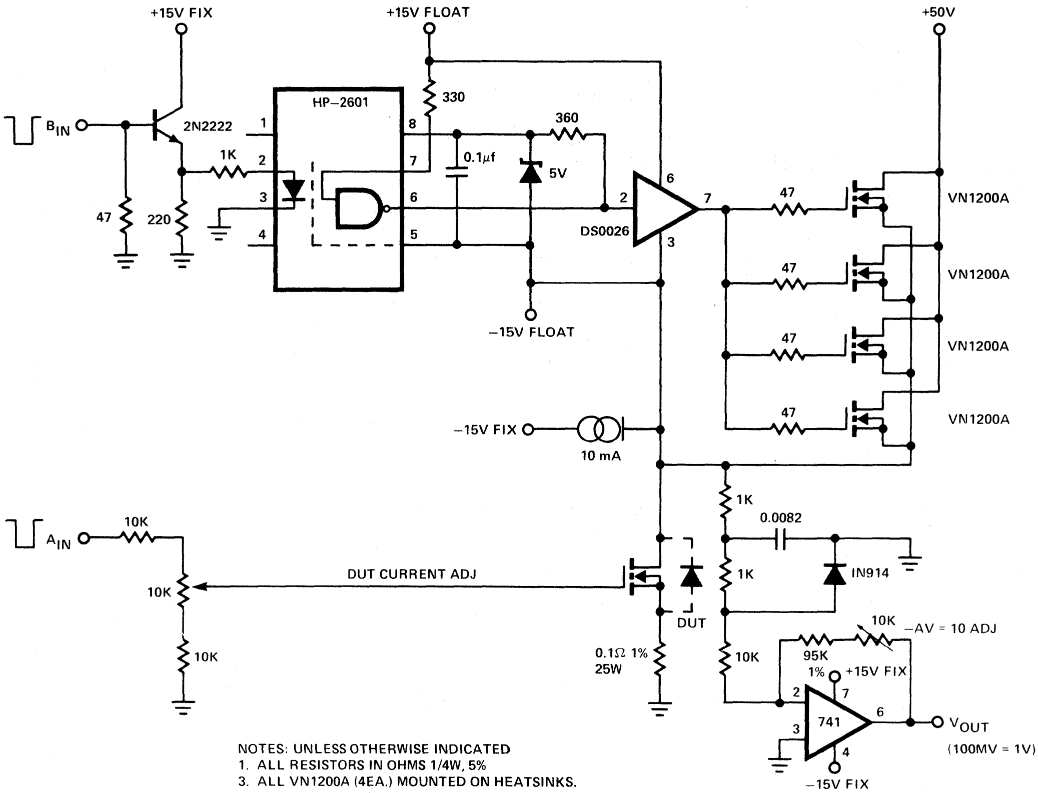
6

TEST CIRCUITS



NOTE:
1. TEMPERATURE PROBE MUST BE 1" BELOW CASE

Figure 4. θJ_A Test Circuit (SIMPLIFIED)



NOTES: UNLESS OTHERWISE INDICATED
1. ALL RESISTORS IN OHMS 1/4W, 5%
3. ALL VN1200A (4EA.) MOUNTED ON HEATSINKS.

Figure 5. θJ_C Test Circuit

TEST CIRCUITS

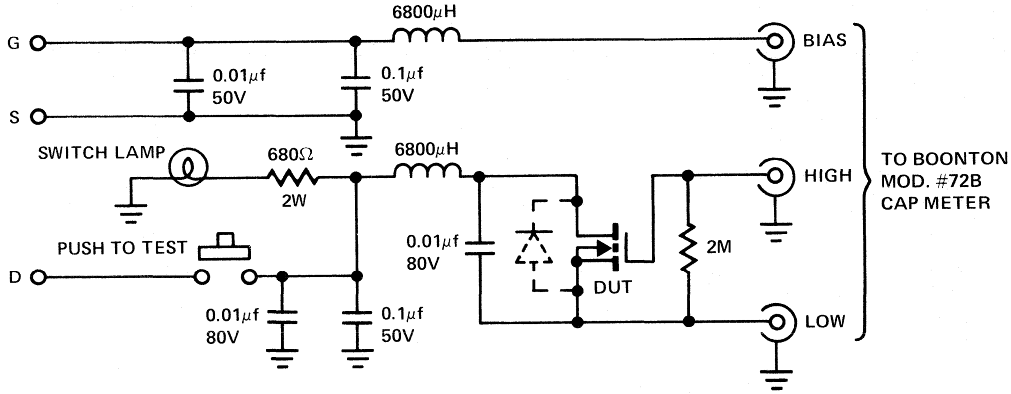


Figure 6. C_{ISS} Test Circuit

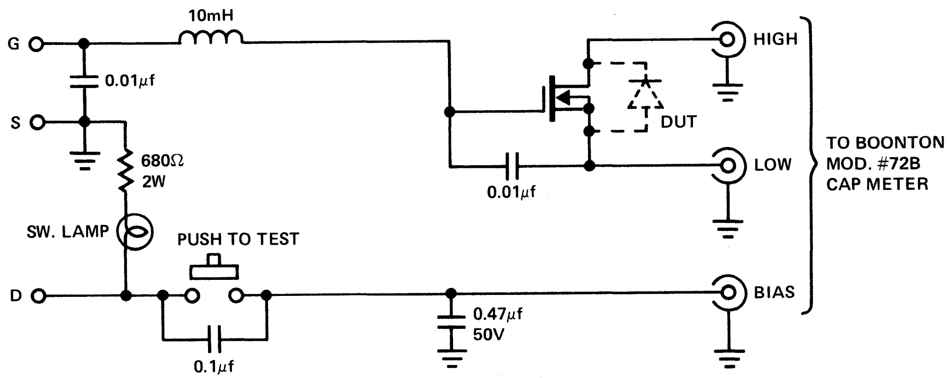


Figure 7. C_{OSS} Test Circuit

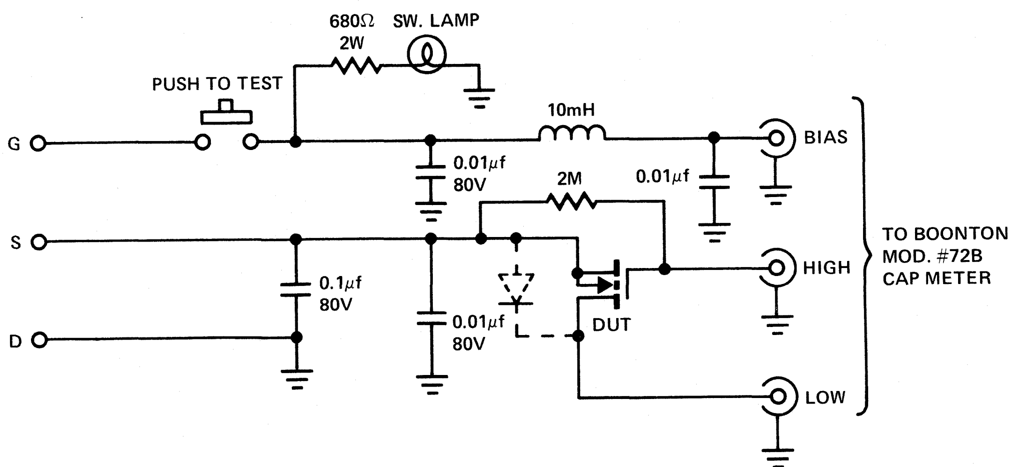
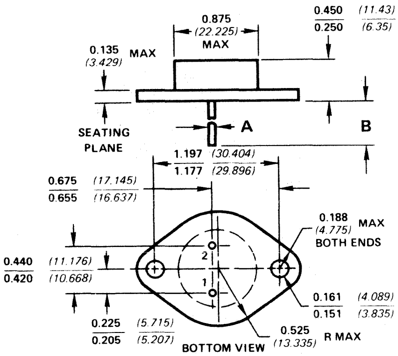


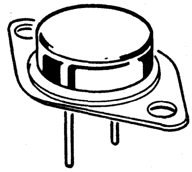
Figure 8. C_{rss} Test Circuit

6

TO-204 (TO-3)
PACKAGE SUFFIX A

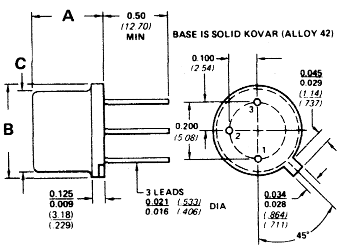


All Dimensions in Inches
(All Dimensions in Millimeters)

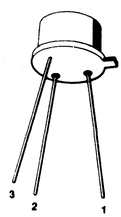


Package	Dimension A		Dimension B	
T0–204AA	0.043 / 0.038	(1.092) / (0.996)	0.312 Min.	*(7.93) Min*
T0–204AE	0.063 / 0.057	(1.60) / (1.45)	0.480 / 0.440	(12.19) / (11.18)

TO-205 (TO-39)
PACKAGE SUFFIX B

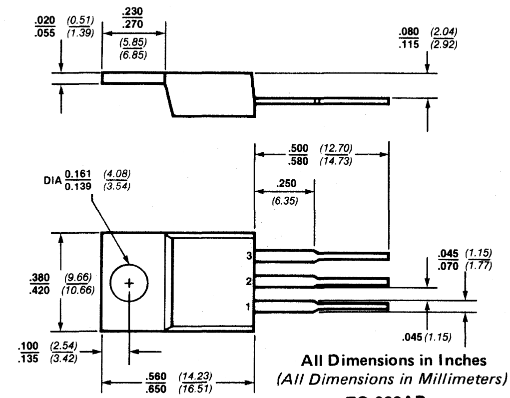


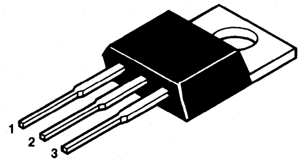
All Dimensions in Inches
(All Dimensions in Millimeters)



Package	Dimension A		Dimension B		Dimension C	
T0–205AD	0.260 / 0.240	(6.60) / (6.10)	0.370 / 0.335	(9.39) / (8.51)	0.335 / 0.305	(8.50) / (7.75)
T0–205AF	0.180 / 0.160	(4.57) / (4.07)	0.370 / 0.340	(9.39) / (8.64)	0.355 / 0.315	(9.01) / (8.01)

TO-220
PACKAGE SUFFIX D

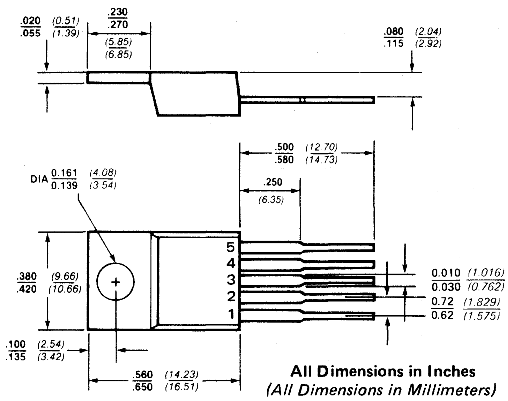


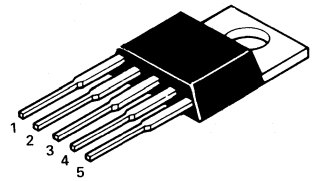


All Dimensions in Inches
(All Dimensions in Millimeters)

TO-220AB

TO-220 (5 LEADS)

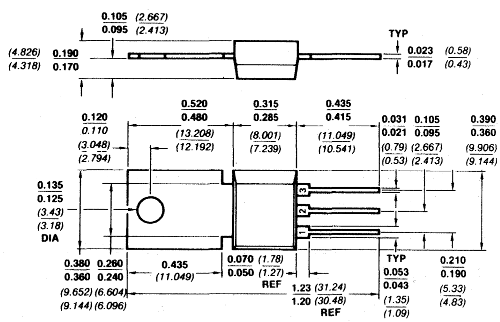


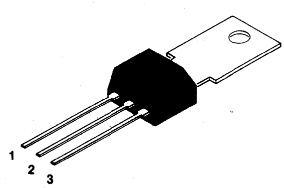


All Dimensions in Inches
(All Dimensions in Millimeters)

TO-220

TO-202
PACKAGE SUFFIX F

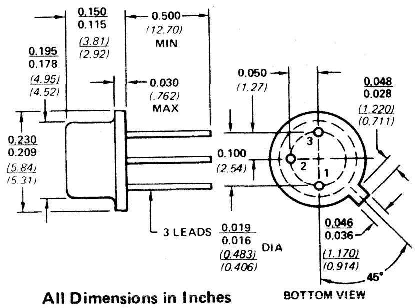


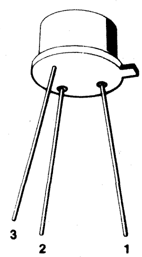


All Dimensions in Inches
(All Dimensions in Millimeters)

TO-202AA

TO-52
PACKAGE SUFFIX E

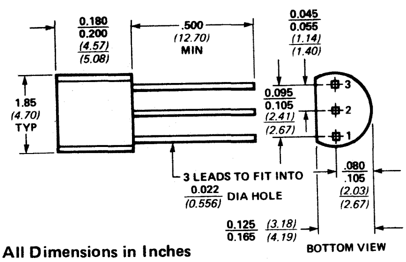


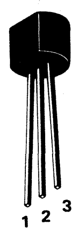


All Dimensions in Inches
(All Dimensions in Millimeters)

TO-52

TO-92
PACKAGE SUFFIX L

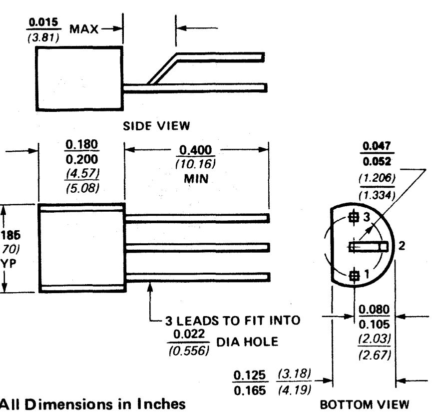


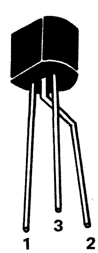


All Dimensions in Inches
(All Dimensions in Millimeters)

TO-92

TO-92-18 (WITH TO-18 LEAD FORM)
PACKAGE SUFFIX L

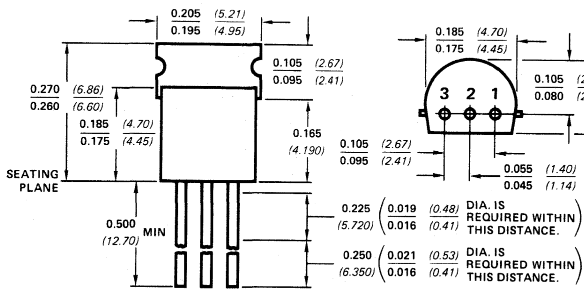


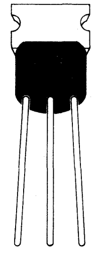


All Dimensions in Inches
(All Dimensions in Millimeters)

7

TO-237
PACKAGE SUFFIX M



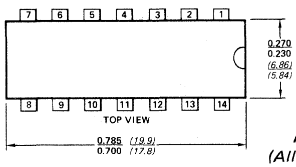


NOTE:
LEADS SOLDER DIPPED OR TIN PLATED.

All Dimensions in Inches
(All Dimensions in Millimeters)

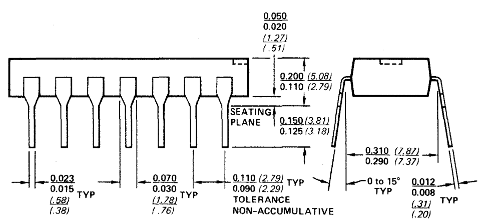
TO-237

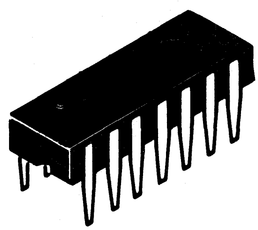
14 LEAD PLASTIC DUAL-IN-LINE (DIP)
PACKAGE SUFFIX J



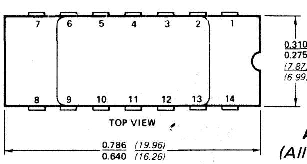
PIN 1 INDEX IS ONE OR MORE OF THE FOLLOWING
- DOT (INK OR IMPRESSION) ON TOP OF PACKAGE
- NOTCH OR HOLE IN PIN 1 VISIBLE FROM TOP AND/OR SIDE
- NOTCH IN END OF PACKAGE VISIBLE FROM TOP AND/OR BOTTOM

All Dimensions in Inches
(All Dimensions in Millimeters)



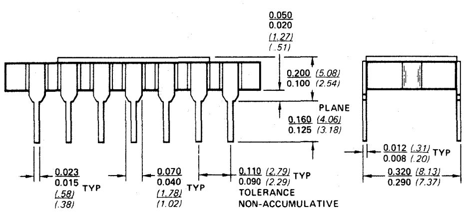


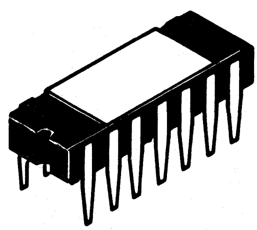
14 LEAD SIDE BRAZE DUAL-IN-LINE (DIP)
PACKAGE SUFFIX P



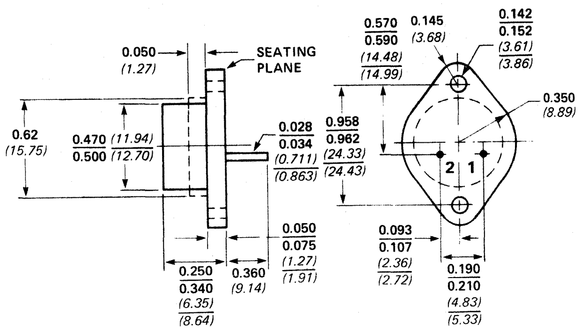
PIN 1 INDEX IS ONE OR MORE OF THE FOLLOWING
- DOT (INK OR IMPRESSION) ON TOP OF PACKAGE
- NOTCH OR HOLE IN PIN 1 VISIBLE FROM TOP AND/OR SIDE
- NOTCH IN END OF PACKAGE VISIBLE FROM TOP AND/OR BOTTOM

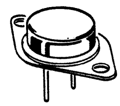
All Dimensions in Inches
(All Dimensions in Millimeters)





TO-66
PACKAGE SUFFIX S





All Dimensions in Inches
(All Dimensions in Millimeters)

TO–66

For information on special packages available from Siliconix, please contact your local Siliconix Field Sales Office, listed at the end of this catalog.

SILICONIX QUALITY AND RELIABILITY PROGRAM

INTRODUCTION — The employees and management of Siliconix are dedicated to a Quality Program emphasizing defect prevention. The corporate Quality Policy initiated by our CEO and his staff is: *Siliconix is dedicated to the manufacture of high quality, reliable products that meet the needs defined by our customers. Achieving Customer requirements as defined by the specification is the responsibility of all Siliconix employees.*
This means Quality is the combined responsibility of Design, Engineering, Manufacturing, and all Support Groups, not solely that of the Quality Department.

ORGANIZATION — To insure maximum attention to Quality, Siliconix is organized so that the Reliability and Quality Assurance Worldwide Directorate report at the same level (the Siliconix Vice President of Worldwide Operations) as worldwide manufacturing, design, engineering, and sales.

QUALITY SYSTEM — Siliconix has adopted a "Quality System" approach based on MIL-Q-9858A, AQAP-1 (NATO) and Defense Standard 05-21 (UK) for its overall Quality Program. This approach provides a structured program addressing every aspect of product quality from **design through shipment.**

PROCESS CONTROL - WAFER FABRICATION

1.0 Process Controls: The Quality Control program utilizes the following methods of control to achieve it's objectives: (1) Process audits, (2) Environmental monitors, (3) Process monitors, (4) Lot acceptance inspections, (5) Process qualifications, and (6) Process integrity audits. Together these methods of control, visually and electrically characterize the wafer fabrication operation.

2.0 Definitions: The essential method of the Quality Control Program is defined as follows:

2.1 Process Audit — Audits concerning manufacturing operator conformance to specification. These are performed on all operations critical to product quality and reliability.

2.2 Environmental Monitor — Monitors concerning the process environment, i.e., water purity, temperature/humidity, particulate counts.

2.3 Process Monitor — Periodic inspections and tests are made at designated process steps to verify the use of manufacturing inspections and the maintenance of process averages. These inspections provide both attribute and variable data.

2.4 Lot Acceptance — Lot by lot sampling. This sampling method is reserved for those operations or attributes deemed critical and requiring special attention.

2.5 Process Qualification — Complete distributional analysis is run to specified tolerance limits on $\overline{x}$ and σ. These qualifications are typically conducted on deposition and evaporation processes, i.e., EPI, aluminum, vapox, backside gold, etc.

2.6 Process Integrity Audit — Special audits are conducted on oxidation and metal evaporation processes. (CV drift — oxidation; SEM evaluation — metal evaporation).

3.0 Data Presentation/Reporting:

3.1 The process control data is recorded on an attribute or variable basis as required. P charts, $\overline{X}R$ charts, or $\overline{x}\sigma$ charts are maintained on a regular basis. This data is periodically reviewed and serves as the criteria for judging the acceptability of specific processes.

3.2 Summary data from the various process control operations is quickly relayed to appropriate line, engineering, and management personnel so that if necessary, appropriate corrective action can be taken promptly.

PROCESS CONTROL - ASSEMBLY

1.0 The process control and inspection points of the assembly operation are explained and listed below:

1.1 Die Inspection — After inspection by Manufacturing, In-Process Quality Control samples each lot to internal or customer specifications and standards.

1.2 Die Attach Inspection — Visual inspection of samples is performed periodically on a machine/operator basis. Die attach techniques are monitored and temperatures are verified.

1.3 Die Attach Integrity — Following die attach, die shear strength or thermal resistance testing is performed periodically on a machine/operator basis. Either manual or automatic die attach is used.

1.4 Wire Bond Inspection — Visual inspection of samples is implemented by wire pull test periodically during each shift. These checks are also done on a machine/operator basis. $\overline{X}R$ data is maintained for the wire pull tests.

1.5 Pre-Seal/Pre-Encapsulation Inspection — Following 100% inspection of each lot, samples are taken on a lot acceptance basis and inspected to suit internal or customer criteria.

1.6 Seal Inspection — Periodic monitoring of the sealing operation checks the critical temperature profile of the sealing oven for both glass and metal preform seals.

QUALITY IMPROVEMENT PROGRAMS

Siliconix is addressing the quality improvement issue and has implemented several programs to achieve the necessary changes:

1.0 Quality Reporting: Our Quality Reports have been restructured to provide more meaningful data and increased focus on problem areas, viz -

1.1 Monthly reports of final product quality provide Process Average (PA) and Average Outgoing Quality (AOQ) measurements by product line.

1.2 Weekly reports of In-Process QC results include control charts for percent defective by product line and defect modes and quantities by operator.

1.3 Monthly reports of operator audits, line audits, and environmental monitors by manufacturing area.

1.4 Monthly reports of incoming materials quality by generic family and vendor.

2.0 Audit and Corrective Action: A two-tier audit program with closed-loop corrective action has been implemented.

2.1 Operator audits are performed continuously in each wafer fabrication and assembly area.

2.2 Quality System audits are performed on each element of our total quality system from product design to product shipment.

2.3 Deficiencies observed in the audit programs are addressed to the responsible parties through Notice of Variance (NOV) system. Responses are coordinated and monitored by QC to ensure effective corrective action has been implemented.

3.0 Quality Improvement Team: A task force has been established to direct the quality improvement effort in Siliconix' worldwide facilities:

3.1 Six diagnostic committees cover the product line and geographic matrix of the Siliconix' organization. Three committees are chaired by the respective product line engineering manager, and three are chaired by the respective plant operations manager. The diagnostic committees have the charter to define problems, recommend and implement Quality Improvement projects and actions, and to measure and report the results.

3.2 A steering committee composed of the Vice President of Operations and Manufacturing and Product Line Directors is chaired by the Quality Director. This steering committe directs the activities of the diagnostic committees through project approval, status reviews, and resource provision.

3.3 A facilitator acts as a coordination, reporting, and communication catalyst to ensure worldwide participation and understanding.

RELIABILITY

1.0 Reliability Department: Provides Siliconix with a number of programs to define product reliability levels. Among these programs are (1) Qualification, (2) Monitoring, (3) Failure analysis and (4) Data collection and presentation.

2.0 Qualification Program:

2.1 Qualification of New Products and Processes.

2.1.1 Procedures for qualification of new chip designs require reliability participation or approval in design reviews, documentation, characterization and reliability stress studies.

2.1.2 New package qualification approval and release for production is granted by Reliability after prescribed environmental tests have been successfully completed.

2.1.3 New process qualification approval is granted by Reliability after Quality control and Reliability have completed evaluation of process control engineering studies. Significant modifications to existing processes are considered as new processes for the purpose of qualification.

2.1.4 Proper documentation of all changes in processes or procedures and any new or improved designs or materials is assured by Reliability approval of all changes.

2.2 Qualification of existing products for new applications.

2.2.1 Customer Qualifications. Reliability is responsible for review and acceptance of all customer qualification requirements. When a qualification program or special testing is required, Reliability designs and implements appropriate test plans and coordinates with the customer.

2.3 Reporting and publication of data.

2.3.1 Qualification test reports are prepared and distributed by Reliability for all products or processes which are approved by formal qualification. These reports contain a statement of qualification that certifies the process or product for use.

2.3.2 When new products require reporting of qualification data, Reliability assists Marketing Services by providing this data for customers or for advertising purposes.

2.4 Research and Development: It is the responsibility of Reliability to investigate new or improved methods and techniques for testing and evaluating products. This includes, but is not limited to the following methods:

2.4.1 Design test plans and programs.

2.4.2 Accelerated stress testing.

3.0 Reliability Monitor Programs for MOSPOWER products:

3.1 Device and Package Reliability Monitor Programs are affected for all packages using a variety of device types to maximize data usefulness and cost effectiveness of equipment. Packages are monitored using equivalent methods of MIL-STD-750. Data is reported as specified in detailed procedures for each package-chip combination. Package monitor programs include, but are not limited to, the following general tests using the equivalent conditions specified.

3.1.1	Biased Humidity Life	
3.1.2	Operating Life	Method 1026
3.1.3	Steam Pressure	
3.1.4	Temperature Cycling	Method 1051
3.1.5	Thermal Shock	Method 1056
3.1.6	Intermittent Opens	
3.1.7	Salt Atmosphere	Method 1041
3.1.8	Constant Acceleration	Method 2006
3.1.9	Mechanical Shock	Method 2016
3.1.10	Solderability	Method 2026
3.1.11	Lead Integrity	Method 2036
3.1.12	Vibration	Method 2046

3.2 Accelerated stress monitor programs are conducted where practical to obtain timely feedback for process effectiveness monitors as well as for ultimate device capability studies. Such tests include the following:

3.2.1 Extended tests, beyond normal device-package expected capabilities, are performed for comparative product evaluation or characterization as well as for quick feedback on component performance trends.

4.0 Failure Analysis and Failure Mode Identification

4.1 Failure analysis in support of in-process quality control process-monitors is handled by Reliability through failure analysis report requests. This support may include such services as visual inspection, cross-sectioning, thickness measurements, selective etching, die probing, and other applicable techniques.

4.2 Customer returns and customer requested failure studies are undertaken by Reliability when required. Reliability will coordinate all replies to customers and approve or originate all correspondence or reports to customers.

4.3 Assembly process failures and failures of finished devices prior to QA acceptance are the responsibility of the product manager, but Reliability provides assistance in analysis when requested by Quality Assurance, Quality Control, or Engineering personnel.

4.4 Corrective action and follow-up — When Reliability has determined that corrective action is necessary, prior to either releasing the product for shipment or proceeding further in production processing, they generate a corrective action request.

5.0 Data Analysis, Publication and Reporting Data from reliability studies is disseminated to all interested parties within Siliconix:

5.1 Collection and analysis of reliability data is the responsibility of Reliability personnel. It is performed as a routine portion of reliability work.

5.2 Reporting of scheduled monitor programs is provided on a scheduled basis.

5.3 Customer and Marketing Data Support. Reliability will provide reports to parties who clearly indicate an interest in reliability of applicable parts.

MILITARY PROGRAMS

Siliconix has a total commitment to the Military and Aerospace Business.

We maintain the following Line Certifications:

— MIL-M-38510 at our Santa Clara Facility for CMOS and Bipolar/PMOS/JFET Products.

— MIL-S-19500 at our Santa Clara, Hong Kong, and Taiwan facilities for JFET and MOSPOWER products.

— BS9000 (British Standard) at our UK facility for Integrated Circuits.

— CECC (European Harmonized Standard) at UK facility for JFET and MOSPOWER products.

We have numerous parts on the Qualified Products Lists of each of these approval systems. (See pages 0-12, 15, 16).

Our Santa Clara facility maintains a LMSC Monitored Line Status and continuously builds product for the major Military and Aerospace Programs.

MOSPOWER Process Flows

LEVEL –1, –2, –3, –4, –5, –7 *

These optional flows include environmental and product conditioning which satisfy most Military/Hi-Rel requirements. Group B and Group C lot qualifications can also be performed at additional cost.

LEVEL –6

Siliconix's standard MOSPOWER flow which combines preseal visual with MIL-STD environmental procedures to assure the highest quality commercial grade products available.

* For price, delivery and minimum quantity information on these optional process flows contact the local Siliconix Sales Representative.

MOSPOWER
Military/Hi-Rel Process Flow(4) (6) (7)

Level – 1(1) (2) Level – 2	Level – 3	Level – 5	Level – 7(7)
Preseal Inspection Method 2072	**Preseal Inspection** Method 2072	**Preseal Inspection** Method 2072	**Preseal Inspection** Method 2072
Stabilization Bake Method 1032 24 Hr. @ Maximum Rated Storage Temperature	**Stabilization Bake** Method 1032 24 Hr. @ Maximum Rated Storage Temperature	**Stabilization Bake** Method 1032 24 Hr. @ Maximum Rated Storage Temperature	**Stabilization Bake** Method 1032 24 Hr. @ Maximum Rated Storage Temperature
Temperature Cycle Method 1051 Condition C or F		**Temperature Cycle** Method 1051 Condition C or F	**Temperature Cycle** Method 1051 Condition C or F
Constant Acceleration Method 2006 (5)		**Constant Acceleration** Method 2006 (5)	**Constant Acceleration** Method 2006 (5)
Fine Leak Method 1071 (5)	**Fine Leak** AQL 1% Method 1071 Condition G or H (5)	**Fine Leak** Method 1071 Condition G or H (5)	**Fine Lead** Method 1071 Condition G or H (5)
Gross Leak Method 1071 Condition C (5)	**Gross Leak** AQL 1% Method 1071, Condition C (5)	**Gross Leak** Method 1071 Condition C (5)	**Gross Leak** Method 1071 Condition C (5)
Electrical Test 100% to 25°C Static Parameters		**Electrical Test** 100% to 25°C Static Parameters	**Electrical Test** 100% to 25°C Static Parameters (3)
HTGB Burn-In Method 1039, Condition A 48 Hr. @ 150°C		**HTGB Burn-In** Method 1039, Condition A 48 Hr. @ 150°C	
Electrical Test 100% to 25°C Static Parameters Read & Record	**Electrical Test** 100% to 25°C Static Parameters	**Electrical Test** 100% to 25°C Static Parameters (3)	
HTRB Burn-In Method 1039, Condition B 168 Hr. @ 150°C		**HTRB Burn-In** Method 1039, Condition B 168 Hr. @ 150°C	**HTRB Burn-In** Method 1039, Condition B 168 Hr. @ 150°C
Electrical Test 100% to 25°C Static Parameters Read, Record & Deltas		**Electrical Test** 100% to 25°C Static Parameters (3)	**Electrical Test** 100% to 25°C Static Parameters
Quality Conformance (4) 25°C Static LTPD = 5 -55°C Static LTPD = 5 150°C Static LTPD = 5 25°C Dynamic LTPD = 5 External Visual LTPD = 5	**Quality Conformance** (4) 25°C Static LTPD = 5 -55°C Static LTPD = 5 150°C Static LTPD = 5 25°C Dynamic LTPD = 5 External Visual LTPD = 5	**Quality Conformance** 25°C Static 0.65% AQL External Visual AQL 1.5%	**Quality Conformance** 25°C Static LTPD = 5 –55°C Static LTPD = 5 150°C Static LTPD = 5 25°C Dynamic LTPD = 5 External Visual LTPD = 5

NOTES:

(1) Level – 1: U.S. Build, U.S. Test.
(2) Level – 2: Overseas Build, U.S. Test (Screening & OCI).
(3) No Read & Record, No Deltas.
(4) Group B and C testing is additional.
(5) Hermetic Only.
(6) Levels 1 thru 6: Latest revision of MIL-STD-750 is applicable.
(7) Level 7: Siliconix Flow for Hermetic Packages (optional).

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MOSPOWER
Commerical/Industrial Process Flow(6)

Level - 4
(Burn In)

Preseal Inspection
Siliconix Standard
MOSPOWER Visual
Criteria

Stabilization Bake
Method 1032
24 Hr. @ Maximum Rated
Storage Temperature

Fine Leak AQL 1%
Method 1071
Condition G or H (5)

Gross Leak AQL 1%
Method 1071
Condition D (5)

Electrical Test
100% to
25% Static Parameters

HTRB Burn-In
Method 1039, Condition B
96 Hr. @ 150° C

Electrical Test
100% to
25° C Static Parameters

Quality Conformance
25° C Static 0.65% AQL
External Visual AQL 1.5%

Level - 6
(Standard Product Flow)

Preseal Inspection
Siliconix Standard
MOSPOWER Visual
Criteria

Stabilization Bake
Method 1032
24 Hr. @ Maximum Rated
Storage Temperature

Fine Leak AQL 1%
Method 1071
Condition G or H (5)

Gross Leak AQL 1%
Method 1071
Condition D (5)

Electrical Test
100% to
25% Static Parameters

Quality Conformance
25° C Static 0.65% AQL
External Visual AQL 1.5%

NOTES:
(1) Level — 1: U.S. Build, U.S. Test.
(2) Level — 2: Overseas Build, U.S. Test (Screening & QCI).
(3) No Read & Record, No Deltas.
(4) Group B and C testing is additional.
(5) Hermetic Only.
(6) Physical Dimensions Excluded. The latest revision of MIL-STD-883 is applicable.
(7) Levels 1 thru 6: Latest revision of MIL-STD-750 is applicable.
(8) Level 7: Latest revision of MIL-STD-883 is applicable.

ADDITIONAL MOSPOWER
Generic-Quality Conformance Testing
For Levels 1, 2 and 3

Group B (1) (2) (4)

SUBGROUP 1 LTPD = 15
Solderability
Method 2026
Resistance to Solvents
Method 1022

SUBGROUP 2 LTPD = 10
Temp. Cycle Method 1051
Fine Leak Cond G
Gross Leak Cond C
Method 1071
Electrical Test
25°C End Points
Read and Record

SUBGROUP 3 LTPD = 5
Steady State OP Life
340 Hrs. Bias Cond
Method 1027
Electrical Test
25°C End Points
Read and Record

SUBGROUP 4 LTPD = 10
Decap Internal Visual
Method 2075
Bond Strength
Method 2037

SUBGROUP 5 LTPD = 15
High Temp Life
Method 4081

SUBGROUP 6 LTPD = 7
High Temp Life
340 Hrs. Method 1032
Electrical Test
25°C End Points
Read and Record

Group C (1) (2) (3) (4)

SUBGROUP 1 LTPD = 15
Physical Dimensions
Method 2066

SUBGROUP 2 LTPD = 10
Thermal Shock 25°C
Method 1056 Cond A or B
Terminal Strength
Method 2036
Fine Leak Cond G
Gross Leak Cond C
Method 1071
Mositure Resistance
Method 1021
External Visual
Method 2071
Electrical Test
25°C End Points
Read and Record

SUBGROUP 3 LTPD = 10
Shock Method 2016
Vibration Frequency
Method 2056
Constant Acceleration
Method 2006
Electrical Test
25°C End Points
Read and Record

SUBGROUP 4 LTPD = 15
Salt Atmosphere
Method 1041

SUBGROUP 5 LTPD = 15
Barometric Pressure (5)
Method 1001

SUBGROUP 6 LTPD = 10
Steady State OP Life
Method 1026 1000 Hrs.
Max Rating Temp
Electrical Test
25°C End Points
Read and Record

NOTES:

(1) Latest Revision of 19500 is Applicable
(2) U.S. Test
(3) Periodic Testing
(4) Group B and C Testing Done at Additional Cost
(5) For Devices ⩾ 200V

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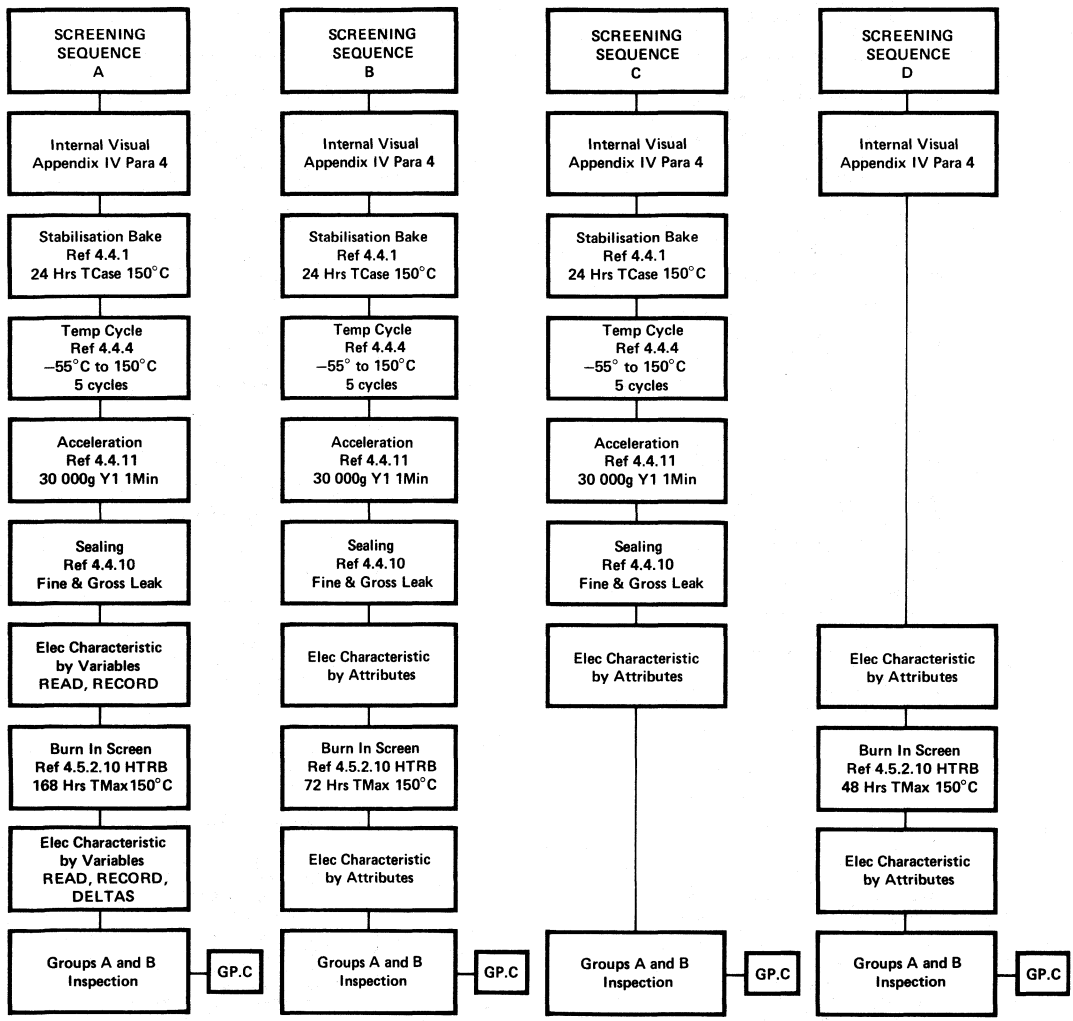
BS CECC 50 000 SERIES PROCESS OPTION FLOW CHART

ALL REFERENCES TO BS CECC 50 000



NOTES:

1. UK Build/Test
2. Delta values dependent upon device type.
3. All tests are per BS/CECC 50 000 Latest Revision.
4. For complete screening/inspection details refer to detail specification. Further information and detail specification available from your nearest field sales office.

ADDITIONAL PRODUCT OPTION FOR EUROPEAN CUSTOMERS

CECC 50000

CECC 50000 is a European system of continuous product assessment intended to produce electronic components of assessed quality to specifications and procedures which conform to internationally recognized standards. Components produced under the system are accepted by all participating countries without further testing being necessary.

At this time, member countries of the CECC are Belgium, Denmark, Germany, France, Ireland, Italy, the Netherlands, Norway, Sweden, Switzerland and the United Kingdom.

Under this assessment scheme, devices are manufactured on an approved line to nationally approved specifications written in accordance with CECC rules. The manufacturer must comply with defined standards relating to organization, facilities and quality control procedures.

The CECC scheme is administered by a committee of European representatives but individual countries have full capability for originating CECC 50000 specifications which are acceptable throughout the member countries. Specifications originating in the U.K. are prefixed with the letters BS.

Specific device types are individually qualified against a controlled detail specification which has been approved by the British Standards Institute acting as the national supervising agency on behalf of CECC.

The JEDEC registered 2N6659/60/61 series of device types are now qualified and available to the following detail specification.

Type Number	Specification Number
2N6659/60/61	BS CECC 50012-016

Screening options, including high temperature reverse bias burn-in are available. For details of screening options see flow chart.

Product is released with a BS CECC certificate of conformity and will have been submitted to:

1. Group A. Sample inspection (lot by lot)
   Quality assessment tests, assuring product conforms to electrical spec.

2. Group B. Sample inspection (lot by lot)
   Reliability tests, including package related tests and 168 hours electrical endurance, to identify potential early failures.

3. Group C. Sample inspection (periodic – 3 monthly)
   Long term reliability tests including 1000 hours of high temperature storage and electrical endurance.

Data from the inspection tests is available to the customer in the form of CTR's (Certificate Test Records).

Manufacturing of BS CECC product is carried out at the Siliconix UK facility located in Morriston, Swansea SA6 6NE, South Wales.

Introduction

Siliconix is committed to your future system designs. As a multinational semiconductor manufacturer, we offer some of the industry's broadest product lines. No one gives you more analog switch ICs and MOSPOWER to choose from. Our multiple technologies include DMOS, VMOS, CMOS, PMOS, PMOS/bipolar and bipolar. And we are constantly advancing semi-custom state-of-the-art technology.

SMALL SIGNAL FETs

Siliconix is an industry leader in the manufacture of Small Signal FETs, offering a broad line of Junction Field Effect Transistors, MOS Field Effect Transistors, and DMOS Field Effect Transistors. Each line of transistors offers high-performance characteristics for such applications as low-noise, low-frequency amplifiers, low-drive DC amplifiers, high-frequency amplifiers on oscillators (to 1 GHz), ultra-low operating gate currents (to 10^{-13} Amp), and high-speed analog switching (under 1 ns).

Junction FETs are also used in N-channel monolithic and discrete pairs for a wide variety of use as high-performance amplifiers.

Siliconix offers a wide variety of package combinations, ranging from hermetic packaging to plastic packaging. The SOT package offers 100% testing capability and has reduced space requirements. Also offered are products in chip form to address hybrid requirements.

MOSPOWER

MOSPOWER identifies the "up front" technology that places Siliconix among the leaders in power device development for the 1980's, and has helped make Siliconix *the Discovery Company*.

MOSPOWER is a generic name coined by Siliconix to identify not only Siliconix's expanding family of medium and high power MOSFETs, but *all* power MOSFETs. The name also covers the many technologies used in the manufacture of these power MOSFETs which have been identified by various trade names. Vertical DMOS (double-diffused MOS); metal-gate V-groove MOS for high-frequency; lateral DMOS technology for arrays — all are covered by this generic name: MOSPOWER.

Analog Switch ICs

Siliconix JFET, MOSPOWER and Integrated Circuit (IC) technologies have been utilized to produce an extensive family of Analog Switch ICs. They are used in many high-reliability military and aerospace applications such as Mercury, Gemini, Apollo and Skylab manned space programs. The family of analog switch ICs includes monolithic multi-channel switches with integral drivers. Also high performance JFET switches packaged with IC drivers offering very low ON-resistance, fast switching, excellent frequency response (DG180 series); low spike feed-through, low leakage and high OFF-isolation (DG281); low cost, single or dual supply operation (DG308, DG211); low consumption CMOS switches (DG300 series) and multiplexers with up to 16 channels (DG506A). The recent addition to the range of analog switch ICs is the Plus-40 enhanced DG5040 series with guaranteed safe operation up to 44V, and DG243CJ, the dual make-before-break equivalent of the DG5043CJ.

LSI/Linear Circuits

Siliconix is an industry leader in telecommunications circuits, A/D conversion and micropower linears. The Company's LSI or linear ICs are incorporated in products ranging from sophisticated instrumentation to consumer smoke detectors. Advanced processing capabilities used in the manufacture of such ICs range from high and low voltage CMOS to bipolar-PMOS. High reliability processing procedures combined with volume production capabilities complement state-of-the-art products.

Telecommunications

Siliconix is a high-technology manufacturer of complex, highly specialized integrated circuits for the telecommunications industry. The current product lines use the CMOS process to satisfy the low power requirements of the telecom industry. Our Loop Disconnect Dialer Circuits offer subscribers push-button dialing privileges even with exchange systems presently tied to the rotary dial pulse timing.

High-Reliability Devices

Siliconix's capability in providing high-reliability devices to meet stringent military or aerospace applications is amply demonstrated by the Company's qualifications as a supplier for important European projects that include Ariane, Concorde, European Airbus, the Alpha Jet and Tornado Aircraft, also Apollo, Viking and Voyager space projects.

Siliconix has a number of standard Hi-Rel screening options that can be applied to standard products. These options include screening to BS9000 for analog switches and CECC standards for FETs, also MIL-STD-750 for discrete FETs. In addition, Siliconix offers certain JEDEC-registered FETs with JAN, JANTX and JANTXV processing, as well as an increasing number of QPL-listed analog switches. Special additional inspections and controls can be met and Siliconix can supply SEM-qualified products to meet individual customer requirements.

FET Product Information

Siliconix FET products are divided into three basic categories:

- **Standard Products** — All the part numbers described in this catalog are standard products. A summary list of the prefixes used is shown below in the Device Identification Table. Ordering any of the standard products is easily done by referring to the data sheet part number. For example, a 2N4391 is simply ordered by that number: "2N4391." It will also appear in that form on the price lists, published separately.

- **Examples of Modified Standard Products are:**

Electrical Specials — Devices with either tightened, relaxed and/or special electrical specifications selected from a standard product.

Mechanical Specials — Devices with standard or modified electrical specifications mounted in non-standard packages or modified (lead formed) standard packages. Modifications and/or additions to standard marking are also considered mechanical specials.

High Reliability Specials — Siliconix has a number of standard High-Reliability screening options that can be ordered as standard products. These options include MIL-STD-750. High-Rel process option details will be found in the introductory section of this data book. In addition, Siliconix offers certain JEDEC-registered FETs with JAN, JANTX, or JANTXV processing. Refer to any current Siliconix OEM price list for details on specific part numbers. If existing screening processes do not meet individual customer requirements, Siliconix can provide special additional inspections and controls to meet the stringent demands.

In all of the above cases (with the exception of JAN, JANTX, or JANTXV parts), a special part number is assigned which defines the part either by reference to customer's print(s) or by associated special requirements. Each special product is proprietary to the customer, and is *not* made available to other customers.

- **Custom Products** — Are designed to meet customer requirements not realizable by selection from standard parts; usually, these products require special engineering development. The proprietary relationship described above also applies to custom products.

Inquiries for *SPECIAL DEVICES* may be directed to the nearest field sales office or to:

FET Marketing Department, Siliconix incorporated, 2201 Laurelwood Road, Santa Clara, California 95054, Telephone: (408) 988-8000.

FETs/Part Number Prefixes and Suffixes

Prefix	XXX	XXXX
BF	European Transistor Standard	
CR	Si Standard N-Channel Current Regulator	
CRR	Si Standard N-Channel Current Regulator	
DM		Si Special DMOS FET
DN		Si Dual N-Channel JFET
FN		Si N-Channel JFET
DPAD	Si Standard Dual JFET Diode	
J	Si Standard TO-92 Cased FET	Special TO-92 Cased FET
JR	Si Standard Current Limiter Diode TO-92 Cased FET	
JPAD	Si Standard JFET Diode	
PAD	Si Standard JFET Diode	
PN		Si Standard TO-92 Cased FET
SD		Si Standard DMOS FET
SI		N-Channel JFET Circuit
SST		JFET in SOT-23 Plastic Package
U	Si Standard FET	
VCR	Si Standard N- and P-Channel Voltage Controlled Resistors	
2N		JEDEC-Registered Device
3N	JEDEC—Registered Device	

Suffix	
-05	Std TO-92 Pkg. Lead Formed to TO-5 Pin Circle
-18	Std TO-92 Pkg. with Center Lead Formed Toward Flat in TO-18 Pin Circle
-TRF	Tape and Reel available on TO-92 FETs.

PROCESS OPTION 750B-MIL-STD 750 = -2 Contact Factory
= -2A Contact Factory

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SMALL SIGNAL FET Product Selector Guide

Application	Detail Application	Important FET Parameters Required	Major Tradeoffs	Unimportant FET Parameters	Preferred Parts
AMPLIFIER	Audio	Low noise (e_n), g_{fs}/g_{os}	Voltage amplification factor μ $= g_{fs}/g_{os}$ $= \Delta V_{DS}/\Delta V_{GS}$ $@ I_D = \text{const}$	$R_{DS(on)}$ $V_{DS(on)}$ $I_{D(off)}$ Switching Times	2N4339-40 2N4867-69 J230-32 J202-4 J308-10 U308-10 2N5911-12 2N4117A-19A U401-6 U421-6 2N6905-7 2N6908-11 SI1000-20 SI1100
	Buffer	Low I_G, high g_{fs}			
	Differential	Good matching V_{GS}, g_{fs}, I_{DSS}, I_G			
	High Input Impedance	Very low I_G (e.g., MOSFET)			
	High Frequency	High g_{fs}/C_{iss} ratio, NF, RF parameters			
	FET Input Op Amp	Good matching V_{GS}, g_{fs}, I_{DSS}, I_G			
	Low Distortion	High $V_{GS(off)}$ compared to signal amplitude			
	Low Supply Voltage	Low $V_{GS(off)}$			
	Low Noise	Low e_n, i_n, low 1/f noise, low NF			
	Preamplifier	Operate near I_{DZO}, high g_{fs}/I_D ratio			
	Video	High g_{fs}/C_{iss} ratio, NF			
SWITCHES	Analog Gates	Fast switching time	$R_{DS(on)}$ vs. Capacitance	g_{fs} g_{os} I_{DSS} max	SD210-15DE 2N4091-3 2N4391-3 PN4091-3 PN4391-3 J108-10 J105-7 U290-1 2N5432-4 2N4856-61 2N5114-16
	Choppers	$r_{DS}/I_{D(off)}$ switching efficiency			
	Commutators	Low C_{rss}			
	Digital	Fast switching time			
	Integrator Reset	Very low $R_{DS(on)}$, High I_{DSS}			
	Sample and Hold	Low C_{rss}			
CONSTANT CURRENT SOURCE	Current Limiting Reference Current Source Biasing	Low g_{oss}, low $V_{GS(off)}$, high BV_{GSS}	I_{DSS} vs. BV_{GSS}	g_{fs}, $R_{DS(on)}$, $I_{D(off)}$, $V_{DS(on)}$ switching times, RF parameters, capacitance	CRR Series J501-11 J552 Any J-FET
VOLTAGE CONTROLLED RESISTORS	Gain Control Amplitude Stability Attenuators	High $V_{GS(off)}$ for wide dynamic range and low distortion		g_{fs}, BV_{GSS}, I_{DSS}	VCR Series Any J-FET
MIXERS	VHF	RF parameters, NF, high g_{fs}/C_{iss} ratio, low C_{rss}		$r_{DS(on)}$ $V_{DS(on)}$ $I_{D(off)}$	U430-1 U440-1-3-4 2N5911-12 U308-10 J308-10 SD210-15DE
	UHF Double Balanced	Matching characteristics			
OSCILLATORS	Class A	Good g_{fs} at operating frequency	g_{fs} vs. Capacitance		2N4416 PN4416 U308-10 J308-10
	Class C	Low C_{iss} for VHF operation			

SMALL SIGNAL FET Application Selection Preferences

Additional Information

Popular Product Type	2N4117-9 2N4117A-19A PN4117-20, A	2N4338-41, J201-4 J304-5, 2N4867-9A, J230-2	2N4416, PN4416	2N3821-2, 2N4221-2 2N5457-9	U308-10, J308-10	J300, J210-2	J105-7, U290-1	2N5432-4 J108-10	2N4856-61, 2N4391-3 J111-13, PN4391-3	3N163, 4, MFE823	U421-U428	2N5196-9, 2N5515-24, 2N5545-7, 2N39548, U231-5	U401-6, 2N6905-7	2N5911-12, U440-1 U443-4	2N5564-6, DN5564-6	2N5018-21, 2N5114-6 J174-7, VCR 3P	J500-J511	CRR0240-CRR0560 J553-7, J9100	CRR0800-CRR1250 CR068-CR150	CRR1450-CRR4300 CR160-CR530	SD210-SD215DE	JR135V-JR240V	M5911CHP-12CHP; M440CHP, M441CHP	M116	SI1000-20, SI1100, 2N6908-10, 2N6911
Process Designation	**NT**	**NPA**	**NH**	**NRL**	**NZA**	**NZF**	**NVA**	**NIP**	**NCB**	**MRA**	**NNT**	**NQP**	**NNR**	**NZFD**	**NCB-D**	**PSB**	**NCL**	**NKL**	**NKM**	**NKO**	**DMCB**	**VRMA**	**NNZ**	**MBN**	**NBA**
Low Current Amplifier	**P**	S		S						**P**	**P**	**P**	**P**												**P**
Low Freq Amplifier < 100 Hz		S		S					S	**P**		**P**	**P**			S									**P**
High Freq Amplifier > 100 MHz			**P**		**P**	**P**								**P**							**P**		**P**		S
HF > 400 MHz Prime					**P**	S															**P**				
General Purpose Amplifier		**P**	**P**	**P**					**P**							**P**					S				**P**
Low Noise Amp (10 Hz e_n)		**P**	S	S				S	**P**			**P**	**P**		**P**										**P**
Low Noise Amp > 50 MHz			**P**	S	**P**	**P**								**P**	**P**								**P**		**P**
High Frequency Mixer			**P**		**P**	**P**																			
Dual Diff Pair									S		**P**	**P**	**P**	**P**	S								**P**		
AGC Amplifier			**P**	**P**		**P**																			
Electrometer Preamp	**P**	S									**P**	S	S												
Microvolt Amplifier	**P**	S									**P**	**P**	**P**												**P**
Low Leakage Diode	**P**	S																							**P**
Low Leakage Dual Diode											**P**	S													**P**
Smoke Detector Input	**P**									**P**															
Battery Operated Amp < 1.5V	**P**	**P**									**P**														
Diff/Single Ended Inp. Stag.									S		**P**	**P**	**P**	**P**	**P**								**P**		**P**
High Slew Rate Diff Amp									S					**P**	**P**								**P**		**P**
Active Filter		S	**P**	**P**																					
Oscillator		S	**P**	**P**	**P**	**P**															S				
Voltage Controlled Resistor		S	**P**	**P**					**P**				**P**			**P**									
Hybrid Chips	**P**	**P**	**P**	**P**					**P**		**P**	**P**	**P**			**P**	**P**	**P**	**P**	**P**					**P**
Analog/Digital Switch			S				**P**	**P**	**P**	S			S		S	**P**					**P**			**P**	
Multiplexing			**P**	S			S	S	**P**							**P**					**P**			**P**	
Choppers							**P**	**P**	**P**						**P**	**P**					**P**			**P**	
Reed Relay Replacement							**P**	**P**													**P**				
Sub pA Dual Diff Pair											**P**														
Sample Hold			**P**	S					**P**		S	S	S			**P**								S	
Buffer Interface to CMOS																**P**									
Matched Switch												S	**P**	S	**P**								S		
Current Limiter									**P**							**P**	**P**	**P**	**P**	**P**		S			
Current Source	S	S		LV							LV						**P**	**P**	**P**	**P**					
High Voltage Protection Diode																						**P**			

Military Application

As an option, Siliconix offers all hermetically packaged product processed to MIL-STD-750. For information, contact your local Siliconix Sales Office or Siliconix, Incorporated direct.

P = Prime Choice
S = Secondary (alternative) Choice
LV = Limited Value

SMALL SIGNAL FET Product Specifications

N & P-Channel Single JFETs

PART NUMBER	N or P	DEVICE	GEOMETRY (Section 4)	RESISTANCE Chnl Ω, Max.	RESISTANCE Gate Ω	NOISE VOLTAGE (nV/√Hz, MAX.) or (NF, dB, MAX.)	INPUT CAPACITANCE (pF, MAX.)	TRANS-CONDUCTANCE gfs (μmhos) Max.	TRANS-CONDUCTANCE gfs (μmhos) Min.	SATURATION CURRENT (mA) Max.	SATURATION CURRENT (mA) Min.	BREAKDOWN VOLTAGE (V, MAX.)	THRESHOLD VOLTAGE (V, MAX.)	LEAKAGE (nA, MAX.) Chnl	LEAKAGE (nA, MAX.) Gate	PACKAGE (TO-)
2N4117	N	LOW LEAKAGE	NT	–	–	–	3	210	70	0.09	0.03	40	1.8	–	0.01	72
2N4117A	N	LOW LEAKAGE	NT	–	–	–	3	210	70	0.09	0.03	40	1.8	–	0.001	72
2N4118	N	LOW LEAKAGE	NT	–	–	–	3	250	80	0.24	0.08	40	3.0	–	0.01	72
2N4118A	N	LOW LEAKAGE	NT	–	–	–	3	250	90	0.24	0.08	40	3.0	–	0.001	72
2N4119	N	LOW LEAKAGE	NT	–	–	–	3	330	100	0.6	0.2	40	6.0	–	0.01	72
2N4119A	N	LOW LEAKAGE	NT	–	–	–	3	330	100	0.6	0.2	40	6.0	–	0.001	72
PN4117	N	LOW LEAKAGE	NT	3K	–	–	–	210	70	0.09	0.03		−40		0.01	92
PN4117A	N	LOW LEAKAGE	NT	3K	–	–	–	210	70	0.09	0.03		−40		0.001	92
PN4118	N	LOW LEAKAGE	NT	3K	–	–	–	250	80	0.24	0.08		−40		0.01	92
PN4118A	N	LOW LEAKAGE	NT	3K	–	–	–	250	80	0.24	0.08		−40		0.001	92
PN4119	N	LOW LEAKAGE	NT	3K	–	–	–	330	100	0.6	0.2		−40		0.01	92
PN4119A	N	LOW LEAKAGE	NT	3K	–	–	–	330	100	0.6	0.2		−40		0.001	92
PN4120	N	LOW LEAKAGE	NT	3K	–	–	–	330	100	0.6	0.2		−40		–	92
FN4117	N	LOW LEAKAGE	NT	3K	–	–	–	210	70	0.09	0.03		−40		0.005	72
FN4117A	N	LOW LEAKAGE	NT	–	–	–	3	210	70	0.2	0.03	40	2.0		0.001	72
FN4118	N	LOW LEAKAGE	NT	3K	–	–	–	250	80	0.24	0.08		−40		0.005	72
FN4118A	N	LOW LEAKAGE	NT	–	–	–	3	250	80	0.4	0.08	40	2.0		0.001	72
FN4119	N	LOW LEAKAGE	NT	3K	–	–	–	330	100	0.6	0.2		−40		0.005	72
FN4119A	N	LOW LEAKAGE	NT	–	–	–	3	330	100	1.2	0.2	40	6.0		0.001	72
FN4392	N	LOW LEAKAGE	NCB	14	60	–	–		–	100	25		40	0.1	0.1	18
FN4393	N	LOW LEAKAGE	NCB	14	100	–	–		–	60	5.0		40	0.1	0.1	18
2N4220A	N	LOW NOISE	NRL	–	1M	2.5	6	4000	1000	3.0	0.5	30	4.0	–	0.1	72
2N4221 A	N	LOW NOISE	NRL	–	1M	2.5	6	5000	2000	6.0	2.0	30	6.0	–	0.1	72
2N4222	N	LOW NOISE	NRL	–	1M	2.5	6	6000	2500	15	5.0	30	8.0	–	0.1	72
2N4338	N	LOW NOISE	NPA	–	1M	1.0	7	1800	600	0.6	0.2	50	1.0	–	0.1	18
2N4339	N	LOW NOISE	NPA	–	1M	1.0	7	2400	800	1.5	0.5	50	1.8	–	0.1	18
2N4340	N	LOW NOISE	NPA	–	1M	1.0	7	3000	1300	3.6	1.2	50	3.0	–	0.1	18
2N4341	N	LOW NOISE	NPA	–	1M	1.0	7	4000	2000	9.0	3.0	50	6.0	–	0.1	18
2N4867	N	LOW NOISE	NPA	–	–	20	25	2000	700	1.2	0.4	40	2.0	–	0.25	72
2N4867A	N	LOW NOISE	NPA	–	–	10	25	2000	700	1.2	0.4	40	2.0	–	0.25	72
2N4868	N	LOW NOISE	NPA	–	–	20	25	3000	1000	3.0	1.0	40	3.0	–	0.25	72
2N4868A	N	LOW NOISE	NPA	–	–	10	25	3000	1000	3.0	1.0	40	3.0	–	0.25	72
2N4869	N	LOW NOISE	NPA	–	–	20	25	4000	1300	7.5	2.5	40	5.0	–	0.25	72
2N4869A	N	LOW NOISE	NPA	–	–	10	25	4000	1300	7.5	2.5	40	5.0	–	0.25	72
SI1000- (2N6908)	N	LOW NOISE	NBA-A	–	–	25	5	3000	100	2.0		30	1.8	–	0.025	72
SI1010- (2N6909)	N	LOW NOISE	NBA-A	–	–	25	5	3500	400	3.5		30	2.3	–	0.025	72
SI1020- (2N6910)	N	LOW NOISE	NBA-A	–	–	25	5	4000	1200	5.0		30	3.5	–	0.025	72
SI1100- (2N6911)	N	LOW NOISE	NBA-B	–	–	25	–	–	–	–		30	2.8	–	0.025	72
J230	N	LOW NOISE	NPA	–	–	30	–	2500	1000	3.0	0.7	40	3.0	–	0.25	92
J230-18	N	LOW NOISE	NPA	–	–	30	–	2500	1000	3.0	0.7	40	3.0	–	0.25	92
J231	N	LOW NOISE	NPA	–	–	30	–	3000	1500	6.0	2.0	40	5.0	–	0.25	92
J231-18	N	LOW NOISE	NPA	–	–	30	–	3000	1500	6.0	2.0	40	5.0	–	0.25	92
J232	N	LOW NOISE	NPA	–	–	30	–	4000	2500	10	5.0	40	6.0	–	0.25	92

SMALL SIGNAL FET Product Specifications (Cont'd)

N & P-Channel Single JFETs

DEVICE: RF AMPLIFIERS

PART NUMBER	N or P	PACKAGE (TO-)	LEAKAGE (nA, MAX.) Gate	LEAKAGE (nA, MAX.) Chnl	THRESHOLD VOLTAGE (V, MAX.)	BREAKDOWN VOLTAGE (V, MAX.)	SATURATION CURRENT (mA) Min.	SATURATION CURRENT (mA) Max.	TRANS-CONDUCTANCE gfs (μmhos) Min.	TRANS-CONDUCTANCE gfs (μmhos) Max.	INPUT CAPACITANCE (pF, MAX.)	NOISE VOLTAGE (nV/√Hz, MAX.) or (NF, dB, MAX.)	RESISTANCE Gate Ω	RESISTANCE Chnl Ω, Max.	GEOMETRY (Section 4)
J232-18	N	92	0.25	—	6.0	40	5.0	10	2500	4000	—	30	—	—	NPA
J270-18	P	92	0.2	—	2.0	30	2.0	15	6000	15000	—	—	—	—	PA-A/B
2N3819	N	92	2.0	—	8.0	25	2.0	20	2000	6500	8.0	—	—	—	NRL
2N3823	N	72	0.5	—	8.0	30	4.0	20	3500	6500	6	2.5	1K	—	NRL
2N4223	N	72	0.25	—	8.0	30	3.0	18	3000	7000	6	5.0	1K	—	NRL
2N4224	N	72	0.5	—	8.0	30	2.0	20	2000	7500	6	—	—	—	NRL
2N4416	N	72	0.1	—	6.0	30	5.0	15	4500	7500	4	2.0	1K	—	NH
2N4416A	N	72	0.1	—	6.0	35	5.0	15	4500	7500	4	2.0	1K	—	NH
2N5484	N	92	1.0	—	3.0	25	1.0	5.0	3000	6000	5	3.0	1K	—	NH
2N5485	N	92	1.0	—	4.0	25	4.0	10	3500	7000	5	2.0	1K	—	NH
2N5486	N	92	1.0	—	6.0	25	8.0	20	4000	8000	5	2.0	1K	—	NH
2N5668	N	92	2.0	—	4.0	25	1.0	5.0	1500	6500	7	2.5	1K	—	NH
2N5669	N	92	2.0	—	6.0	25	4.0	10	2000	6500	7	2.5	1K	—	NH
2N5670	N	92	2.0	—	8.0	25	8.0	20	3000	7500	7.0	2.5	1K	—	NH
J210	N	92	0.1	—	3.0	25	2.0	15	4000	12000	—	—	—	—	NZF
J211	N	92	0.1	—	4.5	25	7.0	20	7000	12000	—	—	—	—	NZF
J212	N	92	0.1	—	6.0	25	15	40	7000	12000	—	—	—	—	NZF
J270	P	92	0.2	—	2.0	30	2.0	15	6000	15000	—	—	—	—	PS-A/B
J271	P	92	0.2	—	4.5	30	6.0	50	8000	18000	—	—	—	—	PS-A/B
J300	N	92	0.5	—	6.0	25	6.0	30	4500	9000	5.5	—	—	—	NZF
J304	N	92	0.1	—	6.0	30	5.0	15	4500	7500	—	—	—	—	NH
J305	N	92	0.1	—	3.0	30	1.0	8.0	3000	—	—	—	—	—	NH
J308	N	92	1.0	—	6.5	25	12	60	8000	20000	7.5	—	—	—	NZA
J309	N	92	1.0	—	4.0	25	12	30	10000	20000	7.5	—	—	—	NZA
J310	N	92	1.0	—	6.5	25	24	60	8000	18000	7.5	—	—	—	NZA
MPF102	N	92	2.0	—	7.5	25	2.0	20	2000	7500	7.0	—	—	—	NH
MPF108	N	92	1.0	—	8.0	25	1.5	24	2000	7500	6.5	2.5	1M	—	NH
MPF112	N	92	100	—	10	25	1.0	25	1000	7500	—	—	—	—	NH
PN4416	N	92	1.0	—	6.0	30	5.0	15	4500	7500	4.0	2.0	1K	—	NH
U308	N	52	0.15	—	6.0	25	12	60	10000	20000	7.5	—	—	—	NZA
U309	N	52	0.15	—	4.0	25	12	30	10000	20000	7.5	—	—	—	NZA
U310	N	52	0.15	—	6.0	25	24	60	10000	18000	7.5	—	—	—	NZA
U311	N	72	0.15	—	6.0	25	20	60	10000	20000	7.5	—	—	—	NZA
U312	N	52	0.1	—	6.0	25	10	30	6000	10000	5.0	—	—	—	NZF

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SMALL SIGNAL FET Product Specifications (Cont'd)

N & P-Channel Single JFETs

DEVICE: SWITCHES & CHOPPERS

PART NUMBER	GEOMETRY (Section 4)	RESISTANCE Chnl Ω, Max.	RESISTANCE Gate Ω	NOISE VOLTAGE (nV/√Hz, MAX.) or (NF, dB, MAX.)	INPUT CAPACITANCE (pF, MAX.)	TRANS-CONDUCTANCE gfs (μmhos) Max.	TRANS-CONDUCTANCE gfs (μmhos) Min.	SATURATION CURRENT (mA) Max.	SATURATION CURRENT (mA) Min.	BREAKDOWN VOLTAGE (V, MAX.)	THRESHOLD VOLTAGE (V, MAX.)	LEAKAGE (nA, MAX.) Chnl	LEAKAGE (nA, MAX.) Gate	PACKAGE (TO-)	N or P
2N3824	NRL	250	—	—	6.0	—	—	—	—	50	8.0	0.1	0.1	72	N
2N3970	NCB	30	—	—	25	—	—	150	50	40	10	0.25	0.25	18	N
2N3971	NCB	60	—	—	25	—	—	75	25	40	5.0	0.25	0.25	18	N
2N3972	NCB	100	—	—	25	—	—	30	5.0	40	3.0	0.25	0.25	18	N
2N4091	NCB	30	—	—	16	—	—	—	30	40	10	0.2	0.2	18	N
2N4092	NCB	50	—	—	16	—	—	—	15	40	7.0	0.2	0.2	18	N
2N4093	NCB	80	—	—	16	—	—	—	8.0	40	5.0	0.2	0.2	18	N
2N4391	NCB	30	—	—	14	—	—	150	50	40	10	0.1	0.1	18	N
2N4392*	NCB	60	—	—	14	—	—	75	25	40	5.0	0.1	0.1	18	N
2N4393*	NCB	100	—	—	14	—	—	30	5.0	40	3.0	0.1	0.1	18	N
2N4856	NCB	25	—	—	18	—	—	—	50	40	10	0.25	0.25	18	N
2N4856A	NCB	25	—	—	10	—	—	—	50	40	10	0.25	0.25	18	N
2N4857	NCB	40	—	—	18	—	—	100	20	40	6.0	0.25	0.25	18	N
2N4857A	NCB	40	—	—	10	—	—	100	20	40	6.0	0.25	0.25	18	N
2N4858	NCB	60	—	—	18	—	—	80	8.0	40	4.0	0.25	0.25	18	N
2N4858A	NCB	60	—	—	10	—	—	80	8.0	40	4.0	0.25	0.25	18	N
2N4859	NCB	25	—	—	18	—	—	—	50	30	10	0.25	0.25	18	N
2N4859A	NCB	25	—	—	10	—	—	—	50	30	10	0.25	0.25	18	N
2N4860	NCB	40	—	—	18	—	—	100	20	30	6.0	0.25	0.25	18	N
2N4860A	NCB	40	—	—	10	—	—	100	20	30	6.0	0.25	0.25	18	N
2N4861	NCB	60	—	—	18	—	—	80	8.0	30	4.0	0.25	0.25	18	N
2N4861A	NCB	60	—	—	10	—	—	80	8.0	30	4.0	0.25	0.25	18	N
2N5018	PS-A/B	75	—	—	45	—	—	—	10	30	10	10.0	2.0	18	P
2N5019	PS-A/B	150	—	—	45	—	—	—	5.0	30	5.0	10.0	2.0	18	P
2N5114	PS-A/B	75	—	—	25	—	—	90	30	30	10	0.5	0.5	18	P
2N5115	PS-A/B	100	—	—	25	—	—	60	15	30	6.0	0.5	0.5	18	P
2N5116	PS-A/B	150	—	—	27	—	—	25	5.0	30	4.0	0.5	0.5	18	P
2N5432	NIP	5.0	—	—	30	—	—	—	150	25	10	0.2	0.2	52	N
2N5433	NIP	7.0	—	—	30	—	—	—	100	25	9.0	0.2	0.2	52	N
2N5434	NIP	10	—	—	30	—	—	—	30	25	4.0	0.2	0.2	52	N
2N5638	NCB	30	—	—	10	—	—	—	50	30	12	1.0	1.0	92	N
2N5639	NCB	60	—	—	10	—	—	—	25	30	8.0	1.0	1.0	92	N

*FN4392 and FN4393 available

SMALL SIGNAL FET Product Specifications (Cont'd)

N & P-Channel Single JFETs

SWITCHES & CHOPPERS

PART NUMBER	GEOMETRY (Section 4)	RESISTANCE Chnl Ω, Max.	RESISTANCE Gate Ω	NOISE VOLTAGE (nV/√Hz, MAX.) or (NF, dB, MAX.)	INPUT CAPACITANCE (pF, MAX.)	TRANS-CONDUCTANCE gfs (μmhos) Max.	TRANS-CONDUCTANCE gfs (μmhos) Min.	SATURATION CURRENT (mA) Max.	SATURATION CURRENT (mA) Min.	BREAKDOWN VOLTAGE (V, MAX.)	THRESHOLD VOLTAGE (V, MAX.)	LEAKAGE (nA, MAX.) Chnl	LEAKAGE (nA, MAX.) Gate	PACKAGE (TO-)	N or P
2N5640	NCB	100	—	—	10	—	—	—	5.0	30	6.0	1.0	1.0	92	N
J105	NVA	3.0	—	—	—	—	—	—	500	25	10.0	3.0	3.0	92	N
J105-18	NVA	3.0	—	—	—	—	—	—	500	25	10	3.0	3.0	92	N
J106	NVA	6.0	—	—	—	—	—	—	200	25	6.0	3.0	3.0	92	N
J106-18	NVA	6.0	—	—	—	—	—	—	200	25	6.0	3.0	3.0	92	N
J107	NVA	8.0	—	—	—	—	—	—	100	25	4.5	3.0	3.0	92	N
J107-18	NVA	8.0	—	—	—	—	—	—	100	25	4.5	3.0	3.0	92	N
J108	NIP	8.0	—	—	—	—	—	—	80	25	10	3.0	3.0	92	N
J108-18	NIP	8.0	—	—	—	—	—	—	80	25	10	3.0	3.0	92	N
J109	NIP	12	—	—	—	—	—	—	40	25	6.0	3.0	3.0	92	N
J109-18	NIP	12	—	—	—	—	—	—	40	25	6.0	3.0	3.0	92	N
J110	NIP	18	—	—	—	—	—	—	10	25	4.0	3.0	3.0	92	N
J110-18	NIP	18	—	—	—	—	—	—	10	25	4.0	3.0	3.0	92	N
J111	NCB	30	—	—	—	—	—	—	20	35	10	1.0	1.0	92	N
J111-18	NCB	30	—	—	—	—	—	—	20	35	10	1.0	1.0	92	N
J112	NCB	50	—	—	—	—	—	—	5.0	35	5.0	1.0	1.0	92	N
J112-18	NCB	50	—	—	—	—	—	—	5.0	35	5.0	1.0	1.0	92	N
J113	NCB	100	—	—	—	—	—	—	2.0	35	3.0	1.0	1.0	92	N
J113-18	NCB	100	—	—	—	—	—	—	2.0	35	3.0	1.0	1.0	92	N
J174	PS-A/B	85	—	—	—	—	—	100	20	30	10	1.0	1.0	92	P
J174-18	PS-A/B	85	—	—	—	—	—	100	20	30	10	1.0	1.0	92	P
J175	PS-A/B	125	—	—	—	—	—	60	7.0	30	6.0	1.0	1.0	92	P
J175-18	PS-A/B	125	—	—	—	—	—	60	7.0	30	6.0	1.0	1.0	92	P
J176	PS-A/B	250	—	—	—	—	—	25	2.0	30	4.0	1.0	1.0	92	P
J176-18	PS-A/B	250	—	—	—	—	—	25	2.0	30	4.0	1.0	1.0	92	P
J177	PS-A/B	300	—	—	—	—	—	20	1.5	30	2.25	1.0	1.0	92	P
J177-18	PS-A/B	300	—	—	—	—	—	20	1.5	30	2.25	1.0	1.0	92	P
P1086	PS-A/B	75	—	—	45	—	—	—	10	30	10	10.0	2.0	92	P
P1086-18	PS-A/B	75	—	—	45	—	—	—	10	30	10	10.0	2.0	92	P
P1087	PS-A/B	150	—	—	45	—	—	—	5.0	30	5.0	10.0	2.0	92	P
P1087-18	PS-A/R	150	—	—	45	—	—	—	5.0	30	5.0	10.0	2.0	92	P
PN4391	NCE	30	—	—	14	—	—	150	50	40	10	1.0	1.0	92	N
PN4391-18	NCB	30	—	—	14	—	—	150	50	40	10	1.0	1.0	92	N
PN4392	NCB	60	—	—	14	—	—	100	25	40	5.0	1.0	1.0	92	N
PN4392-18	NCB	60	—	—	14	—	—	100	25	40	5.0	1.0	1.0	92	N
PN4393	NCB	100	—	—	14	—	—	60	5.0	40	3.0	1.0	1.0	92	N
PN4393-18	NCB	100	—	—	14	—	—	60	5.0	40	3.0	1.0	1.0	92	N

SMALL SIGNAL FET Product Specifications (Cont'd)

N & P-Channel Single JFETs

DEVICE: SWITCHES & CHOPPERS

PART NUMBER	GEOMETRY (Section 4)	RESISTANCE Chnl Ω, Max.	RESISTANCE Gate Ω	NOISE VOLTAGE (nV/√Hz, MAX.) or (NF, dB, MAX.)	INPUT CAPACITANCE (pF, MAX.)	TRANSCONDUCTANCE gfs (μmhos) Max.	TRANSCONDUCTANCE gfs (μmhos) Min.	SATURATION CURRENT (mA) Max.	SATURATION CURRENT (mA) Min.	BREAKDOWN VOLTAGE (V, MAX.)	THRESHOLD VOLTAGE (V, MAX.)	LEAKAGE (nA, MAX.) Chnl	LEAKAGE (nA, MAX.) Gate	PACKAGE (TO-)	N or P
SD210	DMCB-B	70	—	—	5.5	—	—	—	10	30	2.0	100	100	72	N
SD211	DMCB-A	70	—	—	5.5	—	—	—	10	30	2.0	100	100	72	N
SD212	DMCB-B	70	—	—	5.5	—	—	—	10	10	2.0	100	100	72	N
SD213	DMCB-A	70	—	—	5.5	—	—	—	10	10	2.0	100	100	72	N
SD214	DMCB-B	70	—	—	5.5	—	—	—	10	20	2.0	100	100	72	N
SD215	DMCB-A	70	—	—	5.5	—	—	—	10	20	2.0	100	100	72	N
U200	NCB	150	—	—	30	—	—	25	3.0	30	3.0	1.0	1.0	18	N
U201	NCB	75	—	—	30	—	—	75	15	30	5.0	1.0	1.0	18	N
U202	NCB	50	—	—	30	—	—	150	30	30	10	1.0	1.0	18	N
U290	NVA	2.5	—	—	60	—	—	—	500	30	10	1.0	1.0	52	N
U291	NVA	7.0	—	—	60	—	—	—	200	30	4.5	1.0	1.0	52	N
U304	PS-A/B	85	—	—	27	—	—	90	30	30	10	0.5	0.5	18	P
U305	PS-A/B	110	—	—	27	—	—	60	15	30	6.0	0.5	0.5	18	P
U306	PS-A/B	175	—	—	27	—	—	25	5.0	30	4.0	0.5	0.5	18	P
U1897	NCB	30	—	—	16	—	—	—	30	40	10	0.2	0.4	92	N
U1897-18	NCB	30	—	—	16	—	—	—	30	40	10	0.2	0.4	92	N
U1898	NCB	50	—	—	16	—	—	—	15	40	7.0	0.2	0.4	92	N
U1898-18	NCB	50	—	—	16	—	—	—	15	40	7.0	0.2	0.4	92	N
U1899	NCB	80	—	—	16	—	—	—	8.0	40	5.0	0.2	0.4	92	N
U1899-18	NCB	80	—	—	16	—	—	—	8.0	40	5.0	0.2	0.4	92	N

N & P-Channel Single JFETs

GENERAL PURPOSE

PART NUMBER	GEOMETRY (Section 4)	RESISTANCE Chnl Ω, Max.	RESISTANCE Gate Ω	NOISE VOLTAGE (nV/√Hz, MAX.) or (NF, dB, MAX.)	INPUT CAPACITANCE (pF, MAX.)	TRANS-CONDUCTANCE gfs (μmhos) Max.	TRANS-CONDUCTANCE gfs (μmhos) Min.	SATURATION CURRENT (mA) Max.	SATURATION CURRENT (mA) Min.	BREAKDOWN VOLTAGE (V, MAX.)	THRESHOLD VOLTAGE (V, MAX.)	LEAKAGE (nA, MAX.) Chnl	LEAKAGE (nA, MAX.) Gate	PACKAGE (TO-)	N or P
2N3821	NRL	—	—	200	6	4500	1500	2.5	0.5	50	4.0	—	0.1	72	N
2N3822	NRL	—	—	200	6	6500	3000	10	2.0	50	6.0	—	0.1	72	N
2N4220	NRL	—	—	—	6	4000	1000	3.0	0.5	30	4.0	—	0.1	72	N
2N4221	NRL	—	—	—	6	5000	2000	6.0	2.0	30	6.0	—	0.1	72	N
2N4222	NRL	—	—	—	6	6000	2500	15	5.0	30	8.0	—	0.1	72	N
2N5457	NRL	—	1M	3.0	7	5000	1000	5.0	1.0	25	6.0	—	1.0	92	N
2N5458	NRL	—	1M	3.0	7	5500	1500	9.0	2.0	25	7.0	—	1.0	92	N
2N5459	NRL	—	100M	3.0	7	6000	2000	16	4.0	25	8.0	—	1.0	92	N
J201	NPA	—	—	—	5.0	—	500	1.0	0.2	40	1.5	—	0.1	92	N
J201-18	NPA	—	—	—	5.0	—	500	1.00	0.2	40	1.5	—	0.1	92	N
J202	NPA	—	—	—	5.0	—	1000	4.5	0.9	40	4.0	—	0.1	92	N
J202-18	NPA	—	—	—	5.0	—	1000	4.5	0.9	40	4.0	—	0.1	92	N
J203	NPA	—	—	—	5.0	—	1500	20	4.0	40	10	—	0.1	92	N
J203-18	NPA	—	—	—	5.0	—	1500	20	4.0	40	10	—	0.1	92	N
J204	NPA	—	—	—	5.0	—	—	3.0	1.2	25	2.0	—	0.1	92	N
J204-18	NPA	—	—	—	5.0	—	—	3.0	1.2	25	2.0	—	0.1	92	N
J270	PS-A/B	—	—	—	—	18000	8000	50	6.0	30	4.5	—	0.2	92	P
J271-18	PS-A/B	—	—	—	—	18000	8000	50	6.0	30	4.5	—	0.2	92	P
MPF109	NRL	—	1M	2.5	7.0	6000	800	24	0.5	25	8.0	—	1.0	92	N
MPF111	NRL	—	—	—	—	—	500	20	0.5	20	10	—	100	92	N
PN4302	NPA	—	1M	2.0	6	—	1000	5.0	0.5	30	4.0	—	1.0	92	N
PN4302-18	NPA	—	1M	2.0	6.0	—	1000	5.0	0.5	30	4.0	—	1.0	92	N
PN4303	NPA	—	1M	2.0	6	—	2000	10	4.0	30	6.0	—	1.0	92	N
PN4303-18	NPA	—	1M	2.0	6.0	—	2000	10	4.0	30	6.0	—	1.0	92	N
PN4304	NPA	—	1M	3.0	6	—	1000	15	0.5	30	10.0	—	1.0	92	N
PN4304-18	NPA	—	1M	2.0	6.0	—	1000	15	0.5	30	10	—	1.0	92	N
PN5163	—	—	—	50.0	20	9000	2000	40.0	1.0	25	8.0	—	10	92	N

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SMALL SIGNAL FET Product Specifications (Cont'd)

N-Channel Dual JFETs

DEVICE	PART NUMBER	GEOMETRY (Section 4)	OUTPUT CONDUCTANCE gos (μmhos, MAX.)	THRESHOLD Temp Tracking μV/°C	THRESHOLD Static Match (mV, Max.)	NOISE VOLTAGE (nV/√Hz, MAX.) or (NF, dB, MAX.)	INPUT CAPACITANCE (pF, MAX.)	TRANSCONDUCTANCE gfs (μmhos) Max.	TRANSCONDUCTANCE gfs (μmhos) Min.	SATURATION CURRENT (mA) Max.	SATURATION CURRENT (mA) Min.	BREAKDOWN VOLTAGE (V, MAX.)	THRESHOLD VOLTAGE (V, MAX.)	LEAKAGE (nA, MAX.) Gate	PACKAGE (TO-)	N or P
LOW LEAKAGE	2N5196	NQP	50	5.0	5.0	20	6.0	—	1000	7.0	0.7	50	4.0	0.025	71	N
	2N5197	NQP	50	10	5.0	20	6.0	—	1000	7.0	0.7	50	4.0	0.025	71	N
	2N5198	NQP	50	20	10	20	6.0	—	1000	7.0	0.7	50	4.0	0.025	71	N
	2N5199	NQP	50	40	15	20	6.0	—	1000	7.0	0.7	50	4.0	0.025	71	N
	2N5545	NQP	25	10	5.0	200	6.0	—	1500	8.0	0.5	50	4.5	0.1	71	N
	2N5546	NQP	25	20	10	200	6.0	—	1500	8.0	0.5	50	4.5	0.1	71	N
	2N5547	NQP	25	40	15	200	6.0	—	1500	8.0	0.5	50	4.5	0.1	71	N
	2N6905	NNR	—	10	5	15	8.0	—	2000	10	0.5	35	2.5	0.015	71	N
	2N6906	NNR	—	25	15	15	8.0	—	2000	10	0.5	35	2.5	0.015	71	N
	2N6907	NNR	—	50	25	15	8.0	—	2000	10	0.5	35	2.5	0.015	71	N
	U401	NNR	2.0	10	5.0	20	8.0	—	2000	10	0.5	50	2.5	0.025	71	N
	U402	NNR	2.0	10	10	20	8.0	—	2000	10	0.5	50	2.5	0.025	71	N
	U403	NNR	2.0	25	10	20	8.0	—	2000	10	0.5	50	2.5	0.025	71	N
	U404	NNR	2.0	25	15	20	8.0	—	2000	10	0.5	50	2.5	0.025	71	N
	U405	NNR	2.0	40	20	20	8.0	—	2000	10	0.5	50	2.5	0.025	71	N
	U406	NNR	2.0	80	40	20	8.0	—	2000	10	0.5	50	2.5	0.025	71	N
	U421	NNT	0.5	10	10	10	3.0	1500	300	1.0	0.06	40	2.0	0.001	78	N
	U422	NNT	0.5	25	15	10	3.0	1500	300	1.0	0.06	40	2.0	0.001	78	N
	U423	NNT	0.5	40	25	10	3.0	1500	300	1.0	0.06	40	2.0	0.001	78	N
	U424	NNT	1.0	10	10	10	3.0	1500	300	1.8	0.06	40	3.0	0.003	78	N
	U425	NNT	1.0	25	15	10	3.0	1500	300	1.8	0.06	40	3.0	0.003	78	N
	U426	NNT	1.0	40	25	10	3.0	1500	300	1.8	0.06	40	3.0	0.003	78	N
	U427	NNT	3.0	40	25	—	3.0	—	250	1.8	0.06	40	2.0	0.005	78	N
	U428	NNT	5.0	80	40	—	3.0	—	250	1.8	0.06	40	3.0	0.005	78	N
LOW NOISE	2N5515	NQP	1.0	5.0	5.0	30	25	—	1000	7.5	0.5	40	4.0	0.25	71	N
	2N5516	NQP	1.0	10	5.0	30	25	—	1000	7.5	0.5	40	4.0	0.25	71	N
	2N5517	NQP	1.0	20	10	30	25	—	1000	7.5	0.5	40	4.0	0.25	71	N
	2N5518	NQP	1.0	40	15	30	25	—	1000	7.5	0.5	40	4.0	0.25	71	N
	2N5519	NQP	1.0	80	15	30	25	—	1000	7.5	0.5	40	4.0	0.25	71	N
	2N5520	NQP	1.0	5.0	5.0	15	25	—	1000	7.5	0.5	40	4.0	0.25	71	N
	2N5521	NQP	1.0	10	5.0	15	25	—	1000	7.5	0.5	40	4.0	0.25	71	N
	2N5522	NQP	1.0	20	10	15	25	—	1000	7.5	0.5	40	4.0	0.25	71	N
	2N5523	NQP	1.0	40	15	15	25	—	1000	7.5	0.5	40	4.0	0.25	71	N
	2N5524	NQP	1.0	80	15	15	25	—	1000	7.5	0.5	40	4.0	0.25	71	N
	2N6905	NNR	—	10	5	15	8.0	—	2000	10	0.5	35	2.5	0.015	71	N
	2N6906	NNR	—	25	10	15	8.0	—	2000	10	0.5	35	2.5	0.015	71	N
	2N6907	NNR	—	50	25	15	8.0	—	2000	10	0.5	35	2.5	0.015	71	N
	U401	NNR	2.0	10	5.0	20	8.0	—	2000	10	0.5	50	2.5	0.025	71	N
	U402	NNR	2.0	10	10	20	8.0	—	2000	10	0.5	50	2.5	0.025	71	N

SMALL SIGNAL FET Product Specifications (Cont'd)

N-Channel Dual JFETs

PART NUMBER	DEVICE	GEOMETRY (Section 4)	OUTPUT CONDUCTANCE gos (µmhos, MAX.)	THRESHOLD Temp Tracking µV/°C	THRESHOLD Static Match (mV, Max.)	NOISE VOLTAGE (nV/√Hz, MAX.) or (NF, dB, MAX.)	INPUT CAPACITANCE (pF, MAX.)	TRANS-CONDUCTANCE gfs (µmhos) Max.	TRANS-CONDUCTANCE gfs (µmhos) Min.	SATURATION CURRENT (mA) Max.	SATURATION CURRENT (mA) Min.	BREAKDOWN VOLTAGE (V, MAX.)	THRESHOLD VOLTAGE (V, MAX.)	LEAKAGE (nA, MAX.) Gate	PACKAGE (TO-)	N or P
U404	LOW NOISE	NNR	2.0	25	15	20	8.0	—	2000	10	0.5	50	2.5	0.025	71	N
U405	LOW NOISE	NNR	2.0	40	20	20	8.0	—	2000	10	0.5	50	2.5	0.025	71	N
U406	LOW NOISE	NNR	2.0	80	40	20	8.0	—	2000	10	0.5	50	2.5	0.025	71	N
2N5564	RF AMPLIFIER	NCB	45	10	5.0	50	12	—	7500	30	5.0	40	3.0	0.1	71	N
2N5565	RF AMPLIFIER	NCB	45	25	10	50	12	—	7500	30	5.0	40	3.0	0.1	71	N
2N5566	RF AMPLIFIER	NCB	45	50	20	50	12	—	7500	30	5.0	40	3.0	0.1	71	N
2N5911	RF AMPLIFIER	NZF-D	100	20	10	20	3.0	—	5000	40	7.0	25	5.0	0.1	78	N
2N5912	RF AMPLIFIER	NZF-D	100	40	15	20	3.0	—	5000	40	7.0	25	5.0	0.1	78	N
U257	RF AMPLIFIER	NZF-D	150	—	100	30	5.0	—	5000	40	5.0	25	5.0	0.1	78	N
U430	RF AMPLIFIER	NZA-D	150	—	—	12	7.5	—	10000	30	12	25	4.0	0.15	99	N
U431	RF AMPLIFIER	NZA-D	150	—	—	10	7.5	—	10000	60	24	25	6.0	0.15	99	N
U440	RF AMPLIFIER	NZF-D	200	—	10	—	3.5	—	4500	30	6.0	25	6.0	0.50	71	N
U441	RF AMPLIFIER	NZF-D	200	—	20	—	3.5	—	4500	30	6.0	25	6.0	0.50	71	N
U443	RF AMPLIFIER	NZF-D	200	—	10	—	3.5	9000	4500	30	6.0	25	6	.5	78	N
U444	RF AMPLIFIER	NZF-D	200	—	20	—	3.5	9000	4500	30	6.0	25	6	.5	78	N
2N3921	GENERAL PURPOSE	NNR	35	10	5.0	2.0	18	—	1500	10	1.0	50	3.0	1.0	71	N
2N3922	GENERAL PURPOSE	NNR	35	25	5.0	2.0	18	—	1500	10	1.0	50	3.0	1.0	71	N
2N3954	GENERAL PURPOSE	NQP	35	10	5.0	0.5	4.0	—	1000	5.0	0.5	50	4.5	0.1	71	N
2N3954A	GENERAL PURPOSE	NQP	35	5.0	5.0	0.5	4.0	—	1000	5.0	0.5	50	4.5	0.1	71	N
2N3955	GENERAL PURPOSE	NQP	35	25	10	0.5	4.0	—	1000	5.0	0.5	50	4.5	0.1	71	N
2N3955A	GENERAL PURPOSE	NQP	35	15	10	0.5	4.0	—	1000	5.0	0.5	50	4.5	0.1	71	N
2N3956	GENERAL PURPOSE	NQP	35	50	15	0.5	4.0	—	1000	5.0	0.5	50	4.5	0.1	71	N
2N3957	GENERAL PURPOSE	NQP	35	75	20	0.5	4.0	—	1000	5.0	0.5	50	4.5	0.1	71	N
2N3958	GENERAL PURPOSE	NQP	35	100	25	0.5	4.0	—	1000	5.0	0.5	50	4.5	0.1	71	N
2N5045	GENERAL PURPOSE	NQP	25	67	5.0	200	8.0	—	1500	8.0	0.5	50	4.5	0.25	71	N
2N5046	GENERAL PURPOSE	NQP	25	133	10	200	8.0	—	1500	8.0	0.5	50	4.5	0.25	71	N
2N5047	GENERAL PURPOSE	NQP	25	200	15	200	8.0	—	1500	8.0	0.5	50	4.5	0.25	71	N
2N5452	GENERAL PURPOSE	NQP	1.0	5.0	5.0	20	4.0	—	1000	5.0	0.5	50	4.5	0.1	71	N
2N5453	GENERAL PURPOSE	NQP	1.0	10	10	20	4.0	—	1000	5.0	0.5	50	4.5	0.1	71	N
2N5454	GENERAL PURPOSE	NQP	1.0	25	15	20	4.0	—	1000	5.0	0.5	50	4.5	0.1	71	N
DN5564	GENERAL PURPOSE	NCB-D	65	10	5	50	12	12500	7500	50	5	40	3.0	.1	71	N
DN5565	GENERAL PURPOSE	NCB-D	65	25	10	50	12	12500	7500	50	5	40	3.0	.1	71	N
DN5566	GENERAL PURPOSE	NCB-D	65	50	20	50	12	12500	7500	50	5	40	3.0	.1	71	N
U231	GENERAL PURPOSE	NQP	35	10	5.0	80	6.0	—	1000	5.0	0.5	50	4.5	0.1	71	N
U232	GENERAL PURPOSE	NQP	35	25	10	80	6.0	—	1000	5.0	0.5	50	4.5	0.1	71	N
U233	GENERAL PURPOSE	NQP	35	50	15	80	6.0	—	1000	5.0	0.5	50	4.5	0.1	71	N
U234	GENERAL PURPOSE	NQP	35	75	20	80	6.0	—	1000	5.0	0.5	50	4.5	0.1	71	N
U235	GENERAL PURPOSE	NQP	35	100	25	80	6.0	—	1000	5.0	0.5	50	4.5	0.1	71	N
U410	GENERAL PURPOSE	NQP	20	10	10	13	—	—	1000	6.0	0.5	40	3.5	0.2	71	N
U411	GENERAL PURPOSE	NQP	20	25	20	13	—	—	1000	6.0	0.5	40	3.5	0.2	71	N
U412	GENERAL PURPOSE	NQP	20	80	40	13	—	—	1000	6.0	0.5	40	3.5	0.2	71	N
DN5567	SWITCH	NCB-D	—	—	20	—	7.0	—	—	60	5	−40	3.0	0.1	71	N

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Product Specifications (Cont'd)

Low Leakage Diodes

Part Number	Package (TO-)	Diode	Reverse Current (pA, Max.)	Breakdown Voltage (Volts) Min.	Breakdown Voltage (Volts) Max.	Forward Voltage Drop Volts (Max.)	Capacitance (pF, Max.)
DPAD1	78	Dual	1	45	120	1.5	0.8
DPAD2	71	Dual	2	45	120	1.5	0.8
DPAD5	71	Dual	5	45	120	1.5	0.8
DPAD10	71	Dual	10	35	–	1.5	2.0
DPAD20	71	Dual	20	35	–	1.5	2.0
DPAD50	71	Dual	50	35	–	1.5	2.0
DPAD100	71	Dual	100	35	–	1.5	2.0
JPAD5	92	Single	5	35	–	1.5	2.0
JPAD10	92	Single	10	35	–	1.5	2.0
JPAD20	92	Single	20	35	–	1.5	2.0
JPAD50	92	Single	20	35	–	1.5	2.0
JPAD100	92	Single	50	35	–	1.5	2.0
JPAD200	92	Single	100	35	–	1.5	2.0
JPAD500	92	Single	500	35	–	1.5	2.0
PAD1	18	Single	1	45	120	1.5	0.8
PAD2	18	Single	2	45	120	1.5	0.8
PAD5	18	Single	5	45	120	1.5	0.8
PAD10	18	Single	10	35	–	1.5	2.0
PAD20	18	Single	20	35	–	1.5	2.0
PAD50	18	Single	50	35	–	1.5	2.0
PAD100	18	Single	100	35	–	1.5	2.0

Voltage Controlled Resistors

Part Number	N or P	Package (TO-)	Breakdown Voltage (Volts, Min.)	Threshold Voltage (Volts) Min.	Threshold Voltage (Volts) Max.	Resistance (Channel Ω) Min.	Resistance (Channel Ω) Max.	Geometry
VCR2N	N	18	15	3.5	7.0	20	60	NCB
VCR3P	P	72	15	3.5	7.0	70	200	PS-A/B
VCR4N	N	18	15	3.5	7.0	200	600	NPA
VCR5P	P	72	15	3.5	7.0	300	900	PS-A/B
VCR7N	N	72	15	2.5	5.0	4000	8000	NT

P-Channel MOSFETs

Part Number	Package (TO-)	Operating Mode	Threshold Voltage (Volts, Max.)	Resistance Channel (Ω, Max.)	Leakage Channel On (mA) Min.	Leakage Channel On (mA) Max.	Leakage Channel Off (nA, Max.)	Breakdown Voltage (Volts, Max.)	Input Capacitance (pF, Max.)	Reverse Capacitance (pF, Max.)	Geometry
3N163	72	ENH	5.0	250	5.0	30	–	40	2.5	0.7	MRA
3N164	72	ENH	5.0	300	3.0	30	–	30	2.5	0.7	MRA
MFE823	18	ENH	6.0	–	3.0	–	20	25	6.0	1.5	MRA

Product Specifications (Cont'd)

Current Regulator Diodes

Part Number	Package (TO-)	Forward Current (mA)	Forward Current Tolerance (%)	Limiting Voltage (Volts, Max.)	Peak Operating Voltage (Volts, Max.)	Dynamic Impedance (MΩ, Max.)	Forward Capacitance (pF, typ)	Geometry
CR022	18	0.22	10	1.00	100	13	–	NKL
CR024	18	0.24	10	1.00	100	10	–	NKL
CR027	18	0.27	10	1.00	100	9.0	–	NKL
CR030	18	0.30	10	1.00	100	8.0	–	NKL
CR033	18	0.33	10	1.00	100	6.6	–	NKL
CR039	18	0.39	10	1.05	100	4.1	–	NKL
CR043	18	0.43	10	1.05	100	3.3	–	NKL
CR047	18	0.47	10	1.10	100	2.7	–	NKL
CR056	18	0.56	10	1.20	100	1.9	–	NKL
CR062	18	0.62	10	1.30	100	1.55	–	NKL
CR068	18	0.68	10	1.15	100	1.35	–	NKM
CR075	18	0.75	10	1.20	100	1.15	–	NKM
CR082	18	0.82	10	1.25	100	1.00	–	NKM
CR091	18	0.91	10	1.29	100	0.88	–	NKM
CR100	18	1.00	10	1.35	100	0.80	–	NKM
CR110	18	1.10	10	1.40	100	0.70	–	NKM
CR120	18	1.20	10	1.45	100	0.64	–	NKM
CR130	18	1.30	10	1.50	100	0.58	–	NKM
CR140	18	1.40	10	1.55	100	0.54	–	NKM
CR150	18	1.50	10	1.60	100	0.51	–	NKM
CR160	18	1.60	10	1.65	100	0.475	–	NKO
CR180	18	1.80	10	1.75	100	0.42	–	NKO
CR200	18	2.00	10	1.85	100	0.395	–	NKO
CR220	18	2.20	10	1.95	100	0.37	–	NKO
CR240	18	2.40	10	2.00	100	0.345	–	NKO
CR270	18	2.70	10	2.15	100	0.32	–	NKO
CR300	18	3.00	10	2.25	100	0.30	–	NKO
CR330	18	3.30	10	2.35	100	0.28	–	NKO
CR360	18	3.60	10	2.50	100	0.265	–	NKO
CR390	18	3.90	10	2.60	100	0.255	–	NKO
CR430	18	4.30	10	2.75	100	0.245	–	NKO
CR470	18	4.70	10	2.90	100	0.235	–	NKO
CR530	18	5.30	10	3.10	100	0.20	–	NKO
CRR0240	18	.24	25	1.0	100	.9	–	NKL
CRR0360	18	.36	25	1.05	100	4.1	–	NKL
CRR0560	18	.56	25	1.30	100	1.15	–	NKL
CRR0800	18	.80	25	1.35	100	0.8	–	NKL
CRR1250	18	1.95	25	1.60	100	.54	–	NKM
CRR1950	18	1.95	25	1.95	100	.37	–	NKM
CRR2900	18	2.90	25	2.35	100	.28	–	NKO
CRR4300	18	4.30	25	3.00	100	0.5	–	NKO
J500	92	0.24	20	1.20	50	5.0	2	NCL
J501	92	0.33	20	1.30	50	3.0	2	NCL
J502	92	0.43	20	1.50	50	2.0	2	NCL
J503	92	0.56	20	1.70	50	1.4	2	NCL
J504	92	0.75	20	1.90	50	1.0	2	NCL
J505	92	1.00	20	2.10	50	0.6	2	NCL
J506	92	1.40	20	2.50	50	0.4	2	NCL
J507	92	1.80	20	2.80	50	0.25	2	NCL
J508	92	2.40	20	3.10	50	0.25	2	NCL
J509	92	3.00	20	3.50	50	0.20	2	NCL
J510	92	3.60	20	3.90	50	0.20	2	NCL
J511	92	4.70	20	4.20	50	0.15	2	NCL
J552	92	0.05	50	1.5	50	2.0	2	NKL
J553	92	(.18 - 0.75)	–	.75	50	10	–	NCL
J554	92	(06 -1.6)	–	.75	50	1.0	–	NCL
J555	92	(1.4 - 2.6)	–	.75	50	.88	–	NCL
J556	92	(2.4 - 3.8)	–	.75	50	.6	–	NCL
J557	92	(3.6 - 5.3)	–	1.5	50	.48	–	NCL
J9100	92	0.05	50	1.5	50	2.0	2	NCL
JR135V	92	0.200	–	0.9	135	2.0	–	VRMA
JR170V	92	0.200	–	0.9	170	2.0	–	VRMA
JR200V	92	0.200	–	0.9	200	2.0	–	VRMA
JR220V	92	0.200	–	0.9	220	2.0	–	VRMA
JR240V	92	0.200	–	0.9	240	2.0	–	VRMA

SMALL SIGNAL FETs Additional Product Options for European Customers

CECC 50 000

CECC 50 000 is a European system of continuous product assessment intended to produce electronic components of assessed quality to specifications and procedures which conform to internationally recognized standards. Components produced under the system are accepted by all participating countries without further testing being necessary.

At this time, member countries of the CECC are Belgium, Denmark, Germany, France, Ireland, Italy, the Netherlands, Norway, Sweden, Switzerland and the United Kingdom.

Under this assessment scheme, devices are manufactured on an approved line to nationally approved specifications written in accordance with CECC rules. The manufacturer must comply with defined standards relating to organization, facilities and quality control procedures.

Specific device types are individually qualified against a fixed detail specification which has been approved by the British Standards Institute acting as the national supervising agency on behalf of CECC.

The CECC 50 000 scheme is administered in the UK by the BSI, and UK generated specifications are prefixed with the letters BS.

A number of popular standard device types are now qualified and the following detail specifications are available:

Type Number	BS Specification
2N3970/1/2	BS CECC 50012-001
2N4091/2/3	BS CECC 50012-002
2N4391/2/3	BS CECC 50012-004
2N4856/7/8	BS CECC 50012-005
2N4859/60/61	BS CECC 50012-005
2N4856A/7A/8A	BS CECC 50012-006
2N4859A/60A/61A	BS CECC 50012-006
2N3821/2	BS CECC 50012-007
2N3824	BS CECC 50012-008
2N4220/1/2	BS CECC 50012-009
2N4220/1A/2A	BS CECC 50012-009

Each of the approved types is now available with additional screening options. including high temperature reverse bias burn-in, of either 48, 72 or 168 hours duration. Screening details are appended to the detail specification and conform to appendix VI of the European Standard CECC 50 0000 ISSUE 3.

Product is released with a BS CECC certificate of conformity and will have been submitted to:

1. Group A sample inspection (lot by lot)
   quality assessment tests, assuring product conforms to electrical specification.
2. Group B sample inspection (lot by lot)
   reliability tests, including package related tests and 168 hours electrical endurance, to identify potential early failures.
3. Group C sample inspection (periodic—3 monthly)
   long term reliability tests including 1000 hours of high temperature storage and electrical endurance.

Data from the inspection tests is available to the customer in the form of CTRs (certified test records).

Manufacturing of BS CECC product is carried out at the Siliconix UK facility located in Morriston, Swansea SA6 6NE, South Wales

In addition to BS CECC approved product, the Siliconix UK facility can provide internationally recognized high-reliability screening options on standard products. These include Mil-750 and custom screening options.

JAN, JANTX or JANTXV processing for certain JEDEC-registered FETs can also be supplied.

For additional information, enquiries may be directed to the nearest field sales office.

FET Process Option Flow Chart

Military Process		Industrial Process	
Metal Can **(Option -2)**	**Metal Can** **(Option -2A)**	**Standard** **(Hermetic Package)**	**Standard** **(Plastic Package)**
Preseal Inspection Method 2072	Preseal Inspection Siliconix Visual #5201	Preseal Inspection Siliconix Visual #5201	Preseal Inspection Siliconix Visual #5201
Stabilization Bake Method 1031 24 hour @ 200°C	Stabilization Bake Method 1031 24 hour @ 200°C	Stabilization Method 1031 24 hour @ 150°C	
Temperature Cycle Method 1051, Condition C 5 Cycles -65°C to +200°C @ Temperature Extremes, 20 Cycles, 10 Min.	Temperature Cycle Method 1051, Condition C 5 Cycles -65°C to +200°C @ Temperature Extremes, 20 Cycles, 10 Min.	LTPD = 20 Temperature Cycle Method 1051, Condition C 5 Cycles -65°C to +200°C @ Temperature Extremes, 20 Cycles, 10 Min.	
Constant Acceleration Method 2006 Y1 Axis 30,000 G	Constant Acceleration Method 2006 Y1 Axis 30,000 G		
Fine Leak Method 1071, Condition H or G Maximum Leak Rate, 5 x 10^{-8}	Fine Leak Method 1071, Condition H or G Maximum Leak Rate, 5 x 10^{-8}	Fine Leak Method 1071, Condition H or G Maximum Leak Rate, 5 x 10^{-8}	
Gross Leak Method 1071, Condition C	Gross Leak Method 1071, Condition C	Gross Leak Method 1071, Condition C	
Electrical Test to Static Parameters @ 25°C	Electrical Test to Static Parameters @ 25°C	Electrical Test to Static Parameters @ 25°C	Electrical Test to Static Parameters @ 25°C
HTRB Burn-In Method 1039, Condition A 168 hour @ 150°C	HTRB Burn-In Method 1039, Condition A 168 hour @ 150°C		
Electrical Test to Static Parameters @ 25°C	Electrical Test to Static Parameters @ 25°C		
Quality Conformance 25°C Static LTPD=5 -55°C Static LTPD=5 150°C Static LTPD=5 25°C 1 KHz Dynamic LTPD=10 External Visual LTPD=5 On Selected Parameters: Per QAP 1030	Quality Conformance 25°C Static AQL .4% External Visual LTPD = 10 On Selected Parameters: Per QAP 1030	Quality Conformance 25°C Static AQL .4% External Visual LTPD = 10 On Selected Parameters: Per QAP 1030	Quality Conformance 25°C Static AQL .4% External Visual LTPD = 10 On Selected Parameters: Per QAP 1030

NOTES: Processing and test methods are MIL-STD750 unless specified otherwise
-2A Significant savings.

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How to Use the SMALL SIGNAL FET Cross Reference

The following examples illustrate how the FET Cross Reference and Index should be used:

Case (1) Recommended replacement offered by Siliconix is identical to Industry Part Number.

Industry Part Number	Type and Classification	Recommended Replacement
2N4391	N JFET	2N4391

Case (2) Recommended replacement offered by Siliconix is not identical to Industry Part Number.

Industry Part Number	Type and Classification	Recommended Replacement
2N3457	N JFET	2N4338

The recommended replacement may be exact, tighter or looser on electrical characteristics, and may be a different package or pin-out. Data sheets for both parts should, if possible, be reviewed for a complete comparison.

Type and classification abbreviations are described as follows:

BF (JFET Plastic)
CR (Current Limited)
CRR (Current Limiter)
D (Dual)
DM N-Channel DMOS
DN (Dual N-Channel Metal Can)
DPAD (Dual Pico Ampere Diode)
FN (N-Channel Metal Can)
ENH (Enhancement-Mode Normally-Off)
JPAD (Plastic Pico Ampere Diode)
JR (Plastic High Voltage Diode)
N (N-Channel)
P (P-Channel)
PAD (Pico Ampere Diode)
SD (N-Channel DMOS)
SI (N-Channel JFET Circuit)
SST (JFET in SOT-23 Plastic Package)

SMALL SIGNAL FET Cross Reference

Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
1N5283	CL N JFET	CR022	Refer to the Small Signal FET Design Catalog	
1N5284	CL N JFET	CR024		
1N5285	CL N JFET	CR027		
1N5286	CL N JFET	CR030		
1N5287	CL N JFET	CR033		
1N5288	CL N JFET	CR039		
1N5289	CL N JFET	CR043		
1N5290	CL N JFET	CR047		
1N5291	CL N JFET	CR056		
1N5292	CL N JFET	CR062		
1N5293	CL N JFET	CR068		
1N5294	CL N JFET	CR075		
1N5295	CL N JFET	CR082		
1N5296	CL N JFET	CR091		
1N5297	CL N JFET	CR100		
1N5298	CL N JFET	CR110		
1N5299	CL N JFET	CR120		
1N5300	CL N JFET	CR130		
1N5301	CL N JFET	CR140		
1N5302	CL N JFET	CR150		
1N5303	CL N JFET	CR160		
1N5304	CL N JFET	CR180		
1N5305	CL N JFET	CR200		
1N5306	CL N JFET	CR220		
1N5307	CL N JFET	CR240		
1N5308	CL N JFET	CR270		
1N5309	CL N JFET	CR300		
1N5310	CL N JFET	CR330		
1N5311	CL N JFET	CR360		
1N5312	CL N JFET	CR390		
1N5313	CL N JFET	CR430		
1N5314	CL N JFET	CR470		
2N2609	P JFET	2N2609		
2N3066	N JFET	2N4340		
2N3067	N JFET	2N4338		
2N3068	N JFET	2N4338		
2N3069	N JFET	2N4341		
2N3070	N JFET	2N4339		
2N3071	N JFET	2N4338		
2N3084	N JFET	2N4341		
2N3085	N JFET	2N4341		
2N3086	N JFET	2N4341		
2N3087	N JFET	2N4341		
2N3088	N JFET	2N4339		
2N3088A	N JFET	2N4339		
2N3089	N JFET	2N4339		
2N3089A	N JFET	2N4339		
2N3113	P JFET	2N3329		
2N3365	N JFET	2N4340		
2N3366	N JFET	2N4338		
2N3367	N JFET	2N4338		
2N3368	N JFET	2N4341		
2N3369	N JFET	2N4340		
2N3370	N JFET	2N4339		
2N3436	N JFET	2N4341		
2N3437	N JFET	2N4341	Refer to the Small Signal FET Design Catalog	
2N3438	N JFET	2N4341		
2N3452	N JFET	2N4340		
2N3453	N JFET	2N4338		
2N3454	N JFET	2N4338		
2N3455	N JFET	2N4340		
2N3456	N JFET	2N4338		
2N3457	N JFET	2N4338		
2N3458	N JFET	2N4341		
2N3459	N JFET	2N4341		
2N3460	N JFET	2N4340		
2N3608	P MOS ENH	3N163		
2N3684	N JFET	2N4339		
2N3685	N JFET	2N4339		
2N3686	N JFET	2N4340		
2N3687	N JFET	2N4341		
2N3819	N JFET	2N3819		
2N3820	P JFET	J270		
2N3821	N JFET	2N3821		
2N3822	N JFET	2N3822		
2N3823	N JFET	2N3823		
2N3824	N JFET	2N3824		
2N3921	D N JFET	2N3921		
2N3922	D N JFET	2N3922		
2N3954	D N JFET	2N3954		
2N3954A	D N JFET	2N3954A		
2N3955	D N JFET	2N3955		
2N3955A	D N JFET	2N3955A		
2N3956	D N JFET	2N3956		
2N3957	D N JFET	2N3957		
2N3958	D N JFET	2N3958		
2N3966	N JFET	2N3966		
2N3967	N JFET	2N4221		
2N3967A	N JFET	2N4221		
2N3968	N JFET	2N4339		
2N3968A	N JFET	2N4339		
2N3969	N JFET	2N4339		
2N3969A	N JFET	2N3686		
2N3970	N JFET	2N3970		
2N3971	N JFET	2N3971		
2N3972	N JFET	2N3972		
2N4084	D N JFET	2N4084		
2N4085	D N JFET	2N4085		
2N4091	N JFET	2N4091		
2N4091A	N JFET	2N4091		
2N4092	N JFET	2N4092		
2N4092A	N JFET	2N4092		
2N4093	N JFET	2N4093		
2N4093A	N JFET	2N4093		
2N4117	N JFET	2N4117		
2N4117A	N JFET	2N4117A		
2N4118	N JFET	2N4118		
2N4118A	N JFET	2N4118A		
2N4119	N JFET	2N4119		
2N4119A	N JFET	2N4119A		

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SMALL SIGNAL FET Cross Reference (Cont'd)

Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
2N4120	P MOS ENH	3N163		
2N4139	N JFET	2N3822		
2N4220	N JFET	2N4220		
2N4220A	N JFET	2N4220A		
2N4221	N JFET	2N4221		
2N4221A	N JFET	2N4221A		
2N4222	N JFET	2N4222		
2N4222A	N JFET	2N4222A		
2N4223	N JFET	2N4223		
2N4224	N JFET	2N4224		
2N4267	P MOS ENH	3N163		
2N4302	N JFET	PN4302-18		
2N4303	N JFET	PN4303-18		
2N4304	N JFET	PN4304-18		
2N4338	N JFET	2N4338		
2N4339	N JFET	2N4339		
2N4340	N JFET	2N4340		
2N4341	N JFET	2N4341		
2N4352	P MOS ENH	3N163		
2N4381	P JFET	2N2609		
2N4382	P JFET	2N5115		
2N4391	N JFET	2N4391		
2N4392	N JFET	2N4392		
2N4393	N JFET	2N4393		
2N4416	N JFET	2N4416		
2N4416A	N JFET	2N4416A		
2N4445	N JFET	2N5432		
2N4446	N JFET	2N5433		
2N4447	N JFET	2N5432		
2N4448	N JFET	2N5433		
2N4856	N JFET	2N4856		
2N4856A	N JFET	2N4856A		
2N4856JAN	N JFET	2N4856JAN		
2N4856JANTX	N JFET	2N4856JANTX		
2N4856JANTXV	N JFET	2N4856JANTXV		
2N4857	N JFET	2N4857		
2N4857A	N JFET	2N4857A		
2N4857JAN	N JFET	2N4857JAN		
2N4857JANTX	N JFET	2N4857JANTX		
2N4857JANTXV	N JFET	2N4857JANTXV		
2N4858	N JFET	2N4858		
2N4858A	N JFET	2N4858A		
2N4858JAN	N JFET	2N4858JAN		
2N4858JANTX	N JFET	2N4858JANTX		
2N4858JANTXV	N JFET	2N4858JANTXV		
2N4859	N JFET	2N4859		
2N4859A	N JFET	2N4859A		
2N4859JAN	N JFET	2N4859JAN		
2N4859JANTX	N JFET	2N4859JANTX		
2N4859JANTXV	N JFET	2N4859JANTXV		
2N4860	N JFET	2N4860		
2N4860A	N JFET	2N4860A		
2N4860JAN	N JFET	2N4860JAN		
2N4860JANTX	N JFET	2N4860JANTX		
2N4860JANTXV	N JFET	2N4860JANTXV		

Refer to the Small Signal FET Design Catalog

Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
2N4861	N JFET	2N4861		
2N4861A	N JFET	2N4861A		
2N4861JAN	N JFET	2N4861JAN		
2N4861JANTX	N JFET	2N4861JANTX		
2N4861JANTXV	N JFET	2N4861JANTXV		
2N4867	N JFET	2N4867		
2N4867A	N JFET	2N4867A		
2N4868	N JFET	2N4868		
2N4868A	N JFET	2N4868A		
2N4869	N JFET	2N4869		
2N4869A	N JFET	2N4869A		
2N4977	N JFET	2N5432		
2N4978	N JFET	2N5433		
2N4979	N JFET	2N5434		
2N5018	P JFET	2N5018		
2N5019	P JFET	2N5019		
2N5020	P JFET	2N3329		
2N5045	D N JFET	2N5045		
2N5046	D N JFET	2N5046		
2N5047	D N JFET	2N5047		
2N5103	N JFET	2N4416		
2N5104	N JFET	2N4416		
2N5105	N JFET	2N4416		
2N5114	P JFET	2N5114		
2N5115	P JFET	2N5115		
2N5116	P JFET	2N5116		
2N5158	N JFET	2N5434		
2N5159	N JFET	2N5433		
2N5196	D N JFET	2N5196		
2N5197	D N JFET	2N5197		
2N5198	D N JFET	2N5198		
2N5199	D N JFET	2N5199		
2N5245	N JFET	PN4416		
2N5246	N JFET	J305-18		
2N5247	N JFE	J304-18		
2N5248	N JFET	2N5486		
2N5257	N JFET	2N5457		
2N5258	N JFET	2N5458		
2N5259	N JFET	2N5459		
2N5358	N JFET	2N4340		
2N5359	N JFET	2N4340		
2N5360	N JFET	2N4339		
2N5361	N JFET	2N4339		
2N5362	N JFET	2N4339		
2N5363	N JFET	2N4222A		
2N5364	N JFET	2N4224		
2N5391	N JFET	2N4867A		
2N5392	N JFET	2N4868A		
2N5393	N JFET	2N4869A		
2N5394	N JFET	2N4869A		
2N5395	N JFET	2N4869A		
2N5396	N JFET	2N4869A		
2N5397	N JFET	U310		
2N5398	N JFET	U312		
2N5432	N JFET	2N5432		

Refer to the Small Signal FET Design Catalog

SMALL SIGNAL FET Cross Reference (Cont'd)

Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
2N5433	N JFET	2N5433		
2N5434	N JFET	2N5434		
2N5452	D N JFET	2N5452		
2N5453	D N JFET	2N5453		
2N5454	D N JFET	2N5454		
2N5457	N JFET	2N5457		
2N5458	N JFET	2N5458		
2N5459	N JFET	2N5459		
2N5484	N JFET	2N5484		
2N5485	N JFET	2N5485		
2N5486	N JFET	2N5486		
2N5515	D N JFET	2N5515		
2N5516	D N JFET	2N5516		
2N5517	D N JFET	2N5517		
2N5518	D N JFET	2N5518		
2N5519	D N JFET	2N5519		
2N5520	D N JFET	2N5520		
2N5521	D N JFET	2N5521		
2N5522	D N JFET	2N5522		
2N5523	D N JFET	2N5523		
2N5524	D N JFET	2N5524		
2N5545	D N JFET	2N5545		
2N5546	D N JFET	2N5546		
2N5547	D N JFET	2N5547		
2N5549	N JFET	2N4392		
2N5561	D N JFET	U401		
2N5562	D N JFET	U402		
2N5563	D N JFET	U404		
2N5564	D N JFET	2N5564		
2N5565	D N JFET	2N5565		
2N5566	D N JFET	2N5566		
2N5592	N JFET	2N3822		
2N5593	N JFET	2N3822		
2N5594	N JFET	2N3822		
2N5638	N JFET	2N5638		
2N5639	N JFET	2N5639		
2N5640	N JFET	2N5640		
2N5647	N JFET	2N4117A		
2N5648	N JFET	2N4117A		
2N5649	N JFET	2N4117A		
2N5801	N JFET	2N4393		
2N5802	N JFET	2N4393		
2N5803	N JFET	2N4392		
2N5902	D N JFET	U421		
2N5903	D N JFET	U422		
2N5904	D N JFET	U423		
2N5905	D N JFET	U421		
2N5906	D N JFET	U422		
2N5907	D N JFET	U423		
2N5908	D N JFET	U423		
2N5909	D N JFET	U423		
2N5911	D N JFET	2N5911		
2N5912	D N JFET	2N5912		
2N5949	N JFET	PN4416		
2N5950	N JFET	PN4416		
2N5951	N JFET	PN4416		
2N5952	N JFET	J305		
2N5953	N JFET	J305		
2N6451	N JFET	2N4393		
2N6452	N JFET	2N4393		
2N6453	N JFET	2N4393		
2N6454	N JFET	2N4393		
2N6483	D N JFET	U401		
2N6484	D N JFET	U402		
2N6585	D N JFET	U404		
2N6568	N JFET	U290		
2N6656	V MOS N ENH	2N6656		
2N6657	V MOS N ENH	2N6657		
2N6658	V MOS N ENH	2N6658		
2N6659	V MOS N ENH	2N6659		
2N6660	V MOS N ENH	2N6660		
2N6661	V MOS N ENH	2N6661		
3N145	P MOS ENH	3N163		
3N146	P MOS ENH	3N163		
3N155	P MOS ENH	3N163		
3N155A	P MOS ENH	3N163		
3N156	P MOS ENH	3N163		
3N156A	P MOS ENH	3N163		
3N157	P MOS ENH	3N163		
3N157A	P MOS ENH	3N163		
3N158	P MOS ENH	3N163		
3N158A	P MOS ENH	3N163		
3N163	P MOS ENH	3N163		
3N164	P MOS ENH	3N164		
3N174	P MOS ENH	3N163		
14T	N JFET	2N3819		
142T	N JFET	PN4392		
158T	N JFET	PN4302		
159T	N JFET	PN4416		
100S	N JFET	PN4304		
100U	N JFET	2N3684		
102M	N JFET	2N5486		
102S	N JFET	2N4302		
103M	N JFET	2N5457		
103S	N JFET	2N5459		
104M	N JFET	2N5458		
105M	N JFET	2N5459		
105U	N JFET	2N4222		
106M	N JFET	2N5485		
107M	N JFET	2N5486		
110U	N JFET	2N4339		
115U	N JFET			
120U	N JFET	2N4340		
125U	N JFET	2N4339		
130U	N JFET	2N4341		
135U	N JFET	2N4339		
155U	N JFET	2N4416		
182S	N JFET	2N4391		
183S	N JFET	2N3823		
197S	N JFET	2N4338		

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SMALL SIGNAL FET Cross Reference (Cont'd)

Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
198S	N JFET	2N4340	Refer to the Small Signal FET Design Catalog	
199S	N JFET	2N4341		
200S	N JFET	2N4392		
200U	N JFET	2N3824		
201S	N JFET	2N4391		
202S	N JFET	2N4392		
203S	N JFET	2N3821		
204S	N JFET	2N3821		
210U	N JFET	2N4416		
231S	D N JFET	2N3954		
232S	D N JFET	2N3955		
233S	D N JFET	2N3956		
234S	D N JFET	2N3957		
235S	D N JFET	2N3958		
241U	N JFET	2N4869		
250U	N JFET	2N4091		
251U	N JFET	2N4392		
703U	N JFET	2N4220		
704U	N JFET	2N4220		
705U	N JFET	2N4224		
707U	N JFET	2N4860		
714U	N JFET	2N3822		
734U	N JFET	2N4416		
734EU	N JFET	PN4416		
751U	N JFET	2N4340		
752U	N JFET	2N4340		
753U	N JFET	2N4341		
754U	N JFET	2N4340		
755U	N JFET	2N4341		
756U	N JFET	2N4340		
1277A	N JFET	2N3822		
1278A	N JFET	2N3821		
1279A	N JFET	2N3821		
1280A	N JFET	2N4224		
1281A	N JFET	2N3822		
1282A	N JFET	2N4341		
1283A	N JFET	2N4340		
1284A	N JFET	2N4222		
1285A	N JFET	2N3821		
1286A	N JFET	2N4220		
1325A	N JFET	2N4222		
1714A	N JFET	2N4340		
2000M	N JFET	2N3823		
2001M	N JFET	2N3823		
2078A	D N JFET	2N3955		
2079A	D N JFET	2N3955		
2080A	D N JFET	2N5546		
2081A	D N JFET	2N5546		
2093M	N JFET	2N3687		
2094M	N JFET	2N3686		
2095M	N JFET	2N3686		
2098A	D NJFET	2N5545		
2099A	D N JFET	2N5546		
2130U	D N JFET	2N5452		
2132U	D N JFET	2N3955		
2134U	D N JFET	2N3956	Refer to the Small Signal FET Design Catalog	
2136U	D N JFET	2N3957		
2138U	D N JFET	2N3958		
2139U	D N JFET	2N3958		
2147U	D N JFET	2N3958		
2148U	D N JFET	2N3958		
2149U	D N JFET	2N3958		
A5T3821	N JFET	J305		
A5T3822	N JFET	J305		
A5T3823	N JFET	PN4416		
A5T3824	N JFET	J302-18		
A192	N JFET	2N4416		
AD830	D N JFET	U421		
AD831	D N JFET	U421		
AD832	D N JFET	U422		
AD833	D N JFET	U426		
AD833A	D N JFET	U423		
AD835	D N JFET	2N3921		
AD836	D N JFET	2N3921		
AD837	D N JFET	2N3922		
AD838	D N JFET	2N4085		
AD839	D N JFET	2N4085		
AD840	D N JFET	2N5196		
AD841	D N JFET	2N5197		
AD842	D N JFET	2N5199		
AD3954	D N JFET	2N3954		
AD3954A	D N JFET	2N3954A		
AD3955	D N JFET	2N3955		
AD3956	D N JFET	2N3956		
AD3957	D N JFET	2N3957		
AD3958	D N JFET	2N3958		
BC264	N JFET	PN4304		
BC264A	N JFET	PN4302		
BC264B	N JFET	PN4304		
BC264C	N JFET	PN4304		
BC264D	N JFET	PN4416		
BF244A/B/C*	N JFET	*Contact factory		
BF245A/B/C*	D N JFET	*Contact factory		
BFR45	D N JFET	2N4416		
BFS21	N JFET	2N5199		
BFS21A	D N JFET	2N5199		
BFS67	N JFET	2N3821		
BFS67P	N JFET	2N4303		
BFS68	N JFET	2N3823		
BFS68P	N JFET	PN4416		
BFS70	N JFET	2N3821		
BFS71	N JFET	2N3822		
BFS72	N JFET	2N3823		
BFS73	N JFET	2N3821		
BFS74	N JFET	2N4856		
BFS75	N JFET	2N4857		
BFS76	N JFET	2N4858		
BFS77	N JFET	2N4859		
BFS78	N JFET	2N4860		
BFS79	N JFET	2N4861		

SMALL SIGNAL FET Cross Reference (Cont'd)

Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
BFS80	N JFET	2N4416A		
BFW10	N JFET	2N3823		
BFW11	N JFET	2N3822		
BFW54	N JFET	2N3822		
BFW55	N JFET	2N3822		
BFW56	N JFET	2N4869		
BFW61	N JFET	2N4224		
BSV22	N JFET	2N4416		
BSV78	N JFET	2N4856A		
BSV80	N JFET	2N4858A		
C413N	N JFET	2N5434		
C673	N JFET	2N4341		
C674	N JFET	2N4341		
C680	N JFET	2N4338		
C680A	N JFET	2N4338		
C681	N JFET	2N4338		
C681A	N JFET	2N4338		
C682	N JFET	2N4339		
C682A	N JFET	2N4339		
C683	N JFET	2N4339		
C683A	N JFET	2N4339		
C684	N JFET	2N4220		
C684A	N JFET	2N4220		
C685	N JFET	2N4220		
C685A	N JFET	2N4220		
C6690	N JFET	2N4341		
C6691	N JFET	2N4341		
C6692	N JFET	2N4340		
CM600	N JFET	2N4092		
CM601	N JFET	2N4091		
CM602	N JFET	2N4091		
CM603	N JFET	2N4091		
CM640	N JFET	2N4093		
CM641	N JFET	2N4093		
CM642	N JFET	2N4093		
CM643	N JFET	2N4092		
CM644	N JFET	2N4092		
CM645	N JFET	2N4092		
CM646	N JFET	2N4092		
CM647	N JFET	2N4091		
CM650	N JFET	2N5432		
CM651	N JFET	2N5433		
CM652	N JFET	2N5432		
CM653	N JFET	2N5433		
CM697	N JFET	2N5434		
CM800	N JFET	2N5434		
CMX740	N JFET	U290		
CP640	N JFET	U296		
CP643	N JFET	2N5434		
CP650	N JFET	U322		
CP651	N JFET	U320		
CP652	N JFET	U322		
CP653	N JFET	U320		

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Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
CR022 Thru CR530 Referenced Under 1N Series				
CRR0240-4300	CL N FET	CRR0240-4300		
DN5564-66	D N JFET	DN5564-66		
DN5567	D N JFET	DN5567		
DPAD1	D PAD N JFET	DPAD1		
DPAD2	D PAD N JFET	DPAD2		
DPAD5	D PAD N JFET	DPAD5		
DPAD10	D PAD N JFET	DPAD10		
DPAD20	D PAD N JFET	DPAD20		
DPAD50	D PAD N JFET	DPAD50		
DPAD100	D PAD N JFET	DPAD100		
DU4339	D N JFET	U235		
DU4340	D N JFET	U235		
E100	N JFET	J203-18		
E101	N JFET	J201-18		
E102	N JFET	J202-18		
E103	N JFET	J105-18		
E105	N JFET	J105-18		
E106	N JFET	J106-18		
E107	N JFET	J107-18		
E108	N JFET	J108-18		
E109	N JFET	J109-18		
E110	N JFET	J110-18		
E111	N JFET	J111-18		
E112	N JFET	J112-18		
E113	N JFET	J113-18		
E174	P JFET	J174-18		
E175	P JFET	J175-18		
E176	P JFET	J176-18		
E177	P JFET	J177-18		
E201	N JFET	J201-18		
E202	N JFET	J202-18		
E203	N JFET	J203-18		
E204	N JFET	J204-18		
E210	N JFET	J210		
E211	N JFET	J211		
E212	N JFET	J212		
E230	N JFET	J230-18		
E231	N JFET	J231-18		
E232	N JFET	J232-18		
E270	P JFET	J270-18		
E271	P JFET	J271-18		
E300	N JFET	J300		
E304	N JFET	J304		
E305	N JFET	J305		
E308	N JFET	J308		
E309	N JFET	J309		
E310	N JFET	J310		
E400	D N JFET	U410		
E401	D N JFET	U411		
E402	D N JFET	U410		
E410	D N JFET	U410		
E411	D N JFET	U411		
E412	D N JFET	U412		

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SMALL SIGNAL FET Cross Reference (Cont'd)

Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
E413	D N JFET	U410		
E414	D N JFET	U411		
E415	D N JFET	U412		
E420	D N JFET	U440		
E421	D N JFET	U441		
E430	D N JFET	U430		
E431	D N JFET	U431		
E500	CL N JFET	J500		
E501	CL N JFET	J501		
E502	CL N JFET	J502		
E503	CL N JFET	J503		
E504	CL N JFET	J504		
E505	CL N JFET	J505		
E506	CL N JFET	J506		
E507	CL N JFET	J507		
E508	CL N JFET	J508		
E509	CL N JFET	J509		
E510	CL N JFET	J510		
E511	CL N JFET	J511		
EPAD50	DD N JFET	JPAD50		
EPAD100	DD N JFET	JPAD100		
EPAD200	DD N JFET	JPAD200		
EPAD500	DD N JFET	JPAD500		
FE100	N JFET	2N3821		
FE100A	N JFET	2N3821		
FE102	N JFET	2N4119		
FE102A	N JFET	2N4119		
FE104	N JFET	2N4118		
FE104A	N JFET	2N4118		
FE200	N JFET	2N3821		
FE202	N JFET	2N3821		
FE204	N JFET	2N3821		
FE300	N JFET	2N3822		
FE302	N JFET	2N3821		
FE304	N JFET	2N3821		
FE0654A	N JFET	2N5486		
FE0654B	N JFET	2N5485		
FE3819	N JFET	2N3819		
FE5457	N JFET	2N5457		
FE5458	N JFET	2N5458		
FE5459	N JFET	2N5459		
FE5484	N JFET	2N5484		
FE5485	N JFET	2N5485		
FE5486	N JFET	2N5486		
FM3954	D N JFET	2N3954		
FM3954A	D N JFET	2N3954A		
FM3955	D N JFET	2N3955		
FM3955A	D N JFET	2N3955A		
FM3956	D N JFET	2N3956		
FM3957	D N JFET	2N3957		
FM3958	D N JFET	2N3958		
FN4117	N J FET	FN4117		
FN4117A	N J FET	FN4117A		
FN4118	N J FET	FN4118		
FN4118A	N J FET	FN4118A		

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Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
FN4119	N J FET	FN4119		
FN4119A	N J FET	FN4119A		
FN4392	N J FET	FN4392		
FN4393	N J FET	FN4393		
FT0654A	N JFET	2N5486		
FT0654B	N JFET	2N5486		
FT0654C	N JFET	2N4221		
FT0654D	N JFET	2N4221		
FT704	P MOS ENH	3N163		
GET5457	N JFET	2N5457		
GET5458	N JFET	2N5458		
GET5459	N JFET	2N5459		
HDIG1030	P MOS ENH	3N163		
ID100	D PAD N JFET	DPAD1		
ID101	D PAD N JFET	DPAD10		
IMF3954	D N JFET	2N3954		
IMF3954A	D N JFET	2N3954A		
IMF3955	D N JFET	2N3955		
IMF3955A	D N JFET	2N3955A		
IMF3956	D N JFET	2N3956		
IMF3957	D N JFET	2N3957		
IMF3958	D N JFET	2N3958		
IMF6485	D N JFET	U405		
IT100	P JFET	2N5116		
IT101	P JFET	2N5114		
IT108	N JFET	2N5486		
IT109	N JFET	U310		
IT1700	P MOS ENH	3N163		
IT1702	P MOSENH	3N163		
ITE500	CL N JFET	J500		
ITE501	CL N JFET	J501		
ITE502	CL N JFET	J502		
ITE503	CL N JFET	J503		
ITE504	CL N JFET	J504		
ITE505	CL N JFET	J505		
ITE506	CL N JFET	J506		
ITE507	CL N JFET	J507		
ITE3066	N JFET	J202-18		
ITE3067	N JFET	J201-18		
ITE3068	N JFET	J201-18		
ITE4117	N JFET	2N4117		
ITE4118	N JFET	2N4118		
ITE4119	N JFET	2N4119		
ITE4338	N JFET	J201-18		
ITE4339	N JFET	J201-18		
ITE4340	N JFET	J202-18		
ITE4341	N JFET	J203-18		
ITE4391	N JFET	PN4391-18		
ITE4392	N JFET	PN4392-18		
ITE4393	N JFET	PN4393-18		
ITE4416	N JFET	PN4416		
ITE4867	N JFET	J230-18		
ITE4868	N JFET	J231-18		
ITE4869	N JFET	J232-18		
J105	N JFET	J105		

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SMALL SIGNAL FET Cross Reference (Cont'd)

Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
J105-18	N JFET	J105-18	Refer to the Small Signal FET Design Catalog	
J106	N JFET	J106		
J106-18	N JFET	J106-18		
J107	N JFET	J107		
J107-18	N JFET	J107-18		
J108	N JFET	J108		
J108-18	N JFET	J108-18		
J109	N JFET	J109		
J109-18	N JFET	J109-18		
J110	N JFET	J110		
J110-18	N JFET	J110-18		
J111	N JFET	J111		
J111-18	N JFET	J111-18		
J112	N JFET	J112		
J112-18	N JFET	J112-18		
J113	N JFET	J113		
J113-18	N JFET	J113-18		
J174	P JFET	J174		
J174-18	P JFET	J174-18		
J175	P JFET	J175		
J175-18	P JFET	J175-18		
J176	P JFET	J176		
J176-18	P JFET	J176-18		
J177	P JFET	J177		
J177-18	P JFET	J177-18		
J201	N JFET			
J201-18	N JFET			
J202	N JFET			
J202-18	N JFET			
J203	N JFET			
J203-18	N JFET			
J204	N JFET	J204		
J204-18	N JFET	J204-18		
J210	N JFET	J210		
J211	N JFET	J211		
J212	N JFET	J212		
J230	N JFET	J230		
J230-18	N JFET	J230-18		
J231	N JFET	J231		
J231-18	N JFET	J231-18		
J232	N JFET	J232		
J232-18	N JFET	J232-18		
J270	P JFET	J270		
J270-18	P JFET	J270-18		
J271	P JFET	J271		
J271-18	P JFET	J271-18		
J300	N JFET	J300		
J300A/B/C/D	N JFET	J300A/B/C/D		
J304	N JFET	J304		
J305	N JFET	J305		
J308	N JFET	J308		
J309	N JFET	J309		
J310	N JFET	J310		
J401	D N JFET	U401		
J402	D N JFET	U402		
J403	D N JFET	U403	Refer to the Small Signal FET Design Catalog	
J404	D N JFET	U404		
J405	D N JFET	U405		
J406	D N JFET	U406		
J410	D N JFET	U410		
J411	D N JFET	U411		
J412	D N JFET	U412		
J500	CL N JFET	J500		
J501	CL N JFET	J501		
J502	CL N JFET	J502		
J503	CL N JFET	J503		
J504	CL N JFET	J504		
J505	CL N JFET	J505		
J506	CL N JFET	J506		
J507	CL N JFET	J507		
J508	CL N JFET	J508		
J509	CL N JFET	J509		
J510	CL N JFET	J510		
J511	CL N JFET	J511		
J552	CL N JFET	J552		
J553	CL N JFET	J553		
J554	CL N JFET	J554		
J555	CL N JFET	J555		
J556	CL N JFET	J556		
J557	CL N JFET	J557		
JPAD5	PAD N JFET	JPAD5		
JPAD10	PAD N JFET	JPAD10		
JPAD20	PAD N JFET	JPAD20		
JPAD50	PAD N JFET	JPAD50		
JPAD100	PAD N JFET	JPAD100		
JPAD200	PAD NJFET	JPAD200		
JPAD500	PAD N JFET	JPAD500		
JR135V	CL N JFET	JR135V		
JR170V	CL N JFET	JR170V		
JR200V	CL N JFET	JR200V		
JR220V	CL N JFET	JR220V		
JR240V	CL N JFET	JR240V		
J1401	D N JFET	U401		
J1402	D N JFET	U402		
J1403	D N JFET	U403		
J1404	D N JFET	U404		
J1405	D N JFET	U405		
J1406	D N JFET	U406		
J9100	CL N JFET	J9100		
K210-18	N JFET	J210		
K211-18	N JFET	J211		
K212-18	N JFET	J212		
K300-18	N JFET	J210		
K304-18	N JFET	J304		
K305-18	N JFET	J305		
K308-18	N JFET	J308		
K309-18	N JFET	J309		
K310-18	N JFET	J310		
KE3684	N JFET	2N4341		
KE3685	N JFET	2N4340		

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SMALL SIGNAL FET Cross Reference (Cont'd)

Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
KE3686	N JFET	2N4339		
KE3687	N JFET	2N4338		
KE3823	N JFET	J304-18		
KE3970	N JFET	PN4391-18		
KE3971	N JFET	PN4392-18		
KE3972	N JFET	PN4393-18		
KE4091	N JFET	PN4391-18		
KE4092	N JFET	PN4392-18		
KE4093	N JFET	PN4393-18		
KE4220	N JFET	2N5457		
KE4221	N JFET	2N5457		
KE4222	N JFET	2N5459		
KE4223	N JFET	J304-18		
KE4224	N JFET	J304-18		
KE4391	N JFET	PN4391-18		
KE4392	N JFET	PN4392-18		
KE4393	N JFET	PN4393-18		
KE4416	N JFET	PN4416		
KE4856	N JFET	PN4391-18		
KE4857	N JFET	PN4392-18		
KE4858	N JFET	PN4393-18		
KE4859	N JFET	PN4391-18		
KE4860	N JFET	PN4392-18		
KE4861	N JFET	PN4393-18		
KE5103	N JFET	J305		
KE5104	N JFET	J304		
KE5105	N JFET	J306		
KK4416-18	N JFET	PN4416		
LDF603	N JFET	2N4221A		
LDF604	N JFET	2N4221A		
LDF605	N JFET	2N4221A		
M163	P MOS ENH	3N163		
M164	P MOS ENH	3N164		
MEM520	P MOS ENH	3N164		
MEM520C	P MOS ENH	3N164		
MEM561	P MOS ENH	3N163		
MEM561C	P MOS ENH	3N163		
MEM806	P MOS ENH	3N163		
MEM806A	P MOS ENH	3N163		
MFE823	P MOS ENH	MFE823		
MFE2000	N JFET	2N4416		
MFE2001	N JFET	2N4416		
MFE2004	N JFET	2N4093		
MFE2005	N JFET	2N4092		
MFE2006	N JFET	2N4091		
MFE2007	N JFET	2N4860		
MFE2008	N JFET	2N4859		
MFE2009	N JFET	2N4859		
MFE2010	N JFET	2N5434		
MFE2011	N JFET	2N5433		
MFE2012	N JFET	2N5432		
MFE2093	N JFET	2N4338		
MFE2094	N JFET	2N4339		
MFE2095	N JFET	2N4540		
MFE4009	P JFET	2N3329		

Refer to the Small Signal FET Design Catalog

Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
MK10	N JFET	2N4416		
MMBFU310	N JFET	SST310		
MMBF5484	N JFET	SST5484		
MMBF5486	N JFET	SST5486		
MMBF4416	N JFET	SST4416		
MMBF5310	N JFET	SST310		
MMBF4391	N JFET	SST113		
MMBF4860	N JFET	SST112		
MMBF4392	N JFET	SST112		
MMBF4393	N JFET	SST111		
MMF1	D N JFET	2N3921		
MMF2	D N JFET	2N3921		
MMF3	D N JFET	2N3921		
MMF4	D N JFET	2N3921		
MMF5	D N JFET	2N3921		
MMF6	D N JFET	2N3921		
MMT3823	N JFET	2N3823		
MPF102	N JFET	MPF102		
MPF103	N JFET	2N5457		
MPF104	N JFET	2N5458		
MPF105	N JFET	2N5459		
MPF106	N JFET	2N5485		
MPF107	N JFET	2N5486		
MPF108	N JFET	MPF108		
MPF109	N JFET	MPF109		
MPF111	N JFET	MPF111		
MPF112	N JFET	MPF112		
MPF256	N JFET	J309		
MPF820	N JFET	U310		
MPF970	P JFET	J174		
MPF971	P JFET	J176		
MPF4391	N JFET	PN4391-18		
MPF4392	N JFET	PN4392-18		
MPF4393	N JFET	PN4393-18		
NF500	N JFET	2N4416		
NF501	N JFET	2N4416		
NF506	N JFET	2N4416		
NF510	N JFET	2N4393		
NF511	N JFET	2N4393		
NF520	N JFET	2N4339		
NF521	N JFET	2N4339		
NF522	N JFET	2N4339		
NF523	N JFET	2N4340		
NF530	N JFET	2N4341		
NF531	N JFET	2N4339		
NF532	N JFET	2N4341		
NF533	N JFET	2N4339		
NF580	N JFET	2N5432		
NF581	N JFET	2N5432		
NF582	N JFET	2N5433		
NF583	N JFET	2N5434		
NF584	N JFET	2N5433		
NF585	N JFET	2N4859		
NF4302	N JFET	2N4302		
NF4303	N JFET	2N4303		

Refer to the Small Signal FET Design Catalog

SMALL SIGNAL FET Cross Reference (Cont'd)

Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
NF4304	N JFET	2N4304	Refer to the Small Signal FET Design Catalog	
NF4445	N JFET	2N5432		
NF4446	N JFET	2N5433		
NF4447	N JFET	2N5432		
NF4448	N JFET	2N5433		
NF5163	N JFET	2N5163		
NF5457	N JFET	2N5457		
NF5458	N JFET	2N5458		
NF5459	N JFET	2N5459		
NF5484	N JFET	2N5484		
NF5485	N JFET	2N5485		
NF5486	N JFET	2N5486		
NF5555	N JFET	2N5555		
NF5638	N JFET	2N5638		
NF5639	N JFET	2N5639		
NF5640	N JFET	2N5640		
NF5653	N JFET	2N5653		
NF5654	N JFET	2N5654		
PAD1	PAD N JFET	PAD1		
PAD2	PAD N JFET	PAD2		
PAD5	PAD N JFET	PAD5		
PAD10	PAD N JFET	PAD10		
PAD20	PAD N JFET	PAD20		
PAD50	PAD N JFET	PAD50		
PAD100	PAD N JFET	PAD100		
P1086	P JFET	P1086		
P1086-18	P JFET	P1086-18		
P1087	P JFET	P1087		
P1087-18	P JFET	P1087-18		
PN4091	N JFET	PN4091		
PN4092	N JFET	PN4092		
PN4093	N JFET	PN4093		
PN4117	N JFET	PN4117		
PN4117A	N JFET	PN4117A		
PN4118	N JFET	PN4118		
PN4118A	N JFET	PN4118A		
PN4119	N JFET	PN4119		
PN4119A	N JFET	PN4119A		
PN4120	N JFET	PN4120		
PN4120A	N JFET	PN4120A		
PN4302	N JFET	PN4302		
PN4302-18	N JFET	PN4302-18		
PN4303	N JFET	PN4303		
PN4303-18	N JFET	PN4303-18		
PN4304	N JFET	PN4304		
PN4304-18	N JFET	PN4304-18		
PN4391	N JFET	PN4391		
PN4391-18	N JFET	PN4391-18		
PN4392	N JFET	PN4392		
PN4392-18	N JFET	PN4392-18		
PN4393	N JFET	PN4393		
PN4393-18	N JFET	PN4393-18		
PN4416	N JFET	PN4416		
PN5163	N JFET	PN5163		
PF510	P JFET	2N5018		

Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
PF511	P JFET	2N5014	Refer to the Small Signal FET Design Catalog	
SD210DE	D N JFET	SD210DE		
SD211DE	D N JFET	SD211DE		
SD212DE	D N JFET	SD212DE		
SD213DE	D N JFET	SD213DE		
SD214DE	D N JFET	SD214DE		
SD215DE	D N JFET	SD215DE		
SU2078	D N JFET	U425		
SU2079	D N JFET	U425		
SU2098	D N JFET	2N5197		
SU2098A	D N JFET	2N5197		
SU2098B	D N JFET	2N5196		
SU2099	D N JFET	2N5197		
SU2099A	D N JFET	2N5197		
SU2365	D N JFET	U401		
SU2365A	D N JFET	U401		
SU2366	D N JFET	U402		
SU2366A	D N JFET	U402		
SU2367	D N JFET	U403		
SU2367A	D N JFET	U403		
SU2368	D N JFET	U404		
SU2368A	D N JFET	U404		
SU2369	D N JFET	U405		
SU2369A	D N JFET	U405		
SU2410	D N JFET	U424		
SU2411	D N JFET	U425		
SU2412	D N JFET	U426		
TD5902	D N JFET	U421		
TD5902	D N JFET	U421		
TD5902A	D N JFET	U421		
TD5903	D N JFET	U422		
TD5903A	D N JFET	U422		
TD5904	D N JFET	U423		
TD5904A	D N JFET	U423		
TD5905	D N JFET	U424		
TD5905A	D N JFET	U424		
TD5906	D N JFET	U425		
TD5906A	D N JFET	U425		
TD5907	D N JFET	U422		
TD5907A	D N JFET	U422		
TD5908	D N JFET	U423		
TD5908A	D N JFET	U423		
TD5909	D N JFET	U426		
TD5909A	D N JFET	U426		
TD5911	D N JFET	2N5911		
TD5911A	D N JFET	2N5911		
TD5912	D N JFET	2N5912		
TD5912A	D N JFET	2N5912		
TIS14	N JFET	2N4340		
TIS25	D N JFET	U401		
TIS26	D N JFET	U402		
TIS27	D N JFET	U404		
TIS41	N JFET	2N4859		
TIS58	N JFET	J305-18		
TIS59	D N JFET	U1837		

SMALL SIGNAL FET Cross Reference (Cont'd)

Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
TIS73	N JFET	PN4391-18		
TIS74	N JFET	PN4392-18		
TIS75	N JFET	PN4393-18		
TIS88	N JFET	2N5486		
TIXS41	N JFET	2N4859		
TIXS42	N JFET	PN4393-18		
TN4117	N JFET	2N4117		
TN4117A	N JFET	2N4117A		
TN4118	N JFET	2N4118		
TN4118A	N JFET	2N4118A		
TN4119	N JFET	2N4119		
TN4119A	N JFET	2N4119A		
TN4338	N JFET	2N4338		
TN4339	N JFET	2N4339		
TN4340	N JFET	2N4340		
TN4341	N JFET	2N4341		
TP5114	P JFET	2N5114		
TP5115	P JFET	2N5115		
TP5116	P JFET	2N5116		
U182	N JFET	2N4857		
U183	N JFET	2N3824		
U197	N JFET	2N4339		
U198	N JFET	2N4340		
U199	N JFET	2N4341		
U200	N JFET	U200		
U201	N JFET	U201		
U202	N JFET	U202		
U221	N JFET	2N4391		
U222	N JFET	2N4391		
U231	D N JFET	U231		
U232	D N JFET	U232		
U233	D N JFET	U233		
U234	D N JFET	U234		
U235	D N JFET	U235		
U240	N JFET	2N5432		
U241	N JFET	2N5433		
U242	N JFET	2N5432		
U243	N JFET	2N5433		
U248	D N JFET	U421		
U248A	D N JFET	U425		
U249	D N JFET	U422		
U249A	D N JFET	U422		
U250	D N JFET	U423		
U250A	D N JFET	U423		
U251	D N JFET	U424		
U251A	D N JFET	U426		
U254	N JFET	2N4859		
U255	N JFET	2N4860		
U256	N JFET	2N4861		
U257	D N JFET	U257		
U273	N JFET	2N4118A		
U273A	N JFET	2N4118A		
U274	N JFET	2N4119A		
U274A	N JFET	2N4119A		
U275	N JFET	2N4119A		

Refer to the Small Signal FET Design Catalog

Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
U275A	N JFET	2N4119A		
U280	D N JFET	U231		
U281	D N JFET	U231		
U282	D N JFET	U232		
U283	D N JFET	U232		
U284	D N JFET	U233		
U285	D N JFET	U234		
U290	N JFET	U290		
U291	N JFET	U291		
U295	N JFET	U295		
U296	N JFET	U296		
U300	P JFET	2N5114		
U301	P JFET	2N5115		
U304	P JFET	U304		
U305	P JFET	U305		
U306	P JFET	U306		
U308	N JFET	U308		
U309	N JFET	U309		
U310	N JFET	U310		
U311	N JFET	U311		
U320	N JFET	U290		
U321	N JFET	U291		
U322	N JFET	U290		
U401	D N JFET	U401		
U402	D N JFET	U402		
U403	D N JFET	U403		
U404	D N JFET	U404		
U405	D N JFET	U405		
U406	D N JFET	U406		
U410	D N JFET	U410		
U411	D N JFET	U411		
U412	D N JFET	U412		
U421	D N JFET	U421		
U422	D N JFET	U422		
U423	D N JFET	U423		
U424	D N JFET	U424		
U425	D N JFET	U425		
U426	D N JFET	U426		
U427	D N JFET	U427		
U428	D N JFET	U428		
U430	D N JFET	U430		
U431	D N JFET	U431		
U440	D N JFET	U440		
U441	D N JFET	U441		
U443	D N JFET	U443		
U444	D N JFET	U444		
U508	N JFET	CR030		
U1177	N JFET	2N4220A		
U1178	N JFET	2N3821		
U1179	N JFET	2N3821		
U1180	N JFET	2N4221A		
U1181	N JFET	2N4220A		
U1182	N JFET	2N3821		
U1277	N JFET	2N4339		
U1278	N JFET	2N4339		

Refer to the Small Signal FET Design Catalog

SMALL SIGNAL FET Cross Reference (Cont'd)

Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
U1279	N JFET	2N4340		
U1280	N JFET	2N4339		
U1281	N JFET	2N3822		
U1282	N JFET	2N4341		
U1283	N JFET	2N4340		
U1284	N JFET	2N4341		
U1285	N JFET	2N4220		
U1288	N JFET	2N4341		
U1287	N JFET	2N4092		
U1322	N JFET	2N4221A		
U1323	N JFET	2N4221A		
U1324	N JFET	2N4220A		
U1325	N JFET	2N4222		
U1420	N JFET	2N3821		
U1421	N JFET	2N3822		
U1422	N JFET	2N3822		
U1714	N JFET	2N4340		
U1837E	N JFET	U1837		
U1897	N JFET	U1897		
U1897-18	N JFET	U1897-18		
U1897E	N JFET	U1897-18		
U1898	N JFET	U1898		
U1898-18	N JFET	U1898-18		
U1898E	N JFET	U1898-18		
U1899	N JFET	U1899		
U1899-18	N JFET	U1899-18		
U1899E	N JFT	U1899-18		
U1994E	N JFET	U1994		
U2047E	N JFET	PN4416		
U3000	N JFET	2N4341		
U3001	N JFET	2N4339		
U3002	N JFET	2N4338		
U3010	N JFET	2N4341		
U3011	N JFET	2N4340		
U3012	N JFET	2N4338		
UC20	N JFET	2N4341		
UC100	N JFET	2N4339		
UC110	N JFET	2N4339		
UC115	N JFET	2N4340		
UC120	N JFET	2N3686		
UC130	N JFET	2N4341		
UC155	N JFET	2N4416		
UC200	N JFET	2N3824		
UC201	N JFET	2N3824		
UC210	N JFET	2N4416		

Refer to the Small Signal FET Design Catalog

Industry Part Number	Type and Classification	Recommended Replacement	Data Sheet Page	Geometry Page
UC220	N JFET	2N3822		
UC240	N JFET	2N4869		
UC241	N JFET	2N4869		
UC250	N JFET	2N4091		
UC251	N JFET	2N4392		
UC401	P JFET	2N5116		
UC450	P JFET	2N5114		
UC451	P JFET	2N5116		
UC588	N JFET	2N4417		
UC703	N JFET	2N4220		
UC704	N JFET	2N4220		
UC705	N JFET	2N4224		
UC707	N JFET	2N4860		
UC714	N JFET	2N3822		
UC714E	N JFET	J203-18		
UC734	N JFET	2N4416		
UC734E	N JFET	PN4416		
UC751	N JFET	2N4340		
UC752	N JFET	2N4340		
UC753	N JFET	2N4341		
UC754	N JFET	2N4340		
UC755	N JFET	2N4341		
UC756	N JFET	2N4340		
UC805	P JFET	2N3331		
UC807	N JFET	2N4860		
UC814	P JFET	2N3331		
UC1700	P MOS ENH	3N163		
UC1764	P MOS ENH	3N163		
UC2130	D N JFET	2N5452		
UC2132	D N JFET	2N3955		
UC2134	D N JFET	2N3956		
UC2136	D N JFET	2N3957		
UC2138	D N JFET	2N3958		
UC2139	D N JFET	2N3958		
UC2147	D N JFET	2N3958		
UC2148	D N JFET	2N3958		
UC2149	D N JFET	2N3958		
VCR2N	N JFET	VCR2N		
VCR3P	P JFET	VCR3P		
VCR4N	N JFET	VCR4N		
VCR5P	P JFET	VCR5P		
VCR6P	P JFET	2N5116		
VCR7N	N JFET	VCR7N		
VCR11N	N JFET	VCR11N		
WK5457	N JFET	2N5457		
WK5458	N JFET	2N5458		
WK5459	N JFET	2N5459		

Refer to the Small Signal FET Design Catalog

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Analog Switch Selector Guide

SWITCHING SPEED ($t_{(on)}$ or $t_{(off)}$, WHICHEVER IS GREATER)

DRAIN TO SOURCE RESISTANCE: $r_{DS(on)}$	10ns	75ns	150ns	200ns	250ns	300ns	550/600ns	750ns	1µs	1.5/1.6µs	2/2.5µs	DRAIN TO SOURCE RESISTANCE: $r_{DS(on)}$
175Ω							DG201A c● DG202 c○	DG172 p●	DG211 c● DG212 c○	Si3002 p sd	DG123 p○ DG125 p●	175Ω
100Ω				DG308A c○ DG309 c●				Common Drain *(100-450Ω)		*(100-400Ω)	Common Drain *(100-450Ω) 5 per Package	100Ω
90Ω							‡DG221 c●					90Ω
80Ω to 70Ω					**DG182 j●** **DG185 j○ds** DG188 j sd **DG191 j sd**				**DG200A c●**	**†DG126 j○ds** **†DG134 j○** †DG142 j dd †DG143 j sd	Radiation Resistant	80Ω to 70Ω
50Ω	SD5000 d○ SD5001 d○ SD5002 d○ *(19-50Ω)	DG271 c●			**DG304A c○** DG305A c sd **DG306A c○ds** **DG307A c sd**	**DG300A c○** DG301A c sd **DG302A c○ds** **DG303A c sd** **DG381A c●** **DG384A c○ds** DG387A c sd **DG390A c sd**			**†DG243 c sd** DG5040 c○ **DG5041 c●** DG5042 c sd **DG5043 c sd** DG5044 c○ds **DG5045 c○ds**			50Ω
30Ω			**DG181 j●** **DG184 j○ds** DG187 j sd **DG190 j sd**							**†DG129 j○ds** **†DG133 j○** †DG139 j dd †DG144 j sd	Radiation Resistant	30Ω
10Ω						**DG180 j●** **DG183 j○ds** DG186 j sd **DG189 j sd**				Radiation Resistant	**†DG140 j○ds** **†DG141 j○** †DG145 j dd †DG146 j sd	10Ω
	10ns	75ns	150ns	200ns	250ns	300ns	550/600ns	750ns	1µs	1.5/1.6µs	2/2.5µs	

SWITCHING SPEED ($t_{(on)}$ or $t_{(off)}$, WHICHEVER IS GREATER)

Single (1 per Package)
Dual (2 per Package)
Quad (4 per Package)

c = Plus-40 CMOS Switch
d = DMOS Switch
j = N-JFET Switch
p = PMOS Switch

● = normally closed (logic 0 input)
○ = normally open (logic 0 input)

sd = single pole, double throw
ds = double pole, single throw
dd = double pole, double throw
Others = single pole, single throw

* = $r_{DS(on)}$ is a function of drive voltage
† = Make-before-break (Others Break-before-make)
‡ = Latchable inputs

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Analog Switch Product Selector Guide[1]

Basic Part Number	Switch Type	r_{DS} (on) Max.[2] (Ω)	Analog Voltage Range[2] (Vp-p)	Switching Time (μs) t_{on}	t_{off}	Logic Input for ON Switch	Logic Levels (V) V_{inL}	V_{inH}	Supply Voltages V+	V–	V_L[3]	Comments
One Channel SPST												
DG5040	CMOS Plus-40	50	30	1.0	0.5	1	0.8	2.0	15	–15	5	
DG5140[4]	CMOS Plus-40	30	30	0.2	0.125	1	0.8	2.0	15	–15	5	
DG5240[4]	CMOS Plus-40	30	30	0.2	0.125	1	0.8	2.0	15	–15	5	Latchable Inputs
Two Channel SPST												
DG133	N-JFET	30	20	0.6	1.6	1	0.8	2.5	12	–18	–	Use DG181 For New Design
DG134	N-JFET	80	20	0.6	1.6	1	0.8	2.5	12	–18	–	Use DG182 For New Design
DG141	N-JFET	10	20	1.0	2.5	1	0.8	2.5	12	–18	–	Use DG180 For New Design
DG180	N-JFET	10	20	0.3	0.25	0	0.8	2.0	10	–20	5	Break-Before-Make
		10	15	0.3	0.25	0	0.8	2.0	15	–15	5	15V Supplies
DG181	N-JFET	30	20	0.15	0.13	0	0.8	2.0	10	–20	5	Break-Before-Make
		30	15	0.15	0.13	0	0.8	2.0	15	–15	5	15V Supplies
DG182	N-JFET	75	20	0.25	0.13	0	0.8	2.0	10	–20	5	Break-Before-Make
		75	20	0.25	0.13	0	0.8	2.0	15	–15	5	15V Supplies
DG200A	CMOS Plus-40	70	30	1.0	0.5	0	0.8	2.4	15	–15	–	
DG300A	CMOS Plus-40	50	30	0.3	0.25	1	0.8	4.0	15	–15	–	
DG381A	CMOS Plus-40	50	30	0.3	0.25	0	0.8	4.0	15	–15	–	
DG304A	CMOS Plus-40	50	30	0.25	0.15	1	3.5	11.0	15	–15	–	CMOS compatible
DG5041	CMOS Plus-40	50	30	1.0	0.5	1	0.8	2.0	15	–15	5	Break-Before-Make
DG5141[4]	CMOS Plus-40	30	30	0.2	0.125	1	0.8	2.0	15	–15	5	
DG5241[4]	CMOS Plus-40	30	30	0.2	0.125	1	0.8	2.0	15	–15	5	Latchable Inputs
Four Channel SPST												
DG172	PMOS	150-450	20	0.3	0.75	0	0.8	2.0	10	–20	5	
DG201A	CMOS Plus-40	175	30	0.6	0.45	0	0.8	2.4	15	–15	–	
DG202	CMOS Plus-40	175	30	0.6	0.45	1	0.8	2.4	15	–15	–	
DG211	CMOS Plus-40	175	30	1.0	0.5	0	0.8	2.4	15	–15	5	
DG212	CMOS Plus-40	175	30	1.0	0.5	1	0.8	2.4	15	–15	5	
DG221	CMOS Plus-40	100	30						15	–15		Latchable Inputs
DG271[4]	CMOS Plus-40	50	30	0.05	0.04				15	–15		Fast (75 ns) Switch
DG308A	CMOS Plus-40	100	30	0.2	0.15	1	3.5	11.0	15	–15	–	Single Supply Operation
DG309	CMOS Plus-40	100	30	0.2	0.15	0	3.5	11.0	15	–15	–	Single Supply Operation
Five Channel SPST												
DG125	PMOS	100-450	20	0.3	2.0	0	0.5	4.6	10	–20	5	
One Channel SPDT												
DG143	N-JFET	80	20	0.8	1.6	Note 5	2.0	3.0	12	–18	–	Use DG188 For New Design
DG144	N-JFET	30	20	0.8	1.6	Note 5	2.0	3.0	12	–18	–	Use DG187 For New Design
DG146	N-JFET	10	20	1.0	2.5	Note 5	2.0	3.0	12	–18	–	Use DG186 For New Design
DG186	N-JFET	10	20	0.3	0.25	Note 6	0.8	2.0	10	–20	5	Break-Before-Make
		10	15	0.3	0.25	Note 6	0.8	2.0	15	–15	5	15V Supplies
DG187	N-JFET	30	20	0.15	0.13	Note 6	0.8	2.0	10	–20	5	Break-Before-Make
		30	15	0.15	0.13	Note 6	0.8	2.0	15	–15	5	15V Supplies
DG188	N-JFET	75	20	0.25	0.13	Note 6	0.8	2.0	10	–20	5	Break-Before-Make
		75	20	0.25	0.13	Note 6	0.8	2.0	15	–15	5	15V Supplies
DG301A	CMOS Plus-40	50	30	0.3	0.25	Note 6	0.8	4.0	15	–15	–	
DG387A	CMOS Plus-40	50	30	0.3	0.25	Note 6	0.8	4.0	15	–15	–	
DG305A	CMOS Plus-40	50	30	0.25	0.15	Note 6	3.5	11.0	15	–15	–	CMOS compatible
Si3002	PMOS	100-400	20	1.0	1.5	Note 6	0.8	2.0	10	–20	–	
DG5042	CMOS Plus-40	50	30	1.0	0.5	Note 6	0.8	2.0	156	–15	5	Break-Before-Make
DG5142[4]	CMOS Plus-40	30	30	0.2	0.125	Note 6	0.8	2.0	15	–15	5	
DG5242[4]	CMOS Plus-40	30	30	0.2	0.125	Note 6	0.8	2.0	15	–15	5	Latchable Inputs

Analog Switch Product Selector Guide[1]

(Continued)

Basic Part Number	Switch Type	r_{DS} (on) Max.[2] (Ω)	Analog Voltage Range[2] (Vp-p)	Switching Time (μs) t_{on}	t_{off}	Logic Input for ON Switch	Logic Levels (V) V_{inL}	V_{inH}	Supply Voltages V+	V−	V_L[3]	Comments
Two Channel SPDT												
DG189	N-JFET	10	20	0.3	0.25	Note 6	0.8	2.0	10	−20	5	Break-Before-Make
		10	15	0.3	0.25	Note 6	0.8	2.0	15	−15	5	15V Supplies
DG190	N-JFET	30	20	0.15	0.13	Note 6	0.8	2.0	10	−20	5	Break-Before-Make
		30	15	0.15	0.13	Note 6	0.8	2.0	15	−15	5	15V Supplies
DG191	N-JFET	75	20	0.25	0.13	Note 6	0.8	2.0	10	−20	5	Break-Before-Make
		75	20	0.25	0.13	Note 6	0.8	2.0	15	−15	5	15V Supplies
DG243	CMOS Plus-40	50	30	1.0	0.5	Note 6	0.8	2.0	15	−15	5	Make-Before-Break
DG303A	CMOS Plus-40	50	30	0.3	0.25	Note 6	0.8	4.0	15	−15	-	
DG390A	CMOS Plus-40	50	30	0.3	0.25	Note 6	0.8	4.0	15	−15	-	
DG307A	CMOS Plus-40	50	30	0.25	0.15	Note 6	3.5	11.0	15	−15	-	CMOS compatible
DG5043	CMOS Plus-40	50	30	1.0	0.5	Note 6	0.8	2.0	15	−15	5	Break-Before-Make
DG5143[4]	CMOS Plus-40	30	30	0.2	0.125	Note 6	0.8	2.0	15	−15	5	
DG5243[4]	CMOS Plus-40	30	30	0.2	0.125	Note 6	0.8	2.0	15	−15	5	Latchable Inputs
One Channel DPST												
DG5044	CMOS Plus-40	50	30	1.0	0.5	Note 6	0.8	2.0	15	−15	5	Break-Before-Make
DG5144[4]	CMOS Plus-40	30	30	0.2	0.125	Note 6	0.8	2.0	15	−15	5	
DG5244[4]	CMOS Plus-40	30	30	0.2	0.125	Note 6	0.8	2.0	15	−15	5	Latchable Inputs
Two Channel DPST												
DG126	N-JFET	80	20	0.6	1.6	1	0.8	2.5	12	−18	-	See DG185 For New Design
DG129	N-JFET	30	20	0.6	1.6	1	0.8	2.5	12	−18	-	See DG184 For New Design
DG140	N-JFET	10	20	1.0	2.5	1	0.8	2.5	12	−18	-	See DG184 For New Design
DG183	N-JFET	10	20	0.3	0.25	1	0.8	2.0	10	−20	5	Break-Before-Make
		10	15	0.3	0.25	1	0.8	2.0	15	−15	5	15V Supplies
DG184	N-JFET	30	20	0.15	0.13	1	0.8	2.0	10	−20	5	Break-Before-Make
		30	15	0.15	0.13	1	0.8	2.0	15	−15	5	15V Supplies
DG185	N-JFET	75	20	0.25	0.13	1	0.8	2.0	10	−20	5	Break-Before-Make
		75	20	0.25	0.13	1	0.8	2.0	15	−15	5	15V Supplies
DG302A	CMOS Plus-40	50	30	0.3	0.25	1	0.8	4.0	15	−15	-	
DG384A	CMOS Plus-40	50	30	0.3	0.25	1	0.8	4.0	15	−15	-	
DG306A	CMOS Plus-40	50	30	0.25	0.15	1	3.5	11.0	15	−15	-	CMOS compatible
DG5045	CMOS Plus-40	50	30	1.0	0.5	1	0.8	2.0	15	−15	5	Break-Before-Make
DG5145[4]	CMOS Plus-40	30	30	0.2	0.125	1	0.8	2.0	15	−15	5	
DG5245[4]	CMOS Plus-40	30	30	0.2	0.125	1	0.8	2.0	15	−15	5	Latchable Inputs
One Channel DPDT												
DG139	N-JFET	30	20	0.8	1.6	Note 5	2.0	3.0	12	−18	-	See DG191 For New Design
DG142	N-JFET	80	20	0.8	1.6	Note 5	2.0	3.0	12	−18	-	See DG190 For New Design
DG145	N-JFET	10	20	1.0	2.5	Note 5	2.0	3.0	12	−18	-	See DG189 For New Design

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Drivers for FET Switches[1]

Basic Part Number	INPUTS	OUTPUTS	Function	Input Logic for V_{OUTL}	V_{inL} (V)	V_{inH} (V)	Output Drive	t_{on} (ns)	t_{off} (ns)	Optimum Supply Voltage (V) V+	V-	V_L[3]	V_R[7]
D125	6	6	Six separate Drivers	0	0.5	4.6	ON —-5 mA Sink OFF—-30 V Block (Note 8)	500	1500	10	-20	5	-
D129	7	4	Four Channel (BV = 50V) Driver with Decode	1	0.7	2.2	ON —-10mA Sink OFF—50 V Block (Note 8)	300	1500	10	-20	5	0
D139	2	4	Two Channel (BV = 36V) Driver with Decode	(Note 6)	0	5	ON —30 V @ 10mA	170	200	10	-20	5	0

Multiple FET Switches[1]

Basic Part Number	SOURCES	DRAINS	GATES	Switch Type	Pull-up On Gate	r_{DS}(on) Max. V_s = 10V	V_s = -10V	BV_{DSS}	$I_{S\,(off)}$ (nA)	$V_{GS(th)}$ Min.	Max.	Capacitances (pF) C_{gs} (C_g)	C_{ds} (C_d)	C_{sb} (C_s)
G118	6	1	8	SP6T	No	100	450	-30	0.5	-1.5	-4.0	0.9	0.4	2
G119	6	2	3	DP3T	Yes	100	450	-30	0.5	-1.5	-4.0	1.8	0.4	2
SD5000	4	4	4	4 x SPST	No	50	-	20	10.0	0.1	2.0	(3.5)	(1.6)	(5)
SD5001	4	4	4	4 x SPST	No	50	-	10	10.0	0.1	2.0	(3.5)	(1.6)	(5)
SD5002	4	4	4	4 x SPST	No	50	-	15	10.0	0.1	2.0	(3.5)	(1.6)	(5)

Analog Multiplexer Selector Guide[1]

Basic Part Number	Latched Inputs	r_{DS} (on) Max. (Ω)	I_D(off) (nA)	Analog Voltage Range (V)	Transition Time[9] (μs)	Logic Levels (V) V_{inL}	V_{inH}	Supply Voltages V+	V-
Eight Channel MUX + Enable									
DG501[10]	NO	150-250	8	±5	1.5	0.6	3.5	5	-20
DG503[10]	NO	150-800	8	±10	1.5	0.6	3.5	10	-20
DG508A	NO	400	10	+10/−15	1.0	0.8	2.4	15	-15
DG528	YES	400	10	±15	1.0	0.8	2.4	15	-15
DG568[4]	YES	50-500	120	±30	2.0	4.0	11.0	30	-30
SI3705	NO	150-400	8	±5	1.5	0.6	3.5	5	-20

Analog Multiplexer Selector Guide[1]

(Continued)

Basic Part Number	Latched Inputs	r_{DS} (on) Max. (Ω)	I_D(off) (nA)	Analog Voltage Range (V)	Transition Time[9] (μs)	Logic Levels (V) V_{InL}	V_{InH}	Supply Voltages V+	V-
Sixteen Channel MUX + Enable									
DG506A	NO	400	10	±15	1.0	0.8	2.4	15	−15
DG526	YES	400	10	±15	1.0	0.8	2.4	15	−15
Four Channel Differential MUX									
DG509A	NO	400	10	±15	1.0	0.8	2.4	15	−15
DG529	YES	400	10	±15	1.0	0.8	2.4	15	−15
DG569[4]	YES	50-500	120	±30	2.0	4.0	11.0	30	-30
Eight Channel Differential MUX + Enable									
DG507A	NO	400	5	±15	1.0	0.8	2.4	15	−15
DG527	YES	400	5	±15	1.0	0.8	2.4	15	−15

NOTES:
1. Devices shown in **boldface** are recommended for new designs.
2. For most products, the analog voltage range is a function of supply voltages. For PMOS or CMOS switches, r_{DS}(on) is also a function of supply voltage and analog voltage. See individual data sheets for more details.
3. Logic supply voltage required for TTL compatible inputs.
4. Preliminary product. Specifications subject to change. Contact the factory on availability.
5. Input reference voltage of 2.5V is required. See individual data sheets for more details.
6. See data sheets for switch states of differential and multiple switches.
7. Ground reference voltage.
8. Device normally operates with output pullup resistor to 10V.
9. The appropriate switching characteristic for multiplexers is $t_{TRANSITION}$, not t_{on}, t_{off}.
10. Logic pullup resistors required.

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Linear Product Selector Guide[1]

Function	Part No. Package Information	Specifications	Features
Triple Op Amp	**L144** 14-pin plastic, ceramic, flat-pack	±1.5 to ±18V supply Programmable supply current Internally compensated 0.4V/μs slew rate	80dB gain with 20k load Drives large capacitive loads ±30V differential input Monolithic construction
Quad Comparator	**L161** 16-pin plastic, ceramic, flat-pack	±1.5 to ±18V supply Single supply operation Programmable supply current	Gain greater than 20V/mV Sensing near ground ±30V differential input CMOS Logic compatible
Ring Demodulator/ Balanced Mixer	**Si8901**[2] 8-pin metal can	+35 dB third order intercept point -55 dB input port isolation	Low ON resistance (50 ohms max.) Low Node Capacitances (7 pF max.) Very low power loss (<8dB)

Analog-To-Digital Converter Product Selector Guide[1]

Function	Part No. Package Information	Specifications	Features
8 Channel, 8-bit Data Acquisition System	**Si520** 28 pin plastic, 28 pin ceramic DIP	Conversion Time: 70 μs TTL compatible 5 mW power consumption No missing codes	Microprocessor compatible logic inputs and outputs Onboard 8 channel analog multiplexer and sample/hold
	Si8601[2] 28 pin plastic, 28 pin ceramic DIP	Conversion Time: 25 μs TTL and CMOS compatible 5 mW power consumption No missing codes	Microprocessor compatible logic inputs and outputs Onboard 8 channel analog multiplexer and sample/hold
4½-Digit Integrating A/D Converter	**Si7135**[2] 28 pin plastic DIP	±4½-Digit Resolution Accuracy 0.005% ±1 count Auto zero Auto polarity TTL compatible Rollover error ±1 count max.	2.0V full scale input Over-range and under-range signals MUX BCD outputs Monolithic design
	LD120/121A 16-pin & 18-pin plastic DIP respectively	±4½-Digit Resolution Accuracy 0.005% ±1 count Auto Zero Auto polarity TTL compatible Internal clock Linear to 28,500 counts	Two voltage ranges: 2.0V & 200.00mV 1 to 5 samples/s 25% inter-digit blanking MUX BCD outputs 0.5 count stability on 2.0V range Monolithic design
	LD122/121A 16-pin and 18-pin plastic DIP respectively	±4½-Digit Resolution Accuracy 0.005% ±1 count Auto Zero Auto polarity TTL compatible Internal clock Linear to 28,500 counts	Same as LD120/121A but without internal input buffer amplifier

NOTE:
1. Devices shown in **boldface** are recommended for new designs.
2. Preliminary product. Specifications subject to change. Contact factory on availability.

Analog-To-Digital Converter Product Selector Guide[1]

(Continued)

Function	Part No. Package Information	Specifications	Features
3½-Digit High Performance Integrating A/D Converter	**LD110/LD111A** 16-pin plastic DIPs	±3½-Digit Resolution Accuracy 0.02% ±1 count Auto zero Auto polarity 10 V resolution Typical TC of 5 ppm/°C	Three voltage ranges: 1.999V, 199.9mV, & 19.99mV Sampling rate up to 40 samples/s Differential input capability Over-range & under-range signals TTL compatible
8-bit Successive Approximation Register	**Si2503**[2] 16-pin plastic, 16-pin ceramic DIP	TTL compatible 110 mW power consumption	Control logic on board three-state outputs CMOS
12-bit Successive Approximation Register	**Si2504**[2] 24-pin plastic, 24-pin ceramic DIP	TTL compatible 110 mW power consumption	Control logic on board three-state outputs CMOS

Digital-To-Analog Converter Product Selector Guide[1]

Function	Part No. Package Information	Specifications	Features
4-bit SPDT DAC switch	DG515 14 pin plastic, Sidebraze, Ceramic	Binary weighted ON resistance 120 ns T_{on} time	Low ON resistance over temperature On chip drivers Used to configure up to 14 bit ADC or DAC with DG516
10-bit SPDT DAC switch	DG516 28 pin plastic, 28 pin ceramic, Ceramic	Binary weighted ON resistance 120 ns T_{on} time	Low ON resistance over temperature On chip drivers Used to configure up to 14 bit ADC or DAC with DG516
12-bit Monolithic CMOS Multiplying DAC	**Si8021/8020**[2] 28 pin plastic 28 pin ceramic	Guaranteed monotonicity @ 12-bits Nonlinearity: .024% full scale—Si8021 .048% full scale—Si8020 Typical 1 μs settling time	Multiplying DAC-accepts AC or DC reference Full four quadrant operation ±25V reference Double buffered Segmented bus for 4, 8, or 12-bit operation Onboard logic control circuitry

NOTE:
1. Devices shown in **boldface** are recommended for new designs.
2. Preliminary product. Specifications subject to change. Contact factory on availability.

Interface Product Selector Guide[1]

Function	Part No. Package Information	Specifications	Features
Power Drivers			
(Two Channel)	**D169** 14-pin plastic, 14-pin ceramic DIP	Up to 33V output @ ±40 mA Switching time—200 ns max. TTL compatible inputs Variable input threshold (V_L pin)	Logic family flexibility Complimentary outputs Can be used to drive MOSFETs or for level translation, analog multiplexing Single ended or dual supply operation
(Four Channel)	**D469** 14-pin plastic, 14-pin ceramic DIP	High current outputs 500 mA @ 2% duty cycle 100 mA @ 100% duty cycle 150 ns transition time @ 500 pF load TTL or CMOS compatible inputs	Single supply operation Low standby power consumption (60 mW max.) Compelementary logic inputs Can be used to drive MOSFETs
(Bubble Memory)	**Si7250** 16-pin plastic DIP	High current outputs 250 mA (one output @ 100% duty) 25 ns transition time @ 500 pF load TTL compatible inputs	Easy to interface Power fail reset Single supply operation Low standby power consumption
Display Drivers			
LCD Driver	**DF412** 40-pin plastic	4 Digit LCD Driver—BCD to LCD Decoding	CMOS technology, BCD 1111 input blanks digit, internal oscillator develops back plane signal.
E.L. Driver	**Si9551/9552**[2] 44-pin LCC	Row Driver—32 channel 50 mA output current capability	D/CMOS technology and pin Compatible with TI SN75551/2
E.L. Driver	**Si9553/9554**[2] 44-pin LCC	Column Driver—32 channel swing capability 90V output Voltage	D/CMOS technology and pin Compatible with TI SN7553/4

Power Conversion Product Selector Guide[1]

Pulse Width Modulators

Part Number	Function	Operating Frequency	Output Low Voltage @ Rated Current	Output High Voltage @ Rated Current	Supply Voltage
PWM25	Pulse Width Modulator for SMPS to drive NPN or N-channel Devices	200 Hz-300 kHz with Dead Time Adjust	0.4V @ 20mA 2.5V @ 100mA	V+ -2V @ 20mA V+ -3V @ 100mA	8.5V to 35V
PWM27	Pulse Width Modulator for SMPS to drive PNP or N-channel Devices	200 Hz-300 kHz with Dead Time Adjust	0.4V @ 20mA 2.5V @ 100mA	V+ -2V @ 20mA V+ -3V @ 100mA	8.5V to 35V
PWM125[2]	Pulse Width Modulator for SMPS to drive NPN or N-channel Devices	100 Hz-500 kHz with fixed 200 ns dead time	0.4V @ 20mA 2.5V @ 100mA	V+ -2V @ 20mA V+ -3V @ 100mA	8.5V to 35V
Si9100[2]	Switchmode Regulator subsystem for 1 W loads	40 kHz	N/A	N/A	10V to 65V

Power Conversion Product Selector Guide[1]

(Continued)

Voltage Converters

Part Number	Function	Input Voltage Range	Quiescent Current	Output Voltage Range	Output Voltage @ Rated Current
Si7660	Voltage Doubler/Inverter	1.5V to 10V	500μA Max.	-10V to 20V	-8.5V to 18.5V @ 20mA
Si7661[2]	Voltage Doubler/Inverter	4.5V to 20V	2mA Max.	-20V to 40V	-18V to 38V @ 20mA

Telecommunications Product Selector Guide[1]

Function	Part No. Package Information	Specifications	Features
Loop Disconnect Dialer (pulse dialer)	**DF320/320A/322A** 18 pin plastic, 18 pin ceramic	Operation from 2.5 to 5V supply Low standby power dissipation: 3 μW Low dynamic power consumption: 600 μW On-chip oscillator for 3.579545 Mhz crystal	Redial capability Hold capability delays impulsing Post-impulsing pause of 33 ms Mask during impulsing and interdigit pause Selectable make-break ratio 10, 16, 20, 932 Hz impulsing rates Inter-digital pause of 800 ms
Loop Disconnect Dialer (pulse dialer)	**DF820** 18 pin plastic, 18 pin ceramic	Operation from −2.7 to −10V supply Off hook quiescent current 80 μA (typ) On chip oscillator for 3.579545 Mhz crystal	24 digit last number redial Single and double contact keypad interface Multiple mode and dial pulse outputs Directory assistance

NOTES:
1. Devices shown in **boldface** are recommended for new designs.
2. Preliminary product. Specifications subject to change. Contact factory on availability.

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Several Siliconix Analog Switches are available fully certified on the QPL (Qualified Parts List) published monthly by Defense Electronics Supply Center (DESC). The QPL numbers follow this format: JM38510/XXXXX. Refer to the current Siliconix Price List for available part types and order numbers.

JAN Part Numbering System

J M38510 / 111 07 B E C

"JAN" Certification Mark — J

Military Designator — M38510

Detail Specification (Slash Sheet) — 111

/111—DG181 Series
/116—DG300A Series
/123—DG200A Series
/190—DG506 Series

Device Type — 07

	Device Type	
/111	01—DG181	05—DG187
	02—DG182	06—DG188
	03—DG184	07—DG190
	04—DG185	08—DG191
/116	01—DG300A	05—DG304A
	02—DG301A	06—DG305A
	03—DG302A	07—DG306A
	04—DG303A	08—DG307A
/123	01—DG200A	02—DG201A

Device Class — B

S—Class S
B—Class B

Case Outline — E

C—14-Lead side braze
E—16-Lead side braze
I—10-Lead can
A—14-Lead Flatpack

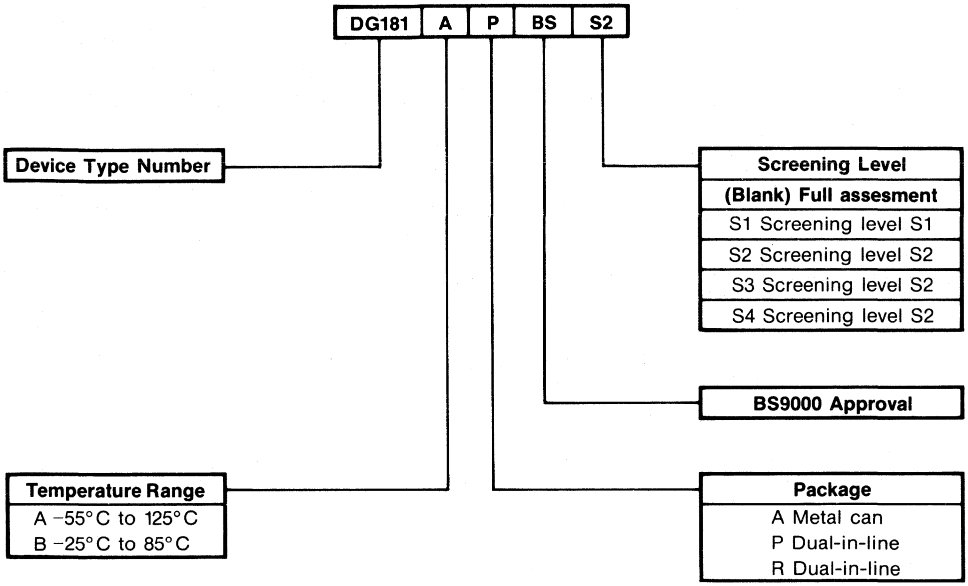
Lead Finish — C

A—Solder dip
C—Gold Plate

Generic Part Number	JAN Part Number	Order Part Number
DG181AP/883	JM38510/11101BCC	SJM181BCC
DG181AA/883	JM38510/11101BIC	SJM181BIC
DG182AP/883	JM38510/11102BCC	SJM182BCC
DG182AA/883	JM38510/11102BIC	SJM182BIC
DG184AP/883	JM38510/11103BEC	SJM184BEC
DG185AP/883	JM38510/1104BEC	SJM185BEC
DG187AP/883	JM38510/11105BCC	SJM187BCC
DG187AA/883	JM38510/11105BIC	SJM187BIC
DG188AP/883	JM38510/11106BCC	SJM188BCC
DG188AA/883	JM38510/11106BIC	SJM188BIC
DG190AP/883	JM38510/11107BEC	SJM190BEC
DG191AP/883	JM38510/11108BEC	SJM191BEC
DG200AAP	JM38510/12301BCC	SJM200ABCC
DG201AAP	JM38510/12302BEC	SJM201ABEC
DG300AAP	JM38510/11601BCA	SJM300ABCA
DG200AAP	JM38510/12301BCA	SJM200ABCA
DG201AAP	JM38510/12302BEA	SJM201ABEA
DG300AAA	JM38510/11601BIC	SJM300ABIC
DG300AAP	JM38510/11601BCC	SJM300ABCC
DG301AAP	JM38510/11602BCC	SJM301ABCC
DG301AAA	JM38510/11602BIC	SJM301ABIC
DG302AAP	JM38510/11603BCC	SJM302ABCC
DG303AAP	JM38510/11604BCC	SJM303ABCC
DG304AAP	JM38510/11605BCC	SJM304ABCC
DG304AAA	JM38510/11605BIC	SJM304ABIC
DG305AAP	JM38510/11606BCC	SJM305ABCC
DG305AAA	JM38510/11606BIC	SJM305ABIC
DG306AAP	JM38510/11607BCC	SJM306ABCC
DG307AAP	JM38510/11608BCC	SJM307ABCC

Analog Switches and Multiplexers BS9000

BS9000 Part Numbering System



Approved Parts		
Generic Part No.	**Generic Part No.**	**Generic Part No.**
DG126/ /BS	DG180/ /BS	DG300A /BS
DG129/ /BS	DG181/ /BS	DG301A /BS
DG133/ /BS	DG182/ /BS	DG302A /BS
DG134/ /BS	DG183/ /BS	DG303A /BS
DG139/ /BS	DG184/ /BS	DG304A /BS
DG140/ /BS	DG185/ /BS	DG305A /BS
DG141/ /BS	DG186/ /BS	DG306A /BS
DG142/ /BS	DG187/ /BS	DG307A /BS
DG143/ /BS	DG188/ /BS	DG308A /BS
DG144/ /BS	DG189/ /BS	DG381A /BS
DG145/ /BS	DG190/ /BS	DG384A /BS
DG146/ /BS	DG191/ /BS	DG387A /BS
DG151/ /BS	DG200A /BS	DG390A /BS
DG152/ /BS	DG201A /BS	
DG153/ /BS	DG501/ /BS	
DG154/ /BS	DG503/ /BS	
DG161/ /BS	DG506A /BS	
DG162/ /BS	DG507A /BS	
DG163/ /BS	DG508A /BS	
DG164/ /BS	DG509A /BS	
	Si3705/ /	

Contact one of the Siliconix sales offices for latest information.

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Gate Arrays 9

CMOS Gate Arrays

A Broad Array Selection.
Siliconix offers a wide selection of arrays ranging from 180 to 2400 gates, available in two different speed versions.

The ISO5 series is capable of operating at toggle rates of 30MHz; the ISO3 series at 50MHz.

Designation	Total Cells	Gate Equivalent	I/O Buffers	Bonding Pads
ISO5I / ISO3I	120	180	30	40
ISO5A / ISO3A	240	360	36	46
ISO5B / IDO3B	360	540	48	58
ISO5C / ISO3C	480	720	54	64
ISO5D / ISO3D	640	960	62	72
ISO5E / ISO3E	800	1200	68	78
ISO5F / ISO3F	1000	1500	76	86
ISO5G / ISO3G	1200	1800	82	92
ISO5H / ISO3H	1600	2400	90	100

Table 1

Performance—ISO- 3, 5 Technology
Typical Gate Delays (ns) F.O.=2
(Room Temperature) (V_{DD}=5V)

Gate Type	ISO-3	ISO-5
Inverter	1.2	2.2
2-Input NAND	1.6	2.8
2-Input NOR	1.7	3.7
3-Input NAND	2.0	3.6
3-Input NOR	2.5	7.8
4-Input NAND	2.5	4.7

Table 2

All arrays have been designed to simplify both design and layout. These advanced three and five-micron gate processes ensure you get a competitive design.

Our CAD system was created to simplify the entering of schematic information. Moreover, special error checking routines help identify potential problems before any prototypes are generated.

Siliconix also offers a comprehensive design manual that leads you through the entire design process—from concept to prototype evaluation.

Each of the arrays is available in both ISO5 (five micron) and ISO3 (three micron) processes. The gate width is inversely proportional to the speed of the process.

The current family of arrays is shown in Table 1.

Table 2 lists typical gate delays for both processes with a fanout of two.

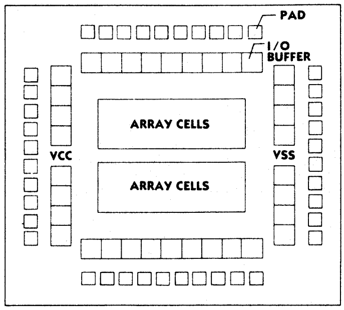

Figure 1

Designed For Maximum Flexibility.
The basic architecture of the arrays is shown in Figure 1. Bonding pads are located around the perimeter of the chip. Just inside the pads are the I/O buffer cells; in the center of the chip are the array cells. All the arrays are organized in the same manner and differ only by the amount of cells available.

Easy-to-Use Cells.
Figure 2 illustrates the basic array cell which consists of three pairs of NMOS and PMOS transistors. The gate is common between adjacent N and P-channel devices. To simplify design and layout, each gate has four possible contact points; each source-and-drain has six contact points.

These contact points or "windows" are programmable, allowing maximum routing flexibility. Individual N and P transistors may be configured into a variety of SSI and MSI logic elements. Pre-designed or characterized SSI and MSI functional building-blocks are called macrocells.

Macrocells.
The gate array design manual contains over 100 characterized macrocells. When used, all contact opening and metal routing within the macrocell is made automatically, eliminating the possibility of error when the function is selected.

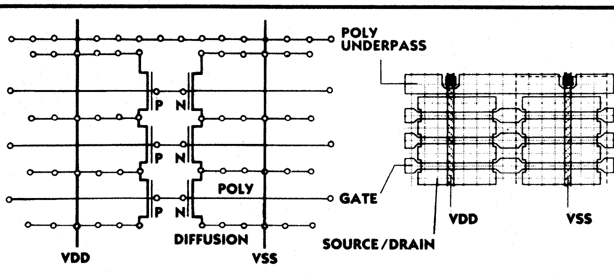

Figure 2

Publications Index

KEY

Catalogs

IC = Integrated Circuit Data Book

AS = Analog Switches and Their Applications

F = FET Design Catalog

MAH = MOSPOWER Applications Handbook

Catalog (See Key)	Document Number	Title Application Notes
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F	AN70-2	FETs for Video Amplifiers
	AN71-1	A High Resolution CMRR Test Method
F	AN72-1	FETs in Balanced Mixers
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FET Design Catalog

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Power FETS and Their Applications, Edwin S. Oxner, Staff Engineer, Siliconix, Inc. Available at your technical bookstore or write to: Mail Order Billing, Prentice-Hall, Inc., Tappan Road, Old Tappan, NJ 07675.

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