NTD3055-150

Power MOSFET 9.0 A, 60 V

N−Channel DPAK

Designed for low voltage, high speed switching applications in power supplies, converters and power motor controls and bridge circuits.

Features

- Pb−Free Packages are Available

Typical Applications

- Power Supplies
- Converters
- Power Motor Controls
- Bridge Circuits

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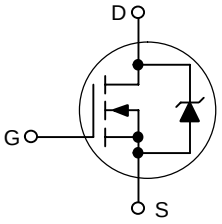
9.0 AMPERES, 60 VOLTS
$R_{DS(on)}$ = 122 mΩ (Typ)

N−Channel



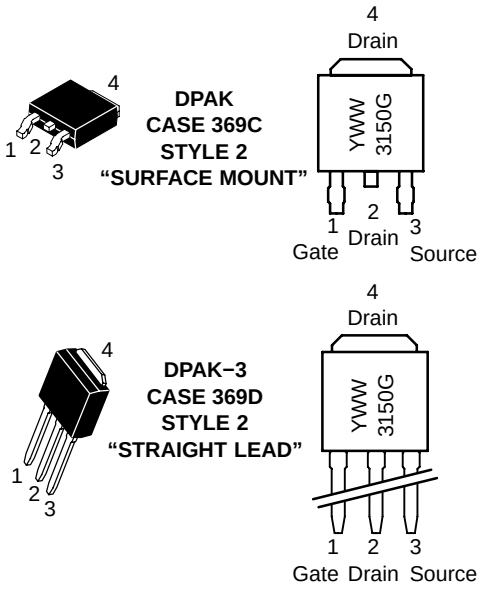
MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain−to−Source Voltage	V_{DSS}	60	Vdc
Drain−to−Gate Voltage (R_{GS} = 10 MΩ)	V_{DGR}	60	Vdc
Gate−to−Source Voltage − Continuous − Non−repetitive ($t_p \le 10$ ms)	 V_{GS} V_{GS}	 ±20 ±30	Vdc
Drain Current − Continuous @ T_A = 25°C − Continuous @ T_A = 100°C − Single Pulse ($t_p \le 10$ μs)	 I_D I_D I_{DM}	 9.0 3.0 27	Adc Apk
Total Power Dissipation @ T_A = 25°C Derate above 25°C Total Power Dissipation @ T_A = 25°C (Note 1) Total Power Dissipation @ T_A = 25°C (Note 2)	P_D	28.8 0.19 2.1 1.5	W W/°C W W
Operating and Storage Temperature Range	T_J, T_{stg}	−55 to 175	°C
Single Pulse Drain−to−Source Avalanche Energy − Starting T_J = 25°C (V_{DD} = 25 Vdc, V_{GS} = 10 Vdc, L = 1.0 mH, I_L(pk) = 7.75 A, V_{DS} = 60 Vdc)	E_{AS}	30	mJ
Thermal Resistance − Junction−to−Case − Junction−to−Ambient (Note 1) − Junction−to−Ambient (Note 2)	 $R_{\theta JC}$ $R_{\theta JA}$ $R_{\theta JA}$	 5.2 71.4 100	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 10 seconds	T_L	260	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. When surface mounted to an FR4 board using 0.5 sq in pad size.
2. When surface mounted to an FR4 board using minimum recommended pad size.

MARKING DIAGRAMS



3150	= Device Code
Y	= Year
WW	= Work Week
G	= Pb−Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

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

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain−to−Source Breakdown Voltage (Note 3) (V_{GS} = 0 Vdc, I_D = 250 μAdc) Temperature Coefficient (Positive)		$V_{(BR)DSS}$	60 −	− 70.2	− −	Vdc mV/°C
Zero Gate Voltage Drain Current (V_{DS} = 60 Vdc, V_{GS} = 0 Vdc) (V_{DS} = 60 Vdc, V_{GS} = 0 Vdc, T_J = 150°C)		I_{DSS}	− −	− −	1.0 10	μAdc
Gate−Body Leakage Current (V_{GS} = ±20 Vdc, V_{DS} = 0 Vdc)		I_{GSS}	−	−	±100	nAdc
ON CHARACTERISTICS (Note 3)						
Gate Threshold Voltage (Note 3) (V_{DS} = V_{GS}, I_D = 250 μAdc) Threshold Temperature Coefficient (Negative)		$V_{GS(th)}$	2.0 −	3.0 6.4	4.0 −	Vdc mV/°C
Static Drain−to−Source On−Resistance (Note 3) (V_{GS} = 10 Vdc, I_D = 4.5 Adc)		$R_{DS(on)}$	−	122	150	mΩ
Static Drain−to−Source On−Voltage (Note 3) (V_{GS} = 10 Vdc, I_D = 9.0 Adc) (V_{GS} = 10 Vdc, I_D = 4.5 Adc, T_J = 150°C)		$V_{DS(on)}$	− −	1.4 1.1	1.9 −	Vdc
Forward Transconductance (Note 3) (V_{DS} = 7.0 Vdc, I_D = 6.0 Adc)		g_{FS}	−	5.4	−	mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{DS} = 25 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{iss}	−	200	280	pF
Output Capacitance		C_{oss}	−	70	100	
Transfer Capacitance		C_{rss}	−	26	40	
SWITCHING CHARACTERISTICS (Note 4)						
Turn−On Delay Time	(V_{DD} = 48 Vdc, I_D = 9.0 Adc, V_{GS} = 10 Vdc, R_G = 9.1 Ω) (Note 3)	$t_{d(on)}$	−	11.2	25	ns
Rise Time		t_r	−	37.1	80	
Turn−Off Delay Time		$t_{d(off)}$	−	12.2	25	
Fall Time		t_f	−	23	50	
Gate Charge	(V_{DS} = 48 Vdc, I_D = 9.0 Adc, V_{GS} = 10 Vdc) (Note 3)	Q_T	−	7.1	15	nC
		Q_1	−	1.7	−	
		Q_2	−	3.5	−	
SOURCE−DRAIN DIODE CHARACTERISTICS						
Forward On−Voltage	(I_S = 9.0 Adc, V_{GS} = 0 Vdc) (Note 3) (I_S = 19 Adc, V_{GS} = 0 Vdc, T_J = 150°C)	V_{SD}	− −	0.98 0.86	1.20 −	Vdc
Reverse Recovery Time	(I_S = 9.0 Adc, V_{GS} = 0 Vdc, dI_S/dt = 100 A/μs) (Note 3)	t_{rr}	−	28.9	−	ns
		t_a	−	21.6	−	
		t_b	−	7.3	−	
Reverse Recovery Stored Charge		Q_{RR}	−	0.036	−	μC

3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
4. Switching characteristics are independent of operating junction temperatures.

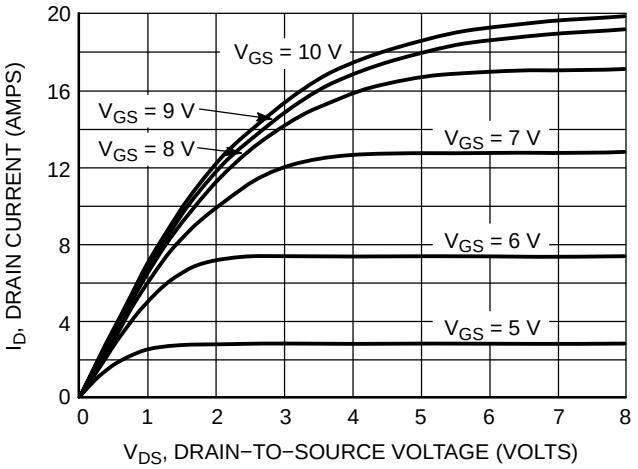


Figure 1. On−Region Characteristics

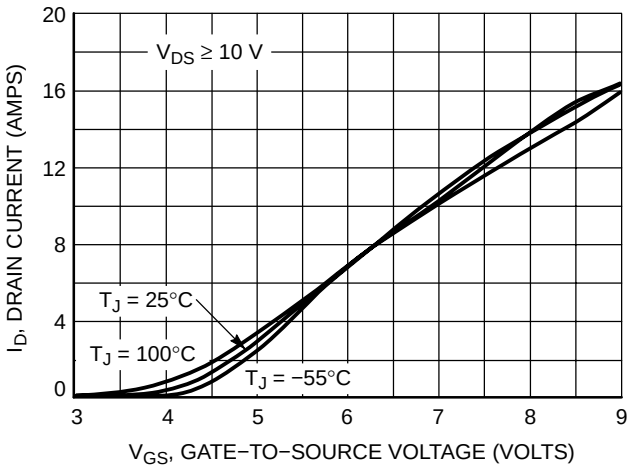


Figure 2. Transfer Characteristics

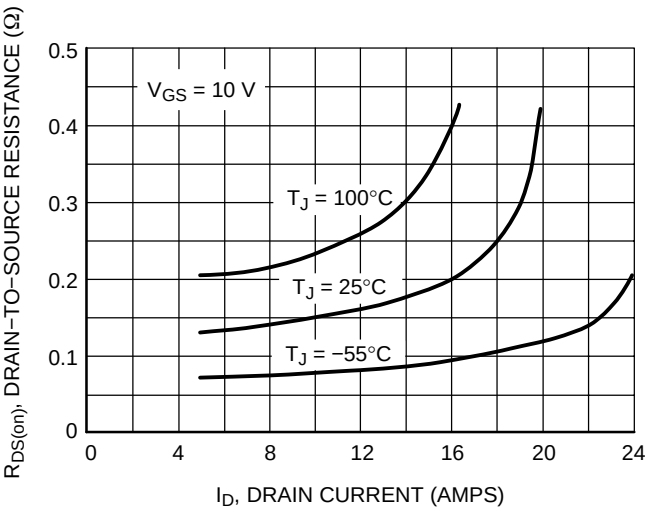


Figure 3. On−Resistance versus Gate−To−Source Voltage

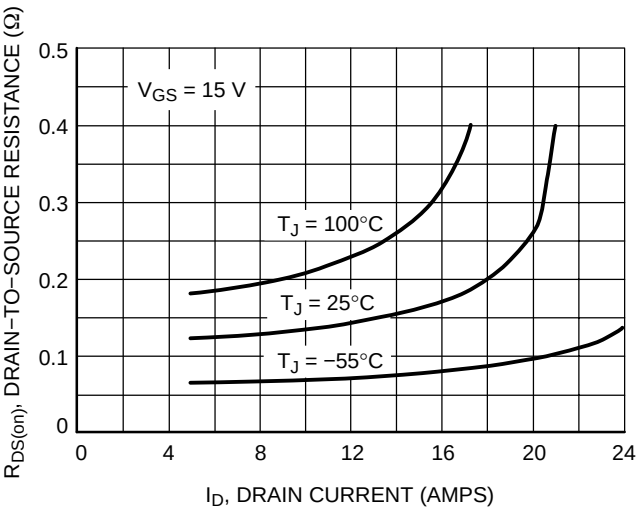


Figure 4. On−Resistance versus Drain Current and Gate Voltage

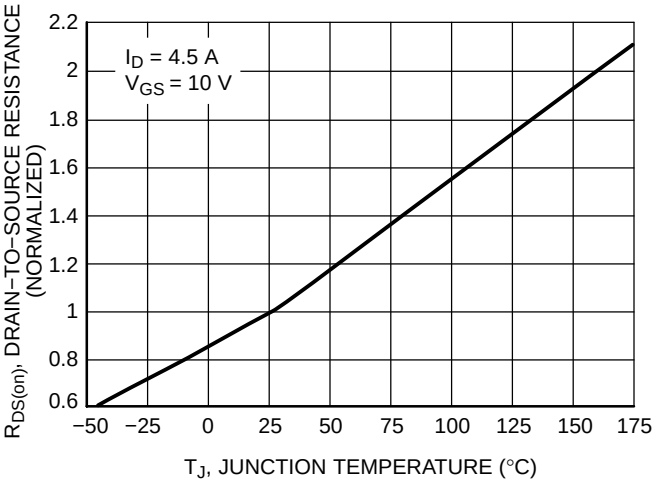


Figure 5. On−Resistance Variation with Temperature

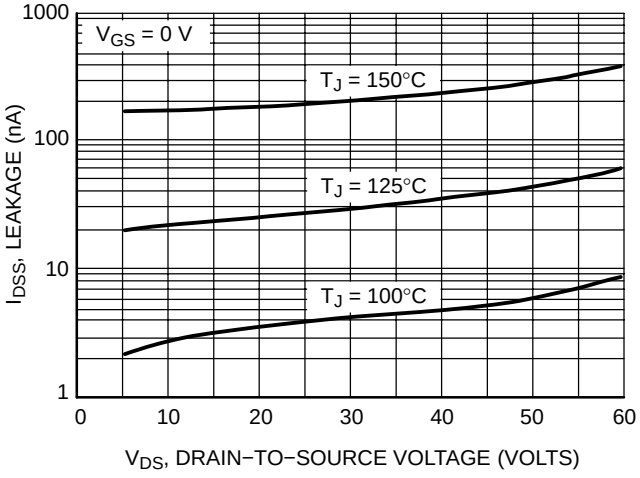


Figure 6. Drain−To−Source Leakage Current versus Voltage

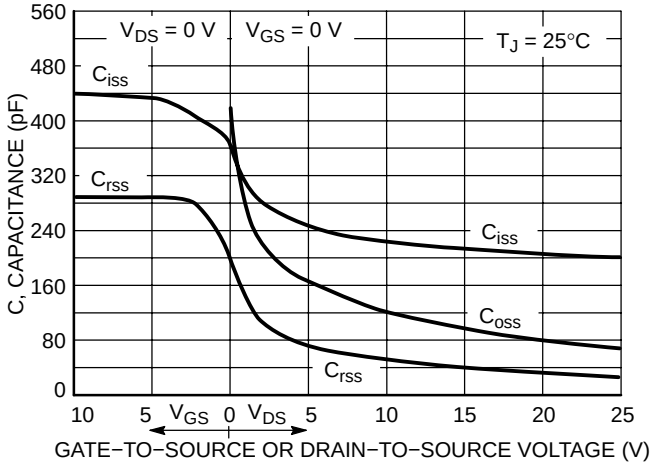


Figure 7. Capacitance Variation

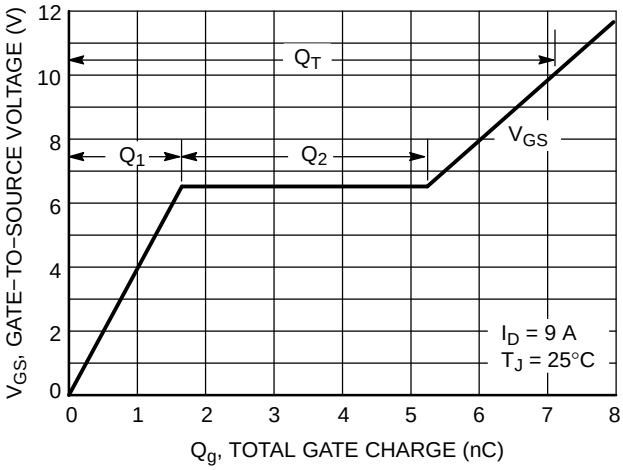


Figure 8. Gate−to−Source and Drain−to−Source Voltage versus Total Charge

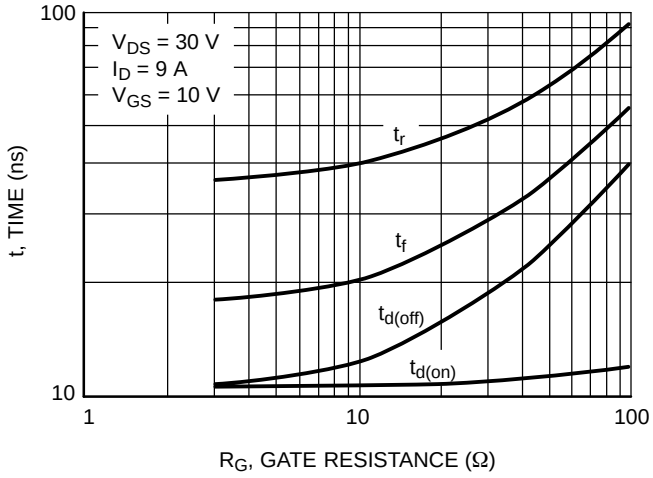


Figure 9. Resistive Switching Time Variation versus Gate Resistance

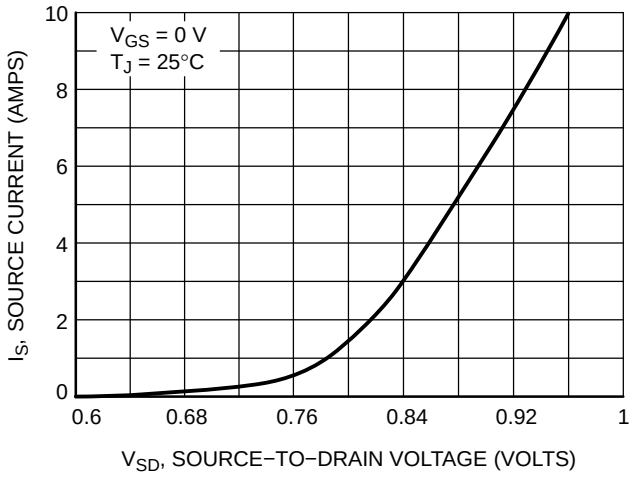


Figure 10. Diode Forward Voltage versus Current

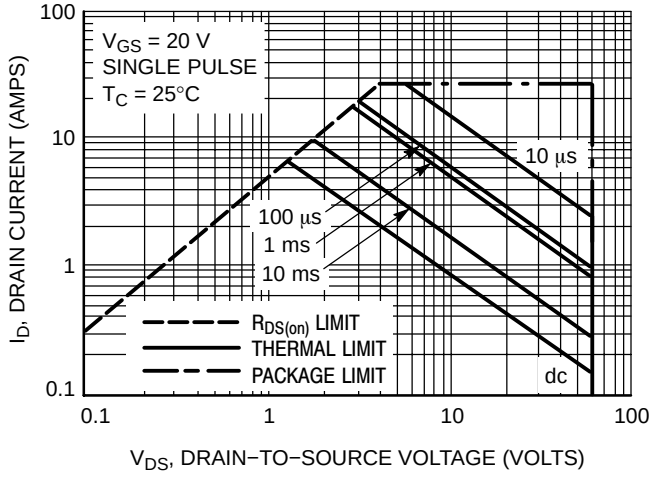


Figure 11. Maximum Rated Forward Biased Safe Operating Area

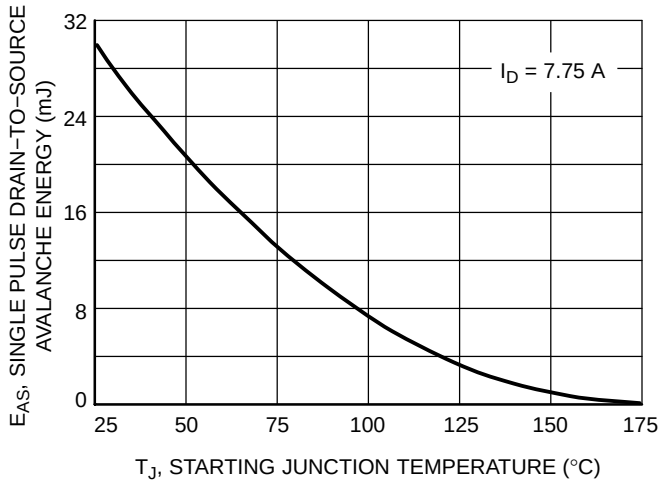


Figure 12. Maximum Avalanche Energy versus Starting Junction Temperature

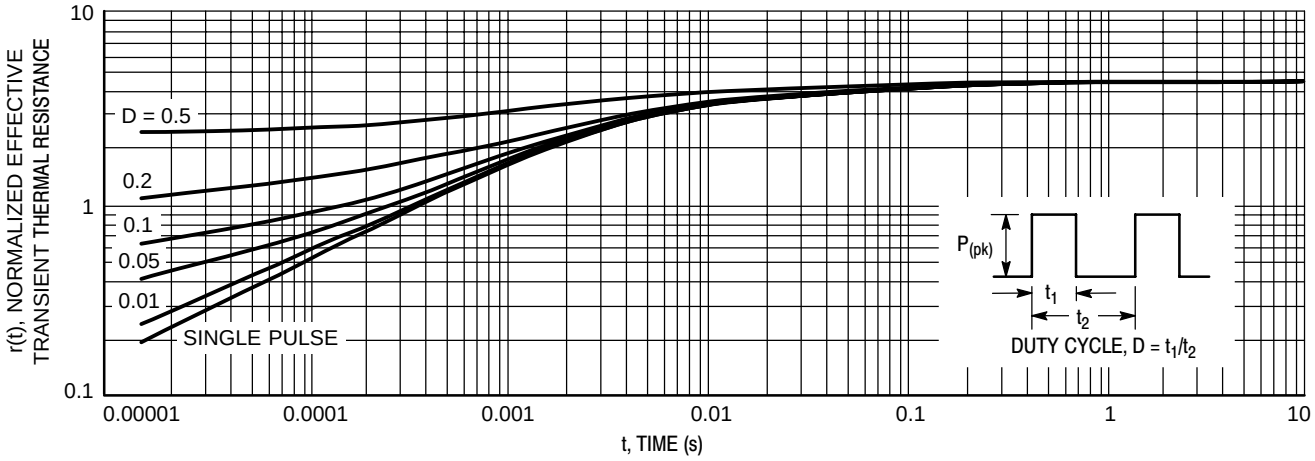


Figure 13. Thermal Response

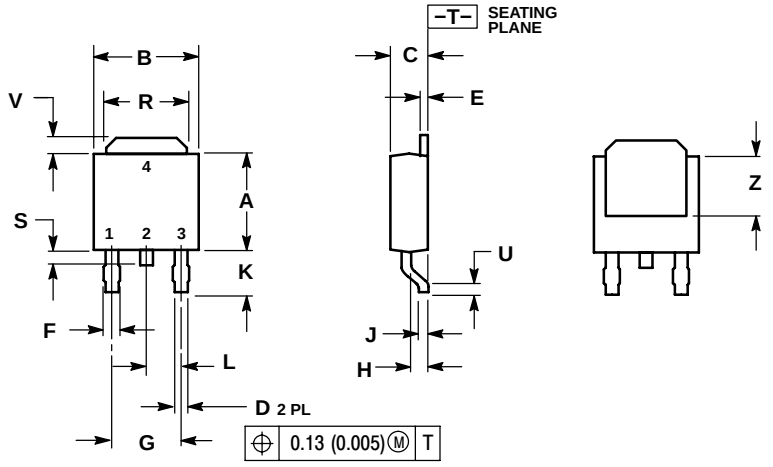
ORDERING INFORMATION

Device	Package	Shipping†
NTD3055−150	DPAK	75 Units/Rail
NTD3055−150G	DPAK (Pb−Free)	75 Units/Rail
NTD3055−150−1	DPAK−3	75 Units/Rail
NTD3055−150−1G	DPAK−3 (Pb−Free)	75 Units/Rail
NTD3055−150T4	DPAK	2500 Tape & Reel
NTD3055−150T4G	DPAK (Pb−Free)	2500 Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

PACKAGE DIMENSIONS

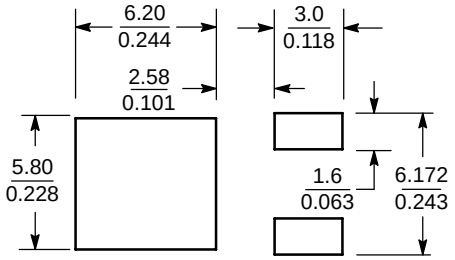
DPAK
CASE 369C−01
ISSUE O



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.245	5.97	6.22
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.018	0.023	0.46	0.58
F	0.037	0.045	0.94	1.14
G	0.180 BSC		4.58 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.102	0.114	2.60	2.89
L	0.090 BSC		2.29 BSC	
R	0.180	0.215	4.57	5.45
S	0.025	0.040	0.63	1.01
U	0.020	−−−	0.51	−−−
V	0.035	0.050	0.89	1.27
Z	0.155	−−−	3.93	−−−

STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

SOLDERING FOOTPRINT*

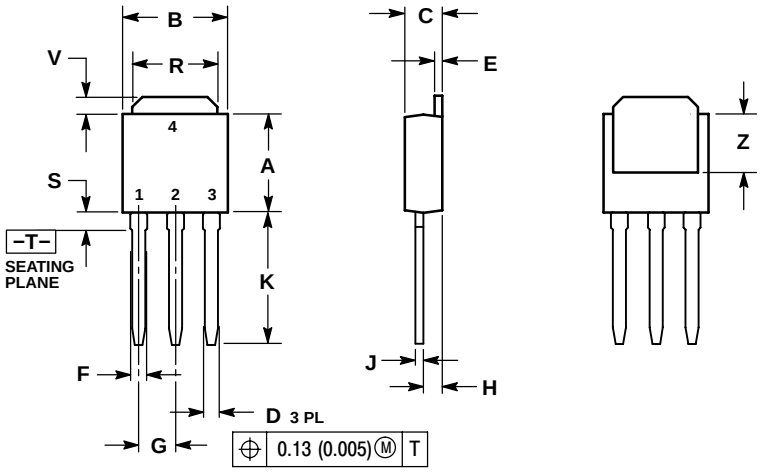


SCALE 3:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PACKAGE DIMENSIONS

DPAK−3
CASE 369D−01
ISSUE B



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.235	0.245	5.97	6.35
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.018	0.023	0.46	0.58
F	0.037	0.045	0.94	1.14
G	0.090 BSC		2.29 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.350	0.380	8.89	9.65
R	0.180	0.215	4.45	5.45
S	0.025	0.040	0.63	1.01
V	0.035	0.050	0.89	1.27
Z	0.155	−−−	3.93	−−−

STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
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