NTJD4001N

Small Signal MOSFET

30 V, 250 mA, Dual N−Channel, SC−88

Features

- Low Gate Charge for Fast Switching
- Small Footprint − 30% Smaller than TSOP−6
- ESD Protected Gate
- Pb−Free Package is Available

Applications

- Low Side Load Switch
- Li−Ion Battery Supplied Devices − Cell Phones, PDAs, DSC
- Buck Converters
- Level Shifts

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

Parameter			Symbol	Value	Units
Drain−to−Source Voltage			V_{DSS}	30	V
Gate−to−Source Voltage			V_{GS}	±20	V
Continuous Drain Current (Note 1)	Steady State	T_A = 25 °C	I_D	250	mA
		T_A = 85 °C		180	
Power Dissipation (Note 1)	Steady State	T_A = 25 °C	P_D	272	mW
Pulsed Drain Current		t =10 μs	I_{DM}	600	mA
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to 150	°C
Source Current (Body Diode)			I_S	250	mA
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			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. Surface mounted on FR4 board using min pad size (Cu area = 0.155 in sq [1 oz] including traces).

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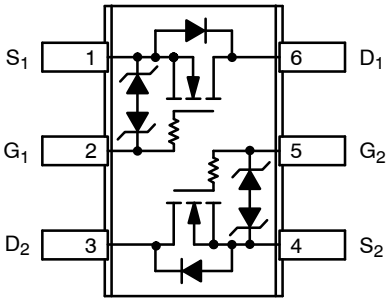
$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D Max
30 V	1.0 Ω @ 4.0 V	250 mA
	1.5 Ω @ 2.5 V	

SOT−363
SC−88 (6 LEADS)

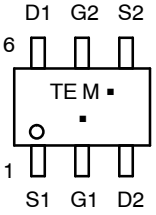


Top View

MARKING DIAGRAM & PIN ASSIGNMENT

1

SOT−363
CASE 419B
STYLE 26



TE = Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
NTJD4001NT1	SOT−363	3000/Tape & Reel
NTJD4001NT1G	SOT−363 (Pb−Free)	3000/Tape & Reel
NTJD4001NT2G	SOT−363 (Pb−Free)	3000/Tape & Reel

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

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 100 μA	30			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			56		mV/ °C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 30 V			1.0	μA
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±10 V			±1.0	μA
ON CHARACTERISTICS (Note 2)						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 100 μA	0.8	1.2	1.5	V
Gate Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			−3.2		mV/ °C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 4.0 V, I_D = 10 mA		1.0	1.5	Ω
		V_{GS} = 2.5 V, I_D = 10 mA		1.5	2.5	
Forward Transconductance	g_{FS}	V_{DS} = 3.0 V, I_D = 10 mA		80		mS
CHARGES AND CAPACITANCES						
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 5.0 V		20	33	pF
Output Capacitance	C_{OSS}			19	32	
Reverse Transfer Capacitance	C_{RSS}			7.25	12	
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 5.0 V, V_{DS} = 24 V, I_D = 0.1 A		0.9	1.3	nC
Threshold Gate Charge	$Q_{G(TH)}$			0.2		
Gate−to−Source Charge	Q_{GS}			0.3		
Gate−to−Drain Charge	Q_{GD}			0.2		
SWITCHING CHARACTERISTICS (Note 3)						
Turn−On Delay Time	$td_{(ON)}$	V_{GS} = 4.5 V, V_{DD} = 5.0 V, I_D = 10 mA, R_G = 50 Ω		17		ns
Rise Time	tr			23		
Turn−Off Delay Time	$td_{(OFF)}$			94		
Fall Time	tf			82		
DRAIN−SOURCE DIODE CHARACTERISTICS						
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 10 mA, T_J = 25°C		0.65	0.7	V
		V_{GS} = 0 V, I_S = 10 mA, T_J = 125°C		0.45		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_S/dt = 8.0 A/μs, I_S = 10 mA		12.4		ns

2. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
3. Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CURVES (T_J = 25°C unless otherwise noted)

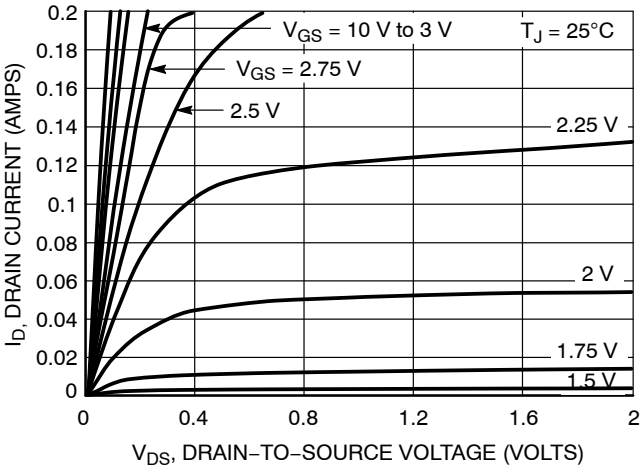


Figure 1. On−Region Characteristics

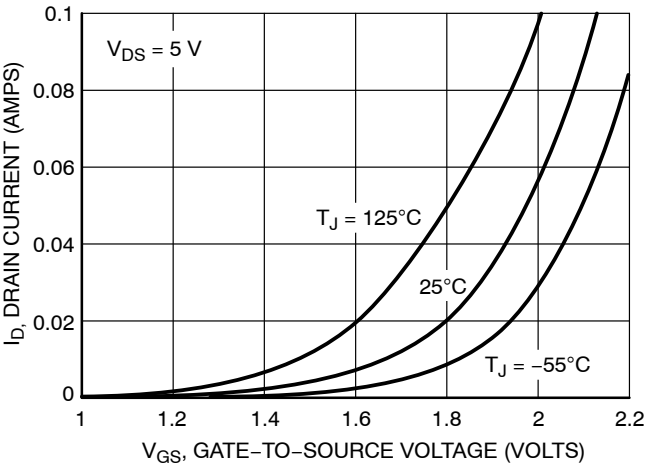


Figure 2. Transfer Characteristics

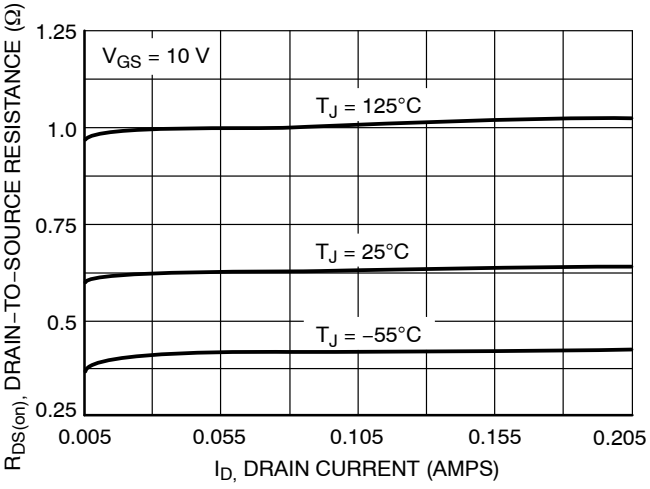


Figure 3. On−Resistance vs. Drain Current and Temperature

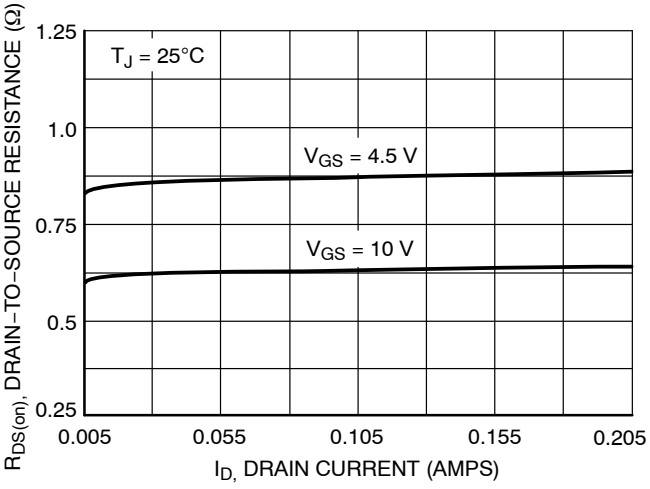


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

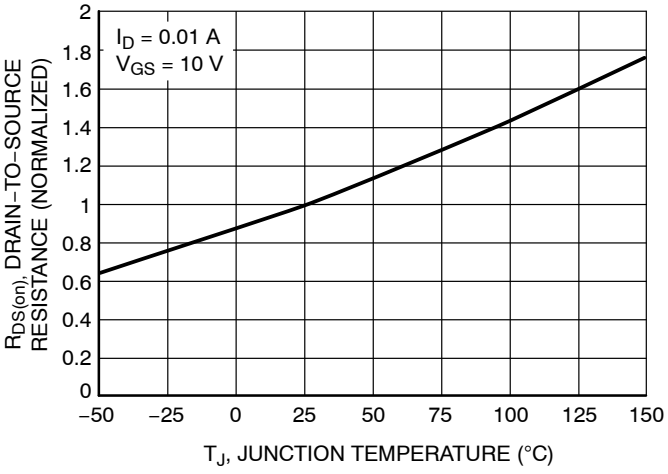


Figure 5. On−Resistance Variation with Temperature

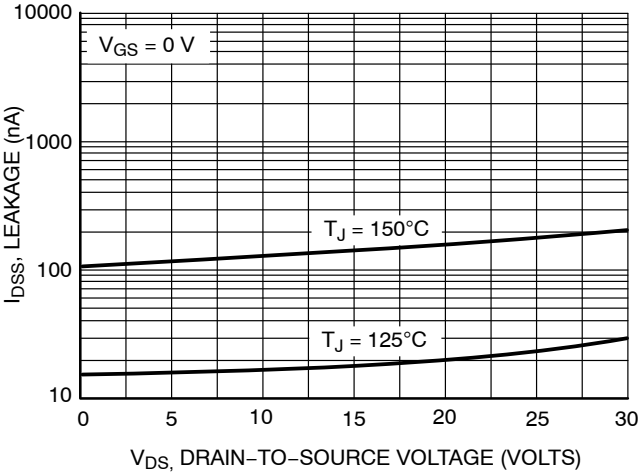


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL PERFORMANCE CURVES (T_J = 25°C unless otherwise noted)

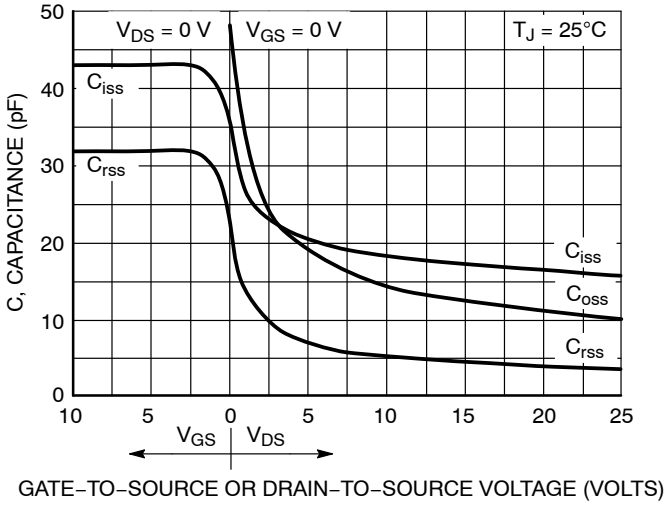


Figure 7. Capacitance Variation

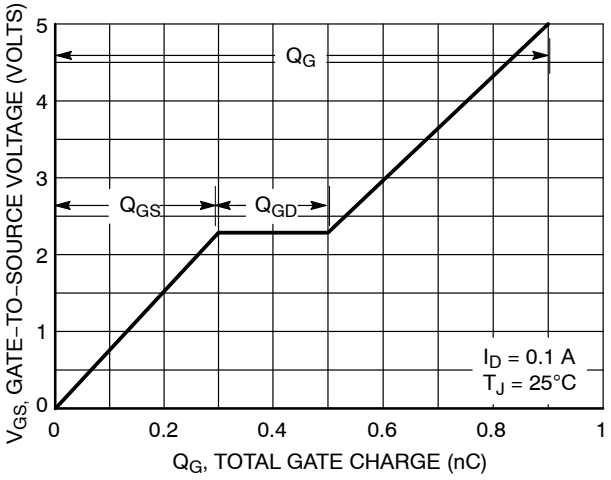


Figure 8. Gate−to−Source Voltage vs. Total Gate Charge

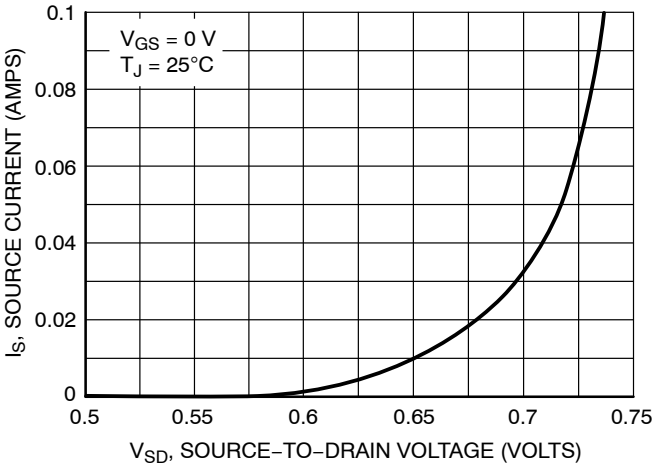


Figure 9. Diode Forward Voltage vs. Current

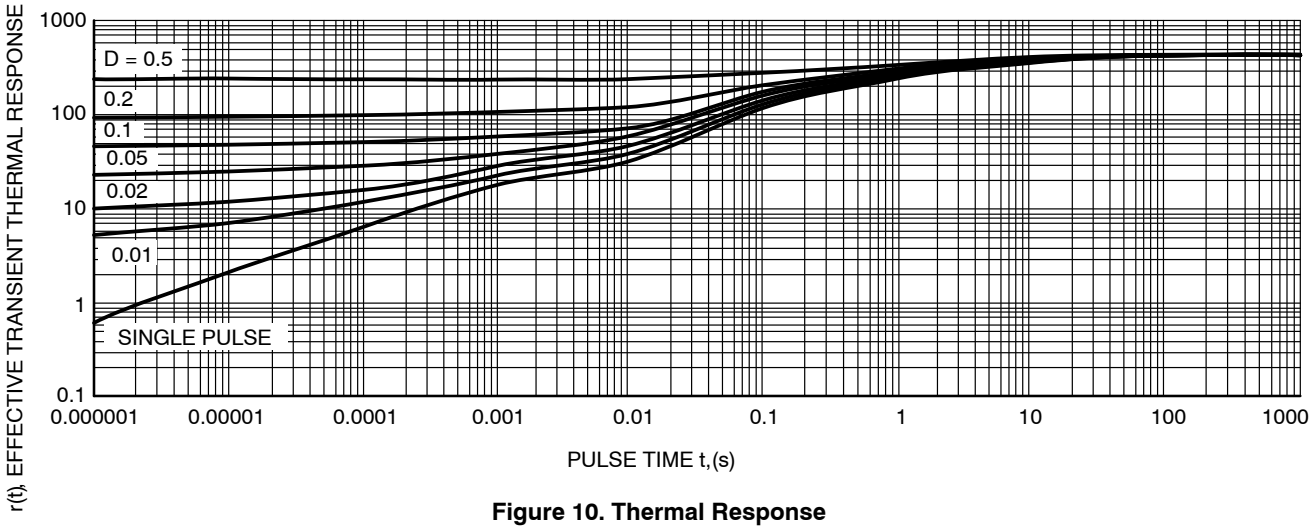
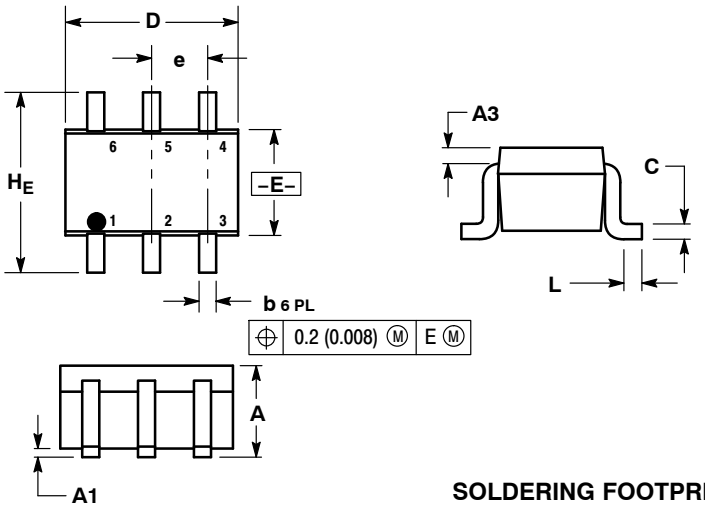


Figure 10. Thermal Response

PACKAGE DIMENSIONS

SC−88/SC70−6/SOT−363
CASE 419B−02
ISSUE W

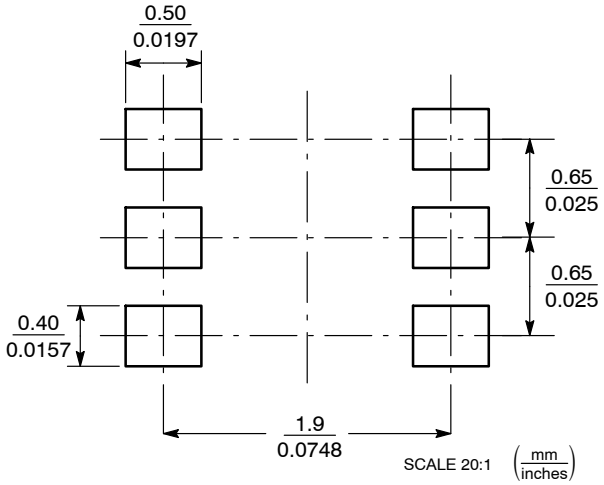


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B−01 OBSOLETE, NEW STANDARD 419B−02.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.95	1.10	0.031	0.037	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A3	0.20 REF			0.008 REF		
b	0.10	0.21	0.30	0.004	0.008	0.012
C	0.10	0.14	0.25	0.004	0.005	0.010
D	1.80	2.00	2.20	0.070	0.078	0.086
E	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC			0.026 BSC		
L	0.10	0.20	0.30	0.004	0.008	0.012
H_E	2.00	2.10	2.20	0.078	0.082	0.086

STYLE 26:
PIN 1. SOURCE 1
2. GATE 1
3. DRAIN 2
4. SOURCE 2
5. GATE 2
6. DRAIN 1

SOLDERING FOOTPRINT*



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

PUBLICATION ORDERING INFORMATION

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