

# 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 for Green Manufacturing (G Suffix)

### Applications

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

### MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise stated)

Parameter			Symbol	Value	Units
Drain-to-Source Voltage			V <sub>DSS</sub>	30	V
Gate-to-Source Voltage			V <sub>GS</sub>	±20	V
Continuous Drain Current (Note 1)	Steady State	T <sub>A</sub> = 25 °C	I <sub>D</sub>	250	mA
		T <sub>A</sub> = 85 °C		180	
Power Dissipation (Note 1)	Steady State	T <sub>A</sub> = 25 °C	P <sub>D</sub>	272	mW
Pulsed Drain Current		t = 10 μs	I <sub>DM</sub>	600	mA
Operating Junction and Storage Temperature			T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C
Source Current (Body Diode)			I <sub>S</sub>	250	mA
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T <sub>L</sub>	260	°C

1. Surface mounted on FR4 board using 1 in sq. pad size (Cu area = 1.127 in sq. [1 oz] including traces).

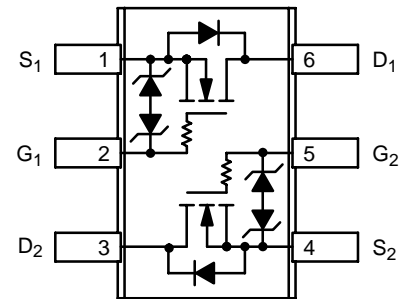


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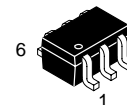
<http://onsemi.com>

V <sub>(BR)DSS</sub>	R <sub>DS(on)</sub> TYP	I <sub>D</sub> Max
30 V	1.0 Ω @ 4.0 V	250 mA
	1.5 Ω @ 2.5 V	

### SOT-363 SC-88 (6 LEADS)

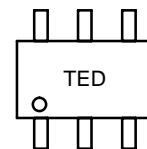


Top View



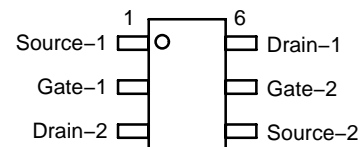
SC-88 / SOT-363  
CASE 419B  
STYLE 26

### MARKING DIAGRAM



TE = Device Code  
D = Date Code

### PIN ASSIGNMENT



Top View

### ORDERING INFORMATION

Device	Package	Shipping
NTJD4001NT1	SC-88	3000 Units/Reel
NTJD4001NT1G	SC-88 (Pb-Free)	3000 Units/Reel

# NTJD4001N

## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 100\ \mu\text{A}$	30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			56		mV/°C
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V}, V_{DS} = 30\text{ V}$			1.0	$\mu\text{A}$
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}$			$\pm 1.0$	$\mu\text{A}$

### ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 100\ \mu\text{A}$	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	$R_{DS(on)}$	$V_{GS} = 4.0\text{ V}, I_D = 10\text{ mA}$		1.0	1.5	$\Omega$
		$V_{GS} = 2.5\text{ V}, I_D = 10\text{ mA}$		1.5	2.5	
Forward Transconductance	$g_{FS}$	$V_{DS} = 3.0\text{ V}, I_D = 10\text{ mA}$		80		mS

### CHARGES AND CAPACITANCES

Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = 5.0\text{ V}$		20	33	pF
Output Capacitance	$C_{OSS}$			19	32	
Reverse Transfer Capacitance	$C_{RSS}$			7.25	12	
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 5.0\text{ V}, V_{DS} = 24\text{ V}, I_D = 0.1\text{ A}$		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	$t_{d(ON)}$	$V_{GS} = 4.5\text{ V}, V_{DD} = 5.0\text{ V}, I_D = 10\text{ mA}, R_G = 50\ \Omega$		17		ns
Rise Time	$t_r$			23		
Turn-Off Delay Time	$t_{d(OFF)}$			94		
Fall Time	$t_f$			82		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 10\text{ mA}$	$T_J = 25^\circ\text{C}$	0.65	0.7	V
			$T_J = 125^\circ\text{C}$	0.45		
Reverse Recovery Time	$t_{RR}$	$V_{GS} = 0\text{ V}, di_S/dt = 8.0\text{ A}/\mu\text{s}, I_S = 10\text{ mA}$		12.4		ns

- Pulse Test: pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Switching characteristics are independent of operating junction temperatures.

# NTJD4001N

## TYPICAL PERFORMANCE CURVES ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

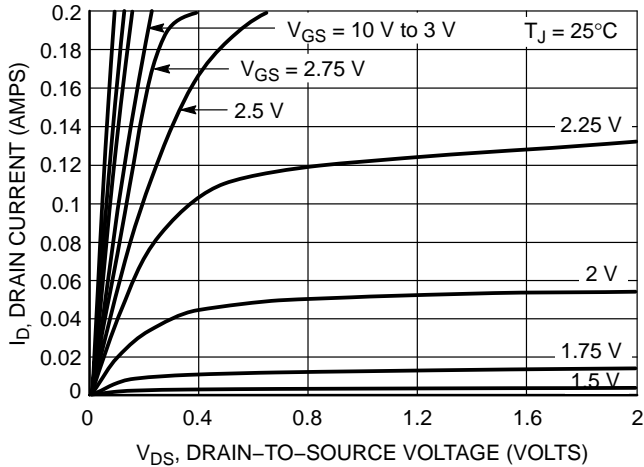


Figure 1. On-Region Characteristics

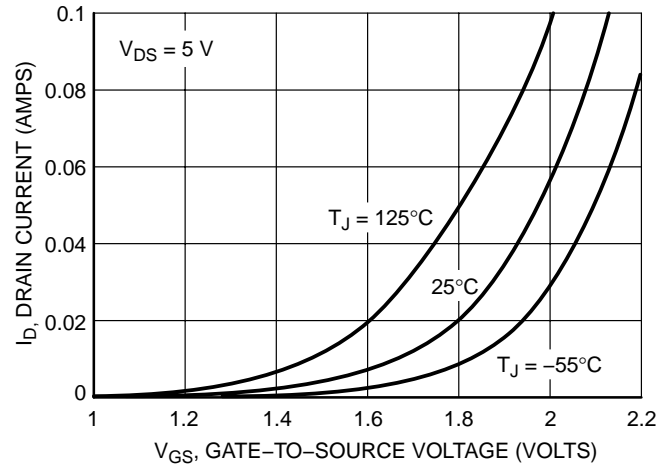


Figure 2. Transfer Characteristics

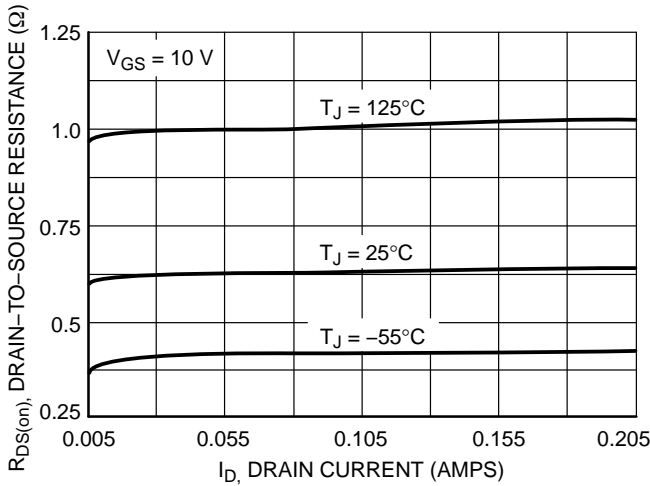


Figure 3. On-Resistance vs. Drain Current and Temperature

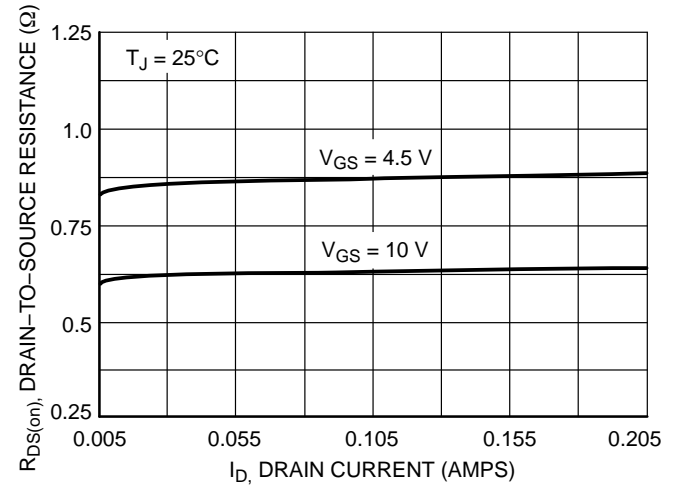


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

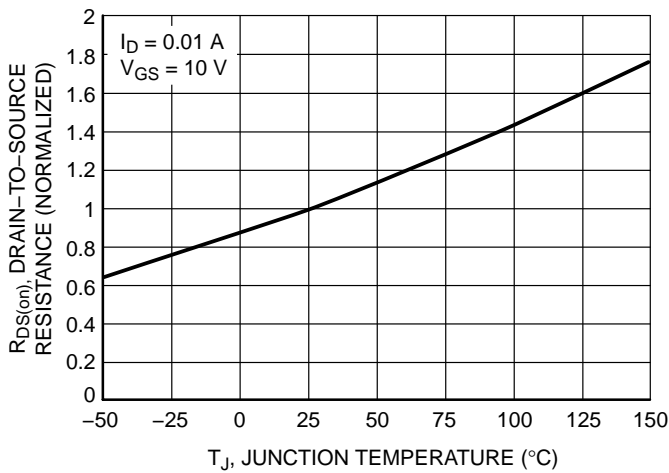


Figure 5. On-Resistance Variation with Temperature

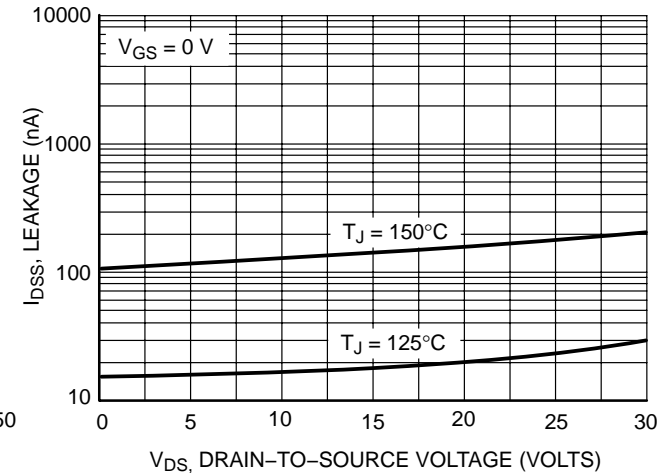
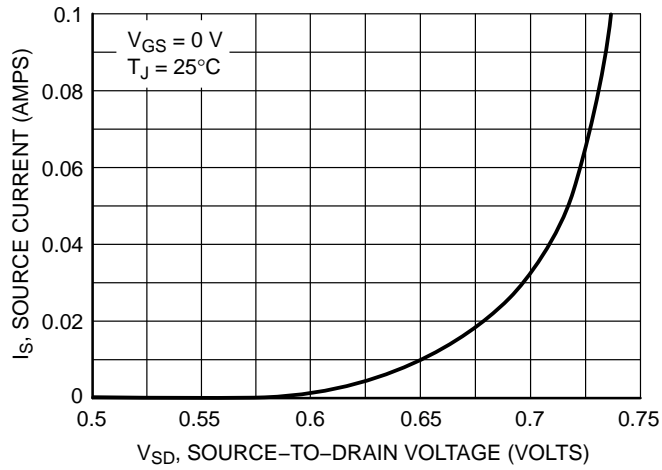
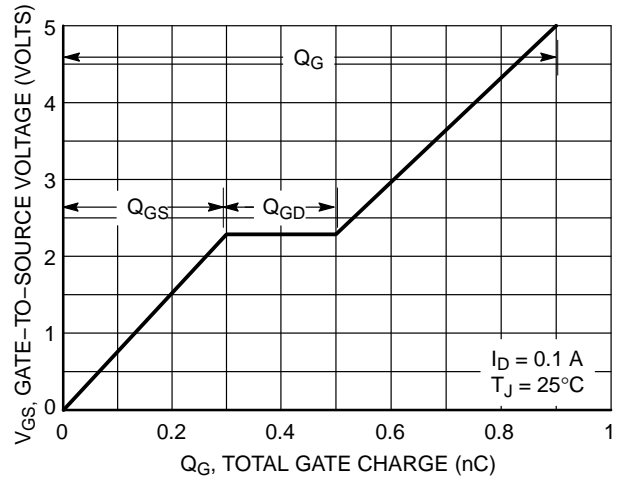
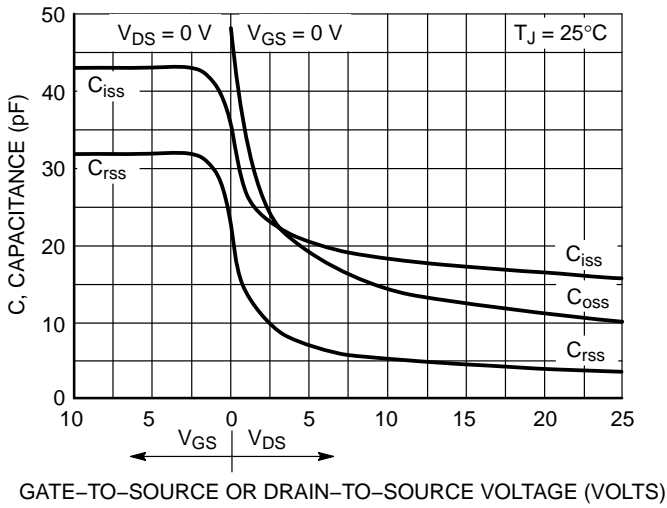


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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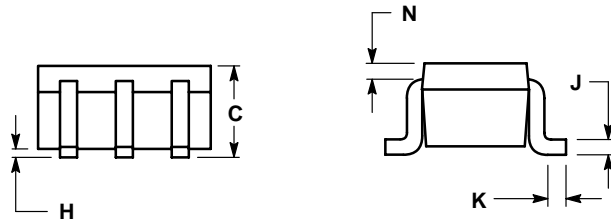
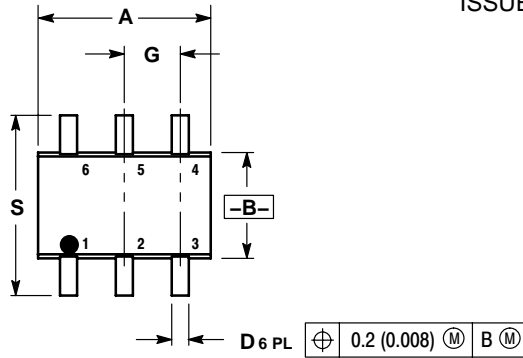
## TYPICAL PERFORMANCE CURVES ( $T_J = 25^\circ\text{C}$ unless otherwise noted)



# NTJD4001N

## PACKAGE DIMENSIONS

SC-88 (SOT-363)  
CASE 419B-02  
ISSUE R




NOTES:

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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

STYLE 26:

- PIN 1. SOURCE 1  
 2. GATE 1  
 3. DRAIN 2  
 4. SOURCE 2  
 5. GATE 2  
 6. DRAIN 1

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