

# NTJD2152P

## Trench Small Signal MOSFET

8 V, Dual P-Channel, SC-88  
ESD Protection

### Features

- Leading -8 V Trench for Low  $R_{DS(ON)}$  Performance
- ESD Protected Gate
- Small Footprint (2 x 2 mm)
- Same Package as SC-70-6
- Pb-Free Packages are Available

### Applications

- Load Power switching
- DC-DC Conversion
- Li-Ion Battery Charging Circuits
- Cell Phones, Media Players, Digital Cameras, PDAs

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

Parameter		Symbol	Value	Unit	
Drain-to-Source Voltage		$V_{DSS}$	-8.0	V	
Gate-to-Source Voltage		$V_{GS}$	$\pm 8.0$	V	
Continuous Drain Current (Based on $R_{\theta JA}$ )	Steady State	$I_D$	$T_A = 25^\circ\text{C}$	-0.775	A
			$T_A = 85^\circ\text{C}$	-0.558	
Power Dissipation (Based on $R_{\theta JA}$ )	Steady State	$P_D$	$T_A = 25^\circ\text{C}$	0.27	W
			$T_A = 85^\circ\text{C}$	0.14	
Continuous Drain Current (Based on $R_{\theta JL}$ )	Steady State	$I_D$	$T_A = 25^\circ\text{C}$	-1.1	A
			$T_A = 85^\circ\text{C}$	-0.8	
Power Dissipation (Based on $R_{\theta JL}$ )	Steady State	$P_D$	$T_A = 25^\circ\text{C}$	0.55	W
			$T_A = 85^\circ\text{C}$	0.29	
Pulsed Drain Current		$t \leq 10 \mu\text{s}$	$I_{DM}$	$\pm 1.2$	A
Operating Junction and Storage Temperature		$T_J, T_{STG}$	-55 to 150		$^\circ\text{C}$
Continuous Source Current (Body Diode)		$I_S$	-0.775		A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		$T_L$	260		$^\circ\text{C}$

### THERMAL RESISTANCE RATINGS (Note 1)

Parameter	Symbol	Typ	Max	Unit
Junction-to-Ambient - Steady State	$R_{\theta JA}$	400	460	$^\circ\text{C}/\text{W}$
Junction-to-Lead (Drain) - Steady State	$R_{\theta JL}$	194	226	

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 1 oz Cu area = 0.9523 in sq.

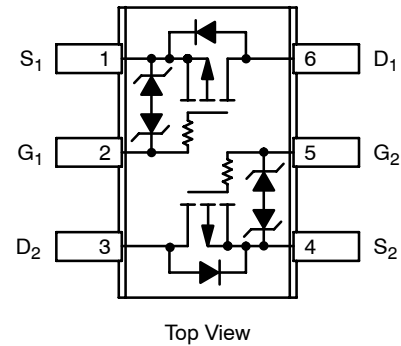


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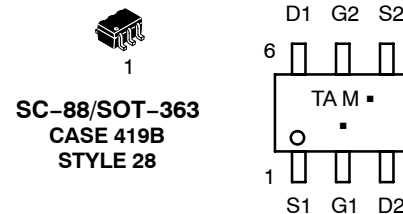
$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	$I_D$ Max
-8 V	0.22 $\Omega$ @ -4.5 V	-0.775 A
	0.32 $\Omega$ @ -2.5 V	
	0.51 $\Omega$ @ -1.8 V	

SOT-363  
SC-88 (6 LEADS)



Top View

### MARKING DIAGRAM & PIN ASSIGNMENT



SC-88/SOT-363  
CASE 419B  
STYLE 28

TA = Device Code  
M = Date Code  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

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

# NTJD2152P

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

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

Drain-to-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = -250 μA	-8.0	-10.5		V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V <sub>(BR)DSS</sub> /T <sub>J</sub>			-6.0		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = -6.4 V			1.0	μA
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±8.0 V			10	μA

### ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250 μA	-0.45	-0.83	-1.0	V
Gate Threshold Temperature Coefficient	V <sub>GS(TH)</sub> /T <sub>J</sub>			2.2		mV/°C
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -0.57 A		0.22	0.3	Ω
		V <sub>GS</sub> = -2.5 V, I <sub>D</sub> = -0.48 A		0.32	0.46	
		V <sub>GS</sub> = -1.8 V, I <sub>D</sub> = -0.20 A		0.51	0.9	
Forward Transconductance	g <sub>FS</sub>	V <sub>GS</sub> = -4.0 V, I <sub>D</sub> = -0.57 A		2.0		S

### CHARGES AND CAPACITANCES

Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> = 0 V, f = 1.0 MHz, V <sub>DS</sub> = -8.0 V		160	225	pF
Output Capacitance	C <sub>OSS</sub>			38	55	
Reverse Transfer Capacitance	C <sub>RSS</sub>			28	40	
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> = -4.5 V, V <sub>DS</sub> = -5.0 V, I <sub>D</sub> = -0.6 A		2.2	4.0	nC
Threshold Gate Charge	Q <sub>G(TH)</sub>			0.1		
Gate-to-Source Charge	Q <sub>GS</sub>			0.5		
Gate-to-Drain Charge	Q <sub>GD</sub>			0.5		

### SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	t <sub>d(ON)</sub>	V <sub>GS</sub> = -4.5 V, V <sub>DD</sub> = -4.0 V, I <sub>D</sub> = -0.5 A, R <sub>G</sub> = 8.0 Ω		13		ns
Rise Time	t <sub>r</sub>			23		
Turn-Off Delay Time	t <sub>d(OFF)</sub>			50		
Fall Time	t <sub>f</sub>			36		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = -0.23 A	T <sub>J</sub> = 25°C	0.76	1.1	V
			T <sub>J</sub> = 125°C	0.63		
Reverse Recovery Time	t <sub>RR</sub>	V <sub>GS</sub> = 0 V, dI <sub>S</sub> /dt = 100 A/μs, I <sub>S</sub> = -0.77 A		78		ns

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

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

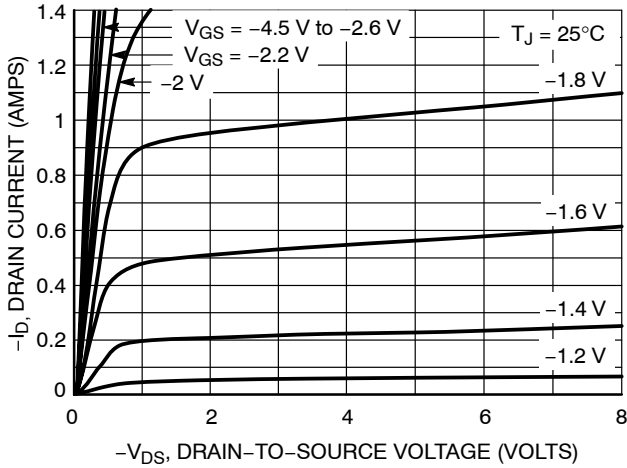


Figure 1. On-Region Characteristics

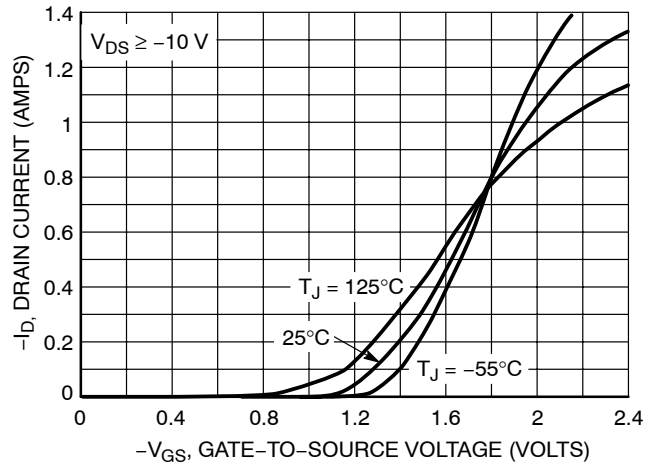


Figure 2. Transfer Characteristics

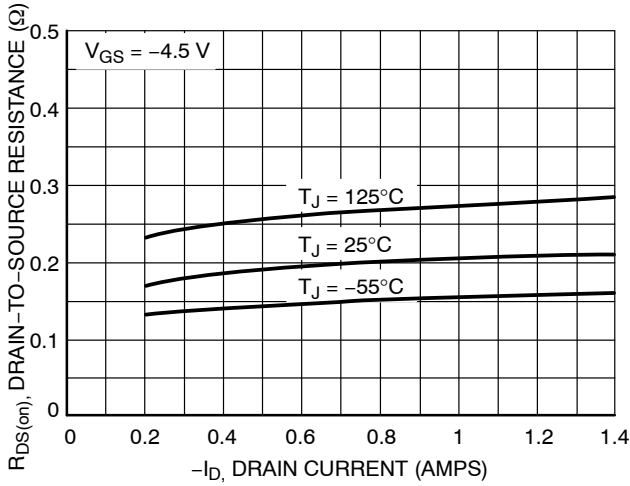


Figure 3. On-Resistance vs. Drain Current and Temperature

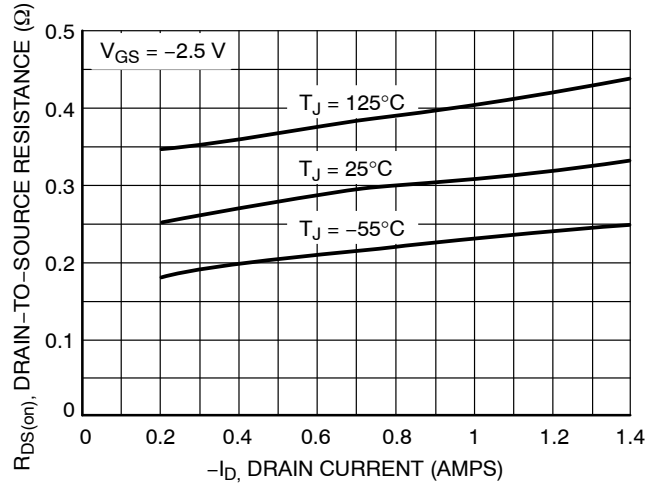


Figure 4. On-Resistance vs. Drain Current and Temperature

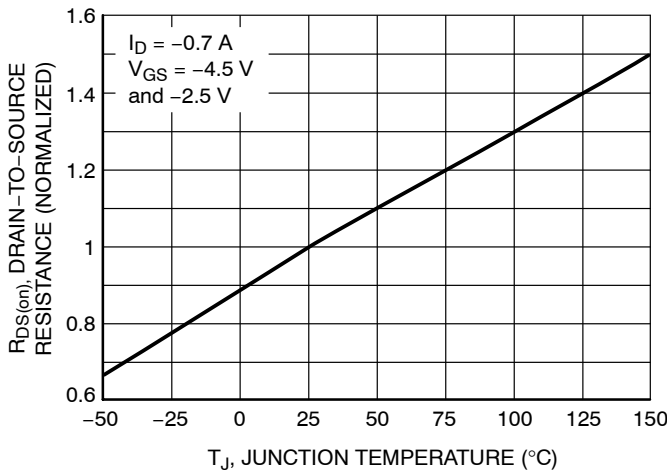


Figure 5. On-Resistance Variation with Temperature

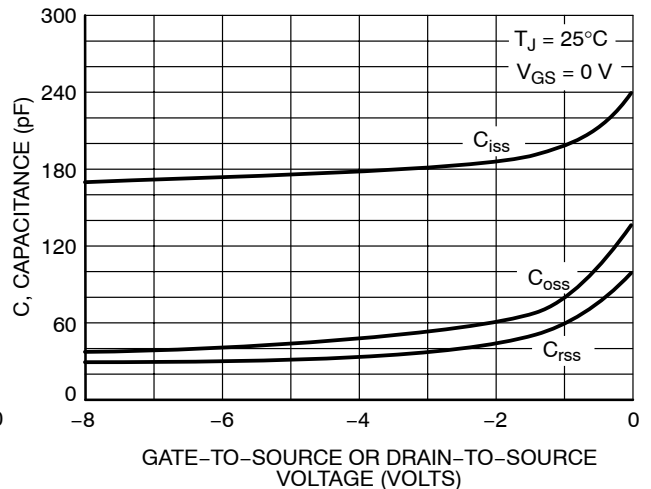
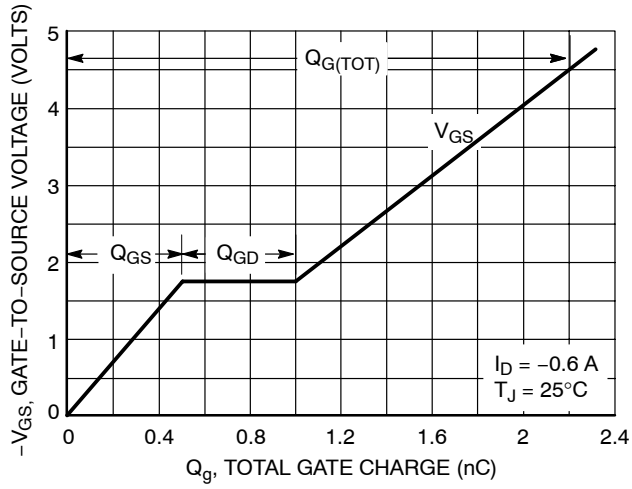


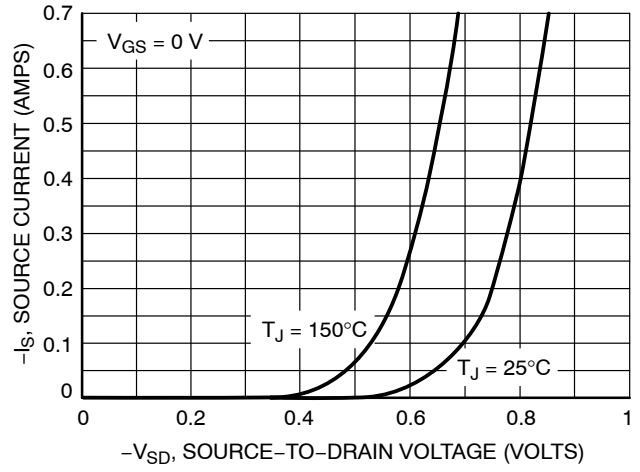
Figure 6. Capacitance Variation

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



**Figure 7. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge**



**Figure 8. Diode Forward Voltage vs. Current**

# NTJD2152P

## ORDERING INFORMATION

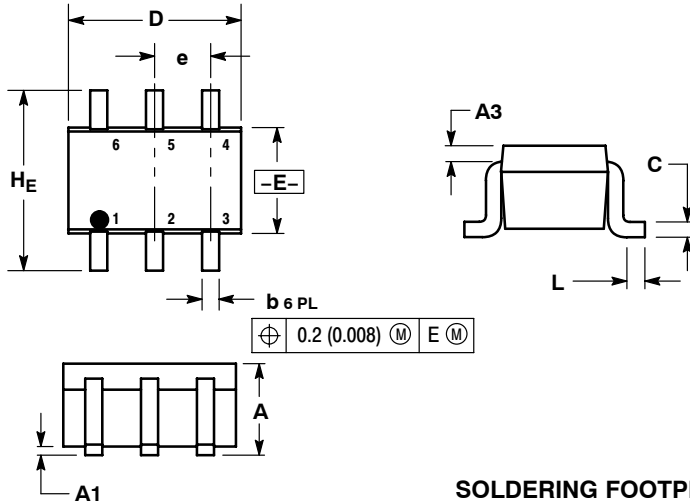
Device Order Number	Package Type	Tape and Reel Size†
NTJD2152PT1	SOT-363	3000 / Tape & Reel
NTJD2152PT1G	SOT-363 (Pb-Free)	3000 / Tape & Reel
NTJD2152PT2	SOT-363	3000 / Tape & Reel
NTJD2152PT2G	SOT-363 (Pb-Free)	3000 / Tape & Reel
NTJD2152PT4	SOT-363	10,000 / Tape & Reel
NTJD2152PT4G	SOT-363 (Pb-Free)	10,000 / 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.

# NTJD2152P

## PACKAGE DIMENSIONS

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



**NOTES:**

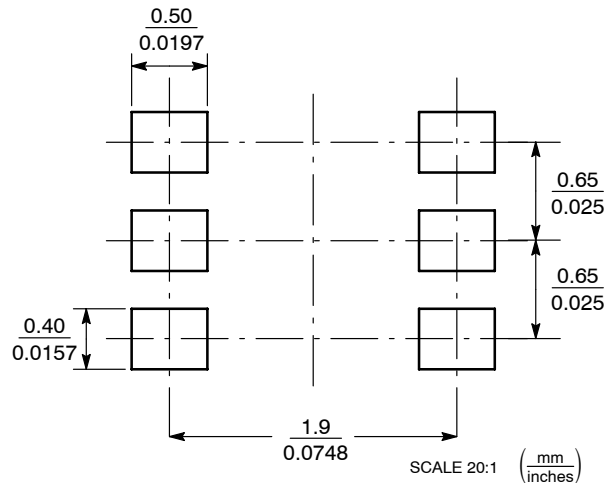
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

DIM	MILLIMETERS			INCHES		
	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
HE	2.00	2.10	2.20	0.078	0.082	0.086

**STYLE 26:**

- PIN 1, SOURCE 1
- GATE 1
- DRAIN 2
- SOURCE 2
- GATE 2
- 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.

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