

# NTJD4152P

## Trench Small Signal MOSFET

20 V, 0.88 A, Dual P-Channel,  
ESD Protected SC-88

### Features

- Leading Trench Technology for Low  $R_{DS(ON)}$  Performance
- Small Footprint Package (SC70-6 Equivalent)
- ESD Protected Gate
- Pb-Free Package is Available

### Applications

- Load/Power Management
- Charging Circuits
- Load Switching
- Cell Phones, Computing, Digital Cameras, MP3s and PDAs

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

Parameter			Symbol	Value	Unit
Drain-to-Source Voltage			V <sub>DSS</sub>	−20	V
Gate-to-Source Voltage			V <sub>GS</sub>	±12	V
Continuous Drain Current (Note 1)	Steady State	T <sub>A</sub> = 25°C	I <sub>D</sub>	−0.88	A
		T <sub>A</sub> = 85°C		−0.63	
Power Dissipation (Note 1)	Steady State	T <sub>A</sub> = 25°C	P <sub>D</sub>	0.272	W
		T <sub>A</sub> = 85°C		0.141	
Continuous Drain Current (Note 2)	t ≤ 5 s	T <sub>A</sub> = 25°C	I <sub>D</sub>	−1.0	A
		T <sub>A</sub> = 85°C		−0.72	
Power Dissipation (Note 2)	t ≤ 5 s	T <sub>A</sub> = 25°C	P <sub>D</sub>	0.35	W
		T <sub>A</sub> = 85°C		0.181	
Pulsed Drain Current		t ≤ 10 μs	I <sub>DM</sub>	±3.0	A
Operating Junction and Storage Temperature			T <sub>J</sub> , T <sub>STG</sub>	−55 to 150	°C
Continuous Source Current (Body Diode)			I <sub>S</sub>	−0.48	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T <sub>L</sub>	260	°C

### THERMAL RESISTANCE RATINGS (Note 1)

Parameter	Symbol	Max	Unit
Junction-to-Ambient – Steady State	$R_{\theta JA}$	460	$^\circ\text{C/W}$
Junction-to-Ambient – $t \leq 5$ s	$R_{\theta JA}$	357	
Junction-to-Lead – Steady State	$R_{\theta JL}$	226	

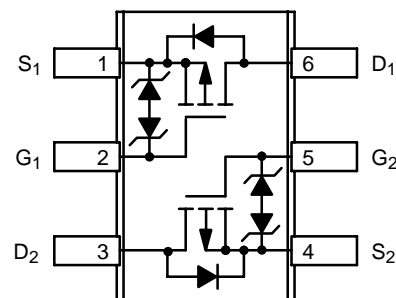
1. Surface mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces), steady state.
2. Surface mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces),  $t \leq 5$  s.



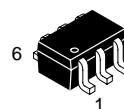
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$V_{(BR)DSS}$	$R_{DS(on)}$ Typ	$I_D$ Max
-20 V	215 m $\Omega$ @ -4.5 V	-0.88 A
	345 m $\Omega$ @ -2.5 V	
	600 m $\Omega$ @ -1.8 V	

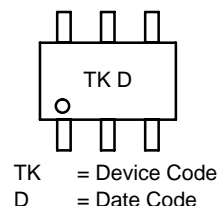


Top View  
SOT-363 (SC-88-6)

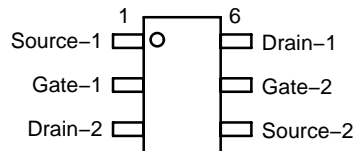


SOT-363 / SC-88  
CASE 419B  
STYLE 26

### MARKING DIAGRAM



### PIN ASSIGNMENT



Top View

### ORDERING INFORMATION

Device	Package	Shipping
NTJD4152PT1	SOT-363	3000 Units/Reel
NTJD4152PT1G	SOT-363 (Pb-Free)	3000 Units/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.

# NTJD4152P

## 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	-20			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = -16 V	T <sub>J</sub> = 25°C		1.0	μA
			T <sub>J</sub> = 125°C	0.5		
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±4.5 V		0.03	1.0	μA
		V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±12 V		6.0		

### ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = -250 μA	-0.45			V
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = -4.5 V, I <sub>D</sub> = -0.88 A		215	260	mΩ
		V <sub>GS</sub> = -2.5 V, I <sub>D</sub> = -0.71 A		345	500	
		V <sub>GS</sub> = -1.8 V, I <sub>D</sub> = -0.20 A		600	1000	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -0.88 A		3.0		S

### CHARGES AND CAPACITANCES

Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> = 0 V, f = 1.0 MHz, V <sub>DS</sub> = -20 V		155		pF
Output Capacitance	C <sub>OSS</sub>			25		
Reverse Transfer Capacitance	C <sub>RSS</sub>			18		
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> = -4.5 V, V <sub>DS</sub> = -10 V, I <sub>D</sub> = -0.88 A		2.2		nC
Gate-to-Source Charge	Q <sub>GS</sub>			0.5		
Gate-to-Drain Charge	Q <sub>GD</sub>			0.65		

### SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	t <sub>d(ON)</sub>	V <sub>GS</sub> = -4.5 V, V <sub>DD</sub> = -10 V, I <sub>D</sub> = -0.5 A, R <sub>G</sub> = 20 Ω		5.8		ns
Rise Time	t <sub>r</sub>			6.5		
Turn-Off Delay Time	t <sub>d(OFF)</sub>			13.5		
Fall Time	t <sub>f</sub>			3.5		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = -0.48 A	T <sub>J</sub> = 25°C		-0.8	-1.2	V
			T <sub>J</sub> = 125°C		-0.66		

3. Pulse Test: pulse width ≤ 300μs, duty cycle ≤ 2%.

4. Switching characteristics are independent of operating junction temperatures.

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

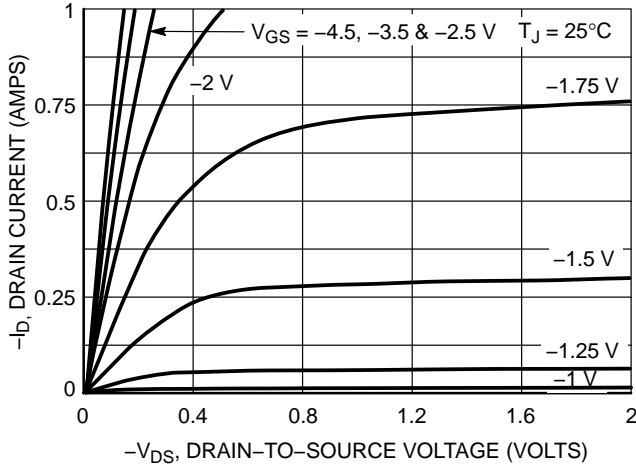


Figure 1. On-Region Characteristics

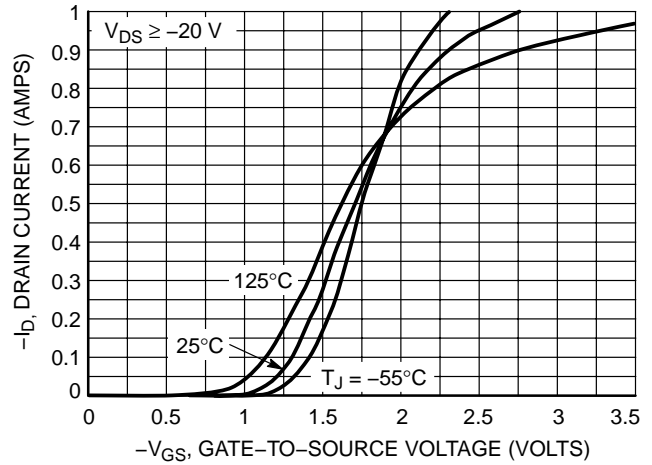


Figure 2. Transfer Characteristics

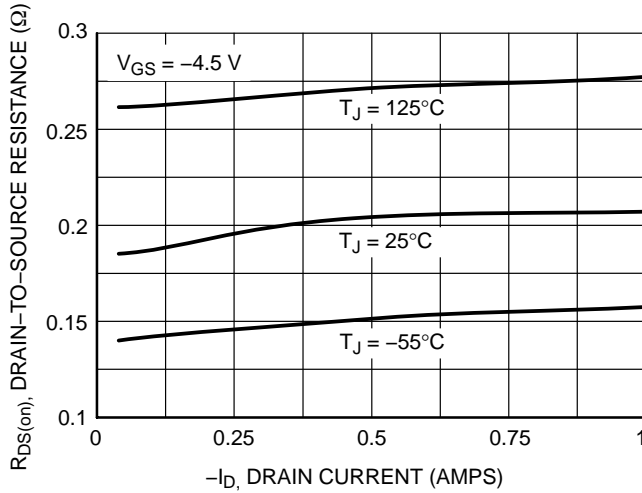


Figure 3. On-Resistance vs. Drain Current and Temperature

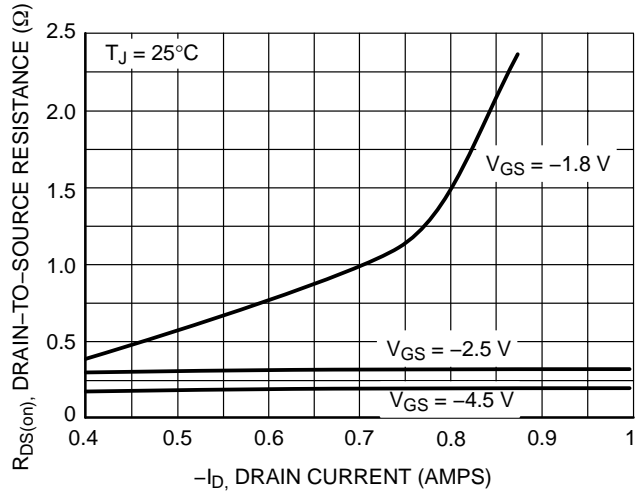


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

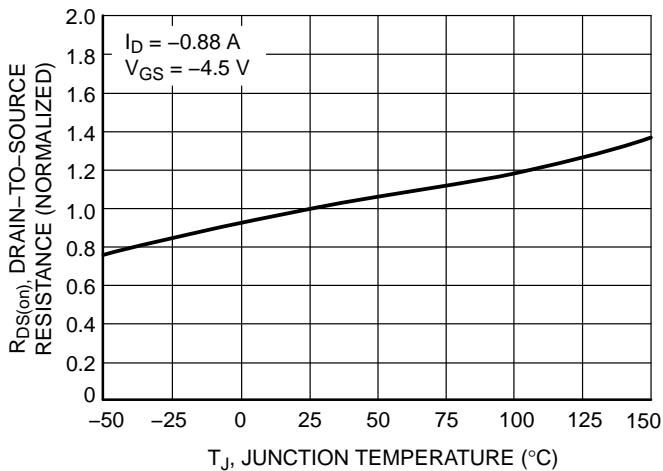


Figure 5. On-Resistance Variation with Temperature

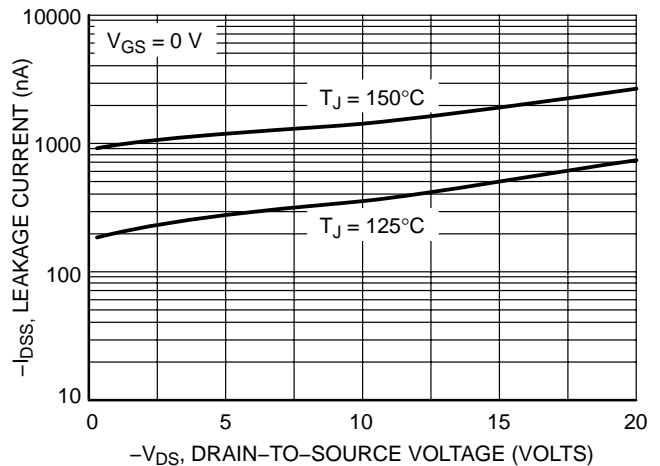
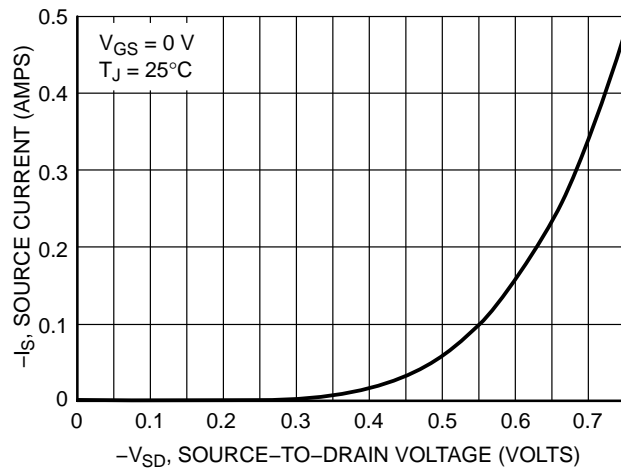
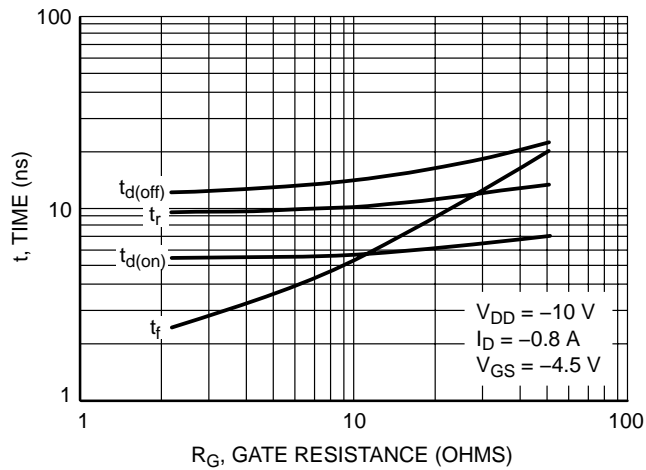
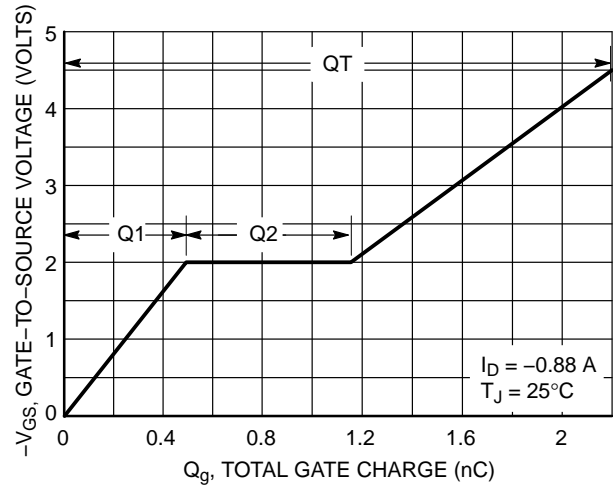
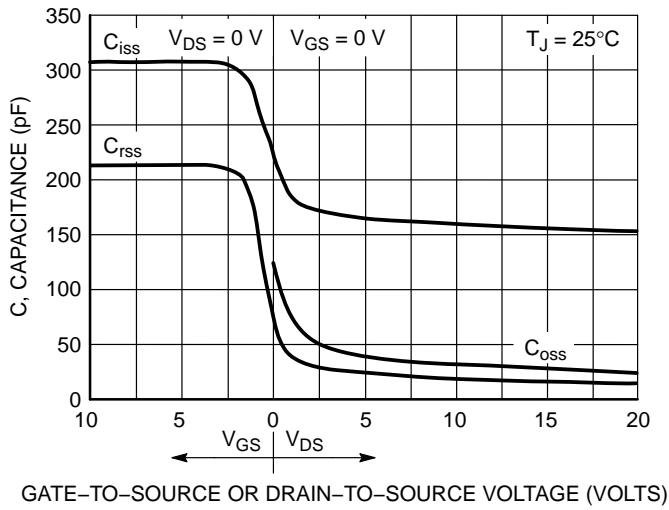


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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



# NTJD4152P

## PACKAGE DIMENSIONS

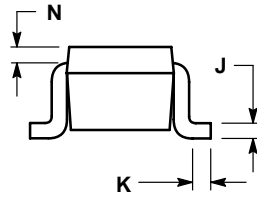
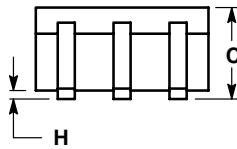
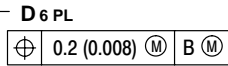
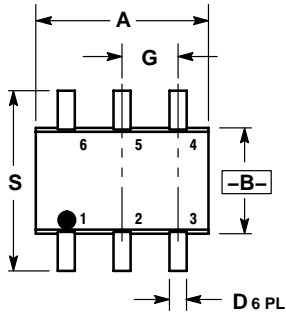
SC-88/SC70-6/SOT-363

CASE 419B-02

ISSUE U

### NOTES:

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

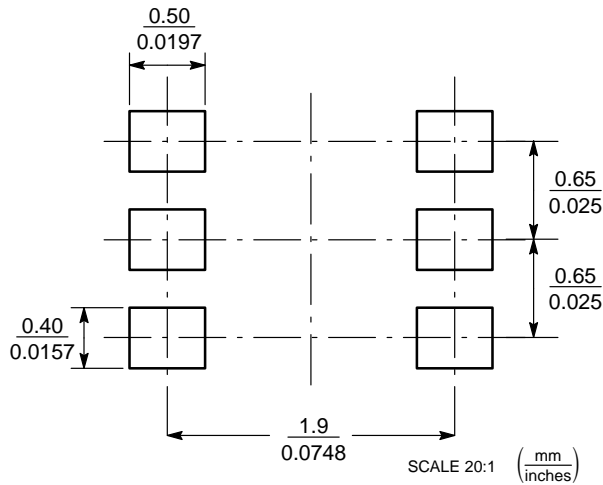


DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

### STYLE 26:


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

## SOLDERING FOOTPRINT\*



SC-88/SC70-6/SOT-363

\*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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