

# NTA4151P, NTE4151P

## Small Signal MOSFET

-20 V, -760 mA, Single P-Channel,  
Gate Zener, SC-75, SC-89



ON Semiconductor®

<http://onsemi.com>

### Features

- Low  $R_{DS(on)}$  for Higher Efficiency and Longer Battery Life
- Small Outline Package (1.6 x 1.6 mm)
- SC-75 Standard Gullwing Package
- ESD Protected Gate
- Pb-Free Packages are Available

### Applications

- High Side Load Switch
- DC-DC Conversion
- Small Drive Circuits
- Battery Operated Systems such as Cell Phones, PDAs, Digital Cameras, etc.

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

Parameter	Symbol	Value	Units
Drain-to-Source Voltage	$V_{DSS}$	-20	V
Gate-to-Source Voltage	$V_{GS}$	$\pm 6.0$	V
Continuous Drain Current (Note 1)	$I_D$	-760	mA
Power Dissipation (Note 1) SC-75 SC-89	$P_D$	301 313	mW
Pulsed Drain Current	$I_{DM}$	$\pm 1000$	mA
Operating Junction and Storage Temperature	$T_J$ , $T_{STG}$	-55 to 150	$^\circ\text{C}$
Continuous Source Current (Body Diode)	$I_S$	-250	mA
Lead Temperature for Soldering Purposes (1/8 in from case for 10 s)	$T_L$	260	$^\circ\text{C}$
Gate-to-Source ESD Rating – (Human Body Model, Method 3015)	ESD	500	V

### THERMAL RESISTANCE RATINGS

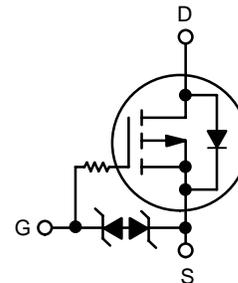
Junction-to-Ambient – Steady State (Note 1) SC-75 SC-89	$R_{\theta JA}$	Value	$^\circ\text{C}/\text{W}$
		415 400	

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

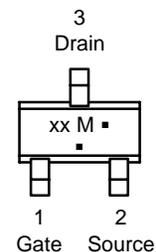
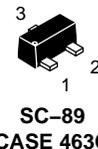
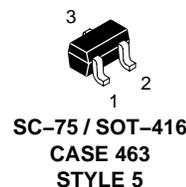
1. Surface mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).

$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	$I_D$ MAX
-20 V	0.26 $\Omega$ @ -4.5 V	-760 mA
	0.35 $\Omega$ @ -2.5 V	
	0.49 $\Omega$ @ -1.8 V	

### P-Channel MOSFET



### MARKING DIAGRAM & PIN ASSIGNMENT



xx = Device Code  
M = Date Code\*  
■ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation may vary depending upon manufacturing location.

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

# NTA4151P, NTE4151P

## 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		-1.0	-100	nA
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±4.5 V		±1.0	±10	μA

### ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> = V <sub>GS</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> = -350 mA		0.26	0.36	Ω
		V <sub>GS</sub> = -2.5 V, I <sub>D</sub> = -300 mA		0.35	0.45	
		V <sub>GS</sub> = -1.8 V, I <sub>D</sub> = -150 mA		0.49	1.0	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = -10 V, I <sub>D</sub> = -250 mA		0.4		S

### CHARGES AND CAPACITANCES

Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> = 0 V, f = 1.0 MHz, V <sub>DS</sub> = -5.0 V		156		pF
Output Capacitance	C <sub>OSS</sub>			28		
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>DD</sub> = -10 V, I <sub>D</sub> = -0.3 A		2.1		nC
Threshold Gate Charge	Q <sub>G(TH)</sub>			0.125		
Gate-to-Source Charge	Q <sub>GS</sub>			0.325		
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> = -10 V, I <sub>D</sub> = -200 mA, R <sub>G</sub> = 10 Ω		8.0		ns
Rise Time	t <sub>r</sub>			8.2		
Turn-Off Delay Time	t <sub>d(OFF)</sub>			29		
Fall Time	t <sub>f</sub>			20.4		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = -250 mA		-0.72	-1.1	V
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- Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
- Switching characteristics are independent of operating junction temperatures.

### ORDERING INFORMATION

Device	Marking	Package	Shipping <sup>†</sup>
NTA4151PT1	TN	SC-75	3000/Tape & Reel
NTA4151PT1G	TN	SC-75 (Pb-Free)	3000/Tape & Reel
NTE4151PT1G	TM	SC-89 (Pb-Free)	3000/Tape & Reel

<sup>†</sup>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.

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## TYPICAL ELECTRICAL CHARACTERISTICS

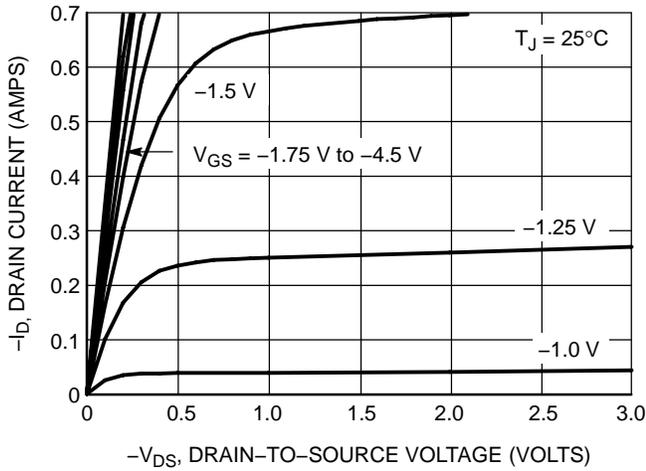


Figure 1. On-Region Characteristics

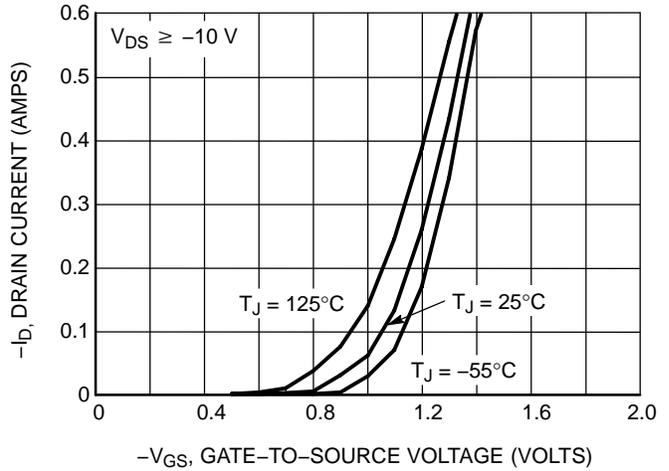


Figure 2. Transfer Characteristics

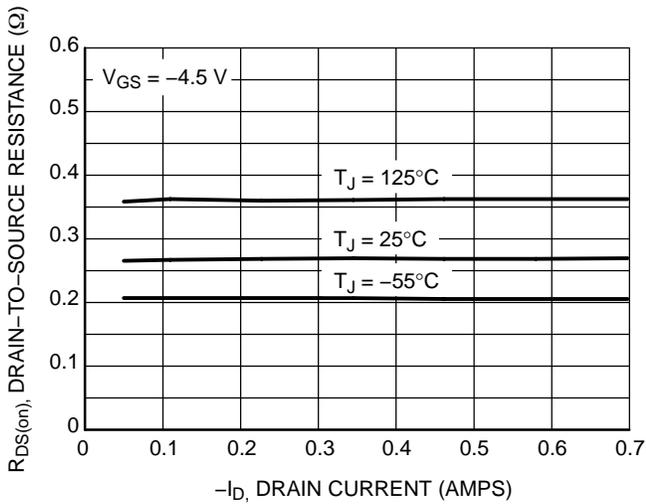


Figure 3. On-Resistance vs. Drain Current and Temperature

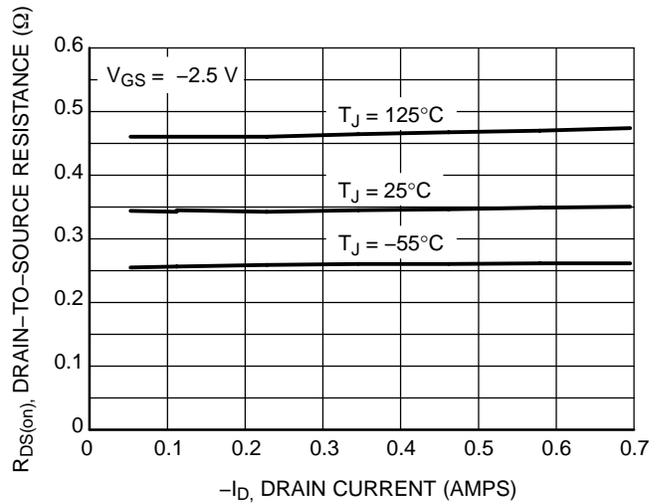


Figure 4. On-Resistance vs. Drain Current and Temperature

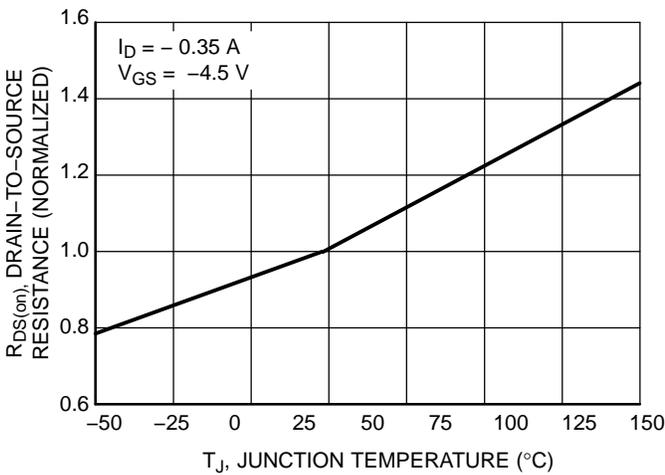


Figure 5. On-Resistance Variation with Temperature

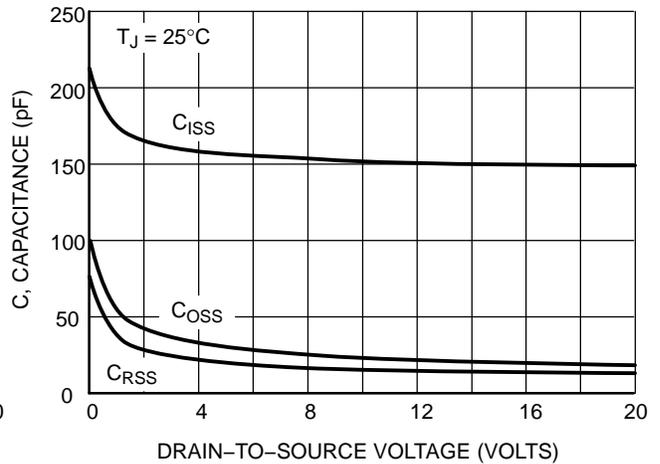


Figure 6. Capacitance Variation

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## TYPICAL ELECTRICAL CHARACTERISTICS

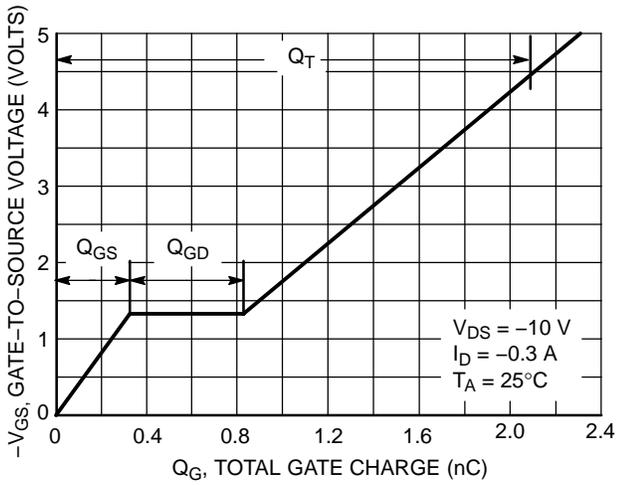


Figure 7. Gate-to-Source Voltage vs. Total Gate Charge

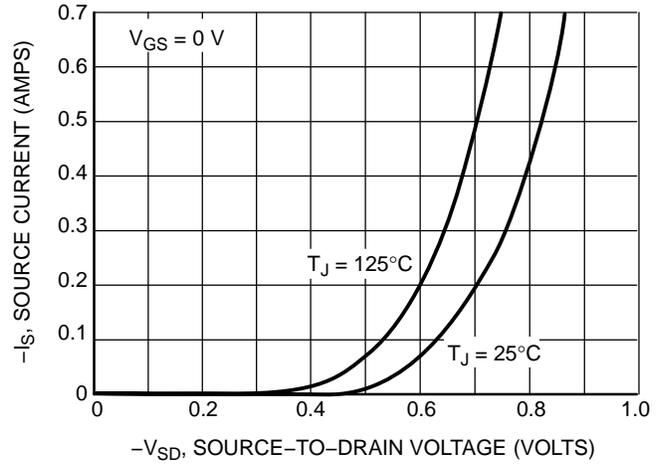


Figure 8. Diode Forward Voltage vs. Current

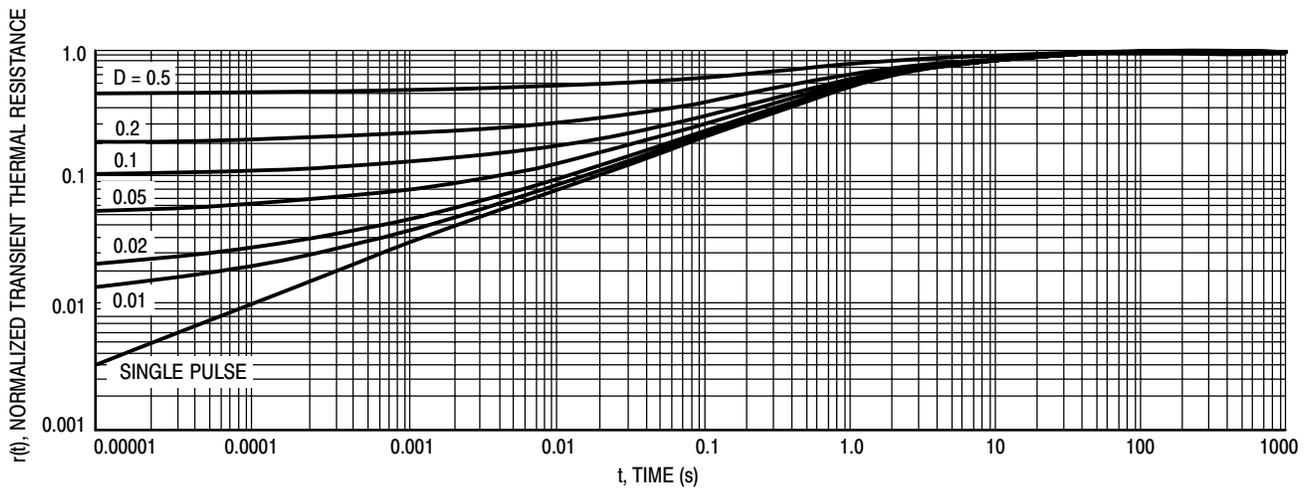
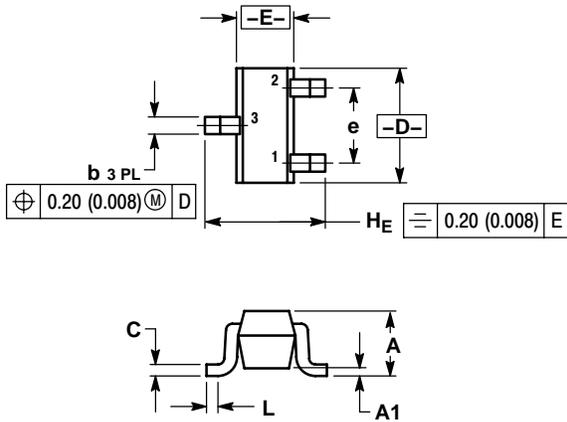


Figure 9. Normalized Thermal Response

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## PACKAGE DIMENSIONS

SC-75 / SOT-416  
CASE 463-01  
ISSUE F



NOTES:

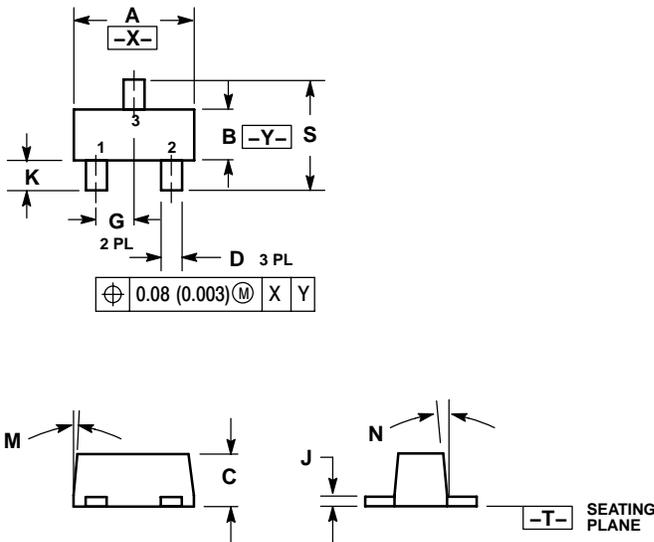
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.80	0.90	0.027	0.031	0.035
A1	0.00	0.05	0.10	0.000	0.002	0.004
b	0.15	0.20	0.30	0.006	0.008	0.012
C	0.10	0.15	0.25	0.004	0.006	0.010
D	1.55	1.60	1.65	0.059	0.063	0.067
E	0.70	0.80	0.90	0.027	0.031	0.035
e	1.00 BSC			0.04 BSC		
L	0.10	0.15	0.20	0.004	0.006	0.008
H <sub>F</sub>	1.50	1.60	1.70	0.061	0.063	0.065

STYLE 5:

1. GATE
2. SOURCE
3. DRAIN

SC-89  
CASE 463C-03  
ISSUE C



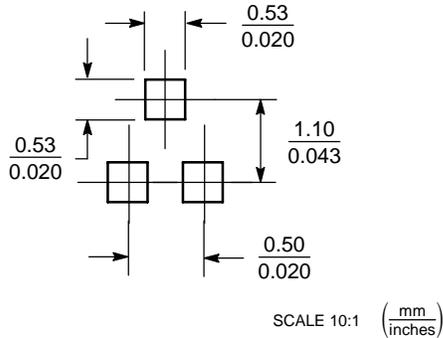
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 463C-01 OBSOLETE, NEW STANDARD 463C-02.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.50	1.60	1.70	0.059	0.063	0.067
B	0.75	0.85	0.95	0.030	0.034	0.040
C	0.60	0.70	0.80	0.024	0.028	0.031
D	0.23	0.28	0.33	0.009	0.011	0.013
G	0.50 BSC			0.020 BSC		
H	0.53 REF			0.021 REF		
J	0.10	0.15	0.20	0.004	0.006	0.008
K	0.30	0.40	0.50	0.012	0.016	0.020
L	1.10 REF			0.043 REF		
M	---	---	10 °	---	---	10 °
N	---	---	10 °	---	---	10 °
S	1.50	1.60	1.70	0.059	0.063	0.067

# NTA4151P, NTE4151P

## RECOMMENDED SOLDERING FOOTPRINT FOR SC-75 AND SC-89\*



\*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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