

NTA4151P, NTE4151P

MOSFET – Single, P-Channel, Small Signal, Gate Zener, SC-75, SC-89

-20 V, -760 mA

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
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

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_{DS}	-20	V
Gate-to-Source Voltage		V_{GS}	± 6.0	V
Continuous Drain Current (Note 1)	Steady State	I_D	-760	mA
Power Dissipation (Note 1)	Steady State	P_D	301	mW
SC-75			313	
SC-89				
Pulsed Drain Current	$t_p = 10 \mu\text{s}$	I_{DM}	± 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	1800	V

THERMAL RESISTANCE RATINGS

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

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, 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).

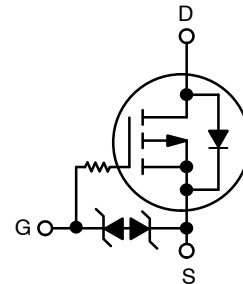


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$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
-20 V	0.26 Ω @ -4.5 V	-760 mA
	0.35 Ω @ -2.5 V	
	0.49 Ω @ -1.8 V	

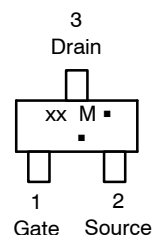
P-Channel MOSFET



MARKING DIAGRAM & PIN ASSIGNMENT

SC-75 / SOT-416
CASE 463
STYLE 5

SC-89
CASE 463C



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.

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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	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-20			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}, V_{DS} = -16\text{ V}$		-1.0	-100	nA
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 4.5\text{ V}$		± 1.0	± 10	μA

ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-0.45		-1.2	V
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -350\text{ mA}$		0.26	0.36	Ω
		$V_{GS} = -2.5\text{ V}, I_D = -300\text{ mA}$		0.35	0.45	
		$V_{GS} = -1.8\text{ V}, I_D = -150\text{ mA}$		0.49	1.0	
Forward Transconductance	g_{FS}	$V_{DS} = -10\text{ V}, I_D = -250\text{ mA}$		0.4		S

CHARGES AND CAPACITANCES

Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = -5.0\text{ V}$		156		pF
Output Capacitance	C_{OSS}			28		
Reverse Transfer Capacitance	C_{RSS}			18		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -4.5\text{ V}, V_{DD} = -10\text{ V}, I_D = -0.3\text{ A}$		2.1		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.125		
Gate-to-Source Charge	Q_{GS}			0.325		
Gate-to-Drain Charge	Q_{GD}			0.5		

SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = -4.5\text{ V}, V_{DD} = -10\text{ V}, I_D = -200\text{ mA}, R_G = 10\text{ }\Omega$		8.0		ns
Rise Time	t_r			8.2		
Turn-Off Delay Time	$t_{d(OFF)}$			29		
Fall Time	t_f			20.4		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = -250\text{ mA}$		-0.72	-1.1	V
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Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Pulse Test: pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

3. Switching characteristics are independent of operating junction temperatures.

ORDERING INFORMATION

Device	Marking	Package	Shipping [†]
NTA4151PT1G	TN	SC-75 (Pb-Free)	3000 / Tape & Reel
NTE4151PT1G	TM	SC-89 (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 Specifications Brochure, BRD8011/D.

TYPICAL ELECTRICAL CHARACTERISTICS

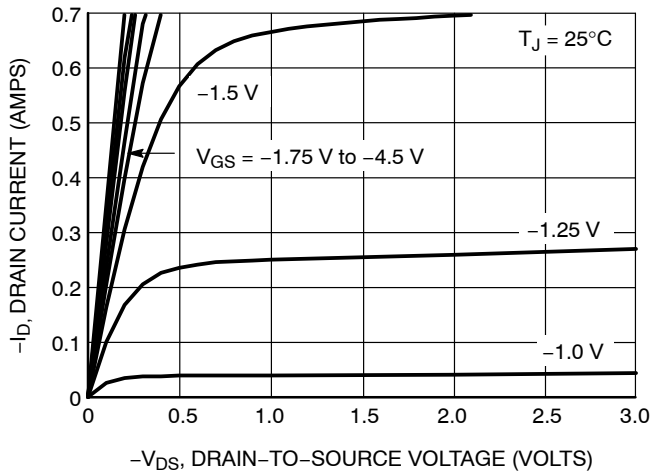


Figure 1. On-Region Characteristics

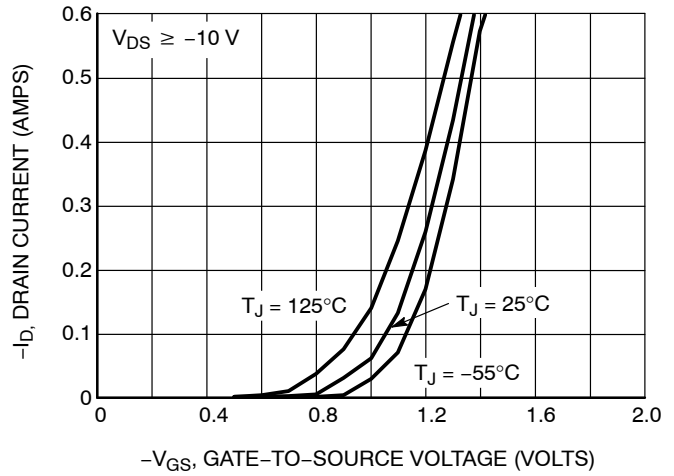


Figure 2. Transfer Characteristics

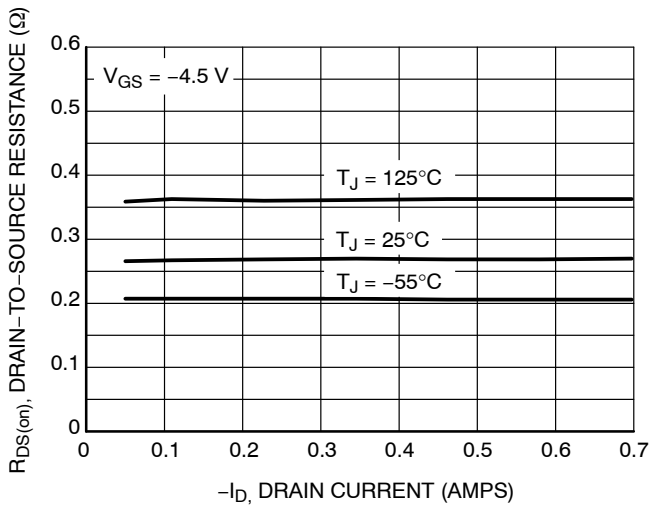


Figure 3. On-Resistance vs. Drain Current and Temperature

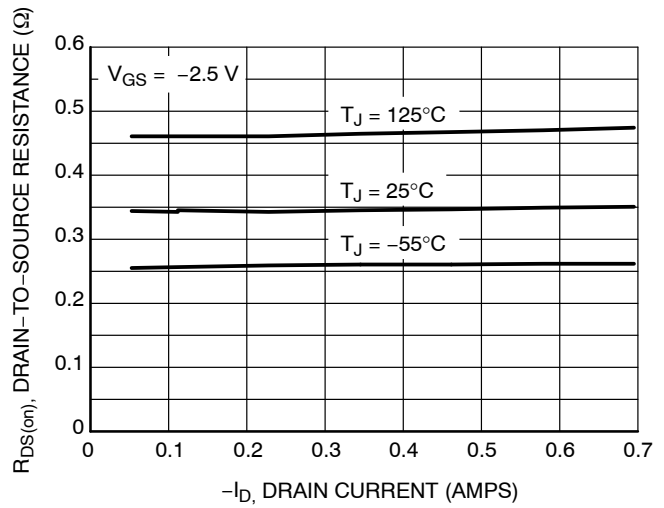


Figure 4. On-Resistance vs. Drain Current and Temperature

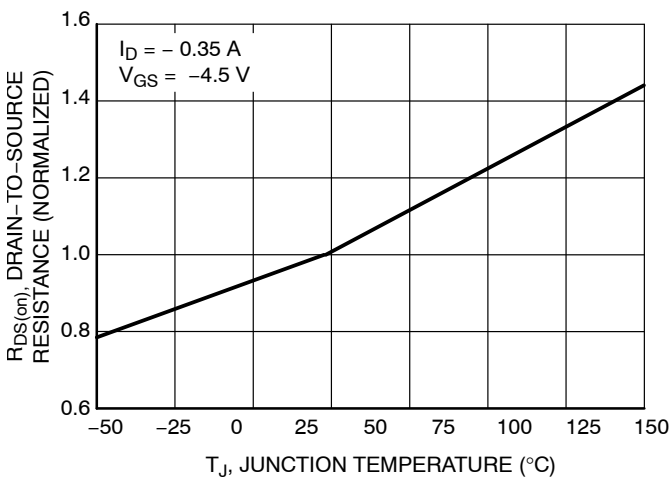


Figure 5. On-Resistance Variation with Temperature

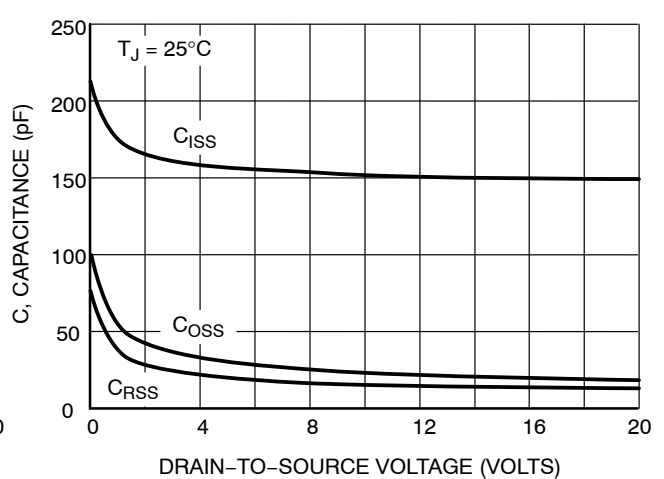


Figure 6. Capacitance Variation

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TYPICAL ELECTRICAL CHARACTERISTICS

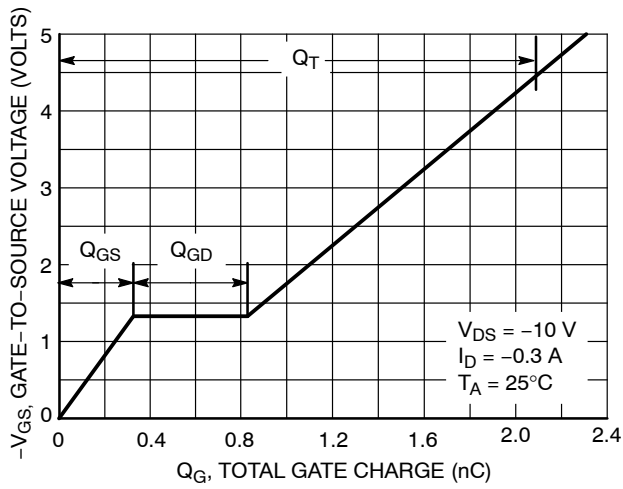


Figure 7. Gate-to-Source Voltage vs. Total Gate Charge

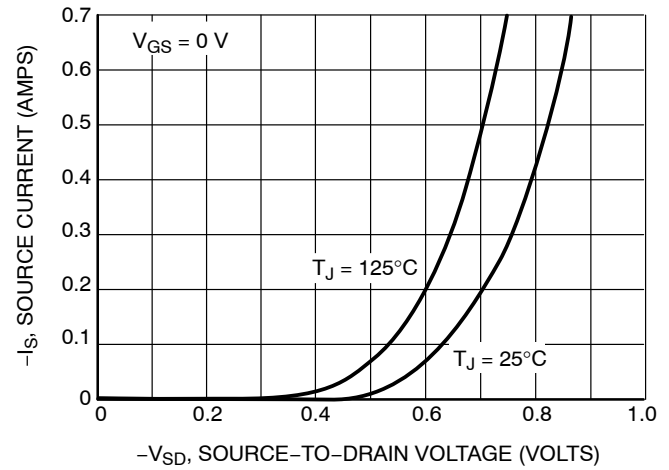


Figure 8. Diode Forward Voltage vs. Current

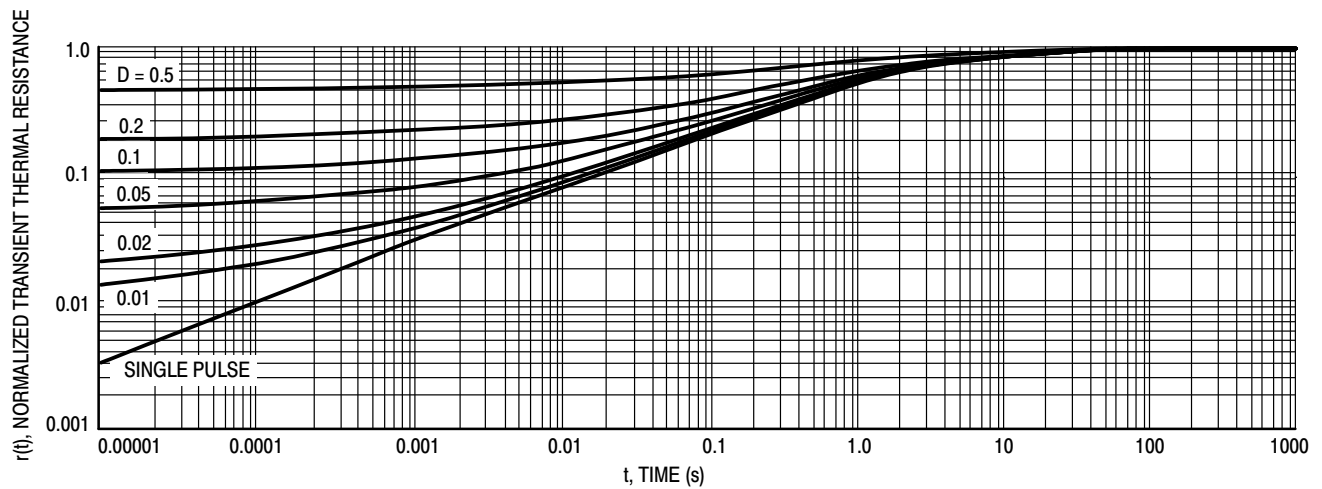


Figure 9. Normalized Thermal Response

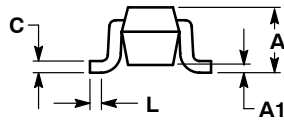
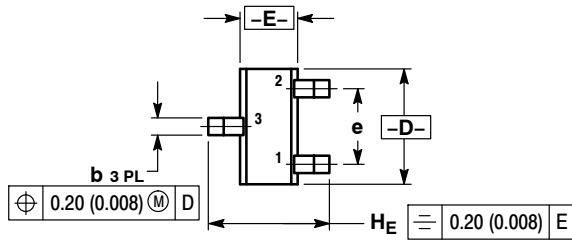
NTA4151P, NTE4151P

PACKAGE DIMENSIONS

SC-75/SOT-416

CASE 463

ISSUE F



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

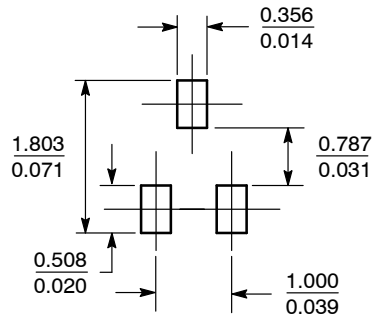
2. CONTROLLING DIMENSION: MILLIMETER.

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 _E	1.50	1.60	1.70	0.061	0.063	0.065

STYLE 5:

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

SOLDERING FOOTPRINT*



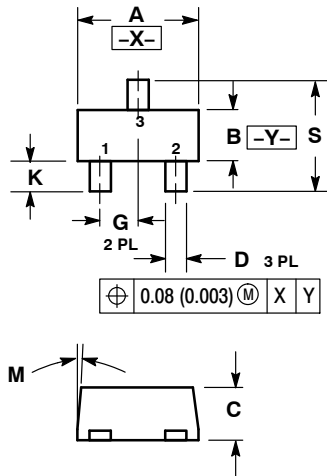
SCALE 10:1 $\left(\frac{\text{mm}}{\text{inches}} \right)$

*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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PACKAGE DIMENSIONS

SC-89, 3-LEAD CASE 463C-03 ISSUE C

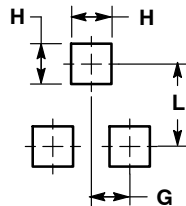


NOTES:


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

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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