

# NTA4153N, NTE4153N

## Small Signal MOSFET

20 V, 915 mA, Single N-Channel  
with ESD Protection, SC-75 and SC-89

### Features

- Low  $R_{DS(on)}$  Improving System Efficiency
- Low Threshold Voltage
- ESD Protected Gate
- Pb-Free Packages are Available

### Applications

- Load/Power Switches
- Power Supply Converter Circuits
- Battery Management
- Portables like Cell Phones, PDAs, Digital Cameras, Pagers, 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		$V_{GS}$	$\pm 6.0$	V
Continuous Drain Current (Note 1)	Steady State	$I_D$	$T_A = 25^\circ\text{C}$ 915	mA
			$T_A = 85^\circ\text{C}$ 660	
Power Dissipation (Note 1)	Steady State	$P_D$	300	mW
Pulsed Drain Current	$t_p = 10 \mu\text{s}$	$I_{DM}$	1.3	A
Operating Junction and Storage Temperature		$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$
Continuous Source Current (Body Diode)		$I_S$	280	mA
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		$T_L$	260	$^\circ\text{C}$

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Value	Units
Junction-to-Ambient – Steady State (Note 1) SC-75 / SOT-416 SC-89	$R_{\theta JA}$	416	$^\circ\text{C/W}$
		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.

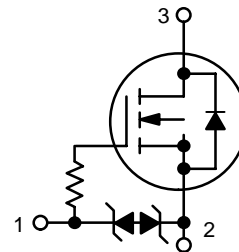
1. Surface mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).



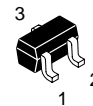
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<http://onsemi.com>

$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	$I_D$ MAX
20 V	0.127 $\Omega$ @ 4.5 V	915 mA
	0.170 $\Omega$ @ 2.5 V	
	0.242 $\Omega$ @ 1.8 V	



N-Channel MOSFET

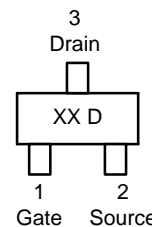


SC-75 / SOT-416  
CASE 463  
STYLE 5



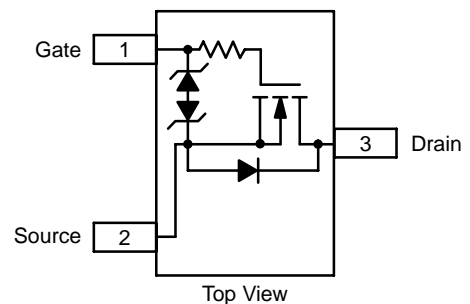
SC-89  
CASE 463C

### MARKING DIAGRAM & PIN ASSIGNMENT



XX = Specific Device Code  
D = Date Code

### SC-75, SC-89



### ORDERING INFORMATION

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

# NTA4153N, NTE4153N

## 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	26		V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V <sub>(BR)DSS</sub> /T <sub>J</sub>			18.4		mV/°C
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 16 V			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	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	0.76		V
Negative Threshold Temperature Coefficient	V <sub>GS(TH)</sub> /T <sub>J</sub>			-2.15		mV/°C
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 600 mA		127	230	mΩ
		V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 500 mA		170	275	
		V <sub>GS</sub> = 1.8 V, I <sub>D</sub> = 350 mA		242	700	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 400 mA		1.4		S

### CHARGES AND CAPACITANCES

Input Capacitance	C <sub>ISS</sub>	V <sub>GS</sub> = 0 V, f = 1.0 MHz, V <sub>DS</sub> = 16 V		110		pF
Output Capacitance	C <sub>OSS</sub>			16		
Reverse Transfer Capacitance	C <sub>RSS</sub>			12		
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> = 0.2 A		1.82		nC
Threshold Gate Charge	Q <sub>G(TH)</sub>			0.2		
Gate-to-Source Charge	Q <sub>GS</sub>			0.3		
Gate-to-Drain Charge	Q <sub>GD</sub>			0.42		

### 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> = 0.2 A, R <sub>G</sub> = 10 Ω		3.7		ns
Rise Time	t <sub>r</sub>			4.4		
Turn-Off Delay Time	t <sub>d(OFF)</sub>			25		
Fall Time	t <sub>f</sub>			7.6		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 200 mA	T <sub>J</sub> = 25°C		0.67	1.1	V
			T <sub>J</sub> = 125°C		0.54		

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

### ORDERING INFORMATION

Device	Marking (XX)	Package	Shipping
NTA4153NT1	TN	SC-75 / SOT-416	3000/Tape & Reel
NTA4153NT1G	TN	SC-75 / SOT-416 (Pb-Free)	3000/Tape & Reel
NTE4153NT1G	TM	SC-89 (Pb-Free)	3000/Tape & Reel

TYPICAL ELECTRICAL CHARACTERISTICS

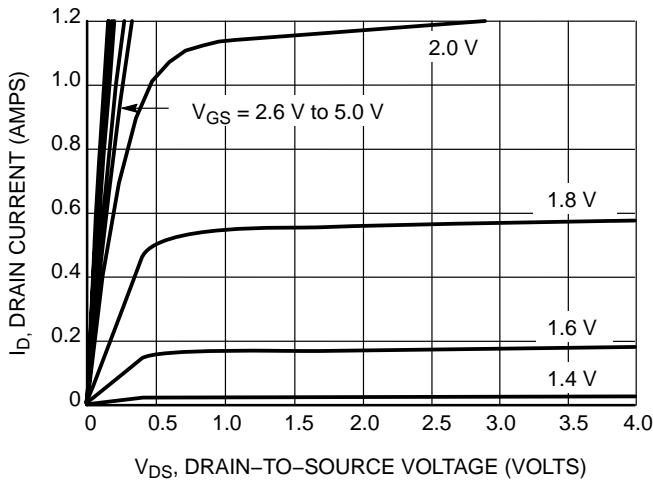


Figure 1. On-Region Characteristics

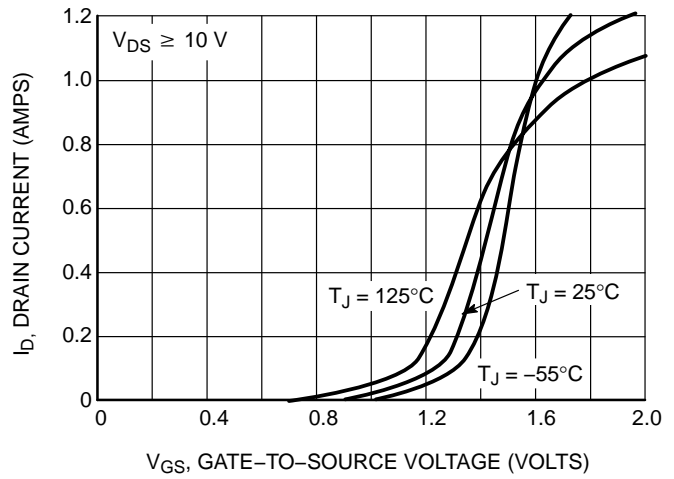


Figure 2. Transfer Characteristics

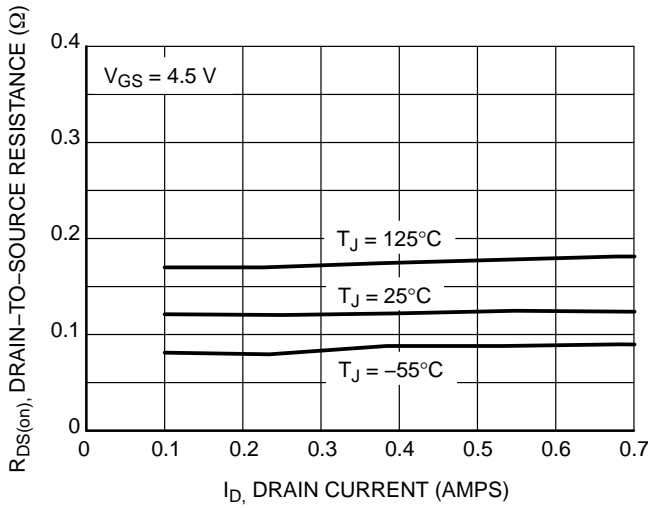


Figure 3. On-Resistance vs. Drain Current and Temperature

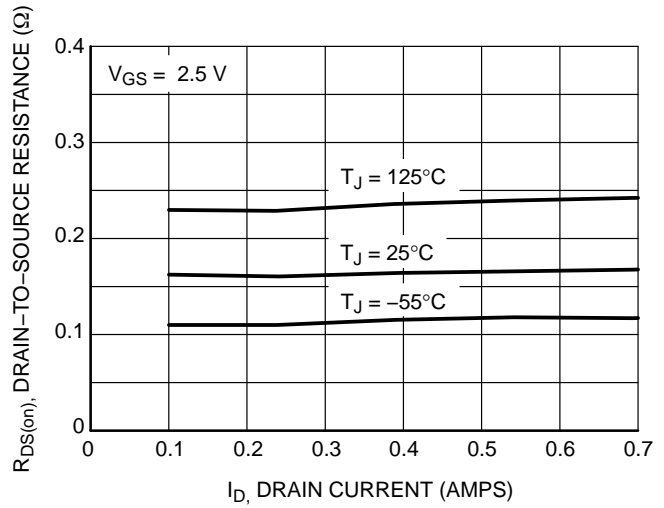


Figure 4. On-Resistance vs. Drain Current and Temperature

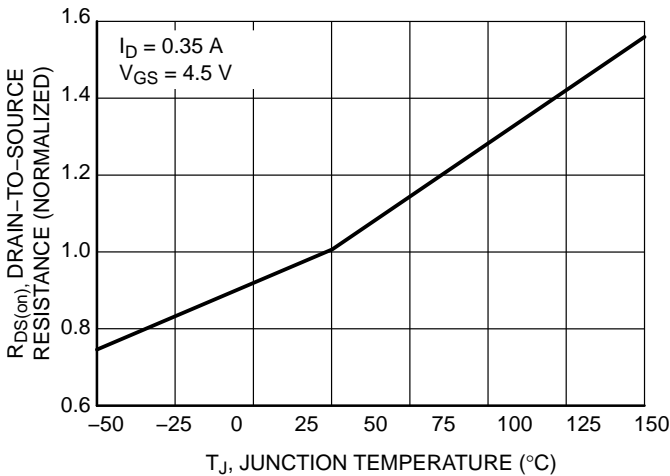


Figure 5. On-Resistance Variation with Temperature

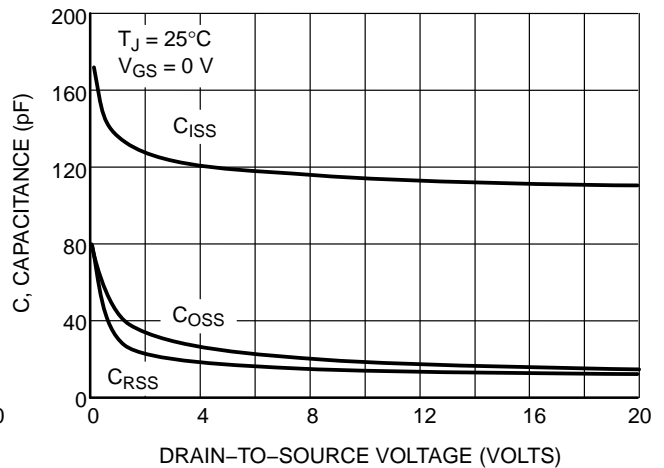


Figure 6. Capacitance Variation

TYPICAL ELECTRICAL CHARACTERISTICS

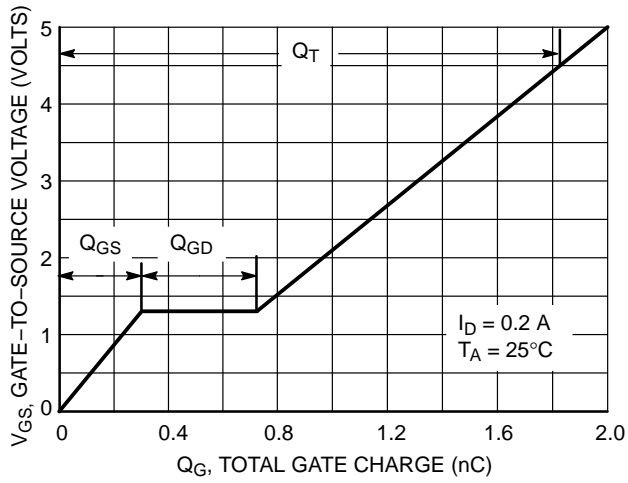


Figure 7. Gate-to-Source Voltage vs. Total Gate Charge

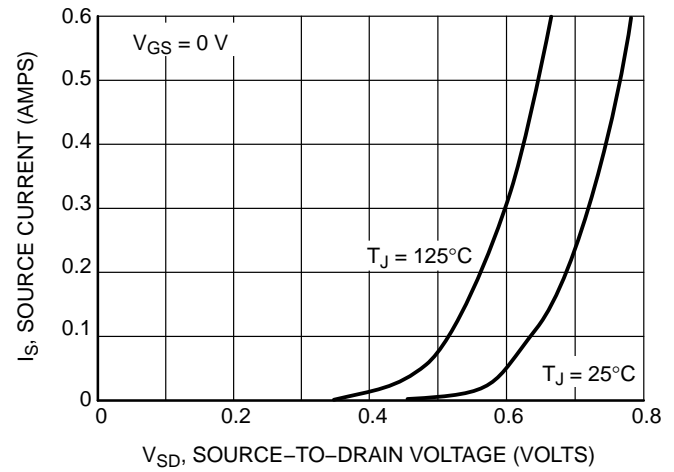


Figure 8. Diode Forward Voltage vs. Current

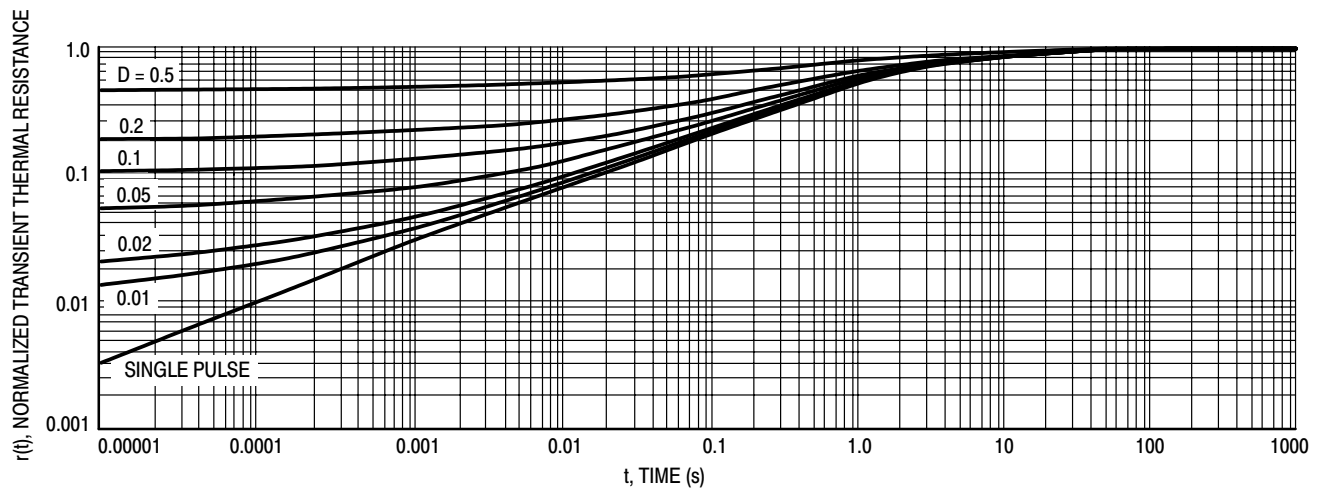


Figure 9. Normalized Thermal Response

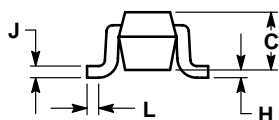
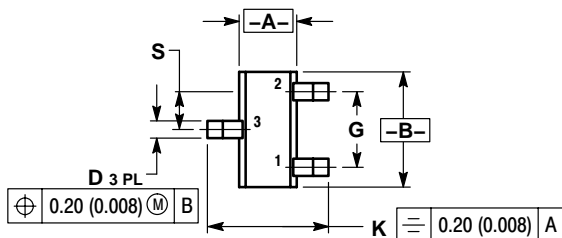
# NTA4153N, NTE4153N

## PACKAGE DIMENSIONS

### SC-75 / SOT-416

CASE 463-01

ISSUE C



#### NOTES:

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

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.70	0.90	0.028	0.035
B	1.40	1.80	0.055	0.071
C	0.60	0.90	0.024	0.035
D	0.15	0.30	0.006	0.012
G	1.00 BSC		0.039 BSC	
H	---	0.10	---	0.004
J	0.10	0.25	0.004	0.010
K	1.45	1.75	0.057	0.069
L	0.10	0.20	0.004	0.008
S	0.50 BSC		0.020 BSC	

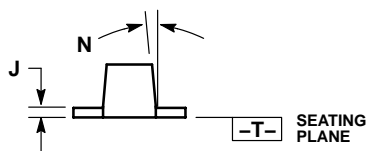
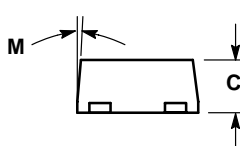
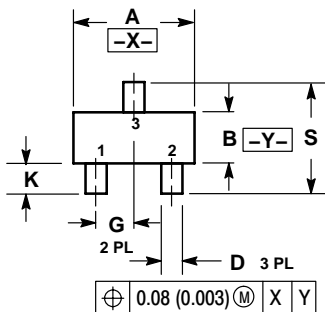
#### STYLE 5:

- PIN 1. GATE
- SOURCE
- DRAIN

### SC-89

CASE 463C-03

ISSUE C



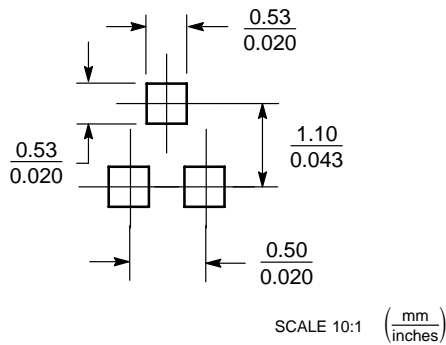
#### NOTES:

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

# NTA4153N, NTE4153N

## 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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