NTA4153N, NTE4153N, NVA4153N, NVE4153N

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

ON Semiconductor®

http://onsemi.com

Features
- Low $R_{DS(on)}$ Improving System Efficiency
- Low Threshold Voltage, 1.5 V Rated
- ESD Protected Gate
- NV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC−Q101 Qualified and PPAP Capable
- Pb−Free Packages are Available

Applications
- Load/Power Switches
- Power Supply Converter Circuits
- Battery Management
- Portables like Cell Phones, PDAs, Digital Cameras, Pagers, etc.

$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
20 V	0.127 Ω @ 4.5 V	915 mA
	0.170 Ω @ 2.5 V	
	0.242 Ω @ 1.8 V	
	0.500 Ω @ 1.5 V	

N−Channel MOSFET

MARKING DIAGRAM & PIN ASSIGNMENT

SC−75 / SOT−416
CASE 463
STYLE 5

SC−89
CASE 463C

3 Drain

XX M■

1 Gate   2 Source

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.

MAXIMUM RATINGS (T$_J$ = 25°C unless otherwise stated)

Parameter			Symbol	Value	Units
Drain−to−Source Voltage			V_{DSS}	20	V
Gate−to−Source Voltage			V_{GS}	±6.0	V
Continuous Drain Current (Note 1)	Steady State	T_A = 25°C	I_D	915	mA
		T_A = 85°C		660	
Power Dissipation (Note 1)	Steady State		P_D	300	mW
Pulsed Drain Current	t_p =10 μs		I_{DM}	1.3	A
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to 150	°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	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Value	Units
Junction−to−Ambient – Steady State (Note 1) SC−75 / SOT−416 SC−89	$R_{\theta JA}$	416 400	°C/W

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.
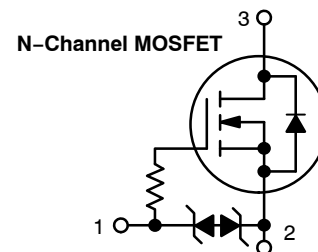
1. Surface mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).
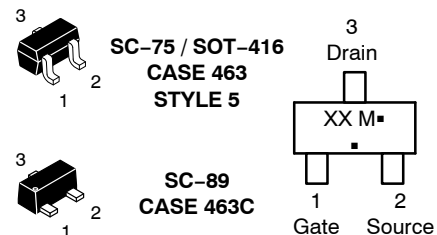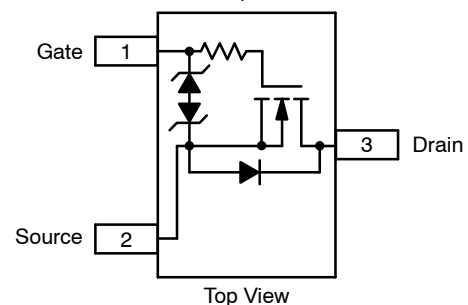
SC−75, SC−89

Gate 1

3 Drain

Source 2

Top View

ORDERING INFORMATION
See detailed ordering and shipping information on page 4 of this data sheet.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise stated)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA	20	26		V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			18.4		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 16 V			100	nA
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±4.5 V			±1.0	μA
ON CHARACTERISTICS (Note 2)						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA	0.45	0.76	1.1	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			−2.15		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 600 mA		127	230	mΩ
		V_{GS} = 2.5 V, I_D = 500 mA		170	275	
		V_{GS} = 1.8 V, I_D = 350 mA		242	700	
		V_{GS} = 1.5 V, I_D = 40 mA		500	950	
Forward Transconductance	g_{FS}	V_{DS} = 10 V, I_D = 400 mA		1.4		S
CHARGES AND CAPACITANCES						
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 16 V		110		pF
Output Capacitance	C_{OSS}			16		
Reverse Transfer Capacitance	C_{RSS}			12		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 10 V, I_D = 0.2 A		1.82		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.2		
Gate−to−Source Charge	Q_{GS}			0.3		
Gate−to−Drain Charge	Q_{GD}			0.42		
SWITCHING CHARACTERISTICS (Note 3)						
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 4.5 V, V_{DD} = 10 V, I_D = 0.2 A, R_G = 10 Ω		3.7		ns
Rise Time	t_r			4.4		
Turn−Off Delay Time	$t_{d(OFF)}$			25		
Fall Time	t_f			7.6		
DRAIN−SOURCE DIODE CHARACTERISTICS						
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 200 mA	T_J = 25°C		0.67	1.1	V
			T_J = 125°C		0.54		

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 ≤ 300 μs, duty cycle ≤ 2%.
3. Switching characteristics are independent of operating junction temperatures.
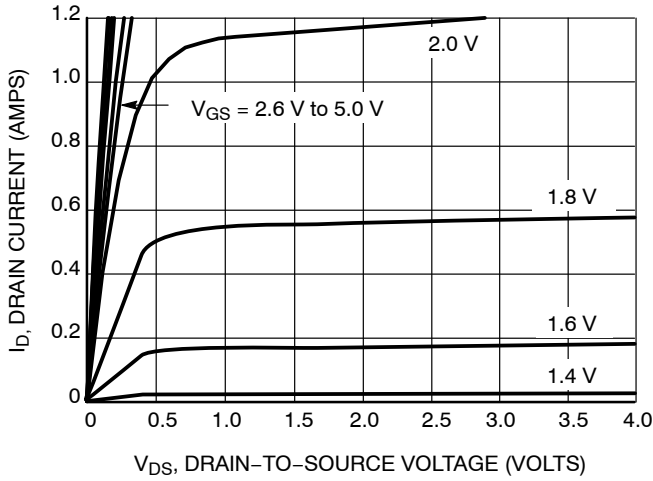
TYPICAL ELECTRICAL CHARACTERISTICS
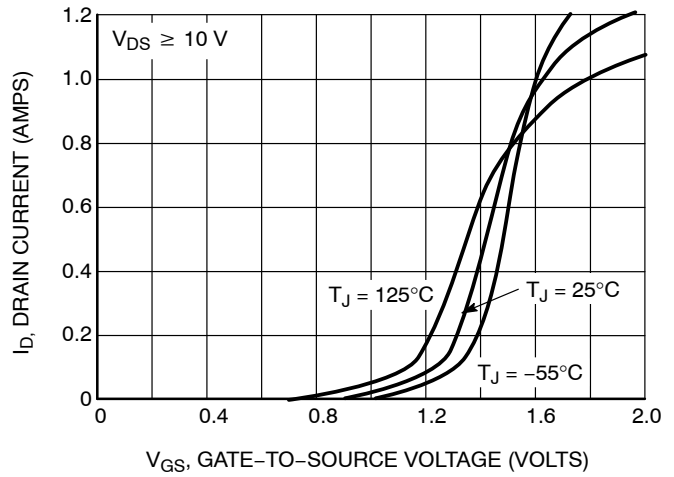
Figure 1. On−Region Characteristics
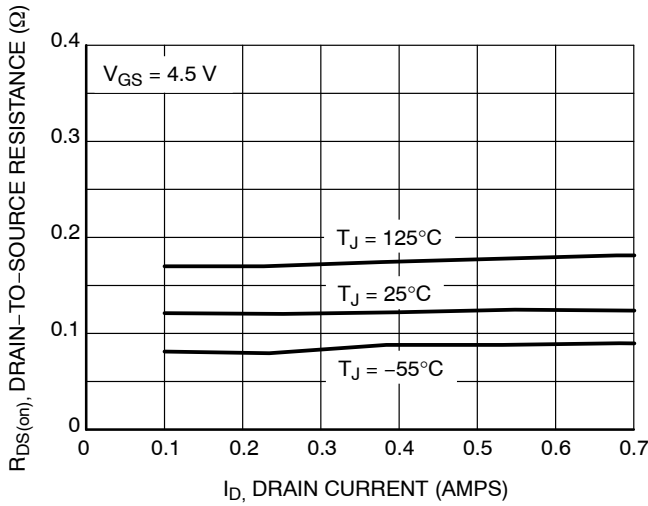
Figure 2. Transfer Characteristics

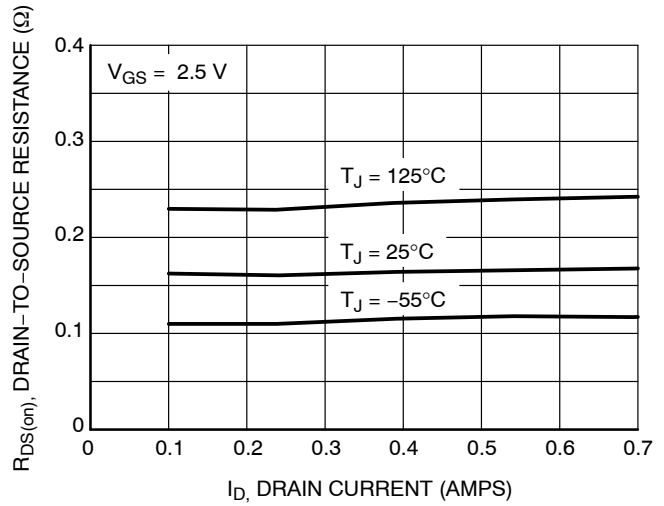**Figure 3. On−Resistance vs. Drain Current and Temperature**

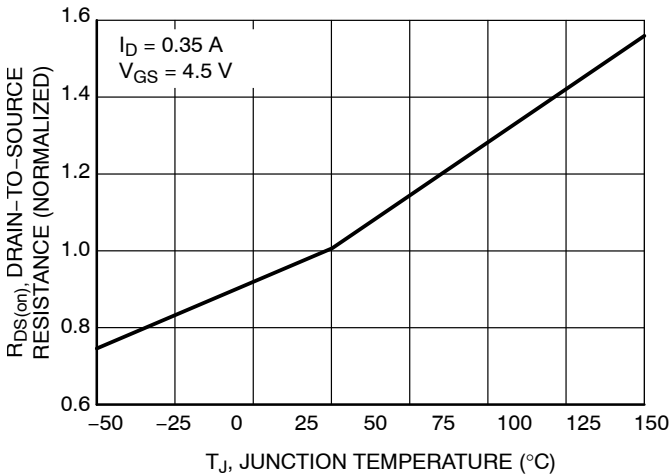**Figure 4. On−Resistance vs. Drain Current and Temperature**

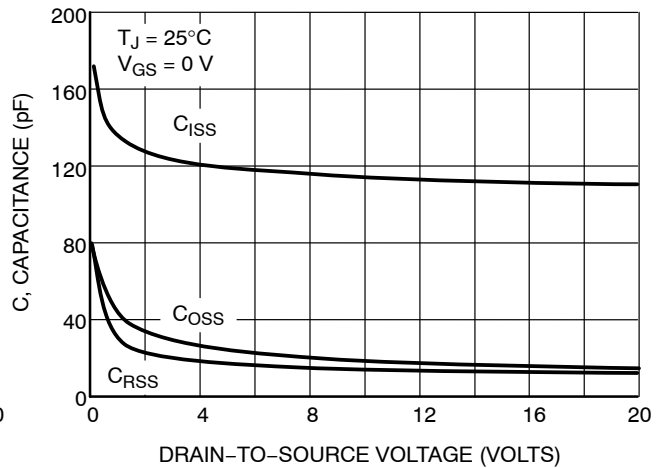**Figure 5. On−Resistance Variation with Temperature**

Figure 6. Capacitance Variation

TYPICAL ELECTRICAL CHARACTERISTICS
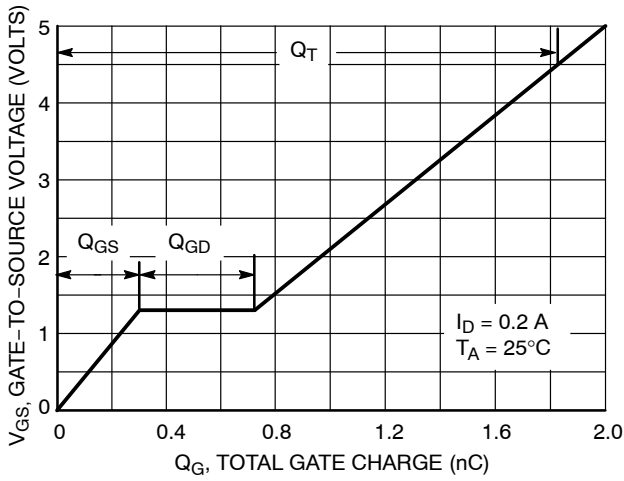
Figure 7. Gate−to−Source Voltage vs. Total
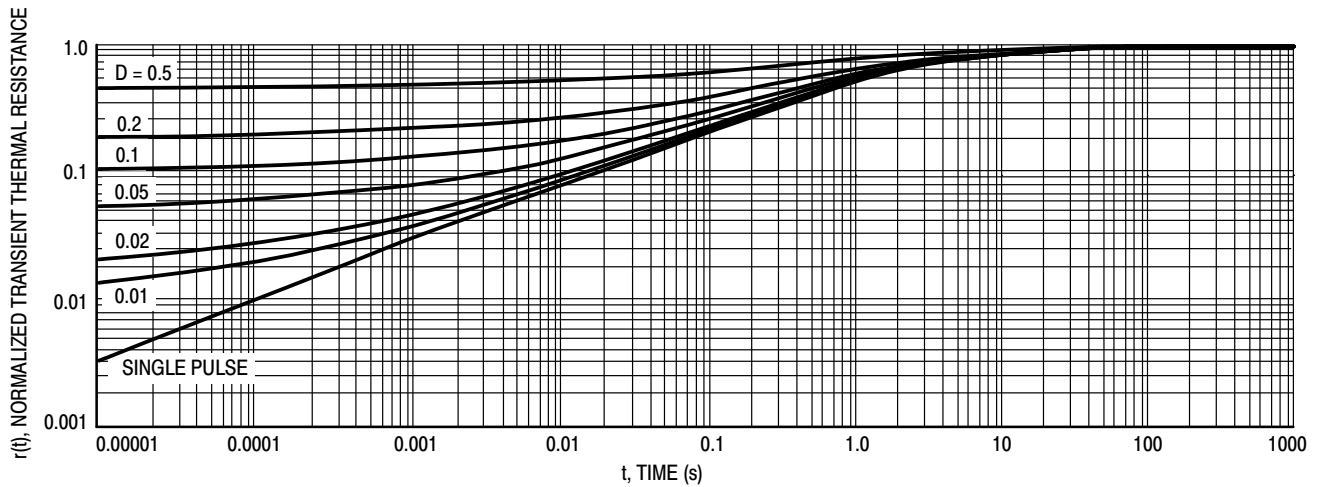Gate Charge
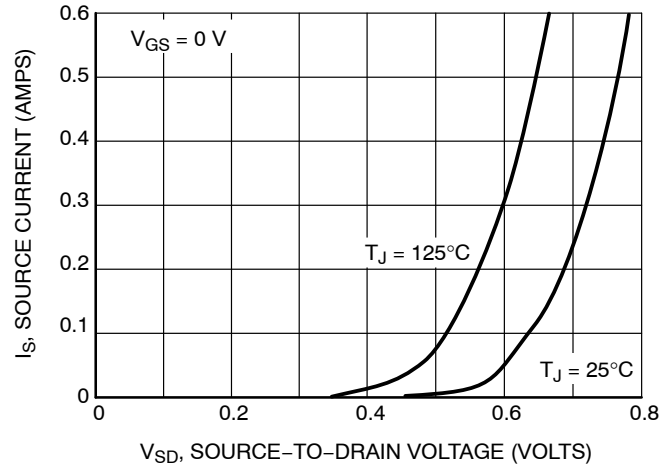
Figure 8. Diode Forward Voltage vs. Current

Figure 9. Normalized Thermal Response

ORDERING INFORMATION

Device	Marking	Package	Shipping†
NTA4153NT1	TR	SC−75 / SOT−416	3000 / Tape & Reel
NTA4153NT1G	TR	SC−75 / SOT−416 (Pb−Free)	3000 / Tape & Reel
NTE4153NT1G	TP	SC−89 (Pb−Free)	3000 / Tape & Reel
NVA4153NT1G	VR	SC−75 / SOT−416 (Pb−Free)	3000 / Tape & Reel
NVE4153NT1G	VP	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.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

SC−75/SOT−416
CASE 463−01
ISSUE G

DATE 07 AUG 2015

SCALE 4:1
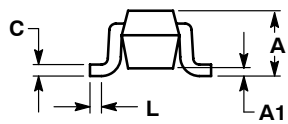
NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

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	0.061	0.063	0.065
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	0.060	0.063	0.067

STYLE 1:
PIN 1. BASE
    2. EMITTER
    3. COLLECTOR

STYLE 2:
PIN 1. ANODE
    2. N/C
    3. CATHODE

STYLE 3:
PIN 1. ANODE
    2. ANODE
    3. CATHODE

STYLE 4:
PIN 1. CATHODE
    2. CATHODE
    3. ANODE

STYLE 5:
PIN 1. GATE
    2. SOURCE
    3. DRAIN

GENERIC MARKING DIAGRAM*
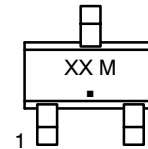
XX   = Specific Device Code
M   = Date Code
▪   = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, "G" or microdot " ▪", may or may not be present.

SOLDERING FOOTPRINT*

$$\frac{0.356}{0.014}$$

$$\frac{1.803}{0.071}$$

$$\frac{0.787}{0.031}$$

$$\frac{0.508}{0.020}$$

$$\frac{1.000}{0.039}$$

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

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

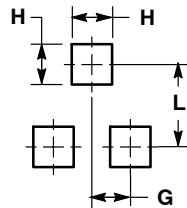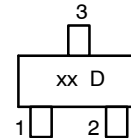| DOCUMENT NUMBER:	98ASB15184C	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.	
DESCRIPTION:	SC−75/SOT−416		PAGE 1 OF 1

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

SC−89, 3 LEAD
CASE 463C−03
ISSUE C

DATE 31 JUL 2003

SCALE 4:1

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

⊕ | 0.08 (0.003) Ⓜ | X | Y

SEATING PLANE −T−

STYLE 1:
PIN 1. BASE
    2. EMITTER
    3. COLLECTOR

STYLE 2:
PIN 1. ANODE
    2. N/C
    3. CATHOD-E

STYLE 3:
PIN 1. ANODE
    2. ANODE
    3. CATHODE

STYLE 4:
PIN 1. CATHODE
    2. CATHODE
    3. ANODE

RECOMMENDED PATTERN OF SOLDER PADS

GENERIC MARKING DIAGRAM*

xx D

xx = Specific Device Code
D = Date Code

*This information is generic. Please refer to device data sheet for actual part marking.

DOCUMENT NUMBER:	98AON11472D	
DESCRIPTION:	SC−89, 3 LEAD	PAGE 1 OF 1

PUBLICATION ORDERING INFORMATION

◊

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[onsemi](#):
  [NTA4153NT1](#) [NTA4153NT1G](#) [NTE4153NT1G](#) [NVE4153NT1G](#) [NVA4153NT1G](#)