NVA4153N, NVE4153N

Small Signal MOSFET

20 V, 952 mA, Single N−Channel with ESD Protection, SC−75 and SC−89

Features

- Low $R_{DS(on)}$ Improving System Efficiency
- Low Threshold Voltage, 1.5 V Rated
- ESD Protected Gate
- AEC−Q101 Qualified and PPAP Capable
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

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

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	952	mA
		T_A = 85°C		737	
Power Dissipation (Note 1)	Steady State		P_D	361	mW
Pulsed Drain Current	t_p =10 μs		I_{DM}	3.8	A
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to 175	°C
Continuous Source Current (Body Diode)			I_S	328	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)	$R_{\theta JA}$		°C/W
SC−75 / SOT−416		416	
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.

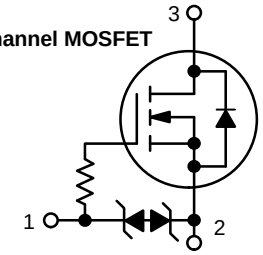
1. Surface mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).

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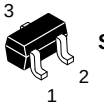
http://onsemi.com

$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
20 V	0.127 Ω @ 4.5 V	952 mA
	0.170 Ω @ 2.5 V	
	0.242 Ω @ 1.8 V	
	0.500 Ω @ 1.5 V	

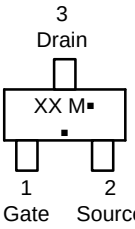
N−Channel MOSFET



MARKING DIAGRAM & PIN ASSIGNMENT



SC−75 / SOT−416
CASE 463
STYLE 5



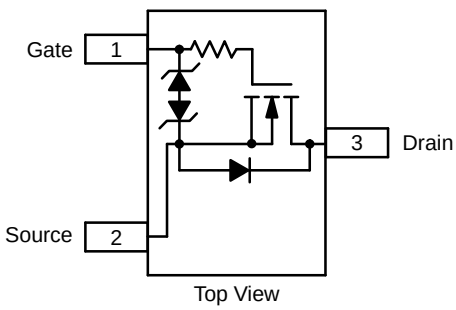


SC−89
CASE 463C

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.

SC−75, SC−89



Top View

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°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	9500	
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		

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

ORDERING INFORMATION

Device	Marking (XX)	Package	Shipping†
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.

TYPICAL ELECTRICAL CHARACTERISTICS

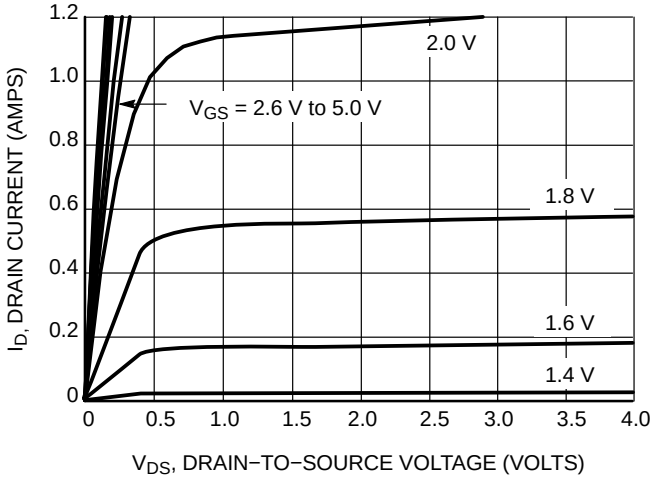


Figure 1. On−Region Characteristics

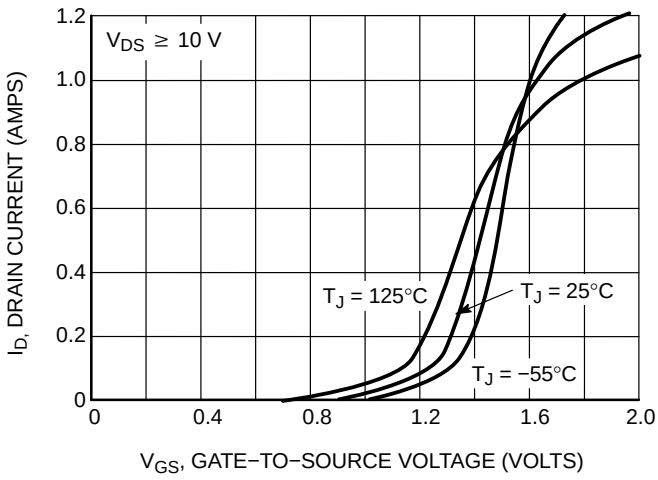


Figure 2. Transfer Characteristics

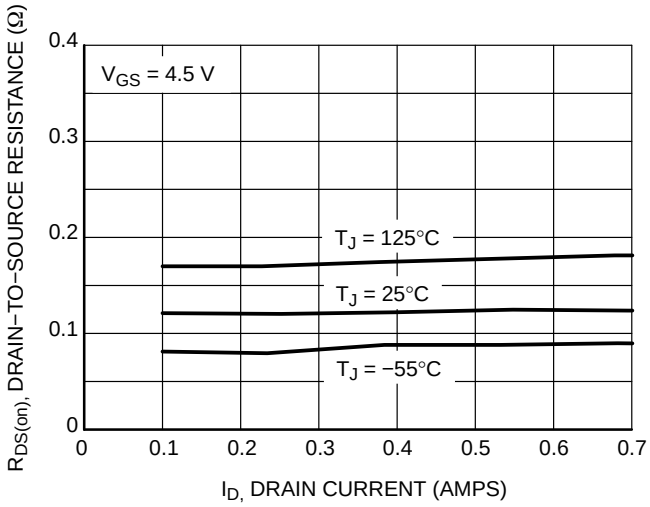


Figure 3. On−Resistance vs. Drain Current and Temperature

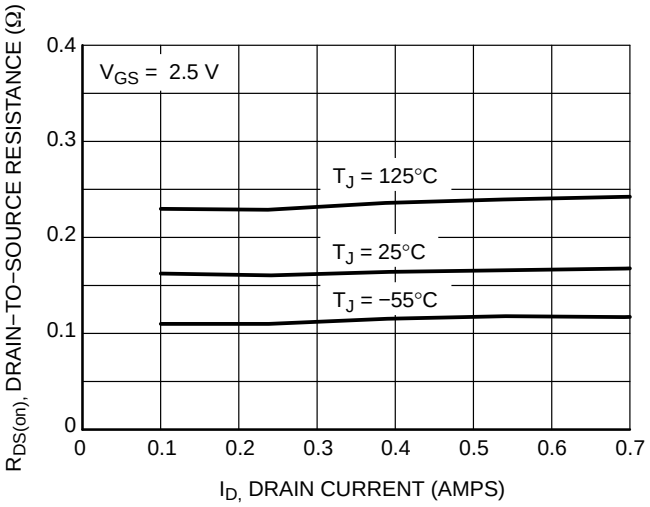


Figure 4. On−Resistance vs. Drain Current and Temperature

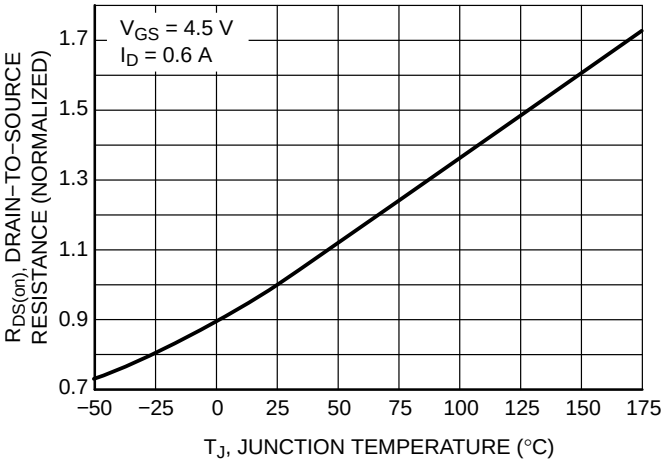


Figure 5. On−Resistance Variation with Temperature

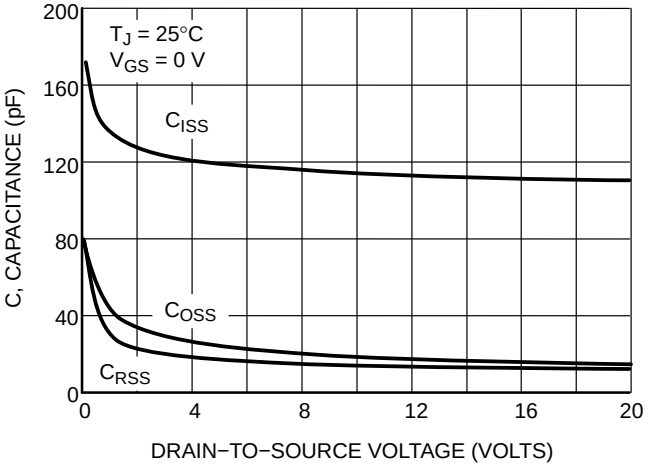


Figure 6. Capacitance Variation

TYPICAL ELECTRICAL CHARACTERISTICS

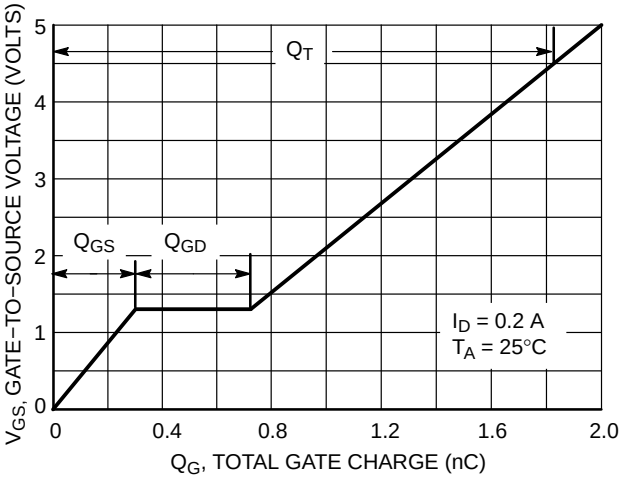


Figure 7. Gate−to−Source Voltage vs. Total Gate Charge

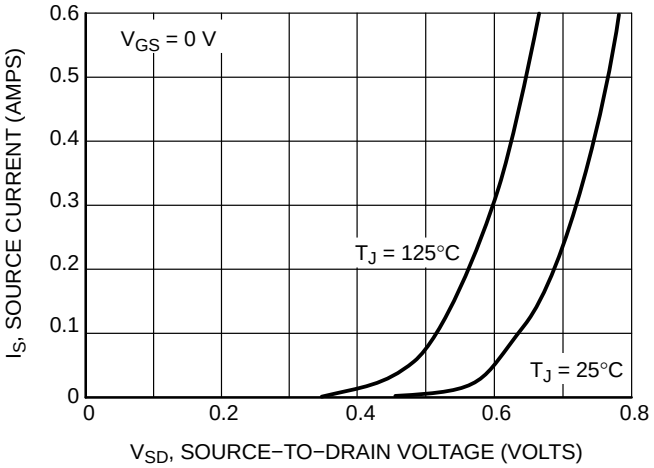


Figure 8. Diode Forward Voltage vs. Current

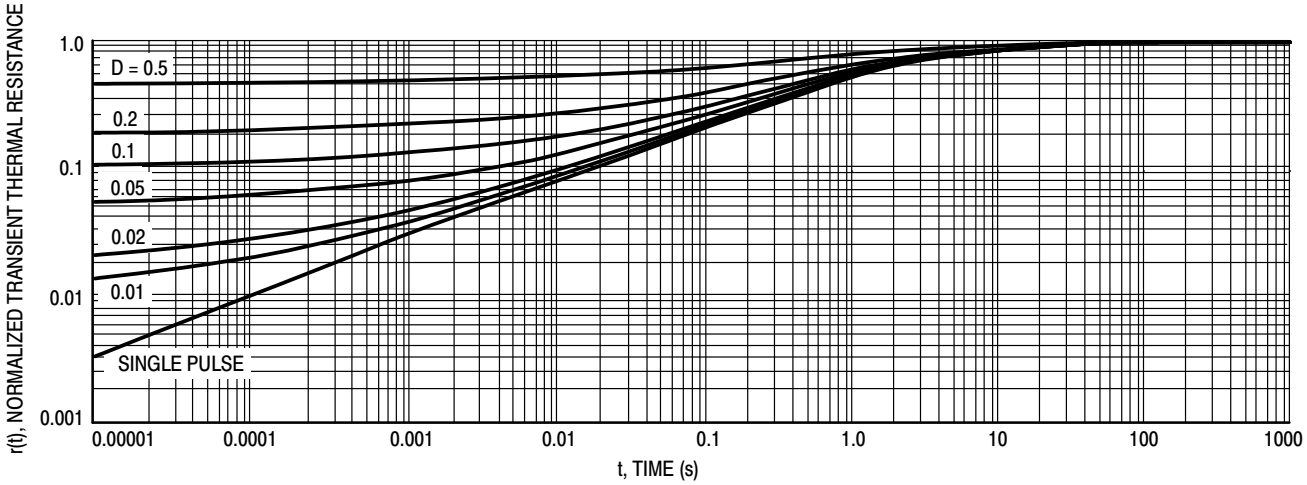
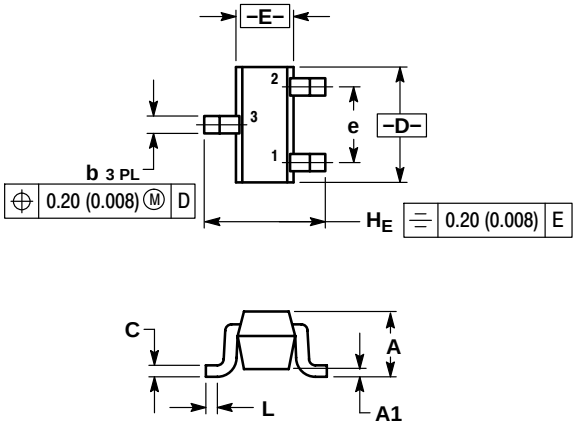


Figure 9. Normalized Thermal Response

PACKAGE DIMENSIONS

SC−75/SOT−416
CASE 463
ISSUE F

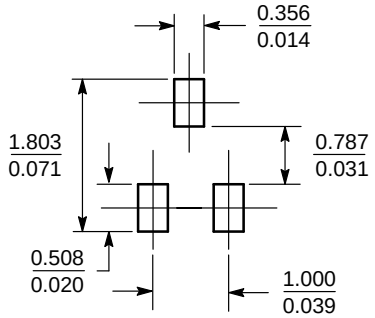


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

	MILLIMETERS			INCHES		
DIM	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*

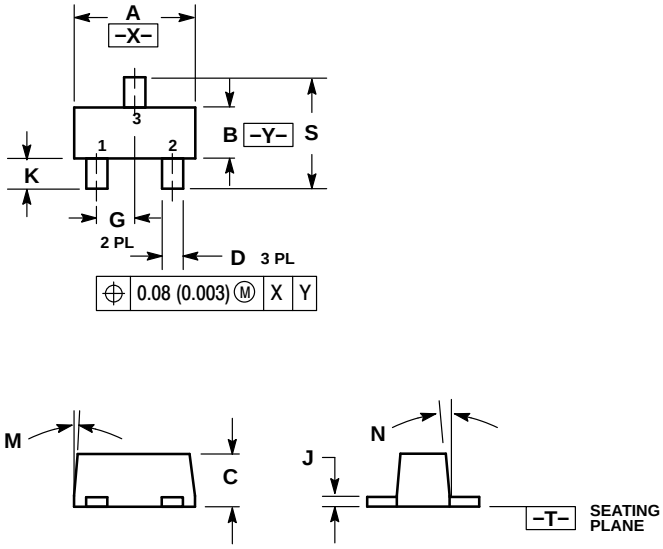


SCALE 10:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

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

PACKAGE DIMENSIONS

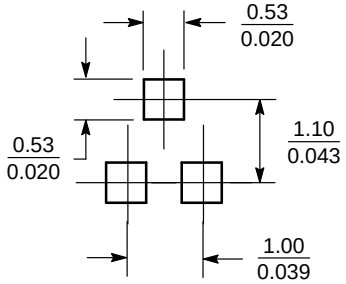
SC−89
CASE 463C−03
ISSUE C



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.

	MILLIMETERS			INCHES		
DIM	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*



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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