NTA4001N, NVA4001N

MOSFET – Single, N-Channel, Gate ESD Protection, Small Signal, SC-75

20 V, 238 mA

Features

- Low Gate Charge for Fast Switching
- Small 1.6 x 1.6 mm Footprint
- ESD Protected Gate
- AEC−Q101 Qualified and PPAP Capable − NVA4001N
- These Devices are Pb−Free and are RoHS Compliant

Applications

- Power Management Load Switch
- Level Shift
- Portable Applications such as Cell Phones, Media Players, Digital Cameras, PDA's, Video Games, Hand Held Computers, etc.

MAXIMUM RATINGS (T_J = 25°C unless otherwise stated)

Parameter		Symbol	Value	Unit
Drain−to−Source Voltage		V_{DSS}	20	V
Gate−to−Source Voltage		V_{GS}	±10	V
Continuous Drain Current (Note 1)	Steady State = 25°C	I_D	238	mA
Power Dissipation (Note 1)	Steady State = 25°C	P_D	300	mW
Pulsed Drain Current	$t_P \le 10$ μs	I_{DM}	714	mA
Operating Junction and Storage Temperature		T_J, T_{STG}	−55 to 150	°C
Continuous Source Current (Body Diode)		I_{SD}	238	mA
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T_L	260	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

THERMAL RESISTANCE RATINGS

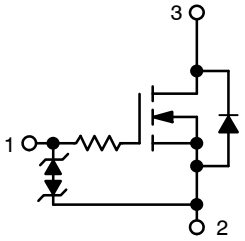
Parameter	Symbol	Max	Unit
Junction−to−Ambient − Steady State (Note 1)	$R_{\theta JA}$	416	°C/W

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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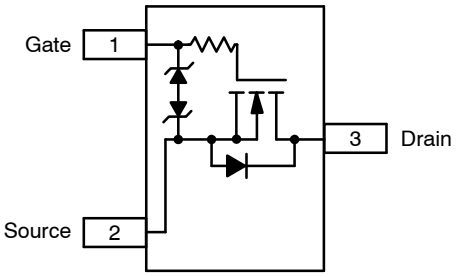
$V_{(BR)DSS}$	$R_{DS(on)}$ Typ @ V_{GS}	I_D MAX (Note 1)
20 V	1.5 Ω @ 4.5 V	238 mA
	2.2 Ω @ 2.5 V	



N−Channel

PIN CONNECTIONS

SC−75 (3−Leads)

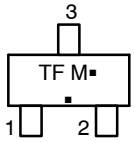


(Top View)

MARKING DIAGRAM



SC−75 / SOT−416
CASE 463
STYLE 5



TF = Specific Device Code
M = Date Code
▪ = Pb−Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 100 μA	20			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 20 V			1.0	μA
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±10 V			±100	μA
ON CHARACTERISTICS (Note 2)						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS} = 3 V, I_D = 100 μA	0.5	1.0	1.5	V
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 10 mA		1.5	3.0	Ω
		V_{GS} = 2.5 V, I_D = 10 mA		2.2	3.5	
Forward Transconductance	g_{FS}	V_{DS} = 3 V, I_D = 10 mA		80		mS
CAPACITANCES						
Input Capacitance	C_{ISS}	V_{DS} = 5 V, f = 1 MHz, V_{GS} = 0 V		11.5	20	pF
Output Capacitance	C_{OSS}			10	15	
Reverse Transfer Capacitance	C_{RSS}			3.5	6.0	
SWITCHING CHARACTERISTICS (Note 3)						
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 4.5 V, V_{DS} = 5 V, I_D = 10 mA, R_G = 10 Ω		13		ns
Rise Time	t_r			15		ns
Turn−Off Delay Time	$t_{d(OFF)}$			98		
Fall Time	t_f			60		
DRAIN−SOURCE DIODE CHARACTERISTICS						
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 10 mA		0.66	0.8	V

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

TYPICAL PERFORMANCE CURVES

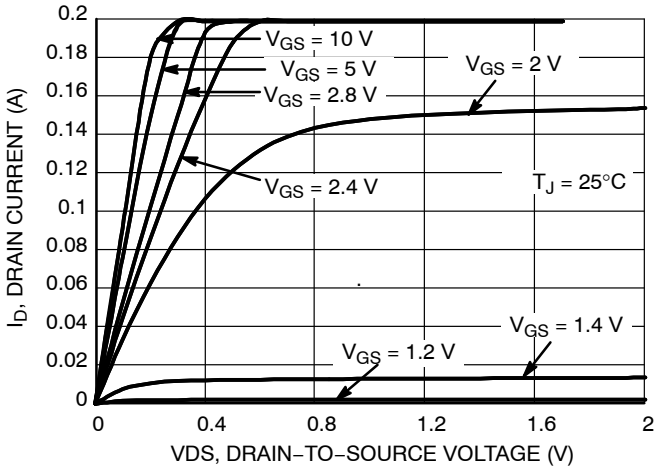


Figure 1. On−region Characteristics

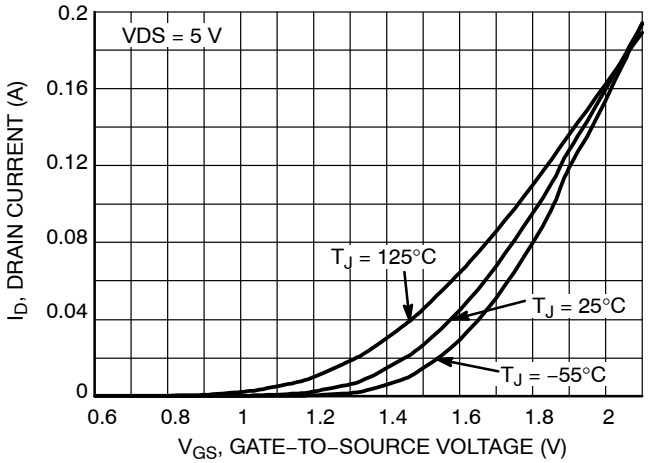


Figure 2. Transfer Characteristics

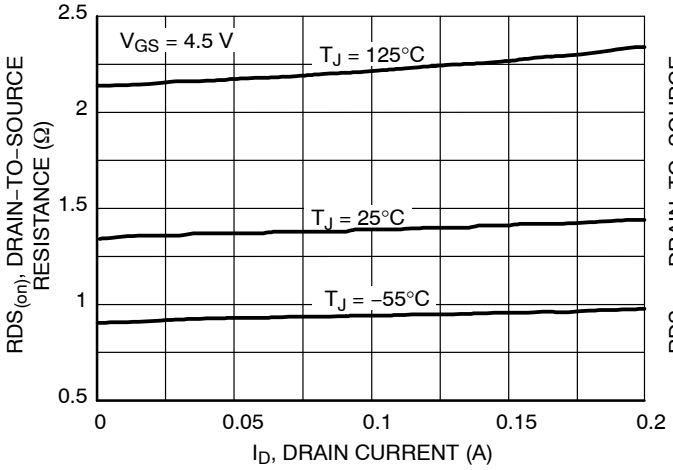


Figure 3. On−resistance versus Drain Current and Temperature

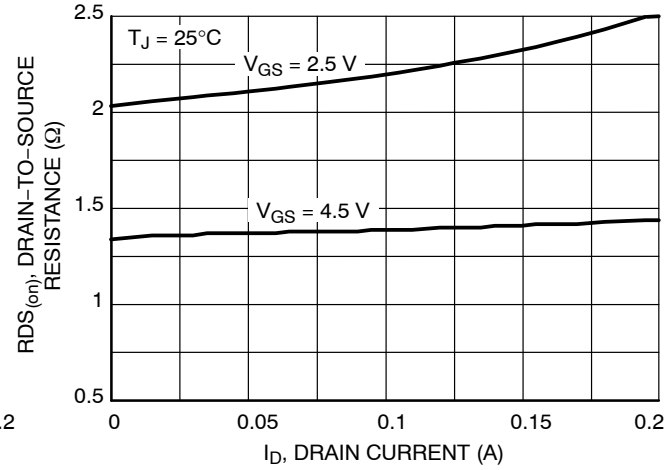


Figure 4. On−resistance versus Drain Current and Gate Voltage

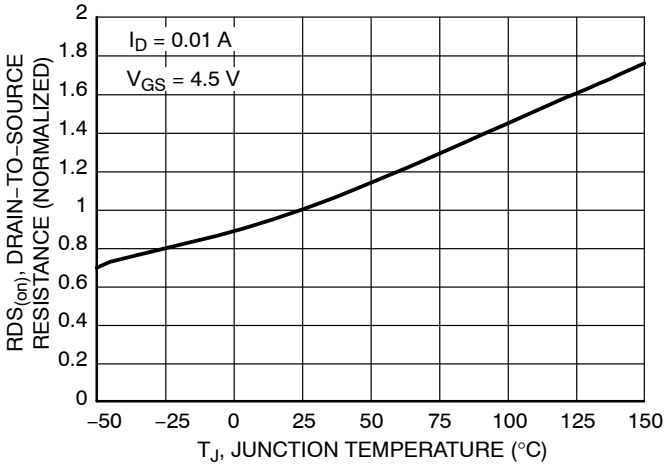


Figure 5. On−resistance Variation with Temperature

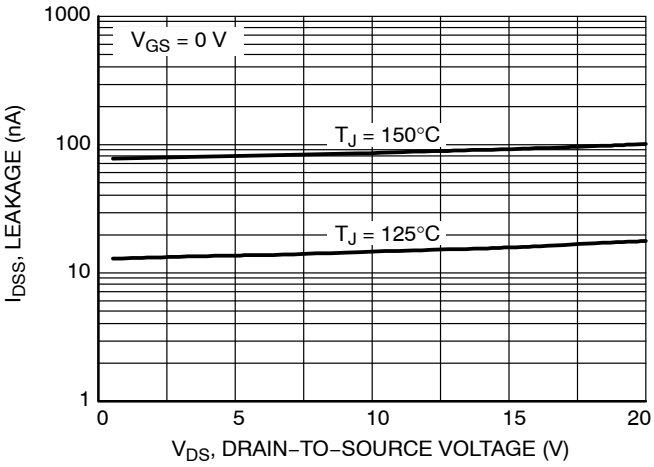


Figure 6. Drain−to−Source Leakage Current versus Voltage

TYPICAL PERFORMANCE CURVES

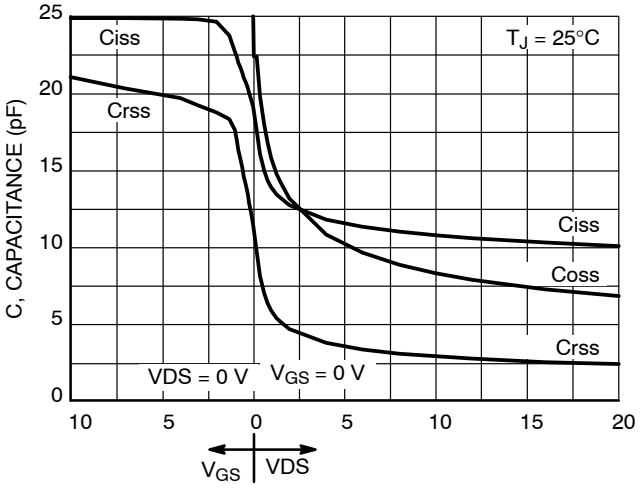


Figure 7. Capacitance Variation

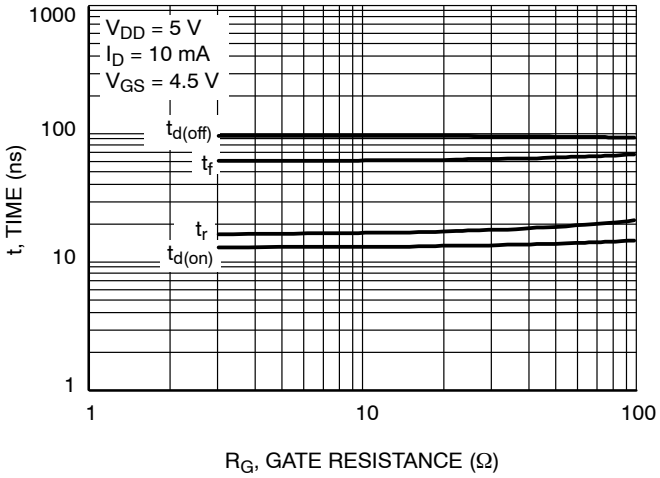


Figure 8. Resistive Switching Time Variation versus Gate Resistance

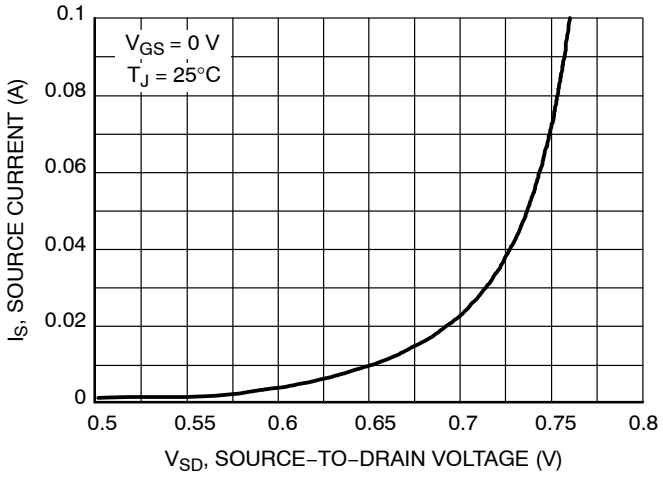


Figure 9. Diode Forward Voltage versus Current

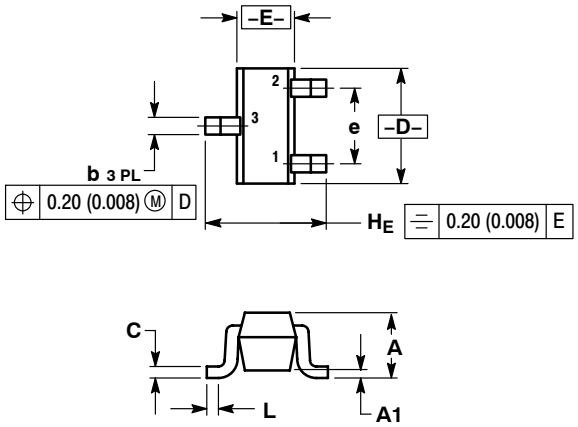
ORDERING INFORMATION

Order Number	Package	Shipping†
NTA4001NT1G	SC−75 (Pb−Free)	3000 / Tape & Reel
NVA4001NT1G	SC−75 (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.

PACKAGE DIMENSIONS

SC−75 / SOT−416
CASE 463−01
ISSUE F

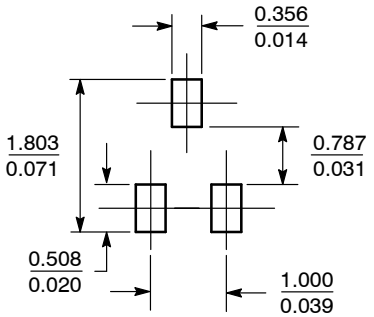


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

	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.

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