

# NTA4001N, NVA4001N

## Small Signal MOSFET

20 V, 238 mA, Single, N-Channel, Gate ESD Protection, SC-75



ON Semiconductor®

<http://onsemi.com>

### 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<sub>J</sub> = 25°C unless otherwise stated)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V <sub>DSS</sub>	20	V
Gate-to-Source Voltage	V <sub>GS</sub>	±10	V
Continuous Drain Current (Note 1)	I <sub>D</sub>	238	mA
Power Dissipation (Note 1)	P <sub>D</sub>	300	mW
Pulsed Drain Current	I <sub>DM</sub>	714	mA
Operating Junction and Storage Temperature	T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C
Continuous Source Current (Body Diode)	I <sub>SD</sub>	238	mA
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	T <sub>L</sub>	260	°C

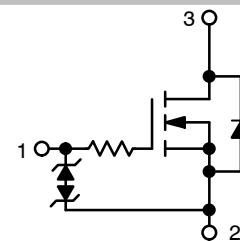
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction-to-Ambient – Steady State (Note 1)	R <sub>θJA</sub>	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).

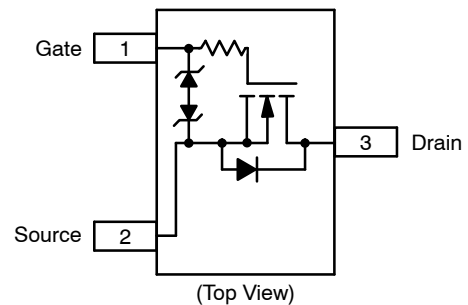
V <sub>(BR)DSS</sub>	R <sub>DS(on)</sub> Typ @ V <sub>GS</sub>	I <sub>D</sub> MAX (Note 1)
20 V	1.5 Ω @ 4.5 V	238 mA
	2.2 Ω @ 2.5 V	



N-Channel

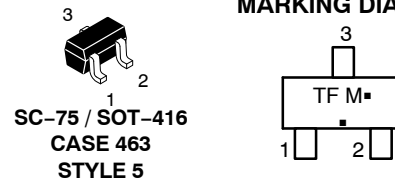
### PIN CONNECTIONS

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.

# NTA4001N, NVA4001N

## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

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

### ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = 3\text{ V}, I_D = 100\ \mu\text{A}$	0.5	1.0	1.5	V
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 10\text{ mA}$		1.5	3.0	$\Omega$
		$V_{GS} = 2.5\text{ V}, I_D = 10\text{ mA}$		2.2	3.5	
Forward Transconductance	$g_{FS}$	$V_{DS} = 3\text{ V}, I_D = 10\text{ mA}$		80		mS

### CAPACITANCES

Input Capacitance	$C_{ISS}$	$V_{DS} = 5\text{ V}, f = 1\text{ MHz}, V_{GS} = 0\text{ V}$		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	$t_{d(ON)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 5\text{ V}, I_D = 10\text{ mA}, R_G = 10\ \Omega$		13		ns
Rise Time	$t_r$			15		
Turn-Off Delay Time	$t_{d(OFF)}$			98		
Fall Time	$t_f$			60		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 10\text{ mA}$		0.66	0.8	V
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- Pulse Test: pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CURVES

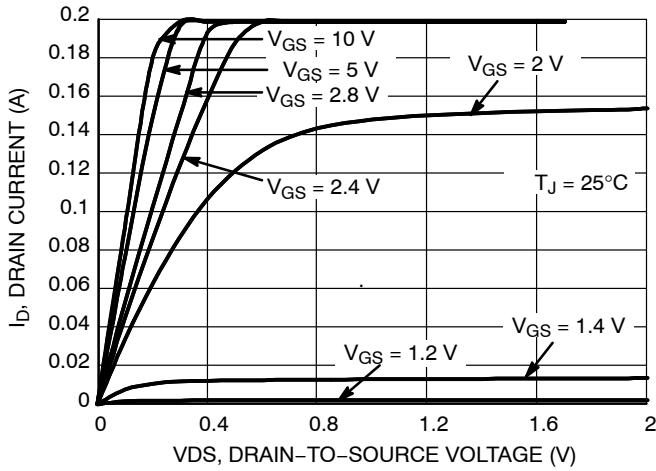


Figure 1. On-region Characteristics

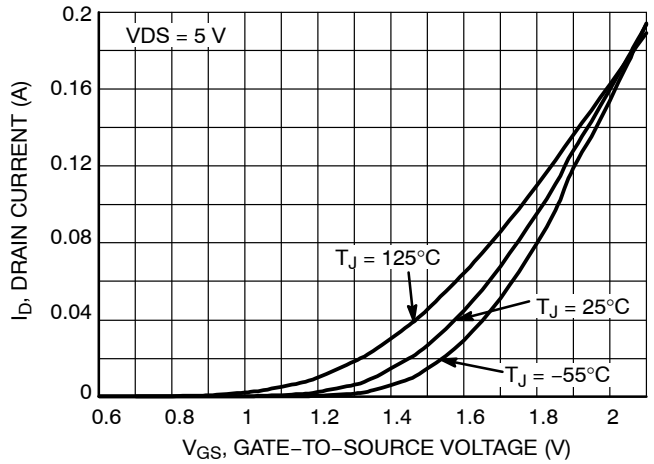


Figure 2. Transfer Characteristics

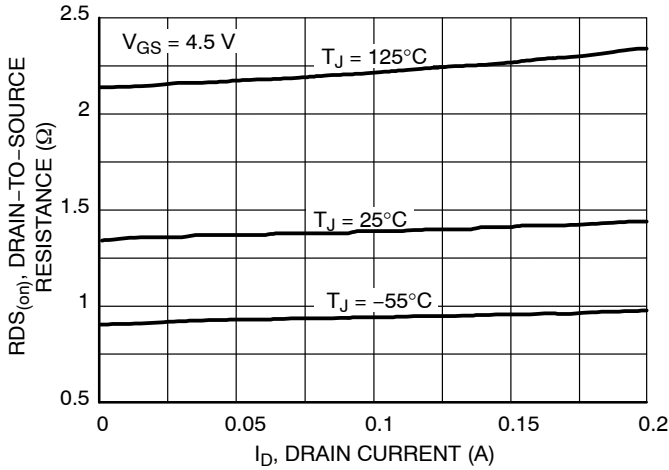


Figure 3. On-resistance versus Drain Current and Temperature

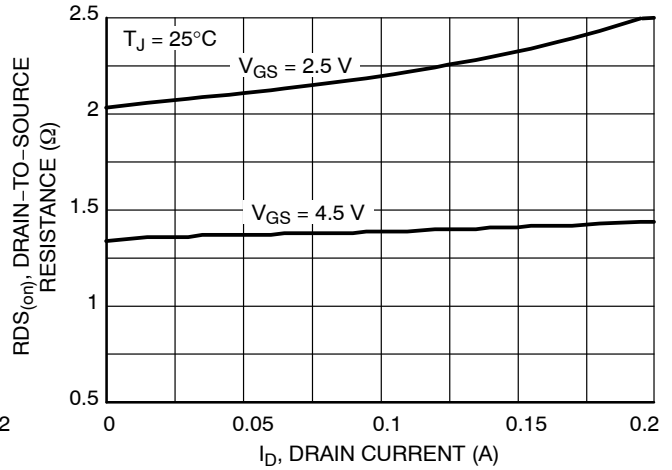


Figure 4. On-resistance versus Drain Current and Gate Voltage

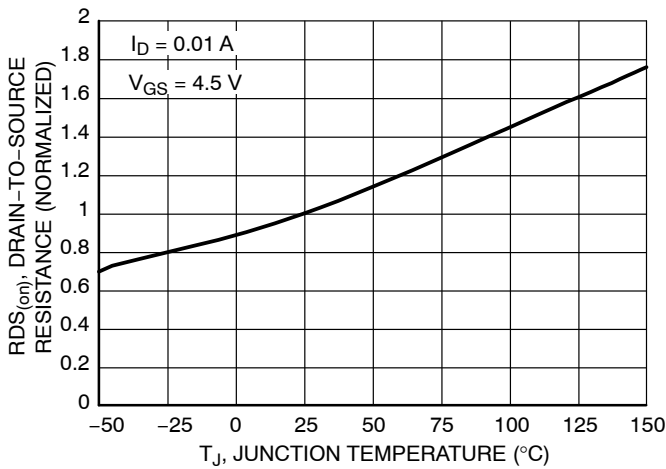


Figure 5. On-resistance Variation with Temperature

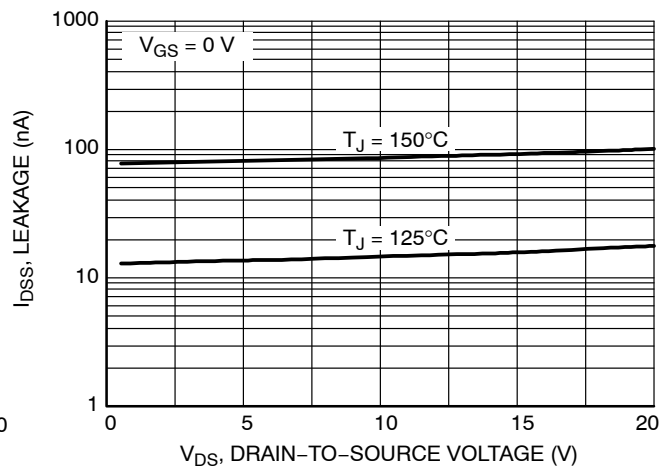
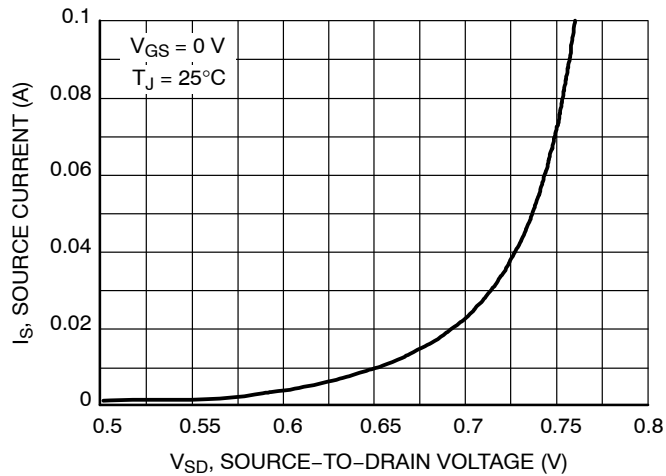
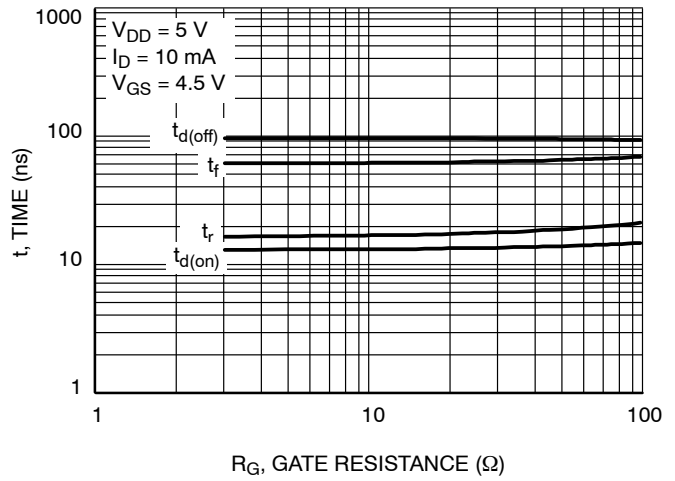
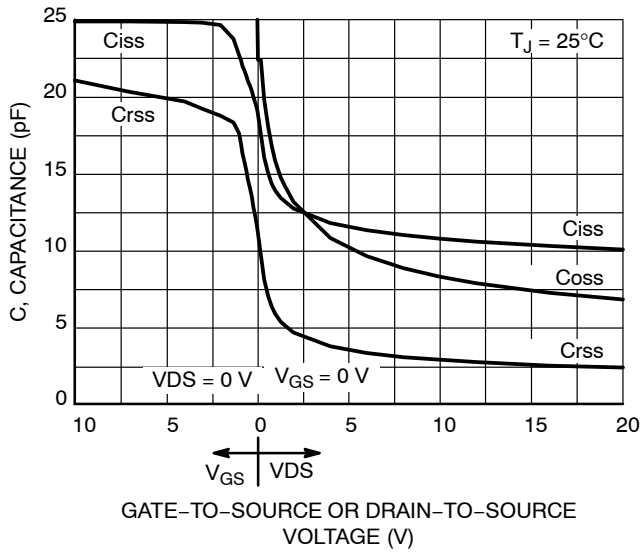


Figure 6. Drain-to-Source Leakage Current versus Voltage

# NTA4001N, NVA4001N

## TYPICAL PERFORMANCE CURVES



### ORDERING INFORMATION

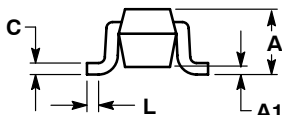
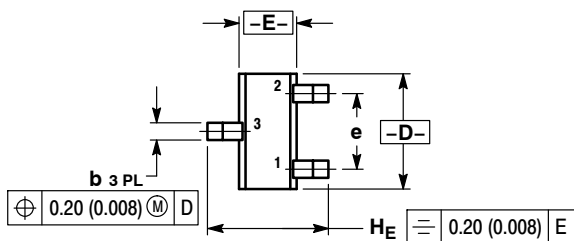
Order Number	Package	Shipping†
NTA4001NT1G	SC-75 (Pb-Free)	3000 / Tape & Reel
NVA4001NT1G	SC-75 (Pb-Free)	3000 / Tape & Reel

†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.

# NTA4001N, NVA4001N

## PACKAGE DIMENSIONS

SC-75 / SOT-416  
CASE 463-01  
ISSUE F



### NOTES:

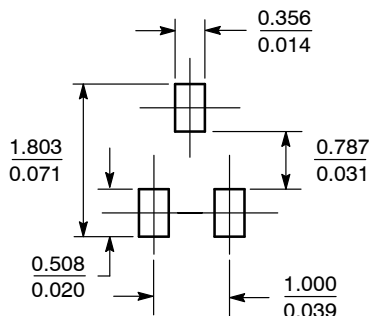
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

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 <sub>E</sub>	1.50	1.60	1.70	0.061	0.063	0.065

### STYLE 5:

- PIN 1. GATE
- SOURCE
- DRAIN

### SOLDERING FOOTPRINT\*



SCALE 10:1 (mm / inches)

\*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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