

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

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	$V_{DS}$	20	V
Gate-to-Source Voltage	$V_{GS}$	$\pm 10$	V
Continuous Drain Current (Note 1)	$I_D$	238	mA
Power Dissipation (Note 1)	$P_D$	300	mW
Pulsed Drain Current	$I_{DM}$	$t_p \leq 10 \mu\text{s}$	714 mA
Operating Junction and Storage Temperature	$T_J, T_{STG}$	-55 to 150	$^\circ\text{C}$
Continuous Source Current (Body Diode)	$I_{SD}$	238	mA
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	$T_L$	260	$^\circ\text{C}$

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	$^\circ\text{C/W}$

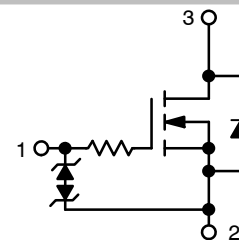
1. Surface-mounted on FR4 board using 1 in sq. pad size (Cu area = 1.127 in sq. [1 oz] including traces).



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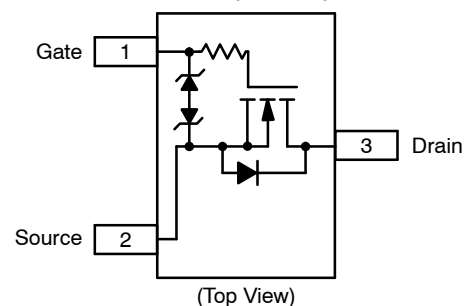
$V_{(BR)DSS}$	$R_{DS(on)}$ Typ @ $V_{GS}$	$I_D$ MAX (Note 1)
20 V	1.5 $\Omega$ @ 4.5 V	238 mA
	2.2 $\Omega$ @ 2.5 V	



**N-Channel**


### PIN CONNECTIONS

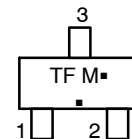
**SC-75 (3-Leads)**



(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<sub>J</sub> = 25°C unless otherwise specified)

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> = 100 μA	20			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 20 V			1.0	μA
Gate-to-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ±10 V			±100	μA

### ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> = 3 V, I <sub>D</sub> = 100 μA	0.5	1.0	1.5	V
Drain-to-Source On Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 10 mA		1.5	3.0	Ω
		V <sub>GS</sub> = 2.5 V, I <sub>D</sub> = 10 mA		2.2	3.5	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> = 3 V, I <sub>D</sub> = 10 mA		80		mS

### CAPACITANCES

Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> = 5 V, f = 1 MHz, V <sub>GS</sub> = 0 V		11.5	20	pF
Output Capacitance	C <sub>OSS</sub>			10	15	
Reverse Transfer Capacitance	C <sub>RSS</sub>			3.5	6.0	

### SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	t <sub>d(ON)</sub>	V <sub>GS</sub> = 4.5 V, V <sub>DS</sub> = 5 V, I <sub>D</sub> = 10 mA, R <sub>G</sub> = 10 Ω		13		ns
Rise Time	t <sub>r</sub>			15		ns
Turn-Off Delay Time	t <sub>d(OFF)</sub>			98		
Fall Time	t <sub>f</sub>			60		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 10 mA		0.66	0.8	V
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- Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
- Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CURVES

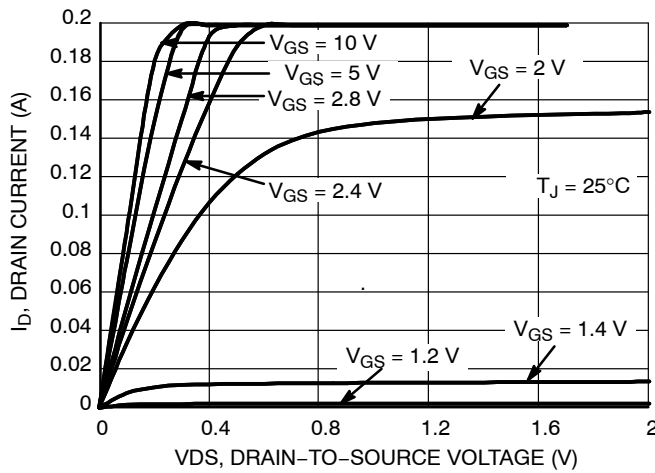


Figure 1. On-region Characteristics

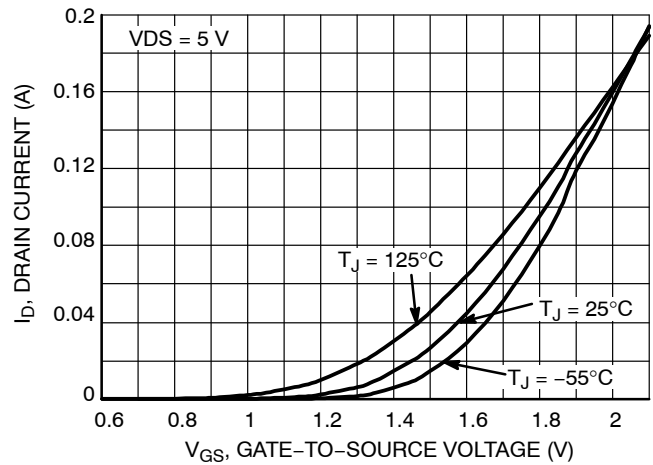


Figure 2. Transfer Characteristics

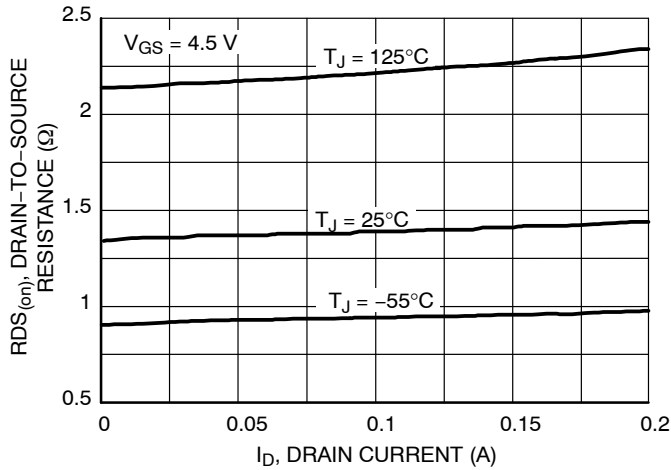


Figure 3. On-resistance versus Drain Current and Temperature

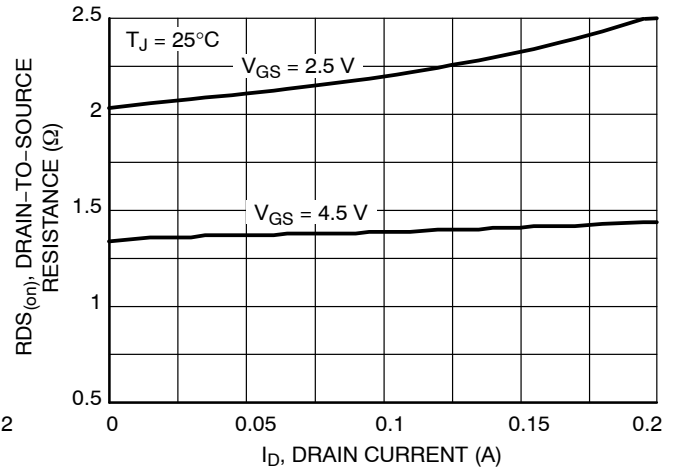


Figure 4. On-resistance versus Drain Current and Gate Voltage

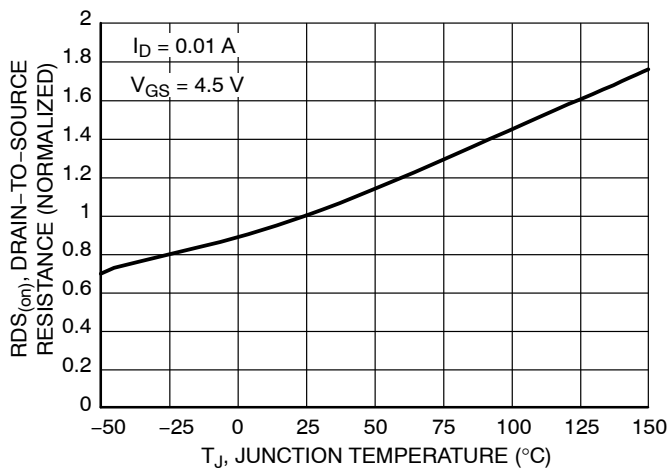


Figure 5. On-resistance Variation with Temperature

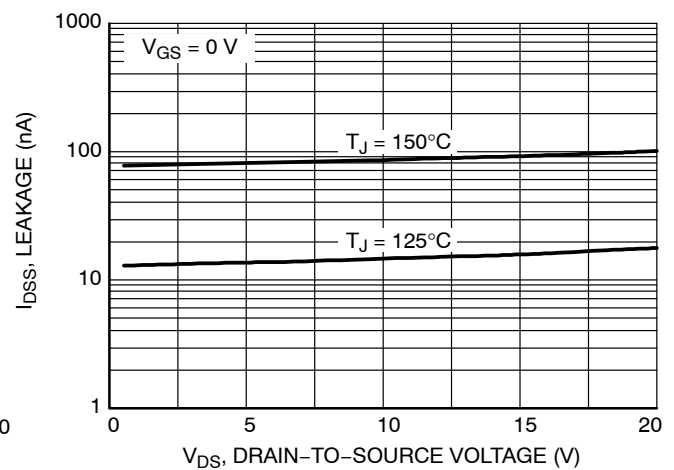


Figure 6. Drain-to-Source Leakage Current versus Voltage

# NTA4001N, NVA4001N

## TYPICAL PERFORMANCE CURVES

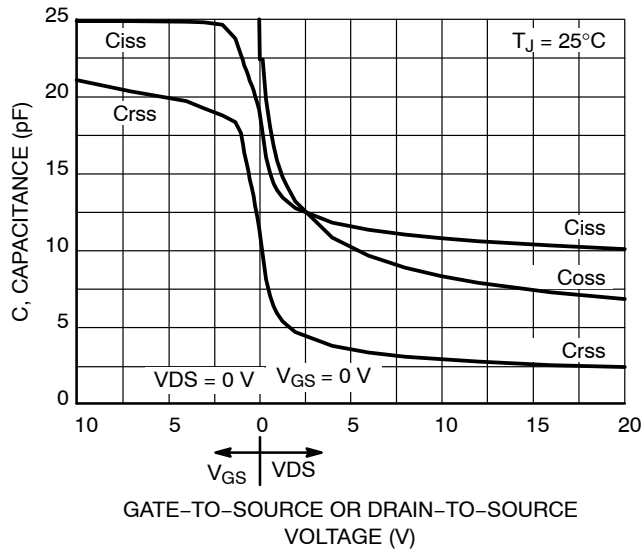


Figure 7. Capacitance Variation

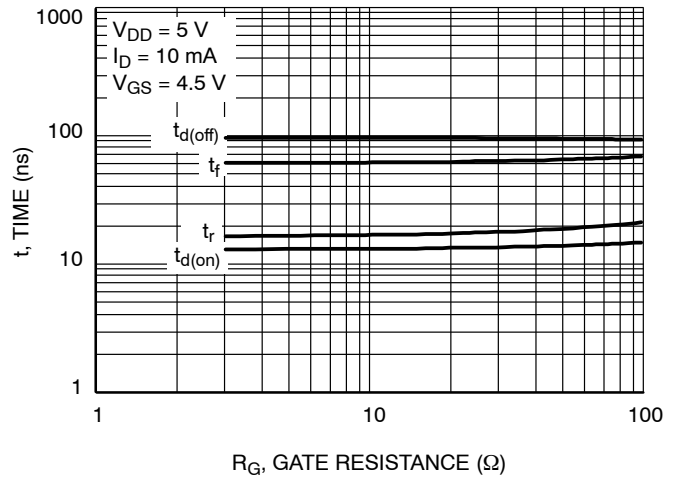


Figure 8. Resistive Switching Time Variation versus Gate Resistance

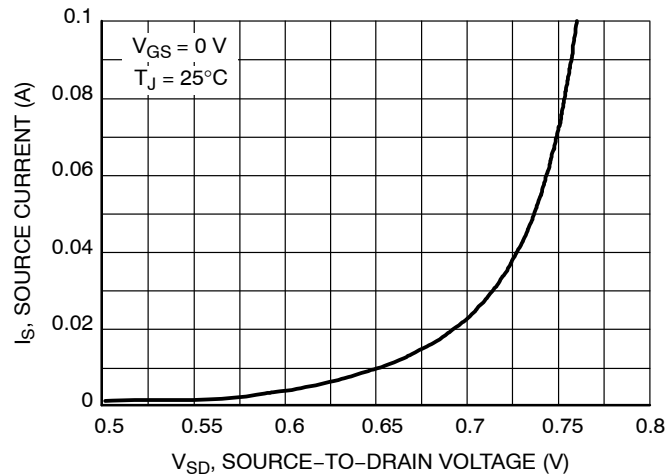


Figure 9. Diode Forward Voltage versus Current

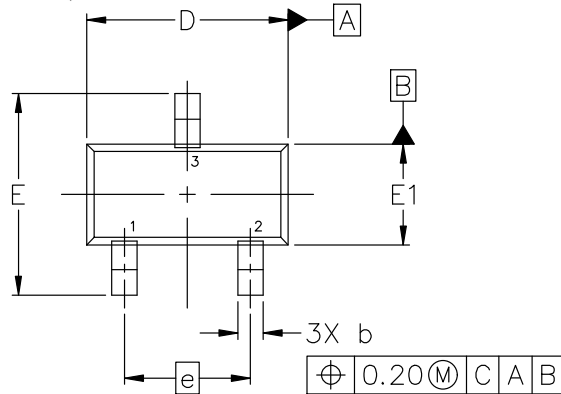
## ORDERING INFORMATION

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

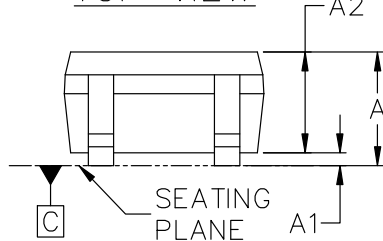
<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

**SC75-3 1.60x0.80x0.80, 1.00P**  
**CASE 463**  
**ISSUE H**

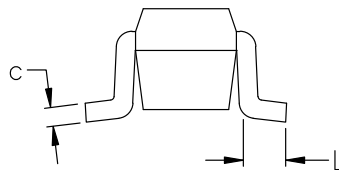
DATE 01 FEB 2024



TOP VIEW

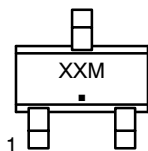


SIDE VIEW



END VIEW

**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. Some products may not follow the Generic Marking.

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

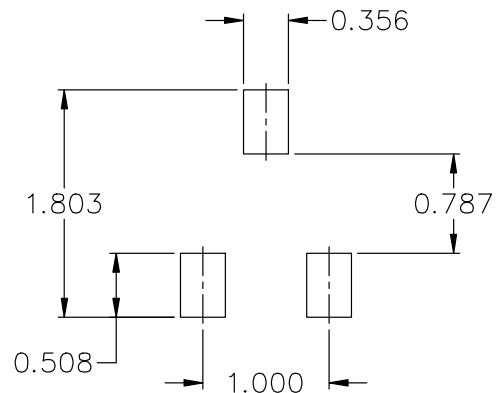
STYLE 2:  
PIN 1. ANODE  
2. N/C  
3. CATHODE

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

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.70	0.80	0.90
A1	0.00	0.05	0.10
A2	0.80 REF.		
b	0.15	0.20	0.30
c	0.10	0.15	0.25
D	1.55	1.60	1.65
E	1.50	1.60	1.70
E1	0.70	0.80	0.90
e	1.00 BSC		
L	0.10	0.15	0.20



**RECOMMENDED MOUNTING FOOTPRINT\***

\* 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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