

# NTA4001N

## Small Signal MOSFET

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

### Features

- Low Gate Charge for Fast Switching
- Small 1.6 X 1.6 mm Footprint
- ESD Protected Gate
- Pb-Free Package for "Green Manufacturing" Compliance

### 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)	Steady State = 25°C	I <sub>D</sub>	238	mA
Power Dissipation (Note 1)	Steady State = 25°C	P <sub>D</sub>	300	mW
Pulsed Drain Current	t <sub>p</sub> ≤ 10 μs	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

### Thermal Resistance Ratings

Parameter	Symbol	Max	Unit
Junction-to-Ambient – Steady State (Note 1)	R <sub>θJA</sub>	416	°C/W

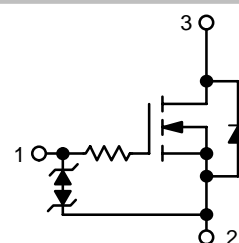
1. Surface-mounted on FR4 board using 1 in sq. pad size (Cu area = 1.127 in sq. [1 oz] including traces).



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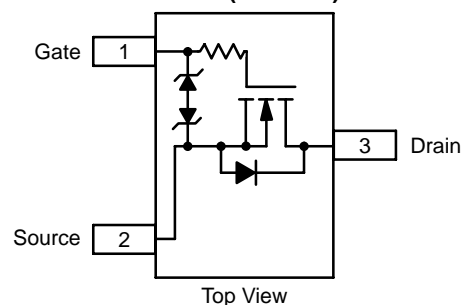
<http://onsemi.com>

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	

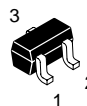


N-Channel

SC-75 (3-Leads)

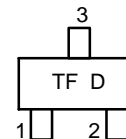


Top View



SC-75 / SOT-416  
CASE 463  
Style 5

### MARKING DIAGRAM



TF = Specific Device Code  
D = Date Code

### ORDERING INFORMATION

Device	Package	Shipping
NTA4001NT1	SC-75	3000 / Tape & Reel
NTA4001NT1G	SC-75 Pb-Free	3000 / Tape & Reel

# NTA4001N

## 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		pF
Output Capacitance	$C_{OSS}$			10		
Reverse Transfer Capacitance	$C_{RSS}$			3.5		

### 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		ns
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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#### NOTES:

- Pulse Test: pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Switching characteristics are independent of operating junction temperatures.

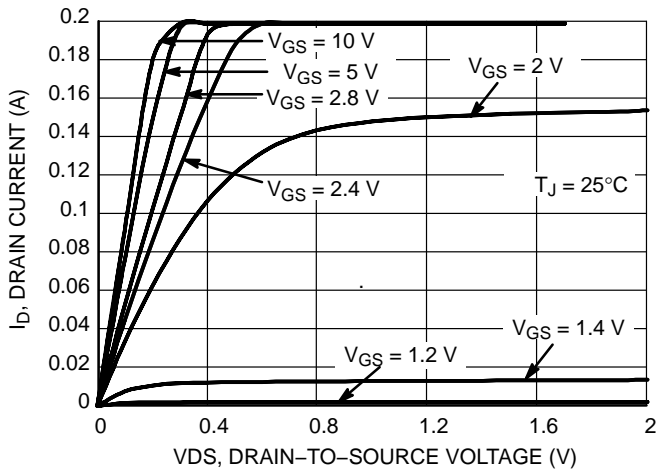


Figure 1. On-region Characteristics

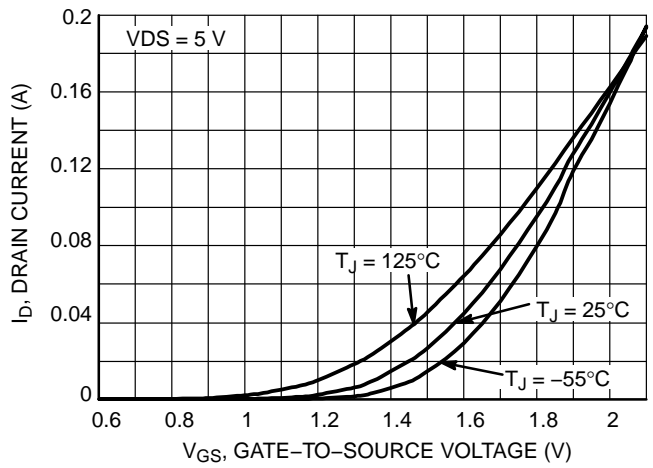


Figure 2. Transfer Characteristics

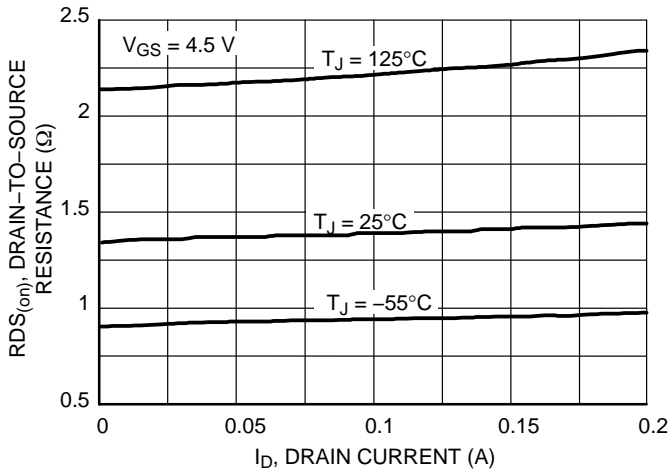


Figure 3. On-resistance versus Drain Current and Temperature

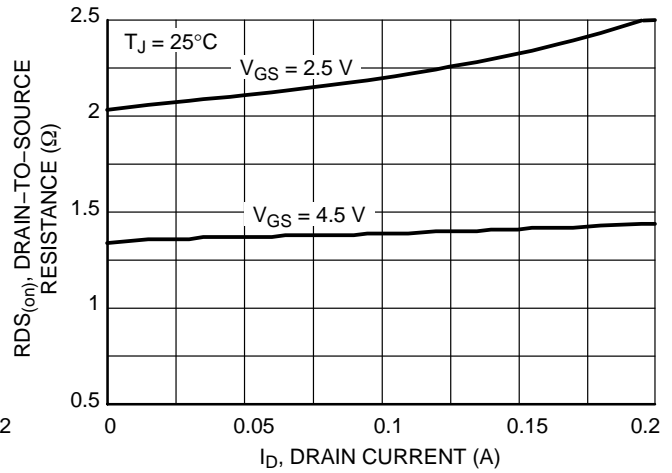


Figure 4. On-resistance versus Drain Current and Gate Voltage

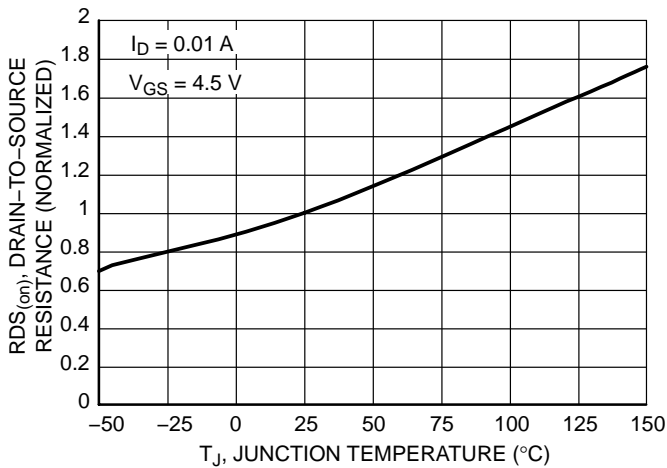


Figure 5. On-resistance Variation with Temperature

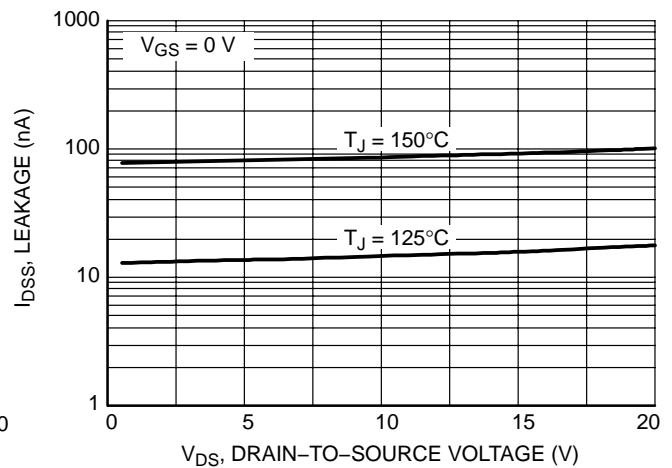
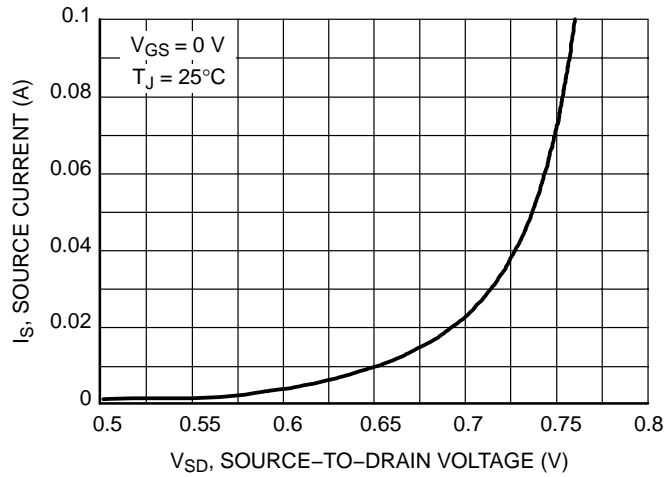
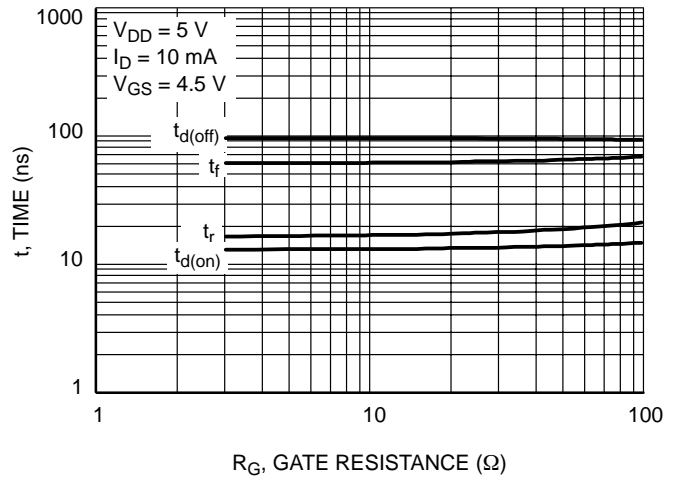
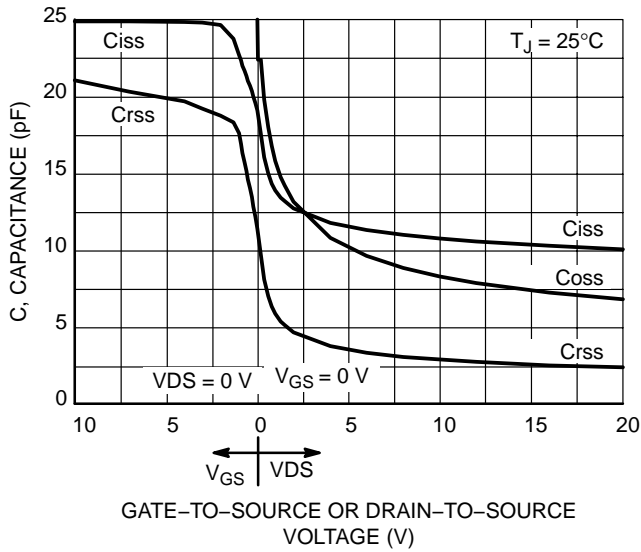


Figure 6. Drain-to-Source Leakage Current versus Voltage

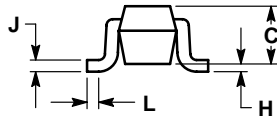
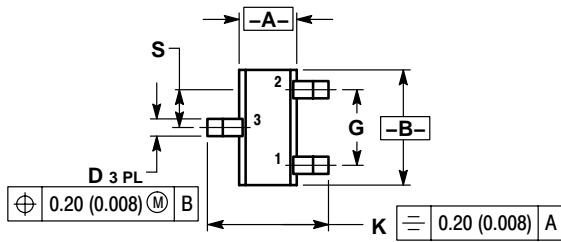
# NTA4001N



# NTA4001N

## PACKAGE DIMENSIONS

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



NOTES:

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

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.70	0.90	0.028	0.035
B	1.40	1.80	0.055	0.071
C	0.60	0.90	0.024	0.035
D	0.15	0.30	0.006	0.012
G	1.00 BSC		0.039 BSC	
H	---	0.10	---	0.004
J	0.10	0.25	0.004	0.010
K	1.45	1.75	0.057	0.069
L	0.10	0.20	0.004	0.008
S	0.50 BSC		0.020 BSC	

STYLE 5:

- PIN 1. GATE
- SOURCE
- DRAIN

# NTA4001N

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