

# NTJS4405N, NVJS4405N

## Small Signal MOSFET

25 V, 1.2 A, Single, N-Channel, SC-88



ON Semiconductor®

<http://onsemi.com>

### Features

- Advance Planar Technology for Fast Switching, Low  $R_{DS(on)}$
- Higher Efficiency Extending Battery Life
- AEC-Q101 Qualified and PPAP Capable – NVJS4405N
- These Devices are Pb-Free and are RoHS Compliant

### Applications

- Boost and Buck Converter
- Load Switch
- Battery Protection

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

Rating		Symbol	Value	Unit
Drain-to-Source Voltage		$V_{DSS}$	25	V
Gate-to-Source Voltage		$V_{GS}$	$\pm 8.0$	V
Drain Current	$t < 5 \text{ s}$ $T_A = 25^\circ\text{C}$	$I_D$	1.2	A
Continuous Drain Current (Note 1)	Steady State $T_A = 25^\circ\text{C}$ $T_A = 75^\circ\text{C}$	$I_D$	1.0	A
			0.80	
Power Dissipation (Note 1)	Steady State	$P_D$	0.63	W
Power Dissipation (Note 1)	$t \leq 5 \text{ s}$	$P_D$	0.89	W
Pulsed Drain Current	$t_p = 10 \mu\text{s}$	$I_{DM}$	3.7	A
Operating Junction and Storage Temperature		$T_J$ , $T_{STG}$	-55 to +150	$^\circ\text{C}$
Source Current (Body Diode) (Note 1)		$I_S$	0.8	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		$T_L$	260	$^\circ\text{C}$
ESD Rating – Machine Model			25	V

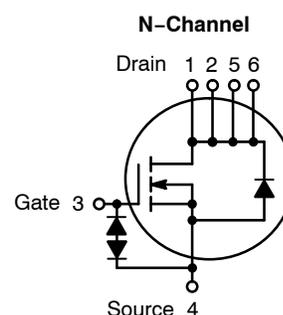
### THERMAL RESISTANCE RATINGS

Rating	Symbol	Max	Unit
Junction-to-Lead – Steady State (Note 1)	$R_{\theta JL}$	102	$^\circ\text{C}/\text{W}$
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	200	
Junction-to-Ambient – $t \leq 5 \text{ s}$ (Note 1)	$R_{\theta JA}$	140	

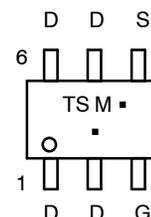
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

$V_{(BR)DSS}$	$R_{DS(on)}$ Typ	$I_D$ Max
25 V	249 m $\Omega$ @ 4.5 V	1.2 A
	299 m $\Omega$ @ 2.7 V	



### MARKING DIAGRAM & PIN ASSIGNMENT



TS = Device Code  
M = Date Code  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

Device	Package	Shipping†
NTJS4405NT1G	SC-88 (Pb-Free)	3000 / Tape & Reel
NVJS4405NT1G	SC-88 (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.

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

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

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	25			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			30		$\text{mV}/^\circ\text{C}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V}, V_{DS} = 20\text{ V}$	$T_J = 25^\circ\text{C}$		1.0	$\mu\text{A}$
			$T_J = 125^\circ\text{C}$		10	
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = 8.0\text{ V}$			100	nA

### ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$	0.65		1.5	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			-2.0		$\text{mV}/^\circ\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 0.6\text{ A}$		249	350	$\text{m}\Omega$
		$V_{GS} = 2.7\text{ V}, I_D = 0.2\text{ A}$		299	400	
		$V_{GS} = 4.5\text{ V}, I_D = 1.2\text{ A}$		260		
Forward Transconductance	$g_{FS}$	$V_{DS} = 5.0\text{ V}, I_D = 0.5\text{ A}$		0.5		S

### CHARGES AND CAPACITANCES

Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = 10\text{ V}$		49	60	$\text{pF}$
Output Capacitance	$C_{OSS}$			22.4	30	
Reverse Transfer Capacitance	$C_{RSS}$			8.0	12	
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 5.0\text{ V}, I_D = 0.95\text{ A}$		0.75	1.5	$\text{nC}$
Threshold Gate Charge	$Q_{G(TH)}$			0.10		
Gate-to-Source Charge	$Q_{GS}$			0.30	0.50	
Gate-to-Drain Charge	$Q_{GD}$			0.20	0.40	

### SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 6.0\text{ V}, I_D = 0.5\text{ A}, R_G = 50\ \Omega$		6.0	12	ns
Rise Time	$t_r$			4.7	8.0	
Turn-Off Delay Time	$t_{d(OFF)}$			25	35	
Fall Time	$t_f$			41	60	

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = 0.6\text{ A}$	$T_J = 25^\circ\text{C}$		0.82	1.20	V
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2. Pulse Test: pulse width  $\leq 300\ \mu\text{s}$ , duty cycle  $\leq 2\%$ .
3. Switching characteristics are independent of operating junction temperatures.

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## TYPICAL PERFORMANCE CURVES ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

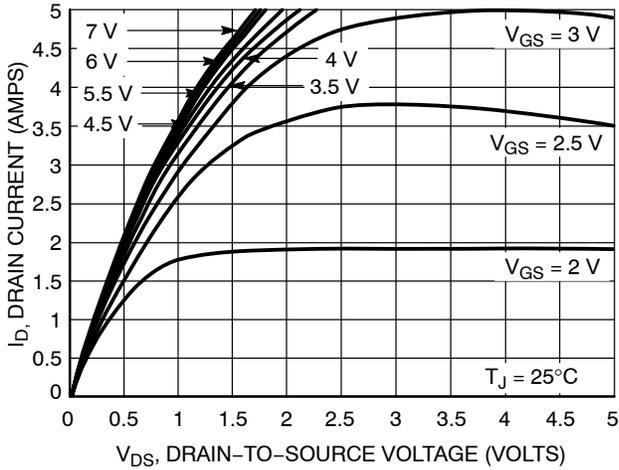


Figure 1. On-Region Characteristics

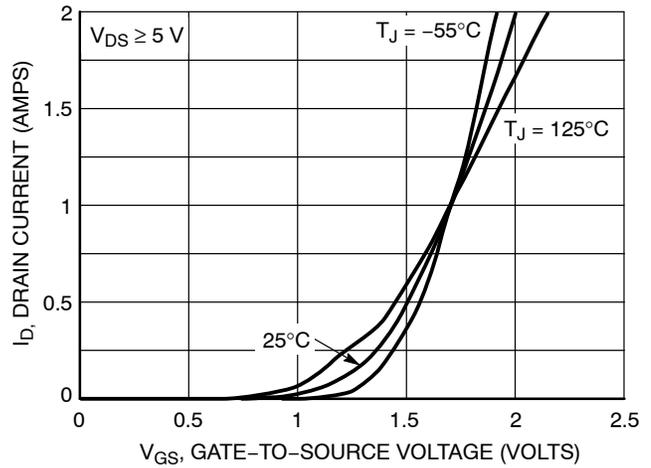


Figure 2. Transfer Characteristics

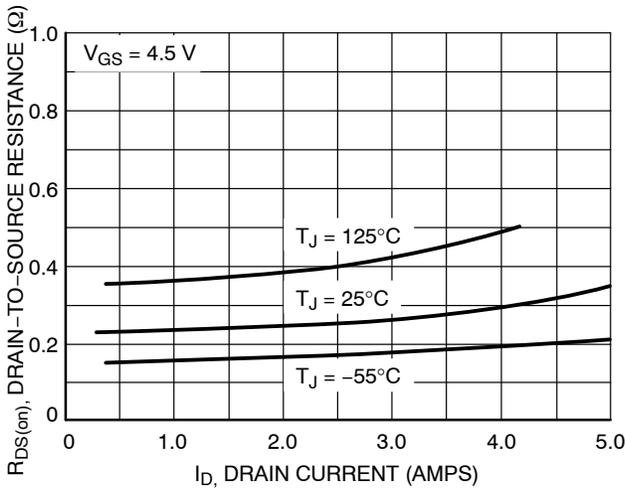


Figure 3. On-Resistance vs. Drain Current and Temperature

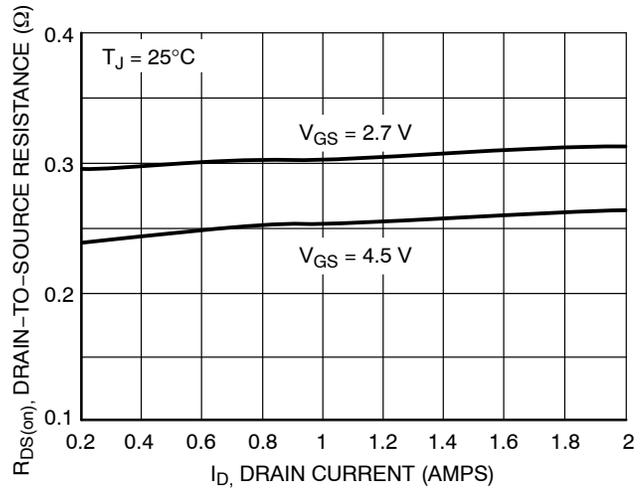


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

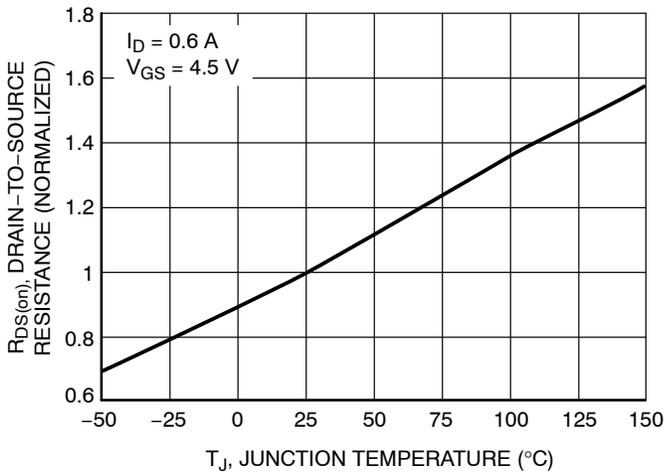


Figure 5. On-Resistance Variation with Temperature

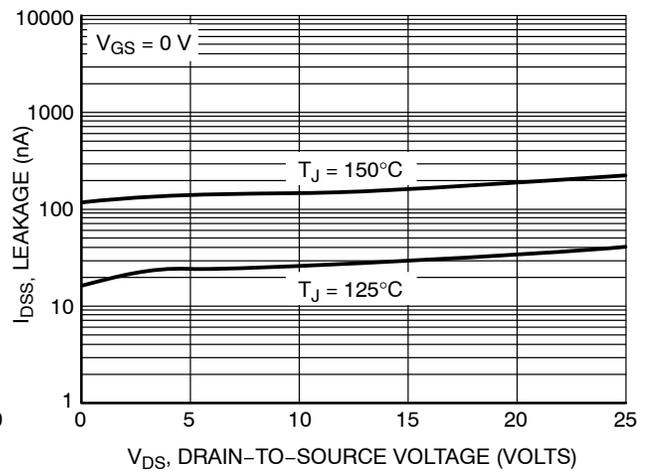
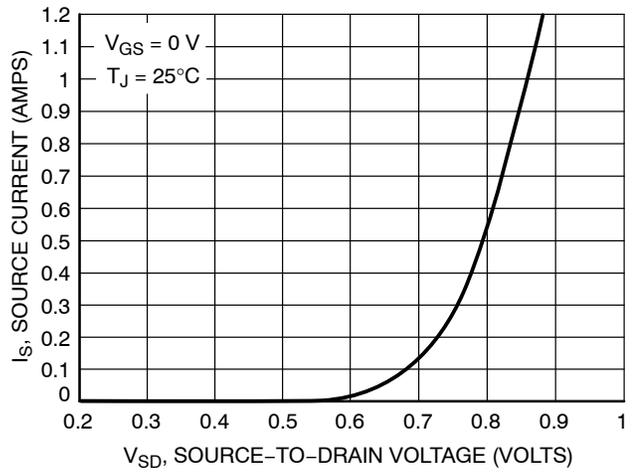
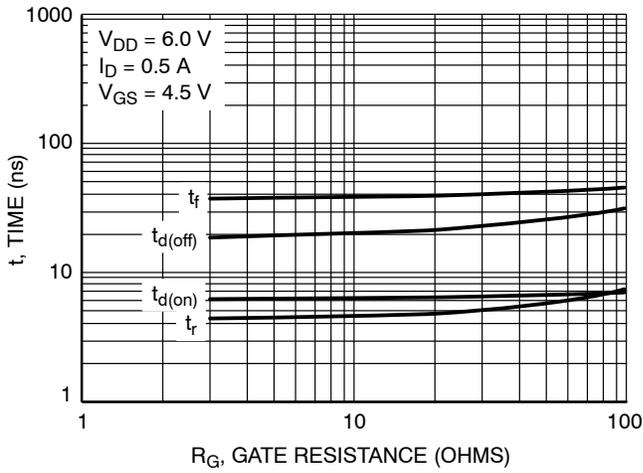
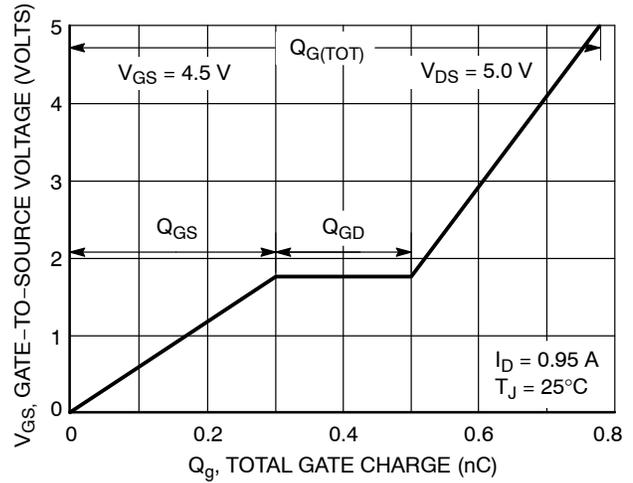
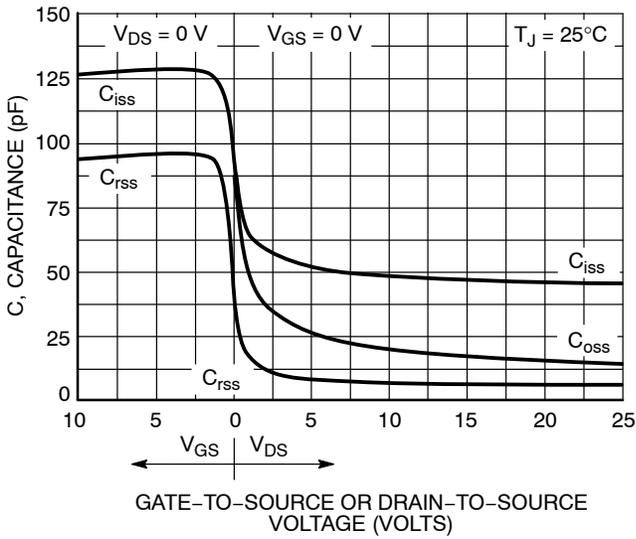


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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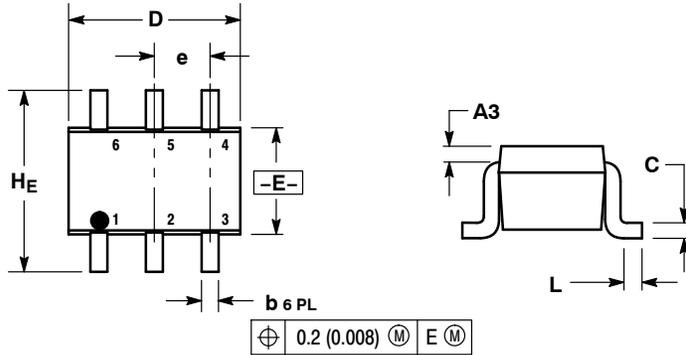
## TYPICAL PERFORMANCE CURVES ( $T_J = 25^\circ\text{C}$ unless otherwise noted)



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## PACKAGE DIMENSIONS

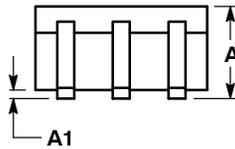
SC-88/SC70-6/SOT-363  
CASE 419B-02  
ISSUE W



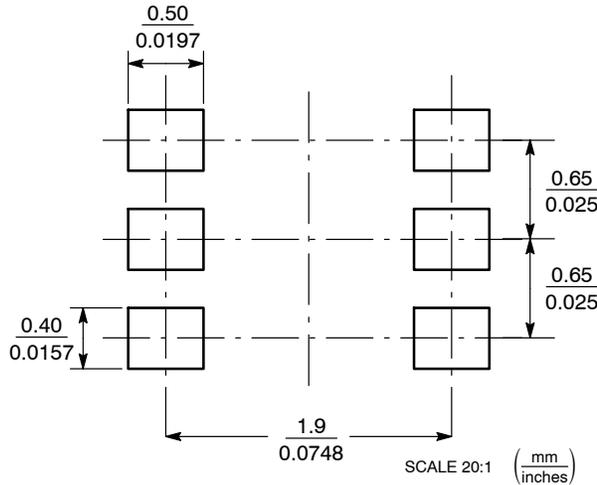
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.95	1.10	0.031	0.037	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A3	0.20 REF			0.008 REF		
b	0.10	0.21	0.30	0.004	0.008	0.012
C	0.10	0.14	0.25	0.004	0.005	0.010
D	1.80	2.00	2.20	0.070	0.078	0.086
E	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC			0.026 BSC		
L	0.10	0.20	0.30	0.004	0.008	0.012
HE	2.00	2.10	2.20	0.078	0.082	0.086



### SOLDERING 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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