

# MOSFET – Single, N-Channel, Small Signal, SC-88

25 V, 1.2 A

NTJS4405N, NVJS4405N

## 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)

Symbol	Rating			Value	Unit
V <sub>DSS</sub>	Drain-to-Source Voltage			25	V
V <sub>GS</sub>	Gate-to-Source Voltage			± 8.0	V
I <sub>D</sub>	Drain Current	t < 5 s	T <sub>A</sub> = 25°C	1.2	A
I <sub>D</sub>	Continuous Drain Current (Note 1)	Steady State	T <sub>A</sub> = 25°C	1.0	A
			T <sub>A</sub> = 75°C	0.80	
P <sub>D</sub>	Power Dissipation (Note 1)	Steady State		0.63	W
P <sub>D</sub>	Power Dissipation (Note 1)	t ≤ 5 s		0.89	W
I <sub>DM</sub>	Pulsed Drain Current	t <sub>p</sub> = 10 μs		3.7	A
T <sub>J</sub> , T <sub>STG</sub>	Operating Junction and Storage Temperature			–55 to +150	°C
I <sub>S</sub>	Source Current (Body Diode) (Note 1)			0.8	A
T <sub>L</sub>	Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			260	°C
	ESD Rating – Machine Model			25	V

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

## THERMAL RESISTANCE RATINGS

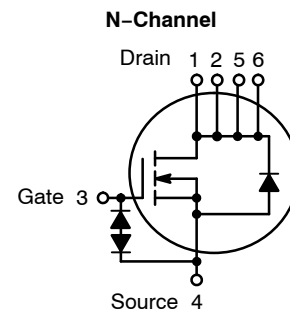
Symbol	Rating	Max	Unit
$R_{\theta JL}$	Junction-to-Lead – Steady State (Note 1)	102	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction-to-Ambient – Steady State (Note 1)	200	
$R_{\theta JA}$	Junction-to-Ambient – $t \leq 5 \text{ s}$ (Note 1)	140	

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

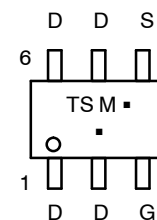
$V_{(BR)DSS}$	$R_{DS(on)}$ Typ	$I_D$ Max
25 V	249 m $\Omega$ @ 4.5 V	1.2 A
	299 m $\Omega$ @ 2.7 V	



SC-88/SOT-363  
CASE 419B



## 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)	3,000 / Tape & Reel
NVJS4405NT1G	SC-88 (Pb-Free)	3,000 / Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, [BRD8011/D](http://BRD8011/D).

# NTJS4405N, NVJS4405N

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

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

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

### ON CHARACTERISTICS (Note 2)

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

### CHARGES AND CAPACITANCES

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

### SWITCHING CHARACTERISTICS (Note 3)

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

### DRAIN-SOURCE DIODE CHARACTERISTICS

$V_{SD}$	Forward Diode Voltage	$V_{GS} = 0\text{ V}, I_S = 0.6\text{ A}$	$T_J = 25^\circ\text{C}$		0.82	1.20	V
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Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

2. Pulse Test: pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

3. Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CURVES ( $T_J = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED) (continued)

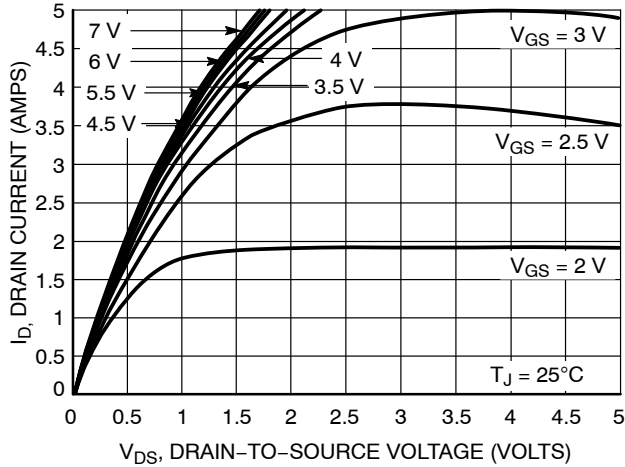


Figure 1. On-Region Characteristics

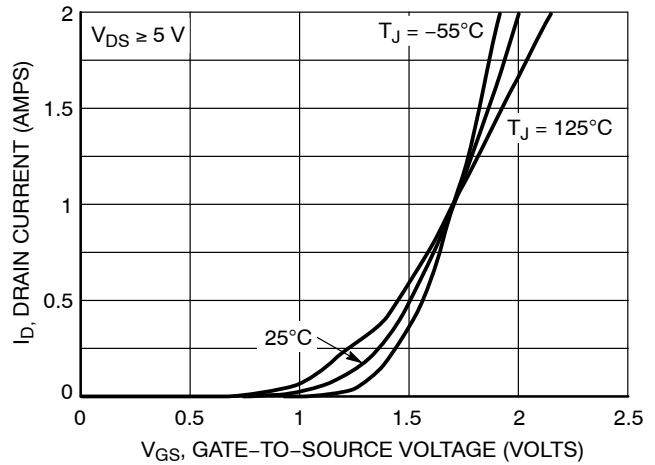


Figure 2. Transfer Characteristics

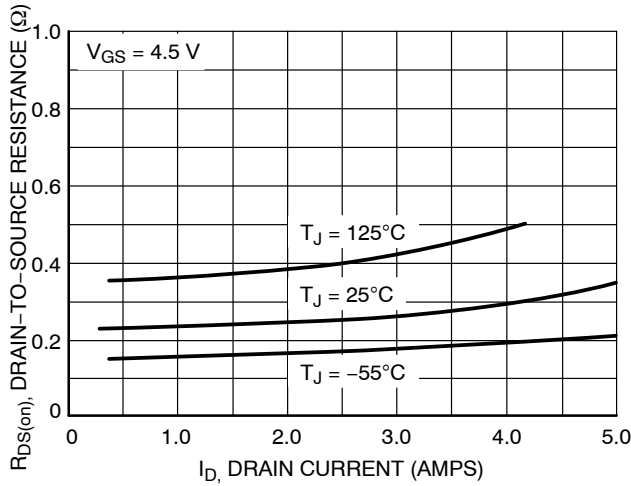


Figure 3. On-Resistance vs. Drain Current and Temperature

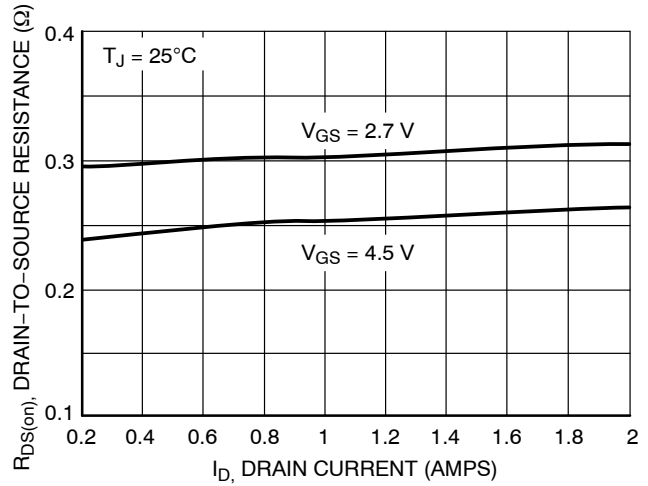


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

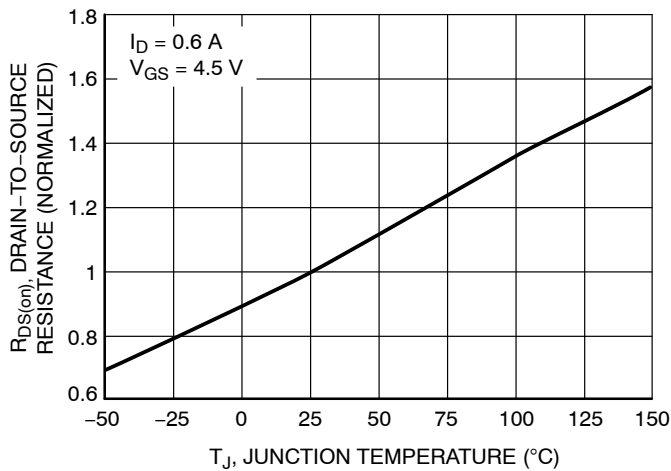


Figure 5. On-Resistance Variation with Temperature

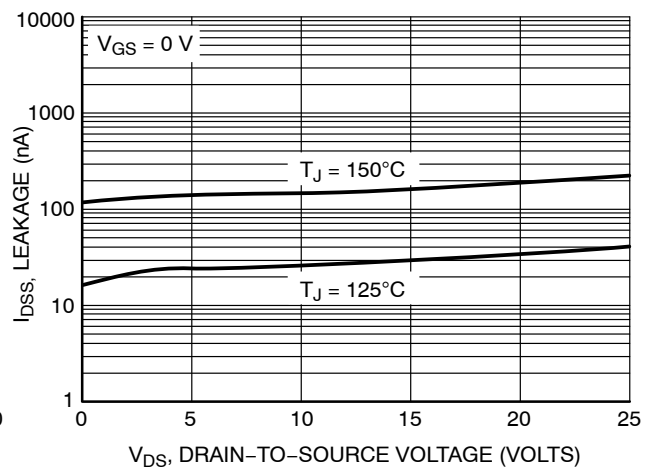
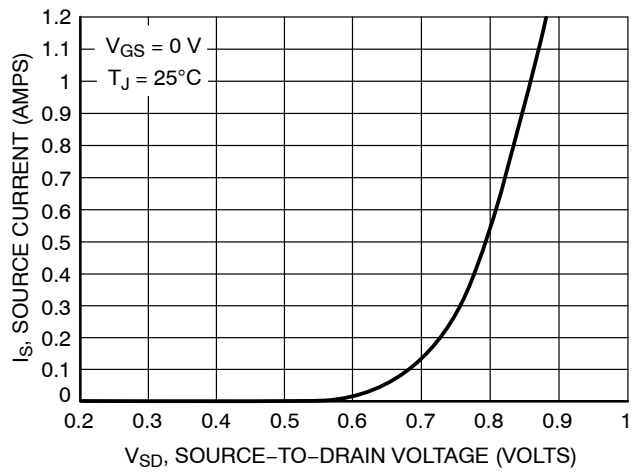
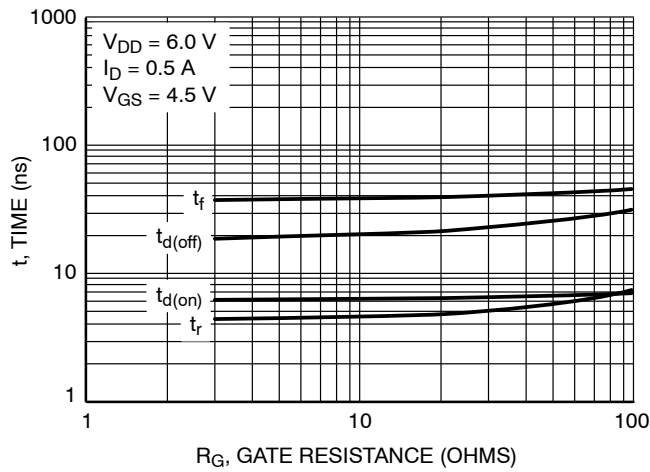
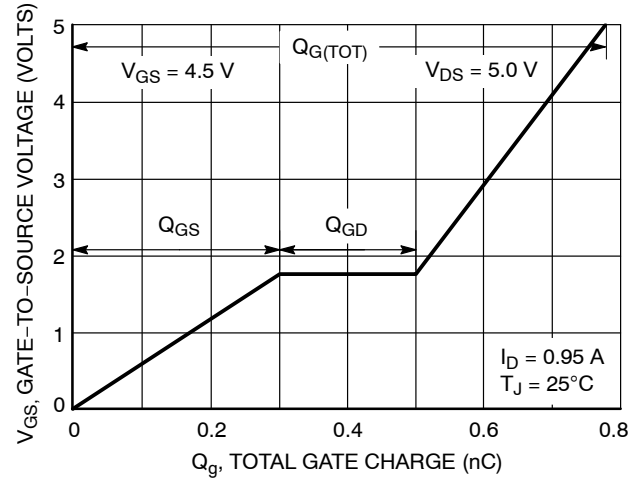
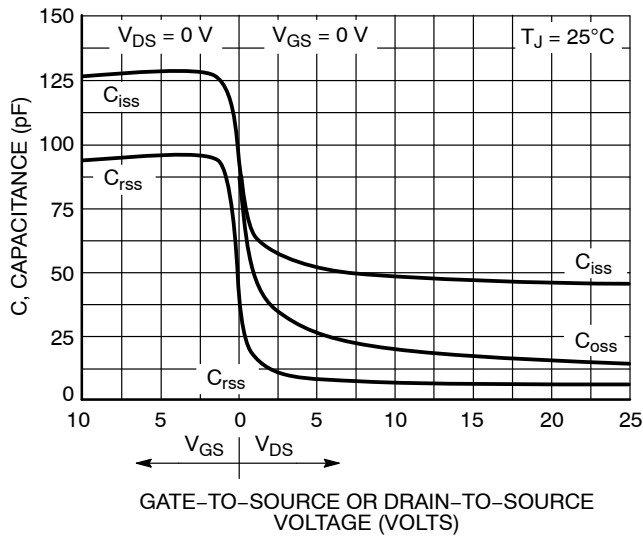


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL PERFORMANCE CURVES ( $T_J = 25^\circ\text{C}$  UNLESS OTHERWISE NOTED) (continued)



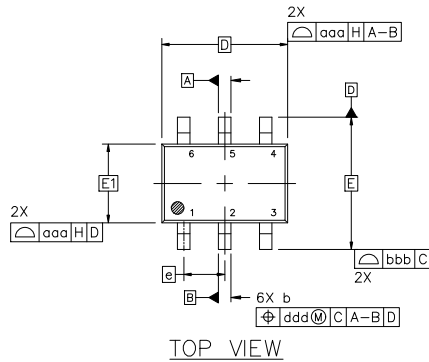


SC-88 2.00x1.25x0.90, 0.65P  
CASE 419B-02  
ISSUE Z

DATE 18 APR 2024

NOTES:

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
2. ALL DIMENSION ARE IN MILLIMETERS.
3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.20 PER END.
4. DIMENSIONS D AND E1 AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY AND DATUM H.
5. DATUMS A AND B ARE DETERMINED AT DATUM H.
6. DIMENSIONS b AND c APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.08 AND 0.15 FROM THE TIP.
7. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF DIMENSION b AT MAXIMUM MATERIAL CONDITION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.

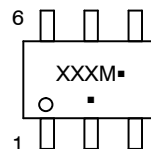


DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	---	---	1.10
A1	0.00	---	0.10
A2	0.70	0.90	1.00
b	0.15	0.20	0.25
c	0.08	0.15	0.22
D	2.00 BSC		
E	2.10 BSC		
E1	1.25 BSC		
e	0.65 BSC		
L	0.26	0.36	0.46
L2	0.15 BSC		
aaa	0.15		
bbb	0.30		
ccc	0.10		
ddd	0.10		



\* FOR ADDITIONAL INFORMATION ON OUR Pb-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ONSEMI SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

GENERIC  
MARKING DIAGRAM\*



XXX = Specific Device Code  
M = Date Code\*  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation and/or position may vary depending upon manufacturing location.

\*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.

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STYLE 1: PIN 1. EMITTER 2 2. BASE 2 3. COLLECTOR 1 4. EMITTER 1 5. BASE 1 6. COLLECTOR 2	STYLE 2: CANCELLED	STYLE 3: CANCELLED	STYLE 4: PIN 1. CATHODE 2. CATHODE 3. COLLECTOR 4. EMITTER 5. BASE 6. ANODE	STYLE 5: PIN 1. ANODE 2. ANODE 3. COLLECTOR 4. EMITTER 5. BASE 6. CATHODE	STYLE 6: PIN 1. ANODE 2 2. N/C 3. CATHODE 1 4. ANODE 1 5. N/C 6. CATHODE 2
STYLE 7: PIN 1. SOURCE 2 2. DRAIN 2 3. GATE 1 4. SOURCE 1 5. DRAIN 1 6. GATE 2	STYLE 8: CANCELLED	STYLE 9: PIN 1. EMITTER 2 2. EMITTER 1 3. COLLECTOR 1 4. BASE 1 5. BASE 2 6. COLLECTOR 2	STYLE 10: PIN 1. SOURCE 2 2. SOURCE 1 3. GATE 1 4. DRAIN 1 5. DRAIN 2 6. GATE 2	STYLE 11: PIN 1. CATHODE 2 2. CATHODE 2 3. ANODE 1 4. CATHODE 1 5. CATHODE 1 6. ANODE 2	STYLE 12: PIN 1. ANODE 2 2. ANODE 2 3. CATHODE 1 4. ANODE 1 5. ANODE 1 6. CATHODE 2
STYLE 13: PIN 1. ANODE 2. N/C 3. COLLECTOR 4. EMITTER 5. BASE 6. CATHODE	STYLE 14: PIN 1. VREF 2. GND 3. GND 4. IOUT 5. VEN 6. VCC	STYLE 15: PIN 1. ANODE 1 2. ANODE 2 3. ANODE 3 4. CATHODE 3 5. CATHODE 2 6. CATHODE 1	STYLE 16: PIN 1. BASE 1 2. EMITTER 2 3. COLLECTOR 2 4. BASE 2 5. EMITTER 1 6. COLLECTOR 1	STYLE 17: PIN 1. BASE 1 2. EMITTER 1 3. COLLECTOR 2 4. BASE 2 5. EMITTER 2 6. COLLECTOR 1	STYLE 18: PIN 1. VIN1 2. VCC 3. VOUT2 4. VIN2 5. GND 6. VOUT1
STYLE 19: PIN 1. I OUT 2. GND 3. GND 4. V CC 5. V EN 6. V REF	STYLE 20: PIN 1. COLLECTOR 2. COLLECTOR 3. BASE 4. EMITTER 5. COLLECTOR 6. COLLECTOR	STYLE 21: PIN 1. ANODE 1 2. N/C 3. ANODE 2 4. CATHODE 2 5. N/C 6. CATHODE 1	STYLE 22: PIN 1. D1 (i) 2. GND 3. D2 (i) 4. D2 (c) 5. VBUS 6. D1 (c)	STYLE 23: PIN 1. Vn 2. CH1 3. Vp 4. N/C 5. CH2 6. N/C	STYLE 24: PIN 1. CATHODE 2. ANODE 3. CATHODE 4. CATHODE 5. CATHODE 6. CATHODE
STYLE 25: PIN 1. BASE 1 2. CATHODE 3. COLLECTOR 2 4. BASE 2 5. EMITTER 6. COLLECTOR 1	STYLE 26: PIN 1. SOURCE 1 2. GATE 1 3. DRAIN 2 4. SOURCE 2 5. GATE 2 6. DRAIN 1	STYLE 27: PIN 1. BASE 2 2. BASE 1 3. COLLECTOR 1 4. EMITTER 1 5. EMITTER 2 6. COLLECTOR 2	STYLE 28: PIN 1. DRAIN 2. DRAIN 3. GATE 4. SOURCE 5. DRAIN 6. DRAIN	STYLE 29: PIN 1. ANODE 2. ANODE 3. COLLECTOR 4. EMITTER 5. BASE/ANODE 6. CATHODE	STYLE 30: PIN 1. SOURCE 1 2. DRAIN 2 3. DRAIN 2 4. SOURCE 2 5. GATE 1 6. DRAIN 1

Note: Please refer to datasheet for style callout. If style type is not called out in the datasheet refer to the device datasheet pinout or pin assignment.

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