

# NTGS3441T1

## Power MOSFET 1 Amp, 20 Volts

### P-Channel TSOP-6

#### Features

- Ultra Low  $R_{DS(on)}$
- Higher Efficiency Extending Battery Life
- Miniature TSOP-6 Surface Mount Package
- Pb-Free Package is Available

#### Applications

- Power Management in Portable and Battery-Powered Products, i.e.: Cellular and Cordless Telephones, and PCMCIA Cards

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

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	$V_{DSS}$	-20	V
Gate-to-Source Voltage - Continuous	$V_{GS}$	$\pm 8.0$	V
Thermal Resistance Junction-to-Ambient (Note 1)	$R_{\theta JA}$	244	$^\circ\text{C/W}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_d$	0.5	W
Drain Current - Continuous @ $T_A = 25^\circ\text{C}$	$I_D$	-1.65	A
- Pulsed Drain Current ( $T_p < 10 \mu\text{s}$ )	$I_{DM}$	-10	A
Thermal Resistance Junction-to-Ambient (Note 2)	$R_{\theta JA}$	128	$^\circ\text{C/W}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_d$	1.0	W
Drain Current - Continuous @ $T_A = 25^\circ\text{C}$	$I_D$	-2.35	A
- Pulsed Drain Current ( $T_p < 10 \mu\text{s}$ )	$I_{DM}$	-14	A
Thermal Resistance Junction-to-Ambient (Note 3)	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_d$	2.0	W
Drain Current - Continuous @ $T_A = 25^\circ\text{C}$	$I_D$	-3.3	A
- Pulsed Drain Current ( $T_p < 10 \mu\text{s}$ )	$I_{DM}$	-20	A
Operating and Storage Temperature Range	$T_J, T_{stg}$	-55 to 150	$^\circ\text{C}$
Maximum Lead Temperature for Soldering Purposes for 10 Seconds	$T_L$	260	$^\circ\text{C}$

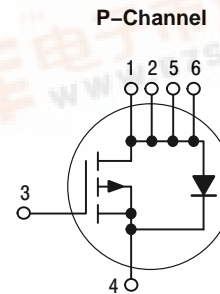
1. Minimum FR-4 or G-10PCB, operating to steady state.
2. Mounted onto a 2" square FR-4 board (1" sq. 2 oz. cu. 0.06" thick single sided), operating to steady state.
3. Mounted onto a 2" square FR-4 board (1" sq. 2 oz. cu. 0.06" thick single sided),  $t < 5.0$  seconds.



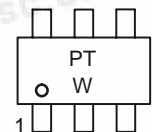
ON Semiconductor®

<http://onsemi.com>

**1 AMPERE  
20 VOLTS**  
 $R_{DS(on)} = 90 \text{ m}\Omega$

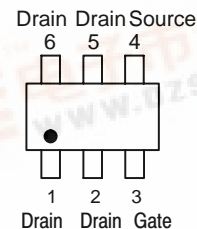


**TSOP-6  
CASE 318G  
STYLE 1**



PT = Device Code  
W = Work Week

#### PIN ASSIGNMENT



#### ORDERING INFORMATION

Device	Package	Shipping†
NTGS3441T1	TSOP-6	3000 / Tape & Reel
NTGS3441T1G	TSOP-6 (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.



# NTGS3441T1

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted) (Notes 4 & 5)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-Source Breakdown Voltage (V <sub>GS</sub> = 0 Vdc, I <sub>D</sub> = -10 μA)	V <sub>(BR)DSS</sub>	-20	-	-	Vdc
Zero Gate Voltage Drain Current (V <sub>GS</sub> = 0 Vdc, V <sub>DS</sub> = -20 Vdc, T <sub>J</sub> = 25°C) (V <sub>GS</sub> = 0 Vdc, V <sub>DS</sub> = -20 Vdc, T <sub>J</sub> = 70°C)	I <sub>DSS</sub>	-	-	-1.0 -5.0	μAdc
Gate-Body Leakage Current (V <sub>GS</sub> = -8.0 Vdc, V <sub>DS</sub> = 0 Vdc)	I <sub>GSS</sub>	-	-	-100	nAdc
Gate-Body Leakage Current (V <sub>GS</sub> = +8.0 Vdc, V <sub>DS</sub> = 0 Vdc)	I <sub>GSS</sub>	-	-	100	nAdc

### ON CHARACTERISTICS

Gate Threshold Voltage (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250 μAdc)	V <sub>GS(th)</sub>	-0.45	-1.05	-1.50	Vdc
Static Drain-Source On-State Resistance (V <sub>GS</sub> = -4.5 Vdc, I <sub>D</sub> = -3.3 Adc) (V <sub>GS</sub> = -2.5 Vdc, I <sub>D</sub> = -2.9 Adc)	R <sub>DS(on)</sub>	-	0.069 0.117	0.090 0.135	Ω
Forward Transconductance (V <sub>DS</sub> = -10 Vdc, I <sub>D</sub> = -3.3 Adc)	g <sub>FS</sub>	-	6.8	-	mhos

### DYNAMIC CHARACTERISTICS

Input Capacitance	(V <sub>DS</sub> = -5.0 Vdc, V <sub>GS</sub> = 0 Vdc, f = 1.0 MHz)	C <sub>iss</sub>	-	480	-	pF
Output Capacitance		C <sub>oss</sub>	-	265	-	pF
Reverse Transfer Capacitance		C <sub>rss</sub>	-	100	-	pF

### SWITCHING CHARACTERISTICS

Turn-On Delay Time	(V <sub>DD</sub> = -20 Vdc, I <sub>D</sub> = -1.6 Adc, V <sub>GS</sub> = -4.5 Vdc, R <sub>g</sub> = 6.0 Ω)	t <sub>d(on)</sub>	-	13	25	ns
Rise Time		t <sub>r</sub>	-	23.5	45	ns
Turn-Off Delay Time		t <sub>d(off)</sub>	-	27	50	ns
Fall Time		t <sub>f</sub>	-	24	45	ns
Total Gate Charge	(V <sub>DS</sub> = -10 Vdc, V <sub>GS</sub> = -4.5 Vdc, I <sub>D</sub> = -3.3 Adc)	Q <sub>tot</sub>	-	6.2	14	nC
Gate-Source Charge		Q <sub>gs</sub>	-	1.3	-	nC
Gate-Drain Charge		Q <sub>gd</sub>	-	2.5	-	nC

### BODY-DRAIN DIODE RATINGS

Diode Forward On-Voltage	(I <sub>S</sub> = -1.6 Adc, V <sub>GS</sub> = 0 Vdc)	V <sub>SD</sub>	-	-0.88	-1.2	Vdc
Diode Forward On-Voltage	(I <sub>S</sub> = -3.3 Adc, V <sub>GS</sub> = 0 Vdc)	V <sub>SD</sub>	-	-0.98	-	Vdc
Reverse Recovery Time	(I <sub>S</sub> = -1.6 Adc, di <sub>S</sub> /dt = 100 A/μs)	t <sub>rr</sub>	-	30	60	ns

4. Indicates Pulse Test: P.W. = 300 μsec max, Duty Cycle = 2%.

5. Handling precautions to protect against electrostatic discharge is mandatory.

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## TYPICAL ELECTRICAL CHARACTERISTICS

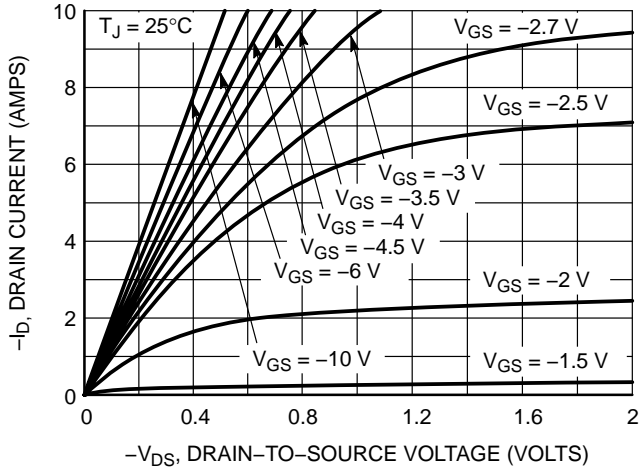


Figure 1. On-Region Characteristics

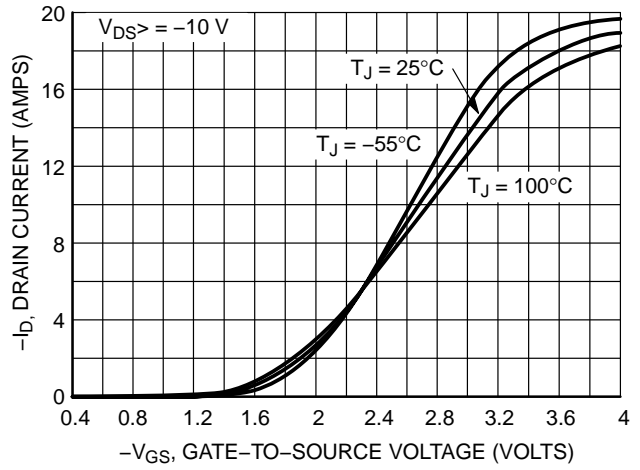


Figure 2. Transfer Characteristics

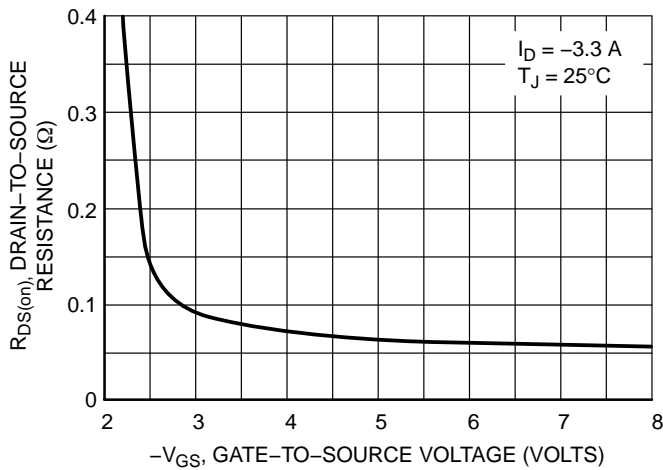


Figure 3. On-Resistance vs. Gate-to-Source Voltage

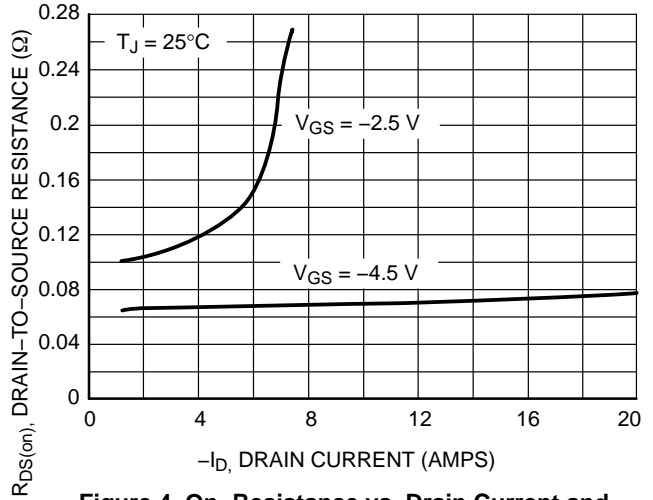


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

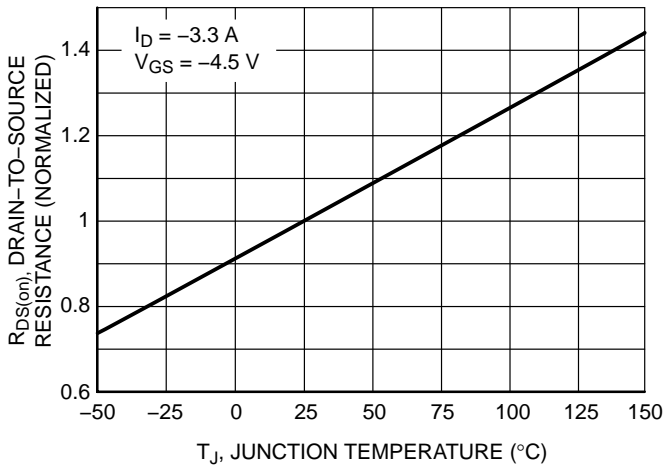


Figure 5. On-Resistance Variation with Temperature

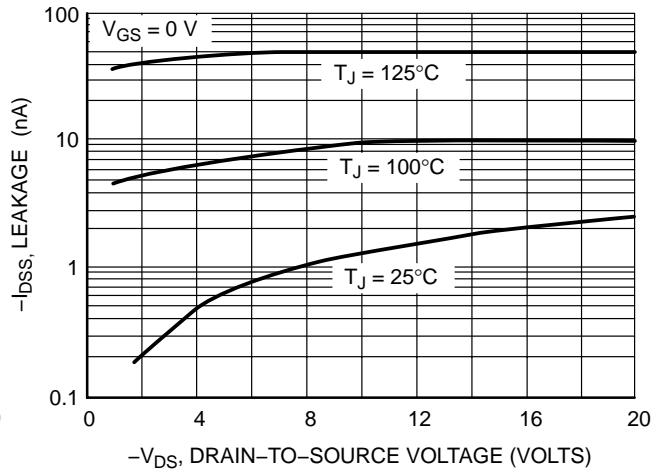


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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## TYPICAL ELECTRICAL CHARACTERISTICS

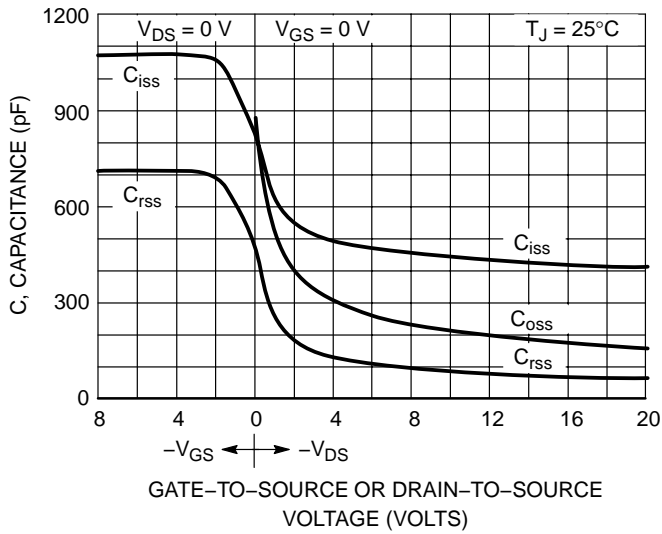


Figure 7. Capacitance Variation

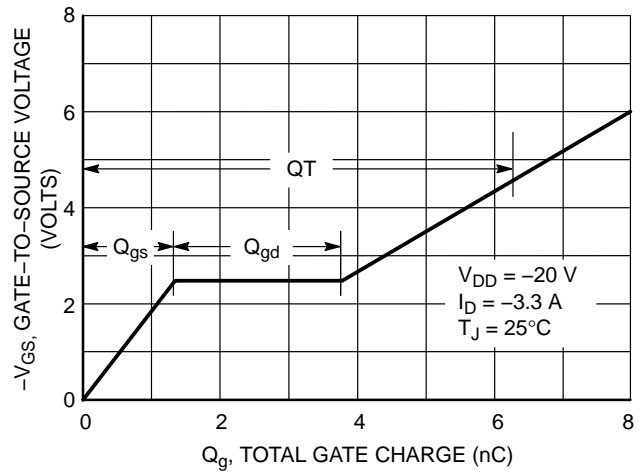


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

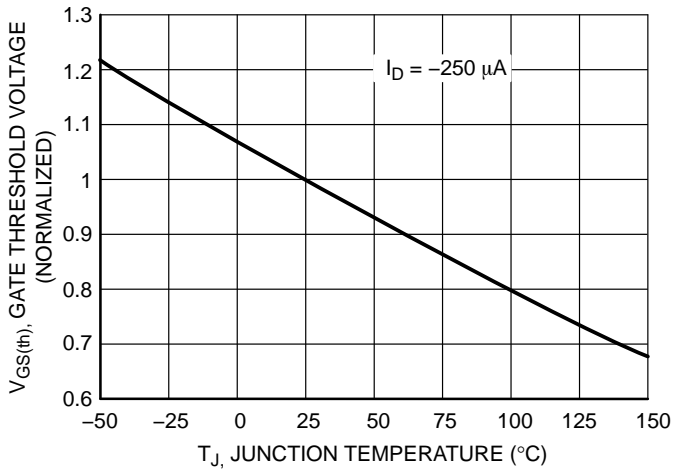


Figure 9. Gate Threshold Voltage Variation with Temperature

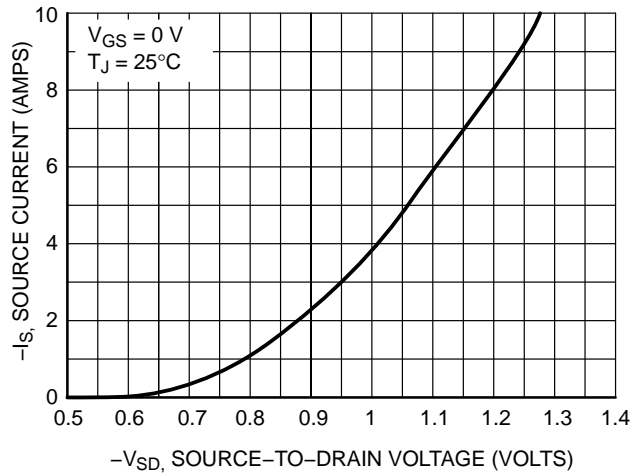


Figure 10. Diode Forward Voltage vs. Current

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## TYPICAL ELECTRICAL CHARACTERISTICS

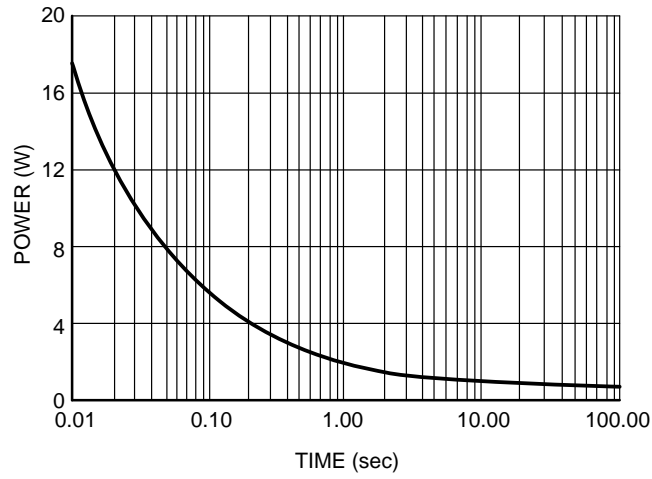


Figure 11. Single Pulse Power

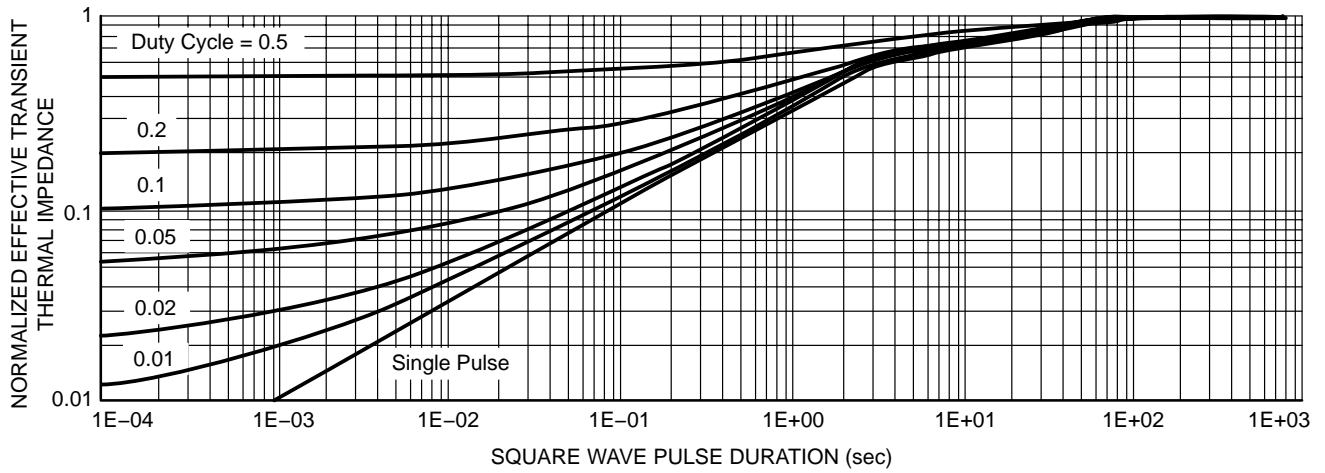
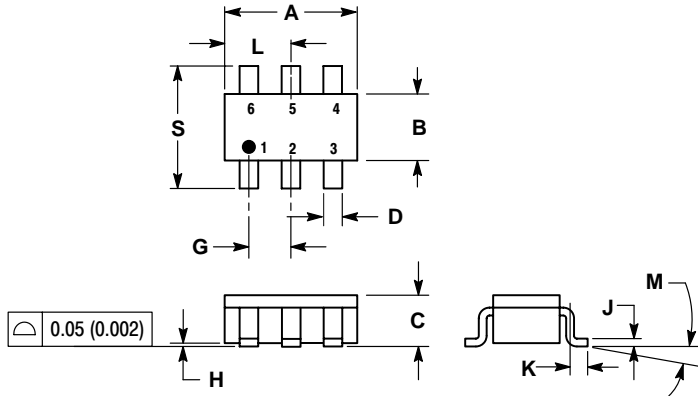


Figure 12. Normalized Thermal Transient Impedance, Junction-to-Ambient

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## PACKAGE DIMENSIONS

TSOP-6  
CASE 318G-02  
ISSUE L



NOTES:

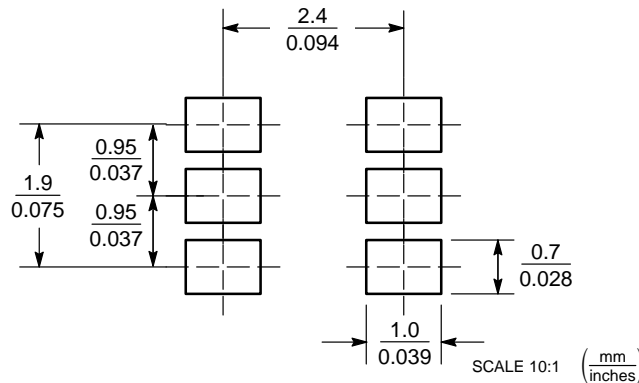
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.90	3.10	0.1142	0.1220
B	1.30	1.70	0.0512	0.0669
C	0.90	1.10	0.0354	0.0433
D	0.25	0.50	0.0098	0.0197
G	0.85	1.05	0.0335	0.0413
H	0.013	0.100	0.0005	0.0040
J	0.10	0.26	0.0040	0.0102
K	0.20	0.60	0.0079	0.0236
L	1.25	1.55	0.0493	0.0610
M	0°	10°	0°	10°
S	2.50	3.00	0.0985	0.1181

STYLE 1:

1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DRAIN

### 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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