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

Applications

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

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

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

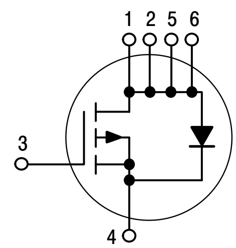
1. Minimum FR–4 or G–10PCB, operating to steady state.
2. Mounted onto a 2″ square FR–4 board (1″ sq. 2 oz. cu. 0.06″ thick single sided), operating to steady state.
3. Mounted onto a 2″ square FR–4 board (1″ sq. 2 oz. cu. 0.06″ thick single sided), t < 5.0 seconds.

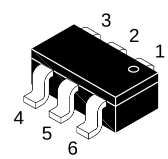
ON Semiconductor®

http://onsemi.com

1 AMPERE
20 VOLTS
$R_{DS(on)}$ = 90 mΩ

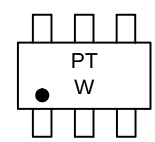
P–Channel





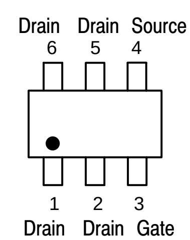
TSOP–6
CASE 318G
STYLE 1

MARKING DIAGRAM



PT = Device Code
W = Work Week

PIN ASSIGNMENT



ORDERING INFORMATION

Device	Package	Shipping
NTGS3441T1	TSOP–6	3000 Tape & Reel

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Notes 4 & 5)

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain–Source Breakdown Voltage (V_{GS} = 0 Vdc, I_D = –10 μA)		$V_{(BR)DSS}$	–20	–	–	Vdc
Zero Gate Voltage Drain Current (V_{GS} = 0 Vdc, V_{DS} = –20 Vdc, T_J = 25°C) (V_{GS} = 0 Vdc, V_{DS} = –20 Vdc, T_J = 70°C)		I_{DSS}	– –	– –	–1.0 –5.0	μAdc
Gate–Body Leakage Current (V_{GS} = –8.0 Vdc, V_{DS} = 0 Vdc)		I_{GSS}	–	–	–100	nAdc
Gate–Body Leakage Current (V_{GS} = +8.0 Vdc, V_{DS} = 0 Vdc)		I_{GSS}	–	–	100	nAdc
ON CHARACTERISTICS						
Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = –250 μAdc)		$V_{GS(th)}$	–0.45	–1.05	–1.50	Vdc
Static Drain–Source On–State Resistance (V_{GS} = –4.5 Vdc, I_D = –3.3 Adc) (V_{GS} = –2.5 Vdc, I_D = –2.9 Adc)		$R_{DS(on)}$	– –	0.069 0.117	0.090 0.135	Ω
Forward Transconductance (V_{DS} = –10 Vdc, I_D = –3.3 Adc)		g_{FS}	–	6.8	–	mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{DS} = –5.0 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{iss}	–	480	–	pF
Output Capacitance		C_{oss}	–	265	–	pF
Reverse Transfer Capacitance		C_{rss}	–	100	–	pF
SWITCHING CHARACTERISTICS						
Turn–On Delay Time	(V_{DD} = –20 Vdc, I_D = –1.6 Adc, V_{GS} = –4.5 Vdc, R_g = 6.0 Ω)	$t_{d(on)}$	–	13	25	ns
Rise Time		t_r	–	23.5	45	ns
Turn–Off Delay Time		$t_{d(off)}$	–	27	50	ns
Fall Time		t_f	–	24	45	ns
Total Gate Charge	(V_{DS} = –10 Vdc, V_{GS} = –4.5 Vdc, I_D = –3.3 Adc)	Q_{tot}	–	6.2	14	nC
Gate–Source Charge		Q_{gs}	–	1.3	–	nC
Gate–Drain Charge		Q_{gd}	–	2.5	–	nC
BODY–DRAIN DIODE RATINGS						
Diode Forward On–Voltage	(I_S = –1.6 Adc, V_{GS} = 0 Vdc)	V_{SD}	–	–0.88	–1.2	Vdc
Diode Forward On–Voltage	(I_S = –3.3 Adc, V_{GS} = 0 Vdc)	V_{SD}	–	–0.98	–	Vdc
Reverse Recovery Time	(I_S = –1.6 Adc, dI_S/dt = 100 A/μs)	t_{rr}	–	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.

TYPICAL ELECTRICAL CHARACTERISTICS

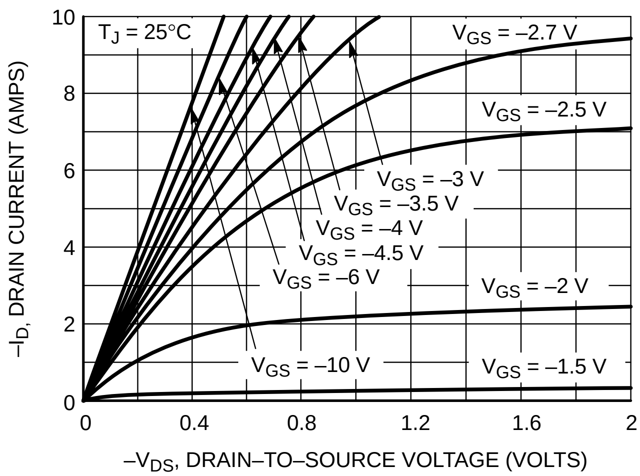


Figure 1. On–Region Characteristics

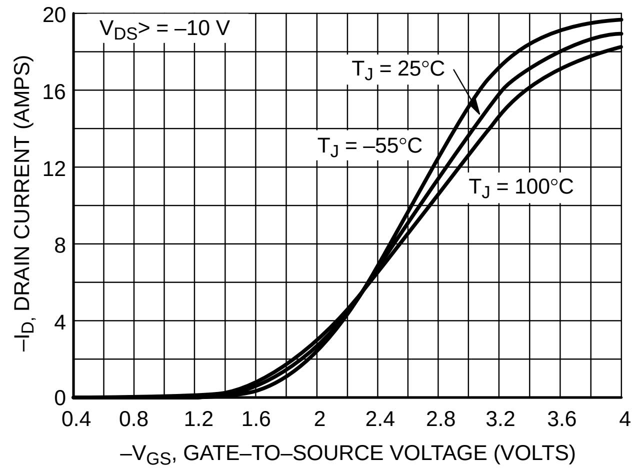


Figure 2. Transfer Characteristics

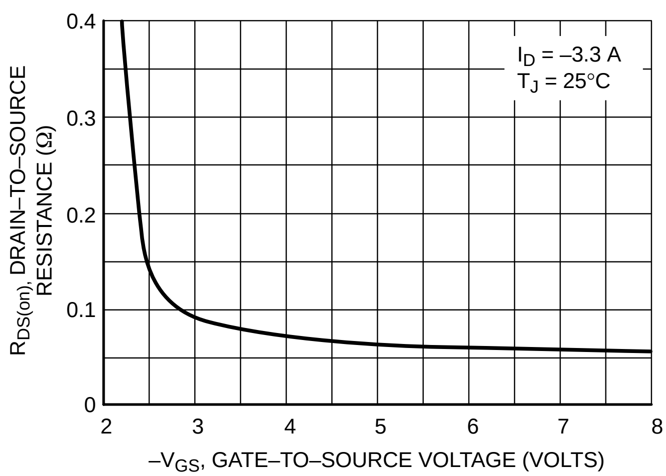


Figure 3. On–Resistance vs. Gate–to–Source Voltage

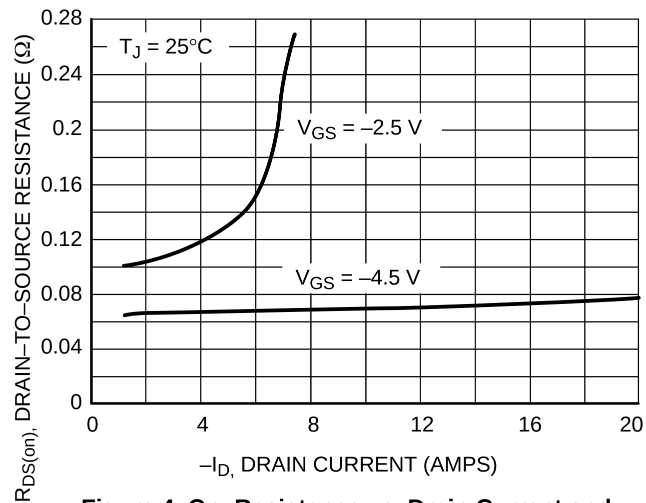


Figure 4. On–Resistance vs. Drain Current and Gate Voltage

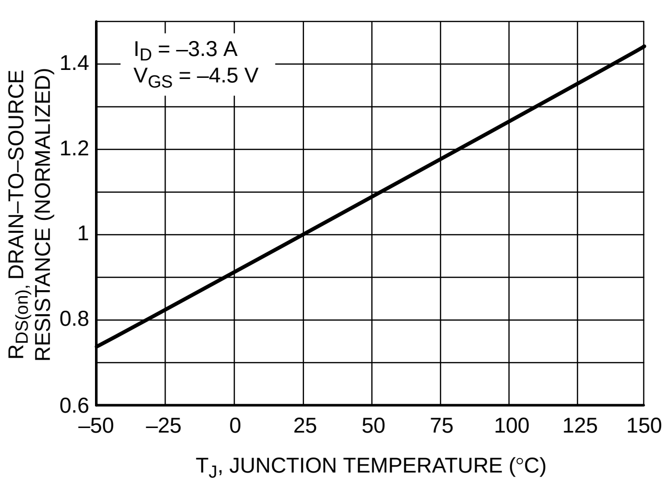


Figure 5. On–Resistance Variation with Temperature

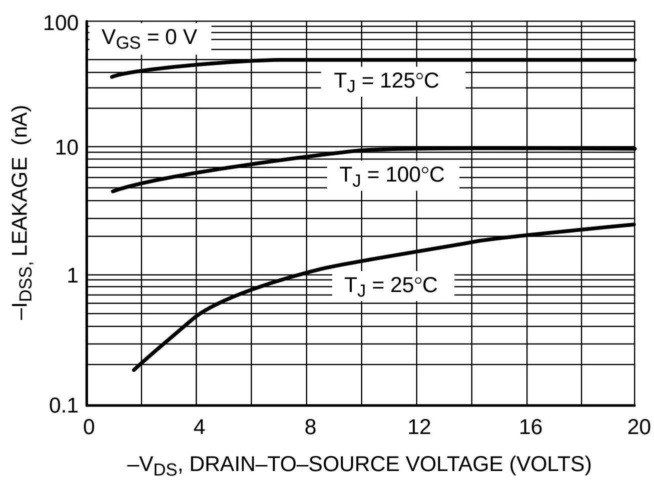


Figure 6. Drain–to–Source Leakage Current vs. Voltage

TYPICAL ELECTRICAL CHARACTERISTICS

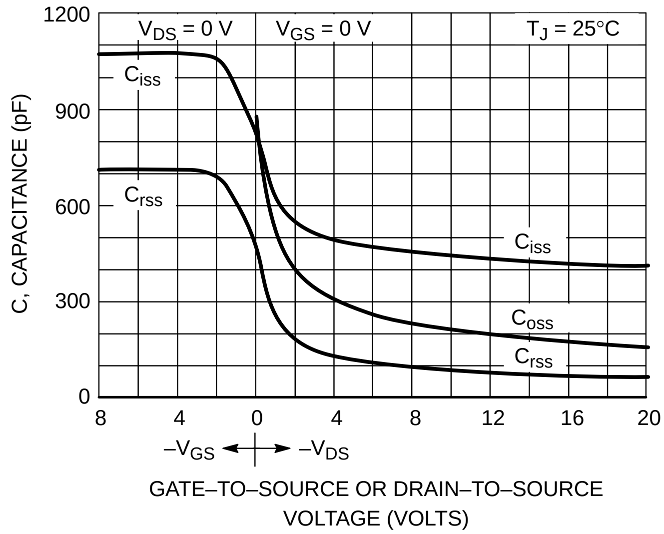


Figure 7. Capacitance Variation

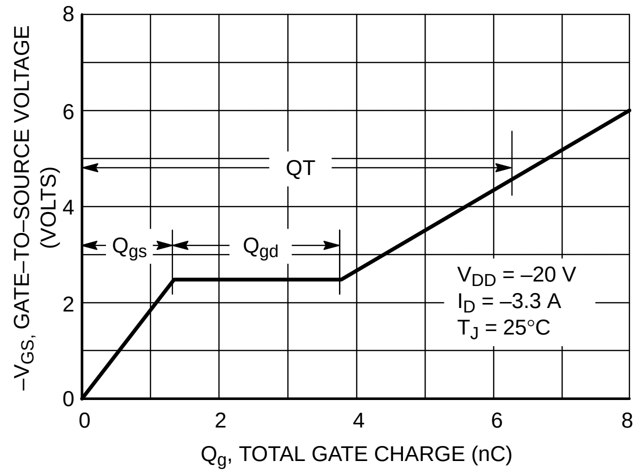


Figure 8. Gate–to–Source and Drain–to–Source Voltage vs. Total Charge

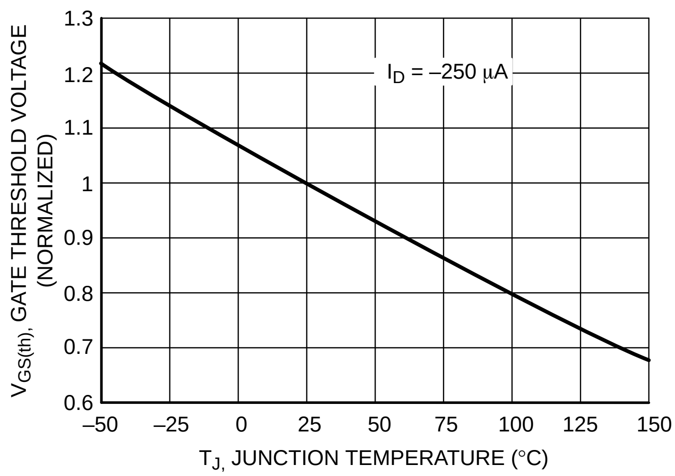


Figure 9. Gate Threshold Voltage Variation with Temperature

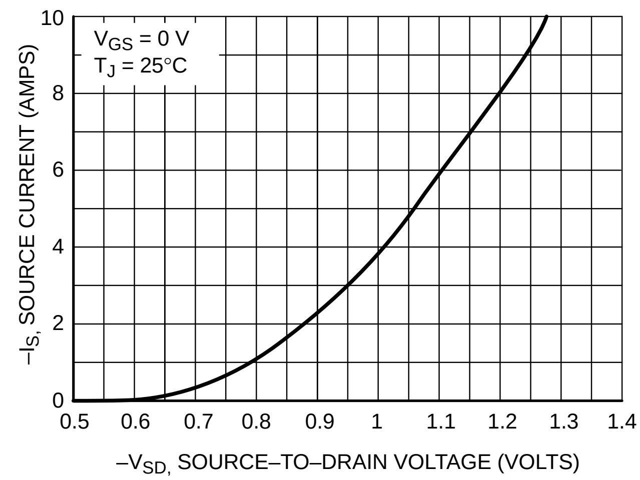


Figure 10. Diode Forward Voltage vs. Current

TYPICAL ELECTRICAL CHARACTERISTICS

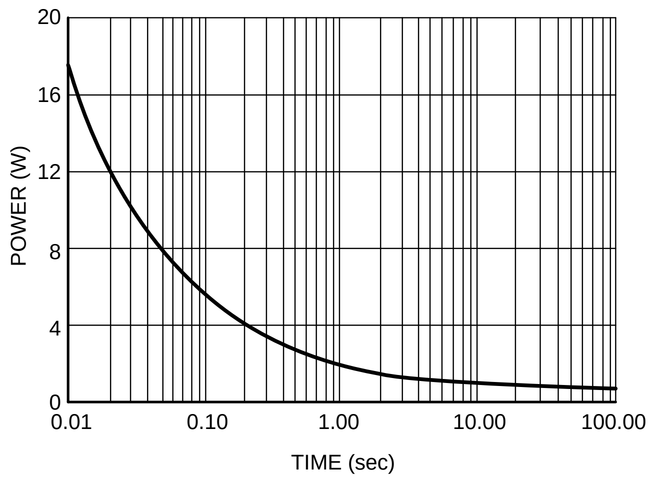


Figure 11. Single Pulse Power

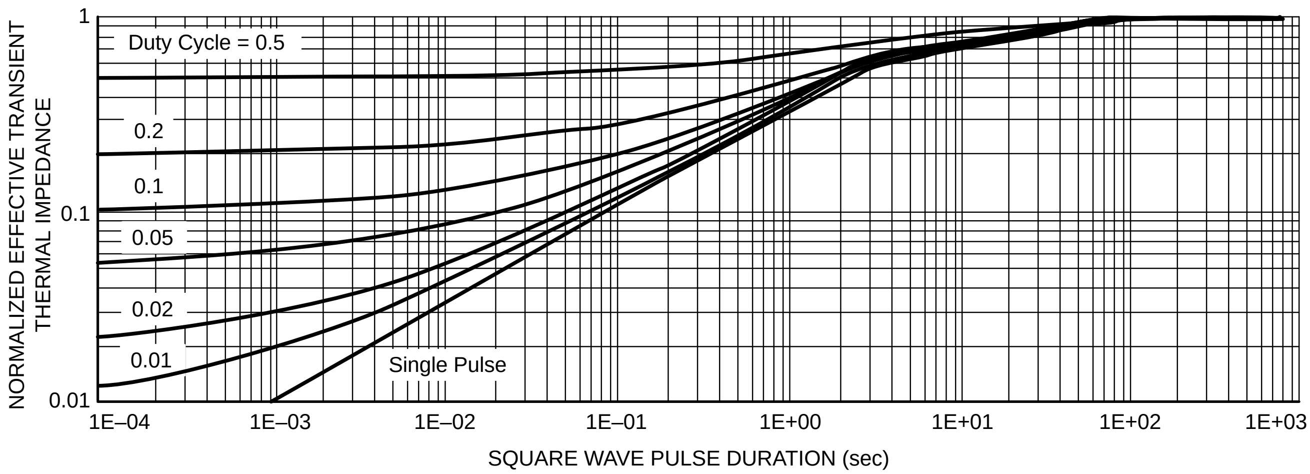
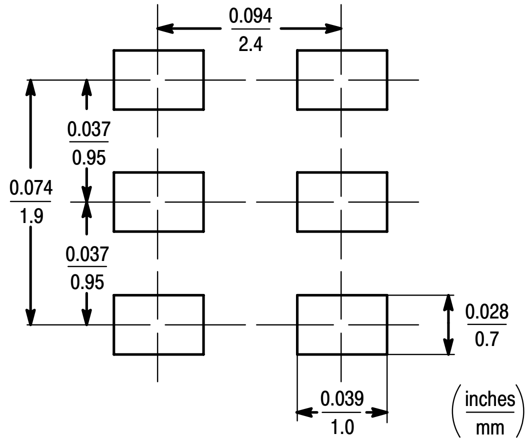


Figure 12. Normalized Thermal Transient Impedance, Junction–to–Ambient

INFORMATION FOR USING THE TSOP−6 SURFACE MOUNT PACKAGE

MINIMUM RECOMMENDED FOOTPRINT FOR SURFACE MOUNTED APPLICATIONS

Surface mount board layout is a critical portion of the total design. The footprint for the semiconductor packages must be the correct size to insure proper solder connection interface between the board and the package. With the correct pad geometry, the packages will self align when subjected to a solder reflow process.



SOLDERING PRECAUTIONS

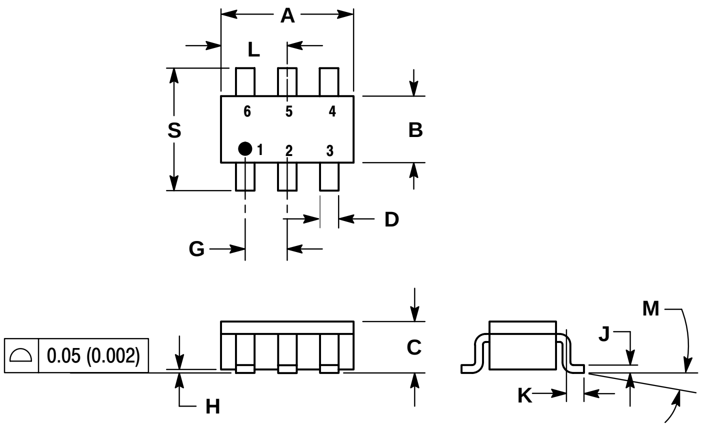
The melting temperature of solder is higher than the rated temperature of the device. When the entire device is heated to a high temperature, failure to complete soldering within a short time could result in device failure. Therefore, the following items should always be observed in order to minimize the thermal stress to which the devices are subjected.

- Always preheat the device.
- The delta temperature between the preheat and soldering should be 100°C or less.*
- When preheating and soldering, the temperature of the leads and the case must not exceed the maximum temperature ratings as shown on the data sheet. When using infrared heating with the reflow soldering method, the difference shall be a maximum of 10°C.
- The soldering temperature and time shall not exceed 260°C for more than 10 seconds.
- When shifting from preheating to soldering, the maximum temperature gradient shall be 5°C or less.
- After soldering has been completed, the device should be allowed to cool naturally for at least three minutes. Gradual cooling should be used as the use of forced cooling will increase the temperature gradient and result in latent failure due to mechanical stress.
- Mechanical stress or shock should not be applied during cooling.

* * Soldering a device without preheating can cause excessive thermal shock and stress which can result in damage to the device.

PACKAGE DIMENSIONS

TSOP–6
CASE 318G–02
ISSUE H



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.

	MILLIMETERS		INCHES	
DIM	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:
PIN 1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DRAIN

PUBLICATION ORDERING INFORMATION

Literature Fulfillment:
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For additional information, please contact your local Sales Representative.