

# NTGS3443, NVGS3443

## Power MOSFET 4.4 Amps, 20 Volts

### P-Channel TSOP-6

#### Features

- Ultra Low  $R_{DS(on)}$
- Higher Efficiency Extending Battery Life
- Miniature TSOP-6 Surface Mount Package
- These Devices are Pb-Free and are RoHS Compliant
- NVGS Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable

#### 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	Volts
Gate-to-Source Voltage - Continuous	$V_{GS}$	$\pm 12$	Volts
Thermal Resistance Junction-to-Ambient (Note 1)	$R_{\theta JA}$	244	$^\circ\text{C}/\text{W}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_d$	0.5	Watts
Drain Current - Continuous @ $T_A = 25^\circ\text{C}$ - Pulsed Drain Current ( $T_p < 10 \mu\text{s}$ )	$I_D$ $I_{DM}$	-2.2 -10	Amps Amps
Thermal Resistance Junction-to-Ambient (Note 2)	$R_{\theta JA}$	128	$^\circ\text{C}/\text{W}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_d$	1.0	Watts
Drain Current - Continuous @ $T_A = 25^\circ\text{C}$ - Pulsed Drain Current ( $T_p < 10 \mu\text{s}$ )	$I_D$ $I_{DM}$	-3.1 -14	Amps Amps
Thermal Resistance Junction-to-Ambient (Note 3)	$R_{\theta JA}$	62.5	$^\circ\text{C}/\text{W}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	$P_d$	2.0	Watts
Drain Current - Continuous @ $T_A = 25^\circ\text{C}$ - Pulsed Drain Current ( $T_p < 10 \mu\text{s}$ )	$I_D$ $I_{DM}$	-4.4 -20	Amps Amps
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	$^\circ\text{C}$

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.

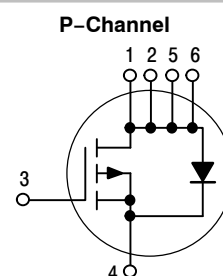
1. Minimum FR-4 or G-10 PCB, operating to steady state.
2. Mounted onto a 2 in square FR-4 board (1 in sq, 2 oz. Cu. 0.06" thick single sided), operating to steady state.
3. Mounted onto a 2 in square FR-4 board (1 in sq, 2 oz. Cu. 0.06" thick single sided),  $t < 5.0$  seconds.



ON Semiconductor®

<http://onsemi.com>

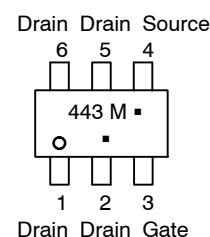
**4.4 AMPERES**  
**20 VOLTS**  
 **$R_{DS(on)} = 65 \text{ m}\Omega$**



#### MARKING DIAGRAM & PIN ASSIGNMENT



TSOP-6  
CASE 318G  
STYLE 1



443 = Specific Device Code  
M = Date Code\*  
□ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation may vary depending upon manufacturing location.

#### ORDERING INFORMATION

Device	Package	Shipping†
NTGS3443T1G	TSOP-6 (Pb-Free)	3000 / Tape & Reel
NVGS3443T1G	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.

# NTGS3443, NVGS3443

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted) (Notes 4 & 5)

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

### OFF CHARACTERISTICS

Drain-Source Breakdown Voltage ( $V_{GS} = 0\text{ Vdc}$ , $I_D = -10\ \mu\text{A}$ )	$V_{(BR)DSS}$	-20	-	-	Vdc
Zero Gate Voltage Drain Current ( $V_{GS} = 0\text{ Vdc}$ , $V_{DS} = -20\text{ Vdc}$ , $T_J = 25^\circ\text{C}$ ) ( $V_{GS} = 0\text{ Vdc}$ , $V_{DS} = -20\text{ Vdc}$ , $T_J = 70^\circ\text{C}$ )	$I_{DSS}$	-	-	-1.0 -5.0	$\mu\text{Adc}$
Gate-Body Leakage Current ( $V_{GS} = -12\text{ Vdc}$ , $V_{DS} = 0\text{ Vdc}$ )	$I_{GSS}$	-	-	-100	nAdc
Gate-Body Leakage Current ( $V_{GS} = +12\text{ Vdc}$ , $V_{DS} = 0\text{ Vdc}$ )	$I_{GSS}$	-	-	100	nAdc

### ON CHARACTERISTICS

Gate Threshold Voltage ( $V_{DS} = V_{GS}$ , $I_D = -250\ \mu\text{Adc}$ )	$V_{GS(th)}$	-0.60	-0.95	-1.50	Vdc
Static Drain-Source On-State Resistance ( $V_{GS} = -4.5\text{ Vdc}$ , $I_D = -4.4\text{ Adc}$ ) ( $V_{GS} = -2.7\text{ Vdc}$ , $I_D = -3.7\text{ Adc}$ ) ( $V_{GS} = -2.5\text{ Vdc}$ , $I_D = -3.5\text{ Adc}$ )	$R_{DS(on)}$	-	0.058 0.082 0.092	0.065 0.090 0.100	$\Omega$
Forward Transconductance ( $V_{DS} = -10\text{ Vdc}$ , $I_D = -4.4\text{ Adc}$ )	$g_{FS}$	-	8.8	-	mhos

### DYNAMIC CHARACTERISTICS

Input Capacitance	$(V_{DS} = -5.0\text{ Vdc}$ , $V_{GS} = 0\text{ Vdc}$ , $f = 1.0\text{ MHz}$ )	$C_{iss}$	-	565	-	pF
Output Capacitance		$C_{oss}$	-	320	-	pF
Reverse Transfer Capacitance		$C_{rss}$	-	120	-	pF

### SWITCHING CHARACTERISTICS

Turn-On Delay Time	$(V_{DD} = -20\text{ Vdc}$ , $I_D = -1.0\text{ Adc}$ , $V_{GS} = -4.5\text{ Vdc}$ , $R_g = 6.0\ \Omega$ )	$t_{d(on)}$	-	10	25	ns
Rise Time		$t_r$	-	18	45	ns
Turn-Off Delay Time		$t_{d(off)}$	-	30	50	ns
Fall Time		$t_f$	-	31	50	ns
Total Gate Charge	$(V_{DS} = -10\text{ Vdc}$ , $V_{GS} = -4.5\text{ Vdc}$ , $I_D = -4.4\text{ Adc}$ )	$Q_{tot}$	-	7.5	15	nC
Gate-Source Charge		$Q_{gs}$	-	1.4	-	nC
Gate-Drain Charge		$Q_{gd}$	-	2.9	-	nC

### BODY-DRAIN DIODE RATINGS

Diode Forward On-Voltage	$(I_S = -1.7\text{ Adc}$ , $V_{GS} = 0\text{ Vdc}$ )	$V_{SD}$	-	-0.83	-1.2	Vdc
Reverse Recovery Time	$(I_S = -1.7\text{ Adc}$ , $dI_S/dt = 100\text{ A}/\mu\text{s}$ )	$t_{rr}$	-	30	-	ns

4. Indicates Pulse Test: P.W. = 300  $\mu\text{sec}$  max, Duty Cycle = 2%.
5. Handling precautions to protect against electrostatic discharge are mandatory.

TYPICAL ELECTRICAL CHARACTERISTICS

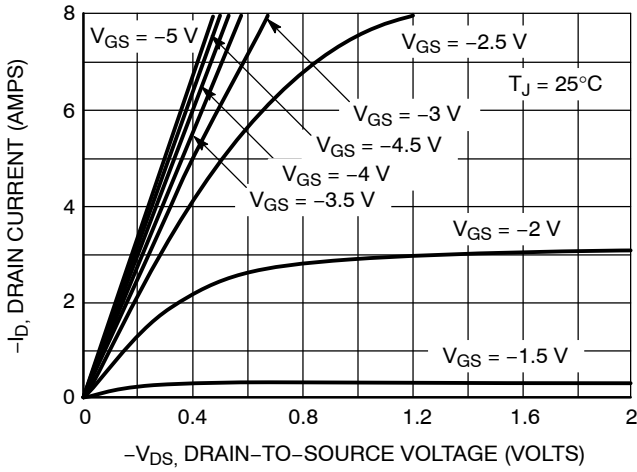


Figure 1. On-Region Characteristics

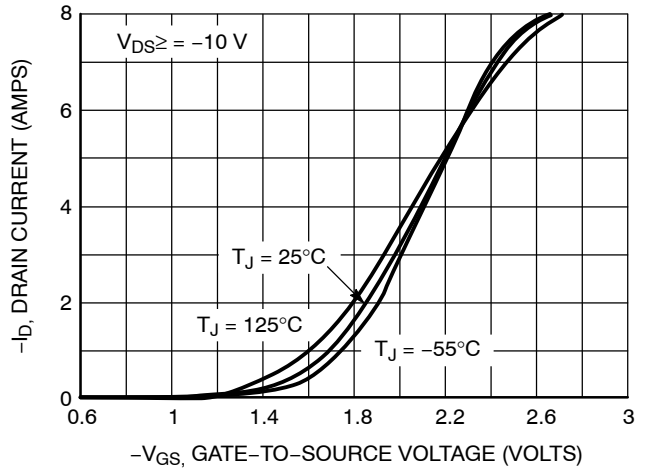


Figure 2. Transfer Characteristics

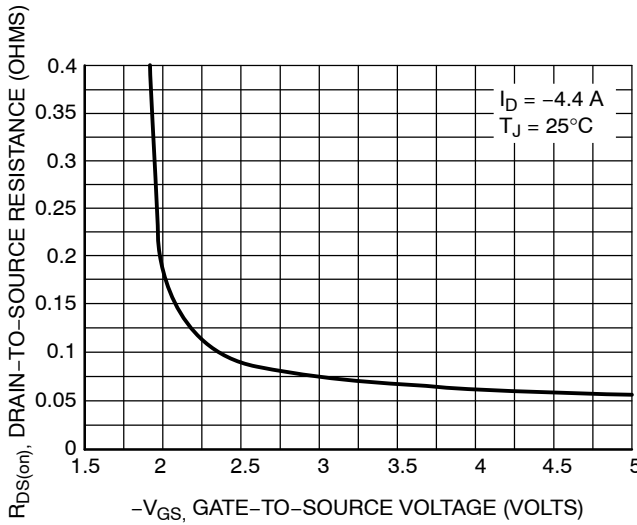


Figure 3. On-Resistance vs. Gate-to-Source Voltage

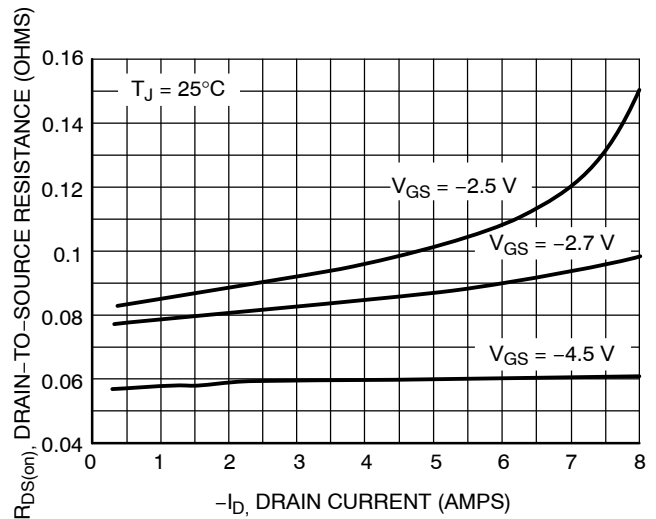


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

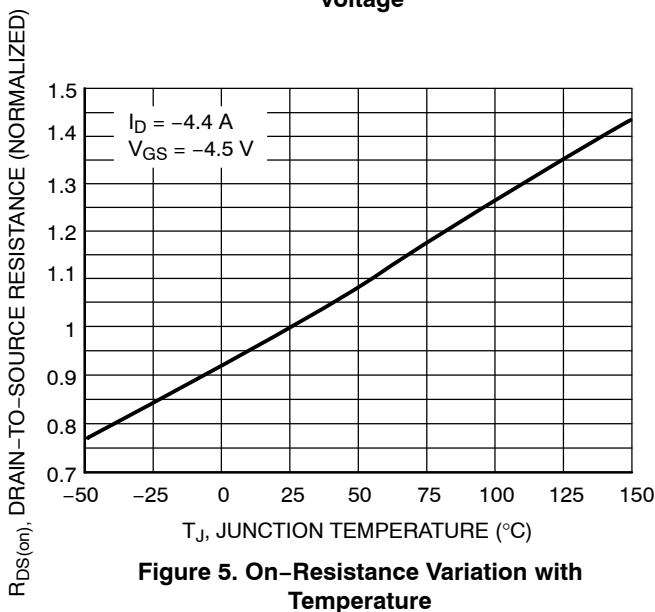


Figure 5. On-Resistance Variation with Temperature

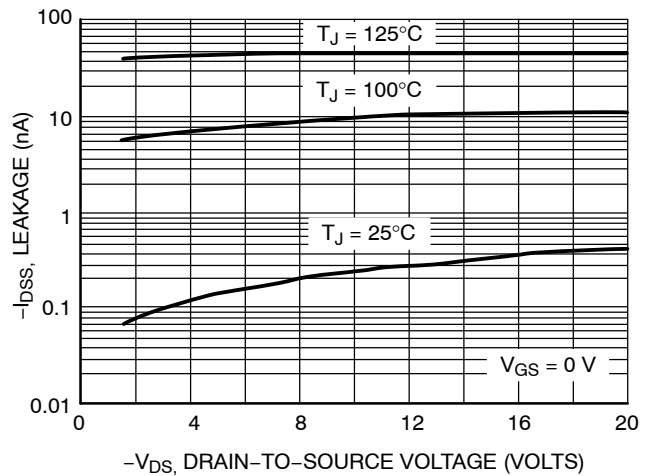


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL ELECTRICAL CHARACTERISTICS

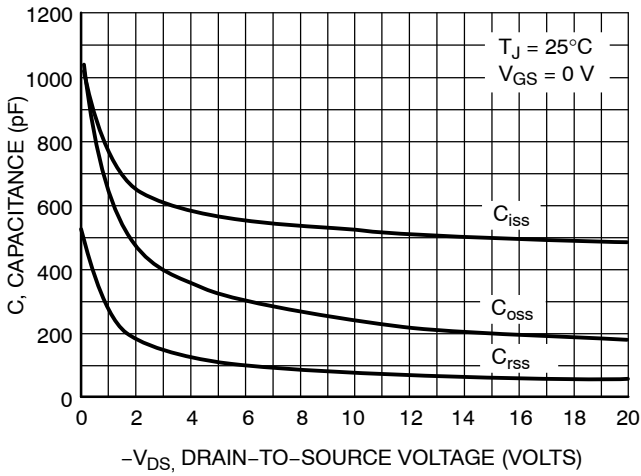


Figure 7. Capacitance Variation

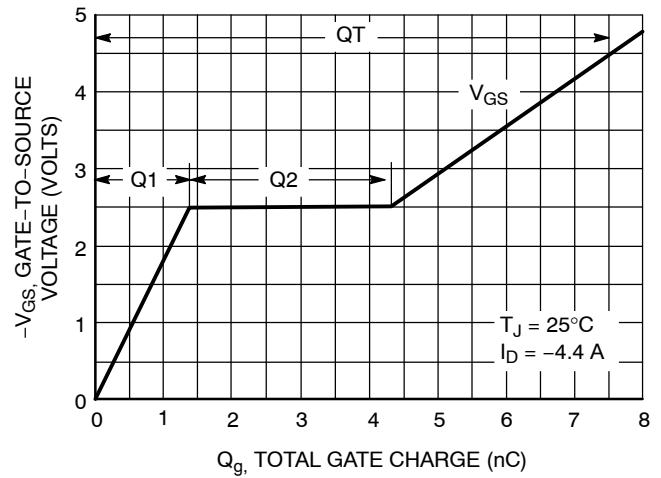


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

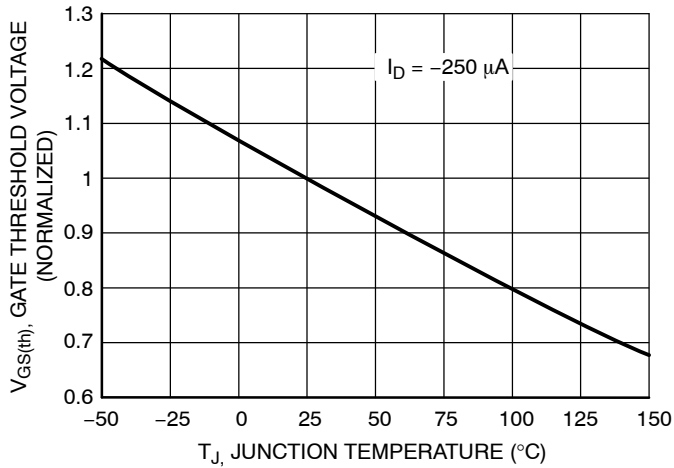


Figure 9. Gate Threshold Voltage Variation with Temperature

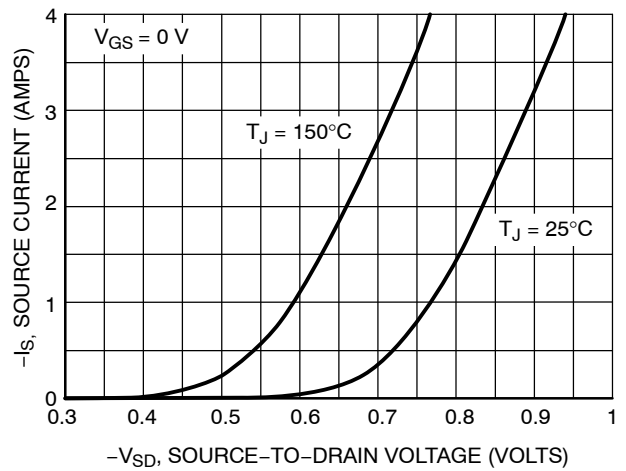


Figure 10. Diode Forward Voltage vs. Current

# NTGS3443, NVGS3443

## TYPICAL ELECTRICAL CHARACTERISTICS

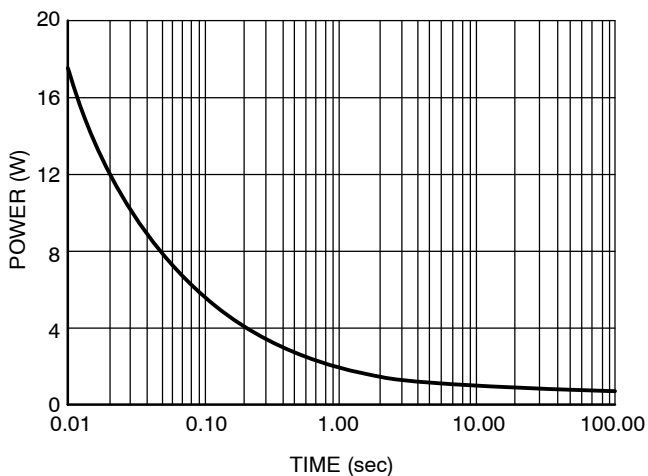


Figure 11. Single Pulse Power

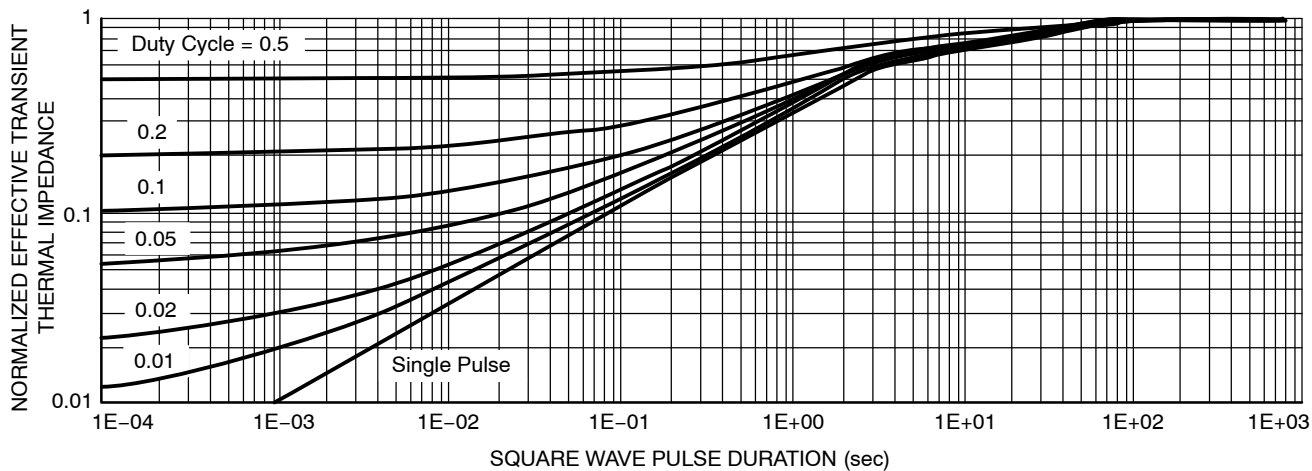
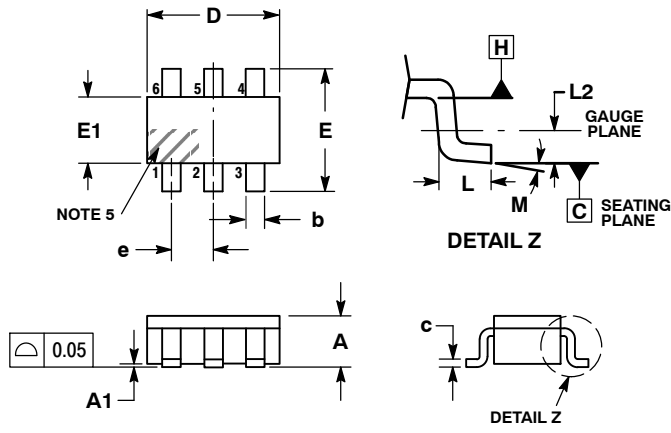


Figure 12. Normalized Thermal Transient Impedance, Junction-to-Ambient

# NTGS3443, NVGS3443

## PACKAGE DIMENSIONS

### TSOP-6 CASE 318G-02 ISSUE V

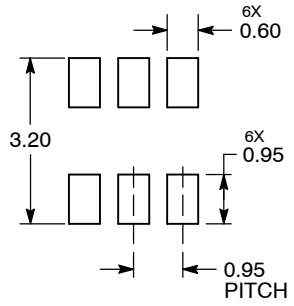


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
  2. CONTROLLING DIMENSION: MILLIMETERS.
  3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
  4. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15 PER SIDE. DIMENSIONS D AND E1 ARE DETERMINED AT DATUM H.
  5. PIN ONE INDICATOR MUST BE LOCATED IN THE INDICATED ZONE.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.90	1.00	1.10
A1	0.01	0.06	0.10
b	0.25	0.38	0.50
c	0.10	0.18	0.26
D	2.90	3.00	3.10
E	2.50	2.75	3.00
E1	1.30	1.50	1.70
e	0.85	0.95	1.05
L	0.20	0.40	0.60
L2	0.25 BSC		
M	0°	-	10°

- STYLE 1:  
 PIN 1: DRAIN  
 2: DRAIN  
 3: GATE  
 4: SOURCE  
 5: DRAIN  
 6: DRAIN

### RECOMMENDED SOLDERING FOOTPRINT\*



DIMENSIONS: MILLIMETERS

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

**ON Semiconductor** and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of SCILLC's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

### PUBLICATION ORDERING INFORMATION

**LITERATURE FULFILLMENT:**  
 Literature Distribution Center for ON Semiconductor  
 P.O. Box 5163, Denver, Colorado 80217 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**N. American Technical Support:** 800-282-9855 Toll Free  
 USA/Canada  
**Europe, Middle East and Africa Technical Support:**  
 Phone: 421 33 790 2910  
**Japan Customer Focus Center**  
 Phone: 81-3-5817-1050

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)  
**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative