

NVGS4141N

Product Preview

Power MOSFET

30 V, 7.7 A, Single N-Channel, TSOP-6

Features

- Low $R_{DS(on)}$
- Low Gate Charge
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR-Free and are RoHS Compliant

Applications

- Load Switch
- Notebook PC
- Desktop PC

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

Rating			Symbol	Value	Unit
Drain-to-Source Voltage			V_{DS}	30	V
Gate-to-Source Voltage			V_{GS}	± 20	V
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	I_D	5.4	A
		$T_A = 85^\circ\text{C}$		4.2	
	$t \leq 10$ s	$T_A = 25^\circ\text{C}$		7.7	
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	P_D	1.2	W
		$t \leq 10$ s		2.4	
Continuous Drain Current (Note 2)	Steady State	$T_A = 25^\circ\text{C}$	I_D	3.8	A
		$T_A = 85^\circ\text{C}$		3.0	
Power Dissipation (Note 2)		$T_A = 25^\circ\text{C}$	P_D	0.61	W
Pulsed Drain Current	$t_p = 10$ μs , $V_{GS} = 10\text{V}$		I_{DM}	22	A
Operating Junction and Storage Temperature			T_J , T_{STG}	-55 to 175	$^\circ\text{C}$
Source Current (Body Diode)			I_S	1.2	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	$^\circ\text{C}$

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

Rating	Symbol	Max	Unit
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	125	$^\circ\text{C/W}$
Junction-to-Ambient – $t \leq 10$ s (Note 1)	$R_{\theta JA}$	62.5	
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	248	

1. Surface-mounted on FR4 board using 1 inch sq pad size (Cu area = 1.127 in sq [1 oz] including traces).
2. Surface-mounted on FR4 board using the minimum recommended pad size (Cu area = 0.0773 in sq).

This document contains information on a product under development. ON Semiconductor reserves the right to change or discontinue this product without notice.

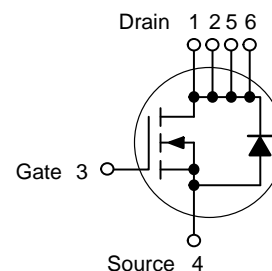


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$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
30 V	21.5 m Ω @ 10 V	7.7 A
	30 m Ω @ 4.5 V	

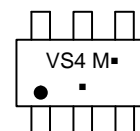
N-Channel



MARKING DIAGRAM

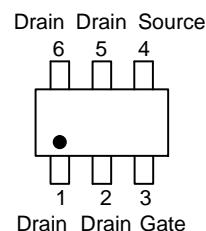


TSOP-6
CASE 318G
STYLE 1



VS4 = Device Code
M = Date Code
▪ = Pb-Free Package
(Note: Microdot may be in either location)

PIN ASSIGNMENT



ORDERING INFORMATION

Device	Package	Shipping†
NVGS4141NT1G	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 Specification Brochure, BRD8011/D.

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ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J			18.4		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = 24 V	T _J = 25°C		1.0	μA
			T _J = 125°C		10	
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±100	nA

ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 250 μA	1.0		3.0	V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J			5.7		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 7.0 A		21.5	25	mΩ
		V _{GS} = 4.5 V, I _D = 6.0 A		30	35	
Forward Transconductance	g _{FS}	V _{DS} = 10 V, I _D = 7.0 A		30		S

CHARGES, CAPACITANCES AND GATE RESISTANCE

Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = 24 V		560		pF
Output Capacitance	C _{OSS}			115		
Reverse Transfer Capacitance	C _{RSS}			75		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 15 V, I _D = 7.0 A		12		nC
Threshold Gate Charge	Q _{G(TH)}			0.85		
Gate-to-Source Charge	Q _{GS}			1.9		
Gate-to-Drain Charge	Q _{GD}			3.0		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 4.5 V, V _{DS} = 15 V, I _D = 7.0 A		6.0		nC
Threshold Gate Charge	Q _{G(TH)}			0.8		
Gate-to-Source Charge	Q _{GS}			1.85		
Gate-to-Drain Charge	Q _{GD}			3.0		
Gate Resistance	R _G			2.8		Ω

SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	t _{d(ON)}	V _{GS} = 10 V, V _{DS} = 24 V, I _D = 7.0 A, R _G = 3.0 Ω		6.0		ns
Rise Time	t _r			15		
Turn-Off Delay Time	t _{d(OFF)}			18		
Fall Time	t _f			4.0		

DRAIN - SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = 2.0 A	T _J = 25°C	0.78	1.0	V
			T _J = 125°C	0.63		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V di _S /dt = 100 A/μs, I _S = 2.0 A		15		ns
Charge Time	t _a			9.0		
Discharge Time	t _b			6.0		
Reverse Recovery Charge	Q _{RR}			8.0		

- Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
- Switching characteristics are independent of operating junction temperatures.

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TYPICAL PERFORMANCE CURVES

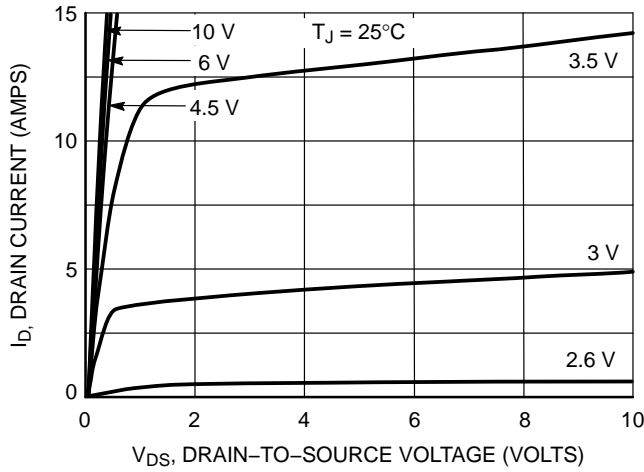


Figure 1. On-Region Characteristics

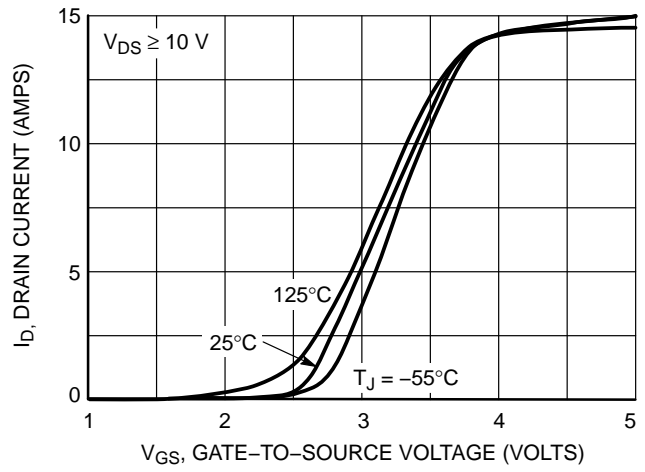


Figure 2. Transfer Characteristics

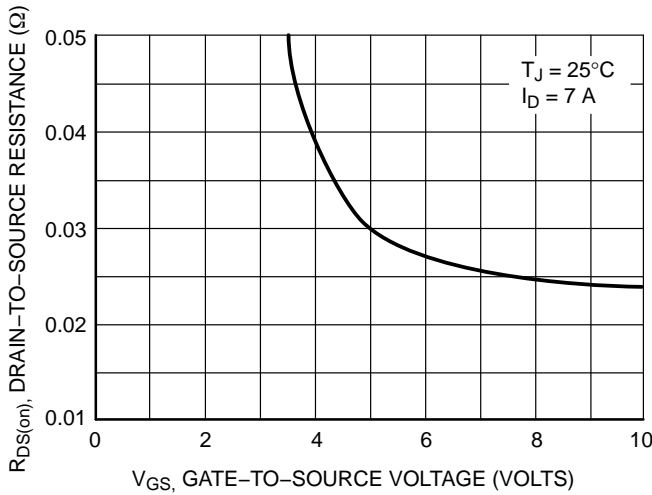


Figure 3. On-Resistance vs. Gate-to-Source Voltage

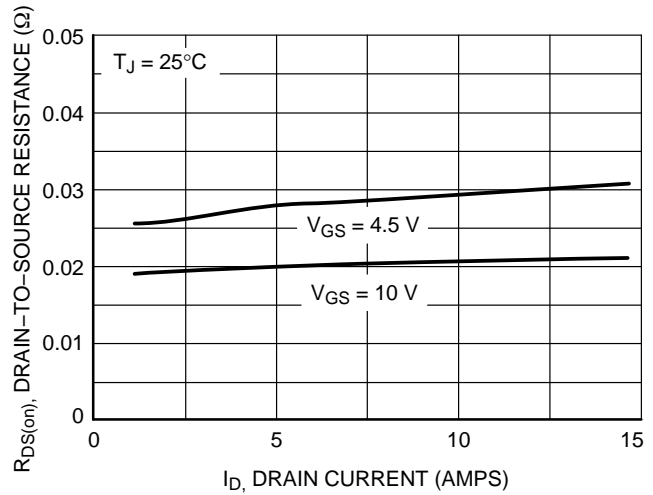


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

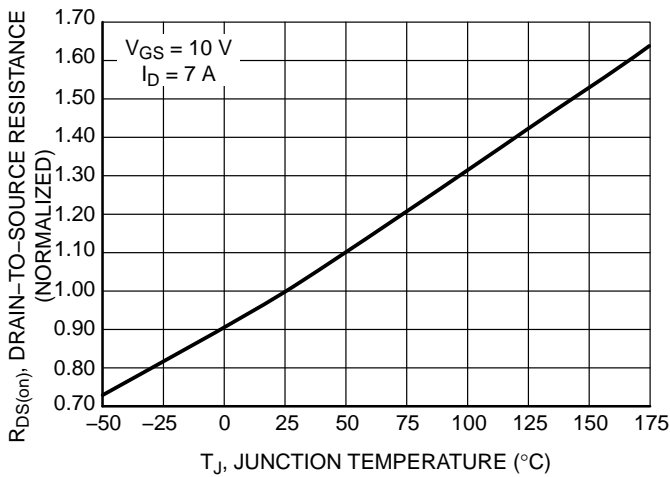


Figure 5. On-Resistance Variation with Temperature

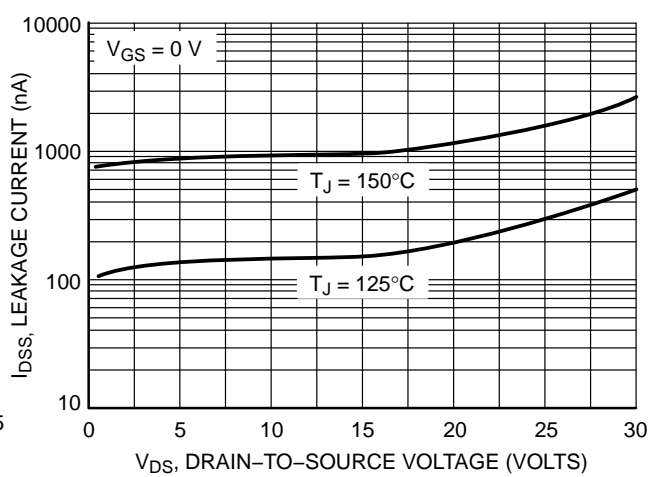
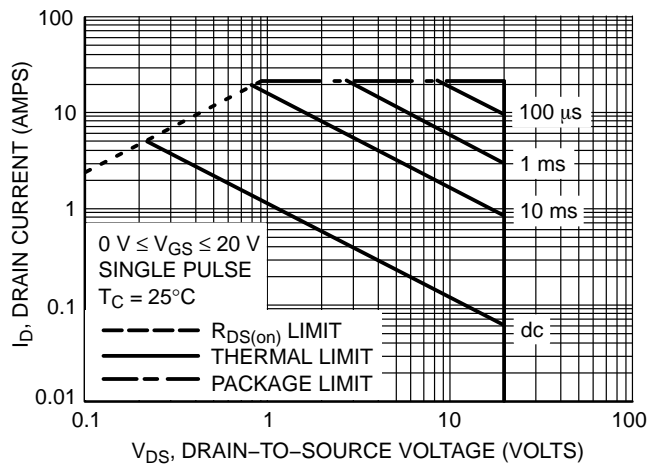
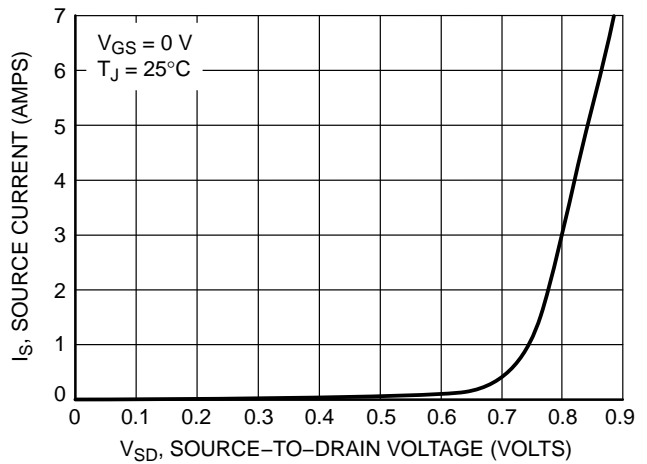
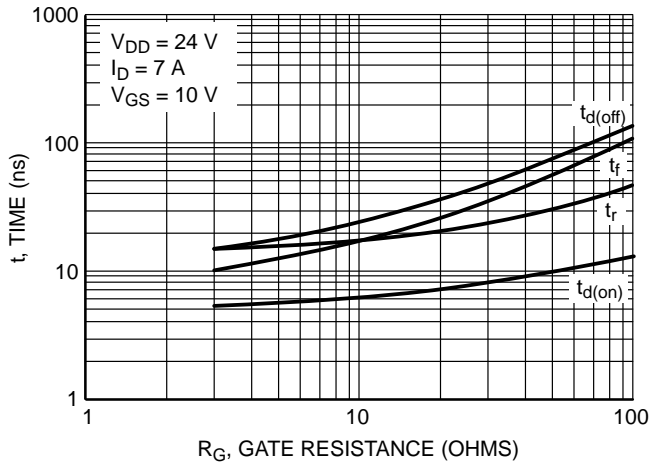
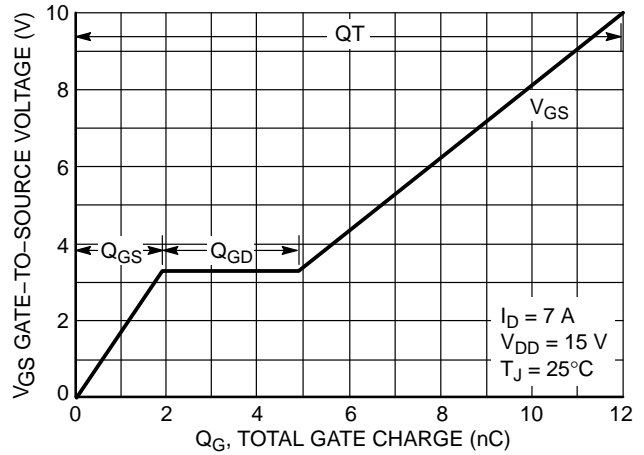
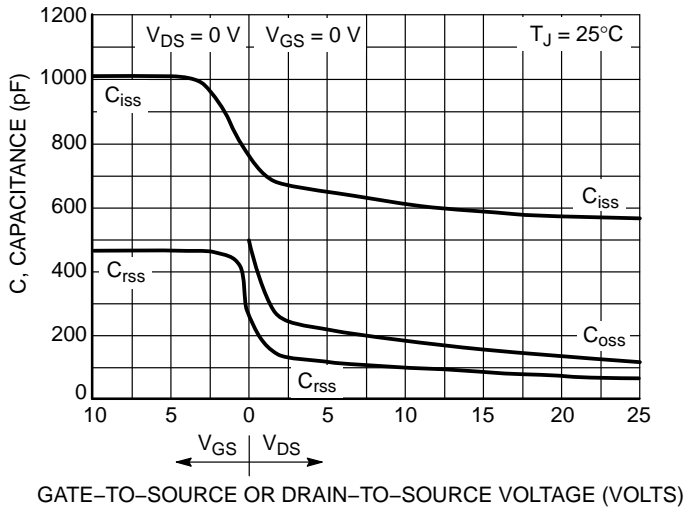


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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TYPICAL PERFORMANCE CURVES



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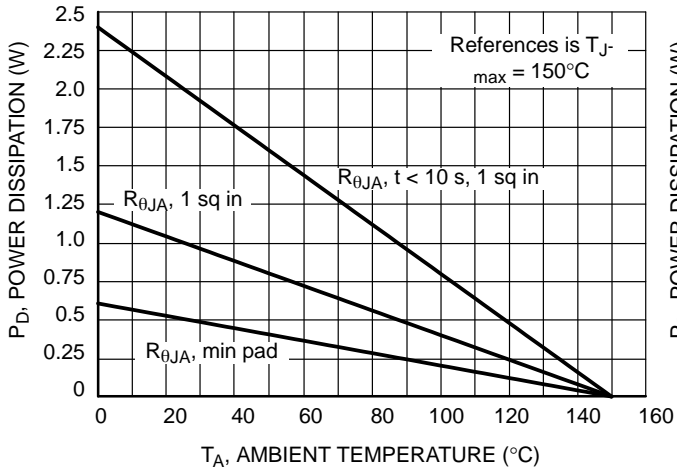


Figure 12. Maximum Power Derating Chart

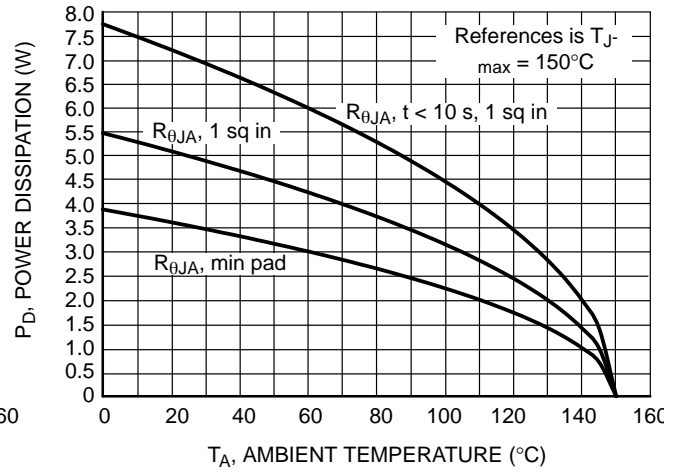


Figure 13. Current Derating Chart

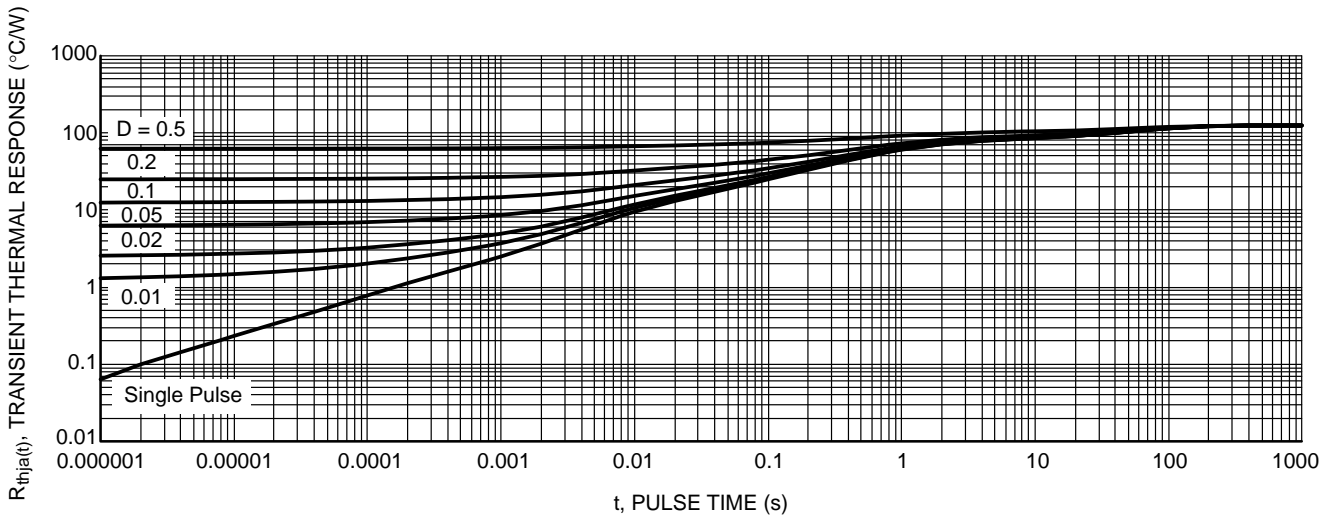
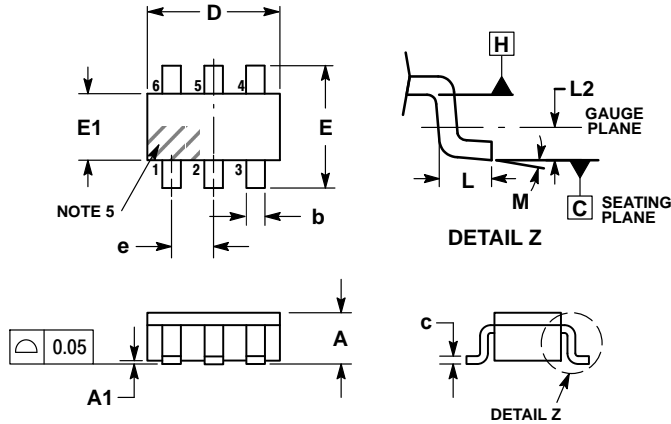


Figure 14. Thermal Response

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PACKAGE DIMENSIONS

TSOP-6 CASE 318G-02 ISSUE V



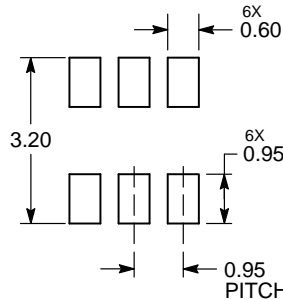
NOTES:

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.

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