NTS4173P

Power MOSFET

−30 V, −1.3 A, Single P−Channel, SC−70

Features

- −30 V BV_{ds}, Low $R_{DS(on)}$ in SC−70 Package
- Low Threshold Voltage
- Fast Switching Speed
- This is a Halide−Free Device
- This is a Pb−Free Device

Applications

- Load Switch
- Low Current Inverter and DC−DC Converters
- Power Switch for Printers, Communication Equipment

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

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	−30	V
Gate−to−Source Voltage			V_{GS}	±12	V
Continuous Drain Current (Note 1)	Steady State	T_A = 25°C	I_D	−1.2	A
		T_A = 85°C		−0.80	
	t ≤ 5 s	T_A = 25°C		−1.3	
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	0.29	W
	t ≤ 5 s			0.35	
Pulsed Drain Current	t_p = 10 μs		I_{DM}	−5.0	A
Operating Junction and Storage Temperature			T_J, T_{stg}	−55 to 150	°C
Source Current (Body Diode)			I_S	−1.0	A
Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)			T_L	260	°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.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction−to−Ambient − Steady State (Note 1)	$R_{\theta JA}$	425	°C/W
Junction−to−Ambient − t ≤ 5 s (Note 1)	$R_{\theta JA}$	360	

1. Surface−mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces)

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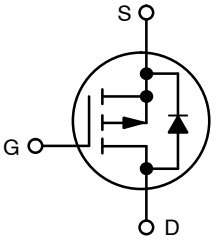
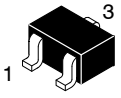
$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
−30 V	150 mΩ @ −10 V	−1.2 A
	200 mΩ @ −4.5 V	−1.0 A
	280 mΩ @ −2.5 V	−0.9 A

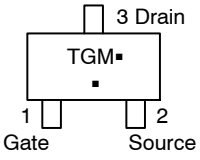
SC−70/SOT−323 (3 LEADS)





SC−70/SOT−323
CASE 419
STYLE 8

MARKING DIAGRAM/ PIN ASSIGNMENT



TG = Specific Device Code
M = Date Code*
▪ = Pb−Free Package
(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
NTS4173PT1G	SC−70 (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.

* Date code orientation may vary depending upon manufacturing location

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
OFF CHARACTERISTICS						
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = −250 μA	−30			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = −24 V, T_J = 25°C V_{GS} = 0 V, V_{DS} = −24 V, T_J = 85°C			−1.0 −5.0	μA
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±12 V			±0.1	μA
ON CHARACTERISTICS (Note 3)						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = −250 μA	−0.7	−1.15	−1.5	V
Drain−to−Source On−Resistance	$R_{DS(on)}$	V_{GS} = −10 V, I_D = −1.2 A		90	150	mΩ
		V_{GS} = −4.5 V, I_D = −1.0 A		110	200	
		V_{GS} = −2.5 V, I_D = −0.9 A		165	280	
Forward Transconductance	g_{FS}	V_{DS} = −5 V, I_D = −1.2 A		3.6		S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C_{iss}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = −15 V		430		pF
Output Capacitance	C_{oss}			55		
Reverse Transfer Capacitance	C_{rss}			40		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = −4.5 V, V_{DS} = −15 V, I_D = −1.2 A		4.8		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.6		
Gate−to−Source Charge	Q_{GS}			1.1		
Gate−to−Drain Charge	Q_{GD}			1.5		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = −10 V, V_{DS} = −15 V, I_D = −1.2 A		10.1		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.6		
Gate−to−Source Charge	Q_{GS}			1.1		
Gate−to−Drain Charge	Q_{GD}			1.5		
SWITCHING CHARACTERISTICS (Note 4)						
Turn−On Delay Time	$t_{d(on)}$	V_{GS} = −4.5 V, V_{DS} = −15 V, I_D = −1.2 A, R_G = 3 Ω		7.7		ns
Rise Time	t_r			5.2		
Turn−Off Delay Time	$t_{d(off)}$			16.2		
Fall Time	t_f			6.7		
Turn−On Delay Time	$t_{d(on)}$	V_{GS} = −10 V, V_{DS} = −15 V, I_D = −1.2 A, R_G = 3 Ω		5.3		ns
Rise Time	t_r			6.7		
Turn−Off Delay Time	$t_{d(off)}$			19.9		
Fall Time	t_f			7.1		
DRAIN−SOURCE DIODE CHARACTERISTICS						
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = −1.0 A		−0.8	−1.0	V
Reverse Recovery Time	t_{RR}	V_{DS} = 20 V, V_{GS} = 0 V, I_S = −1.0 A, dI_{SD}/d_t = 100 A/μs		12		ns
Charge Time	t_a			10		
Discharge Time	t_b			2.0		
Reverse Recovery Charge	Q_{RR}			7.0		nC

2. Surface−mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces)
3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%
4. Switching characteristics are independent of operating junction temperatures

TYPICAL CHARACTERISTICS

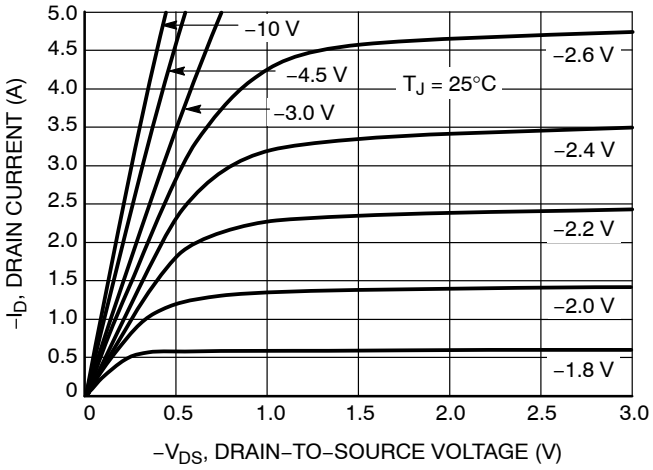


Figure 1. On−Region Characteristics

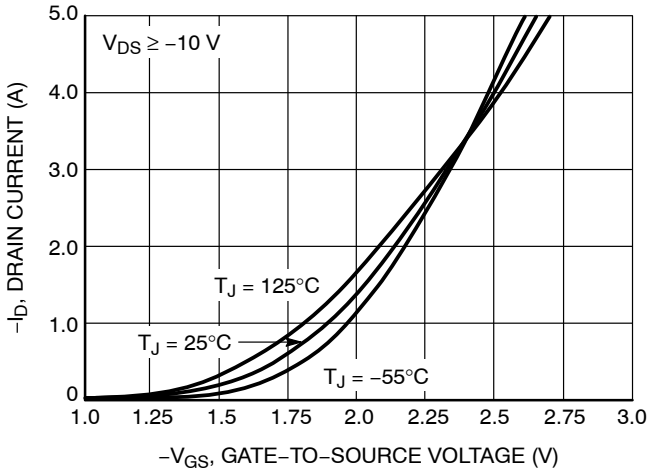


Figure 2. Transfer Characteristics

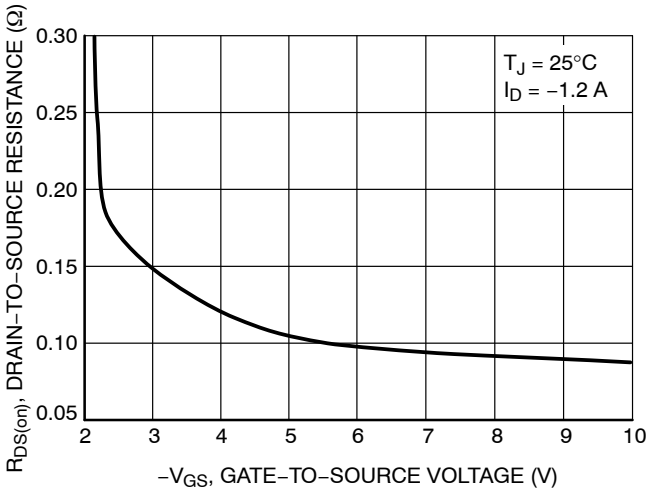


Figure 3. On−Resistance vs. Gate Voltage

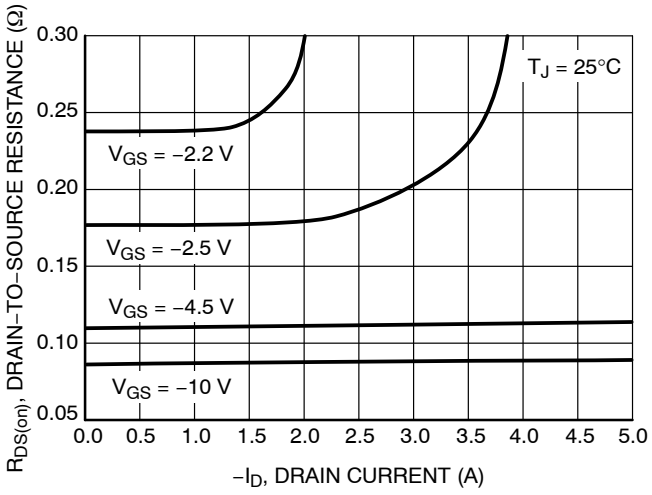


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

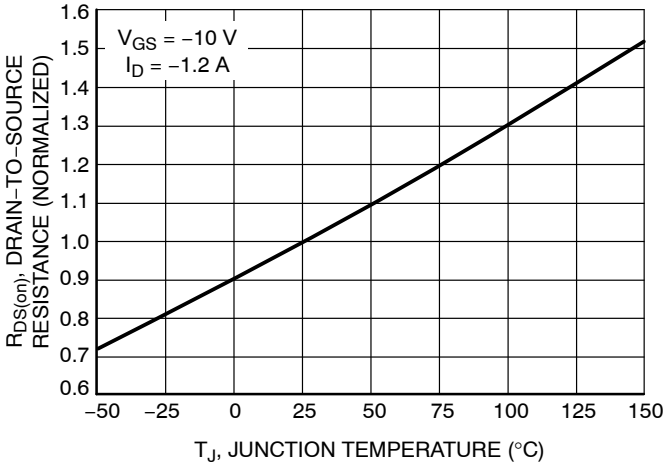


Figure 5. On−Resistance Variation with Temperature

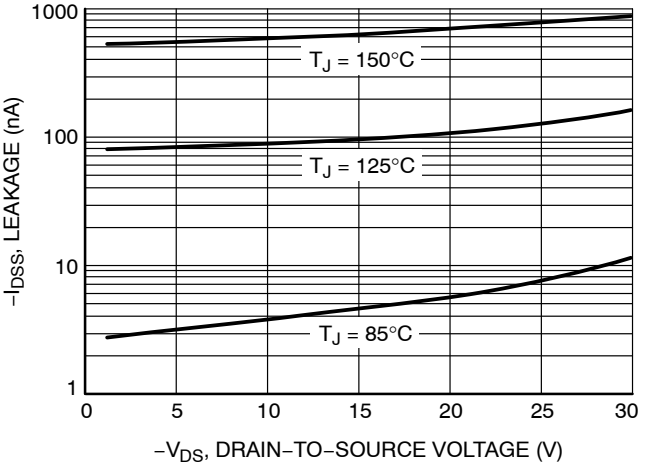


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

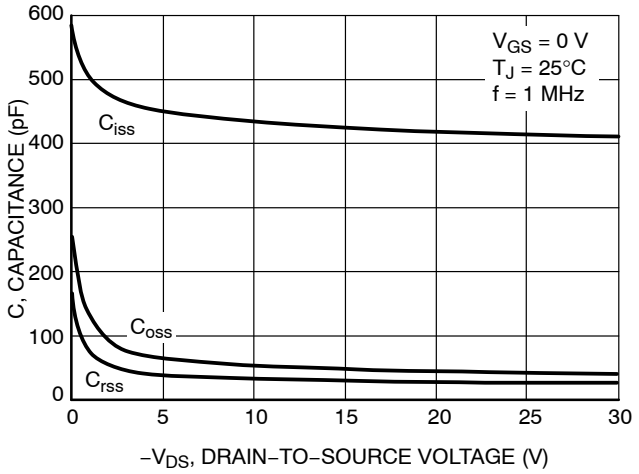


Figure 7. Capacitance Variation

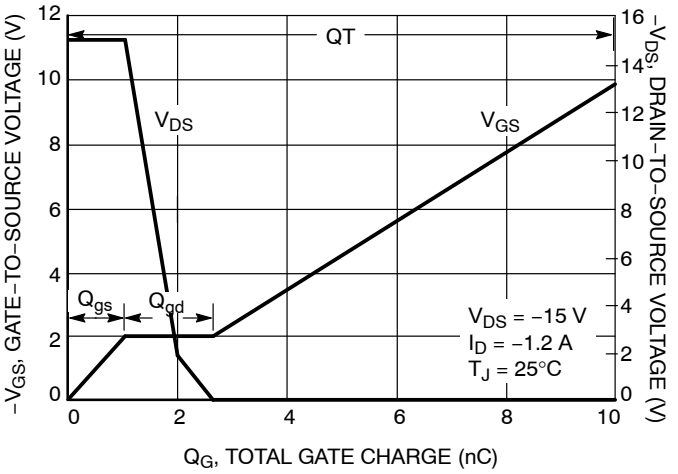


Figure 8. Gate−to−Source Voltage vs. Total Charge

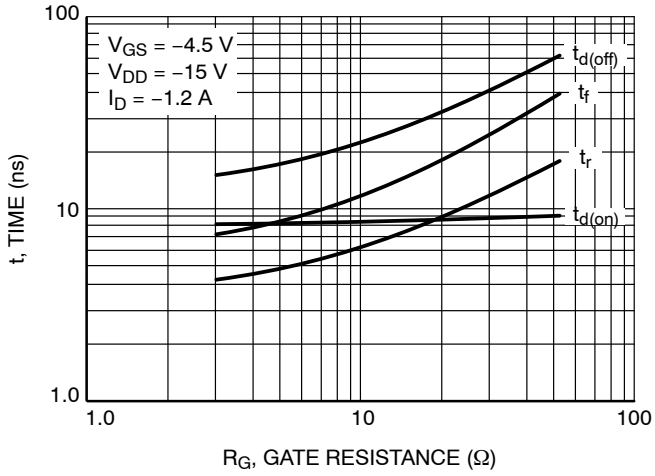


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

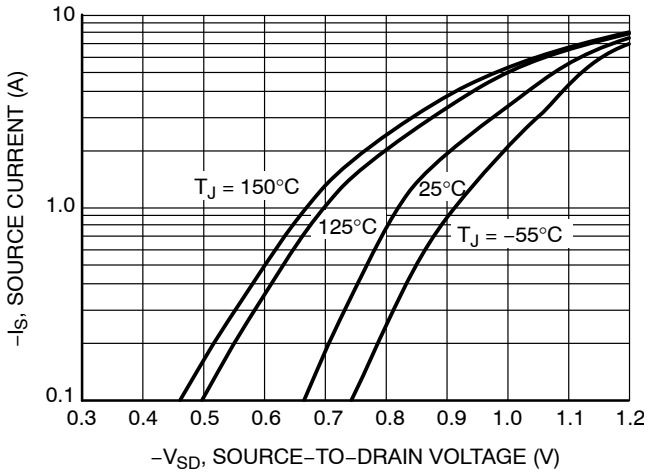


Figure 10. Diode Forward Voltage vs. Current

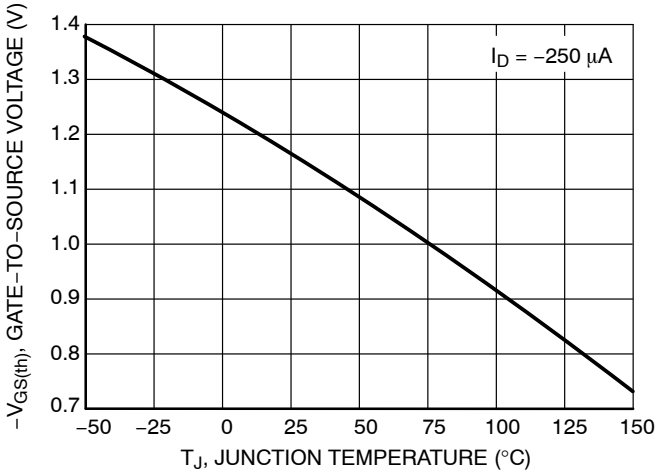


Figure 11. Threshold Voltage

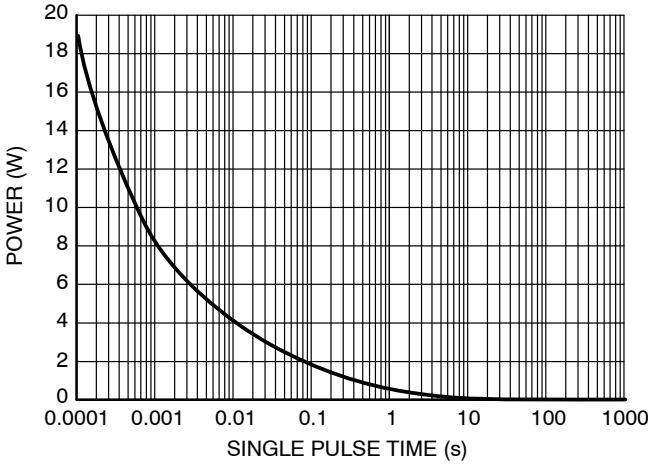


Figure 12. Single Pulse Maximum Power Dissipation

TYPICAL PERFORMANCE CURVES

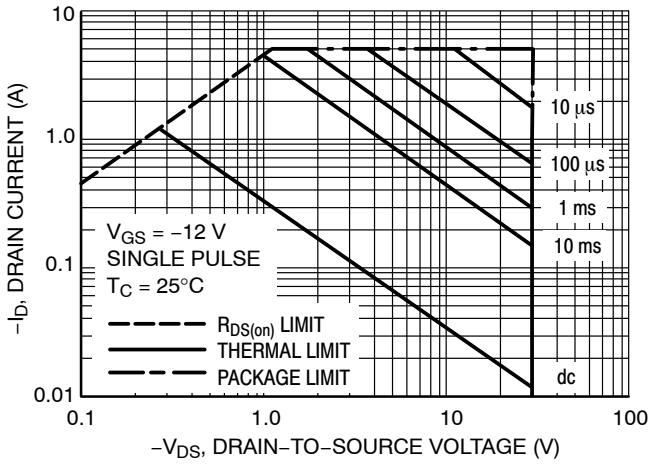


Figure 13. Maximum Rated Forward Biased Safe Operating Area

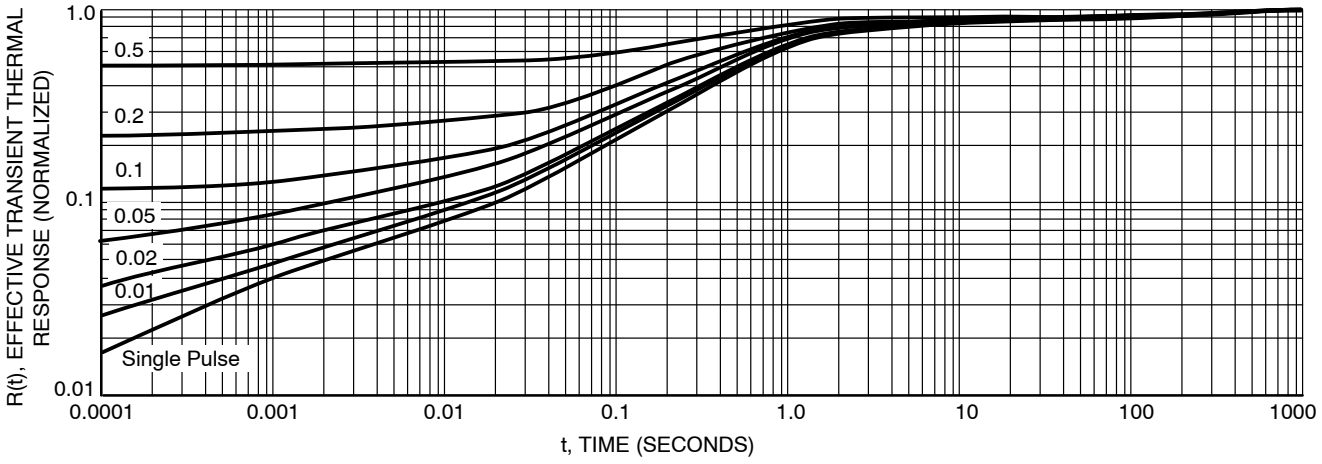
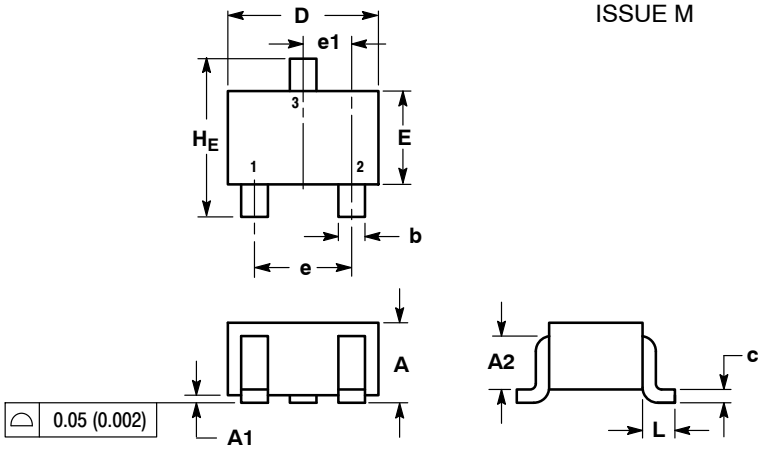


Figure 14. FET Thermal Response

PACKAGE DIMENSIONS

SC−70 (SOT−323)
CASE 419−04
ISSUE M

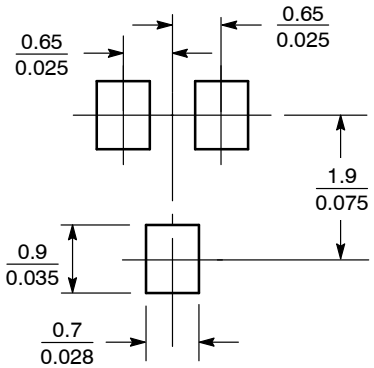


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.90	1.00	0.032	0.035	0.040
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2		0.7 REF			0.028 REF	
b	0.30	0.35	0.40	0.012	0.014	0.016
c	0.10	0.18	0.25	0.004	0.007	0.010
D	1.80	2.10	2.20	0.071	0.083	0.087
E	1.15	1.24	1.35	0.045	0.049	0.053
e	1.20	1.30	1.40	0.047	0.051	0.055
e1		0.65 BSC			0.026 BSC	
L		0.425 REF			0.017 REF	
H_E	2.00	2.10	2.40	0.079	0.083	0.095

STYLE 8:
PIN 1. GATE
2. SOURCE
3. DRAIN

SOLDERING FOOTPRINT*



SCALE 10:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
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