

MOSFET – Small Signal, Single P-Channel, XLLGA3 -30 V, -130 mA



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NTNS41006PZ

Features

- Single P-Channel MOSFET
- Ultra Small and Thin Package (0.62 x 0.62 x 0.4 mm)
- Low $R_{DS(on)}$ Solution in 0.62 x 0.62 mm Package
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- Small Signal Load Switch
- Analog Switch
- High Speed Interfacing
- Optimized for Power Management in Ultra Portable Products

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

Parameter		Symbol	Value	Units	
Drain-to-Source Voltage		V_{DSS}	-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	-137	mA
				$T_A = 85^\circ\text{C}$	
	$t \leq 5 \text{ s}$	$T_A = 25^\circ\text{C}$	-148		
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	P_D	121	mW
				$T_A = 25^\circ\text{C}$	
	$t \leq 5 \text{ s}$	$T_A = 25^\circ\text{C}$			
Pulsed Drain Current		$t_p = 10 \mu\text{s}$	I_{DM}	-550	mA
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to 150		$^\circ\text{C}$
Source Current (Body Diode)		I_S	-137		mA
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

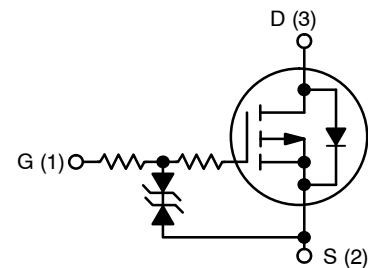
Parameter	Symbol	Max	Units
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	1035	$^\circ\text{C}/\text{W}$
Junction-to-Ambient – $t \leq 5 \text{ s}$ (Note 1)	$R_{\theta JA}$	895	

1. Surface Mounted on FR4 Board using the minimum recommended pad size, (or 2 mm²), 1 oz Cu.
2. Pulse Test: pulse width $\leq 300 \mu\text{s}$, duty cycle $\leq 2\%$.

MOSFET

$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
-30 V	4.0 Ω @ -10 V	-130 mA
	7.0 Ω @ -4.5 V	

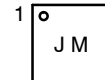
P-Channel MOSFET



MARKING DIAGRAM



XLLGA3
CASE 713AA



J = Specific Device Code
M = Date Code

ORDERING INFORMATION

Device	Package	Shipping†
NTNS41006PZTCG	XLLGA3 (Pb-Free)	8000 / 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.

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ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = -250\ \mu\text{A}$	-30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	$I_D = -250\ \mu\text{A}$, ref to 25°C		32		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}, V_{DS} = -24\text{ V}$ $T_J = 25^\circ\text{C}$			-1.0	μA
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 12\text{ V}$			± 2.0	μA

ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = -250\ \mu\text{A}$	-1.0		-3.0	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			4.0		mV/ $^\circ\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -100\text{ mA}$		2.1	4.0	Ω
		$V_{GS} = -4.5\text{ V}, I_D = -50\text{ mA}$		3.3	7.0	
Forward Transconductance	g_{FS}	$V_{DS} = -5\text{ V}, I_D = -50\text{ mA}$		0.14		S
Source-Drain Diode Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = -50\text{ mA}$		-0.8	-1.0	V

CHARGES & CAPACITANCES

Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, f = 10\text{ kHz}, V_{DS} = -15\text{ V}$		9.1		pF
Output Capacitance	C_{OSS}			3.2		
Reverse Transfer Capacitance	C_{RSS}			1.9		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -10\text{ V}, V_{DS} = -15\text{ V}, I_D = -100\text{ mA}$		1.4		nC
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -4.5\text{ V}, V_{DS} = -15\text{ V}, I_D = -100\text{ mA}$		0.7		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.3		
Gate-to-Source Charge	Q_{GS}			0.4		
Gate-to-Drain Charge	Q_{GD}			0.1		

SWITCHING CHARACTERISTICS, $V_{GS} = -10\text{ V}$ (Note 3)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = -10\text{ V}, V_{DD} = -15\text{ V}, I_D = -100\text{ mA}, R_G = 2\ \Omega$		22.5		ns
Rise Time	t_r			33.1		
Turn-Off Delay Time	$t_{d(OFF)}$			178.9		
Fall Time	t_f			101.3		

SWITCHING CHARACTERISTICS, $V_{GS} = -4.5\text{ V}$ (Note 3)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = -4.5\text{ V}, V_{DD} = -15\text{ V}, I_D = -100\text{ mA}, R_G = 2\ \Omega$		58.7		ns
Rise Time	t_r			137.3		
Turn-Off Delay Time	$t_{d(OFF)}$			78.6		
Fall Time	t_f			99.7		

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. Switching characteristics are independent of operating junction temperatures.

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TYPICAL CHARACTERISTICS

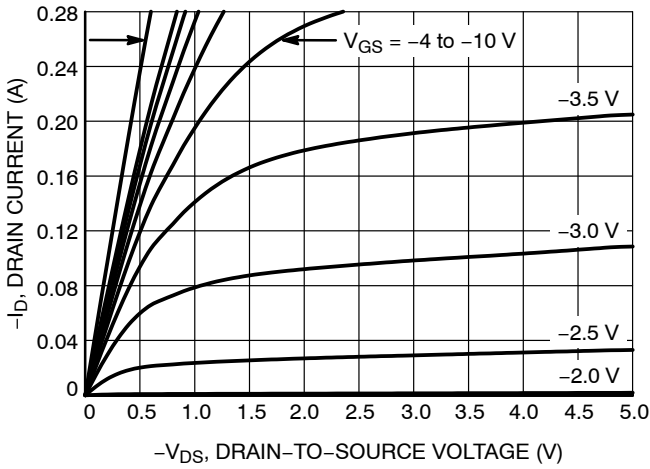


Figure 1. On-Region Characteristics

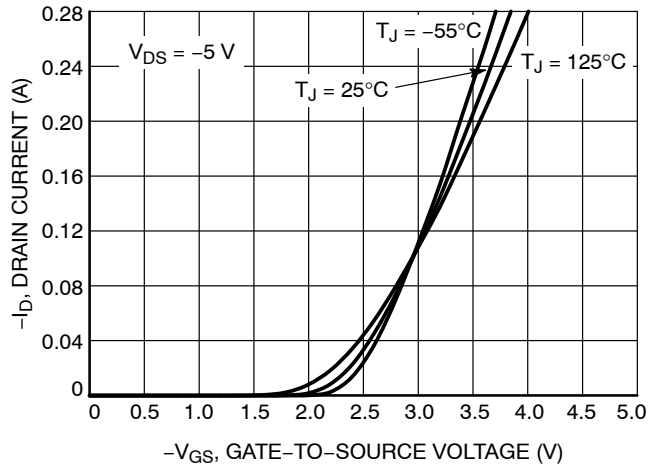


Figure 2. Transfer Characteristics

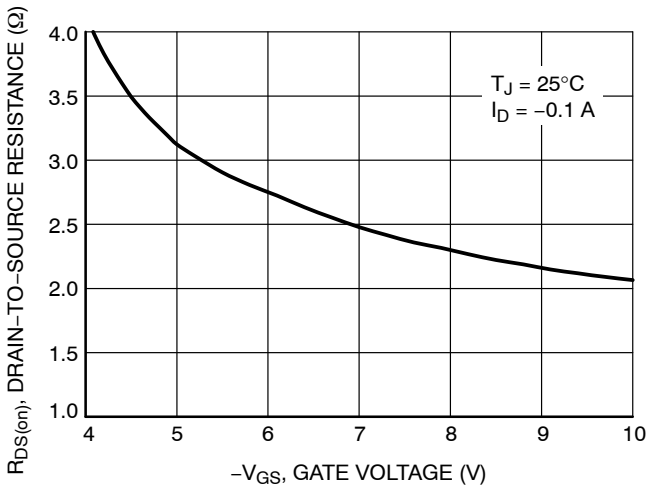


Figure 3. On-Resistance vs. Gate-to-Source Voltage

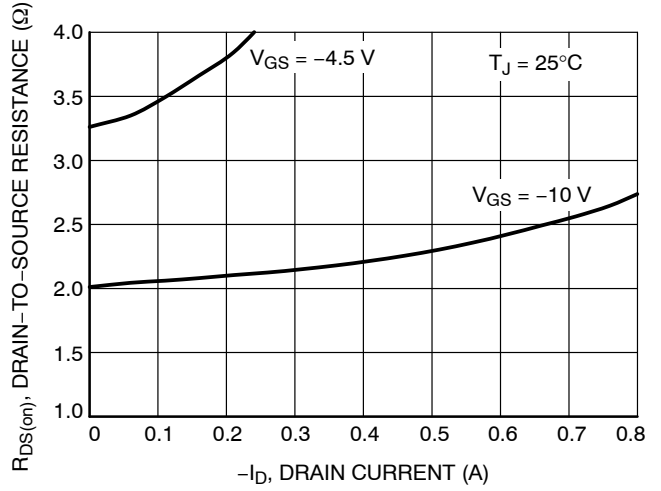


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

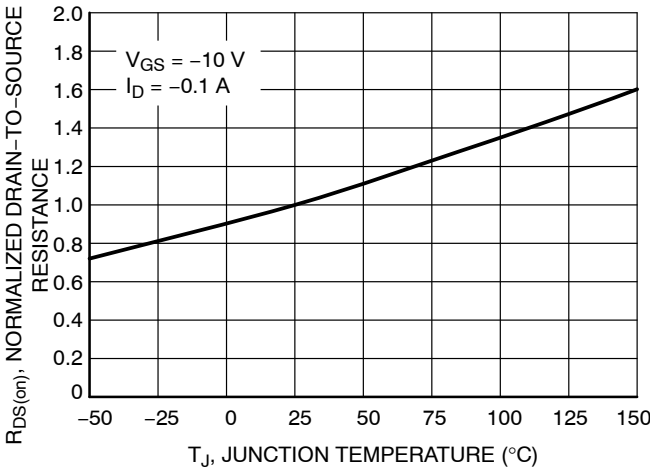


Figure 5. On-Resistance Variation with Temperature

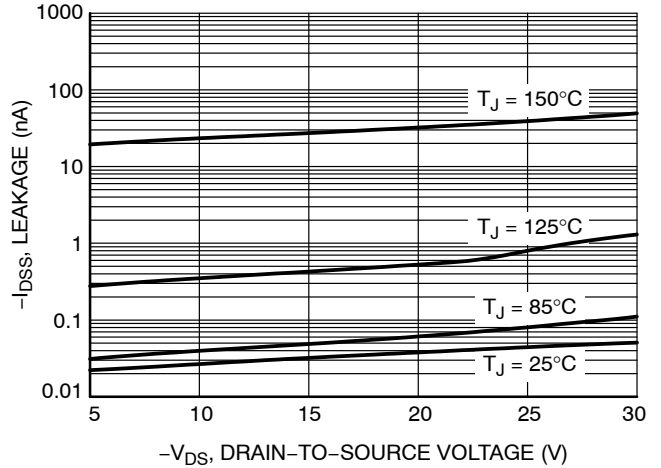


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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TYPICAL CHARACTERISTICS

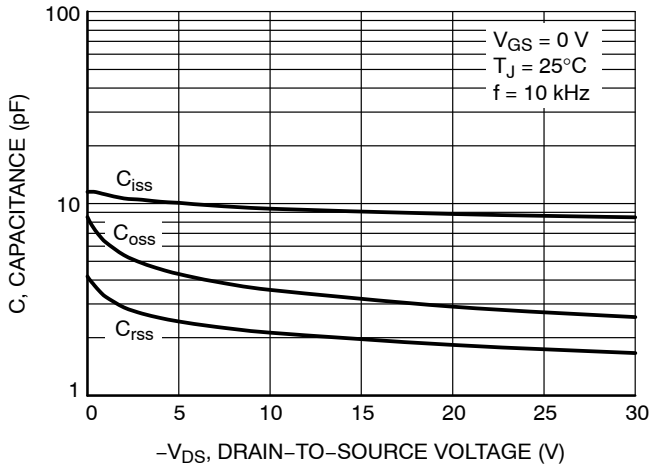


Figure 7. Capacitance Variation

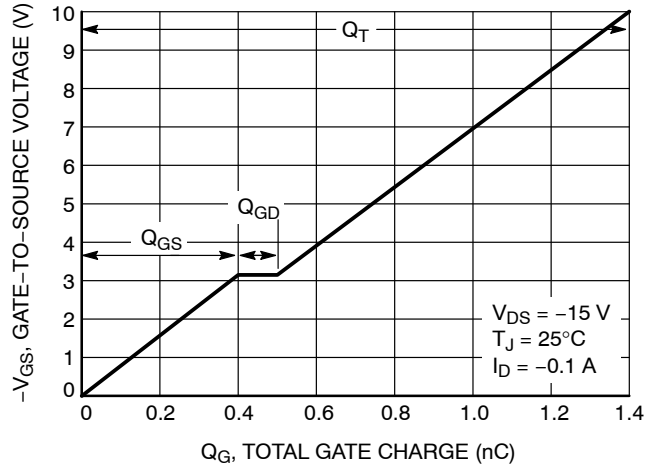


Figure 8. Gate-to-Source vs. Total Charge

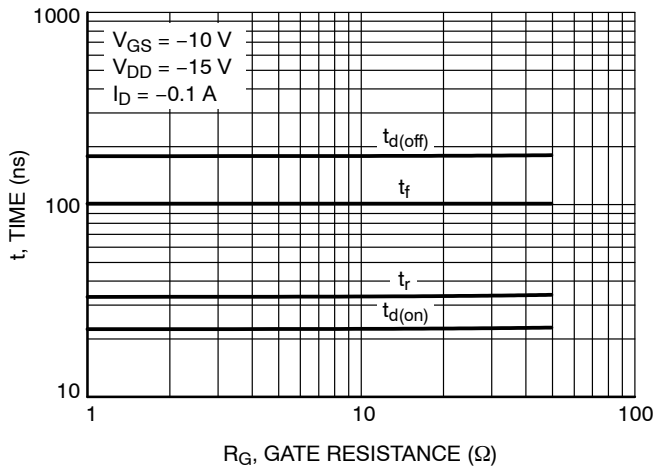


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

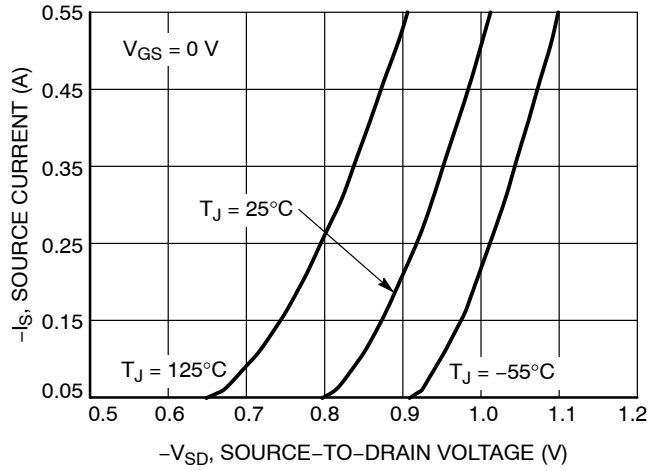


Figure 10. Diode Forward Voltage vs. Current

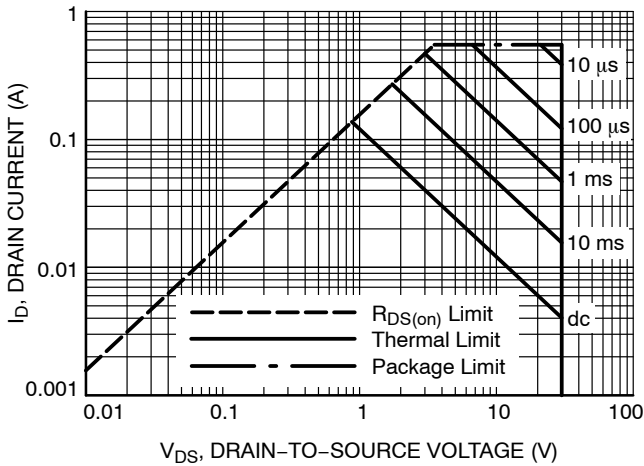


Figure 11. Maximum Rated Forward Biased Safe Operating Area

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TYPICAL CHARACTERISTICS

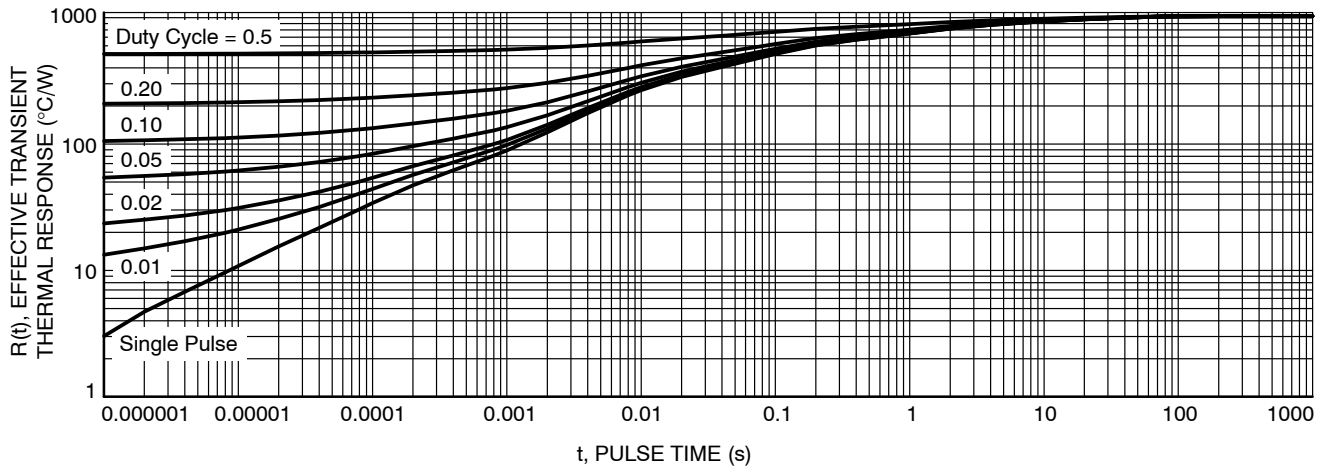


Figure 12. FET Thermal Response

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

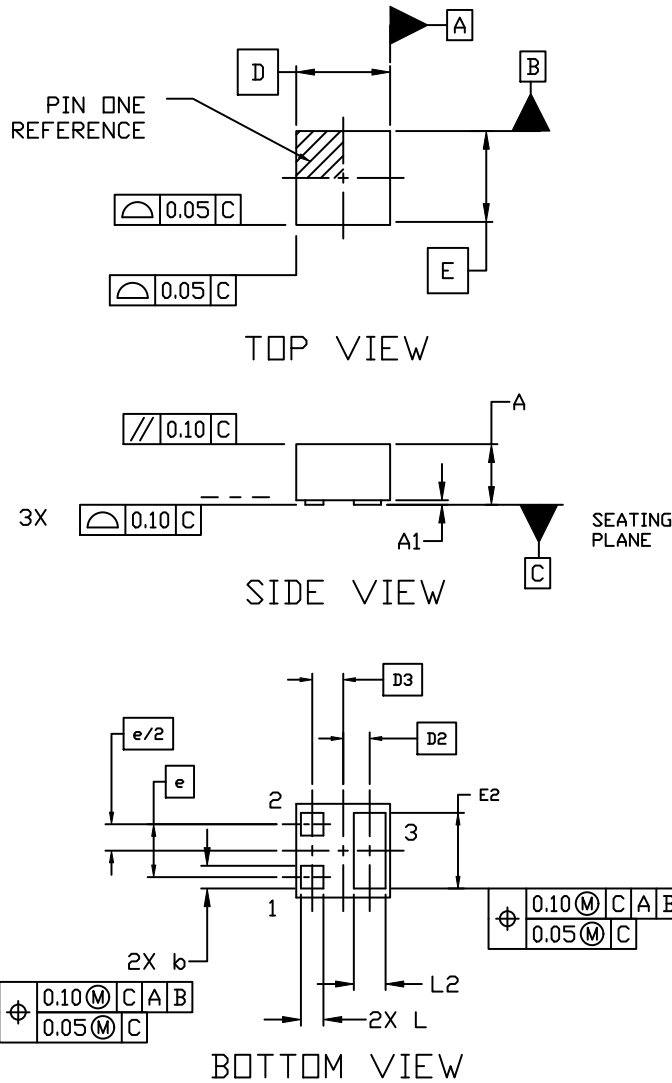
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SCALE 8:1

XLLGA3, 0.62x0.62, 0.35P
CASE 713AA
ISSUE D

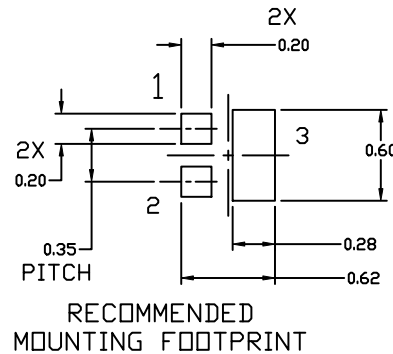
DATE 12 MAR 2021



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.34	0.39	0.43
A1	0.000	---	0.03
b	0.10	0.15	0.20
D	0.57	0.62	0.67
D2	0.175 BSC		
D3	0.205 BSC		
E	0.57	0.62	0.67
E2	0.40	0.50	0.60
e	0.350 BSC		
k	0.200 REF		
L	0.09	0.15	0.21
L2	0.11	0.21	0.31



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

GENERIC MARKING DIAGRAM*



X = Specific Device Code
M = Date Code

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

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