

NTR3A30PZ

MOSFET – Power, Single P-Channel, SOT-23, 2.4 x 2.9 x 1.0 mm

-20 V, -5.5 A

Features

- Low $R_{DS(on)}$ Solution in 2.4 mm x 2.9 mm Package
- ESD Diode-Protected Gate
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- High Side Load Switch
- Battery Switch
- Optimized for Power Management Applications for Portable Products, such as Smart Phones, Media Tablets, PMP, DSC, GPS, and Others

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

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V_{DSS}	-20	V
Gate-to-Source Voltage		V_{GS}	± 8	V
Drain Current (Note 1)	Steady State	I_D	-3.0	A
Drain Current (Note 1)			-2.2	
			-5.5	
Power Dissipation (Note 1)	Steady State	P_D	0.48	W
			1.58	
Pulsed Drain Current	$t_p = 10 \mu\text{s}$	I_{DM}	-9.1	A
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to 150	$^\circ\text{C}$
ESD HBM, JESD22-A114		V_{ESD}	2000	V
Source Current (Body Diode) (Note 2)		I_S	-0.48	A
Lead Temperature for Soldering Purposes (1/8 in 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	Unit
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	260	$^\circ\text{C}/\text{W}$
Junction-to-Ambient – $t \leq 5 \text{ s}$ (Note 1)	$R_{\theta JA}$	79	

1. Surface-mounted on FR4 board using 1 in sq. pad size (Cu area = 1.127 in sq. [2 oz] including traces).
2. Pulse Test: pulse width $\leq 300 \text{ ms}$, duty cycle $\leq 2\%$.

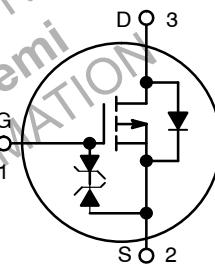
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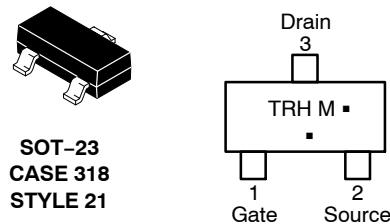
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$V_{(BR)DSS}$	$R_{DS(on)}$ Max	I_D MAX
-20 V	38 m Ω @ -4.5 V	
	50 m Ω @ -2.5 V	-5.5 A
	73 m Ω @ -1.8 V	

P-Channel MOSFET



MARKING DIAGRAM & PIN ASSIGNMENT



TRH = 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 [†]
NTR3A30PZT1G	SOT-23 (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.

NTR3A30PZ

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

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain-to-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0 \text{ V}$, $I_D = 250 \mu\text{A}$		-20			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(\text{BR})\text{DSS}/T_J}$	$I_D = -250 \mu\text{A}$, ref to 25°C			10.5		$\text{mV}/^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{\text{GS}} = 0 \text{ V}$, $V_{\text{DS}} = -20 \text{ V}$	$T_J = 25^\circ\text{C}$			-1	μA
Gate-to-Source Leakage Current	I_{GSS}	$V_{\text{DS}} = 0 \text{ V}$, $V_{\text{GS}} = \pm 5 \text{ V}$				± 10	μA
ON CHARACTERISTICS (Note 3)							
Gate Threshold Voltage	$V_{\text{GS}(\text{TH})}$	$V_{\text{GS}} = V_{\text{DS}}$, $I_D = -250 \mu\text{A}$		-0.4	-0.65	-1.0	V
Negative Threshold Temperature Coefficient	$V_{\text{GS}(\text{TH})/T_J}$				10.5		$\text{mV}/^\circ\text{C}$
Drain-to-Source On Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = -4.5 \text{ V}$	$I_D = -3 \text{ A}$		31	38	$\text{m}\Omega$
		$V_{\text{GS}} = -2.5 \text{ V}$	$I_D = -2.5 \text{ A}$		36	50	
		$V_{\text{GS}} = -1.8 \text{ V}$	$I_D = -1.5 \text{ A}$		51	73	
Forward Transconductance	g_{FS}	$V_{\text{DS}} = -5 \text{ V}$, $I_D = -3 \text{ A}$			30		S
CHARGES AND CAPACITANCES							
Input Capacitance	C_{iss}	$V_{\text{GS}} = 0 \text{ V}$, $f = 1.0 \text{ MHz}$, $V_{\text{DS}} = -15 \text{ V}$			1651		pF
Output Capacitance	C_{oss}				148		
Reverse Transfer Capacitance	C_{rss}				129		
Total Gate Charge	$Q_{\text{G}(\text{TOT})}$	$V_{\text{GS}} = -4.5 \text{ V}$, $V_{\text{DS}} = -15 \text{ V}$, $I_D = -3 \text{ A}$			17.6		nC
Threshold Gate Charge	$Q_{\text{G}(\text{TH})}$				0.7		
Gate-to-Source Charge	Q_{GS}				2.4		
Gate-to-Drain Charge	Q_{GD}				4.9		
SWITCHING CHARACTERISTICS (Note 4)							
Turn-On Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{GS}} = -4.5 \text{ V}$, $V_{\text{DS}} = -15 \text{ V}$, $I_D = -3 \text{ A}$, $R_G = 6.0 \Omega$			100		ns
Rise Time	t_r				208		
Turn-Off Delay Time	$t_{\text{d}(\text{off})}$				1043		
Fall Time	t_f				552		
DRAIN-SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	$V_{\text{GS}} = 0 \text{ V}$, $I_S = -0.4 \text{ A}$	$T_J = 25^\circ\text{C}$		0.65	1.0	V
			$T_J = 125^\circ\text{C}$		0.47		

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. Pulse Test: pulse width $\leq 300 \text{ ms}$, duty cycle $\leq 2\%$.

4. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

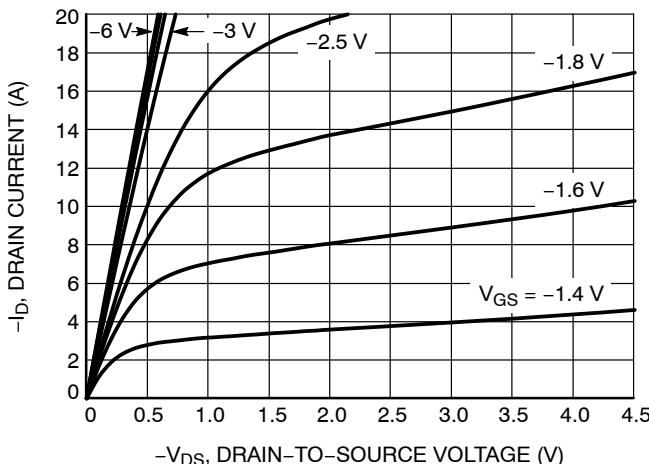


Figure 1. On-Region Characteristics

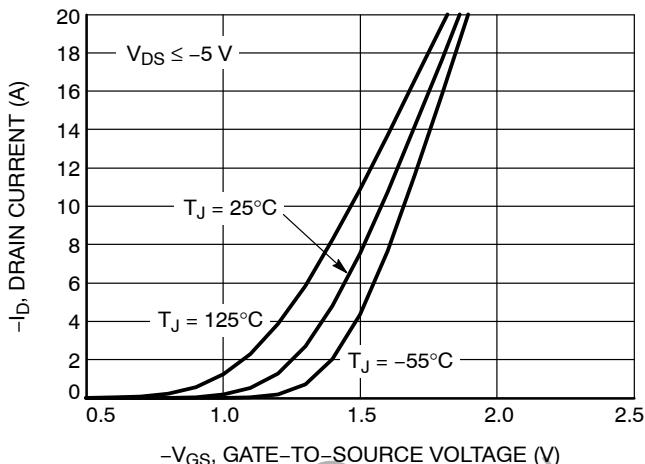


Figure 2. Transfer Characteristics

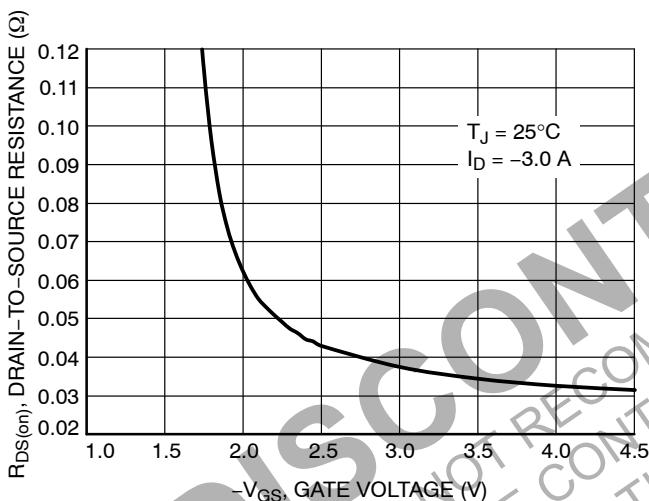


Figure 3. On-Resistance vs. Gate-to-Source Voltage

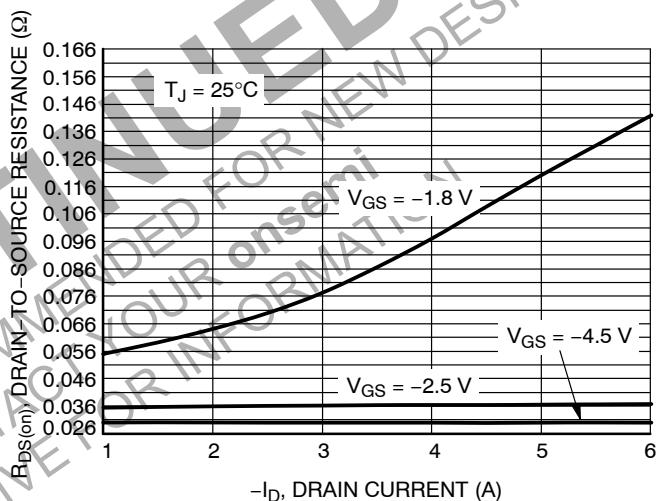


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

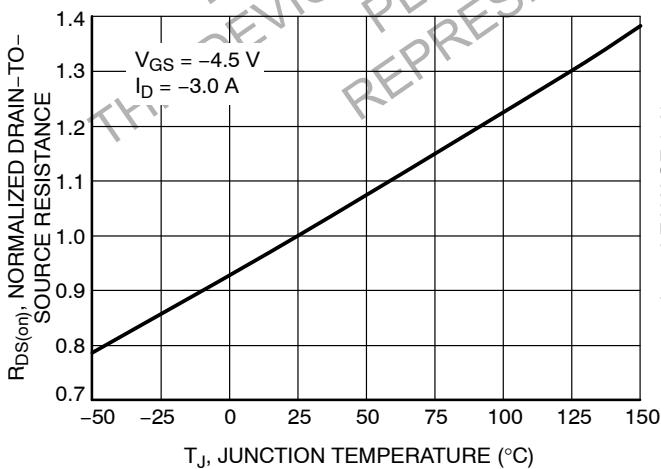


Figure 5. On-Resistance Variation with Temperature

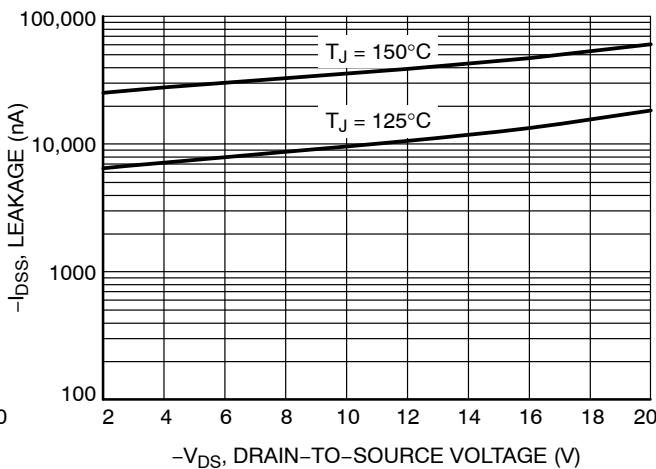
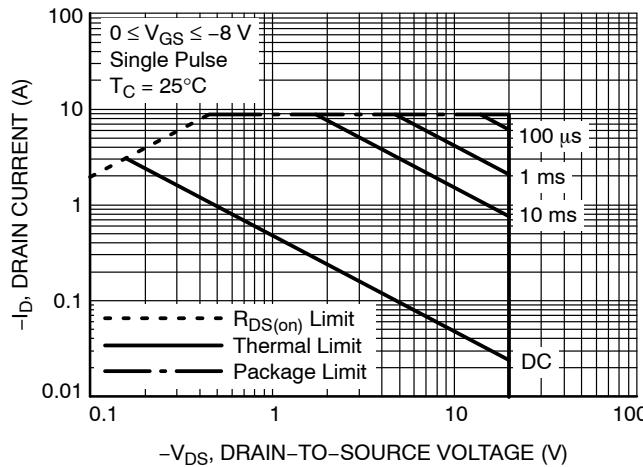
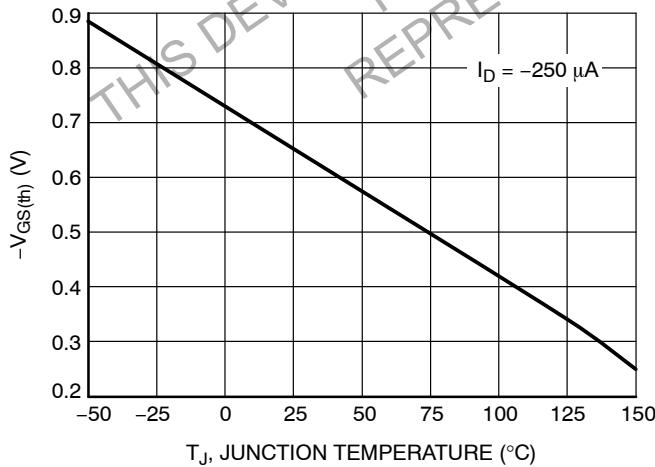
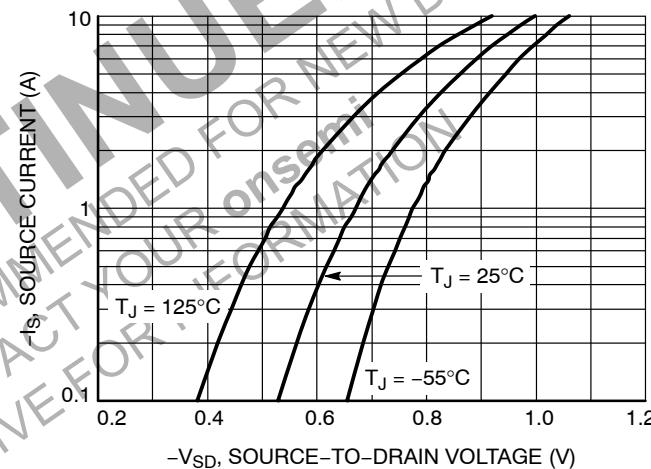
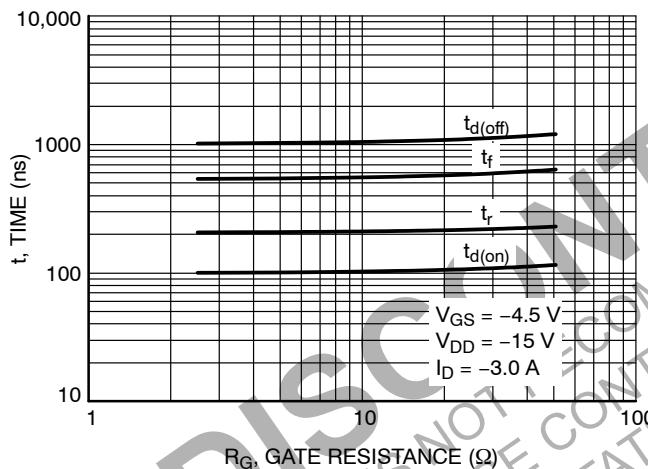
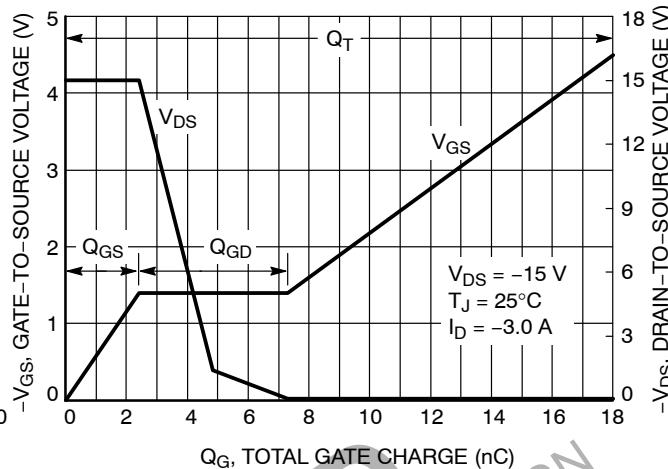
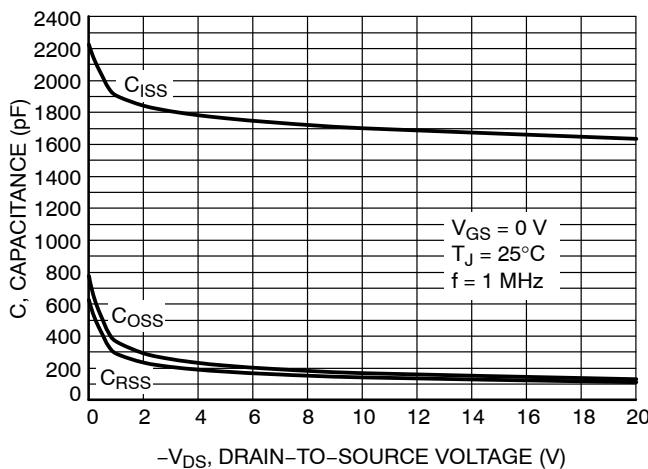
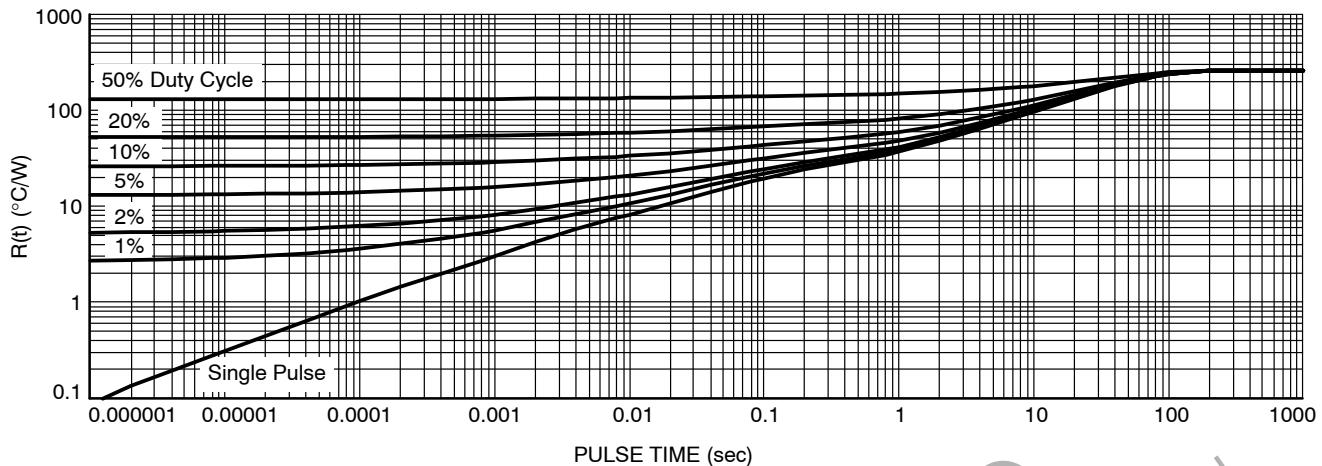


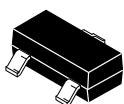
Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS



TYPICAL CHARACTERISTICS**Figure 13. FET Thermal Response**

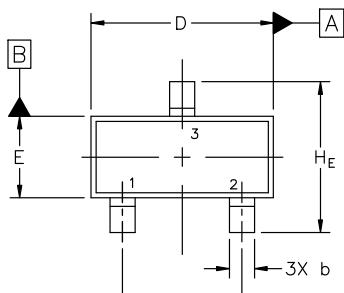
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REPRESENTATIVE FOR INFORMATION



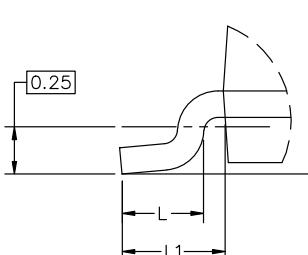
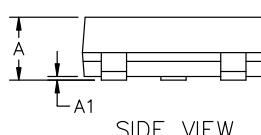
SCALE 4:1

SOT-23 (TO-236) 2.90x1.30x1.00 1.90P
CASE 318
ISSUE AU

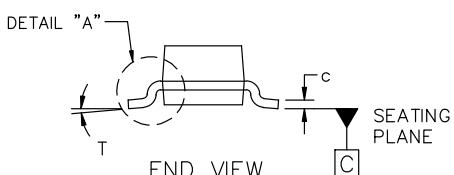
DATE 14 AUG 2024



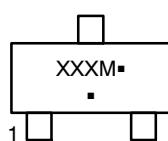
TOP VIEW

DETAIL "A"
Scale 3:1

SIDE VIEW



END VIEW

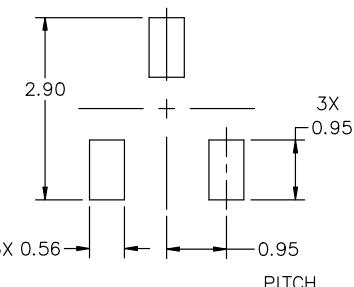
GENERIC
MARKING DIAGRAM*

XXX = Specific Device Code

M = Date Code

■ = Pb-Free Package

*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.

RECOMMENDED
MOUNTING FOOTPRINT

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

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.89	1.00	1.11
A1	0.01	0.06	0.10
b	0.37	0.44	0.50
c	0.08	0.14	0.20
D	2.80	2.90	3.04
E	1.20	1.30	1.40
e	1.78	1.90	2.04
L	0.30	0.43	0.55
L1	0.35	0.54	0.69
H _E	2.10	2.40	2.64
T	0°	---	10°

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

STYLES ON PAGE 2

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CASE 318

ISSUE AU

DATE 14 AUG 2024

STYLE 1 THRU 5:
CANCELLEDSTYLE 6:
PIN 1. BASE
2. Emitter
3. CollectorSTYLE 7:
PIN 1. Emitter
2. Base
3. CollectorSTYLE 8:
PIN 1. Anode
2. No Connection
3. CathodeSTYLE 9:
PIN 1. Anode
2. Anode
3. CathodeSTYLE 10:
PIN 1. Drain
2. Source
3. GateSTYLE 11:
PIN 1. Anode
2. Cathode
3. Cathode-AnodeSTYLE 12:
PIN 1. Cathode
2. Cathode
3. AnodeSTYLE 13:
PIN 1. Source
2. Drain
3. GateSTYLE 14:
PIN 1. Cathode
2. Gate
3. AnodeSTYLE 15:
PIN 1. Gate
2. Cathode
3. AnodeSTYLE 16:
PIN 1. Anode
2. Cathode
3. CathodeSTYLE 17:
PIN 1. No Connection
2. Anode
3. CathodeSTYLE 18:
PIN 1. No Connection
2. Cathode
3. AnodeSTYLE 19:
PIN 1. Cathode
2. Anode
3. Cathode-AnodeSTYLE 20:
PIN 1. Cathode
2. Anode
3. GateSTYLE 21:
PIN 1. Gate
2. Source
3. DrainSTYLE 22:
PIN 1. Return
2. Output
3. InputSTYLE 23:
PIN 1. Anode
2. Anode
3. CathodeSTYLE 24:
PIN 1. Gate
2. Drain
3. SourceSTYLE 25:
PIN 1. Anode
2. Cathode
3. GateSTYLE 26:
PIN 1. Cathode
2. Anode
3. No ConnectionSTYLE 27:
PIN 1. Cathode
2. Cathode
3. CathodeSTYLE 28:
PIN 1. Anode
2. Anode
3. Anode

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