

# NTF3055L108, NVF3055L108

## MOSFET – Power, N-Channel, Logic Level, SOT-223 3.0 A, 60 V

Designed for low voltage, high speed switching applications in power supplies, converters and power motor controls and bridge circuits.

### Features

- NVF Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

### Applications

- Power Supplies
- Converters
- Power Motor Controls
- Bridge Circuits

### MAXIMUM RATINGS (T<sub>C</sub> = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V <sub>DSS</sub>	60	Vdc
Drain-to-Gate Voltage (R <sub>GS</sub> = 1.0 MΩ)	V <sub>DGR</sub>	60	Vdc
Gate-to-Source Voltage	V <sub>GS</sub>	± 15	Vdc
– Continuous		± 20	Vpk
– Non-repetitive (t <sub>p</sub> ≤ 10 ms)			
Drain Current	I <sub>D</sub>	3.0	Adc
– Continuous @ T <sub>A</sub> = 25°C (Note 1)		1.4	Apk
– Continuous @ T <sub>A</sub> = 100°C (Note 2)		9.0	
– Single Pulse (t <sub>p</sub> ≤ 10 μs)	I <sub>DM</sub>		
Total Power Dissipation @ T <sub>A</sub> = 25°C (Note 1)	P <sub>D</sub>	2.1	Watts
Total Power Dissipation @ T <sub>A</sub> = 25°C (Note 2)		1.3	Watts
Derate above 25°C		0.014	W/°C
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	–55 to 175	°C
Single Pulse Drain-to-Source Avalanche Energy – Starting T <sub>J</sub> = 25°C (V <sub>DD</sub> = 25 Vdc, V <sub>GS</sub> = 5.0 Vdc, I <sub>L(pk)</sub> = 7.0 Apk, L = 3.0 mH, V <sub>DS</sub> = 60 Vdc)	E <sub>AS</sub>	74	mJ
Thermal Resistance	R <sub>θJA</sub>	72.3	°C/W
– Junction-to-Ambient (Note 1)		114	
– Junction-to-Ambient (Note 2)			
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T <sub>L</sub>	260	°C

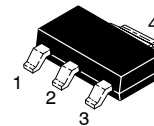
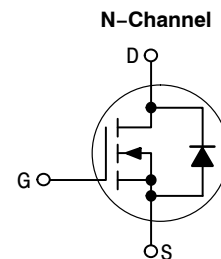
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.



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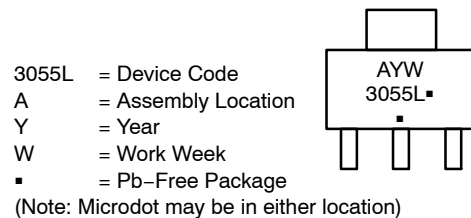
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3.0 A, 60 V  
R<sub>DS(on)</sub> = 120 mΩ

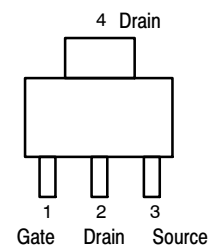


SOT-223  
CASE 318E  
STYLE 3

### MARKING DIAGRAM



### PIN ASSIGNMENT



### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

## NTF3055L108, NVF3055L108

1. When surface mounted to an FR4 board using 1" pad size, 1 oz. (Cu. Area 1 in<sup>2</sup>).
2. When surface mounted to an FR4 board using minimum recommended pad size, 2 oz. (Cu. Area 0.272 in<sup>2</sup>).

# NTF3055L108, NVF3055L108

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Drain-to-Source Breakdown Voltage (Note 3) (V <sub>GS</sub> = 0 Vdc, I <sub>D</sub> = 250 μAdc) Temperature Coefficient (Positive)	V <sub>(BR)DSS</sub>	60 -	68 68	- -	Vdc mV/°C
Zero Gate Voltage Drain Current (V <sub>DS</sub> = 60 Vdc, V <sub>GS</sub> = 0 Vdc) (V <sub>DS</sub> = 60 Vdc, V <sub>GS</sub> = 0 Vdc, T <sub>J</sub> = 150°C)	I <sub>DSS</sub>	- -	- -	1.0 10	μAdc
Gate-Body Leakage Current (V <sub>GS</sub> = ± 15 Vdc, V <sub>DS</sub> = 0 Vdc)	I <sub>GSS</sub>	-	-	± 100	nAdc

## ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage (Note 3) (V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μAdc) Threshold Temperature Coefficient (Negative)	V <sub>GS(th)</sub>	1.0 -	1.68 4.6	2.0 -	Vdc mV/°C
Static Drain-to-Source On-Resistance (Note 3) (V <sub>GS</sub> = 5.0 Vdc, I <sub>D</sub> = 1.5 Adc)	R <sub>DS(on)</sub>	-	92	120	mΩ
Static Drain-to-Source On-Resistance (Note 3) (V <sub>GS</sub> = 5.0 Vdc, I <sub>D</sub> = 3.0 Adc) (V <sub>GS</sub> = 5.0 Vdc, I <sub>D</sub> = 1.5 Adc, T <sub>J</sub> = 150°C)	V <sub>DS(on)</sub>	-	0.290 0.250	0.43 -	Vdc
Forward Transconductance (Note 3) (V <sub>DS</sub> = 7.0 Vdc, I <sub>D</sub> = 3.0 Adc)	g <sub>fs</sub>	-	5.7	-	Mhos

## DYNAMIC CHARACTERISTICS

Input Capacitance	(V <sub>DS</sub> = 25 Vdc, V <sub>GS</sub> = 0 V, f = 1.0 MHz)	C <sub>iss</sub>	-	313	440	pF
Output Capacitance		C <sub>oss</sub>	-	112	160	
Transfer Capacitance		C <sub>rss</sub>	-	40	60	

## SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	(V <sub>DD</sub> = 30 Vdc, I <sub>D</sub> = 3.0 Adc, V <sub>GS</sub> = 5.0 Vdc, R <sub>G</sub> = 9.1 Ω) (Note 3)	t <sub>d(on)</sub>	-	11	25	ns
Rise Time		t <sub>r</sub>	-	35	70	
Turn-Off Delay Time		t <sub>d(off)</sub>	-	22	45	
Fall Time		t <sub>f</sub>	-	27	60	
Gate Charge	(V <sub>DS</sub> = 48 Vdc, I <sub>D</sub> = 3.0 Adc, V <sub>GS</sub> = 5.0 Vdc) (Note 3)	Q <sub>T</sub>	-	7.6	15	nC
		Q <sub>1</sub>	-	1.4	-	
		Q <sub>2</sub>	-	4.0	-	

## SOURCE-DRAIN DIODE CHARACTERISTICS

Forward On-Voltage	(I <sub>S</sub> = 3.0 Adc, V <sub>GS</sub> = 0 Vdc) (I <sub>S</sub> = 3.0 Adc, V <sub>GS</sub> = 0 Vdc, T <sub>J</sub> = 150°C) (Note 3)	V <sub>SD</sub>	- -	0.87 0.72	1.0 -	Vdc
Reverse Recovery Time	(I <sub>S</sub> = 3.0 Adc, V <sub>GS</sub> = 0 Vdc, dI <sub>S</sub> /dt = 100 A/μs) (Note 3)	t <sub>rr</sub>	-	35	-	ns
		t <sub>a</sub>	-	21	-	
		t <sub>b</sub>	-	14	-	
Reverse Recovery Stored Charge		Q <sub>RR</sub>	-	0.044	-	μC

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.

- Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.
- Switching characteristics are independent of operating junction temperatures.

TYPICAL ELECTRICAL CHARACTERISTICS

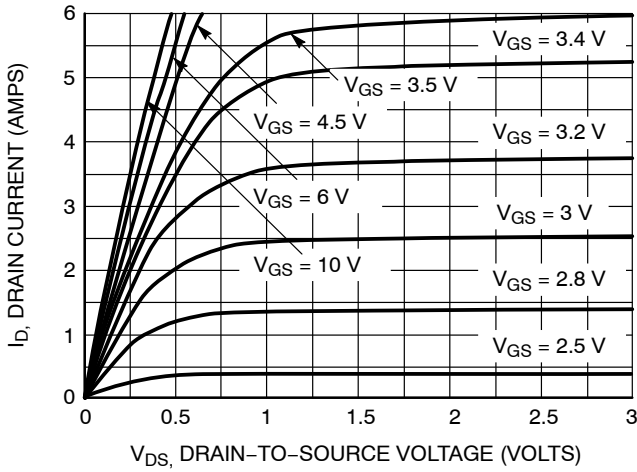


Figure 1. On-Region Characteristics

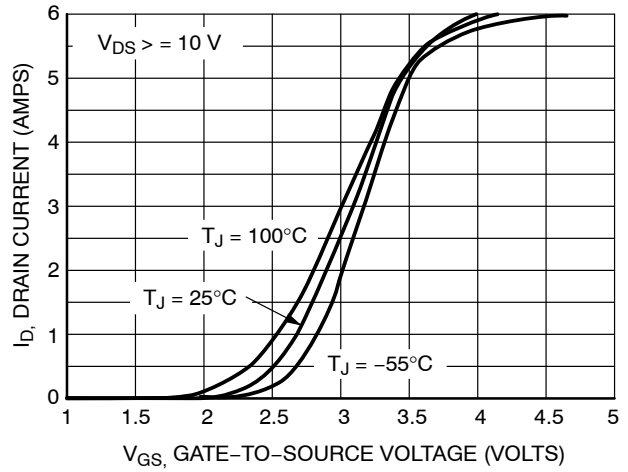


Figure 2. Transfer Characteristics

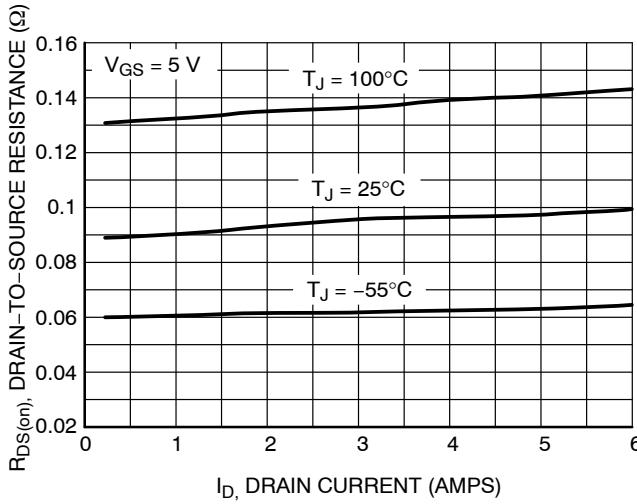


Figure 3. On-Resistance vs. Gate-to-Source Voltage

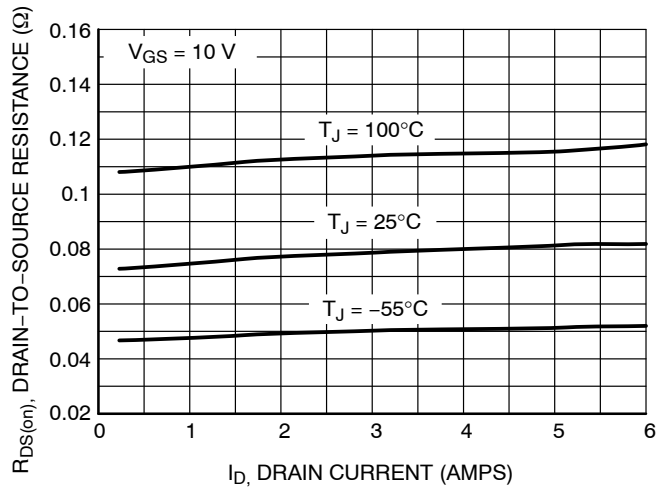


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

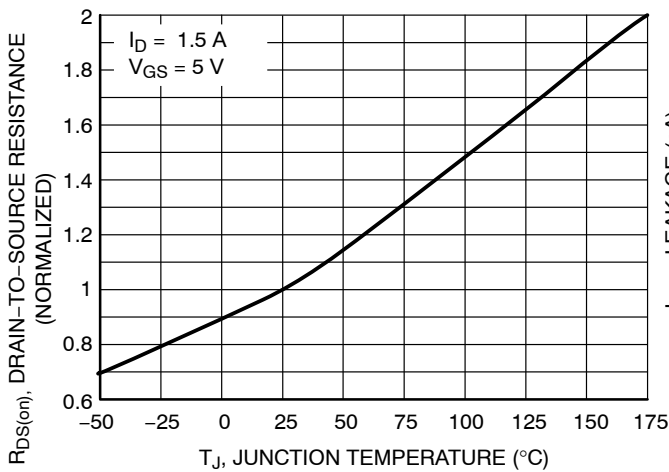


Figure 5. On-Resistance Variation with Temperature

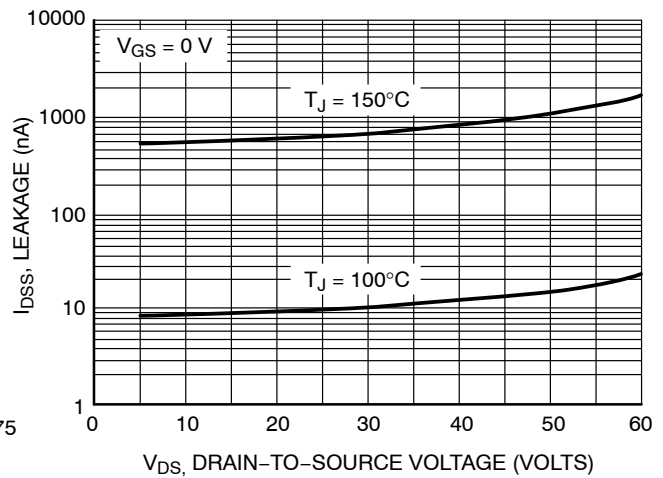


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL ELECTRICAL CHARACTERISTICS

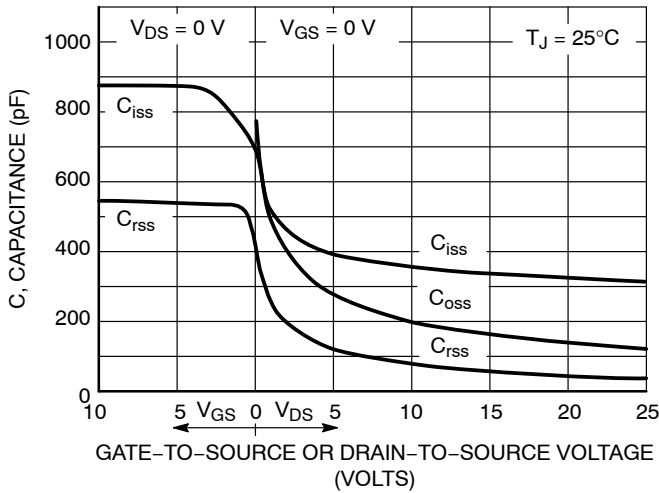


Figure 7. Capacitance Variation

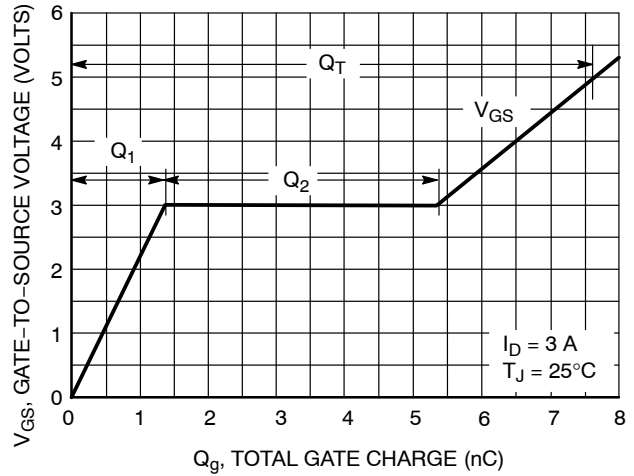


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

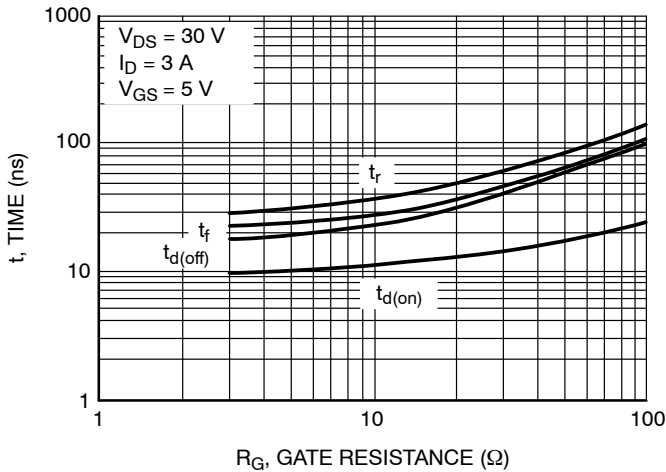


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

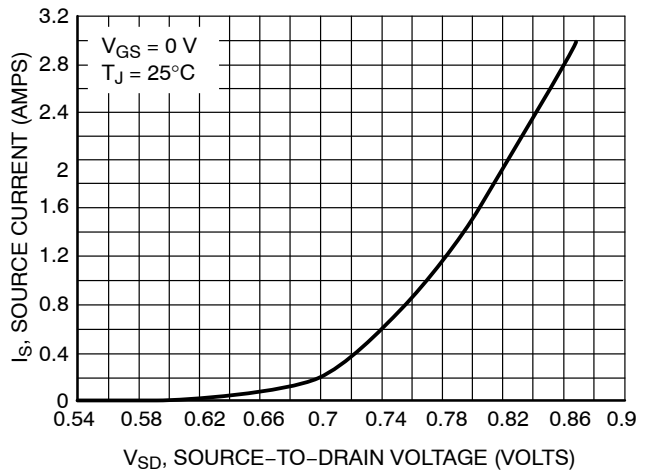


Figure 10. Diode Forward Voltage vs. Current

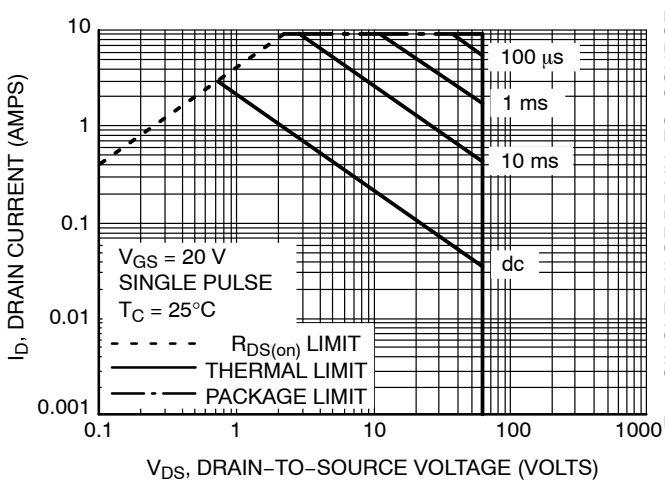


Figure 11. Maximum Rated Forward Biased Safe Operating Area

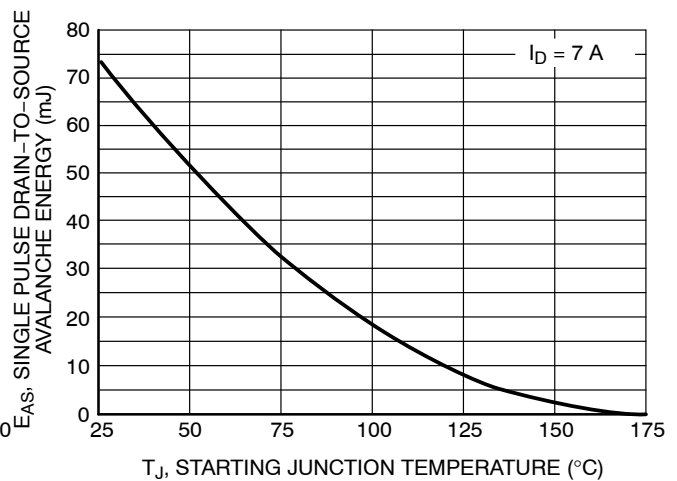


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

# NTF3055L108, NVF3055L108

## TYPICAL ELECTRICAL CHARACTERISTICS

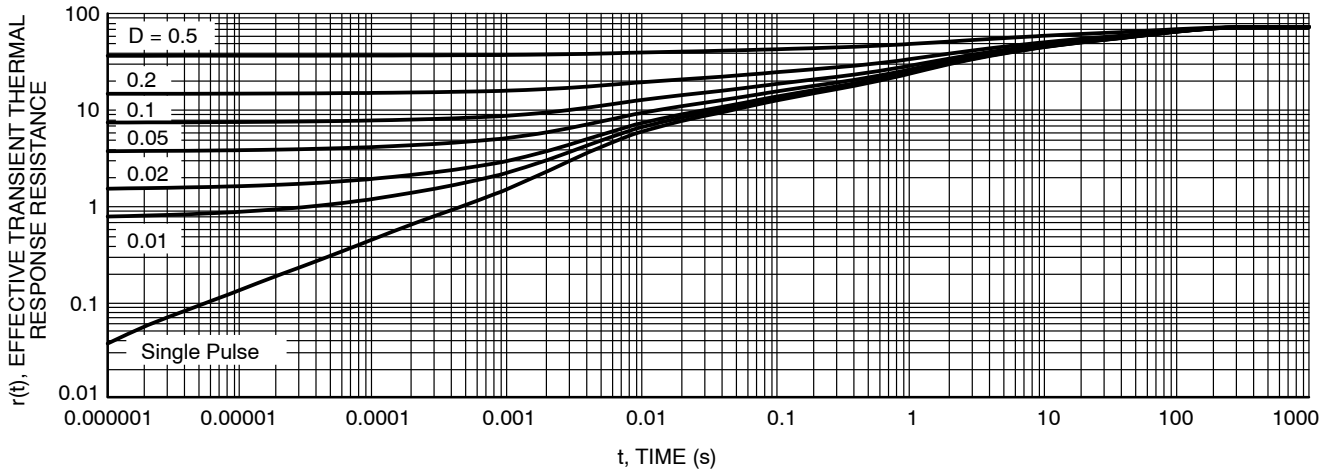


Figure 13. Thermal Response

### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
NTF3055L108T1G	SOT-223 (TO-261) (Pb-Free)	1000 / Tape & Reel
NVF3055L108T1G	SOT-223 (TO-261) (Pb-Free)	1000 / Tape & Reel

<sup>†</sup>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.

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

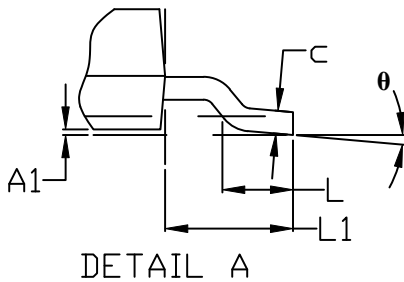
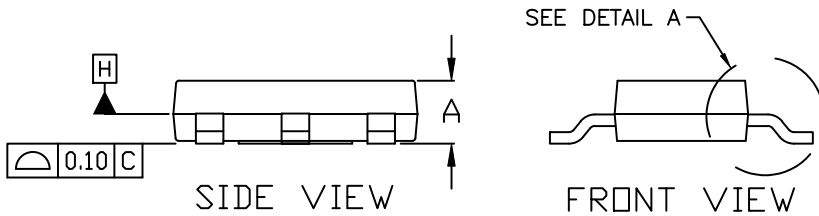
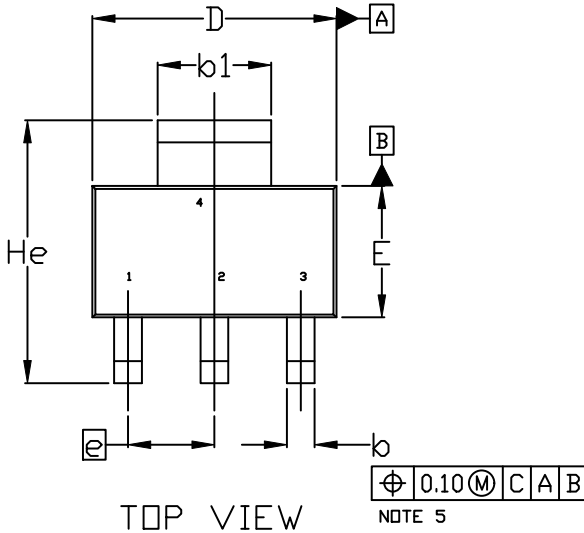
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SCALE 1:1

SOT-223 (TO-261)  
CASE 318E-04  
ISSUE R

DATE 02 OCT 2018



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D & E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.200MM PER SIDE.
4. DATUMS A AND B ARE DETERMINED AT DATUM H.
5. A1 IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.
6. POSITIONAL TOLERANCE APPLIES TO DIMENSIONS b AND b1.

MILLIMETERS			
DIM	MIN.	NOM.	MAX.
A	1.50	1.63	1.75
A1	0.02	0.06	0.10
b	0.60	0.75	0.89
b1	2.90	3.06	3.20
c	0.24	0.29	0.35
D	6.30	6.50	6.70
E	3.30	3.50	3.70
e	2.30 BSC		
L	0.20	---	---
L1	1.50	1.75	2.00
He	6.70	7.00	7.30
$\theta$	0°	---	10°



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**SOT-223 (TO-261)**  
**CASE 318E-04**  
**ISSUE R**

DATE 02 OCT 2018

- |  |   |   |   |   |
|--|---|---|---|---|
| <b>STYLE 1:</b><br>PIN 1. BASE<br>2. COLLECTOR<br>3. EMITTER<br>4. COLLECTOR | <b>STYLE 2:</b><br>PIN 1. ANODE<br>2. CATHODE<br>3. NC<br>4. CATHODE        | <b>STYLE 3:</b><br>PIN 1. GATE<br>2. DRAIN<br>3. SOURCE<br>4. DRAIN           | <b>STYLE 4:</b><br>PIN 1. SOURCE<br>2. DRAIN<br>3. GATE<br>4. DRAIN   | <b>STYLE 5:</b><br>PIN 1. DRAIN<br>2. GATE<br>3. SOURCE<br>4. GATE    |
| <b>STYLE 6:</b><br>PIN 1. RETURN<br>2. INPUT<br>3. OUTPUT<br>4. INPUT        | <b>STYLE 7:</b><br>PIN 1. ANODE 1<br>2. CATHODE<br>3. ANODE 2<br>4. CATHODE | <b>STYLE 8:</b><br>CANCELLED  | <b>STYLE 9:</b><br>PIN 1. INPUT<br>2. GROUND<br>3. LOGIC<br>4. GROUND | <b>STYLE 10:</b><br>PIN 1. CATHODE<br>2. ANODE<br>3. GATE<br>4. ANODE |
| <b>STYLE 11:</b><br>PIN 1. MT 1<br>2. MT 2<br>3. GATE<br>4. MT 2             | <b>STYLE 12:</b><br>PIN 1. INPUT<br>2. OUTPUT<br>3. NC<br>4. OUTPUT         | <b>STYLE 13:</b><br>PIN 1. GATE<br>2. COLLECTOR<br>3. EMITTER<br>4. COLLECTOR |   |   |

**GENERIC  
 MARKING DIAGRAM\***



- A = Assembly Location
- Y = Year
- W = Work Week
- XXXXX = Specific Device Code
- = Pb-Free Package

(Note: Microdot may be in either location)

\*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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