

# MMBT2907AM3T5G

## PNP General Purpose Transistor

The MMBT2907AM3T5G device is a spin-off of our popular SOT-23 three-leaded device. It is designed for general purpose amplifier applications and is housed in the SOT-723 surface mount package. This device is ideal for low-power surface mount applications where board space is at a premium.

### Features

- Reduces Board Space
- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	-60	Vdc
Collector-Base Voltage	$V_{CBO}$	-60	Vdc
Emitter-Base Voltage	$V_{EBO}$	-5.0	Vdc
Collector Current - Continuous	$I_C$	-600	mAdc

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board (Note 1) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	265 2.1	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	470	$^\circ\text{C/W}$
Total Device Dissipation Alumina Substrate, (Note 2) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	640 5.1	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	195	$^\circ\text{C/W}$
Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

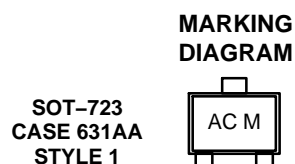
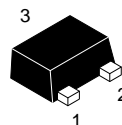
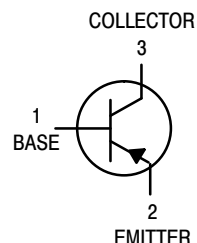
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR-5 =  $1.0 \times 0.75 \times 0.062$  in.
2. Alumina =  $0.4 \times 0.3 \times 0.024$  in. 99.5% alumina.



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AC = Specific Device Code  
M = Date Code

### ORDERING INFORMATION

Device	Package	Shipping†
MMBT2907AM3T5G	SOT-723 (Pb-Free)	8000/Tape & Reel
NSVMMBT2907AM3T5G	SOT-723 (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.

# MMBT2907AM3T5G

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector–Emitter Breakdown Voltage (Note 3) (I <sub>C</sub> = –10 mA <sub>dc</sub> , I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	–60	–	V <sub>dc</sub>
Collector–Base Breakdown Voltage (I <sub>C</sub> = –10 μA <sub>dc</sub> , I <sub>E</sub> = 0)	V <sub>(BR)CBO</sub>	–60	–	V <sub>dc</sub>
Emitter–Base Breakdown Voltage (I <sub>E</sub> = –10 μA <sub>dc</sub> , I <sub>C</sub> = 0)	V <sub>(BR)EBO</sub>	–5.0	–	V <sub>dc</sub>
Collector Cutoff Current (V <sub>CE</sub> = –30 V <sub>dc</sub> , V <sub>EB(off)</sub> = –0.5 V <sub>dc</sub> )	I <sub>CEX</sub>	–	–50	nA <sub>dc</sub>
Collector Cutoff Current (V <sub>CB</sub> = –50 V <sub>dc</sub> , I <sub>E</sub> = 0) (V <sub>CB</sub> = –50 V <sub>dc</sub> , I <sub>E</sub> = 0, T <sub>A</sub> = 125°C)	I <sub>CBO</sub>	– –	–0.010 –10	μA <sub>dc</sub>
Base Cutoff Current (V <sub>CE</sub> = –30 V <sub>dc</sub> , V <sub>EB(off)</sub> = –0.5 V <sub>dc</sub> )	I <sub>BL</sub>	–	–50	nA <sub>dc</sub>

## ON CHARACTERISTICS

DC Current Gain (I <sub>C</sub> = –0.1 mA <sub>dc</sub> , V <sub>CE</sub> = –10 V <sub>dc</sub> ) (I <sub>C</sub> = –1.0 mA <sub>dc</sub> , V <sub>CE</sub> = –10 V <sub>dc</sub> ) (I <sub>C</sub> = –10 mA <sub>dc</sub> , V <sub>CE</sub> = –10 V <sub>dc</sub> ) (I <sub>C</sub> = –150 mA <sub>dc</sub> , V <sub>CE</sub> = –10 V <sub>dc</sub> ) (I <sub>C</sub> = –500 mA <sub>dc</sub> , V <sub>CE</sub> = –10 V <sub>dc</sub> ) (Note 3)	h <sub>FE</sub>	75 100 100 100 50	– – – 300 –	–
Collector–Emitter Saturation Voltage (Note 3) (I <sub>C</sub> = –150 mA <sub>dc</sub> , I <sub>B</sub> = –15 mA <sub>dc</sub> ) (Note 3) (I <sub>C</sub> = –500 mA <sub>dc</sub> , I <sub>B</sub> = –50 mA <sub>dc</sub> )	V <sub>CE(sat)</sub>	– –	–0.4 –1.6	V <sub>dc</sub>
Base–Emitter Saturation Voltage (Note 3) (I <sub>C</sub> = –150 mA <sub>dc</sub> , I <sub>B</sub> = –15 mA <sub>dc</sub> ) (I <sub>C</sub> = –500 mA <sub>dc</sub> , I <sub>B</sub> = –50 mA <sub>dc</sub> )	V <sub>BE(sat)</sub>	– –	–1.3 –2.6	V <sub>dc</sub>

## SMALL–SIGNAL CHARACTERISTICS

Current–Gain – Bandwidth Product (Notes 3, 4) (I <sub>C</sub> = –50 mA <sub>dc</sub> , V <sub>CE</sub> = –20 V <sub>dc</sub> , f = 100 MHz)	f <sub>T</sub>	200	–	MHz
Output Capacitance (V <sub>CB</sub> = –10 V <sub>dc</sub> , I <sub>E</sub> = 0, f = 1.0 MHz)	C <sub>obo</sub>	–	8.0	pF
Input Capacitance (V <sub>EB</sub> = –2.0 V <sub>dc</sub> , I <sub>C</sub> = 0, f = 1.0 MHz)	C <sub>ibo</sub>	–	30	pF

## SWITCHING CHARACTERISTICS

Turn–On Time	(V <sub>CC</sub> = –30 V <sub>dc</sub> , I <sub>C</sub> = –150 mA <sub>dc</sub> , I <sub>B1</sub> = –15 mA <sub>dc</sub> )	t <sub>on</sub>	–	45	ns
Delay Time		t <sub>d</sub>	–	10	
Rise Time		t <sub>r</sub>	–	40	
Turn–Off Time	(V <sub>CC</sub> = –6.0 V <sub>dc</sub> , I <sub>C</sub> = –150 mA <sub>dc</sub> , I <sub>B1</sub> = I <sub>B2</sub> = –15 mA <sub>dc</sub> )	t <sub>off</sub>	–	100	
Storage Time		t <sub>s</sub>	–	80	
Fall Time		t <sub>f</sub>	–	30	

3. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

4. f<sub>T</sub> is defined as the frequency at which |h<sub>fe</sub>| extrapolates to unity.

# MMBT2907AM3T5G

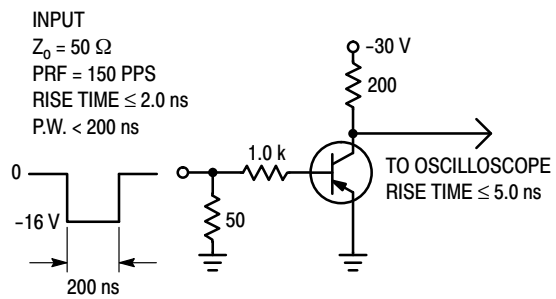


Figure 1. Delay and Rise Time Test Circuit

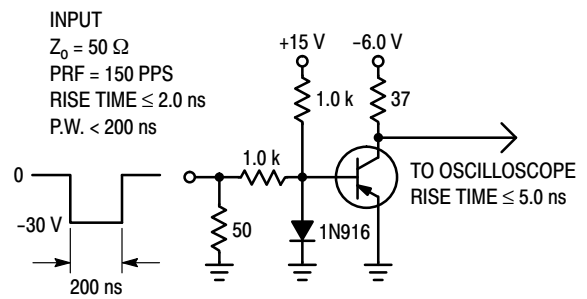


Figure 2. Storage and Fall Time Test Circuit

# MMBT2907AM3T5G

## TYPICAL CHARACTERISTICS

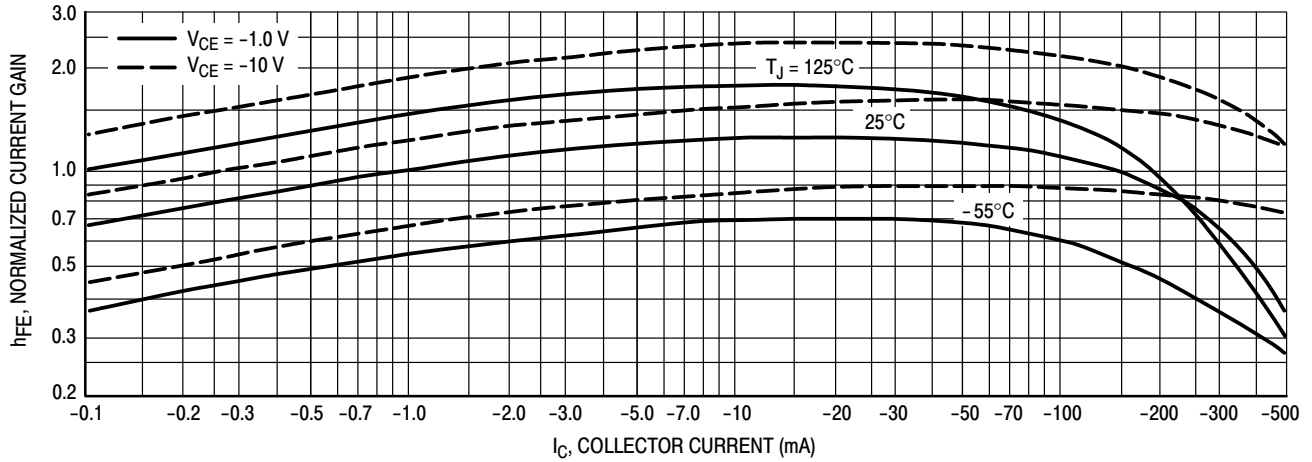


Figure 3. DC Current Gain

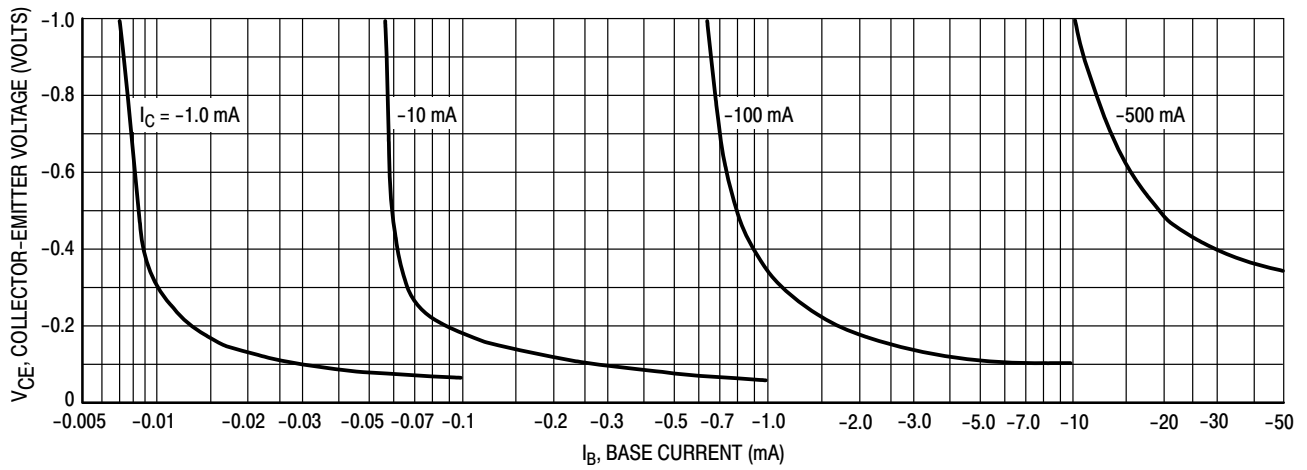


Figure 4. Collector Saturation Region

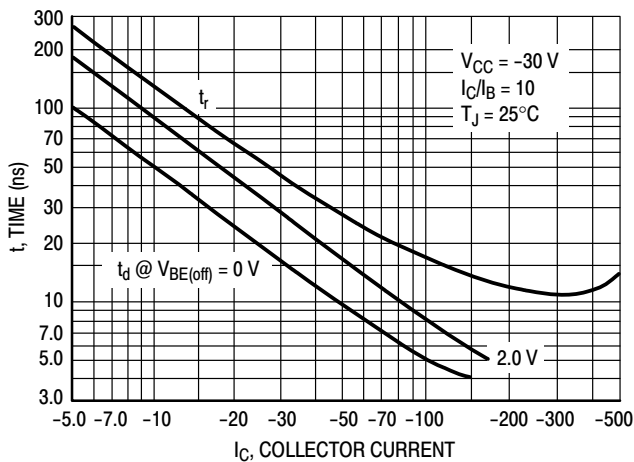


Figure 5. Turn-On Time

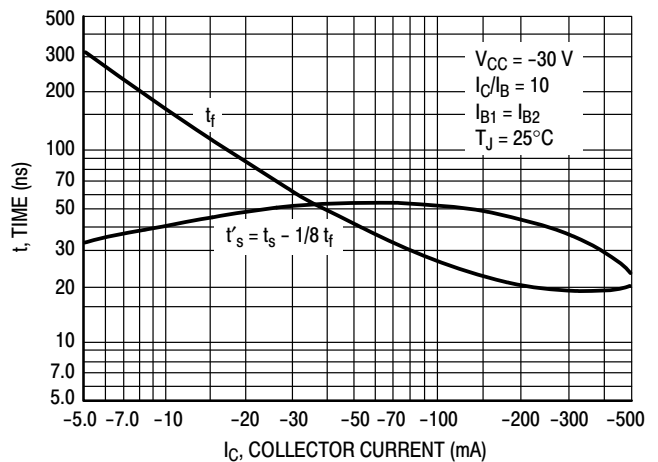


Figure 6. Turn-Off Time

# MMBT2907AM3T5G

## TYPICAL SMALL-SIGNAL Characteristics NOISE FIGURE

$V_{CE} = 10 \text{ Vdc}$ ,  $T_A = 25^\circ\text{C}$

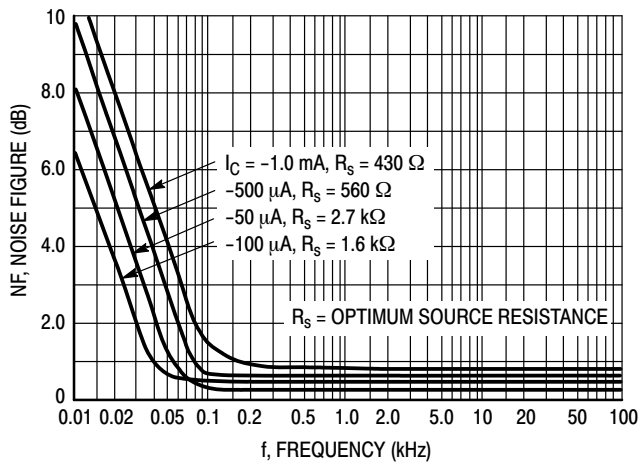


Figure 7. Frequency Effects

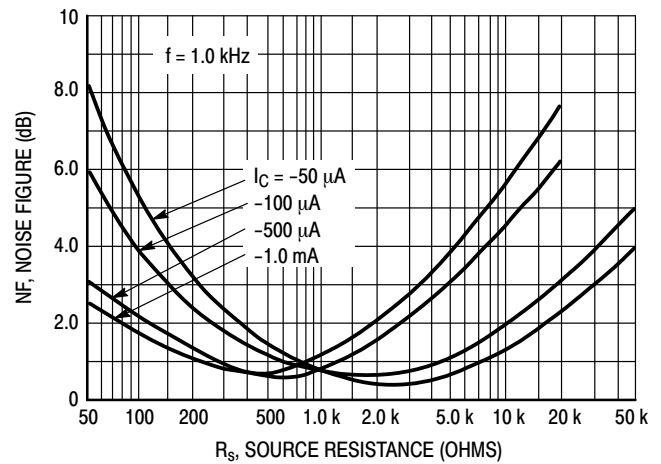


Figure 8. Source Resistance Effects

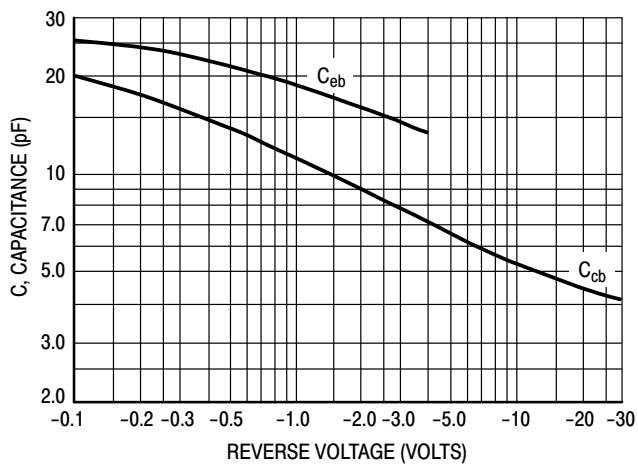


Figure 9. Capacitances

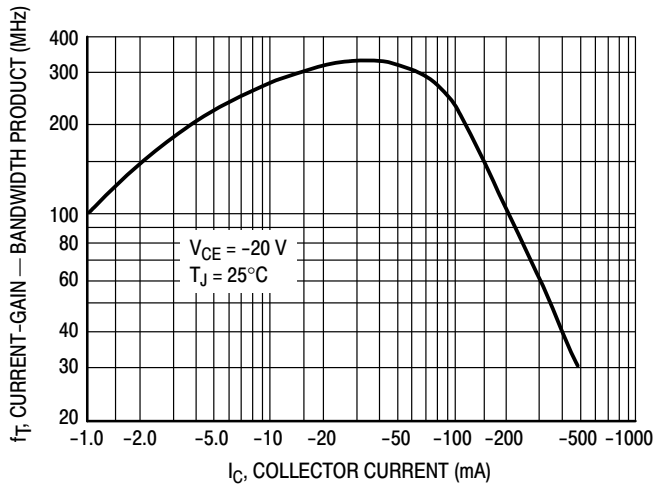


Figure 10. Current-Gain - Bandwidth Product

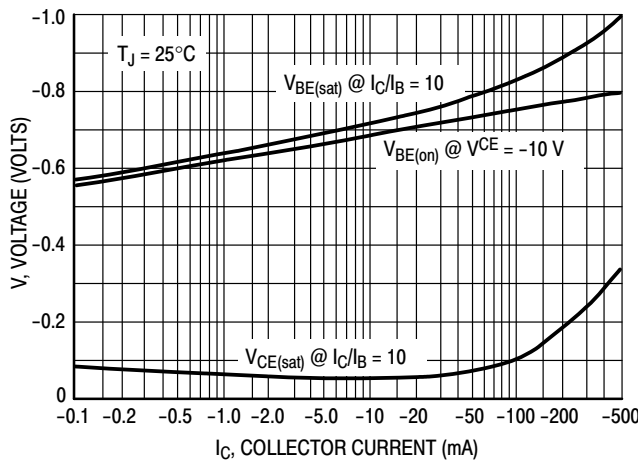


Figure 11. "On" Voltage

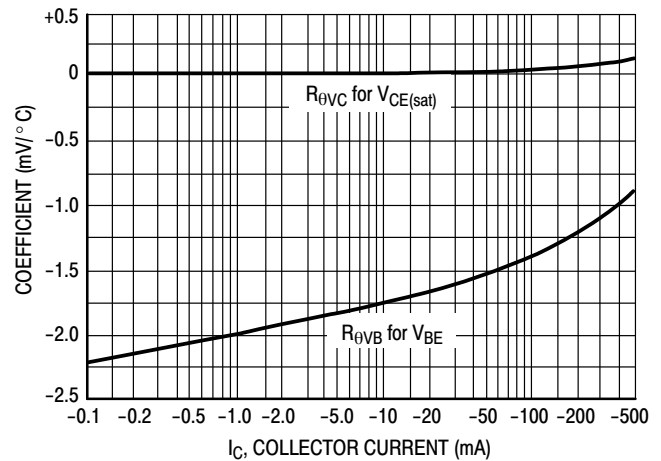


Figure 12. Temperature Coefficients

# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

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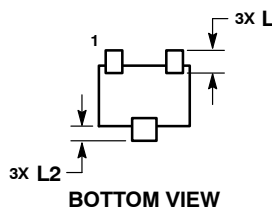
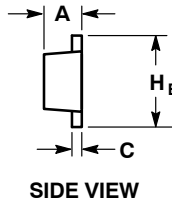
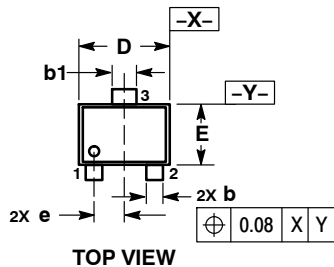
ON



SCALE 4:1

## SOT-723 CASE 631AA-01 ISSUE D

DATE 10 AUG 2009



STYLE 1:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR

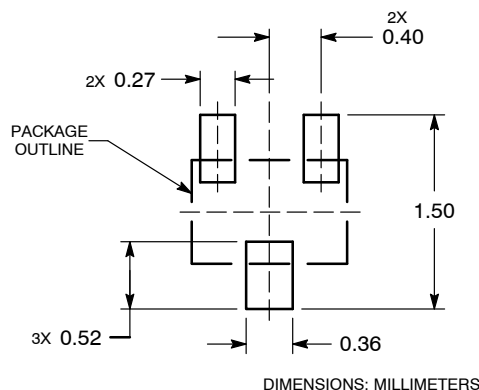
STYLE 2:  
PIN 1. ANODE  
2. N/C  
3. CATHODE

STYLE 3:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

STYLE 4:  
PIN 1. CATHODE  
2. CATHODE  
3. ANODE

STYLE 5:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN

### RECOMMENDED SOLDERING FOOTPRINT\*



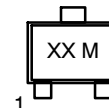
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

#### 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 E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	0.45	0.50	0.55
b	0.15	0.21	0.27
b1	0.25	0.31	0.37
C	0.07	0.12	0.17
D	1.15	1.20	1.25
E	0.75	0.80	0.85
e	0.40 BSC		
H E	1.15	1.20	1.25
L	0.29 REF		
L2	0.15	0.20	0.25

### GENERIC MARKING DIAGRAM\*



XX = Specific Device Code  
M = Date Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G", may or not be present.

DOCUMENT NUMBER: 98AON12989D

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DESCRIPTION: SOT-723

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