

# PNP General Purpose Transistor

## MMBT2907AM3T5G

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

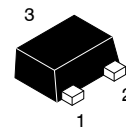
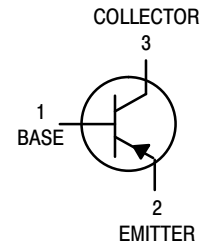
| Rating                         | Symbol    | Value | Unit |
|--------------------------------|-----------|-------|------|
| Collector–Emitter Voltage      | $V_{CEO}$ | –60   | Vdc  |
| Collector–Base Voltage         | $V_{CBO}$ | –60   | Vdc  |
| Emitter–Base Voltage           | $V_{EBO}$ | –5.0 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

### THERMAL CHARACTERISTICS

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

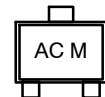
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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.



SOT-723  
CASE 631AA  
STYLE 1

### MARKING DIAGRAM



AC = Specific Device Code  
M = Date Code

### ORDERING INFORMATION

| Device            | Package              | Shipping†           |
|-------------------|----------------------|---------------------|
| MMBT2907AM3T5G    | SOT-723<br>(Pb-Free) | 8000/Tape<br>& Reel |
| NSVMMBT2907AM3T5G | SOT-723<br>(Pb-Free) | 8000/Tape<br>& 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 ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic                                                                                                                                 | Symbol        | Min  | Max           | Unit            |
|------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------|---------------|-----------------|
| <b>OFF CHARACTERISTICS</b>                                                                                                                     |               |      |               |                 |
| Collector–Emitter Breakdown Voltage (Note 3)<br>( $I_C = -10\text{ mA}$ , $I_B = 0$ )                                                          | $V_{(BR)CEO}$ | -60  | –             | Vdc             |
| Collector–Base Breakdown Voltage<br>( $I_C = -10\text{ }\mu\text{A}$ , $I_E = 0$ )                                                             | $V_{(BR)CBO}$ | -60  | –             | Vdc             |
| Emitter–Base Breakdown Voltage<br>( $I_E = -10\text{ }\mu\text{A}$ , $I_C = 0$ )                                                               | $V_{(BR)EBO}$ | -5.0 | –             | Vdc             |
| Collector Cutoff Current<br>( $V_{CE} = -30\text{ Vdc}$ , $V_{EB(off)} = -0.5\text{ Vdc}$ )                                                    | $I_{CEX}$     | –    | -50           | nAdc            |
| Collector Cutoff Current<br>( $V_{CB} = -50\text{ Vdc}$ , $I_E = 0$ )<br>( $V_{CB} = -50\text{ Vdc}$ , $I_E = 0$ , $T_A = 125^\circ\text{C}$ ) | $I_{CBO}$     | –    | -0.010<br>-10 | $\mu\text{Adc}$ |
| Base Cutoff Current<br>( $V_{CE} = -30\text{ Vdc}$ , $V_{EB(off)} = -0.5\text{ Vdc}$ )                                                         | $I_{BL}$      | –    | -50           | nAdc            |

## ON CHARACTERISTICS

|                                                                                                                                                                                                                                                                                                                           |               |                               |                         |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------|-------------------------|-----|
| DC Current Gain<br>( $I_C = -0.1\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ )<br>( $I_C = -1.0\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ )<br>( $I_C = -10\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ )<br>( $I_C = -150\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ )<br>( $I_C = -500\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ ) (Note 3) | $h_{FE}$      | 75<br>100<br>100<br>100<br>50 | –<br>–<br>–<br>300<br>– | –   |
| Collector–Emitter Saturation Voltage (Note 3)<br>( $I_C = -150\text{ mA}$ , $I_B = -15\text{ mA}$ ) (Note 3)<br>( $I_C = -500\text{ mA}$ , $I_B = -50\text{ mA}$ )                                                                                                                                                        | $V_{CE(sat)}$ | –<br>–                        | -0.4<br>-1.6            | Vdc |
| Base–Emitter Saturation Voltage (Note 3)<br>( $I_C = -150\text{ mA}$ , $I_B = -15\text{ mA}$ )<br>( $I_C = -500\text{ mA}$ , $I_B = -50\text{ mA}$ )                                                                                                                                                                      | $V_{BE(sat)}$ | –<br>–                        | -1.3<br>-2.6            | Vdc |

## SMALL–SIGNAL CHARACTERISTICS

|                                                                                                                               |           |     |     |     |
|-------------------------------------------------------------------------------------------------------------------------------|-----------|-----|-----|-----|
| Current–Gain – Bandwidth Product (Notes 3, 4)<br>( $I_C = -50\text{ mA}$ , $V_{CE} = -20\text{ Vdc}$ , $f = 100\text{ MHz}$ ) | $f_T$     | 200 | –   | MHz |
| Output Capacitance<br>( $V_{CB} = -10\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )                                        | $C_{obo}$ | –   | 8.0 | pF  |
| Input Capacitance<br>( $V_{EB} = -2.0\text{ Vdc}$ , $I_C = 0$ , $f = 1.0\text{ MHz}$ )                                        | $C_{ibo}$ | –   | 30  |     |

## SWITCHING CHARACTERISTICS

|               |                                                                                               |           |   |     |    |
|---------------|-----------------------------------------------------------------------------------------------|-----------|---|-----|----|
| Turn–On Time  | $(V_{CC} = -30\text{ Vdc}$ , $I_C = -150\text{ mA}$ ,<br>$I_{B1} = -15\text{ mA}$ )           | $t_{on}$  | – | 45  | ns |
| Delay Time    |                                                                                               | $t_d$     | – | 10  |    |
| Rise Time     |                                                                                               | $t_r$     | – | 40  |    |
| Turn–Off Time | $(V_{CC} = -6.0\text{ Vdc}$ , $I_C = -150\text{ mA}$ ,<br>$I_{B1} = I_{B2} = -15\text{ mA}$ ) | $t_{off}$ | – | 100 |    |
| Storage Time  |                                                                                               | $t_s$     | – | 80  |    |
| Fall Time     |                                                                                               | $t_f$     | – | 30  |    |

3. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

4.  $f_T$  is defined as the frequency at which  $|h_{fe}|$  extrapolates to unity.

# MMBT2907AM3T5G

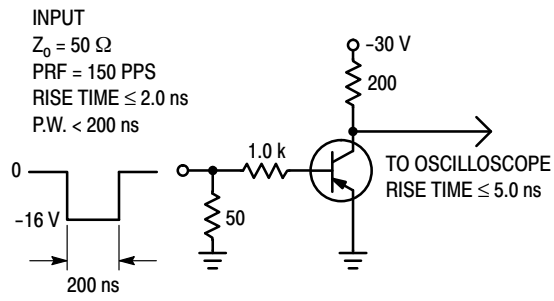


Figure 1. Delay and Rise Time Test Circuit

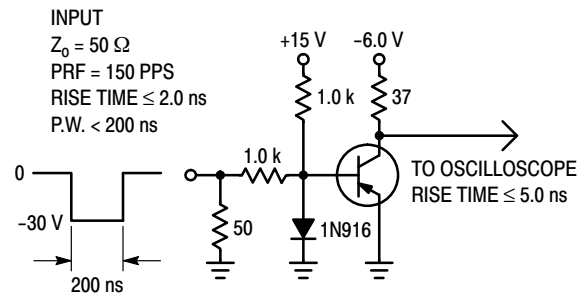


Figure 2. Storage and Fall Time Test Circuit

# MMBT2907AM3T5G

## TYPICAL CHARACTERISTICS

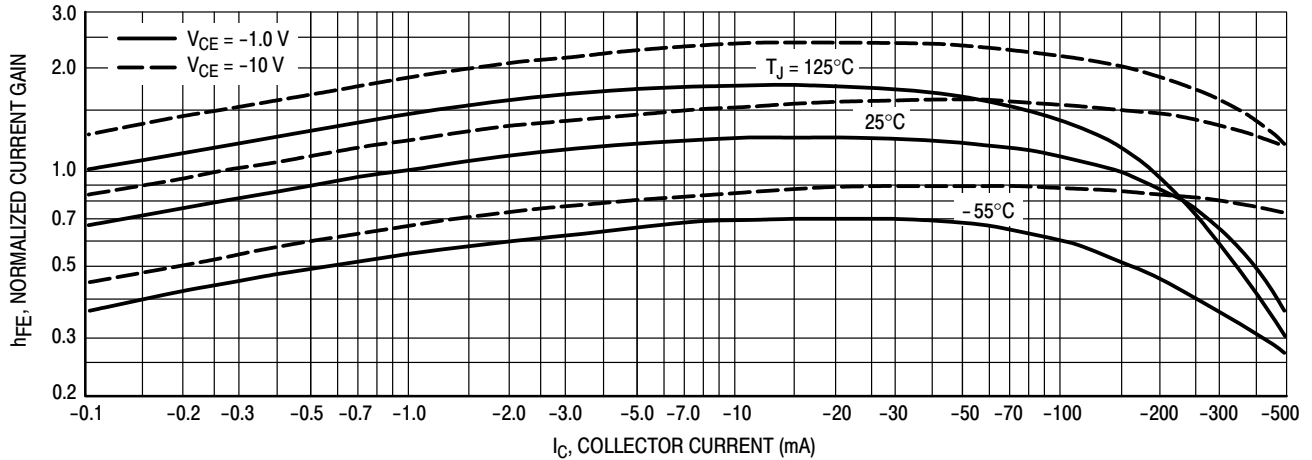


Figure 3. DC Current Gain

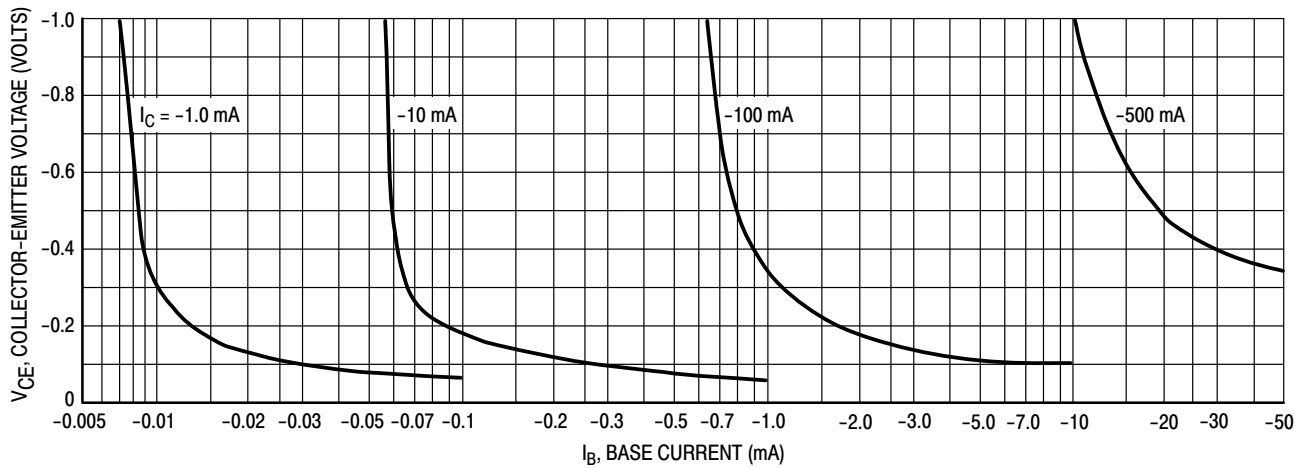


Figure 4. Collector Saturation Region

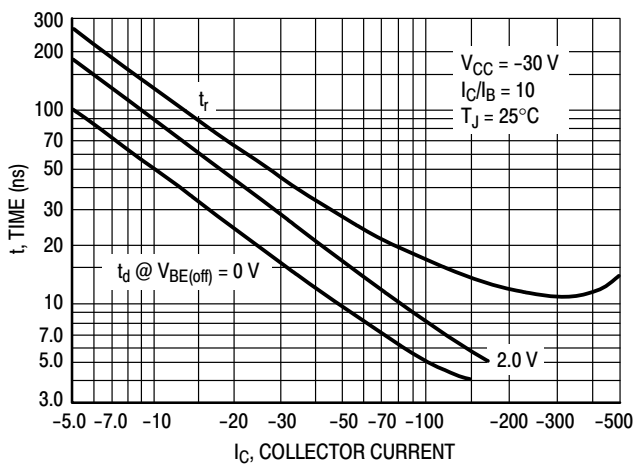


Figure 5. Turn-On Time

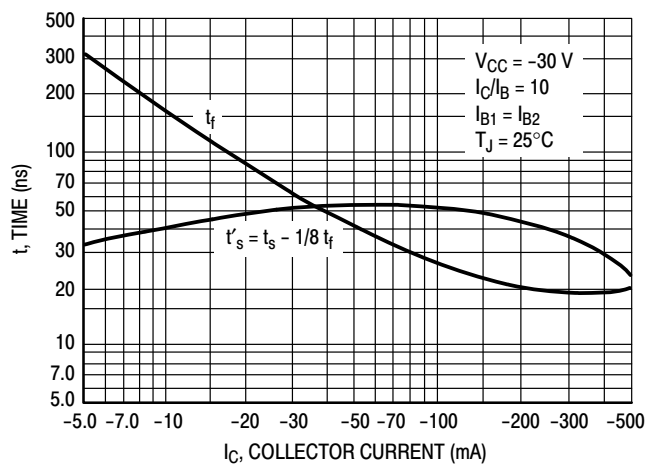


Figure 6. Turn-Off Time

# MMBT2907AM3T5G

## TYPICAL SMALL-SIGNAL Characteristics NOISE FIGURE

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

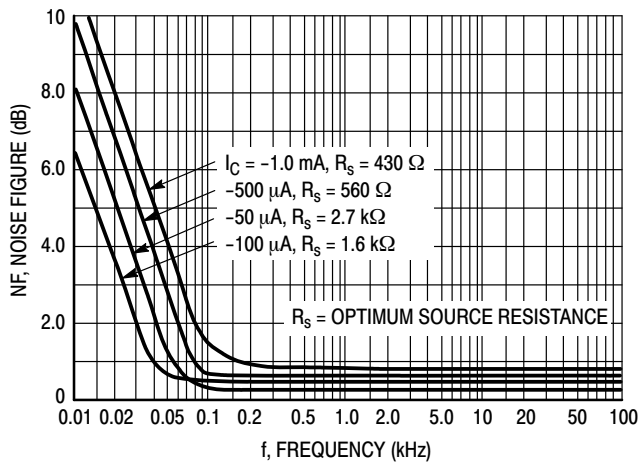


Figure 7. Frequency Effects

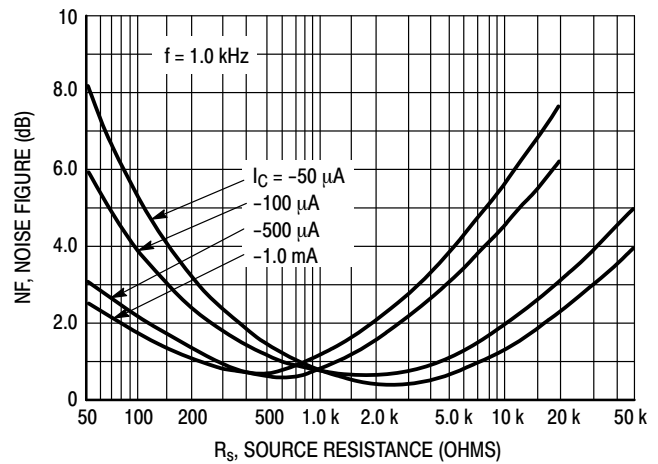


Figure 8. Source Resistance Effects

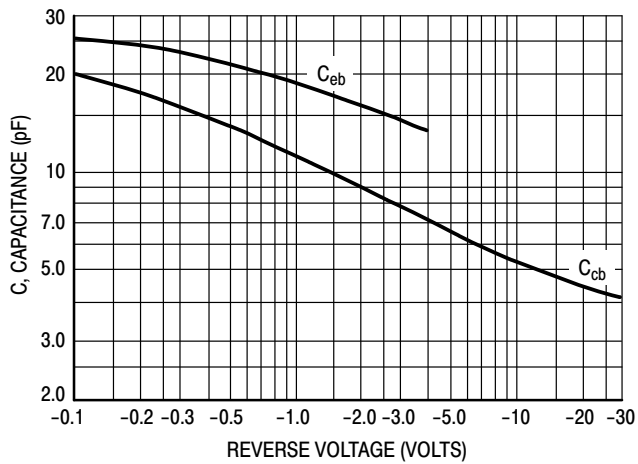


Figure 9. Capacitances

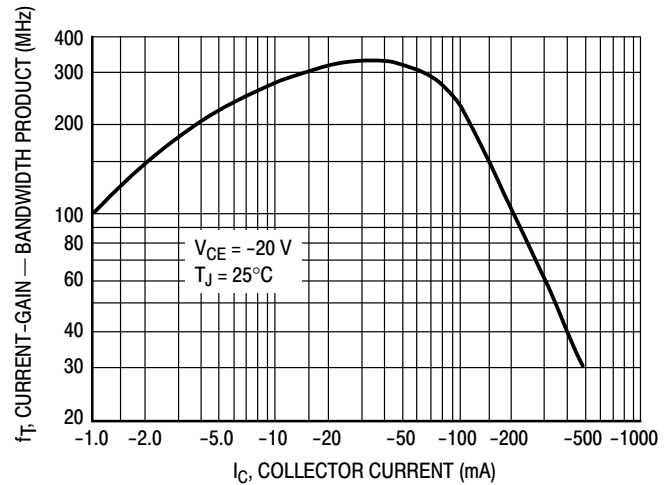


Figure 10. Current-Gain - Bandwidth Product

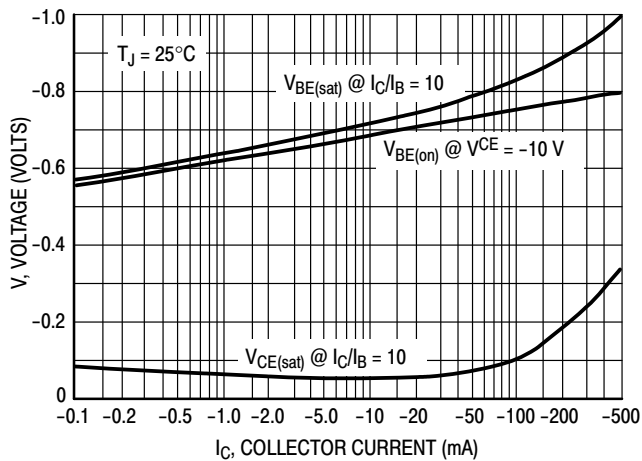


Figure 11. "On" Voltage

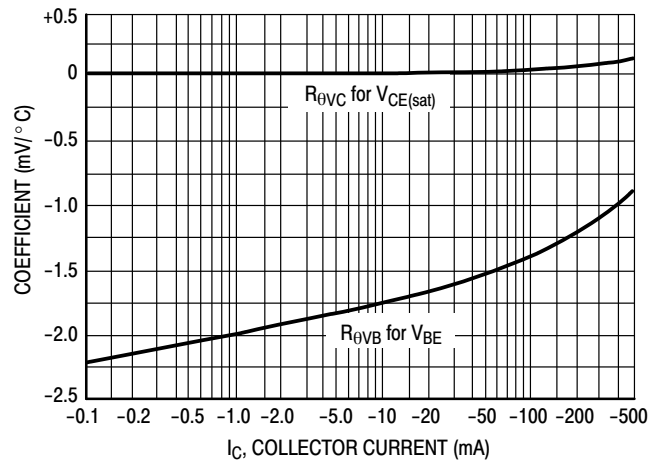
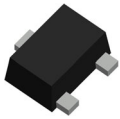


Figure 12. Temperature Coefficients

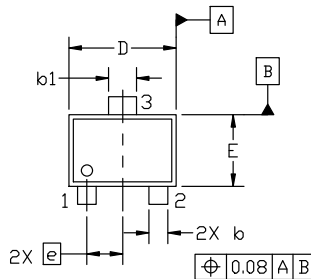


**SOT-723 1.20x0.80x0.50, 0.40P**  
**CASE 631AA**  
**ISSUE E**

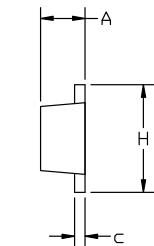
DATE 24 JAN 2024

NOTES:

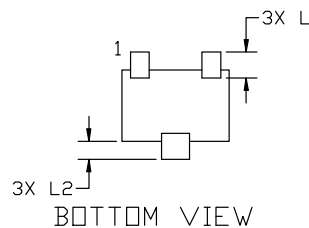
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.



TOP VIEW

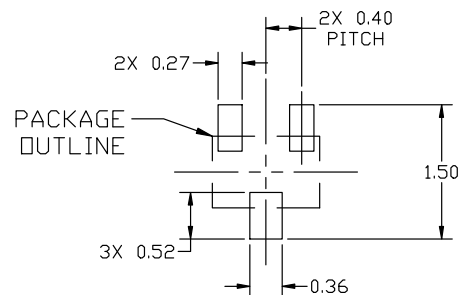


SIDE VIEW



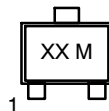
BOTTOM VIEW

| 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   | 1.15        | 1.20 | 1.25 |
| L   | 0.29 REF    |      |      |
| L2  | 0.15        | 0.20 | 0.25 |



RECOMMENDED MOUNTING  
FOOTPRINT

**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" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

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

|                                                       |                                                  |                                                    |                                                      |                                                  |
|-------------------------------------------------------|--------------------------------------------------|----------------------------------------------------|------------------------------------------------------|--------------------------------------------------|
| STYLE 1:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR | STYLE 2:<br>PIN 1. ANODE<br>2. N/C<br>3. CATHODE | STYLE 3:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE | STYLE 4:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. ANODE | STYLE 5:<br>PIN 1. GATE<br>2. SOURCE<br>3. DRAIN |
|-------------------------------------------------------|--------------------------------------------------|----------------------------------------------------|------------------------------------------------------|--------------------------------------------------|

|                         |                                      |                                                                                                                                                                                  |
|-------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| <b>DESCRIPTION:</b>     | <b>SOT-723 1.20x0.80x0.50, 0.40P</b> | <b>PAGE 1 OF 1</b>                                                                                                                                                               |

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