

# General Purpose Transistor

## PNP Silicon

### MMBT2907AWT1G, NSVMMBT2907AWT1G

These transistors are designed for general purpose amplifier applications. They are housed in the SC-70/SOT-323 package which is designed for low power surface mount applications.

#### Features

- 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

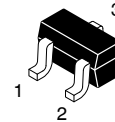
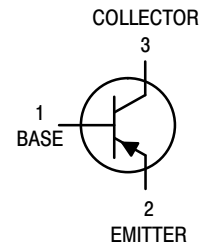
| Rating                         | Symbol    | Value | Unit |
|--------------------------------|-----------|-------|------|
| Collector–Emitter Voltage      | $V_{CEO}$ | –60   | Vdc  |
| Collector–Base Voltage         | $V_{CBO}$ | –60   | Vdc  |
| Emitter–Base Voltage           | $V_{EBO}$ | –5.0 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

#### THERMAL CHARACTERISTICS

| Characteristic                                                           | Symbol          | Max         | Unit                      |
|--------------------------------------------------------------------------|-----------------|-------------|---------------------------|
| Total Device Dissipation FR–5 Board<br>(Note 1) $T_A = 25^\circ\text{C}$ | $P_D$           | 150         | mW                        |
| Thermal Resistance Junction–to–Ambient                                   | $R_{\theta JA}$ | 833         | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature                                         | $T_J, T_{stg}$  | –55 to +150 | $^\circ\text{C}$          |

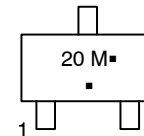
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. FR–5 = 1.0 x 0.75 x 0.062 in.



SC-70/SOT-323  
CASE 419-04  
STYLE 3

#### MARKING DIAGRAM



20 = 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 <sup>†</sup> |
|------------------|--------------------|-----------------------|
| MMBT2907AWT1G    | SC-70<br>(Pb-Free) | 3000 Tape & Reel      |
| NSVMMBT2907AWT1G | SC-70<br>(Pb-Free) | 3000 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.

# MMBT2907AWT1G, NSVMMBT2907AWT1G

## 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 2)<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  |
| Base Cutoff Current<br>( $V_{CE} = -30\text{ Vdc}$ , $V_{EB(off)} = -0.5\text{ Vdc}$ )      | $I_{BL}$      | –    | -50 | nAdc |
| Collector Cutoff Current<br>( $V_{CE} = -30\text{ Vdc}$ , $V_{EB(off)} = -0.5\text{ Vdc}$ ) | $I_{CEX}$     | –    | -50 | nAdc |

## ON CHARACTERISTICS<sup>(3)</sup>

|                                                                                                                                                                                                                                                                                                                           |               |                               |                         |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------------------|-------------------------|-----|
| DC Current Gain (Note 2)<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>( $I_C = -500\text{ mA}$ , $V_{CE} = -10\text{ Vdc}$ ) | $H_{FE}$      | 75<br>100<br>100<br>100<br>50 | –<br>–<br>–<br>340<br>– | –   |
| Collector – Emitter Saturation Voltage (Note 2)<br>( $I_C = -150\text{ mA}$ , $I_B = -15\text{ mA}$ )<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 2)<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<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  | pF  |

## SWITCHING CHARACTERISTICS

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

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.

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

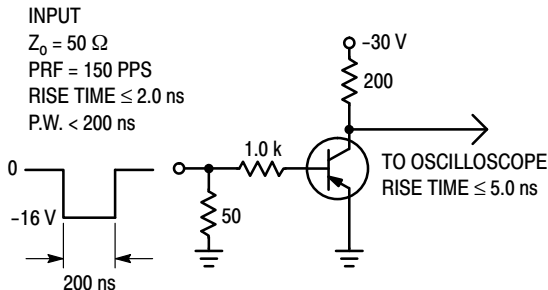


Figure 1. Delay and Rise Time Test Circuit

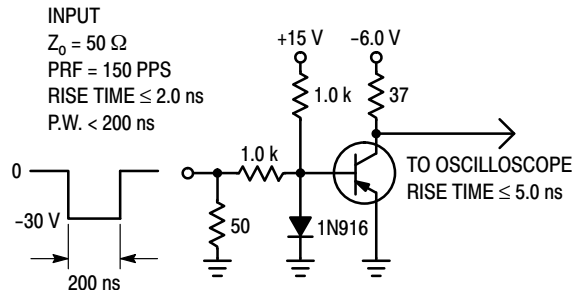


Figure 2. Storage and Fall Time Test Circuit

# MMBT2907AWT1G, NSVMMBT2907AWT1G

## TYPICAL CHARACTERISTICS

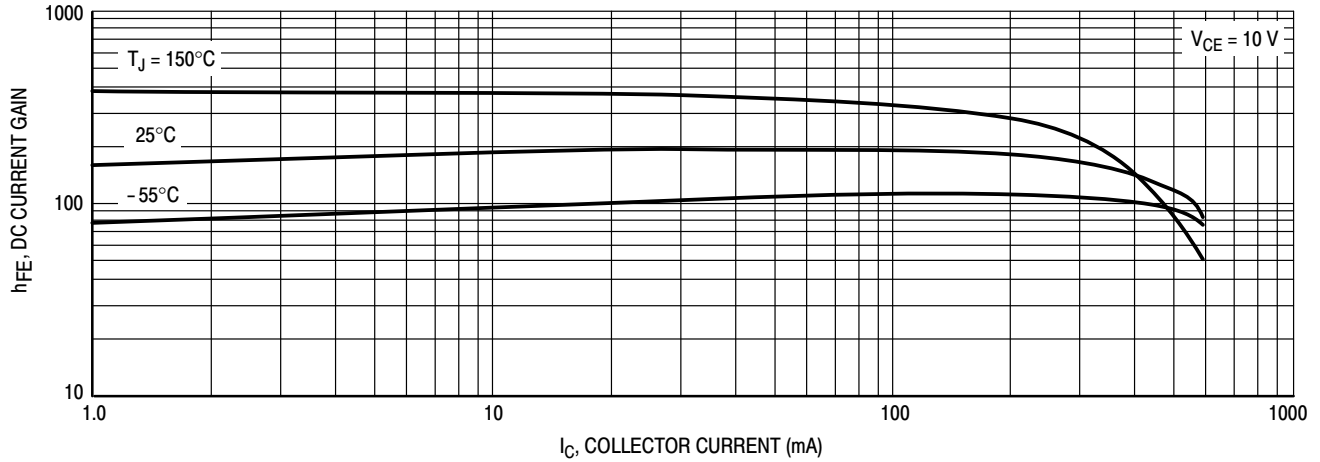


Figure 3. DC Current Gain

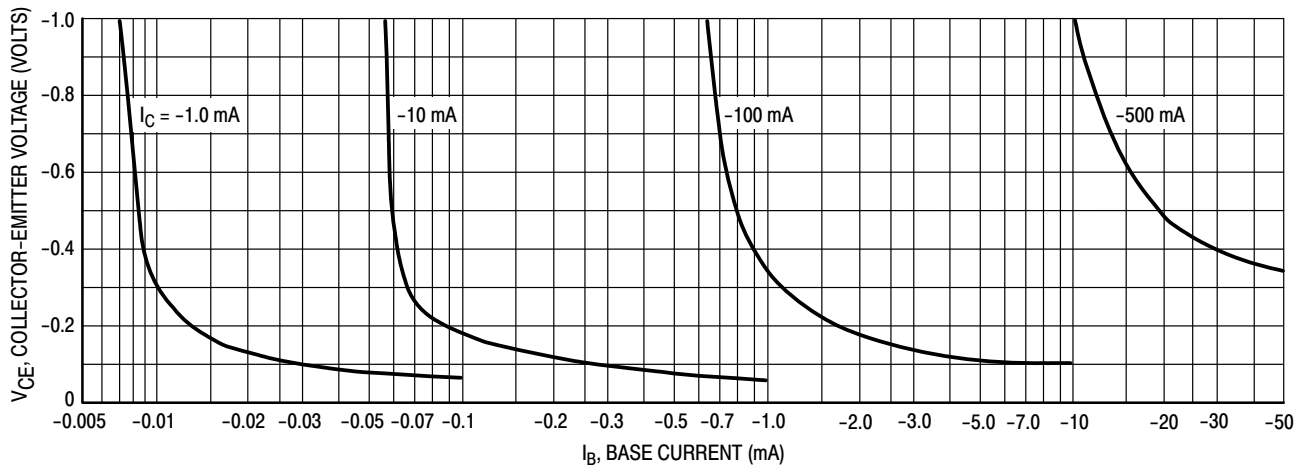


Figure 4. Collector Saturation Region

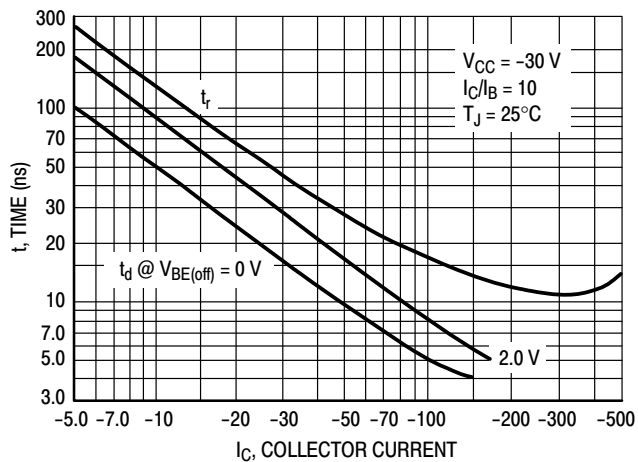


Figure 5. Turn-On Time

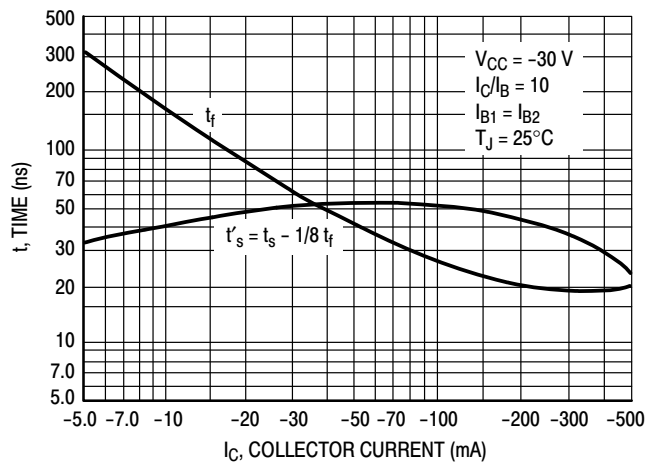


Figure 6. Turn-Off Time

# MMBT2907AWT1G, NSVMMBT2907AWT1G

## TYPICAL SMALL-SIGNAL Characteristics NOISE FIGURE

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

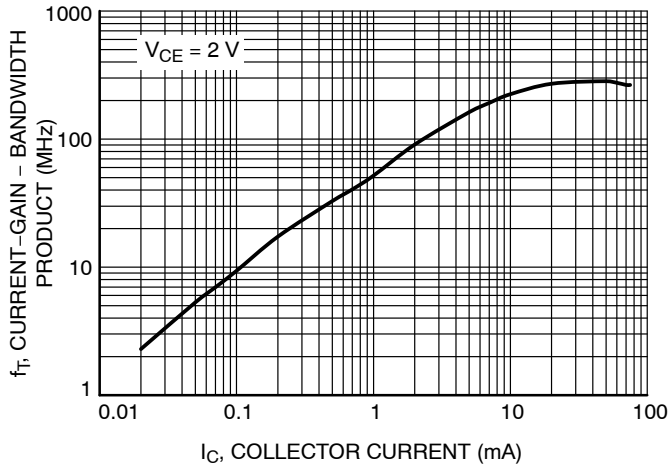


Figure 7. Current-Gain - Bandwidth Product

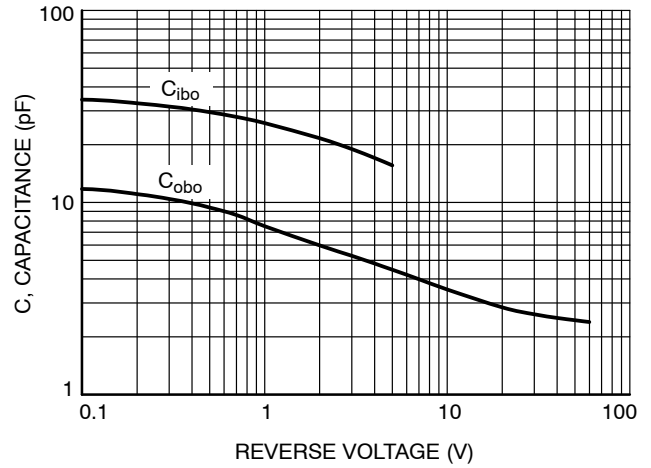


Figure 8. Capacitances

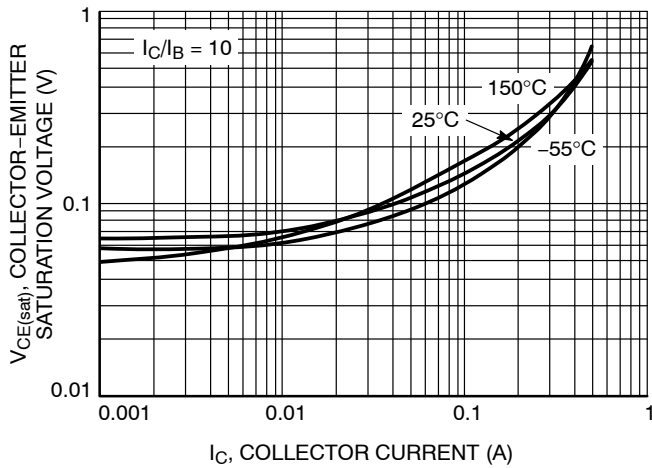


Figure 9. Collector Emitter Saturation Voltage vs. Collector Current

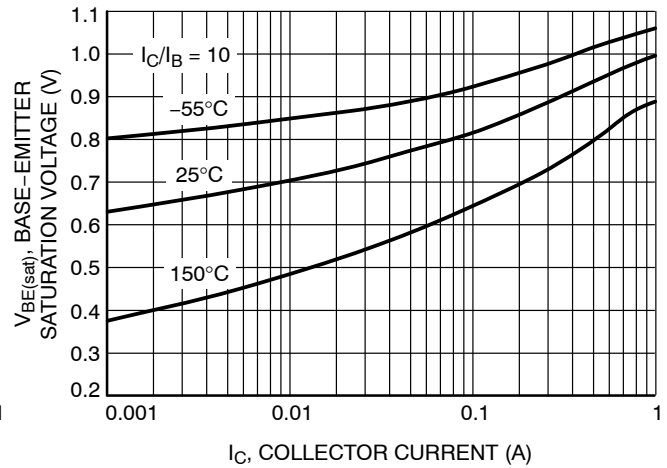


Figure 10. Base Emitter Saturation Voltage vs. Collector Current

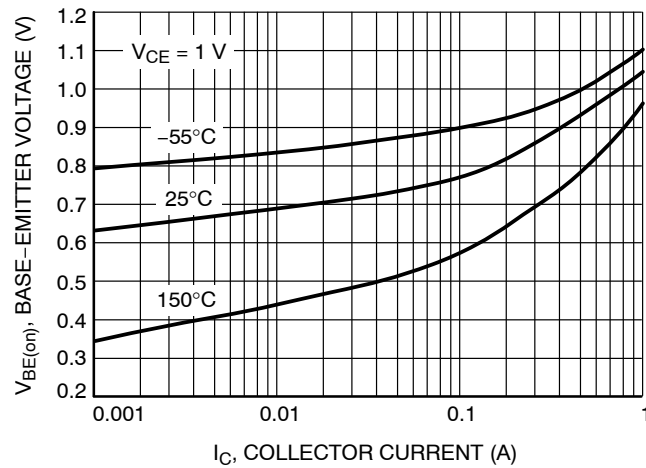
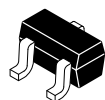


Figure 11. Base Emitter Voltage vs. Collector Current



SCALE 4:1

### SC-70 (SOT-323)

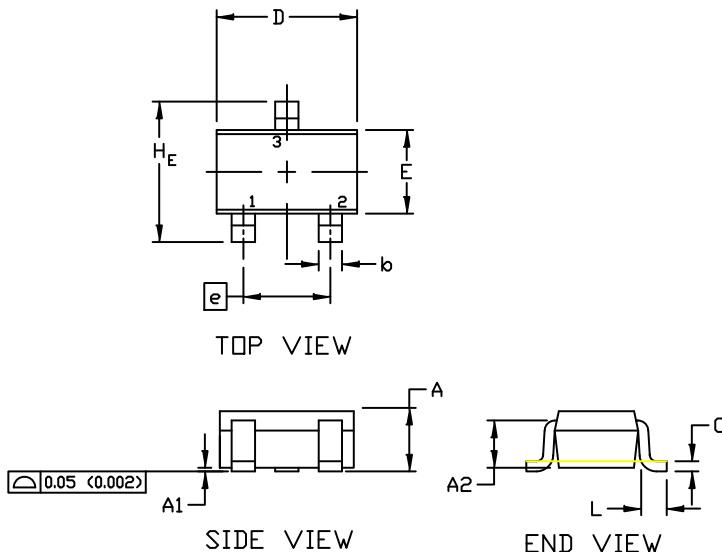
#### CASE 419

#### ISSUE P

DATE 07 OCT 2021

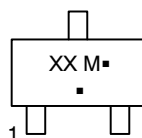
#### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH



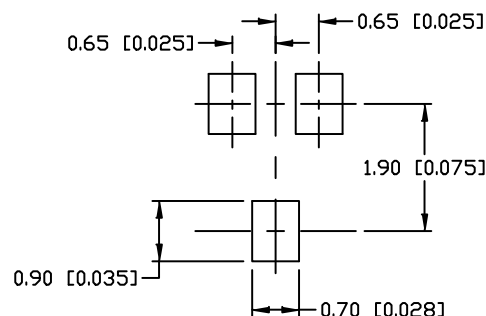
| DIM            | MILLIMETERS |      |      | INCHES    |       |       |
|----------------|-------------|------|------|-----------|-------|-------|
|                | MIN.        | NOM. | MAX. | MIN.      | NOM.  | MAX.  |
| A              | 0.80        | 0.90 | 1.00 | 0.032     | 0.035 | 0.040 |
| A1             | 0.00        | 0.05 | 0.10 | 0.000     | 0.002 | 0.004 |
| A2             | 0.70 REF    |      |      | 0.028 BSC |       |       |
| b              | 0.30        | 0.35 | 0.40 | 0.012     | 0.014 | 0.016 |
| c              | 0.10        | 0.18 | 0.25 | 0.004     | 0.007 | 0.010 |
| D              | 1.80        | 2.10 | 2.20 | 0.071     | 0.083 | 0.087 |
| E              | 1.15        | 1.24 | 1.35 | 0.045     | 0.049 | 0.053 |
| e              | 1.20        | 1.30 | 1.40 | 0.047     | 0.051 | 0.055 |
| e1             | 0.65 BSC    |      |      | 0.026 BSC |       |       |
| L              | 0.20        | 0.38 | 0.56 | 0.008     | 0.015 | 0.022 |
| H <sub>E</sub> | 2.00        | 2.10 | 2.40 | 0.079     | 0.083 | 0.095 |

#### GENERIC MARKING DIAGRAM



XX = 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.



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

#### SOLDERING FOOTPRINT

STYLE 1:  
CANCELLED

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

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

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

STYLE 5:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

STYLE 6:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

STYLE 7:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR

STYLE 8:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN

STYLE 9:  
PIN 1. ANODE  
2. CATHODE  
3. CATHODE-ANODE

STYLE 10:  
PIN 1. CATHODE  
2. ANODE  
3. ANODE-CATHODE

STYLE 11:  
PIN 1. CATHODE  
2. CATHODE  
3. CATHODE

|                  |                 |                                                                                                                                                                                  |
|------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| DESCRIPTION:     | SC-70 (SOT-323) | PAGE 1 OF 1                                                                                                                                                                      |

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