

# MMBT6427LT1

Preferred Device

## Darlington Transistor

### NPN Silicon

#### Features

- Pb-Free Package is Available

#### MAXIMUM RATINGS

| Rating                         | Symbol    | Value | Unit |
|--------------------------------|-----------|-------|------|
| Collector – Emitter Voltage    | $V_{CEO}$ | 40    | Vdc  |
| Collector – Base Voltage       | $V_{CBO}$ | 40    | Vdc  |
| Emitter – Base Voltage         | $V_{EBO}$ | 12    | Vdc  |
| Collector Current – Continuous | $I_C$     | 500   | mAdc |

#### THERMAL CHARACTERISTICS

| Characteristic                                                                                                      | Symbol          | Max         | Unit                       |
|---------------------------------------------------------------------------------------------------------------------|-----------------|-------------|----------------------------|
| Total Device Dissipation FR-5 Board,<br>(Note 1) $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$        | $P_D$           | 225<br>1.8  | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient                                                                             | $R_{\theta JA}$ | 556         | $^\circ\text{C/W}$         |
| Total Device Dissipation Alumina Substrate,<br>(Note 2) $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 300<br>2.4  | mW<br>mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient                                                                             | $R_{\theta JA}$ | 417         | $^\circ\text{C/W}$         |
| Junction and Storage Temperature                                                                                    | $T_J, T_{stg}$  | -55 to +150 | $^\circ\text{C}$           |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

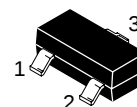
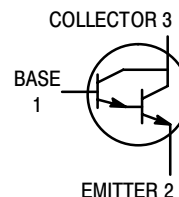
1. FR-5 = 1.0 x 0.75 x 0.062 in.

2. Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.



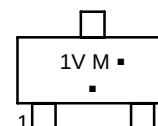
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SOT-23 (TO-236)  
CASE 318  
STYLE 6

#### MARKING DIAGRAM



1V = Device Code

M = Date Code\*

■ = Pb-Free Package

(Note: Microdot may be in either location)

\*Date Code orientation and/or overbar may vary depending upon manufacturing location.

#### ORDERING INFORMATION

| Device       | Package             | Shipping <sup>†</sup> |
|--------------|---------------------|-----------------------|
| MMBT6427LT1  | SOT-23              | 3,000 / Tape & Reel   |
| MMBT6427LT1G | SOT-23<br>(Pb-Free) | 3,000 / 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.

**Preferred** devices are recommended choices for future use and best overall value.

# MMBT6427LT1

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic                                                                         | Symbol        | Min | Max | Unit            |
|----------------------------------------------------------------------------------------|---------------|-----|-----|-----------------|
| <b>OFF CHARACTERISTICS</b>                                                             |               |     |     |                 |
| Collector – Emitter Breakdown Voltage<br>( $I_C = 10\text{ mAdc}$ , $V_{BE} = 0$ )     | $V_{(BR)CEO}$ | 40  | –   | Vdc             |
| Collector – Base Breakdown Voltage<br>( $I_C = 100\text{ }\mu\text{Adc}$ , $I_E = 0$ ) | $V_{(BR)CBO}$ | 40  | –   | Vdc             |
| Emitter – Base Breakdown Voltage<br>( $I_C = 10\text{ }\mu\text{Adc}$ , $I_C = 0$ )    | $V_{(BR)EBO}$ | 12  | –   | Vdc             |
| Collector Cutoff Current<br>( $V_{CE} = 25\text{ Vdc}$ , $I_B = 0$ )                   | $I_{CES}$     | –   | 1.0 | $\mu\text{Adc}$ |
| Collector Cutoff Current<br>( $V_{CB} = 30\text{ Vdc}$ , $I_E = 0$ )                   | $I_{CBO}$     | –   | 50  | nAdc            |
| Emitter Cutoff Current<br>( $V_{EB} = 10\text{ Vdc}$ , $I_C = 0$ )                     | $I_{EBO}$     | –   | 50  | nAdc            |

## ON CHARACTERISTICS

|                                                                                                                                                                                                 |                     |                            |                               |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------------|-------------------------------|-----|
| DC Current Gain<br>( $I_C = 10\text{ mAdc}$ , $V_{CE} = 5.0\text{ Vdc}$ )<br>( $I_C = 100\text{ mAdc}$ , $V_{CE} = 5.0\text{ Vdc}$ )<br>( $I_C = 500\text{ mAdc}$ , $V_{CE} = 5.0\text{ Vdc}$ ) | $h_{FE}$            | 10,000<br>20,000<br>14,000 | 100,000<br>200,000<br>140,000 | –   |
| Collector – Emitter Saturation Voltage<br>( $I_C = 50\text{ mAdc}$ , $I_B = 0.5\text{ mAdc}$ )<br>( $I_C = 500\text{ mAdc}$ , $I_B = 0.5\text{ mAdc}$ )                                         | $V_{CE(sat)}^{(3)}$ | –<br>–                     | 1.2<br>1.5                    | Vdc |
| Base – Emitter Saturation Voltage<br>( $I_C = 500\text{ mAdc}$ , $I_B = 0.5\text{ mAdc}$ )                                                                                                      | $V_{BE(sat)}$       | –                          | 2.0                           | Vdc |
| Base – Emitter On Voltage<br>( $I_C = 50\text{ mAdc}$ , $V_{CE} = 5.0\text{ Vdc}$ )                                                                                                             | $V_{BE(on)}$        | –                          | 1.75                          | Vdc |

## SMALL – SIGNAL CHARACTERISTICS

|                                                                                                                             |            |     |     |     |
|-----------------------------------------------------------------------------------------------------------------------------|------------|-----|-----|-----|
| Output Capacitance<br>( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )                                       | $C_{obo}$  | –   | 7.0 | pF  |
| Input Capacitance<br>( $V_{EB} = 0.5\text{ Vdc}$ , $I_C = 0$ , $f = 1.0\text{ MHz}$ )                                       | $C_{ibo}$  | –   | 15  | pF  |
| Current Gain – High Frequency<br>( $I_C = 10\text{ mAdc}$ , $V_{CE} = 5.0\text{ Vdc}$ , $f = 100\text{ MHz}$ )              | $ h_{fe} $ | 1.3 | –   | Vdc |
| Noise Figure<br>( $I_C = 1.0\text{ mAdc}$ , $V_{CE} = 5.0\text{ Vdc}$ , $R_S = 100\text{ k}\Omega$ , $f = 1.0\text{ kHz}$ ) | NF         | –   | 10  | dB  |

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

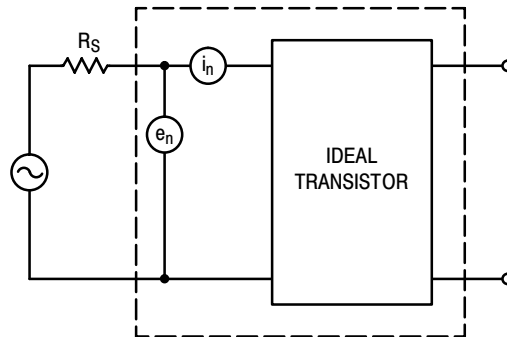


Figure 1. Transistor Noise Model

# MMBT6427LT1

## NOISE CHARACTERISTICS

( $V_{CE} = 5.0 \text{ Vdc}$ ,  $T_A = 25^\circ\text{C}$ )

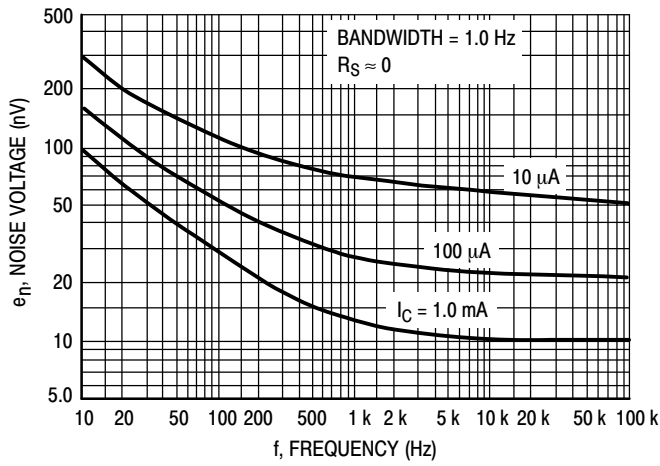


Figure 2. Noise Voltage

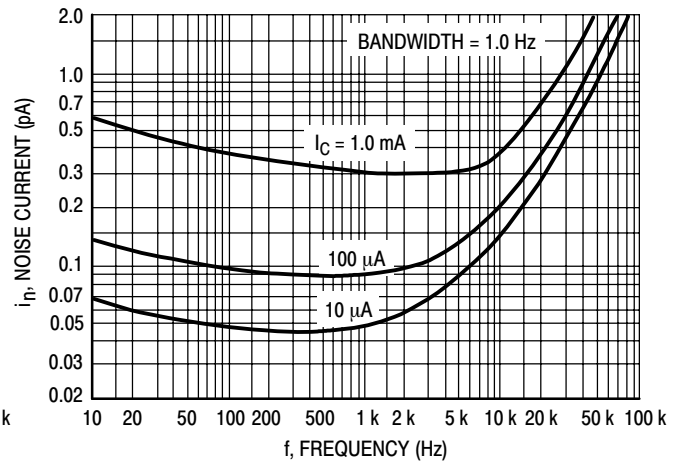


Figure 3. Noise Current

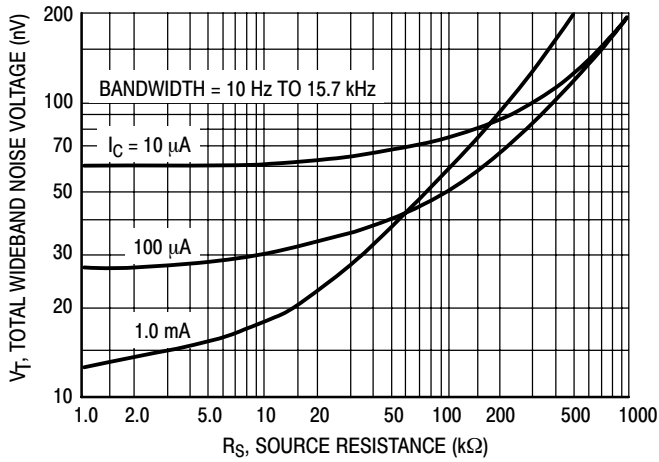


Figure 4. Total Wideband Noise Voltage

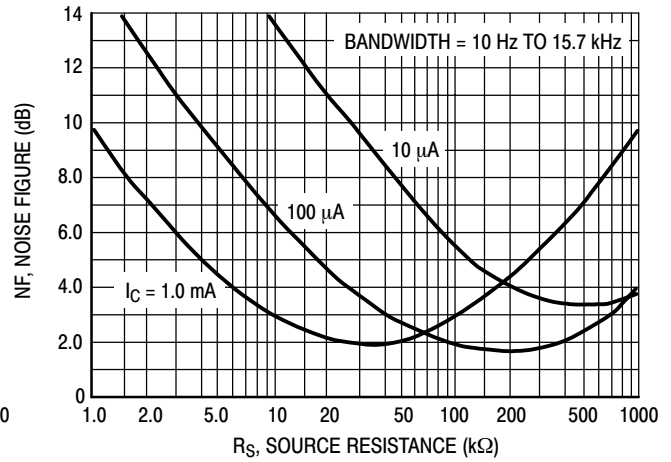


Figure 5. Wideband Noise Figure

# MMBT6427LT1

## SMALL-SIGNAL CHARACTERISTICS

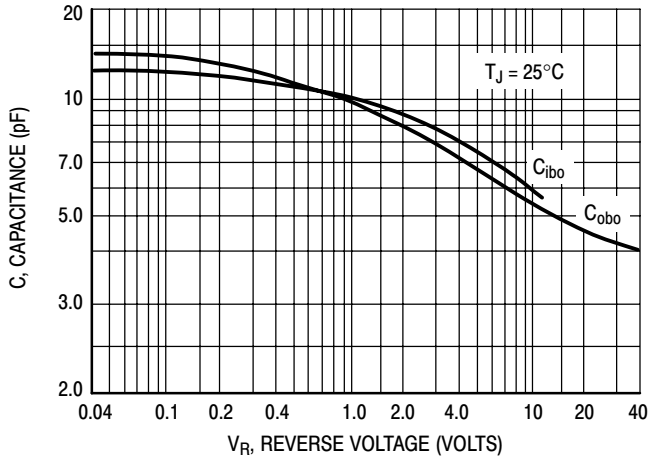


Figure 6. Capacitance

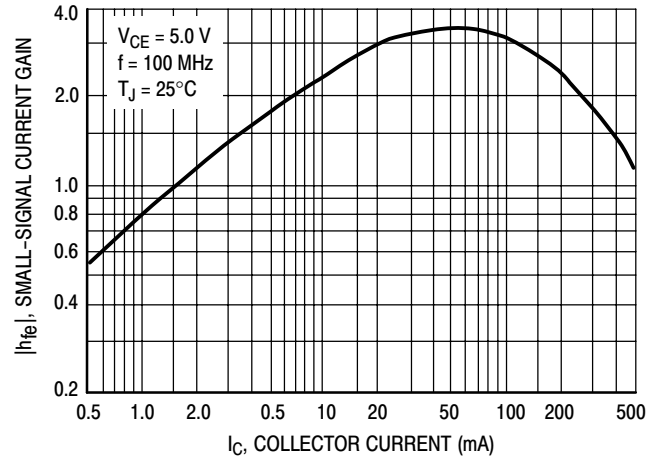


Figure 7. High Frequency Current Gain

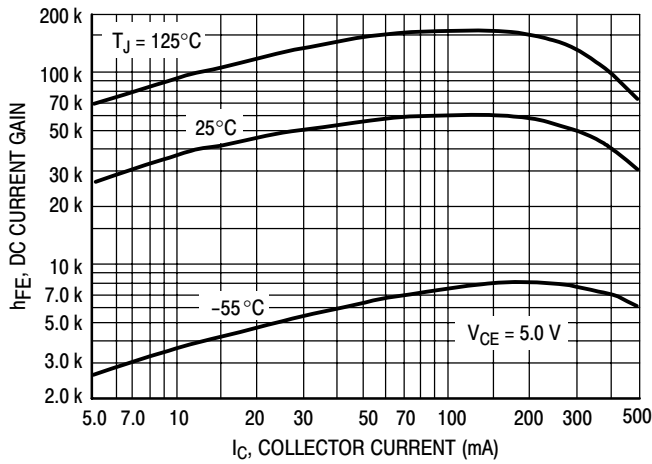


Figure 8. DC Current Gain

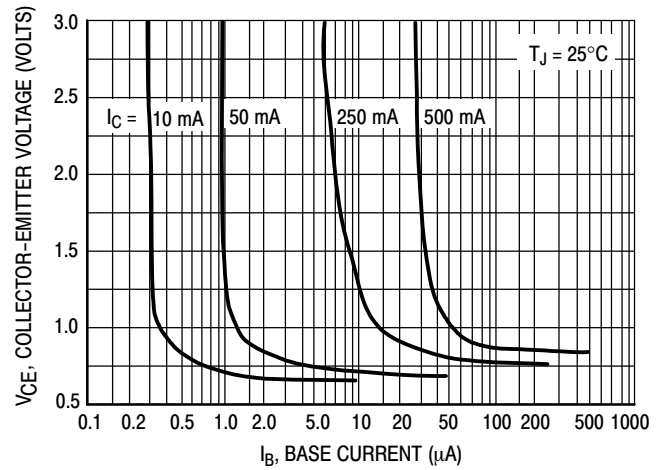


Figure 9. Collector Saturation Region

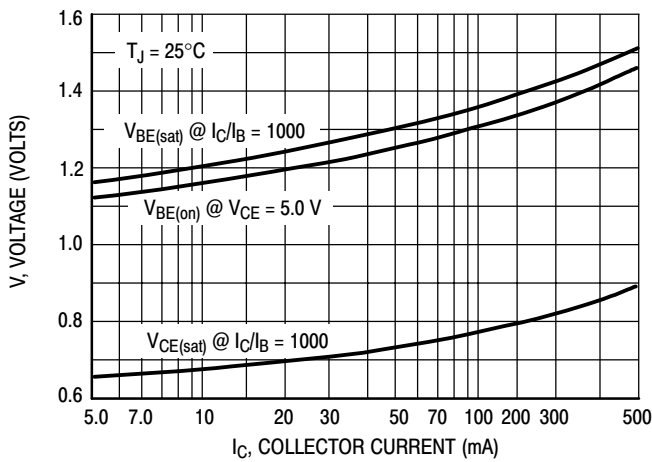


Figure 10. "On" Voltages

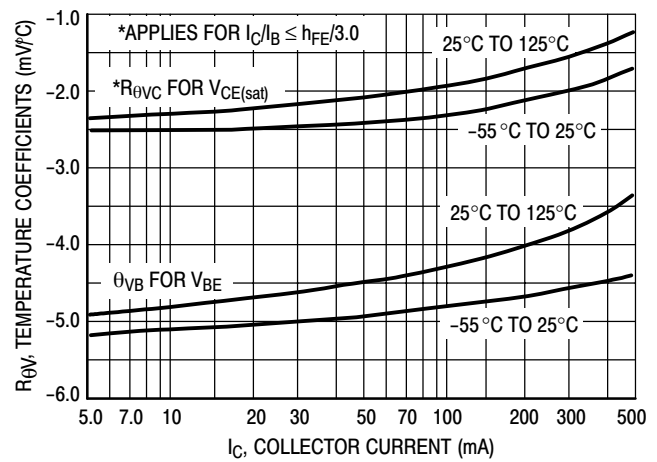


Figure 11. Temperature Coefficients

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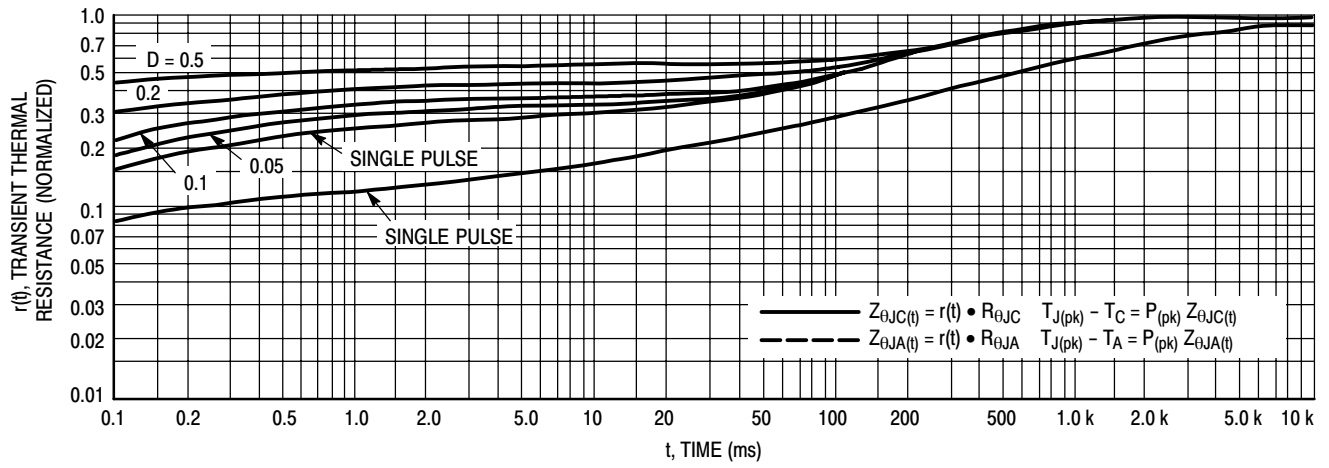
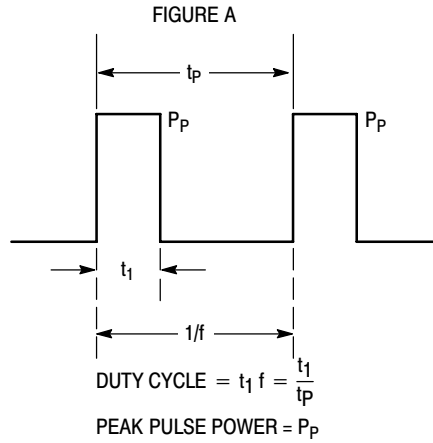


Figure 12. Thermal Response

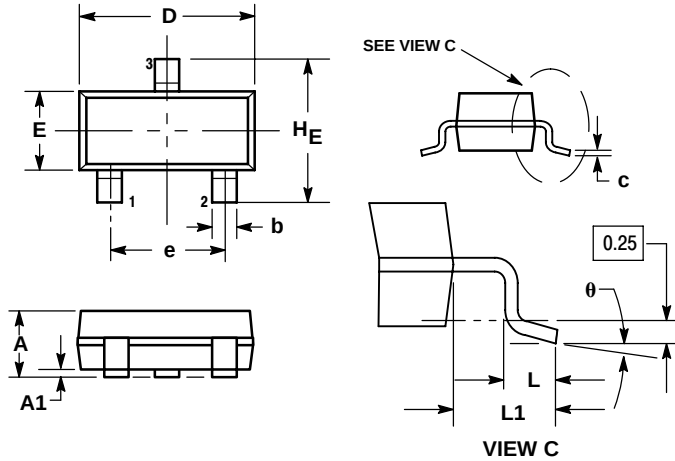


Design Note: Use of Transient Thermal Resistance Data

# MMBT6427LT1

## PACKAGE DIMENSIONS

### SOT-23 (TO-236) CASE 318-08 ISSUE AN



#### NOTES:

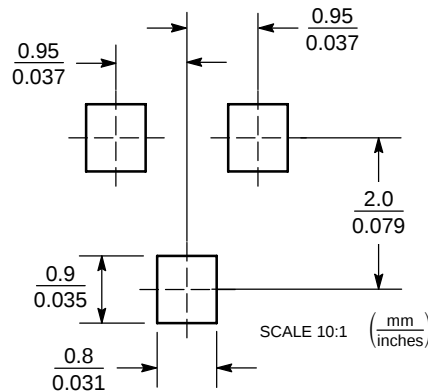
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-01 THRU -07 AND -09 OBSOLETE, NEW STANDARD 318-08.

| DIM | MILLIMETERS |      |      | INCHES |       |       |
|-----|-------------|------|------|--------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A   | 0.89        | 1.00 | 1.11 | 0.035  | 0.040 | 0.044 |
| A1  | 0.01        | 0.06 | 0.10 | 0.001  | 0.002 | 0.004 |
| b   | 0.37        | 0.44 | 0.50 | 0.015  | 0.018 | 0.020 |
| c   | 0.09        | 0.13 | 0.18 | 0.003  | 0.005 | 0.007 |
| D   | 2.80        | 2.90 | 3.04 | 0.110  | 0.114 | 0.120 |
| E   | 1.20        | 1.30 | 1.40 | 0.047  | 0.051 | 0.055 |
| e   | 1.78        | 1.90 | 2.04 | 0.070  | 0.075 | 0.081 |
| L   | 0.10        | 0.20 | 0.30 | 0.004  | 0.008 | 0.012 |
| L1  | 0.35        | 0.54 | 0.69 | 0.014  | 0.021 | 0.029 |
| HE  | 2.10        | 2.40 | 2.64 | 0.083  | 0.094 | 0.104 |

#### STYLE 6:

1. BASE
2. EMITTER
3. COLLECTOR

### 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.

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