

MMBT5550L, MMBT5551L, SMMBT5551L



High Voltage Transistors

NPN Silicon

Features

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

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|-----------|-----------------|------|
| Collector - Emitter Voltage MMBT5550 MMBT5551, SMMBT5551 | V_{CEO} | 140 160 | Vdc |
| Collector - Base Voltage MMBT5550 MMBT5551, SMMBT5551 | V_{CBO} | 160 180 | Vdc |
| Emitter - Base Voltage | V_{EBO} | 6.0 | Vdc |
| Collector Current - Continuous | I_C | 600 | mAdc |
| Electrostatic Discharge Human Body Model Machine Model | ESD | > 8000 > 400 | V |

THERMAL CHARACTERISTICS

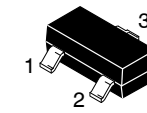
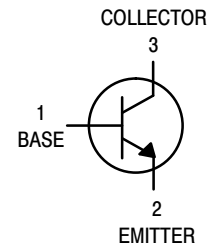
| Characteristic | Symbol | Max | Unit |
|--|-----------------|-------------|----------------------------|
| Total Device Dissipation FR-5 Board (Note 1) @ $T_A = 25^\circ\text{C}$ Derate Above 25°C | P_D | 225 1.8 | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$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

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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.

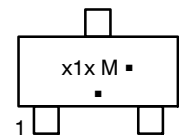
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SOT-23 (TO-236)
CASE 318
STYLE 6

MARKING DIAGRAM



x1x = Device Code
M1F = MMBT5550LT
G1 = MMBT5551LT
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† |
|---------------|---------------------|---------------------|
| MMBT5550LT1G | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| MMBT5551LT1G | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| SMMBT5551LT1G | SOT-23 (Pb-Free) | 10,000/Tape & Reel |
| MMBT5551LT1G | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| SMMBT5551LT3G | SOT-23 (Pb-Free) | 10,000/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.

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ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Max | Unit | |
|--|--|----------------------|----------------------------------|--------------------------------|--------------|
| OFF CHARACTERISTICS | | | | | |
| Collector – Emitter Breakdown Voltage (Note 3) (I _C = 1.0 mA, I _B = 0) | MMBT5550 MMBT5551, SMMBT551 | V _{(BR)CEO} | 140 160 | – – | Vdc |
| Collector – Base Breakdown Voltage (I _C = 100 μA, I _E = 0) | MMBT5550 MMBT5551, SMMBT551 | V _{(BR)CBO} | 160 180 | – – | Vdc |
| Emitter – Base Breakdown Voltage (I _E = 10 μA, I _C = 0) | | V _{(BR)EBO} | 6.0 | – | Vdc |
| Collector Cutoff Current (V _{CB} = 100 Vdc, I _E = 0) (V _{CB} = 120 Vdc, I _E = 0) (V _{CB} = 100 Vdc, I _E = 0, T _A = 100°C) (V _{CB} = 120 Vdc, I _E = 0, T _A = 100°C) | MMBT5550 MMBT5551, SMMBT551 MMBT5550 MMBT5551, SMMBT551 | I _{CBO} | – – – – | 100 50 100 50 | nAdc μAdc |
| Emitter Cutoff Current (V _{EB} = 4.0 Vdc, I _C = 0) | | I _{EBO} | – | 50 | nAdc |
| ON CHARACTERISTICS | | | | | |
| DC Current Gain (I _C = 1.0 mA, V _{CE} = 5.0 Vdc) (I _C = 10 mA, V _{CE} = 5.0 Vdc) (I _C = 50 mA, V _{CE} = 5.0 Vdc) | MMBT5550 MMBT5551, SMMBT551 MMBT5550 MMBT5551, SMMBT551 MMBT5550 MMBT5551, SMMBT551 | h _{FE} | 60 80 60 80 20 30 | – – 250 250 – – | – |
| Collector – Emitter Saturation Voltage (I _C = 10 mA, I _B = 1.0 mA) (I _C = 50 mA, I _B = 5.0 mA) | Both Types MMBT5550 MMBT5551, SMMBT551 | V _{CE(sat)} | – – – | 0.15 0.25 0.20 | Vdc |
| Base – Emitter Saturation Voltage (I _C = 10 mA, I _B = 1.0 mA) (I _C = 50 mA, I _B = 5.0 mA) | Both Types MMBT5550 MMBT5551, SMMBT551 | V _{BE(sat)} | – – – | 1.0 1.2 1.0 | Vdc |
| Collector Emitter Cut-off (V _{CB} = 10 V) (V _{CB} = 75 V) | Both Types | I _{CES} | – – | 50 100 | nA |

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

MMBT5550L, MMBT5551L, SMMBT5551L

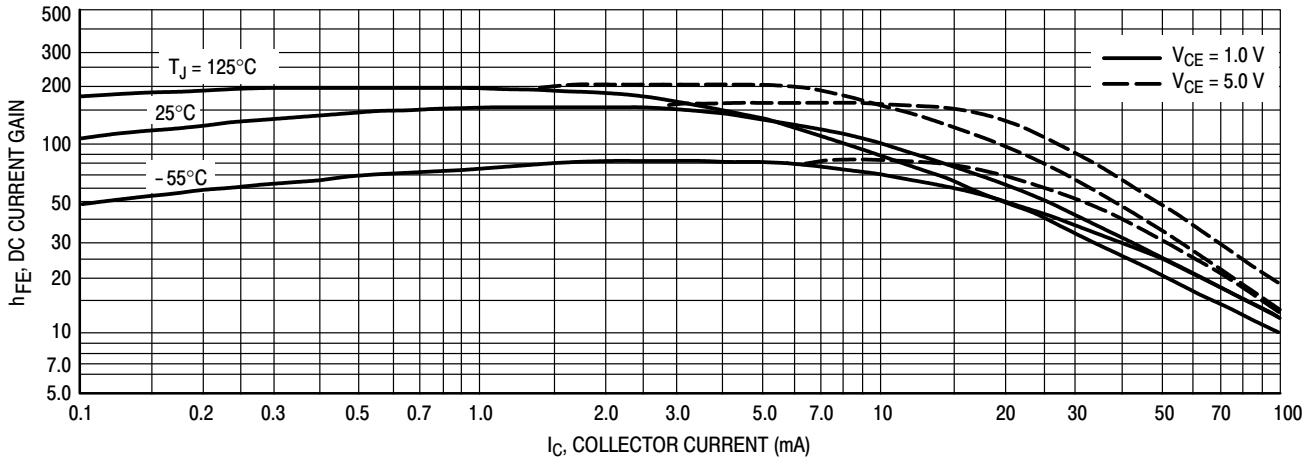


Figure 1. DC Current Gain

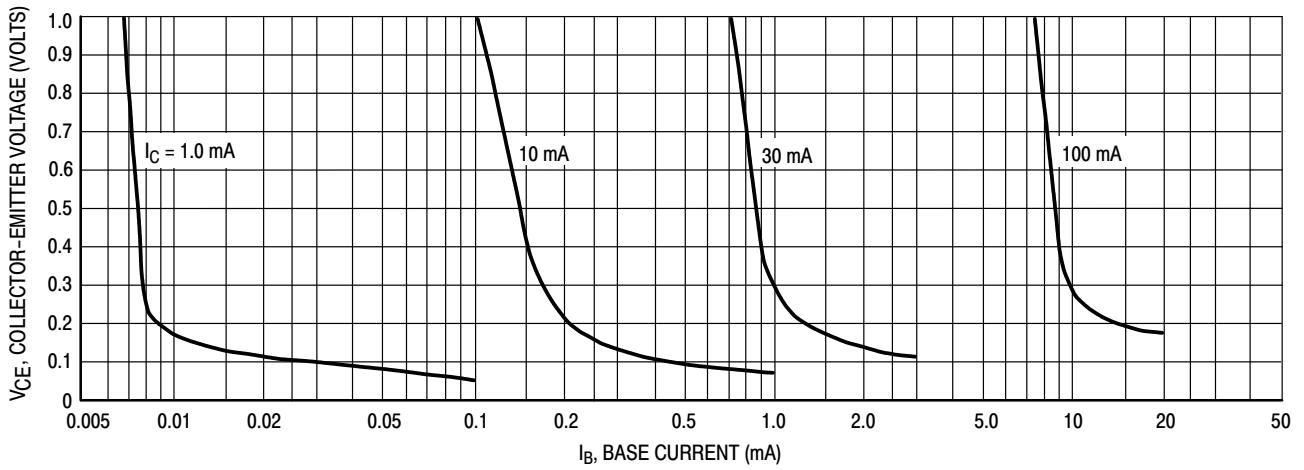


Figure 2. Collector Saturation Region

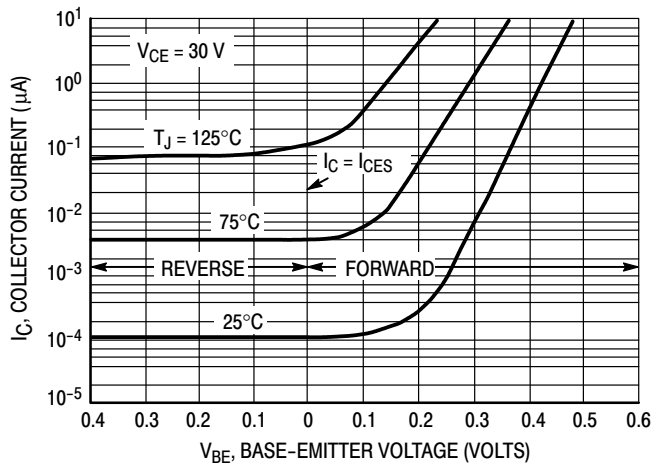


Figure 3. Collector Cut-Off Region

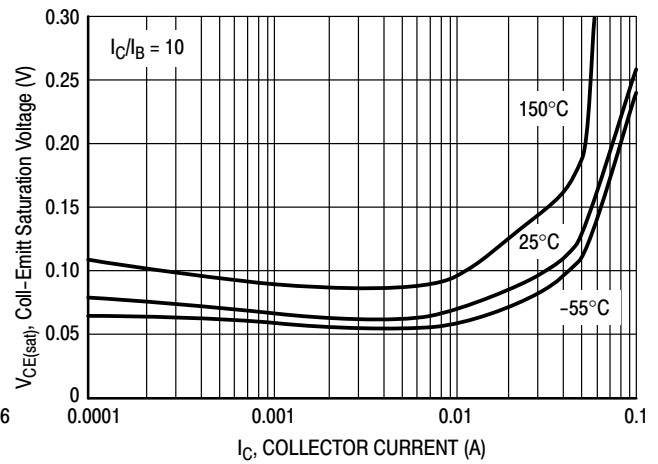


Figure 4. $V_{CE(sat)}$

MMBT5550L, MMBT5551L, SMMBT5551L

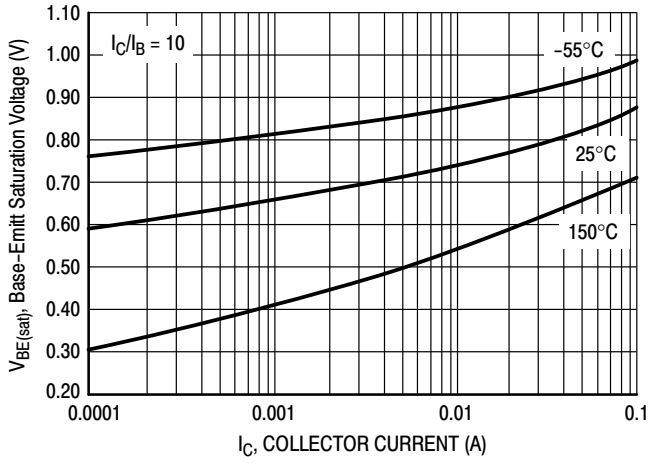


Figure 5. $V_{BE(sat)}$

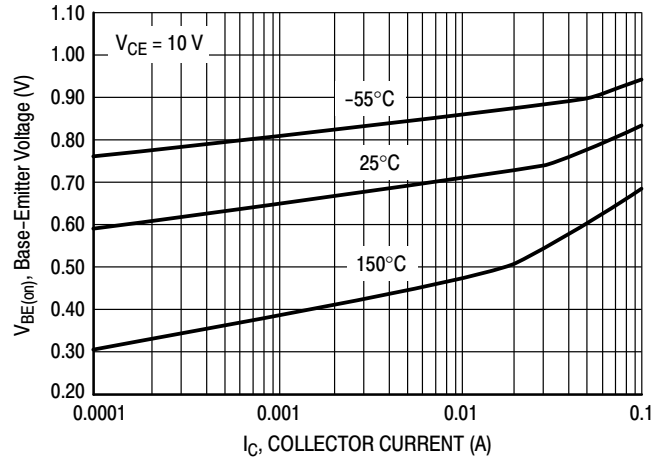


Figure 6. $V_{BE(on)}$

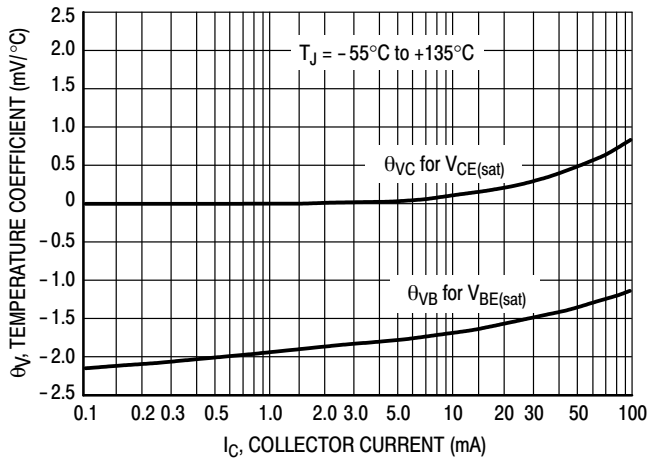


Figure 7. Temperature Coefficients

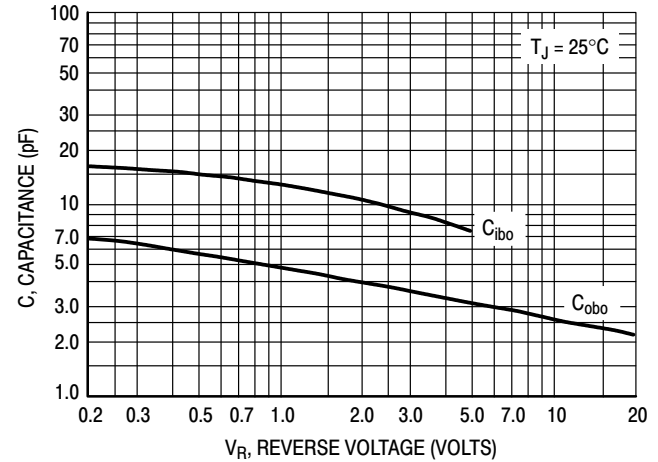
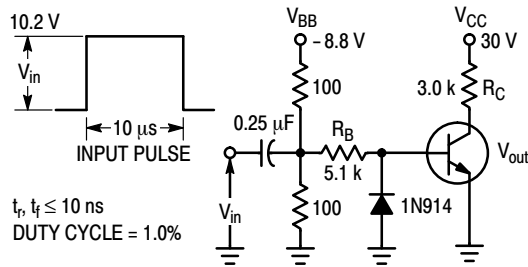


Figure 8. Capacitances



Values Shown are for $I_C @ 10 \text{ mA}$

Figure 9. Switching Time Test Circuit

MMBT5550L, MMBT5551L, SMMBT5551L

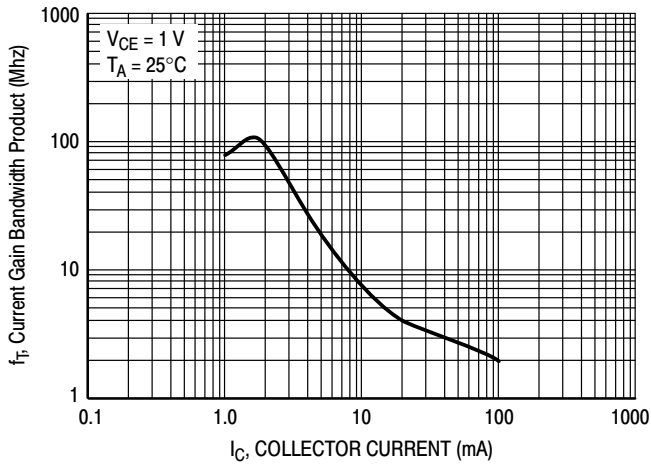


Figure 10. Current Gain Bandwidth Product

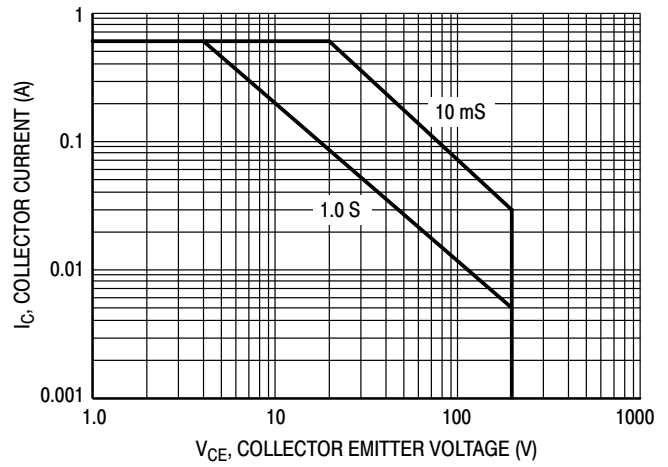


Figure 11. Safe Operating Area

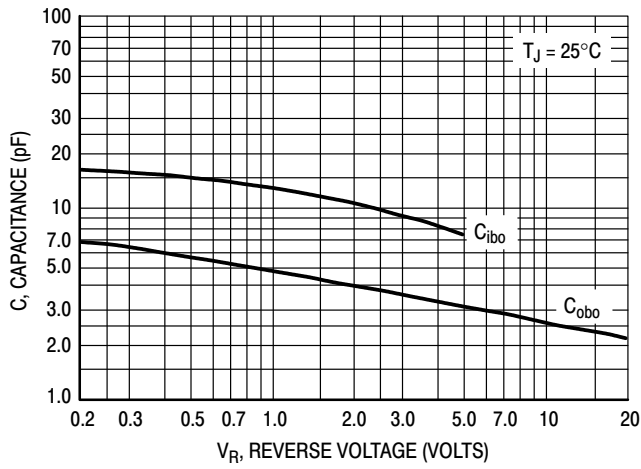


Figure 12. Capacitances

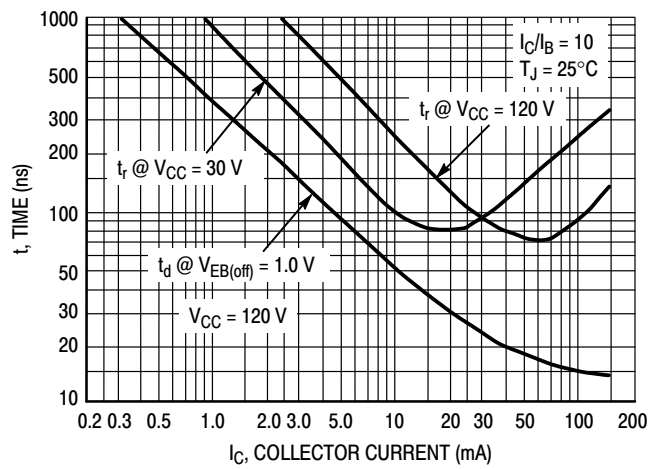
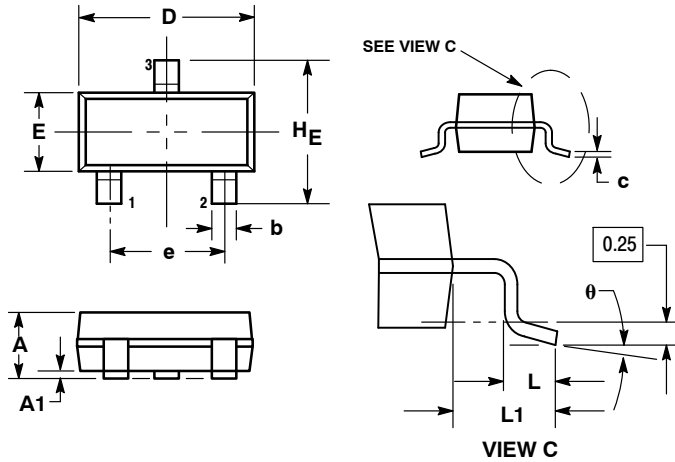


Figure 13. Turn-On Time

MMBT5550L, MMBT5551L, SMMBT5551L

PACKAGE DIMENSIONS

SOT-23 (TO-236)
CASE 318-08
ISSUE AP

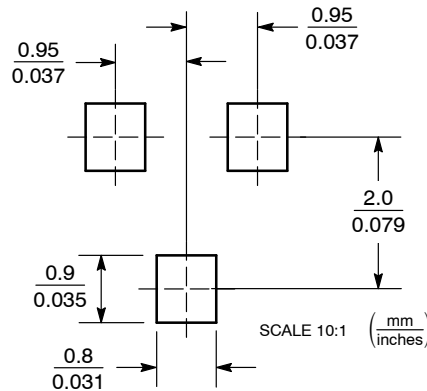


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
 4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| 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 |
| θ | 0° | --- | 10° | 0° | --- | 10° |

- STYLE 6:
PIN 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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