

BC846ALT1G Series

General Purpose Transistors

NPN Silicon

Features

- Moisture Sensitivity Level: 1
- ESD Rating – Human Body Model: >4000 V
– Machine Model: >400 V
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|-----------|-------------------|------|
| Collector-Emitter Voltage BC846 BC847, BC850 BC848, BC849 | V_{CEO} | 65 45 30 | Vdc |
| Collector-Base Voltage BC846 BC847, BC850 BC848, BC849 | V_{CBO} | 80 50 30 | Vdc |
| Emitter-Base Voltage BC846 BC847, BC850 BC848, BC849 | V_{EBO} | 6.0 6.0 5.0 | Vdc |
| Collector Current – Continuous | I_C | 100 | mAdc |

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.

THERMAL CHARACTERISTICS

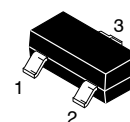
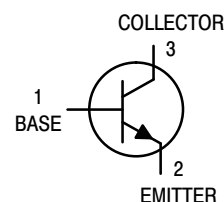
| Characteristic | Symbol | Max | Unit |
|---|-----------------|----------------|----------------------------|
| Total Device Dissipation FR-5 Board, (Note 1) $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 225 1.8 | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient (Note 1) | $R_{\theta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

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.



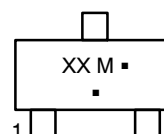
ON Semiconductor®

<http://onsemi.com>



SOT-23
CASE 318
STYLE 6

MARKING DIAGRAM



XX = 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

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

BC846ALT1G Series

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

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | | |
|---|--|----------------------|-------------------|-------------|-------------|----------|
| Collector – Emitter Breakdown Voltage (I _C = 10 mA) | BC846A,B BC847A,B,C, BC850B,C BC848A,B,C, BC849B,C | V _{(BR)CEO} | 65 45 30 | – – – | – – – | V |
| Collector – Emitter Breakdown Voltage (I _C = 10 μA, V _{EB} = 0) | BC846A,B BC847A,B,C BC850B,C BC848A,B,C, BC849B,C | V _{(BR)CES} | 80 50 30 | – – – | – – – | V |
| Collector – Base Breakdown Voltage (I _C = 10 μA) | BC846A,B BC847A,B,C, BC850B,C BC848A,B,C, BC849B,C | V _{(BR)CBO} | 80 50 30 | – – – | – – – | V |
| Emitter – Base Breakdown Voltage (I _E = 1.0 μA) | BC846A,B BC847A,B,C, BC850B,C BC848A,B,C, BC849B,C | V _{(BR)EBO} | 6.0 6.0 5.0 | – – – | – – – | V |
| Collector Cutoff Current (V _{CB} = 30 V) (V _{CB} = 30 V, T _A = 150°C) | | I _{CBO} | – – | – – | 15 5.0 | nA μA |

ON CHARACTERISTICS

| | | | | | | |
|--|---|----------------------|-------------------|-------------------|-------------------|----|
| DC Current Gain (I _C = 10 μA, V _{CE} = 5.0 V) | BC846A, BC847A, BC848A BC846B, BC847B, BC848B BC847C, BC848C | h _{FE} | – – – | 90 150 270 | – – – | – |
| (I _C = 2.0 mA, V _{CE} = 5.0 V) | BC846A, BC847A, BC848A BC846B, BC847B, BC848B, BC849B, BC850B BC847C, BC848C, BC849C, BC850C | | 110 200 420 | 180 290 520 | 220 450 800 | |
| Collector – Emitter Saturation Voltage (I _C = 10 mA, I _B = 0.5 mA) (I _C = 100 mA, I _B = 5.0 mA) | | V _{CE(sat)} | – – | – – | 0.25 0.6 | V |
| Base – Emitter Saturation Voltage (I _C = 10 mA, I _B = 0.5 mA) (I _C = 100 mA, I _B = 5.0 mA) | | V _{BE(sat)} | – – | 0.7 0.9 | – – | V |
| Base – Emitter Voltage (I _C = 2.0 mA, V _{CE} = 5.0 V) (I _C = 10 mA, V _{CE} = 5.0 V) | | V _{BE(on)} | 580 – | 660 – | 700 770 | mV |

SMALL – SIGNAL CHARACTERISTICS

| | | | | | | |
|--|--|------------------|--------|--------|-----------|-----|
| Current – Gain – Bandwidth Product (I _C = 10 mA, V _{CE} = 5.0 Vdc, f = 100 MHz) | | f _T | 100 | – | – | MHz |
| Output Capacitance (V _{CB} = 10 V, f = 1.0 MHz) | | C _{obo} | – | – | 4.5 | pF |
| Noise Figure (I _C = 0.2 mA, V _{CE} = 5.0 Vdc, R _S = 2.0 kΩ, f = 1.0 kHz, BW = 200 Hz) | BC846A,B, BC847A,B,C, BC848A,B,C BC849B,C, BC850B,C | NF | – – | – – | 10 4.0 | dB |

BC846ALT1G Series

BC847, BC848, BC849, BC850

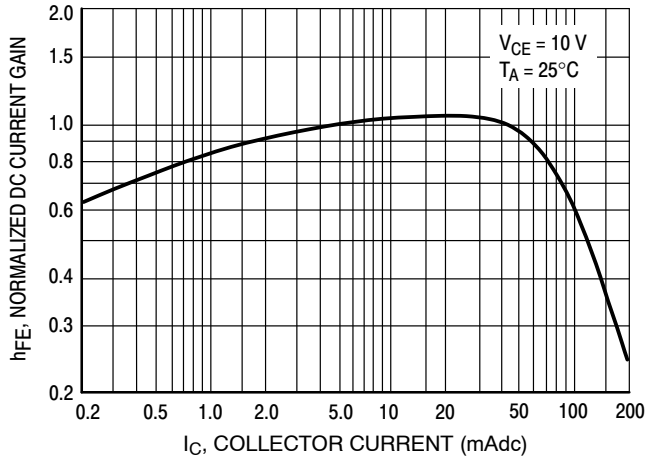


Figure 1. Normalized DC Current Gain

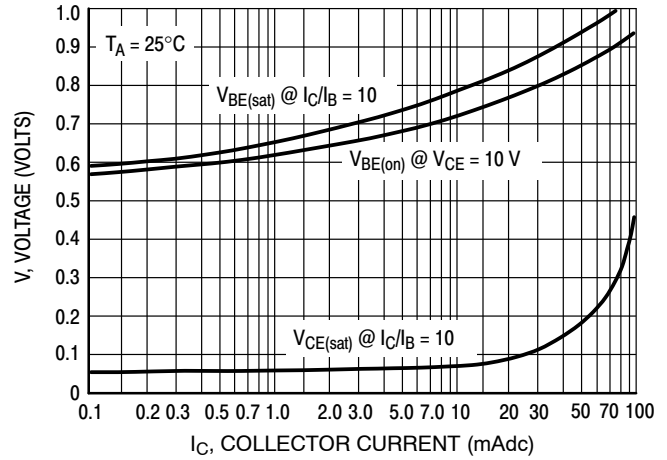


Figure 2. "Saturation" and "On" Voltages

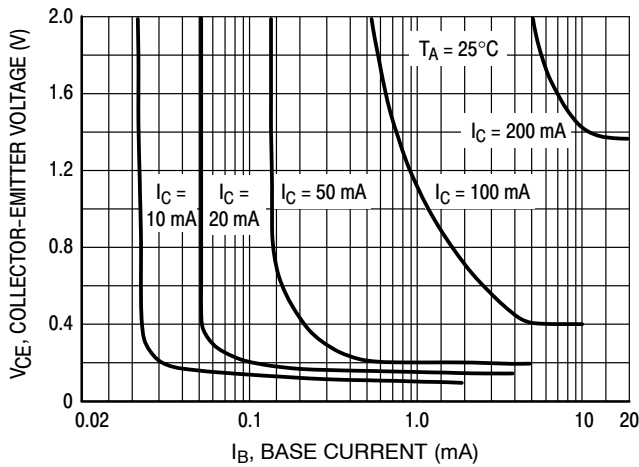


Figure 3. Collector Saturation Region

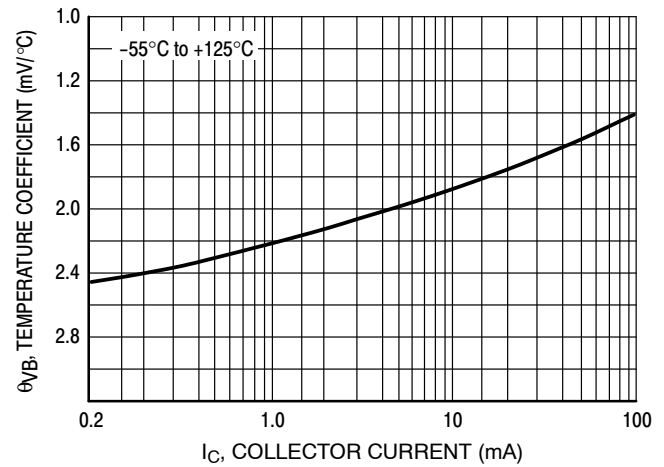


Figure 4. Base-Emitter Temperature Coefficient

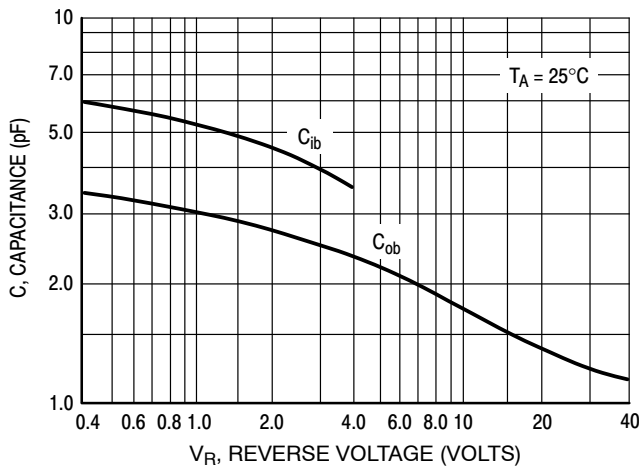


Figure 5. Capacitances

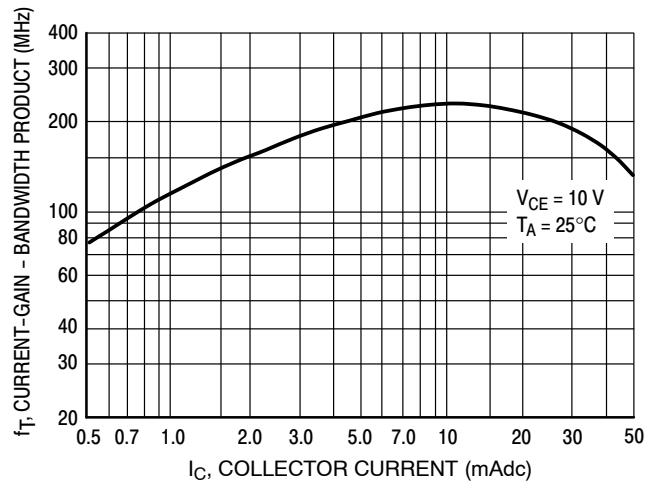


Figure 6. Current-Gain - Bandwidth Product

BC846ALT1G Series

BC846

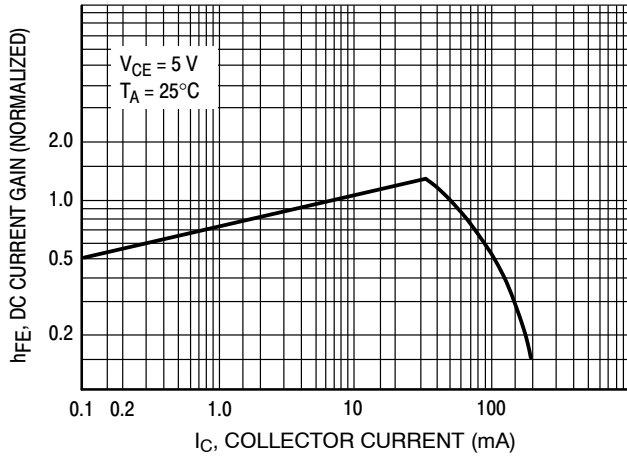


Figure 7. DC Current Gain

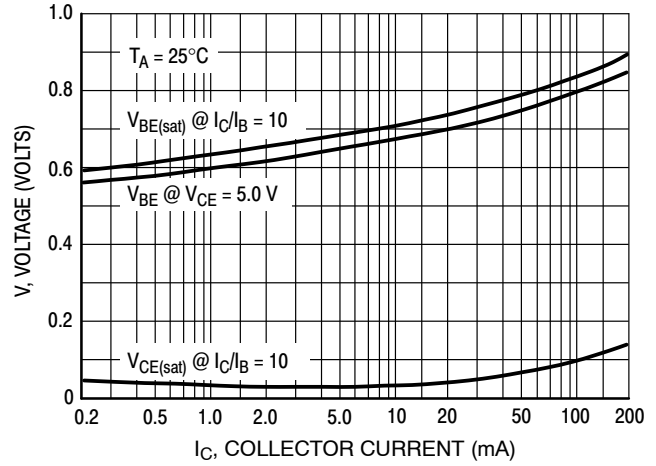


Figure 8. "On" Voltage

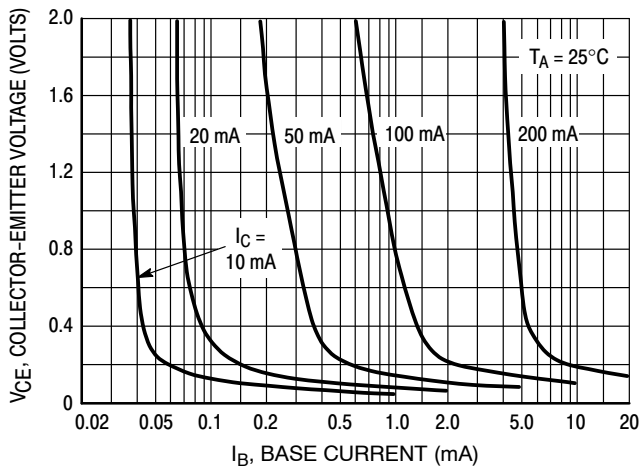


Figure 9. Collector Saturation Region

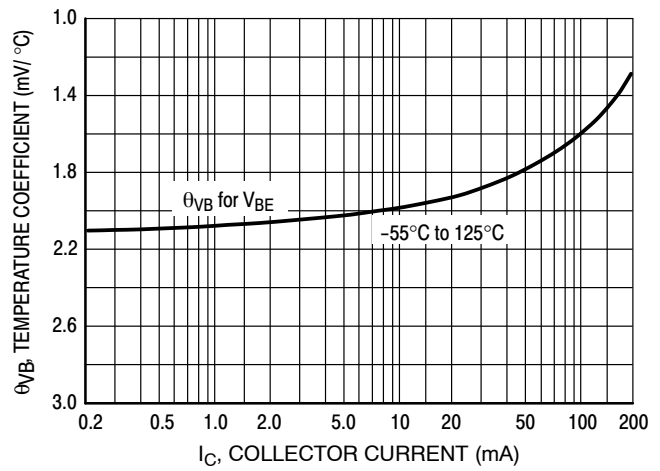


Figure 10. Base-Emitter Temperature Coefficient

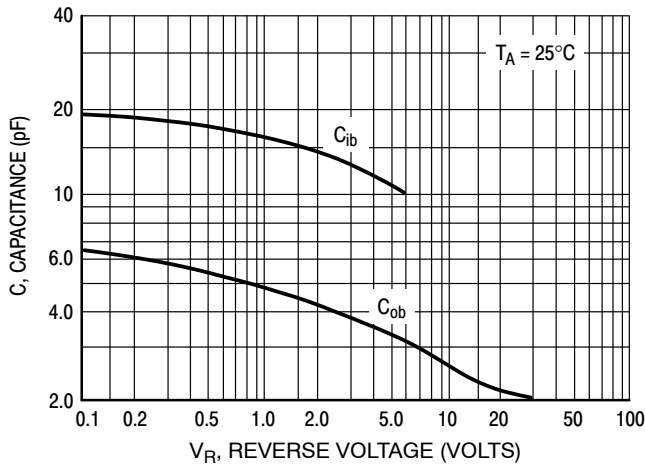


Figure 11. Capacitance

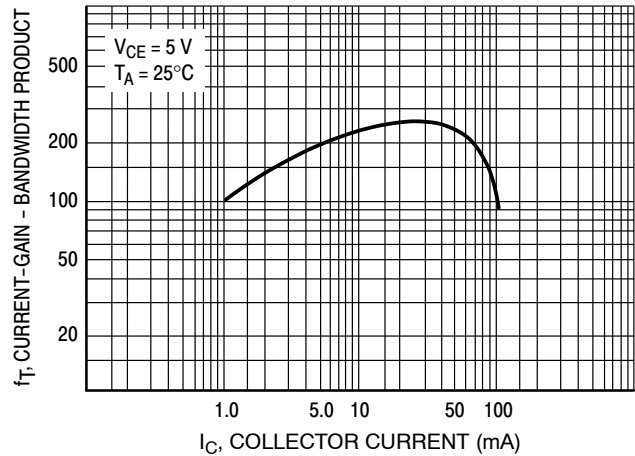


Figure 12. Current-Gain - Bandwidth Product

BC846ALT1G Series

ORDERING INFORMATION

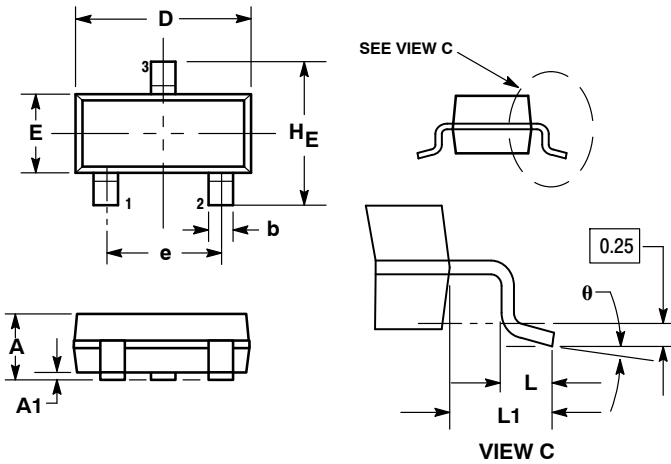
| Device | Marking | Package | Shipping [†] |
|------------|---------|---------------------|-----------------------|
| BC846ALT1G | 1A | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC846ALT3G | | SOT-23 (Pb-Free) | 10,000 / Tape & Reel |
| BC846BLT1G | 1B | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC846BLT3G | | SOT-23 (Pb-Free) | 10,000 / Tape & Reel |
| BC847ALT1G | 1E | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC847ALT3G | | SOT-23 (Pb-Free) | 10,000 / Tape & Reel |
| BC847BLT1G | 1F | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC847BLT3G | | SOT-23 (Pb-Free) | 10,000 / Tape & Reel |
| BC847CLT1G | 1G | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC847CLT3G | | SOT-23 (Pb-Free) | 10,000 / Tape & Reel |
| BC848ALT1G | 1J | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC848BLT1G | 1K | SOT-23 (Pb-Free) | |
| BC848BLT3G | | SOT-23 (Pb-Free) | 10,000 / Tape & Reel |
| BC848CLT1G | 1L | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC848CLT3G | | SOT-23 (Pb-Free) | 10,000 / Tape & Reel |
| BC849BLT1G | 2B | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC849BLT3G | | SOT-23 (Pb-Free) | 10,000 / Tape & Reel |
| BC849CLT1G | 2C | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC849CLT3G | | SOT-23 (Pb-Free) | 10,000 / Tape & Reel |
| BC850BLT1G | 2F | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC850CLT1G | 2G | SOT-23 (Pb-Free) | |

[†]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.

BC846ALT1G Series

PACKAGE DIMENSIONS

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

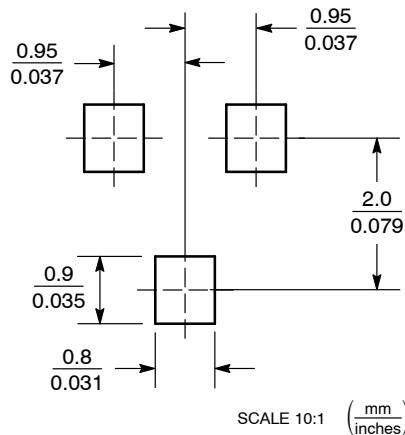


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
 4. 318-01 THRU -07 AND -09 OBSOLETE, NEW STANDARD 318-08.


| 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:
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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