



THE DATASHEET OF BC846BLT1



BC846ALT1 Series

BC846, BC847 and BC848 are Preferred Devices

General Purpose Transistors

NPN Silicon

Features

- Pb-Free Packages are Available
- Moisture Sensitivity Level: 1
- ESD Rating – Human Body Model: >4000 V
– Machine Model: >400 V

MAXIMUM RATINGS

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

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.

THERMAL CHARACTERISTICS

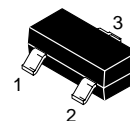
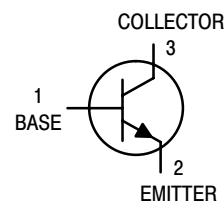
| Characteristic | Symbol | Max | Unit |
|---|-----------------|----------------|---------------------------|
| Total Device Dissipation FR-5 Board, (Note 1) $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 225 | mW |
| | | 1.8 | mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient (Note 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 | mW |
| | | 2.4 | 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.



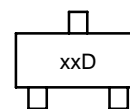
ON Semiconductor®

<http://onsemi.com>



SOT-23
CASE 318
STYLE 6

MARKING DIAGRAM



xx = Specific Device Code
D = Date Code

ORDERING INFORMATION

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

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

BC846ALT1 Series

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

| Characteristic | Symbol | Min | Typ | Max | Unit | |
|---|---|---------------|-------------------|-------------------|-------------------|---------------------|
| OFF CHARACTERISTICS | | | | | | |
| Collector–Emitter Breakdown Voltage ($I_C = 10\text{ mA}$) | BC846A,B BC847A,B,C, BC850B,C BC848A,B,C, BC849B,C | $V_{(BR)CEO}$ | 65 45 30 | – – – | – – – | V |
| Collector–Emitter Breakdown Voltage ($I_C = 10\text{ }\mu\text{A}$, $V_{EB} = 0$) | BC846A,B BC847A,B,C BC850B,C BC848A,B,C, BC849B,C | $V_{(BR)CES}$ | 80 50 30 | – – – | – – – | V |
| Collector–Base Breakdown Voltage ($I_C = 10\text{ }\mu\text{A}$) | BC846A,B BC847A,B,C, BC850B,C BC848A,B,C, BC849B,C | $V_{(BR)CBO}$ | 80 50 30 | – – – | – – – | V |
| Emitter–Base Breakdown Voltage ($I_E = 1.0\text{ }\mu\text{A}$) | 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 ($V_{CB} = 30\text{ V}$) ($V_{CB} = 30\text{ V}$, $T_A = 150^\circ\text{C}$) | | I_{CBO} | – – | – – | 15 5.0 | nA μA |
| ON CHARACTERISTICS | | | | | | |
| DC Current Gain ($I_C = 10\text{ }\mu\text{A}$, $V_{CE} = 5.0\text{ V}$) | BC846A, BC847A, BC848A BC846B, BC847B, BC848B BC847C, BC848C | h_{FE} | – – – | 90 150 270 | – – – | – |
| ($I_C = 2.0\text{ mA}$, $V_{CE} = 5.0\text{ V}$) | 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 ($I_C = 10\text{ mA}$, $I_B = 0.5\text{ mA}$) ($I_C = 100\text{ mA}$, $I_B = 5.0\text{ mA}$) | | $V_{CE(sat)}$ | – – | – – | 0.25 0.6 | V |
| Base–Emitter Saturation Voltage ($I_C = 10\text{ mA}$, $I_B = 0.5\text{ mA}$) ($I_C = 100\text{ mA}$, $I_B = 5.0\text{ mA}$) | | $V_{BE(sat)}$ | – – | 0.7 0.9 | – – | V |
| Base–Emitter Voltage ($I_C = 2.0\text{ mA}$, $V_{CE} = 5.0\text{ V}$) ($I_C = 10\text{ mA}$, $V_{CE} = 5.0\text{ V}$) | | $V_{BE(on)}$ | 580 – | 660 – | 700 770 | mV |
| SMALL–SIGNAL CHARACTERISTICS | | | | | | |
| Current–Gain – Bandwidth Product ($I_C = 10\text{ mA}$, $V_{CE} = 5.0\text{ Vdc}$, $f = 100\text{ MHz}$) | | f_T | 100 | – | – | MHz |
| Output Capacitance ($V_{CB} = 10\text{ V}$, $f = 1.0\text{ MHz}$) | | C_{obo} | – | – | 4.5 | pF |
| Noise Figure ($I_C = 0.2\text{ mA}$, $V_{CE} = 5.0\text{ Vdc}$, $R_S = 2.0\text{ k}\Omega$, $f = 1.0\text{ kHz}$, $BW = 200\text{ Hz}$) | BC846A,B, BC847A,B,C, BC848A,B,C BC849B,C, BC850B,C | NF | – – | – – | 10 4.0 | dB |

BC846ALT1 Series

BC847, BC848, BC849, BC850

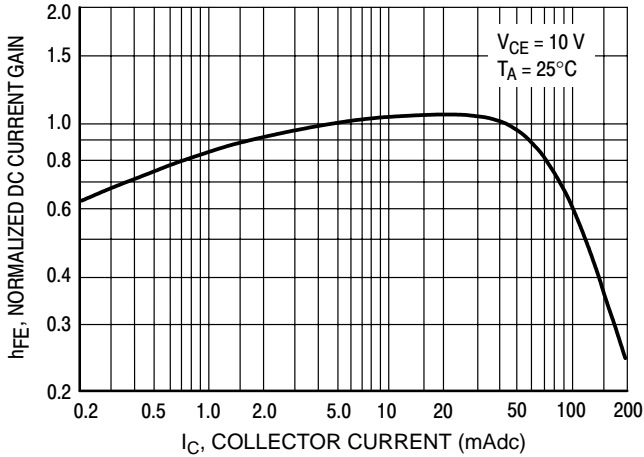


Figure 1. Normalized DC Current Gain

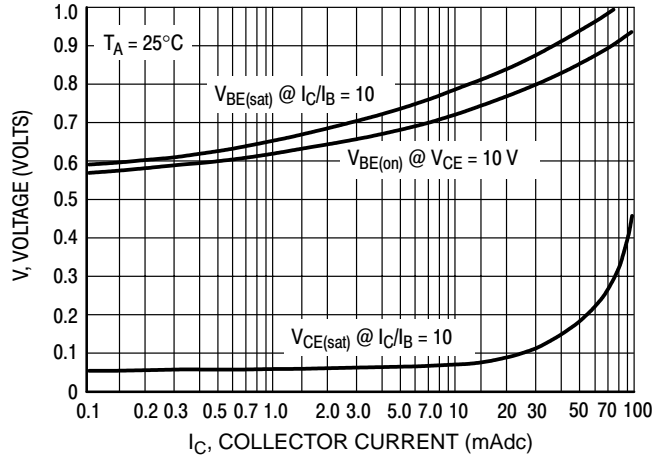


Figure 2. "Saturation" and "On" Voltages

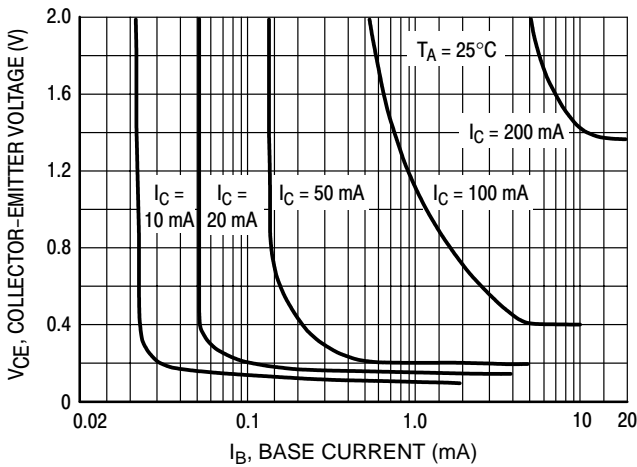


Figure 3. Collector Saturation Region

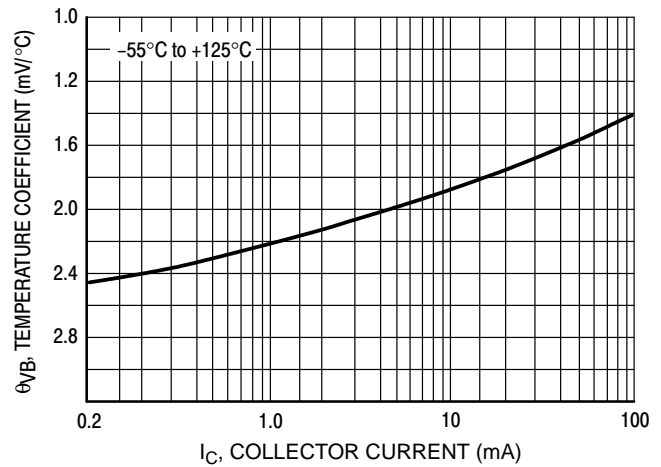


Figure 4. Base-Emitter Temperature Coefficient

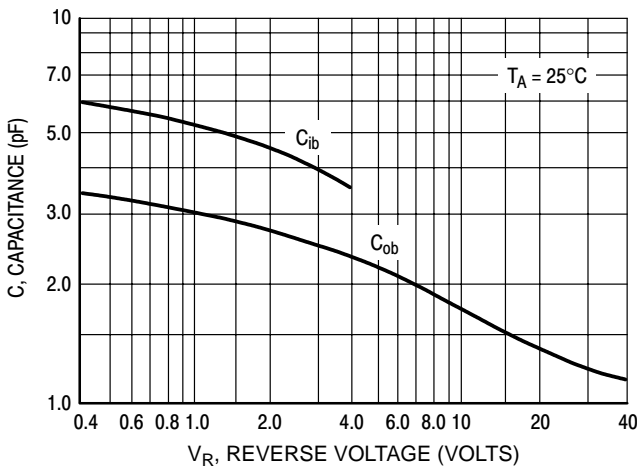


Figure 5. Capacitances

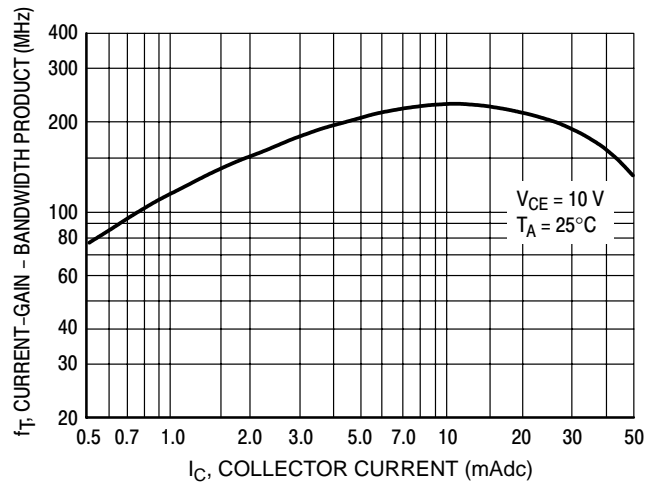


Figure 6. Current-Gain - Bandwidth Product

BC846ALT1 Series

BC846

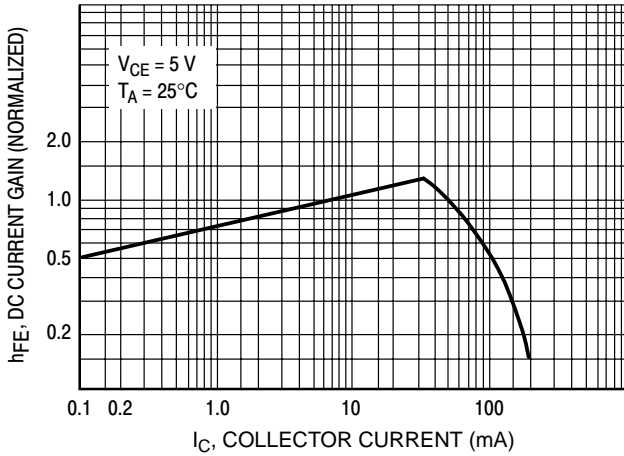


Figure 7. DC Current Gain

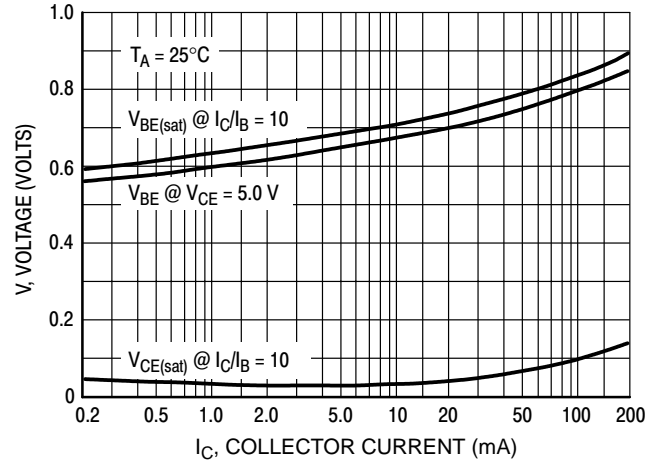


Figure 8. "On" Voltage

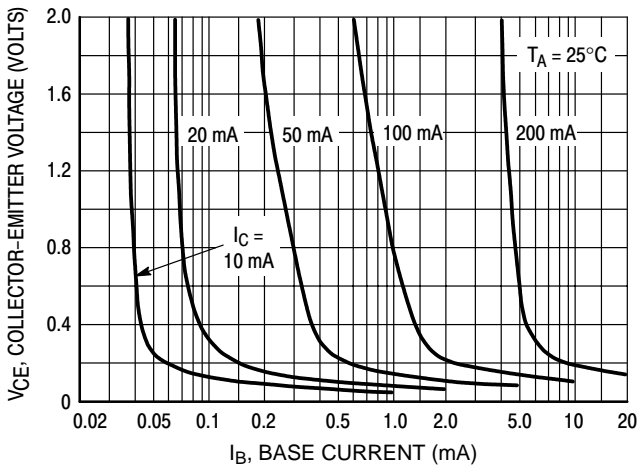


Figure 9. Collector Saturation Region

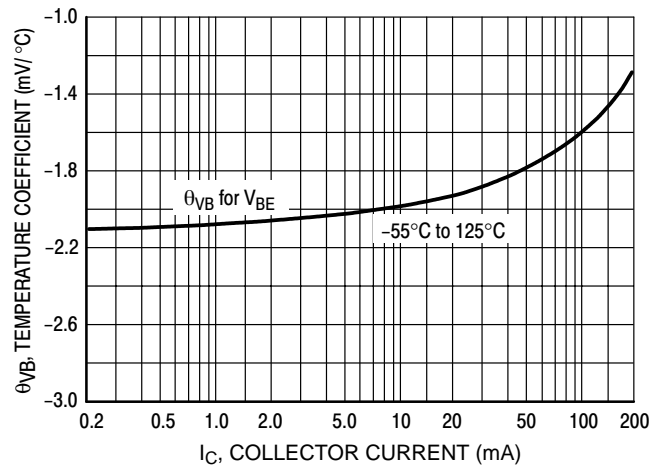


Figure 10. Base-Emitter Temperature Coefficient

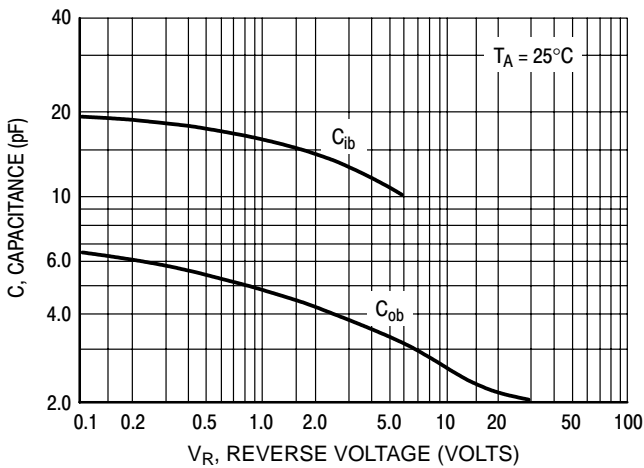


Figure 11. Capacitance

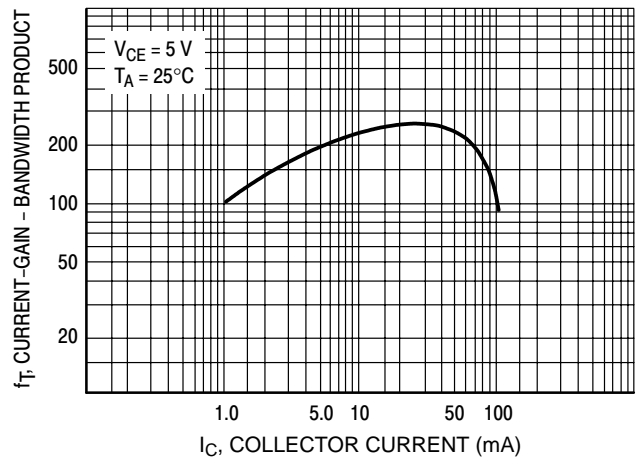


Figure 12. Current-Gain - Bandwidth Product

BC846ALT1 Series

ORDERING INFORMATION

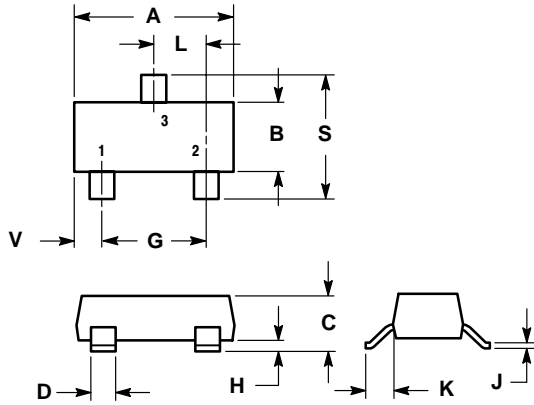
| Device | Marking | Package | Shipping† |
|------------|---------|---------------------|----------------------|
| BC846ALT1 | 1A | SOT-23 | 3,000 / Tape & Reel |
| BC846ALT3 | 1A | SOT-23 | 10,000 / Tape & Reel |
| BC846BLT1 | 1B | SOT-23 | 3,000 / Tape & Reel |
| BC846BLT3 | 1B | SOT-23 | 10,000 / Tape & Reel |
| BC847ALT1 | 1E | SOT-23 | 3,000 / Tape & Reel |
| BC847ALT1G | 1E | SOT-23 (Pb-Free) | |
| BC847BLT1 | 1F | SOT-23 | 3,000 / Tape & Reel |
| BC847CLT1 | 1G | SOT-23 | 3,000 / Tape & Reel |
| BC847CLT1G | 1G | SOT-23 (Pb-Free) | |
| BC847CLT3 | 1G | SOT-23 | 10,000 / Tape & Reel |
| BC847CLT3G | 1G | SOT-23 (Pb-Free) | |
| BC848ALT1 | 1J | SOT-23 | 3,000 / Tape & Reel |
| BC848ALT1G | 1J | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC848BLT1 | 1K | SOT-23 | 3,000 / Tape & Reel |
| BC848BLT3 | 1K | SOT-23 | 10,000 / Tape & Reel |
| BC848CLT1 | 1L | SOT-23 | 3,000 / Tape & Reel |
| BC848CLT1G | 1L | SOT-23 (Pb-Free) | |
| BC849BLT1 | 2B | SOT-23 | 3,000 / Tape & Reel |
| BC849BLT3 | 2B | SOT-23 | 10,000 / Tape & Reel |
| BC849CLT1 | 2C | SOT-23 | 3,000 / Tape & Reel |
| BC849CLT1G | 2C | SOT-23 (Pb-Free) | 3,000 / Tape & Reel |
| BC850BLT1 | 2F | SOT-23 | 3,000 / Tape & Reel |
| BC850CLT1 | 2G | SOT-23 | 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.

BC846ALT1 Series

PACKAGE DIMENSIONS

SOT-23 (TO-236)
CASE 318-09
ISSUE AI



NOTES:

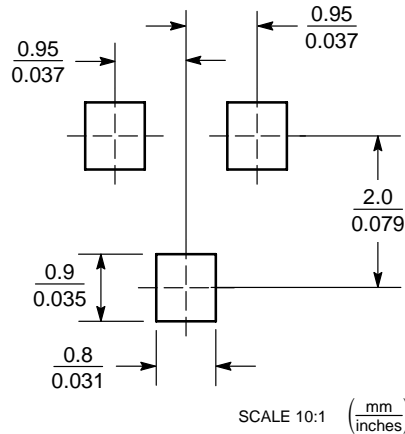
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-01, -02, AND -06 OBSOLETE, NEW STANDARD 318-09.

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|--------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.1102 | 0.1197 | 2.80 | 3.04 |
| B | 0.0472 | 0.0551 | 1.20 | 1.40 |
| C | 0.0385 | 0.0498 | 0.99 | 1.26 |
| D | 0.0140 | 0.0200 | 0.36 | 0.50 |
| G | 0.0670 | 0.0826 | 1.70 | 2.10 |
| H | 0.0040 | 0.0098 | 0.10 | 0.25 |
| J | 0.0034 | 0.0070 | 0.085 | 0.177 |
| K | 0.0180 | 0.0236 | 0.45 | 0.60 |
| L | 0.0350 | 0.0401 | 0.89 | 1.02 |
| S | 0.0830 | 0.0984 | 2.10 | 2.50 |
| V | 0.0177 | 0.0236 | 0.45 | 0.60 |


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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