

BC846, SBC846, BC847, SBC847, BC848 Series



ON Semiconductor®

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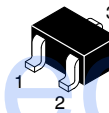
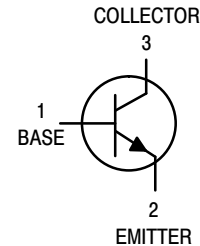
General Purpose Transistors

NPN Silicon

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

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



SC-70/SOT-323
CASE 419
STYLE 3

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|-----------|-------------------|------|
| Collector-Emitter Voltage BC846, SBC846 BC847, SBC847 BC848 | V_{CEO} | 65 45 30 | V |
| Collector-Base Voltage BC846, SBC846 BC847, SBC847 BC848 | V_{CBO} | 80 50 30 | V |
| Emitter-Base Voltage BC846, SBC846 BC847, SBC847 BC848 | V_{EBO} | 6.0 6.0 5.0 | V |
| Collector Current – Continuous | I_C | 100 | mAdc |

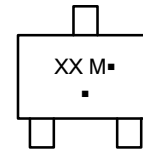
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|-----------------|----------------|---------------------------|
| Total Device Dissipation FR-5 Board, (Note 1) $T_A = 25^\circ\text{C}$ | 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 | $^\circ\text{C}$ |

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

MARKING DIAGRAM



XX = Specific Device Code
M = Month Code
■ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 12 of this data sheet.

BC846, SBC846, BC847, SBC847, BC848 Series

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

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|---|----------------------|---------------|-----|-----|-----------|---------------------|
| OFF CHARACTERISTICS | | | | | | |
| Collector – Emitter Breakdown Voltage ($I_C = 10\text{ mA}$) | BC846, SBC846 Series | $V_{(BR)CEO}$ | 65 | – | – | V |
| | BC847, SBC847 Series | | 45 | – | – | |
| | BC848 Series | | 30 | – | – | |
| Collector – Emitter Breakdown Voltage ($I_C = 10\ \mu\text{A}$, $V_{EB} = 0$) | BC846, SBC846 Series | $V_{(BR)CES}$ | 80 | – | – | V |
| | BC847, SBC847 Series | | 50 | – | – | |
| | BC848 Series | | 30 | – | – | |
| Collector – Base Breakdown Voltage ($I_C = 10\ \mu\text{A}$) | BC846, SBC846 Series | $V_{(BR)CBO}$ | 80 | – | – | V |
| | BC847, SBC847 Series | | 50 | – | – | |
| | BC848 Series | | 30 | – | – | |
| Emitter – Base Breakdown Voltage ($I_E = 1.0\ \mu\text{A}$) | BC846, SBC846 Series | $V_{(BR)EBO}$ | 6.0 | – | – | V |
| | BC847, SBC847 Series | | 6.0 | – | – | |
| | BC848 Series | | 5.0 | – | – | |
| 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 ($I_C = 10\ \mu\text{A}$, $V_{CE} = 5.0\text{ V}$) ($I_C = 2.0\text{ mA}$, $V_{CE} = 5.0\text{ V}$) | BC846A, BC847A, SBC847A, BC848A | h_{FE} | – | 90 | – | – |
| | BC846B, SBC846B, BC847B, SBC847B, BC848B | | – | 150 | – | – |
| | BC847C, SBC847C, BC848C | | – | 270 | – | – |
| | BC846A, BC847A, SBC847A, BC848A | | 110 | 180 | 220 | |
| | BC846B, SBC846B, BC847B, SBC847B, BC848B | | 200 | 290 | 450 | |
| | BC847C, SBC847C, BC848C | | 420 | 520 | 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 | V |
| | | | – | – | 0.6 | |
| 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 | – | V |
| | | | – | 0.9 | – | |
| 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 | mV |
| | | | – | – | 770 | |

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 ($I_C = 0.2\text{ mA}$, $V_{CE} = 5.0\text{ Vdc}$, $R_S = 2.0\text{ k}\Omega$, $f = 1.0\text{ kHz}$, $BW = 200\text{ Hz}$) | NF | – | – | 10 | dB |

BC846, SBC846, BC847, SBC847, BC848 Series

BC846A, BC847A, SBC847A, BC848A

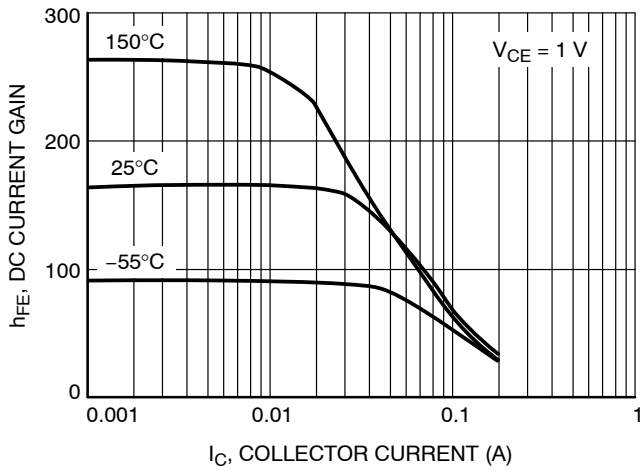


Figure 1. DC Current Gain vs. Collector Current

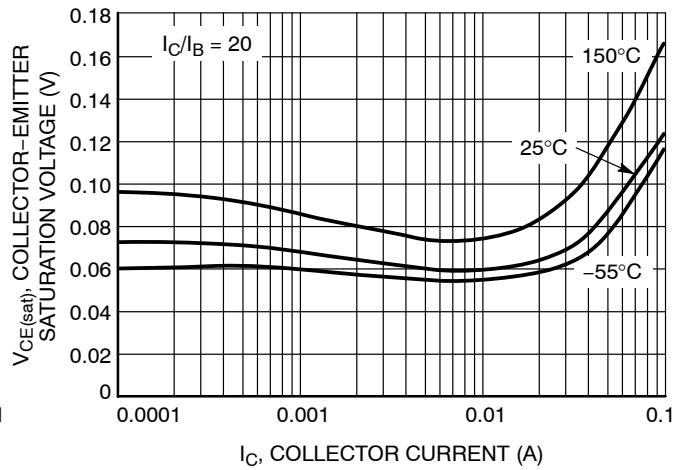


Figure 2. Collector Emitter Saturation Voltage vs. Collector Current

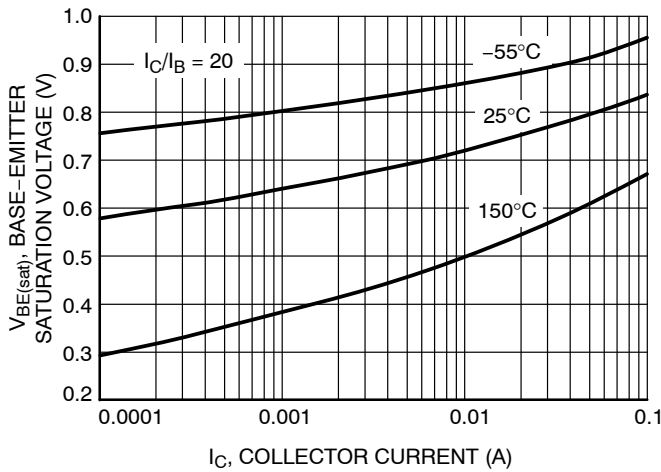


Figure 3. Base Emitter Saturation Voltage vs. Collector Current

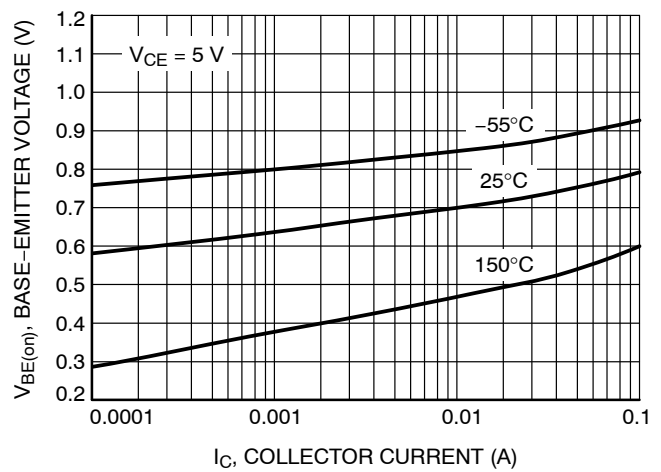


Figure 4. Base Emitter Voltage vs. Collector Current

BC846, SBC846, BC847, SBC847, BC848 Series

BC846A, BC847A, SBC847A, BC848A

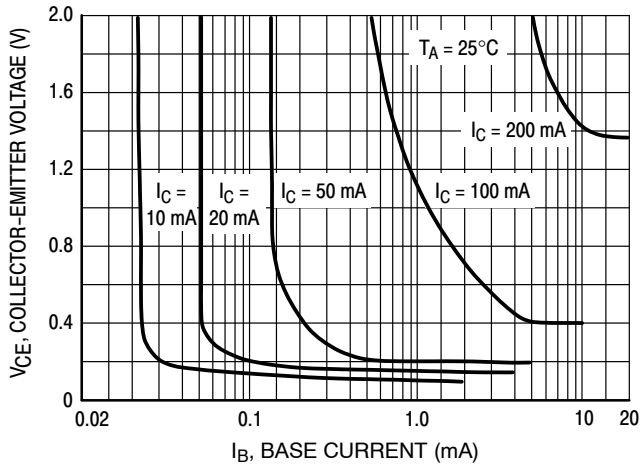


Figure 5. Collector Saturation Region

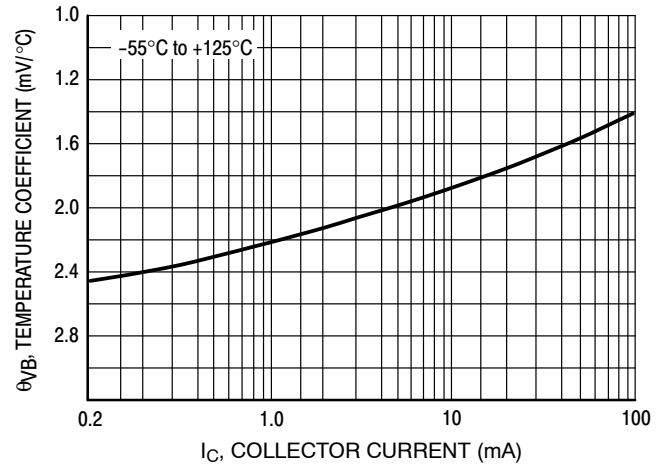


Figure 6. Base-Emitter Temperature Coefficient

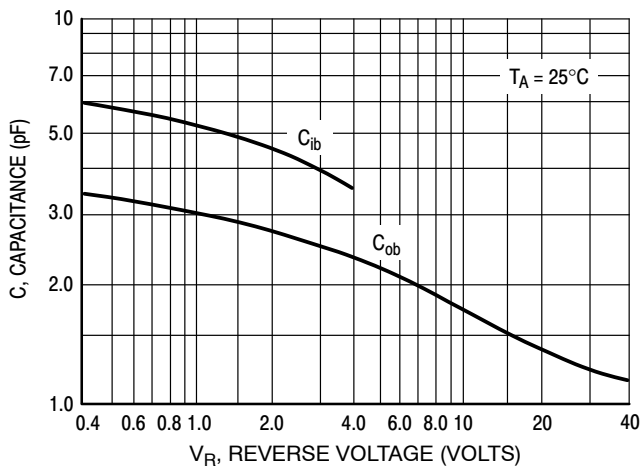


Figure 7. Capacitances

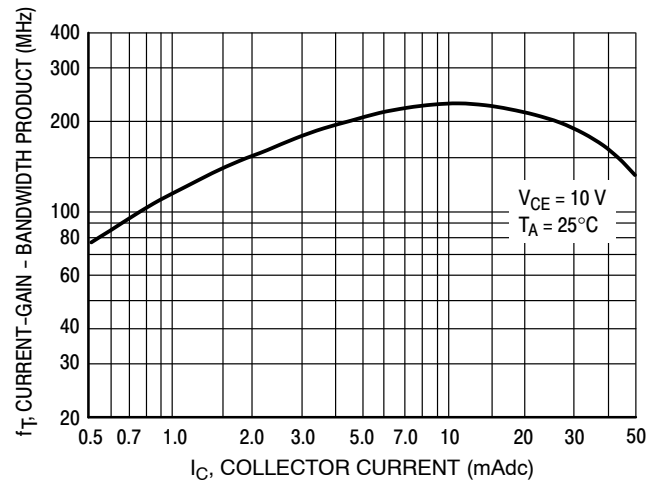


Figure 8. Current-Gain - Bandwidth Product

BC846B, SBC846B

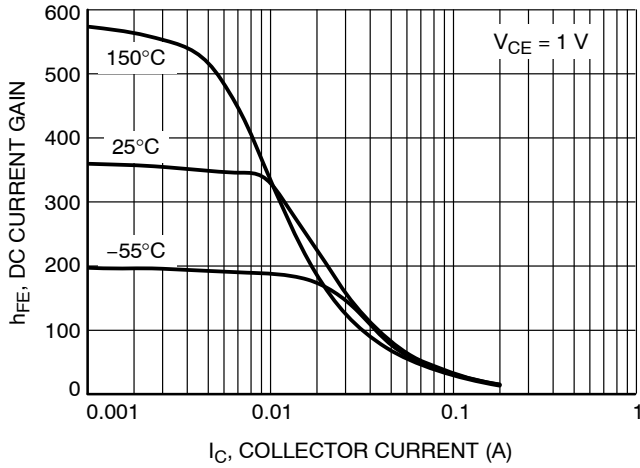


Figure 9. DC Current Gain vs. Collector Current

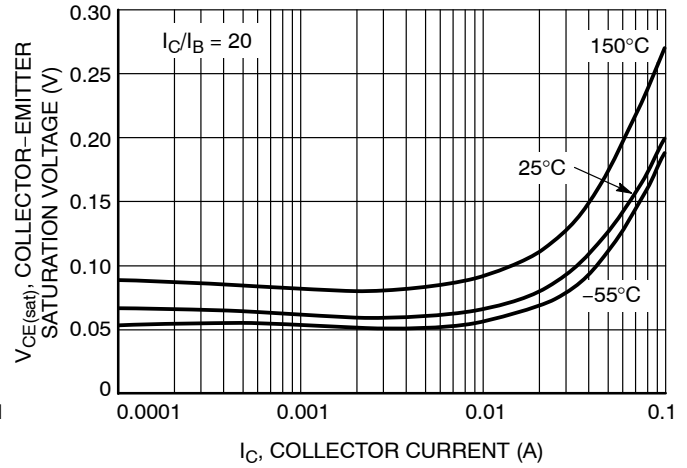


Figure 10. Collector Emitter Saturation Voltage vs. Collector Current

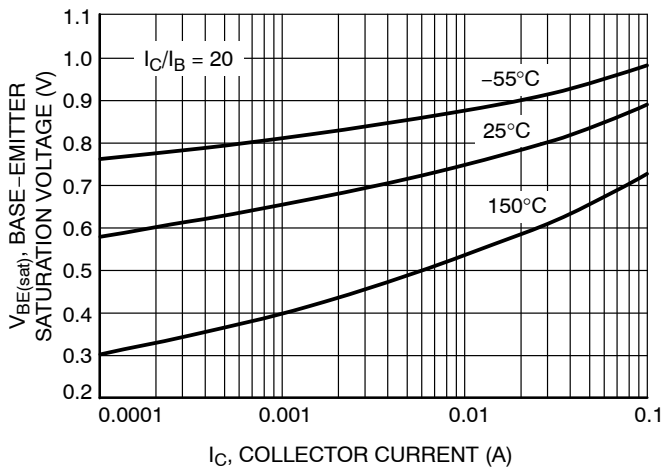


Figure 11. Base Emitter Saturation Voltage vs. Collector Current

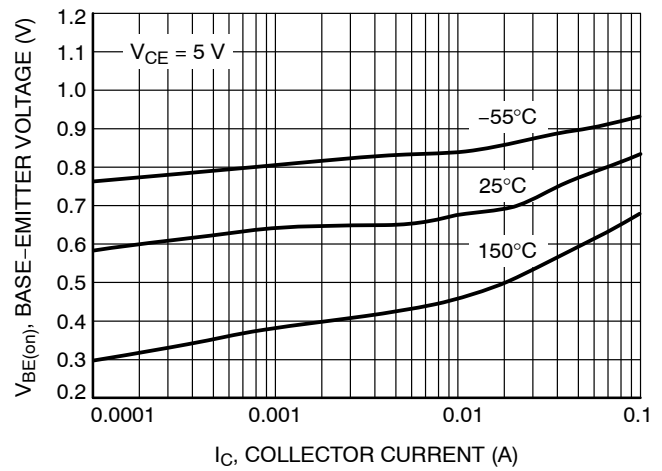


Figure 12. Base Emitter Voltage vs. Collector Current

BC846, SBC846, BC847, SBC847, BC848 Series

BC846B, SBC846B

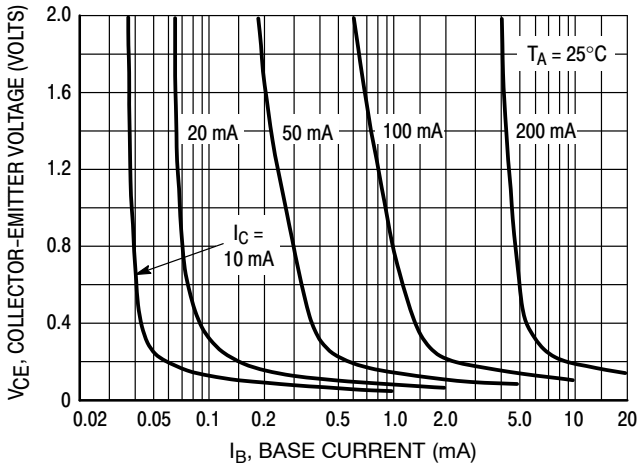


Figure 13. Collector Saturation Region

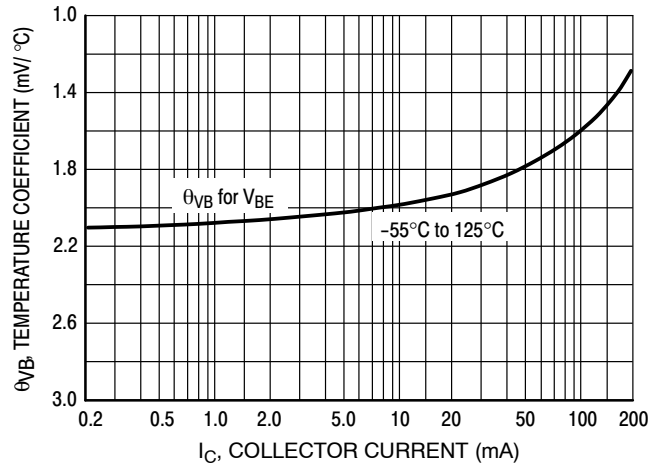


Figure 14. Base-Emitter Temperature Coefficient

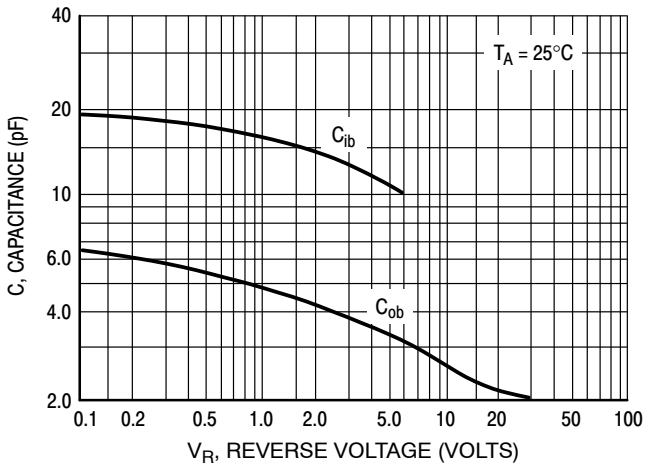


Figure 15. Capacitance

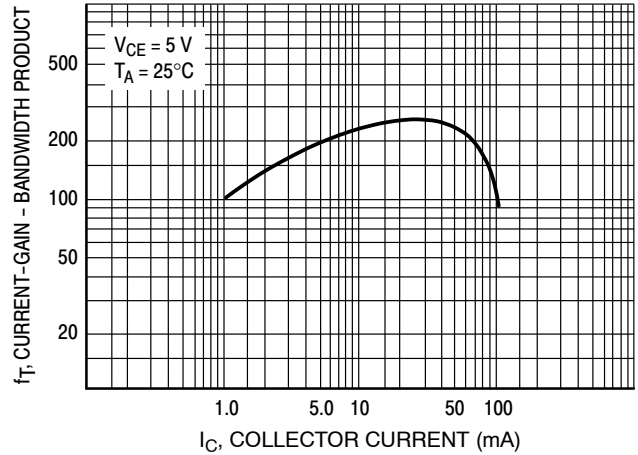


Figure 16. Current-Gain - Bandwidth Product

BC846, SBC846, BC847, SBC847, BC848 Series

BC847B, SBC847B, BC848B

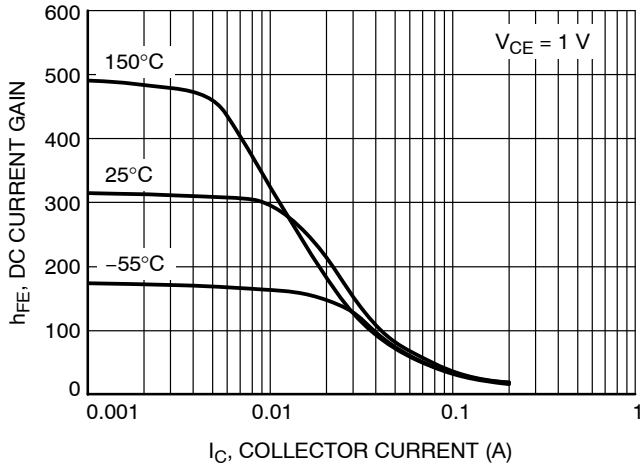


Figure 17. DC Current Gain vs. Collector Current

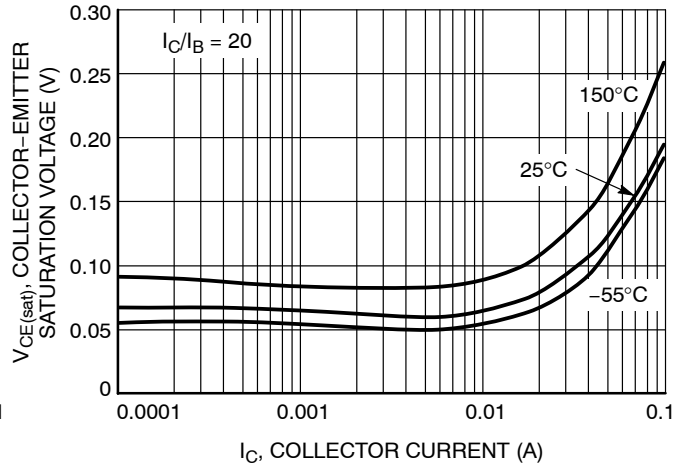


Figure 18. Collector Emitter Saturation Voltage vs. Collector Current

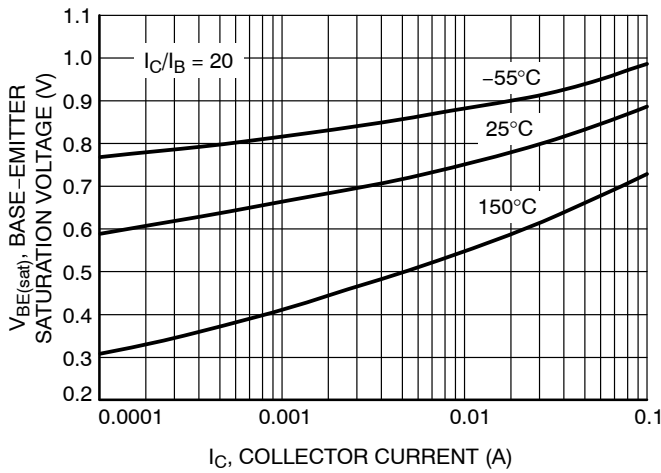


Figure 19. Base Emitter Saturation Voltage vs. Collector Current

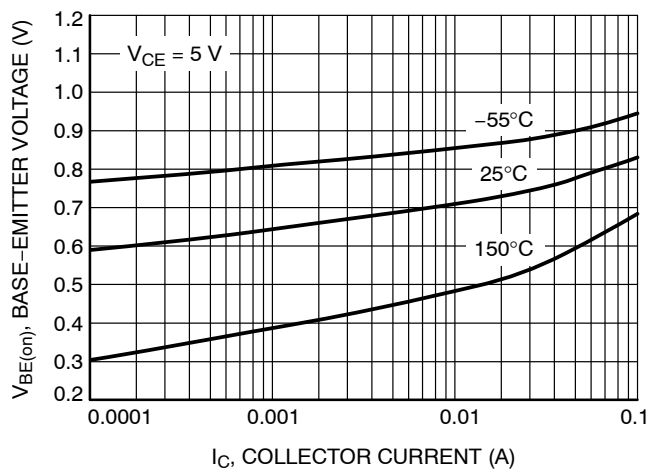


Figure 20. Base Emitter Voltage vs. Collector Current

BC846, SBC846, BC847, SBC847, BC848 Series

BC847B, SBC847B, BC848B

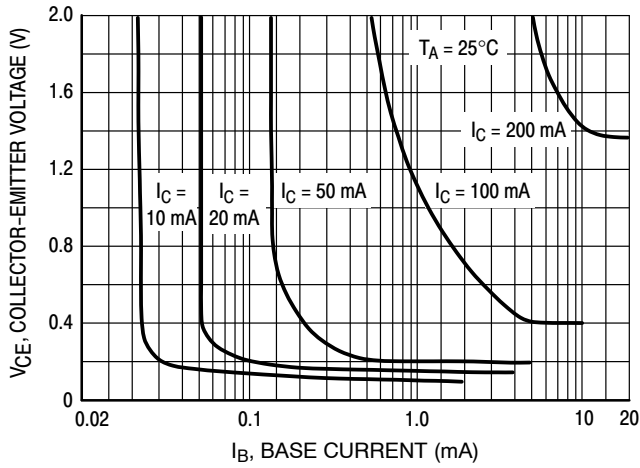


Figure 21. Collector Saturation Region

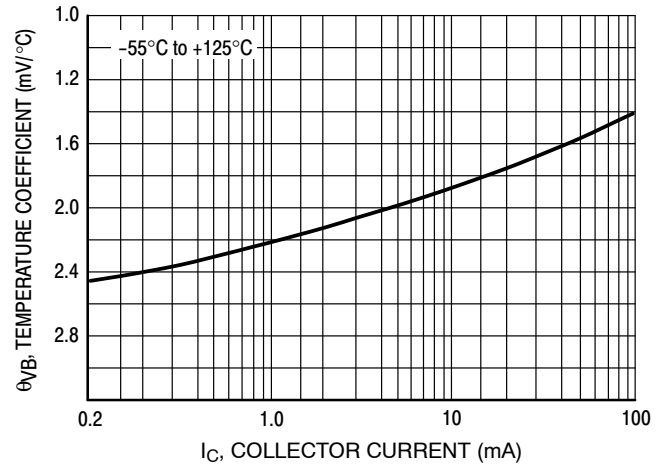


Figure 22. Base-Emitter Temperature Coefficient

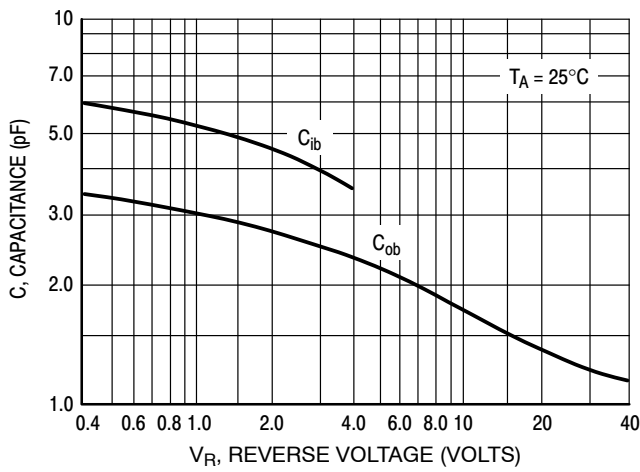


Figure 23. Capacitances

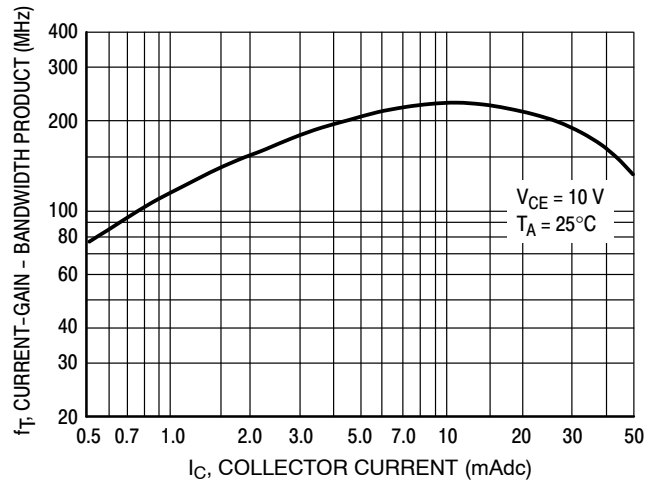


Figure 24. Current-Gain - Bandwidth Product

BC846, SBC846, BC847, SBC847, BC848 Series

BC847C, SBC847C, BC848C

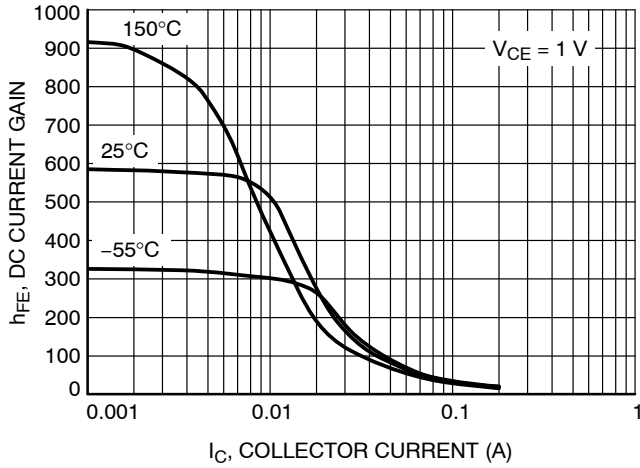


Figure 25. DC Current Gain vs. Collector Current

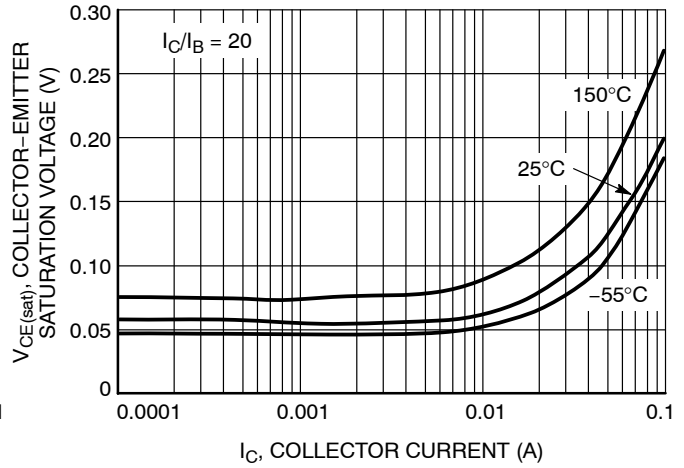


Figure 26. Collector Emitter Saturation Voltage vs. Collector Current

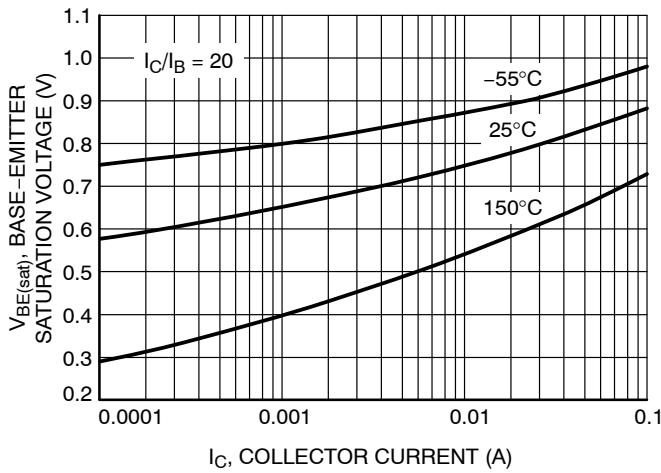


Figure 27. Base Emitter Saturation Voltage vs. Collector Current

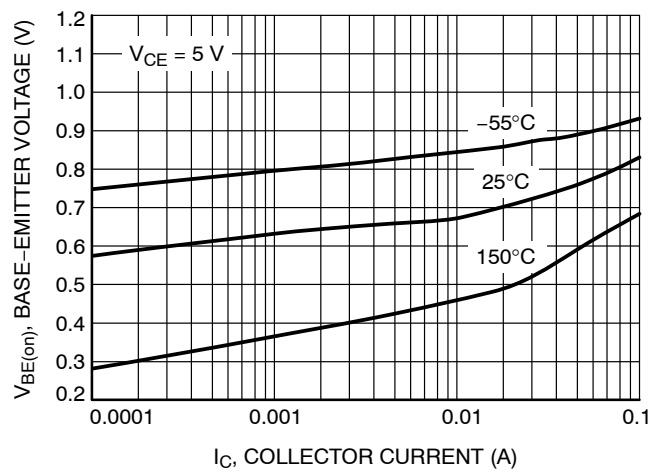


Figure 28. Base Emitter Voltage vs. Collector Current

BC846, SBC846, BC847, SBC847, BC848 Series

BC847C, SBC847C, BC848C

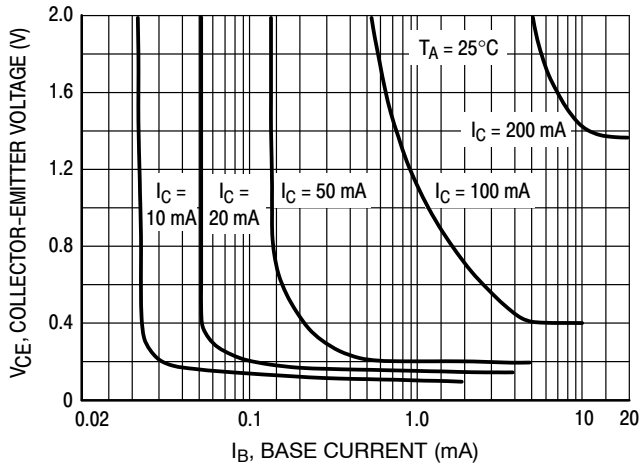


Figure 29. Collector Saturation Region

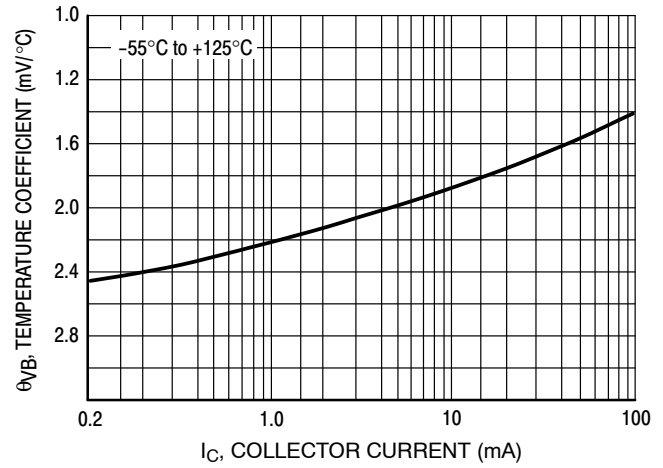


Figure 30. Base-Emitter Temperature Coefficient

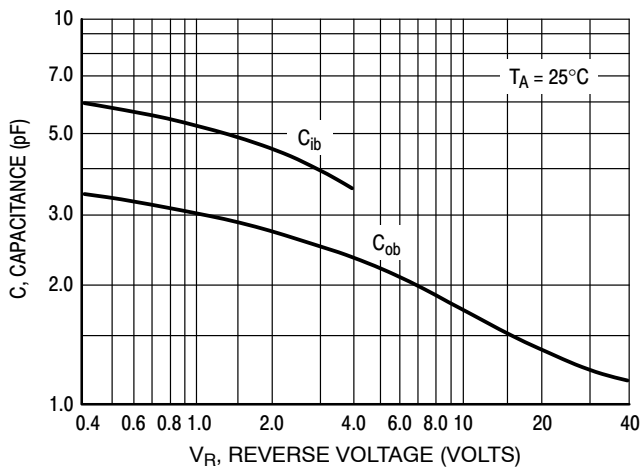


Figure 31. Capacitances

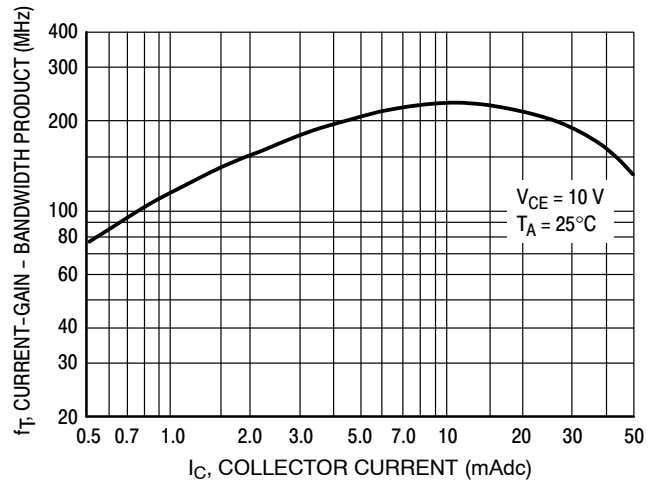


Figure 32. Current-Gain - Bandwidth Product

BC846, SBC846, BC847, SBC847, BC848 Series

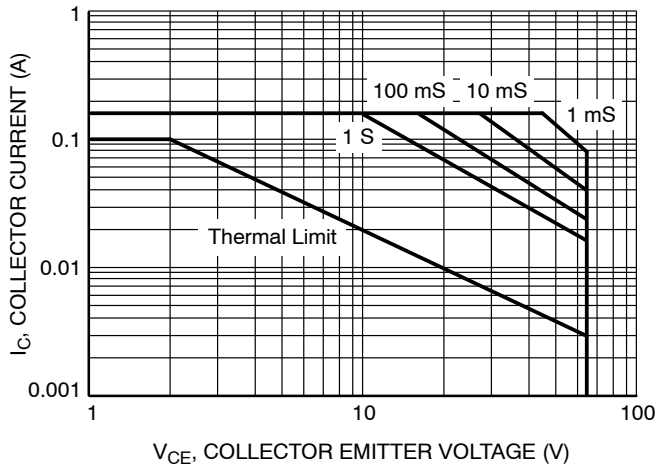


Figure 33. Safe Operating Area for BC846A, BC846B

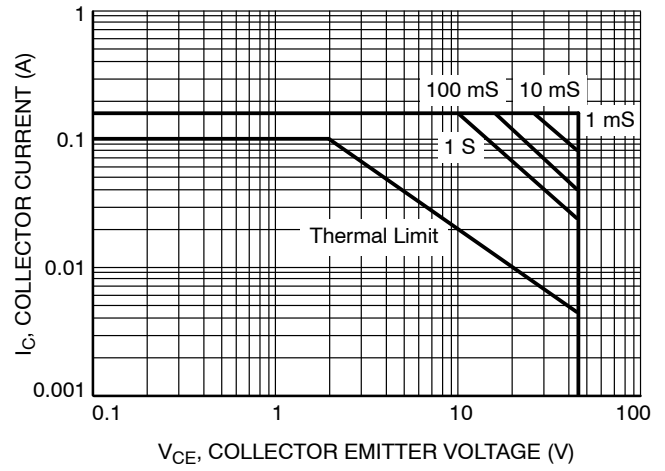


Figure 34. Safe Operating Area for BC847A, BC847B, BC847C

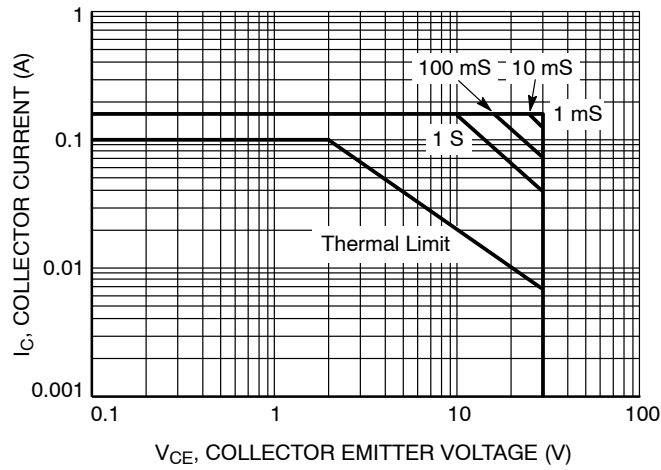


Figure 35. Safe Operating Area for BC848A, BC848B, BC848C

BC846, SBC846, BC847, SBC847, BC848 Series

DEVICE ORDERING AND SPECIFIC MARKING INFORMATION

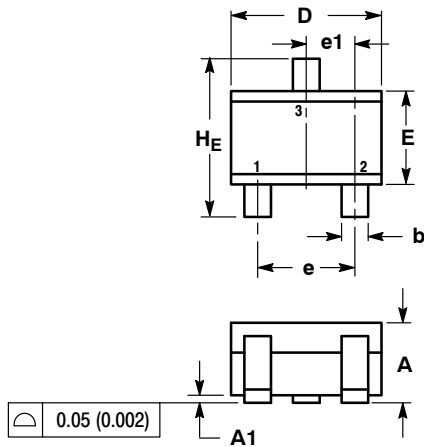
| Device | Specific Marking Code | Package | Shipping† |
|-------------|-----------------------|------------------------------|----------------------|
| BC846AWT1G | 1A | SC-70 (SOT-323) (Pb-Free) | 3,000 / Tape & Reel |
| BC846BWT1G | 1B | SC-70 (SOT-323) (Pb-Free) | 3,000 / Tape & Reel |
| SBC846BWT1G | | | |
| BC847AWT1G | 1E | SC-70 (SOT-323) (Pb-Free) | 3,000 / Tape & Reel |
| SBC847AWT1G | | | |
| BC847BWT1G | 1F | SC-70 (SOT-323) (Pb-Free) | 3,000 / Tape & Reel |
| SBC847BWT1G | | | |
| BC847CWT1G | 1G | SC-70 (SOT-323) (Pb-Free) | 3,000 / Tape & Reel |
| SBC847CWT1G | | | |
| BC847CWT3G | 1G | SC-70 (SOT-323) (Pb-Free) | 10,000 / Tape & Reel |
| BC848AWT1G | 1J | SC-70 (SOT-323) (Pb-Free) | 3,000 / Tape & Reel |
| BC848BWT1G | 1K | SC-70 (SOT-323) (Pb-Free) | 3,000 / Tape & Reel |
| BC848CWT1G | 1L | SC-70 (SOT-323) (Pb-Free) | 3,000 / 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.

BC846, SBC846, BC847, SBC847, BC848 Series

PACKAGE DIMENSIONS

SC-70 (SOT-323) CASE 419-04 ISSUE N



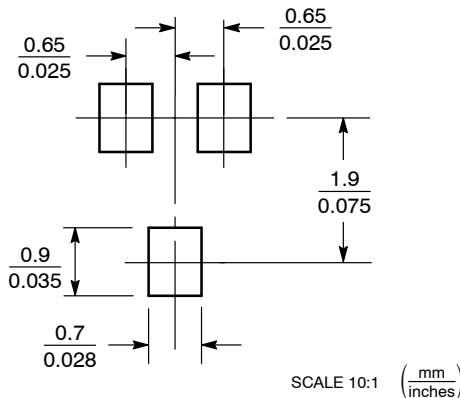
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI 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 REF | | |
| 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 |
| HE | 2.00 | 2.10 | 2.40 | 0.079 | 0.083 | 0.095 |

STYLE 3:
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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