

BC846AWT1, BC847AWT1, BC848AWT1 Series

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

- Pb-Free Packages are Available

MAXIMUM RATINGS

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

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

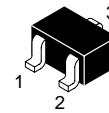
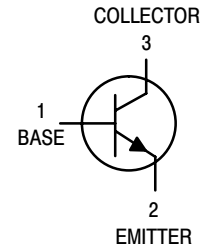
| Characteristic | Symbol | Max | Unit |
|---|-----------------|----------------|---------------------------|
| Total Device Dissipation FR-5 Board, (Note 1) $T_A = 25^\circ\text{C}$ | P_D | 150 | mW |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 833 | $^\circ\text{C}/\text{W}$ |
| Junction 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.



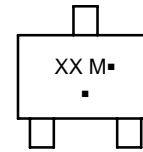
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SC-70/SOT-323
CASE 419
STYLE 3

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 5 of this data sheet.

BC846AWT1, BC847AWT1, BC848AWT1 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 Series BC847 Series BC848 Series | $V_{(BR)CEO}$ | 65 45 30 | – – – | – – – | V |
| Collector–Emitter Breakdown Voltage ($I_C = 10\text{ }\mu\text{A}$, $V_{EB} = 0$) | BC846 Series BC847 Series BC848 Series | $V_{(BR)CES}$ | 80 50 30 | – – – | – – – | V |
| Collector–Base Breakdown Voltage ($I_C = 10\text{ }\mu\text{A}$) | BC846 Series BC847 Series BC848 Series | $V_{(BR)CBO}$ | 80 50 30 | – – – | – – – | V |
| Emitter–Base Breakdown Voltage ($I_E = 1.0\text{ }\mu\text{A}$) | BC846 Series BC847 Series BC848 Series | $V_{(BR)EBO}$ | 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 ($I_C = 10\text{ }\mu\text{A}$, $V_{CE} = 5.0\text{ V}$) ($I_C = 2.0\text{ mA}$, $V_{CE} = 5.0\text{ V}$) | BC846A, BC847A, BC848A BC846B, BC847B, BC848B BC847C, BC848C BC846A, BC847A, BC848A BC846B, BC847B, BC848B BC847C, BC848C | h_{FE} | – – – 110 200 420 | 90 150 270 180 290 520 | – – – 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 ($I_C = 0.2\text{ mA}$, $V_{CE} = 5.0\text{ Vdc}$, $R_S = 2.0\text{ k}\Omega$, $f = 1.0\text{ kHz}$, $BW = 200\text{ Hz}$) | | NF | – | – | 10 | dB |

BC846AWT1, BC847AWT1, BC848AWT1 Series

BC847 SERIES & BC848 SERIES

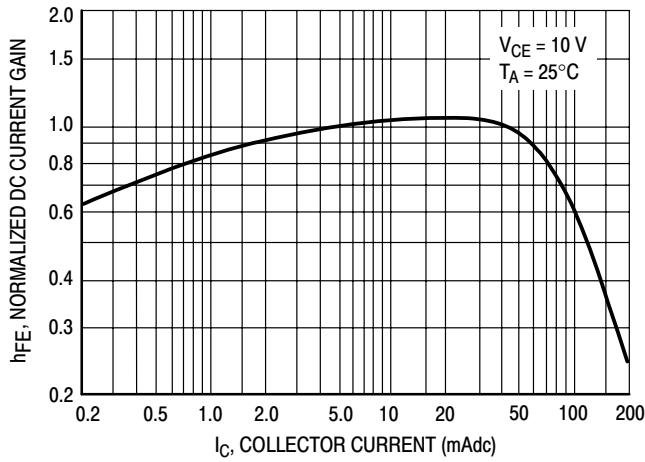


Figure 1. Normalized DC Current Gain

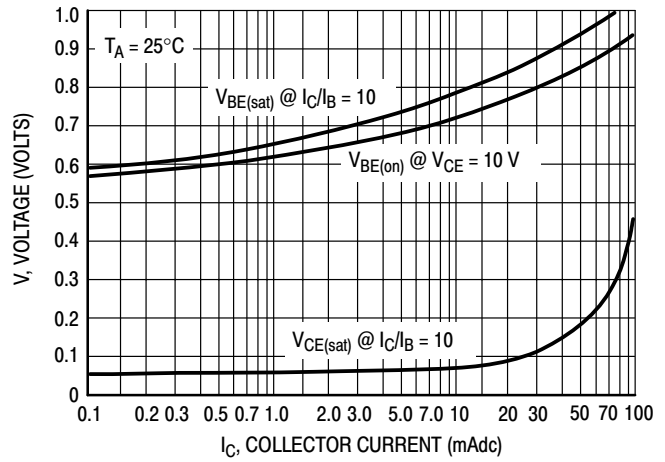


Figure 2. "Saturation" and "On" Voltages

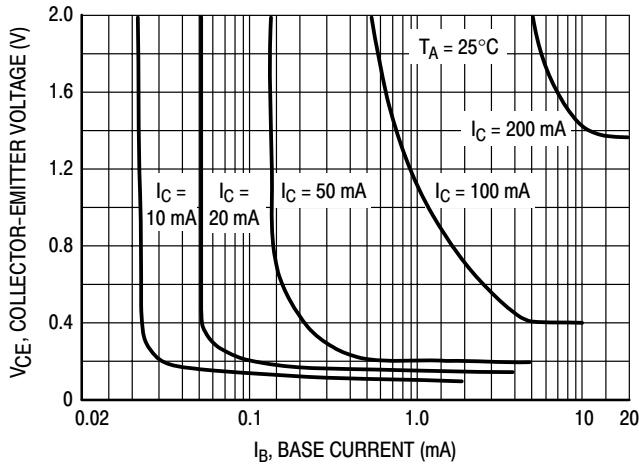


Figure 3. Collector Saturation Region

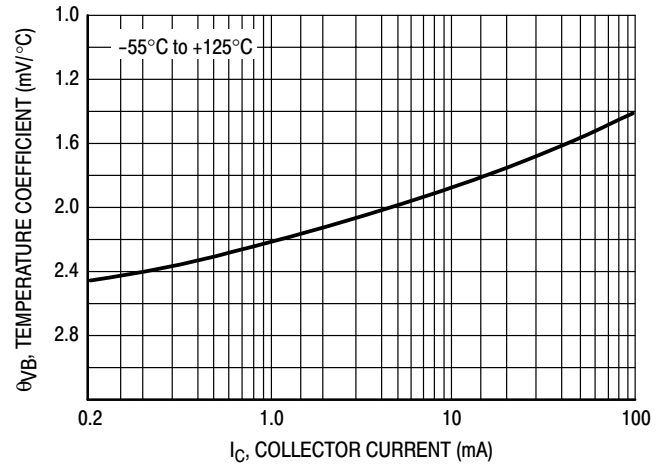


Figure 4. Base-Emitter Temperature Coefficient

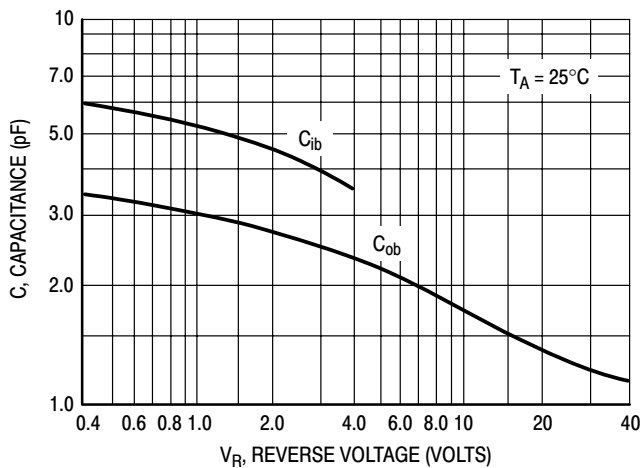


Figure 5. Capacitances

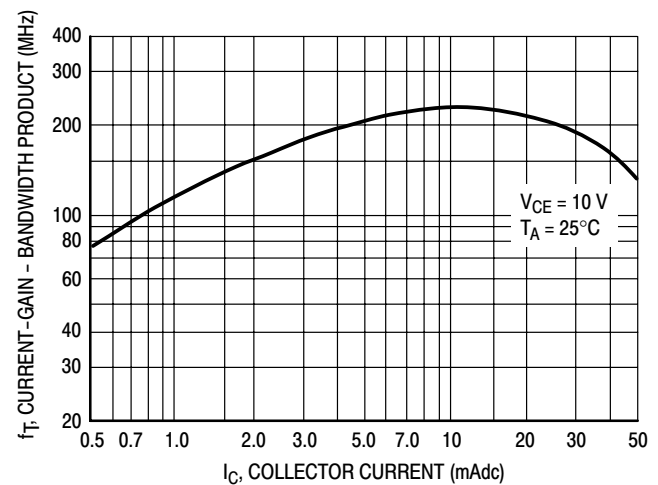


Figure 6. Current-Gain - Bandwidth Product

BC846AWT1, BC847AWT1, BC848AWT1 Series

BC846 SERIES

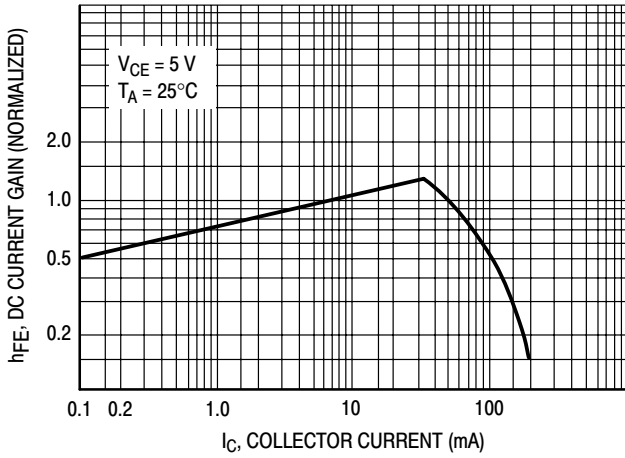


Figure 7. DC Current Gain

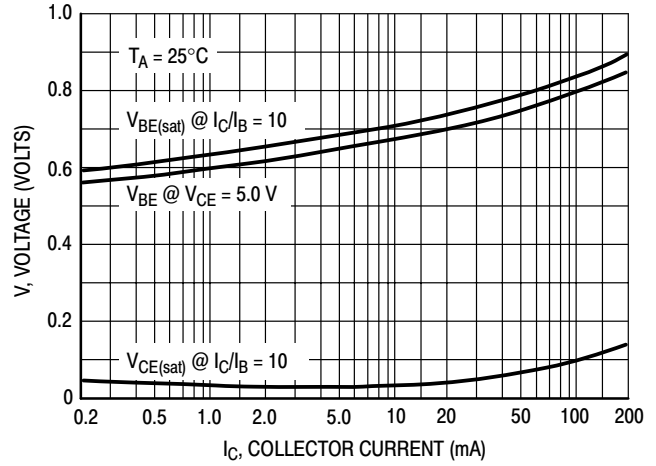


Figure 8. "On" Voltage

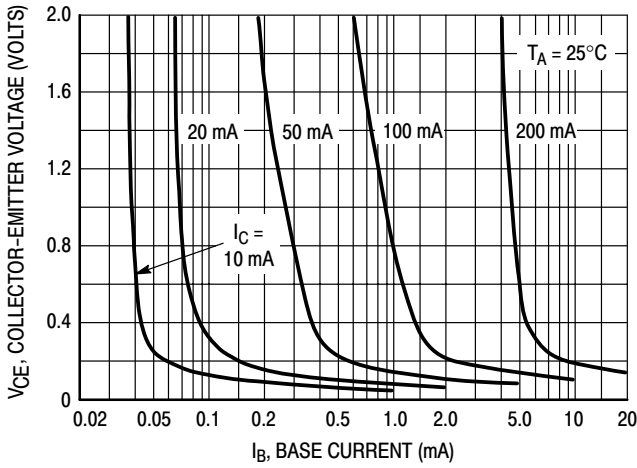


Figure 9. Collector Saturation Region

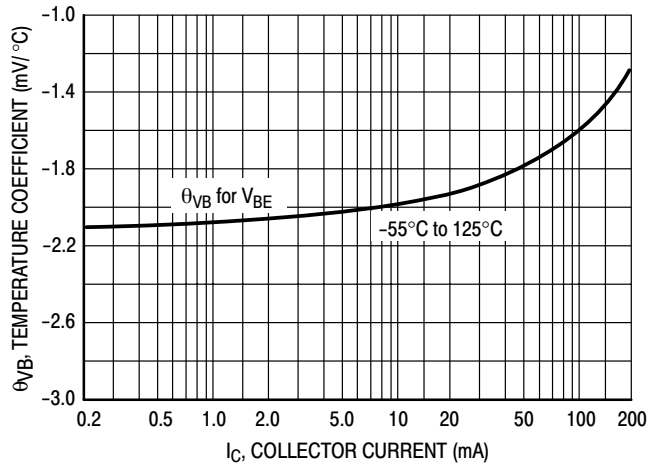


Figure 10. Base-Emitter Temperature Coefficient

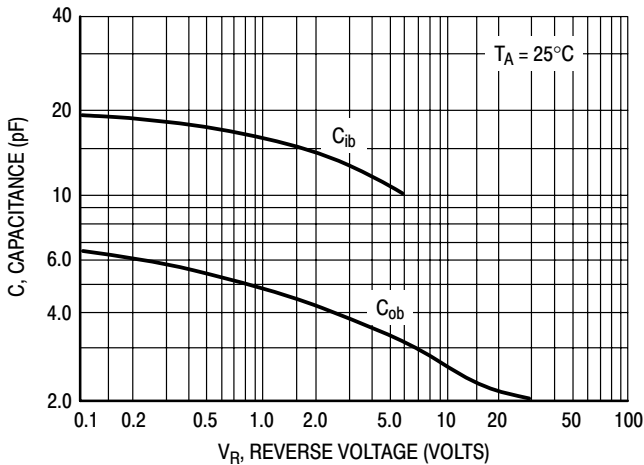


Figure 11. Capacitance

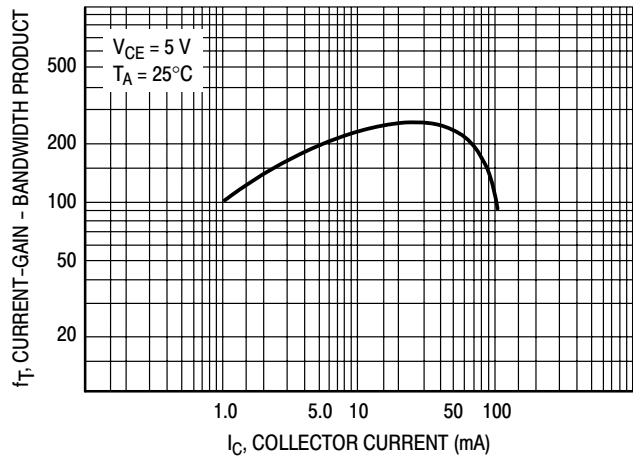


Figure 12. Current-Gain - Bandwidth Product

BC846AWT1, BC847AWT1, BC848AWT1 Series

DEVICE ORDERING AND SPECIFIC MARKING INFORMATION

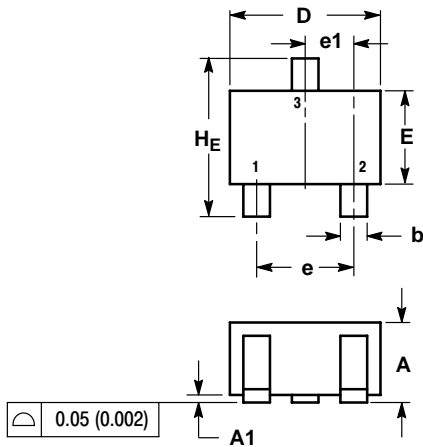
| Device | Specific Marking Code | Package | Shipping [†] |
|------------|-----------------------|------------------------------|-----------------------|
| BC846AWT1 | 1A | SC-70 (SOT-323) | 3,000 / Tape & Reel |
| BC846AWT1G | 1A | SC-70 (SOT-323) (Pb-Free) | |
| BC846BWT1 | 1B | SC-70 (SOT-323) | 3,000 / Tape & Reel |
| BC846BWT1G | 1B | SC-70 (SOT-323) (Pb-Free) | 3,000 / Tape & Reel |
| BC847AWT1 | 1E | SC-70 (SOT-323) | 3,000 / Tape & Reel |
| BC847AWT1G | 1E | SC-70 (SOT-323) (Pb-Free) | 3,000 / Tape & Reel |
| BC847BWT1 | 1F | SC-70 (SOT-323) | 3,000 / Tape & Reel |
| BC847BWT1G | 1F | SC-70 (SOT-323) (Pb-Free) | |
| BC847CWT1 | 1G | SC-70 (SOT-323) | 3,000 / Tape & Reel |
| BC847CWT1G | 1G | SC-70 (SOT-323) (Pb-Free) | |
| BC848AWT1 | 1J | SC-70 (SOT-323) | 3,000 / Tape & Reel |
| BC848AWT1G | 1J | SC-70 (SOT-323) (Pb-Free) | 3,000 / Tape & Reel |
| BC848BWT1 | 1K | SC-70 (SOT-323) | 3,000 / Tape & Reel |
| BC848BWT1G | 1K | SC-70 (SOT-323) (Pb-Free) | |
| BC848CWT1 | 1L | SC-70 (SOT-323) | 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.

BC846AWT1, BC847AWT1, BC848AWT1 Series

PACKAGE DIMENSIONS

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

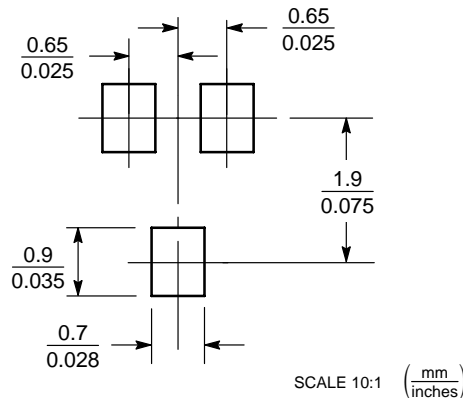


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.

| 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 | 0.7 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 | 0.425 REF | | | 0.017 REF | | |
| 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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