General Purpose Transistors NPN Silicon

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



COLLECTOR

EMITTER

MAXIMUM RATINGS

Rating	Symbol	BC846	BC847	BC848	Unit
Collector-Emitter Voltage	VCEO	65	45	30	V
Collector-Base Voltage	V _{CBO}	80	50	30	V
Emitter-Base Voltage	VEBO	6.0	6.0	5.0	V
Collector Current — Continuous	IC	100	100	100	mAdc

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit		
Total Device Dissipation FR-5 Board, (1) $T_A = 25^{\circ}C$	PD	150	mW		
Thermal Resistance, Junction to Ambient	R _{θJA}	833	°C/W		
Total Device Dissipation	PD	2.4	mW/°C		
Junction and Storage Temperature	Tj, T _{stg}	-55 to +150	°C		

DEVICE MARKING

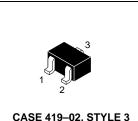
BC846AWT1 = 1A; BC846BWT1 = 1B; BC847AWT1 = 1E; BC847BWT1 = 1F; BC847CWT1 = 1G; BC848AWT1 = 1J; BC848BWT1 = 1K; BC848CWT1 = 1L

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

Characteristic		Symbol	Min	Тур	Max	Unit
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage (I _C = 10 mA)	BC846 Series BC847 Series BC848 Series	V(BR)CEO	65 45 30			V
Collector – Emitter Breakdown Voltage ($I_C = 10 \ \mu A, \ V_{EB} = 0$)	BC846 Series BC847 Series BC848 Series	V(BR)CES	80 50 30			V
Collector-Base Breakdown Voltage (I _C = 10 μA)	BC846 Series BC847 Series BC848 Series	V _(BR) CBO	80 50 30			V
Emitter-Base Breakdown Voltage (I _E = 1.0 μA)	BC846 Series BC847 Series BC848 Series	V(BR)EBO	6.0 6.0 5.0			V
Collector Cutoff Current (V _{CB} = 30 V) (V _{CB} = 30 V, T _A = 15	0°C)	IСВО		_	15 5.0	nA μA

1. FR-5 = $1.0 \times 0.75 \times 0.062$ in

Thermal Clad is a trademark of the Bergquist Company.



BC846AWT1,BWT1

BC847AWT1,BWT1, CWT1

BC848AWT1,BWT1,

CWT1

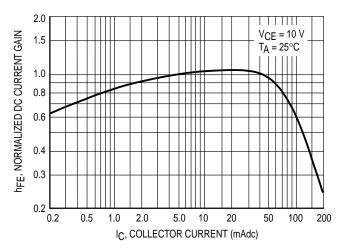
SOT-323/SC-70



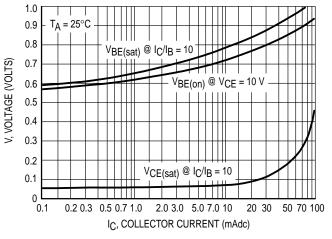
BC846AWT1,BWT1 BC847AWT1,BWT1,CWT1 BC848AWT1,BWT1,CWT1

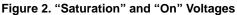
ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted) (Continued)

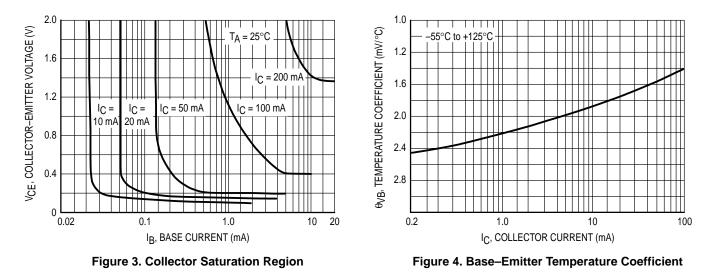
	Characteristic	Symbol	Min	Тур	Max	Unit
ON CHARACTERISTICS						
DC Current Gain (I _C = 10 μA, V _{CE} = 5.0 V)	BC846A, BC847A, BC848A BC846B, BC847B, BC848B BC847C, BC848C	hFE		90 150 270		_
$(I_{C} = 2.0 \text{ mA}, V_{CE} = 5.0 \text{ V})$	BC846A, BC847A, BC848A BC846B, BC847B, BC848B BC847C, BC848C		110 200 420	180 290 520	220 450 800	
Collector-Emitter Saturation Vo	ltage (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)		VBE(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 CHARACT	ERISTICS					
Current-Gain — Bandwidth Pro ($I_C = 10 \text{ mA}, V_{CE} = 5.0 \text{ Vdc}, t$		fT	100	—	-	MHz
Output Capacitance (V _{CB} = 10 V	V, f = 1.0 MHz)	Cobo	—	—	4.5	pF
Noise Figure (I _C = 0.2 mA, V _{CE} = 5.0 Vdc, R _S = 2.0 k Ω , f = 1.0 kHz, BW = 200 Hz)		NF		_	10 4.0	dB











BC846AWT1,BWT1 BC847AWT1,BWT1,CWT1 BC848AWT1,BWT1,CWT1

BC847/BC848

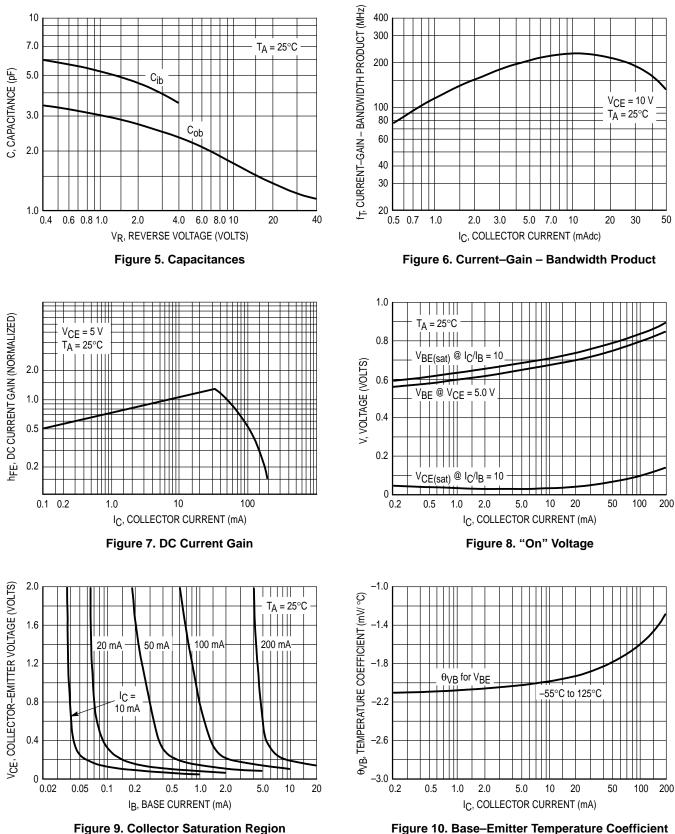


Figure 10. Base–Emitter Temperature Coefficient

BC846AWT1,BWT1 BC847AWT1,BWT1,CWT1 BC848AWT1,BWT1,CWT1

BC846

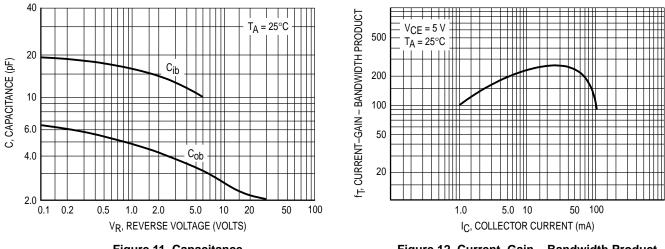


Figure 11. Capacitance

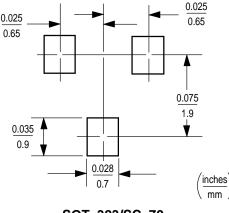
Figure 12. Current–Gain – Bandwidth Product

BC846AWT1,BWT1 BC847AWT1,BWT1,CWT1 BC848AWT1,BWT1,CWT1 INFORMATION FOR USING THE SOT-323/SC-70 SURFACE MOUNT PACKAGE

MINIMUM RECOMMENDED FOOTPRINT FOR SURFACE MOUNTED APPLICATIONS

Surface mount board layout is a critical portion of the total design. The footprint for the semiconductor packages must be the correct size to insure proper solder connection

interface between the board and the package. With the correct pad geometry, the packages will self align when subjected to a solder reflow process.



SOT-323/SC-70

SOT-323/SC-70 POWER DISSIPATION

The power dissipation of the SOT–323/SC–70 is a function of the pad size. This can vary from the minimum pad size for soldering to a pad size given for maximum power dissipation. Power dissipation for a surface mount device is determined by $T_{J(max)}$, the maximum rated junction temperature of the die, $R_{\theta JA}$, the thermal resistance from the device junction to ambient, and the operating temperature, T_A . Using the values provided on the data sheet for the SOT–323/SC–70 package, P_D can be calculated as follows:

$$P_{D} = \frac{T_{J(max)} - T_{A}}{R_{\theta JA}}$$

The values for the equation are found in the maximum ratings table on the data sheet. Substituting these values into the equation for an ambient temperature T_A of 25°C, one can calculate the power dissipation of the device which in this case is 150 milliwatts.

$$P_{D} = \frac{150^{\circ}C - 25^{\circ}C}{833^{\circ}C/W} = 150 \text{ milliwatts}$$

The 833°C/W for the SOT–323/SC–70 package assumes the use of the recommended footprint on a glass epoxy printed circuit board to achieve a power dissipation of 150 milliwatts. There are other alternatives to achieving higher power dissipation from the SOT–323/SC–70 package. Another alternative would be to use a ceramic substrate or an aluminum core board such as Thermal Clad[™]. Using a board material such as Thermal Clad, an aluminum core board, the power dissipation can be doubled using the same footprint.

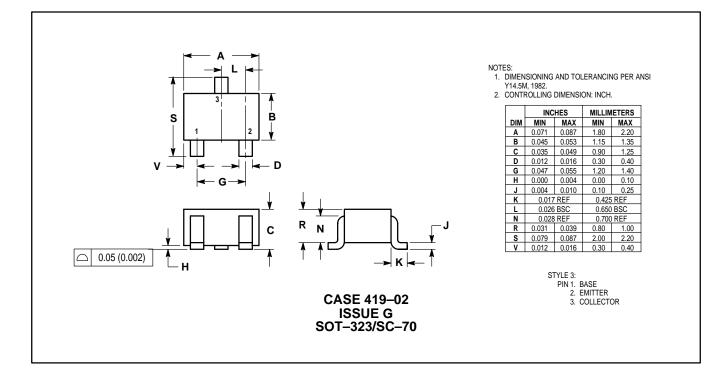
SOLDERING PRECAUTIONS

The melting temperature of solder is higher than the rated temperature of the device. When the entire device is heated to a high temperature, failure to complete soldering within a short time could result in device failure. Therefore, the following items should always be observed in order to minimize the thermal stress to which the devices are subjected.

- Always preheat the device.
- The delta temperature between the preheat and soldering should be 100°C or less.*
- When preheating and soldering, the temperature of the leads and the case must not exceed the maximum temperature ratings as shown on the data sheet. When using infrared heating with the reflow soldering method, the difference shall be a maximum of 10°C.
- The soldering temperature and time shall not exceed 260°C for more than 10 seconds.
- When shifting from preheating to soldering, the maximum temperature gradient shall be 5°C or less.
- After soldering has been completed, the device should be allowed to cool naturally for at least three minutes. Gradual cooling should be used as the use of forced cooling will increase the temperature gradient and result in latent failure due to mechanical stress.
- Mechanical stress or shock should not be applied during cooling.

* Soldering a device without preheating can cause excessive thermal shock and stress which can result in damage to the device.

BC846AWT1,BWT1 BC847AWT1,BWT1,CWT1 BC848AWT1,BWT1,CWT1 PACKAGE DIMENSIONS



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