

# General Purpose Transistor

## NPN Silicon

# BC846BM3T5G, NSVBC846BM3T5G

### Features

- Moisture Sensitivity Level: 1
- ESD Rating: Human Body Model: >4000 V  
Machine Model: >400 V
- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- This is a Pb-Free Device

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO}$	65	Vdc
Collector-Base Voltage	$V_{CBO}$	80	Vdc
Emitter-Base Voltage	$V_{EBO}$	6.0	Vdc
Collector Current – Continuous	$I_C$	100	mAdc

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation FR-5 Board (Note 1) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	265	mW
Thermal Resistance, Junction to Ambient (Note 1)	$R_{\theta JA}$	470	$^\circ\text{C}/\text{W}$
Total Device Dissipation Alumina Substrate (Note 2) $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	640	mW
Thermal Resistance, Junction to Ambient (Note 2)	$R_{\theta JA}$	195	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

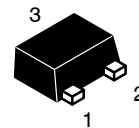
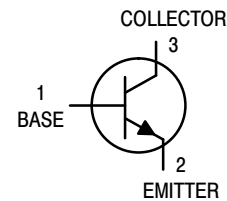
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

- FR-5 =  $1.0 \times 0.75 \times 0.062$  in.
- Alumina =  $0.4 \times 0.3 \times 0.024$  in. 99.5% alumina.



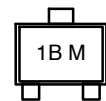
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SOT-723  
CASE 631AA  
STYLE 1

### MARKING DIAGRAM



1B = Specific Device Code  
M = Date Code

### ORDERING INFORMATION

Device	Package	Shipping†
BC846BM3T5G	SOT-723 (Pb-Free)	8000 / Tape & Reel
NSVBC846BM3T5G	SOT-723 (Pb-Free)	8000 / 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.

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## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Collector – Emitter Breakdown Voltage (I <sub>C</sub> = 10 mA)	V <sub>(BR)CEO</sub>	65	–	–	V
Collector – Emitter Breakdown Voltage (I <sub>C</sub> = 10 μA, V <sub>EB</sub> = 0)	V <sub>(BR)CES</sub>	80	–	–	V
Collector – Base Breakdown Voltage (I <sub>C</sub> = 10 μA)	V <sub>(BR)CBO</sub>	80	–	–	V
Emitter – Base Breakdown Voltage (I <sub>E</sub> = 1.0 μA)	V <sub>(BR)EBO</sub>	6.0	–	–	V
Collector Cutoff Current (V <sub>CB</sub> = 30 V) (V <sub>CB</sub> = 30 V, T <sub>A</sub> = 150°C)	I <sub>CBO</sub>	–	–	15 5.0	nA μA
Base Peak Current (t ≤ 1 s)	I <sub>BM</sub>	–	–	200	mA

### ON CHARACTERISTICS

DC Current Gain (I <sub>C</sub> = 10 μA, V <sub>CE</sub> = 5.0 V) (I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V)	h <sub>FE</sub>	– 200	150 290	– 450	–
Collector – Emitter Saturation Voltage (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0.5 mA) (I <sub>C</sub> = 100 mA, I <sub>B</sub> = 5.0 mA)	V <sub>CE(sat)</sub>	– –	– –	0.25 0.6	V
Base – Emitter Saturation Voltage (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0.5 mA) (I <sub>C</sub> = 100 mA, I <sub>B</sub> = 5.0 mA)	V <sub>BE(sat)</sub>	– –	0.7 0.9	– –	V
Base – Emitter Voltage (I <sub>C</sub> = 1.0 mA, V <sub>CE</sub> = 5.0 V) (I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V) (I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 5.0 V)	V <sub>BE(on)</sub>	550 580 –	645 660 –	700 700 770	mV

### SMALL-SIGNAL CHARACTERISTICS

Current – Gain – Bandwidth Product (I <sub>C</sub> = 10 mA, V <sub>CE</sub> = 5.0 Vdc, f = 100 MHz)	f <sub>T</sub>	100	–	–	MHz
Output Capacitance (V <sub>CB</sub> = 10 V, f = 1.0 MHz)	C <sub>obo</sub>	–	–	4.5	pF
Noise Figure (I <sub>C</sub> = 0.2 mA, V <sub>CE</sub> = 5.0 Vdc, R <sub>S</sub> = 2.0 kΩ, f = 1.0 kHz, BW = 200 Hz)	NF	–	–	10	dB

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL CHARACTERISTICS

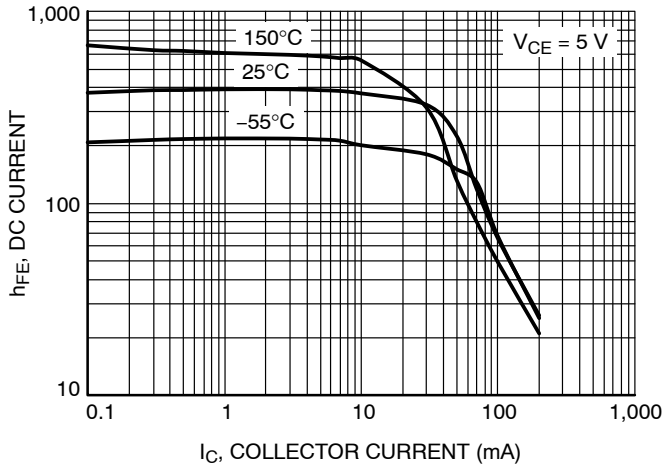


Figure 1. DC Current Gain

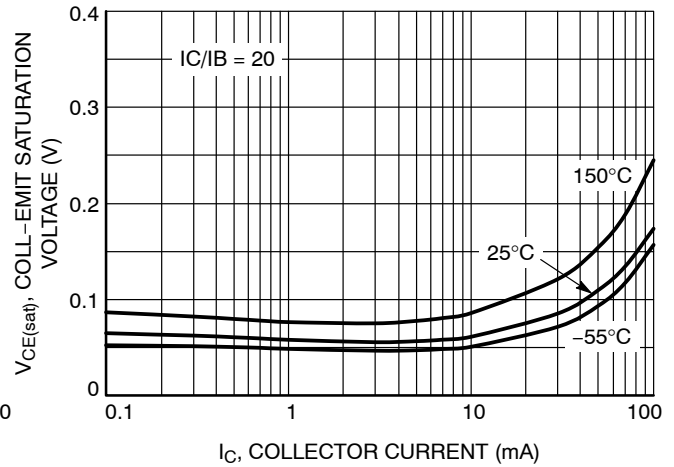


Figure 2. Collector-Emitter Saturation Voltage

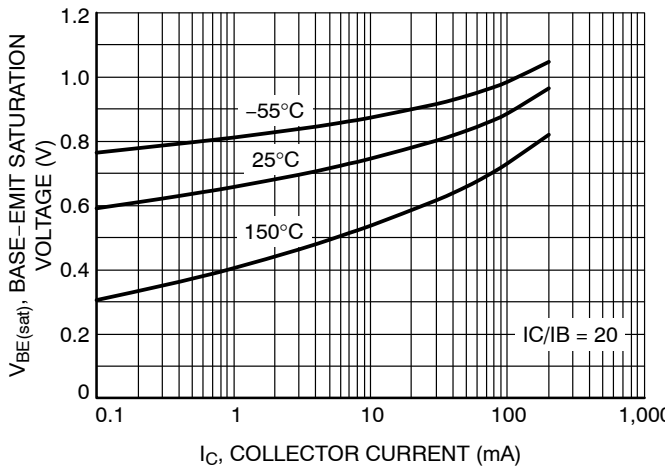


Figure 3. Base-Emitter Saturation Voltage

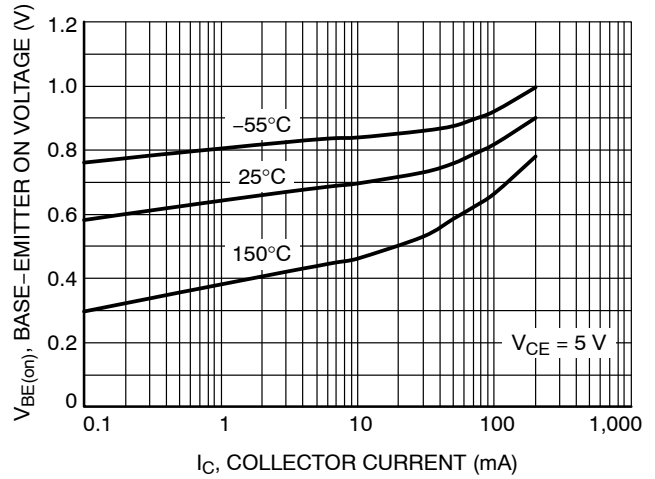


Figure 4. Base-Emitter "On" Voltage

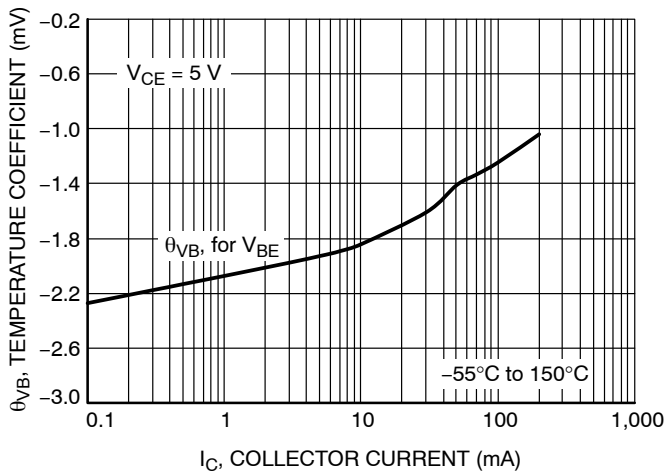


Figure 5. Base-Emitter Temperature Coefficient

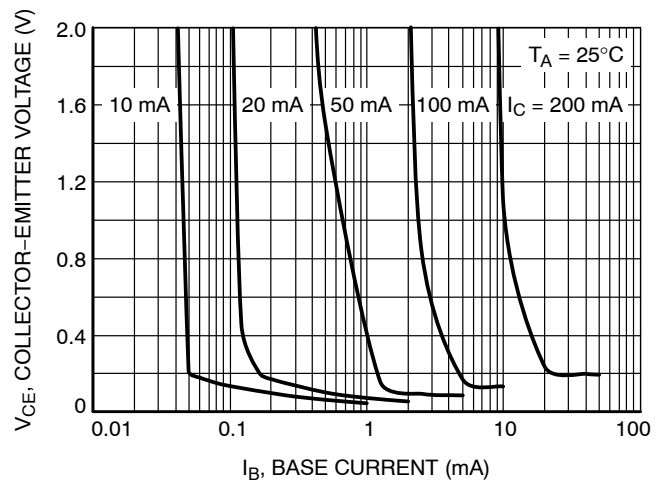


Figure 6. Collector Saturation Region

# BC846BM3T5G, NSVBC846BM3T5G

## TYPICAL CHARACTERISTICS

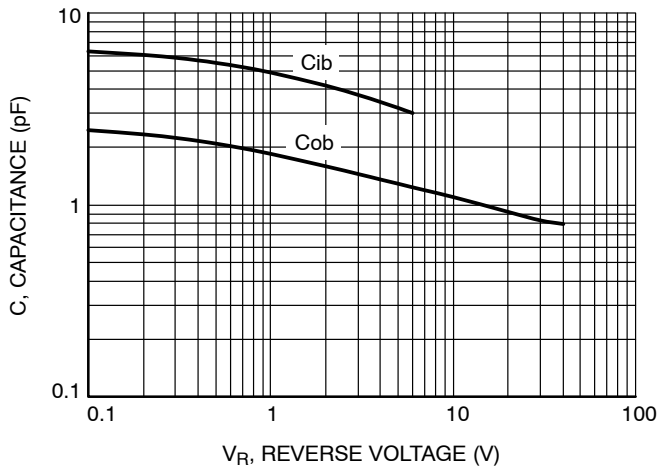


Figure 7. Capacitances

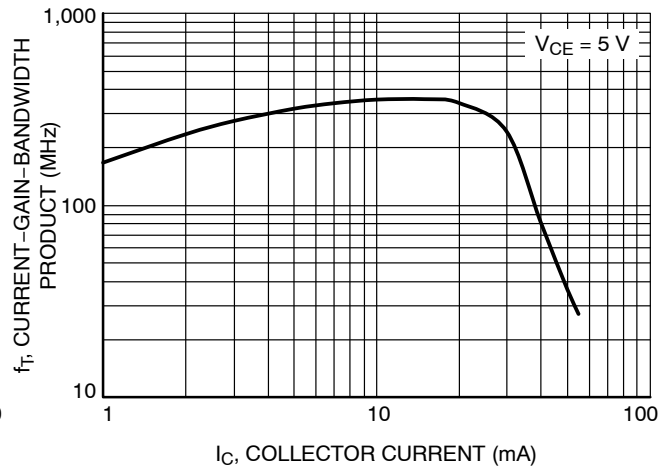


Figure 8. Current-Gain-Bandwidth Product

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

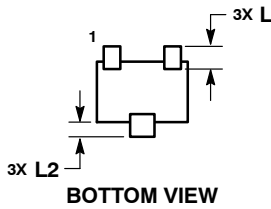
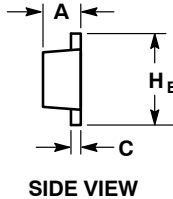
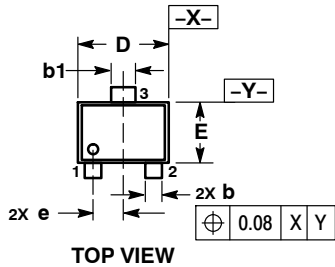
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SCALE 4:1

**SOT-723**  
CASE 631AA-01  
ISSUE D

DATE 10 AUG 2009

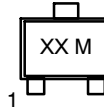


**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.45	0.50	0.55
b	0.15	0.21	0.27
b1	0.25	0.31	0.37
C	0.07	0.12	0.17
D	1.15	1.20	1.25
E	0.75	0.80	0.85
e	0.40 BSC		
H E	1.15	1.20	1.25
L	0.29 REF		
L2	0.15	0.20	0.25

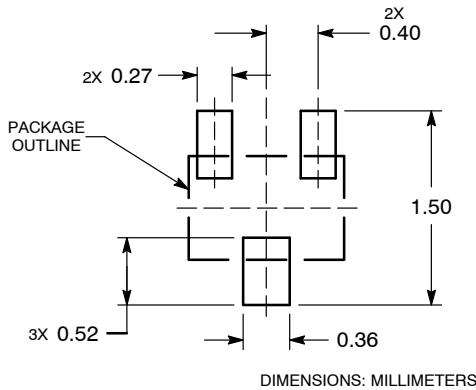
**GENERIC MARKING DIAGRAM\***



XX = Specific Device Code  
M = Date Code

- |   |  |  |  |  |
|---|--|--|--|--|
| STYLE 1:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR | STYLE 2:<br>PIN 1. ANODE<br>2. N/C<br>3. CATHODE | STYLE 3:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE | STYLE 4:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. ANODE | STYLE 5:<br>PIN 1. GATE<br>2. SOURCE<br>3. DRAIN |
|---|--|--|--|--|

**RECOMMENDED SOLDERING FOOTPRINT\***



\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G", may or not be present.

\*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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