

# 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 |

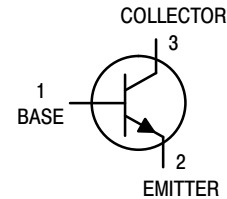
#### THERMAL CHARACTERISTICS

| Characteristic                                                                                                     | Symbol          | Max         | Unit                 |
|--------------------------------------------------------------------------------------------------------------------|-----------------|-------------|----------------------|
| Total Device Dissipation FR-5 Board (Note 1)<br>$T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$        | $P_D$           | 265         | mW                   |
|                                                                                                                    |                 | 2.1         | mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient (Note 1)                                                                   | $R_{\theta JA}$ | 470         | $^\circ\text{C/W}$   |
| Total Device Dissipation Alumina Substrate (Note 2)<br>$T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$           | 640         | mW                   |
|                                                                                                                    |                 | 5.1         | mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient (Note 2)                                                                   | $R_{\theta JA}$ | 195         | $^\circ\text{C/W}$   |
| Junction and Storage Temperature Range                                                                             | $T_J, T_{stg}$  | -55 to +150 | $^\circ\text{C}$     |

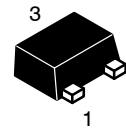
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

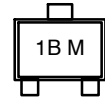
2. Alumina =  $0.4 \times 0.3 \times 0.024$  in. 99.5% alumina.



#### MARKING DIAGRAM



SOT-723  
CASE 631AA  
STYLE 1



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 Specification Brochure, [BRD8011/D](http://BRD8011/D).

# BC846BM3T5G, NSVBC846BM3T5G

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

| Characteristic                                                                                                             | Symbol        | Min    | Typ    | Max       | Unit                |
|----------------------------------------------------------------------------------------------------------------------------|---------------|--------|--------|-----------|---------------------|
| <b>OFF CHARACTERISTICS</b>                                                                                                 |               |        |        |           |                     |
| Collector - Emitter Breakdown Voltage<br>( $I_C = 10\text{ mA}$ )                                                          | $V_{(BR)CEO}$ | 65     | –      | –         | V                   |
| Collector - Emitter Breakdown Voltage<br>( $I_C = 10\text{ }\mu\text{A}$ , $V_{EB} = 0$ )                                  | $V_{(BR)CES}$ | 80     | –      | –         | V                   |
| Collector - Base Breakdown Voltage<br>( $I_C = 10\text{ }\mu\text{A}$ )                                                    | $V_{(BR)CBO}$ | 80     | –      | –         | V                   |
| Emitter - Base Breakdown Voltage<br>( $I_E = 1.0\text{ }\mu\text{A}$ )                                                     | $V_{(BR)EBO}$ | 6.0    | –      | –         | V                   |
| Collector Cutoff Current<br>( $V_{CB} = 30\text{ V}$ )<br>( $V_{CB} = 30\text{ V}$ , $T_A = 150\text{ }^{\circ}\text{C}$ ) | $I_{CBO}$     | –<br>– | –<br>– | 15<br>5.0 | nA<br>$\mu\text{A}$ |
| Base Peak Current<br>( $t \leq 1\text{ s}$ )                                                                               | $I_{BM}$      | –      | –      | 200       | mA                  |

## ON CHARACTERISTICS

|                                                                                                                                                                                         |               |                 |                 |                   |    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-----------------|-----------------|-------------------|----|
| DC Current Gain<br>( $I_C = 10\text{ }\mu\text{A}$ , $V_{CE} = 5.0\text{ V}$ )<br>( $I_C = 2.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )                                                   | $h_{FE}$      | –<br>200        | 150<br>290      | –<br>450          | –  |
| Collector - Emitter Saturation Voltage ( $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ )<br>( $I_C = 100\text{ mA}$ , $I_B = 5.0\text{ mA}$ )                                            | $V_{CE(sat)}$ | –<br>–          | –<br>–          | 0.25<br>0.6       | V  |
| Base - Emitter Saturation Voltage ( $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ )<br>( $I_C = 100\text{ mA}$ , $I_B = 5.0\text{ mA}$ )                                                 | $V_{BE(sat)}$ | –<br>–          | 0.7<br>0.9      | –<br>–            | V  |
| Base - Emitter Voltage ( $I_C = 1.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )<br>( $I_C = 2.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )<br>( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ ) | $V_{BE(on)}$  | 550<br>580<br>– | 645<br>660<br>– | 700<br>700<br>770 | mV |

## SMALL-SIGNAL CHARACTERISTICS

|                                                                                                                                                  |           |     |   |     |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----|---|-----|-----|
| Current - Gain – Bandwidth Product<br>( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ , $f = 100\text{ MHz}$ )                                | $f_T$     | 100 | – | –   | MHz |
| Output Capacitance<br>( $V_{CB} = 10\text{ V}$ , $f = 1.0\text{ MHz}$ )                                                                          | $C_{obo}$ | –   | – | 4.5 | pF  |
| Noise Figure<br>( $I_C = 0.2\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ , $R_S = 2.0\text{ k}\Omega$ , $f = 1.0\text{ kHz}$ , $BW = 200\text{ Hz}$ ) | NF        | –   | – | 10  | dB  |

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

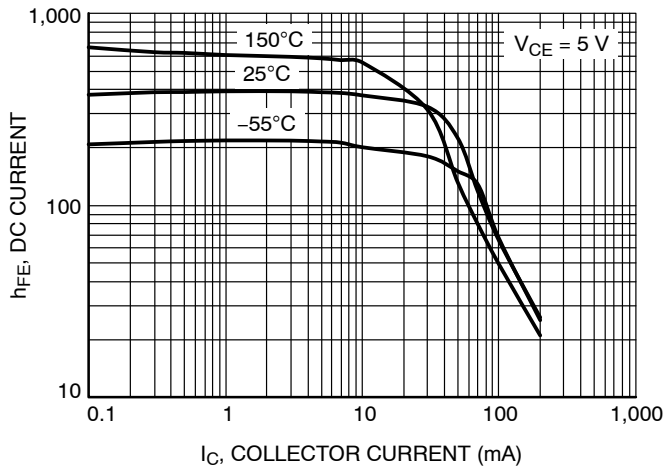


Figure 1. DC Current Gain

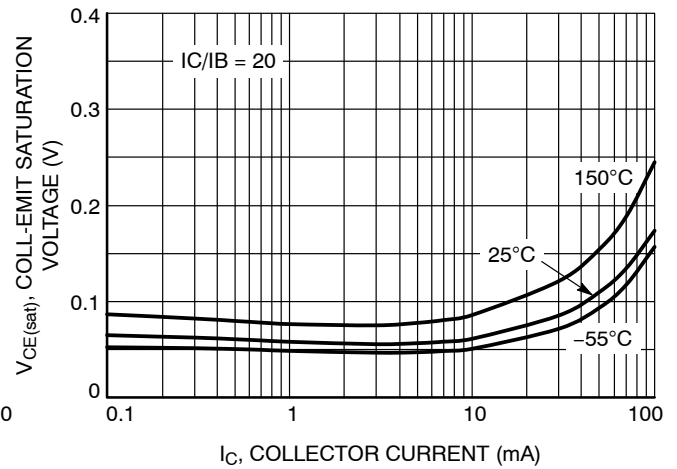


Figure 2. Collector-Emitter Saturation Voltage

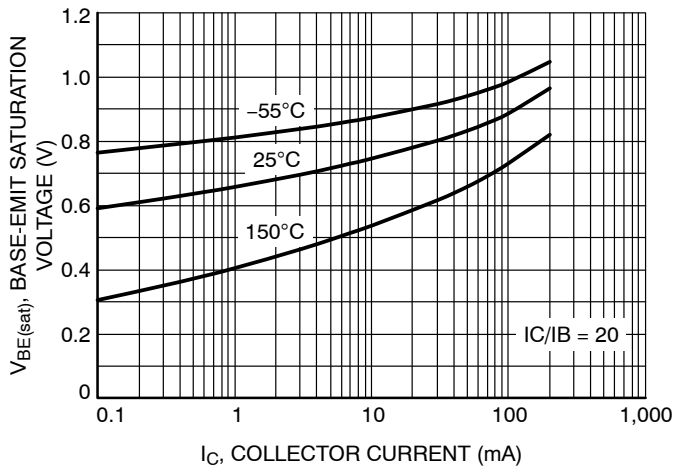


Figure 3. Base-Emitter Saturation Voltage

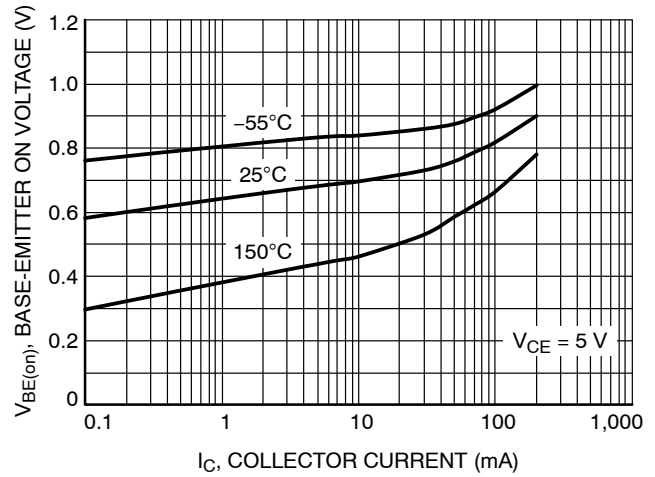


Figure 4. Base-Emitter "On" Voltage

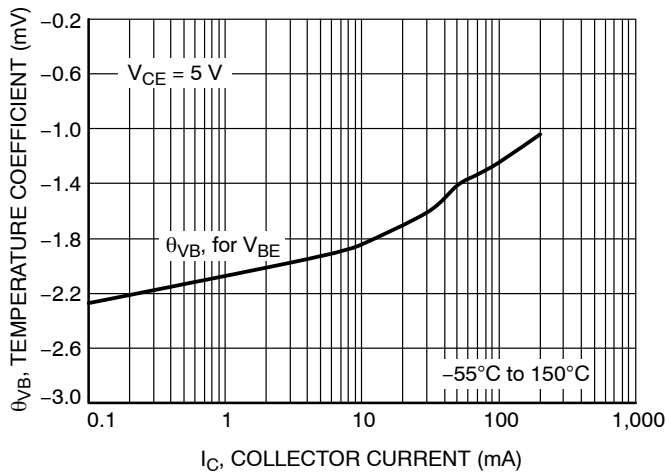


Figure 5. Base-Emitter Temperature Coefficient

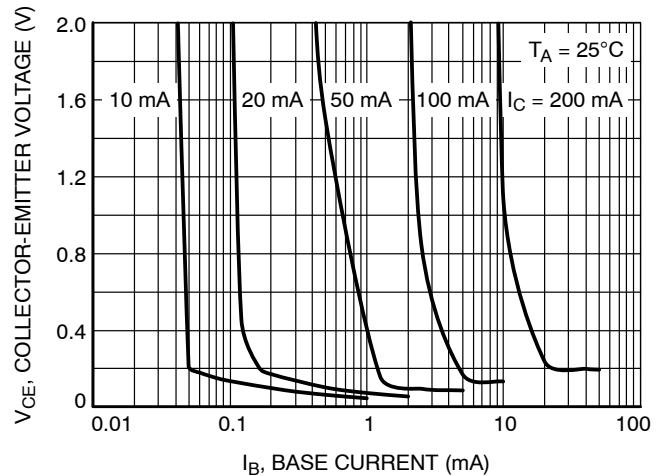


Figure 6. Collector Saturation Region

TYPICAL CHARACTERISTICS

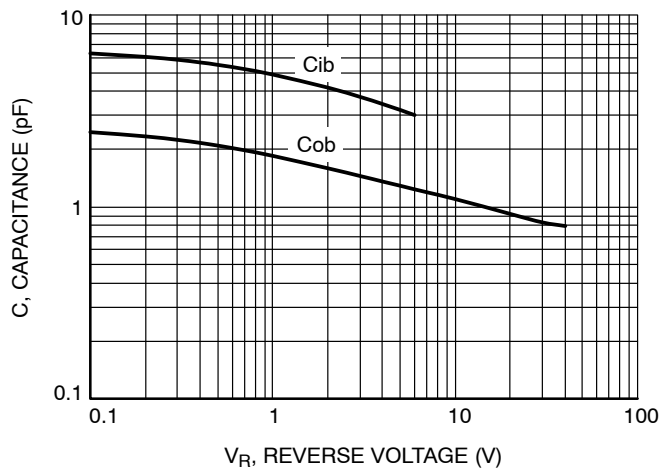


Figure 7. Capacitances

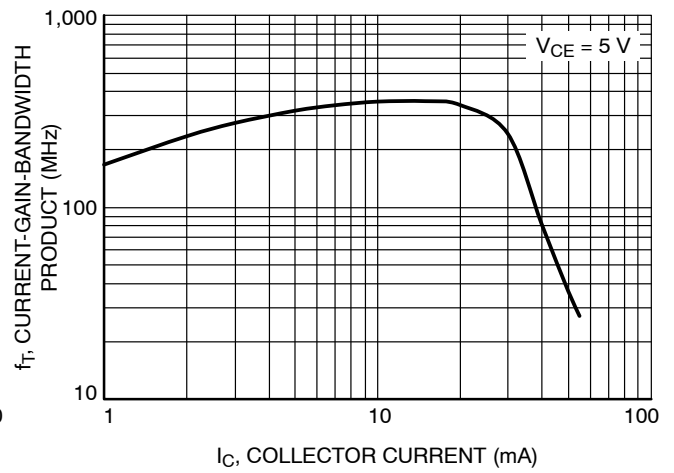
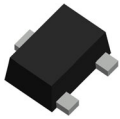


Figure 8. Current-Gain-Bandwidth Product

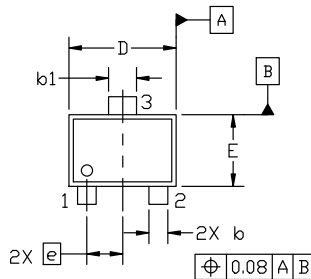


**SOT-723 1.20x0.80x0.50, 0.40P**  
**CASE 631AA**  
**ISSUE E**

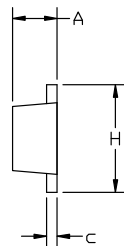
DATE 24 JAN 2024

NOTES:

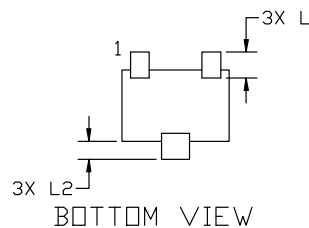
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.



TOP VIEW

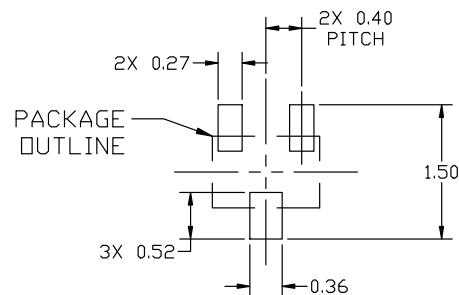


SIDE VIEW



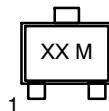
BOTTOM VIEW

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | 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   | 1.15        | 1.20 | 1.25 |
| L   | 0.29 REF    |      |      |
| L2  | 0.15        | 0.20 | 0.25 |



RECOMMENDED MOUNTING  
FOOTPRINT

**GENERIC  
MARKING DIAGRAM\***



XX = Specific Device Code  
M = Date Code

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERM/D.

|                                                       |                                                  |                                                    |                                                      |                                                  |
|-------------------------------------------------------|--------------------------------------------------|----------------------------------------------------|------------------------------------------------------|--------------------------------------------------|
| 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 |
|-------------------------------------------------------|--------------------------------------------------|----------------------------------------------------|------------------------------------------------------|--------------------------------------------------|

|                         |                                      |                                                                                                                                                                                  |
|-------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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