

# NST846BF3T5G

## NPN General Purpose Transistor

The NST846BF3T5G device is a spin-off of our popular SOT-23/SOT-323/SOT-563 three-leaded device. It is designed for general purpose amplifier applications and is housed in the SOT-1123 surface mount package. This device is ideal for low-power surface mount applications where board space is at a premium.

### Features

- $h_{FE}$ , 200–450
- Low  $V_{CE(sat)}$ ,  $\leq 0.25$  V
- Reduces Board Space
- This is a Halide-Free Device
- 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, $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$ (Note 1)	290 2.3	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$ (Note 1)	432	$^\circ\text{C}/\text{W}$
Total Device Dissipation, $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$ (Note 2)	347 2.8	mW mW/ $^\circ\text{C}$
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$ (Note 2)	360	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction–to–Lead 3	$R_{\psi JL}$ (Note 2)	143	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	$T_J, T_{stg}$	–55 to +150	$^\circ\text{C}$

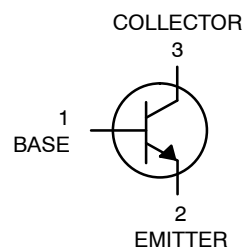
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. 100 mm<sup>2</sup> 1 oz, copper traces.
2. 500 mm<sup>2</sup> 1 oz, copper traces.

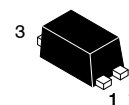


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NST846BF3T5G



SOT-1123  
CASE 524AA  
STYLE 1

(Rotated 90° Clockwise)

### MARKING DIAGRAM



V = Device Code  
M = Date Code

### ORDERING INFORMATION

Device	Package	Shipping†
NST846BF3T5G	SOT-1123 (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.

# NST846BF3T5G

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

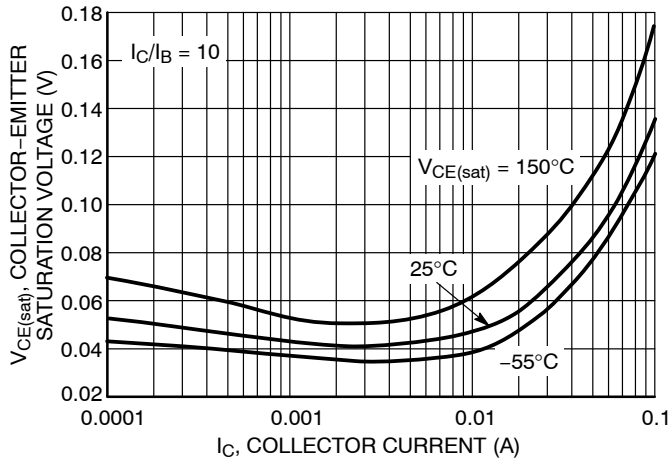
Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector – Emitter Breakdown Voltage (I <sub>C</sub> = 10 mA)	V <sub>(BR)CEO</sub>	65	–	–	V
Collector – Emitter Breakdown Voltage (I <sub>C</sub> = 10 μA, V <sub>EB</sub> = 0)	V <sub>(BR)CES</sub>	80	–	–	V
Collector – Base Breakdown 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)	I <sub>CBO</sub>	–	–	15	nA
(V <sub>CB</sub> = 30 V, T <sub>A</sub> = 150°C)		–	–	5.0	μA

## ON CHARACTERISTICS

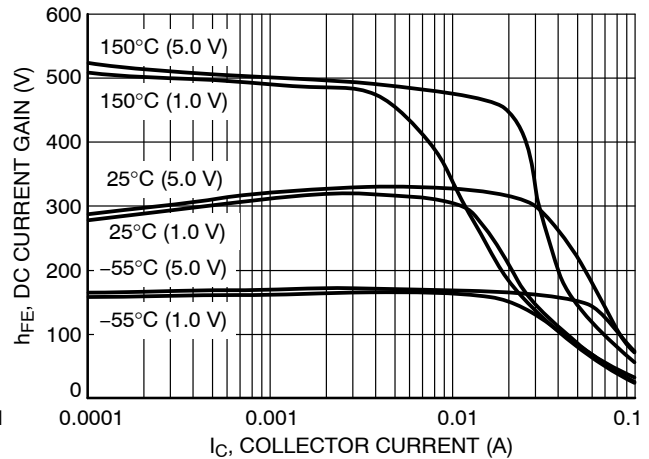
DC Current Gain (I <sub>C</sub> = 10 μA, V <sub>CE</sub> = 5.0 V)	h <sub>FE</sub>	–	150	–	–
(I <sub>C</sub> = 2.0 mA, V <sub>CE</sub> = 5.0 V)		200	290	450	–
Collector – Emitter Saturation Voltage (I <sub>C</sub> = 10 mA, I <sub>B</sub> = 0.5 mA)	V <sub>CE(sat)</sub>	–	–	0.25	V
(I <sub>C</sub> = 100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

## 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
Input Capacitance (V <sub>EB</sub> = 0.5 V, I <sub>C</sub> = 0 mA, f = 1.0 MHz)	C <sub>ibo</sub>	–	–	10	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

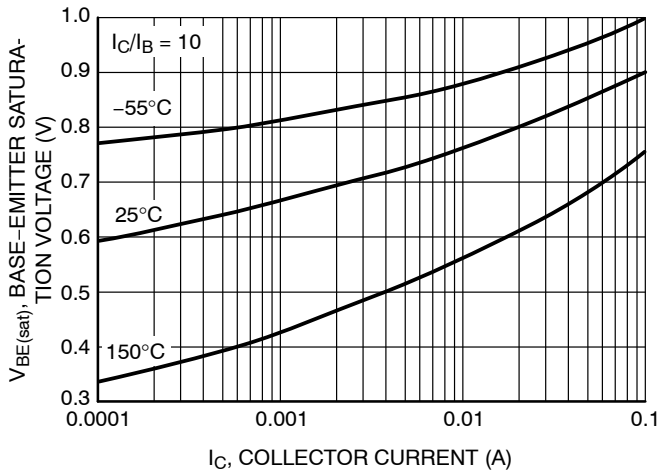


**Figure 1. Collector Emitter Saturation Voltage vs. Collector Current**

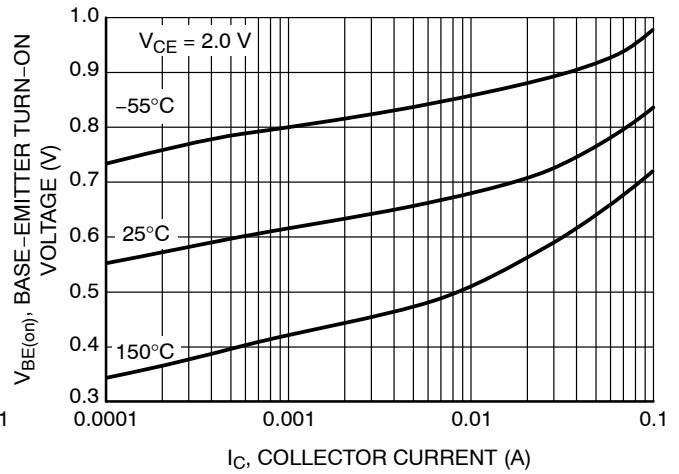


**Figure 2. DC Current Gain vs. Collector Current**

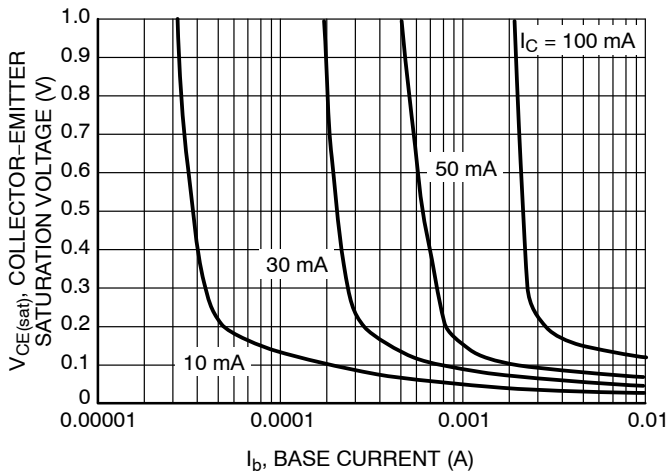
# NST846BF3T5G



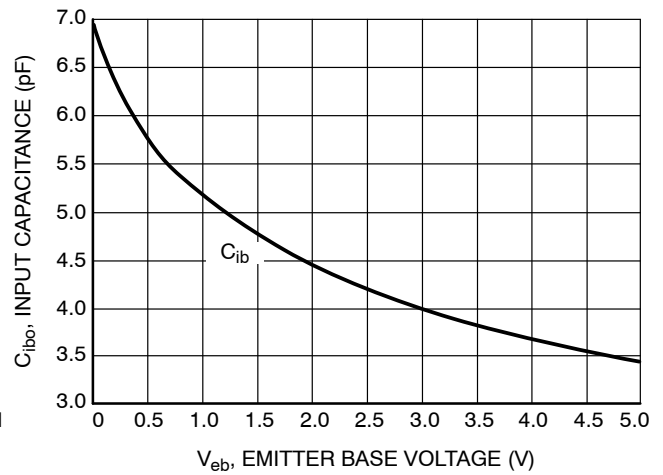
**Figure 3. Base Emitter Saturation Voltage vs. Collector Current**



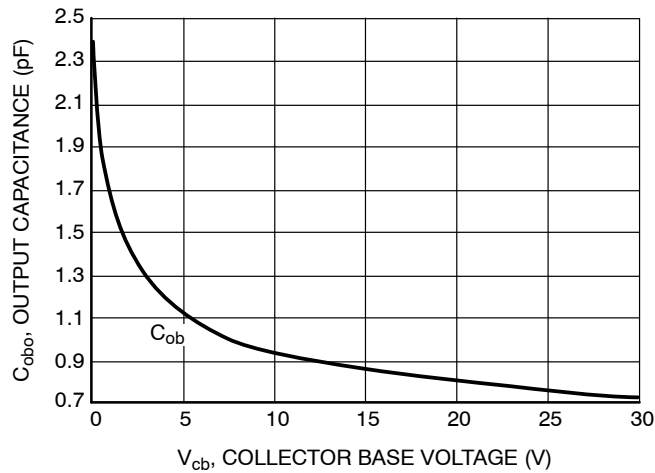
**Figure 4. Base Emitter Turn-On Voltage vs. Collector Current**



**Figure 5. Saturation Region**



**Figure 6. Input Capacitance**

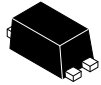


**Figure 7. Output Capacitance**

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

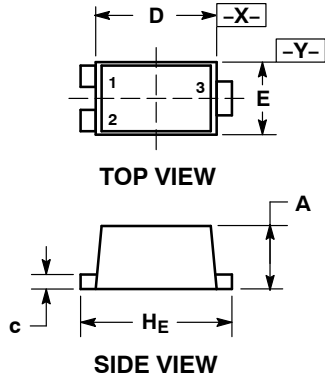
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SCALE 8:1

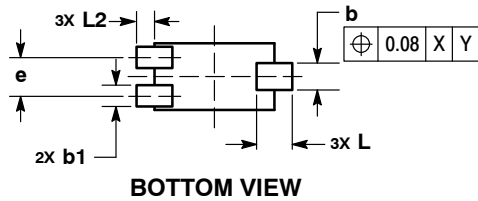
SOT-1123  
CASE 524AA  
ISSUE C

DATE 29 NOV 2011

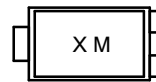


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
  2. CONTROLLING DIMENSION: MILLIMETERS.
  3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
  4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

DIM	MILLIMETERS	
	MIN	MAX
A	0.34	0.40
b	0.15	0.28
b1	0.10	0.20
c	0.07	0.17
D	0.75	0.85
E	0.55	0.65
e	0.35	0.40
HE	0.95	1.05
L	0.185	REF
L2	0.05	0.15

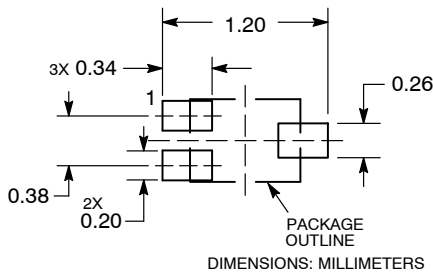


### GENERIC MARKING DIAGRAM\*



X = Specific Device Code  
M = Date Code

### SOLDERING FOOTPRINT\*



\*This information is generic. Please refer to device data sheet for actual part marking.  
Pb-Free indicator, "G" or microdot "μ", may or may 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.

- |   |  |  |  |  |
|---|--|--|--|--|
| 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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<b>DESCRIPTION:</b>	<b>SOT-1123, 3-LEAD, 1.0X0.6X0.37, 0.35P</b>	<b>PAGE 1 OF 1</b>

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