

# General Purpose Transistor

## NPN Silicon

- Moisture Sensitivity Level: 1
- ESD Rating: Human Body Model: >4000 V  
Machine Model: >400 V
- 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

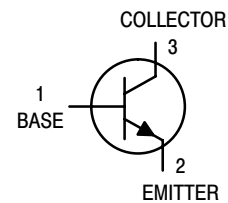
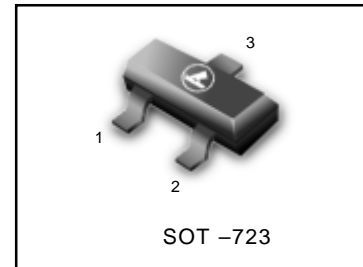
### THERMAL CHARACTERISTICS

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
		2.1	mW/ $^\circ\text{C}$
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
		5.1	mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient (Note 2)	$R_{\theta JA}$	195	$^\circ\text{C}/\text{W}$
Junction and Storage	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

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.

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.

## LBC846BM3T5G



### ORDERING INFORMATION

Device	Marking	Shipping
LBC846BM3T5G	1B	3000/Tape & Reel

**LBC846BM3T5G**
**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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**OFF CHARACTERISTICS**

Collector–Emitter Breakdown Voltage ( $I_C = 10\text{ mA}$ )	$V_{(BR)CEO}$	65	–	–	V
Collector–Emitter Breakdown Voltage ( $I_C = 10\ \mu\text{A}$ , $V_{EB} = 0$ )	$V_{(BR)CES}$	80	–	–	V
Collector–Base Breakdown Voltage ( $I_C = 10\ \mu\text{A}$ )	$V_{(BR)CBO}$	80	–	–	V
Emitter–Base Breakdown Voltage ( $I_E = 1.0\ \mu\text{A}$ )	$V_{(BR)EBO}$	6.0	–	–	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 $\mu\text{A}$

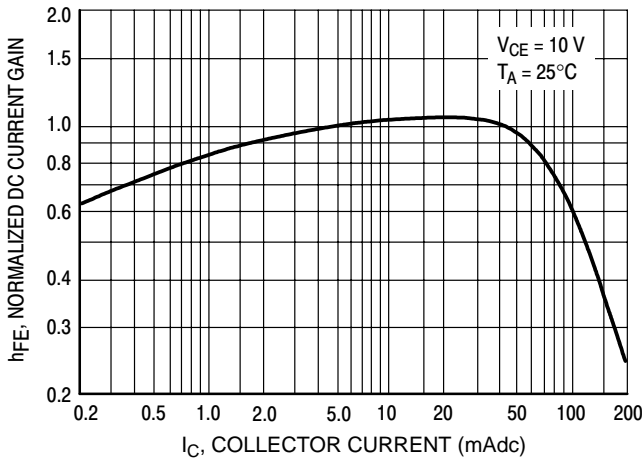
**ON CHARACTERISTICS**

DC Current Gain ( $I_C = 10\ \mu\text{A}$ , $V_{CE} = 5.0\text{ V}$ ) ( $I_C = 2.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )	$h_{FE}$	– 200	150 290	– 450	–
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

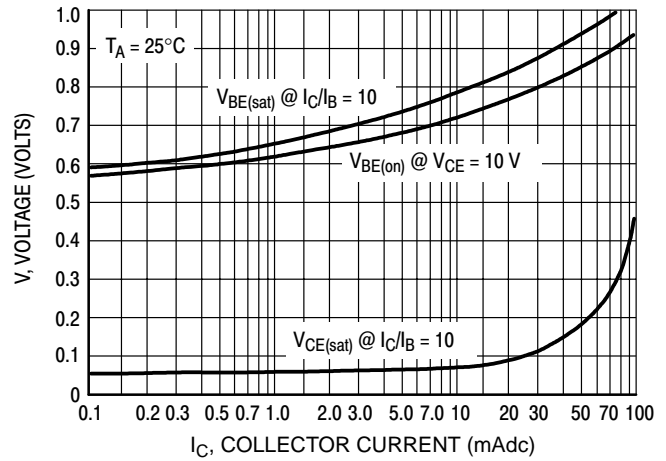
**SMALL–SIGNAL CHARACTERISTICS**

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

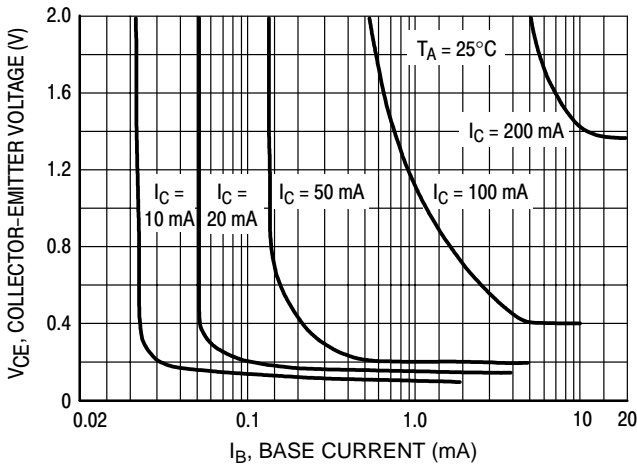
**LBC846BM3T5G**



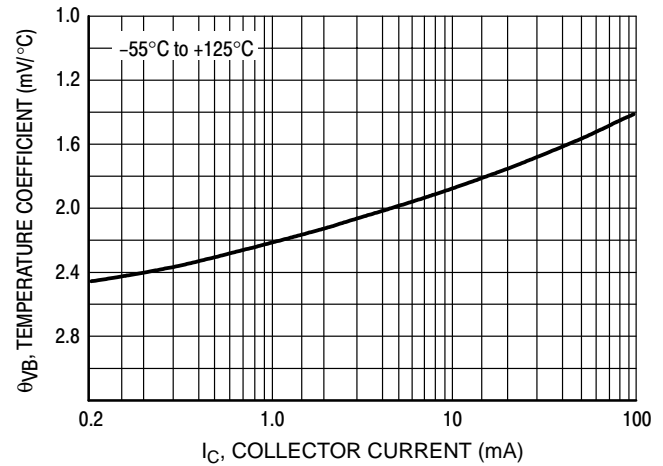
**Figure 1. Normalized DC Current Gain**



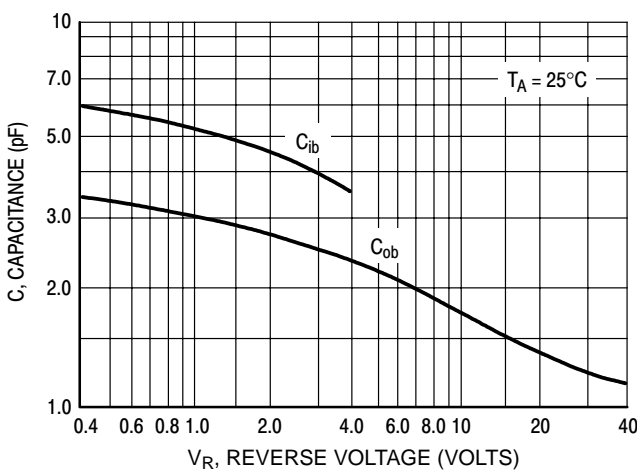
**Figure 2. "Saturation" and "On" Voltages**



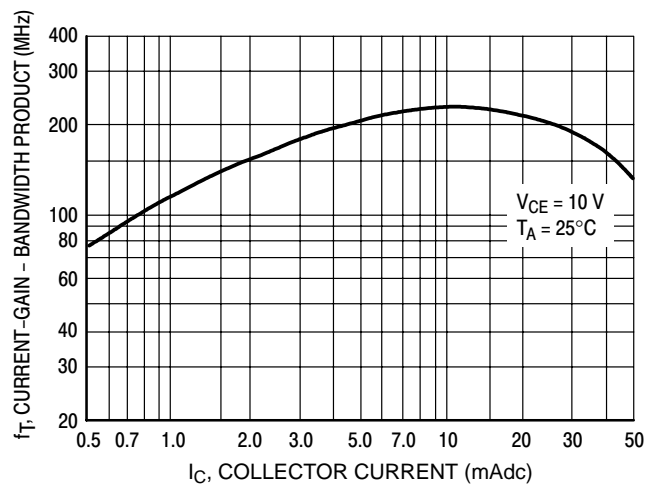
**Figure 3. Collector Saturation Region**



**Figure 4. Base-Emitter Temperature Coefficient**

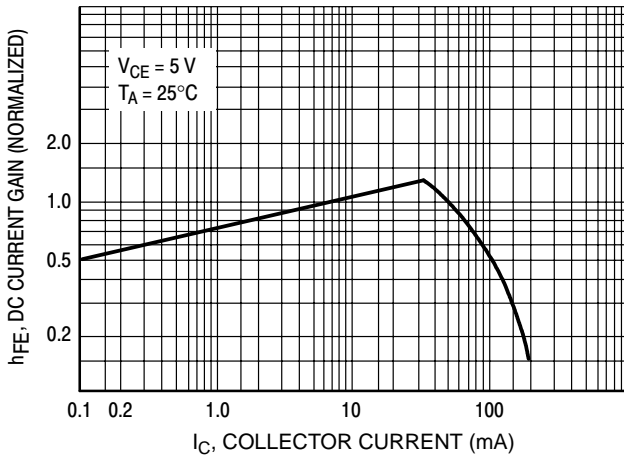


**Figure 5. Capacitances**

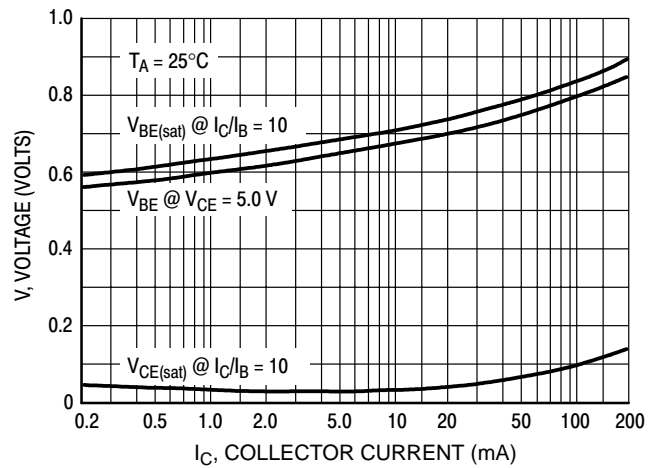


**Figure 6. Current-Gain - Bandwidth Product**

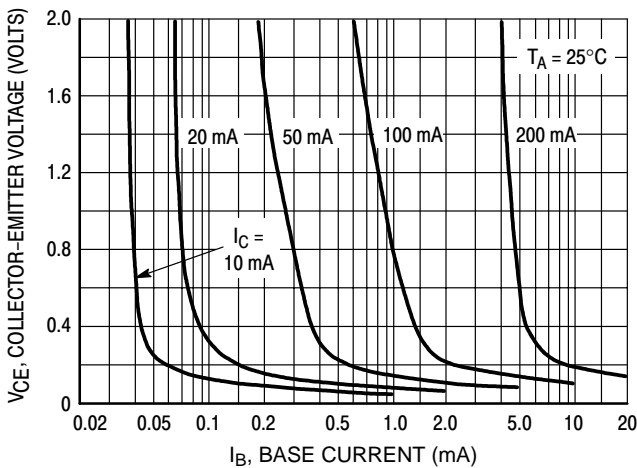
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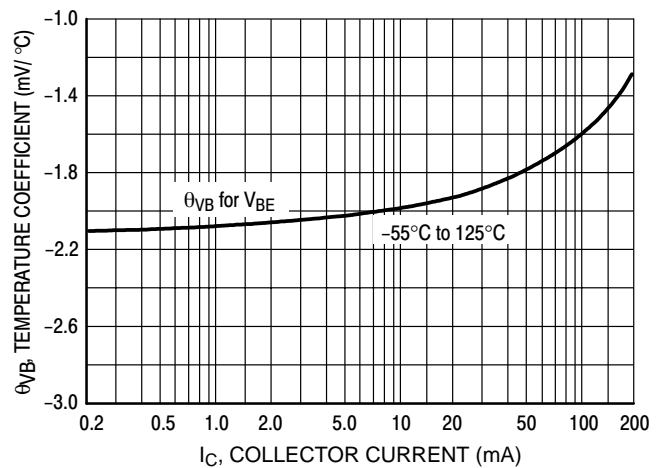
**Figure 7. DC Current Gain**



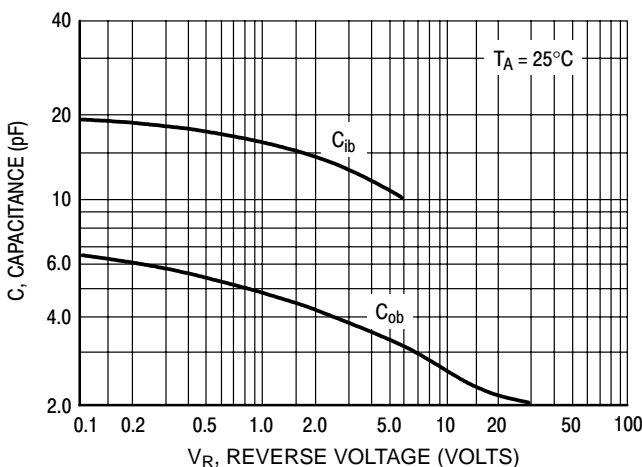
**Figure 8. "On" Voltage**



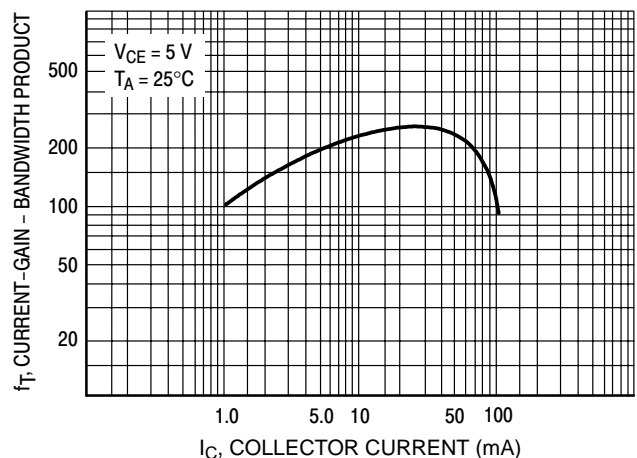
**Figure 9. Collector Saturation Region**



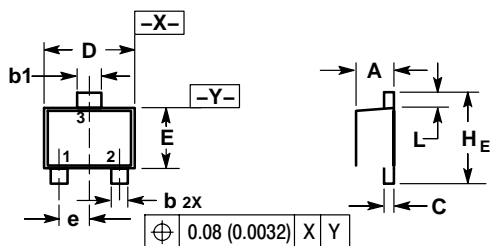
**Figure 10. Base-Emitter Temperature Coefficient**



**Figure 11. Capacitance**



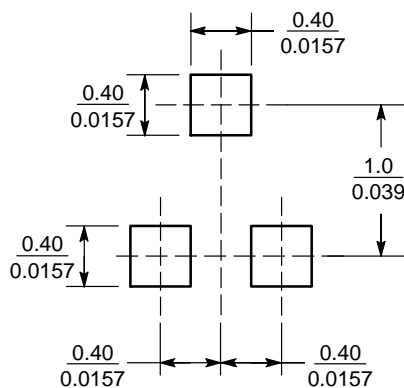
**Figure 12. Current-Gain - Bandwidth Product**

**LBC846BM3T5G**
**SOT-723**

**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
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			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.45	0.50	0.55	0.018	0.020	0.022
b	0.15	0.21	0.27	0.0059	0.0083	0.0106
b1	0.25	0.31	0.37	0.010	0.012	0.015
C	0.07	0.12	0.17	0.0028	0.0047	0.0067
D	1.15	1.20	1.25	0.045	0.047	0.049
E	0.75	0.80	0.85	0.03	0.032	0.034
e	0.40 BSC			0.016 BSC		
HE	1.15	1.20	1.25	0.045	0.047	0.049
L	0.15	0.20	0.25	0.0059	0.0079	0.0098

STYLE 1:  
 PIN 1. BASE  
 2. EMITTER  
 3. COLLECTOR

**SOLDERING FOOTPRINT\***


SCALE 20:1 (mm / inches)