

# General Purpose Transistors

## NPN Silicon

These transistors are designed for general purpose amplifier applications. They are housed in the SC-89 package which is designed for low power surface mount applications.

### Features

- Pb-Free Packages are Available
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

Rating	Symbol	Max	Unit
Collector-Emitter Voltage	$V_{CEO}$	45	V
Collector-Base Voltage	$V_{CBO}$	50	V
Emitter-Base Voltage	$V_{EBO}$	6.0	V
Collector Current – Continuous	$I_C$	100	mAdc

### THERMAL CHARACTERISTICS

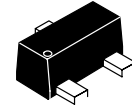
Characteristic	Symbol	Max	Unit
Total Device Dissipation, FR-4 Board (Note 1) $T_A = 25^\circ\text{C}$ Derated above $25^\circ\text{C}$	$P_D$	200	mW
Thermal Resistance, Junction-to-Ambient (Note 1)	$R_{\theta JA}$	600	$^\circ\text{C}/\text{W}$
Total Device Dissipation, FR-4 Board (Note 2) $T_A = 25^\circ\text{C}$ Derated above $25^\circ\text{C}$	$P_D$	300	mW
Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	400	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

1. FR-4 @ min pad.
2. FR-4 @  $1.0 \times 1.0$  in pad.

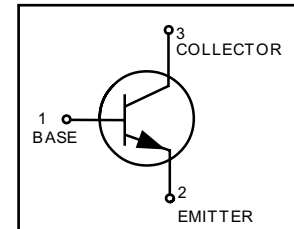
### ORDERING INFORMATION

Device	Marking	Package	Shipping†
LBC847ATT1G S-LBC847ATT1G	1E	SC-89	3,000 / Tape & Reel
LBC847BTT1G S-LBC847BTT1G	1F	SC-89	3,000 / Tape & Reel
LBC847CTT1G S-LBC847CTT1G	1G	SC-89	3,000 / Tape & Reel

**LBC847ATT1G**  
**S-LBC847ATT1G**  
**Series**



SC-89



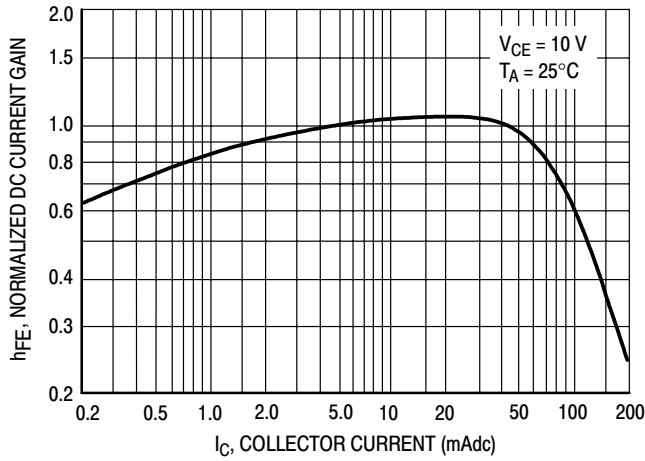
**LBC847ATT1G Series**  
**S-LBC847ATT1G Series**

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

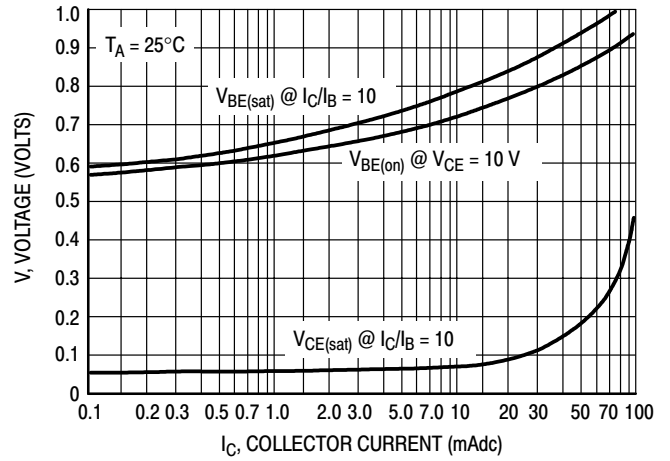
Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector–Emitter Breakdown Voltage ( $I_C = 10\text{ mA}$ )	LBC847 Series $V_{(BR)CEO}$	45	–	–	V
Collector–Emitter Breakdown Voltage ( $I_C = 10\text{ }\mu\text{A}$ , $V_{EB} = 0$ )	LBC847 Series $V_{(BR)CES}$	50	–	–	V
Collector–Base Breakdown Voltage ( $I_C = 10\text{ }\mu\text{A}$ )	LBC847 Series $V_{(BR)CBO}$	50	–	–	V
Emitter–Base Breakdown Voltage ( $I_E = 1.0\text{ }\mu\text{A}$ )	LBC847 Series $V_{(BR)EBO}$	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 $\mu\text{A}$
<b>ON CHARACTERISTICS</b>					
DC Current Gain ( $I_C = 10\text{ }\mu\text{A}$ , $V_{CE} = 5.0\text{ V}$ )	LBC847A LBC847B LBC847C	–	90	–	–
( $I_C = 2.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )	LBC847A LBC847B LBC847C	110 200 420	180 290 520	220 450 800	–
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
<b>SMALL–SIGNAL CHARACTERISTICS</b>					
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

**LBC847ATT1G Series**  
**S-LBC847ATT1G Series**

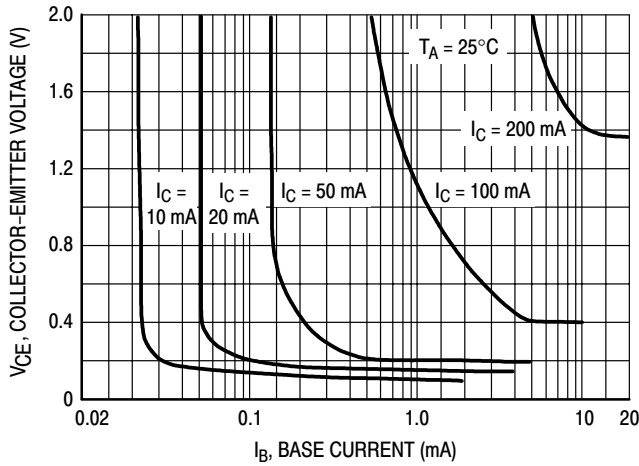
**LBC847ATT1G, LBC847BTT1G, LBC847CTT1G**



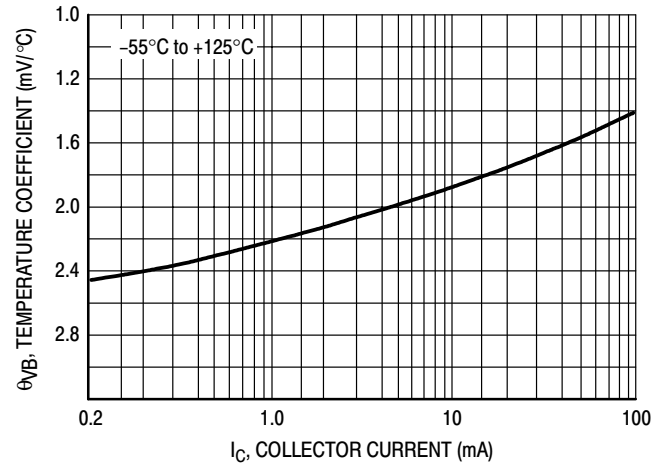
**Figure 1. Normalized DC Current Gain**



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



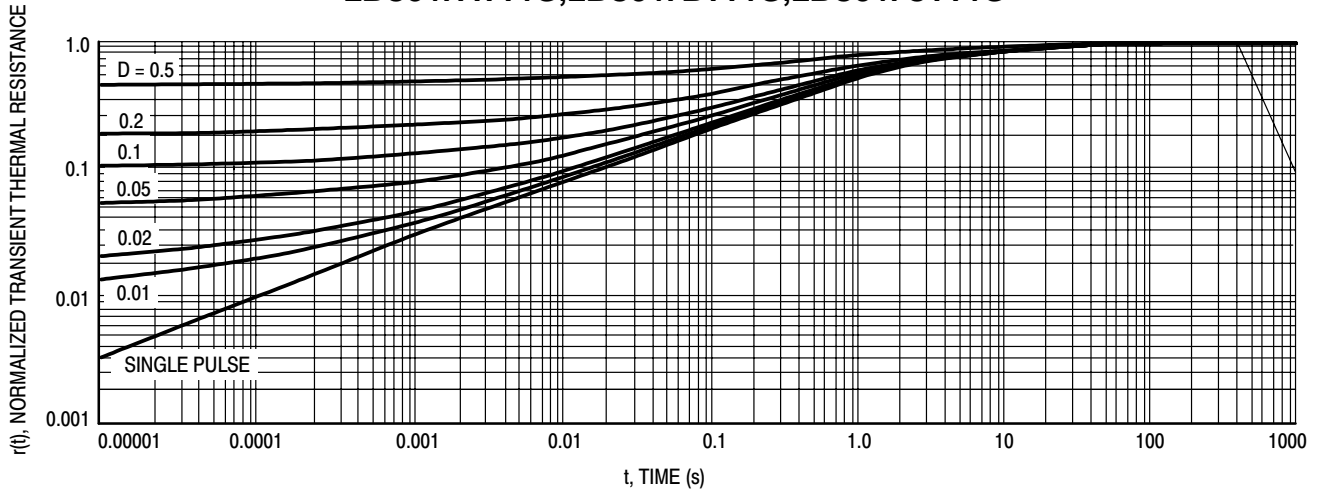
**Figure 3. Collector Saturation Region**



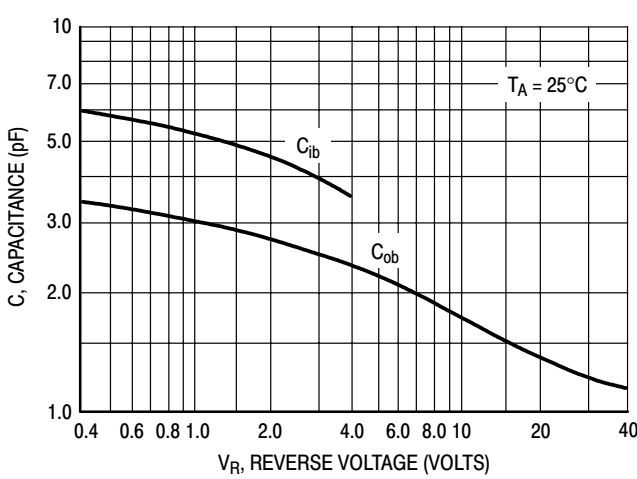
**Figure 4. Base-Emitter Temperature Coefficient**

**LBC847ATT1G Series**  
**S-LBC847ATT1G Series**

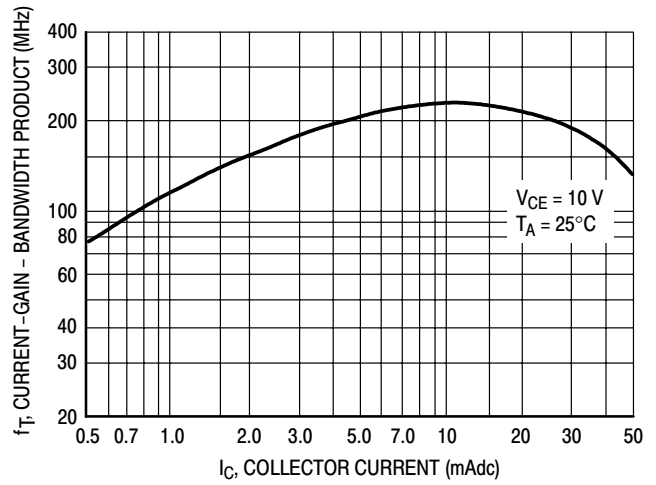
**LBC847ATT1G, LBC847BTT1G, LBC847CTT1G**



**Figure 5. Normalized Thermal Response**



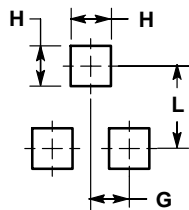
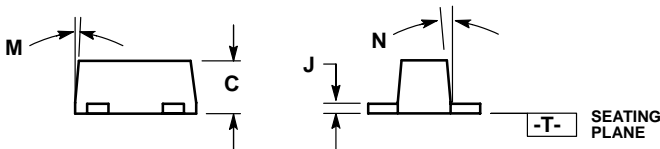
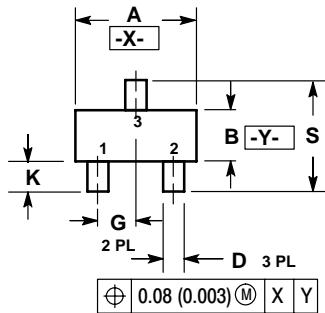
**Figure 6. Capacitances**



**Figure 7. Current-Gain - Bandwidth Product**

**LBC847ATT1G Series**  
**S-LBC847ATT1G Series**

SC-89



RECOMMENDED PATTERN OF SOLDER PADS

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETERS
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 463C-01 OBSOLETE, NEW STANDARD 463C-02.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.50	1.60	1.70	0.059	0.063	0.067
B	0.75	0.85	0.95	0.030	0.034	0.040
C	0.60	0.70	0.80	0.024	0.028	0.031
D	0.23	0.28	0.33	0.009	0.011	0.013
G	0.50 BSC			0.020 BSC		
H	0.53 REF			0.021 REF		
J	0.10	0.15	0.20	0.004	0.006	0.008
K	0.30	0.40	0.50	0.012	0.016	0.020
L	1.10 REF			0.043 REF		
M	---	---	10 °	---	---	10 °
N	---	---	10 °	---	---	10 °
S	1.50	1.60	1.70	0.059	0.063	0.067