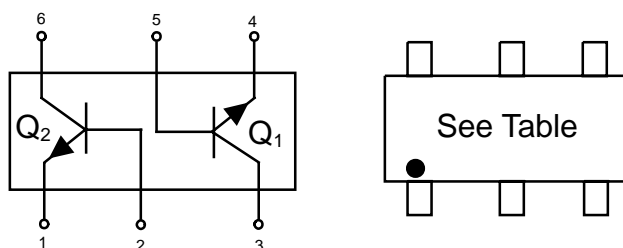


# Dual General Purpose Transistors

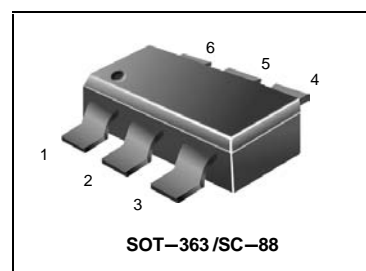
## NPN Duals

These transistors are designed for general purpose amplifier applications. They are housed in the SOT-363/SC-88 which is designed for low power surface mount applications.

We declare that the material of product compliance with RoHS requirements.



**LBC846BDW1T1G**  
**LBC847BDW1T1G**  
**LBC847CDW1T1G**  
**LBC848BDW1T1G**  
**LBC848CDW1T1G**



## MAXIMUM RATINGS

Rating	Symbol	BC846	BC847	BC848	Unit
Collector-Emitter Voltage	$V_{CE0}$	65	45	30	V
Collector-Base Voltage	$V_{CBO}$	80	50	30	V
Emitter-Base Voltage	$V_{EBO}$	6.0	6.0	5.0	V
Collector Current -Continuous	$I_C$	100	100	100	mAdc

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation	$P_D$	380	mW
Per Device		250	mW
FR-5 Board, (1) $T_A = 25^\circ\text{C}$			
Derate above $25^\circ\text{C}$		3.0	mW/ $^\circ\text{C}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	328	$^\circ\text{C/W}$
Junction and Storage Temperature	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

1. FR-5 = 1.0 x 0.75 x 0.062 in.

## ORDERING INFORMATION

Device	Marking	Shipping
LBC846BDW1T1G	1B	3000 Units/Reel
LBC846BDW1T3G	1B	10000 Units/Reel
LBC847BDW1T1G	1F	3000 Units/Reel
LBC847BDW1T3G	1F	10000 Units/Reel
LBC847CDW1T1G	1G	3000 Units/Reel
LBC847CDW1T3G	1G	10000 Units/Reel
LBC848BDW1T1G	1K	3000 Units/Reel
LBC848BDW1T3G	1K	10000 Units/Reel
LBC848CDW1T1G	1L	3000 Units/Reel
LBC848CDW1T3G	1L	10000 Units/Reel

**LBC846BDW1T1G, LBC847BDW1T1G, LBC847CDW1T1G, LBC848BDW1T1G, LBC848CDW1T1G**

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

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

**OFF CHARACTERISTICS**

Collector–Emitter Breakdown Voltage ( $I_C = 10\text{ mA}$ )	$V_{(BR)CEO}$				V
LBC846 Series		65	—	—	
LBC847 Series		45	—	—	
LBC848 Series		30	—	—	
Collector–Emitter Breakdown Voltage ( $I_C = 10\ \mu\text{A}$ , $V_{EB} = 0$ )	$V_{(BR)CES}$				V
LBC846 Series		80	—	—	
LBC847 Series		50	—	—	
LBC848 Series		30	—	—	
Collector–Base Breakdown Voltage ( $I_C = 10\ \mu\text{A}$ )	$V_{(BR)CBO}$				V
LBC846 Series		80	—	—	
LBC847 Series		50	—	—	
LBC848 Series		30	—	—	
Emitter–Base Breakdown Voltage ( $I_E = 1.0\ \mu\text{A}$ )	$V_{(BR)EBO}$				V
LBC846 Series		6.0	—	—	
LBC847 Series		6.0	—	—	
LBC848 Series		5.0	—	—	
Collector Cutoff Current ( $V_{CB} = 30\text{ V}$ )	$I_{CBO}$	—	—	15	nA
( $V_{CB} = 30\text{ V}$ , $T_A = 150^\circ\text{C}$ )		—	—	5.0	$\mu\text{A}$

**ON CHARACTERISTICS**

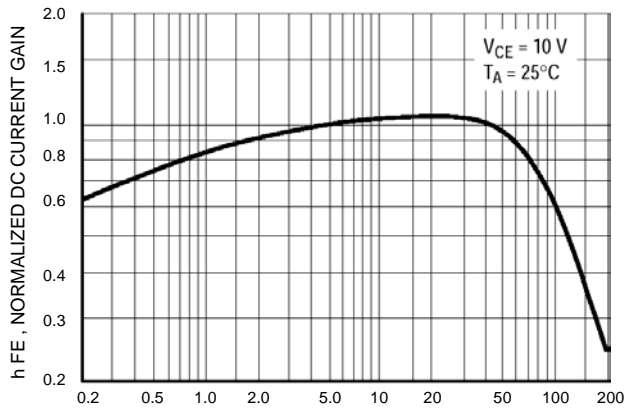
DC Current Gain ( $I_C = 10\ \mu\text{A}$ , $V_{CE} = 5.0\text{ V}$ )	$h_{FE}$				—
LBC846B, LBC847B, LBC848B		—	150	—	
LBC847C, LBC848C		—	270	—	
( $I_C = 2.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )					
LBC846B, LBC847B, LBC848B		200	290	450	
LBC847C, LBC848C		420	520	800	
Collector–Emitter Saturation Voltage ( $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ )	$V_{CE(sat)}$	—	—	0.25	V
( $I_C = 100\text{ mA}$ , $I_B = 5.0\text{ mA}$ )		—	—	0.6	
Base–Emitter Saturation Voltage ( $I_C = 10\text{ mA}$ , $I_B = 0.5\text{ mA}$ )	$V_{BE(sat)}$	—	0.7	—	V
( $I_C = 100\text{ mA}$ , $I_B = 5.0\text{ mA}$ )		—	0.9	—	
Base–Emitter Voltage ( $I_C = 2.0\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )	$V_{BE(on)}$	580	660	700	mV
( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ V}$ )		—	—	770	

**SMALL–SIGNAL CHARACTERISTICS**

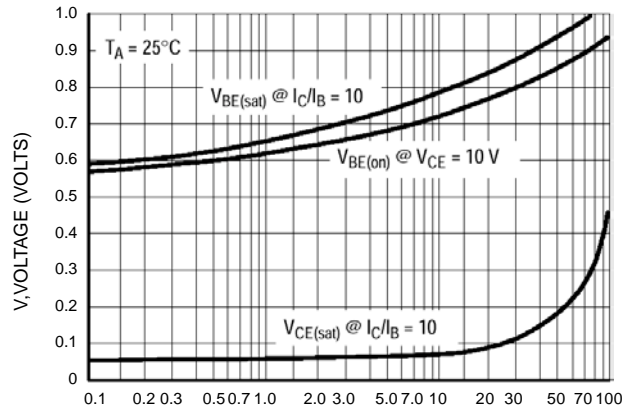
Current–Gain — Bandwidth Product ( $I_C = 10\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ , $f = 100\text{ MHz}$ )	$f_T$	100	—	—	MHz
Output Capacitance ( $V_{CB} = 10\text{ V}$ , $f = 1.0\text{ MHz}$ )	$C_{obo}$	—	—	4.5	pF
Noise Figure ( $I_C = 0.2\text{ mA}$ , $V_{CE} = 5.0\text{ Vdc}$ , $R_S = 2.0\text{ k}\Omega$ , $f = 1.0\text{ kHz}$ , $BW = 200\text{ Hz}$ )	NF				dB
LBC846B, LBC847B, LBC848B		—	—	10	
LBC847C, LBC848C		—	—	4.0	

LBC846BDW1T1G, LBC847BDW1T1G, LBC847CDW1T1G, LBC848BDW1T1G, LBC848CDW1T1G

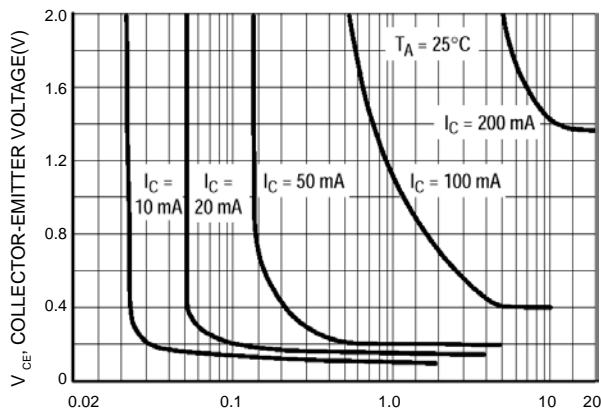
TYPICAL CHARACTERISTICS



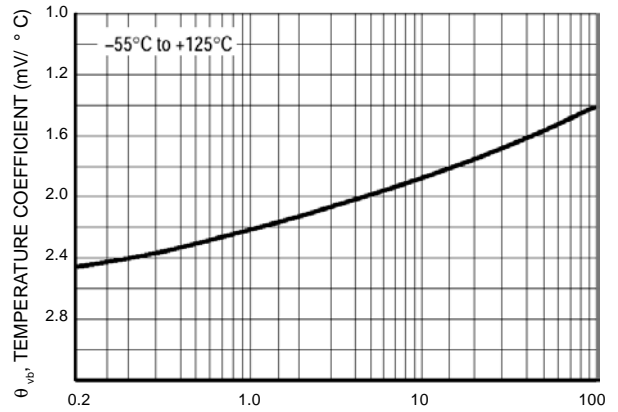
IC, COLLECTOR CURRENT (mAdc)  
**Figure 1. Normalized DC Current Gain**



IC, COLLECTOR CURRENT (mAdc)  
**Figure 2. "Saturation" and "On" Voltages**



IB, BASE CURRENT (mA)  
**Figure 3. Collector Saturation Region**



IC, COLLECTOR CURRENT (mA)  
**Figure 4. Base-Emitter Temperature Coefficient**

LBC846BDW1T1G, LBC847BDW1T1G, LBC847CDW1T1G, LBC848BDW1T1G, LBC848CDW1T1G

TYPICAL CHARACTERISTICS

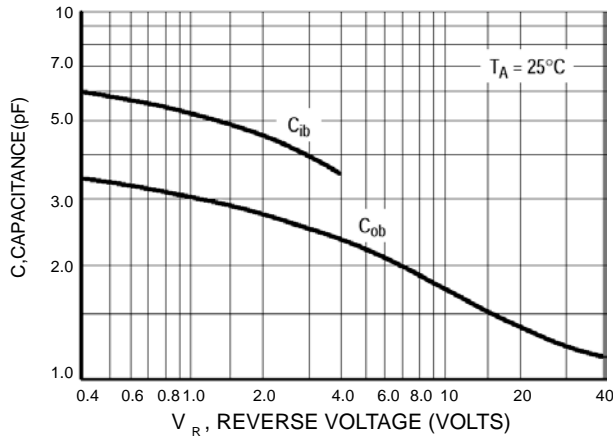


Figure 5. Capacitances

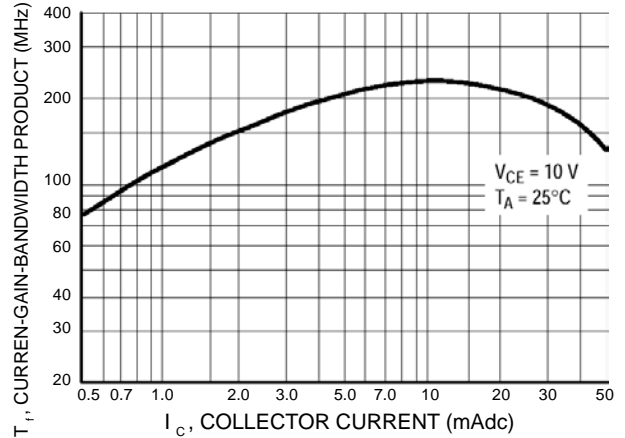


Figure 6. Current-Gain – Bandwidth Product

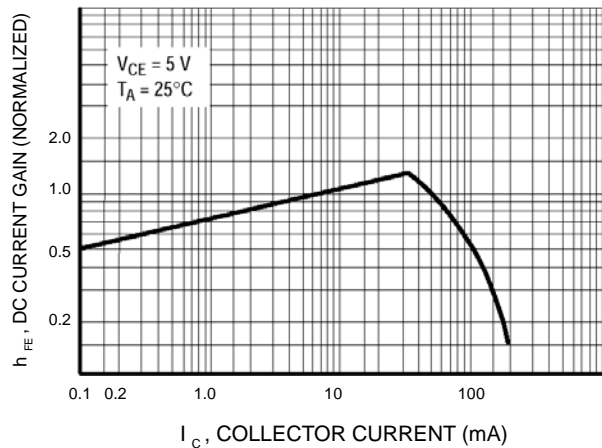


Figure 7. DC Current Gain

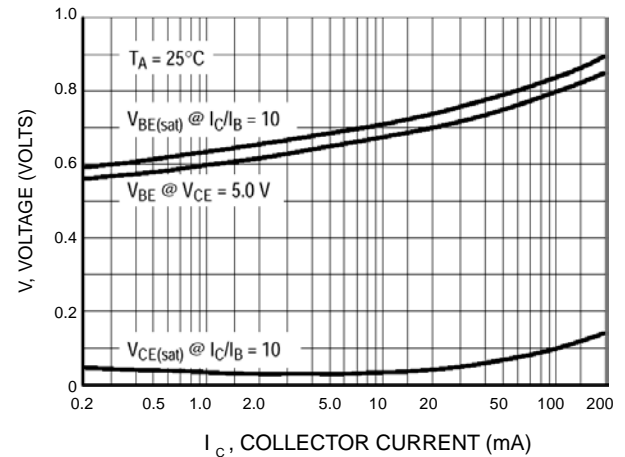


Figure 8. "On" Voltage

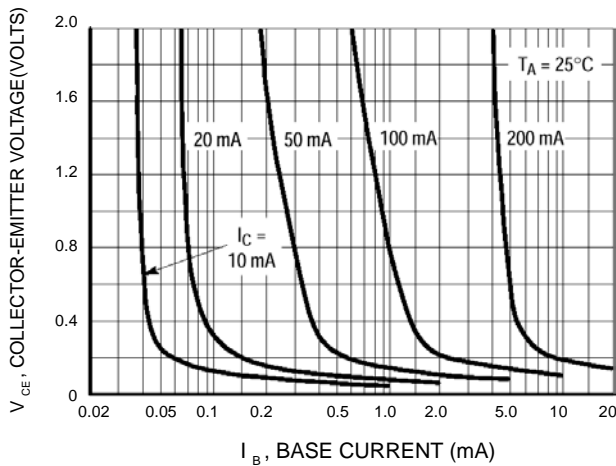


Figure 9. Collector Saturation Region

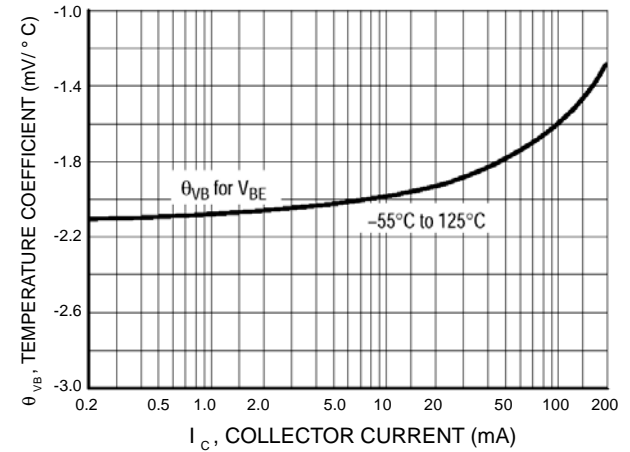


Figure 10. Base-Emitter Temperature Coefficient

LBC846BDW1T1G, LBC847BDW1T1G, LBC847CDW1T1G, LBC848BDW1T1G, LBC848CDW1T1G

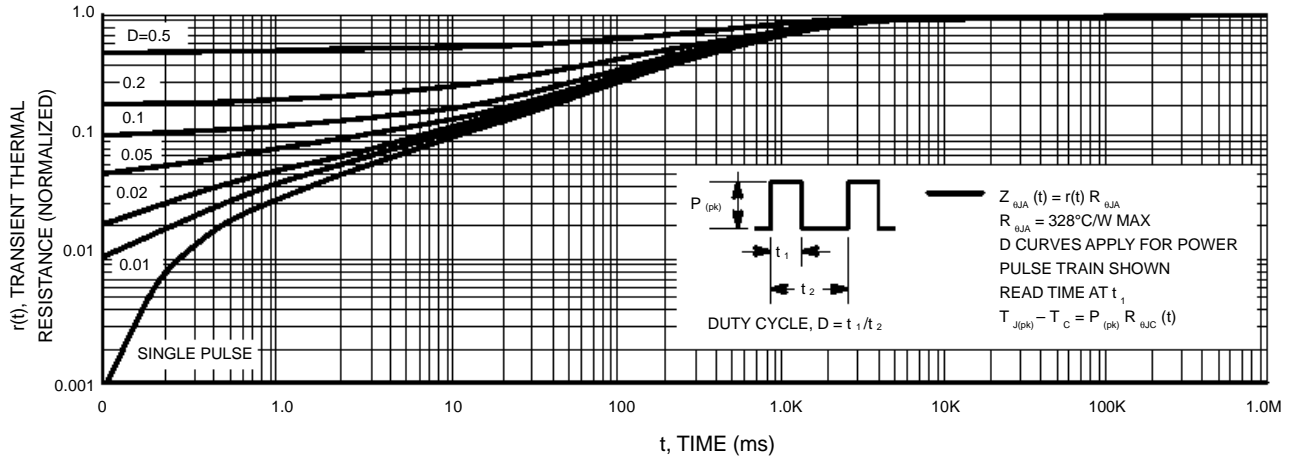


Figure 11. Thermal Response

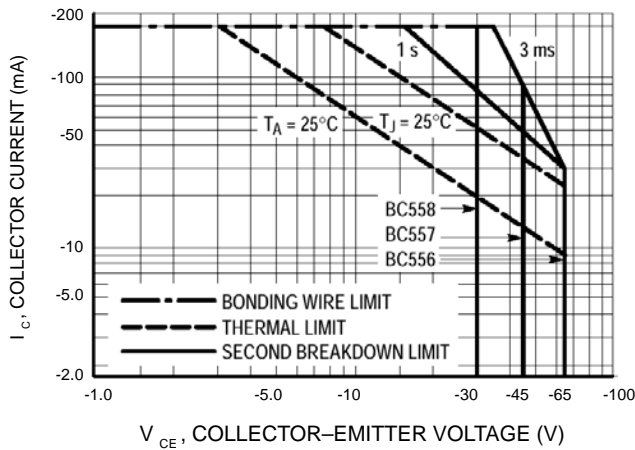


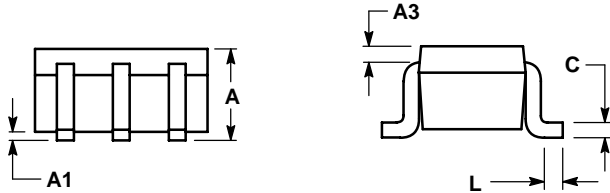
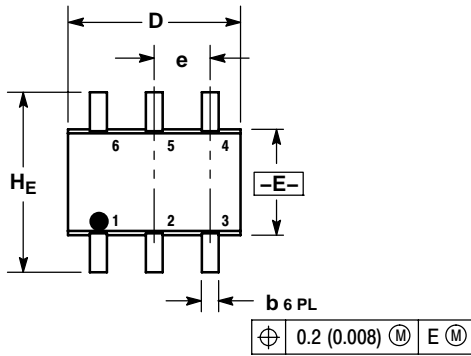
Figure 12. Active Region Safe Operating Area

The safe operating area curves indicate  $I_C - V_{CE}$  limits of the transistor that must be observed for reliable operation. Collector load lines for specific circuits must fall below the limits indicated by the applicable curve.

The data of Figure 12 is based upon  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  or  $T_A$  is variable depending upon conditions. Pulse curves are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^\circ\text{C}$ .  $T_{J(pk)}$  may be calculated from the data in Figure 12. At high case or ambient temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by the secondary breakdown.

LBC846BDW1T1G, LBC847BDW1T1G, LBC847CDW1T1G, LBC848BDW1T1G, LBC848CDW1T1G

SC-88

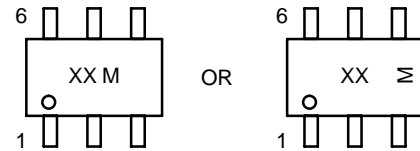


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.95	1.10	0.031	0.037	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A3	0.20 REF			0.008 REF		
b	0.10	0.21	0.30	0.004	0.008	0.012
C	0.10	0.14	0.25	0.004	0.005	0.010
D	1.80	2.00	2.20	0.070	0.078	0.086
E	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC			0.026 BSC		
L	0.10	0.20	0.30	0.004	0.008	0.012
HE	2.00	2.10	2.20	0.078	0.082	0.086

GENERIC MARKING DIAGRAM\*



XX = Specific Device Code  
M = Date Code