

Dual General Purpose Transistors

NPN/PNP Duals (Complimentary)

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.

• Device Marking:

- LBC846BPDW1T1G = BB
- LBC847BPDW1T1G = 3F
- LBC847CPDW1T1G = 3G
- LBC848BPDW1T1G = 13K
- LBC848CPDW1T1G = 13L

ORDERING INFORMATION

| Device | Shipping |
|------------------|------------------|
| LBC846BPDW1T1G_S | 3000 Units/Reel |
| LBC846BPDW1T3G_S | 10000 Units/Reel |

MAXIMUM RATINGS – NPN

| Rating | Symbol | LBC846 | LBC847 | LBC848 | Unit |
|---------------------------------------|-----------|--------|--------|--------|------|
| Collector–Emitter Voltage | V_{CEO} | 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 I_C Continuous | I_C | 100 | 100 | 100 | mAdc |

MAXIMUM RATINGS – PNP

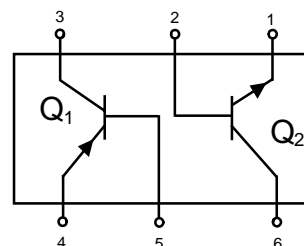
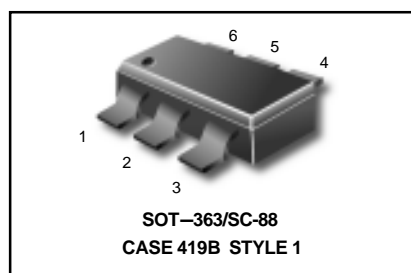
| Rating | Symbol | LBC846 | LBC847 | LBC848 | Unit |
|---------------------------------------|-----------|--------|--------|--------|------|
| Collector–Emitter Voltage | V_{CEO} | -65 | -45 | -30 | V |
| Collector–Base Voltage | V_{CBO} | -80 | -50 | -30 | V |
| Emitter–Base Voltage | V_{EBO} | -5.0 | -5.0 | -5.0 | V |
| Collector Current I_C Continuous | I_C | -100 | -100 | -100 | mAdc |

THERMAL CHARACTERISTICS

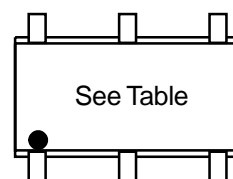
| Characteristic | Symbol | Max | Unit |
|---|-----------------|-------------|--------------------|
| Total Device Dissipation Per Device FR-5 Board (1) $T_A = 25^\circ\text{C}$ Derate Above 25°C | P_D | 380 250 | mW |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 328 | $^\circ\text{C/W}$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

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

LBC846BPDW1T1G
LBC847BPDW1T1G
LBC847CPDW1T1G
LBC848BPDW1T1G
LBC848CPDW1T1G



DEVICE MARKING



LBC846BPDW1T1G LBC847BPDW1T1G Series, LBC848BPDW1T1G Series
ELECTRICAL CHARACTERISTICS (NPN) ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|--|-------------------|-------------|-------------|---------------------|
| OFF CHARACTERISTICS | | | | | |
| Collector–Emitter Breakdown Voltage ($I_C = 10\text{ mA}$) | LBC846 Series LBC847 Series LBC848 Series $V_{(BR)CEO}$ | 65 45 30 | — — — | — — — | V |
| Collector–Emitter Breakdown Voltage ($I_C = 10\text{ }\mu\text{A}$, $V_{EB} = 0$) | LBC846 Series LBC847B Only LBC848 Series $V_{(BR)CES}$ | 80 50 30 | — — — | — — — | V |
| Collector–Base Breakdown Voltage ($I_C = 10\text{ }\mu\text{A}$) | LBC846 Series LBC847 Series LBC848 Series $V_{(BR)CBO}$ | 80 50 30 | — — — | — — — | V |
| Emitter–Base Breakdown Voltage ($I_E = 1.0\text{ }\mu\text{A}$) | LBC846 Series LBC847 Series LBC848 Series $V_{(BR)EBO}$ | 6.0 6.0 5.0 | — — — | — — — | 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 μA |

ON CHARACTERISTICS

| | | | | | |
|--|---|------------|------------|-------------|----|
| DC Current Gain ($I_C = 10\text{ }\mu\text{A}$, $V_{CE} = 5.0\text{ V}$) | LBC846B, LBC847B, LBC848B LBC847C, LBC848C h_{FE} | — — | 150 270 | — — | — |
| ($I_C = 2.0\text{ mA}$, $V_{CE} = 5.0\text{ V}$) | LBC846B, LBC847B, LBC848B LBC847C, LBC848C | 200 420 | 290 520 | 475 800 | |
| 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 |

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 |

LBC846BPDW1T1G LBC847BPDW1T1G Series, LBC848BPDW1T1G Series
ELECTRICAL CHARACTERISTICS (PNP) ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---------------|----------------------|--------------------------|----------------------|---------------------|
| OFF CHARACTERISTICS | | | | | |
| Collector–Emitter Breakdown Voltage ($I_C = -10\text{ mA}$) LBC846 Series LBC847 Series LBC848 Series | $V_{(BR)CEO}$ | -65 -45 -30 | — — — | — — — | V |
| Collector–Emitter Breakdown Voltage ($I_C = -10\ \mu\text{A}$, $V_{EB} = 0$) LBC846 Series LBC847 Series LBC848 Series | $V_{(BR)CES}$ | -80 -50 -30 | — — — | — — — | V |
| Collector–Base Breakdown Voltage ($I_C = -10\ \mu\text{A}$) LBC846 Series LBC847 Series LBC848 Series | $V_{(BR)CBO}$ | -80 -50 -30 | — — — | — — — | V |
| Emitter–Base Breakdown Voltage ($I_E = -1.0\ \mu\text{A}$) LBC846 Series LBC847 Series LBC848 Series | $V_{(BR)EBO}$ | -5.0 -5.0 -5.0 | — — — | — — — | V |
| Collector Cutoff Current ($V_{CB} = -30\text{ V}$) ($V_{CB} = -30\text{ V}$, $T_A = 150^\circ\text{C}$) | I_{CBO} | — — | — — | -15 -4.0 | nA μA |
| ON CHARACTERISTICS | | | | | |
| DC Current Gain ($I_C = -10\ \mu\text{A}$, $V_{CE} = -5.0\text{ V}$) LBC846B, LBC847B, LBC848B LBC847C, LBC848C ($I_C = -2.0\text{ mA}$, $V_{CE} = -5.0\text{ V}$) LBC846B, LBC847B, LBC848B LBC847C, LBC848C | h_{FE} | — — 200 420 | 150 270 290 520 | — — 475 800 | — |
| Collector–Emitter Saturation Voltage ($I_C = -10\text{ mA}$, $I_B = -0.5\text{ mA}$) ($I_C = -100\text{ mA}$, $I_B = -5.0\text{ mA}$) | $V_{CE(sat)}$ | — — | — — | -0.3 -0.65 | 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 On Voltage ($I_C = -2.0\text{ mA}$, $V_{CE} = -5.0\text{ V}$) ($I_C = -10\text{ mA}$, $V_{CE} = -5.0\text{ V}$) | $V_{BE(on)}$ | -0.6 — | — — | -0.75 -0.82 | V |
| 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_{ob} | — | — | 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 |

LBC846BPDW1T1G LBC847BPDW1T1G Series, LBC848BPDW1T1G Series

TYPICAL NPN CHARACTERISTICS – LBC846

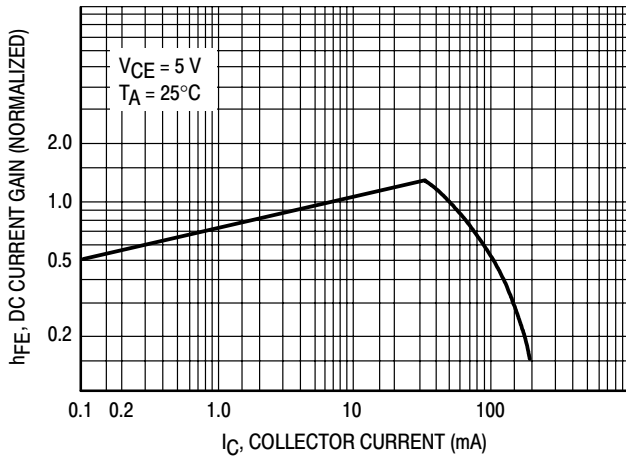


Figure 1. DC Current Gain

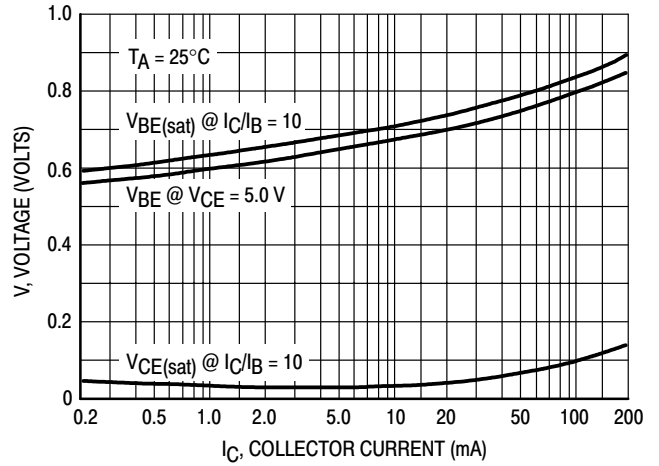


Figure 2. "On" Voltage

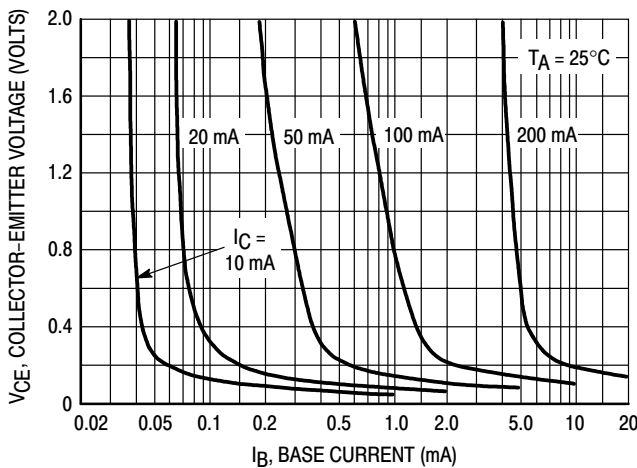


Figure 3. Collector Saturation Region

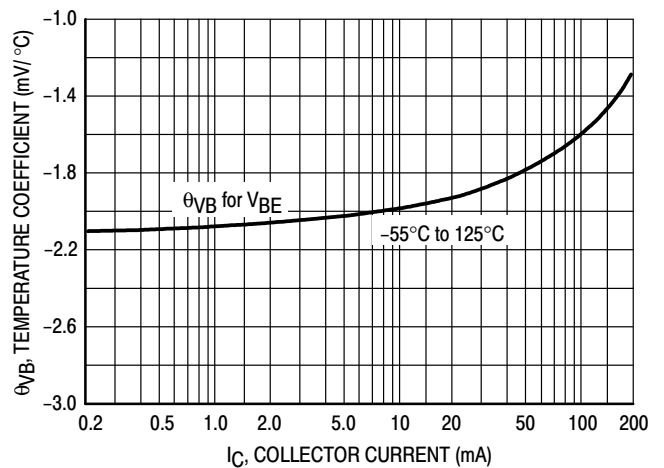


Figure 4. Base-Emitter Temperature Coefficient

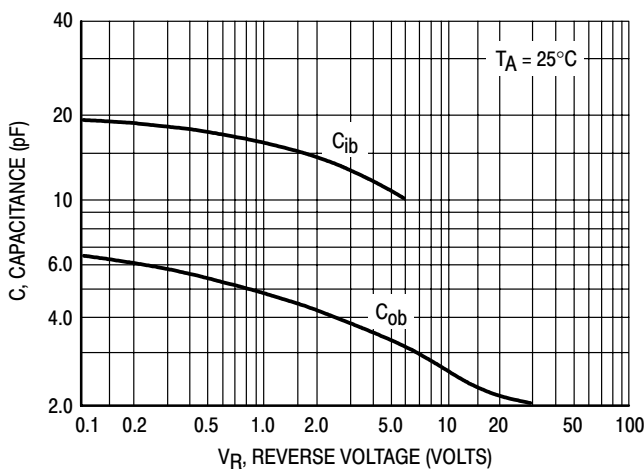


Figure 5. Capacitance

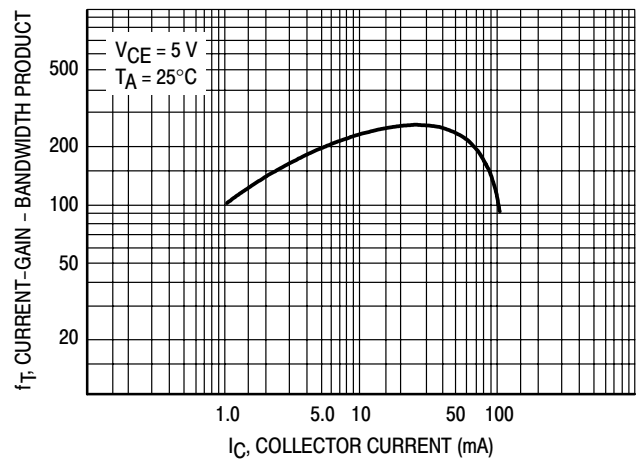


Figure 6. Current-Gain - Bandwidth Product

LBC846BPDW1T1G LBC847BPDW1T1G Series, LBC848BPDW1T1G Series

TYPICAL PNP CHARACTERISTICS — LBC846

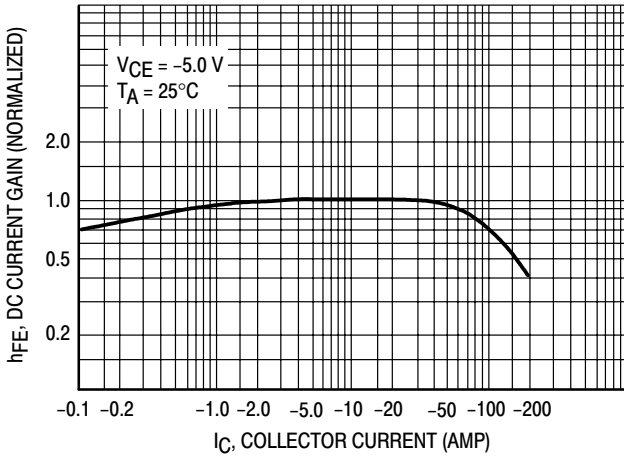


Figure 7. DC Current Gain

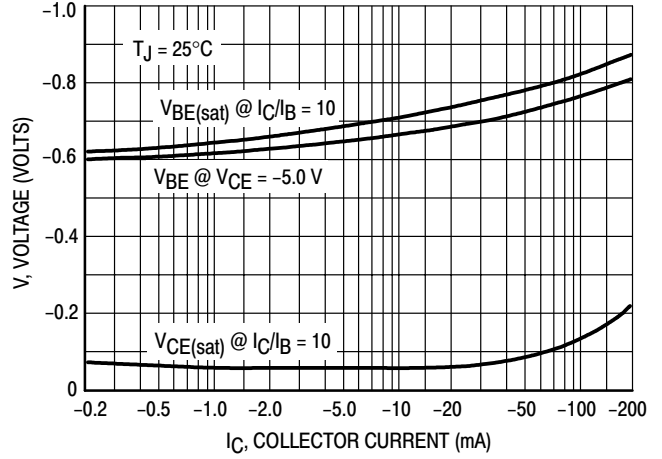


Figure 8. "On" Voltage

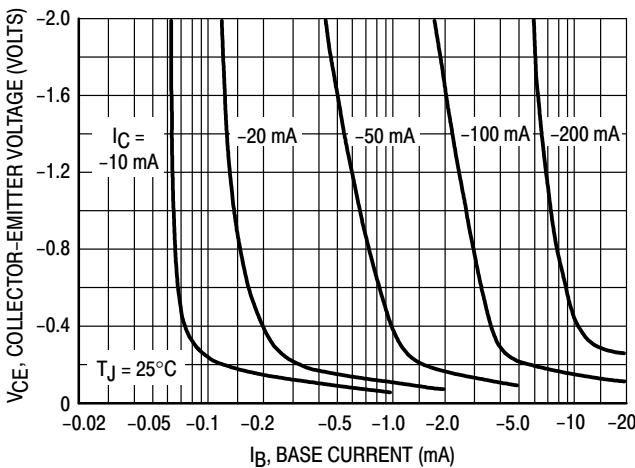


Figure 9. Collector Saturation Region

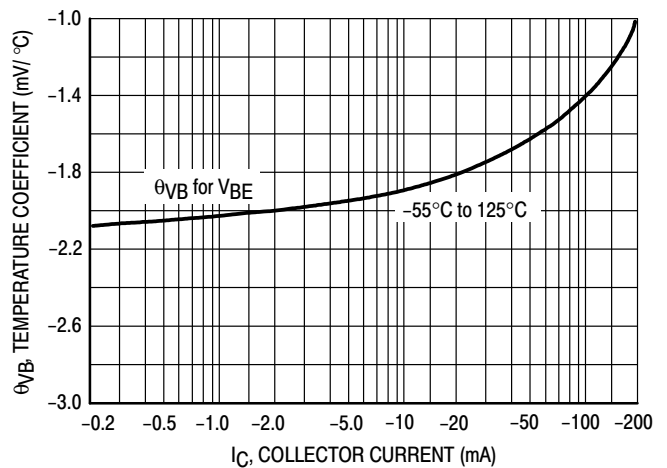


Figure 10. Base-Emitter Temperature Coefficient

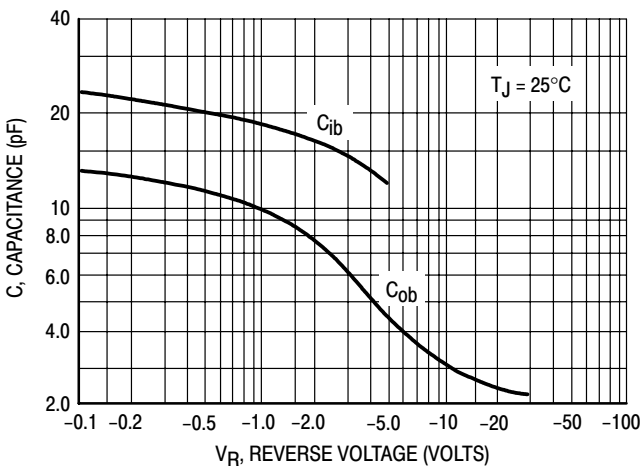


Figure 11. Capacitance

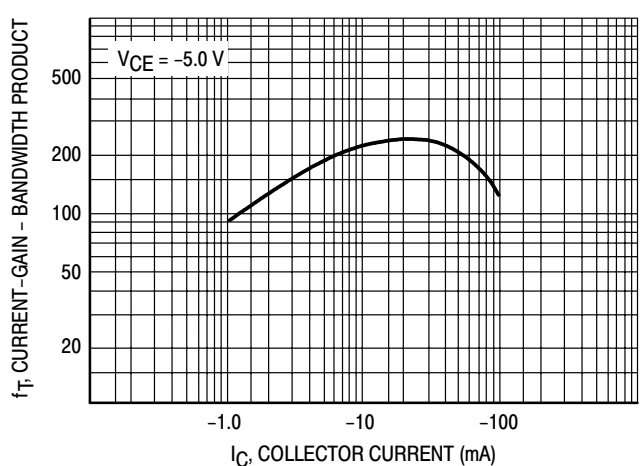


Figure 12. Current-Gain - Bandwidth Product

LBC846BPDW1T1G LBC847BPDW1T1G Series, LBC848BPDW1T1G Series

TYPICAL NPN CHARACTERISTICS – LBC847 SERIES & LBC848 SERIES

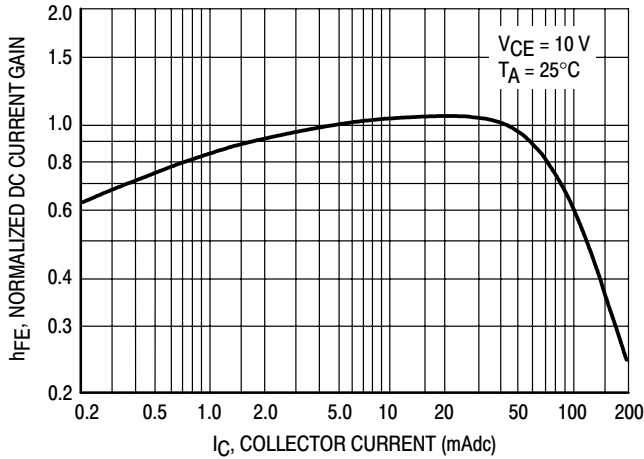


Figure 13. Normalized DC Current Gain

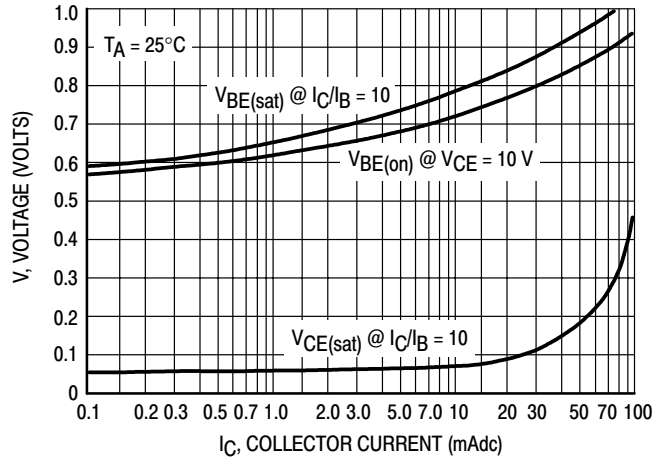


Figure 14. "Saturation" and "On" Voltages

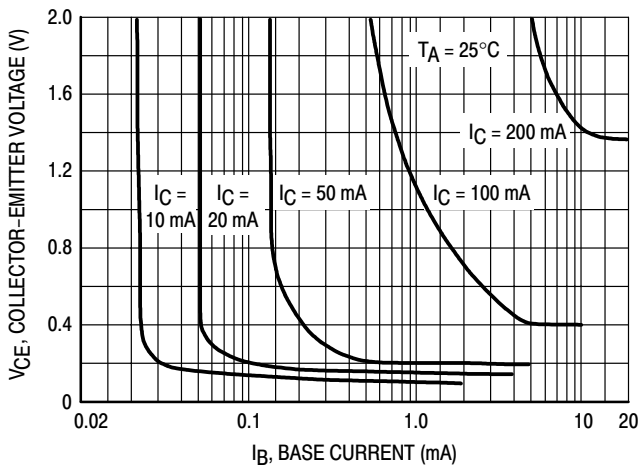


Figure 15. Collector Saturation Region

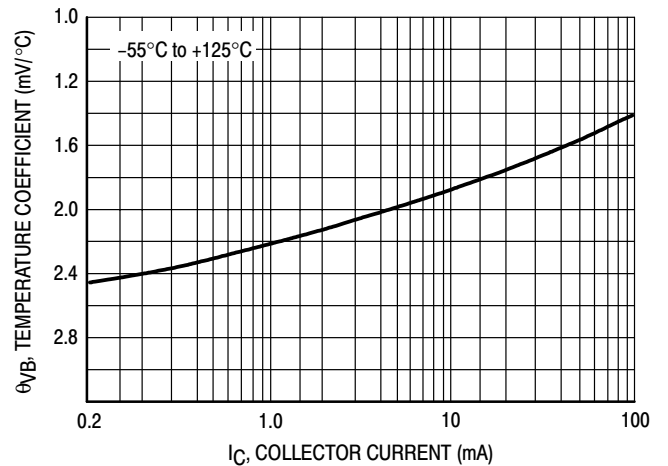


Figure 16. Base-Emitter Temperature Coefficient

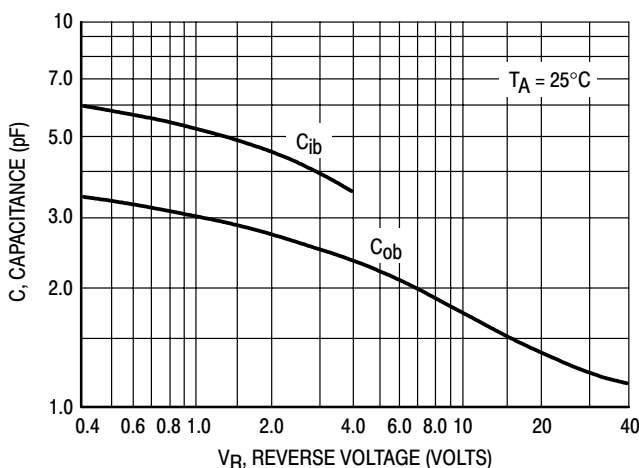


Figure 17. Capacitances

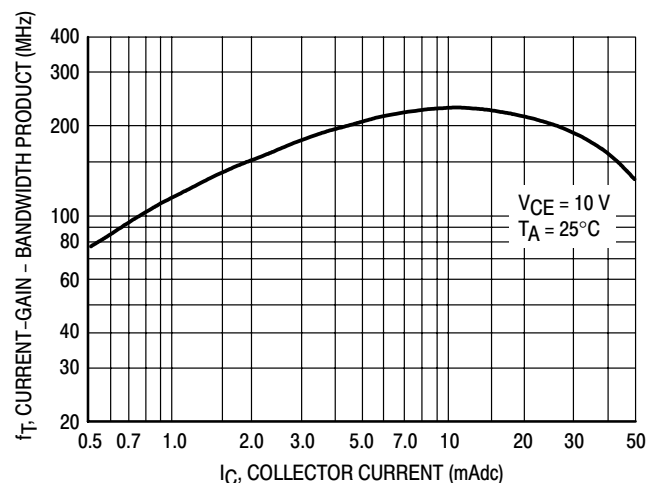


Figure 18. Current-Gain - Bandwidth Product

LBC846BPDW1T1G LBC847BPDW1T1G Series, LBC848BPDW1T1G Series

TYPICAL PNP CHARACTERISTICS — LBC847 SERIES & LBC848 SERIES

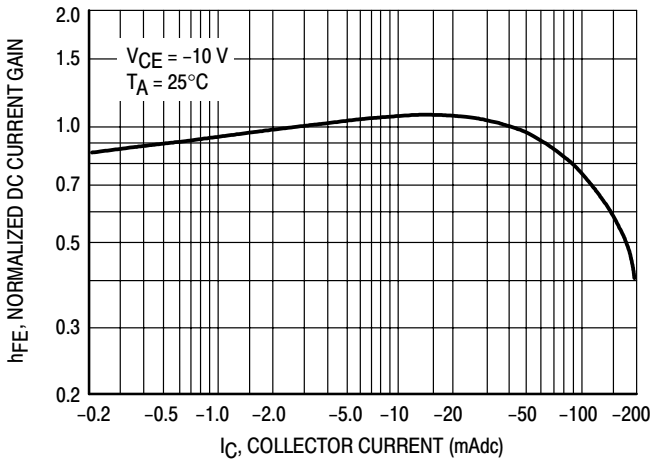


Figure 19. Normalized DC Current Gain

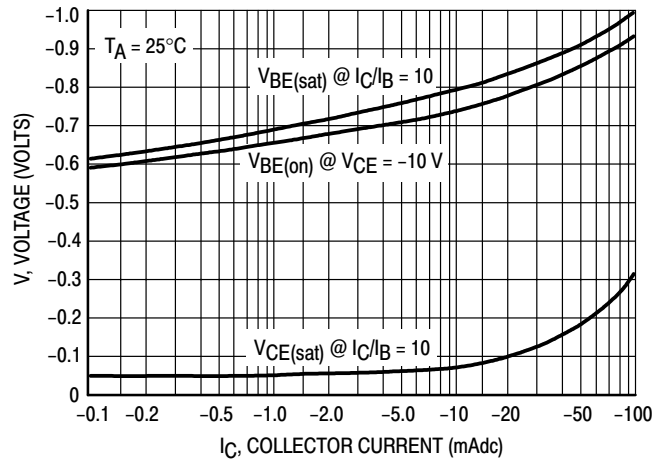


Figure 20. "Saturation" and "On" Voltages

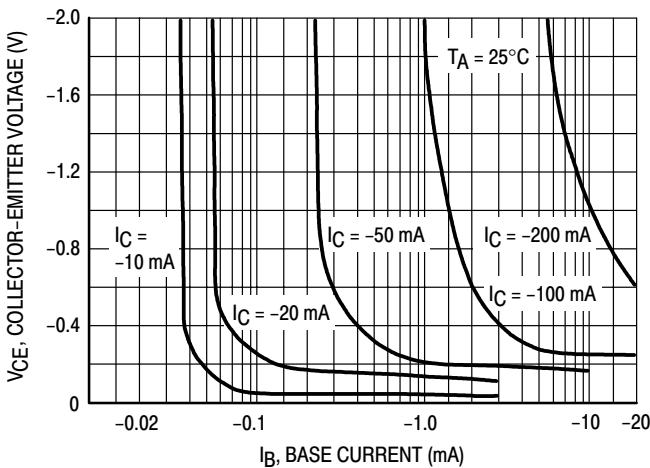


Figure 21. Collector Saturation Region

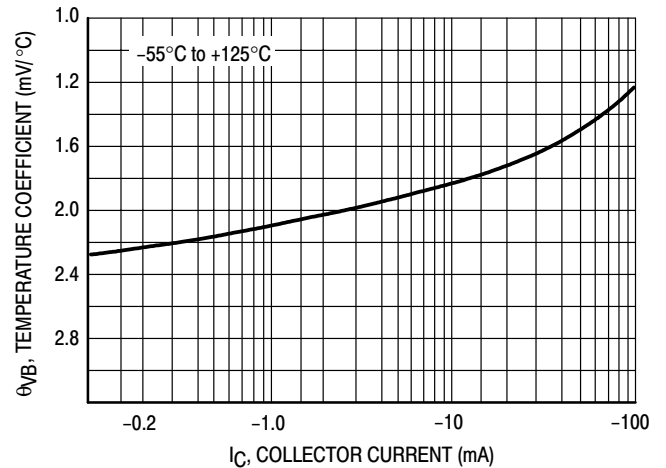


Figure 22. Base-Emitter Temperature Coefficient

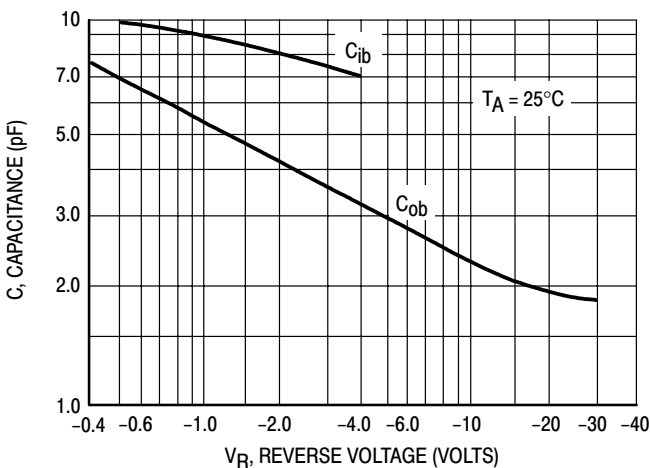


Figure 23. Capacitances

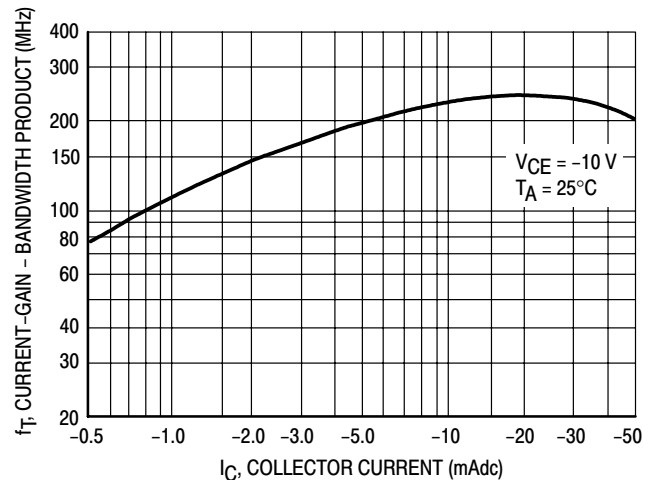


Figure 24. Current-Gain - Bandwidth Product

LBC846BPDW1T1G LBC847BPDW1T1G Series, LBC848BPDW1T1G Series

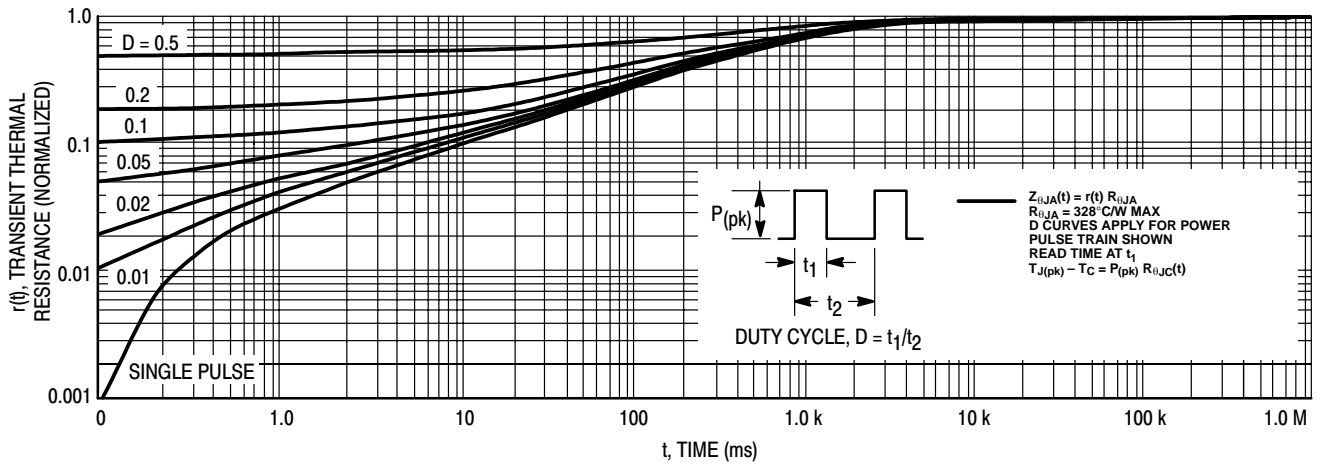
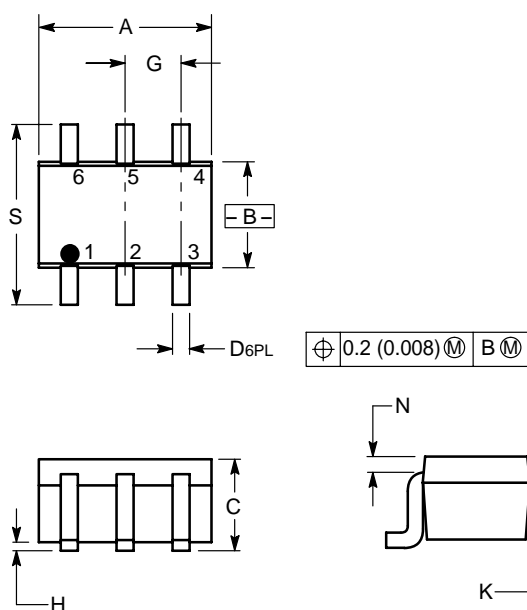


Figure 25. Thermal Response

LBC846BPDW1T1, LBC847BPDW1T1 Series, LBC848BPDW1T1 Series

SC-88/SOT-363

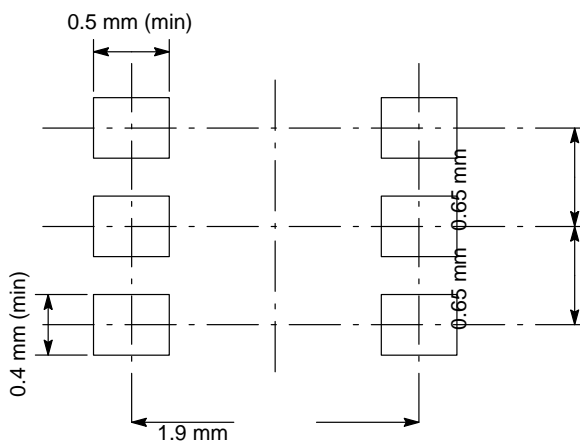


NOTES:

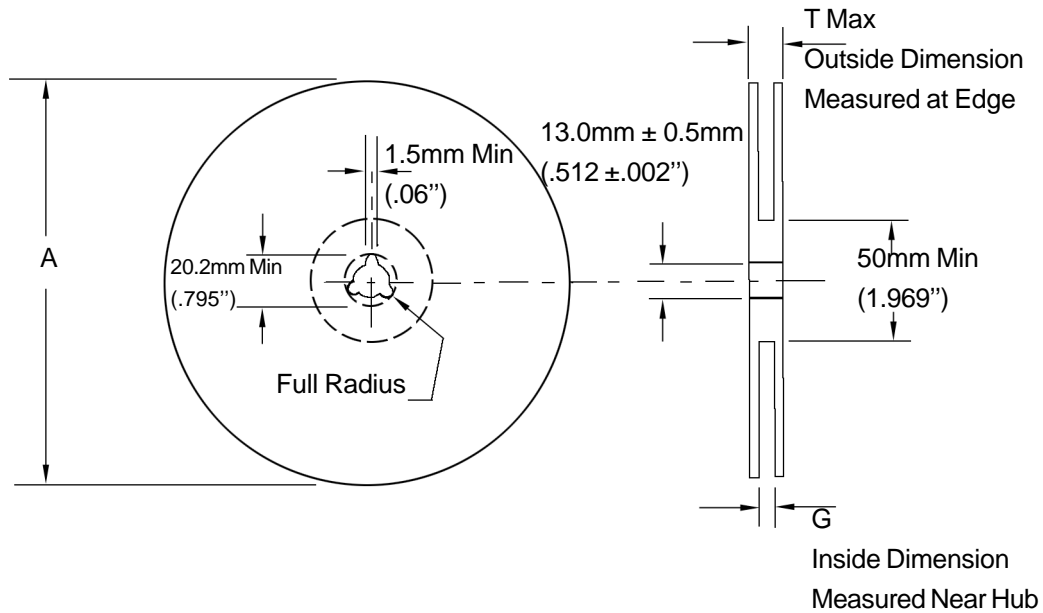
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

| DIM | INCHES | | MILLIMETERS | |
|-----|-----------|-------|-------------|------|
| | MIN | MAX | MIN | MAX |
| A | 0.071 | 0.087 | 1.80 | 2.20 |
| B | 0.045 | 0.053 | 1.15 | 1.35 |
| C | 0.031 | 0.043 | 0.80 | 1.10 |
| D | 0.004 | 0.012 | 0.10 | 0.30 |
| G | 0.026 BSC | | 0.65 BSC | |
| H | --- | 0.004 | --- | 0.10 |
| J | 0.004 | 0.010 | 0.10 | 0.25 |
| K | 0.004 | 0.012 | 0.10 | 0.30 |
| N | 0.008 REF | | 0.20 REF | |
| S | 0.079 | 0.087 | 2.00 | 2.20 |

- PIN 1. EMITTER 2
- 2. BASE 2
- 3. COLLECTOR 1
- 4. EMITTER 1
- 5. BASE 1
- 6. COLLECTOR 2



EMBOSSED TAPE AND REEL DATA FOR DISCRETES



| Size | A Max | G | T Max |
|------|--------------------|--|------------------|
| 8 mm | 330mm (12.992") | 8.4mm+1.5mm, -0.0 (.33"+.059", -0.00) | 14.4mm (.56") |

Reel Dimensions

Metric Dimensions Govern — English are in parentheses for reference only

Storage Conditions

Temperature: 5 to 40 Deg.C (20 to 30 Deg. C is preferred)

Humidity: 30 to 80 RH (40 to 60 is preferred)

Recommended Period: One year after manufacturing

(This recommended period is for the soldering condition only. The characteristics and reliabilities of the products are not restricted to this limitation)

Shipment Specification

