

General Purpose Transistors

NPN Silicon

- Moisture Sensitivity Level: 1
- ESD Rating – Human Body Model: >4000 V
– Machine Model: >400 V
- We declare that the material of product compliance with RoHS requirements.
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

MAXIMUM RATINGS

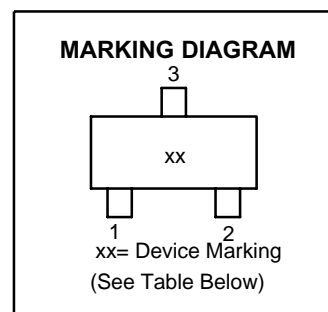
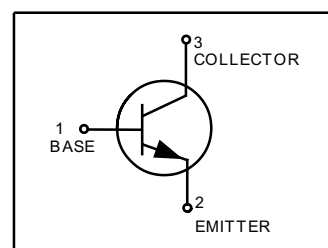
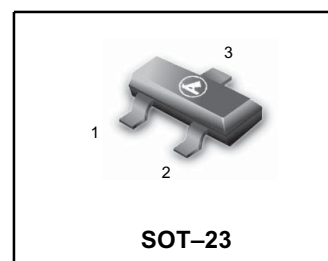
| Rating | Symbol | Value | Unit |
|---|-----------|-------------------|------|
| Collector–Emitter Voltage LBC846 LBC847, LBC850 LBC848, LBC849 | V_{CEO} | 65 45 30 | Vdc |
| Collector–Base Voltage LBC846 LBC847, LBC850 LBC848, LBC849 | V_{CBO} | 80 50 30 | Vdc |
| Emitter–Base Voltage LBC846 LBC847, LBC850 LBC848, LBC849 | V_{EBO} | 6.0 6.0 5.0 | 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°C | P_D | 225 1.8 | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient (Note 1.) | $R_{\theta JA}$ | 556 | $^\circ\text{C}/\text{W}$ |
| Total Device Dissipation Alumina Substrate (Note 2.) $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 300 2.4 | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction to Ambient (Note 2.) | $R_{\theta JA}$ | 417 | $^\circ\text{C}/\text{W}$ |
| 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
2. Alumina = 0.4 x 0.3 x 0.024 in. 99.5% alumina.

LBC846ALT1G S-LBC846ALT1G Series



LBC846ALT1G Series
S-LBC846ALT1G Series

DEVICE MARKING AND ORDERING INFORMATION

| Device | Marking | Package | Shipping |
|------------------------------|---------|---------|-----------------|
| LBC846ALT1G S-LBC846ALT1G | 1A | SOT-23 | 3000/Tape&Reel |
| LBC846ALT3G S-LBC846ALT3G | 1A | SOT-23 | 10000/Tape&Reel |
| LBC846BLT1G S-LBC846BLT1G | 1B | SOT-23 | 3000/Tape&Reel |
| LBC846BLT3G S-LBC846BLT3G | 1B | SOT-23 | 10000/Tape&Reel |
| LBC847ALT1G S-LBC847ALT1G | 1E | SOT-23 | 3000/Tape&Reel |
| LBC847ALT3G S-LBC847ALT3G | 1E | SOT-23 | 10000/Tape&Reel |
| LBC847BLT1G S-LBC847BLT1G | 1F | SOT-23 | 3000/Tape&Reel |
| LBC847BLT3G S-LBC847BLT3G | 1F | SOT-23 | 10000/Tape&Reel |
| LBC847CLT1G S-LBC847CLT1G | 1G | SOT-23 | 3000/Tape&Reel |
| LBC847CLT3G S-LBC847CLT3G | 1G | SOT-23 | 10000/Tape&Reel |
| LBC848ALT1G S-LBC848ALT1G | 1J | SOT-23 | 3000/Tape&Reel |
| LBC848ALT3G S-LBC848ALT3G | 1J | SOT-23 | 10000/Tape&Reel |
| LBC848BLT1G S-LBC848BLT1G | 1K | SOT-23 | 3000/Tape&Reel |
| LBC848BLT3G S-LBC848BLT3G | 1K | SOT-23 | 10000/Tape&Reel |
| LBC848CLT1G S-LBC848CLT1G | 1L | SOT-23 | 3000/Tape&Reel |
| LBC848CLT3G S-LBC848CLT3G | 1L | SOT-23 | 10000/Tape&Reel |
| LBC849BLT1G S-LBC849BLT1G | 2B | SOT-23 | 3000/Tape&Reel |
| LBC849BLT3G S-LBC849BLT3G | 2B | SOT-23 | 10000/Tape&Reel |
| LBC849CLT1G S-LBC849CLT1G | 2C | SOT-23 | 3000/Tape&Reel |
| LBC849CLT3G S-LBC849CLT3G | 2C | SOT-23 | 10000/Tape&Reel |
| LBC850BLT1G S-LBC850BLT1G | 2E | SOT-23 | 3000/Tape&Reel |
| LBC850BLT3G S-LBC850BLT3G | 2E | SOT-23 | 10000/Tape&Reel |
| LBC850CLT1G S-LBC850CLT1G | 2G | SOT-23 | 3000/Tape&Reel |
| LBC850CLT3G S-LBC850CLT3G | 2G | SOT-23 | 10000/Tape&Reel |

LBC846ALT1G Series
S-LBC846ALT1G Series

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

| Characteristic | Symbol | Min | Typ | Max | Unit | |
|---|---|---------------|-------------------|-------------------|-------------------|---------------------|
| OFF CHARACTERISTICS | | | | | | |
| Collector–Emitter Breakdown Voltage ($I_C = 10\text{ mA}$) | LBC846A,B LBC847A,B,C, LBC850B,C LBC848A,B,C, LBC849B,C | $V_{(BR)CEO}$ | 65 45 30 | – – – | – – – | V |
| Collector–Emitter Breakdown Voltage ($I_C = 10\text{ }\mu\text{A}$, $V_{EB} = 0$) | LBC846A,B LBC847A,B,C, LBC850B,C LBC848A,B,C, LBC849B,C | $V_{(BR)CES}$ | 80 50 30 | – – – | – – – | V |
| Collector–Base Breakdown Voltage ($I_C = 10\text{ }\mu\text{A}$) | LBC846A,B LBC847A,B,C, LBC850B,C LBC848A,B,C, LBC849B,C | $V_{(BR)CBO}$ | 80 50 30 | – – – | – – – | V |
| Emitter–Base Breakdown Voltage ($I_E = 1.0\text{ }\mu\text{A}$) | LBC846A,B LBC847A,B,C, LBC850B,C LBC848A,B,C, LBC849B,C | $V_{(BR)EBO}$ | 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 ($I_C = 2.0\text{ mA}$, $V_{CE} = 5.0\text{ V}$) | LBC846A, LBC847A, LBC848A LBC846B, LBC847B, LBC848B, LBC849B, LBC850B LBC847C, LBC848C, LBC849C, LBC850C | h_{FE} | 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 |
| 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 ($I_C = 0.2\text{ mA}$, $V_{CE} = 5.0\text{ Vdc}$, $R_S = 2.0\text{ k}\Omega$, $f = 1.0\text{ kHz}$, $BW = 200\text{ Hz}$) | LBC846A,B, LBC847A,B,C, LBC848A,B,C LBC849B,C, LBC850B,C | NF | – – | – – | 10 4.0 | dB |

LBC846ALT1G Series
S-LBC846ALT1G Series

LBC846A, LBC847A, LBC848A

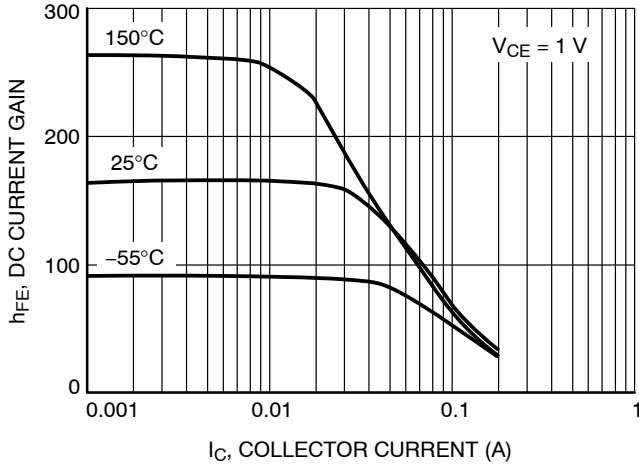


Figure 1. DC Current Gain vs. Collector Current

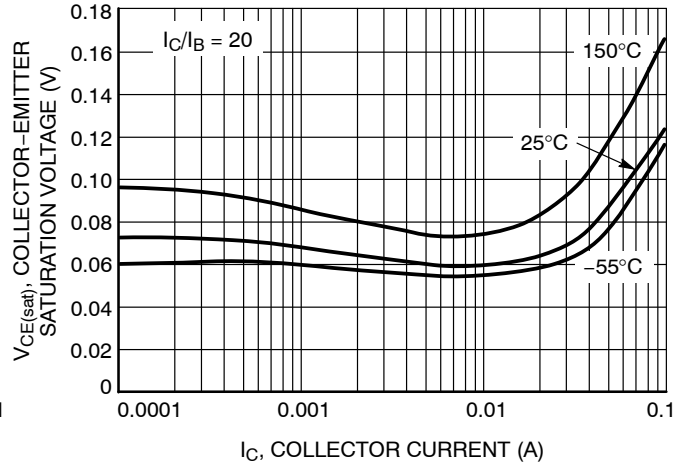


Figure 2. Collector Emitter Saturation Voltage vs. Collector Current

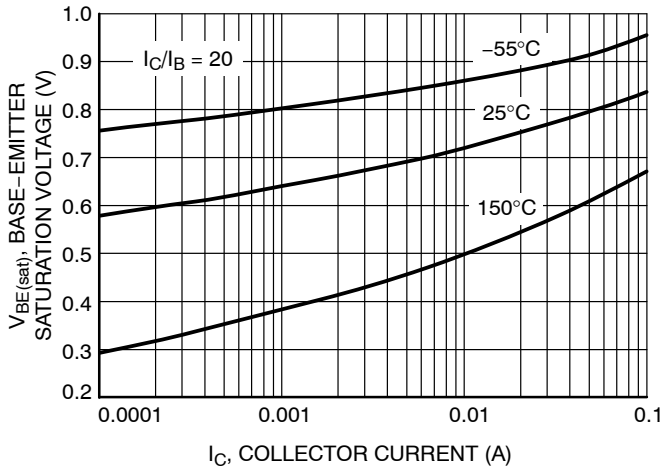


Figure 3. Base Emitter Saturation Voltage vs. Collector Current

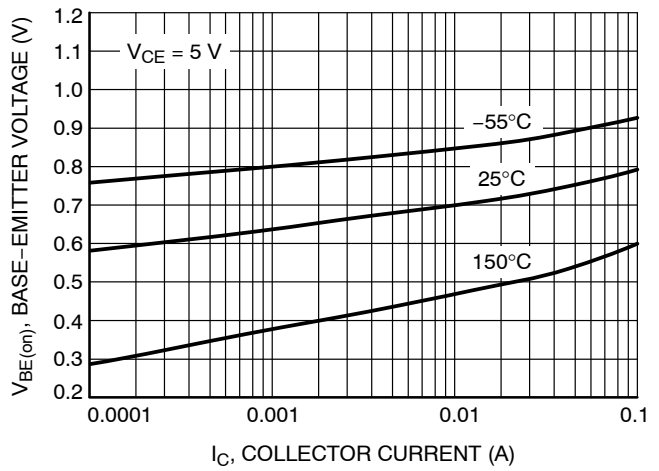


Figure 4. Base Emitter Voltage vs. Collector Current

LBC846A, LBC847A, LBC848A

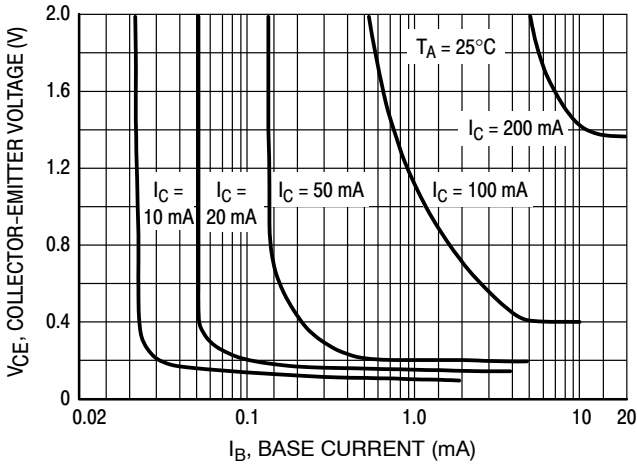


Figure 5. Collector Saturation Region

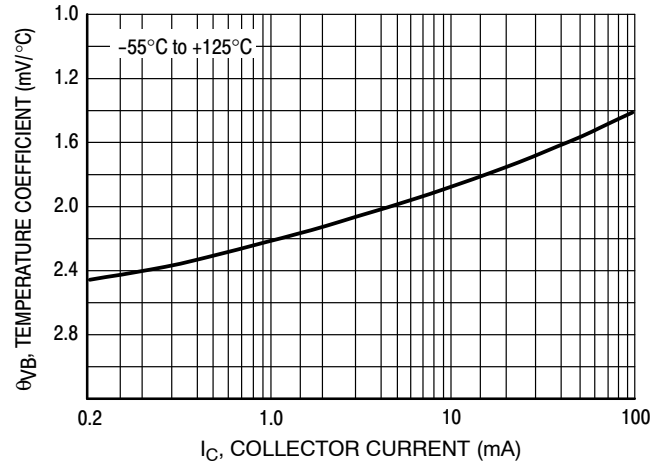


Figure 6. Base-Emitter Temperature Coefficient

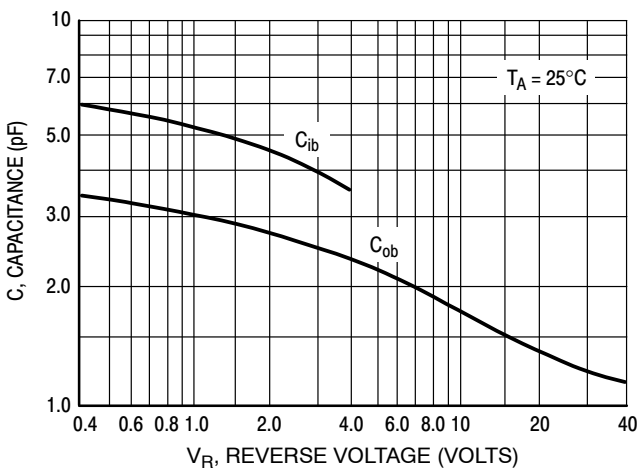


Figure 7. Capacitances

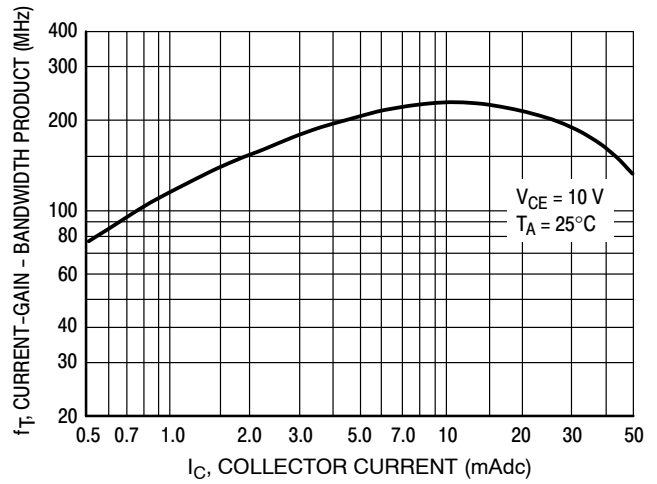


Figure 8. Current-Gain - Bandwidth Product

LBC846ALT1G Series
S-LBC846ALT1G Series

LBC846B

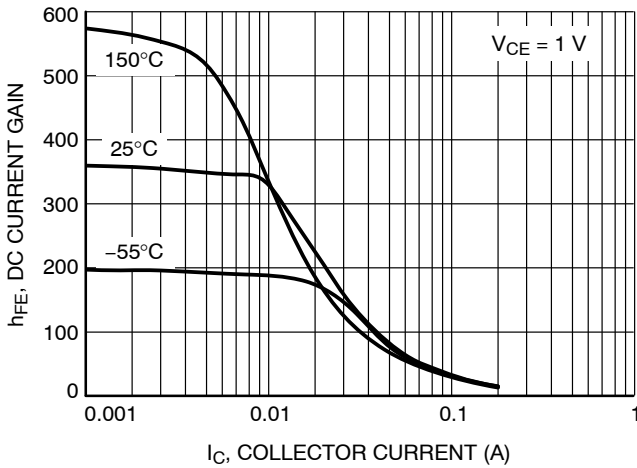


Figure 9. DC Current Gain vs. Collector Current

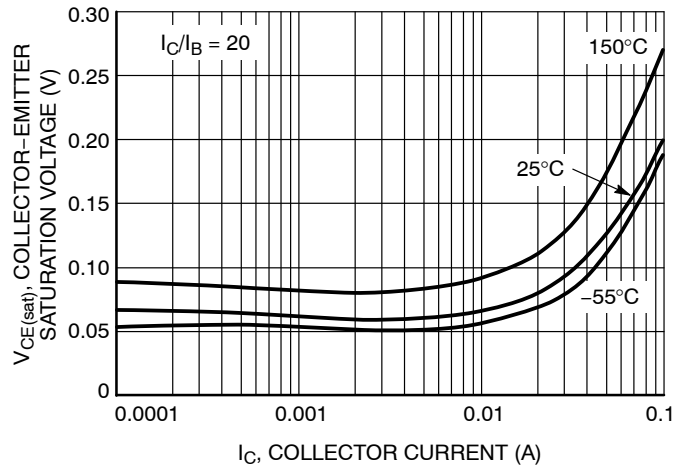


Figure 10. Collector Emitter Saturation Voltage vs. Collector Current

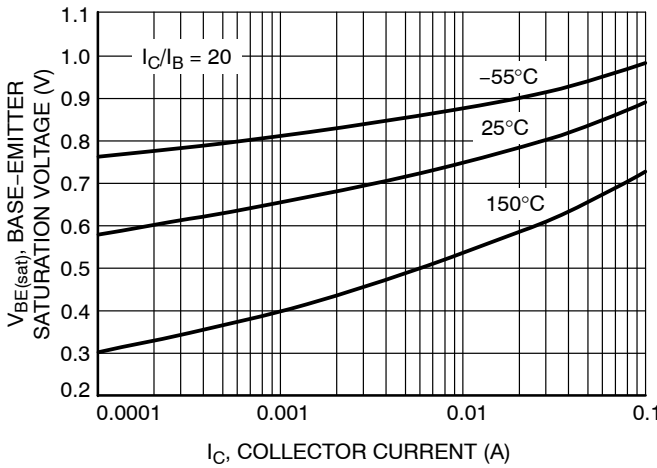


Figure 11. Base Emitter Saturation Voltage vs. Collector Current

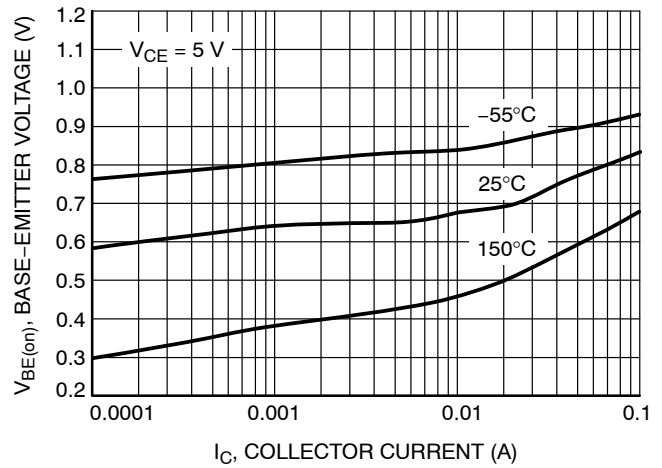


Figure 12. Base Emitter Voltage vs. Collector Current

LBC846ALT1G Series
S-LBC846ALT1G Series

LBC846B

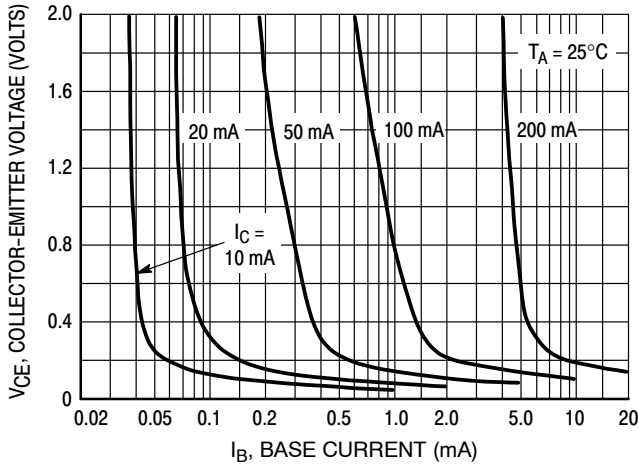


Figure 13. Collector Saturation Region

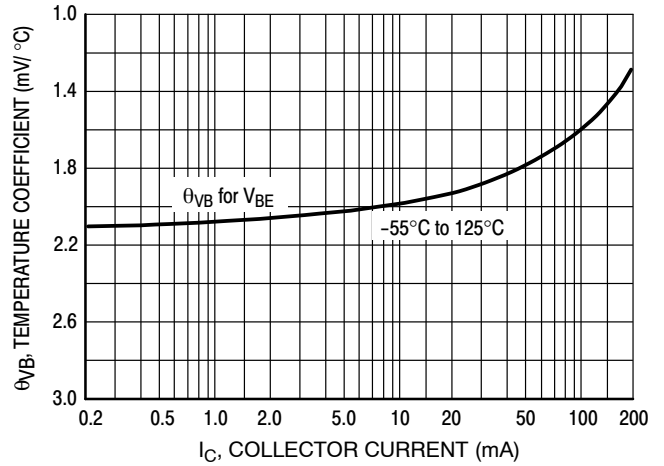


Figure 14. Base-Emitter Temperature Coefficient

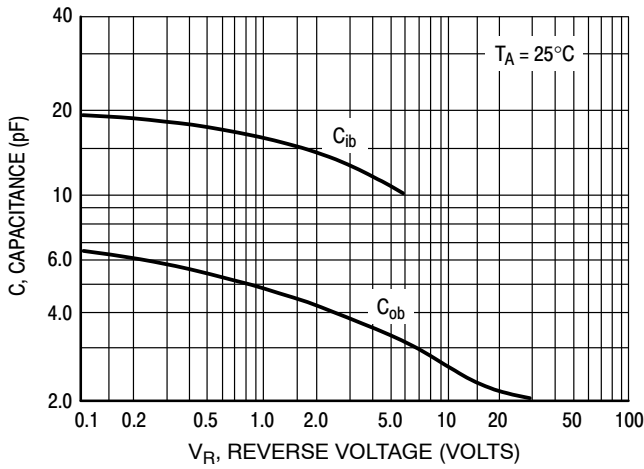


Figure 15. Capacitance

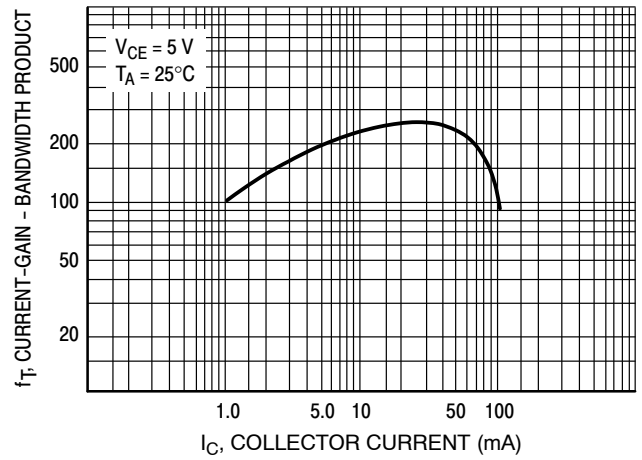


Figure 16. Current-Gain - Bandwidth Product

LBC846ALT1G Series
S-LBC846ALT1G Series

LBC847B, LBC848B, LBC849B, LBC850B

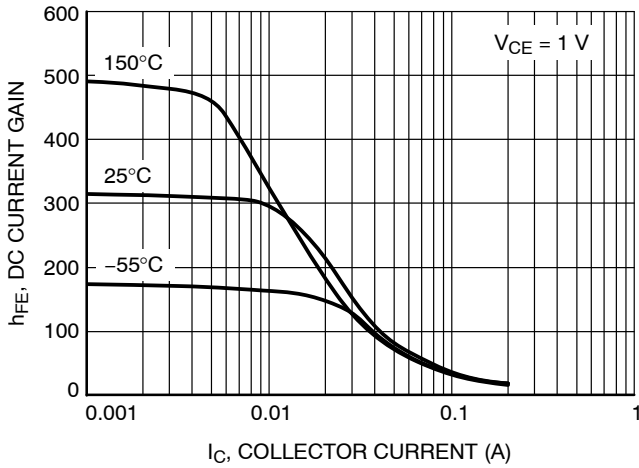


Figure 17. DC Current Gain vs. Collector Current

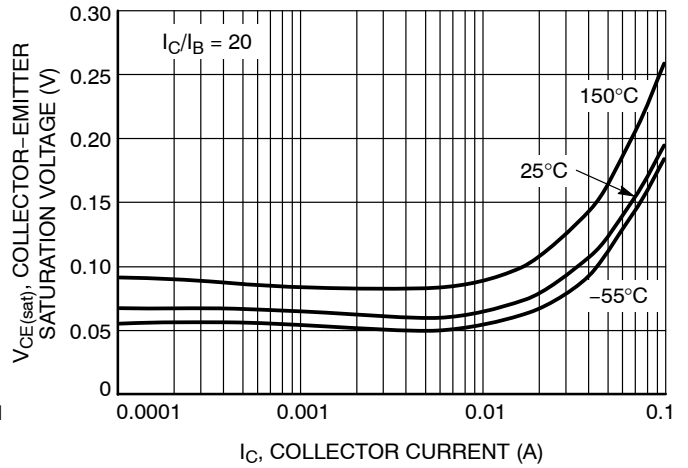


Figure 18. Collector Emitter Saturation Voltage vs. Collector Current

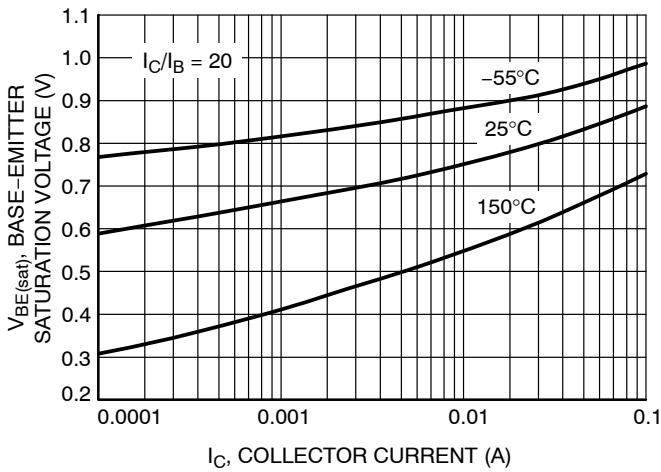


Figure 19. Base Emitter Saturation Voltage vs. Collector Current

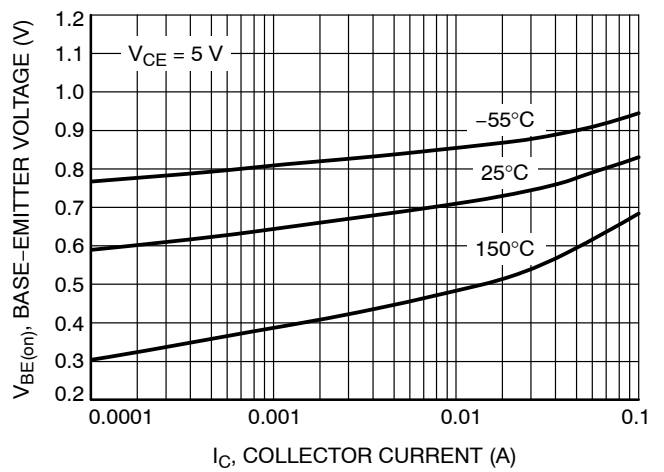
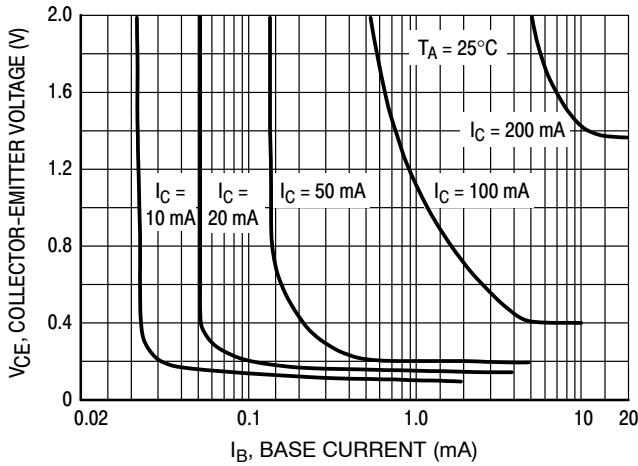
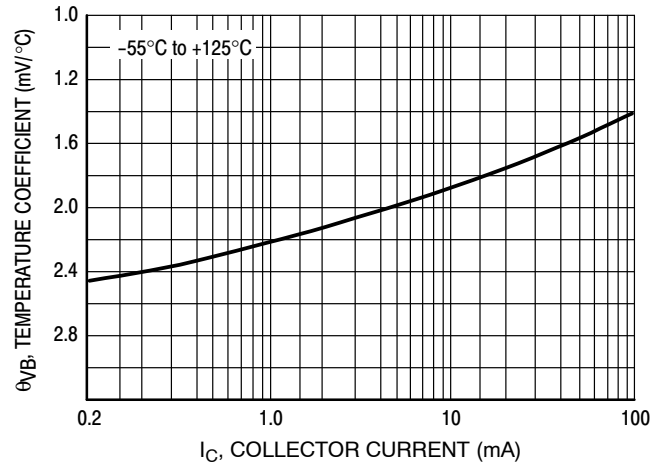
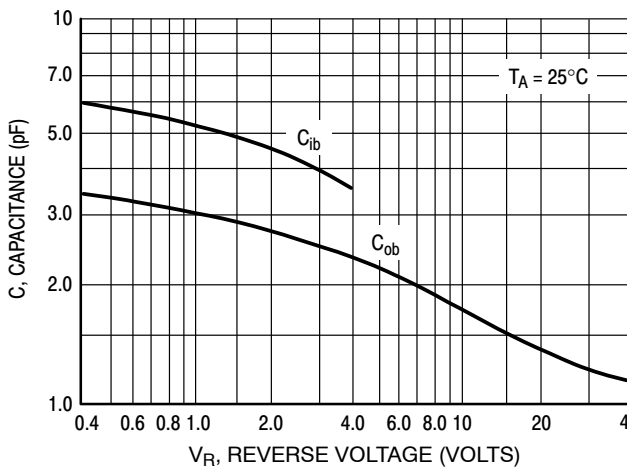
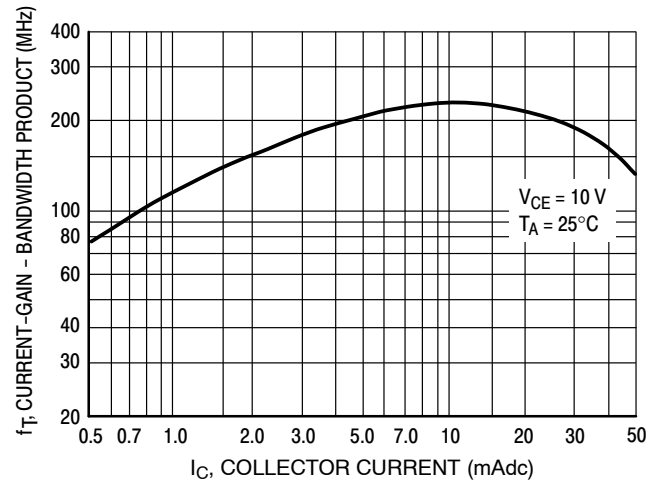


Figure 20. Base Emitter Voltage vs. Collector Current

**LBC846ALT1G Series
S-LBC846ALT1G Series**
LBC847B, LBC848B, LBC849B, LBC850B

Figure 21. Collector Saturation Region

Figure 22. Base-Emitter Temperature Coefficient

Figure 23. Capacitances

Figure 24. Current-Gain - Bandwidth Product

LBC846ALT1G Series
S-LBC846ALT1G Series

LBC847C, LBC848C, LBC849C, LBC850C

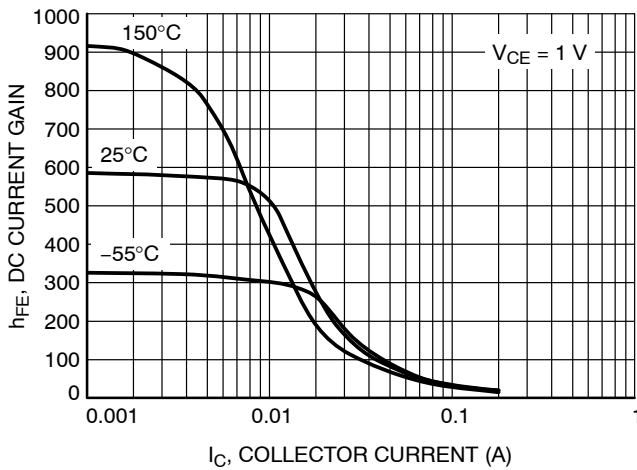


Figure 25. DC Current Gain vs. Collector Current

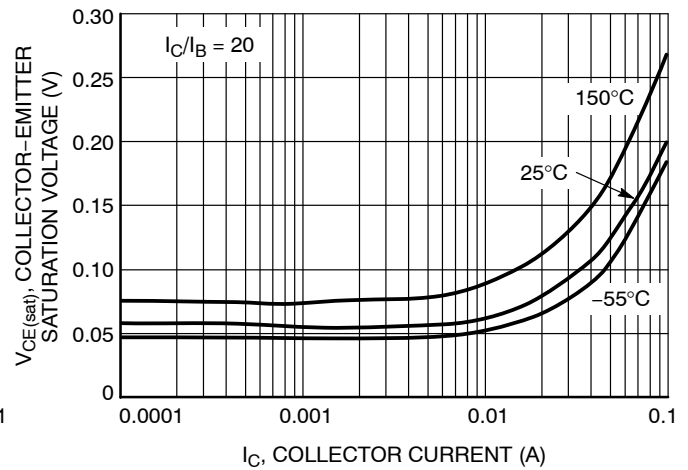


Figure 26. Collector Emitter Saturation Voltage vs. Collector Current

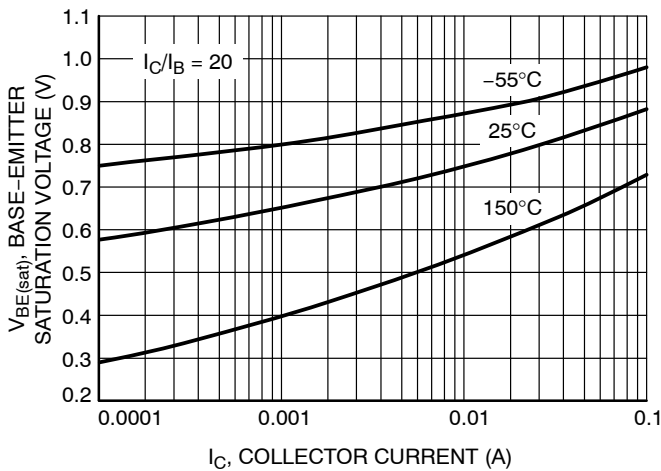


Figure 27. Base Emitter Saturation Voltage vs. Collector Current

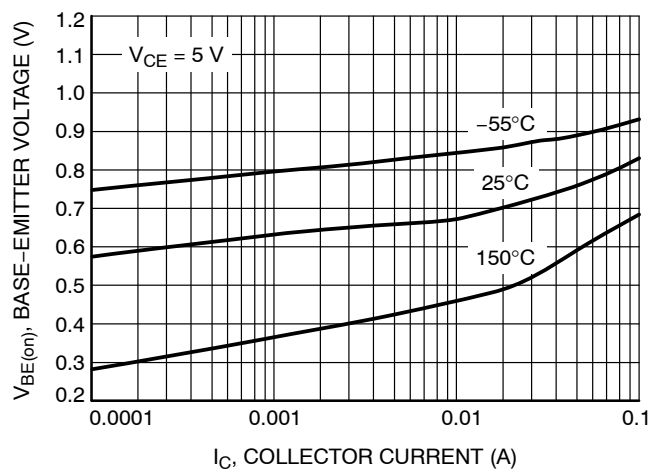


Figure 28. Base Emitter Voltage vs. Collector Current

LBC846ALT1G Series
S-LBC846ALT1G Series

LBC847C, LBC848C, LBC849C, LBC850C

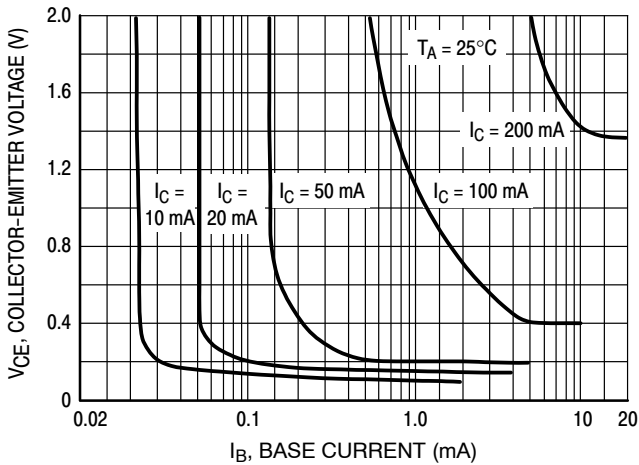


Figure 29. Collector Saturation Region

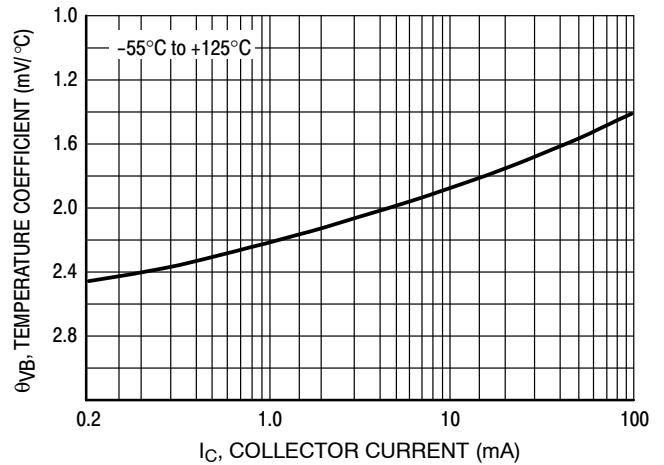


Figure 30. Base-Emitter Temperature Coefficient

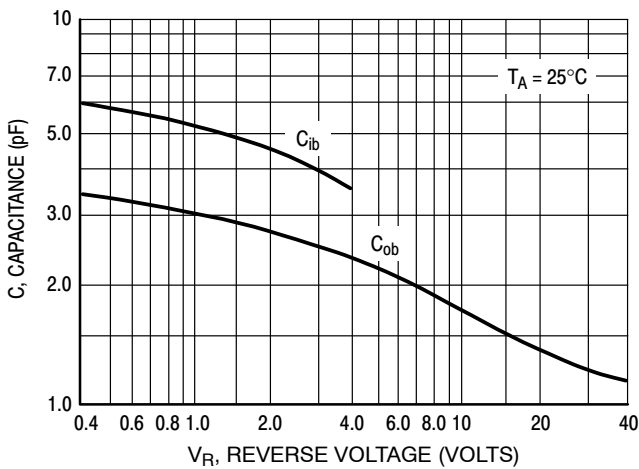


Figure 31. Capacitances

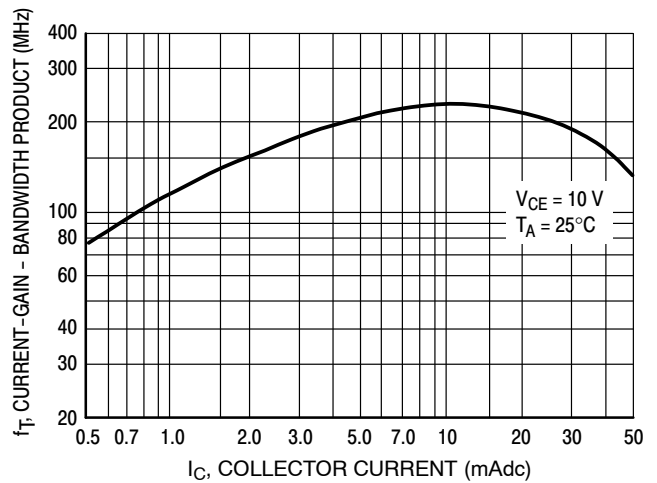


Figure 32. Current-Gain - Bandwidth Product

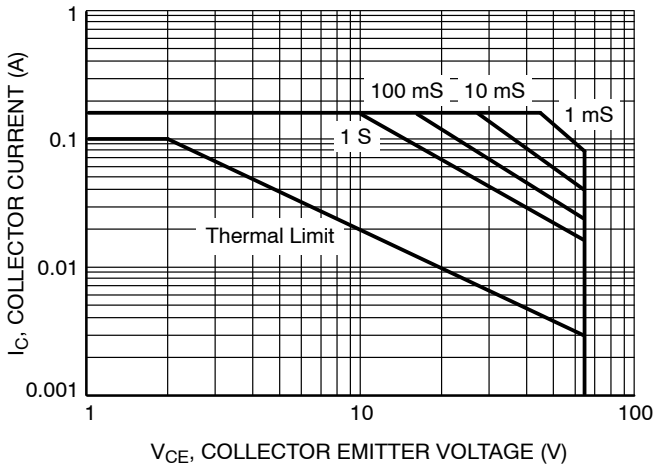
LBC846ALT1G Series
S-LBC846ALT1G Series


Figure 33. Safe Operating Area for
LBC846A, LBC846B

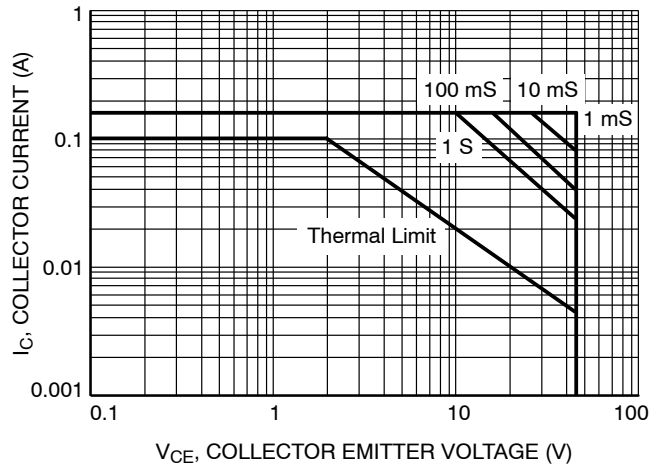


Figure 34. Safe Operating Area for
LBC847A, LBC847B, LBC847C, LBC850B, LBC850C

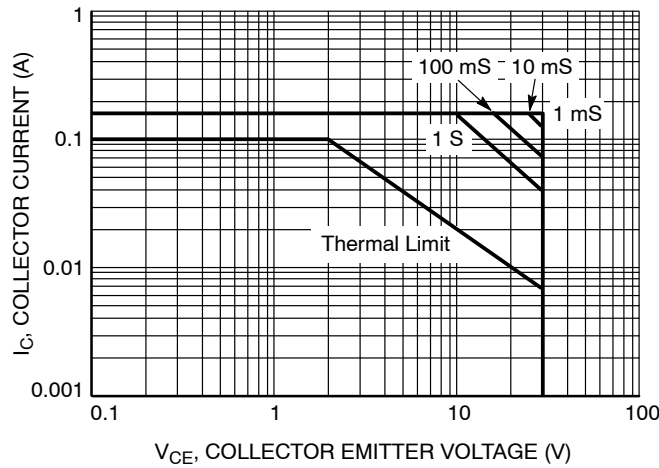
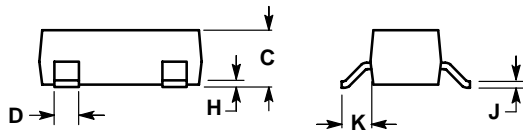
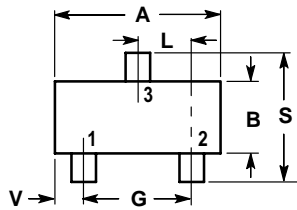


Figure 35. Safe Operating Area for
LBC848A, LBC848B, LBC848C, LBC849B, LBC849C

LBC846ALT1G Series
S-LBC846ALT1G Series

SOT-23



NOTES:

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

| DIM | INCHES | | MILLIMETERS | |
|-----|--------|--------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.1102 | 0.1197 | 2.80 | 3.04 |
| B | 0.0472 | 0.0551 | 1.20 | 1.40 |
| C | 0.0350 | 0.0440 | 0.89 | 1.11 |
| D | 0.0150 | 0.0200 | 0.37 | 0.50 |
| G | 0.0701 | 0.0807 | 1.78 | 2.04 |
| H | 0.0005 | 0.0040 | 0.013 | 0.100 |
| J | 0.0034 | 0.0070 | 0.085 | 0.177 |
| K | 0.0140 | 0.0285 | 0.35 | 0.69 |
| L | 0.0350 | 0.0401 | 0.89 | 1.02 |
| S | 0.0830 | 0.1039 | 2.10 | 2.64 |
| V | 0.0177 | 0.0236 | 0.45 | 0.60 |

