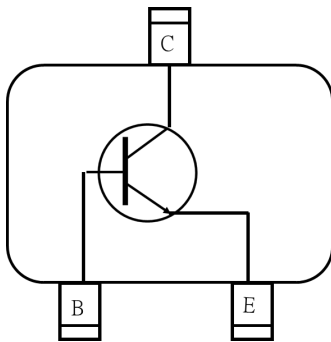


1. Features List

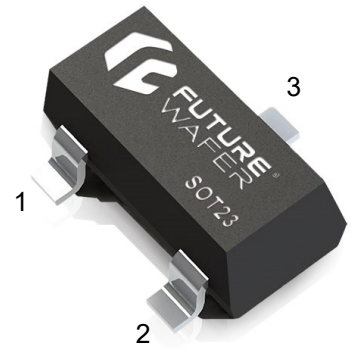
- Complementary NPN types available
- For switching and AF Amplifier applications
- Totally Lead-Free

2. Mechanical Characteristics

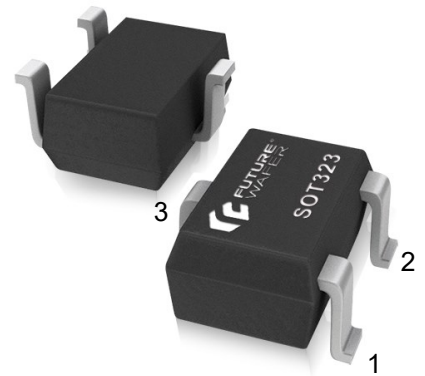
- Molded JEDEC SOT-23/SOT-323 Package
- Packaging: Tape and Reel
- Flammability rating UL 94V-0
- Halogen Free



Pin 1 : Base
Pin 2 : Emitter
Pin 3 : Collector



SOT-23



SOT-323



3. Device Characteristics

Maximum Ratings@25°C Unless Otherwise Specified

| Parameter | Symbol | Value | Units |
|-------------------------------------|------------------|------------|-------|
| Collector Base Voltage | V _{CBO} | 80 | V dc |
| | | 50 | |
| | | 30 | |
| Collector Emitter Voltage | V _{CEO} | 65 | |
| | | 45 | |
| | | 30 | |
| Emitter Base Voltage | V _{EBO} | 6.0 | |
| | | 6.0 | |
| | | 5.0 | |
| Collector Current | I _C | 100 | mAdc |
| Total Device Dissipation FR-5 Board | P _D | 250 | mW |
| Junction Temperature | T _J | -55 to 150 | °C |
| Storage Temperature | T _{STG} | | |

4. Electrical Characteristics ($T_A=25\text{ °C}$ unless otherwise noted)

| Parameter | | Symbol | Min. | Typ. | Max. | Units |
|--|--------------|--------------|------|------|------|-------|
| Collector-Emitter Breakdown Voltage $I_C = -10\text{mA}$ | BC846/BC846W | V_{BR-CEO} | 65 | - | - | V |
| | BC847/BC847W | | 45 | - | - | |
| | BC848/BC848W | | 30 | - | - | |
| Emitter-Base Breakdown Voltage $I_E = -1.0\mu\text{A}$ | BC846/BC846W | V_{BR-EBO} | 6 | - | - | |
| | BC847/BC847W | | 6 | - | - | |
| | BC848/BC848W | | 5 | - | - | |
| Collector-Base Breakdown Voltage $I_C = -10\mu\text{A}$ | BC846/BC846W | V_{BR-CBO} | 80 | - | - | |
| | BC847/BC847W | | 50 | - | - | |
| | BC848/BC848W | | 30 | - | - | |
| Collector-Base Cutoff Current $V_{CB} = 30\text{V}, T_A = 25\text{ °C}$ | | I_{CBO} | - | - | 15 | nA |
| Emitter-Base Cutoff Current $V_{CB} = 30\text{V}, T_A = 25\text{ °C}$ | | I_{EBO} | - | - | 100 | |

5. On Characteristics

| Parameter | | Symbol | Min. | Typ. | Max. | Units |
|--|--|---------------|------|------|------|-------|
| DC Current Gain $I_C = 2.0\text{mA}, V_{CE} = 5.0\text{V}$ | BC846A/BC846AW BC847A/BC847AW BC848A/BC848AW | h_{FE} | 110 | - | 220 | V |
| | BC846B/BC846BW BC847B/BC847BW BC848B/BC848BW | | 200 | - | 450 | |
| | BC846C/BC846CW BC847C/BC847CW BC848C/BC848CW | | 420 | - | 800 | |
| Collector-Emitter Saturation Voltage, $I_C = -10\text{mA}, I_B = -0.5\text{mA}$ | | $V_{CE(sat)}$ | - | - | 0.25 | |
| Collector-Emitter Saturation Voltage, $I_C = -100\text{mA}, I_B = -5.0\text{mA}$ | | | - | - | 0.60 | |
| Base-Emitter Voltage, $I_C = 2\text{mA}, V_{CE} = 5\text{V}$ | | V_{BE} | - | - | 0.7 | |
| Base-Emitter Voltage, $I_C = 10\text{mA}, V_{CE} = 5\text{V}$ | | | - | - | 0.77 | |

6. Small Signal Characteristics

| Parameter | | Symbol | Min. | Typ. | Max. | Units |
|--|--|--------|------|------|------|-------|
| Current Gain Bandwidth Product $I_C = 10\text{mA}, V_{CE} = 5.0\text{V}, f = 100\text{MHz}$ | | fT | 100 | - | - | Mhz |
| Output Capacitance $V_{CB} = 10\text{V}, f = 1.0\text{Mhz}$ | | Cob | - | - | 4.5 | pF |

7. Rating and Characteristic Curve

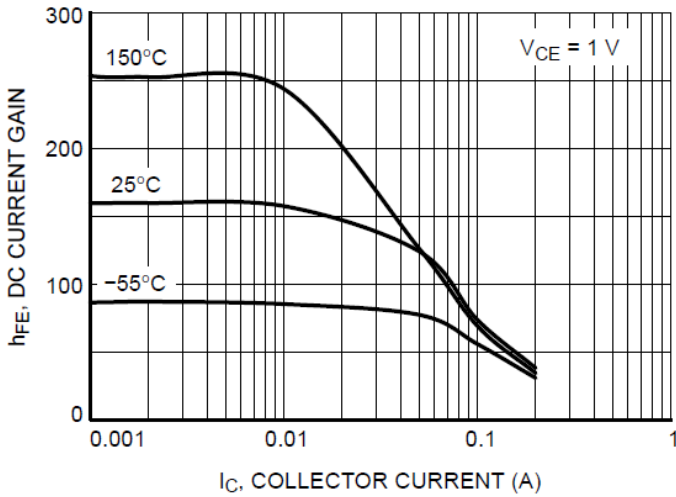


Figure 1. DC Current Gain vs. Collector Current

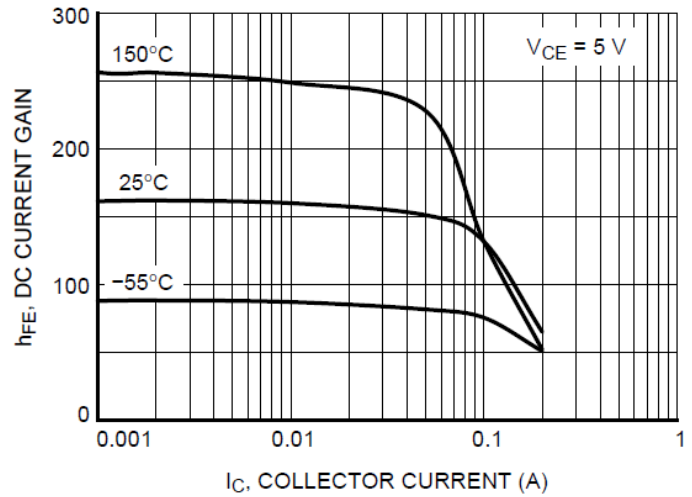


Figure 2. DC Current Gain vs. Collector Current

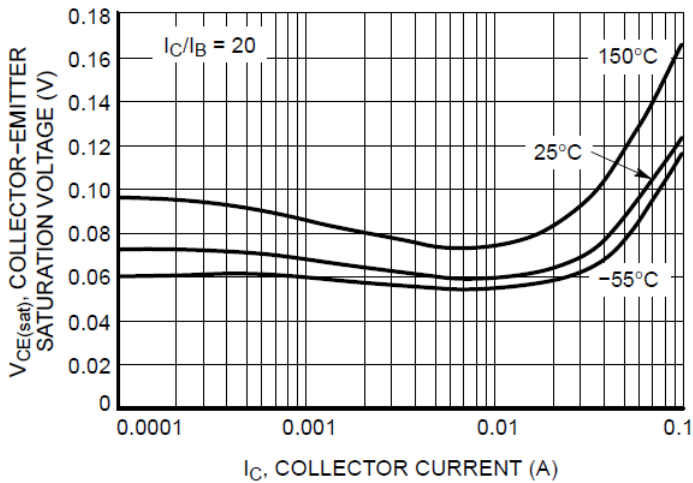


Figure 3. Collector Emitter Saturation Voltage vs. Collector Current

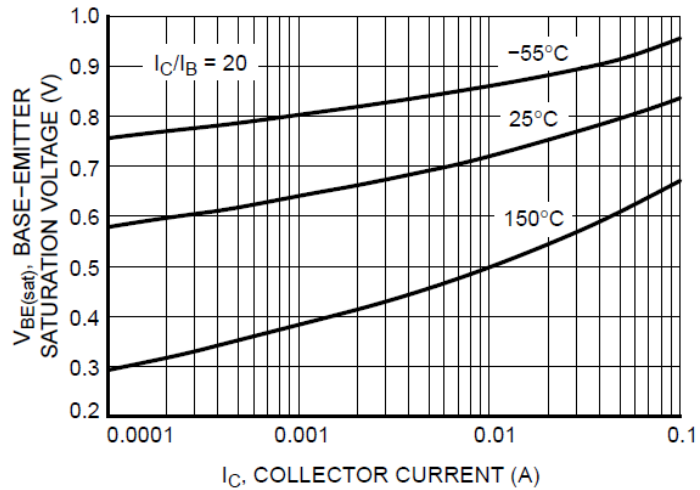


Figure 4. Base Emitter Saturation Voltage vs. Collector Current

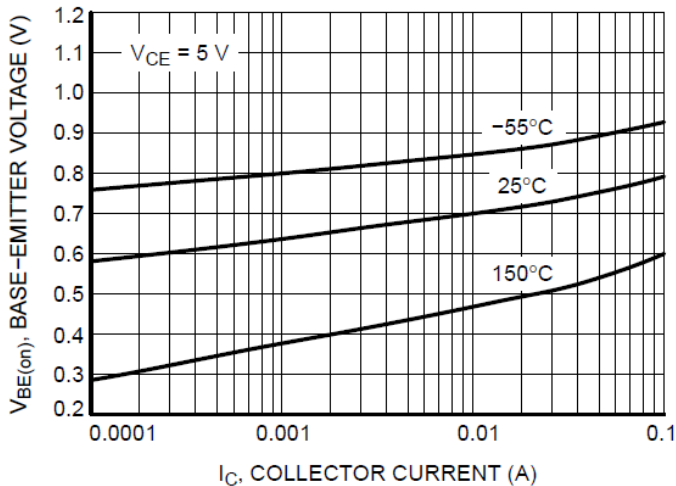


Figure 5. Base Emitter Voltage vs. Collector Current

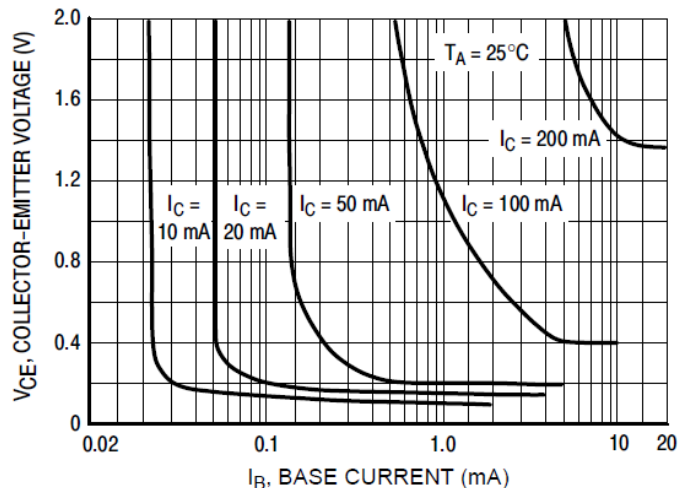


Figure 6. Collector Saturation Region

7. Rating and characteristic curve

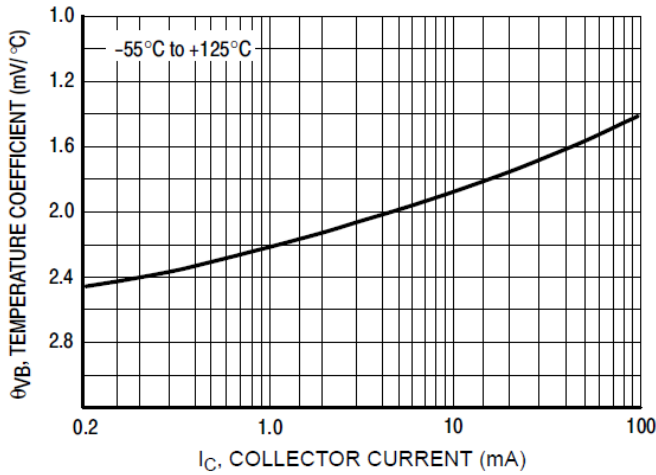


Figure 7. Base-Emitter Temperature Coefficient

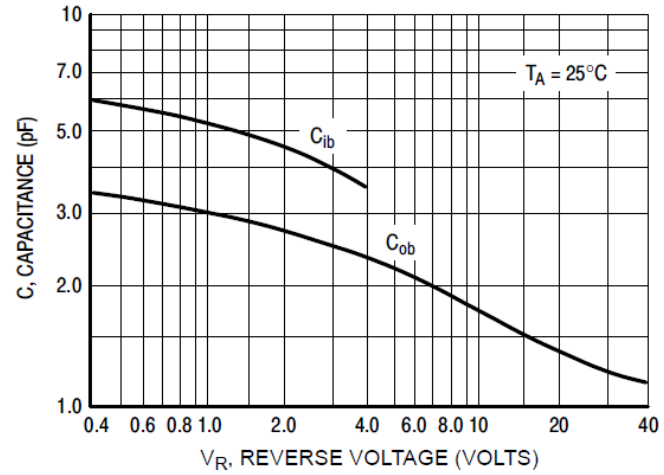


Figure 8. Capacitances

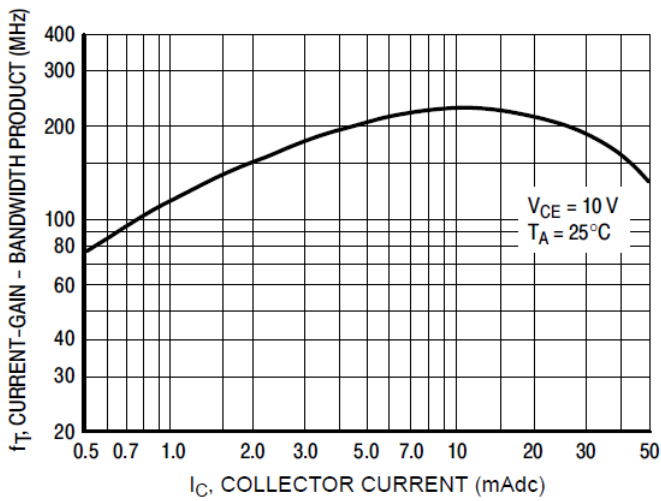


Figure 9. Current-Gain - Bandwidth Product

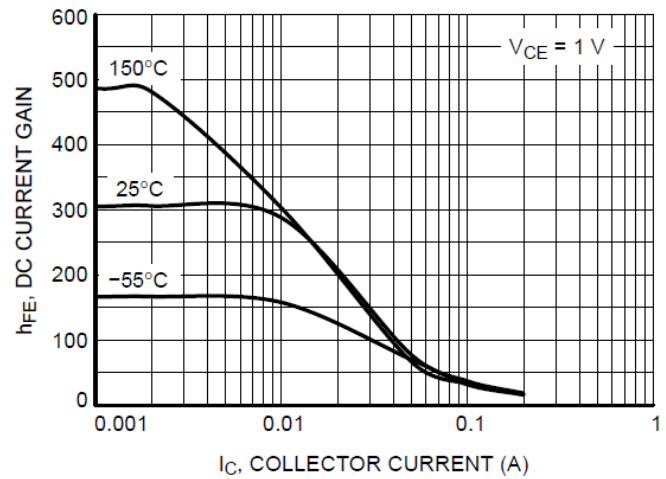


Figure 10. DC Current Gain vs. Collector Current

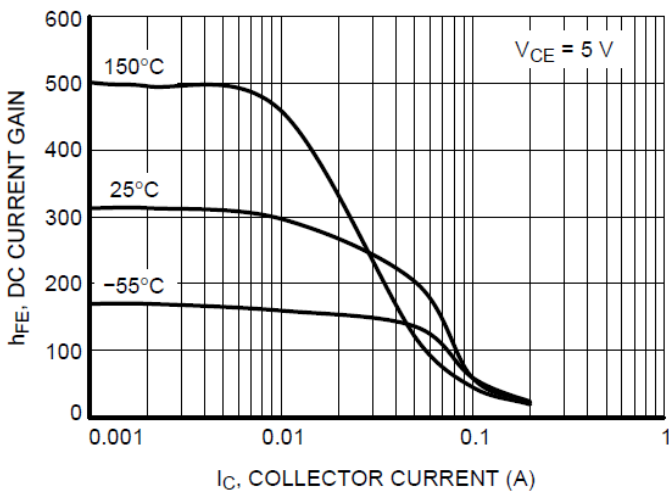


Figure 11. DC Current Gain vs. Collector Current

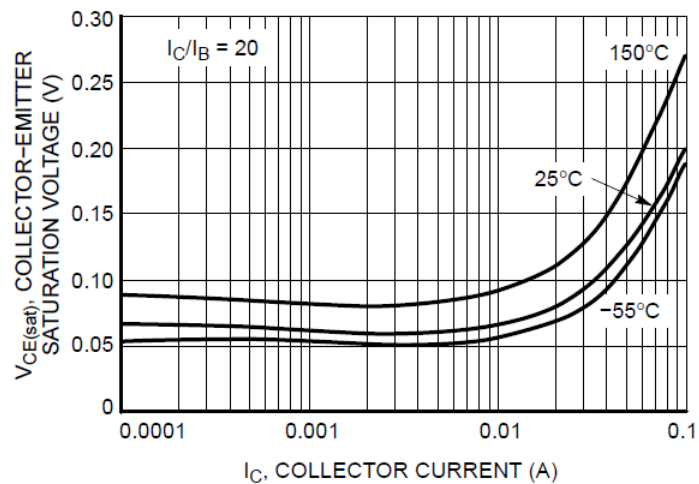


Figure 12. Collector Emitter Saturation Voltage vs. Collector Current

7. Rating and Characteristic Curve

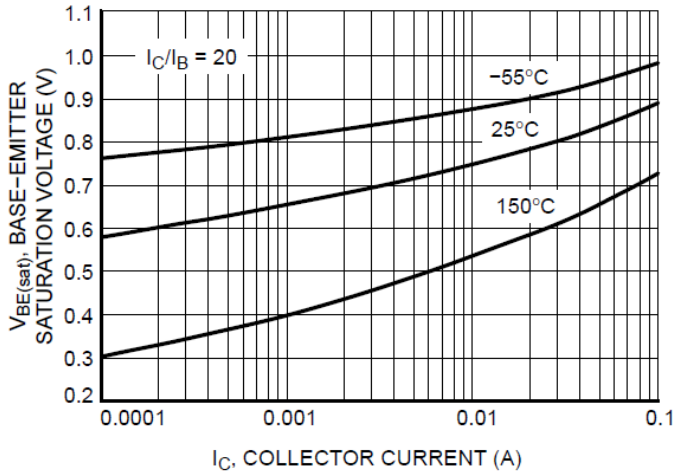


Figure 13. Base Emitter Saturation Voltage vs. Collector Current

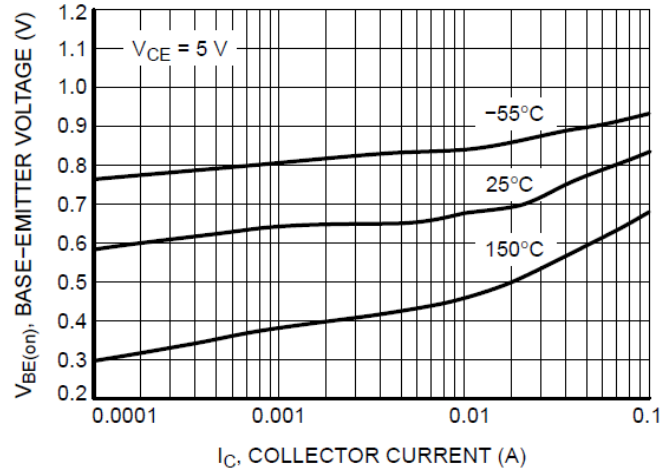


Figure 14. Base Emitter Voltage vs. Collector Current

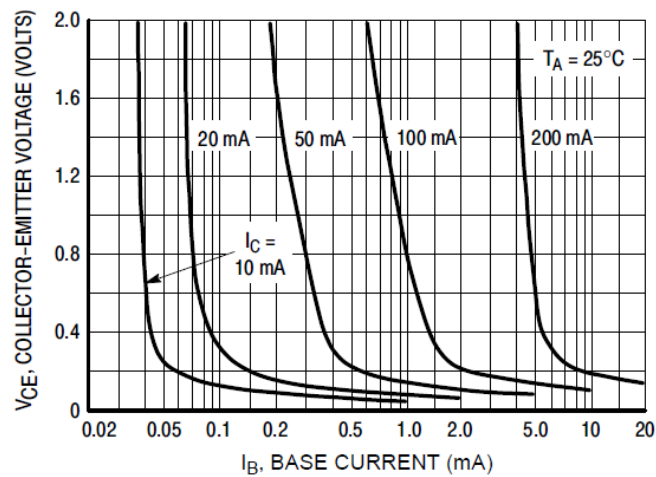


Figure 15. Collector Saturation Region

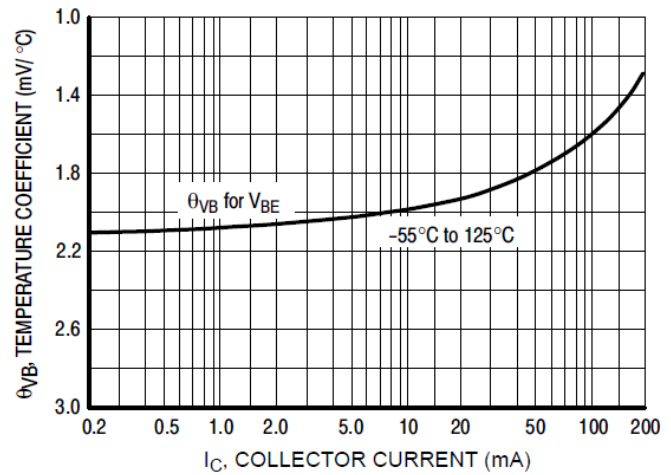


Figure 16. Base-Emitter Temperature Coefficient

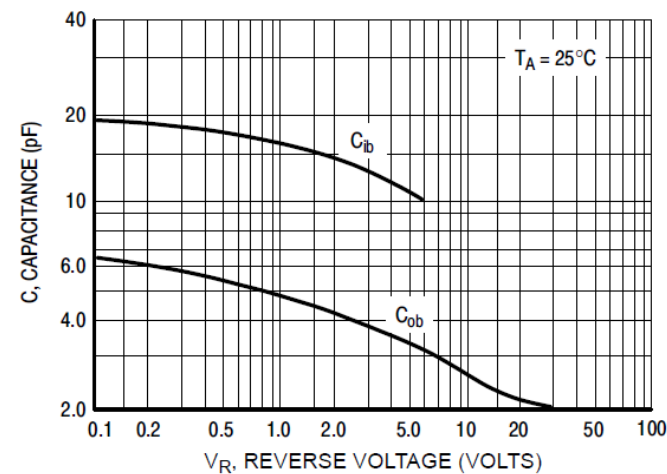


Figure 17. Capacitance

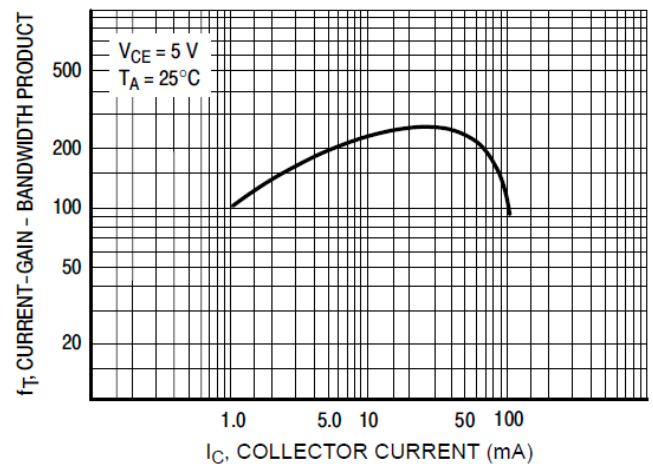


Figure 18. Current-Gain - Bandwidth Product

7. Rating and Characteristic Curve

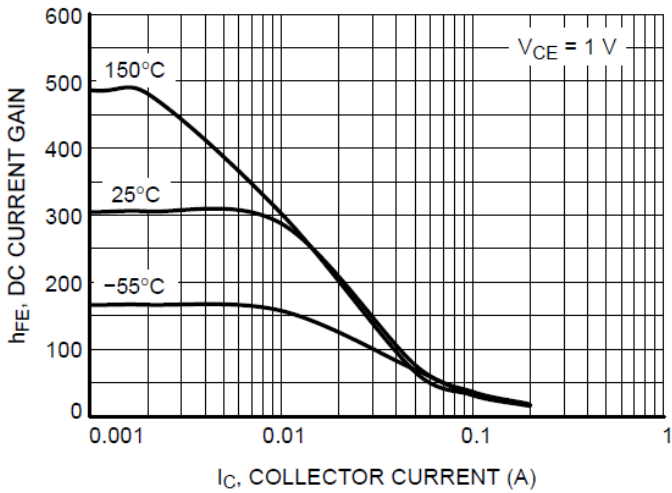


Figure 19. DC Current Gain vs. Collector Current

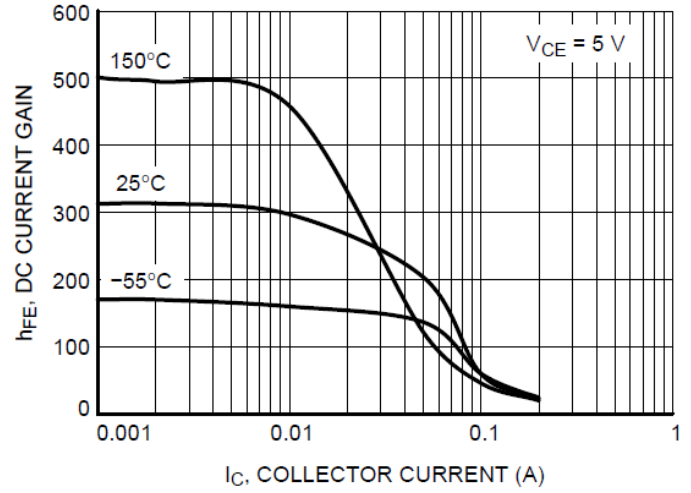


Figure 20. DC Current Gain vs. Collector Current

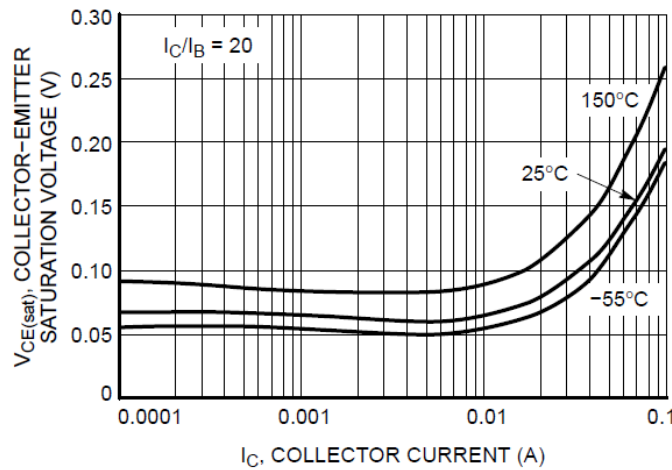


Figure 21. Collector Emitter Saturation Voltage vs. Collector Current

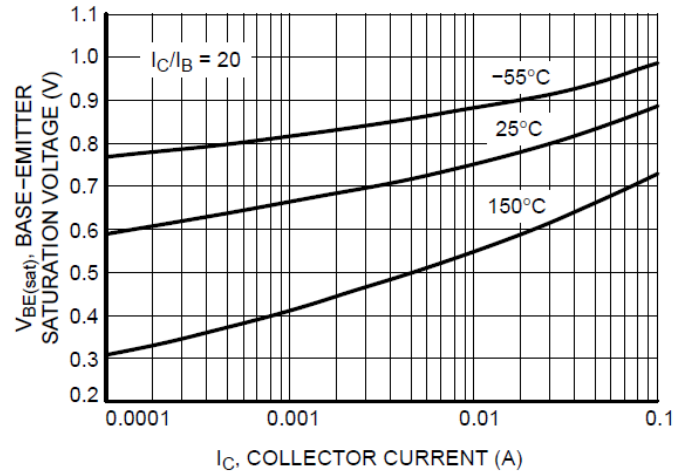


Figure 22. Base Emitter Saturation Voltage vs. Collector Current

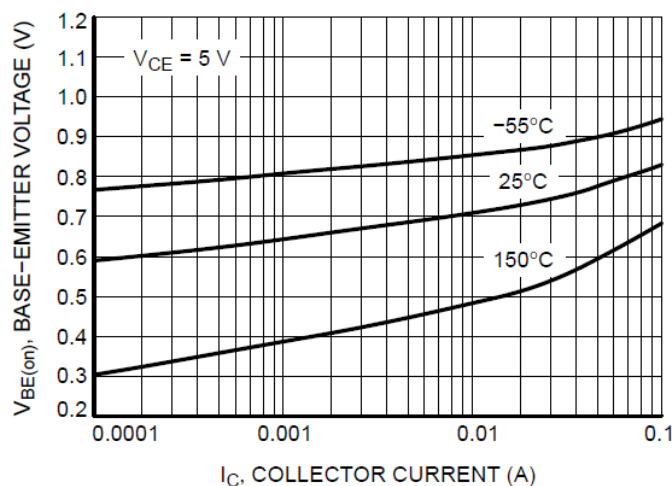


Figure 23. Base Emitter Voltage vs. Collector Current

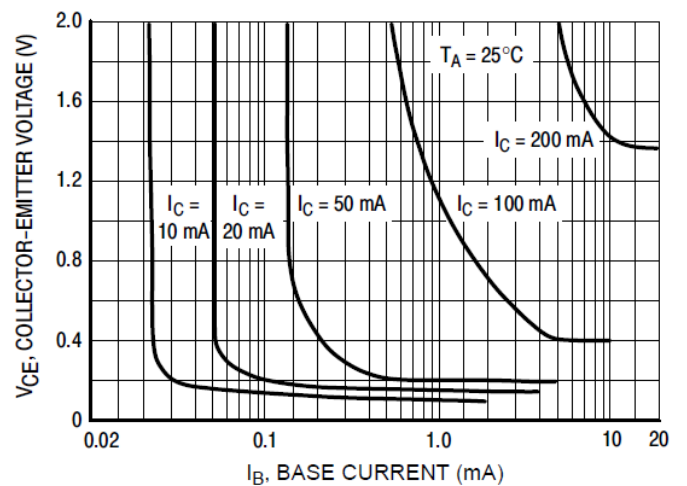


Figure 24. Collector Saturation Region

7. Rating and Characteristic Curve

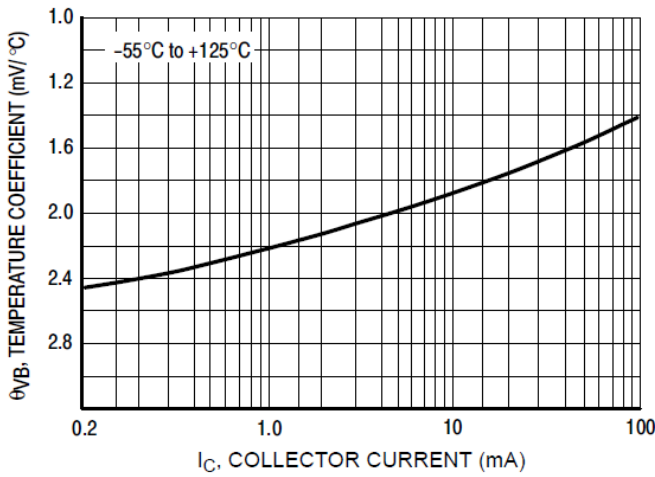


Figure 25. Base-Emitter Temperature Coefficient

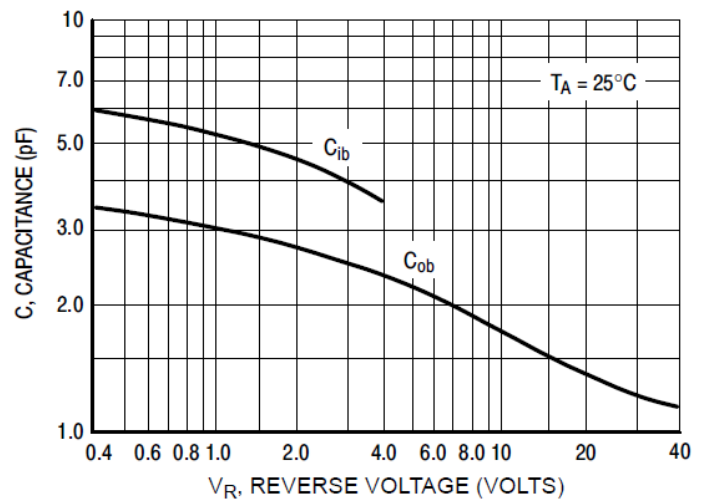


Figure 26. Capacitances

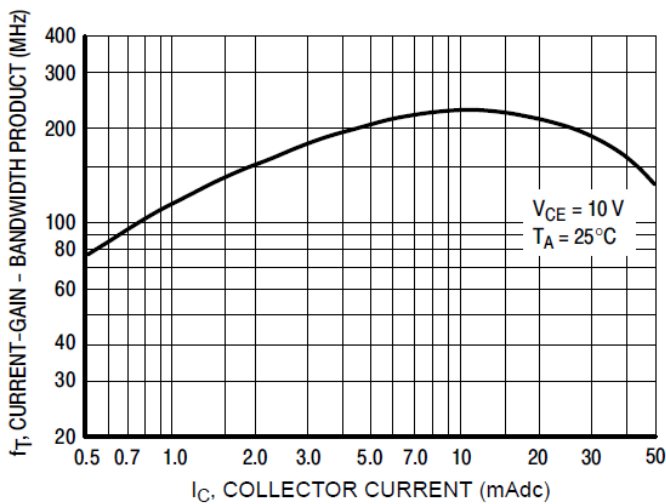


Figure 27. Current-Gain - Bandwidth Product

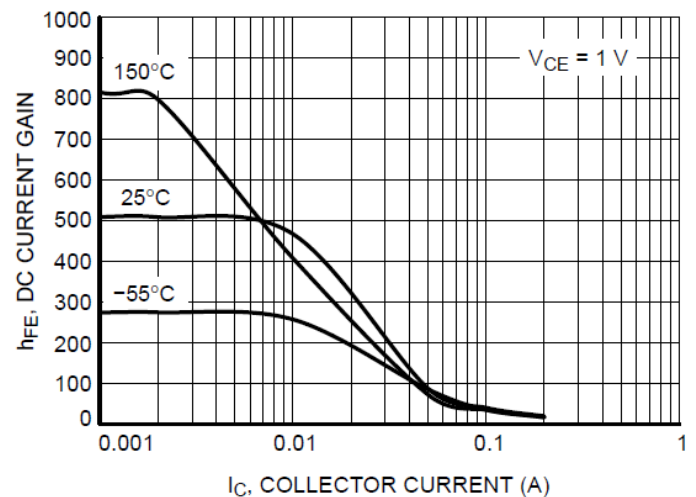


Figure 28. DC Current Gain vs. Collector Current

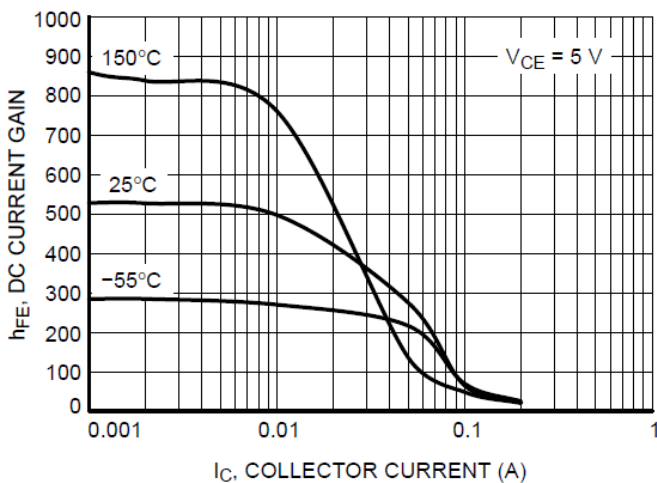


Figure 29. DC Current Gain vs. Collector Current

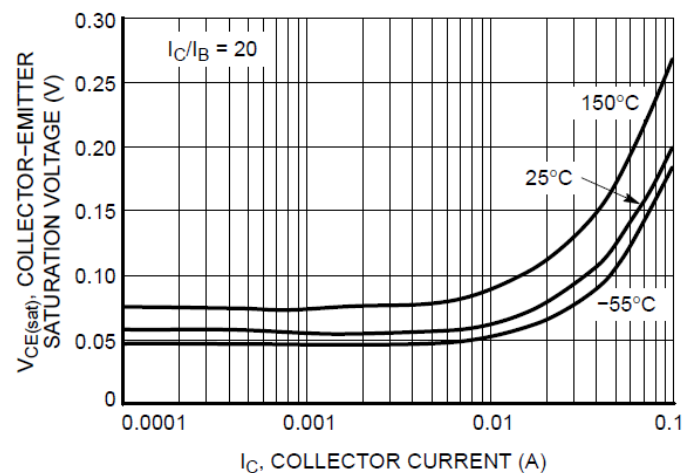


Figure 30. Collector Emitter Saturation Voltage vs. Collector Current

7. Rating and Characteristic Curve

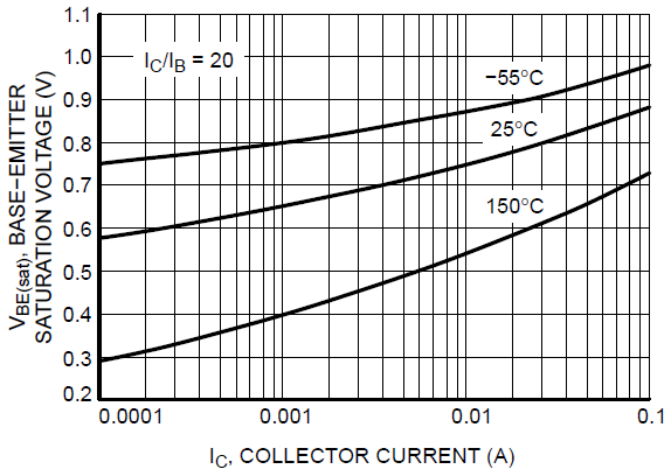


Figure 31. Base Emitter Saturation Voltage vs. Collector Current

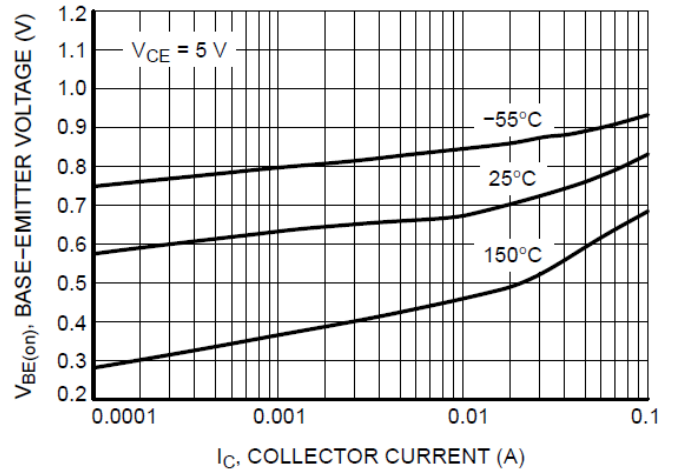


Figure 32. Base Emitter Voltage vs. Collector Current

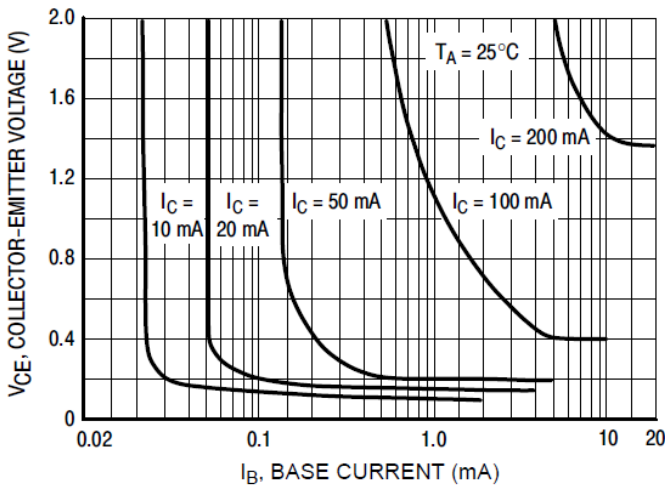


Figure 33. Collector Saturation Region

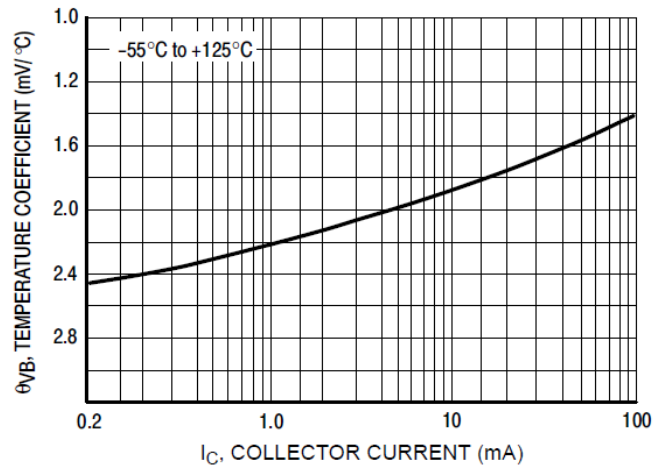


Figure 34. Base-Emitter Temperature Coefficient

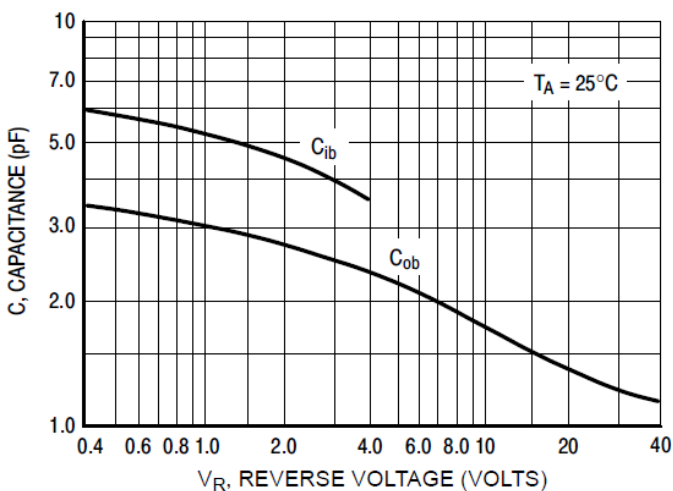


Figure 35. Capacitances

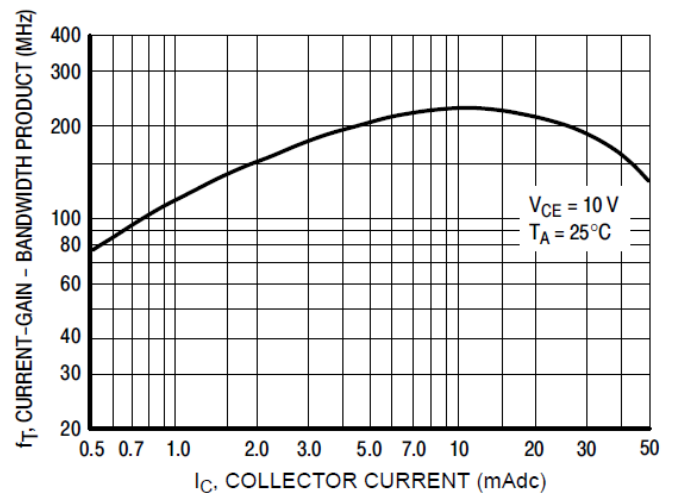


Figure 36. Current-Gain - Bandwidth Product

7. Rating and Characteristic Curve

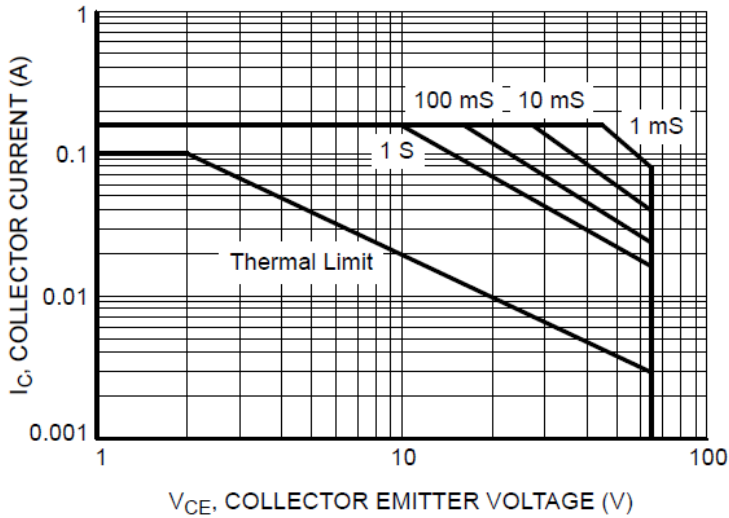


Figure 37. Safe Operating Area for BC846A/B/C

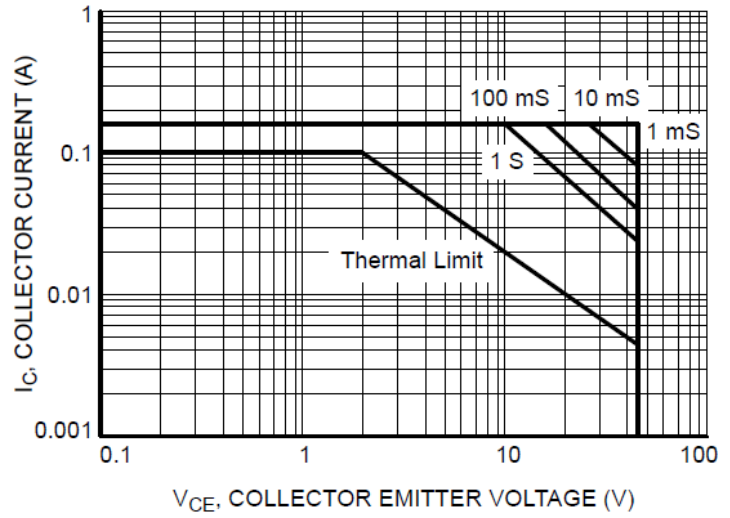


Figure 38. Safe Operating Area for BC847A/B/C

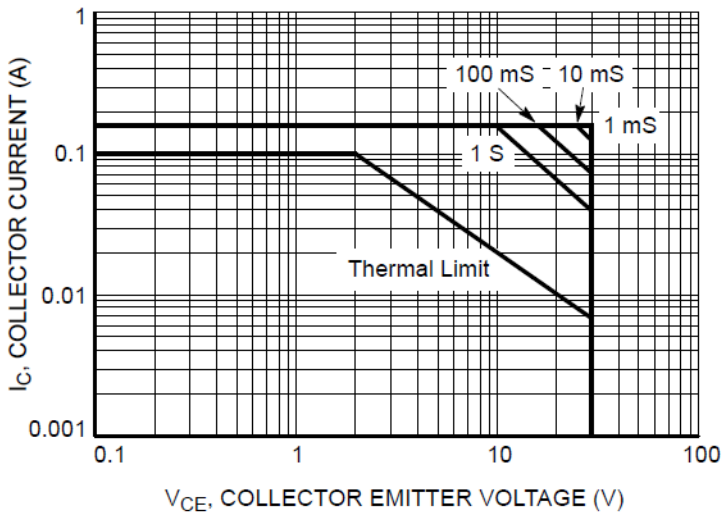
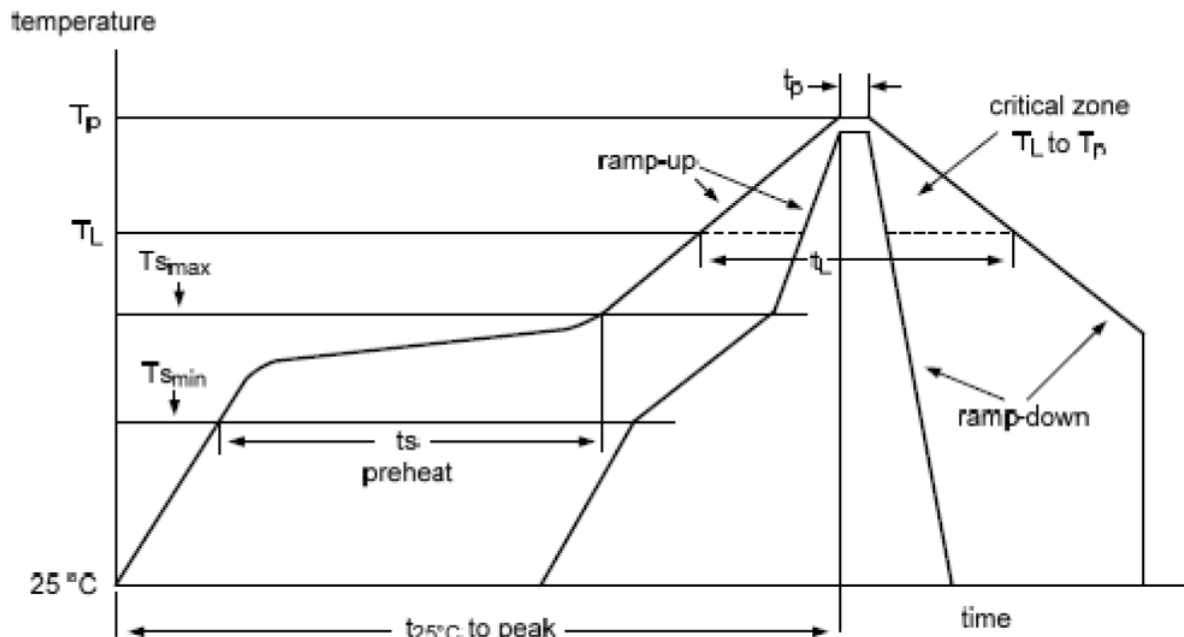


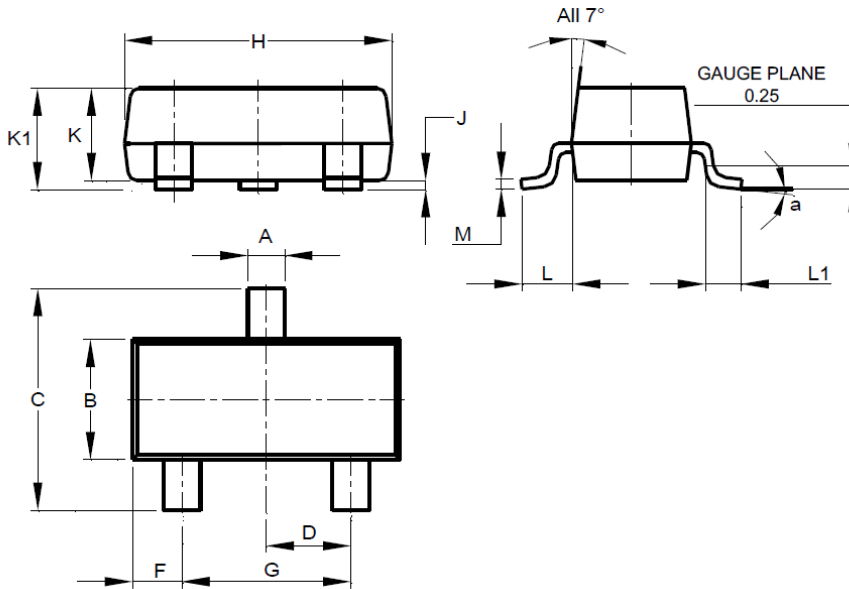
Figure 39. Safe Operating Area for BC848A/B/C

8. Soldering Parameters

| Profile Feature | SnPb eutectic assembly | Pb-free assembly |
|---|------------------------|-------------------|
| Average ramp-up rate (T _{smax} to T _p) | 3 °C/s maximum | 3 °C/s maximum |
| Preheat | | |
| Temperature minimum (T _{smin}) | 100 °C | 150 °C |
| Temperature maximum (T _{smax}) | 150 °C | 200 °C |
| Time (t _{smin} to t _{smax}) | 60 s to 120 s | 60 s to 180 s |
| Time maintained above | | |
| Temperature (T _L) | 183 °C | 217 °C |
| Time (t _L) | 60 s to 150 s | 60 s to 150 s |
| Peak/classification temperature (T) | 235 °C | 260 °C |
| Number of allowed reflow cycles | 3 | 3 |
| Time within 5 °C of actual peak temperature (t _p) | 10 s to 30 s | 20 s to 40 s |
| Ramp-down rate | 6 °C/s maximum | 6 °C/s maximum |
| Time 25 °C to peak temperature | 6 minutes maximum | 8 minutes maximum |



9. Package Information-SOT-23

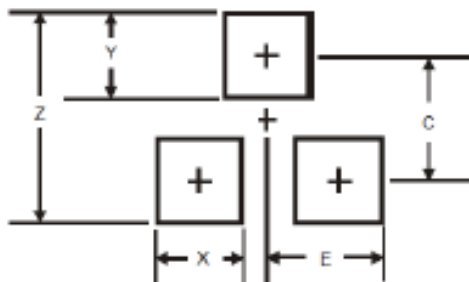


SOT-23

| Dim | Min | Max | Typ |
|-----|-------|-------|-------|
| A | 0.37 | 0.51 | 0.40 |
| B | 1.20 | 1.40 | 1.30 |
| C | 2.30 | 2.50 | 2.40 |
| D | 0.89 | 1.03 | 0.915 |
| F | 0.45 | 0.60 | 0.535 |
| G | 1.78 | 2.05 | 1.83 |
| H | 2.80 | 3.00 | 2.90 |
| J | 0.013 | 0.10 | 0.05 |
| K | 0.890 | 1.00 | 0.975 |
| K1 | 0.903 | 1.10 | 1.025 |
| L | 0.45 | 0.61 | 0.55 |
| L1 | 0.25 | 0.55 | 0.40 |
| M | 0.085 | 0.150 | 0.110 |
| a | 8°C | | |

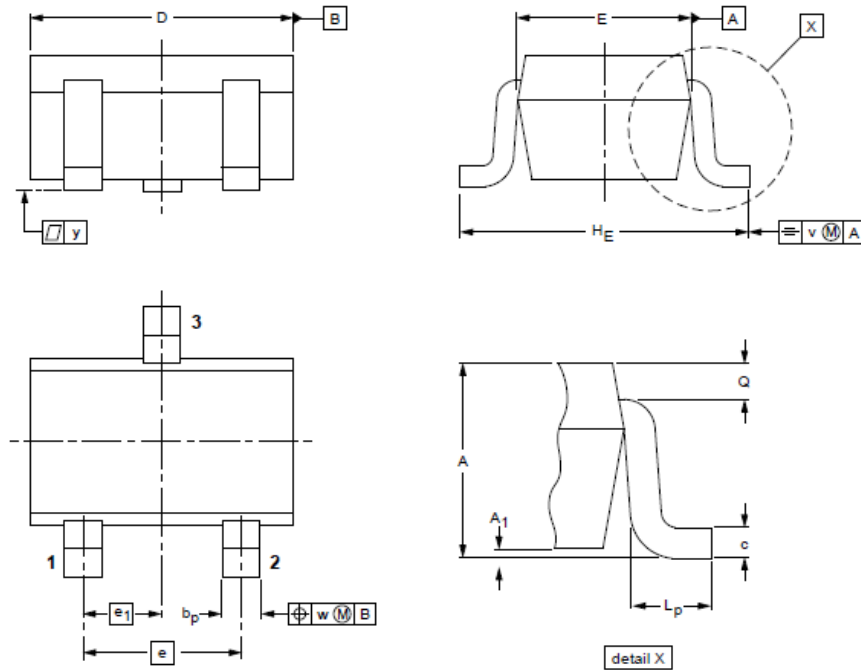
Dimension in mm

10. Suggest Pad Layout-SOT-23



| Dimension | Millimeter |
|-----------|------------|
| Z | 2.9 |
| X | 0.8 |
| Y | 0.9 |
| C | 2.0 |
| E | 1.35 |

9. Package Information-SOT-323

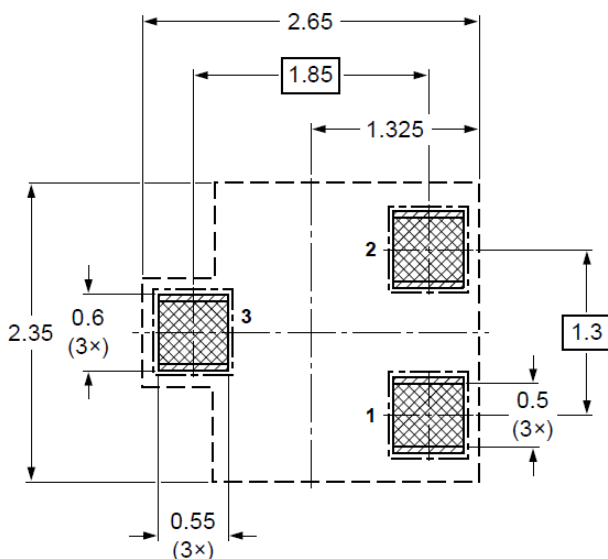


SOT-323

| Dim | Min | Max | Typ |
|-----|------|------|-----|
| A | 0.8 | 1.1 | - |
| A1 | - | 0.1 | - |
| bp | 0.3 | 0.4 | - |
| c | 0.1 | 0.25 | - |
| D | 1.8 | 2.2 | - |
| E | 1.15 | 1.35 | - |
| e | - | 1.3 | - |
| e1 | - | 0.65 | - |
| HE | 2.0 | 2.2 | - |
| Lp | 0.15 | 0.45 | - |
| Q | 0.13 | 0.23 | - |
| v | - | 0.2 | - |
| w | - | 0.2 | - |

Dimension in mm

10. Suggest Pad Layout-SOT-323



Dimension in mm

11. Ordering Information

| Part No. | Marking | Package Type | Shipping |
|----------|---------|--------------|---------------------|
| BC846A | 1A | SOT-23 | 3,000PCS/Tape @Reel |
| BC846B | 1B | | |
| BC846C | 1C | | |
| BC847A | 1E | | |
| BC847B | 1F | | |
| BC847C | 1G | | |
| BC848A | 1E | | |
| BC848B | 1F | | |
| BC848C | 1G | | |
| BC846AW | 2B | SOT-323 | |
| BC846BW | 1B | | |
| BC846CW | 3B | | |
| BC847AW | 2F | | |
| BC847BW | 1F | | |
| BC847CW | 3F | | |
| BC848AW | 2K | | |
| BC848BW | 1K | | |
| BC848CW | 3K | | |

12. History

| Version | Date | File No. | Recording | Basis |
|---------|-------------|----------|----------------------------|--------|
| A | 10-Jul-2018 | F51840C | New Create | Market |
| B | 03-Apr-2019 | | Update Company Information | System |
| 2.0 | 21-May-2021 | | Update Version | System |