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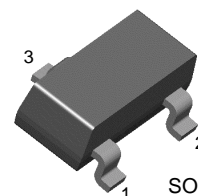
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## BCW33

### NPN General Purpose Amplifier

- This device is designed for general purpose applications at collector currents to 300mA.
- Sourced from process 07.



SOT-23  
Mark: D3  
1. Base 2. Emitter 3. Collector

### Absolute Maximum Ratings \* $T_a=25^\circ\text{C}$ unless otherwise noted

| Symbol         | Parameter  | Value      | Units            |
|----------------|--|------------|------------------|
| $V_{CEO}$      | Collector-Emitter Voltage                        | 32         | V                |
| $V_{CBO}$      | Collector-Base Voltage                           | 32         | V                |
| $V_{EBO}$      | Emitter-Base Voltage                             | 5.0        | V                |
| $I_C$          | Collector current (DC)                           | 500        | mA               |
| $T_J, T_{stg}$ | Operating and Storage Junction Temperature Range | -55 ~ +150 | $^\circ\text{C}$ |

\* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

#### NOTES:

- These ratings are based on a maximum junction temperature of 150 degrees C.
- These are state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

### Electrical Characteristics $T_a=25^\circ\text{C}$ unless otherwise noted

| Symbol                              | Parameter                            | Test Condition   | Min. | Typ. | Max.      | Units               |
|-------------------------------------|--------------------------------------|--|------|------|-----------|---------------------|
| <b>Off Characteristics</b>          |                                      |  |      |      |           |                     |
| $V_{(BR)CBO}$                       | Collector-Base Breakdown Voltage     | $I_C = 2.0\text{mA}, I_B = 0$  | 32   |      |           | V                   |
| $V_{(BR)CEO}$                       | Collector-Emitter Breakdown Voltage  | $I_C = 10\mu\text{A}, I_B = 0$   | 32   |      |           | V                   |
| $V_{(BR)EBO}$                       | Emitter-Base Breakdown Voltage       | $I_C = 10\mu\text{A}, I_C = 0$   | 5.0  |      |           | V                   |
| $I_{CBO}$                           | Collector Cutoff Current             | $V_{CB} = 32\text{V}, I_E = 0, T_A = 100^\circ\text{C}$<br>$V_{CB} = 32\text{V}, I_E = 0, T_A = 100^\circ\text{C}$ |      |      | 100<br>10 | nA<br>$\mu\text{A}$ |
| <b>On Characteristics</b>           |                                      |  |      |      |           |                     |
| $h_{FE}$                            | DC Current Gain                      | $I_C = 2.0\text{mA}, V_{CE} = 5.0\text{V}$   | 420  |      | 800       |                     |
| $V_{CE(sat)}$                       | Collector-Emitter Saturation Voltage | $I_C = 10\text{mA}, I_B = 0.5\text{mA}$  |      |      | 0.25      | V                   |
| $V_{BE(on)}$                        | Base-Emitter On Voltage              | $I_C = 2.0\text{mA}, V_{CE} = 5.0\text{V}$   | 0.55 |      | 0.7       | V                   |
| <b>Small Signal Characteristics</b> |                                      |  |      |      |           |                     |
| $f_T$                               | Current Gain Bandwidth Product       | $I_C = 2.0\text{mA}, V_{CE} = 5.0\text{V}$<br>$f = 35\text{MHz}$   | 200  |      |           |                     |
| $C_{obo}$                           | Output Capacitance                   | $V_{CB} = 10\text{V}, I_E = 0, f = 1.0\text{MHz}$  |      |      | 4.0       | pF                  |
| NF                                  | Noise Figure                         | $I_C = 0.2\text{mA}, V_{CE} = 5.0\text{V}$<br>$R_S = 2.0\text{k}\Omega, f = 1.0\text{kHz}$<br>$B_W = 200\text{Hz}$ |      |      | 10        | dB                  |

### Thermal Characteristics $T_a=25^\circ\text{C}$ unless otherwise noted

| Symbol          | Parameter   | Max.       | Units                      |
|-----------------|---|------------|----------------------------|
| $P_D$           | Total Device Dissipation<br>Derate above $25^\circ\text{C}$ | 350<br>2.8 | mW<br>mW/ $^\circ\text{C}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient                     | 357        | $^\circ\text{C}/\text{W}$  |

Device mounted on FR-4PCB 40mm x 40mm x 1.5mm

## Typical Characteristics

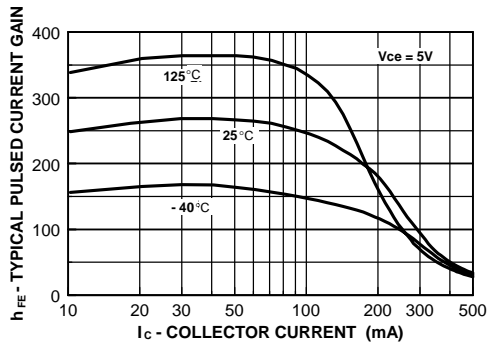


Figure 1. Typical Pulsed Current Gain vs Collector Current

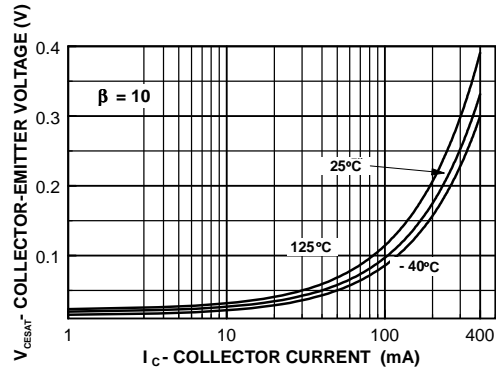


Figure 2. Collector-Emitter Saturation Voltage vs Collector Current

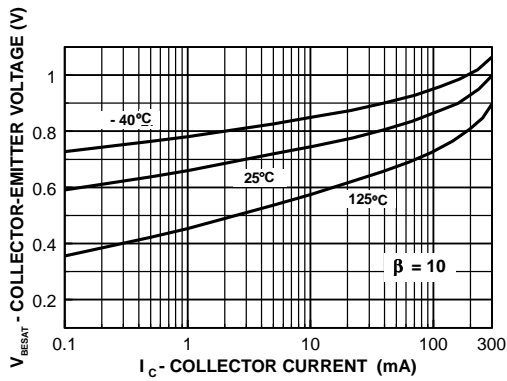


Figure 3. Base-Emitter Saturation Voltage vs Collector Current

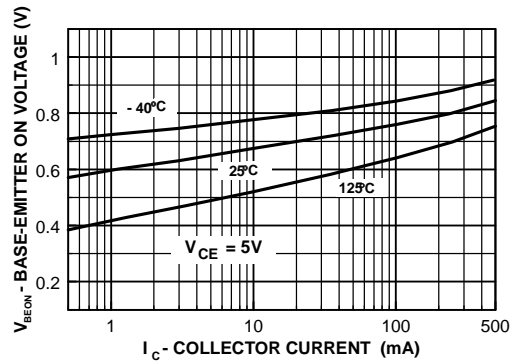


Figure 4. Base-Emitter On Voltage vs Collector Current

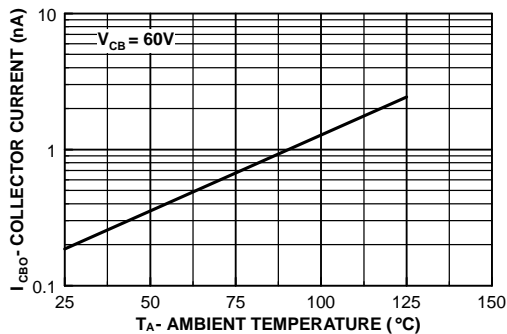


Figure 5. Collector-Cutoff Current vs Ambient Temperature

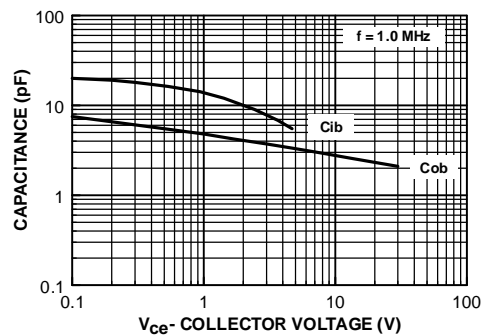
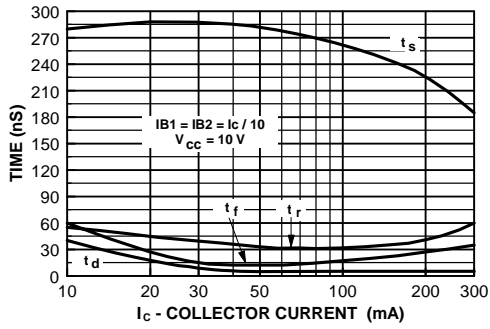
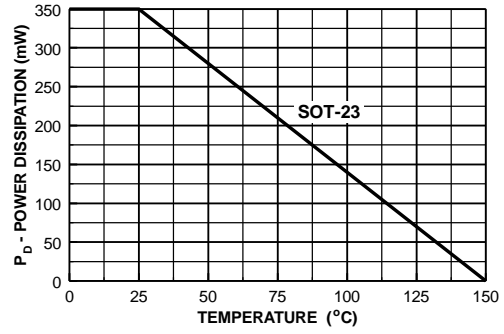


Figure 6. Input and Output Capacitance vs Reverse Voltage

**Typical Characteristics** (Continued)



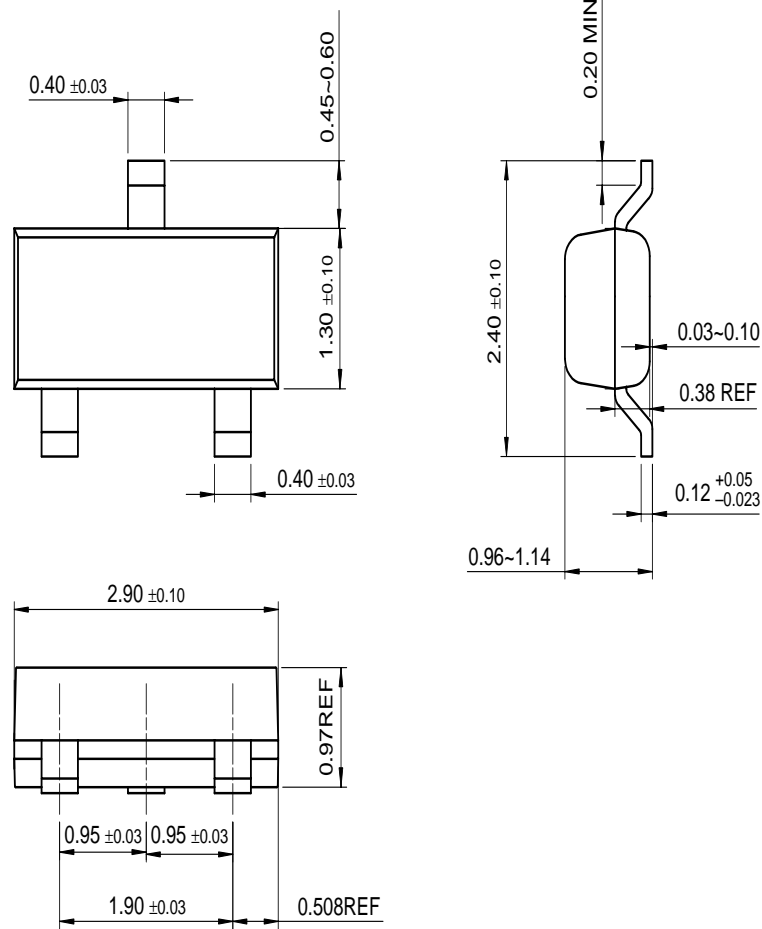
**Figure 7. Switching Times vs Collector Current**



**Figure 8. Power Dissipation vs Ambient Temperature**

**Package Dimensions**

**SOT-23**



Dimensions in Millimeters

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| Bottomless™                          | FAST®               | LittleFET™         | Power247™           | SuperSOT™-3     |
| CoolFET™                             | FASTr™              | MicroFET™          | PowerTrench®        | SuperSOT™-6     |
| CROSSVOLT™                           | FRFET™              | MicroPak™          | QFET™               | SuperSOT™-8     |
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