

# NPN General Purpose Amplifier

## BCW71

### Description

This device is designed for general purpose amplifier applications at collector currents to 300 mA. Sourced from Process 10.

### ABSOLUTE MAXIMUM RATINGS

( $T_A = 25^\circ\text{C}$  unless otherwise noted.) (Notes 1, 2)

| Symbol         | Parameter  | Value       | Unit |
|----------------|--|-------------|------|
| $V_{CEO}$      | Collector-Emitter Voltage                        | 45          | V    |
| $V_{CBO}$      | Collector-Base Voltage                           | 50          | V    |
| $V_{EBO}$      | Emitter-Base Voltage                             | 5.0         | V    |
| $I_C$          | Collector Current – Continuous                   | 500         | mA   |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range | -55 to +150 | °C   |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

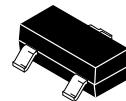
1. These ratings are based on a maximum junction temperature of  $150^\circ\text{C}$ .
2. These are steady-state limits. **onsemi** should be consulted on applications involving pulsed or low-duty-cycle operations.

### THERMAL CHARACTERISTICS

( $T_A = 25^\circ\text{C}$  unless otherwise noted.) (Note 3)

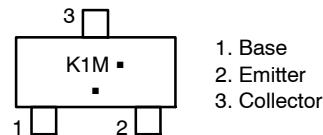
| Symbol          | Parameter                               | Max | Unit  |
|-----------------|---|-----|-------|
| $P_D$           | Total Device Dissipation                | 350 | mW    |
|                 | Derate Above $25^\circ\text{C}$         | 2.8 | mW/°C |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 357 | °C/W  |

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



SOT-23  
CASE 318

### MARKING DIAGRAM



1. Base
2. Emitter
3. Collector

K1 = Specific Device Code

M = Date Code

▪ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

| Device | Package                             | Shipping               |
|--------|-------------------------------------|------------------------|
| BCW71  | SOT-23<br>(Pb-Free,<br>Halide Free) | 3,000 /<br>Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

# BCW71

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

| Symbol                      | Parameter                           | Test Conditions   | Min    | Typ    | Max       | Unit          |
|-----------------------------|-------------------------------------|---|--------|--------|-----------|---------------|
| <b>OFF CHARACTERISTICS</b>  |                                     |   |        |        |           |               |
| $V_{(\text{BR})\text{CEO}}$ | Collector-Emitter Breakdown Voltage | $I_C = 1.0 \text{ mA}, I_B = 0$   | 45     | –      | –         | V             |
| $V_{(\text{BR})\text{CBO}}$ | Collector-Base Breakdown Voltage    | $I_C = 10 \mu\text{A}, I_E = 0$   | 50     | –      | –         | V             |
| $V_{(\text{BR})\text{EBO}}$ | Emitter-Base Breakdown Voltage      | $I_E = 10 \mu\text{A}, I_C = 0$   | 5.0    | –      | –         | V             |
| $I_{\text{CBO}}$            | Collector Cut-Off Current           | $V_{\text{CB}} = 20 \text{ V}, I_E = 0$<br>$V_{\text{CB}} = 20 \text{ V}, I_E = 0, T_A = 100^\circ\text{C}$ | –<br>– | –<br>– | 100<br>10 | $\mu\text{A}$ |

## ON CHARACTERISTICS

|                             |                                      |   |     |      |      |   |
|-----------------------------|--------------------------------------|---|-----|------|------|---|
| $h_{\text{FE}}$             | DC Current Gain                      | $I_C = 2.0 \text{ mA}, V_{\text{CE}} = 5.0 \text{ V}$ | 110 | –    | 220  |   |
| $V_{\text{CE}(\text{sat})}$ | Collector-Emitter Saturation Voltage | $I_C = 10 \text{ mA}, I_B = 0.5 \text{ mA}$           | –   | –    | 0.25 | V |
| $V_{\text{BE}(\text{sat})}$ | Base-Emitter Saturation Voltage      | $I_C = 50 \text{ mA}, I_B = 2.5 \text{ mA}$           | –   | 0.85 | –    | V |
| $V_{\text{BE}(\text{on})}$  | Base-Emitter On Voltage              | $I_C = 2.0 \text{ mA}, V_{\text{CE}} = 5.0 \text{ V}$ | 0.6 | –    | 0.75 | V |

## SMALL SIGNAL CHARACTERISTICS

|                  |                                  |   |   |     |     |     |
|------------------|----------------------------------|---|---|-----|-----|-----|
| $f_T$            | Current Gain – Bandwidth Product | $I_C = 10 \text{ mA}, V_{\text{CE}} = 5.0 \text{ V}, f = 35 \text{ MHz}$  | – | 330 | –   | MHz |
| $C_{\text{obo}}$ | Output Capacitance               | $V_{\text{CE}} = 10 \text{ V}, I_E = 0, f = 1.0 \text{ MHz}$  | – | –   | 4.0 | pF  |
| $C_{\text{ibo}}$ | Input Capacitance                | $V_{\text{EB}} = 0.5 \text{ V}, I_C = 0, f = 1.0 \text{ MHz}$   | – | 9.0 | –   | pF  |
| NF               | Noise Figure                     | $I_C = 0.2 \text{ mA}, V_{\text{CE}} = 5.0 \text{ V}, R_S = 2.0 \text{ k}\Omega, f = 1.0 \text{ kHz}, \text{BW} = 200 \text{ Hz}$ | – | –   | 10  | dB  |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

## TYPICAL CHARACTERISTICS

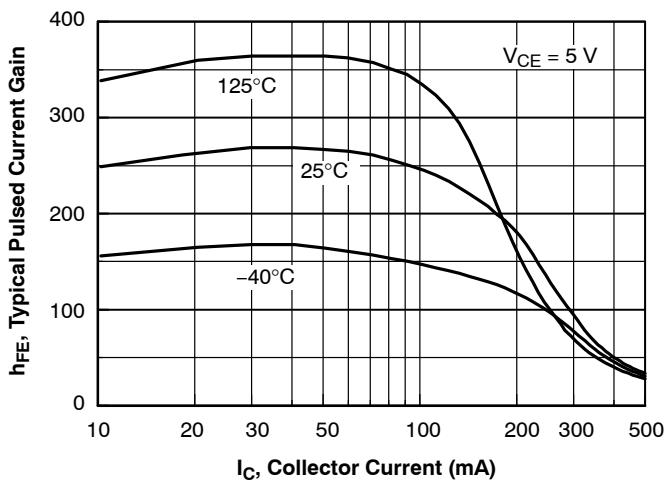


Figure 1. Typical Pulsed Current Gain vs.  
Collector Current

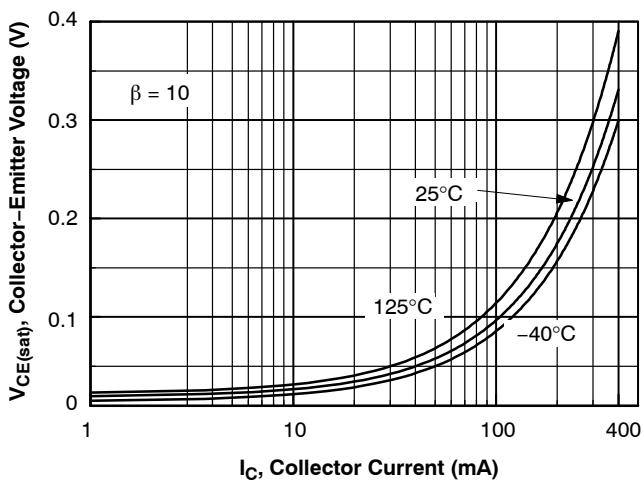


Figure 2. Collector-Emitter Saturation  
Voltage vs. Collector Current

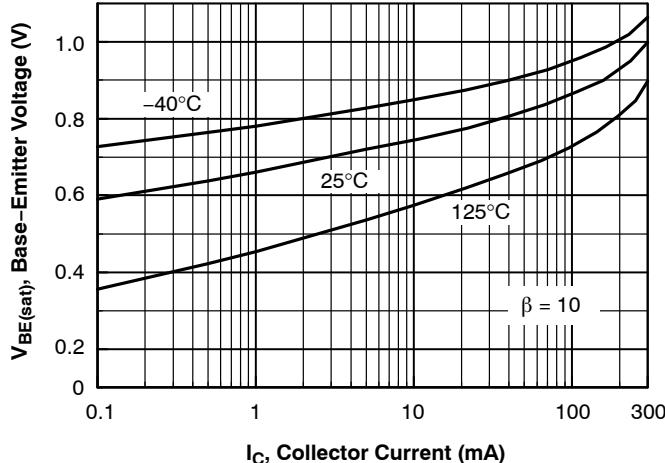


Figure 3. Base-Emitter Saturation Voltage vs.  
Collector Current

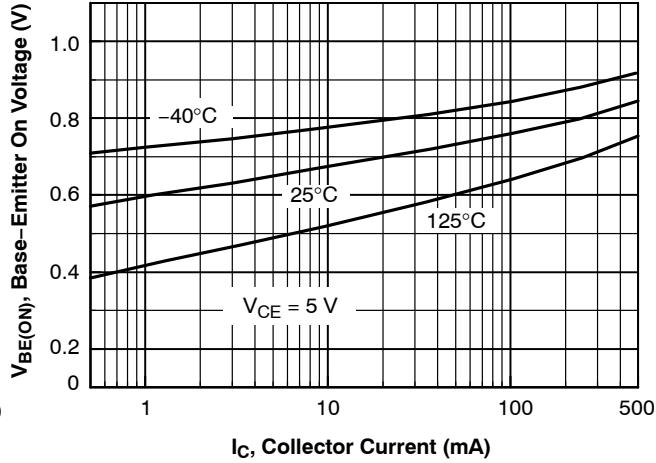


Figure 4. Base Emitter On Voltage vs.  
Collector Current

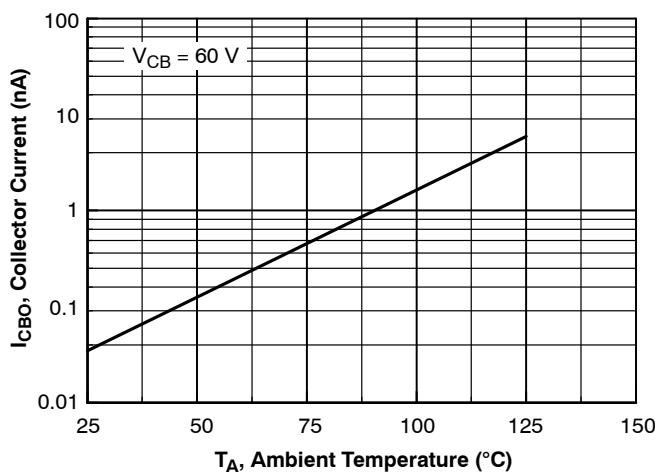


Figure 5. Collector Cut-Off Current vs.  
Ambient Temperature

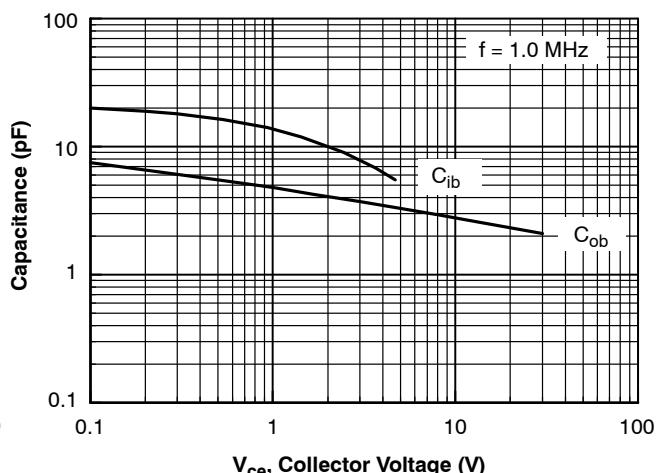
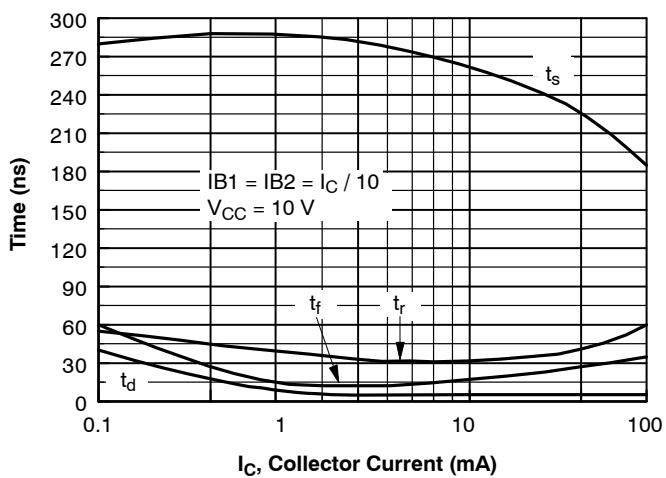
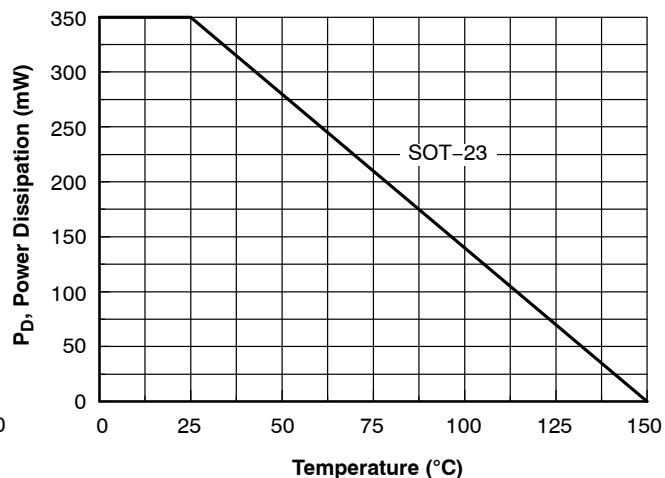


Figure 6. Input and Output Capacitance vs.  
Reverse Voltage

**TYPICAL CHARACTERISTICS** (Continued)**Figure 7. Switching Times vs. Collector Current****Figure 8. Power Dissipation vs. Ambient Temperature**

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