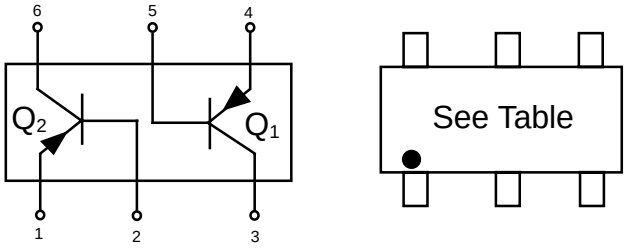
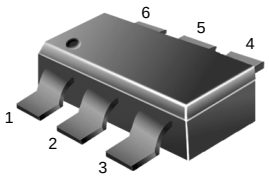
# Dual General Purpose Transistors

## PNP Duals

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.

**BC856BDW1T1**
**BC857BDW1T1**
**BC857CDW1T1**
**BC858BDW1T1**
**BC858CDW1T1**




SOT–363/SC–88
CASE 419B STYLE 1

### MAXIMUM RATINGS

| Rating | Symbol | BC856 | BC857 | BC858 | 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 –Continuous | $I_C$ | –100 | –100 | –100 | mAdc |

### THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Total Device Dissipation | $P_D$ | 380 | mW |
| Per Device | | 250 | mW |
| FR– 5 Board, (1) $T_A$ = 25°C | | | |
| Derate above 25°C | | 3.0 | mW/°C |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 328 | °C/W |
| Junction and Storage Temperature | $T_J$ , $T_{stg}$ | –55 to +150 | °C |

1. FR–5 = 1.0 x 0.75 x 0.062 in.

### ORDERING INFORMATION

| Device | Package | Shipping |
|---|---|---|
| BC856BDW1T1 | SOT–363 | 3000 Units/Reel |
| BC857BDW1T1 | SOT–363 | 3000 Units/Reel |
| BC857CDW1T1 | SOT–363 | 3000 Units/Reel |
| BC858BDW1T1 | SOT–363 | 3000 Units/Reel |
| BC858CDW1T1 | SOT–363 | 3000 Units/Reel |

# BC856BDW1T1, BC857BDW1T1, BC857CDW1T1, BC858BDW1T1, BC858CDW1T1

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted)

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Collector–Emitter Breakdown Voltage | | $V_{(BR)CEO}$ | | | | V |
| ($I_C$ = –10 mA) | BC856 Series | | –65 | — | — | |
| | BC857 Series | | –45 | — | — | |
| | BC858 Series | | –30 | — | — | |
| Collector–Emitter Breakdown Voltage | | $V_{(BR)CES}$ | | | | V |
| ($I_C$ = –10 µA, $V_{EB}$ = 0) | BC856 Series | | –80 | — | — | |
| | BC857 Series | | –50 | — | — | |
| | BC858 Series | | –30 | — | — | |
| Collector–Base Breakdown Voltage | | $V_{(BR)CBO}$ | | | | V |
| ($I_C$ = –10 µA) | BC856 Series | | –80 | — | — | |
| | BC857 Series | | –50 | — | — | |
| | BC858 Series | | –30 | — | — | |
| Emitter–Base Breakdown Voltage | | $V_{(BR)EBO}$ | | | | V |
| ($I_E$ = –1.0 µA) | BC856 Series | | –5.0 | — | — | |
| | BC857 Series | | –5.0 | — | — | |
| | BC858 Series | | –5.0 | — | — | |
| Collector Cutoff Current | ($V_{CB}$ = –30 V) | $I_{CBO}$ | — | — | –15 | nA |
| | ($V_{CB}$ = –30 V, $T_A$ = 150°C) | | — | — | –4.0 | µA |
| **ON CHARACTERISTICS** | | | | | | |
| DC Current Gain | | $h_{FE}$ | | | | — |
| ($I_C$ = –10 µA, $V_{CE}$ = –5.0 V) | BC856B, BC857B, BC858B | | — | 150 | — | |
| | BC857C, BC858C | | — | 270 | — | |
| ($I_C$ = –2.0 mA, $V_{CE}$ =– 5.0 V) | BC856B, BC857B, BC858B | | 220 | 290 | 475 | |
| | BC857C, BC858C | | 420 | 520 | 800 | |
| Collector–Emitter Saturation Voltage ($I_C$ = -10 mA, $I_B$ = -0.5 mA) | | $V_{CE(sat)}$ | — | — | –0.3 | V |
| ($I_C$ = -100 mA, $I_B$ = -5.0 mA) | | | — | — | –0.65 | |
| Base–Emitter Saturation Voltage ($I_C$ = –10 mA, $I_B$ = –0.5 mA) | | $V_{BE(sat)}$ | — | –0.7 | — | V |
| ($I_C$ = –100 mA, $I_B$ = –5.0 mA) | | | — | –0.9 | — | |
| Base–Emitter Voltage ($I_C$ = –2.0 mA, $V_{CE}$ = –5.0 V) | | $V_{BE(on)}$ | –0.6 | — | –0.75 | V |
| ($I_C$ = –10 mA, $V_{CE}$ = –5.0 V) | | | — | — | –0.82 | |
| **SMALL–SIGNAL CHARACTERISTICS** | | | | | | |
| Current–Gain — Bandwidth Product | | $f_T$ | 100 | — | — | MHz |
| ($I_C$ = –10 mA, $V_{CE}$ = –5.0 Vdc, f = 100 MHz) | | | | | | |
| Output Capacitance ($V_{CB}$ = –10 V, f = 1.0 MHz) | | $C_{obo}$ | — | — | 4.5 | pF |
| Noise Figure ($I_C$ = –0.2 mA, | | NF | | | | dB |
| $V_{CE}$ = –5.0 V $_{dc}$, $R_S$ = 2.0 kΩ, f = 1.0 kHz, BW = 200 Hz) | | | — | — | 10 | |

**BC856BDW1T1, BC857BDW1T1, BC857CDW1T1**
**BC858BDW1T1, BC858CDW1T1**

## TYPICAL PNP CHARACTERISTICS — BC856

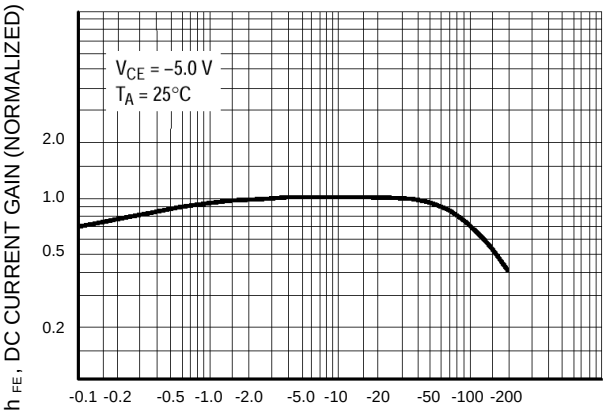



**Figure 1. DC Current Gain**

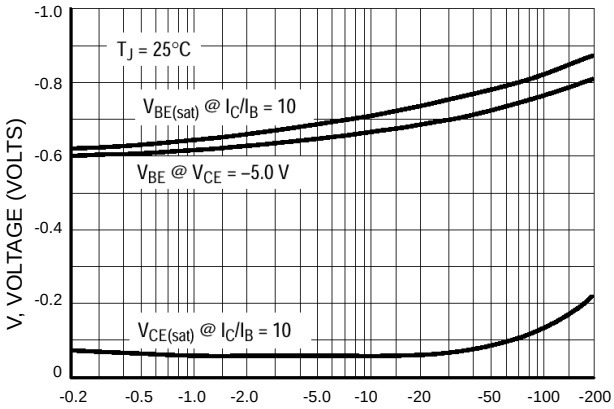



**Figure 2. “On” Voltage**

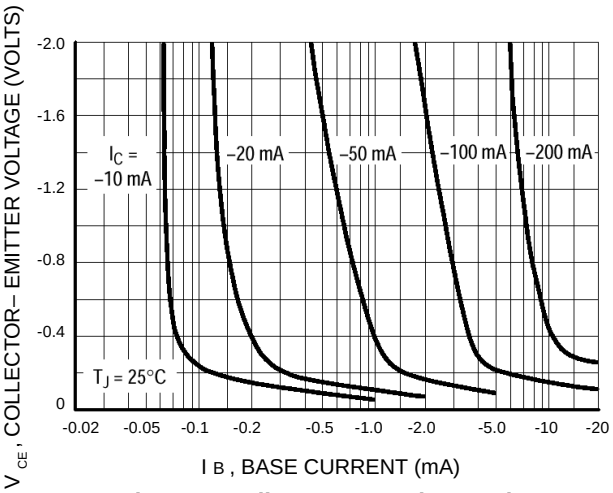



**Figure 3. Collector Saturation Region**

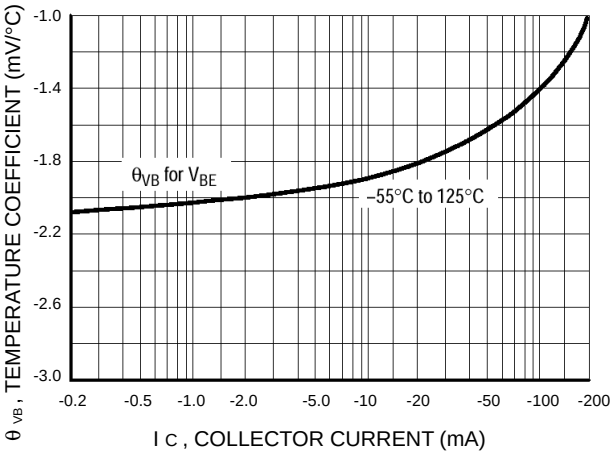



**Figure 4. Base–Emitter Temperature Coefficient**

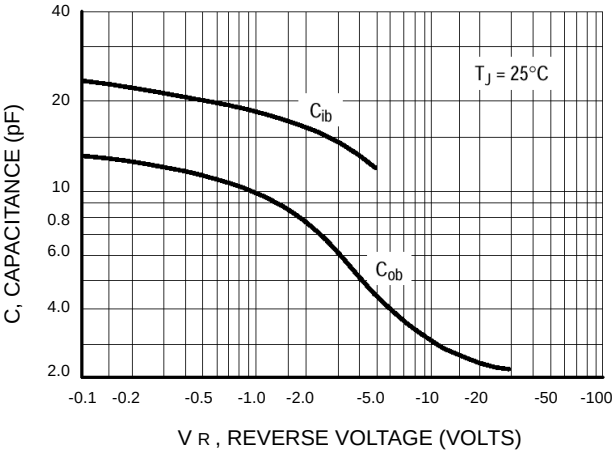



**Figure 5. Capacitance**

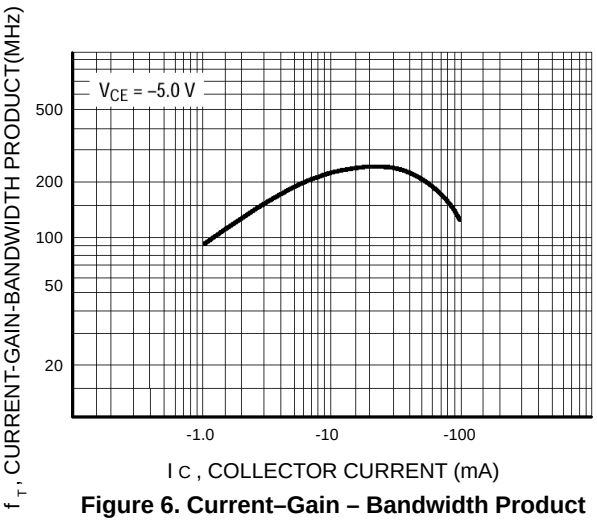



**Figure 6. Current–Gain – Bandwidth Product**

**BC856BDW1T1, BC857BDW1T1, BC857CDW1T1**
**BC858BDW1T1, BC858CDW1T1**

## TYPICAL PNP CHARACTERISTICS — BC857/BC858

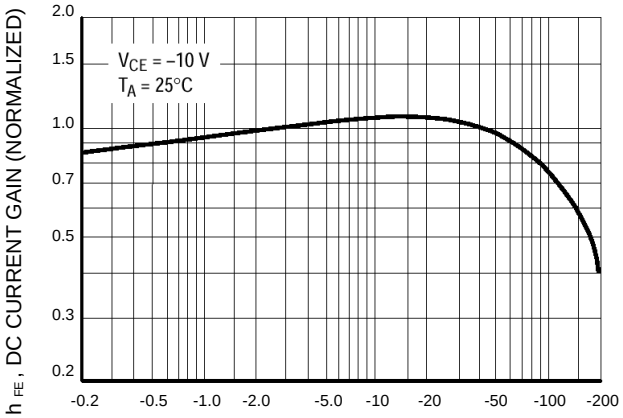



**Figure 7. Normalized DC Current Gain**

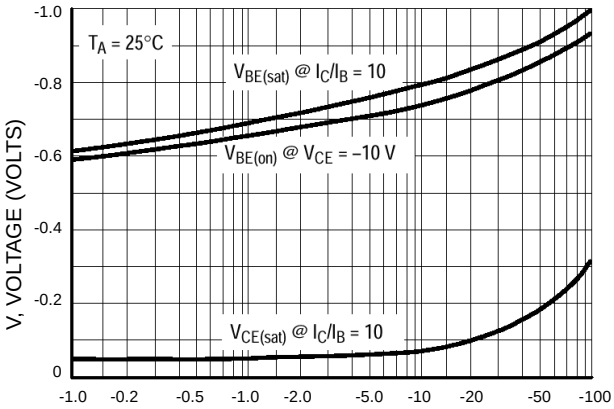



**Figure 8. “Saturation” and “On” Voltages**

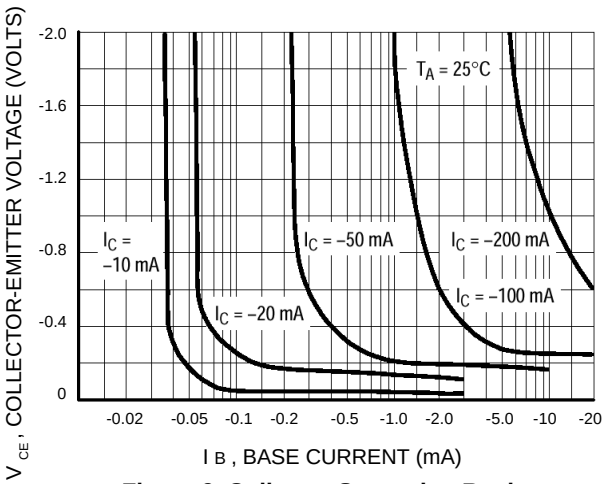



**Figure 9. Collector Saturation Region**

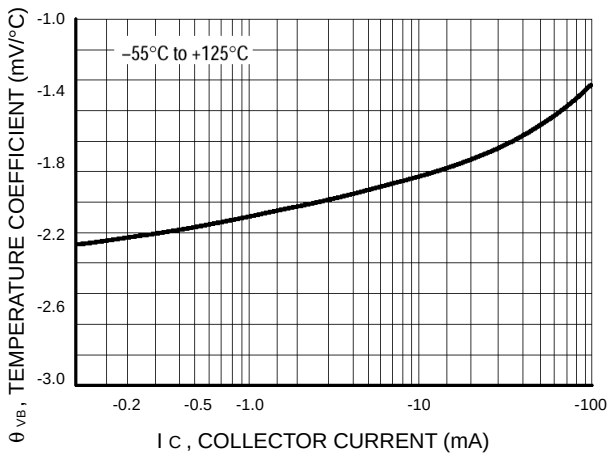



**Figure 10. Base–Emitter Temperature Coefficient**

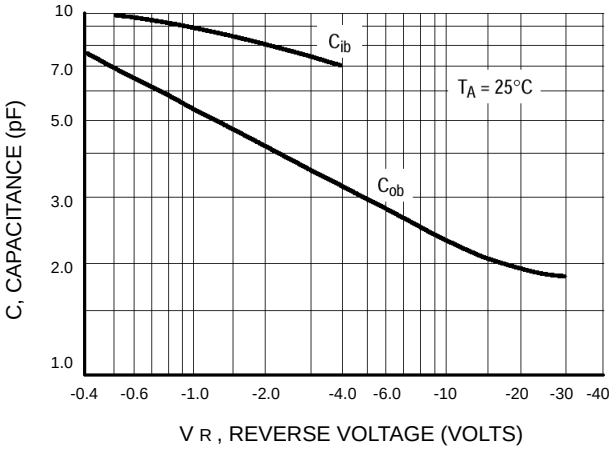



**Figure 11. Capacitance**

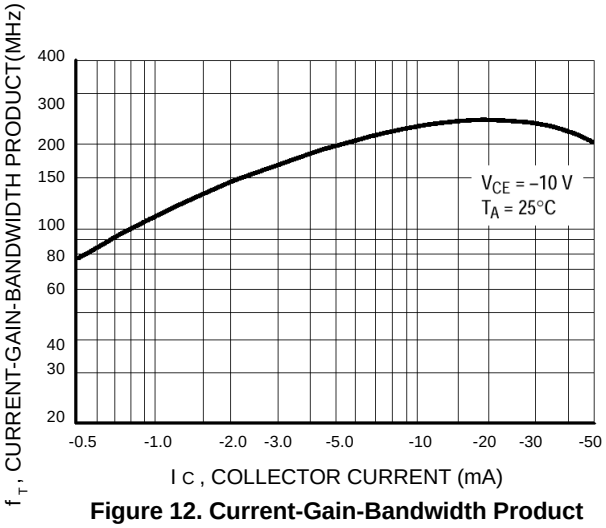



**Figure 12. Current-Gain-Bandwidth Product**

## BC846BDW1T1, BC847BDW1T1, BC847CDW1T1, BC848BDW1T1, BC848CDW1T1

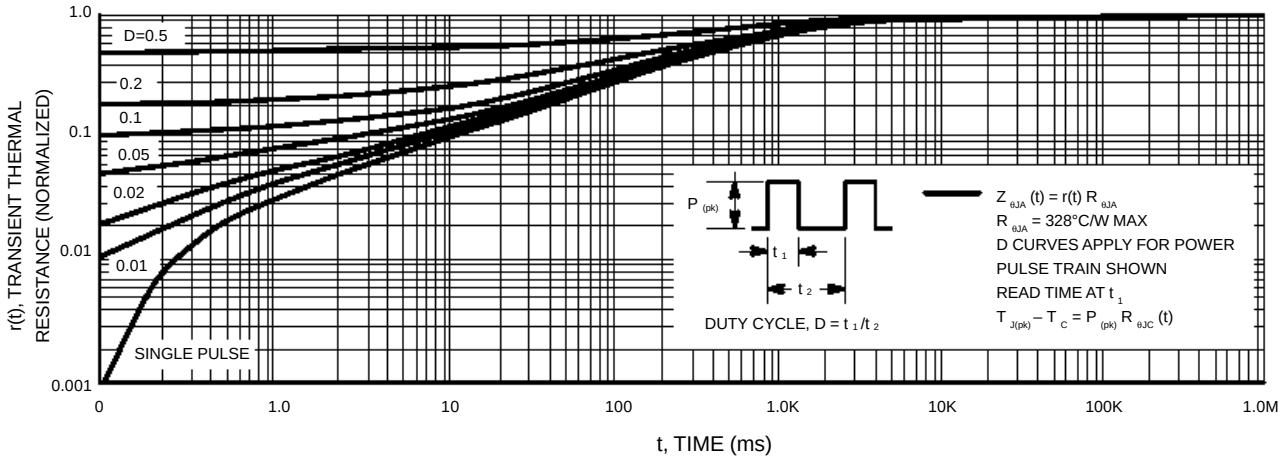



**Figure 13. Thermal Response**

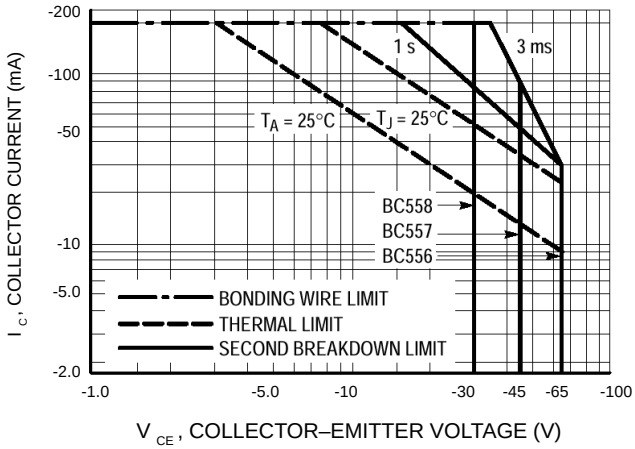



**Figure 14. Active Region Safe Operating Area**

The safe operating area curves indicate $I_C$–$V_{CE}$ limits of thetransistor that must be observed for reliable operation. Collector load lines for specific circuits must fall below the limits indicated by the applicable curve.

The data of Figure 14 is based upon $T_{J(pk)}$ = 150°C; $T_C$ or $T_A$ is variable depending upon conditions. Pulse curves are valid for duty cycles to 10% provided $T_{J(pk)} \leq$ 150°C. $T_J$ (pk) may be calculated from the data in Figure 13. At high case or ambient temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by the secondary breakdown.