



# BC857AT, BT, CT

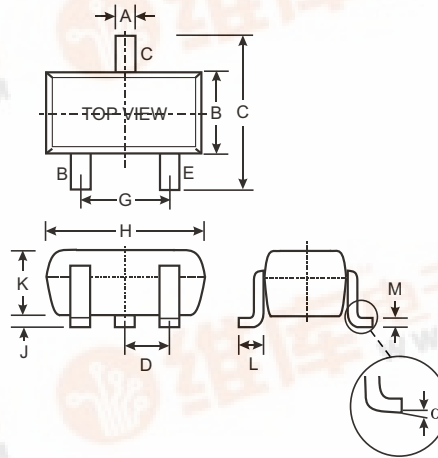
## PNP SMALL SIGNAL SURFACE MOUNT TRANSISTOR

### Features

- Epitaxial Die Construction
- Complementary NPN Types Available (BC847AT, BT, CT)
- Ultra-Small Surface Mount Package
- Lead Free/RoHS Compliant (Note 2)
- Qualified to AEC-Q101 Standards for High Reliability

### Mechanical Data

- Case: SOT-523
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020C
- Terminals: Solderable per MIL-STD-202, Method 208
- Lead Free Plating (Matte Tin Finish annealed over Alloy 42 leadframe).
- Terminal Connections: See Diagram
- Marking Codes (See Table Below & Diagrams on Page 2)
- Ordering & Date Code Information: See Page 2
- Weight: 0.002 grams (approximate)



| SOT-523              |      |      |      |
|----------------------|------|------|------|
| Dim                  | Min  | Max  | Typ  |
| A                    | 0.15 | 0.30 | 0.22 |
| B                    | 0.75 | 0.85 | 0.80 |
| C                    | 1.45 | 1.75 | 1.60 |
| D                    |      |      | 0.50 |
| G                    | 0.90 | 1.10 | 1.00 |
| H                    | 1.50 | 1.70 | 1.60 |
| J                    | 0.00 | 0.10 | 0.05 |
| K                    | 0.60 | 0.80 | 0.75 |
| L                    | 0.10 | 0.30 | 0.22 |
| M                    | 0.10 | 0.20 | 0.12 |
| N                    | 0.45 | 0.65 | 0.50 |
|                      | 0    | 8    |      |
| All Dimensions in mm |      |      |      |

| Type    | Marking |
|---------|---------|
| BC857AT | 3V      |
| BC857BT | 3W      |
| BC857CT | 3G      |

### Maximum Ratings @ $T_A = 25^\circ\text{C}$ unless otherwise specified

| Characteristic                                   | Symbol         | Value       | Unit               |
|--------------------------------------------------|----------------|-------------|--------------------|
| Collector-Base Voltage                           | $V_{CBO}$      | -50         | V                  |
| Collector-Emitter Voltage                        | $V_{CEO}$      | -45         | V                  |
| Emitter-Base Voltage                             | $V_{EBO}$      | -5.0        | V                  |
| Collector Current                                | $I_C$          | -100        | mA                 |
| Power Dissipation (Note 1)                       | $P_d$          | 150         | mW                 |
| Thermal Resistance, Junction to Ambient (Note 1) | $R_{JA}$       | 833         | $^\circ\text{C/W}$ |
| Operating and Storage Temperature Range          | $T_j, T_{STG}$ | -55 to +150 | $^\circ\text{C}$   |

- Notes:
- Device mounted on FR-4 PCB, 1 inch x 0.85 inch x 0.062 inch; pad layout as shown on Diodes Inc. suggested pad layout document AP02001, which can be found on our website at <http://www.diodes.com/datasheets/ap02001.pdf>.
  - No purposefully added lead.



**Electrical Characteristics** @  $T_A = 25^\circ\text{C}$  unless otherwise specified

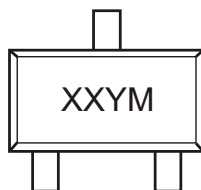
| Characteristic                                | Symbol                               | Min               | Typ             | Max               | Unit                | Test Condition                                                                                                          |
|-----------------------------------------------|--------------------------------------|-------------------|-----------------|-------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------|
| Collector-Base Breakdown Voltage (Note 3)     | $V_{(BR)CBO}$                        | -50               | —               | —                 | V                   | $I_C = 10\text{ A}, I_B = 0$                                                                                            |
| Collector-Emitter Breakdown Voltage (Note 3)  | $V_{(BR)CEO}$                        | -45               | —               | —                 | V                   | $I_C = 10\text{mA}, I_B = 0$                                                                                            |
| Emitter-Base Breakdown Voltage (Note 3)       | $V_{(BR)EBO}$                        | -5                | —               | —                 | V                   | $I_E = 1\text{ A}, I_C = 0$                                                                                             |
| DC Current Gain (Note 3)                      | Current Gain A<br>B<br>C<br>$h_{FE}$ | 125<br>220<br>420 | —<br>290<br>520 | 250<br>475<br>800 | —                   | $V_{CE} = -5.0\text{V}, I_C = -2.0\text{mA}$                                                                            |
| Collector-Emitter Saturation Voltage (Note 3) | $V_{CE(SAT)}$                        | —                 | —               | -300<br>-650      | mV                  | $I_C = -10\text{mA}, I_B = -0.5\text{mA}$<br>$I_C = -100\text{mA}, I_B = -5.0\text{mA}$                                 |
| Base-Emitter Saturation Voltage (Note 3)      | $V_{BE(SAT)}$                        | —                 | -700<br>-900    | —                 | mV                  | $I_C = -10\text{mA}, I_B = -0.5\text{mA}$<br>$I_C = -100\text{mA}, I_B = -5.0\text{mA}$                                 |
| Base-Emitter Voltage (Note 3)                 | $V_{BE(ON)}$                         | -600<br>—         | —               | -750<br>-820      | mV                  | $V_{CE} = -5.0\text{V}, I_C = -2.0\text{mA}$<br>$V_{CE} = -5.0\text{V}, I_C = -10\text{mA}$                             |
| Collector-Cutoff Current (Note 3)             | $I_{CBO}$                            | —                 | —               | -15<br>-4.0       | NA<br>$\mu\text{A}$ | $V_{CB} = -30\text{V}$<br>$V_{CB} = -30\text{V}, T_A = 150^\circ\text{C}$                                               |
| Gain Bandwidth Product                        | $f_T$                                | 100               | —               | —                 | MHz                 | $V_{CE} = -5.0\text{V}, I_C = -10\text{mA},$<br>$f = 100\text{MHz}$                                                     |
| Output Capacitance                            | $C_{OB}$                             | —                 | —               | 4.5               | pF                  | $V_{CB} = -10\text{V}, f = 1.0\text{MHz}$                                                                               |
| Noise Figure                                  | NF                                   | —                 | —               | 10                | dB                  | $I_C = -0.2\text{mA}, V_{CE} = -5.0\text{Vdc},$<br>$R_S = 2.0\text{K}\Omega, f = 1.0\text{KHz},$<br>$BW = 200\text{Hz}$ |

Notes: 3. Short duration pulse test used to minimize self-heating effect.

**Ordering Information** (Note 4)

| Device      | Packaging | Shipping         |
|-------------|-----------|------------------|
| BC857AT-7-F | SOT-523   | 3000/Tape & Reel |
| BC857BT-7-F | SOT-523   | 3000/Tape & Reel |
| BC857CT-7-F | SOT-523   | 3000/Tape & Reel |

 Notes: 4. For Packaging Details: go to our website at <http://www.diodes.com/datasheets/ap02007.pdf>.

**Marking Information**


XX = Product Type Marking Code (See Page 1), e.g. 3V = BC857AT  
 YM = Date Code Marking  
 Y = Year (ex: N = 2002)  
 M = Month (ex: 9 = September)

Date Code Key

| Year | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Code | J    | K    | L    | M    | N    | P    | R    | S    | T    | U    | V    | W    | X    | Y    | Z    |

| Month | Jan | Feb | March | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Code  | 1   | 2   | 3     | 4   | 5   | 6   | 7   | 8   | 9   | O   | N   | D   |

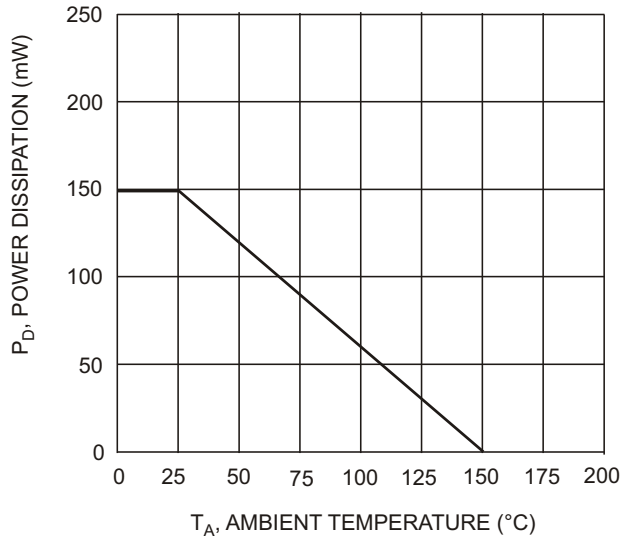


Fig. 1, Max Power Dissipation vs Ambient Temperature

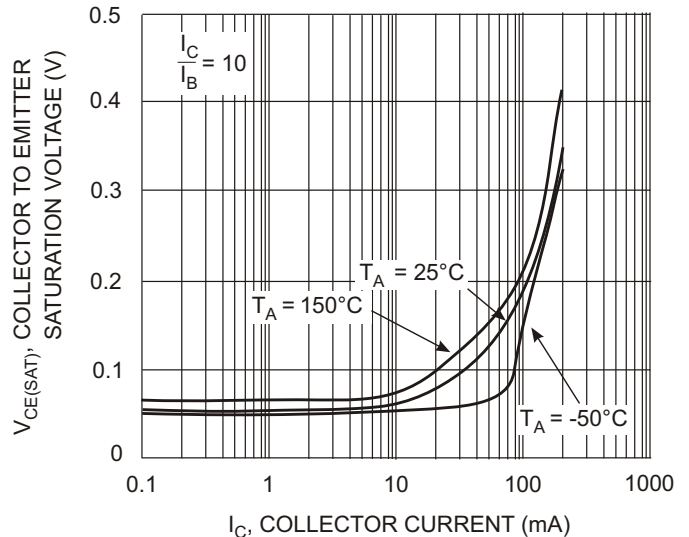


Fig. 2 Collector Emitter Saturation Voltage vs. Collector Current

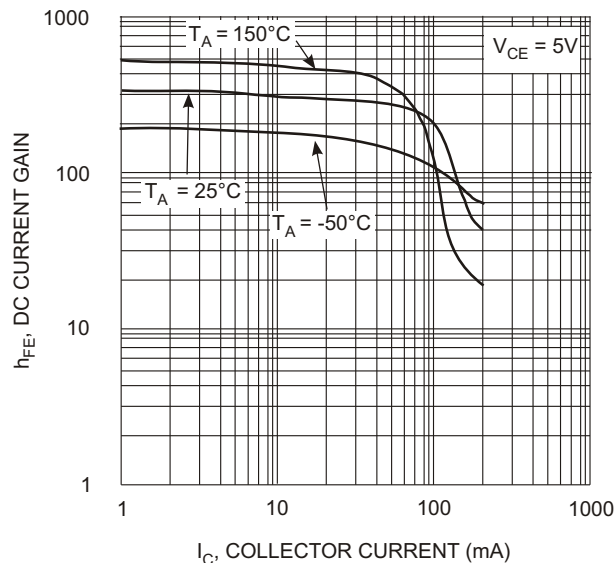


Fig. 3, DC Current Gain vs. Collector Current

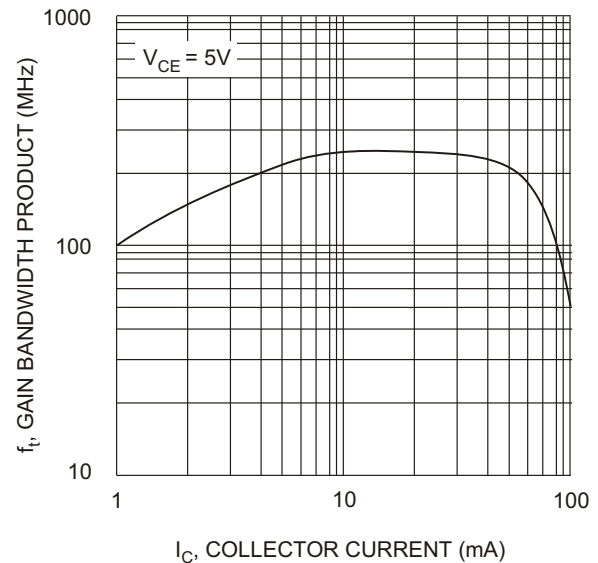


Fig. 4, Gain Bandwidth Product vs Collector Current

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