

## 200mW, PNP Small Signal Transistor

### FEATURES

- Low power loss, high efficiency
- Ideal for automated placement
- High surge current capability
- Compliant to RoHS directive 2011/65/EU and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21

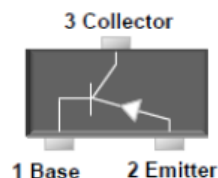
### APPLICATIONS

- Switching mode power supply (SMPS)
- Adapters
- Lighting application
- On-board DC/DC converter

### MECHANICAL DATA

- Case: SOT-23
- Molding compound meets UL 94 V-0 flammability rating
- Moisture sensitivity level: level 1, per J-STD-020
- Packing code with suffix "G" means green compound (halogen-free)
- Terminal: Matte tin plated leads, solderable per J-STD-002
- Meet JESD 201 class 1A whisker test
- Weight: 0.008 grams (approximately)

| KEY PARAMETERS |             |      |
|----------------|-------------|------|
| PARAMETER      | VALUE       | UNIT |
| $V_{CBO}$      | -80         | V    |
| $V_{CEO}$      | -65         | V    |
| $V_{EBO}$      | -5          | V    |
| $I_C$          | -0.1        | A    |
| $h_{FE}$       | 250-800     |      |
| Package        | SOT-23      |      |
| Configuration  | Single Dice |      |



| ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted) |        |        |       |      |
|-----------------------------------------------------------------------------|--------|--------|-------|------|
| PARAMETER                                                                   |        | SYMBOL | VALUE | UNIT |
| Marking code on the device                                                  | BC856A |        | 3A    |      |
|                                                                             | BC856B |        | 3B    |      |
|                                                                             | BC857A |        | 3E    |      |
|                                                                             | BC857B |        | 3F    |      |
|                                                                             | BC857C |        | 3G    |      |
|                                                                             | BC858A |        | 3E    |      |
|                                                                             | BC858B |        | 3F    |      |
|                                                                             | BC858C |        | 3G    |      |
| Power dissipation                                                           |        | $P_D$  | 200   | mW   |

**ABSOLUTE MAXIMUM RATINGS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

| PARAMETER                            |       | SYMBOL    | VALUE       | UNIT             |
|--------------------------------------|-------|-----------|-------------|------------------|
| Collector-base voltage, emitter open | BC856 | $V_{CBO}$ | -80         | V                |
|                                      | BC857 |           | -50         |                  |
|                                      | BC858 |           | -30         |                  |
| Collector-emitter voltage, base open | BC856 | $V_{CEO}$ | -65         | V                |
|                                      | BC857 |           | -45         |                  |
|                                      | BC858 |           | -30         |                  |
| Emitter-base voltage, collector open |       | $V_{EBO}$ | -5          | V                |
| Collector current, dc                |       | $I_C$     | -0.1        | A                |
| Junction temperature                 |       | $T_J$     | -55 to +150 | $^\circ\text{C}$ |
| Storage temperature                  |       | $T_{STG}$ | -55 to +150 | $^\circ\text{C}$ |

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

| PARAMETER                              | CONDITIONS                                 |                      | SYMBOL    | MIN | TYP | MAX  | UNIT          |
|----------------------------------------|--------------------------------------------|----------------------|-----------|-----|-----|------|---------------|
| Collector cutoff current, emitter open | $V_{CB} = -70\text{ V}, I_E = 0$           | BC856                | $I_{CBO}$ | -   | -   | -100 | nA            |
|                                        | $V_{CB} = -45\text{ V}, I_E = 0$           | BC857                |           | -   | -   | -100 |               |
|                                        | $V_{CB} = -25\text{ V}, I_E = 0$           | BC858                |           | -   | -   | -100 |               |
| Emitter cutoff current, collector open | $V_{EB} = -5\text{ V}, I_C = 0$            |                      | $I_{EBO}$ | -   | -   | -0.1 | $\mu\text{A}$ |
| Collector-base voltage, emitter open   | $I_C = -10\text{ }\mu\text{A}, I_E = 0$    | BC856                | $V_{CBO}$ | -80 | -   | -    | V             |
|                                        |                                            | BC857                |           | -50 | -   | -    |               |
|                                        |                                            | BC858                |           | -30 | -   | -    |               |
| Collector-emitter voltage, base open   | $I_C = -10\text{ mA}, I_B = 0$             | BC856                | $V_{CEO}$ | -65 | -   | -    | V             |
|                                        |                                            | BC857                |           | -45 | -   | -    |               |
|                                        |                                            | BC858                |           | -30 | -   | -    |               |
| Emitter-base voltage, collector open   | $I_E = -1\text{ }\mu\text{A}, I_C = 0$     |                      | $V_{EBO}$ | -5  | -   | -    | V             |
| DC current gain                        | $V_{CE} = -5\text{ V}, I_C = -2\text{ mA}$ | BC856A/BC857A/BC858A | $h_{FE}$  | 125 | -   | 250  |               |
|                                        |                                            | BC856B/BC857B/BC858B |           | 220 | -   | 475  |               |
|                                        |                                            | BC857C/BC858C        |           | 420 | -   | 800  |               |

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

| PARAMETER                            | CONDITIONS                                                               | SYMBOL        | MIN | TYP | MAX   | UNIT |
|--------------------------------------|--------------------------------------------------------------------------|---------------|-----|-----|-------|------|
| Collector-emitter saturation voltage | $I_C = -100\text{ mA}$ , $I_B = -5\text{ mA}$                            | $V_{CE(sat)}$ | -   | -   | -0.65 | V    |
| Base-emitter saturation voltage      | $I_C = -100\text{ mA}$ , $I_B = -5\text{ mA}$                            | $V_{BE(sat)}$ | -   | -   | -1.10 | V    |
| Transition frequency                 | $V_{CE} = -5\text{ V}$ , $I_C = -10\text{ mA}$ ,<br>$f = 100\text{ MHz}$ | $f_T$         | 100 | -   | -     | MHz  |

**ORDERING INFORMATION**

| PART NO.           | PACKING CODE | PACKING CODE SUFFIX(*) | PACKAGE | PACKING      |
|--------------------|--------------|------------------------|---------|--------------|
| BC85XX<br>(Note 1) | RF           | G                      | SOT-23  | 3K / 7" Reel |

**Notes:**

1. "xx" is device code from "6A" to "8C"

\*: optional available

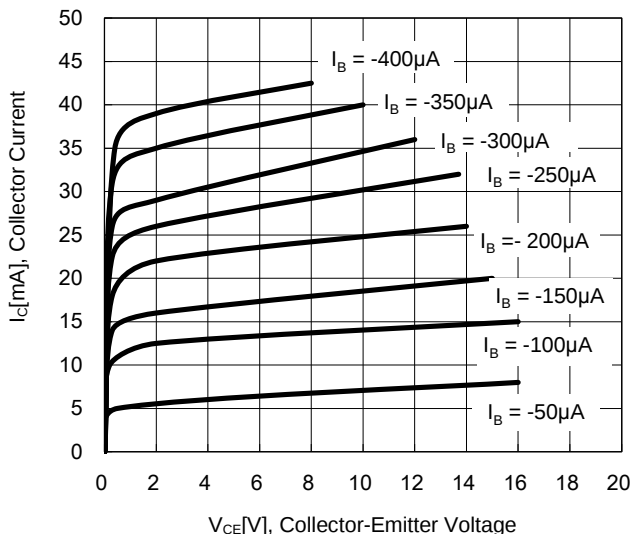
**EXAMPLE**

| EXAMPLE P/N | PART NO. | PACKING CODE | PACKING CODE SUFFIX | DESCRIPTION    |
|-------------|----------|--------------|---------------------|----------------|
| BC856A RFG  | BC856A   | RF           | G                   | Green compound |

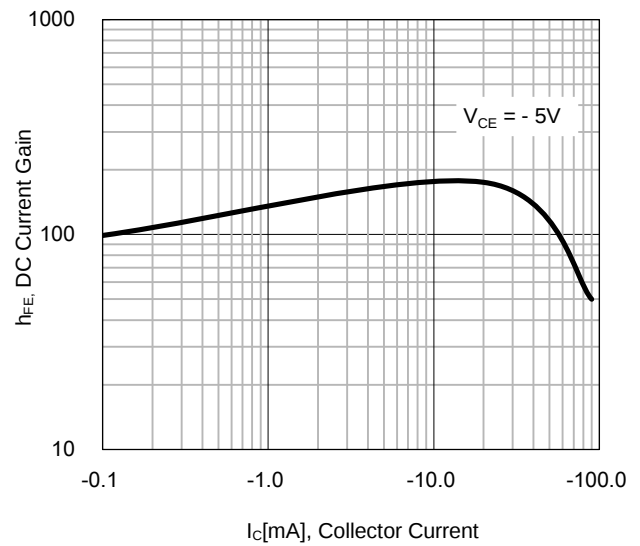
## CHARACTERISTICS CURVES

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

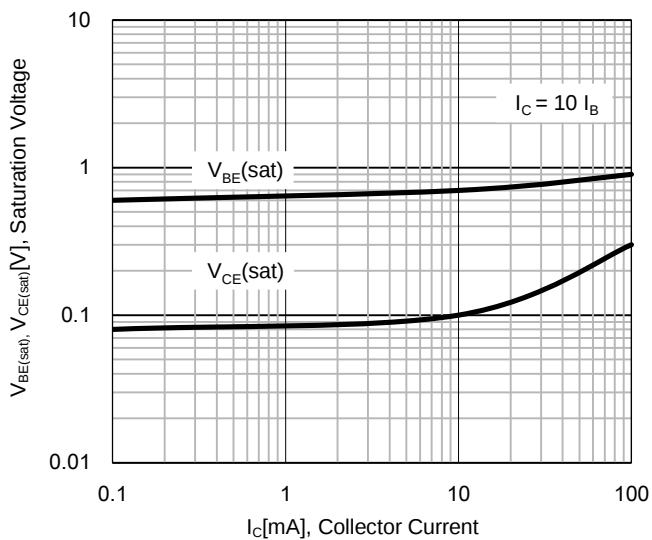
**Fig.1 Static Characteristic**



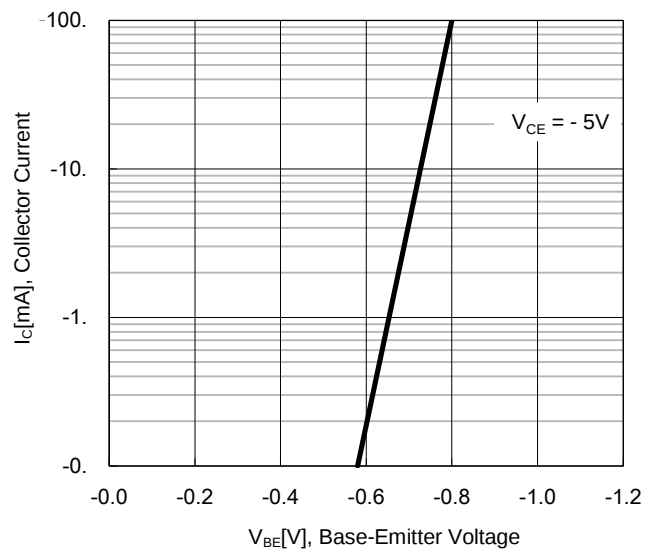
**Fig. 2 DC Current Gain**



**Fig.3 Base-Emitter Saturation Voltage VS. Collector-Emitter Saturation**



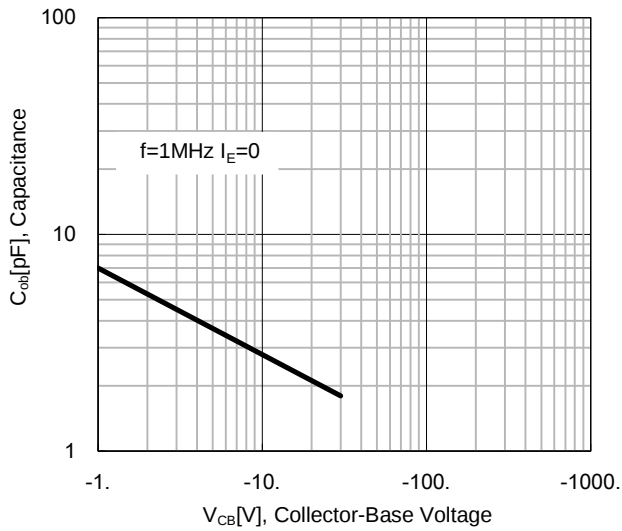
**Fig.4 Base-Emitter On Voltage**



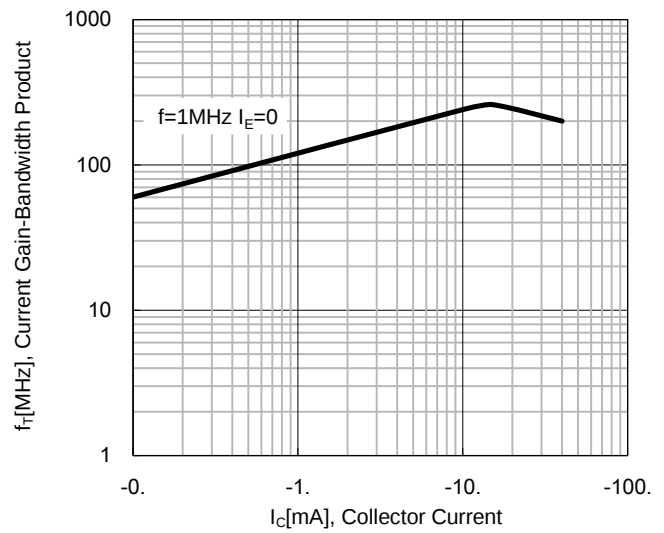
## CHARACTERISTICS CURVES

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

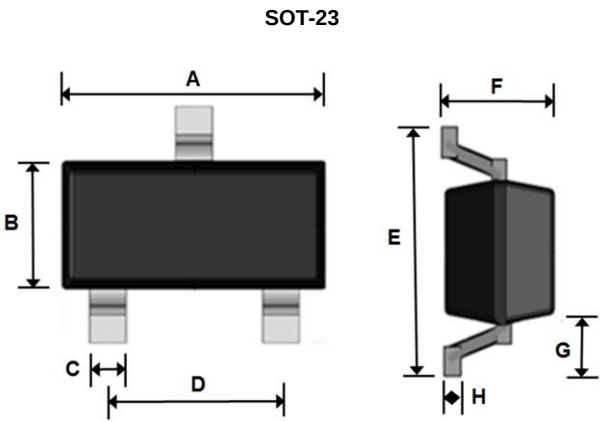
**Fig.5 Collector Output Capacitance**



**Fig. 6 Current Gain Bandwidth Product**

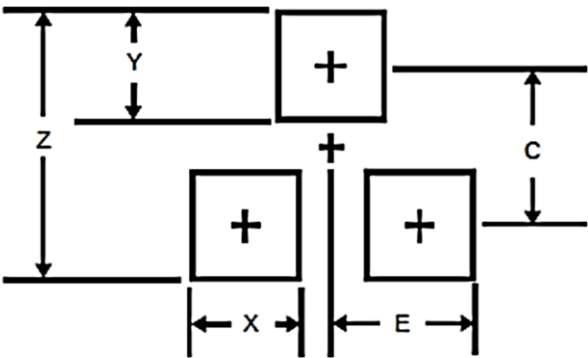


**PACKAGE OUTLINE DIMENSION**



| DIM. | Unit(mm) |      | Unit(inch) |       |
|------|----------|------|------------|-------|
|      | Min      | Max  | Min        | Max   |
| A    | 2.70     | 3.10 | 0.106      | 0.122 |
| B    | 1.10     | 1.50 | 0.043      | 0.059 |
| C    | 0.30     | 0.51 | 0.012      | 0.020 |
| D    | 1.78     | 2.04 | 0.070      | 0.080 |
| E    | 2.20     | 2.60 | 0.087      | 0.102 |
| F    | 0.90     | 1.30 | 0.035      | 0.051 |
| G    | 0.55 REF |      | 0.022 REF  |       |
| H    | 0.10 REF |      | 0.004 REF  |       |

**SUGGEST PAD LAYOUT**



| DIM. | Unit(mm) | Unit(inch) |
|------|----------|------------|
|      | Typ.     | Typ.       |
| Z    | 2.80     | 0.110      |
| X    | 0.70     | 0.028      |
| Y    | 0.90     | 0.035      |
| C    | 1.90     | 0.075      |
| E    | 1.00     | 0.039      |

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