

## Features

- Halogen Free. "Green" Device (Note 1)
- AEC-Q101 Qualified
- For Switching and AF Amplifier Applications
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Lead Free Finish/RoHS Compliant ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Maximum Ratings

- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 320°C/W Junction to Solder-point (Note2)
- Thermal Resistance: 403°C/W Junction to Ambient (Note2)

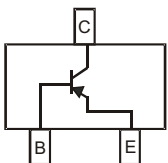
| Parameter                 | Symbol    | Rating | Unit |
|---------------------------|-----------|--------|------|
| Collector-Base Voltage    | $V_{CBO}$ | -80    | V    |
| Collector-Emitter Voltage | $V_{CEO}$ | -65    | V    |
| Emitter-Base Voltage      | $V_{EBO}$ | -5     | V    |
| Collector Current         | $I_C$     | -100   | mA   |
| Peak Collector Current    | $I_{CM}$  | -200   | mA   |
| Peak Emitter Current      | $I_{EM}$  | -200   | mA   |
| Power Dissipation (Note2) | $P_D$     | 310    | mW   |

Note: 1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

2. Package Mounted 1.0\*1.0mm Pad Layout 1oz Copper That is On a Single-sided FR4 PCB.

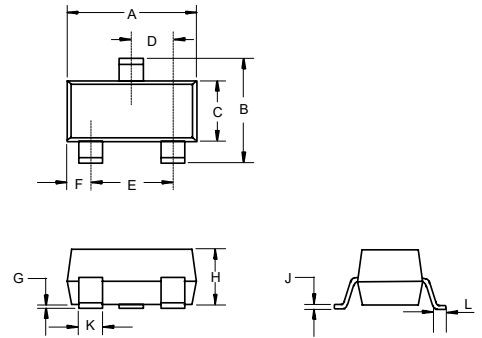
| Part Number | BC856AHE3 | BC856BHE3 |
|-------------|-----------|-----------|
| Marking     | 3A        | 3B        |

## Internal Structure



# PNP Small Signal Transistor

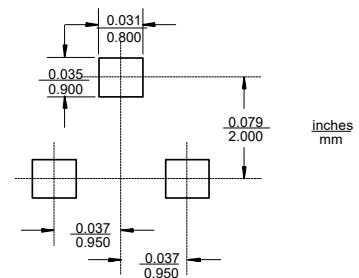
## SOT-23



### DIMENSIONS

| DIM | INCHES |       | MM   |      | NOTE |
|-----|--------|-------|------|------|------|
|     | MIN    | MAX   | MIN  | MAX  |      |
| A   | 0.110  | 0.120 | 2.80 | 3.04 |      |
| B   | 0.083  | 0.104 | 2.10 | 2.64 |      |
| C   | 0.047  | 0.055 | 1.20 | 1.40 |      |
| D   | 0.034  | 0.041 | 0.85 | 1.05 |      |
| E   | 0.067  | 0.083 | 1.70 | 2.10 |      |
| F   | 0.018  | 0.024 | 0.45 | 0.60 |      |
| G   | 0.0004 | 0.006 | 0.01 | 0.15 |      |
| H   | 0.035  | 0.043 | 0.90 | 1.10 |      |
| J   | 0.003  | 0.007 | 0.08 | 0.18 |      |
| K   | 0.014  | 0.020 | 0.35 | 0.51 |      |
| L   | 0.007  | 0.020 | 0.20 | 0.50 |      |

### Suggested Solder Pad Layout



**Electrical Characteristics @ 25°C Unless Otherwise Specified**

| Parameter                                               | Symbol        | Min  | Typ                  | Max  | Units      | Conditions                                                                      |
|---------------------------------------------------------|---------------|------|----------------------|------|------------|---------------------------------------------------------------------------------|
| Collector-Base Breakdown Voltage <sup>(Note3)</sup>     | $V_{(BR)CBO}$ | -80  |                      |      | V          | $I_C = -10\mu A, I_E = 0$                                                       |
| Collector-Emitter Breakdown Voltage <sup>(Note3)</sup>  | $V_{(BR)CEO}$ | -65  |                      |      | V          | $I_C = -10mA, I_B = 0$                                                          |
| Emitter-Base Breakdown Voltage <sup>(Note3)</sup>       | $V_{(BR)EBO}$ | -5   |                      |      | V          | $I_E = -1\mu A, I_C = 0$                                                        |
| Collector-Cutoff Current <sup>(Note3)</sup>             | $I_{CBO}$     |      |                      | -15  | nA         | $V_{CB} = -30V$                                                                 |
|                                                         |               |      |                      | -4   | $\mu A$    | $V_{CB} = -30V, T_A = 150^\circ C$                                              |
| DC Current Gain <sup>(Note3)</sup>                      | BC856AHE3     | 125  | 180                  | 250  |            | $V_{CE} = -5V_{dc}, I_C = -2mA$                                                 |
|                                                         | BC856BHE3     | 220  | 290                  | 475  |            |                                                                                 |
| Small Signal Current Gain                               | BC856AHE3     |      | 200                  |      |            | $V_{CE} = -5V$<br>$I_C = -2mA$<br>$f = 1KHz$                                    |
|                                                         | BC856BHE3     |      | 330                  |      |            |                                                                                 |
| Input Impedance                                         | BC856AHE3     |      | 2.7                  |      | K $\Omega$ |                                                                                 |
|                                                         | BC856BHE3     |      | 4.5                  |      |            |                                                                                 |
| Output Admittance                                       | BC856AHE3     |      | 18                   |      | $\mu S$    |                                                                                 |
|                                                         | BC856BHE3     |      | 30                   |      |            |                                                                                 |
| Reverse Voltage Transfer Ratio                          | BC856AHE3     |      | $1.5 \times 10^{-4}$ |      |            |                                                                                 |
|                                                         | BC856BHE3     |      | $2 \times 10^{-4}$   |      |            |                                                                                 |
| Collector-Emitter Saturation Voltage <sup>(Note3)</sup> | $V_{CE(sat)}$ |      | -75                  | -300 | mV         | $I_C = -10mA, I_B = -0.5mA$                                                     |
|                                                         |               |      | -250                 | -650 | mV         | $I_C = -100mA, I_B = -5mA$                                                      |
| Base-Emitter Saturation Voltage <sup>(Note3)</sup>      | $V_{BE(sat)}$ |      | -700                 |      | mV         | $I_C = -10mA, I_B = -0.5mA$                                                     |
|                                                         |               |      | -850                 |      | mV         | $I_C = -100mA, I_B = -5mA$                                                      |
| Base-Emitter Voltage <sup>(Note3)</sup>                 | $V_{BE}$      | -600 | -650                 | -750 | mV         | $V_{CE} = -5V, I_C = -2mA$                                                      |
|                                                         |               |      |                      | -820 | mV         | $V_{CE} = -5V, I_C = -10mA$                                                     |
| Current Gain-Bandwidth Product                          | $f_T$         | 100  | 200                  |      | MHz        | $V_{CE} = -5V, I_C = -10mA, f = 100MHz$                                         |
| Collector-Base Capacitance                              | $C_{CBO}$     |      | 3                    |      | pF         | $V_{CB} = -10V, f = 1MHz$                                                       |
| Noise Figure                                            | NF            |      | 2                    | 10   | dB         | $V_{CE} = -5V, I_C = -200\mu A$<br>$R_S = 2K\Omega, f = 1KHz, \Delta f = 200Hz$ |

Note: 3. Short Duration Pulse Test to Minimize Self-heating Effect.

**Curve Characteristics**

Fig. 1 - Static Characteristics

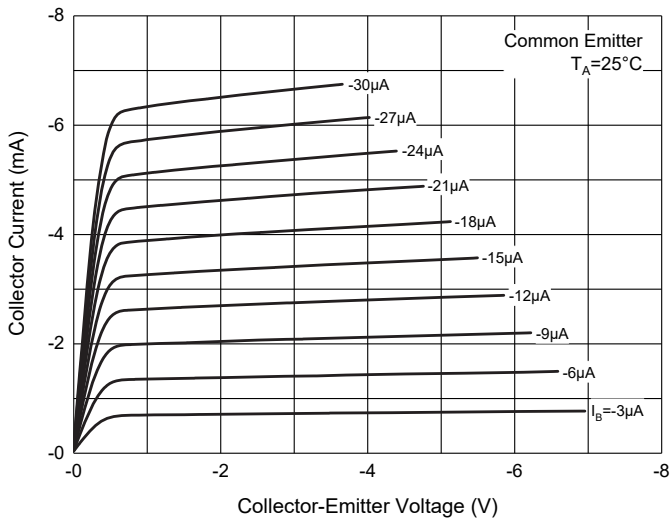


Fig. 2 - DC Current Gain Characteristics

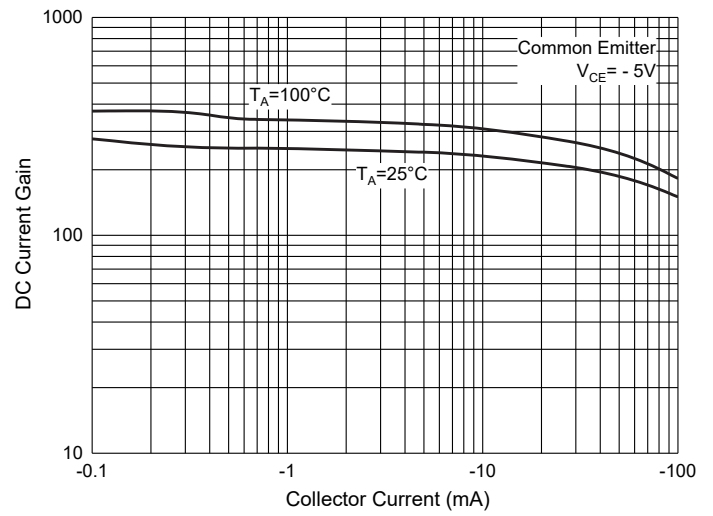


Fig. 3 - Collector-Emitter Saturation Voltage Characteristics

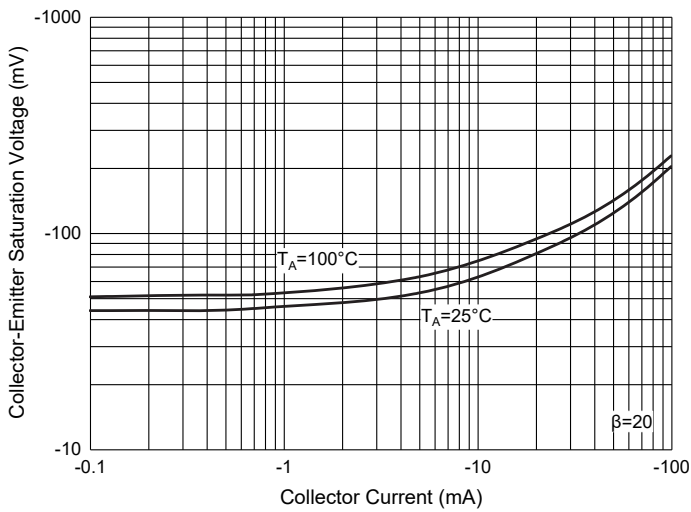


Fig. 4 - Base-Emitter Saturation Voltage Characteristics

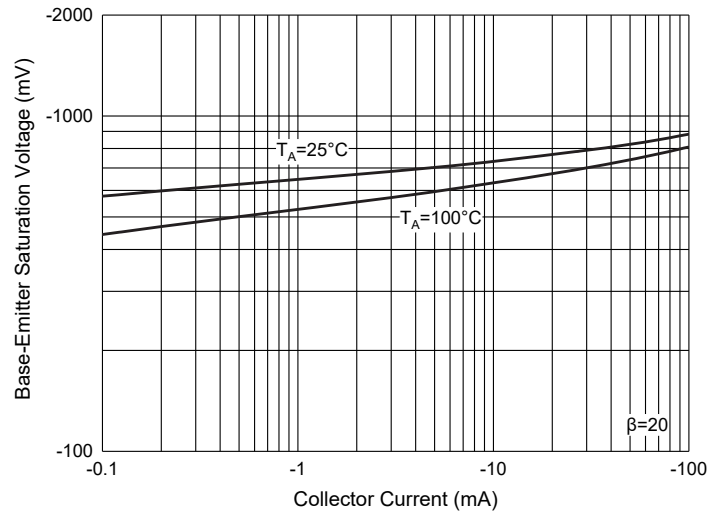


Fig. 5 - Base-Emitter Voltage Characteristics

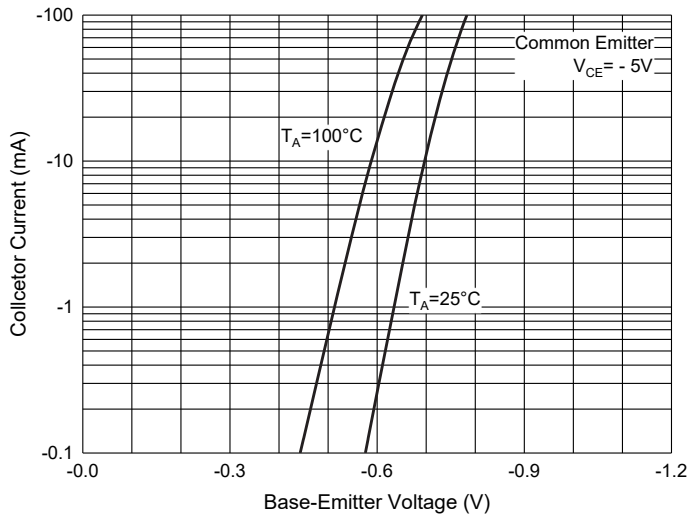
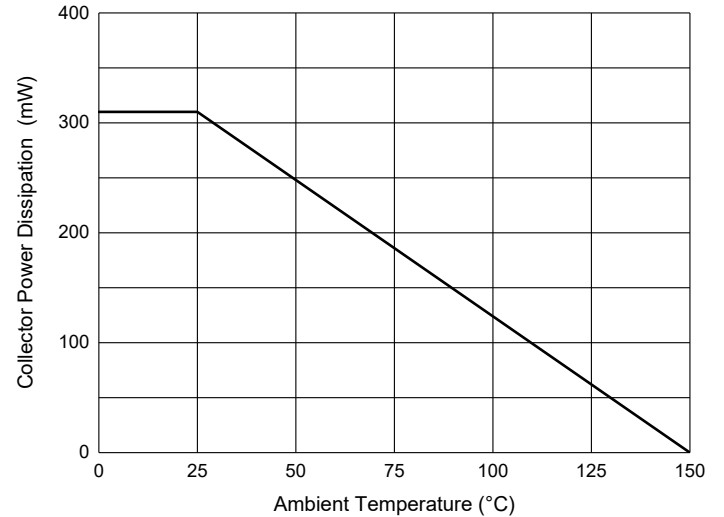


Fig. 6 - Collector Power Derating Curve



## Ordering Information

| Device         | Packing               |
|----------------|-----------------------|
| Part Number-TP | Tape&Reel: 3Kpcs/Reel |

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