

## Features

- Halogen Free. "Green" Device (Note 1)
- 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)

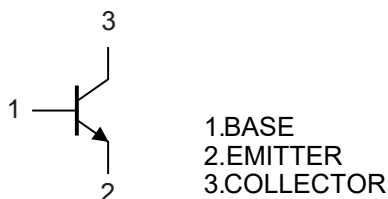
## Maximum Ratings @ 25°C Unless Otherwise Specified

- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 625°C/W Junction to Ambient

| Parameter                    | Symbol    | Rating | Unit |
|------------------------------|-----------|--------|------|
| Collector-Base Voltage       | $V_{CBO}$ | 60     | V    |
| Collector-Emitter Voltage    | $V_{CEO}$ | 50     | V    |
| Emitter-Base Voltage         | $V_{EBO}$ | 7      | V    |
| Continuous Collector Current | $I_C$     | 150    | mA   |
| Power Dissipation            | $P_D$     | 200    | mW   |

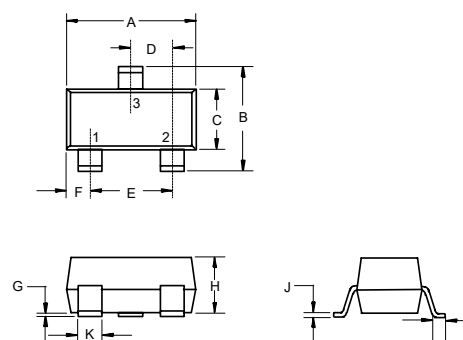
Note: 1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

## Internal Structure



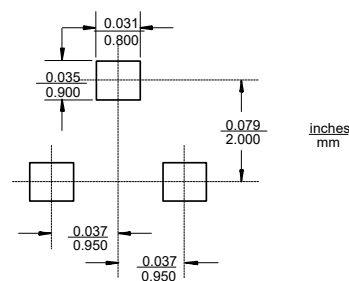
# NPN Silicon Epitaxial Transistors

## 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          | 0.012  | 0.020 | 0.30 | 0.51 |      |
| L          | 0.007  | 0.020 | 0.20 | 0.50 |      |

## Suggested Solder Pad Layout



### Electrical Characteristics @ $T_A=25^{\circ}\text{C}$ Unless Otherwise Specified

| Parameter                            | Symbol        | Min | Typ | Max | Units         | Conditions   |
|--------------------------------------|---------------|-----|-----|-----|---------------|--|
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$ | 60  |     |     | V             | $I_C=50\mu\text{A}$ , $I_E=0$                              |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | 50  |     |     | V             | $I_C=1\text{mA}$ , $I_B=0$                                 |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$ | 7   |     |     | V             | $I_E=50\mu\text{A}$ , $I_C=0$                              |
| Collector-Base Cutoff Current        | $I_{CBO}$     |     |     | 0.1 | $\mu\text{A}$ | $V_{CB}=60\text{V}$ , $I_E=0$                              |
| Emitter-Base Cutoff Current          | $I_{EBO}$     |     |     | 0.1 | $\mu\text{A}$ | $V_{EB}=7\text{V}$ , $I_C=0$                               |
| DC Current Gain                      | $h_{FE}$      | 120 |     | 560 |               | $V_{CE}=6\text{V}$ , $I_C=1\text{mA}$                      |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ |     |     | 0.4 | V             | $I_C=50\text{mA}$ , $I_B=5\text{mA}$                       |
| Transition Frequency                 | $f_T$         | 150 |     |     | MHz           | $V_{CE}=12\text{V}$ , $I_C=2\text{mA}$ , $f=100\text{MHz}$ |

### Classification of $h_{FE}$

| Rank    | Q       | R       | S       |
|---------|---------|---------|---------|
| Range   | 120-270 | 180-390 | 270-560 |
| Marking | BQ      | BR      | BS      |

## Curve Characteristics

Fig. 1 - Static Characteristics

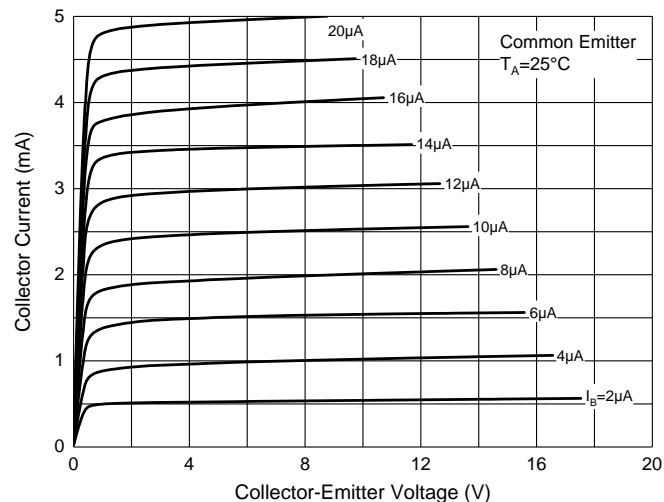


Fig. 2 - DC Current Gain Characteristics

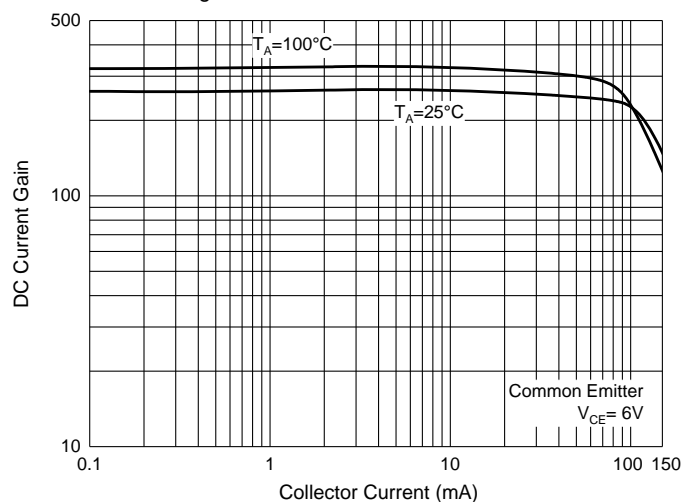


Fig. 3 - Collector-Emitter Saturation Voltage Characteristics

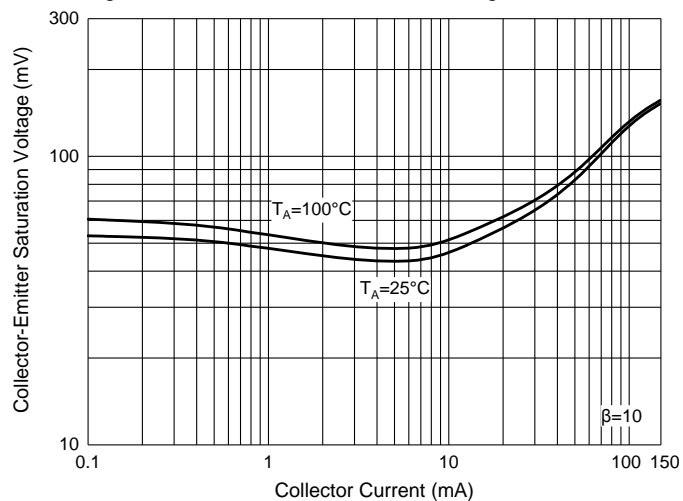


Fig. 4 - Base-Emitter Saturation Voltage Characteristics

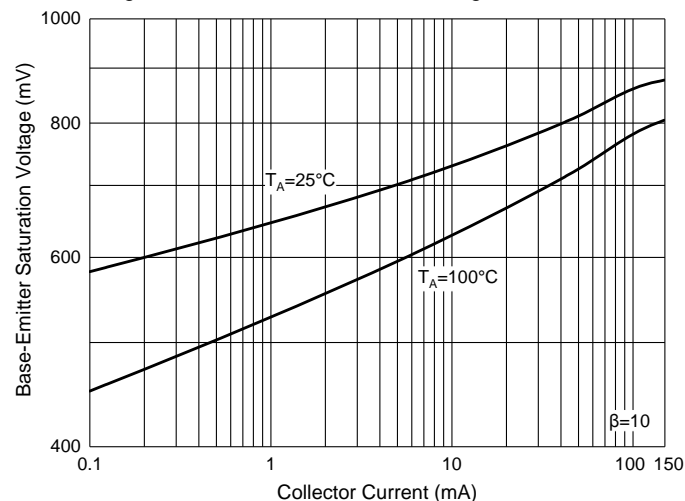


Fig. 5 - Base-Emitter Voltage Characteristics

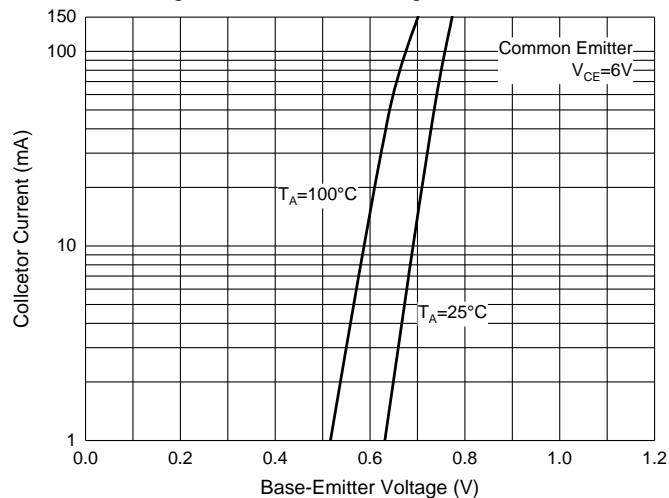
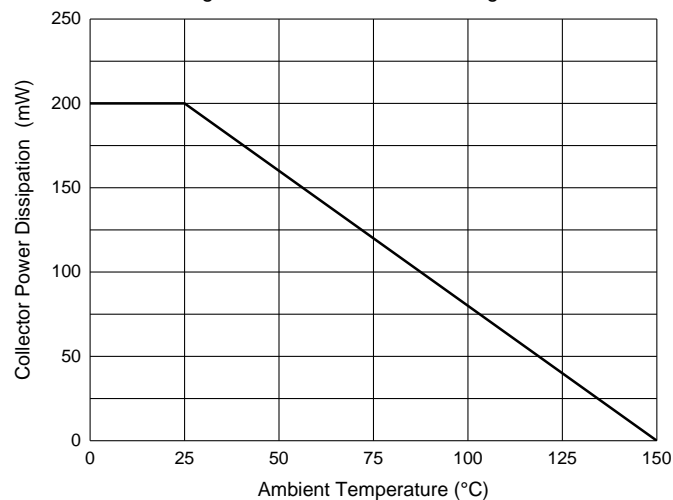


Fig. 6 - Collector Power Derating Curve



## Ordering Information

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

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