

**Features**

- Fast Switching Speed
- Low Collector-to-Emitter Saturation Voltage
- 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)

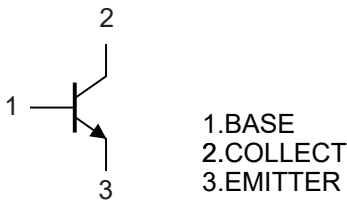
**Maximum Ratings @ 25°C Unless Otherwise Specified**

- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 250°C/W Junction to Ambient

| Parameter                    | Symbol    | Rating | Unit |
|------------------------------|-----------|--------|------|
| Collector-Base Voltage       | $V_{CBO}$ | 40     | V    |
| Collector-Emitter Voltage    | $V_{CEO}$ | 32     | V    |
| Emitter-Base Voltage         | $V_{EBO}$ | 5      | V    |
| Continuous Collector Current | $I_C$     | 1      | A    |
| Power Dissipation            | $P_D$     | 0.5    | W    |

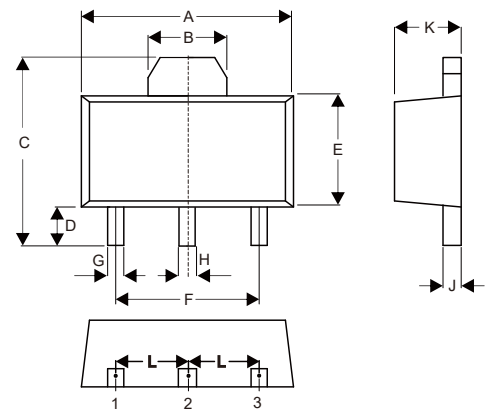
Note: 1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

**Internal Structure**



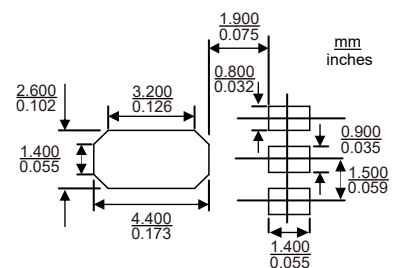
**NPN Epitaxial Planar Silicon Transistors**

**SOT-89**



| DIM | INCHES |       | MM   |      | NOTE |
|-----|--------|-------|------|------|------|
|     | MIN    | MAX   | MIN  | MAX  |      |
| A   | 0.169  | 0.185 | 4.30 | 4.70 |      |
| B   | 0.061  |       | 1.55 |      | TYP. |
| C   | 0.154  | 0.171 | 3.91 | 4.35 |      |
| D   | 0.031  | 0.047 | 0.80 | 1.20 |      |
| E   | 0.089  | 0.104 | 2.25 | 2.65 |      |
| F   | 0.118  |       | 3.00 |      | TYP. |
| G   | 0.013  | 0.020 | 0.33 | 0.52 |      |
| H   | 0.015  | 0.021 | 0.38 | 0.53 |      |
| J   | 0.014  | 0.017 | 0.35 | 0.44 |      |
| K   | 0.055  | 0.063 | 1.40 | 1.60 |      |
| L   | 0.059  |       | 1.50 |      | TYP. |

**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     | $V_{(BR)CBO}$ | 40  |     |     | V             | $I_C=50\mu\text{A}, I_E=0$                            |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | 32  |     |     | V             | $I_C=1\text{mA}, I_B=0$                               |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$ | 5   |     |     | V             | $I_E=50\mu\text{A}, I_C=0$                            |
| Collector Cutoff Current             | $I_{CBO}$     |     |     | 0.5 | $\mu\text{A}$ | $V_{CB}=20\text{V}, I_E=0$                            |
| Emitter Cutoff Current               | $I_{EBO}$     |     |     | 0.5 | $\mu\text{A}$ | $V_{EB}=4\text{V}, I_C=0$                             |
| DC Current Gain                      | $h_{FE}$      | 82  |     | 390 |               | $V_{CE}=3\text{V}, I_C=0.1\text{A}$                   |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ |     |     | 0.4 | V             | $I_C=0.5\text{A}, I_B=0.05\text{A}$                   |
| Transition Frequency                 | $f_T$         |     | 150 |     | MHz           | $V_{CE}=5\text{V}, I_C=0.05\text{A}, f=100\text{MHz}$ |
| Output Capacitance                   | $C_{ob}$      |     | 15  |     | pF            | $V_{CB}=10\text{V}, I_E=0, f=1\text{MHz}$             |

**Classification of  $h_{FE}$** 

| Rank    | P      | Q       | R       |
|---------|--------|---------|---------|
| Range   | 82-180 | 120-270 | 180-390 |
| Marking | DAP    | DAQ     | DAR     |

**Curve Characteristics**

Fig. 1 - Static Characteristics

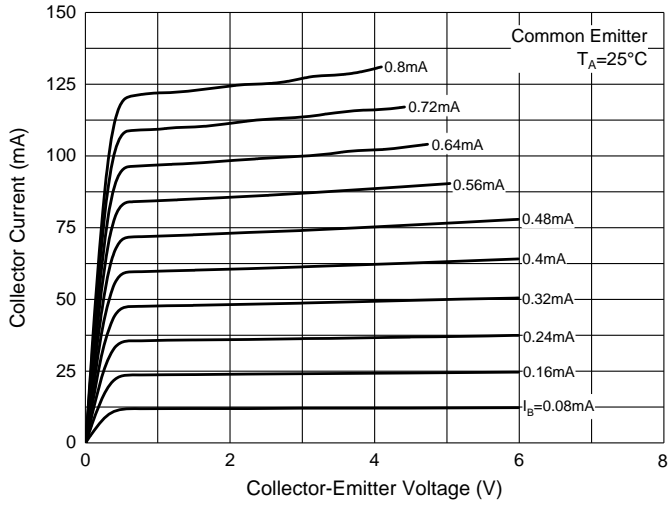


Fig. 2 - DC Current Gain Characteristics

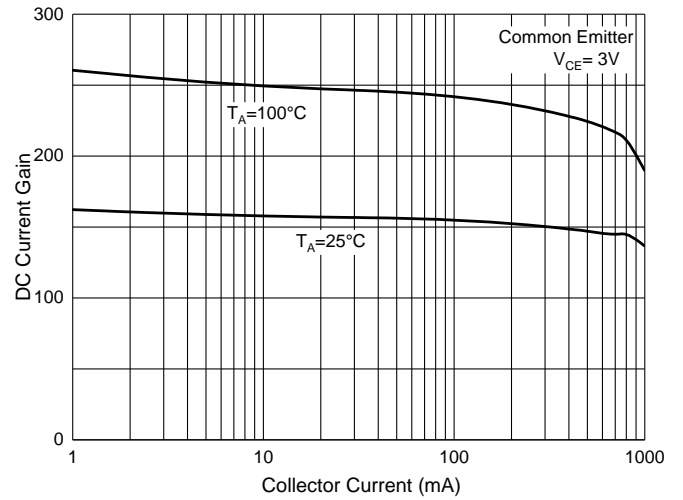


Fig. 3 - Base-Emitter Saturation Voltage Characteristics

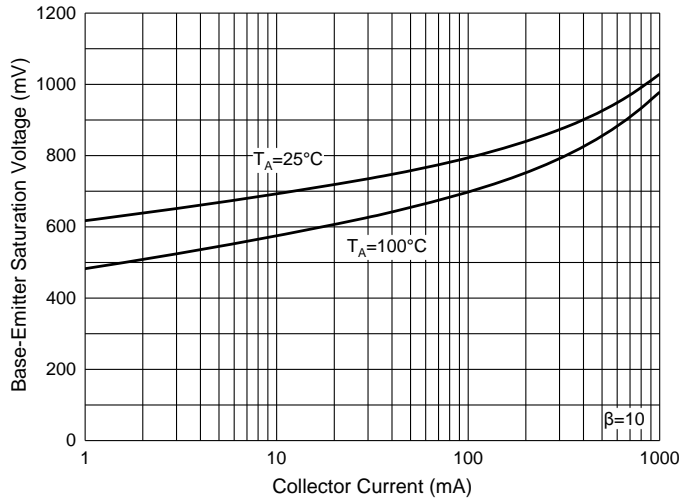


Fig. 4 - Collector-Emitter Saturation Voltage Characteristics

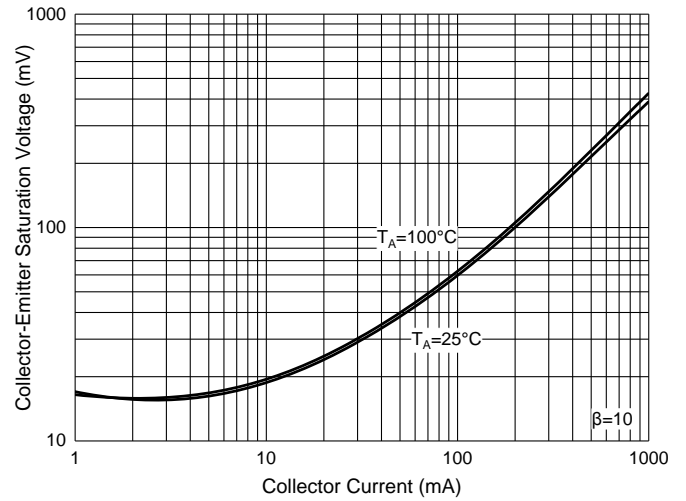


Fig. 5 - Transition frequency Characteristics

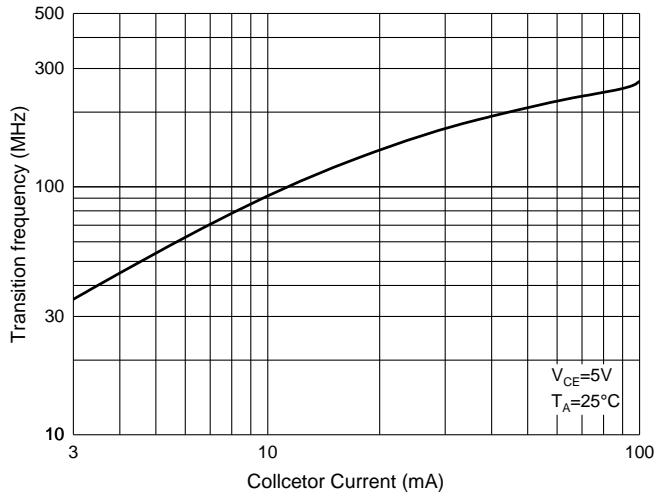
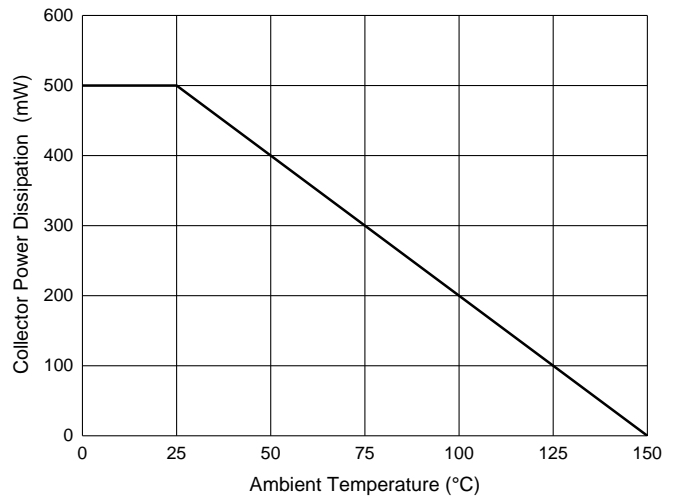


Fig. 6 - Collector Power Derating Curve



## Ordering Information

| Device         | Packing               |
|----------------|-----------------------|
| Part Number-TP | Tape&Reel: 1Kpcs/Reel |

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