

**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**

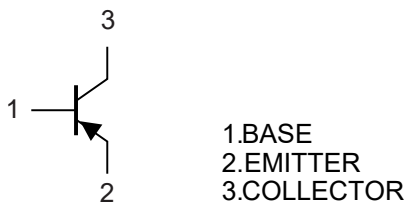
- Operating Junction Temperature Range: -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 250°C/W Junction to Ambient

| Parameter                    | Symbol    | Rating | Unit |
|------------------------------|-----------|--------|------|
| Collector-Base Voltage       | $V_{CBO}$ | -80    | V    |
| Collector-Emitter Voltage    | $V_{CEO}$ | -60    | V    |
| Emitter-Base Voltage         | $V_{EBO}$ | -5     | V    |
| Continuous Collector Current | $I_C$     | -1     | A    |
| Power Dissipation            | $P_D$     | 500    | 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.

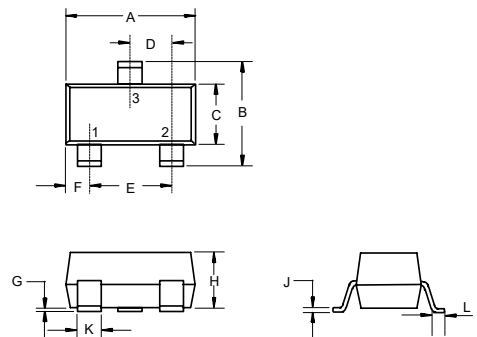
**Marking: 591**

**Internal Structure**



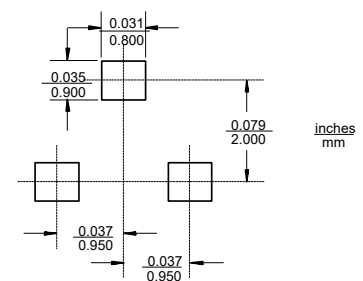
**PNP  
Plastic-Encapsulate  
Transistor**

**SOT-23**



| DIM | DIMENSIONS |       |      |      | NOTE |
|-----|------------|-------|------|------|------|
|     | INCHES     |       | MM   |      |      |
|     | 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**

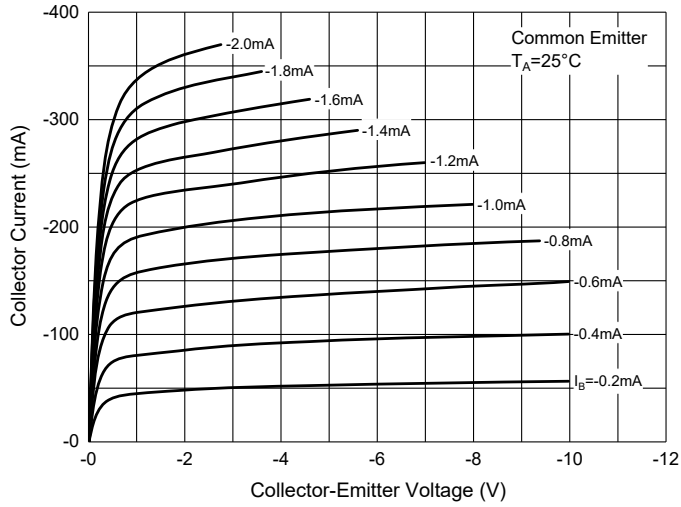


**Electrical Characteristics @  $T_A=25^\circ\text{C}$  Unless Otherwise Specified**

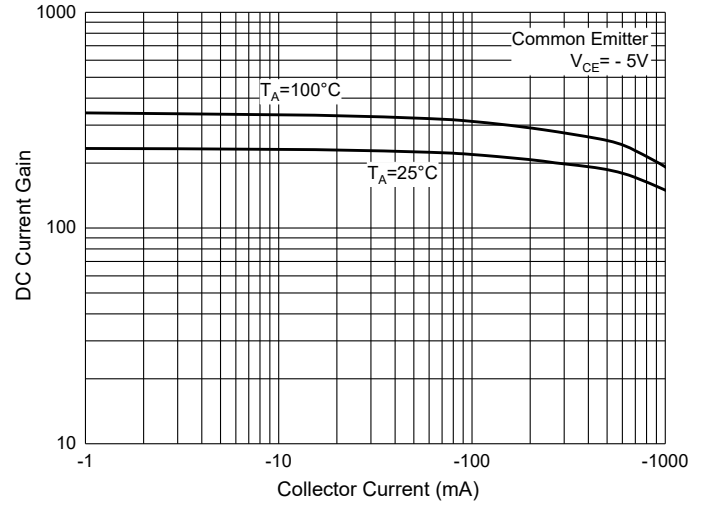
| Parameter                            | Symbol        | Min | Typ | Max  | Units         | Conditions  |
|--------------------------------------|---------------|-----|-----|------|---------------|---|
| Collector-Base Breakdown Voltage     | $V_{(BR)CBO}$ | -80 |     |      | V             | $I_C=-100\mu\text{A}, I_E=0$                            |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | -60 |     |      | V             | $I_C=-10\text{mA}, I_B=0$                               |
| Emitter-Base Breakdown Voltage       | $V_{(BR)EBO}$ | -5  |     |      | V             | $I_E=-100\mu\text{A}, I_C=0$                            |
| 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 | $\mu\text{A}$ | $V_{EB}=-4\text{V}, I_C=0$                              |
| DC Current Gain                      | $h_{FE(1)}$   | 100 |     |      |               | $V_{CE}=-5\text{V}, I_C=-1\text{mA}$                    |
|                                      | $h_{FE(2)}$   | 100 |     | 300  |               | $V_{CE}=-5\text{V}, I_C=-500\text{mA}$                  |
|                                      | $h_{FE(3)}$   | 80  |     |      |               | $V_{CE}=-5\text{V}, I_C=-1\text{A}$                     |
|                                      | $h_{FE(4)}$   | 15  |     |      |               | $V_{CE}=-5\text{V}, I_C=-2\text{A}$                     |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ |     |     | -0.3 | V             | $I_C=-500\text{mA}, I_B=-50\text{mA}$                   |
|                                      |               |     |     | -0.6 | V             | $I_C=-1\text{A}, I_B=-100\text{mA}$                     |
| Base-Emitter Saturation Voltage      | $V_{BE(sat)}$ |     |     | -1.2 | V             | $I_C=-1\text{A}, I_B=-100\text{mA}$                     |
| Base-Emitter Voltage                 | $V_{BE}$      |     |     | -1.0 | V             | $V_{CE}=-5\text{V}, I_C=-1\text{A}$                     |
| Transition Frequency                 | $f_T$         | 150 |     |      | MHz           | $V_{CE}=-10\text{V}, I_C=-50\text{mA}, f=100\text{MHz}$ |
| Output Capacitance                   | $C_{ob}$      |     |     | 10   | pF            | $V_{CB}=-10\text{V}, I_E=0, f=1\text{MHz}$              |

**Curve Characteristics**

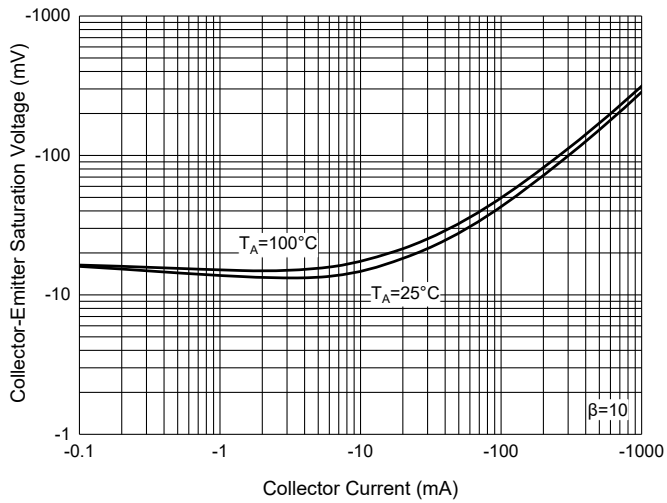
**Fig. 1 - Static Characteristics**



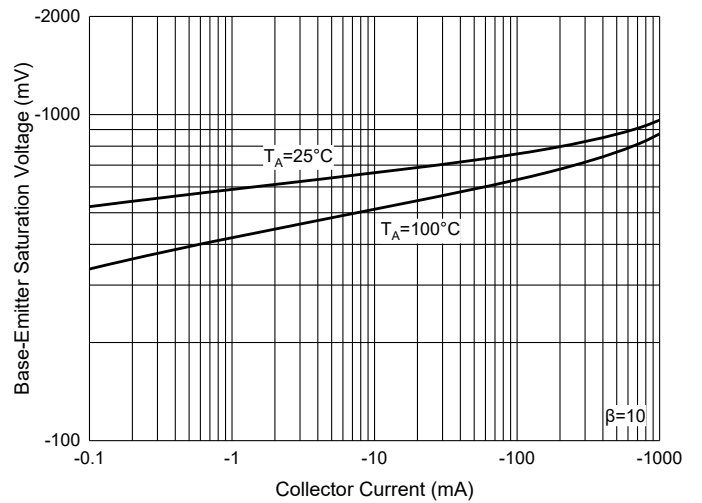
**Fig. 2 - DC Current Gain Characteristics**



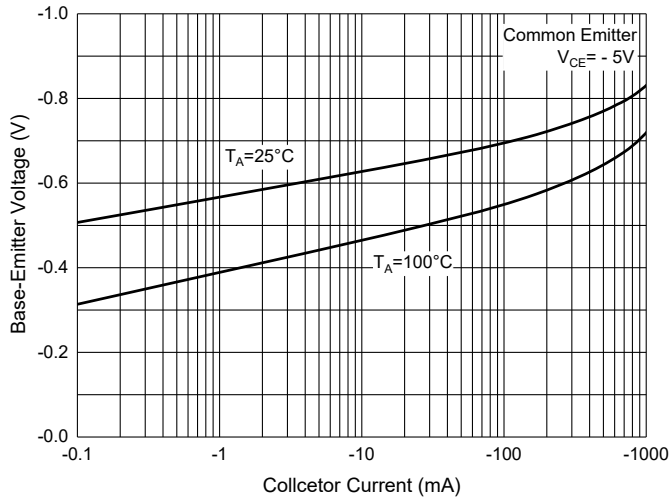
**Fig. 3 - Collector-Emitter Saturation Voltage Characteristics**



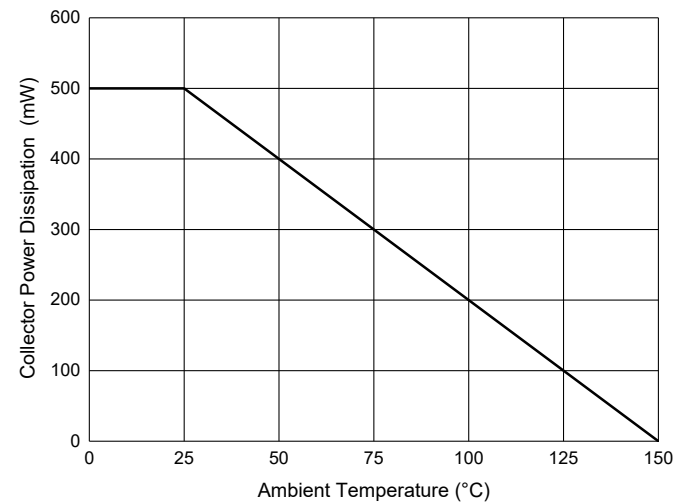
**Fig. 4 - Base-Emitter Saturation Voltage Characteristics**



**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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