

## 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: 357°C/W Junction to Ambient (Note 2)

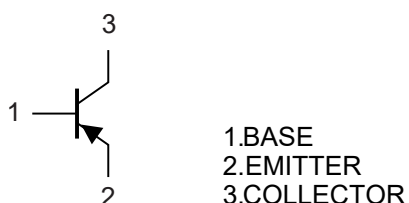
| Parameter                    | Symbol    | Rating | Unit |
|------------------------------|-----------|--------|------|
| Collector-Base Voltage       | $V_{CBO}$ | -40    | V    |
| Collector-Emitter Voltage    | $V_{CEO}$ | -40    | V    |
| Emitter-Base Voltage         | $V_{EBO}$ | -5     | V    |
| Continuous Collector Current | $I_C$     | -600   | mA   |
| Power Dissipation            | $P_D$     | 350    | 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. For the Device Mounted on 15mm x 15mm x 1.6mm FR4 PCB with High Coverage of Single Sided 1oz Copper, in Still Air Conditions.

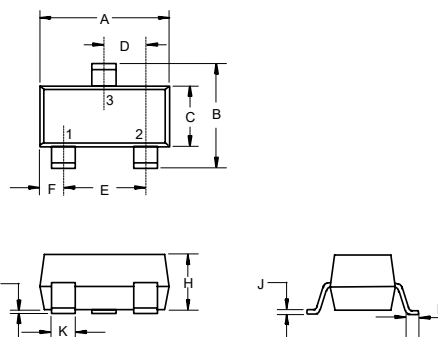
## Marking: 2T

## Internal Structure



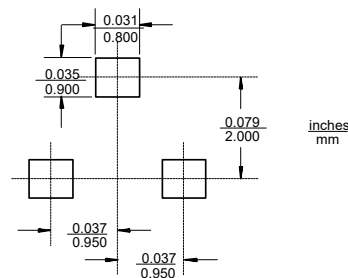
# PNP General Purpose Amplifier

## SOT-23



| 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                   | $V_{(BR)CBO}$ | -40 |       |       | V             | $I_C=-100\mu\text{A}$ , $I_E=0$   |
| Collector-Emitter Breakdown Voltage <sup>(3)</sup> | $V_{(BR)CEO}$ | -40 |       |       | V             | $I_C=-1\text{mA}$ , $I_B=0$   |
| Emitter-Base Breakdown Voltage                     | $V_{(BR)EBO}$ | -5  |       |       | V             | $I_E=-100\mu\text{A}$ , $I_C=0$   |
| Base Cutoff Current                                | $I_{BL}$      |     |       | -0.1  | $\mu\text{A}$ | $V_{CE}=-30\text{V}$ , $V_{BE}=-3\text{V}$  |
| Collector Cutoff Current                           | $I_{CEX}$     |     |       | -0.1  | $\mu\text{A}$ | $V_{CE}=-30\text{V}$ , $V_{BE}=-3\text{V}$  |
| DC Current Gain <sup>(3)</sup>                     | $h_{FE(1)}$   | 30  |       |       |               | $V_{CE}=-1\text{V}$ , $I_C=-0.1\text{mA}$   |
|  | $h_{FE(2)}$   | 60  |       |       |               | $V_{CE}=-1\text{V}$ , $I_C=-1\text{mA}$   |
|  | $h_{FE(3)}$   | 100 |       |       |               | $V_{CE}=-1\text{V}$ , $I_C=-10\text{mA}$  |
|  | $h_{FE(4)}$   | 100 |       | 300   |               | $V_{CE}=-2\text{V}$ , $I_C=-150\text{mA}$   |
|  | $h_{FE(5)}$   | 20  |       |       |               | $V_{CE}=-2\text{V}$ , $I_C=-500\text{mA}$   |
| Collector-Emitter Saturation Voltage               | $V_{CE(sat)}$ |     |       | -0.4  | V             | $I_C=-150\text{mA}$ , $I_B=-15\text{mA}$  |
|  |               |     |       | -0.75 | V             | $I_C=-500\text{mA}$ , $I_B=-50\text{mA}$  |
| Base-Emitter Saturation Voltage                    | $V_{BE(sat)}$ |     | -0.75 | -0.95 | V             | $I_C=-150\text{mA}$ , $I_B=-15\text{mA}$  |
|  |               |     |       | -1.3  | V             | $I_C=-500\text{mA}$ , $I_B=-50\text{mA}$  |
| Transition Frequency                               | $f_T$         | 200 |       |       | MHz           | $V_{CE}=-10\text{V}$ , $I_C=-20\text{mA}$ , $f=100\text{MHz}$                                 |
| Delay Time   | $t_d$         |     |       | 15    | ns            | $V_{CC}=-30\text{V}$ , $V_{BE}=-0.5\text{V}$ , $I_C=-150\text{mA}$ ,<br>$I_{B1}=-15\text{mA}$ |
| Rise Time  | $t_r$         |     |       | 20    | ns            |   |
| Storage Time                                       | $t_s$         |     |       | 225   | ns            | $V_{CC}=-30\text{V}$ , $I_C=-150\text{mA}$ , $I_{B1}=I_{B2}=-15\text{mA}$                     |
| Fall Time  | $t_f$         |     |       | 30    | ns            |   |
| Collector-Base Capacitance                         | $C_{cb}$      |     |       | 8.5   | pF            | $V_{CB}=-10\text{V}$ , $I_E=0$ , $f=1\text{MHz}$  |
| Emitter-Base Capacitance                           | $C_{eb}$      |     |       | 30    | pF            | $V_{EB}=-0.5\text{V}$ , $I_C=0$ , $f=1\text{MHz}$   |

Note :3. Pulse test: Pulse Width $\leq 300\mu\text{s}$ , Duty Cycle $\leq 2.0\%$ .

## Curve Characteristics

Fig. 1 - Static Characteristics

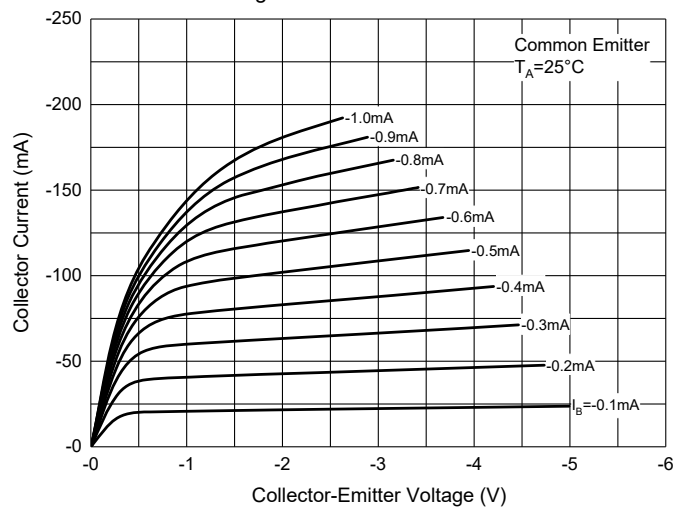


Fig. 2 - DC Current Gain Characteristics

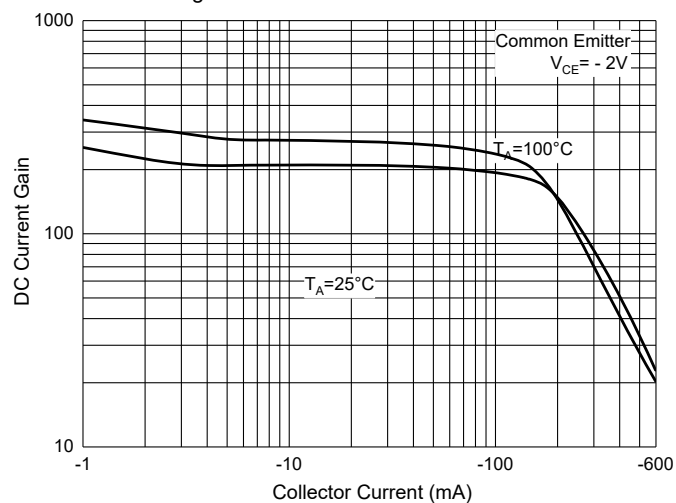


Fig. 3 - Collector-Emitter Saturation Voltage Characteristics

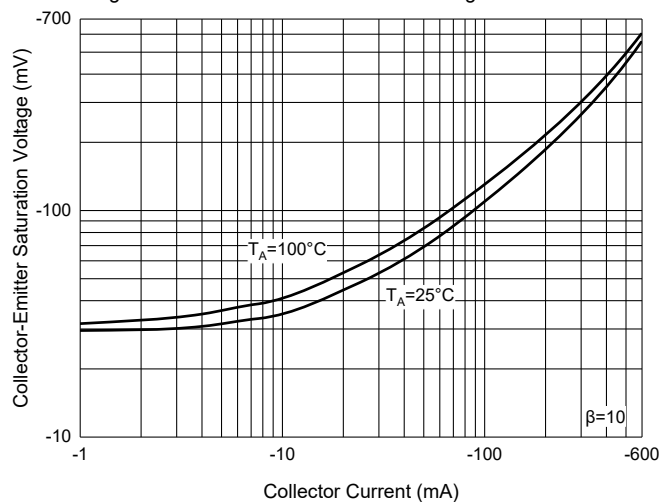


Fig. 4 - Base-Emitter Saturation Voltage Characteristics

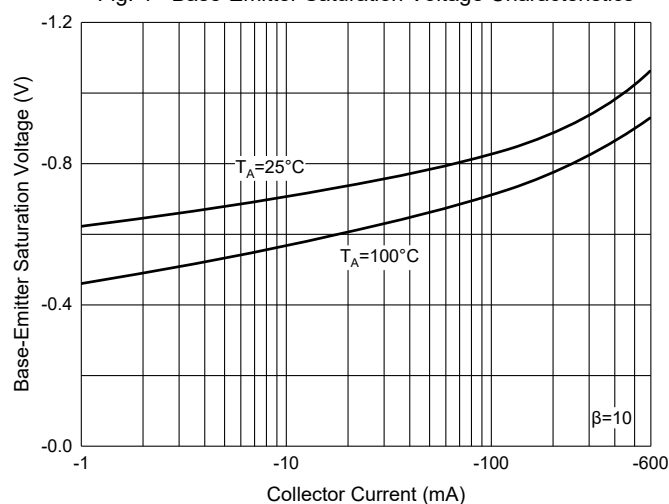


Fig. 5 - Base-Emitter Voltage Characteristics

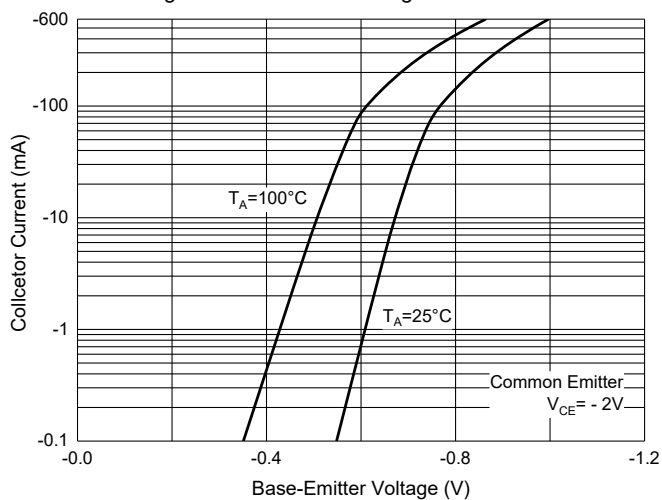
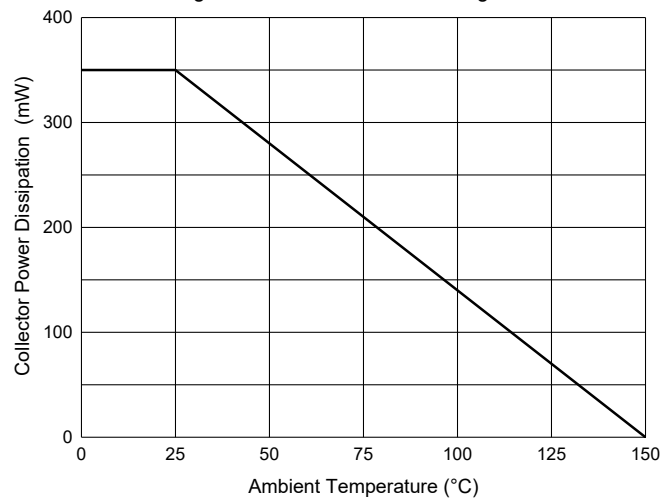


Fig. 6 - Collector Power Derating Curve



## Ordering Information

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

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