

## 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           | $V_{CBO}$ | 100    | V    |
| Collector-Emitter Voltage        | $V_{CEO}$ | 80     | V    |
| Emitter-Base Voltage             | $V_{EBO}$ | 5      | V    |
| Collector Current                | $I_C$     | 1      | A    |
|                                  |           | 2      |      |
| Power Dissipation <sup>(3)</sup> | $P_D$     | 0.5    | W    |
|                                  |           | 2      |      |

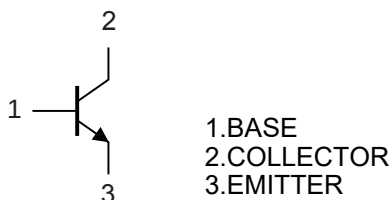
Note: 1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

2. Pulse Width=20ms, Duty Cycle=1/2.

3. Mounted on a 40x40x0.7mm Ceramic Board.

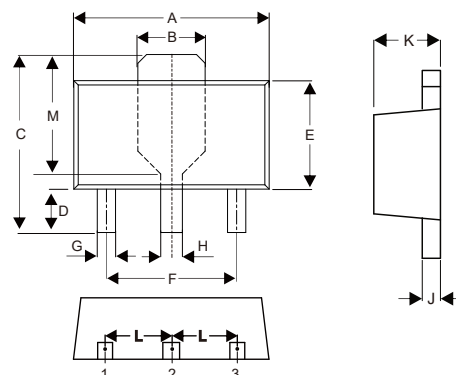
## Marking: DF

## Internal Structure



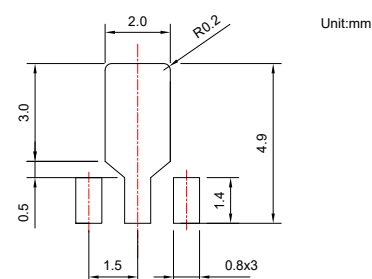
# NPN Silicon Power Transistors

## SOT-89



| DIMENSIONS |        |       |      |      |      |
|------------|--------|-------|------|------|------|
| 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. |
| M          | 0.108  |       | 2.75 |      | 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     | $V_{(BR)CBO}$ | 100 |      |     | V             | $I_C=50\mu\text{A}$ , $I_E=0$                               |
| Collector-Emitter Breakdown Voltage  | $V_{(BR)CEO}$ | 80  |      |     | 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             | $I_{CBO}$     |     |      | 1   | $\mu\text{A}$ | $V_{CB}=80\text{V}$ , $I_E=0$                               |
| Emitter Cutoff Current               | $I_{EBO}$     |     |      | 1   | $\mu\text{A}$ | $V_{EB}=4\text{V}$ , $I_C=0$                                |
| DC Current Gain                      | $h_{FE}$      | 82  |      | 390 |               | $V_{CE}=3\text{V}$ , $I_C=0.5\text{A}$                      |
| Collector-Emitter Saturation Voltage | $V_{CE(sat)}$ |     | 0.15 | 0.4 | V             | $I_C=500\text{mA}$ , $I_B=20\text{mA}$                      |
| Transition Frequency                 | $f_T$         |     | 100  |     | MHz           | $V_{CE}=10\text{V}$ , $I_C=50\text{mA}$ , $f=100\text{MHz}$ |
| Output Capacitance                   | $C_{ob}$      |     | 20   |     | 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 |

## Curve Characteristics

Fig. 1 - Static Characteristics

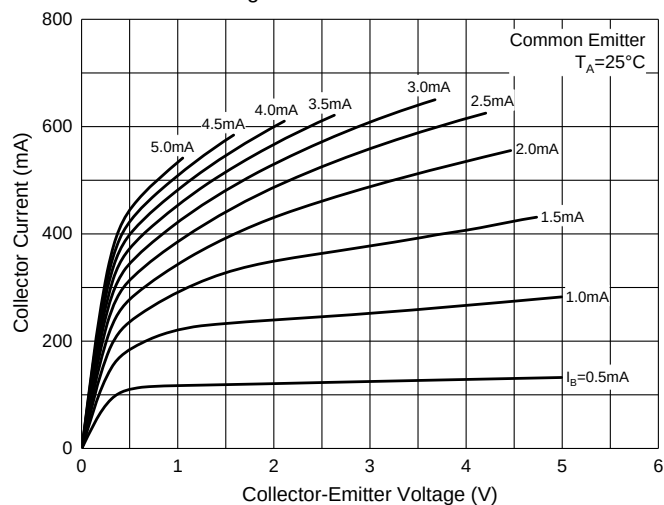


Fig. 2 - DC Current Gain Characteristics

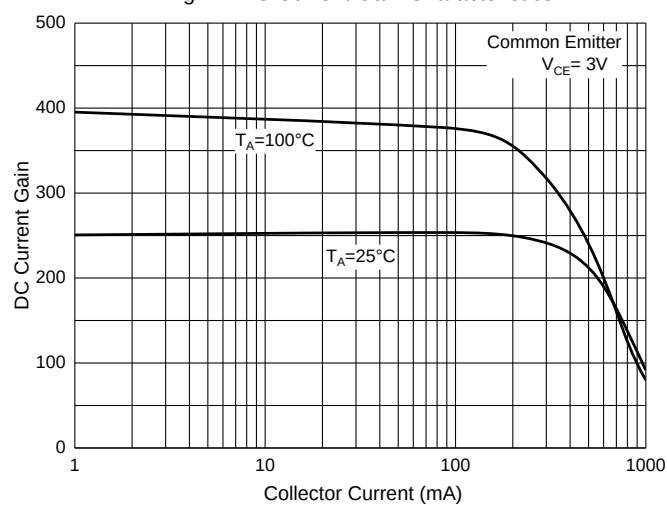


Fig. 3 - Base-Emitter Saturation Voltage Characteristics

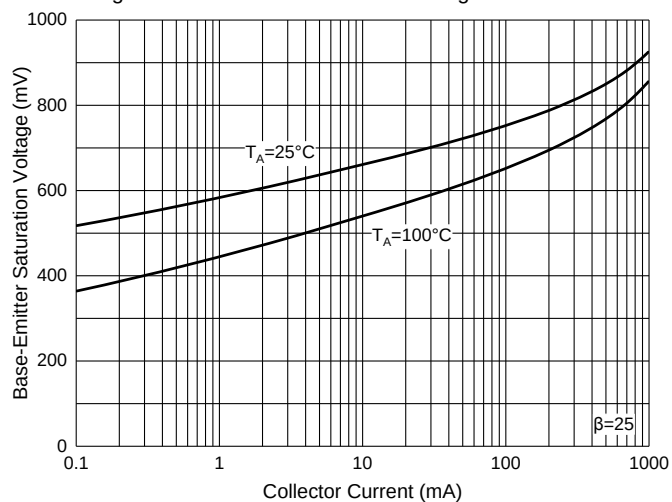


Fig. 4 - Collector-Emitter Saturation Voltage Characteristics

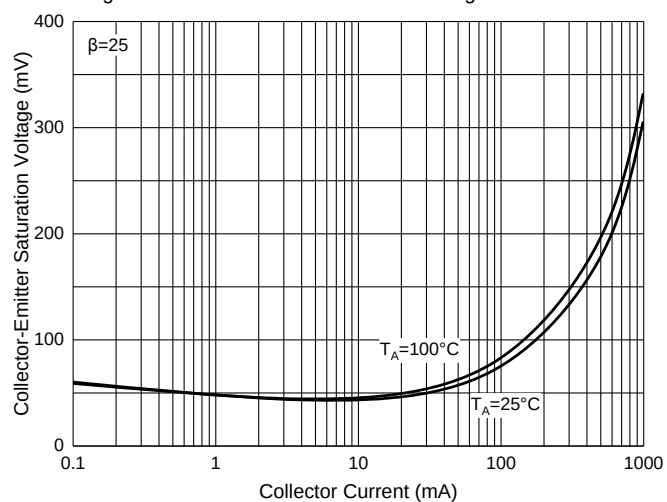
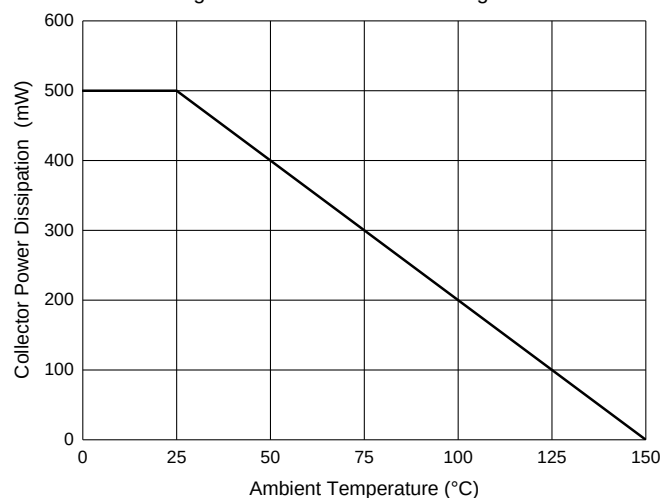


Fig. 5 - Collector Power Derating Curve



## Ordering Information

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

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