

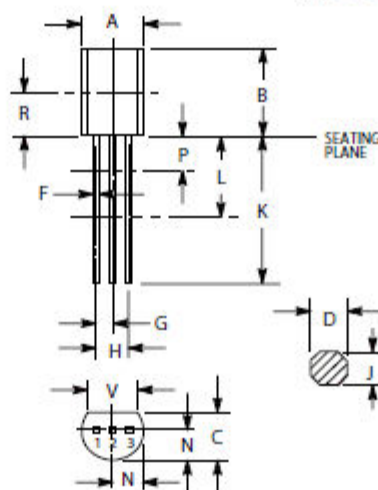


## POWER TRANSISTOR E13003

### SWITCHING REGULATOR APPLICATION

- High speed switching
- Suitable for switching regulator and motor control
- Case : TO-92 molded plastic body

#### TO-92



| DIM | INCHES |       | MILLIMETERS |      |
|-----|--------|-------|-------------|------|
|     | MIN    | MAX   | MIN         | MAX  |
| A   | 0.175  | 0.205 | 4.44        | 5.21 |
| B   | 0.290  | 0.310 | 7.37        | 7.87 |
| C   | 0.125  | 0.165 | 3.18        | 4.19 |
| D   | 0.018  | 0.022 | 0.46        | 0.56 |
| F   | 0.016  | 0.019 | 0.41        | 0.48 |
| G   | 0.045  | 0.055 | 1.15        | 1.39 |
| H   | 0.095  | 0.105 | 2.42        | 2.66 |
| J   | 0.018  | 0.024 | 0.46        | 0.61 |
| K   | 0.500  | —     | 12.70       | —    |
| L   | 0.250  | —     | 6.35        | —    |
| N   | 0.080  | 0.105 | 2.04        | 2.66 |
| P   | —      | 0.100 | —           | 2.54 |
| R   | 0.135  | —     | 3.43        | —    |
| V   | 0.135  | —     | 3.43        | —    |

### NPN SILICON TRANSISTOR

#### FEATURES $T_c=25^\circ\text{C}$ unless otherwise specified

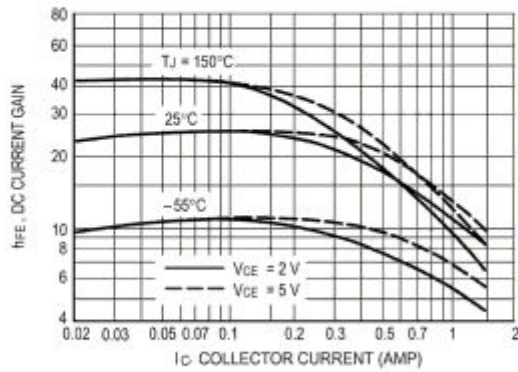
| Parameter                                        | Symbol         | Value                                       | UNIT             |
|--------------------------------------------------|----------------|---------------------------------------------|------------------|
| Collector dissipation                            | $P_c$          | 20                                          | W                |
| Collector current (DC)                           | $I_c$          | 1.5                                         | A                |
| Collector current (Pulse)                        | $I_{cp}$       | 3                                           | A                |
| Operating and storage junction temperature range | $T_j, T_{stg}$ | $-55^\circ\text{C}$ to $+150^\circ\text{C}$ | $^\circ\text{C}$ |

#### ELECTRICAL CHARACTERISTICS $T_c=25^\circ\text{C}$ unless otherwise specified

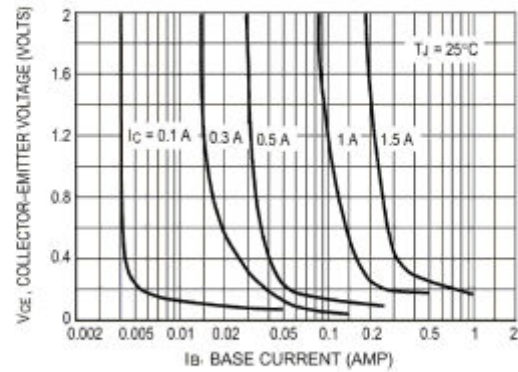
| Parameter                            | Symbol        | Test conditions                                          | MIN | MAX | UNIT          |
|--------------------------------------|---------------|----------------------------------------------------------|-----|-----|---------------|
| Collector-base breakdown voltage     | $V_{(BR)CBO}$ | $I_c=1\text{mA}, I_E=0$                                  | 700 |     | V             |
| Collector-emitter breakdown voltage  | $V_{(BR)CEO}$ | $I_c=10\text{mA}, I_B=0$                                 | 400 |     | V             |
| Emitter-base breakdown voltage       | $V_{(BR)EBO}$ | $I_E=1\text{mA}, I_C=0$                                  | 9   |     | V             |
| Collector cut-off current            | $I_{CBO}$     | $V_{CB}=700\text{V}, I_E=0$                              |     | 1   | mA            |
| Collector cut-off current            | $I_{CEO}$     | $V_{CE}=400\text{V}, I_B=0$                              |     | 500 | $\mu\text{A}$ |
| Emitter cut-off current              | $I_{EBO}$     | $V_{EB}=9\text{V}, I_C=0$                                |     | 1   | mA            |
| DC current gain                      | $h_{FE(1)}$   | $V_{CE}=2\text{V}, I_C=0.5\text{mA}$                     | 8   | 40  |               |
|                                      | $h_{FE(2)}$   | $V_{CE}=10\text{V}, I_C=0.5\text{mA}$                    | 5   |     |               |
| Collector-emitter saturation voltage | $V_{CEsat}$   | $I_C=1\text{A}, I_B=250\text{mA}$                        |     | 1   | V             |
| Base-emitter saturation voltage      | $V_{BEsat}$   | $I_C=1\text{A}, I_B=250\text{mA}$                        |     | 1.2 | V             |
| Base-emitter voltage                 | $V_{BE}$      | $I_E=2\text{A}$                                          |     | 3   | V             |
| Transition frequency                 | $f_T$         | $V_{CE}=10\text{V}, I_C=100\text{mA}$<br>$f=1\text{MHz}$ | 5   |     | MHz           |
| Fall time                            | $t_f$         | $I_C=1\text{A}, I_{B1}=-I_{B2}=0.2\text{mA}$             |     | 0.5 | $\mu\text{s}$ |
| Storage time                         | $t_s$         | $V_{CC}=100\text{V}$                                     |     | 2.5 | $\mu\text{s}$ |



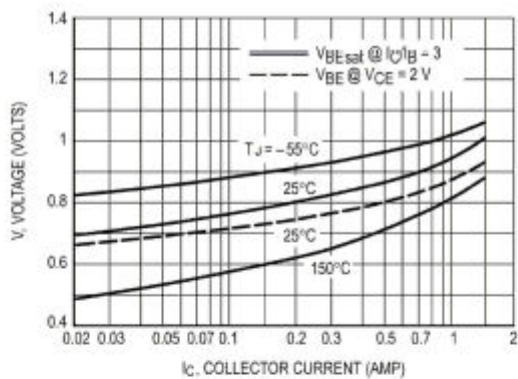
## RATINGS AND CHARACTERISTIC CURVES E13003



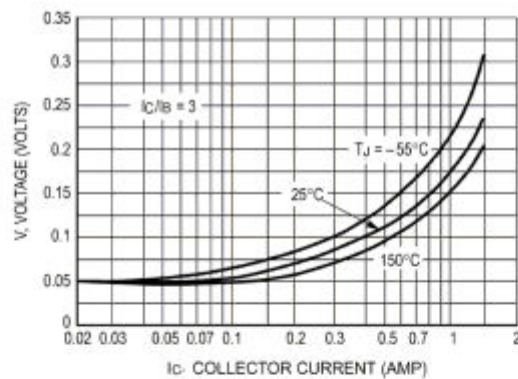
DC Current Gain



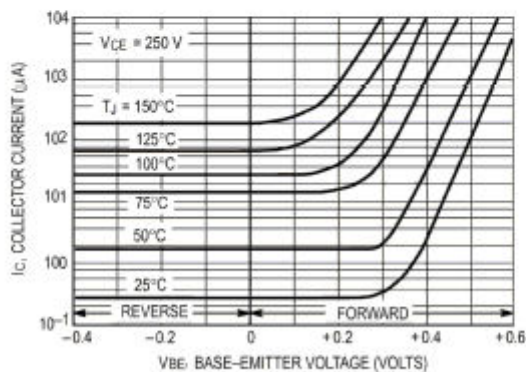
Collector Saturation Region



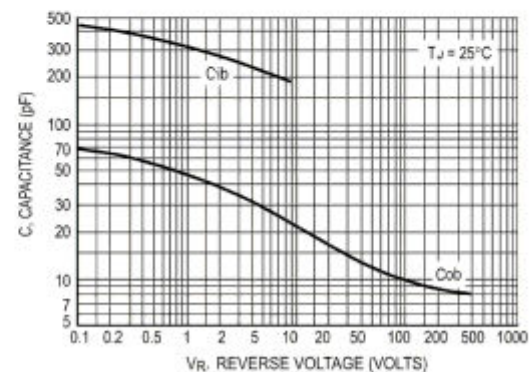
Base-Emitter Voltage



Collector-Emitter Saturation Region



Collector Cutoff Region



Capacitance