# TS13003

High Voltage NPN Transistor

TO-126



1 2 3

TO-92



1 2 3

Pin assignment:
1. Emitter
2. Collector
3. Emitter

**$BV_{CEO}$ = 400V**
**$BV_{CBO}$ = 700V**
**Ic = 1.5A**
**$V_{CE\ (SAT)}$, = 0.8V @ Ic / Ib = 0.5A / 0.1A**

## Features

- ✧ High voltage.
- ✧ High speed switching

## Structure

- ✧ Silicon triple diffused type.
- ✧ NPN silicon transistor

## Ordering Information

| Part No. | Packing | Package |
|---|---|---|
| TS13003CT | Bulk | TO-92 |
| TS13003CK | | TO-126 |

## Absolute Maximum Rating (Ta = 25 °C unless otherwise noted)

| Parameter | | Symbol | Limit | Unit |
|---|---|---|---|---|
| Collector-Base Voltage | | $V_{CBO}$ | 700V | V |
| Collector-Emitter Voltage | | $V_{CEO}$ | 400V | V |
| Emitter-Base Voltage | | $V_{EBO}$ | 9 | V |
| Collector Current | DC | $I_C$ | 1.5 | A |
| | Pulse | | 3 | |
| Collector Power Dissipation | TO-92 | $P_D$ | 0.6 | W |
| | TO-126 | | 20 | |
| Operating Junction Temperature | | $T_J$ | +150 | °C |
| Operating Junction and Storage Temperature Range | | $T_{STG}$ | - 55 to +150 | °C |

Note: 1. Single pulse, Pw = 5mS, Duty <= 10%

## Electrical Characteristics

Ta = 25 °C unless otherwise noted

| Parameter | Conditions | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Collector-Base Voltage | $I_C$ = 5mA, $I_B$ = 0 | $BV_{CBO}$ | 700 | | | V |
| Collector-Emitter Breakdown Voltage | $I_C$ = 5mA, $I_E$ = 0 | $BV_{CEO}$ | 400 | | | V |
| Emitter-Base Breakdown Voltage | $I_E$ = 1mA, $I_C$ = 0 | $BV_{EBO}$ | 9 | | | V |
| Collector Cutoff Current | $V_{CB}$ = 700V, $I_E$ = 0 | $I_{CBO}$ | | | 100 | uA |
| Emitter Cutoff Current | $V_{EB}$ = 9V, $I_C$ = 0 | $I_{EBO}$ | | | 10 | uA |
| Collector-Emitter Saturation Voltage | $I_C$ / $I_B$ = 1.5A / 0.5A<br>$I_C$ / $I_B$ = 0.5A / 0.1A | $V_{CE(SAT)1}$<br>$V_{CE(SAT)2}$ | | | 3<br>0.5 | V |
| DC Current Gain | $V_{CE}$ = 2V, $I_C$ = 0.5A | $h_{FE}$ | 8 | | 40 | |
| Frequency | $V_{CE}$ = 10V, $I_C$ = 0.1A | $f_T$ | 4 | | | MHz |
| Output Capacitance | $V_{CB}$ = 10V, f = 0.1MHz | Cob | | 21 | | pF |
| Turn On Time | $V_{CC}$ = 125V, $I_C$ = 1A, | $t_{ON}$ | | 1.1 | | uS |
| Storage Time | $I_{B1}$ = 0.2A, $I_{B2}$ = - 0.2A, | $t_{STG}$ | | | 4 | uS |
| Fall Time | $R_L$ = 125ohm | $t_f$ | | | 0.7 | uS |

Note : pulse test: pulse width <=5mS, duty cycle <=10%

## Electrical Characteristics Curve

**Figure 1. Static Characteric**

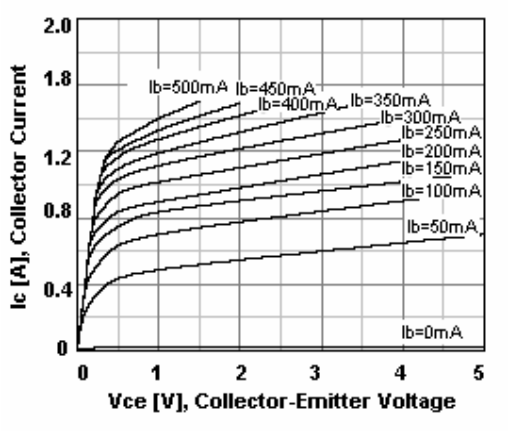



**Figure 2. DC Current Gain**

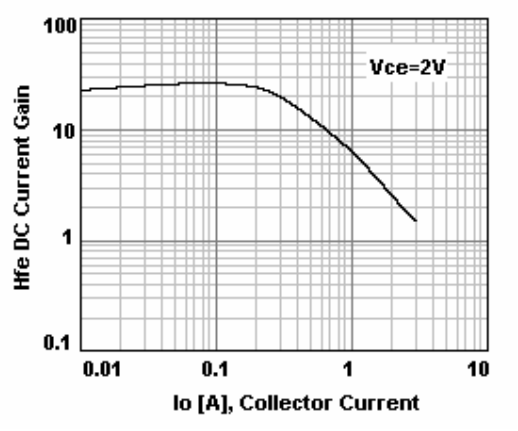



**Figure 3. Vce(sat) v.s. Vbe(sat)**

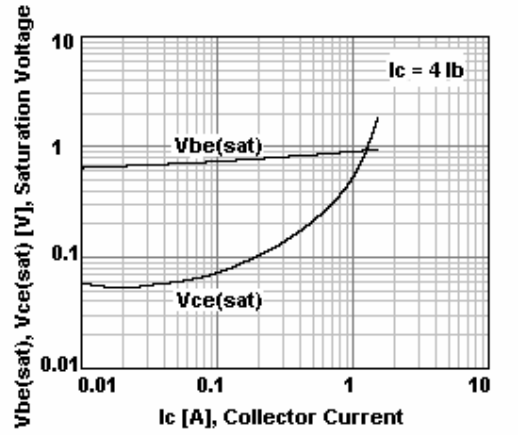



**Figure 4. Switching Time**

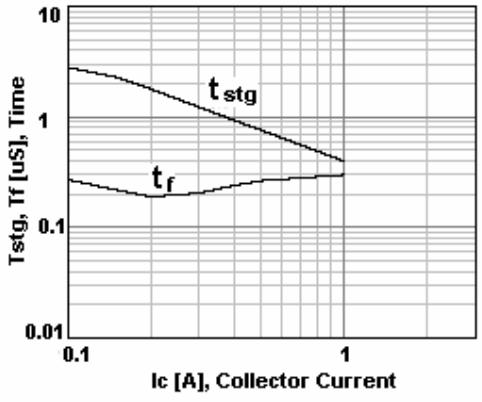



**Figure 5. Safe Operating Area**

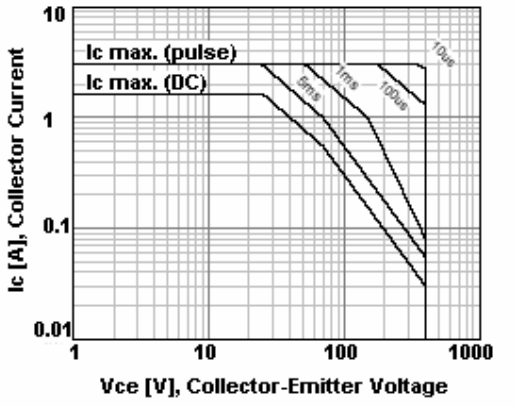
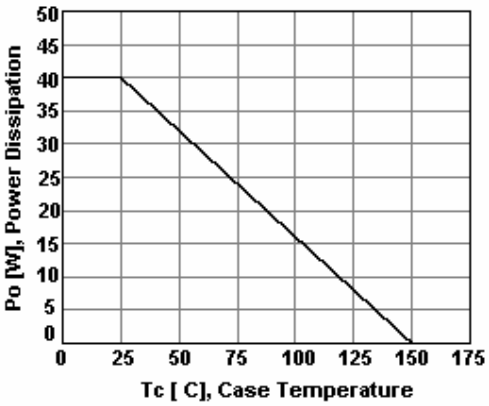
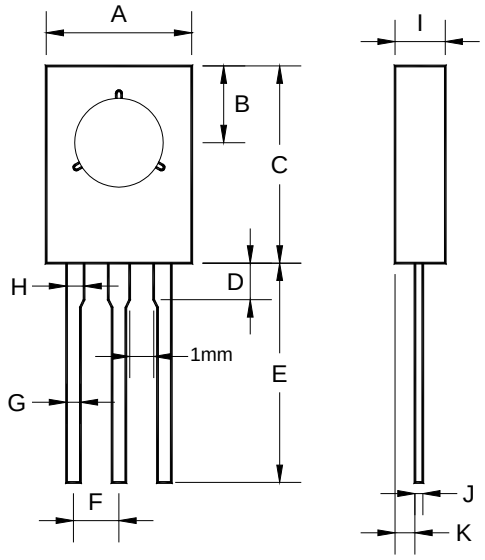



**Figure 6. Power Derating**

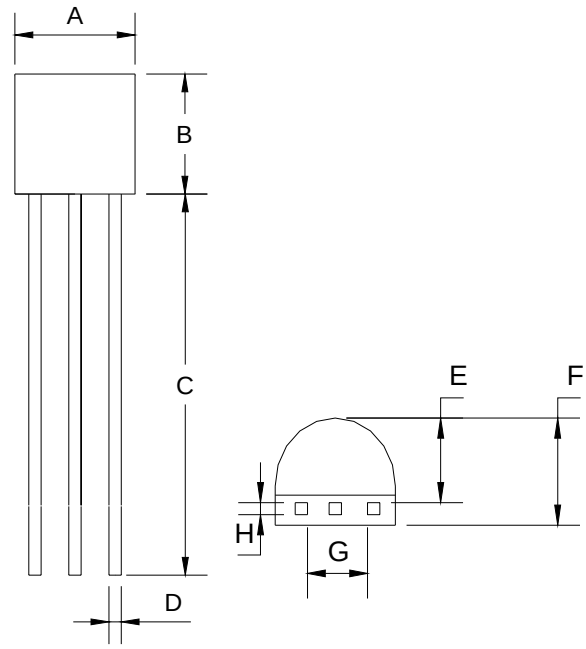


# TO-126 Mechanical Drawing




| TO-126 DIMENSION | | | | |
|---|---|---|---|---|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 8.00 (typ) | | 0.315(typ) | |
| B | 4.20 (typ) | | 0.165 (typ) | |
| C | 10.58 | 11.00 | 0.417 | 0.433 |
| D | 2.00 (typ) | | 0.079 (typ) | |
| E | 12.00(typ) | | 0.472(typ) | |
| F | 2.50(typ) | | 0.098 (typ) | |
| G | 0.74 | 0.78 | 0.029 | 0.031 |
| H | 0.8 (typ) | | 0.031(typ) | |
| I | 2.56 | 3.00 | 0.101 | 0.118 |
| J | 0.38 | 0.50 | 0.015 | 0.020 |
| K | 1.1 (typ) | | 0.043 (typ) | |

# TO-92 Mechanical Drawing




| TO-92 DIMENSION | | | | |
|---|---|---|---|---|
| DIM | MILLIMETERS | | INCHES | |
| | MIN | MAX | MIN | MAX |
| A | 4.30 | 4.70 | 0.169 | 0.185 |
| B | 4.30 | 4.70 | 0.169 | 0.185 |
| C | 14.30(typ) | | 0.563(typ) | |
| D | 0.43 | 0.49 | 0.017 | 0.019 |
| E | 2.19 | 2.81 | 0.086 | 0.111 |
| F | 3.30 | 3.70 | 0.130 | 0.146 |
| G | 2.42 | 2.66 | 0.095 | 0.105 |
| H | 0.37 | 0.43 | 0.015 | 0.017 |
| | | | | |