

# 2SC4004

## Silicon NPN triple diffusion planar type

For high breakdown voltage high-speed switching

### ■ Features

- High-speed switching
- High collector-base voltage (Emitter open)  $V_{CBO}$
- Wide safe operation area
- Satisfactory linearity of forward current transfer ratio  $h_{FE}$
- Full-pack package which can be installed to the heat sink with one screw

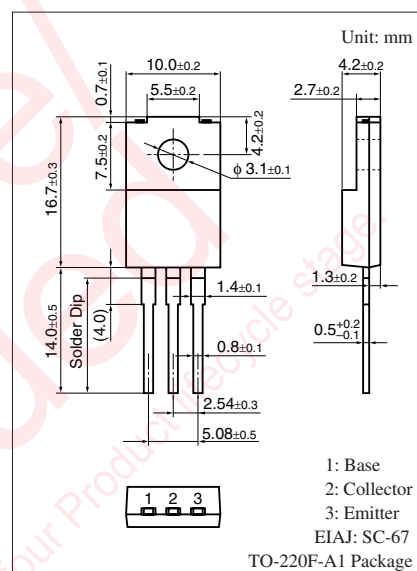
### ■ Absolute Maximum Ratings $T_C = 25^\circ\text{C}$

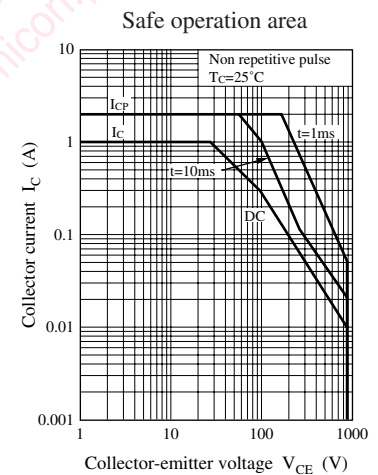
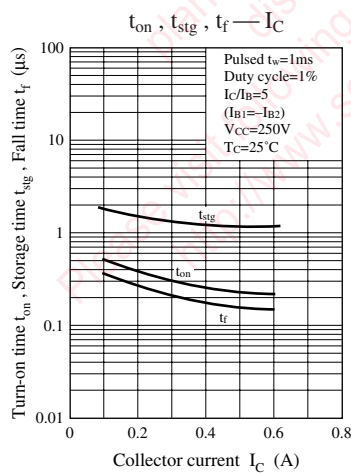
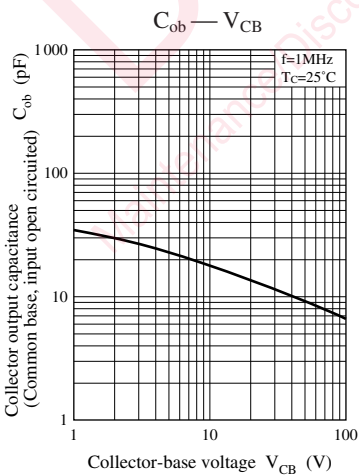
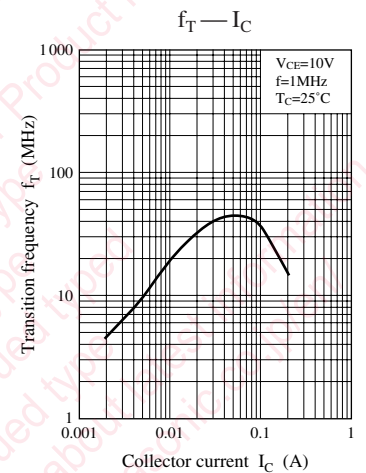
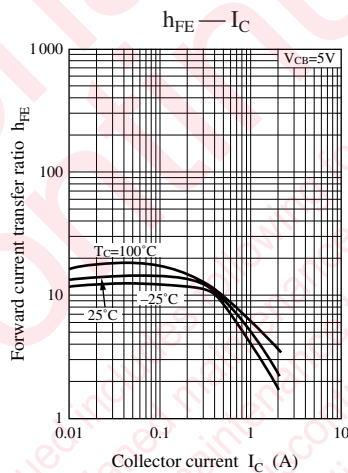
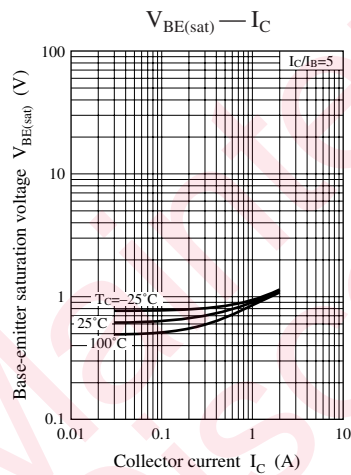
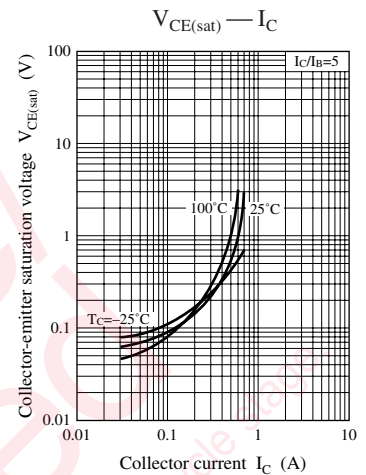
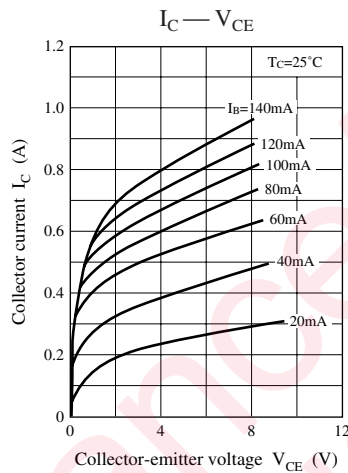
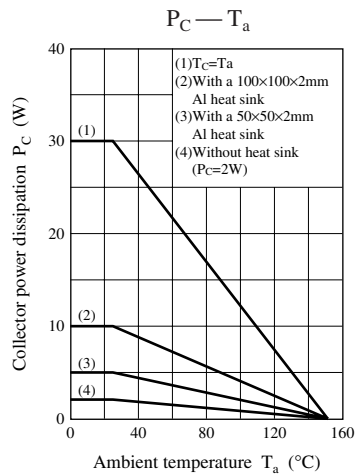
| Parameter                             | Symbol                     | Rating      | Unit               |
|---------------------------------------|----------------------------|-------------|--------------------|
| Collector-base voltage (Emitter open) | $V_{CBO}$                  | 900         | V                  |
| Collector-emitter voltage (E-B short) | $V_{CES}$                  | 900         | V                  |
| Collector-emitter voltage (Base open) | $V_{CEO}$                  | 800         | V                  |
| Emitter-base voltage (Collector open) | $V_{EBO}$                  | 7           | V                  |
| Base current                          | $I_B$                      | 0.3         | A                  |
| Collector current                     | $I_C$                      | 1           | A                  |
| Peak collector current                | $I_{CP}$                   | 2           | A                  |
| Collector power dissipation           | $P_C$                      | 30          | W                  |
|                                       |                            | 2.0         |                    |
|                                       | $T_a = 25^{\circ}\text{C}$ |             |                    |
| Junction temperature                  | $T_j$                      | 150         | $^{\circ}\text{C}$ |
| Storage temperature                   | $T_{stg}$                  | -55 to +150 | $^{\circ}\text{C}$ |

### ■ Electrical Characteristics $T_C = 25^\circ\text{C} \pm 3^\circ\text{C}$

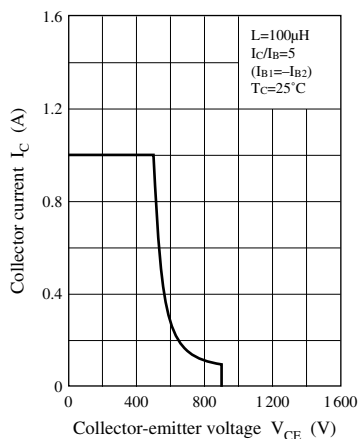
| Parameter                                    | Symbol        | Conditions                                                    | Min | Typ | Max | Unit          |
|----------------------------------------------|---------------|---------------------------------------------------------------|-----|-----|-----|---------------|
| Collector-emitter voltage (Base open)        | $V_{CEO}$     | $I_C = 1\text{ mA}, I_B = 0$                                  | 800 |     |     | V             |
| Collector-base cutoff current (Emitter open) | $I_{CBO}$     | $V_{CB} = 900\text{ V}, I_E = 0$                              |     |     | 50  | $\mu\text{A}$ |
| Emitter-base cutoff current (Collector open) | $I_{EBO}$     | $V_{EB} = 7\text{ V}, I_C = 0$                                |     |     | 50  | $\mu\text{A}$ |
| Forward current transfer ratio               | $h_{FE1}$     | $V_{CE} = 5\text{ V}, I_C = 0.05\text{ A}$                    | 6   |     |     | —             |
|                                              | $h_{FE2}$     | $V_{CE} = 5\text{ V}, I_C = 0.5\text{ A}$                     | 3   |     |     |               |
| Collector-emitter saturation voltage         | $V_{CE(sat)}$ | $I_C = 0.2\text{ A}, I_B = 0.04\text{ A}$                     |     |     | 1.5 | V             |
| Base-emitter saturation voltage              | $V_{BE(sat)}$ | $I_C = 0.2\text{ A}, I_B = 0.04\text{ A}$                     |     |     | 1.0 | V             |
| Transition frequency                         | $f_T$         | $V_{CE} = 10\text{ V}, I_C = 0.05\text{ A}, f = 1\text{ MHz}$ |     | 4   |     | MHz           |
| Turn-on time                                 | $t_{on}$      | $I_C = 0.2\text{ A}$                                          |     |     | 1.0 | $\mu\text{s}$ |
| Storage time                                 | $t_{stg}$     | $I_{B1} = 0.04\text{ A}, I_{B2} = -0.04\text{ A}$             |     |     | 3.0 | $\mu\text{s}$ |
| Fall time                                    | $t_f$         | $V_{CC} = 250\text{ V}$                                       |     |     | 1.0 | $\mu\text{s}$ |

(Note) Measuring methods are based on JAPANESE INDUSTRIAL STANDARD JIS C 7030 measuring methods for transistors.

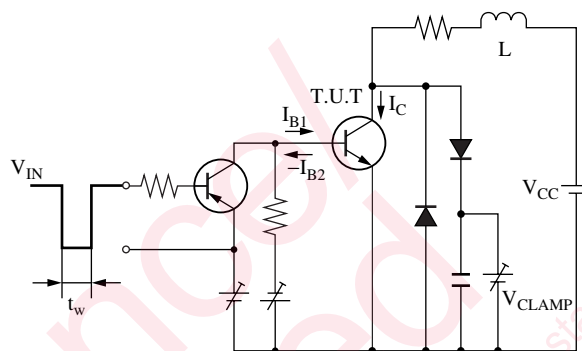
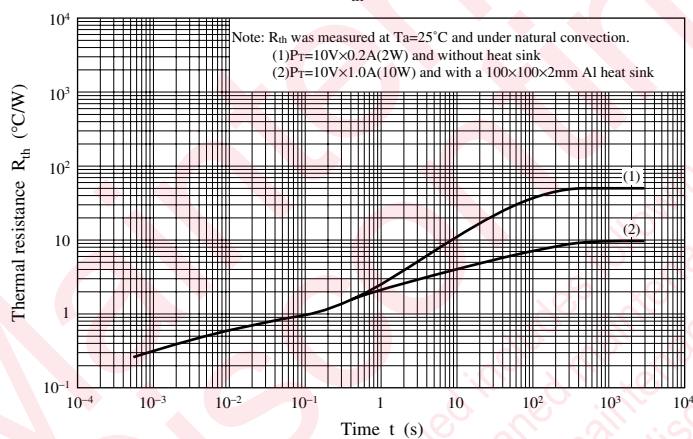




Safe operation area (Reverse bias)



Safe operation area (Reverse bias) measurement circuit

 $R_{th} - t$ 

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