

# 2SC3970, 2SC3970A

## Silicon NPN triple diffusion planar type

For high breakdown voltage high-speed switching

### Features

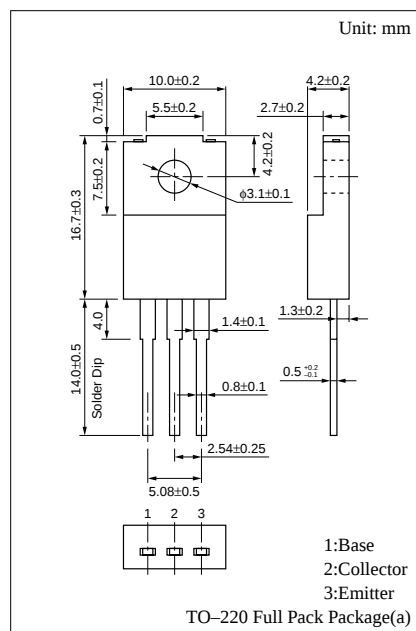
- High-speed switching
- High collector to base voltage  $V_{CBO}$
- Wide area of safe operation (ASO)
- Satisfactory linearity of forward current transfer ratio  $h_{FE}$
- Full-pack package which can be installed to the heat sink with one screw

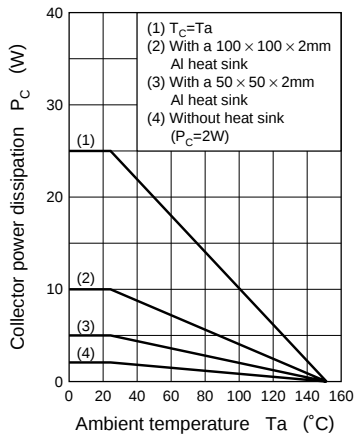
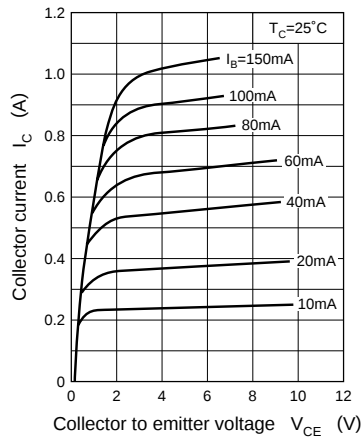
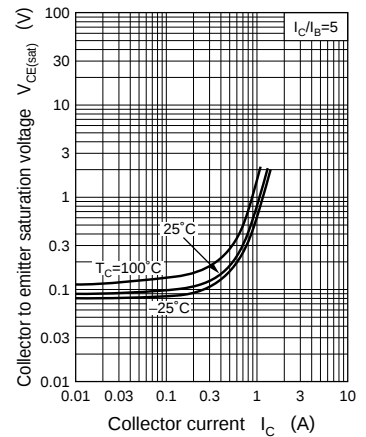
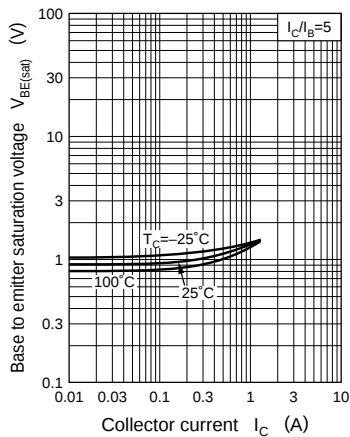
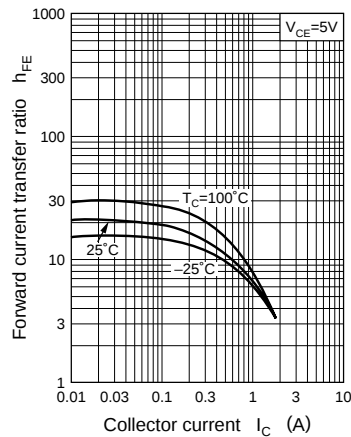
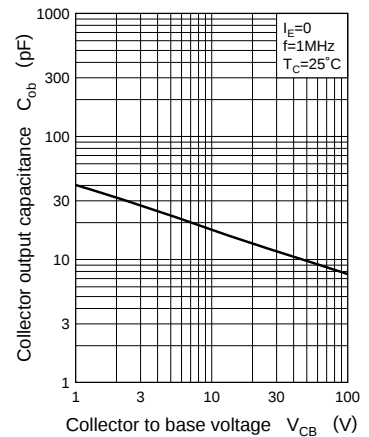
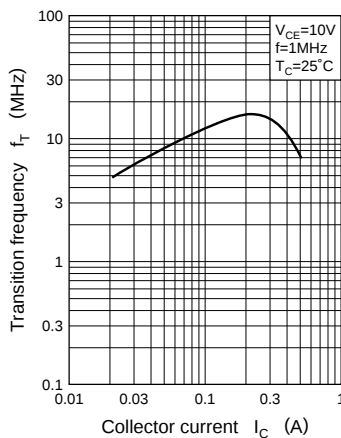
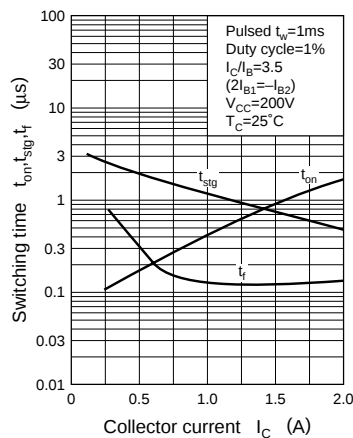
### Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ )

| Parameter                    | Symbol    | Ratings                   | Unit             |
|------------------------------|-----------|---------------------------|------------------|
| Collector to base voltage    | $V_{CBO}$ | 2SC3970 800               | V                |
|                              |           | 2SC3970A 900              |                  |
| Collector to emitter voltage | $V_{CES}$ | 2SC3970 800               | V                |
|                              |           | 2SC3970A 900              |                  |
| Collector to emitter voltage | $V_{CEO}$ | 500                       | V                |
| Emitter to base voltage      | $V_{EBO}$ | 8                         | V                |
| Peak collector current       | $I_{CP}$  | 3.0                       | A                |
| Collector current            | $I_C$     | 1.5                       | A                |
| Base current                 | $I_B$     | 0.5                       | A                |
| Collector power dissipation  | $P_C$     | $T_C=25^\circ\text{C}$ 25 | W                |
|                              |           | $T_a=25^\circ\text{C}$ 2  |                  |
| Junction temperature         | $T_j$     | 150                       | $^\circ\text{C}$ |
| Storage temperature          | $T_{stg}$ | -55 to +150               | $^\circ\text{C}$ |

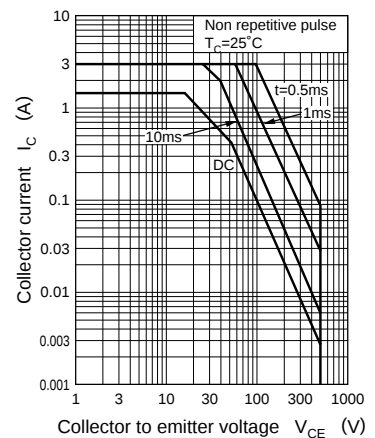
### Electrical Characteristics ( $T_C=25^\circ\text{C}$ )

| Parameter                               | Symbol        | Conditions                                                                               | min | typ | max | Unit          |
|-----------------------------------------|---------------|------------------------------------------------------------------------------------------|-----|-----|-----|---------------|
| Collector cutoff current                | $I_{CBO}$     | $V_{CB} = 800\text{V}, I_E = 0$                                                          |     |     | 100 | $\mu\text{A}$ |
|                                         |               | $V_{CB} = 900\text{V}, I_E = 0$                                                          |     |     | 100 |               |
| Emitter cutoff current                  | $I_{EBO}$     | $V_{EB} = 5\text{V}, I_C = 0$                                                            |     |     | 100 | $\mu\text{A}$ |
| Collector to emitter voltage            | $V_{CEO}$     | $I_C = 10\text{mA}, I_B = 0$                                                             | 500 |     |     | V             |
| Forward current transfer ratio          | $h_{FE1}$     | $V_{CE} = 5\text{V}, I_C = 0.1\text{A}$                                                  | 15  |     |     |               |
|                                         | $h_{FE2}$     | $V_{CE} = 5\text{V}, I_C = 0.6\text{A}$                                                  | 8   |     |     |               |
| Collector to emitter saturation voltage | $V_{CE(sat)}$ | $I_C = 0.6\text{A}, I_B = 0.17\text{A}$                                                  |     |     | 1.0 | V             |
| Base to emitter saturation voltage      | $V_{BE(sat)}$ | $I_C = 0.6\text{A}, I_B = 0.17\text{A}$                                                  |     |     | 1.5 | V             |
| Transition frequency                    | $f_T$         | $V_{CE} = 10\text{V}, I_C = 0.1\text{A}, f = 1\text{MHz}$                                |     | 20  |     | MHz           |
| Turn-on time                            | $t_{on}$      | $I_C = 0.6\text{A}, I_{B1} = 0.17\text{A}, I_{B2} = -0.34\text{A}, V_{CC} = 200\text{V}$ |     |     | 1.0 | $\mu\text{s}$ |
| Storage time                            | $t_{stg}$     |                                                                                          |     |     | 3.0 | $\mu\text{s}$ |
| Fall time                               | $t_f$         |                                                                                          |     |     | 0.3 | $\mu\text{s}$ |

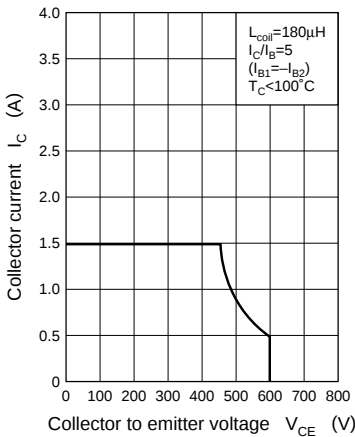


$P_C - T_a$  $I_C - V_{CE}$  $V_{CE(sat)} - I_C$  $V_{BE(sat)} - I_C$  $h_{FE} - I_C$  $C_{ob} - V_{CB}$  $f_T - I_C$  $t_{on}, t_{stg}, t_f - I_C$ 

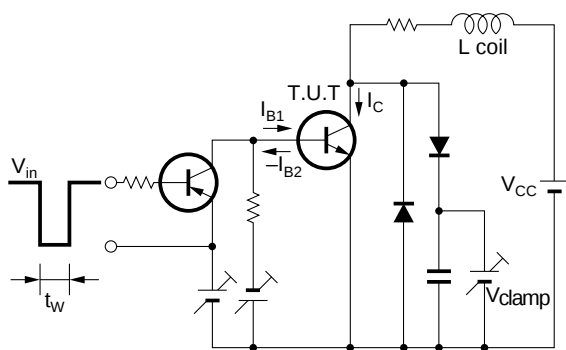
Area of safe operation (ASO)



Area of safe operation, reverse bias ASO



Reverse bias ASO measuring circuit



$R_{th(t)} - t$

