

TOSHIBA Transistor Silicon PNP Epitaxial Type

# 2SA2070

## High-Speed Switching Applications

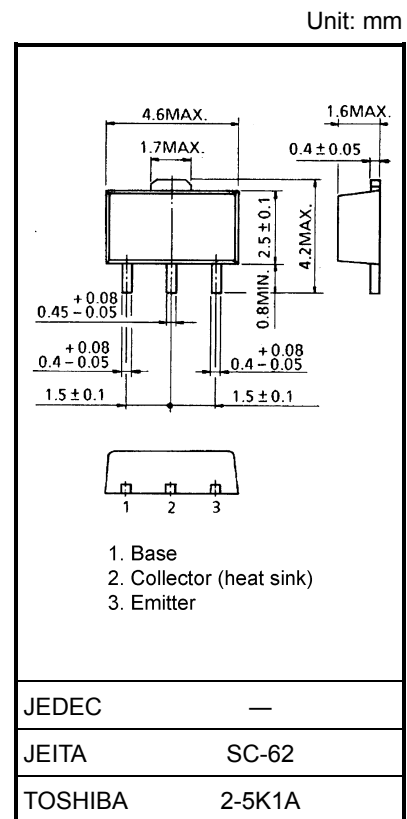
## DC-DC Converter Applications

- High DC current gain:  $h_{FE} = 200$  to  $500$  ( $I_C = -0.1$  A)
- Low collector-emitter saturation voltage:  $V_{CE(sat)} = -0.20$  V (max)
- High-speed switching:  $t_f = 70$  ns (typ.)

### Maximum Ratings (Ta = 25°C)

| Characteristics             |          | Symbol       | Rating     | Unit |
|-----------------------------|----------|--------------|------------|------|
| Collector-base voltage      |          | $V_{CBO}$    | -50        | V    |
| Collector-emitter voltage   |          | $V_{CEO}$    | -50        | V    |
| Emitter-base voltage        |          | $V_{EBO}$    | -7         | V    |
| Collector current           | DC       | $I_C$        | -1.0       | A    |
|                             | Pulse    | $I_{CP}$     | -2.0       |      |
| Base current                |          | $I_B$        | -0.1       | A    |
| Collector power dissipation | DC       | $P_C$ (Note) | 1.0        | W    |
|                             | t = 10 s |              | 2.0        |      |
| Junction temperature        |          | $T_j$        | 150        | °C   |
| Storage temperature range   |          | $T_{stg}$    | -55 to 150 | °C   |

Note: Mounted on FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645 mm<sup>2</sup>)

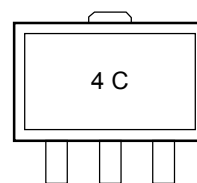
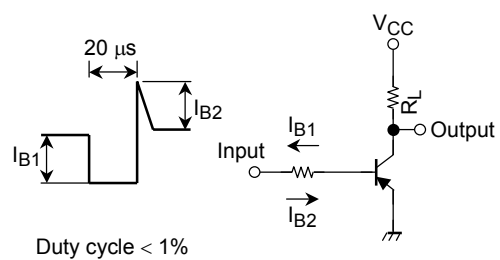


Weight: 0.05 g (typ.)

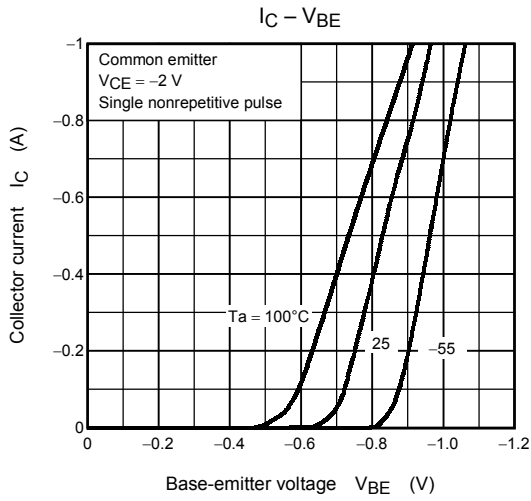
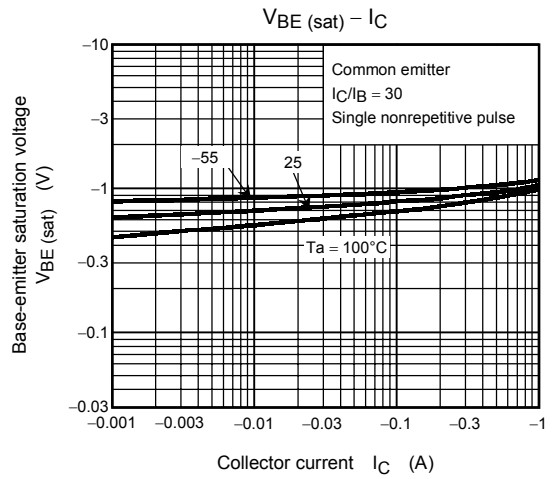
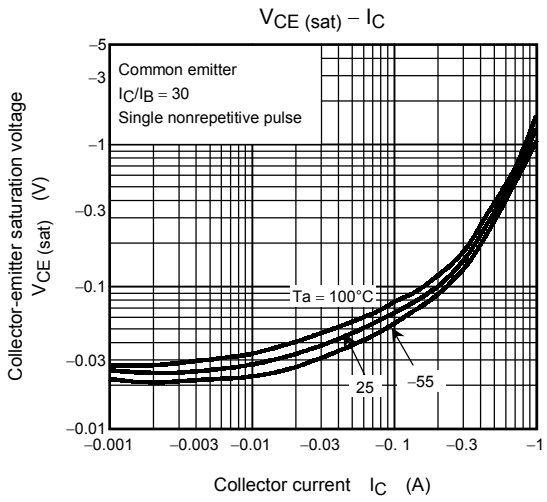
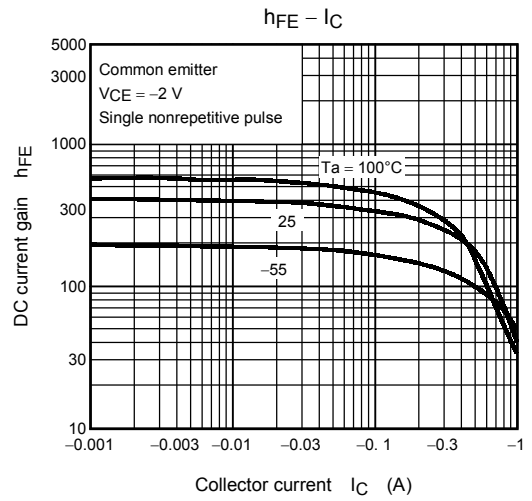
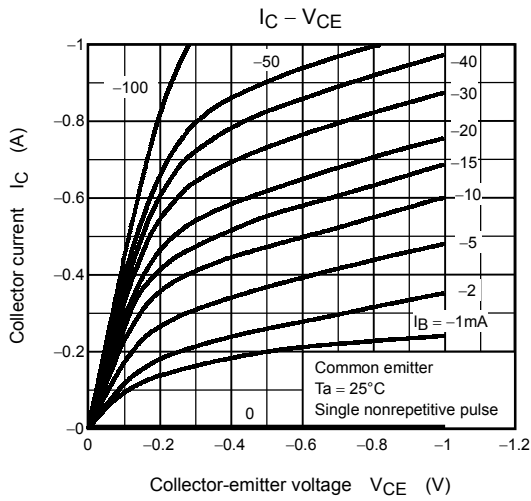
### Electrical Characteristics (Ta = 25°C)

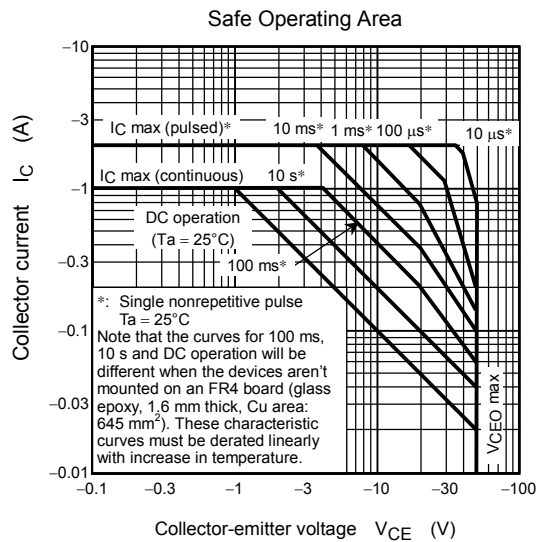
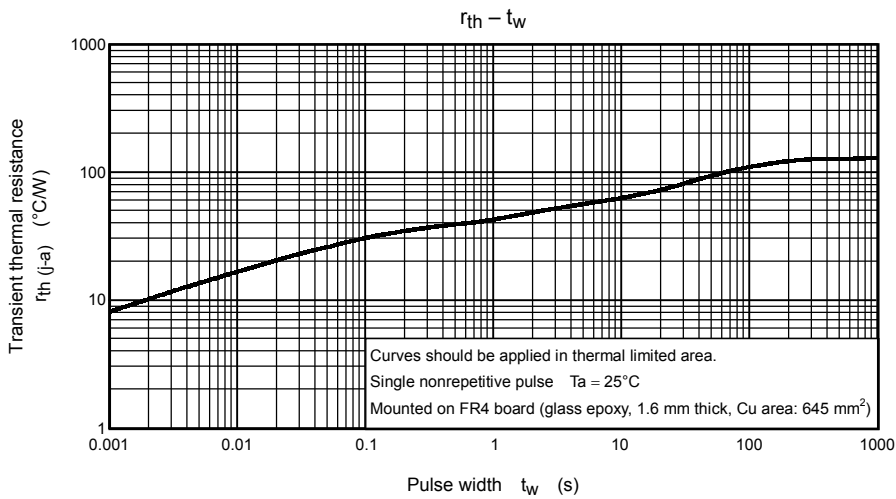
| Characteristics                      |              | Symbol                                      | Test Condition  | Min | Typ. | Max   | Unit |
|--------------------------------------|--------------|---|---|-----|------|-------|------|
| Collector cut-off current            |              | $I_{CBO}$                                   | $V_{CB} = -50\text{ V}, I_E = 0$  | —   | —    | -100  | nA   |
| Emitter cut-off current              |              | $I_{EBO}$                                   | $V_{EB} = -7\text{ V}, I_C = 0$   | —   | —    | -100  | nA   |
| Collector-emitter breakdown voltage  |              | $V_{(BR)CEO}$                               | $I_C = -10\text{ mA}, I_B = 0$  | -50 | —    | —     | V    |
| DC current gain                      | $h_{FE(1)}$  | $V_{CE} = -2\text{ V}, I_C = -0.1\text{ A}$ | 200   | —   | 500  |       |      |
|                                      | $h_{FE(2)}$  | $V_{CE} = -2\text{ V}, I_C = -0.3\text{ A}$ | 125   | —   | —    |       |      |
| Collector-emitter saturation voltage |              | $V_{CE(sat)}$                               | $I_C = -0.3\text{ A}, I_B = -0.01\text{ mA}$  | —   | —    | -0.20 | V    |
| Base-emitter saturation voltage      |              | $V_{BE(sat)}$                               | $I_C = -0.3\text{ A}, I_B = -0.01\text{ mA}$  | —   | —    | -1.10 | V    |
| Collector output capacitance         |              | $C_{ob}$                                    | $V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$  | —   | 8    | —     | pF   |
| Switching time                       | Rise time    | $t_r$                                       | See Figure 1 circuit diagram.<br>$V_{CC} \approx -30\text{ V}, R_L = 100\ \Omega$<br>$I_{B1} = -I_{B2} = -10\text{ mA}$ | —   | 60   | —     | ns   |
|                                      | Storage time | $t_{stg}$                                   |   | —   | 280  | —     |      |
|                                      | Fall time    | $t_f$                                       |   | —   | 70   | —     |      |

## Marking



**Figure 1 Switching Time Test Circuit & Timing Chart**





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