

TOSHIBA Transistor Silicon PNP Epitaxial Type

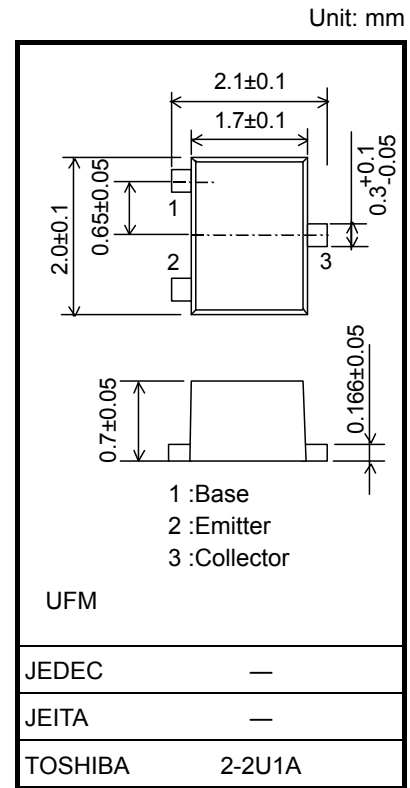
# 2SA2214

High-Speed Switching Applications  
 DC-DC Converter Applications  
 Strobe Applications

- High DC current gain:  $h_{FE} = 200$  to  $500$  ( $I_C = -1.5$  A)
- Low collector-emitter saturation voltage:  $V_{CE(sat)} = -0.14$  V (max)
- High-speed switching:  $t_f = 37$  ns (typ.)

### Absolute Maximum Ratings (Ta = 25°C)

| Characteristics             |       | Symbol         | Rating     | Unit |
|-----------------------------|-------|----------------|------------|------|
| Collector-base voltage      |       | $V_{CBO}$      | -20        | V    |
| Collector-emitter voltage   |       | $V_{CEO}$      | -20        | V    |
| Emitter-base voltage        |       | $V_{EBO}$      | -7         | V    |
| Collector current           | DC    | $I_C$          | -1.5       | A    |
|                             | Pulse | $I_{CP}$       | -2.5       |      |
| Base current                |       | $I_B$          | -150       | mA   |
| Collector power dissipation |       | $P_C$ (Note 1) | 800        | mW   |
|                             |       | $P_C$ (Note 2) | 500        |      |
| Junction temperature        |       | $T_j$          | 150        | °C   |
| Storage temperature range   |       | $T_{stg}$      | -55 to 150 | °C   |



Weight: 6.6 mg (typ.)

Note 1: Mounted on ceramic board.(25.4 mm × 25.4 mm × 0.8 mm, Cu Pad: 645 mm<sup>2</sup> )

Note 2: Mounted on FR4 board.(25.4 mm × 25.4 mm × 1.6mm, Cu Pad: 645 mm<sup>2</sup> )

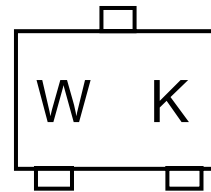
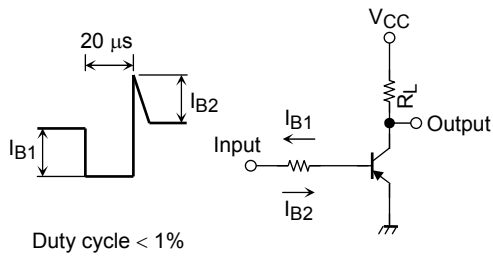
Note 3: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e.operatingtemperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

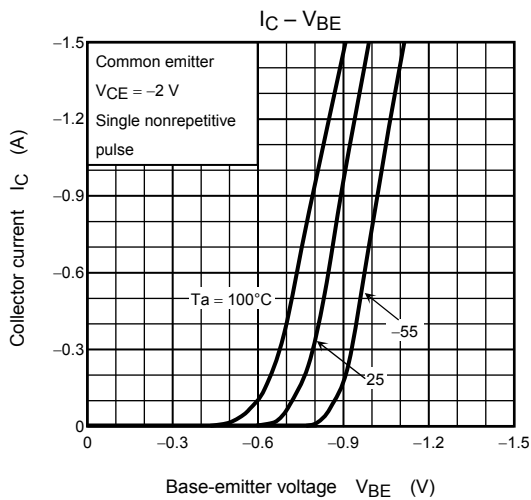
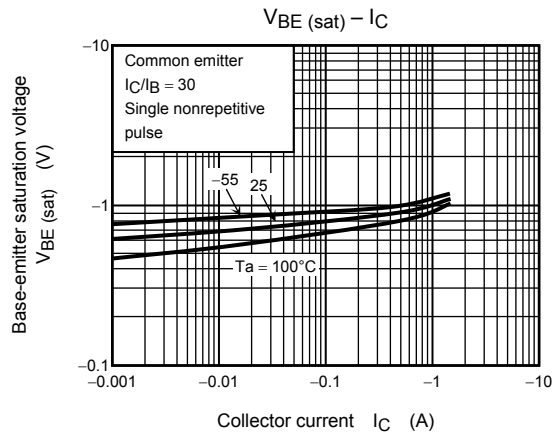
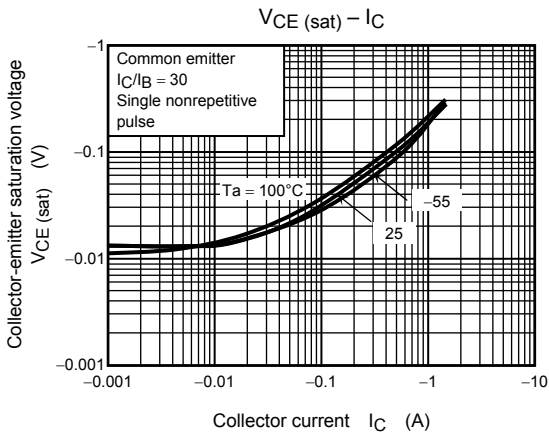
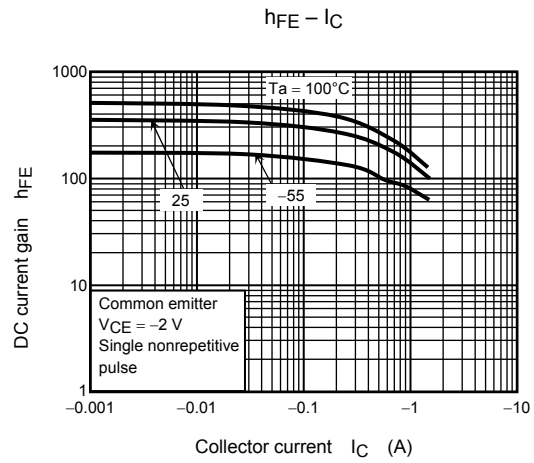
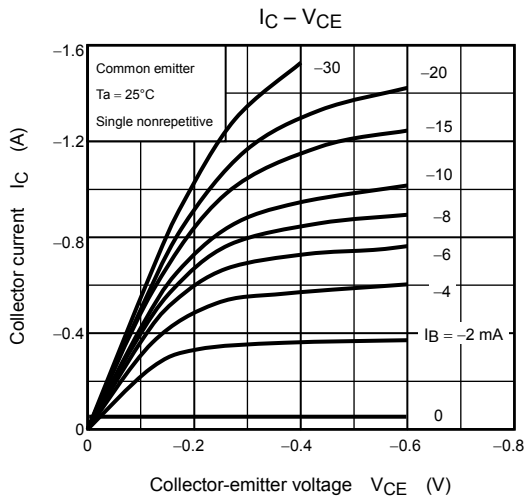
**Electrical Characteristics (Ta = 25°C)**

| Characteristics                      |              | Symbol        | Test Condition                                  | Min | Typ. | Max   | Unit |
|--------------------------------------|--------------|---------------|-------------------------------------------------|-----|------|-------|------|
| Collector cut-off current            |              | $I_{CBO}$     | $V_{CB} = -20\text{ V}, I_E = 0$                | —   | —    | -100  | nA   |
| Emitter cut-off current              |              | $I_{EBO}$     | $V_{EB} = -7\text{ V}, I_C = 0$                 | —   | —    | -100  | nA   |
| Collector-emitter breakdown voltage  |              | $V_{(BR)CEO}$ | $I_C = -10\text{ mA}, I_B = 0$                  | -20 | —    | —     | V    |
| DC current gain                      |              | $h_{FE}(1)$   | $V_{CE} = -2\text{ V}, I_C = -0.15\text{ A}$    | 200 | —    | 500   |      |
|                                      |              | $h_{FE}(2)$   | $V_{CE} = -2\text{ V}, I_C = -0.5\text{ A}$     | 125 | —    | —     |      |
| Collector-emitter saturation voltage |              | $V_{CE(sat)}$ | $I_C = -0.5\text{ A}, I_B = -17\text{ mA}$      | —   | —    | -0.14 | V    |
| Base-emitter saturation voltage      |              | $V_{BE(sat)}$ | $I_C = -0.5\text{ A}, I_B = -17\text{ mA}$      | —   | —    | -1.10 | V    |
| Switching time                       | Rise time    | $t_r$         | See Figure 1 circuit diagram.                   | —   | 40   | —     | ns   |
|                                      | Storage time | $t_{stg}$     | $V_{CC} \approx -10\text{ V}, R_L = 20\ \Omega$ | —   | 135  | —     |      |
|                                      | Fall time    | $t_f$         | $I_{B1} = -I_{B2} = -17\text{ mA}$              | —   | 37   | —     |      |

**Marking**



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



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