

TOSHIBA Transistor Silicon NPN Epitaxial Type

2SC6133

High-Speed Switching Applications
DC-DC Converter Applications

- High DC current gain: $h_{FE} = 400$ to 1000 ($I_C = 0.15A$)
- Low collector-emitter saturation voltage: $V_{CE(sat)} = 0.12$ V (max)
- High-speed switching: $t_f = 45$ ns (typ.)

Absolute Maximum Ratings ($T_a = 25^\circ C$)

| Characteristics | | Symbol | Rating | Unit |
|-----------------------------|-------|---------------|------------|------------|
| Collector-base voltage | | V_{CBO} | 40 | V |
| Collector-emitter voltage | | V_{CEX} | 30 | 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 (Note1) | 800 | mW |
| | | P_C (Note2) | 500 | |
| Junction temperature | | T_j | 150 | $^\circ C$ |
| Storage temperature range | | T_{stg} | -55 to 150 | $^\circ C$ |

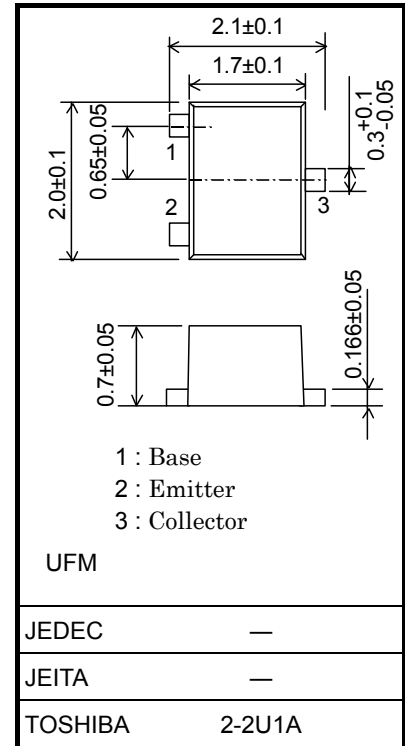
Note1: Mounted on ceramic board.
(25.4 mm × 25.4 mm × 0.8 mm, Cu Pad: 645 mm²)

Note2: Mounted on FR4 board.
(25.4 mm × 25.4 mm × 1.6 mm, Cu Pad: 645 mm²)

Note3: 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. operating temperature/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).

Unit: mm

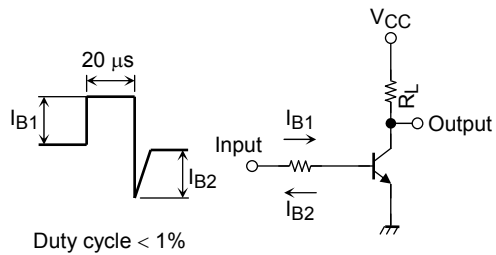


Weight: 6.6 mg (typ.)

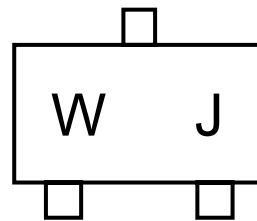
Start of commercial production
2007-08

Electrical Characteristics (Ta = 25°C)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|---------------|---------------------------------------------------|------------------------------------------------|------|------|------|
| Collector cut-off current | I_{CBO} | $V_{CB} = 40\text{ V}, I_E = 0$ | — | — | 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 | $h_{FE}(1)$ | $V_{CE} = 2\text{ V}, I_C = 0.15\text{ A}$ | 400 | — | 1000 | |
| | $h_{FE}(2)$ | $V_{CE} = 2\text{ V}, I_C = 0.5\text{ A}$ | 200 | — | — | |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C = 0.5\text{ A}, I_B = 10\text{ mA}$ | — | — | 0.12 | V |
| Base-emitter saturation voltage | $V_{BE(sat)}$ | $I_C = 0.5\text{ A}, I_B = 10\text{ mA}$ | — | — | 1.10 | V |
| Collector output capacitance | C_{ob} | $V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$ | — | 18 | — | pF |
| Switching time | Rise time | t_r | See Figure 1. | | — | ns |
| | Storage time | t_{stg} | $V_{CC} \approx 12\text{ V}, R_L = 24\ \Omega$ | | — | |
| | Fall time | t_f | $I_{B1} = -I_{B2} = 17\text{ mA}$ | | — | |

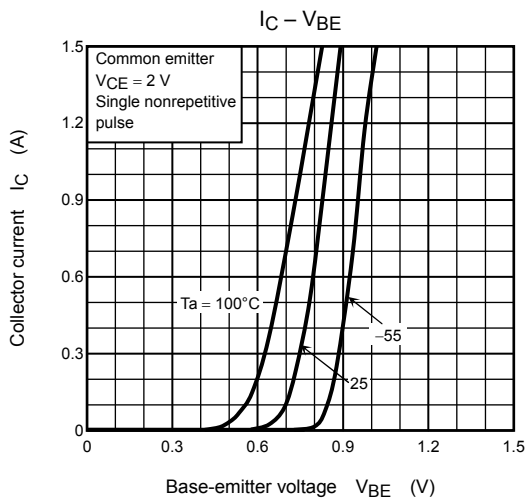
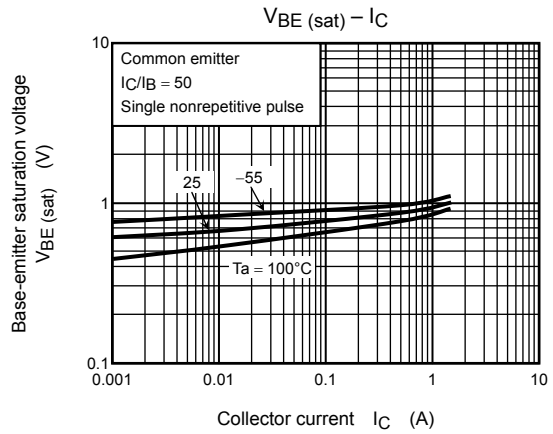
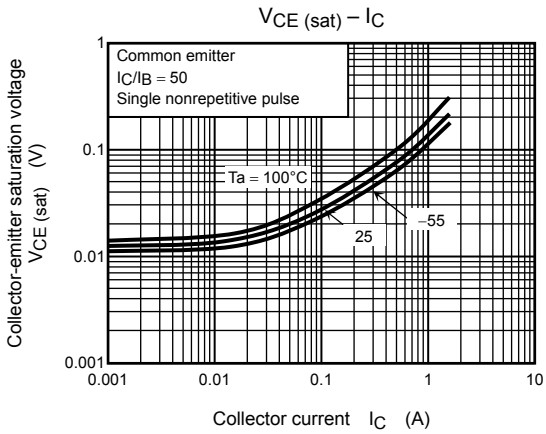
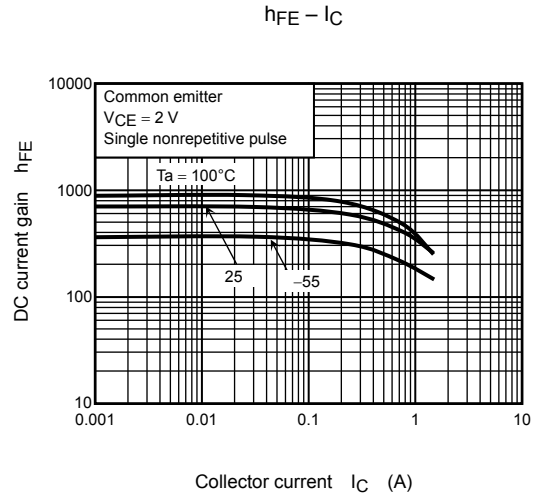
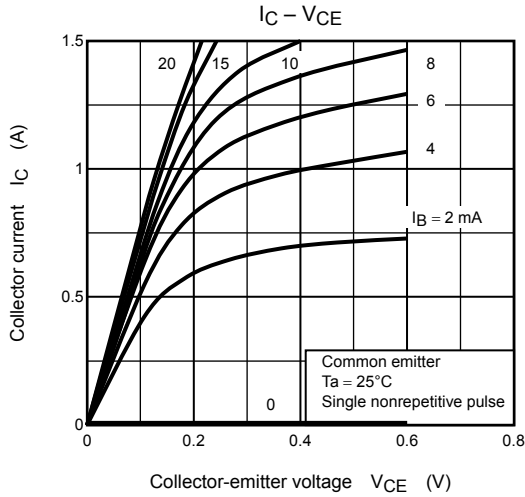


Marking



WJ: Part No. (or abbreviation code)

Figure 1 Switching Time Test Circuit & Timing Chart



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