

TTC017

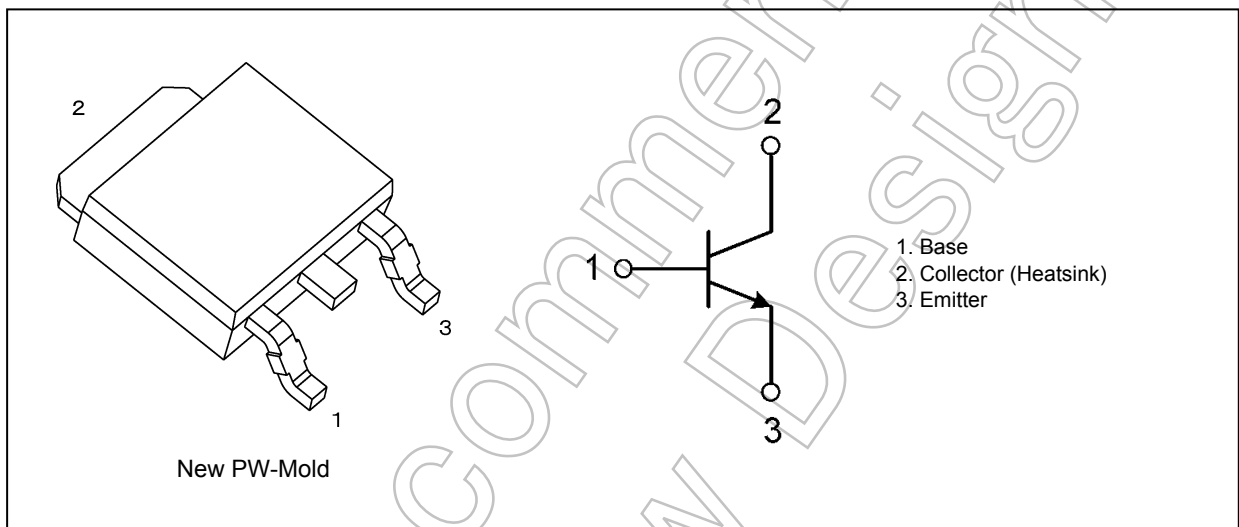
1. Applications

- Power Amplifiers
- Power Switching

2. Features

- (1) High DC current gain : $h_{FE} = 180$ to 450 ($I_C = 0.5$ A)
- (2) Low collector saturation voltage : $V_{CE(sat)} = 0.5$ V (max) ($I_C = 1$ A)
- (3) High-speed switching : $t_{stg} = 400$ ns (typ.) ($I_C = 1$ A)

3. Packaging and Internal Circuit



Start of commercial production

2015-03

4. Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$)

| Characteristics | Symbol | Rating | Unit |
|------------------------------------------------------------------|-----------|------------|------------------|
| Collector-base voltage | V_{CBO} | 160 | V |
| Collector-emitter voltage | V_{CEX} | 160 | |
| | V_{CEO} | 80 | |
| Emitter-base voltage | V_{EBO} | 9 | A |
| Collector current (DC) (Note 1) | I_C | 3 | |
| Collector current (pulsed) (Note 1) | I_{CP} | 5 | |
| Base current | I_B | 1.5 | W |
| Collector power dissipation | P_C | 1.2 | |
| Collector power dissipation ($T_c = 25\text{ }^\circ\text{C}$) | P_C | 12 | |
| Junction temperature (Note 2) | T_j | 175 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | -55 to 150 | |

Note: 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.).

Note 1: Ensure that the junction temperature does not exceed $175\text{ }^\circ\text{C}$.

Note 2: Merely junction temperature is guaranteed $175\text{ }^\circ\text{C}$.

Storage temperature range is guaranteed as usual (-55 to $150\text{ }^\circ\text{C}$).

5. Electrical Characteristics

5.1. Static Characteristics (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|--------------------------------------|------------------|-------------------------------------------|-----|------|-----|------|
| Collector cut-off current | I_{CBO} | $V_{CB} = 160\text{ V}, I_E = 0\text{ A}$ | — | — | 100 | nA |
| Emitter cut-off current | I_{EBO} | $V_{EB} = 9\text{ V}, I_C = 0\text{ A}$ | — | — | 100 | |
| Collector-emitter breakdown voltage | $V_{(BR)CEO}$ | $I_C = 10\text{ mA}, I_B = 0\text{ A}$ | 80 | — | — | V |
| DC current gain | $h_{FE(1)}$ | $V_{CE} = 2\text{ V}, I_C = 1\text{ mA}$ | 150 | — | — | — |
| | $h_{FE(2)}$ | $V_{CE} = 2\text{ V}, I_C = 0.5\text{ A}$ | 180 | — | 450 | |
| | $h_{FE(3)}$ | $V_{CE} = 2\text{ V}, I_C = 1\text{ A}$ | 100 | — | — | |
| Collector-emitter saturation voltage | $V_{CE(sat)(1)}$ | $I_C = 0.5\text{ A}, I_B = 50\text{ mA}$ | — | — | 0.3 | V |
| | $V_{CE(sat)(2)}$ | $I_C = 1\text{ A}, I_B = 100\text{ mA}$ | — | — | 0.5 | |
| Base-emitter saturation voltage | $V_{BE(sat)}$ | $I_C = 1\text{ A}, I_B = 100\text{ mA}$ | — | — | 1.5 | |

5.2. Dynamic Characteristics (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|-------------------------------|-----------|---------------------------------------------------------------------------------------------------|-----|------|-----|------|
| Collector output capacitance | C_{ob} | $V_{CB} = 10\text{ V}, I_E = 0\text{ A}, f = 1\text{ MHz}$ | — | 14 | — | pF |
| Transition frequency | f_T | $V_{CE} = 2\text{ V}, I_C = 0.5\text{ A}$ | — | 150 | — | MHz |
| Switching time (rise time) | t_r | See Figure 5.2.1. | — | 50 | — | ns |
| Switching time (storage time) | t_{stg} | $V_{CC} \approx 24\text{ V}, R_L = 24\ \Omega,$ $I_{B1} = 0.1\text{ A}, I_{B2} = 0.1\text{ A}$ | — | 400 | — | |
| Switching time (fall time) | t_f | | — | 150 | — | |

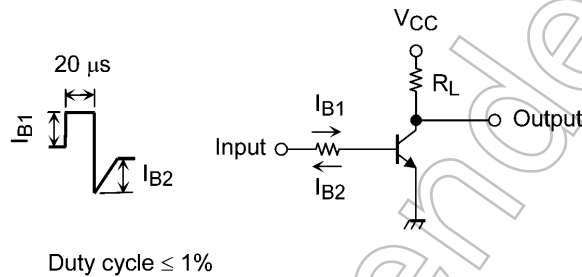


Fig. 5.2.1 Switching Time Test Circuit

6. Marking (Note)

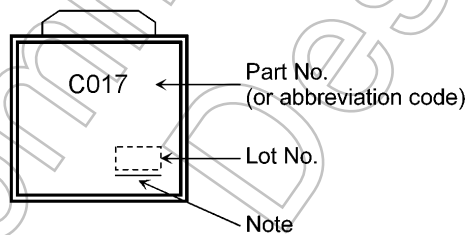


Fig. 6.1 Marking

Note: A line under a Lot No. identifies the indication of product Labels.
[[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product.

The RoHS is the Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

7. Characteristics Curves (Note)

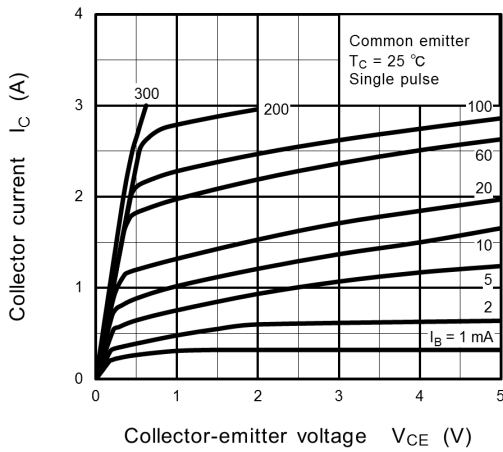


Fig. 7.1 $I_c - V_{ce}$

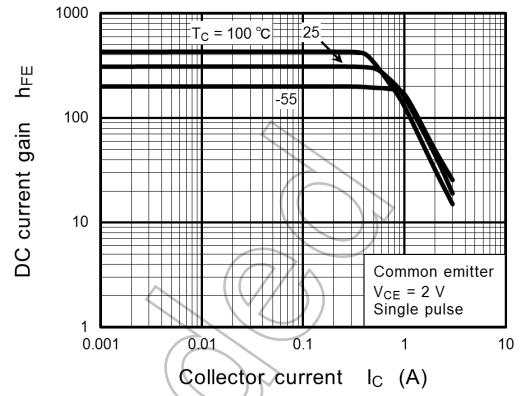


Fig. 7.2 $h_{FE} - I_c$

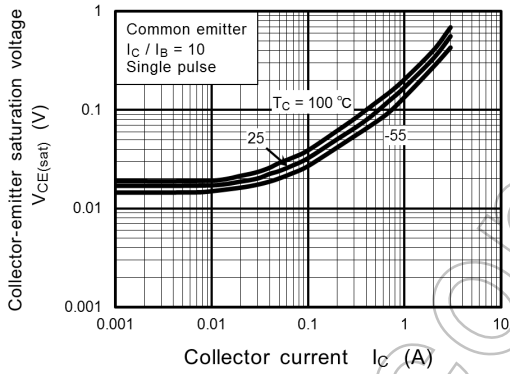


Fig. 7.3 $V_{ce(sat)} - I_c$

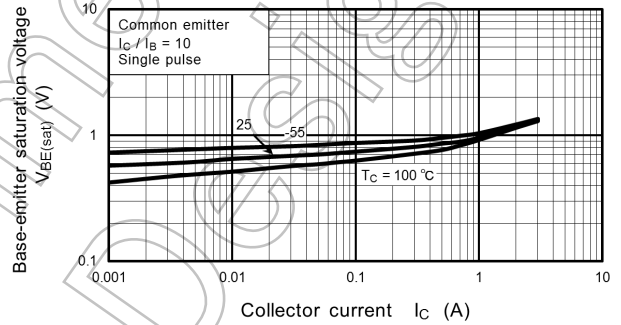


Fig. 7.4 $V_{be(sat)} - I_c$

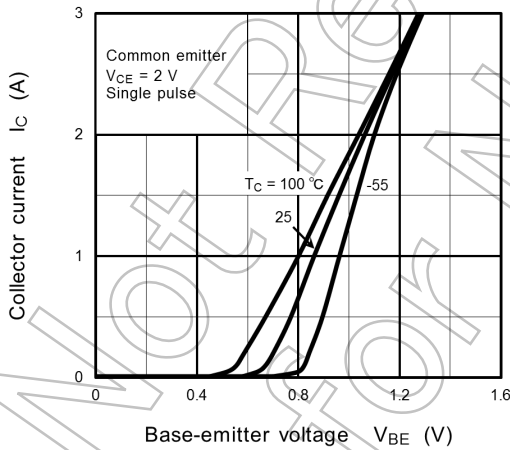


Fig. 7.5 $I_c - V_{be}$

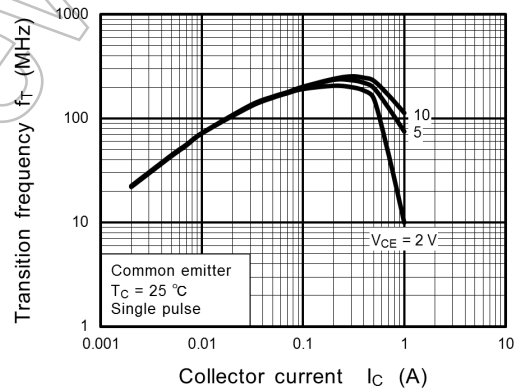


Fig. 7.6 $f_T - I_c$

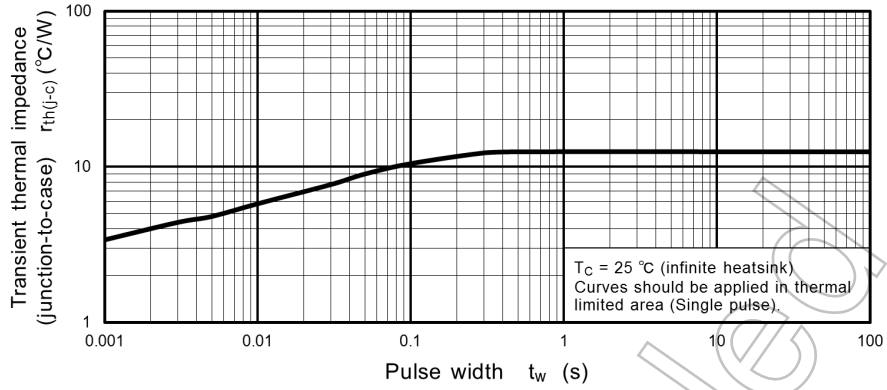


Fig. 7.7 $r_{th} - t_w$
(Guaranteed Maximum)

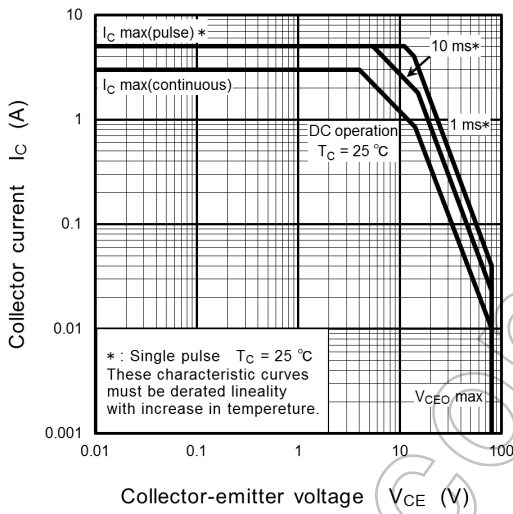
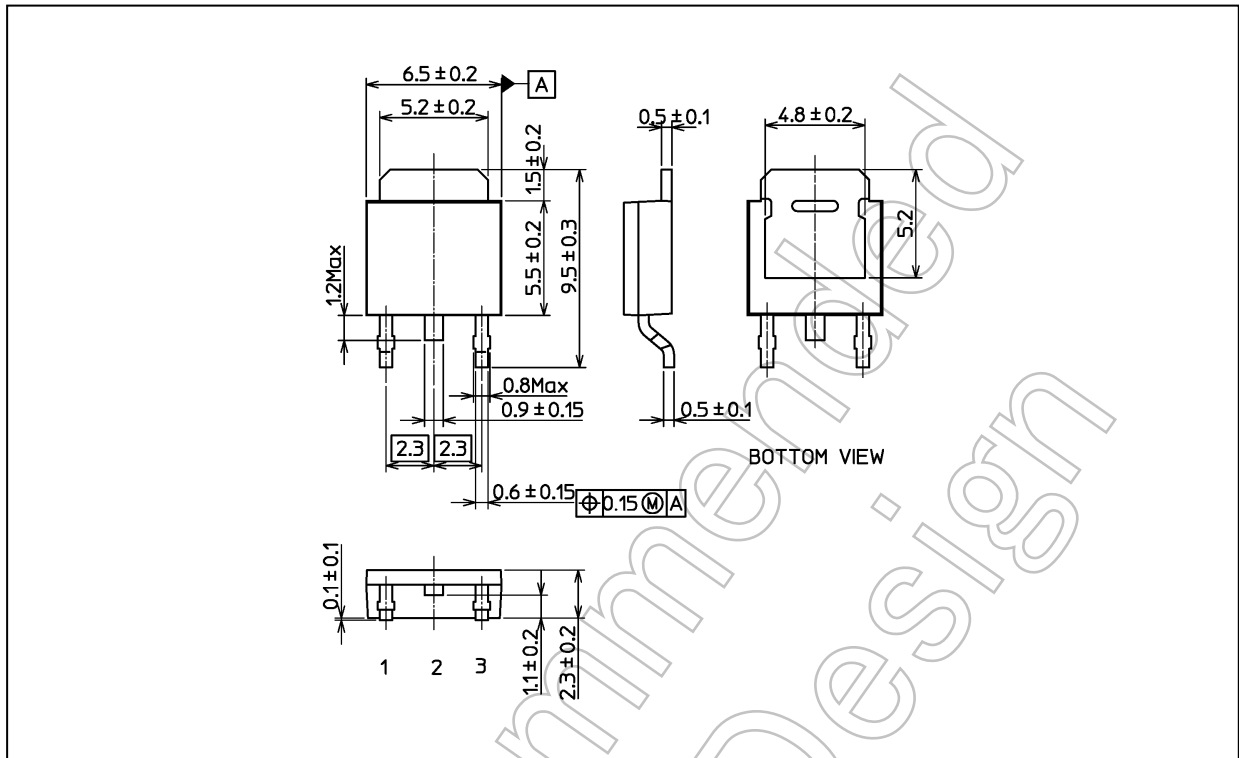


Fig. 7.8 Safe Operating Area
(Guaranteed Maximum)

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Package Dimensions

Unit: mm



Weight: 0.36 g (typ.)

| Package Name(s) |
|-----------------------|
| TOSHIBA: 2-7J1S |
| Nickname: New PW-Mold |

Not Recommended for New Design

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