Bipolar Transistors Silicon PNP Triple-Diffused Type

# 2SA2034

## 1. Applications

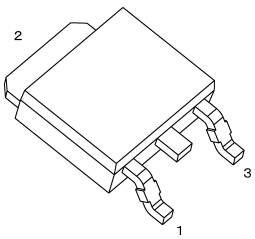
- High-Voltage Switching

## 2. Features

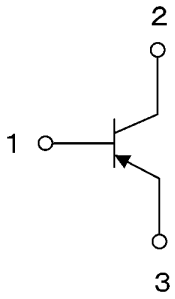
(1) High collector voltage: $V_{CEO}$ = -400 V (min)

(2) High-speed switching: $t_f$ = 0.3 μs (max) ($I_C$ = -1.0 A)

## 3. Packaging and Internal Circuit




New PW-Mold




1. Base
2. Collector (Heatsink)
3. Emitter

## 4. Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a$ = 25 °C)

| Characteristics | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Collector-base voltage | | $V_{CBO}$ | -400 | V |
| Collector-emitter voltage | | $V_{CEO}$ | -400 | |
| Emitter-base voltage | | $V_{EBO}$ | -7 | |
| Collector current (DC) | (Note 1) | $I_C$ | -2 | A |
| Collector current (pulsed) | (Note 1) | $I_{CP}$ | -4 | |
| Base current | | $I_B$ | -1 | |
| Collector power dissipation | ($T_a$ = 25 °C) | $P_C$ | 1 | W |
| Collector power dissipation | ($T_c$ = 25 °C) | $P_C$ | 15 | |
| Junction temperature | | $T_j$ | 150 | °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 150 °C.

Start of commercial production
2000-02

## 5. Thermal Characteristics

| Characteristics | Symbol | Max | Unit |
|---|---|---|---|
| Junction-to-case thermal resistance | $R_{th(j-c)}$ | 8.33 | °C/W |
| Junction-to-ambient thermal resistance | $R_{th(j-a)}$ | 125 | |

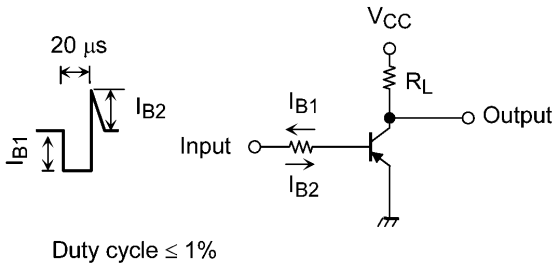
## 6. Electrical Characteristics

### 6.1. Static Characteristics (Unless otherwise specified, $T_a$ = 25 °C)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Collector cut-off current | $I_{CBO}$ | $V_{CB}$ = -400 V, $I_E$ = 0 A | — | — | -10 | μA |
| Emitter cut-off current | $I_{EBO}$ | $V_{EB}$ = -7 V, $I_C$ = 0 A | — | — | -1 | |
| Collector-emitter breakdown voltage | $V_{(BR)CEO}$ | $I_C$ = -10 mA, $I_B$ = 0 A | -400 | — | — | V |
| DC current gain | $h_{FE(1)}$ | $V_{CE}$ = -5 V, $I_C$ = -1 mA | 80 | — | — | — |
| | $h_{FE(2)}$ | $V_{CE}$ = -5 V, $I_C$ = -0.1 A | 80 | — | 240 | — |
| Collector-emitter saturation voltage | $V_{CE(sat)}$ | $I_C$ = -0.5 A, $I_B$ = -0.1 A | — | — | -1.0 | V |
| Base-emitter saturation voltage | $V_{BE(sat)}$ | $I_C$ = -0.5 A, $I_B$ = -0.1 A | — | — | -1.5 | |

### 6.2. Dynamic Characteristics (Unless otherwise specified, $T_a$ = 25 °C)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Switching time (rise time) | $t_r$ | See Fig. 6.2.1 | — | — | 0.3 | μs |
| Switching time (storage time) | $t_{stg}$ | $V_{CC}$ ≈ -200 V, $R_L$ = 200 Ω, $I_{B1}$ = -0.2 A, $I_{B2}$ = 0.2 A, | — | — | 2.5 | μs |
| Switching time (fall time) | $t_f$ | | — | — | 0.3 | μs |




Duty cycle ≤ 1%

**Fig. 6.2.1 Switching Time Test Circuit**

## 7. Marking (Note)

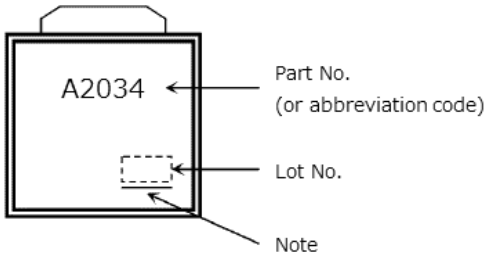



**Fig. 7.1 Marking**

Note: A line under a Lot No. identifies the indication of product Labels.
Not underlined: [[Pb]]/INCLUDES > MCV
Underlined: [[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.

## 8. Characteristics Curves (Note)

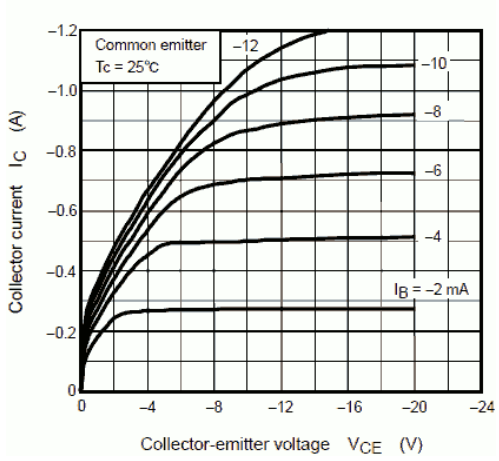



Fig. 8.1 $I_C$ - $V_{CE}$

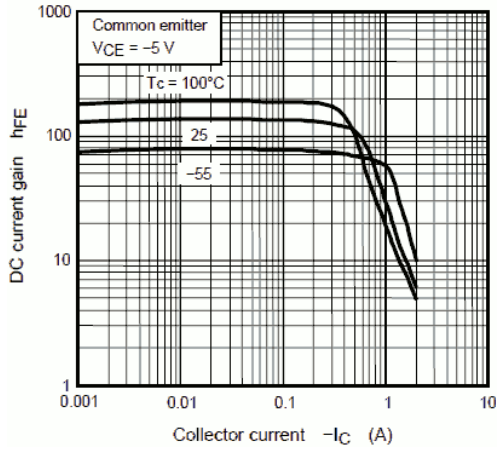



Fig. 8.2 $h_{FE}$ - $I_C$

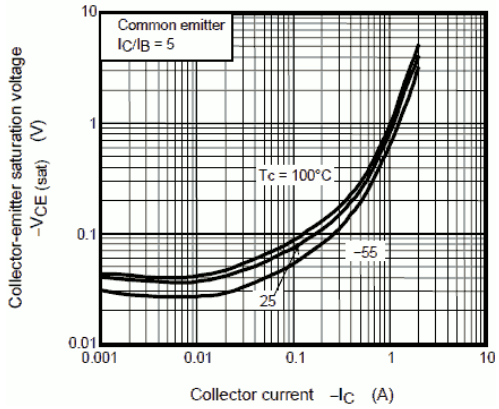



Fig. 8.3 $V_{CE(sat)}$ - $I_C$

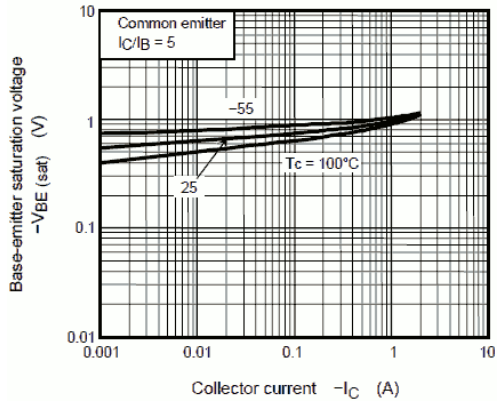



Fig. 8.4 $V_{BE(sat)}$ - $I_C$

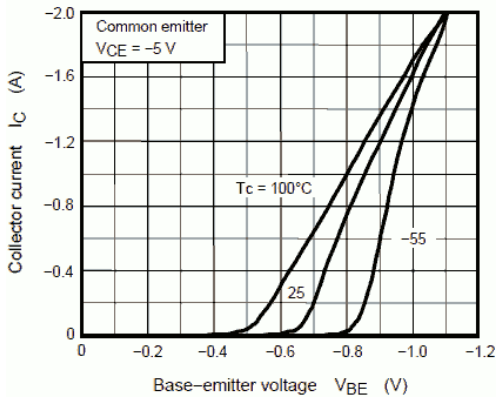



Fig. 8.5 $I_C$ - $V_{BE}$

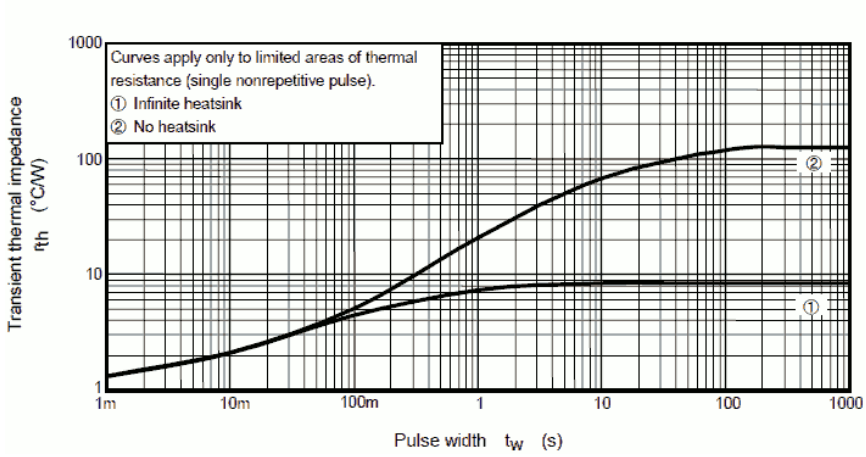



**Fig. 8.6 $r_{th(j-a)}$ - $t_w$ (Guaranteed Maximum)**

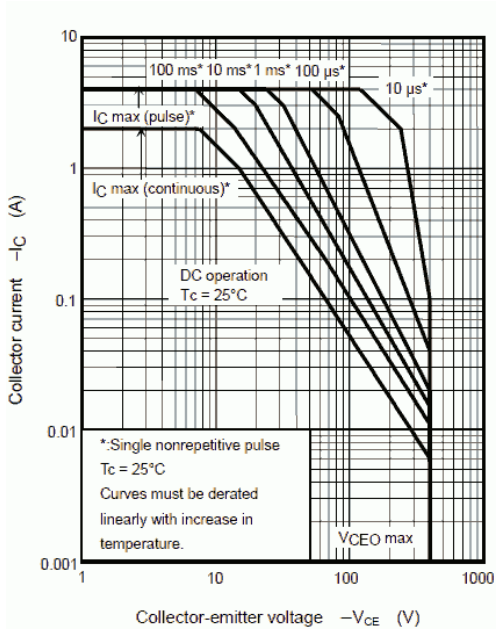
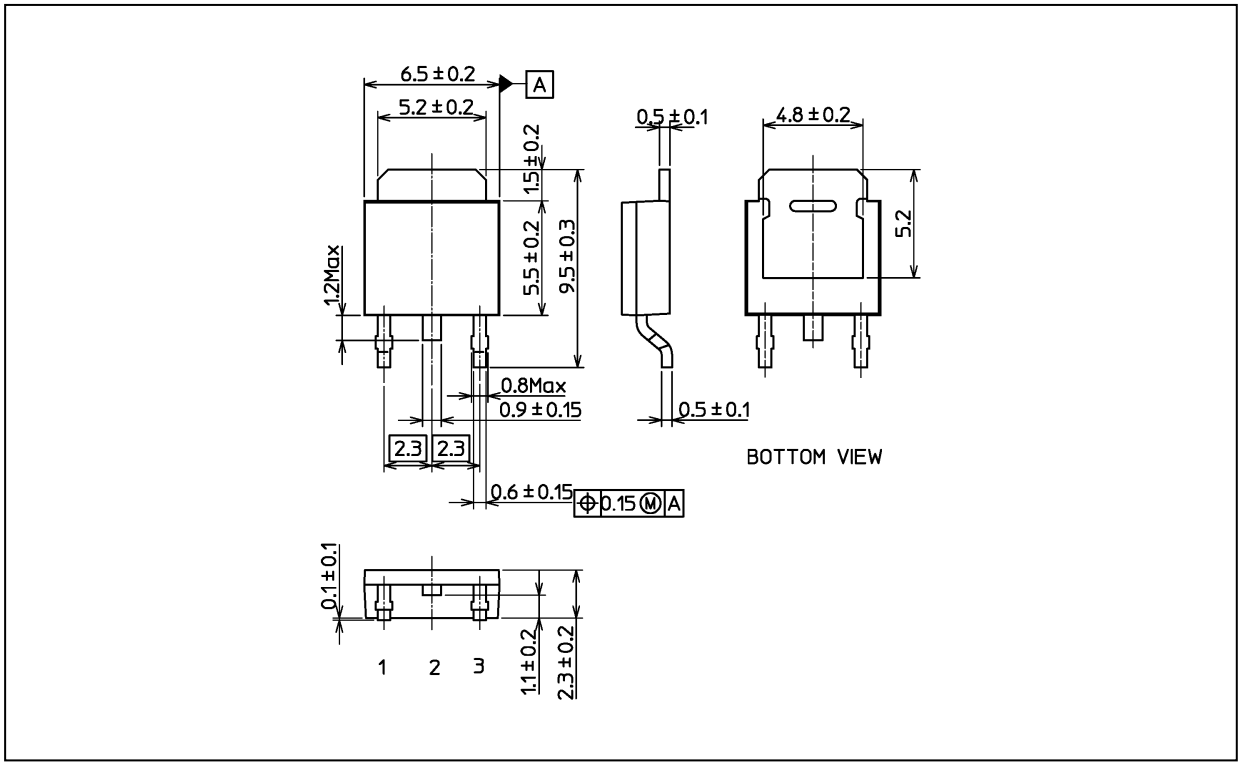



**Fig. 8.7 Safe Operating Area (Guaranteed Maximum)**

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 |

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