

2SA2034

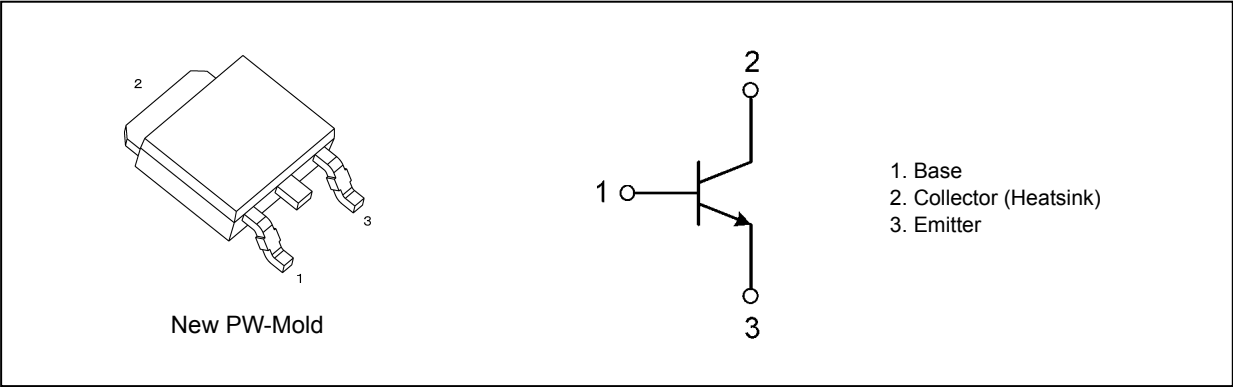
1. Applications

- High-Voltage Switching

2. Features

- (1) High collector voltage:  $V_{CEO} = -400\text{ V (min)}$
- (2) High-speed switching:  $t_f = 0.3\text{ }\mu\text{s (max)}$  ( $I_C = -1.0\text{ A}$ )

3. Packaging and Internal Circuit



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

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 ( $T_a = 25\text{ }^\circ\text{C}$ )	$P_C$	1	W
Collector power dissipation ( $T_c = 25\text{ }^\circ\text{C}$ )	$P_C$	15	
Junction temperature	$T_j$	150	$^\circ\text{C}$
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  $150\text{ }^\circ\text{C}$ .

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	

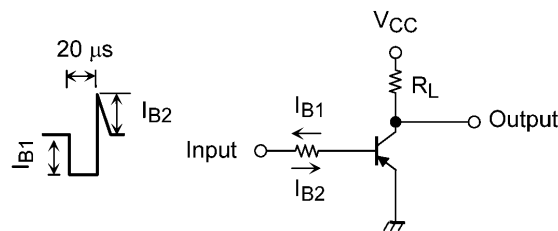
## 6. Electrical Characteristics

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

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

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

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



Duty cycle  $\leq 1\%$

Fig. 6.2.1 Switching Time Test Circuit

## 7. Marking (Note)

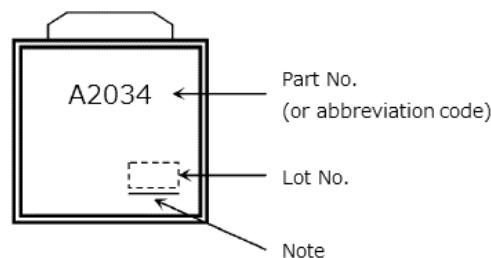


Fig. 7.1 Marking

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)

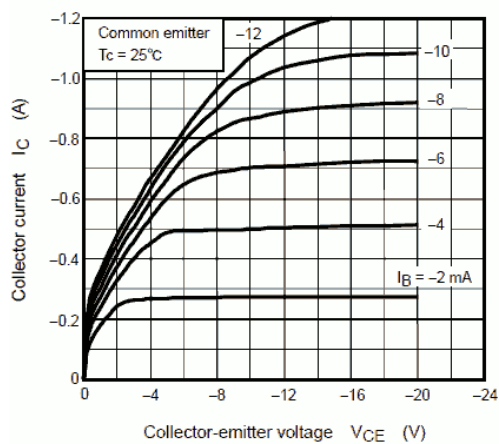


Fig. 8.1  $I_C - V_{CE}$

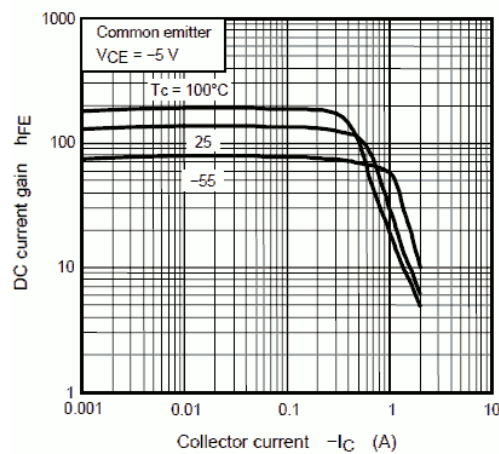


Fig. 8.2  $h_{FE} - I_C$

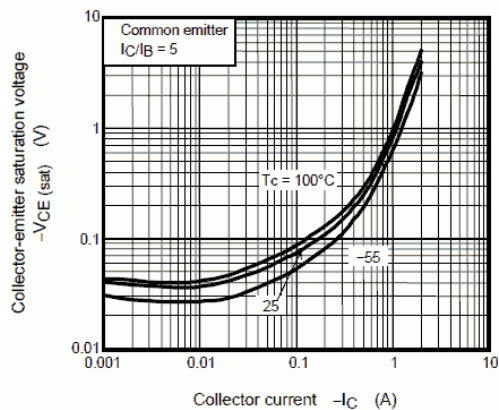


Fig. 8.3  $V_{CE}(\text{sat}) - I_C$

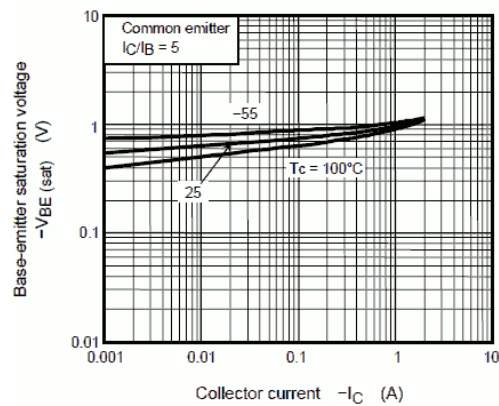


Fig. 8.4  $V_{BE}(\text{sat}) - I_C$

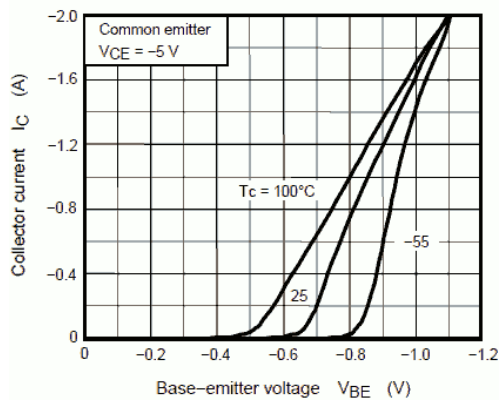


Fig. 8.5  $I_C - V_{BE}$

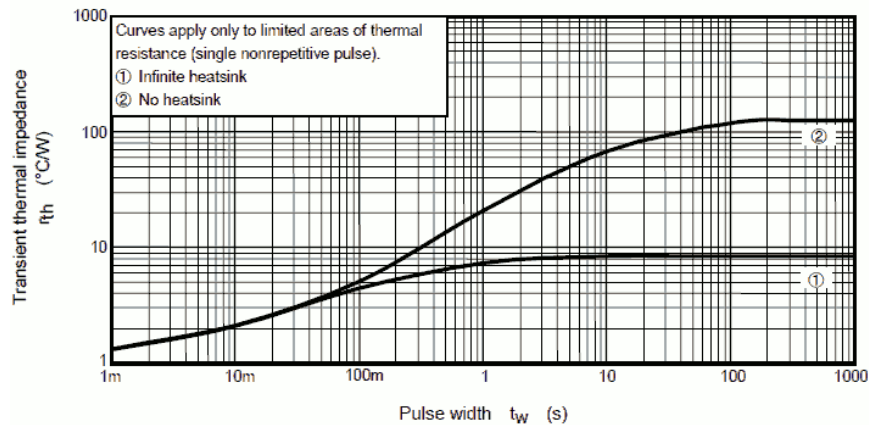


Fig. 8.6  $r_{th(j-a)} - t_w$   
(Guaranteed Maximum)

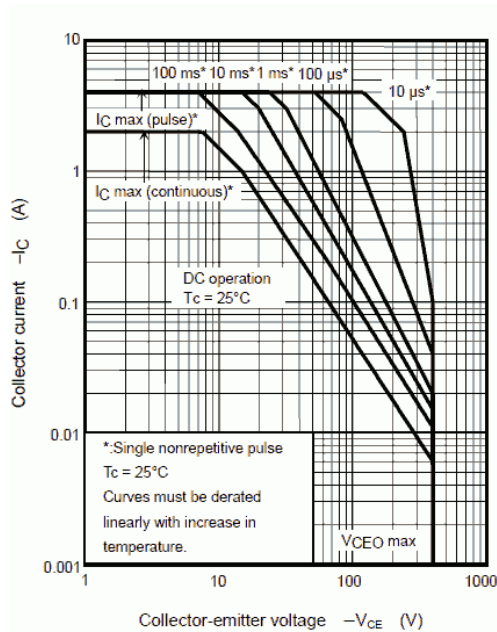
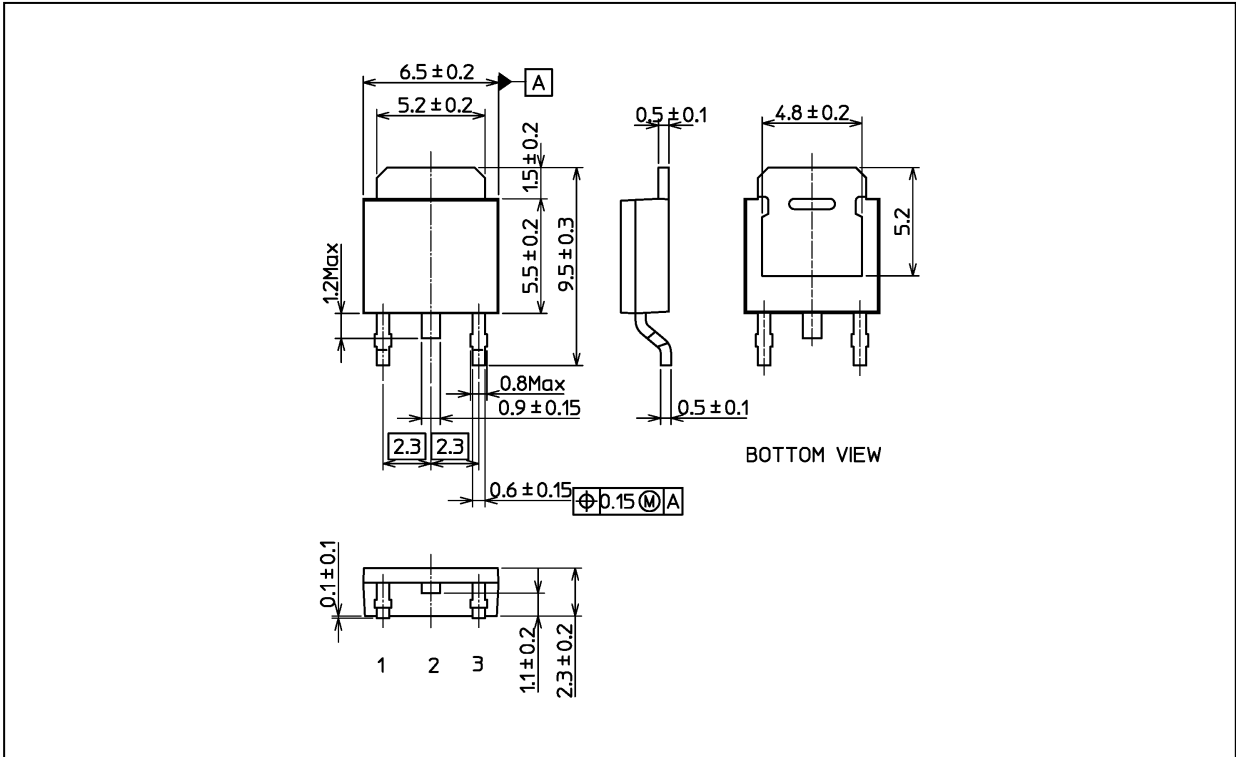


Fig. 8.7 Safe Operating Area  
(Guaranteed Maximum)

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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