

# TTA003

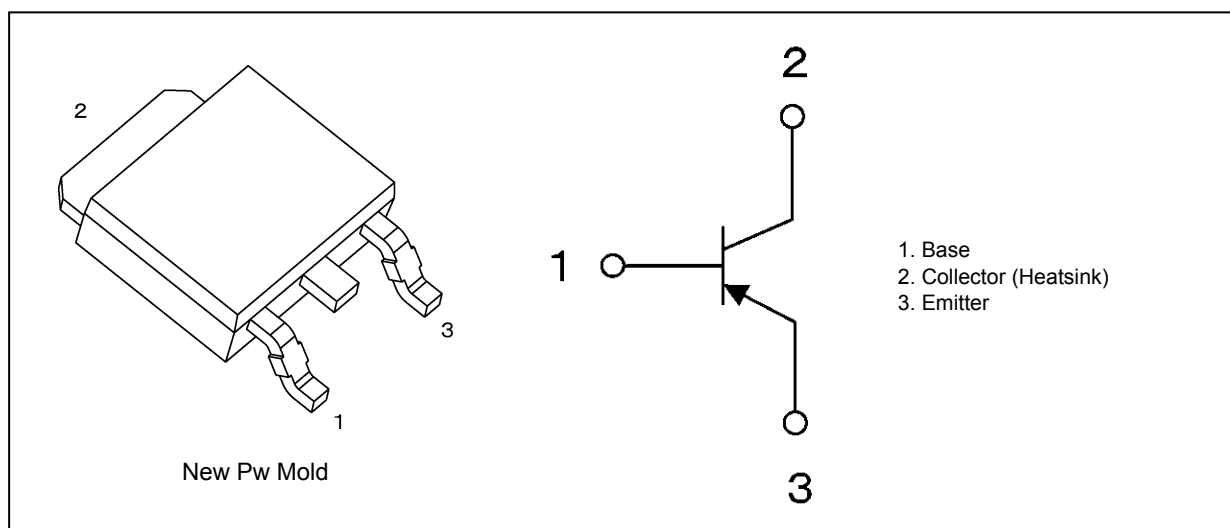
## 1. Applications

- Power Amplifiers
- Power Switching

## 2. Features

- (1) Low collector saturation voltage:  $V_{CE(sat)} = -0.5 \text{ V (max)}$  ( $I_C = -1 \text{ A}$ ,  $I_B = -100 \text{ mA}$ )
- (2) High-speed switching:  $t_{stg} = 300 \text{ ns (typ.)}$

## 3. Packaging and Internal Circuit



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

Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	-80	V
Collector-emitter voltage	$V_{CEO}$	-80	
Emitter-base voltage	$V_{EBO}$	-7	
Collector current (DC)	$I_C$	-3	A
Collector current (pulsed)	$I_{CP}$	-5	
Base current	$I_B$	-1.5	
Collector power dissipation	$P_C$	10	W
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  $150^\circ\text{C}$ .

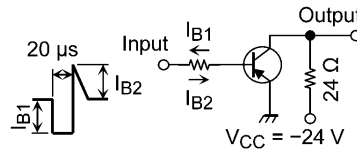
**5. Electrical Characteristics**

**5.1. Static Characteristics (Unless otherwise specified, Ta = 25°C)**

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = -80\text{ V}, I_E = 0\text{ A}$	—	—	-100	nA
Emitter cut-off current	$I_{EBO}$	$V_{EB} = -7\text{ V}, I_C = 0\text{ A}$	—	—	-100	nA
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = -10\text{ mA}, I_B = 0\text{ A}$	-80	—	—	V
DC current gain	$h_{FE(1)}$	$V_{CE} = -2\text{ V}, I_C = -1\text{ mA}$	80	—	—	—
	$h_{FE(2)}$	$V_{CE} = -2\text{ V}, I_C = -0.5\text{ A}$	100	—	200	—
	$h_{FE(3)}$	$V_{CE} = -2\text{ V}, I_C = -1\text{ A}$	60	—	—	—
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	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = -1\text{ A}, I_B = -100\text{ mA}$	—	—	-1.5	V

**5.2. Dynamic Characteristics (Unless otherwise specified, Ta = 25°C)**

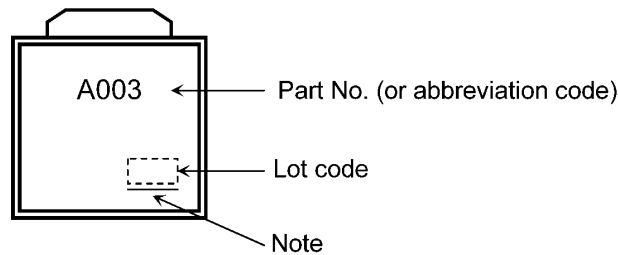
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Transition frequency	$f_T$	$V_{CE} = -2\text{ V}, I_C = -0.5\text{ A}$	—	100	—	MHz
Collector output capacitance	$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0\text{ A}, f = 1\text{ MHz}$	—	25	—	pF
Switching time (rise time)	$t_r$	See Figure 5.2.1.	—	30	—	ns
Switching time (storage time)	$t_{stg}$		—	300	—	
Switching time (fall time)	$t_f$		—	40	—	



$I_{B1} = 100\text{ mA}, I_{B2} = 100\text{ mA}$   
 Duty cycle  $\leq 1\%$

**Fig. 5.2.1 Switching Time Test Circuit**

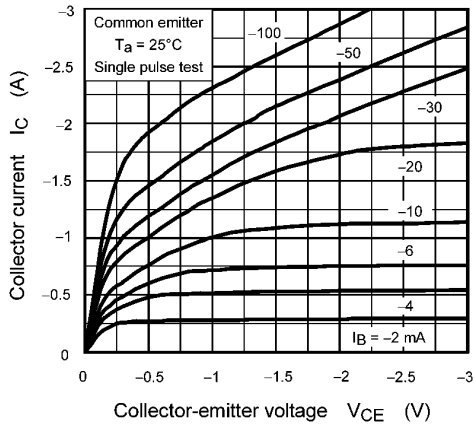
**6. Marking (Note)**



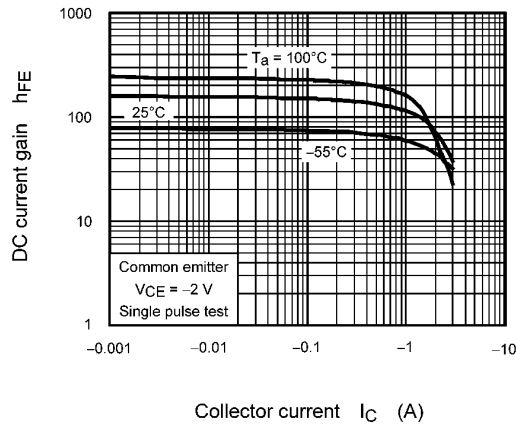
**Fig. 6.1 Marking**

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 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

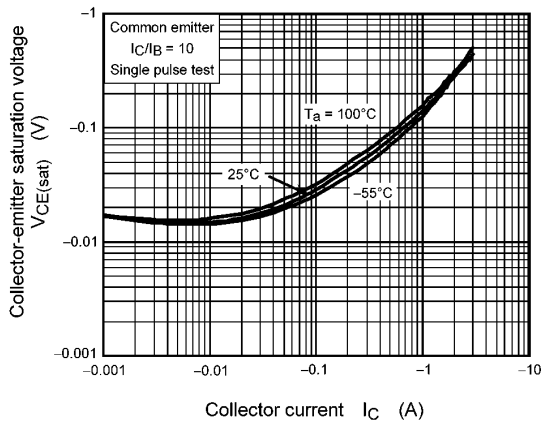
**7. Characteristics Curves (Note)**



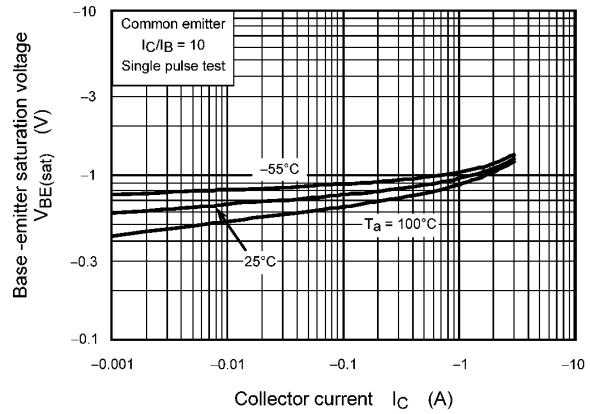
**Fig. 7.1 IC - VCE**



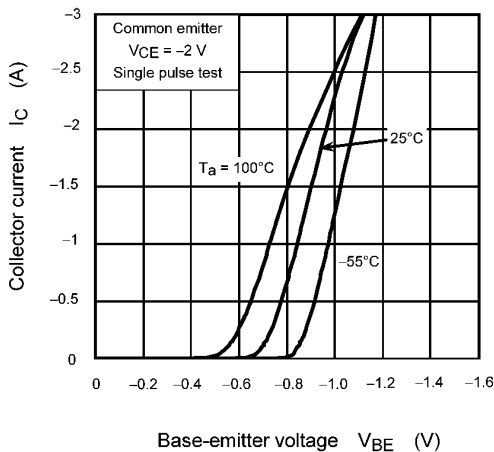
**Fig. 7.2 hFE - IC**



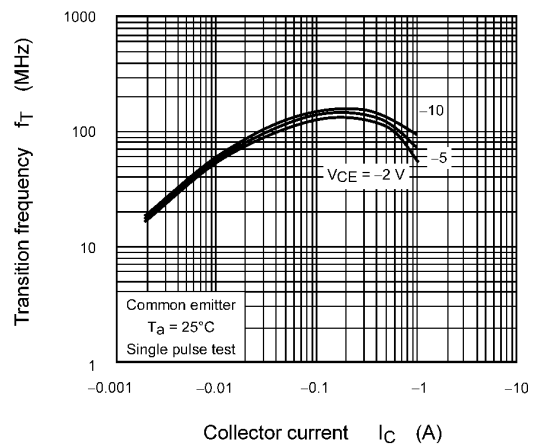
**Fig. 7.3 VCE(sat) - IC**



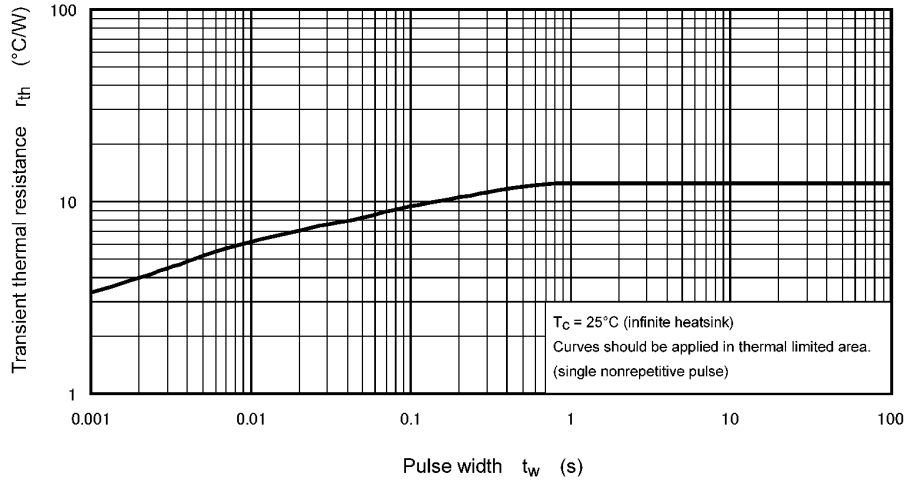
**Fig. 7.4 VBE(sat) - IC**



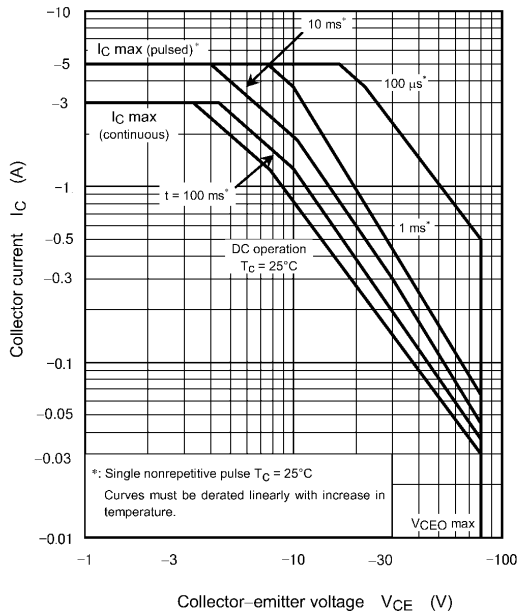
**Fig. 7.5 IC - VBE**



**Fig. 7.6 fT - IC**



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

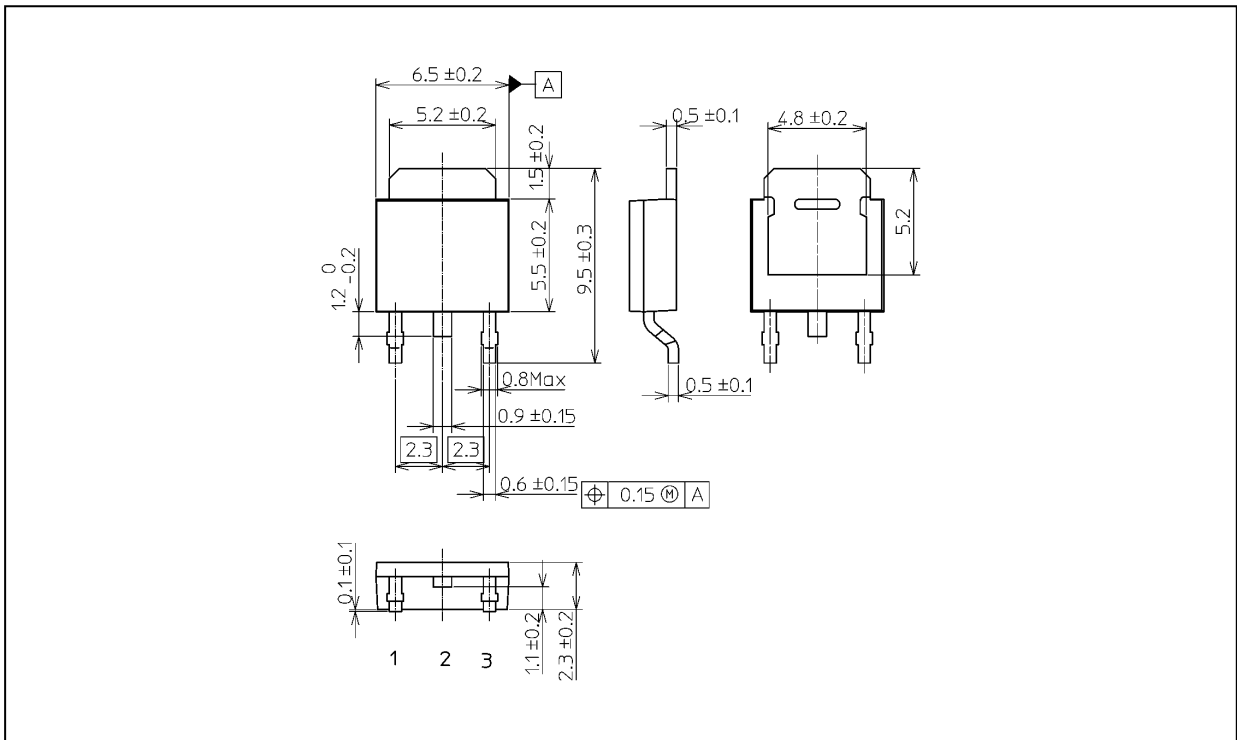


**Fig. 7.8 Safe Operating Area**  
(Guaranteed Maximum)

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

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