

TTA009

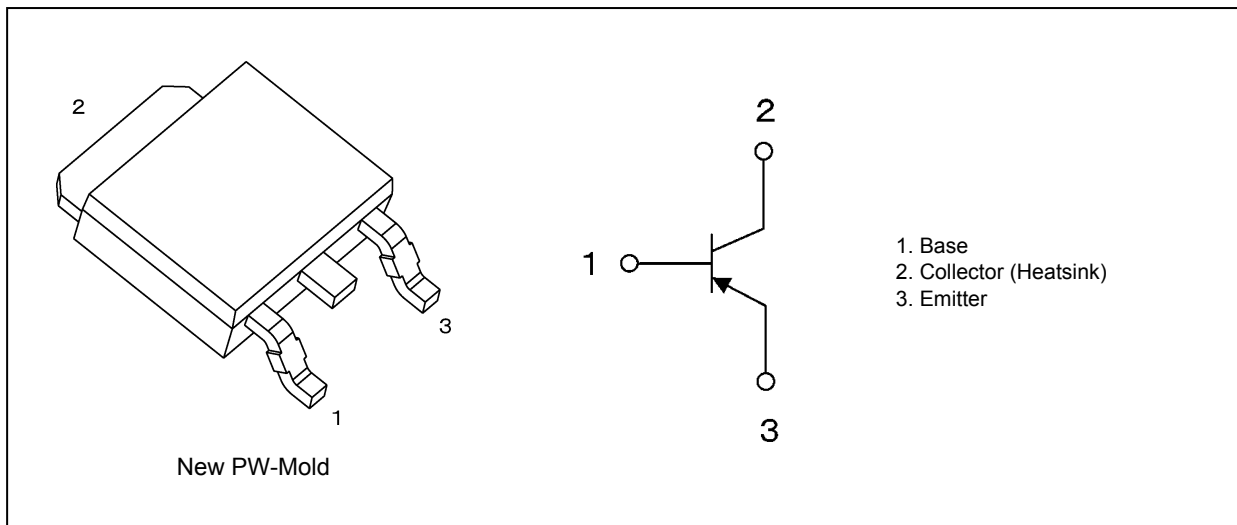
1. Applications

- 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 : $t_{stg} = 300 \text{ ns (typ.)}$ ($I_C = -1 \text{ A}$)

3. Packaging and Internal Circuit



Start of commercial production

2015-04

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

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	-80	V
Collector-emitter voltage	V_{CEO}	-80	V
Emitter-base voltage	V_{EBO}	-7	
Collector current (DC) (Note 1)	I_C	-3	A
Collector current (pulsed) (Note 1)	I_{CP}	-5	A
Base current	I_B	-1.5	
Collector power dissipation	P_C	1.2	W
Collector power dissipation ($T_c = 25\text{ }^\circ\text{C}$)	P_C	12	W
Junction temperature (Note 2)	T_j	175	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to 150	$^\circ\text{C}$

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}	$V_{CB} = -80\text{ V}, I_E = 0\text{ A}$	—	—	-100	nA
Emitter cut-off current	I_{EBO}	$V_{EB} = -7\text{ V}, I_C = 0\text{ A}$	—	—	-100	
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	
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}	$V_{CB} = -10\text{ V}$, $I_E = 0\text{ A}$, $f = 1\text{ MHz}$	—	25	—	pF
Transition frequency	f_T	$V_{CE} = -2\text{ V}$, $I_C = -0.5\text{ A}$	—	100	—	MHz
Switching time (rise time)	t_r	See Figure 5.2.1.	—	30	—	ns
Switching time (storage time)	t_{stg}	$V_{CC} \approx -24\text{ V}$, $R_L = 24\ \Omega$, $I_{B1} = 0.1\text{ A}$, $I_{B2} = 0.1\text{ A}$	—	300	—	
Switching time (fall time)	t_f		—	40	—	

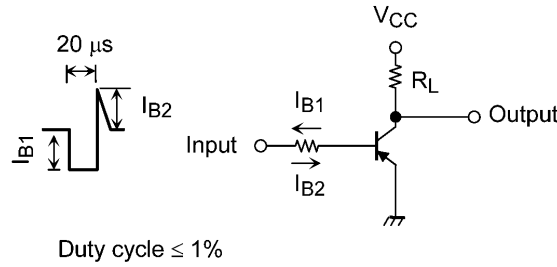


Fig. 5.2.1 Switching Time Test Circuit

6. Marking (Note)

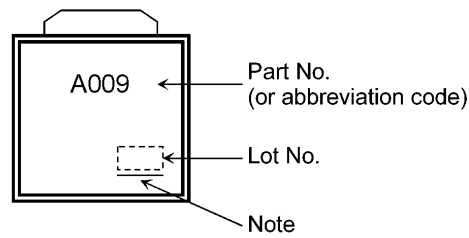


Fig. 6.1 Marking

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)

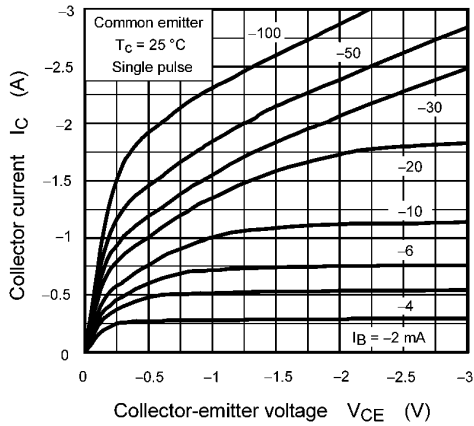


Fig. 7.1 $I_C - V_{CE}$

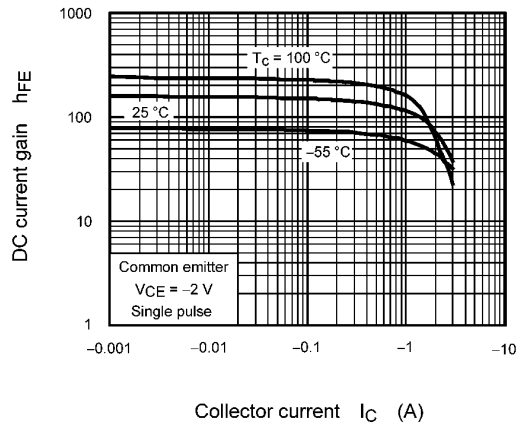


Fig. 7.2 $h_{FE} - I_C$

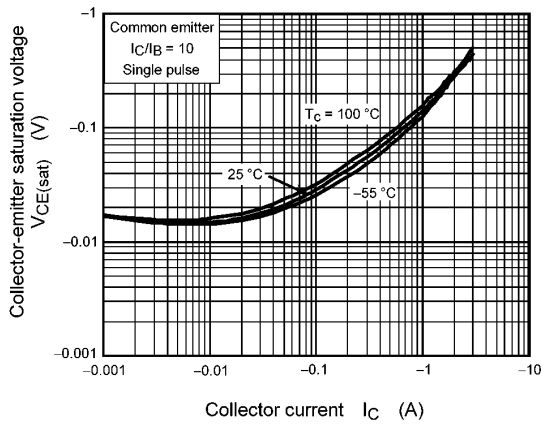


Fig. 7.3 $V_{CE(sat)} - I_C$

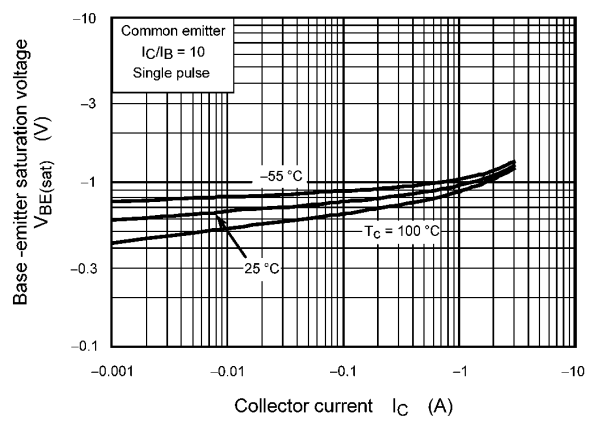


Fig. 7.4 $V_{BE(sat)} - I_C$

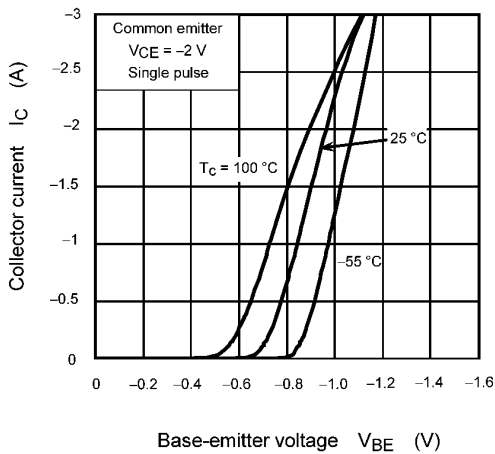


Fig. 7.5 $I_C - V_{BE}$

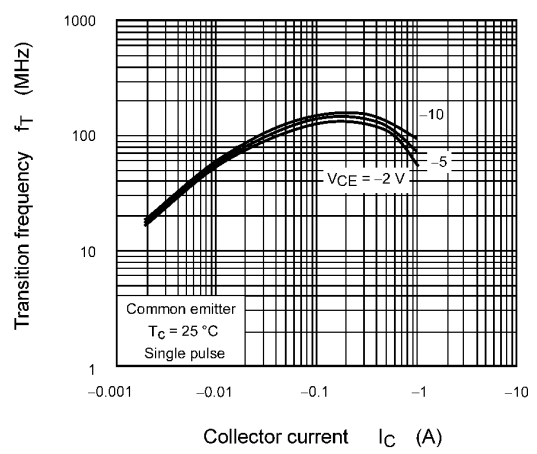


Fig. 7.6 $f_T - I_C$

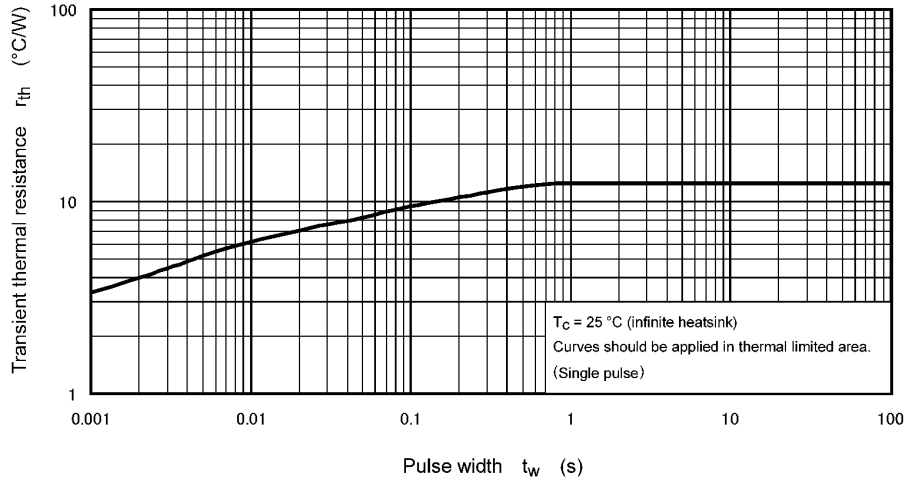


Fig. 7.7 $r_{th} - t_w$
(Guaranteed Maximum)

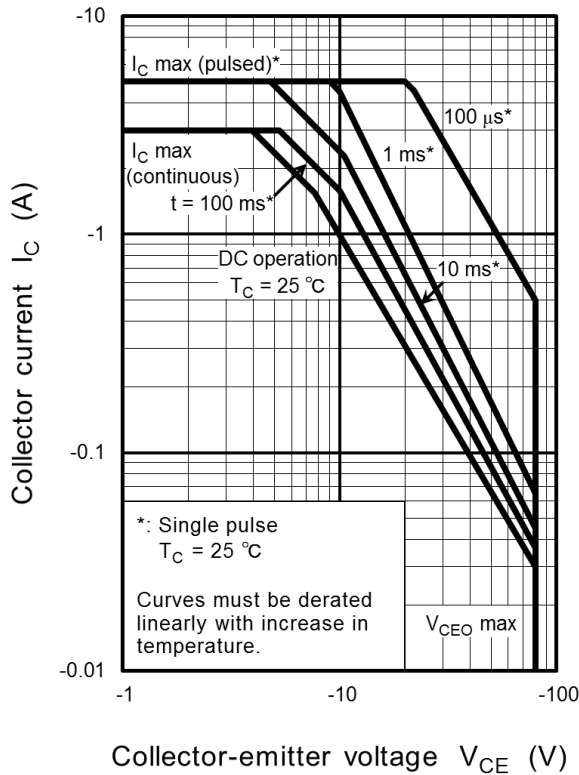
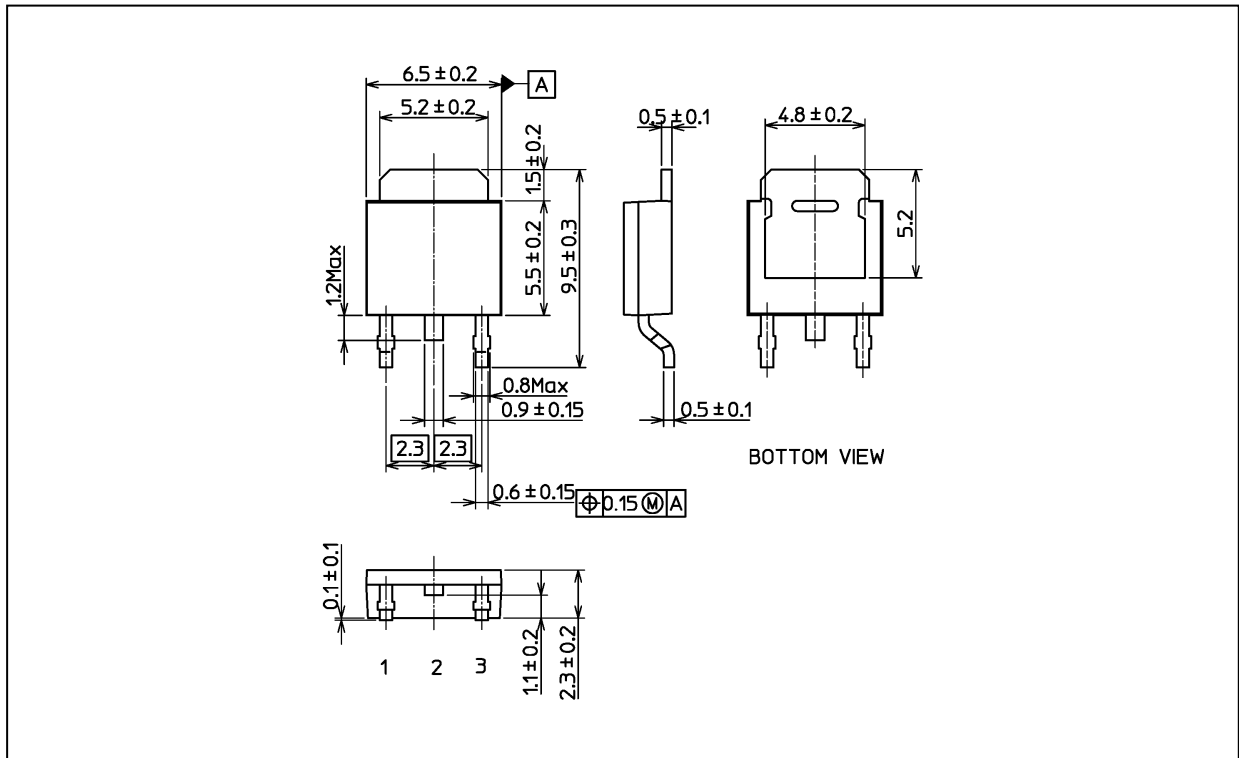


Fig. 7.8 Safe Operating Area
(Guaranteed Maximum)

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

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