

# TPCP8511

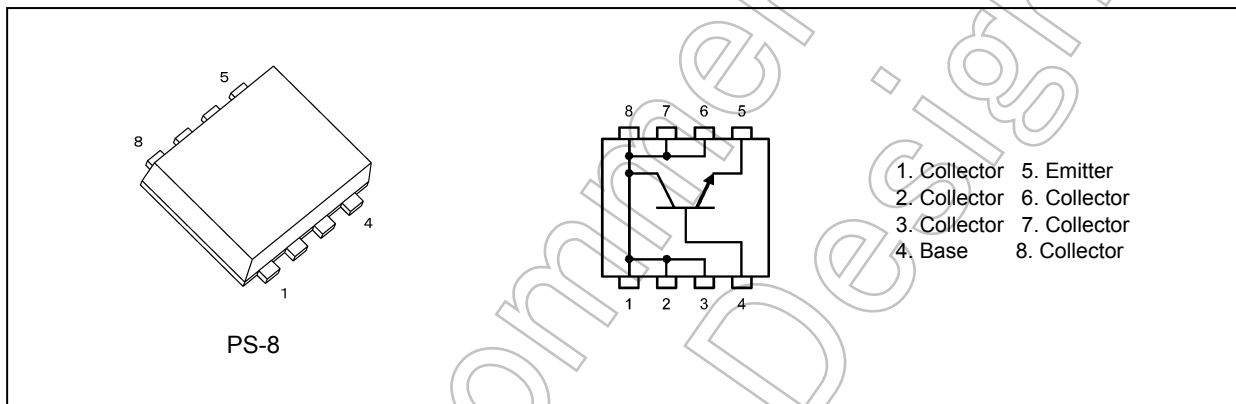
## 1. Applications

- High-Speed Switching
- DC-DC Converters
- Photo Flashes

## 2. Features

- (1) High DC current gain:  $h_{FE} = 250$  to  $400$  ( $I_C = 0.3$  A)
- (2) Low collector-emitter saturation:  $V_{CE(sat)} = 0.18$  V(max) ( $I_B = 33$  mA)
- (3) High-speed switching:  $t_f = 38$  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	$V_{CBO}$	100	V
Collector-emitter voltage	$V_{CEX}$	80	
Collector-emitter voltage	$V_{CEO}$	50	
Emitter-base voltage	$V_{EBO}$	6	
Collector current (DC)	(Note 1) $I_C$	3	A
Collector current (pulsed)	(Note 1) $I_{CP}$	5	
Base current	$I_B$	0.3	
Collector power dissipation	(t = 10 s) (Note 2) $P_C$	3	W
Collector power dissipation	(DC) (Note 2)	1.25	
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  $150^\circ\text{C}$ .

Note 2: Device mounted on a 25.4 mm x 25.4 mm x 1.6 mm FR-4 glass epoxy board (with a dissipating copper surface of 645 mm<sup>2</sup>)

Start of commercial production

2010-08

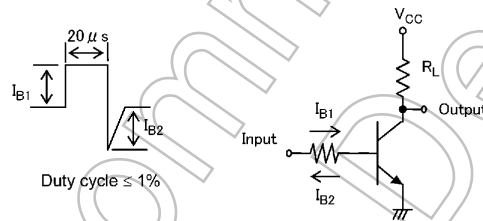
**5. Electrical Characteristics**

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = 100\text{ V}, I_E = 0\text{ A}$	—	—	100	nA
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 6\text{ V}, I_C = 0\text{ A}$	—	—	100	nA
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 10\text{ mA}, I_B = 0\text{ A}$	50	—	—	V
DC current gain	$h_{FE(1)}$	$V_{CE} = 2\text{ V}, I_C = 0.3\text{ A}$	250	—	400	—
	$h_{FE(2)}$	$V_{CE} = 2\text{ V}, I_C = 1\text{ A}$	120	—	—	—
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 1\text{ A}, I_B = 33\text{ mA}$	—	—	0.18	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = 1\text{ A}, I_B = 33\text{ mA}$	—	—	1.1	V

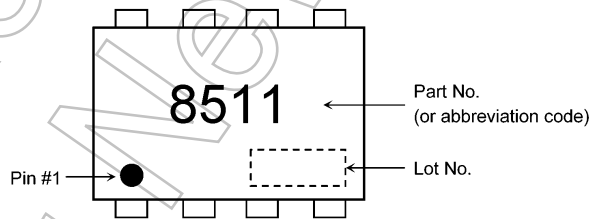
**5.2. Dynamic Characteristics (Unless otherwise specified,  $T_a = 25^\circ\text{C}$ )**

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector output capacitance	$C_{ob}$	$V_{CB} = 10\text{ V}, I_E = 0\text{ A}, f = 1\text{ MHz}$	—	18	—	pF
Switching time (rise time)	$t_r$	See Figure 5.2.1	—	25	—	ns
Switching time (storage time)	$t_{stg}$	$V_{CC} \approx 20\text{ V}, R_L = 20\ \Omega,$ $I_{B1} = 33\text{ mA}, I_{B2} = -33\text{ mA},$ Duty cycle $\leq 1\%$	—	470	—	—
Switching time (fall time)	$t_f$		—	38	—	—



**Fig. 5.2.1 Switching Time Test Circuit**

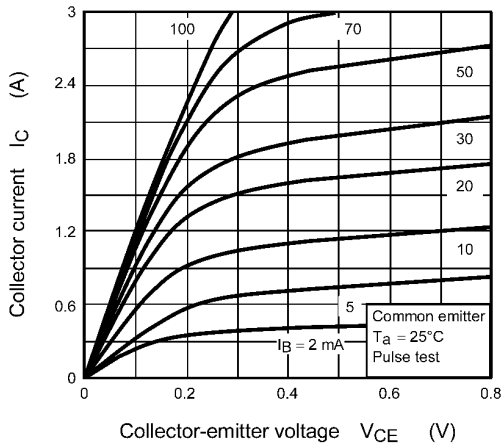
**6. Marking**



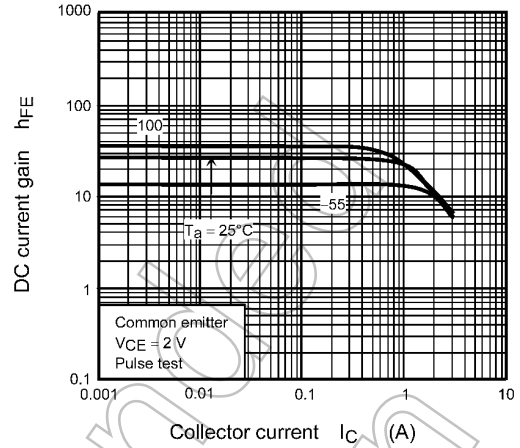
**Fig. 6.1 Marking**



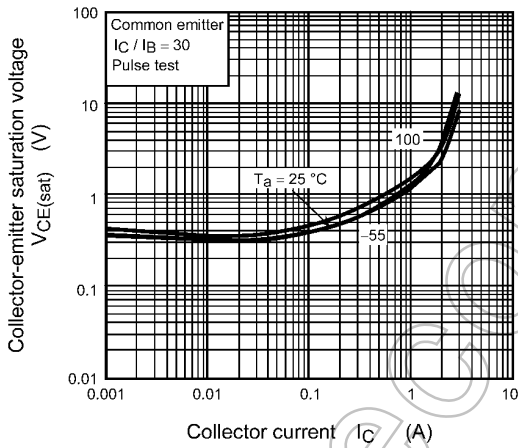
**7. Characteristics Curves (Note)**



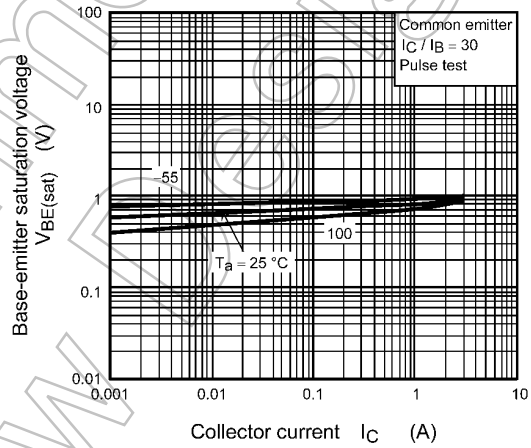
**Fig. 7.1  $I_C - V_{CE}$**



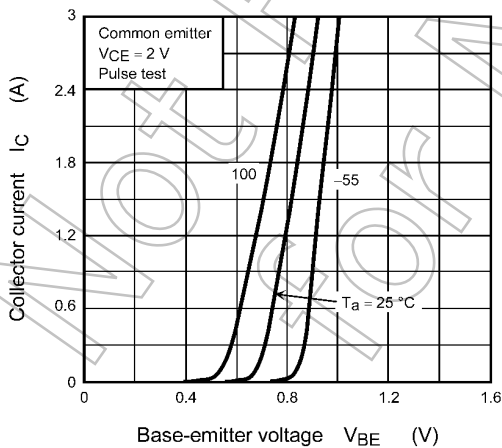
**Fig. 7.2  $h_{FE} - I_C$**



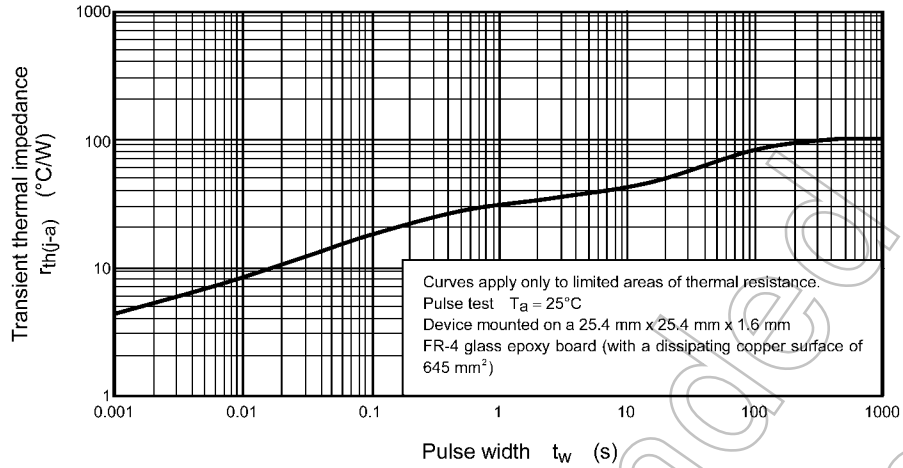
**Fig. 7.3  $V_{CE(sat)} - I_C$**



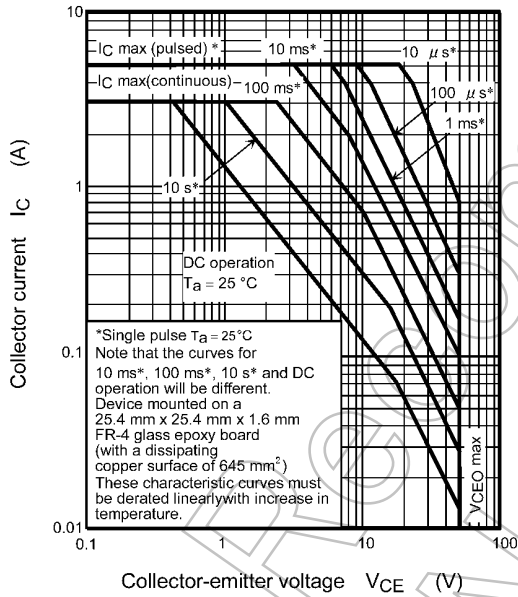
**Fig. 7.4  $V_{BE(sat)} - I_C$**



**Fig. 7.5  $I_C - V_{BE}$**



**Fig. 7.6  $r_{th(j-a)} - t_w$   
(Guaranteed Maximum)**

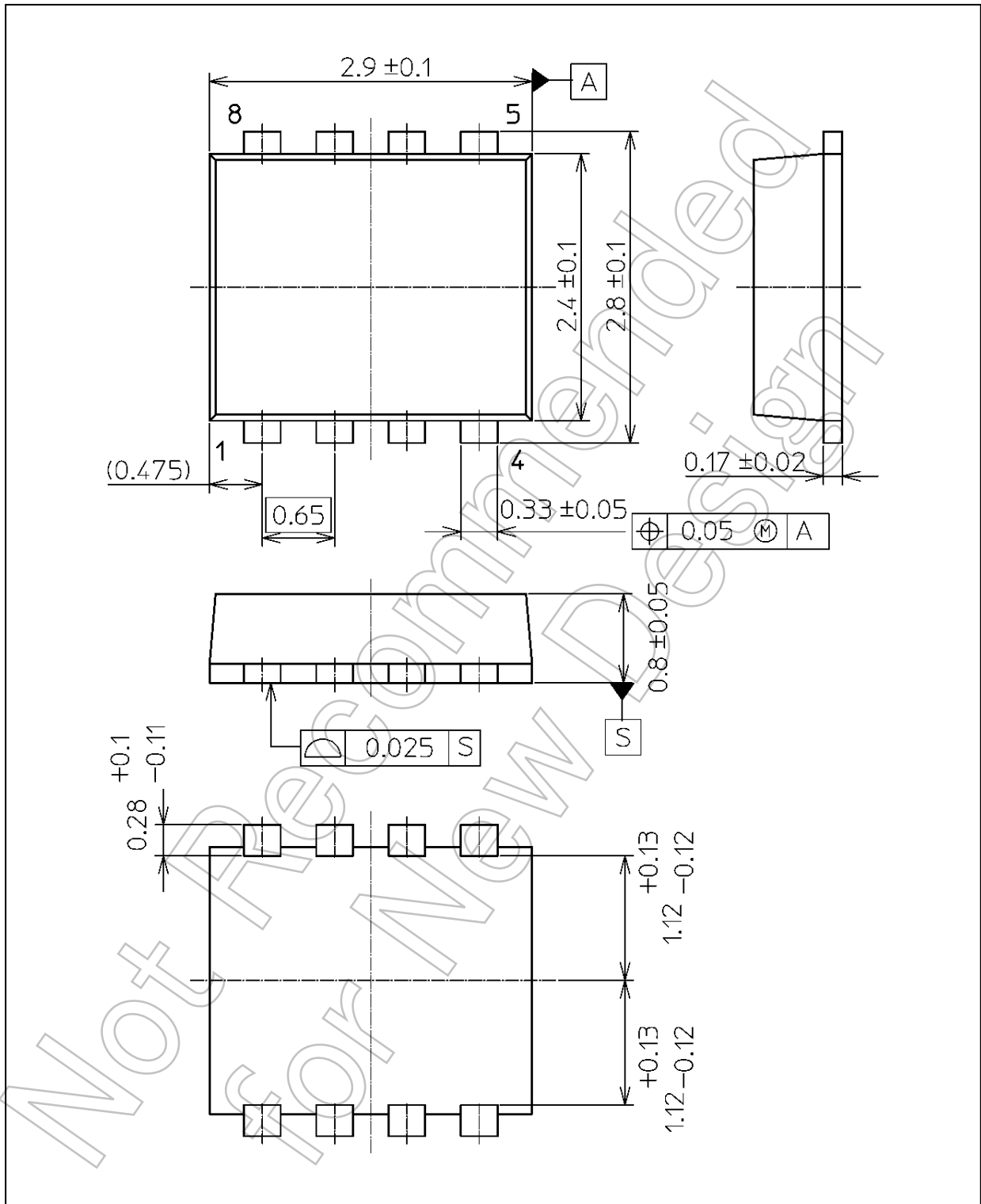


**Fig. 7.7 Safe Operating Area  
(Guaranteed Maximum)**

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

Package Dimensions

Unit: mm



The drawings shown may not accurately represent the actual shape or dimensions.

Weight: 0.017 g (typ.)

Package Name(s)
Nickname: PS-8

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