Bipolar Transistors Silicon NPN Epitaxial Type

TPCP8511

1. Applications

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

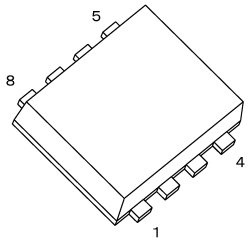
2. Features

(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



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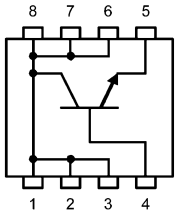


1. Collector 5. Emitter
2. Collector 6. Collector
3. Collector 7. Collector
4. Base 8. Collector

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

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 mm²)

Start of commercial production
2010-08

5. Electrical Characteristics

5.1. 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} = 100 V, I_E = 0 A	—	—	100	nA
Emitter cut-off current	I_{EBO}	V_{EB} = 6 V, I_C = 0 A	—	—	100	
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	I_C = 10 mA, I_B = 0 A	50	—	—	V
DC current gain	$h_{FE(1)}$	V_{CE} = 2 V, I_C = 0.3 A	250	—	400	—
	$h_{FE(2)}$	V_{CE} = 2 V, I_C = 1 A	120	—	—	
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C = 1 A, I_B = 33 mA	—	—	0.18	V
Base-emitter saturation voltage	$V_{BE(sat)}$	I_C = 1 A, I_B = 33 mA	—	—	1.1	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector output capacitance	C_{ob}	V_{CB} = 10 V, I_E = 0 A, f = 1 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 V, R_L = 20 Ω, I_{B1} = 33 mA, I_{B2} = -33 mA, Duty cycle ≤ 1%	—	470	—	
Switching time (fall time)	t_f		—	38	—	

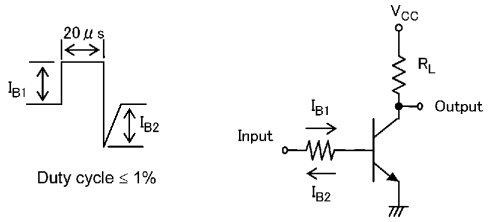


Fig. 5.2.1 Switching Time Test Circuit

6. Marking

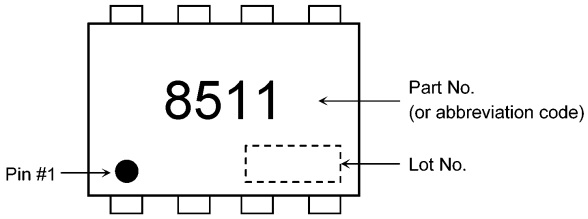
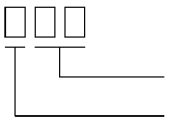


Fig. 6.1 Marking

Lot No. :

Weekly code (Three digits)



Week of manufacture
(01 for the first week of calendar year; sequential number up to 52 or 53)

Year of manufacture
(Last digit of calendar year)

7. Characteristics Curves (Note)

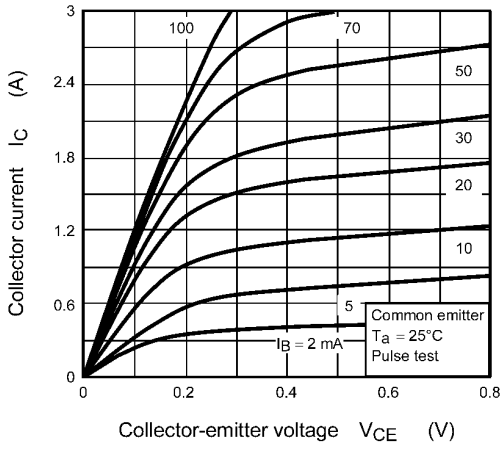


Fig. 7.1 I_C - V_{CE}

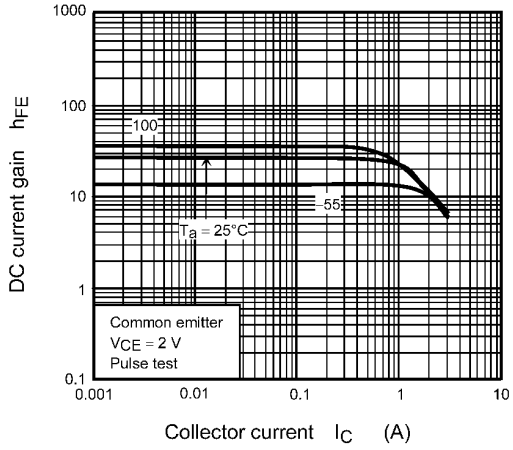


Fig. 7.2 h_{FE} - I_C

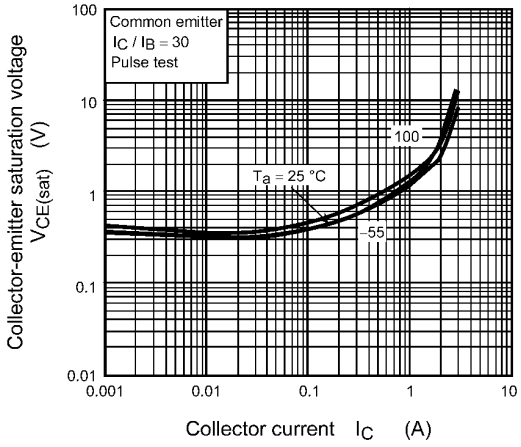


Fig. 7.3 $V_{CE(sat)}$ - I_C

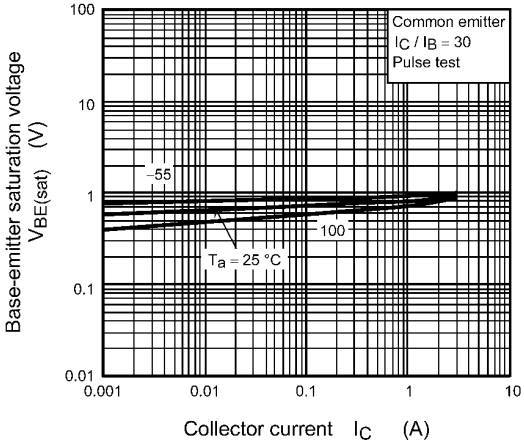


Fig. 7.4 $V_{BE(sat)}$ - I_C

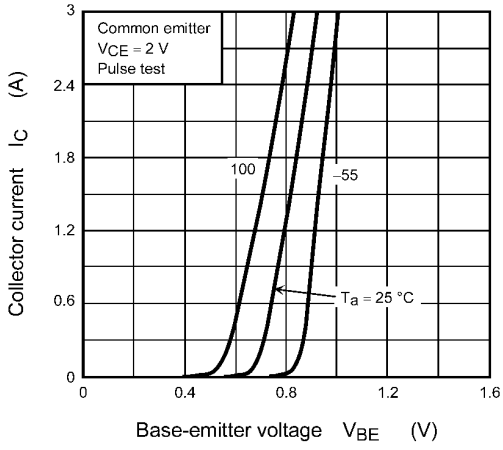


Fig. 7.5 I_C - V_{BE}

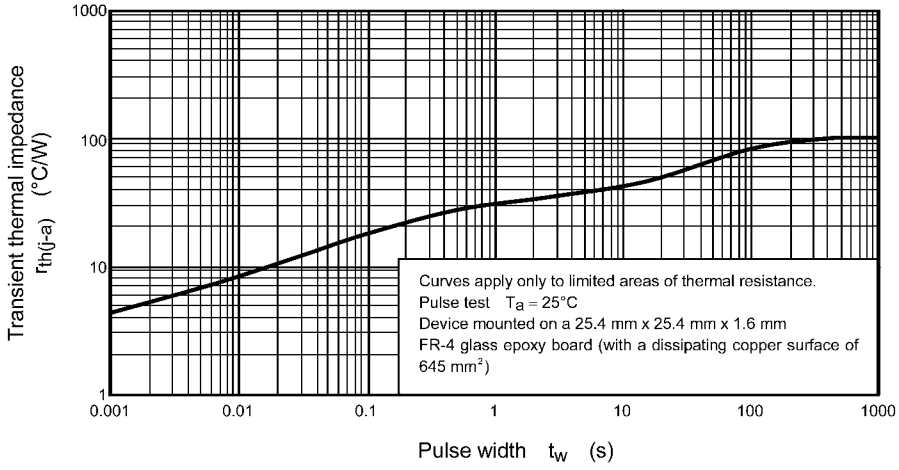


Fig. 7.6 $r_{th(j-a)}$ - t_w (Guaranteed Maximum)

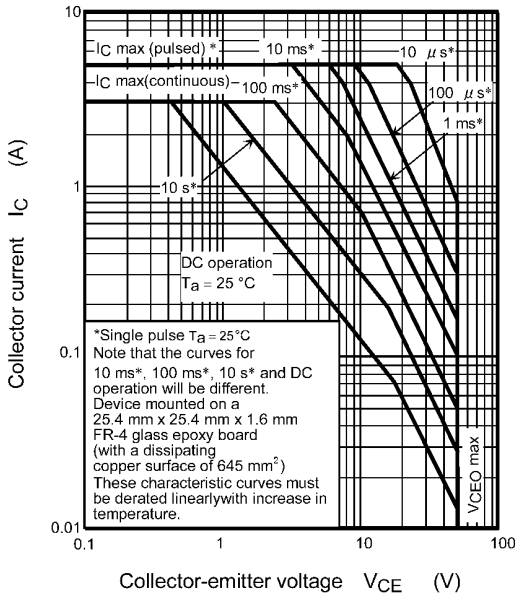
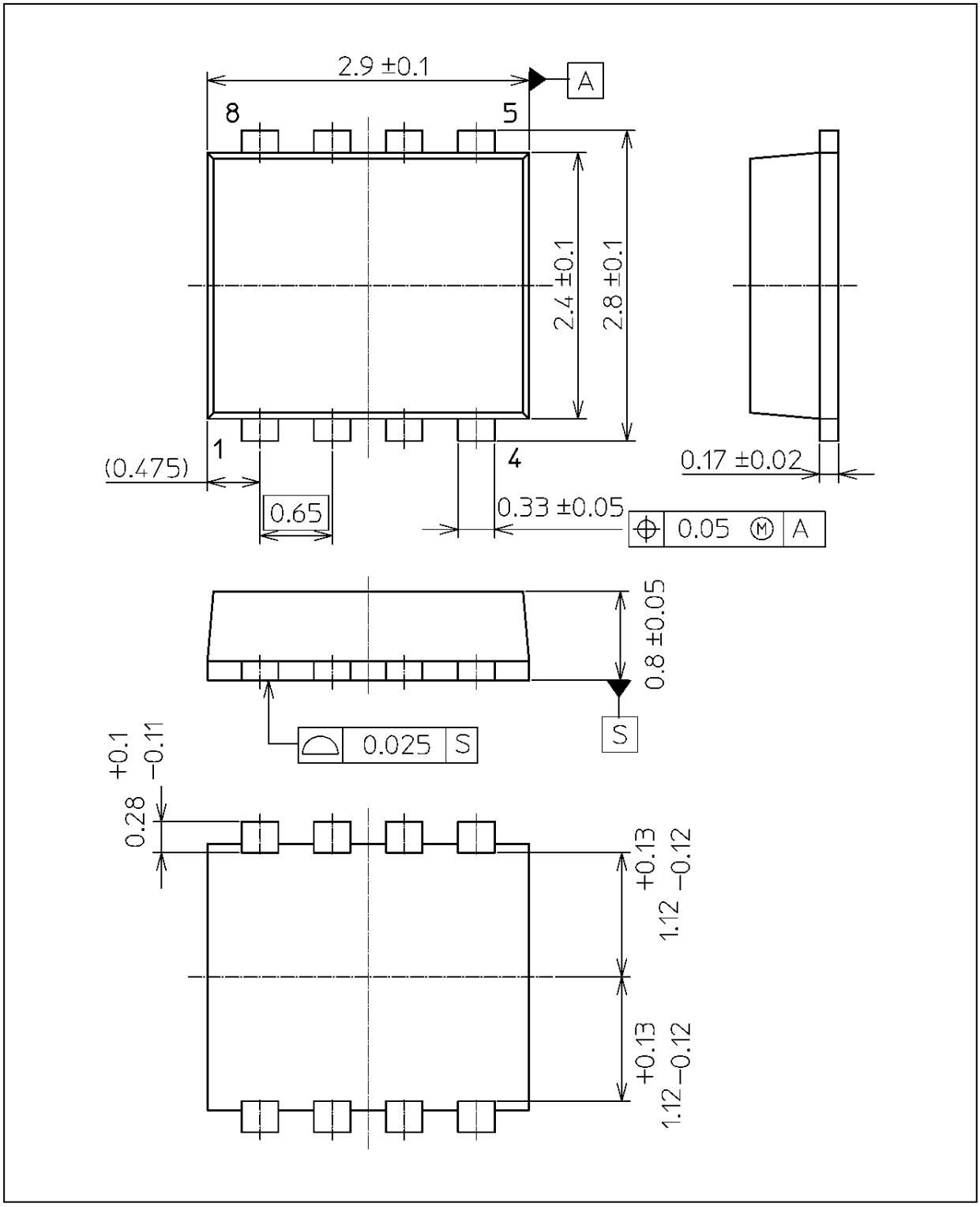


Fig. 7.7 Safe Operating Area (Guaranteed Maximum)

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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