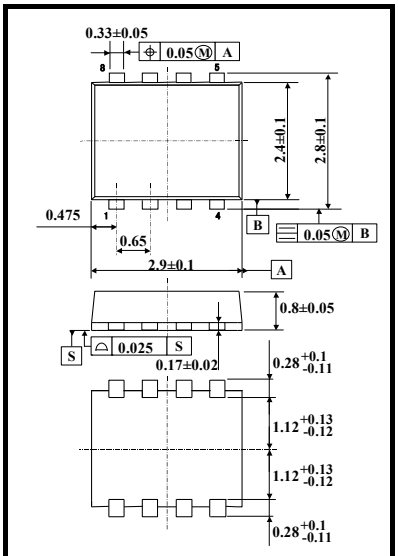
TOSHIBA Transistor Silicon NPN Epitaxial Type

TPCP8510

High-Speed, High-Voltage Switching Applications
DC-DC Converter Applications

- High DC current gain: h_{FE} = 120 to 300 (I_C = 0.1 A)
- Low collector-emitter saturation: $V_{CE\ (sat)}$ = 0.14 V (max)
- High-speed switching: t_f = 0.2 μs (typ)

Unit: mm



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

JEDEC	—
JEITA	—
TOSHIBA	2-3V1Q

Weight: 0.017 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	180	V
Collector-emitter voltage		V_{CEX}	150	V
		V_{CEO}	120	V
Emitter-base voltage		V_{EBO}	7	V
Collector current	DC (Note 1)	I_C	1.0	A
	Pulse (Note 1)	I_{CP}	2.0	
Base current		I_B	0.1	A
Collector power dissipation	t = 10s	P_C (Note 2)	2.25	W
	DC		1.1	
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

Note 1: Please use devices on condition that the junction temperature is below 150°C.

Note 2: Mounted on FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645 mm^2)

Note 3: 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).

Figure 1. Circuit configuration (top view)

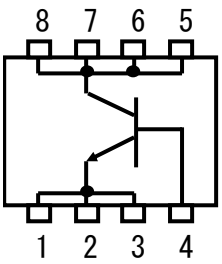
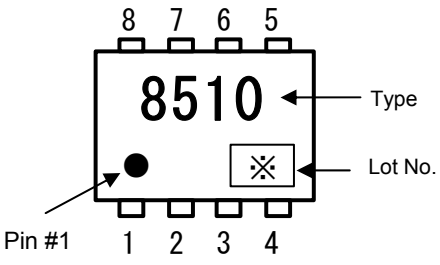


Figure 2. Marking

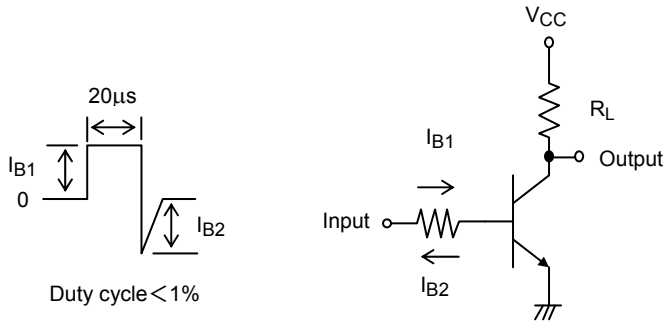


Start of commercial production
2009-01

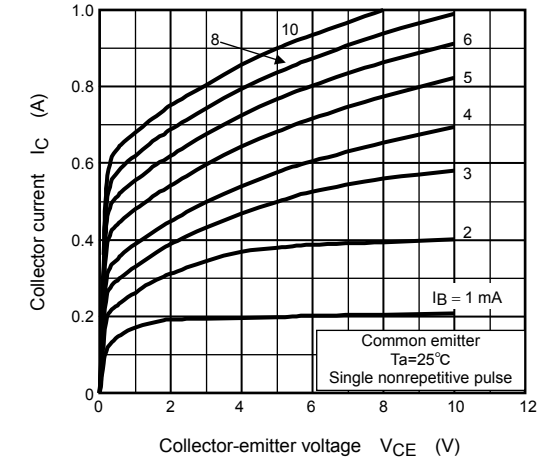
Electrical Characteristics (Ta = 25°C)

Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	V_{CB} = 180 V, I_E = 0	—	—	100	nA
Emitter cut-off current		I_{EBO}	V_{EB} = 7 V, I_C = 0	—	—	100	nA
Collector-base breakdown voltage		$V_{(BR)\ CBO}$	I_C = 1 mA, I_B = 0	180	—	—	V
Collector-emitter breakdown voltage		$V_{(BR)\ CEO}$	I_C = 10 mA, I_B = 0	120	—	—	V
DC current gain		$h_{FE\ (1)}$	V_{CE} = 2 V, I_C = 0.1 A	120	—	300	
		$h_{FE\ (2)}$	V_{CE} = 2 V, I_C = 0.3 A	60	—	—	
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = 0.3 A, I_B = 0.01 A	—	—	0.14	V
Base-emitter saturation voltage		$V_{BE\ (sat)}$	I_C = 0.3 A, I_B = 0.01 A	—	—	1.1	V
Switching time	Rise time	t_r	See Figure 3 circuit diagram	—	0.1	—	μs
	Storage time	t_{stg}	$V_{CC} \approx$ 72 V, R_L = 240 Ω	—	1.5	—	
	Fall time	t_f	$I_{B1} = I_{B2}$ = 10 mA	—	0.2	—	

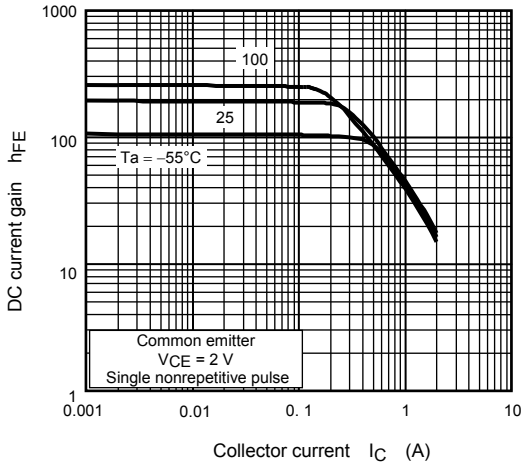
Figure 3. Switching Time Test Circuit



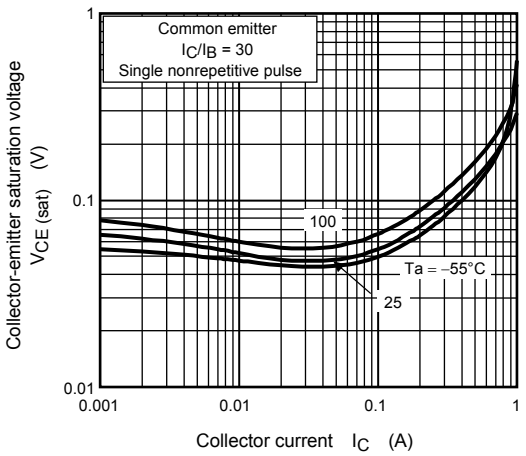
$I_C - V_{CE}$



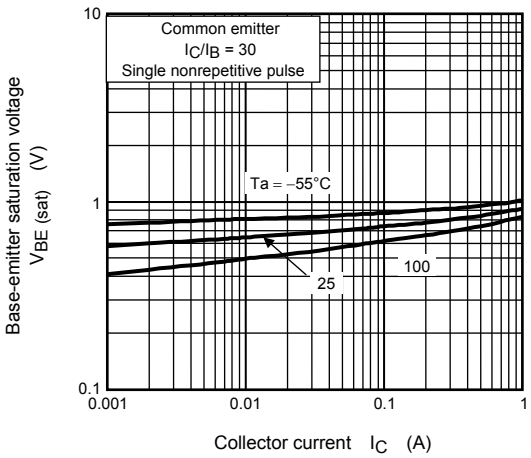
$h_{FE} - I_C$



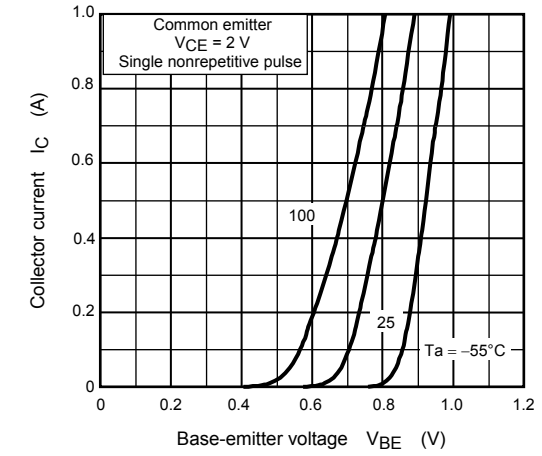
$V_{CE(sat)} - I_C$



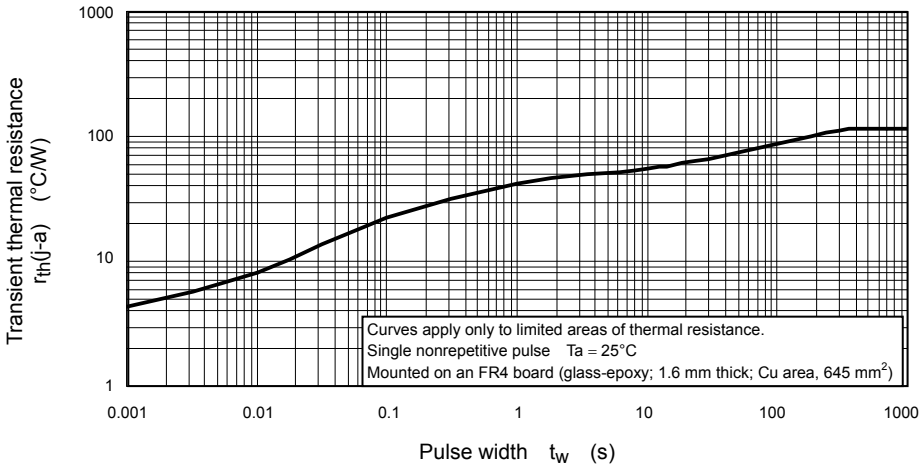
$V_{BE(sat)} - I_C$



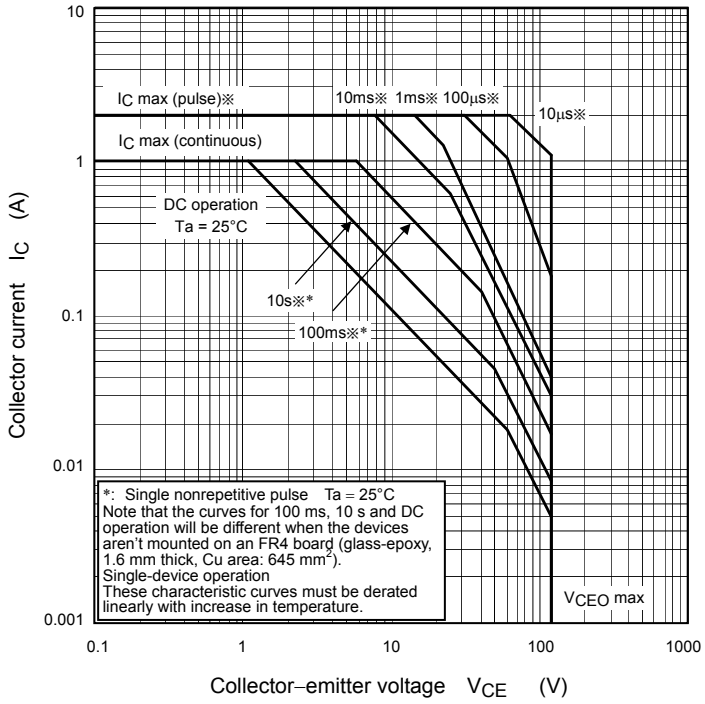
$I_C - V_{BE}$



$r_{th} - t_w$



Safe operating area



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