

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:  $t_f = 0.2$   $\mu$ s (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
	Pulse (Note 1)	$I_{CP}$	2.0
Base current	$I_B$	0.1	A
Collector power dissipation	$t = 10$ s	$P_C$ (Note 2)	2.25
	DC		1.1
Junction temperature	$T_j$	150	°C
Storage temperature range	$T_{stg}$	-55 to 150	°C

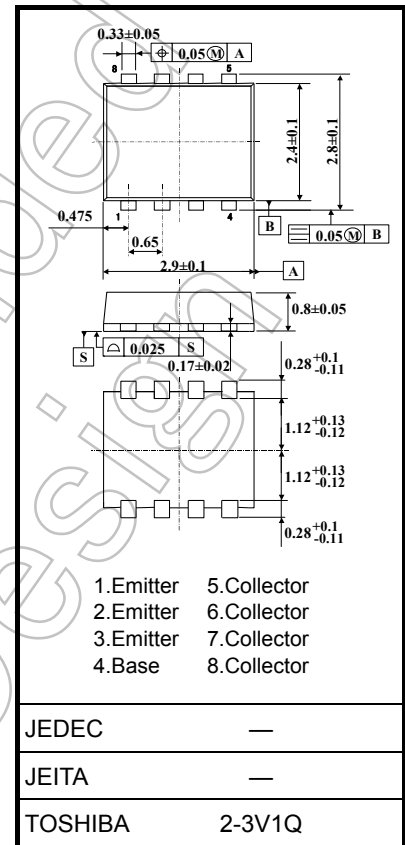
Note 1: Please use devices on condition that the junction temperature is below 150°C.

Note 2: Mounted on FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645 mm<sup>2</sup>)

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).

Unit: mm



Weight: 0.017 g (typ.)

Figure 1. Circuit configuration (top view)

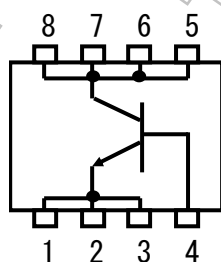
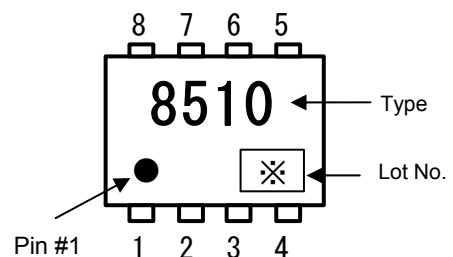


Figure 2. Marking

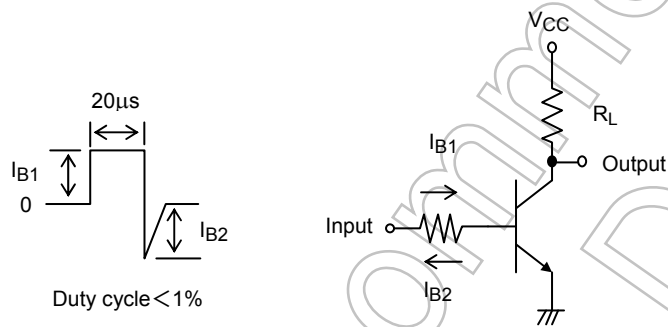


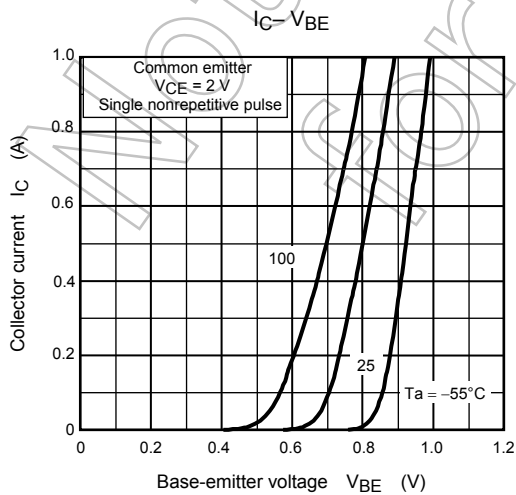
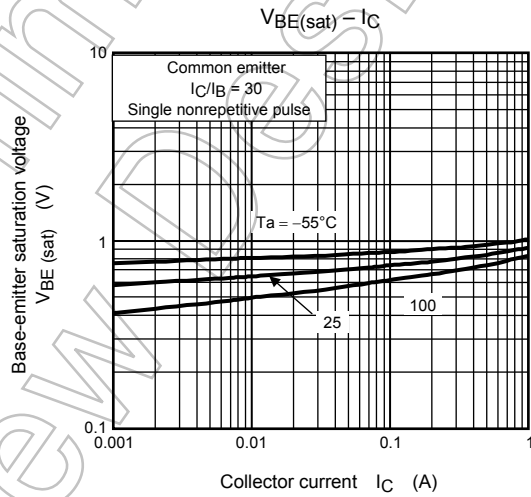
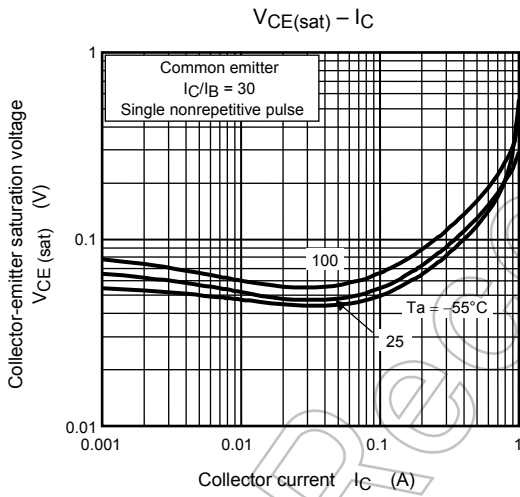
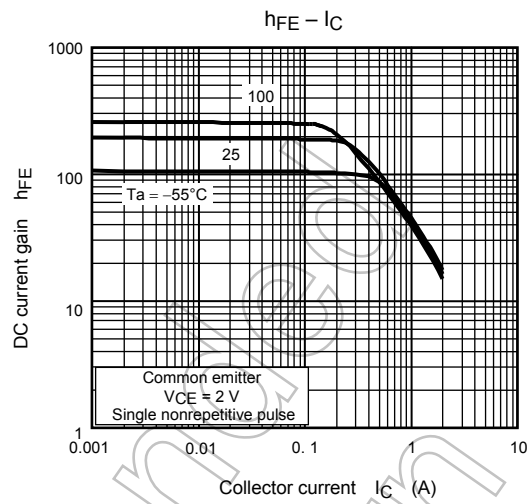
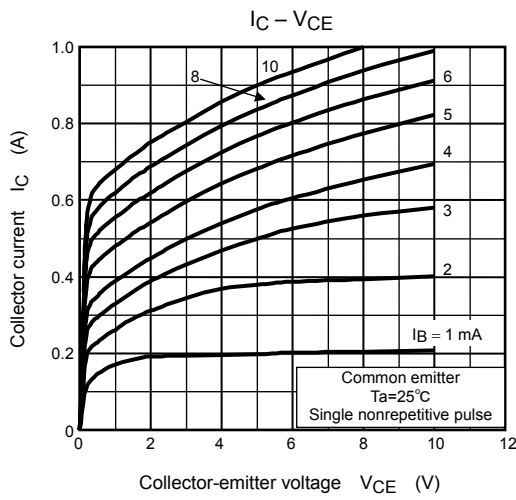
Start of commercial production  
2009-01

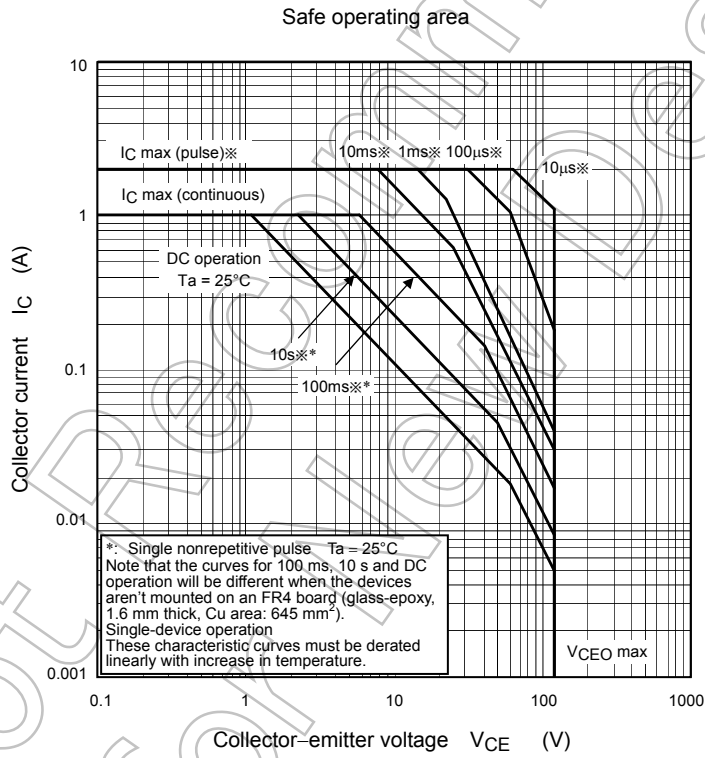
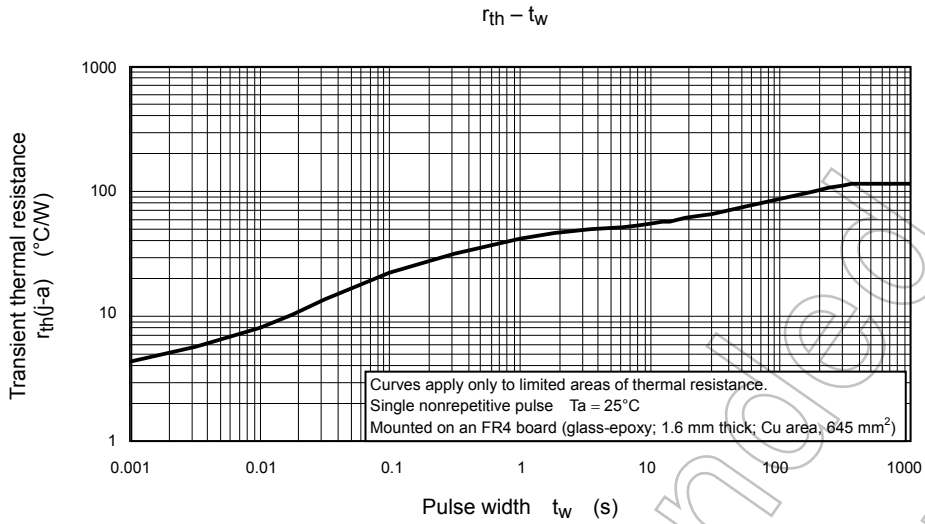
**Electrical Characteristics (Ta = 25°C)**

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

**Figure 3. Switching Time Test Circuit**







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