

TOSHIBA Transistor Silicon NPN Epitaxial Type

TPCP8501

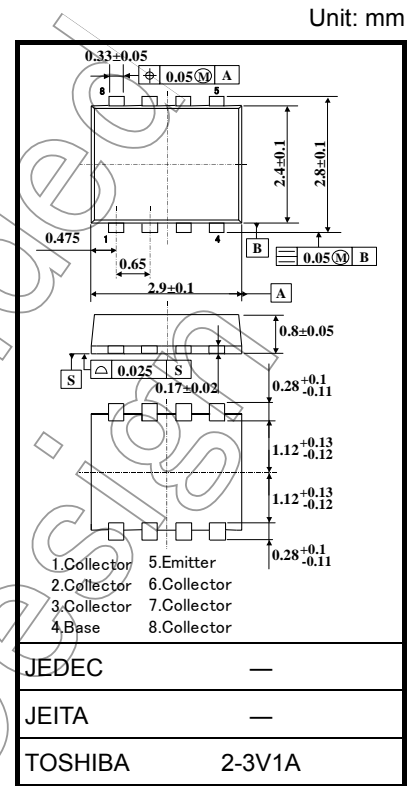
Switching Applications

DC-DC Converter Applications

- High DC current gain : $h_{FE} = 100$ to 300 ($I_C = 0.3$ A)
- Low collector-emitter saturation : $V_{CE(sat)} = 0.2$ V (max)
- High-speed switching : $t_f = 100$ ns (typ.)

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	180	V
Collector-emitter voltage		V_{CEX}	150	V
		V_{CEO}	100	
Emitter-base voltage		V_{EBO}	7	V
Collector current	DC (Note 1)	I_C	2.0	A
	Pulse (Note 1)	I_{CP}	4.0	
Base current		I_B	0.2	A
Collector power dissipation ($t = 10\text{s}$)	$t = 10\text{s}$	P_C (Note 2)	3.3	W
	DC		1.3	
Junction temperature		T_j	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$



Weight: 0.017 g (typ.)

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)

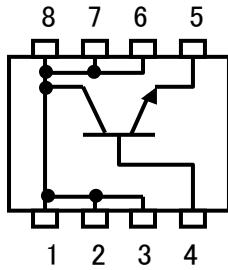
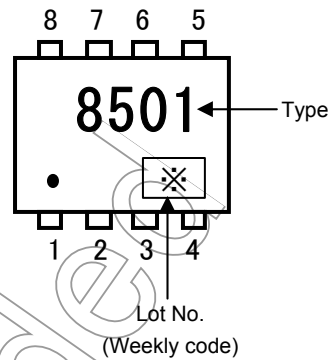
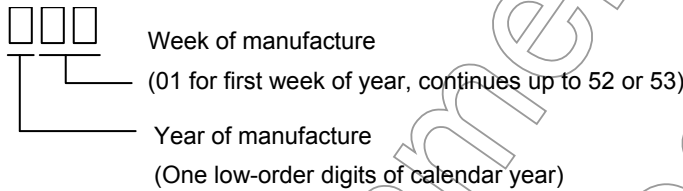


Figure 2. Marking (Note 4)



Note 4: ● on lower left on the marking indicates Pin 1.

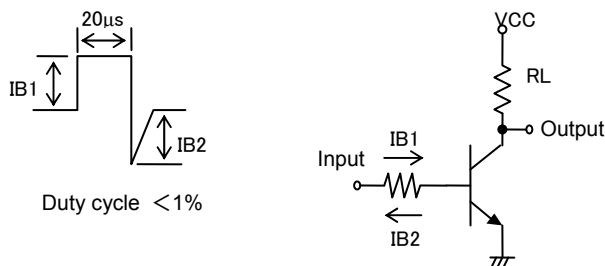
※ Weekly code: (Three digits)

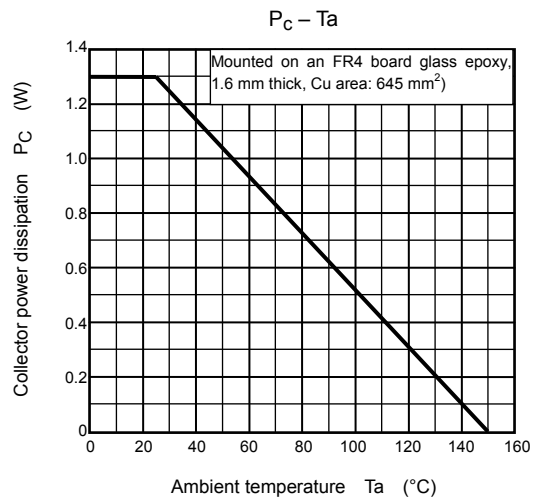
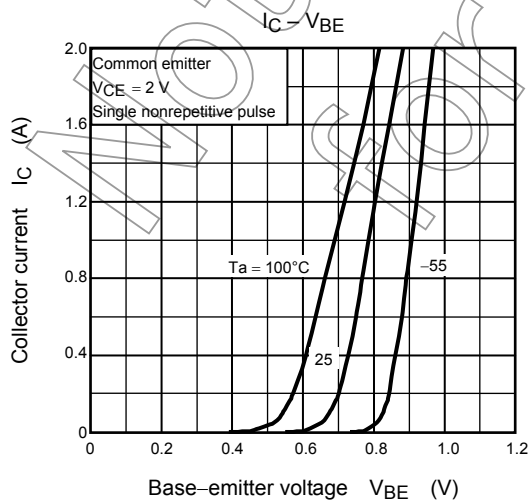
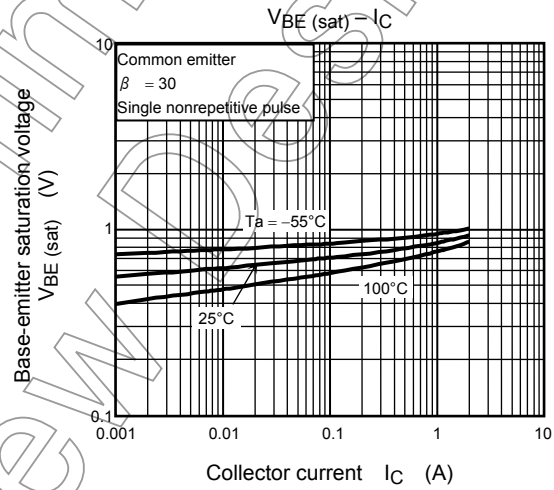
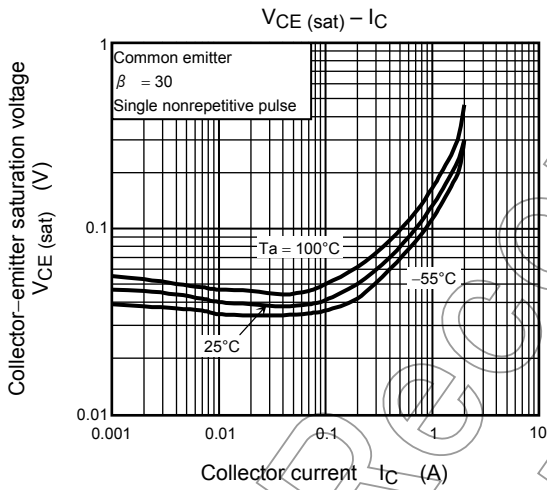
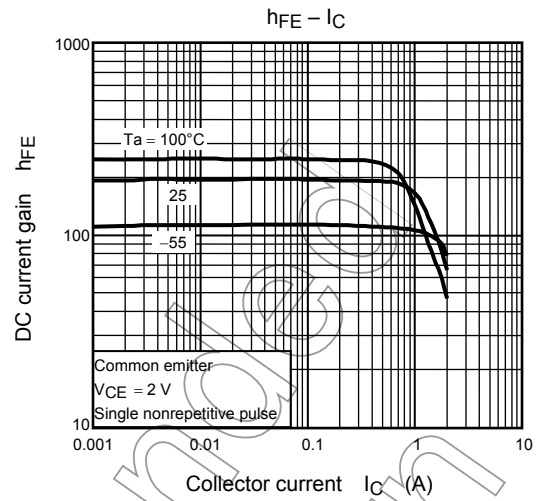
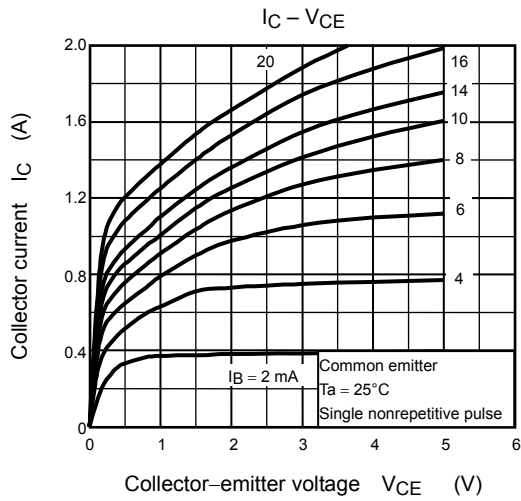


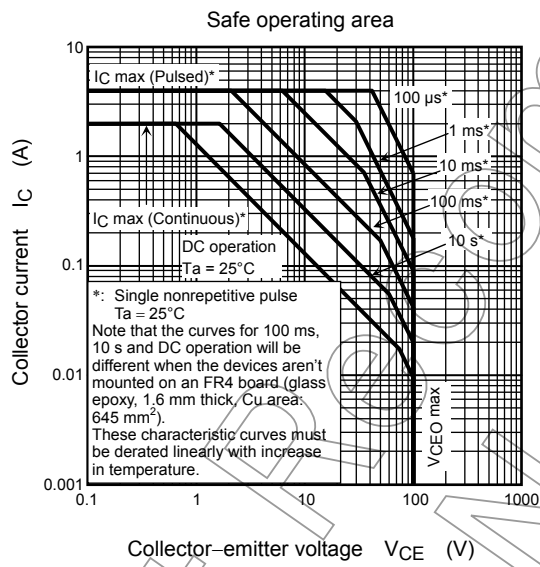
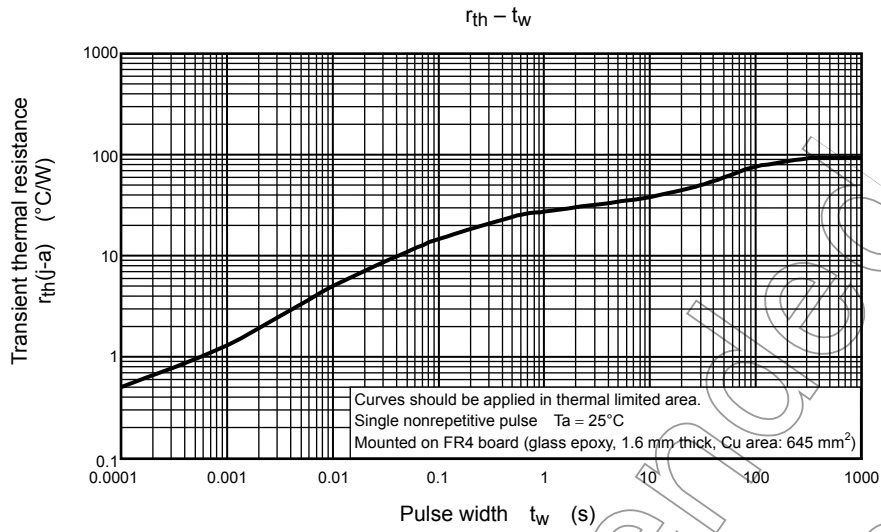
Electrical Characteristics (Ta = 25°C)

Characteristics	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	$V_{(BR)CEO}$	$I_C = 10\text{ mA}, I_B = 0$	100	—	—	V
DC current gain	$h_{FE} (1)$	$V_{CE} = 2\text{ V}, I_C = 0.3\text{ A}$	100	—	300	
	$h_{FE} (2)$	$V_{CE} = 2\text{ V}, I_C = 1.0\text{ A}$	80	—	—	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 1\text{ A}, I_B = 33\text{ mA}$	—	—	0.2	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = 1\text{ A}, I_B = 33\text{ mA}$	—	—	1.1	V
Collector output capacitance	C_{ob}	$V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	23	—	pF
Switching time	Rise time	t_r	—	65	—	ns
	Storage time	t_{stg}	—	1.4	—	$\mu\text{ s}$
	Fall time	t_f	—	100	—	ns

Figure 3. Switching Time Test Circuit & Timing Chart







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