TOSHIBA Transistor Silicon NPN Epitaxial Type

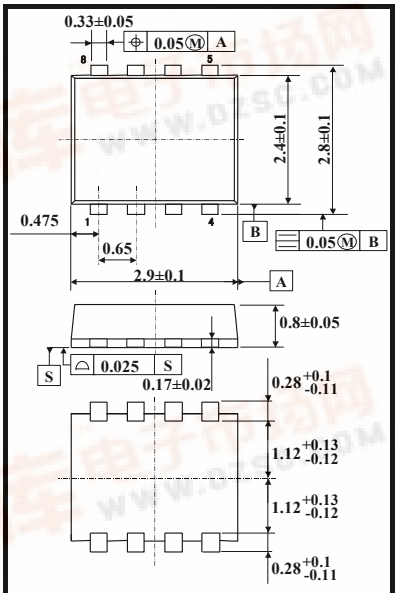
TPCP8507

High-Speed Switching Applications

DC/DC Converters

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

Unit: mm



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

JEDEC	—
JEITA	—
TOSHIBA	2-3V1A

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
Collector-emitter voltage		V_{CEO}	120	V
Collector-emitter voltage		V_{EBO}	7	V
Collector current	DC (Note 1)	I_C	1.0	A
	Pulsed (Note 1)	I_{CP}	2.0	A
Base current		I_B	0.1	A
Collector power dissipation	t = 10 s	P_C (Note 2)	3.00	W
	DC		1.25	W
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55~150	°C

Note 1: Ensure that the channel temperature does not exceed 150°C during use of the device.

Note 2: Mounted on an 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)

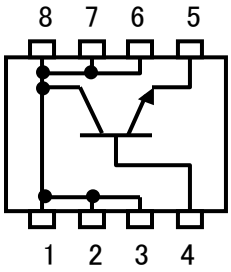
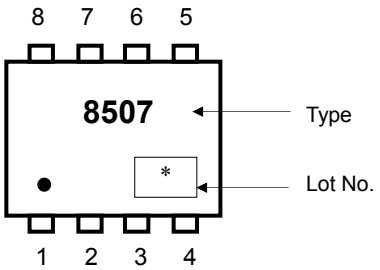
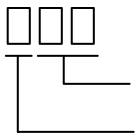


Figure 2. Marking (Note 4)



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

* Weekly code: (Three digits)



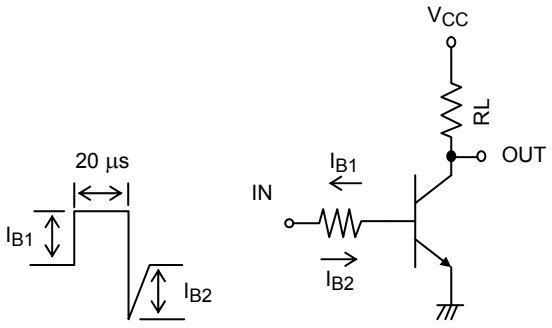
Week of manufacture
(01 for first week of year, continues up to 52 or 53)

Year of manufacture
(One low-order digits of calendar year)

Electrical Characteristics (Ta = 25°C)

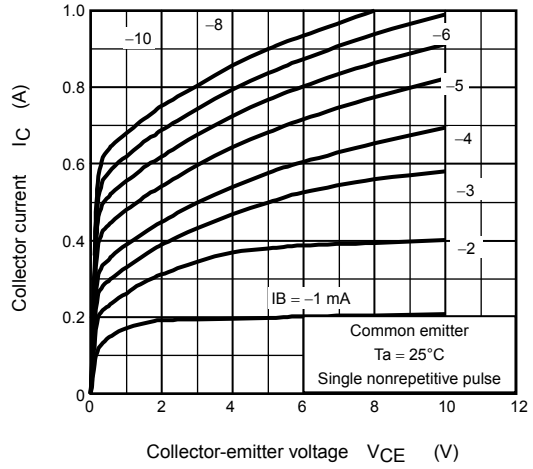
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cutoff current		I_{CBO}	V_{CB} = 180 V, IE = 0	—	—	100	nA
Emitter cutoff current		I_{EBO}	V_{EB} = 7 V, I_C = 0	—	—	100	nA
Collector-emitter breakdown voltage		$V_{(BR)\ CBO}$	I_C = 1 mA, IB = 0	180	—	—	V
Collector-emitter breakdown voltage		$V_{(BR)\ CEO}$	I_C = 10 mA, IB = 0	120	—	—	V
DC current gain		hFE(1)	V_{CE} = 2 V, I_C = 0.1A	120	—	300	
		hFE(2)	V_{CE} = 2 V, I_C = 0.3A	60	—	—	
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = 0.3 A, IB = 0.01A	—	—	0.14	V
Base-emitter saturation voltage		$V_{BE\ (sat)}$	I_C = 0.3 A, IB = 0.01A	—	—	1.1	V
Switching time	Storage time	t_r	See Figure 3 circuit diagram.	—	0.1	—	μs
	Storage time	t_{stg}	$V_{CC} \cong$ 72 V, RL = 240 Ω	—	1.5	—	
	Fall time	t_f	IB1 = −IB2 = 10mA	—	0.2	—	

Figure 3. Switching Time Test Circuit & Timing Chart

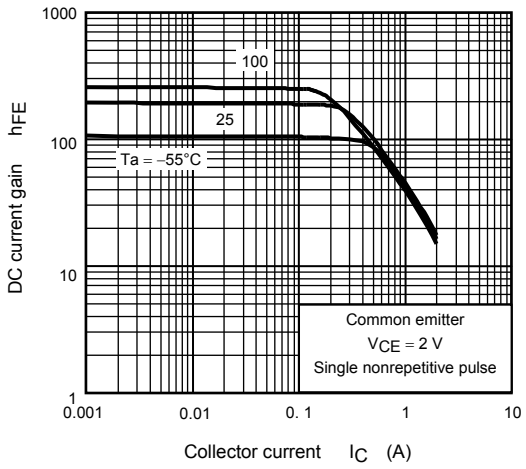


Duty cycle < 1 %

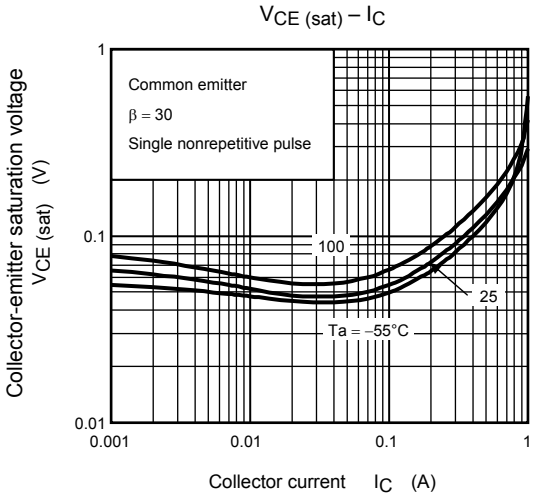
$I_C - V_{CE}$



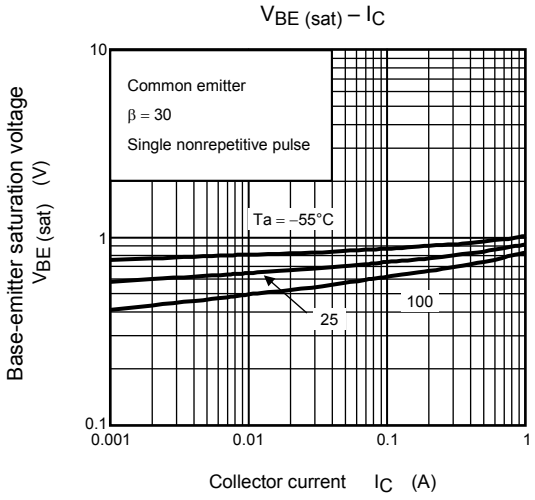
hFE – I_C



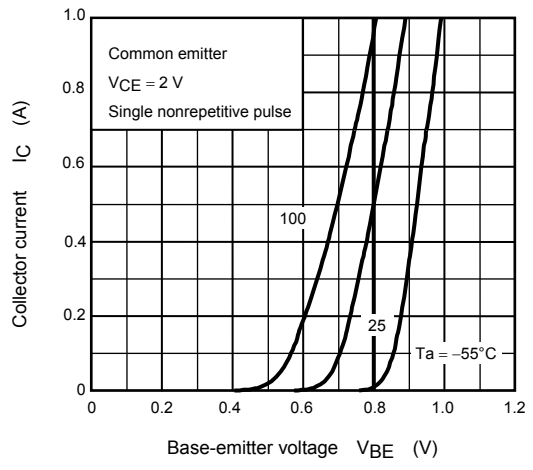
$V_{CE\ (sat)} - I_C$



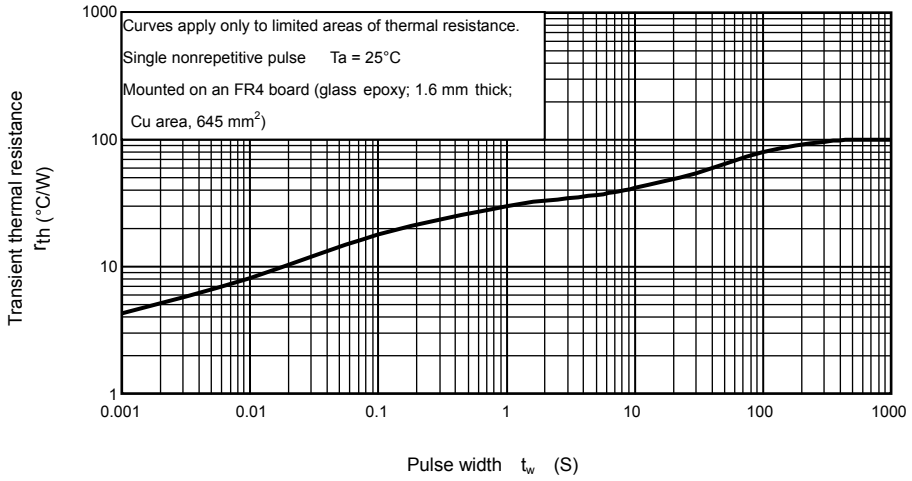
$V_{BE\ (sat)} - I_C$



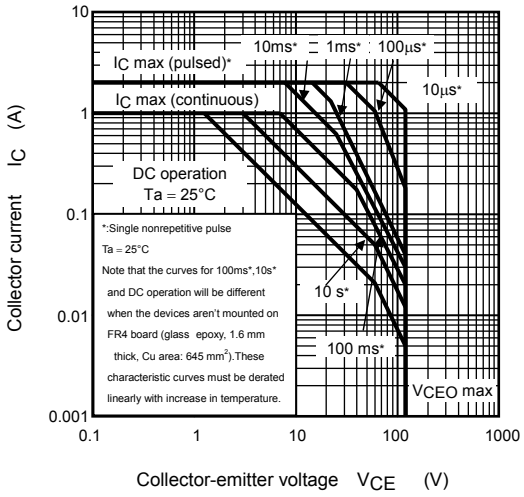
$I_C - V_{BE}$



$r_{th} - t_w$



Safe Operating Area



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