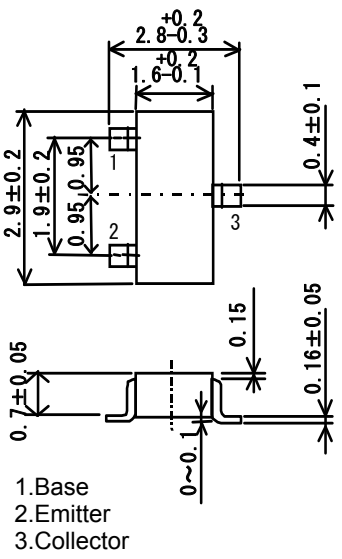
TOSHIBA Transistor Silicon NPN Epitaxial Type

2SC5976

High-Speed Switching Applications
DC-DC Converter Applications
Strobe Flash Applications

- High DC current gain: h_{FE} = 250 to 400 (I_C = 0.3 A)
- Low collector-emitter saturation voltage: $V_{CE\ (sat)}$ = 0.14 V (max)
- High-speed switching: t_f = 25 ns (typ.)

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2−3S1C

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	50	V
Collector-emitter voltage		V_{CEX}	50	V
Collector-emitter voltage		V_{CEO}	30	V
Emitter-base voltage		V_{EBO}	6	V
Collector current	DC	I_C	3.0	A
	Pulse	I_{CP}	5.0	
Base current		I_B	0.3	A
Collector power dissipation (t=10s)		P_C (Note.1)	1.00	W
Total collector power dissipation (DC)			0.625	
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

Note 1: Mounted on an FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645 mm^2)

Note 2: 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).

Start of commercial production
2004-01

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	V_{CB} = 50 V, I_E = 0	—	—	0.1	μA
Emitter cut-off current		I_{EBO}	V_{EB} = 6 V, I_C = 0	—	—	0.1	μA
Collector-emitter breakdown voltage		$V_{(BR)\ CEO}$	I_C = 10 mA, I_B = 0	30	—	—	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 = 1.0 A	120	—	—	
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = 1.0 A, I_B =33mA	—	—	0.14	V
Base-emitter saturation voltage		$V_{BE\ (sat)}$	I_C = 1.0 A, I_B =33mA	—	—	1.10	V
Collector output capacitance		Cob	V_{CB} = 10 V, I_E = 0, f=1MHz		18		pF
Switching time	Rise time	t_r	See Figure 1.	—	40	—	ns
	Storage time	t_{stg}	V_{CC} ≈ 12V, R_L = 12 Ω	—	320	—	
	Fall time	t_f	I_{B1} = −I_{B2} = 33 mA	—	25	—	

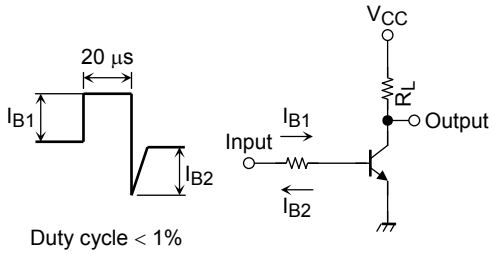
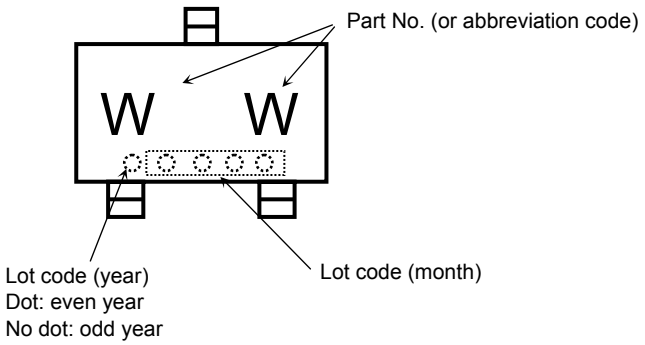
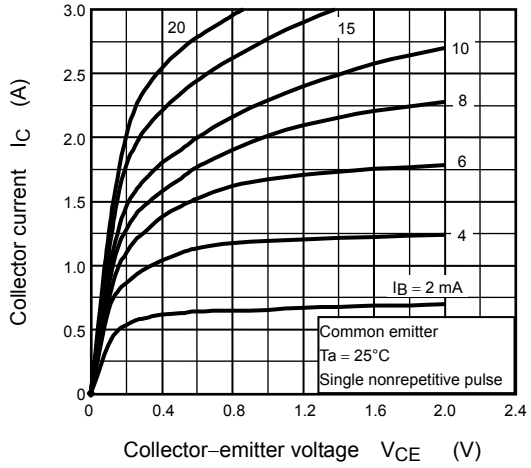


Figure 1 Switching Time Test Circuit & Timing Chart

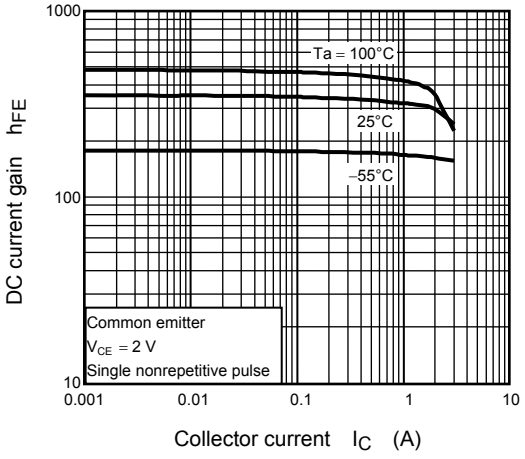
Marking



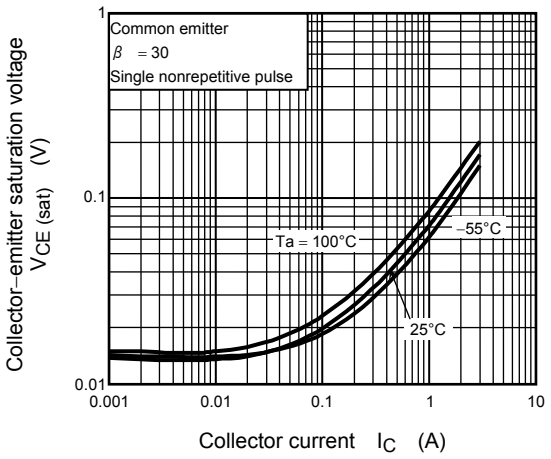
$I_C - V_{CE}$



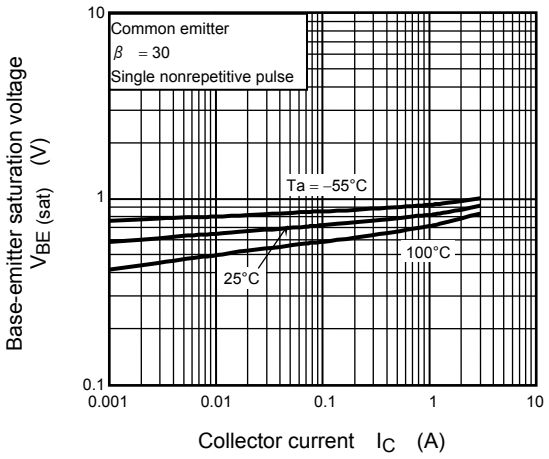
$h_{FE} - I_C$



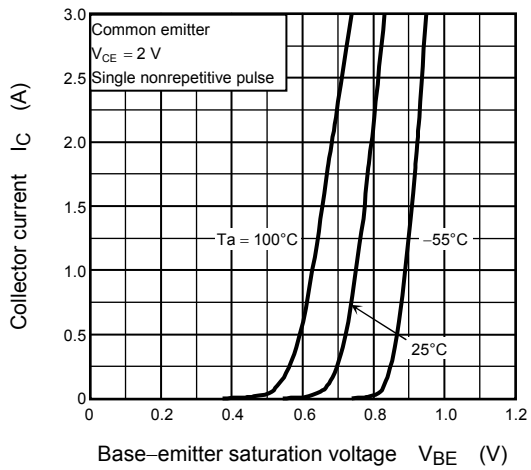
$V_{CE\ (sat)} - I_C$



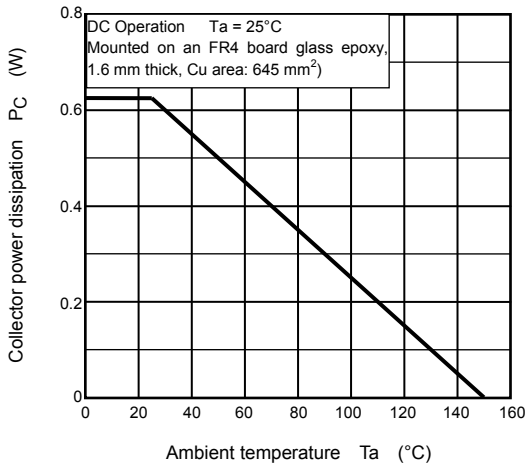
$V_{BE\ (sat)} - I_C$



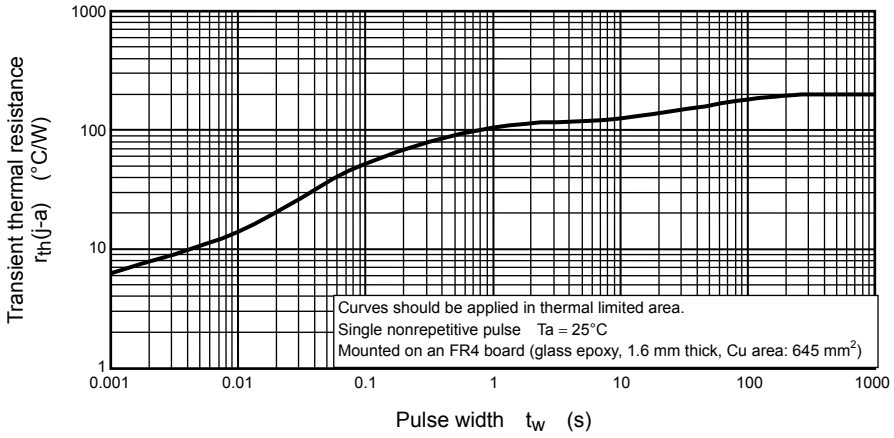
$I_C - V_{BE}$



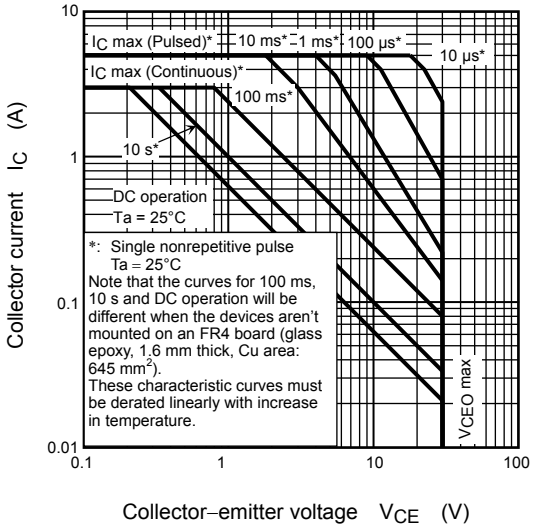
$P_C - Ta$



$r_{th} - t_w$



Safe operating area



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