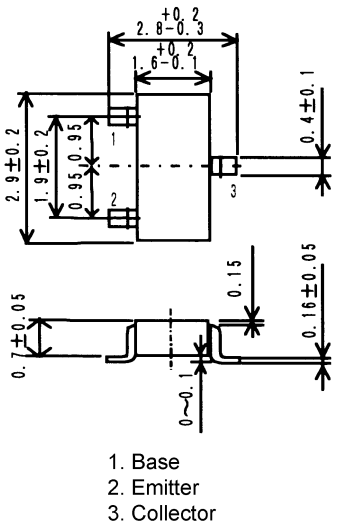
TOSHIBA Transistor Silicon NPN Epitaxial Type

2SC5755

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

- High DC current gain: h_{FE} = 400 to 1000 (I_C = 0.2 A)
- Low collector-emitter saturation voltage: $V_{CE\ (sat)}$ = 0.12 V (max)
- High-speed switching: t_f = 25 ns (typ.)

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-3S1A

Weight: 0.01 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	20	V
Collector-emitter voltage		V_{CEO}	10	V
Emitter-base voltage		V_{EBO}	7	V
Collector current	DC	I_C	2	A
	Pulse	I_{CP}	3.5	
Base current		I_B	200	mA
Collector power dissipation	DC	P_C (Note 1)	500	mW
	t = 10 s		750	
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).

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	V_{CB} = 20 V, I_E = 0	—	—	100	nA
Emitter cut-off current		I_{EBO}	V_{EB} = 7 V, I_C = 0	—	—	100	nA
Collector-emitter breakdown voltage		$V_{(BR)\ CEO}$	I_C = 10 mA, I_B = 0	10	—	—	V
DC current gain		h_{FE} (1)	V_{CE} = 2 V, I_C = 0.2 A	400	—	1000	
		h_{FE} (2)	V_{CE} = 2 V, I_C = 0.6 A	200	—	—	
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = 0.6 A, I_B = 12 mA	—	—	0.12	V
Base-emitter saturation voltage		$V_{BE\ (sat)}$	I_C = 0.6 A, I_B = 12 mA	—	—	1.10	V
Switching time	Rise time	t_r	See Figure 1.	—	60	—	ns
	Storage time	t_{stg}	$V_{CC} \approx$ 6 V, R_L = 10 Ω	—	215	—	
	Fall time	t_f	$I_{B1} = -I_{B2}$ = 12 mA	—	25	—	

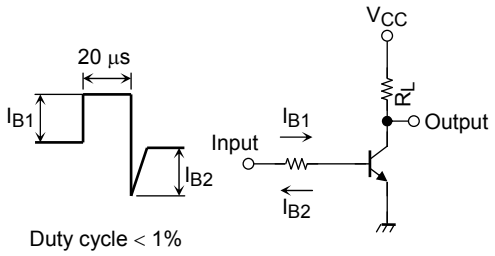
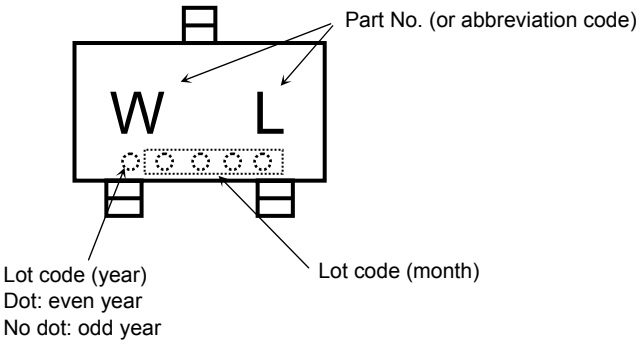
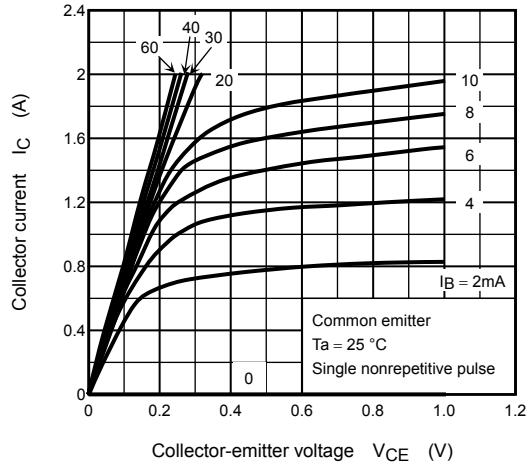


Figure 1 Switching Time Test Circuit & Timing Chart

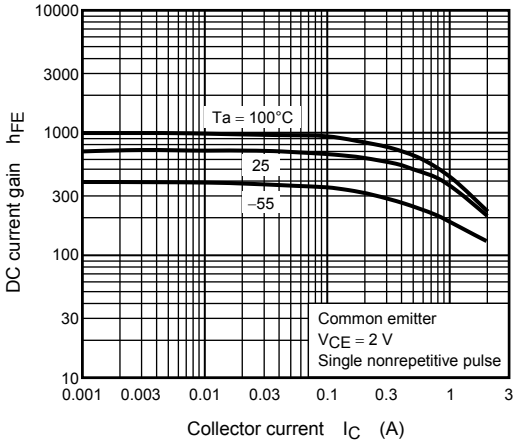
Marking



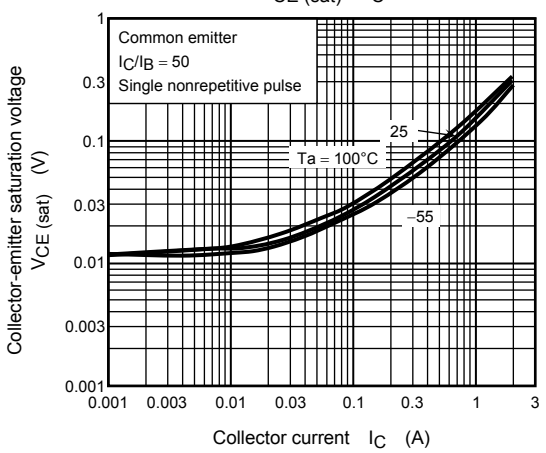
$I_C - V_{CE}$



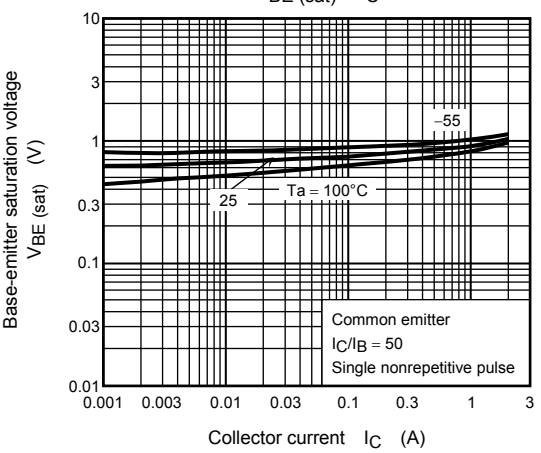
$h_{FE} - I_C$



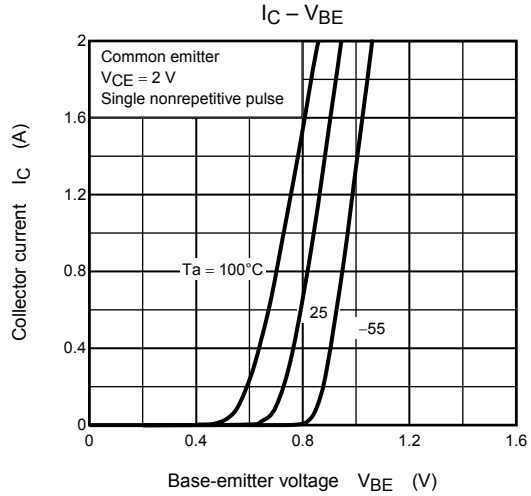
$V_{CE\ (sat)} - I_C$

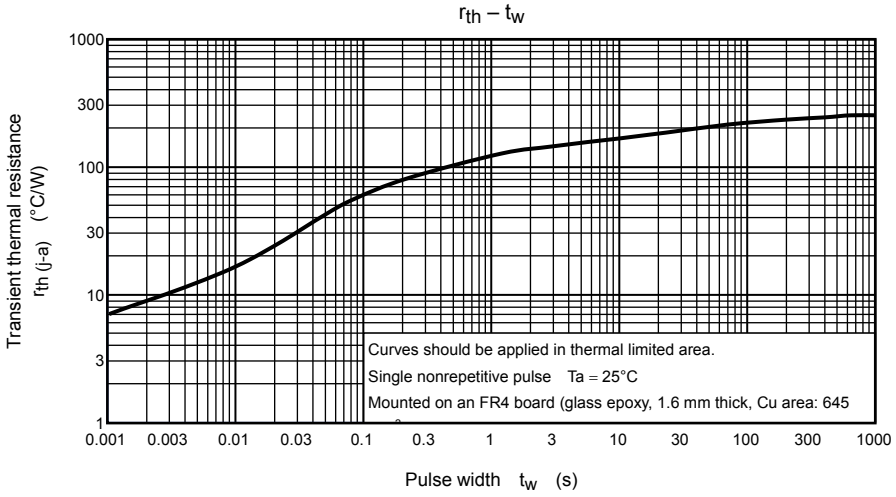


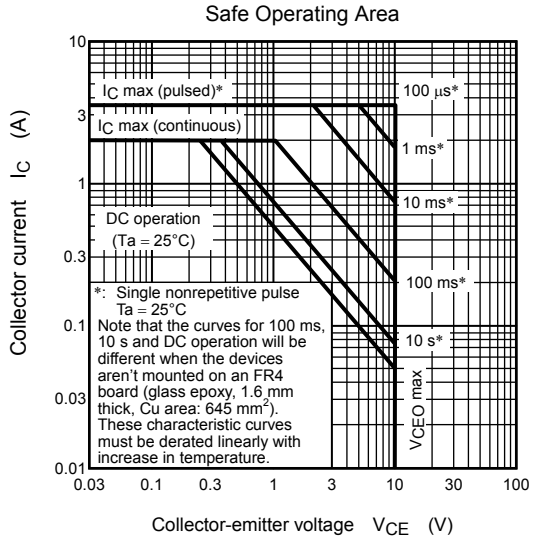
$V_{BE\ (sat)} - I_C$



$I_C - V_{BE}$




$r_{th} - t_w$
Transient thermal resistance $r_{th\ (j\text{-}a)}$ (°C/W)
1000
300
100
30
10
3
1
0.001
0.003
0.01
0.03
0.1
0.3
1
3
10
30
100
300
1000
Curves should be applied in thermal limited area.
Single nonrepetitive pulse Ta = 25°C
Mounted on an FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645
Pulse width t_w (s)


Safe Operating Area
Collector current I_C (A)
10
3
1
0.3
0.1
0.03
0.01
I_C max (pulsed)*
I_C max (continuous)
DC operation
(Ta = 25°C)
100 μs*
1 ms*
10 ms*
100 ms*
10 s*
V_{CEO} max
*: Single nonrepetitive pulse
Ta = 25°C
Note that the curves for 100 ms, 10 s and DC operation will be different when the devices aren't mounted on an FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645 mm^2). These characteristic curves must be derated linearly with increase in temperature.
0.03
0.1
0.3
1
3
10
30
100
Collector-emitter voltage V_{CE} (V)

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