

TOSHIBA Transistor Silicon NPN Epitaxial Type

2SC5738

High-Speed Switching Applications

DC-DC Converter Applications

- High DC current gain: $hFE = 400$ to 1000 ($I_C = 0.5$ A)
- Low collector-emitter saturation voltage: $V_{CE}(\text{sat}) = 0.15$ V (max)
- High-speed switching: $t_f = 90$ ns (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	40	V
Collector-emitter voltage	V_{CEX}	30	V
Collector-emitter voltage	V_{CEO}	20	V
Emitter-base voltage	V_{EBO}	7	V
Collector current	DC	I_C	A
	Pulse	I_{CP}	
Base current		I_B	mA
Collector power dissipation	DC	P_C (Note 1)	mW
	$t = 10 \text{ s}$		
Junction temperature		T_j	$^{\circ}\text{C}$
Storage temperature range		T_{stg}	-55 to 150

Unit: mm

The drawing illustrates the physical dimensions of a TO-3P transistor package. It features a central rectangular body with three leads extending from the bottom. The top lead is labeled 'Base' (1), the left lead is labeled 'Emitter' (2), and the right lead is labeled 'Collector' (3). Various dimensions are indicated with tolerances:

- Top Lead (Base):** Total width is $2.8-0.2$ mm, height is $0.95-0.05$ mm, and a central slot width is $1.6-0.1$ mm.
- Left Lead (Emitter):** Total height is 2.9 ± 0.2 mm, and a central slot height is 1.9 ± 0.2 mm.
- Right Lead (Collector):** Total height is 0.4 ± 0.1 mm, and a central slot height is 0.16 ± 0.05 mm.
- Bottom Body:** A central slot width is 0.7 ± 0.05 mm.
- Bottom Lead Spacing:** The distance between the bottom of the emitter and collector leads is $0 \sim 0.1$ mm.

1. Base
2. Emitter
3. Collector

Weight: 0.01 g (typ.)

Note 1: Mounted on an FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645 mm²)

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
2000-08

Electrical Characteristics ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	$V_{CB} = 40\text{ V}$, $I_E = 0$	—	—	100	nA
Emitter cut-off current	I_{EBO}	$V_{EB} = 7\text{ V}$, $I_C = 0$	—	—	100	nA
Collector-emitter breakdown voltage	$V_{(BR)\text{CEO}}$	$I_C = 10\text{ mA}$, $I_B = 0$	20	—	—	V
DC current gain	h_{FE} (1)	$V_{CE} = 2\text{ V}$, $I_C = 0.5\text{ A}$	400	—	1000	
	h_{FE} (2)	$V_{CE} = 2\text{ V}$, $I_C = 1.6\text{ A}$	200	—	—	
Collector-emitter saturation voltage	$V_{CE\text{ (sat)}}$	$I_C = 1.6\text{ A}$, $I_B = 32\text{ mA}$	—	—	0.15	V
Base-emitter saturation voltage	$V_{BE\text{ (sat)}}$	$I_C = 1.6\text{ A}$, $I_B = 32\text{ mA}$	—	—	1.10	V
Collector output capacitance	C_{ob}	$V_{CB} = 10\text{ V}$, $I_E = 0$, $f = 1\text{ MHz}$	—	18	—	pF
Switching time	Rise time	t_r	See Figure 1.	—	100	—
	Storage time	t_{stg}	$V_{CC} \approx 12\text{ V}$, $R_L = 7.5\Omega$	—	350	—
	Fall time	t_f	$I_{B1} = -I_{B2} = 53\text{ mA}$	—	90	—

Marking

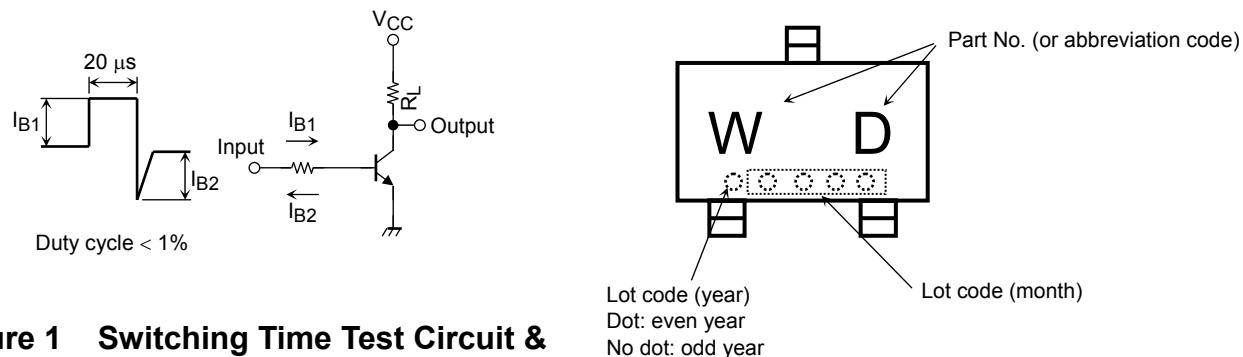
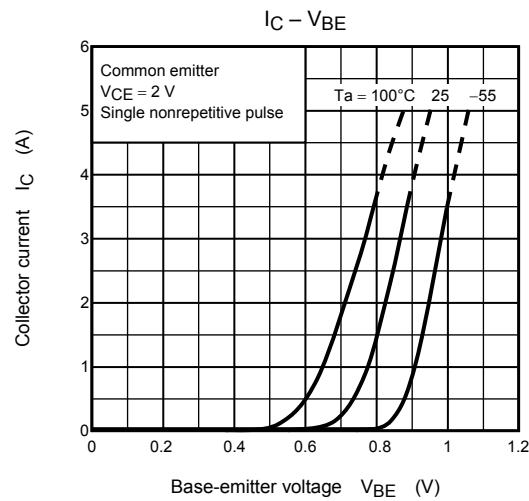
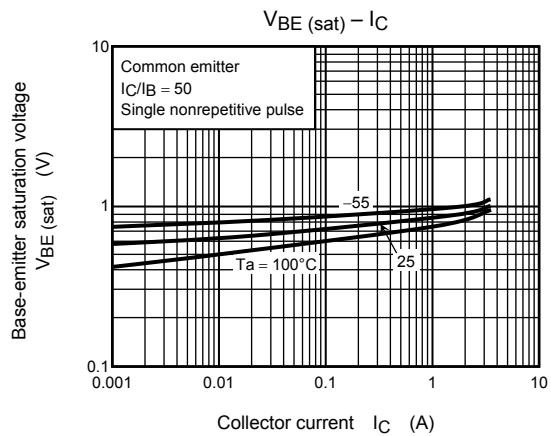
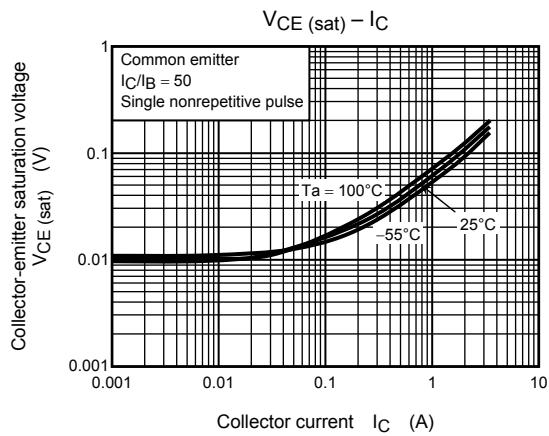
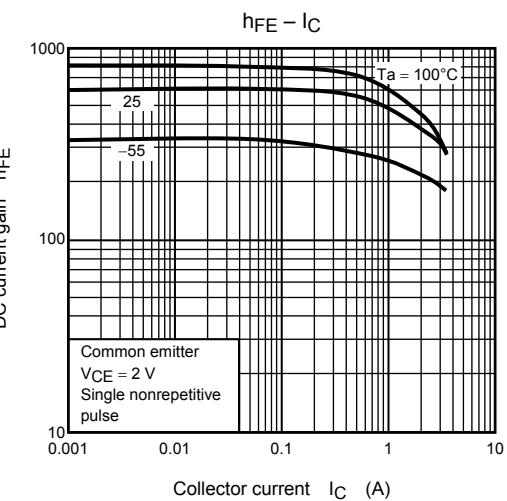
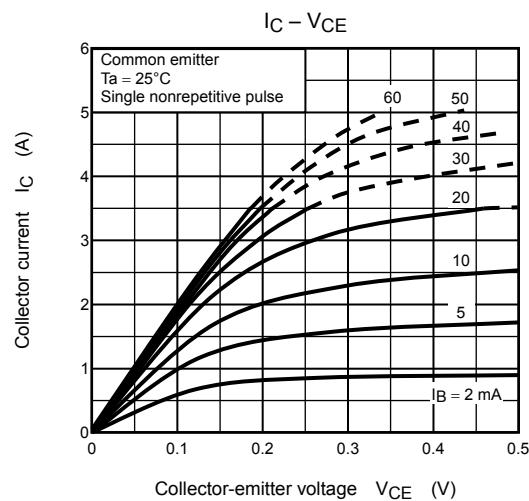
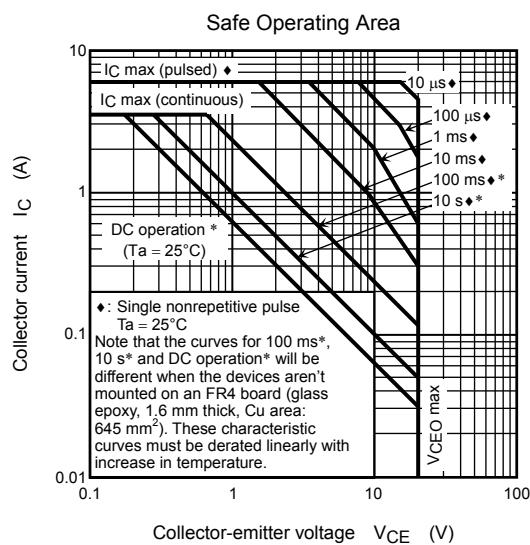
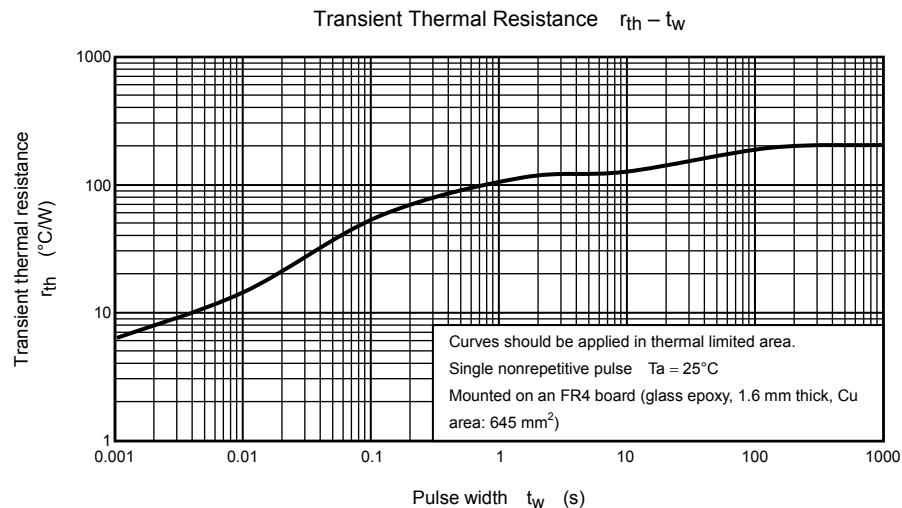


Figure 1 Switching Time Test Circuit & Timing Chart





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