

TOSHIBA Transistor Silicon NPN Epitaxial Type

2SC5738

High-Speed Switching Applications
DC-DC Converter Applications

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

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

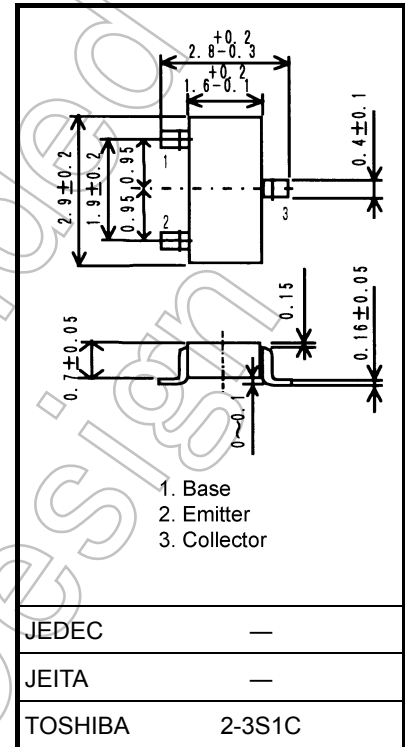
Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	40	V
Collector-emitter voltage		V_{CEX}	30	V
Collector-emitter voltage		V_{CEO}	20	V
Emitter-base voltage		V_{EBO}	7	V
Collector current	DC	I_C	3.5	A
	Pulse	I_{CP}	6.0	
Base current		I_B	350	mA
Collector power dissipation	DC	P_C	625	mW
	$t = 10$ s	(Note 1)	1000	
Junction temperature		T_j	150	$^\circ\text{C}$
Storage temperature range		T_{stg}	-55 to 150	$^\circ\text{C}$

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).

Unit: mm



Weight: 0.01 g (typ.)

Start of commercial production
2000-08

Electrical Characteristics (Ta = 25°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	$V_{(BR)CEO}$	$I_C = 10\text{ mA}, I_B = 0$	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	$V_{CE(sat)}$	$I_C = 1.6\text{ A}, I_B = 32\text{ mA}$	—	—	0.15	V	
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = 1.6\text{ A}, I_B = 32\text{ mA}$	—	—	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	ns
	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	

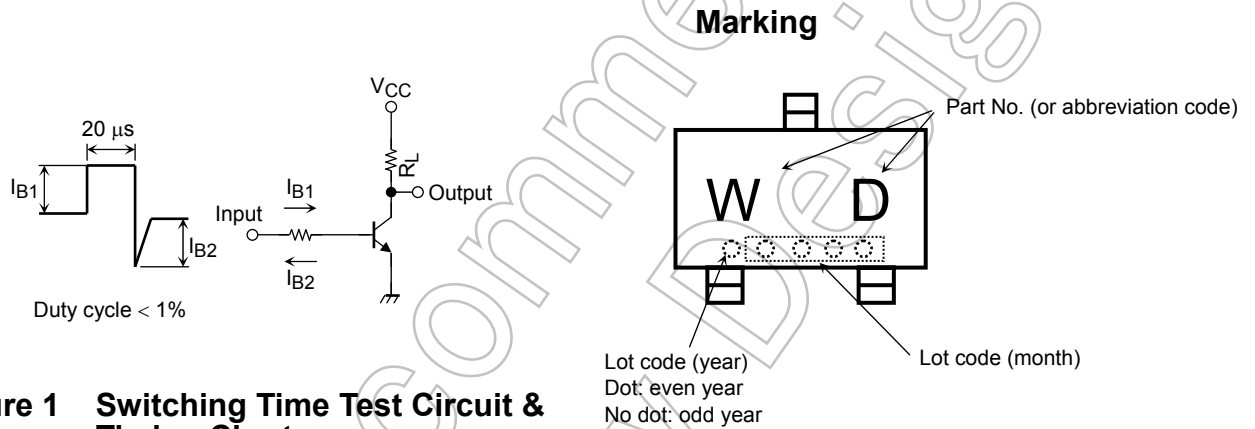
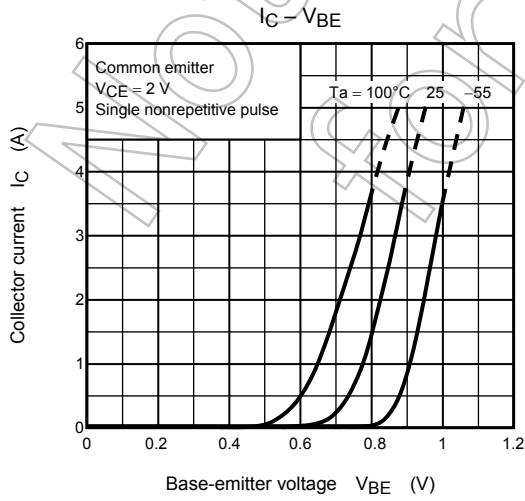
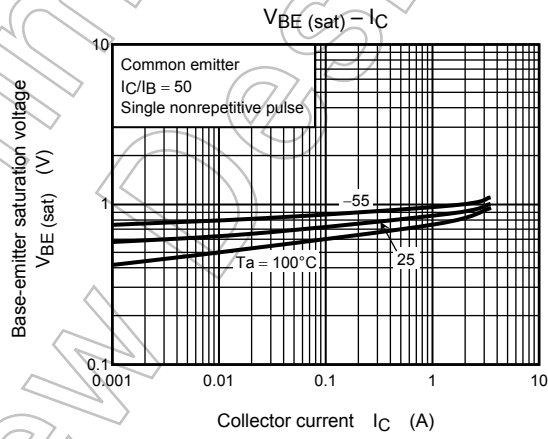
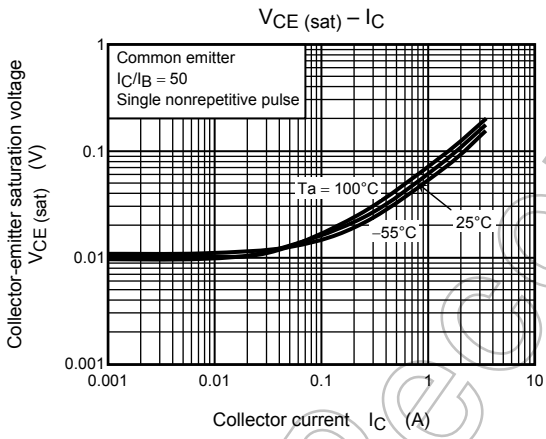
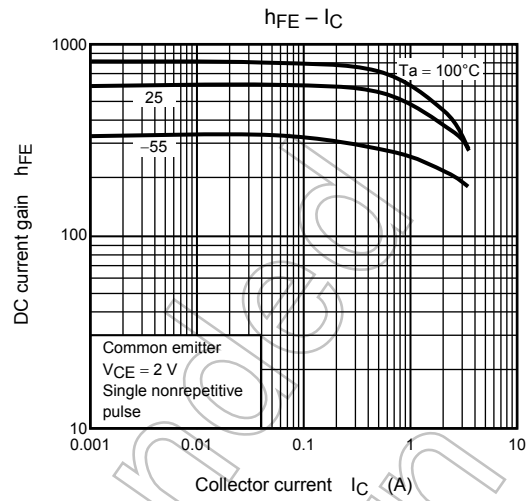
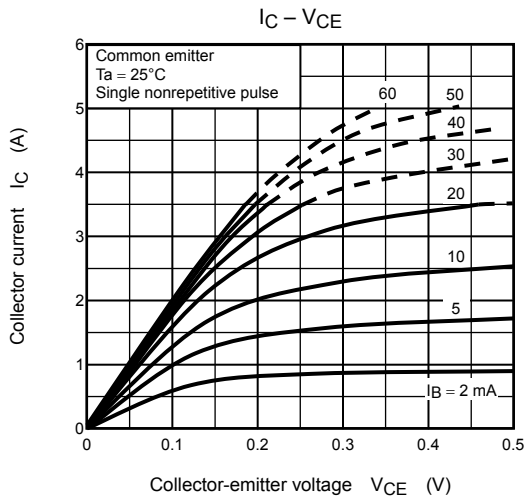
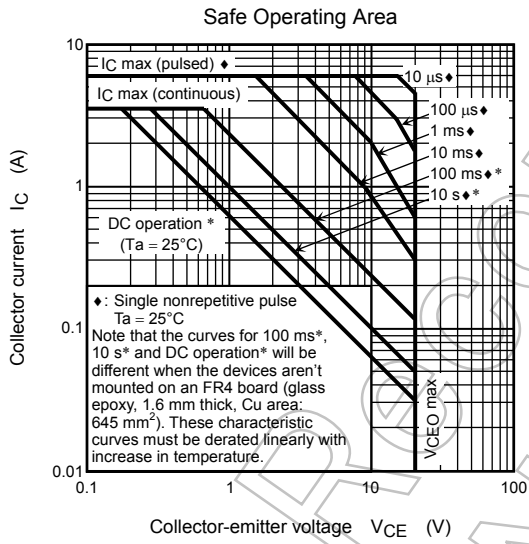
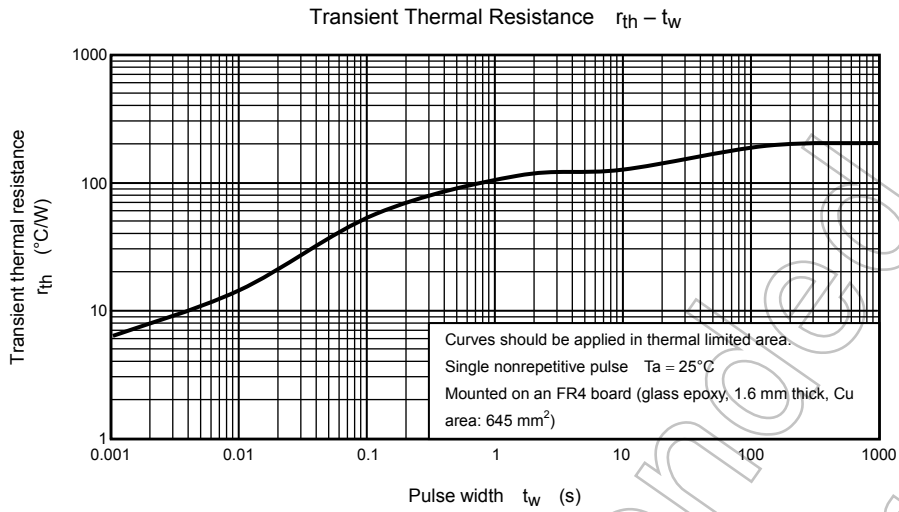


Figure 1 Switching Time Test Circuit & Timing Chart





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