

TOSHIBA Transistor Silicon NPN Epitaxial Type

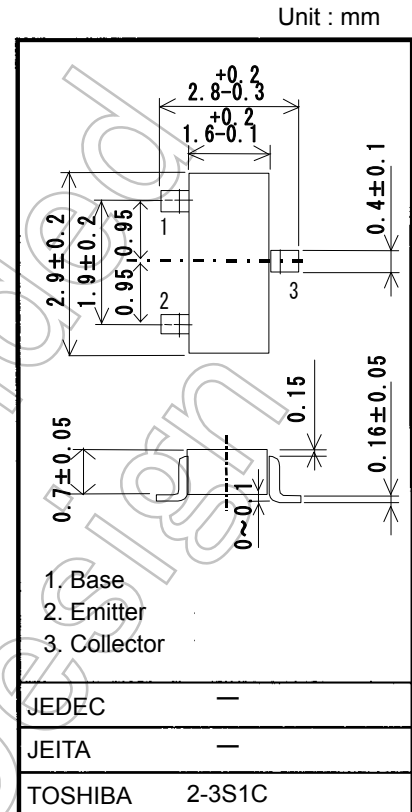
# 2SC6033

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:  $V_{CE(sat)} = 0.18$  V (max)
- High-speed switching:  $t_f = 38$  ns (typ.)

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

Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	100	V
Collector-emitter voltage	$V_{CEX}$	80	V
	$V_{CEO}$	50	V
Emitter-base voltage	$V_{EBO}$	6	V
Collector current	DC	$I_C$	2.5
	Pulse	$I_{CP}$	5
Base current	$I_B$	0.3	A
Collector power dissipation	$t = 10$ s	$P_C$ (Note 1)	1.00
	DC		0.625
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-55 to 150	$^\circ\text{C}$



Weight: 0.01g (typ.)

Note 1: Mounted on an FR4 board (glass epoxy, 1.6mm thick, Cu area: 64.5 mm<sup>2</sup>)

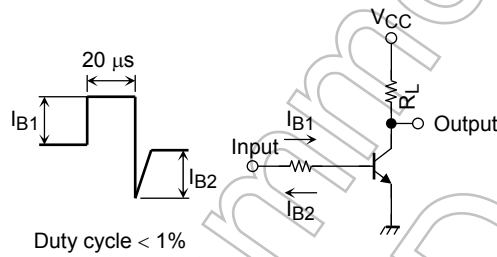
Note 2: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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

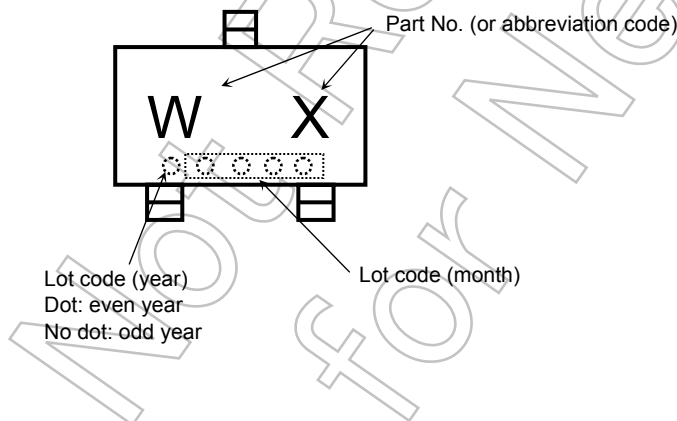
**Electrical Characteristics (Ta = 25°C)**

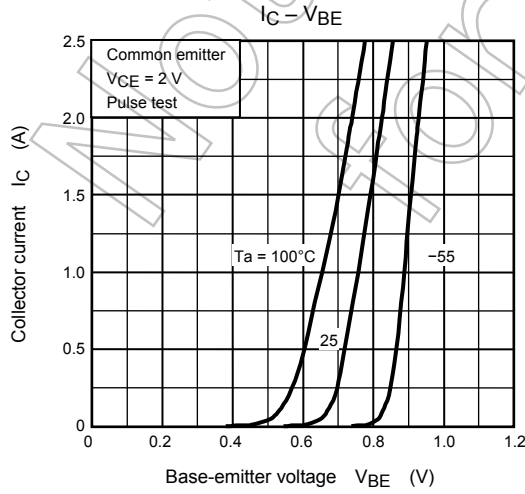
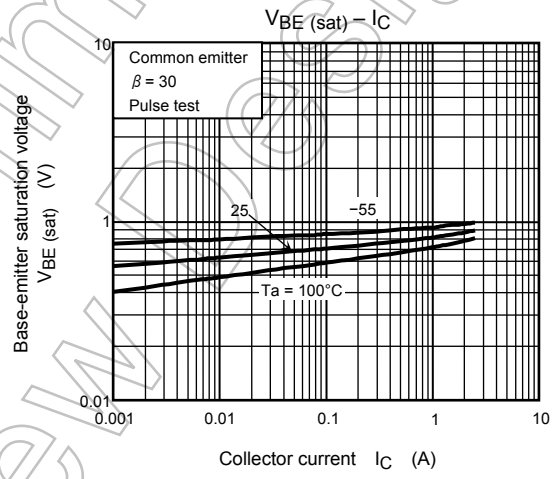
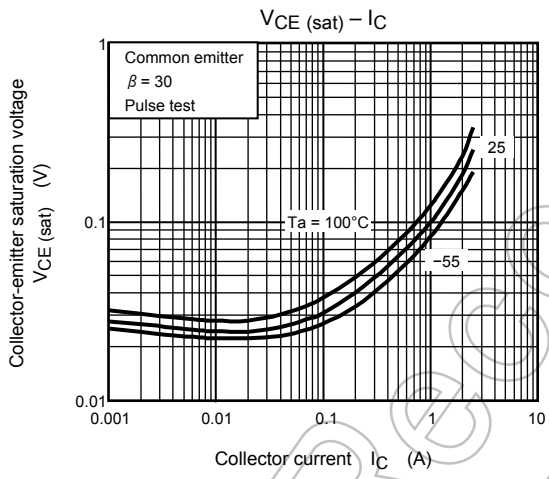
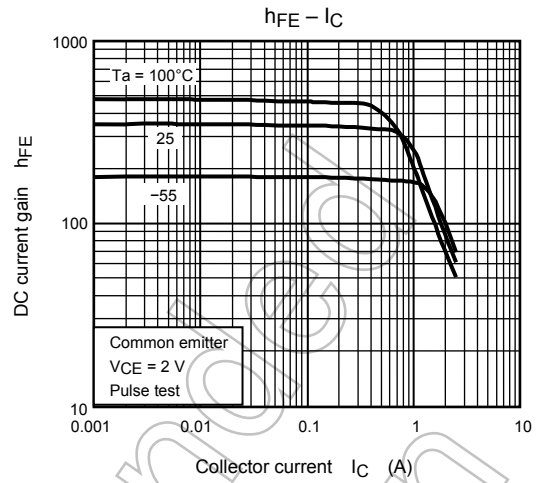
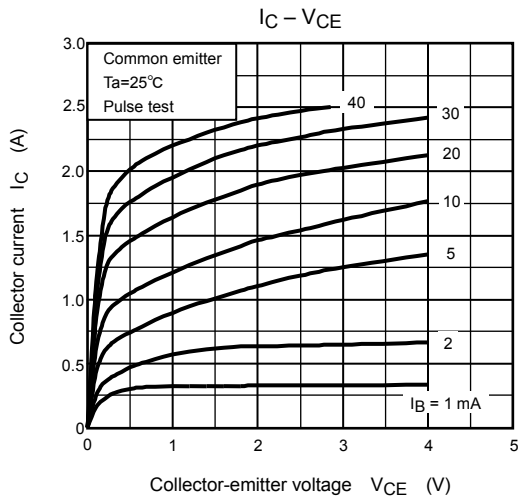
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		$I_{CBO}$	$V_{CB} = 100\text{ V}, I_E = 0$	—	—	0.1	$\mu\text{ A}$
Emitter cut-off current		$I_{EBO}$	$V_{EB} = 6\text{ V}, I_C = 0$	—	—	0.1	$\mu\text{ A}$
Collector-emitter breakdown voltage		$V_{(BR)CEO}$	$I_C = 10\text{ mA}, I_B = 0$	50	—	—	V
DC current gain		$h_{FE}(1)$	$V_{CE} = 2\text{ V}, I_C = 0.3\text{ A}$	250	—	400	
		$h_{FE}(2)$	$V_{CE} = 2\text{ V}, I_C = 1.0\text{ A}$	120	—	—	
Collector-emitter saturation voltage		$V_{CE(sat)}$	$I_C = 1.0\text{ A}, I_B = 33\text{ mA}$	—	—	0.18	V
Base-emitter saturation voltage		$V_{BE(sat)}$	$I_C = 1.0\text{ A}, I_B = 33\text{ mA}$	—	—	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. $V_{CC} \approx 20\text{ V}, R_L = 20\ \Omega$ $I_{B1} = -I_{B2} = 33\text{ mA}$	—	25	—	ns
	Storage time	$t_{stg}$		—	470	—	
	Fall time	$t_f$		—	38	—	

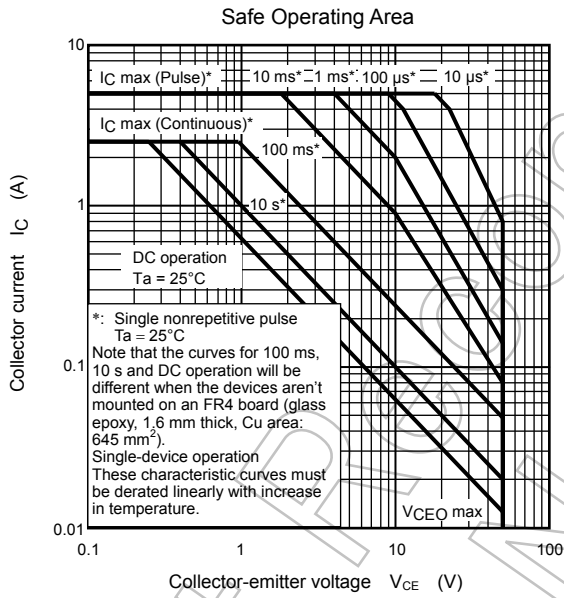
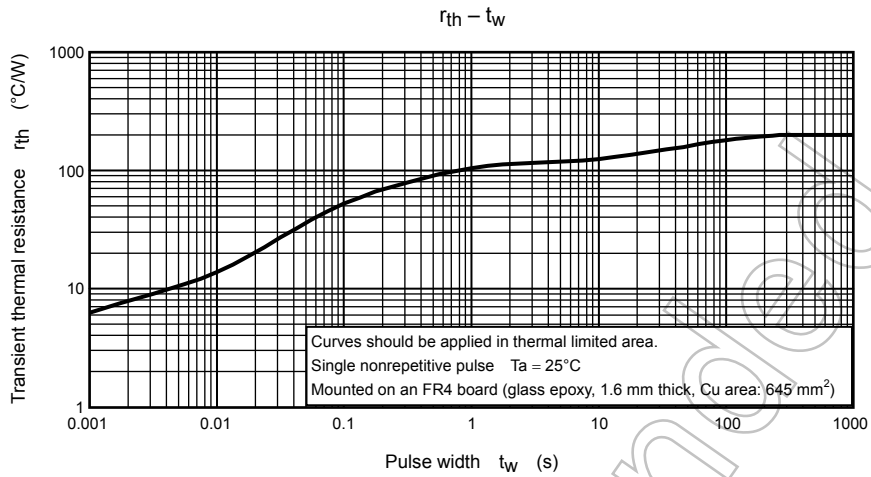


**Figure 1 Switching Time Test Circuit & Timing Chart**

**Marking**







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