

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.)

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

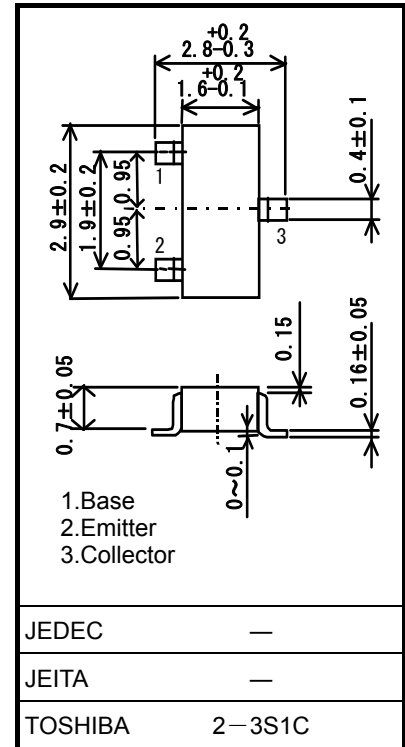
Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	50	V
Collector-emitter voltage	$V_{CEX}$	50	V
Collector-emitter voltage	$V_{CEO}$	30	V
Emitter-base voltage	$V_{EBO}$	6	V
Collector current	DC	$I_C$	3.0
	Pulse	$I_{CP}$	5.0
Base current	$I_B$	0.3	A
Collector power dissipation ( $t=10\text{s}$ )	$P_C$ (Note.1)	1.00	W
Total collector power dissipation (DC)		0.625	
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 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.

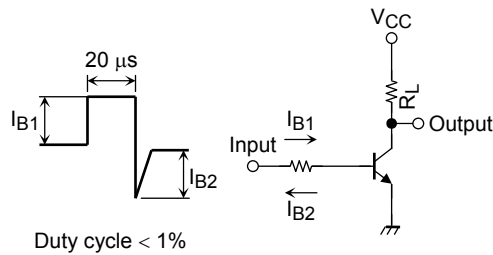
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Unit: mm



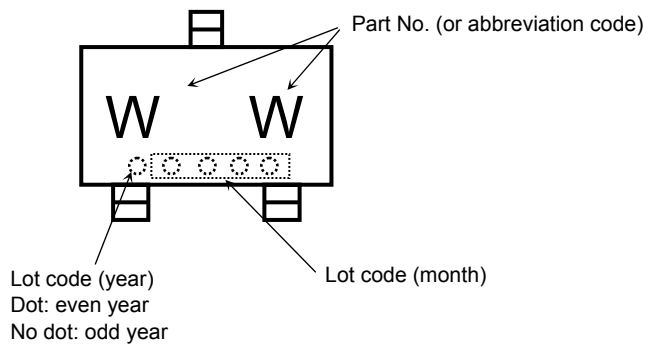
**Electrical Characteristics (Ta = 25°C)**

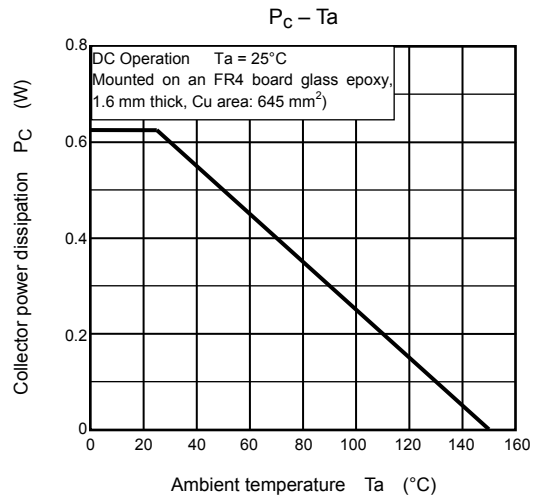
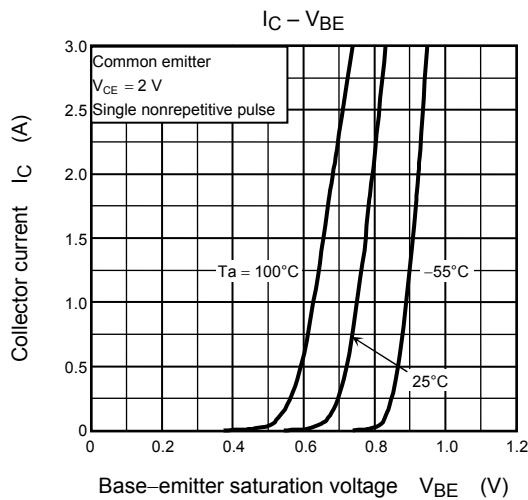
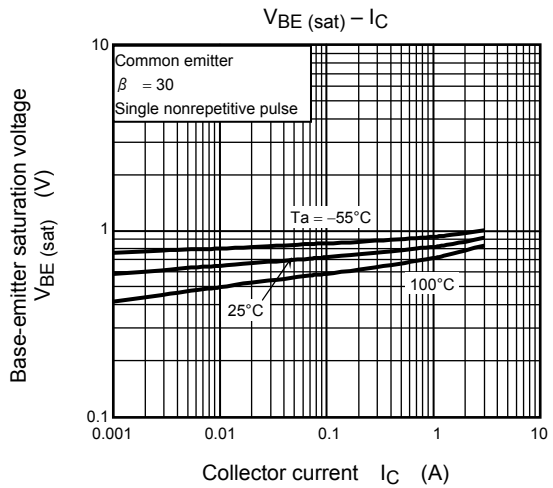
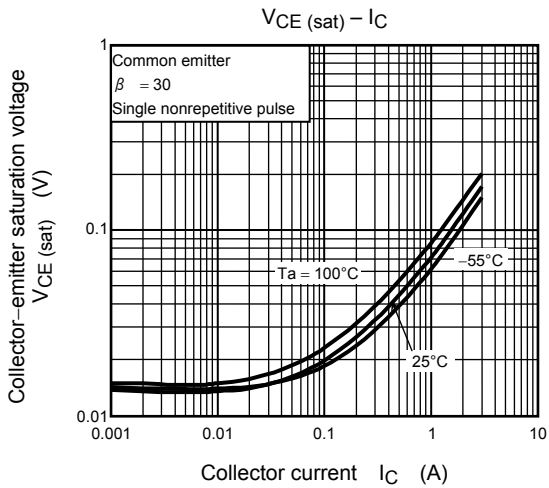
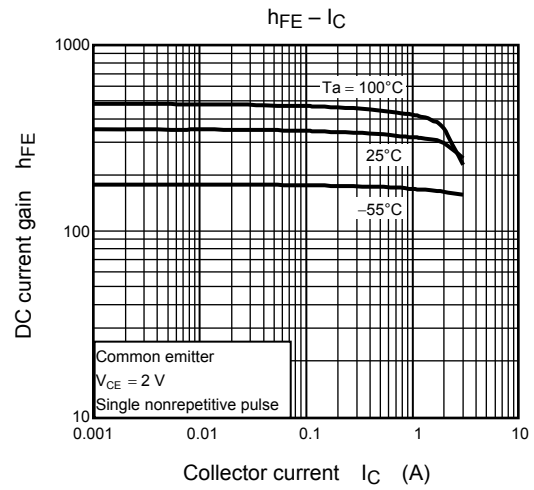
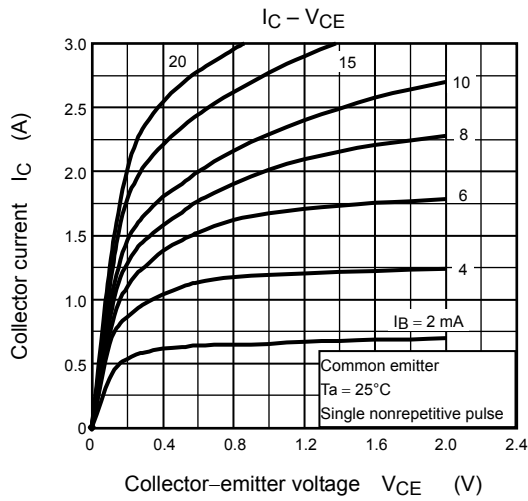
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit	
Collector cut-off current	$I_{CBO}$	$V_{CB} = 50\text{ V}, I_E = 0$	—	—	0.1	$\mu\text{ A}$	
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 6\text{ V}, I_C = 0$	—	—	0.1	$\mu\text{ A}$	
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 10\text{ mA}, I_B = 0$	30	—	—	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	$V_{CE(sat)}$	$I_C = 1.0\text{ A}, I_B = 33\text{ mA}$	—	—	0.14	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.		—	40	ns
	Storage time	$t_{stg}$	$V_{CC} \approx 12\text{ V}, R_L = 12\ \Omega$		—	320	
	Fall time	$t_f$	$I_{B1} = -I_{B2} = 33\text{ mA}$		—	25	

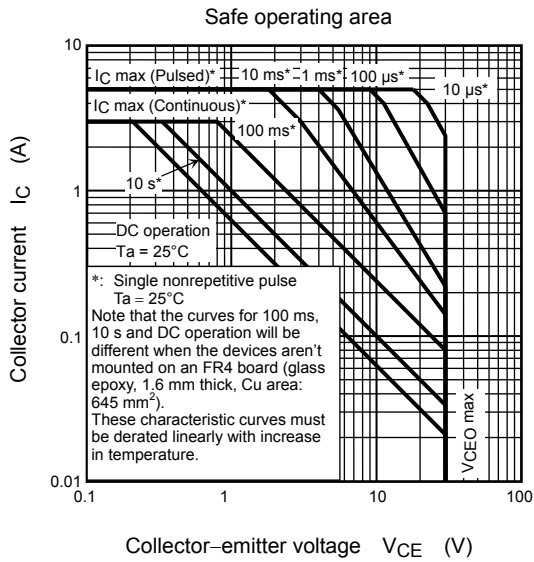
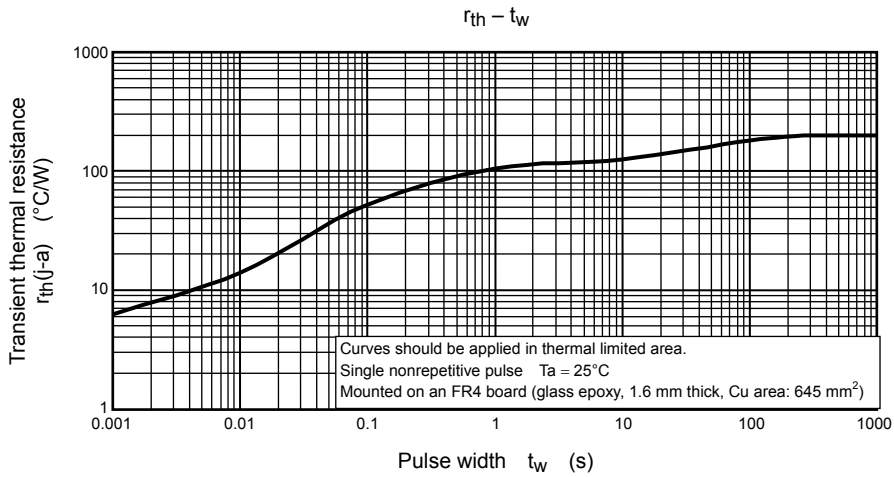


**Figure 1 Switching Time Test Circuit & Timing Chart**

**Marking**







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