

TOSHIBA Transistor Silicon NPN Epitaxial Type

# TPC6504

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

- High DC current gain :  $h_{FE} = 400$  to  $1000$  ( $I_C = 0.1$  A)
- Low collector-emitter saturation voltage :  $V_{CE(sat)} = 0.17$  V (max)
- High-speed switching :  $t_f = 85$  ns (typ.)

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

Characteristic	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	100	V
Collector-emitter voltage	$V_{CEX}$	80	V
	$V_{CEO}$	50	V
Emitter-base voltage	$V_{EBO}$	7	V
Collector current (Note 1)	DC	$I_C$	1.0
	Pulse	$I_{CP}$	2.0
Base current	$I_B$	0.1	A
Collector power dissipation (Note 2)	DC	$P_C$	0.8
	$t = 10$ s		1.6
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-55 to 150	$^\circ\text{C}$

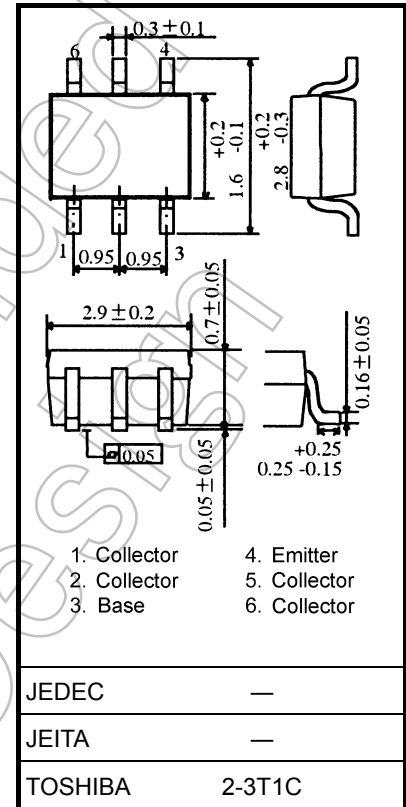
Note 1: Ensure that the channel temperature does not exceed  $150^\circ\text{C}$  during use of the device.

Note 2: Mounted on an FR4 board (glass-epoxy; 1.6 mm thick; Cu area,  $645\text{ mm}^2$ )

Note 3: 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



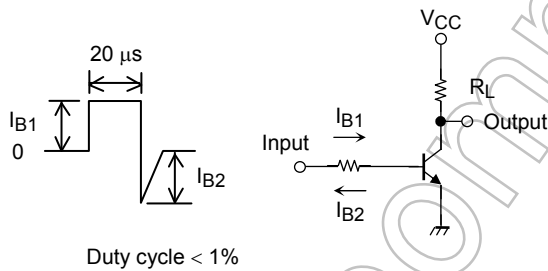
Weight: 0.011 g (typ.)

Start of commercial production  
 2008-11

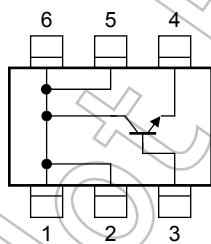
**Electrical Characteristics (Ta = 25°C)**

Characteristic		Symbol	Test Conditions	Min	Typ.	Max	Unit
Collector cut-off current		$I_{CBO}$	$V_{CB} = 100\text{ V}, I_E = 0$	—	—	100	nA
Emitter cut-off current		$I_{EBO}$	$V_{EB} = 7\text{ V}, I_C = 0$	—	—	100	nA
Collector-emitter breakdown voltage		$V_{(BR)CEO}$	$I_C = 10\text{ mA}, I_B = 0$	50	—	—	V
DC current gain		$h_{FE(1)}$	$V_{CE} = 2\text{ V}, I_C = 0.1\text{ A}$	400	—	1000	
		$h_{FE(2)}$	$V_{CE} = 2\text{ V}, I_C = 0.3\text{ A}$	200	—	—	
Collector-emitter saturation voltage		$V_{CE(sat)}$	$I_C = 300\text{ mA}, I_B = 6\text{ mA}$	—	—	0.17	V
Base-emitter saturation voltage		$V_{BE(sat)}$	$I_C = 300\text{ mA}, I_B = 6\text{ mA}$	—	—	1.1	V
Collector output capacitance		$C_{ob}$	$V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	5	—	pF
Switching time	Rise time	$t_r$	See Figure 1 circuit diagram. $V_{CC} \approx 30\text{ V}, R_L = 100\ \Omega$ $I_{B1} = I_{B2} = 10\text{ mA}$	—	35	—	ns
	Storage time	$t_{stg}$		—	680	—	
	Fall time	$t_f$		—	85	—	

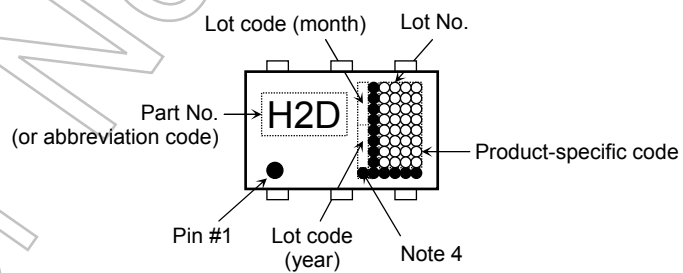
**Figure 1. Switching Time Test Circuit & Timing Chart**



**Circuit Configuration**



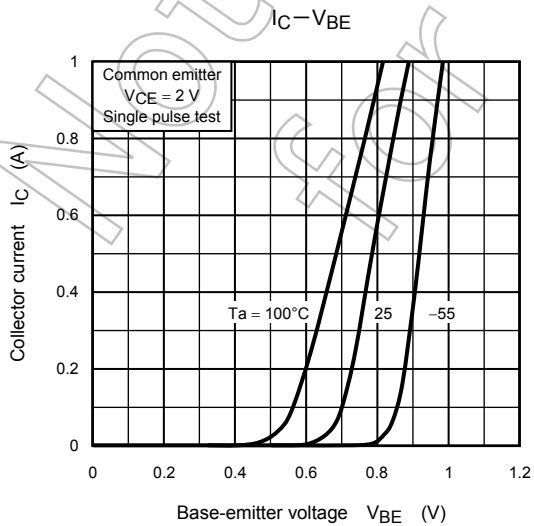
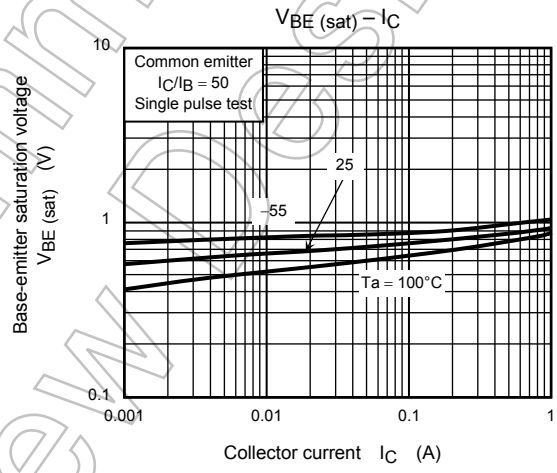
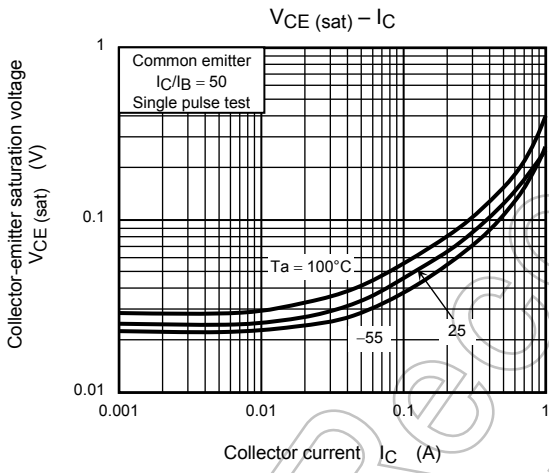
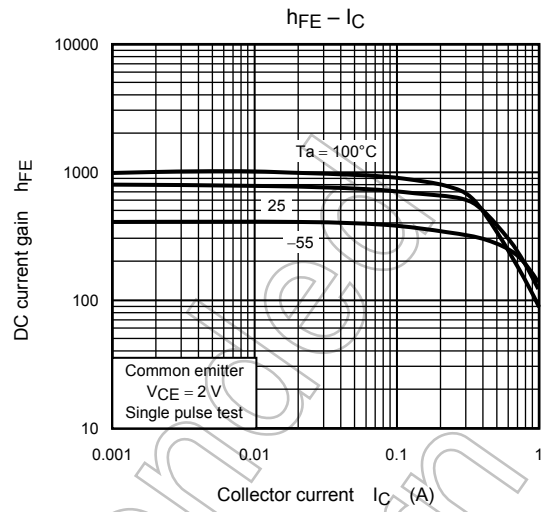
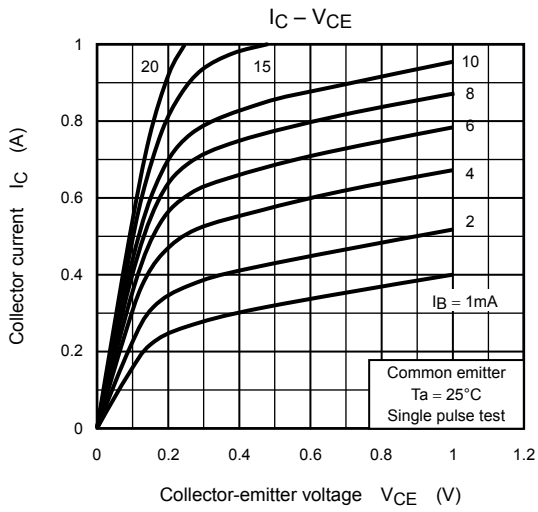
**Marking**

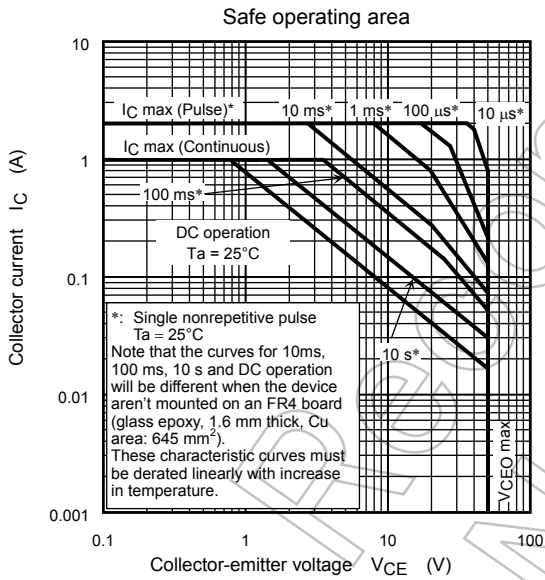
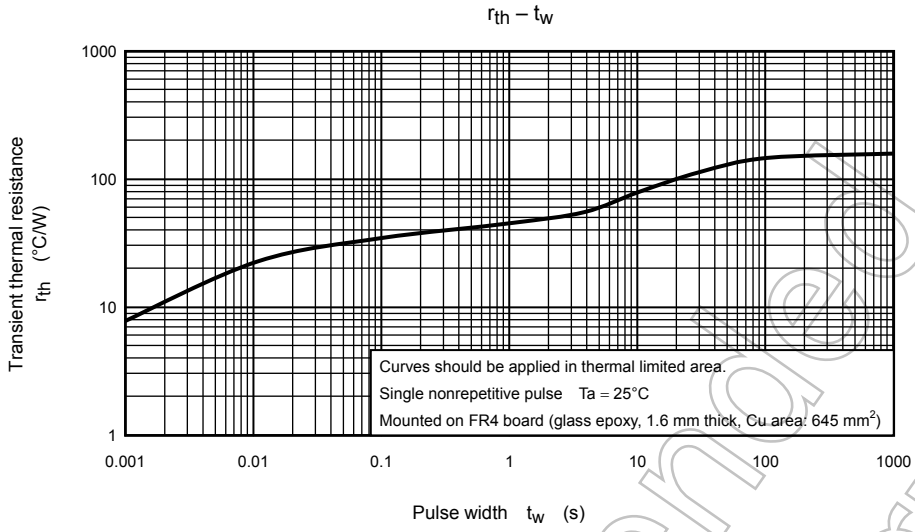


Note 4 : A dot marking identifies the indication of product Labels.  
[[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product.

The RoHS is the Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.





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