

TOSHIBA Transistor Silicon PNP Epitaxial Type

# TPC6604

High-Speed Switching Applications  
DC-DC Converter Applications

- High DC current gain :  $h_{FE} = 200$  to  $500$  ( $I_C = -0.1$  A)
- Low collector-emitter saturation voltage :  $V_{CE(sat)} = -0.23$  V (max)
- High-speed switching :  $t_f = 70$  ns (typ.)

## Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	-50	V
Collector-emitter voltage	$V_{CEO}$	-50	V
Emitter-base voltage	$V_{EBO}$	-7	V
Collector current (Note 1)	DC	$I_C$	-1
	Pulse	$I_{CP}$	-2
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	°C
Storage temperature range	$T_{stg}$	-55 to 150	°C

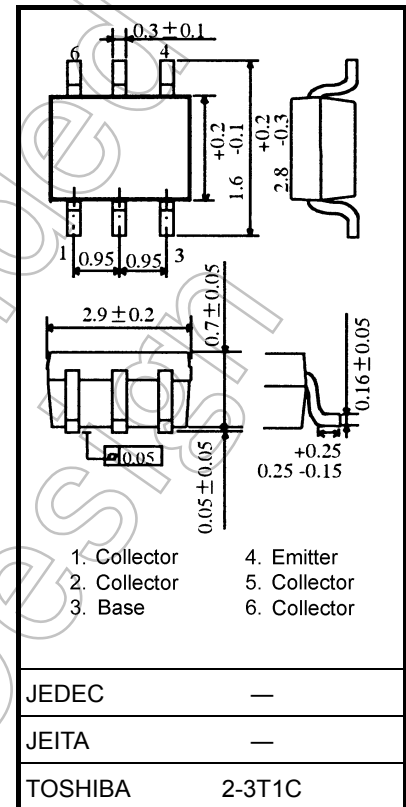
Note 1: Ensure that the junction temperature does not exceed 150°C during use of the device.

Note 2: Mounted on an FR4 board (glass-epoxy; 1.6 mm thick; Cu area, 645 mm<sup>2</sup>)

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



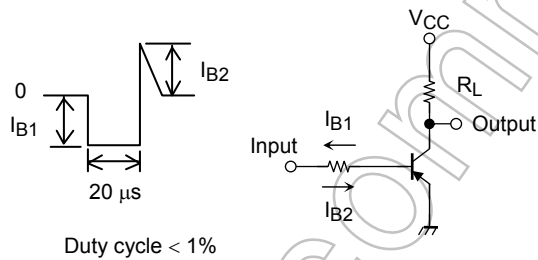
Weight: 0.011 g (typ.)

Start of commercial production  
2009-03

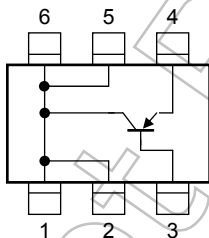
**Electrical Characteristics (Ta = 25°C)**

Characteristic	Symbol	Test Conditions	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = -50\text{ V}, I_E = 0$	—	—	-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	$h_{FE} (1)$	$V_{CE} = -2\text{ V}, I_C = -0.1\text{ A}$	200	—	500	
	$h_{FE} (2)$	$V_{CE} = -2\text{ V}, I_C = -0.3\text{ A}$	125	—	—	
Collector-emitter saturation voltage	$V_{CE (sat)}$	$I_C = -300\text{ mA}, I_B = -10\text{ mA}$	—	—	-0.23	V
Base-emitter saturation voltage	$V_{BE (sat)}$	$I_C = -300\text{ mA}, I_B = -10\text{ mA}$	—	—	-1.1	V
Collector output capacitance	$C_{ob}$	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	8	—	pF
Switching time	Rise time	$t_r$	—	60	—	ns
	Storage time	$t_{stg}$	—	280	—	
	Fall time	$t_f$	—	70	—	

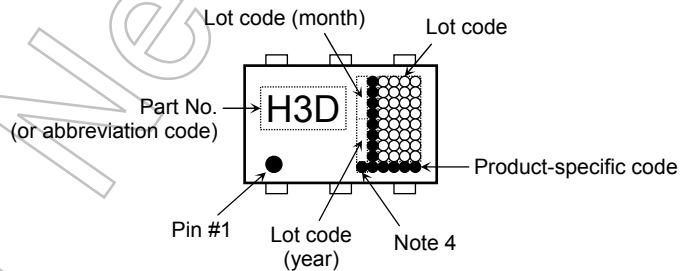
**Figure 1. Switching Time Test Circuit & Timing Chart**



**Circuit Configuration**



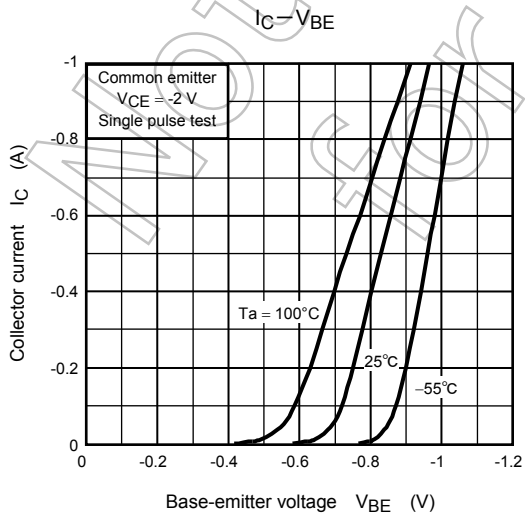
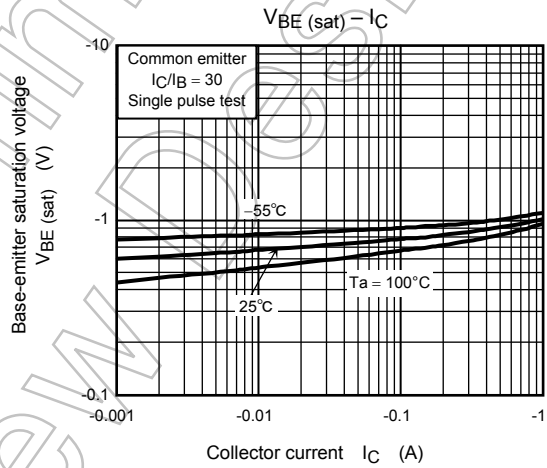
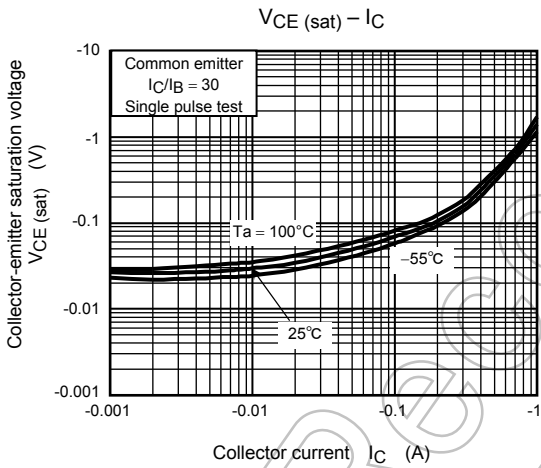
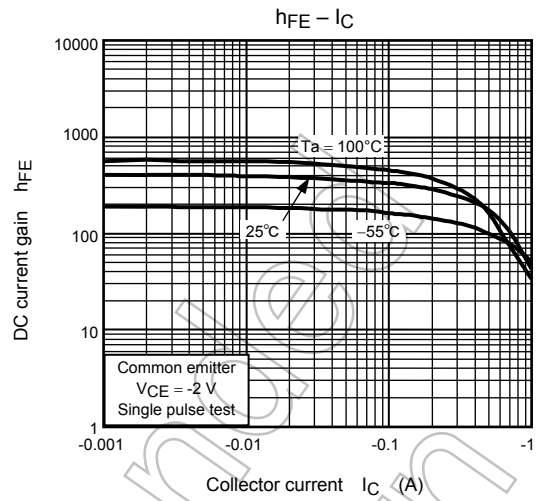
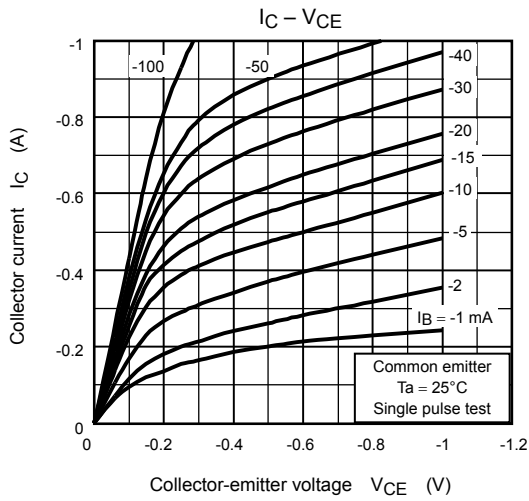
**Marking**

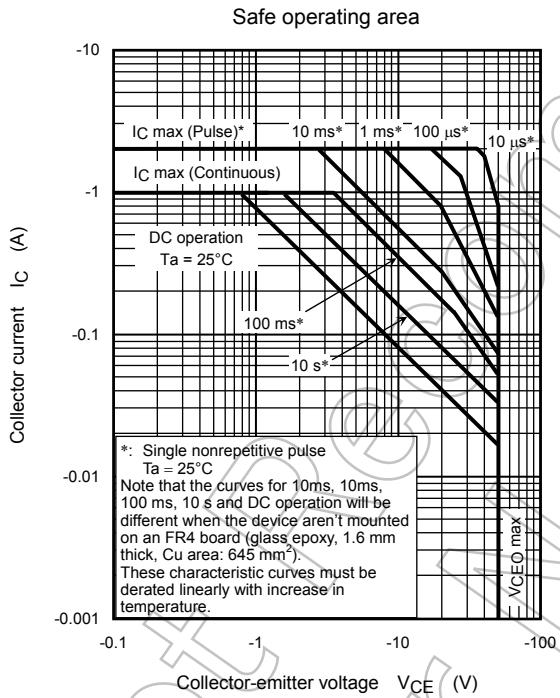
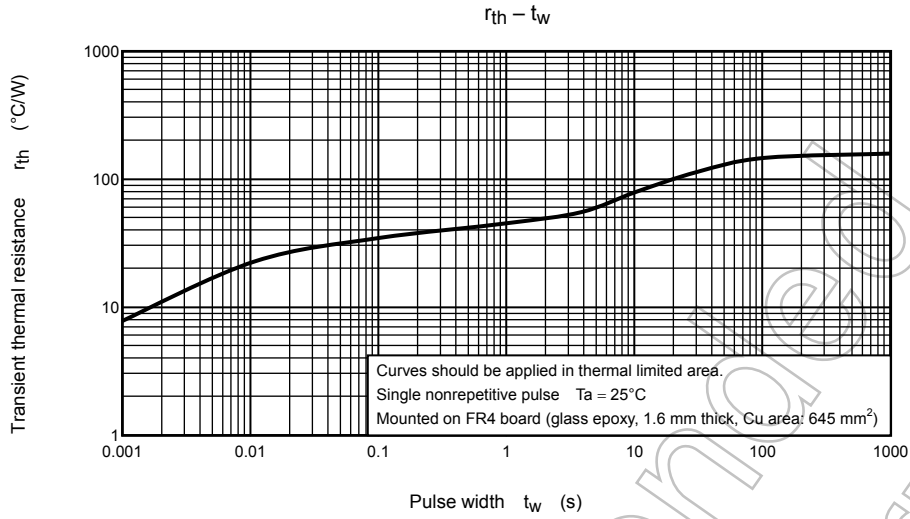


Note 4 : A dot marking identifies the indication of product Labels.  
 [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

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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