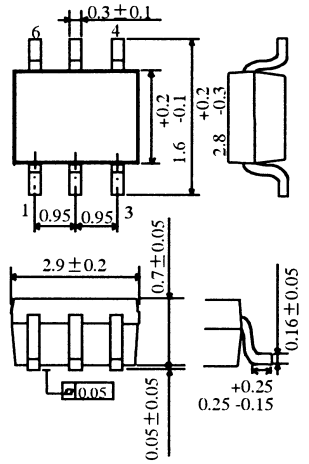
TOSHIBA Multi-Chip Transistor Silicon NPN Epitaxial Type

TPC6701

High-Speed Switching Applications
Motor Drive Applications
Inverter Lighting Applications

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-3T1A

Weight: 0.011 g (typ.)

- Two NPN transistors are mounted on a compact and slim package.
- 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 (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	100	V
Collector-emitter voltage		V_{CEX}	80	V
Collector-emitter voltage		V_{CEO}	50	V
Emitter-base voltage		V_{EBO}	7	V
Collector current	DC	I_C	1.0	A
	Pulse	I_{CP}	2.0	
Base current		I_B	0.1	mA
Collector power dissipation (single-device operation)		P_C (Note 1)	400	mW
Total collector power dissipation (simultaneous operation)		P_{CT} (Note 2)	660	mW
Thermal resistance, junction to ambient (single-device operation)		$R_{th\ (j\text{-}a)}$ (Note 1)	312	°C/W
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55 to 150	°C

Note 1: Mounted on an FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645 mm^2)

Note 2: Mounted on an FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645 mm^2)
Total collector power dissipation value when two devices are operated at the same time

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).

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	V_{CB} = 100 V, I_E = 0	—	—	100	nA
Emitter cut-off current		I_{EBO}	V_{EB} = 7 V, I_C = 0	—	—	100	nA
Collector-emitter breakdown voltage		$V_{(BR)\ CEO}$	I_C = 10 mA, I_B = 0	50	—	—	V
DC current gain		h_{FE} (1)	V_{CE} = 2 V, I_C = 0.1 A	400	—	1000	
		h_{FE} (2)	V_{CE} = 2 V, I_C = 0.3 A	200	—	—	
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = 300 mA, I_B = 6 mA	—	—	0.17	V
Base-emitter saturation voltage		$V_{BE\ (sat)}$	I_C = 300 mA, I_B = 6 mA	—	—	1.10	V
Collector output capacitance		C_{ob}	V_{CB} = 10 V, I_E = 0, f = 1 MHz	—	5	—	pF
Switching time	Rise time	t_r	See Figure 1 circuit diagram.	—	35	—	ns
	Storage time	t_{stg}	V_{CC} ≈ 30 V, R_L = 100 Ω	—	680	—	
	Fall time	t_f	I_{B1} = −I_{B2} = 10 mA	—	85	—	

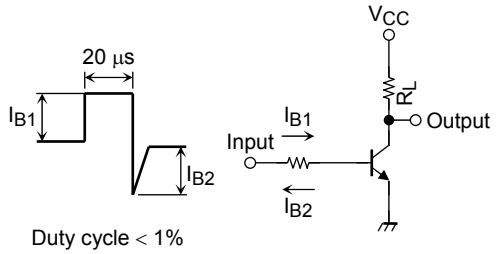
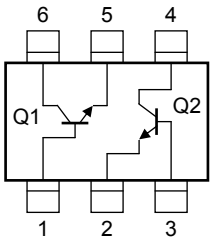
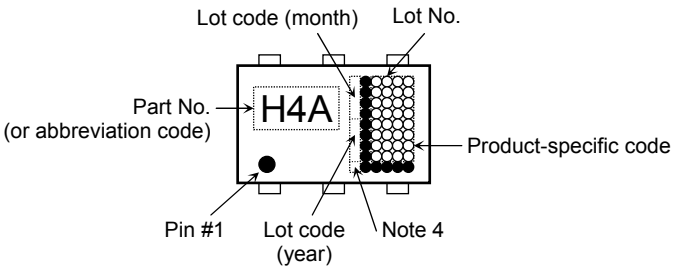


Figure 1 Switching Time Test Circuit & Timing Chart

Circuit Configuration



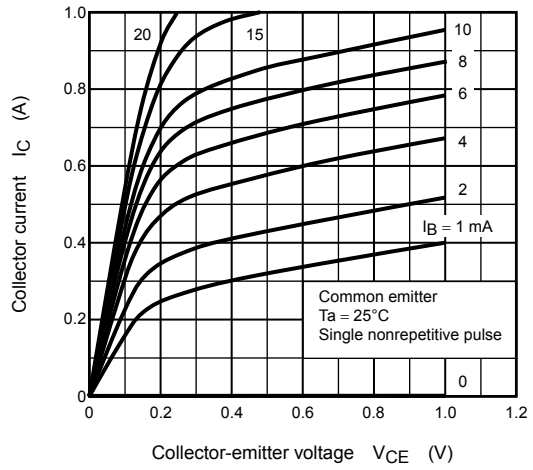
Marking



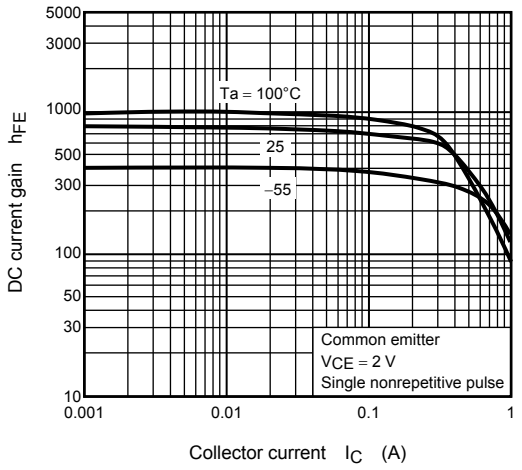
Note 4: A dot marking identifies the indication of product Labels.
Without a dot: [[Pb]]/INCLUDES > MCV
With a dot: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

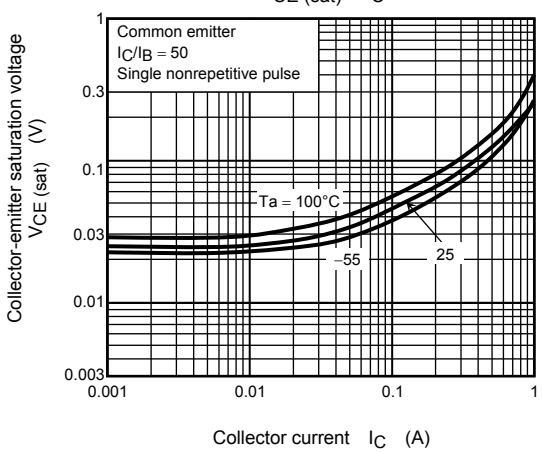
$I_C - V_{CE}$



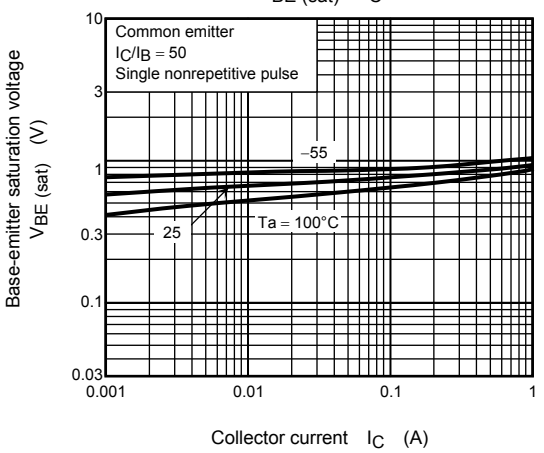
$h_{FE} - I_C$



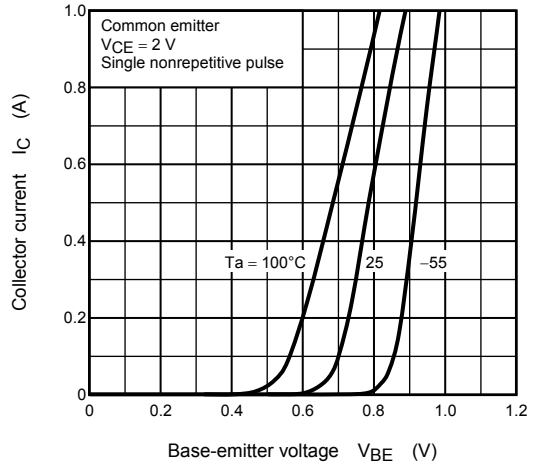
$V_{CE\ (sat)} - I_C$



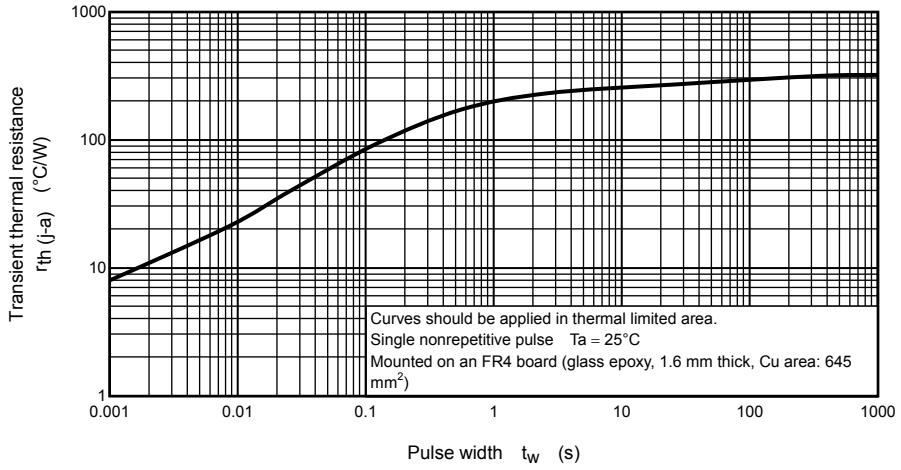
$V_{BE\ (sat)} - I_C$



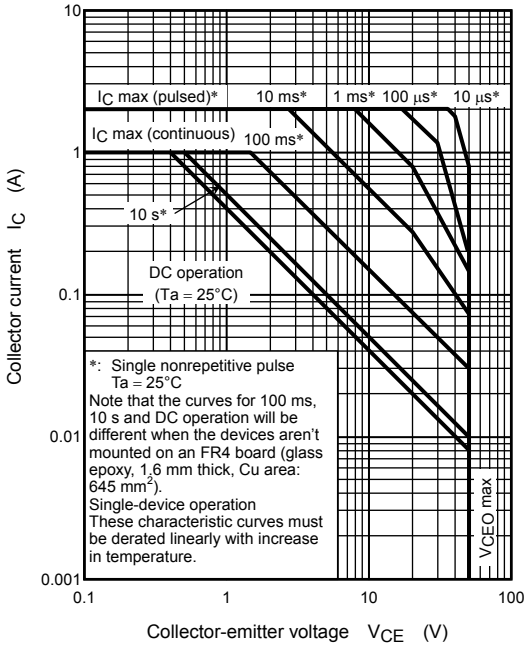
$I_C - V_{BE}$



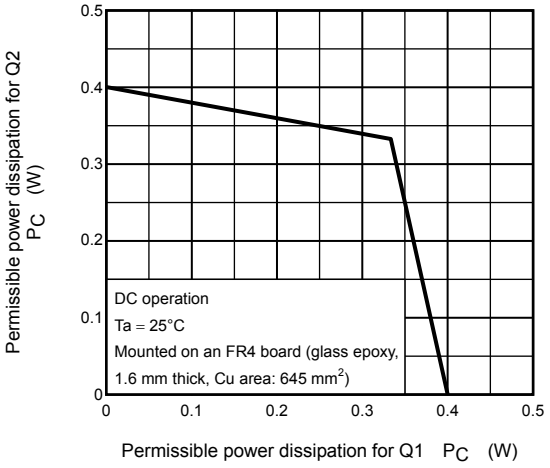
Transient Thermal Resistance $r_{th} - t_w$



Safe Operating Area



Permissible Power Dissipation for Simultaneous Operation



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