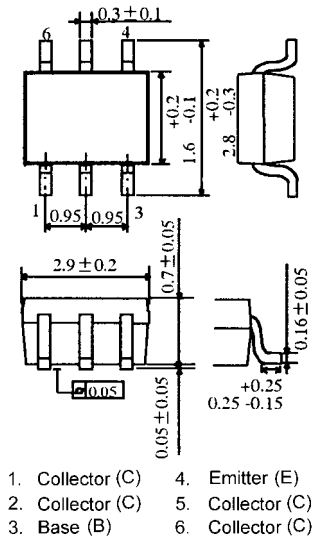
TOSHIBA Transistor Silicon PNP Epitaxial Type

TPC6602

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

- High DC current gain: h_{FE} = 200 to 500 (I_C = −0.2 A)
- Low collector-emitter saturation voltage: $V_{CE\ (sat)}$ = −0.19 V (max)
- High-speed switching: t_f = 25 ns (typ.)

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-3T1

Weight: 0.011 g (typ.)

Maximum Ratings (Ta = 25°C)

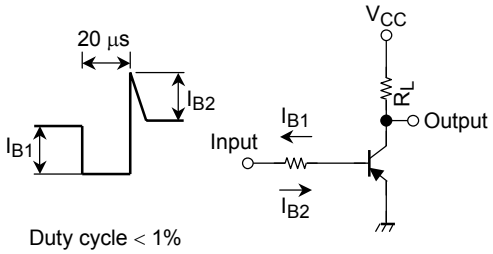
Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	−20	V
Collector-emitter voltage		V_{CEO}	−10	V
Emitter-base voltage		V_{EBO}	−7	V
Collector current	DC	I_C	−2.0	A
	Pulse	I_{CP}	−3.5	
Base current		I_B	−200	mA
Collector power dissipation	t = 10 s	P_C (Note)	1.6	W
	DC		0.8	
Junction temperature		T_j	150	°C
Storage temperature range		T_{stg}	−55~150	°C

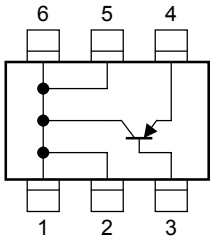
Note: Mounted on FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645 mm^2)

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	V_{CB} = −20 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	−10	—	—	V
DC current gain		h_{FE} (1)	V_{CE} = −2 V, I_C = −0.2 A	200	—	500	
		h_{FE} (2)	V_{CE} = −2 V, I_C = −0.6 A	125	—	—	
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = −0.6 A, I_B = −0.02 A	—	—	−0.19	V
Base-emitter saturation voltage		$V_{BE\ (sat)}$	I_C = −0.6 A, I_B = −0.02 A	—	—	−1.10	V
Collector output capacitance		C_{ob}	V_{CB} = −10 V, I_E = 0, f = 1 MHz	—	12	—	pF
Switching time	Rise time	t_r	See Figure 1 circuit diagram.	—	50	—	ns
	Storage time	t_{stg}	$V_{CC} \simeq$ −6 V, R_L = 10 Ω	—	115	—	
	Fall time	t_f	I_{B1} = −I_{B2} = −20 mA	—	25	—	

Circuit Configuration **Marking**





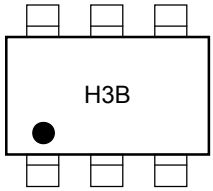
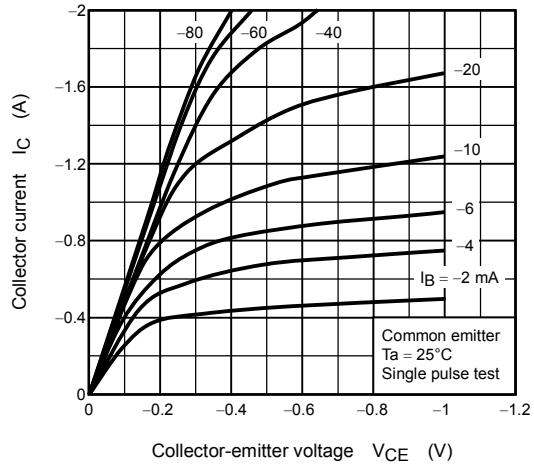
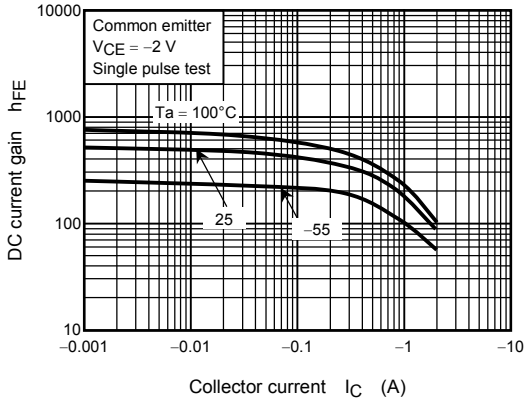


Figure 1 Switching Time Test Circuit & Timing Chart

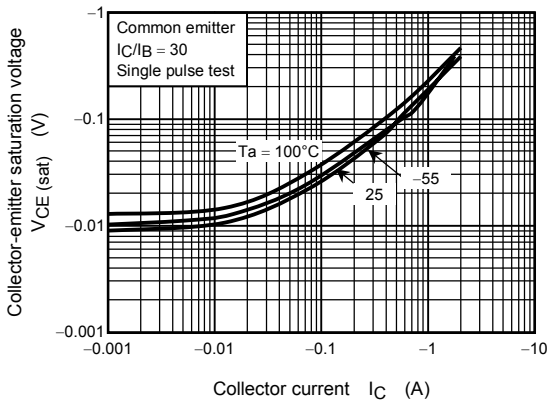
$I_C - V_{CE}$



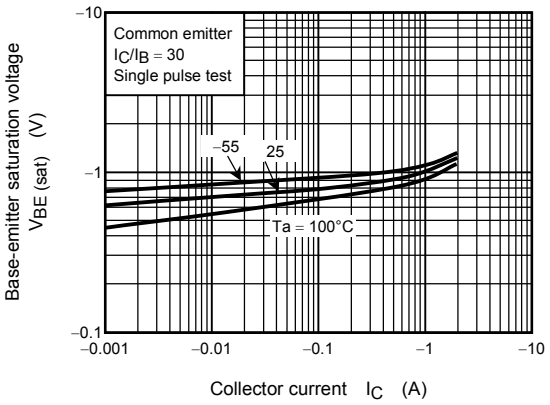
$h_{FE} - I_C$



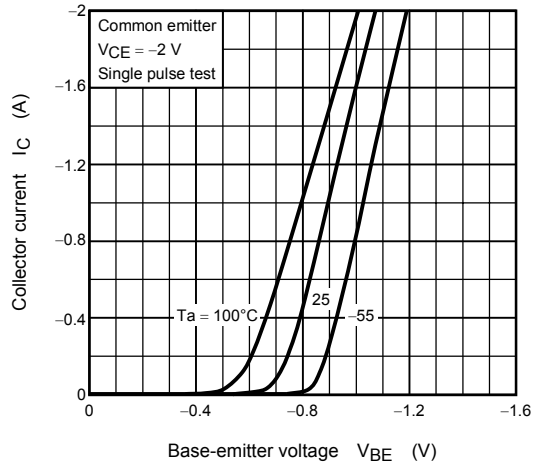
$V_{CE\ (sat)} - I_C$

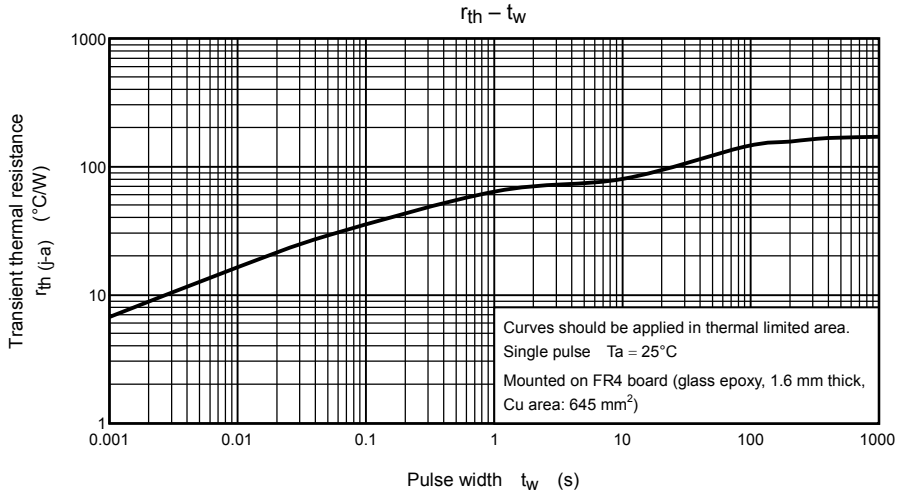


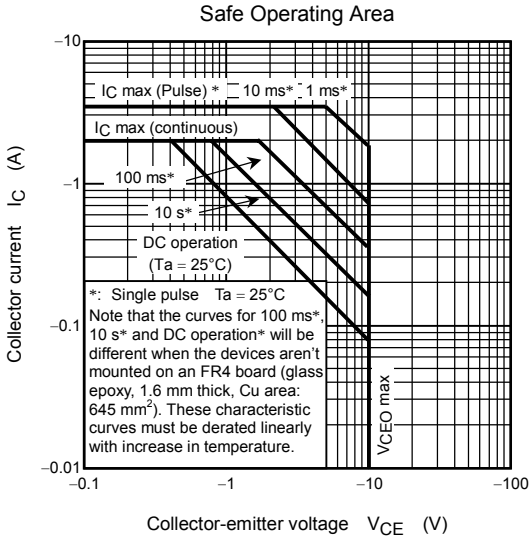
$V_{BE\ (sat)} - I_C$



$I_C - V_{BE}$




$r_{th} - t_w$
Transient thermal resistance r_{th} (j-a) (°C/W)
1000
100
10
1
0.001
0.01
0.1
1
10
100
1000
Curves should be applied in thermal limited area.
Single pulse Ta = 25°C
Mounted on FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645 mm²)
Pulse width t_w (s)


Safe Operating Area
−10
−1
−0.1
−0.01
−0.1
−1
−10
−100
I_C max (Pulse) *
10 ms*
1 ms*
I_C max (continuous)
100 ms*
10 s*
DC operation
(Ta = 25°C)
*: Single pulse Ta = 25°C
Note that the curves for 100 ms*, 10 s* and DC operation* will be different when the devices aren't mounted on an FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645 mm²). These characteristic curves must be derated linearly with increase in temperature.
V_{CEO} max
Collector current I_C (A)
Collector-emitter voltage V_{CE} (V)

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