

TOSHIBA Multi-Chip Transistor Silicon NPN / PNP Epitaxial Type

TPC6901A

High-Speed Switching Applications
MOS Gate Drive Applications

- NPN and PNP transistors are mounted on a compact and slim package.
- High DC current gain : NPN $h_{FE} = 400$ to 1000
: PNP $h_{FE} = 200$ to 500
- Low collector-emitter saturation voltage
: NPN $V_{CE(sat)} = 0.17$ V (max)
: PNP $V_{CE(sat)} = -0.23$ V (max)
- High-speed switching : NPN $t_f = 85$ ns (typ.)
: PNP $t_f = 70$ ns (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating		Unit	
		NPN	PNP		
Collector-base voltage	V_{CBO}	100	-50	V	
Collector-emitter voltage	V_{CEX}	80	-50	V	
Collector-emitter voltage	V_{CEO}	50	-50	V	
Emitter-base voltage	V_{EBO}	7	-7	V	
Collector current	DC (Note 1)	I_C	1.0	-0.7	A
	Pulse (Note 1)	I_{CP}	5.0	-5.0	A
Base current	I_B	0.1	-0.1	A	
Collector power dissipation (t=10 s)	Single-device operation	P_C (Note 2)	500	mW	
Collector power dissipation (DC)	Single-device operation	P_C (Note 2)	400	mW	
	Single-device value at dual operation	P_C (Note 2)	330		
Thermal resistance, junction to ambient (t=10 s)	Single-device operation	$R_{th(j-a)}$ (Note 2)	250	°C/W	
Thermal resistance, junction to ambient (DC)	Single-device operation	$R_{th(j-a)}$ (Note 2)	312	°C/W	
	Single-device value at dual operation	$R_{th(j-a)}$ (Note 2)	378		
Junction temperature	T_j	150		°C	
Storage temperature range	T_{stg}	-55 to 150		°C	

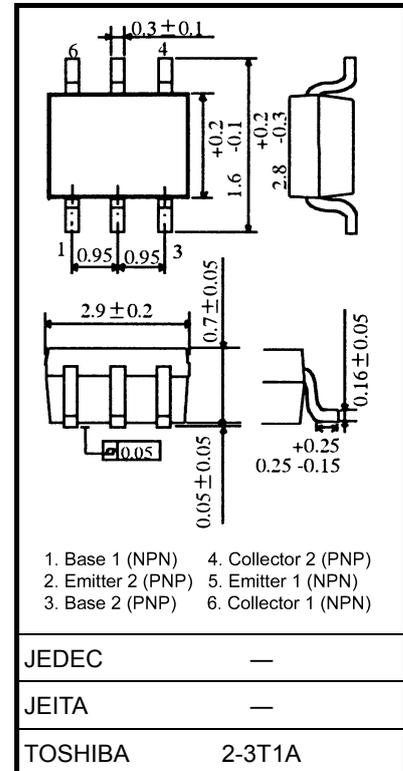
Note 1: Please use devices on condition that the junction temperature is below 150°C.

Note 2: Mounted on FR4 board (glass epoxy, 1.6 mm thick, Cu area: 645 mm²)

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.

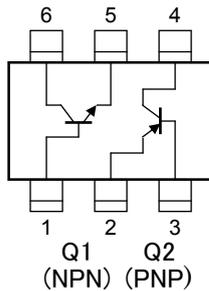
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Unit: mm

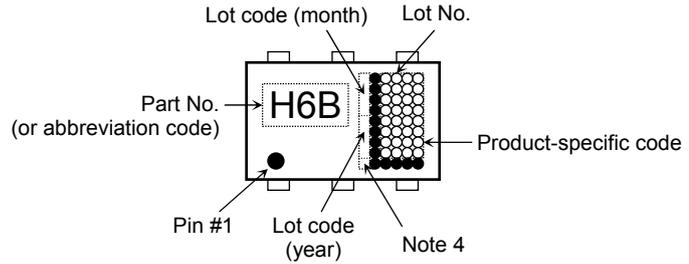


Weight: 0.011 g (typ.)

Circuit Configuration



Marking



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

Electrical Characteristics (Ta = 25°C): NPN

Characteristics		Symbol	Test Condition	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		$V_{BE(sat)}$	$I_C = 300\text{ mA}, I_B = 6\text{ mA}$	—	—	1.10	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	—	

Electrical Characteristics (Ta = 25°C): PNP

Characteristics		Symbol	Test Condition	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		$V_{BE(sat)}$	$I_C = -300\text{ mA}, I_B = -10\text{ mA}$	—	—	-1.10	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	See Figure 2 circuit diagram. $V_{CC} \approx -30\text{ V}, R_L = 100\ \Omega$ $I_{B1} = I_{B2} = 10\text{ mA}$	—	60	—	ns
	Storage time	t_{stg}		—	280	—	
	Fall time	t_f		—	70	—	

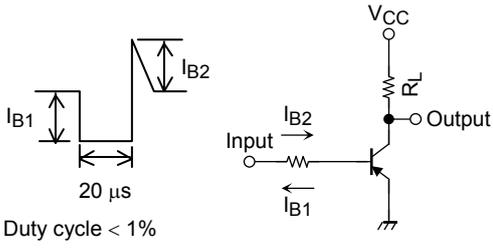
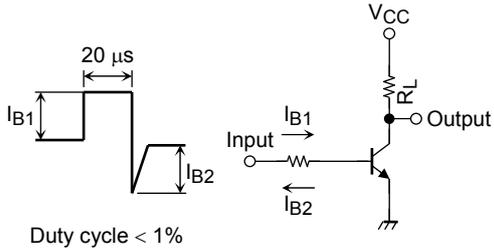
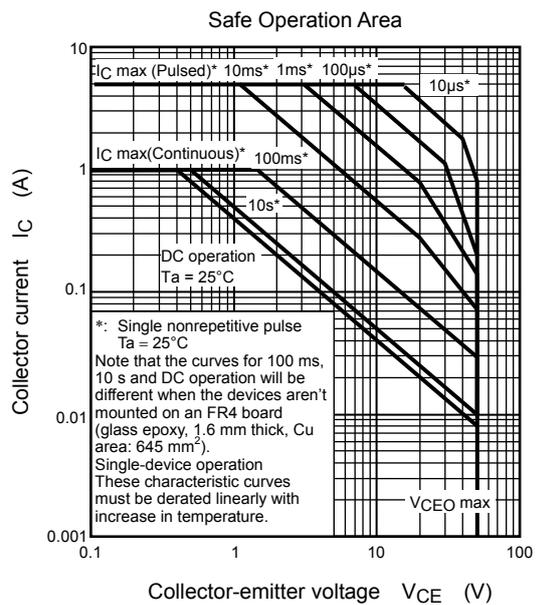
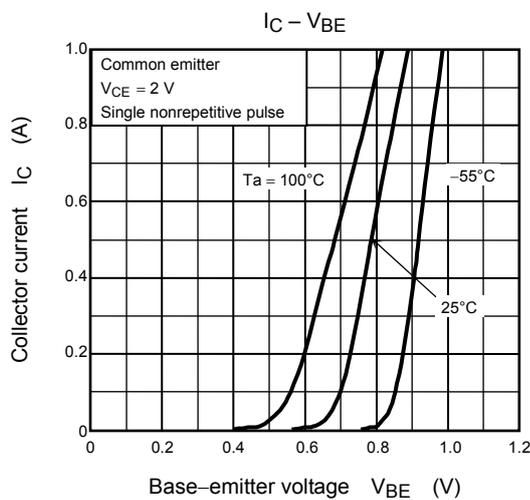
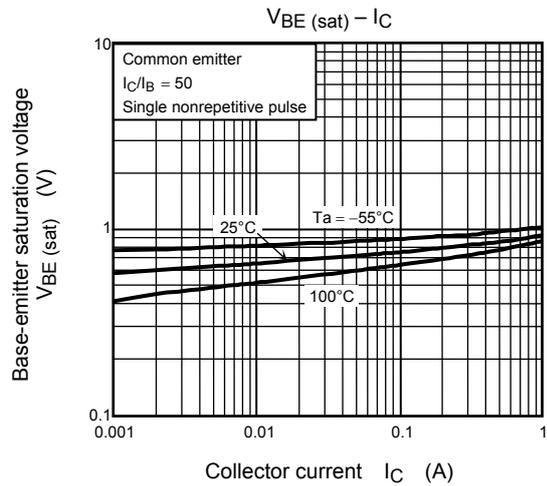
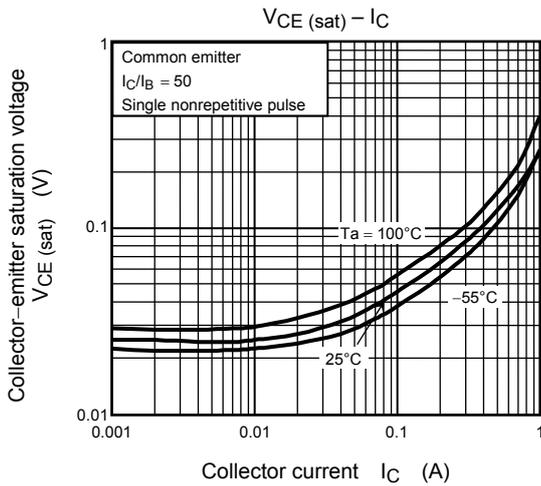
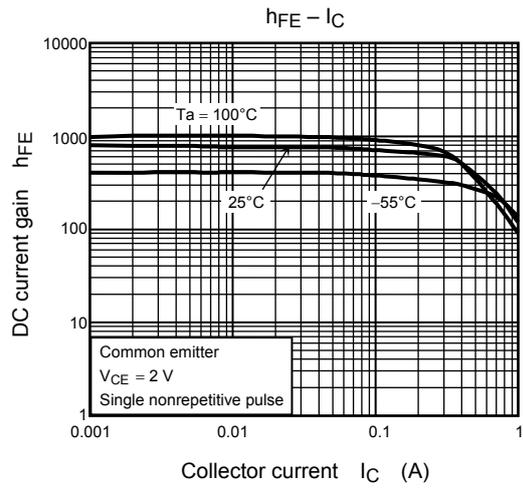
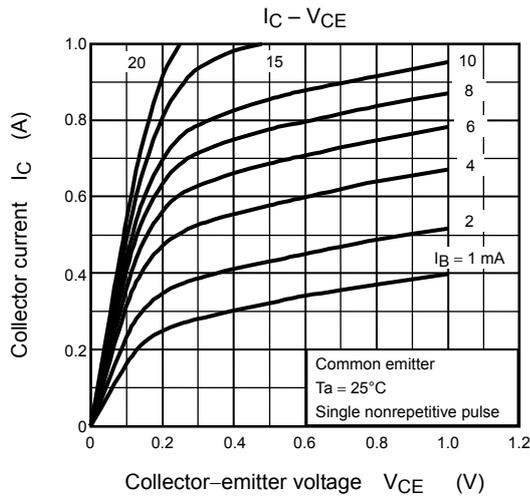


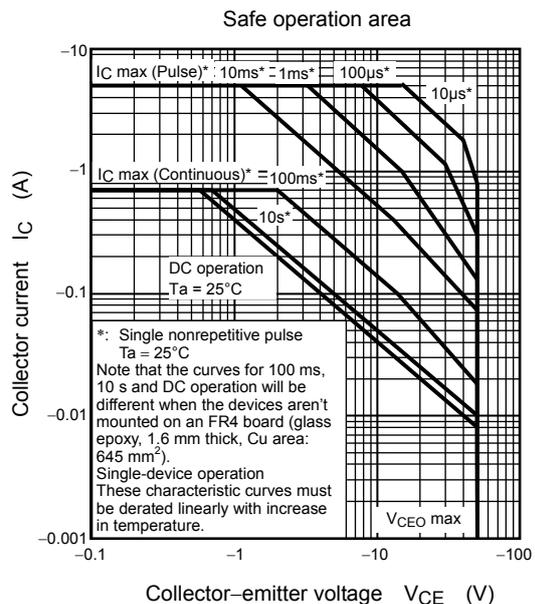
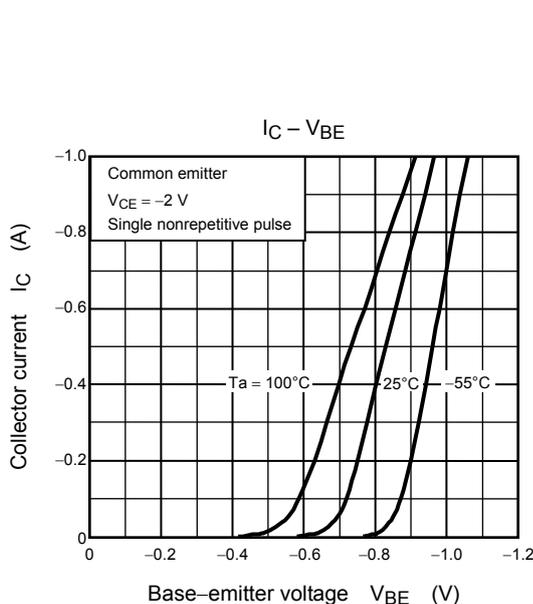
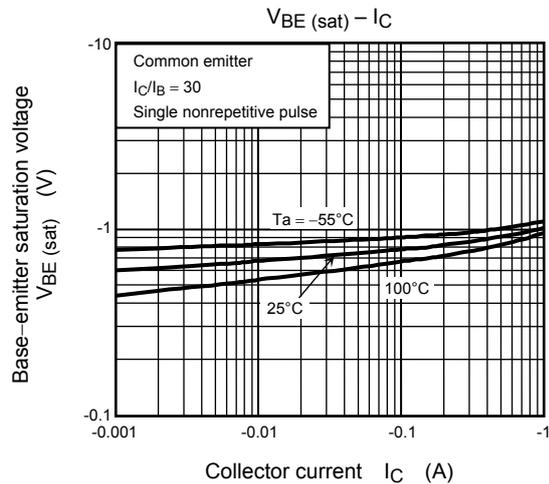
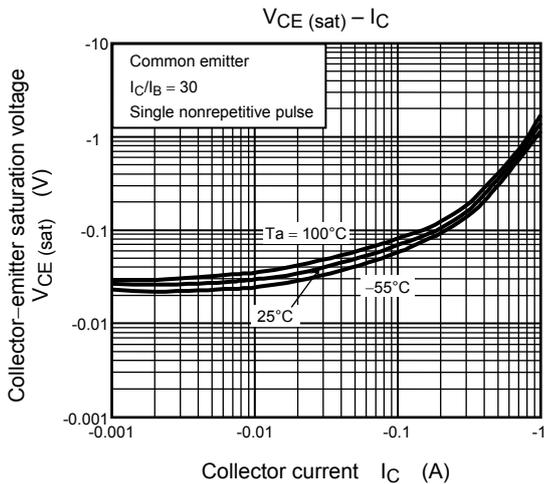
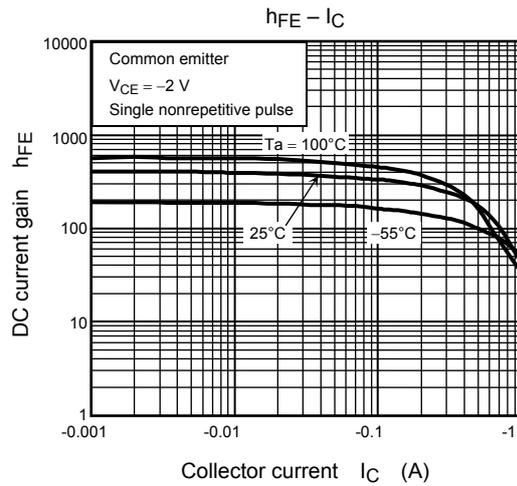
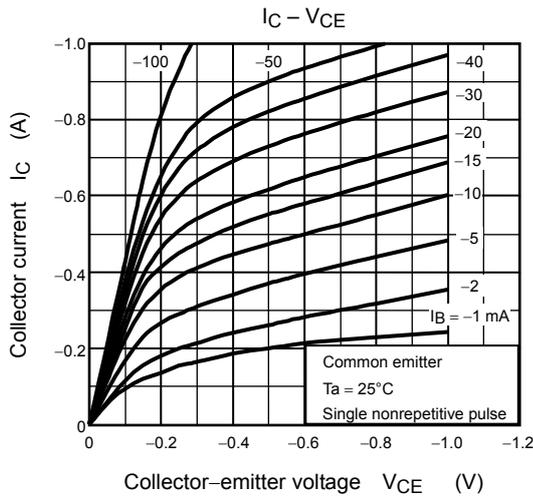
Figure 1 Switching Time Test Circuit & Timing Chart (NPN)

Figure 2 Switching Time Test Circuit & Timing Chart (PNP)

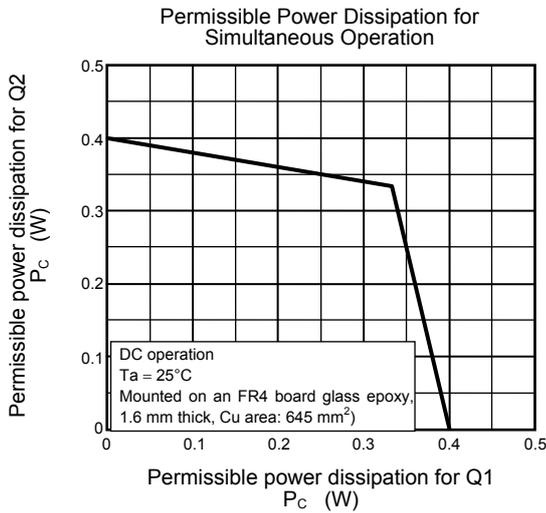
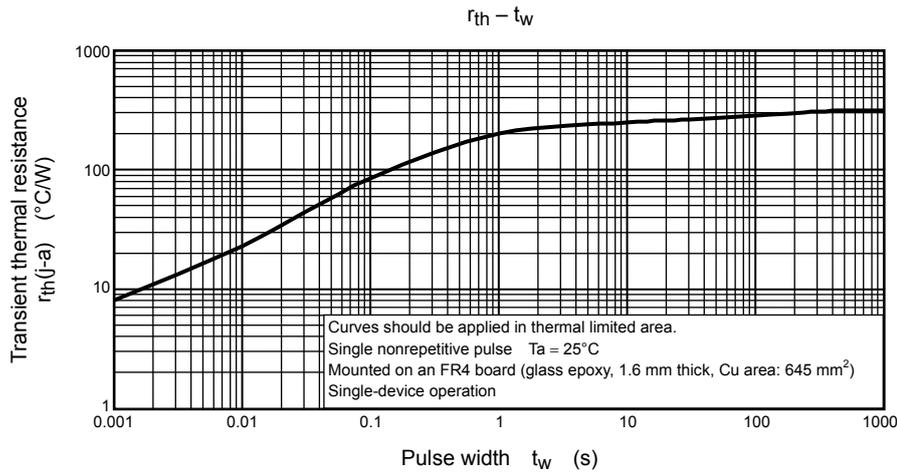
NPN



PNP



Common



Collector power dissipation at the single-device operation is 0.4W.
 Collector power dissipation at the single-device value at dual operation is 0.33W.
 Collector power dissipation at the dual operation is set to 0.66W.

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