TOSHIBA Transistor Silicon PNP / NPN Epitaxial Type (PCT Process)

HN4B102J

MOS Gate Drive Applications Switching Applications

Small footprint due to a small and thin package

• High DC current gain : PNP h_{FE} = 200 to 500 (I_{C} = -0.2 A)

: NPN $h_{FE} = 200 \text{ to } 500 \text{ (I}_{C} = 0.2 \text{ A)}$

• Low collector-emitter saturation : PNP V_{CE (sat)} =−0.20 V (max)

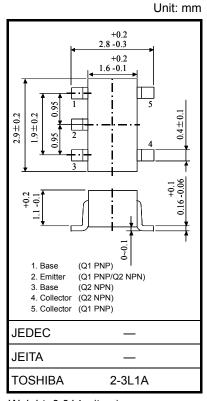
: NPN $V_{CE (sat)} = 0.14 \text{ V (max)}$

• High-speed switching : PNP t_f = 40 ns (typ.)

: NPN $t_f = 45 \text{ ns (typ.)}$

Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating		Unit	
		Symbol	PNP	NPN	Ollit	
Collector-base voltage	V_{CBO}	-30	60	V		
Collector-emitter voltage		V_{CEO}	-30	30	V	
Emitter-base voltage		V_{EBO}	-7	7	V	
Collector current	DC (Note 1)	Ic	-1.8	2.0	Α	
	Pulse (Note 1)	I _{CP}	-8.0	8.0	^	
Base current		ΙB	-0.5	0.5	Α	
Collector power dissipation (t = 10 s)	Single-device operation	P _C (Note 2)	1.1		W	
Collector power dissipation (DC)	Single-device operation	P _C (Note 2)	0.75		W	
Junction temperature		Tj	150		°C	
Storage temperature range		T _{stg}	-55 to 150		°C	



Weight: 0.014g (typ.)

- Note 1: Ensure that the channel 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 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).

Figure 1 Circuit Configuration (top view)

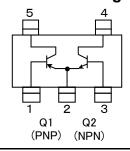
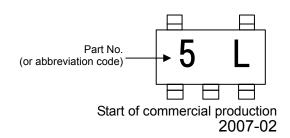


Figure 2 Marking



Electrical Characteristics (Ta = 25°C)

PNP

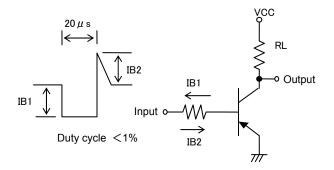
Characteristic		Symbol	Test Condition	Min	Тур.	Max	Unit
Collector cut-off current		I _{CBO}	$V_{CB} = -30 \text{ V}, I_E = 0$	_	_	-100	nA
Emitter cut-off current		I _{EBO}	$V_{EB} = -7 \text{ V, } I_{C} = 0$	_	_	-100	nA
Collector-emitter breakdown voltage		V (BR) CEO	$I_C = -10 \text{ mA}, I_B = 0$	-30	_	_	V
DC current gain		h _{FE} (1)	$V_{CE} = -2 \text{ V}, I_{C} = -0.2 \text{ A}$	200	_	500	
		h _{FE} (2)	$V_{CE} = -2 \text{ V}, I_{C} = -0.6 \text{ A}$	125	_	_	
		h _{FE} (3)	$V_{CE} = -2 \text{ V}, I_{C} = -2.0 \text{ A}$	40	_	_	
Collector-emitter saturation voltage		V _{CE} (sat)	$I_C = -0.6 \text{ A}, I_B = -20 \text{ mA}$	_	_	-0.20	V
Base-emitter saturation voltage		V _{BE (sat)}	$I_C = -0.6 \text{ A}, I_B = -20 \text{ mA}$	_	_	-1.10	V
Collector output capacitance		C _{ob}	$V_{CB} = -10 \text{ V}, I_E = 0, f = 1 \text{MHz}$	_	16.5	_	pF
Switching time	Rise time	t _r	See Figure 3 circuit diagram V _{CC} i≒−18 V, R _L = 30 Ω I _{B1} = I _{B2} = 20 mA	_	40	_	ns
	Storage time	t _{stg}		_	280	_	
	Fall time	t _f		_	40	_	

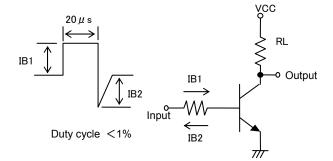
NPN

Char	acteristic	Symbol	Test Condition	Min	Тур.	Max	Unit
Collector cut-off current		I _{CBO}	$V_{CB} = 60 \text{ V}, I_E = 0$	_	_	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	30	_	_	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	_	_	
		h _{FE} (3)	V _{CE} = 2 V, I _C = 2.0 A	40	_	_	
Collector-emitter saturation voltage		V _{CE} (sat)	I _C = 0.6 A, I _B = 20 mA	_	_	0.14	V
Base-emitter saturation voltage		V _{BE (sat)}	I _C = 0.6 A, I _B = 20 mA	_	_	1.10	V
Collector output capacitance		C _{ob}	V _{CB} = 10 V, I _E = 0, f = 1MHz	_	14	_	pF
Switching time	Rise time	t _r	See Figure 4 circuit diagram V _{CC} ≒18 V, R _L = 30 Ω I _{B1} = I _{B2} = 20 mA	_	45	_	
	Storage time	t _{stg}		_	580	_	ns
	Fall time	t _f		_	45	_	

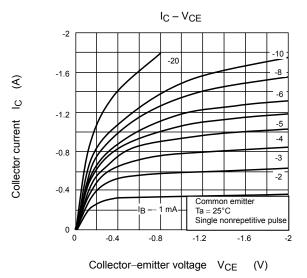
Figure 3. Switching Time Test Circuit & Timing Chart

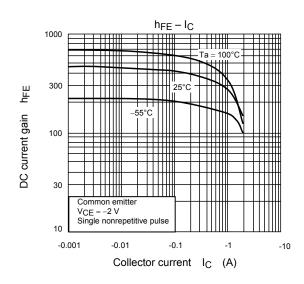
Figure 4. Switching Time Test Circuit & Timing Chart

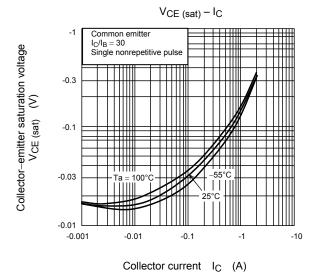


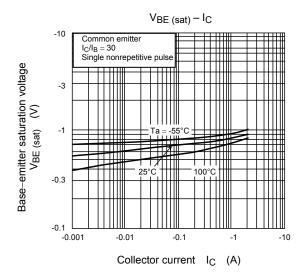


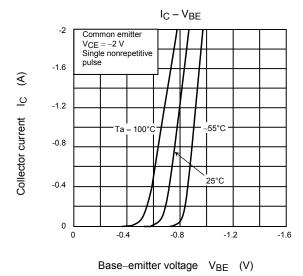
PNP

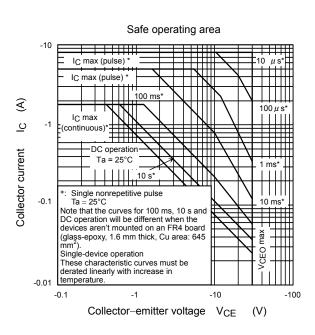






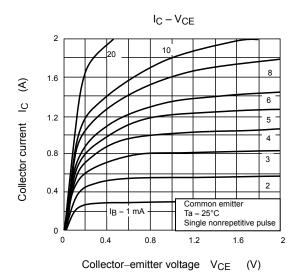


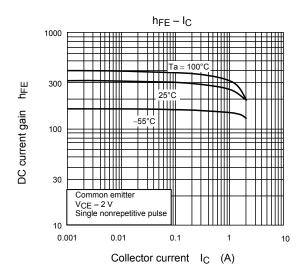


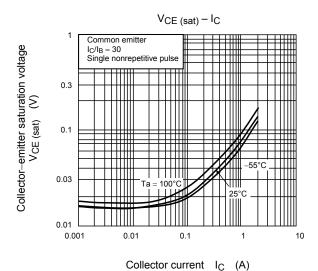


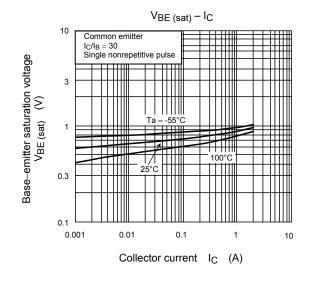
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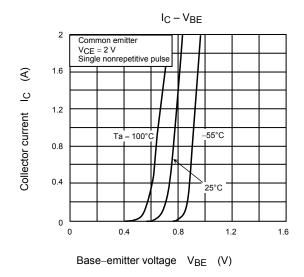
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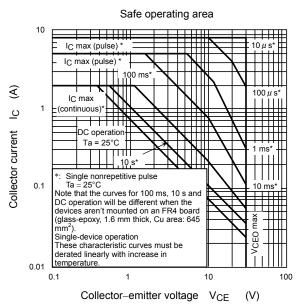




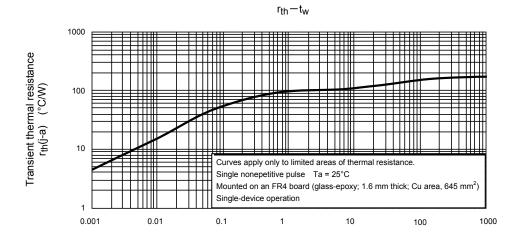








Common



Pulse width t_W (s)

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