

TOSHIBA Transistor Silicon NPN Epitaxial Type (Darlington Power)

2SD2686

Solenoid Drive Applications
 Motor Drive Applications

- High DC current gain: $h_{FE} = 2000$ (min) ($V_{CE} = 2\text{ V}$, $I_C = 1.0\text{ A}$)
- Zener diode included between collector and base

Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

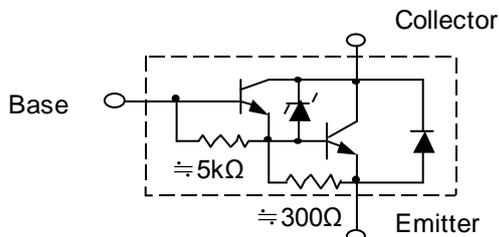
Characteristic	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	50	V
Collector-emitter voltage	V_{CEO}	60 ± 10	V
Emitter-base voltage	V_{EBO}	8	V
Collector current	DC	I_C	1
	Pulse	I_{CP}	3
Base current	I_B	0.5	A
Collector power dissipation	DC	P_C (Note 1)	1.0
	$t = 10\text{ s}$		2.5
Junction temperature	T_j	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55 to 150	$^\circ\text{C}$

Note 1: Mounted on an FR4 board (glass-epoxy; 1.6 mm thick; Cu area, 645 mm²)

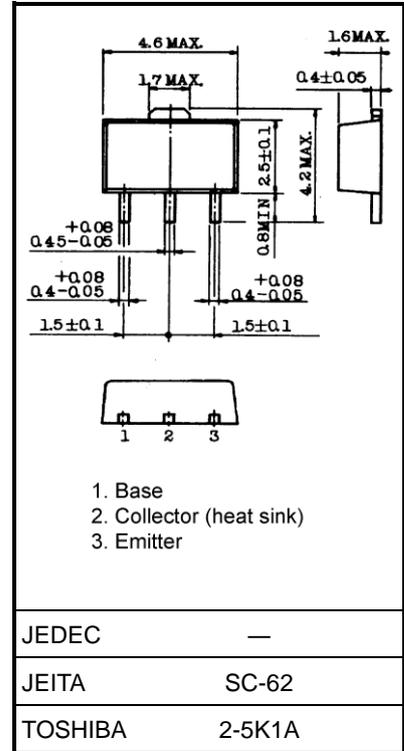
Note 2: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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).

Equivalent Circuit



Unit: mm



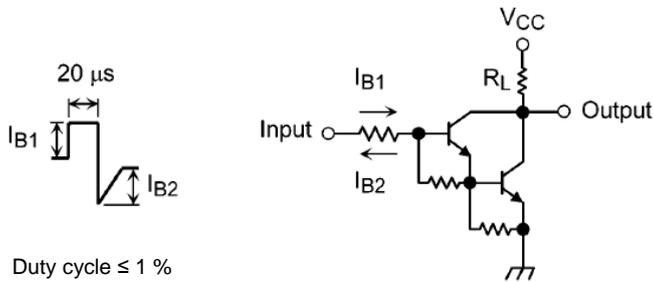
Weight: 0.05 g (typ.)

Start of commercial production
 2002-09

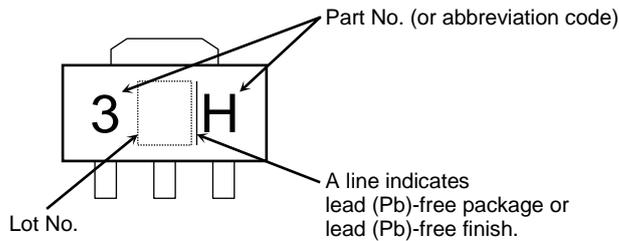
Electrical Characteristics (Ta = 25°C)

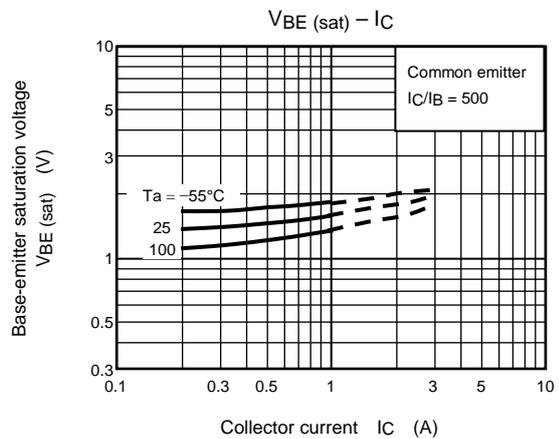
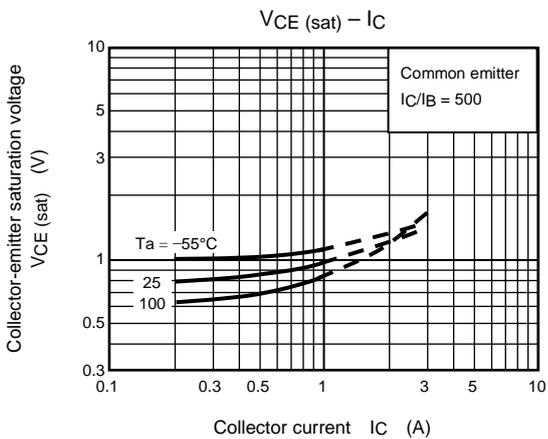
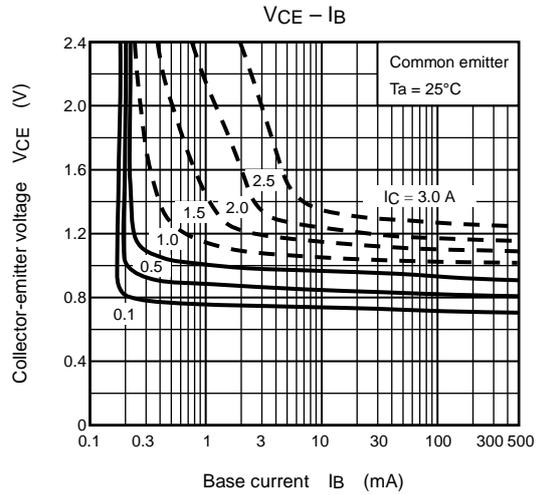
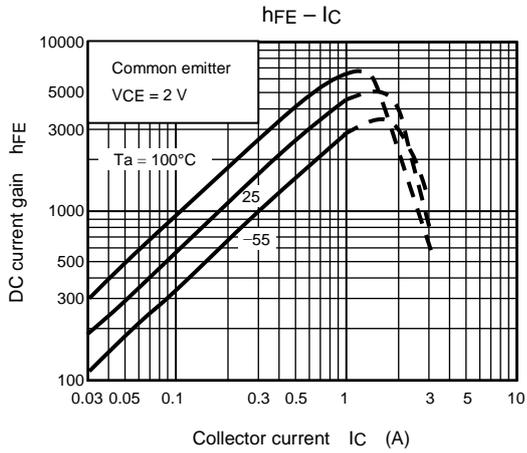
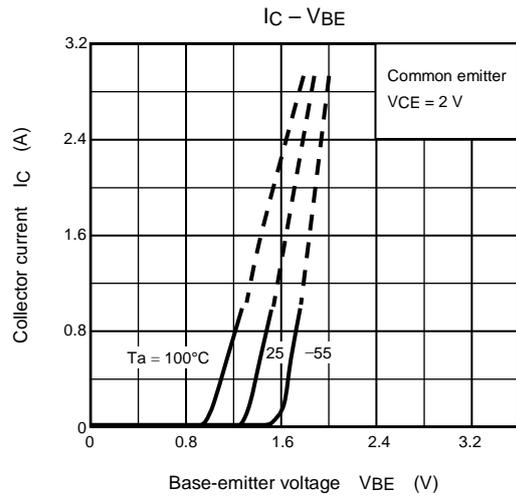
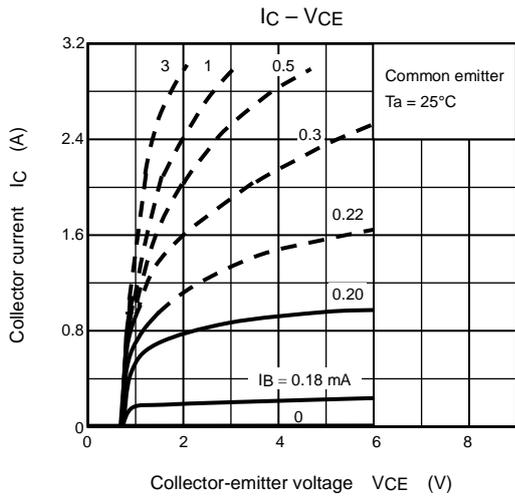
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cutoff current		ICBO	V _{CB} = 45 V, I _E = 0 A	—	—	10	μA
		ICEO	V _{CE} = 45 V, I _E = 0 A	—	—	10	μA
Emitter cutoff current		I _{EBO}	V _{EB} = 8 V, I _C = 0 A	0.80	—	4.0	mA
Collector-emitter breakdown voltage		V (BR) CEO	I _C = 10 mA, I _B = 0 A	50	60	70	V
DC current gain		hFE	V _{CE} = 2 V, I _C = 1.0 A	2000	—	—	—
Collector-emitter saturation voltage		V _{CE (sat) (1)}	I _C = 0.5 A, I _B = 1 mA	—	—	1.2	V
		V _{CE (sat) (2)}	I _C = 1.0 A, I _B = 1 mA	—	—	1.5	V
Base-emitter saturation voltage		V _{BE (sat)}	I _C = 1.0 A, I _B = 1 mA	—	—	2.0	V
Switching time	Rise time	t _{on}	See Figure 1 V _{CC} ≈ 30 V, R _L = 30 Ω I _{B1} = 1 mA, I _{B2} = 1 mA	—	0.4	—	μs
	Storage time	t _{stg}		—	4.0	—	
	Fall time	t _f		—	0.6	—	

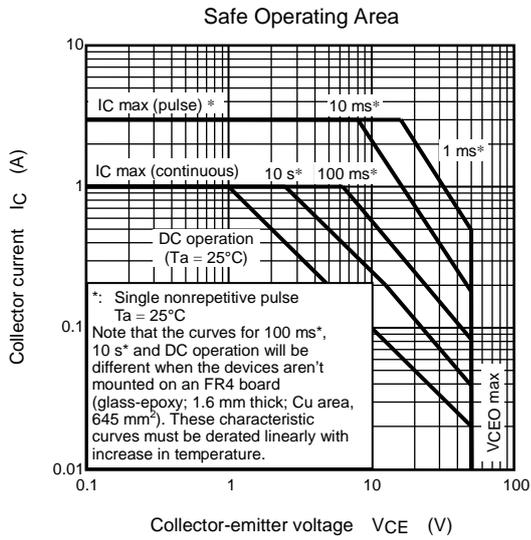
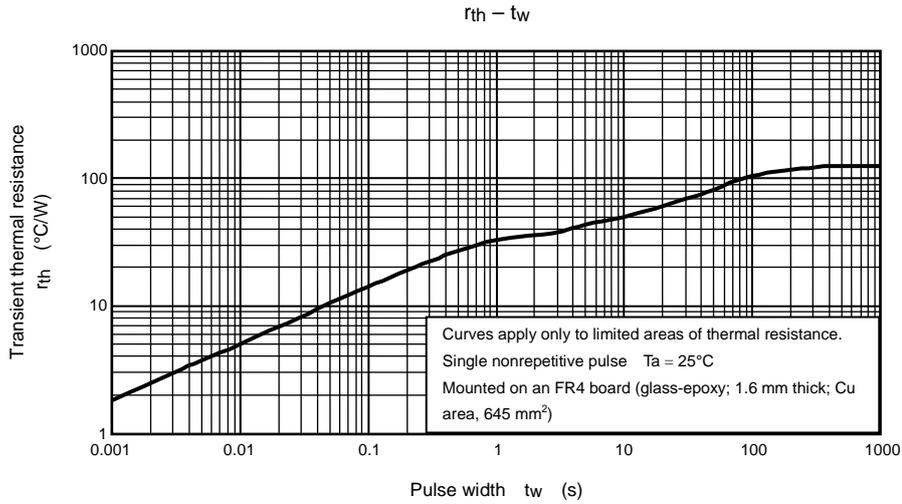
Figure 1. Switching Time Test Circuit



Marking







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