Bipolar Transistors Silicon NPN Triple-Diffused Type

TTD1410B

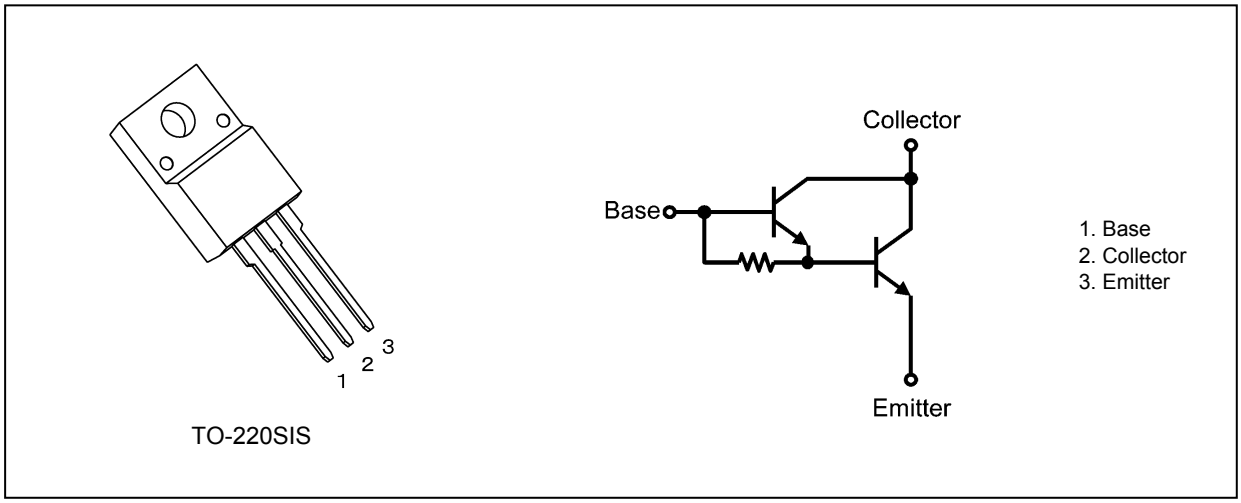
1. Applications

- High-Voltage Switching

2. Features

(1) High DC current gain: h_{FE} = 2000 (min) (V_{CE} = 2 V , I_C = 2 A)

3. Packaging and Internal Circuit



4. Absolute Maximum Ratings (Note) (T_a = 25 °C unless otherwise specified)

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	300	V
Collector-emitter voltage		V_{CEO}	250	
Emitter-base voltage		V_{EBO}	5	
Collector current (DC)	(Note 1)	I_C	6	A
Collector current (pulsed)	(Note 1)	I_{CP}	10	
Base current		I_B	1	
Collector power dissipation		P_C	2	W
Collector power dissipation	(T_c = 25 °C)	P_C	25	
Junction temperature		T_j	150	°C
Storage temperature		T_{stg}	-55 to 150	
Mounting torque		TOR	0.6	N · m

Note: 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).

Note 1: Ensure that the junction temperature does not exceed 150 °C.

Start of commercial production
2012-09

5. Electrical Characteristics

5.1. Static Characteristics (T_a = 25 °C unless otherwise specified)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB} = 300 V, I_E = 0 A	—	—	20	μA
Emitter cut-off current	I_{EBO}	V_{EB} = 5 V, I_C = 0 A	—	—	20	
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	I_C = 10 mA, I_B = 0 A	250	—	—	V
DC current gain	$h_{FE(1)}$	V_{CE} = 2 V, I_C = 2 A	2000	—	—	—
	$h_{FE(2)}$	V_{CE} = 2 V, I_C = 4 A	200	—	—	
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C = 4 A, I_B = 0.04 A	—	—	2.0	V
Base-emitter saturation voltage	$V_{BE(sat)}$	I_C = 4 A, I_B = 0.04 A	—	—	2.5	

5.2. Dynamic Characteristics (T_a = 25 °C unless otherwise specified)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector output capacitance	C_{ob}	V_{CB} = 50 V, I_E = 0 A, f = 1 MHz	—	30	—	pF
Switching time (turn-on time)	t_{on}	See Figure 5.2.1.	—	1	—	μs
Switching time (storage time)	t_{stg}	$V_{CC} \approx$ 100 V, R_L = 25 Ω, I_{B1} = -I_{B2} = 0.04 A, Duty cycle ≤ 1%	—	8	—	
Switching time (fall time)	t_f		—	5	—	

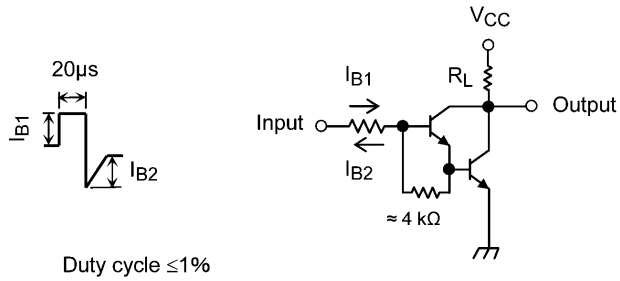


Fig. 5.2.1 Switching Time Test Circuit

6. Marking (Note)

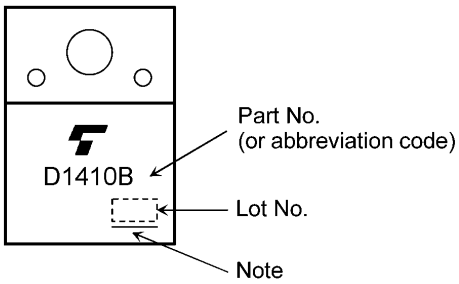


Fig. 6.1 Marking

Note: A line under a Lot No. identifies the indication of product Labels.
[[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 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

7. Characteristics Curves (Note)

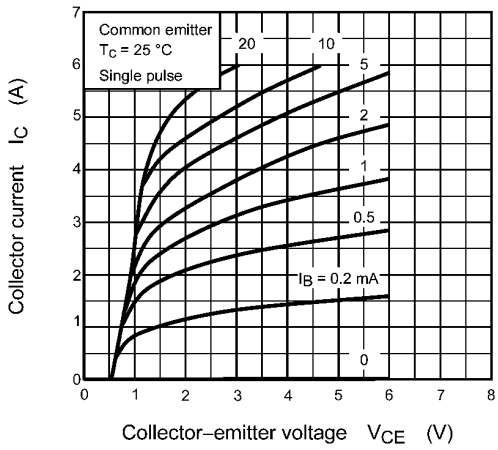


Fig. 7.1 I_C - V_{CE}

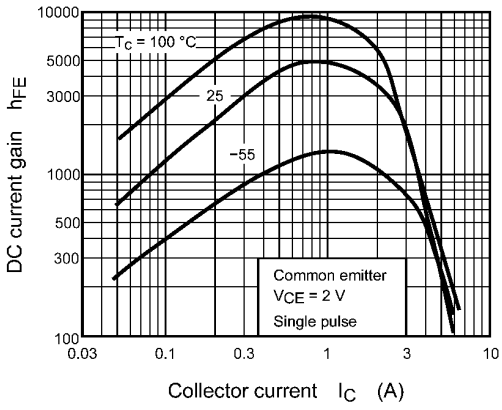


Fig. 7.2 h_{FE} - I_C

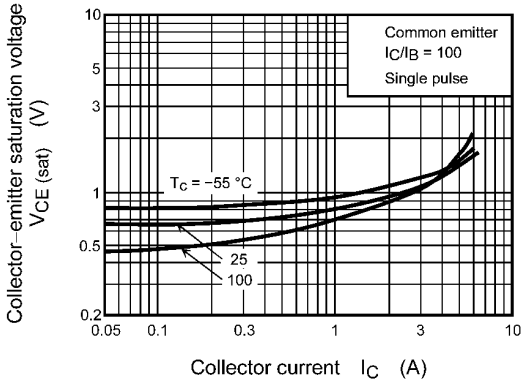


Fig. 7.3 $V_{CE(sat)}$ - I_C

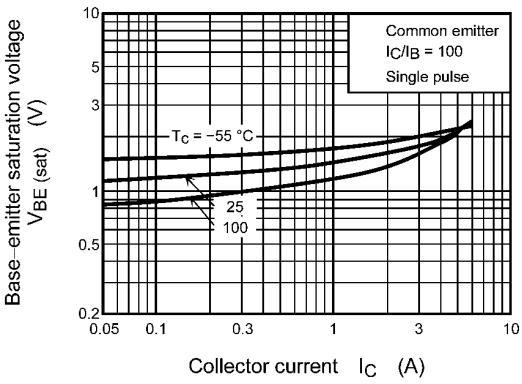


Fig. 7.4 $V_{BE(sat)}$ - I_C

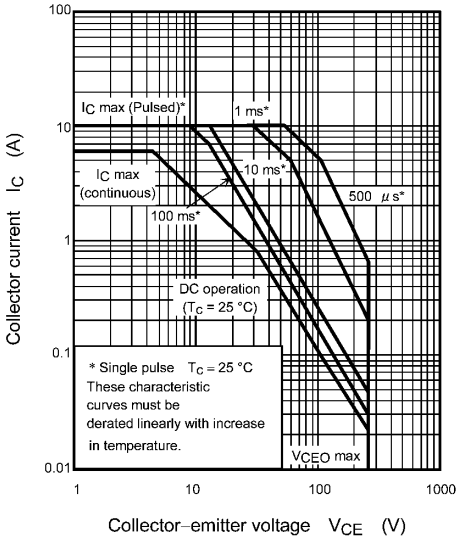
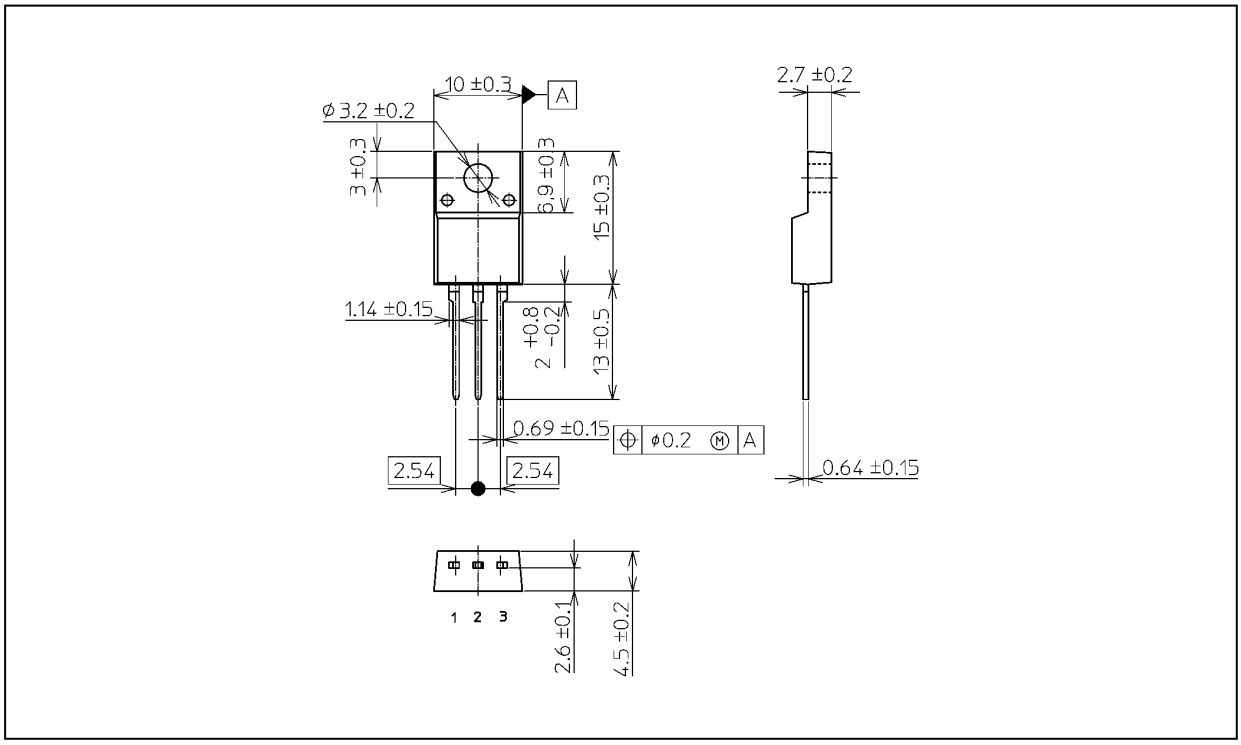


Fig. 7.5 Safe Operating Area (Guaranteed Maximum)

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

Package Dimensions

Unit: mm



Weight: 1.7 g (typ.)

Package Name(s)
TOSHIBA: 2-10U1S
Nickname: TO-220SIS

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