Bipolar Transistors Silicon NPN Triple-Diffused Type

TTD1415B

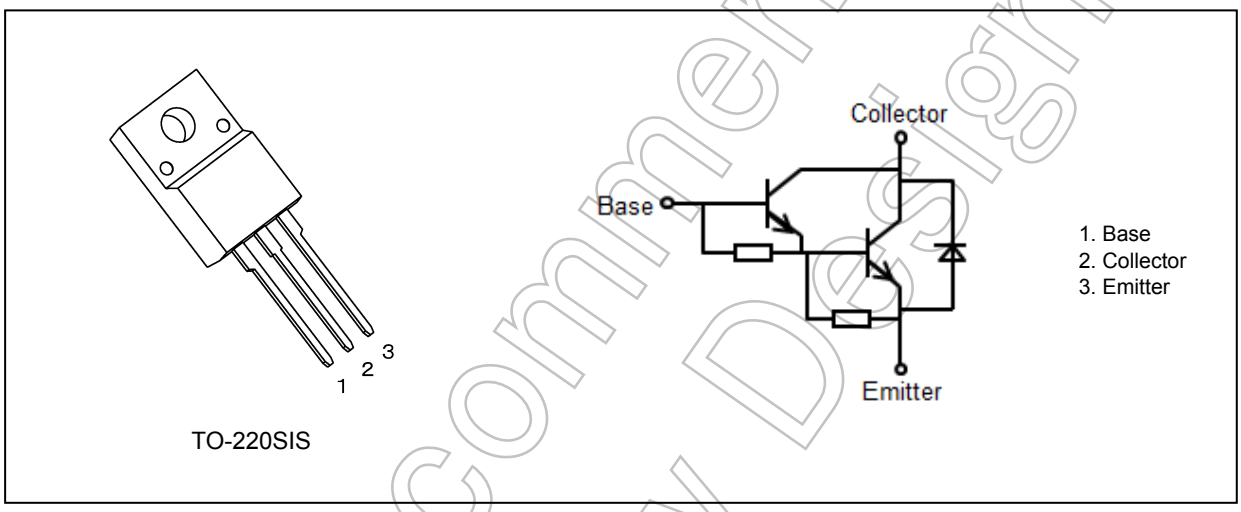
1. Applications

- High-Power Switching
- Hammer Drivers

2. Features

(1) High DC current gain: h_{FE} = 2000 (min) (V_{CE} = 3 V, I_C = 3 A)
(2) Low collector-emitter saturation voltage: $V_{CE(sat)}$ = 1.5 V (max) (I_C = 3 A , I_B = 6 mA)
(3) Complementary to TTB1020B

3. Packaging and Internal Circuit



Start of commercial production
2012-09

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	120	V
Collector-emitter voltage		V_{CEO}	100	
Emitter-base voltage		V_{EBO}	6	
Collector current (DC)	(Note 1)	I_C	7	A
Collector current (pulsed)	(Note 1)	I_{CP}	10	
Base current		I_B	0.7	
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.

5. Thermal Characteristics

Characteristics	Symbol	Max	Unit
Junction-to-case thermal resistance	$R_{th(j-c)}$	5.0	°C/W
Junction-to-ambient thermal resistance	$R_{th(j-a)}$	62.5	

6. Electrical Characteristics

6.1. 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} = 120 V, I_E = 0 A	—	—	2	μA
Emitter cut-off current	I_{EBO}	V_{EB} = 6 V, I_C = 0 A	0.75	—	3.0	mA
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	I_C = 50 mA, I_B = 0 A	100	—	—	V
DC current gain	$h_{FE(1)}$	V_{CE} = 3 V, I_C = 3 A	2000	—	15000	—
	$h_{FE(2)}$	V_{CE} = 3 V, I_C = 6 A	1000	—	—	
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C = 3 A, I_B = 6 mA	—	0.9	1.5	V
Base-emitter saturation voltage	$V_{BE(sat)}$	I_C = 3 A, I_B = 6 mA	—	1.5	2.0	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Switching time (turn-on time)	t_{on}	See Figure 6.2.1. $V_{CC} \approx 45$ V, $R_L = 15\ \Omega$, $I_{B1} = -I_{B2} = 6$ mA, Duty cycle ≤ 1%	—	0.3	—	μs
Switching time (storage time)	t_{stg}		—	5.1	—	
Switching time (fall time)	t_f		—	0.6	—	

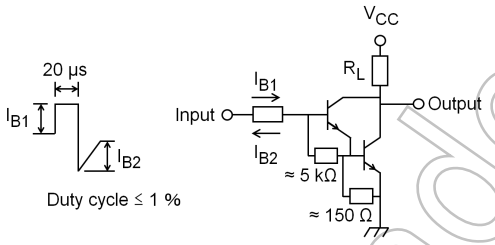


Fig. 6.2.1 Switching Time Test Circuit

7. Marking (Note)

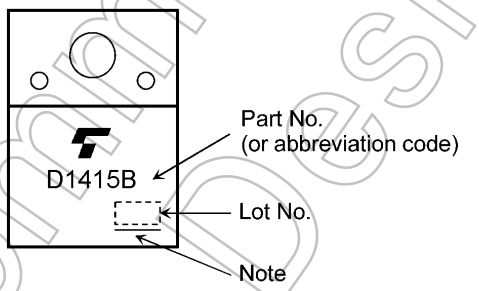


Fig. 7.1 Marking

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.

8. Characteristics Curves (Note)

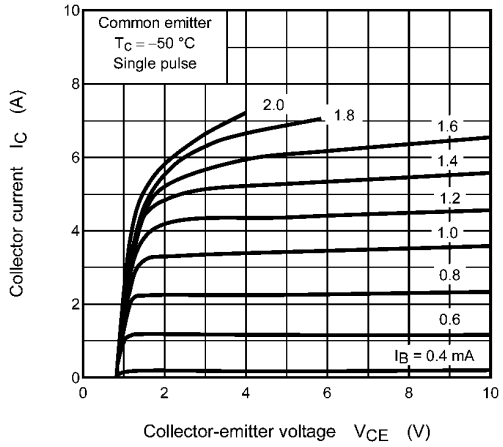


Fig. 8.1 I_C - V_{CE}

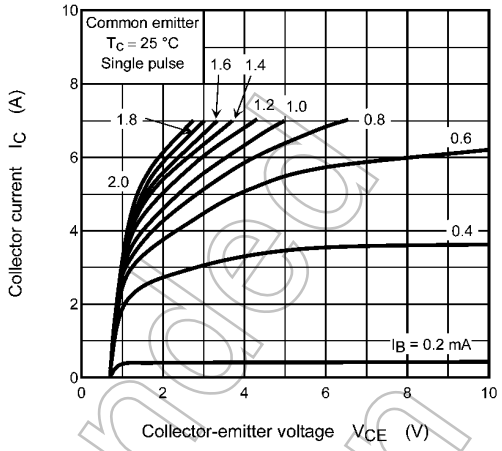


Fig. 8.2 I_C - V_{CE}

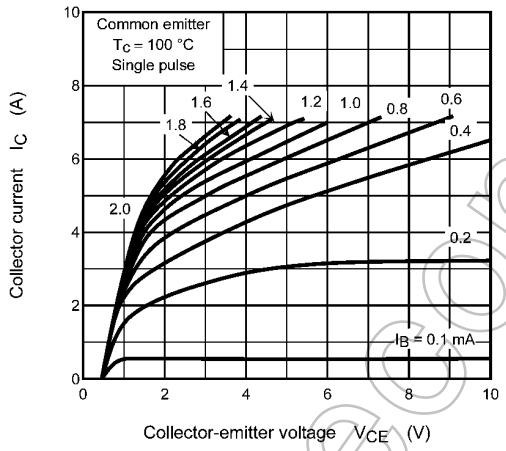


Fig. 8.3 I_C - V_{CE}

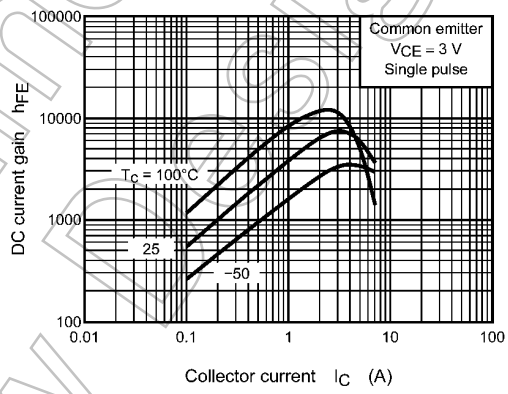


Fig. 8.4 h_{FE} - I_C

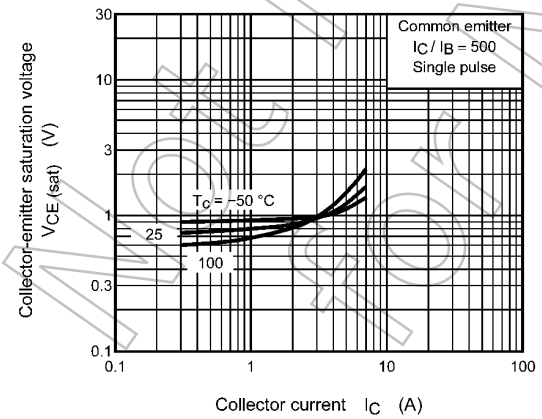


Fig. 8.5 $V_{CE(sat)}$ - I_C

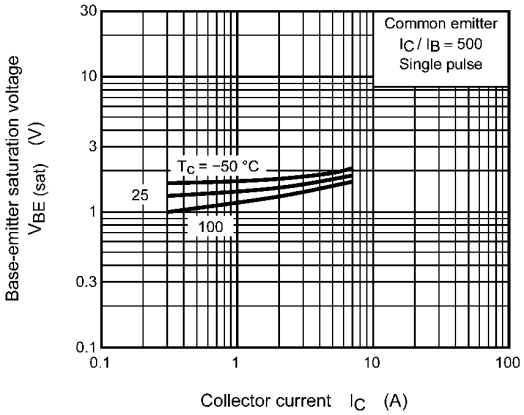


Fig. 8.6 $V_{BE(sat)}$ - I_C

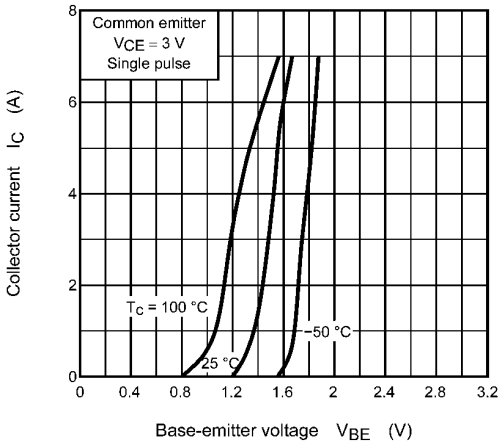


Fig. 8.7 I_C - V_{BE}

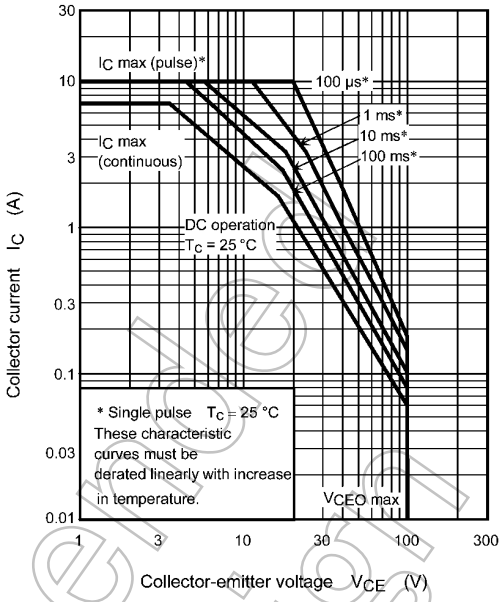
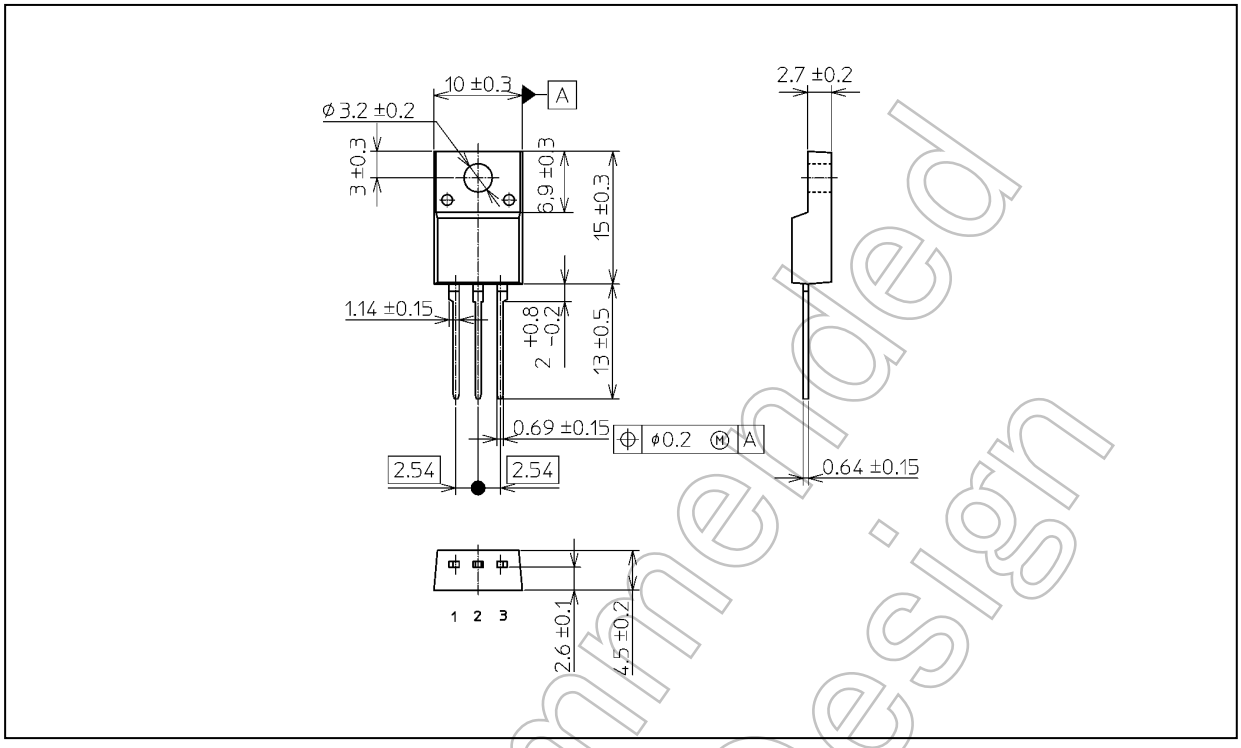


Fig. 8.8 Safe Operating Area (Guaranteed Maximum)

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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