Bipolar Transistors Silicon NPN Epitaxial Type (Darlington Transistor)

TTD1509B

1. Applications

- Micromotor Drivers
- Hammer Drivers
- Switching
- Power Amplifiers

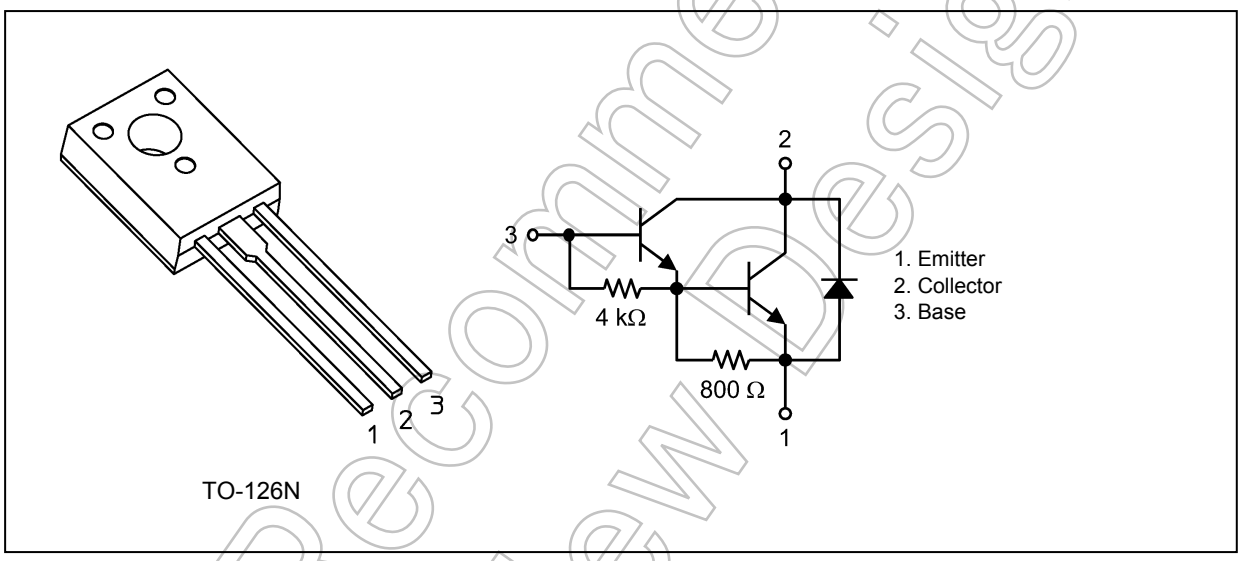
2. Features

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

(2) Low collector-emitter saturation voltage : $V_{CE(sat)}$ = 1.5 V (max) (I_C = 1 A, I_B = 1 mA)

(3) Complementary to TTB1067B

3. Packaging and Internal Circuit (Note)



Note: Although this device is encapsulated in epoxy resin, it does not provide any guarantee to the maximum isolation voltage. Therefore, as with the case with non-isolated devices, care should be taken with regard to electrical isolation from surrounding parts.

Start of commercial production
2013-08

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

Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	80	V
Collector-emitter voltage		V_{CEO}	80	
Emitter-base voltage		V_{EBO}	8	
Collector current (DC)	(Note 1)	I_C	2	A
Collector current (pulsed)	(Note 1)	I_{CP}	3	
Base current		I_B	0.5	
Collector power dissipation		P_C	1.5	W
Collector power dissipation	(T_c = 25 °C)	P_C	10	
Junction temperature		T_j	150	°C
Storage temperature		T_{stg}	-55 to 150	

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.

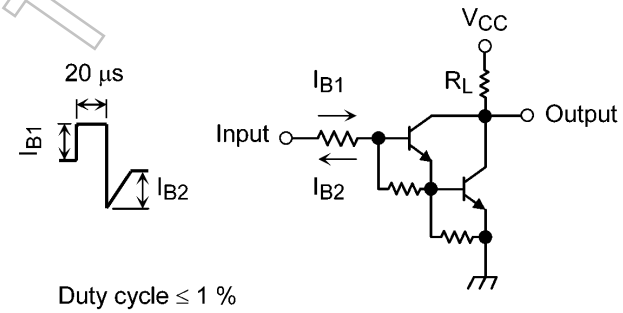
5. Electrical Characteristics

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} = 80 V, I_E = 0 A	—	—	100	nA
Emitter cut-off current	I_{EBO}	V_{EB} = 8 V, I_C = 0 A	0.8	—	4	mA
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	I_C = 10 mA, I_B = 0 A	80	—	—	V
DC current gain	h_{FE}	V_{CE} = 2 V, I_C = 1 A	2000	—	—	—
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C = 1 A, I_B = 1 mA	—	—	1.5	V
Base-emitter saturation voltage	$V_{BE(sat)}$	I_C = 1 A, I_B = 1 mA	—	—	2.0	V

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} = 10 V, I_E = 0 A, f = 1 MHz	—	20	—	pF
Transition frequency	f_T	V_{CE} = 2 V, I_C = 0.5 A	—	100	—	MHz
Switching time (rise time)	t_r	See Figure 5.2.1.	—	0.4	—	μs
Switching time (storage time)	t_{stg}	V_{CC} ≈ 30 V, R_L = 30 Ω, I_{B1} = 1 mA, I_{B2} = 1 mA	—	4.0	—	
Switching time (fall time)	t_f		—	0.6	—	



Duty cycle ≤ 1 %

Fig. 5.2.1 Switching Time Test Circuit

6. Marking (Note)

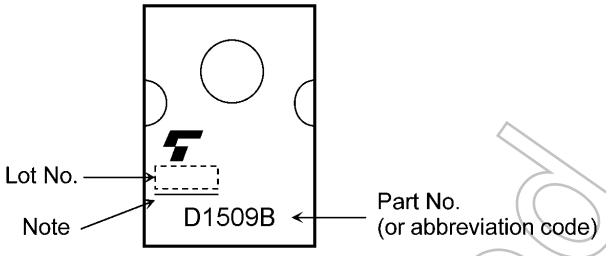


Fig. 6.1 Marking

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)

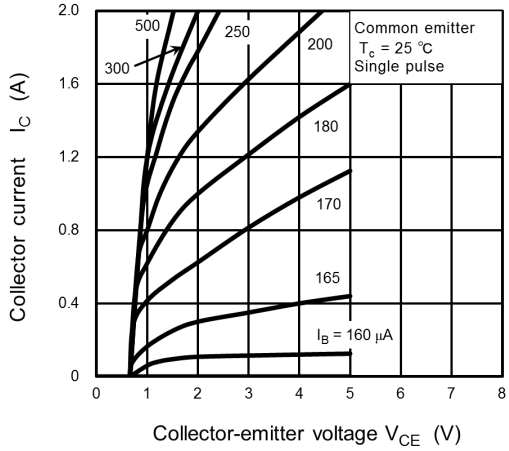


Fig. 7.1 I_C - V_{CE}

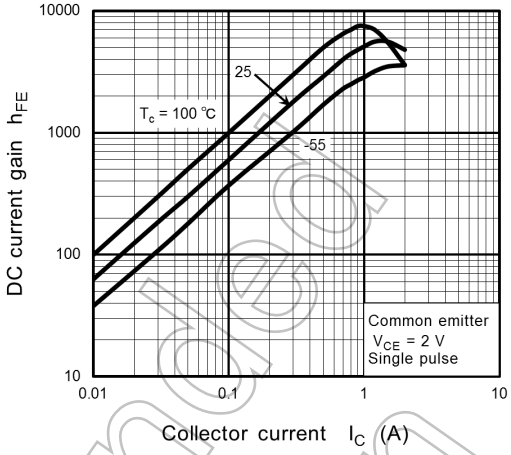


Fig. 7.2 h_{FE} - I_C

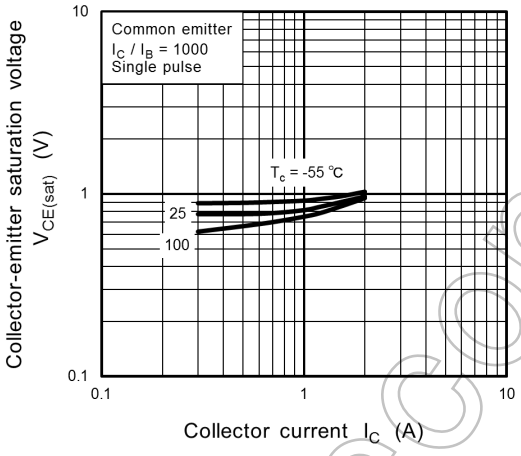


Fig. 7.3 $V_{CE(sat)}$ - I_C

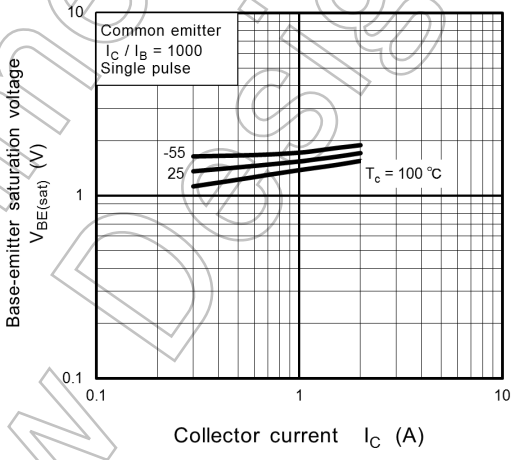


Fig. 7.4 $V_{BE(sat)}$ - I_C

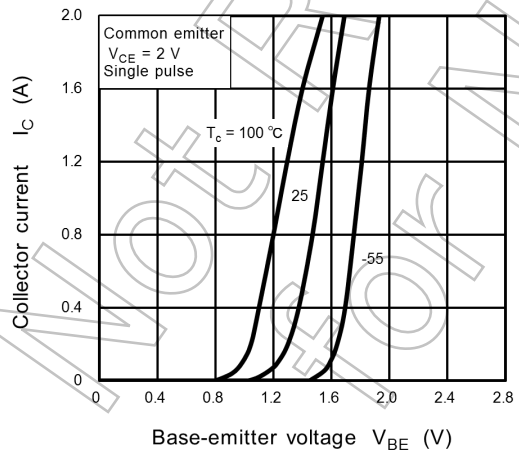


Fig. 7.5 I_C - V_{BE}

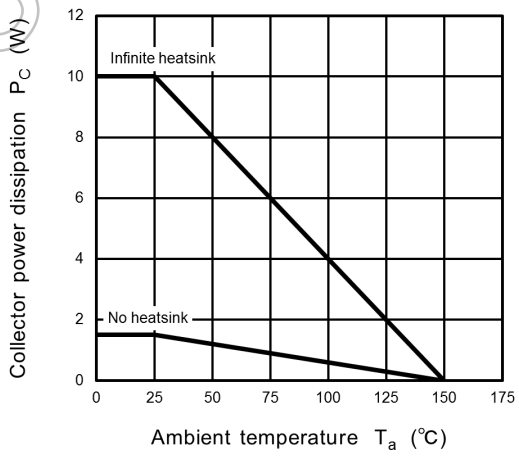


Fig. 7.6 P_C - T_a

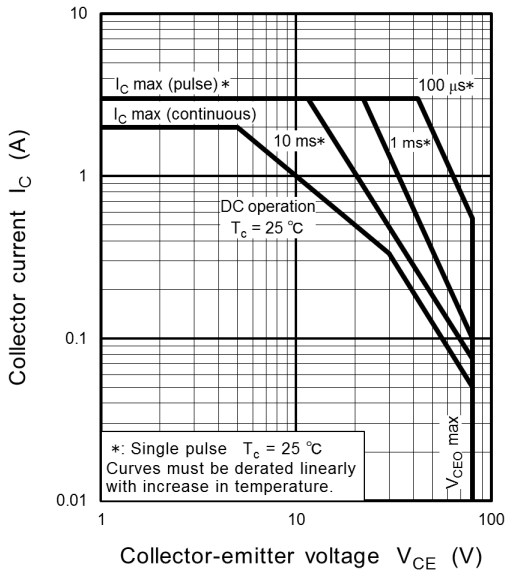
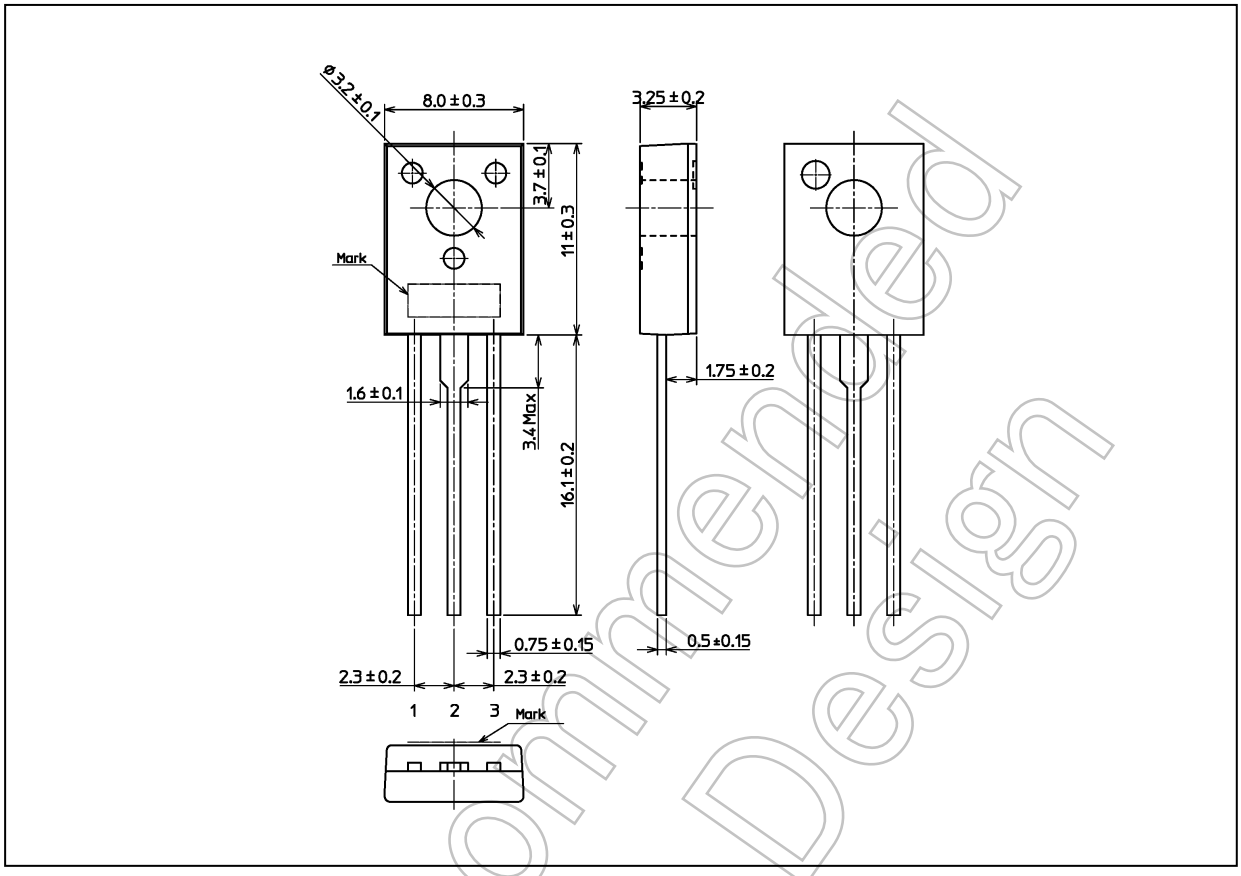


Fig. 7.7 Safe Operating Area (Guaranteed Maximum)

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

Package Dimensions

Unit: mm



Weight: 0.84 g (typ.)

Package Name(s)
TOSHIBA: 2-8U1A
Nickname: TO-126N

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