

Bipolar Transistors Silicon NPN Epitaxial Type

TTC004B

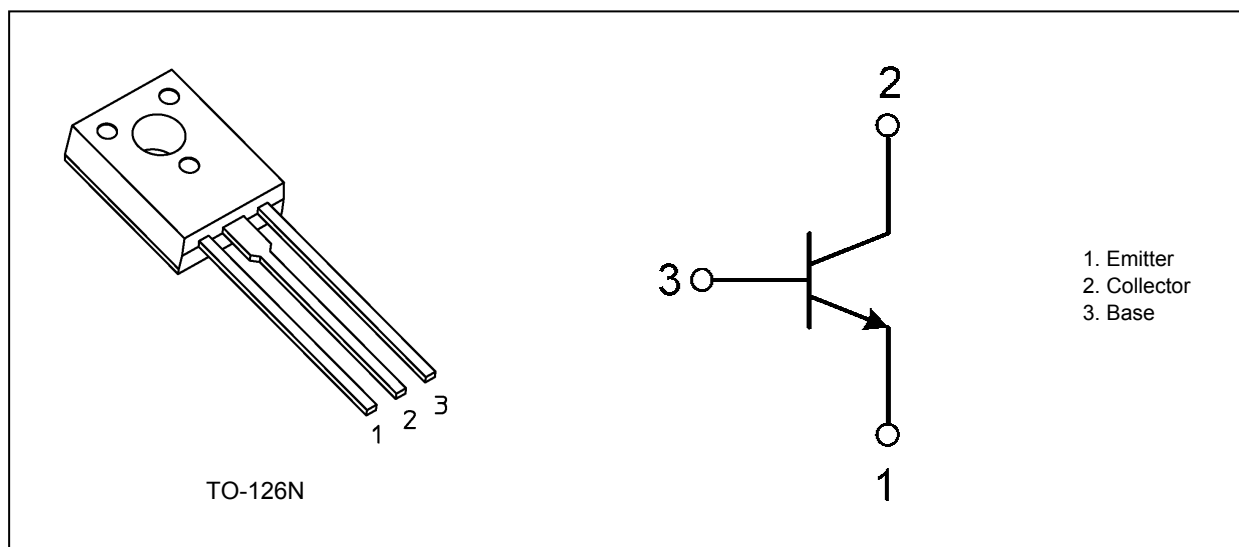
1. Applications

- Audio-Frequency Amplifiers

2. Features

- (1) High collector voltage: $V_{CE0} = 160 \text{ V (min)}$
- (2) Complementary to TTA004B
- (3) Small collector output capacitance: $C_{ob} = 12 \text{ pF (typ.)}$
- (4) High transition frequency: $f_T = 100 \text{ MHz (typ.)}$

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
2013-05

4. Absolute Maximum Ratings (Note) ($T_a = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	160	V
Collector-emitter voltage	V_{CEO}	160	
Emitter-base voltage	V_{EBO}	6	
Collector current (DC)	I_C	1.5	A
Collector current (pulsed)	I_{CP}	2.5	
Base current	I_B	0.5	
Collector power dissipation	P_C	1.5	W
Collector power dissipation ($T_c = 25\text{ }^{\circ}\text{C}$)	P_C	10	
Junction temperature	T_j	150	$^{\circ}\text{C}$
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 $150\text{ }^{\circ}\text{C}$.

5. Electrical Characteristics

5.1. Static Characteristics ($T_a = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	$V_{CB} = 160\text{ V}, I_E = 0\text{ A}$	—	—	100	nA
Emitter cut-off current	I_{EBO}	$V_{EB} = 6\text{ V}, I_C = 0\text{ A}$	—	—	100	
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 10\text{ mA}, I_B = 0\text{ A}$	160	—	—	V
DC current gain	$h_{FE(1)}$	$V_{CE} = 5\text{ V}, I_C = 1\text{ mA}$	80	—	—	—
	$h_{FE(2)}$	$V_{CE} = 5\text{ V}, I_C = 0.1\text{ A}$	140	—	280	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 0.5\text{ A}, I_B = 50\text{ mA}$	—	—	0.5	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = 0.5\text{ A}, I_B = 50\text{ mA}$	—	—	1.3	V

5.2. Dynamic Characteristics ($T_a = 25\text{ }^{\circ}\text{C}$ unless otherwise specified)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector output capacitance	C_{ob}	$V_{CB} = 10\text{ V}, I_E = 0\text{ A}, f = 1\text{ MHz}$	—	12	—	pF
Transition frequency	f_T	$V_{CE} = 10\text{ V}, I_C = 100\text{ mA}$	—	100	—	MHz

6. Marking (Note)

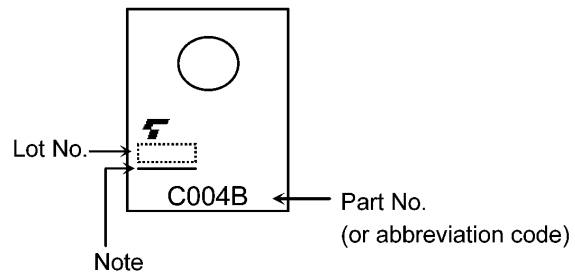


Fig. 6.1 Marking

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)

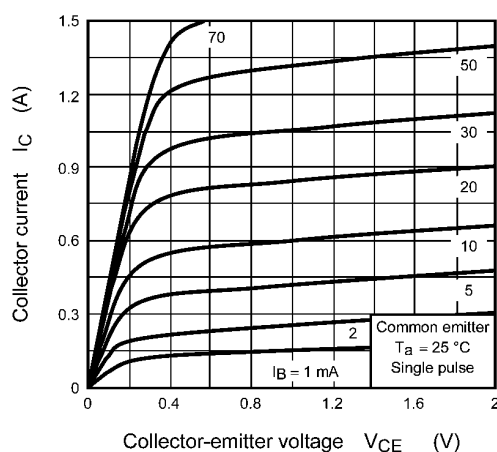


Fig. 7.1 $I_C - V_{CE}$

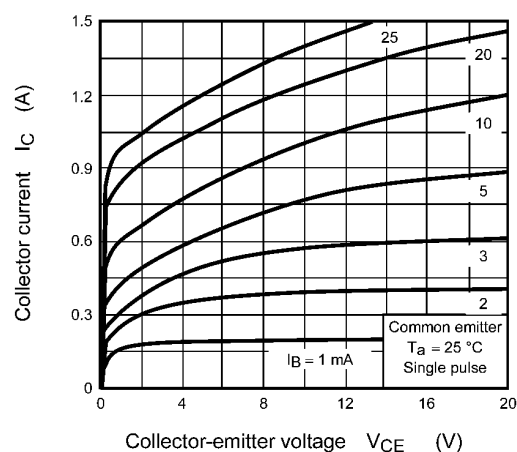


Fig. 7.2 $I_C - V_{CE}$

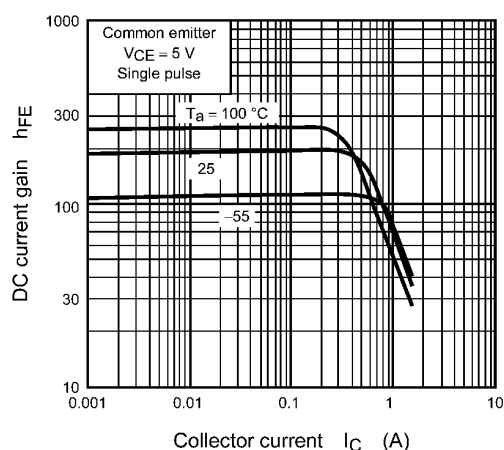


Fig. 7.3 $h_{FE} - I_C$

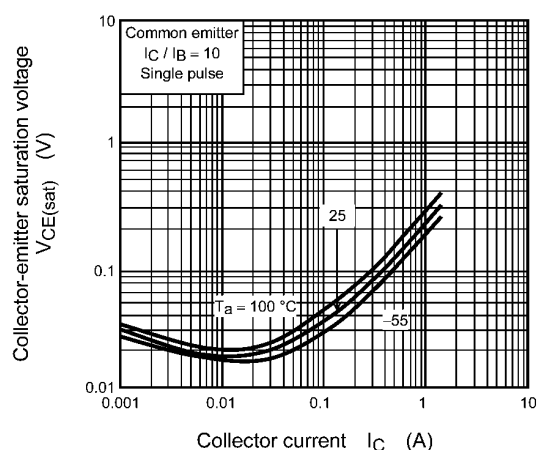


Fig. 7.4 $V_{CE(sat)} - I_C$

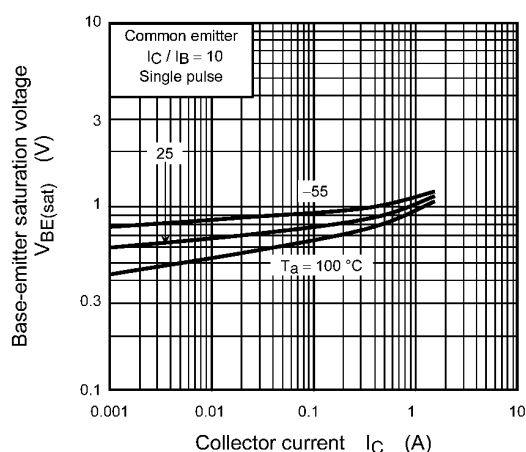


Fig. 7.5 $V_{BE(sat)} - I_C$

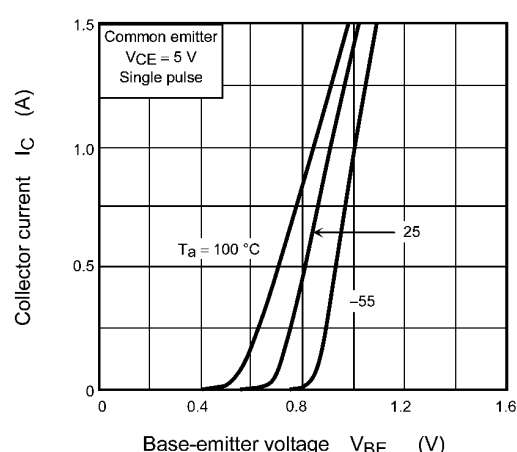


Fig. 7.6 $I_C - V_{BE}$

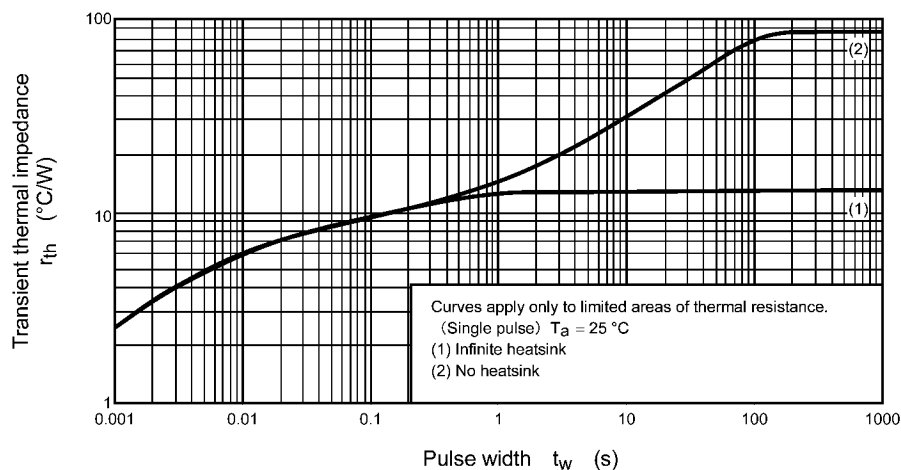


Fig. 7.7 $r_{th} - t_w$
(Guaranteed Maximum)

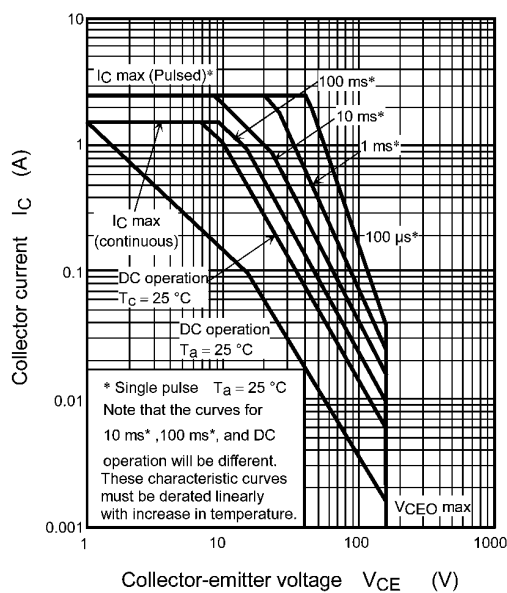


Fig. 7.8 Safe Operating Area
(Guaranteed Maximum)

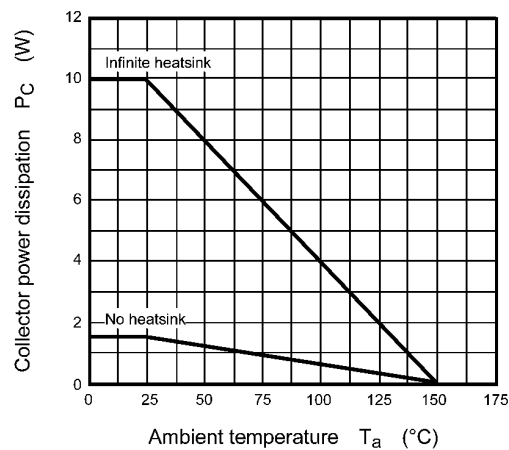


Fig. 7.9 $P_C - T_a$

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

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