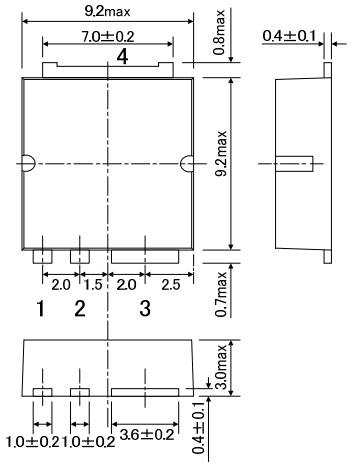
TOSHIBA Transistor Silicon PNP Diffused Type

TTB001

○ Audio Frequency Power Amplifier Application

- Low collector saturation voltage : $V_{CE\ (sat)}$ = −1.7 V (max)
- High power dissipation : P_C = 36 W (Tc = 25°C)

Unit: mm



1. Base
2. N.C.
3. Emitter
4. Collector (heat sink)

JEDEC	―
JEITA	―
TOSHIBA	2-9F1D

Weight: 1.4 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

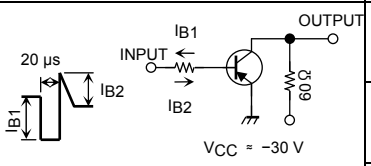
Characteristics		Symbol	Rating	Unit
Collector-base voltage		V_{CBO}	-60	V
Collector-emitter voltage		V_{CEO}	-60	V
Emitter-base voltage		V_{EBO}	-7	V
Collector current (Note1)	DC	I_C	-3	A
	Pulse	I_{CP}	-6	A
Base current		I_B	-0.5	A
Collector power dissipation	Tc = 25°C	P_C	36	W
Junction temperature (Note 2)		T_j	175	°C
Storage temperature range (Note 2)		T_{stg}	-55 to 175	°C

Note 1: Ensure that the junction temperature does not exceed 175°C during use of the device.

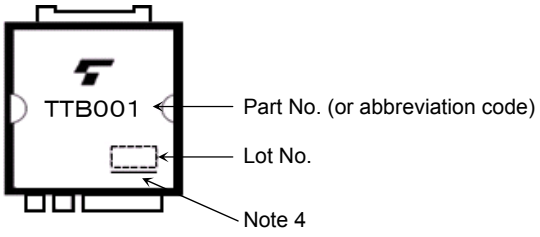
Note 2: Junction temperature is guaranteed up to 175°C based on AEC Q101.

Note 3: 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).

Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current		I_{CBO}	V_{CB} = -60 V, I_E = 0	—	—	-100	nA
Emitter cut-off current		I_{EBO}	V_{EB} = -7 V, I_C = 0	—	—	-100	nA
Collector-emitter breakdown voltage		$V_{(BR)\ CEO}$	I_C = -10 mA, I_B = 0	-60	—	—	V
DC current gain		h_{FE} (1)	V_{CE} = -5 V, I_C = -0.5 A	100	—	250	
		h_{FE} (2)	V_{CE} = -5 V, I_C = -3 A	20	—	—	
Collector-emitter saturation voltage		$V_{CE\ (sat)}$	I_C = -3 A, I_B = -0.3 A	—	—	-1.7	V
Base-emitter voltage		V_{BE}	V_{CE} = −5 V, I_C = −0.5 A	—	—	-1	V
Transition frequency		f_T	V_{CE} = −5 V, I_C = −0.5 A	—	9	—	MHz
Collector output capacitance		C_{ob}	V_{CB} = −10 V, I_E = 0, f = 1 MHz	—	90	—	pF
Switching time	Turn-on time	t_{on}		—	0.6	—	μs
	Storage time	t_{stg}		—	1.7	—	
	Fall time	t_f	I_{B1} = 25 mA, I_{B2} = 50 mA Duty cycle ≤ 1%	—	0.2	—	

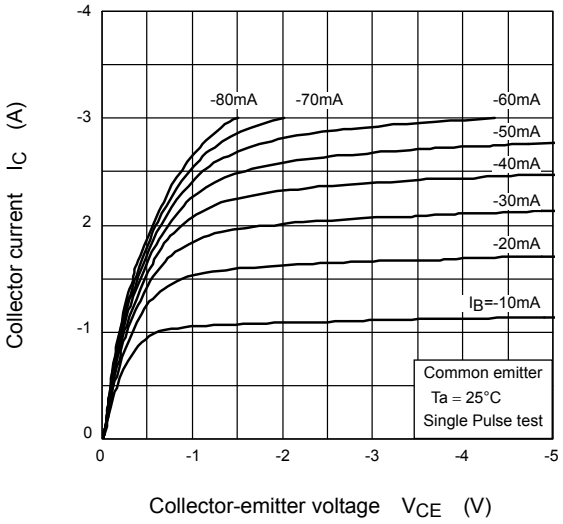
Marking



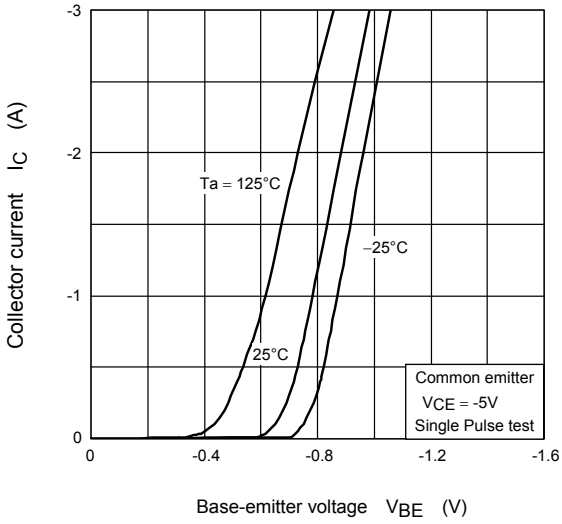
Note 4: A line under a Lot No. identifies the indication of product Labels
[[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product.
The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

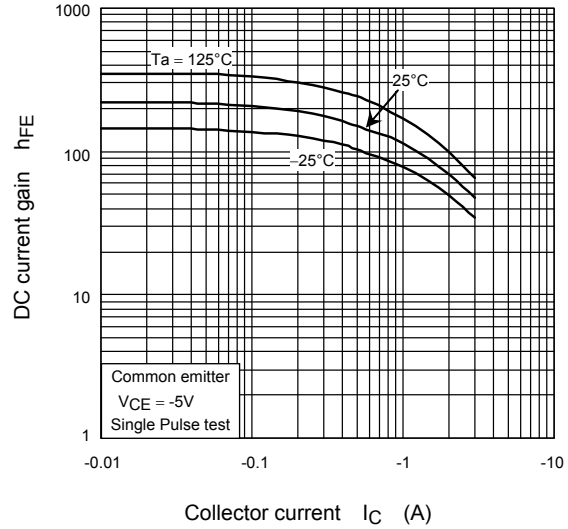
$I_C - V_{CE}$



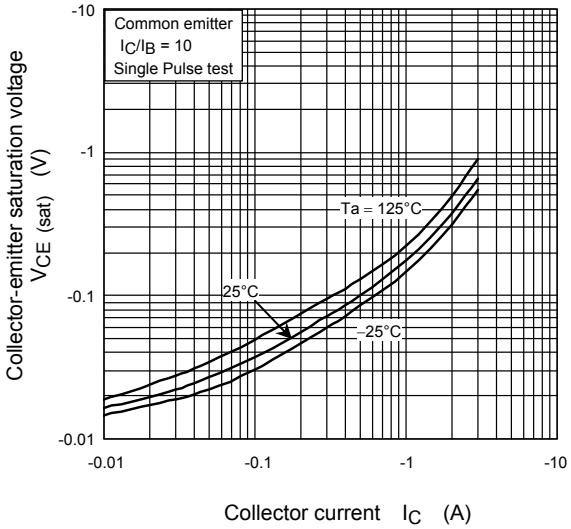
$I_C - V_{BE}$



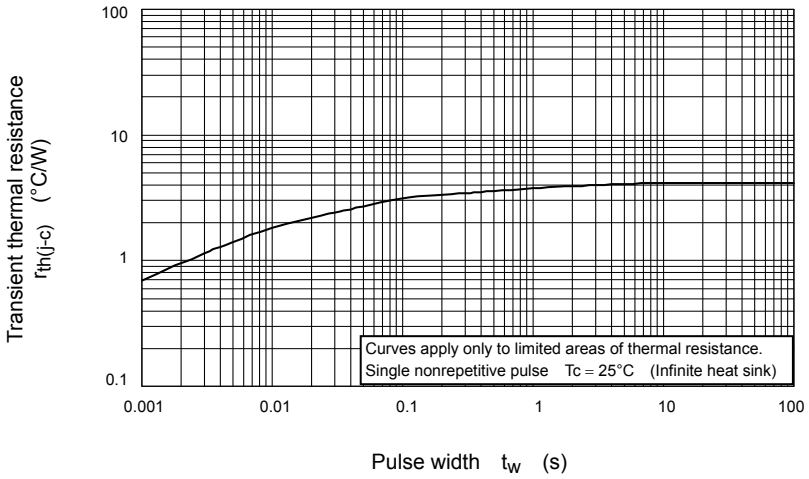
$h_{FE} - I_C$



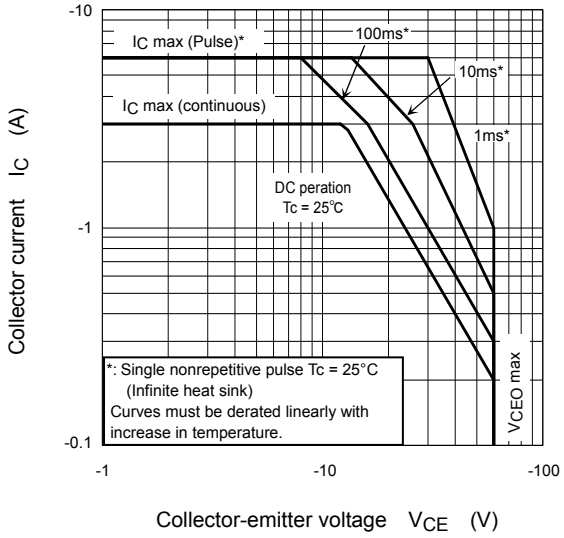
$V_{CE\ (sat)} - I_C$



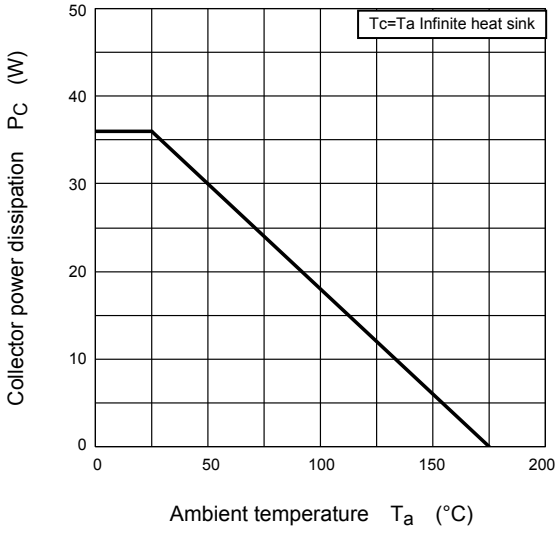
$r_{th(j-c)} - t_w$



Safe Operating Area



$P_C - T_a$



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