

TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT Process) Silicon PNP Epitaxial Type (PCT Process)

HN1B04FE

Audio Frequency General Purpose Amplifier Applications

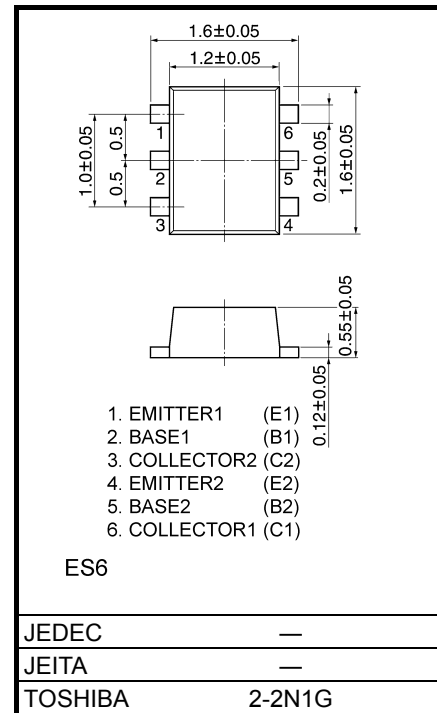
Unit: mm

Q1:

- High voltage and high current
: $V_{CEO} = 50V, I_C = 150mA$ (max)
- High h_{FE} : $h_{FE} = 120$ to 400
- Excellent h_{FE} linearity
: $h_{FE}(I_C = 0.1mA) / h_{FE}(I_C = 2mA) = 0.95$ (typ.)

Q2:

- High voltage and high current
: $V_{CEO} = -50V, I_C = -150mA$ (max)
- High h_{FE} : $h_{FE} = 120$ to 400
- Excellent h_{FE} linearity
: $h_{FE}(I_C = -0.1mA) / h_{FE}(I_C = -2mA) = 0.95$ (typ.)



Weight: 3.0mg (typ.)

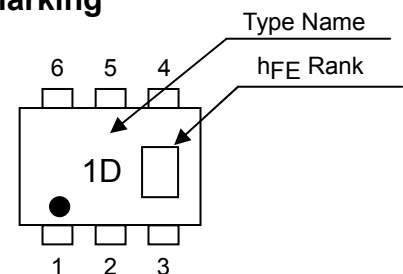
Q1 Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	60	V
Collector-emitter voltage	V_{CEO}	50	V
Emitter-base voltage	V_{EBO}	5	V
Collector current	I_C	150	mA
Base current	I_B	30	mA

Q2 Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	-50	V
Collector-emitter voltage	V_{CEO}	-50	V
Emitter-base voltage	V_{EBO}	-5	V
Collector current	I_C	-150	mA
Base current	I_B	-30	mA

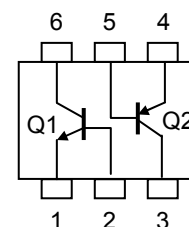
Marking



Q1, Q2 Common Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector power dissipation	P_C^*	100	mW
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	-55 to 150	°C

Equivalent Circuit (Top View)



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).

* Total rating

Start of commercial production
2000-05

Q1 Electrical Characteristics (Ta = 25°C)

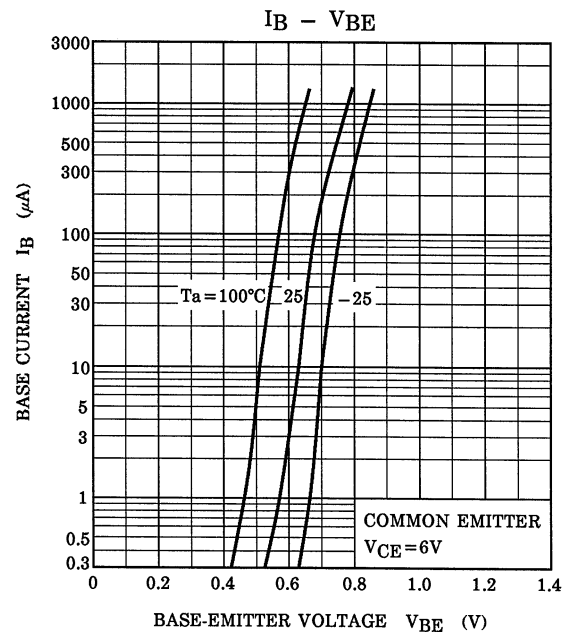
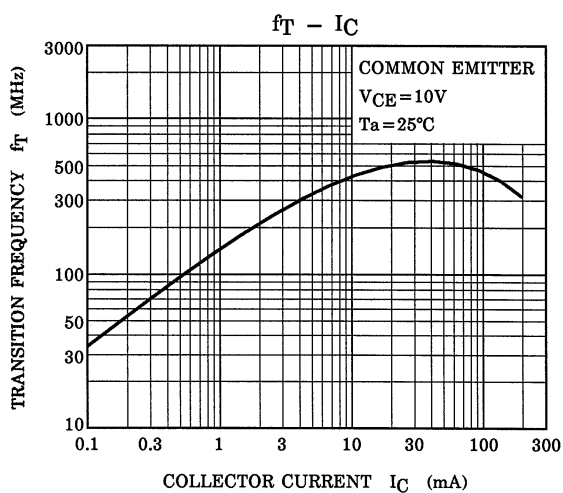
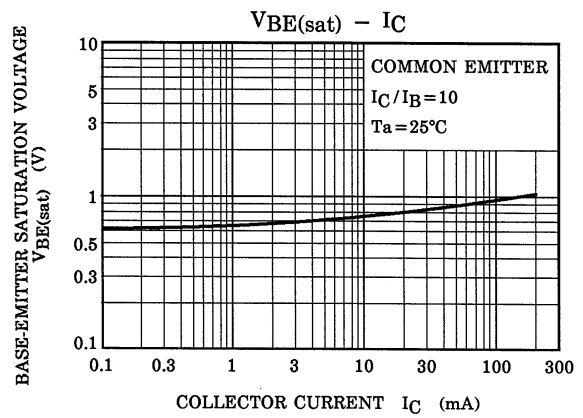
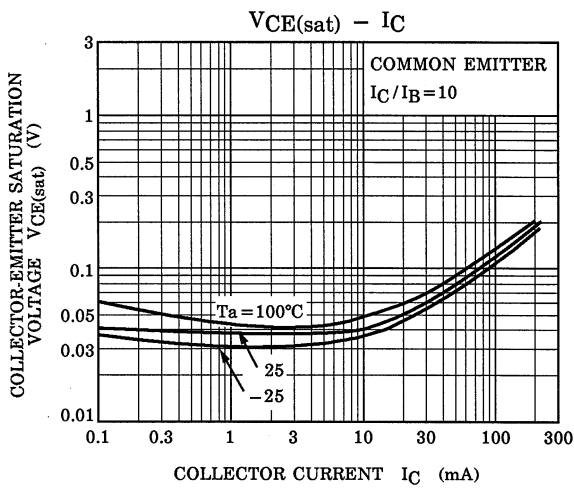
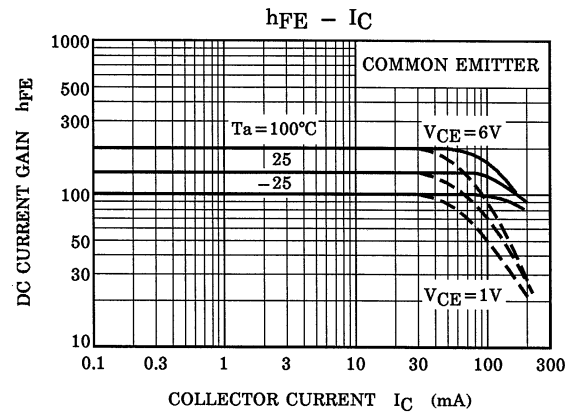
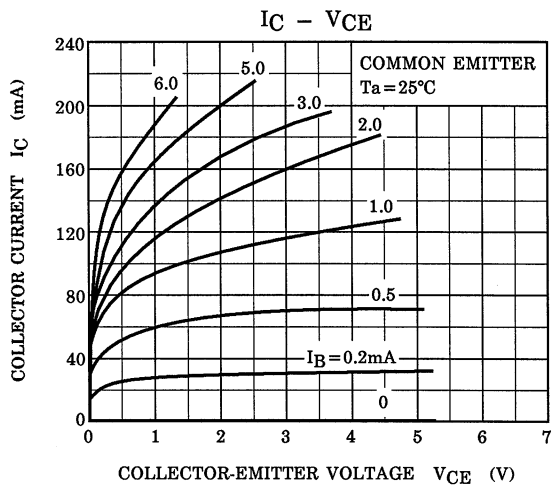
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	—	$V_{CB} = 60V, I_E = 0$	—	—	0.1	μA
Emitter cut-off current	I_{EBO}	—	$V_{EB} = 5V, I_C = 0$	—	—	0.1	μA
DC current gain	h_{FE} (Note)	—	$V_{CE} = 6V, I_C = 2mA$	120	—	400	
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	$I_C = 100mA, I_B = 10mA$	—	0.1	0.25	V
Transition frequency	f_T	—	$V_{CE} = 10V, I_C = 1mA$	80	—	—	MHz
Collector output capacitance	C_{ob}	—	$V_{CB} = 10V, I_E = 0, f = 1MHz$	—	2	—	pF

Q2 Electrical Characteristics (Ta = 25°C)

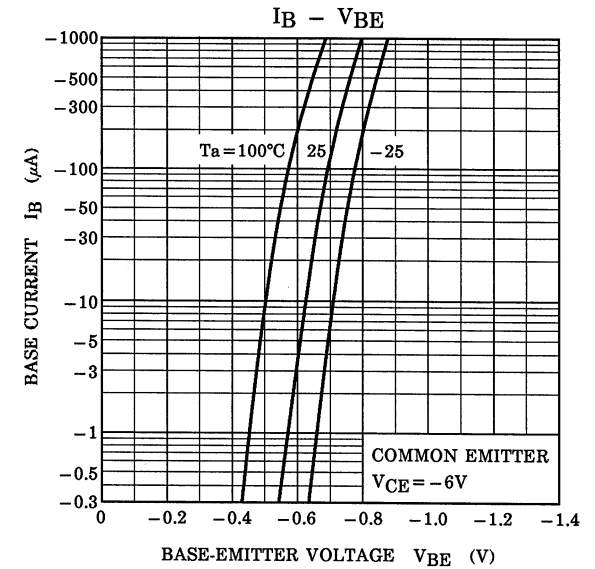
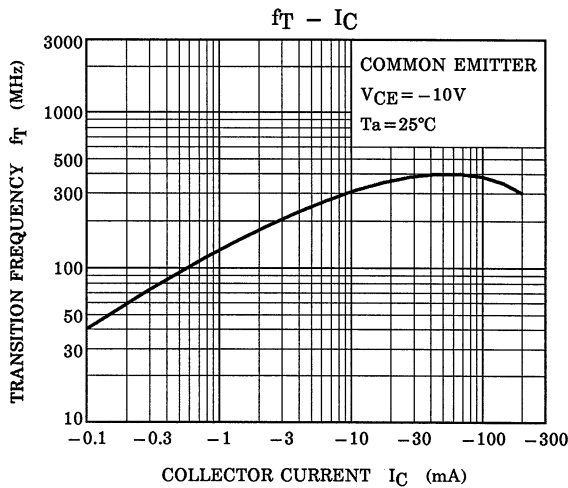
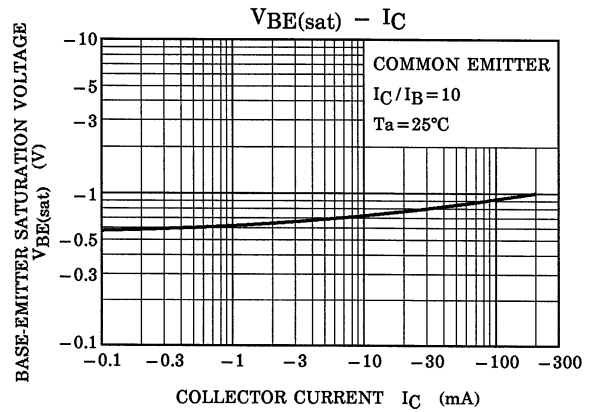
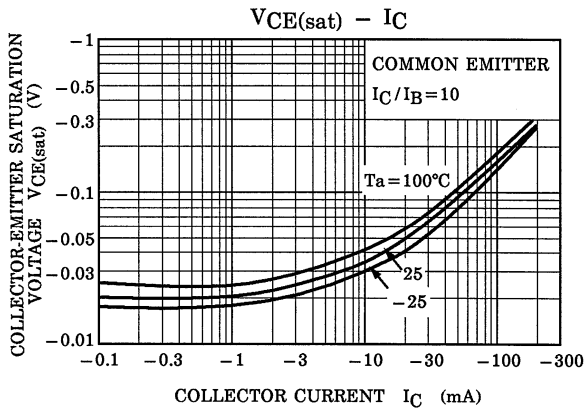
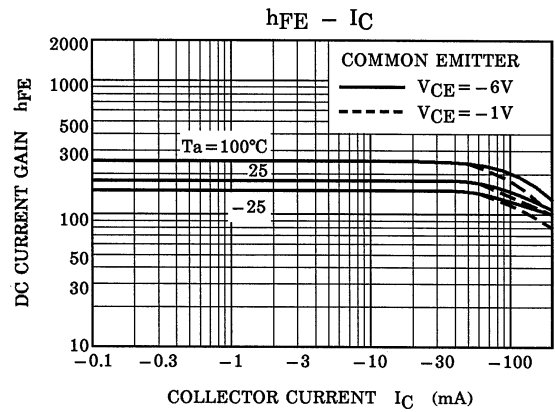
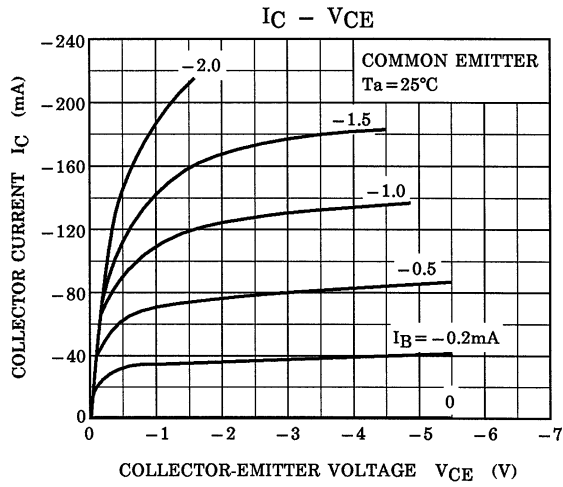
Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	—	$V_{CB} = -50V, I_E = 0$	—	—	-0.1	μA
Emitter cut-off current	I_{EBO}	—	$V_{EB} = -5V, I_C = 0$	—	—	-0.1	μA
DC current gain	h_{FE} (Note)	—	$V_{CE} = -6V, I_C = -2mA$	120	—	400	
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	$I_C = -100mA, I_B = -10mA$	—	-0.1	-0.3	V
Transition frequency	f_T	—	$V_{CE} = -10V, I_C = -1mA$	80	—	—	MHz
Collector output capacitance	C_{ob}	—	$V_{CB} = -10V, I_E = 0, f = 1MHz$	—	4	—	pF

Note: h_{FE} Classification Y (Y): 120 to 240, GR (G): 200 to 400
 () Marking Symbol

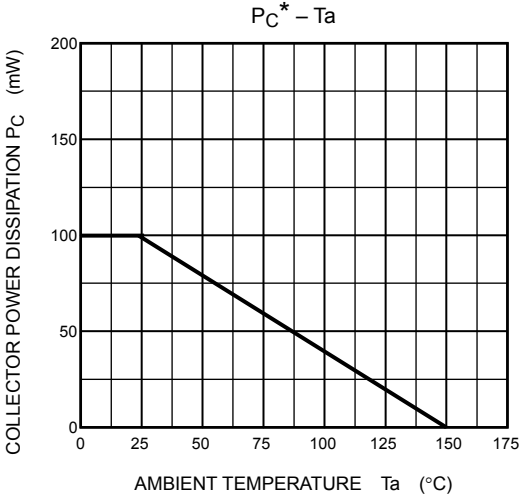
Q1 (NPN transistor)



Q2 (PNP transistor)



(Q1, Q2 Common)





*:Total Rating

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