

# HN1B04FU

## Audio Frequency General Purpose Amplifier Applications

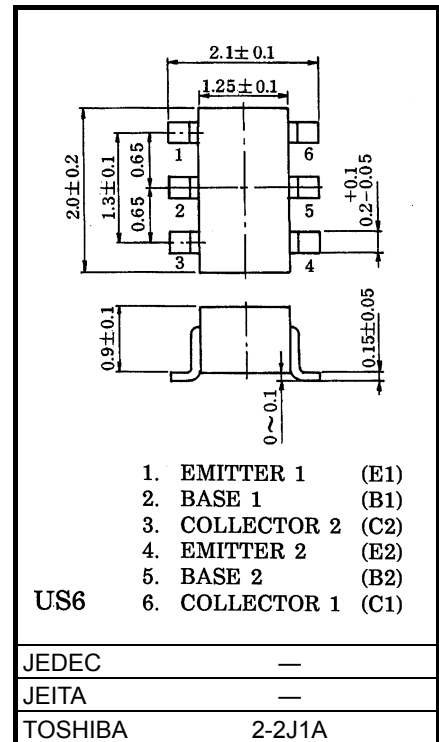
Unit: mm

**Q1:**

- High voltage and high current  
:  $V_{CE0} = 50V, I_C = 150mA$  (max)
- High  $h_{FE}$ :  $h_{FE} = 120\sim 400$
- Excellent  $h_{FE}$  linearity  
:  $h_{FE}(I_C = 0.1mA) / h_{FE}(I_C = 2mA) = 0.95$  (typ.)

**Q2:**

- High voltage and high current  
:  $V_{CE0} = -50V, I_C = -150mA$  (max)
- High  $h_{FE}$ :  $h_{FE} = 120\sim 400$
- Excellent  $h_{FE}$  linearity  
:  $h_{FE}(I_C = -0.1mA) / h_{FE}(I_C = -2mA) = 0.95$  (typ.)

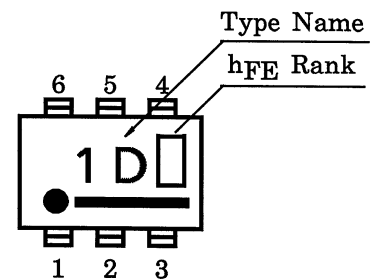


Weight: 6.8mg (typ.)

### 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

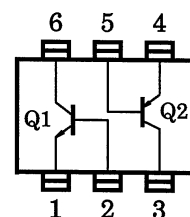
### Marking



## Q2 Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector-base voltage	V <sub>CB0</sub>	-50	V
Collector-emitter voltage	V <sub>CEO</sub>	-50	V
Emitter-base voltage	V <sub>EBO</sub>	-5	V
Collector current	I <sub>C</sub>	-150	mA
Base current	I <sub>B</sub>	-30	mA

## Equivalent Circuit (Top View)



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

Characteristic	Symbol	Rating	Unit
Collector power dissipation	P <sub>C</sub> *	200	mW
Junction temperature	T <sub>j</sub>	125	°C
Storage temperature range	T <sub>stg</sub>	-55~125	°C

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

## Q1 Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I <sub>CBO</sub>	—	V <sub>CB</sub> = 60V, I <sub>E</sub> = 0	—	—	0.1	μA
Emitter cut-off current	I <sub>EBO</sub>	—	V <sub>EB</sub> = 5V, I <sub>C</sub> = 0	—	—	0.1	μA
DC current gain	h <sub>FE</sub> (Note)	—	V <sub>CE</sub> = 6V, I <sub>C</sub> = 2mA	120	—	400	
Collector-emitter saturation voltage	V <sub>CE (sat)</sub>	—	I <sub>C</sub> = 100mA, I <sub>B</sub> = 10mA	—	0.1	0.25	V
Transition frequency	f <sub>T</sub>	—	V <sub>CE</sub> = 10V, I <sub>C</sub> = 1mA	—	150	—	MHz
Collector output capacitance	C <sub>ob</sub>	—	V <sub>CB</sub> = 10V, I <sub>E</sub> = 0, f = 1MHz	—	2	—	pF

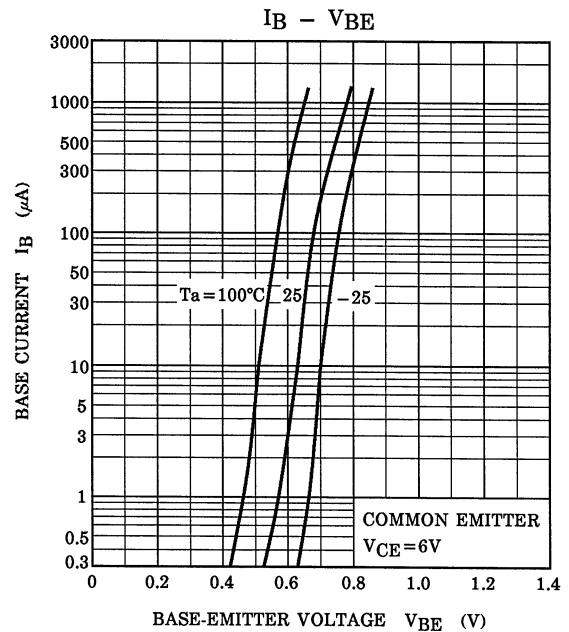
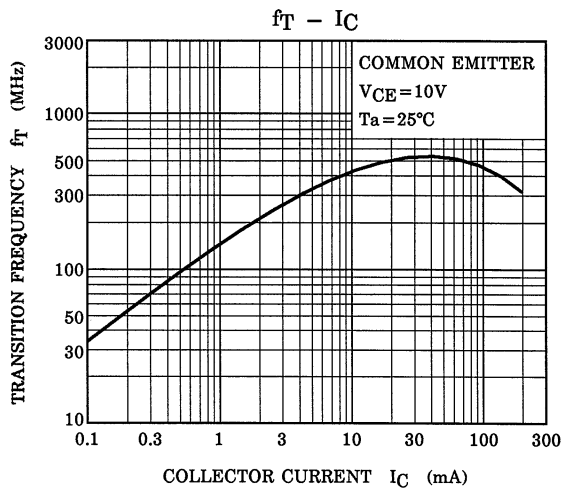
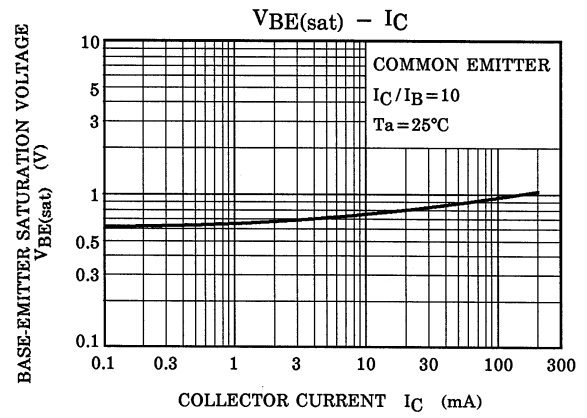
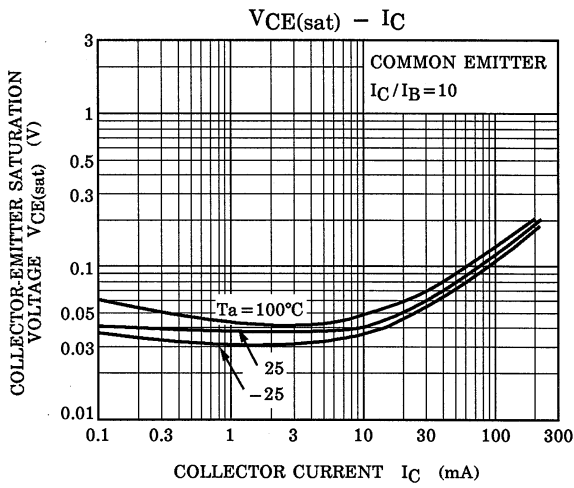
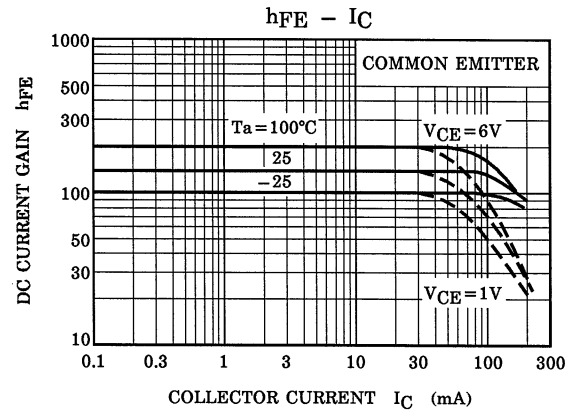
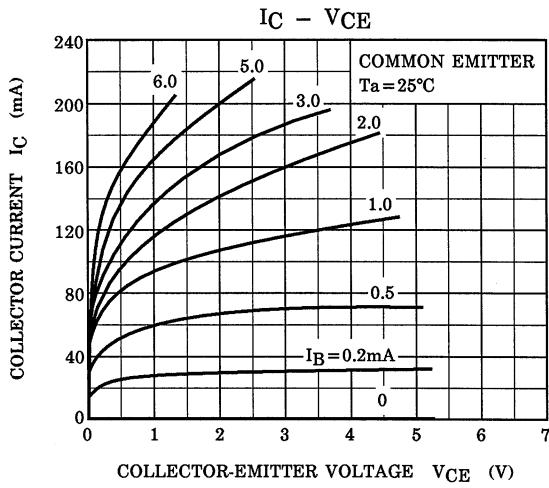
## Q2 Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I <sub>CBO</sub>	—	V <sub>CB</sub> = -50V, I <sub>E</sub> = 0	—	—	-0.1	μA
Emitter cut-off current	I <sub>EBO</sub>	—	V <sub>EB</sub> = -5V, I <sub>C</sub> = 0	—	—	-0.1	μA
DC current gain	h <sub>FE</sub> (Note)	—	V <sub>CE</sub> = -6V, I <sub>C</sub> = -2mA	120	—	400	
Collector-emitter saturation voltage	V <sub>CE (sat)</sub>	—	I <sub>C</sub> = -100mA, I <sub>B</sub> = -10mA	—	-0.1	-0.3	V
Transition frequency	f <sub>T</sub>	—	V <sub>CE</sub> = -10V, I <sub>C</sub> = -1mA	—	120	—	MHz
Collector output capacitance	C <sub>ob</sub>	—	V <sub>CB</sub> = -10V, I <sub>E</sub> = 0, f = 1MHz	—	4	—	pF

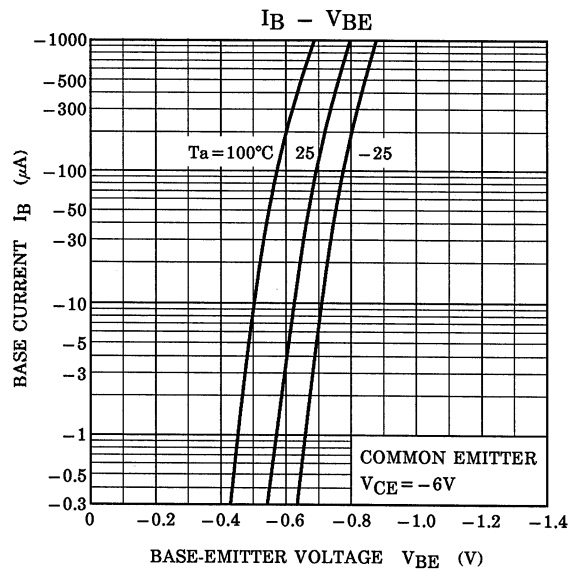
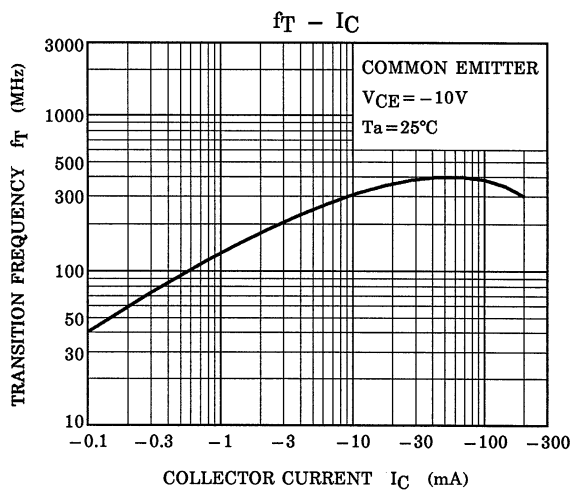
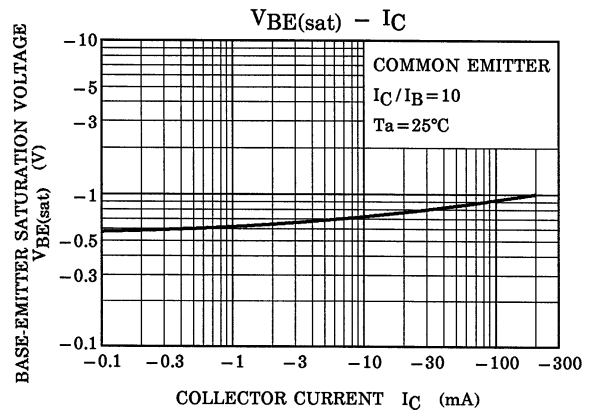
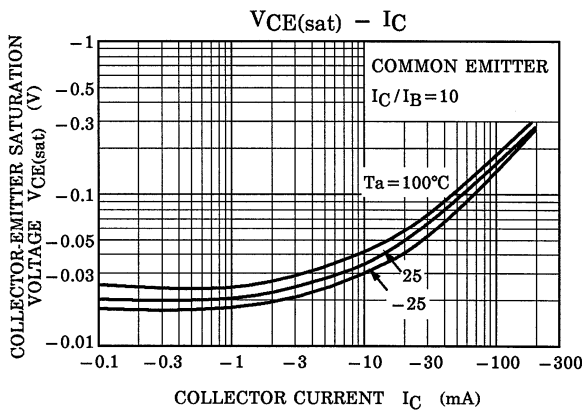
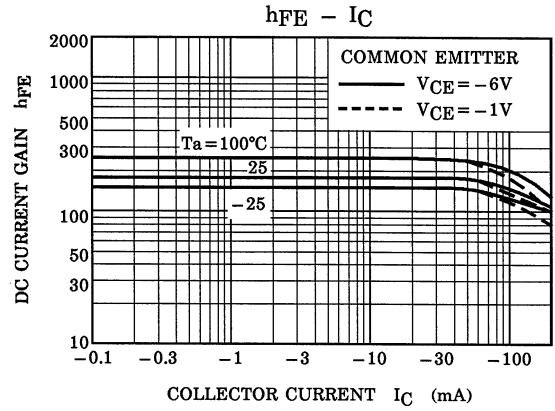
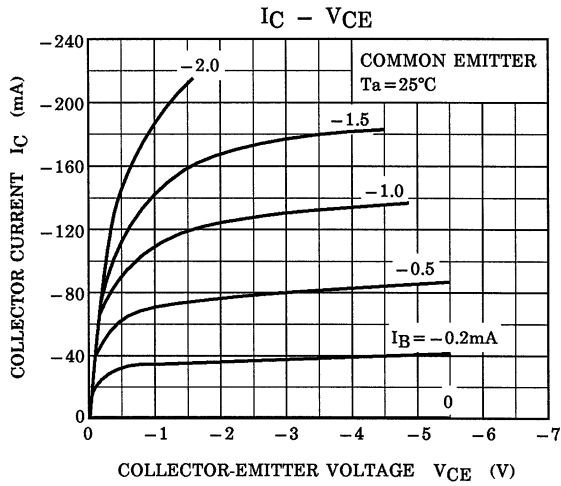
Note: h<sub>FE</sub> Classification Y (Y): 120~240, GR (G): 200~400

( ) Marking Symbol

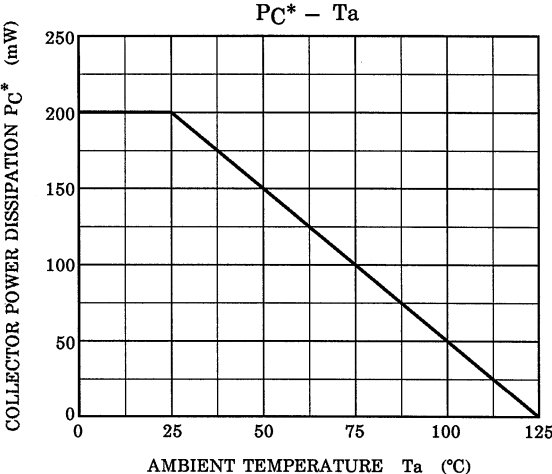
## Q1 (NPN transistor)



**Q2 (PNP transistor)**



(Q1, Q2 Common)



\*: Total Rating

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