

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

## HN1B01F

Audio Frequency General Purpose Amplifier Applications

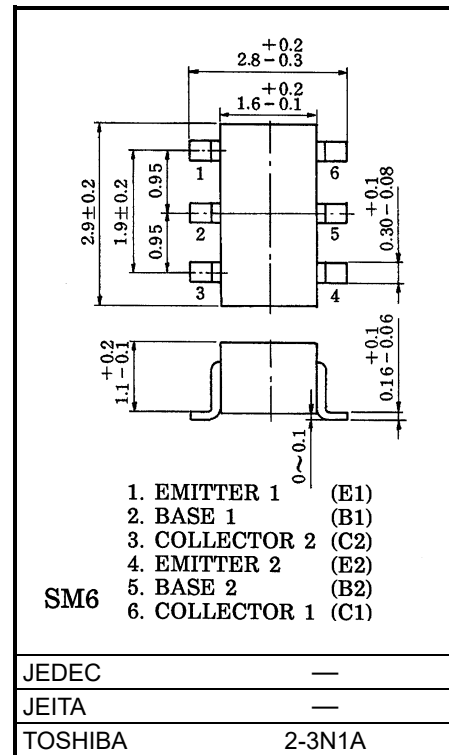
Unit: mm

### Q1:

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

### Q2:

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



Weight: 0.015 g (typ.)

### Q1 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	$I_B$	-50	mA

### Q2 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

Start of commercial production  
1989-02

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

Characteristic	Symbol	Rating	Unit
Collector power dissipation	PC*	300	mW
Junction temperature	T <sub>j</sub> (Note 1)	150	°C
	T <sub>j</sub> (Note 2)	125	
Storage temperature range	T <sub>stg</sub> (Note 1)	-55 to 150	°C
	T <sub>stg</sub> (Note 2)	-55 to 125	

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.

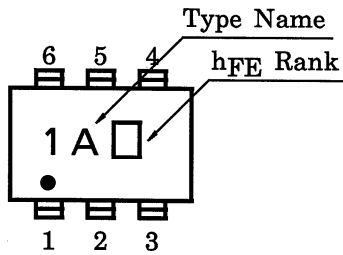
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

\*: Total rating

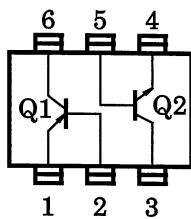
Note 1: For devices with the ordering part number ending in LF(T).

Note 2: For devices with the ordering part number in other than LF(T).

## Marking



## Equivalent Circuit (Top View)



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

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

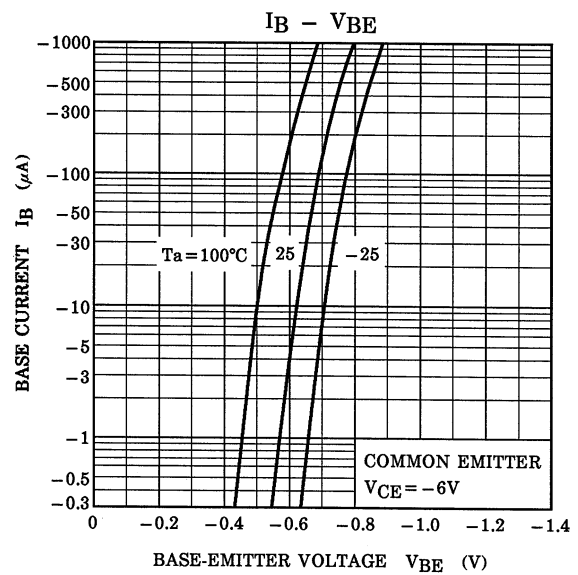
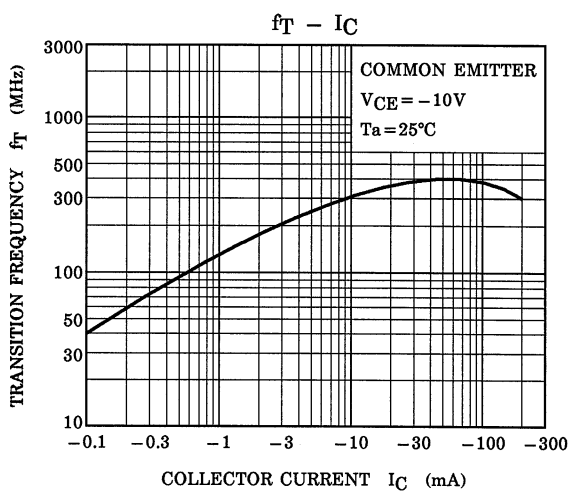
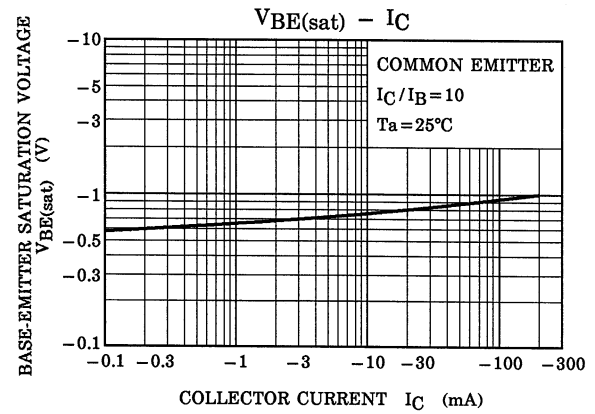
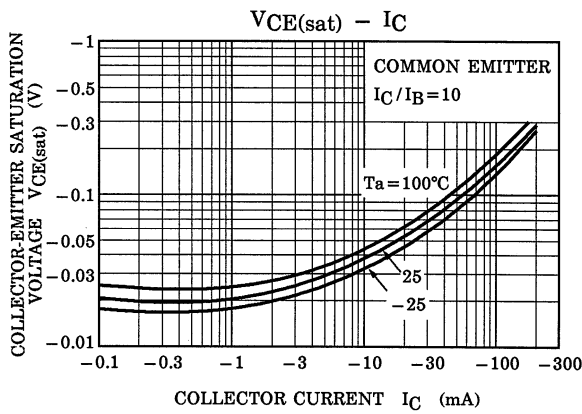
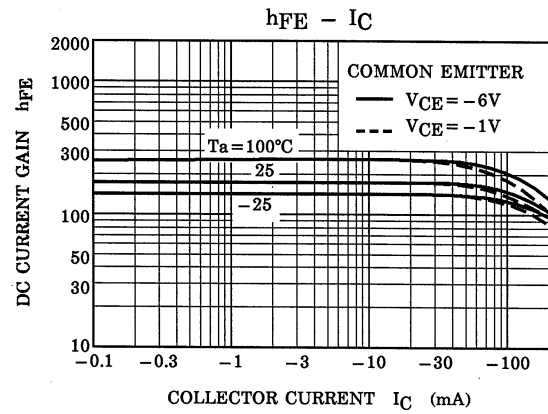
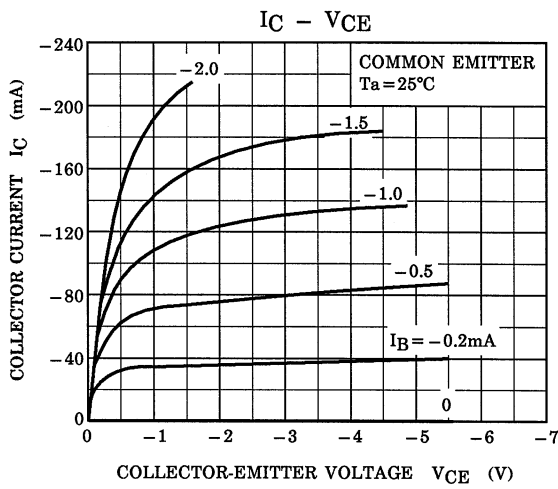
### Q2 Electrical Characteristics (Ta = 25°C)

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

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

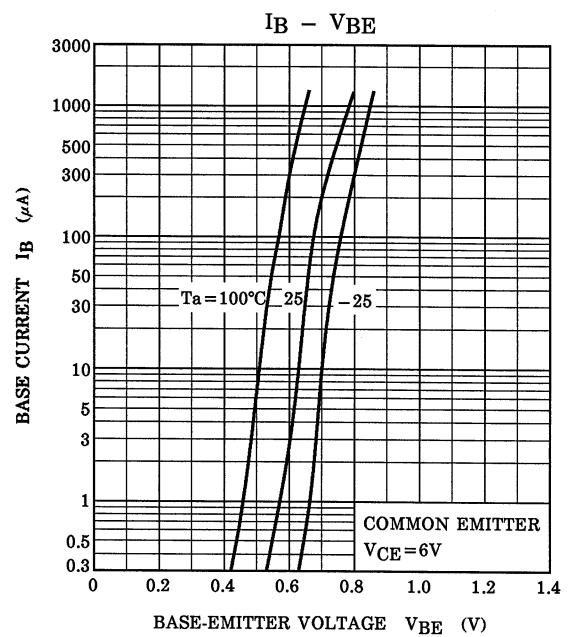
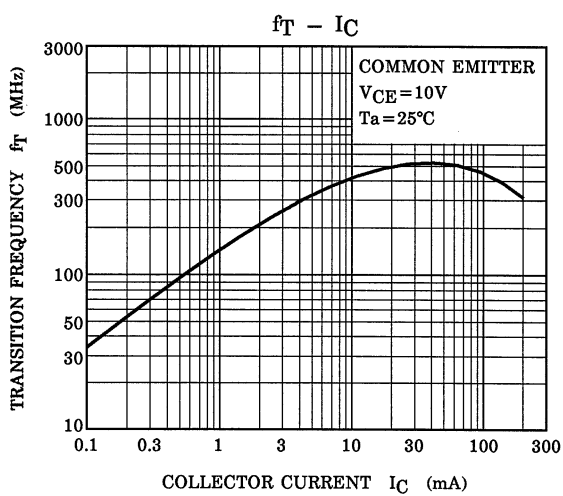
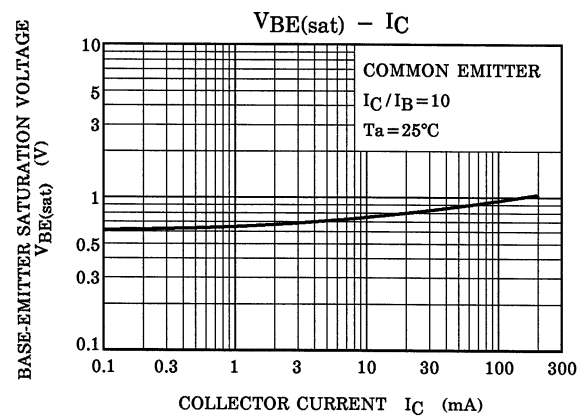
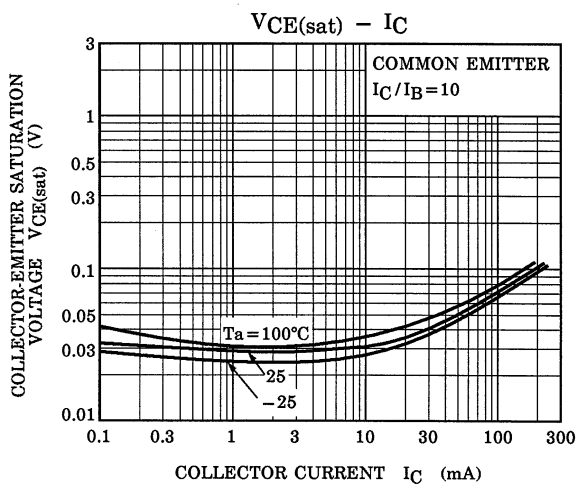
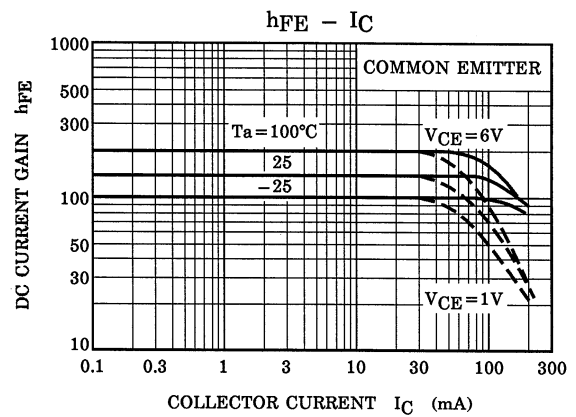
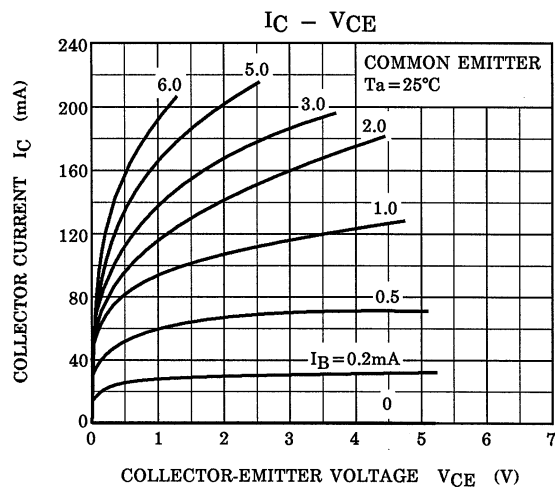
( ) Marking symbol

### Characteristics Curves Q1 (PNP Transistor)



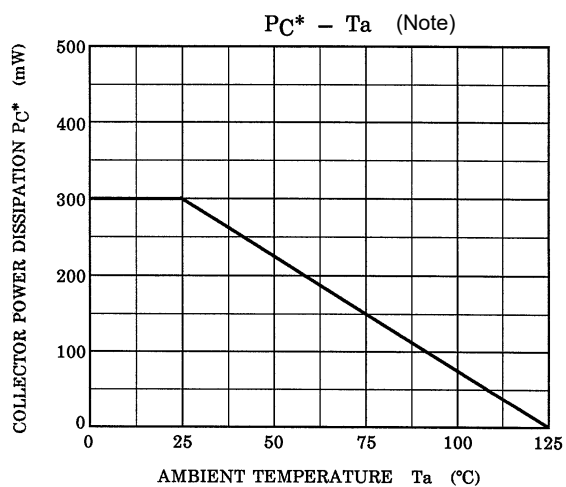
The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

### Characteristics Curves Q2 (NPN Transistor)



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

### Characteristics Curves (Q1, Q2 Common)



\* : Total Rating

Note: Reference only with  $T_j$  of 125 °C.

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