

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

## HN1B01F

Audio-Frequency General-Purpose Amplifier Applications

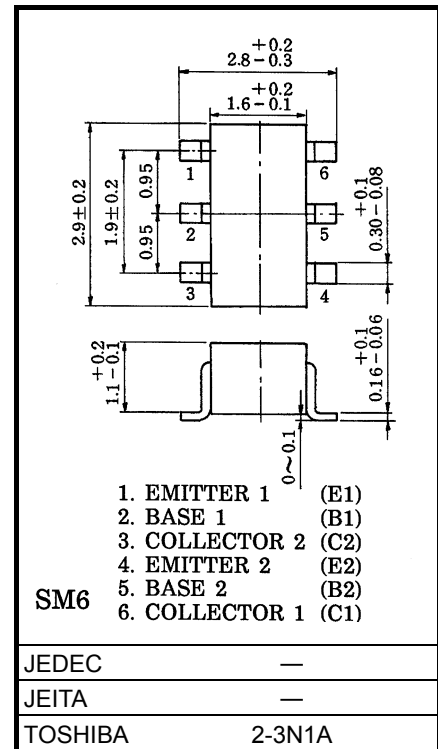
Unit: mm

### 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.)

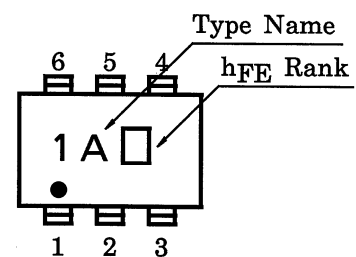


Weight: 0.015 g (typ.)

### Q1 Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

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

### Marking

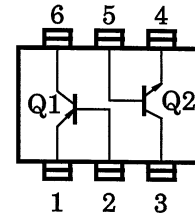


Start of commercial production  
1989-02

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

Characteristic	Symbol	Rating	Unit
Collector-base voltage	$V_{CB0}$	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

## Equivalent Circuit (Top View)



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

Characteristic	Symbol	Rating	Unit
Collector power dissipation	$P_C^*$	300	mW
Junction temperature	$T_j$	125	°C
Storage temperature range	$T_{stg}$	-55 to 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	$I_{CBO}$	—	$V_{CB} = -50\text{ V}, I_E = 0$	—	—	-0.1	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	—	$V_{EB} = -5\text{ V}, I_C = 0$	—	—	-0.1	$\mu\text{A}$
DC current gain	$h_{FE}$ (Note)	—	$V_{CE} = -6\text{ V}, I_C = -2\text{ mA}$	120	—	400	
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	$I_C = -100\text{ mA}, I_B = -10\text{ mA}$	—	-0.1	-0.3	V
Transition frequency	$f_T$	—	$V_{CE} = -10\text{ V}, I_C = -1\text{ mA}$	—	120	—	MHz
Collector output capacitance	$C_{ob}$	—	$V_{CB} = -10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	4	—	pF

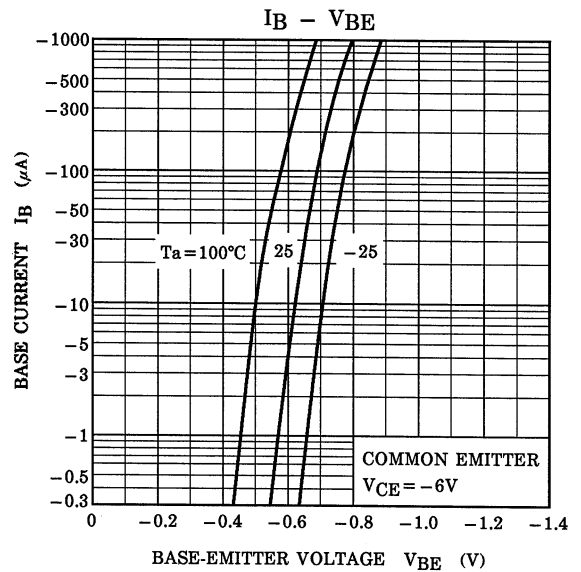
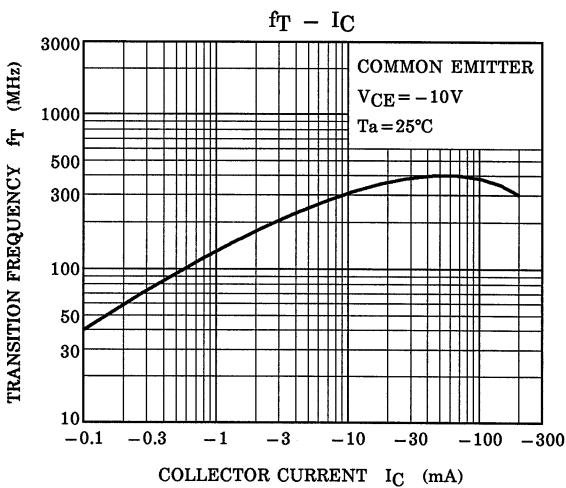
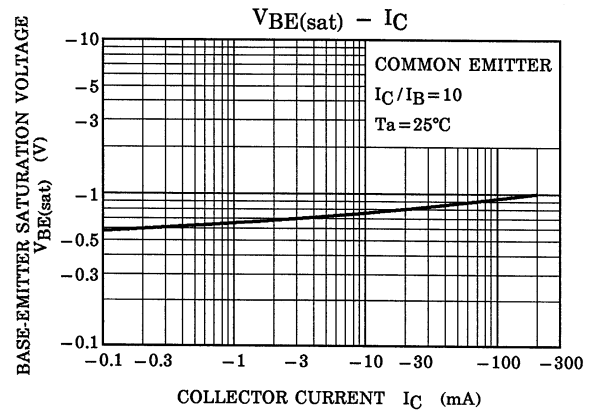
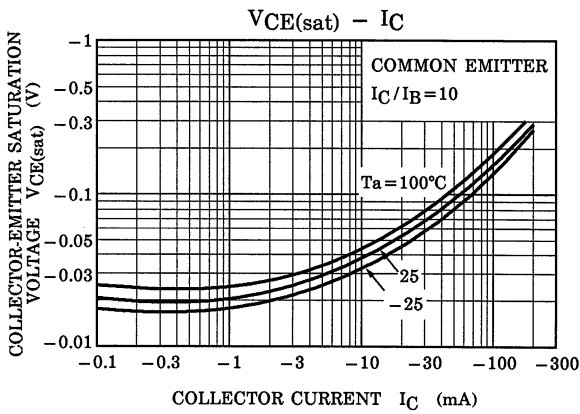
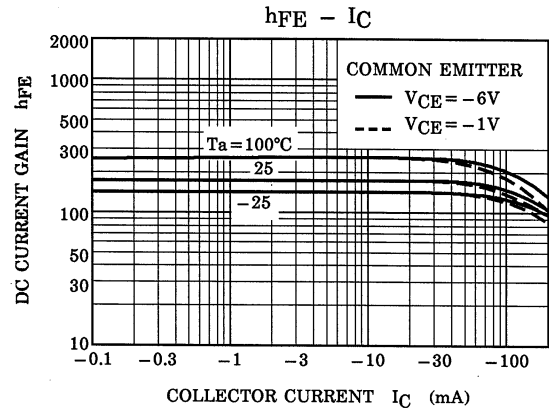
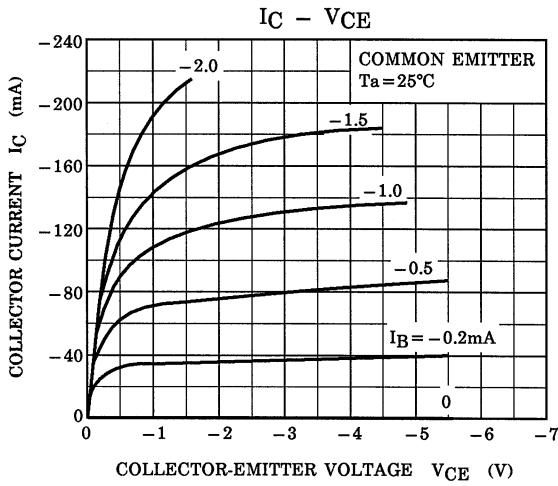
## Q2 Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	—	$V_{CB} = 60\text{ V}, I_E = 0$	—	—	0.1	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	—	$V_{EB} = 5\text{ V}, I_C = 0$	—	—	0.1	$\mu\text{A}$
DC current gain	$h_{FE}$ (Note)	—	$V_{CE} = 6\text{ V}, I_C = 2\text{ mA}$	120	—	400	
Collector-emitter saturation voltage	$V_{CE(sat)}$	—	$I_C = 100\text{ mA}, I_B = 10\text{ mA}$	—	0.1	0.25	V
Transition frequency	$f_T$	—	$V_{CE} = 10\text{ V}, I_C = 1\text{ mA}$	—	150	—	MHz
Collector output capacitance	$C_{ob}$	—	$V_{CB} = 10\text{ V}, I_E = 0, f = 1\text{ MHz}$	—	2	—	pF

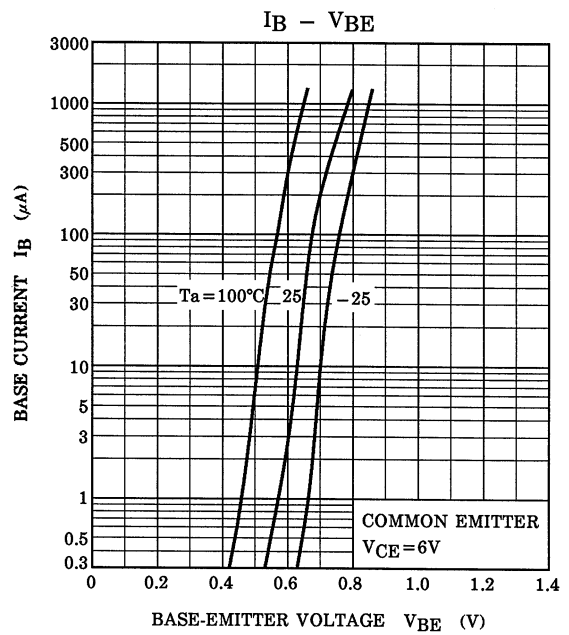
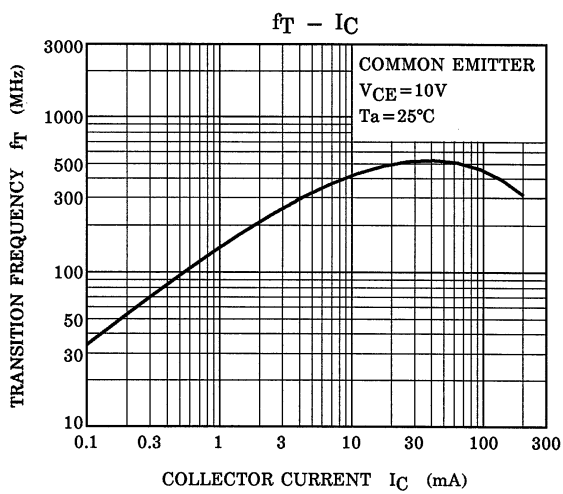
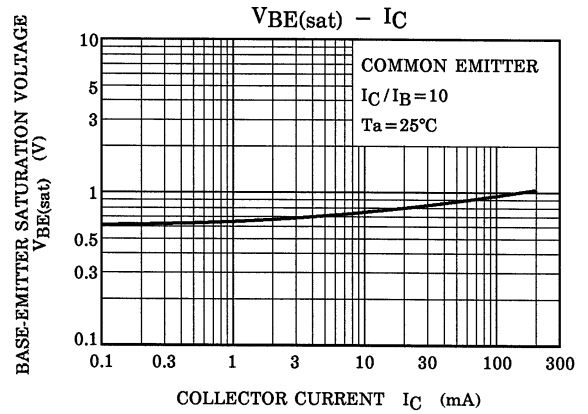
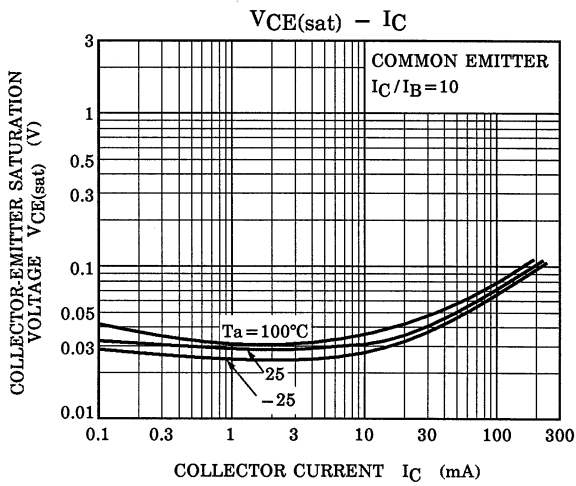
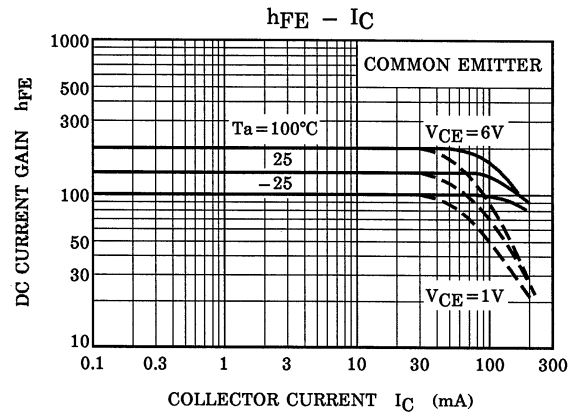
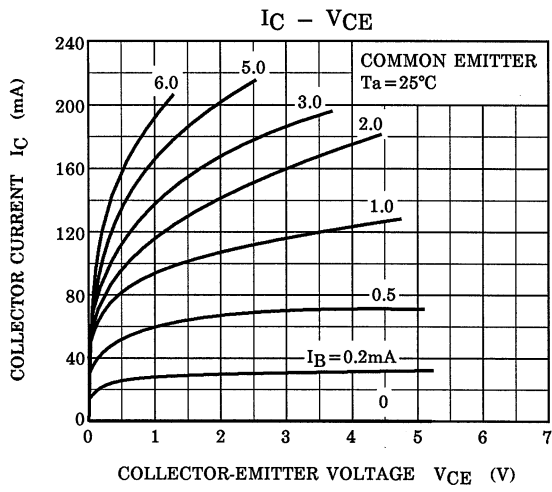
Note:  $h_{FE}$  Classification Y (Y): 120 to 240, GR (G): 200 to 400

( ) Marking symbol

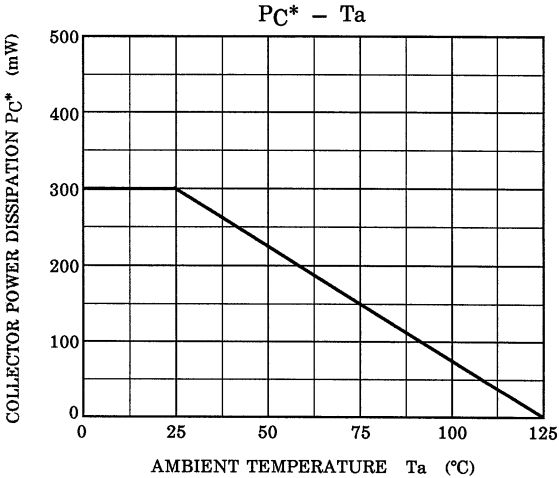
## Q1 (PNP Transistor)



## Q2 (NPN Transistor)



(Q1, Q2 Common)



\* : Total Rating

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