

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

HN1B01F

Audio Frequency General Purpose Amplifier Applications

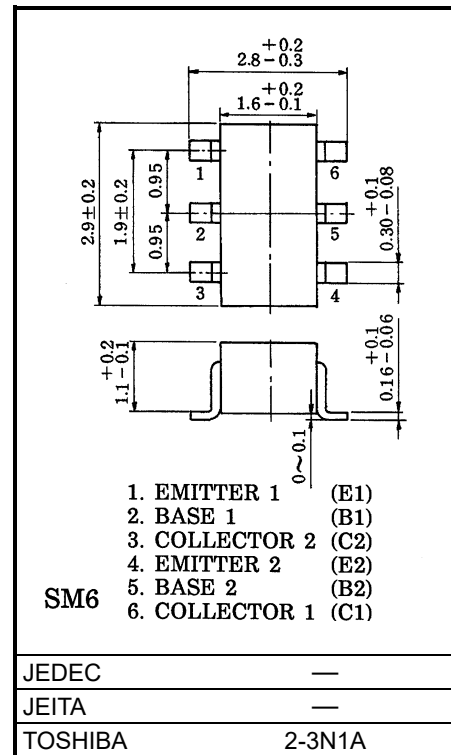
Unit: mm

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 _j (Note 1)	150	°C
	T _j (Note 2)	125	
Storage temperature range	T _{stg} (Note 1)	-55 to 150	°C
	T _{stg} (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.

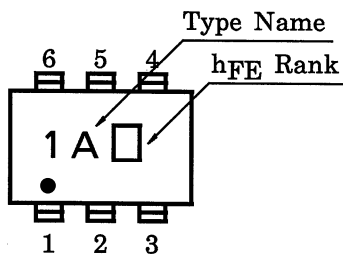
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

*: Total rating

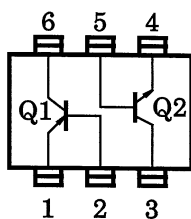
Note 1: For devices with the ordering part number ending in LF(T).

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 _{CB} = -50 V, I _E = 0 A	—	—	-0.1	μA
Emitter cut-off current	IEBO	V _{EB} = -5 V, I _C = 0 A	—	—	-0.1	μA
DC current gain	h _{FE} (Note)	V _{CE} = -6 V, I _C = -2 mA	120	—	400	—
Collector-emitter saturation voltage	V _{CE (sat)}	I _C = -100 mA, I _B = -10 mA	—	-0.1	-0.3	V
Transition frequency	f _T	V _{CE} = -10 V, I _C = -1 mA	—	120	—	MHz
Collector output capacitance	C _{ob}	V _{CB} = -10 V, I _E = 0 A, f = 1 MHz	—	4	—	pF

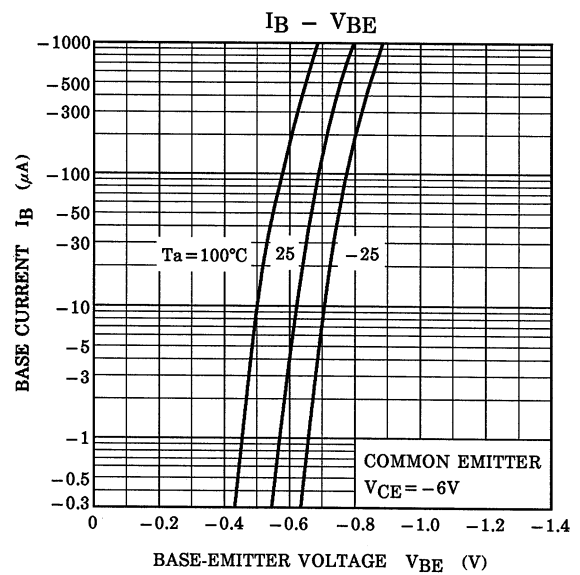
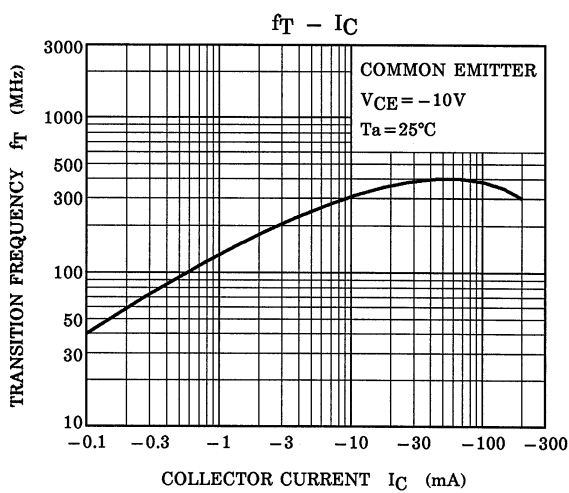
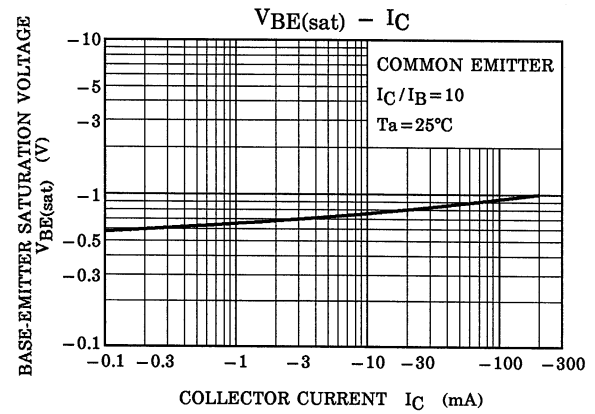
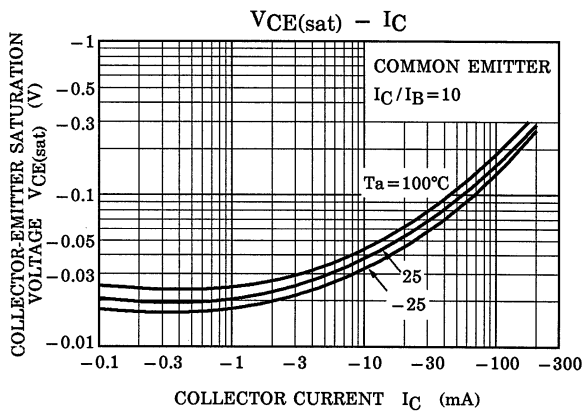
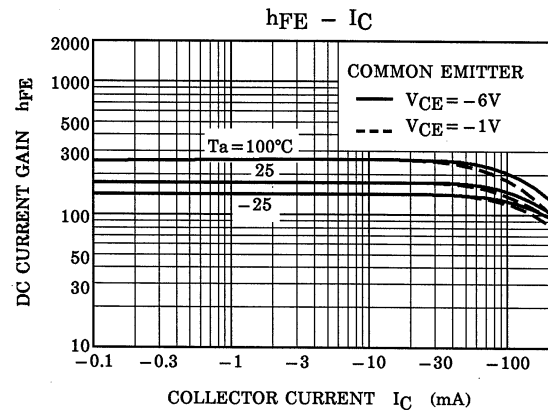
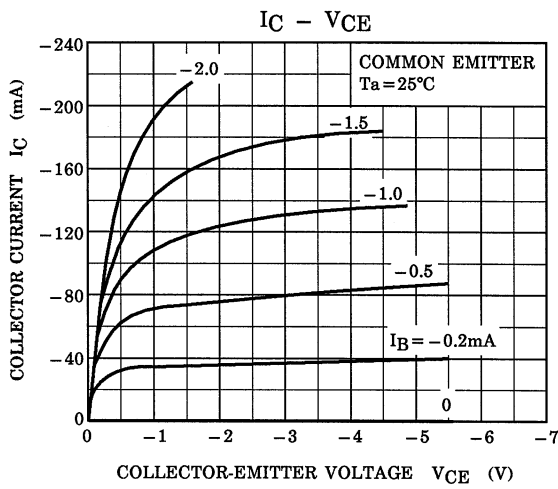
Q2 Electrical Characteristics (Ta = 25°C)

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

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

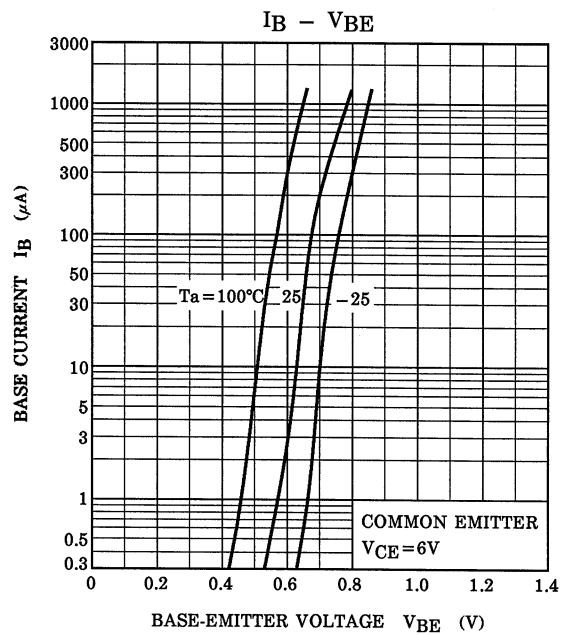
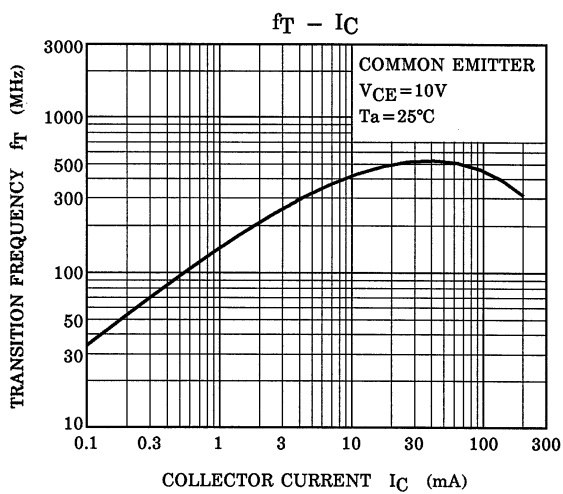
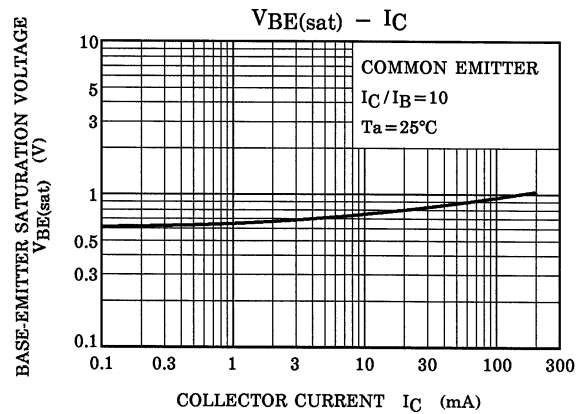
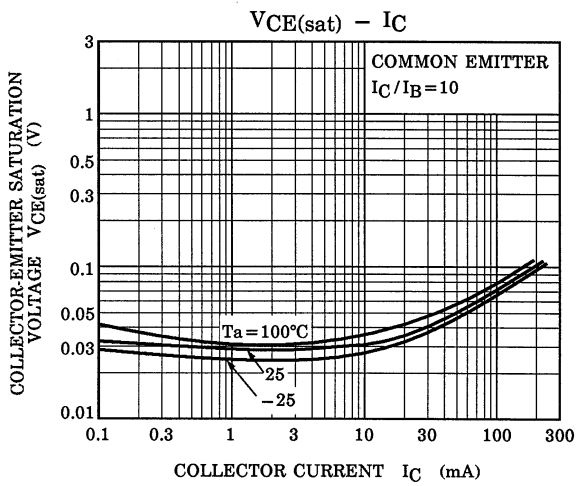
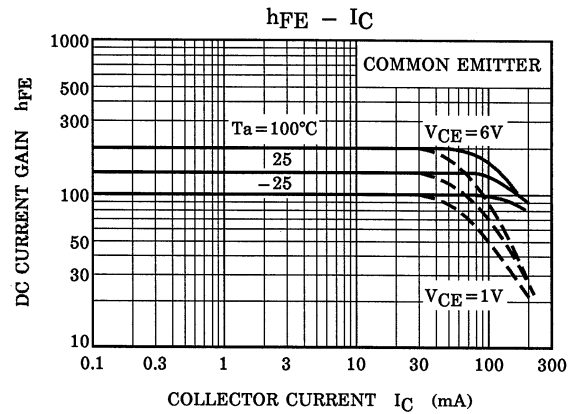
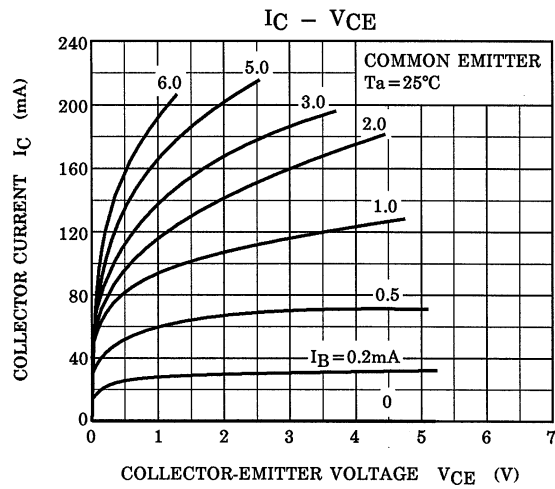
() Marking symbol

Characteristics Curves Q1 (PNP Transistor)



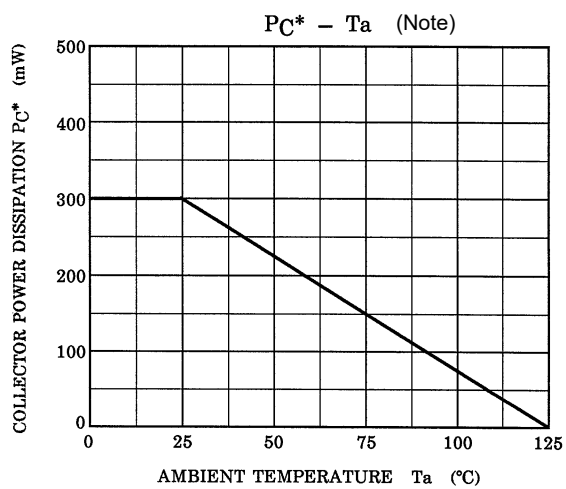
The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

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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