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

HN4B01JE

Audio Frequency General Purpose Amplifier Applications Q1:

• High voltage and high current

: $V_{CEO} = 50V$, $I_{C} = 150mA$ (max)

• High h_{FE} : $h_{FE} = 120~400$

Excellent h_{FF} linearity

: $h_{FE} (I_C = 0.1 \text{mA}) / h_{FE} (I_C = 2 \text{mA}) = 0.95 \text{ (typ.)}$

Q2:

High voltage and high current

: $V_{CEO} = -50V$, $I_{C} = -150mA$ (max)

• High h_{FE} : $h_{FE} = 120~400$

Excellent h_{FE} linearity

: $h_{FE} (I_C = -0.1 \text{mA}) / h_{FE} (I_C = -2 \text{mA}) = 0.95 \text{ (typ.)}$

Q1 Absolute Maximum Ratings (Ta = 25°C)

Q2 Absolute Maximum Ratings (Ta = 25°C)

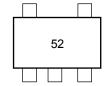
Characteristic	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	60	V
Collector-emitter voltage	V _{CEO}	50	V
Emitter-base voltage	V _{EBO}	5	V
Collector current	IC	150	mA
Base current	ΙΒ	30	mA

Unit: mm 1.6±0.05 1.2±0.05 1.6±0.05 0.2 ± 0.05 0.5 0.12 ± 0.05 2.EMITTER 3 BASE2 4.COLLECTOR2 5.COLLECTOR1 ESV **JEDEC JEITA TOSHIBA** 2-2L1C

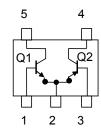
Weight: 3.0mg (typ.)

Marking

Characteristic Symbol Rating Unit Collector-base voltage **V**CBO -50V -50 V Collector-emitter voltage V_{CEO} Emitter-base voltage -5 ٧ V_{EBO} Collector current lc -150mA -30 Base current I_{B} mΑ



Equivalent Circuit (Top View)



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

Characteristic	Symbol	Rating	Unit
Collector power dissipation	P _C *	100	mW
Junction temperature	Tj	150	°C
Storage temperature range	T _{stg}	-55 to 150	°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

Start of commercial production 2000-09

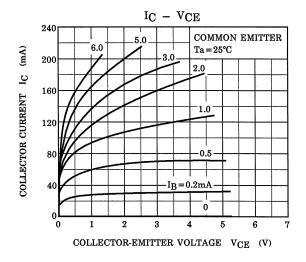
Q1 Electrical Characteristics (Ta = 25°C)

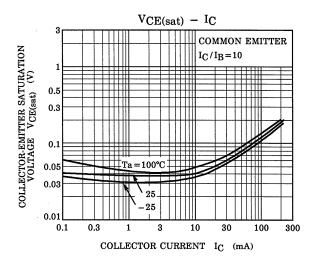
Characteristic	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
Collector cut-off current	I _{CBO}	_	V _{CB} = 60V, I _E = 0	_	_	100	nA
Emitter cut-off current	I _{EBO}	_	V _{EB} = 5V, I _C = 0	_	_	100	nA
DC current gain	h _{FE}	_	V _{CE} = 6V, I _C = 2mA	120	_	400	
Collector-emitter saturation voltage	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

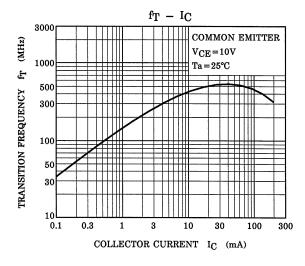
Q2 Electrical Characteristics (Ta = 25°C)

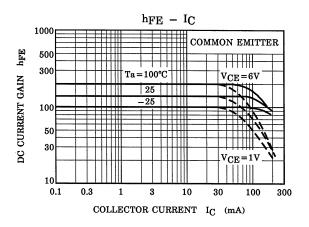
Characteristic	Symbol	Test Circuit	Test Condition	Min	Тур.	Max	Unit
Collector cut-off current	Ісво	_	$V_{CB} = -50V$, $I_E = 0$	_	_	-100	nA
Emitter cut-off current	I _{EBO}	_	$V_{EB} = -5V$, $I_{C} = 0$	_	_	-100	nA
DC current gain	h _{FE}	_	$V_{CE} = -6V, I_{C} = -2mA$	120	_	400	
Collector-emitter saturation 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

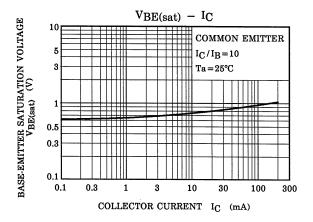
Q1 (NPN transistor)

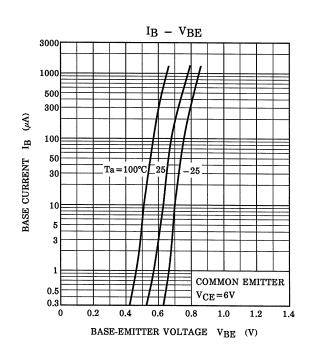






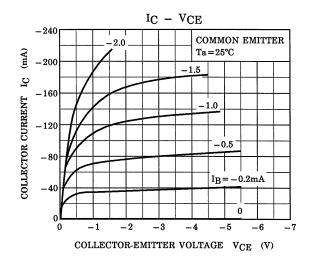


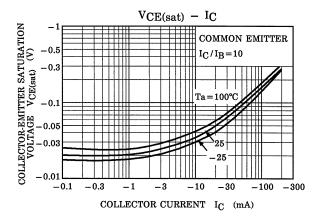


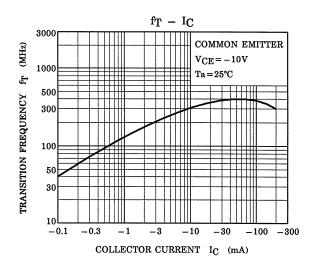


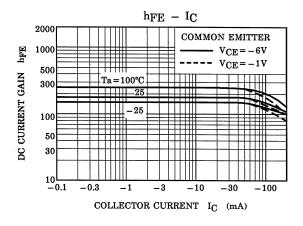
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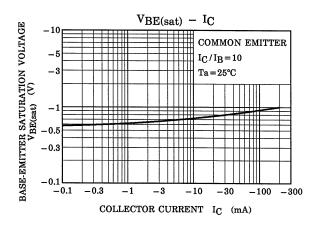
Q2 (PNP transistor)

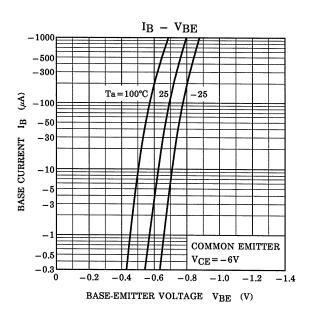




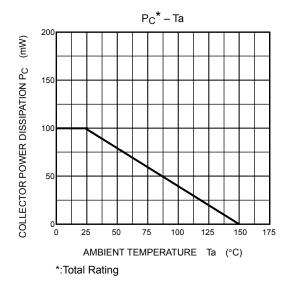








(Q1, Q2 Common)



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