Unit: mm

TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process)

2SA970

Low Noise Audio Amplifier Applications

• Low noise: NF = 3dB (typ.) R_G = 100 Ω , V_{CE} = -6 V, I_C = -100 μA , f = 1 kHz : NF = 0.5dB (typ.) R_G = 1 k Ω , V_{CE} = -6 V, I_C = -100 μA ,

NF = 0.5dB (typ.) $R_G = 1 \text{ k}\Omega$, $V_{CE} = -6 \text{ V}$, $I_C = -100 \text{ }\mu\text{A}$, f = 1 kHz

• High DC current gain: $h_{FE} = 200 \sim 700$

• High breakdown voltage: $V_{CEO} = -120 \text{ V}$

Low pulse noise. Low 1/f noise

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Collector-base voltage	V_{CBO}	-120	V
Collector-emitter voltage	V_{CEO}	-120	V
Emitter-base voltage	V _{EBO}	-5	٧
Collector current	Ic	-100	mA
Base current	ΙΒ	-20	mA
Collector power dissipation	PC	300	mW
Junction temperature	Tj	125	°C
Storage temperature range	T _{stg}	-55∼12 5	°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.

1. EMITTER 2. COLLECTOR 3. BASE

JEDEC TO-92

JEITA SC-43

TOSHIBA 2-5F1B

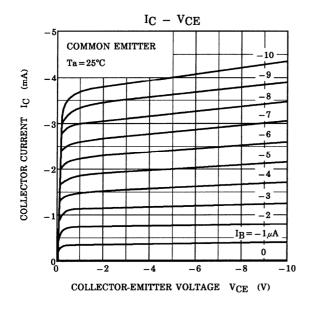
Weight: 0.21 g (typ.)

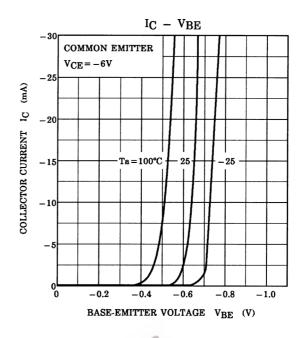
operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

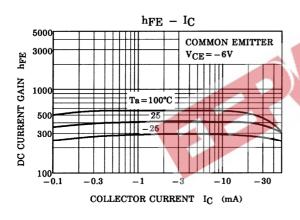
Electrical Characteristics (Ta = 25°C)

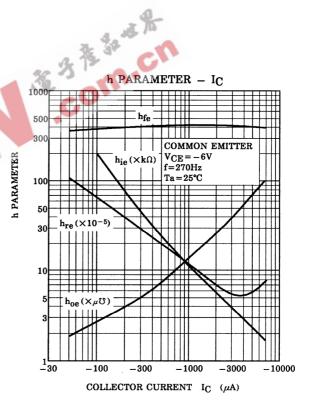
Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit
Collector cut-off current	I _{CBO}	$V_{CB} = -120 \text{ V}, I_E = 0$	_	_	-0.1	μΑ
Emitter cut-off current	I _{EBO}	$V_{EB} = -5 \text{ V}, I_C = 0$	_	_	-0.1	μА
Collector-emitter breakdown voltage	V (BR) CEO	$I_C = -1 \text{ mA}, I_B = 0$	-120	_	_	V
DC current gain	h _{FE} (Note)	$V_{CE} = -6 \text{ V}, I_{C} = -2 \text{ mA}$	200	_	700	
Collector-emitter saturation voltage	V _{CE} (sat)	$I_C = -10 \text{ mA}, I_B = -1 \text{ mA}$	_	_	-0.3	V
Base-emitter voltage	V _{BE}	$V_{CE} = -6 \text{ V}, I_{C} = -2 \text{ mA}$	_	-0.65	_	V
Transition frequency	f _T	$V_{CE} = -6 \text{ V}, I_{C} = -1 \text{ mA}$	_	100	_	MHz
Collector output capacitance	C _{ob}	$V_{CB} = -10 \text{ V}, I_{E} = 0, f = 1 \text{ MHz}$	_	4.0	_	pF
Noise figure NF		$\begin{split} &V_{CE} = -6 \text{ V, I}_{C} = -0.1 \text{ mA, f} = 10 \text{ Hz,} \\ &R_{G} = 10 \text{ k}\Omega \end{split}$	_	_	6	
	$V_{CE} = -6$ V, $I_{C} = -0.1$ mA, $f = 1$ kHz, $R_{G} = 10$ k Ω	_	_	2	dB	
	$\begin{aligned} &V_{CE} = -6 \text{ V, I}_{C} = -0.1 \text{ mA, f} = 1 \text{ kHz,} \\ &R_{G} = 100 \Omega \end{aligned}$	_	3	_		

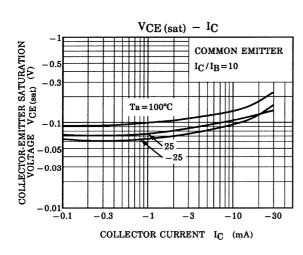
Note: hFE classification GR: 200~400, BL: 350~700



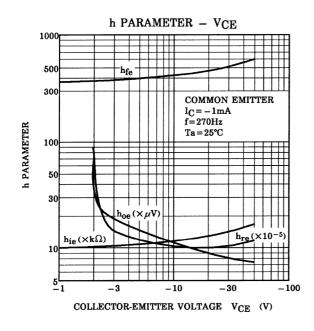


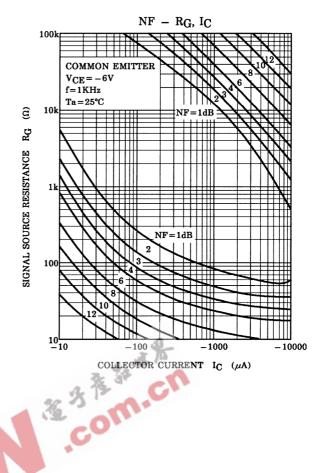


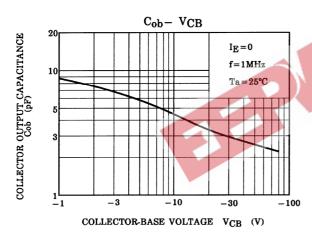


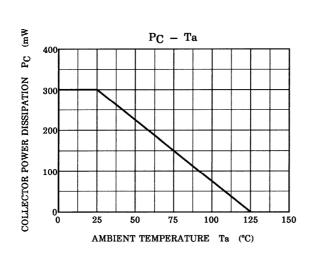


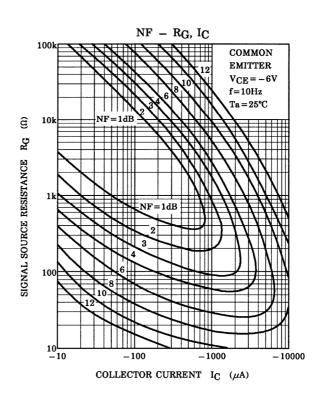
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20070701-EN GENERAL

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