

TOSHIBA Transistor Silicon PNP Epitaxial Type (PCT process)

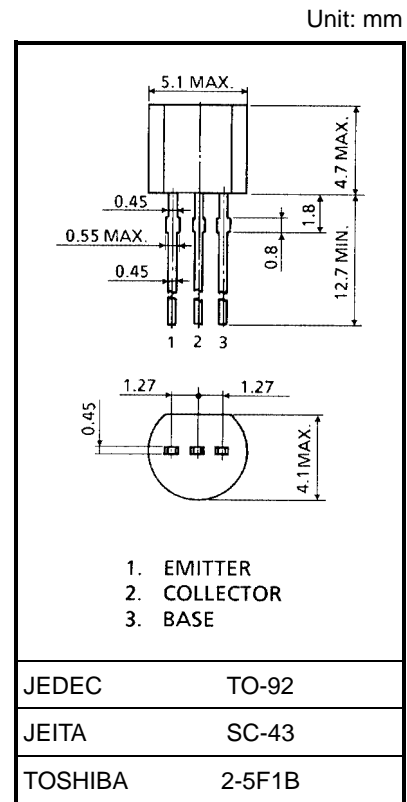
# 2SA970

## Low Noise Audio Amplifier Applications

- Low noise:  $NF = 3dB$  (typ.)  $R_G = 100 \Omega$ ,  $V_{CE} = -6 V$ ,  $I_C = -100 \mu A$ ,  $f = 1 kHz$   
 :  $NF = 0.5dB$  (typ.)  $R_G = 1 k\Omega$ ,  $V_{CE} = -6 V$ ,  $I_C = -100 \mu A$ ,  $f = 1 kHz$
- High DC current gain:  $h_{FE} = 200\sim 700$
- High breakdown voltage:  $V_{CEO} = -120 V$
- Low pulse noise. Low  $1/f$  noise

## Maximum Ratings ( $T_a = 25^\circ C$ )

Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	-120	V
Collector-emitter voltage	$V_{CEO}$	-120	V
Emitter-base voltage	$V_{EBO}$	-5	V
Collector current	$I_C$	-100	mA
Base current	$I_B$	-20	mA
Collector power dissipation	$P_C$	300	mW
Junction temperature	$T_j$	125	$^\circ C$
Storage temperature range	$T_{stg}$	-55~125	$^\circ C$

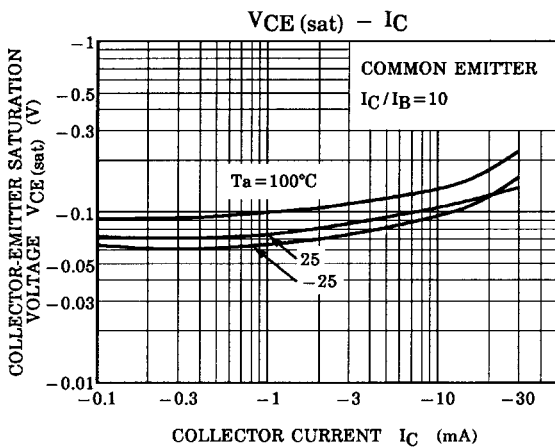
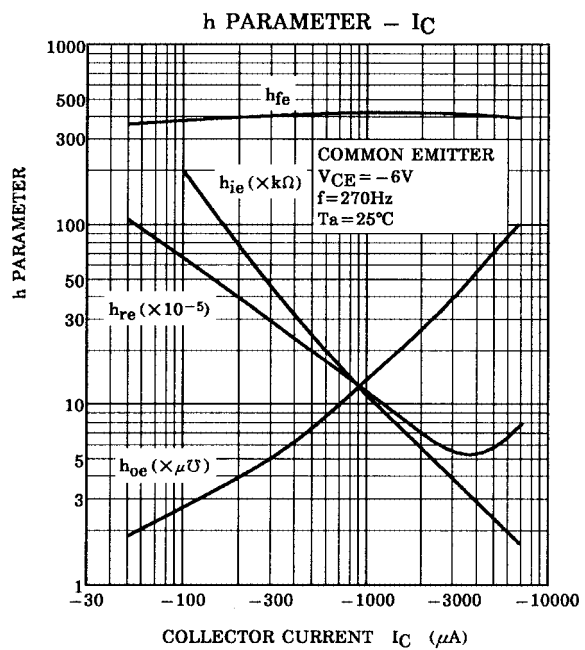
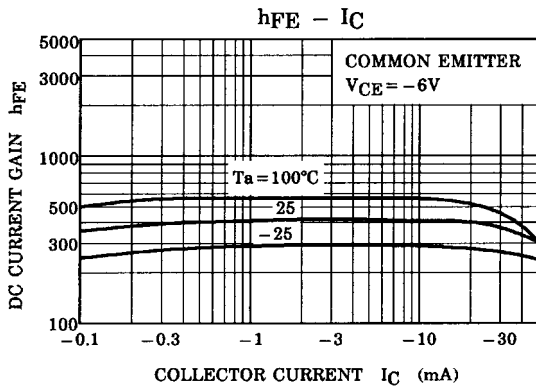
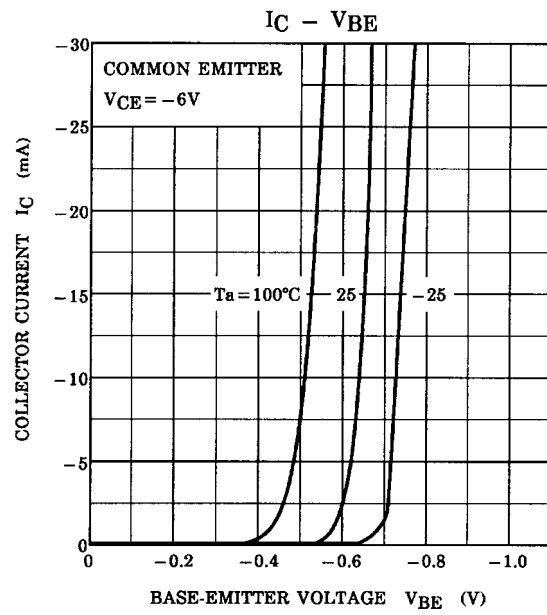
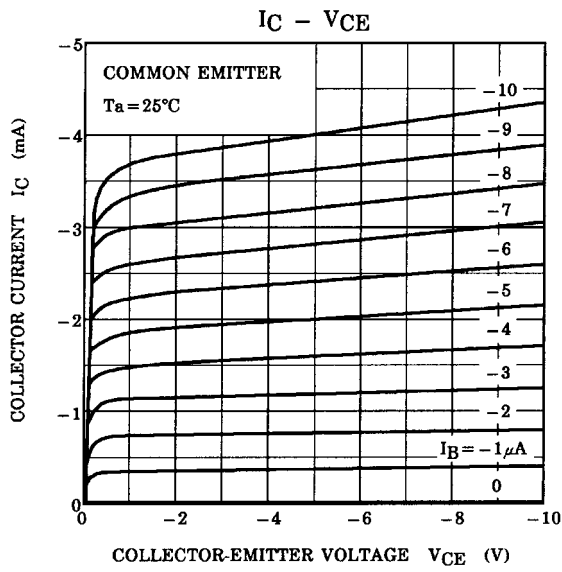


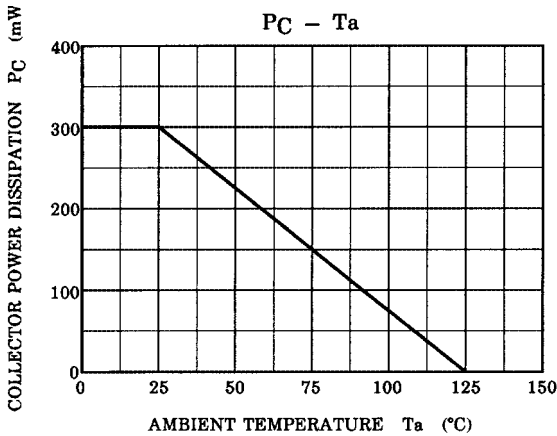
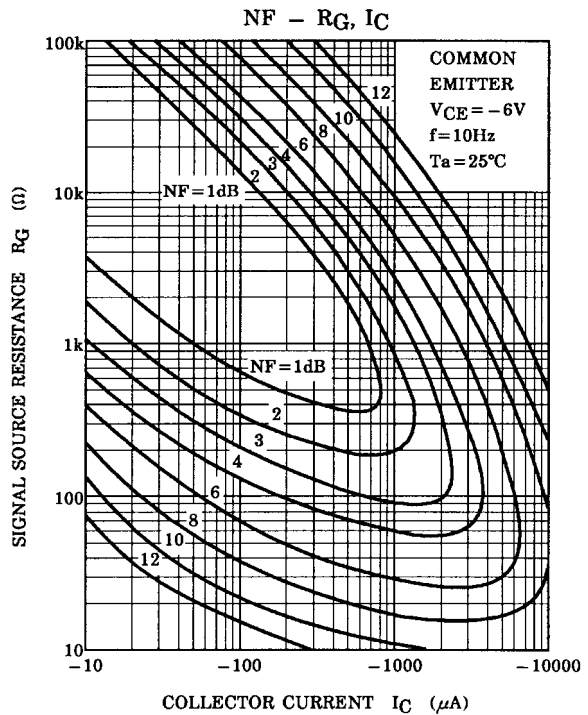
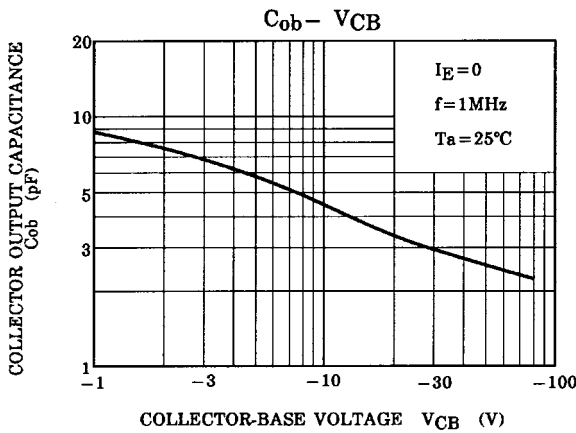
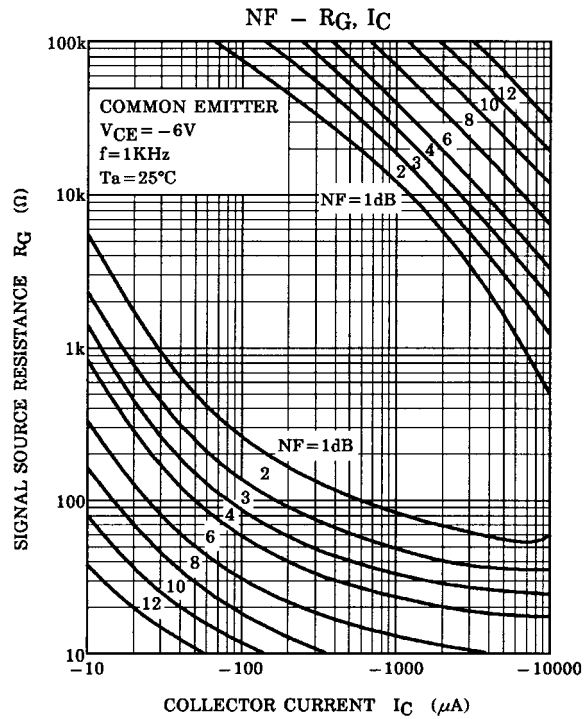
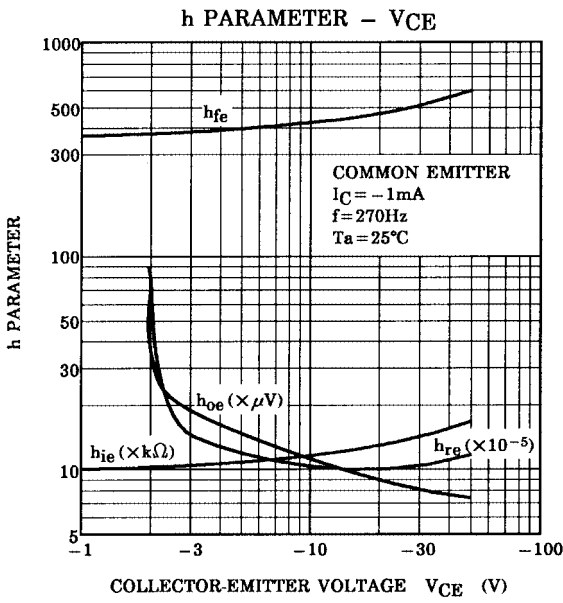
Weight: 0.21 g (typ.)

## Electrical Characteristics ( $T_a = 25^\circ C$ )

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = -120 V, I_E = 0$	—	—	-0.1	$\mu A$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = -5 V, I_C = 0$	—	—	-0.1	$\mu A$
Collector-emitter breakdown voltage	$V_{(BR) CEO}$	$I_C = -1 mA, I_B = 0$	-120	—	—	V
DC current gain	$h_{FE}$ (Note)	$V_{CE} = -6 V, I_C = -2 mA$	200	—	700	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = -10 mA, I_B = -1 mA$	—	—	-0.3	V
Base-emitter voltage	$V_{BE}$	$V_{CE} = -6 V, I_C = -2 mA$	—	0.65	—	V
Transition frequency	$f_T$	$V_{CE} = -6 V, I_C = -1 mA$	—	100	—	MHz
Collector output capacitance	$C_{ob}$	$V_{CB} = -10 V, I_E = 0, f = 1 MHz$	—	4.0	—	pF
Noise figure	NF	$V_{CE} = -6 V, I_C = -0.1 mA, f = 10 Hz, R_G = 10 k\Omega$	—	—	6	dB
		$V_{CE} = -6 V, I_C = -0.1 mA, f = 1 kHz, R_G = 10 k\Omega$	—	—	2	
		$V_{CE} = -6 V, I_C = -0.1 mA, f = 1 kHz, R_G = 100 \Omega$	—	3	—	

Note:  $h_{FE}$  classification GR: 200~400, BL: 350~700





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