TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process)

# 2SC2240

#### Low Noise Audio Amplifier Applications

The 2SC2240 is a transistor for low frequency and low noise applications. This device is designed to lower noise figure in the region of low signal source impedance, and to lower the pulse noise. This is recommended for the first stages of Equalizer amplifiers.

• Low noise: NF = 4dB (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

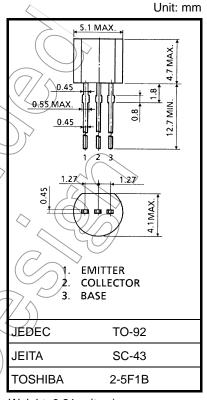
• Low pulse noise: Low 1/f noise

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

• High breakdown voltage: VCEO = 120 V

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

Characteristics	Symbol	Rating	Unit	
Collector-base voltage	V <sub>CBO</sub>	120	/	
Collector-emitter voltage	VCEO	120	/2/	
Emitter-base voltage	V <sub>EB</sub> Q	)) 5	V \	
Collector current	tc	100 〈	\ mA	
Base current	(JB)	20	mA	
Collector power dissipation	Pc	300	m\V	
Junction temperature	$\bigcirc f_j$	125	>•c	
Storage temperature range	T <sub>stg</sub>	-55~125	°C	



Weight: 0.21 g (typ.)

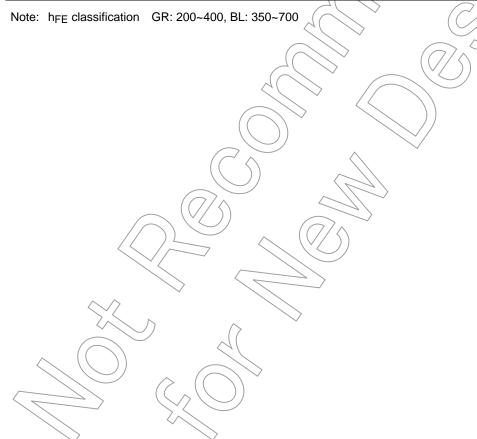
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) 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).

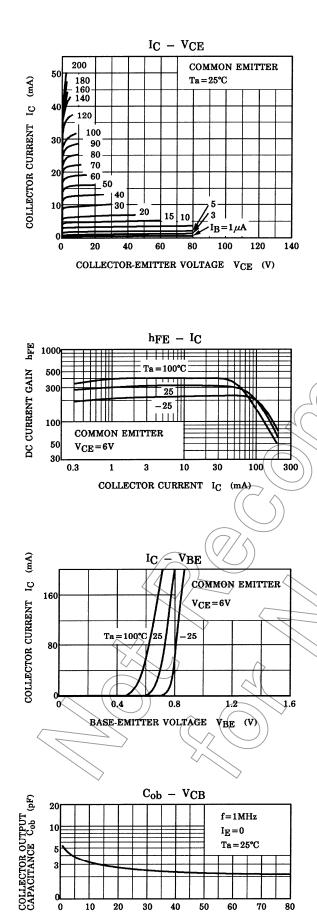
on and estimated failure rate, etc)

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

Characteristics	Symbol	Test Condition	Min	Тур.	Max	Unit		
Collector cut-off current	I <sub>CBO</sub>	V <sub>CB</sub> = 120 V, I <sub>E</sub> = 0	_	_	0.1	μΑ		
Emitter cut-off current	I <sub>EBO</sub>	V <sub>EB</sub> = 5 V, I <sub>C</sub> = 0	_	_	0.1	μА		
Collector-emitter breakdown voltage	V (BR) CEO	I <sub>C</sub> = 1 mA, I <sub>B</sub> = 0	120	_	_	V		
DC current gain	h <sub>FE</sub> (Note)	V <sub>CE</sub> = 6 V, I <sub>C</sub> = 2 mA	200	) -	700			
Collector-emitter saturation voltage	V <sub>CE</sub> (sat)	I <sub>C</sub> = 10 mA, I <sub>B</sub> = 1 mA	>~	_	0.3	V		
Base-emitter voltage	V <sub>BE</sub>	V <sub>CE</sub> = 6 V, I <sub>C</sub> = 2 mA	))	0.65	_	V		
Transition frequency	f <sub>T</sub>	V <sub>CE</sub> = 6 V, I <sub>C</sub> = 1 mA	_	100	_	MHz		
Collector output capacitance	C <sub>ob</sub>	V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0, f = 1 MHz	_	3.0	_	pF		
Noise figure NF		$V_{CE} = 6 \text{ V}, I_{C} = 0.1 \text{ mA}, f = 10 \text{ Hz}, R_{G} = 10 \text{ k}\Omega$	_		6			
	NF	$V_{CE} = 6 \text{ V}, I_{C} = 0.1 \text{ mA}, f = 1 \text{ kHz},$ $R_{G} = 10 \text{ k}\Omega$	-6		> 2	dB		
	$V_{CE} = 6 \text{ V, } I_{C} = 0.1 \text{ mA, } f = 1 \text{ kHz,}$ $R_{G} = 100 \Omega$	1	4)	) _				



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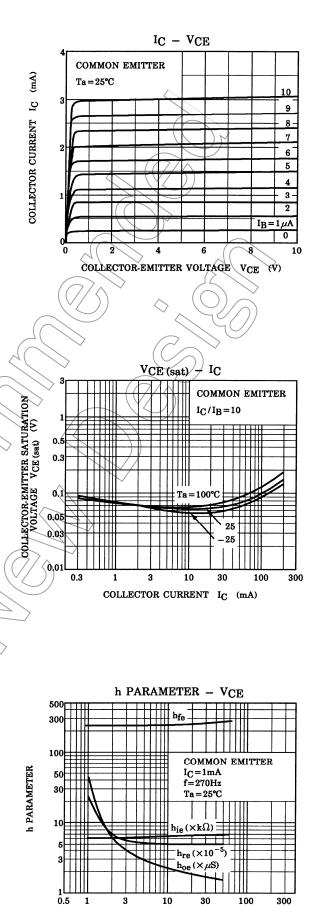
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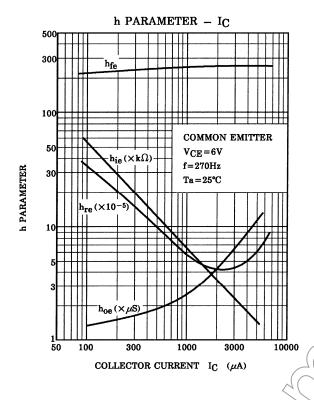
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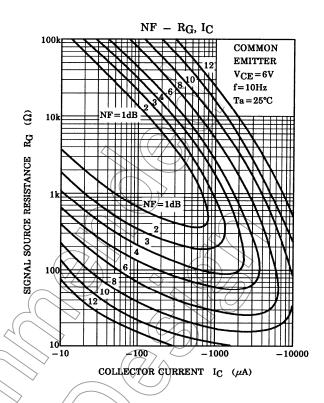
COLLECTOR-BASE VOLTAGE VCB (V)

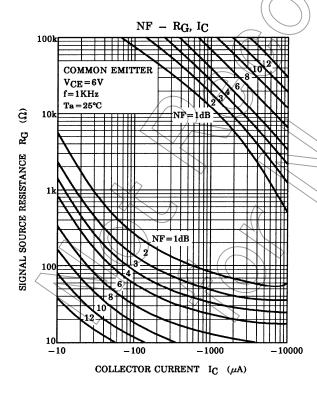
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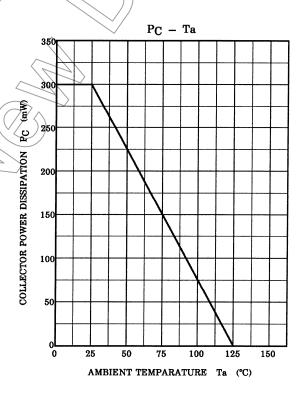


COLLECTOR-EMITTER VOLTAGE VCE (V)









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