

TOSHIBA Transistor Silicon NPN Epitaxial Type (PCT process)

## 2SC2713

## Audio Frequency General Purpose Amplifier Applications

Unit: mm

- AEC-Q101 Qualified (Note1).
- High voltage:  $V_{CEO} = 120\text{ V}$
- Excellent  $h_{FE}$  linearity:  $h_{FE} (I_C = 0.1\text{ mA})/h_{FE} (I_C = 2\text{ mA}) = 0.95$  (typ.)
- High  $h_{FE}$ :  $h_{FE} = 200$  to  $700$
- Low noise:  $NF = 1\text{ dB}$  (typ.),  $10\text{ dB}$  (max)
- Complementary to 2SA1163
- Small package

Note1: For detail information, please contact our sales.

Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

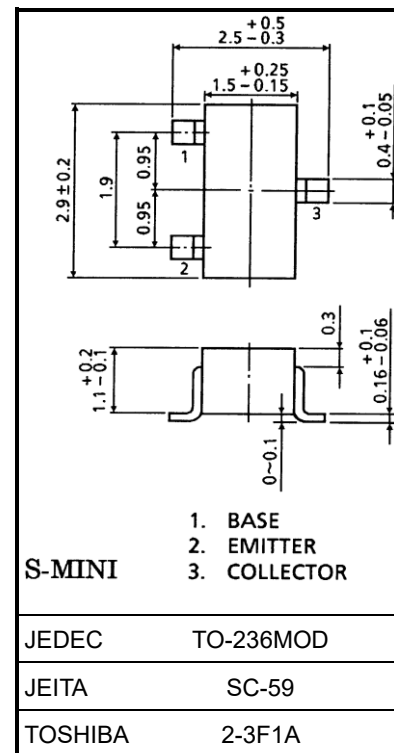
Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	120	V
Collector-emitter voltage	$V_{CEO}$	120	V
Emitter-base voltage	$V_{EBO}$	5	V
Collector current	$I_C$	100	mA
Base current	$I_B$	20	mA
Collector power dissipation	$P_C$ (Note 2, 4)	200	mW
	$P_C$ (Note 3)	150	
Junction temperature	$T_j$ (Note 2)	150	$^\circ\text{C}$
	$T_j$ (Note 3)	125	
Storage temperature range	$T_{stg}$ (Note 2)	-55 to 150	$^\circ\text{C}$
	$T_{stg}$ (Note 3)	-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).

Note 2: For devices with the ordering part number ending in LF(T).

Note 3: For devices with the ordering part number in other than LF(T).

Note 4: Mounted on a FR4 board. (25.4 mm × 25.4 mm × 1.6 mm, Cu pad: 0.8 mm<sup>2</sup> × 3)

Weight: 0.012 g (typ.)

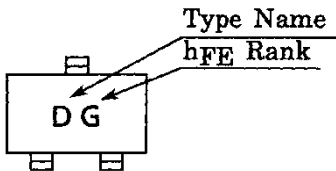
Start of commercial production  
1982-10

Electrical Characteristics (Ta = 25°C)

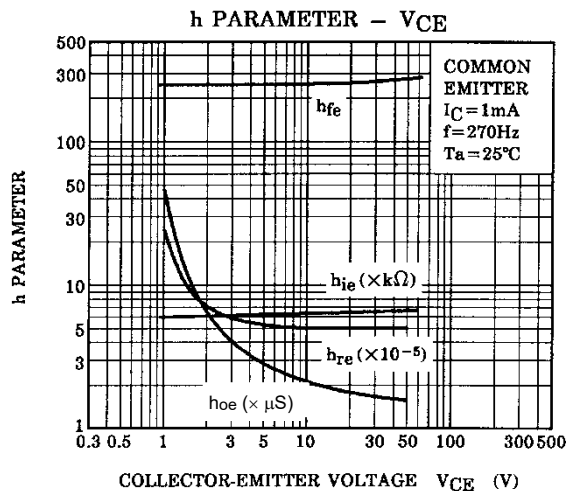
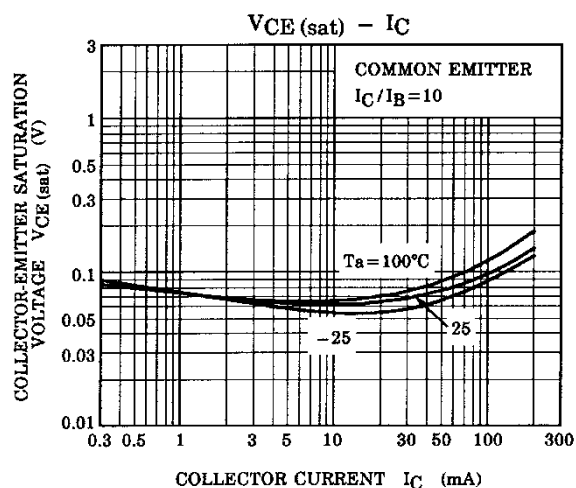
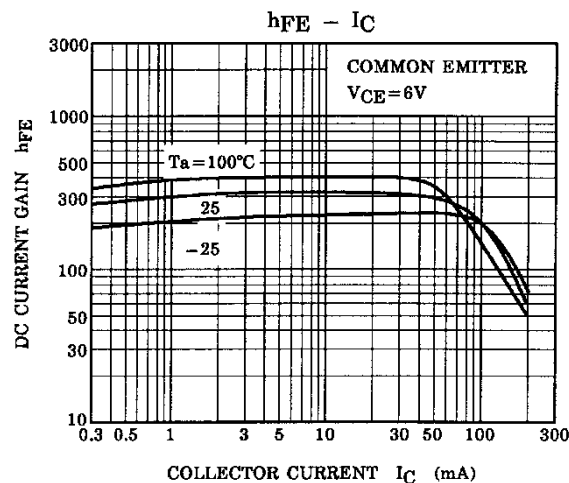
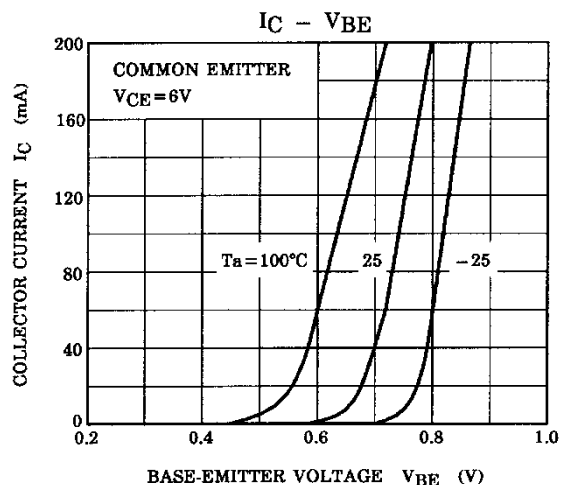
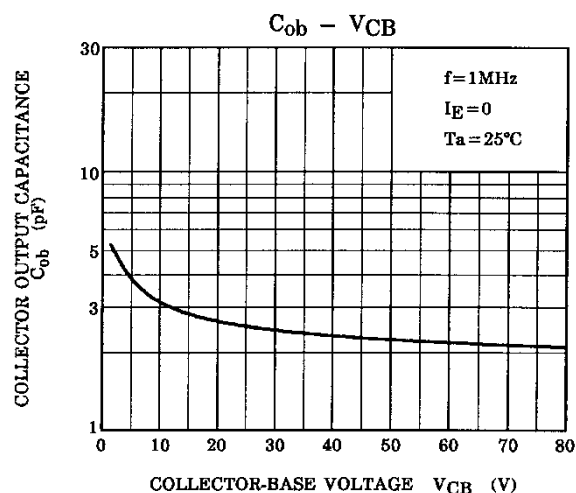
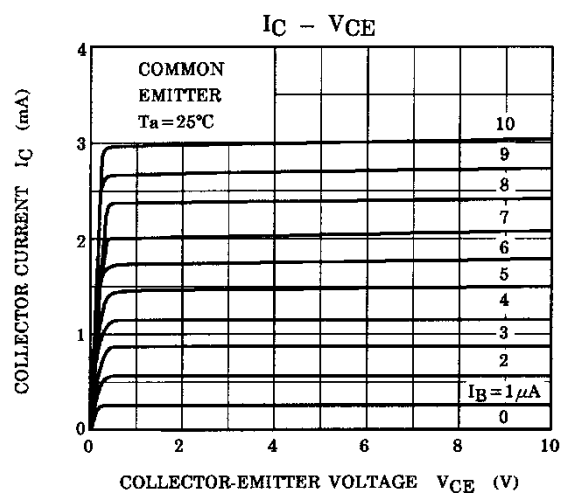
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	ICBO	V <sub>CB</sub> = 120 V, I <sub>E</sub> = 0 A	—	—	0.1	μA
Emitter cut-off current	IEBO	V <sub>EB</sub> = 5 V, I <sub>C</sub> = 0 A	—	—	0.1	μA
DC current gain	h <sub>FE</sub> (Note)	V <sub>CE</sub> = 6 V, I <sub>C</sub> = 2 mA	200	—	700	—
Collector-emitter saturation voltage	V <sub>CE (sat)</sub>	I <sub>C</sub> = 10 mA, I <sub>B</sub> = 1 mA	—	—	0.3	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 A, f = 1 MHz	—	3.0	—	pF
Noise figure	NF	V <sub>CE</sub> = 6 V, I <sub>C</sub> = 0.1 mA f = 1 kHz, R <sub>G</sub> = 10 kΩ	—	1.0	10	dB

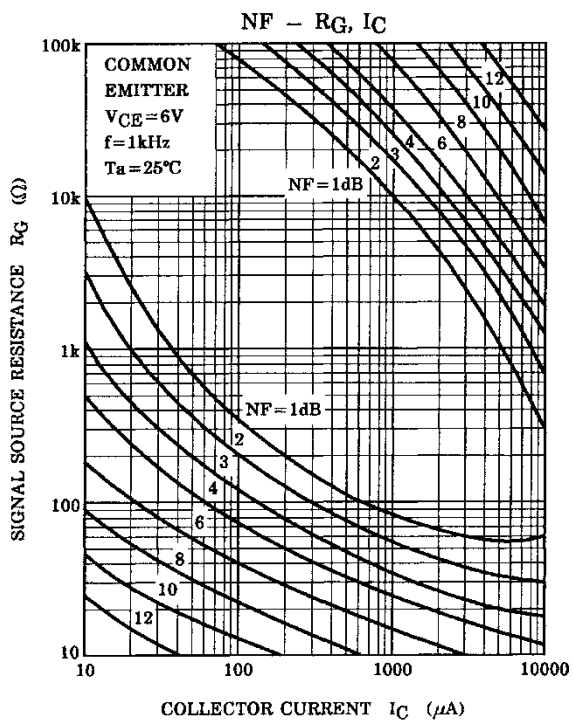
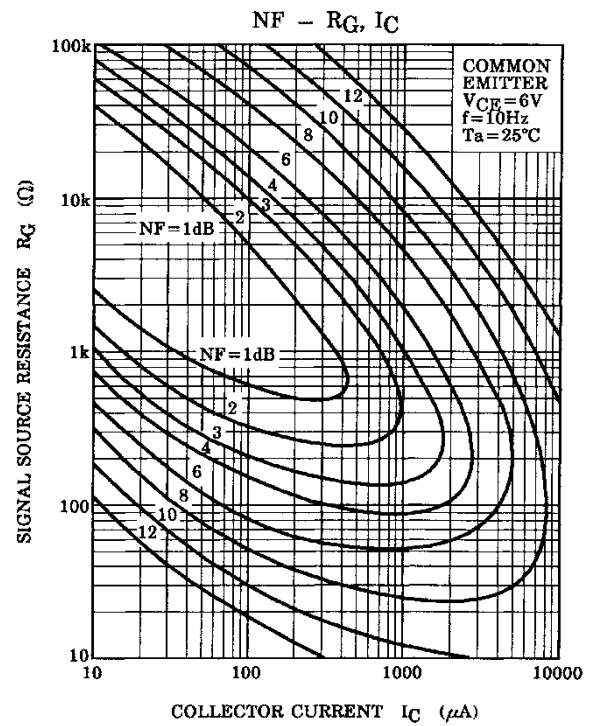
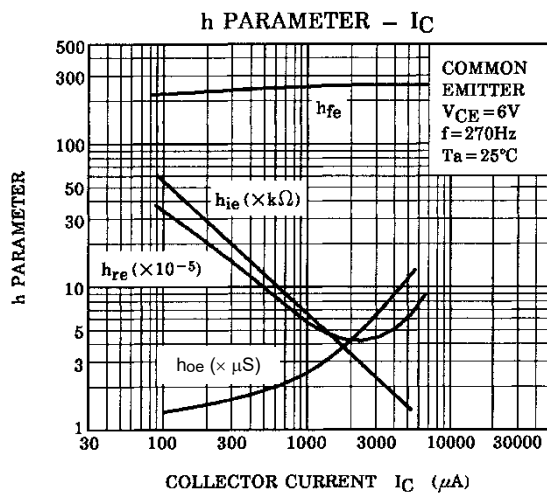
Note: hFE classification GR (G): 200~400, BL (L): 350~700, ( ) marking symbol

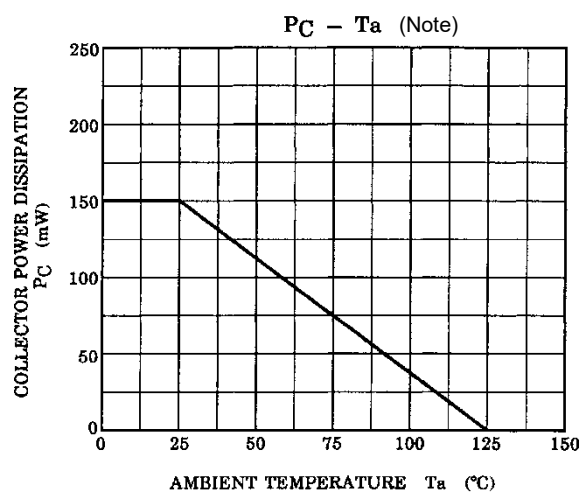
Marking



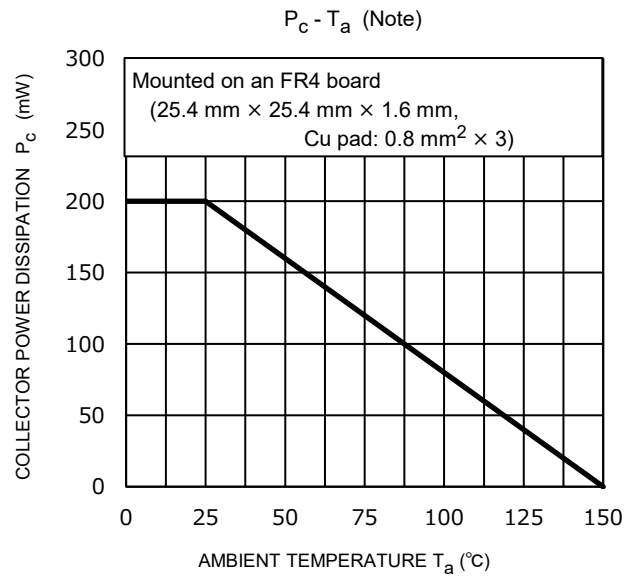
## Characteristics Curves







Note: Reference only with  $T_j$  of 125 °C.



Note: Reference only with  $T_j$  of 150 °C.

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

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