

TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

# 2SC5087R

## VHF to UHF Band Low Noise Amplifier Applications

Unit: mm

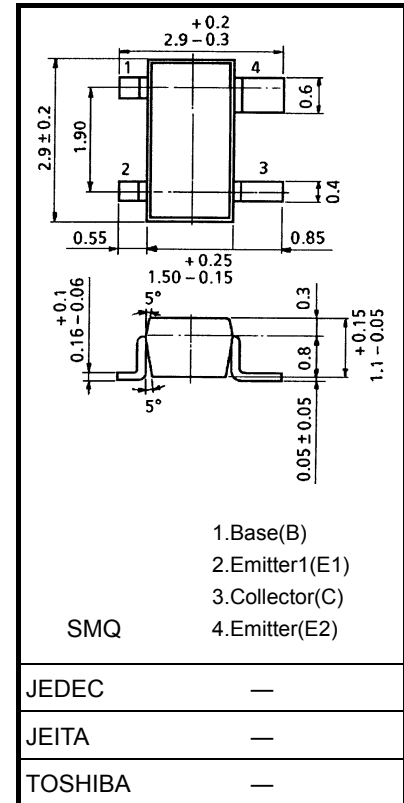
- Low noise figure, high gain.
- $NF = 1.1\text{dB}$ ,  $|S_{21e}|^2 = 13.5\text{dB}$  ( $f = 1\text{ GHz}$ )

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

Characteristic	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	20	V
Collector-emitter voltage	$V_{CEO}$	12	V
Emitter-base voltage	$V_{EBO}$	3	V
Base current	$I_B$	40	mA
Collector current	$I_C$	80	mA
Collector power dissipation	$P_C$	150	mW
Junction temperature	$T_j$	125	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-55 to 125	$^\circ\text{C}$

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).



Weight: 12 mg (typ.)

### Microwave Characteristics ( $T_a = 25^\circ\text{C}$ )

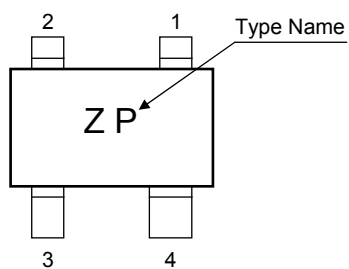
Characteristic	Symbol	Condition	Min	Typ.	Max	Unit
Transition frequency	$f_T$	$V_{CE} = 10\text{ V}$ , $I_C = 30\text{ mA}$	6	8	—	GHz
Insertion gain	$ S_{21e} ^2 (1)$	$V_{CE} = 5\text{ V}$ , $I_C = 20\text{ mA}$ , $f = 1\text{ GHz}$	—	12.5	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE} = 10\text{ V}$ , $I_C = 30\text{ mA}$ , $f = 1\text{ GHz}$	11	13.5	—	
Noise figure	NF	$V_{CE} = 10\text{ V}$ , $I_C = 7\text{ mA}$ , $f = 1\text{ GHz}$	—	1.1	2	

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

Characteristic	Symbol	Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = 10\text{ V}$ , $I_E = 0$	—	—	1	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 1\text{ V}$ , $I_C = 0$	—	—	1	$\mu\text{A}$
DC current gain	$h_{FE}$	$V_{CE} = 10\text{ V}$ , $I_C = 20\text{ mA}$	120	—	240	—
Output capacitance	$C_{ob}$	$V_{CB} = 10\text{ V}$ , $I_E = 0$ , $f = 1\text{ MHz}$ (Note 1)	—	1.1	1.6	pF
Reverse transfer capacitance	$C_{re}$		—	0.65	1	pF

Note 1:  $C_{re}$  is measured with a three-terminal method using a capacitance bridge.

Start of commercial production  
2005-05

**Marking**

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