

TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

# MT4S06

## VHF~UHF Band Low Noise Amplifier Applications

- Low noise figure:  $NF = 1.6\text{dB}$  ( $V_{CE} = 3\text{ V}$ ,  $I_C = 3\text{ mA}$ ,  $f = 2\text{ GHz}$ )
- High gain:  $|S_{21e}|^2 = 11.5\text{dB}$  ( $V_{CE} = 3\text{ V}$ ,  $I_C = 7\text{ mA}$ ,  $f = 2\text{ GHz}$ )

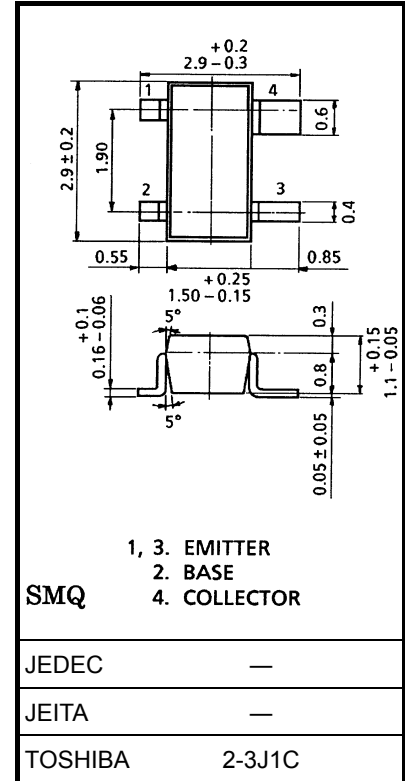
### Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Characteristics	Symbol	Rating	Unit
Collector-base voltage	$V_{CBO}$	10	V
Collector-emitter voltage	$V_{CEO}$	5	V
Emitter-base voltage	$V_{EBO}$	1.5	V
Base current	$I_B$	15	mA
Collector current	$I_C$	7	mA
Collector power dissipation	$P_C$	60	mW
Junction temperature	$T_j$	125	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-55~125	$^\circ\text{C}$

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.

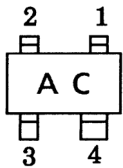
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Unit: mm



Weight: 0.012 g (typ.)

### Marking



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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Transition frequency	$f_T$	$V_{CE} = 3\text{ V}$ , $I_C = 5\text{ mA}$	7	10	—	GHz
Insertion gain	$ S_{21e} ^2$ (1)	$V_{CE} = 1\text{ V}$ , $I_C = 5\text{ mA}$ , $f = 2\text{ GHz}$	—	10.5	—	dB
	$ S_{21e} ^2$ (2)	$V_{CE} = 3\text{ V}$ , $I_C = 7\text{ mA}$ , $f = 2\text{ GHz}$	8.5	11.5	—	
Noise figure	NF (1)	$V_{CE} = 1\text{ V}$ , $I_C = 3\text{ mA}$ , $f = 2\text{ GHz}$	—	1.7	3	dB
	NF (2)	$V_{CE} = 3\text{ V}$ , $I_C = 3\text{ mA}$ , $f = 2\text{ GHz}$	—	1.6	3	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB} = 5\text{ V}, I_E = 0$	—	—	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	$h_{FE}$	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA}$	70	—	140	
Reverse transfer capacitance	$C_{re}$	$V_{CB} = 1\text{ V}, I_E = 0, f = 1\text{ MHz}$ (Note)	—	0.23	0.7	pF

Note:  $C_{re}$  is measured by 3 terminal method with capacitance bridge.

**Caution**

This device is sensitive to electrostatic discharge. Please handle with caution.

**RESTRICTIONS ON PRODUCT USE**

20070701-EN GENERAL

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