

TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

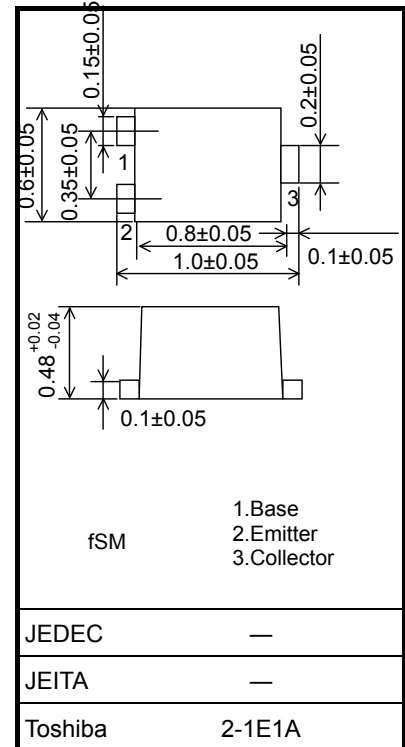
# MT3S03AFS

VHF~UHF Band Low-Noise Amplifier Applications

VHF~UHF Band Oscillator/Buffer Applications

- Superior performance in oscillator and Buffer applications
- Superior noise characteristics  
: NF = 1.7 dB,  $|S_{21e}|^2 = 5.5$  dB (f = 2 GHz)

Unit: mm



Weight: 0.0006 g (typ.)

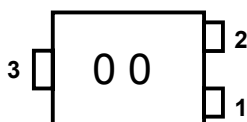
## Absolute Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rating	Unit
Collector- base voltage	V <sub>CBO</sub>	10	V
Collector- emitter voltage	V <sub>CEO</sub>	5	V
Emitter- base voltage	V <sub>EBO</sub>	2	V
Collector current	I <sub>C</sub>	40	mA
Base current	I <sub>B</sub>	10	mW
Collector power dissipation	P <sub>C</sub> (Note 1)	85	mW
Junction temperature	T <sub>j</sub>	125	°C
Storage temperature range	T <sub>stg</sub>	-55~125	°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).

Note 1: 10 mm<sup>2</sup> × 1.0 mm (t), mounted on a glass-epoxy printed circuit board.

## Marking



## Microwave Characteristics (Ta = 25°C)

Characteristic	Symbol	Condition	Min	Typ.	Max	Unit
Transition frequency	$f_T$	$V_{CE} = 3\text{ V}, I_C = 10\text{ mA}$	7	10	—	GHz
Insertion gain	$ S_{21e} ^2 (1)$	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA}, f = 2\text{ GHz}$	—	5.5	—	dB
	$ S_{21e} ^2 (2)$	$V_{CE} = 3\text{ V}, I_C = 20\text{ mA}, f = 2\text{ GHz}$	6	8.5	—	
Noise figure	NF (1)	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA}, f = 2\text{ GHz}$	—	1.7	3	dB

## Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Condition	Min	Typ.	Max	Unit
Collector cutoff current	$I_{CBO}$	$V_{CB} = 5\text{ V}, I_E = 0$	—	—	0.1	$\mu\text{A}$
Emitter cutoff current	$I_{EBO}$	$V_{EB} = 3.5\text{ V}, I_C = 0$	—	—	10	$\mu\text{A}$
DC current gain	$h_{FE}$	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA}$	80	—	160	
Reverse transfer capacitance	$C_{re}$	$V_{CB} = 1\text{ V}, I_E = 0, f = 1\text{ MHz}(\text{Note})$	—	0.75	1	pF

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

## Caution

This device is sensitive to electrostatic discharge. Ensure that tools and equipment are sufficiently grounded before handling. When handling individual devices (which are not yet mounted on a circuit board), ensure that the environment is protected against electrostatic discharge. Operators should wear antistatic clothing, and containers and other objects that come into direct contact with devices should be made of antistatic materials.

**RESTRICTIONS ON PRODUCT USE**

20070701-EN GENERAL

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- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.  
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