

TOSHIBA TRANSISTOR SILICON-GERMANIUM NPN EPITAXIAL PLANER TYPE

# MT3S109FS

VCO OSCILLETOR STAGE

VHF-UHF Low Noise Amplifier Application

## FEATURES

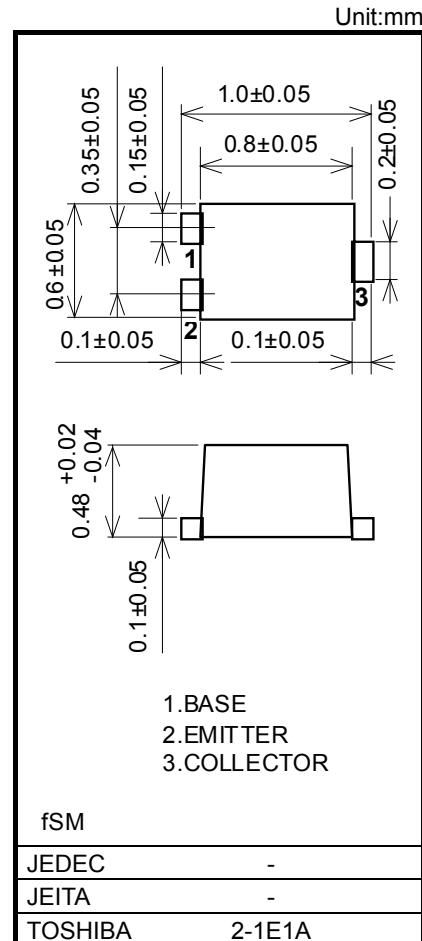
- Low Noise Figure : $NF=1.35\text{dB}$  (@ $f=2\text{GHz}$ )
- High Gain: $|S_{21e}|^2=8.2\text{dB}$  (@ $f=2\text{GHz}$ )

## Marking



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

Characteristics	Symbol	Rating	Unit
Collector-Base voltage	$V_{CBO}$	13	V
Collector-Emitter voltage	$V_{CEO}$	6	V
Emitter-Base voltage	$V_{EBO}$	1	V
Collector-Current	$I_C$	80	mA
Base-Current	$I_B$	20	mA
Collector Power dissipation	$P_C$ (Note 1)	100	mW
Junction temperature	$T_j$	150	°C
Storage temperature Range	$T_{stg}$	-55~150	°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: Device mounted on a glass-epoxy PCB(1.0 cm<sup>2</sup> x 1.0 mm (t))

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Transition Frequency	f <sub>T</sub>	V <sub>CE</sub> =1V, I <sub>C</sub> =10mA	5	7	-	GHz
Insertion Gain	S <sub>21e</sub>   <sup>2</sup> (1)	V <sub>CE</sub> =1V, I <sub>C</sub> =10mA, f=2GHz	-	6.5	-	dB
	S <sub>21e</sub>   <sup>2</sup> (2)	V <sub>CE</sub> =3V, I <sub>C</sub> =20mA, f=2GHz	6.5	8	-	dB
Noise Figure	NF	V <sub>CE</sub> =1V, I <sub>C</sub> =15mA, f=2GHz	-	1.35	2	dB

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector Cut-off Current	I <sub>CB0</sub>	V <sub>CB</sub> =5V, I <sub>E</sub> =0	-	-	0.1	μA
Emitter Cut-off Current	I <sub>EB0</sub>	V <sub>EB</sub> =1V, I <sub>C</sub> =0	-	-	0.5	μA
DC Current Gain	h <sub>FE</sub>	V <sub>CE</sub> =1V, I <sub>C</sub> =5mA	75	-	125	-
Reverse Transistor Capacitance	C <sub>re</sub>	V <sub>CB</sub> =1V, I <sub>E</sub> =0, f=1MHz (Note 1)	-	0.75	0.95	pF

**Note 1:** C<sub>re</sub> is measured by 3 terminal method with capacitance Bridge.

**Caution:**

This device is sensitive to electrostatic discharge due to applied the high frequency transistor process of f<sub>T</sub>=60GHz class is used for this product.

Please make enough tool and equipment earthed when you handle.

## RESTRICTIONS ON PRODUCT USE

20070701-EN GENERAL

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