TOSHIBA Transistor Silicon-Germanium NPN Epitaxial Planar Type

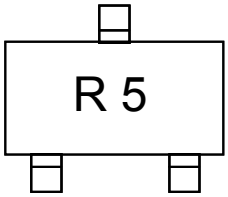
MT3S111

VHF-UHF Low-Noise, Low-Distortion Amplifier Applications

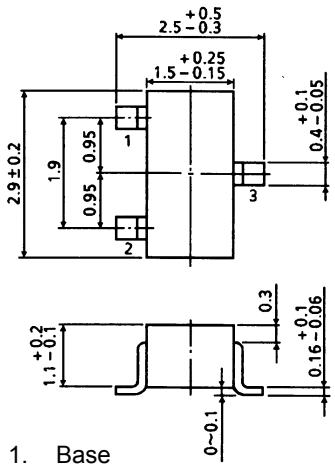
Features

- Low-Noise Figure: NF=0.9 dB (typ.) (@ f=1 GHz)
- High Gain:$|S_{21e}|^2$=12 dB (typ.) (@ f=1 GHz)

Marking



Unit: mm



1. Base
2. Emitter
3. Collector

S-Mini	
JEDEC	TO-236
JEITA	SC-59
TOSHIBA	2-3F1A

Weight: 0.012 g (typ.)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Collector-emitter voltage	V_{CES}	13	V
Collector-emitter voltage	V_{CEO}	6	V
Emitter-base voltage	V_{EBO}	0.6	V
Collector-current	I_C	100	mA
Base-current	I_B	10	mA
Collector power dissipation	P_C	160	mW
Collector power dissipation	P_C (Note 1)	700	mW
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	−55 to 150	°C

Note 1: The device is mounted on a ceramic board (25.4 mm x 25.4 mm x 0.8 mm (t))

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).

Start of commercial production
2007-12

Microwave Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Transition frequency	f_T	V_{CE}=5 V, I_C=30 mA	9	11.5	—	GHz
Insertion gain	$\|S_{21e}\|^2$(1)	V_{CE}=5 V, I_C=30 mA, f=500 MHz	—	17.5	—	dB
	$\|S_{21e}\|^2$(2)	V_{CE}=5 V, I_C=30 mA, f=1 GHz	10	12	—	dB
Noise figure	NF(1)	V_{CE}=5 V, I_C=30 mA, f=500 MHz	—	0.65	—	dB
	NF(2)	V_{CE}=5 V, I_C=30 mA, f=1 GHz	—	0.9	1.2	dB
3^{rd} order intermodulation distortion output intercept point	OIP_3	V_{CE}=5 V, I_C=30 mA, f=500 MHz, ⊿f=1 MHz	—	32	—	dBmW

Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	I_{CBO}	V_{CB}=5 V, I_E=0 A	—	—	0.1	μA
DC current gain	h_{FE}	V_{CE}=5 V, I_C=50 mA	200	—	400	—
Output capacitance	C_{ob}	V_{CB}=5 V, I_E=0 A, f=1 MHz	—	1.45	—	pF
Reverse transfer capacitance	C_{re}	V_{CB}=5 V, I_E=0 A, f=1 MHz (Note 2)	—	0.9	1.2	pF

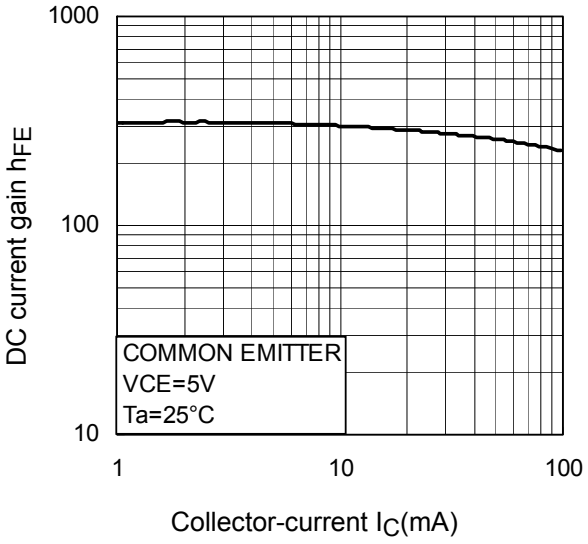
Note 2: C_{re} is measured using a 3-terminal method with capacitance bridge

Caution:

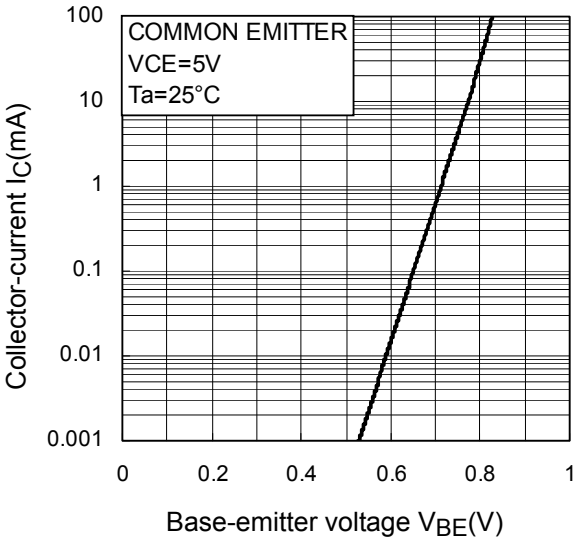
This device is sensitive to electrostatic discharge due to the high frequency transistor process of f_T=60 GHz class which is used for this product.

Please make tool and equipment earthed enough when you handle.

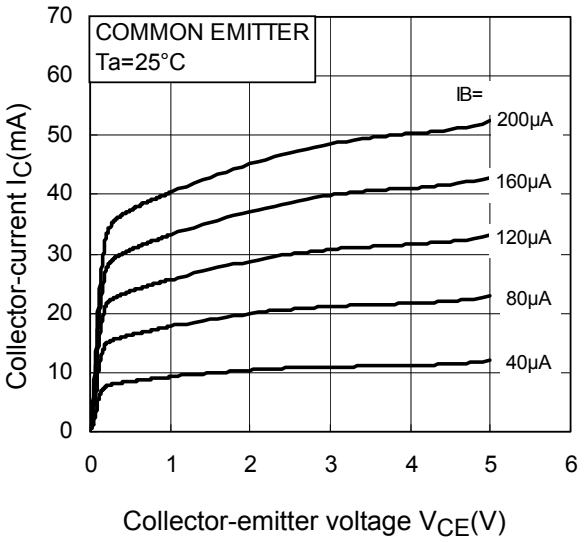
h_{FE}-I_C



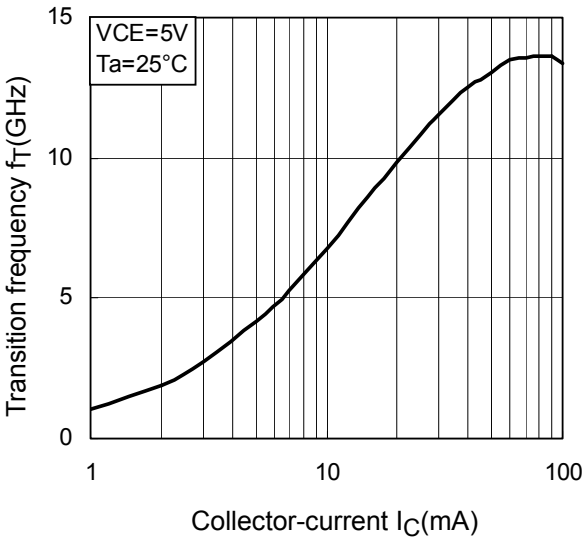
I_C-V_{BE}



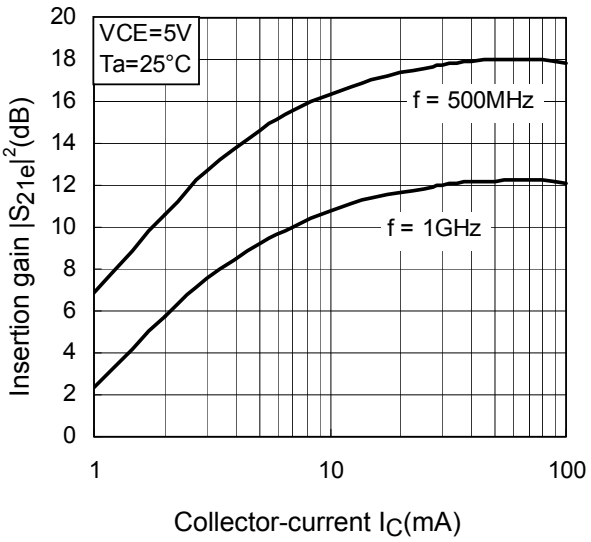
I_C-V_{CE}



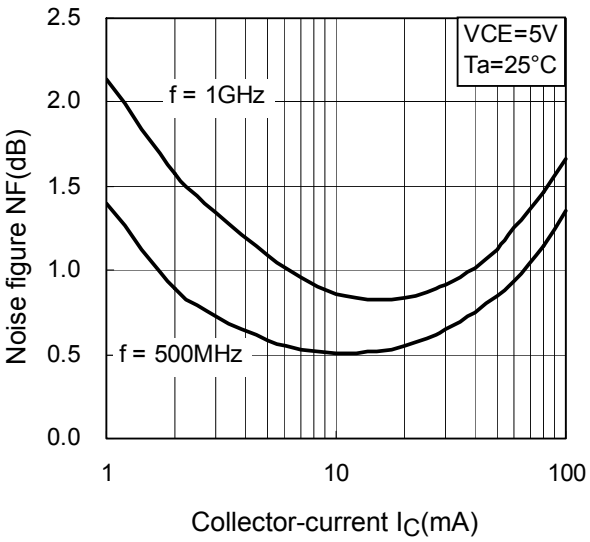
f_T-I_C



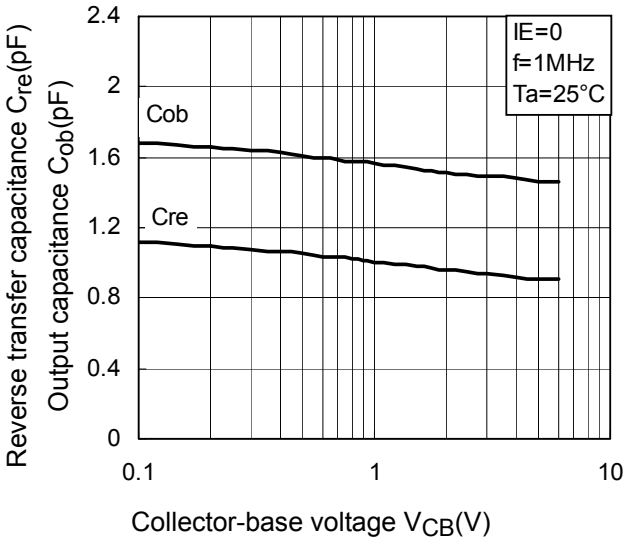
$|S_{21e}|^2$-I_C



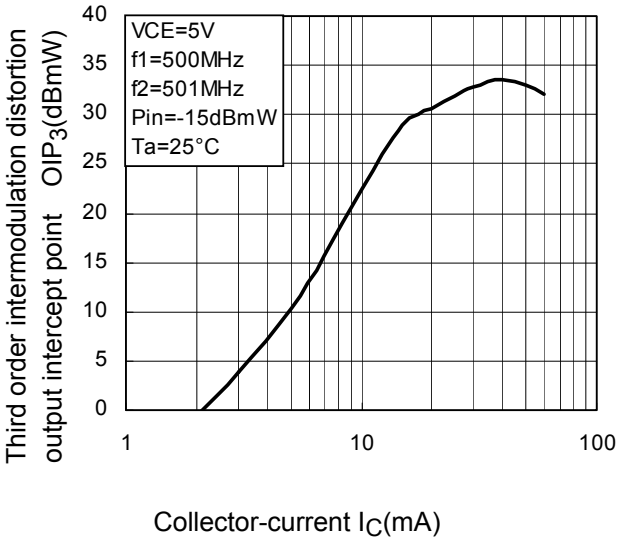
NF-I_C



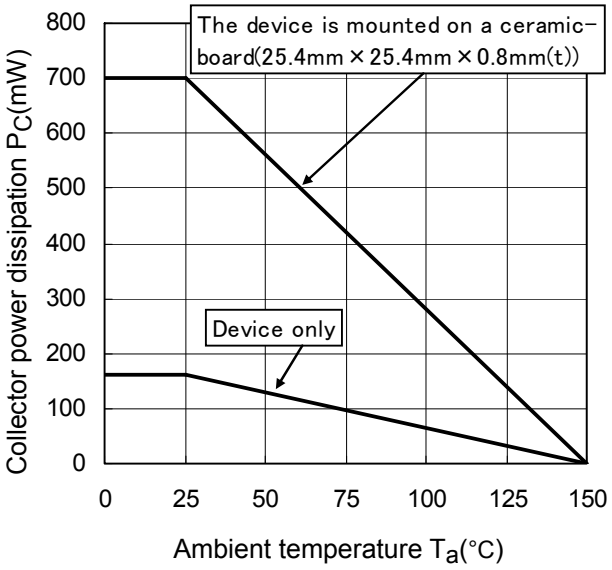
C_{re},C_{ob}-V_{CB}



OIP_3-I_C



P_C-T_a



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