

# MT3S111

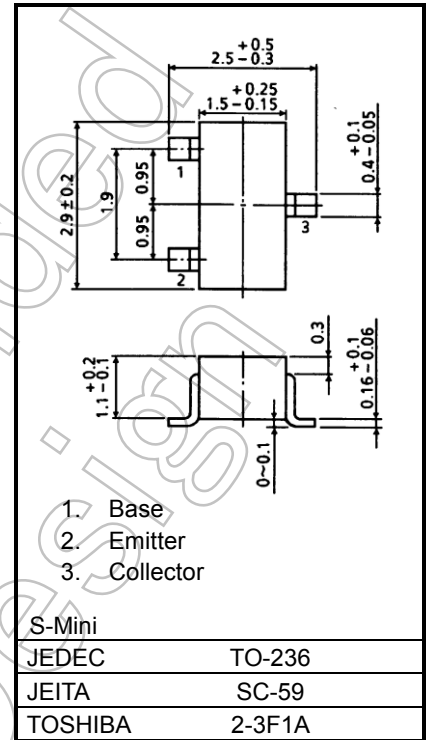
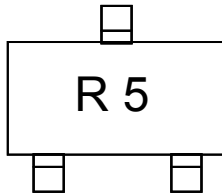
VHF-UHF Low-Noise, Low-Distortion Amplifier Applications

Unit: mm

## Features

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

## Marking



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	$f_T$	$V_{CE}=5\text{ V}, I_C=30\text{ mA}$	9	11.5	—	GHz
Insertion gain	$ S_{21e} ^2(1)$	$V_{CE}=5\text{ V}, I_C=30\text{ mA}, f=500\text{ MHz}$	—	17.5	—	dB
	$ S_{21e} ^2(2)$	$V_{CE}=5\text{ V}, I_C=30\text{ mA}, f=1\text{ GHz}$	10	12	—	dB
Noise figure	NF(1)	$V_{CE}=5\text{ V}, I_C=30\text{ mA}, f=500\text{ MHz}$	—	0.65	—	dB
	NF(2)	$V_{CE}=5\text{ V}, I_C=30\text{ mA}, f=1\text{ GHz}$	—	0.9	1.2	dB
3 <sup>rd</sup> order intermodulation distortion output intercept point	OIP <sub>3</sub>	$V_{CE}=5\text{ V}, I_C=30\text{ mA}, f=500\text{ MHz}, \Delta f=1\text{ MHz}$	—	32	—	dBmW

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

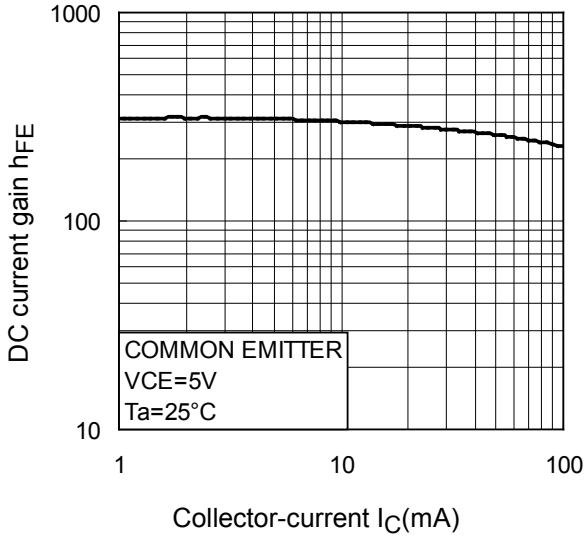
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB}=5\text{ V}, I_E=0\text{ A}$	—	—	0.1	$\mu\text{A}$
DC current gain	$h_{FE}$	$V_{CE}=5\text{ V}, I_C=30\text{ mA}$	200	—	400	—
Output capacitance	$C_{ob}$	$V_{CB}=5\text{ V}, I_E=0\text{ A}, f=1\text{ MHz}$	—	1.45	—	pF
Reverse transfer capacitance	$C_{re}$	$V_{CB}=5\text{ V}, I_E=0\text{ A}, f=1\text{ MHz}$ (Note 2)	—	0.9	1.2	pF

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

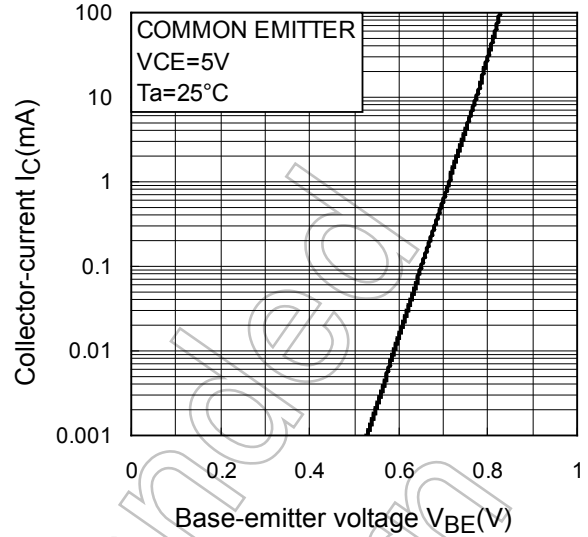
**Caution:**

This device is sensitive to electrostatic discharge due to the high frequency transistor process of  $f_T=60\text{ GHz}$  class which is used for this product.  
Please make tool and equipment earthed enough when you handle.

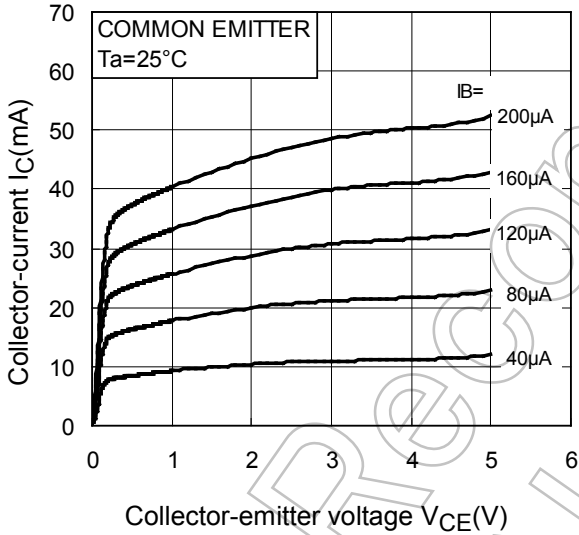
$h_{FE}-I_C$



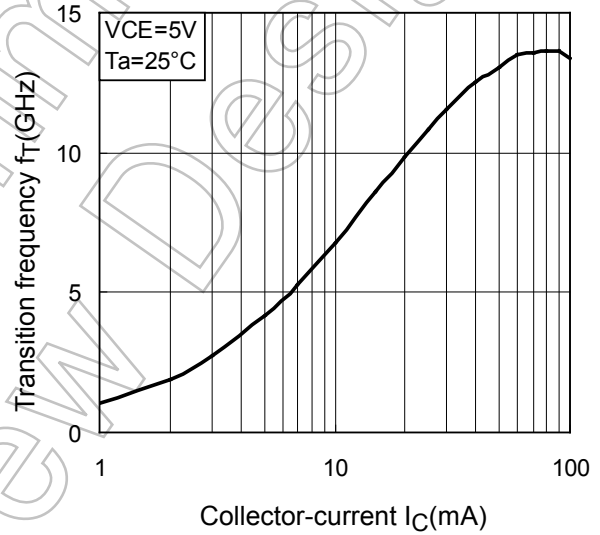
$I_C-V_{BE}$



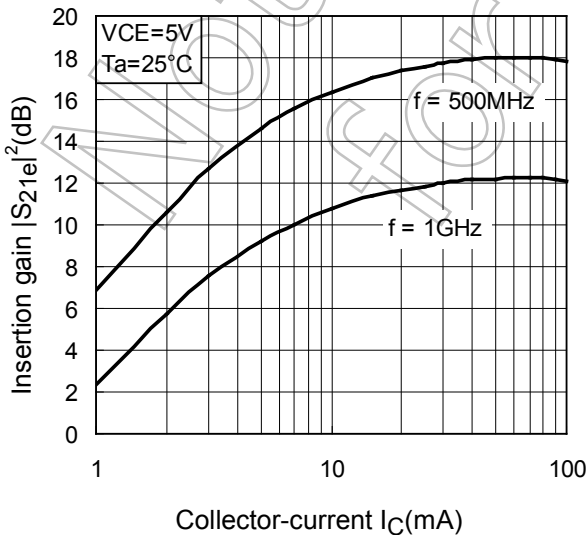
$I_C-V_{CE}$



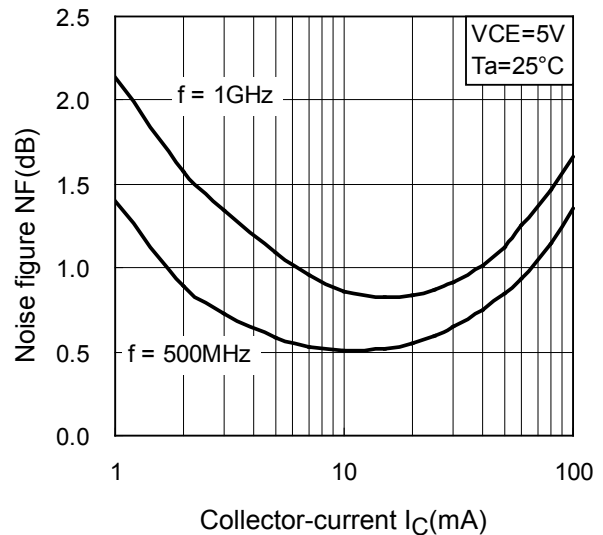
$f_T-I_C$



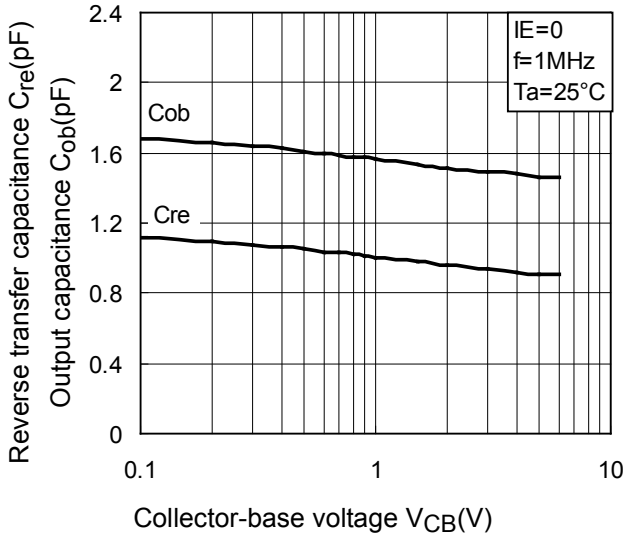
$|S_{21e}|^2-I_C$



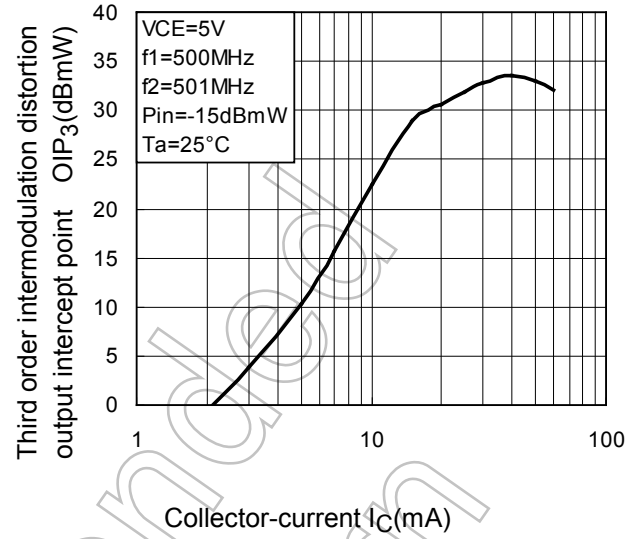
NF- $I_C$



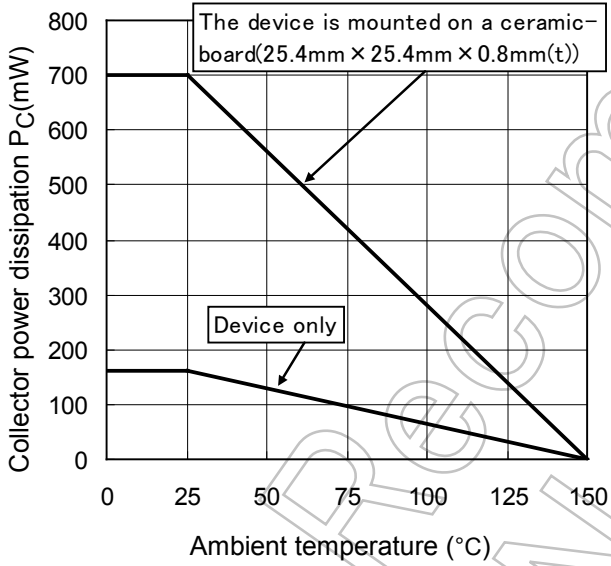
$C_{re}, C_{ob}-V_{CB}$



OIP<sub>3</sub>-I<sub>C</sub>



$P_C-T_a$



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