

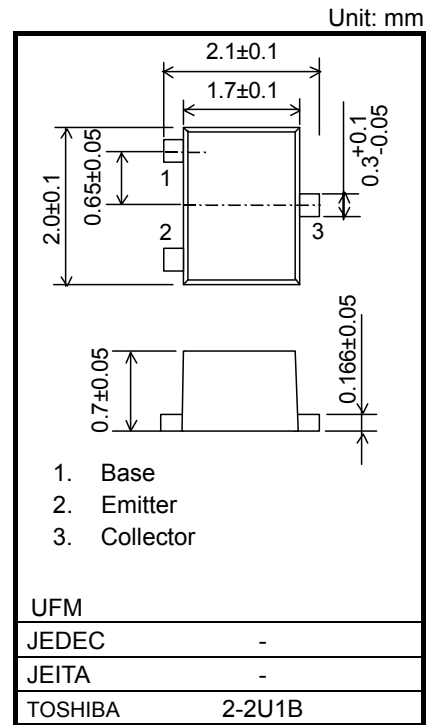
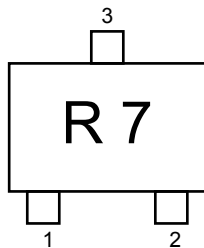
# MT3S113TU

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

## FEATURES

- Low Noise Figure:  $NF=1.15\text{dB(Typ.)}$  (@  $f=1\text{GHz}$ )
- High Gain:  $|S_{21e}|^2=12.5\text{dB(Typ.)}$  (@  $f=1\text{GHz}$ )

## Marking



Weight : 6.6mg (typ.)

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

Characteristics	Symbol	Rating	Unit
Collector-emitter voltage	$V_{CES}$	13	V
Collector-emitter voltage	$V_{CEO}$	5.3	V
Emitter-base voltage	$V_{EBO}$	0.6	V
Collector-current	$I_C$	100	mA
Base-current	$I_B$	10	mA
Collector power dissipation	$P_C(\text{Note1})$	900	mW
Junction temperature	$T_j$	150	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-55 to 150	$^\circ\text{C}$

Note1: The device is mounted on a ceramic board (25.4 mm x 25.4 mm x 0.8 mm (t))

Note2: 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).

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Transition frequency	$f_T$	$V_{CE}=5V, I_C=50mA$	9	11.2	—	GHz
Insertion gain	$ S_{21e} ^2(1)$	$V_{CE}=5V, I_C=50mA, f=500MHz$	—	18	—	dB
	$ S_{21e} ^2(2)$	$V_{CE}=5V, I_C=50mA, f=1GHz$	10.5	12.5	—	dB
Noise figure	NF(1)	$V_{CE}=5V, I_C=50mA, f=500MHz$	—	0.88	—	dB
	NF(2)	$V_{CE}=5V, I_C=50mA, f=1GHz$	—	1.15	1.45	dB
3 <sup>rd</sup> order intermodulation distortion output intercept point	OIP3	$V_{CE}=5V, I_C=50mA, f=500MHz,$ $\Delta f=1MHz$	30.5	34.8	—	dBmW

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Collector cut-off current	$I_{CBO}$	$V_{CB}=5V, I_E=0$	—	—	0.1	$\mu A$
DC current gain	$h_{FE}$	$V_{CE}=5V, I_C=30mA$	200	—	400	—
Output capacitance	$C_{ob}$	$V_{CB}=5V, I_E=0, f=1MHz$	—	1.49	—	pF
Reverse transfer capacitance	$C_{re}$	$V_{CB}=5V, I_E=0, f=1MHz$ (Note3)	—	0.94	1.25	pF

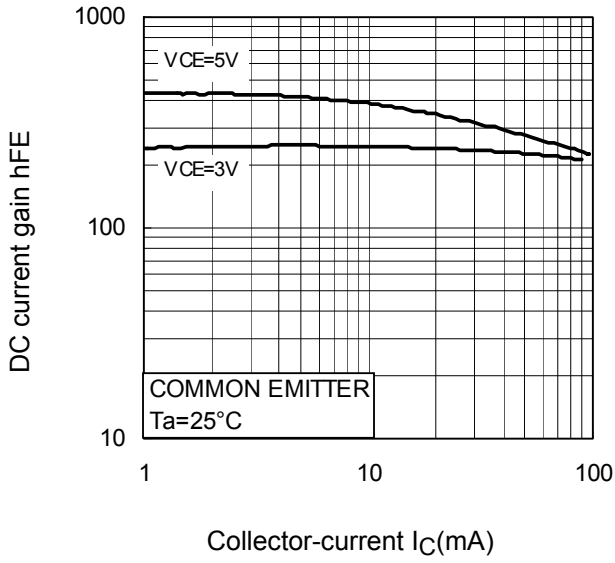
Note 3:  $C_{re}$  is measured using a 3-terminal method with capacitance bridge

**Caution:**

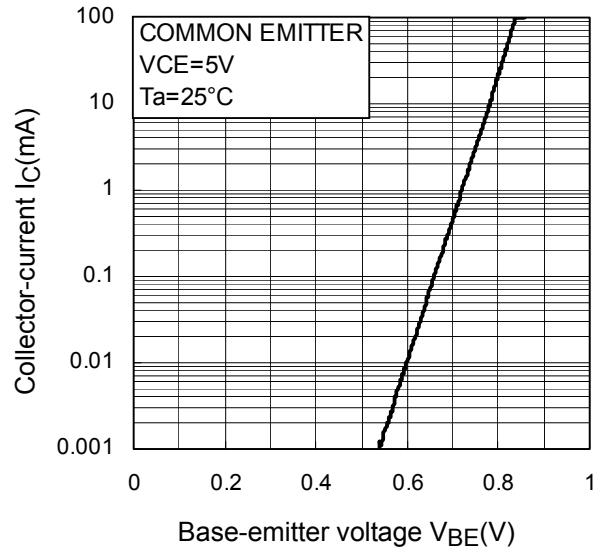
This device is sensitive to electrostatic discharge due to applied the high frequency transistor process of  $f_T=60GHz$  class is used for this product.

Please make enough tool and equipment earthed when you handle.

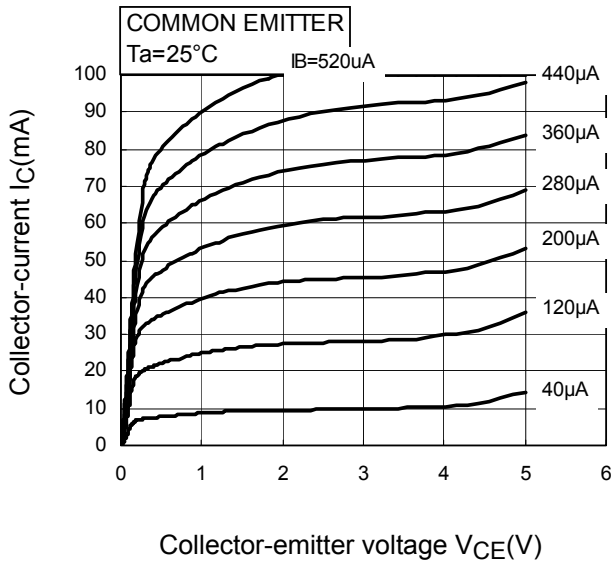
$h_{FE}-I_C$



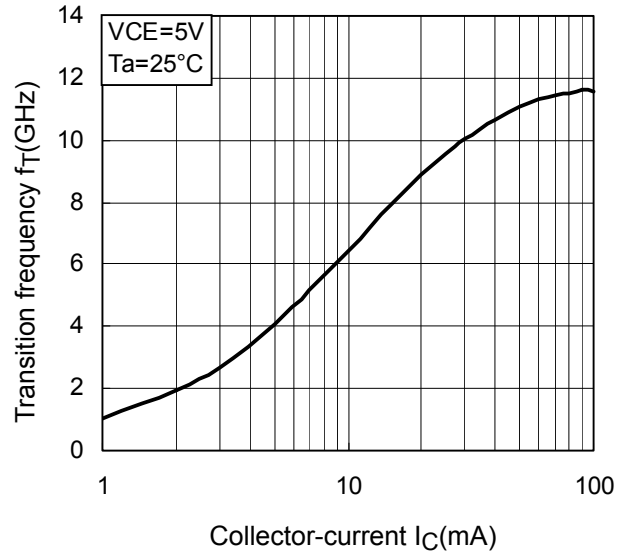
$I_C-V_{BE}$



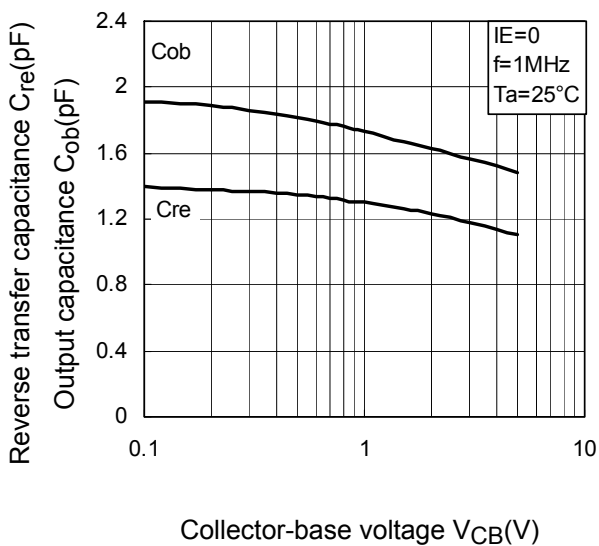
$I_C-V_{CE}$



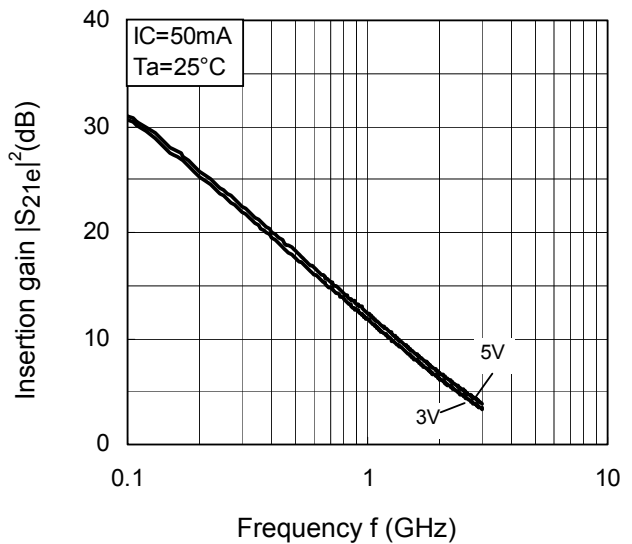
$f_T-I_C$

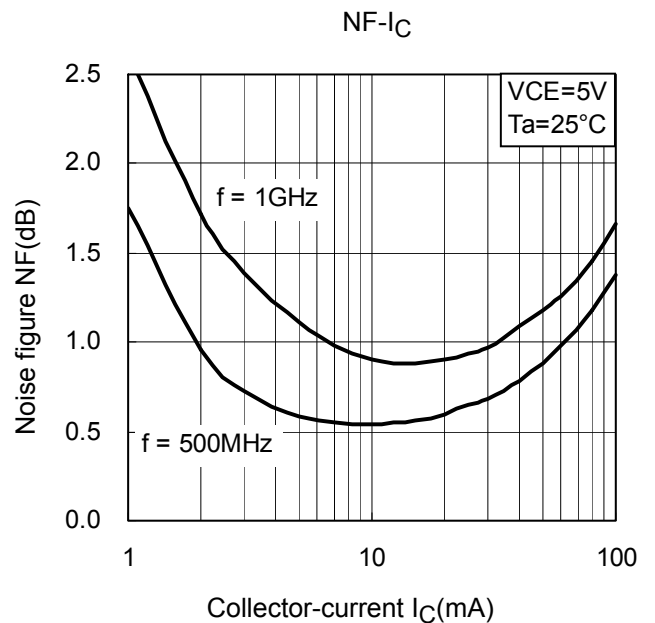
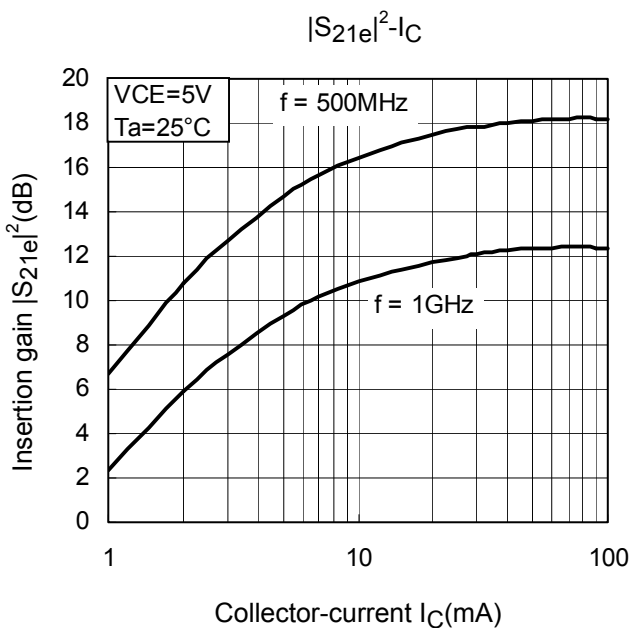
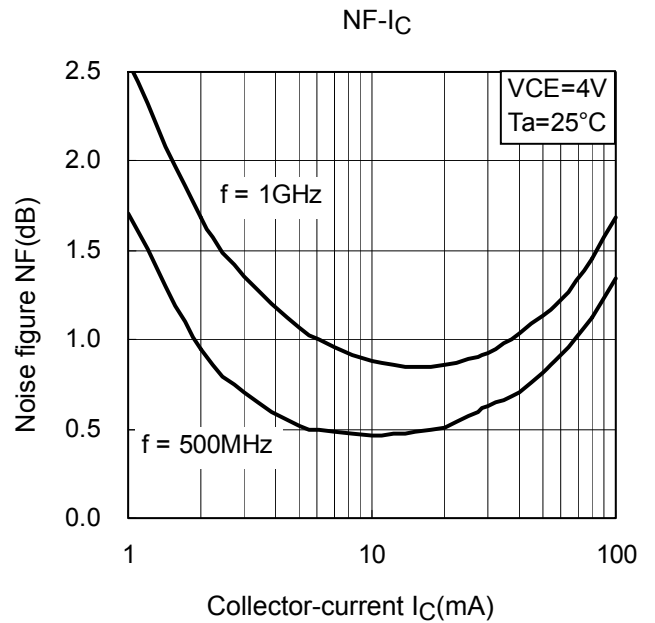
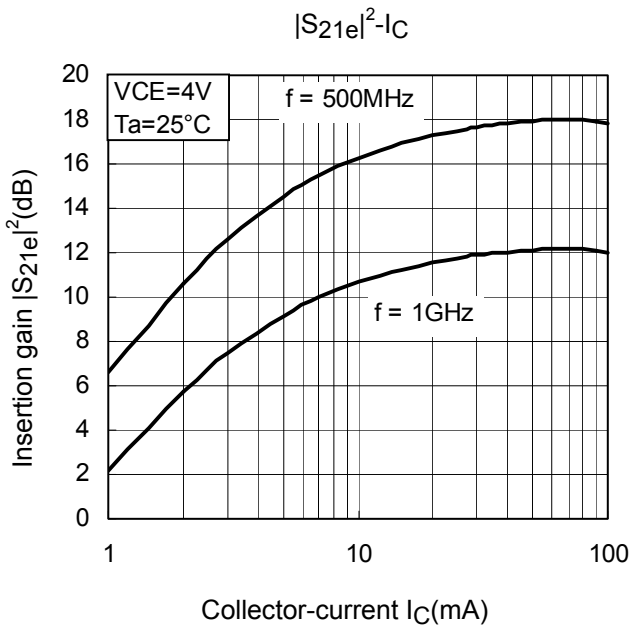
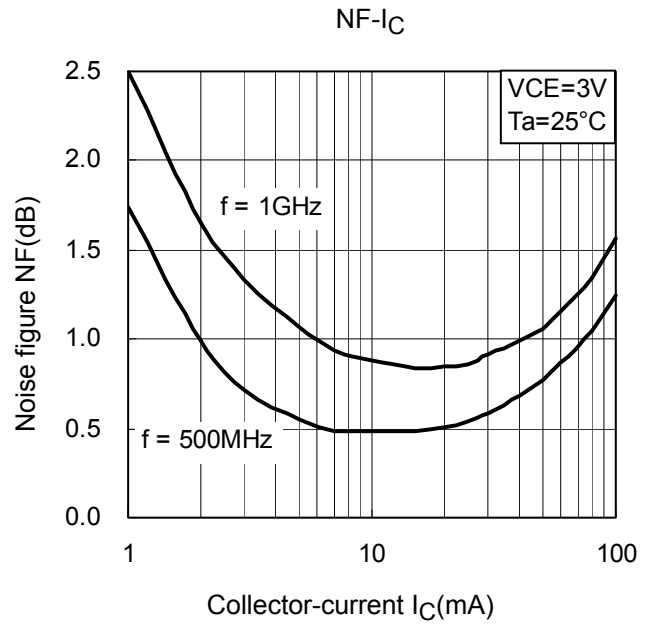
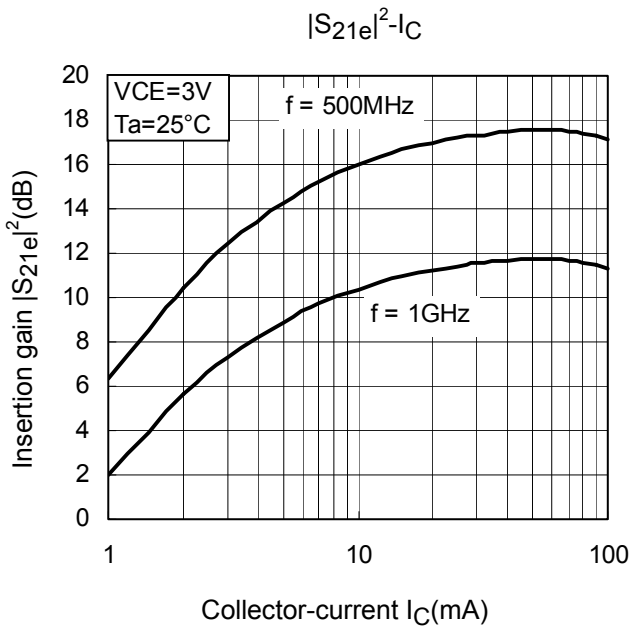


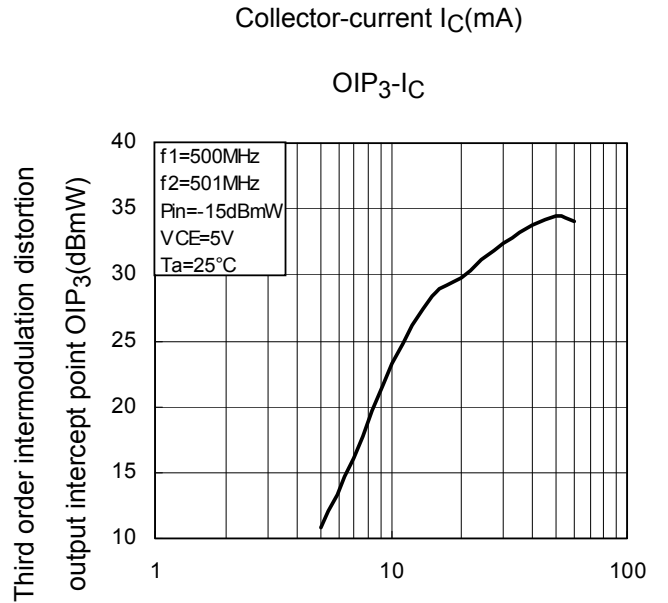
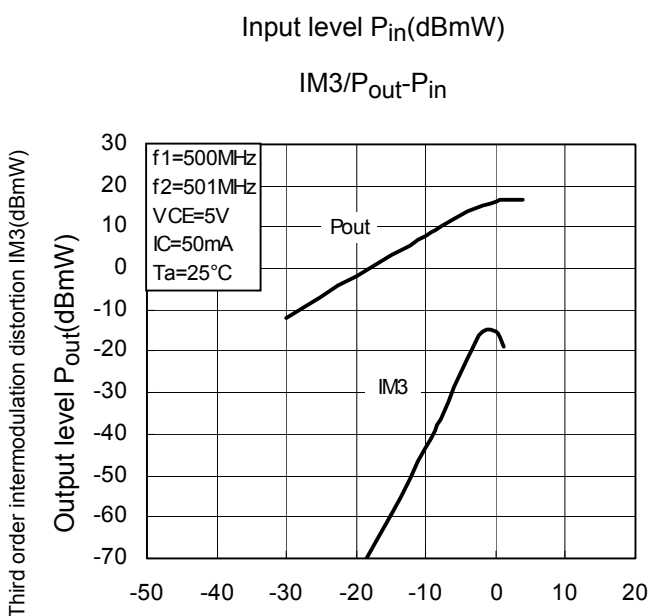
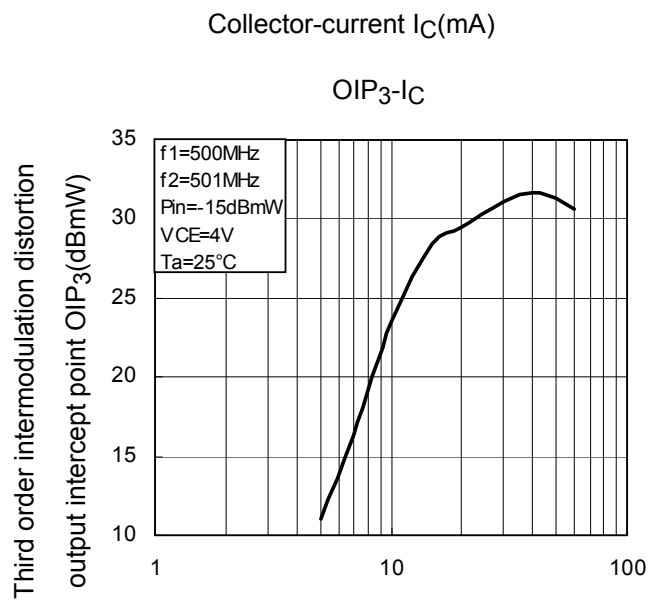
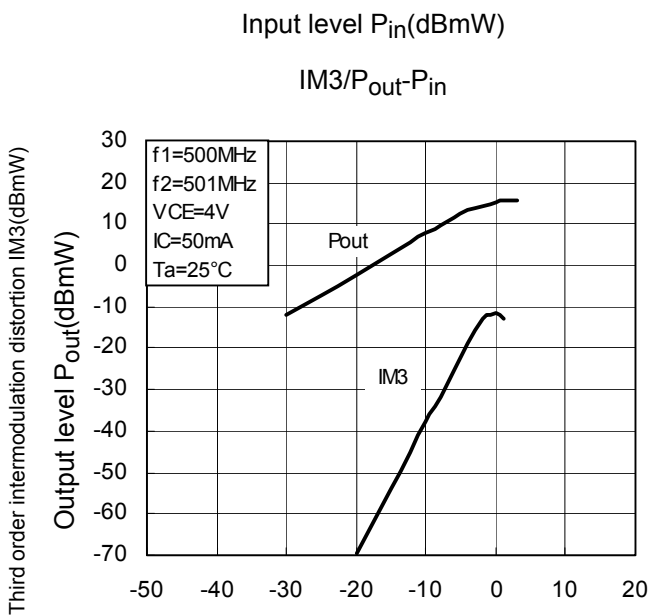
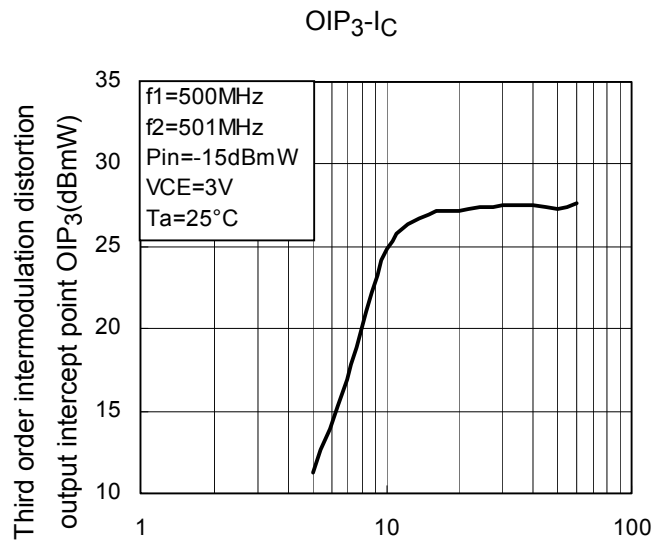
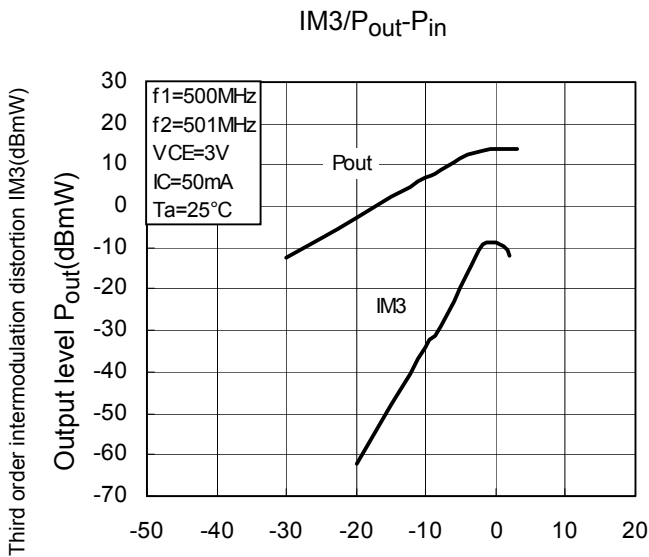
$C_{re}, C_{ob}-V_{CB}$



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

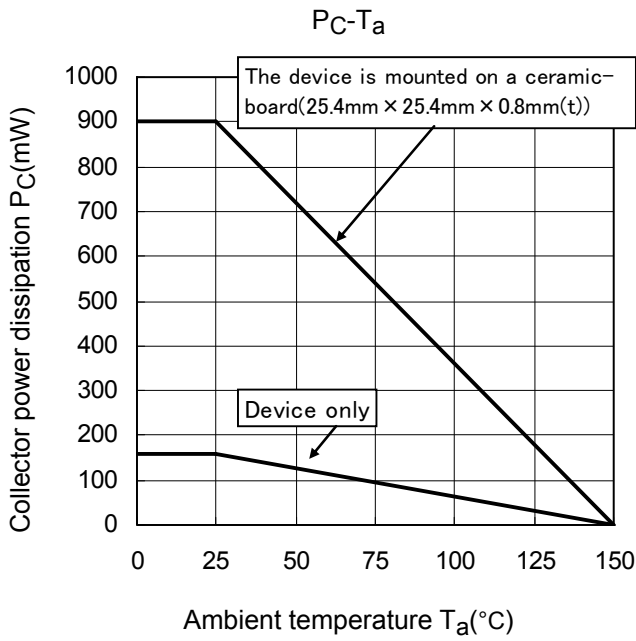
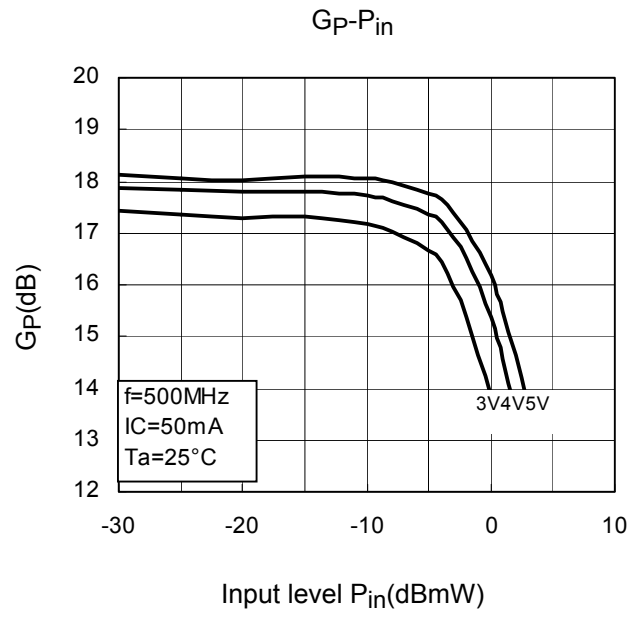
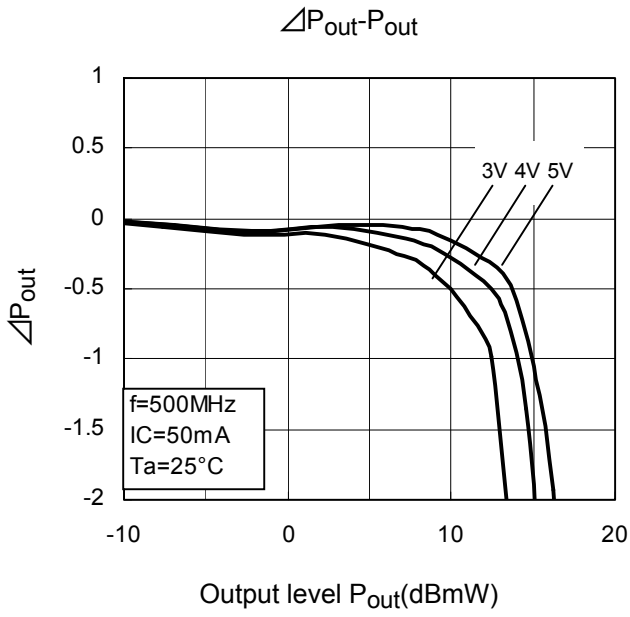






Input level P<sub>in</sub>(dBmW)

Collector-current I<sub>C</sub>(mA)



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