

TOSHIBA Transistor Silicon-Germanium NPN Epitaxial Planer Type

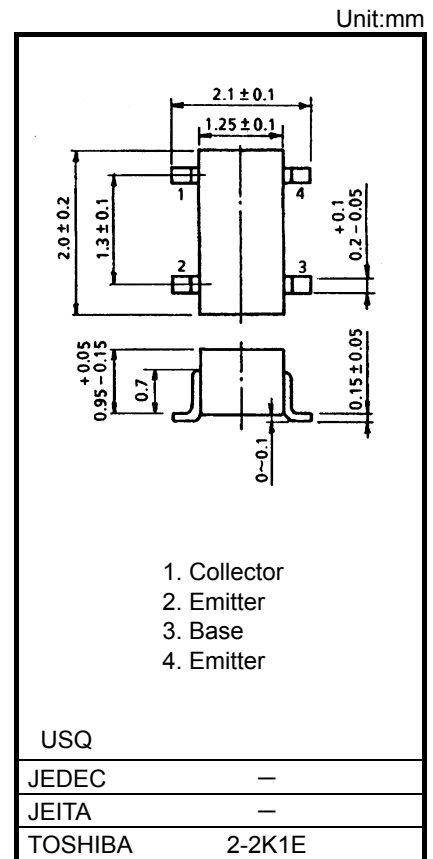
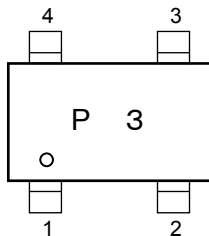
MT4S300U

○ UHF-SHF Low Noise Amplifier Application

FEATURES

- Low Noise Figure :NF=0.55dB(Typ.) (@f=2GHz)
- High Gain :|S21e|²=16.9dB(Typ.) (@f=2GHz)
- 2 kV ESD robustness (HBM) due to integrated protection circuits

Marking



Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Collector-Base voltage	V _{CBO}	6	V
Collector-Emitter voltage	V _{CEO}	4	V
Collector-Current	I _C	50	mA
Base-Current	I _B	10	mA
Collector Power dissipation	P _C	100	mW
Collector Power dissipation	P _C (Note1)	250	mW
Junction temperature	T _j	150	°C
Storage temperature Range	T _{stg}	-55~150	°C

Weight: 6 mg (Typ.)

Note1 : The device is mounted on a FR4 board (20 mm x 25 mm x 1.55 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	$V_{CE}=3V, I_C=20mA$	22.5	26.5	—	GHz
Insertion Gain	$ S_{21e} ^2$	$V_{CE}=3V, I_C=20mA, f=2GHz$	14	16.9	—	dB
Noise Figure	NF	$V_{CE}=3V, I_C=10mA, f=2GHz$	—	0.55	0.7	dB

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	μA
DC Current Gain	h_{FE}	$V_{CE}=3V, I_C=10mA$	200	—	400	-
Reverse Transfer Capacitance	C_{re}	$V_{CB}=1V, I_E=0, f=1MHz$ (Note3)	—	0.16	0.27	pF

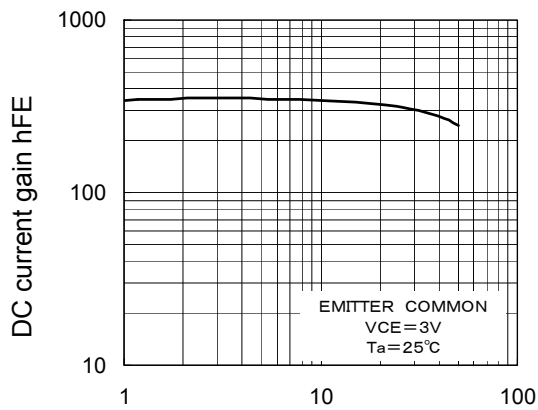
Note3: C_{re} is measured by 3 terminal method with capacitance bridge.

Caution:

This device is due to applied the high frequency transistor process of $f_T=100GHz$ class is used for this product.

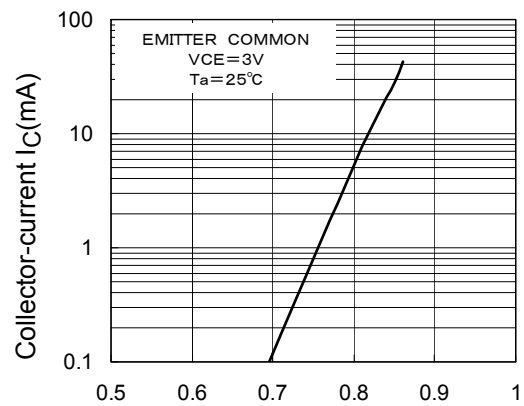
Please make enough tool and equipment earthed when you handle.

$h_{FE}-I_C$



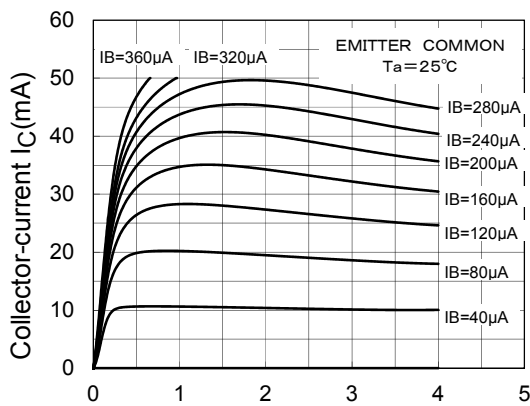
Collector-current I_C (mA)

I_C-V_{BE}



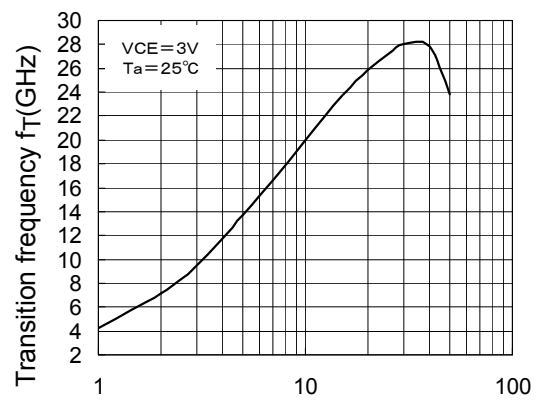
Base-emitter voltage V_{BE} (V)

I_C-V_{CE}



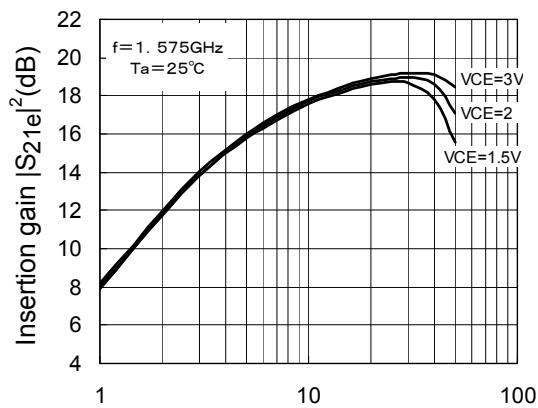
Collector-emitter voltage V_{CE} (V)

f_T-I_C



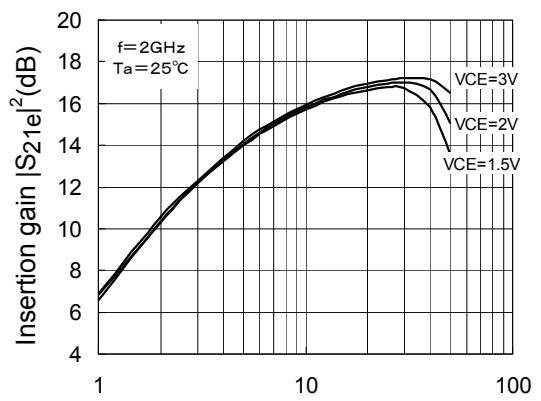
Collector-current I_C (mA)

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



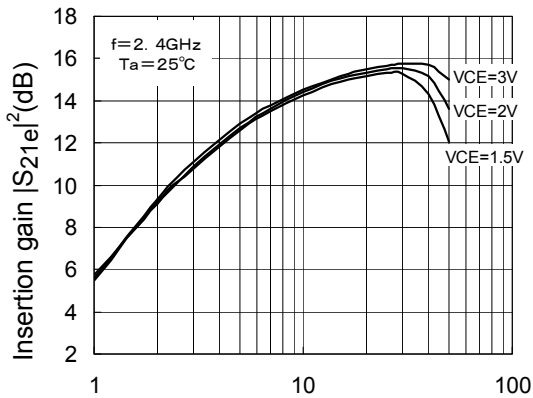
Collector-current I_C (mA)

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



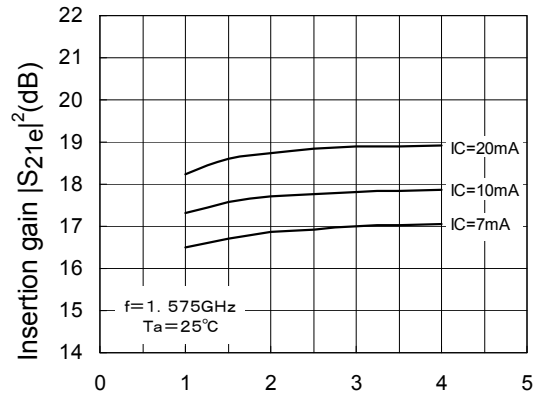
Collector-current I_C (mA)

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



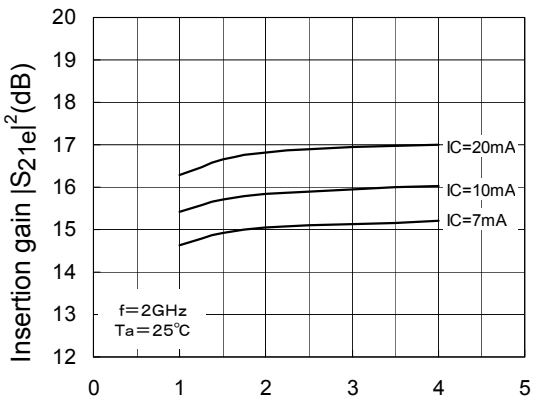
Collector-current I_C (mA)

$|S_{21e}|^2 - V_{CE}$



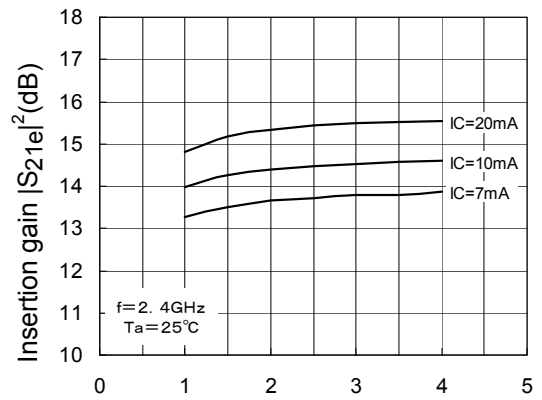
Collector-emitter voltage V_{CE} (V)

$|S_{21e}|^2 - V_{CE}$



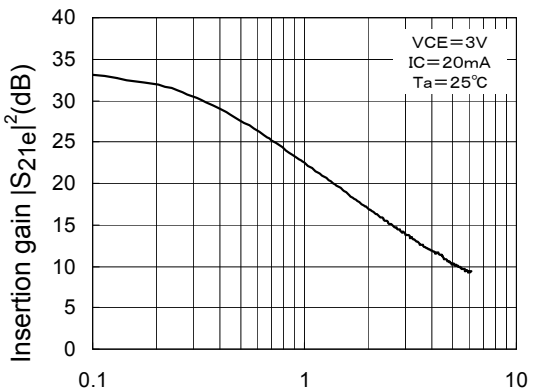
Collector-emitter voltage V_{CE} (V)

$|S_{21e}|^2 - V_{CE}$



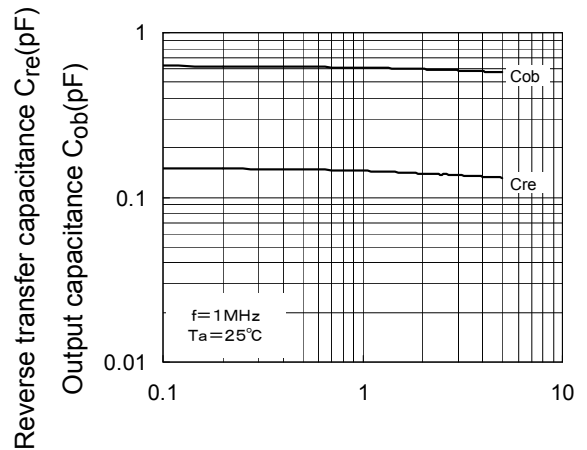
Collector-emitter voltage V_{CE} (V)

$|S_{21e}|^2 - \text{Freq.}$



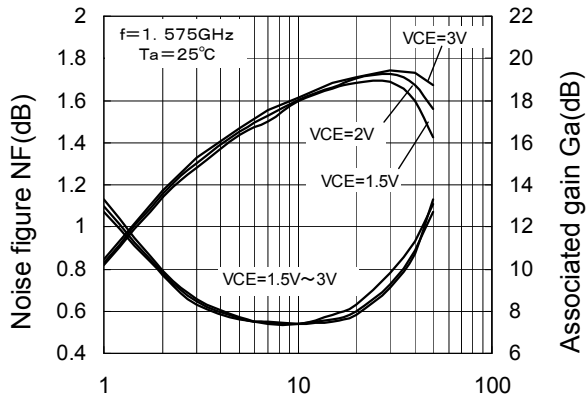
Frequency f (GHz)

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



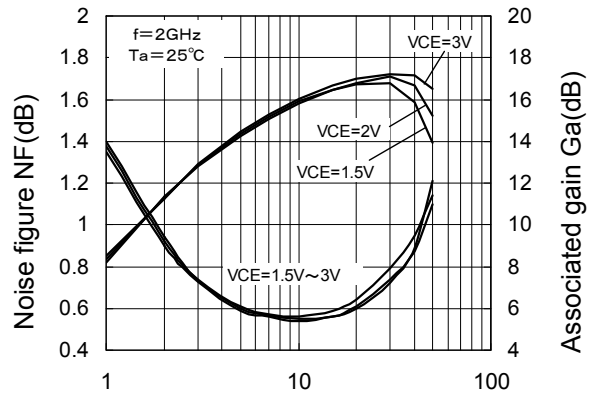
Collector-base voltage V_{CB} (V)

NF ,Ga-Ic



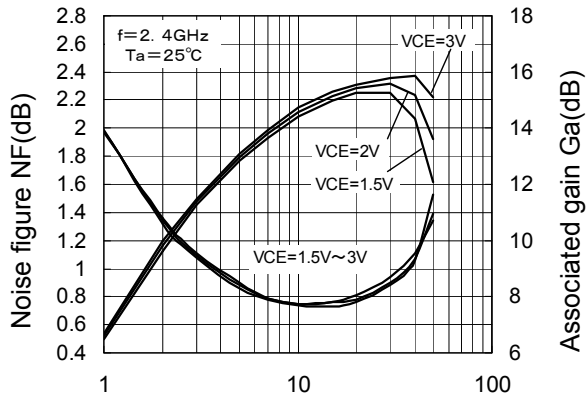
Collector-current I_C (mA)

NF ,Ga-Ic



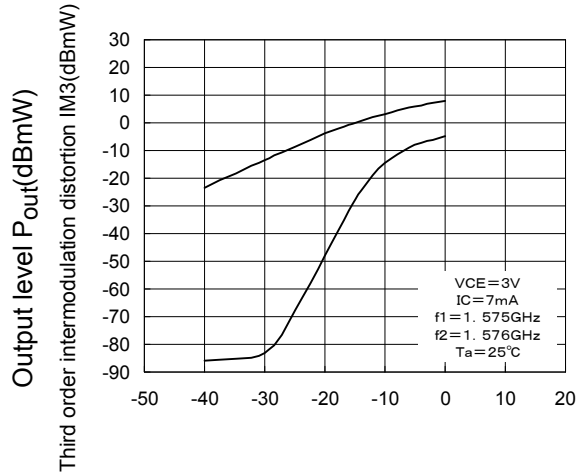
Collector-current I_C (mA)

NF ,Ga-Ic



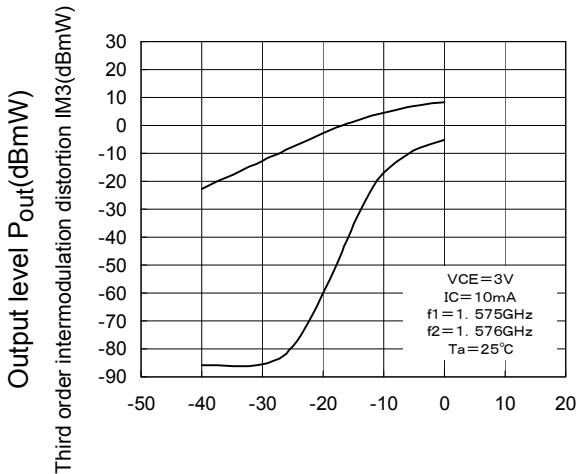
Collector-current I_C (mA)

P_{out} ,IM3- P_{in}



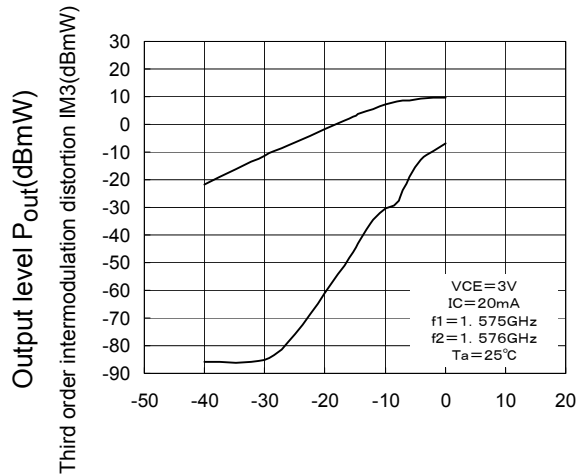
Input level P_{in} (dBmW)

P_{out} ,IM3- P_{in}

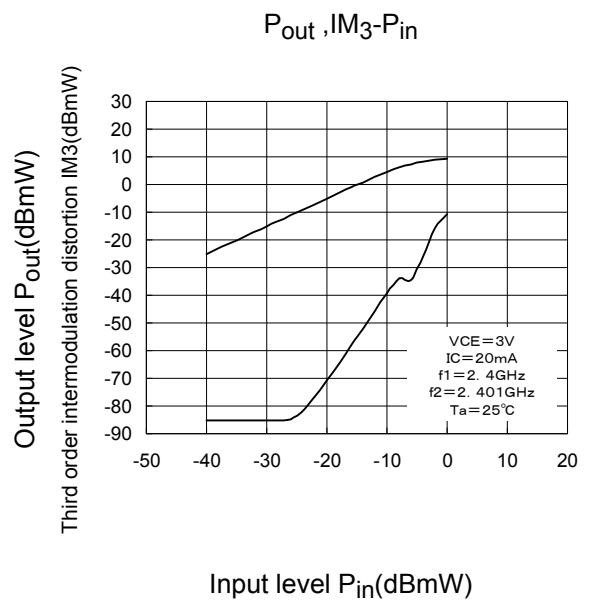
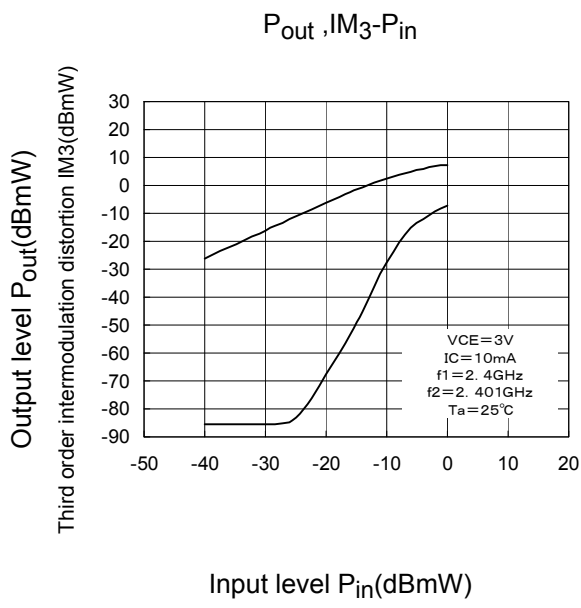
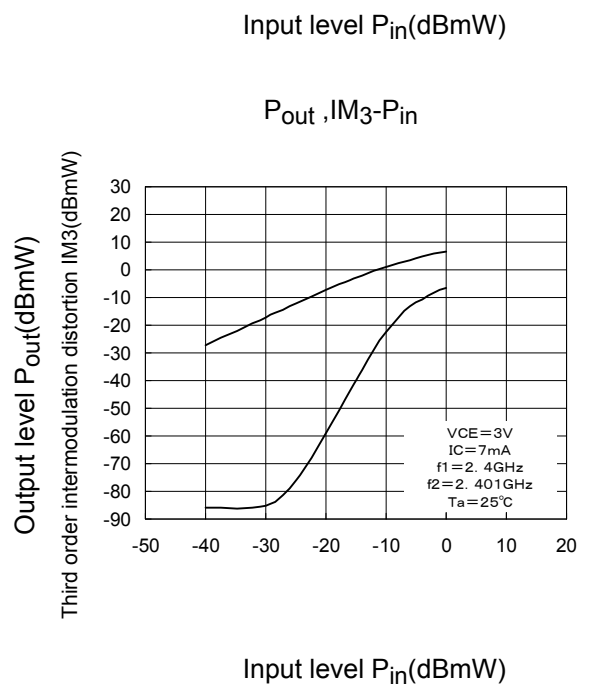
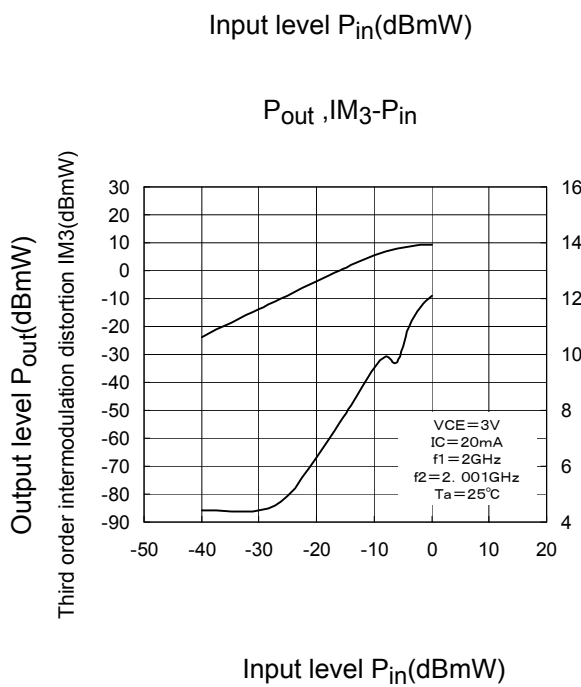
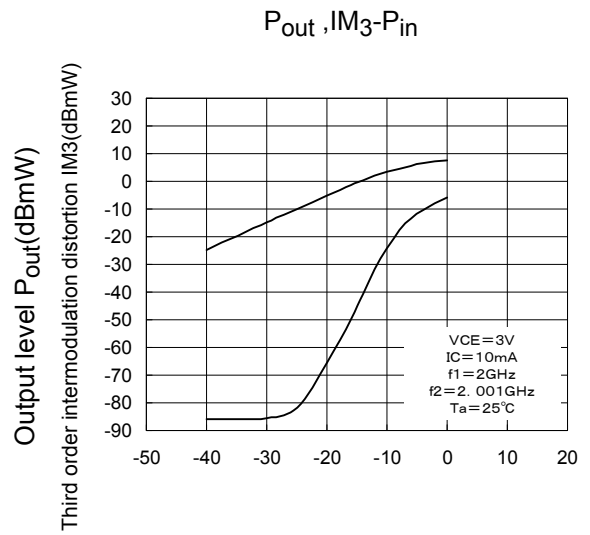
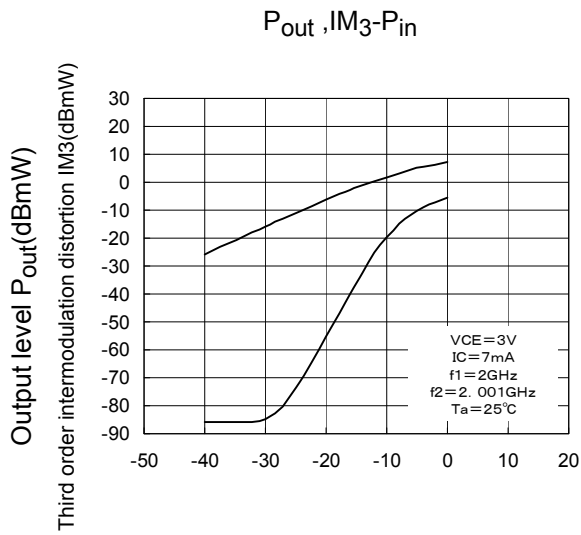


Input level P_{in} (dBmW)

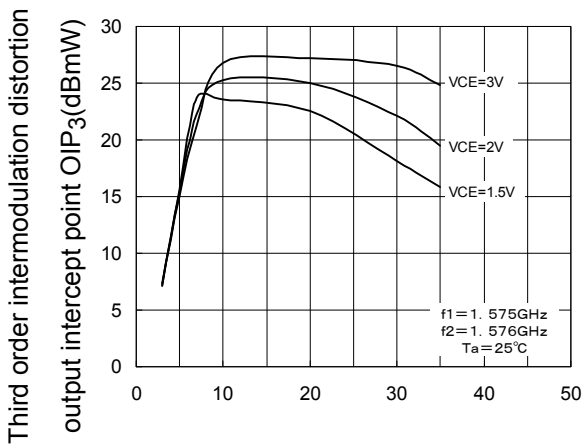
P_{out} ,IM3- P_{in}



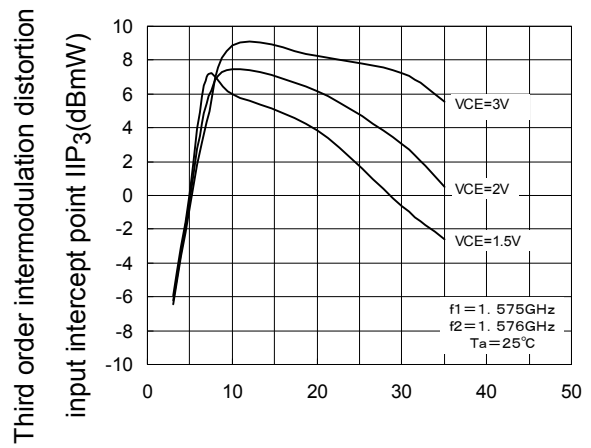
Input level P_{in} (dBmW)



OIP₃-I_C



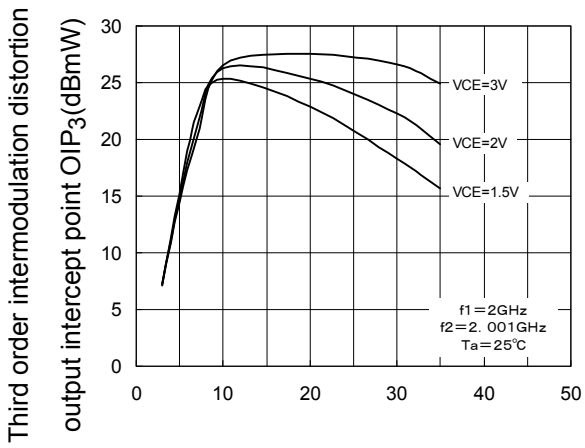
IIP₃-I_C



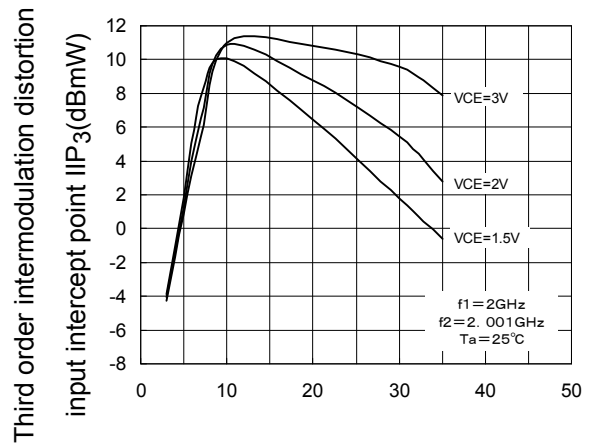
Collector-current I_C(mA)

Collector-current I_C(mA)

OIP₃-I_C



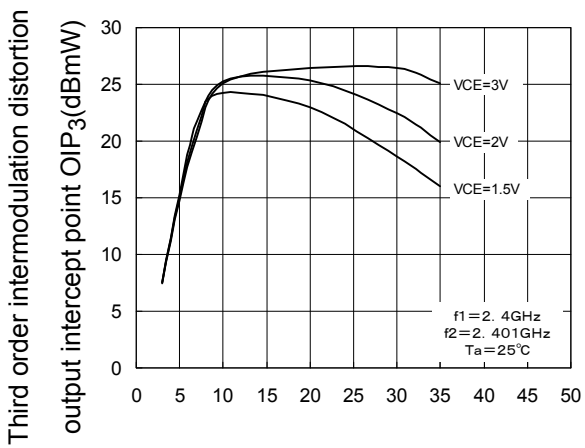
IIP₃-I_C



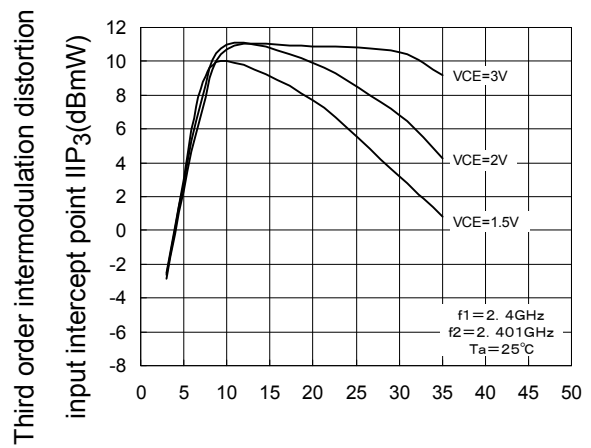
Collector-current I_C(mA)

Collector-current I_C(mA)

OIP₃-I_C



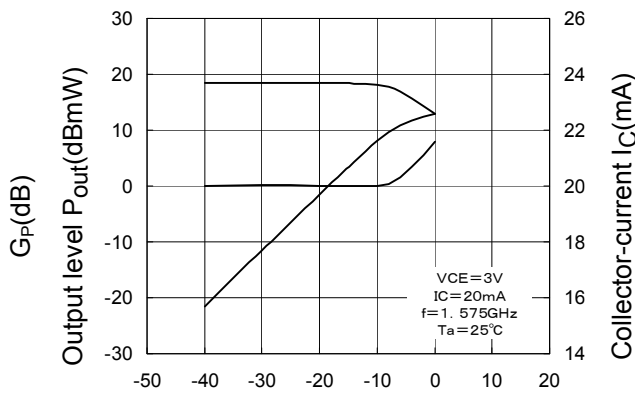
IIP₃-I_C



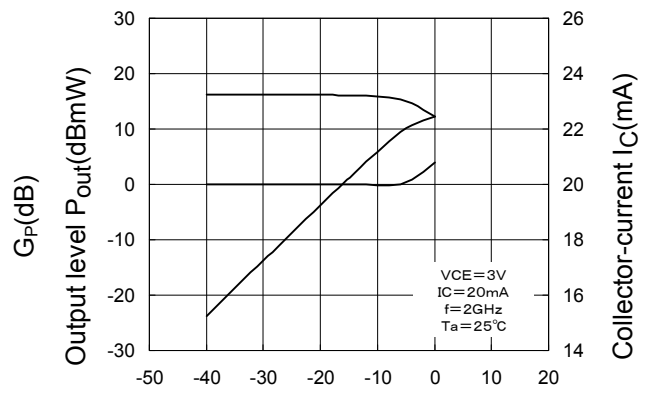
Collector-current I_C(mA)

Collector-current I_C(mA)

$P_{out}, G_p, I_C - P_{in}$



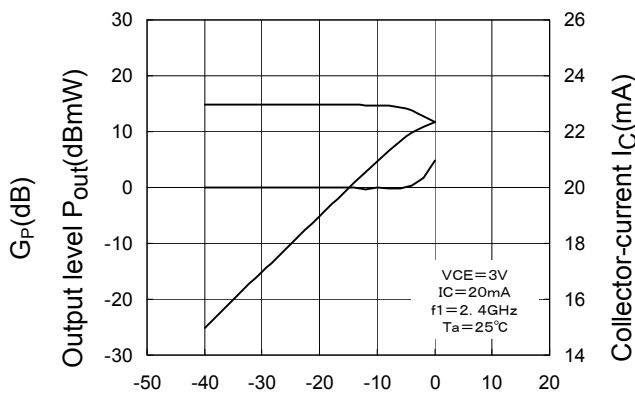
$P_{out}, G_p, I_C - P_{in}$



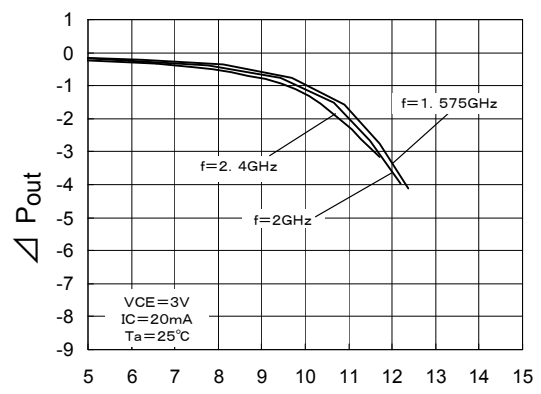
Input level P_{in} (dBmW)

Input level P_{in} (dBmW)

$P_{out}, G_p, I_C - P_{in}$



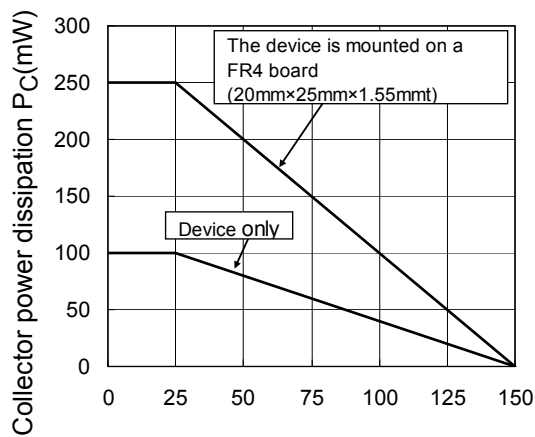
$\Delta P_{out} - P_{out}$



Input level P_{in} (dBmW)

Output level P_{out} (dBmW)

$P_C - T_a$



Ambient temperature T_a (°C)

Note4: The graphs indicate nominal characteristics.

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