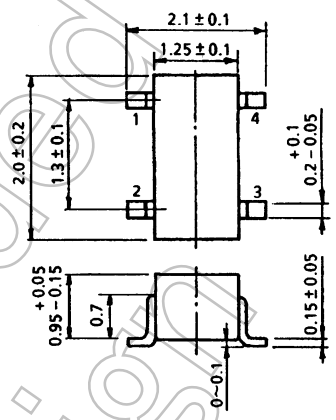
TOSHIBA Transistor Silicon-Germanium NPN Epitaxial Planer Type

MT4S301U

○ UHF-SHF Low Noise Amplifier Application

Unit:mm



1. Collector
2. Emitter
3. Base
4. Emitter

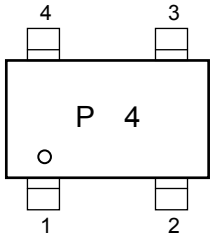
USQ	
JEDEC	―
JEITA	―
TOSHIBA	2-2K1E

Weight: 6 mg (Typ.)

FEATURES

- Low Noise Figure :NF=0.57dB(Typ.) (@f=2GHz)
- High Gain :$|S21e|^2$=18.1dB(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	35	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

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=15mA	23	27.5	—	GHz
Insertion Gain	$\|S21e\|^2$(1)	V_{CE}=3V, I_C=15mA,f=2GHz	15.5	18.1	—	dB
	$\|S21e\|^2$(2)	V_{CE}=3V, I_C=15mA,f=5.8GHz	9.5	11.5	—	dB
Noise Figure	NF(1)	V_{CE}=3V, I_C=7mA, f=2GHz	—	0.57	0.7	dB
	NF(2)	V_{CE}=3V, I_C=7mA,f=5.8GH	—	1.51	—	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	hFE	V_{CE}=3V, I_C=5mA	200	—	400	-
Reverse Transfer Capacitance	C_{re}	V_{CB}=1V, I_E=0, f=1MHz (Note3)	—	0.09	0.17	pF

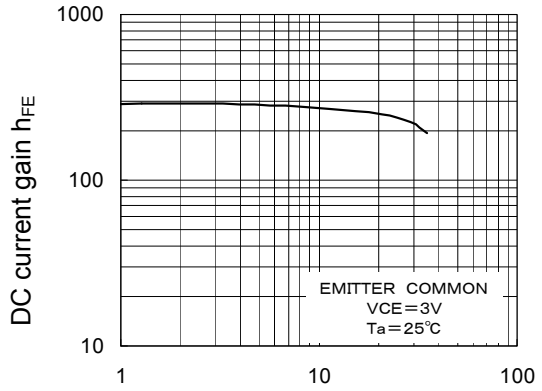
Note3: Cre is measured by 3 terminal method with capacitance bridge.

Caution:

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

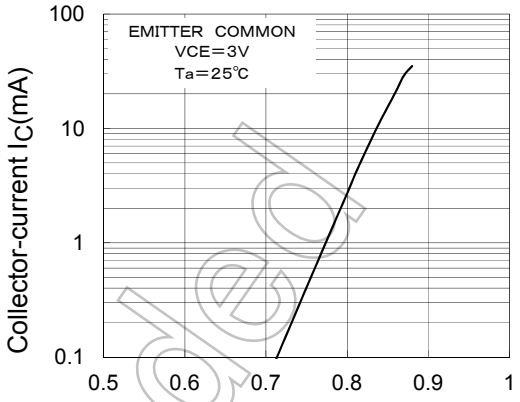
Please make enough tool and equipment earthed when you handle.

h_{FE}-I_C



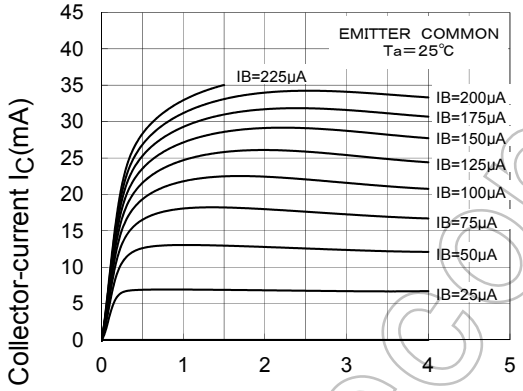
Collector-current I_C(mA)

I_C-V_{BE}



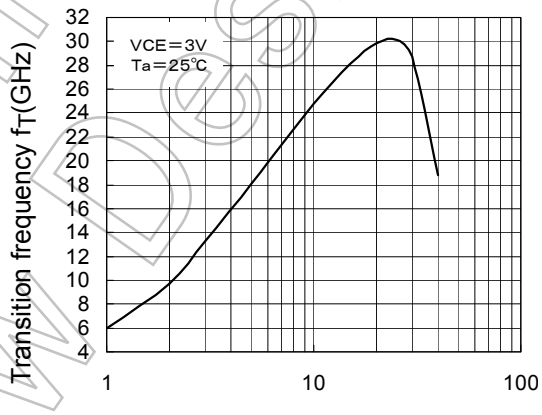
Base-emitter voltage V_{BE}(V)

I_C-V_{CE}



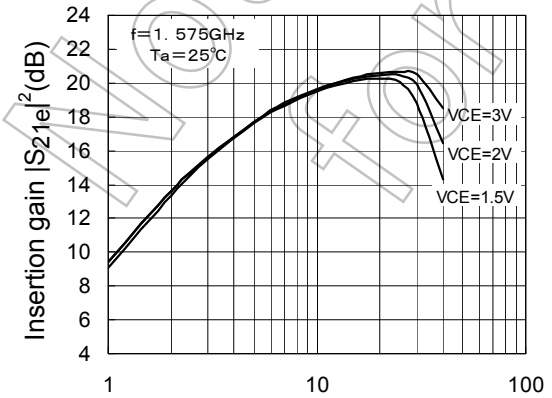
Collector-emitter voltage V_{CE}(V)

f_T-I_C



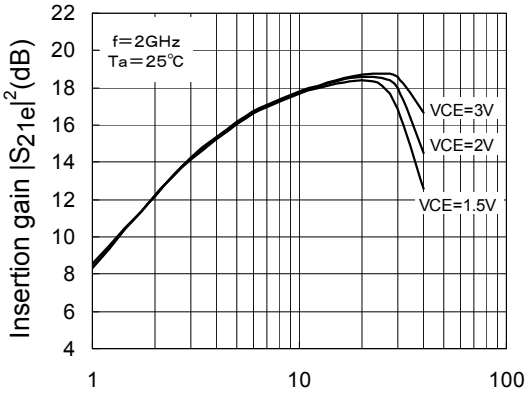
Collector-current I_C(mA)

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



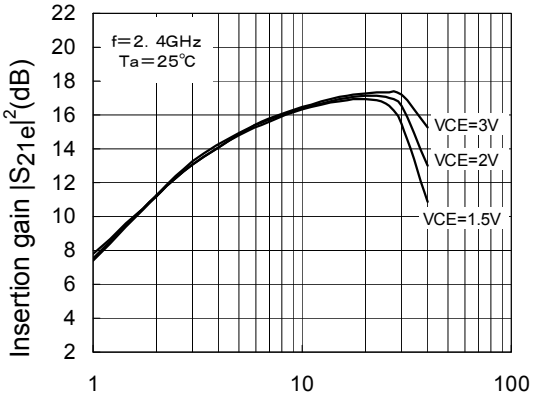
Collector-current I_C(mA)

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



Collector-current I_C(mA)

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



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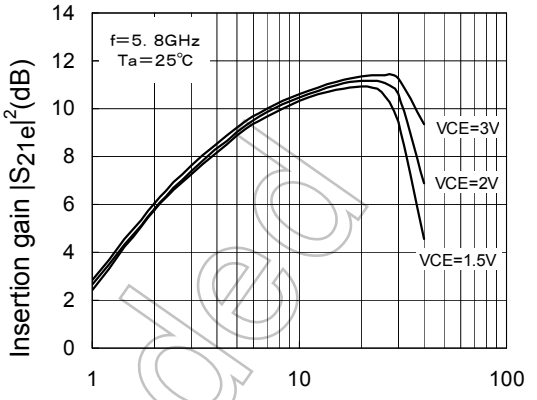
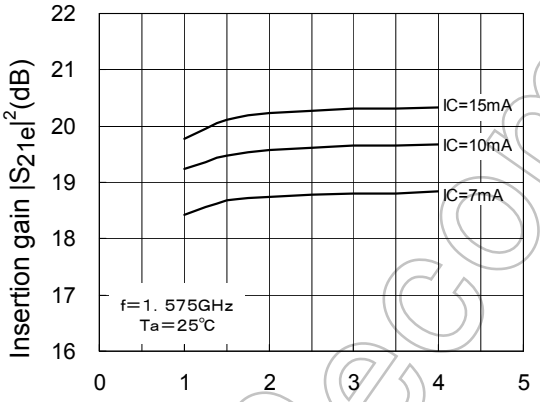


$|S_{21e}|^2$-V_{CE}



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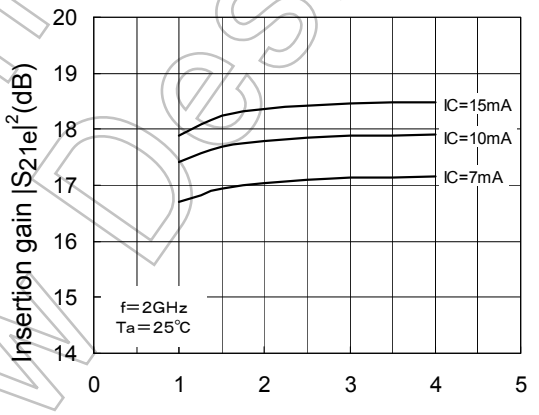

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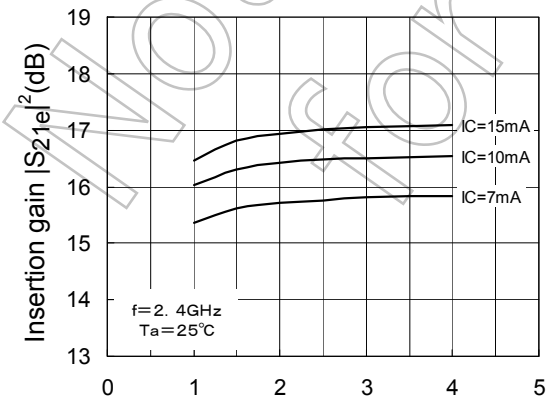

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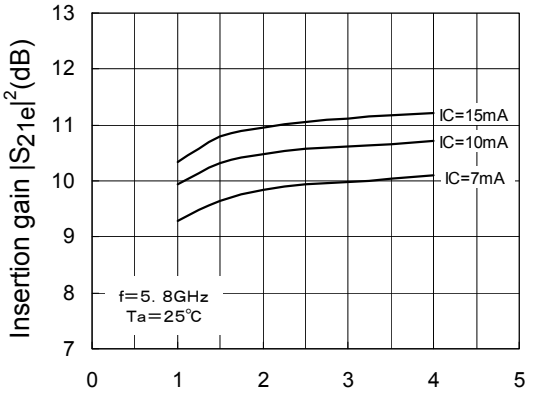
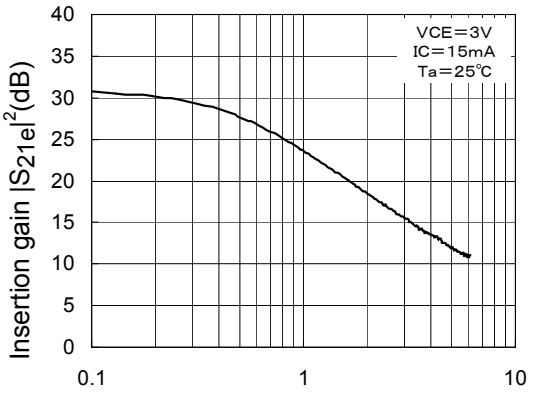
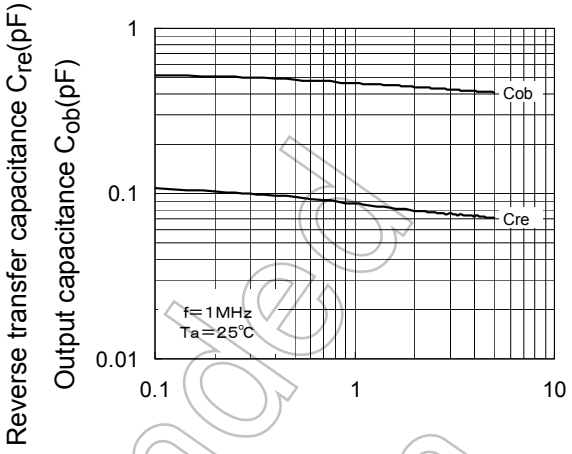


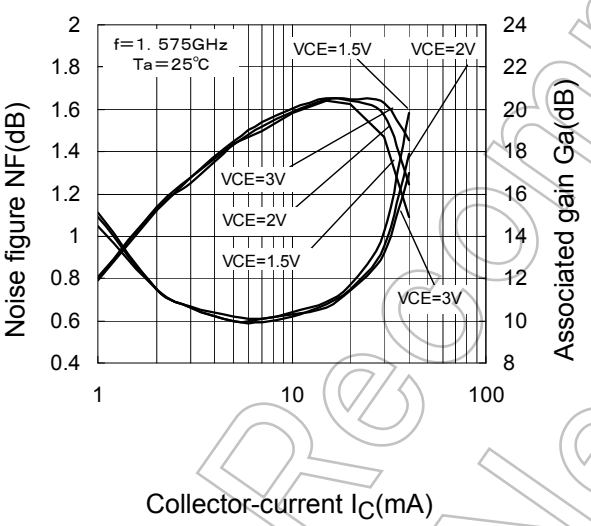
$|S_{21e}|^2$- f



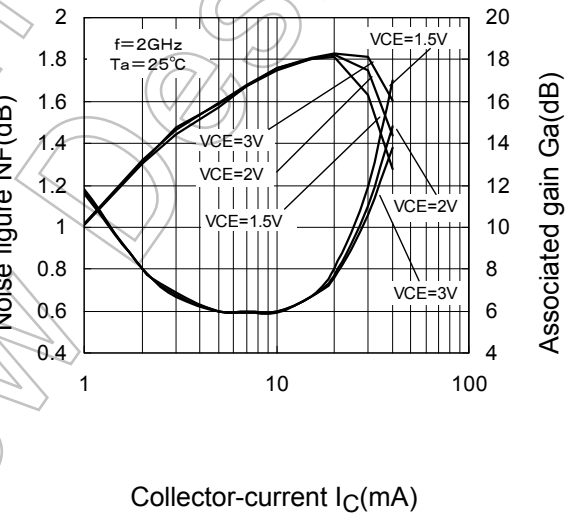
C_{re} ,C_{ob}-V_{CB}



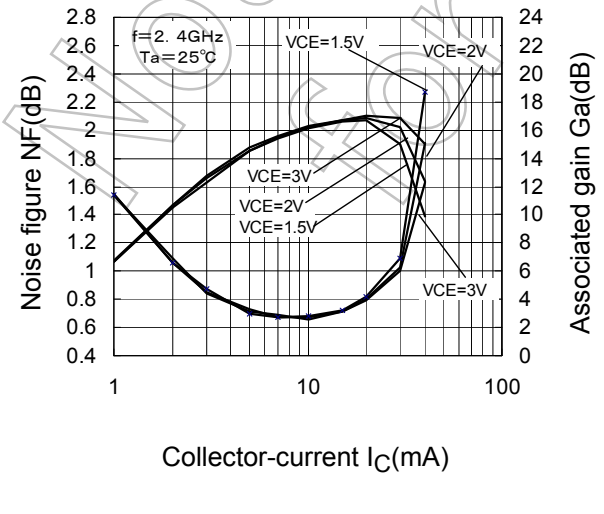
NF ,Ga-I_C



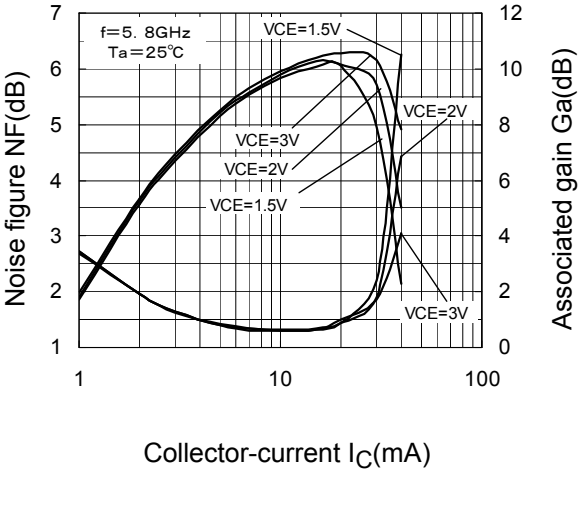
NF ,Ga-I_C



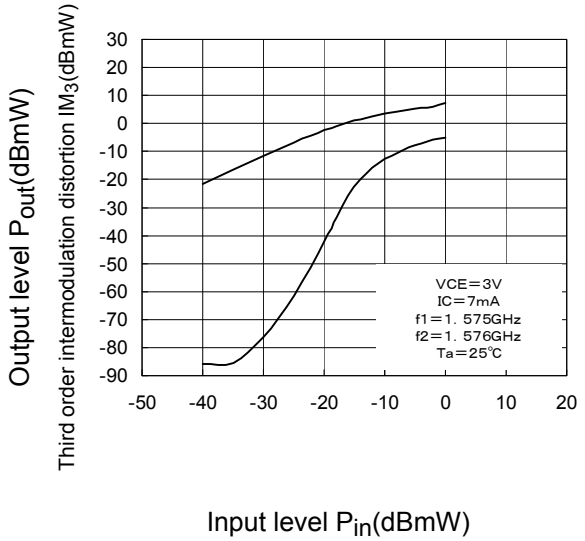
NF ,Ga-I_C



NF ,Ga-I_C



P_{out} ,IM_3-P_{in}



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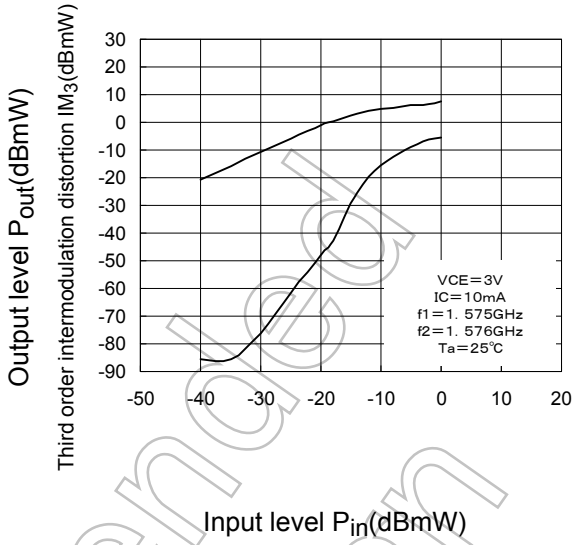

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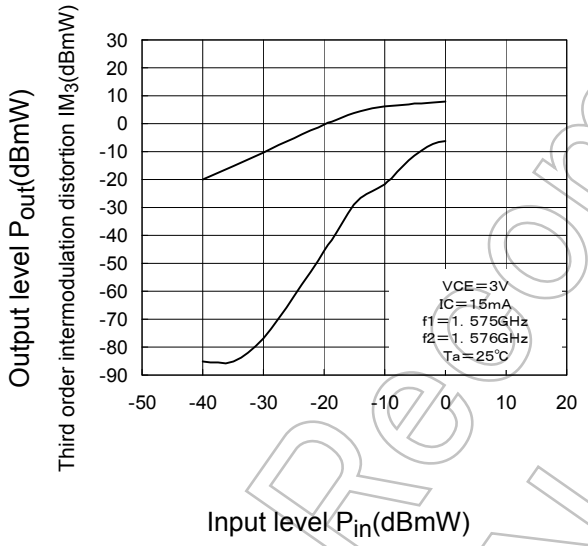

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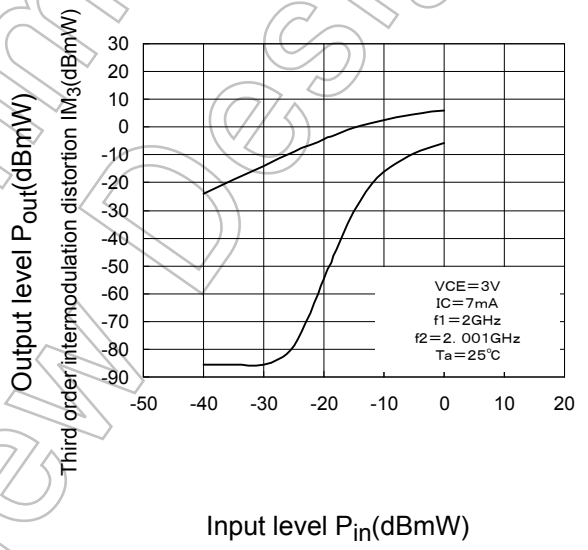

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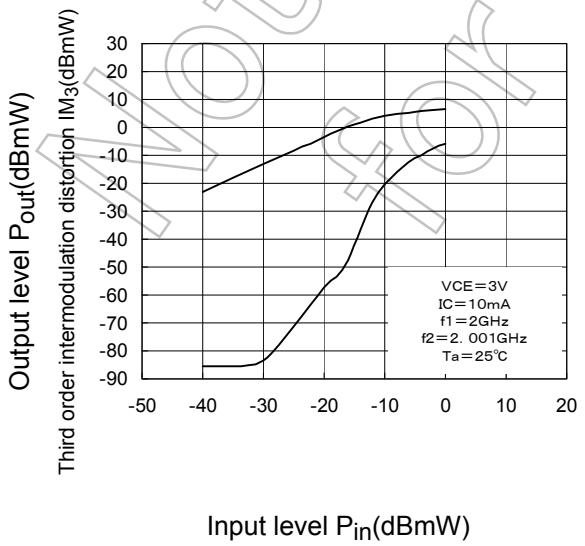

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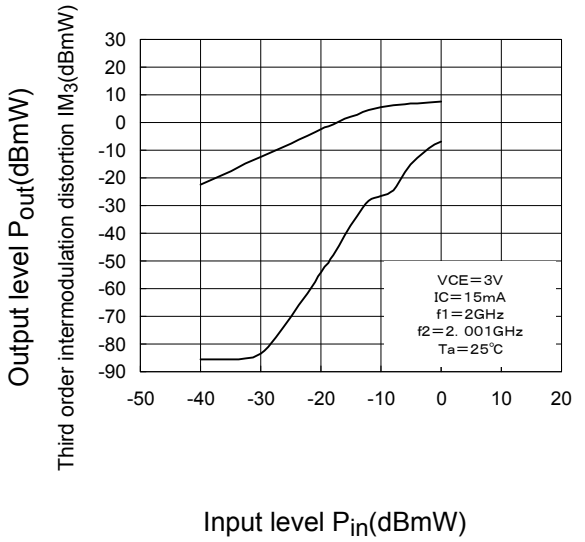

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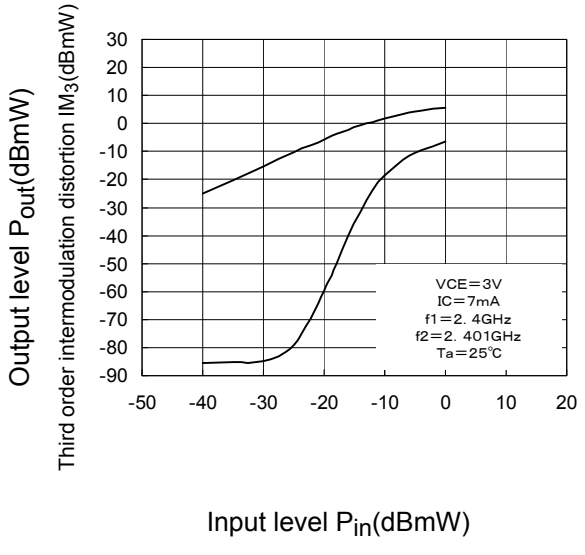

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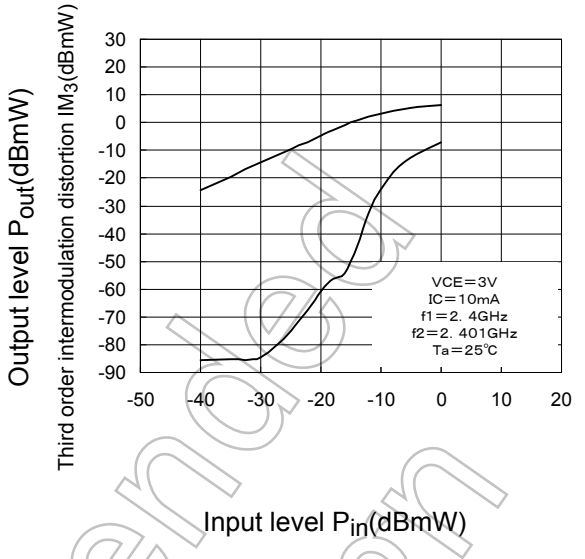

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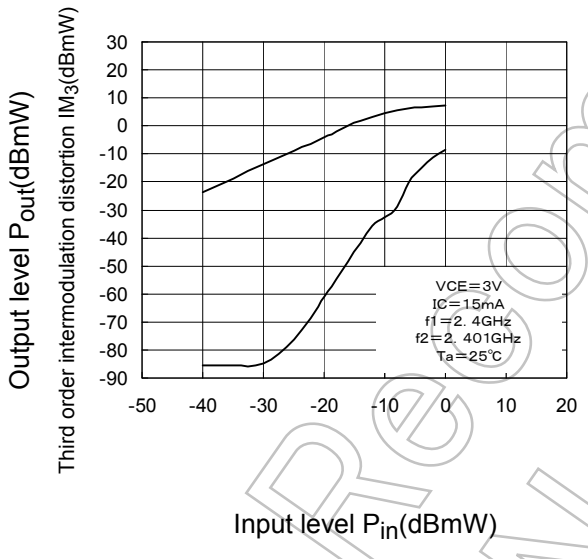
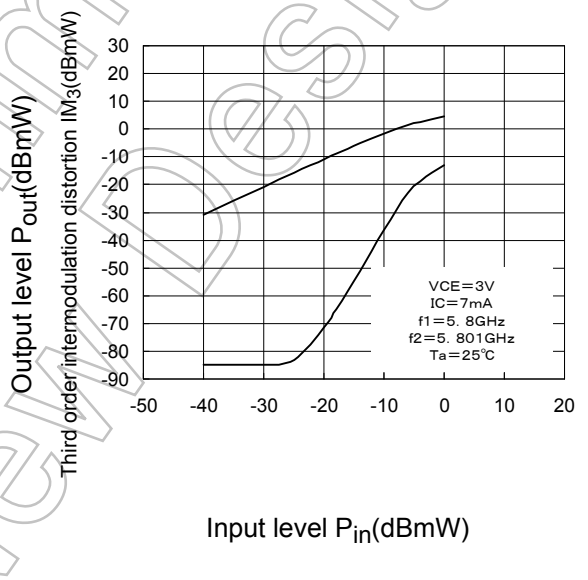


P_{out} ,IM_3-P_{in}



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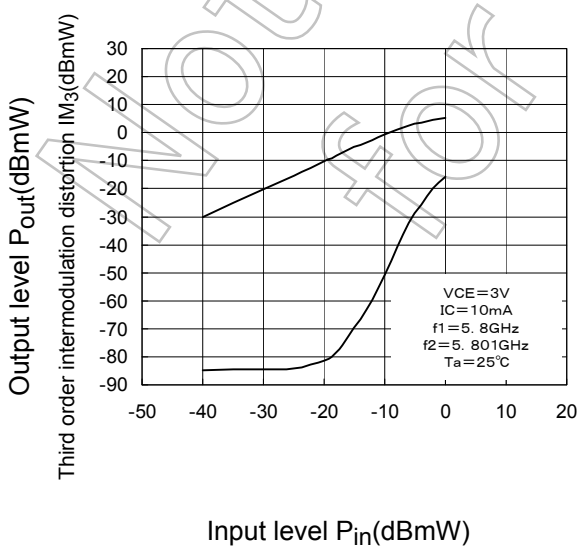

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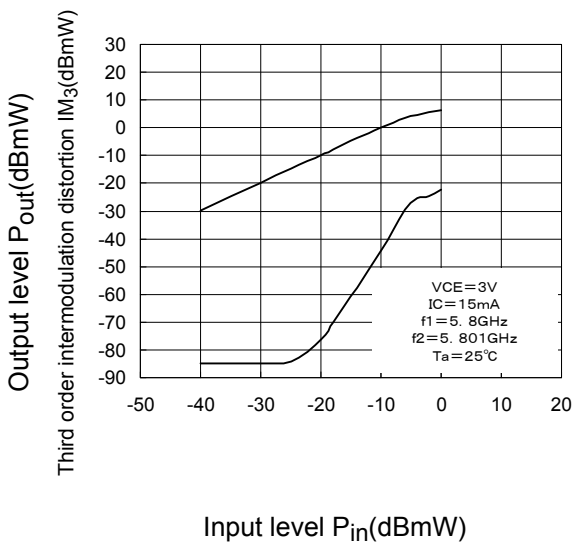
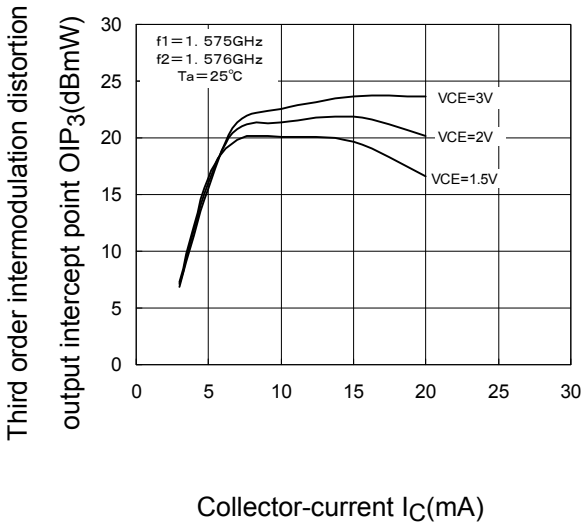


OIP_3-I_C



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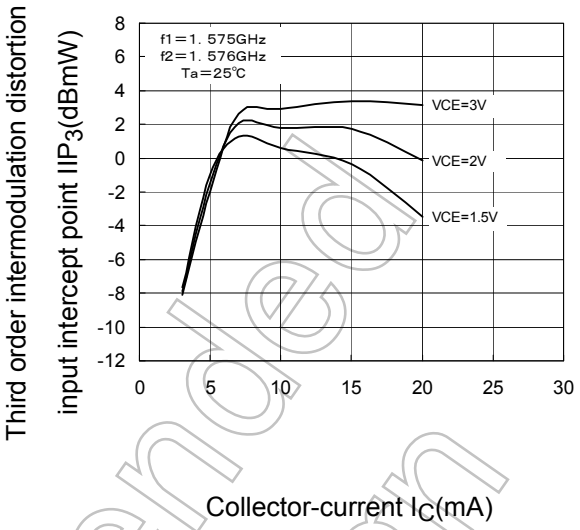

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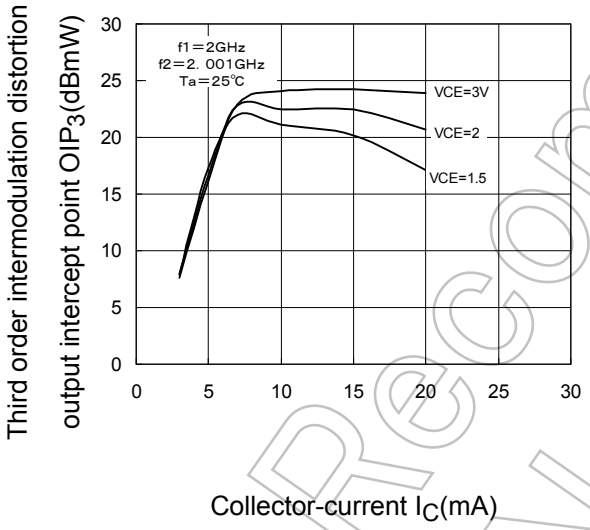

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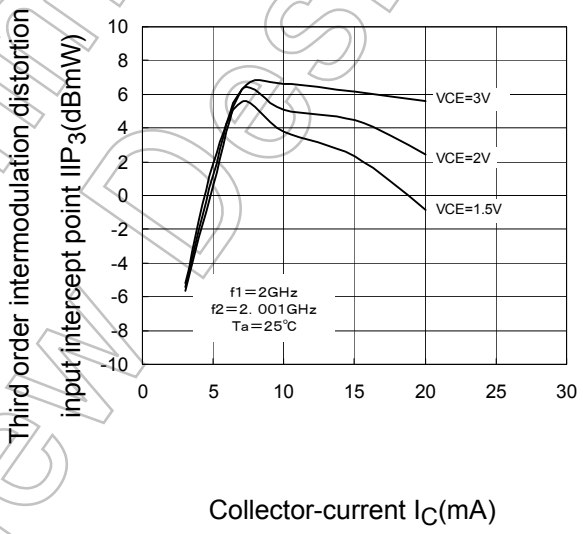

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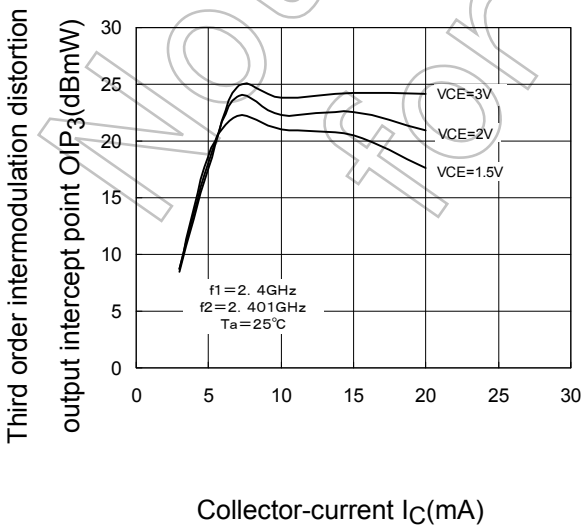

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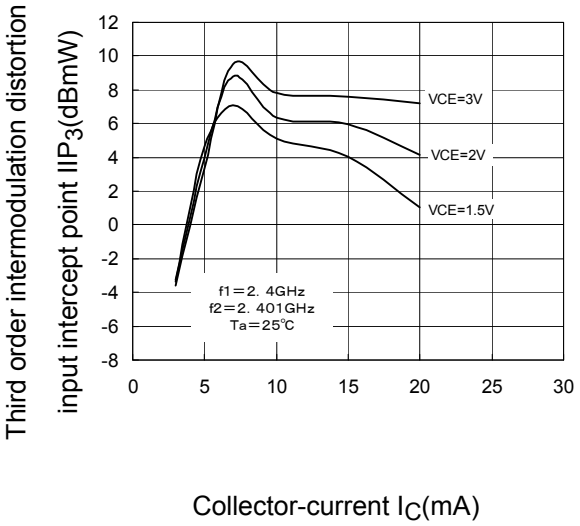

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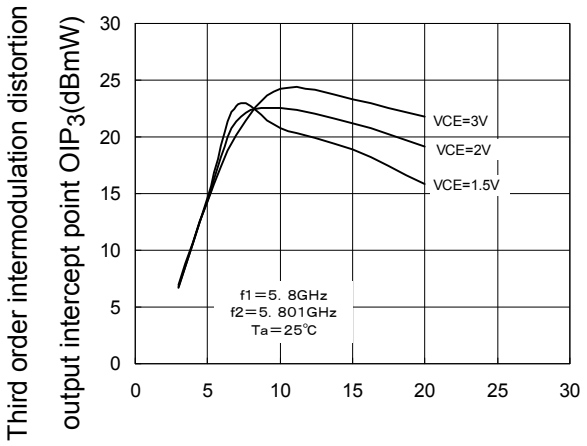

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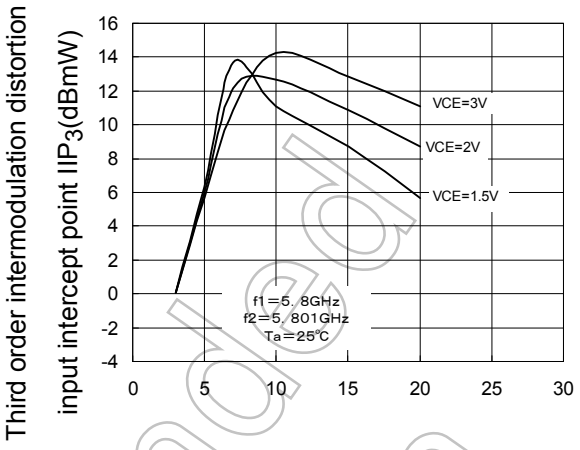
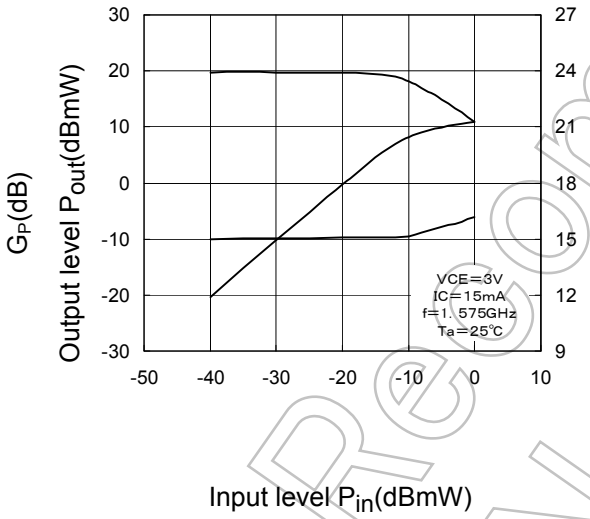
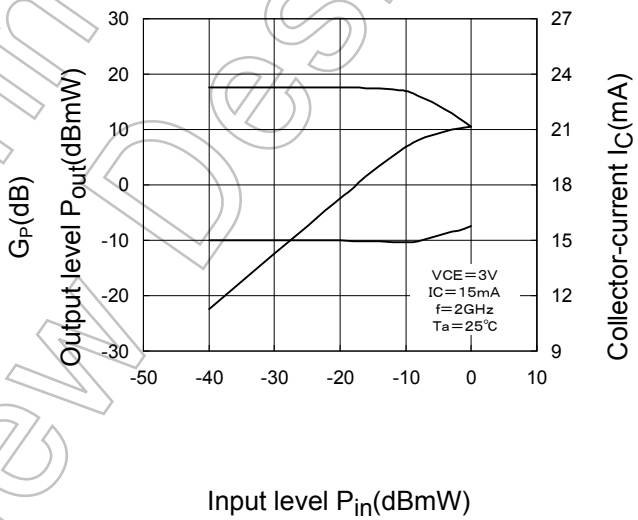


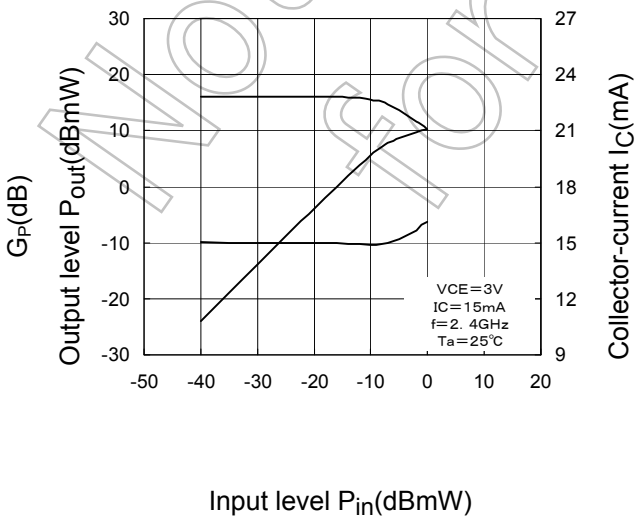
P_{out} ,Gp ,I_C-P_{in}



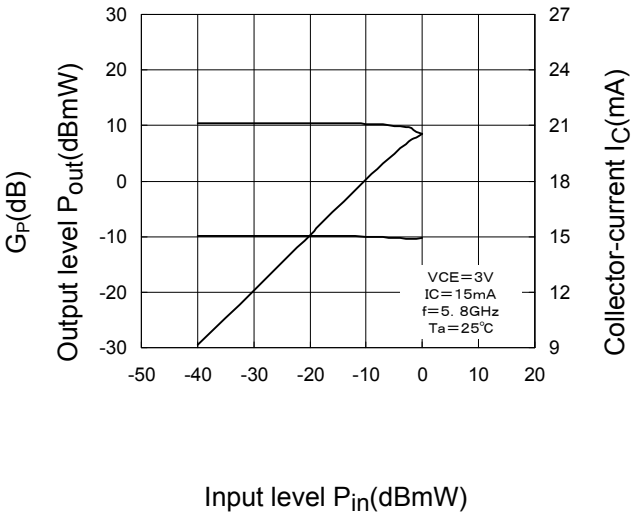
P_{out} ,Gp ,I_C-P_{in}



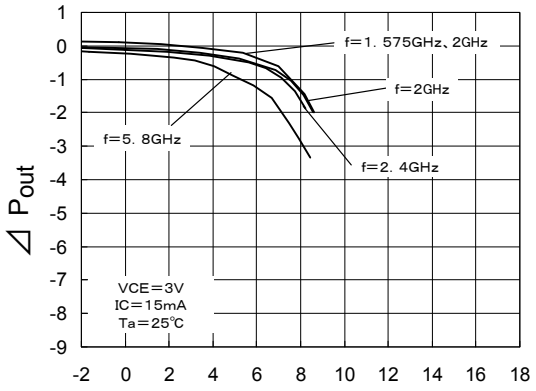
P_{out} ,Gp ,I_C-P_{in}



P_{out} ,Gp ,I_C-P_{in}

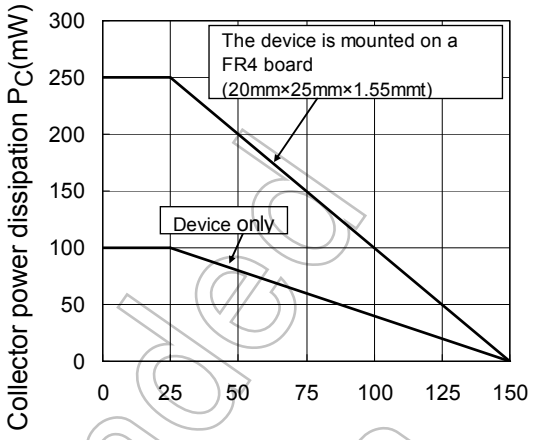


ΔP_{out}-P_{out}



Output level P_{out}(dBmW)

P_C-T_a



Ambient temperature T_a(°C)

Note4: The graphs indicate nominal characteristics.

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