TOSHIBA Linear Integrated Circuit Silicon-Germanium Monolithic

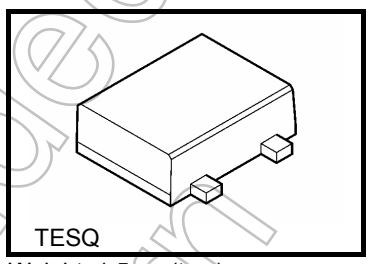
TA4032FT

○ UHF Band Low Noise Amplifier Applications

・Thin Extreme Super mini Quad Package (4pin) : TESQ

FEATURES

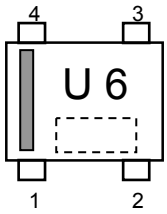
- Low Noise Figure: NF = 1dB (typ.) (@ f=1.575GHz)
- High Gain:$|S21e|^2$ = 14.8dB (typ.) (@ f=1.575GHz)
- ESD immunity level improvement of TA4020FT.



TESQ

Weight: 1.5mg (typ.)

Marking



No.	Pin Name
1	INPUT
2	GND
3	OUTPUT
4	V_{CC}

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Voltage at pin Vcc	V_{CC}	5	V
Output Voltage	V_{OUT}	3	V
Current into pin Vcc	I_{CC}	15	mA
Total Power dissipation	P_D	100	mW
Junction temperature	T_j	150	°C
Operate temperature Range	T_{opr}	−40 to 85	°C
Storage temperature Range	T_{stg}	−55 to 150	°C

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 and the operating ranges.
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).

Operation range

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Voltage supply	V_{CC}	—	2.5	3	5	V

Start of commercial production
2008-12

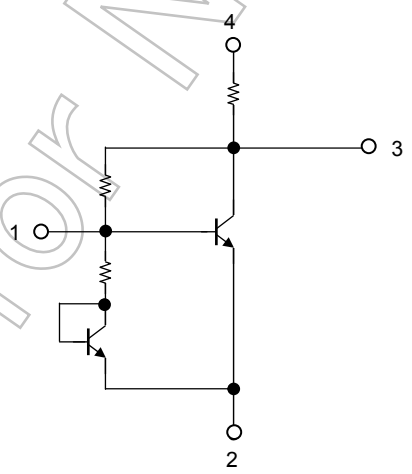
Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Circuit Current	I_{CC}	V_{CC} = 3V	3.8	5	6.5	mA
Insertion Gain	$\|S21e\|^2$(1)	V_{CC} = 3V, f = 1.575GHz $Z_S=Z_L=50\Omega$	13	14.8	—	dB
	$\|S21e\|^2$(2)	V_{CC} = 3V, f = 2GHz $Z_S=Z_L=50\Omega$	11	13	—	dB
	$\|S21e\|^2$(3)	V_{CC} = 3V, f = 2.4GHz $Z_S=Z_L=50\Omega$	10	11.7	—	dB
Noise Figure	NF(1)	V_{CC} = 3V, f = 1.575GHz $Z_S=Z_L=50\Omega$	—	1	1.2	dB
	NF(2)	V_{CC} = 3V, f = 2GHz $Z_S=Z_L=50\Omega$	—	1.05	1.25	dB
	NF(3)	V_{CC} = 3V, f=2.4GHz $Z_S=Z_L=50\Omega$	—	1.15	1.4	dB
3^{rd} order intermodulation distortion input intercept point	IIP3	V_{CC} = 3V, f = 1.575GHz , ⊿f = 1MHz $Z_S=Z_L=50\Omega$	-11	-8.2	—	dBmW
3^{rd} order intermodulation distortion output intercept point	OIP3	V_{CC} = 3V, f = 1.575GHz , ⊿f = 1MHz $Z_S=Z_L=50\Omega$	2	5.9	—	dBmW
Input return loss	RLin	V_{CC} = 3V, f = 1.575GHz $Z_S=Z_L=50\Omega$	—	5.6	—	dB
Output return loss	RLout	V_{CC} = 3V, f = 1.575GHz $Z_S=Z_L=50\Omega$	—	7.8	—	dB
Isolation	ISL	V_{CC} = 3V, f = 1.575GHz $Z_S=Z_L=50\Omega$	—	24.3	—	dB

Caution:

This device is sensitive to electrostatic discharge due to 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.



Equivalent Circuit

RF Test Circuit (Top View)

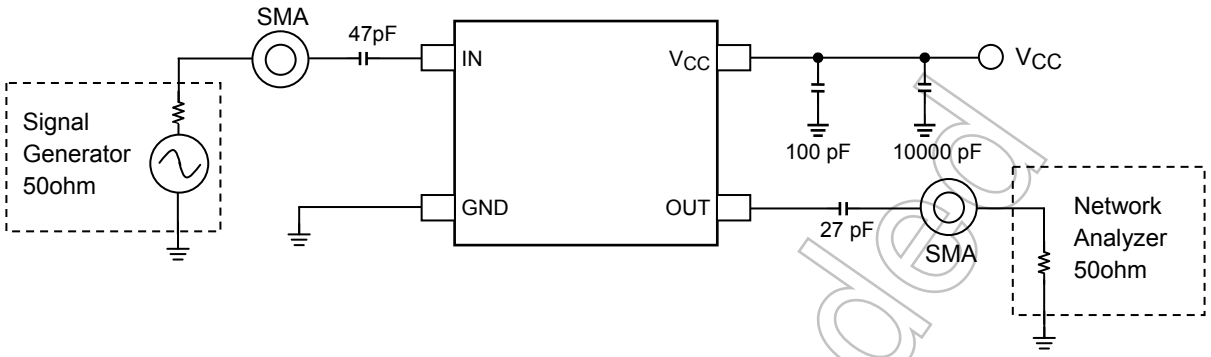


Fig.1 S21, RL_{in}, RL_{out}, ISL Test Circuit

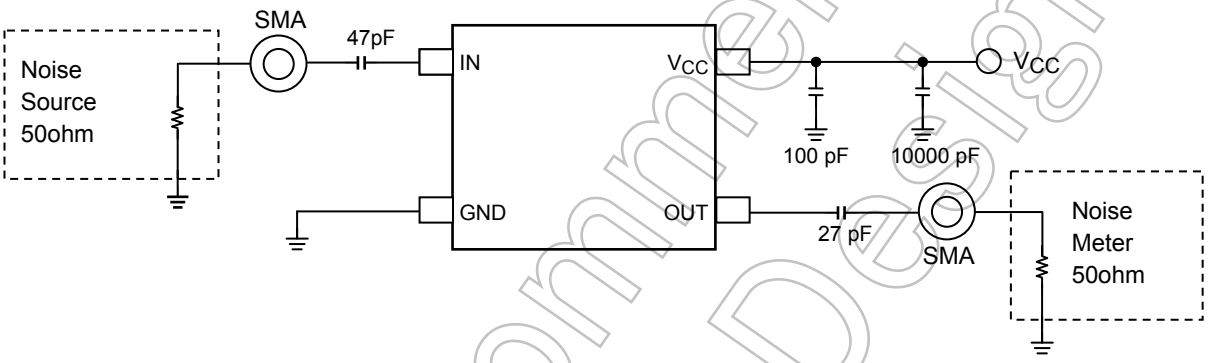


Fig.2 NF Test Circuit

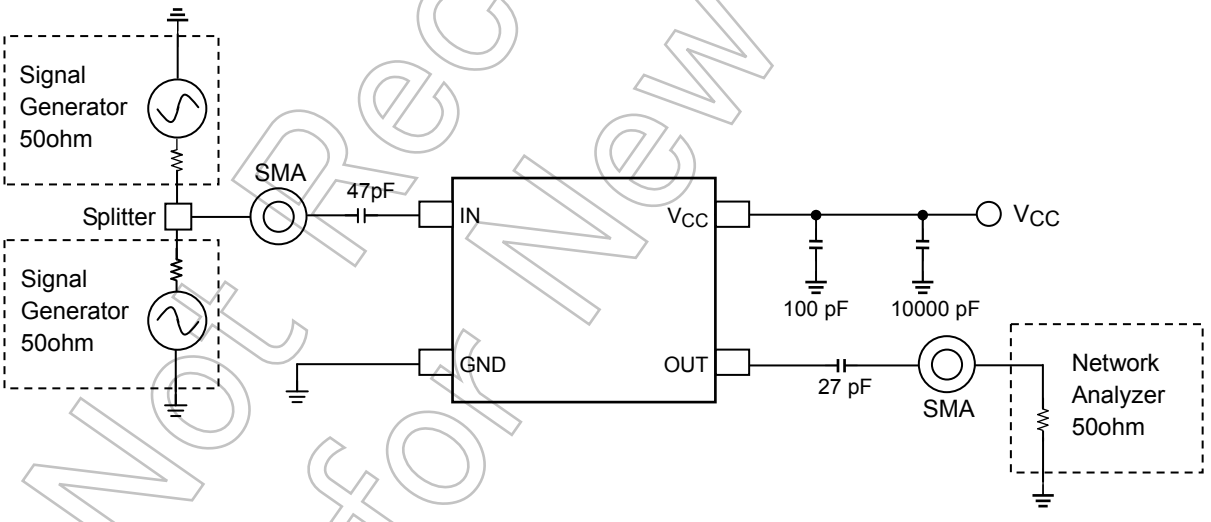


Fig.3 OIP_3, IIP_3 Test Circuit

Notice

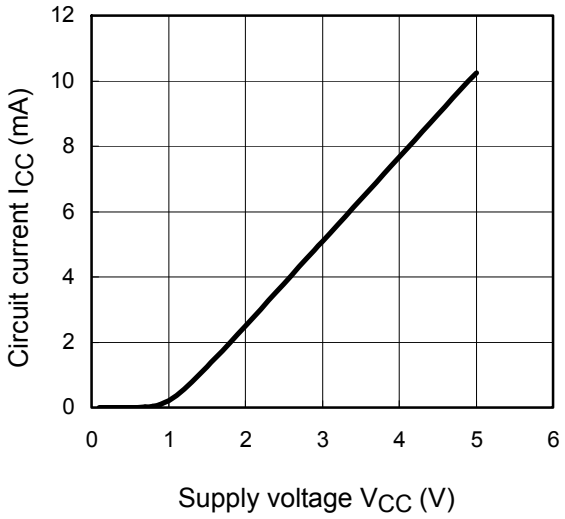
The circuits and measurements contained in this document are given only in the context of as examples of applications for these products.

Moreover, these example application circuits are not intended for mass production, since the high-frequency characteristics (the AC characteristics) of these devices will be affected by the external components which the customer uses, by the design of the circuit and by various other conditions.

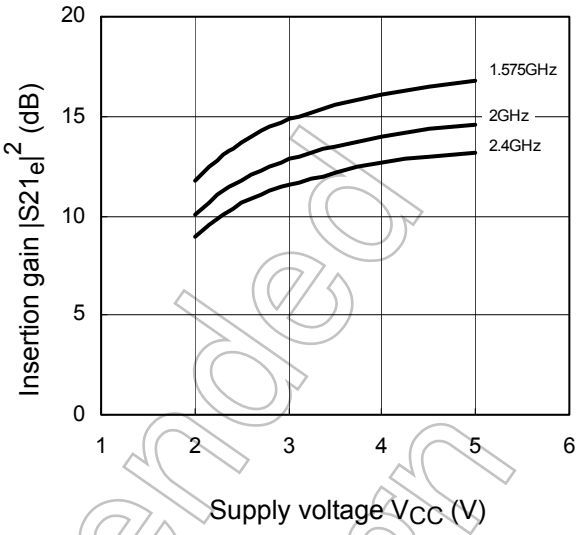
It is the responsibility of the customer to design external circuits which correctly implement the intended application, and to check the characteristics of the design.

TOSHIBA assume no responsibility for the integrity of customer circuit designs or applications.

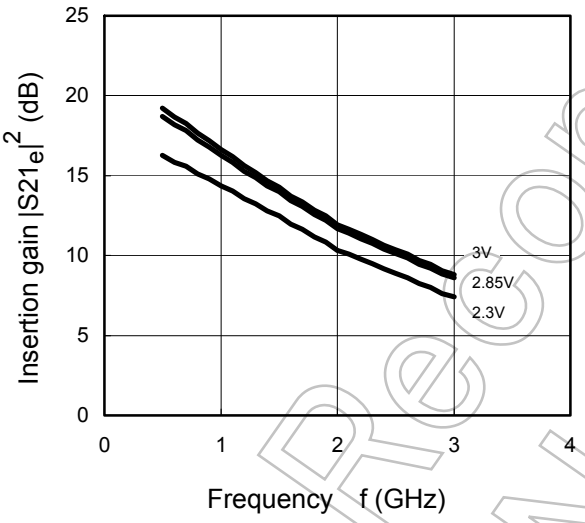
I_{CC}-V_{CC}



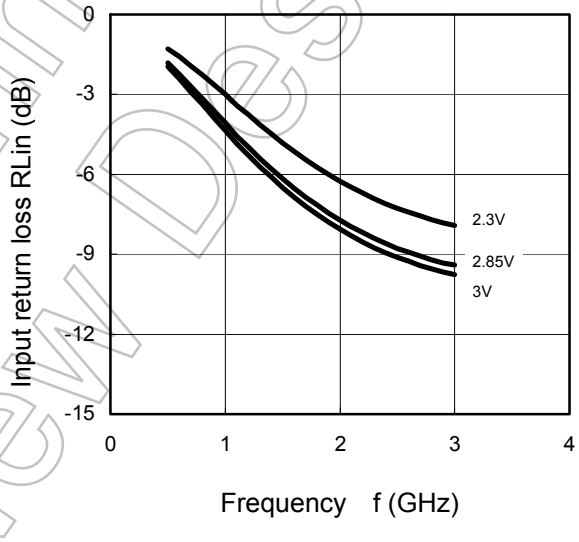
$|S21_e|^2$-V_{CC}



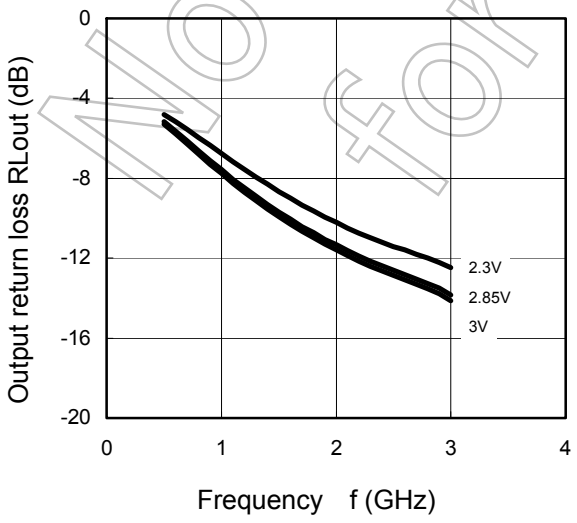
$|S21_e|^2$-f



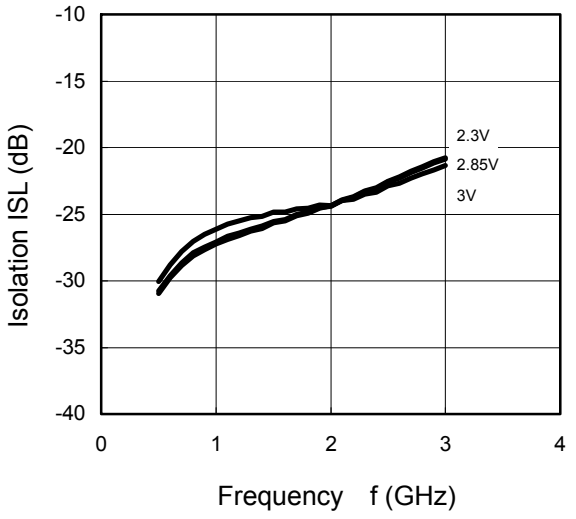
RL_{in} -f



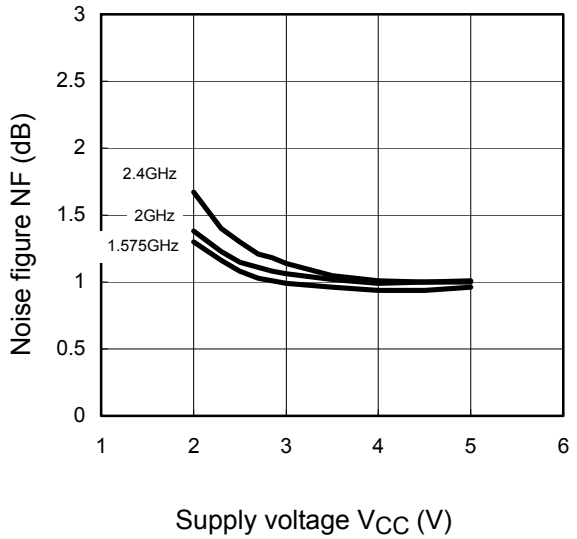
RL_{out}-f



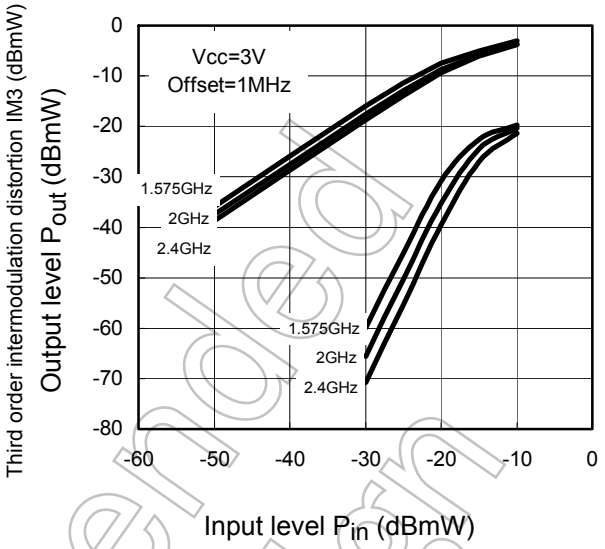
ISL - f



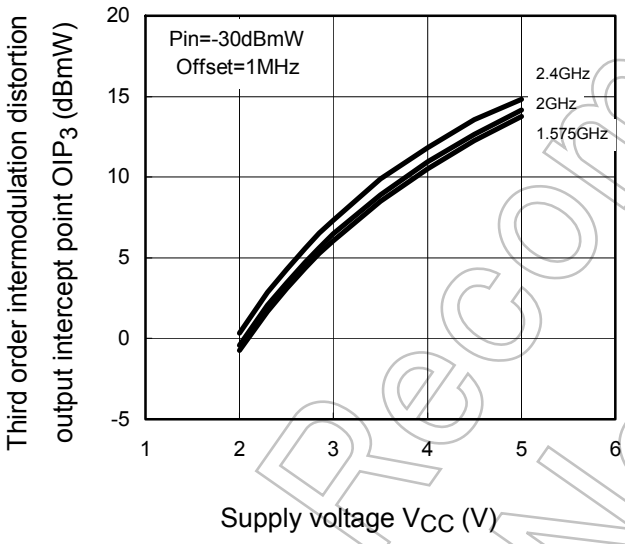
NF-V_{CC}



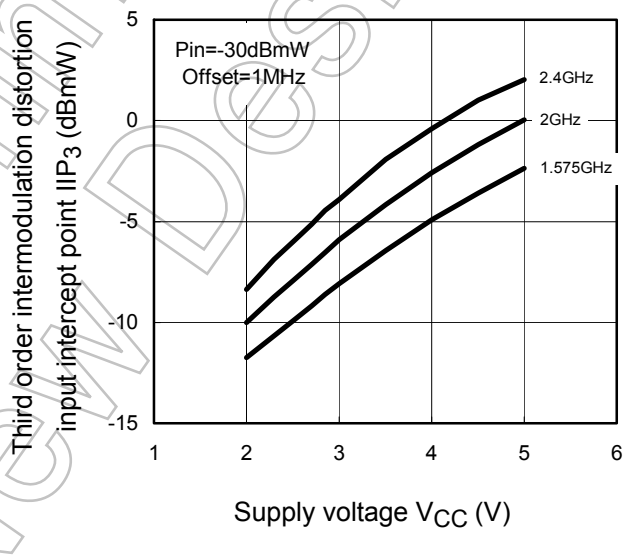
IM3/P_{out}-P_{in}



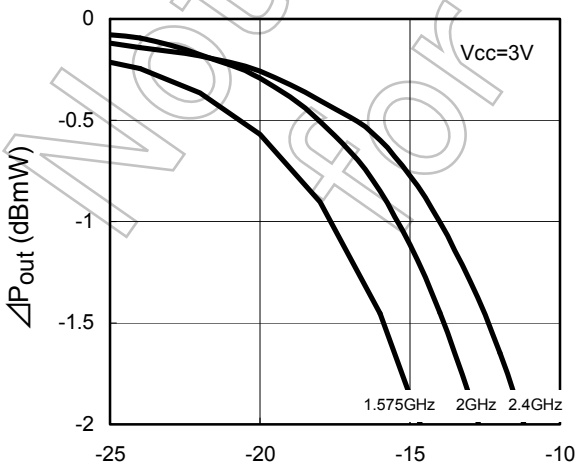
OIP_3-V_{CC}



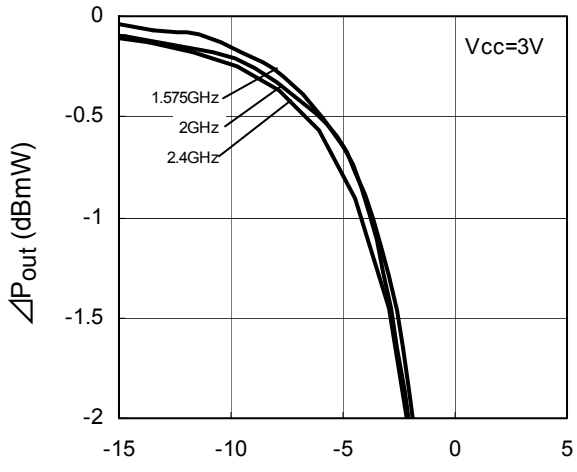
IIP_3-V_{CC}



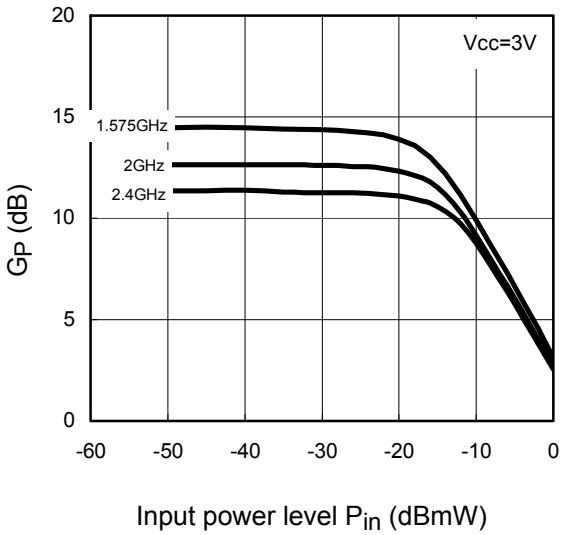
ΔP_{out}-P_{in}



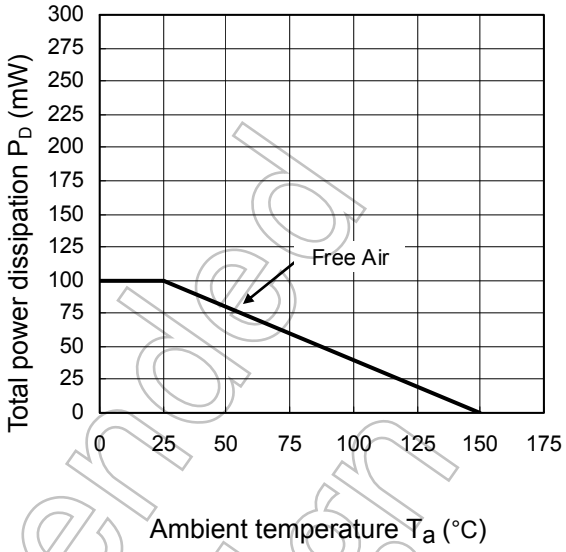
ΔP_{out}-P_{out}



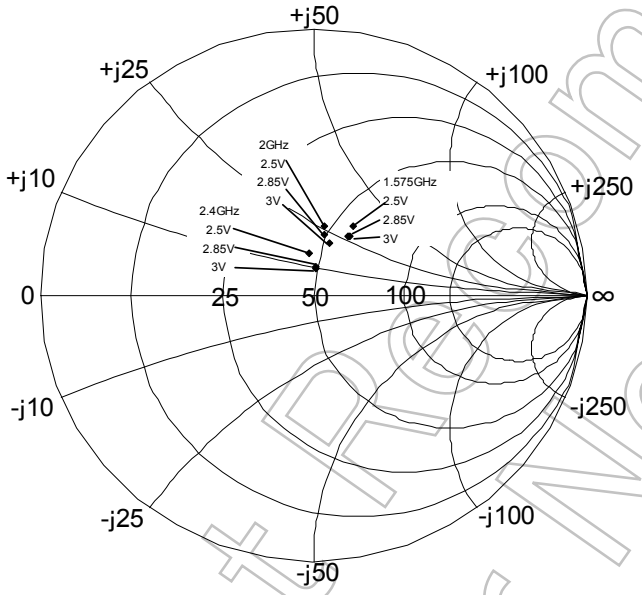
G_P-P_{in}



P_D-T_a



NFmin Γ opt

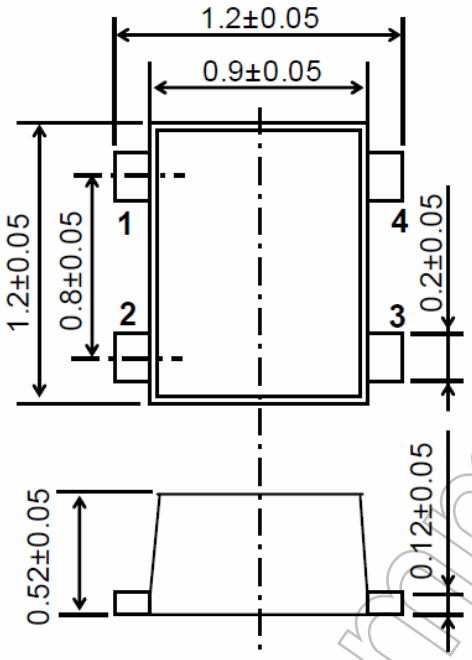


Frequency (GHz)	Vcc(V)	NFmin Γ opt			Rn
		NF(dB)	mag.(−)	ang.(°)	
1.575	3	0.85	0.255	58.3	8.1
	2.85	0.87	0.258	60.2	8.4
	2.5	0.89	0.295	60.6	9.2
2	3	0.95	0.201	73.8	8.3
	2.85	0.96	0.229	80.2	7.3
	2.5	0.97	0.263	81.3	6.8
2.4	3	1.05	0.159	95.3	6.9
	2.85	1.10	0.107	86.2	6.2
	2.5	1.17	0.097	85.8	6.0

Package Dimensions

Unit: mm

SON4-P-0101-0.80



Weight: 1.5 mg (Typ.)

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