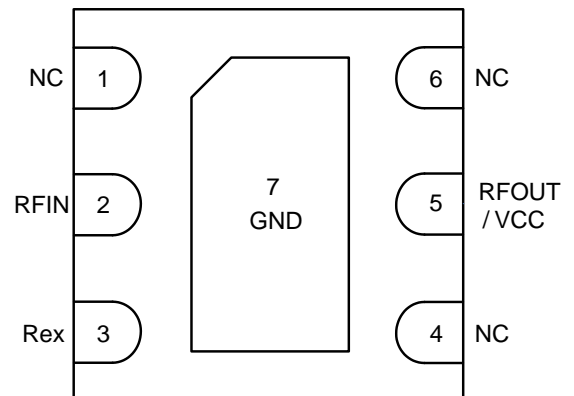


Features

- 50MHz to 8GHz operational
- Gain $\geq 18\text{dB}$ up to 8GHz
- $\pm 1.5\text{dB}$ Wideband flat Gain up to 8GHz
- 18.5dB Gain at 3.5GHz
- +35 dBm OIP3 at 3.5GHz
- OIP3 $\geq +34.5$ dBm between 3.2GHz and 3.8GHz
- OIP3 $\geq +34$ dBm between 2.3GHz and 2.7GHz
- 5V single typical supply, 10mA~93mA operational
- Controllable Gain/Current with Rex
- Linearity and thermal compensation with Integrated Active Bias Circuit
- Industry Standard DFN2x2-6L Package
- ESD protection all ports above 1000V HBM



Functional Block Diagram

Applications

- | | |
|--------------------------------|--------------------|
| ■ 5G mobile application/m-MIMO | ■ TDD/FDD System |
| ■ WLAN / WiMAX / WiBro | ■ GSM / CDMA / PCS |
| ■ WCDMA / LTE | ■ CATV |
| ■ GPS / COMPASS | ■ ISM |

Product Description

The YG802020W is a cascadable high performance InGaP/GaAs HBT MMIC broadband gain block amplifier with controllable Gain and device current. It covers the 50MHz-8GHz frequency band and provides a very flat gain. At 3.5GHz, the amplifier provides 18.5dB gain, 21dBm P1dB and 35dBm OIP3 while drawing 93mA current from a 5V single supply. The YG802020W is internally matched to 50Ω and assembled in an industry standard DFN2x2-6L package. It is internally integrated with ESD protection unit.

Pin Description

Pin No.	Symbol	Description
1,4,6	NC	No Connection
2	RFIN	RF input
5	RFOUT/VCC	RF output and bias
3	Rex	Gain and Device Current controlling ⁽¹⁾
7	GND	Ground connected

Notes: The Current and Gain can be controlled by the external resistor connected between Rex and RFIN. When the resistor is 0Ω, Device is shut down.

Absolute Maximum Ratings

Parameter	Rating	Unit
Input RF Power	+20	dBm
Supply Voltage	6	V
Device Current	150	mA
Operating Ambient Temperature	-40 to +85	°C
Storage Temperature	-40 to +150	°C



Caution!

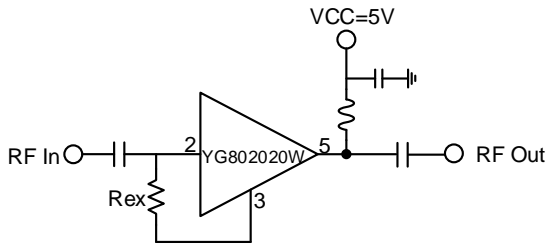
Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability.

Electrical Specifications

Parameter	Condition ⁽¹⁾	Specification			Unit
		Min.	Typ.	Max.	
Operational Frequency Range		50		8000	MHz
Test Frequency			3500		MHz
Small Signal Gain			18.5		dB
Gain Flatness	3000M~4000M	0.11			dB
P1dB Output Power			21		dBm
Input Return Loss			15		dB
Output Return Loss			12		dB
Reverse Isolation			26		dB
OIP3	Pout=0dBm/ tone, Δf = 1MHz		35.8		dBm
Noise Figure			5.1		dB
Supply Voltage			5		V
Device Current	ON, Normal operation, Rex=∞		93		mA
	OFF, Shut down, Rex=0		1		mA

Notes: Test condition unless otherwise noted: Vcc=+5V, Temp=+25°C, Rex=∞, 50Ω system.

Device Current vs. Controlling Resistor



Device Current vs. Controlling Resistor R_{ex}

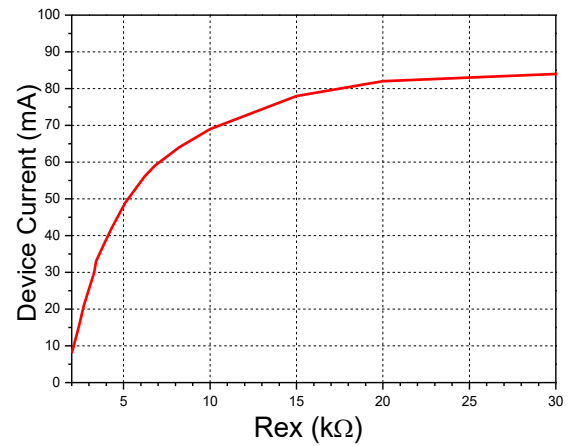


Table: Device Current vs. Controlling Resistor R_{ex}

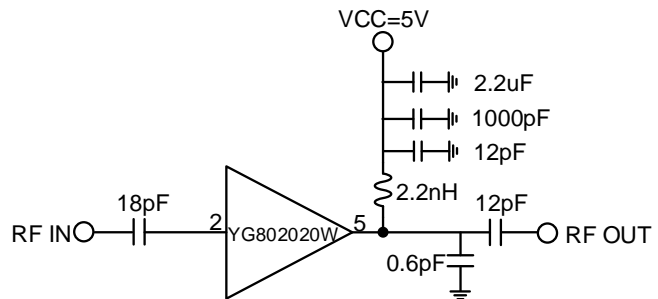
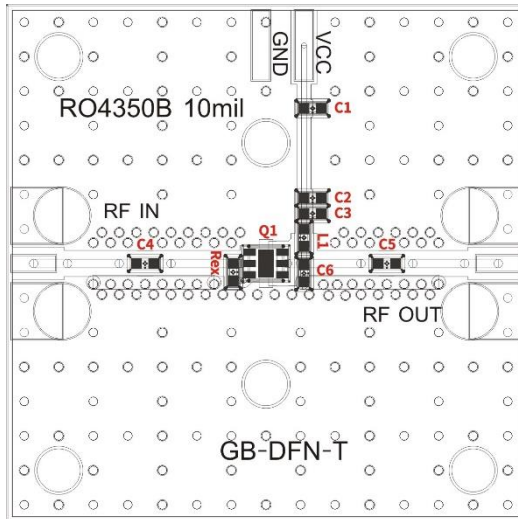
R (KΩ)	0	2.3	2.8	3.2	4	5.1	7.1	10.8	17.4	open
Current(mA)	1	10	20	30	40	50	60	70	80	90

Notes:

1. Test condition unless otherwise noted: $V_{cc}=+5V$, $Temp=+25^{\circ}C$, 50Ω system.
2. When the resistor R_{ex} is 0Ω , Device is shut down.

Evaluation Board-YG802020WEVB-01

3200MHz~3800MHz Application



Bill of material

Reference Des.	Value	Description	Manuf.	Part Number
PCB		Printed circuit Board		
Q1		YG802020W,DFN2x2_6L	Innotion	YG802020W
C1	2.2uF	CAP, 2.2uF,0402,	various	
C2	1000pF	CAP,1000pF,0402	various	
C3	12pF	CAP,12pF,0603	Dalicap	
C4	18pF	CAP,18pF,0603	Dalicap	
C5	12pF	CAP,12pF,0603	Dalicap	
C6	0.6pF	CAP,0.6pF,0603	Dalicap	
L1	2.2nH	IND,2.2nH,0603	Coilcraft	

Typical performance on EVB

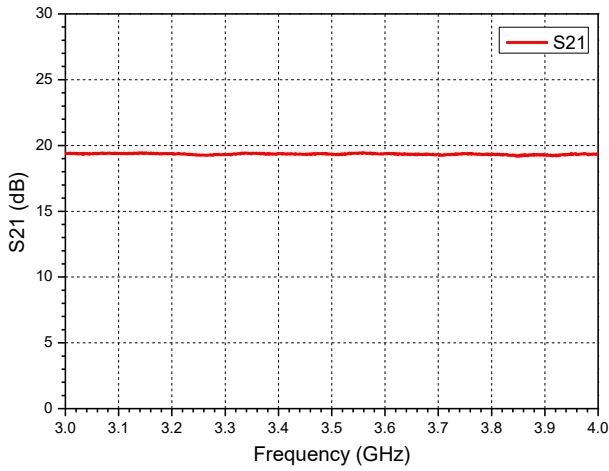
Parameter	Typical Value							Unit
	3.2	3.3	3.4	3.5	3.6	3.7	3.8	
Frequency								GHz
Small Signal Gain	19.34	19.32	19.35	19.35	19.39	19.24	19.27	dB
Input Return Loss	12	12	12.4	12.9	13.1	13.3	13.5	dB
Output Return Loss	11.6	11.7	10.3	10	8.6	8.3	8	dB
Reverse Isolation	25	25	25	25	25	25	25	dB
Output P1dB	21.2	21.1	21	21	21.1	21	21	dBm
OIP3	35.6	36	36.1	35.8	35.7	35.1	34.7	dBm

Notes:

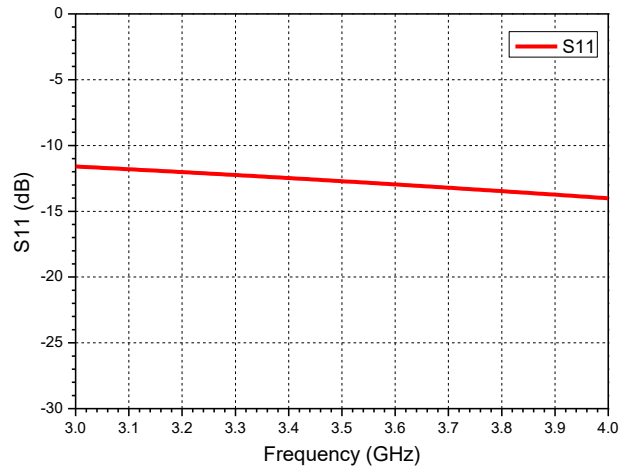
1. Test condition unless otherwise noted: Vcc=+5V, Temp=+25°C, Rex=∞, 50Ω system.
2. OIP3 measured with two tones at an output power of 0dBm/ tone separated by 1MHz.

Performance plots⁽¹⁾

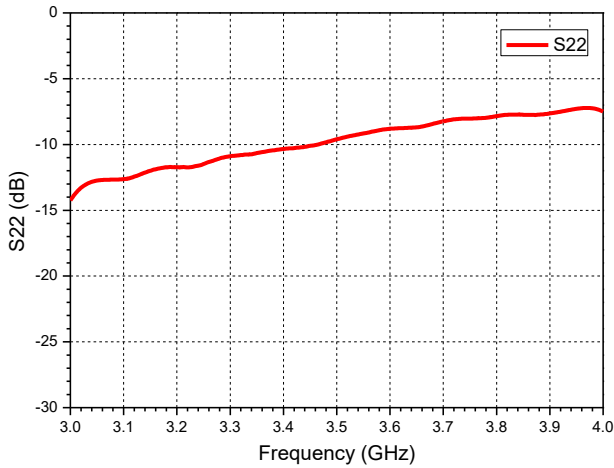
Gain vs. Frequency



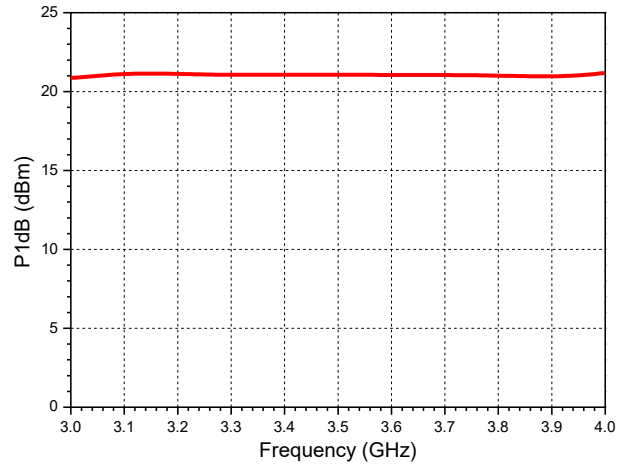
Input Return Loss vs. Frequency



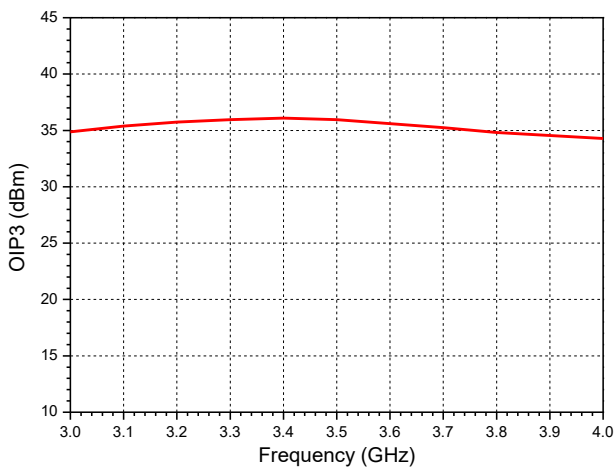
Output Return Loss vs. Frequency



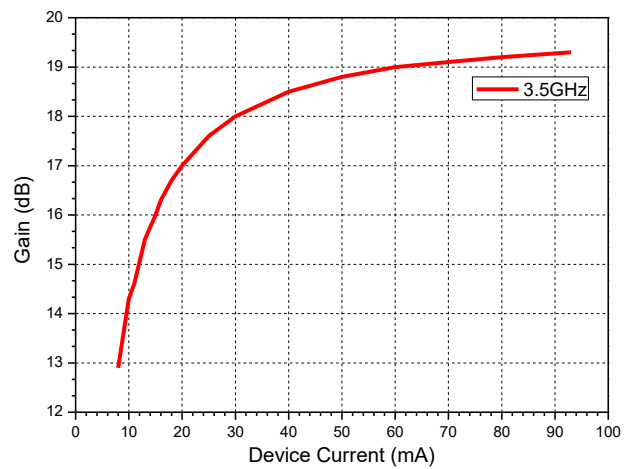
P1dB vs. Frequency



OIP3 vs. Frequency



Gain vs. Current⁽²⁾

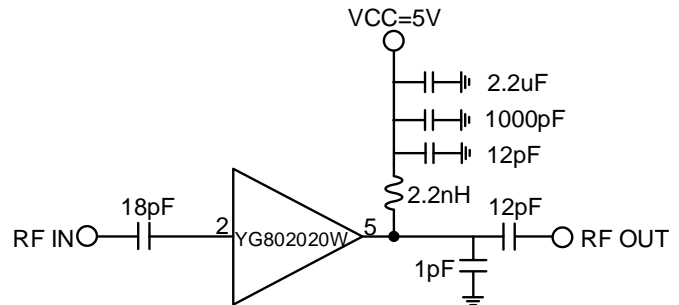
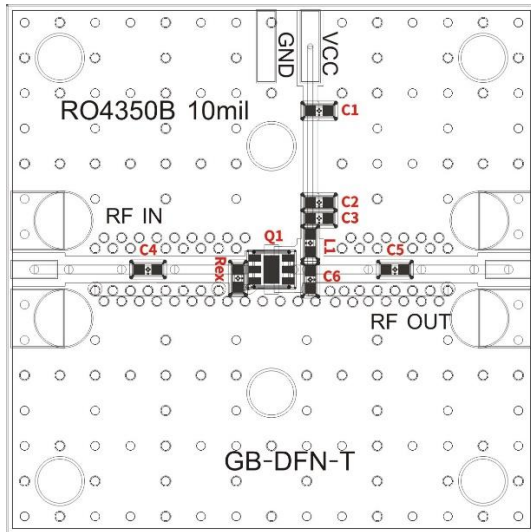


Notes:

1. Test condition unless otherwise noted: Vcc=+5V, Temp=+25°C, Rex=∞, 50Ω system.
2. The Device Current in 'Gain vs. current' can be achieved from external resistor Rex.

Evaluation Board-YG802020WEVB-02

2300MHz~2700MHz Application



Bill of material

Reference Des.	Value	Description	Manuf.	Part Number
PCB		Printed circuit Board		
Q1		YG802020W,DFN2x2_6L	Innotion	YG802020W
C1	2.2uF	CAP, 2.2uF,0402,	various	
C2	1000pF	CAP,1000pF,0402	various	
C3	12pF	CAP,12pF,0603	Dalicap	
C4	18pF	CAP,18pF,0603	Dalicap	
C5	12pF	CAP,12pF,0603	Dalicap	
C6	1pF	CAP,1pF,0603	Dalicap	
L1	2.2nH	IND,2.2nH,0603,	Coilcraft	

Typical performance on EVB

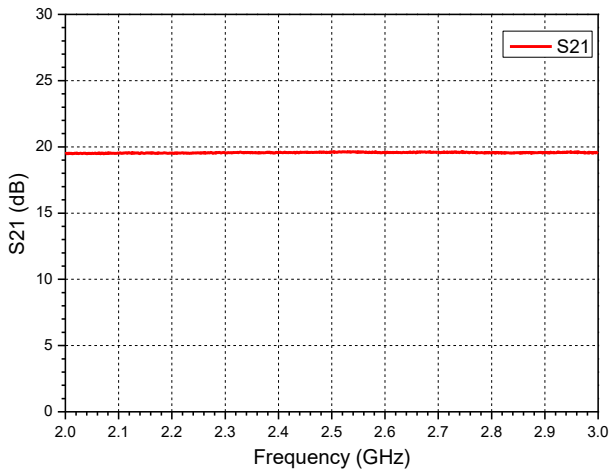
Parameter	Typical Value						Unit
	2.3	2.4	2.5	2.6	2.7	2.8	
Frequency	2.3	2.4	2.5	2.6	2.7	2.8	GHz
Small Signal Gain	19.5	19.6	19.6	19.6	19.6	19.6	dB
Input Return Loss	14.6	14.3	13.9	13.7	13.8	13.9	dB
Output Return Loss	20.1	16.8	15.2	15.4	14.2	13.6	dB
Output P1dB	21	21	21	21.2	21.4	21.3	dBm
OIP3	34.7	34.7	34.4	34.2	34	34	dBm
Noise Figure	4.8	4.8	4.7	4.7	4.7	4.7	dB

Notes:

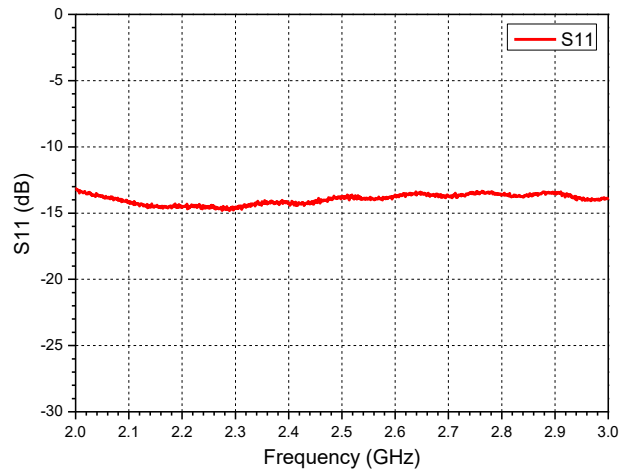
1. Test condition unless otherwise noted: Vcc=+5V, Temp=+25°C, Rex=∞, 50Ω system.
2. OIP3 measured with two tones at an output power of 0dBm/ tone separated by 1MHz.

Performance plots⁽¹⁾

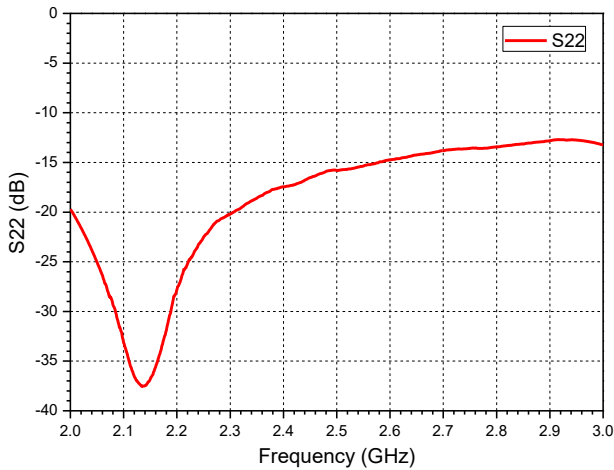
Gain vs. Frequency



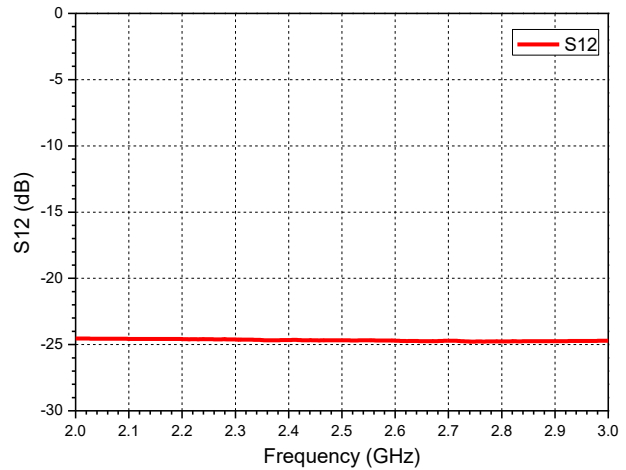
Input Return Loss vs. Frequency



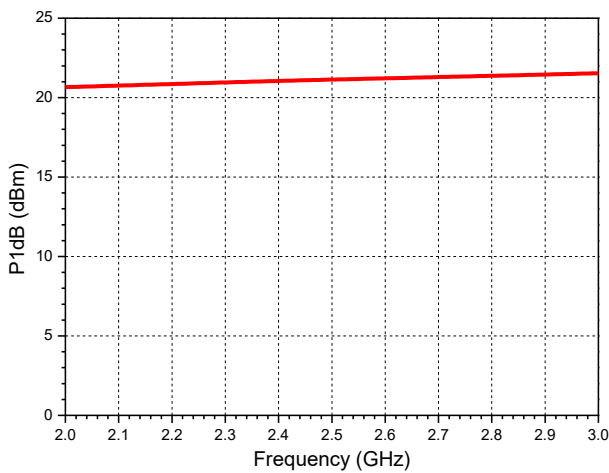
Output Return Loss vs. Frequency



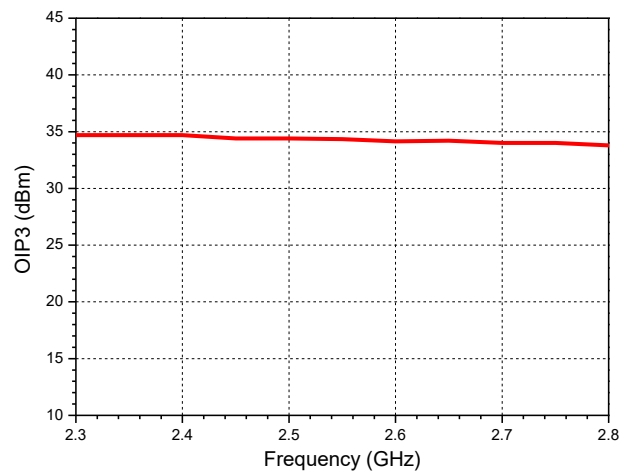
Isolation Loss vs. Frequency



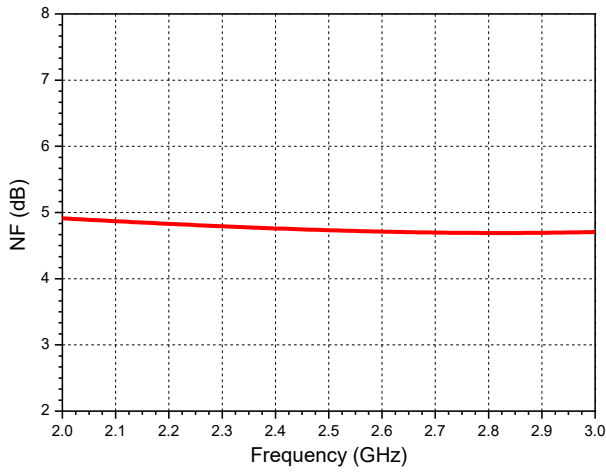
P1dB vs. Frequency



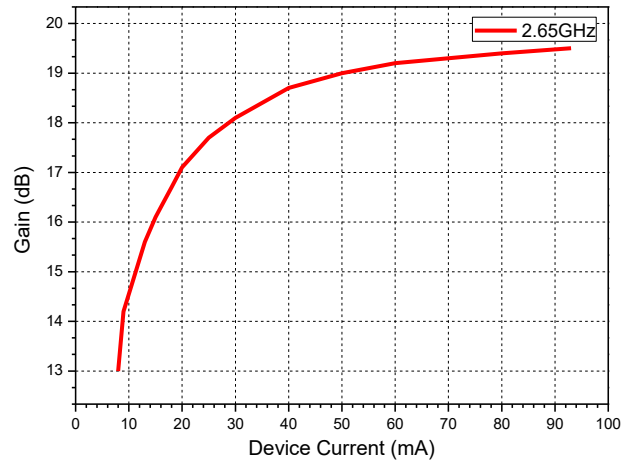
OIP3 vs. Frequency



NF vs. Frequency



Gain vs. Current⁽²⁾

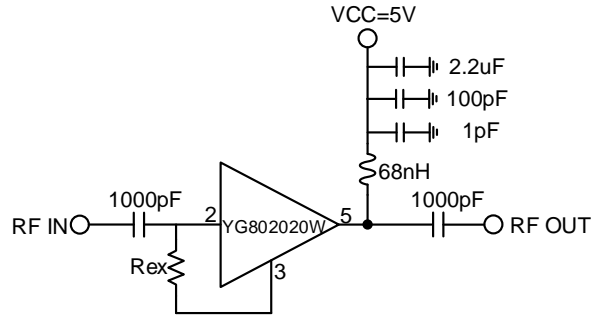
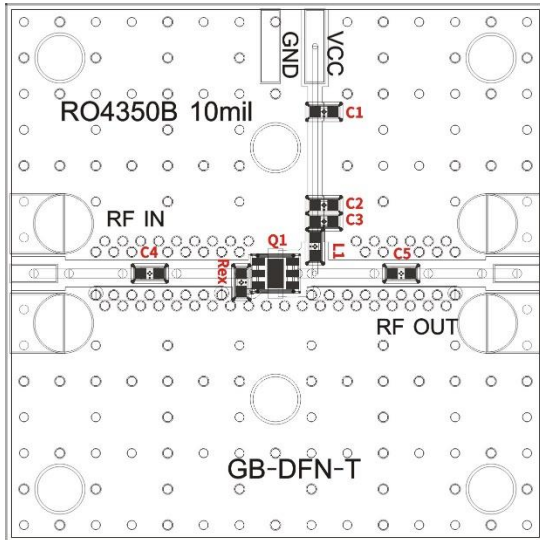


Notes:

1. Test condition unless otherwise noted: $V_{cc}=+5V$, $Temp=+25^{\circ}C$, $R_{ex}=\infty$, 50Ω system.
2. The Device Current in 'Gain vs. current' can be achieved from external resistor R_{ex} .

Evaluation Board-YG802020WEVB-03

200~8000MHz Evaluation Circuit

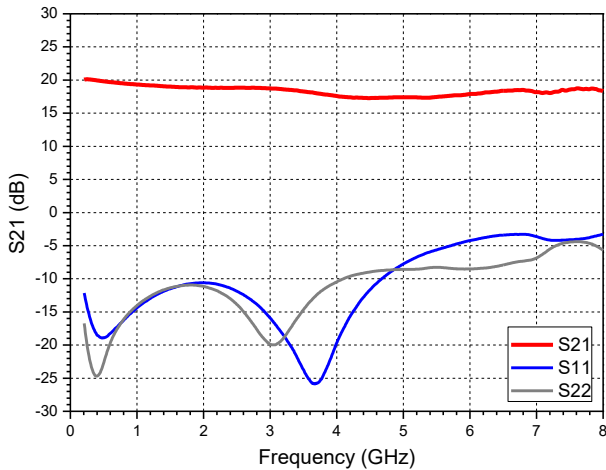


Bill of material

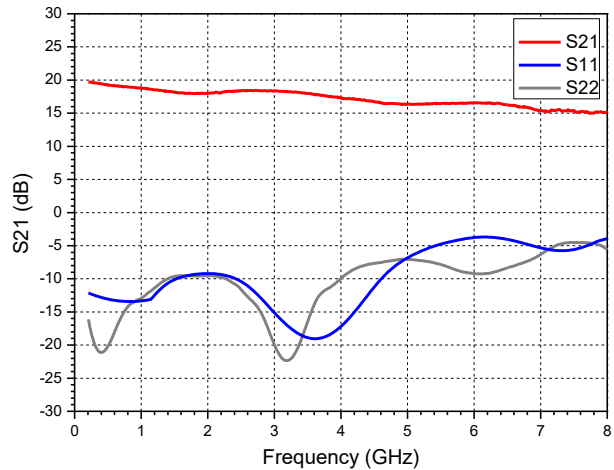
Reference Des.	Value	Description	Manuf.	Part Number
PCB		Printed circuit Board		
Q1		YG802020W,DFN2x2_6L	Innotion	YG802020W
C1	2.2uF	CAP, 2.2uF,0402,	various	
C2	100pF	CAP,100pF,0402	various	
C3	1pF	CAP,1pF,0603	Dalicap	
C4	1000pF	CAP,1000pF,0603	Dalicap	
C5	1000pF	CAP,1000pF,0603	Dalicap	
L1	68nH	IND,68nH,0603,	Coilcraft	

Performance plots⁽¹⁾

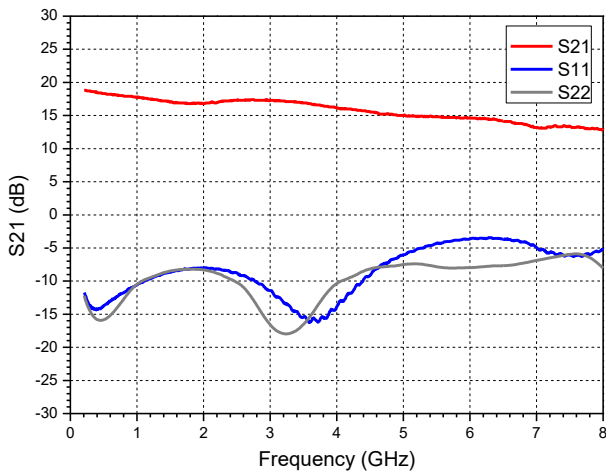
Gain vs. Frequency@75mA



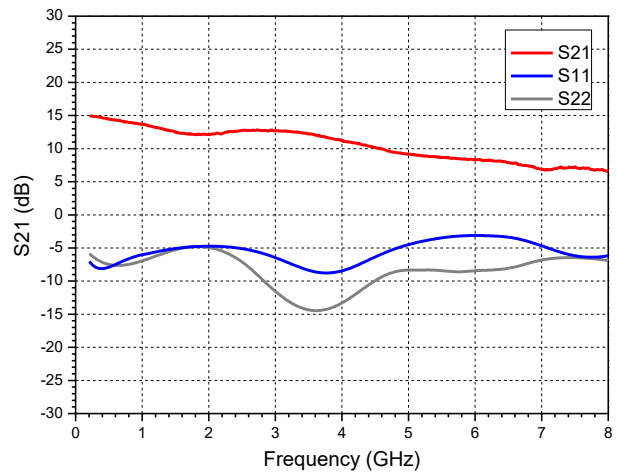
Gain vs. Frequency@50mA



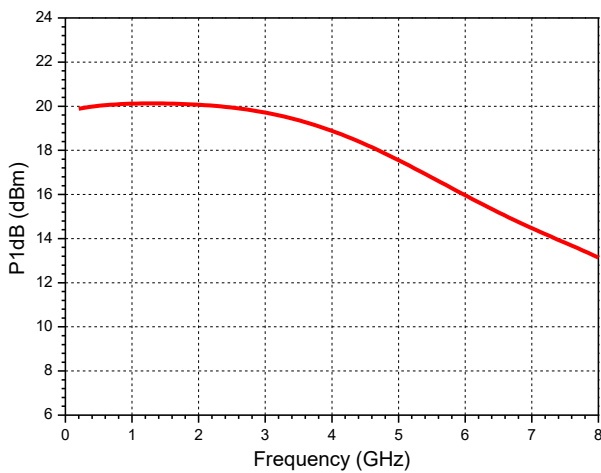
Gain vs. Frequency@30mA



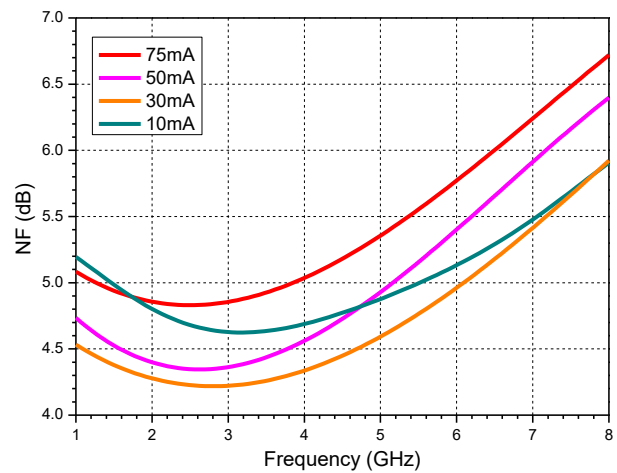
Gain vs. Frequency@10mA



P1dB vs. Frequency@75mA



NF vs. Frequency

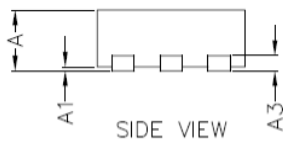
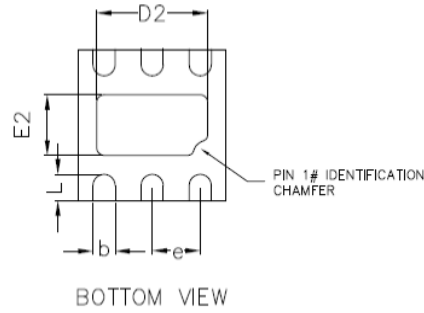
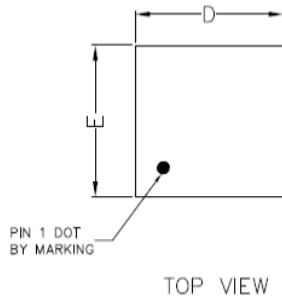


Notes:

1. Test condition unless otherwise noted: Vcc=+5V, Temp=+25°C, 50Ω system.

Package Diagram

(Units: millimeters)



COMMON DIMENSIONS(MM)			
PKG. REF.	W:VERY VERY THIN		
	MIN.	NOM.	MAX
A	0.70	0.75	0.80
A1	0.00	-	0.05
A3	0.2 REF.		
D	1.95	2.00	2.05
F	1.95	2.00	2.05
D2	1.35	1.50	1.60
E2	0.65	0.80	0.90
L	0.25	0.35	0.45
b	0.25	0.30	0.35
e	0.65 Bsc		