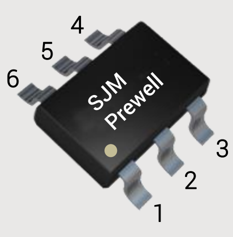
SJM PREWELL
PNW566
Gain Block

Features
- 5 to 3000MHz
- Gain 21.3dB @ 70MHz
- P1dB 20.8dBm @ 2600MHz
- OIP3 36.5dBm @ 70MHz
- Lead-free / Green / RoHS compliant SOT-363 Package

Applications
- Base station / Repeater / Mobile / Automotive / Military
  - FDD-LTE, TD-LTE, TDS-CDMA, CDMA, WCDMA, WiMAX, PCS, GSM, GPS, GPRS, TETRA
- IoT / Broadcasting / WLAN
  - FM, DMB, DVB, ISM

Functional Diagram
RF IN 3 RF OUT / Bias 6
GND 1,2,4,5



ESD/MSL
1 ESD sensitive device. Observe handling precautions.
2 HBM: Class 1A , JESD22-A114
3 CDM: Class C3 , JESD22-C101F
4 MSL 3, J-STD-020

Description
The PNW566 is a high performance GaAs p-HEMT MMIC Amplifier and high linearity gain block amplifier in a high quality SOT-363 package. The PNW566 has excellent input/output return loss and high linear performance. The device can be easily matched to obtain optimum power and linearity. The product is targeted for using as low-current gain block amplifier for wireless infrastructure applications. The PNW566 operates from a single 3 voltage supply and has an internal active bias. All devices are 100% RF and DC tested.

Specifications (Vd = 3V)

Parameters	Units	Frequency (MHz)				
		70	850	1850	2140	2600
S21	dB	21.3	18.2	14.5	13.7	11.8
S11	dB	-15	-11	-13	-15	-31
S22	dB	-20	-13	-11	-10	-11
P1dB	dBm	19.2	19.7	19.8	20.3	20.8
OIP3	dBm	36.5	36.3	34.0	35.0	34.0
NF	dB	2.1	1.9	2.5	2.6	2.6
V / I	V/mA	3 / 85				
Rth	℃/W	22				

1) Test Conditions : T=25℃, Supply Voltage=3V, 50ohm System
2) OIP3 measured with two tones at an output power of 5dBm/tone separated by 1MHz.

Specifications (Vd = 2.8V)

Parameters	Units	Frequency (MHz)				
		70	850	1850	2140	2600
S21	dB	21.3	18.1	14.5	13.7	11.8
S11	dB	-15	-11	-13	-15	-32
S22	dB	-23	-13	-11	-10	-11
P1dB	dBm	18.5	19.0	19.2	19.4	20.2
OIP3	dBm	36.0	35.9	34.7	35.0	34.5
NF	dB	2.1	1.8	2.4	2.8	2.5
V / I	V/mA	2.8 / 70				
Rth	℃/W	22				

1) Test Conditions : T=25℃, Supply Voltage=2.8V, 50ohm System
2) OIP3 measured with two tones at an output power of 5dBm/tone separated by 1MHz.

Absolute Maximum Ratings

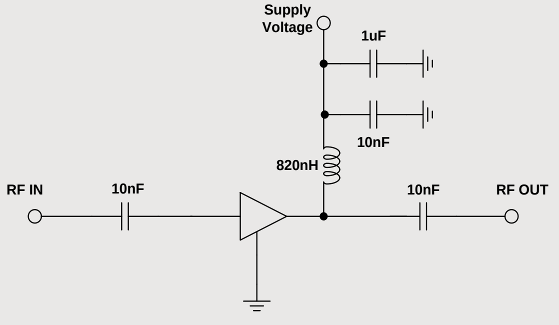
Parameters	Rating	Units
Device Voltage	4.0	V
Device Current	138	mA
RF Power Input	25	dBm
Storage Temperature	-55 to 150	℃
Ambient Operating Temperature	-40 to 85	℃
Junction Temperature	185	℃

1) Stresses above the maximum values listed have may cause permanent damage to the device.
2) MTTF is more than 100 years.

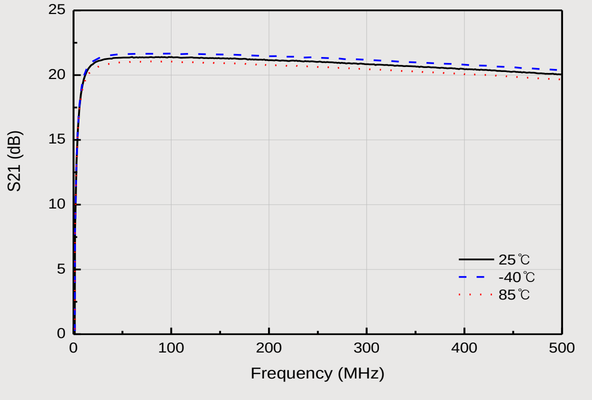
Typical RF Performance for IF Application Circuit Ⅰ

Supply Bias Voltage = 3V, Current= 85mA

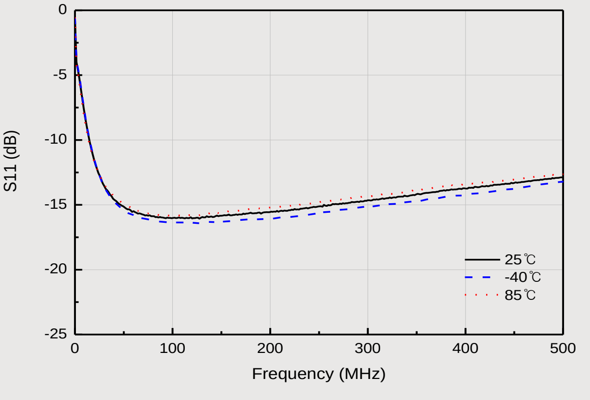
Parameters	Units	Frequency (MHz)			
		70	140	250	500
S21	dB	21.3	21.3	21.0	20.0
S11	dB	-15	-15	-15	-12
S22	dB	-20	-27	-28	-22
P1dB	dBm	19.2	19.1	18.6	19.4
OIP3 @ 5dBm	dBm	36.5	36.5	36.5	37.0
NF	dB	2.1	2.0	2.0	2.1



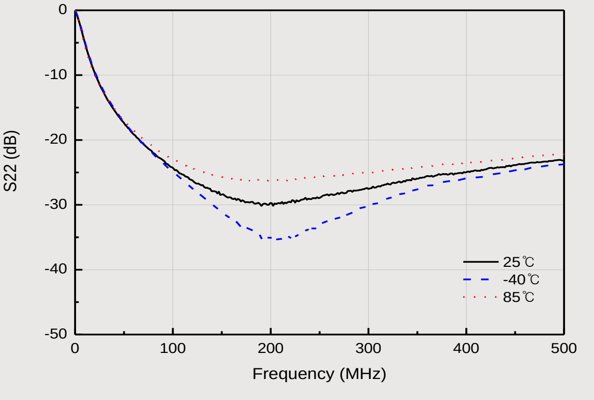
Gain vs. Frequency



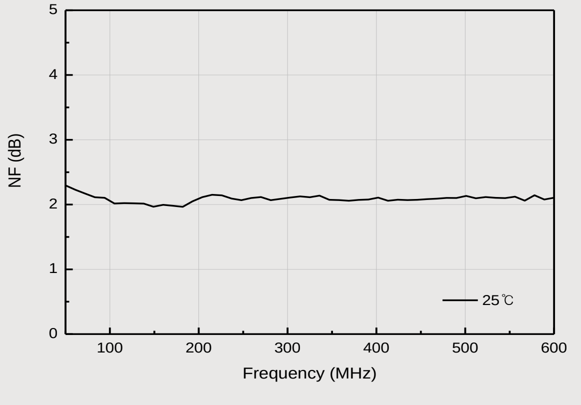
Input Return Loss



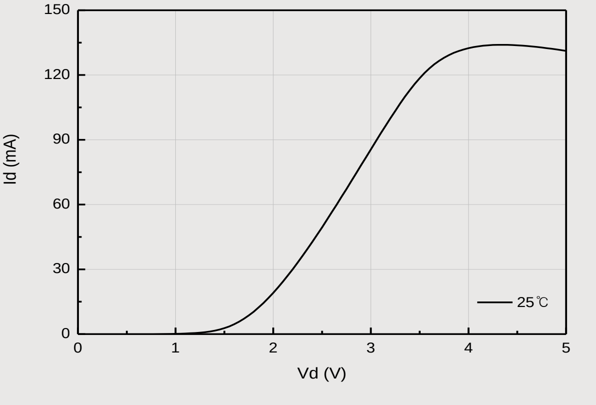
Output Return Loss



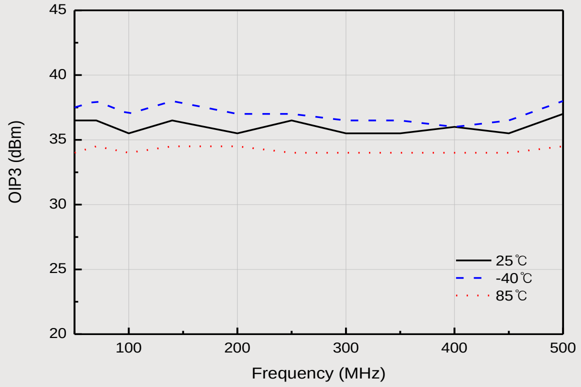
NF vs. Frequency



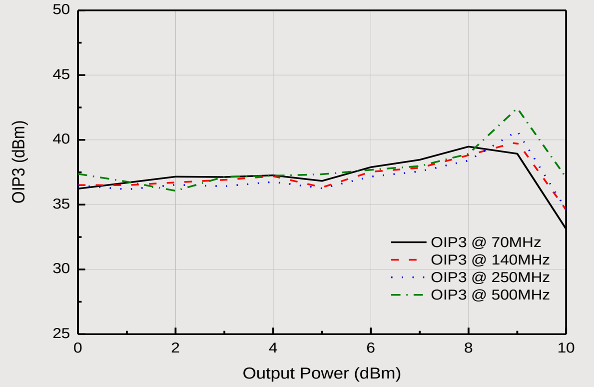
Id vs. Vd



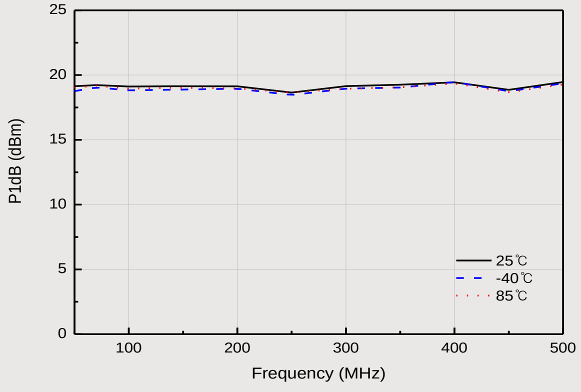
OIP3 vs. Frequency



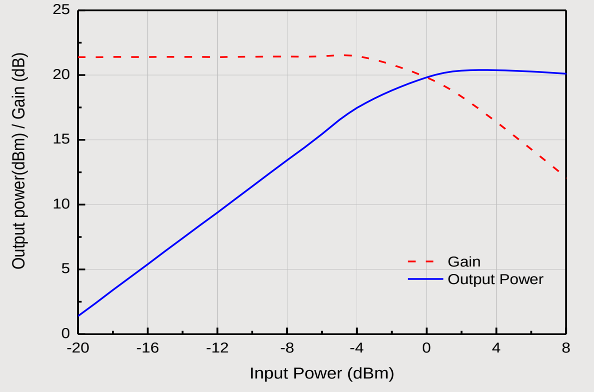
OIP3 vs. Output Power



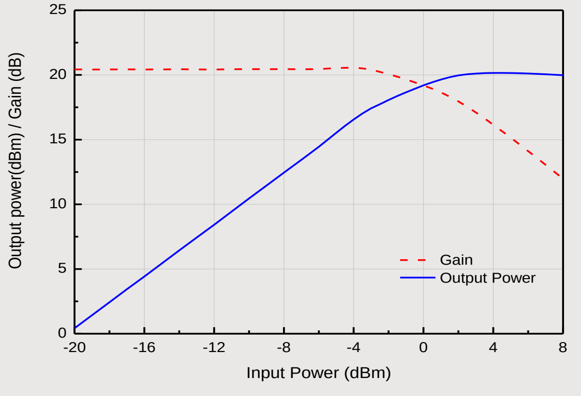
P1dB vs. Frequency



Output Power / Gain vs Input Power @ 70MHz



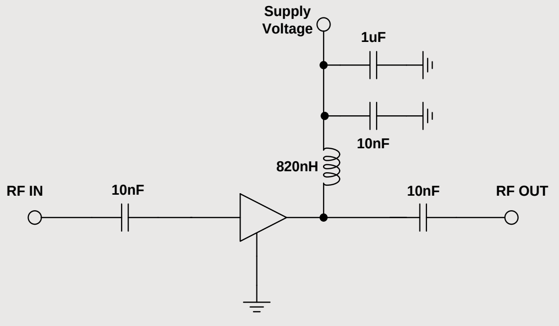
Output Power / Gain vs Input Power @ 250MHz



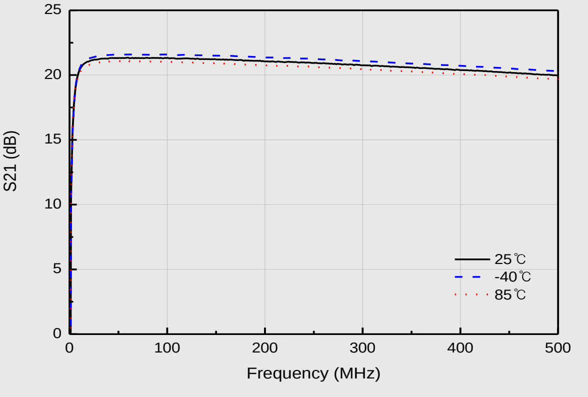
Typical RF Performance for IF Application Circuit Ⅱ

Supply Bias Voltage = 2.8V, Current= 70mA

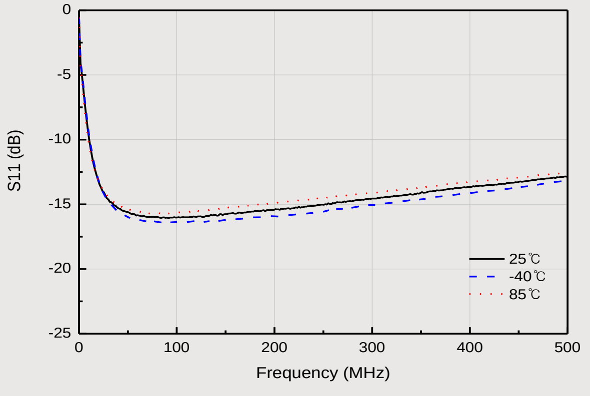
Parameters	Units	Frequency (MHz)			
		70	140	250	500
S21	dB	21.3	21.2	20.9	19.9
S11	dB	-15	-15	-15	-12
S22	dB	-23	-27	-26	-20
P1dB	dBm	18.5	18.5	18.1	18.8
OIP3 @ 5dBm	dBm	36.0	36.0	36.0	36.0
NF	dB	2.1	2.0	2.1	2.0



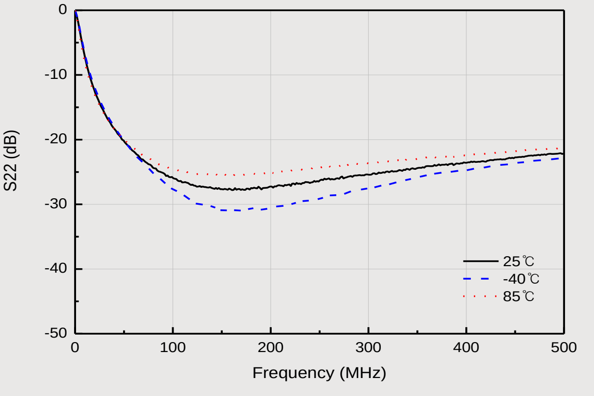
Gain vs. Frequency



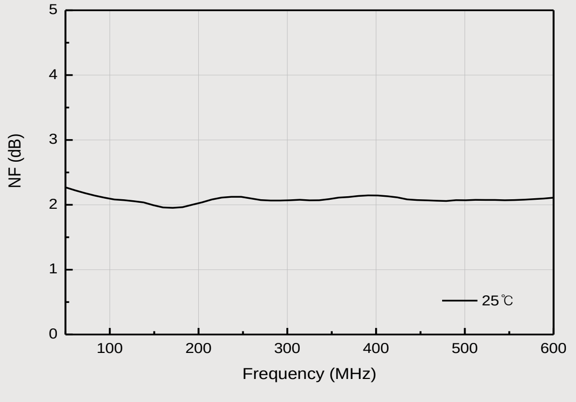
Input Return Loss



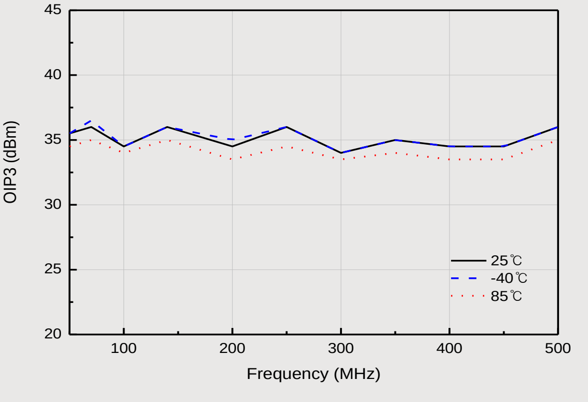
Output Return Loss



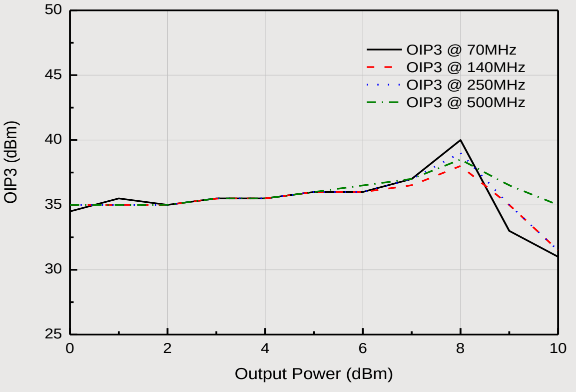
NF vs. Frequency



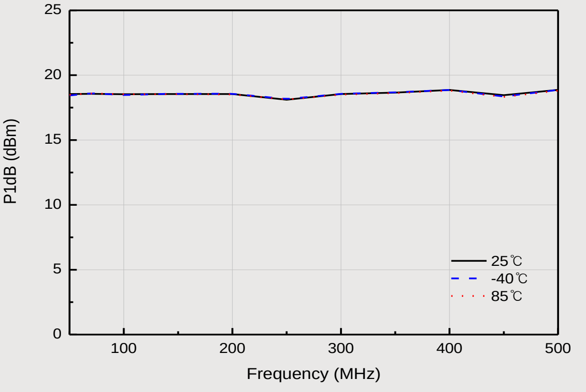
OIP3 vs. Frequency



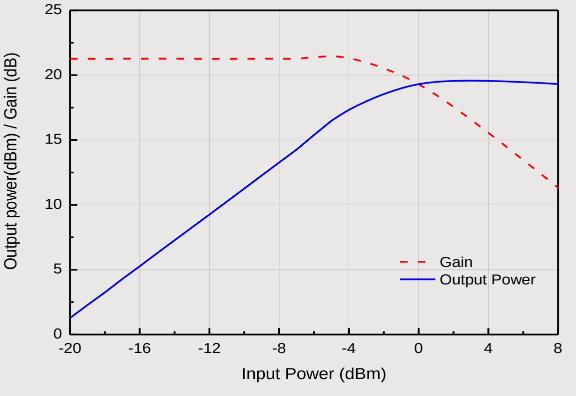
OIP3 vs. Output Power



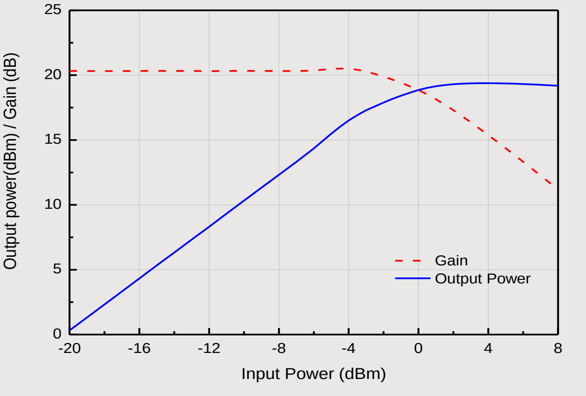
P1dB vs. Frequency



Output Power / Gain vs Input Power @ 70MHz



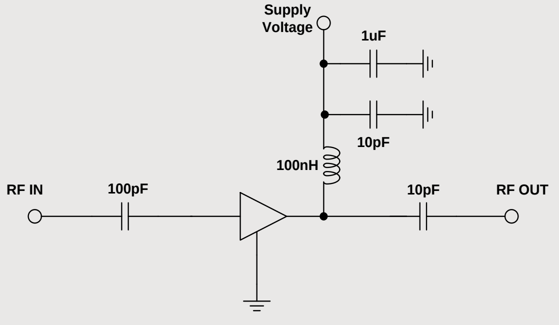
Output Power / Gain vs Input Power @ 250MHz



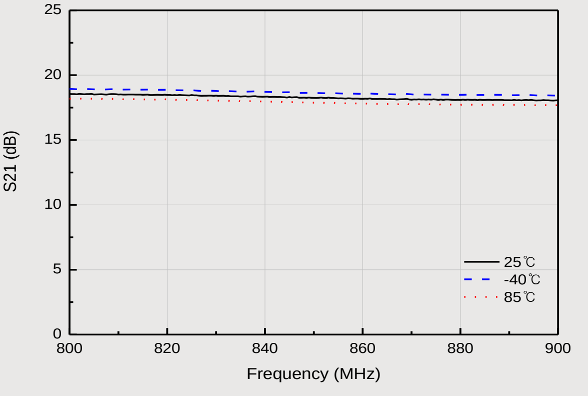
Typical RF Performance for RF 850MHz Tuned Application Circuit Ⅰ

Supply Bias Voltage = 3V, Current= 85mA

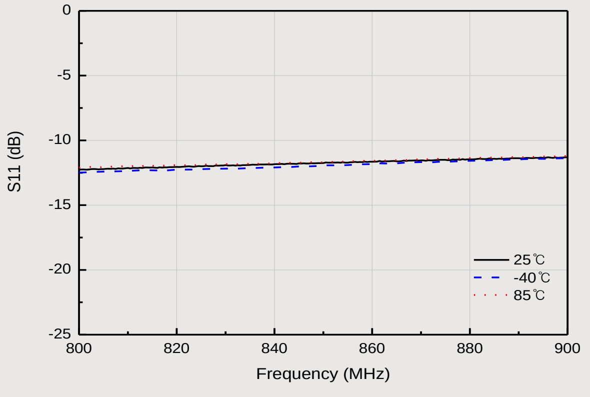
Parameters	Units	Frequency (MHz)		
		800	850	900
S21	dB	18.5	18.2	18.0
S11	dB	-12	-11	-11
S22	dB	-13	-13	-14
P1dB	dBm	19.4	19.7	19.7
OIP3 @ 5dBm	dBm	36.7	36.3	36.3
NF	dB	1.9	1.9	1.9



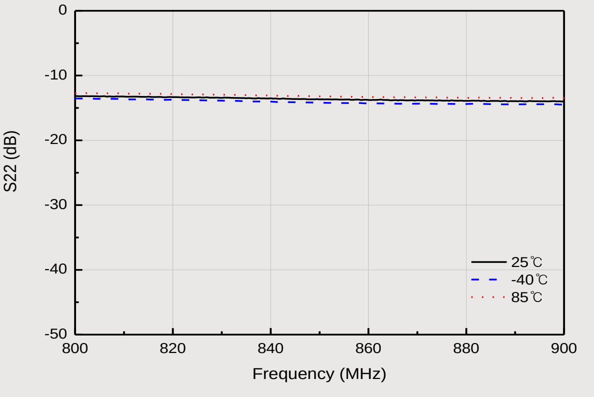
Gain vs. Frequency



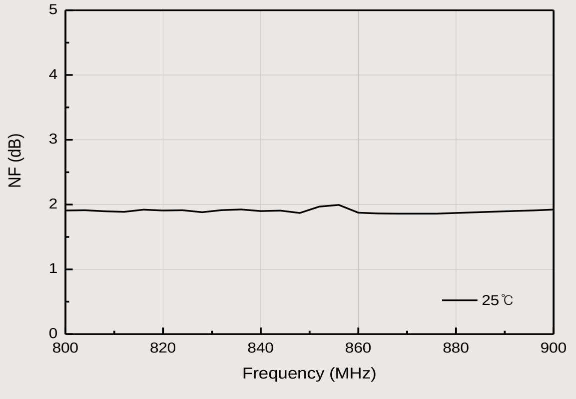
Input Return Loss



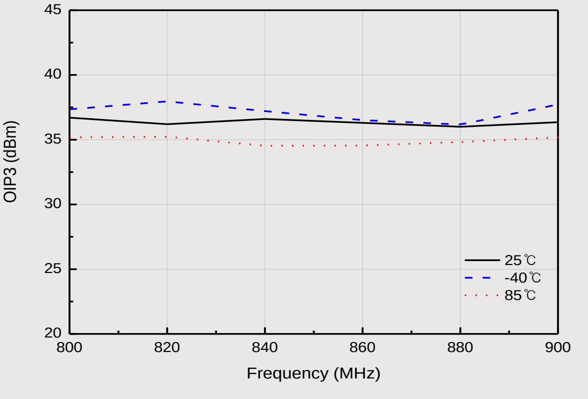
Output Return Loss

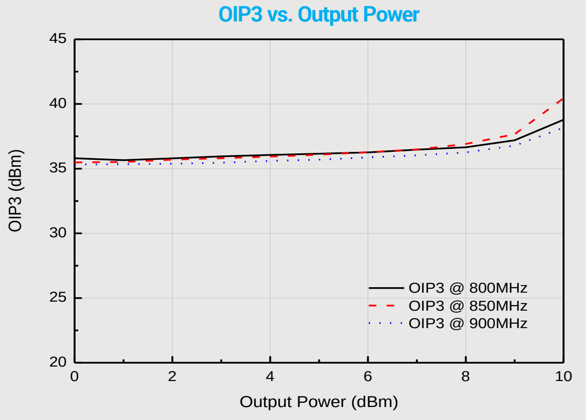


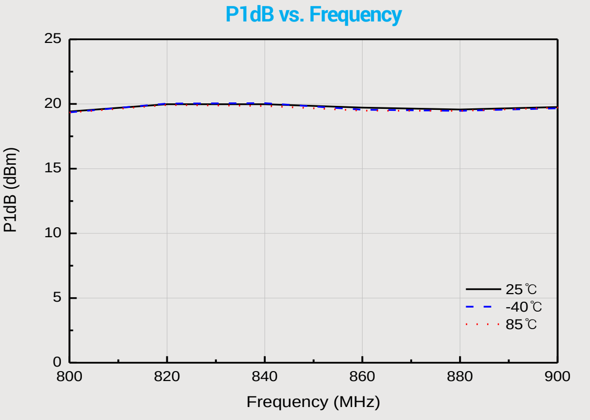
NF vs. Frequency

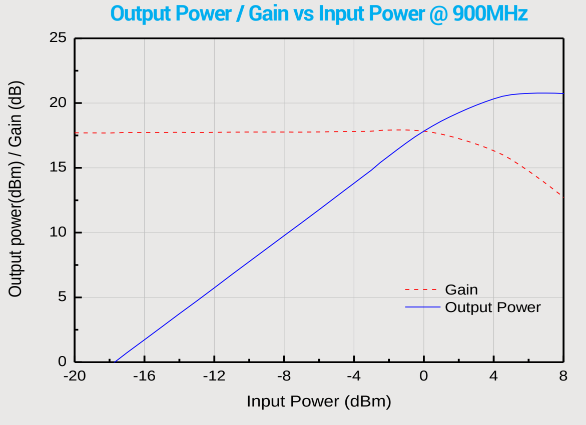


OIP3 vs. Frequency




OIP3 vs. Output Power
45
40
35
30
25
20
OIP3 (dBm)
0
2
4
6
8
10
Output Power (dBm)
OIP3 @ 800MHz
OIP3 @ 850MHz
OIP3 @ 900MHz

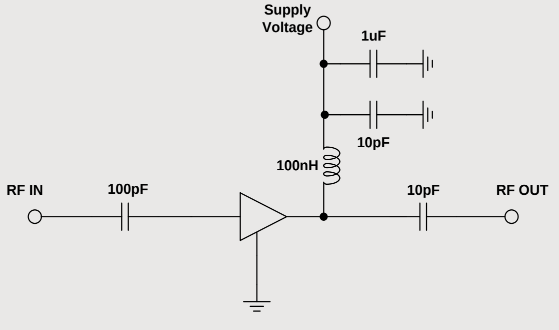

P1dB vs. Frequency
25
20
15
10
5
0
P1dB (dBm)
800
820
840
860
880
900
Frequency (MHz)
25℃
-40℃
85℃


Output Power / Gain vs Input Power @ 900MHz
25
20
15
10
5
0
Output power(dBm) / Gain (dB)
-20
-16
-12
-8
-4
0
4
8
Input Power (dBm)
Gain
Output Power

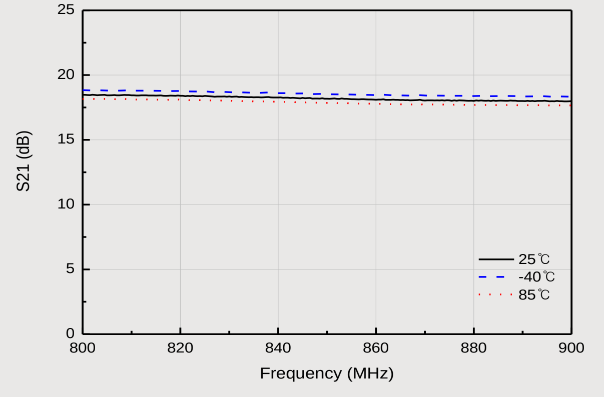
Typical RF Performance for RF 850MHz Tuned Application Circuit Ⅱ

Supply Bias Voltage = 2.8V, Current= 70mA

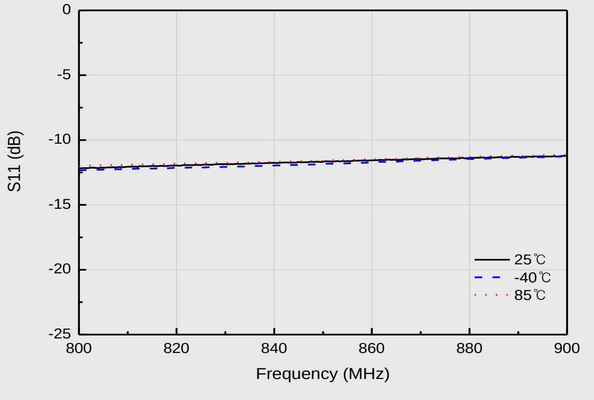
Parameters	Units	Frequency (MHz)		
		800	850	900
S21	dB	18.4	18.1	17.9
S11	dB	-12	-11	-11.2
S22	dB	-12	-13	-13
P1dB	dBm	18.8	19.0	19.1
OIP3 @ 5dBm	dBm	37.0	35.9	37.0
NF	dB	1.8	1.8	1.8



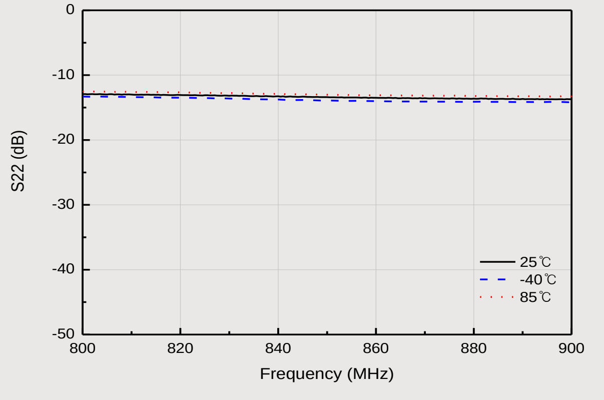
Gain vs. Frequency



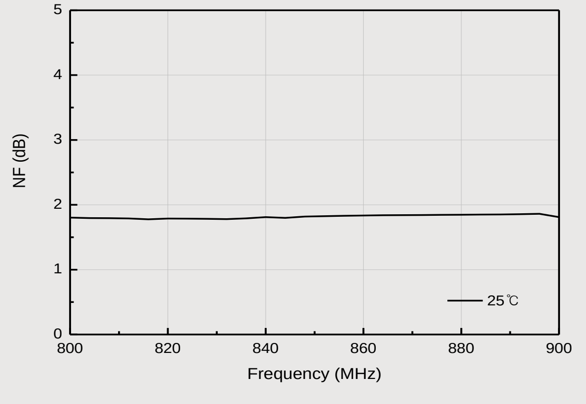
Input Return Loss



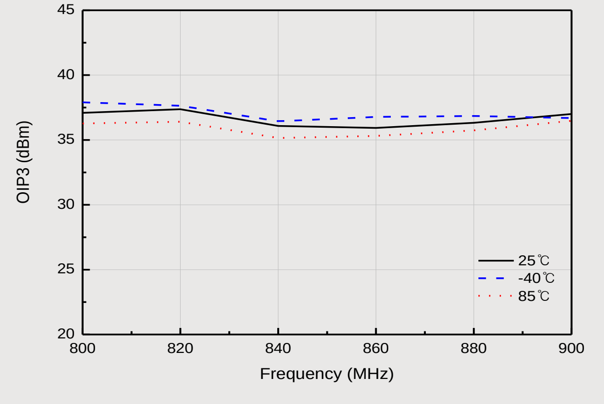
Output Return Loss



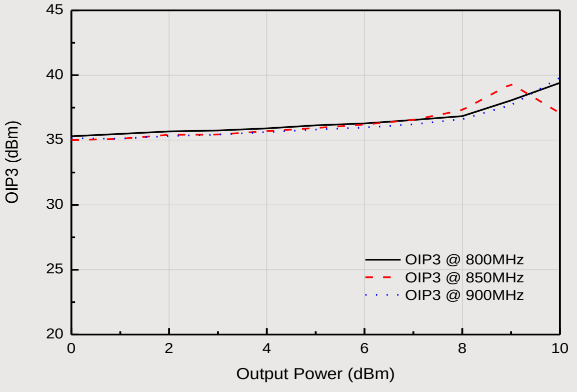
NF vs. Frequency



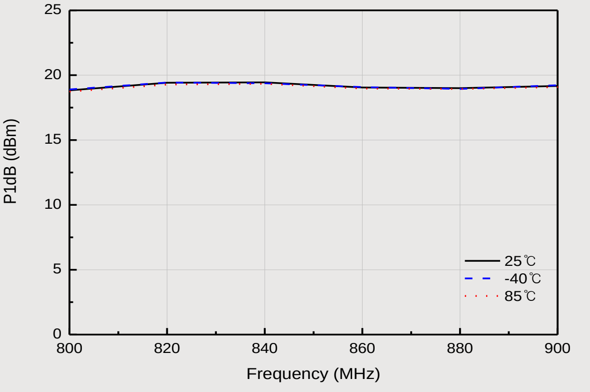
OIP3 vs. Frequency



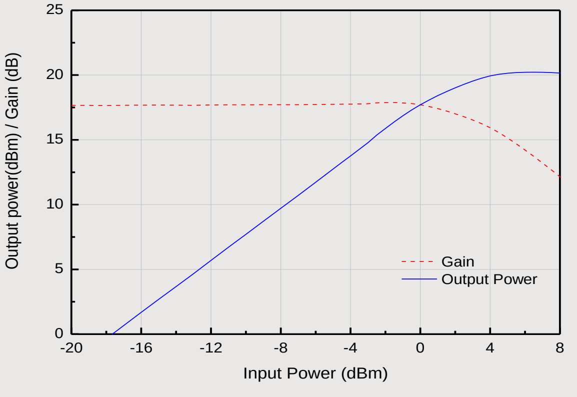
OIP3 vs. Output Power



P1dB vs. Frequency



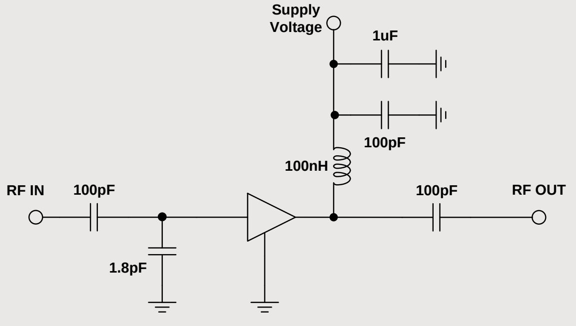
Output Power / Gain vs Input Power @ 900MHz



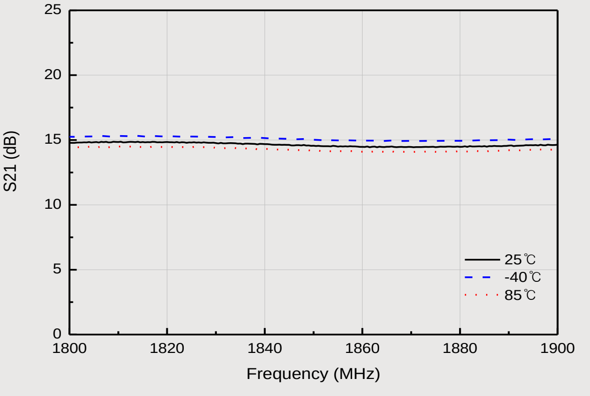
Typical RF Performance for RF 1850MHz Tuned Application Circuit I

Supply Bias Voltage = 3V, Current= 85mA

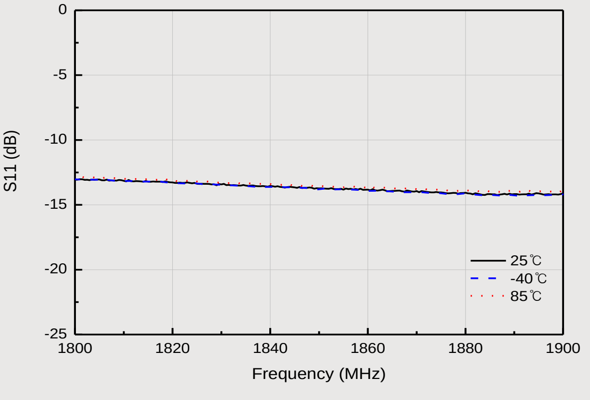
Parameters	Units	Frequency (MHz)		
		1800	1850	1900
S21	dB	14.7	14.5	14.6
S11	dB	-13	-13	-14
S22	dB	-12	-11	-11
P1dB	dBm	20.2	19.8	20.5
OIP3 @ 5dBm	dBm	34.2	34.0	34.0
NF	dB	2.4	2.5	2.6



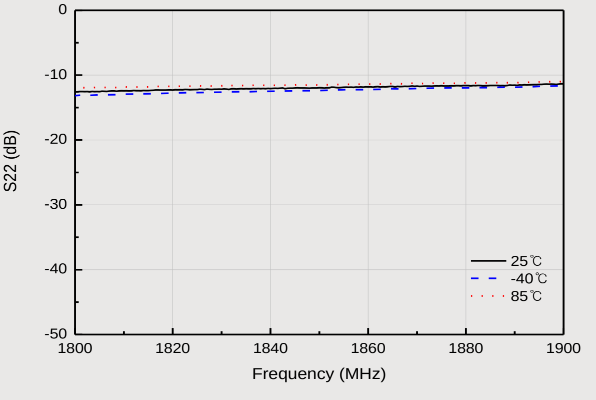
Gain vs. Frequency



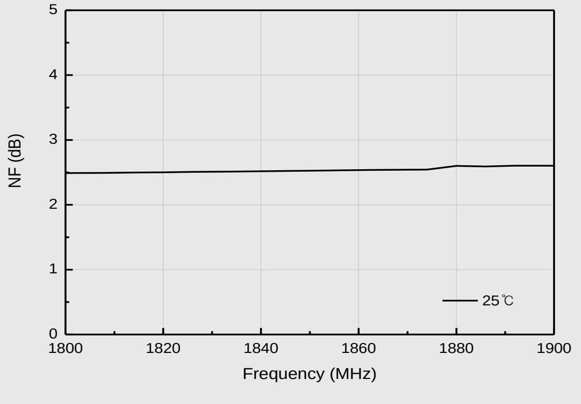
Input Return Loss



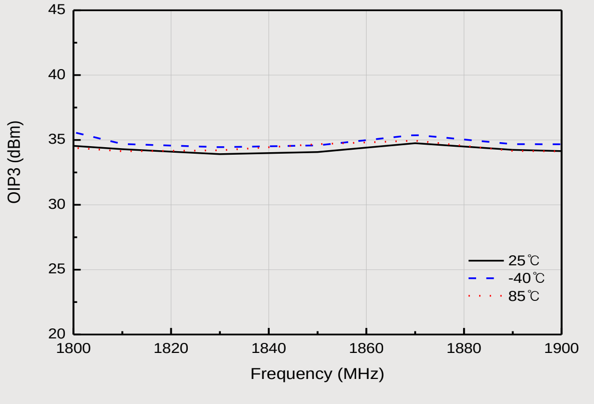
Output Return Loss



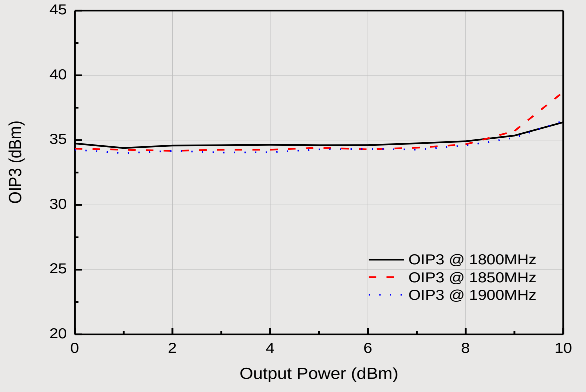
NF vs. Frequency



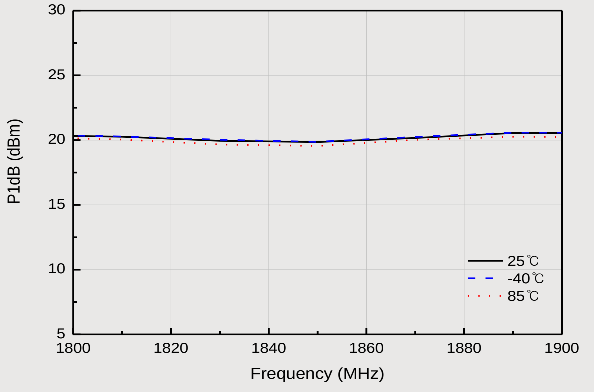
OIP3 vs. Frequency



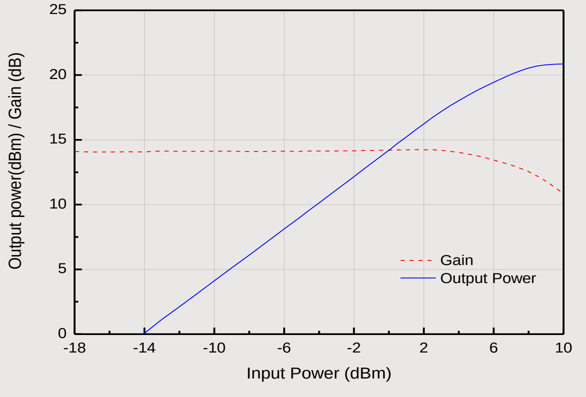
OIP3 vs. Output Power



P1dB vs. Frequency

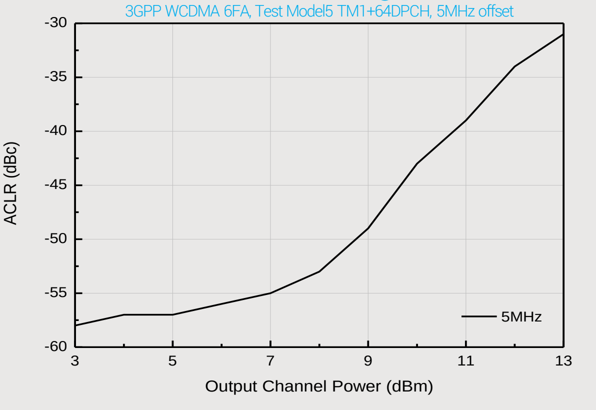


Output Power / Gain vs Input Power @ 1850MHz



ACLR vs. Channel Power @ 1850MHz

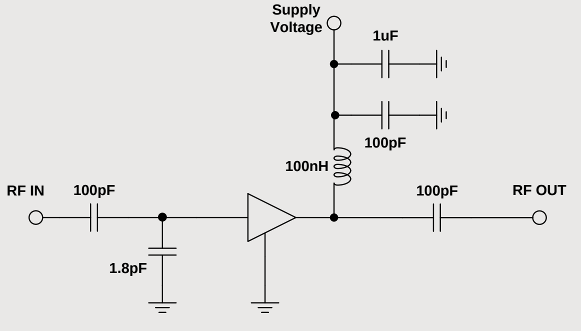
3GPP WCDMA 6FA, Test Model5 TM1+64DPCH, 5MHz offset



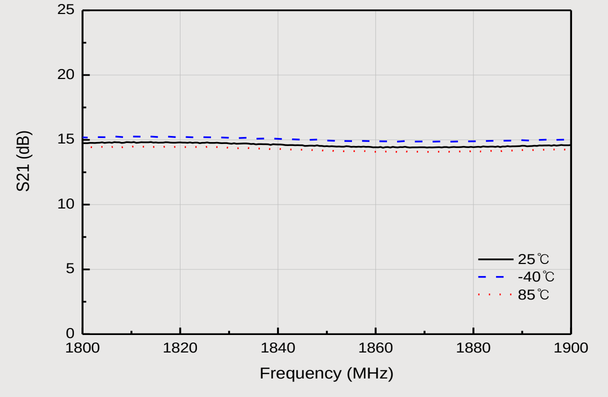
Typical RF Performance for RF 1850MHz Tuned Application Circuit Ⅱ

Supply Bias Voltage = 2.8V, Current= 70mA

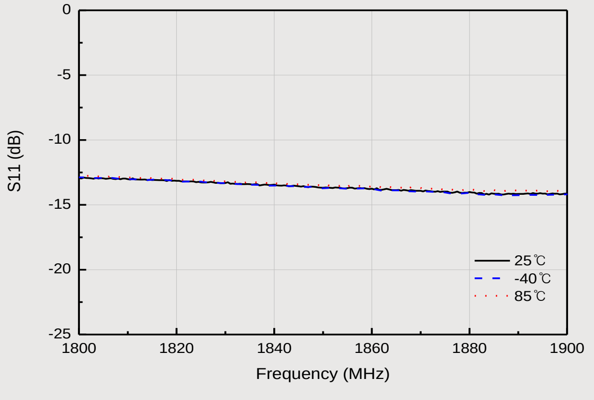
Parameters	Units	Frequency (MHz)		
		1800	1850	1900
S21	dB	14.7	14.5	14.6
S11	dB	-12	-13	-14
S22	dB	-12	-11	-11
P1dB	dBm	19.6	19.2	19.9
OIP3 @ 5dBm	dBm	34.8	34.7	34.7
NF	dB	2.3	2.4	2.4



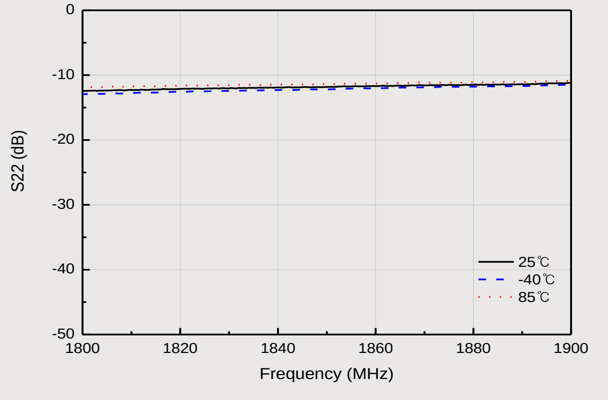
Gain vs. Frequency



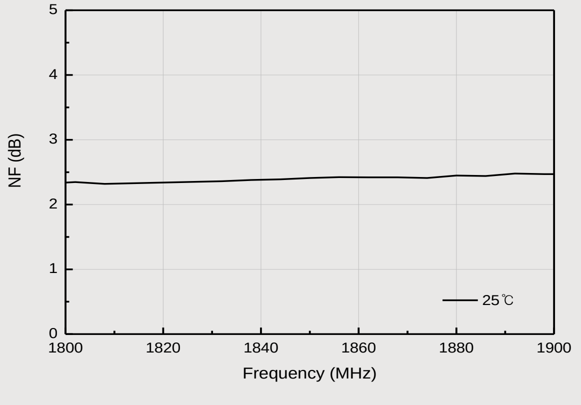
Input Return Loss



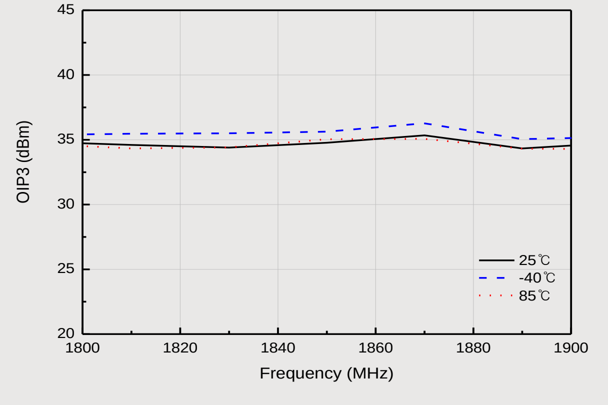
Output Return Loss



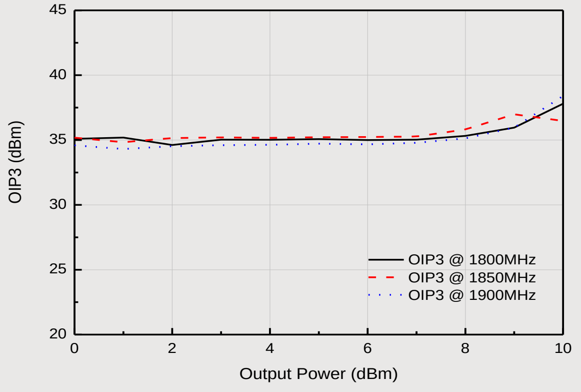
NF vs. Frequency



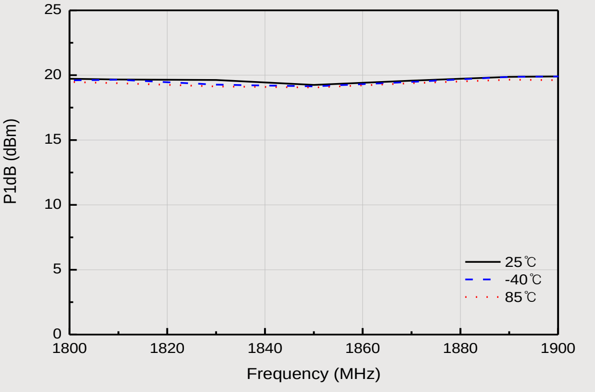
OIP3 vs. Frequency



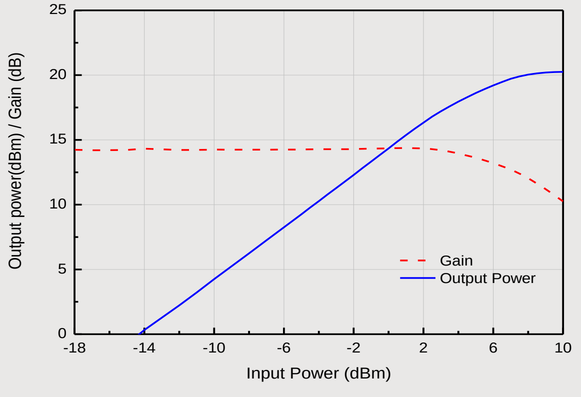
OIP3 vs. Output Power



P1dB vs. Frequency

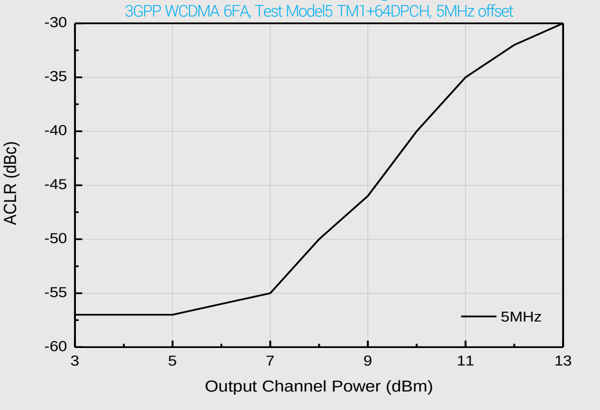


Output Power / Gain vs Input Power @ 1850MHz



ACLR vs. Channel Power @ 1850MHz

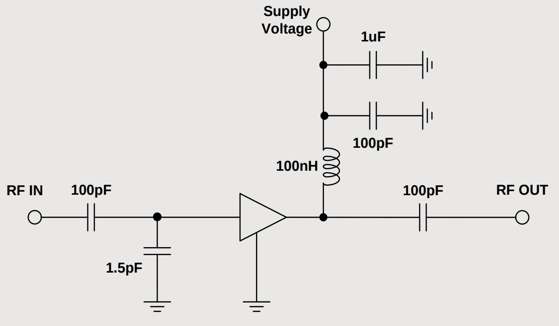
3GPP WCDMA 6FA, Test Model5 TM1+64DPCH, 5MHz offset



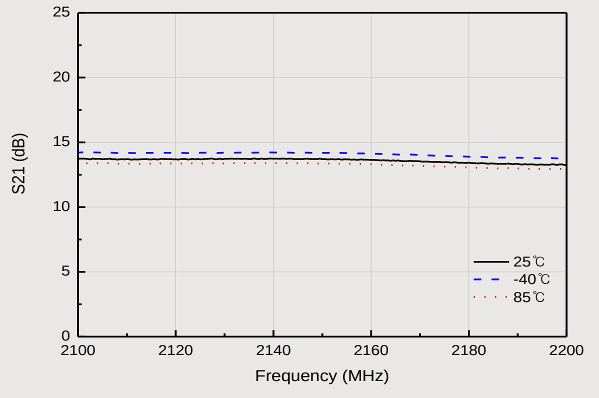
Typical RF Performance for RF 2140MHz Tuned Application Circuit Ⅰ

Supply Bias Voltage = 3V, Current= 85mA

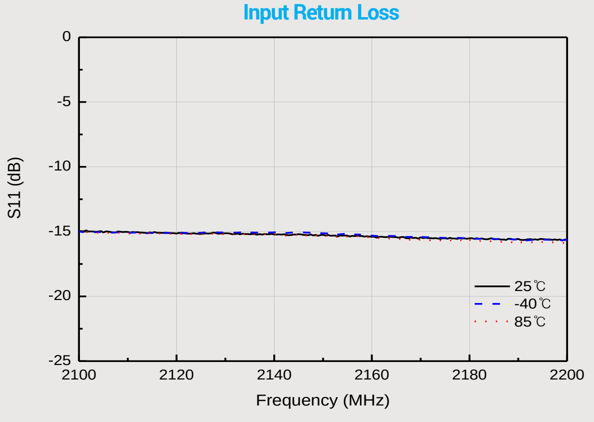
Parameters	Units	Frequency (MHz)		
		2100	2140	2200
S21	dB	13.7	13.7	13.2
S11	dB	-14	-15	-15
S22	dB	-11	-10	-10
P1dB	dBm	20.7	20.3	20.5
OIP3 @ 5dBm	dBm	34.5	35.0	35.0
NF	dB	2.5	2.6	2.6



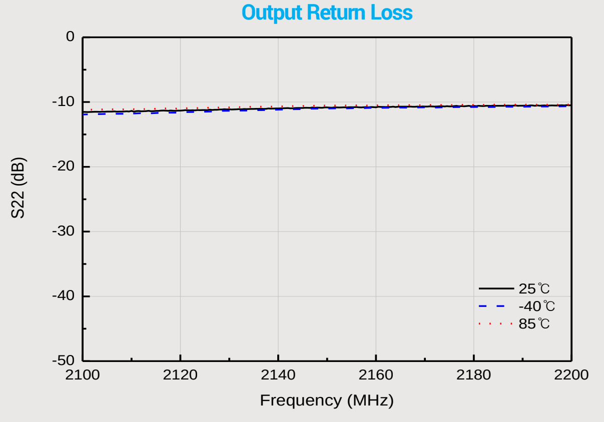
Gain vs. Frequency



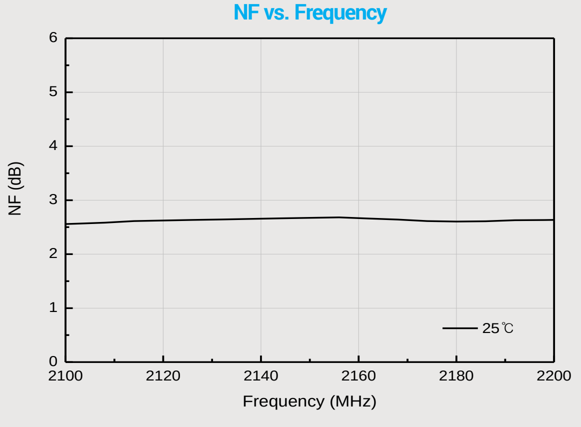
Input Return Loss



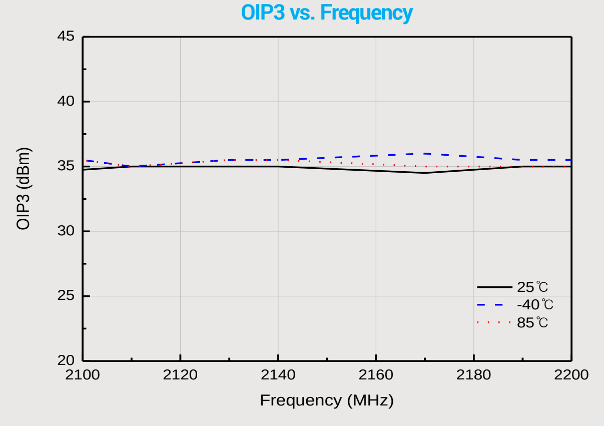
Output Return Loss

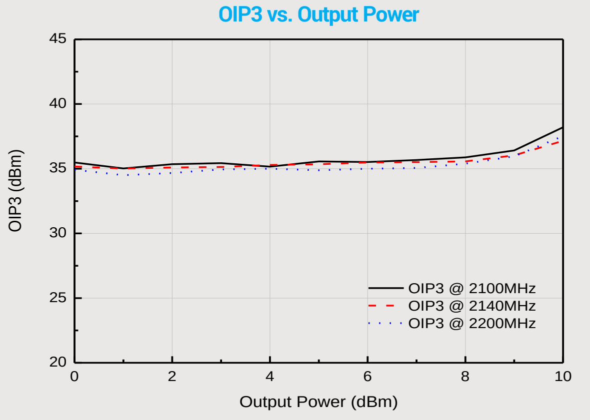


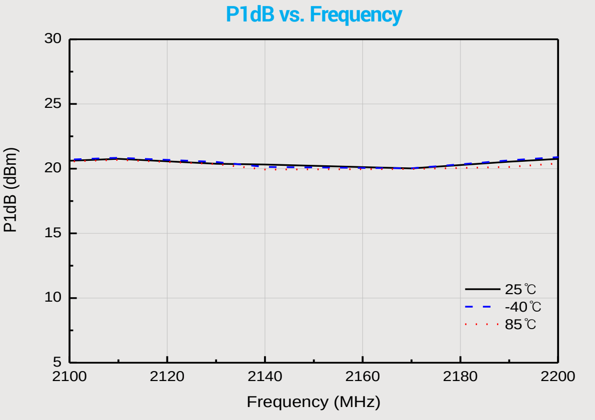
NF vs. Frequency

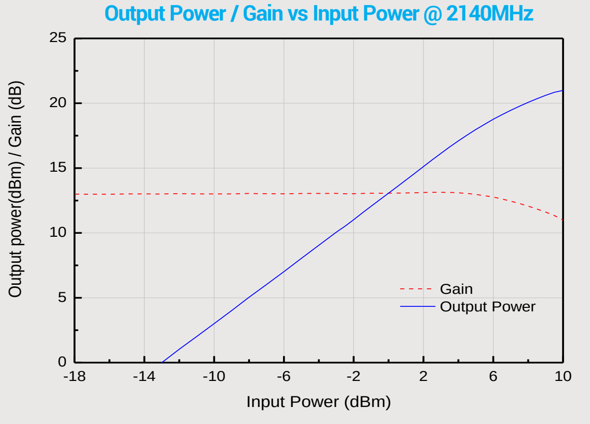


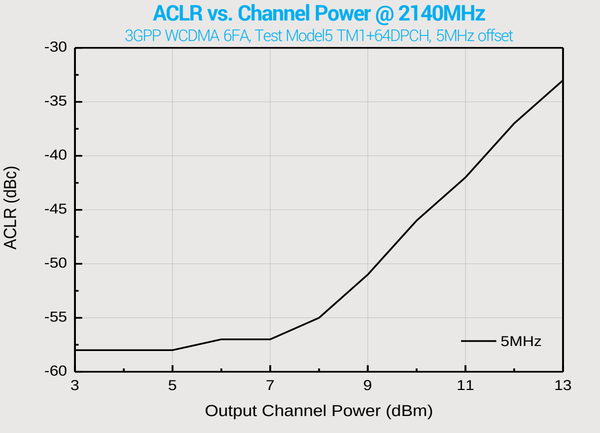
OIP3 vs. Frequency




OIP3 vs. Output Power
OIP3 (dBm)
Output Power (dBm)
OIP3 @ 2100MHz
OIP3 @ 2140MHz
OIP3 @ 2200MHz


P1dB vs. Frequency
P1dB (dBm)
Frequency (MHz)
25℃
-40℃
85℃

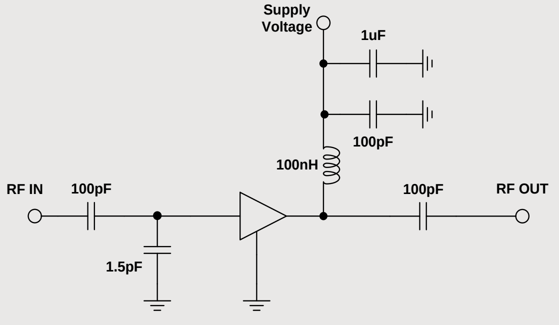

Output Power / Gain vs Input Power @ 2140MHz
Output power(dBm) / Gain (dB)
Input Power (dBm)
Gain
Output Power


ACLR vs. Channel Power @ 2140MHz
3GPP WCDMA 6FA, Test Model5 TM1+64DPCH, 5MHz offset
ACLR (dBc)
Output Channel Power (dBm)
5MHz

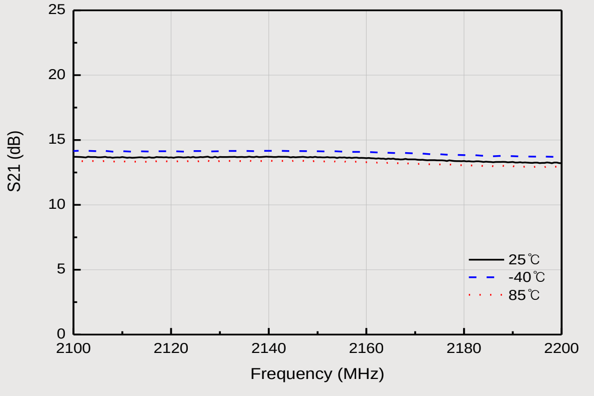
Typical RF Performance for RF 2140MHz Tuned Application Circuit Ⅱ

Supply Bias Voltage = 2.8V, Current= 70mA

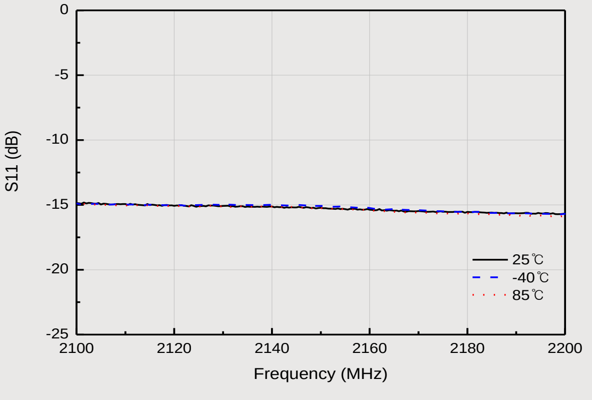
Parameters	Units	Frequency (MHz)		
		2100	2140	2200
S21	dB	13.7	13.7	13.2
S11	dB	-14	-15	-15
S22	dB	-11	-10	-10
P1dB	dBm	20.0	19.4	19.9
OIP3 @ 5dBm	dBm	35.0	35.0	35.0
NF	dB	2.4	2.8	2.4



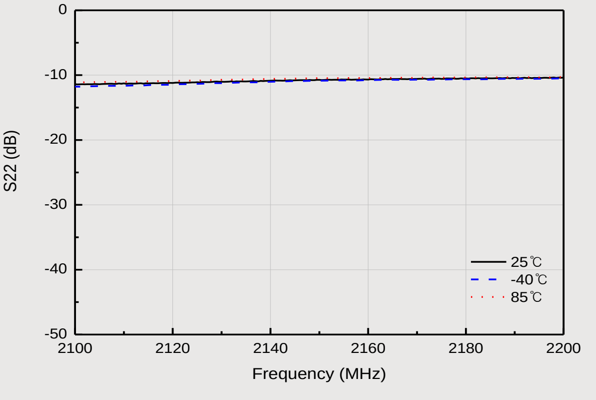
Gain vs. Frequency



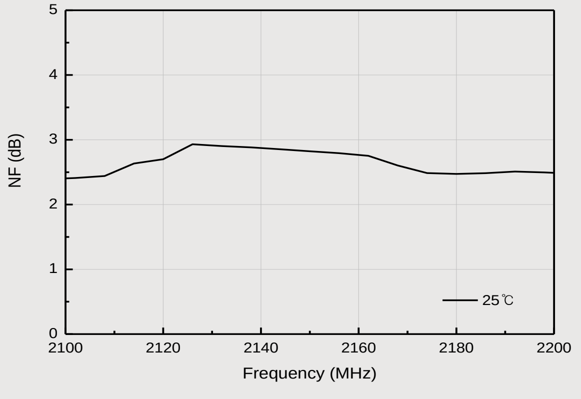
Input Return Loss



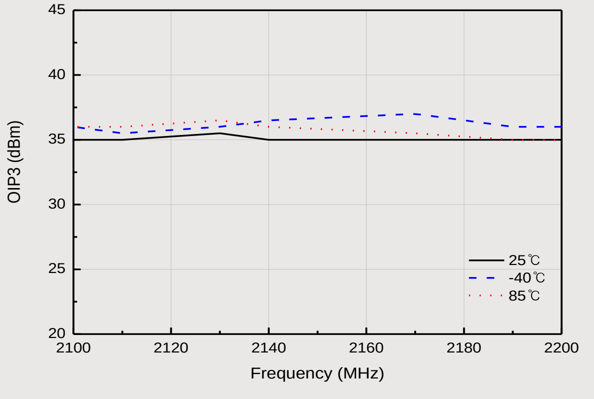
Output Return Loss

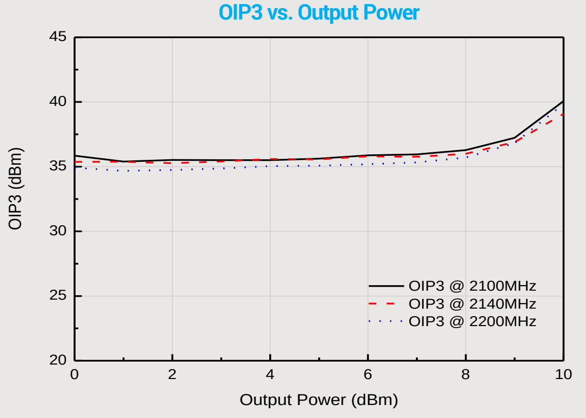


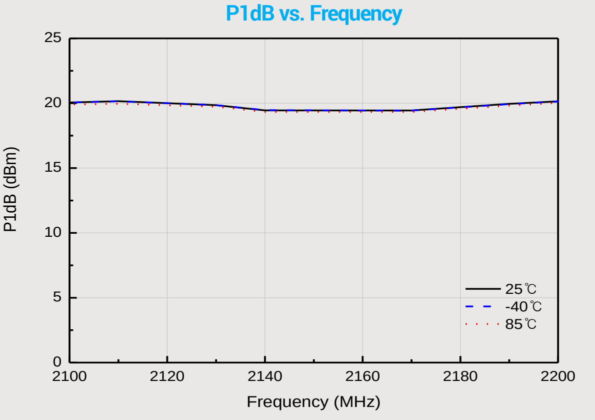
NF vs. Frequency

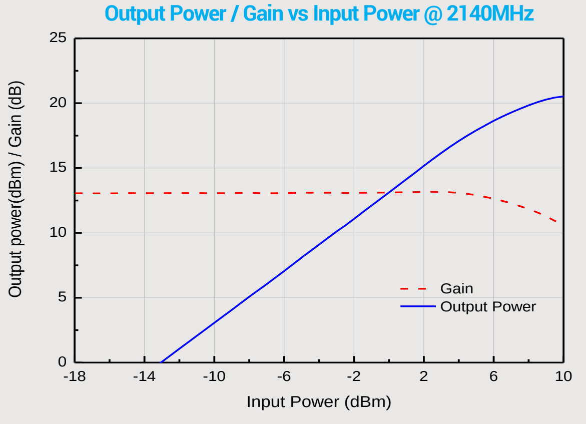


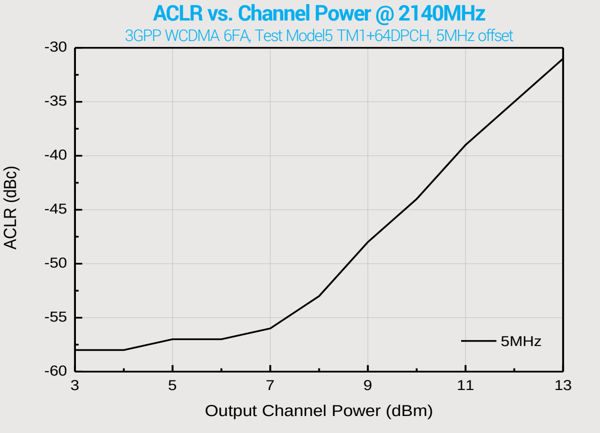
OIP3 vs. Frequency




OIP3 vs. Output Power
45
40
35
30
25
20
OIP3 (dBm)
0
2
4
6
8
10
Output Power (dBm)
OIP3 @ 2100MHz
OIP3 @ 2140MHz
OIP3 @ 2200MHz


P1dB vs. Frequency
25
20
15
10
5
0
P1dB (dBm)
2100
2120
2140
2160
2180
2200
Frequency (MHz)
25℃
-40℃
85℃

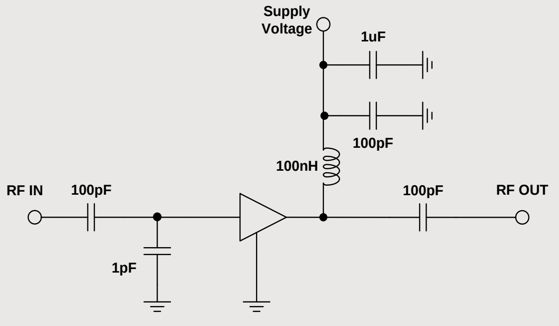

Output Power / Gain vs Input Power @ 2140MHz
25
20
15
10
5
0
Output power(dBm) / Gain (dB)
-18
-14
-10
-6
-2
2
6
10
Input Power (dBm)
Gain
Output Power


ACLR vs. Channel Power @ 2140MHz
3GPP WCDMA 6FA, Test Model5 TM1+64DPCH, 5MHz offset
-30
-35
-40
-45
-50
-55
-60
ACLR (dBc)
3
5
7
9
11
13
Output Channel Power (dBm)
5MHz

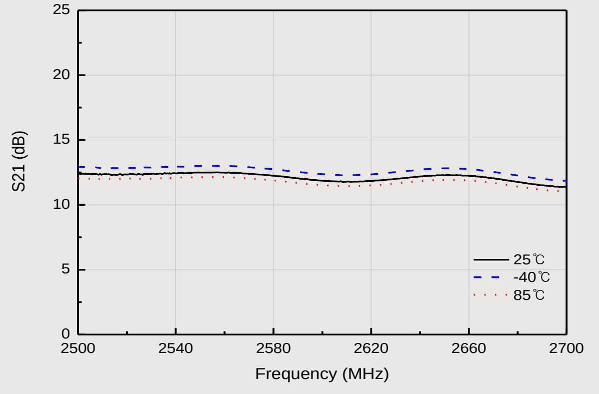
Typical RF Performance for RF 2600MHz Tuned Application Circuit Ⅰ

Supply Bias Voltage = 3V, Current= 85mA

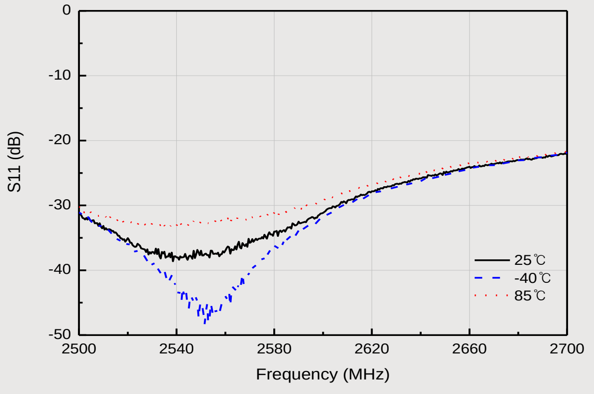
Parameters	Units	Frequency (MHz)		
		2500	2600	2700
S21	dB	12.4	11.8	11.3
S11	dB	-31	-31	-21
S22	dB	-12	-11	-11
P1dB	dBm	20.6	20.8	20.8
OIP3 @ 5dBm	dBm	34.5	34.0	34.0
NF	dB	2.5	2.6	2.7



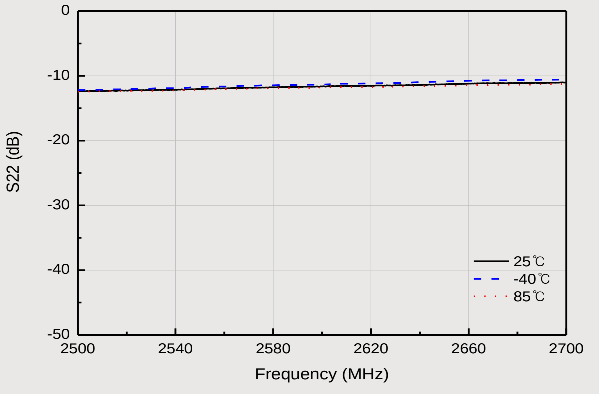
Gain vs. Frequency



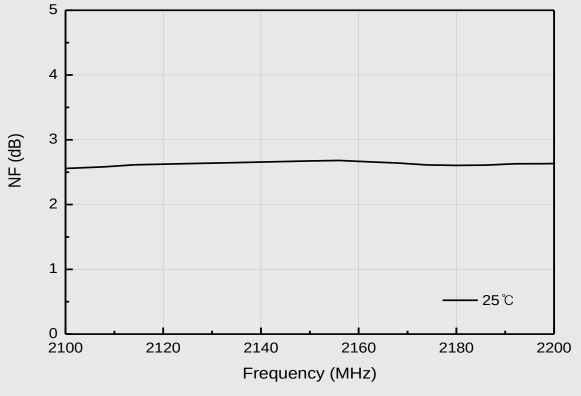
Input Return Loss



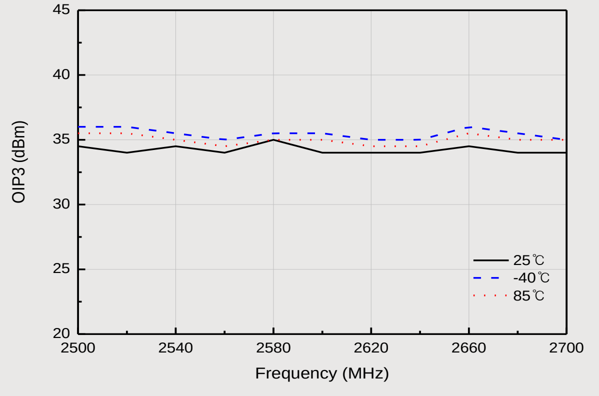
Output Return Loss



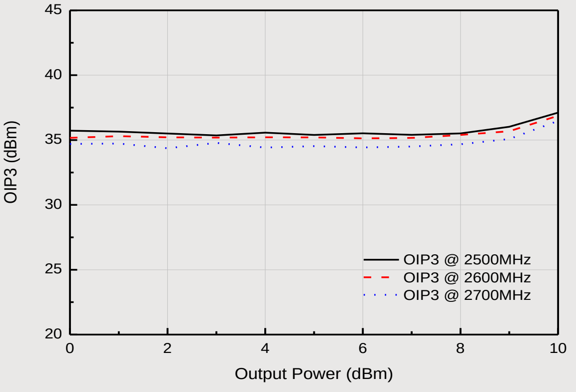
NF vs. Frequency



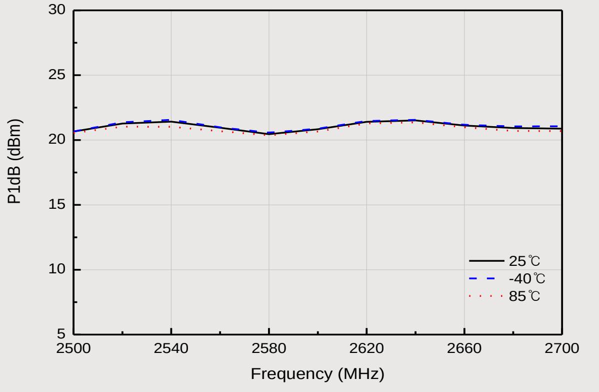
OIP3 vs. Frequency



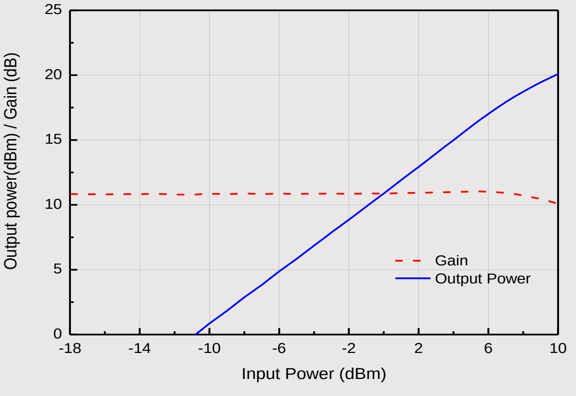
OIP3 vs. Output Power



P1dB vs. Frequency



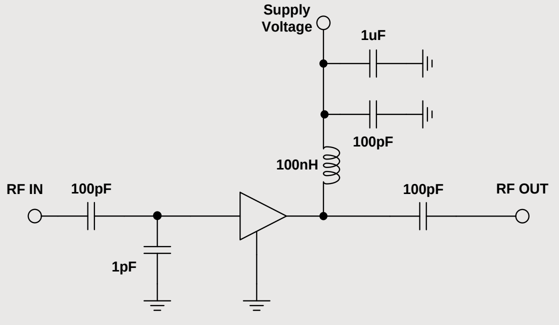
Output Power / Gain vs Input Power @ 2600MHz



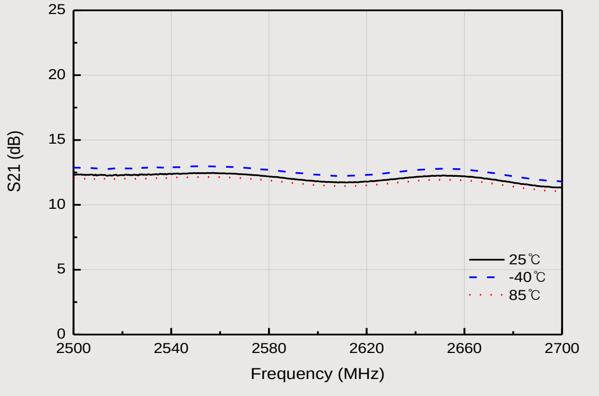
Typical RF Performance for RF 2600MHz Tuned Application Circuit Ⅱ

Supply Bias Voltage = 2.8V, Current= 70mA

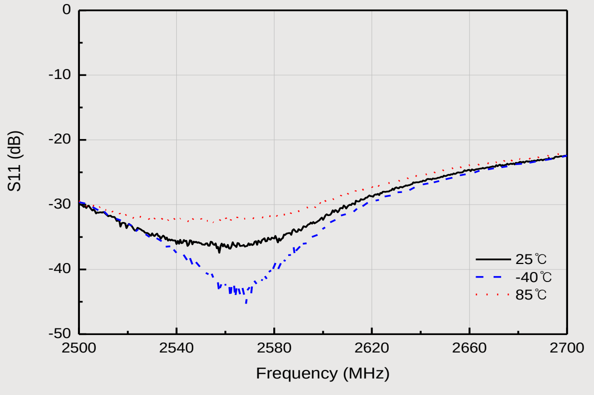
Parameters	Units	Frequency (MHz)		
		2500	2600	2700
S21	dB	12.3	11.8	11.3
S11	dB	-29	-32	-22
S22	dB	-12	-11	-10
P1dB	dBm	20.0	20.2	20.2
OIP3 @ 5dBm	dBm	35.0	34.5	34.5
NF	dB	2.2	2.5	2.6



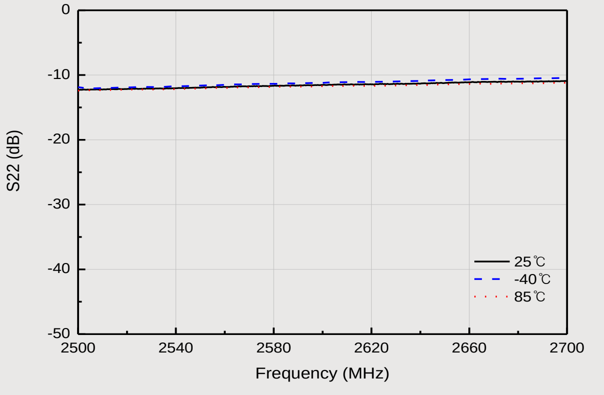
Gain vs. Frequency



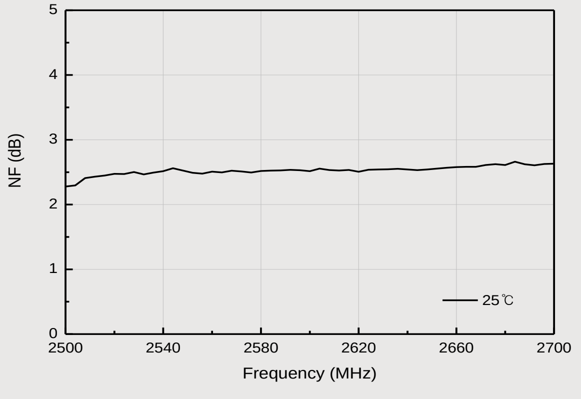
Input Return Loss



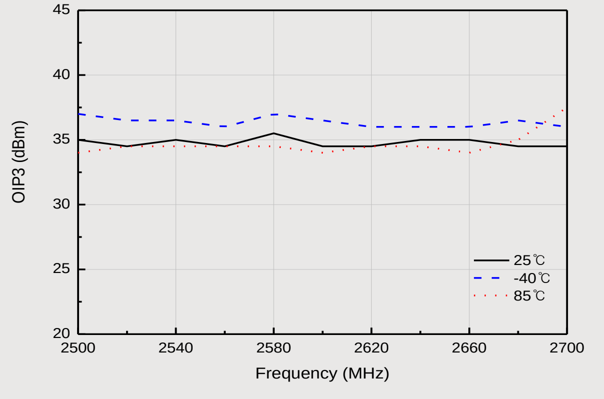
Output Return Loss

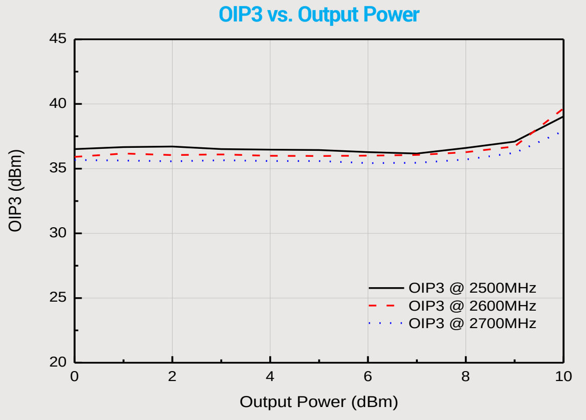


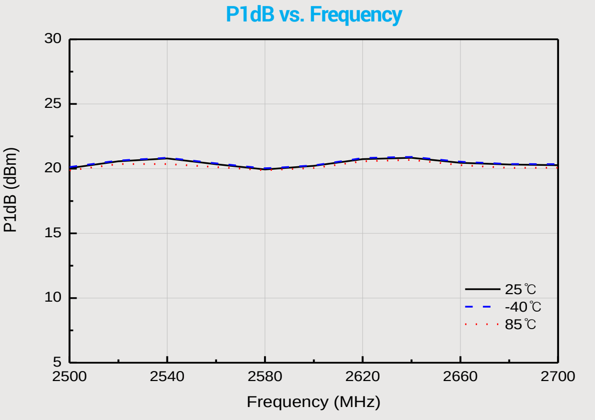
NF vs. Frequency

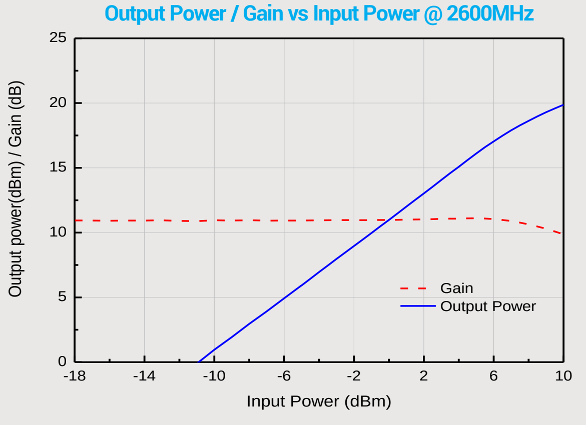


OIP3 vs. Frequency

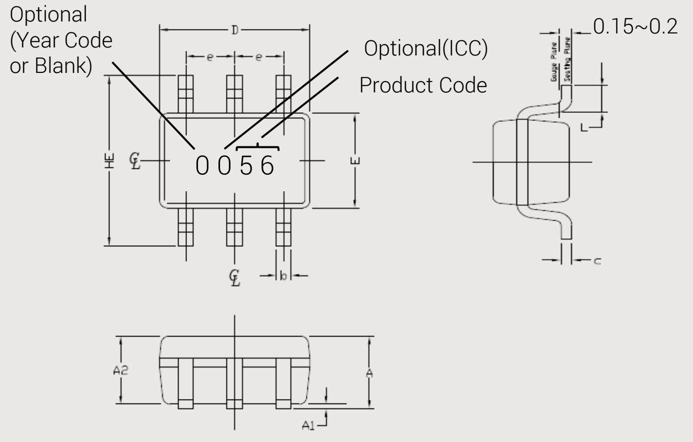



OIP3 vs. Output Power
OIP3 (dBm)
Output Power (dBm)
45
40
35
30
25
20
0
2
4
6
8
10
OIP3 @ 2500MHz
OIP3 @ 2600MHz
OIP3 @ 2700MHz


P1dB vs. Frequency
P1dB (dBm)
Frequency (MHz)
30
25
20
15
10
5
2500
2540
2580
2620
2660
2700
25℃
-40℃
85℃

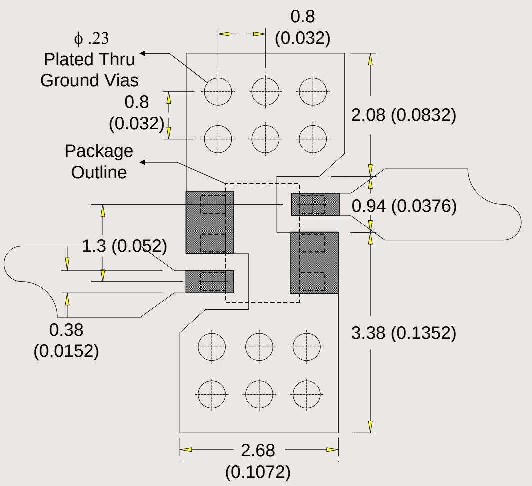

Output Power / Gain vs Input Power @ 2600MHz
Output power(dBm) / Gain (dB)
Input Power (dBm)
25
20
15
10
5
0
-18
-14
-10
-6
-2
2
6
10
Gain
Output Power

Lead-free /RoHS Compliant / Green SOT-363 Package Outline

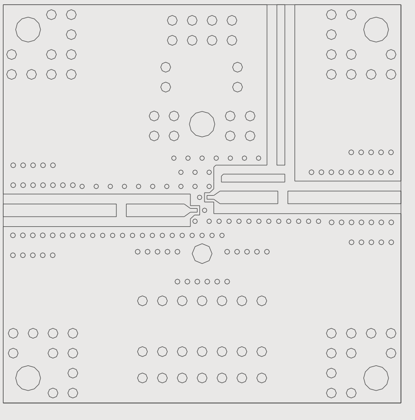


SYMBOL	MIN.	MAX.
E	1.15	1.35
D	1.85	2.25
HE	1.95	2.30
A	0.80	1.10
A2	0.70	1.00
A1	0.00	0.10
e	0.65 BSC	
b	0.15	0.40
c	0.08	0.25
L	0.21	0.26

Land Pattern



Evaluation Board Layout (40x40)



Mounting Instructions

1 Use a large ground pad area with many plated through-holes as shown.
2 We recommend 1 oz copper minimum.
3 Measurement for our data sheet was made on 0.8mm thick FR-4 Board.
4 RF trace width depends on the board material and construction.
5 Add mounting screws near the part to fasten the board to a heatsink.
6 Add as much copper as possible to inner and outer layers near the part to ensure optimal thermal performance.