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[CLASSIFICATION] APPLICATION NOTE

[DATE] 2024.03

[REVISION NO.] REV B.

[MEASURING INSTRUMENTS]

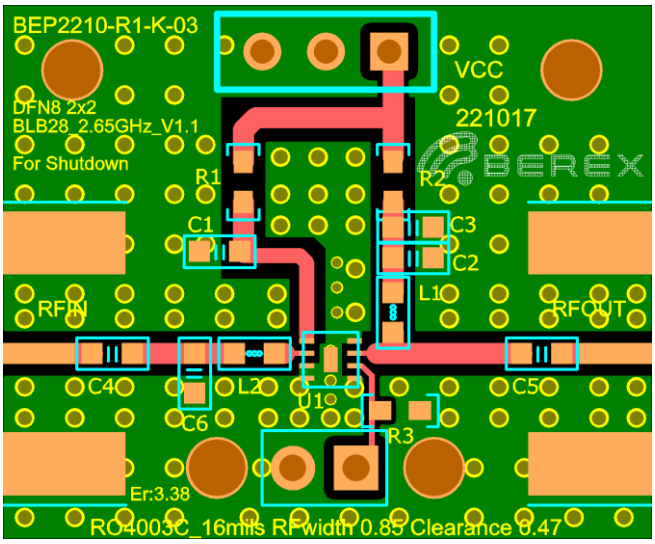
- NA_AGILENT E5080A
- SA_AGILENT N9020A
- SG_AGILENT N5182A
- SG_AGILENT N5182B

High Gain LNA BLB28

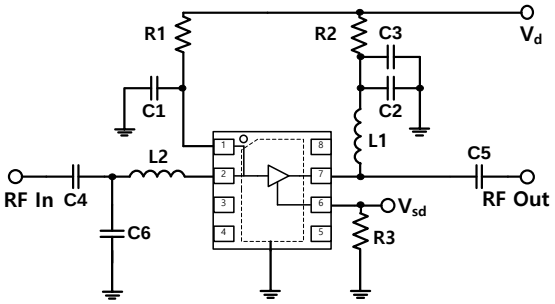
Application Note

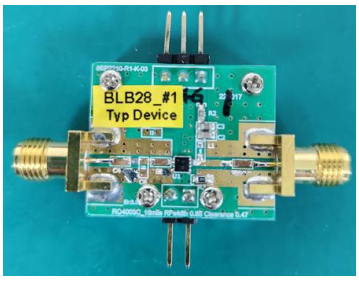
Contents

1. BLB28_ 2.14GHz 3.3V Application Note



Ref. Des.	Description/ Part Number	Values	Vendor
C1	0603 CAP	N/A	Samsung
C2 C4 C5	0603 CAP	100pF	Samsung
C3	0603 CAP	1nF	Samsung
C6	0603 CAP	1pF	Johanson(HQ)
L1	0603 IND	5.6nH	TAIYOTUDEN
L2	0603 IND	2.2nH	TAIYOTUDEN
R1	0603 RES	1.5kohm	Samsung
R2	0603 RES	0ohm	Samsung
R3	0603 RES	20kohm	Samsung
U1	DFN 2X2	BLB28	BEREX





Note:

1. PCB: 16mil thick RO4003
2. Distance between the edge of the shunt cap(C6) and the input pin of BLB28 5.9mm.
3. Distance between the edge of the series ind(L2) and the input pin of BLB28 1.1mm.

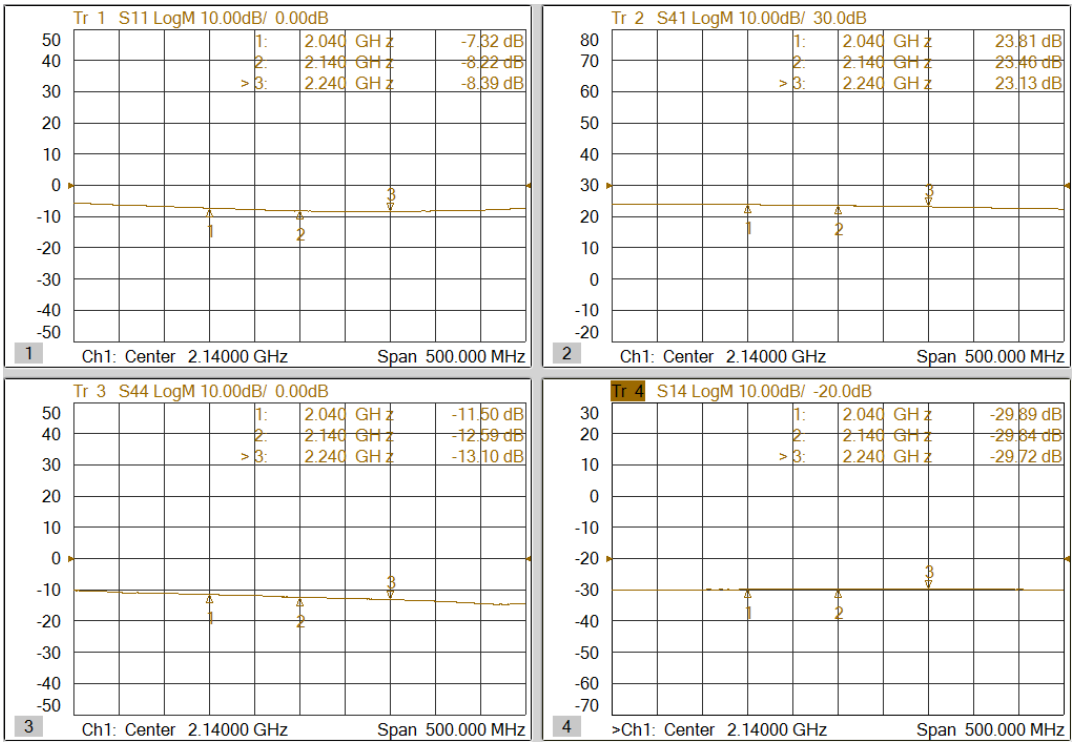
TITLE	
BLB28 Evaluation Board	
2.14GHz	
Drawing Number	Rev.
Date	Drawn By
FILE NAME	SHEET

1.1 BLB28_2.14GHz 3.3V Test Result

SN	Freq [GHz]	Vcc [V]	Icc [mA]	Gain [dB]	OIP3 [dBm](1)	P1dB [dBm]	IRL [dB]	ORL [dB]	NF [dB]](2)
-#17	2.04	3.3	31	23.8	26.4	14.9	-7.3	-11.5	0.73
-#17	2.14	3.3	31	23.4	26.7	15.1	-8.2	-12.5	0.76
-#17	2.24	3.3	31	23.1	26.4	15.0	-8.3	-13.1	0.74

(1) OIP3 was tested @Pout = 0Bm/tone 1MHz offset

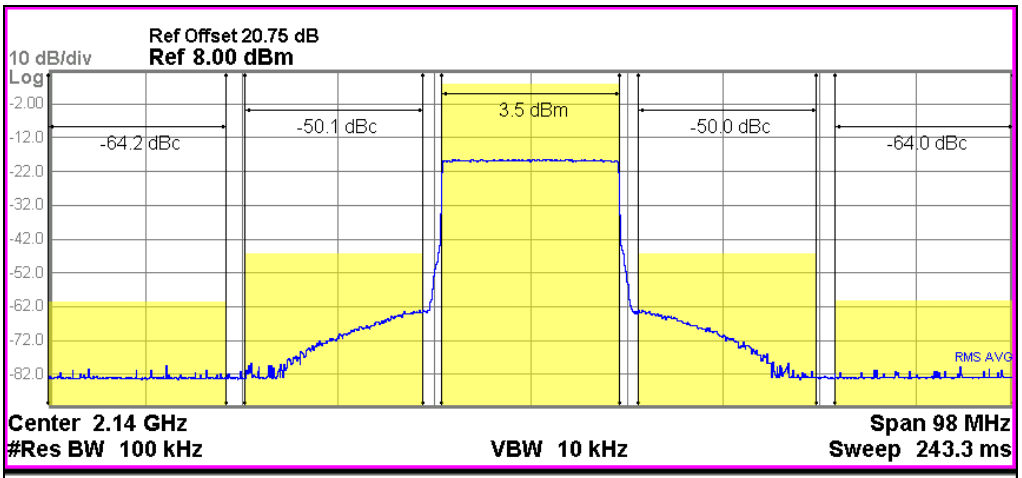
(2) Noise Figure data has input trace loss de-embedded.



1.1.1 2.14GHz 3.3V LTE 20MHz_ ACLR Test Result

Out Power : 3.5 dBm

3GPP LTE, FDD E-TM3.1, PAR 9.75 at 0.01% Prob : 2.14GHz -50dBc

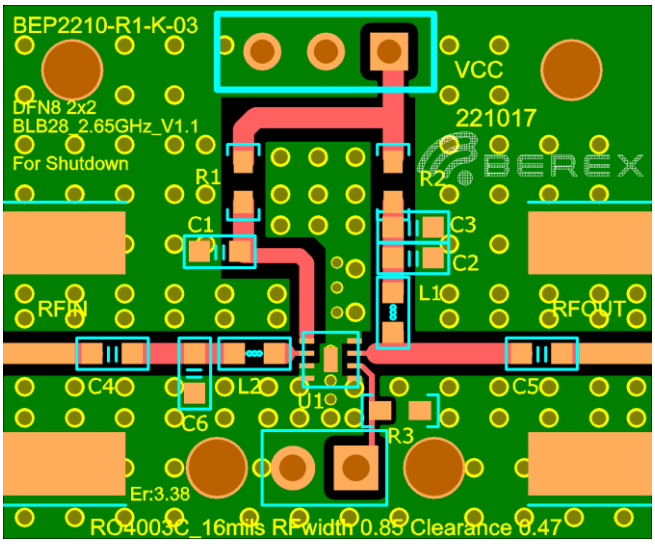


Total Carrier Power 3.518 dBm/ 18.00 MHz ACP-IBW

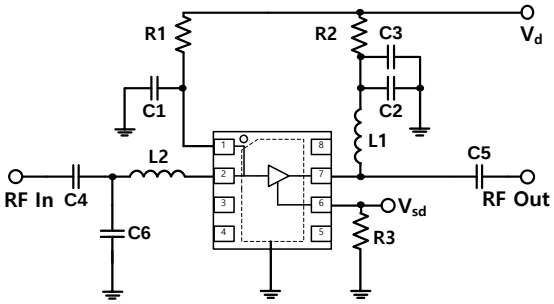
Carrier Power			Filter
1	3.518 dBm /	18.00 MHz	OFF

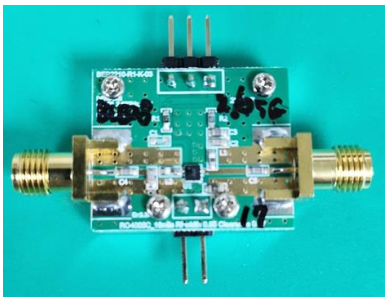
		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
20.00 MHz	18.00 MHz	-50.12	-46.61	-50.05	-46.53	OFF
40.00 MHz	18.00 MHz	-64.17	-60.65	-63.95	-60.44	OFF

2. BLB28_ 2.65GHz 3.3V Application Note



Ref. Des.	Description/ Part Number	Values	Vendor
C1	0603 CAP	N/A	Samsung
C2 C4 C5	0603 CAP	100pF	Samsung
C3	0603 CAP	1nF	Samsung
C6	0603 CAP	1pF	Johanson(HQ)
L1	0603 IND	2.7nH	TAIYOTUDEN
L2	0603 IND	1.5nH	TAIYOTUDEN
R1	0603 RES	1.5kohm	Samsung
R2	0603 RES	0ohm	Samsung
R3	0603 RES	20kohm	Samsung
U1	DFN 2X2	BLB28	BEREX





Note:

2. PCB: 16mil thick RO4003
2. Distance between the edge of the shunt cap(C6) and the input pin of BLB28 4.0mm.
3. Distance between the edge of the series ind(L2) and the input pin of BLB28 1.0mm.

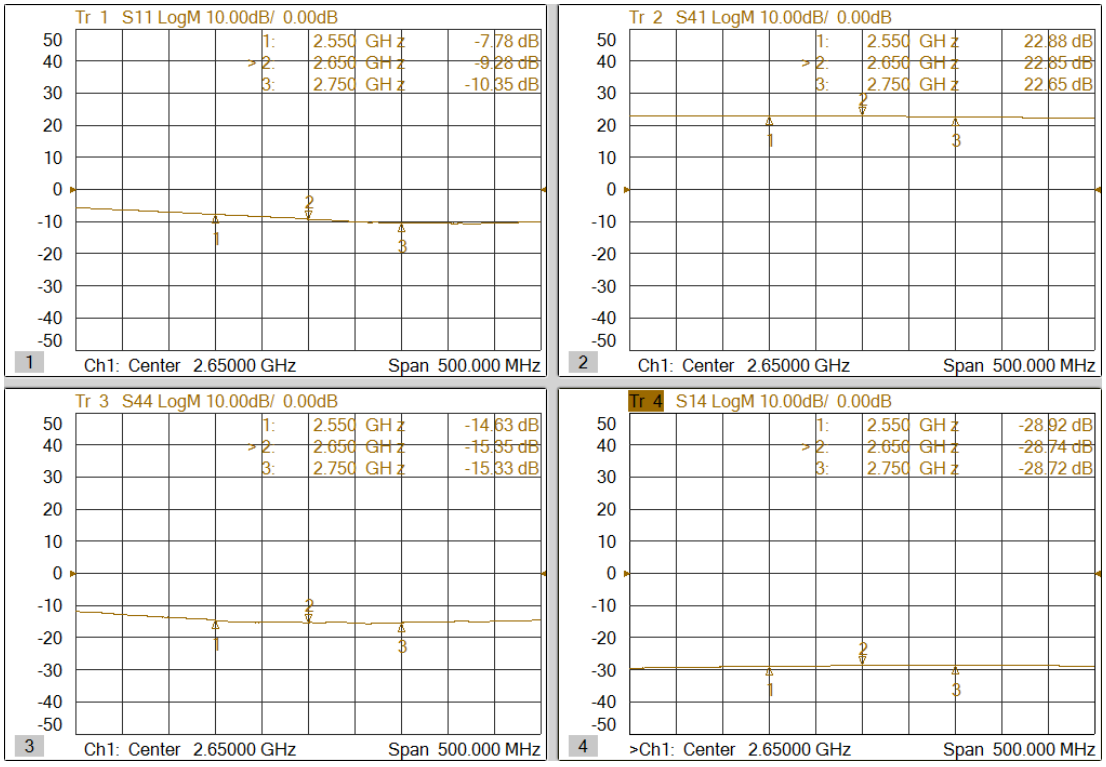
TITLE	
BLB28 Evaluation Board	
2.65GHz	
Drawing Number	Rev.
Date	Drawn By
FILE NAME	SHEET

1.2 BLB28_2.65GHz 3.3V Test Result

SN	Freq [GHz]	Vcc [V]	Icc [mA]	Gain [dB]	OIP3 [dBm](1)	P1dB [dBm]	IRL [dB]	ORL [dB]	NF [dB]](2)
-#17	2.55	3.3	29	22.9	26.2	14.3	-7.8	-14.6	0.71
-#17	2.65	3.3	29	22.9	26.5	14.3	-9.3	-15.4	0.7
-#17	2.75	3.3	29	22.7	26.7	14.7	-10.4	-15.3	0.69

(3) OIP3 was tested @Pout = 0Bm/tone 1MHz offset

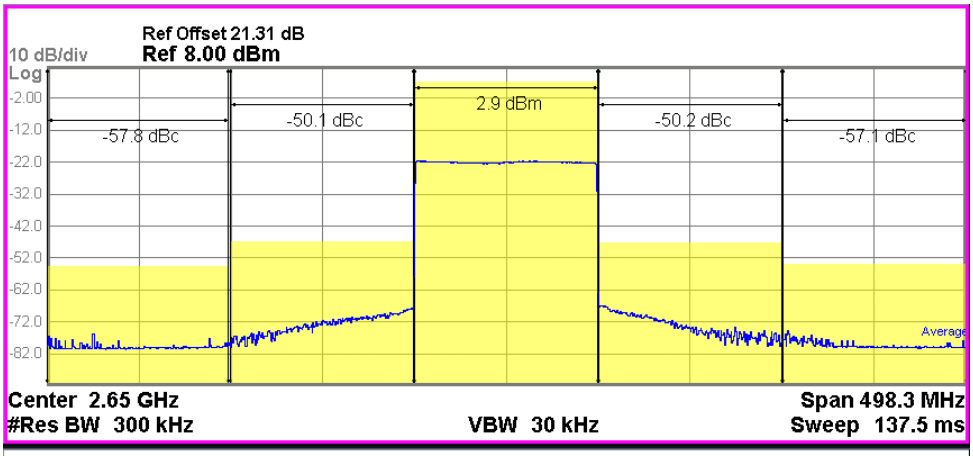
(4) Noise Figure data has input trace loss de-embedded.



1.2.1 2.65GHz 3.3V 5GNR_ ACLR Test Result

Out Power : 2.8 dBm

5GNR_1FA_TM 3p1_100% : 2.65GHz -50dBc

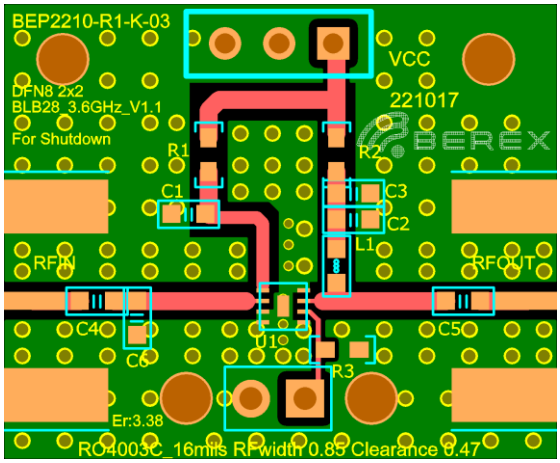


Total Carrier Power 2.852 dBm/ 98.28 MHz ACP-IBW

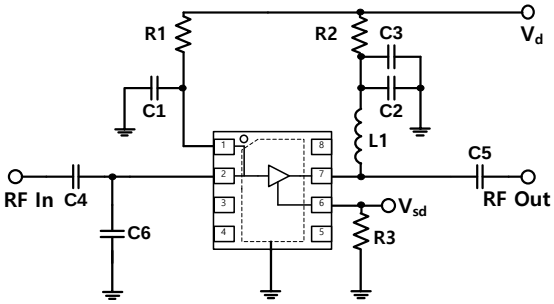
Carrier Power			Filter
1	2.852 dBm /	98.28 MHz	OFF

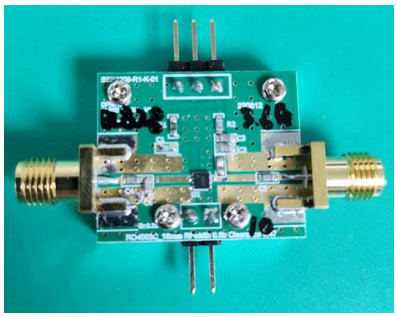
		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
100.0 MHz	98.28 MHz	-50.12	-47.27	-50.17	-47.32	OFF
200.0 MHz	98.28 MHz	-57.77	-54.91	-57.15	-54.29	OFF

2. BLB28_ 3.6GHz 3.3V Application Note



Ref. Des.	Description/ Part Number	Values	Vendor
C1	0603 CAP	N/A	Samsung
C2 C4 C5	0603 CAP	100pF	Samsung
C3	0603 CAP	1nF	Samsung
C6	0603 CAP	0.5pF	Johanson(HQ)
L1	0603 IND	2.7nH	TAIYOTUDEN
R1	0603 RES	1.5kohm	Samsung
R2	0603 RES	0ohm	Samsung
R3	0603 RES	20kohm	Samsung
U1	DFN 2X2	BLB28	BEREX





Note:

1. PCB: 16mil thick RO4003
2. Distance between the edge of the shunt cap(C6) and the input pin of BLB28 5.5mm.

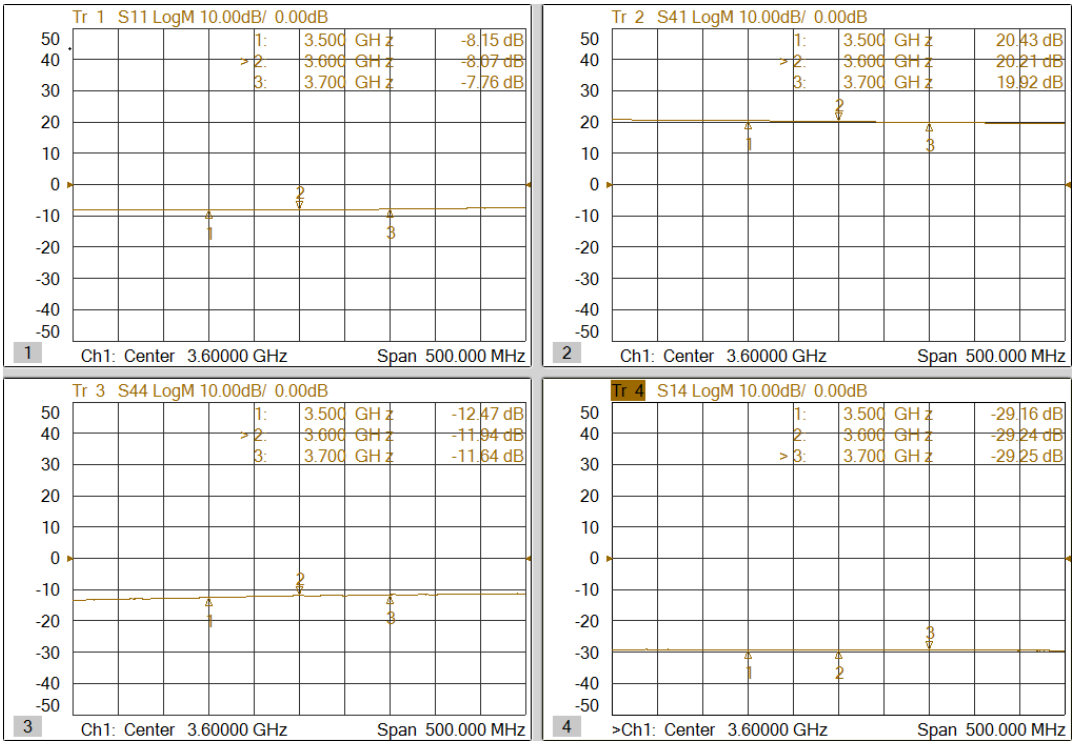
TITLE	
BLB28 Evaluation Board	
3.6GHz	
Drawing Number	Rev.
Date	Drawn By
FILE NAME	SHEET

2.1 BLB28_ 3.6GHz 3.3V Test Result

SN	Freq [GHz]	Vcc [V]	Icc [mA]	Gain [dB]	OIP3 [dBm](1)	P1dB [dBm]	IRL [dB]	ORL [dB]	NF [dB](2)
-#10	3.5	3.3	31	20.4	26.9	14.6	-8.2	-12.5	0.69
-#10	3.6	3.3	31	20.2	26.7	14.7	-8.1	-11.9	0.73
-#10	3.7	3.3	31	19.9	26.7	14.8	-7.8	-11.6	0.7

(1) OIP3 was tested @Pout = 0Bm/tone 1MHz offset

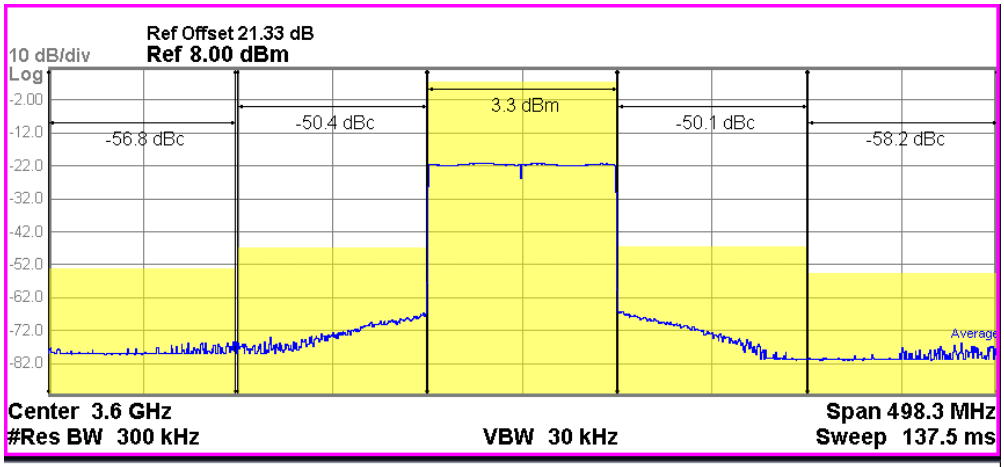
(2) Noise Figure data has input trace loss de-embedded.



2.1.1 3.6GHz 3.3V 5GNR_ ACLR Test Result

Out Power : 3.3 dBm

5GNR_1FA_TM 3p1_100% : 3.6GHz -50dBc

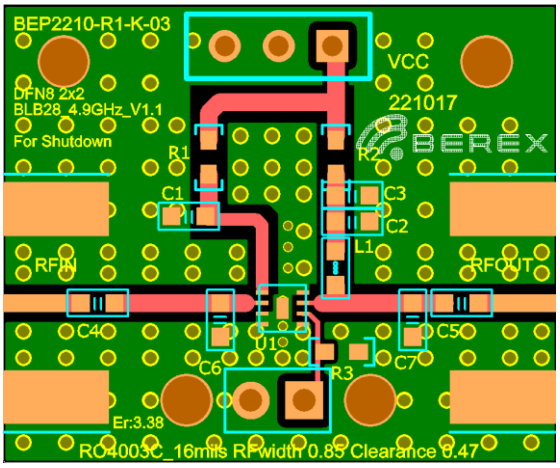


Total Carrier Power 3.294 dBm/ 98.28 MHz ACP-IBW

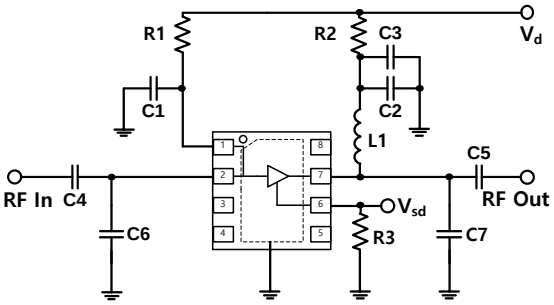
Carrier Power			Filter
1	3.294 dBm /	98.28 MHz	OFF

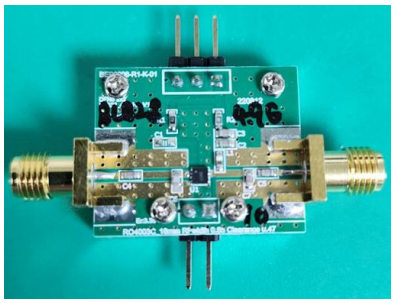
		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
100.0 MHz	98.28 MHz	-50.40	-47.11	-50.06	-46.77	OFF
200.0 MHz	98.28 MHz	-56.79	-53.50	-58.23	-54.94	OFF

3. BLB28_ 4.9GHz 3.3V Application Note



Ref. Des.	Description/ Part Number	Values	Vendor
C1	0603 CAP	N/A	Samsung
C2 C4 C5	0603 CAP	100pF	Samsung
C3	0603 CAP	1nF	Samsung
C6	0603 CAP	0.5pF	Johanson(HQ)
C7	0603 CAP	0.3pF	Samsung
L1	0603 IND	2.7nH	TAIYOTUDEN
R1	0603 RES	1.5kohm	Samsung
R2	0603 RES	0ohm	Samsung
R3	0603 RES	20kohm	Samsung
U1	DFN 2X2	BLB28	BEREX





Note:

1. PCB: 16mil thick RO4003
2. Distance between the edge of the shunt cap(C6) and the input pin of BLB28 1.5mm.
3. Distance between the edge of the shunt cap(C7) and the output pin of BLB28 4.5mm.

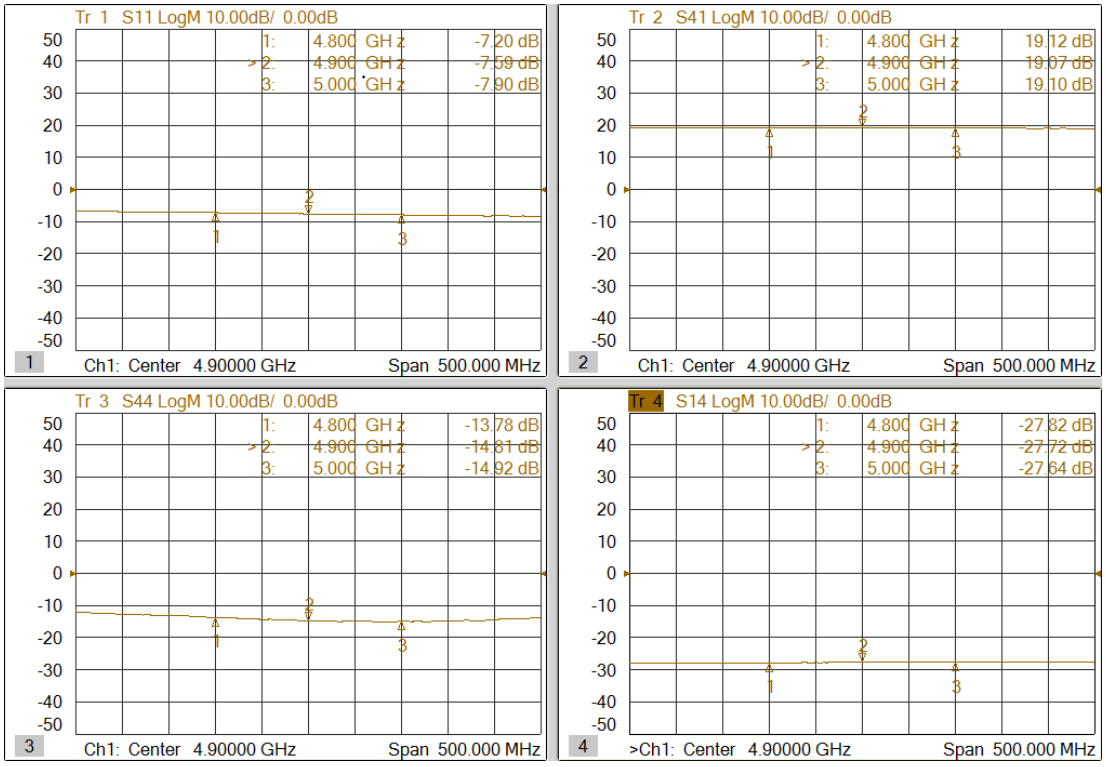
TITLE	
BLB28 Evaluation Board	
4.9GHz	
Drawing Number	Rev.
Date	Drawn By
FILE NAME	SHEET

3.1 BLB28_4.9GHz 3.3V Test Result

SN	Freq [GHz]	Vcc [V]	Icc [mA]	Gain [dB]	OIP3 [dBm](1)	P1dB [dBm]	IRL [dB]	ORL [dB]	NF [dB]](2)
-#10	4.8	3.3	30	19.1	25.5	14.0	-7.2	-13.8	0.85
-#10	4.9	3.3	30	19.1	25.6	14.1	-7.6	-14.8	0.82
-#10	5.0	3.3	30	19.1	25.6	14.2	-7.9	-14.9	0.86

(5) OIP3 was tested @Pout = 0Bm/tone 1MHz offset

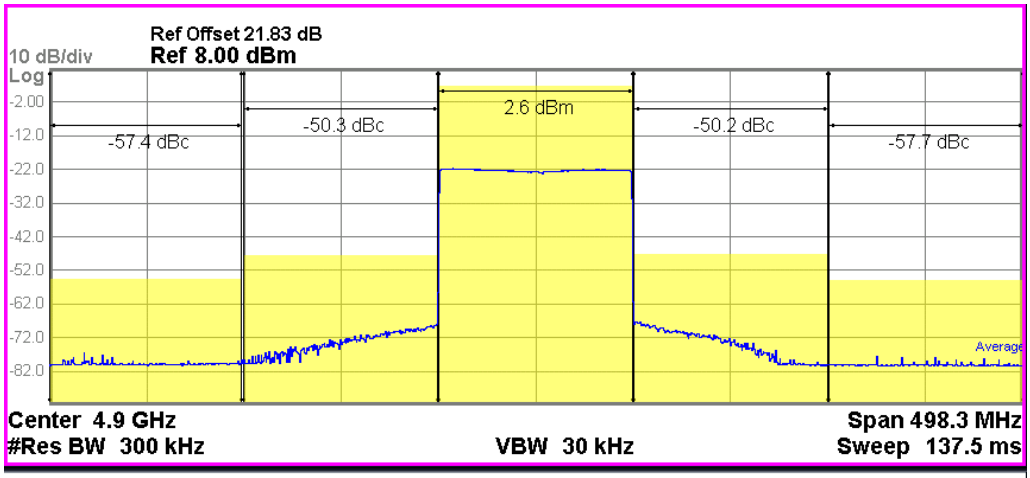
(6) Noise Figure data has input trace loss de-embedded.



3.1.1 4.9GHz 3.3V 5GNR_ ACLR Test Result

Out Power : 2.6 dBm

5GNR_1FA_TM 3p1_100% : 4.9GHz -50dBc

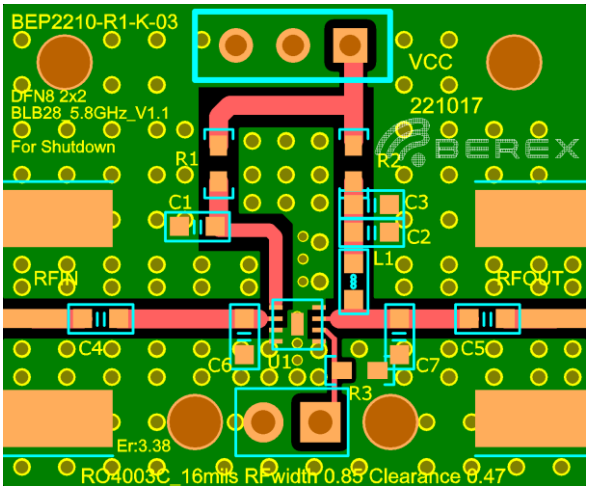


Total Carrier Power 2.616 dBm/ 98.28 MHz ACP-IBW

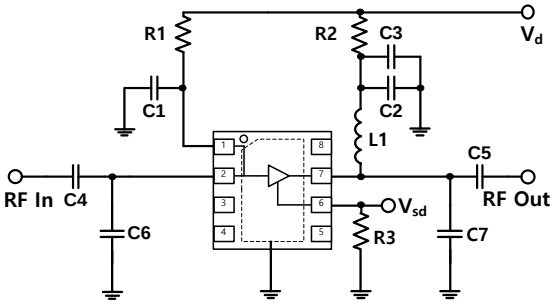
Carrier Power			Filter
1	2.616 dBm /	98.28 MHz	OFF

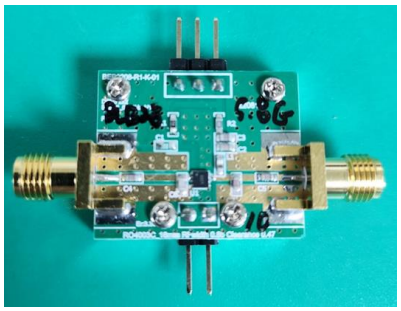
		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
100.0 MHz	98.28 MHz	-50.28	-47.67	-50.15	-47.54	OFF
200.0 MHz	98.28 MHz	-57.43	-54.82	-57.75	-55.13	OFF

4. BLB28_ 5.8GHz 3.3V Application Note



Ref. Des.	Description/ Part Number	Values	Vendor
C1	0603 CAP	N/A	Samsung
C2 C4 C5	0603 CAP	100pF	Samsung
C3	0603 CAP	1nF	Samsung
C6	0603 CAP	0.5pF	Johanson(HQ)
C7	0603 CAP	0.3pF	Samsung
L1	0603 IND	2.7nH	TAIYOTUDEN
R1	0603 RES	1.5kohm	Samsung
R2	0603 RES	0ohm	Samsung
R3	0603 RES	20kohm	Samsung
U1	DFN 2X2	BLB28	BEREX





Note:

1. PCB: 16mil thick RO4003
2. Distance between the edge of the shunt cap(C6) and the input pin of BLB28 0.8mm.
3. Distance between the edge of the shunt cap(C7) and the output pin of BLB28 3.0mm.

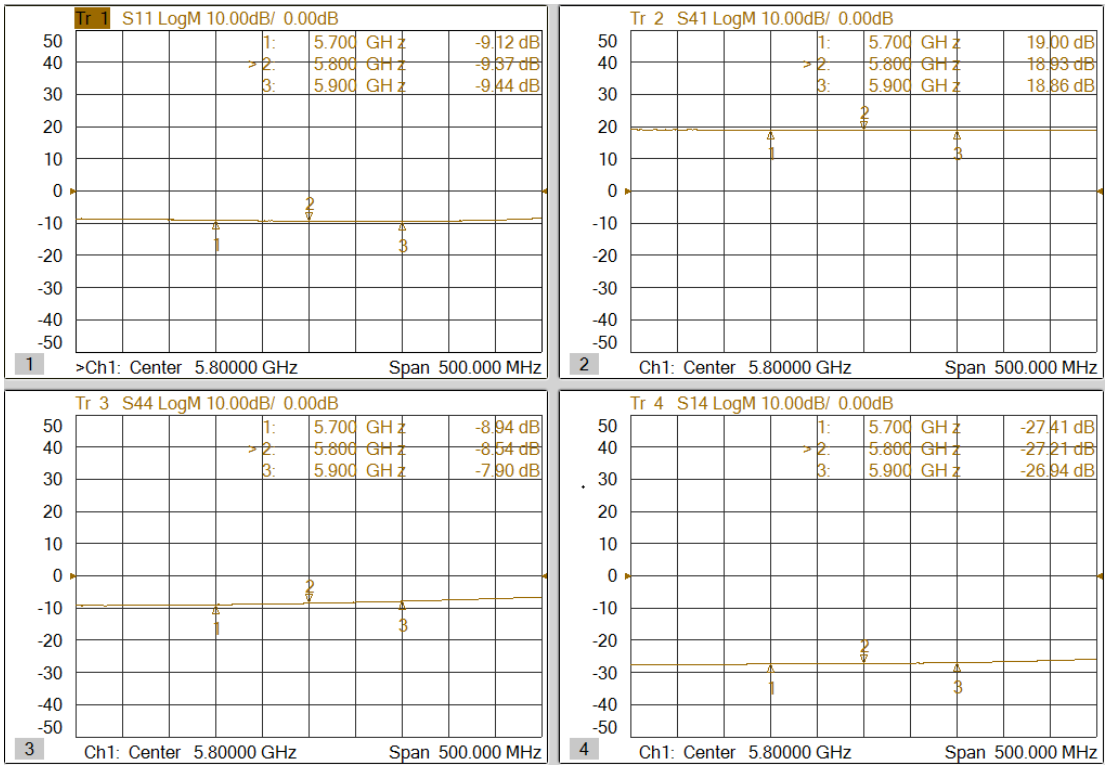
TITLE	
BLB28 Evaluation Board	
5.8GHz	
Drawing Number	Rev.
Date	Drawn By
FILE NAME	SHEET

5-1 BLB28_ 5.8GHz 3.3V Test Result

SN	Freq [GHz]	Vcc [V]	Icc [mA]	Gain [dB]	OIP3 [dBm](1)	P1dB [dBm]	IRL [dB]	ORL [dB]	NF [dB](2)
-#10	5.7	3.3	30	19.0	24.1	12.8	-9.1	-8.9	1.02
-#10	5.8	3.3	30	18.9	24.0	12.8	-9.4	-8.5	1.02
-#10	5.9	3.3	30	18.9	23.1	12.2	-9.4	-7.9	1.02

(3) OIP3 was tested @Pout = 0Bm/tone 1MHz offset

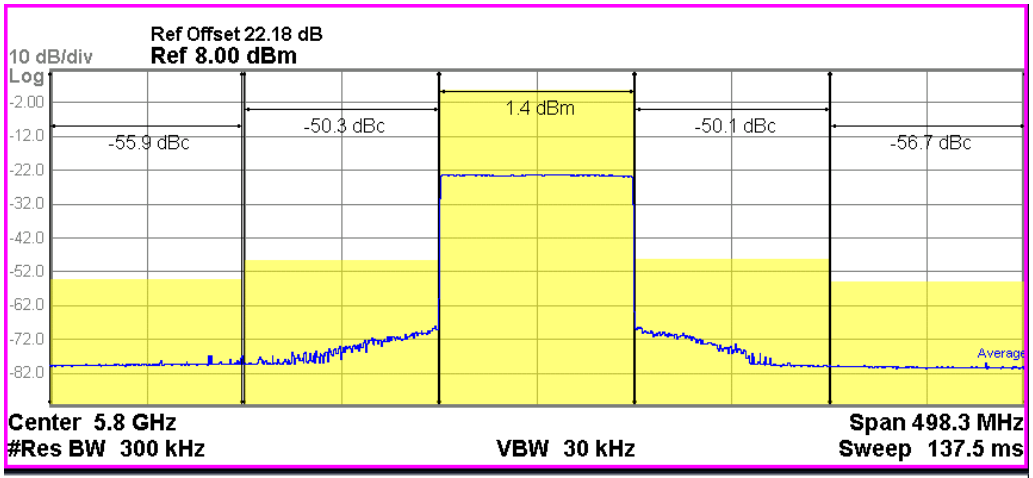
(4) Noise Figure data has input trace loss de-embedded.



4.1.1 5.8GHz 3.3V 5GNR_ ACLR Test Result

Out Power : 1.4 dBm

5GNR_1FA_TM 3p1_100% : 5.8GHz -50dBc



Total Carrier Power 1.414 dBm/ 98.28 MHz ACP-IBW

Carrier Power			Filter
1	1.414 dBm /	98.28 MHz	OFF

		Lower		Upper		
Offset Freq	Integ BW	dBc	dBm	dBc	dBm	Filter
100.0 MHz	98.28 MHz	-50.26	-48.84	-50.11	-48.70	OFF
200.0 MHz	98.28 MHz	-55.92	-54.51	-56.73	-55.31	OFF