LimeRFE 1v0

Measurement Results

Version: 1.0
Revision: 5
Date: 28.02.2020

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LimeRFE 1v0 Performance Summary

Measured results of the several prototype boards are given in the table bellow.

No.	Band	TX						RX								
		Gain [dB]			OP1dB [dBm]			Gain [dB]			NF [dB]			IIP3 [dBm]		
		Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max	Min	Nom	Max
1	WB 1000	26		45	22.5		28.5	16		20.8	3.6		4.3	12		17.5
2	WB 4000	10		33	14		24	7		18	3		6.5	11		25
3	HAM 30															
	5 – 30 MHz		35			32.5			20			6			15	
	1 – 5 MHz											/		8		14
4	HAM 50-70		33			30			18			4			16	
5	HAM 145		31			33			17			3.8			13.4	
6	HAM 220		35			33.2			17			3.9			14.5	
7	HAM 435		36			33.2			15			4.3			10.9	
8	HAM 920		34			29.5			15			3			16	
9	HAM 1280		30			29			15.5			3.5			21	
10	HAM 2400		41			28.5			12.5			4			14.5	
11	HAM 3500		17.5			20			7			5.5			12.5	
12	Cell Band 1		37			28			11			5.8			17	
13	Cell Band 2		40			30.5			11			8			17	
14	Cell Band 3		40			28.5			13			/			16.5	
15	Cell Band 7		37			26			8			6.5			18	
16	Cell Band 38		38			26			7			6			18	

Setup

Measurements results were corrected by 46 dB to account for the setup.

So, approximately, the additional setup contribution is:

@ 2.0 GHz approx. 0.8 dB
@ 2.5 GHz approx. 1.2 dB
@ 3.5 GHz approx. 1.5 dB

This additional setup contribution was not de-embedded from the results.

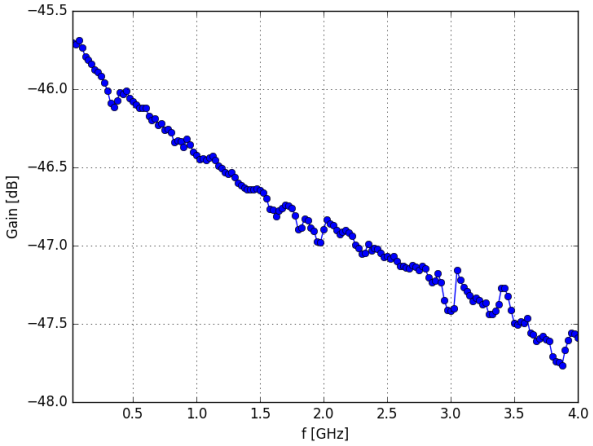

Figure 1: Setup gain

Measurement results are from the board #2.

TX

Wideband 1 – 1000 MHz

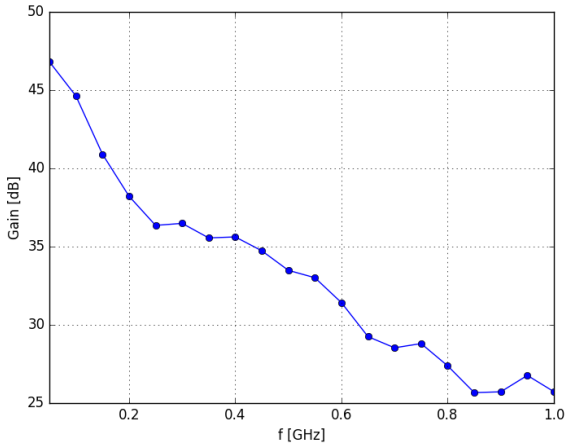

Figure 2: Gain

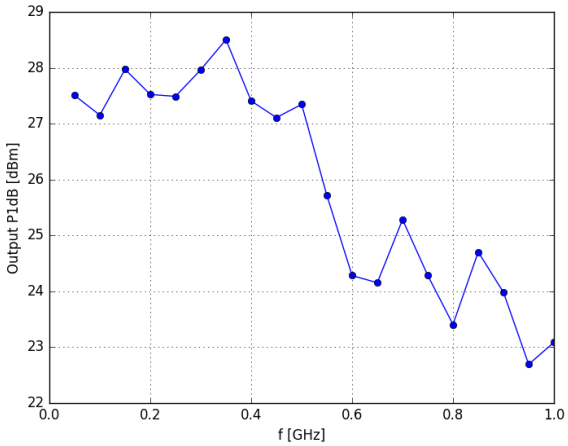

Figure 3: Output P1dB

HF Performance

The following graphs present the performance of the *Wideband 1 – 1000 MHz* channel for HF frequencies.

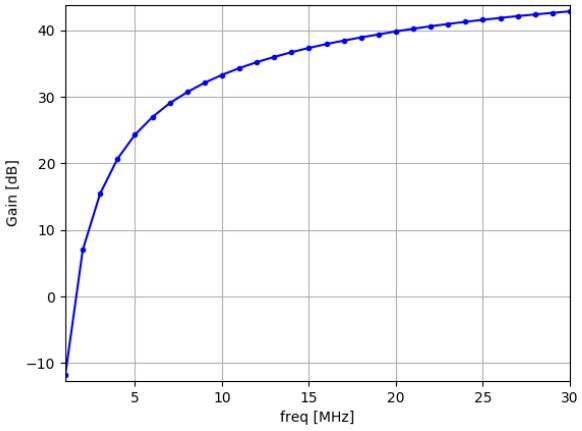

Figure 4: Gain (HF Band)

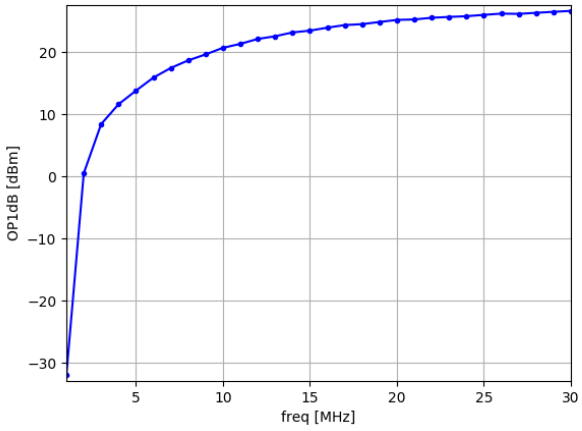

Figure 5: Output P1dB (HF Band)

Wideband 1000 – 4000 MHz

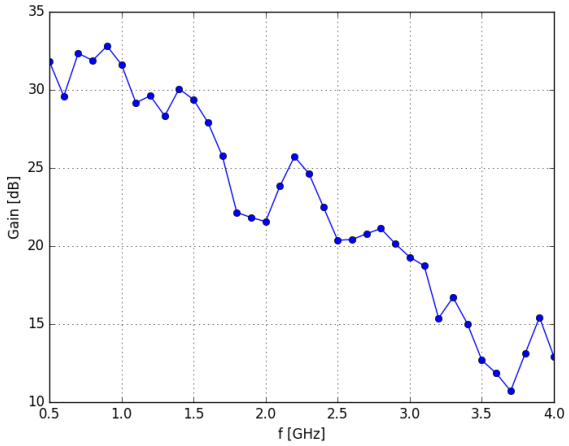

Figure 6: Gain

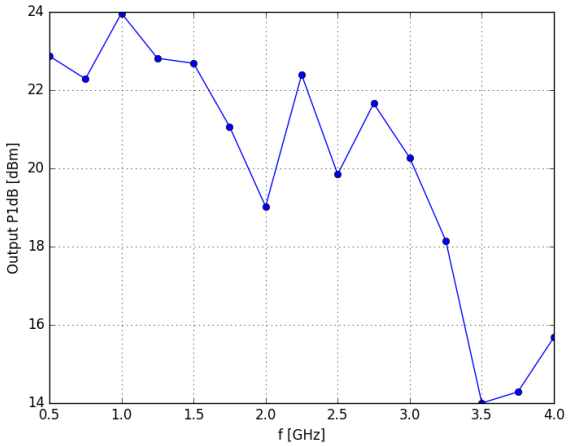

Figure 7: Output P1dB

HAM 30 MHz (HF)

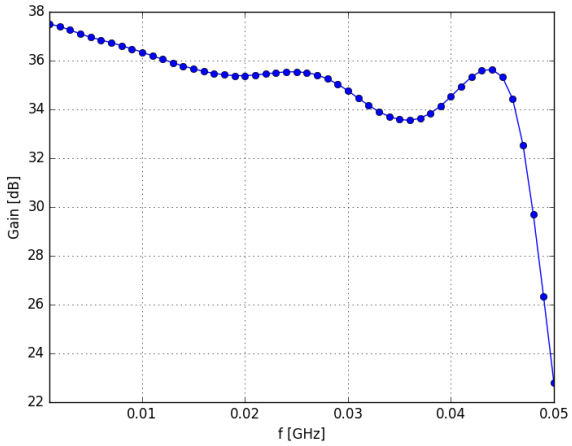

Figure 8: Gain

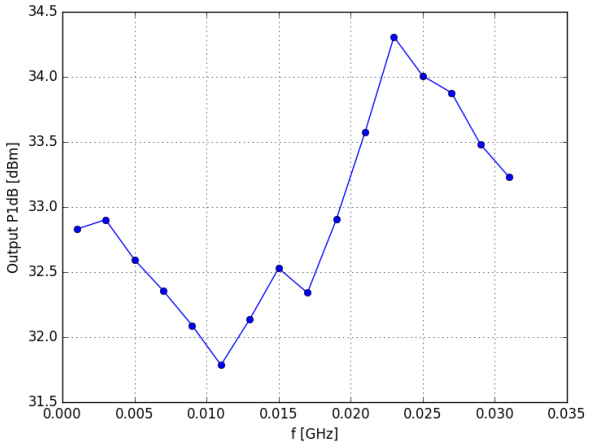

Figure 9: Output P1dB

HAM 50 – 70 MHz (6 & 4 m)

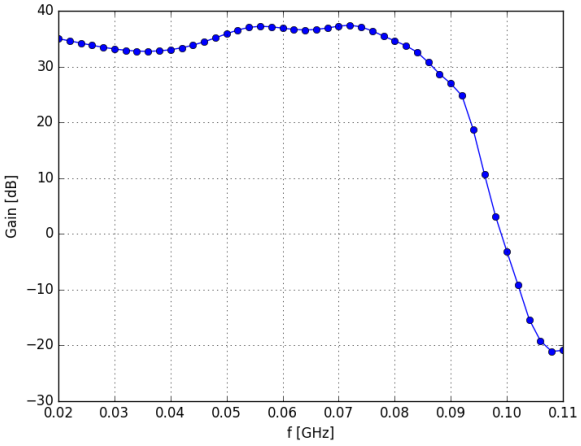

Figure 10: Gain

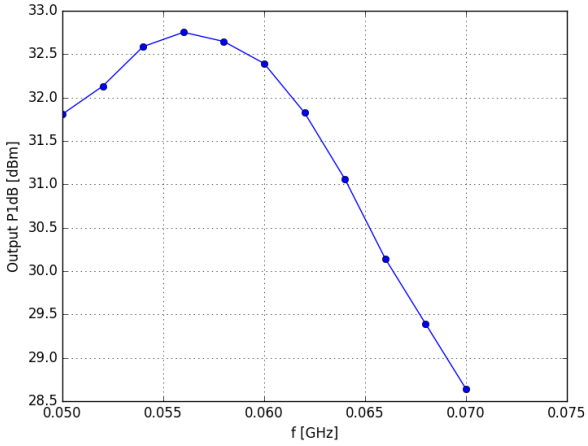

Figure 11: Output P1dB

HAM 144 – 146 MHz (2 m)

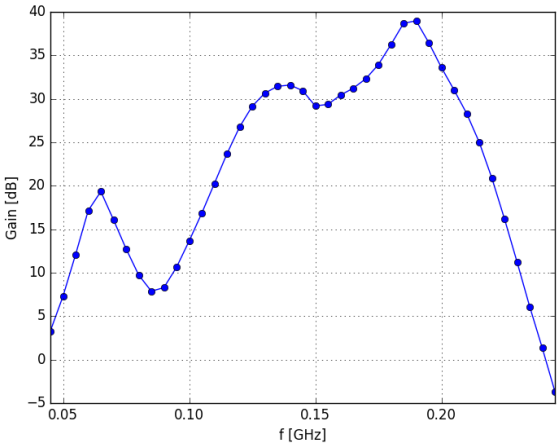

Figure 12: Gain

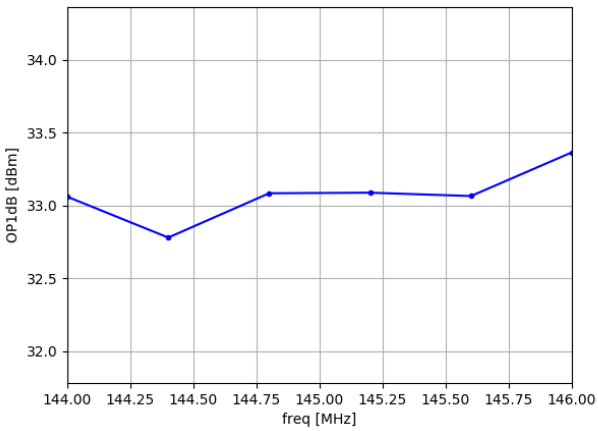

Figure 13: Output P1dB

HAM 220 – 225 MHz (1.25 m)

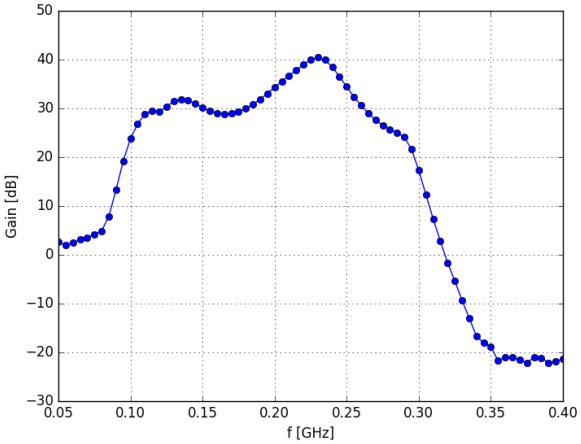

Figure 14: Gain

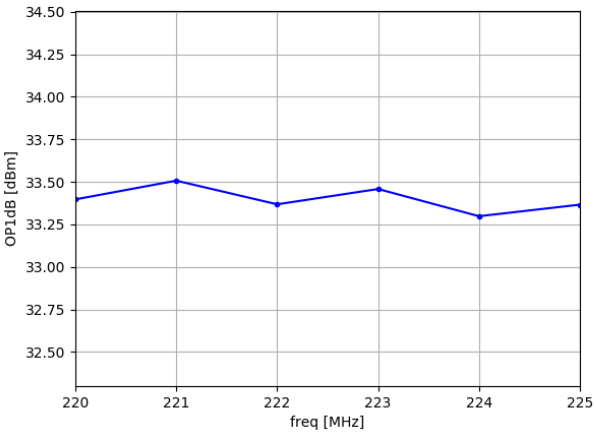

Figure 15: Output P1dB

HAM 430 – 440 MHz (70 cm)

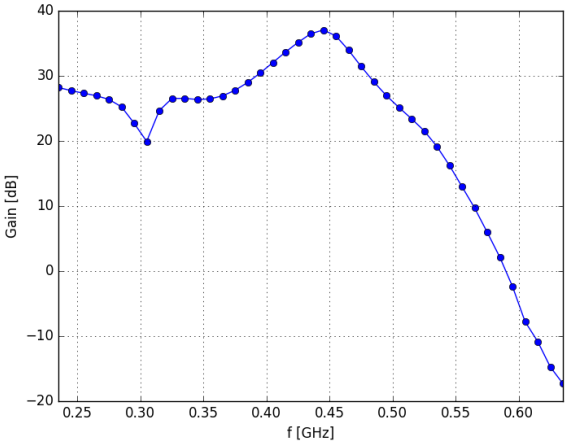

Figure 16: Gain

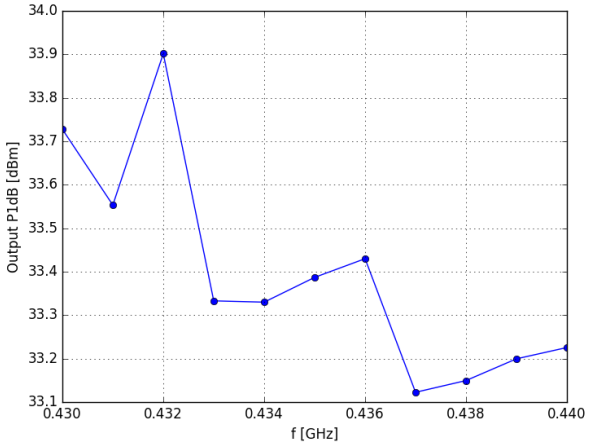

Figure 17: Output P1dB

HAM 902 – 928 MHz (33 cm)

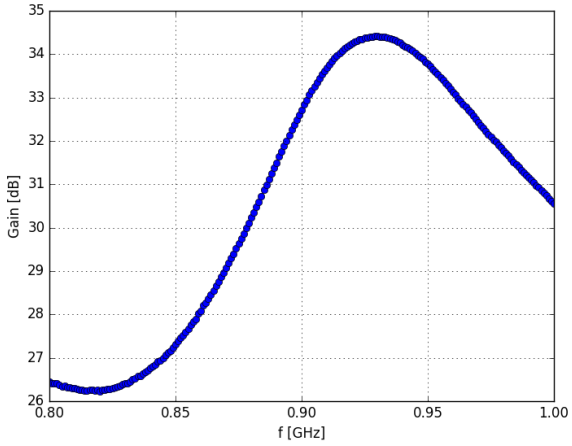

Figure 18: Gain

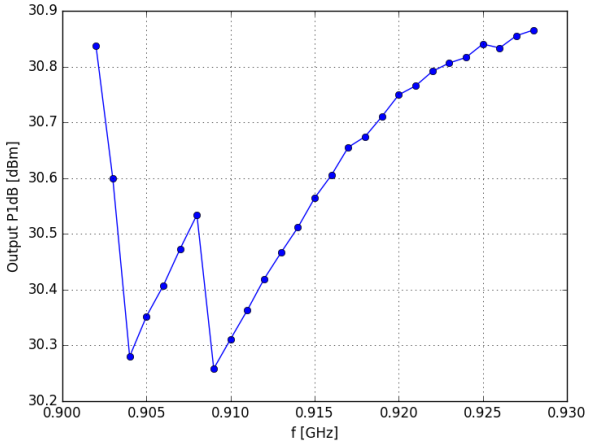

Figure 19: Output P1dB

HAM 1240 – 1325 MHz (23 cm)

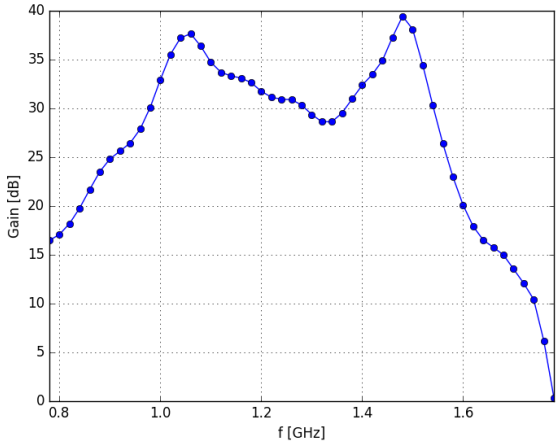

Figure 20: Gain

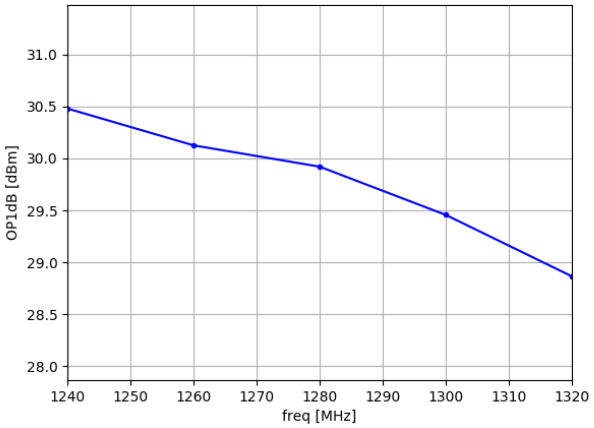

Figure 21: Output P1dB

HAM 2300 – 2450 MHz (13 cm)

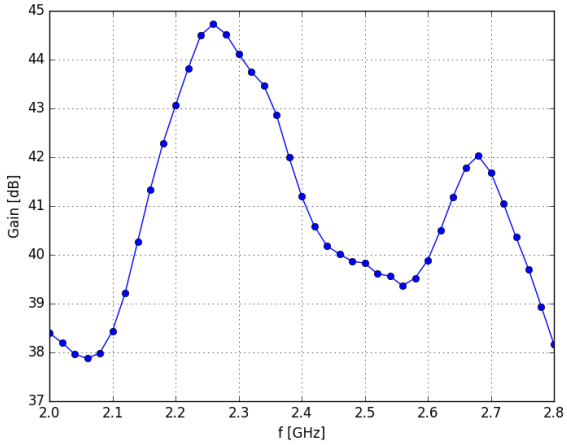

Figure 22: Gain

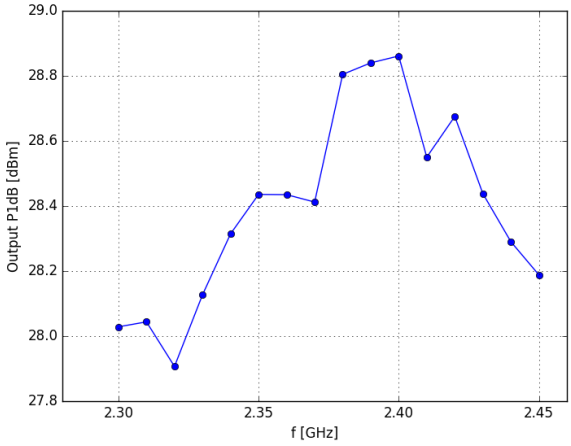

Figure 23: Output P1dB

HAM 3300 – 3500 MHz (9 cm)

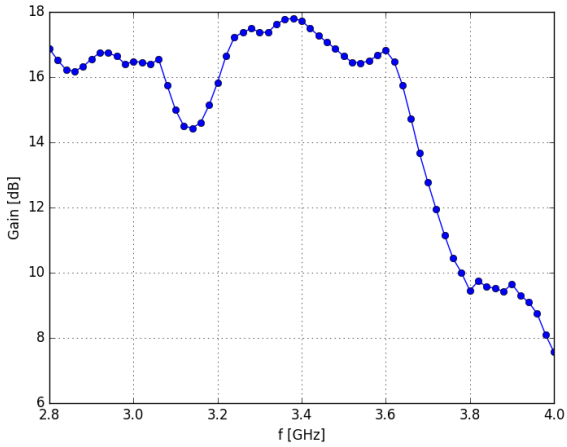

Figure 24: Gain

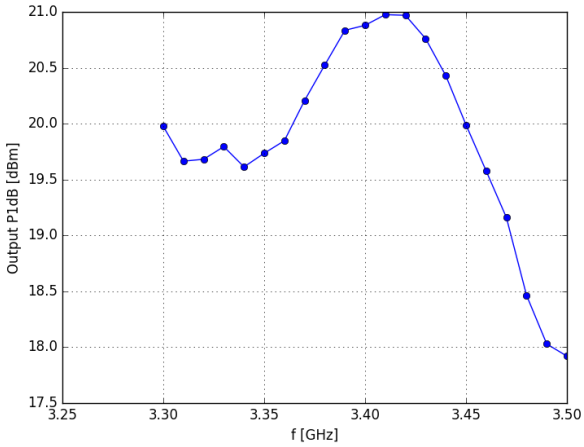

Figure 25: Output P1dB

Cellular Band 1

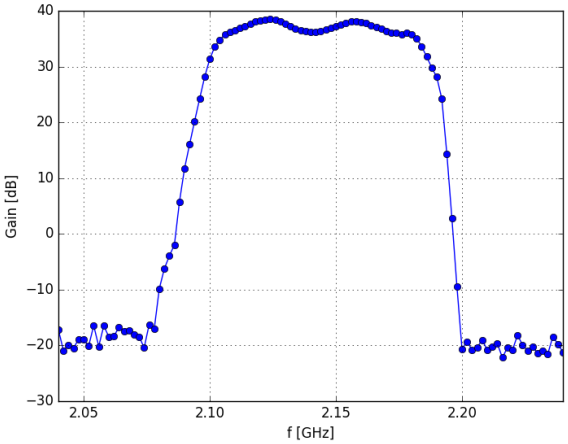

Figure 26: Gain

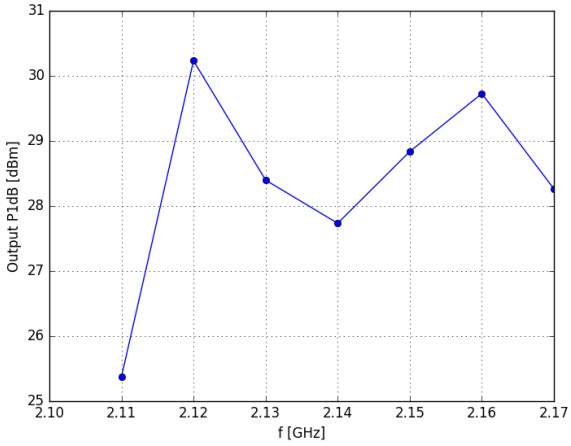

Figure 27: Output P1dB

Cellular Band 2

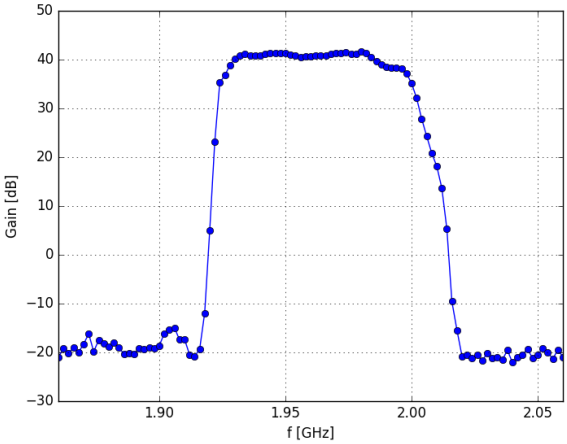

Figure 28: Gain

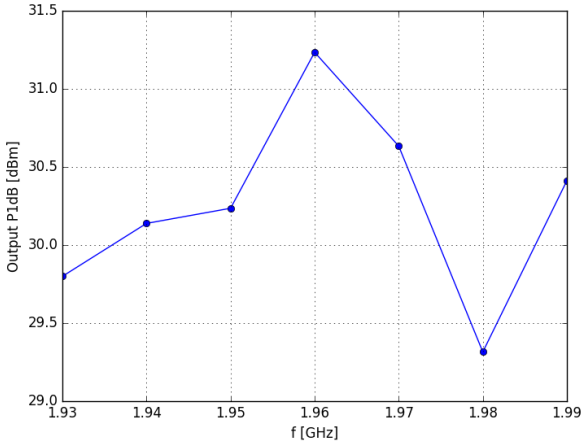

Figure 29: Output P1dB

Cellular Band 3

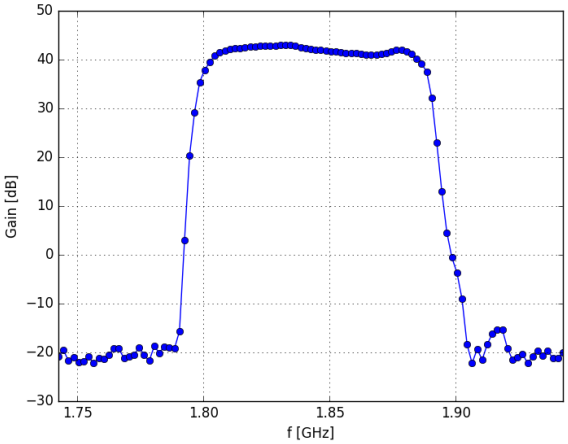

Figure 30: Gain

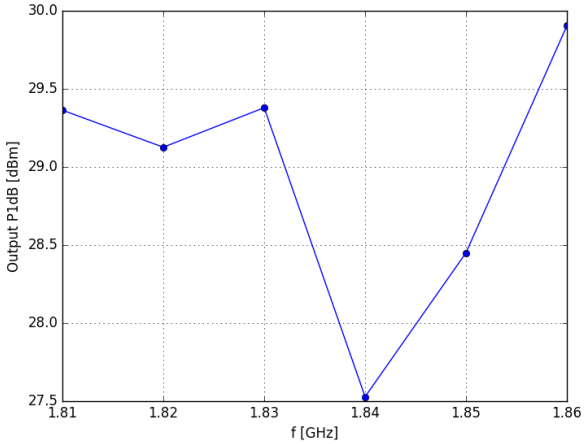

Figure 31: Output P1dB

Cellular Band 7

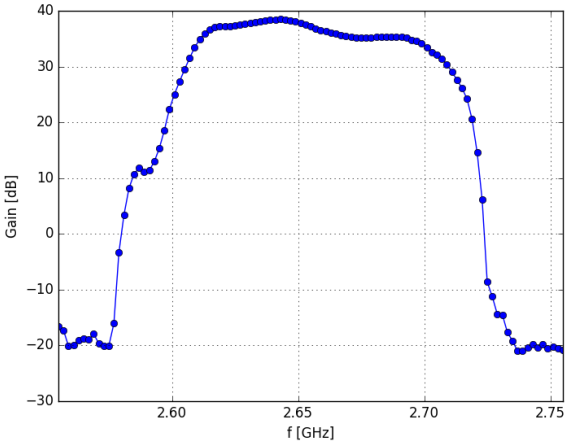

Figure 32: Gain

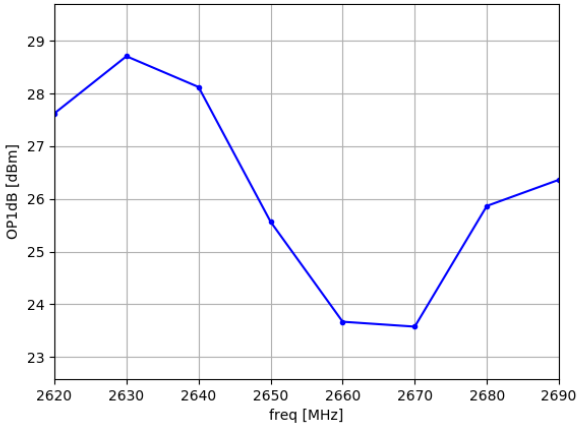

Figure 33: Output P1dB

Cellular Band 38

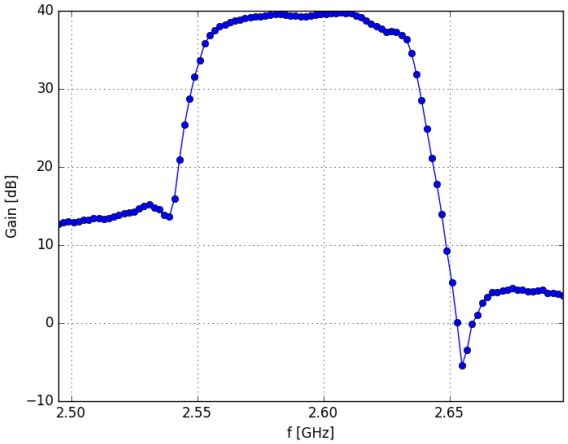

Figure 34: Gain

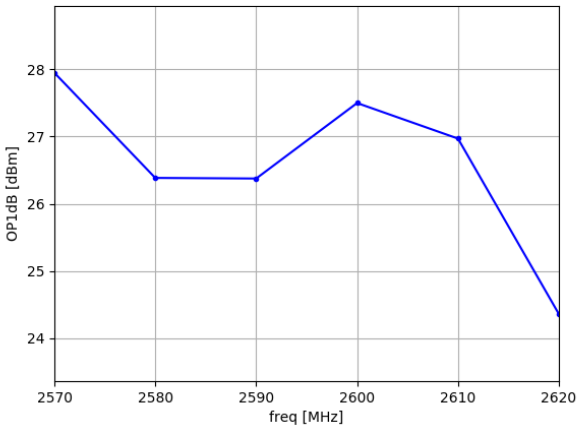

Figure 35: Output P1dB

RX

Wideband 1 – 1000 MHz

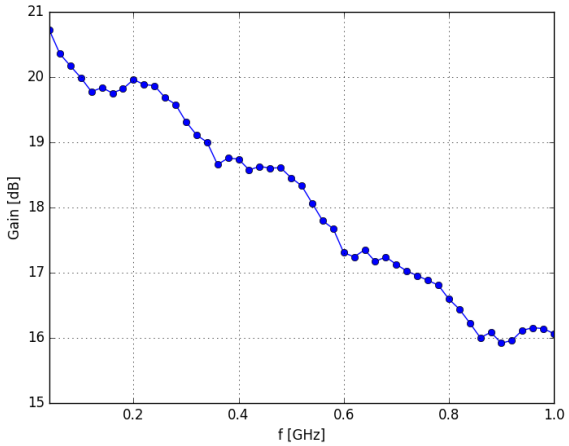

Figure 36: Gain

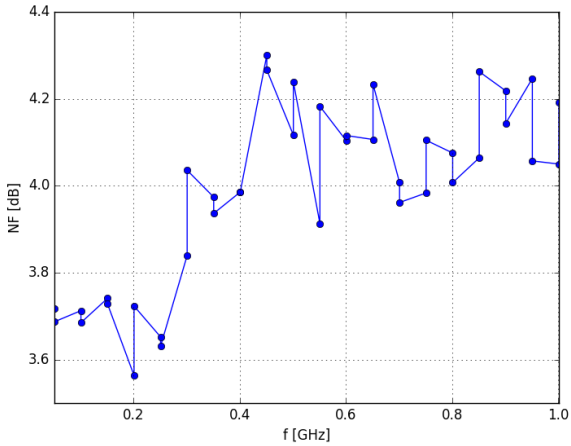

*Figure 37: Noise Figure**

*** Note:** Extreme NF values resulted from inadequate EM isolation of the measured device. These values have not been taken into account in the Summary.

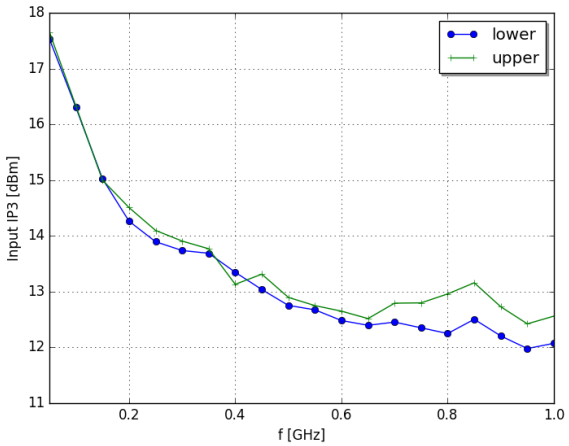

Figure 38: Input IP3

HF Performance

The following graphs present the performance of the *Wideband 1 – 1000 MHz* channel for HF frequencies.

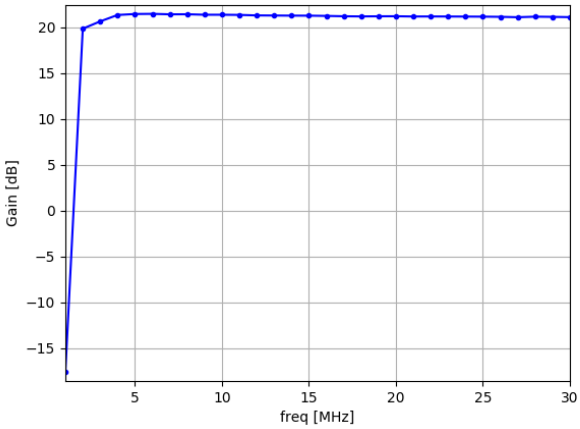

Figure 39: Gain (HF Band)

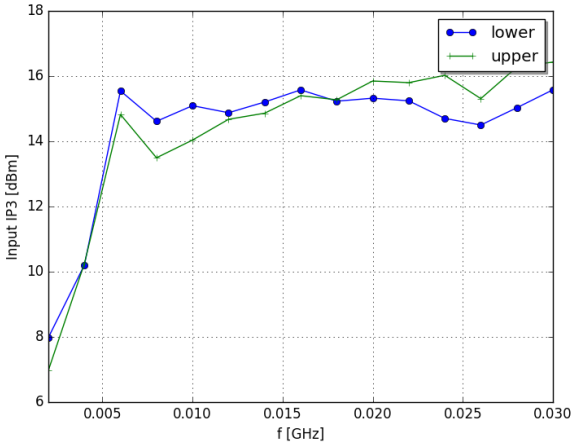

Figure 40: Input IP3 (HF Band)

Wideband 1000 – 4000 MHz

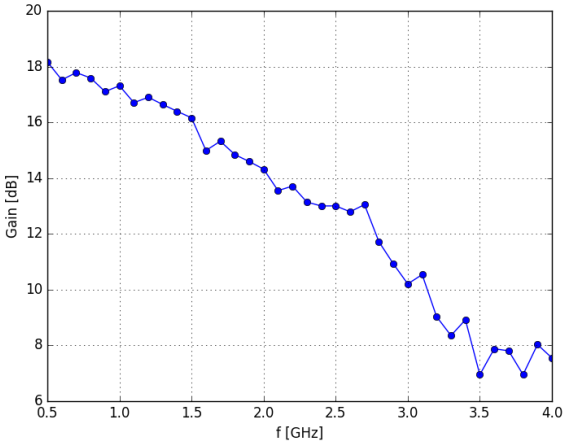

Figure 41: Gain

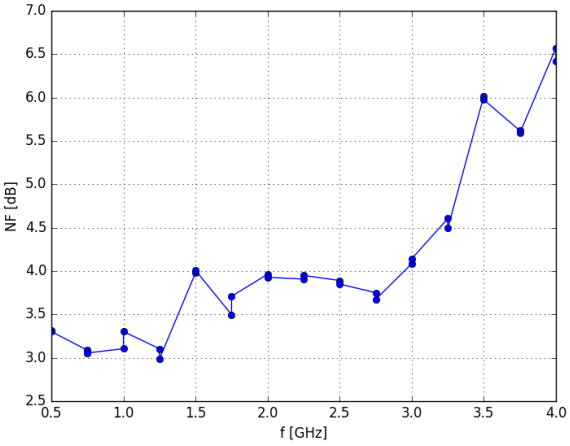

Figure 42: Noise Figure

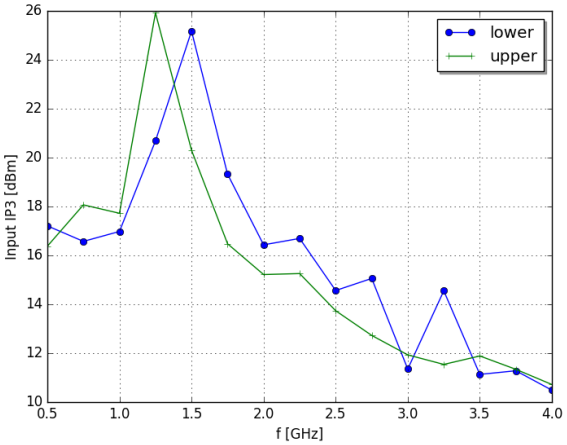

Figure 43: Input IP3

HAM 30 MHz (HF)

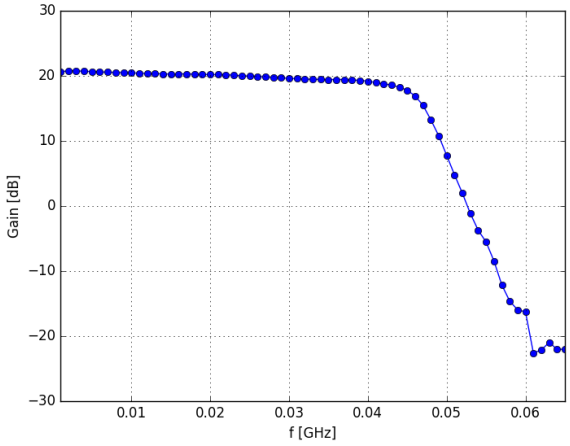

Figure 44: Gain

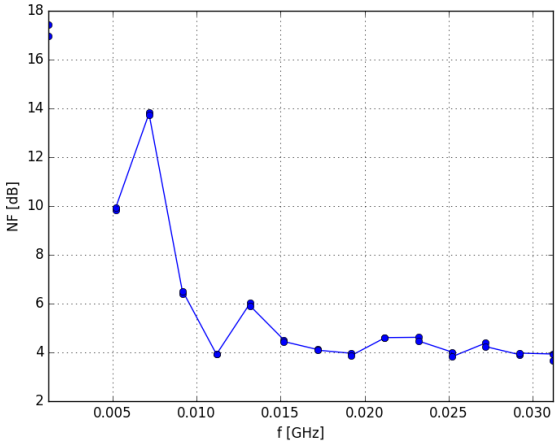

*Figure 45: Noise Figure**

*** Note:** Extreme NF values resulted from inadequate EM isolation of the measured device. These values have not been taken into account in the Summary. NF measurements below 10 MHz are not valid, since the noise head used was not calibrated at these frequencies.

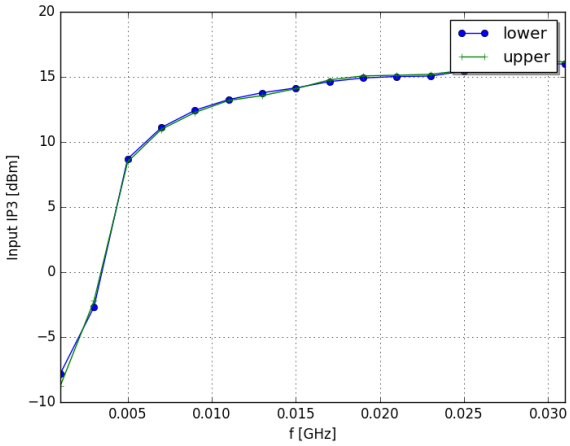

*Figure 46: Input IP3***

**** Note:** Why does the IP3 deteriorates for frequencies below 5 MHz? This issues will be further investigated.

HAM 50 – 70 MHz (6 & 4 m)

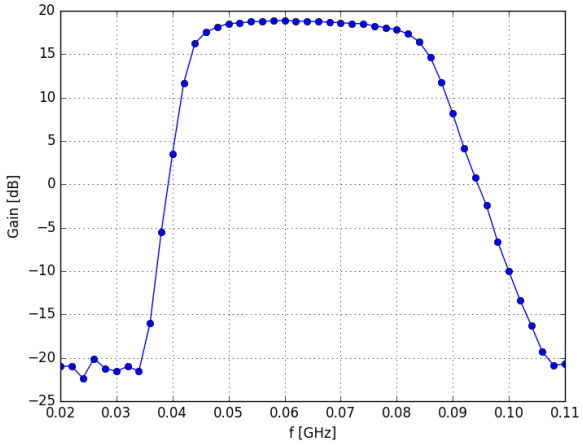

Figure 47: Gain

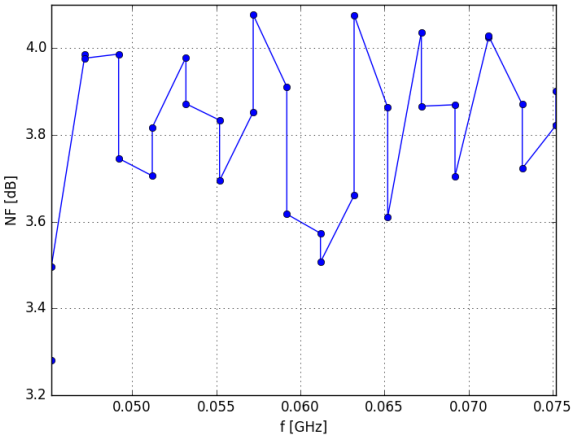

*Figure 48: Noise Figure **

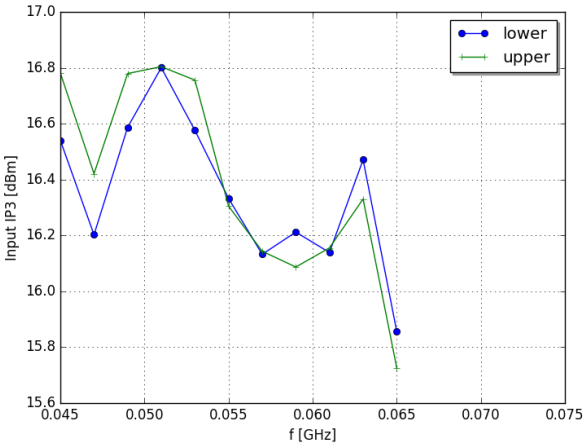

Figure 49: Input IP3

HAM 144 – 146 MHz (2 m)

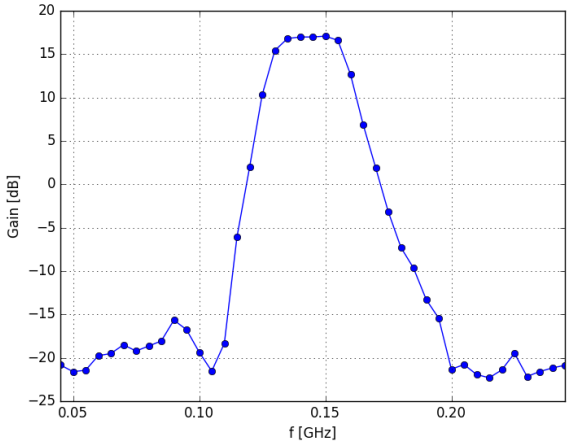

Figure 50: Gain

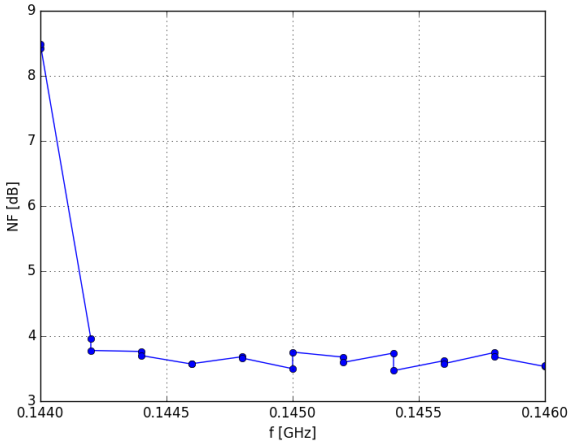

Figure 51: Noise Figure

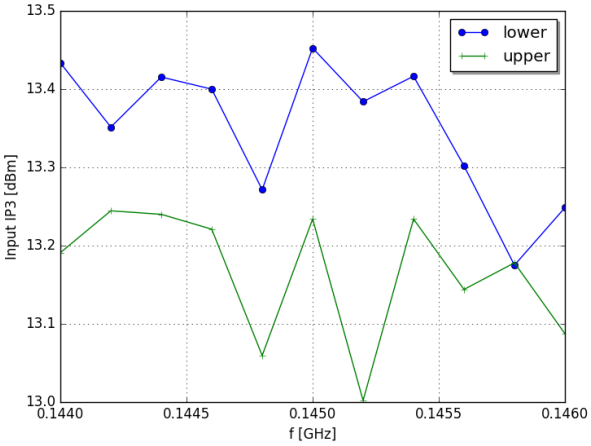

Figure 52: Input IP3

HAM 220 – 225 MHz (1.25 m)

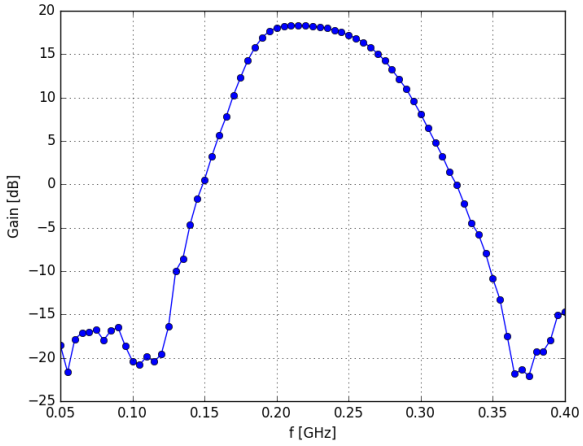

Figure 53: Gain

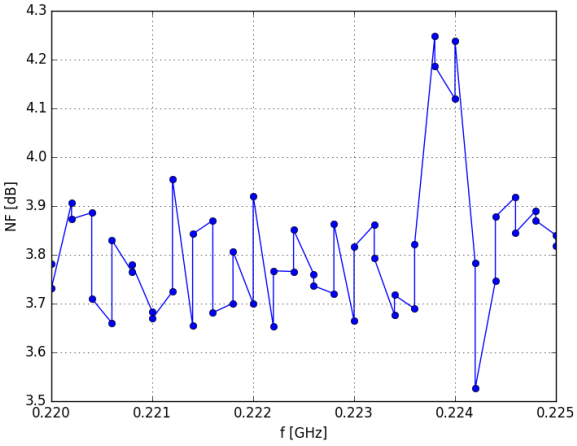

Figure 54: Noise Figure

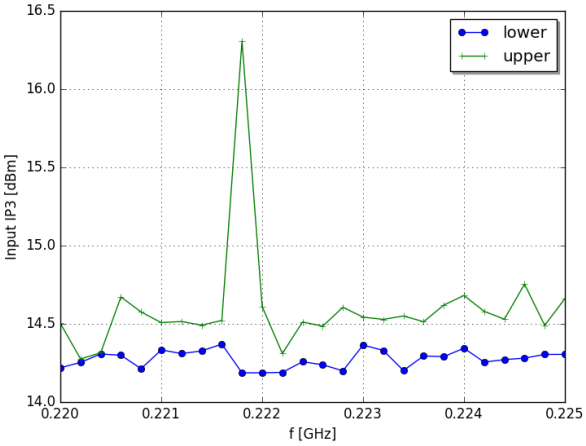

Figure 55: Input IP3

HAM 430 – 440 MHz (70 cm)

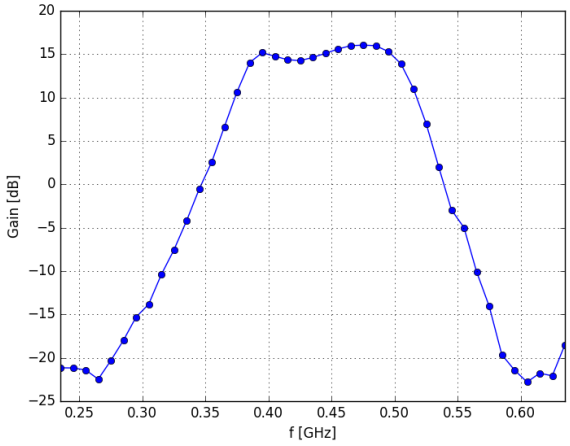

Figure 56: Gain

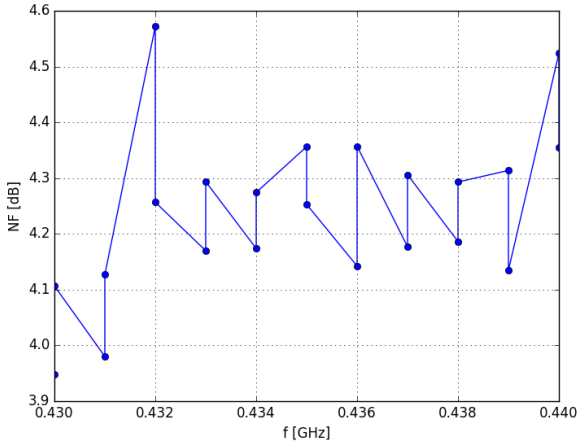

Figure 57: Noise Figure

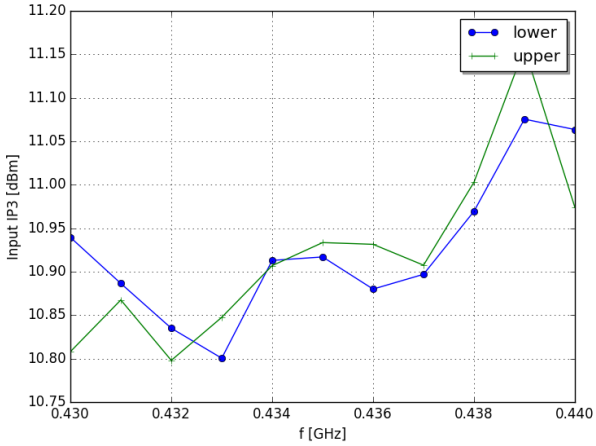

Figure 58: Input IP3

HAM 902 – 928 MHz (33 cm)

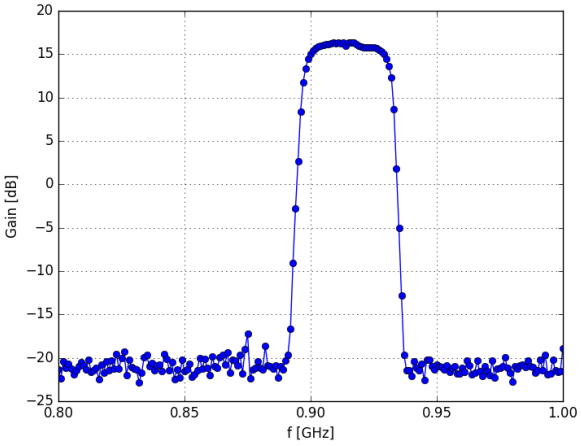

Figure 59: Gain

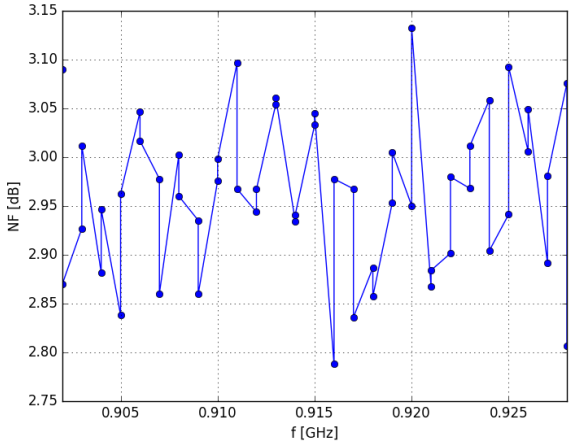

Figure 60: Noise Figure

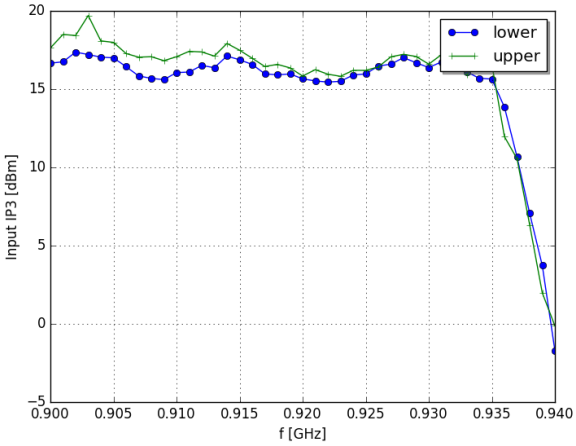

Figure 61: Input IP3

HAM 1240 – 1325 MHz (23 cm)

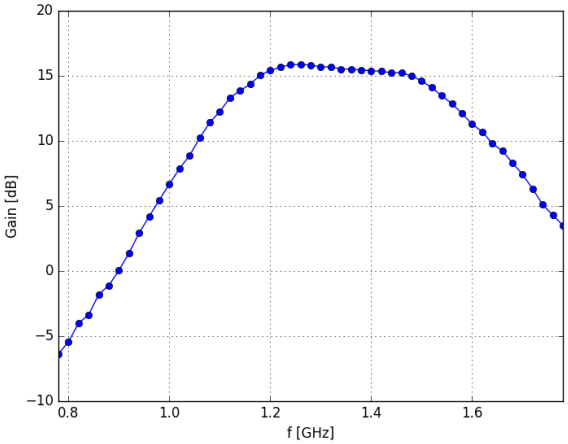

Figure 62: Gain

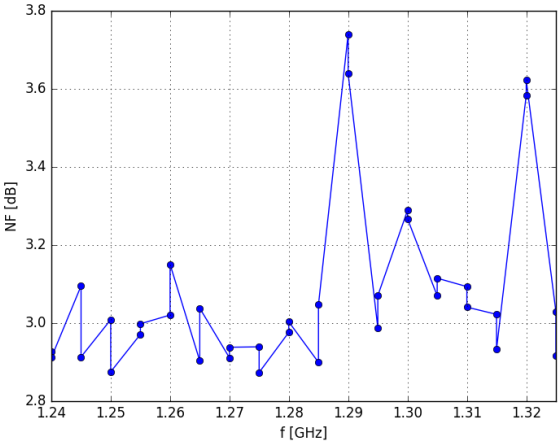

*Figure 63: Noise Figure **

*** Note:** Extreme NF values resulted from inadequate EM isolation of the measured device. These values have not been taken into account in the Summary.

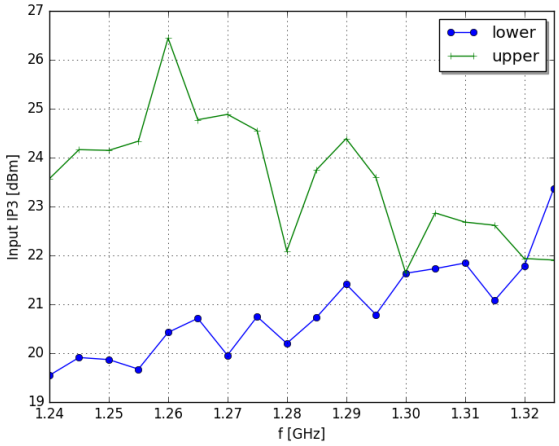

Figure 64: Input IP3

HAM 2300 – 2450 MHz (13 cm)

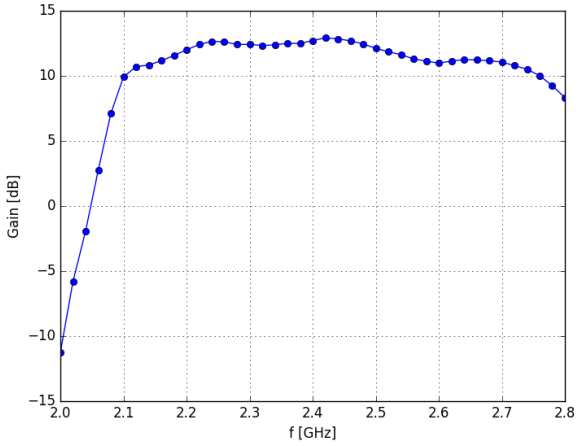

Figure 65: Gain

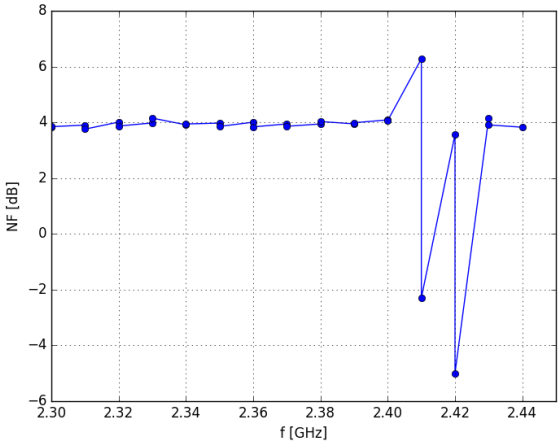

Figure 66: Noise Figure

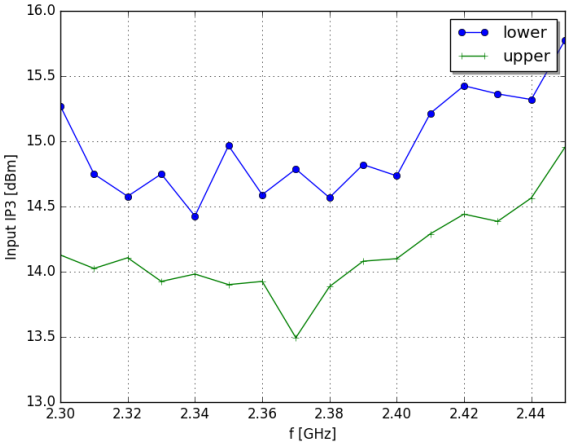

Figure 67: Input IP3

HAM 3300 – 3500 MHz (9 cm)

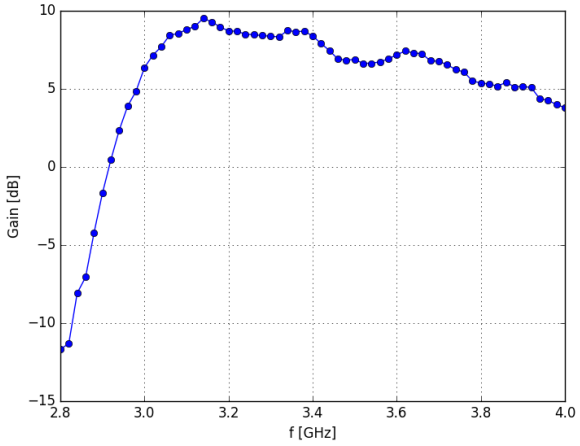

Figure 68: Gain

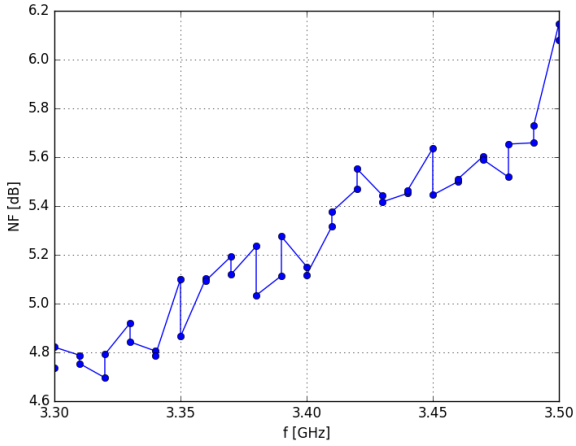

Figure 69: Noise Figure

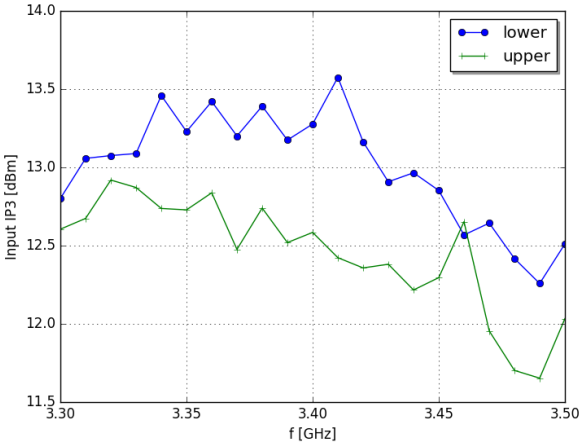

Figure 70: Input IP3

Cellular Band 1

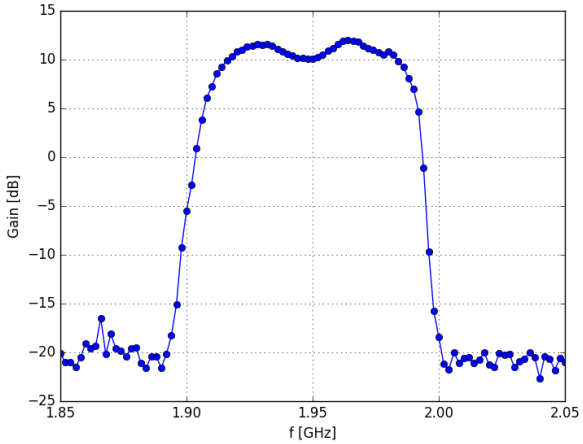

Figure 71: Gain

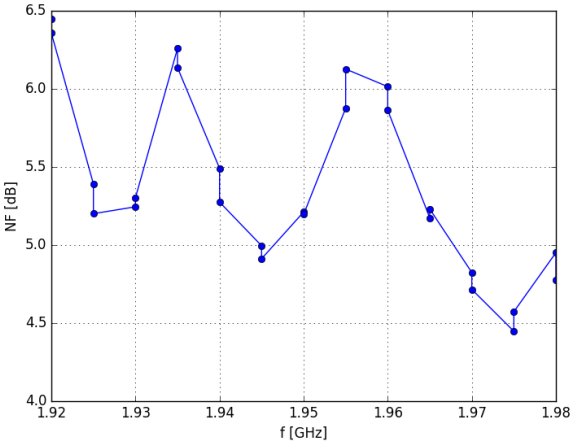

*Figure 72: Noise Figure**

*** Note:** Extreme NF values resulted from inadequate EM isolation of the measured device. These values have not been taken into account in the Summary.

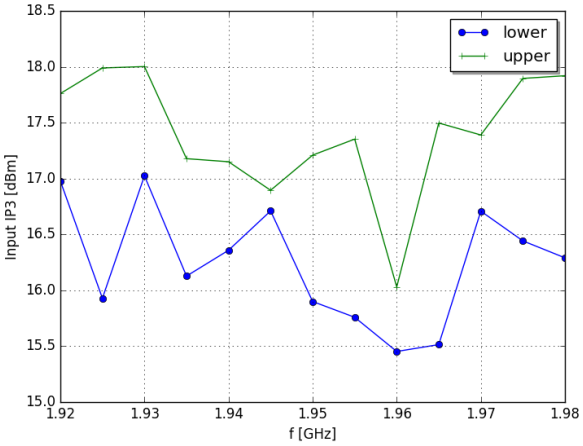

Figure 73: Input IP3

Cellular Band 2

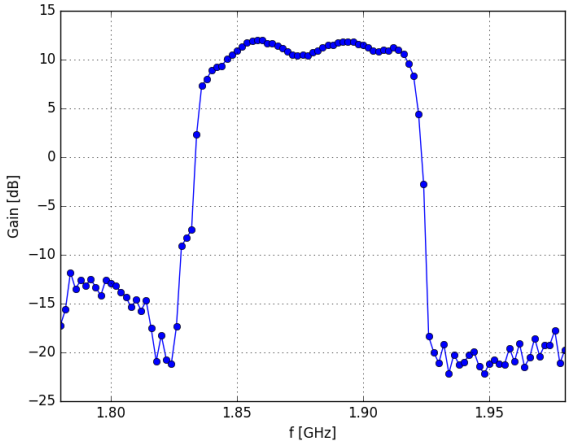

Figure 74: Gain

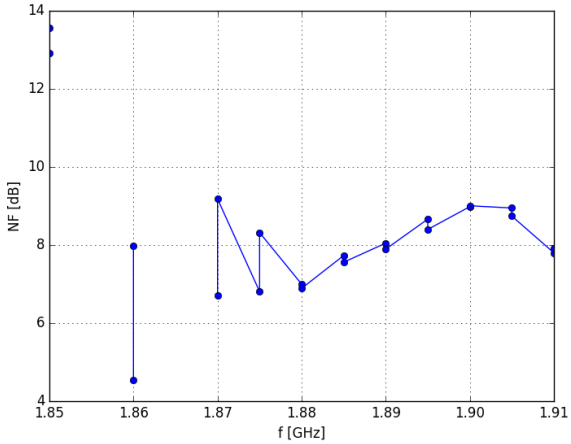

*Figure 75: Noise Figure **

*** Note:** Extreme NF values resulted from inadequate EM isolation of the measured device. These values have not been taken into account in the Summary.

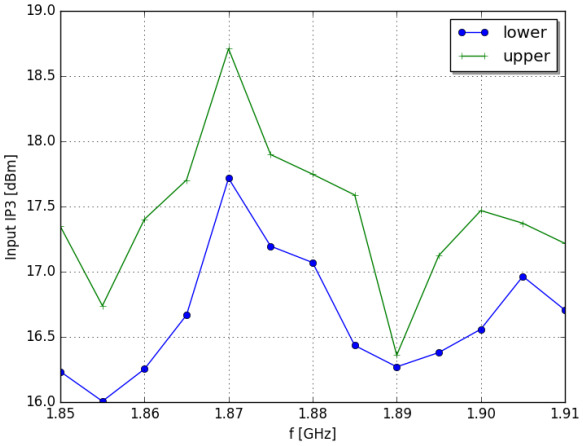

Figure 76: Input IP3

Cellular Band 3

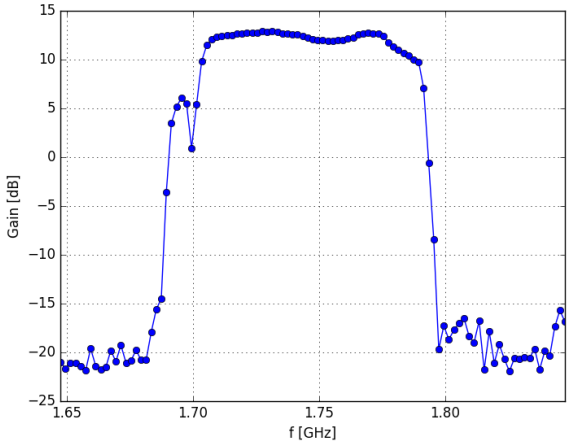

Figure 77: Gain

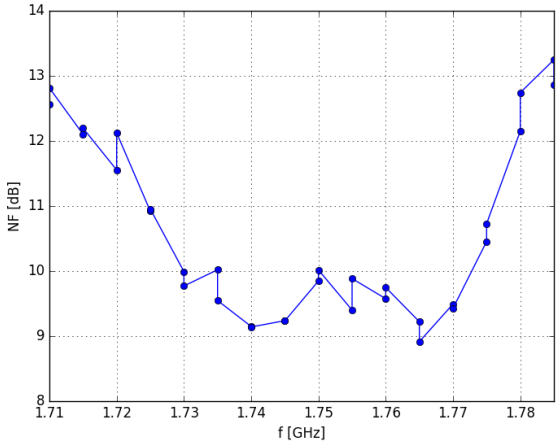

Figure 78: Noise Figure

*** Note:** Extreme NF values resulted from inadequate EM isolation of the measured device. These values have not been taken into account in the Summary.

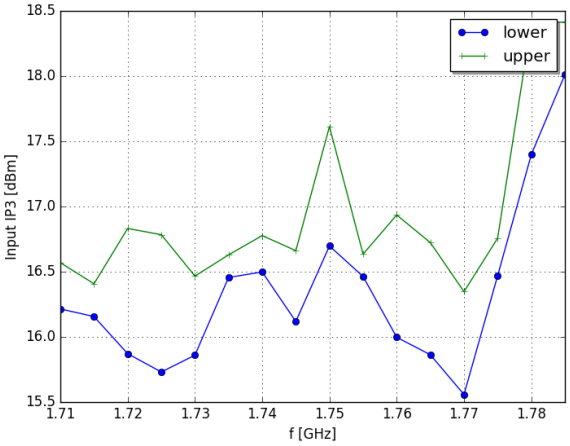

Figure 79: Input IP3

Cellular Band 7

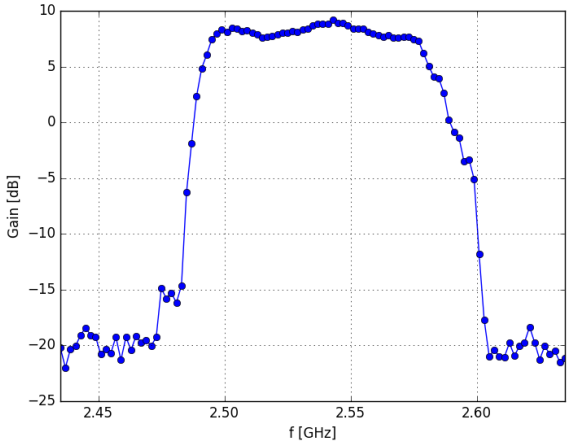

Figure 80: Gain

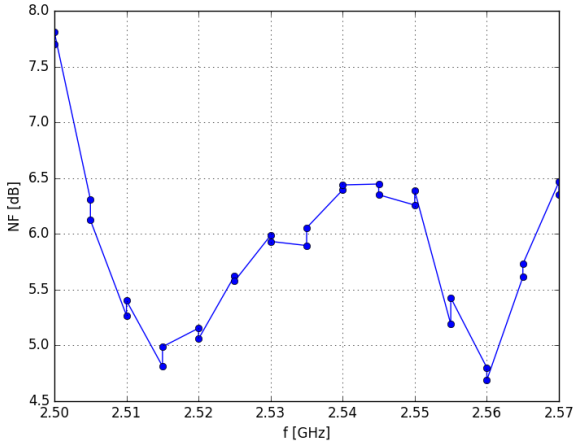

Figure 81: Noise Figure

*** Note:** Extreme NF values resulted from inadequate EM isolation of the measured device. These values have not been taken into account in the Summary.

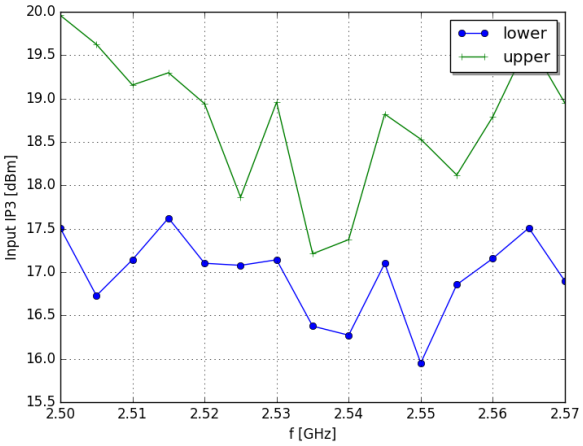

Figure 82: Input IP3

Cellular Band 38

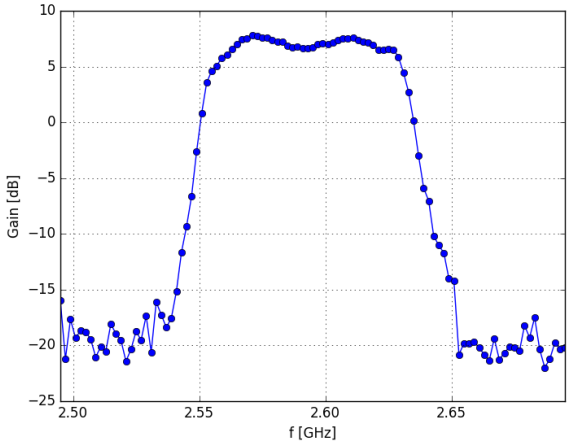

Figure 83: Gain

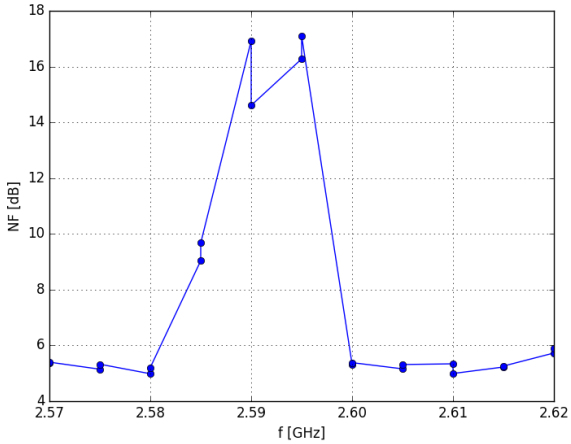

*Figure 84: Noise Figure **

*** Note:** Extreme NF values resulted from inadequate EM isolation of the measured device. These values have not been taken into account in the Summary.

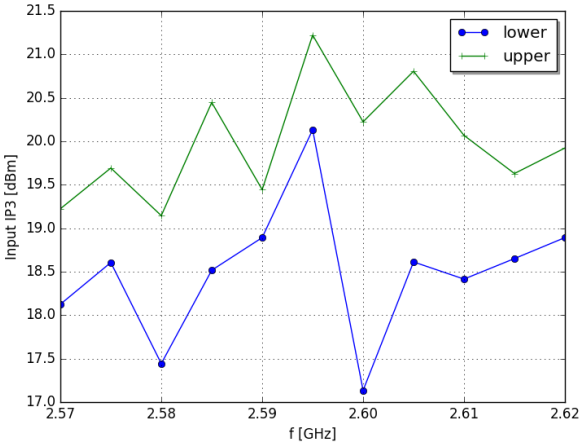

Figure 85: Input IP3