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Date	Reference	Page
2014-12-17	4P06570-01-F27	1 (2)

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Radio measurements on RD 2242 B4 with FCC ID TA8BKRY901309-1 and IC:287AB-AS9013091

(9 appendices)

Test object

Product name: RD 2242 B4
Product number: KRY 901 309/1

Summary

See appendix 1 for general information and appendix 9 for external photos.

Standard		Compliant	Appendix
FCC CFR 47 part 2 and 27 / IC RSS-139 Issue 2			
2.1046 / RSS-139 6.4	RF power output conducted	Yes	2
2.1046 / RSS-139 6.4	RF power output radiated	Yes	3
2.1049 / RSS-Gen 6.6	Occupied bandwidth	Yes	4
2.1051 / RSS-139 6.5	Band edge	Yes	5
2.1051 / RSS-139 6.5	Spurious emission at antenna terminals	Yes	6
2.1053 / RSS-139 6.5	Field strength of spurious radiation	Yes	7
2.1055 / RSS-139 6.3	Frequency stability	Yes	8

SP Technical Research Institute of Sweden
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Performed by

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Appendix 1

Description of the test object

Radio equipment:	RD 2242 B4 Product number: KRY 901 309/1 FCC ID TA8BKRY901309-1 IC 287AB-AS9013091 IC MODEL NO: AS9013091
Hardware revision state:	R2A
Tested configuration:	LTE single RAT
Frequency bands:	TX: 2110 – 2155 MHz RX: 1710 – 1755 MHz
Antenna ports:	2 TX/RX ports, (internally connected to integrated Omni directional antenna elements)
RF configuration:	Single carrier, multi carrier,TX-diversity and MIMO 2x2
RF power tolerance	±2 dB
Nominal output power per antenna port:	Single carrier: 1x 17 dBm (1 x 50mW) Multi carrier: 2 x 14 dBm (2 x 25mW)
Antenna type:	Omni directional antenna
Antenna gain:	2.5 dBi
Channel bandwidths:	Singel carrier: 5 MHz, 10 MHz, 15 MHz and 20 MHz Multi carrier: 5 MHz, 10 MHz, 15 MHz and 20 MHz
Modulations:	QPSK, 16QAM and 64QAM
Nominal supply voltage:	-48VDC (associated equipment)

Appendix 1

Operation mode during measurements

Measurements were performed with the test object transmitting test models as defined in 3GPP TS 36.141. Test model E-TM1.1 represent QPSK modulation, test model E-TM3.2 represent 16QAM modulation and test model E-TM3.1 represent 64QAM modulation.

The settings below were deemed representative for all traffic scenarios when settings with different modulations, channel bandwidths, number of carriers and RF configurations has been tested to find the worst case setting. All measurements were performed with the test object configured for maximum transmit power. The settings below were used for all measurements if not otherwise noted.

MIMO mode, single carrier, E-TM1.1
MIMO mode, multi carrier, 2 carriers, E-TM1.1

Cable configurations between RD and IRU

The cables, used during tests, correspond to minimum and maximum length, according to table 8 in Exhibit 12 – Technical Circuit Description. The following cable configurations has been used:

RDI Cable 20m: total cabel length 20m patch cables included.

RDI Cable 52m: total cabel length 52m patch cables included.

RDI Cable 200m: total cabel length 200m patch cables included.

Patch cable	Cat 6a Schneider Electric Actassi CL-MNC6A
RDI cable	Cat 6a Schneider Electric Actassi CL-MXC6A

Conducted measurements

The conducted measurements were performed on RD 2242 B4 with
product number KRY 901 309/1.

The test object was mounted in a fixture and powered by the RBS Main Unit via the RDI LAN cable.
All TX parameters were measured at port RF B with port RF A terminated into 50 ohm. Complete measurements were made on RF B with additional measurements on RF A to verify that the ports are identical.

Radiated measurements

The test object was mounted in a fixture and powered by the RBS Main Unit via the RDI LAN cable. In field strength of spurios radition both RF ports were terminated into 50 ohm. For RF power output measurement the internal antenna was used.

Purpose of test

The purpose of the tests is to verify compliance to the performance characteristics specified in applicable items of FCC CFR 47 part 2 and 27, IC RSS-139 and IC RSS-Gen.

References

Measurements were done according to relevant parts of the following standards:

ANSI 63.4-2009
ANSI/TIA/EIA-603-C-2004
3GPP TS 36.141, version 11.4.0
CFR 47 part 2, October 1st , 2013
CFR 47 part 27, October 1st, 2013
RSS-Gen Issue 4
RSS-139 Issue 2

Uncertainties

Measurement and test instrument uncertainties are described in the quality assurance documentation ”SP-QD 10885”. The uncertainties are calculated with a coverage factor k=2 (95% level of confidence).
Compliance evaluation is based on a shared risk principle with respect to the measurement uncertainty.

Reservation

The test results in this report apply only to the particular test object as declared in the report.

Delivery of test object

The test object was delivered 2014-11-25.

Manufacturer’s representative

Lars Wallin, Ericsson AB.

Test engineers

Andreas Johnson, Hyder Khalaf , Maulo Rivera, Tomas Isbring, Rani Karnabi and Jörgen Wassholm, SP.

Test participant

Adam skoglund, Ericsson AB.

Measurement equipment

	Calibration Due	SP number
Semi anechoic chamber, Edison	2015-12	504 114
R&S ESU 26	2015-08	902 210
R&S ESI 26	2015-07	503 292
R&S FSQ 40	2015-07	504 143
R&S FSW 43	2015-07	902 073
R&S FSIQ 40	2015-07	503 738
Control computer with R&S software EMC32 version 8.52.0	- 	- 503 889
High pass filter	2015-01	BX40074
High pass filter	2015-07	901 501
High pass filter	2015-07	901 502
High pass filter	2015-07	504 199
High pass filter	2015-07	901 373
High pass filter	2016-07	503 739
High pass filter	2015-07	503 740
High pass filter	2015-07	504 200
RF attenuator	2016-07	503 248
RF attenuator	2016-06	503 249
RF attenuator	2015-08	504 159
RF attenuator	2015-07	900 233
RF attenuator	2015-11	900 691
HP Filter	2015-01	BX40074
RF attenuator	2015-06	901 384
RF attenuator	2014-11	901 508
Antenna Schaffner CBL 6143	2016-10	504 079
STS-Lindgren Antenna 3115	2015-10	902 212
µComp Nordic, Low Noise Amplifier	2015-01	901 545
Flann STD Gain Horn Antenna 16240-25	-	503 939
Flann STD Gain Horn Antenna 18240-25	-	503 900
Flann STD Gain Horn Antenna 20240-20	-	503 674
Miteq, Low Noise Amplifier	2015-02	504 160
Schwarzbeck preamplifier BBV 9742	2015-01	504 085
Temperature and humidity meter, Testo 635	2015-03	504 203
Temperature and humidity meter, Testo 625	2015-06	504 117
Temperature Chamber	-	503 360
Multimeter Fluke 87	2015-08	502 190

Test frequencies used for conducted and radiated measurements

TX test frequencies, single carrier:

EARFCN Downlink	Frequency [MHz]	Symbolic name	Comment
1975	2112.5	B	TX bottom frequency in 5 MHz BW configuration
2000	2115.0	B	TX bottom frequency in 10 MHz BW configuration
2025	2117.5	B	TX bottom frequency in 15 MHz BW configuration
2050	2120.0	B	TX bottom frequency in 20 MHz BW configuration
2175	2132.5	M	TX band mid frequency all BW configurations
2375	2152.5	T	TX top frequency in 5 MHz BW configuration
2350	2150.0	T	TX top frequency in 10 MHz BW configuration
2325	2147.5	T	TX top frequency in 15 MHz BW configuration
2300	2145.0	T	TX top frequency in 20 MHz BW configuration

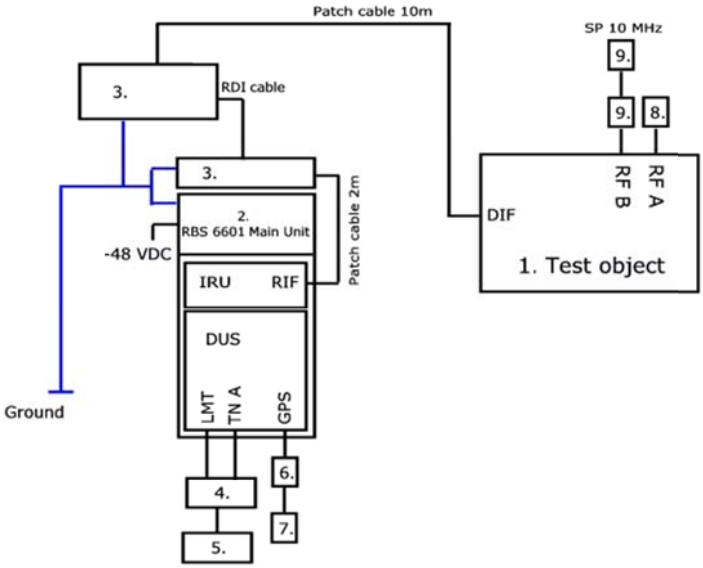
TX test frequencies, multi carrier:

1975 2025	2112.5 2117.5	B2-5	2 carrier TX band bottom constellation 5 MHz BW configuration
2000 2100	2115.0 2125.0	B2-10	2 carrier TX band bottom constellation 10 MHz BW configuration
2025 2175	2117.5 2132.5	B2-15	2 carrier TX band bottom constellation 15 MHz BW configuration
2050 2250	2120.0 2140.0	B2-20	2 carrier TX band bottom constellation 20 MHz BW configuration
2150 2200	2130.0 2135.0	M2-5	2 carrier TX band mid constellation 5 MHz BW configuration
2125 2225	2127.5 2137.5	M2-10	2 carrier TX band mid constellation 10 MHz BW configuration
2100 2250	2125.0 2140.0	M2-15	2 carrier TX band mid constellation 15 MHz BW configuration
2075 2275	2122.5 2142.5	M2-20	2 carrier TX band mid constellation 20 MHz BW configuration
2325 2375	2147.5 2152.5	T2-5	2 carrier TX band top constellation 5 MHz BW configuration
2250 2350	2140.0 2150.0	T2-10	2 carrier TX band top constellation 10 MHz BW configuration
2175 2325	2132.5 2147.5	T2-15	2 carrier TX band top constellation 15 MHz BW configuration
2100 2300	2125.0 2145.0	T2-20	2 carrier TX band top constellation 20 MHz BW configuration
2100 2262	2125.0 2141.2	Bim	2 carrier TX band 5 MHz BW configuration
2088 2250	2123.8 2140.0	Tim	2 carrier TX 5 MHz BW configuration
2100 2306	2125.0 2145.6	Bim2	2 carrier TX 5 MHz BW configuration
2000 2350	2115 2150	M2.1-5	2 carrier TX band mid constellation 5 MHz BW configuration

All RX frequencies were configured 400 MHz below the corresponding TX frequency according the applicable duplex offset for the operating band.

Appendix 1

Test setup conducted measurements



Test object

1.	RD 2242 B4, KRY 901 309/1, revision R2A, s/n: C828676786 (FCC ID: TA8BKRY901309-1 and IC: 287AB-AS9013091) with software: CXP 901 3268/14, revision R59DM05

Associated equipment:

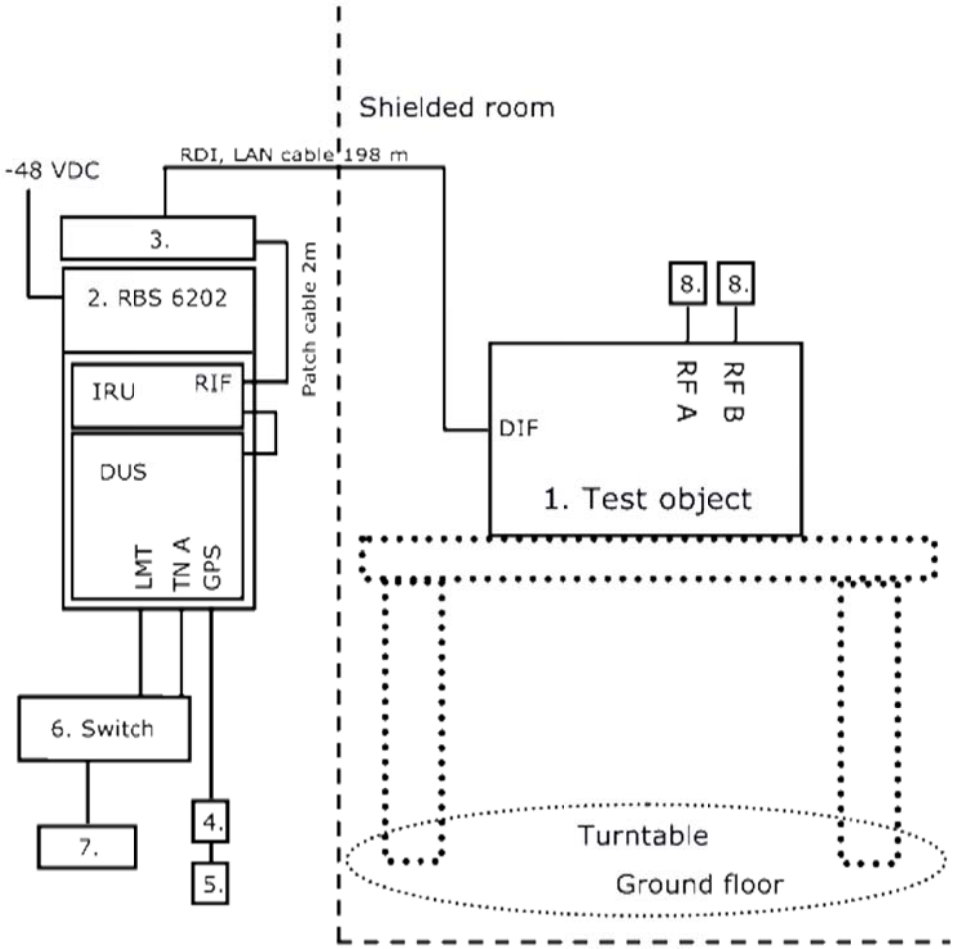
2.	RBS 6601 Main Unit: BFL 901 009/4, revision R1E, s/n: BR82173432 DUS 41 01, KDU 137 624/1, revision R5A/A, s/n: D16G937758 IRU 2242, KRC 161 444/1, revision R1C, s/n: C828523838
3.	Patch panel, BGK 901 55/1, revision R1A, s/n: -
6.	GPS 02 01, NCD 901 41/1, revision R1D, s/n: TU8K474887
7.	GPS Active Antenna, KRE 101 2082/1

Functional test equipment:

4.	Switch Netgear GS108E
5.	Laptop EliteBook 8560w, BAMS – 1001236858
8.	Attenuator/ Terminator 50 ohm
9.	SP test instrument according measurement equipment list

Appendix 1

Test setup radiated measurements



Test object

1.	RD 2242 B4, KRY 901 309/1, revision R2A, s/n: C828676614 (FCC ID: TA8BKRY901309-**1** and IC: 287AB-AS9013091) with software: CXP 901 3268/14, revision R59DM05

Associated equipment:

2.	RBS 6202 Main Unit: SCU 03 01, BGM 136 1006/3, rev: R1B, s/n: CR94860726 PDU 02 02, BGM 980 336/5, rev: R1E, s/n: C941477616 DUS 41 01, KDU 137 624/1, rev: R5A/A, s/n: D18G937758 IRU 2242, KRC 161 444/1, rev: R1C, s/n: C828523838 PFU 02 02, KFE 101 1162/3, rev: R1G/A, s/n: X051734127
3.	Patch panel, BGK 901 55/1, revision R1A, s/n: -
4.	GPS 02 01, NCD 901 41/1, revision R1D, s/n: TU8KH75515
5.	GPS Active Antenna, KRE 101 2082/1

Functional test equipment:

6.	Switch Neatgear GS108E
7.	HP Elitebook 8560w, BAMS – 1001236858
8.	Attenuator/ Terminator 50 ohm

Appendix 1

Interfaces:	**Type of port:**
Antenna port (A), hirose connector	Antenna
Antenna port (B), hirose connector	Antenna
DIF, Patch cable Cat 6a Schneider Electric Actassi CL-MNC6A	Signal
RDI, Cat 6a Schneider Electric Actassi CL-MXC6A	Signal

RBS software:

Software	**Revision**
CXP 102 051/22	R44JF

Appendix 2

RF power output measurements according to CFR 47 §27.50/ IC RSS-139 6.4, conducted

Date	Temperature	Humidity
2014-12-06	23 °C ± 3 °C	29 % ± 5 %
2014-12-08	23 °C ± 3 °C	25 % ± 5 %
2014-12-09	23 °C ± 3 °C	29 % ± 5 %

Test set-up and procedure

The test object was connected to a signal analyser measuring peak and RMS output power in CDF mode. A resolution bandwidth of 50 MHz was used.

Measurement equipment	SP number
R&S FSQ 40	504 143
RF attenuator	900 691
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 1.1 dB

Results

Configuration: RDI Cable 200m

MIMO mode, single carrier

Rated output power level at RF connector 1x 17 dBm.

Carrier BW [MHz]	Symbolic name	[RMS dBm/ PAR dB]		
		Port RF A	Port RF B	Total power[1)]
5	B	15.75/ 7.84	16.10/ 7.93	18.76
5	M	17.09/ 7.64	17.78/ 7.72	20.46
10	M	17.07/ 7.64	17.67/ 7.67	20.39
15	M	17.12/ 7.69	17.59/ 7.74	20.37
20	M	17.04/ 7.69	17.99/ 7.74	20.55
5	T	17.52/ 7.72	17.54/ 7.79	20.54

MIMO mode, multi carrier

Rated output power level at RF connector 2x 14 dBm.

Carrier BW [MHz]	Symbolic name	[RMS dBm/ PAR dB]		
		Port RF A	Port RF B	Total power[1)]
5	B2-5	16.58/ 7.86	16.63/ 7.93	19.62
20	B2-20	17.26/ 8.03	17.57/ 7.96	20.43
5	M2-5	17.20/ 7.67	17.74/ 7.72	20.49
10	M2-10	17.33/ 7.64	17.89/ 7.69	20.63
15	M2-15	17.24/ 7.72	17.75/ 7.76	20.51
20	M2-20	17.01/ 7.93	17.49/ 7.96	20.27
5	T2-5	17.58/ 7.76	17.64/ 7.81	20.62

[1)]: Summed output power according to FCC KDB662911 Multiple transmitter output v02r01.

Note: The PAR value is the 0.1 % Peak to Average Ratio.

Configuration: RDI Cable 52m

MIMO mode, single carrier

Rated output power level at RF connector 1x 17 dBm.

Carrier BW [MHz]	Symbolic name	[RMS dBm/ PAR dB]		
		Port RF A	Port RF B	Total power[1)]
5	B	17.28/ 7.81	17.73/ 7.91	20.52
5	M	17.54/ 7.64	17.95/ 7.69	20.76
10	M	17.28/ 7.62	17.83/ 7.67	20.57
15	M	17.30/ 7.69	17.84/ 7.74	20.59
20	M	17.39/ 7.69	17.91/ 7.74	20,67
5	T	16.43/ 7.81	16.58/ 7.76	19.52

MIMO mode, multi carrier

Rated output power level at RF connector 2x 14 dBm.

Carrier BW [MHz]	Symbolic name	[RMS dBm/ PAR dB]		
		Port RF A	Port RF B	Total power[1)]
5	B2-5	17.24/ 7.84	17.45/ 7.91	20.36
5	M2-5	17.39/ 7.69	17.74/ 7.74	20.58
10	M2-10	17.47/ 7.67	17.69/ 7.72	20.59
15	M2-15	17.39/ 7.74	17.78/ 7.79	20.60
20	M2-20	17.10/ 7.88	17.37/ 7.93	20.25
5	T2-5	16.07/ 7.81	16.28/ 7.86	19.19

[1)]: Summed output power according to FCC KDB662911 D01 Multiple transmitter output v02r01.

Note: The PAR value is the 0.1 % Peak to Average Ratio.

Configuration: RDI Cable 20m

MIMO mode, single carrier

Rated output power level at RF connector 1x 17 dBm.

Carrier BW [MHz]	Symbolic name	[RMS dBm/ PAR dB]		
		Port RF A	Port RF B	Total power[1)]
5	B	17.28/ 7.81	18.07/ 7.91	20.70
10	B	17.47/ 7.79	18.16/ 7.86	20.84
15	B	17.47/ 7.81	18.37/ 7.88	20.95
20	B	17.63/ 7.76	18.30/ 7.86	20.99
5	M	16.98/ 7.64	18.00/ 7.72	20.53
5	T	15.50/ 7.79	16.17/ 7.86	18.86

[1)]: Summed output power according to FCC KDB662911 Multiple transmitter output v02r01.

Note: The PAR value is the 0.1 % Peak to Average Ratio.

Configuration: RDI Cable 200m

MIMO mode, single carrier

Measured output power per 1 MHz.

Carrier BW [MHz]	Symbolic name	[RMS dBm]		Total power[1)] [RMS dBm]
		Port RF A	Port RF B	
5	B	10.28	10.40	13.40
5	M	11.00	11.52	14.52
10	M	8.08	8.40	11.40
15	M	6.35	6.62	9.62
20	M	5.06	6.19	9.19
5	T	11.79	11.18	14.79

Configuration: RDI Cable 52m

MIMO mode, single carrier

Measured output power per 1 MHz.

Carrier BW [MHz]	Symbolic name	[RMS dBm]		Total power[1)] [RMS dBm]
		Port RF A	Port RF B	
5	B	10.99	11.12	14.12
5	M	11.02	11.98	14.98
10	M	7.98	8.73	11.73
15	M	6.44	6.87	9.87
20	M	5.19	5.89	8.89
5	T	9.73	9.85	12.85

[1)]: Measured according to FCC KDB662911 D01 Multiple Transmitter Output v02r01. Method E), 2), c). “Measure and add 10 log(N_{Ant})”.

Configuration: RDI Cable 20m

MIMO mode, single carrier

Measured output power per 1 MHz.

Carrier BW [MHz]	Symbolic name	[RMS dBm]		Total power[1)] [RMS dBm]
		Port RF A	Port RF B	
5	B	11.32	12.12	15.12
10	B	8.60	9.65	12.65
15	B	6.89	8.04	11.04
20	B	5.80	6.65	9.65
5	M	10.64	11.80	14.80
5	T	9.45	10.02	13.02

[1)]: Measured according to FCC KDB662911 D01 Multiple Transmitter Output v02r01. Method E), 2), c). "Measure and add 10 log(N_{Ant})".

Limits

§27.50:

There is no maximum output power specified for base stations transmitting in the 2110-2155 MHz band. However, a licensee operating a base or fixed station in the 2110-2155 MHz band utilizing a power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must coordinate such operations in advance with the parties addressed in the rules.
In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

RSS-139 6.4:

There is no power limit specified for base station equipment in the RSS-139.
EIRP compliance is addressed at the time of licensing, as required by the responsible IC Bureau. Licensee's are required to take into account the antenna gain to get the maximum usable power settings to prevent the radiated output power to exceed the ERP/EIRP limits specified in SRSP-513
When the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

Complies?	Yes

Appendix 3

RF power output measurements according to CFR 47 §27.50/ IC RSS-139 6.4, radiated

Date	Temperature	Humidity
2014-11-27	22°C ± 3°C	28 % ± 5 %
2014-11-28	23°C ± 3°C	25 % ± 5 %

Test set-up and procedure

The measurements were performed according to ANSI C63.4-2009.

The test was performed with continuous transmission.

The test of radiated emission was performed in a semi anechoic chamber. The measurements were performed with both horizontal and vertical polarizations of the antenna. The antenna distance was 3.0 m.

The fundamental was scanned with PEAK-detector with the antenna height was varied between 1-4 m and the turntable was rotated between 0-360 degrees for maximum response. The carrier power was measured with RMS- detector activated with a RBW of 1 MHz. The output power was verified with the substitution method .The antenna distance during the measurements was 3.0 m.

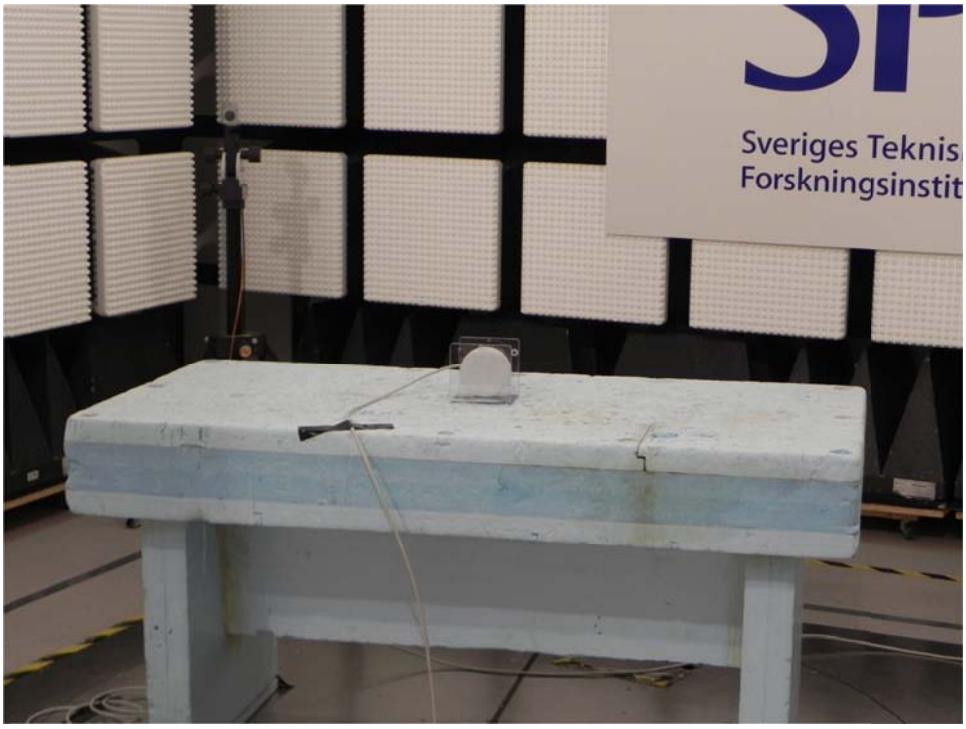
Measurement equipment

Measurement equipment	SP number
Semi anechoic chamber	504 114
R&S ESU 26	902 210
EMC 32 ver. 8.52.0	503 889
EMCO Horn Antenna 3115	502 175
EMCO Horn Antenna 3115	902 212
R&S SMB 100A	902 059
Attenuator 20 dB	BX41644
Testo 635 temperature and humidity meter	504 117

Measurement uncertainty:

3.1 dB

The test set-up during the effective radiated output power measurements is shown in the picture below, side mounted.



The test set-up during the effective radiated output power measurements is shown in the picture below, upright mounted.

Appendix 3

Results

Configuration: RDI Cable 200m

Upright mounted

Bandwidth configuration (MHz)	Tested frequency B		Tested frequency M		Tested frequency T	
	Vertical/Horizontal RMS power (EIRP)		Vertical/Horizontal RMS power (EIRP)		Vertical/Horizontal RMS power (EIRP)	
	dBm/ MHz	mW/ MHz	dBm/ MHz	mW/ MHz	dBm/ MHz	mW/ MHz
5	11.3/ 6.9	13.5/ 4.9	13.6/ 8.3	22.9/ 6.8	13.4/ 8.9	21.9/ 7.8
10	-	-	11.3/ 5.6	13.5/ 3.6	-	-
15	-	-	9.8/ 3.8	9.6/ 2.4	-	-
20	-	-	8.6/ 2.6	7.2/ 1.8	-	-

Side mounted

Bandwidth configuration (MHz)	Tested frequency B		Tested frequency M		Tested frequency T	
	Vertical/Horizontal RMS power (EIRP)		Vertical/Horizontal RMS power (EIRP)		Vertical/Horizontal RMS power (EIRP)	
	dBm/ MHz	mW/ MHz	dBm/ MHz	mW/ MHz	dBm/ MHz	mW/ MHz
5	10.1/ 8.2	10.2/ 6.6	11.9/ 10.5	15.5/ 11.2	10.5/ 10.4	11.2/ 11.0
10	-	-	9.0/ 8.1	7.9/ 6.5	-	-
15			7.1/ 6.2	5.1/ 4.2		
20			6.0/ 5.1	4.0/ 3.2		

Limits

§27.50:

There is no maximum output power specified for base stations transmitting in the 2110-2155 MHz band. However, a licensee operating a base or fixed station in the 2110-2155 MHz band utilizing a power greater than 1640 watts EIRP and greater than 1640 watts/MHz EIRP must coordinate such operations in advance with the parties addressed in the rules.
In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

RSS-139 6.4:

There is no power limit specified for base station equipment in the RSS-139.
EIRP compliance is addressed at the time of licensing, as required by the responsible IC Bureau. Licensee's are required to take into account the antenna gain to get the maximum usable power settings to prevent the radiated output power to exceed the ERP/EIRP limits specified in SRSP-513
When the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

Complies?	Yes

Appendix 4

Occupied bandwidth measurements according to 47 CFR 2.1049 / RSS-Gen 4.6.1

Date	Temperature	Humidity
2014-12-06	23 °C ± 3 °C	29 % ± 5 %
2014-12-08	23 °C ± 3 °C	25 % ± 5 %
2014-12-09	23 °C ± 3 °C	29 % ± 5 %

Test set-up and procedure

The measurements were made per definition in FCC: KDB: 971168 D01 Power Meas Licens, v02r02 and IC: RSS-Gen section 6.6. The output was connected to a signal analyzer with the Peak detector activated and max hold. The signal analyser was connected to an external 10 MHz reference standard during the measurements.

Measurement equipment	SP number
R&S FSQ 40	504 143
RF attenuator	900 691
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

Configuration: RDI Cable 52m

MIMO mode, single carrier

Diagram	BW configuration	Tested frequency	Tested Port	Occupied BW (99%) [MHz]
1	5 MHz	B	RF B	4.50
2	5 MHz	M	RF B	4.49
3	5 MHz	T	RF B	4.49

Configuration: RDI Cable 200m

MIMO mode, single carrier

Diagram	BW configuration	Tested frequency	Tested Port	Occupied BW (99%) [MHz]
4	5 MHz	B	RF B	4.50
5	5 MHz	M	RF A	4.48
6	5 MHz	M	RF B	4.49
7	10 MHz	M	RF B	8.98
8	15 MHz	M	RF B	13.47
9	20 MHz	M	RF B	17.92
10	5 MHz	T	RF B	4.50

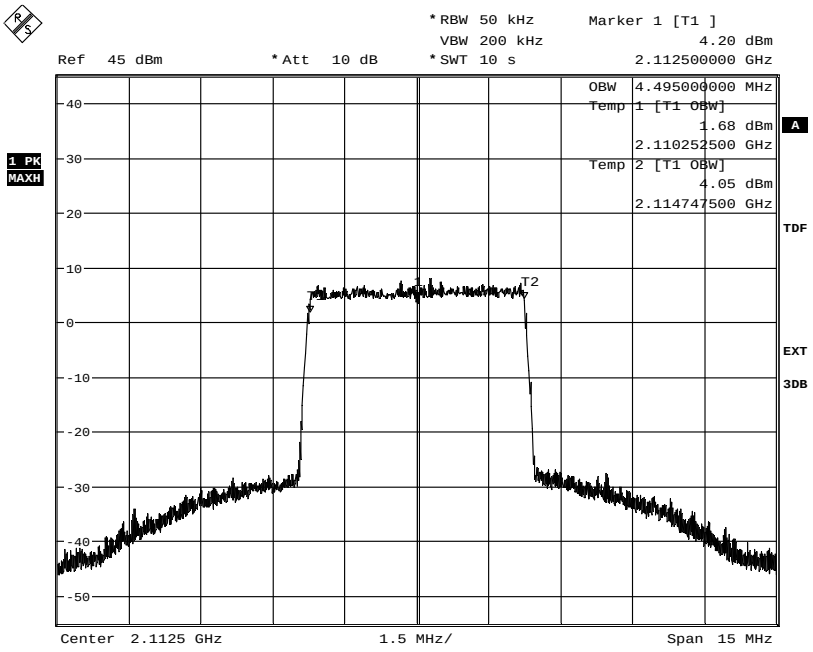
Configuration: RDI Cable 20m

MIMO mode, single carrier

Diagram	BW configuration	Tested frequency	Tested Port	Occupied BW (99%) [MHz]
11	5 MHz	B	RF B	4.49
12	5 MHz	M	RF B	4.50
13	5 MHz	T	RF B	4.49

Appendix 4

Diagram 1:



Date: 5.DEC.2014 14:52:16

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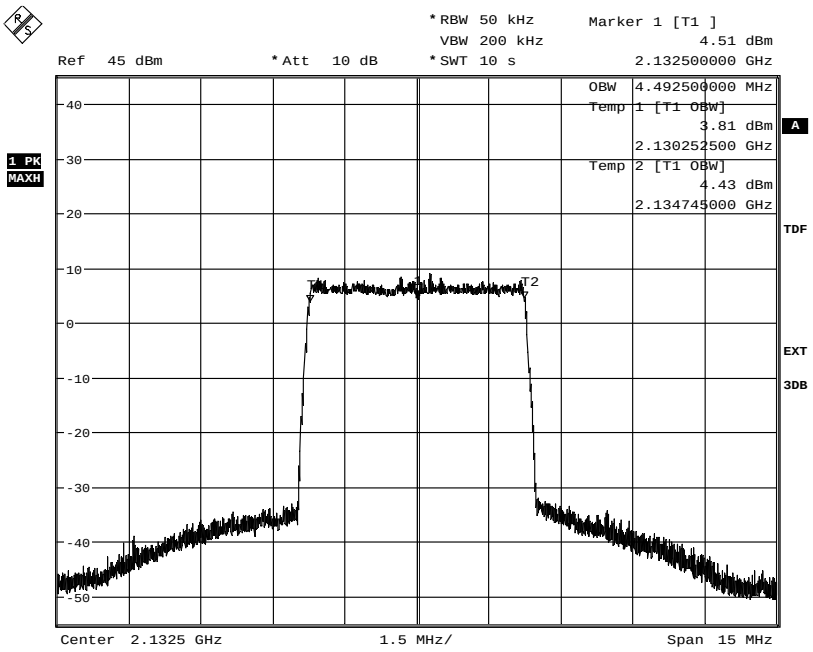
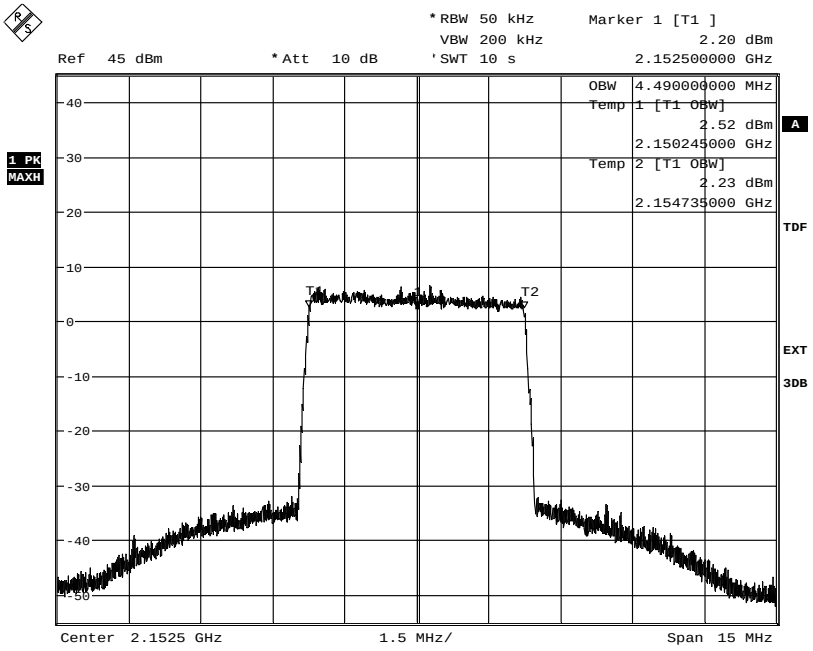


Date: 2.DEC.2014 10:00:09

Appendix 4

Diagram 3:



Date: 6.DEC.2014 08:28:59

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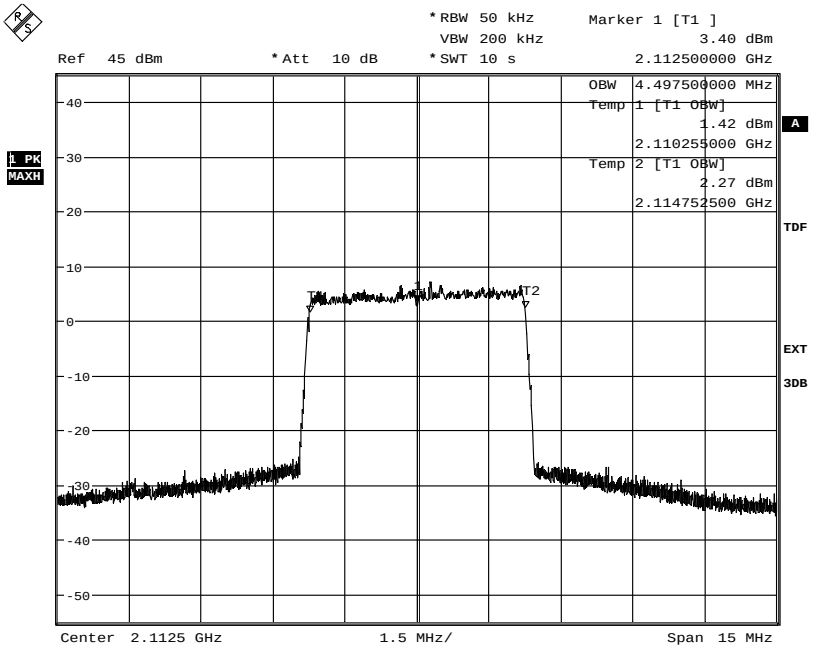
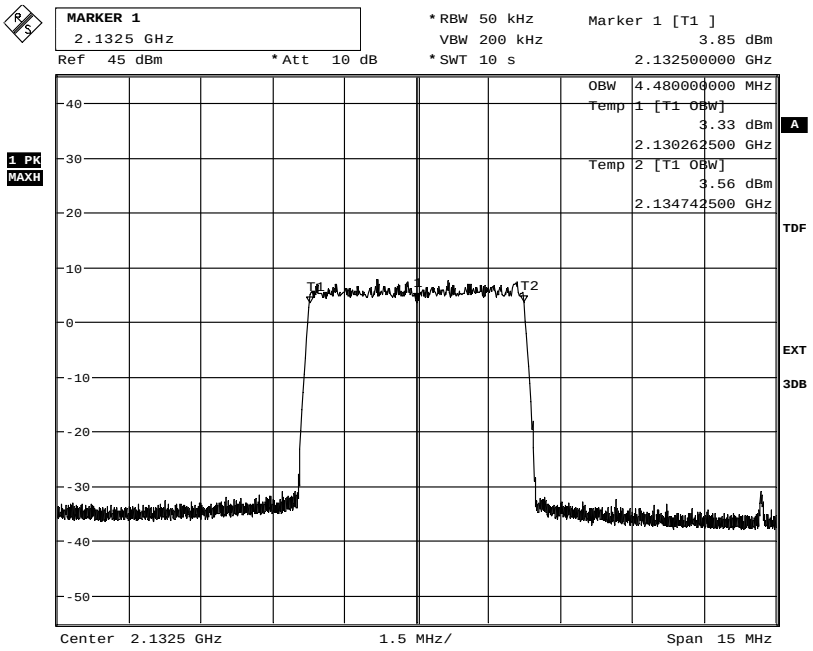


Date: 9.DEC.2014 07:05:17

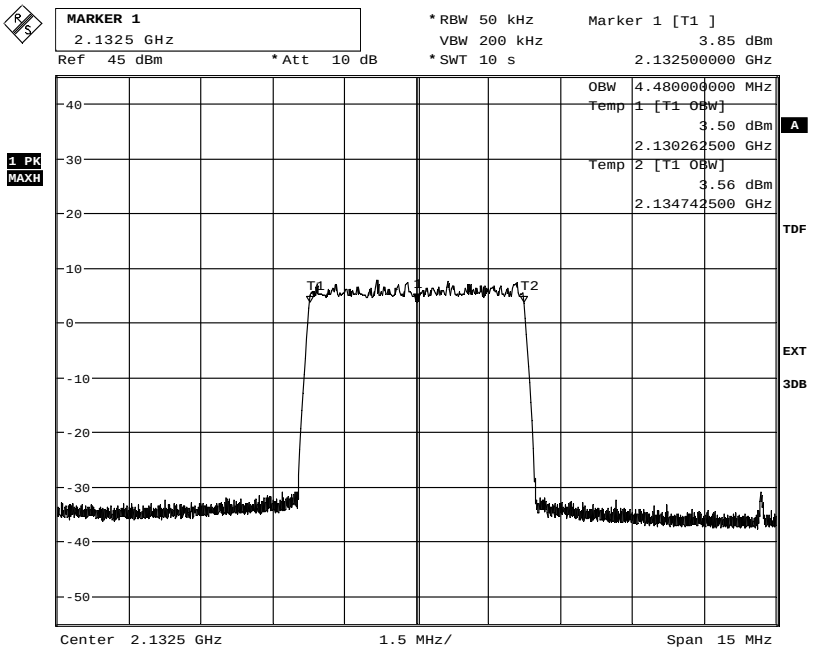
Appendix 4

Diagram 5:



Date: 10.DEC.2014 12:01:32

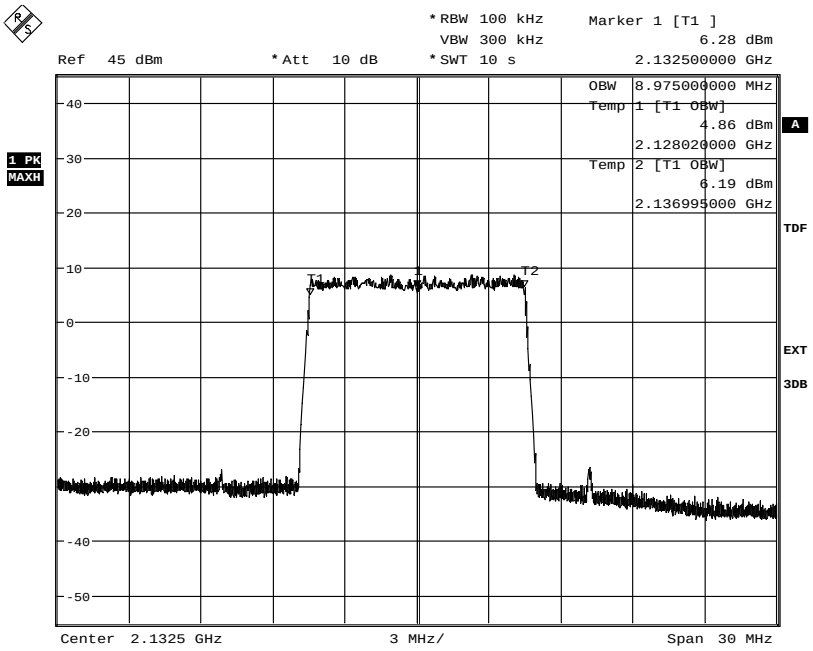
Diagram 6:



Date: 10.DEC.2014 12:02:55

Appendix 4

Diagram 7:



Date: 8.DEC.2014 16:09:16

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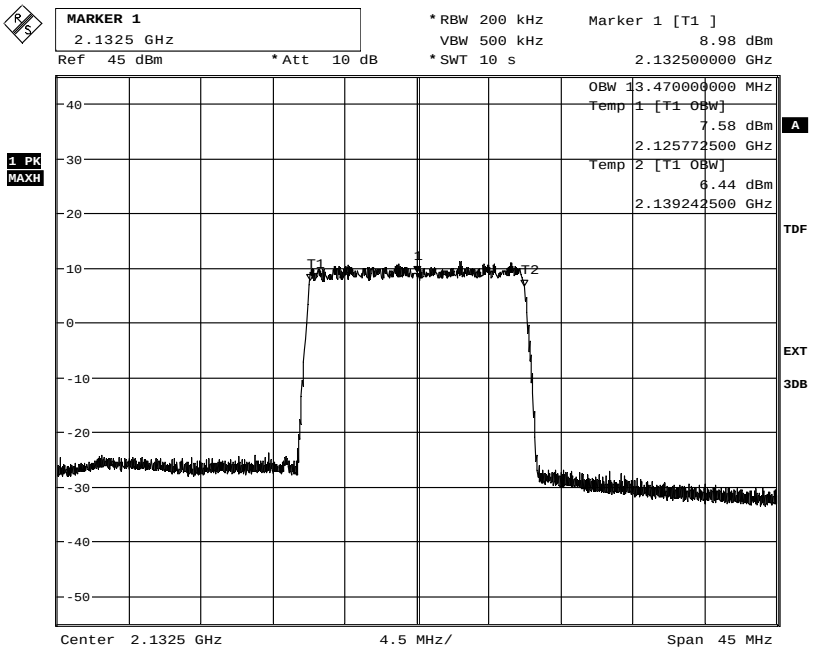
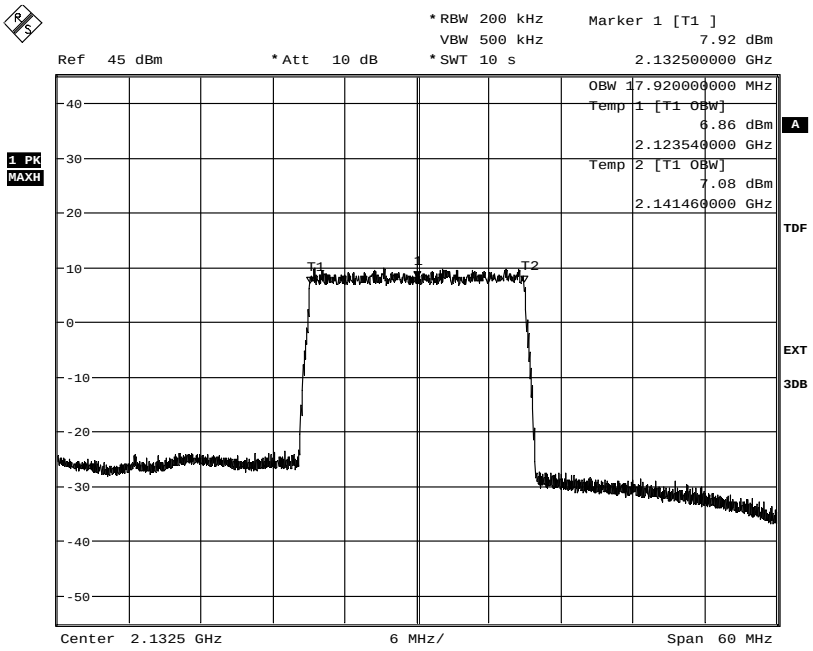


Date: 8.DEC.2014 16:19:08

Appendix 4

Diagram 9:



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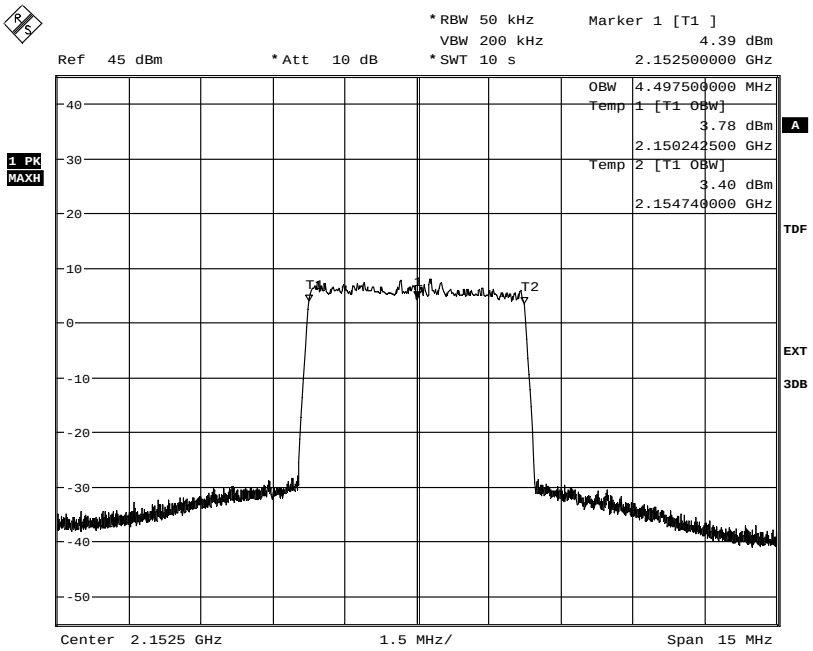
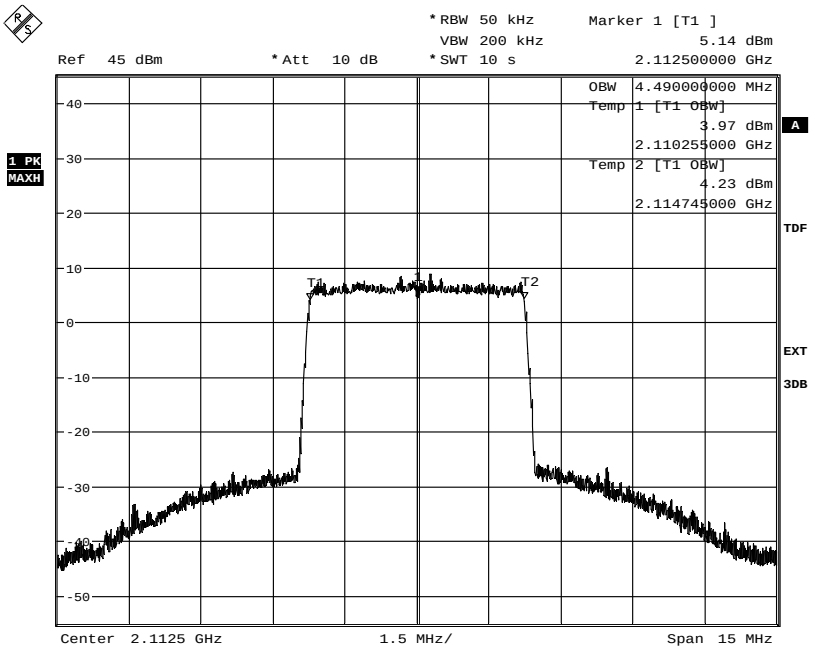


Date: 6.DEC.2014 13:35:53

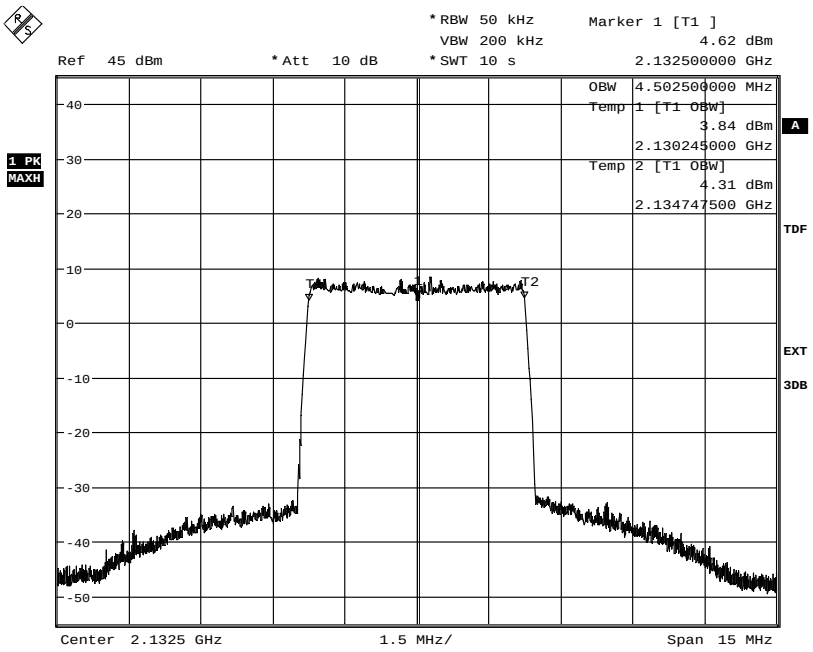
Appendix 4

Diagram 11:



Date: 9.DEC.2014 11:37:34

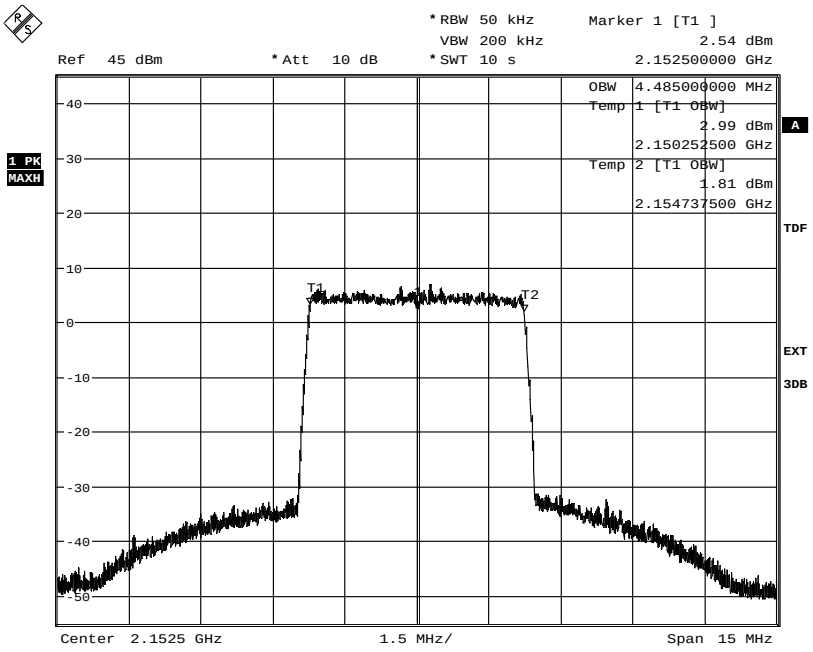
Diagram 12:



Date: 9.DEC.2014 11:45:05

Appendix 4

Diagram 13:



Date: 9.DEC.2014 10:32:27

Band edge measurements according to CFR 47 §27.53(h)/ RSS-Gen 4.6.1

Date	Temperature	Humidity
2014-12-06	23 °C ± 3 °C	29 % ± 5 %
2014-12-08	23 °C ± 3 °C	25 % ± 5 %
2014-12-09	23 °C ± 3 °C	29 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §27.53(h). The test object was connected to a spectrum analyser with the RMS detector activated. The spectrum analyser was connected to an external 10 MHz reference standard during the measurements.

Beyond the 1st MHz off the band edges the limit was adjusted to compensate for reduced measurement bandwidths pursuant to the FCC rules, specifying a RBW of at least 1% of the fundamental emission bandwidth up to 1 MHz away from the band edges and a RBW of 1 MHz for measurements of emissions more than 1 MHz away from the band edges.

A resolution bandwidth of 100 kHz was used 1 MHz to 6 MHz away from the band edges, to compensate for the reduced resolution bandwidth the limit was adjusted by 10 dB to -23 dBm.

Before comparing the results to the limit, 3 dB [10 log (2)] should be added according to method E), 3), a), (iii) Measure and add 10 log(N_{ANT})" of FCC KDB662911 D01 Multiple Transmitter Output v02r01.

Measurement equipment	SP number
R&S FSQ 43	504 143
RF attenuator	900 691
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

Configuration: RDI Cable 52m

MIMO mode, single carrier

Diagram	BW configuration	Tested frequency	Tested Port
1 a-c	5 MHz	B	RF B
2 a-c	5 MHz	T	RF B

MIMO mode, multi carrier

Diagram	BW configuration	Testedfrequency	Tested Port
3 a-c	5 MHz	B2-5	RF B
4 a-c	5 MHz	T2-5	RF B

Configuration: RDI Cable 200m

MIMO mode, single carrier

Diagram	BW configuration	Tested frequency	Tested Port
5 a-c	5 MHz	B	RF A
6 a-c	5 MHz	B	RF B
7 a-c	10 MHz	B	RF B
8 a-c	15 MHz	B	RF B
9 a-c	20 MHz	B	RF B
10 a-c	5 MHz	T	RF A
11 a-c	5 MHz	T	RF B
12 a-c	10 MHz	T	RF B
13 a-c	15 MHz	T	RF B
14 a-c	20 MHz	T	RF B

MIMO mode, multi carrier

Diagram	BW configuration	Testedfrequency	Tested Port
15 a-c	5 MHz	B2-5	RF B
16 a-c	5 MHz	T2-5	RF B

Configuration: RDI Cable 20m

MIMO mode, single carrier

Diagram	BW configuration	Tested frequency	Tested Port
17 a-c	5 MHz	B	RF B
18 a-c	5 MHz	T	RF B

Limits

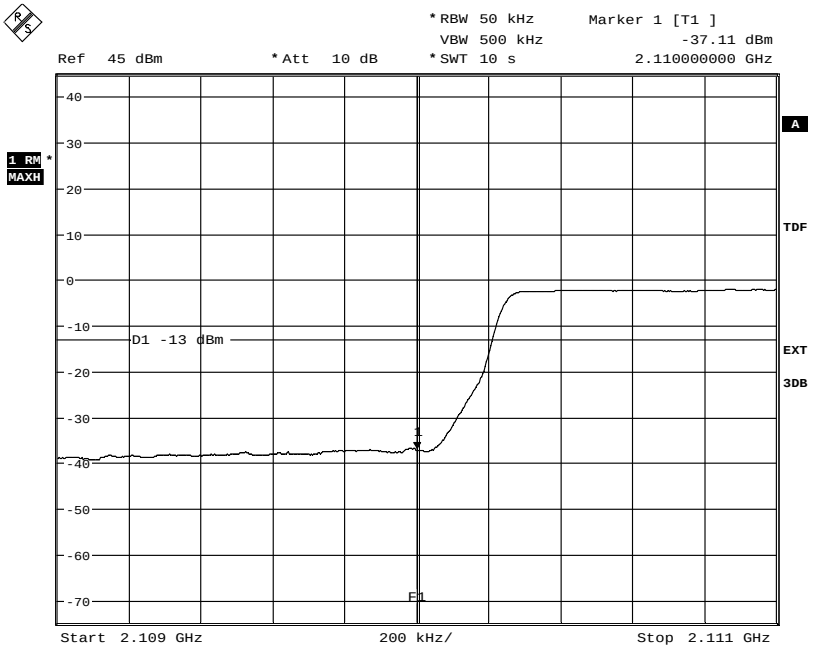
CFR 47 §27.53(h) and RSS-139 6.5

Outside a licensee's frequency band(s) of operation the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, resulting in a limit of -13 dBm.

Complies?	Yes

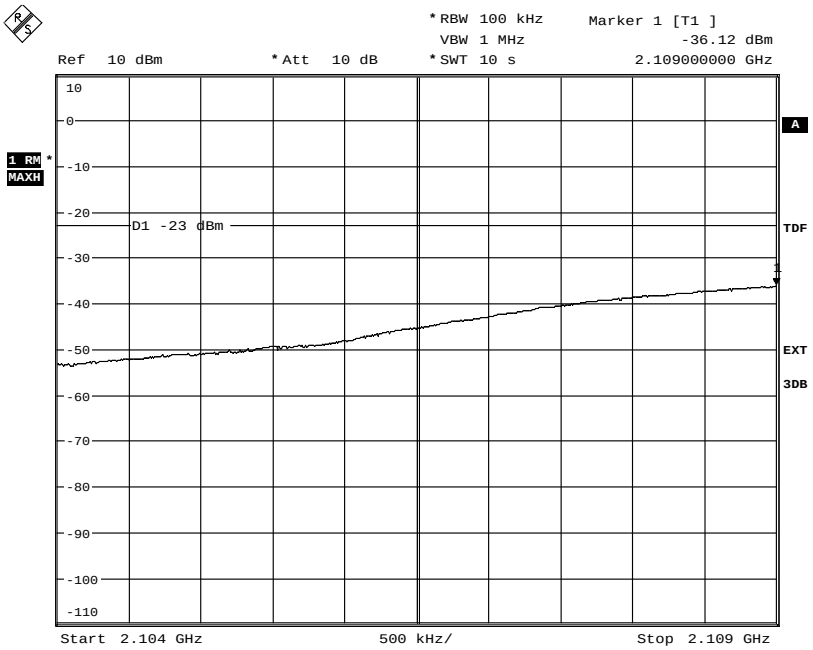
Appendix 5

Diagram 1 a:



Date: 5.DEC.2014 14:55:12

Diagram 1 b:



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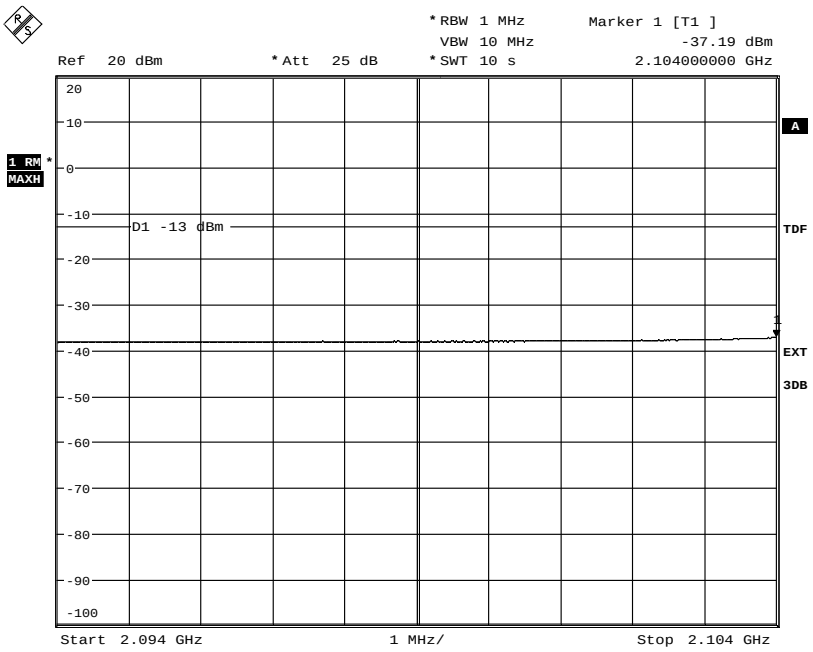
Appendix 5

Diagram 1c:



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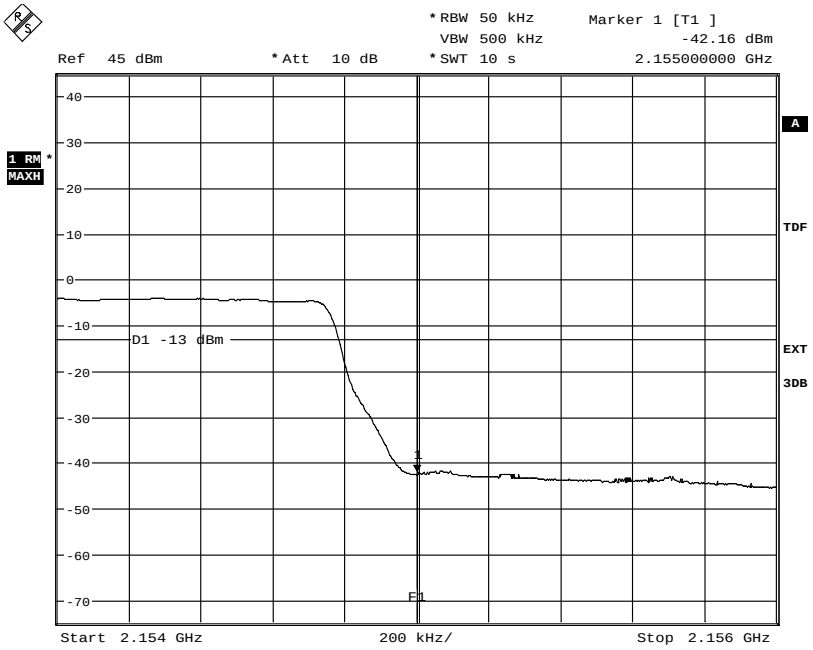
Appendix 5

Diagram 2 a:



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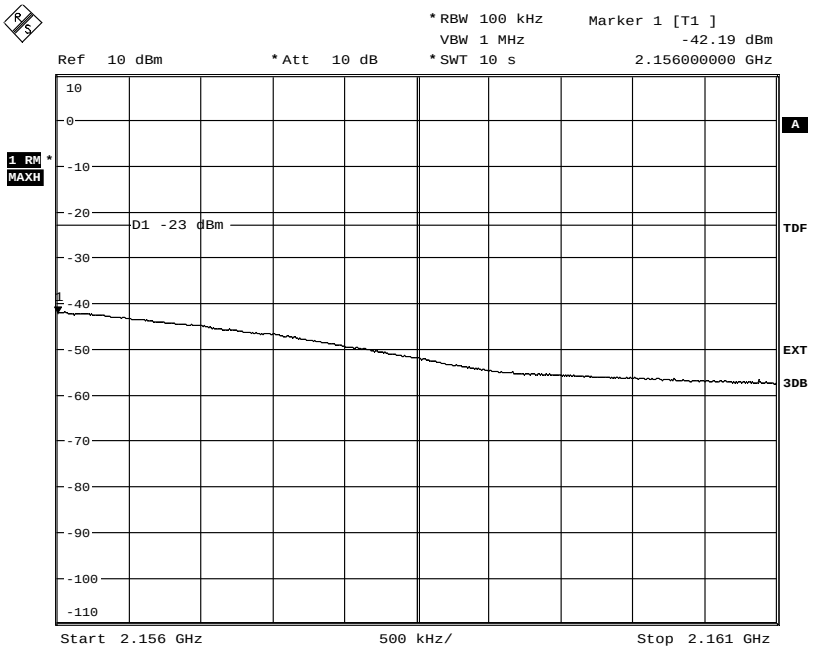

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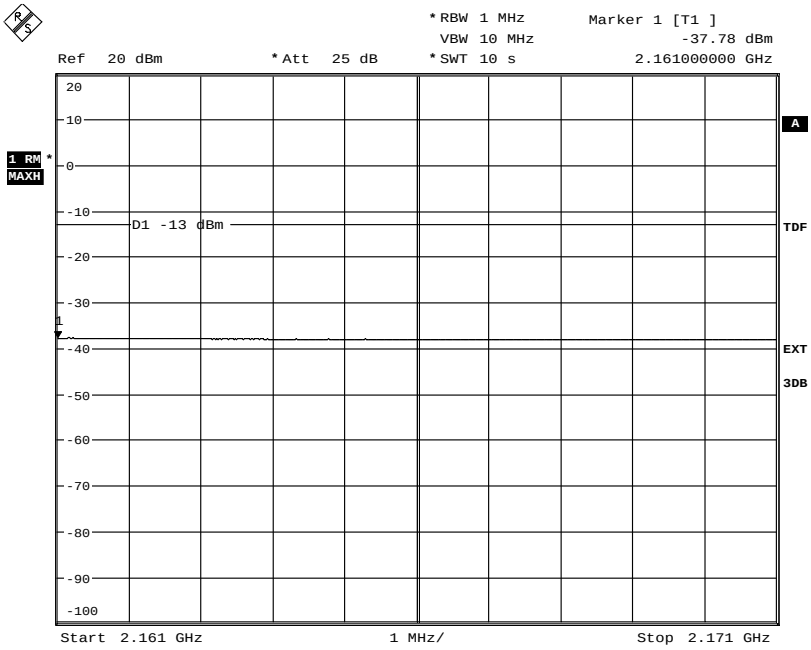
Appendix 5

Diagram 2 c:



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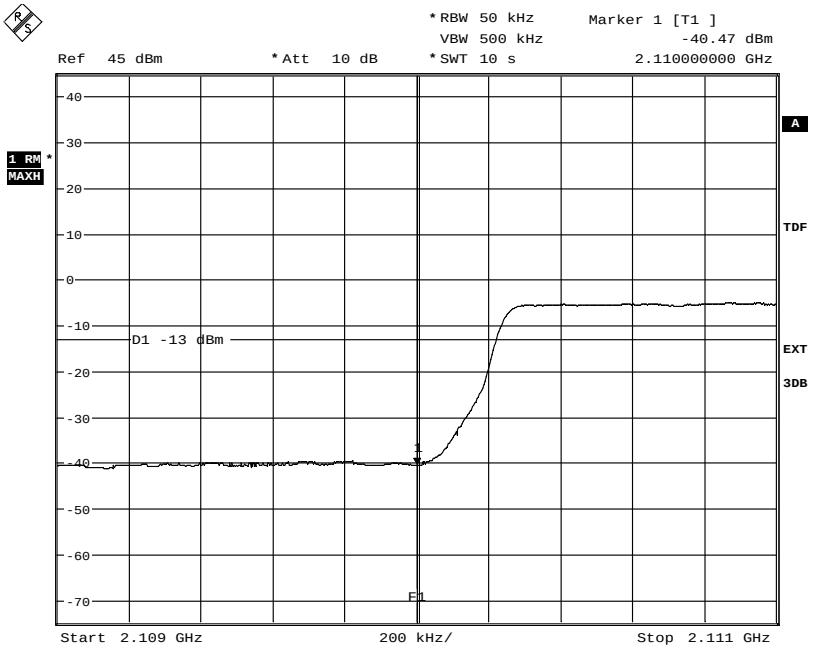
Appendix 5

Diagram 3 a:



Date: 6.DEC.2014 11:05:46

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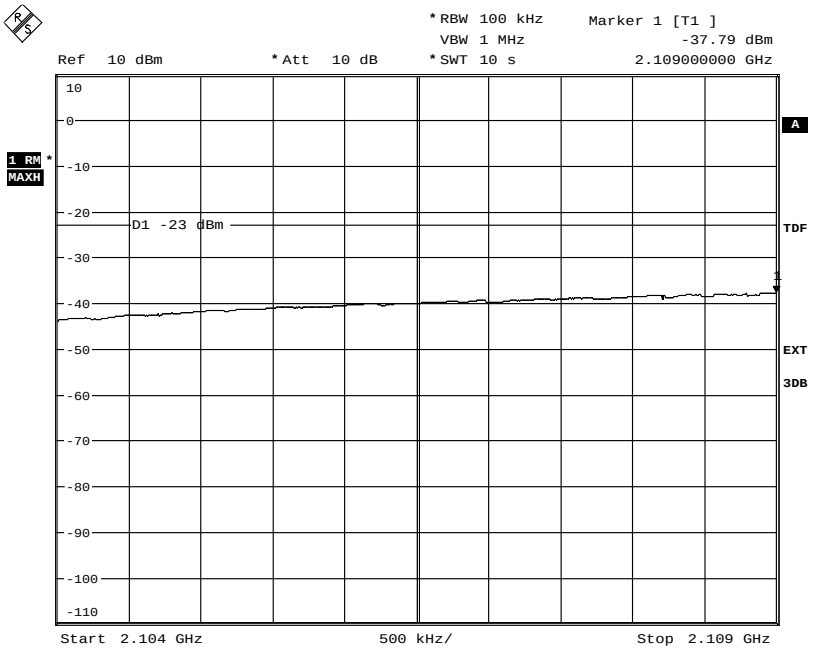
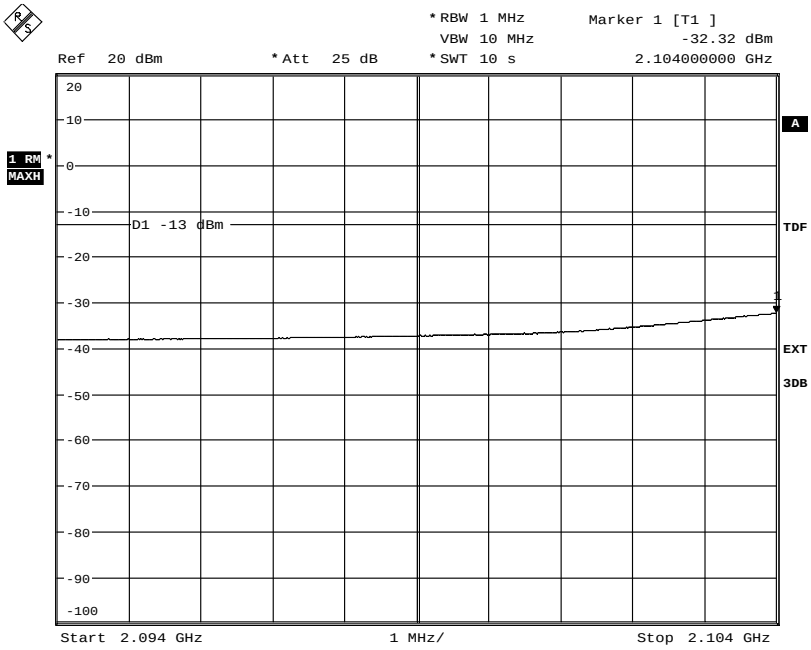


Date: 6.DEC.2014 11:07:57

Appendix 5

Diagram 3 c:



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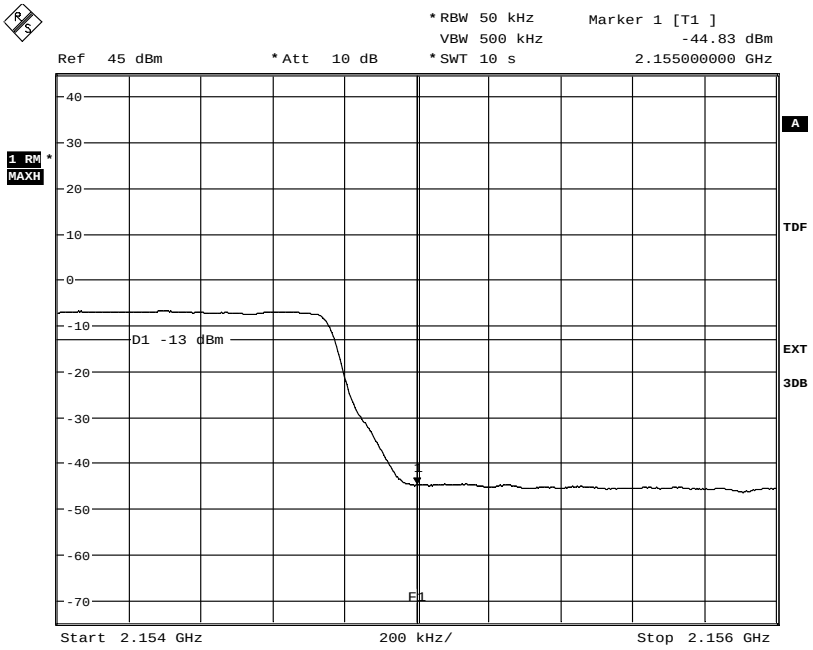
Appendix 5

Diagram 4 a:



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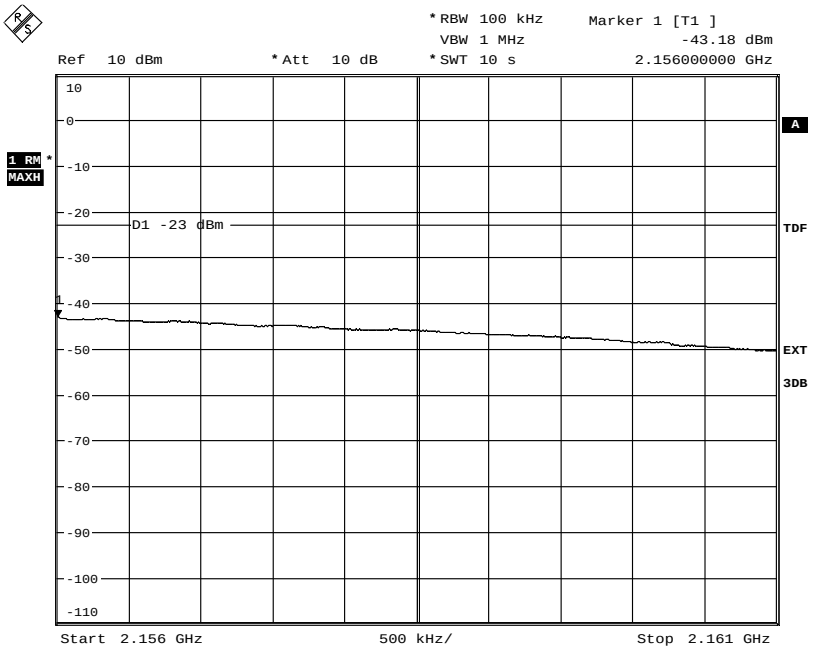

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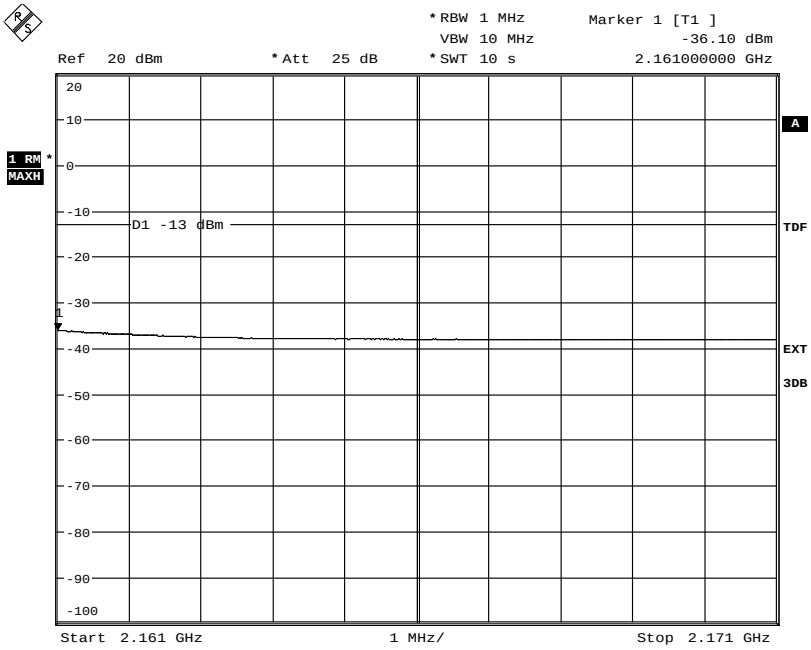
Appendix 5

Diagram 4 c:



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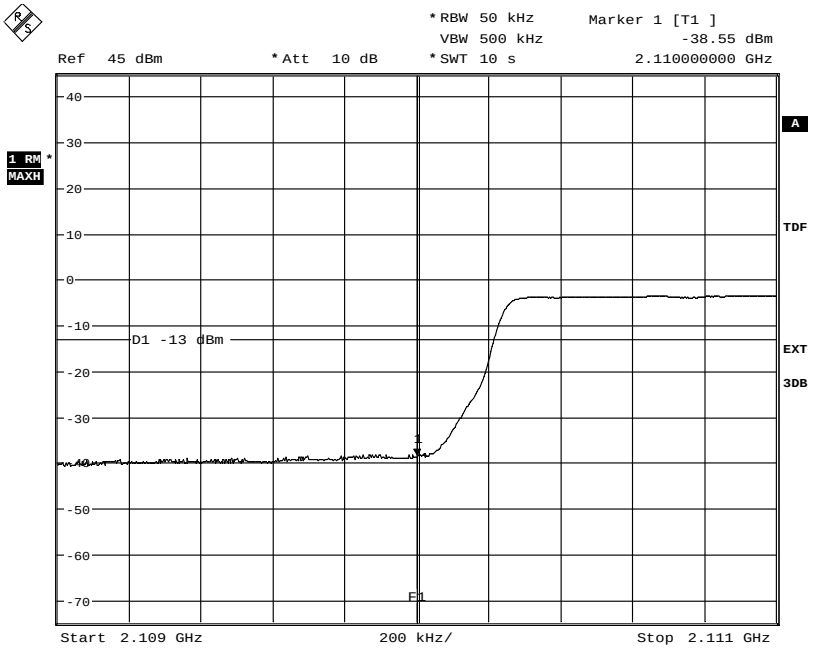
Appendix 5

Diagram 5 a:



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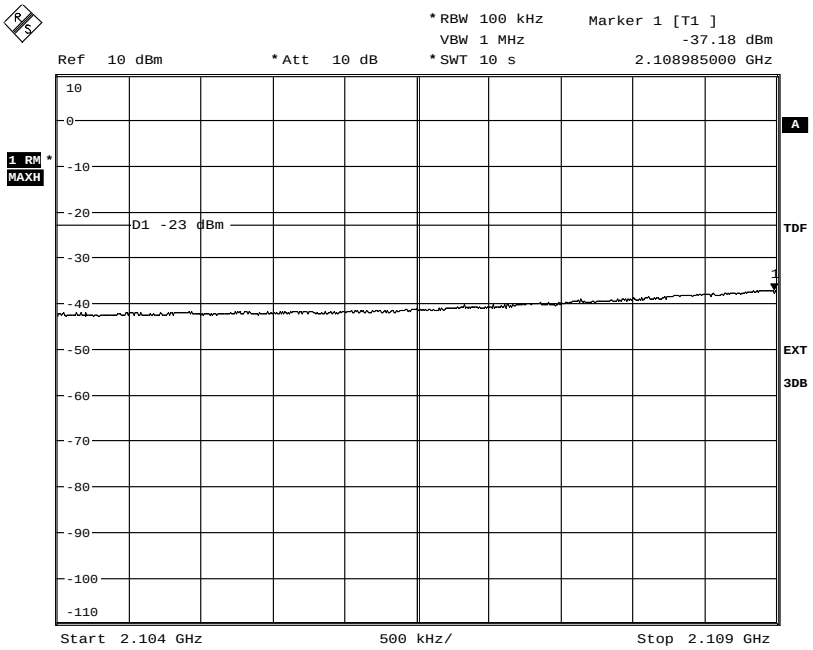
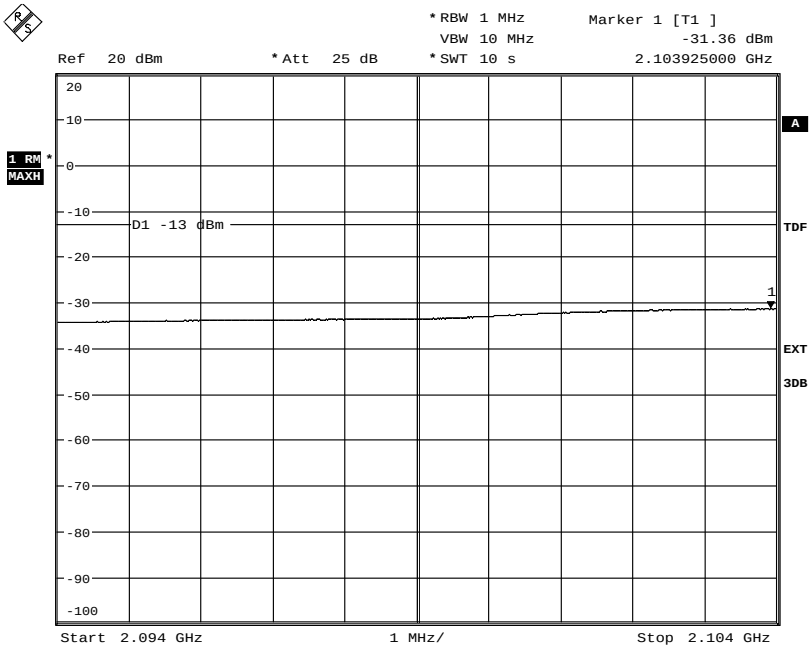


Date: 9.DEC.2014 08:02:25

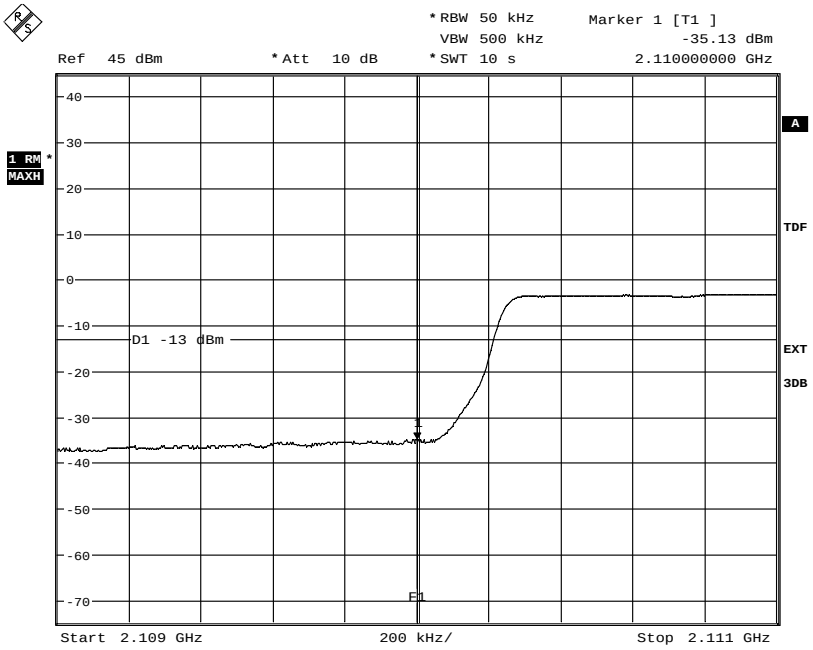
Appendix 5

Diagram 5 c:



Appendix 5

Diagram 6 a:



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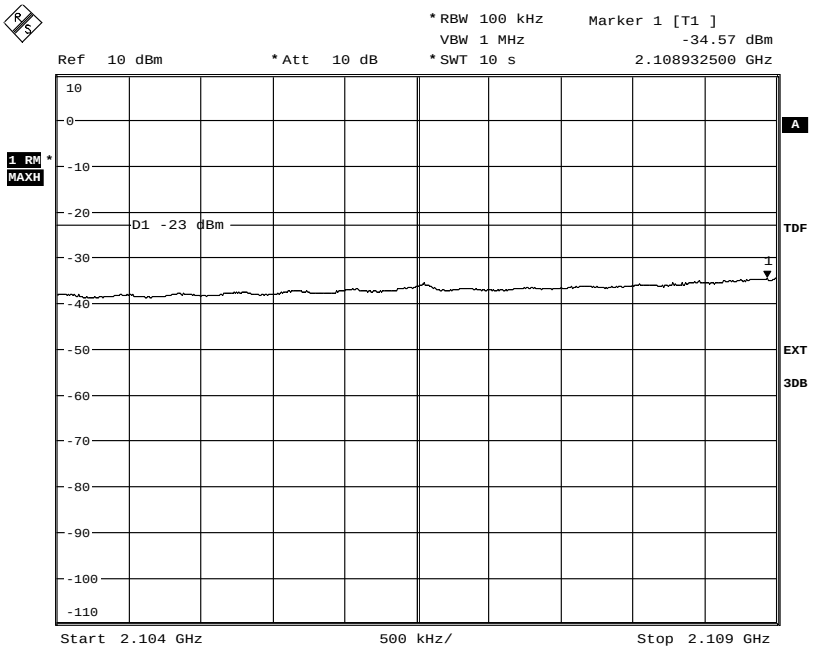

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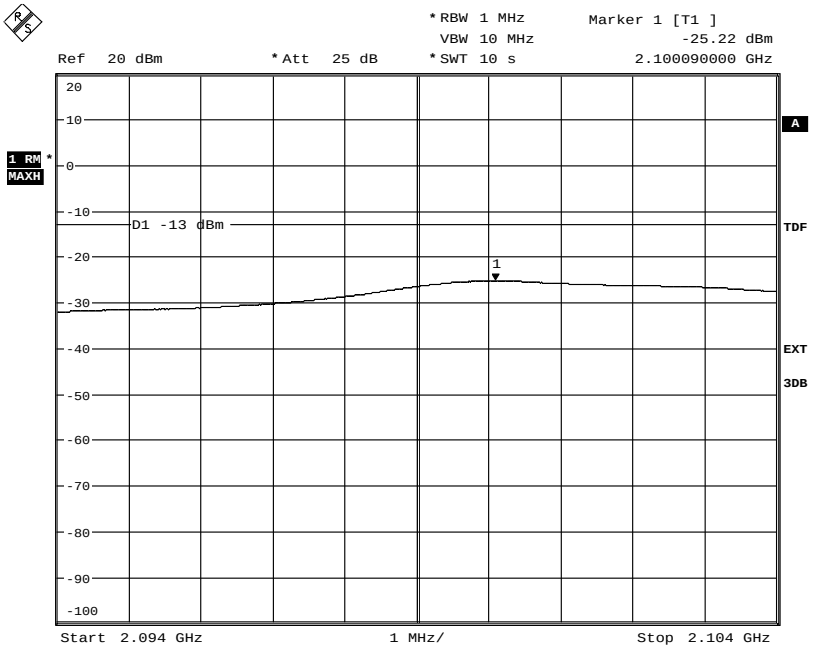
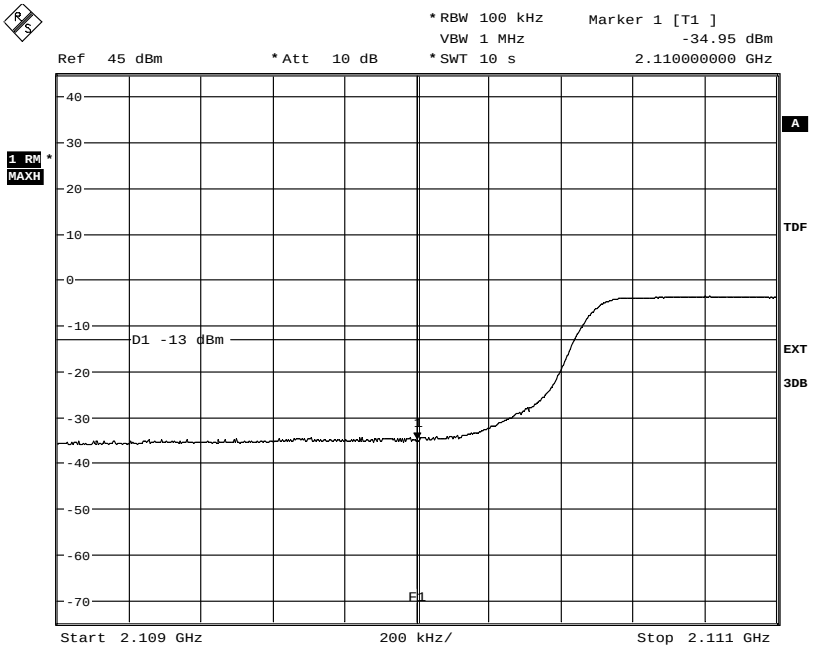


Appendix 5

Diagram 7 a:



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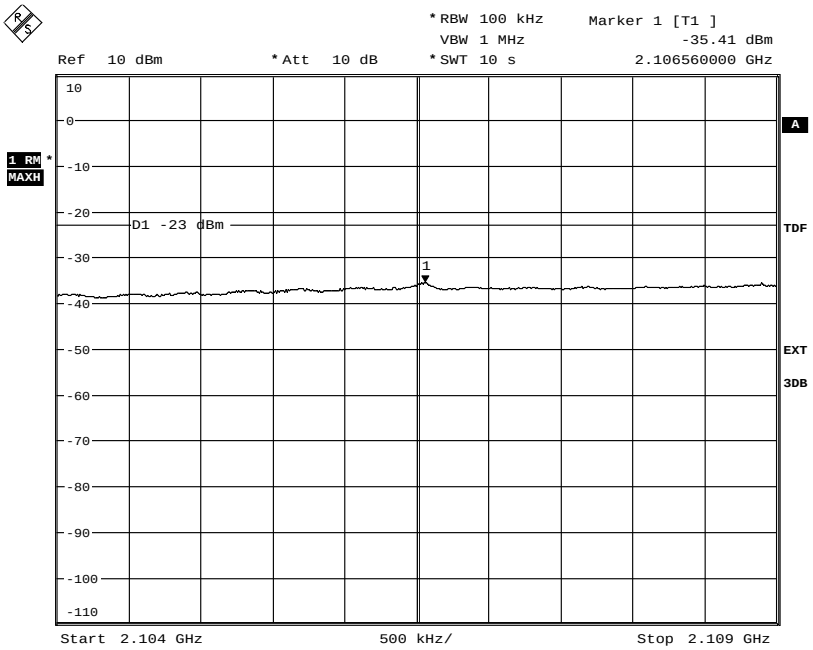

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Appendix 5

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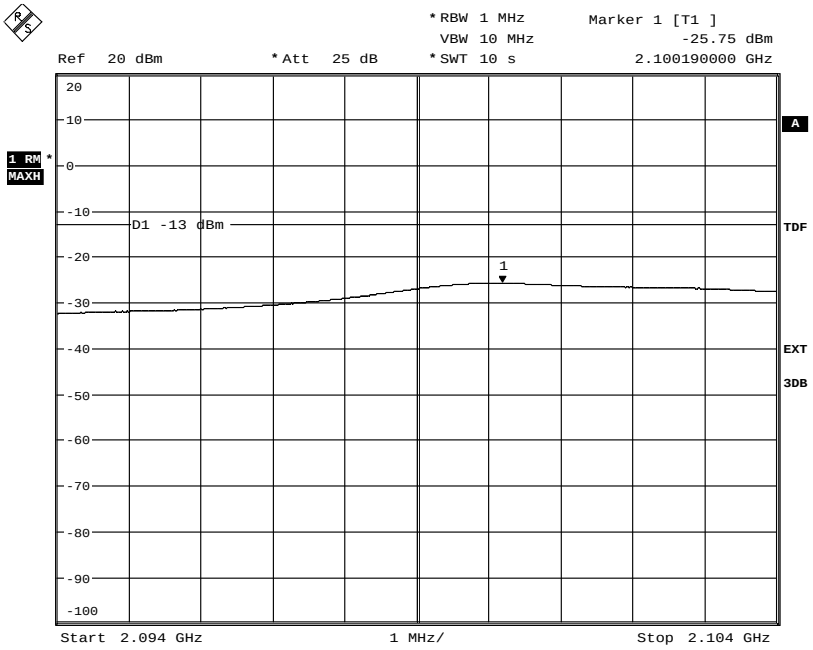

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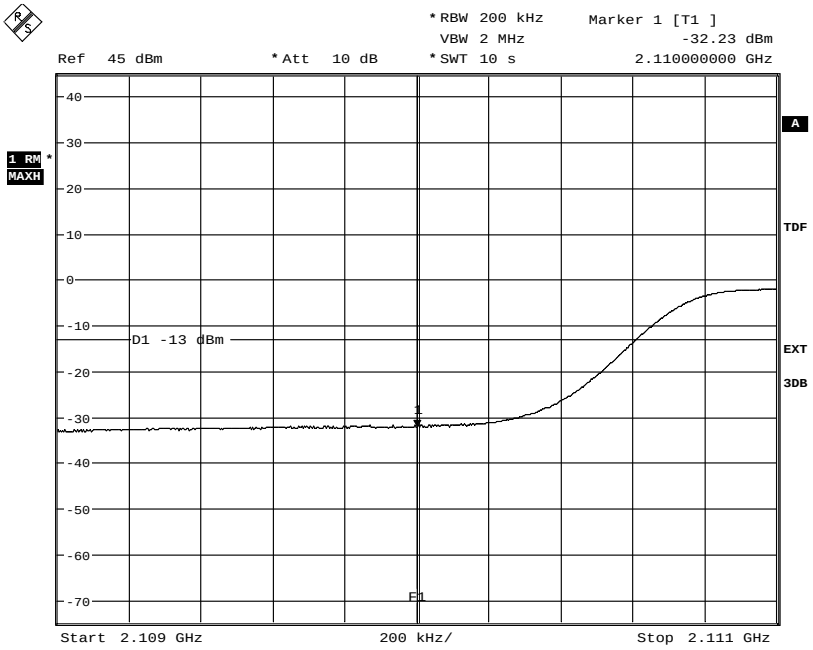
Diagram 8 a:



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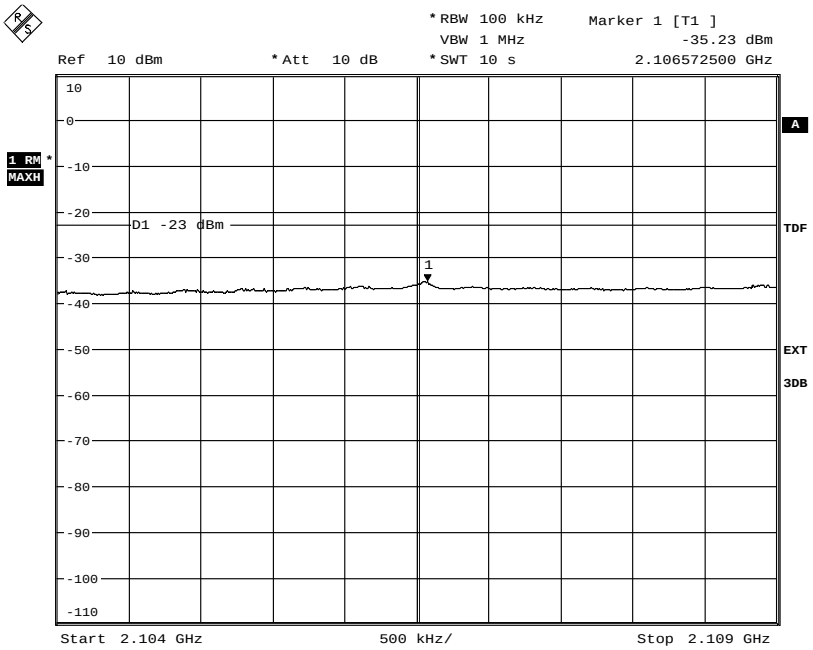

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Appendix 5

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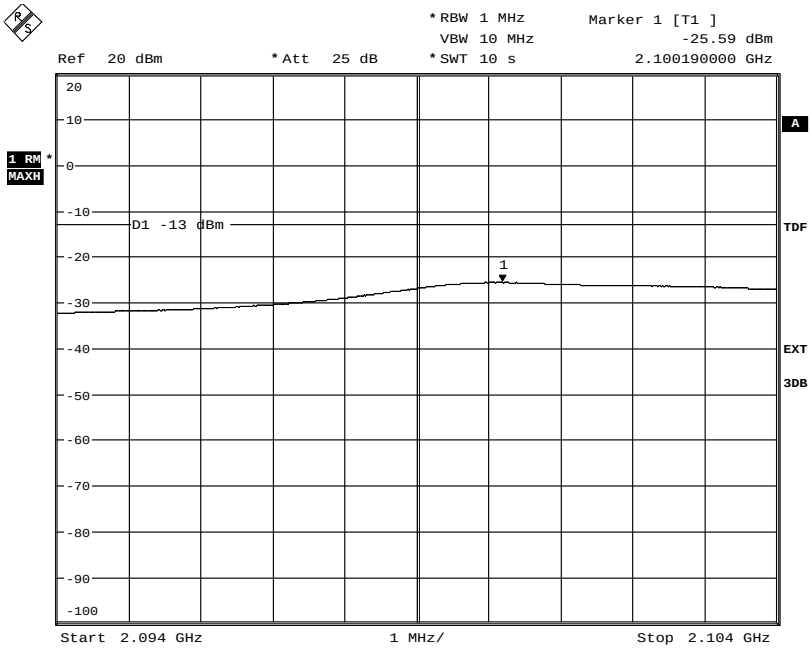

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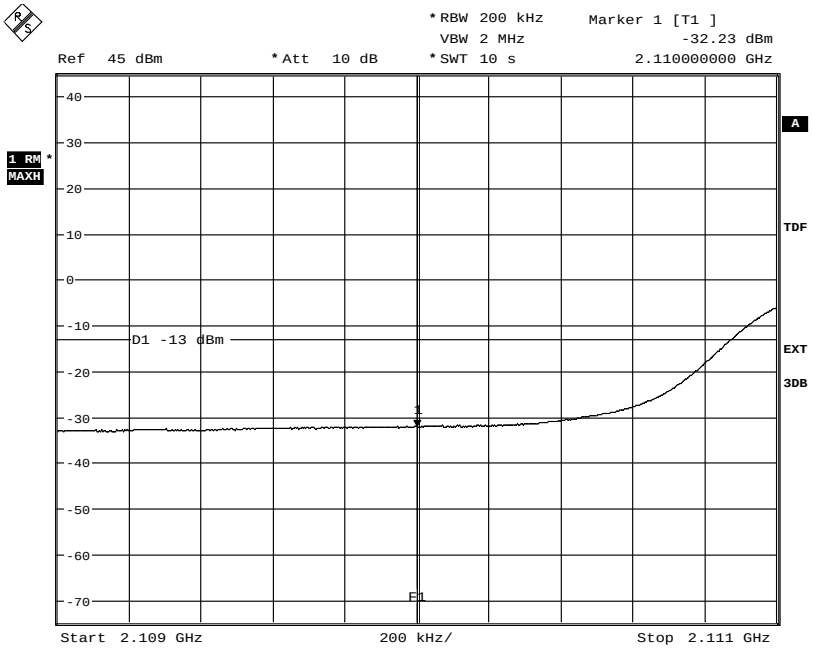
Appendix 5

Diagram 9 a:



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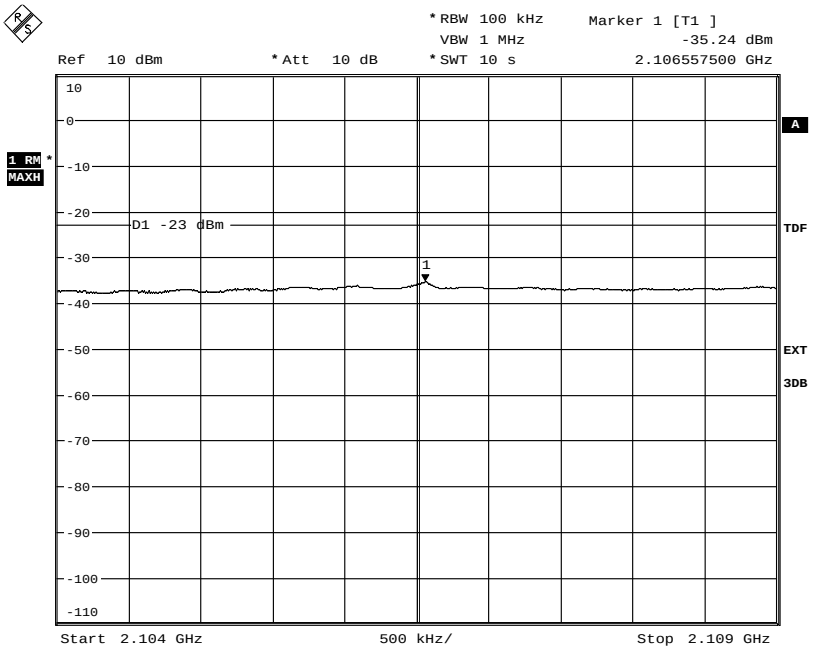

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Appendix 5

Diagram 9 c:

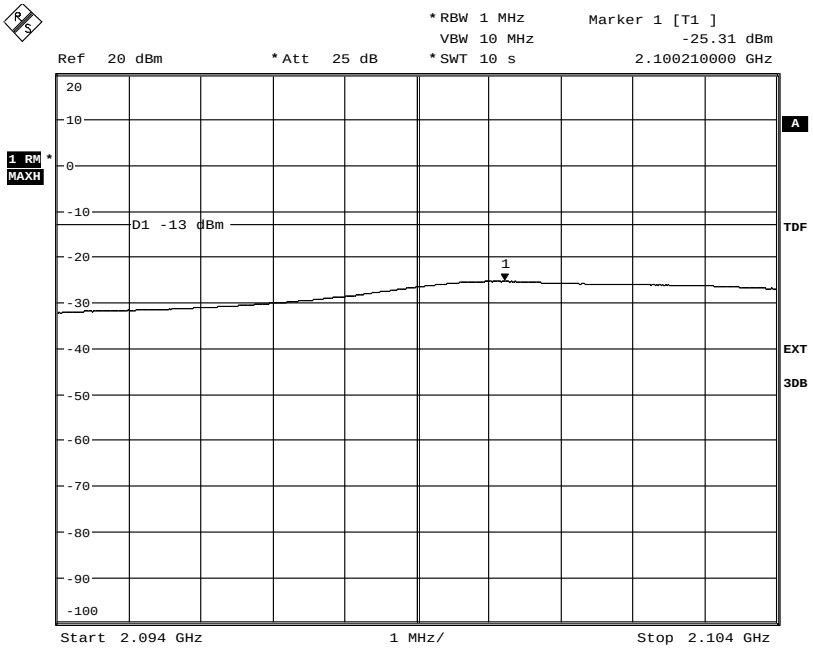

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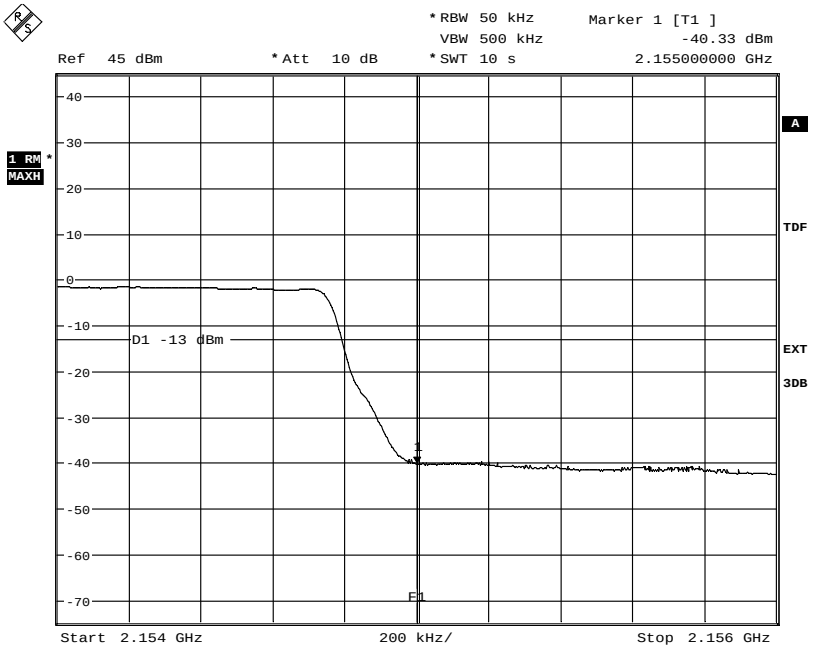
Diagram 10 a:



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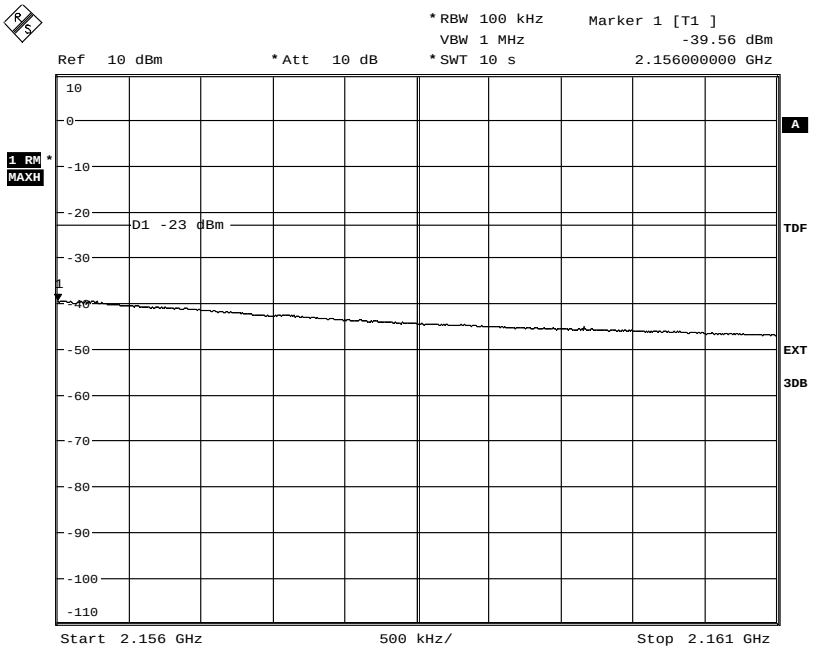

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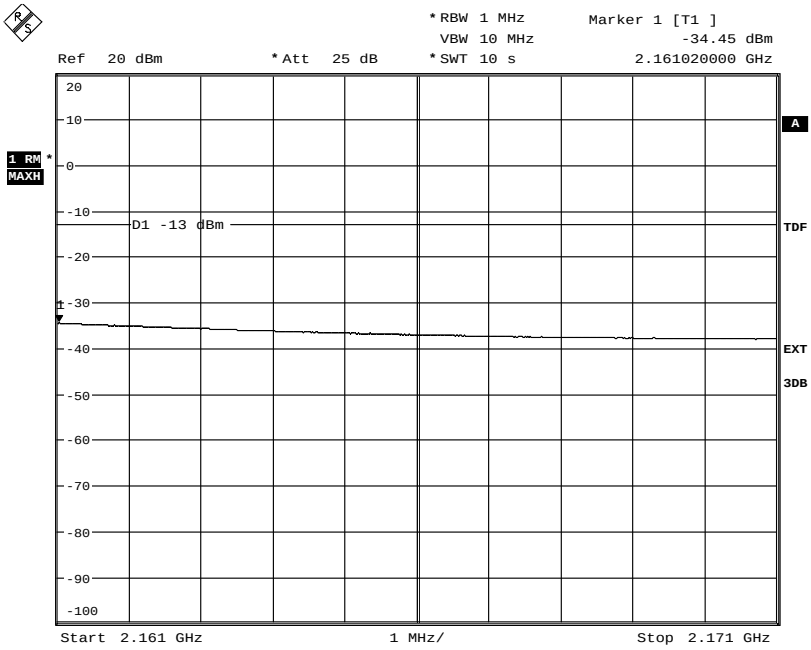
Appendix 5

Diagram 10 c:



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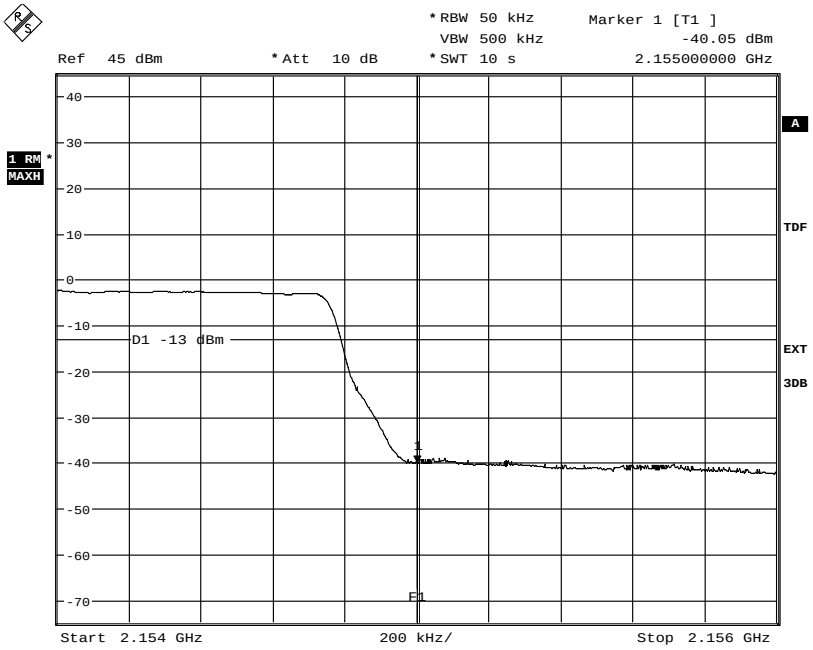
Appendix 5

Diagram 11 a:



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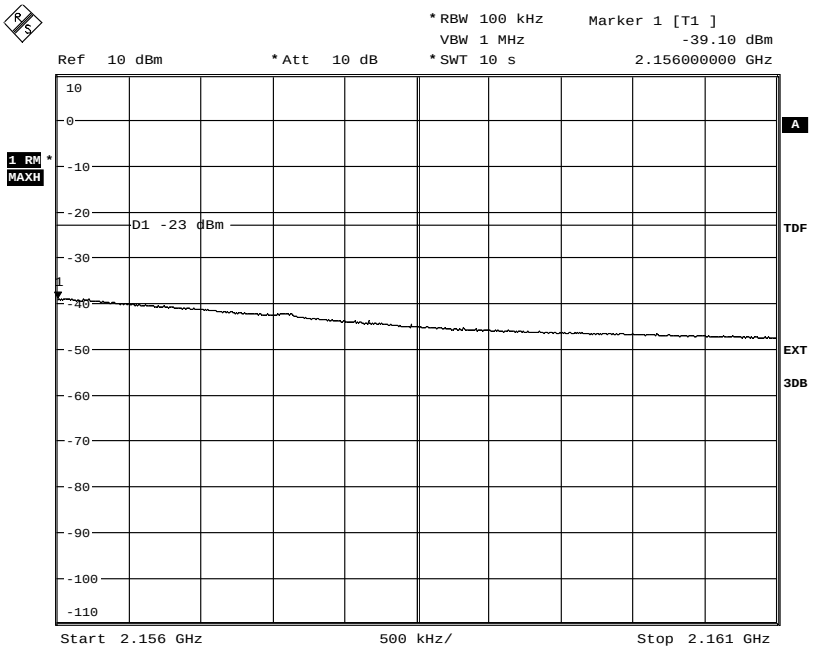

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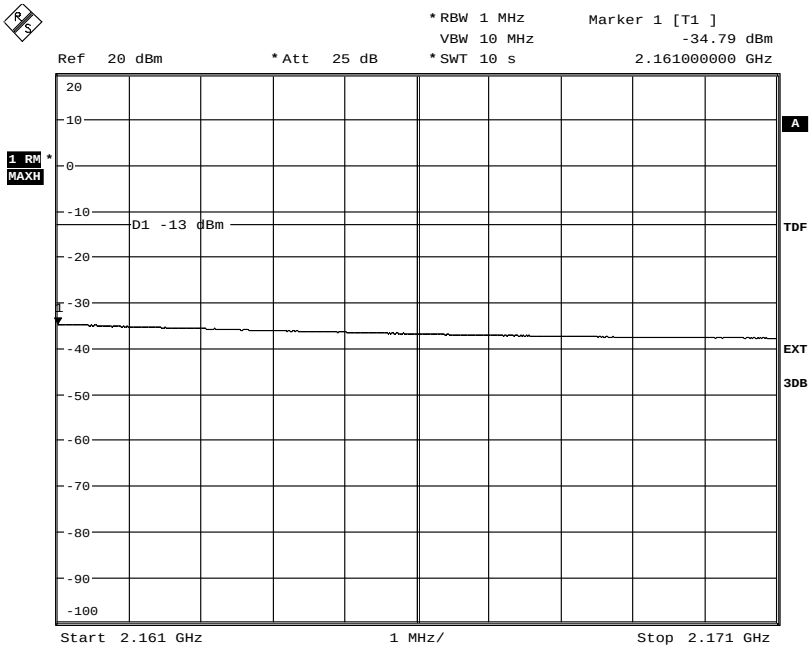
Appendix 5

Diagram 11 c:



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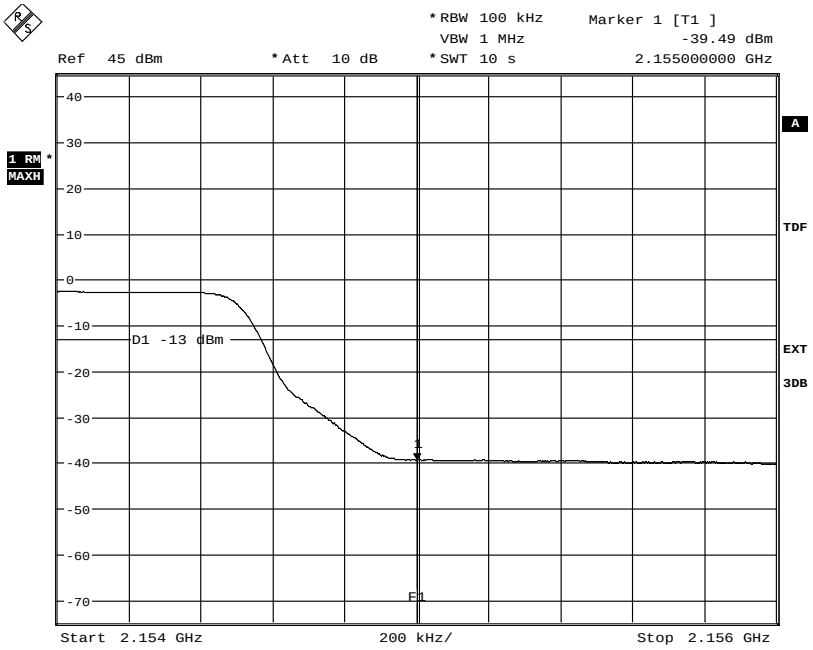
Appendix 5

Diagram 12 a:



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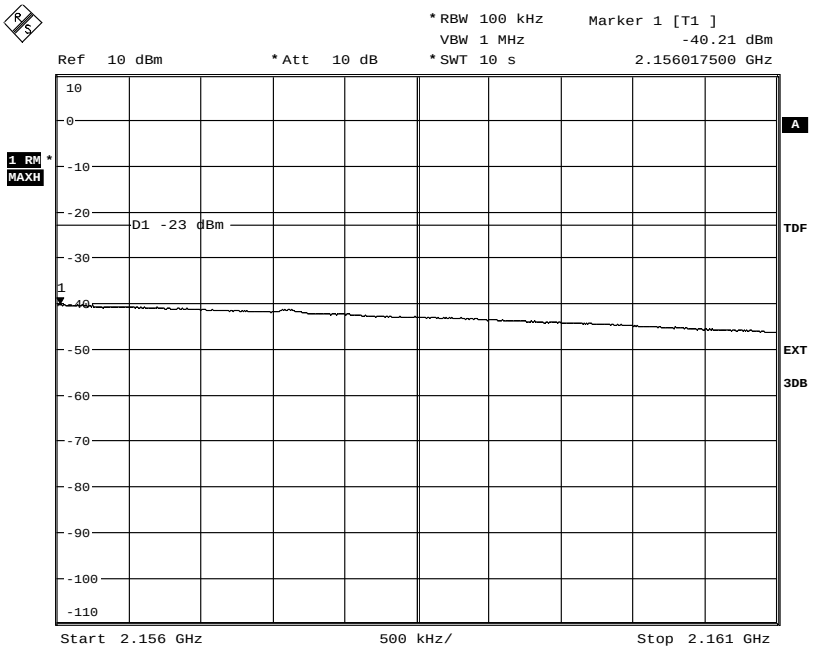

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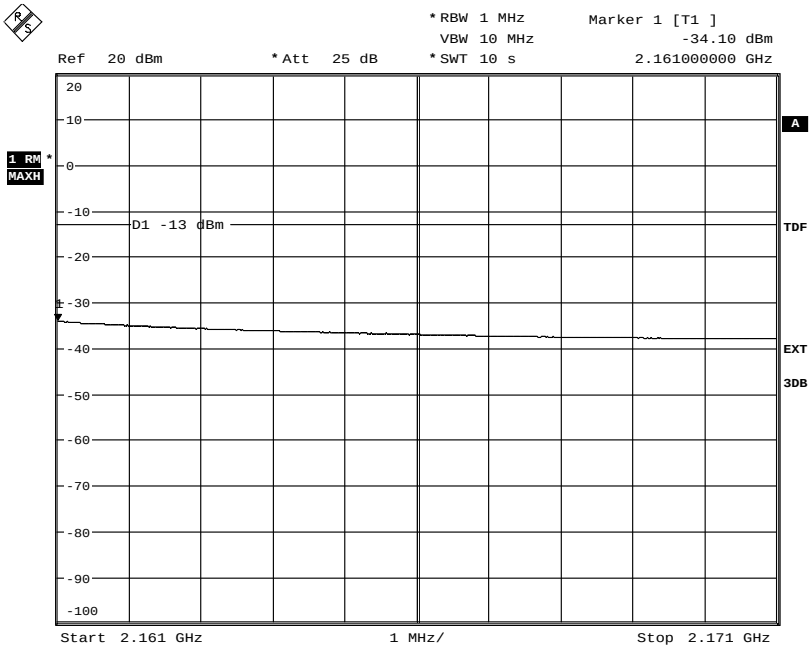
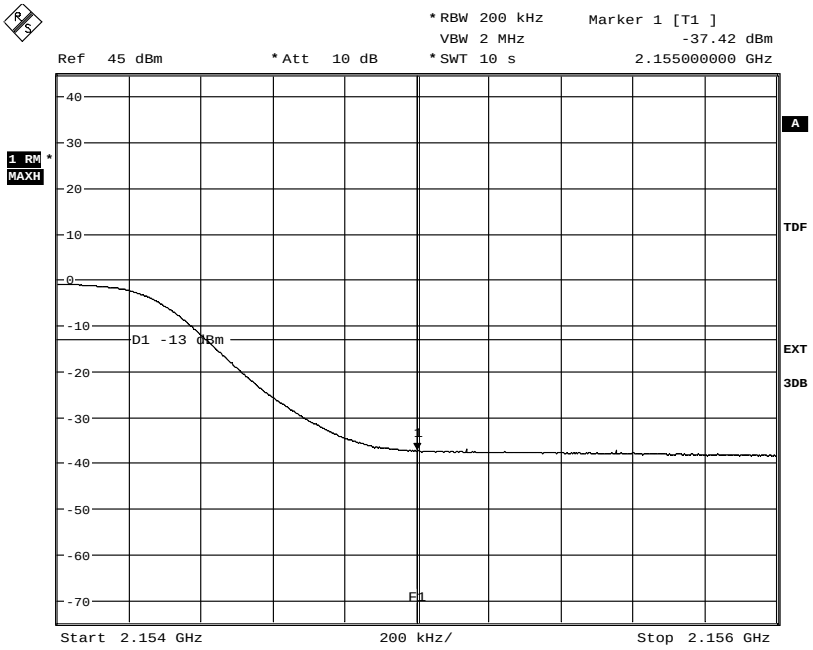
Appendix 5

Diagram 12 c:



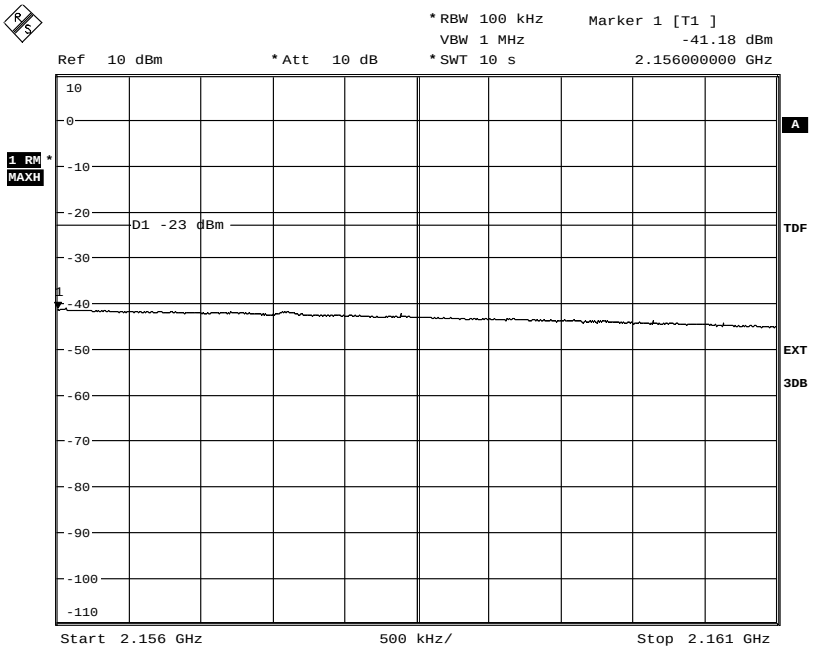
Appendix 5

Diagram 13 a:



Date: 9.DEC.2014 07:23:43

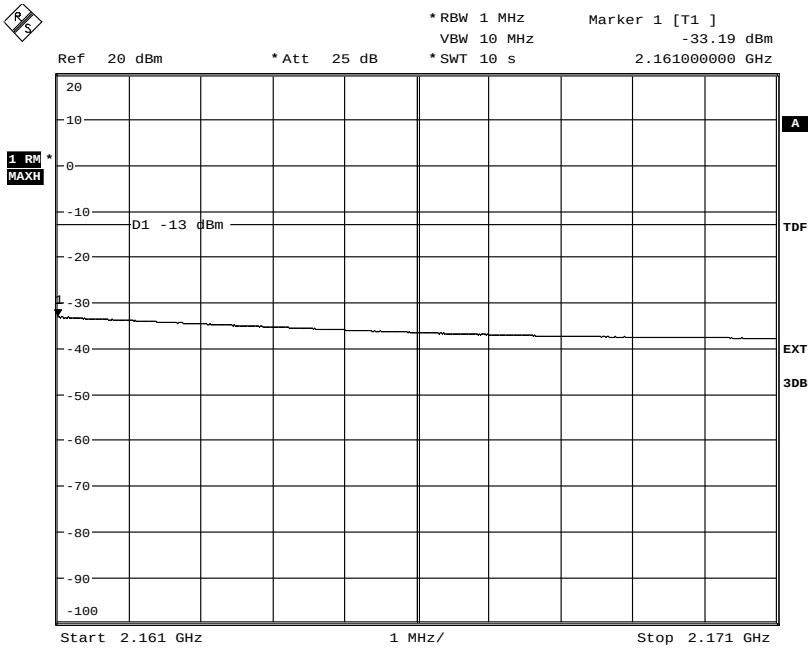
Diagram 13 b:



Date: 9.DEC.2014 07:22:29

Appendix 5

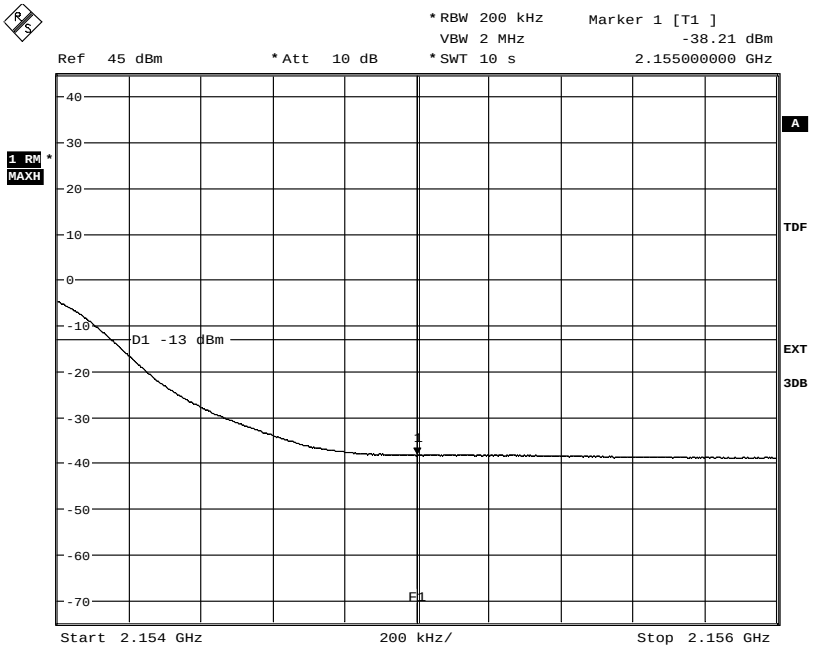
Diagram 13 c:



Date: 9.DEC.2014 07:21:19

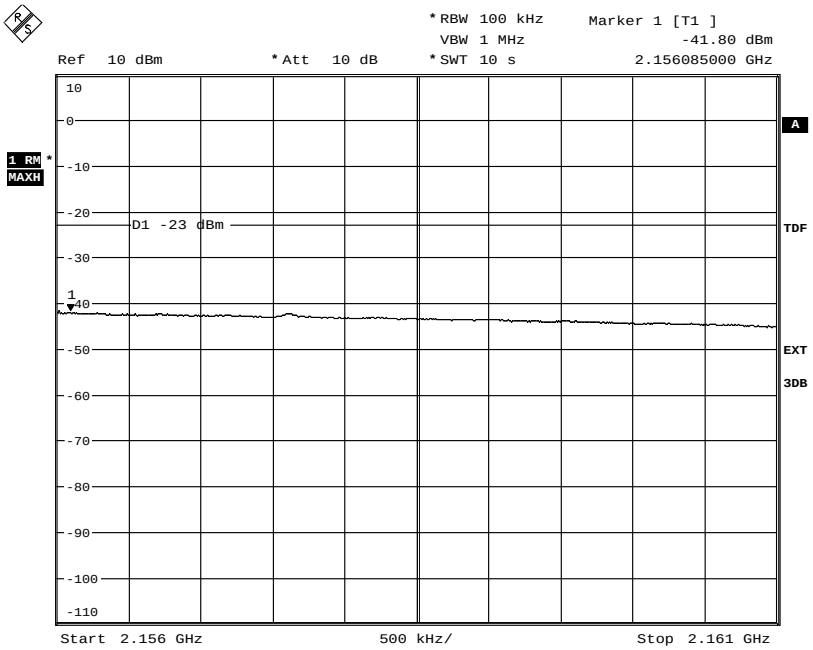
Appendix 5

Diagram 14 a:



Date: 9.DEC.2014 07:16:53

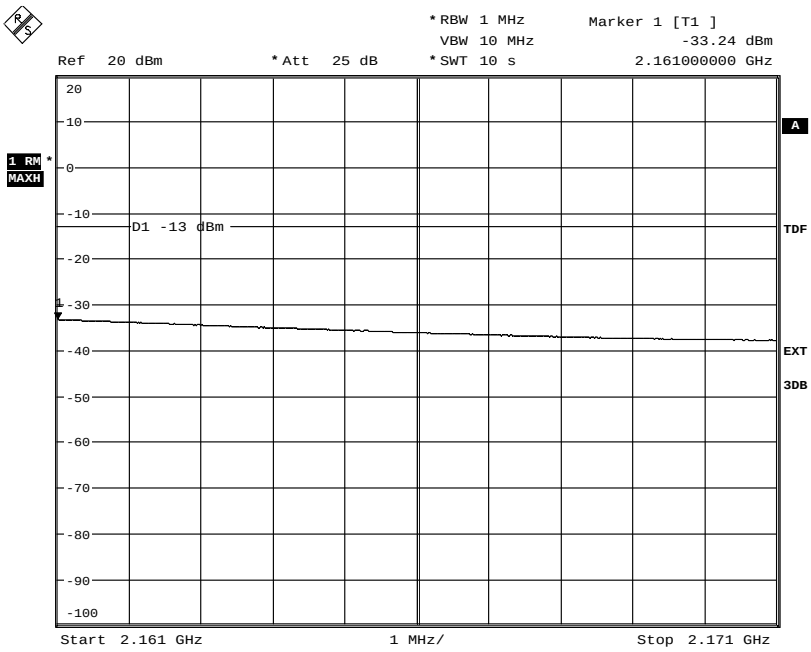
Diagram 14 b:



Date: 9.DEC.2014 07:18:16

Appendix 5

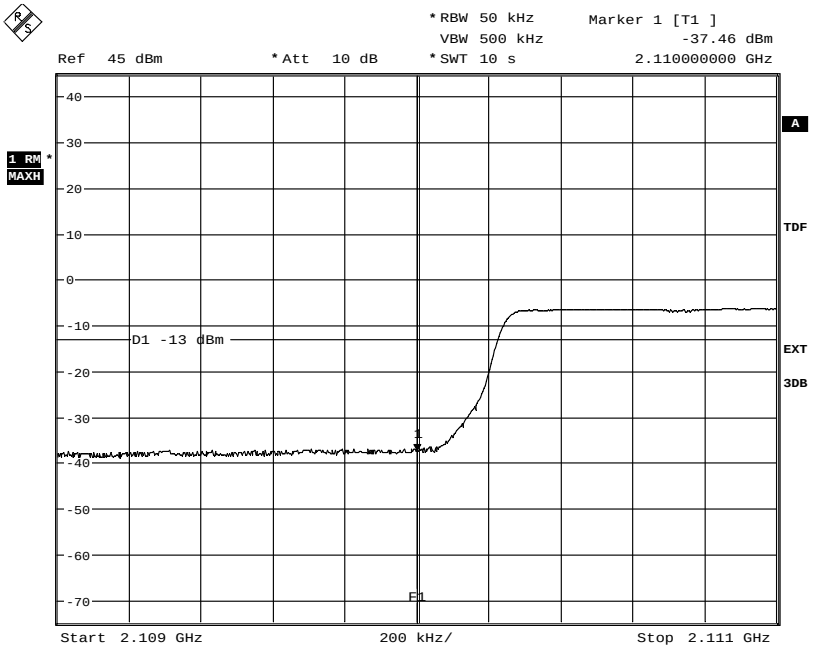
Diagram 14 c:



Date: 9.DEC.2014 07:19:23

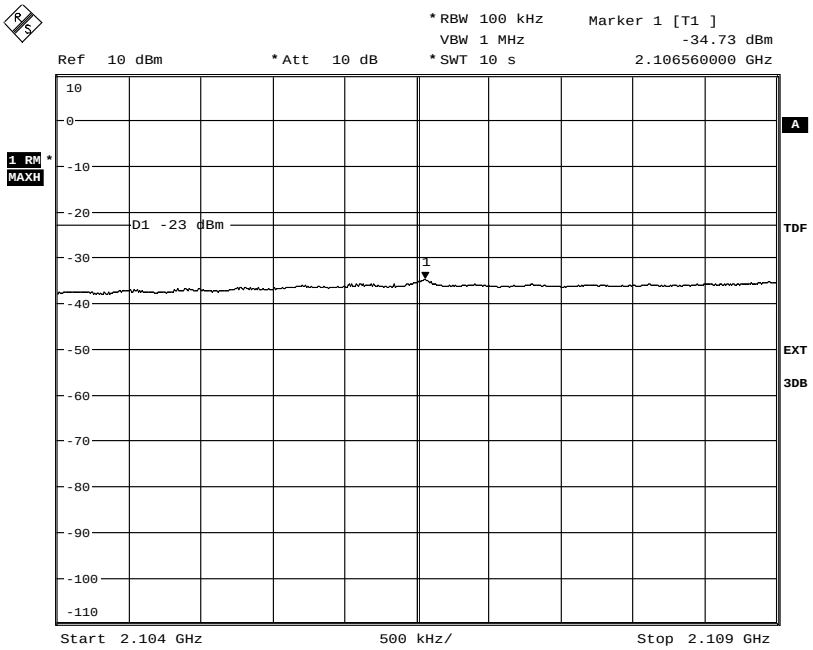
Appendix 5

Diagram 15 a:



Date: 8.DEC.2014 13:41:31

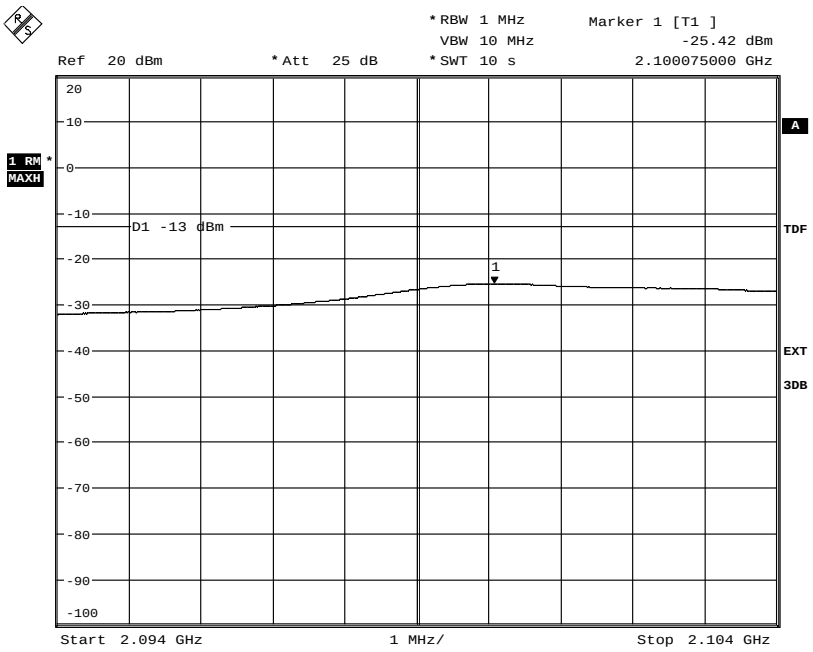
Diagram 15 b:



Date: 8.DEC.2014 13:39:13

Appendix 5

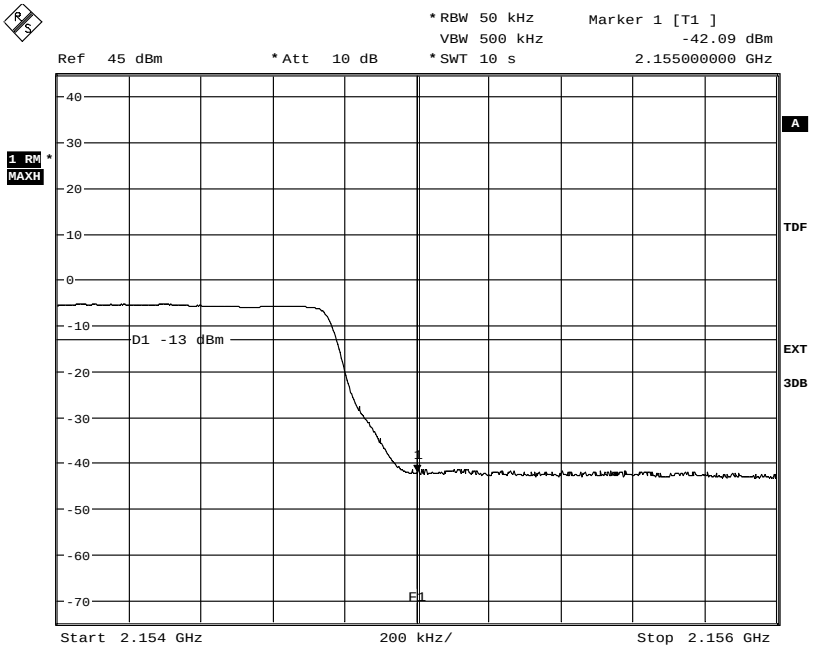
Diagram 15 c:



Date: 8.DEC.2014 13:40:22

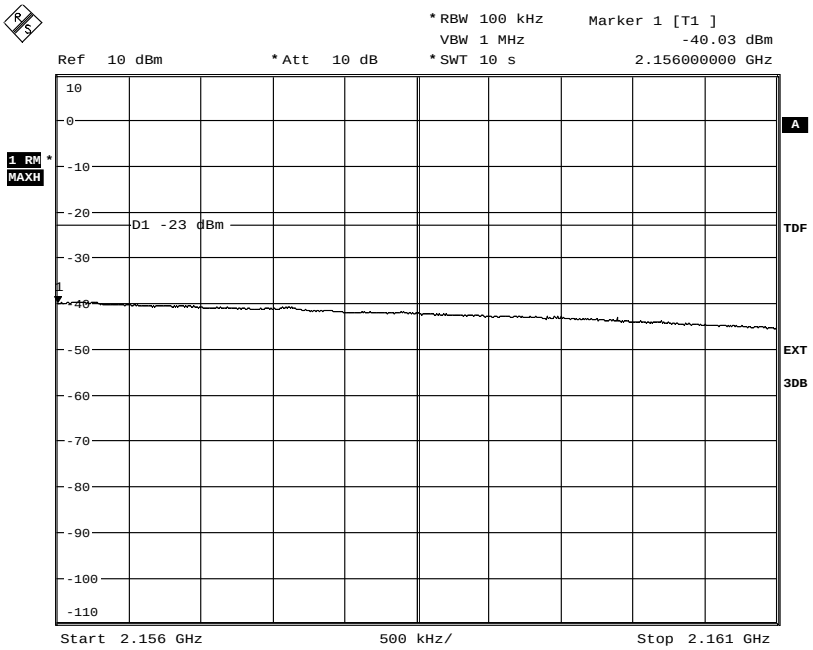
Appendix 5

Diagram 16 a:



Date: 8.DEC.2014 13:36:17

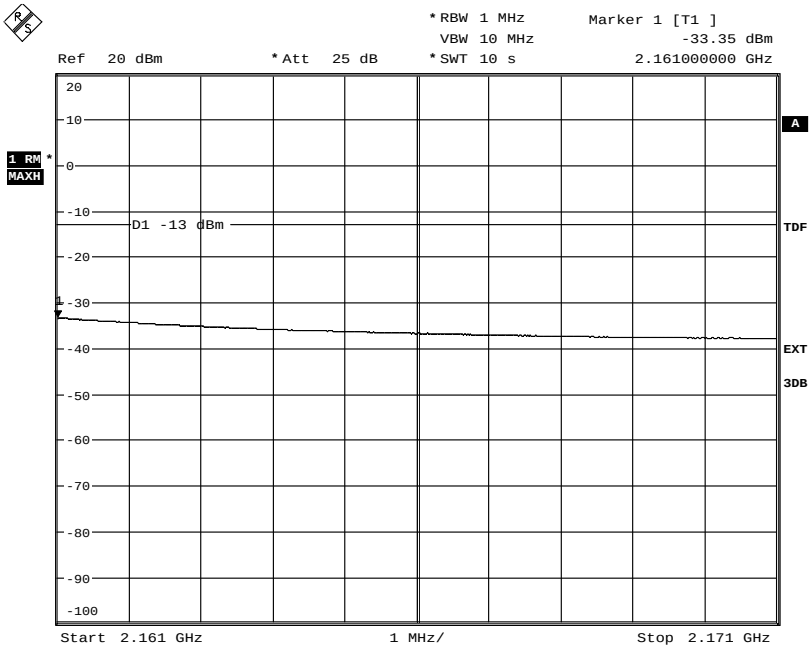
Diagram 16 b:



Date: 8.DEC.2014 13:35:01

Appendix 5

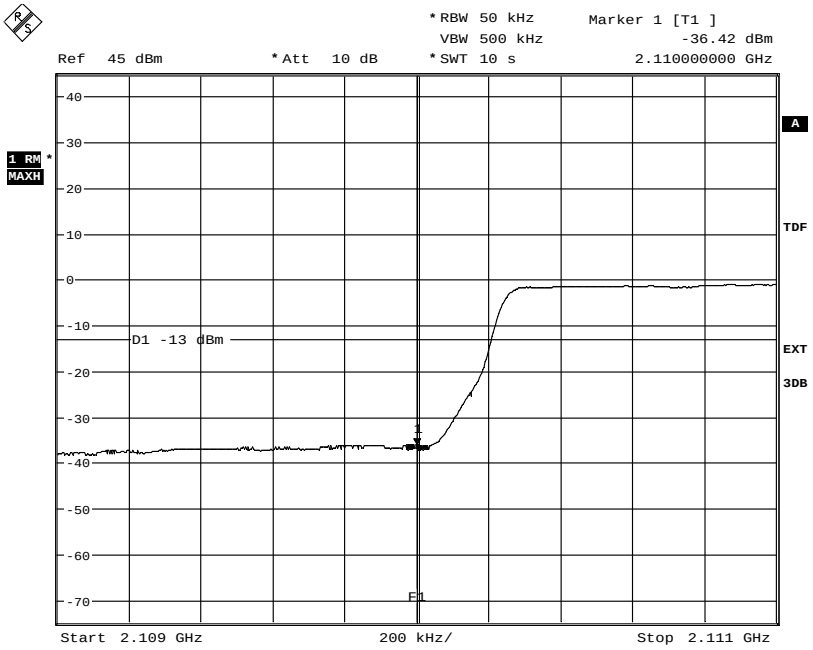
Diagram 16 c:



Date: 8.DEC.2014 13:33:42

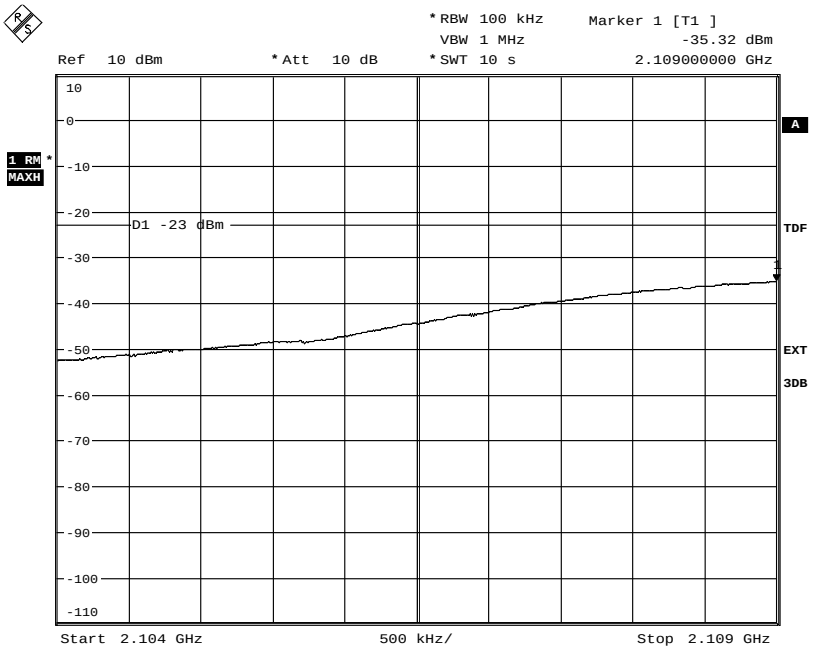
Appendix 5

Diagram 17 a:



Date: 9.DEC.2014 10:45:00

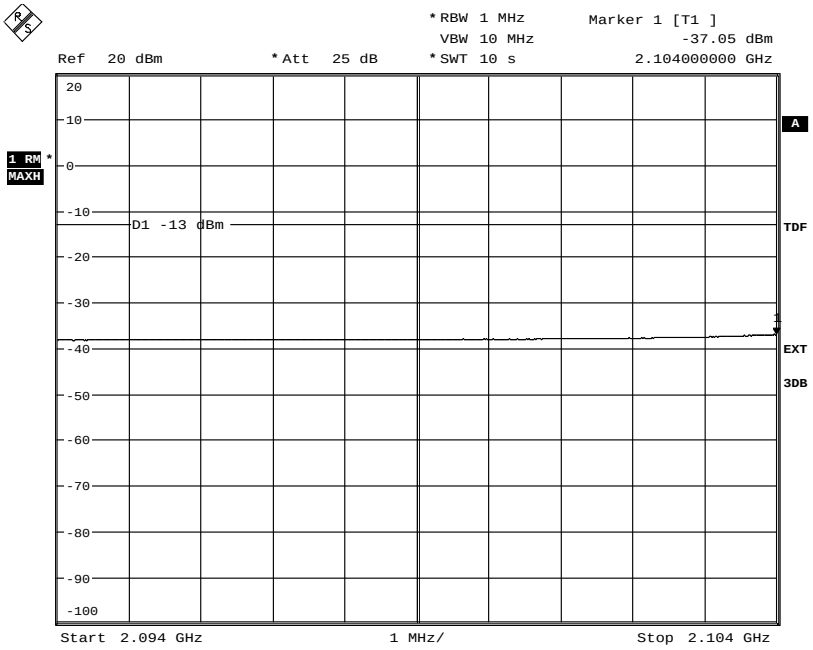
Diagram 17 b:



Date: 9.DEC.2014 10:46:09

Appendix 5

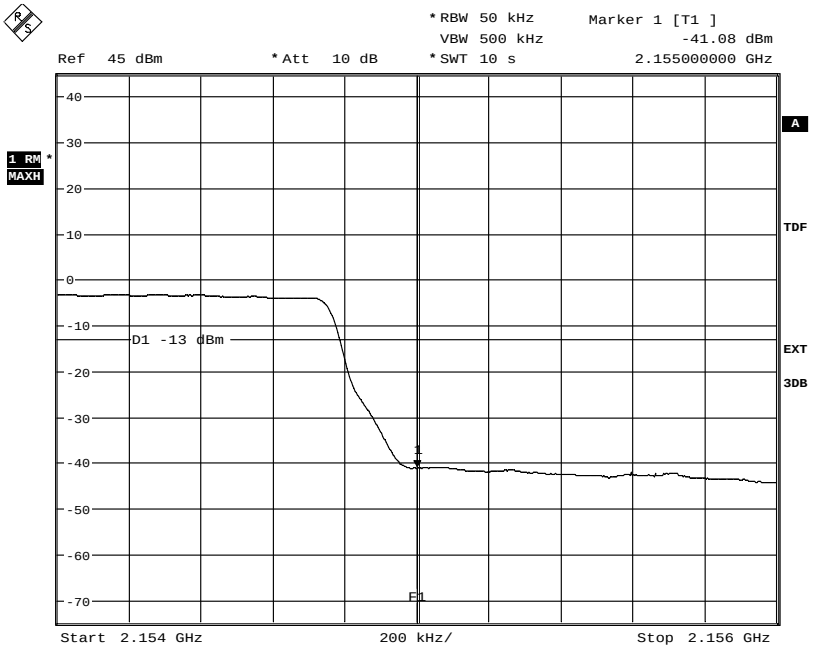
Diagram 17 c:



Date: 9.DEC.2014 10:47:12

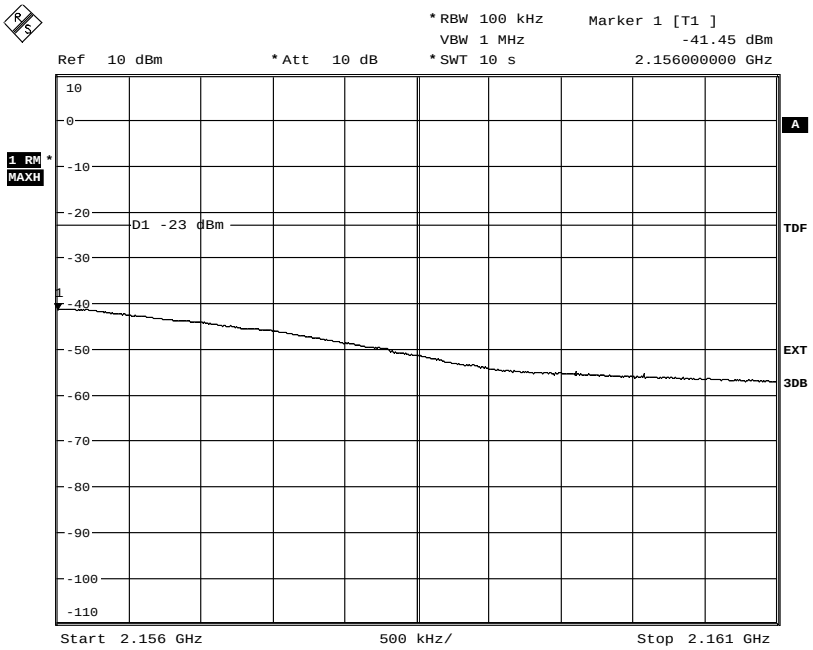
Appendix 5

Diagram 18 a:



Date: 9.DEC.2014 10:36:49

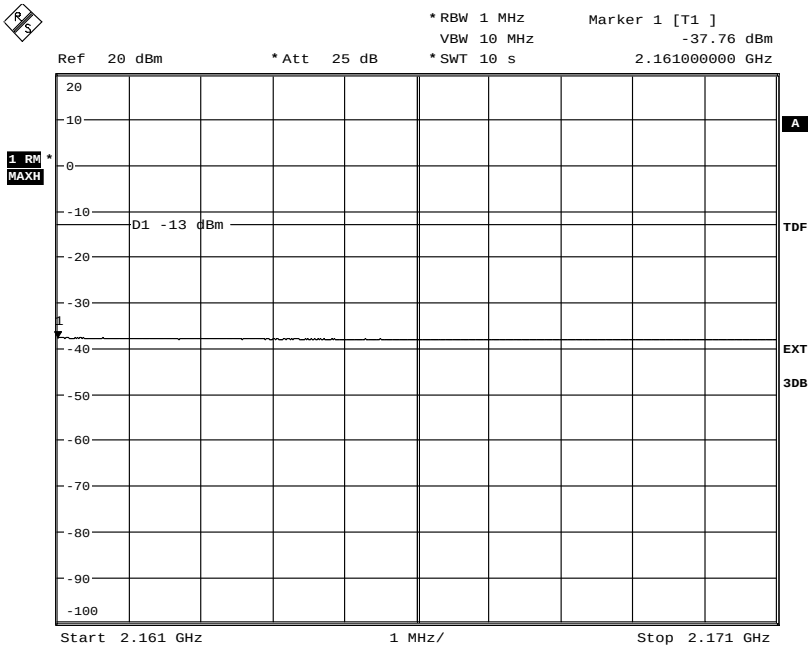
Diagram 18 b:



Date: 9.DEC.2014 10:37:46

Appendix 5

Diagram 18 c:



Date: 9.DEC.2014 10:39:10

Conducted spurious emission measurements according to CFR 47 §27.53(h) / IC RSS-139 6.5

Date	Temperature	Humidity
2014-12-06	23 °C ± 3 °C	29 % ± 5 %
2014-12-08	23 °C ± 3 °C	25 % ± 5 %
2014-12-09	23 °C ± 3 °C	29 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §27.53(h). The output was connected to a spectrum analyser with a RBW setting of 1 MHz and RMS detector activated. The spectrum analyser was connected to an external 10 MHz reference standard during the measurements.

Before comparing the results to the limit, 3 dB [10 log (2)] should be added according to method E), 3), (iii) “measure and add 10 log(N_{ANT})” of FCC KDB662911 D01 Multiple Transmitter Output v02r01.

Measurement equipment	SP number
R&S FSQ 40	504 143
RF attenuator	900 691
HP filter	BX40074
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

Configuration: RDI Cable 52m

MIMO mode, single carrier

Diagram	BW configuration / [MHz]	Symbolic name	Tested Port
1 a+b+c+d	5 MHz	B	RF B
2 a+b+c+d	5 MHz	M	RF B
3 a+b+c+d	5 MHz	T	RF B

MIMO mode, multi carrier

Diagram	BW configuration	Symbolic name	Tested Port
4 a+b+c+d+e	5 MHz	Bim	RF B
5 a+b+c+d+e	5 MHz	M2-5	RF B
6 a+b+c+d+e	5 MHz	Tim	RF B

Configuration: RDI Cable 200m

MIMO mode, single carrier

Diagram	BW configuration / [MHz]	Symbolic name	Tested Port
7 a+b+c+d+e	5 MHz	B	RF B
8 a+b+c+d+e	5 MHz	M	RF A
9 a+b+c+d+e	5 MHz	M	RF B
10 a+b+c+d+e	10 MHz	M	RF B
11 a+b+c+d+e	15 MHz	M	RF B
12 a+b+c+d+e	20 MHz	M	RF B
13 a+b+c+d+e	5 MHz	T	RF B

MIMO mode, multi carrier

Diagram	BW configuration	Symbolic name	Tested Port
14 a+b+c+d+e	5 MHz	Bim	RF B
15 a+b+c+d+e	5 MHz	Bim2	RF B
16 a+b+c+d+e	5 MHz	M2-5	RF B
17 a+b+c+d+e	5 MHz	Tim	RF B
18 a+b+c+d+e	20 MHz	M2-20	RF B
19 a	15 MHz	M2-15	RF B
20 a	10 MHz	M2-10	RF B

Configuration: RDI Cable 20m

MIMO mode, single carrier

Diagram	BW configuration / [MHz]	Symbolic name	Tested Port
21 a+b+c+d	5 MHz	B	RF B

Remark

The emission at 9 kHz on the plots was not generated by the test object. A complementary measurement with a smaller RBW showed that it was related to the LO feed-through.

The highest fundamental frequency is 2.155 GHz. The measurements were made up to 22 GHz (10x2.155 GHz = 21.55 GHz).

Limits

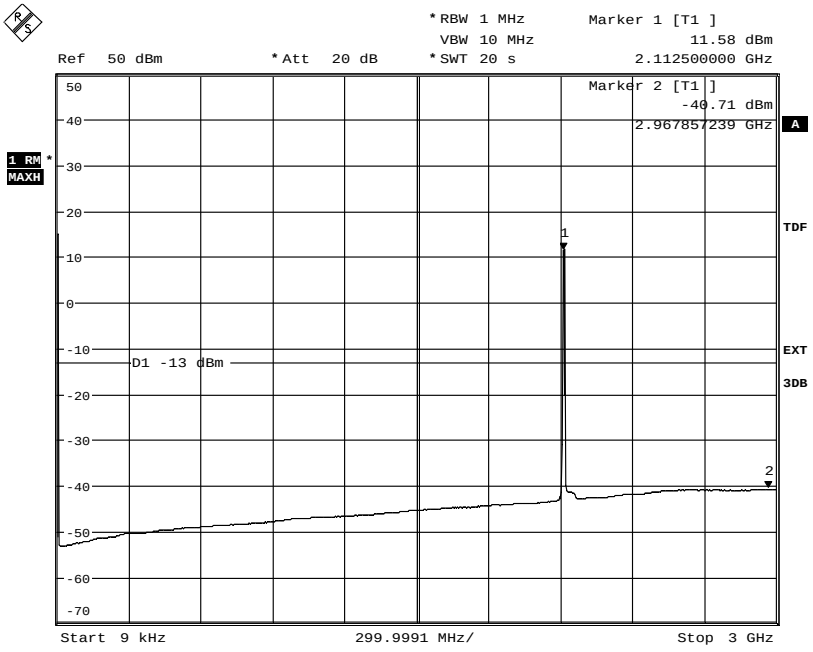
§27.53(h) and RSS-139 6.5

Outside a licensee's frequency band(s) of operation the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, resulting in a limit of -13 dBm per 1 MHz RBW.

Complies?	Yes

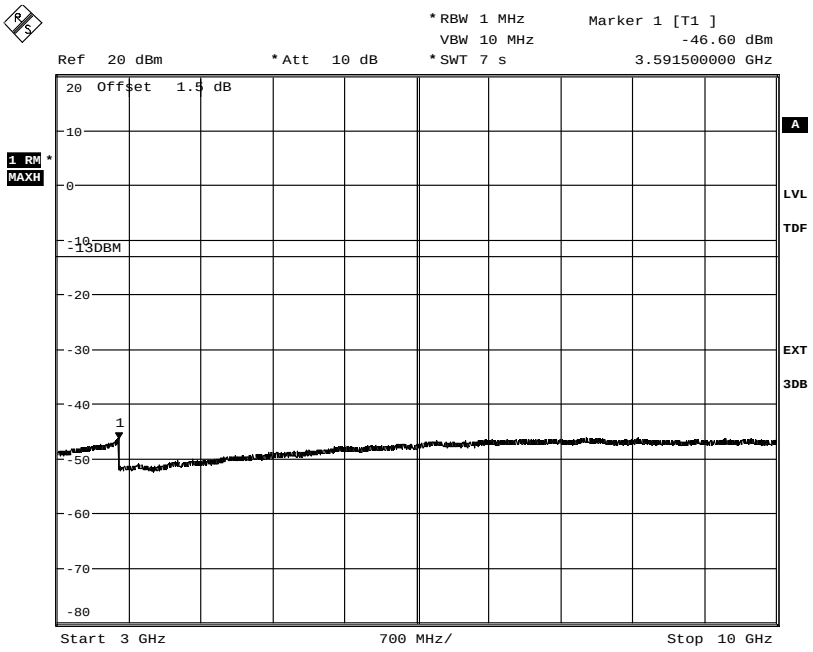
Appendix 6

Diagram 1 a:



Date: 5.DEC.2014 15:02:21

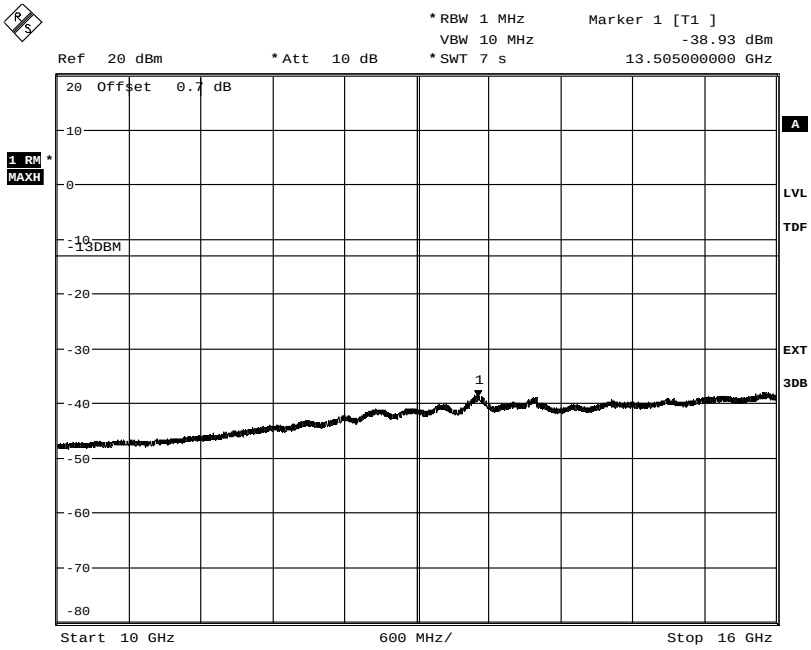
Diagram1 b:



Date: 5.DEC.2014 15:04:20

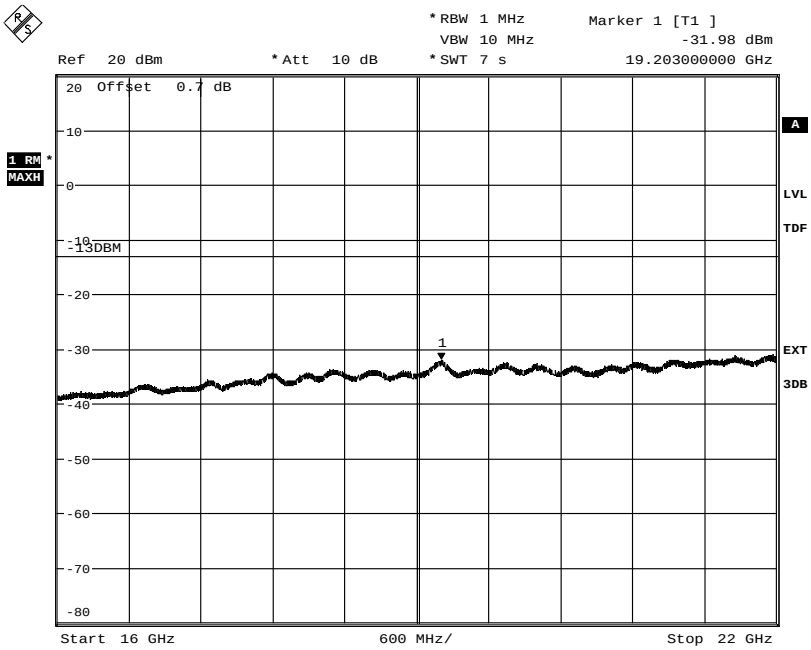
Appendix 6

Diagram 1 c:



Date: 5.DEC.2014 15:05:34

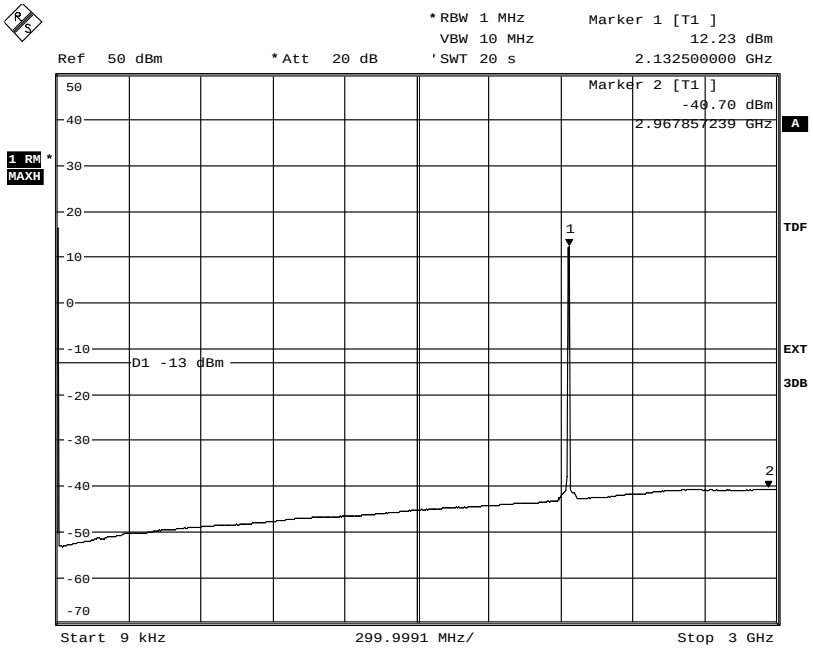
Diagram 1 d:



Date: 5.DEC.2014 15:07:04

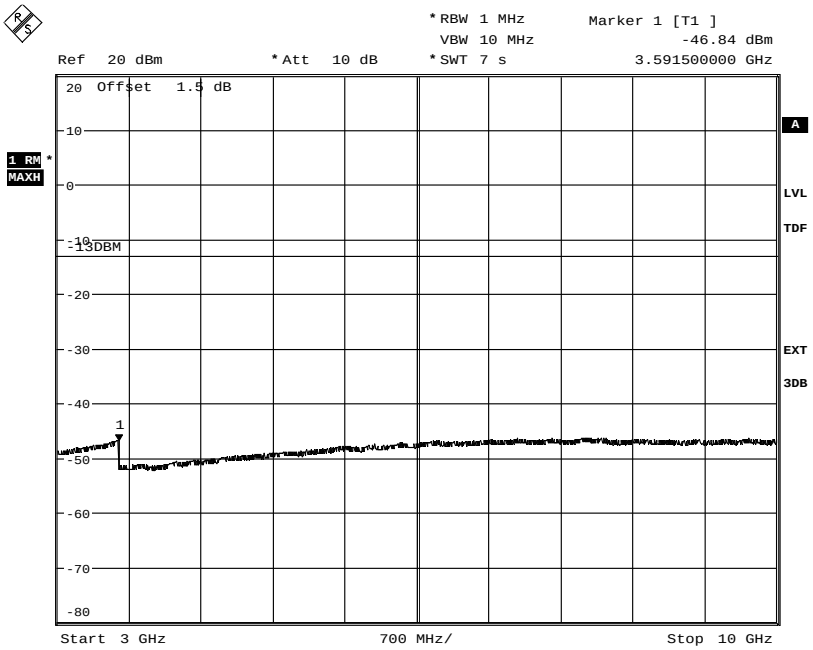
Appendix 6

Diagram 2 a:



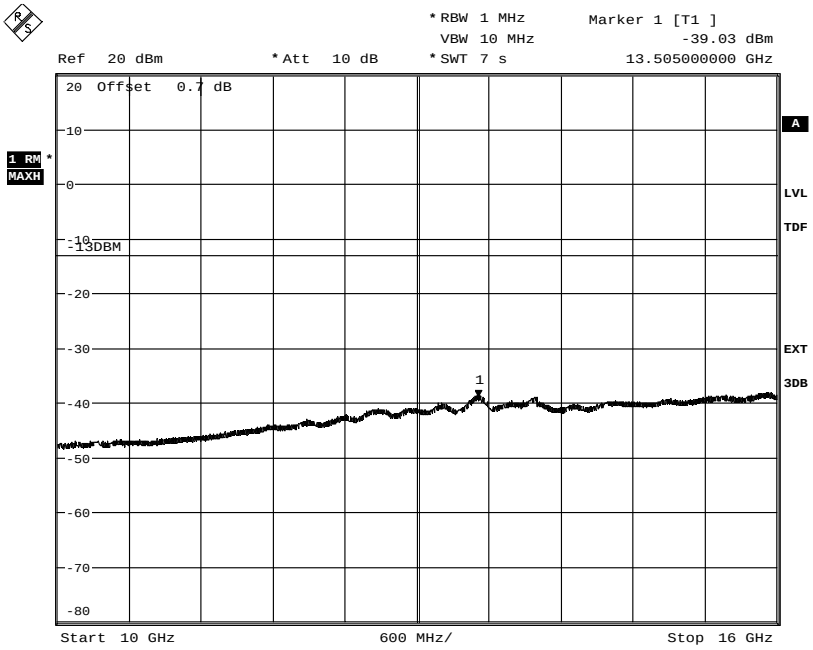
Date: 2.DEC.2014 11:57:54

Diagram 2 b:



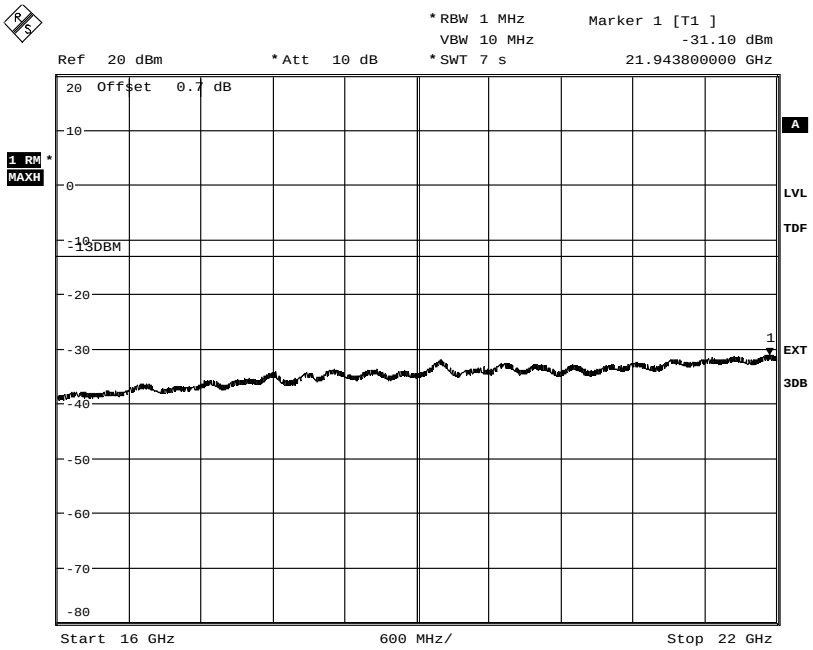
Date: 2.DEC.2014 10:06:07

Diagram 2 c:



Date: 2.DEC.2014 10:48:13

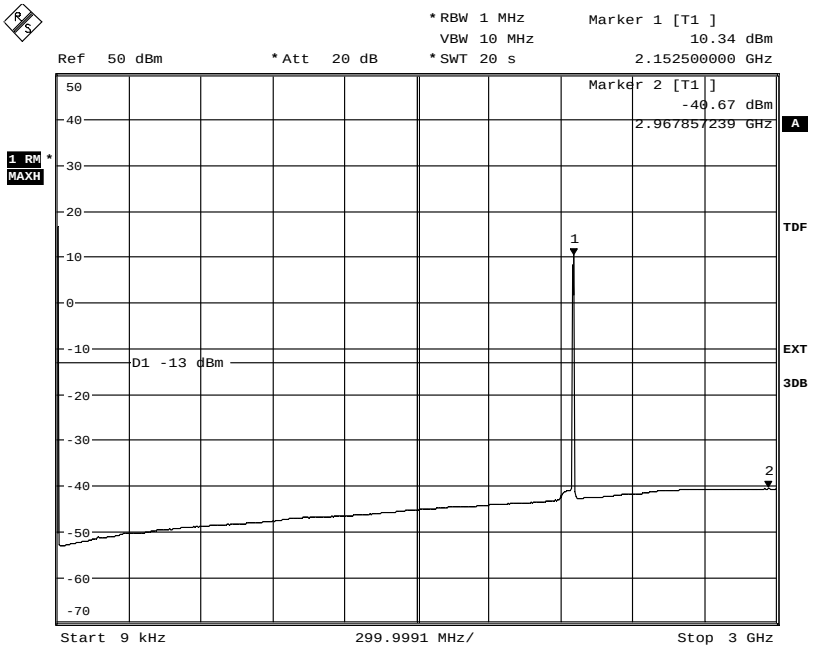
Diagram 2 d:



Date: 2.DEC.2014 10:49:26

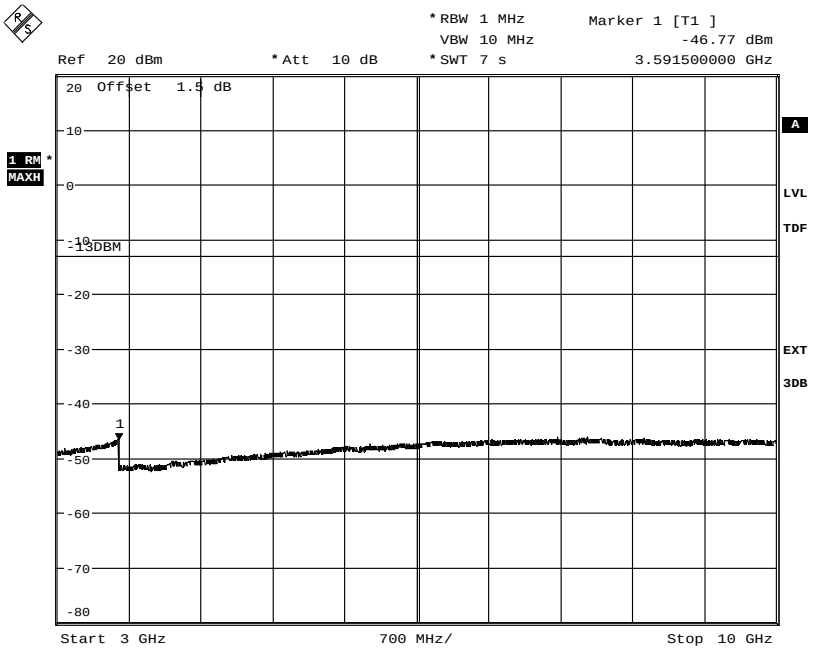
Appendix 6

Diagram 3 a:



Date: 6.DEC.2014 08:42:05

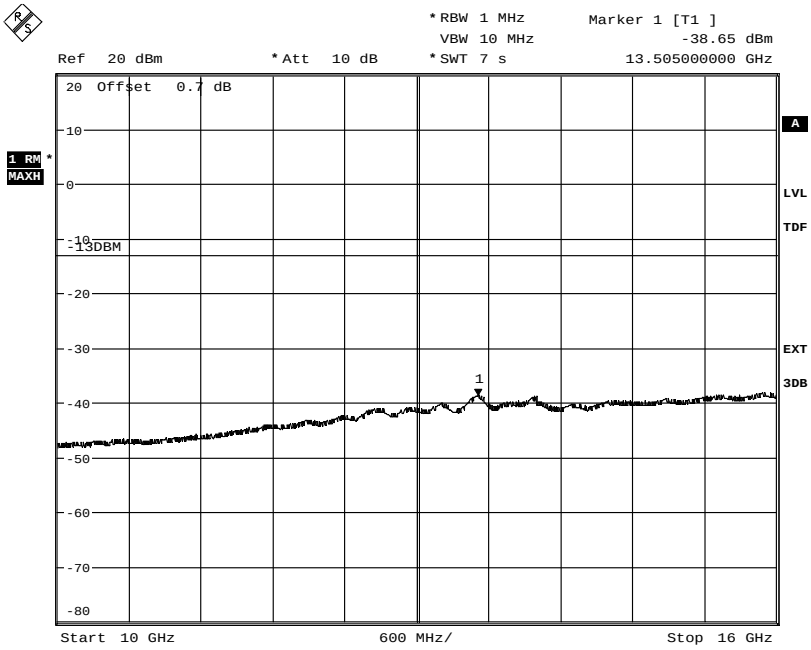
Diagram 3 b:



Date: 6.DEC.2014 08:47:53

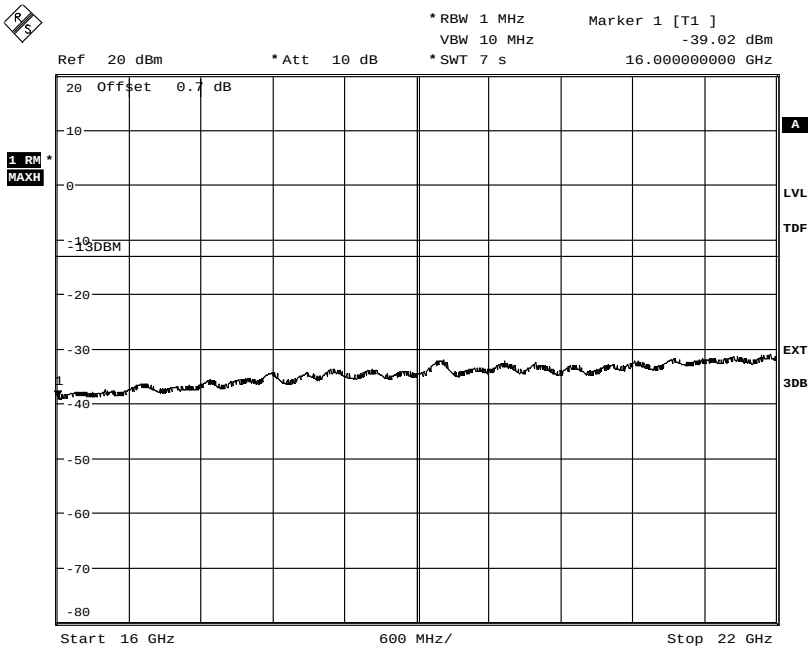
Appendix 6

Diagram 3 c:



Date: 6.DEC.2014 09:05:15

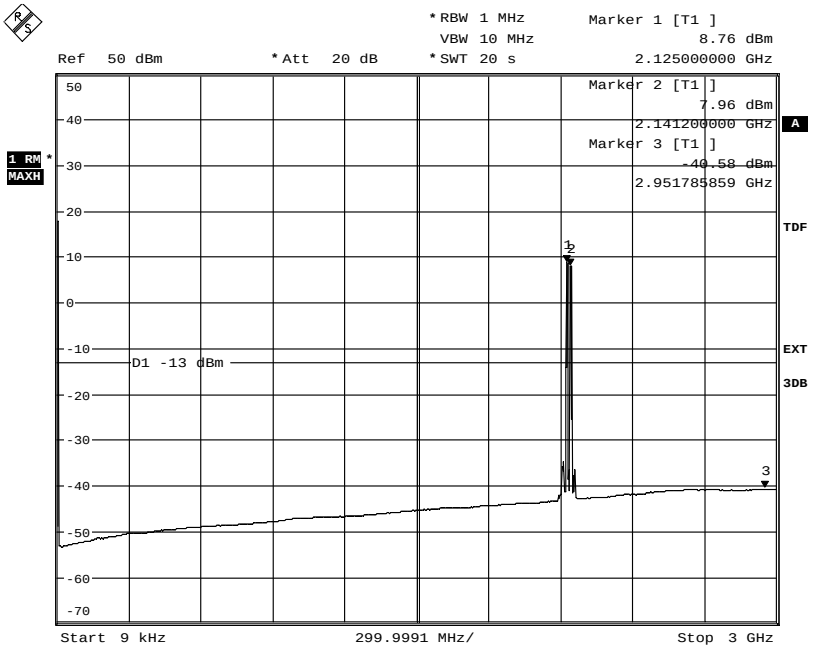
Diagram 3 d:



Date: 6.DEC.2014 09:07:32

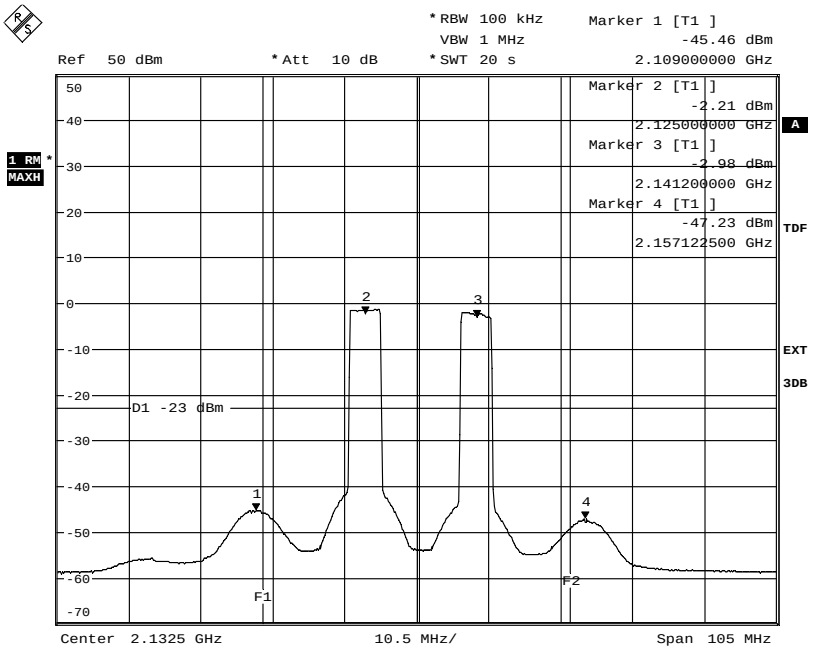
Appendix 6

Diagram 4 a:



Date: 6.DEC.2014 10:07:31

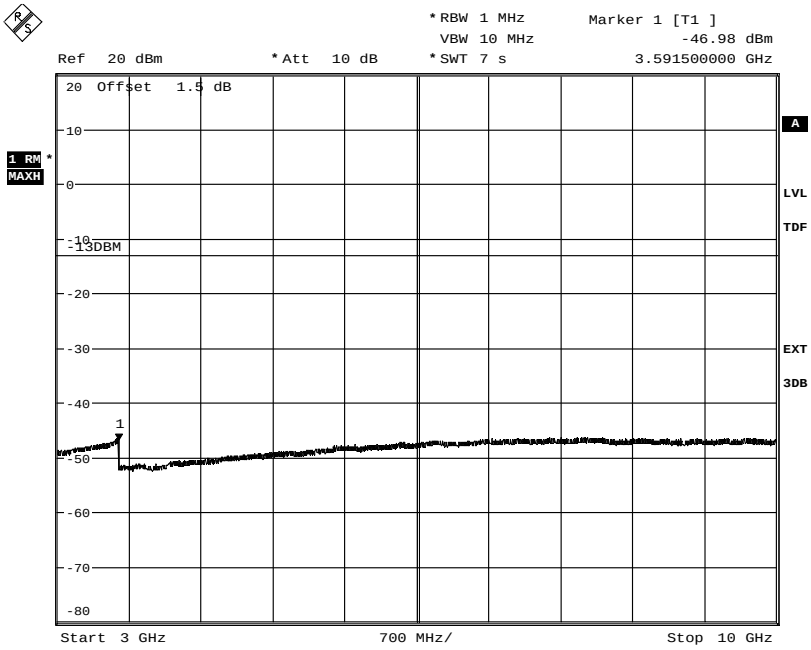
Diagram 4 b:



Date: 6.DEC.2014 10:10:05

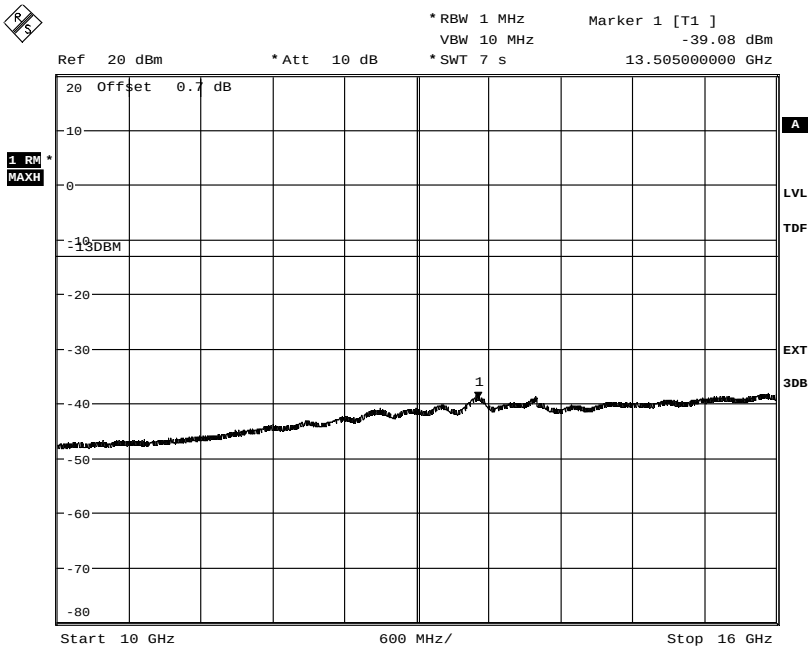
Appendix 6

Diagram 4 c:



Date: 6.DEC.2014 10:02:37

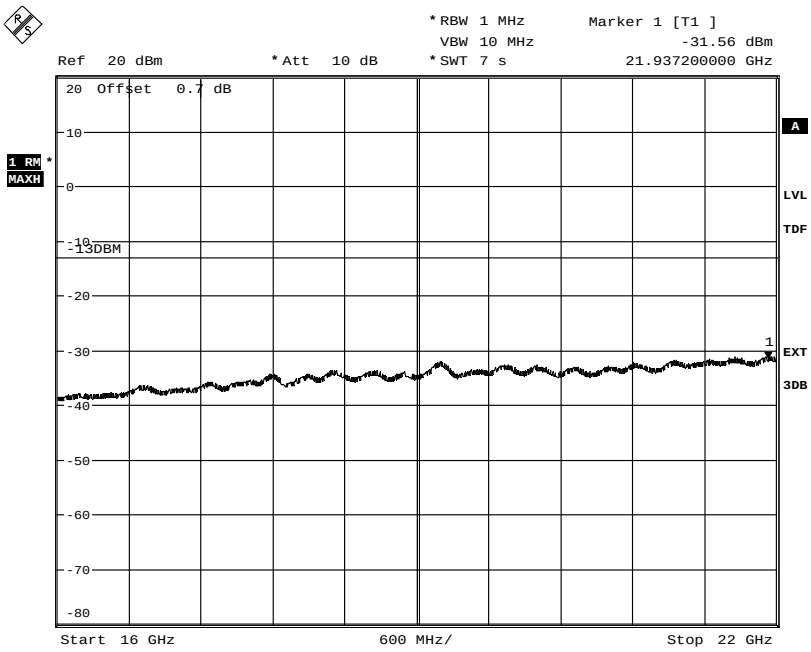
Diagram 4 d:



Date: 6.DEC.2014 09:59:28

Appendix 6

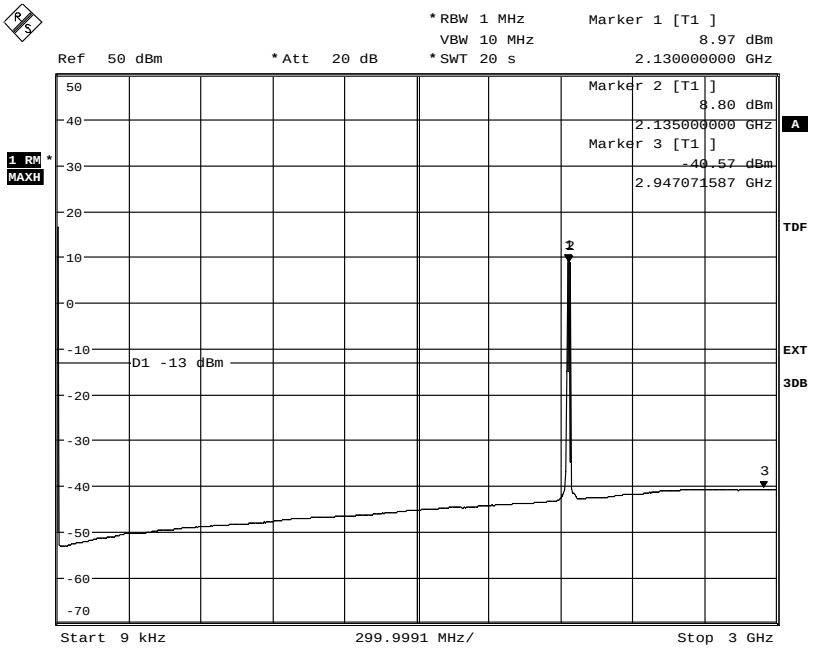
Diagram 4 e:



Date: 6.DEC.2014 09:57:17

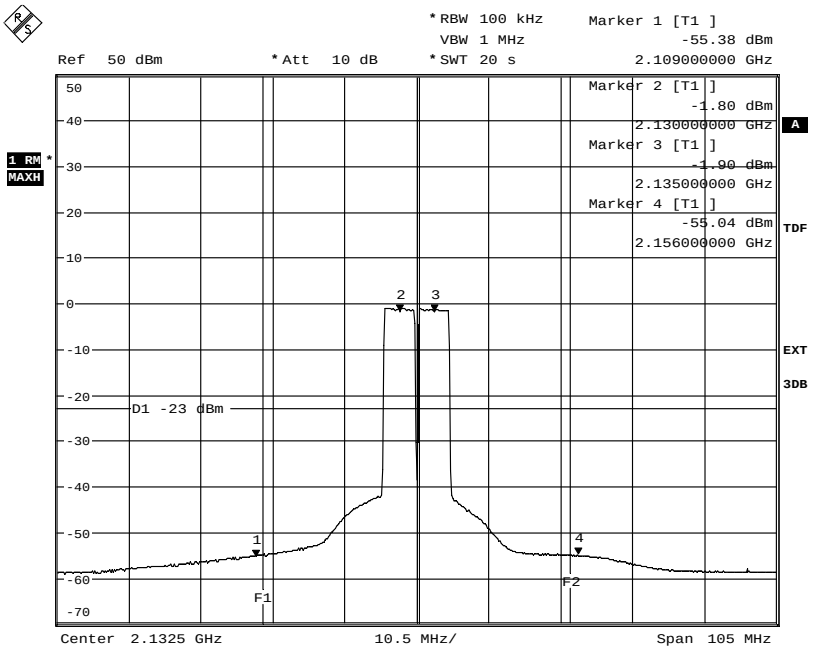
Appendix 6

Diagram 5 a:



Date: 6.DEC.2014 09:39:09

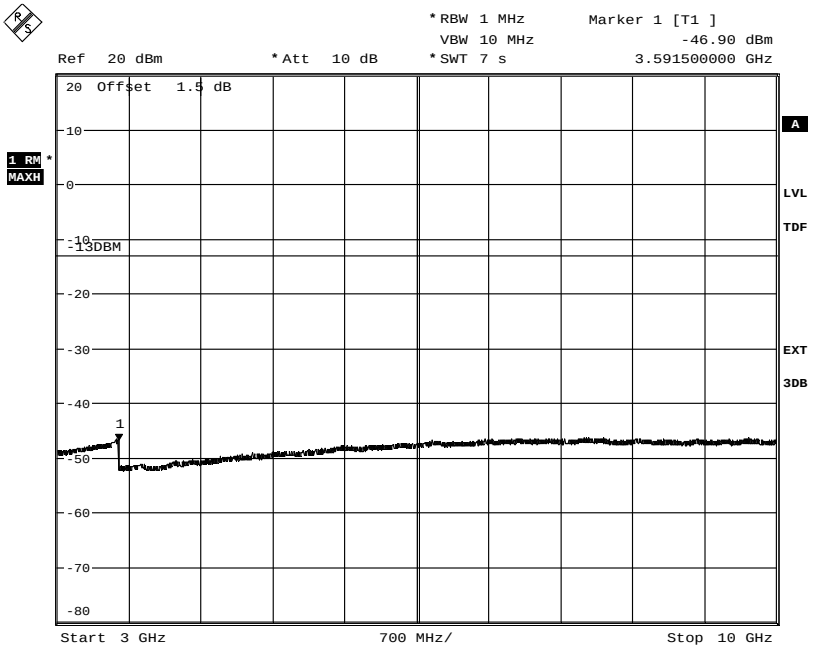
Diagram 5 b:



Date: 6.DEC.2014 09:42:38

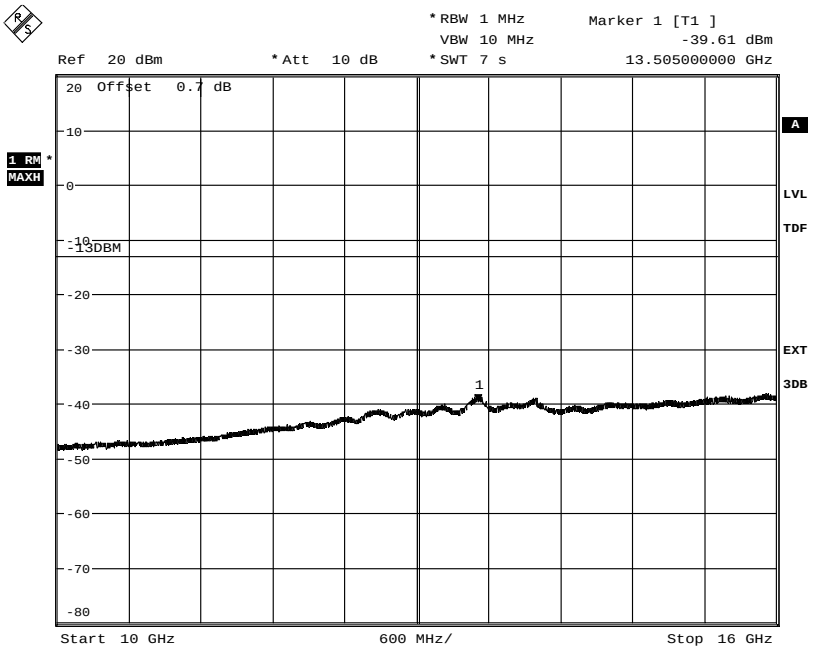
Appendix 6

Diagram 5 c:



Date: 6.DEC.2014 09:44:36

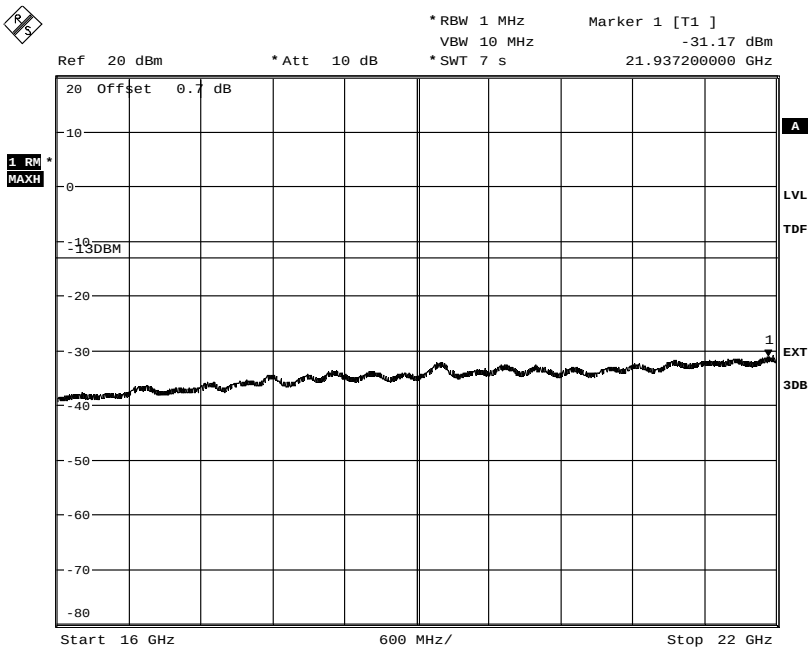
Diagram 5 d:



Date: 6.DEC.2014 09:45:46

Appendix 6

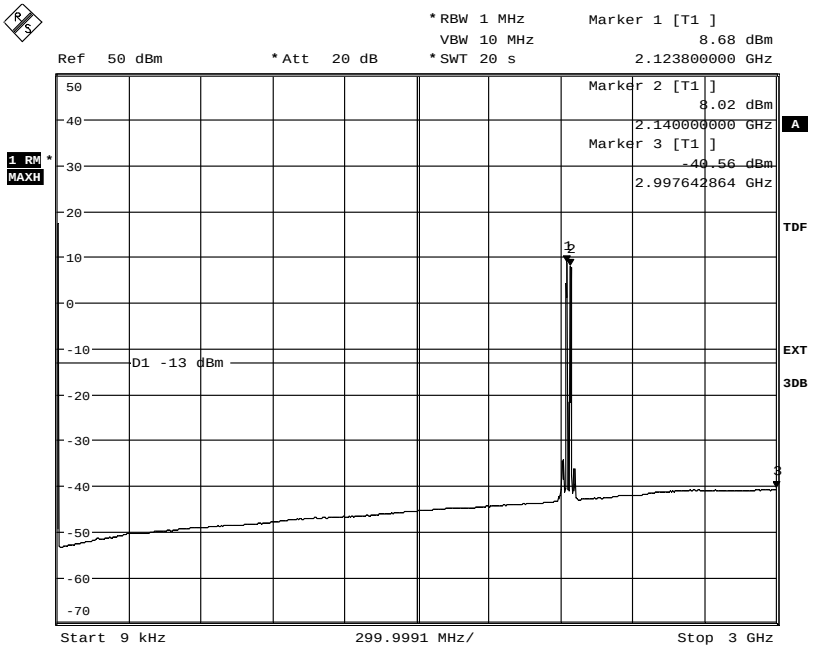
Diagram 5 e:



Date: 6.DEC.2014 09:47:08

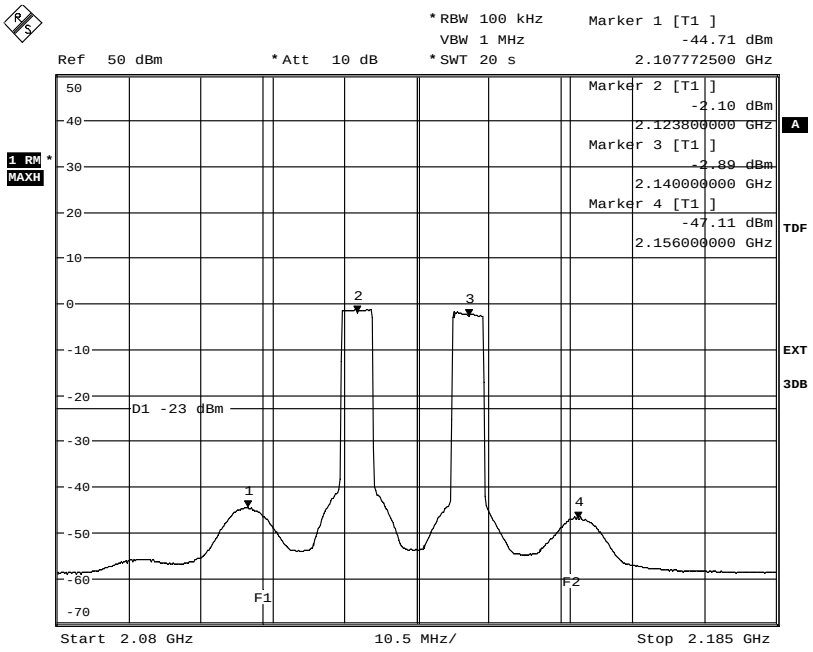
Appendix 6

Diagram 6 a:



Date: 6.DEC.2014 10:14:52

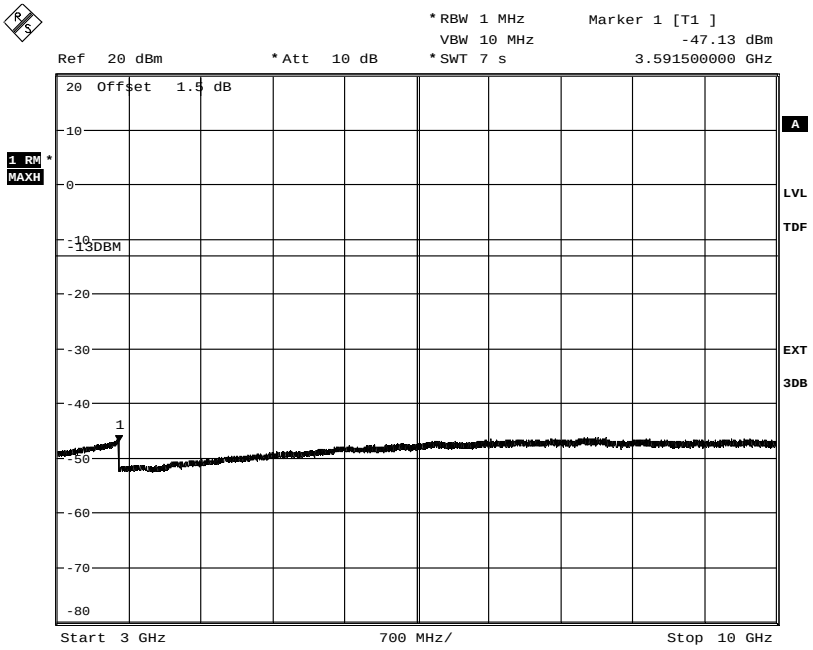
Diagram 6 b:



Date: 6.DEC.2014 10:13:30

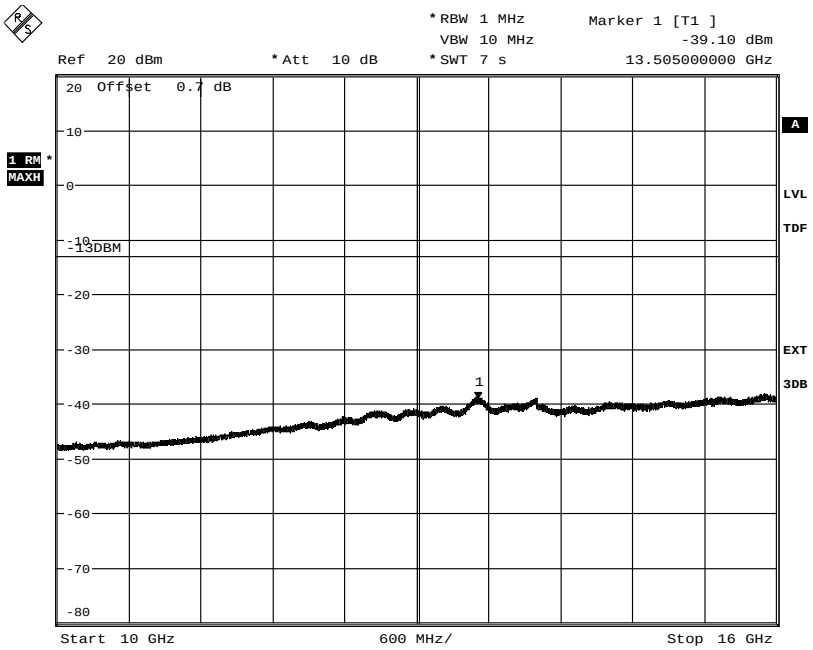
Appendix 6

Diagram 6 c:



Date: 6.DEC.2014 10:03:27

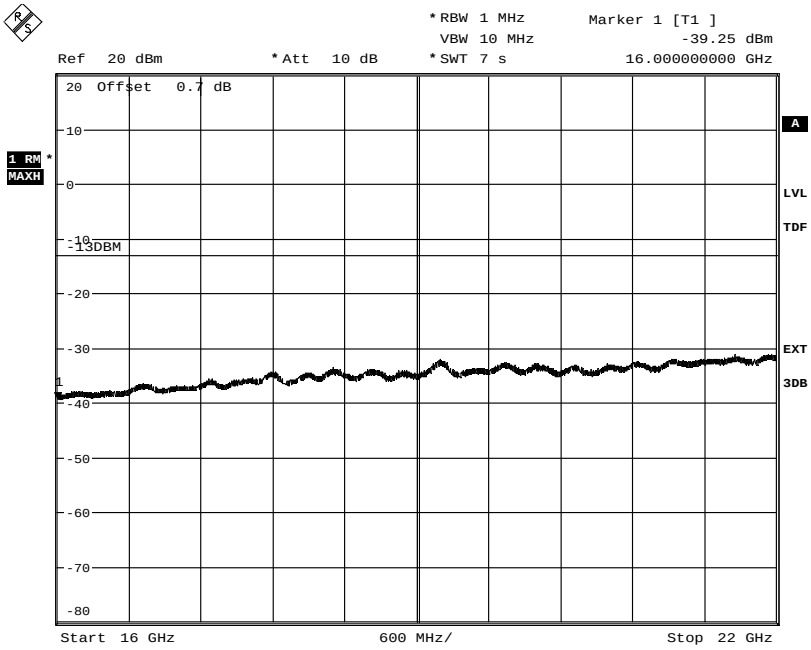
Diagram 6 d:



Date: 6.DEC.2014 10:00:40

Appendix 6

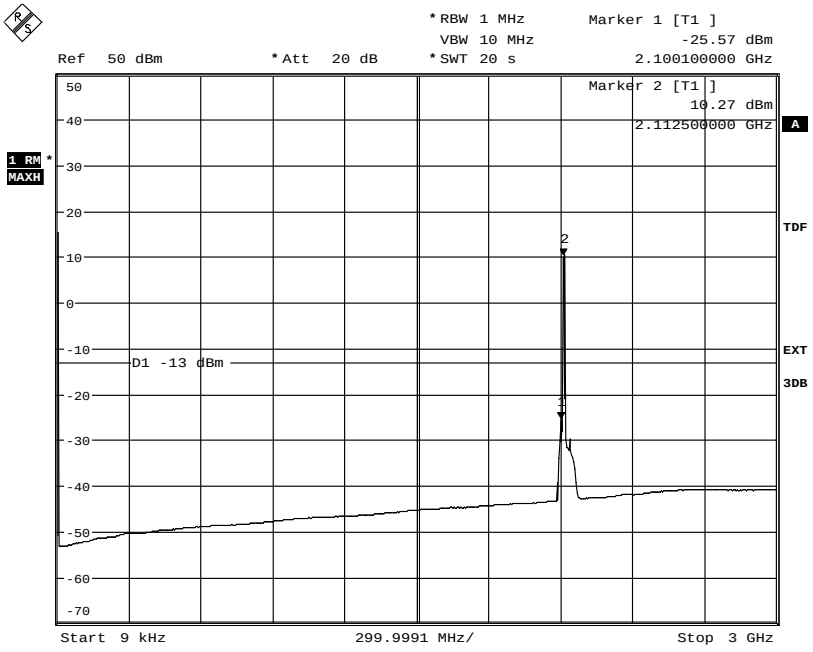
Diagram 6 e:



Date: 6.DEC.2014 10:01:31

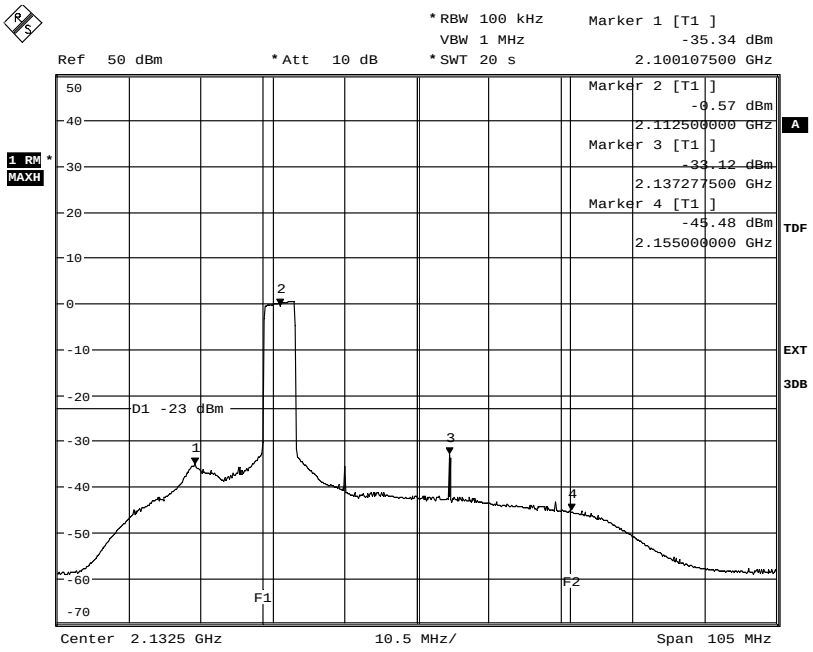
Appendix 6

Diagram 7 a:



Date: 8.DEC.2014 14:23:44

Diagram 7 b:



Date: 8.DEC.2014 14:21:49

Appendix 6

Diagram 7 c:

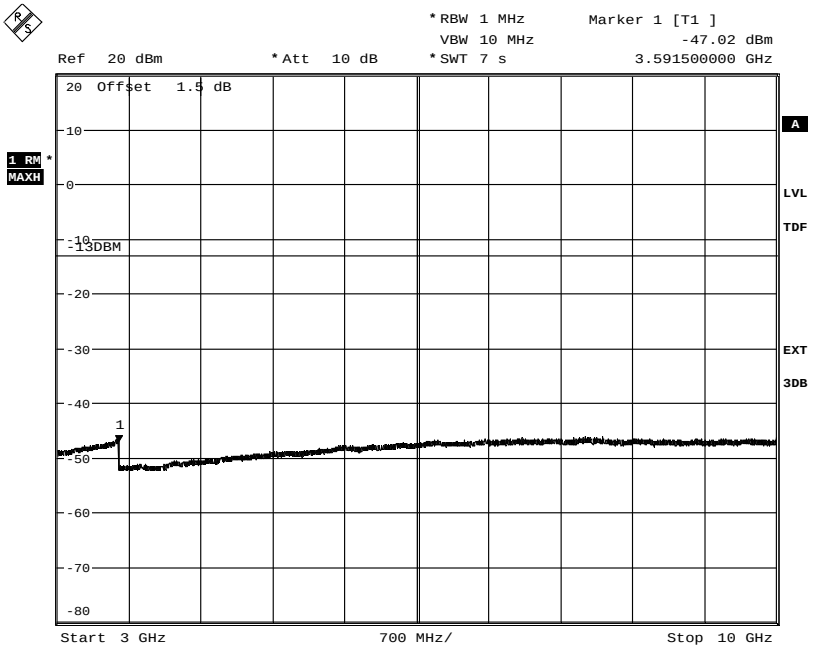


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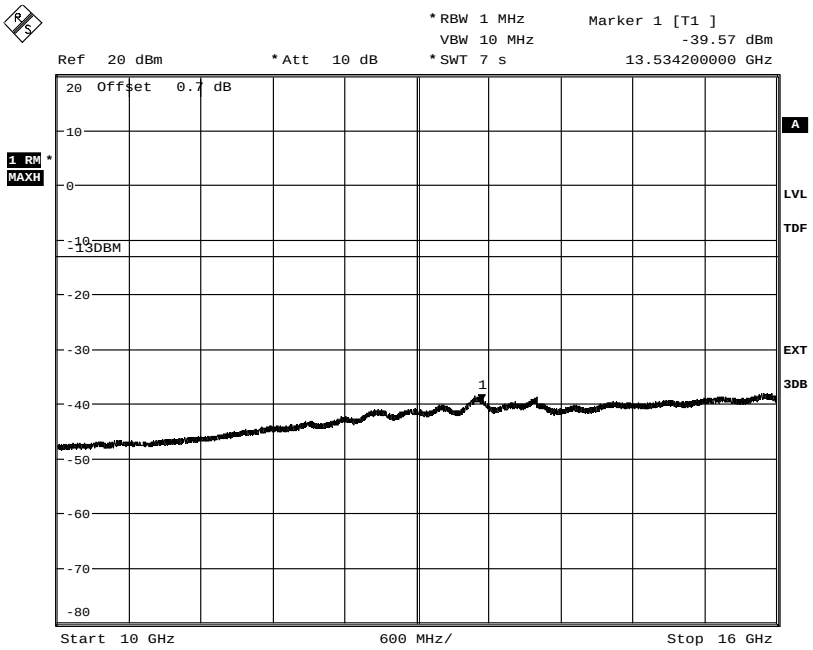
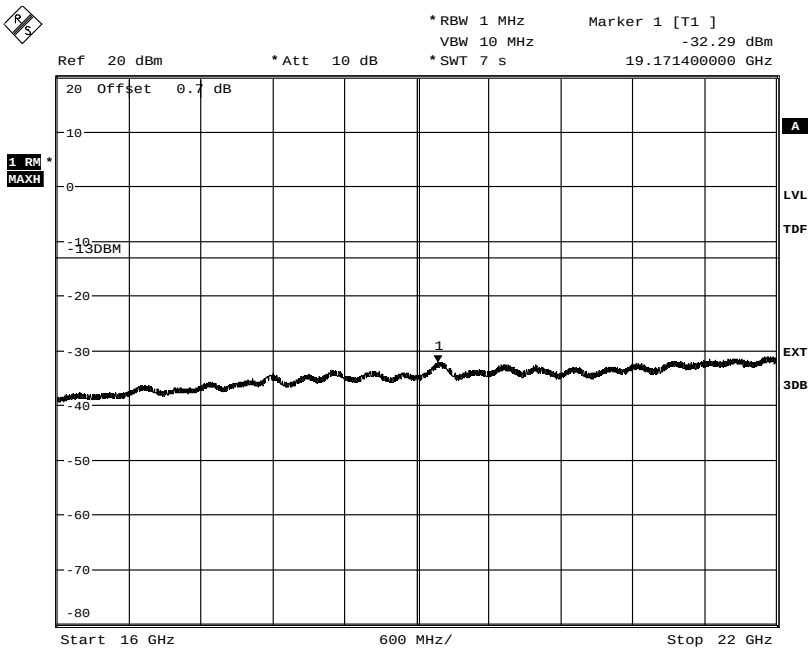
Diagram 7 d:



Date: 8.DEC.2014 14:32:12

Appendix 6

Diagram 7 e:



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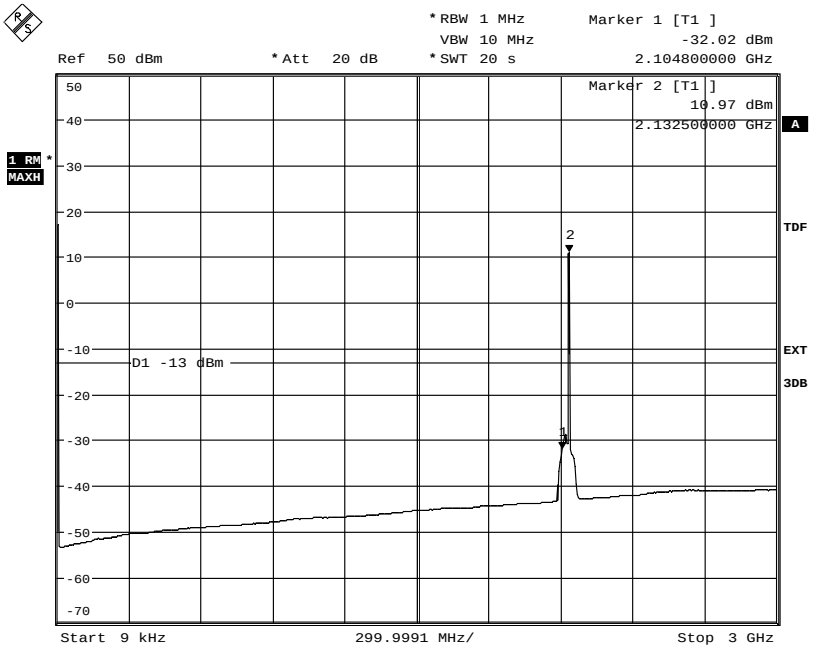
Appendix 6

Diagram 8 a:



Date: 9.DEC.2014 07:48:34

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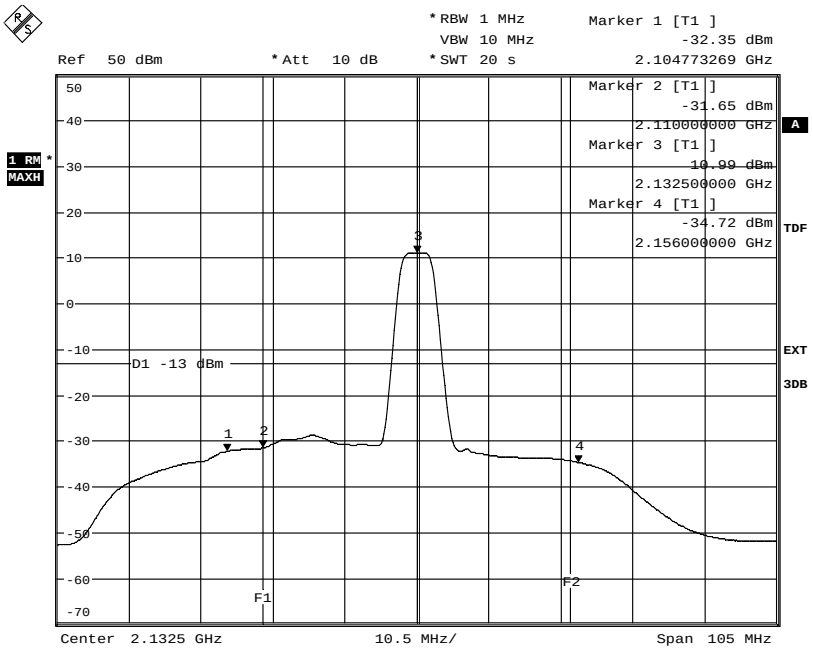

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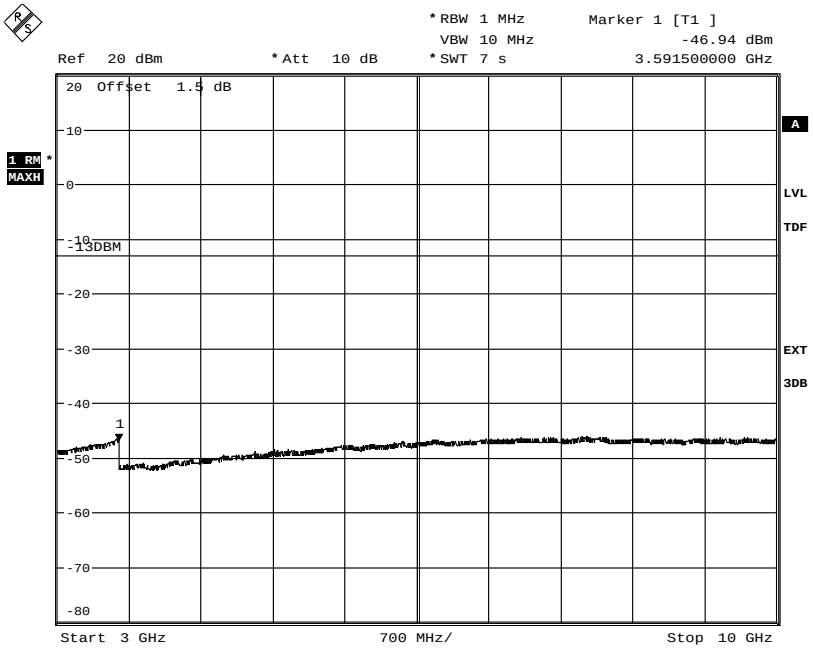
Appendix 6

Diagram 8 c:



Date: 8.DEC.2014 15:29:08

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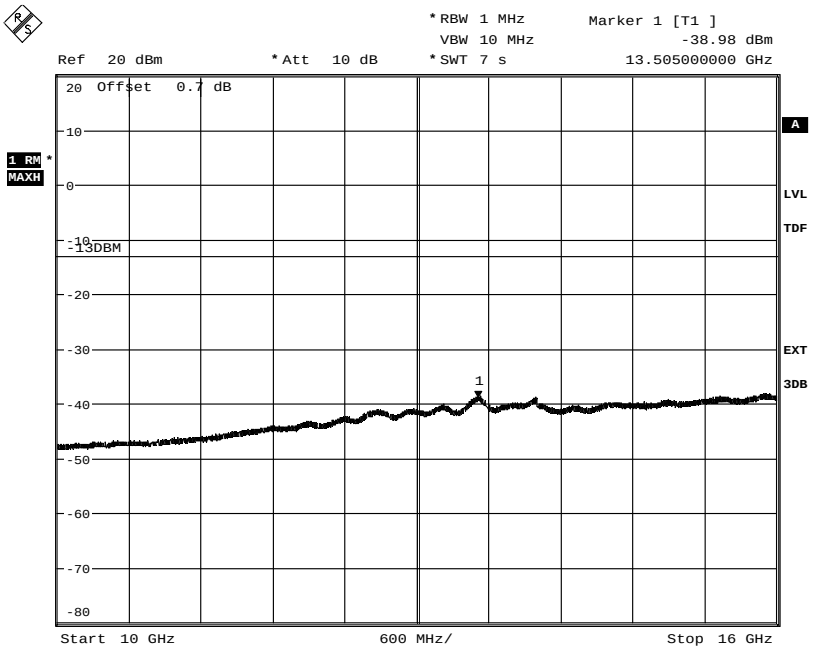

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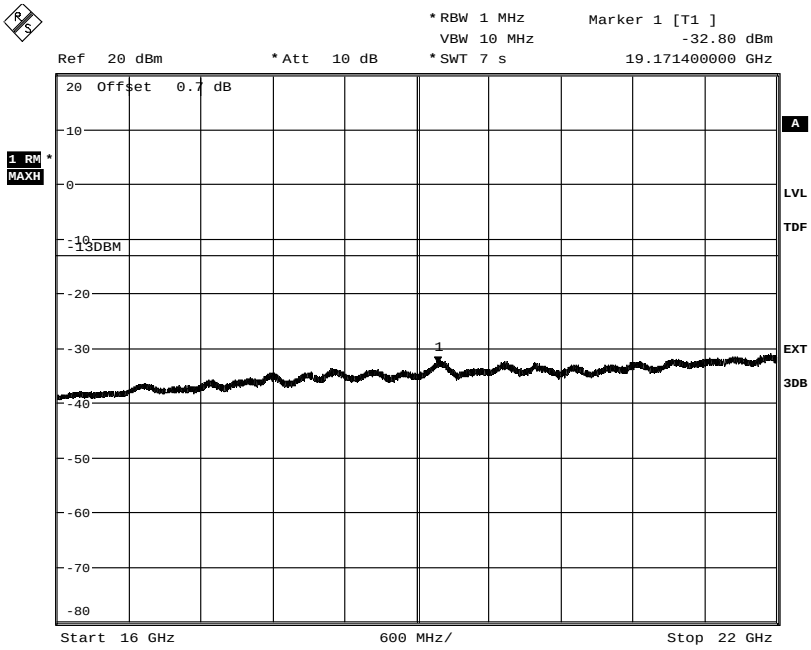
Appendix 6

Diagram 8 e:



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Appendix 6

Diagram 9 a:

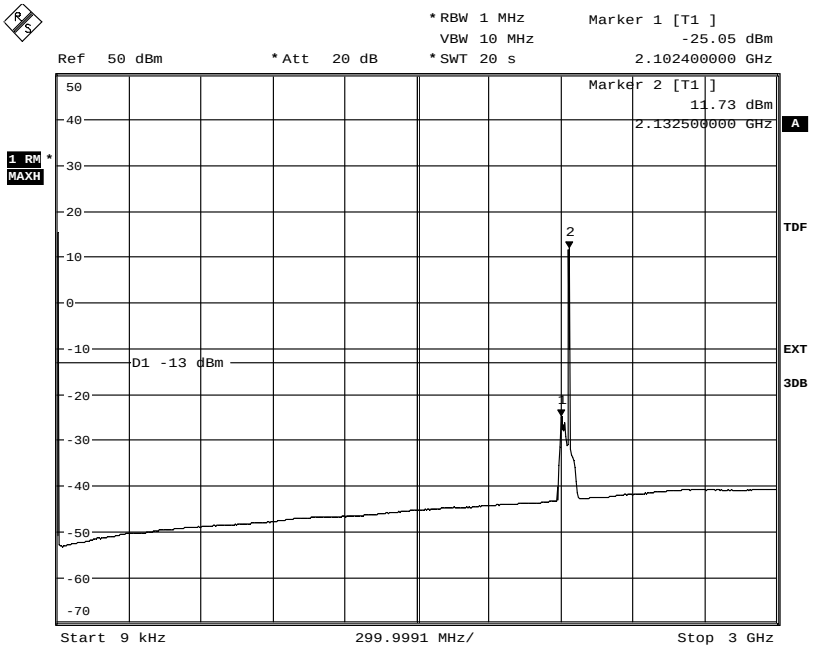

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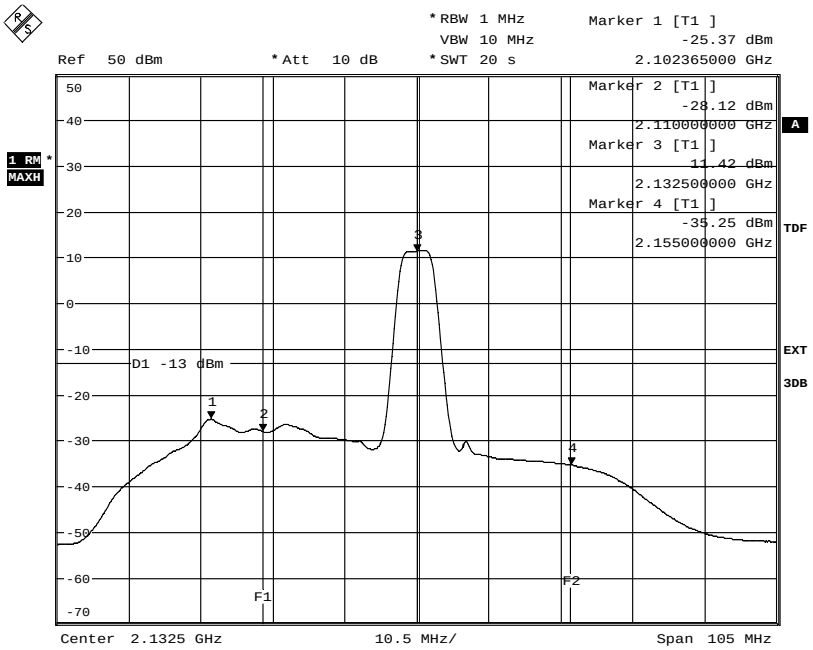
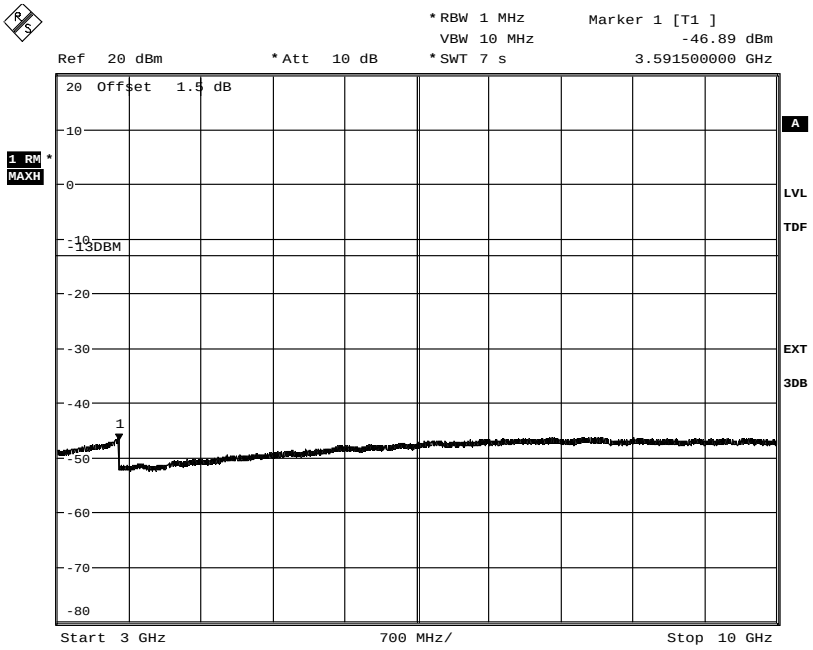
Diagram 9 b:



Date: 8.DEC.2014 14:11:10

Appendix 6

Diagram 9 c:



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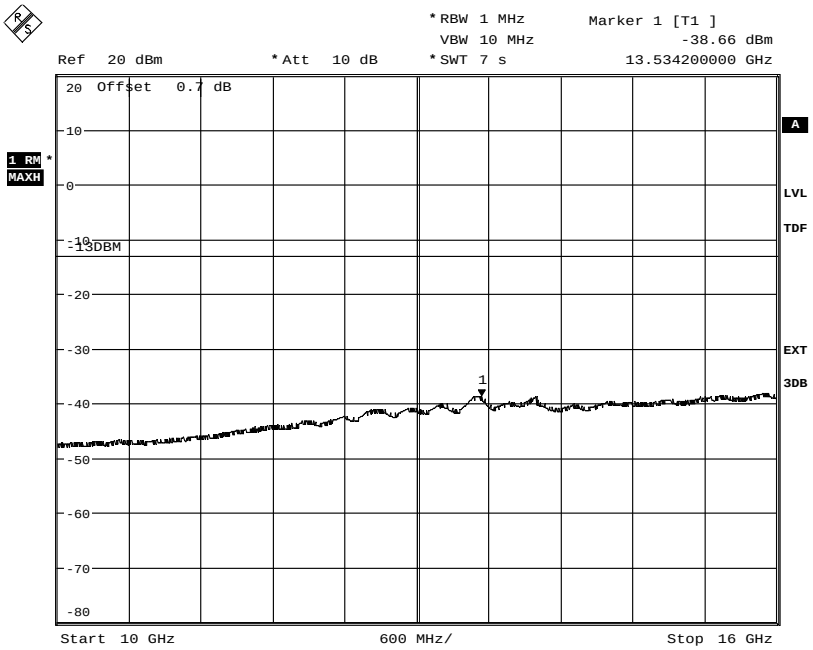

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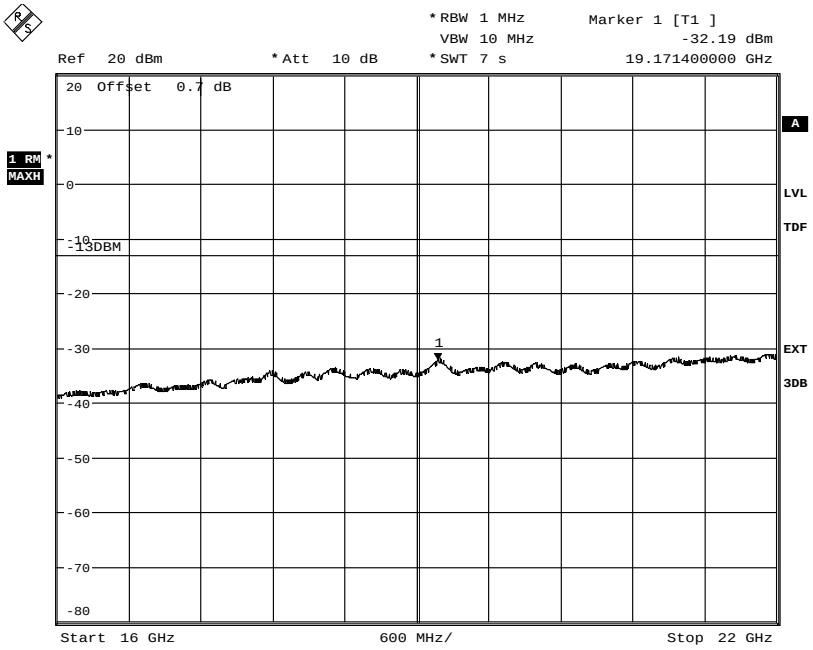
Appendix 6

Diagram 9 e:



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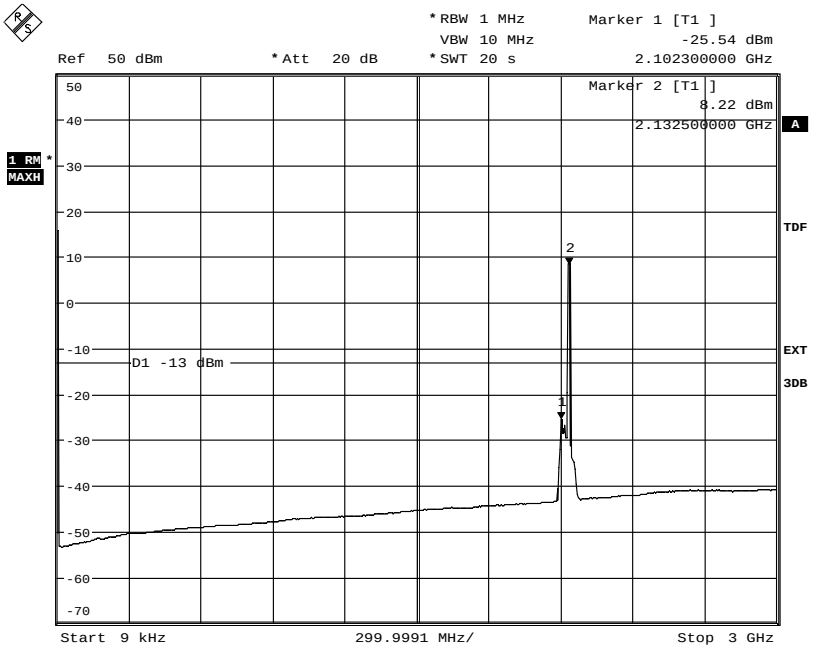
Appendix 6

Diagram 10 a:



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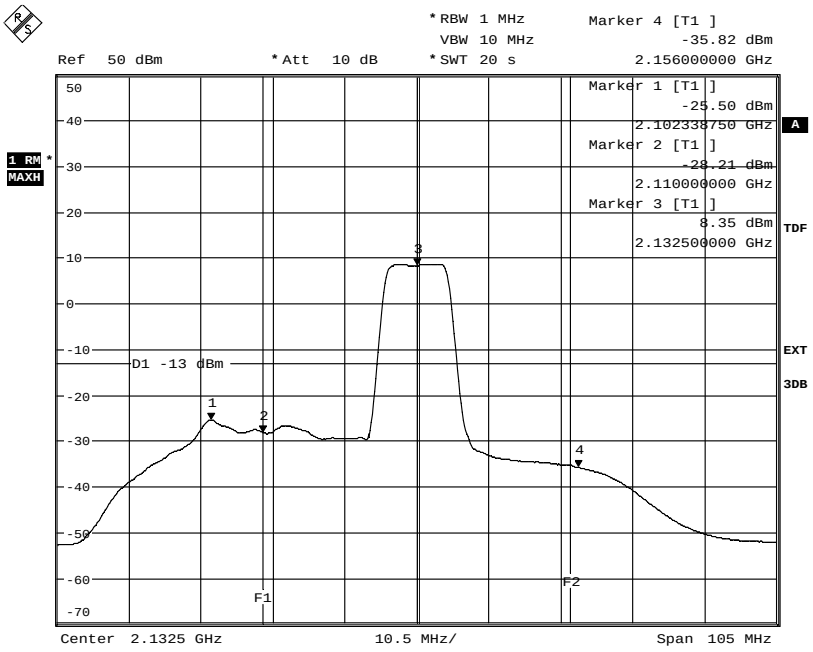

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Appendix 6

Diagram 10 c:

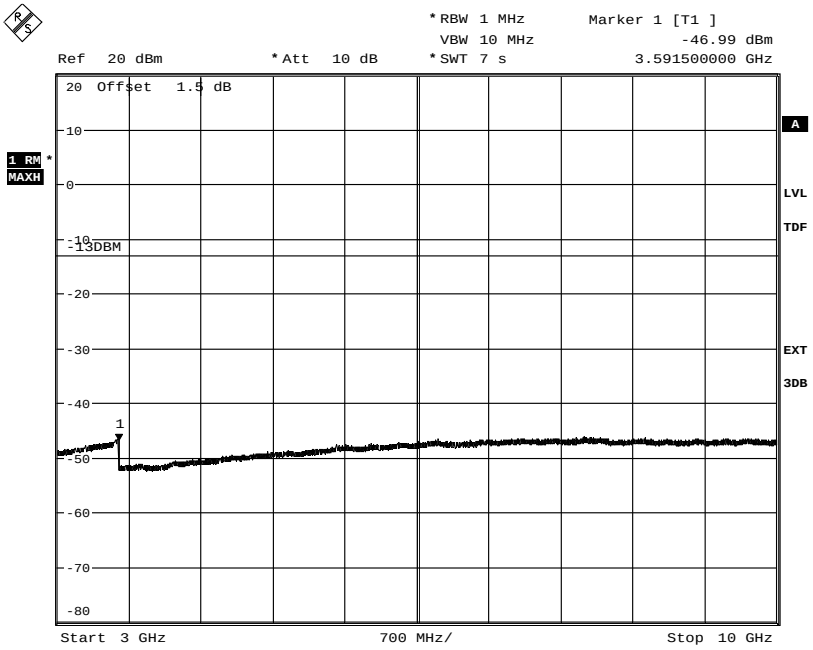

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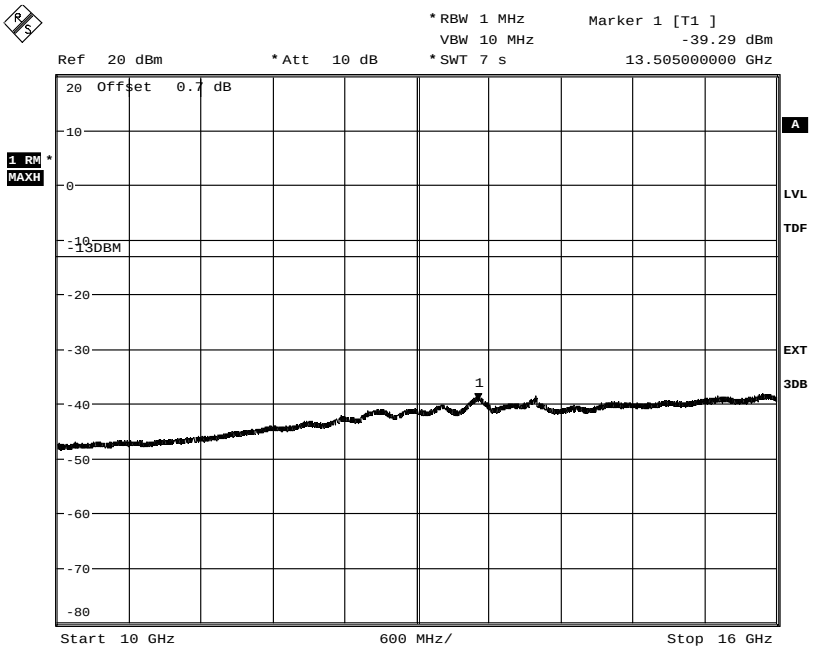
Diagram 10 d:



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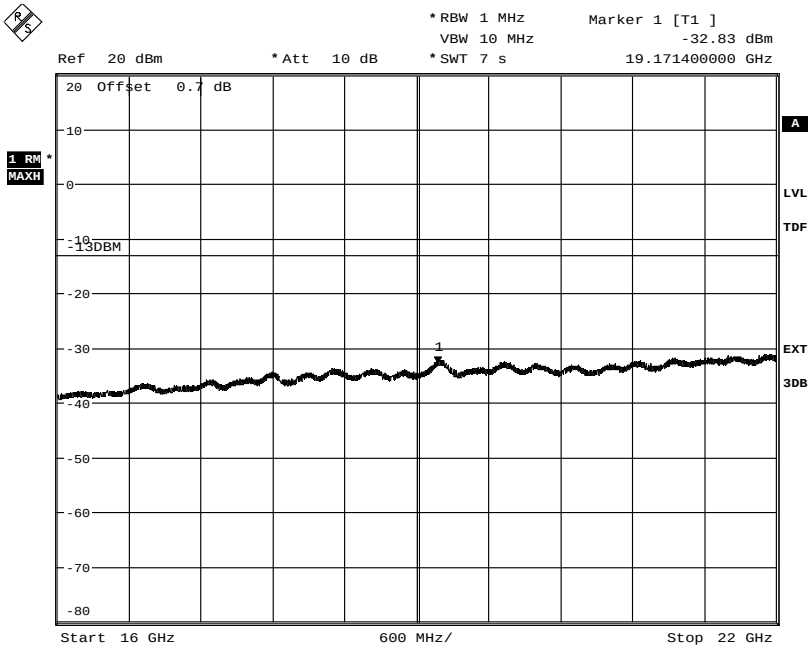
Appendix 6

Diagram 10 e:



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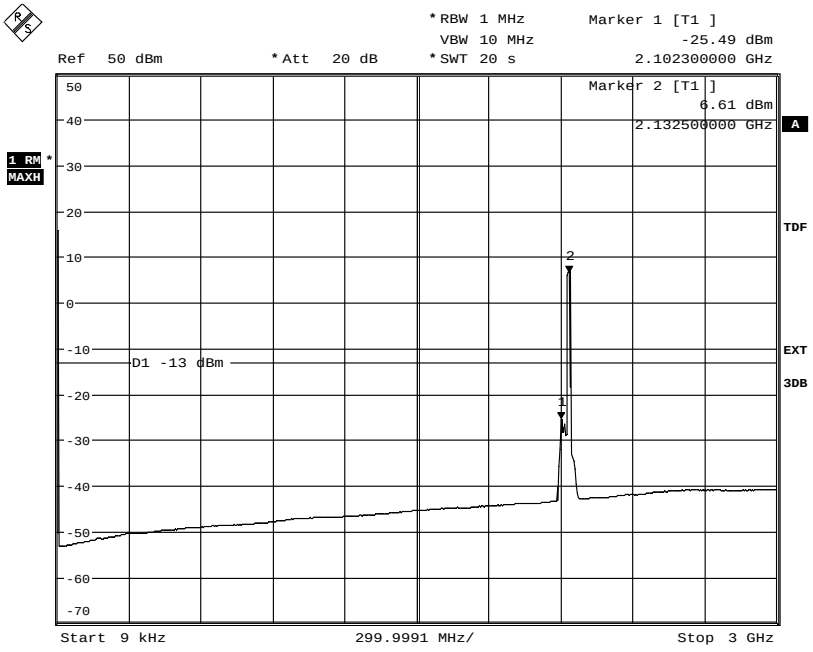
Appendix 6

Diagram 11 a:



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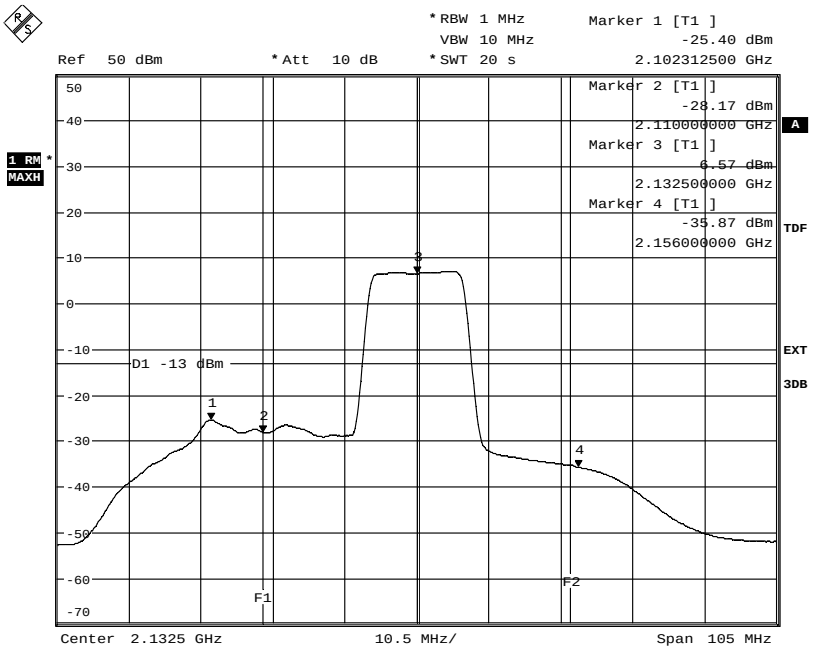

Date: 8.DEC.2014 15:50:36

Appendix 6

Diagram 11 c:

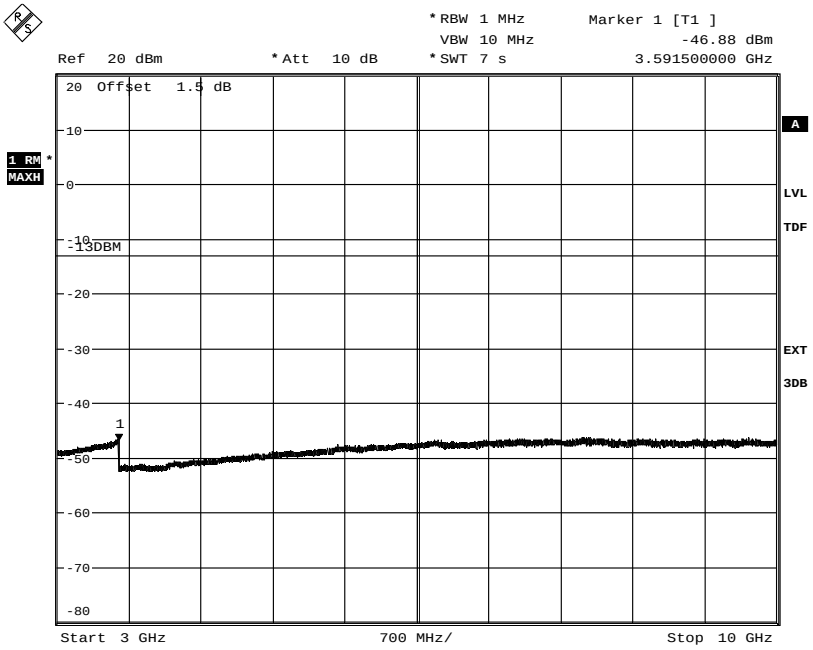

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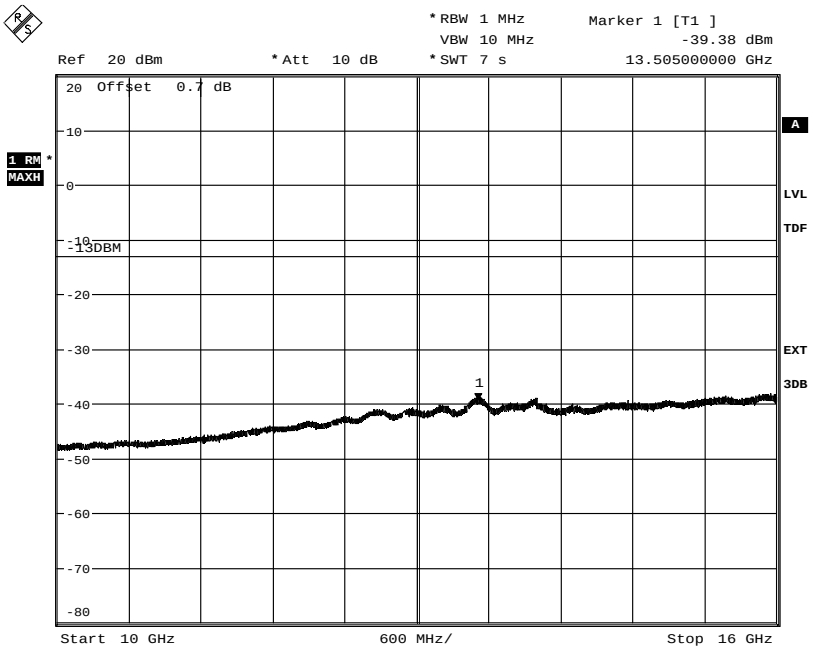
Diagram 11 d:



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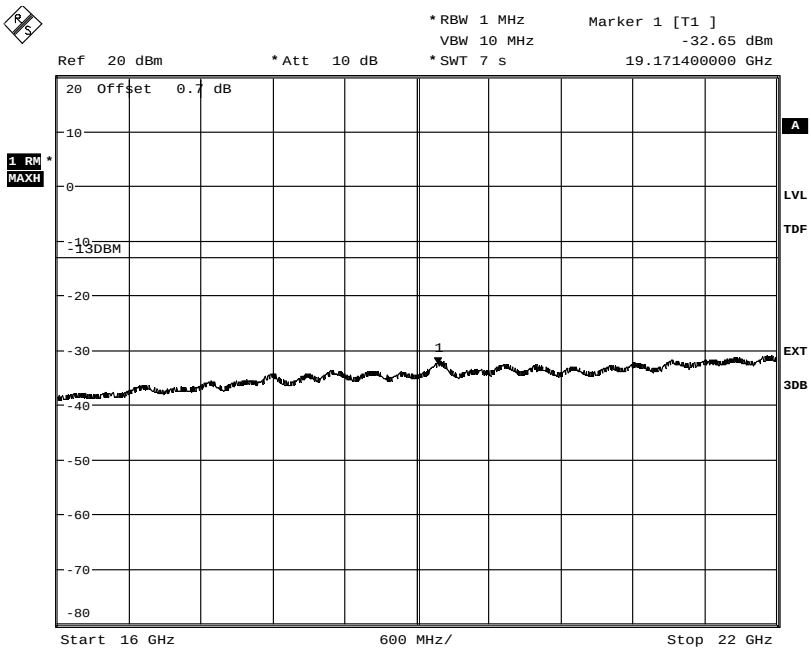
Appendix 6

Diagram 11 e:



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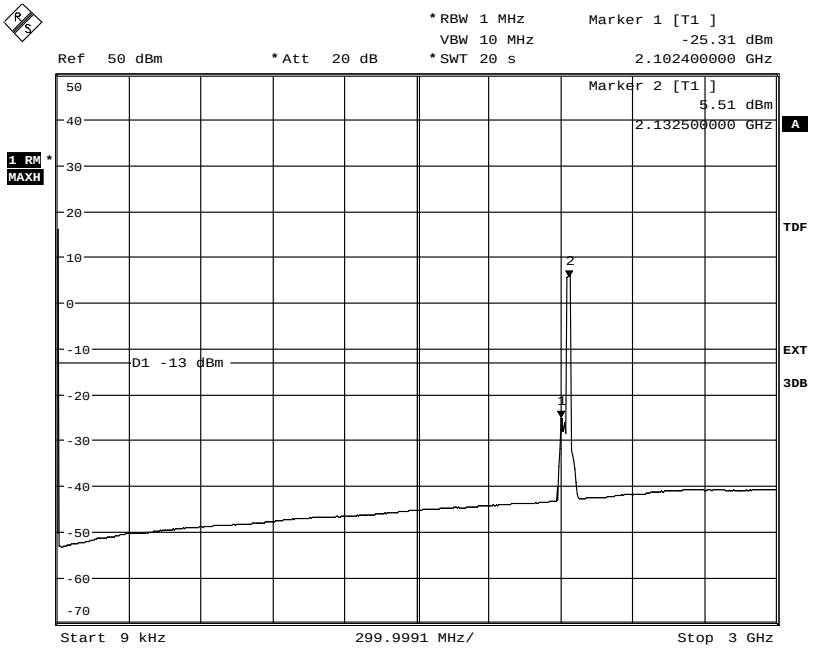
Appendix 6

Diagram 12 a:



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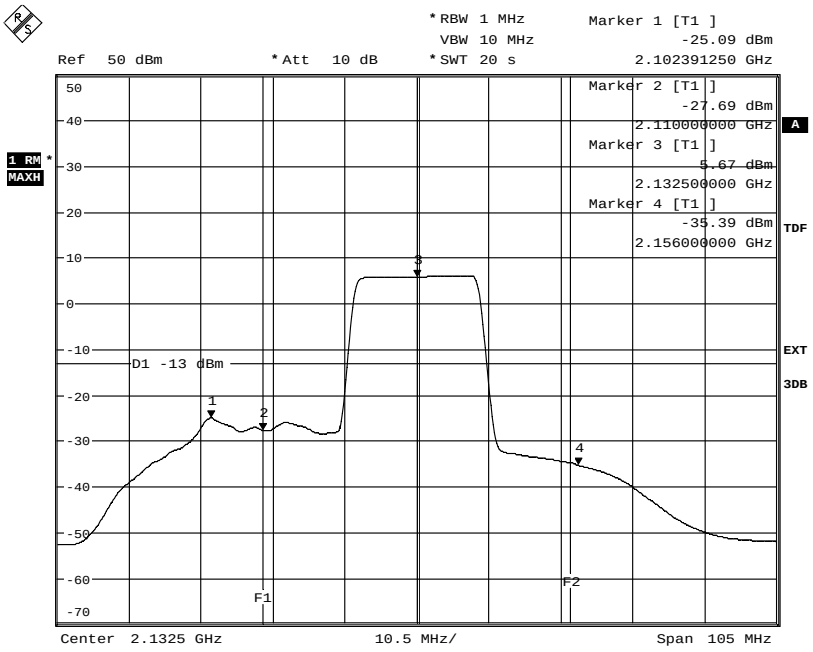

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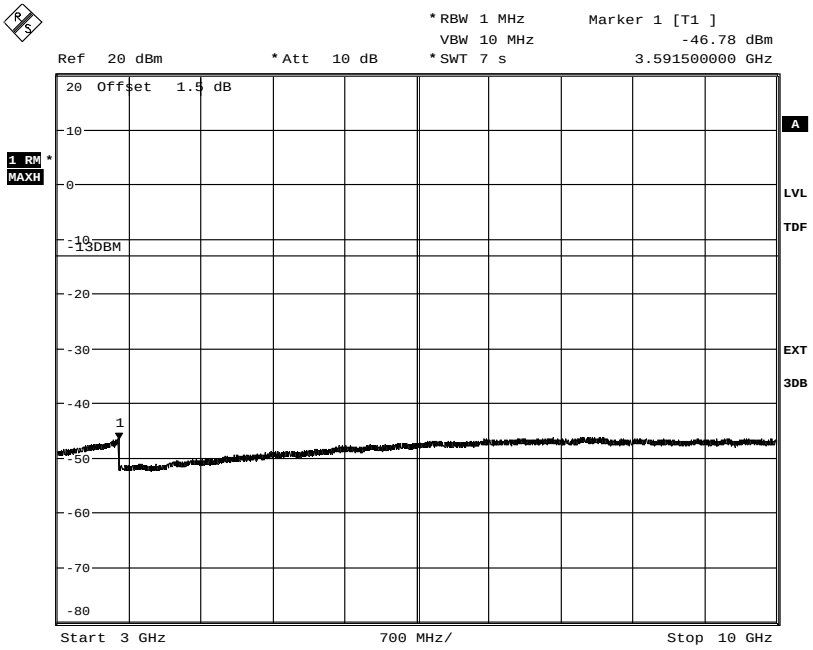
Appendix 6

Diagram 12 c:



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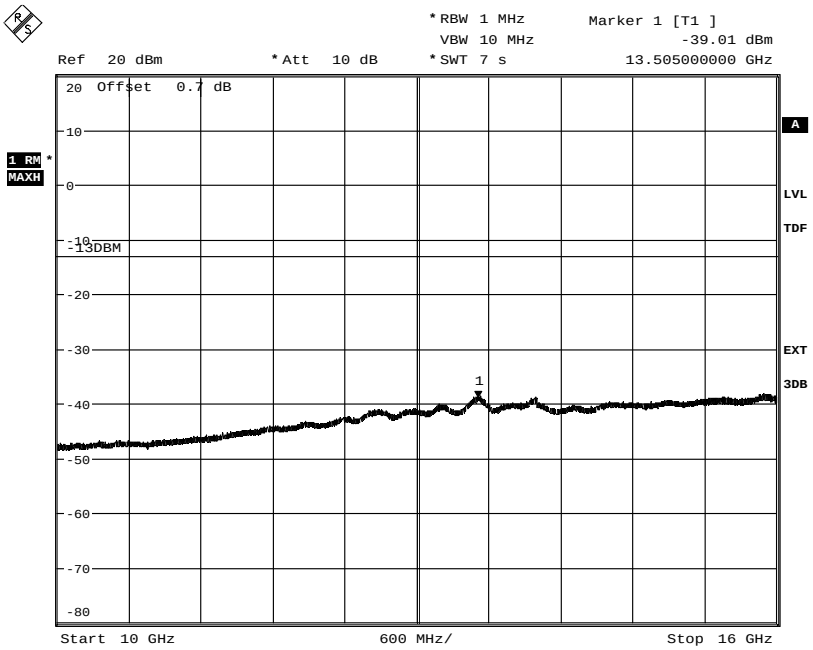

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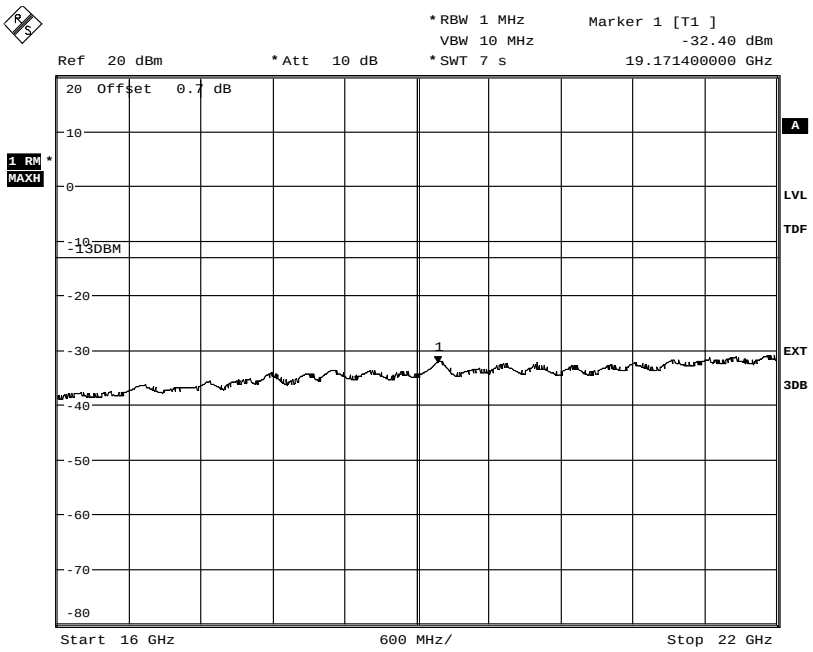

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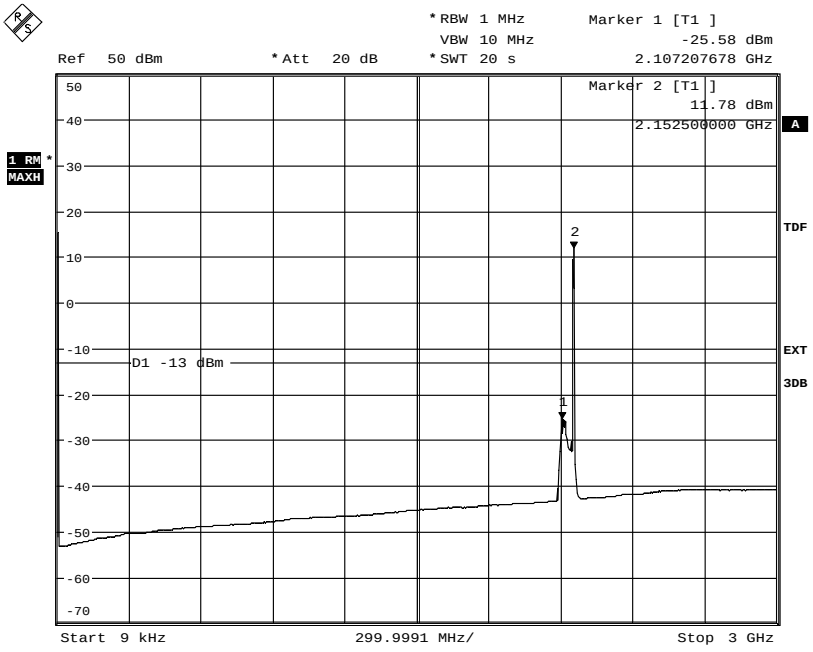
Appendix 6

Diagram 13 a:



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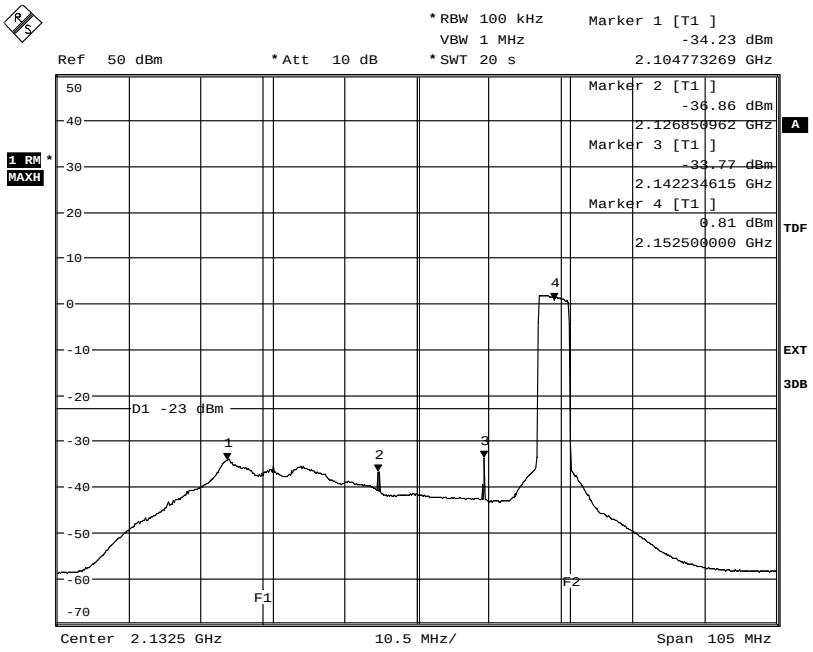

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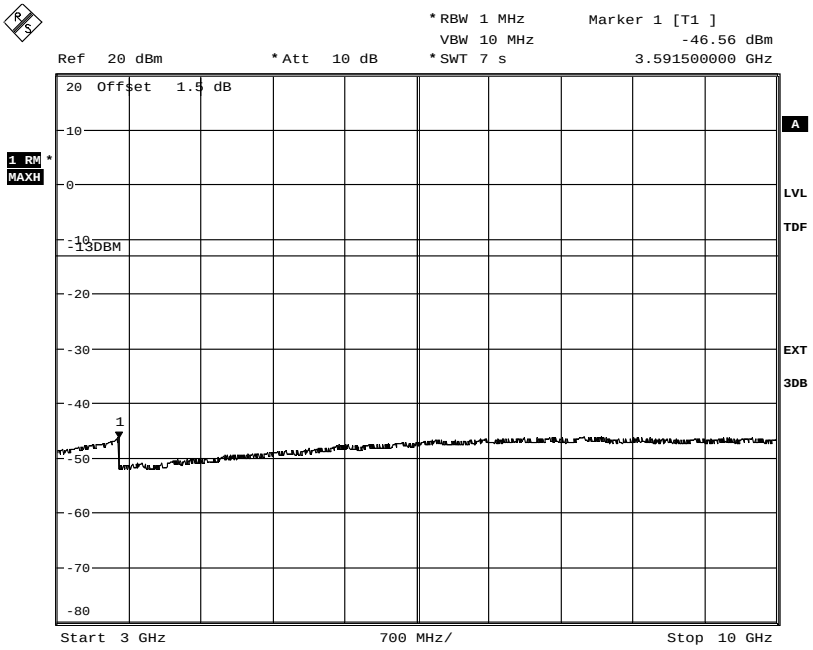
Appendix 6

Diagram 13 c:



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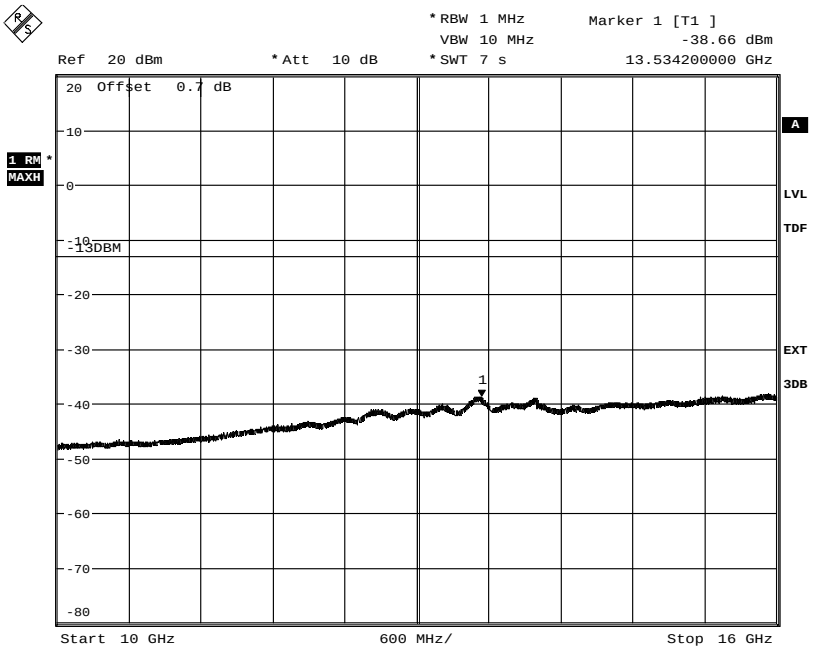

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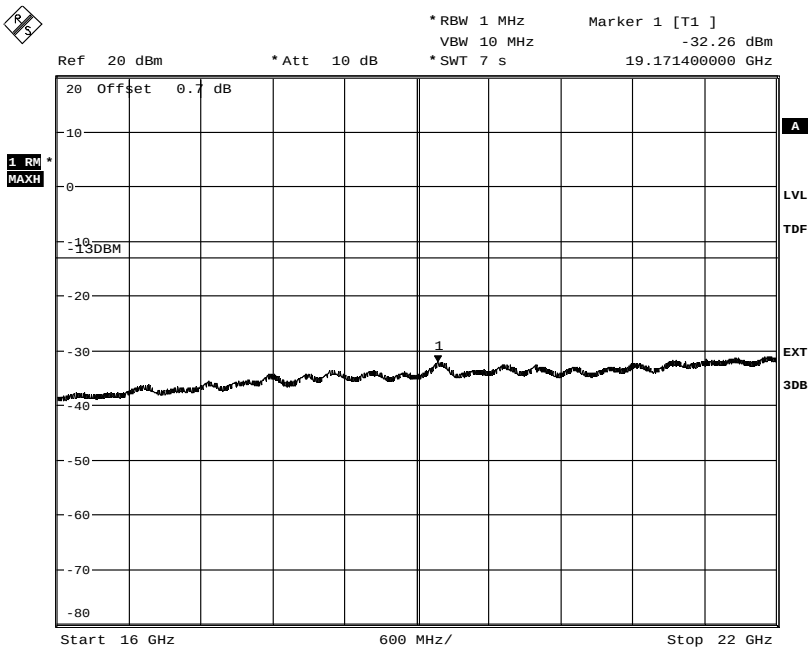
Appendix 6

Diagram 13 e:



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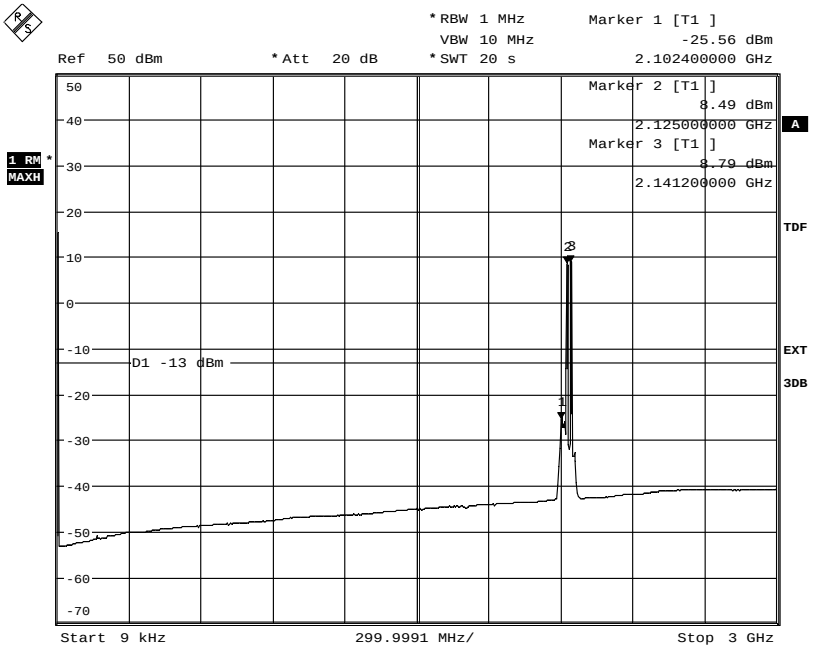
Appendix 6

Diagram 14 a:



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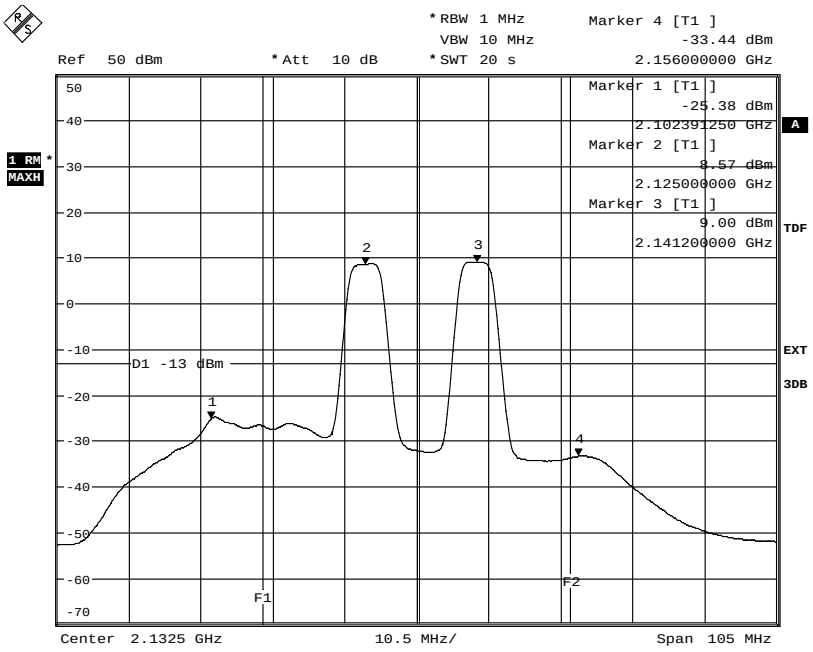

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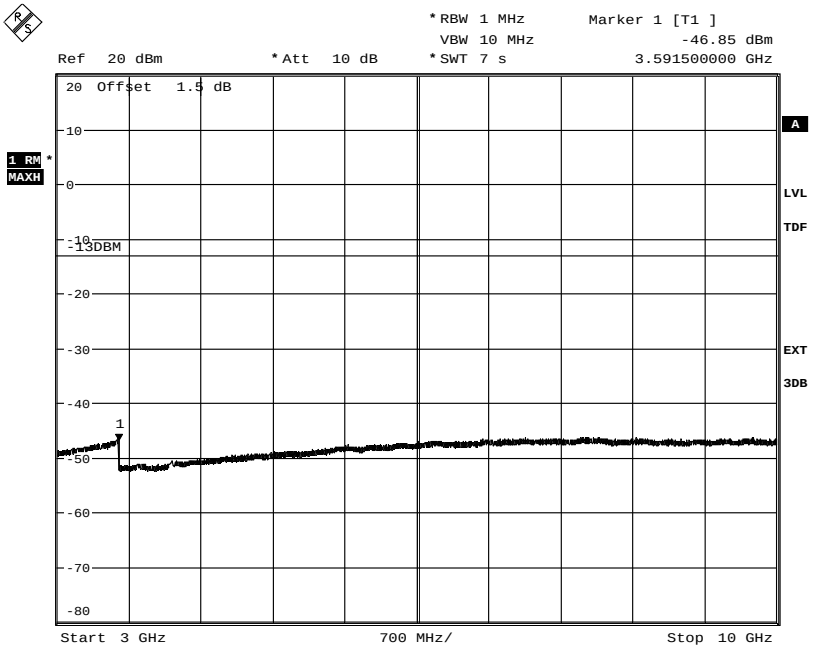
Appendix 6

Diagram 14 c:



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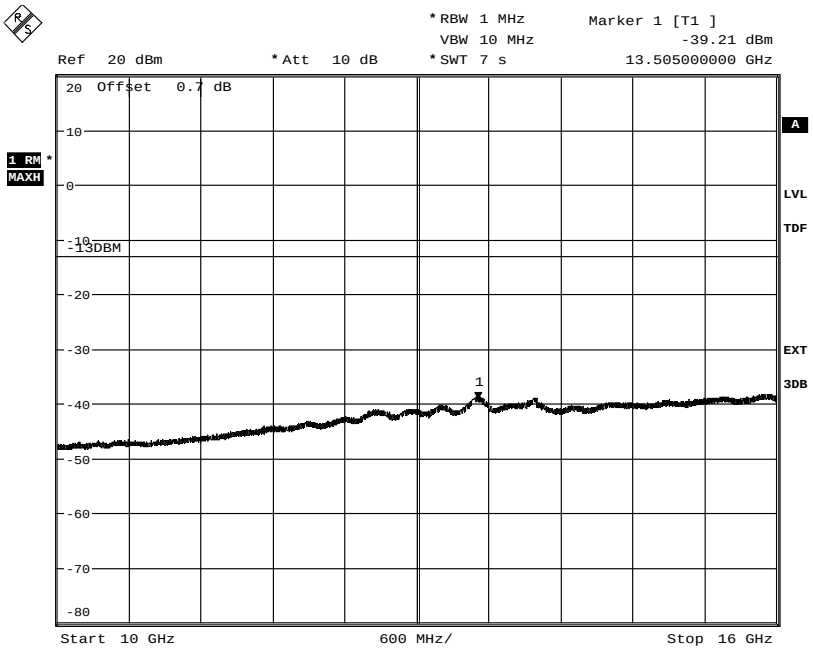

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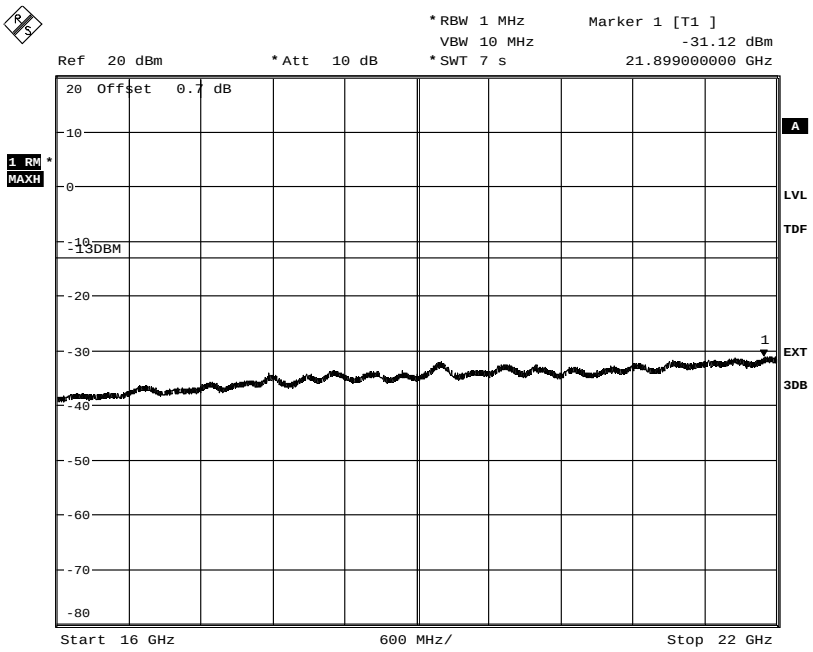
Appendix 6

Diagram 14 e:



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Appendix 6

Diagram 15 a:

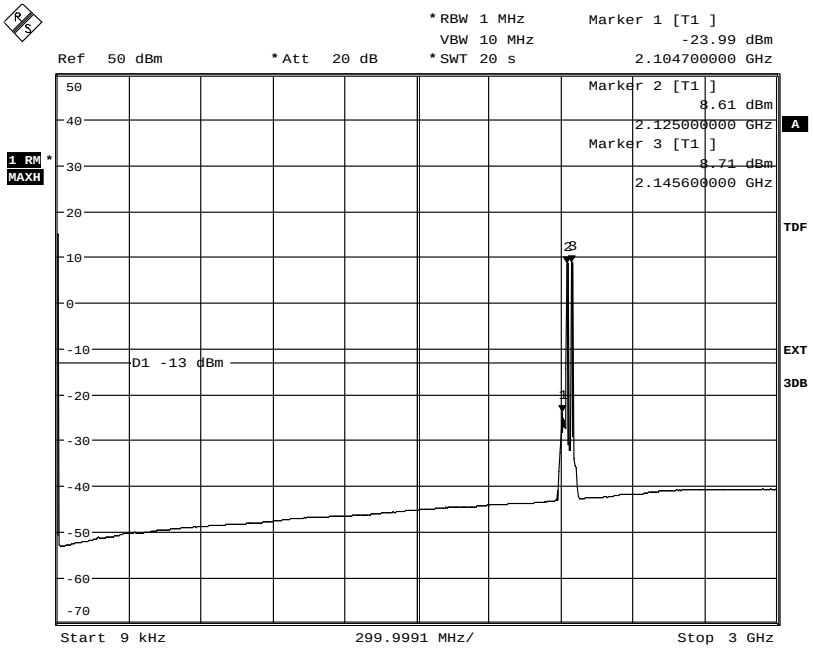

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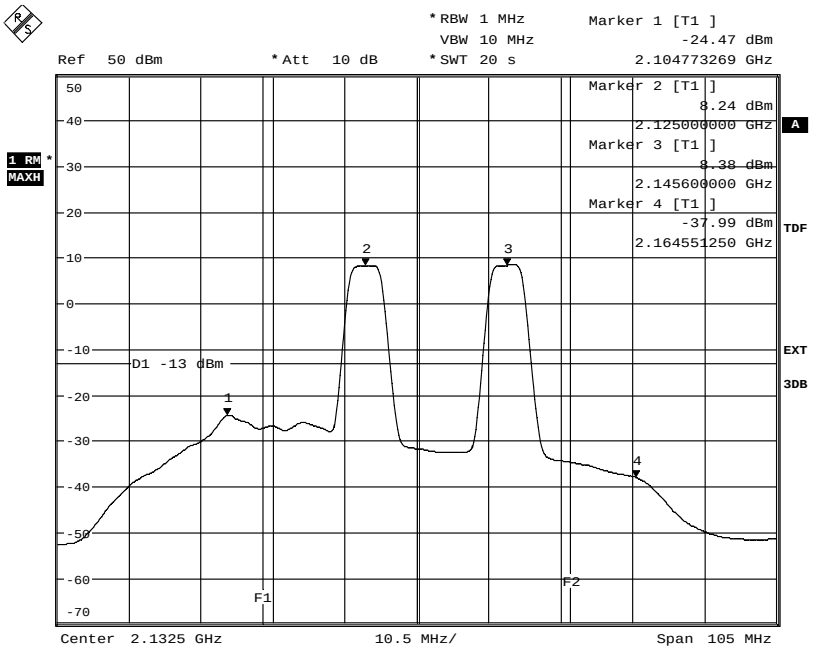
Diagram 15 b:



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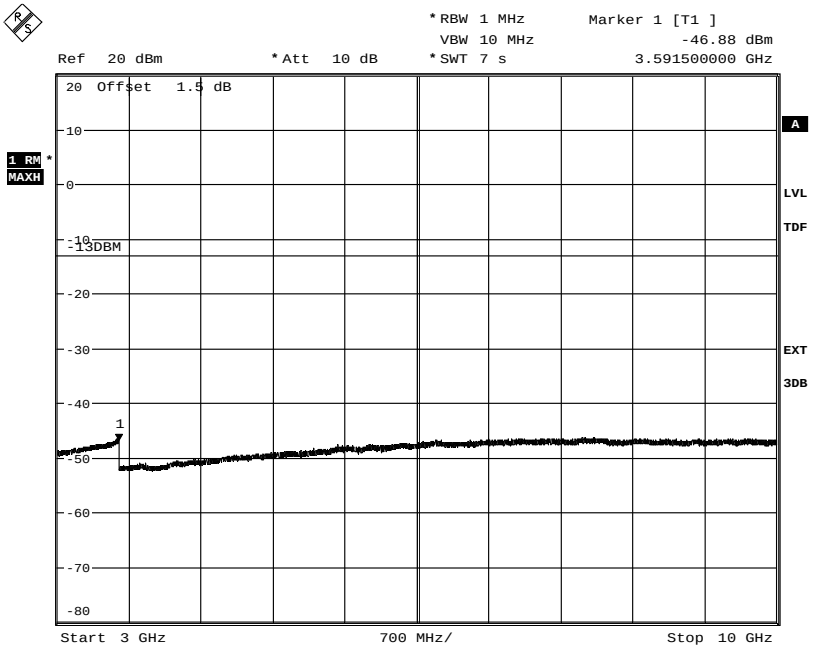
Appendix 6

Diagram 15 c:



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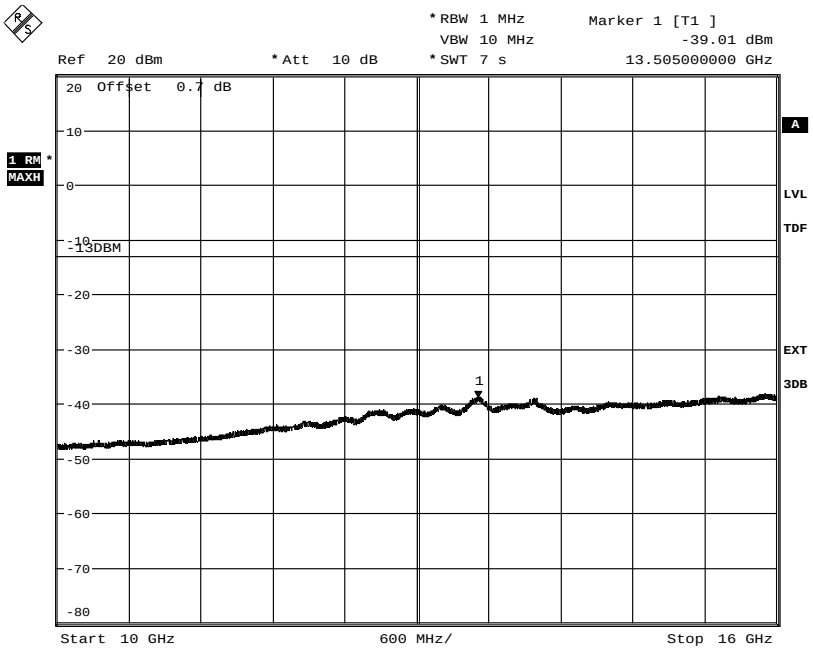

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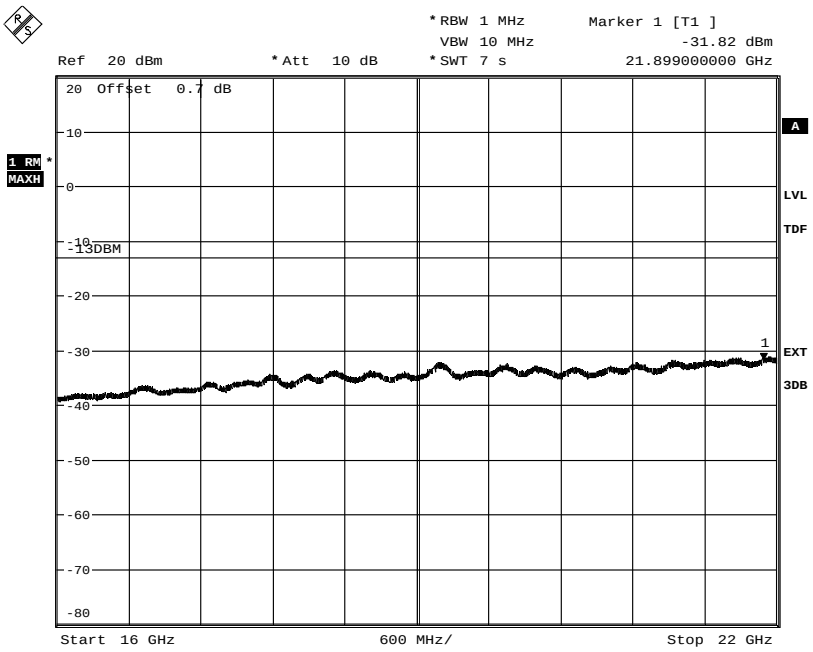
Appendix 6

Diagram 15 e:



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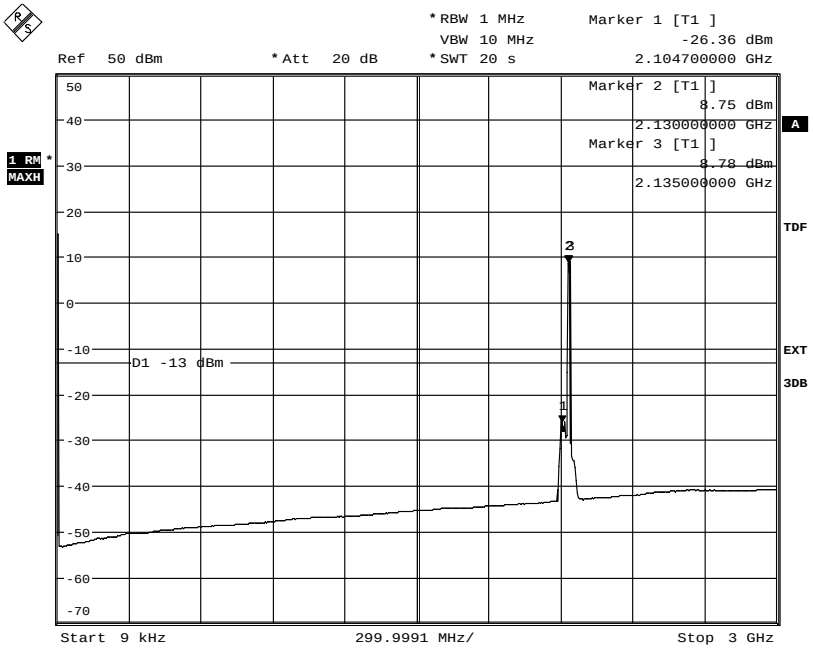
Appendix 6

Diagram 16 a:



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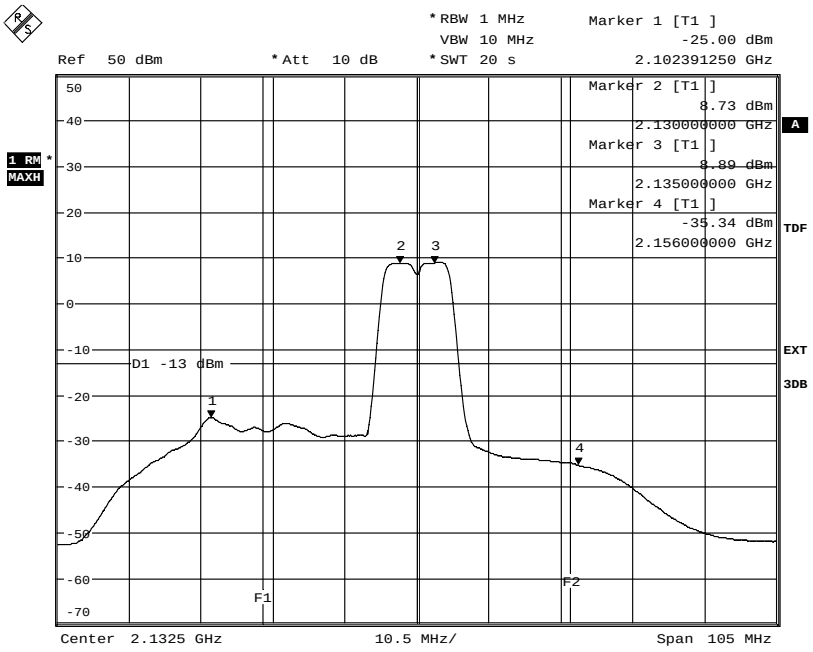

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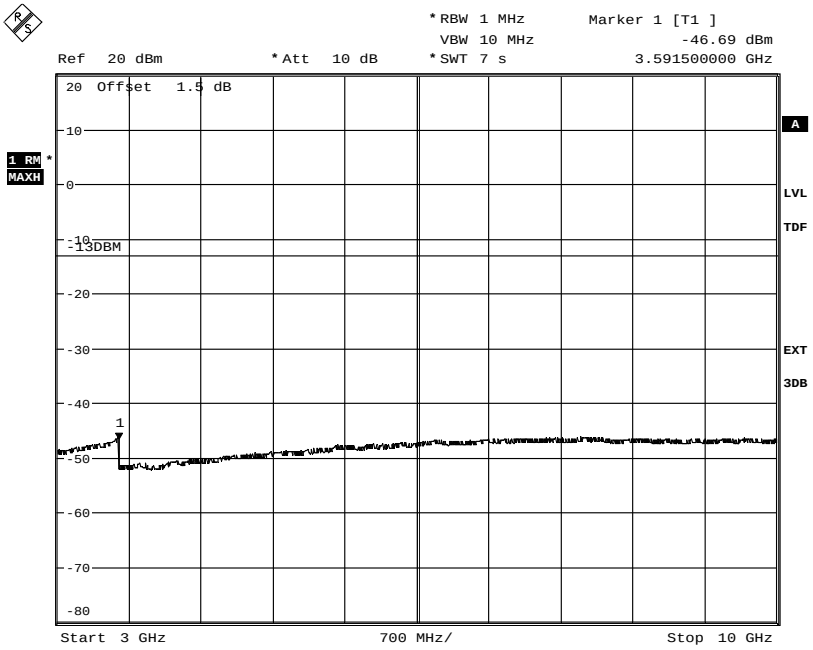
Appendix 6

Diagram 16 c:



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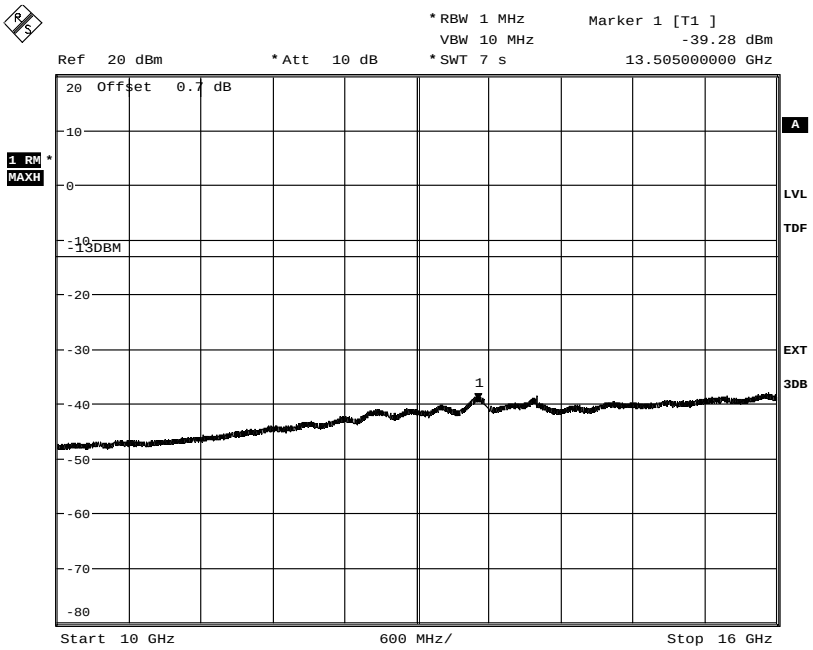

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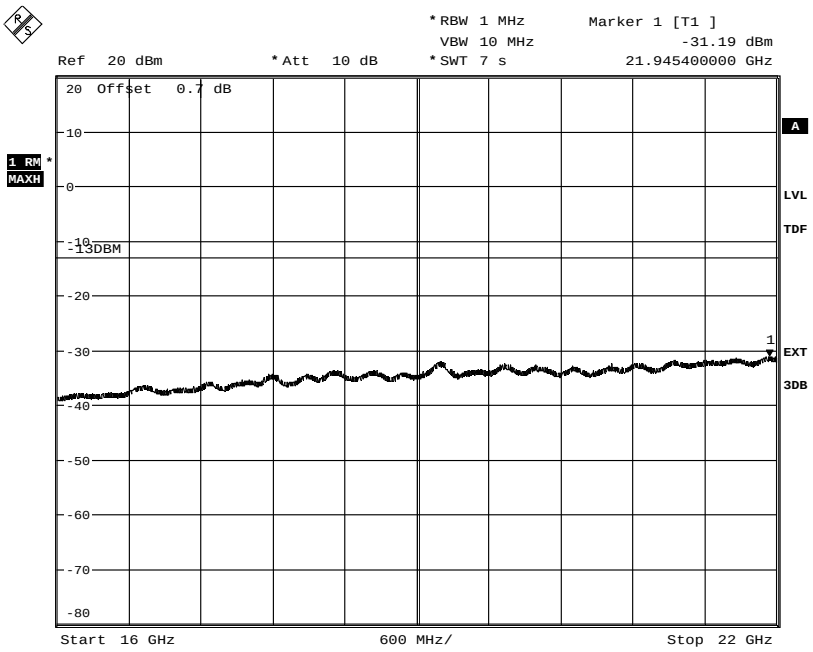
Appendix 6

Diagram 16 e:



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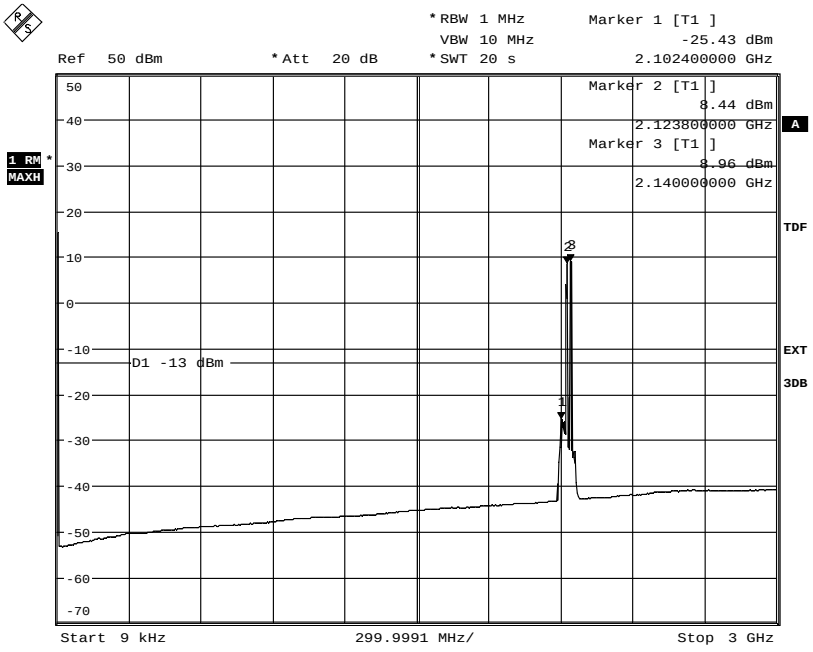
Appendix 6

Diagram 17 a:



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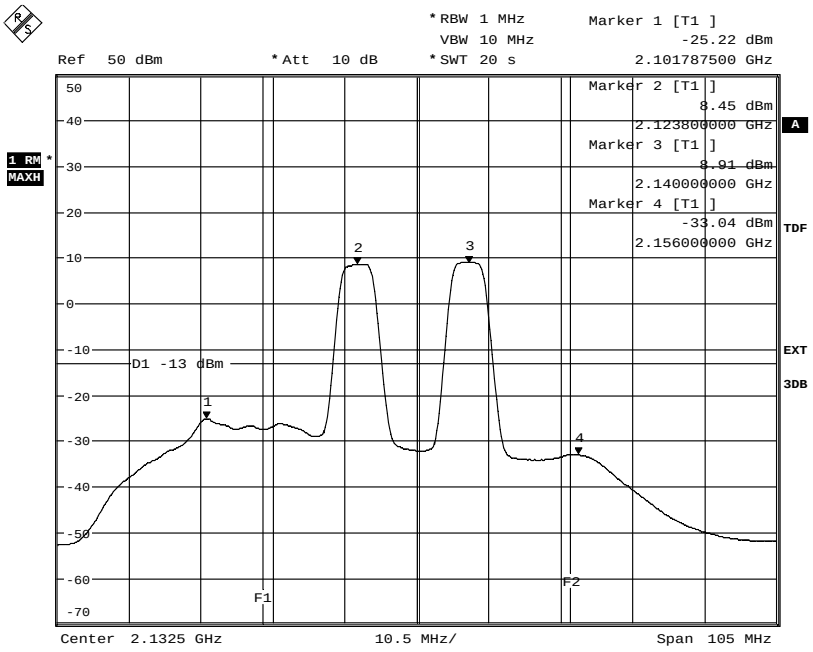

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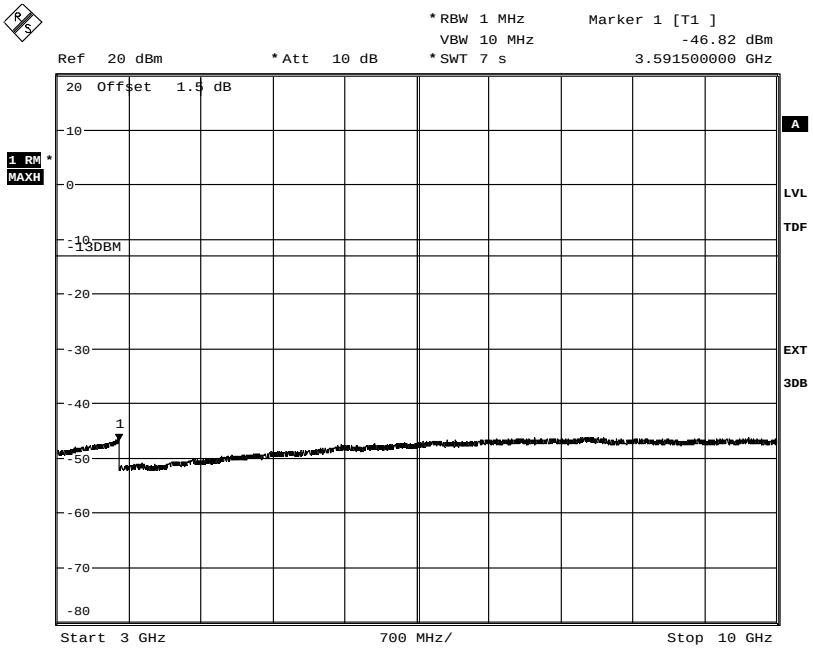
Appendix 6

Diagram 17 c:



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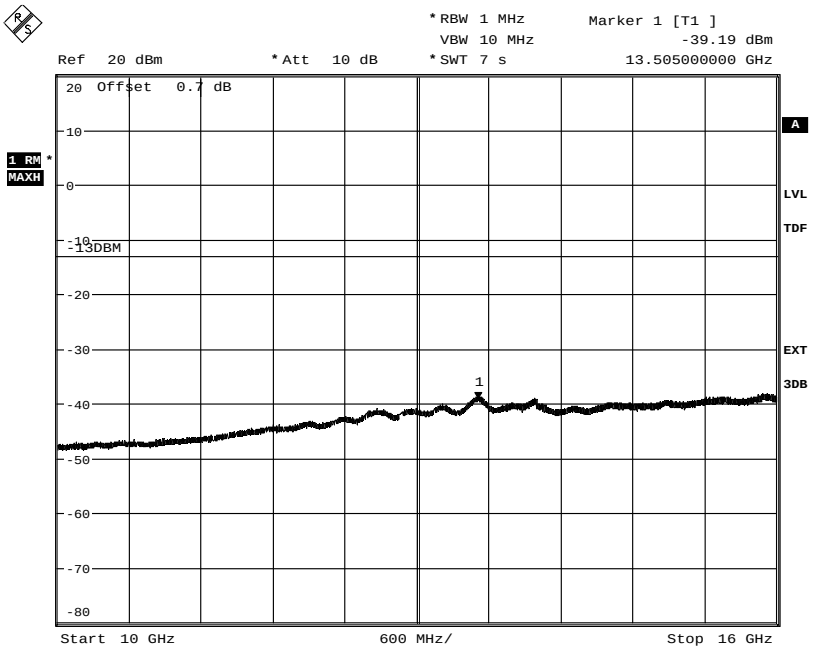

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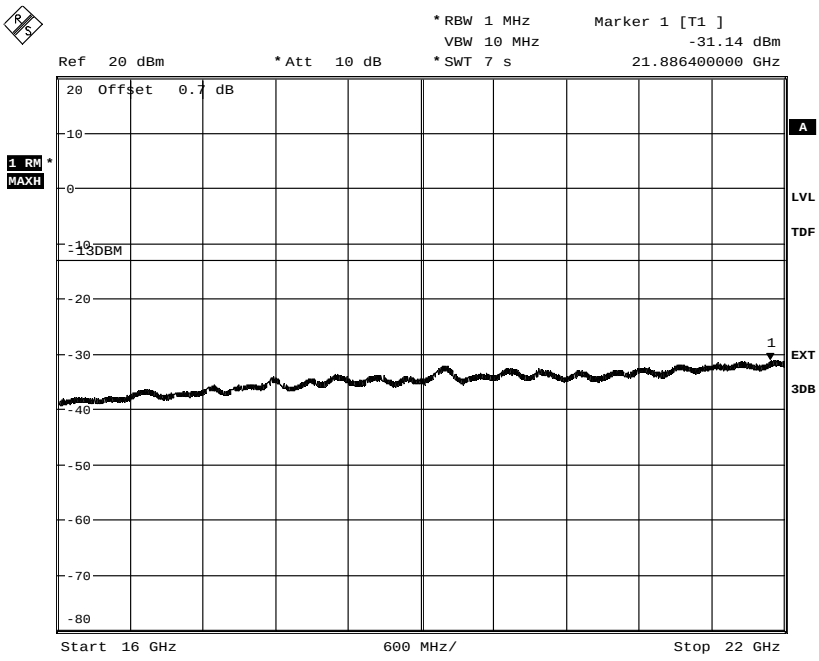
Appendix 6

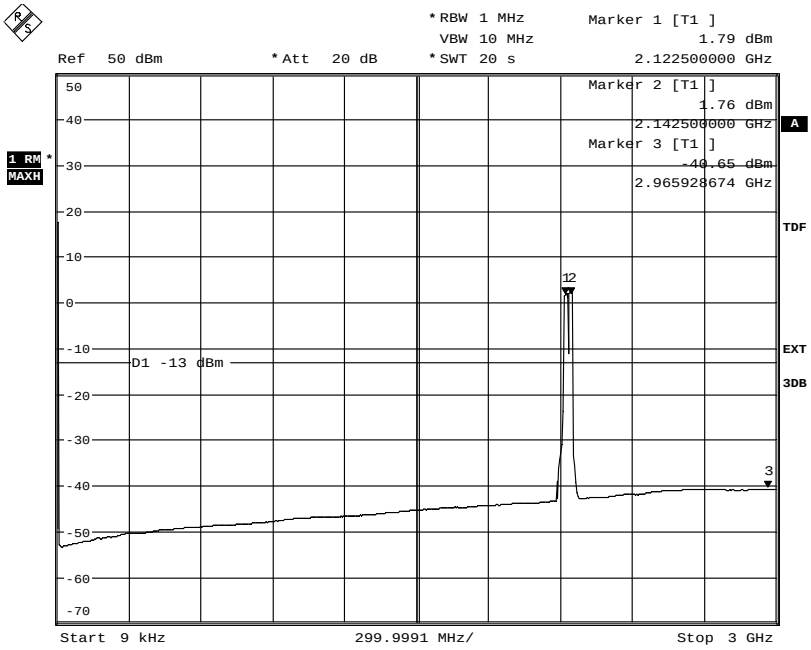
Diagram 17 e:



Date: 8.DEC.2014 11:30:03

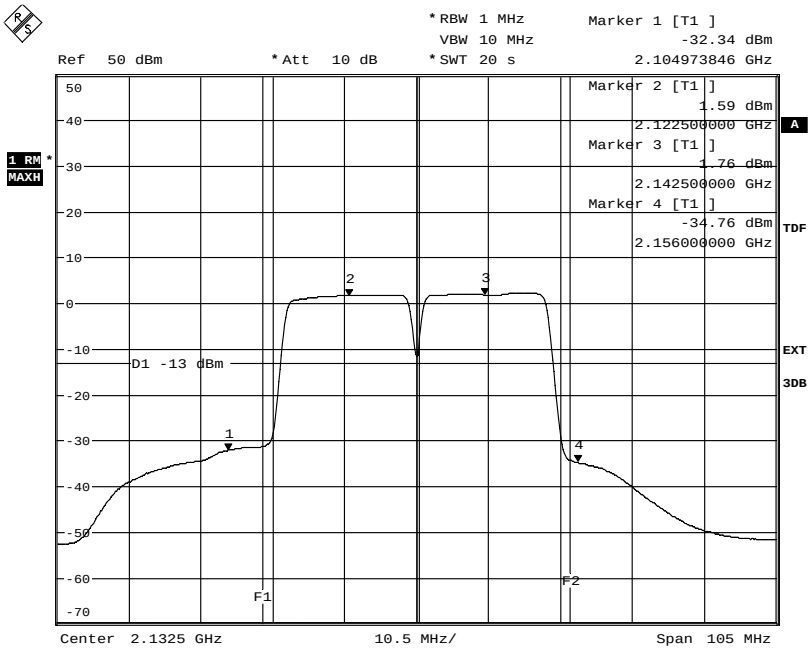
Appendix 6

Diagram 18 a:



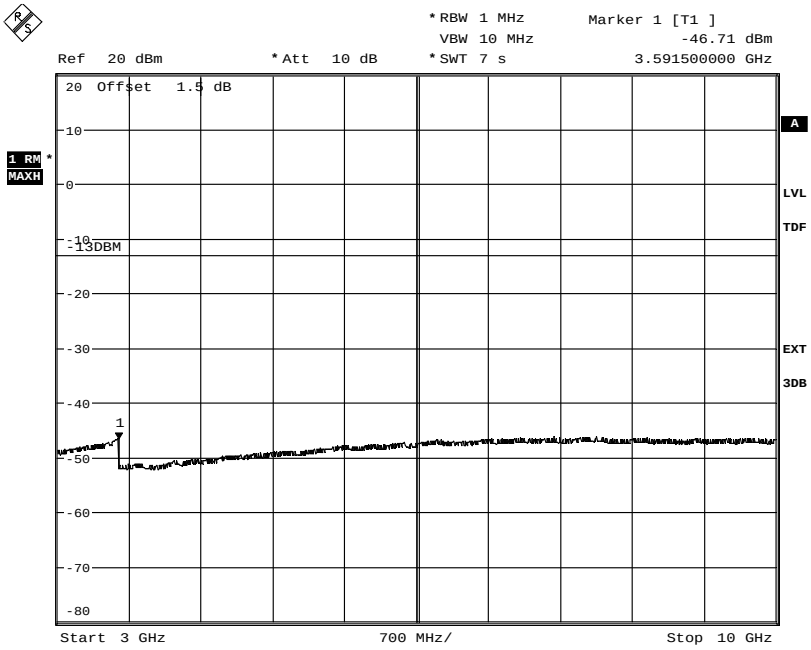
Date: 10.DEC.2014 09:00:19

Diagram 18 b:



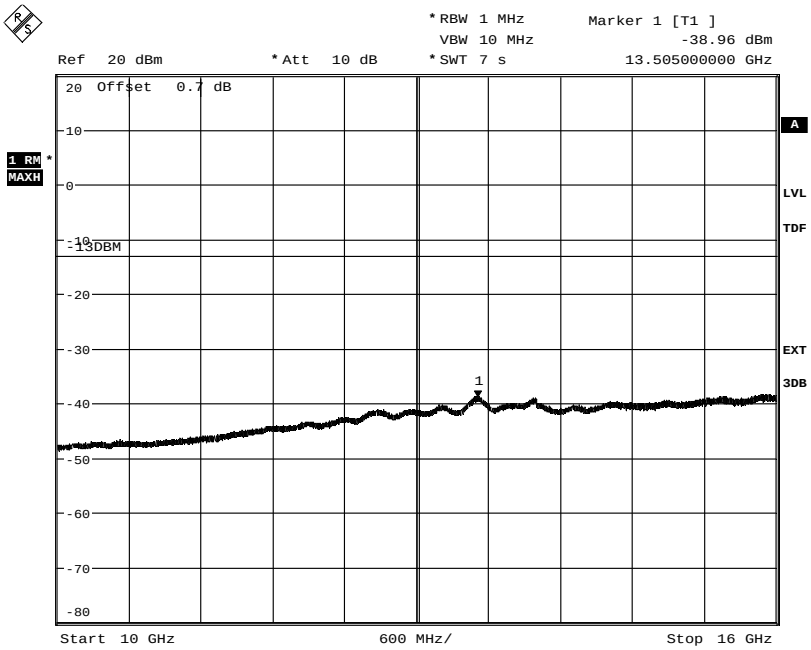
Date: 10.DEC.2014 07:43:23

Diagram 18 c:



Date: 10.DEC.2014 09:02:53

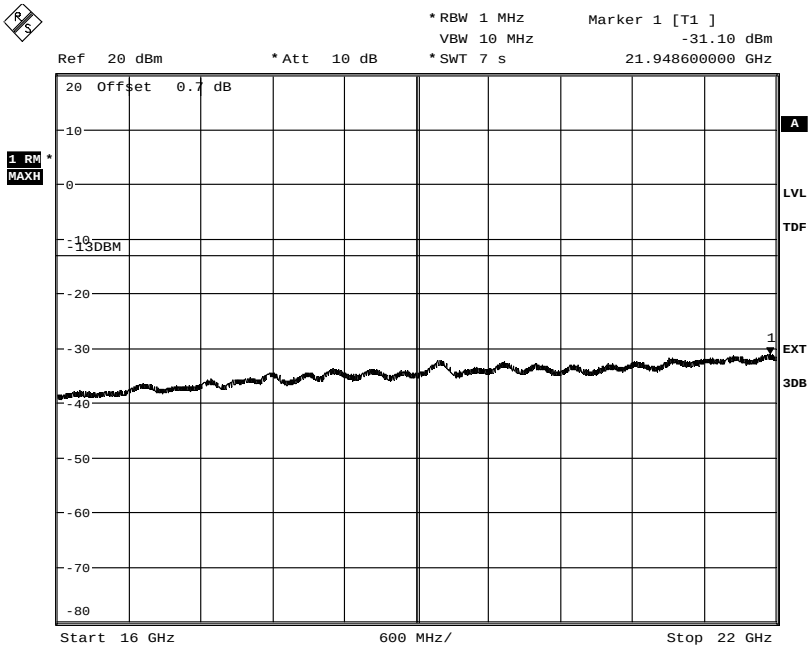
Diagram 18 d:



Date: 10.DEC.2014 09:03:53

Appendix 6

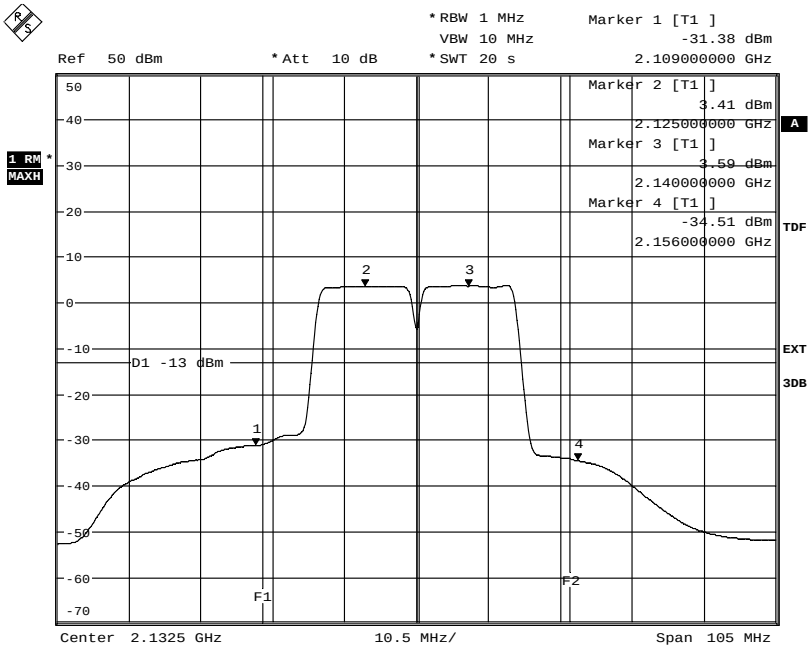
Diagram 18 e:



Date: 10.DEC.2014 09:04:56

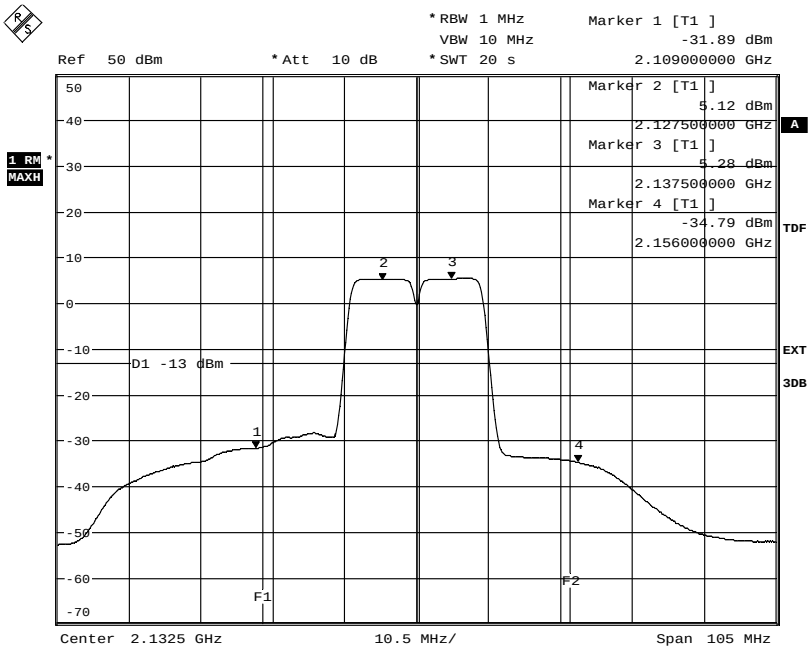
Appendix 6

Diagram 19 a:



Date: 10.DEC.2014 09:15:51

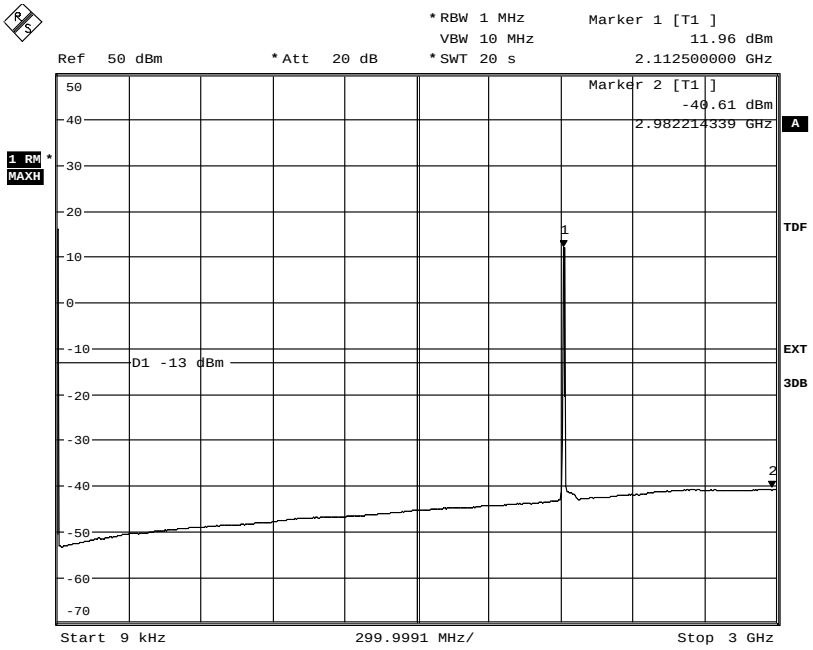
Diagram 20 a:



Date: 10.DEC.2014 09:32:02

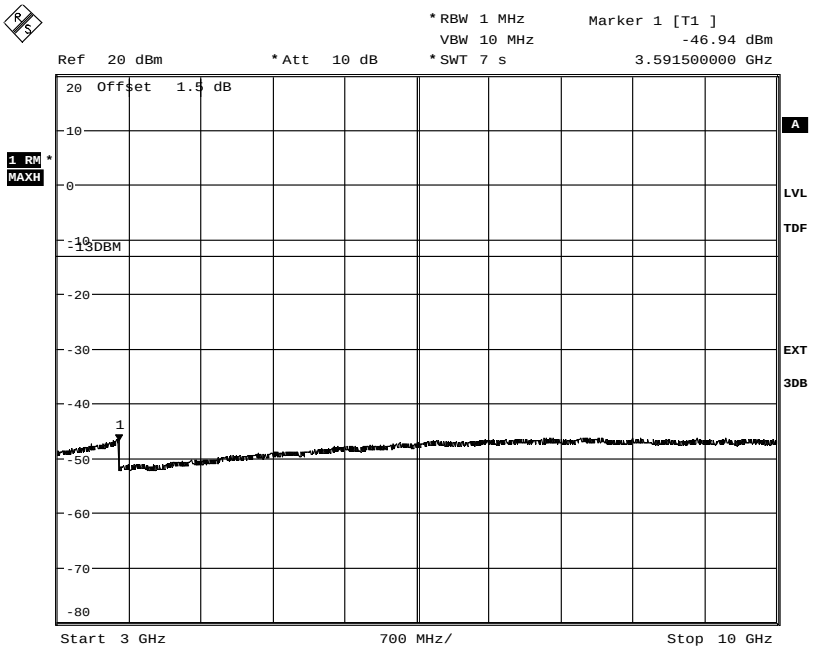
Appendix 6

Diagram 21 a:



Date: 9.DEC.2014 11:52:40

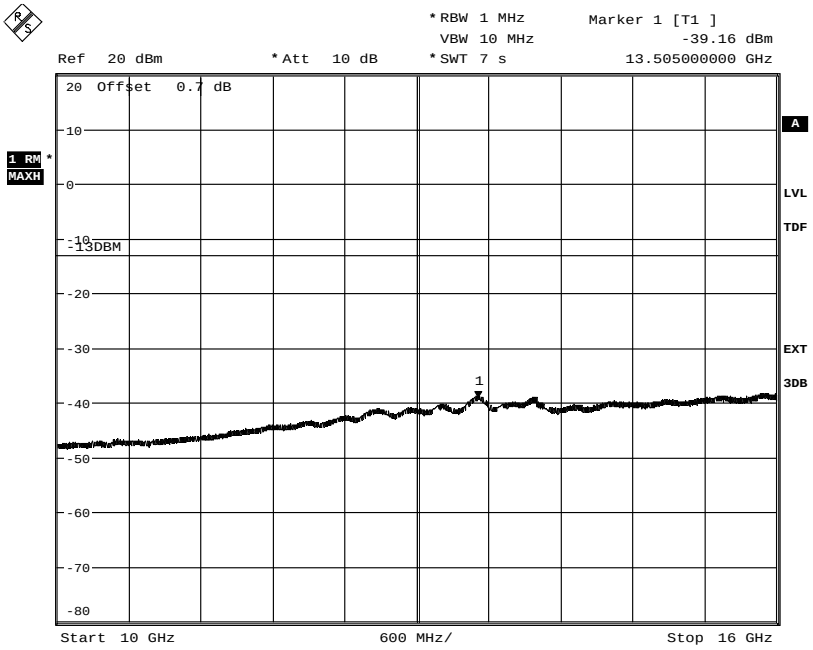
Diagram 21 b:



Date: 9.DEC.2014 12:00:23

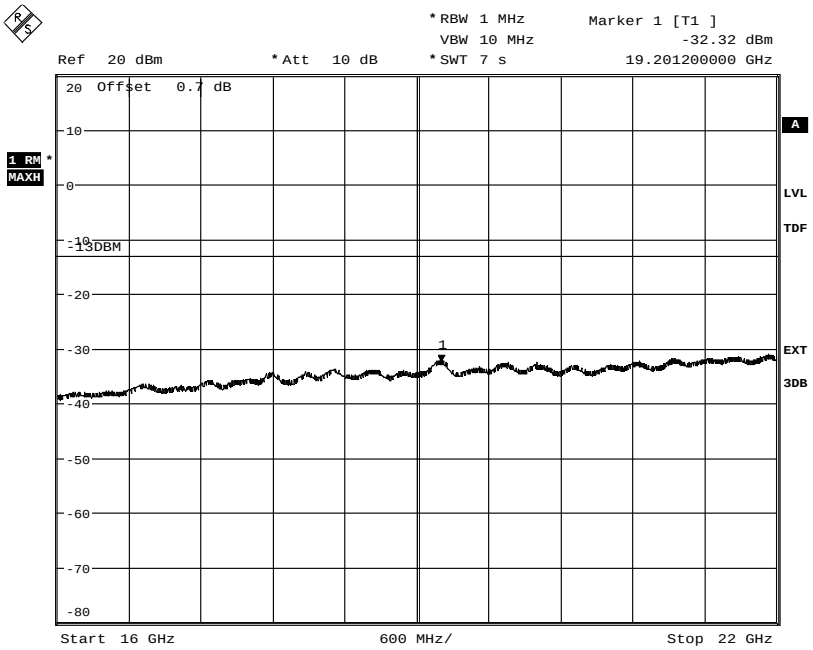
Appendix 6

Diagram 21 c:



Date: 9.DEC.2014 12:01:19

Diagram 21 d:



Date: 9.DEC.2014 12:02:32

Field strength of spurious radiation measurements according to 47 CFR 27.53 (h)/ IC RSS-139 6.5

Date	Temperature	Humidity
2014-11-26	23°C ± 3°C	29 % ± 5 %
2014-11-27	22°C ± 3°C	28 % ± 5 %
2014-12-03	22°C ± 3°C	24 % ± 5 %

Test set-up and procedure

The test sites are listed at FCC, Columbia with registration number: 93866. The test site complies with RSS-Gen, Industry Canada file no. 3482A-2.

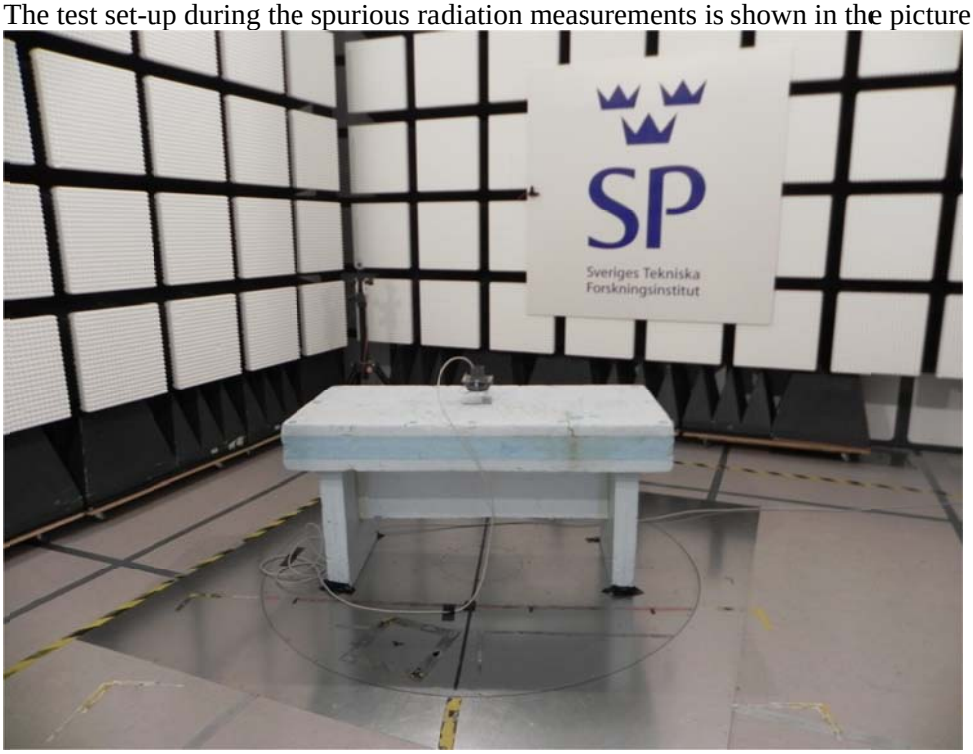
The measurements were performed with both horizontal and vertical polarization of the antenna. The antenna distance was 3 m in the frequency range 30 MHz – 18 GHz and 1m in the frequency range 18 – 22 GHz.

In the frequency range 30 MHz – 22 GHz the measurement was performed in power with a RBW of 1 MHz. A propagation loss in free space was calculated. The used formula was $\gamma = 20\log\left(\frac{4\pi D}{\lambda}\right)$, γ is the propagation loss and D is the antenna distance.

The measurement procedure was as the following:

1. The pre-measurement was first performed with peak detector. The EUT was measured in eight directions and with the antenna at three heights, 1.0 m, 1.5 m and 2.0 m.
2. Spurious radiation on frequencies closer than 20 dB to the limit in the pre-measurement is scanned 0-360 degrees and the antenna is scanned 1- 4 m for maximum response. The emission is then measured with the RMS detector and the RMS value is reported. Frequencies closer than 10 dB to the limit when measured with the RMS detector were measured with the substitution method according to the standard.

The test set-up during the spurious radiation measurements is shown in the picture below:



Measurement equipment

Measurement equipment	SP number
Semi anechoic chamber	504 114
R&S ESU 26	902 210
EMC 32 ver. 8.52.0	503 889
Antenna Schaffner CBL 6143	504 079
EMCO Horn Antenna 3115	502 175
Flann STD Gain Horn Antenna 20240-20	503 674
FLANN Std gain horn antenna 18-240	503 900
FLANN Std gain horn antenna 16-240	503 939
High pass filter, RLC Electronics	504 200
Schwarzbeck preamplifier BBV 9742	504 085
µComp Nordic, Low Noise Amplifier	504 160
Miteq, Low Noise Amplifier 18-40 GHz	503 278
Temperature and humidity meter, Testo 625	504 117

Tested configurations

Configuration: RDI Cable 200m

Symbolic name	Bandwidth (MHz)
B	5
M	5,10,15 and 20
T	5
M2.1-5	5+5

Results, representing worst case

M, BW: 5 MHz Diagram 1 a-d

Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
30-22 000	All emission > 20 dB below limit	All emission > 20 dB below limit

Measurement uncertainty:

3.2 dB up to 18 GHz, 3.6 dB above 18 GHz

Limits

§27.53(h) and RSS-139 6.5

Outside a licensee's frequency band(s) of operation the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, resulting in a limit of -13 dBm per 1 MHz RBW.

Complies?	Yes

Diagram 1 a:

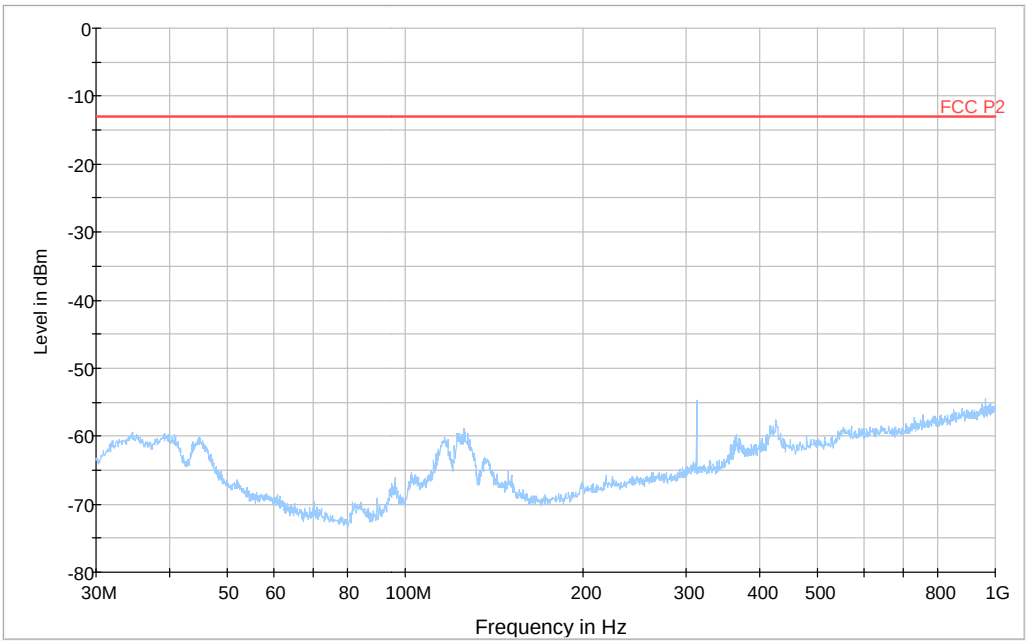
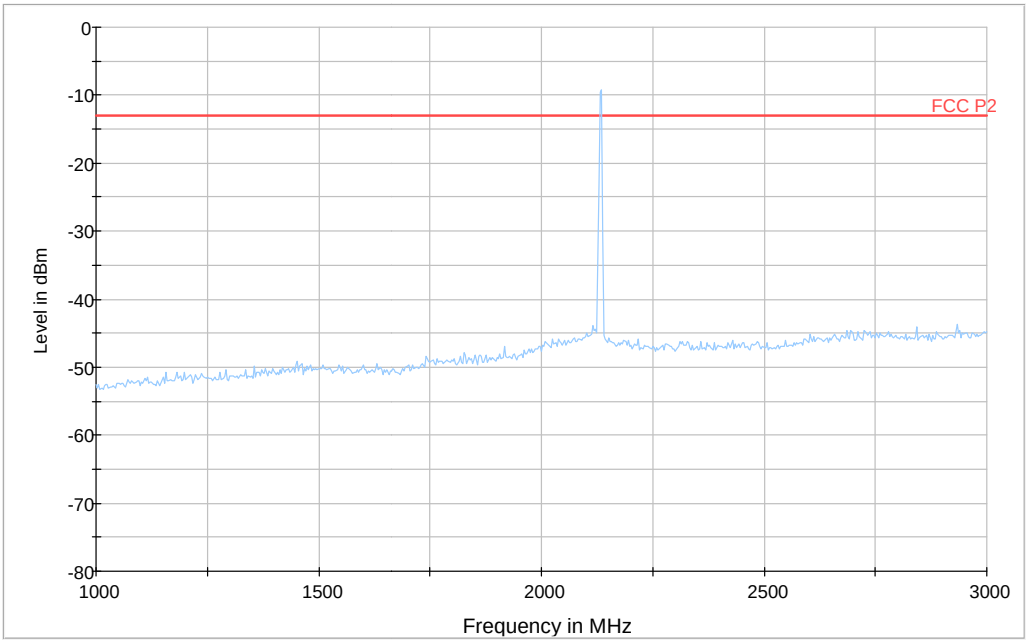


Diagram 1 b:



Note: The emission at 2132.5 MHz is the carrier frequency and shall be ignored in the context.

Appendix 7

Diagram 1 c:

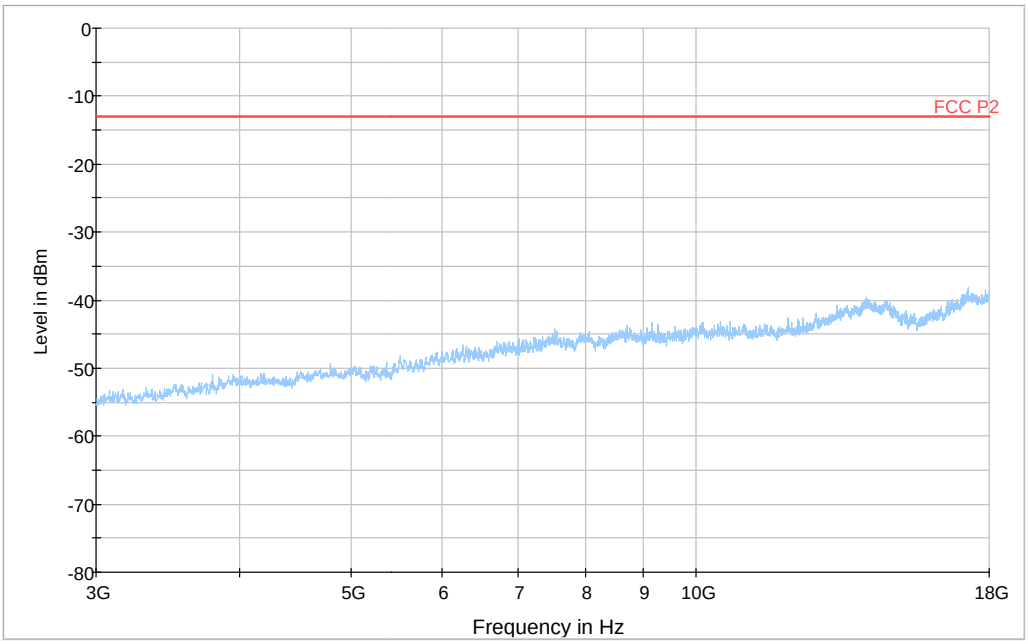
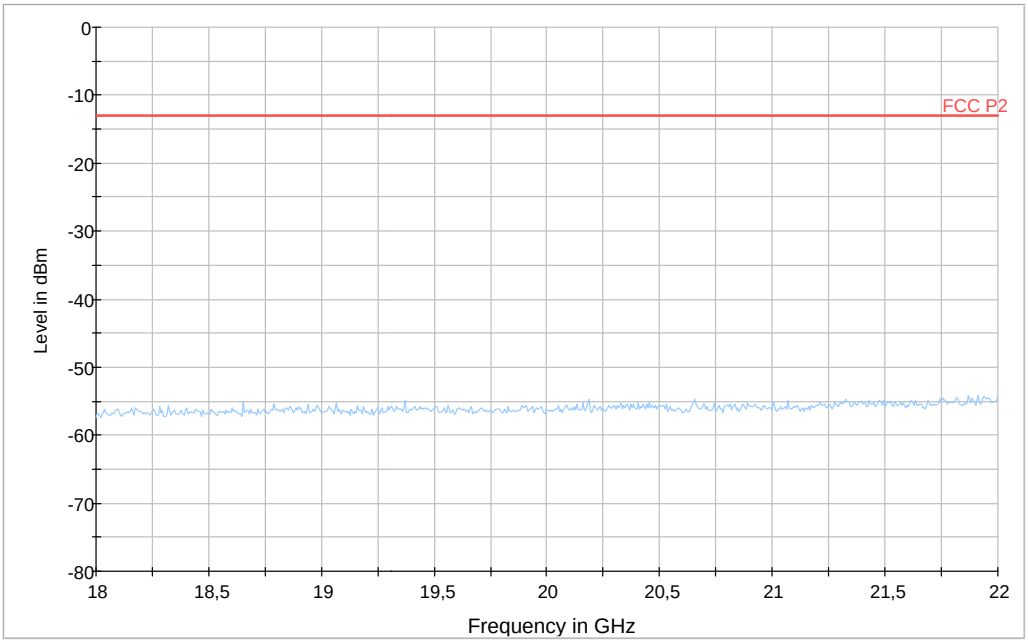


Diagram 1 d:



Appendix 8

Frequency stability measurements according to CFR 47 §27.54/ IC RSS-139 6.5

Date	Temperature (test equipment)	Humidity (test equipment)
2014-12-10 to 2014-12-12	22-23 °C ± 3 °C	27-29 % ± 5 %

Test set-up and procedure

The measurement was made per 3GPP TS 36.141. The output was connected to a spectrum analyser. The spectrum analyser was connected to an external 10 MHz reference standard during the measurements.

The measurement was also made using a resolution bandwidth of 1% of the emission bandwidth, a reference point at the unwanted emission level which complies with the attenuation of 43 + 10 log10 p (watts) (i.e. -13dBm) (for MIMO -16dBm) at the band edge of the lowest and highest channel was selected, and the frequency at these points was recorded as fL and fH respectively.

Measurement equipment	SP number
Rohde & Schwarz signal analyzer FSQ 40	504 143
R&S FSQ 40	902 073
RF attenuator	900 691
Testo 635, Temperature and humidity meter	504 203
Temperature cabinet	503 360

Results

Nominal transmitter frequency was 2132.5 MHz (M) with a bandwidth of 5 MHz. Rated output power level at connector RF A (maximum): 17 dBm.

Configuration: RDI Cable 200m

Test conditions		Frequency error (Hz)
Supply voltage DC (V)	Temp. (°C)	
-48.0	+20	+10
-55.2	+20	+11
-40.8	+20	+11
-48.0	+30	+11
-48.0	+40	+12
-48.0	+50	+11
-48.0	+10	+8
-48.0	0	Not possible to activate transmitter
Maximum freq. error (Hz)		12
Measurement uncertainty		$< \pm 1 \times 10^{-7}$

Configuration: RDI Cable 200m

Test conditions			Frequency margin to band edge at -16dBm			
Supply voltage DC [V]	Temp [°C].	Carrier Bandwidth [MHz]	Test frequency Symbolic name Bottom		Test frequency Symbolic name Top	
			fL [MHz]	Offset to lower band edge (2110 MHz) [kHz]	fH [MHz]	Offset to upper band edge (2155 MHz) [kHz]
-48.0	+20	5	2110.205	205.0	2154.800	200.0
-48.0	+20	20	2110.832	832.0	2154.16	840.0

The frequency error results clearly shows that the frequency stability is good enough to ensure that the transmitted carrier stay within the operating band.

Remark

It was deemed sufficient to test one combination of TX frequency, channel bandwidth configuration and test model (modulation), as all combinations share a common internal reference to derive the TX frequency from.

Limits

§27.54:
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

RSS-139 6.3 Frequency:
The frequency stability shall be sufficient to ensure that the emission bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen

Complies?	Yes

Appendix 9

External photos

Top side

Bottom side

Side

Label