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Class II permissive change on AIR 21 B4A B2P 1700/2100 MHz radio equipment with FCC ID: TA8AKRC118046-1 and IC: 287AB-AS1180461 (6 appendices)

Test object

Product name: AIR 21 B4A B2P
Product number: KRC 118 046/1, R3B

Summary

See appendix 1 for general information and appendix 6 for external photos.

Standard	Compliant	Appendix
FCC CFR 47 / IC RSS-139 Issue 2		
2.1046 / RSS-139 6.4 RF power output conducted	Yes	2
2.1049 / RSS-Gen 4.6.1 Occupied bandwidth	Yes	3
2.1051 / RSS-139 6.5 Band edge	Yes	4
2.1051 / RSS-139 6.5 Spurious emission at antenna terminals	Yes	5

Note: Above RSS-139 items are given as cross-reference only. Measurements were performed according to ANSI procedures referenced by FCC and covered by SP's accreditation.

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Appendix 1

Description of the test object

Equipment:	Product name: AIR 21 B4A B2P Product number: KRC 118 046/1, R3B FCC ID TA8AKRC118046-1 IC 287AB-AS1180461 IC MODEL NO: AS1180461
Tested configuration:	LTE single RAT MIMO mode
Frequency bands:	TX: 2110 – 2155 MHz RX: 1710 – 1755 MHz
Antenna ports:	2 TX/RX ports, (internally connected to integrated Cross-Polarized antenna elements)
RF configuration:	Single carrier, multi carrier and MIMO 2x2
Nominal output power per antenna port:	Single carrier: 1x 44.8 dBm (1 x 30W) Multi carrier: 2 x 41.8 dBm (2 x 15W)
Antenna type:	Cross- polarized antenna
Antenna gain:	18 dBi
Channel bandwidths:	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz and 20 MHz
Modulations:	QPSK, 16QAM and 64QAM
Nominal supply voltage:	-48VDC

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. 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

The test object was powered with -48 VDC unless noted otherwise. All measurements were performed with the test object configured for maximum transmit power.

Conducted measurements

The conducted measurements were performed on AIR 21 B4A B12P B8P with product number KRC 118 056/1 including the radio unit ARUS B4 1/KRC 118 046 which is identical for AIR 21 B4 B2P and is representative for conducted TX performance measurements.

The test object was pole mounted and powered with -48 VDC by an external power supply. All TX parameters were measured at port RF A with port RF B terminated into 50 ohm. Complete measurements were made on RF A with additional measurements on RF B to verify that the ports are identical.

Purpose of test

The purpose of test is to justify a Class II Permissive Change of the test object with hardware update and to include the use of multi carrier and MIMO mode, by verifying compliance to the performance characteristics specified in applicable parts of FCC CFR 47, 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, 2012

CFR 47 part 27, October 1st, 2012

RSS-Gen Issue 3

RSS-139 Issue 2

Appendix 1

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 2013-10-18.

Manufacturer's representative

Christer Gustavsson, Ericsson AB.

Test engineers

Andreas Johnson , Kexin Chen, Hyder Khalaf, Tomas Lennhager, Tomas Isbring, Jörgen Wassholm and Rolf Kühn, SP.

Test participant

None.

Appendix 1

Measurement equipment

	Calibration Due	SP number
Test site Tesla	2014-01	503 881
R&S FSIQ 40	2014-07	503 738
R&S ESU 26	2014-05	901 553
R&S FSQ 40	2014-03	504 143
Control computer with R&S software EMC32 version 8.52.0	-	503 899
High pass filter	2014-07	901 501
High pass filter	2014-07	901 502
High pass filter	2014-07	504 199
High pass filter	2014-09	901 373
High pass filter	2014-09	503 739
High pass filter	2014-07	503 740
RF attenuator	2014-07	504 159
RF attenuator	2014-07	900 233
RF attenuator	2014-07	900 691
RF attenuator	2014-07	901 384
RF attenuator	2013-12	901 508
Chase Bilog Antenna CBL 6111A	2014-10	503 182
EMCO Horn Antenna 3115	2015-09	502 175
Std.gain horn FLANN model 20240-20	-	503 674
µComp Nordic, Low Noise Amplifier	2014-04	901 545
Miteq Low Noise Amplifier	2014-09	503 285
Schwartzbeck preamplifier BBV 9742	2014-14	504 085
Temperature and humidity meter, Testo 635	2014-06	504 203
Temperature and humidity meter, Testo 625	2014-06	504 188
Temperature Chamber	2013-11	501 031
Multimeter Fluke 87	2014-08	502 190

Appendix 1

Test frequencies used for conducted and radiated measurements

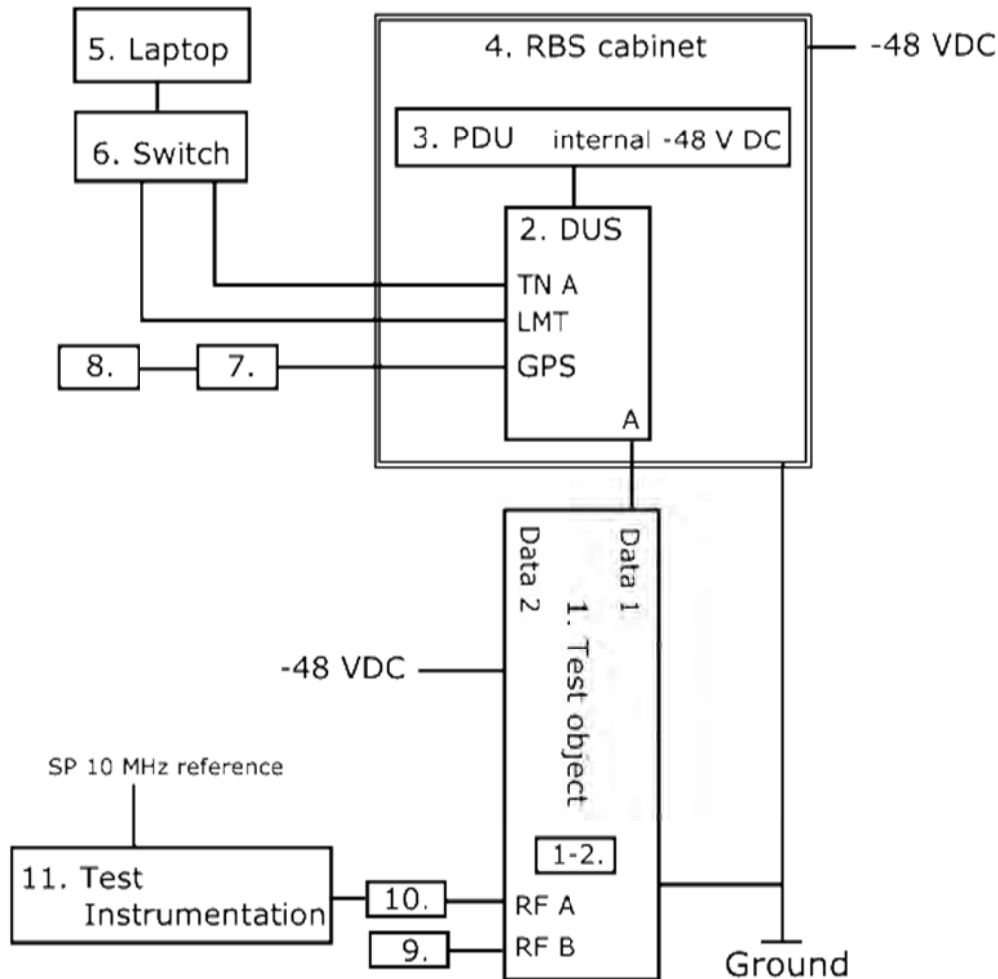
TX test frequencies

EARFCN Downlink	Frequency [MHz]	Symbolic name	Comment
1957	2110.7	B	TX bottom frequency in 1.4 MHz BW configuration
1957	2110.7	B2-1.4	2 carrier TX band bottom constellation
1971	2112.1		1.4 MHz BW configuration
1965	2111.5	B2-3	2 carrier TX band bottom constellation
1995	2114.5		3 MHz BW configuration
1965	2111.5	B	TX bottom frequency in 3 MHz BW configuration
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
2168	2131.8	M2	2 carrier TX band mid constellation
2182	2133.2		1.4 MHz BW configuration
2393	2154.3	T	TX top frequency in 1.4 MHz BW configuration
2385	2153.5	T	TX top frequency in 3 MHz BW configuration
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
2379	2152.9	T2-1.4	2 carrier TX band top constellation
2393	2154.3		1.4 MHz BW configuration
2385	2153.5	T2-3	2 carrier TX band top constellation
2355	2150.5		3 MHz BW configuration
1980	2113.0	Bim1	2 carrier TX band 1.4 MHz BW configuration
2022	2117.2		
2328	2147.8	Tim1	2 carrier TX band 1.4 MHz BW configuration
2370	2152.0		
2100	2125.0	Bim2	2 carrier TX band 1.4 MHz BW configuration
2262	2141.2		
2088	2123.8	Tim2	2 carrier TX 1.4 MHz BW configuration
2250	2140.0		

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

Appendix 1

Test set-up conducted measurements



Test object

1.	AIR 21 B4A B12P B8P, KRC 118 056/1, revision R1A, s/n: CQ30112763 with software: CXP 901 3268/6, revision R51NE 1-2. Transciever, ARUS B4 1/KRC 118 046, revision R1C
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Functional test equipment

2.	DUS 41 01, KDU 137 624/1, revision R6A, s/n: A401981392
3.	PDU 02 01, BMG 980 336/4, revision R2A, s/n: BJ31528316
4.	RBS 6201 cabinet, BAMS – 1000778792
5.	Controlling laptop HP Elitebook 8560w, BAMS 1001236856 running software MOSHELL V9.0z
6.	Fast Ethernet switch, Netgear FS726T
7.	GPS 02 01, NCD 901 41/1, revision R1D, s/n: TU8K475230
8.	GPS Active Antenna, KRE 101 2082/1
9.	Terminator, 50 ohm
10.	Attenuator, according respective appendix
11.	SP Test Instrumentation according to measurement equipment list

Appendix 1

Interfaces:**Type of port:**

Power: -48 VDC	DC Power
Antenna port (A), (passive antenna), 7/16-connector	Antenna
Antenna port (B), (passive antenna), 7/16-connector	Antenna
Data 1, Optical Interface Link, single mode opto fibre	Signal
Data 2, Optical Interface Link, single mode opto fibre, not in use	Signal
Ground wire	Ground

RBS software:

Software	Revision
CXP 102 051/19	R22EU

Appendix 2

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

Date	Temperature	Humidity
2013-11-05	22 °C ± 3 °C	30 % ± 5 %
2013-11-06	22 °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	504 143
RF attenuator	901 508
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 1.1 dB

Results

MIMO mode, single carrier

Rated output power level at RF connector 1x 44.8 dBm.

Carrier BW [MHz]	Symbolic name	[RMS dBm/ PAR dB]		
		Port RF A	Port RF B	Total power ¹⁾
1.4	B	44.59/ 7.19	44.37/ 7.21	47.49
20.0	B	44.80/ 7.36	44.60/ 7.36	47.71
1.4	M	44.67/ 7.19	44.67/ 7.21	47.68
3.0	M	44.80/ 7.26	44.73/ 7.28	47.78
5.0	M	44.79/ 7.33	44.73/ 7.36	47.77
10.0	M	44.74/ 7.28	44.63/ 7.28	47.70
15.0	M	44.76/ 7.28	44.61/ 7.28	47.70
20.0	M	44.78/ 7.28	44.60/ 7.31	47.70
1.4	T	44.58/ 7.19	44.45/ 7.21	47.53
20.0	T	44.77/ 7.38	44.62/ 7.38	47.71

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

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

Appendix 2

MIMO mode, multicarrier

Rated output power level at RF connector 2x 41.8 dBm.

Carrier BW [MHz]	Symbolic name	[RMS dBm/ PAR dB]		
		Port RF A	Port RF B	Total power ¹⁾
1.4	B2-1.4	44.52/ 6.97	44.55/ 7.00	47.55
1.4	M2	44.67/ 6.97	44.56/ 6.97	47.63
1.4	T2-1.4	44.58/ 6.97	44.58/ 7.00	47.59

¹⁾: Summed output power according to FCC KDB662911 D01 Multiple transmitter output v02

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

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	
1.4	B	43.57	43.70	46.70
20.0	B	33.05	33.16	36.16
1.4	M	43.96	43.80	46.96
3.0	M	41.12	41.05	44.12
5.0	M	39.11	38.91	42.11
10.0	M	36.04	35.86	39.04
15.0	M	34.50	34.34	37.50
20.0	M	32.78	32.99	35.99
1.4	T	43.69	43.82	46.82
20.0	T	33.19	33.14	36.19

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

Appendix 2

Limits

- §27.50: The maximum output power may not exceed 1640 W (EIRP)/ MHz.
The Peak to Average Ratio (PAR) may not exceed 13 dB.
- RSS-139 6.4: The average equivalent isotropically radiated power (e.i.r.p.) limits in SRSP-513 apply, resulting in a maximum EIRP of 1640 W/ MHz for the scope of this report.
The peak-to-average ratio PAR of the power shall not exceed 13 dB.

Complies?	Yes
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Appendix 3

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

Date	Temperature	Humidity
2013-11-05	22 °C ± 3 °C	30 % ± 5 %
2013-11-06	22 °C ± 3 °C	29 % ± 5 %
2013-11-25	24 °C ± 3 °C	16 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §2.1049. The output was connected to a signal analyser with the RMS detector activated. The signal analyser was connected to an external 10 MHz reference standard during the measurements.

Measurement equipment	SP number
R&S FSW 43	902 073
RF attenuator	902 282
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

MIMO mode, single carrier

Diagram	BW configuration	Symbolic name	Tested Port	Occupied BW (99%) [MHz]
1	1.4 MHz	B	RF A	1.09
2	20 MHz	B	RF A	17.85
3	1.4 MHz	M	RF A	1.09
4	1.4 MHz	M	RF B	1.09
5	3 MHz	M	RF A	2.69
6	5 MHz	M	RF A	4.48
7	10 MHz	M	RF A	8.94
8	15 MHz	M	RF A	13.41
9	20 MHz	M	RF A	17.86
10	20 MHz	M	RF B	17.86
11	1.4 MHz	T	RF A	1.09
12	20 MHz	T	RF A	17.85

Appendix 3

Diagram 1:

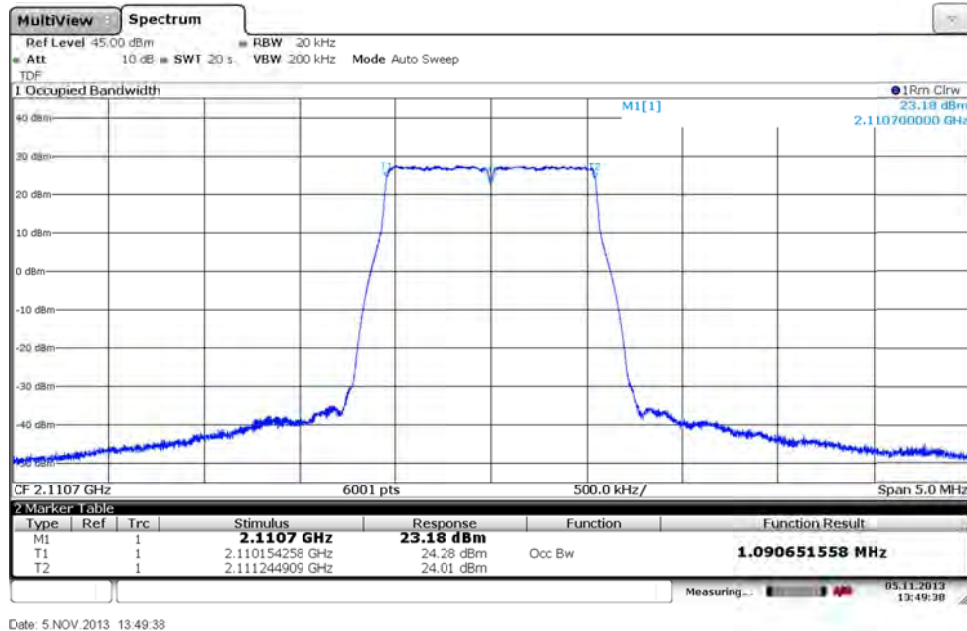
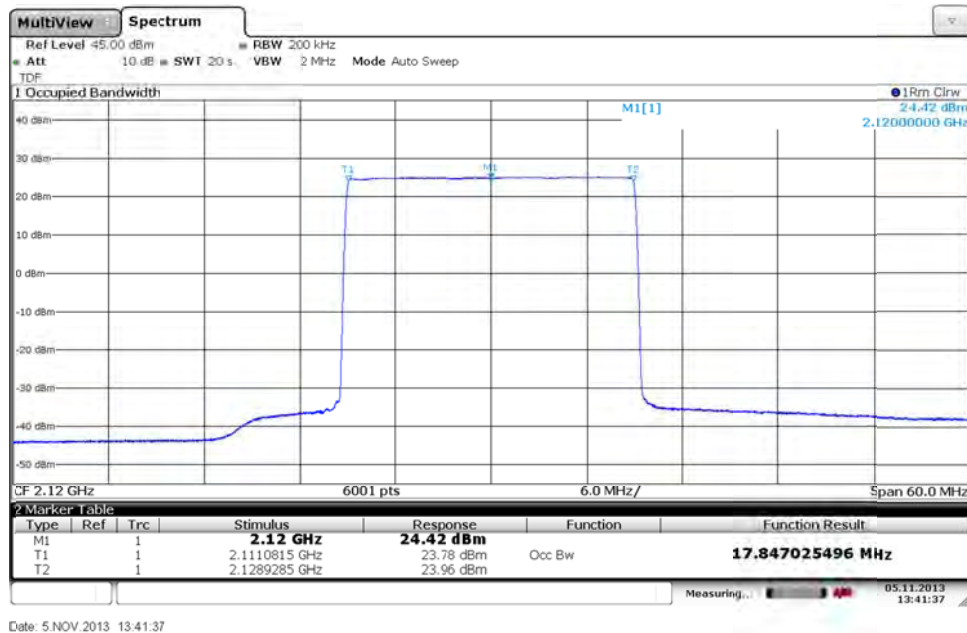


Diagram 2:



Appendix 3

Diagram 3:

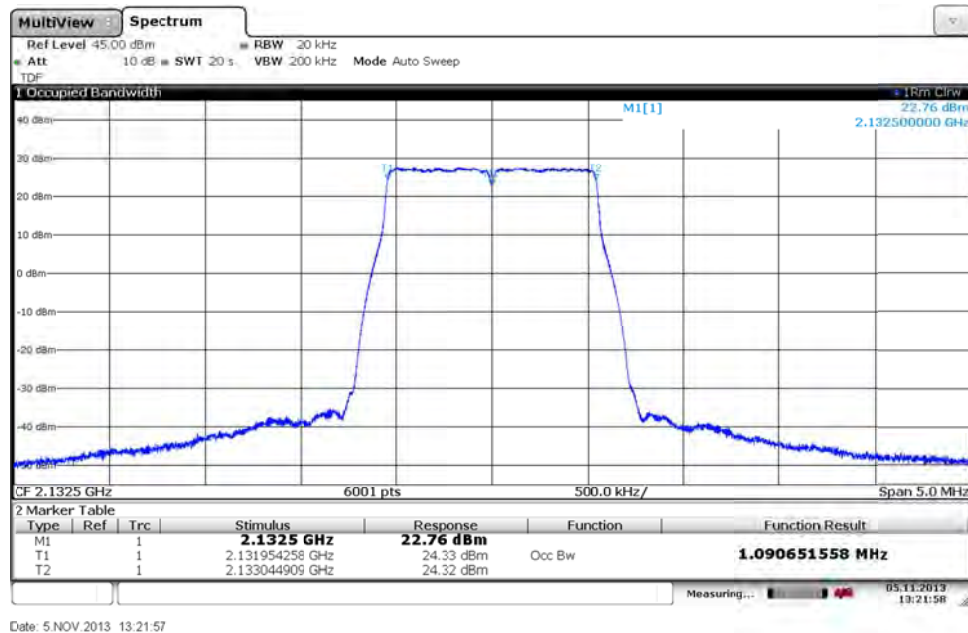
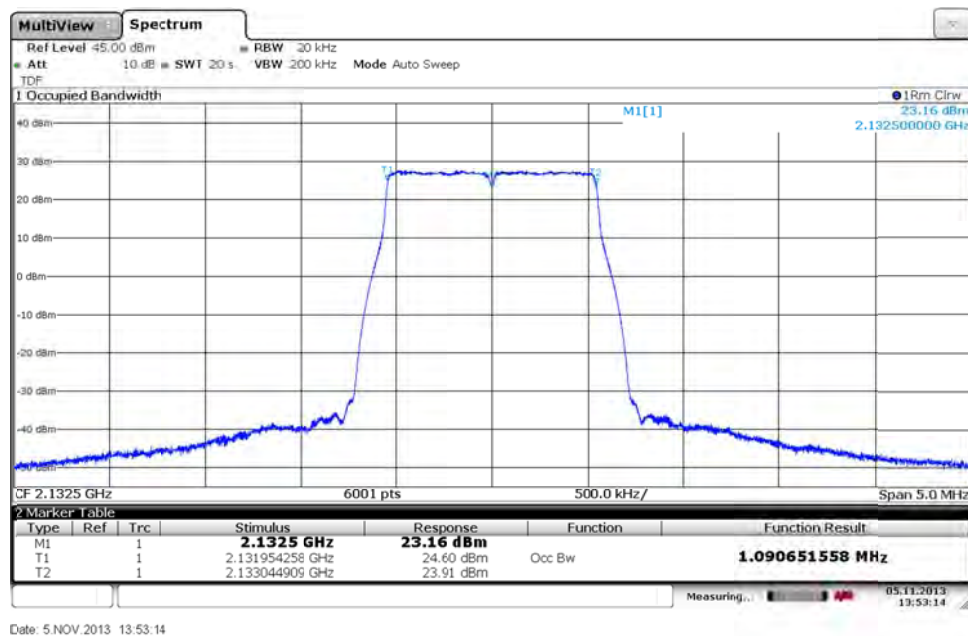
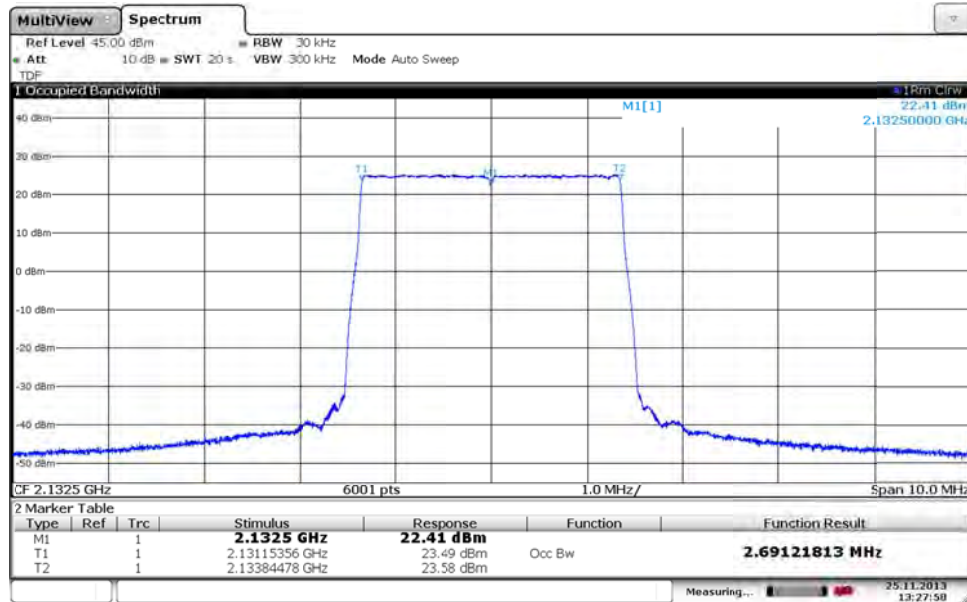


Diagram 4:



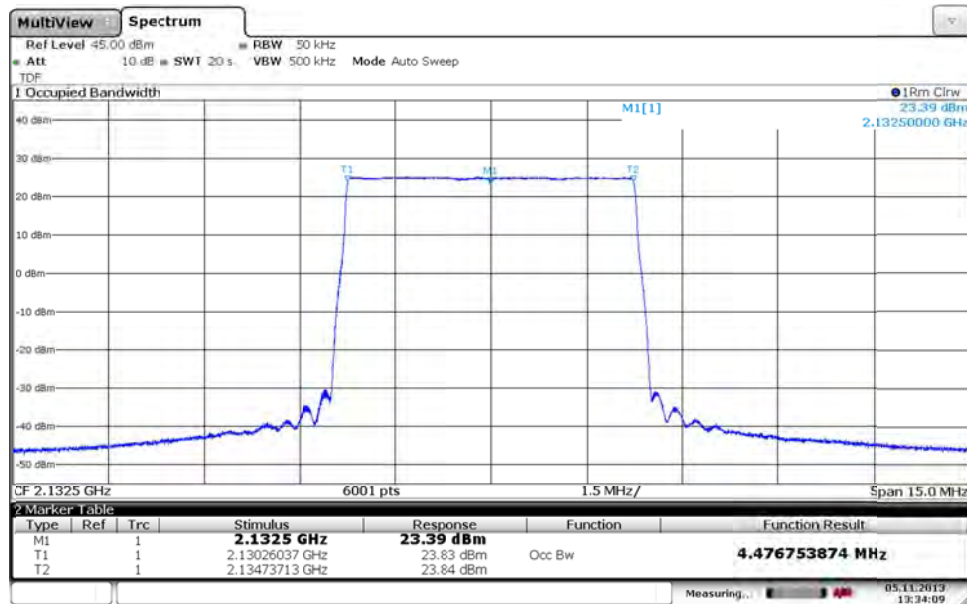
Appendix 3

Diagram 5:



Date: 25.NOV.2013 13:27:59

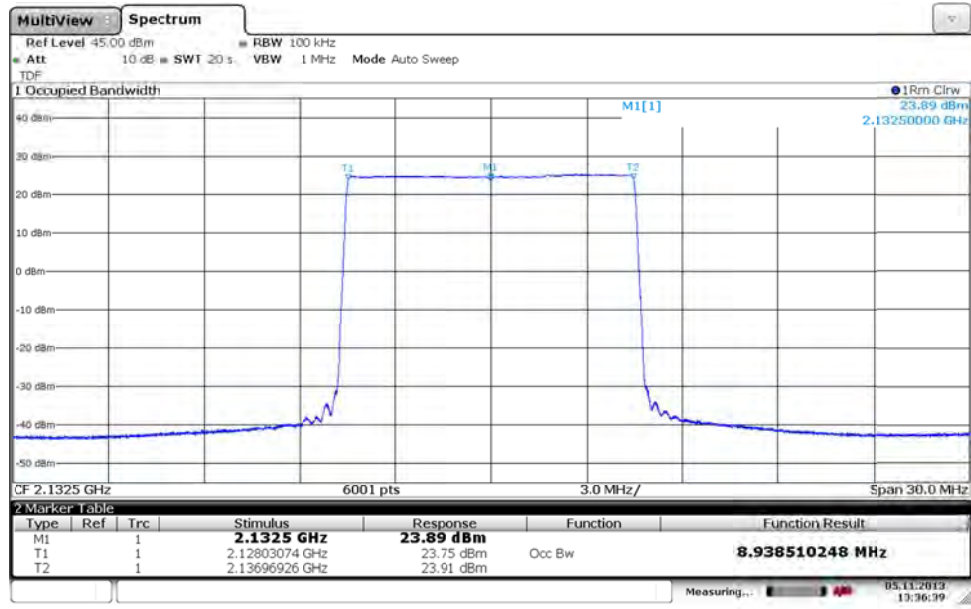
Diagram 6:



Date: 5.NOV.2013 13:34:09

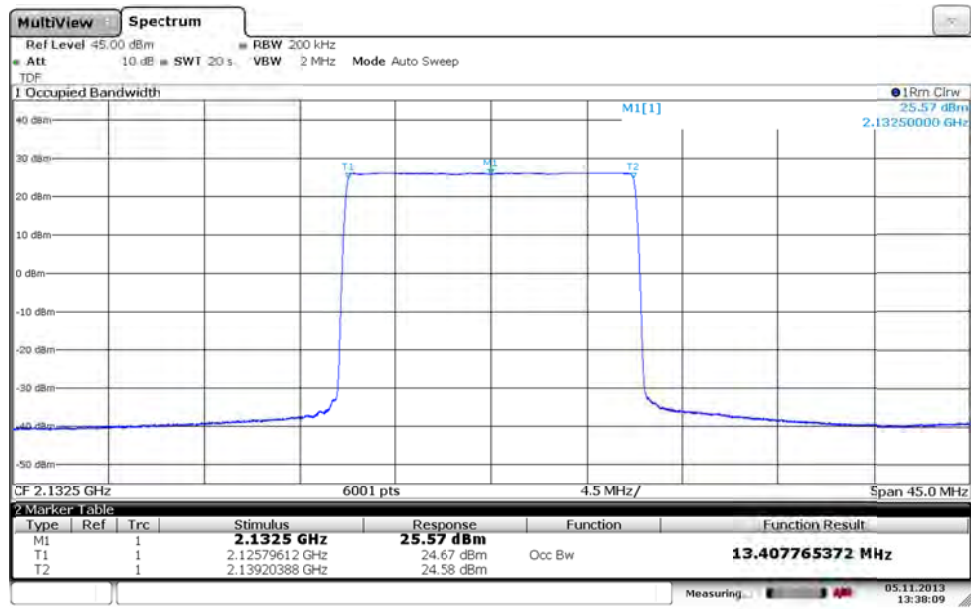
Appendix 3

Diagram 7:



Date: 5 NOV 2013 13:36:33

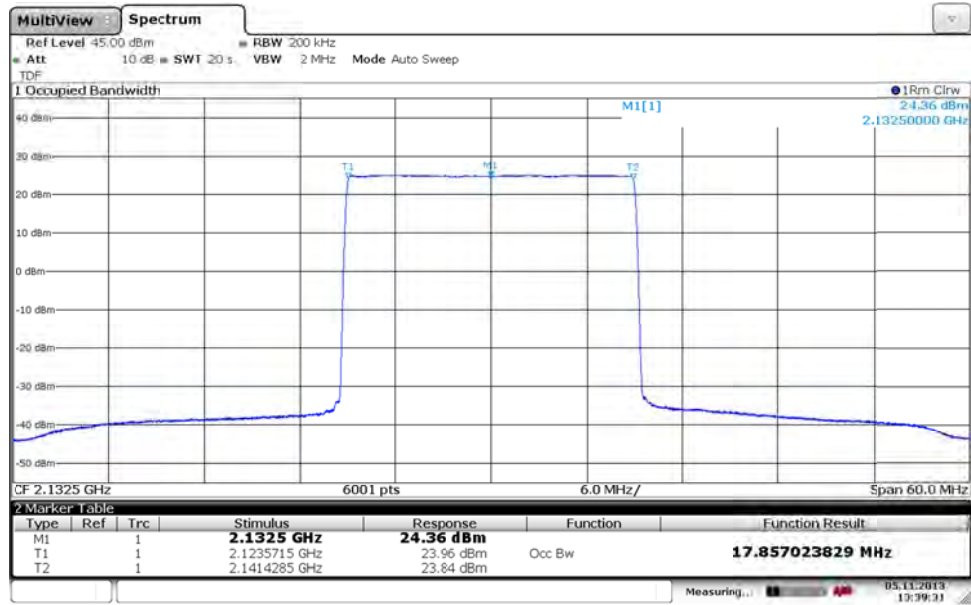
Diagram 8:



Date: 5 NOV 2013 13:38:09

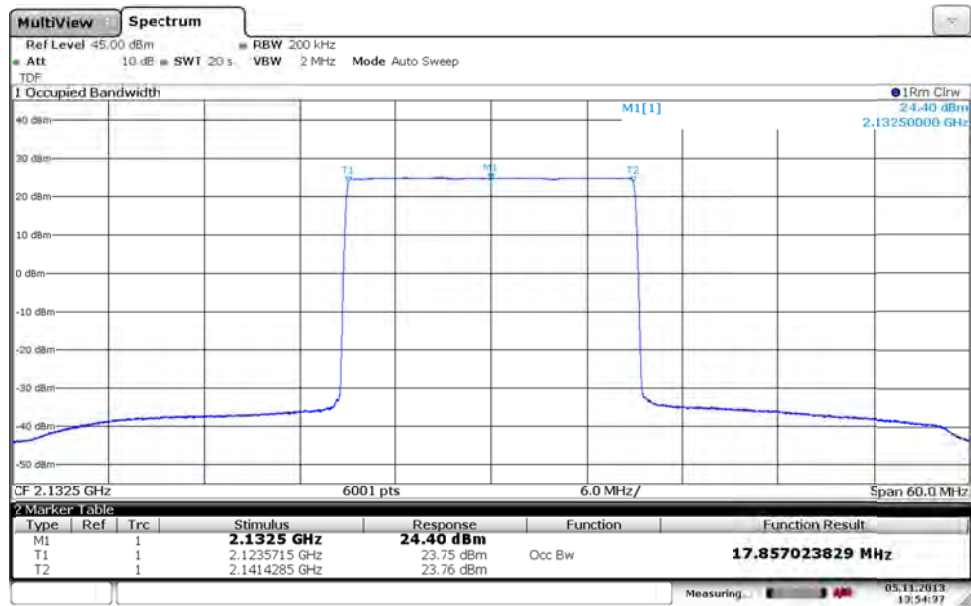
Appendix 3

Diagram 9:



Date: 5 NOV 2013 13:39:31

Diagram 10:



Date: 5 NOV 2013 13:54:37

Appendix 3

Diagram 11:

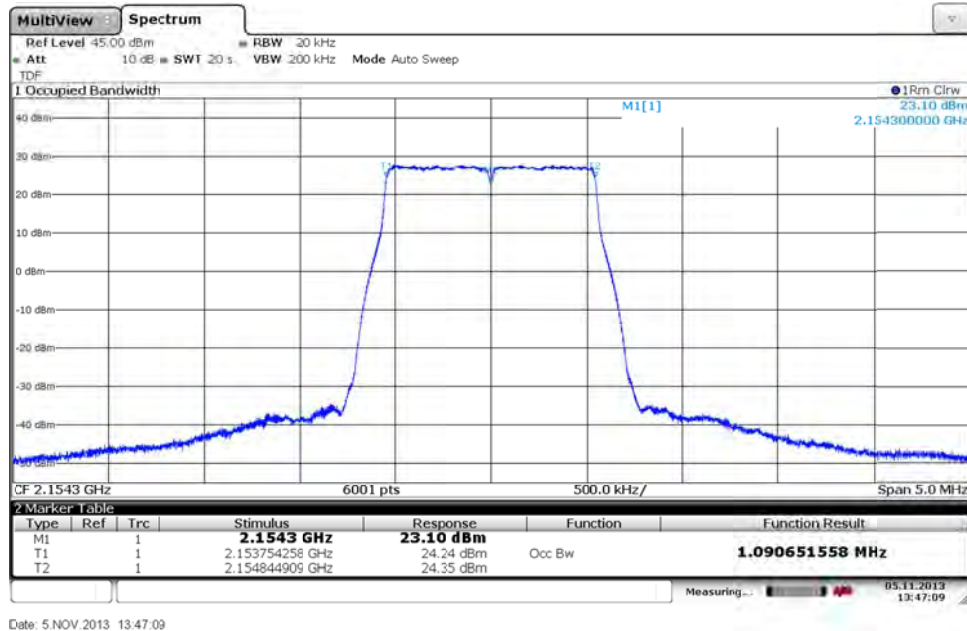
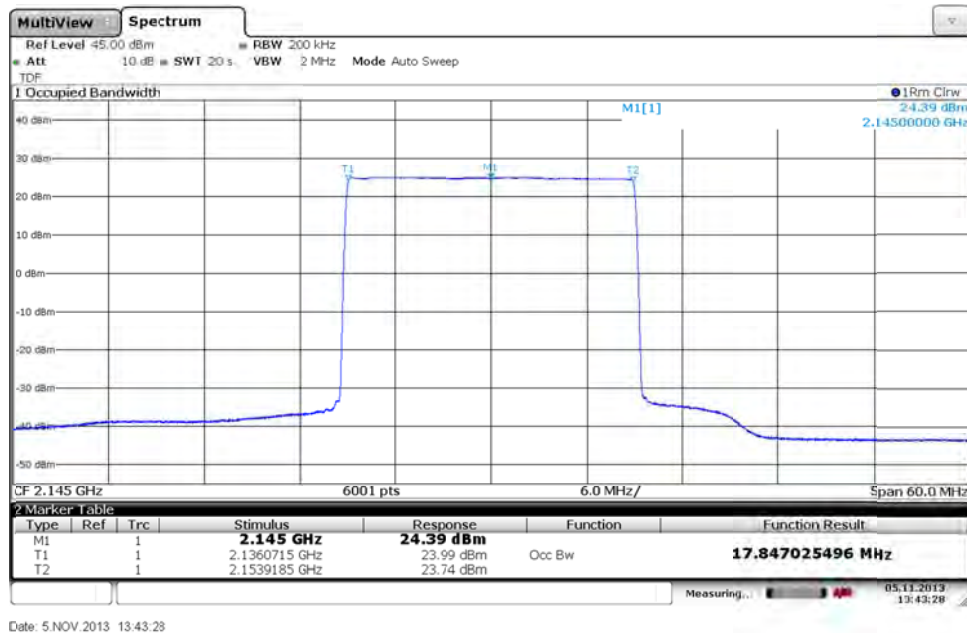


Diagram 12:



Appendix 4

Band edge measurements according to CFR 47 §27.53(h) / IC RSS-139 6.5

Date	Temperature	Humidity
2013-11-04	19 °C ± 3 °C	35 % ± 5 %
2013-11-05	22 °C ± 3 °C	30 % ± 5 %
2013-11-06	22 °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 200 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 7 dB to -20 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 FSW 43	902 073
RF attenuator	902 282
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Appendix 4

Results

MIMO mode, single carrier

Diagram	BW configuration	Symbolic name	Tested Port
1 a-c	1.4 MHz	B	RF A
2 a-c	3 MHz	B	RF A
3 a-c	3 MHz	B	RF B
4 a-c	5 MHz	B	RF A
5 a-c	10 MHz	B	RF A
6 a-c	15 MHz	B	RF A
7 a-c	20 MHz	B	RF A
8 a-c	1.4 MHz	T	RF A
9 a-c	3 MHz	T	RF A
10 a-c	3 MHz	T	RF B
11 a-c	5 MHz	T	RF A
12 a-c	10 MHz	T	RF A
13 a-c	15 MHz	T	RF A
14 a-c	20 MHz	T	RF A

MIMO mode, multi carrier

Diagram	BW configuration	Symbolic name	Tested Port
15 a-c	1.4 MHz	B2-1.4	RF A
16 a-c	3 MHz	B2-3	RF A
17 a-c	1.4 MHz	T2-1.4	RF A
18 a-c	3 MHz	T2-3	RF A

Limits

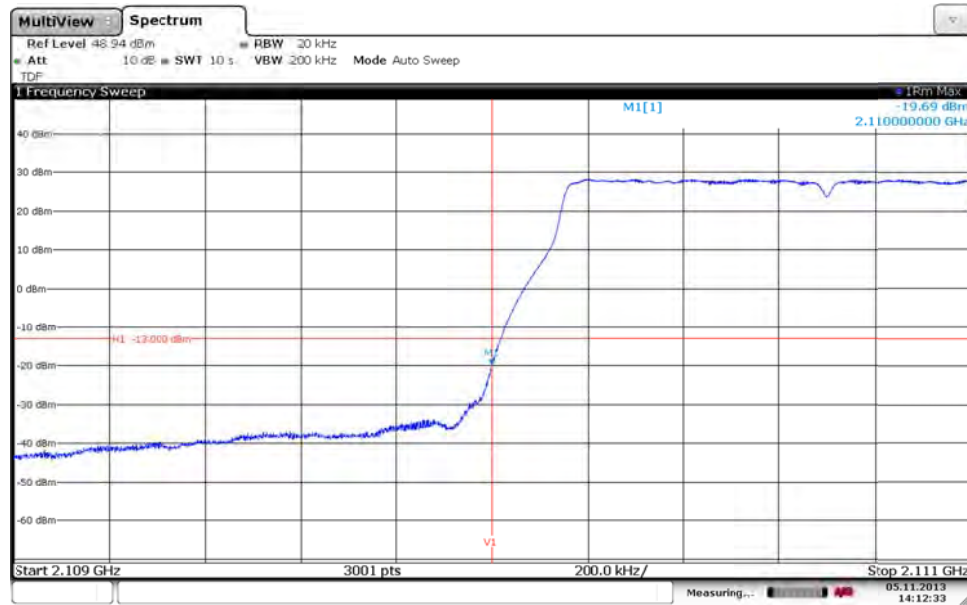
CFR 47 §27.53(h) and RSS-139 6.5

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
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Appendix 4

Diagram 1 a:



Date: 5 NOV. 2013 14:12:33

Diagram 1 b:



Date: 5 NOV. 2013 14:13:22

Appendix 4

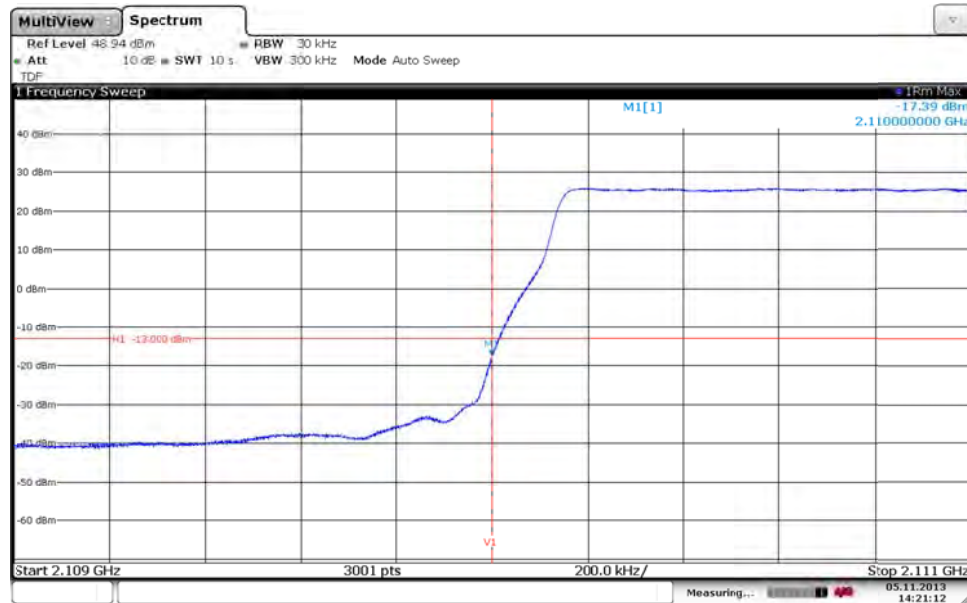
Diagram 1 c:



Date: 5 NOV. 2013 14:14:05

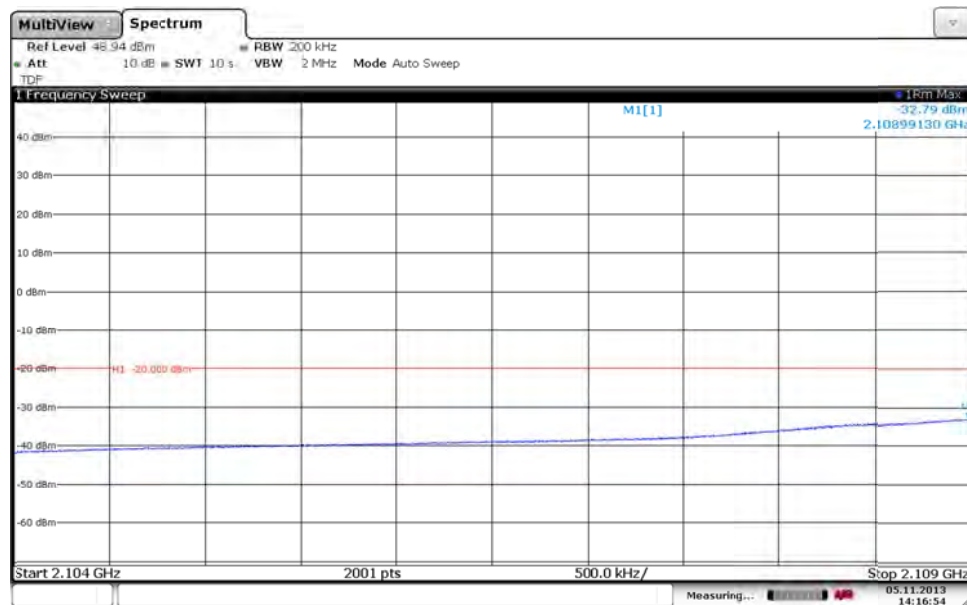
Appendix 4

Diagram 2 a:



Date: 5 NOV. 2013 14:21:12

Diagram 2 b:



Date: 5 NOV. 2013 14:16:55

Appendix 4

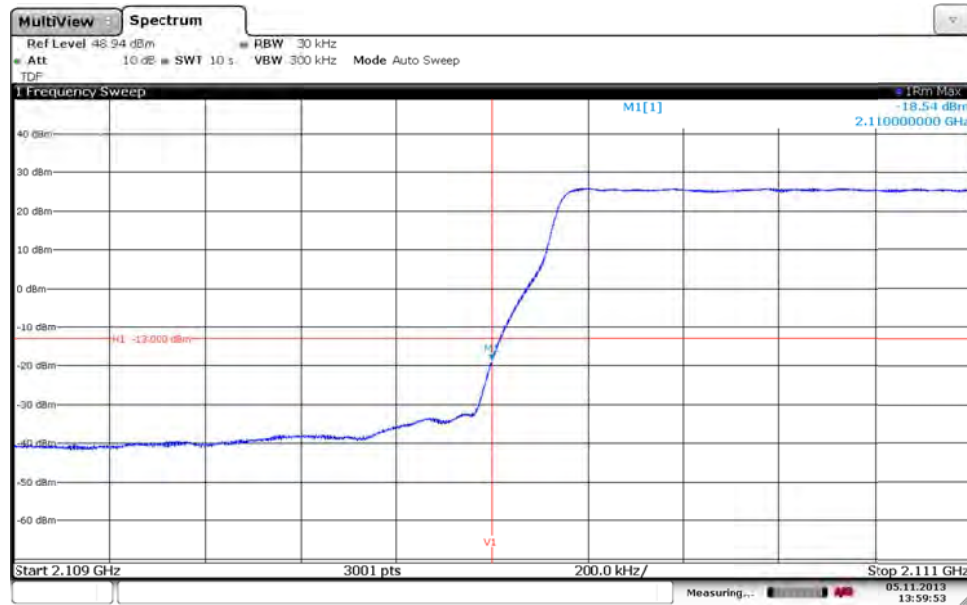
Diagram 2c:



Date: 5 NOV. 2013 14:16:04

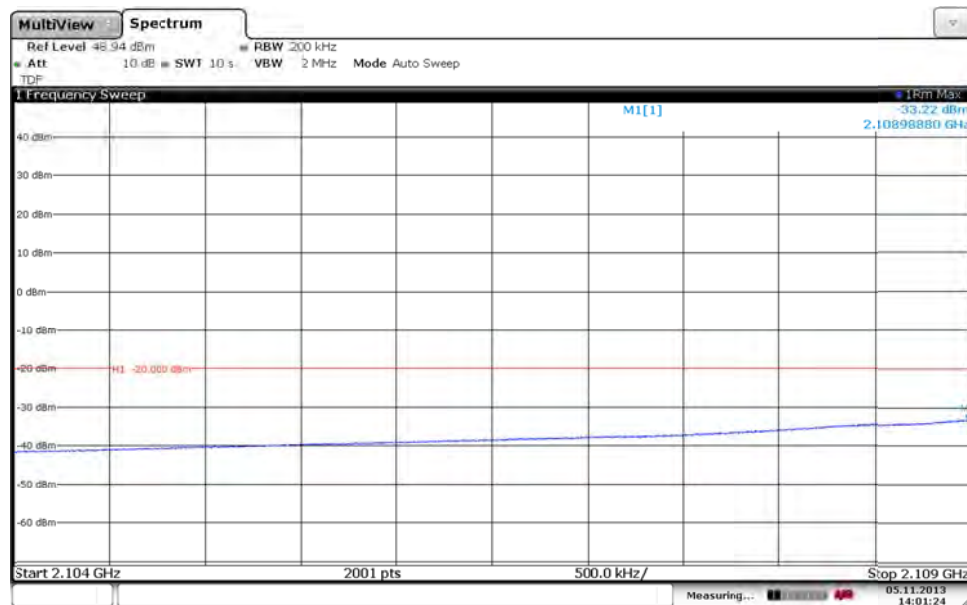
Appendix 4

Diagram 3 a:



Date: 5 NOV. 2013 13:59:54

Diagram 3 b:



Date: 5 NOV. 2013 14:01:25

Appendix 4

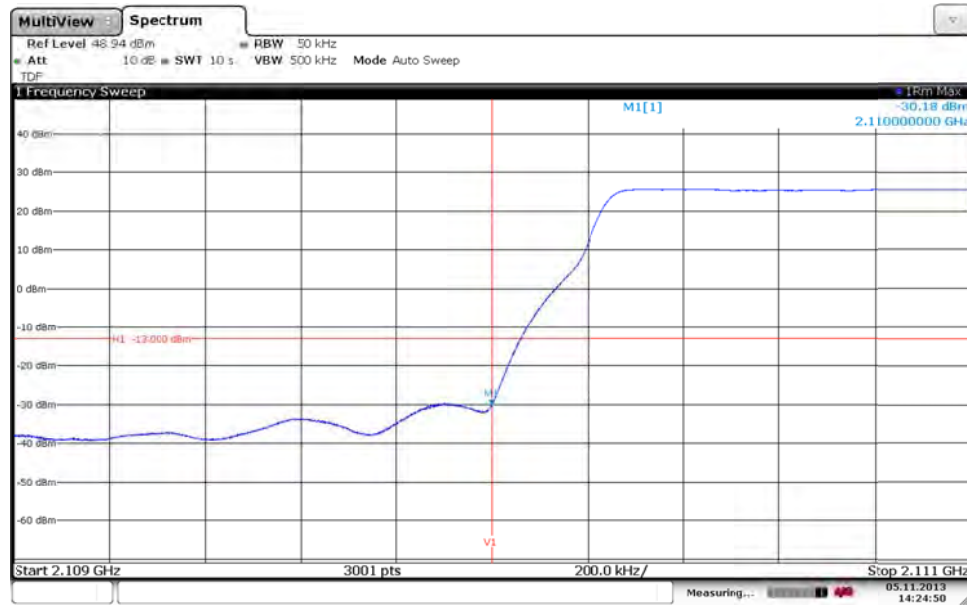
Diagram 3 c:



Date: 5 NOV 2013 14:02:37

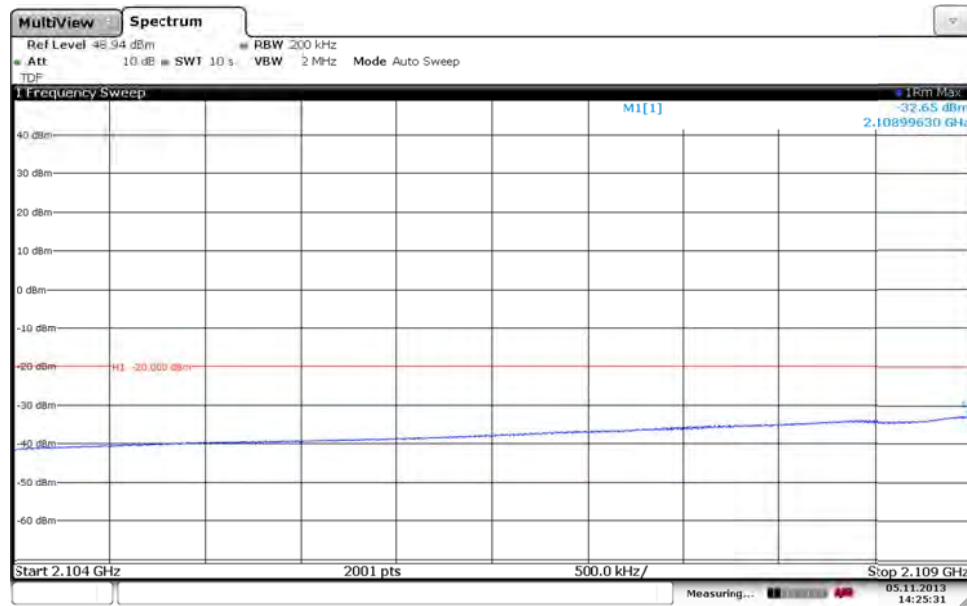
Appendix 4

Diagram 4 a:



Date: 5 NOV. 2013 14:24:49

Diagram 4 a:



Date: 5 NOV. 2013 14:25:31

Appendix 4

Diagram 4 c:



Date: 5 NOV 2013 14:26:23

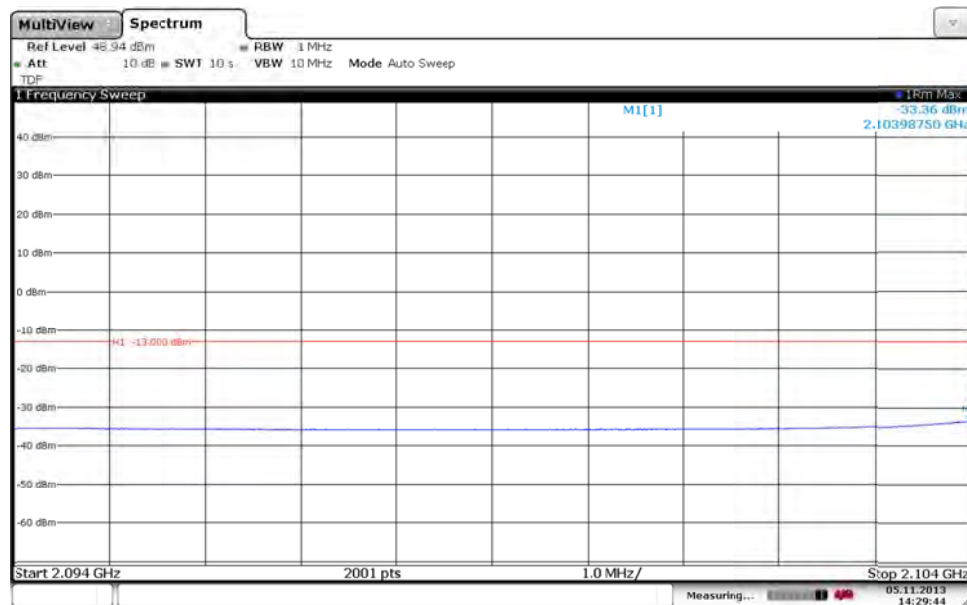
Appendix 4

Diagram 5 a:



Date: 5 NOV. 2013 14:32:29

Diagram 5 b:



Date: 5 NOV. 2013 14:29:44

Appendix 4

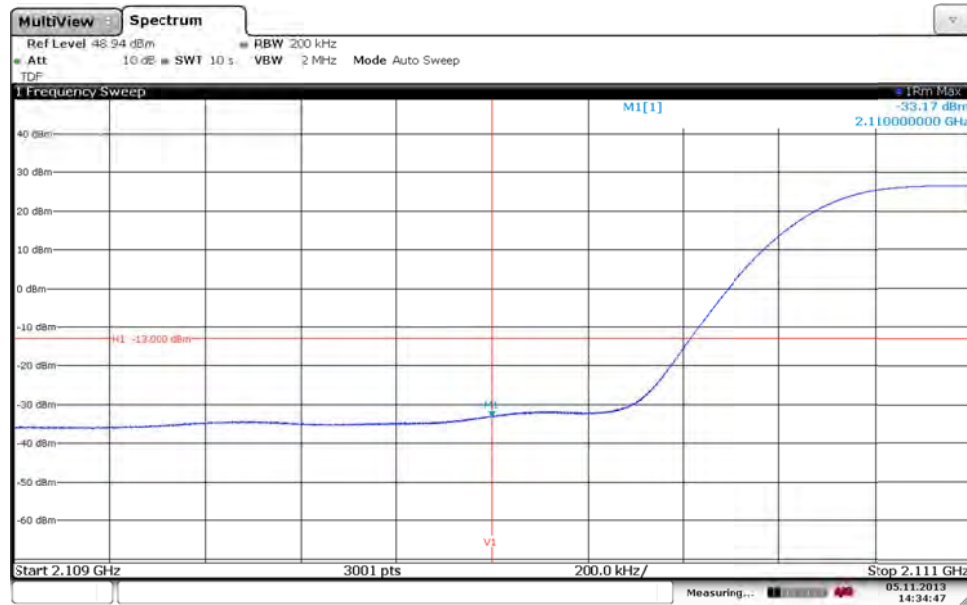
Diagram 5 c



Date: 5 NOV 2013 14:29:04

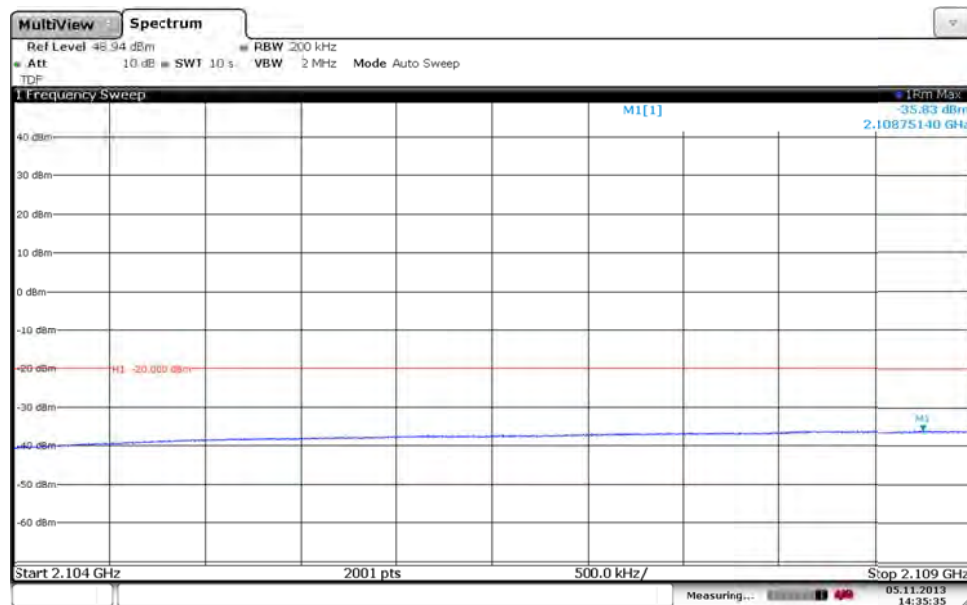
Appendix 4

Diagram 6 a:



Date: 5 NOV. 2013 14:34:43

Diagram 6 b:



Date: 5 NOV. 2013 14:35:35

Appendix 4

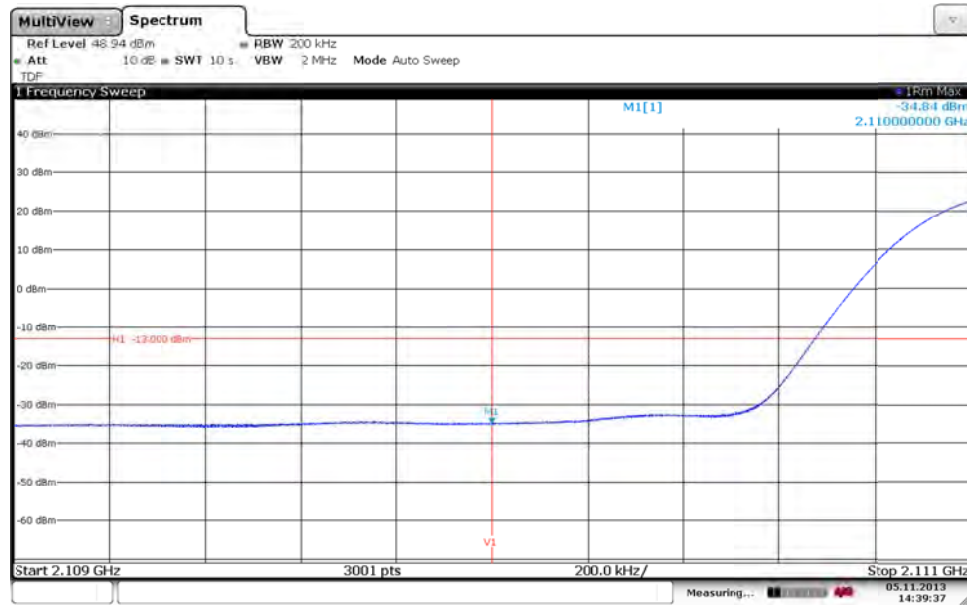
Diagram 6 c:



Date: 5 NOV. 2013 14:36:21

Appendix 4

Diagram 7 a:



Date: 5 NOV. 2013 14:39:37

Diagram 7 b:



Date: 5 NOV. 2013 14:38:35

Appendix 4

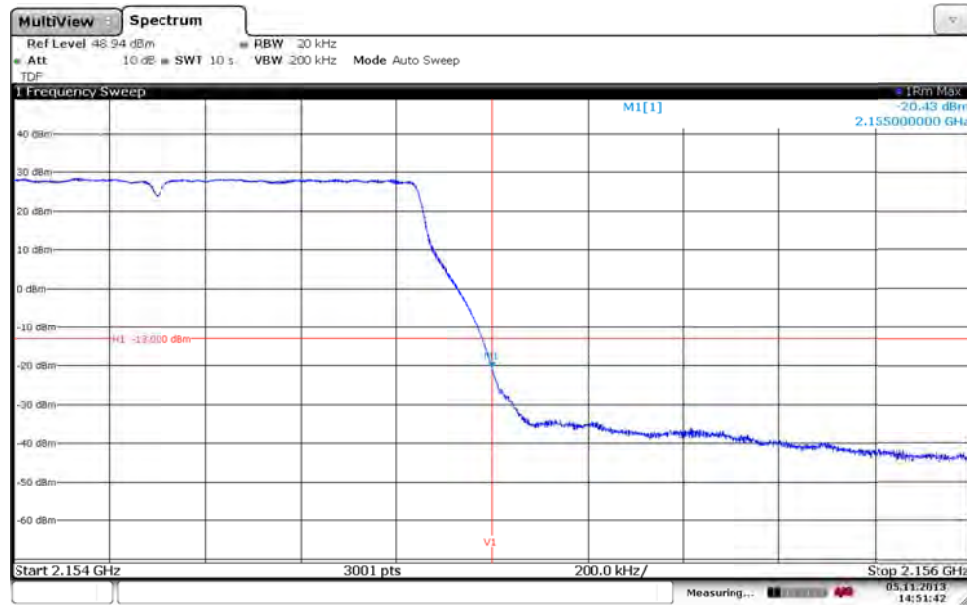
Diagram 7 c:



Date: 5 NOV. 2013 14:37:45

Appendix 4

Diagram 8 a:



Date: 5 NOV. 2013 14:51:42

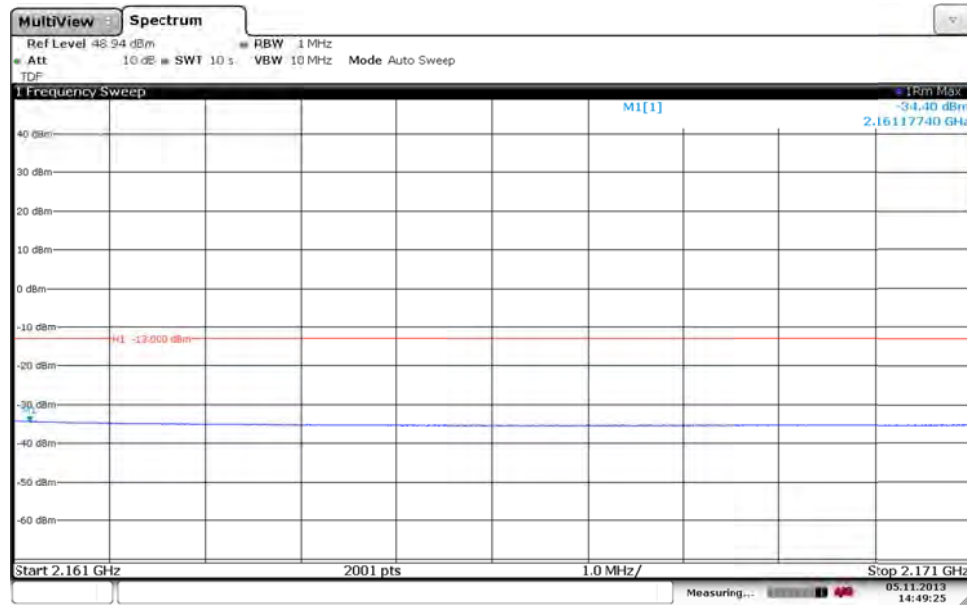
Diagram 8 b:



Date: 5 NOV. 2013 14:50:02

Appendix 4

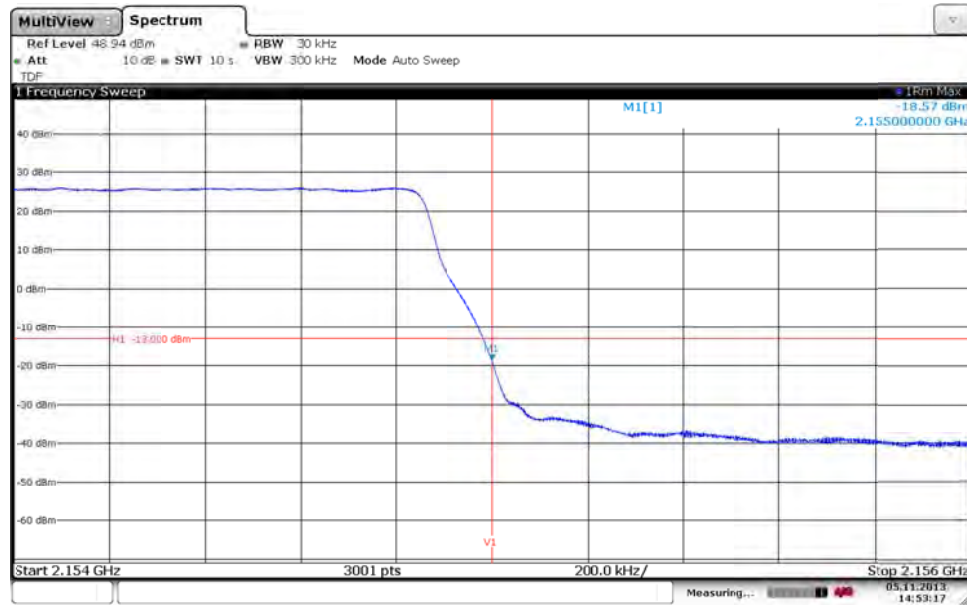
Diagram 8 c:



Date: 5 NOV. 2013 14:49:25

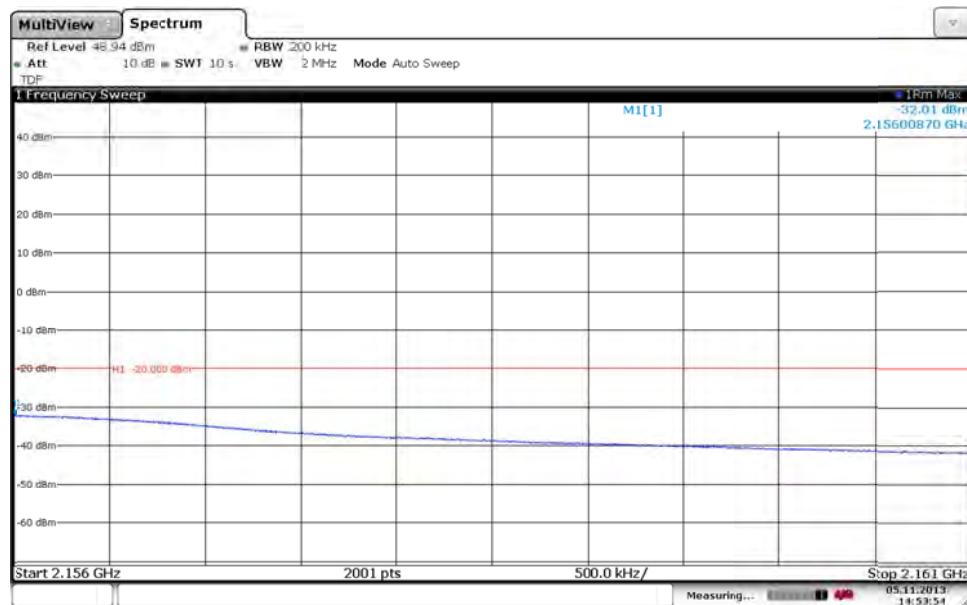
Appendix 4

Diagram 9 a:



Date: 5 NOV. 2013 14:53:13

Diagram 9 b:



Date: 5 NOV. 2013 14:53:54

Appendix 4

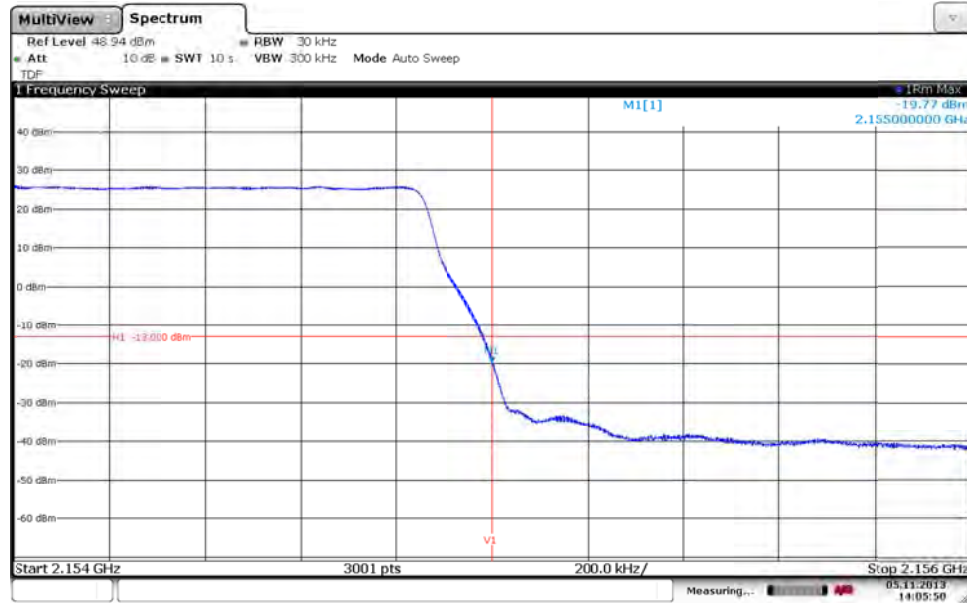
Diagram 9 c:



Date: 5 NOV. 2013 14:54:43

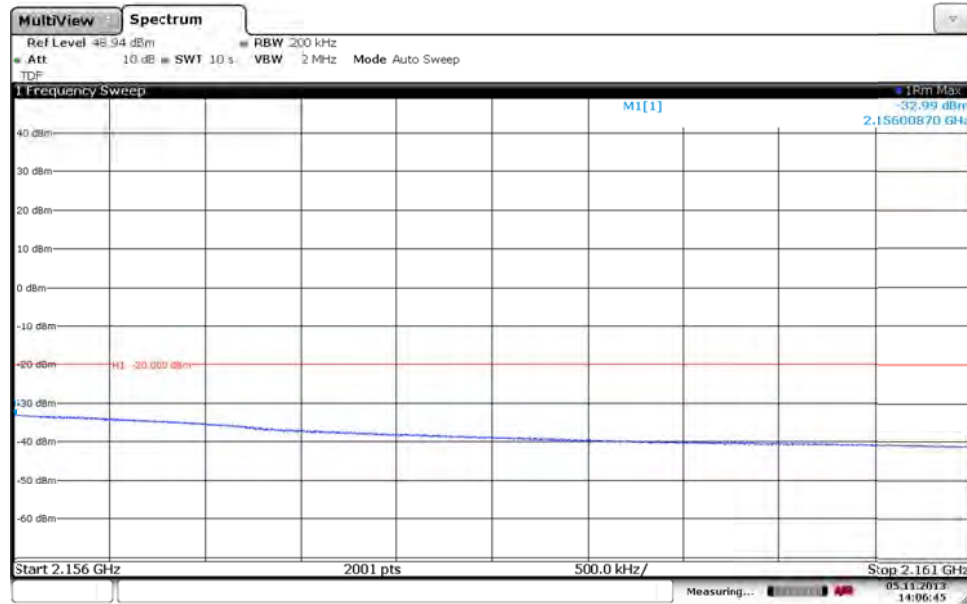
Appendix 4

Diagram 10 a:



Date: 5 NOV 2013 14:05:50

Diagram 10 b:



Date: 5 NOV 2013 14:06:44

Appendix 4

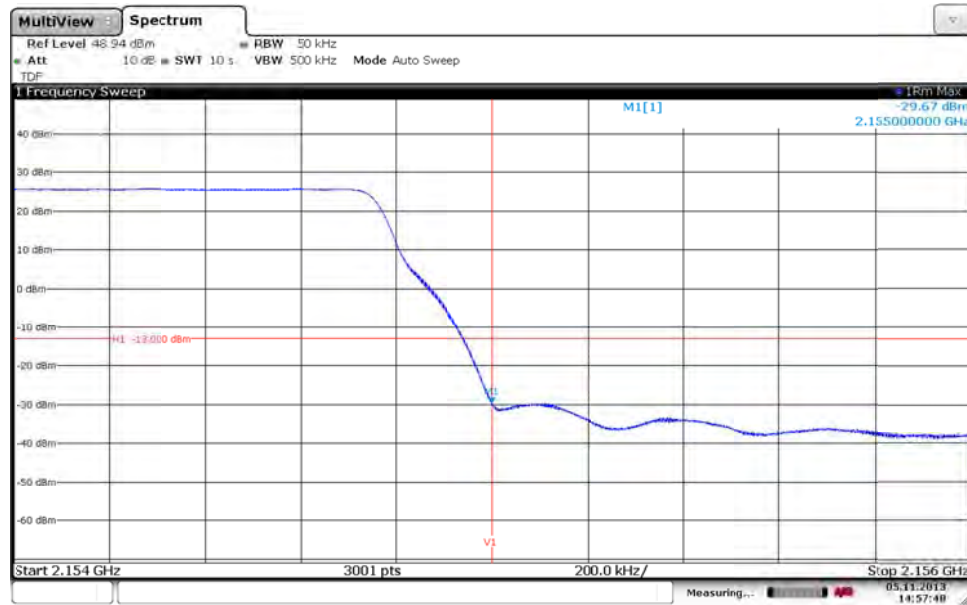
Diagram 10 c:



Date: 5 NOV. 2013 14:07:35

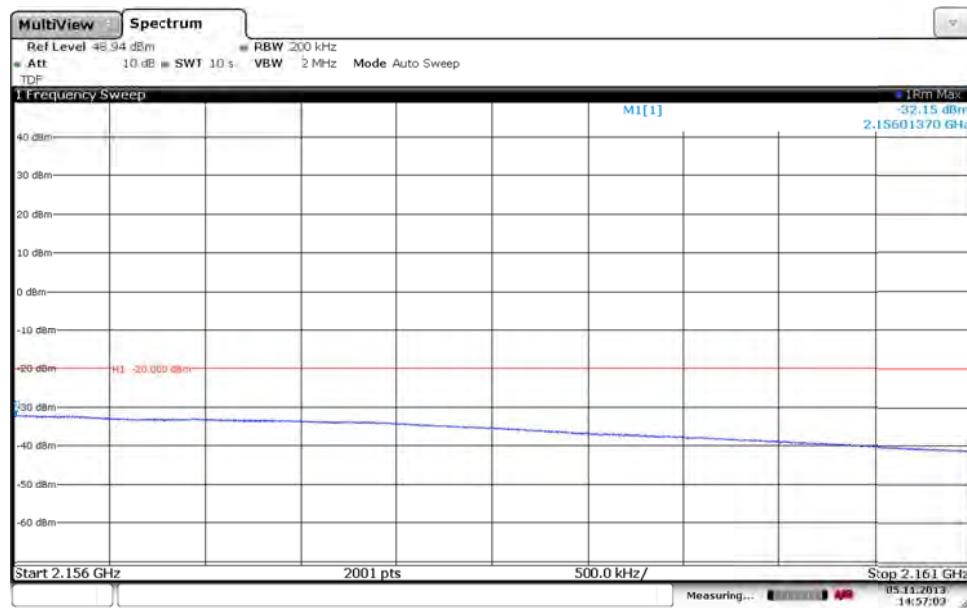
Appendix 4

Diagram 11a:



Date: 5 NOV. 2013 14:57:43

Diagram 11 b:



Date: 5 NOV. 2013 14:57:02

Appendix 4

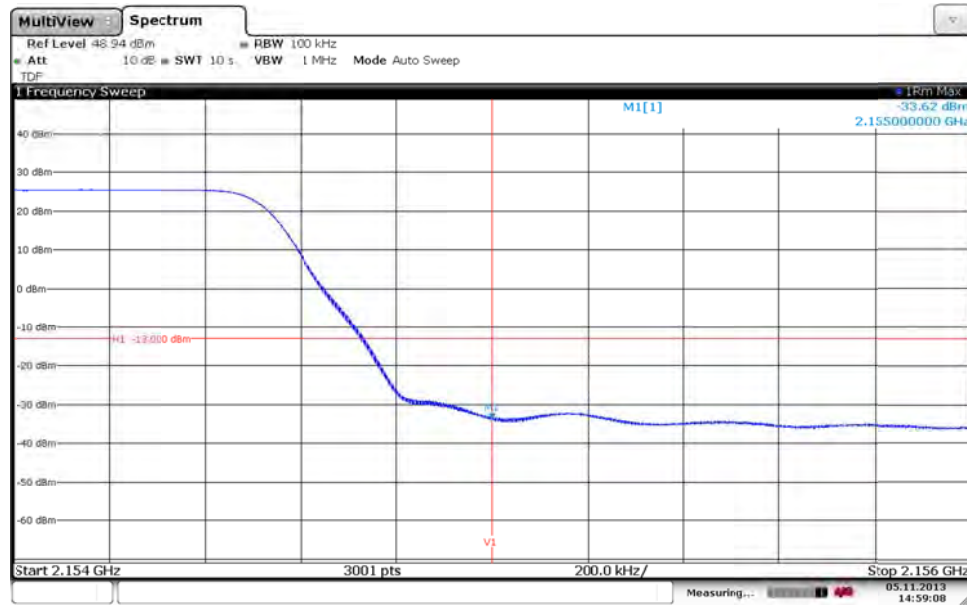
Diagram 11 c:



Date: 5 NOV. 2013 14:56:35

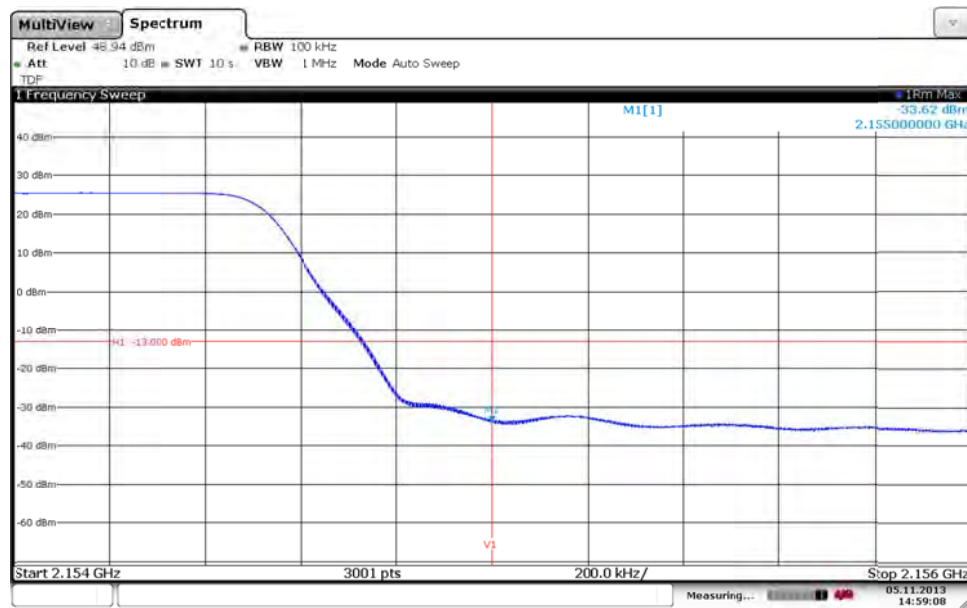
Appendix 4

Diagram 12 a:



Date: 5 NOV. 2013 14:59:08

Diagram 12 b:



Date: 5 NOV. 2013 14:59:08

Appendix 4

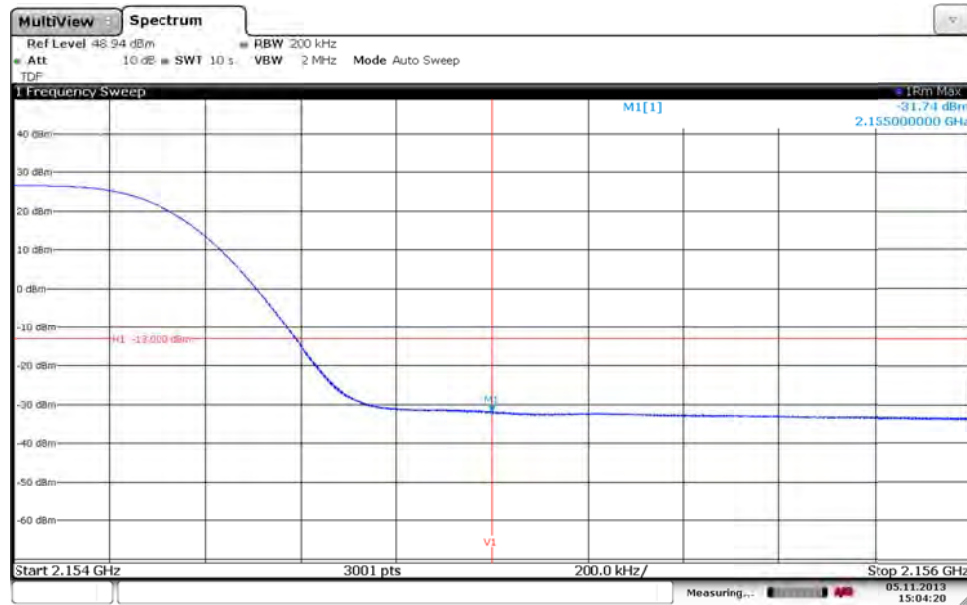
Diagram 12 c:



Date: 5 NOV. 2013 15:00:49

Appendix 4

Diagram 13a:



Date: 5 NOV. 2013 15:04:20

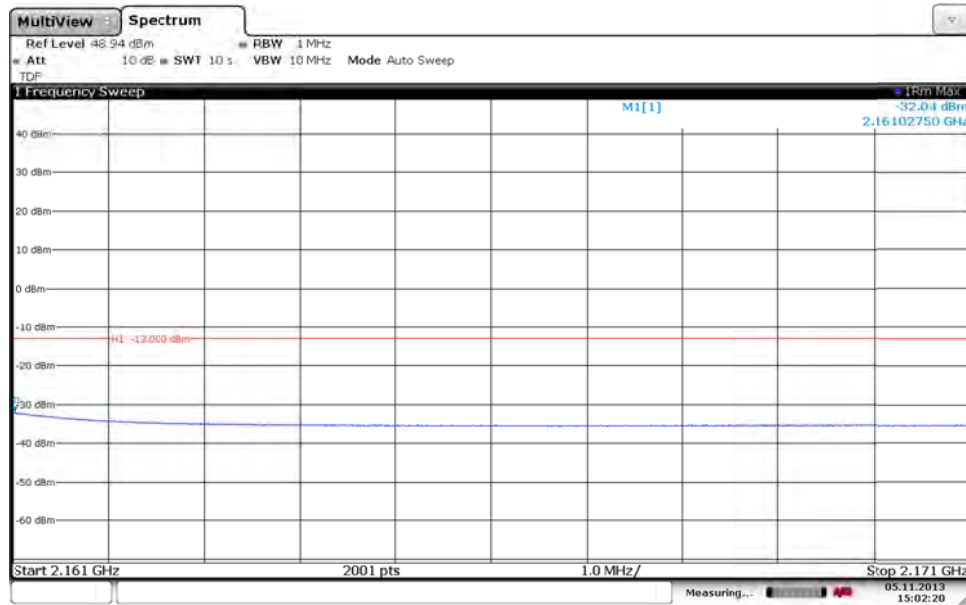
Diagram 13 b:



Date: 5 NOV. 2013 15:02:20

Appendix 4

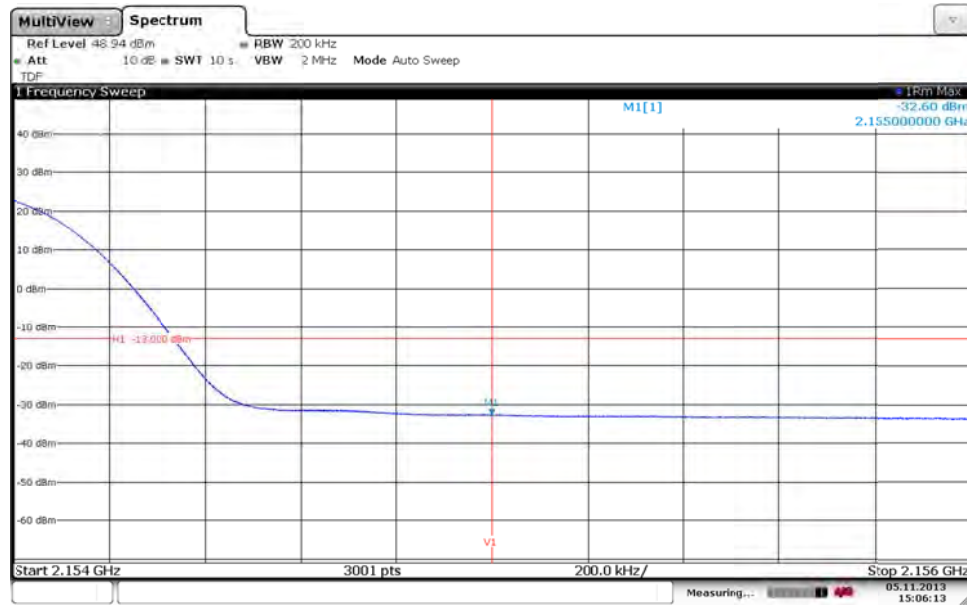
Diagram 13 c:



Date: 5 NOV 2013 15:02:20

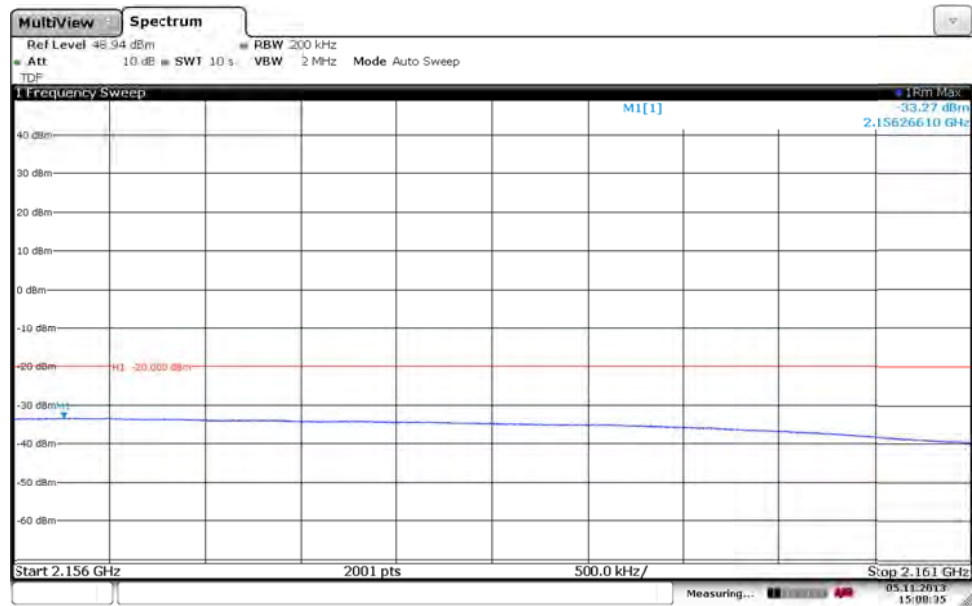
Appendix 4

Diagram 14 a:



Date: 5 NOV. 2013 15:06:13

Diagram 14 b:



Date: 5 NOV. 2013 15:08:35

Appendix 4

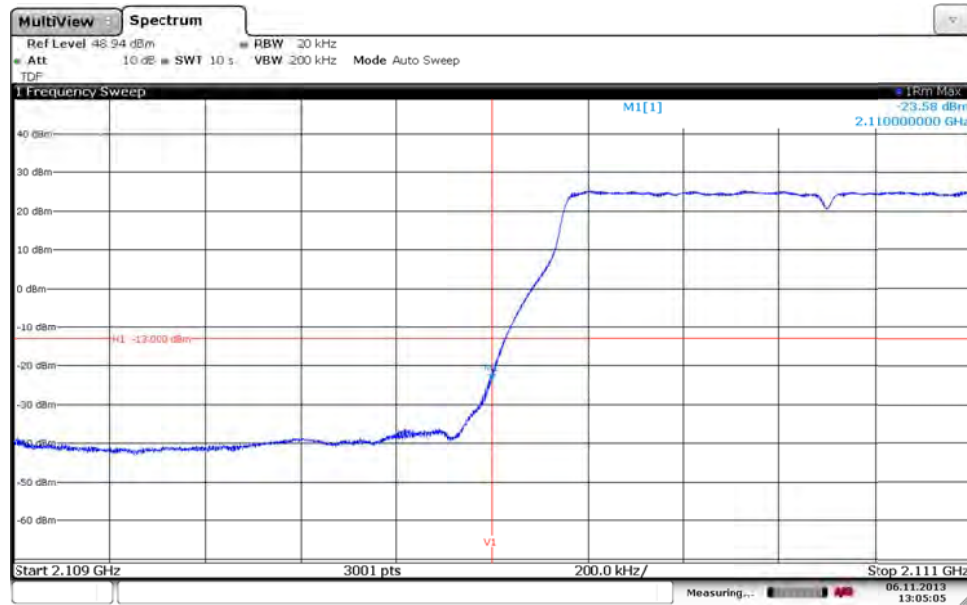
Diagram 14 c:



Date: 5 NOV. 2013 15:09:15

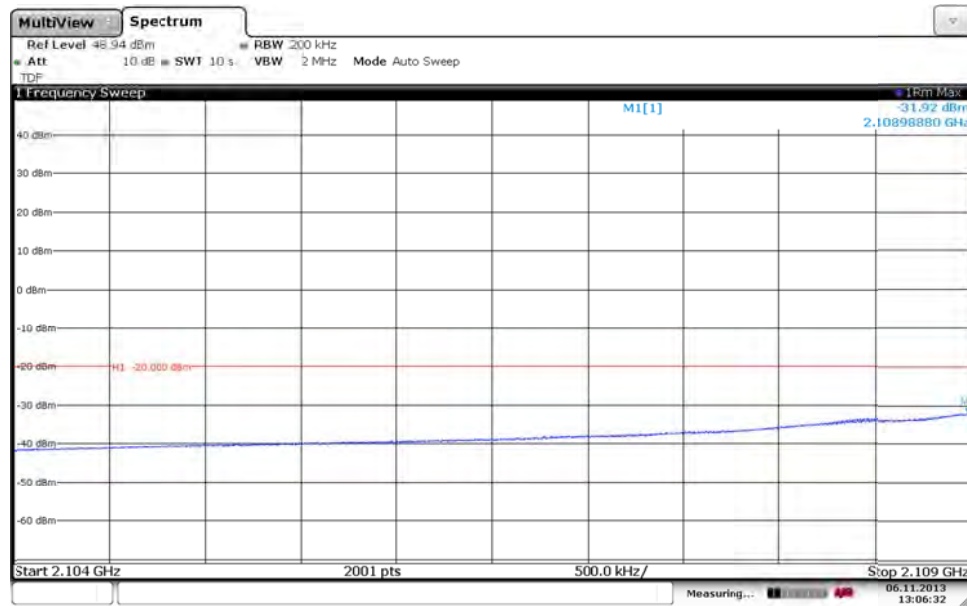
Appendix 4

Diagram 15 a:



Date: 6 NOV 2013 13:05:05

Diagram 15 b:



Date: 6 NOV 2013 13:06:32

Appendix 4

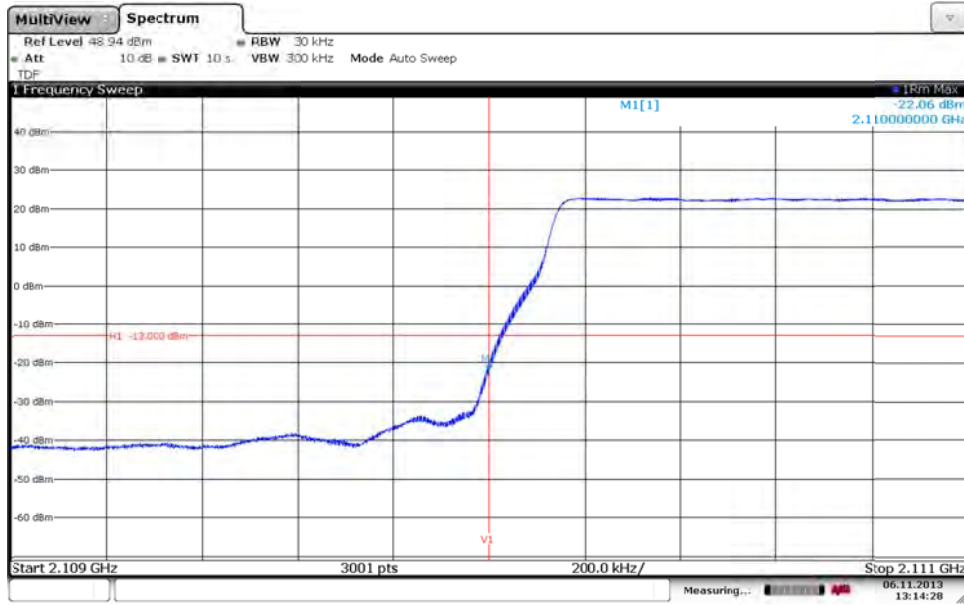
Diagram 15 c:



Date: 6 NOV. 2013 13:07:40

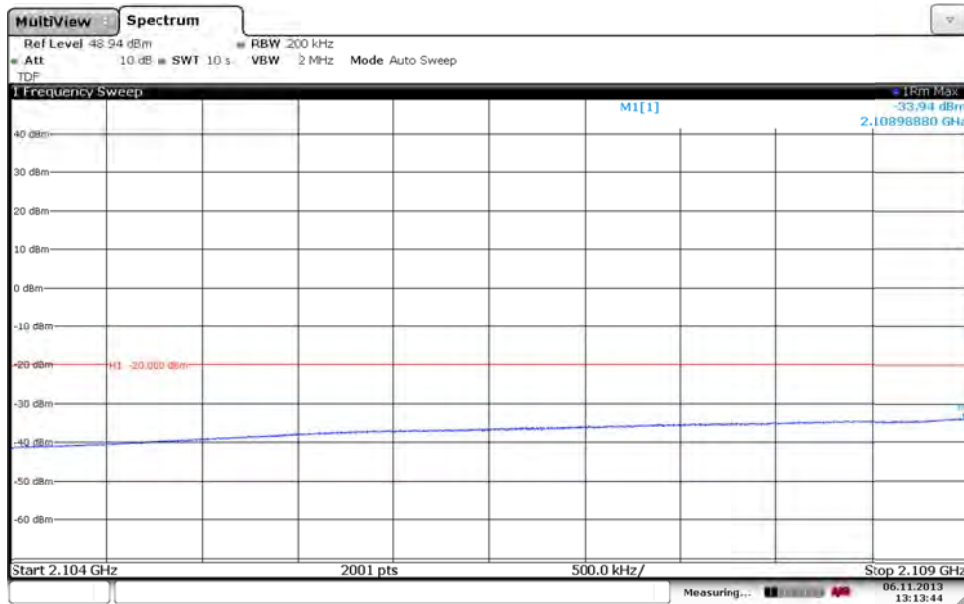
Appendix 4

Diagram 16 a:



Date: 6 NOV 2013 13:14:28

Diagram 16 b:



Date: 6 NOV 2013 13:13:44

Appendix 4

Diagram 16 c:



Date: 6 NOV. 2013 13:13:13

Appendix 4

Diagram 17 a:

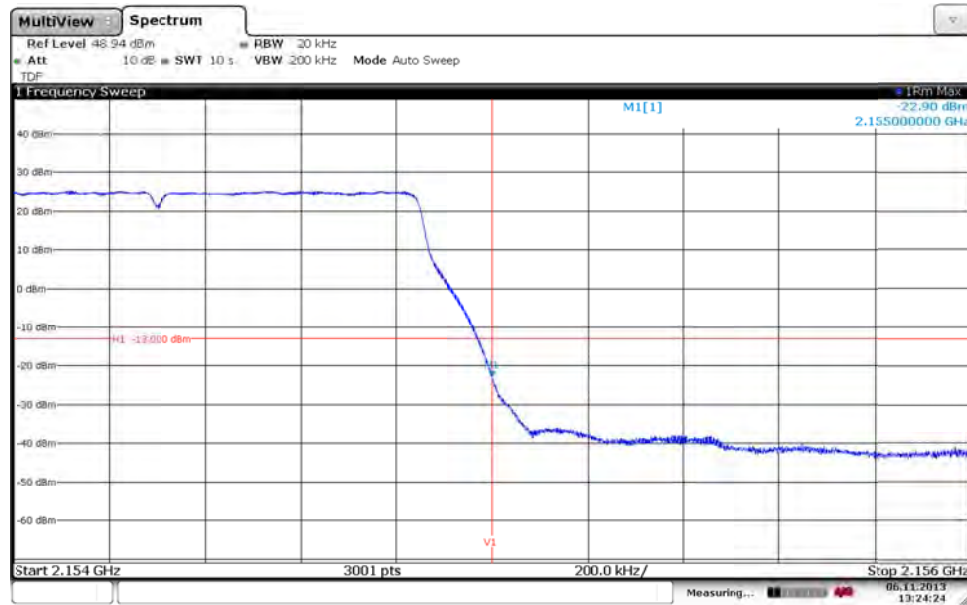
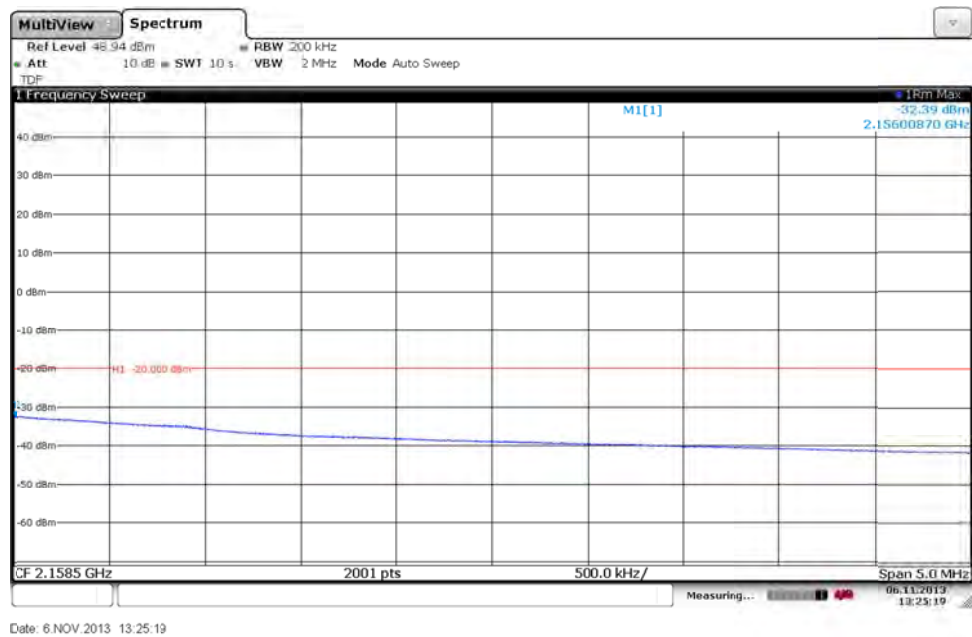


Diagram 17 b:



Appendix 4

Diagram 17 c:



Date: 6 NOV 2013 13:26:01

Appendix 4

Diagram 18 a:

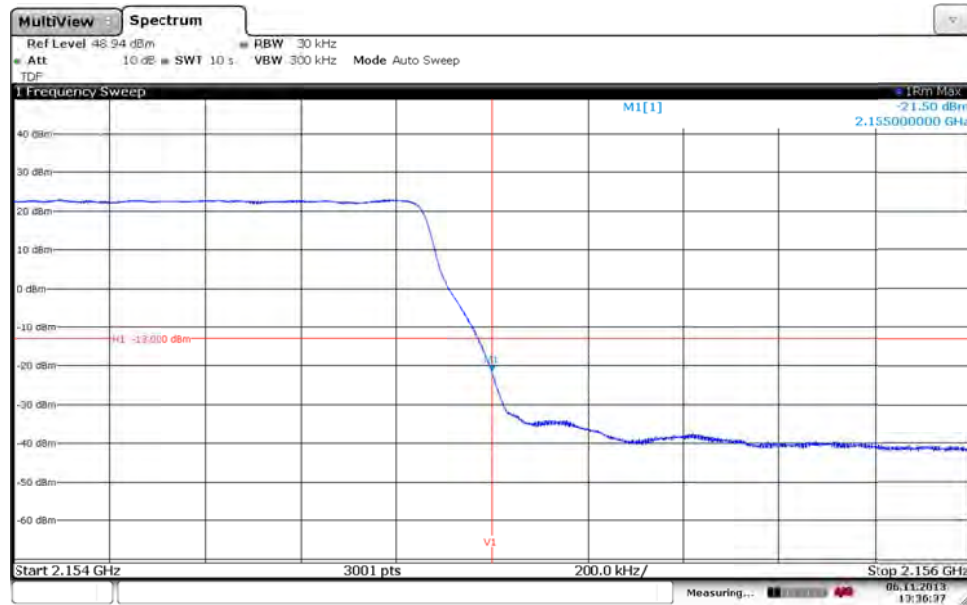
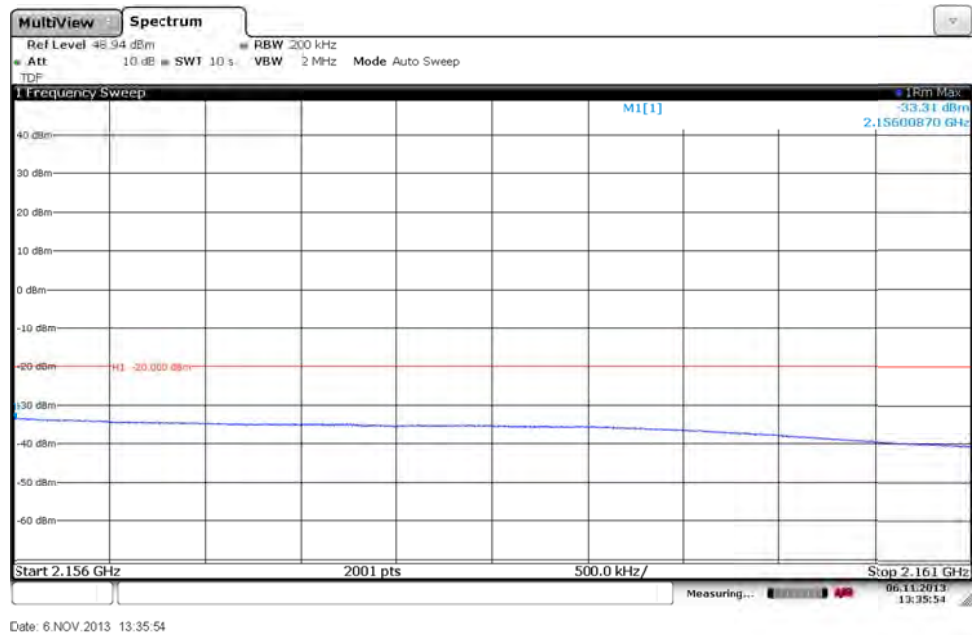


Diagram 18 b:



Appendix 4

Diagram 18 c:



Date: 6 NOV. 2013 13:35:19

Appendix 5

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

Date	Temperature	Humidity
2013-11-04	19 °C ± 3 °C	35 % ± 5 %
2013-11-06	22 °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 FSW 43	902 073
RF attenuator	902 282
HP filter	901 502
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Appendix 5

Results

MIMO mode, single carrier

Diagram	BW configuration / [MHz]	Symbolic name	Tested Port
1 a+b+c+d	1.4 MHz	B	RF A
2 a+b+c+d	20 MHz	B	RF A
3 a+b+c+d	1.4 MHz	M	RF A
4 a+b+c+d	1.4 MHz	M	RF B
5 a+b+c+d	3 MHz	M	RF A
6 a+b+c+d	5 MHz	M	RF A
7 a+b+c+d	10 MHz	M	RF A
8 a+b+c+d	15 MHz	M	RF A
9 a+b+c+d	20 MHz	M	RF A
10 a+b+c+d	20 MHz	M	RF B
11 a+b+c+d	1.4 MHz	T	RF A
12 a+b+c+d	20 MHz	T	RF A

MIMO mode, multi carrier

Diagram	BW configuration	Symbolic name	Tested Port
13 a+b+c+d+e	1.4 MHz	B2im1	RF A
14 a+b+c+d+e	1.4 MHz	B2im2	RF A
15 a+b+c+d	1.4 MHz	M3	RF A
16 a+b+c+d+e	1.4 MHz	T2im1	RF A
17 a+b+c+d+e	1.4 MHz	T2im2	RF A

Note: Measurements were limited to port RF A due to the measurement result in single carrier mode that shows that the ports are electrical identical as declared by the client.

Appendix 5

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 ($10 \times 2.155 \text{ GHz} = 21.55 \text{ GHz}$).

Limits

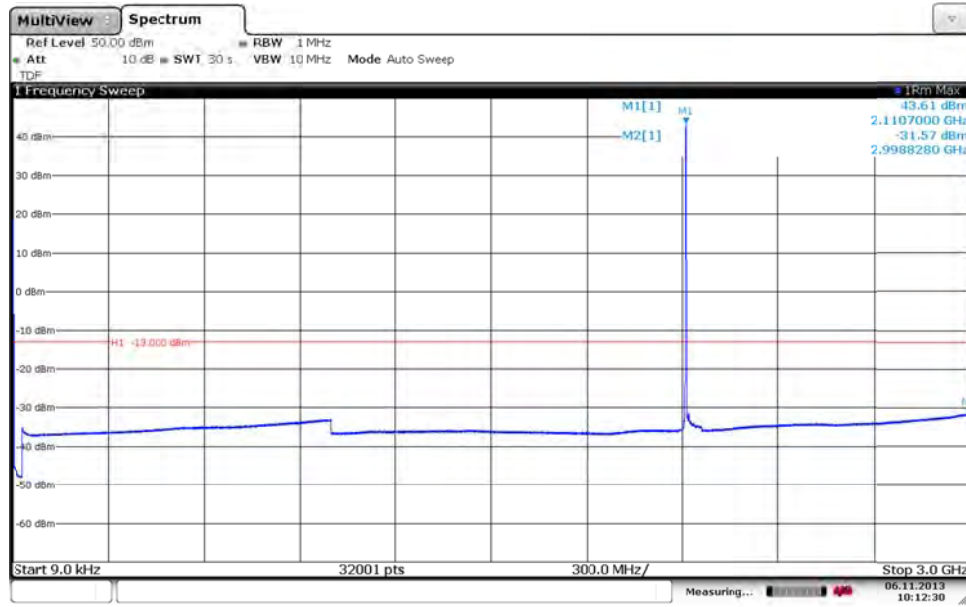
§27.53(h) and RSS-139 6.5

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
-----------	-----

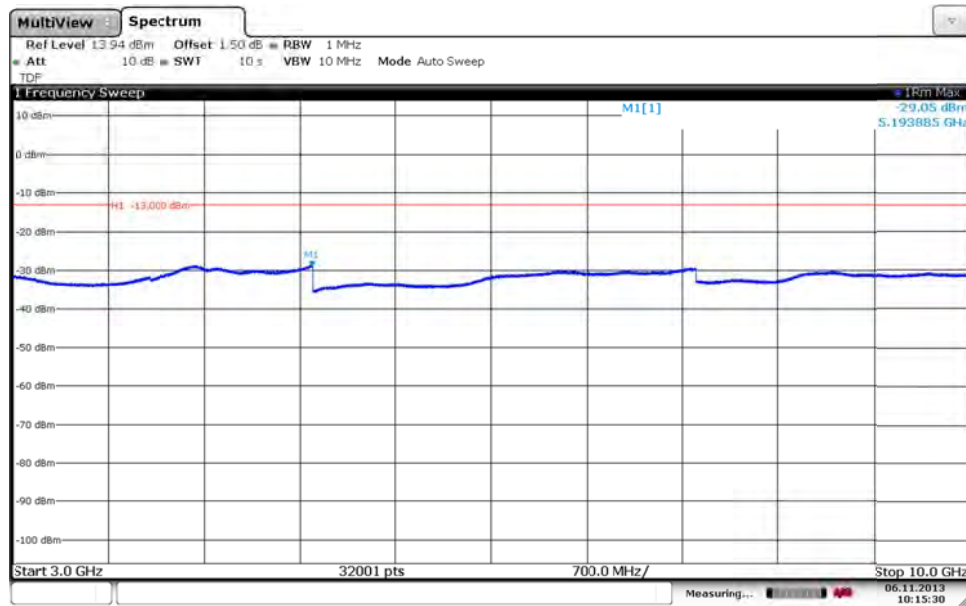
Appendix 5

Diagram 1 a:



Date: 6 NOV 2013 10:12:31

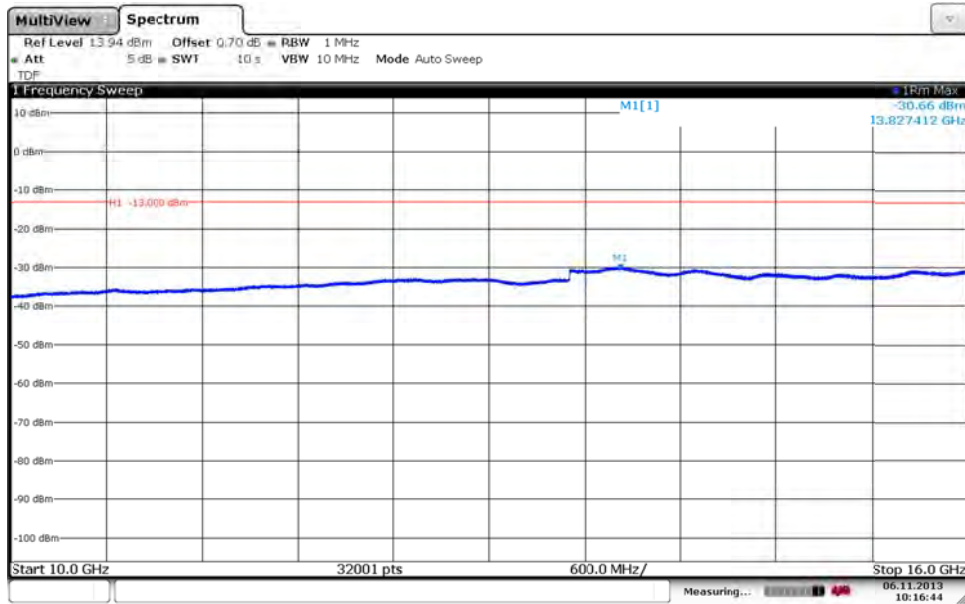
Diagram 1 b:



Date: 6 NOV 2013 10:15:30

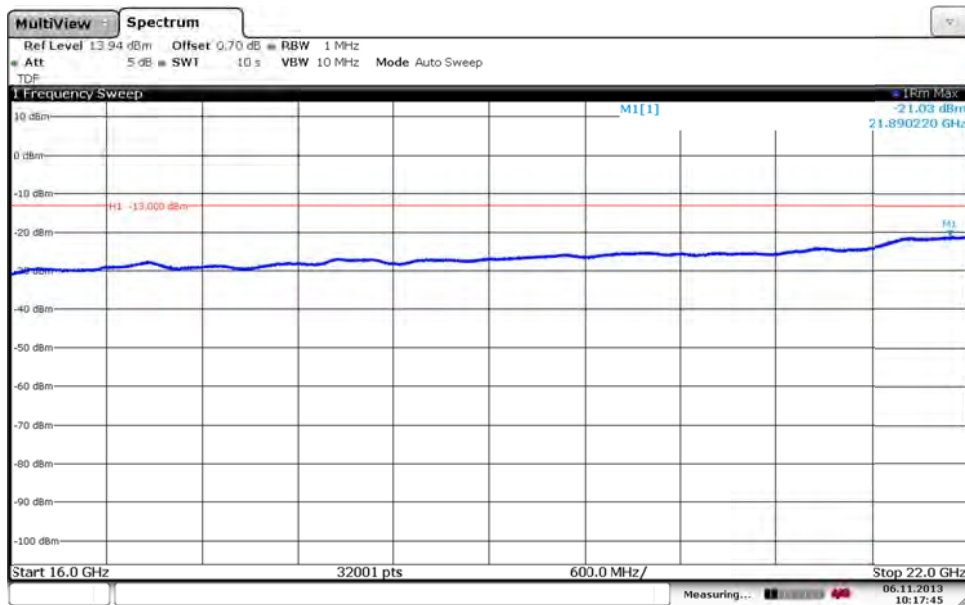
Appendix 5

Diagram 1 c:



Date: 6 NOV 2013 10:16:44

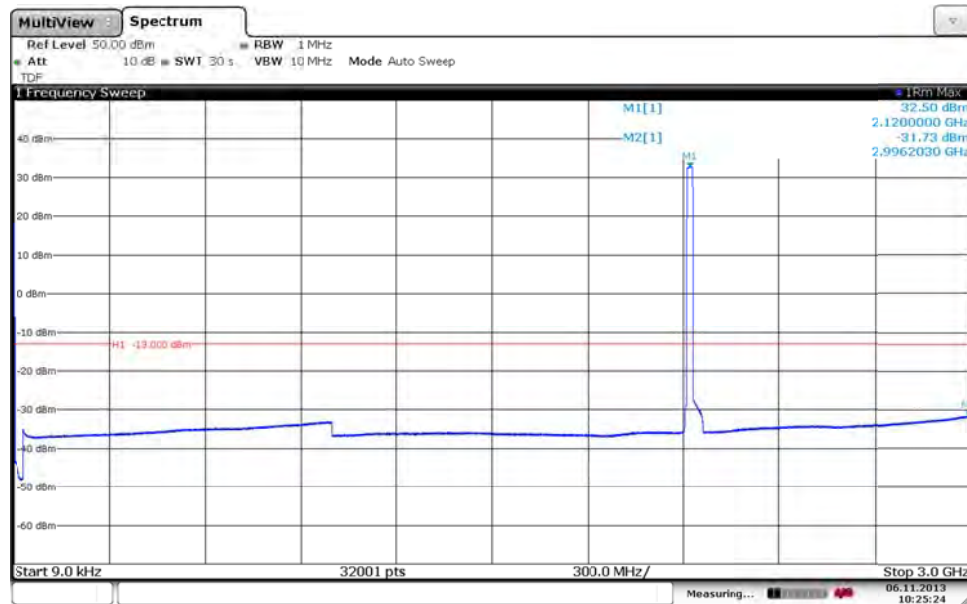
Diagram 1 d:



Date: 6 NOV 2013 10:17:44

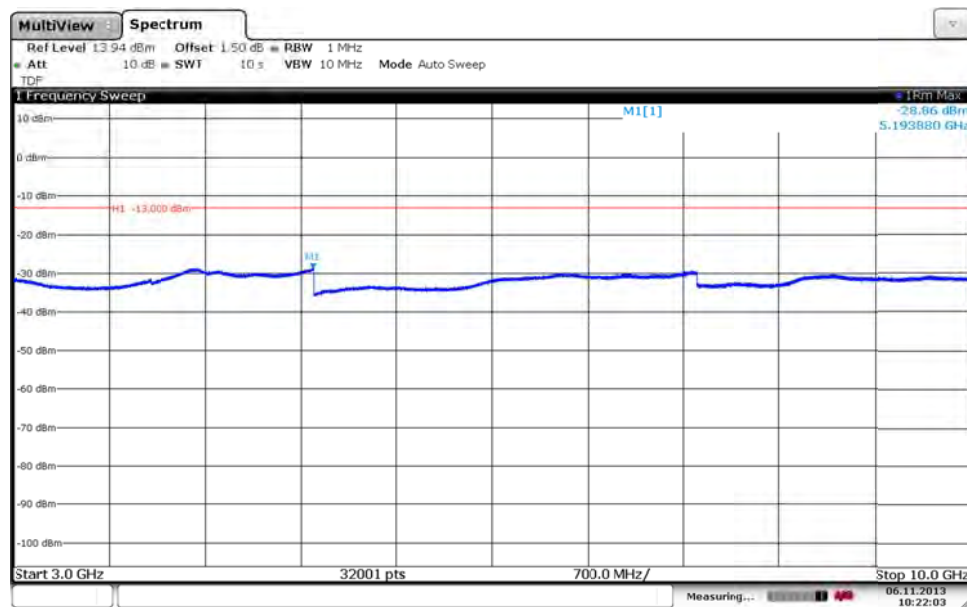
Appendix 5

Diagram 2 a:



Date: 6 NOV 2013 10:25:24

Diagram 2 b:



Date: 6 NOV 2013 10:22:03

Appendix 5

Diagram 2 c:

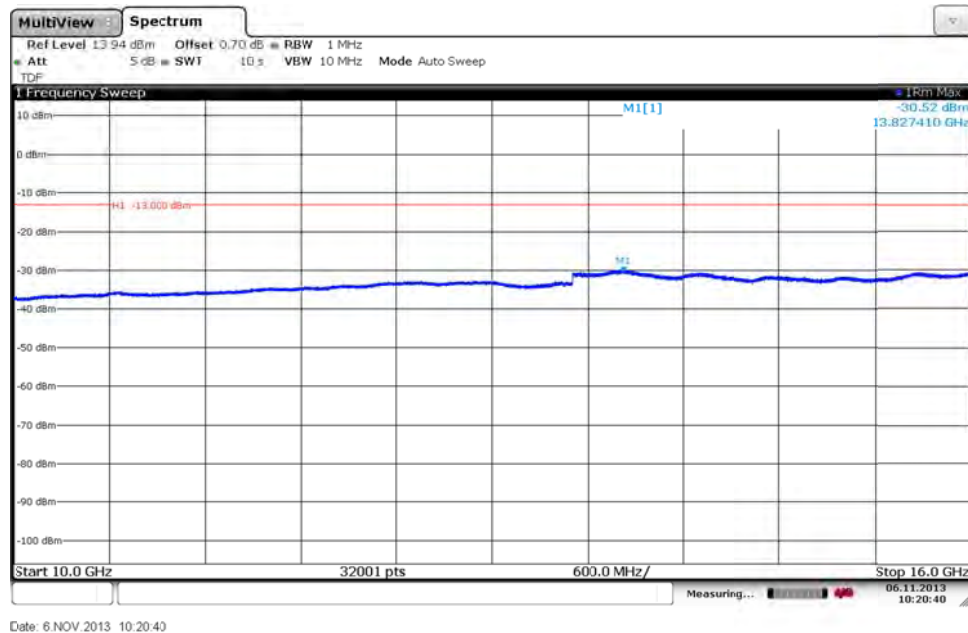
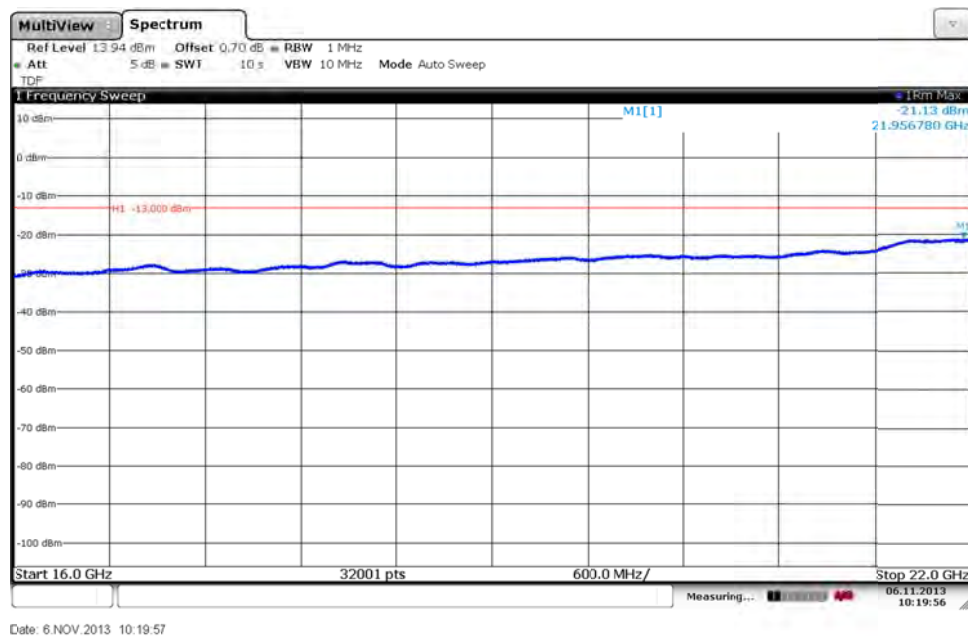


Diagram 2 d:



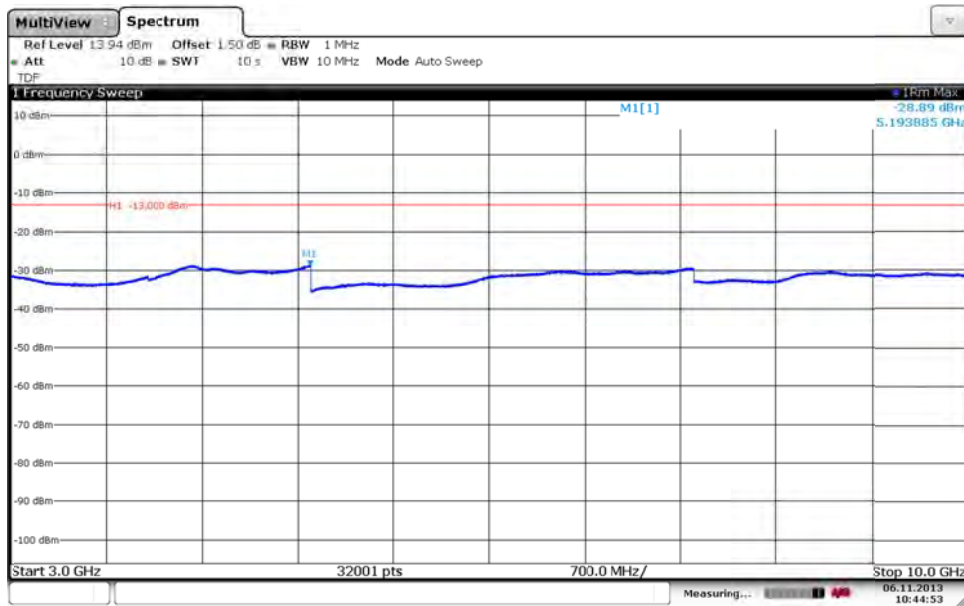
Appendix 5

Diagram 3 a:



Date: 6 NOV. 2013 10:41:14

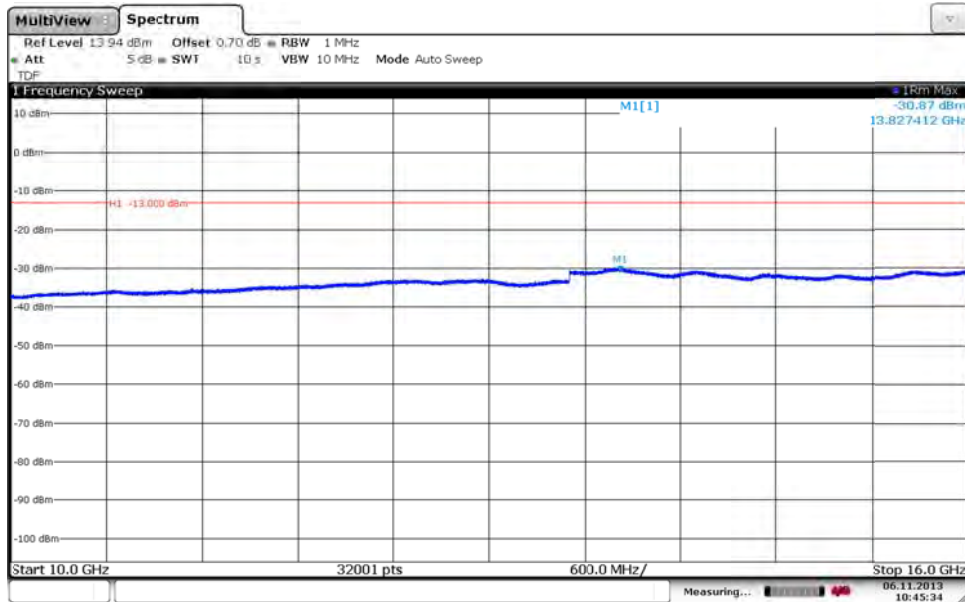
Diagram 3 b:



Date: 6 NOV. 2013 10:44:53

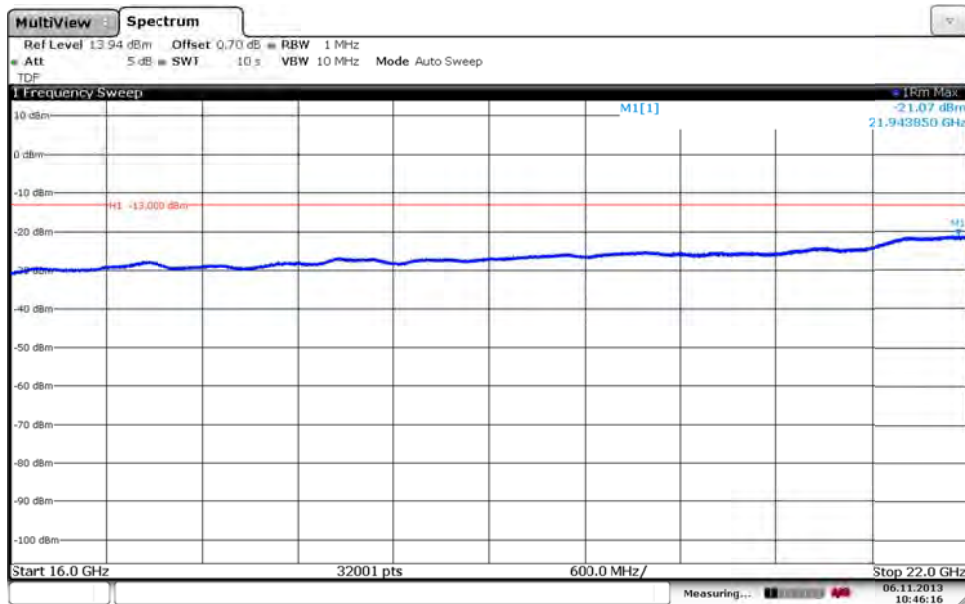
Appendix 5

Diagram 3 c:



Date: 6 NOV. 2013 10:45:34

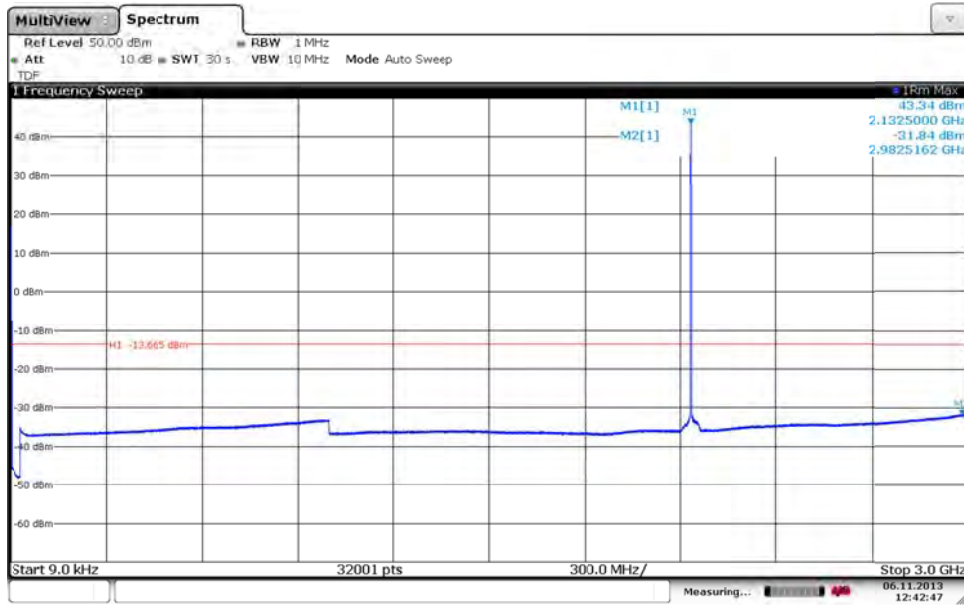
Diagram 3 d:



Date: 6 NOV. 2013 10:46:16

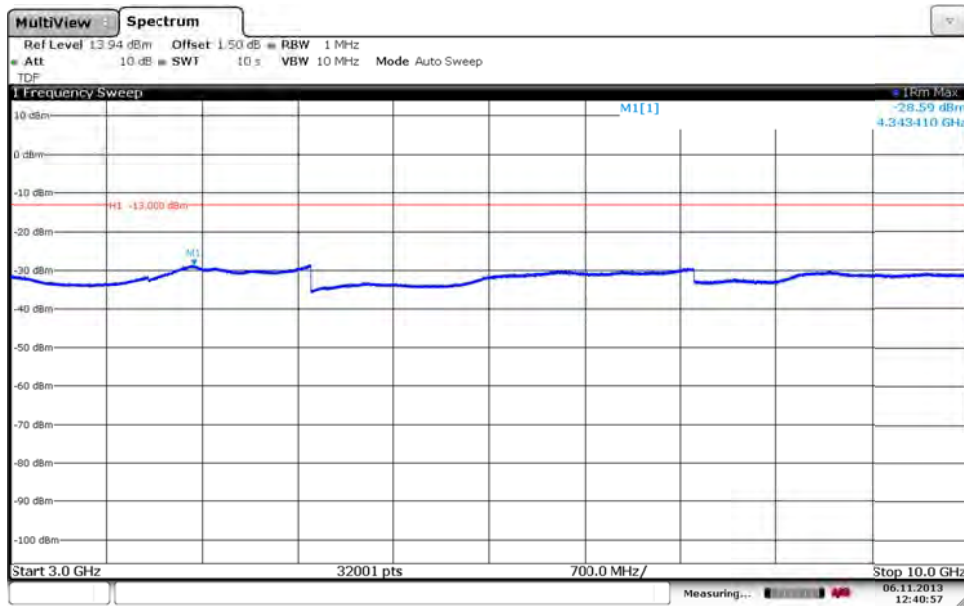
Appendix 5

Diagram 4 a:



Date: 6 NOV. 2013 12:42:46

Diagram 4 b:



Date: 6 NOV. 2013 12:40:58

Appendix 5

Diagram 4 c:

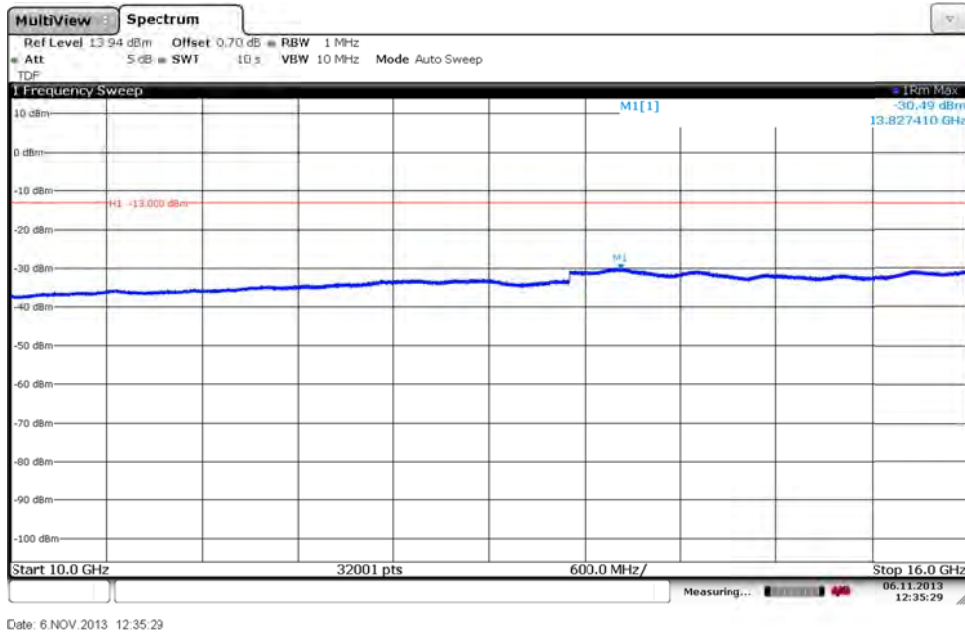
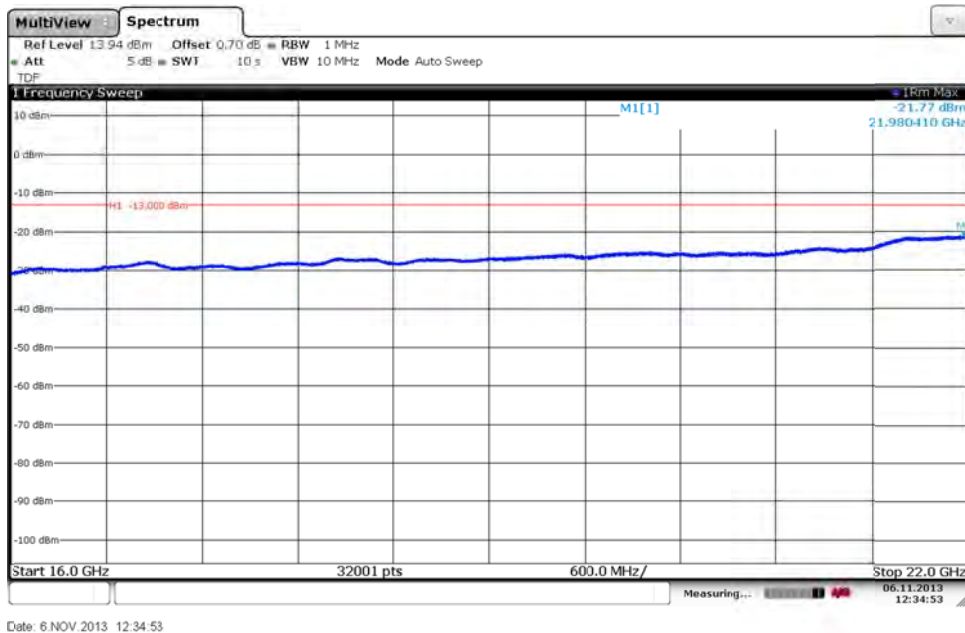
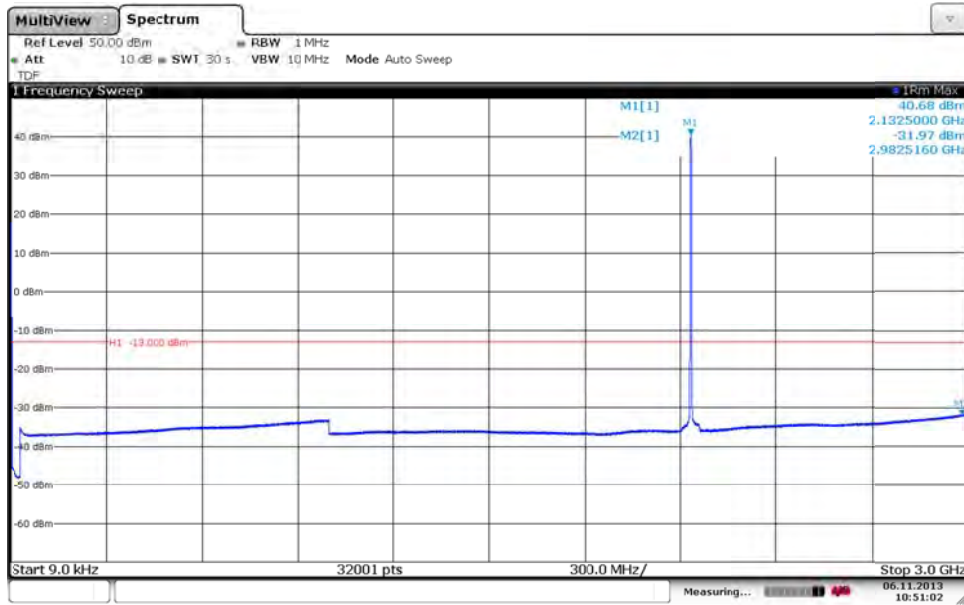


Diagram 4 d:



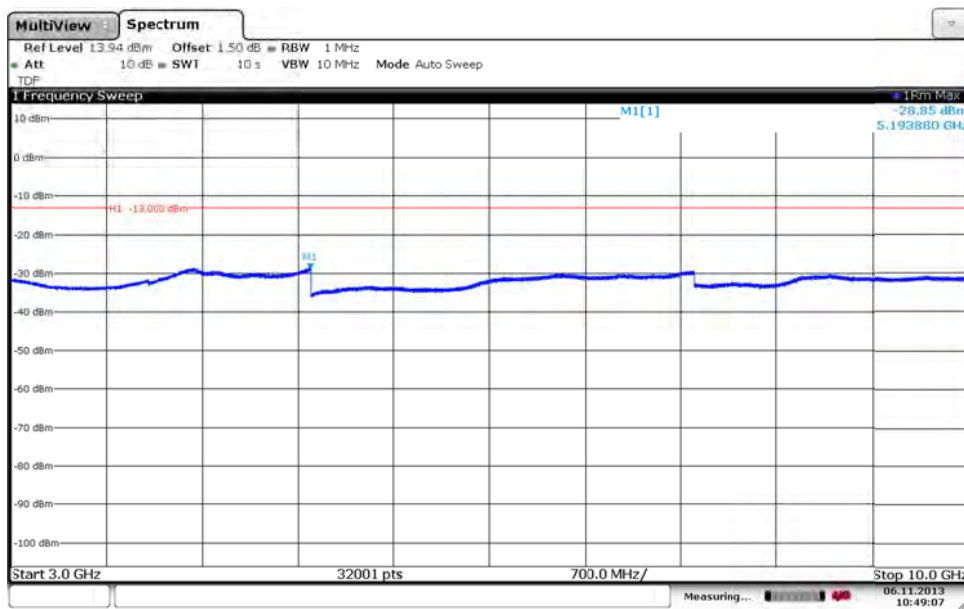
Appendix 5

Diagram 5 a:



Date: 6 NOV. 2013 10:51:02

Diagram 5 b:



Date: 6 NOV. 2013 10:49:07

Appendix 5

Diagram 5 c:

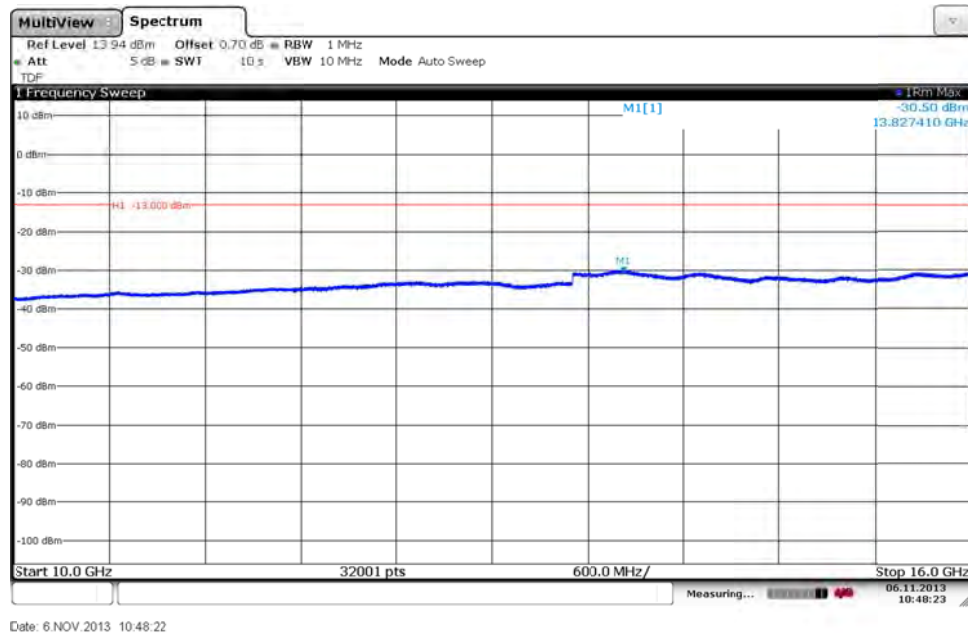
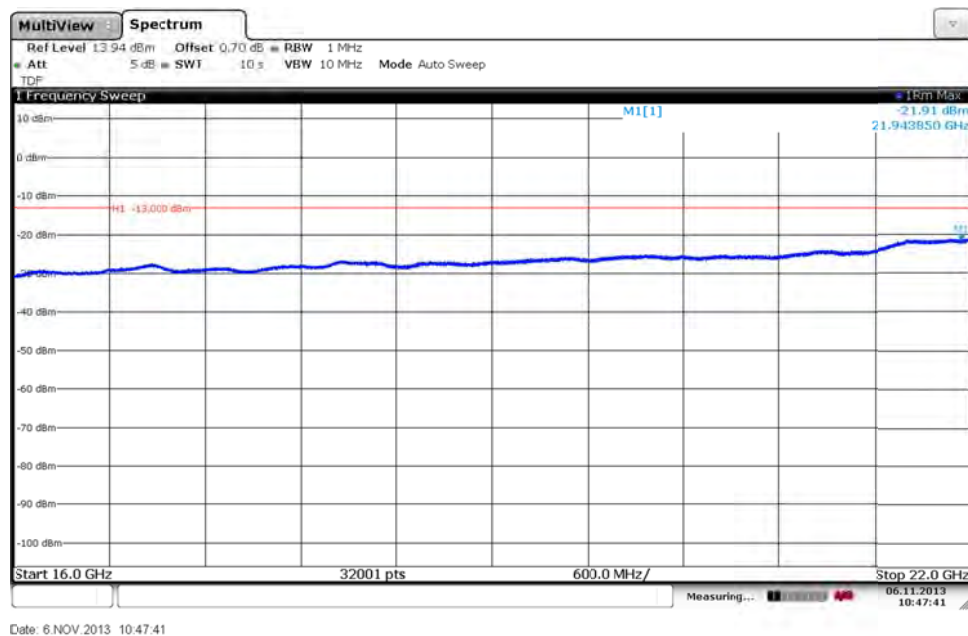
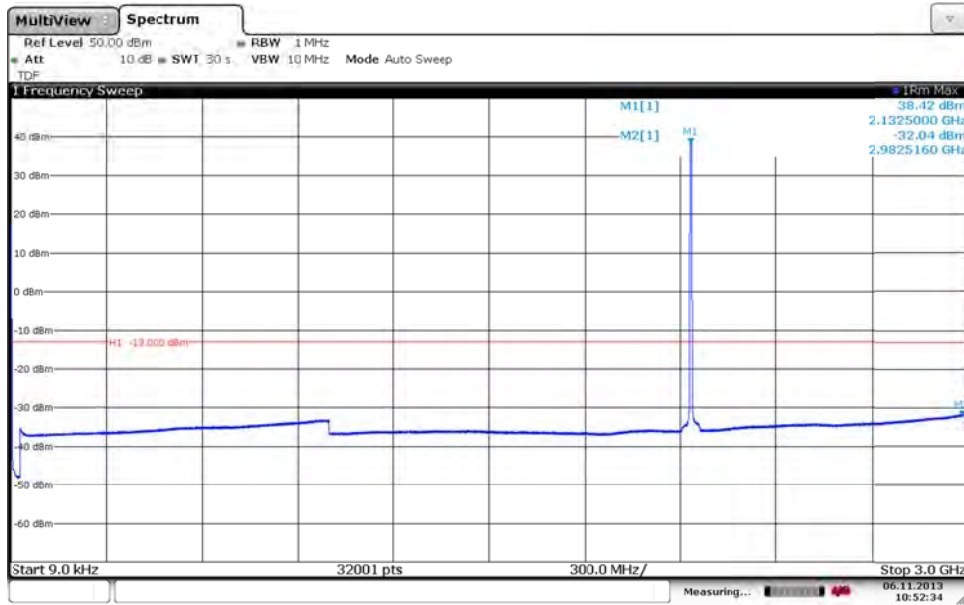


Diagram 5 d:



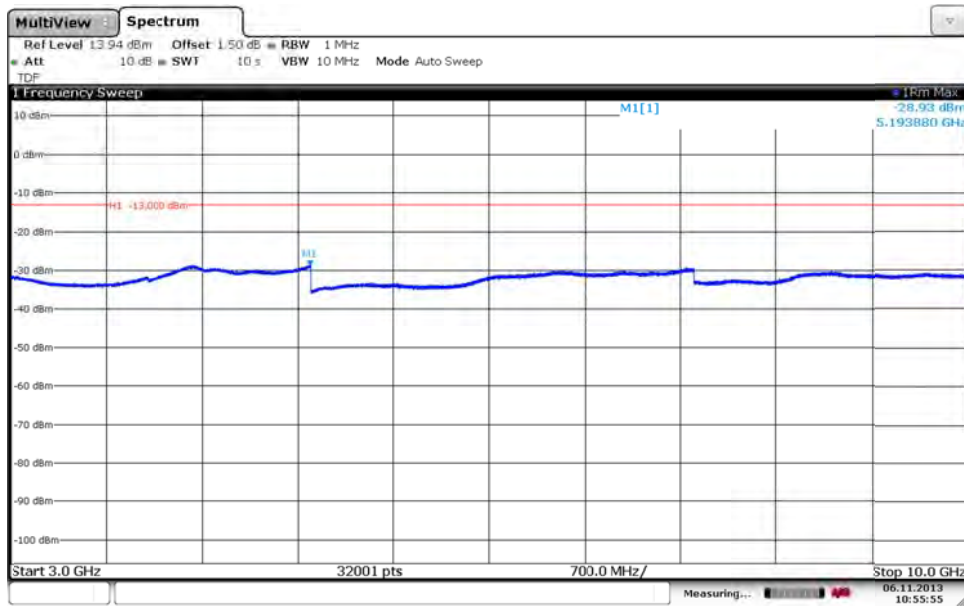
Appendix 5

Diagram 6 a:



Date: 6 NOV. 2013 10:52:34

Diagram 6 b:



Date: 6 NOV. 2013 10:55:58

Appendix 5

Diagram 6 c:

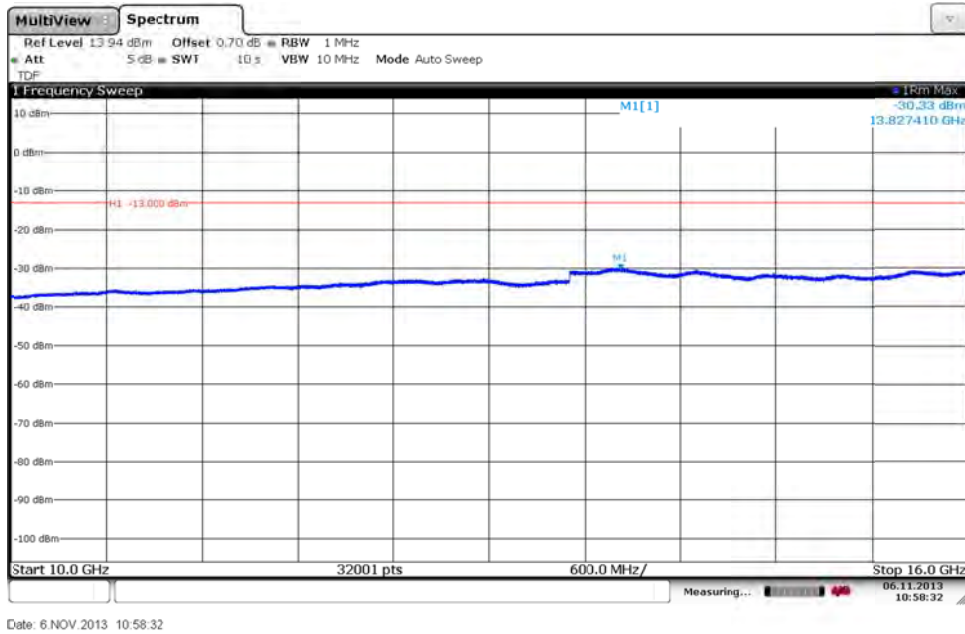
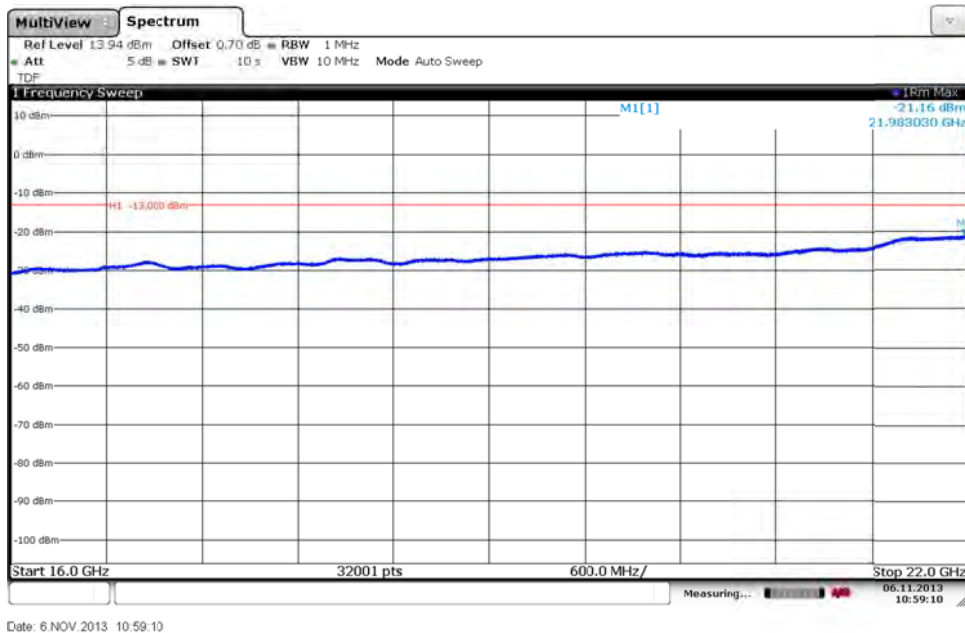


Diagram 6 d:



Appendix 5

Diagram 7 a:

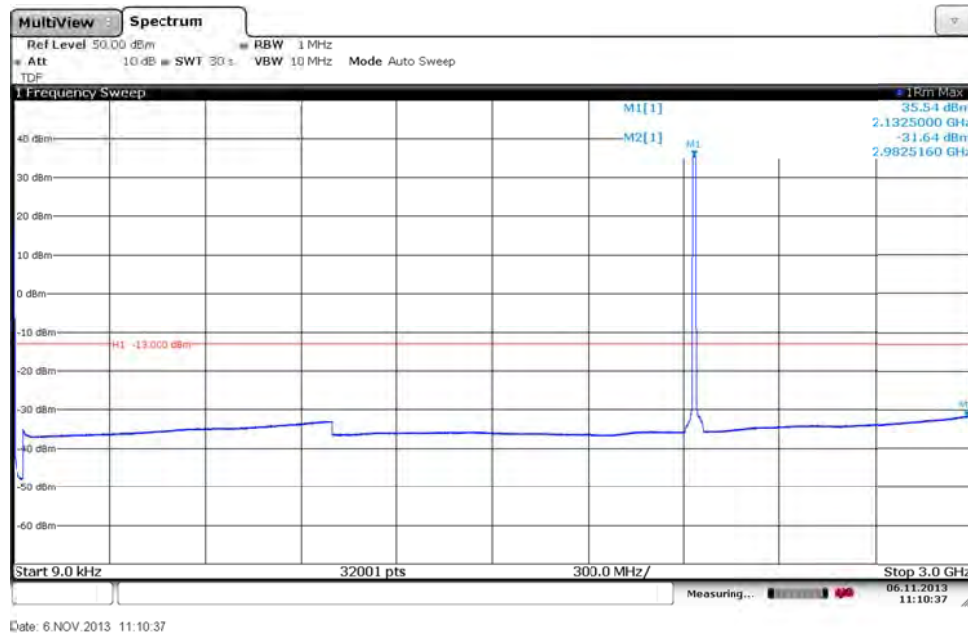
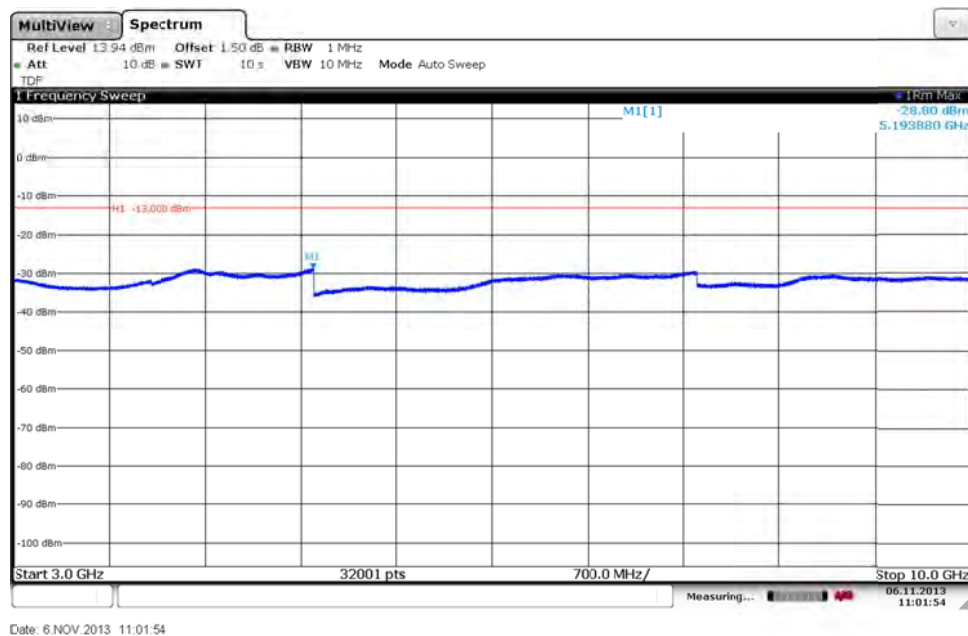
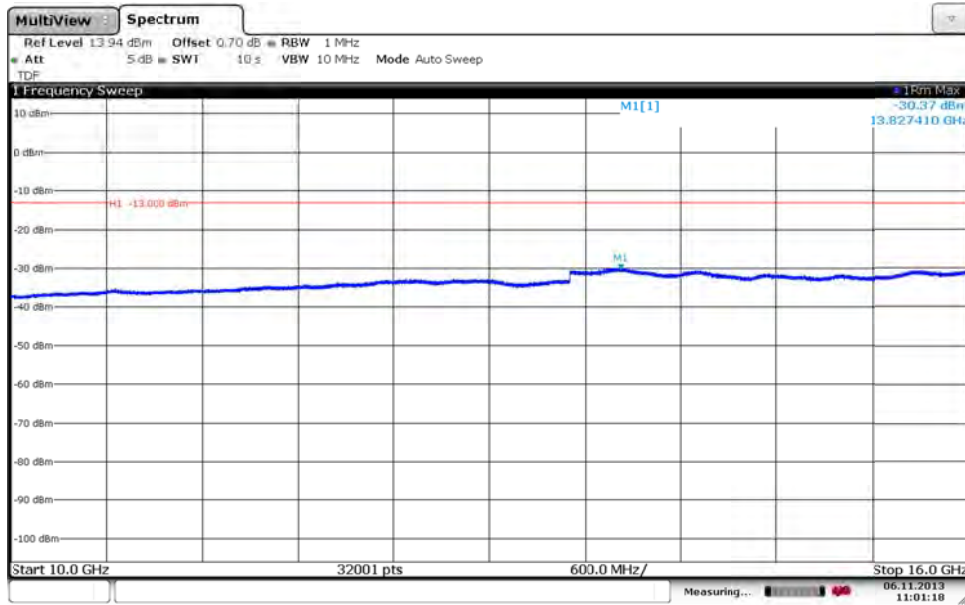


Diagram 7 b:



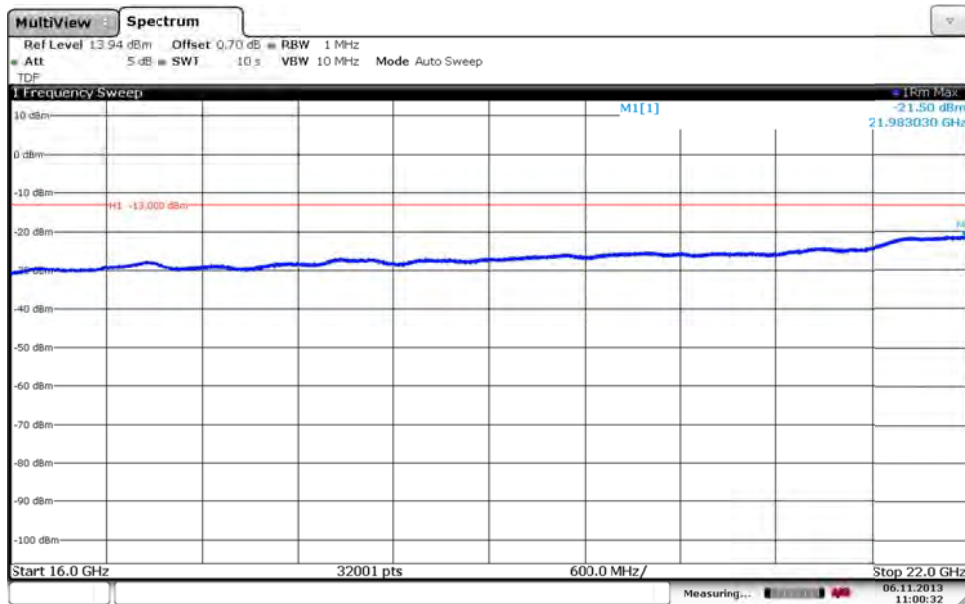
Appendix 5

Diagram 7 c:



Date: 6 NOV. 2013 11:01:18

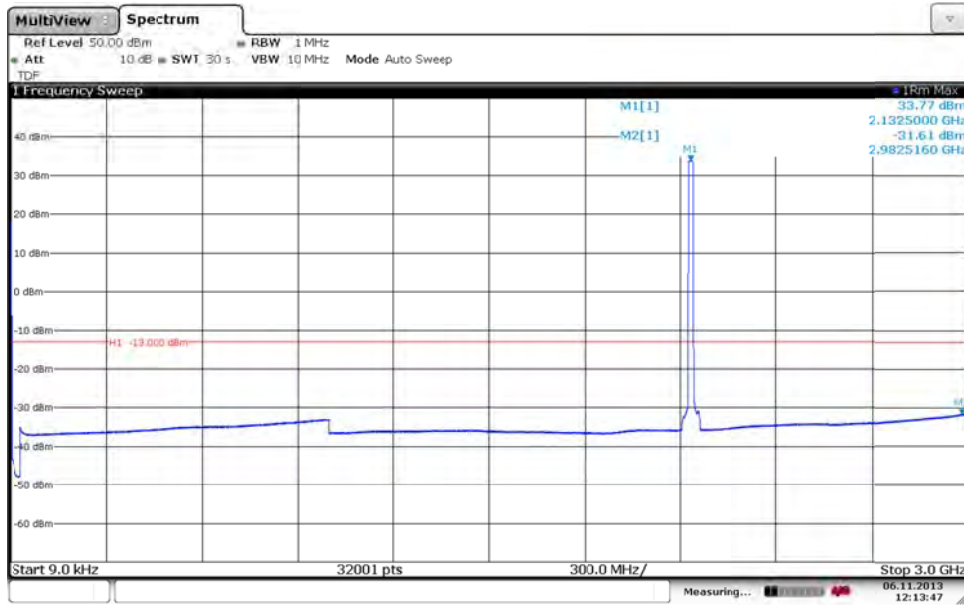
Diagram 7 d:



Date: 6 NOV. 2013 11:00:32

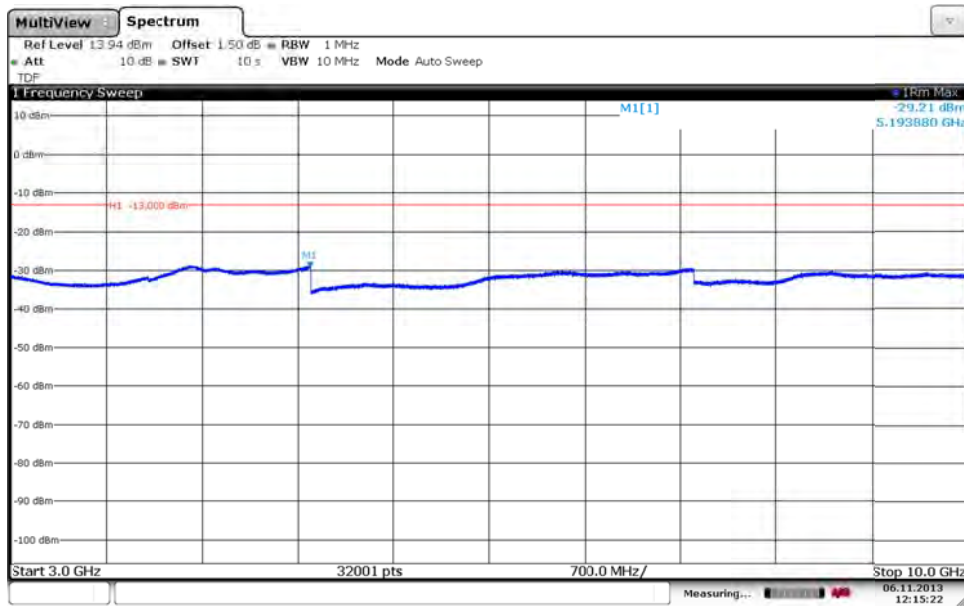
Appendix 5

Diagram 8 a:



Date: 6 NOV. 2013 12:13:46

Diagram 8 b:



Date: 6 NOV. 2013 12:15:22

Appendix 5

Diagram 8 c:

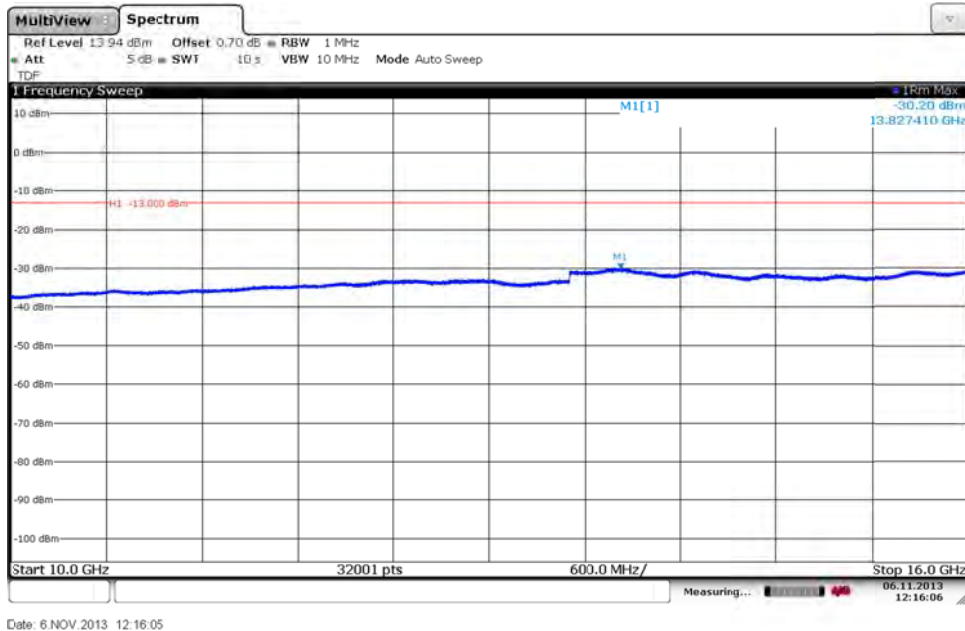
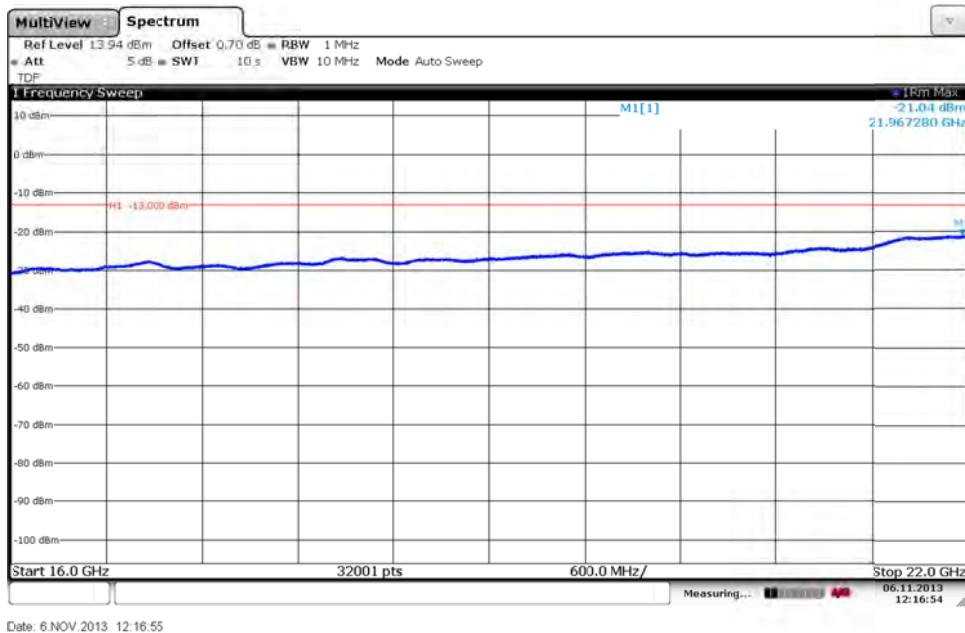
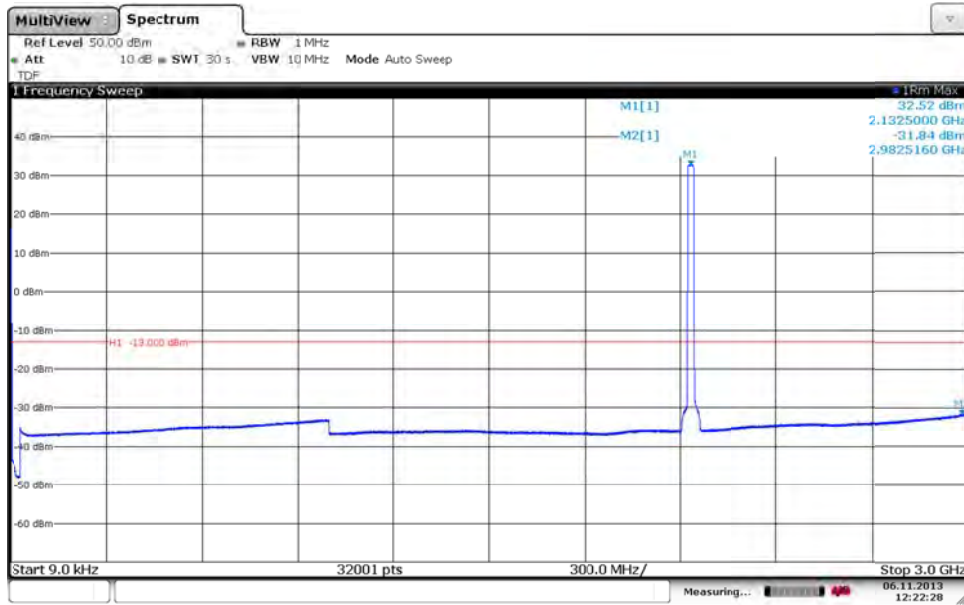


Diagram 8 d:



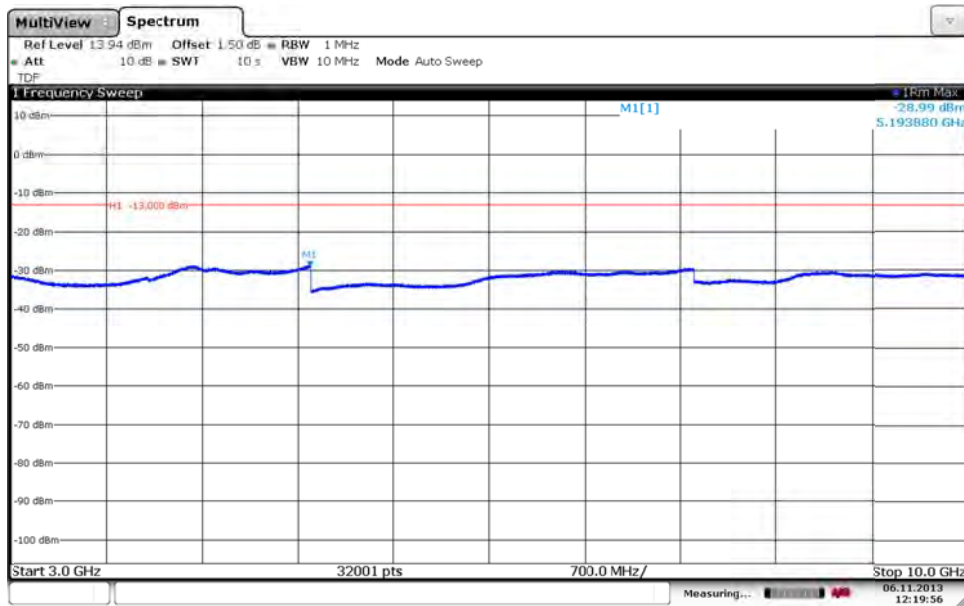
Appendix 5

Diagram 9 a:



Date: 6 NOV 2013 12:22:28

Diagram 9 b:



Date: 6 NOV 2013 12:19:56

Appendix 5

Diagram 9 c:

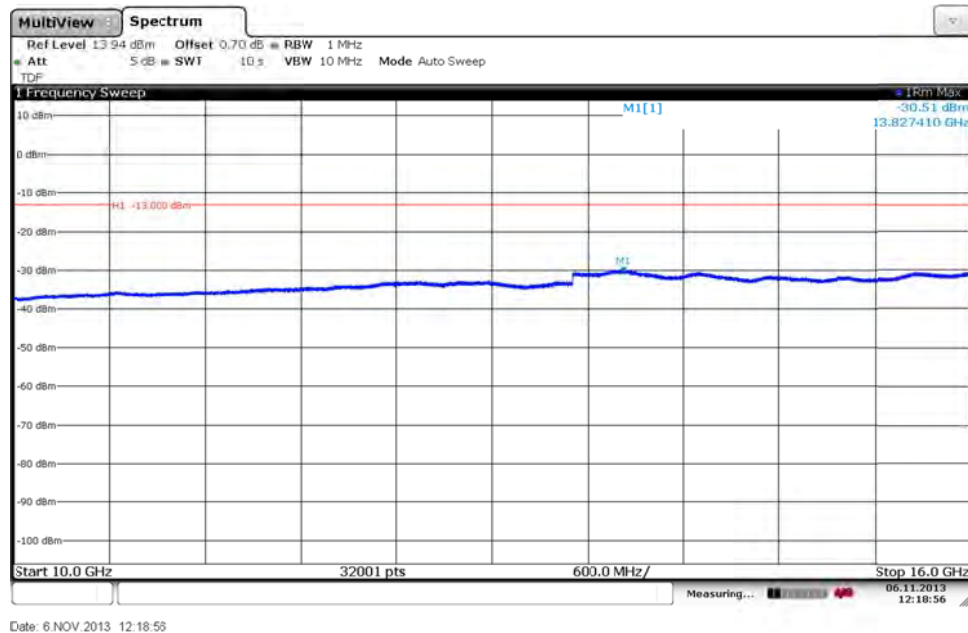
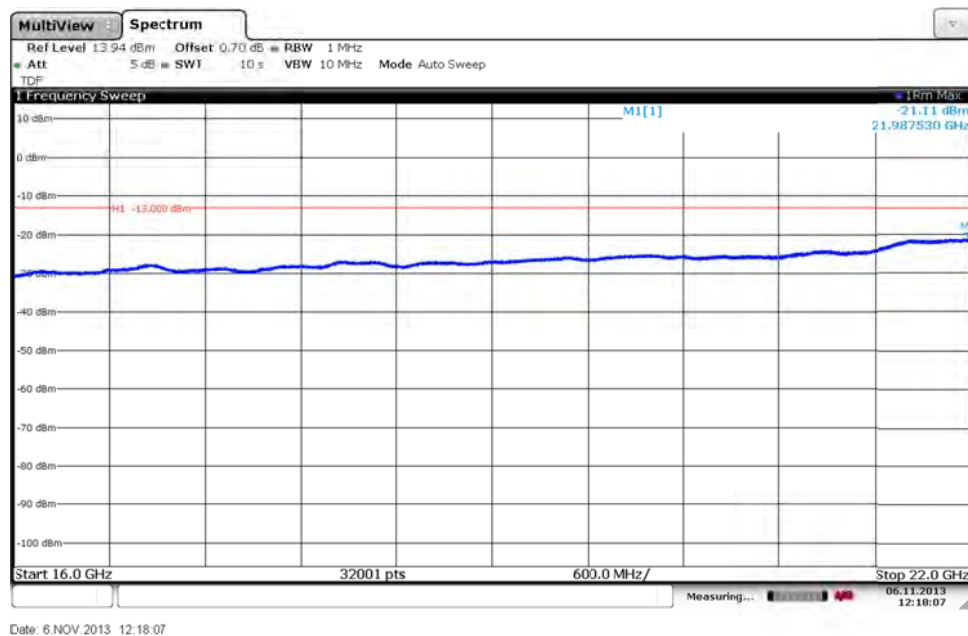
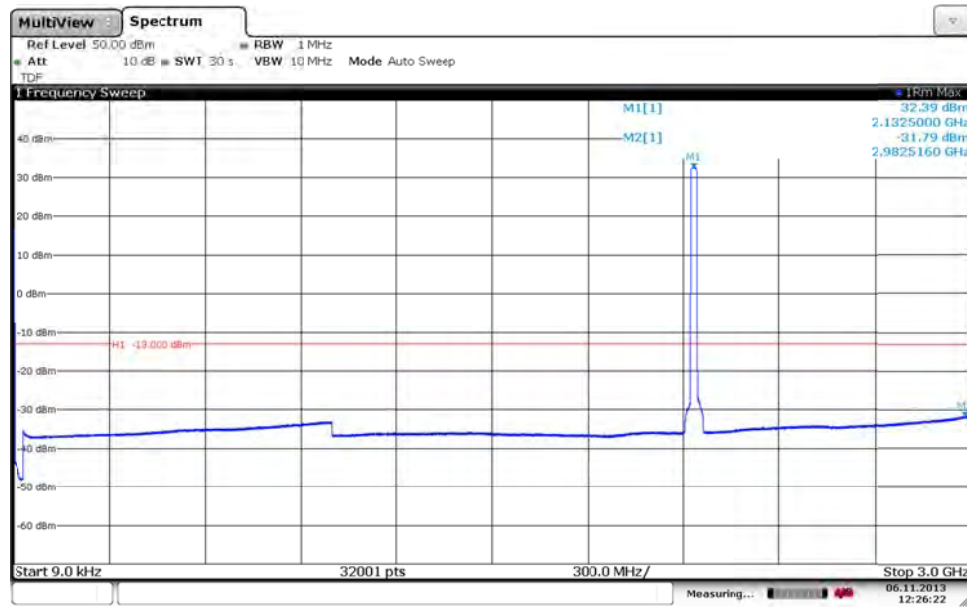


Diagram 9 d:



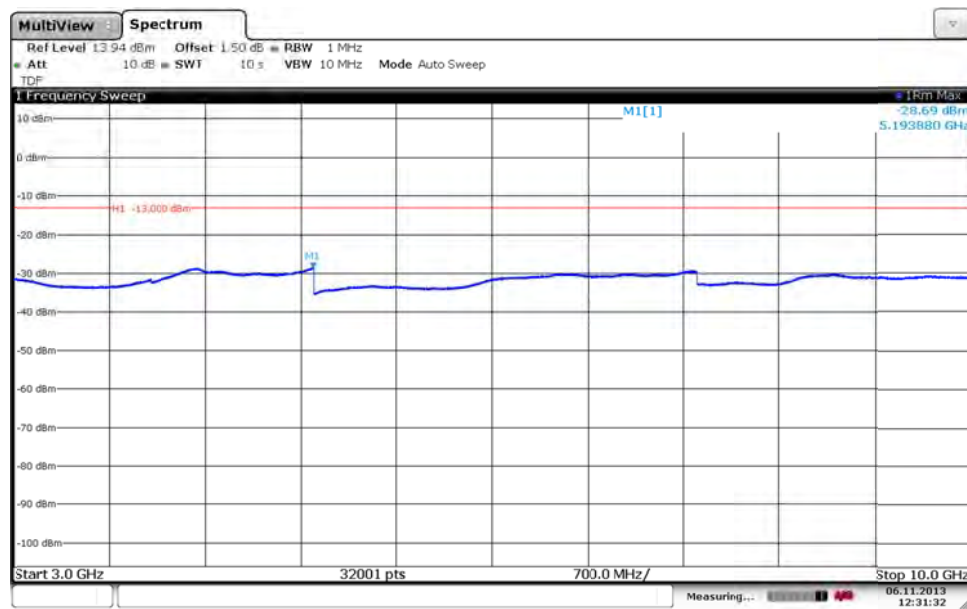
Appendix 5

Diagram 10 a:



Date: 6 NOV. 2013 12:26:22

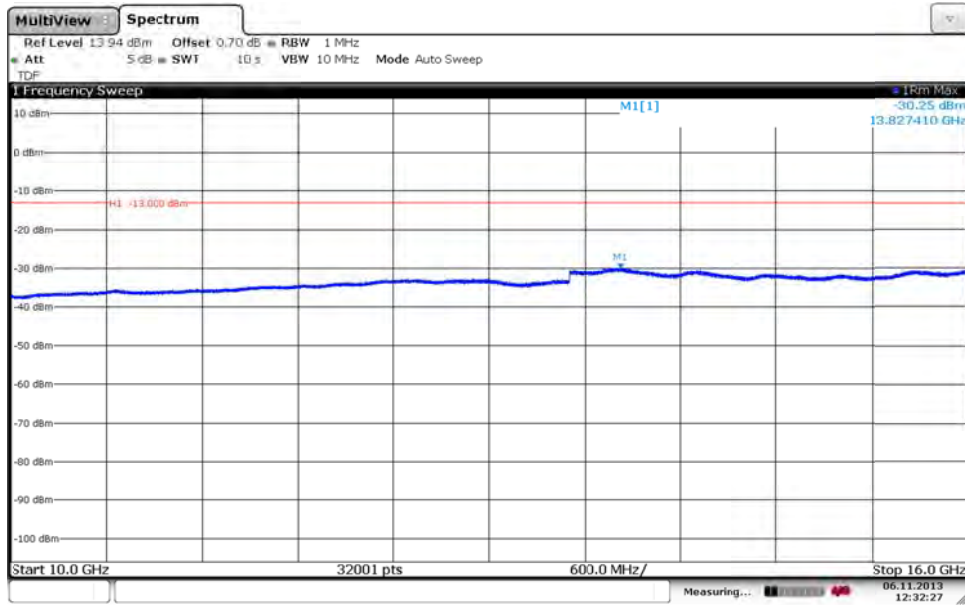
Diagram 10 b:



Date: 6 NOV. 2013 12:31:33

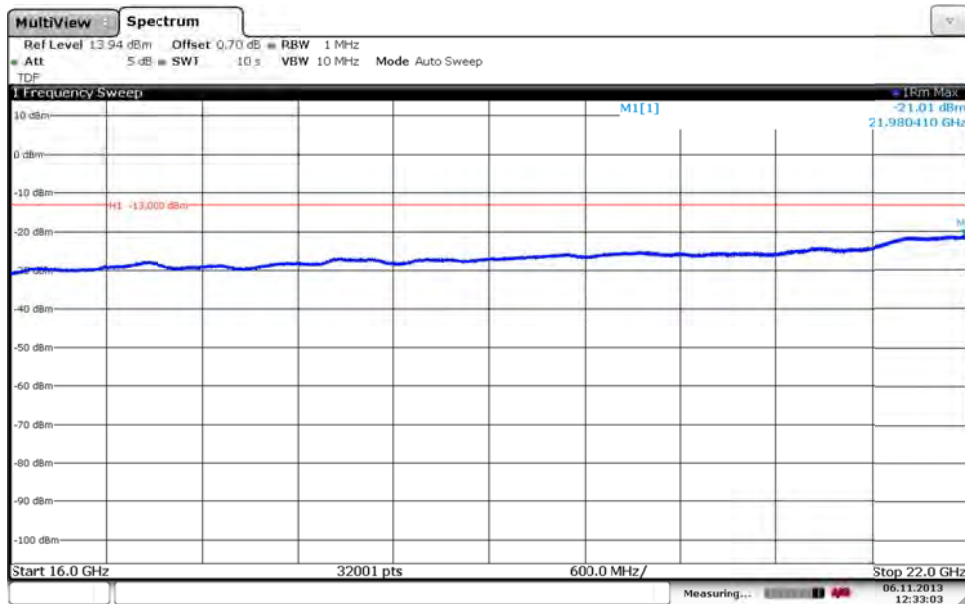
Appendix 5

Diagram 10 c:



Date: 6 NOV. 2013 12:32:27

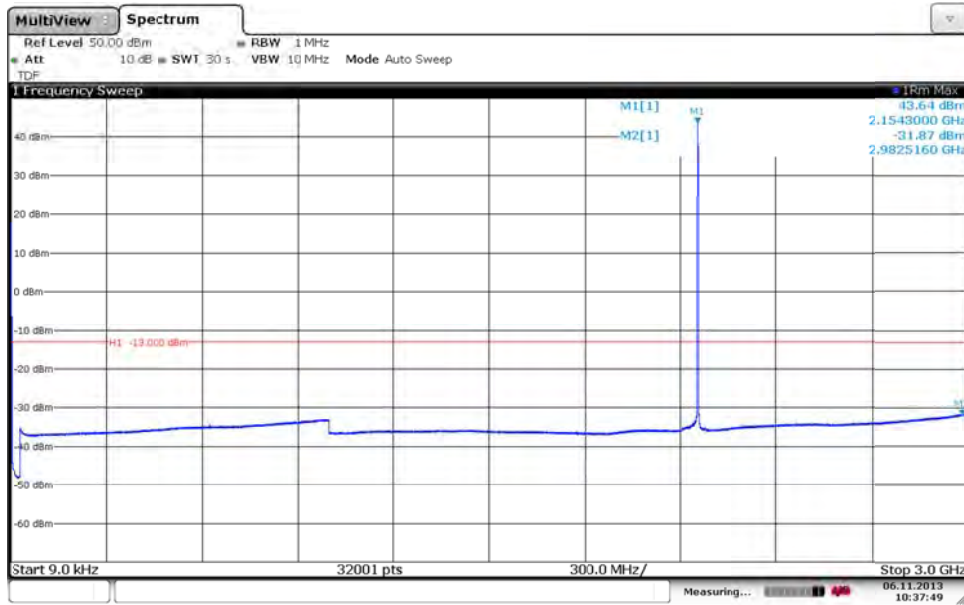
Diagram 10 d:



Date: 6 NOV. 2013 12:33:02

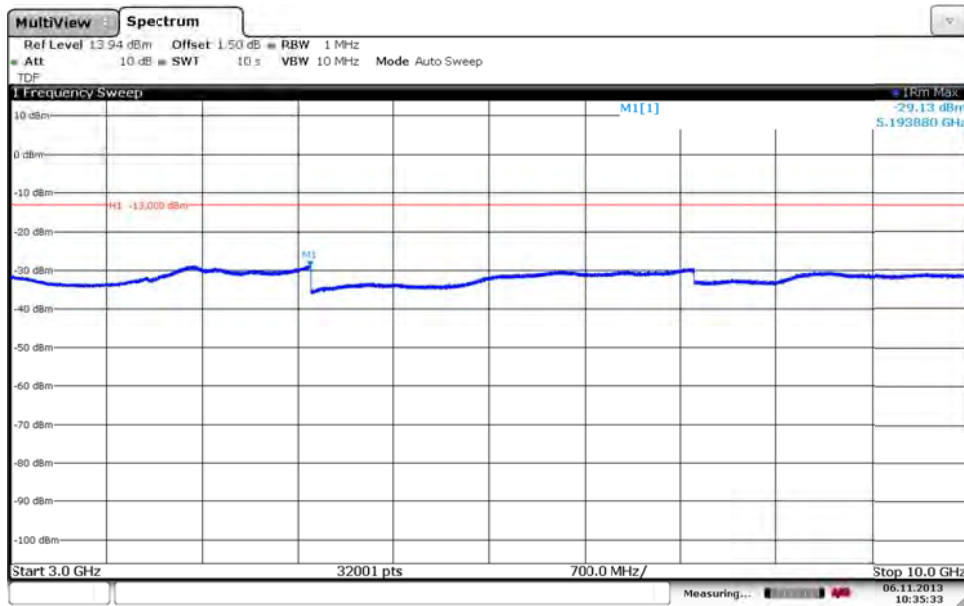
Appendix 5

Diagram 11 a:



Date: 6 NOV 2013 10:37:50

Diagram 11 b:



Date: 6 NOV 2013 10:35:33

Appendix 5

Diagram 11 c:

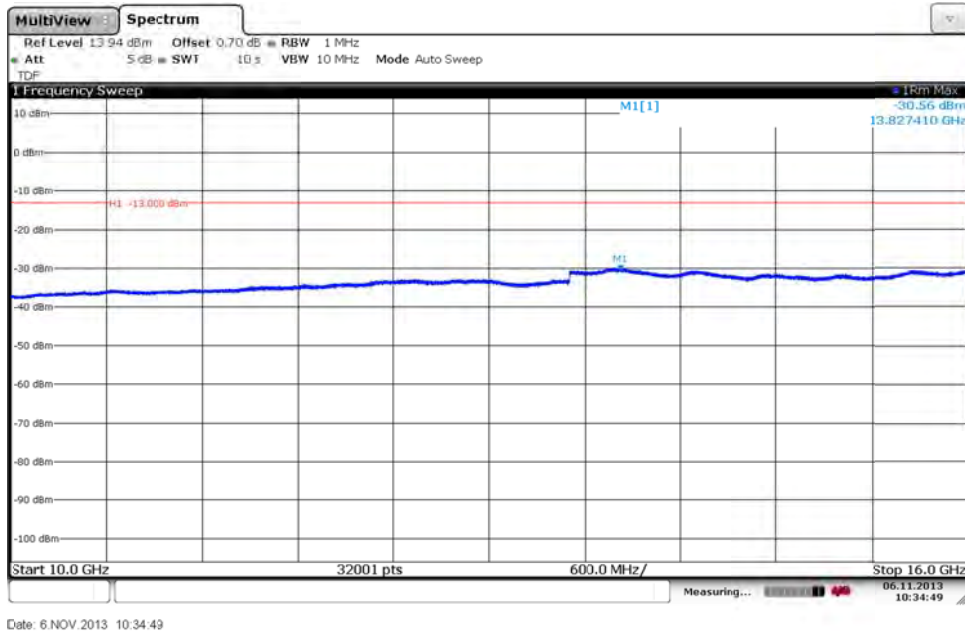
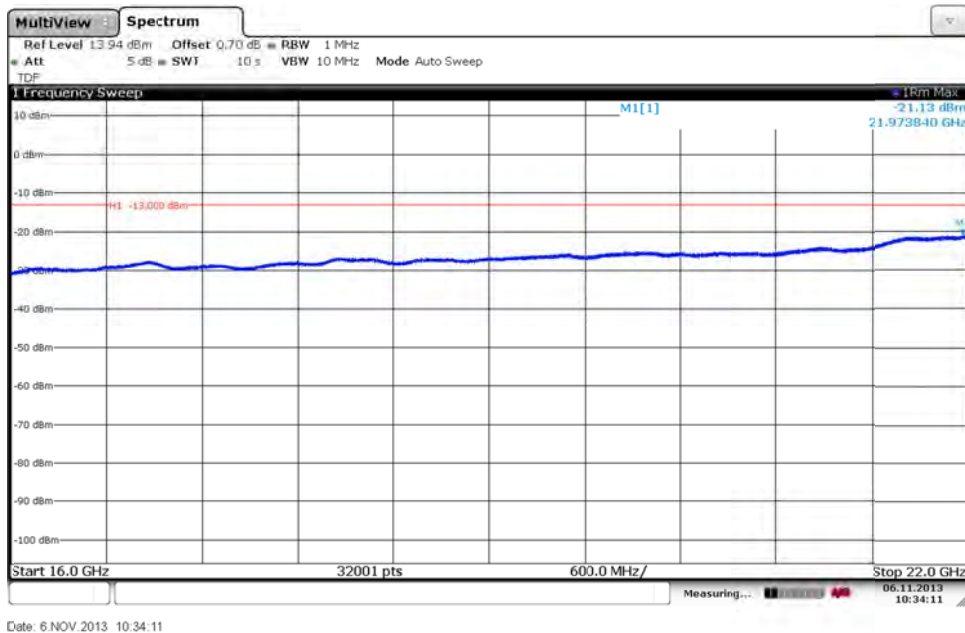
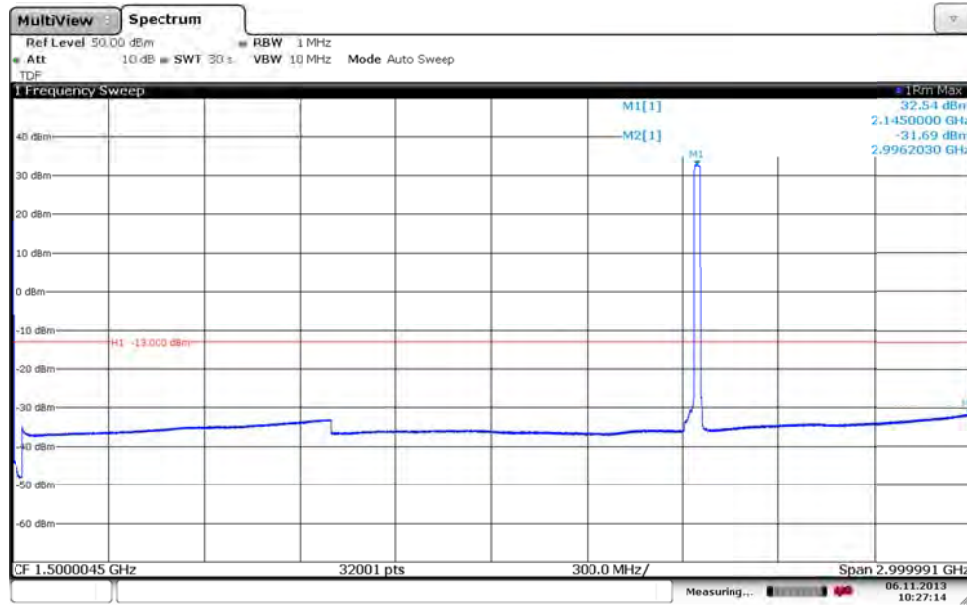


Diagram 11 d:



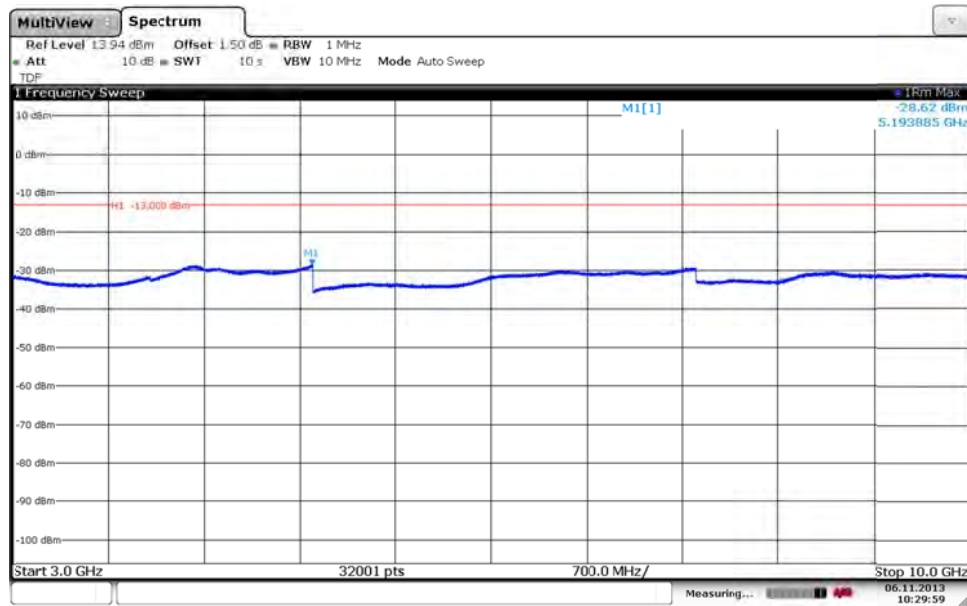
Appendix 5

Diagram 12 a:



Date: 6 NOV 2013 10:27:15

Diagram 12 b:



Date: 6 NOV 2013 10:29:58

Appendix 5

Diagram 12 c:

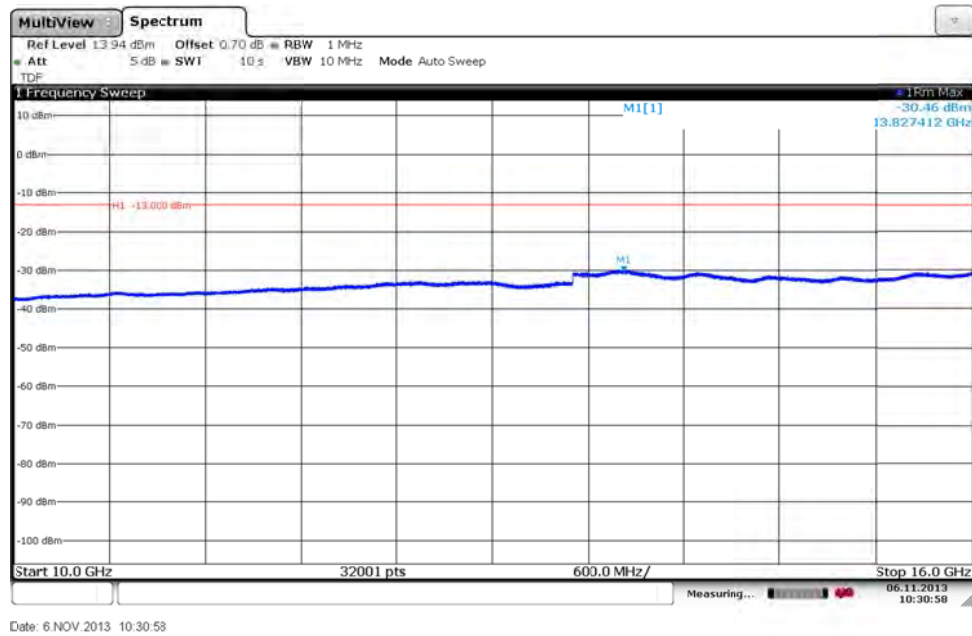
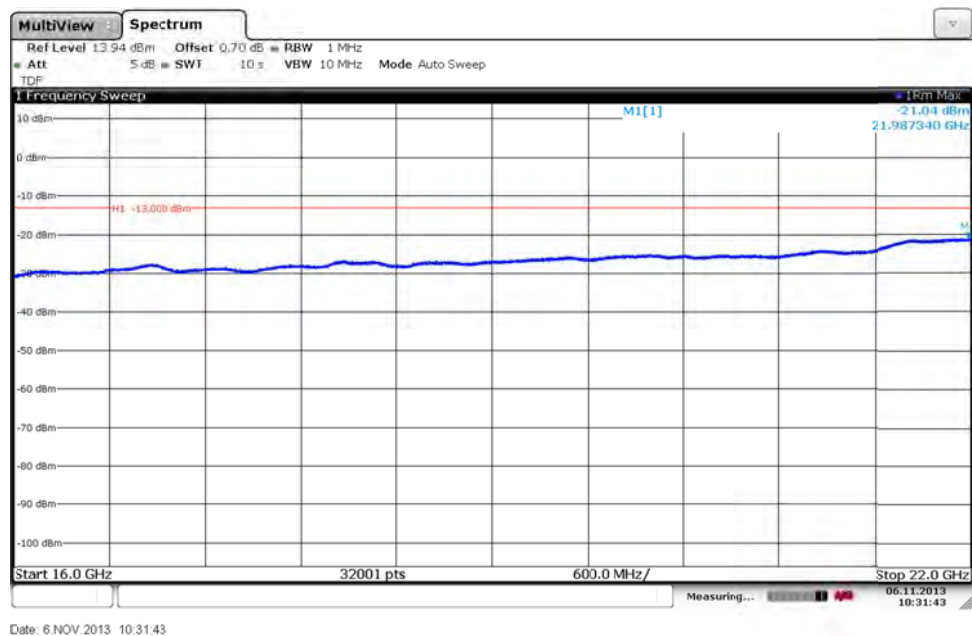
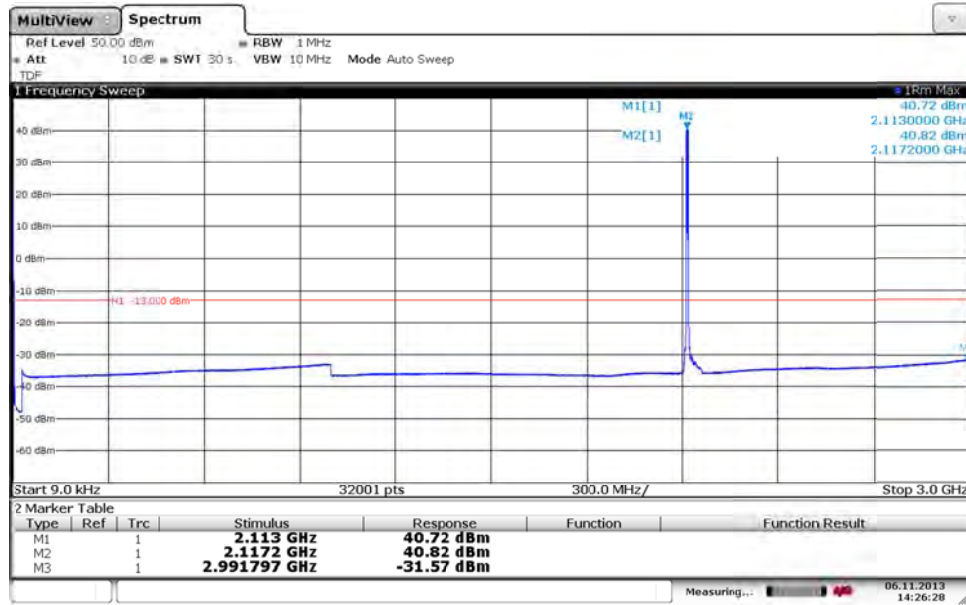


Diagram 12 d:



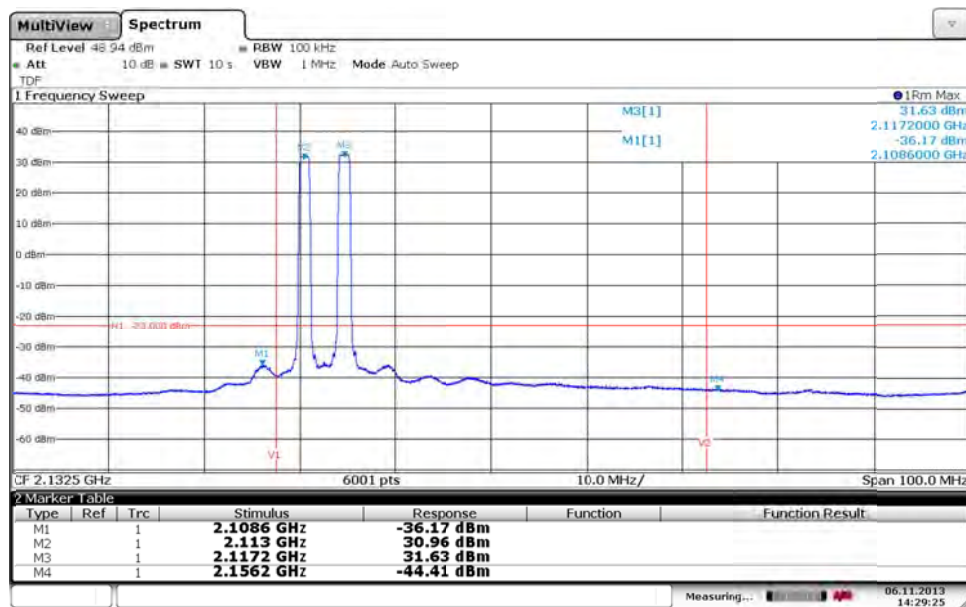
Appendix 5

Diagram 13 a:



Date: 6 NOV 2013 14:26:27

Diagram 13 b:



Date: 6 NOV 2013 14:29:25

Appendix 5

Diagram 13 c:

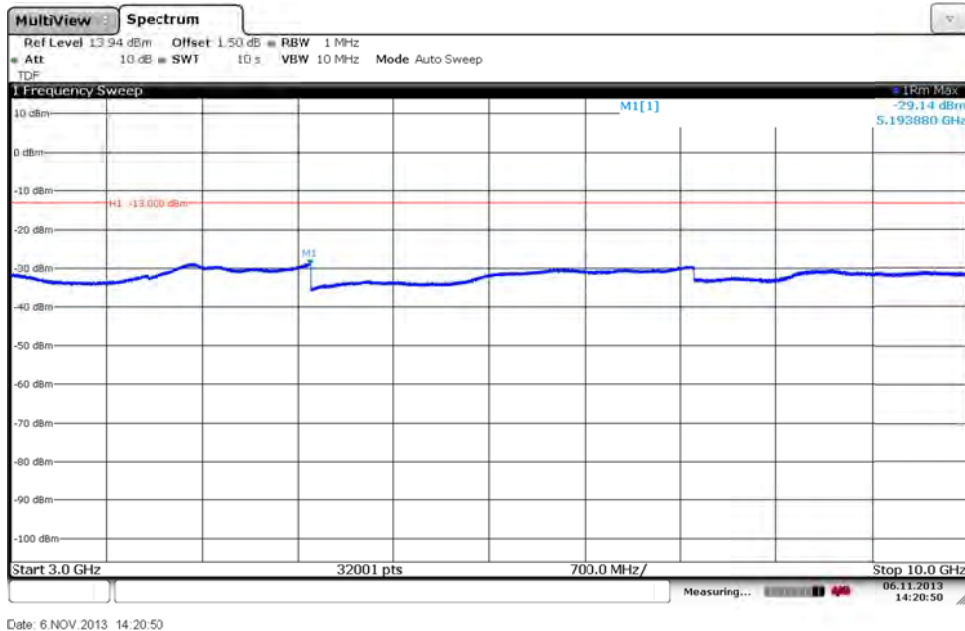
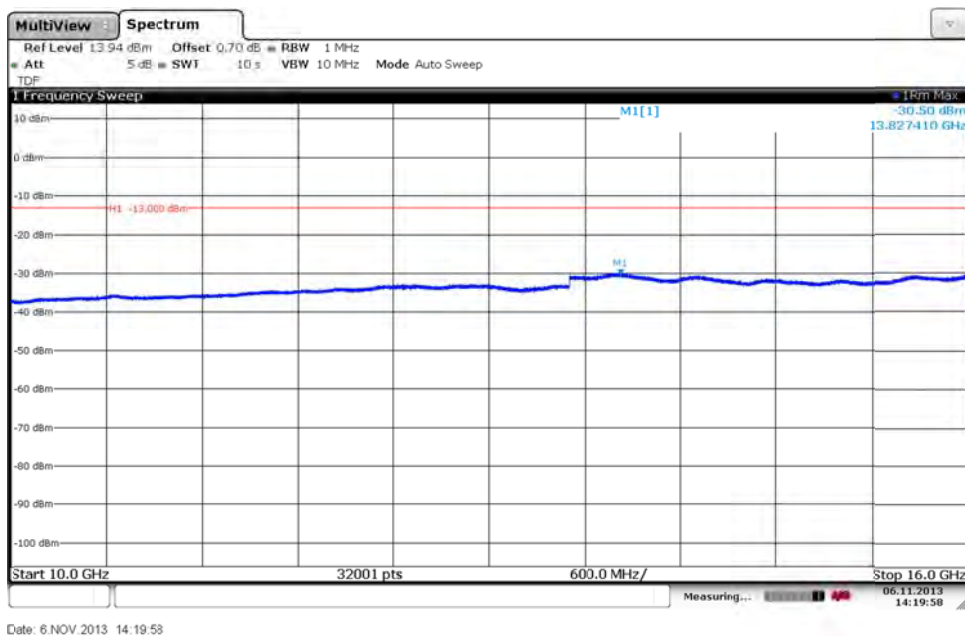
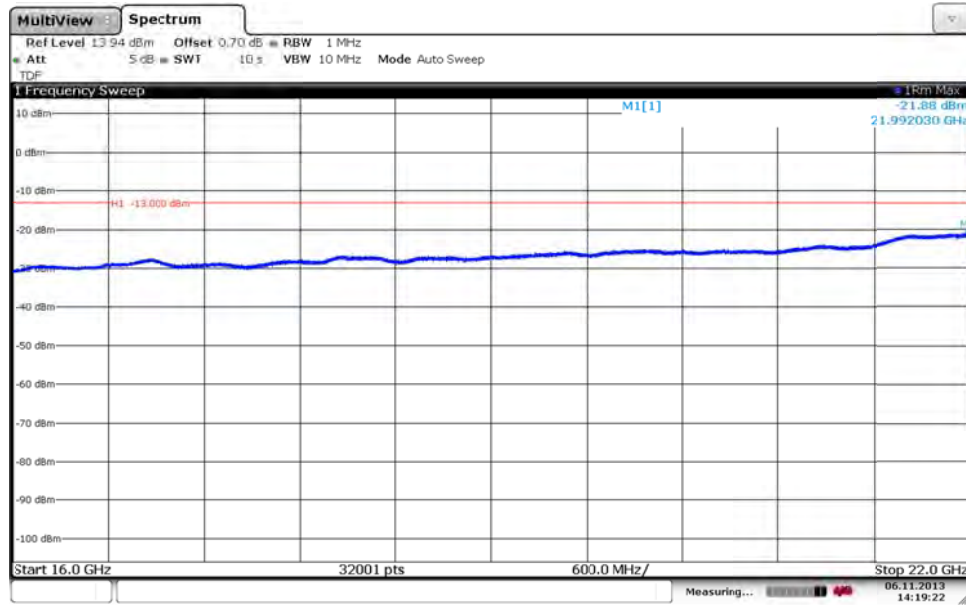


Diagram 13 d:



Appendix 5

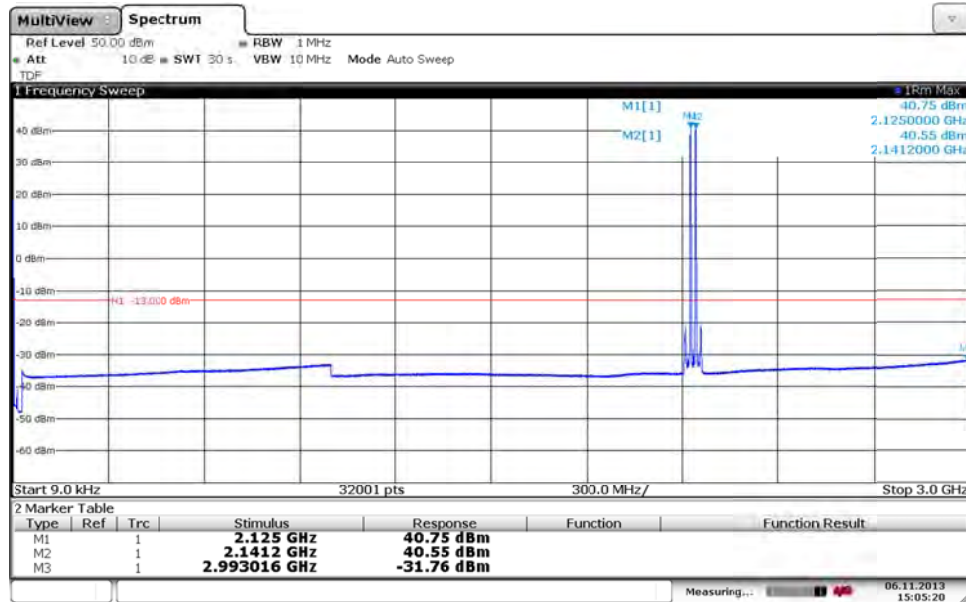
Diagram 13 e:



Date: 6 NOV. 2013 14:19:22

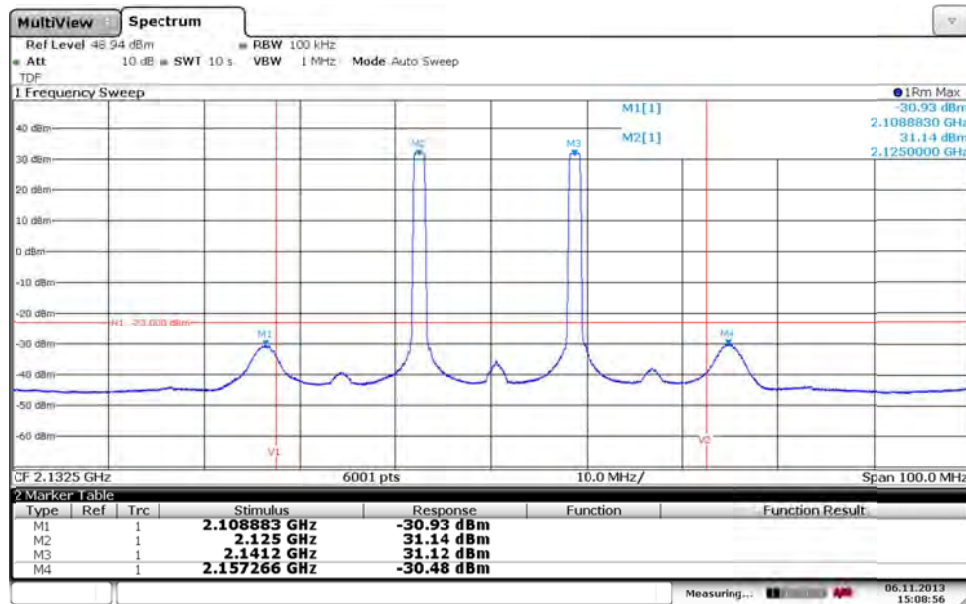
Appendix 5

Diagram 14 a:



Date: 6 NOV 2013 15:05:19

Diagram 14 b:



Date: 6 NOV 2013 15:08:58

Appendix 5

Diagram 14 c:

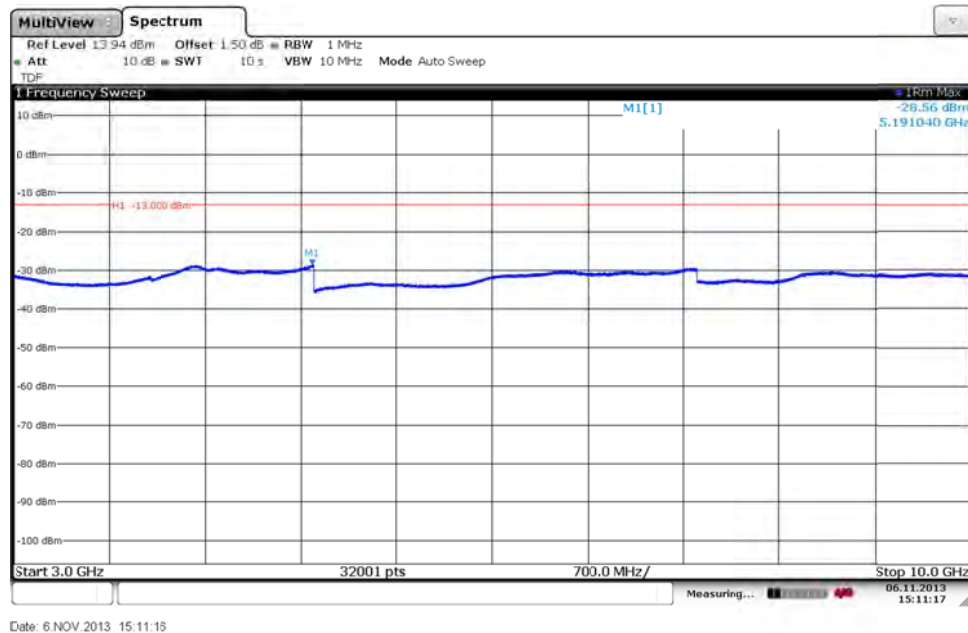
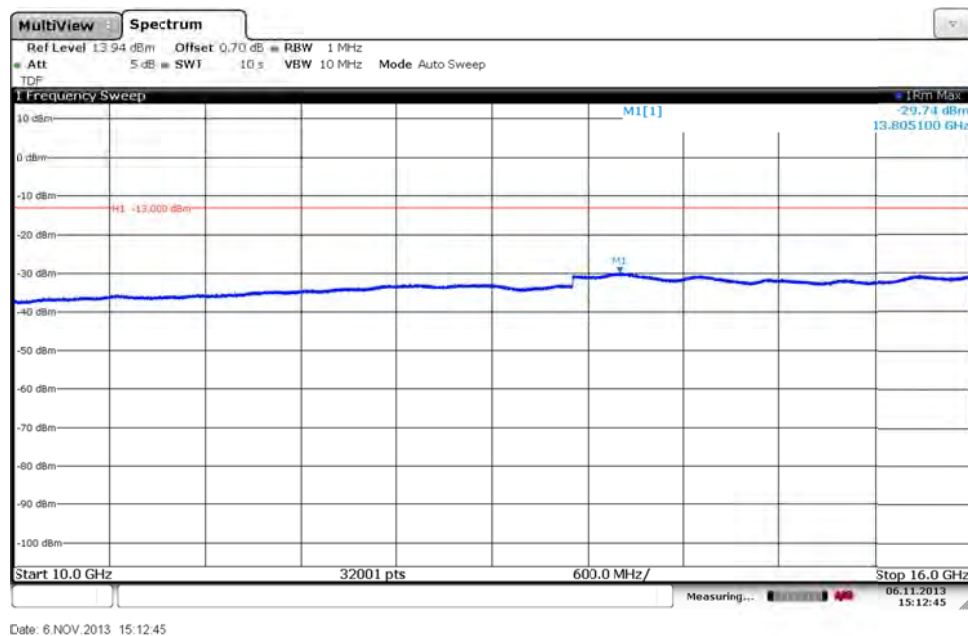
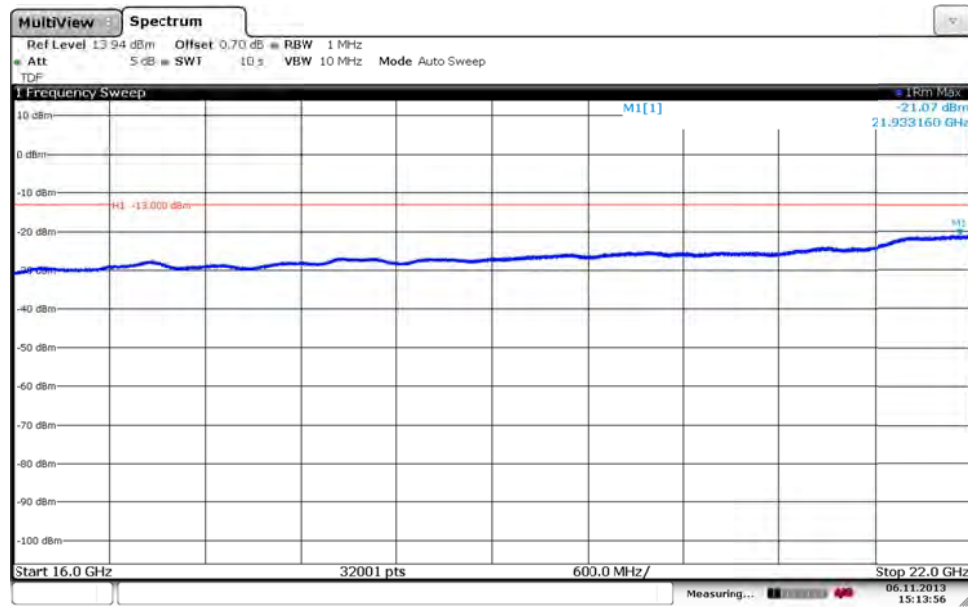


Diagram 14 d:



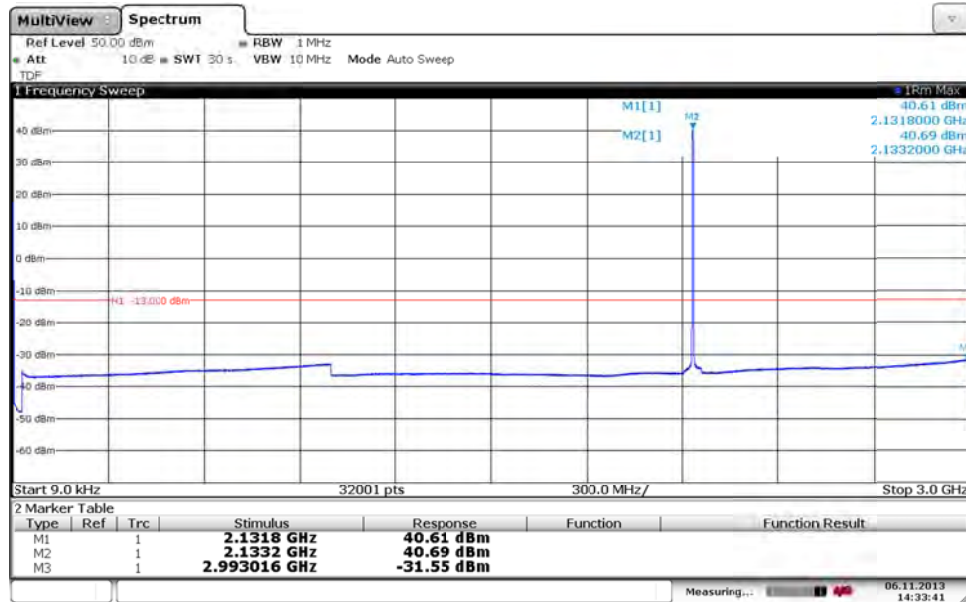
Appendix 5

Diagram 14 e:



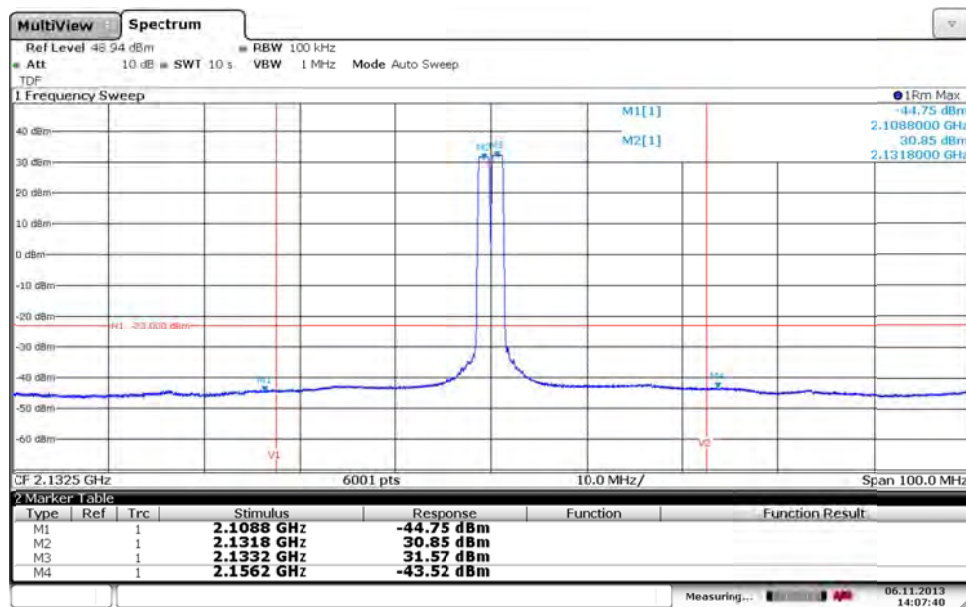
Appendix 5

Diagram 15 a:



Date: 6 NOV 2013 14:33:41

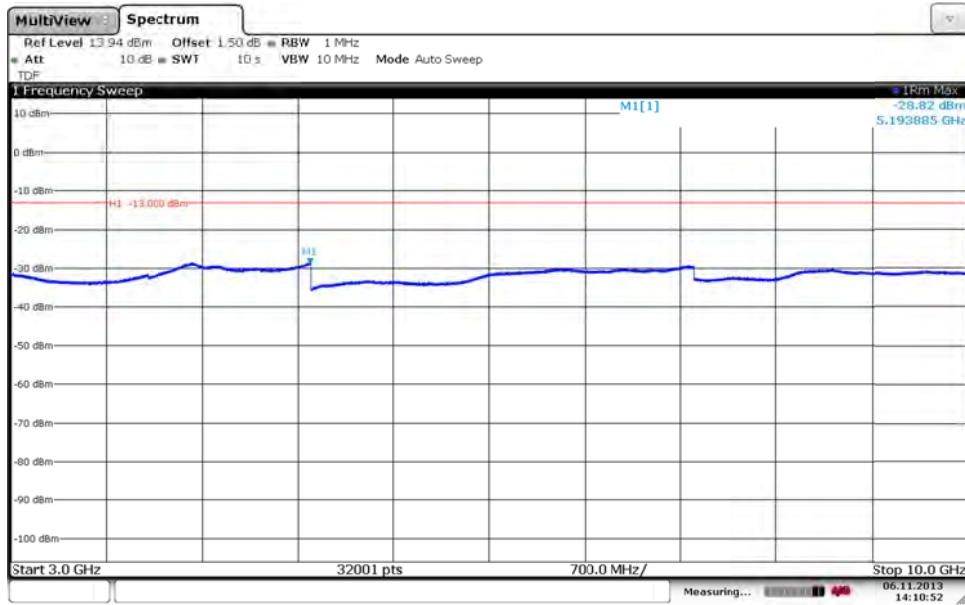
Diagram 15 b:



Date: 6 NOV 2013 14:07:40

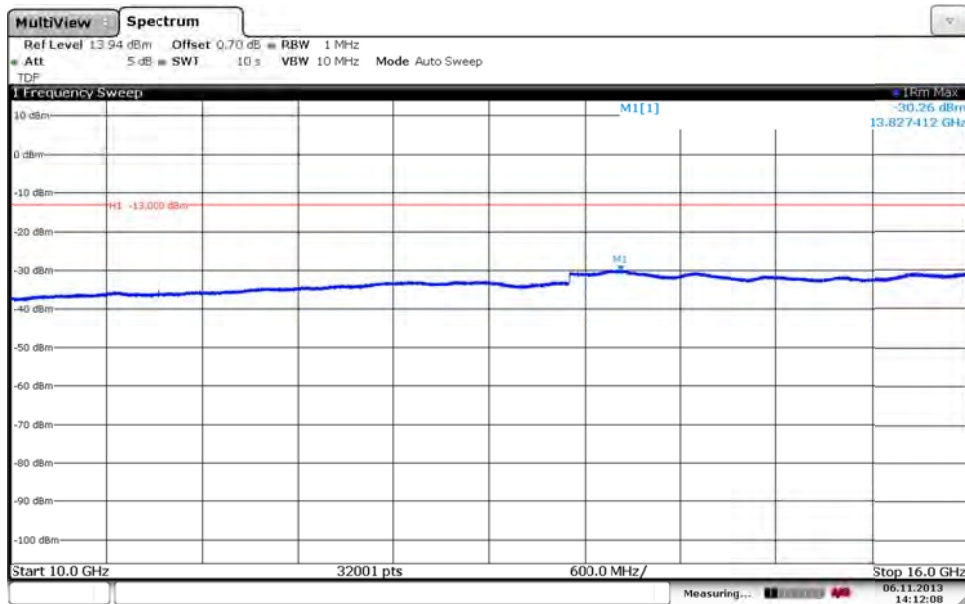
Appendix 5

Diagram 15 c:



Date: 6 NOV. 2013 14:10:52

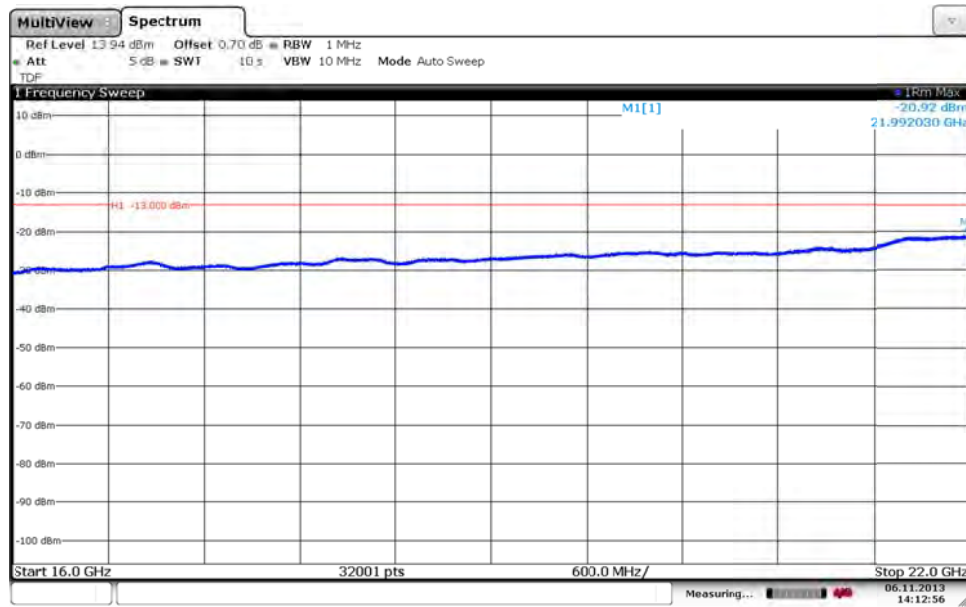
Diagram 15 d:



Date: 6 NOV. 2013 14:12:08

Appendix 5

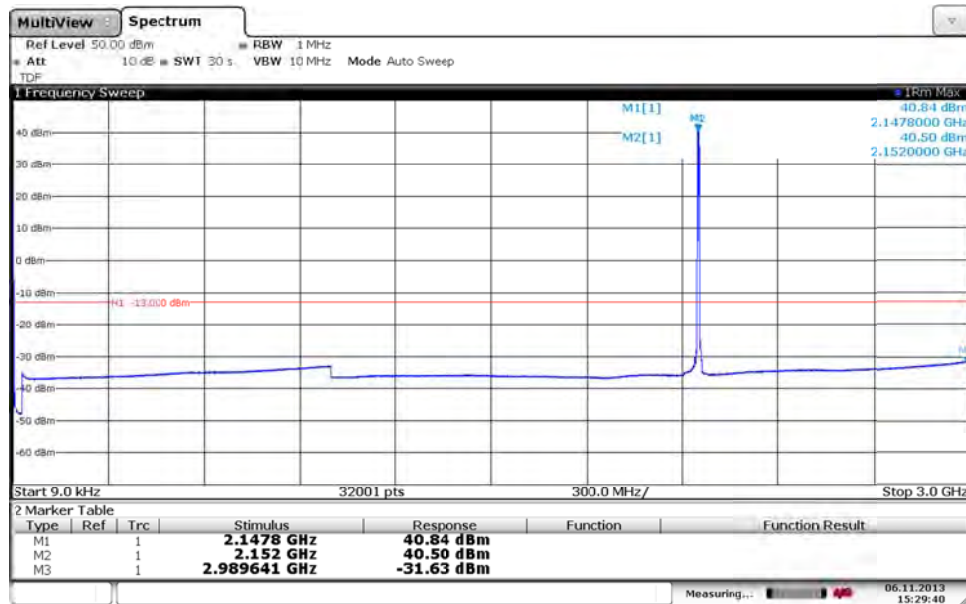
Diagram 15 e:



Date: 6 NOV. 2013 14:12:56

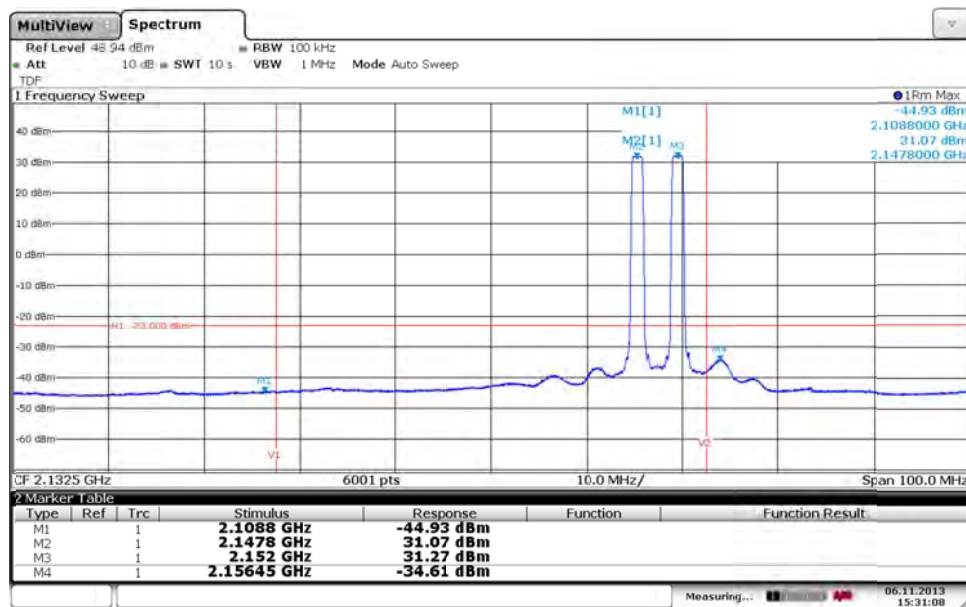
Appendix 5

Diagram 16 a:



Date: 6 NOV 2013 15:29:40

Diagram 16 b:



Date: 6 NOV 2013 15:31:08

Appendix 5

Diagram 16 c:

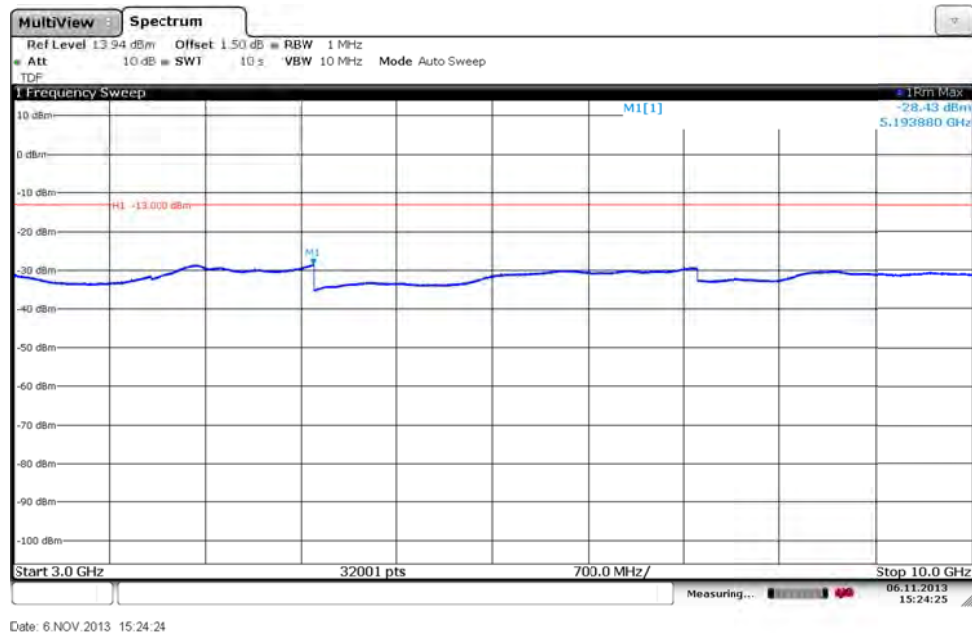
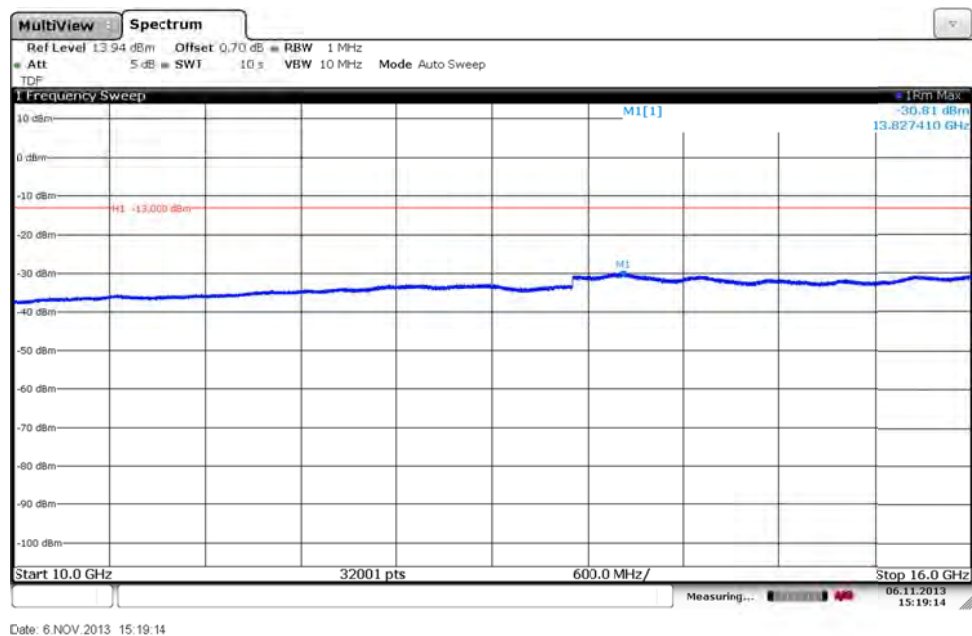
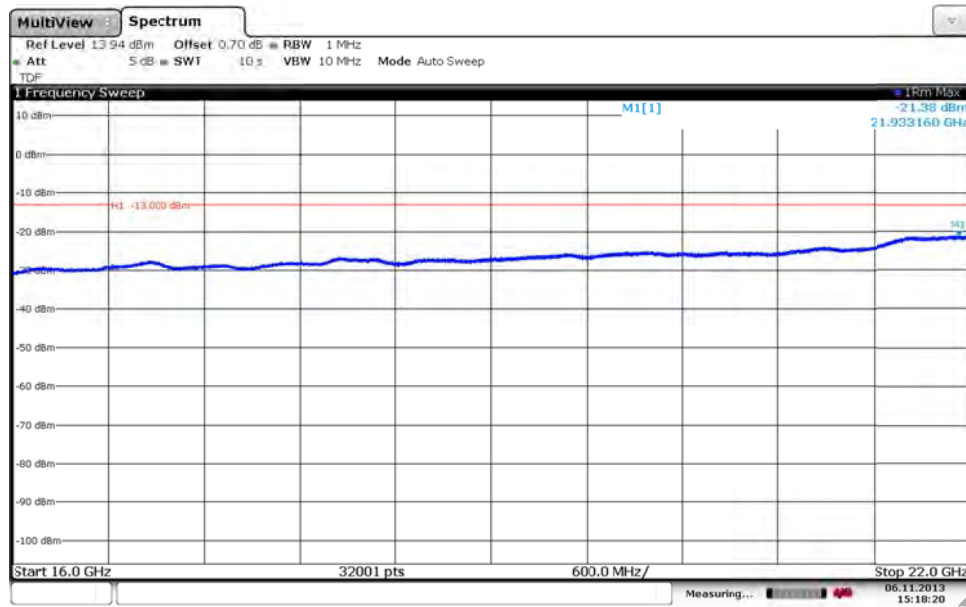


Diagram 16 d:



Appendix 5

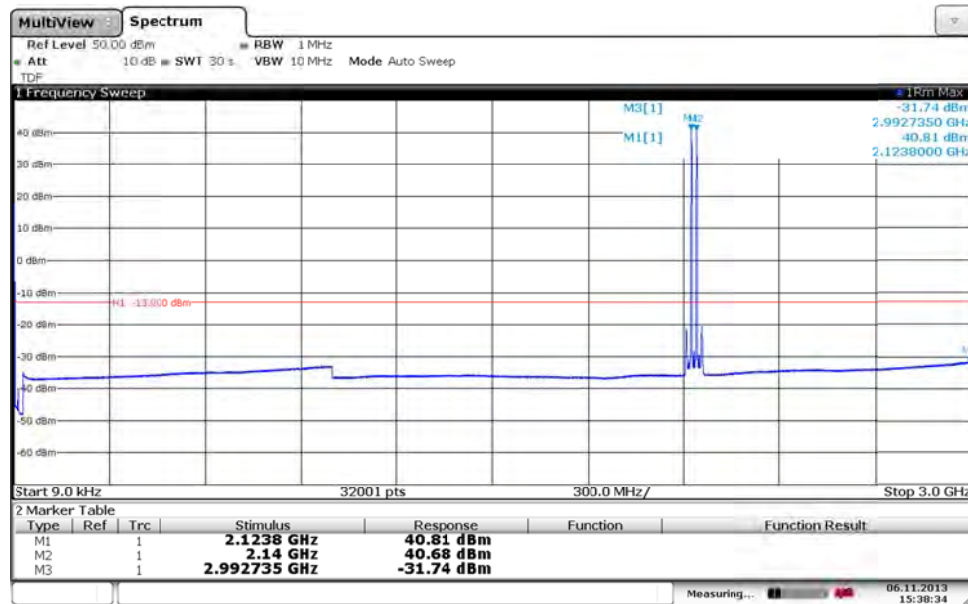
Diagram 16 e:



Date: 6 NOV. 2013 15:18:20

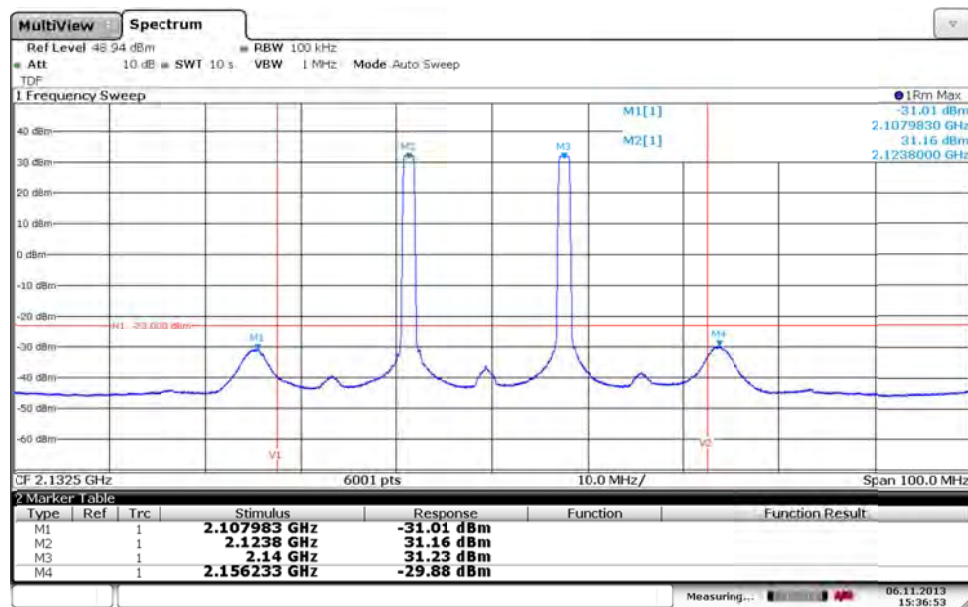
Appendix 5

Diagram 17 a:



Date: 6 NOV 2013 15:38:35

Diagram 17 b:



Date: 6 NOV 2013 15:36:53

Appendix 5

Diagram 17 c:

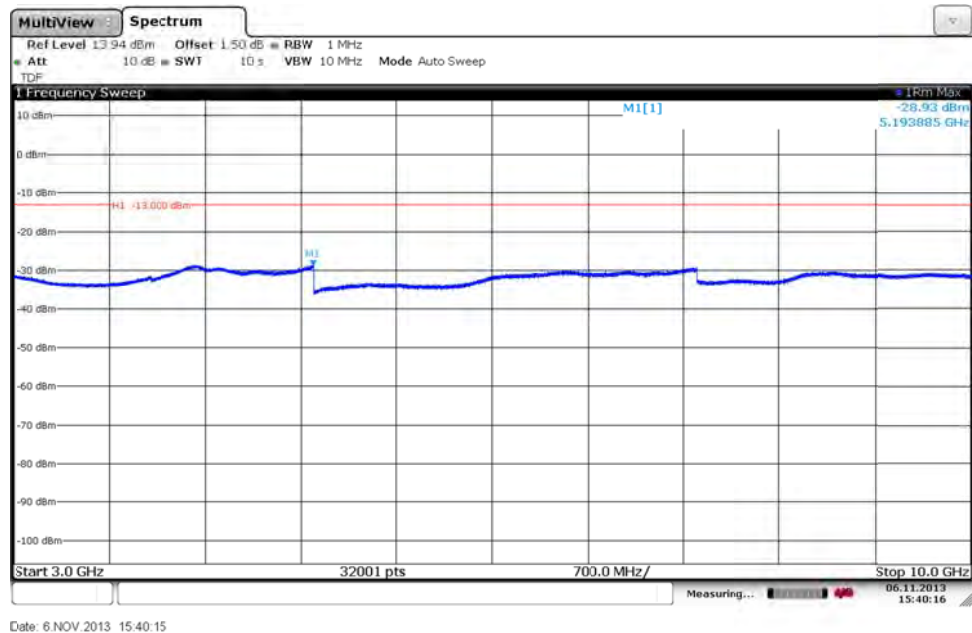
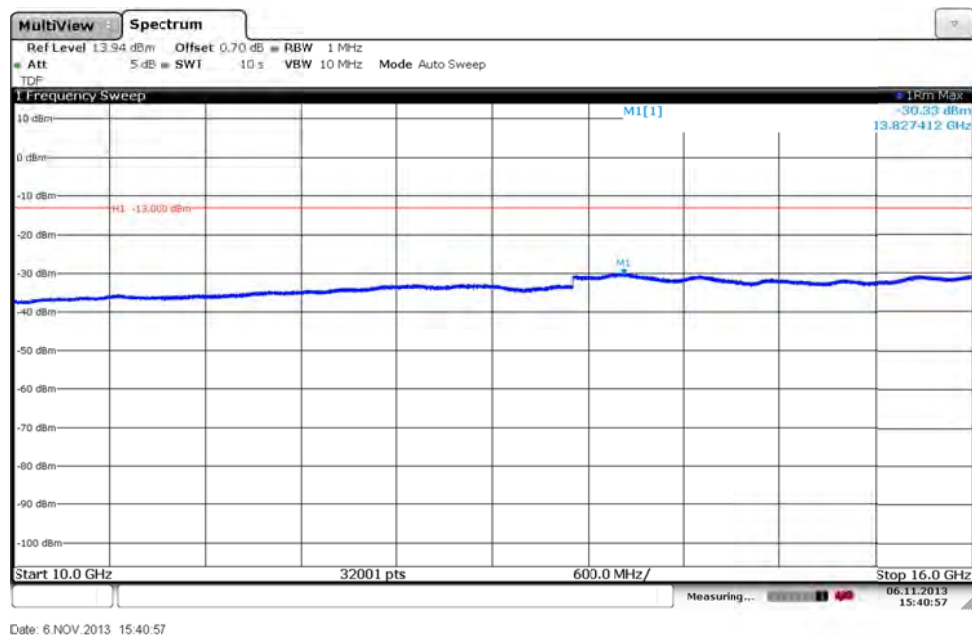
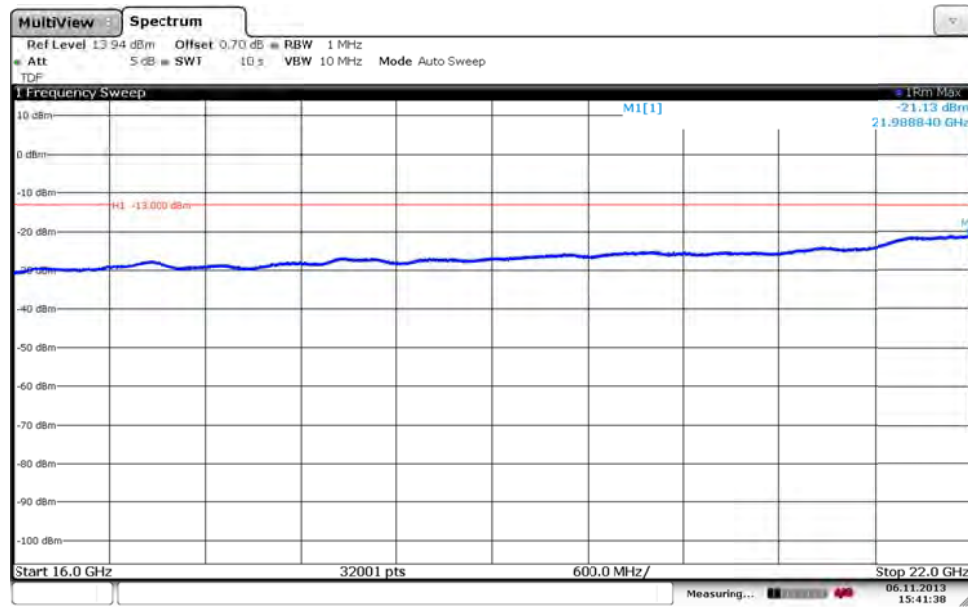


Diagram 17 d:



Appendix 5

Diagram 17 e:



Date: 6 NOV. 2013 15:41:38

Appendix 6

External photos

Front side



Rear side



Appendix 6

Left side



Right side



Appendix 6

Top side



Bottom side

