REPORT

Issued by an FCC listed Laboratory Reg. no93866
The test site complies with RSS-Gen, IC file no. 3482A-2

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Date	Reference	Page
2014-07-03	4P02676-01	1 (2)

1002
ISO/IEC 17025

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Class II permissive change on RUS 01 B2 1900 MHz radio equipment with FCC ID: TA8BKRC11866-1 and IC: 287AB-BS118661

(7 appendices)

Test object

Product name: RUS 01 B2
Product number: KRC 118 66/1, R2G

Summary

See appendix 1 for general information and appendix 7 for external photos.

Standard		Compliant	Appendix
FCC CFR 47 / IC RSS-133 Issue 6			
2.1046 / RSS-133 6.4	RF power output	Yes	2
2.1049 / RSS-Gen 4.6.1	Occupied bandwidth	Yes	3
2.1051 / RSS-133 6.5	Band edge	Yes	4
2.1051 / RSS-133 6.5	Spurious emission at antenna terminals	Yes	5
2.1053 / RSS-133 6.5	Field strength of spurious radiation	Yes	6

Note: Above RSS-133 items are given as cross-reference only. Measurements were performed according to ANSI procedures referenced by FCC and covered by SP's accreditation.

SP Technical Research Institute of Sweden

Electronics – EMC

Performed by

Signed by: Jörgen Wassholm
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Appendix 1

Description of the test object

Equipment:	Radio equipment RUS 01 B2 Product number KRC 118 66/1 FCC ID: TA8BKRC11866-1 IC: 287AB-BS118661 IC MODEL NO: BS118661
Tested configuration:	WCDMA single RAT, (MIMO 2x2)
Frequency range:	TX: 1930 – 1990 MHz RX: 1850 – 1910 MHz
Antenna ports:	1 TX/RX port 1 RX port
RF configuration:	MIMO 2x2, single and multi carrier
Nominal RF output power per antenna port:	Single carrier: 1x 47.0 dBm (1x 50W) Multi carrier: 2x 44.8 dBm (2x 30W) 4x 41.8 dBm (4x 15W)
Antenna:	No dedicated antenna, handled during licensing
Modulations:	QPSK, 16QAM and 64QAM
Channel bandwidths:	4.2 to 5 MHz (configurable in steps of 100/200 kHz)
Channel spacing:	4.4 to 5 MHz (configurable in steps of 100/200 kHz)
Nominal supply voltage:	-48VDC

Appendix 1

Operation mode during measurements

Measurements were performed with the test object transmitting the Test model 1 which are defined in 3GPP TS 25.141. Test model 1 (TM1) represent QPSK modulation. Test model 5 (TM5) includes the 16QAM modulation and Test model 6 (TM6) includes the 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
TM5: 8 HS-PDSCH at 240 ksps + 30 DPCH:s at 30 ksps (SF=128)

MIMO mode, multi carrier (2 carriers)
TM5: 8 HS-PDSCH at 240 ksps +30 DPCH:s at 30 ksps (SF=128)

Channel bandwidth: 5 MHz

Conducted measurements

The test object was hosted in a RBS 6201 powered with -48 VDC. Additional connections are documented in the set-up drawings below.
All measurements were performed on test object 1 (described in the Test setup diagram), running in primary mode. All TX parameters were measured at port RF A

Radiated measurements

The test object was tested stand-alone. It was powered with -48 VDC. RF A port was terminated into 50 ohm.

Purpose of test

The purpose of this test is to justify a Class II Permissive Change of the test object to include the use of MIMO with WCDMA access technology, by verifying compliance to the performance characteristics specified in applicable items of FCC CFR 47 and Industry Canada RSS-133 and RSS-Gen.

References

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

ANSI C63.4-2009
ANSI/TIA/EIA-603-C-2004
3GPP TS 25.141, version 11.4.0
CFR 47 part 2, October 1st , 2013
CFR 47 part 24 Subpart E, October 1st, 2013
RSS-Gen Issue 3
RSS-133 Issue 6

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 objects was delivered 2013-09-27 and 2014-03-28.

Manufacturer’s representative

Christer Gustavsson, Ericsson AB.

Test engineers

Andreas Johnson, Kexin Chen, Rolf Kühn, Maulo Rivera-Avalos, Tomas Lennhager, Tomas Isbring and Jörgen Wassholm, SP.

Test participant

None.

Measurement equipment

	Calibration Due	SP number
Test site Edison	2015-03	504 114
R&S FSIQ 40	2014-07	503 738
R&S ESIB 26	2014-07	503 885
R&S FSQ 40	2014-07	504 143
Control computer with R&S software EMC32 version 8.52.0	-	503 899
High pass filter	2015-01	BX40074
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	2014-11	901 508
Antenna Schaffner CBL 6143	2016-10	504 079
EMCO Horn Antenna 3115	2015-03	902 212
Std.gain horn FLANN model 20240-20	-	503 674
µComp Nordic, Low Noise Amplifier	2015-02	504 160
Miteq Low Noise Amplifier	2014-09	503 285
Schwartzbeck preamplifier BBV 9742	2015-01	504 085
Temperature and humidity meter, Testo 635	2015-03	504 203
Temperature and humidity meter, Testo 625	2014-06	504 117
Temperature Chamber	2015-03	501 031
Multimeter Fluke 87	2014-08	502 190

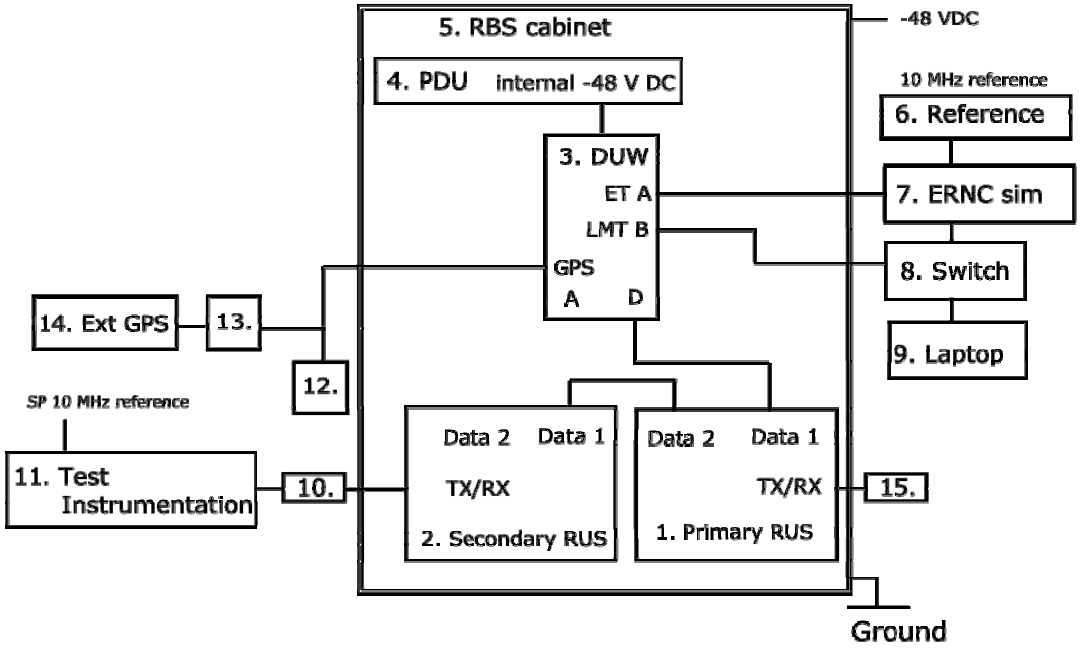
Appendix 1

Test frequencies during conducted and radiated measurements

UARFCN Downlink	Frequency [MHz]	Symbolic name	Comment
9662	1932.4	B	Single carrier TX bottom frequency
9662 9687	1932.4 1937.4	B2	2-carriers TX band bottom constellation
9662 9712	1932.4 1942.4	B3	2-carriers TX band bottom constellation
9662 9687 9712 9737	1932.4 1937.4 1942.4 1947.4	B4	4-carriers TX band bottom constellation
9800	1960.0	M	Single carrier TX band mid frequency
9800 9825	1960.0 1965.0	M2	2-carriers TX band mid constellation
9800 9850	1960.0 1970.0	M3	2-carriers TX band mid constellation
9763 9788 9813 9838	1952.6 1957.6 1962.6 1967.6	M4	4-carriers TX band mid constellation
9938	1987.6	T	Single carrier TX band top frequency
9938 9913	1987.6 1982.6	T2	2-carriers TX band top constellation
9938 9888	1987.6 1977.6	T3	2-carriers TX band top constellation
9938 9913 9888 9863	1987.6 1982.6 1977.6 1972.6	T4	4-carriers TX band top constellation

All RX frequencies were configurated 80 MHz below the corresponding TX frequency according to the applicable duplex offset for the operating band.

Test setup conducted measurements WCDMA



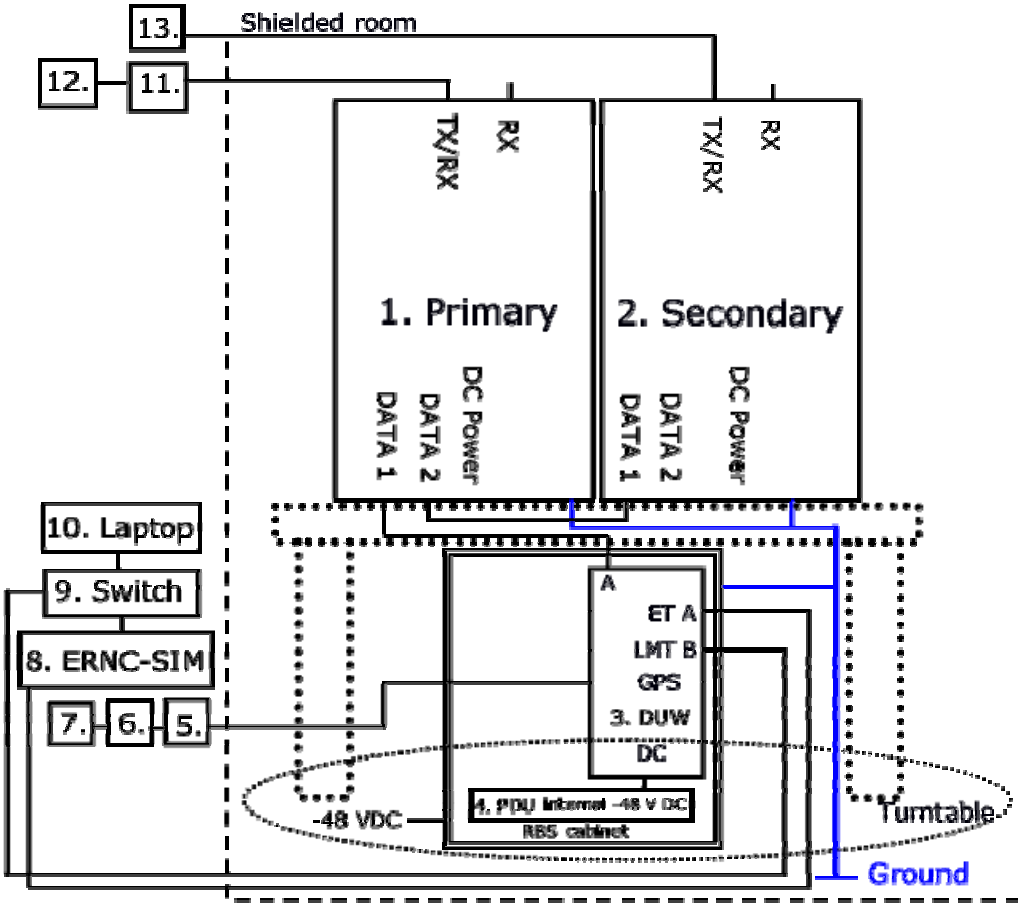
Test object:

1.	RUS 01 B2, KRC 118 66/1, rev. R2G, s/n: : CB4J995167, Test object: primary/ secondary
2.	RUS 01 B2, KRC 118 66/1, rev. R2G, s/n: : CB4J995078, Dummy (secondary/ primary) software CXP 901 3268/6, rev. R57CA with FCC ID: TA8BKRC11866-1 and IC: 287AB-BS118661

Functional test equipment:

3.	DUW 41 01, KDU 127 174/4, rev. R2C, s/n: A401998222
4.	PDU 02 02, BMG 980 336/5, rev. R1F, s/n: X051445683
5.	RBS 6201 cabinet, BAMS – 1000778792
6.	Symmetricon 8040 reference, BAMS – 1000714189
7.	ERNC Sim 130, BAMS – 100066091
8.	Fast Ethernet switch, Netgear FS726T
9.	Laptop, EliteBook 8560w, BAMS – 1001236856
10.	Attenuator, filter, according respective appendix
11.	SP test instrument according measurement equipment list
12.	Power supply, Mascot Type 719
13.	GPS 02 01, NCD 901 41/1, rev. R1D, s/n: TU8K474887
14.	GPS Active Antenna, KRE 101 2082/1
15.	Terminator

Test setup radiated measurements WCDMA



Test object:

1.	RUS 01 B2, KRC 118 66/1, rev. R2G, s/n: : CB4J995167, Test object: primary/ secondary
2.	RUS 01 B2, KRC 118 66/1, rev. R2G, s/n: : CB4J995078, Dummy (secondary/ primary) software CXP 901 3268/6, rev. R57CA with FCC ID: TA8BKRC11866-1 and IC: 287AB-BS118661

Functional test equipment:

3.	DUW 41 01, KDU 127 174/4, rev. R2C, s/n: A401998222
4.	RBS 6202: PDU 02 02, BMG 980 336/5, rev. R1F, s/n: X051445683
5.	Power supply, Mascot Type 719
6.	GPS 02 01, NCD 901 41/1, rev. R1D, s/n: TU8K356428
7.	GPS Active Antenna, KRE 101 2082/1
8.	ERNC-SIM 131, BAMS – 1000660992, Symetricom 8040, BAMS – 1000714186
9.	Switch Netgear FS726T
10.	Laptop, EliteBook 8560w, BAMS – 1001236856
11.	Attenuator
12.	FSIQ 40, SP number: 503 738, for supervision purpose only
13.	Terminator

Appendix 1

Interfaces:	**Type of port:**
Power: -48 VDC	DC Power
Antenna port (A), 7/16 connector, combined TX/RX	Antenna
Antenna port (B), 7/16 connector, only RX	Antenna
Data 1, electrical interface	Signal
Data 2, electrical interface	Signal
RX A Out, no cable attached	RF
RX A I/O, no cable attached	RF
RX B I/O, no cable attached	RF
Ground wire	Ground

RBS software:

Software	**Revision**
CXP 902 1719	R1DG07

RF power output measurements according to CFR 47 §2.1046 / IC RSS-133 6.4

Date	Temperature	Humidity
2014-06-03	23 °C ± 3 °C	30 % ± 5 %
2014-06-04	22 °C ± 3 °C	45 % ± 5 %

Test set-up and procedure

The test object was connected to a signal analyzer 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	902 282
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 1.1 dB

Results

MIMO mode, single carrier

Rated output power 1 x 47 dBm per RF port.

Symbolic name	Transmitter power [RMS (dBm)/ PAR dB]		
	Port RF A primary	Port RF A secondary	Total power[1)]
B	47.43/ 7.16	47.41/ 7.16	50.43
M	47.45/ 7.16	47.29/ 7.16	50.38
T	47.29/ 7.16	47.32/ 7.16	50.32

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

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

MIMO mode, 2-Carrier

Rated output power 2 x 44.8 dBm per RF port.

Symbolic name	Transmitter power [RMS (dBm)/ PAR dB]		
	Port RF A primary	Port RF A secondary	Total power[1)]
B2	47.53/ 7.07	47.60/ 7.07	50.58
M2	47.58/ 7.02	47.47/ 7.04	50.54
T2	47.51/ 7.04	47.49/ 7.00	50.51

MIMO mode, 4-Carrier

Rated output power 4 x 41.8 dBm per RF port.

Symbolic name	Transmitter power [RMS (dBm)/ PAR dB]		
	Port RF A primary	Port RF A secondary	Total power[1)]
B4	47.46/ 7.31	47.51/ 7.28	50.50
M4	47.47/ 7.04	47.41/ 7.12	50.45
T4	47.44/ 7.12	47.20/ 7.31	50.33

[1)]: 2 outputs summed power according to FCC KDB662911 Multiple transmitter output v02r01

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

MIMO mode, single carrier

Measured output power per 1 MHz.

Symbolic name	[RMS dBm]		Total power[1)] [RMS dBm]
	Port RF A primary	Port RF A secondary	
B	42.26	42.22	45.26
M	42.33	42.12	45.33
T	42.21	42.28	45.28

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

Remark

This unit is tested without antenna. ERP/EIRP compliance is addressed at the time of licensing, as required by the responsible FCC/IC Bureau(s). Licensee's are required to take into account maximum allowed antenna gain used in combination with above power settings to prevent the radiated output power to exceed the limits.

Limits

§24.232 The maximum output power may not exceed 3280 W/MHz (EIRP).
The Peak to Average Ratio (PAR) may not exceed 13 dB.

RSS-133 Base station transmitters operating in the band 1930-1995 MHz shall not have output power exceeding 100 watts. When the transmitter power is measured in terms of average value, the peak-to-average ratio(PAR) of the power shall not exceed 13 dB

There is no EIRP limit specified for base station equipment in the RSS-133.

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 EIRP limits specified in SRSP-510

Complies?	Yes

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

Date	Temperature	Humidity
2014-06-03	23 °C ± 3 °C	30 % ± 5 %
2014-06-04	22 °C ± 3 °C	45 % ± 5 %

Test set-up and procedure

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

Measurement equipment	SP number
R&S FSQ 40	504 143
RF attenuator	902 282
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

MIMO mode, single carrier,

Diagram	Symbolic name	Tested port	Occupied BW (99%) [MHz]
1	B	RF A Primary	4.18
2	M	RF A Primary	4.17
3	M	RF A Secondary	4.17
4	T	RF A Primary	4.16

Appendix 3

Diagram 1:

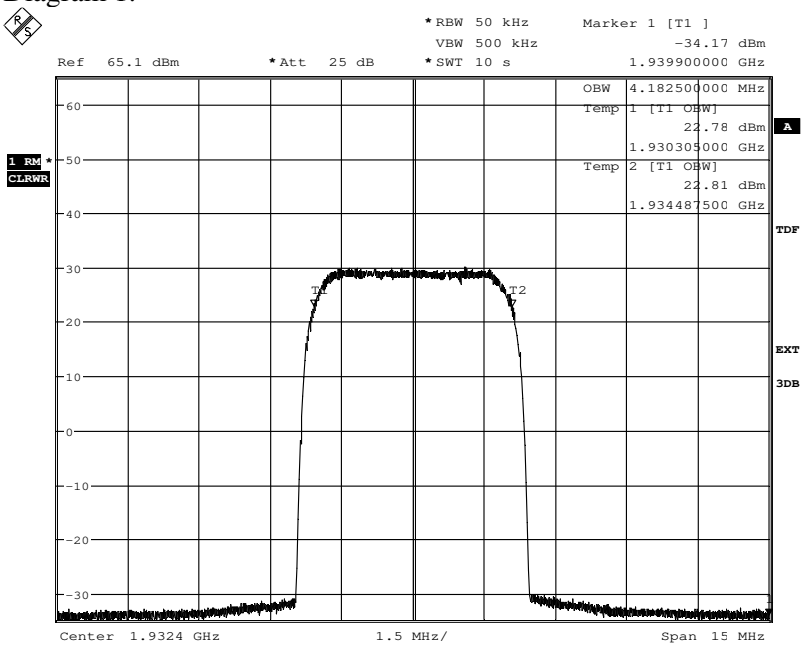


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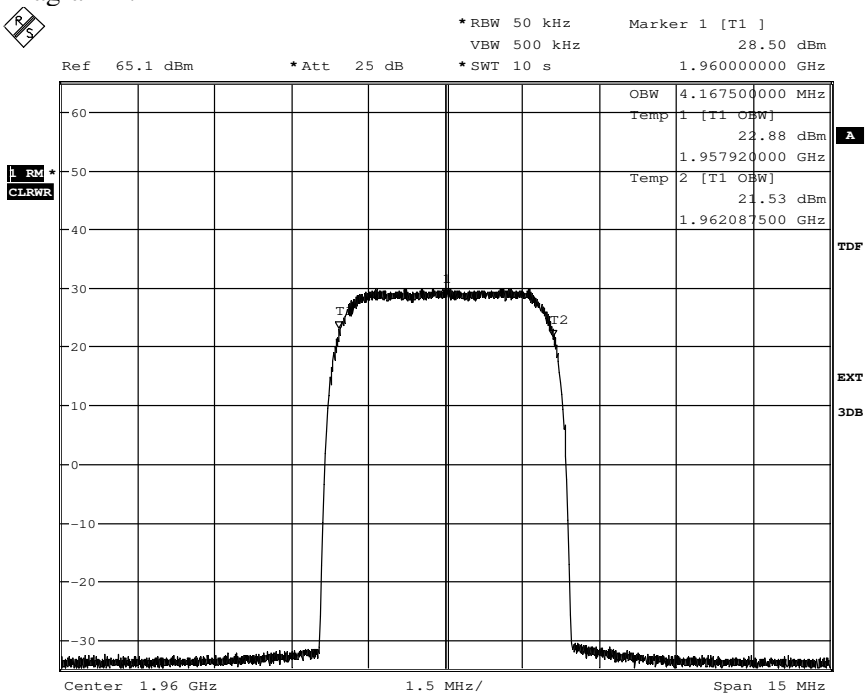
Diagram 2:



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Appendix 3

Diagram 3:

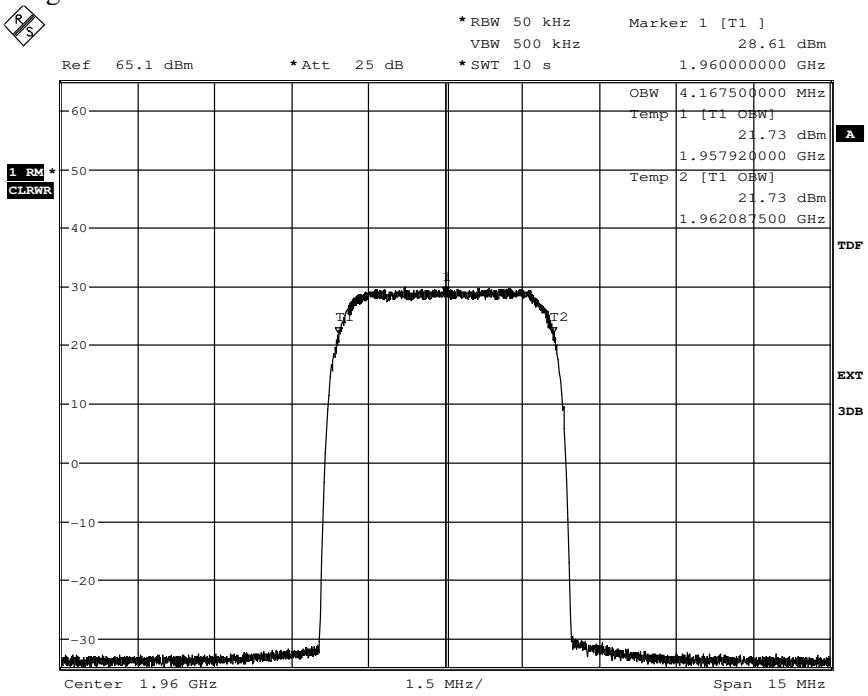

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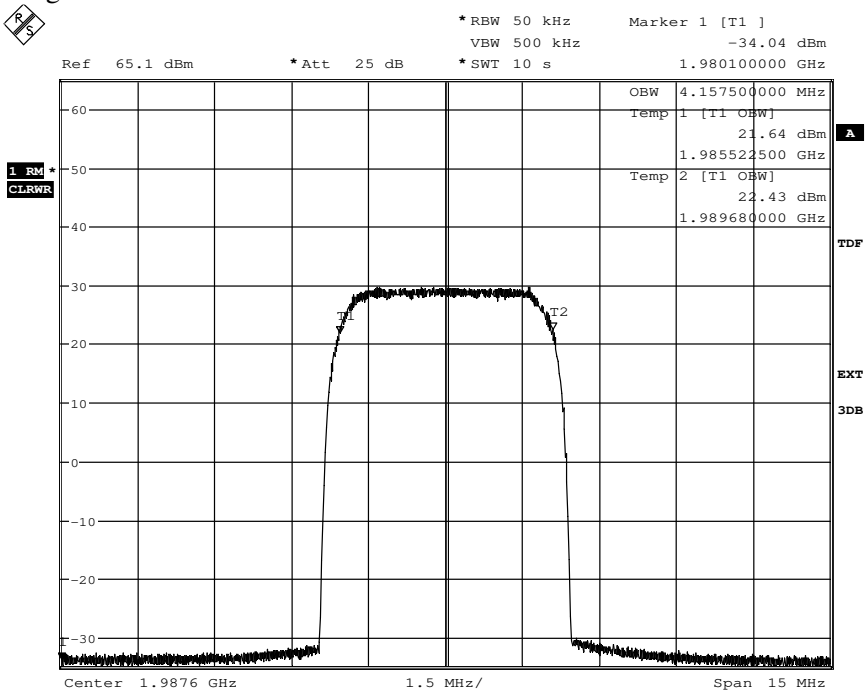
Diagram 4:



Date: 4.JUN.2014 08:57:33

Appendix 4

Band edge measurements according to CFR 47 §2.1051 / IC RSS-133 6.5

Date	Temperature	Humidity
2014-06-03	23 °C ± 3 °C	30 % ± 5 %
2014-06-04	22 °C ± 3 °C	45 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §24.238. The output was connected to a spectrum analyzer with the RMS detector activated. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements. A resolution bandwidth of 10 kHz was used up to 1 MHz away from the band edges. 10 kHz is <1% of the Emission BW (4.37 MHz between the 26 dB points for 5 MHz nominal BW setting). To compensate for the reduced resolution bandwidth, the limit was adjusted with 6.4 dB to -19.4 dBm.
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.
A resolution bandwidth of 1 MHz was used from 6 to 15 MHz away from the band edges.

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	504 143
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
1 a-c	5 MHz	B	Primary
2 a-c	5 MHz	B	Secondary
3 a-c	5 MHz	T	Primary
4 a-c	5 MHz	T	Secondary

MIMO mode, 2-carriers

Diagram	BW configuration	Symbolic name	Tested Port
5 a-c	5 MHz	B2	Primary
6 a-c	5 MHz	T2	Primary

MIMO mode, 4-carriers

Diagram	BW configuration	Symbolic name	Tested Port
7 a-c	5 MHz	B4	Primary
8 a-c	5 MHz	T4	Primary

Limits

CFR 47 §24.238 and RSS-133 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 4

Diagram 1 a:

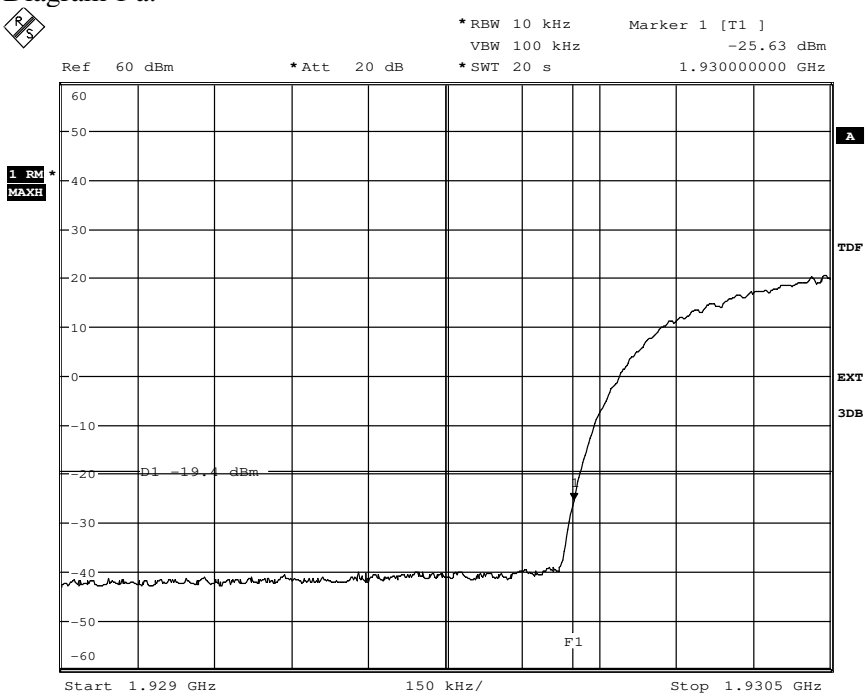


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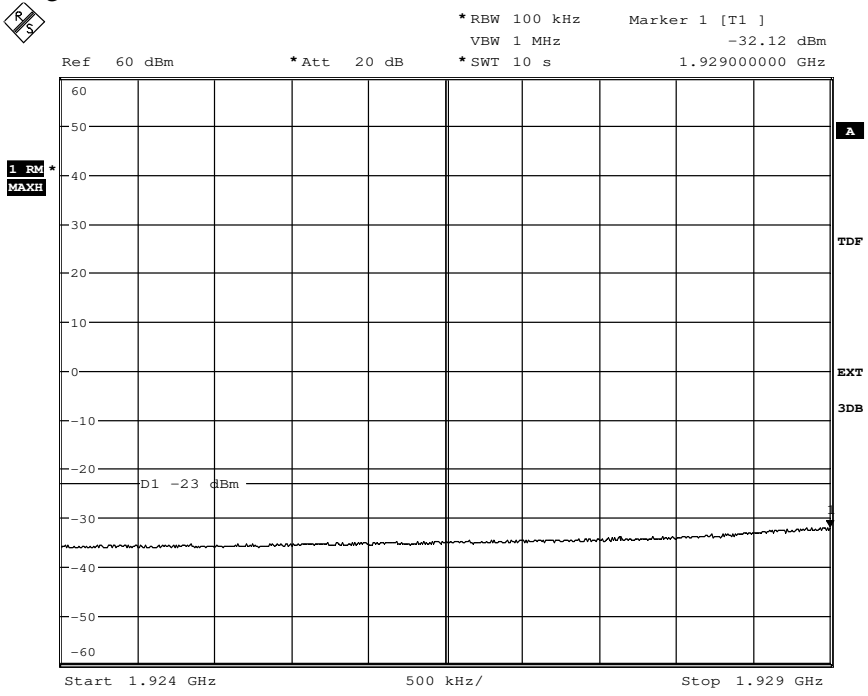
Diagram 1 b:



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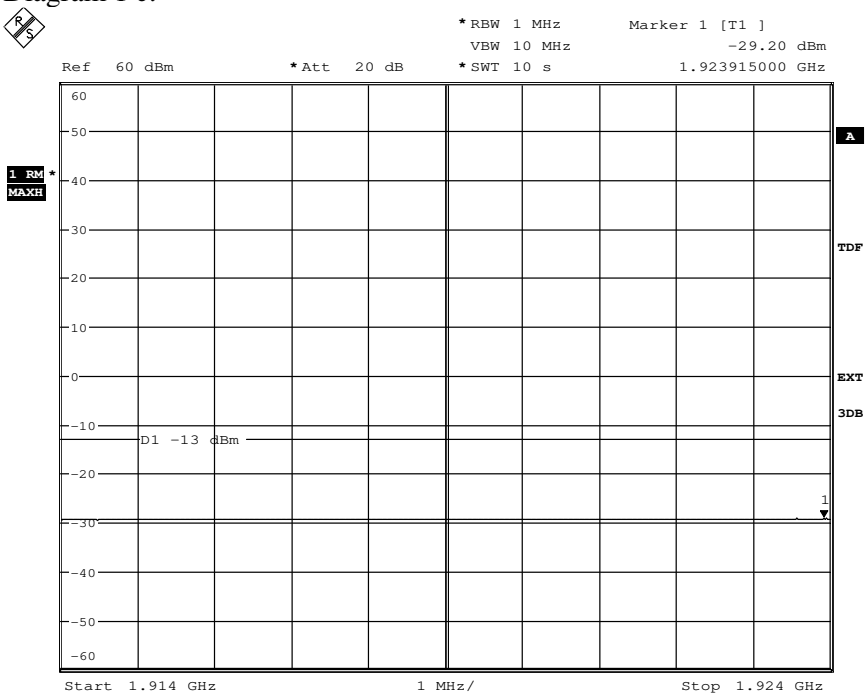
Appendix 4

Diagram 1 c:



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Appendix 4

Diagram 2 a:

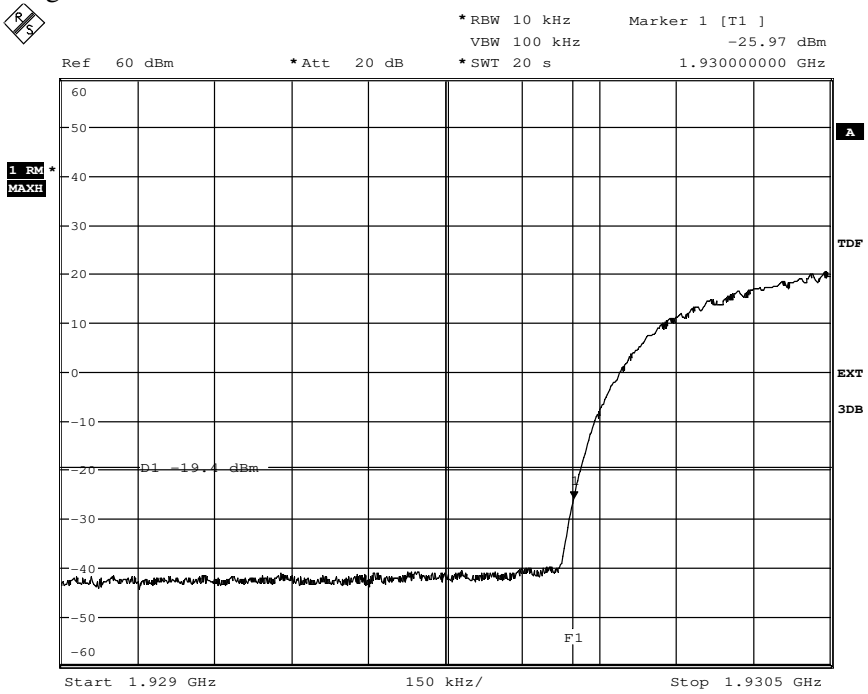

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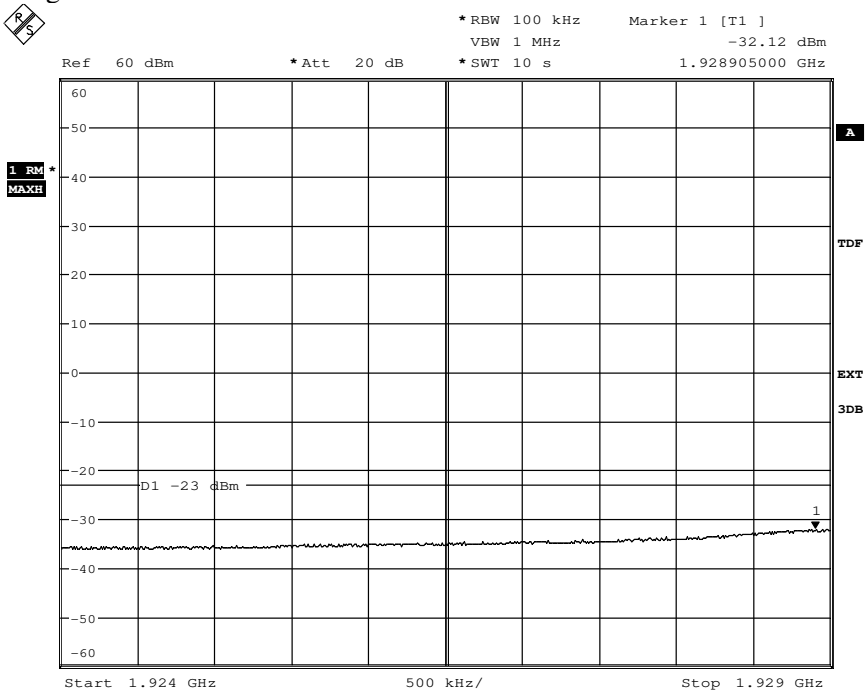
Diagram 2 b:



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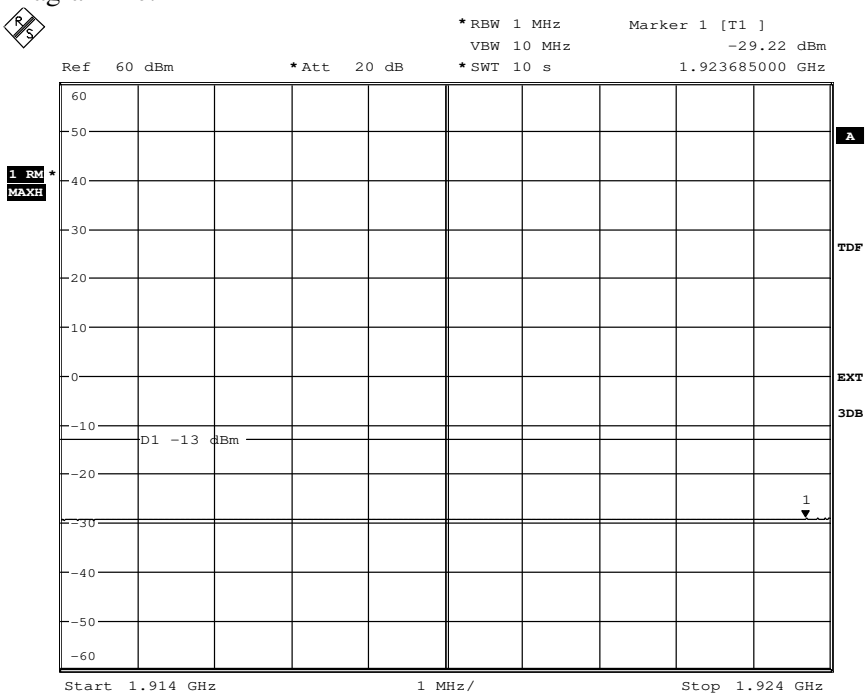
Appendix 4

Diagram 2 c:



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Appendix 4

Diagram 3 a:

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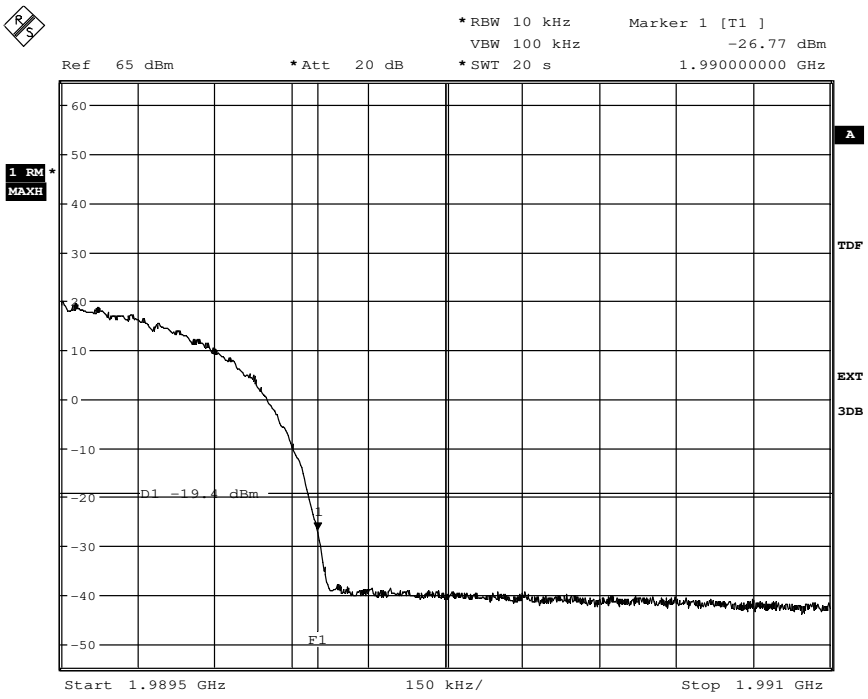

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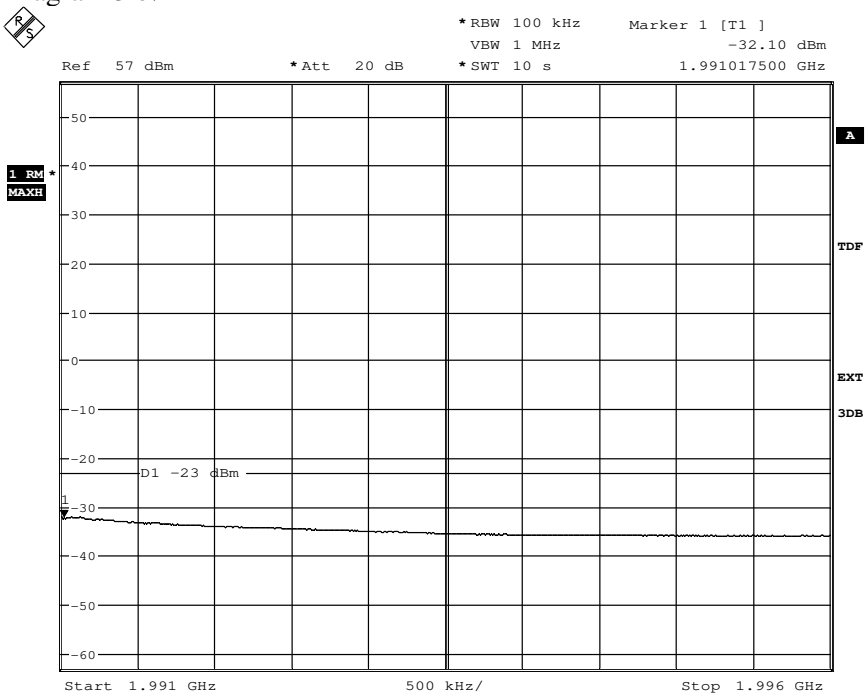

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Appendix 4

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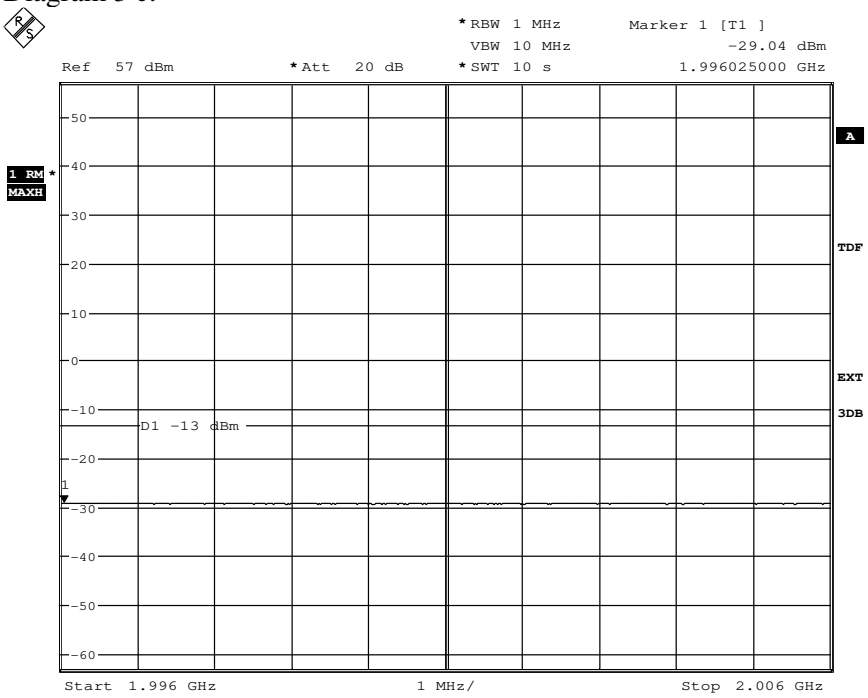

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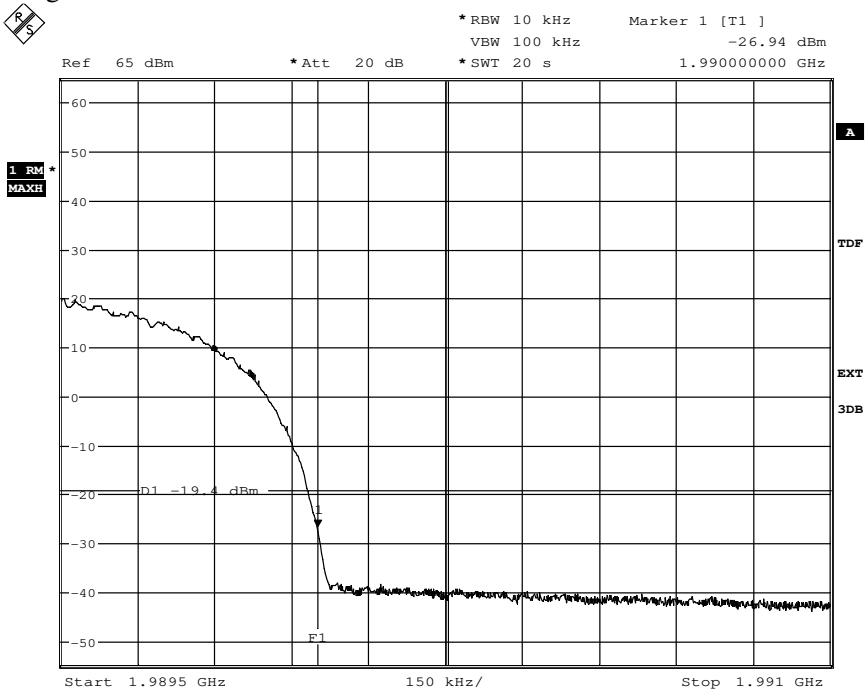
Appendix 4

Diagram 4 a:



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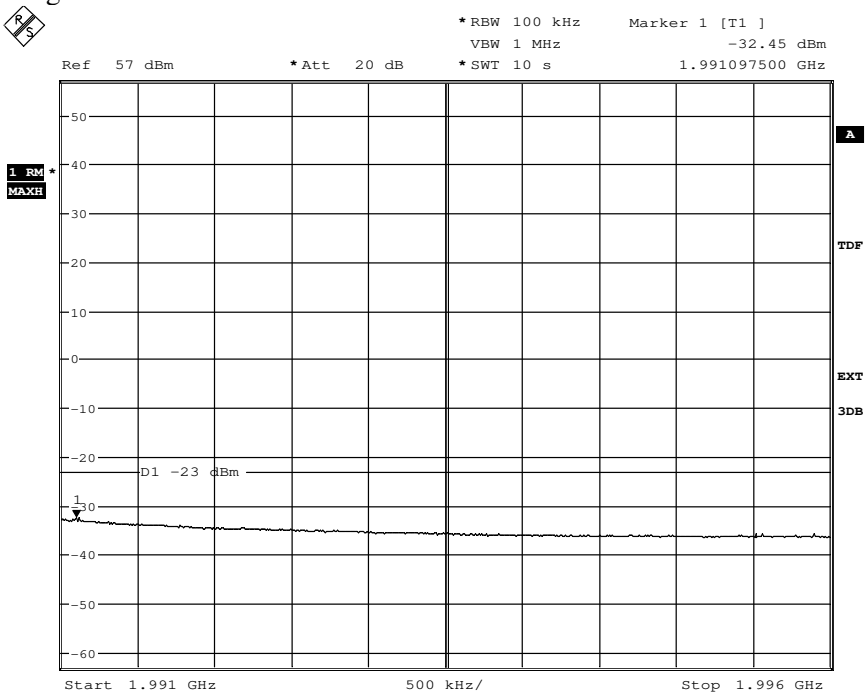

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Appendix 4

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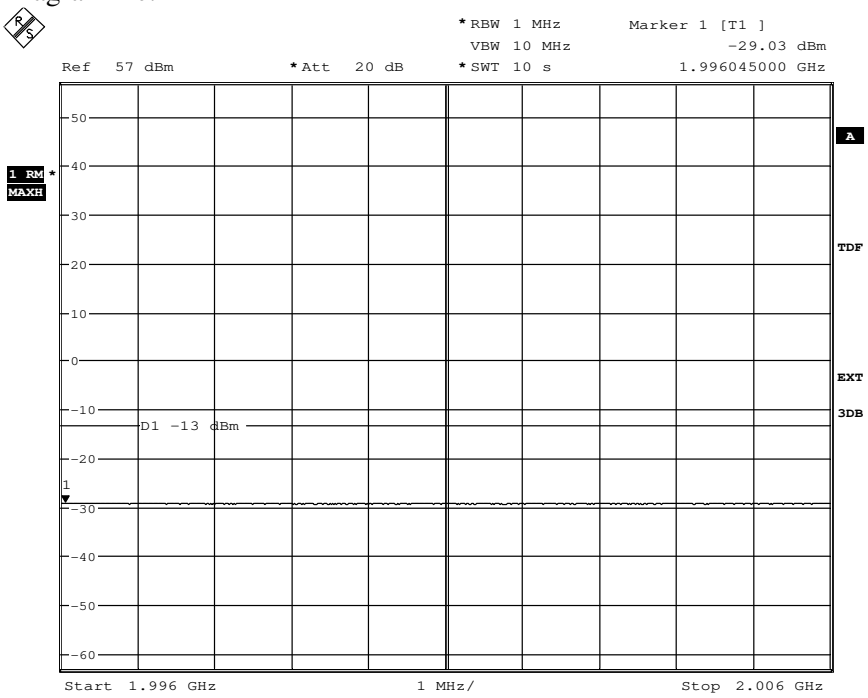

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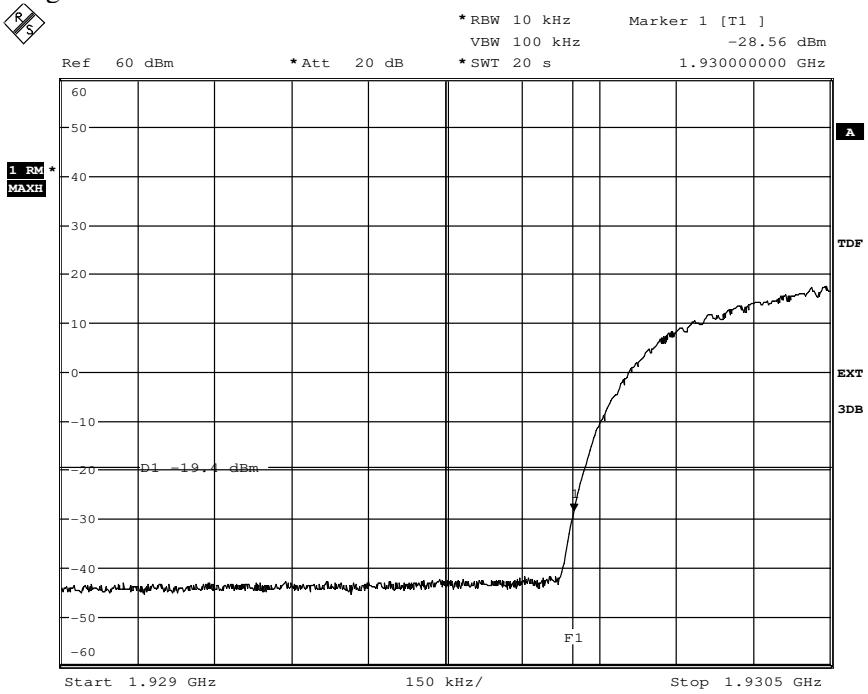
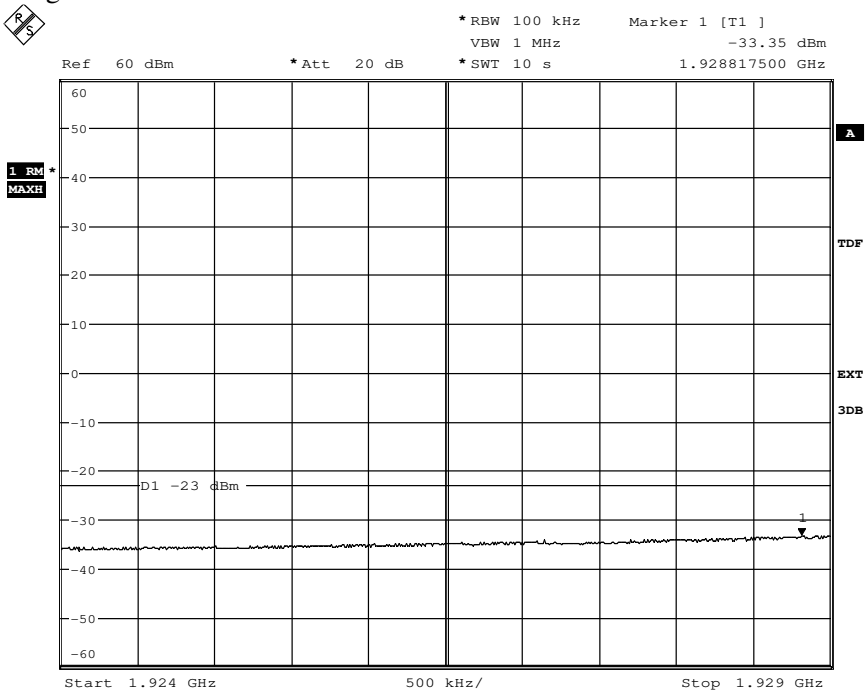
Diagram 5 a:



Date: 4.JUN.2014 13:52:01

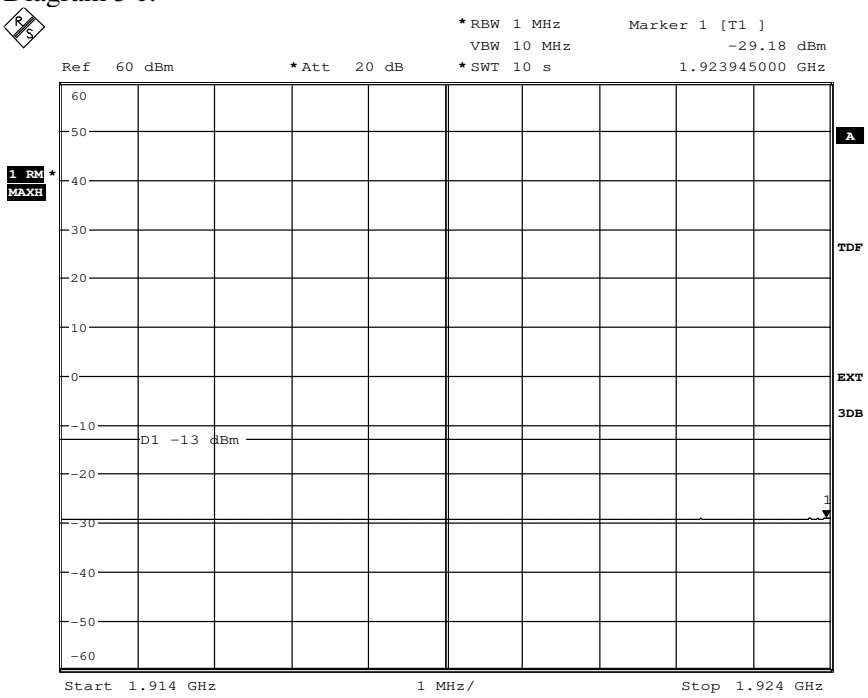
Diagram 5 b:



Date: 4.JUN.2014 13:53:36

Appendix 4

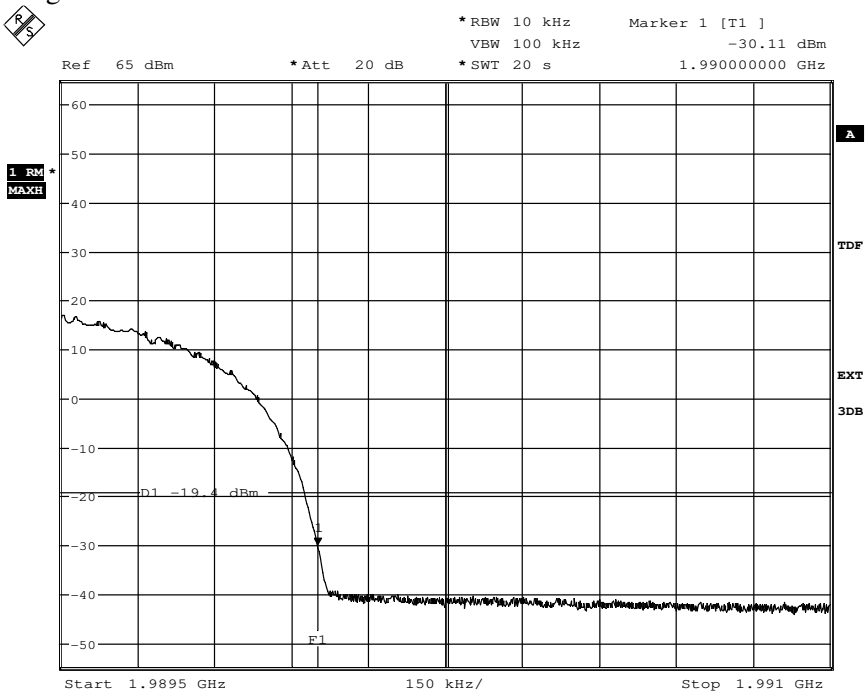
Diagram 5 c:



Date: 4.JUN.2014 13:56:55

Appendix 4

Diagram 6 a:



Date: 4.JUN.2014 14:20:58

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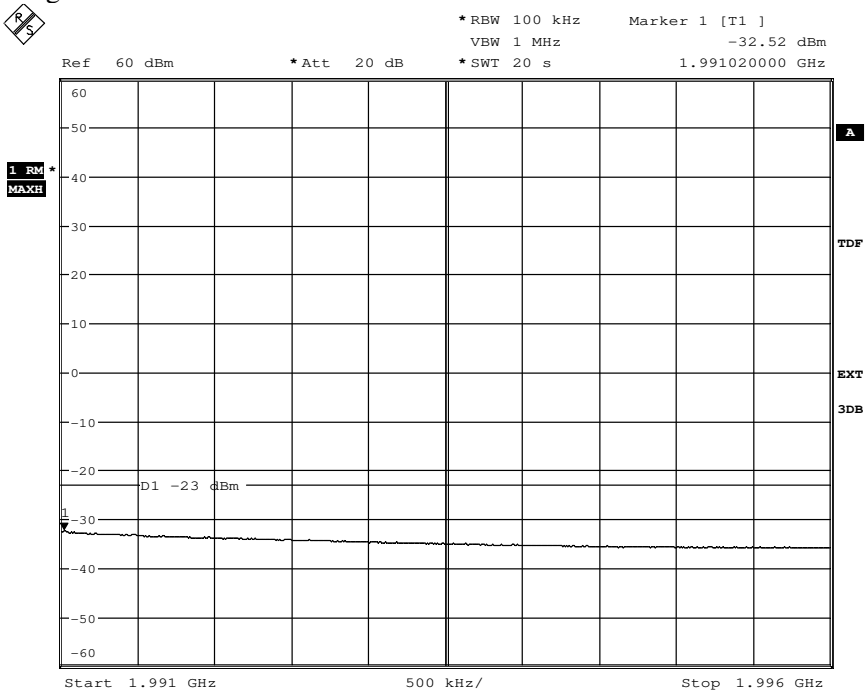
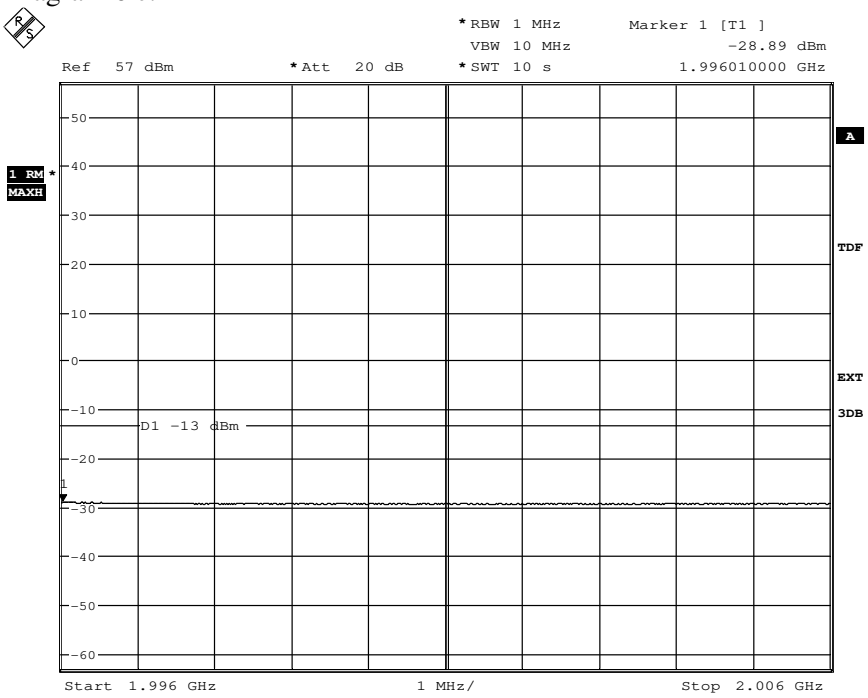


Date: 4.JUN.2014 14:22:39

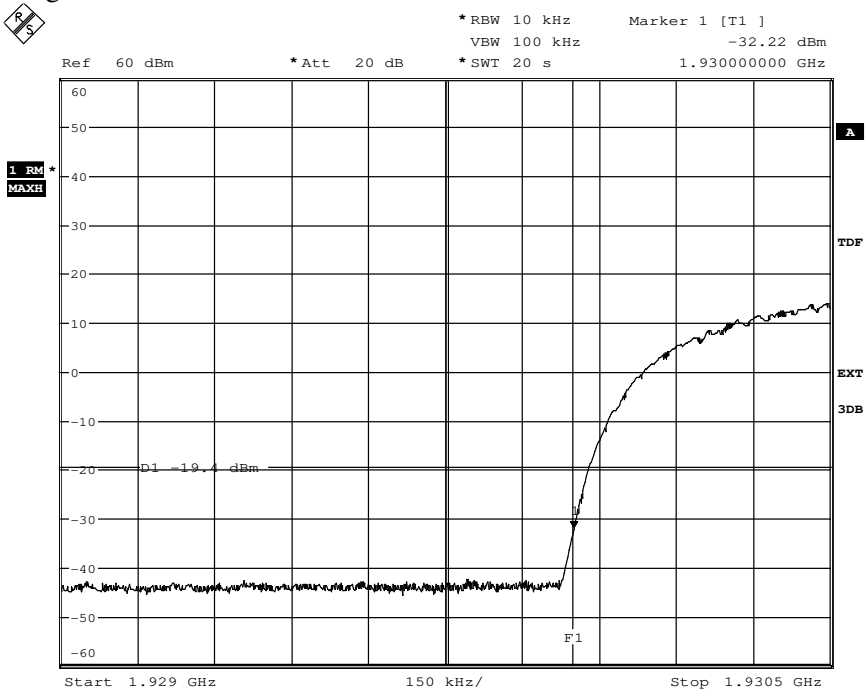
Appendix 4

Diagram 6 c:



Date: 4.JUN.2014 14:23:47

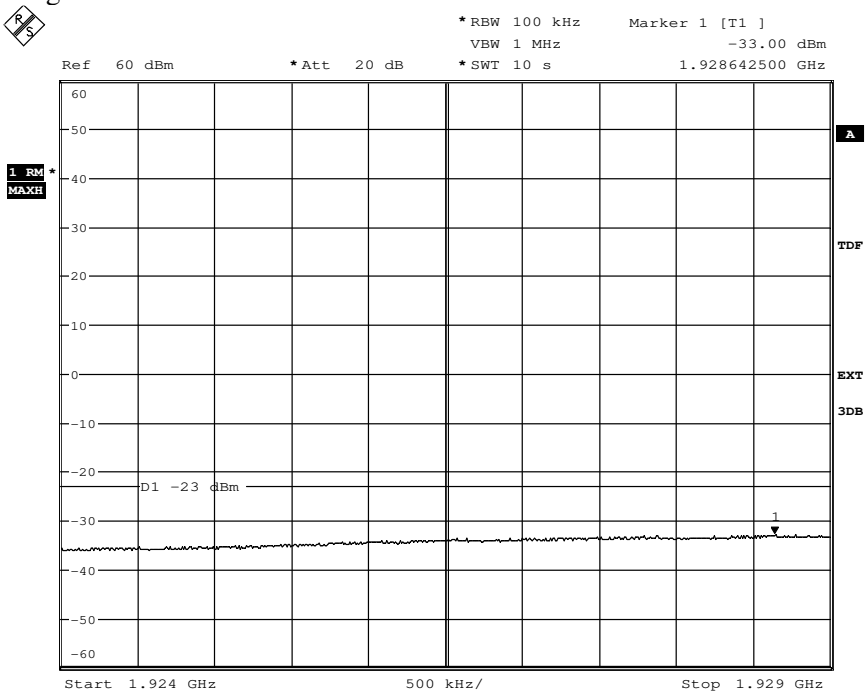
Diagram 7 a:



Date: 4.JUN.2014 16:56:01

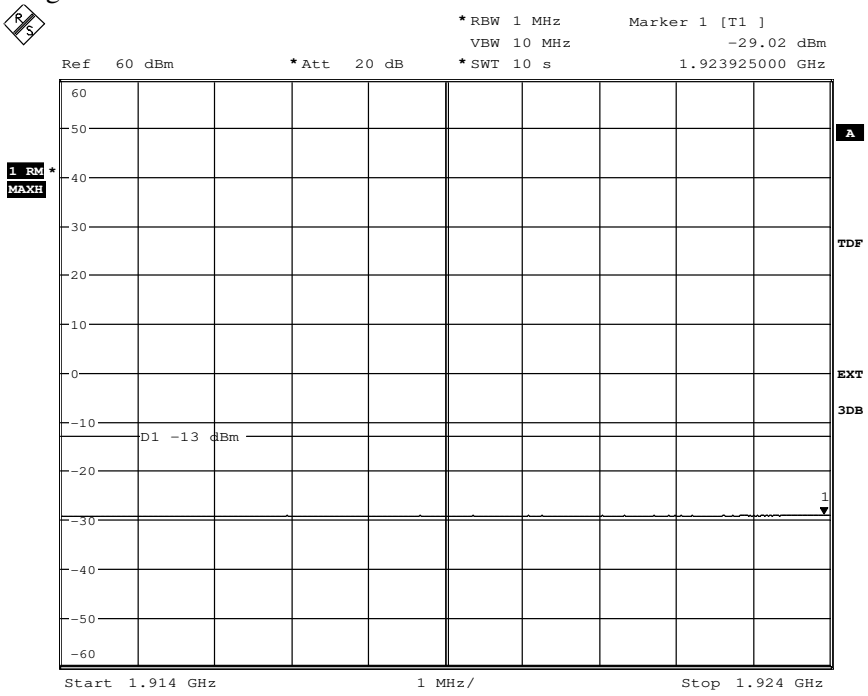
Appendix 4

Diagram 7 b:



Date: 4.JUN.2014 16:57:18

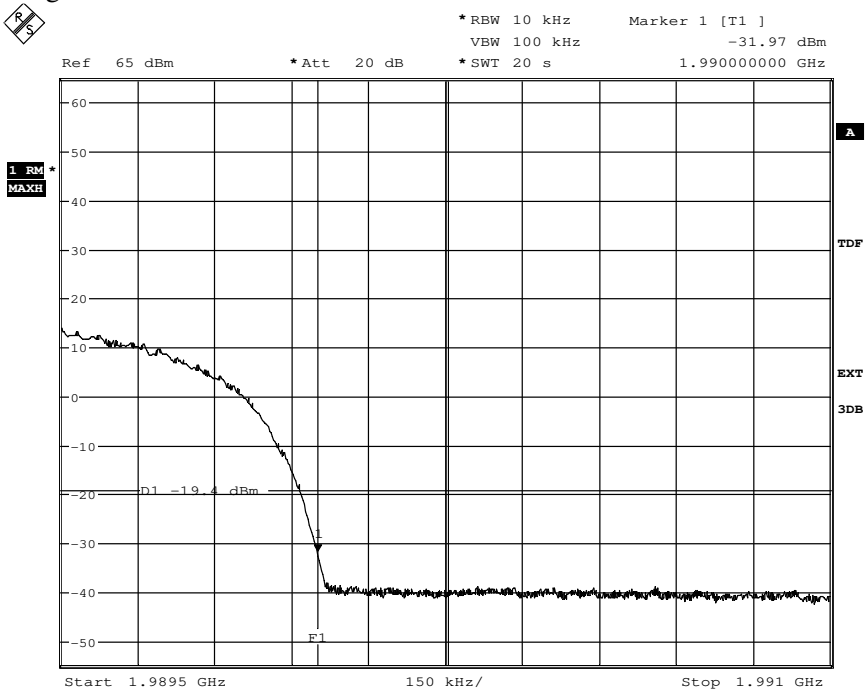
Diagram 7 c:



Date: 4.JUN.2014 16:58:06

Appendix 4

Diagram 8 a:



Date: 4.JUN.2014 16:34:08

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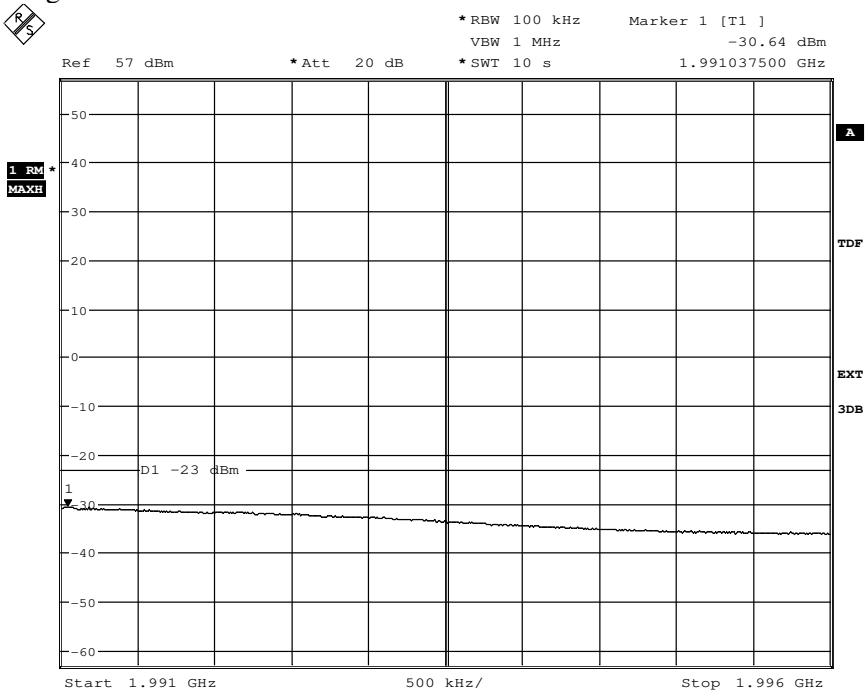
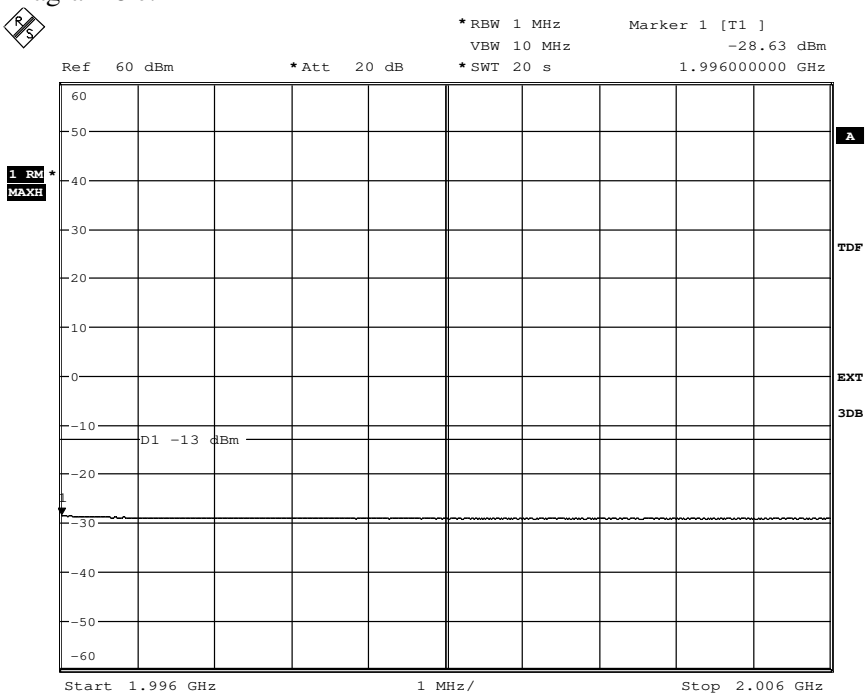


Date: 4.JUN.2014 16:35:07

Appendix 4

Diagram 8 c:



Date: 4.JUN.2014 16:36:07

Conducted spurious emission measurements according to CFR 47 §2.1051 / IC RSS-133 6.5

Date	Temperature	Humidity
2014-06-03	23 °C ± 3 °C	30 % ± 5 %
2014-06-04	22 °C ± 3 °C	45 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §24.238. The output was connected to a spectrum analyzer with a RBW setting of 1 MHz and RMS detector activated. The spectrum analyzer 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), a), (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	902 282
HP filter	BX40074
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

MIMO mode, single carrier

Diagram	Symbolic name	Tested Port
1 a+b+c+d	B	RF A Primary
2 a+b+c+d	M	RF A Primary
3 a+b+c+d	M	RF A Secondary
4 a+b+c+d	T	RF A Primary

MIMO mode, 2-carriers

Diagram	BW configuration	Symbolic name	Tested Port
5 a+b+c+d+e	5 MHz	B3	RF A Primary
6 a+b+c+d+e	5 MHz	M3	RF A Primary
7 a+b+c+d+e	5 MHz	T3	RF A Primary

MIMO mode, 4-carriers

Diagram	BW configuration	Symbolic name	Tested Port
8 a+b+c+d+e	5 MHz	B4	RF A Primary
9 a+b+c+d+e	5 MHz	M4	RF A Primary
10 a+b+c+d+e	5 MHz	T4	RF A Primary

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.

Limits

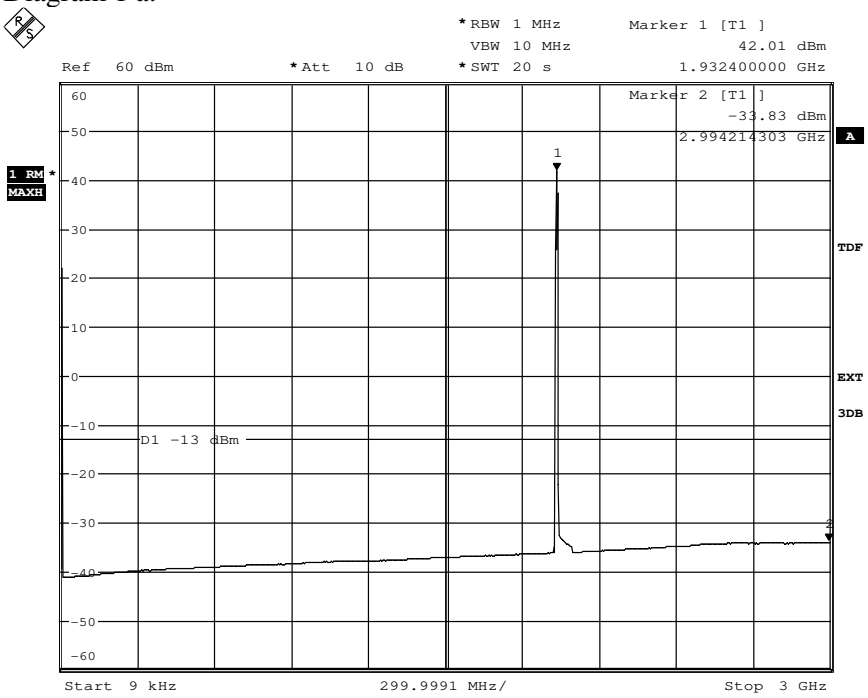
§24.238 and RSS-133 6.5

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

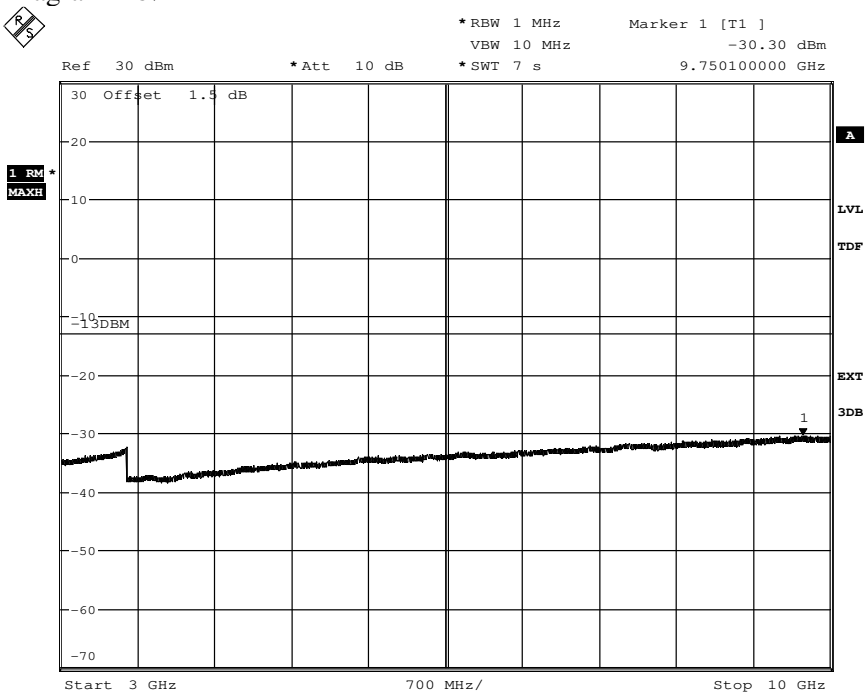
Appendix 5

Diagram 1 a:



Date: 3.JUN.2014 15:52:00

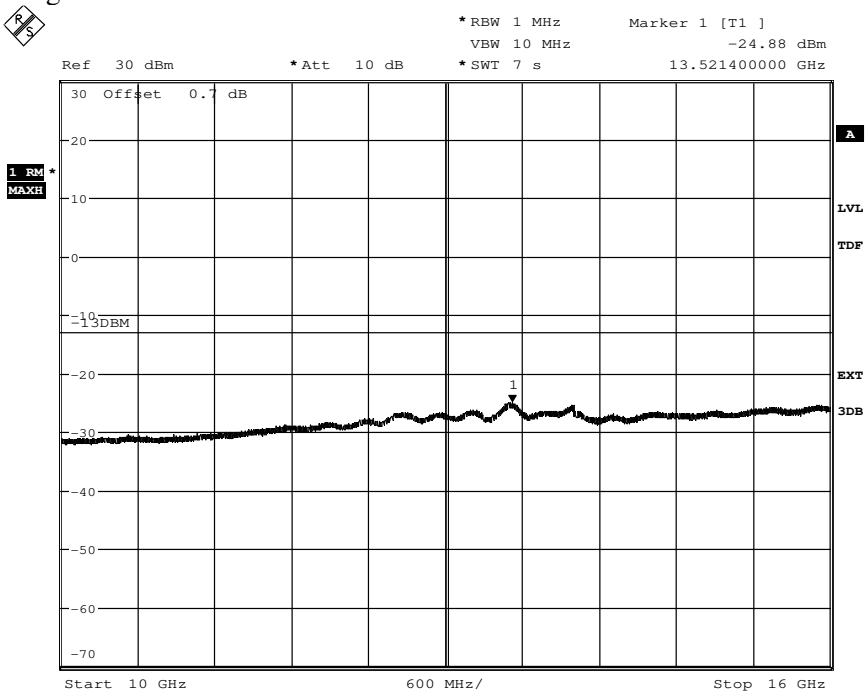
Diagram 1 b:



Date: 3.JUN.2014 15:54:39

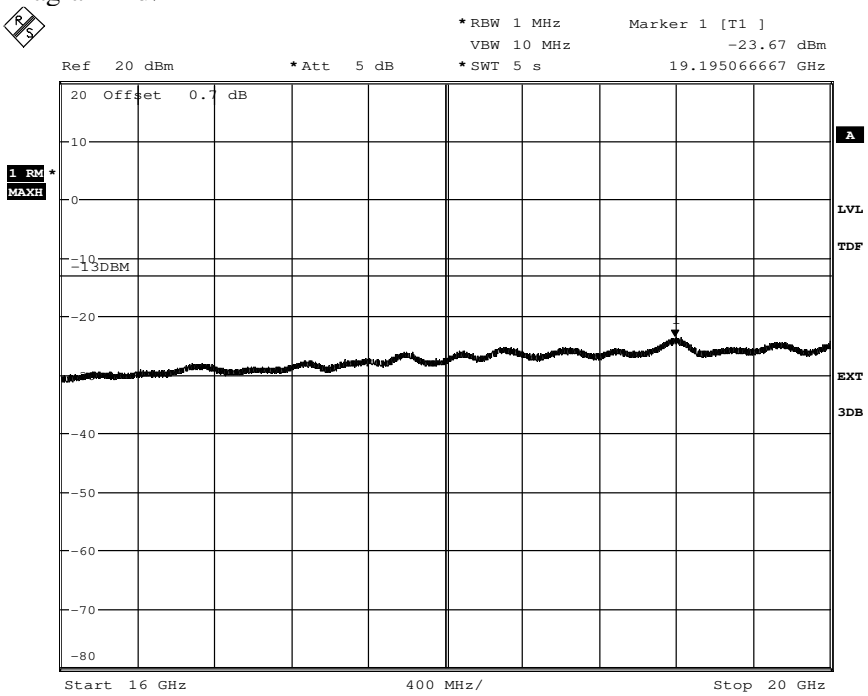
Appendix 5

Diagram 1 c:



Date: 3.JUN.2014 15:56:16

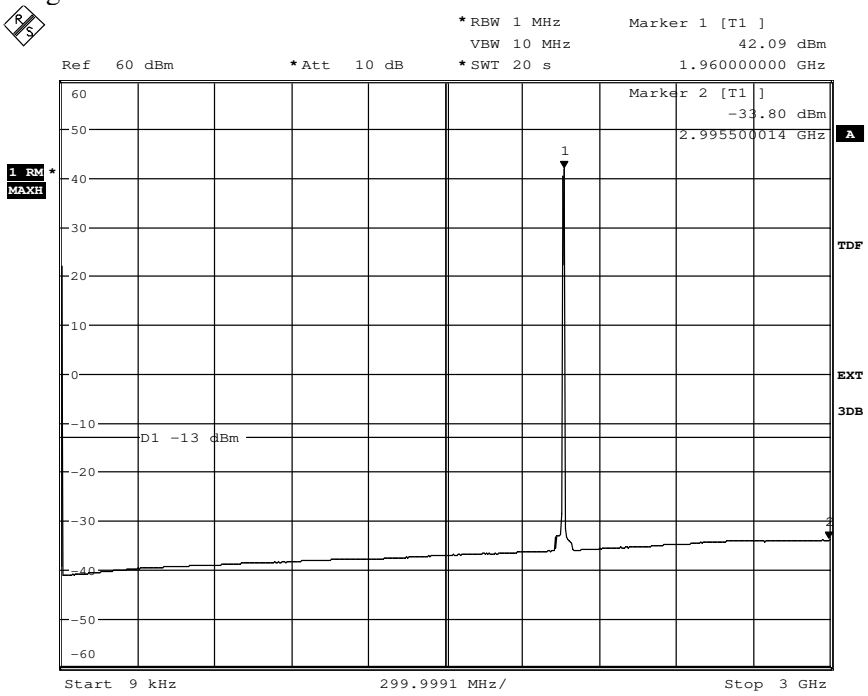
Diagram 1 d:



Date: 3.JUN.2014 15:57:31

Appendix 5

Diagram 2 a:



Date: 3.JUN.2014 16:28:51

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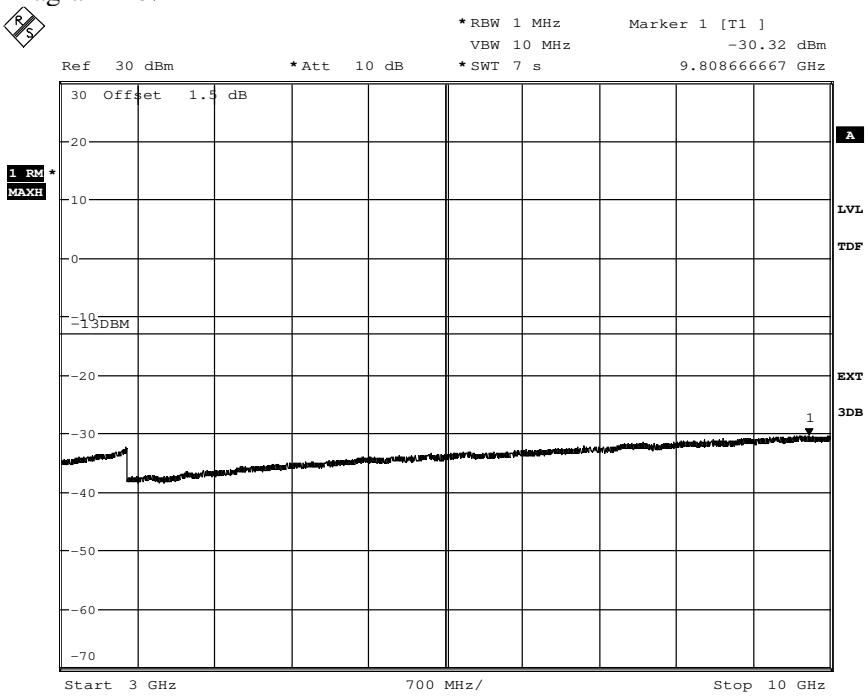

Date: 3.JUN.2014 16:31:08

Appendix 5

Diagram 2 c:

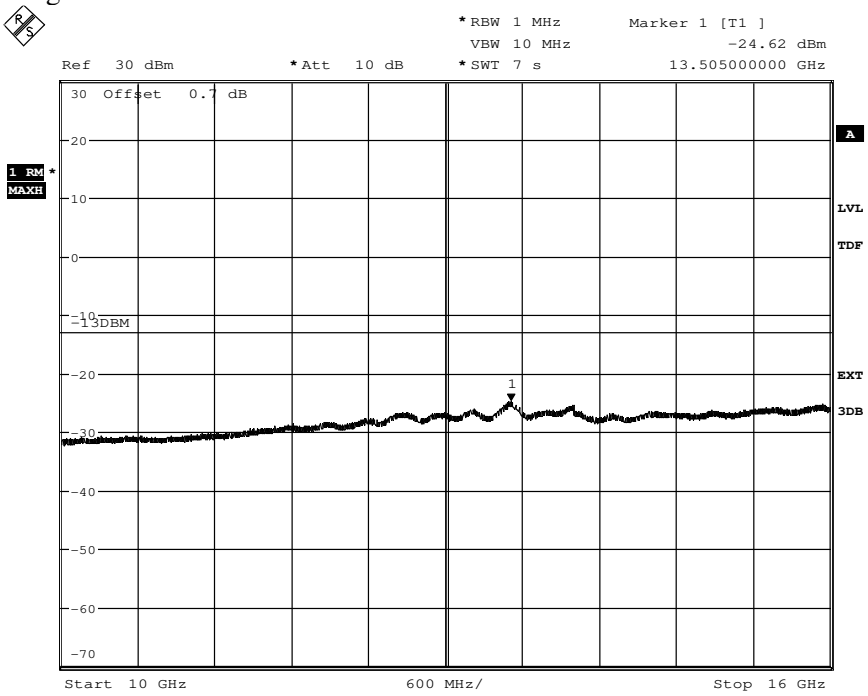

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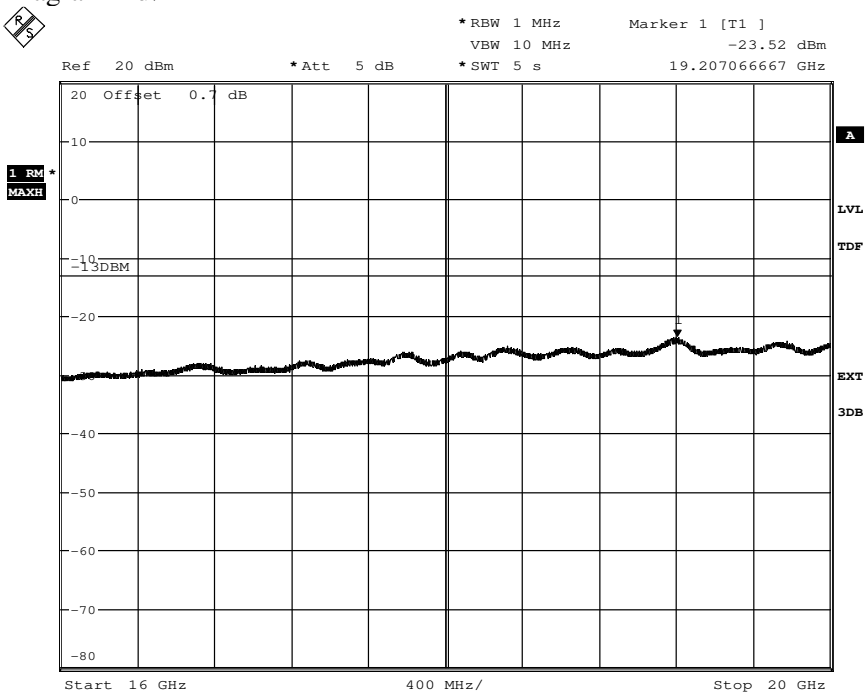
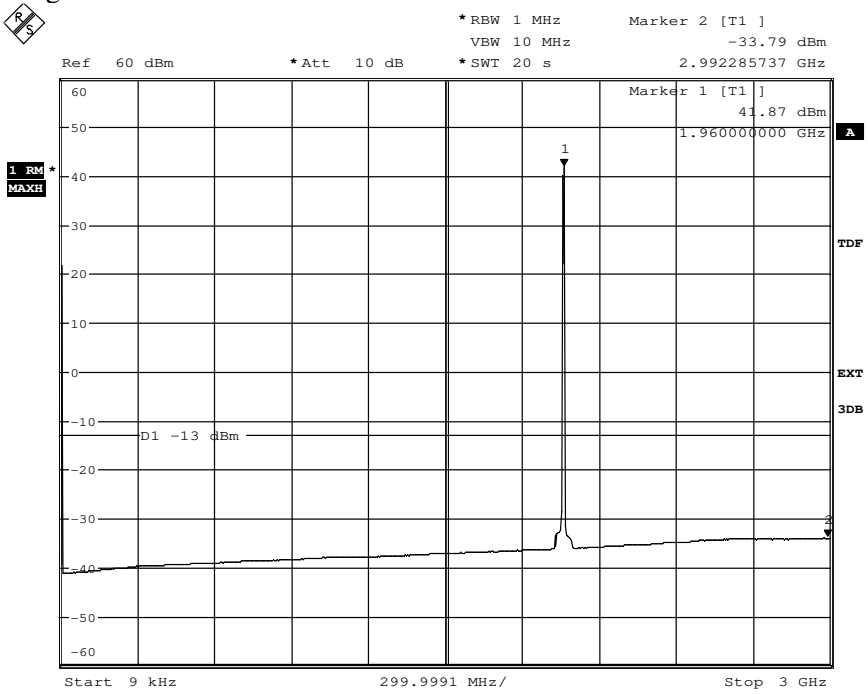
Diagram 2 d:



Date: 3.JUN.2014 16:33:49

Appendix 5

Diagram 3 a:



Date: 4.JUN.2014 13:04:30

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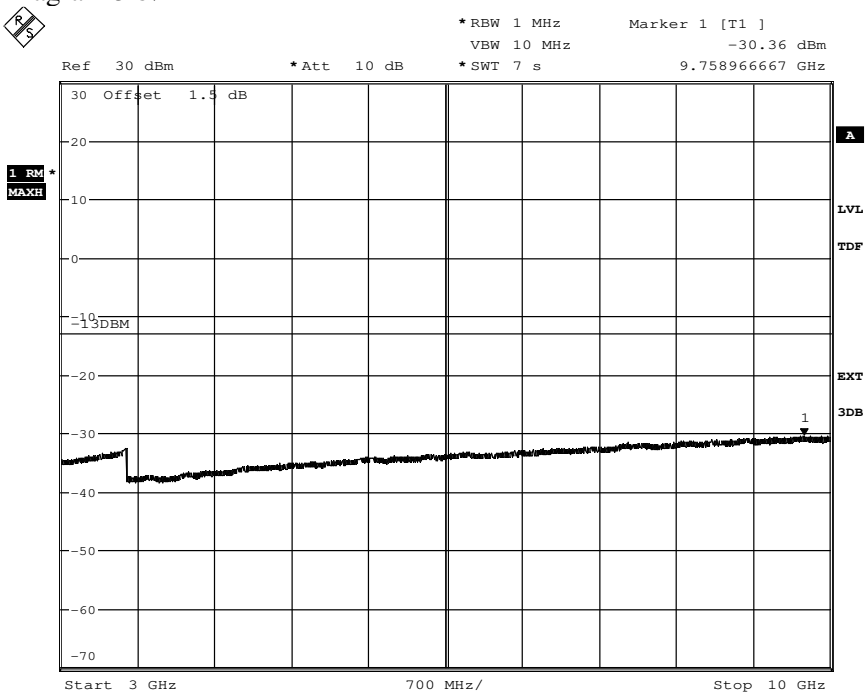
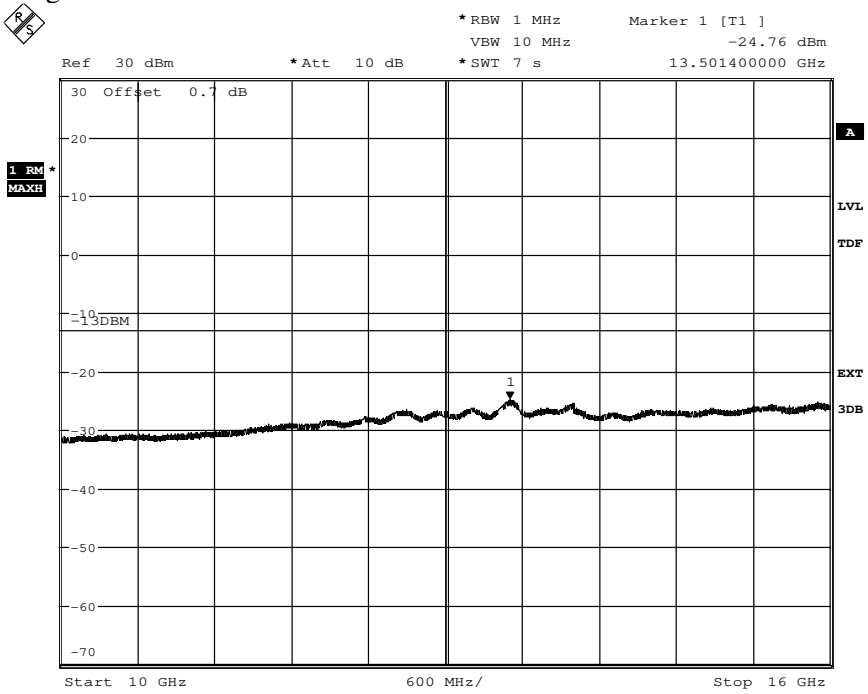


Date: 4.JUN.2014 13:08:20

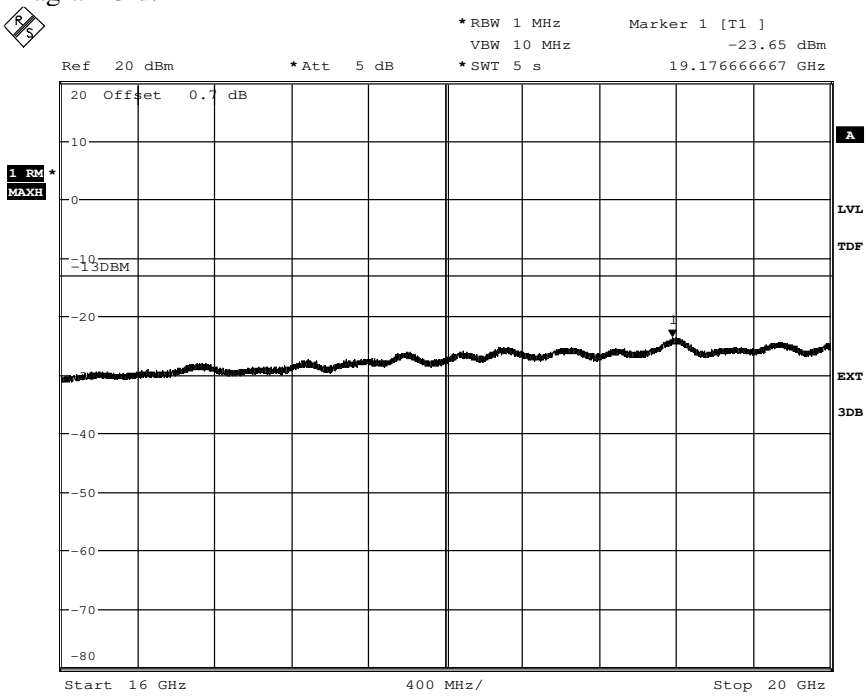
Appendix 5

Diagram 3 c:



Date: 4.JUN.2014 13:09:35

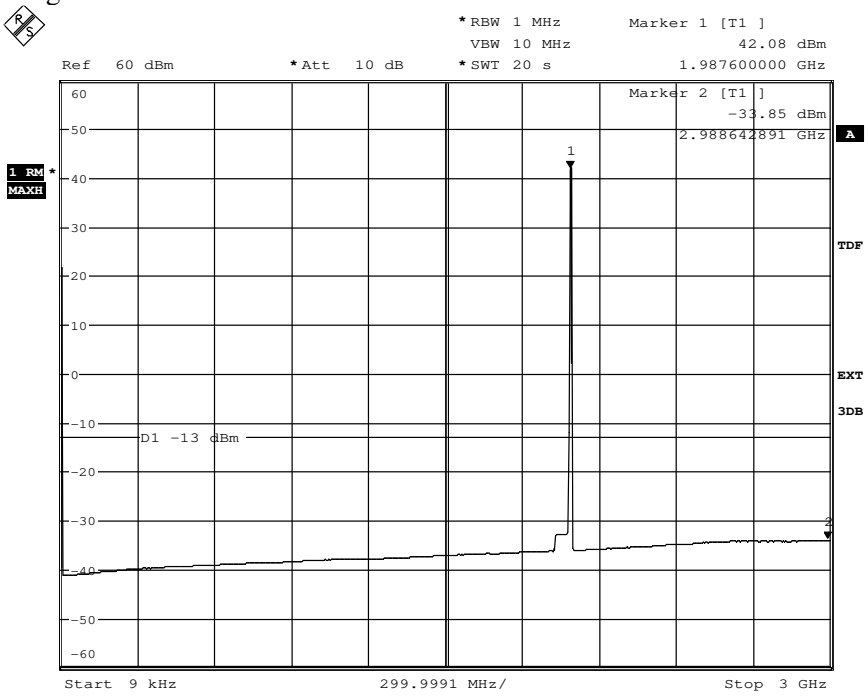
Diagram 3 d:



Date: 4.JUN.2014 13:10:38

Appendix 5

Diagram 4 a:



Date: 4.JUN.2014 11:22:04

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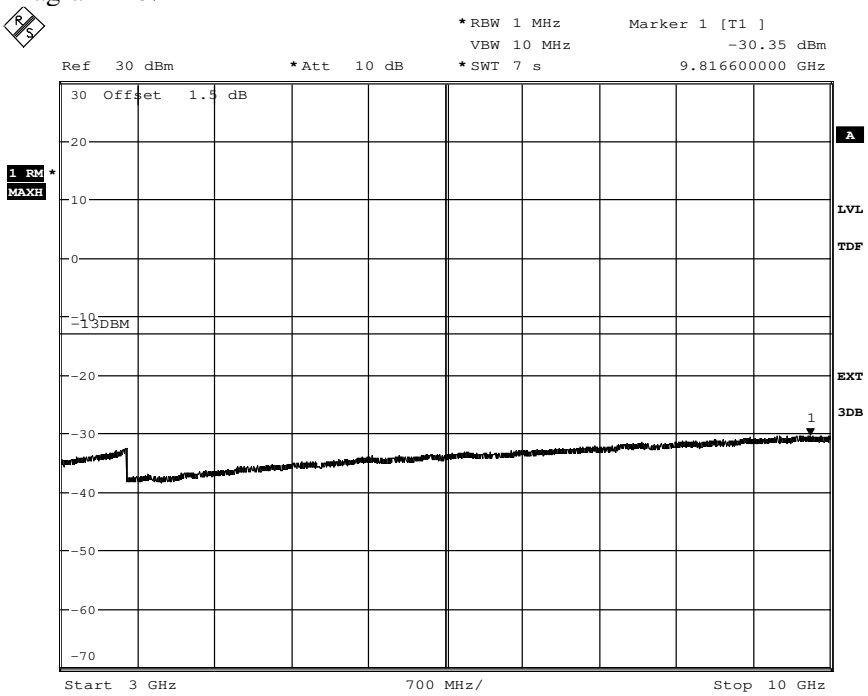
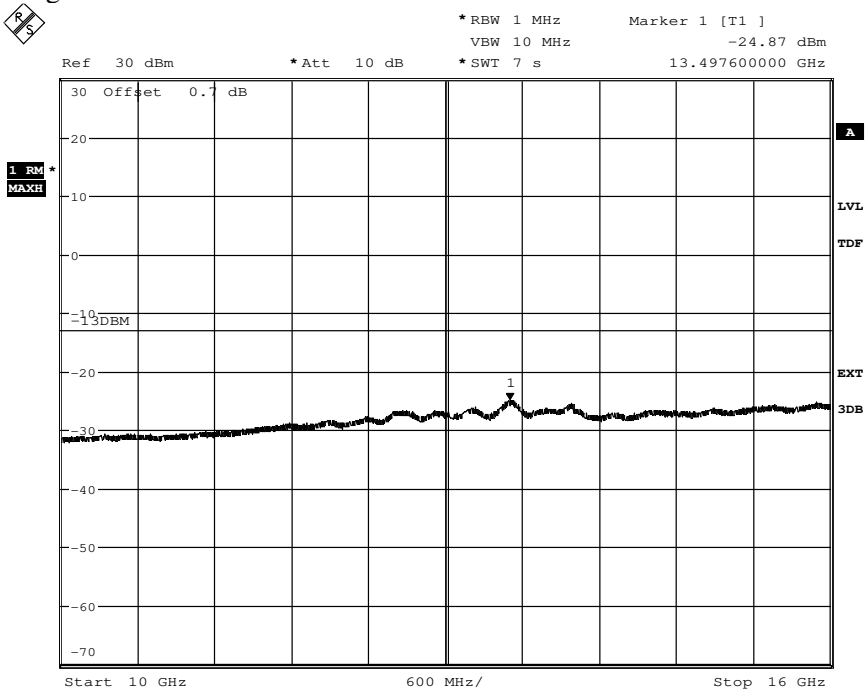


Date: 4.JUN.2014 11:24:00

Appendix 5

Diagram 4 c:



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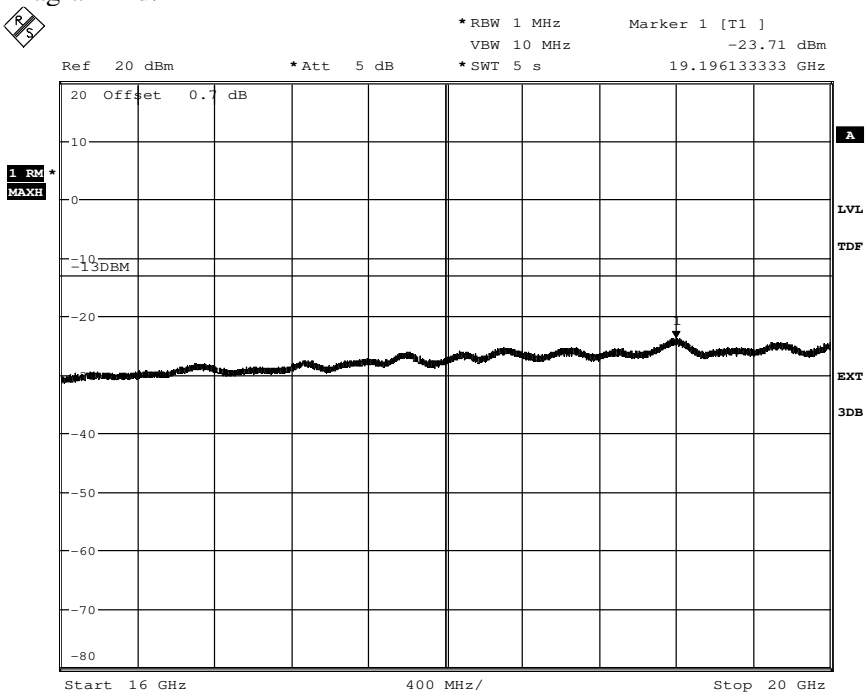

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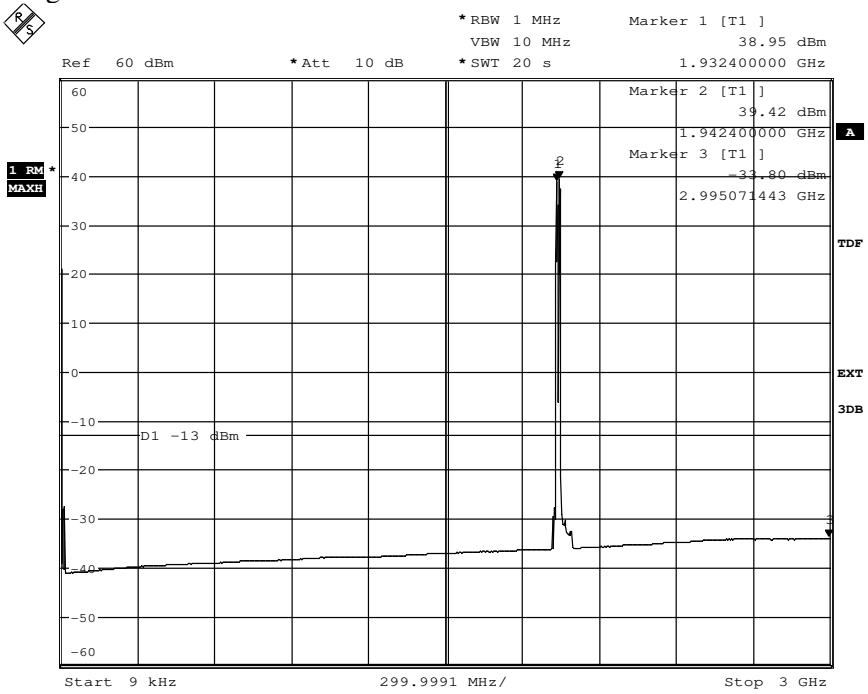
Appendix 5

Diagram 5 a:



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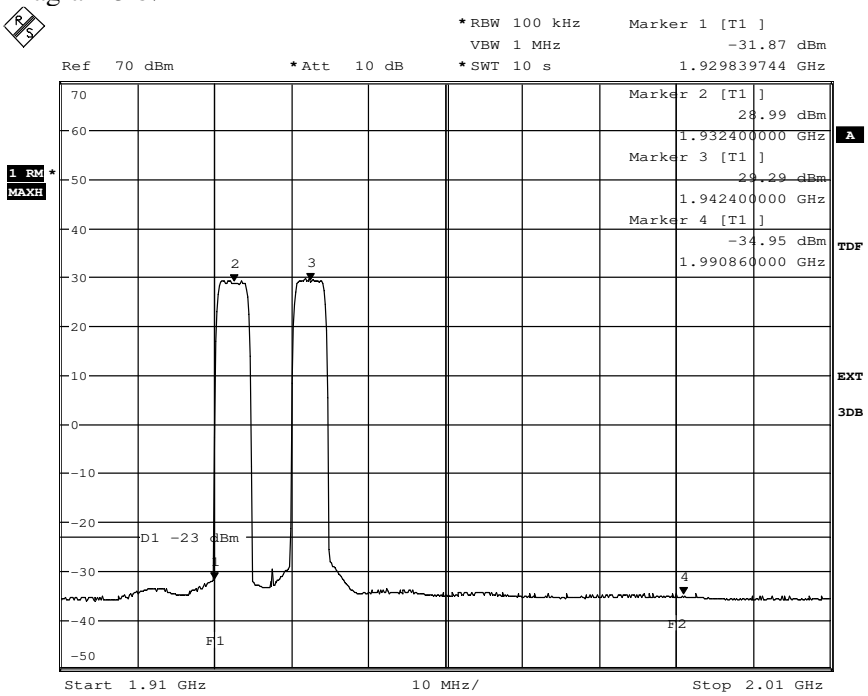
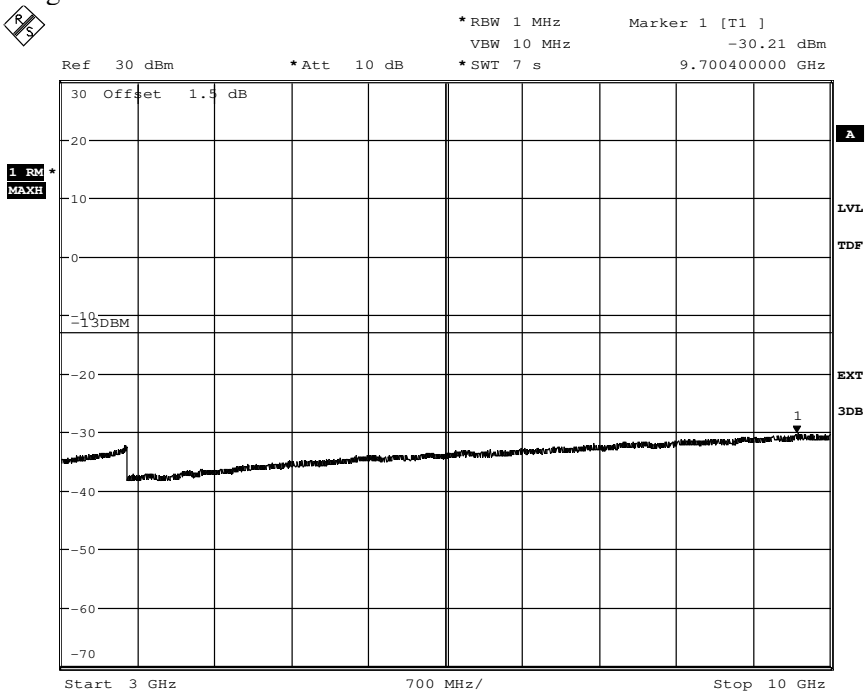


Date: 4.JUN.2014 14:41:55

Appendix 5

Diagram 5 c:



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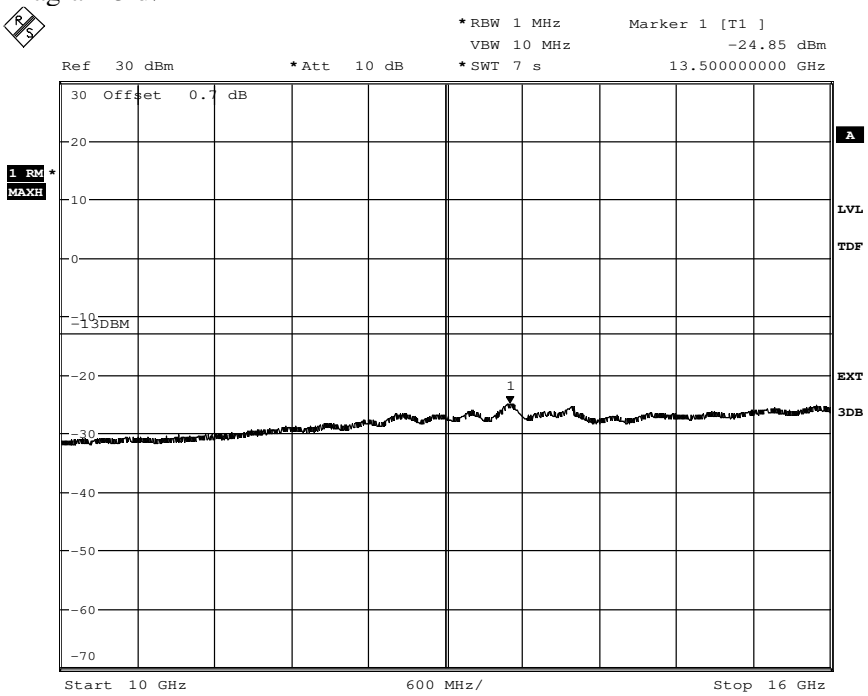
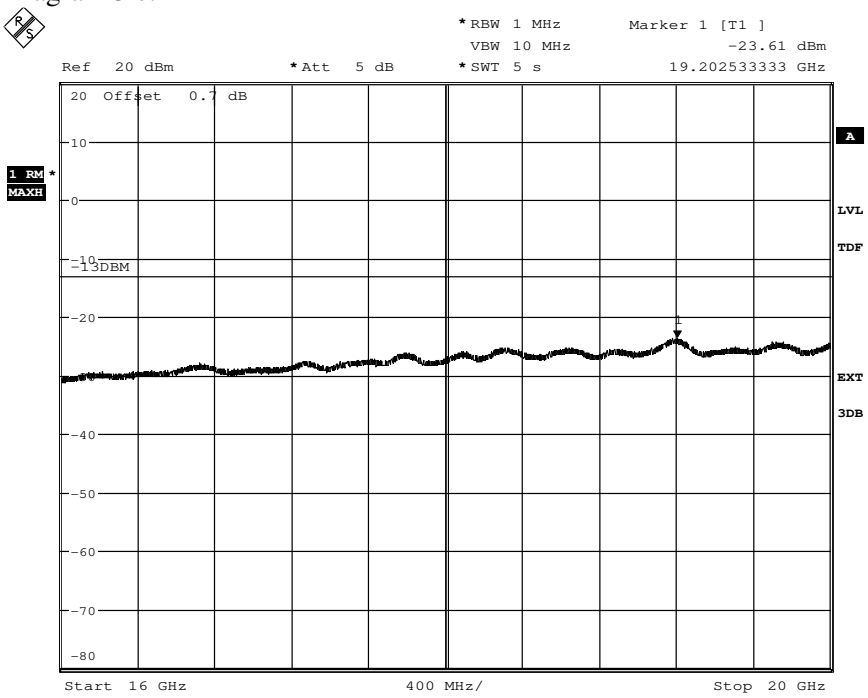


Date: 4.JUN.2014 14:58:48

Appendix 5

Diagram 5 e:



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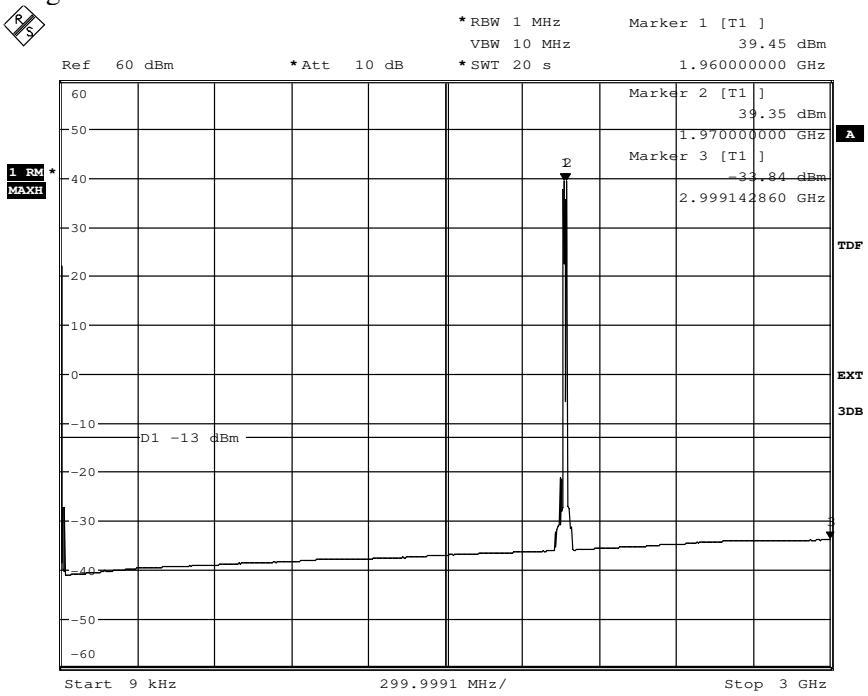
Appendix 5

Diagram 6 a:



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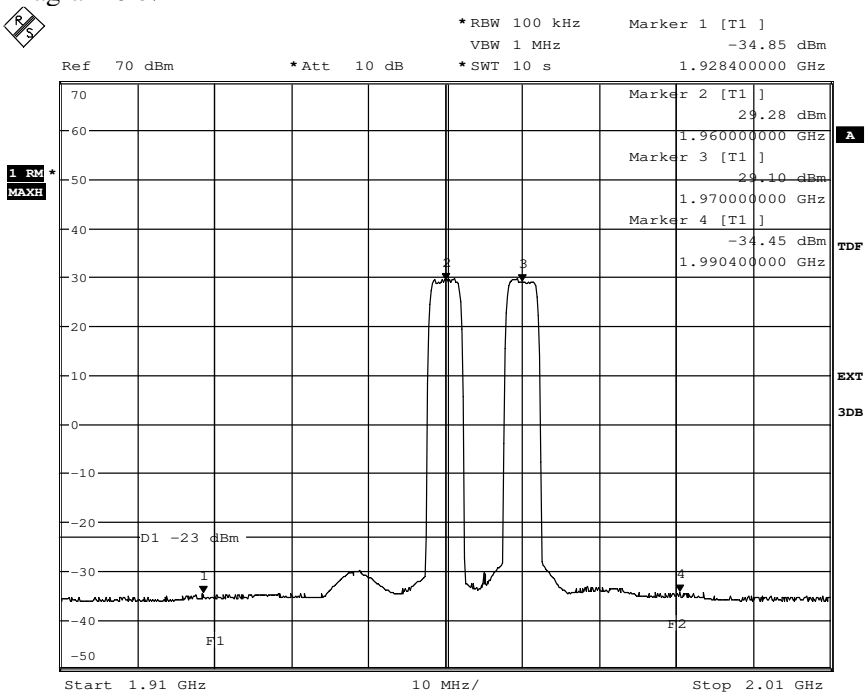
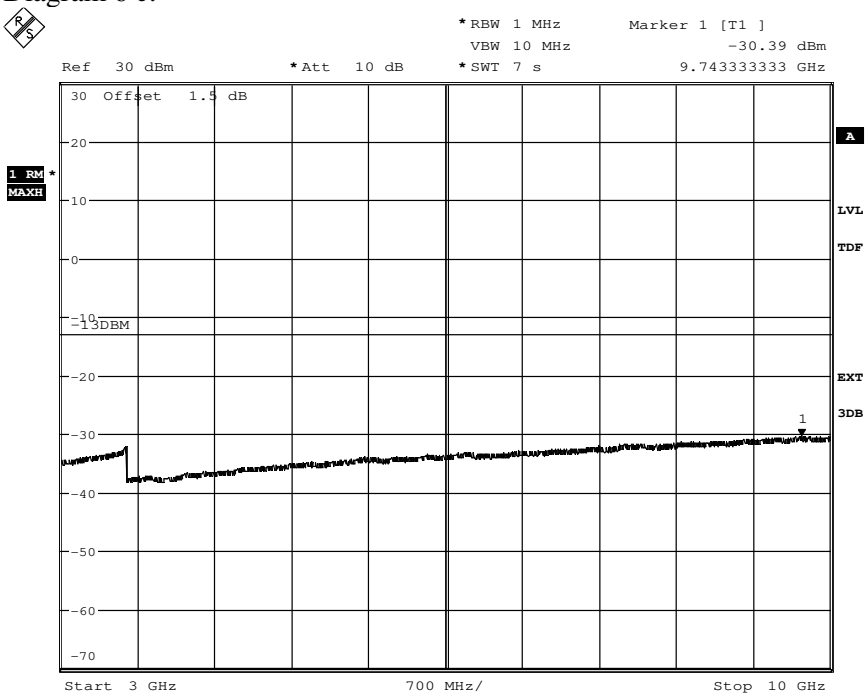


Date: 4.JUN.2014 15:17:57

Appendix 5

Diagram 6 c:



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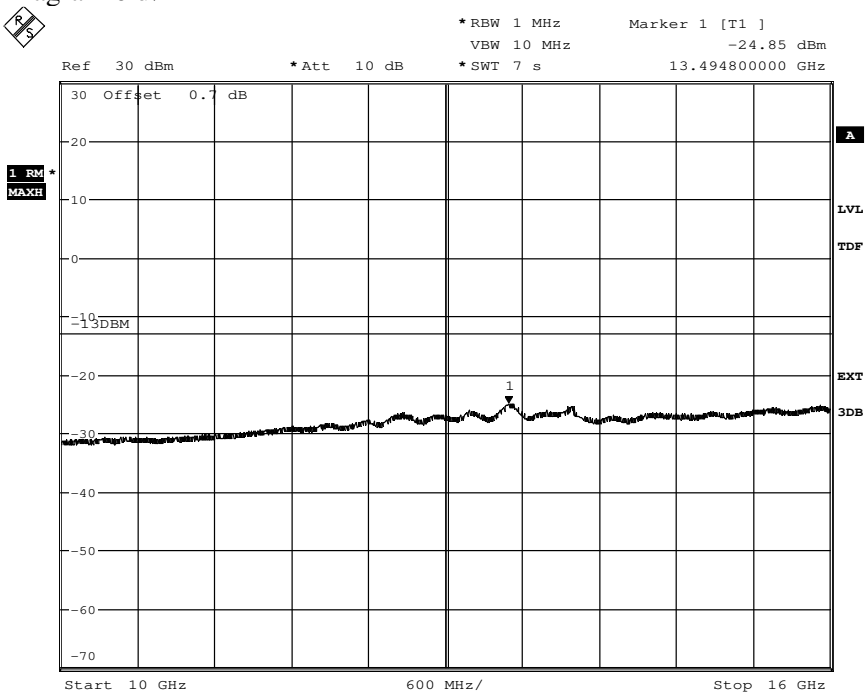
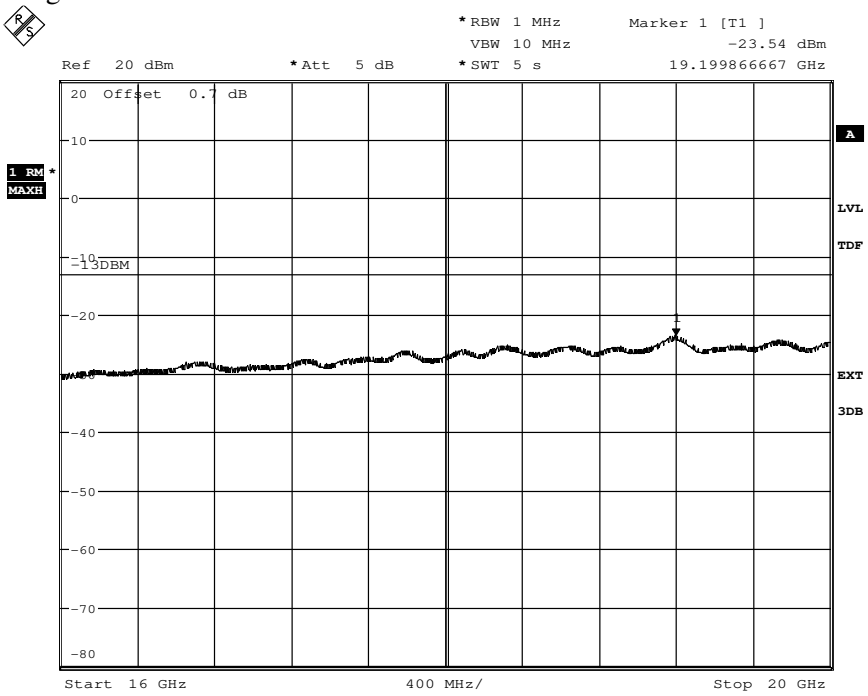


Date: 4.JUN.2014 15:20:08

Appendix 5

Diagram 6 e:



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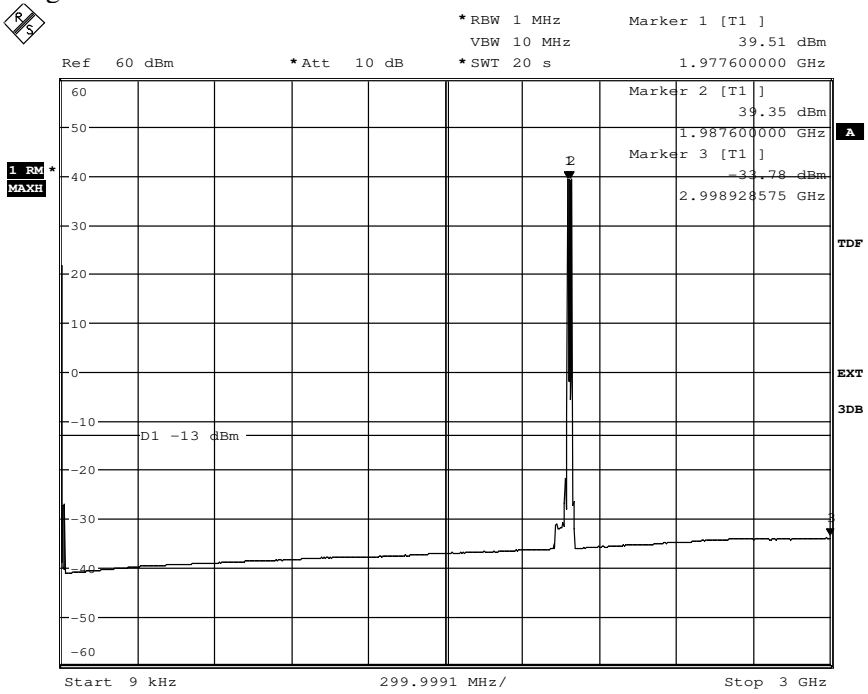
Appendix 5

Diagram 7 a:



Date: 4.JUN.2014 15:29:49

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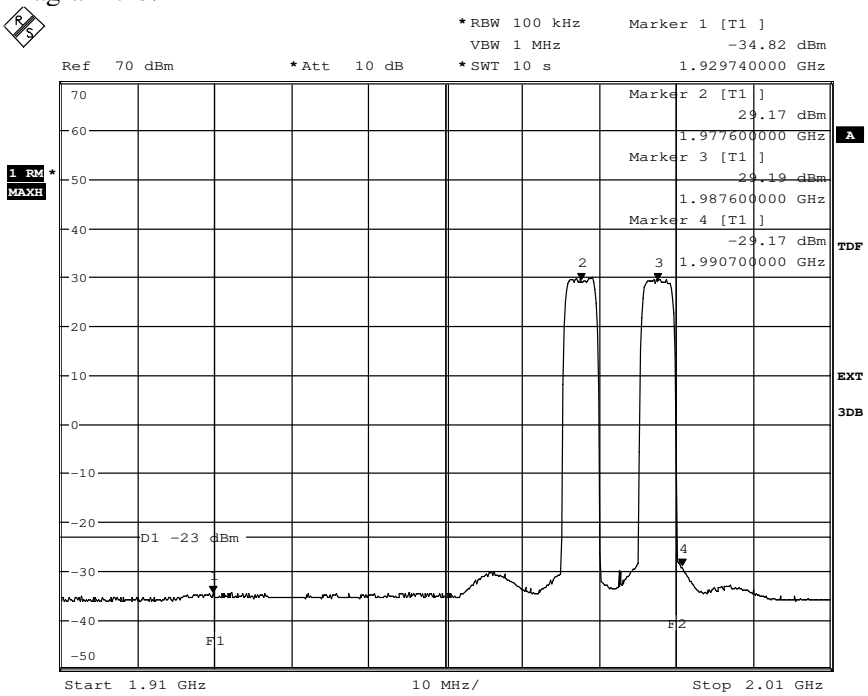
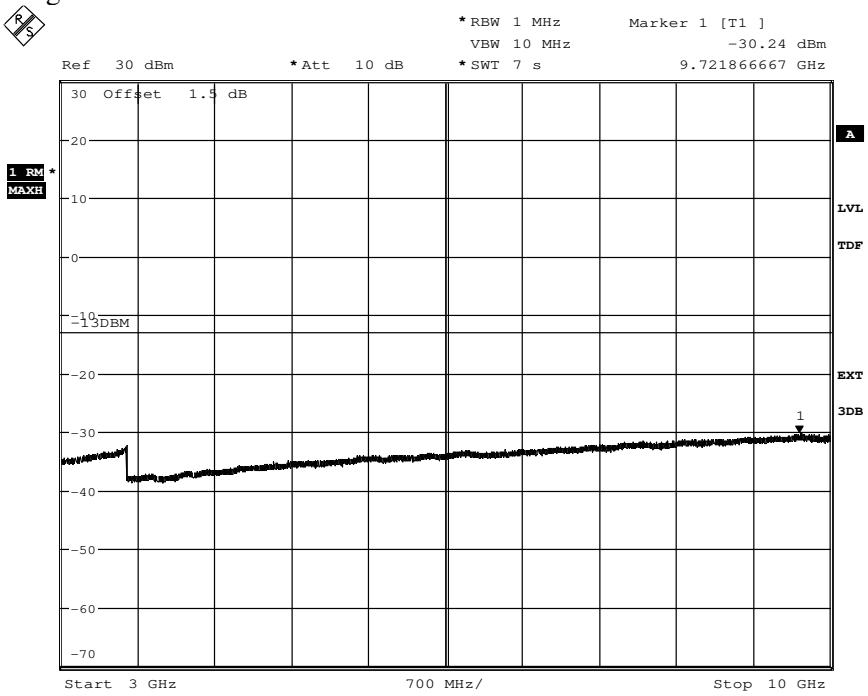


Date: 4.JUN.2014 15:31:12

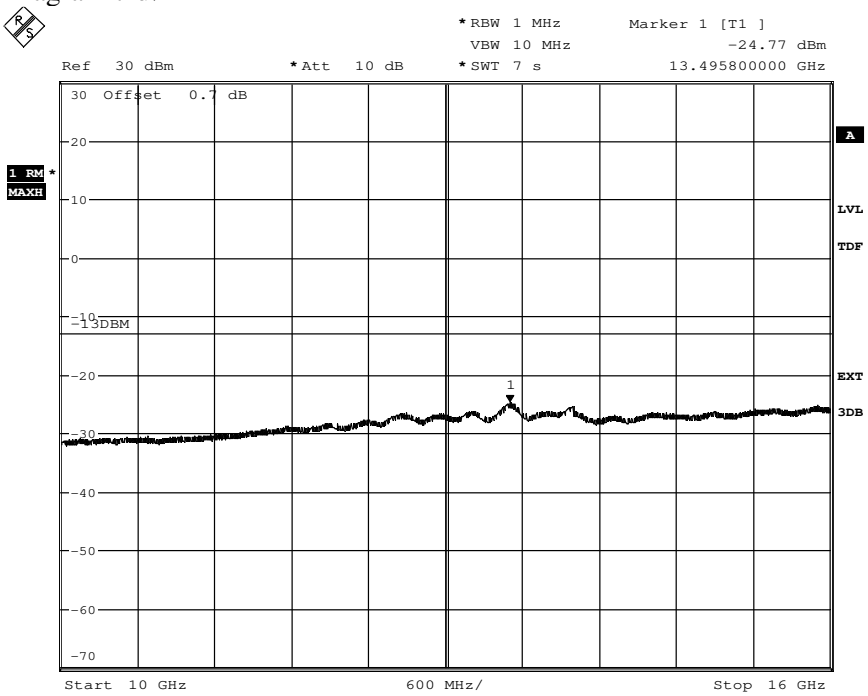
Appendix 5

Diagram 7 c:



Date: 4.JUN.2014 15:33:27

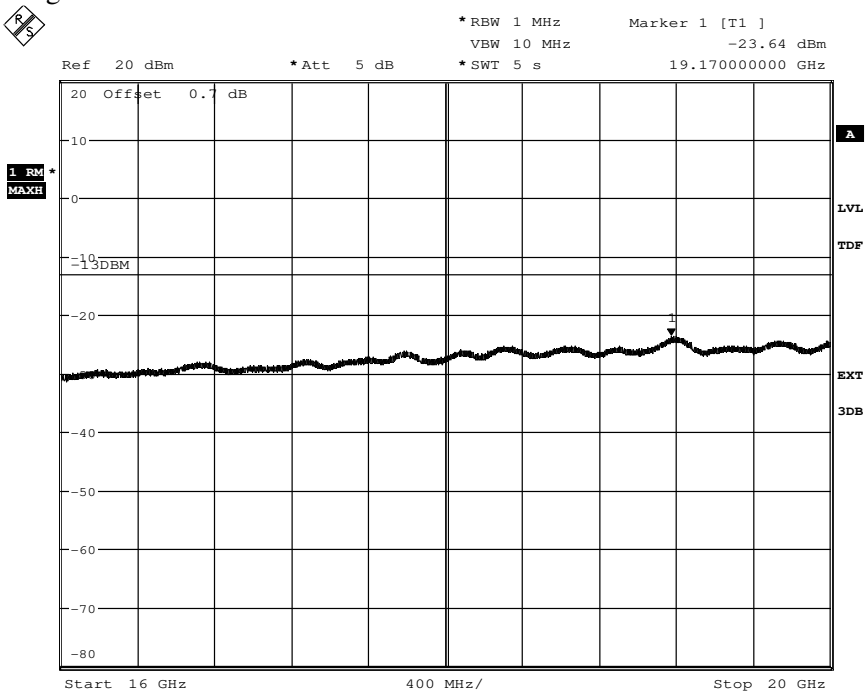
Diagram 7 d:



Date: 4.JUN.2014 15:34:09

Appendix 5

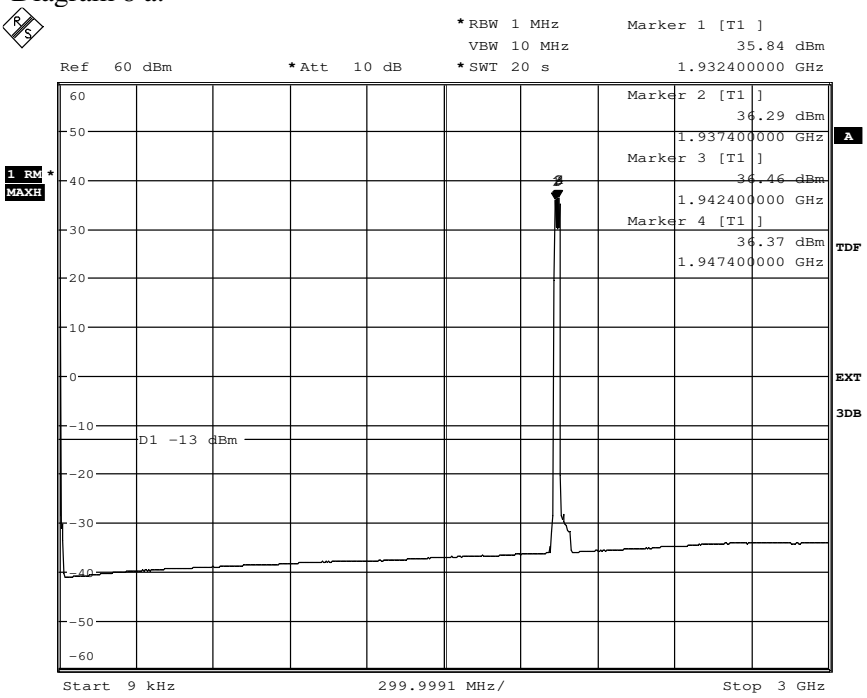
Diagram 7 e:



Date: 4.JUN.2014 15:35:09

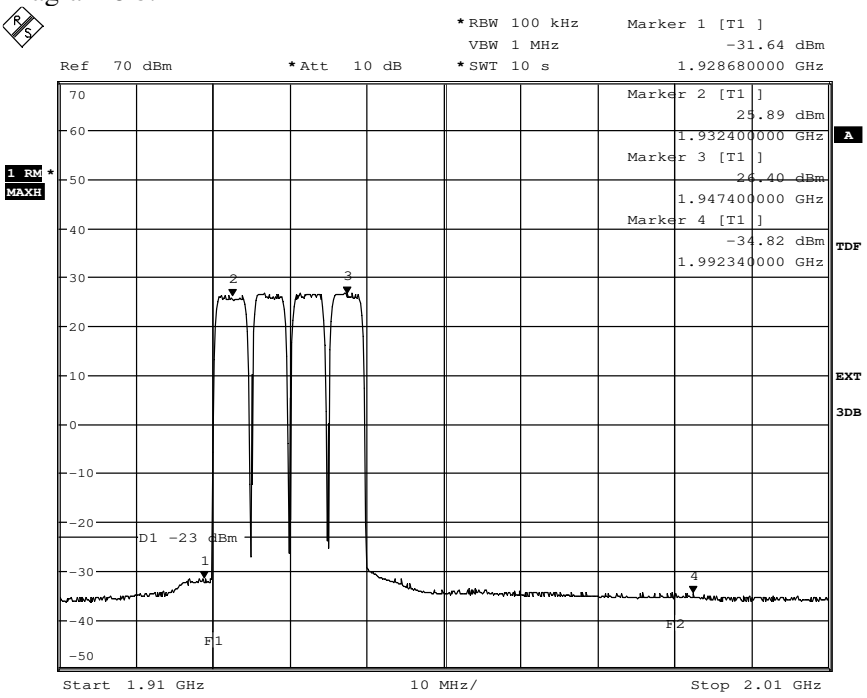
Appendix 5

Diagram 8 a:



Date: 4.JUN.2014 17:00:28

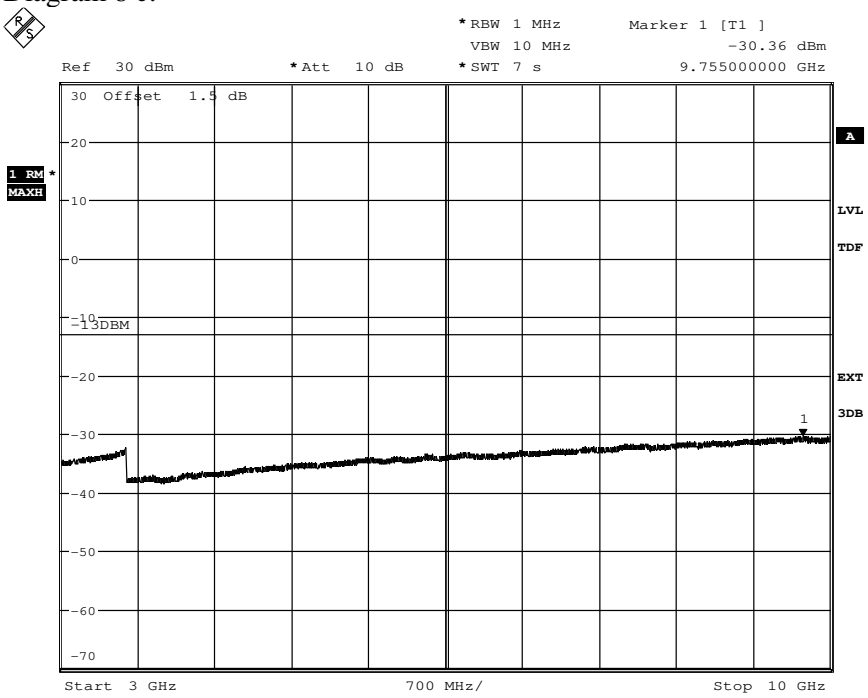
Diagram 8 b:



Date: 4.JUN.2014 17:02:01

Appendix 5

Diagram 8 c:



Date: 4.JUN.2014 17:04:07

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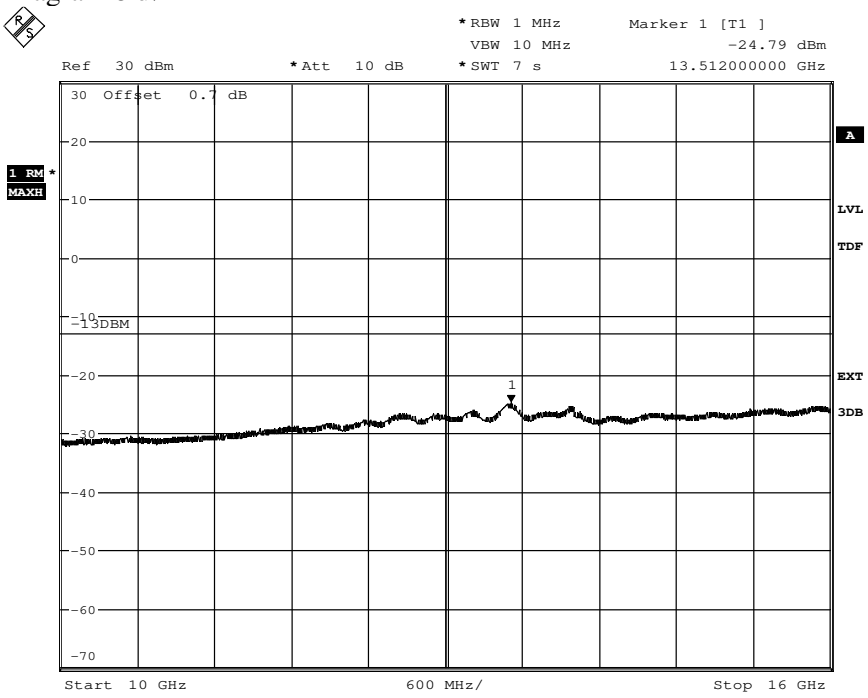
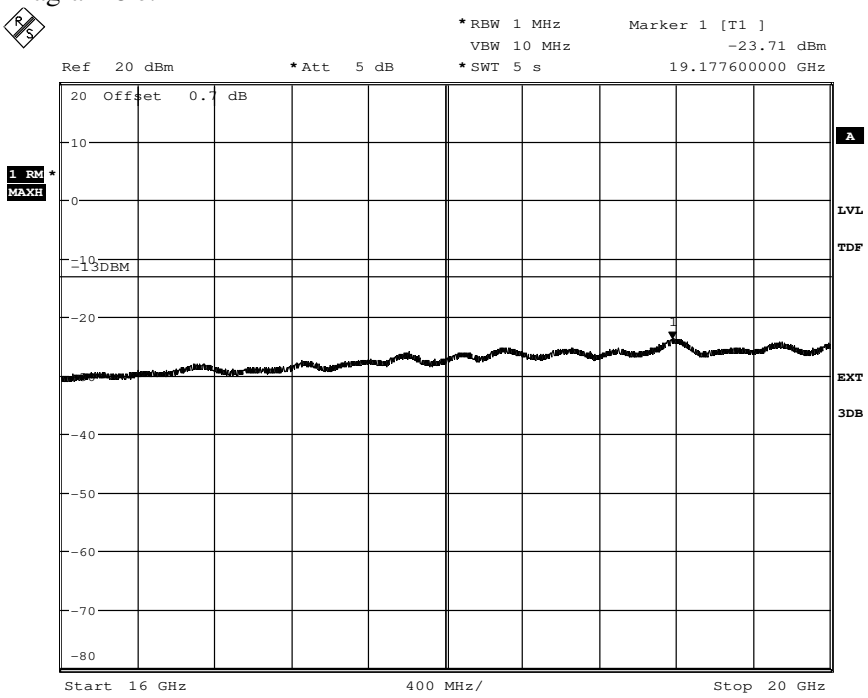


Date: 4.JUN.2014 17:04:49

Appendix 5

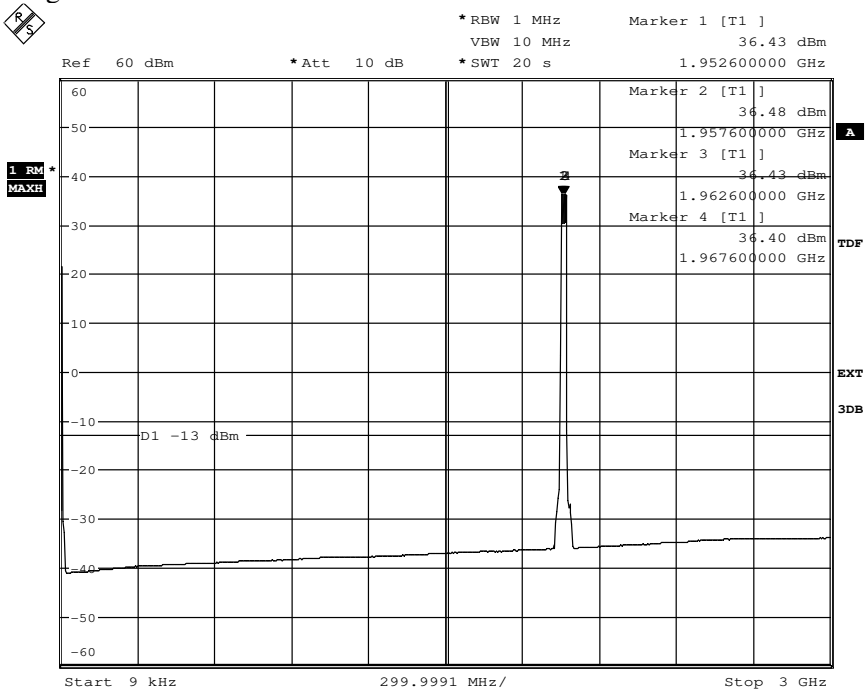
Diagram 8 e:



Date: 4.JUN.2014 17:05:36

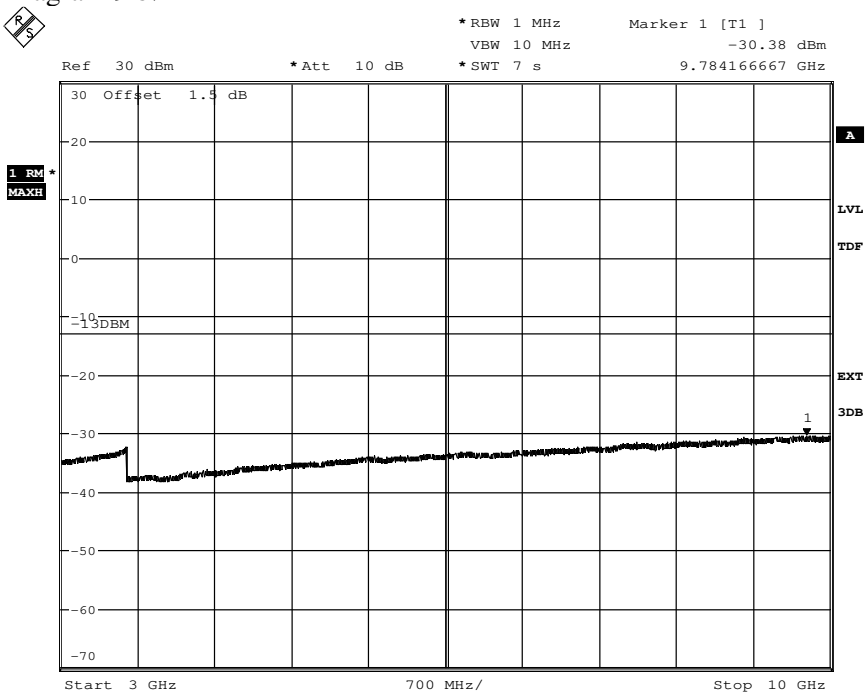
Appendix 5

Diagram 9 a:



Date: 4.JUN.2014 17:14:35

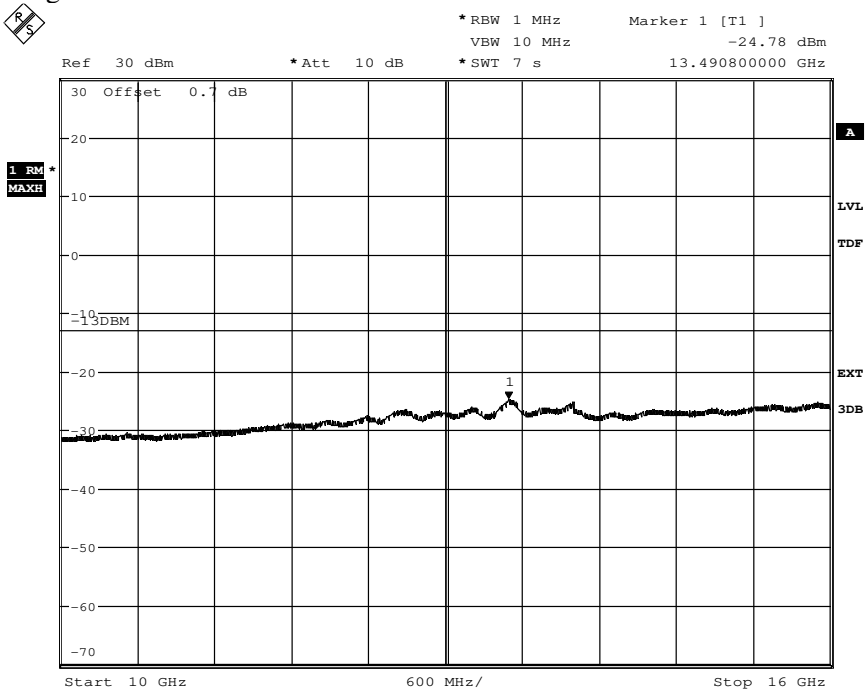
Diagram 9 b:



Date: 4.JUN.2014 17:17:24

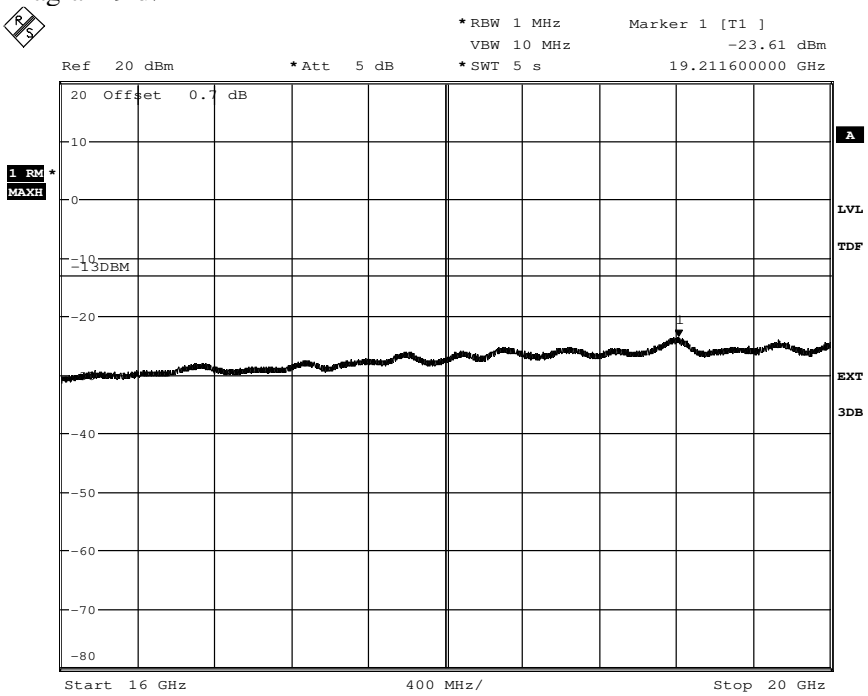
Appendix 5

Diagram 9 c:



Date: 4.JUN.2014 17:18:09

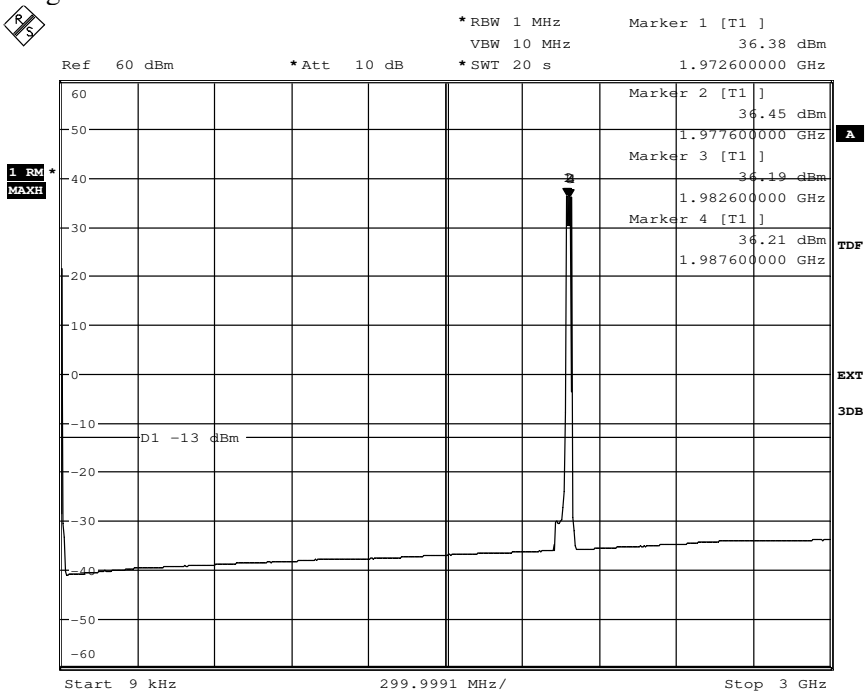
Diagram 9 d:



Date: 4.JUN.2014 17:18:49

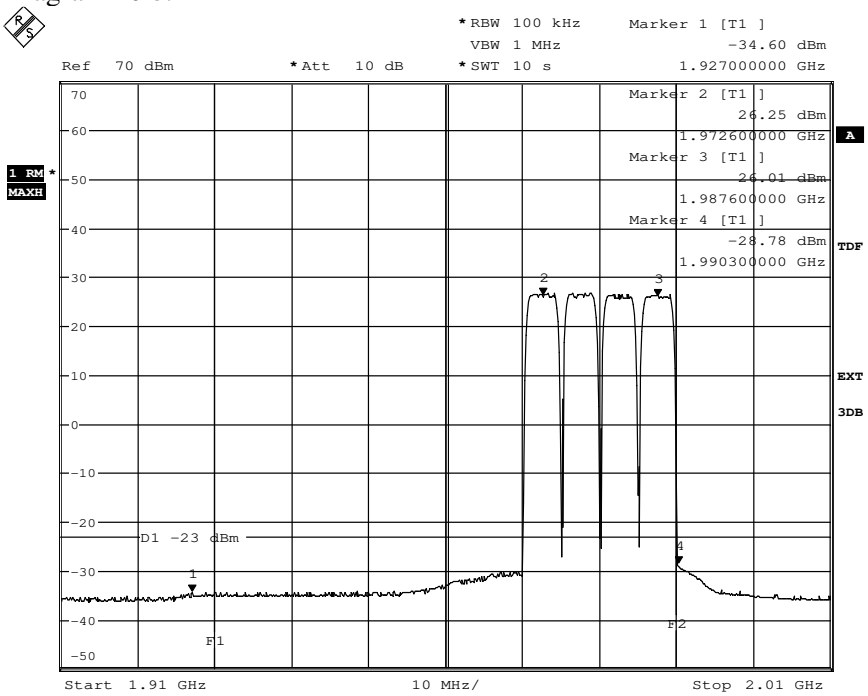
Appendix 5

Diagram 10 a:



Date: 4.JUN.2014 16:40:48

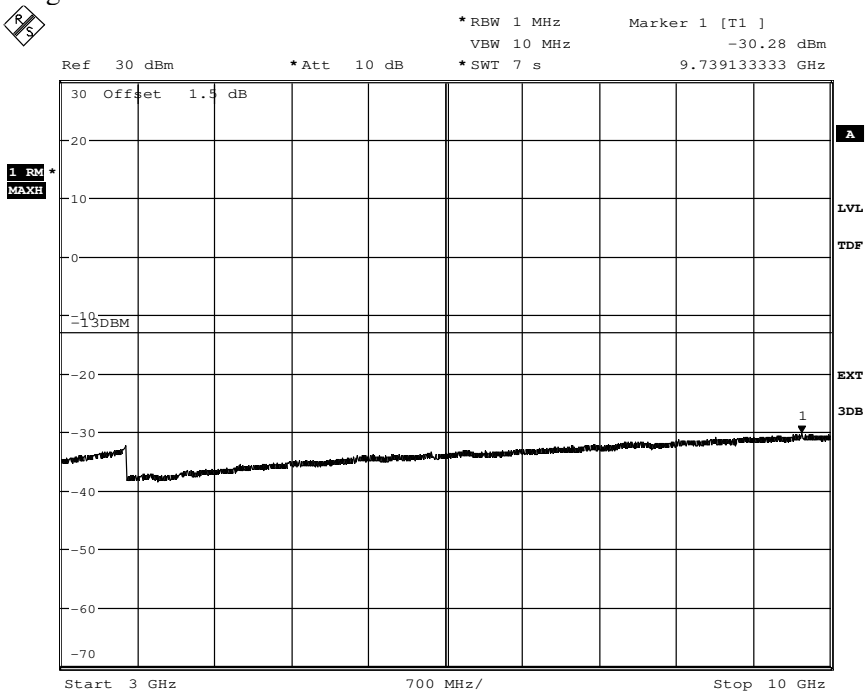
Diagram 10 b:



Date: 4.JUN.2014 16:42:47

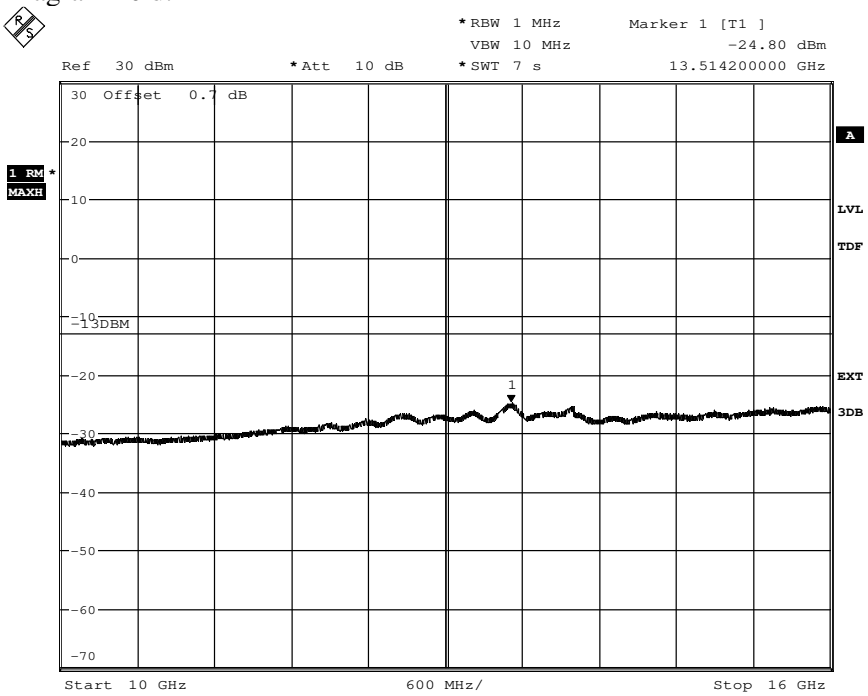
Appendix 5

Diagram 10 c:



Date: 4.JUN.2014 16:44:48

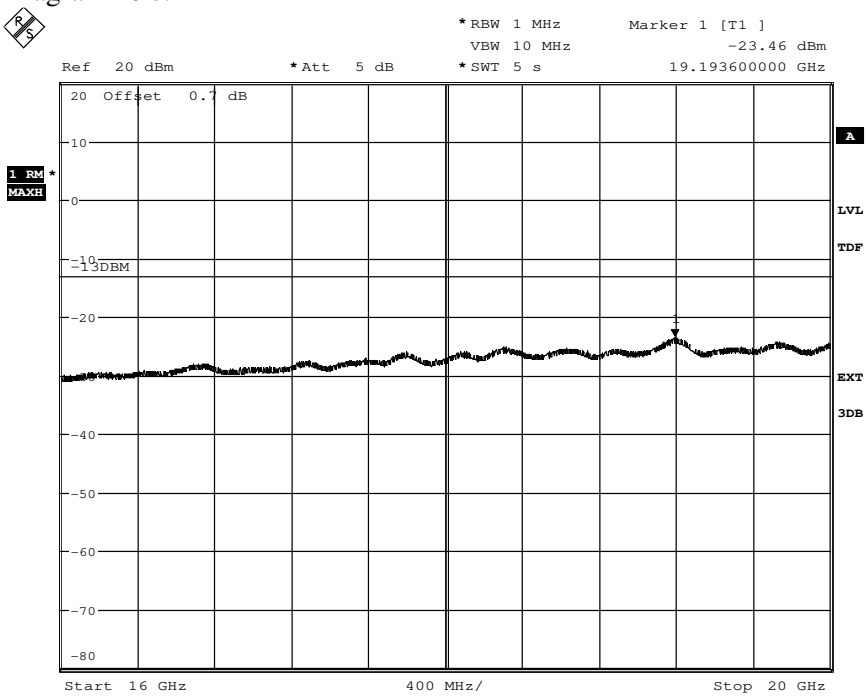
Diagram 10 d:



Date: 4.JUN.2014 16:45:30

Appendix 5

Diagram 10 e:



Date: 4.JUN.2014 16:46:29

Appendix 7

Field strength of spurious radiation measurements according to CFR 47 §2.1053 / IC RSS-133 6.5

Date	Temperature	Humidity
2014-05-23	23 °C ± 3°C	40 % ± 5 %
2014-05-26	23 °C ± 3°C	36 % ± 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.

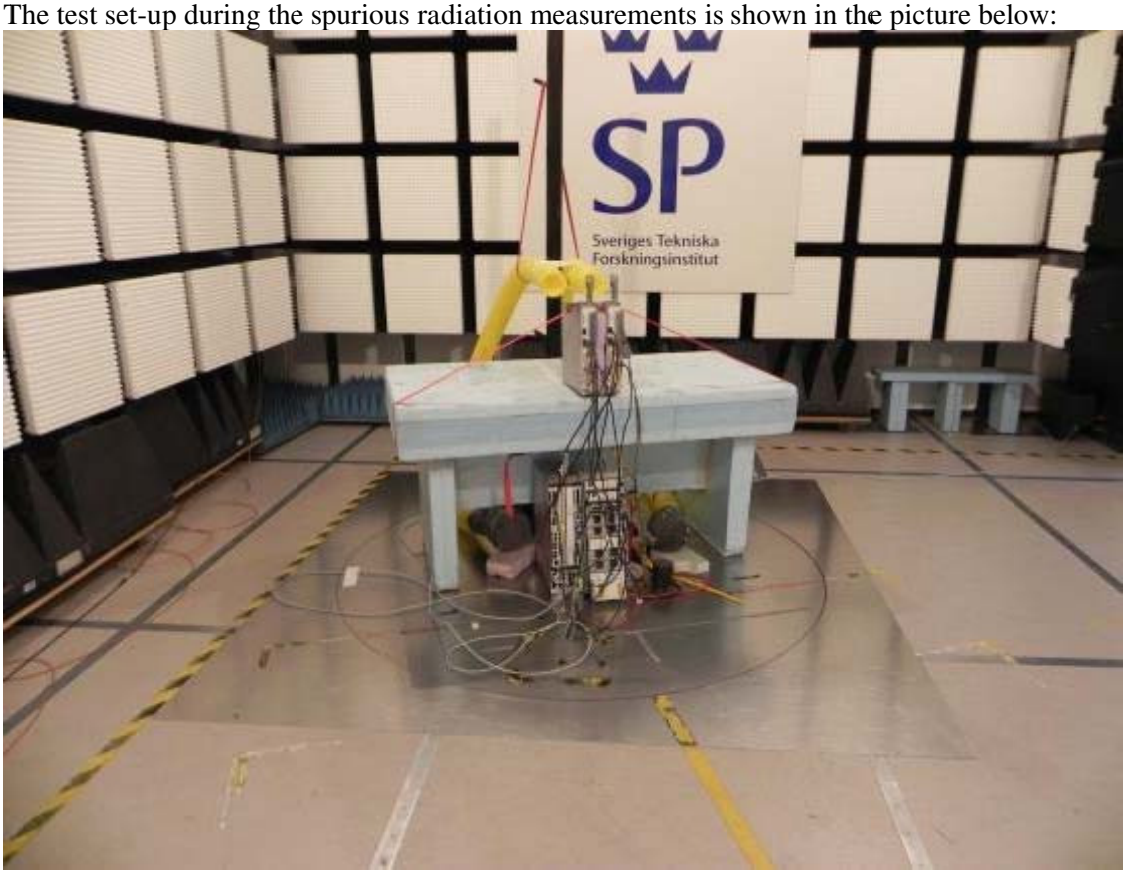
The measurements were performed with both horizontal and vertical polarization of the antenna. The antenna distance was 3 m in the frequency range 30 MHz – 18 GHz and 1 m in the frequency range 18 - 20 GHz.

In the frequency range 30 MHz - 20 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 ESIB 26	503 885
R&S FSIQ 40	503 738
EMC 32 ver. 8.52.0	503 899
Antenna Schaffner CBL 6143	504 079
EMCO Horn Antenna 3115	902 212
Flann STD Gain Horn Antenna 20240-20	503 674
High pass filter, RLC Electronics	503 739
Miteq, Low Noise Amplifier	503 285
Schwarzbeck preamplifier BBV 9742	504 085
µComp Nordic, Low Noise Amplifier	504 160
Temperature and humidity meter, Testo 625	504 188

Tested configurations

Symbolic name MIMO mode
B
M
T
M2
M4

Results, representing worst case

Diagram	Symbolic name MIMO mode
1 a-d	M

Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
30-20 000	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

CFR 47 §24.238 and RSS-133 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 7

Diagram 1a:

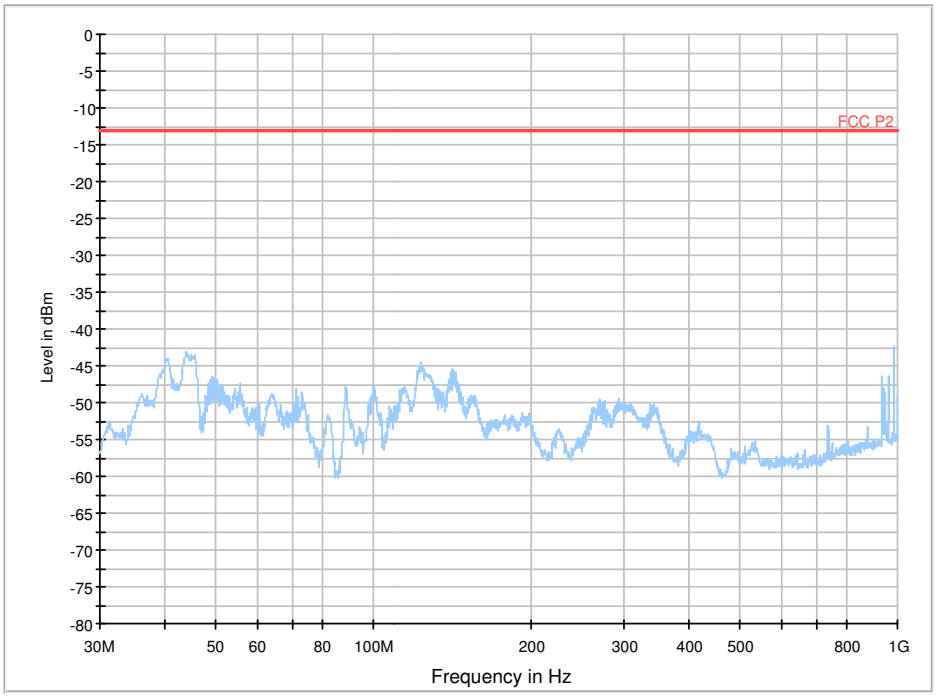
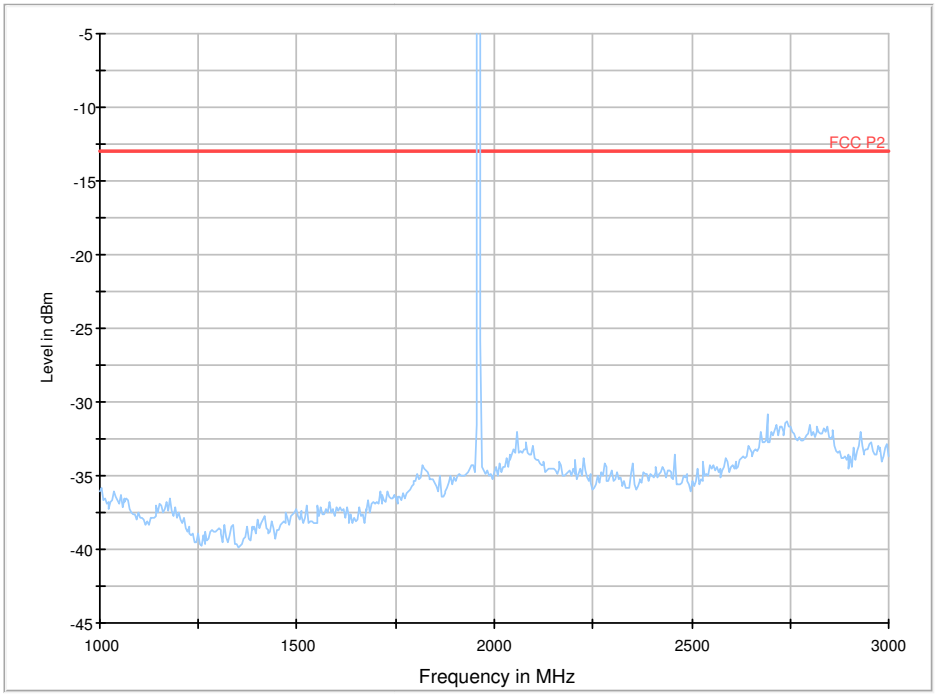
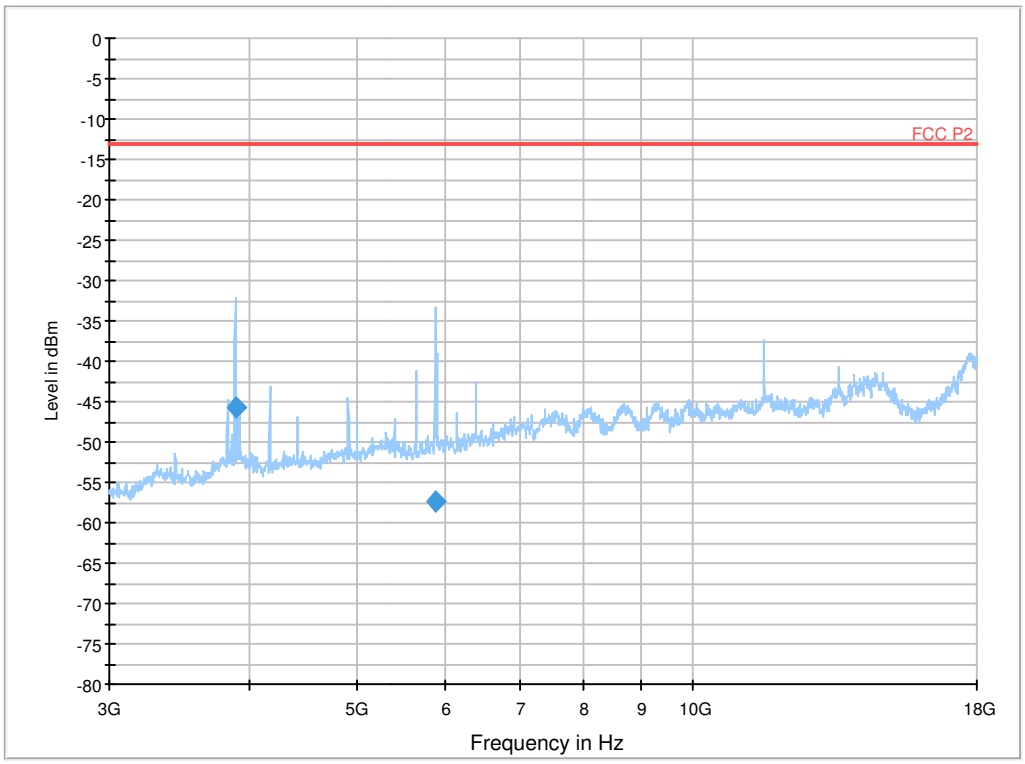


Diagram 1b:



Note: The emission at 1960 MHz is the carrier frequency and shall be ignored in the context.

Diagram 1c:

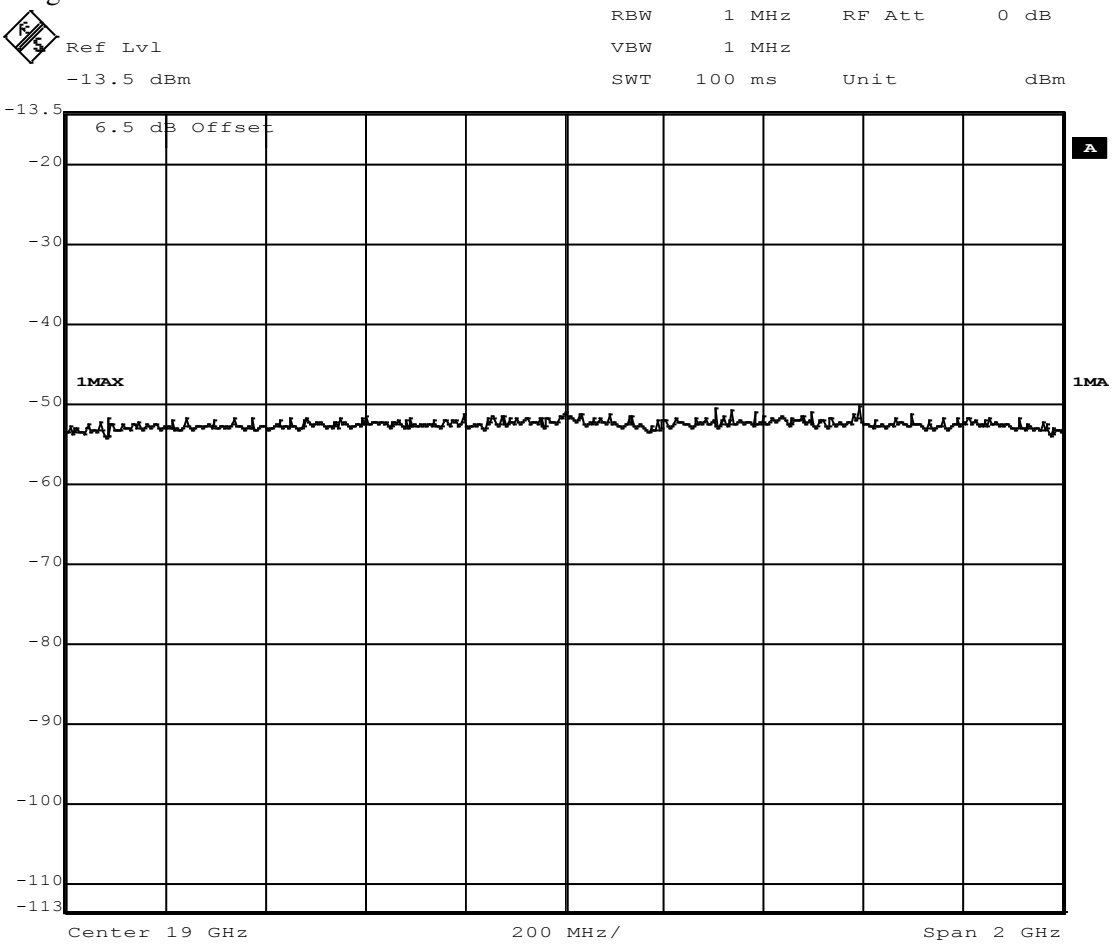


Final RMS Result

Frequency (MHz)	RMS (dBm)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBm)
3891.012	-45.7	3000.0	1000.000	100.0	V	45.0	-103.7	32.7	-13.0
5881.412	-57.3	3000.0	1000.000	100.0	H	41.0	-102.6	44.3	-13.0

Appendix 7

Diagram 1d:



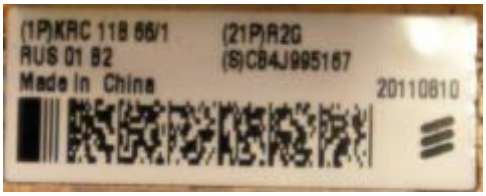
Appendix 7

External photos

Front side:

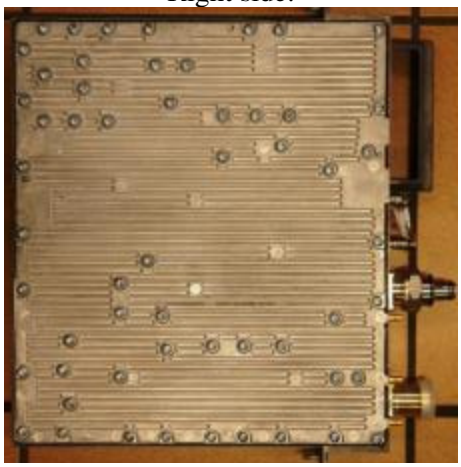
Back side:

Product Label:



Left side:

Right side:



Appendix 7

Top side:

Bottom side: