# REPORT

issued by an FCC listed Laboratory Reg. no. 93866
The test site complies with RSS-Gen, IC file no. 3482A-1

Contact person
Tomas Lennhager
Electronics
+46 10 516 54 09
Tomas.Lennhager@sp.se

| Date | Reference | Page |
|---|---|---|
| 2013-12-03 | 3P07325-02-F27 | 1 (2) |

1002 ISO/IEC 17025

Ericsson AB
Klaes Holm
PDU HW
164 80 Stockholm

## Radio measurements on AIR 21 B4A B12P B8P 1700/2100 MHz radio equipment with FCC ID: TA8AKRC118056-1 and IC: 287AB-AS1180561

(8 appendices)

### Test object

Product name: AIR 21 B4A B12P B8P
Product number: KRC 118 056/1, R1A

### Summary

See appendix 1 for general information and appendix 8 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 |
| 2.1053 / RSS-139 6.5 | Field strength of spurious radiation | Yes | 6 |
| 2.1055 / RSS-139 6.3 | Frequency stability | Yes | 7 |

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.

**SP Technical Research Institute of Sweden**
**Electronics - EMC**

Performed by

Tomas Lennhager

Examined by

Bengt Andersson

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Appendix 1

## Description of the test object

| | |
|---|---|
| Equipment: | Product name: AIR 21 B4A B12P B8P<br>Product number: KRC 118 056/1, R1A<br>FCC ID TA8AKRC118056-1<br>IC 287AB-AS1180561<br>IC MODEL NO: AS1180561 |
| Tested configuration: | WCDMA single RAT |
| Frequency bands: | TX: 2110 – 2155 MHz<br>RX: 1710 – 1755 MHz |
| Antenna ports: | 2 TX/RX ports, (internally connected to integrated Cross-Polarized antenna elements) |
| RF configurations: | Single carrier, multi carrier and MIMO 2x2 |
| Nominal RF output power per antenna port: | Single carrier: 1x 44.8 dBm (1x 30W)<br>Multi carrier: 2x 41.8 dBm (2x 15W)<br>4x 38.8 dBm (4x 7.5W) |
| Antenna type: | Cross- polarized antenna |
| Antenna gain: | 18 dBi |
| 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 |

## 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.

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

multi carrier(2 carriers), MIMO mode
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 pole mounted and powered with -48 VDC by an external power supply, unless noted otherwise. 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.

### Radiated measurements

The test object was pole mounted and powered with -48 VDC by an external power supply. Both RF ports were terminated into 50 ohm.

### Purpose of test

The purpose of the tests is to verify compliance to the performance characteristics specified in applicable items of FCC CFR 47 and Industry Canada RSS-139 and 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 25.141, 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

## 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 2013-10-10.

## Manufacturer’s representative

Christer Gustavsson, Ericsson AB.

## Test engineers

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

## Test participant

None.

## 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<br>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 | 2014-03 | 503 674 |
| µComp Nordic, Low Noise Amplifier | 2014-04 | 901 545 |
| Schwarzbeck preamplifier BBV 9742 | 2014-03 | 504 085 |
| Miteq Low Noise Amplifier | 2014-09 | 503 285 |
| 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 |

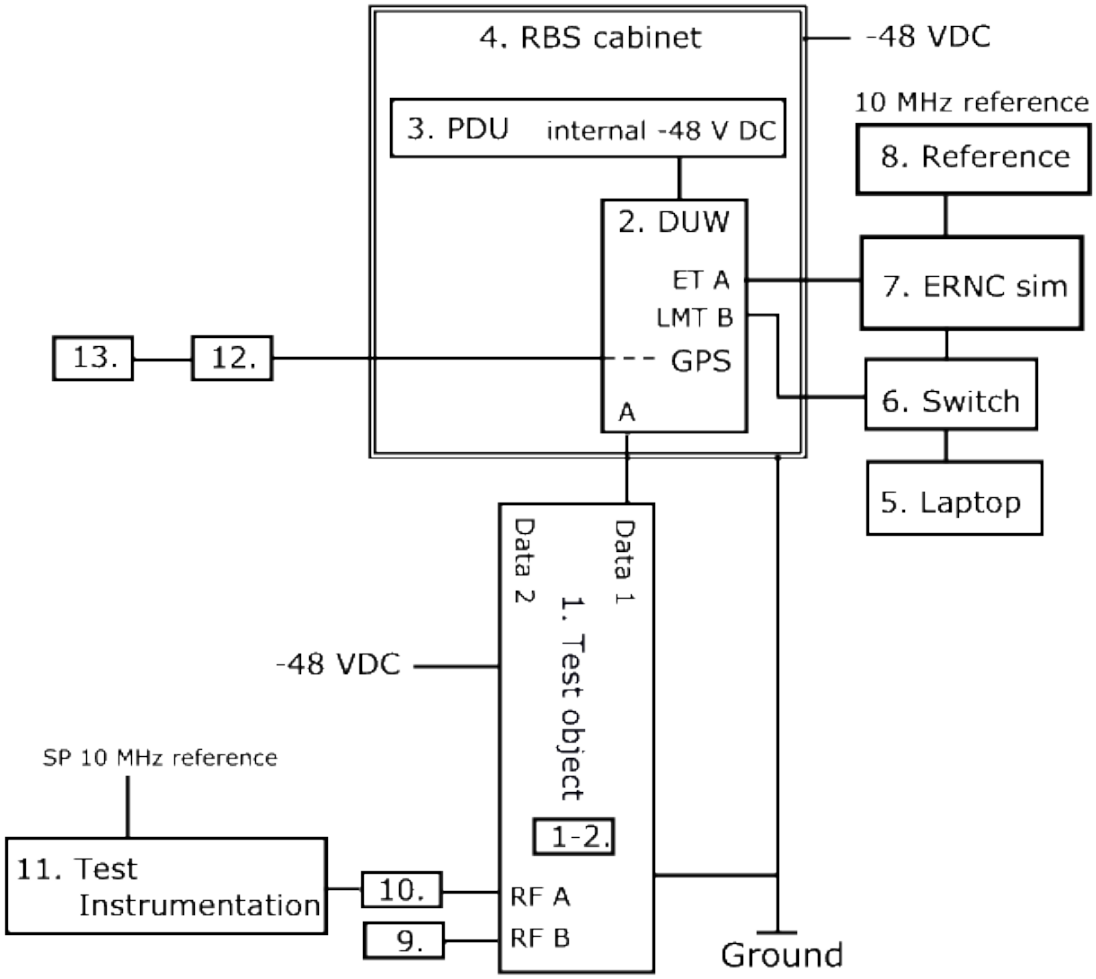
**Test frequencies during measurements**

TX test frequencies

| UARFCN Downlink | Frequency [MHz] | Symbolic name | Comment |
|---|---|---|---|
| 1537 | 2112.4 | B | Single carrier TX bottom frequency |
| 1537<br>1562 | 2112.4<br>2117.4 | B2 | 2 carrier TX band bottom constellation |
| 1537<br>1587 | 2112.4<br>2122.4 | B3 | 2 carrier TX band bottom constellation |
| 1537<br>1562<br>1587<br>1612 | 2112.4<br>2117.4<br>2122.4<br>2127.4 | B4 | 4 carrier TX band bottom constellation |
| 1638 | 2132.6 | M | Single carrier TX band mid frequency |
| 1625<br>1650 | 2130.0<br>2135.0 | M2 | 2 carrier TX band mid constellation |
| 1600<br>1625<br>1650<br>1675 | 2125.0<br>2130.0<br>2135.0<br>2140.0 | M4 | 4 carrier TX band midconstellation |
| 1738 | 2152.6 | T | Single carrier TX top frequency |
| 1713<br>1738 | 2147.6<br>2152.6 | T2 | 2 carrier TX band top constellation |
| 1688<br>1738 | 2142.6<br>2152.6 | T3 | 2 carrier TX band top constellation |
| 1663<br>1688<br>1713<br>1738 | 2137.6<br>2142.6<br>2147.6<br>2152.6 | T4 | 4 carrier TX band top constellation |

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

**Test set-up conducted measurements**




**Test object:**

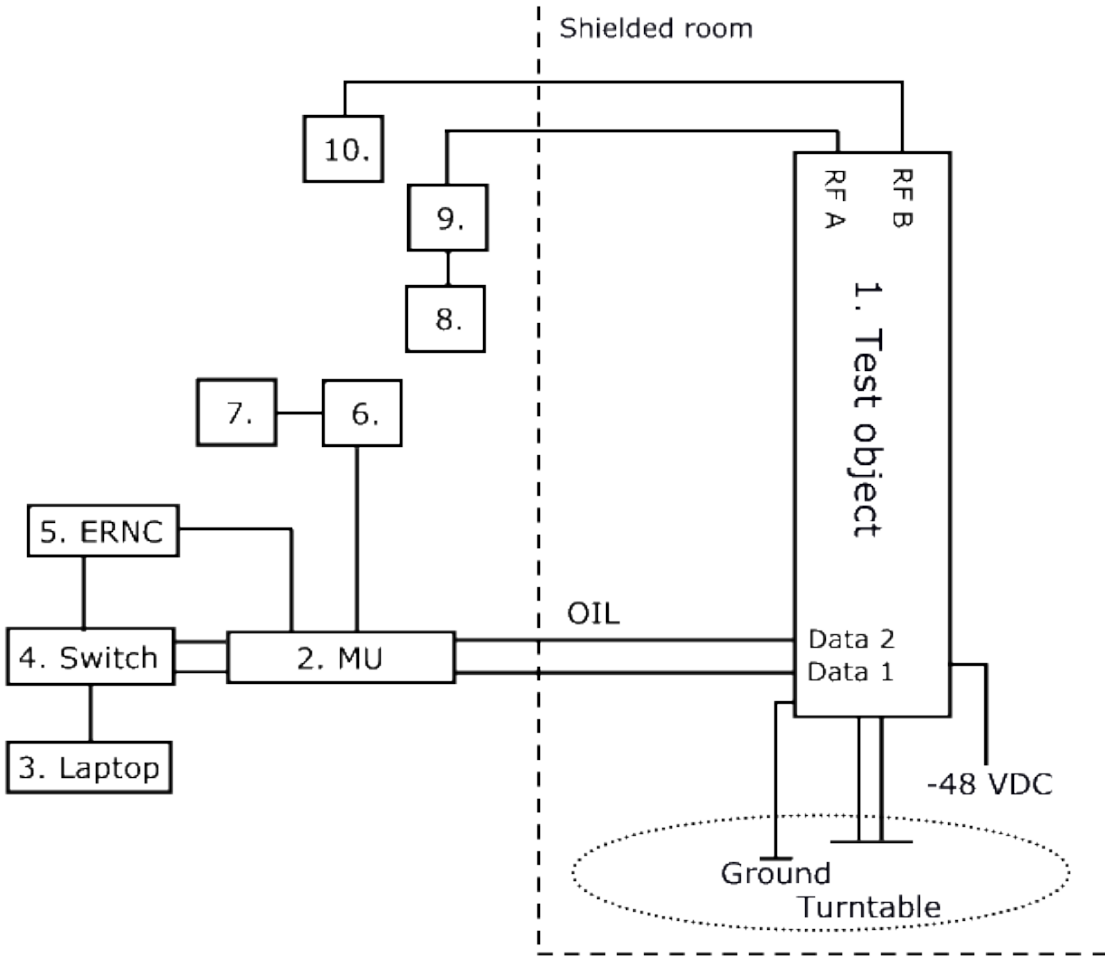
| | |
|---|---|
| 1. | AIR 21 B4A B12 P B8P, KRC 118 056/1, revision R1A, s/n: CQ30112763<br>(FCC ID TA8AKRC118056-1 and IC 287AB-AS1180561)<br>with software: CXP 901 3268/6, revison R51NE<br>1-2. Transceiver, ARUS B4 1/KRC 118 046, revision R1C |

**Functional test equipment**

| | |
|---|---|
| 2. | DUW 30 01, KDU 127 161/3, revision R4F, s/n: TU8XB20713 |
| 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<br>running software MOSHELL V9.0z |
| 6. | Fast Ethernet switch, Netgear FS726T |
| 7. | ERNC Sim 130, BAMS – 100066091 |
| 8. | Symmetricon 8040 reference, BAMS – 1000714189 |
| 9. | Terminator, 50 ohm |
| 10. | Attenuator, according respective appendix |
| 11. | SP Test Instrumentation according to measurement equipment list |
| 12. | GPS 02 01, NCD 901 41/1, revision R1D, s/n: TU8K474887 |
| 13. | GPS Active Antenna, KRE 101 2082/1 |

Appendix 1

**Test set-up radiated measurements**




**Test object:**

| | |
|---|---|
| 1. | AIR 21 B4A B12 P B8P, KRC 118 056/1, revision R1A, s/n: CQ30112763<br>with software: CXP 901 3268/6, revision R51NE<br>FCC ID TA8AKRC118056-1 and IC 287AB-AS1180561<br>1-2. Transceiver, ARUS B4 1/KRC 118 046, revision R1C |

**Functional test equipment:**

| | |
|---|---|
| 2. | Main Unit<br>SUP 6601, 1/BFL 901 009/4, revision R1E, s/n: BR88236818<br>DUW 30 01, KDU 127 161/3, revision R4F, s/n: TU8XB20902 |
| 3. | Laptop, EliteBook 8560w, BAMS – 1001236854 |
| 4. | Fast Ethernet switch, Netgear FS726T |
| 5. | ERNC-SIM 131, BAMS – 1000660992 |
| 6. | GPS 02 01, NCD 901 41/1, revision R1D, s/n: TU8K357393 |
| 7. | GPS Active Antenna, KRE 101 2082/1 |
| 8. | FSIQ 40, SP number: 503 738, for supervision purpose only |
| 9. | Attenuator |
| 10. | Terminator 50 ohm |

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 | Signal |
| Ground wire | Ground |

**RBS software:**

| **Software** | **Revision** |
|---|---|
| CXP 902 1719 | R4F/5 |

Appendix 2

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

| Date | Temperature | Humidity |
|---|---|---|
| 2013-11-08 | 23°C ± 3°C | 31 % ± 5 % |
| 2013-11-10 | 23°C ± 3°C | 31 % ± 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 40 | 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 1 x 44.8 dBm per RF port.

| Symbolic name | Transmitter power [RMS (dBm)/ PAR dB] | | |
|---|---|---|---|
| | Port RF A | Port RF B | Total power[1)] |
| B | 44.88/ 7.24 | 44.72/ 7.24 | 47.81 |
| M | 44.86/ 7.24 | 44.76/ 7.24 | 47.82 |
| T | 44.86/ 7.24 | 44.71/ 7.24 | 47.80 |

[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 41.8 dBm per RF port.

| Symbolic name | Transmitter power [RMS (dBm)/ PAR dB] | | |
|---|---|---|---|
| | Port RF A | Port RF B | Total power[1)] |
| B2 | 44.72/ 7.24 | 44.70/ 7.26 | 47.72 |
| M2 | 44.81/ 7.24 | 44.71/ 7.21 | 47.77 |
| T2 | 44.79/ 7.24 | 44.78/ 7.19 | 47.80 |

MIMO mode, 4-Carrier

Rated output power 4 x 38.8 dBm per RF port.

| Symbolic name | Transmitter power [RMS (dBm)/ PAR dB] | | |
|---|---|---|---|
| | Port RF A | Port RF B | Total power[1)] |
| B4 | 44.93/ 7.31 | 44.93/ 731 | 47.94 |
| M4 | 45.01/ 7.19 | 44.84/ 7.19 | 47.94 |
| T4 | 44.90/ 7.38 | 44.93/ 7.38 | 47.93 |

[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 | Port RF B | |
| B | 38.99 | 39.61 | 42.61 |
| M | 39.94 | 39.67 | 42.94 |
| T | 40.00 | 39.59 | 43.00 |

[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 |

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

| Date | Temperature | Humidity |
|---|---|---|
| 2013-11-07 | 23 °C ± 3 °C | 31 % ± 5 % |
| 2013-11-08 | 23 °C ± 3 °C | 31 % ± 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 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 | Tested frequency | Tested Port | Occupied BW (99%) [MHz] |
|---|---|---|---|---|
| 1 | 5 MHz | B | RF A | 4.16 |
| 2 | 5 MHz | M | RF A | 4.17 |
| 3 | 5 MHz | M | RF B | 4.17 |
| 4 | 5 MHz | T | RF A | 4.17 |

Appendix 3

Diagram 1:

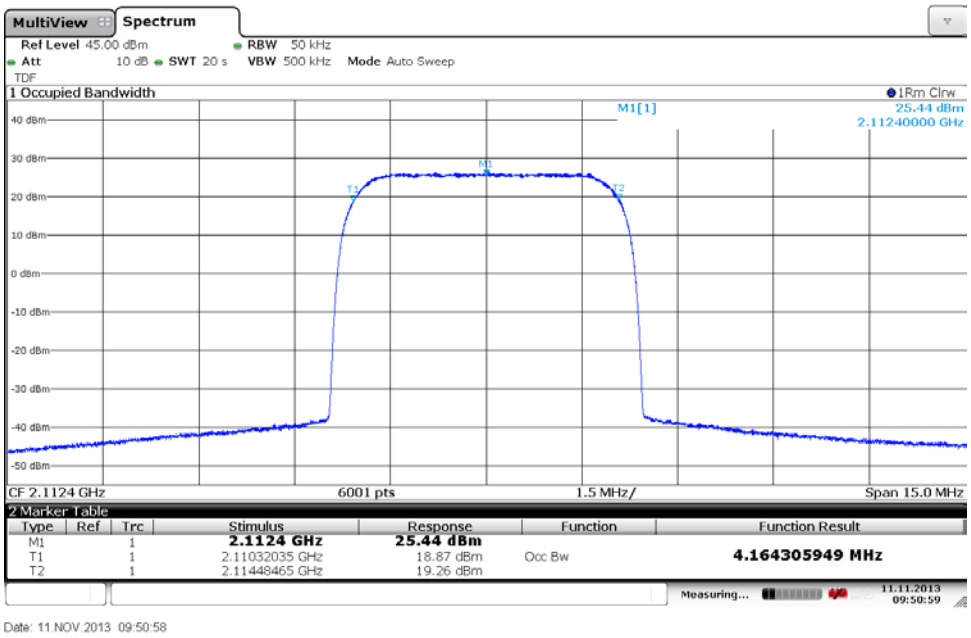



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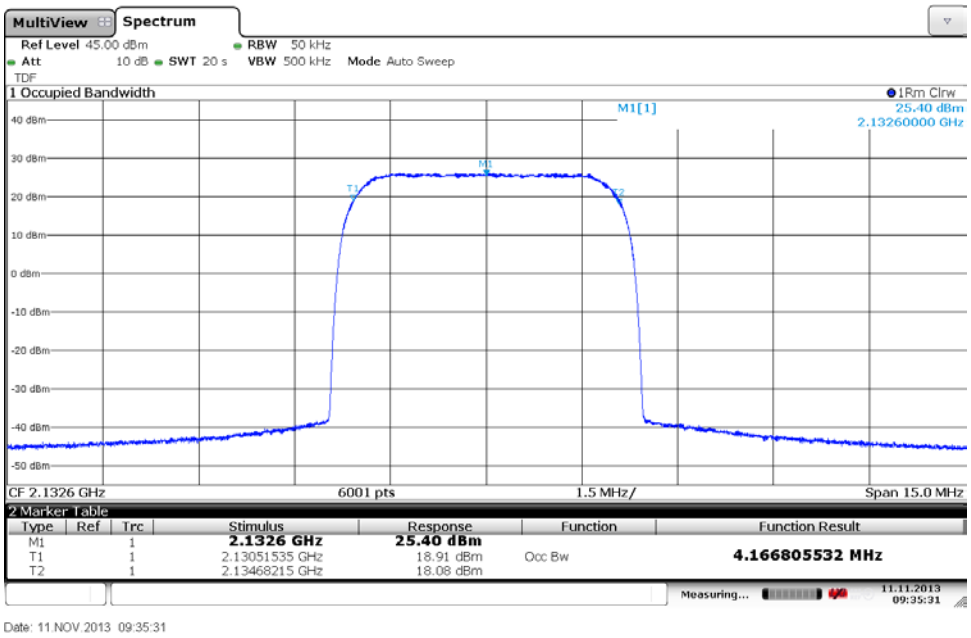
Diagram 2:

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Appendix 3

Diagram 3:

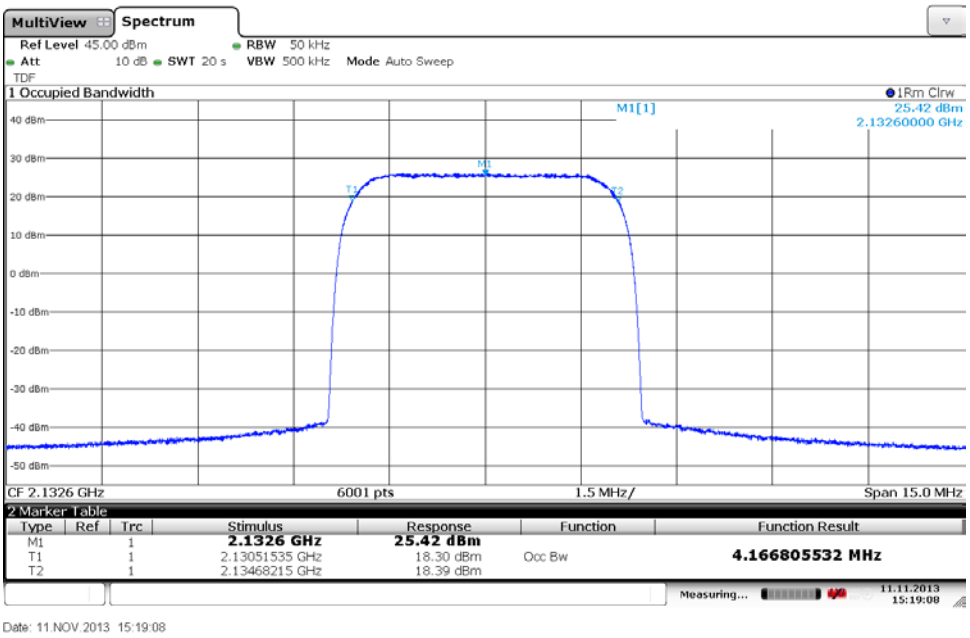


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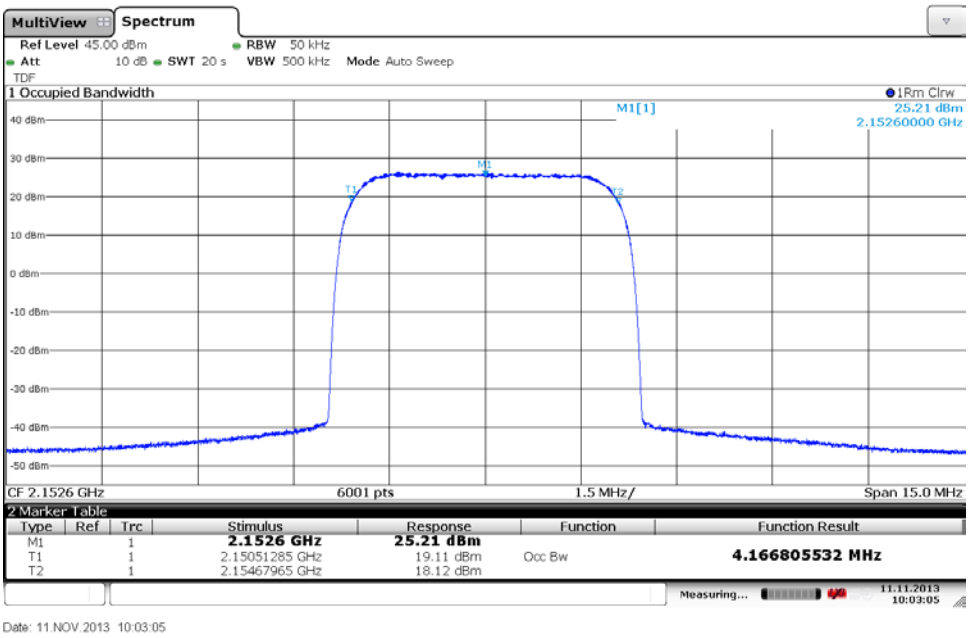
Diagram 4:

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Appendix 4

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

| Date | Temperature | Humidity |
|---|---|---|
| 2013-11-07 | 23 °C ± 3 °C | 31 % ± 5 % |
| 2013-11-08 | 23 °C ± 3 °C | 31 % ± 5 % |

### Test set-up and procedure

The measurements were made per definition in §27.53(h). The test object 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 20 kHz was used up to 1 MHz away from the band edges. 20 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 3.4 dB to -16.4 dBm.

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), (iii) “measure and add 10 log($N_{ANT}$)” of FCC KDB662911 D01 Multiple Transmitter Output v01r02

| 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 |
|---|---|---|---|
| 1 a-c | 5 MHz | B | RF A |
| 2 a-c | 5 MHz | B | RF B |
| 3 a-c | 5 MHz | T | RF A |
| 4 a-c | 5 MHz | T | RF B |

MIMO mode, 2-carriers

| Diagram | BW configuration | Symbolic name | Tested Port |
|---|---|---|---|
| 5 a-c | 5 MHz | B2 | RF A |
| 6 a-c | 5 MHz | T2 | RF A |

MIMO mode, 4-carriers

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

Appendix 4

Diagram 1 a:

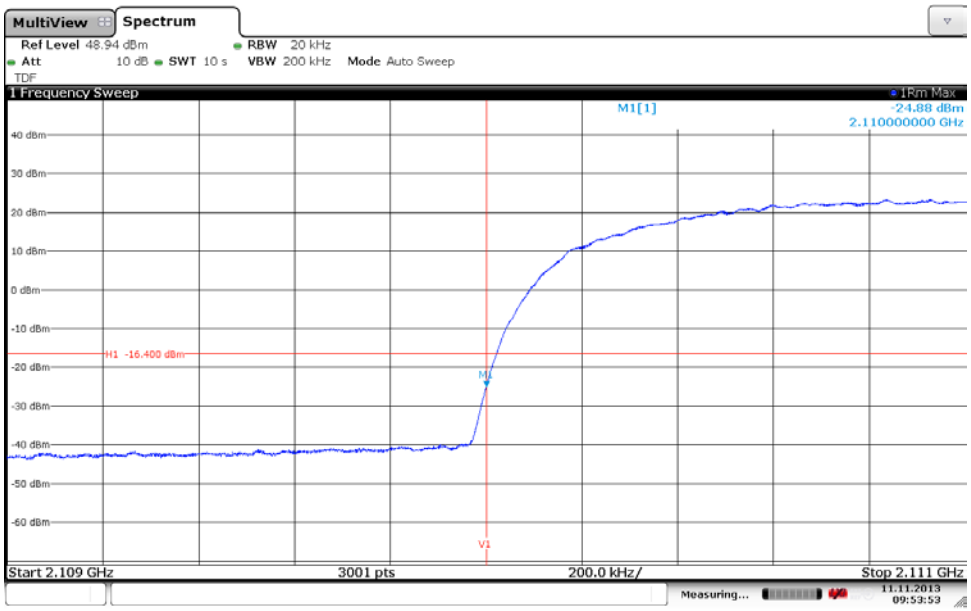


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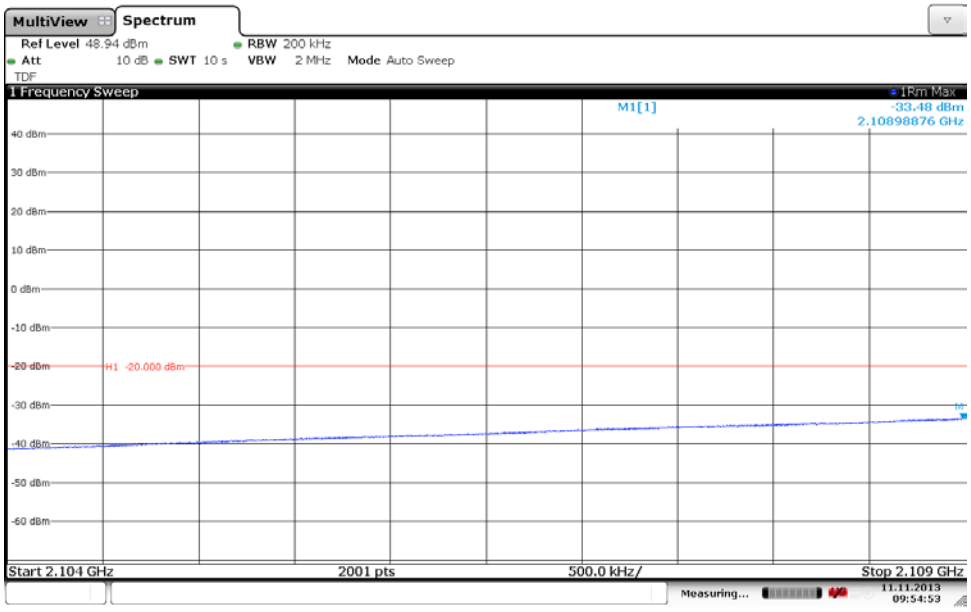
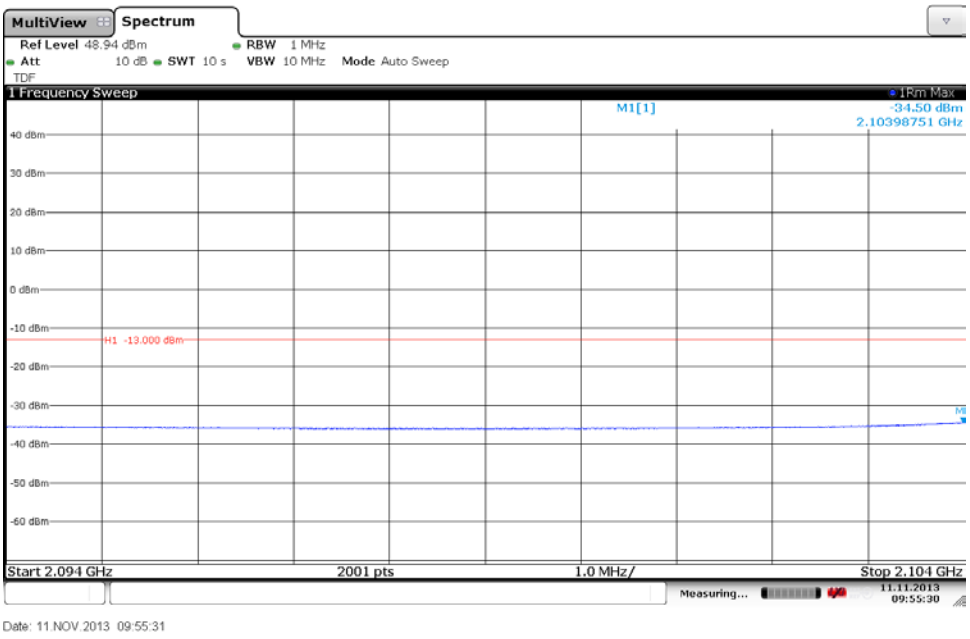
Diagram 1 b:




Date: 11.NOV.2013 09:54:53

Appendix 4

Diagram 1 c



Appendix 4

Diagram 2 a:

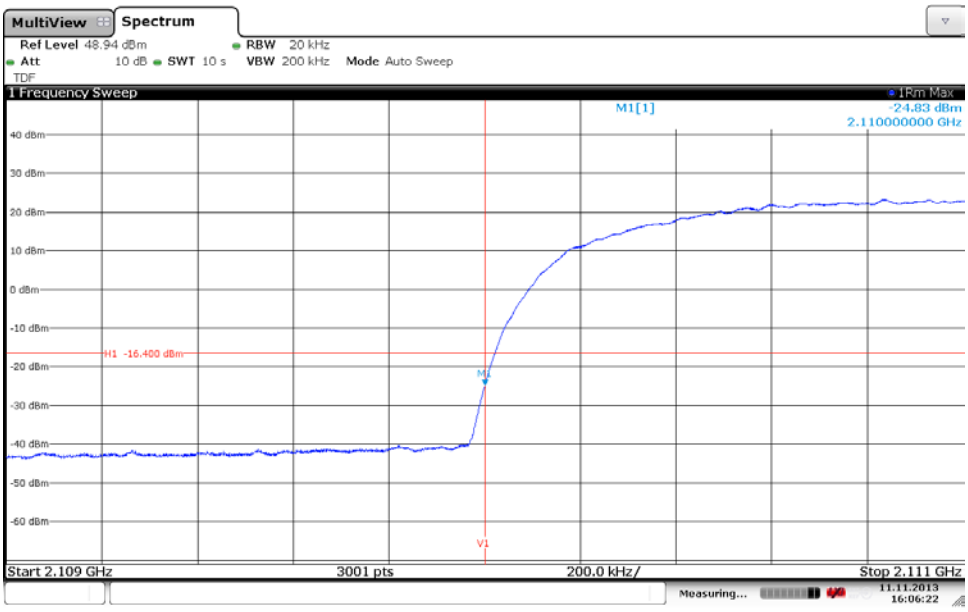



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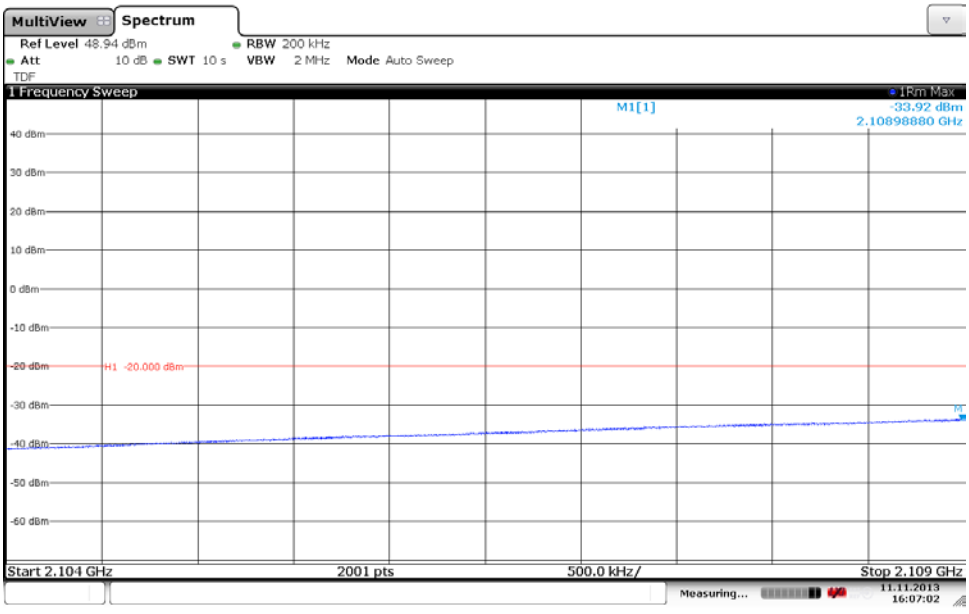
Diagram 2 b:

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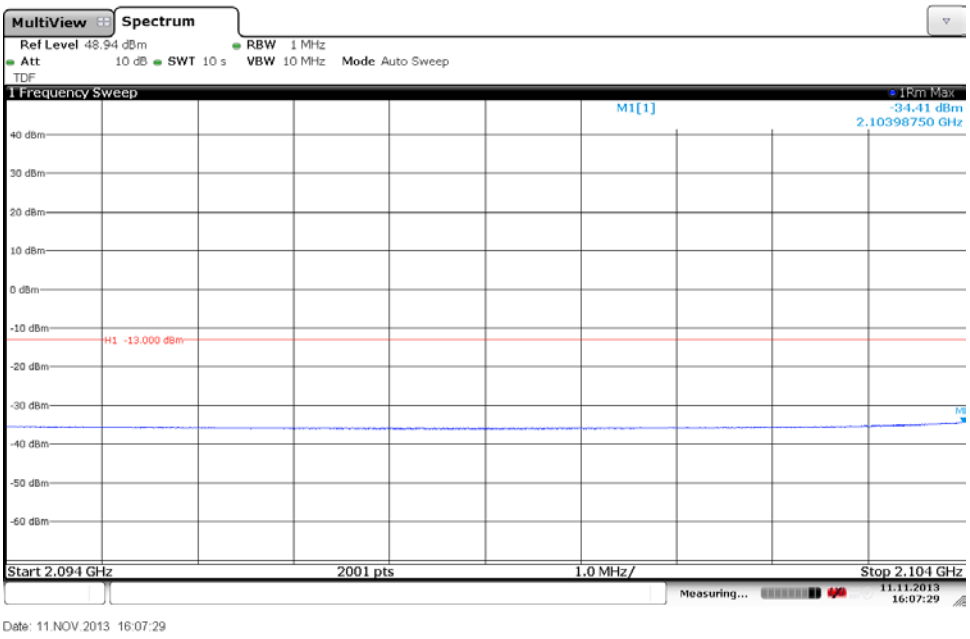
Appendix 4

Diagram 2 c:



Appendix 4

Diagram 3 a:

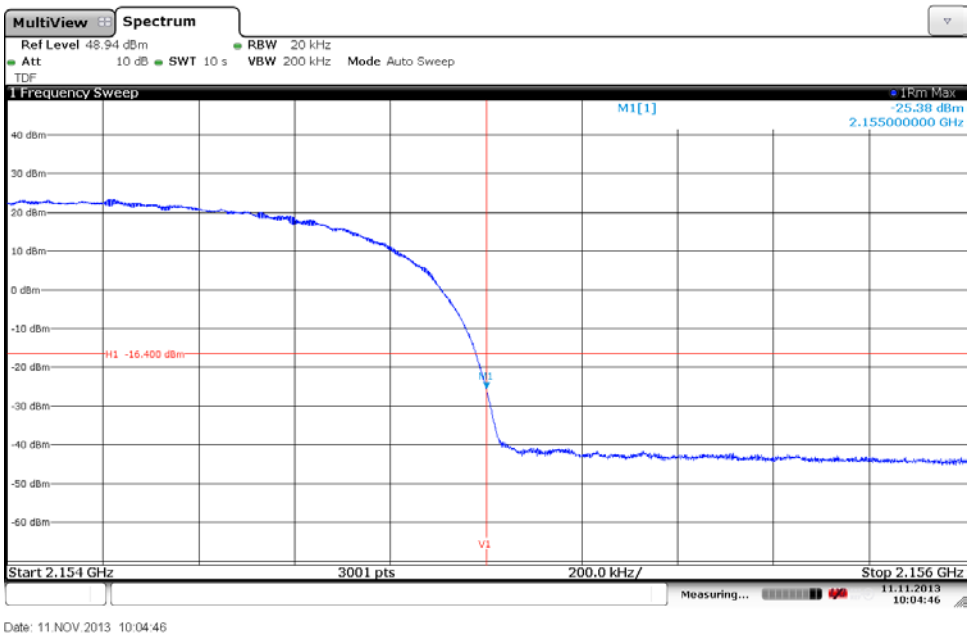



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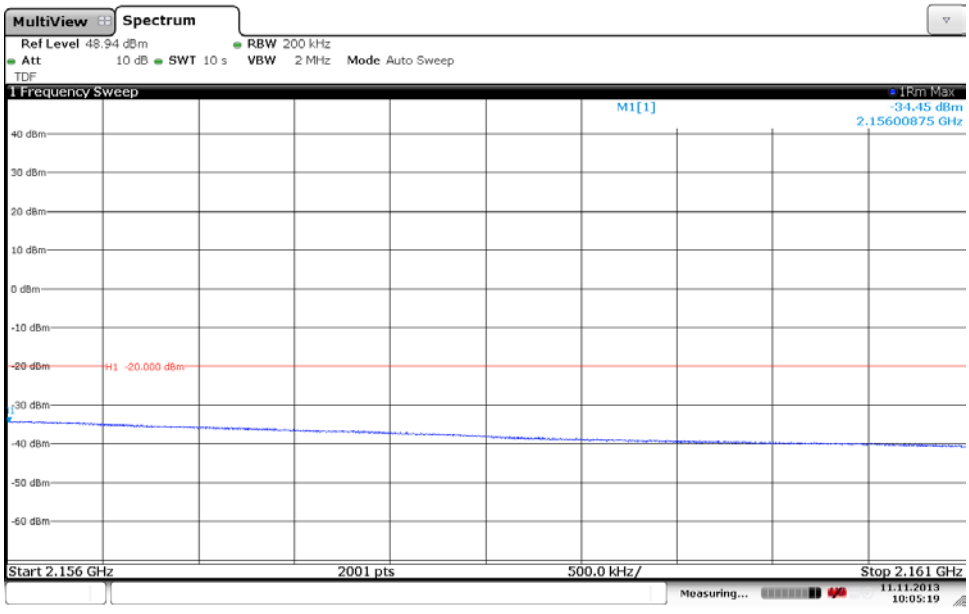
Diagram 3 b:

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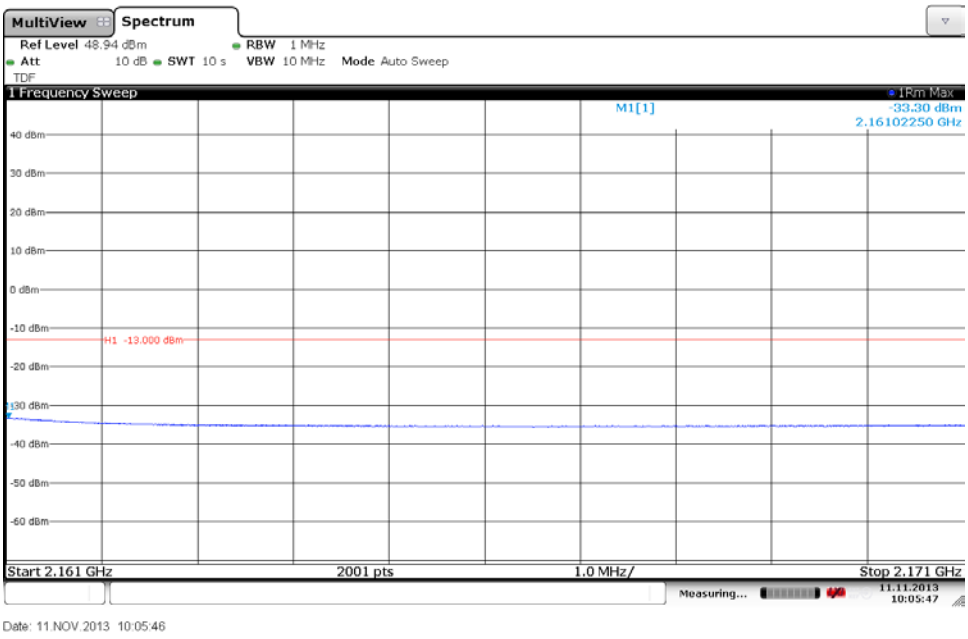
Appendix 4

Diagram 3 c:



Appendix 4

Diagram 4 a:

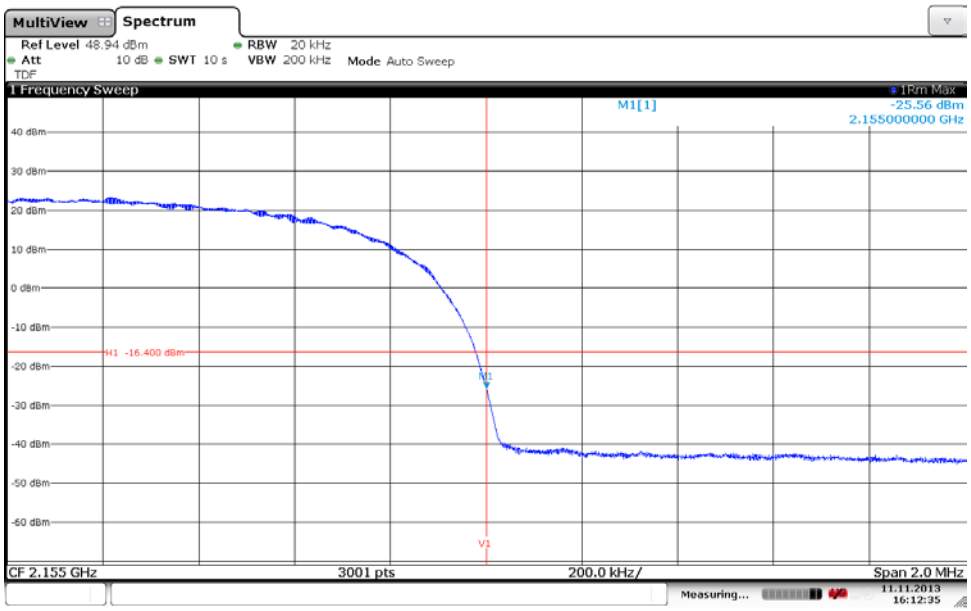



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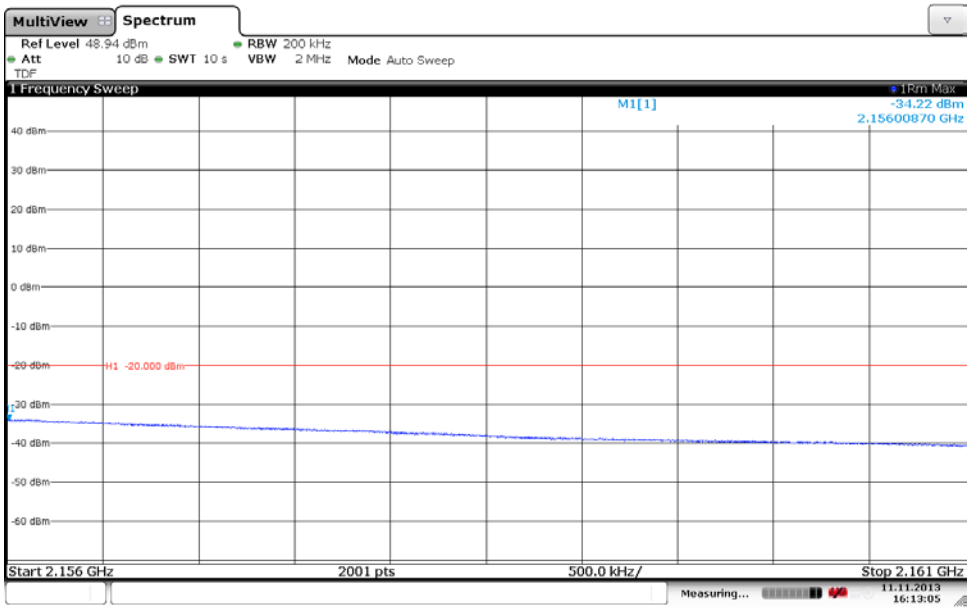
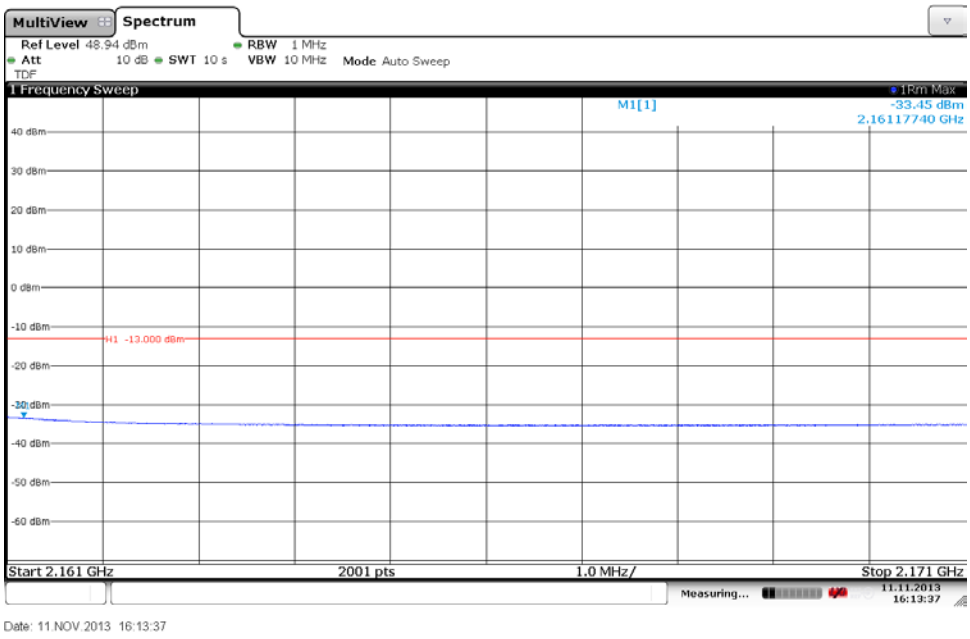
Diagram 4 b:




Date: 11.NOV.2013 16:13:05

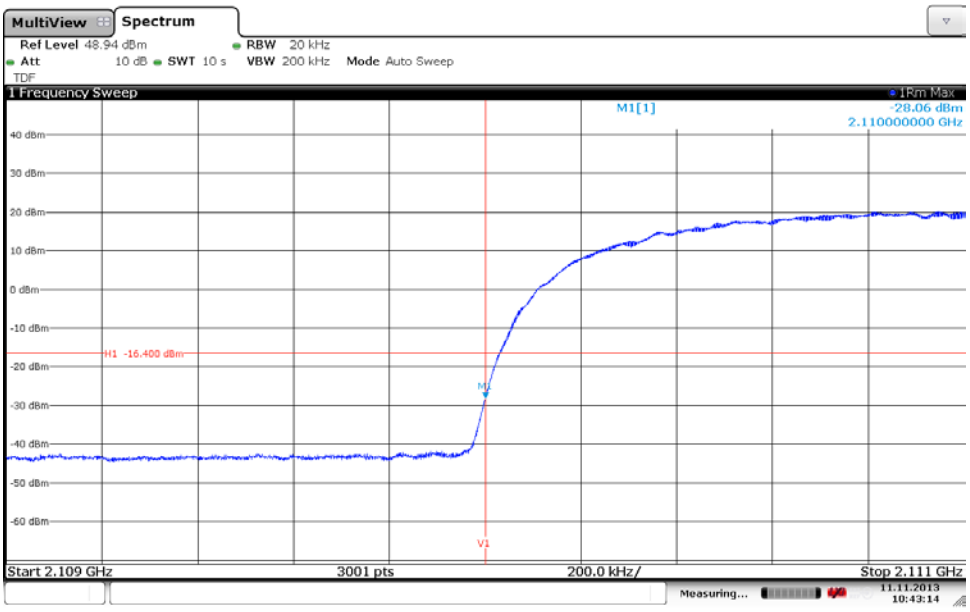
Appendix 4

Diagram 4 c:



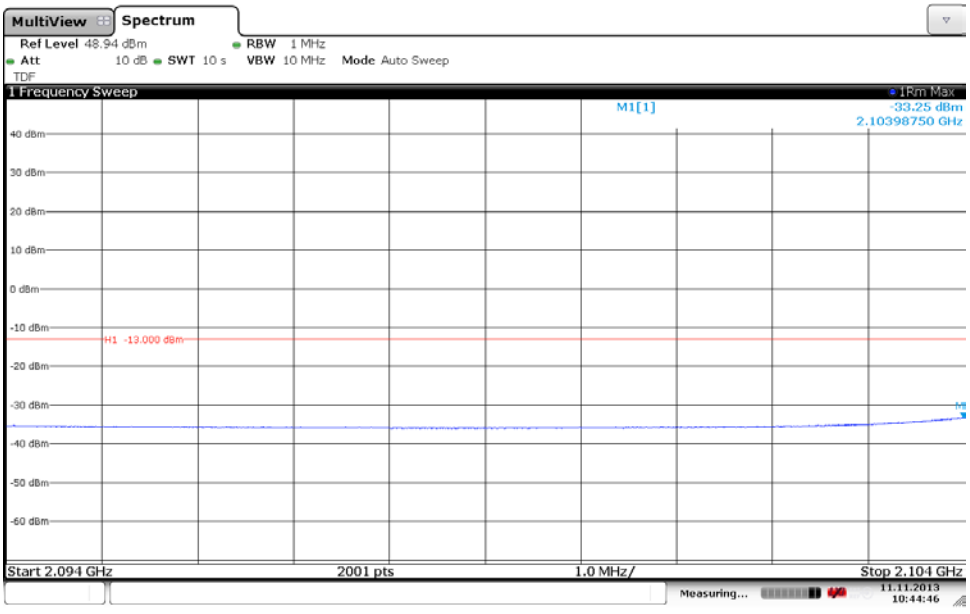
Appendix 4

Diagram 5 a:




Date: 11.NOV.2013 10:43:14

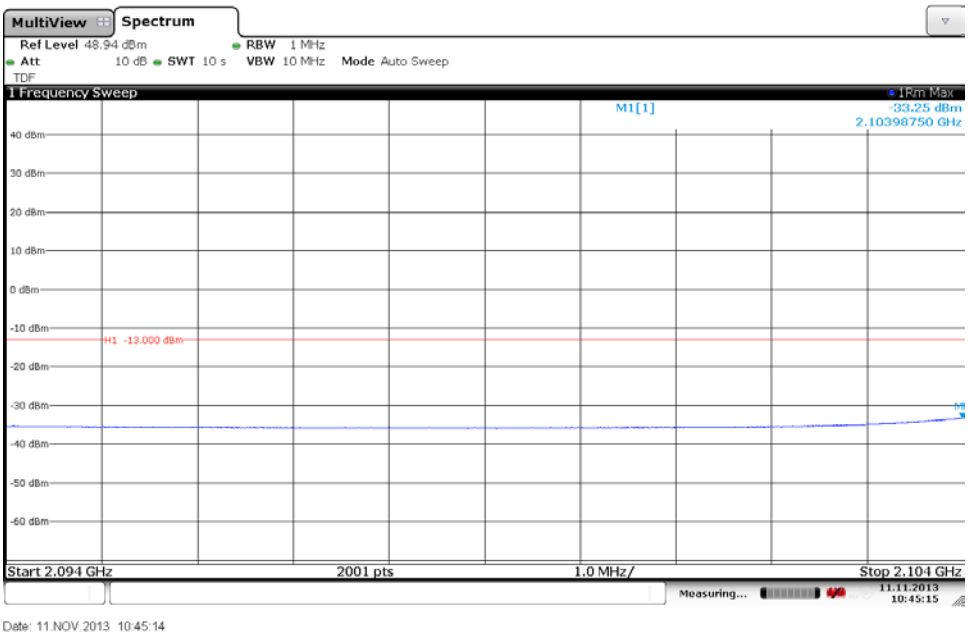
Diagram 5 b:




Date: 11.NOV.2013 10:44:46

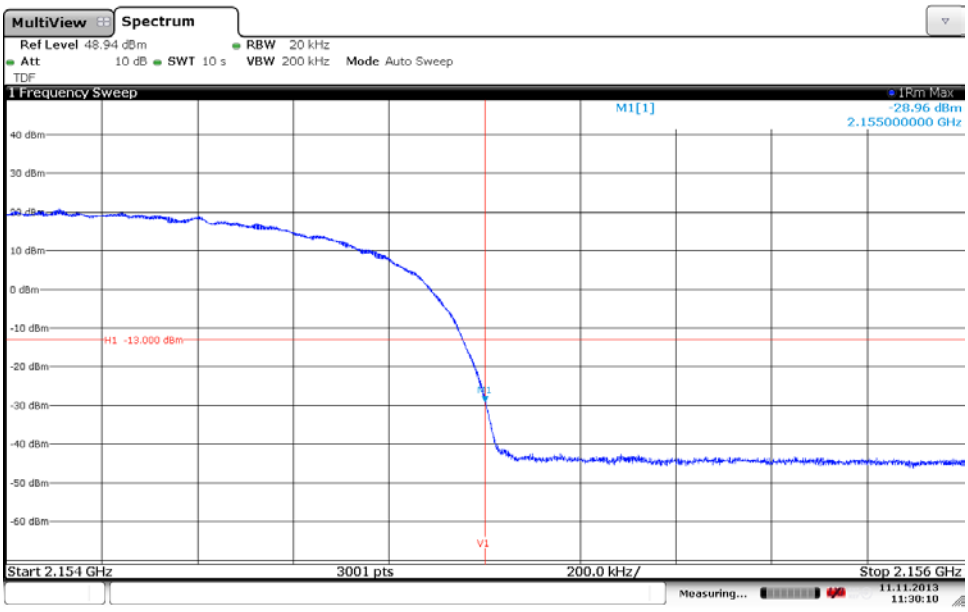
Appendix 4

Diagram 5 c:



Appendix 4

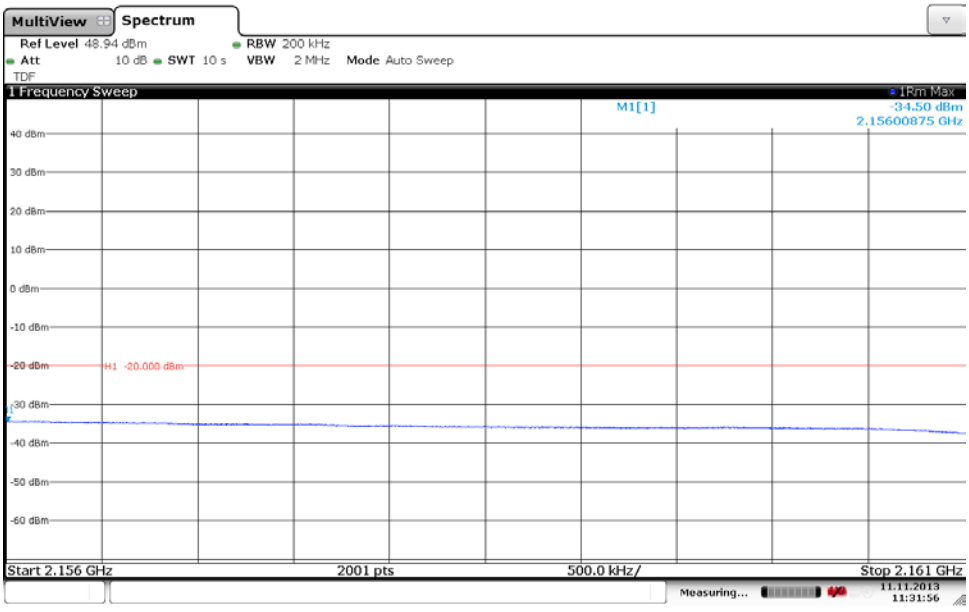
Diagram 6 a:




Date: 11.NOV.2013 11:30:10

Note: Limit above should be adjusted to -16.4 dBm instead of -13 dBm.

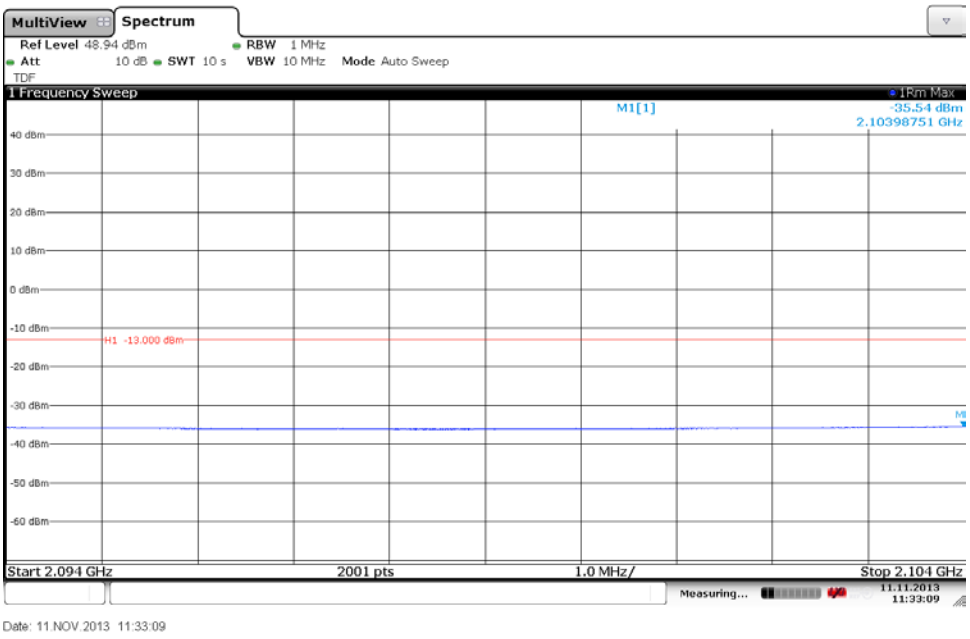
Diagram 6 b:




Date: 11.NOV.2013 11:31:56

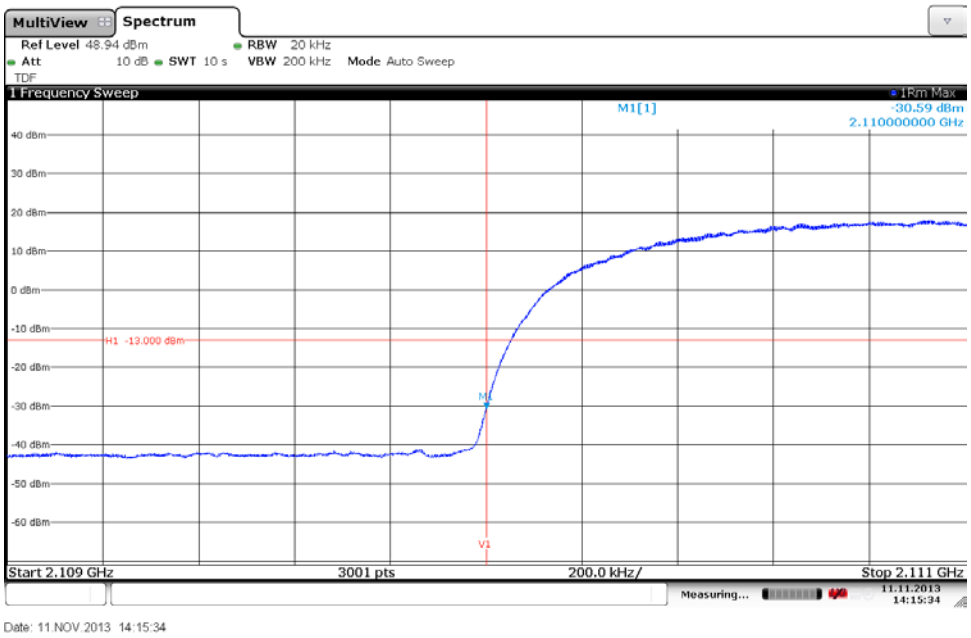
Appendix 4

Diagram 6 c:



Appendix 4

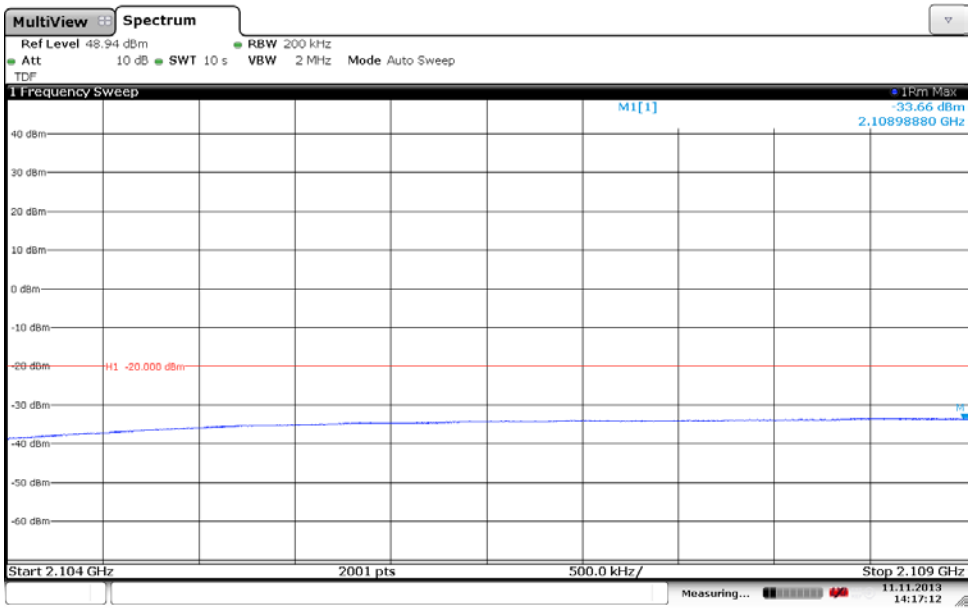
Diagram 7 a:




Date: 11.NOV.2013 14:15:34

Note: Limit above should be adjusted to -16.4 dBm instead of -13 dBm.

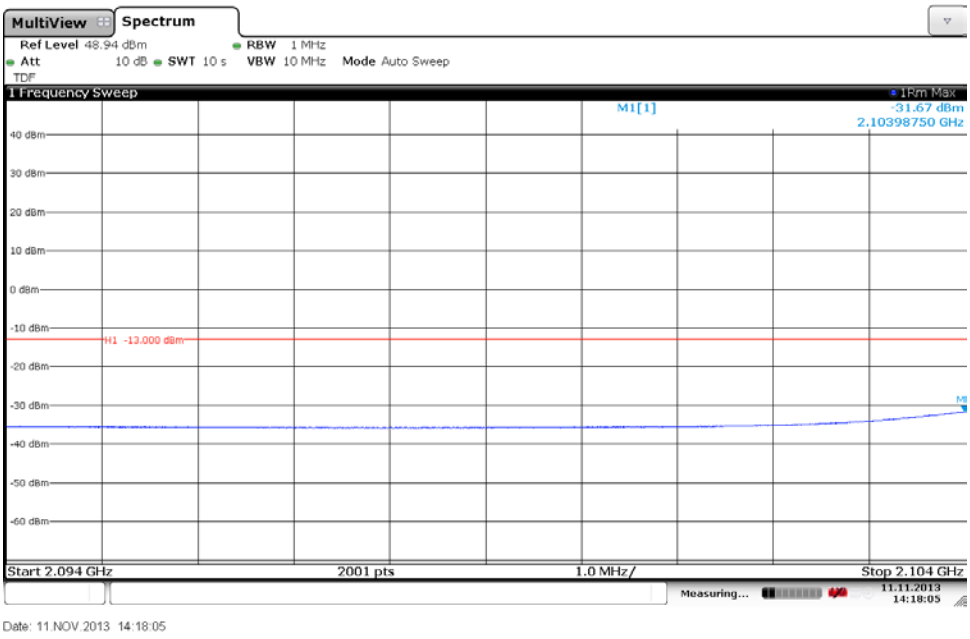
Diagram 7 b:




Date: 11.NOV.2013 14:17:12

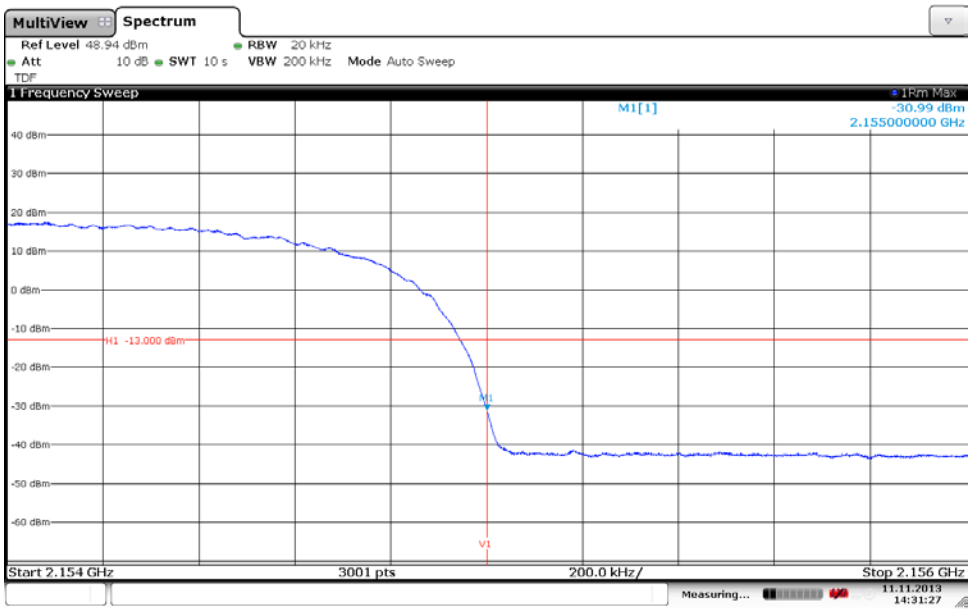
Appendix 4

Diagram 7 c



Appendix 4

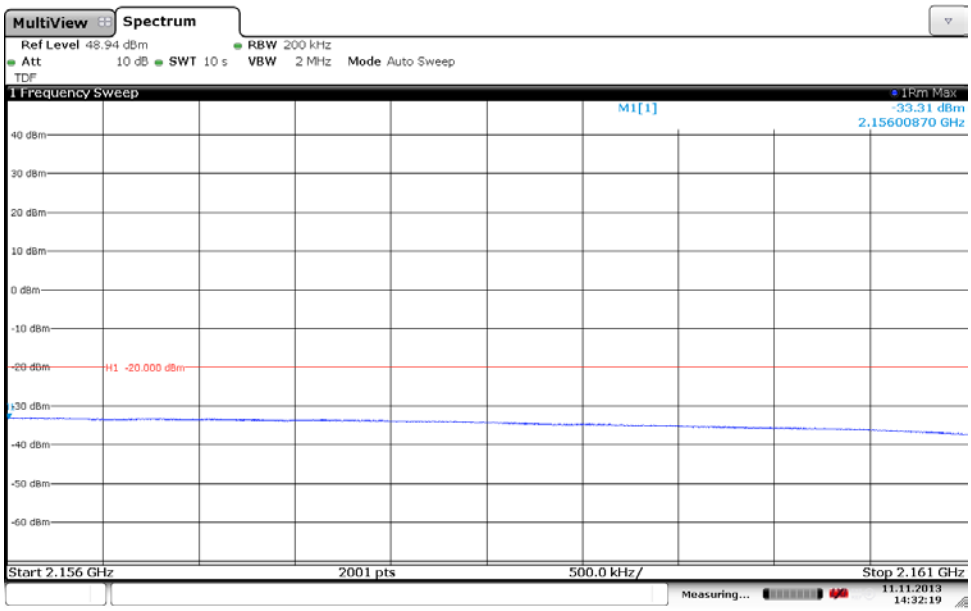
Diagram 8 a:




Date: 11.NOV.2013 14:31:27

Note: Limit above should be adjusted to -16.4 dBm instead of -13 dBm.

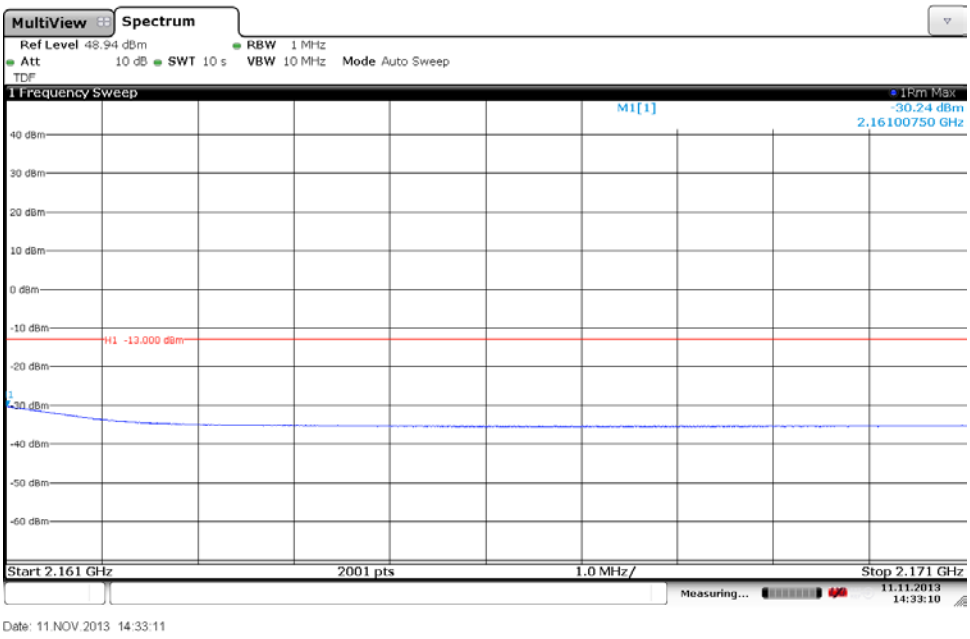
Diagram 8 b:




Date: 11.NOV.2013 14:32:18

Appendix 4

Diagram 8 c



Appendix 5

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

| Date | Temperature | Humidity |
|---|---|---|
| 2013-11-07 | 23 °C ± 3 °C | 31 % ± 5 % |
| 2013-11-08 | 23 °C ± 3 °C | 31 % ± 5 % |

### Test set-up and procedure

The measurements were made per definition in §27.53(h). 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), (iii) “measure and add 10 log($N_{ANT}$)” of FCC KDB662911 D01 Multiple Transmitter Output v01r02

| Measurement equipment | SP number |
|---|---|
| R&S FSW 43 | 902 073 |
| RF attenuator | 902 282 |
| High pass filter | 901 502 |
| 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 |
| 2 a+b+c+d | M | RF A |
| 3 a+b+c+d | M | RF B |
| 4 a+b+c+d | T | RF A |

MIMO mode, 2-carriers

| Diagram | Symbolic name | Tested Port |
|---|---|---|
| 5 a+b+c+d | B3 | RF A |
| 6 a+b+c+d | T3 | RF A |

MIMO mode, 4-carriers

| Diagram | Symbolic name | Tested Port |
|---|---|---|
| 7 a+b+c+d | B4 | RF A |

**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**

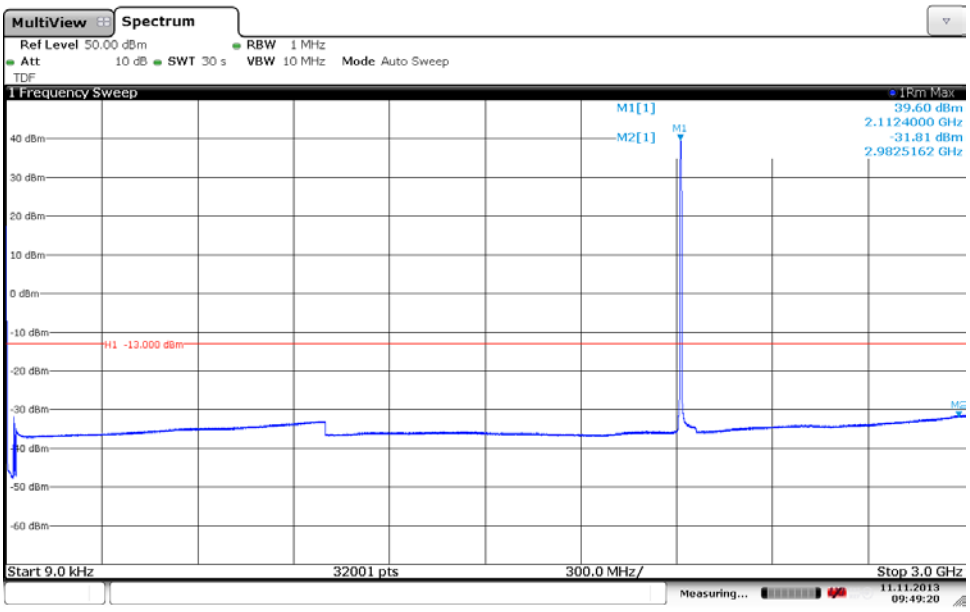
§27.53(h) and RSS-139 6.5

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 |

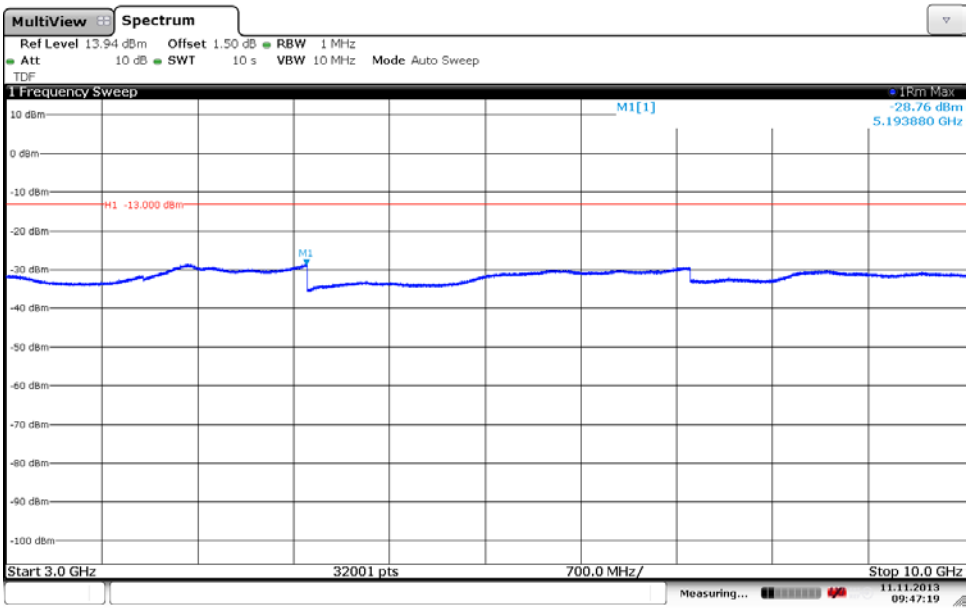
Appendix 5

Diagram 1 a:




Date: 11.NOV.2013 09:49:20

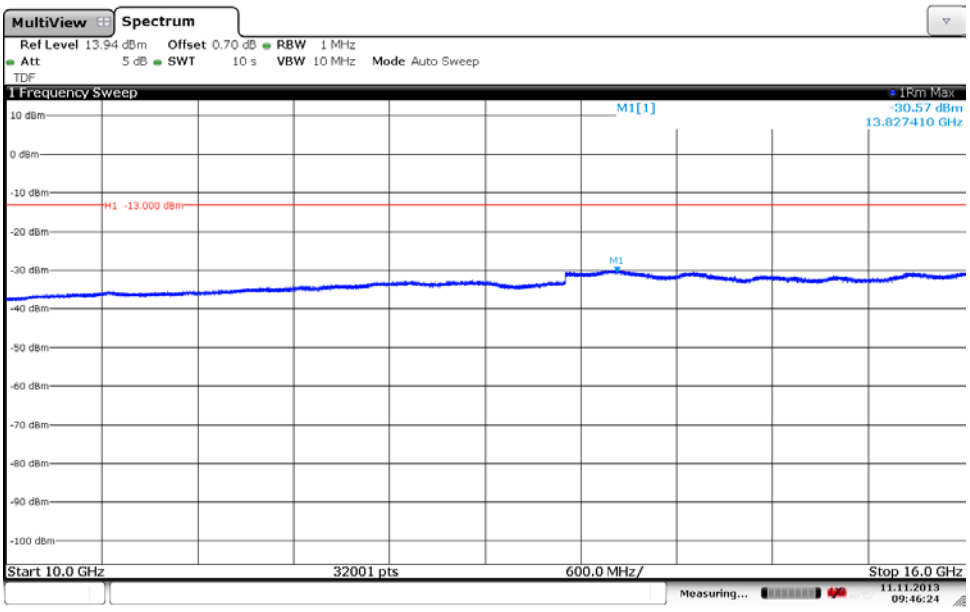
Diagram 1 b:




Date: 11.NOV.2013 09:47:19

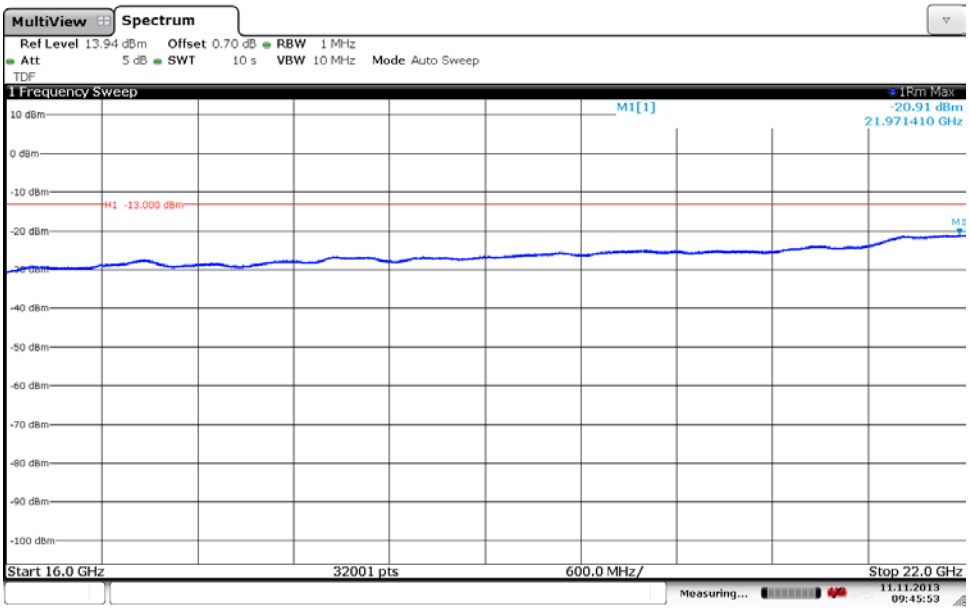
Appendix 5

Diagram 1 c:




Date: 11.NOV.2013 09:46:24

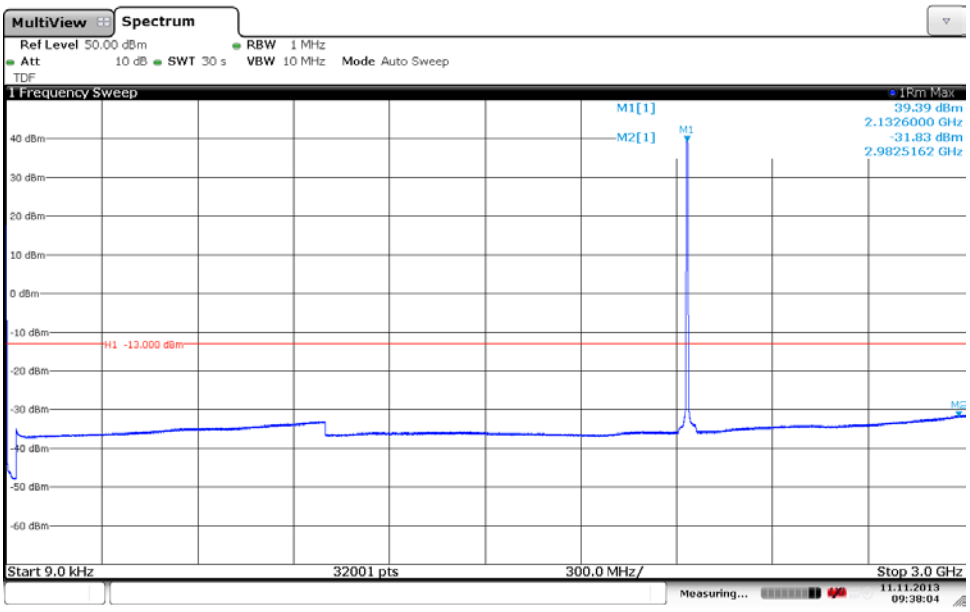
Diagram 1 d:




Date: 11.NOV.2013 09:45:53

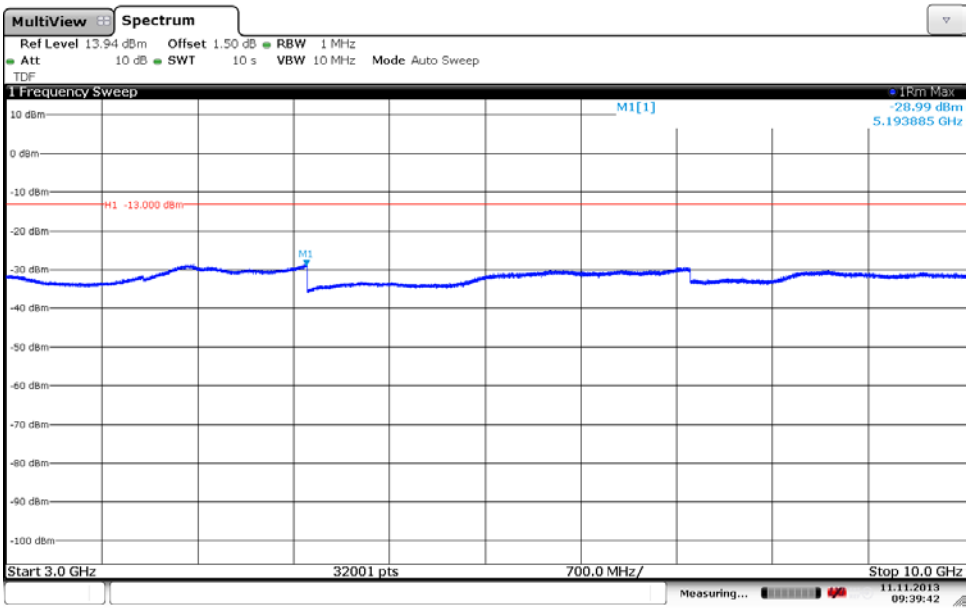
Appendix 5

Diagram 2 a:




Date: 11.NOV.2013 09:38:04

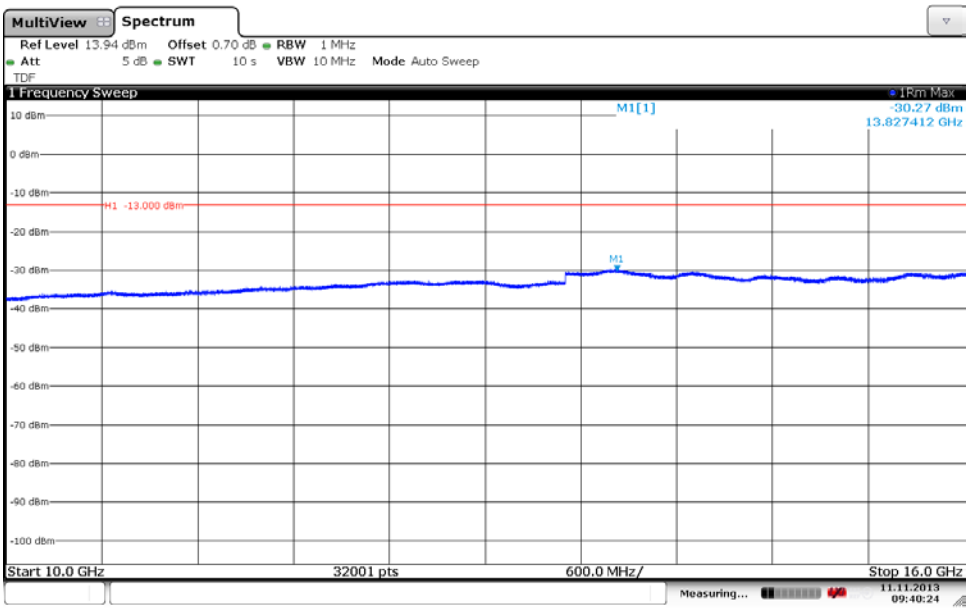
Diagram 2 b:




Date: 11.NOV.2013 09:39:42

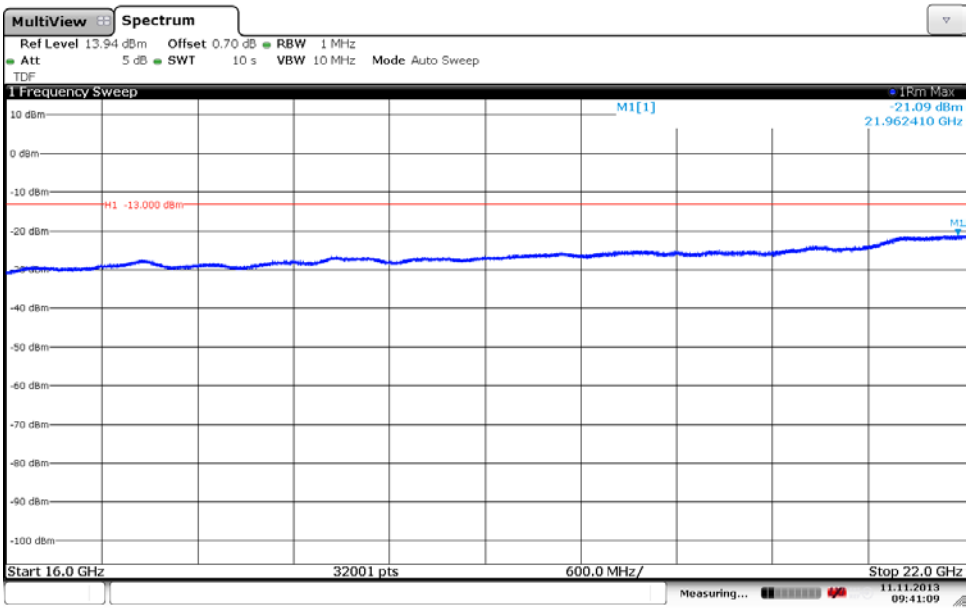
Appendix 5

Diagram 2 c:




Date: 11.NOV.2013 09:40:24

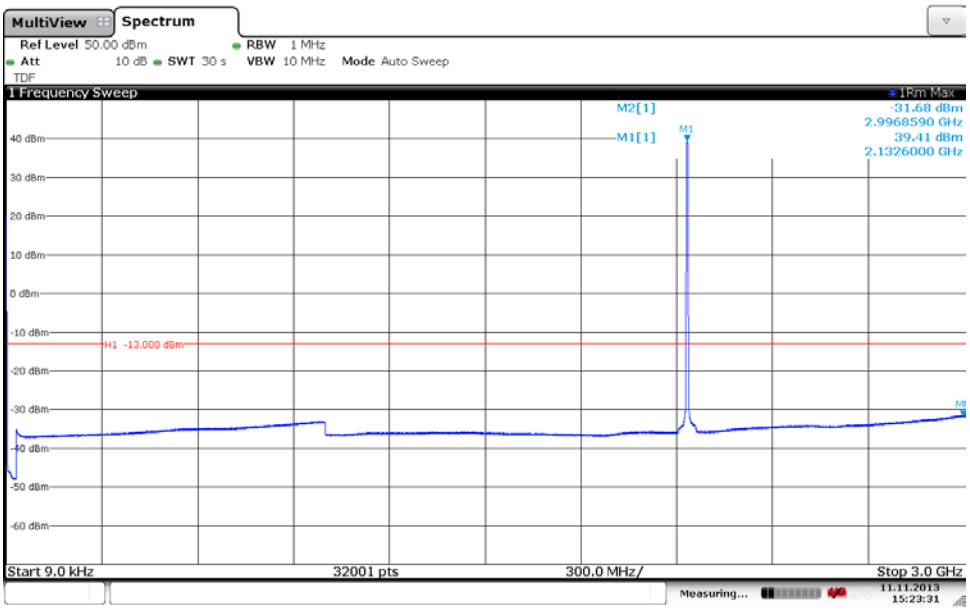
Diagram 2 d:




Date: 11.NOV.2013 09:41:09

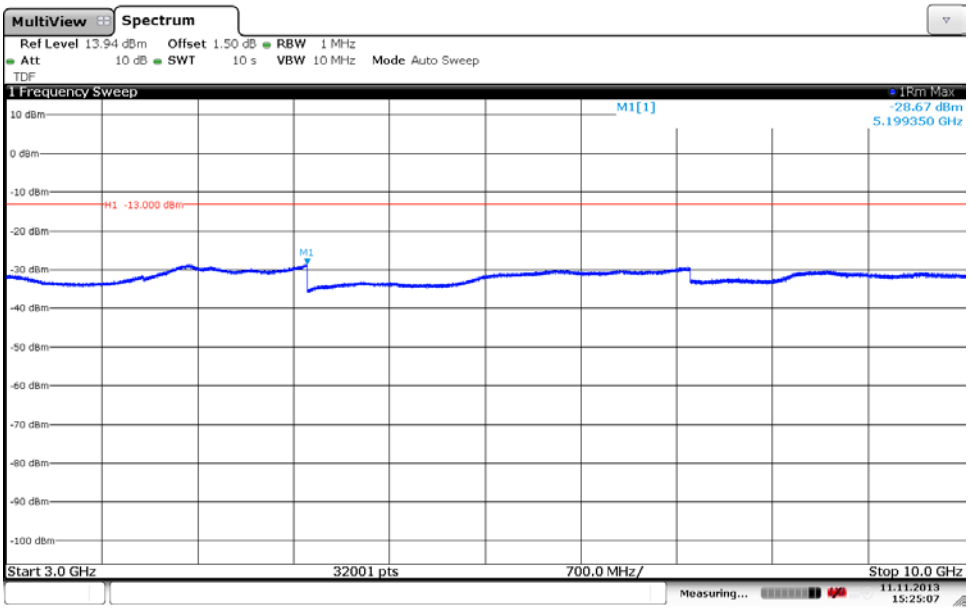
Appendix 5

Diagram 3 a:




Date: 11.NOV.2013 15:23:31

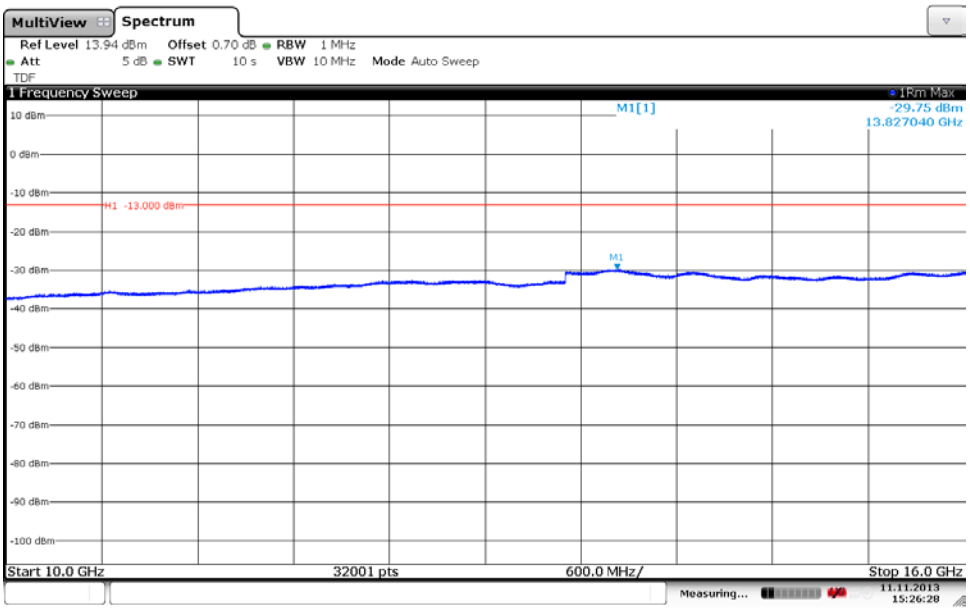
Diagram 3 b:




Date: 11.NOV.2013 15:25:07

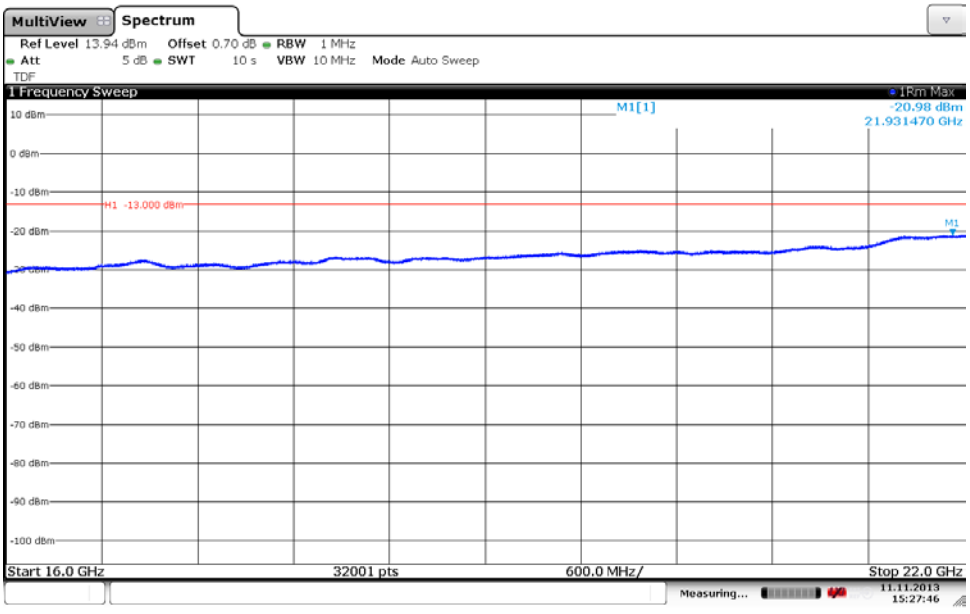
Appendix 5

Diagram 3 c:




Date: 11.NOV.2013 15:26:28

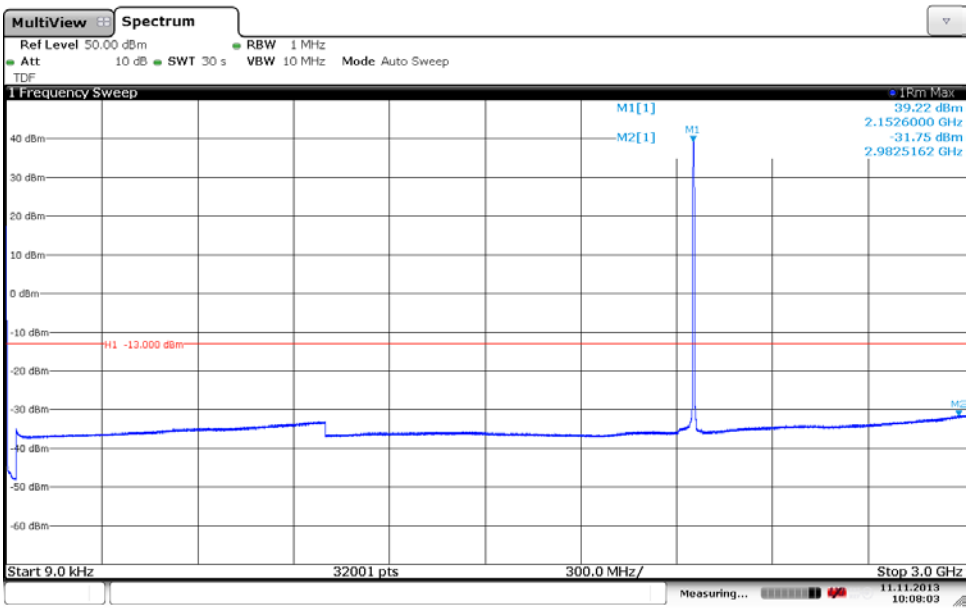
Diagram 3 d:




Date: 11.NOV.2013 15:27:45

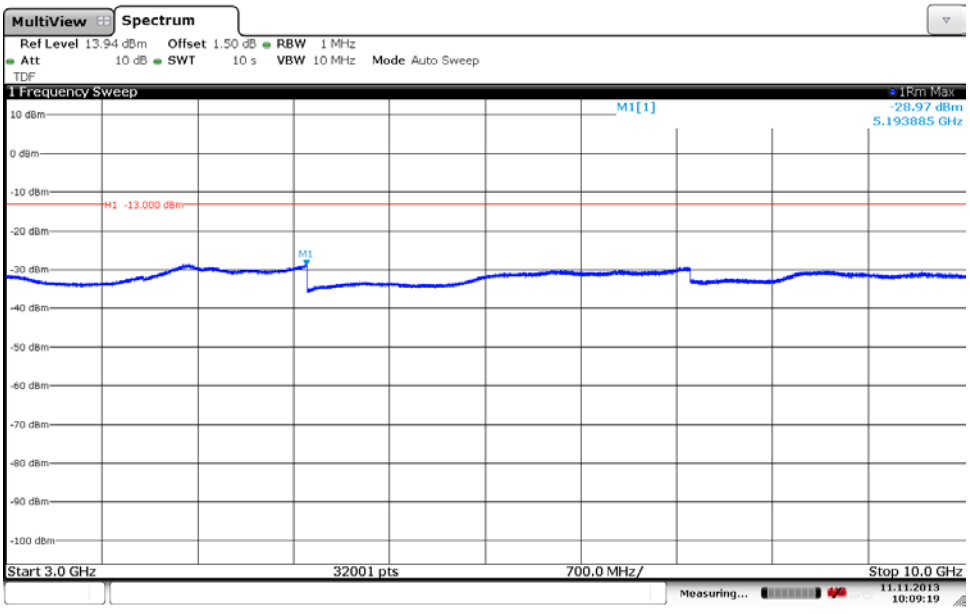
Appendix 5

Diagram 4 a:




Date: 11.NOV.2013 10:08:02

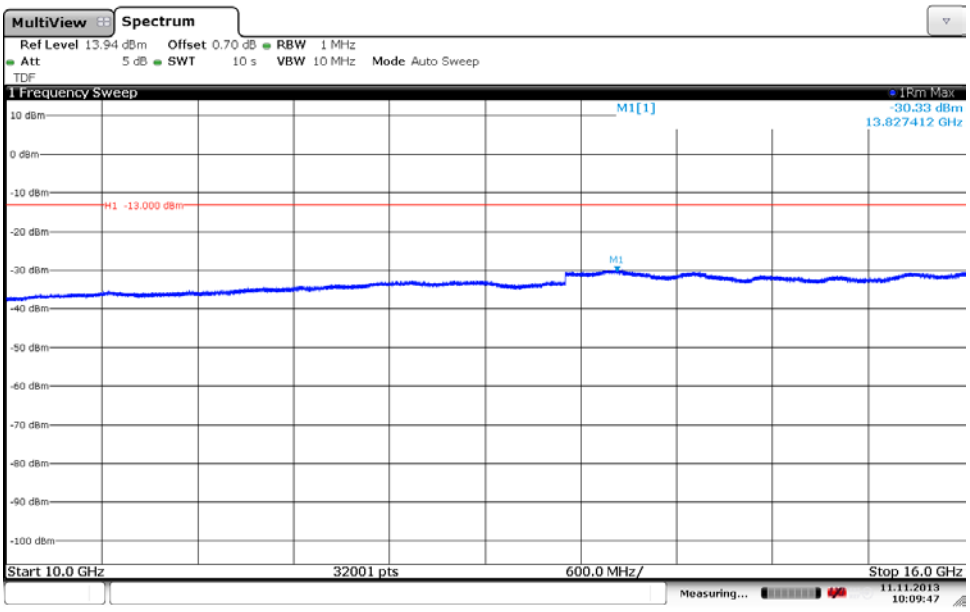
Diagram 4 b:




Date: 11.NOV.2013 10:09:19

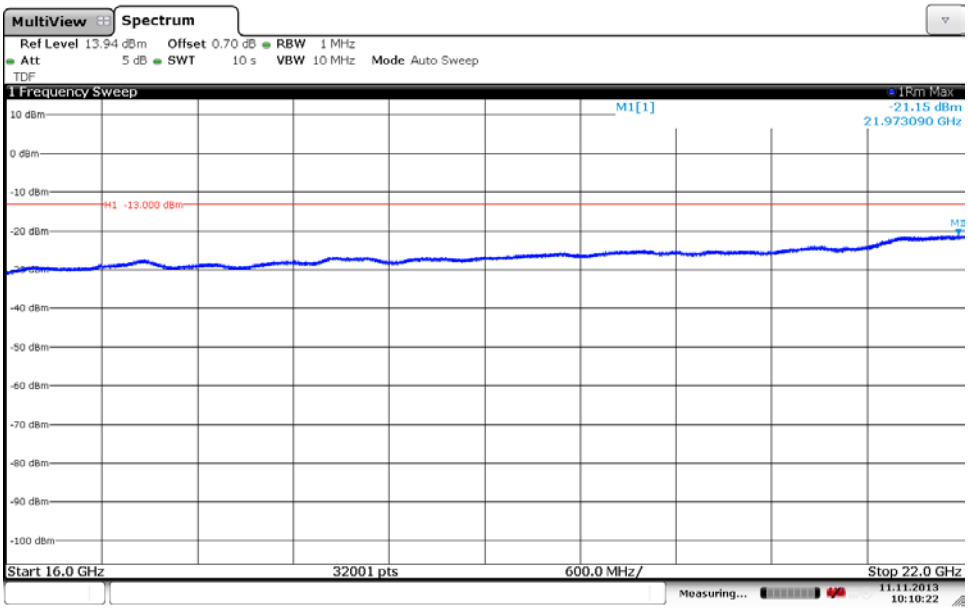
Appendix 5

Diagram 4 c:




Date: 11.NOV.2013 10:09:47

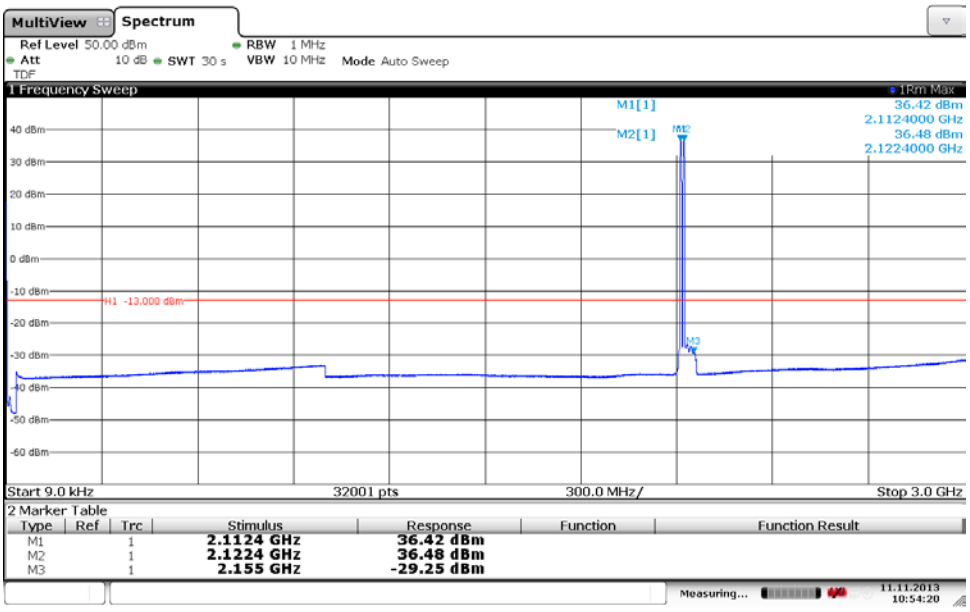
Diagram 4 d:




Date: 11.NOV.2013 10:10:22

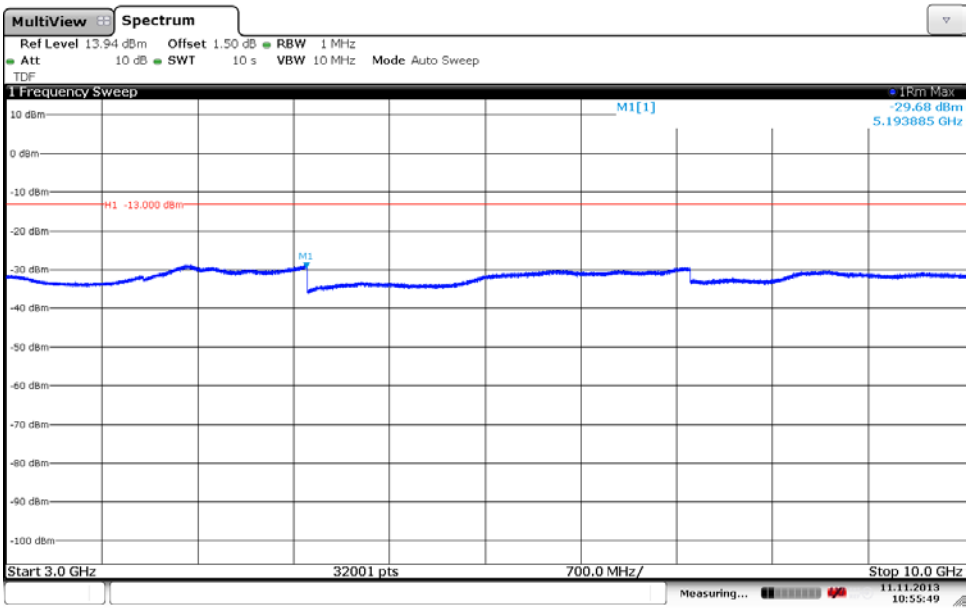
Appendix 5

Diagram 5 a:




Date: 11.NOV.2013 10:54:20

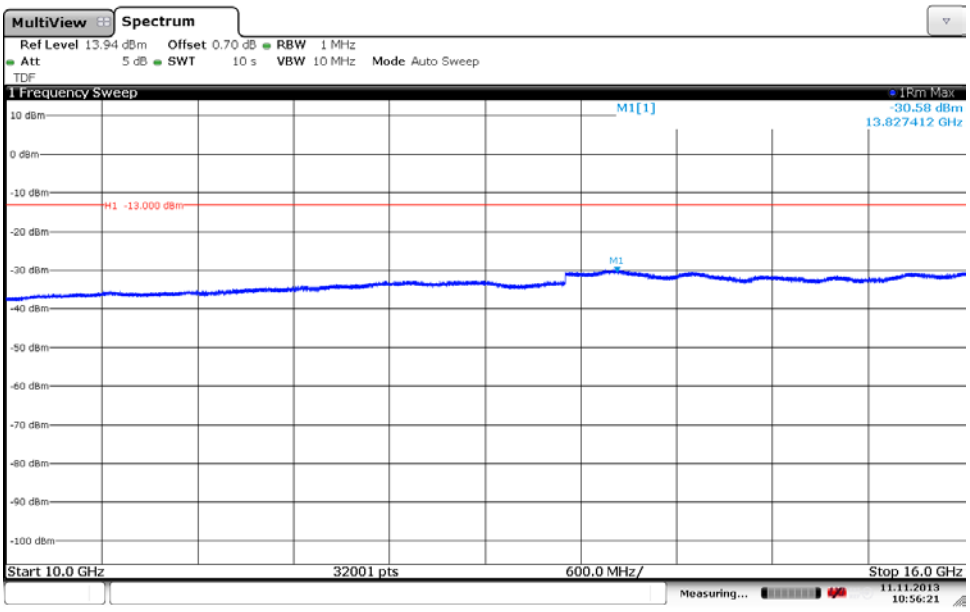
Diagram 5 b:




Date: 11.NOV.2013 10:55:49

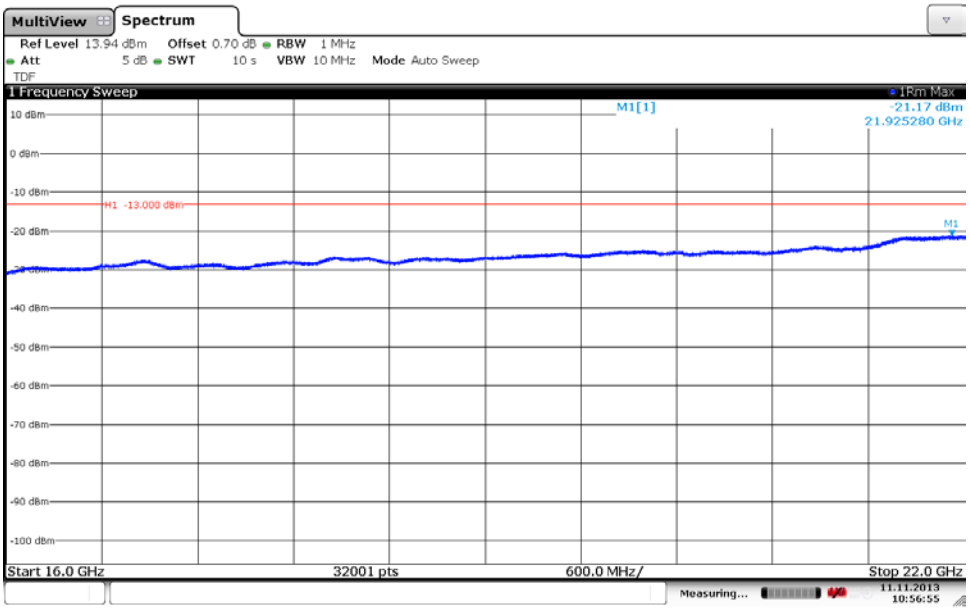
Appendix 5

Diagram 5 c:




Date: 11.NOV.2013 10:56:21

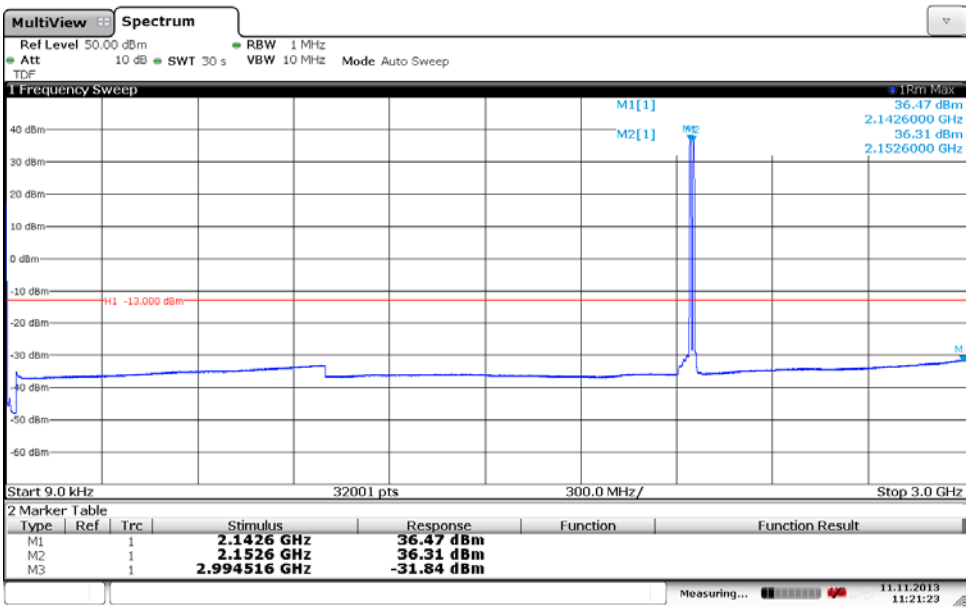
Diagram 5 d:




Date: 11.NOV.2013 10:56:55

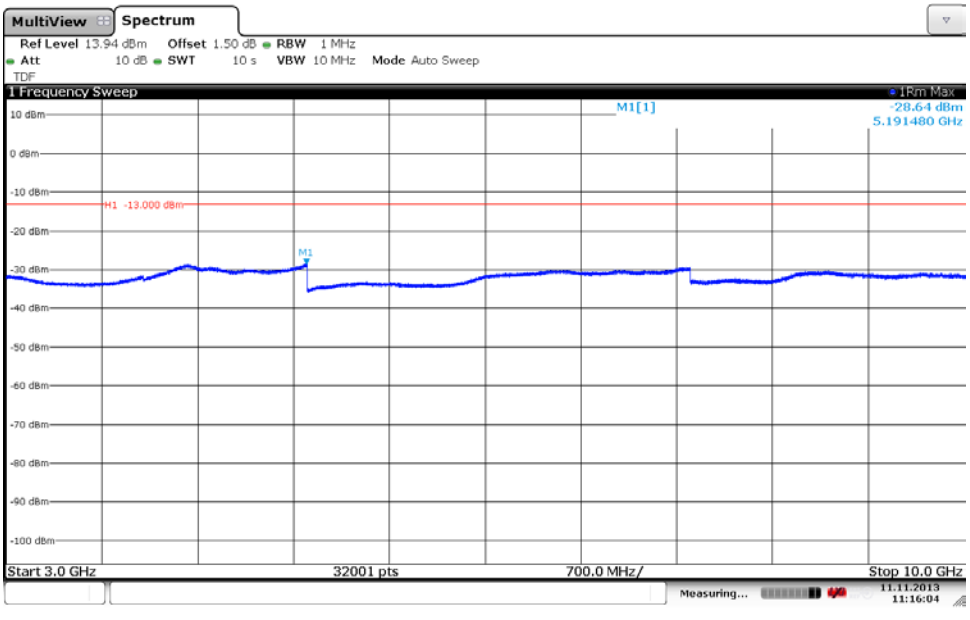
Appendix 5

Diagram 6 a:




Date: 11.NOV.2013 11:21:23

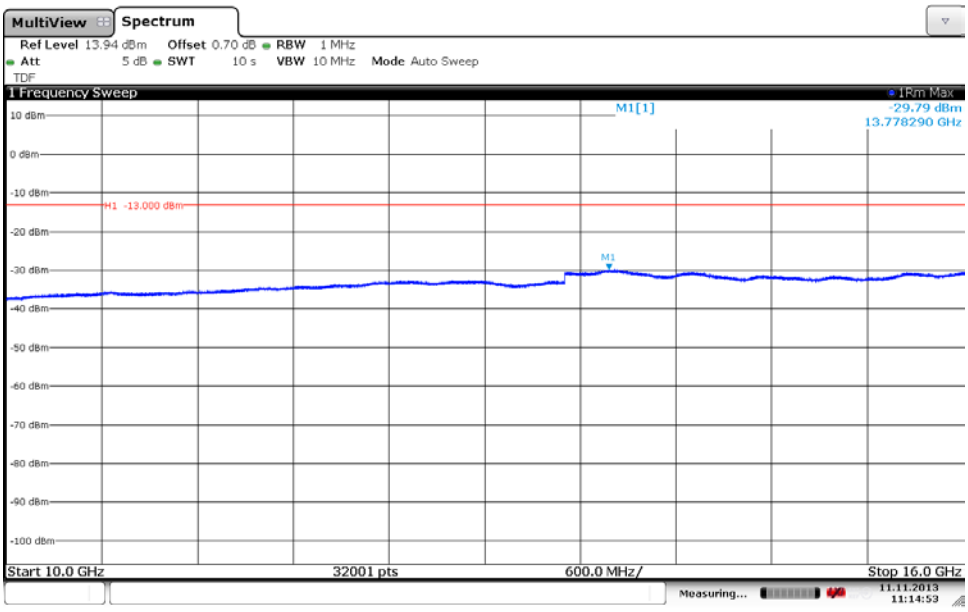
Diagram 6 b:




Date: 11.NOV.2013 11:16:04

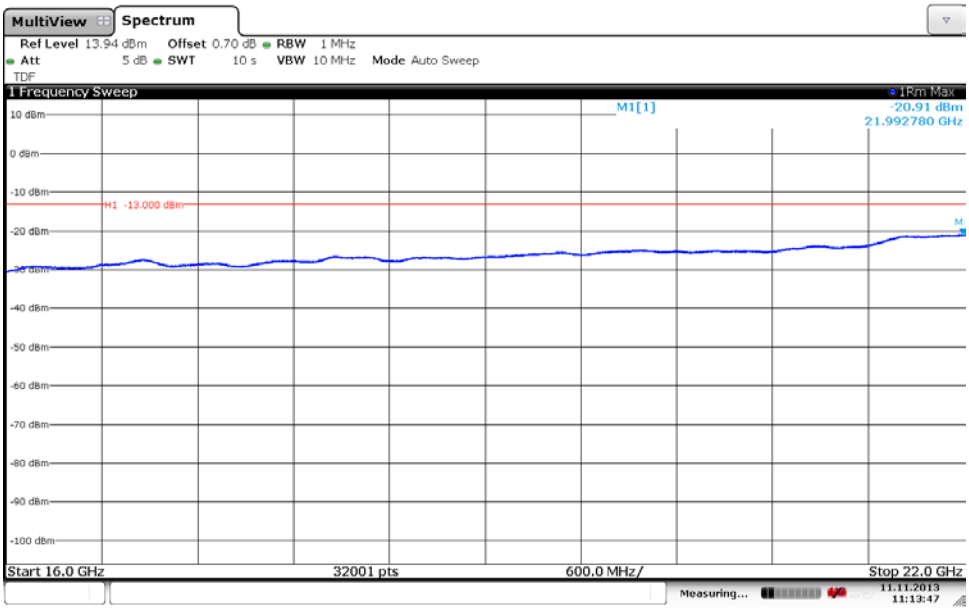
Appendix 5

Diagram 6 c:




Date: 11.NOV.2013 11:14:53

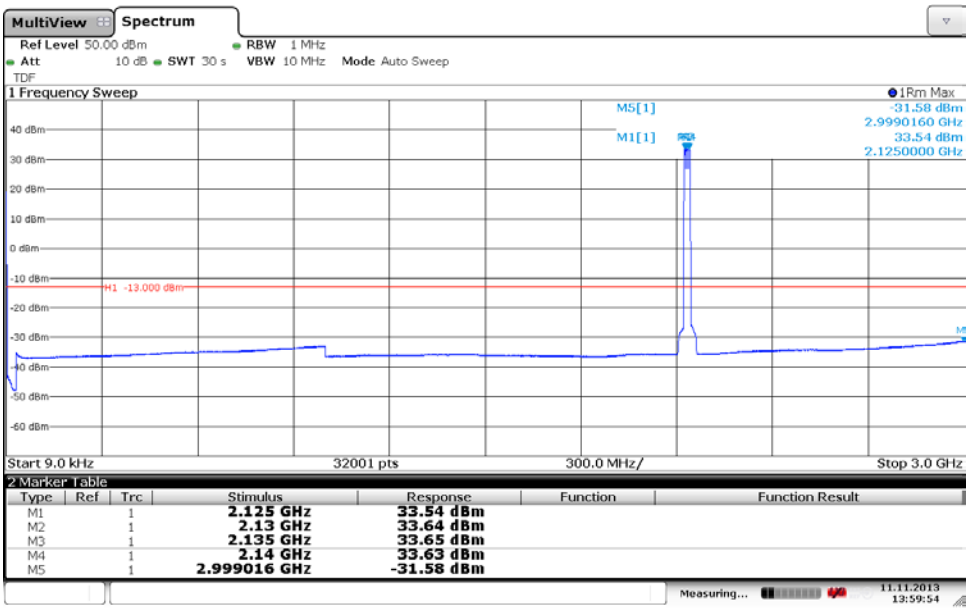
Diagram 6 d:




Date: 11.NOV.2013 11:13:48

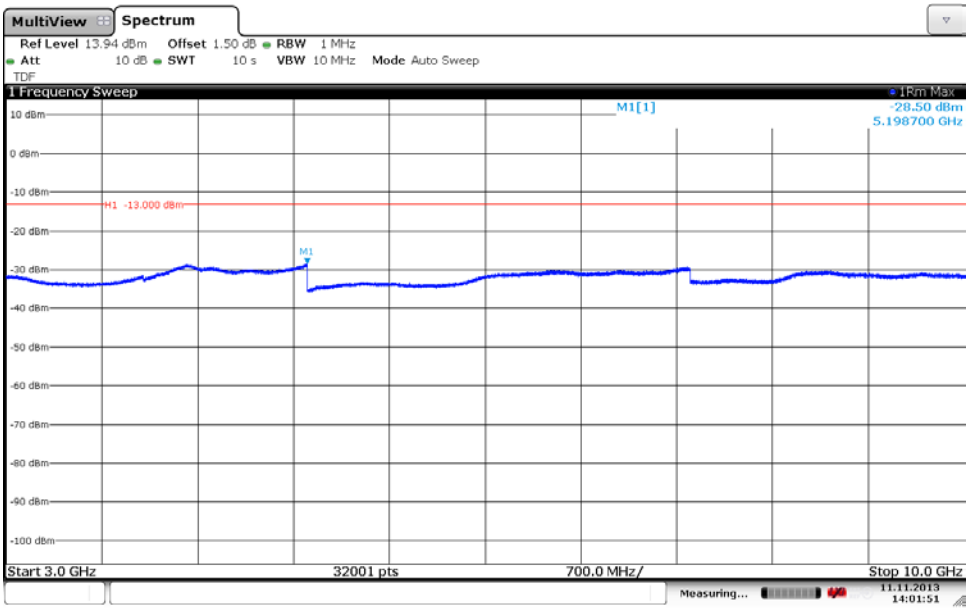
Appendix 5

Diagram 7 a:




Date: 11.NOV.2013 13:59:54

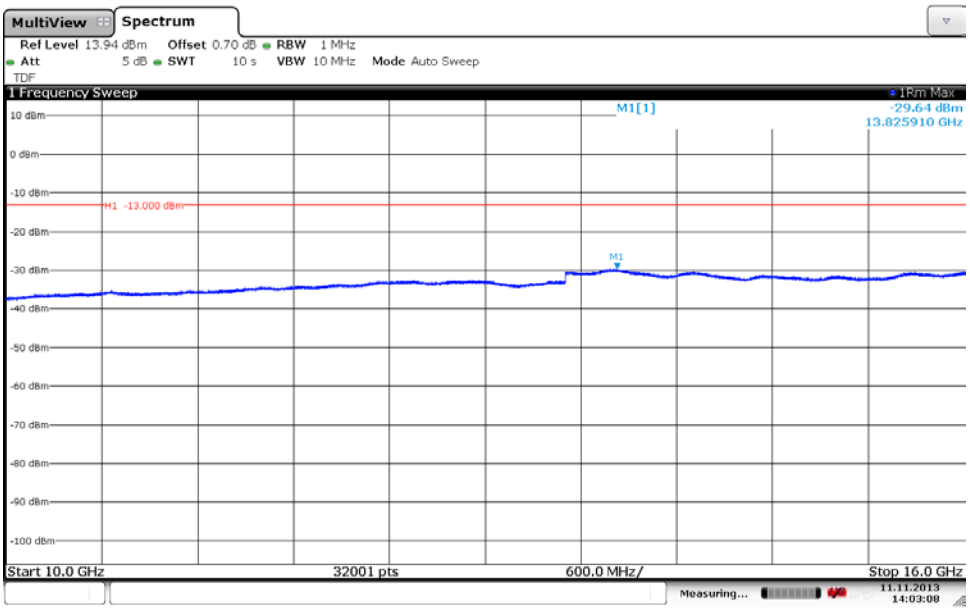
Diagram 7 b:




Date: 11.NOV.2013 14:01:52

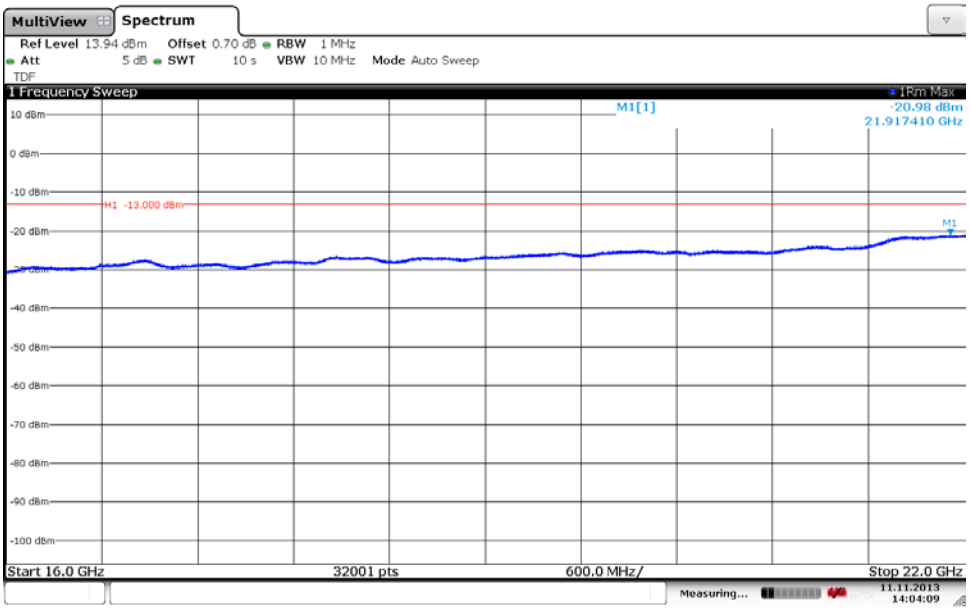
Appendix 5

Diagram 7 c:




Date: 11.NOV.2013 14:03:08

Diagram 7 d:




Date: 11.NOV.2013 14:04:09

Appendix 6

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

| Date | Temperature | Humidity |
|---|---|---|
| 2013-10-31 | 23°C ± 3°C | 38 % ± 5 % |
| 2013-11-01 | 22°C ± 3°C | 41 % ± 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-1.

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 $\gamma = 20\log\left(\frac{4\pi D}{\lambda}\right)$, $\gamma$ 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 | 503 881 |
| R&S ESU 26 | 901 553 |
| EMC 32 ver. 8.52.0 | 503 899 |
| Chase Bilog Antenna CBL 6111A | 502 182 |
| EMCO Horn Antenna 3115 | 502 175 |
| 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 | 901 545 |
| Temperature and humidity meter, Testo 625 | 504 188 |

**Tested configurations**

| Symbolic name |
|---|
| B |
| M |
| T |
| T3 |
| T4 |

**Results,** representing worst case

| Diagram | Symbolic name |
|---|---|
| 1 a-d | T |

| 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 |

Appendix 6

Diagram 1 a:

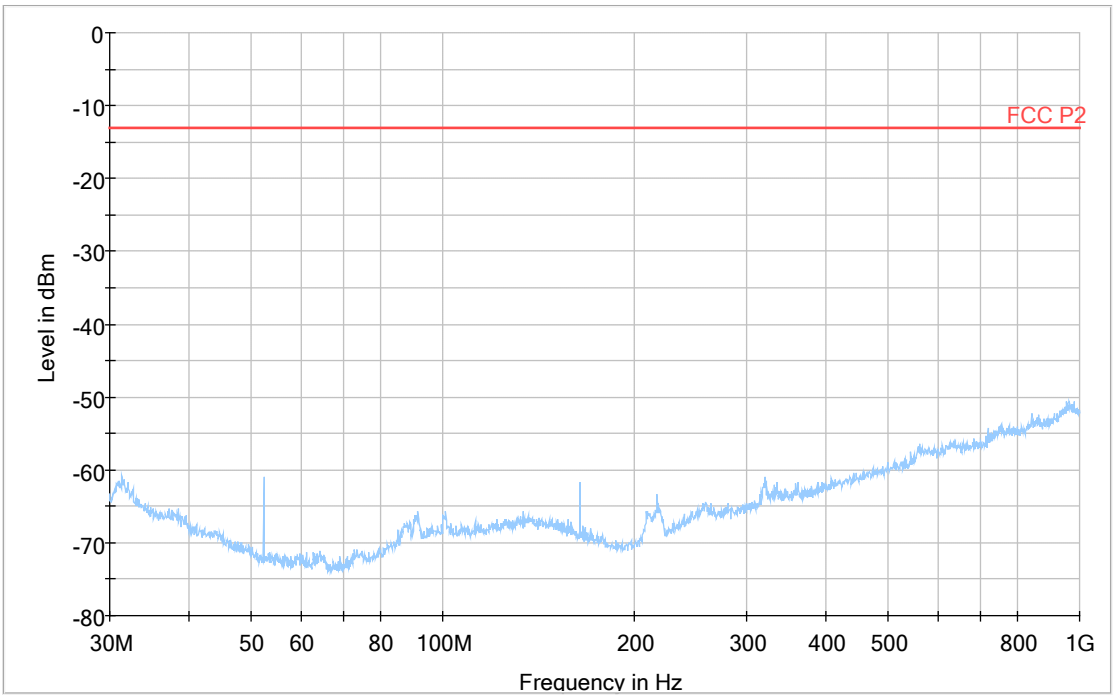
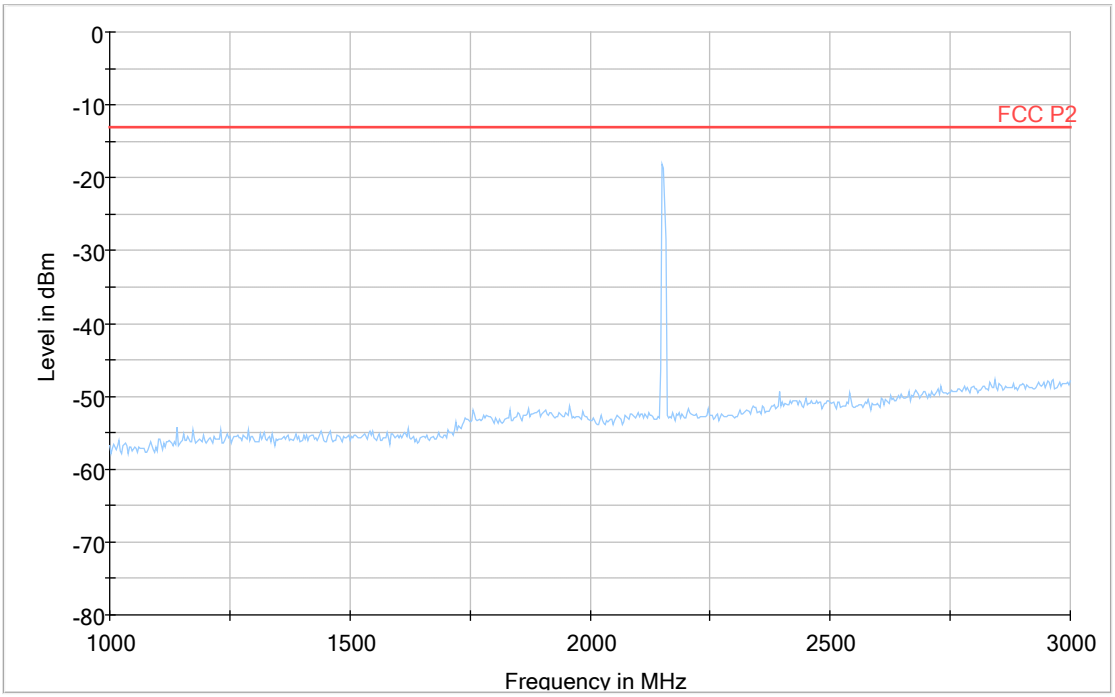



Diagram 1 b:




Note: The emission at 2152.6 MHz is the carrier frequency and shall be ignored in the context.

Appendix 6

Diagram 1 c:

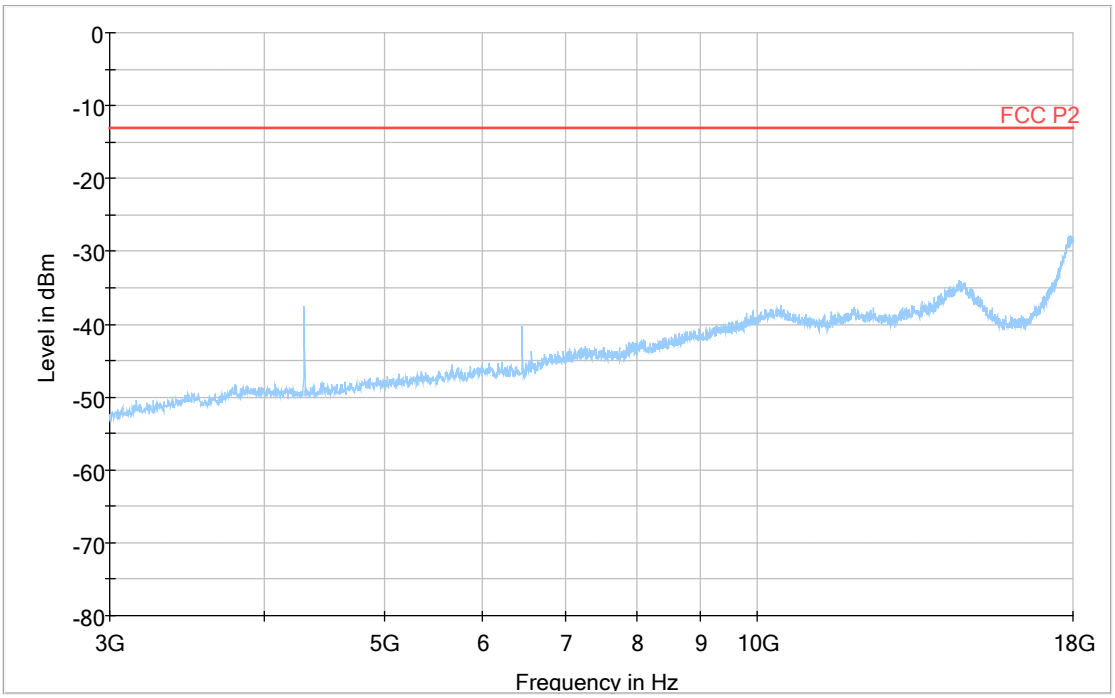
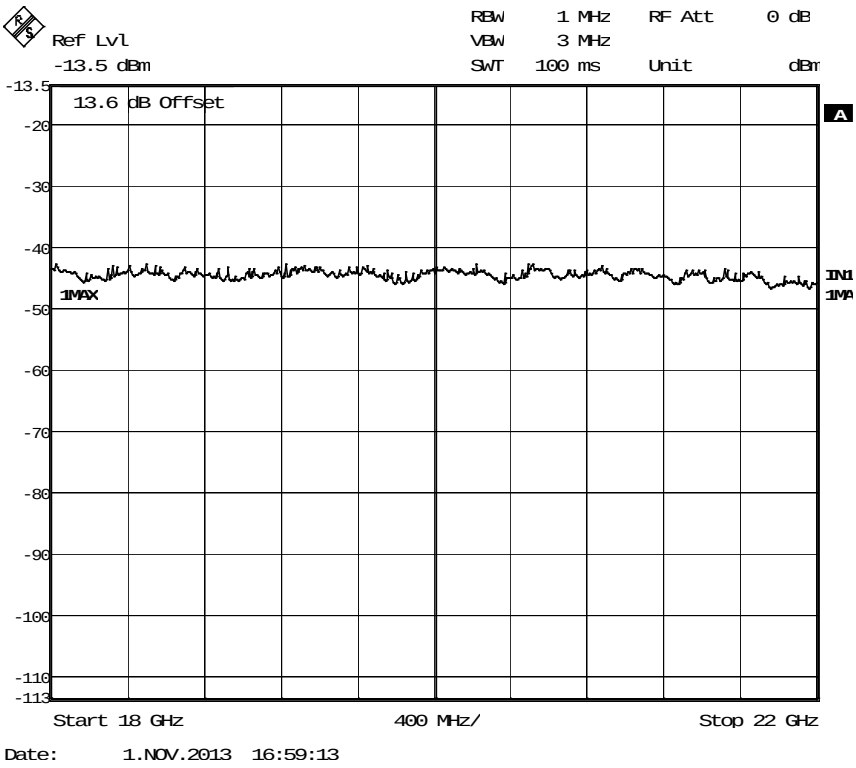



Diagram 1 d:



Appendix 7

## Frequency stability measurements according to CFR 47 §27.54 / IC RSS 139 6.3

| Date | Temperature (test equipment) | Humidity (test equipment) |
|---|---|---|
| 2013-10-24 to 2013-10-27 | 22-23 °C ± 3 °C | 35-41 % ± 5 % |

### Test set-up and procedure

The measurement was made per 3GPP TS 25.141. The output was connected to a spectrum analyzer. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements.

| Measurement equipment | SP number |
|---|---|
| Rohde & Schwarz signal analyzer FSQ40 | 504 143 |
| RF attenuator | 503 870 |
| Testo 635, Temperature and humidity meter | 504 203 |
| Temperature cabinet | 503 360 |

### Results

Maximum output power at mid channel (M). Rated output power level at connector RF A (maximum): 44.8 dBm (30 W).

| Test conditions | | Frequency error (Hz) |
|---|---|---|
| Supply voltage DC (V) | Temp (°C) | |
| -48.0 | +20 | +4 |
| -55.2 | +20 | +5 |
| -40.8 | +20 | +4 |
| -48.0 | +30 | +4 |
| -48.0 | +40 | +4 |
| -48.0 | +50 | -5 |
| -48.0 | +10 | -5 |
| -48.0 | 0 | -6 |
| -48.0 | -10 | -4 |
| -48.0 | -20 | -6 |
| -48.0 | -30 | -5 |
| Maximum freq. error (Hz) | | 6 |
| Measurement uncertainty | | $< \pm 1 \times 10^{-7}$ |

**Limits**

Limit according to 3GPP TS 25.141:

The frequency error shall be within ± 0.05 PPM ± 12 Hz (±118.630 Hz).

§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.

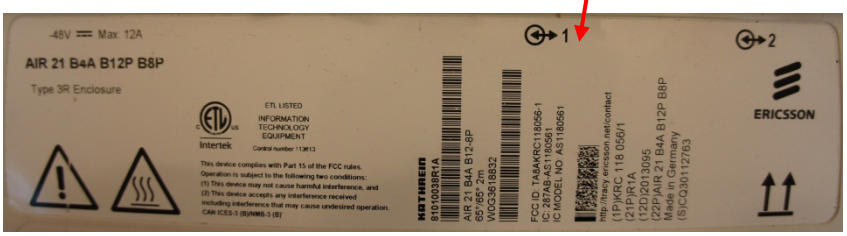
| | |
|---|---|
| Complies? | Yes |

Appendix 8

## External photos

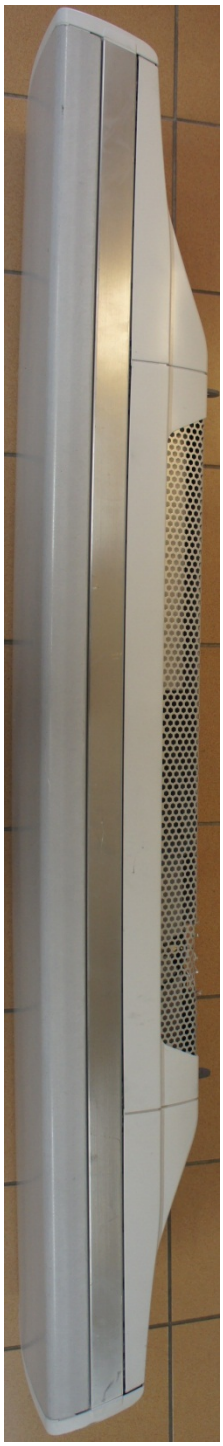
Front side

Rear side



Appendix 8

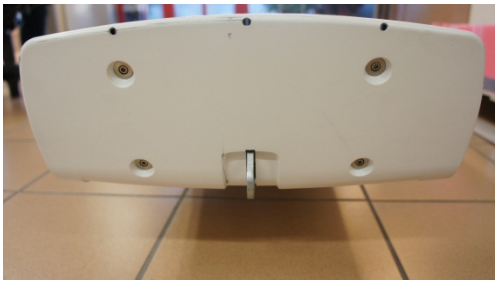
Left side



Right side

Appendix 8

Top side



Bottom side