

Date

2010-08-14

Reference

FX012084-F27

Page

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Handled by, department

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## Measurements on RUS 01 B4 1700/2100 MHz radio equipment with FCC ID: TA8BKRC11859-1 and IC: 287AB-BS118591 (9 appendices)

### Test object

RUS 01 B4, (1P)KRC 118 59/1 Rev. (21P)R3A

### Summary

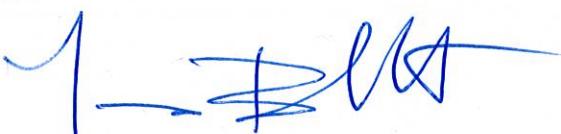
Appendix 1 describes the test object and set-ups during test.  
Appendix 9 presents photos of the test object.

| Standard                               |  | Compliant | Appendix | Remarks |
|--|--|-----------|----------|---------|
| <b>FCC CFR 47 / IC RSS-139 Issue 2</b> |  |           |          |         |
| 2.1046 / RSS-139 6.4                   | RF power output                        | Yes       | 2        | -       |
| 2.1049 / RSS-139 6.5                   | 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        | -       |
| <b>FCC CFR 47 / IC RSS-Gen Issue2</b>  |  |           |          |         |
| 15.111 / RSS-Gen 4.10                  | Receiver spurious emissions            | Yes       | 8        |         |

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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IC: 287AB-BS118591

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Appendix 1

**Description of test object**

Equipment: Radio equipment RUS 1700/2100 MHz running in WCDMA mode supporting single carrier and multi carrier.

Frequency bands: TX: 2110 – 2155 MHz  
RX: 1710 – 1755 MHz

Channel bandwidth: 4.2 to 5 MHz (configurable in steps of 100/200 kHz)

Channel spacing: 4.4 to 5MHz (configurable in steps of 100/200 kHz)

Modulations: QPSK, 16QAM and 64QAM

Maximum rated output power: Single carrier 1x 47.8 dBm (1x60 W)  
Multi carrier 2x44.8 dBm (2x30W)

Number of antenna ports: TX/RX: 1 RX: 1

Nominal power voltage: -48 VDC

**Tested channels**

| Channel | Downlink   |        | Uplink     |        |
|---------|------------|--------|------------|--------|
|         | Frequency* | UARFCN | Frequency* | UARFCN |
| B       | 2112.4     | 1537   | 1712.4     | 1312   |
| B+5     | 2117.4     | 1562   | 1717.4     | 1337   |
| B+10    | 2122.4     | 1587   | 1722.4     | 1362   |
| M       | 2132.6     | 1638   | 1732.6     | 1413   |
| T-10    | 2142.6     | 1688   | 1742.6     | 1463   |
| T-5     | 2147.6     | 1713   | 1747.6     | 1488   |
| T       | 2152.6     | 1738   | 1752.6     | 1513   |

\* Frequency in MHz

Note: UARFCN are derived according 3GPP TS 25.141.



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Appendix 1

## **Operation mode during measurements**

Measurements were performed with the test object transmitting the Test models which are defined in 3GPP TS 25.141. Test model 1 (TM1) uses the QPSK modulation only, Test model 5 (TM5) includes the 16QAM modulation and Test model 6 (TM6) includes the 64QAM modulation.

The settings below were found to be representative for all traffic scenarios when several settings with the different modulations and channel bandwidths were tested to find the worst case setting. These settings were used for all measurements if not otherwise noted.

Single carrier TM1: 64 DPCH:s at 30 ksps (SF=128)  
Multi carrier TM1: 32 DPCH:s at 30 ksps (SF=128) in each carrier  
Channel bandwidth 5 MHz

## **Conducted measurements**

The test object was powered with -48 VDC. All RF conducted measurements were performed with the test object configured for maximum transmit power. All TX measurements were done at the RF A connector and the RX measurements were done at the RF B connector.

## **Radiated measurements**

The test object was powered with -48 VDC. All radiated measurements were performed with the test object configured for maximum transmit power installed in a wooden rack without EMC shielding. This configuration represents worst case for radiated spurious emission measurements.

The RF output power port was via a RF attenuator connected to functional test equipment for supervision.

## **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.

## **References**

Measurements were done according to relevant parts of the following standards:  
ANSI 63.4-2003  
ANSI/TIA/EIA-603-B-2002  
3GPP TS 25.141  
RSS-Gen Issue 2  
RSS-139 Issue 2

## **Uncertainties**

Measurement and test instrument uncertainties are described in the quality assurance documentation "EL-QD 8.2". The uncertainties are calculated with a coverage factor k=2 (95% level of confidence).

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Appendix 1

### Measurement equipment

| Measurement equipment                    | Calibration Due | SP number |
|--|-----------------|-----------|
| Test site Tesla                          | 2010-10         | 503 881   |
| R&S FSIQ 40                              | 2010-07-30      | 503 738   |
| R&S FSQ 40                               | 2010-07-30      | 504 143   |
| High pass filter                         | 2011-03         | 504 200   |
| RF attenuator                            | 2011-07         | 504 159   |
| RF attenuator                            | 2011-07         | 900 229   |
| RF step attenuator                       | 2011-07         | 503 096   |
| Boonton RF Peak power meter/analyzer     | 2010-09         | 503 144   |
| Boonton Power sensor 56518-S/4           | 2012-02         | 503 146   |
| Chase Bilog antenna CBL 6111A            | 2011-11         | 502 181   |
| EMCO Horn Antenna 3115                   | 2011-01         | 502 175   |
| Standard gain antenna 20240-20           | -               | 503 674   |
| MITEQ Low Noise Amplifier                | 2010-08         | 503 285   |
| Climate chamber 2                        | 2010-11         | 501 031   |
| Rotronic temperature and humidity meter  | 2010-11         | 502 946   |
| Multimeter Fluke 87                      | 2011-03         | 502 190   |
| Testo 635 temperature and humidity meter | 2011-03         | 504 203   |
| Testo 625 temperature and humidity meter | 2011-04         | 504 117   |

### 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: 2010-07-01.

### Manufacturer's representative

Anders Johansson, Ericsson AB

### Test engineers

Jörgen Wassholm, Tomas Lennhager, and Jonas Bremholt

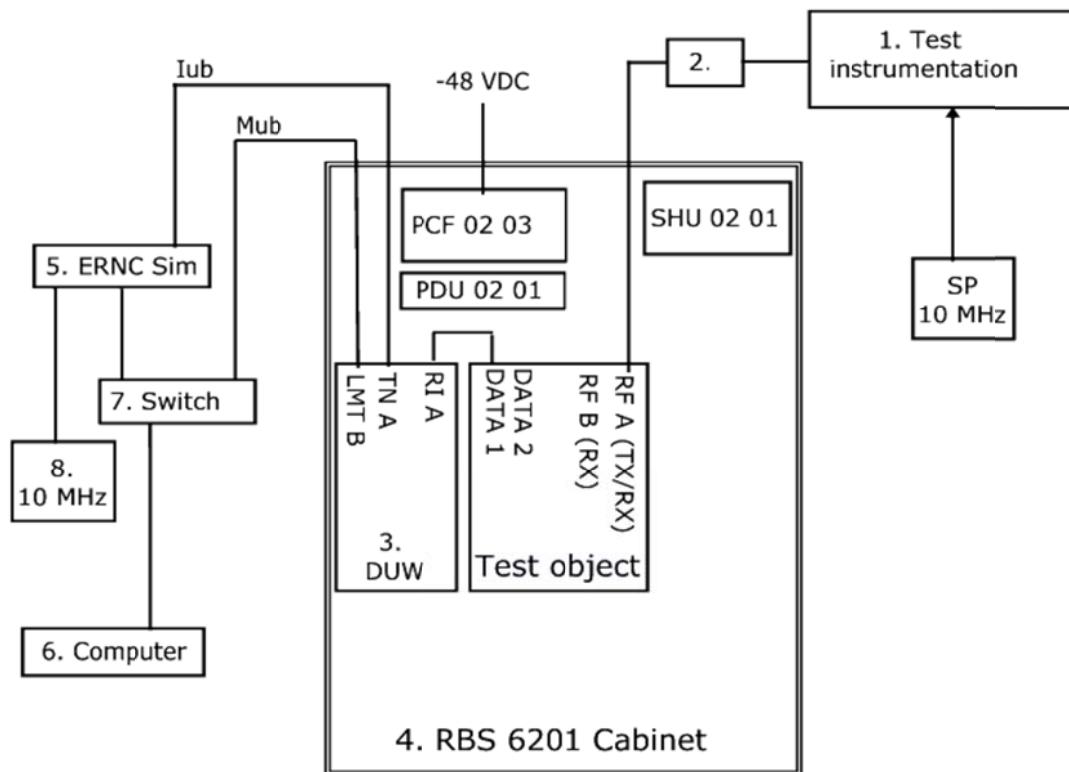
### Test participants

Reja Mohammed, Ericsson AB

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Appendix 1

### Test set-up conducted TX measurements at port RF A



#### Test object

RUS 01 B4, KRC 118 59/1 Rev. R3A, S/N (S)C823555257  
FCC ID: TA8BKRC11859-1 and IC: 287AB-BS118591  
with software Basic package CXP 901 6243 Rev. R7A01 and Upgrade package CXP 901 6114/1 Rev R7G01

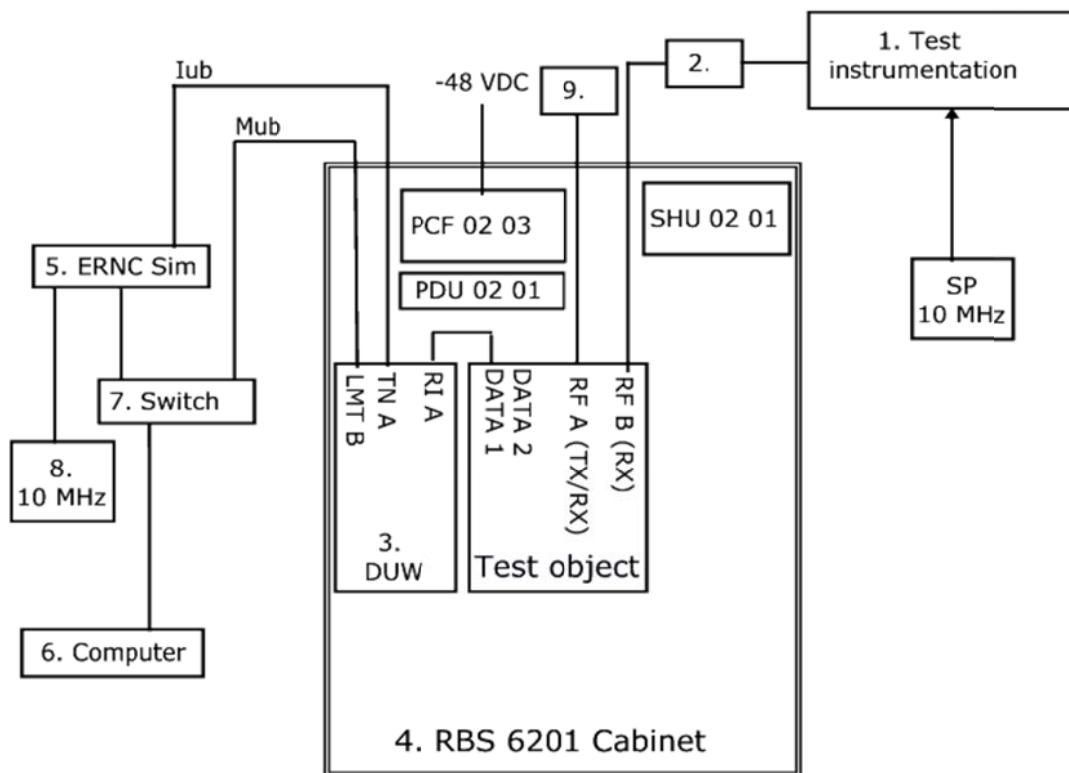
#### Functional test equipment

1. SP test instrument according equipment list
2. Attenuator SP 900 229
3. DUW KDU 127 161/3 Rev R2B S/N (S)C823486740
4. RBS 6201 cabinet
5. ERNC Sim 131
6. Computer, SunBlade 2500, BAMS-0000015231
7. Switch, Netgear FS726T
8. Symmetricom 8040 10 MHz reference, BAMS-1000714190

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Appendix 1

### Test set-up conducted RX measurements at port RF B



### Test object

RUS 01 B4, KRC 118 59/1 Rev. R3A, S/N (S)C823555257  
FCC ID: TA8BKRC11859-1 and IC: 287AB-BS118591  
with software Basic package CXP 901 6243 Rev. R7A01 and Upgrade package CXP 901 6114/1 Rev R7G01

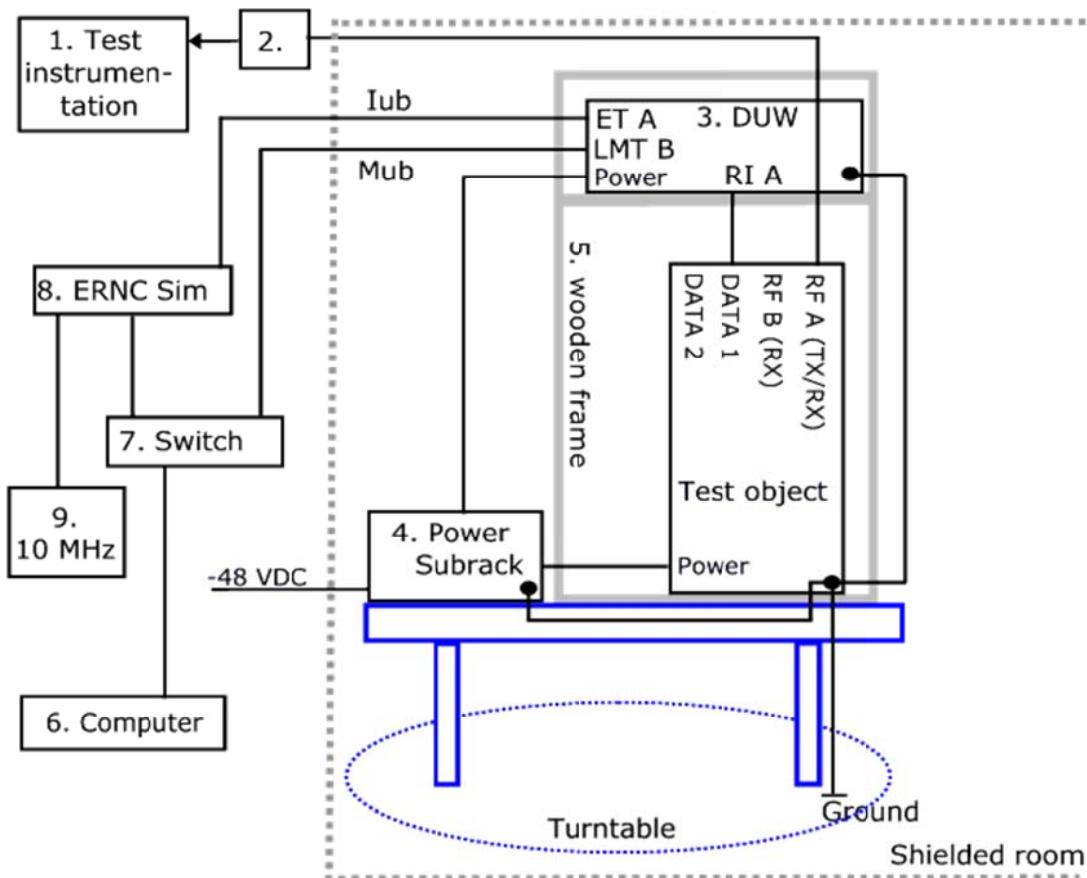
### Functional test equipment

1. SP test instrument according equipment list
2. RF Attenuator SP 503096 (10 dB)
3. DUW KDU 127 161/3 Rev R2B S/N (S)C823486740
4. RBS 6201 Cabinet
5. ERNC Sim 131
6. Computer, SunBlade 2500, BAMS-0000015231
7. Switch, Netgear FS726T
8. Symmetricom 8040 10 MHz reference, BAMS-1000714190
9. Attenuator SP900229& termination 50 ohm

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Appendix 1

### Test set-up, radiated measurements



### Test object

RUS 01 B4, KRC 118 59/1 Rev. R3A, S/N (S)C823555247  
FCC ID: TA8AKRC11859-1 and IC: 287AB-AS118591  
with software Basic package CXP 901 6243 Rev. R7A01 and Upgrade package CXP 901 6114/1 Rev R7G01

### Functional test equipment

1. CMU 300, BAMS 1000306761 (for supervision only)
2. Attenuator
3. DUW 30 01, KDU 127 161/3 Rev. R2B, S/N (S)C823474489
4. Power Subrack, SXK 109 8115/1, Rev. R2A  
individual components see section 'Components of Power Subrack' below
5. Wooden frame
6. Computer, Sun Blade 2500 BAMS-0000015235
7. Switch, Netgear FS726T
8. ERNC Sim 130
9. Symmetricom 8040 10 MHz Reference BAMS-1000714189



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Appendix 1

## Test object ports

| Interface:   | Type of port: |
|--|---------------|
| Ground connection  | Ground        |
| Supply power -48 VDC   | DC Power      |
| Antenna port 1 "RF A", 7/16 connector, female, combined TX/RX                          | Antenna       |
| Antenna port 2 "RF B", 7/16 connector, female, RX only                                 | Antenna       |
| "DATA 1", data connection to AE for O&M  | Signal        |
| "DATA 2", unconnected  | Signal        |
| RXA I/O: RXA cross connector output 17 dB / external input.<br>Connector QMA. Not used | Signal        |
| RXB I/O: RXB cross connector input / co-site output 18 dB.<br>Connector QMA. Not used  | Signal        |
| RXA OUT: RXA co-site output 18dB. Connector QMA. Not used                              | Signal        |

## Components of Power Subrack

| Position | Product name         | Product number        | R-state    | Serial number | Comment |
|----------|----------------------|-----------------------|------------|---------------|---------|
|          | <b>Power Subrack</b> | <b>SXK 109 8115/1</b> | <b>R2A</b> | -             |         |
| 1        | PDU 01 01            | BMG 980 336/2         | R4F        | (s)BJ31532384 |         |
| 2        | PDU 01 01            | BMG 980 336/2         | R4F        | (s)BJ31532382 |         |
| 3        | SHU 01 01            | BMG 980 336/2         | R3C        | (s)BJ31446269 |         |
| 4        | DUMMY                | SXK 109 8257/1        | R1F        | -             |         |
| 5        | DUMMY                | SXK 109 8257/1        | R1F        | -             |         |
| 6        | DUMMY                | SXK 109 8257/1        | R1F        | -             |         |
| 7        | DUMMY                | SXK 109 8257/1        | R1F        | -             |         |
| 8        | DUMMY                | SXK 109 8257/1        | R1F        | -             |         |
| 9        | PCF 02 01            | KFE 101 1157/1        | R1C        | (s)BW95301450 |         |

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Appendix 2

**RF power output measurements according to 47 CFR 2.1046 / IC RSS-139 6.4**

| Date       | Temperature  | Humidity   |
|------------|--------------|------------|
| 2010-07-06 | 24 °C ± 3 °C | 36 % ± 5 % |
| 2010-07-07 | 24 °C ± 3 °C | 42 % ± 5 % |

**Test set-up and procedure**

The test object was connected to a power analyzer measuring peak and RMS output power.

| Measurement equipment                     | SP number |
|---|-----------|
| Boonton RF Peak power meter/analyizer     | 503 144   |
| Boonton Power sensor 56518-S/4            | 503 146   |
| RF attenuator                             | 900 229   |
| Testo 635, Temperature and humidity meter | 504 203   |

**Measurement uncertainty:** 0.7 dB

**Results**

Single carrier: Output power level at RF A connector (maximum):

| Transmitter power (dBm/ dB)<br>RMS/ PAR |           |           |
|---|-----------|-----------|
| B                                       | M         | T         |
| 47.5/ 6.6                               | 47.5/ 6.5 | 47.5/ 6.6 |

Multi carrier: Output power level at RF A connector (maximum):

| Transmitter combined power (dBm/ dB)<br>RMS/ PAR |              |              |
|--|--------------|--------------|
| B and (B+10)                                     | M and (T-10) | T and (T-10) |
| 47.5/ 6.1  | 47.4/ 6.1    | 47.4/ 6.1    |



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Appendix 2

**Limit**

From amendment to CFR 47, part 27.50 Power and antenna height limits:  
The power of each fixed or base station transmitting in the 2110–2155 MHz band and located in any county with population density of 100 or fewer persons per square mile, is limited to an EIRP of 3280 watts/MHz. The power of each fixed or base station transmitting in the 2110–2155 MHz band and situated in any other geographic location is limited to an EIRP of 1640 watts/MHz. In measuring transmissions using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

From IC RSS-139, section 6.4:

The transmitter output power shall be within  $\pm 1$  dB of the manufacturer's rated power.  
In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio of the power shall not exceed 13 dB.

From IC SRSP-513, Issue 2, section 5.1.1 2110-2155 MHz sub-band:

For fixed or base stations operating in this sub-band with a channel bandwidth greater than 1 MHz, the maximum e.i.r.p. is limited to 3280 watts/MHz e.i.r.p. (i.e., no more than 3280 watts e.i.r.p. in any 1 MHz band segment) with an antenna height above average terrain (HAAT) up to 300 metres. Fixed or base stations operating in urban areas are limited to a maximum allowable e.i.r.p. of 1640 watts/MHz.

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

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Appendix 3

### Occupied bandwidth measurements according to 47 CFR 2.1049 / IC RSS-139 6.5

| Date       | Temperature  | Humidity   |
|------------|--------------|------------|
| 2010-07-06 | 24 °C ± 3 °C | 36 % ± 5 % |
| 2010-07-07 | 24 °C ± 3 °C | 42 % ± 5 % |

#### Test set-up and procedure

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

All measurements were performed at maximum RF output power and were iterated over the supported channel bandwidth configurations, payload modulations and carrier configurations as documented in the results below.

| Measurement equipment                     | SP number |
|---|-----------|
| Rohde & Schwarz signal analyzer FSQ40     | 504 143   |
| RF attenuator                             | 900 229   |
| Testo 635, Temperature and humidity meter | 504 203   |

Measurement uncertainty: 3.7 dB

#### Results

The results are shown in appendix 3.1

##### Channel Bandwidth 5.0 MHz

|           | Channel | OBW      |
|-----------|---------|----------|
| Diagram 1 | B       | 4.18 MHz |
| Diagram 2 | M       | 4.18 MHz |
| Diagram 3 | T       | 4.18 MHz |

##### Channel Bandwidth 4.2 MHz

|           | Channel | OBW      |
|-----------|---------|----------|
| Diagram 4 | B       | 3.85 MHz |
| Diagram 5 | M       | 3.85 MHz |
| Diagram 6 | T       | 3.85 MHz |

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## Appendix 3.1

Diagram 1:

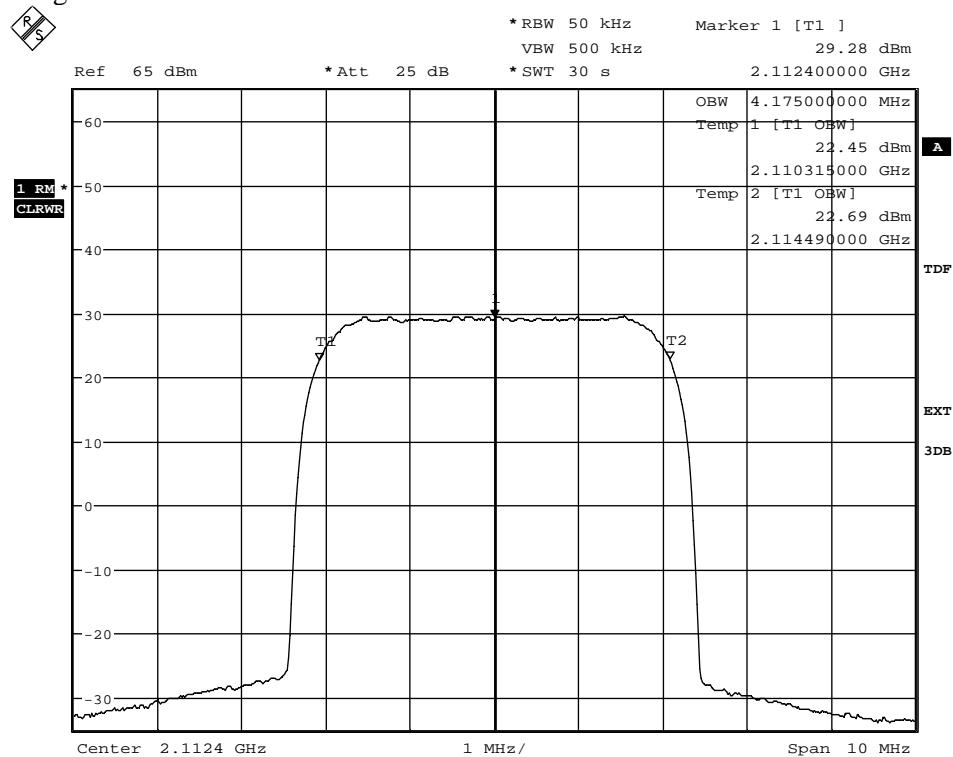
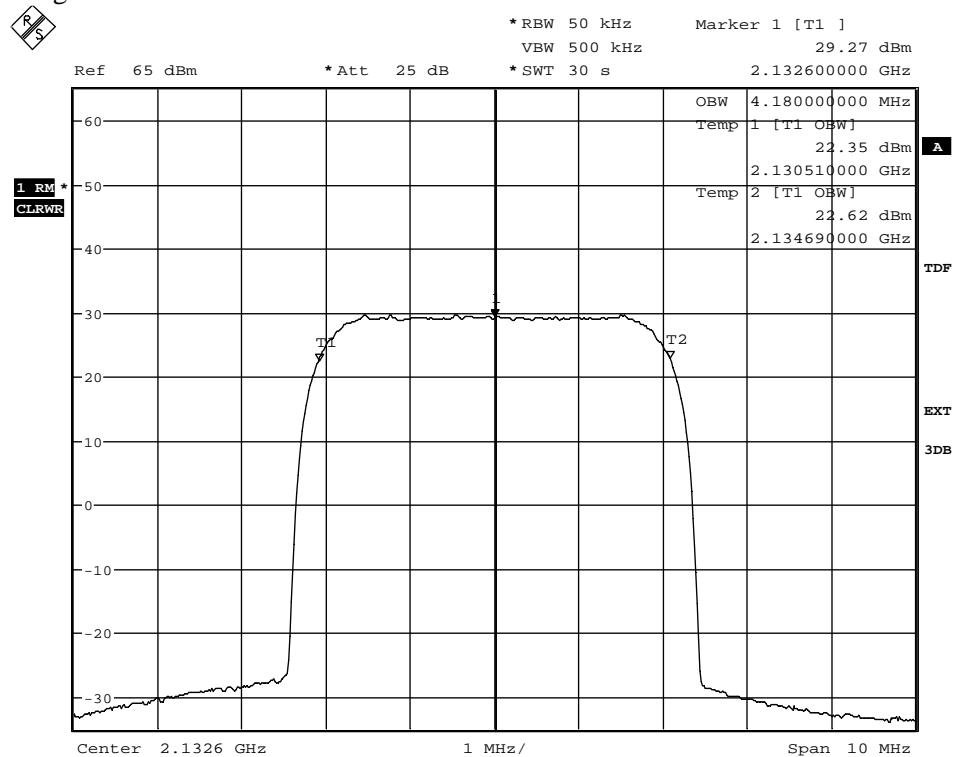


Diagram 2



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## Appendix 3.1

Diagram 3

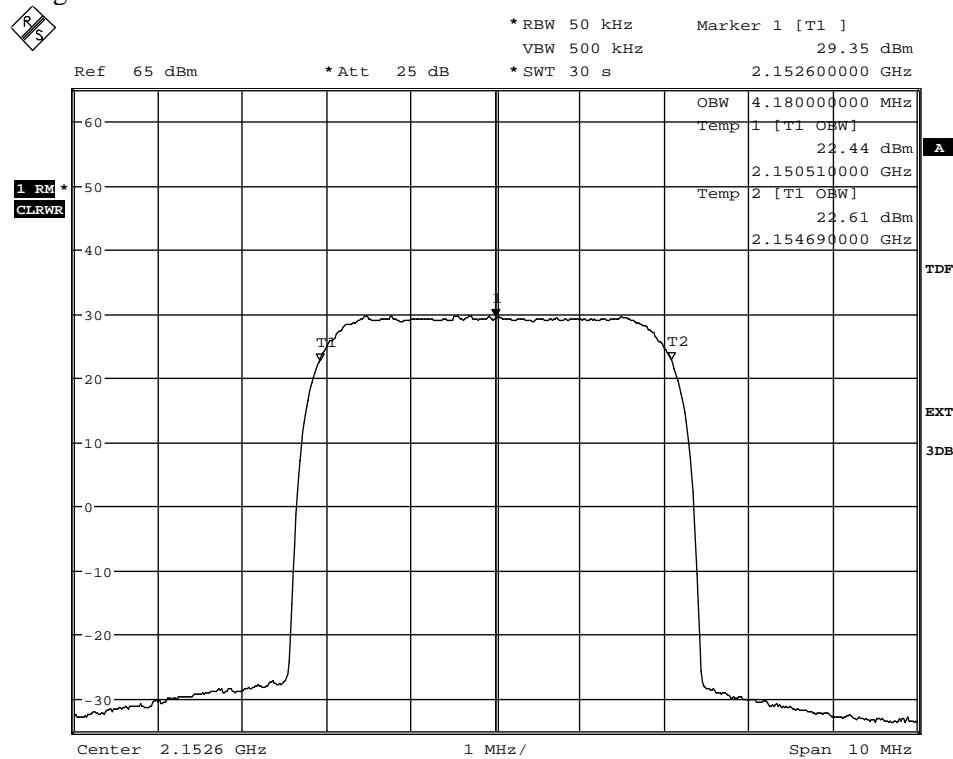
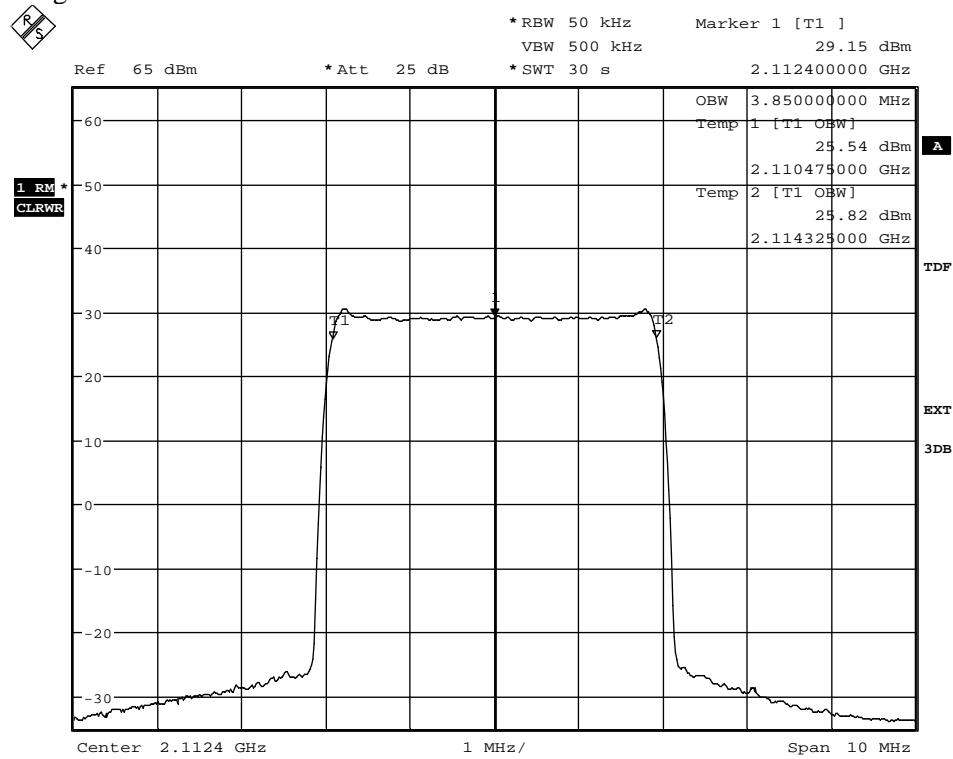


Diagram 4



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## Appendix 3.1

Diagram 5

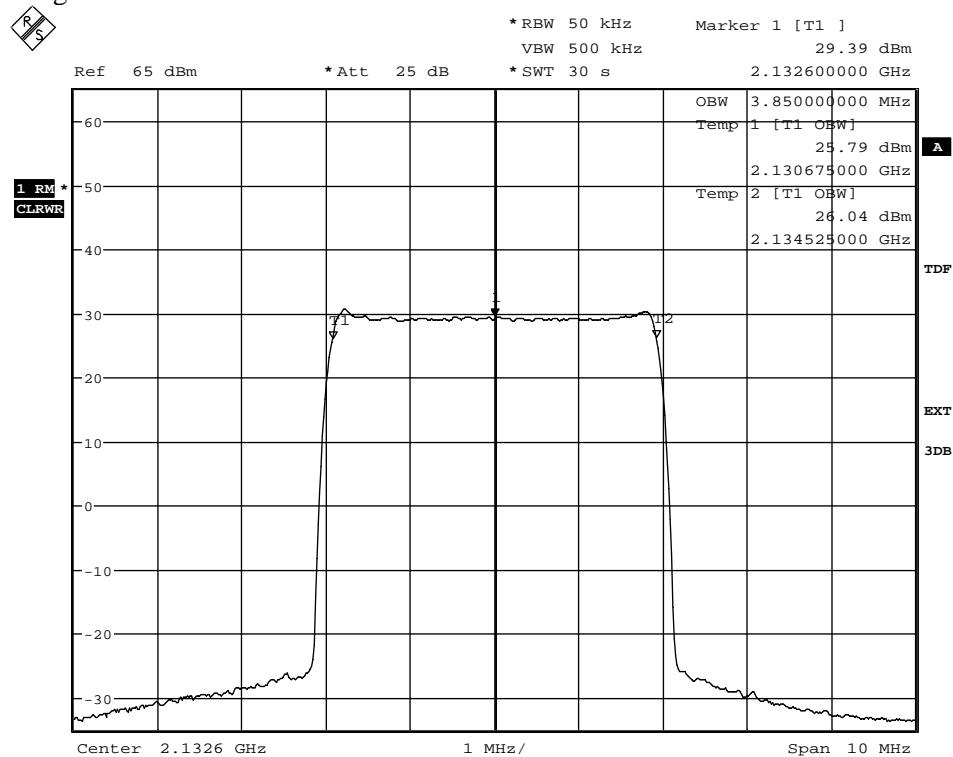
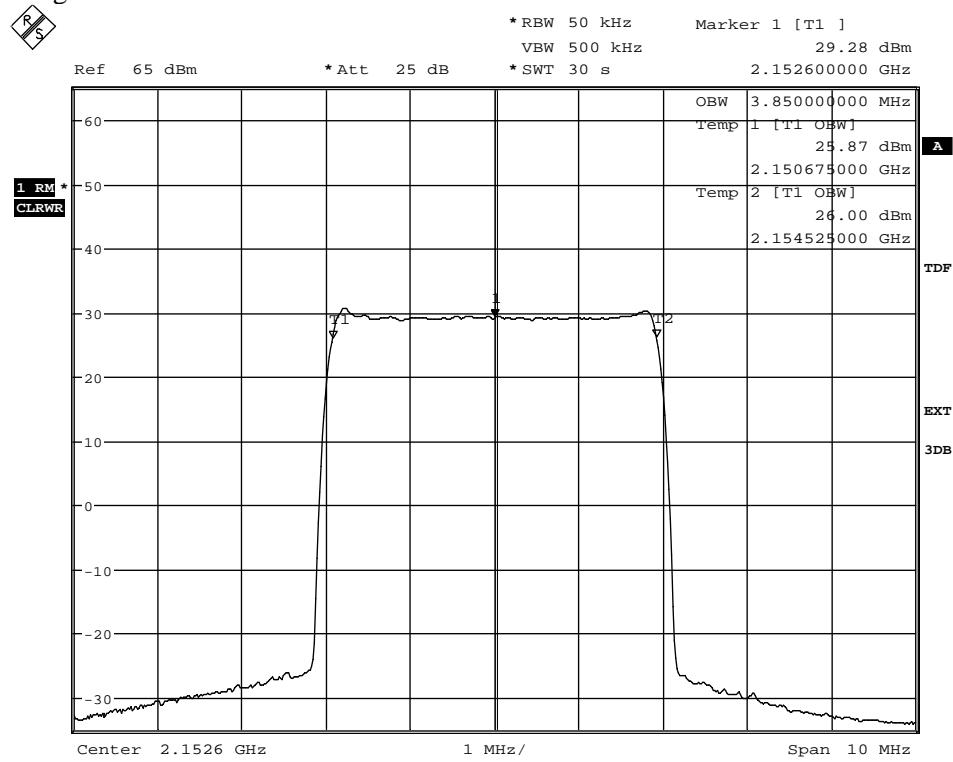


Diagram 6



FCC ID: TA8BKRC11859-1  
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Appendix 4

### Band edge measurements according to 47 CFR 2.1051 / IC RSS-139 6.5

| Date       | Temperature  | Humidity   |
|------------|--------------|------------|
| 2010-07-06 | 24 °C ± 3 °C | 36 % ± 5 % |
| 2010-07-07 | 24 °C ± 3 °C | 42 % ± 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 30 kHz was used up to 5 MHz away from the band edges. 30 kHz is <1% of the Emission BW(4.25 MHz between the 26 dB points). To compensate for the reduced measurement bandwidth, the limit was adjusted with 1.5 dB to -14.5 dBm up to 1 MHz away from the band edges and with 15.2 dB to -28.2 dBm in the frequency range 1 MHz to 5 MHz away from the band edges.

| Measurement equipment                     | SP number |
|---|-----------|
| R&S FSQ                                   | 504 143   |
| RF attenuator                             | 900 229   |
| Testo 635, Temperature and humidity meter | 504 203   |

**Measurement uncertainty:** 3.7 dB

#### Results

The results are shown in appendix 4.1

Single carrier:

Diagram 1: B

Diagram 2: T

Multi carrier:

Diagram 3: B and (B+5)

Diagram 4: T and (T-5)

#### Limits

From CRF 47 §27.53 (h): For operations in the 2110–2155 MHz band, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log_{10}(P)$  dB.

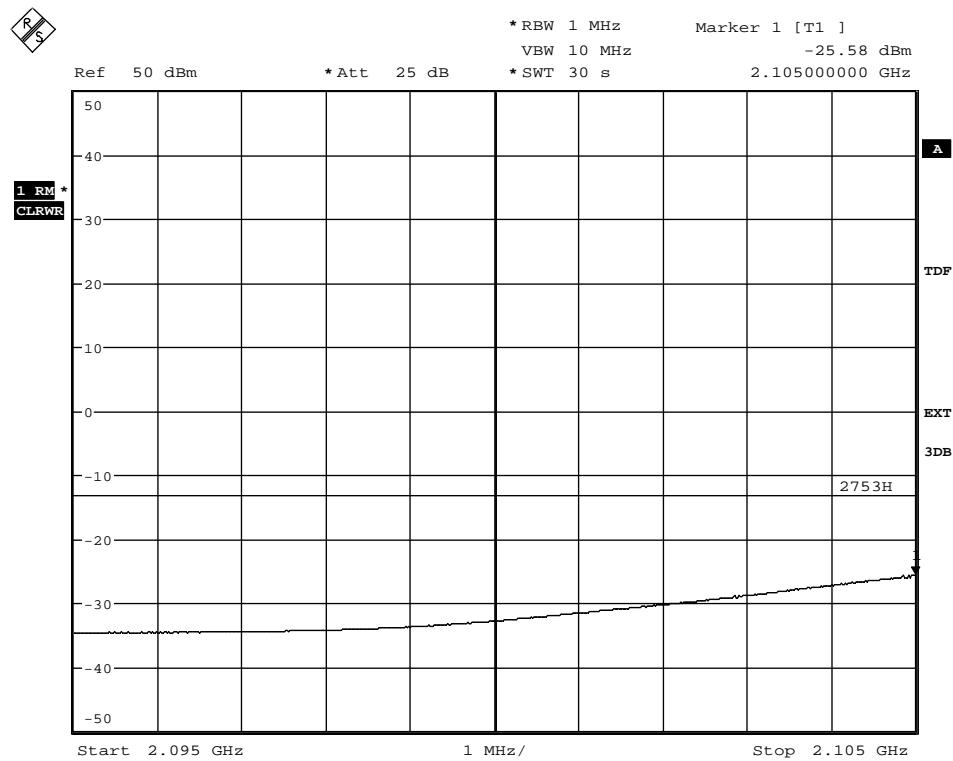
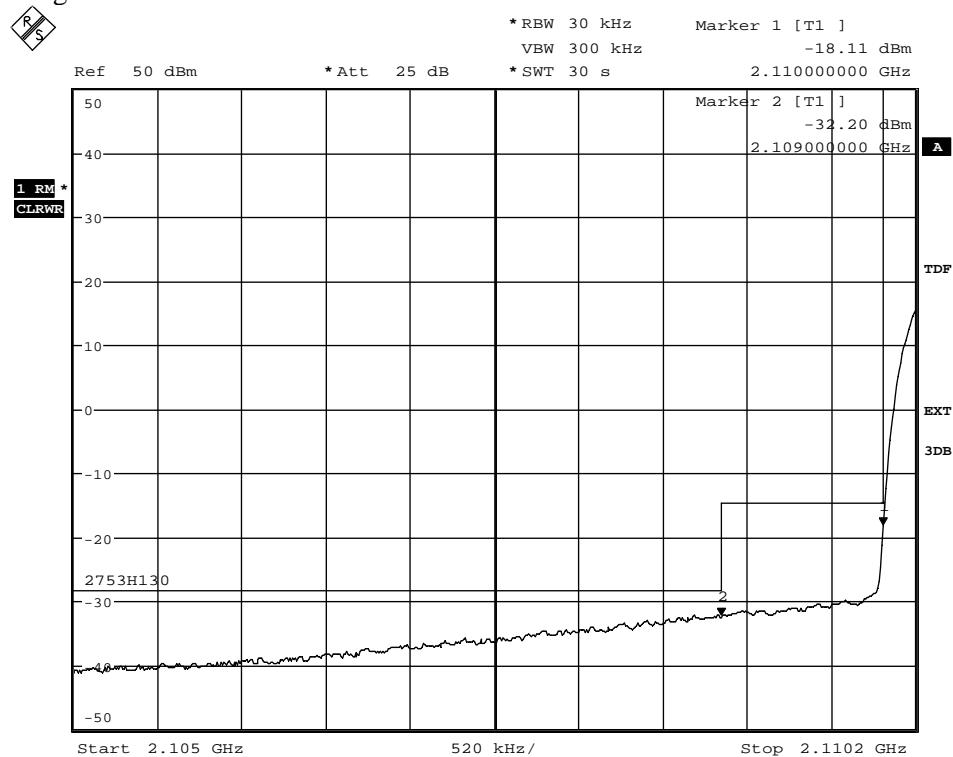
Resulting in an absolute limit of -13 dBm within the specified measurement bandwidth.

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

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## Appendix 4.1

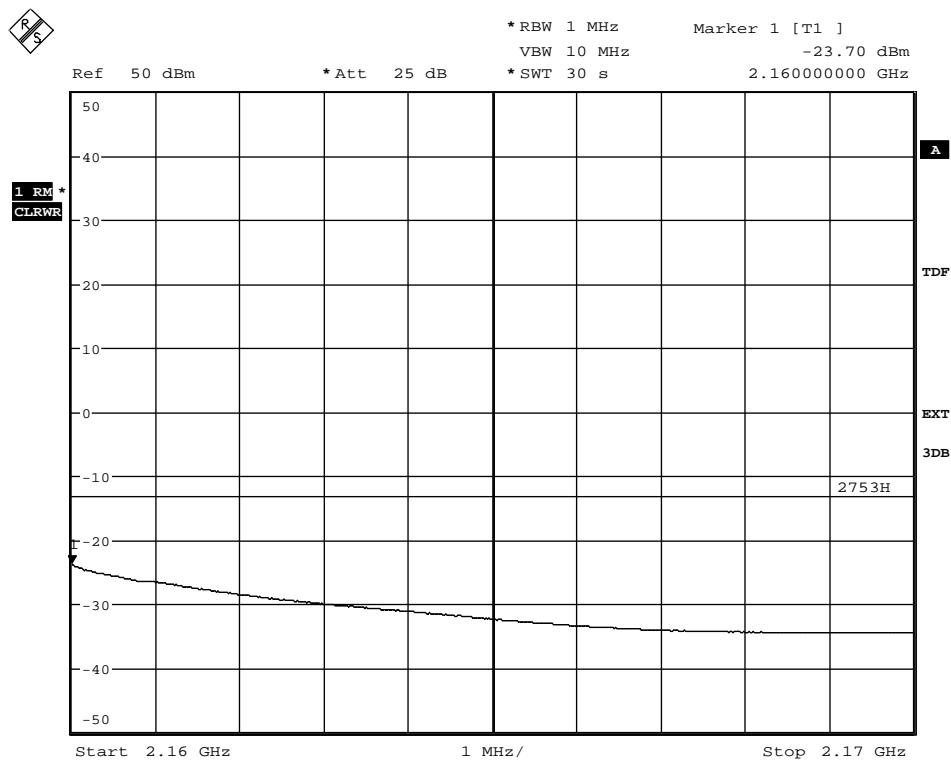
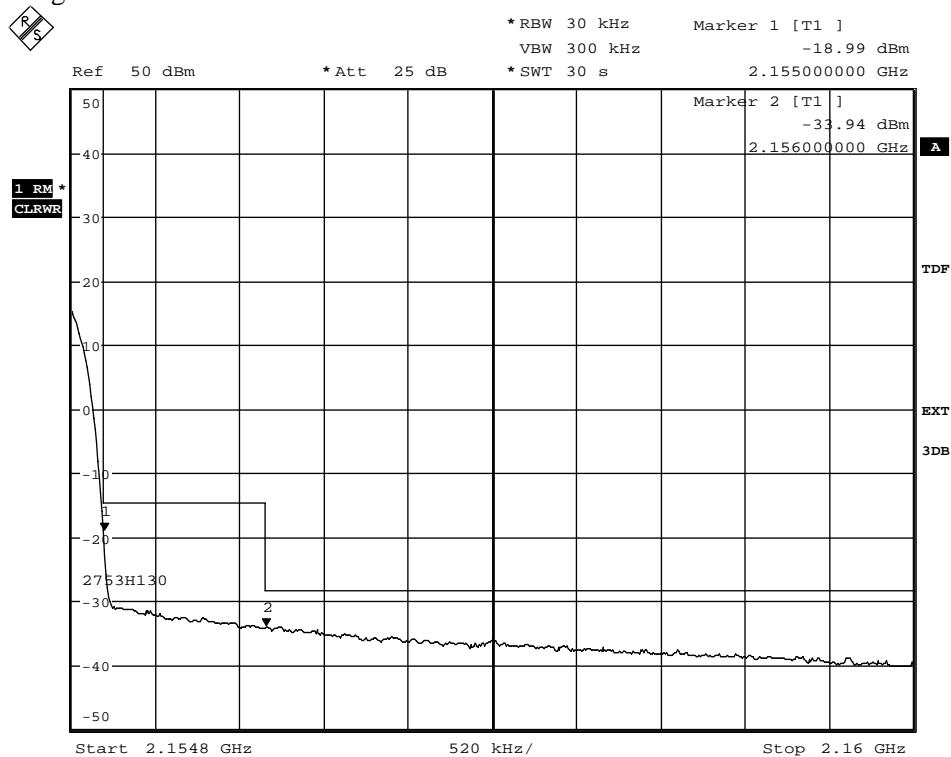
Diagram 1



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## Appendix 4.1

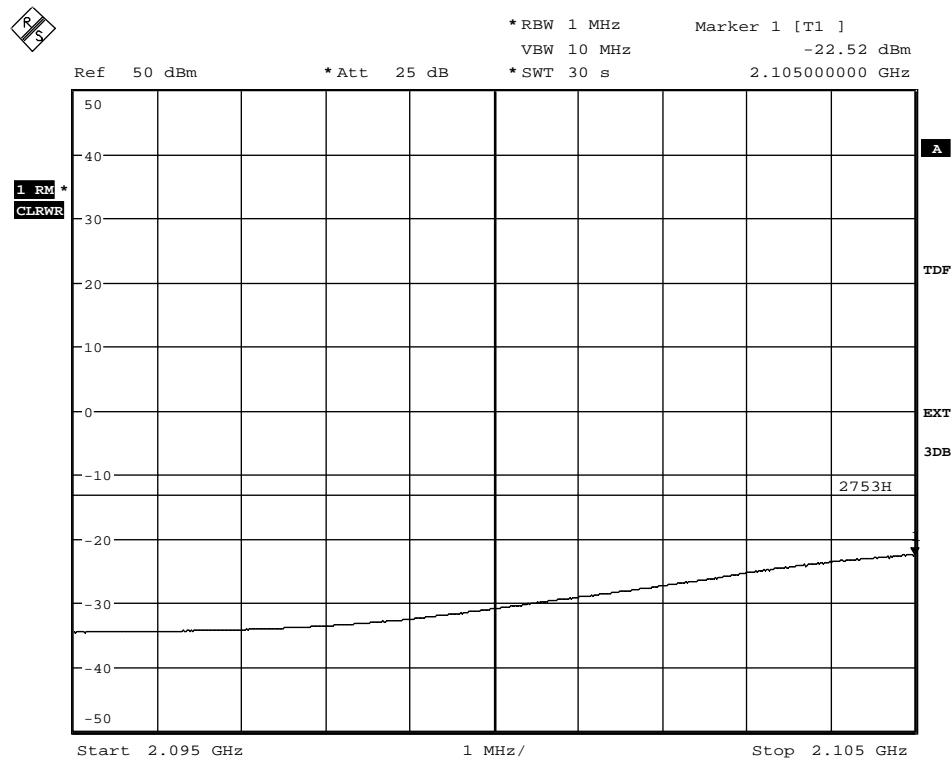
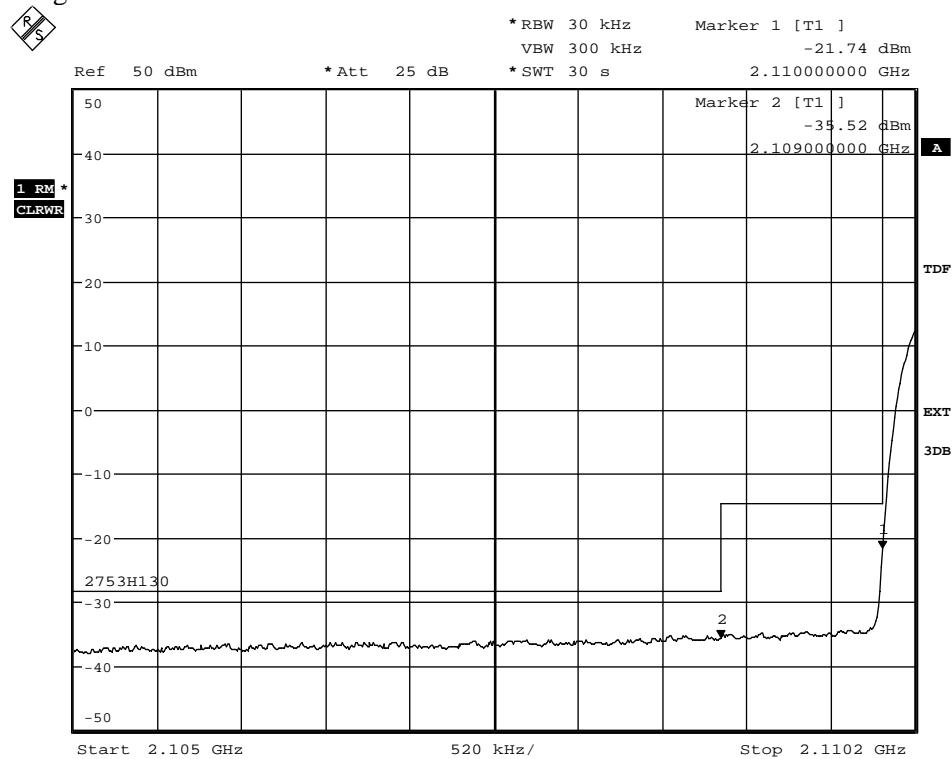
Diagram 2



FCC ID: TA8BKRC11859-1  
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## Appendix 4.1

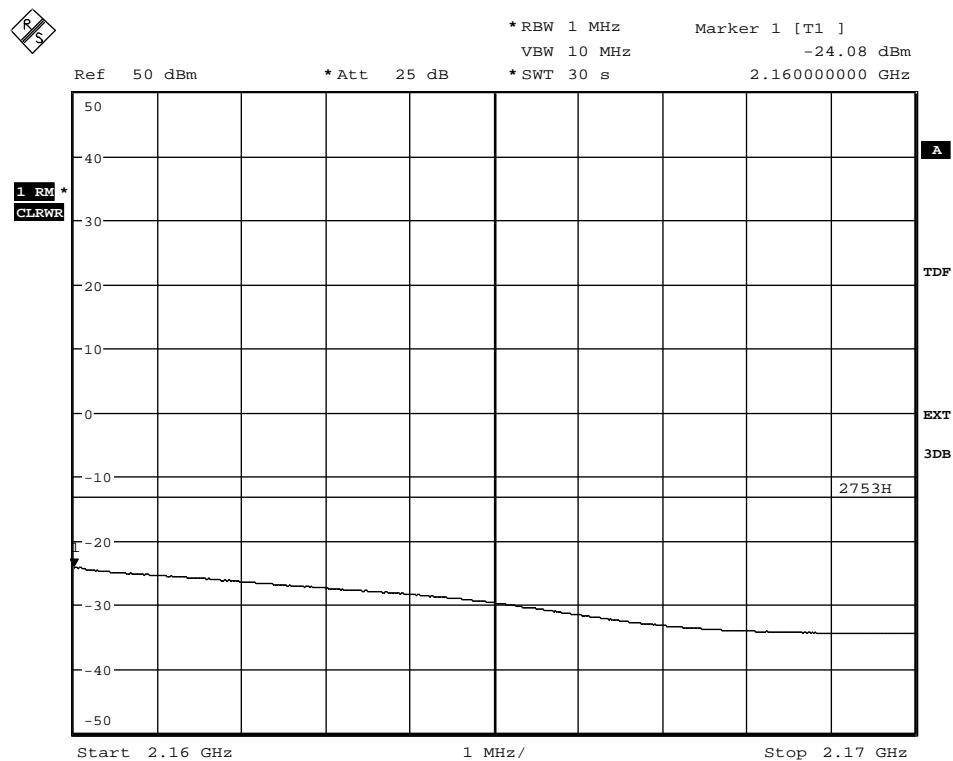
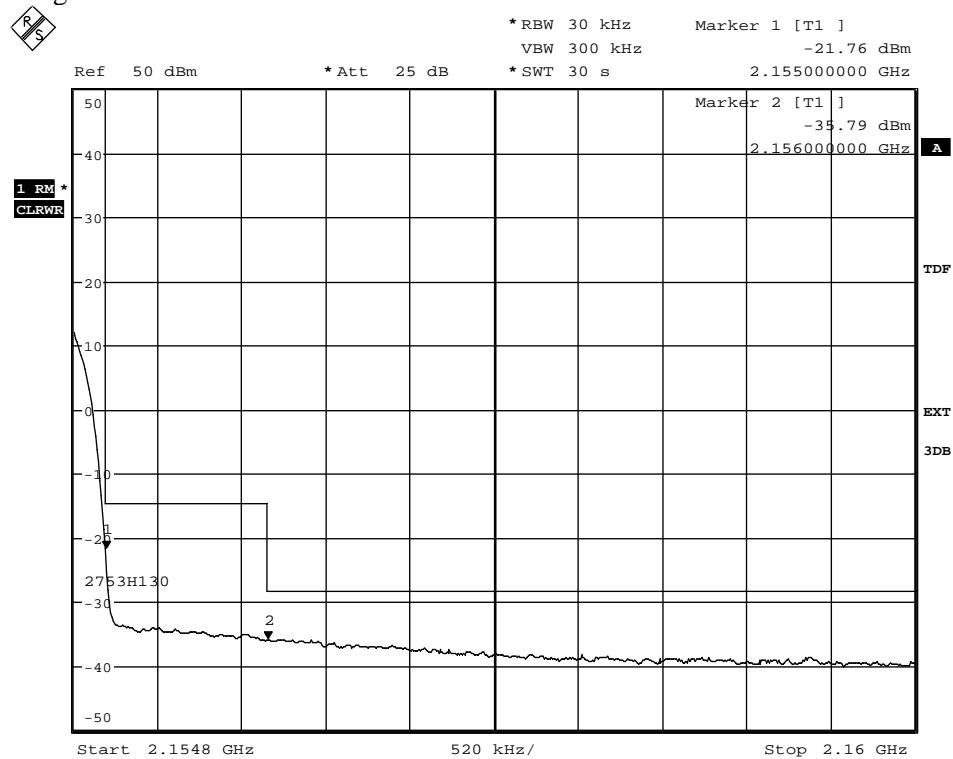
Diagram 3



FCC ID: TA8BKRC11859-1  
IC: 287AB-BS118591

## Appendix 4.1

Diagram 4



FCC ID: TA8BKRC11859-1  
IC: 287AB-BS118591

Appendix 5

**Conducted spurious emission measurements according to 47 CFR 2.1051 / IC RSS-139 6.5**

| Date       | Temperature  | Humidity   |
|------------|--------------|------------|
| 2010-07-06 | 24 °C ± 3 °C | 36 % ± 5 % |
| 2010-07-07 | 24 °C ± 3 °C | 42 % ± 5 % |

**Test set-up and procedure**

The measurements were made per definition in §27.53. The output was connected to a spectrum analyzer. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements. A pre-measurement was performed with the PEAK detector activated. Emission close to or above the limit with the PEAK detector is measured with the RMS detector activated and the level of the emission is determined with the substitution method.

| Measurement equipment                     | SP number |
|---|-----------|
| R&S FSQ 40                                | 504 143   |
| RF attenuator                             | 900 229   |
| High pass filter                          | 504 200   |
| Testo 635, Temperature and humidity meter | 504 203   |

**Measurement uncertainty:** 3.7 dB

**Results**

The results are shown in appendix 5.1

Single carrier:

Diagram 1: B

Diagram 2: M

Diagram 3: T

Multi carrier:

Diagram 4: B and (B+10)

Diagram 5: T and (T-10)

**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**

The power of any emission outside the frequency band shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log P$  dB.

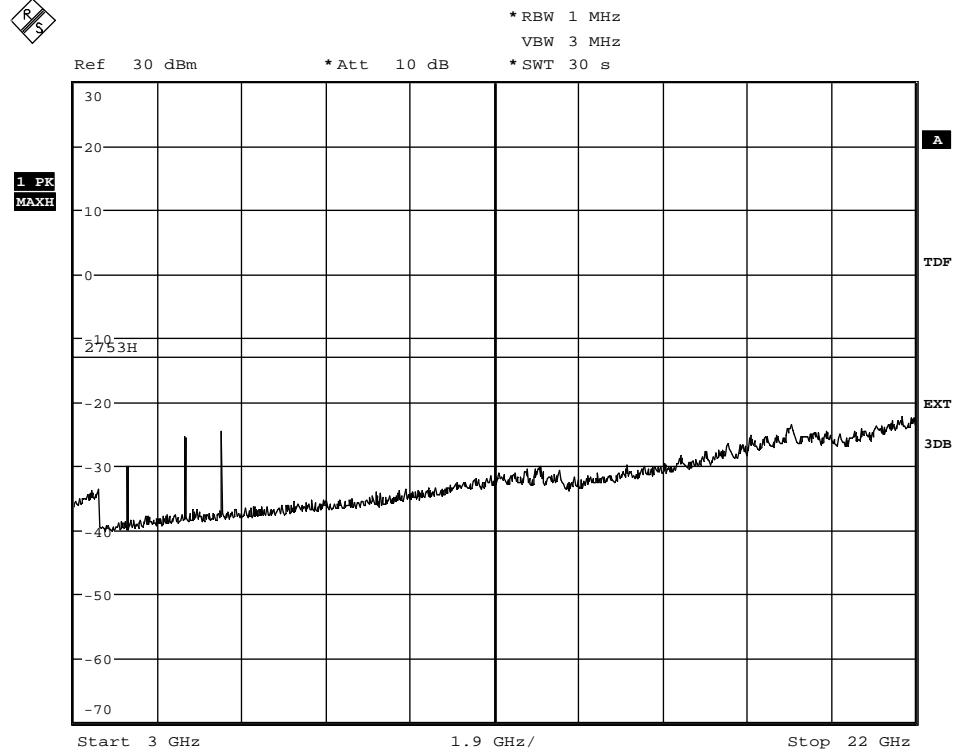
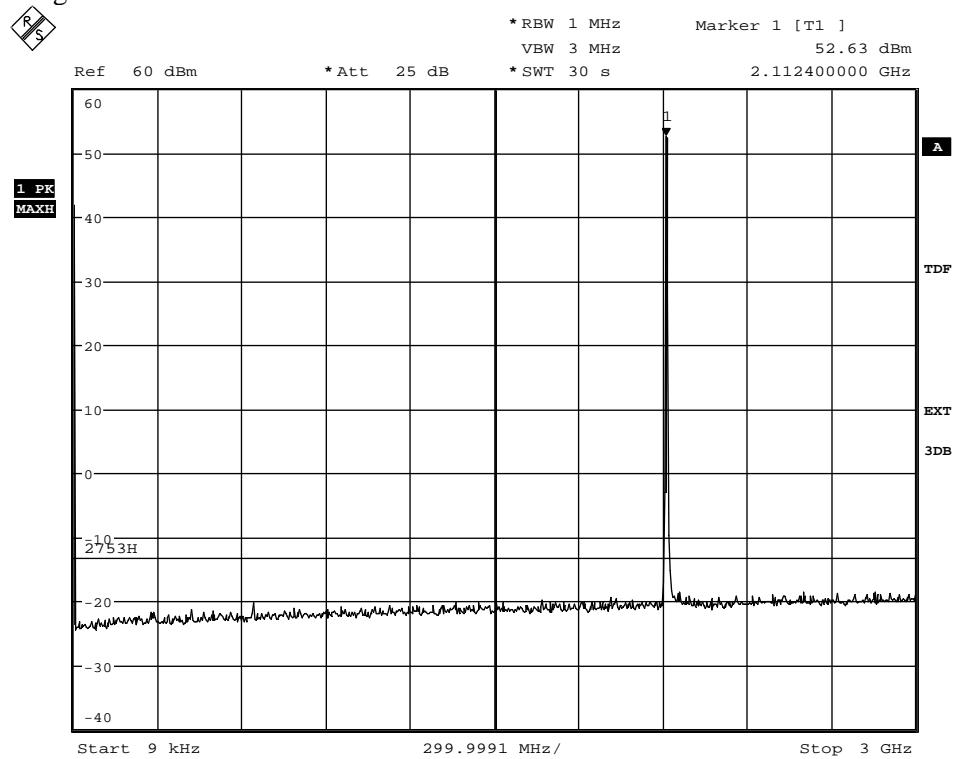
Resulting in an absolute limit of -13 dBm within the specified measurement bandwidth.

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

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Appendix 5.1

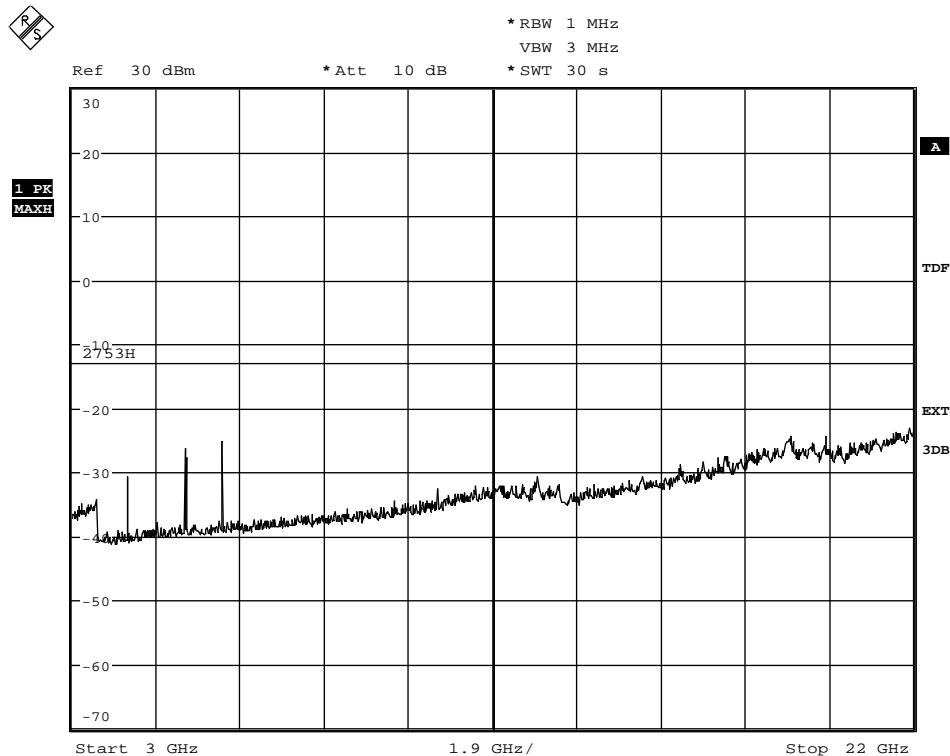
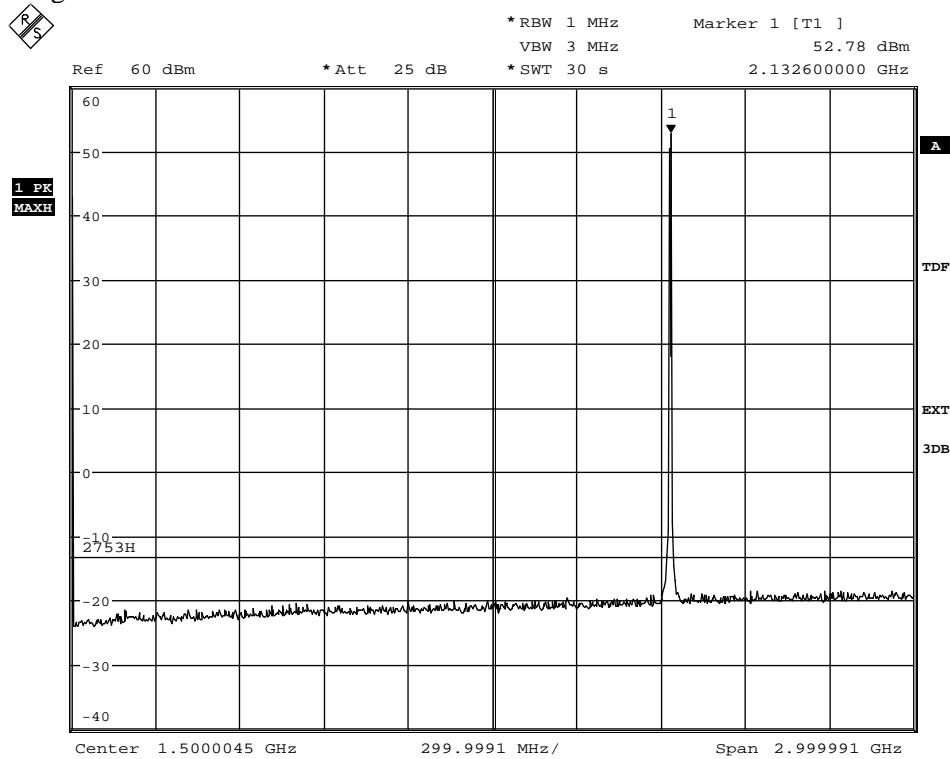
Diagram 1:



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Appendix 5.1

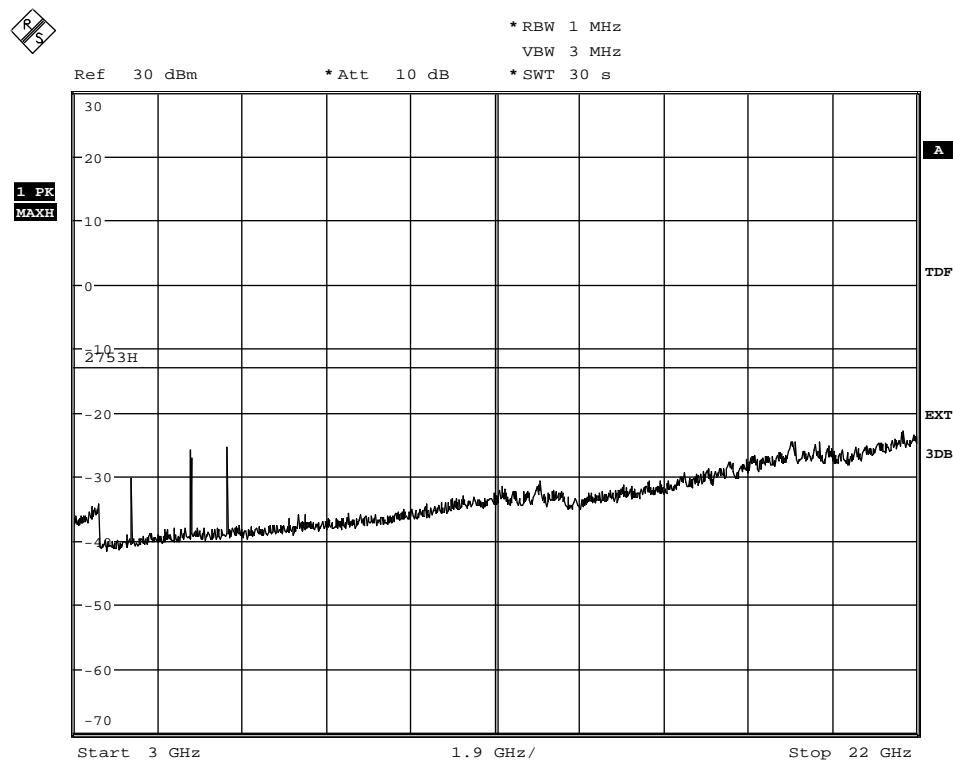
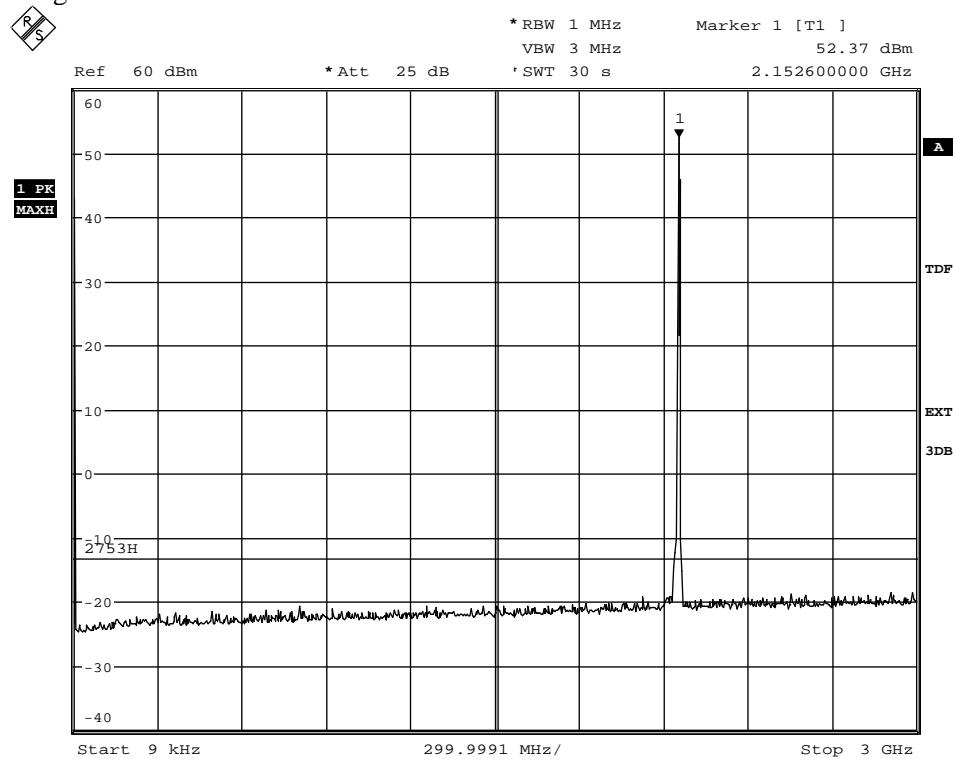
Diagram 2:



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Appendix 5.1

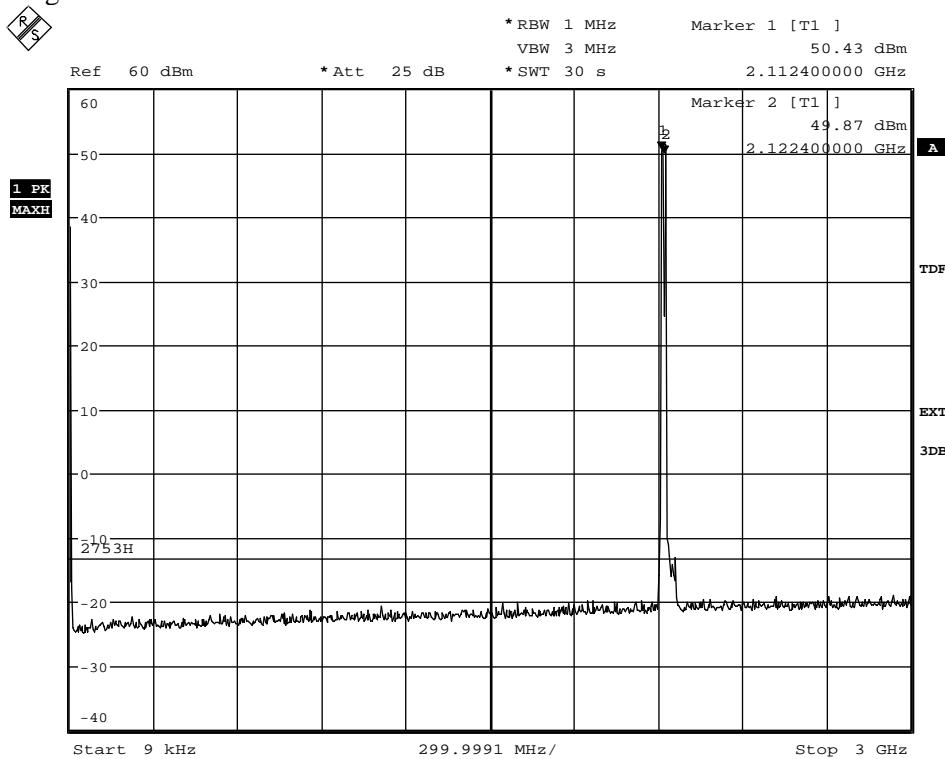
Diagram 3:



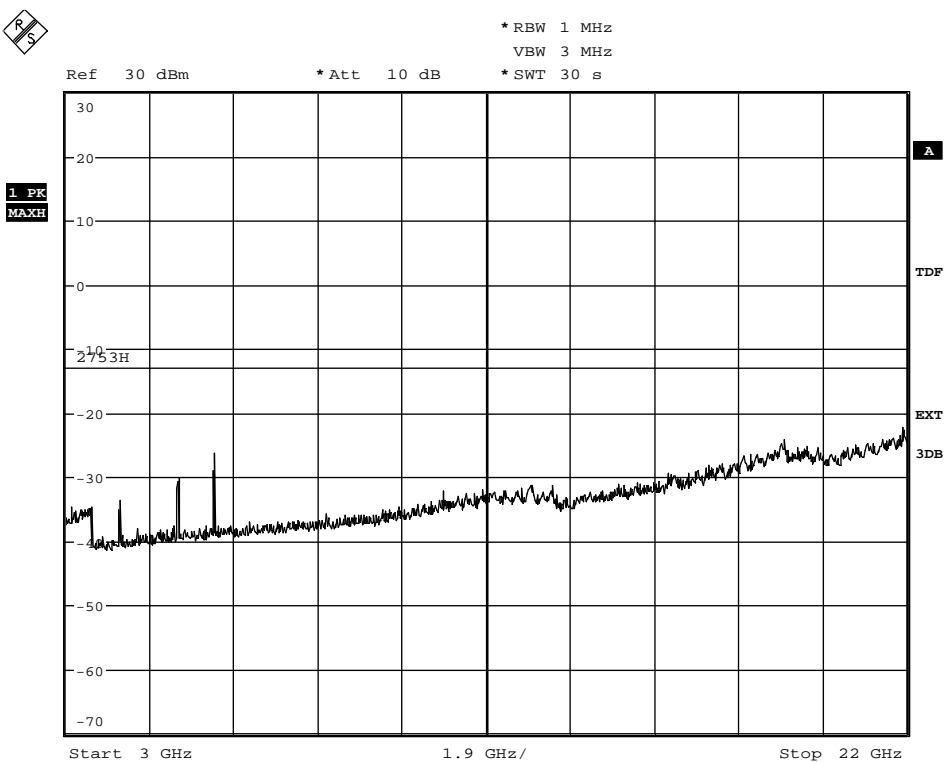
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## Appendix 5.1

Diagram 4:



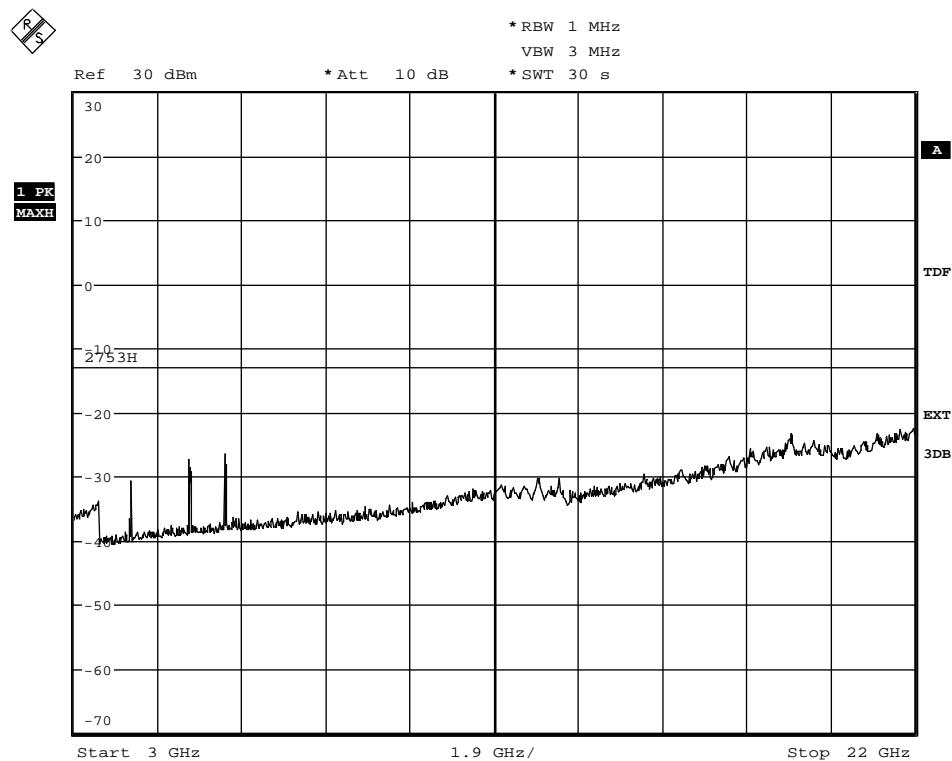
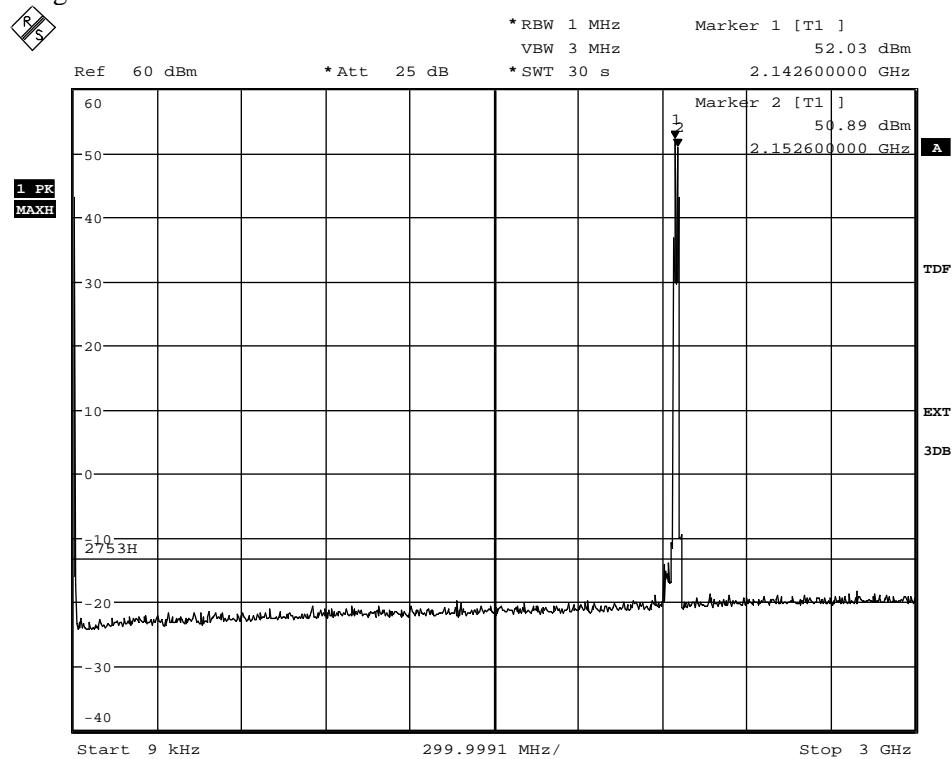
The spurious close to the limit at 2170 MHz was >15 dB below limit when measured with the RMS detector.



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## Appendix 5.1

Diagram 5:



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Appendix 6

**Field strength of spurious radiation measurements according to 47 CFR 2.1053 / IC RSS-139 6.5**

| Date                     | Temperature  | Humidity         |
|--------------------------|--------------|------------------|
| 2010-07-02 to 2010-07-07 | 23 °C ± 3 °C | 41 to 52 % ± 5 % |

**Test set-up and procedure**

The test site is listed at FCC, Columbia with registration number: 93866. The test site comply with RSS-Gen, Issue 2, Industry Canada file no.:IC 3482A-1.

The measurements were performed with both horizontal and vertical polarisation 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.

A pre-measurement was first performed:

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,

$$\gamma = 20 \log \left( \frac{4\pi D}{\lambda} \right), \gamma \text{ is the propagation loss and } D \text{ is the antenna distance.}$$

The measurement procedure was as the following:

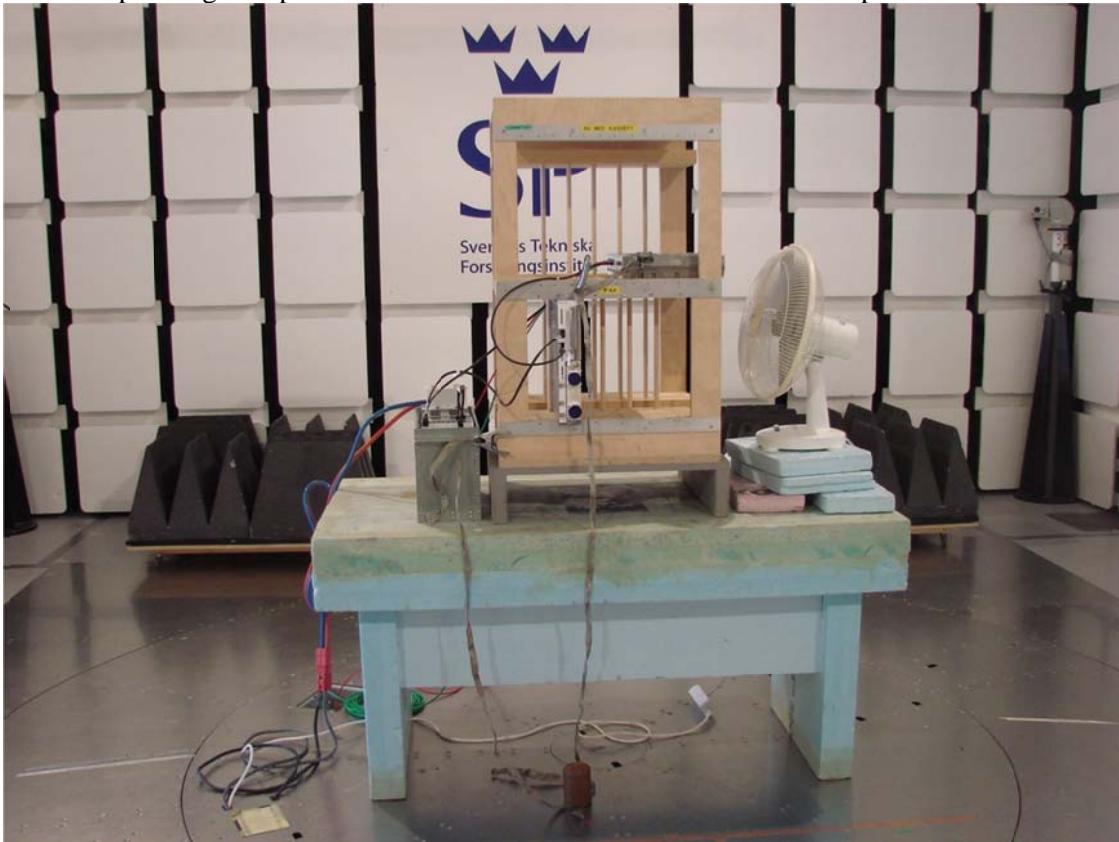
1. The pre-measurement was first performed with peak detector. The EUT was measured in eight directions and with the antenna at three heights, 1.0 m, 1.5 m and 2.0 m.
2. Spurious radiation on frequencies closer than 20 dB to the limit is scanned 0-360 degrees and the antenna is scanned 1-4 m for maximum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

| Measurement equipment                    | SP number |
|--|-----------|
| Test site Tesla                          | 503 881   |
| Test site Tesla (measurements 18-22 GHz) | 503 881   |
| R&S ESI 26                               | 503 292   |
| Control computer                         | 503 479   |
| Software: R&S EMC32, ver. 8.20.1         | -         |
| Chase Bilog antenna CBL 6111A            | 502 182   |
| EMCO Horn Antenna 3115                   | 502 175   |
| MITEQ Low Noise Amplifier                | 503 285   |
| Standard gain antenna 20240-20           | 503 674   |
| Testo 625 temperature and humidity meter | 504 117   |

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**Appendix 6**

Test set-up during the spurious radiation measurements are shown in the picture below:



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Appendix 6

The measurements were performed with the test object allocated to the following channels:

Single Carrier:

|         |   |   |   |
|---------|---|---|---|
| Cell    | 1 | 1 | 1 |
| Channel | B | M | T |

Multi Carrier:

|         |   |      |   |      |
|---------|---|------|---|------|
| Cell    | 1 | 2    | 1 | 2    |
| Channel | B | B+10 | T | T-10 |

## Results

Single carrier

| Frequency<br>(MHz)      | Spurious emission level (dBm)    |                                  |
|-------------------------|----------------------------------|----------------------------------|
|                         | Vertical                         | Horizontal                       |
| 30-22 000               | All emission > 20 dB below limit | All emission > 20 dB below limit |
| Measurement uncertainty |                                  | 4.7 dB                           |

Multi carrier

| Frequency<br>(MHz)      | Spurious emission level (dBm)    |                                  |
|-------------------------|----------------------------------|----------------------------------|
|                         | Vertical                         | Horizontal                       |
| 30-22 000               | All emission > 20 dB below limit | All emission > 20 dB below limit |
| Measurement uncertainty |                                  | 4.7 dB                           |

## Limits

The power of any emission outside the frequency band shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log P$  dB.

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



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Appendix 7

## Frequency stability measurements according to 47 CFR 2.1055

| Date                     | Temperature (test equipment) | Humidity (test equipment) |
|--------------------------|------------------------------|---------------------------|
| 2010-07-02 to 2010-07-04 | 22 to 24 °C ± 3 °C           | 32 to 36 % ± 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 |
|---|-----------|
| Climate chamber 2                         | 503 546   |
| Rohde & Schwarz signal analyzer FSQ40     | 504 143   |
| RF attenuator                             | 504 159   |
| Testo 635, Temperature and humidity meter | 504 203   |
| Rotronic temperature and humidity meter   | 502 946   |
| Multimeter Fluke 87                       | 502 190   |



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Appendix 7

## Results

Nominal transmitter frequency was 2132.6 MHz.

| Supply voltage<br>DC (V) | T (°C) | Frequency error (Hz)     |
|--------------------------|--------|--------------------------|
| -48.0                    | +20    | -11                      |
| -55.2                    | +20    | -13                      |
| -40.8                    | +20    | -12                      |
| -48.0                    | +30    | -22                      |
| -48.0                    | +40    | -18                      |
| -48.0                    | +50    | -12                      |
| -48.0                    | +10    | -11                      |
| -48.0                    | 0      | -15                      |
| -48.0                    | -10    | +15                      |
| -48.0                    | -20    | TX disabled (Note 1)     |
| -48.0                    | -30    | N.T.                     |
| Maximum freq. error (Hz) |        | 22                       |
| Measurement uncertainty  |        | $< \pm 1 \times 10^{-7}$ |

Note 1: This temperature caused an unacceptable error “TemperatureExceptionallyLow” and it was not possible to enable the transmitter.

## Limits (according to 3GPP TS 25.141)

The frequency Error shall be within  $\pm(0.05 \text{ PPM} + 12 \text{ Hz})$  ( $\pm 118.63 \text{ Hz}$ ).

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

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Appendix 8

## Receiver spurious emissions measurements according to 47 CFR 15.111 and RSS-GEN Issue 2

|                    |                             |                        |
|--------------------|-----------------------------|------------------------|
| Date<br>2010-07-09 | Temperature<br>24 °C ± 3 °C | Humidity<br>51 % ± 5 % |
|--------------------|-----------------------------|------------------------|

### Test set-up and procedure

The measurements were performed according to ANSI C63.4.

Measurements were performed on port “RF B”. The measurement was first performed with peak detector. Emission on frequencies close to or above the limit was re-measured with quasi-peak detector below 1 GHz and with average detector above 1GHz.

During the measurement at the receiver port “RF B” the combined TX/RX port “RF A” was terminated into 50 ohm. The TX was active at maximum power at the TX band center frequency 2132.6 MHz.

| Measurement equipment                    | SP number |
|--|-----------|
| R&S FSQ40                                | 504 143   |
| RF attenuator                            | 900 229   |
| High pass filter                         | 504 199   |
| Testo 635 Temperature and humidity meter | 504 203   |

### Result

The results are shown in appendix 8.1:

The nominal RX frequency was 1732.5 MHz.

Tested port, frequency range  
Diagram 1a RX B, 9 KHz – 1 GHz  
Diagram 1b RX B, 1 GHz – 11 GHz

### Remarks

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

It was deemed sufficient to measure RX conducted emissions with only the worst case TX configuration. The upper frequency bound 11 GHz was chosen to cover 5x the upper edge of the TX band as the client declared highest internal generated frequency.

### Limit

The power of any spurious output signals appearing at the antenna terminals must not exceed -57 dBm (2 nanowatt).

|                       |     |
|-----------------------|-----|
| Emission below limit? | Yes |
|-----------------------|-----|

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Appendix 8.1

Diagram 1a:

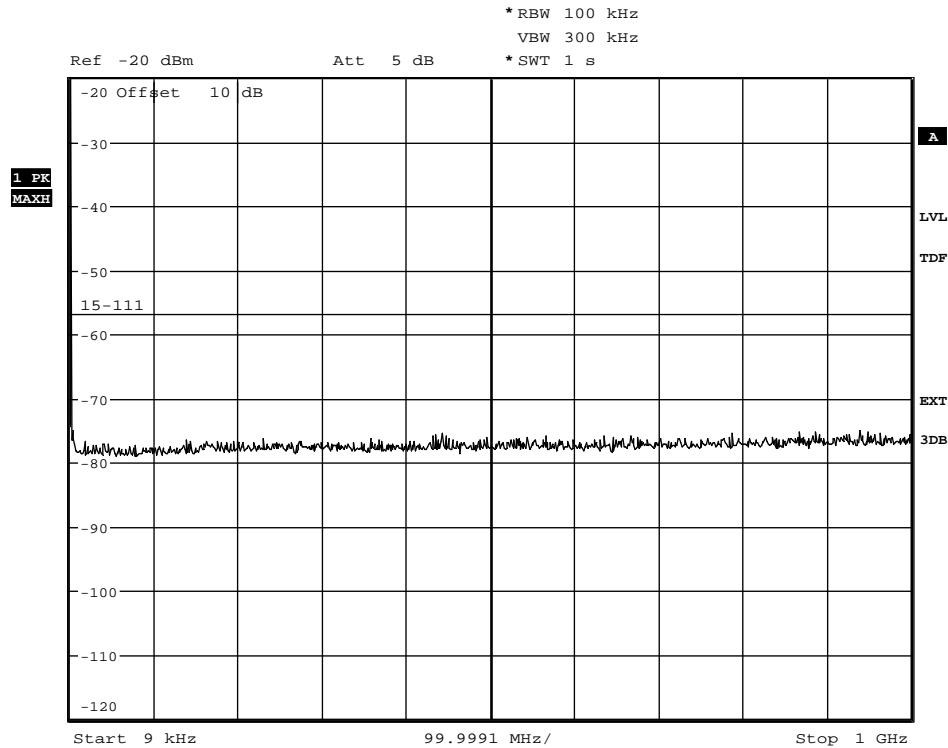
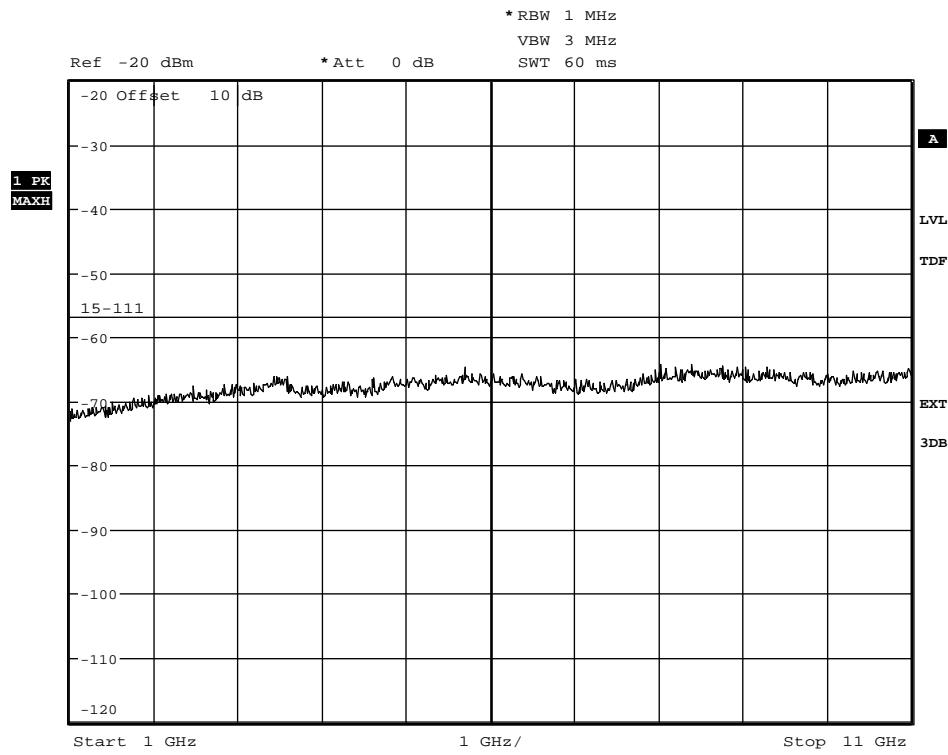


Diagram 1b:



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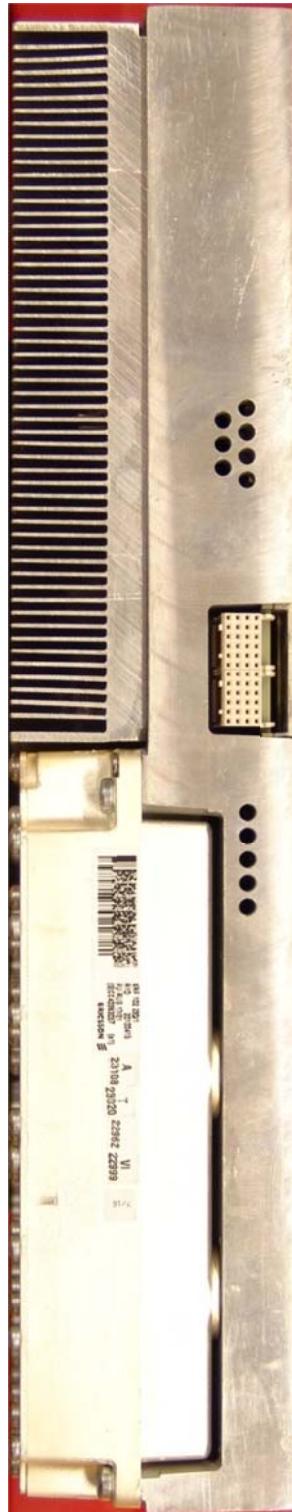
Appendix 9

## Photos

Front



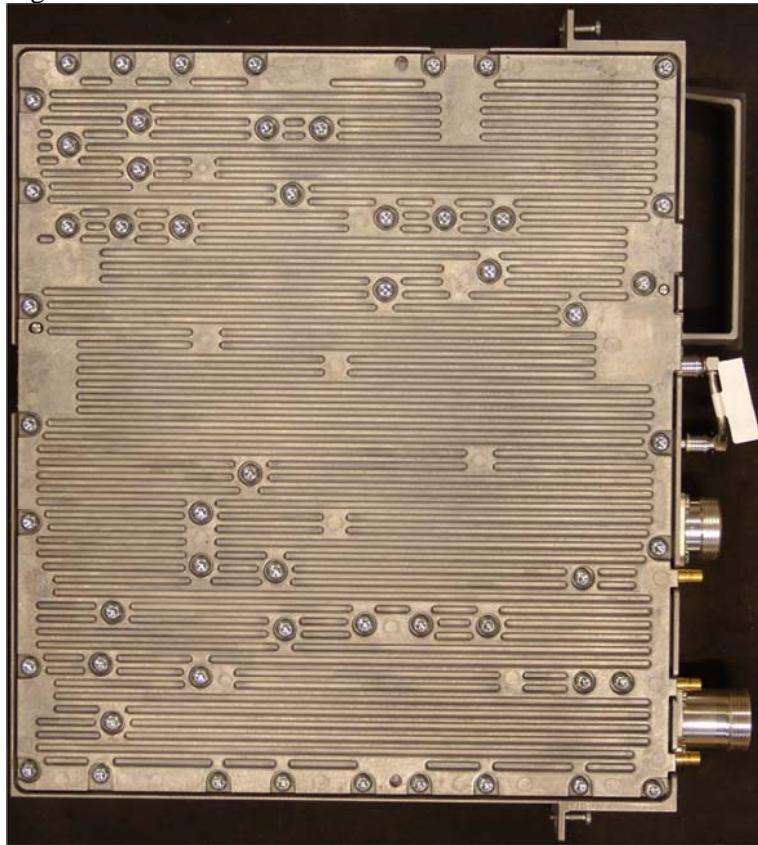
Back



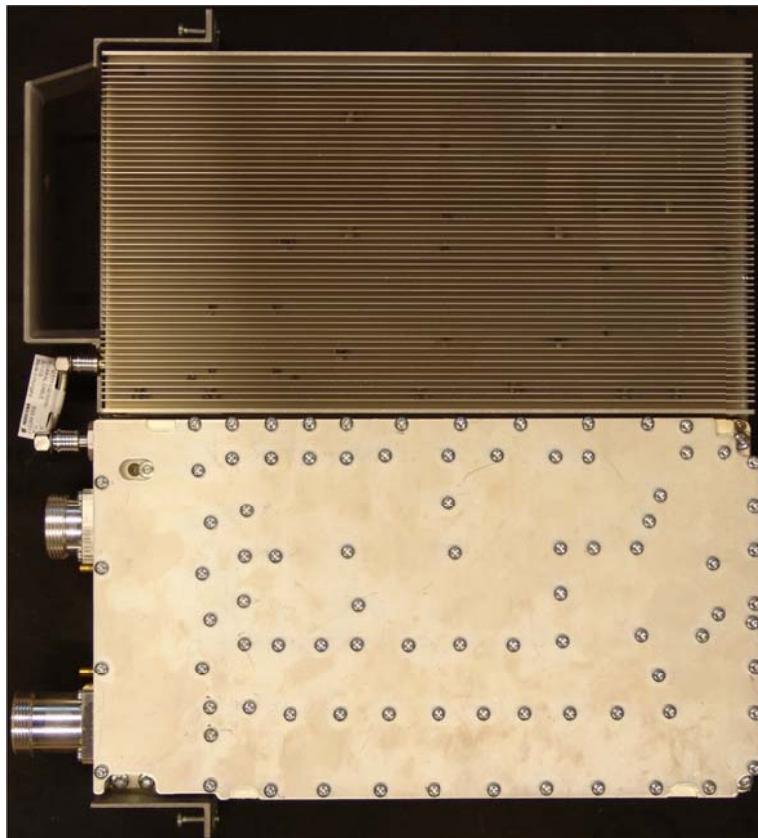
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Appendix 9

Right side



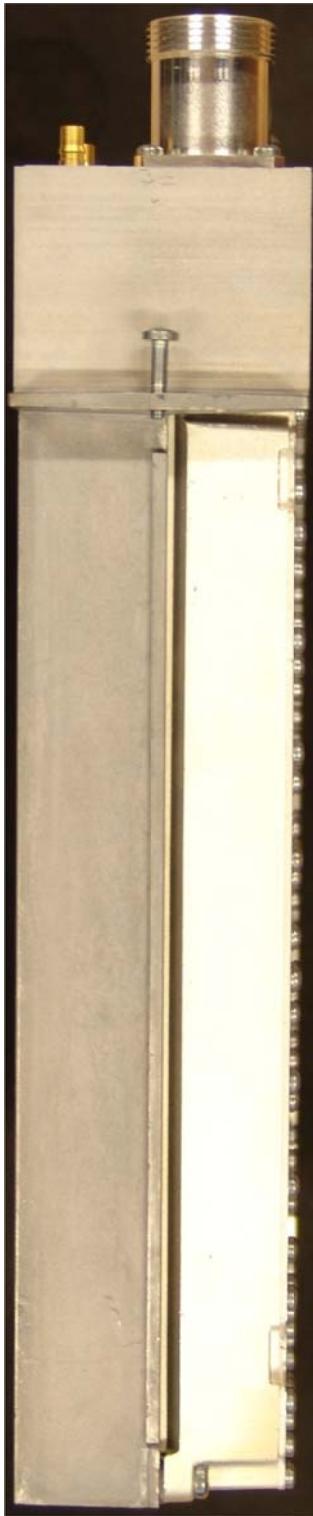
Left side



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## Appendix 9

Bottom side



Top side

