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**Measurements on RUS 01 B4 1700/2100 MHz radio equipment with
FCC ID: TA8AKRC11859-1 and IC: 287AB-AS11859-1
(9 appendices)**

Test object

RUS 01 B4, KRC 118 59/1 Rev. R2A, S/N (S)C823283518

Summary

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

| Standard | | Compliant | Appendix | Remarks |
|--|--|-----------|----------|---------|
| FCC CFR 47 / IC RSS-139 Issue 2 | | | | |
| 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 | - |
| FCC CFR 47 / IC RSS-Gen Issue2 | | | | |
| 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.

**SP Sveriges Tekniska Forskningsinstitut
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Christer Karlsson
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| | | | |
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|--|--|---|---|

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Appendix 1

Description of test object

| | | |
|--|---|-----------------------------------|
| Equipment: | LTE radio equipment RUS 1700/2100 MHz single carrier | |
| Frequency bands: | TX: 2110 – 2155 MHz RX: 1710 – 1755 MHz | |
| Supported channel bandwidth configurations | 5 MHz and 10 MHz | according 3GPP 36.141 section 5.6 |
| Modulation and access scheme | OFDMA in FDD | |
| OFDM subcarrier modulation | System information and pilots use BPSK and QPSK. For payload data QPSK, 16QAM and 64QAM can be used. | |
| Maximum rated output power: | Single carrier 1x 47.8 dBm (1x60 W) | |
| Number of antenna ports: | TX/RX: 1 | RX: 1 |
| Nominal power voltage: | -48 VDC | |

Tested frequencies and EARFCNs for TX measurements

For channel bandwidth configuration 5 MHz:

| EARFCN | Frequency [MHz] | Comment |
|--------|-----------------|--|
| 1975 | 2112.5 | Lowest supported TX carrier frequency |
| 2175 | 2132.5 | TX band center frequency |
| 2375 | 2152.5 | Highest supported TX carrier frequency |

For channel bandwidth configuration 10 MHz:

| EARFCN | Frequency [MHz] | Comment |
|--------|-----------------|--|
| 2000 | 2115.0 | Lowest supported TX carrier frequency |
| 2175 | 2132.5 | TX band center frequency |
| 2350 | 2150.0 | Highest supported TX carrier frequency |

Tested frequencies and EARFCNs for RX measurement

RX spurious emissions conducted were measured at the RX band center frequency in 5 MHz channel bandwidth configuration only.

| EARFCN | Frequency [MHz] | Comment |
|--------|-----------------|--------------------------|
| 20175 | 1732.5 | RX band center frequency |

Note: EARFCN are derived according 3GPP TS 36.141, table 5.7.3-1.

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Appendix 1

Operation modes during measurements

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

The setting TX single carrier with test model E-TM1.1 in channel bandwidth configuration 5 MHz was found to be representative for all traffic scenarios when several settings with different modulations and channel bandwidth configurations were compared to find a worst case setting. This setting was used for all measurements unless noted otherwise.

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

Conducted measurements

TX parameters were measured at port RF A. RX parameters were measured at port RF B.

Radiated measurements

Port RF A was during the measurements connected to functional test equipment for supervision of the transmitted signal.

Purpose of test

The purpose of the tests is to verify compliance to the performance characteristics specified in applicable parts of FCC CFR 47.

References

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

ANSI C63.4-2003
ANSI/TIA/EIA-603-B-2002
3GPP TS 36.141
RSS-139 Issue 2
RSS-Gen Issue 2

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Appendix 1

Measurement equipment

| Measurement equipment | Calibration Due | SP number |
|--|-----------------|-----------|
| Test site Tesla | 2010-10 | 503 881 |
| Test site Edison | 2011-12 | 504 114 |
| R&S FSIQ 40 | 2010-07 | 503 738 |
| R&S FSQ 40 | 2010-07 | 504 143 |
| R&S ESI 26 | 2010-07 | 503 292 |
| R&S ESI 26 | 2010-07 | 503 885 |
| High pass filter | 2010-06 | 502 758 |
| High pass filter | 2011-03 | 504 199 |
| High pass filter | 2011-03 | 504 200 |
| RF attenuator | 2010-06 | 504 159 |
| RF attenuator | 2010-08 | 900 229 |
| RF attenuator | 2010-06 | 900 115 |
| RF step attenuator | 2010-06 | 503 096 |
| Boonton RF Peak power meter/analyizer | 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 |
| MITEQ Low Noise Amplifier | 2010-08 | 503 285 |
| MITEQ Low Noise Amplifier | 2010-06 | 504 160 |
| Climate chamber 2 | 2010-11 | 501 031 |
| Multimeter Fluke 87 | 2010-01 | 502 190 |
| Testo 635 temperature and humidity meter | 2011-03 | 504 203 |
| Testo 625 temperature and humidity meter | 2010-05 | 504 188 |

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: 2010-02-01.

Manufacturer's representative

Anders Johansson, Ericsson AB

Test engineers

Jörgen Wassholm, Tomas Lennhager, Jonas Bremholt and Reinhold Reul

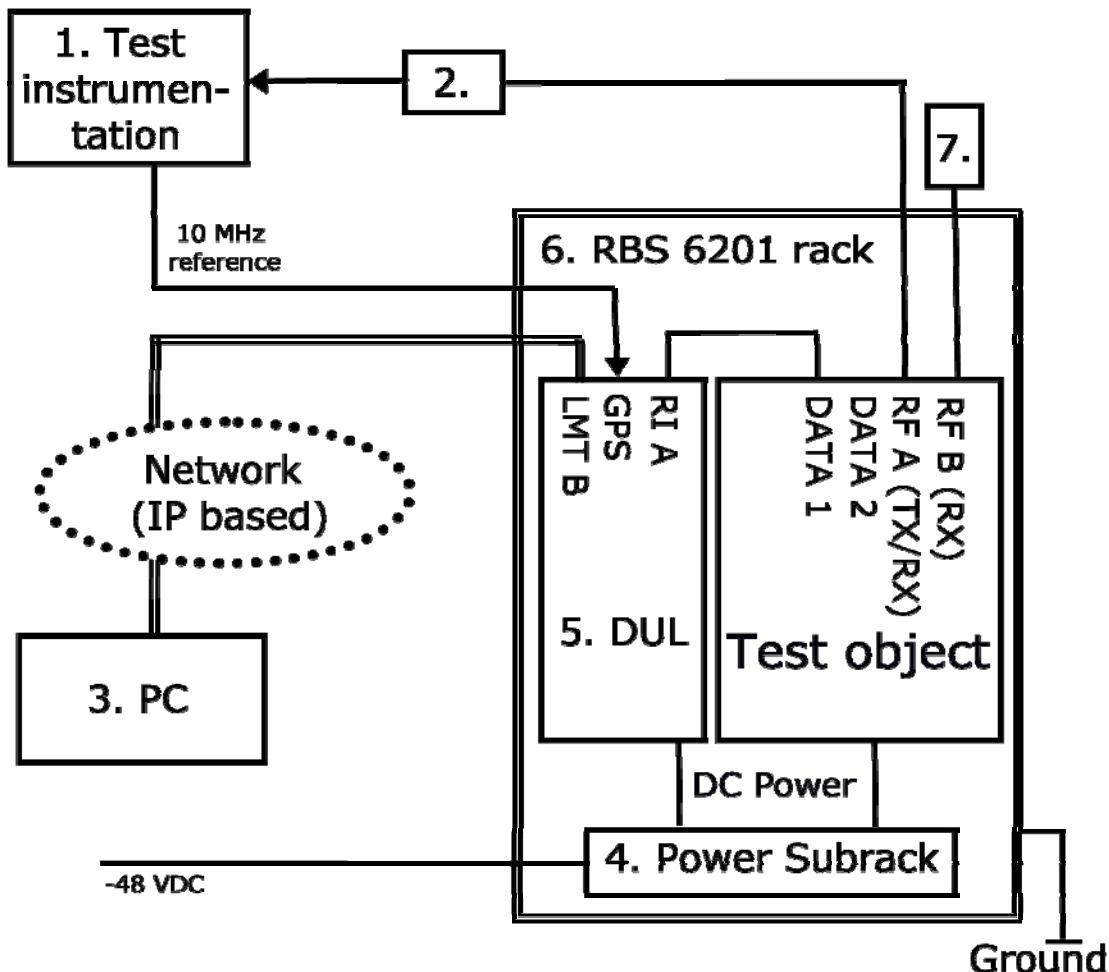
Test participants

Christer Gustavsson and Johnny Berg, 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. R2A, S/N (S)C823283518

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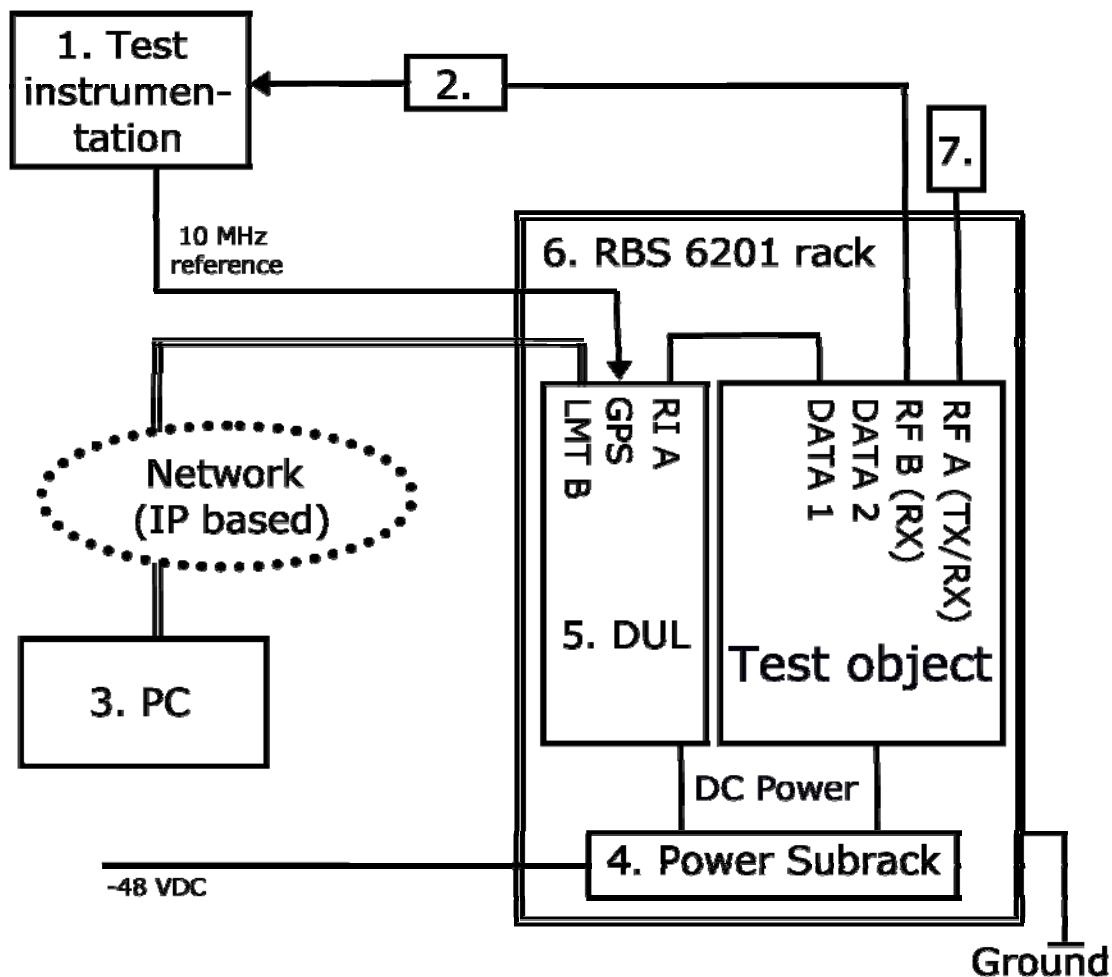
with software CXP 102 051/1 Rev R19M

Functional test equipment

1. SP test instrument according equipment list
2. Attenuator SP900229
3. Computer, SunFire x2200
4. Power Subrack, SXK 109 8115/1, Rev. R2A
 individual components see section 'Components of Power Subrack' below
5. DUL KDU 137 533/3 Rev R2B, SN (s)C823158943
6. RBS 6201 rack the EUT was mounted in during conducted measurements on port RF A.
7. Termination 50 ohm

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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. R2A, S/N (S)C823283518
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with software CXP 102 051/1 Rev R19M

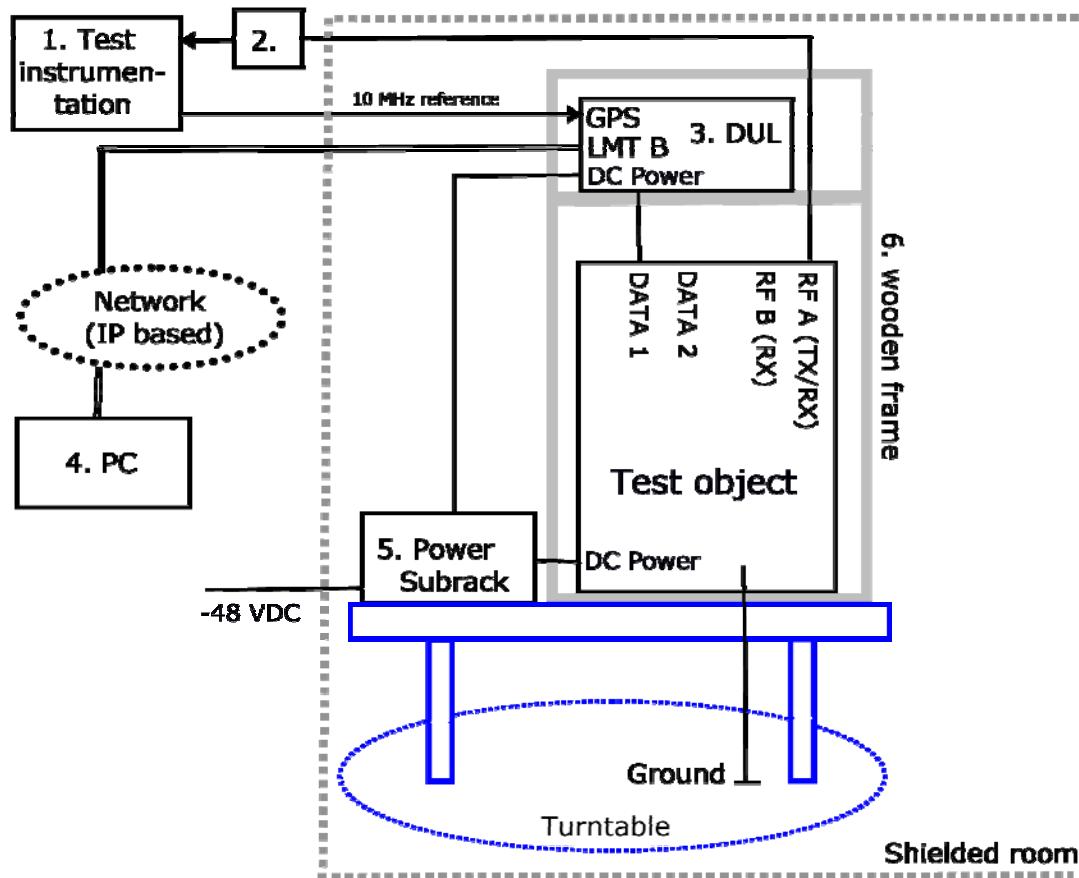
Functional test equipment

1. SP test instrument according equipment list
2. Attenuator SP503096 (below 1 GHz), DC-block (1 GHz and higher)
3. Computer, SunFire x2200
4. Power Subrack, SXK 109 8115/1, Rev. R2A
individual components see section 'Components of Power Subrack' below
5. DUL KDU 137 533/3 Rev R2B, SN (s)C823158943
6. RBS 6201 rack the EUT was mounted in during conducted measurements on port RF B.
7. 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. R2A, S/N (S)C823283518
FCC ID: TA8AKRC11859-1 and IC: 287AB-AS11859-1
with software CXP 102 051/1 Rev R19M

Functional test equipment

1. SP test instrument according equipment list
2. Attenuator
3. DUL KDU 137 533/3 Rev R2B, SN (s)C823158943
4. Computer, SunFire x2200
5. Power Subrack, SXK 109 8115/1, Rev. R2A
individual components see section 'Components of Power Subrack' below
6. Wooden frame



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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. Connector QMA. Not used | Signal |
| RXB I/O: RXB cross connector input / co-site output 18 dB. 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 |
|----------|----------------------|-----------------------|------------|---------------|---------|
| | Power Subrack | SXK 109 8115/1 | R2A | - | |
| 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 |
|------------|--------------|------------|
| 2010-03-02 | 22 °C ± 3 °C | 18 % ± 5 % |
| 2010-03-03 | 22 °C ± 3 °C | 15 % ± 5 % |

Test set-up and procedure

The test object was connected to a power analyzer measuring peak and RMS output power. All measurements were performed at maximum RF output power and were iterated over the supported channel bandwidth configurations, payload modulations and carrier configurations.

| Measurement equipment | SP number |
|---|-----------|
| Boonton RF Peak power meter/analyzer | 503 144 |
| Boonton Power sensor 56518-S/4 | 503 146 |
| RF attenuator | 900 229 |
| Testo 625, Temperature and humidity meter | 504 188 |

Measurement uncertainty: 0.7 dB**Results****Bandwidth configuration 5 MHz**

Rated output power level (maximum): 1x47.8 dBm

| Test conditions | Transmitter power | | |
|---|------------------------|----------------------|----------------------|
| | RMS (dBm) / CREST (dB) | | |
| T _{nom} 22 °C/ V _{nom} -48 V DC | Frequency 2112.5 MHz | Frequency 2132.5 MHz | Frequency 2152.5 MHz |
| E-TM1.1 | 47.0 / 6.5 | 47.1 / 6.5 | 47.0 / 6.4 |

Bandwidth configuration 10 MHz

Rated output power level (maximum): 1x47.8 dBm

| Test conditions | Transmitter power | | |
|---|------------------------|----------------------|--------------------|
| | RMS (dBm) / CREST (dB) | | |
| T _{nom} 22 °C/ V _{nom} -48 V DC | Frequency 2115 MHz | Frequency 2132.5 MHz | Frequency 2150 MHz |
| E-TM1.1 | 47.1 / 6.4 | 47.2 / 6.4 | 47.1 / 6.4 |



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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 ± 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 |
|------------|--------------|------------|
| 2010-03-02 | 22 °C ± 3 °C | 18 % ± 5 % |
| 2010-03-03 | 22 °C ± 3 °C | 15 % ± 5 % |
| 2010-03-04 | 22 °C ± 3 °C | 13 % ± 5 % |
| 2010-03-08 | 22 °C ± 3 °C | 16 % ± 5 % |

Test set-up and procedure

The measurements were made per definition in §2.1049. The output was connected to a signal 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 625, Temperature and humidity meter | 504 188 |

Measurement uncertainty: 3.7 dB

Results

The results are shown in appendix 3.1

Bandwidth configuration 5 MHz, E-TM1.1

| | Frequency | OBW |
|-----------|------------|----------|
| Diagram 1 | 2112.5 MHz | 4.48 MHz |
| Diagram 2 | 2132.5 MHz | 4.48 MHz |
| Diagram 3 | 2152.5 MHz | 4.48 MHz |

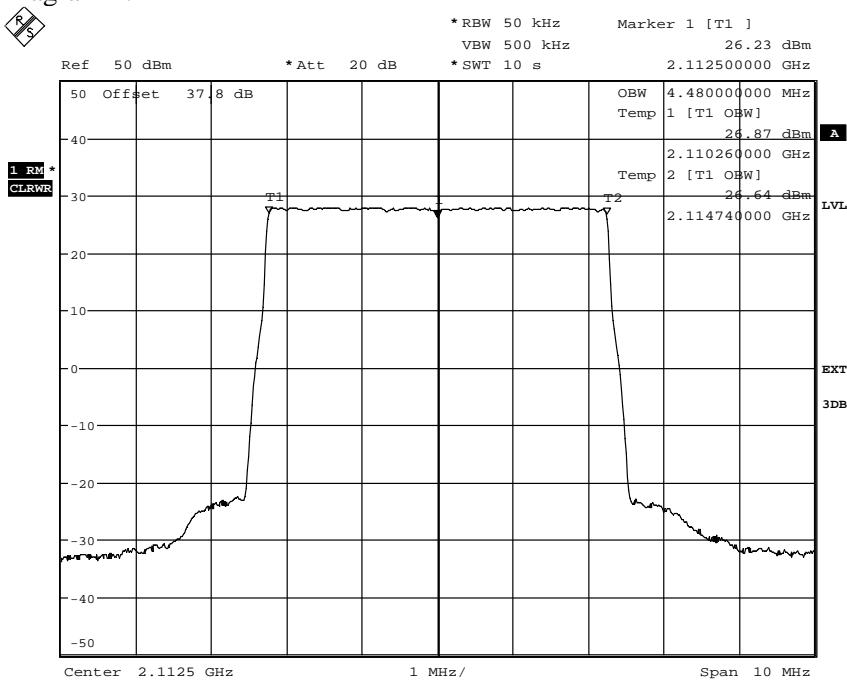
Bandwidth configuration 10 MHz, E-TM1.1

| | Frequency | OBW |
|-----------|------------|----------|
| Diagram 4 | 2115.0 MHz | 8.94 MHz |
| Diagram 5 | 2132.5 MHz | 8.94 MHz |
| Diagram 6 | 2150.0 MHz | 8.94 MHz |

FCC ID: TA8AKRC11859-1

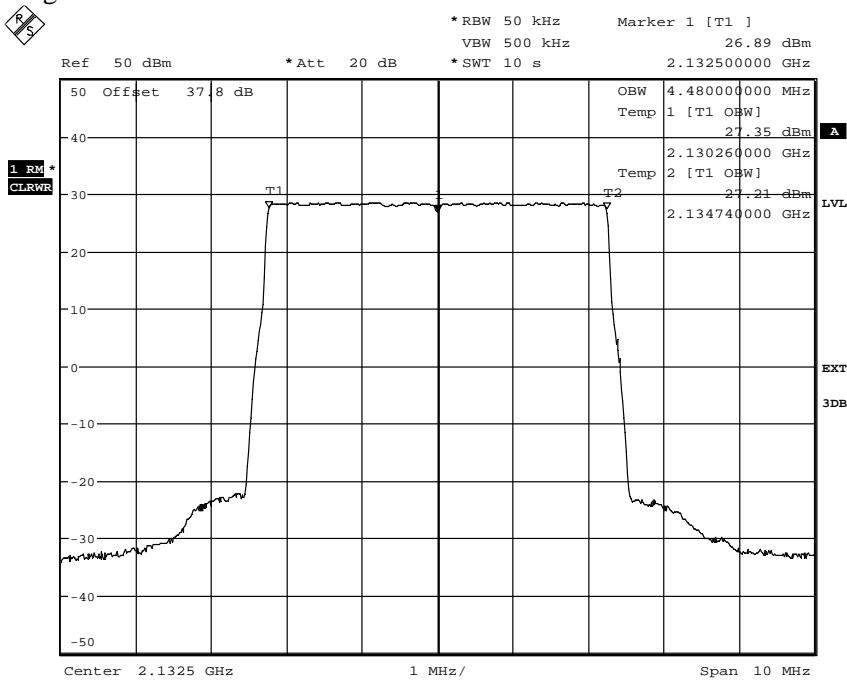
Appendix 3.1

Diagram 1:



Date: 3.MAR.2010 08:45:32

Diagram 2

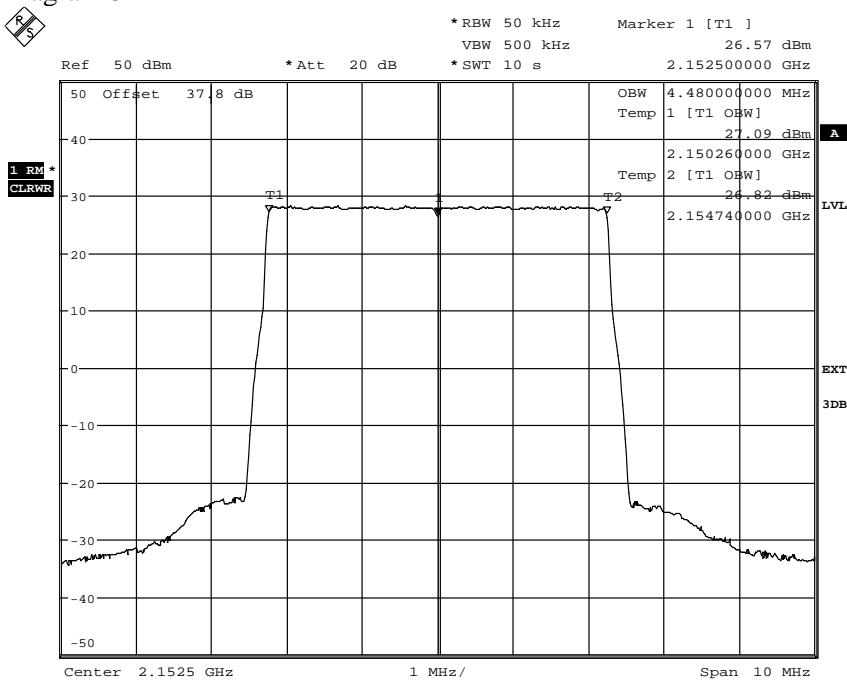


Date: 8.MAR.2010 10:26:13

FCC ID: TA8AKRC11859-1

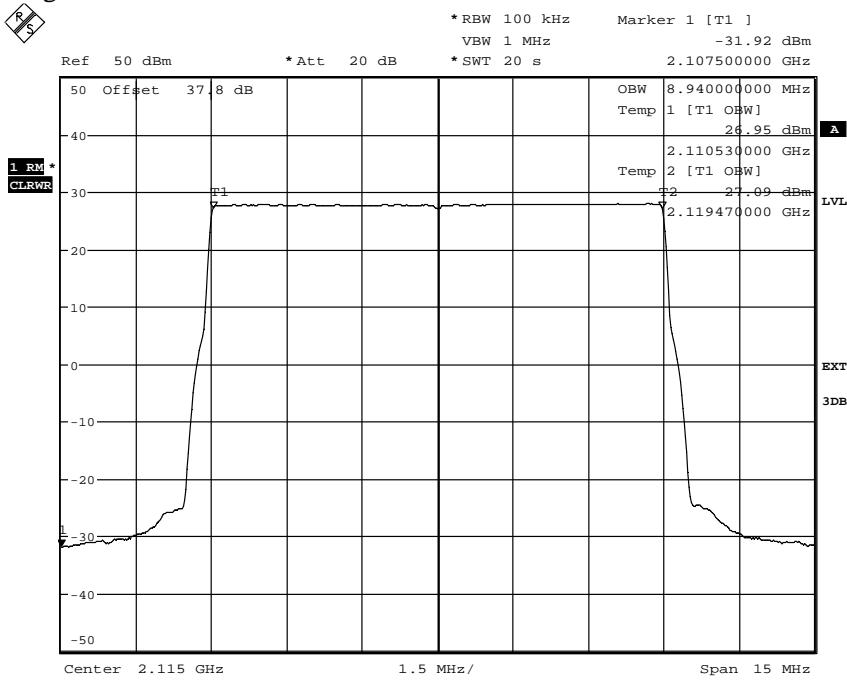
Appendix 3.1

Diagram 3



Date: 4.MAR.2010 08:53:17

Diagram 4

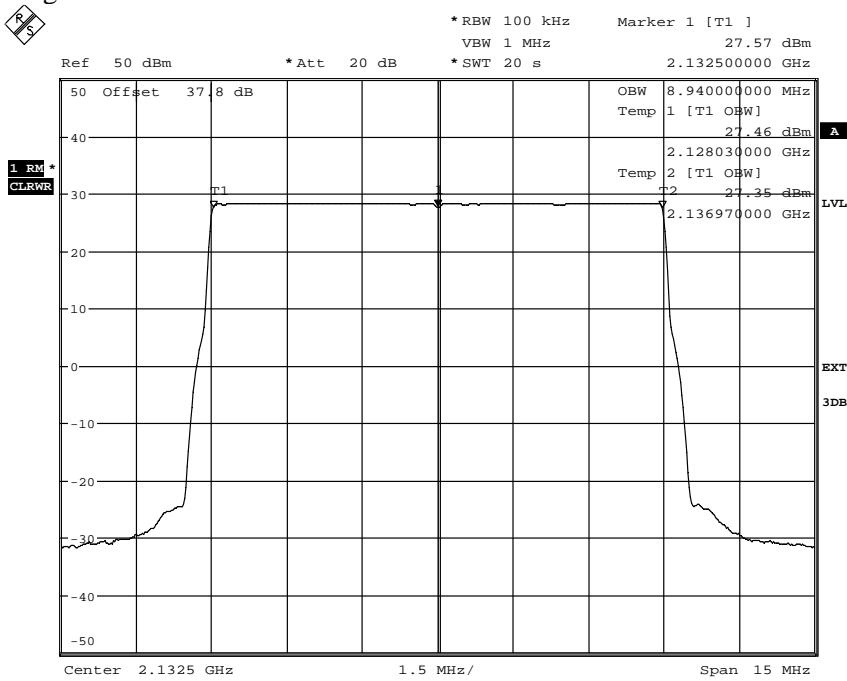


Date: 2.MAR.2010 14:58:00

FCC ID: TA8AKRC11859-1

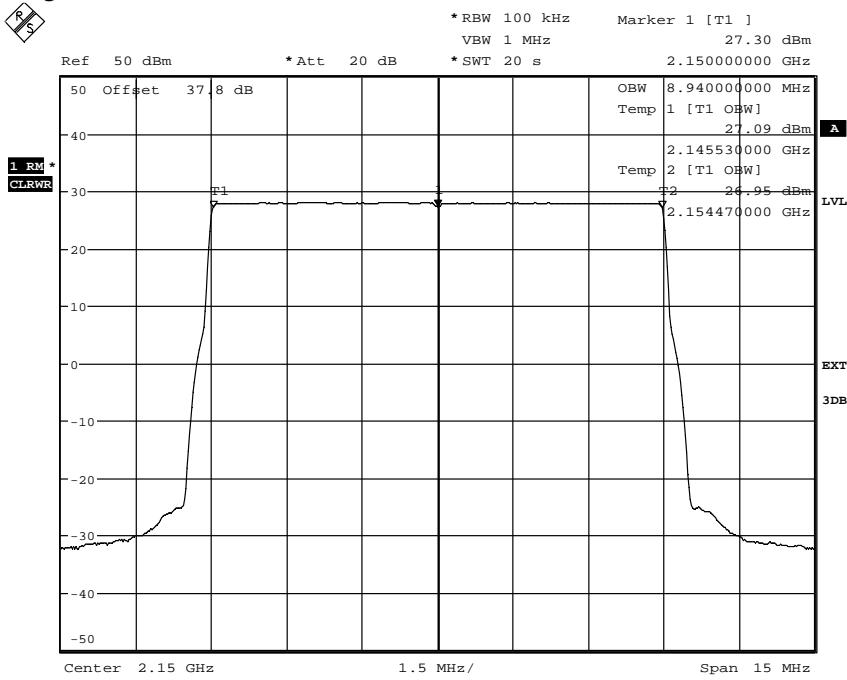
Appendix 3.1

Diagram 5



Date: 8.MAR.2010 12:07:24

Diagram 6



Date: 4.MAR.2010 14:21:33

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Appendix 4

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

| Date | Temperature | Humidity |
|------------|--------------|------------|
| 2010-03-04 | 22 °C ± 3 °C | 13 % ± 5 % |
| 2010-03-08 | 22 °C ± 3 °C | 16 % ± 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.

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

For channel bandwidth configuration 5 MHz the emission bandwidth was measured as 4.5 MHz and RBW 30 kHz was used for band-edge measurement. In consequence a correction of -1.8 dB (10 log (30/45) and an absolute limit of -14.8 dBm was applied for the first MHz outside the band. A correction of -15.2 dB (10 log (30/1000)) to -28.2 dBm was applied for emission more than 1 MHz from the band edge.

For channel bandwidth configuration 10 MHz the emission bandwidth was measured as 9.0 MHz and RBW 50 kHz was used for band-edge measurement. In consequence a correction of -2.6 dB (10 log (50/90) and an absolute limit of -15.6 dBm was applied for the first MHz outside the band and a correction of -13.0 dB (10 log (50/1000)) to -26.0 dBm was applied for emission more than 1 MHz from the band edge.

| Measurement equipment | SP number |
|---|-----------|
| R&S FSQ | 504 143 |
| RF attenuator | 900 229 |
| Testo 625, Temperature and humidity meter | 504 188 |

Measurement uncertainty: 3.7 dB

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Appendix 4

Results

The results are shown in appendix 4.1

Channel bandwidth configuration 5 MHz

| | Lower band edge TX center frequency 2112.5 MHz | Upper band edge TX center frequency 2152.5 MHz |
|-----------------------|---|---|
| Test model E-TM1.1 | Diagrams 1 a & b | Diagrams 2 a & b |

Channel bandwidth configuration 10 MHz

| | Lower band edge TX center frequency 2115 MHz | Upper band edge TX center frequency 2150 MHz |
|-----------------------|---|---|
| Test model E-TM1.1 | Diagrams 3 a & b | Diagrams 4 a & b |

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.

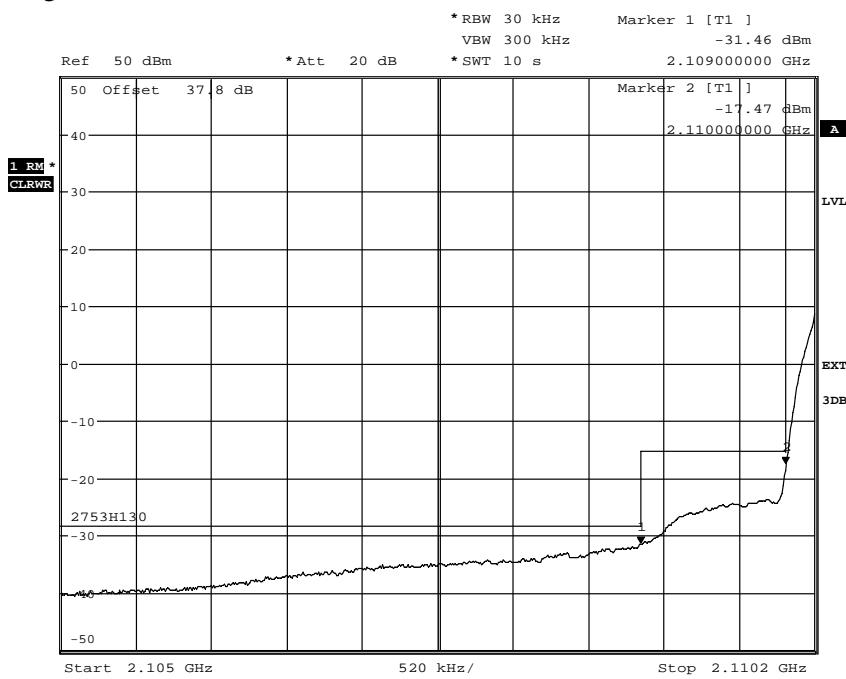
Resulting in an absolute limit of -13 dBm within the specified measurement bandwidth.

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

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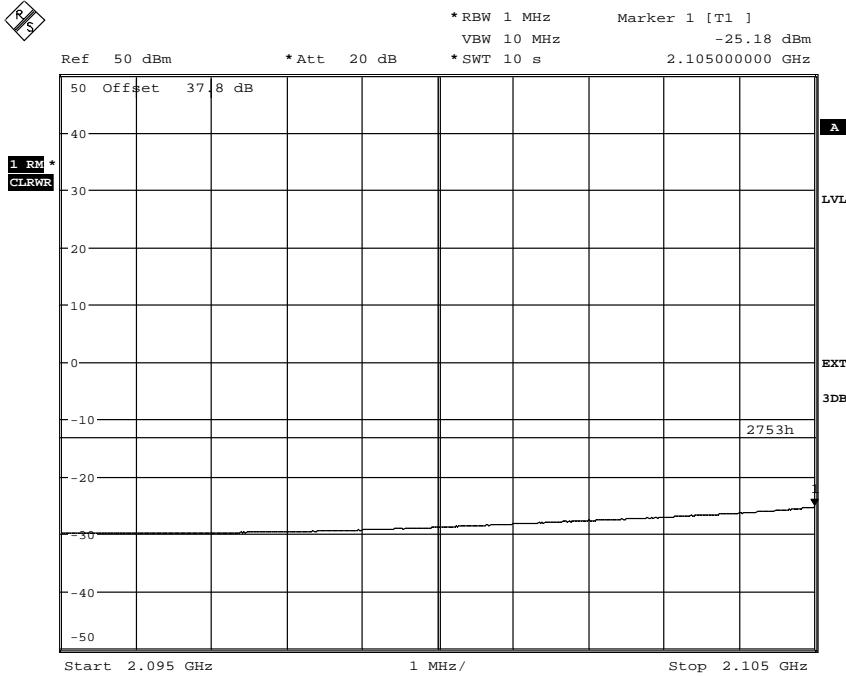
Appendix 4.1

Diagram 1 a



Date: 8.MAR.2010 12:46:42

Diagram 1 b

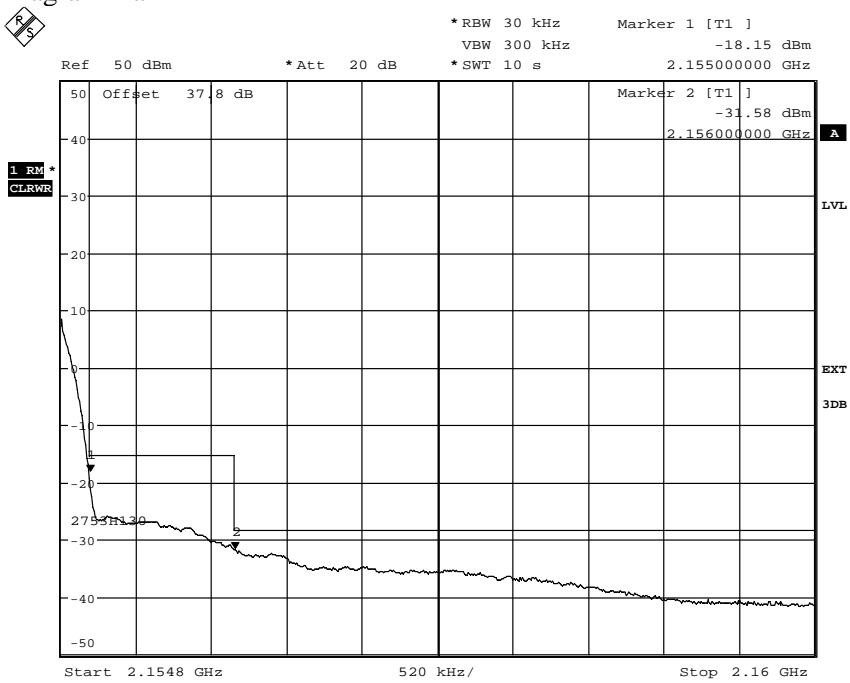


Date: 8.MAR.2010 13:54:59

FCC ID: TA8AKRC11859-1

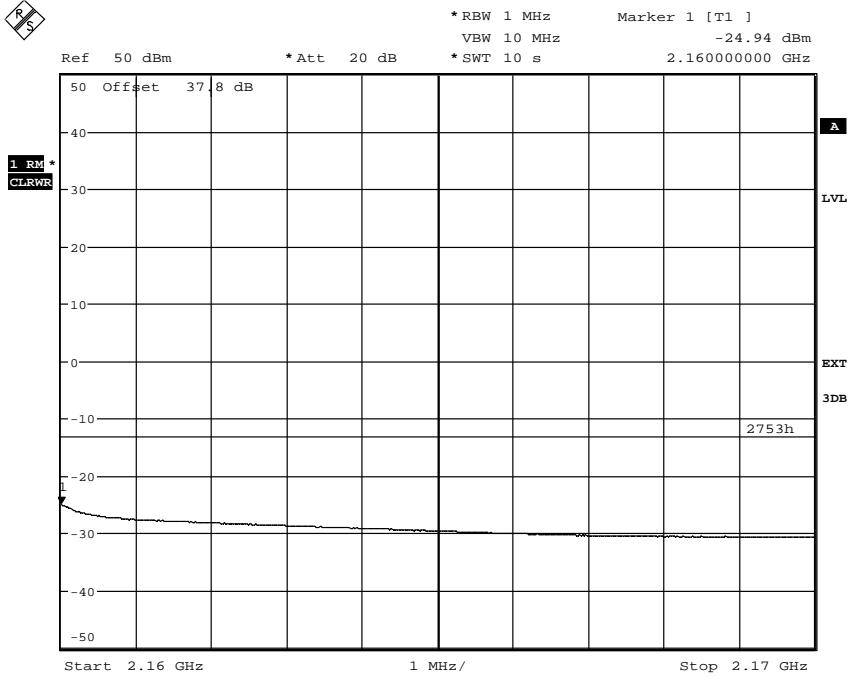
Appendix 4.1

Diagram 2 a



Date: 4.MAR.2010 13:10:26

Diagram 2 b

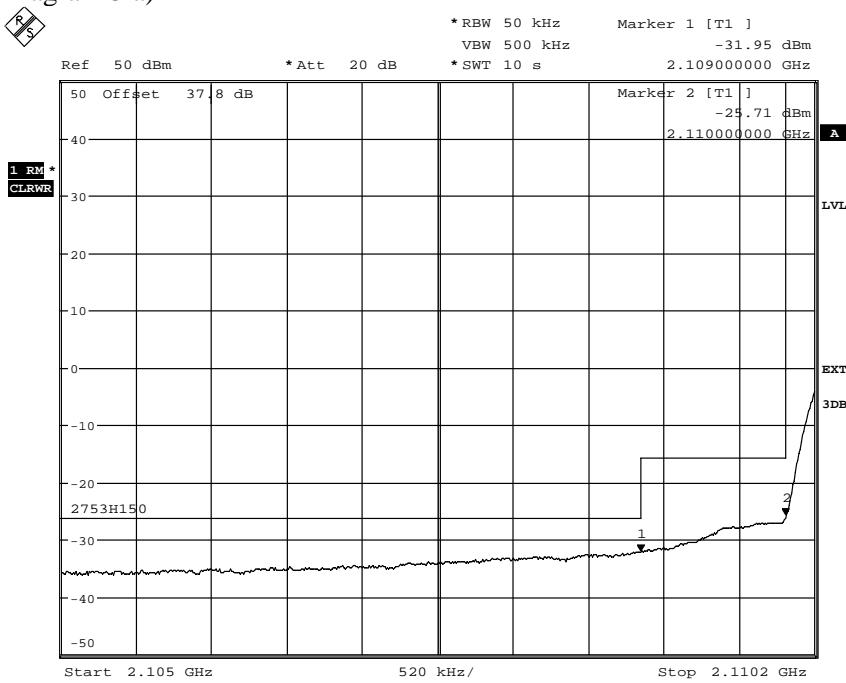


Date: 4.MAR.2010 13:16:53

FCC ID: TA8AKRC11859-1

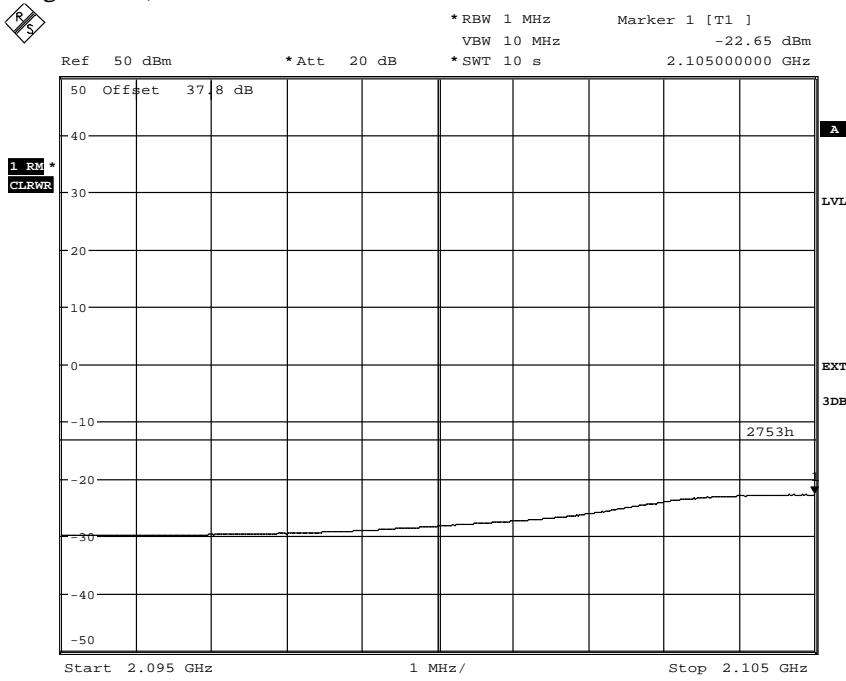
Appendix 4.1

Diagram 3 a)



Date: 8.MAR.2010 13:30:43

Diagram 3 b)

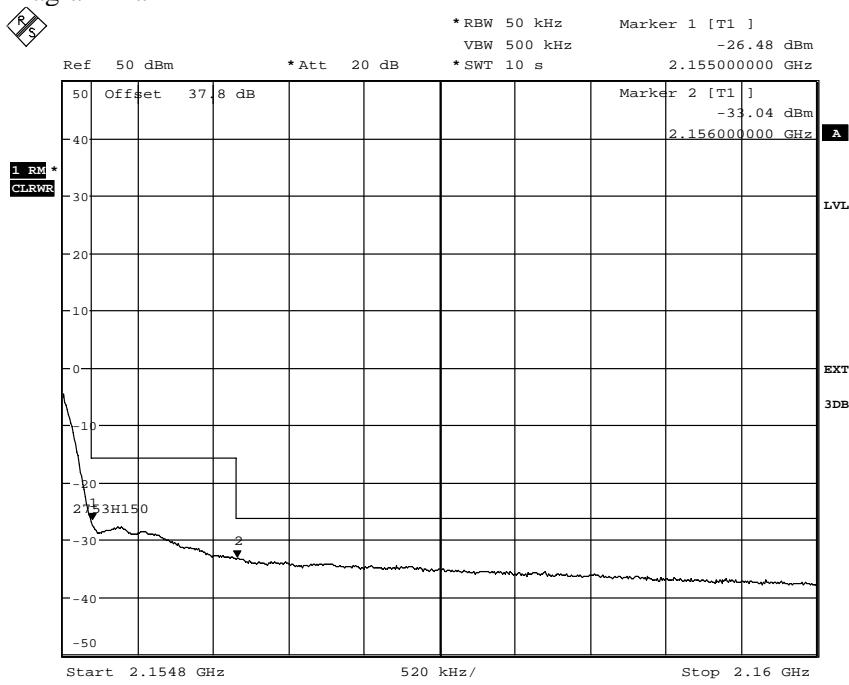


Date: 8.MAR.2010 13:36:29

FCC ID: TA8AKRC11859-1

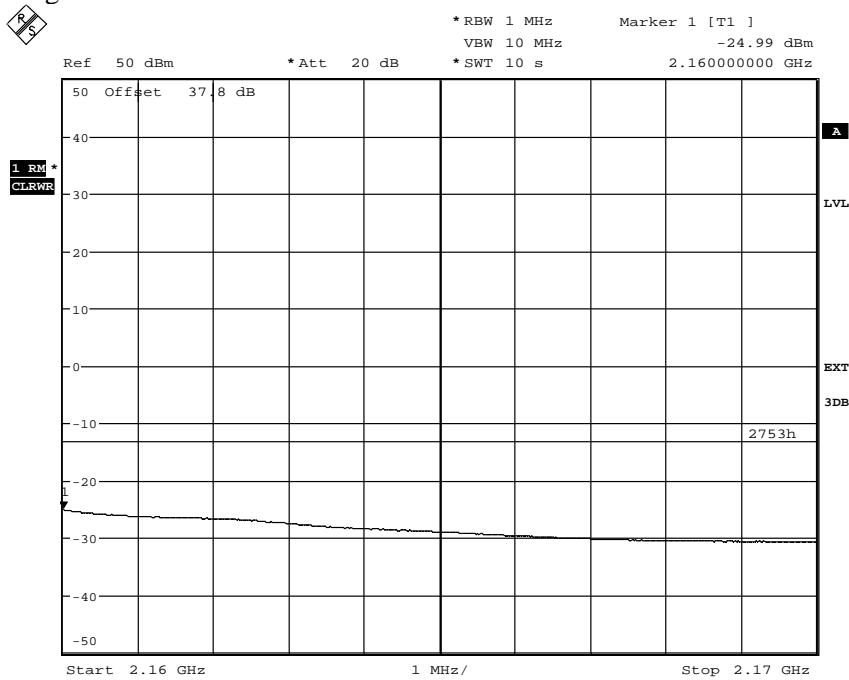
Appendix 4.1

Diagram 4 a



Date: 4.MAR.2010 14:09:48

Diagram 4 b



Date: 4.MAR.2010 14:00:02

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Appendix 5

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

| Date | Temperature | Humidity |
|------------|--------------|------------|
| 2010-03-03 | 22 °C ± 3 °C | 15 % ± 5 % |
| 2010-03-04 | 22 °C ± 3 °C | 13 % ± 5 % |
| 2010-03-08 | 22 °C ± 3 °C | 16 % ± 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.

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 |
|---|-----------|
| R&S FSQ | 504 143 |
| RF attenuator | 900 229 |
| High pass filter | 504 200 |
| Testo 625, Temperature and humidity meter | 504 188 |

Measurement uncertainty: 3.7 dB**Results**

| | Frequency |
|-----------|------------|
| Diagram 1 | 2112.5 MHz |
| Diagram 2 | 2132.5 MHz |
| Diagram 3 | 2152.5 MHz |

The diagrams are shown in appendix 5.1

Note: During wide-band pre-measurement a PEAK detector was used and a conservative external attenuation value was applied, corresponding to the highest attenuation within the displayed frequency range. This led to lower frequency spurious components being presented with a significantly higher value compared to measurement with a RMS-detector and the external attenuation value corrected for the frequency of interest. For detected spurious emissions narrow-band RMS measurements were done to determine the correct level.

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.

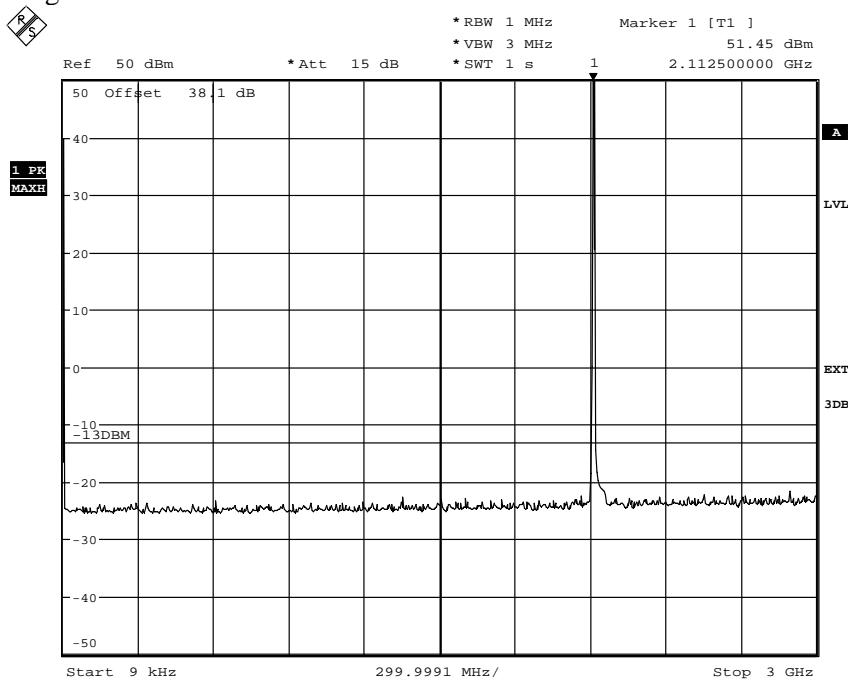
| | |
|-----------|-----|
| Complies? | Yes |
|-----------|-----|

FCC ID: TA8AKRC11859-1

Appendix 5.1

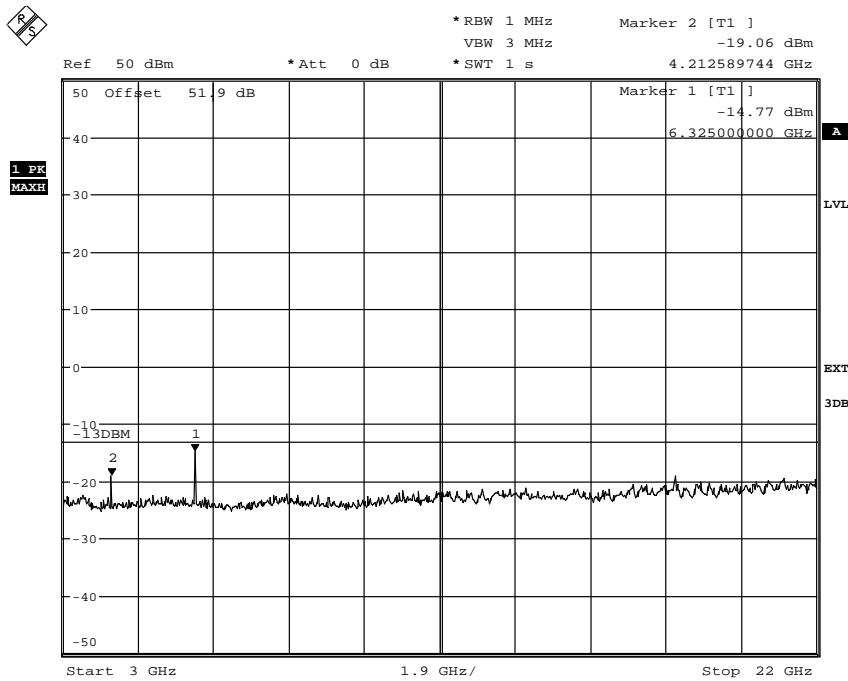
Result diagrams

Diagram 1:



Date: 3.MAR.2010 09:02:29

Note: The emission at 9 kHz was related to the LO feedthrough. A complementary measurement was performed with a smaller RBW to verify that there were no emissions in the frequency range 9k-10MHz.



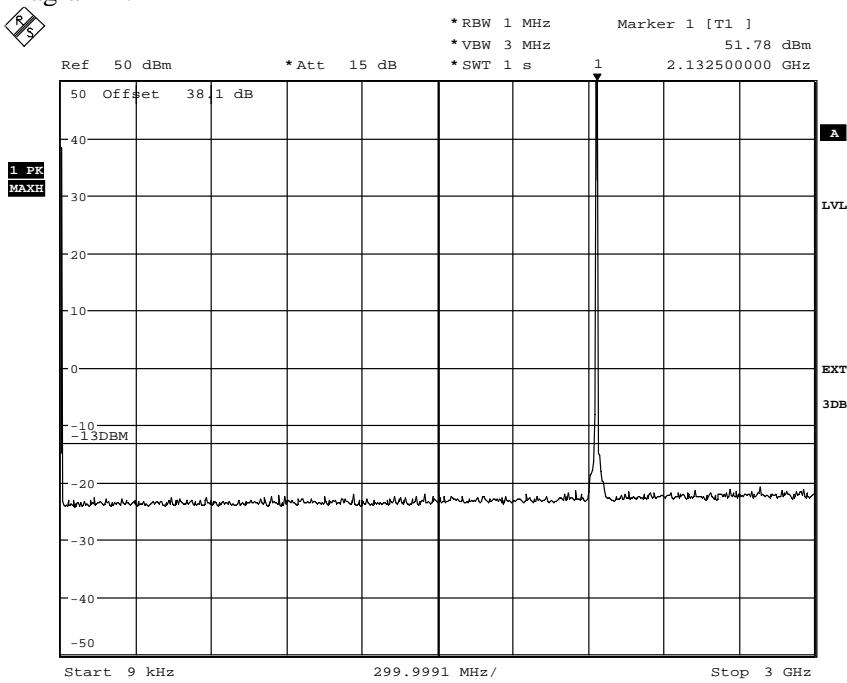
Date: 3.MAR.2010 09:09:07

Note: Above marked emissions did not exceed an RMS-value of -33 dBm.

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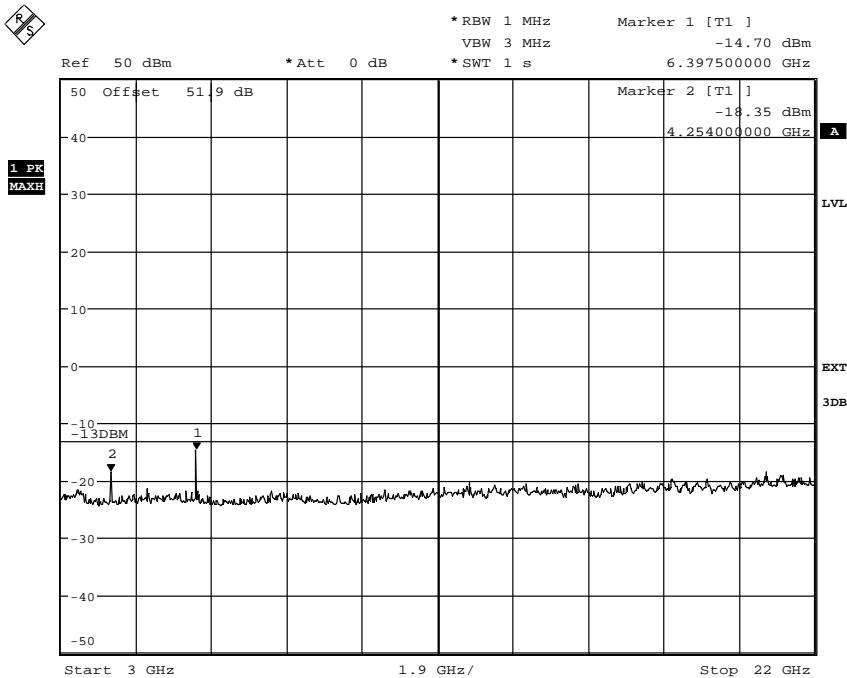
Appendix 5.1

Diagram 2:



Date: 8.MAR.2010 10:39:12

Note: The emission at 9 kHz was related to the LO feedthrough. A complementary measurement was performed with a smaller RBW to verify that there were no emission in the frequency range 9k-10MHz.



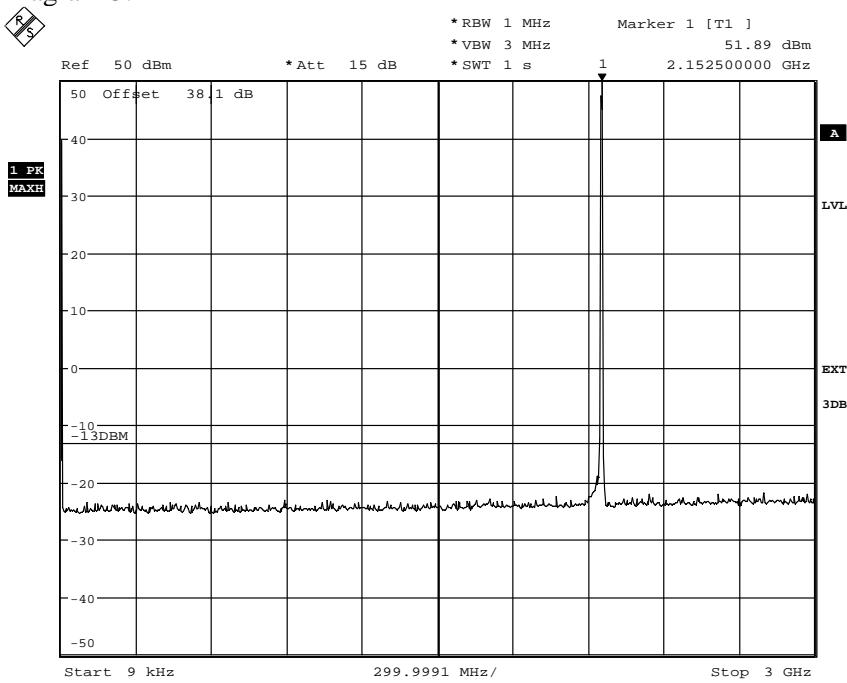
Date: 8.MAR.2010 10:44:31

Note: Above marked emissions did not exceed an RMS-value of -33 dBm.

FCC ID: TA8AKRC11859-1

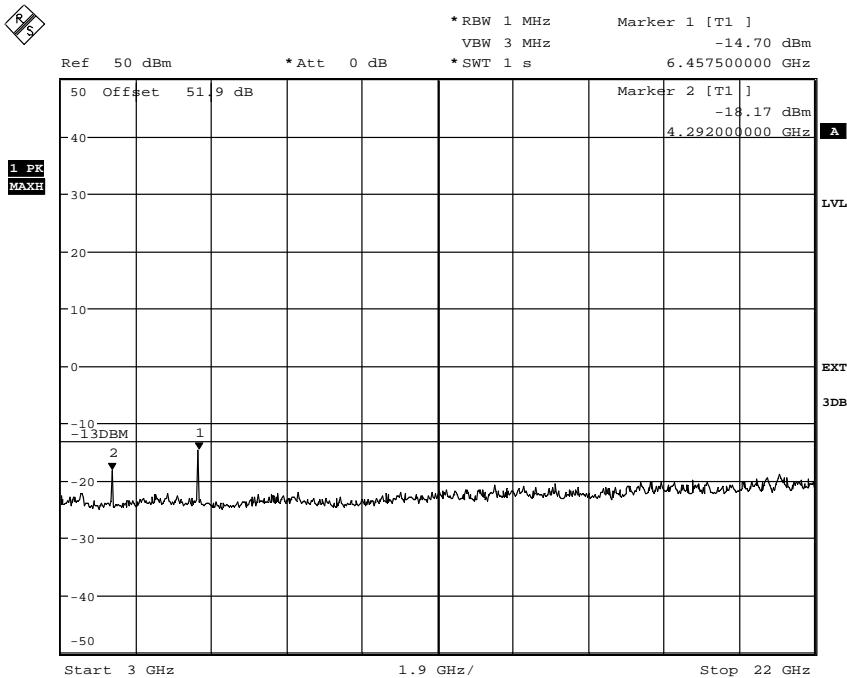
Appendix 5.1

Diagram 3:



Date: 4.MAR.2010 10:05:50

Note: The emission at 9 kHz was related to the LO feedthrough. A complementary measurement was performed with a smaller RBW to verify that there were no emission in the frequency range 9k-10MHz.



Date: 4.MAR.2010 10:10:17

Note: Above marked emissions did not exceed an RMS-value of -33 dBm.

FCC ID: TA8AKRC11859-1
 IC: 287AB-AS11859-1

Appendix 6

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

| Date | Temperature | Humidity |
|------------|--------------|------------|
| 2010-02-24 | 21 °C ± 3 °C | 20 % ± 5 % |
| 2010-02-25 | 21 °C ± 3 °C | 18 % ± 5 % |
| 2010-02-26 | 21 °C ± 3 °C | 26 % ± 5 % |
| 2010-03-01 | 21 °C ± 3 °C | 26 % ± 5 % |

Test set-up and procedure

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

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

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,

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

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.

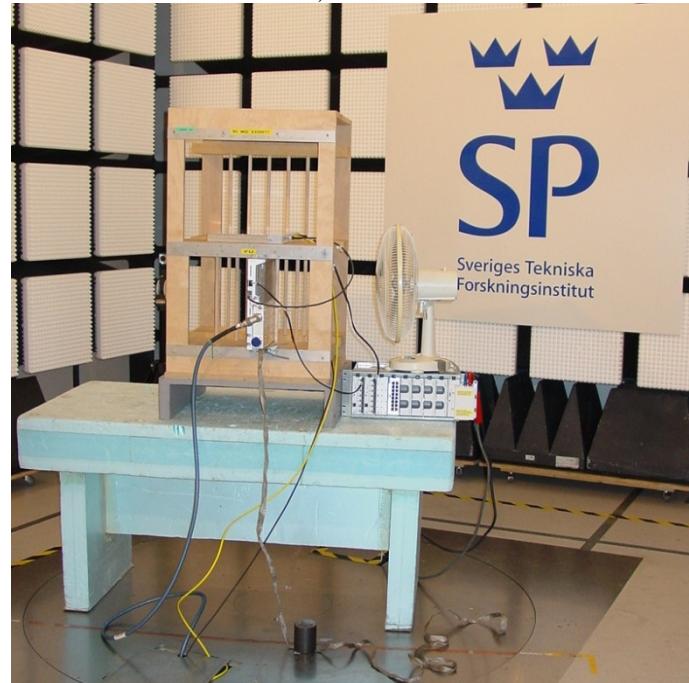
| Measurement equipment | SP number |
|--|-----------|
| Semi anechoic chamber, Edison (measurements 30MHz-18GHz) | 504 114 |
| EMI measurement computer | - |
| R&S EMI test receiver ESIB 26 | 503 885 |
| Software: R&S EMC32, ver. 6.10.10 | 503 745 |
| Antenna Schaffner CBL 6143 | 504 079 |
| EMCO Horn Antenna 3115 | 501 548 |
| MITEQ Low Noise Amplifier | 504 160 |
| 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 |
| MITEQ Low Noise Amplifier | 503 285 |
| Standard gain antenna 20240-20 | 503 674 |
| High pass filter | 504 200 |
| Testo 625 temperature and humidity meter | 504 188 |

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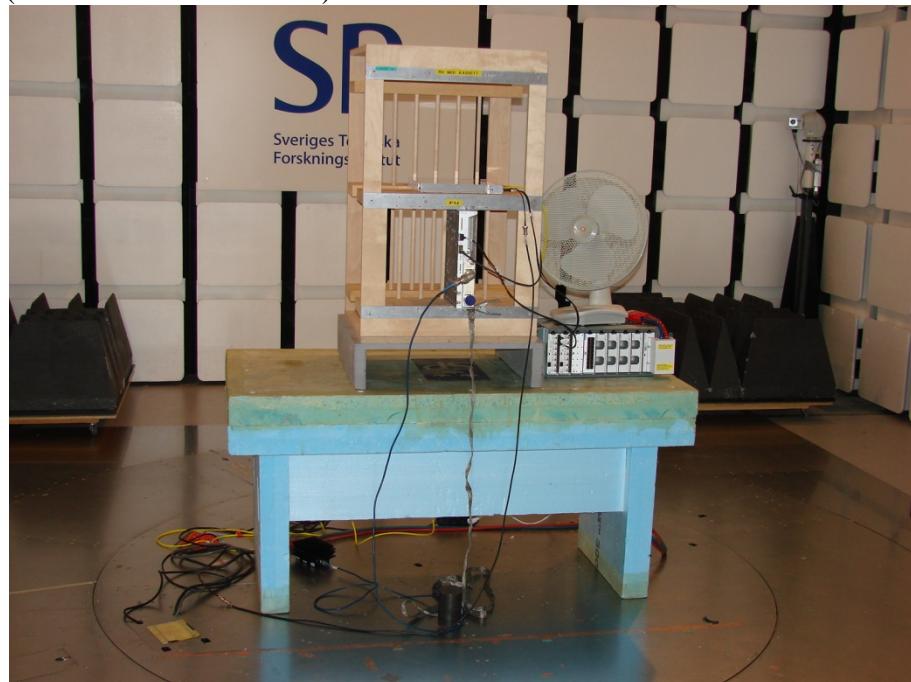
Appendix 6

The test set-ups during the spurious radiation measurements are shown in the pictures below:

Site Edison (measurements 30 MHz – 18 GHz):



Site Tesla (measurements 18-22 GHz):



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Appendix 6

Results

Single carrier

| 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 | | 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 |
|-----------|-----|

FCC ID: TA8AKRC11859-1
IC: 287AB-AS11859-1

Appendix 7

Frequency stability measurements according to 47 CFR 2.1055

| Date | Temperature (test equipment) | Humidity (test equipment) |
|------------|------------------------------|---------------------------|
| 2010-02-01 | 23 °C ± 3 °C | 24 % ± 5 % |
| 2010-02-02 | 24 °C ± 3 °C | 24 % ± 5 % |
| 2010-02-03 | 23 °C ± 3 °C | 24 % ± 5 % |
| 2010-03-04 | 23 °C ± 3 °C | 24 % ± 5 % |

Test set-up and procedure

The measurement was made per 3GPP TS 36.141. 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 3 | 503 546 |
| Rohde & Schwarz signal analyzer FSQ40 | 504 143 |
| RF attenuator | 900 229 |
| RF attenuator | 504 159 |
| Testo 635, Temperature and humidity meter | 504 203 |
| Testo 625, Temperature and humidity meter | 504 188 |
| Rotronic temperature and humidity meter | 502 946 |
| Multimeter Fluke 87 | 502 190 |

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Appendix 7

Results

Nominal transmitter frequency was 2132.5 MHz in channel bandwidth configuration 10 MHz.
Rated output power level at RF A connector (maximum): 47.8 dBm (60 W).

| Test conditions | | Frequency error (Hz) |
|--------------------------|--------|--------------------------|
| Supply voltage DC (V) | T (°C) | E-TM1.1 |
| -48.0 | +20 | -5 |
| -55.2 | +20 | -3 |
| -40.8 | +20 | -4 |
| -48.0 | +30 | -6 |
| -48.0 | +40 | -6 |
| -48.0 | +50 | +6 |
| -48.0 | +10 | -5 |
| -48.0 | 0 | -4 |
| -48.0 | -10 | TX disabled (Note 1) |
| -48.0 | -20 | N.T. |
| -48.0 | -30 | N.T. |
| Maximum freq. error (Hz) | | -6 |
| Measurement uncertainty | | $< \pm 1 \times 10^{-7}$ |

Note 1: The test object firmware successfully disabled TX transmission outside the temperature range specified by the manufacturer.

Limits (according to 3GPP TS 36.141)

6.5.1.5 The frequency Error shall be within $\pm(0.05 \text{ PPM} + 12 \text{ Hz})$ ($\pm 118.625 \text{ Hz}$).

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

FCC ID: TA8AKRC11859-1
IC: 287AB-AS11859-1

Appendix 8

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

| | | |
|--------------------|-----------------------------|------------------------|
| Date 2010-03-08 | Temperature 22 °C ± 3 °C | Humidity 16 % ± 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 2132.5 MHz with test model E-TM1.1 in channel bandwidth configuration 5 MHz.

| Measurement equipment | SP number |
|--|-----------|
| R&S FSQ40 | 504 143 |
| RF attenuator | 900 229 |
| High pass filter | 504 199 |
| Testo 625 Temperature and humidity meter | 504 188 |

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

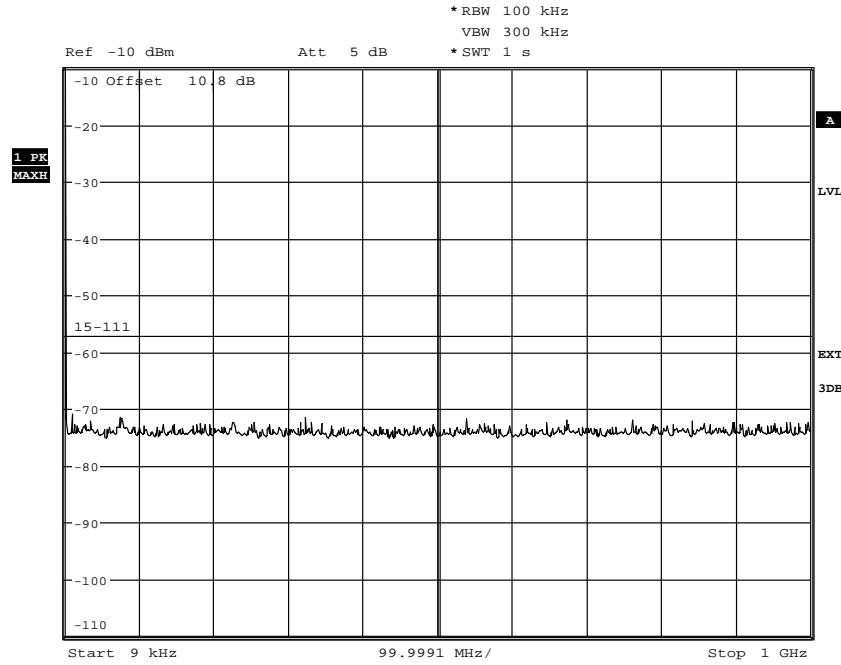
The power of any spurious output signals appearing at the antenna terminals must not exceed -57 dBm (2 nanowatt).

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

FCC ID: TA8AKRC11859-1
 IC: 287AB-AS11859-1

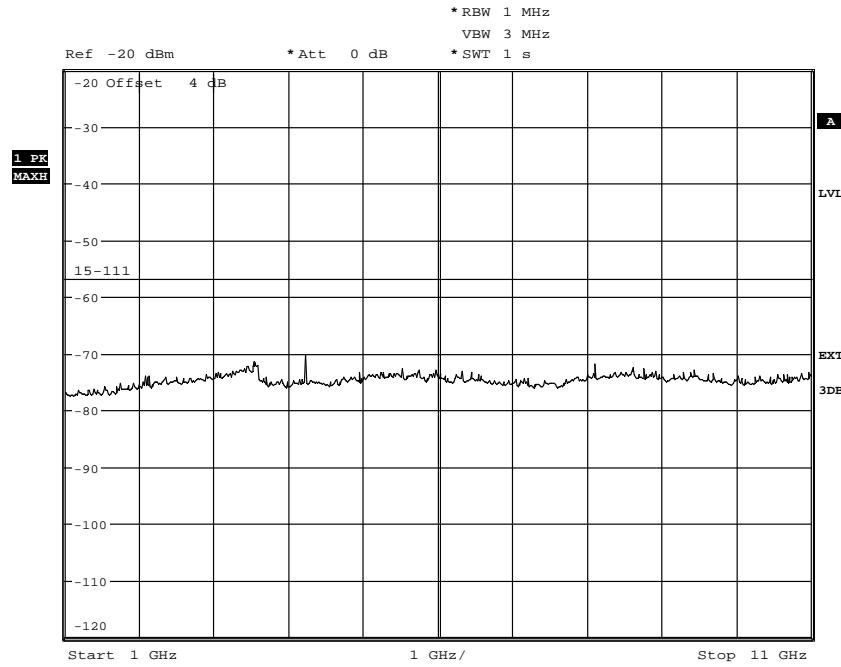
Appendix 8.1

Diagram 1a:



Date: 8.MAR.2010 11:00:31

Diagram 1b:



Date: 8.MAR.2010 11:11:28

FCC ID: TA8AKRC11859-1
IC: 287AB-AS11859-1

Appendix 9

Photos

Front side



Rear side



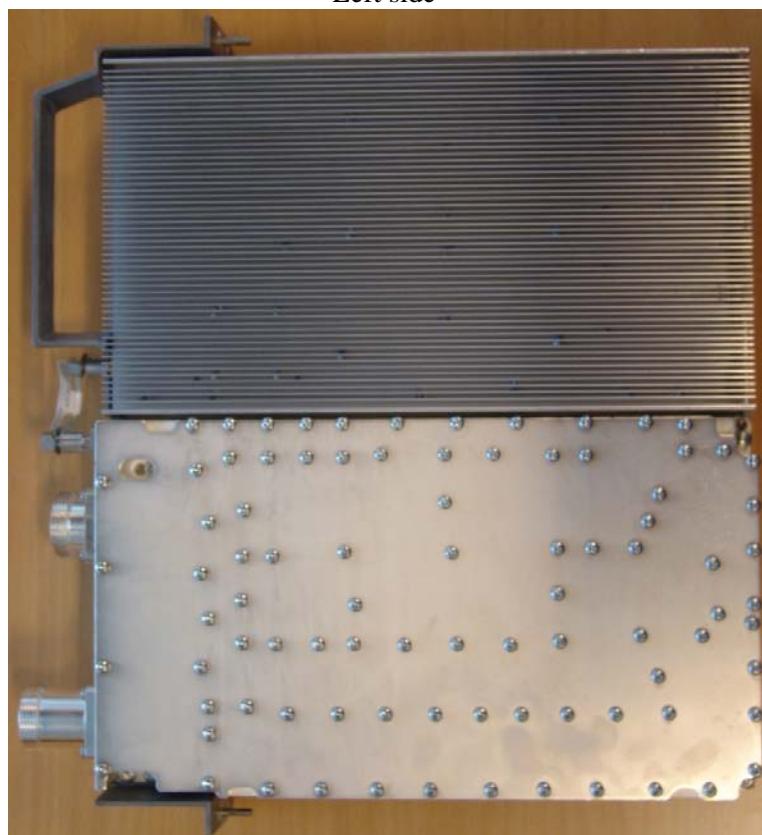
FCC ID: TA8AKRC11859-1
IC: 287AB-AS11859-1

Appendix 9

Right side



Left side



FCC ID: TA8AKRC11859-1
IC: 287AB-AS11859-1

Appendix 9

Bottom side



Top side

