REPORT

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The test site complies with RSS-Gen, Issue 2, file no: IC 3482

Date	Reference	Page
2007-10-30	F717142-F22	1 (2)

1002
ISO/IEC 17025

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Radio measurements on WCDMA 850 MHz Radio Equipment with FCC ID: TA8AKRC161134-5

(9 appendices)

Test object

RRU22 0840, product no. KRC 161 134/5 revision R1B, serial no. CB44474900

Appendix 1 provides information about the test object and the test set-up.
Appendix 9 provides external photos of the test object.

Summary

Standard		Compliant	Appendix
FCC CFR 47 / IC RSS-132			
2.1046 / RSS-132 4.4	RF power output	Yes	2
2.1049 / -	Occupied bandwidth	Yes	3
2.1051 / RSS-132 4.5	Band edge	Yes	4
2.1051 / RSS-132 4.5	Spurious emission at antenna terminals	Yes	5
2.1053 / -	Field strength of spurious radiation	Yes	6
2.1055 / RSS-132 4.3	Frequency stability	Yes	7
FCC CRF 47 / Industry Canada RSS-132			
15.111 / RSS-132 4.6	Receiver spurious emissions	Yes	8

Note: Above RSS-132 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
Electronics - EMC

Jan Welinder
Technical Manager

Reinhold Reul
Technical Officer

Table of contents

Description – Test object

Equipment: WCDMA Radio Equipment RRU22 0840, with 850 MHz single and multi carrier configuration.

Tx Frequency range: 871.4 – 891.6 MHz

Modulations: QPSK and 16QAM

Maximum output power: Single carrier: 1x 46 dBm (1x 40W)
Multi carrier: 2x 43 dBm (2x 20W)

Nominal power voltage: -48 VDC

Tested channels

UARFCN	Frequency
4357	871.4 MHz
4407	881.4 MHz
4408	881.6 MHz
4458	891.6 MHz

Operation mode during measurements

Test models

All measurements were performed with the test object configured with the test models 1 and 5 as defined in 3GPP TS 25.141. Test model 1 uses the QPSK modulation only, and test model 5 includes the 16QAM modulation.

Conducted measurements

TX conducted measurements were done at the output connector Ant 1 of the RRU22 0840, KRC 161134/5. RX conducted measurements were done at the output connector Ant 2 of the RRU22 0840, KRC 161134/5. All measurements were performed at maximum output power with both modulations unless otherwise noted.

The settings below was found to be representative for all traffic scenarios when several settings were tested to find the setting for worst case.

Single carrier
Test model 1: 64 DPCH:s at 30 ksps (SF=128)
Test model 5: 30 DPCH:s at 30 ksps (SF=128) and 8 HS-PDSCH:s at 240 ksps (SF=16)

Multi carrier
Test model 1: 32 DPCH:s at 30 ksps (SF=128)
Test model 5: 30 DPCH:s at 30 ksps (SF=128) and 8 HS-PDSCH:s at 240 ksps (SF=16)

Radiated measurements

All radiated measurements were performed with the test object powered with -48 VDC, either directly (power configuration 1) or with 120 VAC/60 Hz via the PSU AC/DC converter (power configuration 2) or via both ACCU and PSU (power configuration 3). The configurations were selected to represent worst cases.

The RRU22 was activated as Single Carrier 1x 46 dBm and as Multi Carrier 2x 43 dBm. The RF output power ports were terminated with 50 ohm loads.

The RRU22 was measured with the following settings:

Single Carrier

Downlink UARFCN	4357 (871,4 MHz)	4357 (871,4 MHz)	4407 (881,4 MHz)	4407 (881,4 MHz)	4458 (891.6 MHz)	4458 (891.6 MHz)
Uplink UARFCN:	4132 (826,4 MHz)	4132 (826,4 MHz)	4182 (836,4 MHz)	4182 (836,4 Hz)	4233 (846.6 MHz)	4233 (846.6 MHz)
Test model	1	5	1	5	1	5
Power configuration	1	1	2	2	3	3

Test model 1: 64 DPCHs at 30 ksps (SF=128)
Test model 5: 30 DHCPs at 30 ksps (SF=128) and 8 HS-PDSCHs at 240 ksps (SF=16)

Multi Carrier:

Cell	1	2
Downlink	4357 (871,4 MHz)	4407 (881,4 MHz)
Uplink	4132 (826,4 MHz)	4182 (836,4 MHz)
Test model	1	5
Power configuration	1	1

Test model 1: 32 DPCHs at 30 ksps (SF=128)
Test model 5: 30 DHCPs at 30 ksps (SF=128) and 8 HS-PDSCHs at 240 ksps (SF=16)

Purpose of test

The purpose of the tests is to verify compliance to the performance characteristics specified in FCC CFR 47 and Industry Canada RSS-132.

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
RSS-132

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: 2007-10-01

Manufacturer's representative

Han Li, Ericsson (China) Communications Company Ltd.

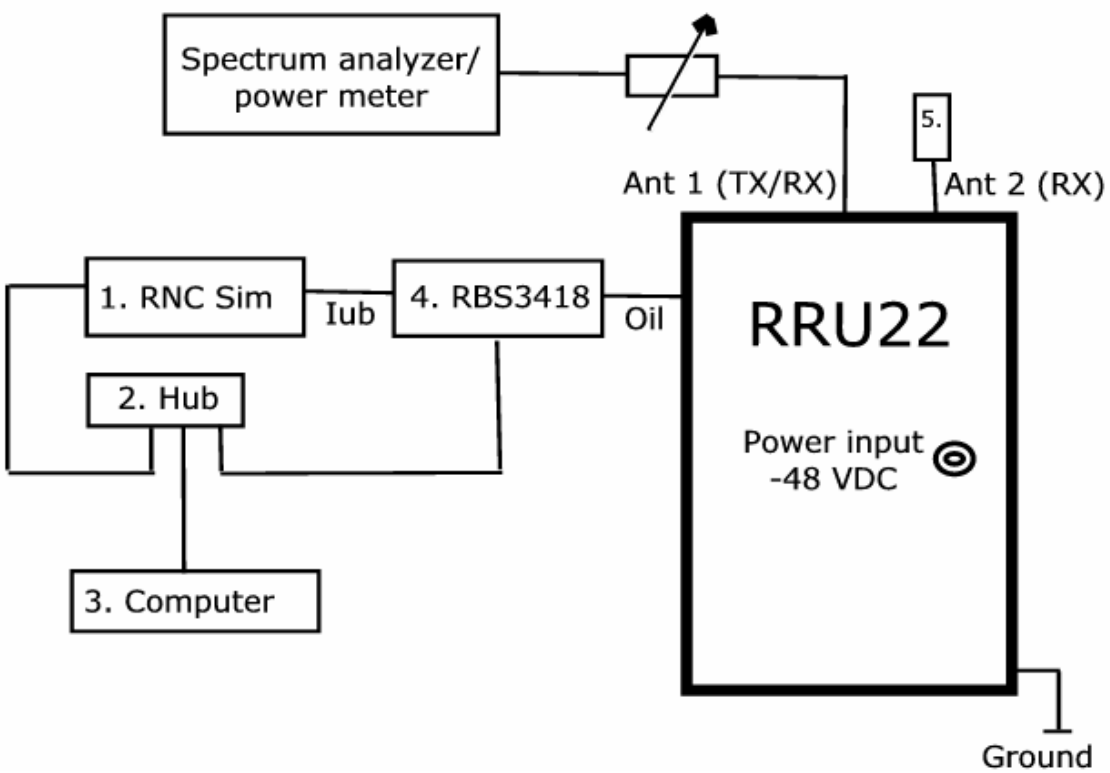
Test engineers

.
Jörgen Wassholm and Reinhold Reul

Test witness

Guanghua Chen, Ericsson (China) Communications Company Ltd.

Test set-up, TX conducted measurements



Test object
RRU22 0840, KRC 161 134/5 revision R1B, serial no: CB44474900
Software CXP 9011610/1 revision R11AG02
with updated RRU load module CXP9011683/2 revision R2F01
FCC ID: TA8AKRC161134-5

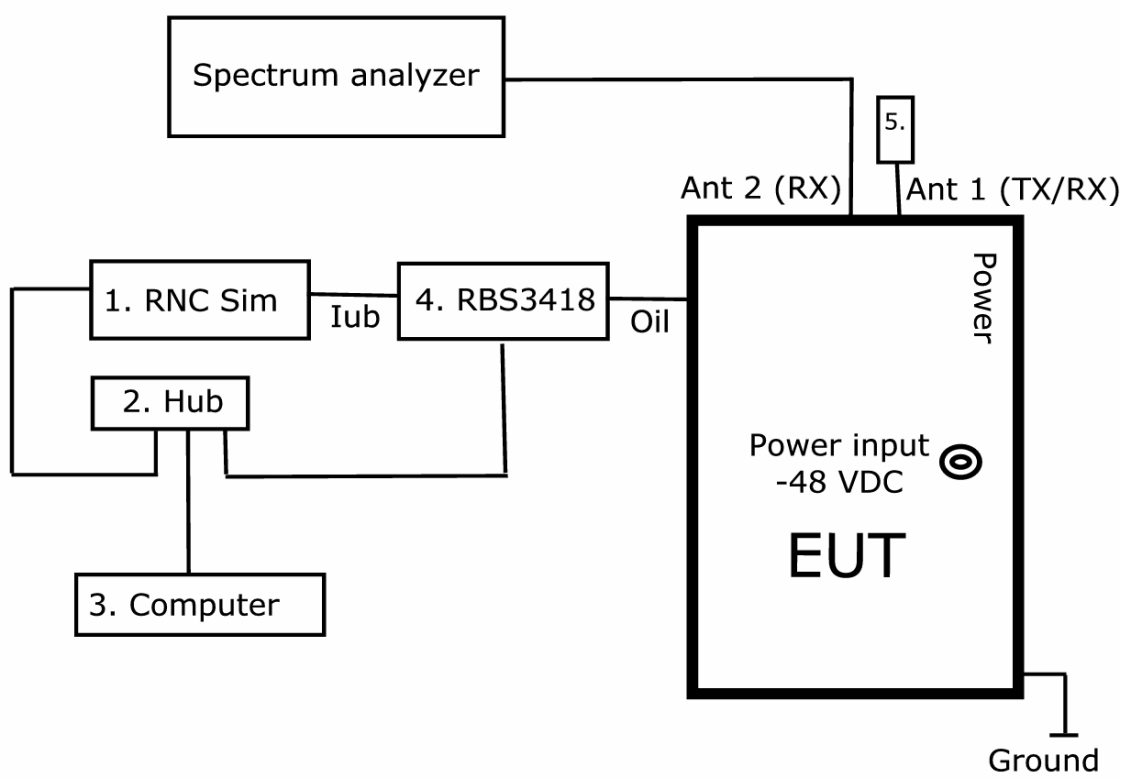
Functional test equipment

1. RNC Mini-sim #48, 4780FA SN0218 Rev DBA
2. Hub, TP-Link, TL HP8MU, 10Base-T Ethernet
3. Computer, Sun Blade 1500, asset ID AP016574
4. RBS3418, product no. BFE4011019, serial no. TA63805732
5. Termination (50 ohm)

Note: The Iub link between RNC Mini sim and RBS3418 is configured as T1.

Interfaces:	**Type of port:**
Power input -48 VDC	Power
Ant 1 (TX/RX): Coaxial cable with N connector and adaptor to 7/16”	Antenna
Ant 2 (RX): 50 ohm terminator with N connector and adaptor to 7/16”	Antenna
Oil - optical interface link, data connection between RBS3418 and EUT	Opto interface

Test set-up, RX conducted measurements



Test object
RRU22 0840, KRC 161 134/5 revision R1B, serial no: CB44474900
Software CXP 9011610/1 revision R11AG02
with updated RRU load module CXP9011683/2 revision R2F01
FCC ID: TA8AKRC161134-5

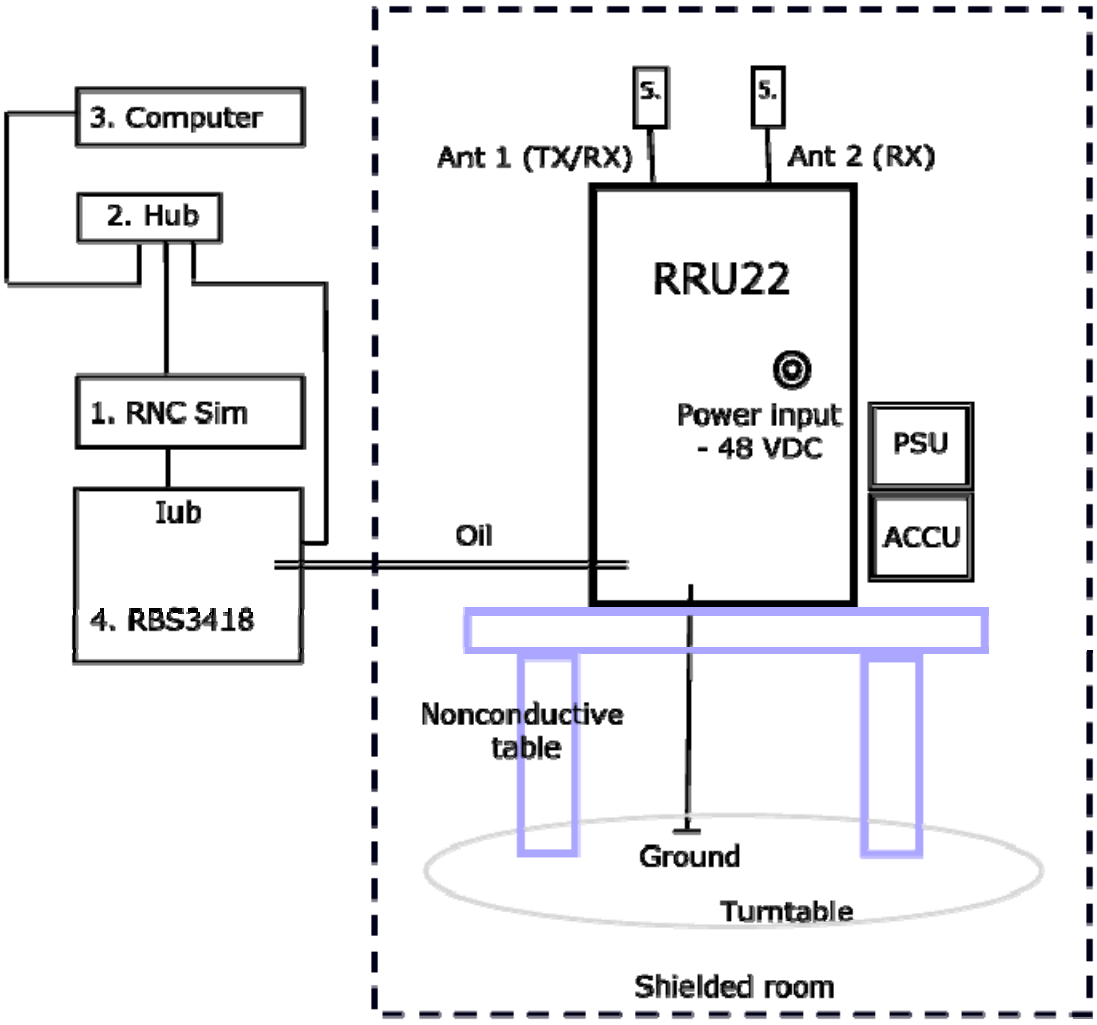
Functional test equipment

1. RNC Mini-sim #48, 4780FA SN0218 Rev DBA
2. Hub, TP-Link, TL HP8MU, 10Base-T Ethernet
3. Computer, Sun Blade 1500, asset ID AP016574
4. RBS3418, product no. BFE4011019, serial no. TA63805732
5. Termination (50 ohm)

Note: The Iub link between RNC Mini sim and RBS3418 is configured as T1.

Interfaces:	**Type of port:**
Power input -48 VDC	Power
Ant 2 (RX): Coaxial cable with N connector and adaptor to 7/16”	Antenna
Ant 1 (TX/RX): 50 ohm terminator with N connector and adaptor to 7/16”	Antenna
Oil - optical interface link, data connection between RBS3418 and EUT	Opto interface

Test set-up, radiated measurements



Test object
RRU22 0840, KRC 161 134/5 revision R1B, serial no: CB44474900
Software CXP 9011610/1 revision R11AG02
with updated RRU load module CXP9011683/2 revision R2F01
FCC ID: TA8AKRC161134-5

Auxiliary equipment
PSU, power supply unit, converting 120 VAC/60 Hz to -48 VDC (only power configurations 2 and 3)
ACCU, lightning protection (only power configuration 3)

Functional test equipment
1. RNC Mini-sim #48, 4780FA SN0218 Rev DBA
2. Hub, TP-Link, TL HP8MU, 10Base-T Ethernet
3. Computer, Sun Blade 1500, asset ID AP016574
4. RBS3418, product no. BFE4011019, serial no. TA63805732
5. Terminator (50 ohm)

Interfaces:	**Type of port:**
Tested 3 different supply power configurations:	Power
Power configuration 1: DC, -48 VDC directly connected to test object power input	
Power configuration 2: AC indoor, 120 VAC/60 Hz, connected to PSU, interconnection cable from PSU to test object power input	
Power configuration 3: AC outdoor, 120 VAC/60 Hz, connected to ACCU; ACCU interconnected to PSU, PSU interconnected to test object power input	
Ant 1: Combined TX/RX connector 7/16” terminated in 50 ohm via adapter 7/16“to N.	Antenna
Ant 2: RX connector 7/16” terminated in 50 ohm via adapter 7/16“to N.	Antenna
Oil, optical link to RBS3418	Opto interface
GND	Safety ground

RF power output measurements according to 47 CFR 2.1046

Date	Temperature	Humidity
2007-10-03	23 °C ± 3 °C	34 % ± 5 %

Test set-up and procedure

The output was connected to a Peak power analyzer. The transmitter was set up according to Test model 1 and Test model 5 during the measurements.

Measurement equipment	Calibration Due	SP number
Boonton RF Peak power meter/analyzer	2008-12	503 144
Boonton Power sensor 56518-S/4	2009-06	503 145
Multimeter Fluke 87	2007-12	502 190
Testo 610, Temperature and humidity meter	2009-04	502 658

Measurement uncertainty: 0.5 dB

Results

Single carrier

Maximum rated output power level: 1x 46 dBm

Test conditions	Transmitter power (dBm) RMS		
T_{nom} 22 °C/ V_{nom} -48 V DC	Frequency 871.4 MHz	Frequency 881.4 MHz	Frequency 891.6 MHz
QPSK	45.4	45.7	45.6
16QAM	46.3	46.4	46.4

Multi carrier

Maximum rated output power level: 2x 43 dBm

Test conditions	Transmitter combined power (dBm) RMS	
T_{nom} 23 °C/ V_{nom} -48 V DC	Frequencies 871.4 + 881.4 MHz	Frequencies 881.6 + 891.6MHz
QPSK	45.5	45.5
16QAM	46.3	46.2

Limit

According to CFR § 22 there are no conducted limits at the antenna connector.

CFR § 22.913: The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts (57 dBm).

Complies?	Yes

Occupied bandwidth measurements according to 47 CFR 2.1049

Date	Temperature	Humidity
2007-10-04	24 °C ± 3 °C	29 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §2.1049. The output was connected to a spectrum analyzer. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements. The transmitter was set up according to Test model 1 and Test model 5 during the measurements.

Measurement equipment	Calibration Due	SP number
R&S FSIQ	2008-10	503 738
Testo 610, Temperature and humidity meter	2009-04	502 658

Measurement uncertainty: 3.7 dB

Results

The results are shown in appendix 3.1

QPSK

	Frequency	OBW
Diagram 1:	871.4 MHz	4.2 MHz
Diagram 2:	881.4 MHz	4.2 MHz
Diagram 3:	891.6 MHz	4.2 MHz

16QAM

	Frequency	OBW
Diagram 4:	871.4 MHz	4.2 MHz
Diagram 5:	881.4 MHz	4.2 MHz
Diagram 6:	891.6 MHz	4.2 MHz

Diagram 1

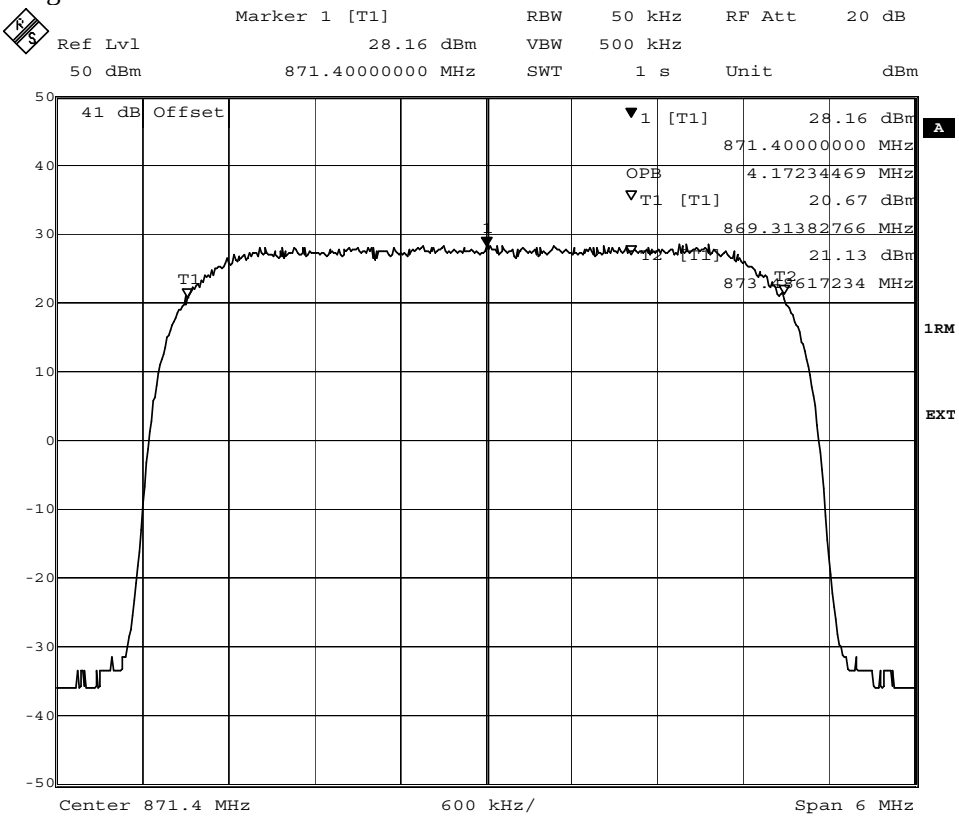


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Diagram 2

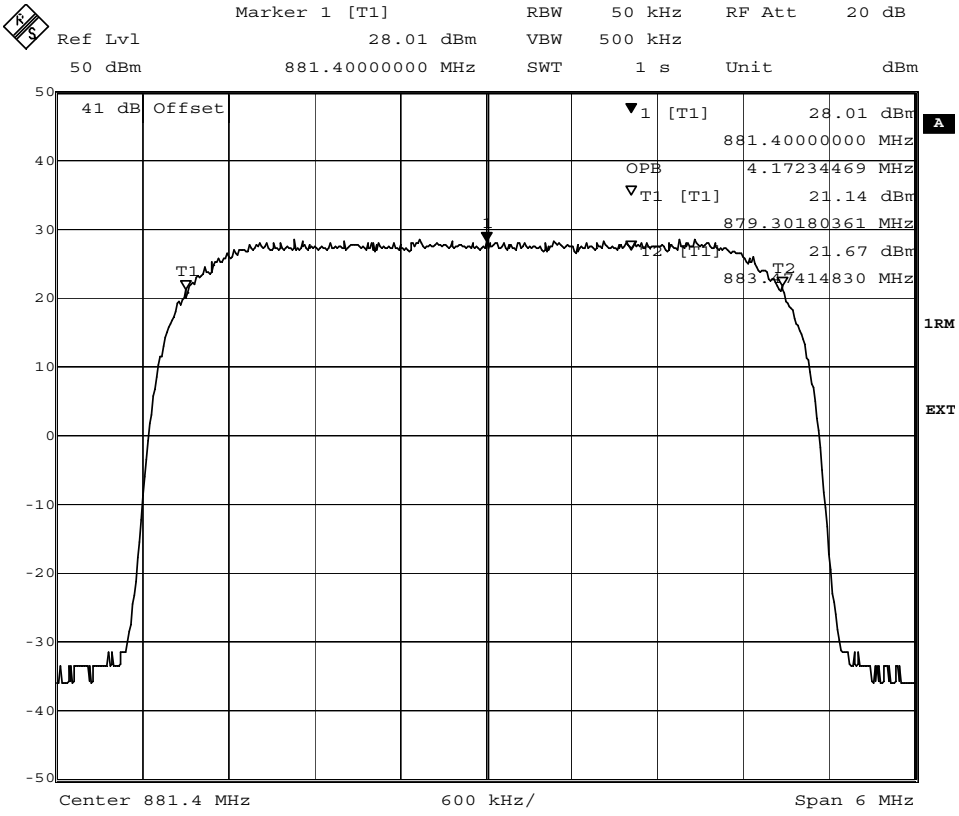

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Diagram 3

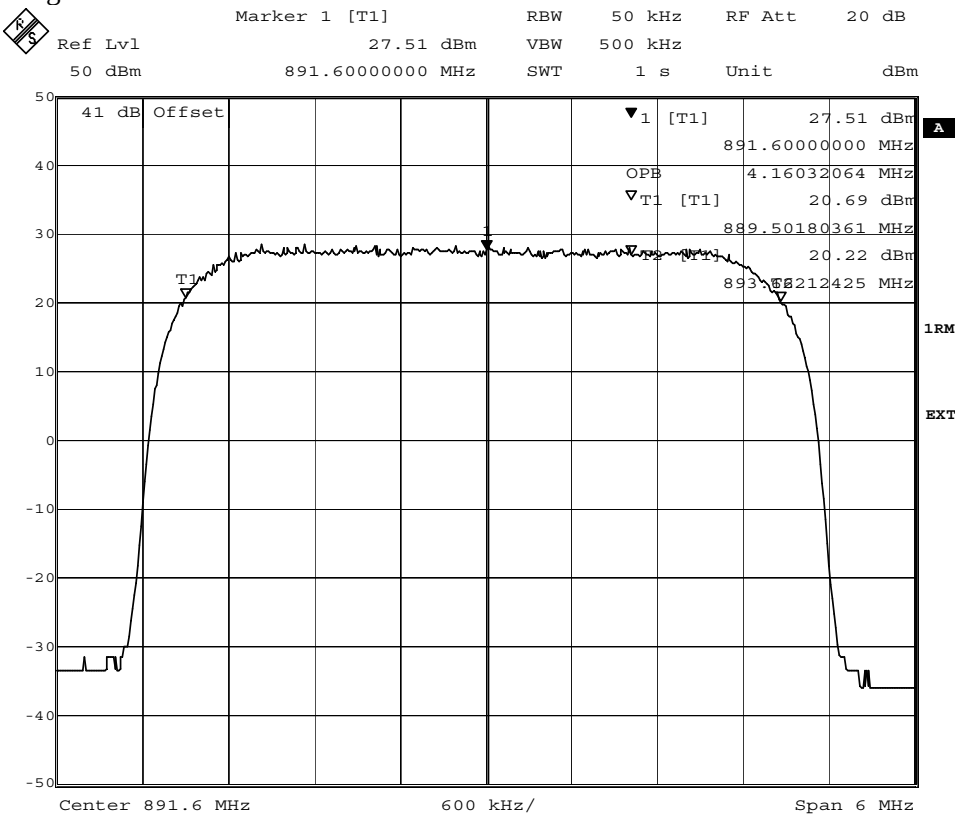


Diagram 4

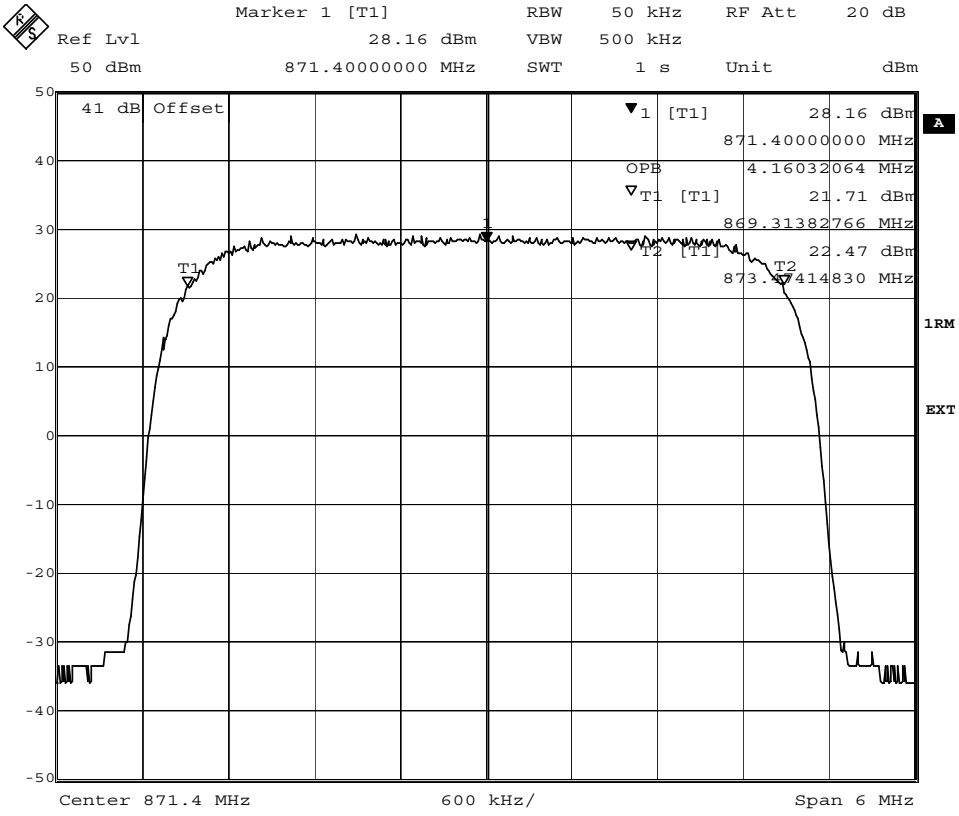


Diagram 5

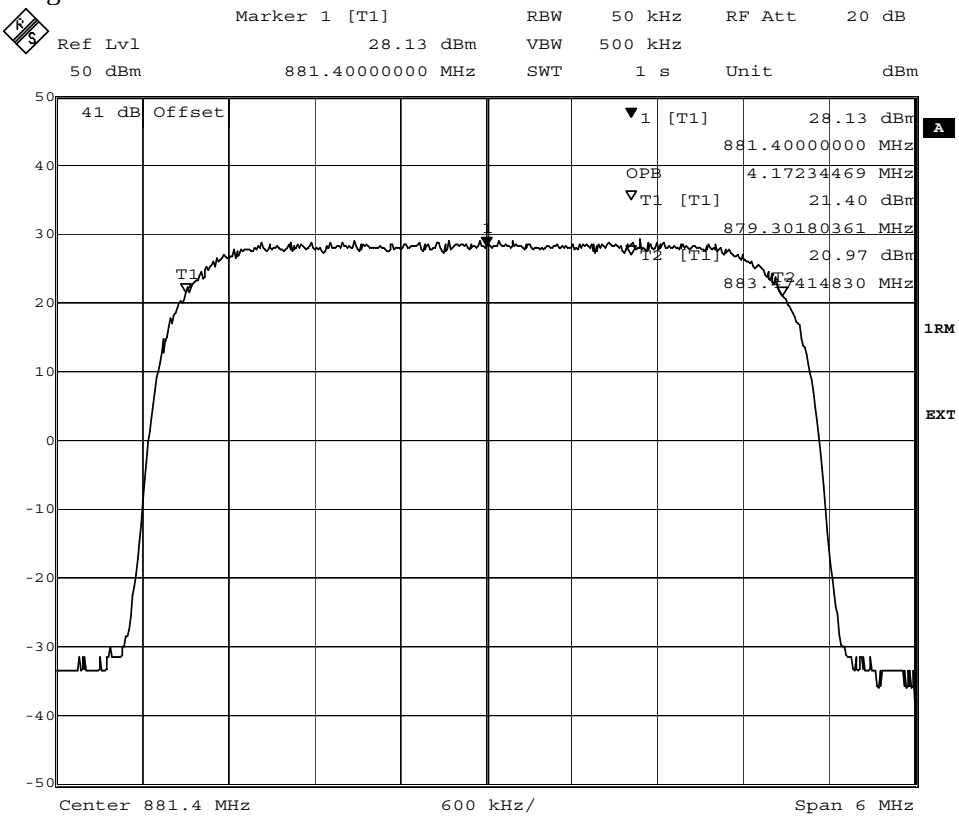
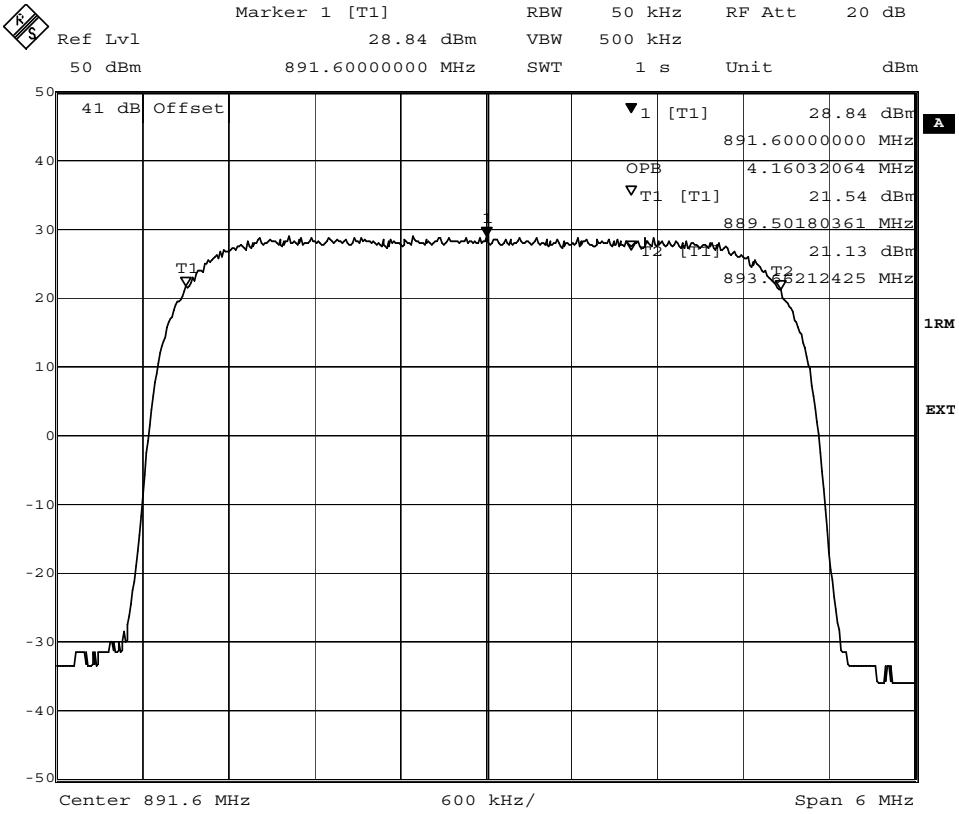


Diagram 6



Band edge measurements according to 47 CFR 2.1051

Date	Temperature	Humidity
2007-10-04	24 °C ± 3 °C	29 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §22.917. The output was connected to a spectrum analyzer with the RMS detector activated. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements. A resolution bandwidth of 30 kHz was used up to 3.25 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 band width, 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 between 1 MHz to 3.25 MHz away from the band edges. The transmitter was set up according to Test model 1 and Test model 5 during the measurements.

Measurement equipment	Calibration Due	SP number
R&S FSIQ	2008-10	503 738
Testo 610, Temperature and humidity meter	2009-04	502 658

Measurement uncertainty: 3.7 dB

Results

The results are shown in appendix 4.1

Single carrier

	QPSK		16QAM
Diagram 1:	871.4 MHz	Diagram 3:	871.4 MHz
Diagram 2:	891.6 MHz	Diagram 4:	891.6 MHz

Multi carrier

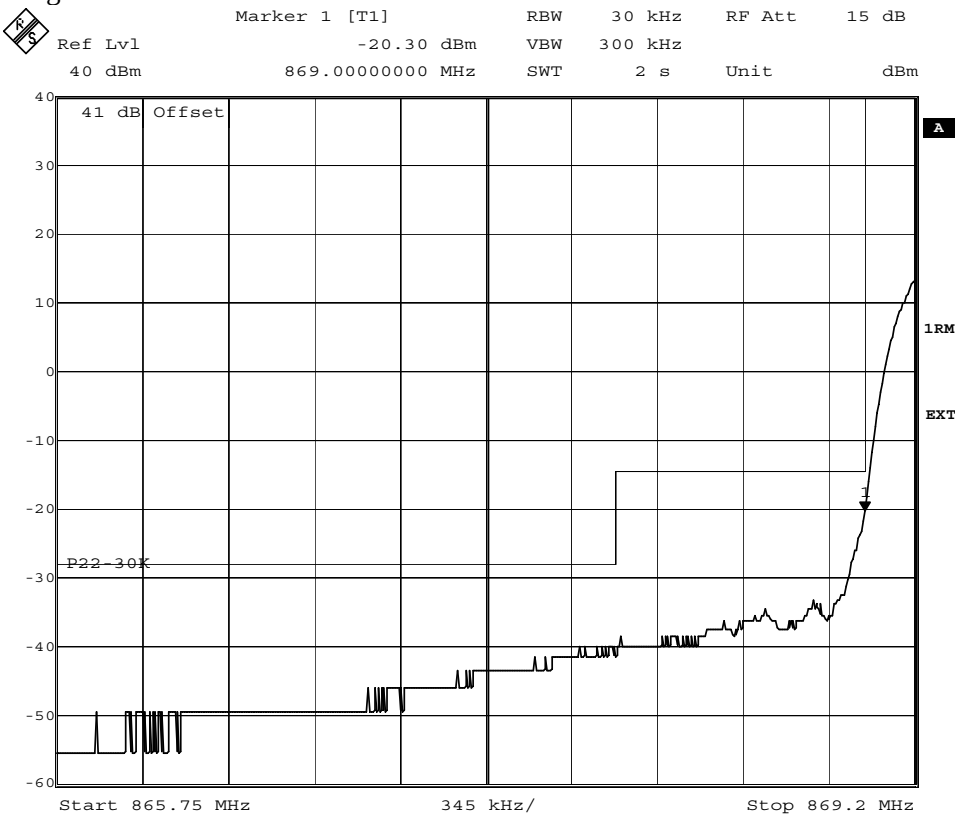
	QPSK		16QAM
Diagram 5:	871.4+881.4 MHz	Diagram 7:	871.4+881.4 MHz
Diagram 6:	881.6+891.6 MHz	Diagram 8:	881.6+891.6 MHz

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

Diagram 1


Marker 1 [T1]
-20.30 dBm
869.00000000 MHz
RBW 30 kHz
VBW 300 kHz
SWT 2 s
RF Att 15 dB
Unit dBm
Ref Lvl
40 dBm
41 dB Offset
A
1RM
EXT
P22-30K
Start 865.75 MHz
345 kHz/
Stop 869.2 MHz
Date: 4.OCT.2007 09:16:06

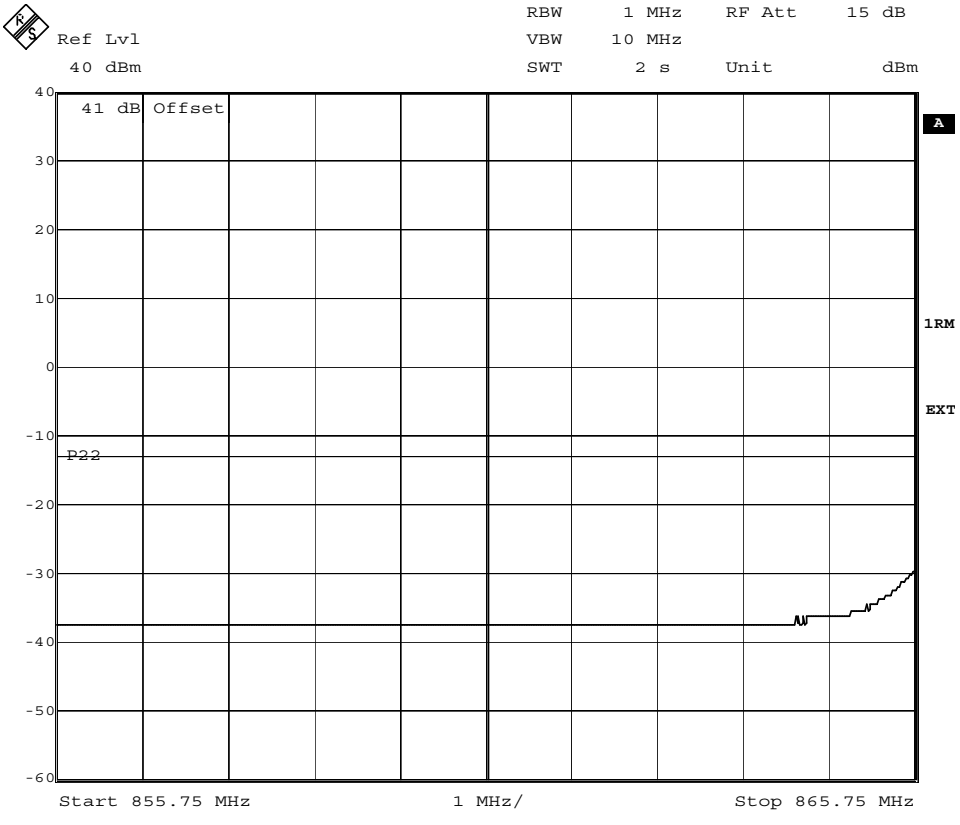
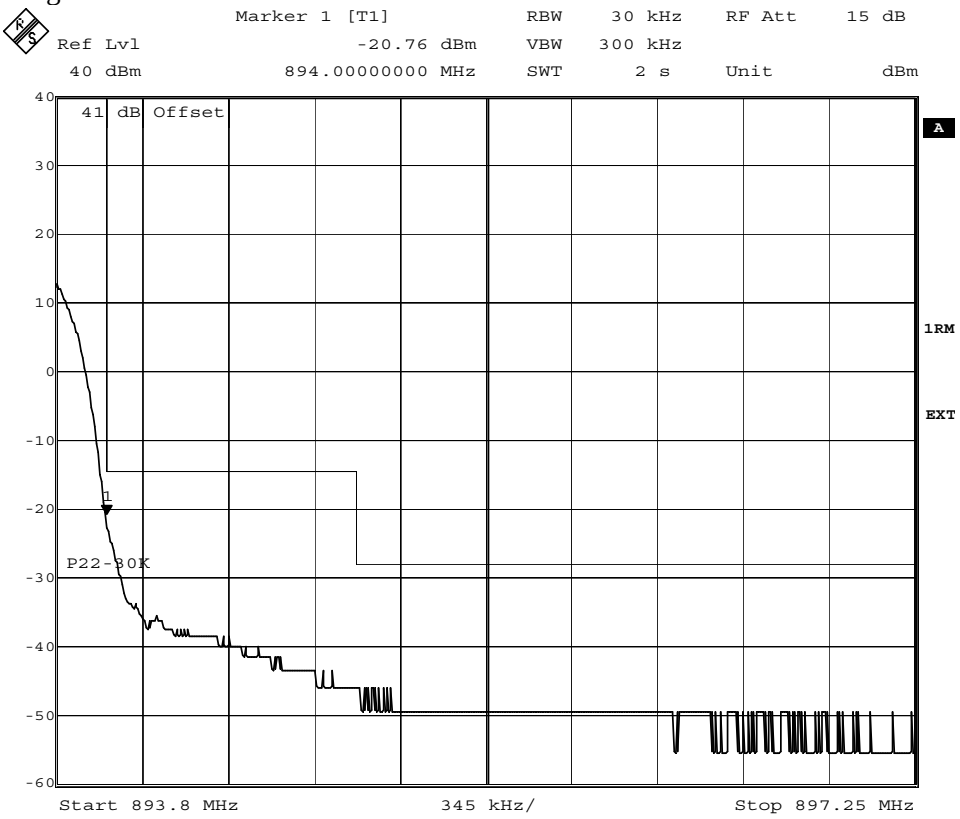

RBW 1 MHz
VBW 10 MHz
SWT 2 s
RF Att 15 dB
Unit dBm
Ref Lvl
40 dBm
41 dB Offset
A
1RM
EXT
P22
Start 855.75 MHz
1 MHz/
Stop 865.75 MHz
Date: 4.OCT.2007 09:16:49

Diagram 2


Marker 1 [T1]
-20.76 dBm
894.00000000 MHz
RBW 30 kHz
VBW 300 kHz
SWT 2 s
RF Att 15 dB
Unit dBm
Ref Lvl
40 dBm
41 dB Offset
A
1RM
EXT
P22-30K
Start 893.8 MHz
345 kHz/
Stop 897.25 MHz
Date: 4.OCT.2007 11:06:35

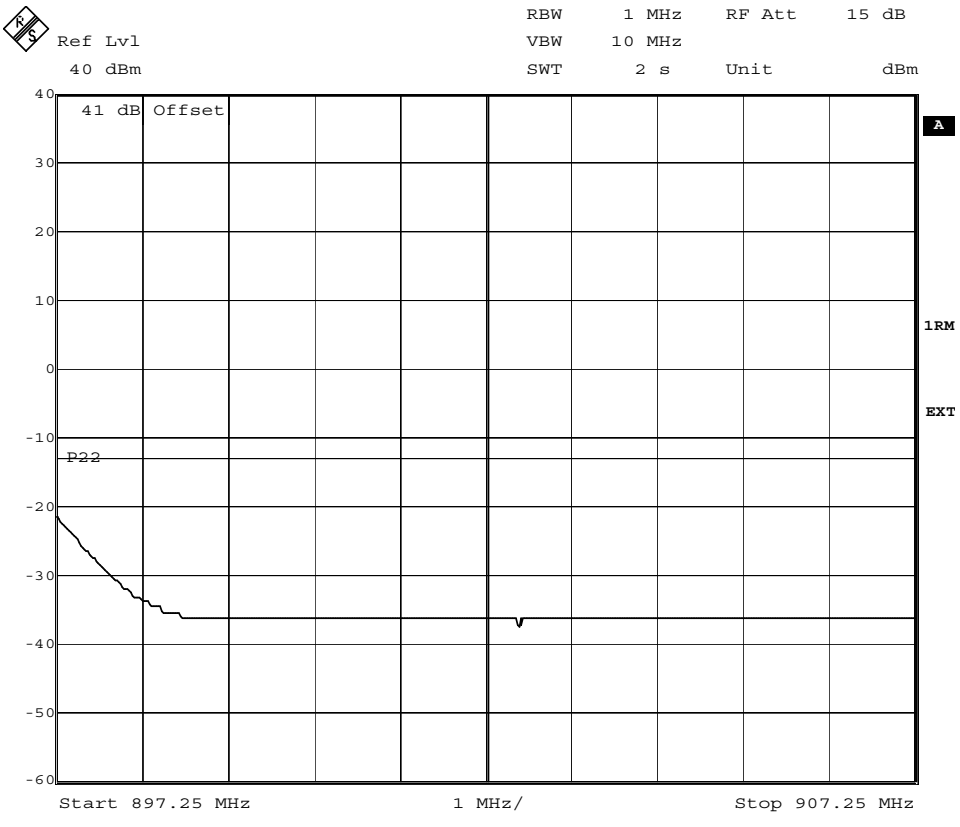
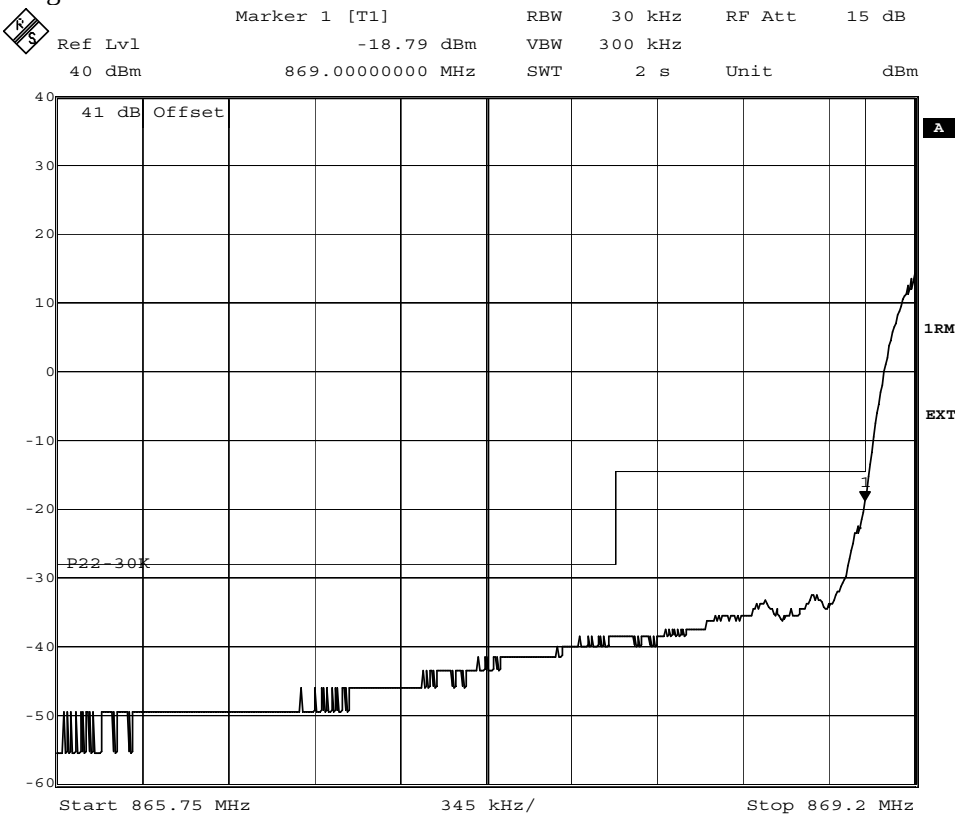

RBW 1 MHz
VBW 10 MHz
SWT 2 s
RF Att 15 dB
Unit dBm
Ref Lvl
40 dBm
41 dB Offset
A
1RM
EXT
P22
Start 897.25 MHz
1 MHz/
Stop 907.25 MHz
Date: 4.OCT.2007 11:06:00

Diagram 3


Marker 1 [T1]
-18.79 dBm
869.00000000 MHz
RBW 30 kHz
VBW 300 kHz
SWT 2 s
RF Att 15 dB
Unit dBm
Ref Lvl
40 dBm
41 dB Offset
A
1RM
EXT
P22-30K
Start 865.75 MHz
345 kHz/
Stop 869.2 MHz
Date: 4.OCT.2007 09:39:09

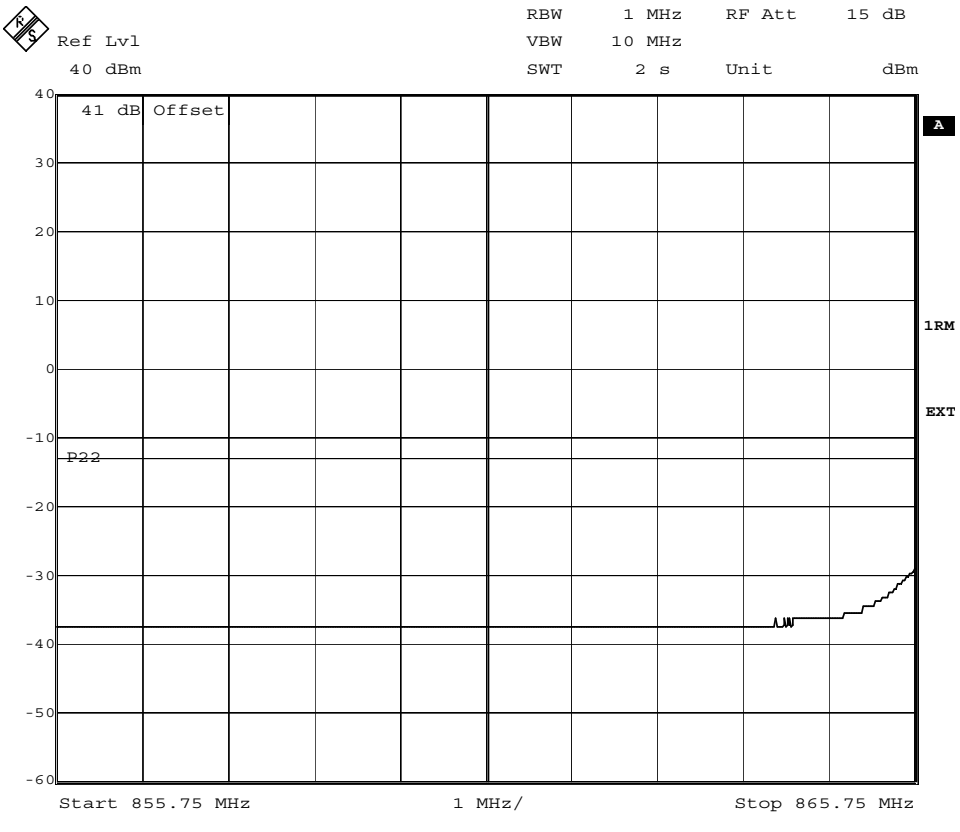
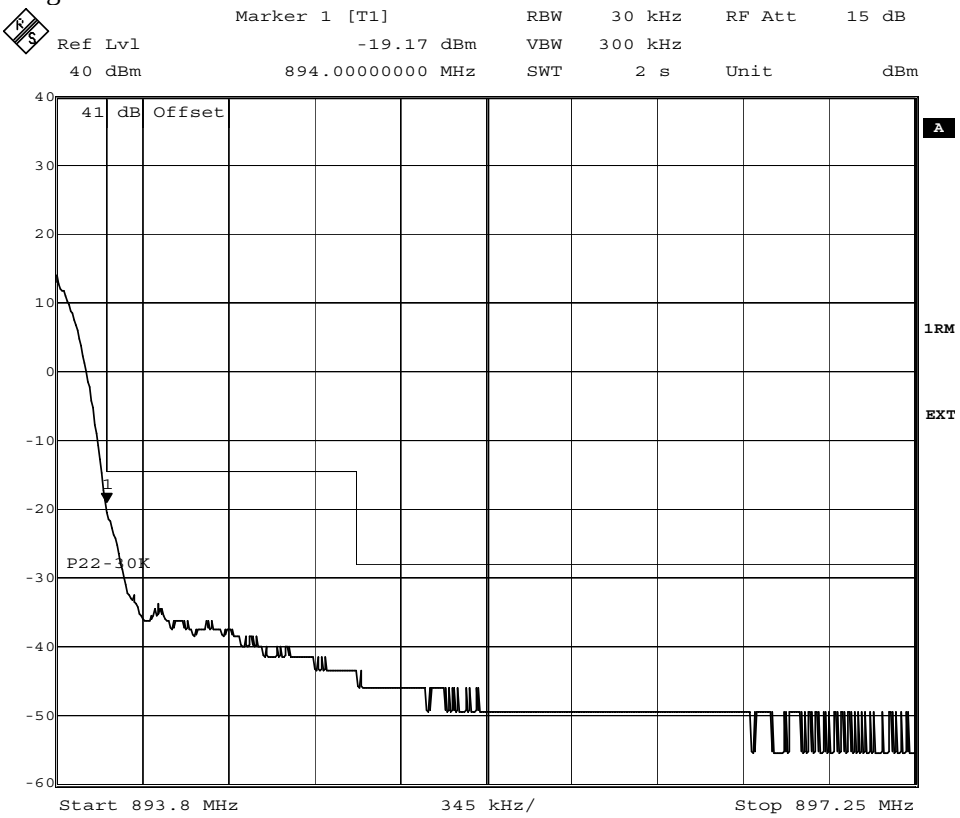

RBW 1 MHz
VBW 10 MHz
SWT 2 s
RF Att 15 dB
Unit dBm
Ref Lvl
40 dBm
41 dB Offset
A
1RM
EXT
P22
Start 855.75 MHz
1 MHz/
Stop 865.75 MHz
Date: 4.OCT.2007 09:39:59

Diagram 4


Marker 1 [T1]
RBW 30 kHz
RF Att 15 dB
Ref Lvl
-19.17 dBm
VBW 300 kHz
40 dBm
894.00000000 MHz
SWT 2 s
Unit dBm
41 dB Offset
A
1RM
EXT
1
P22-30K
Start 893.8 MHz
345 kHz/
Stop 897.25 MHz
Date: 4.OCT.2007 11:10:54

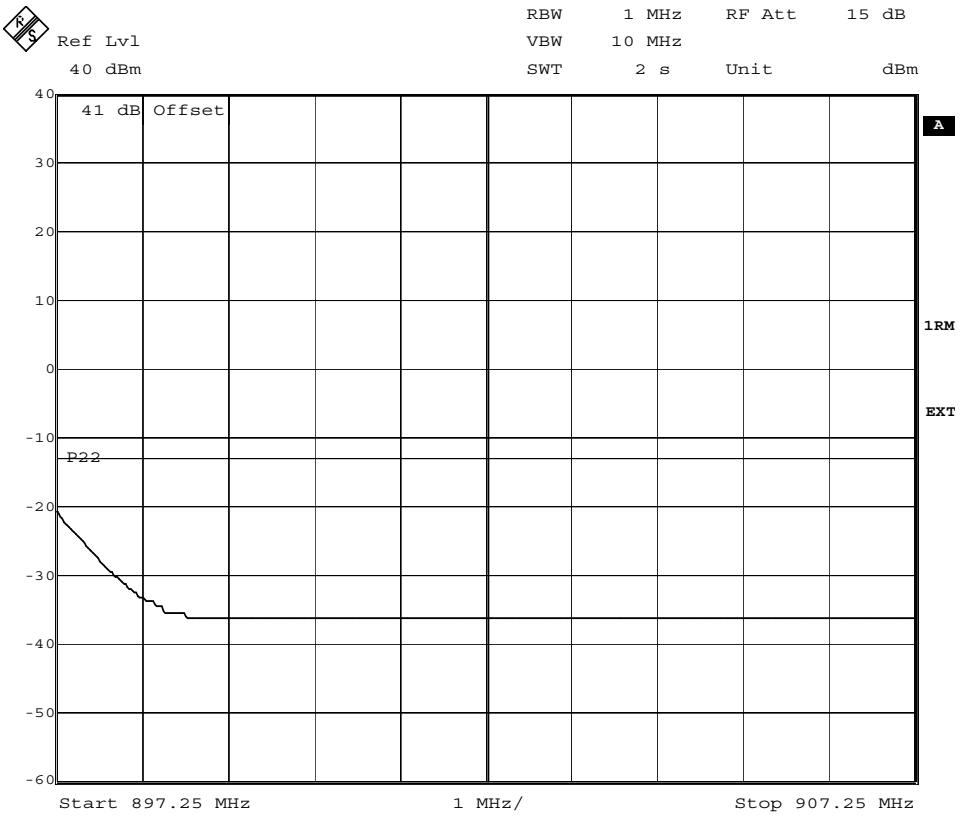
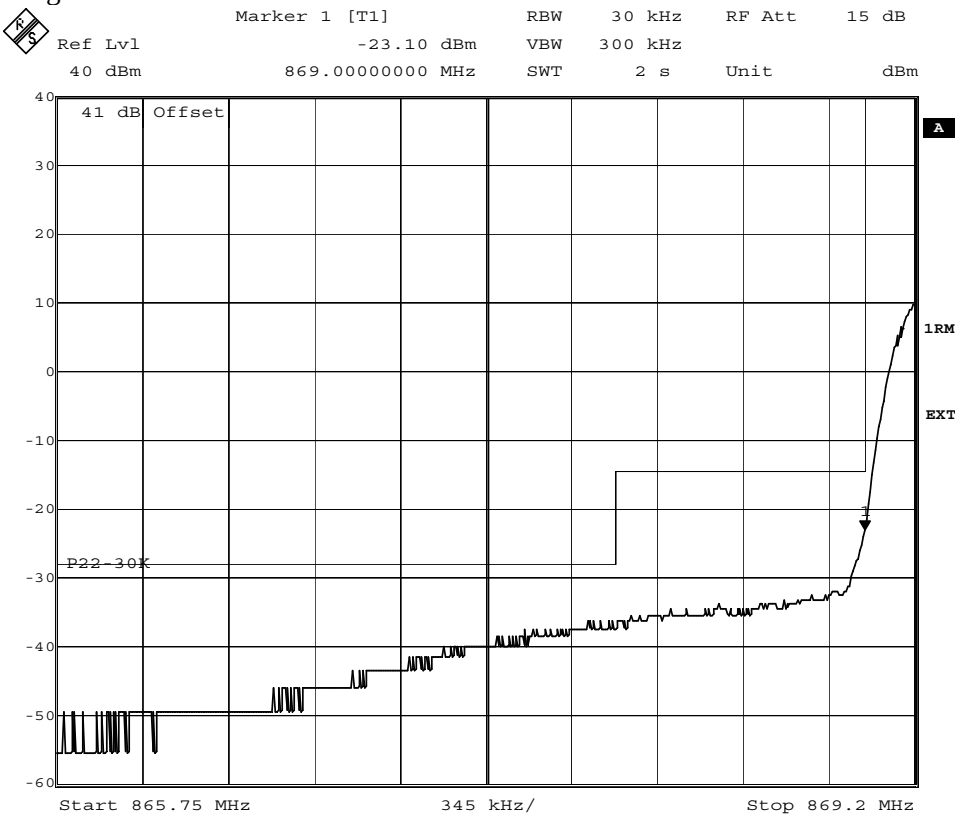
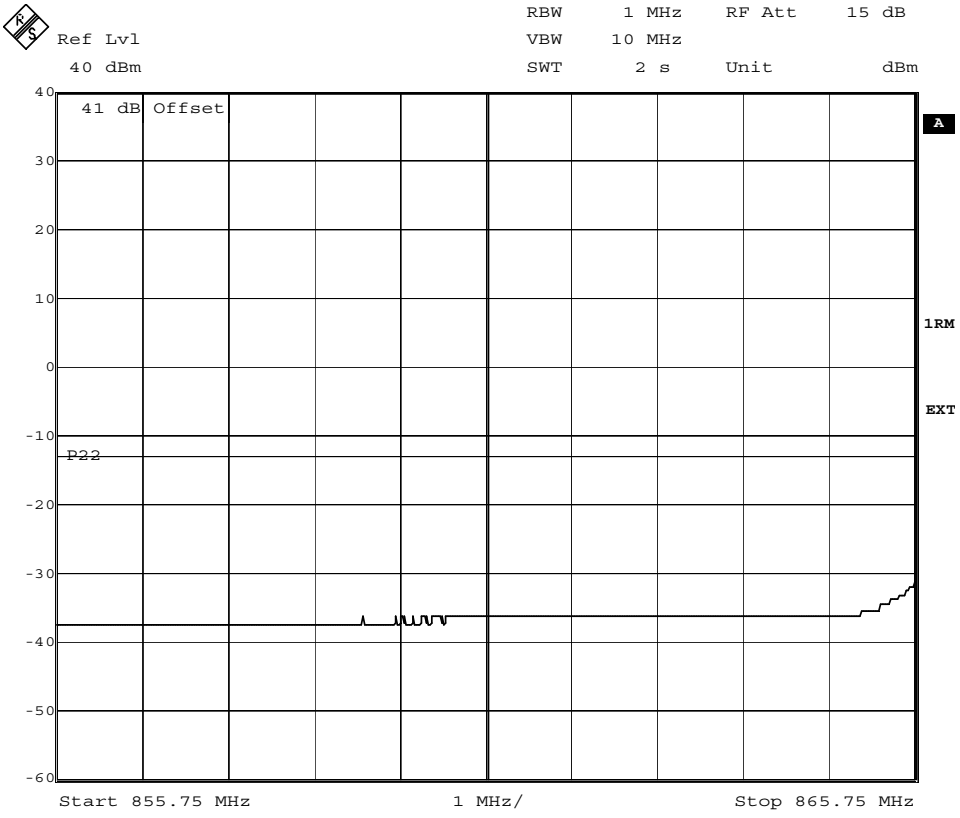

RBW 1 MHz
RF Att 15 dB
Ref Lvl
VBW 10 MHz
40 dBm
SWT 2 s
Unit dBm
41 dB Offset
A
1RM
EXT
P22
Start 897.25 MHz
1 MHz/
Stop 907.25 MHz
Date: 4.OCT.2007 11:11:39

Diagram 5

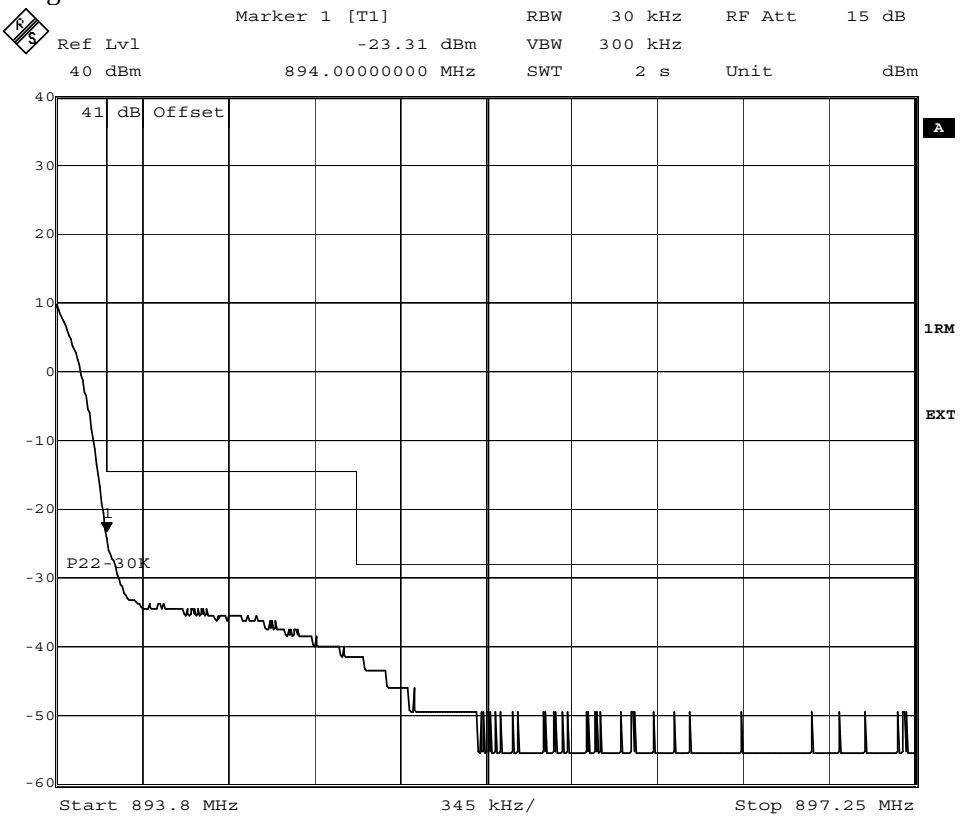


Date: 4.OCT.2007 11:34:01



Date: 4.OCT.2007 11:34:42

Diagram 6


Marker 1 [T1]
-23.31 dBm
894.00000000 MHz
RBW 30 kHz
VBW 300 kHz
SWT 2 s
RF Att 15 dB
Unit dBm
Ref Lvl
40 dBm
41 dB Offset
A
1RM
EXT
P22-30K
Start 893.8 MHz
345 kHz/
Stop 897.25 MHz
Date: 4.OCT.2007 12:53:31

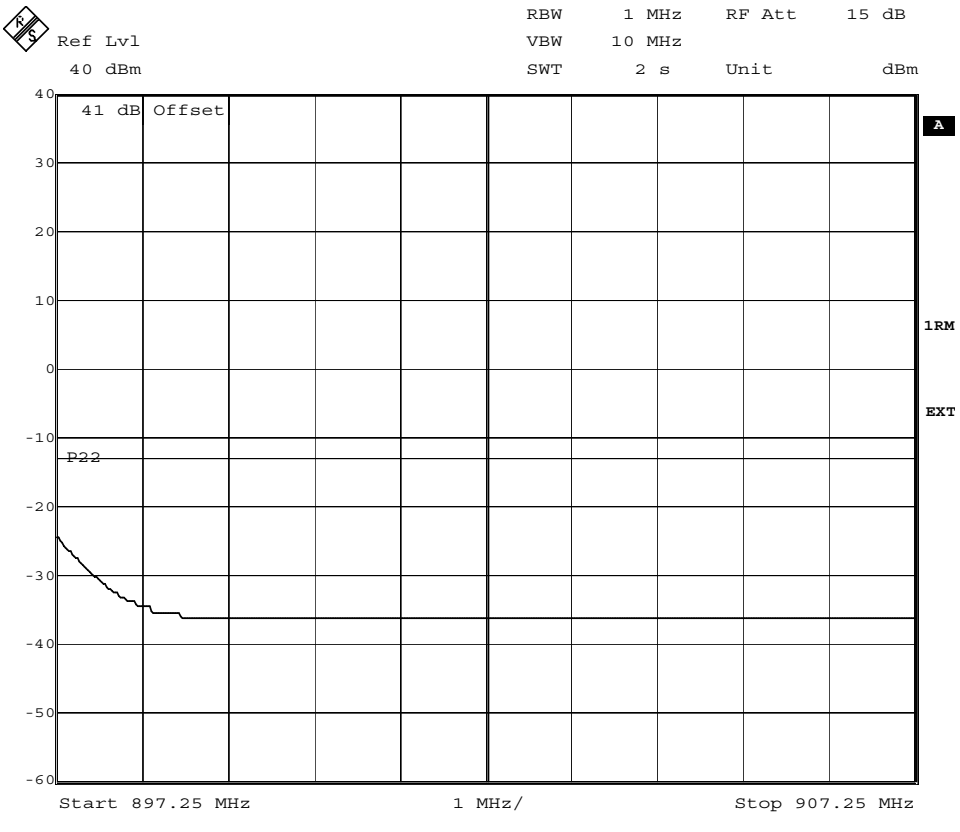
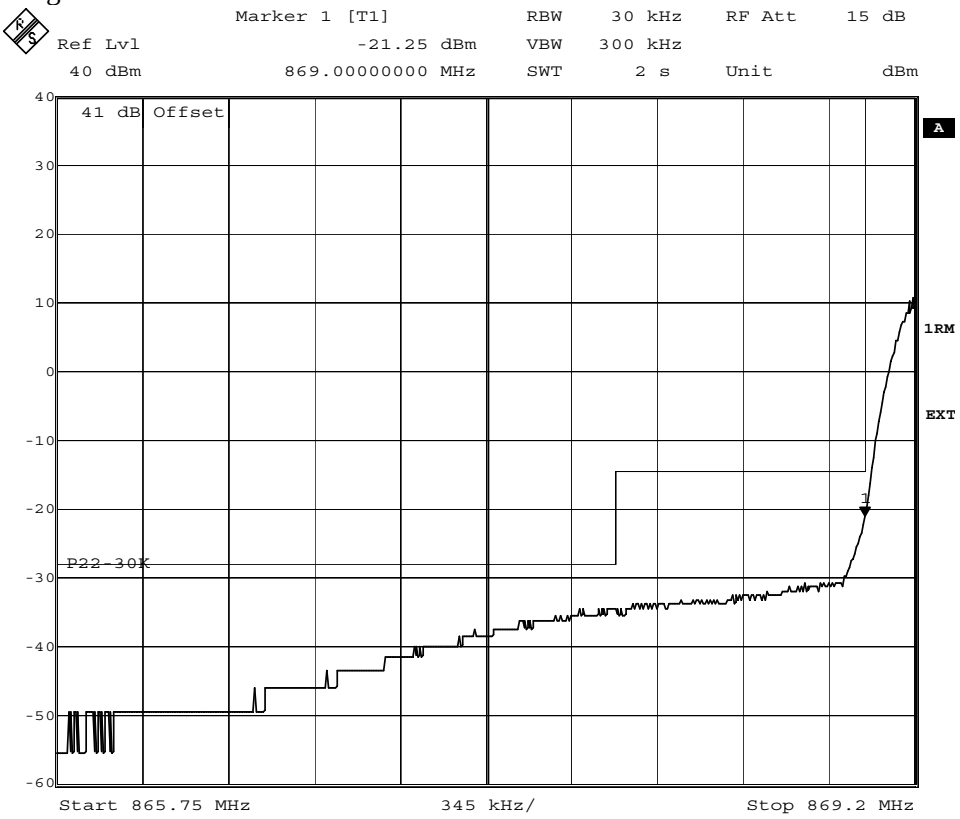

RBW 1 MHz
VBW 10 MHz
SWT 2 s
RF Att 15 dB
Unit dBm
Ref Lvl
40 dBm
41 dB Offset
A
1RM
EXT
P22
Start 897.25 MHz
1 MHz/
Stop 907.25 MHz
Date: 4.OCT.2007 12:54:00

Diagram 7


Marker 1 [T1]
-21.25 dBm
869.00000000 MHz
RBW 30 kHz
VBW 300 kHz
SWT 2 s
RF Att 15 dB
Unit dBm
Ref Lvl
40 dBm
41 dB Offset
A
1RM
EXT
P22-30K
Start 865.75 MHz
345 kHz/
Stop 869.2 MHz
Date: 4.OCT.2007 11:39:20

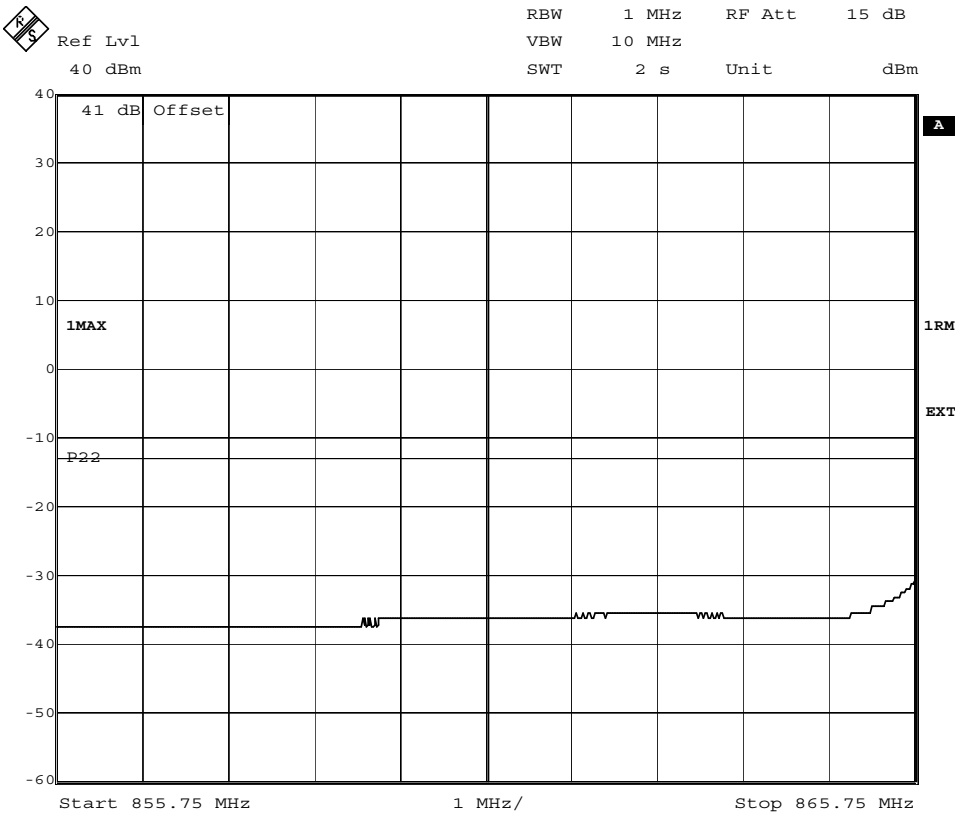
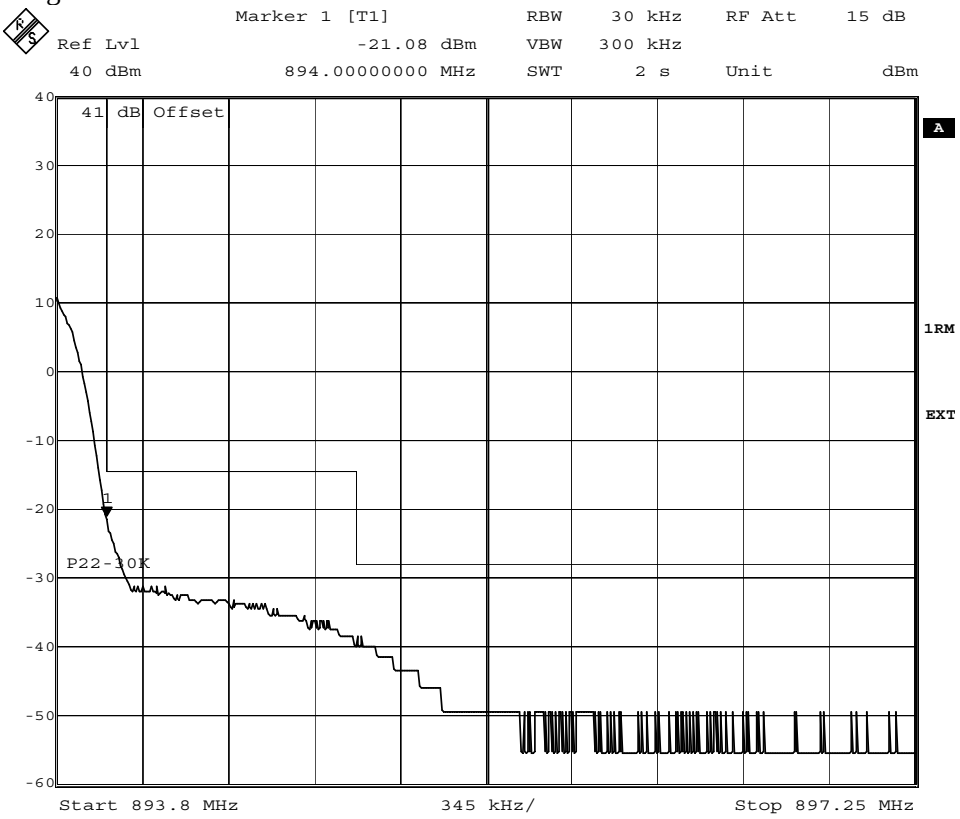
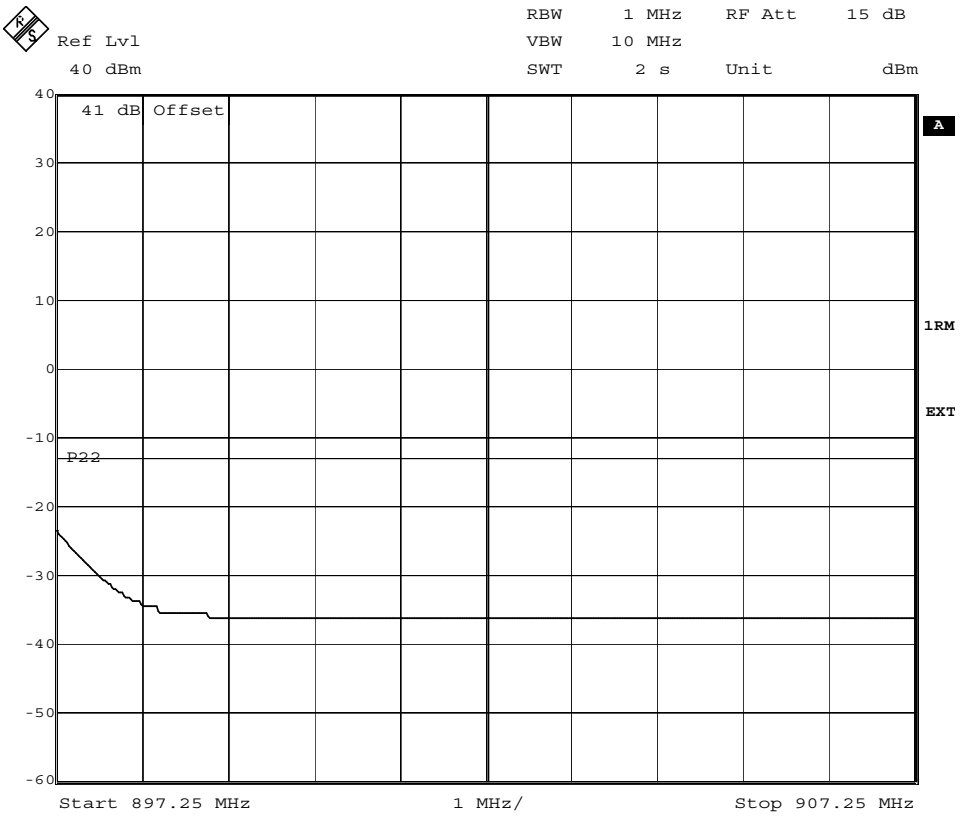

RBW 1 MHz
VBW 10 MHz
SWT 2 s
RF Att 15 dB
Unit dBm
Ref Lvl
40 dBm
41 dB Offset
A
1MAX
1RM
EXT
P22
Start 855.75 MHz
1 MHz/
Stop 865.75 MHz
Date: 4.OCT.2007 11:38:53

Diagram 8


Marker 1 [T1]
-21.08 dBm
894.00000000 MHz
RBW 30 kHz
VBW 300 kHz
SWT 2 s
RF Att 15 dB
Unit dBm
Ref Lvl
40 dBm
41 dB Offset
A
1RM
EXT
P22-30K
Start 893.8 MHz
345 kHz/
Stop 897.25 MHz
Date: 4.OCT.2007 12:59:03


RBW 1 MHz
VBW 10 MHz
SWT 2 s
RF Att 15 dB
Unit dBm
Ref Lvl
40 dBm
41 dB Offset
A
1RM
EXT
P22
Start 897.25 MHz
1 MHz/
Stop 907.25 MHz
Date: 4.OCT.2007 12:59:42

Conducted spurious emission measurements according to 47 CFR 2.1051

Date	Temperature	Humidity
2007-10-04	24 °C ± 3 °C	29 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §22.917, with a RBW of 1 MHz. The output was connected to a spectrum analyzer. A pre-measurement was performed with the PEAK detector activated. Emission above the limit with the PEAK detector is measured with the RMS detector activated. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements. The transmitter was set up according to Test model 1 and Test model 5 during the measurements.

Measurement equipment	Calibration Due	SP number
R&S FSIQ	2008-10	503 738
High pass filter	2008-07	502 758
Testo 610, Temperature and humidity meter	2009-04	502 658

Measurement uncertainty: 3.7 dB

Results

The results are shown in appendix 5.1

Single carrier

QPSK		16QAM	
Diagram 1:	871.4 MHz	Diagram 4:	871.4 MHz
Diagram 2:	881.4 MHz	Diagram 5:	881.4 MHz
Diagram 3:	891.6 MHz	Diagram 6:	891.6 MHz

Multi carier

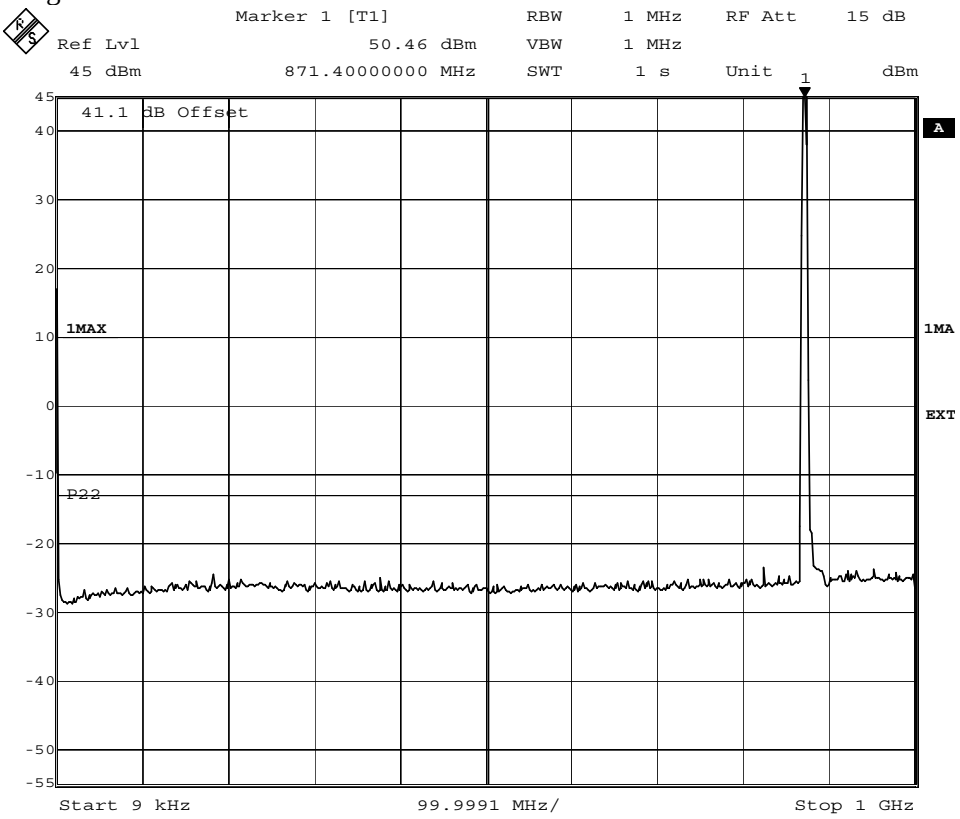
QPSK		16QAM	
Diagram 7:	871.4+881.4 MHz	Diagram 9:	871.4+881.4 MHz
Diagram 8:	881.6+891.6 MHz	Diagram 10:	881.6+891.6 MHz

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

Diagram 1



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 9 kHz -10 MHz.

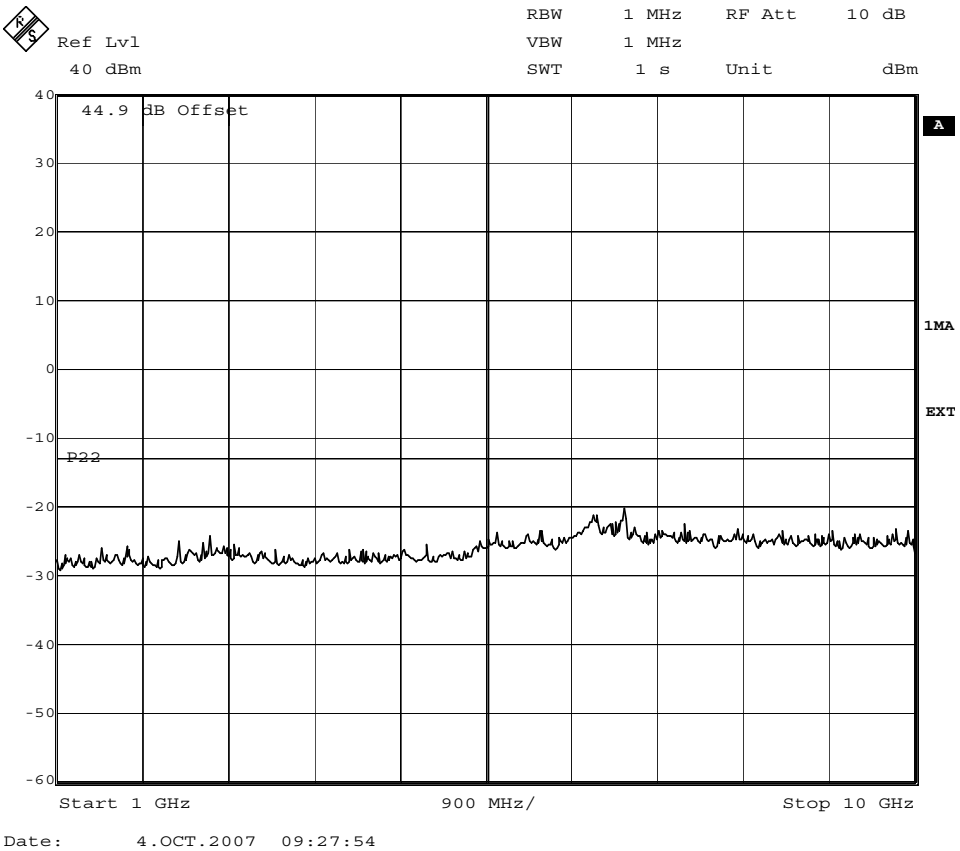
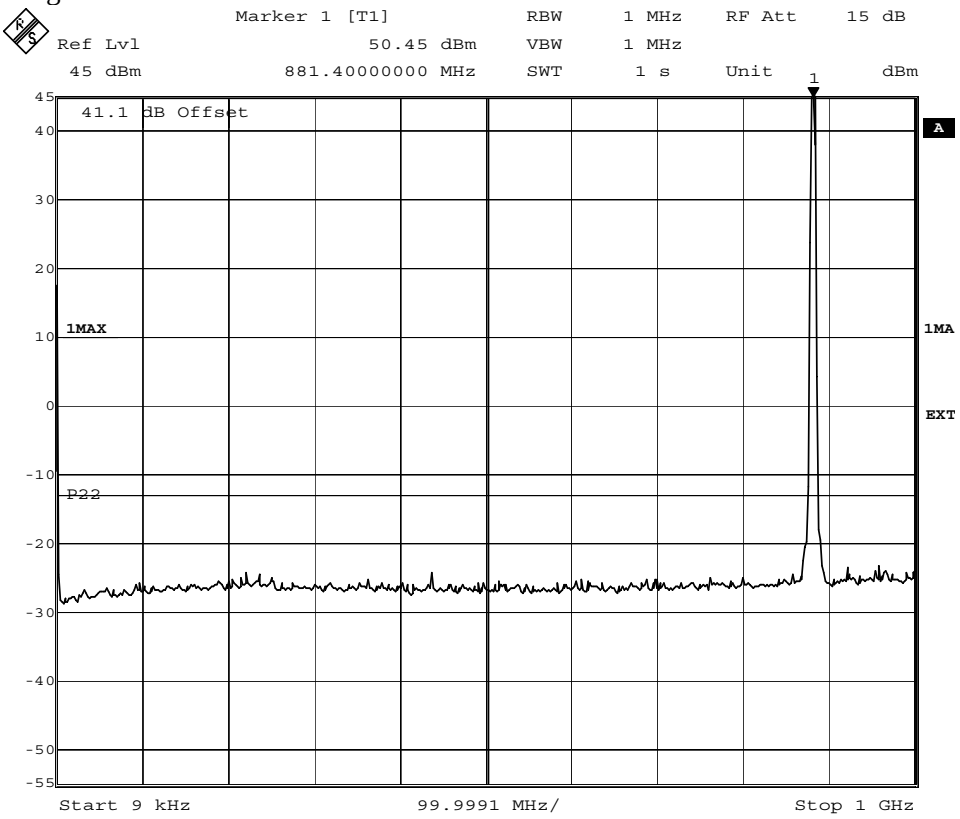


Diagram 2



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 9 kHz -10 MHz.

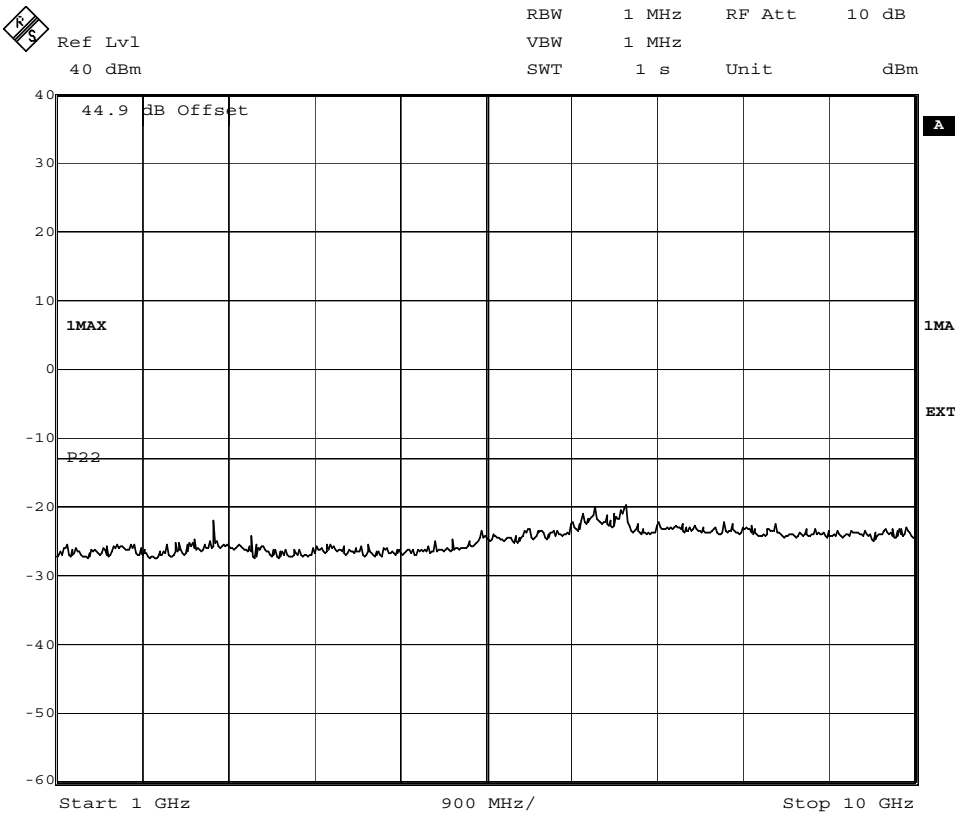
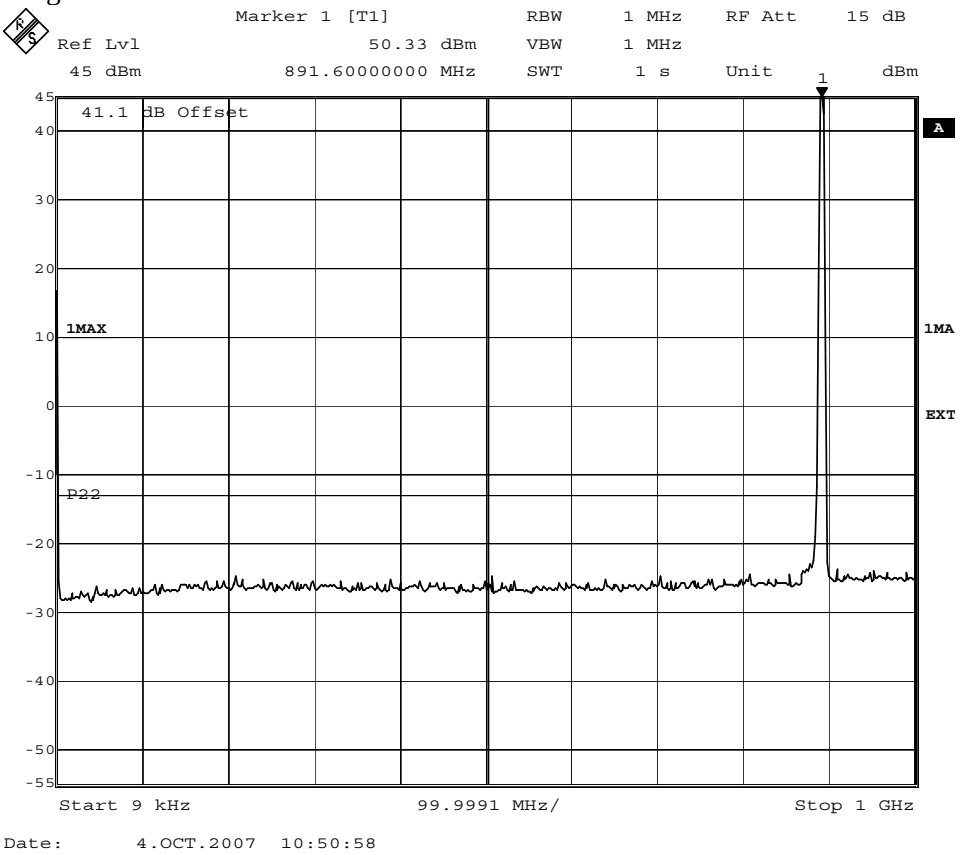


Diagram 3



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 9 kHz -10 MHz.

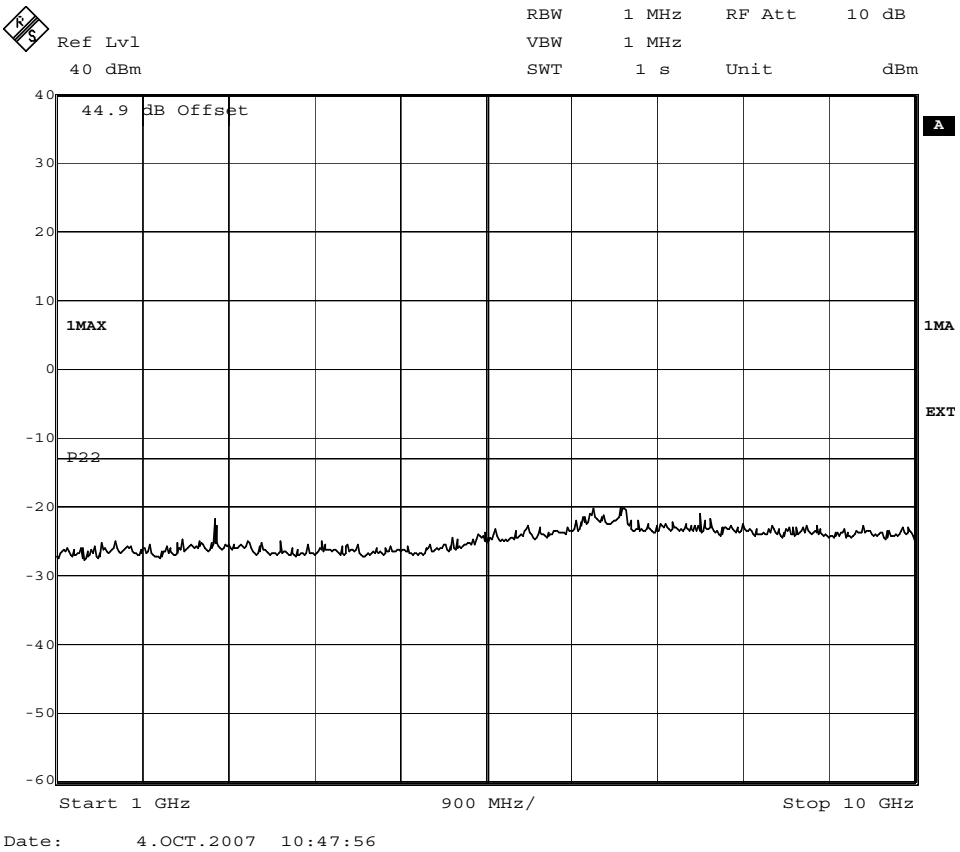
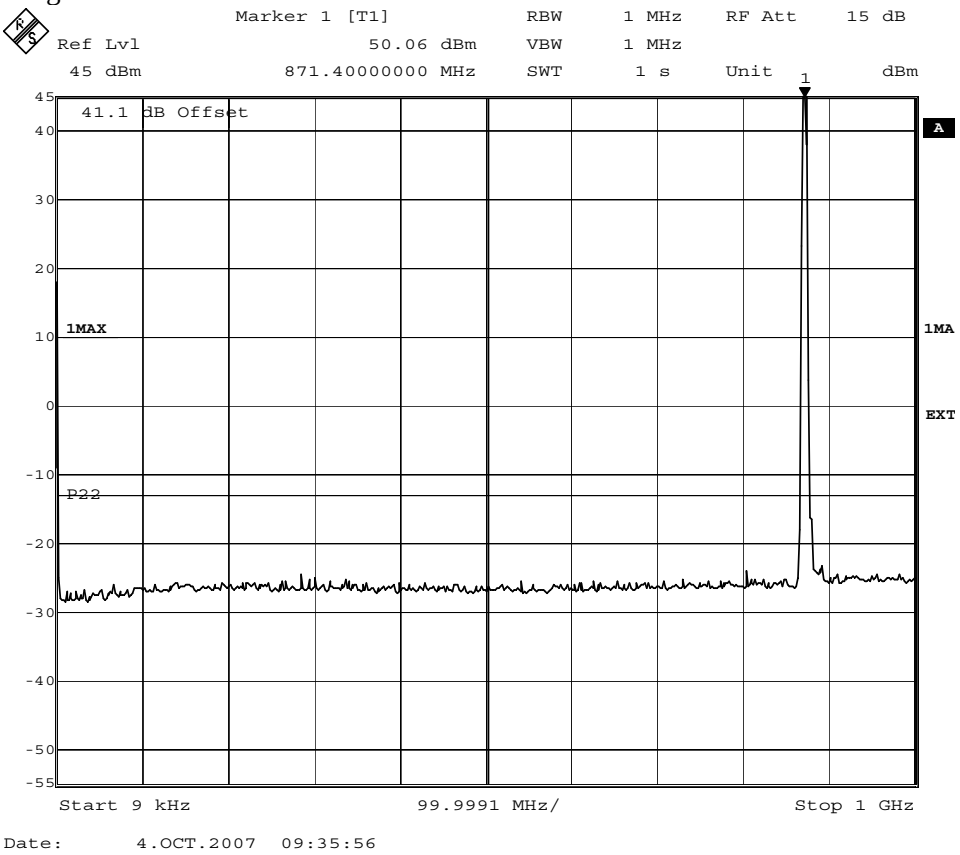


Diagram 4



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 9 kHz -10 MHz.

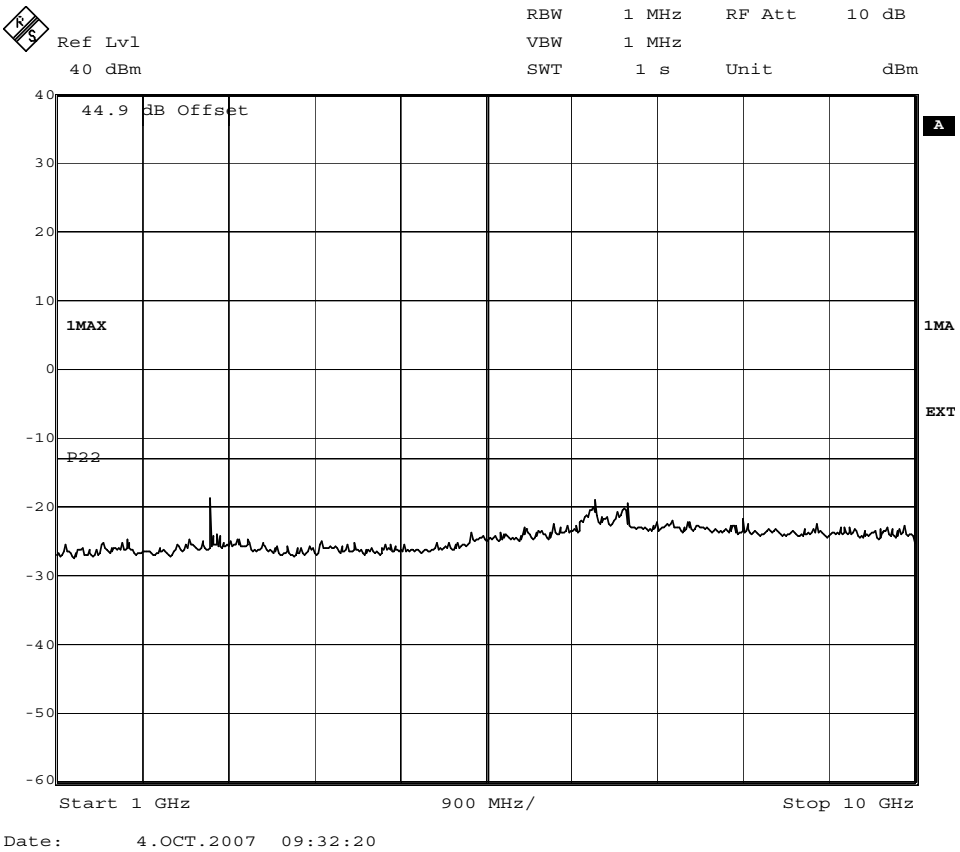
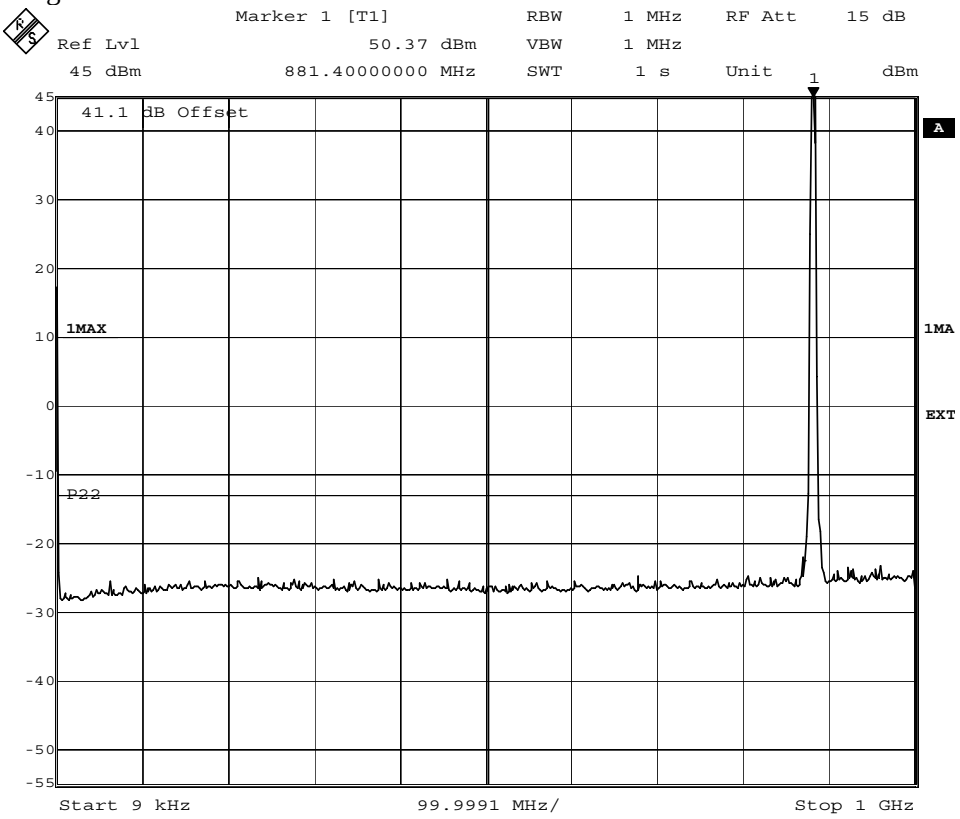


Diagram 5



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 9 kHz -10 MHz.

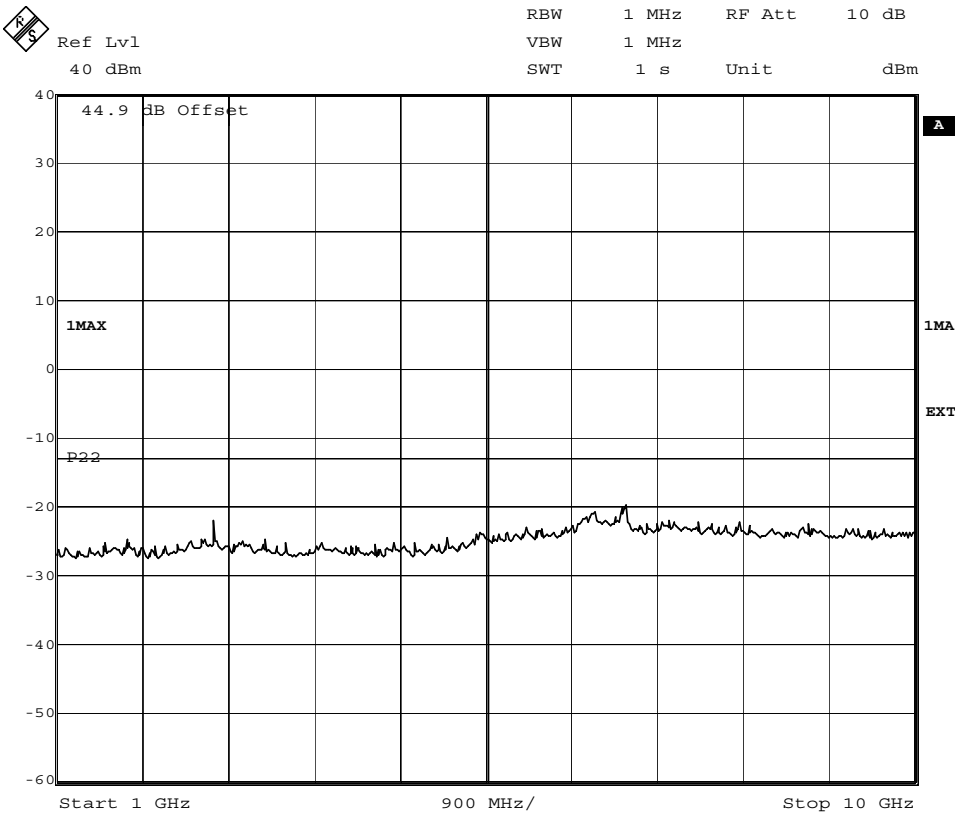
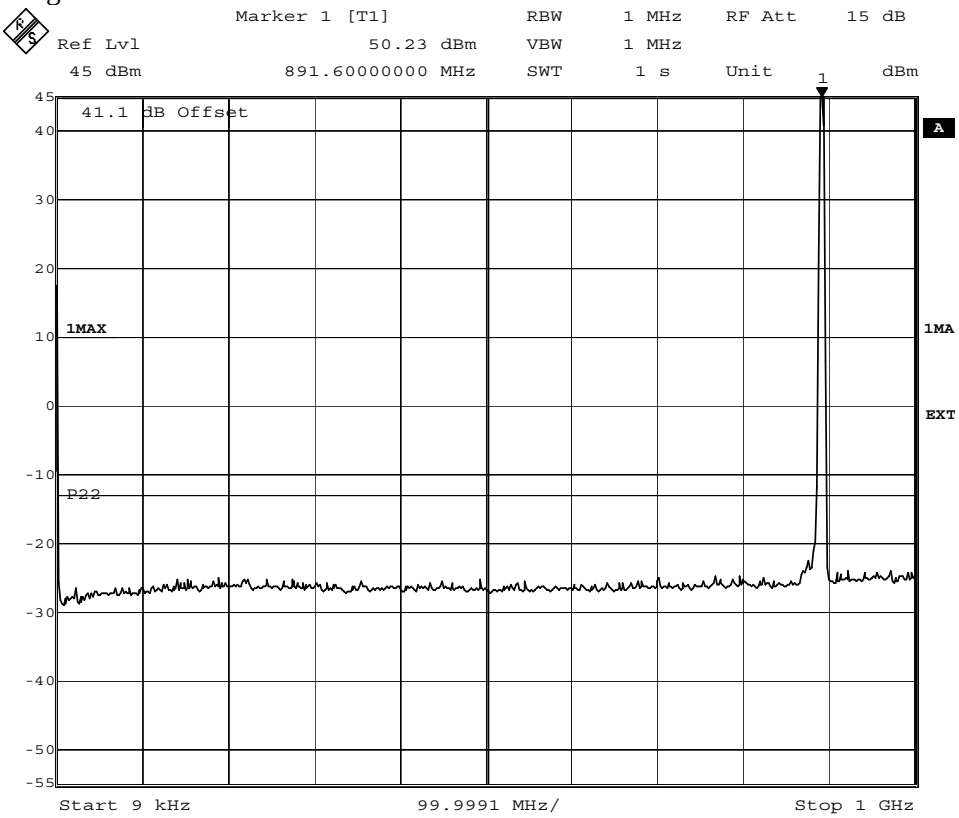


Diagram 6



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 9 kHz -10 MHz.

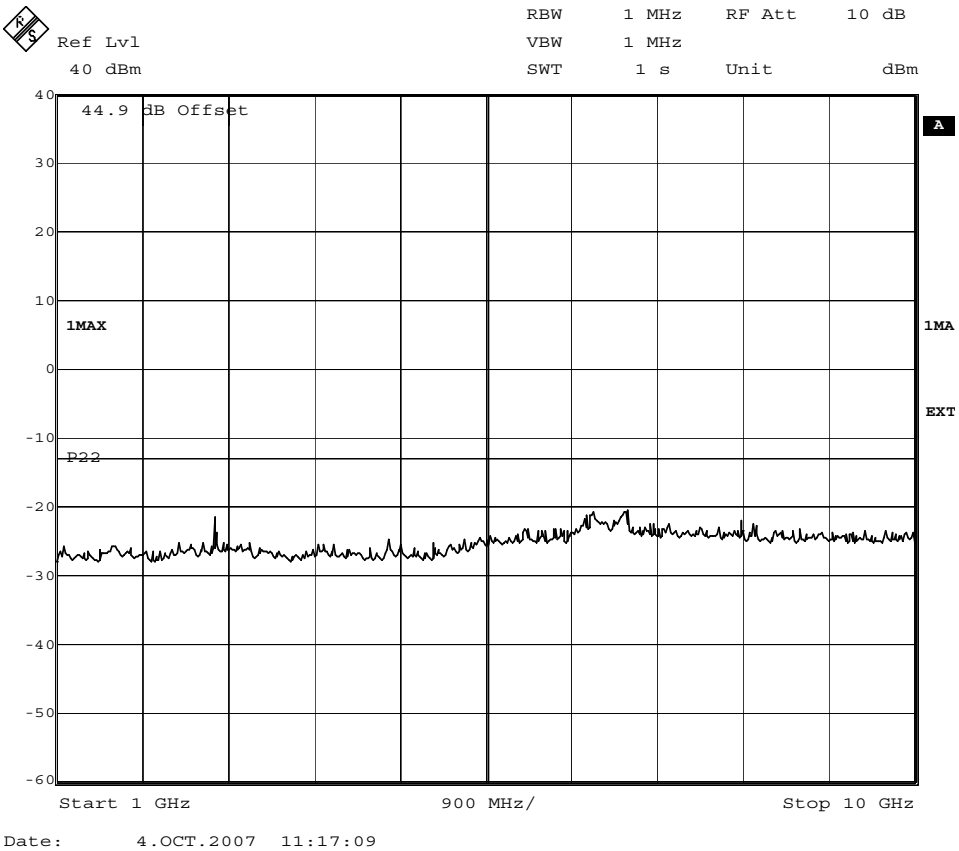
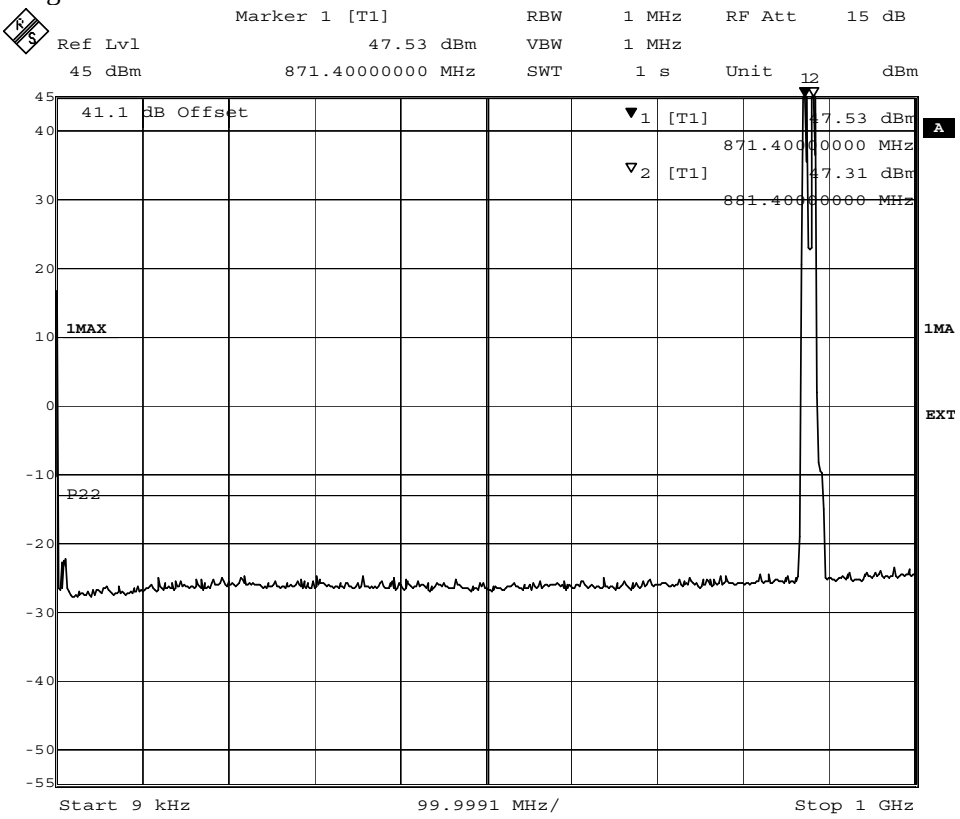


Diagram 7



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 9 kHz -10 MHz.

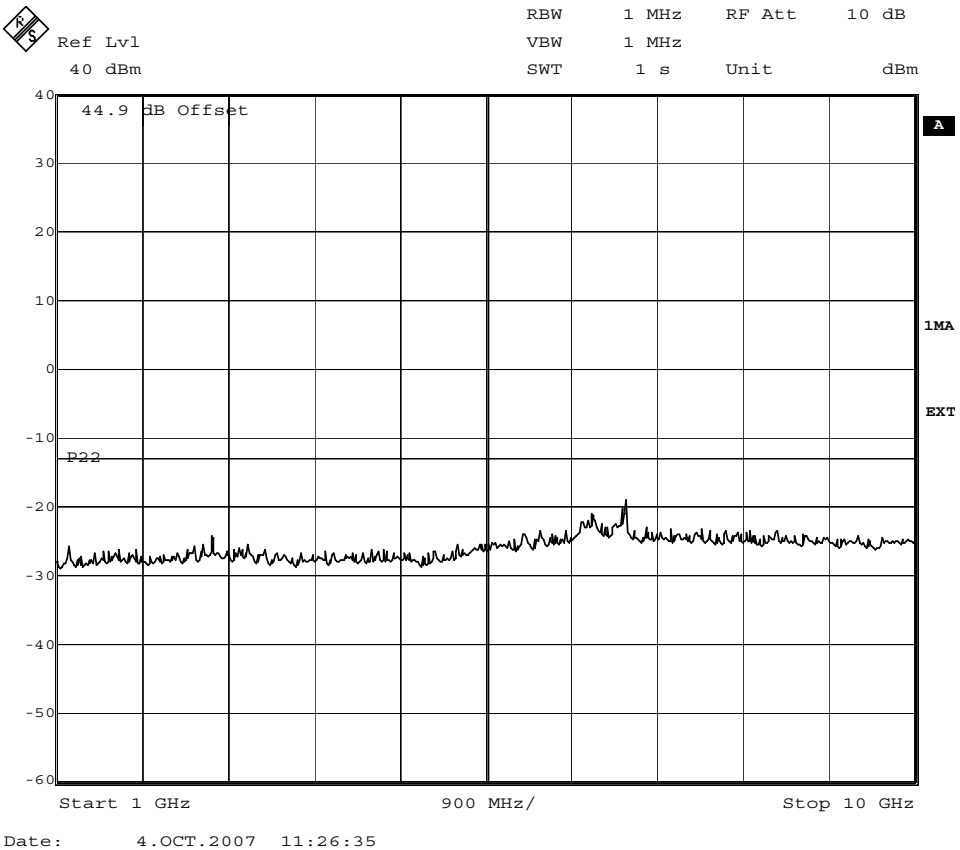
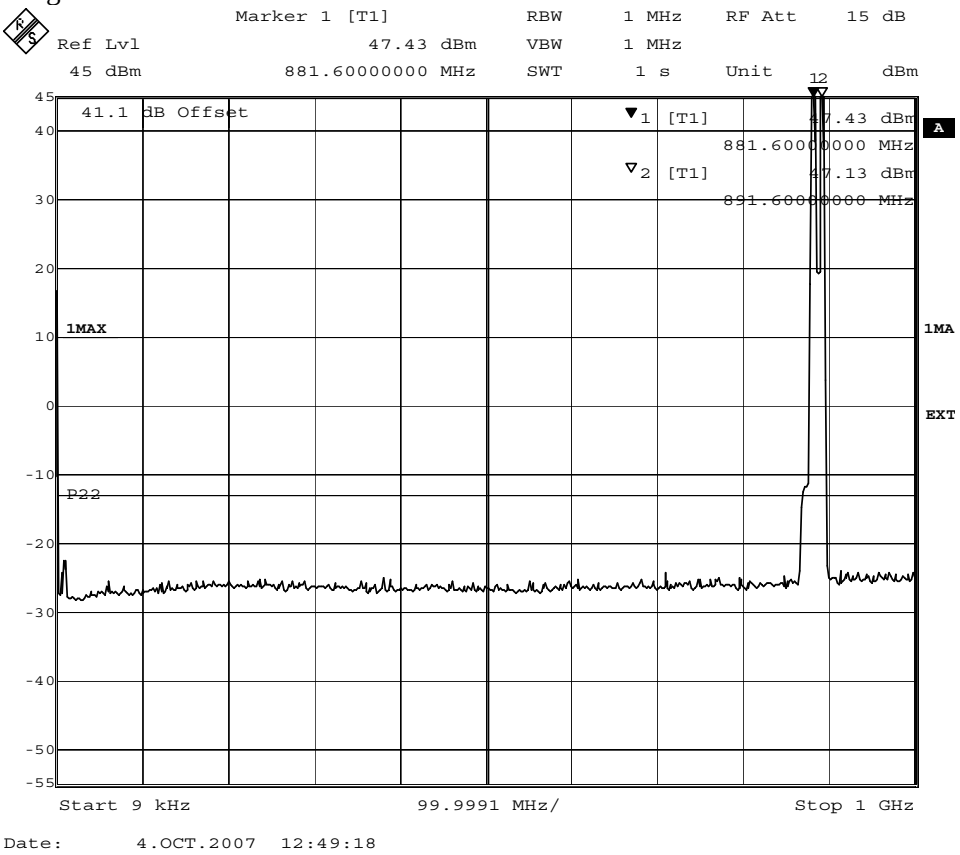


Diagram 8



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 9 kHz -10 MHz.

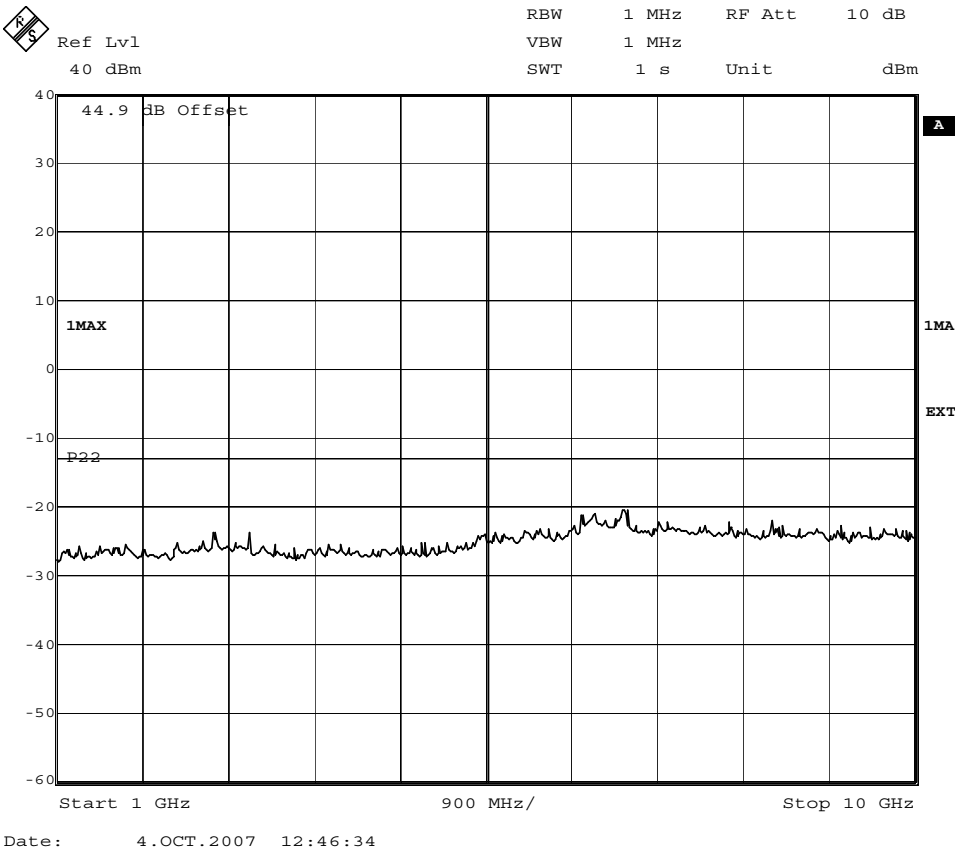
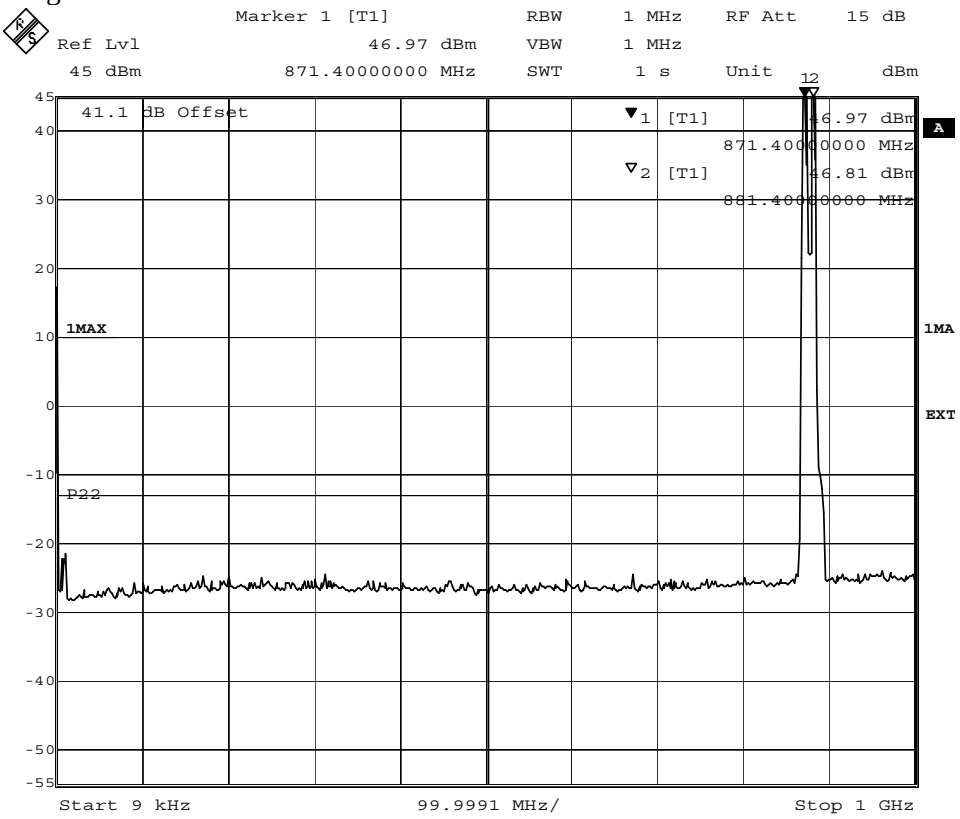


Diagram 9



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 9 kHz -10 MHz.

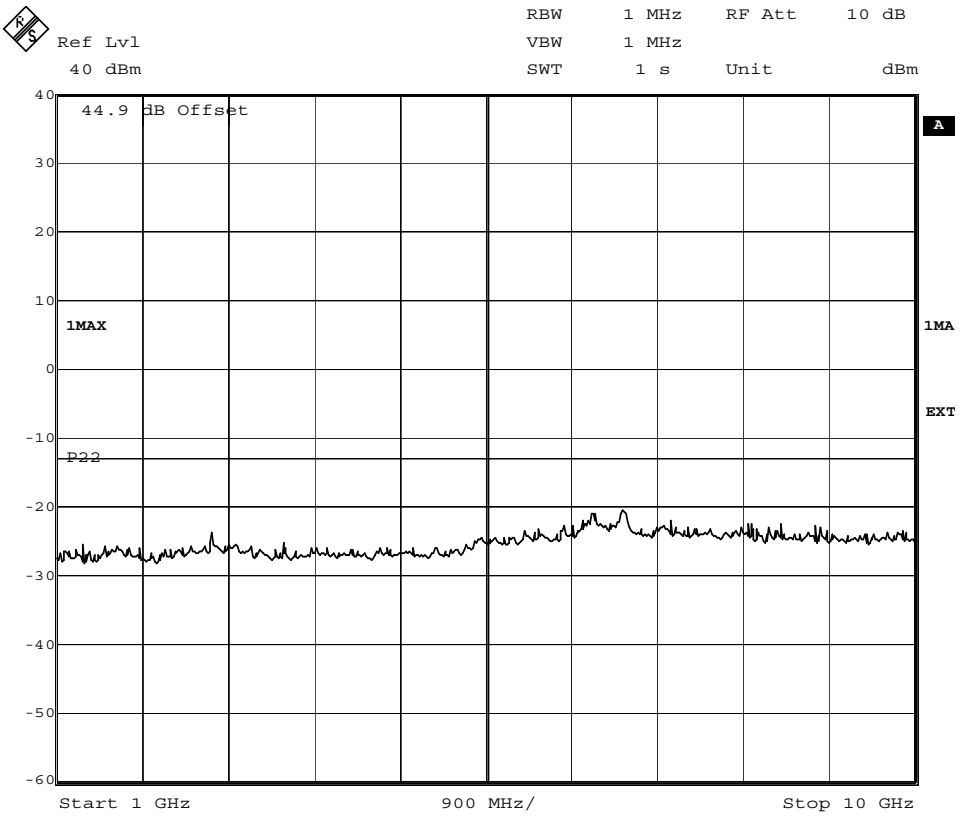
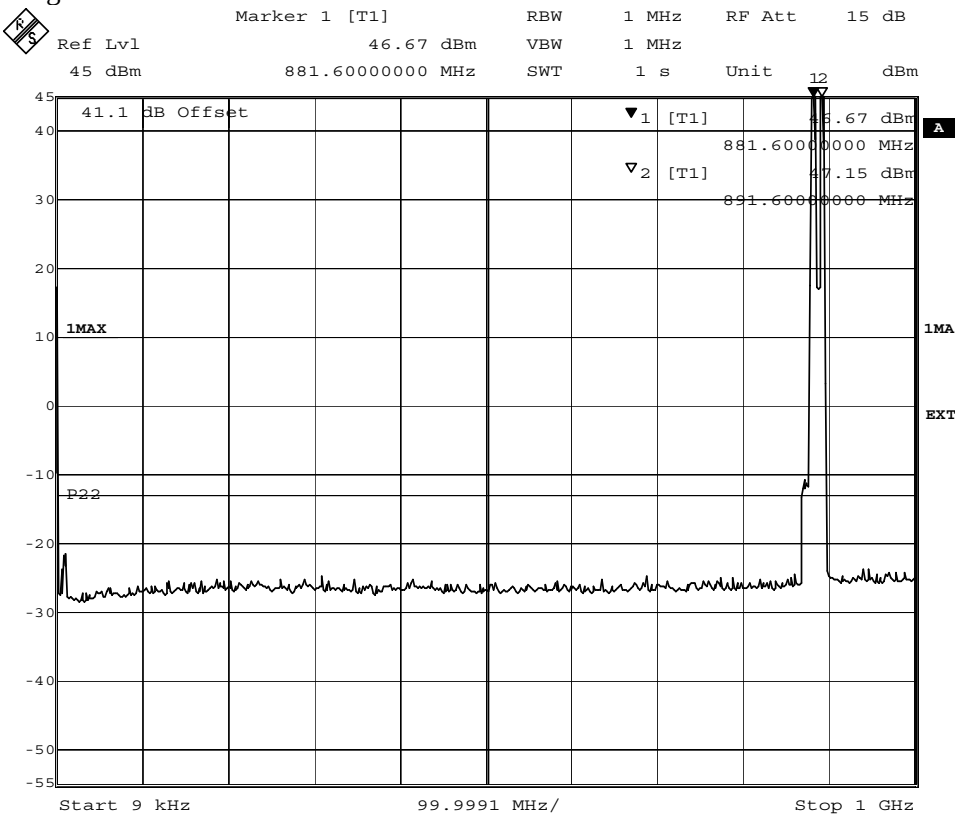
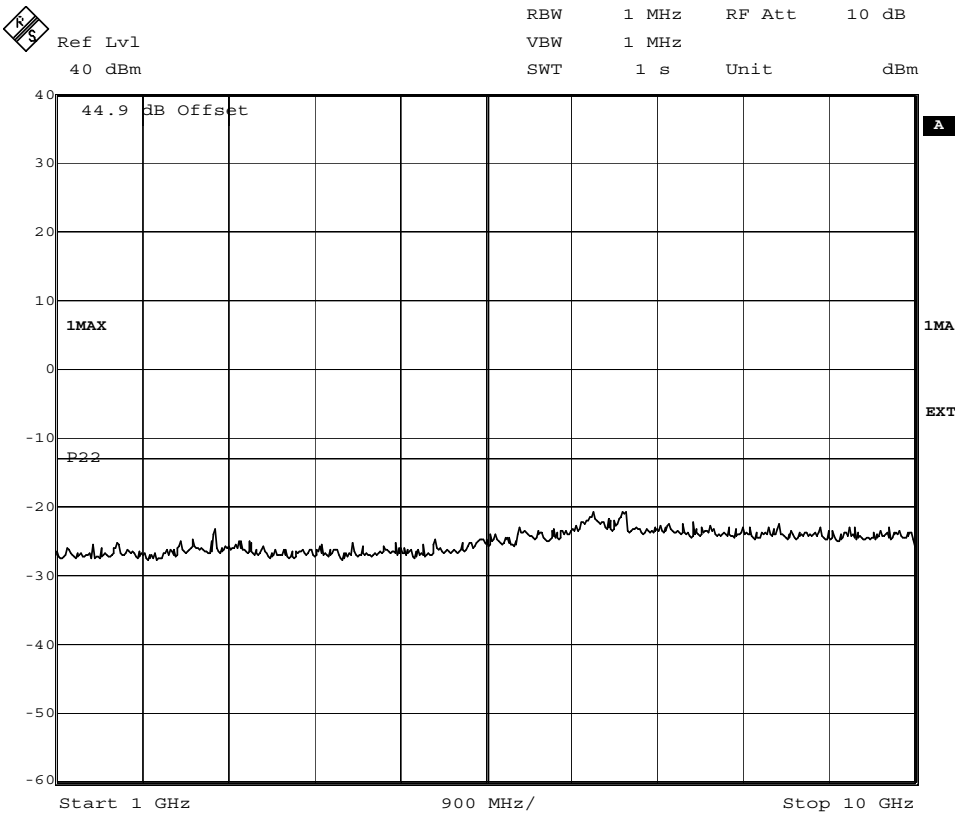


Diagram 10



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 9 kHz -10 MHz.



Field strength of spurious radiation measurements according to 47 CFR 2.1053

Date	Temperature	Humidity
2007-10-01	22 °C ± 3 °C	46 % ± 5 %
2007-10-02	22 °C ± 3 °C	38 % ± 5 %
2007-10-03	22 °C ± 3 °C	33 % ± 5 %

Test set-up and procedure

The test site is listed at FCC, Columbia with registration number: 93866. The test site also complies with RSS-Gen, Issue 2, Industry Canada file no.:IC 3482.
The transmitter was set up according to Test model 1 and Test model 5 during the measurements. The antenna ports were terminated with 50 ohm loads.

The measurements were performed with both horizontal and vertical polarisation of the antenna. The antenna distance was 3 m..

A pre-measurement was first performed:
In the frequency range 30 MHz-10 GHz the measurement was performed in power with a RBW of 1 MHz. A propagation loss in free space was calculated. The used formula was, $\gamma = 20\log\left(\frac{4\pi D}{\lambda}\right)$, γ is the propagation loss and D is the antenna distance.

The measurement procedure was as the following:

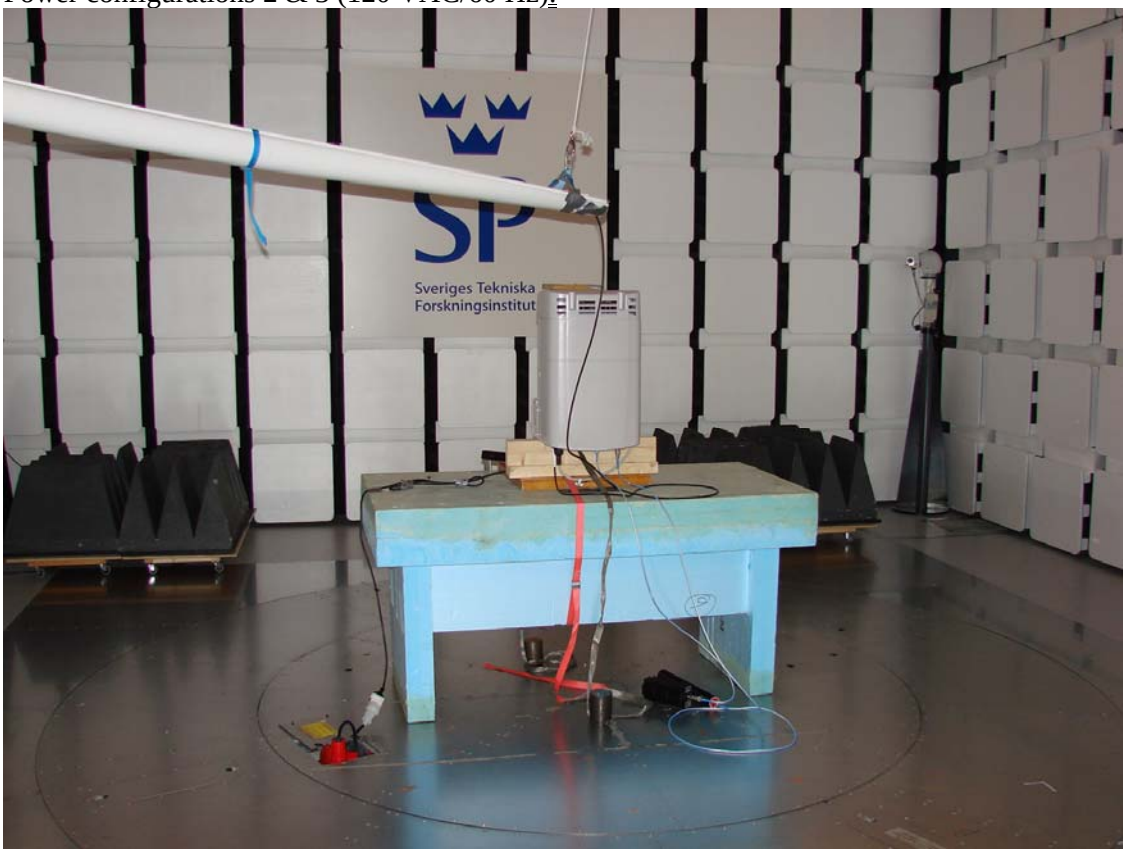
1. The pre-measurement was first performed with peak detector. The EUT was measured in eight directions and with the antenna at three heights, 1.0 m, 1.5 m and 2.0 m.
2. Spurious radiation on frequencies closer than 20 dB to the limit is scanned 0-360 degrees and the antenna is scanned 1-4 m for maximum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

Measurement equipment	Calibration Due	SP number
Test site	2008-11	503 881
R&S ESI 26	2008-07	503 292
R&S FSIQ	2008-10	503 738
Control computer	-	503 479
Software: R&S ES-K1, ver. 1.60	-	-
Chase Bilog antenna CBL 6111A	2008-11	503 182
EMCO Horn Antenna 3115	2007-11	502 175
MITEQ Low Noise Amplifier	2008-08	503 285
High pass filter	2008-07	502 758
Testo 610, Temperature and humidity meter	2009-04	502 658

The test set-ups during the spurious radiation measurements are shown in the picture below.

Power configuration 1 (-48 VDC):

Power configurations 2 & 3 (120 VAC/60 Hz):



Results

Single carrier

Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
30-10 000	All emission > 20 dB below limit	All emission > 20 dB below limit
Measurement uncertainty		4.7 dB

Multi carrier

Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
30-10 000	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

Frequency stability measurements according to 47 CFR 2.1055

Date	Temperature (test equipment)	Humidity (test equipment)
2007-10-05	23 °C ± 3 °C	38 % ± 5 %
2007-10-08	23 °C ± 3 °C	34 % ± 5 %
2007-10-09	22 °C ± 3 °C	28 % ± 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. The transmitter was set up according to Test model 1 and Test model 5 during the measurements.

Measurement equipment	Calibration Due	SP number
Climate chamber	2009-05	503 546
R&S FSIQ	2008-10	503 738
Multimeter Fluke 87	2008-04	502 190
Testo 610, Temperature and humidity meter	2009-04	502 658

Results

Nominal Voltage -48 VDC
46 dBm output power at 881.4 MHz

Test conditions		Frequency error (Hz)	
Supply voltage DC (V)	T (°C)	QPSK	16QAM
-48.0	+20	-4	-3
-55.2	+20	-4	-4
-40.8	+20	-4	-3
-48.0	+30	-3	-4
-48.0	+40	-3	-3
-48.0	+50	+3	-5
-48.0	+10	-2	-2
-48.0	0	-4	+2
-48.0	- 10	-3	-2
-48.0	- 20	-3	-2
-48.0	- 30	-4	-2
Maximum freq. error (Hz)		-5	
Measurement uncertainty		$< \pm 1 \times 10^{-7}$	

Note: After start-up at -30 °C the test object software disabled TX functionality for 8 minutes. During this time the software increased the current consumption to 5.4 A until a safe operating temperature range was reported by the build in sensors inside the test object.

Limits (according to 3GPP TS 25.141)

The frequency error shall be within ± 0.05 PPM ± 12 Hz (±56.07 Hz).

Complies?	Yes

Receiver spurious emissions measurements according to 47 CFR 15.111

Date	Temperature	Humidity
2007-10-10	23 °C ± 3 °C	32 % ± 5 %

Test set-up and procedure

The measurements were performed according to ANSI C63.4-2003.

Measurements were performed on the receiver antenna terminal (Ant 2). The measurement is first performed with peak detector. Emission on frequencies close to or above the limit is re-measured with quasi-peak detector (average detector above 1000 MHz).

Measurement equipment	Calibration Due	SP number
R&S FSIQ 40	2008-10	503 738
Testo 610, Temperature and humidity meter	2009-04	502 658

Result

The results are shown in appendix 8.1:

	Rx frequency
Diagram 1	826.4 MHz
Diagram 2	836.4 MHz
Diagram 3	846.6 MHz

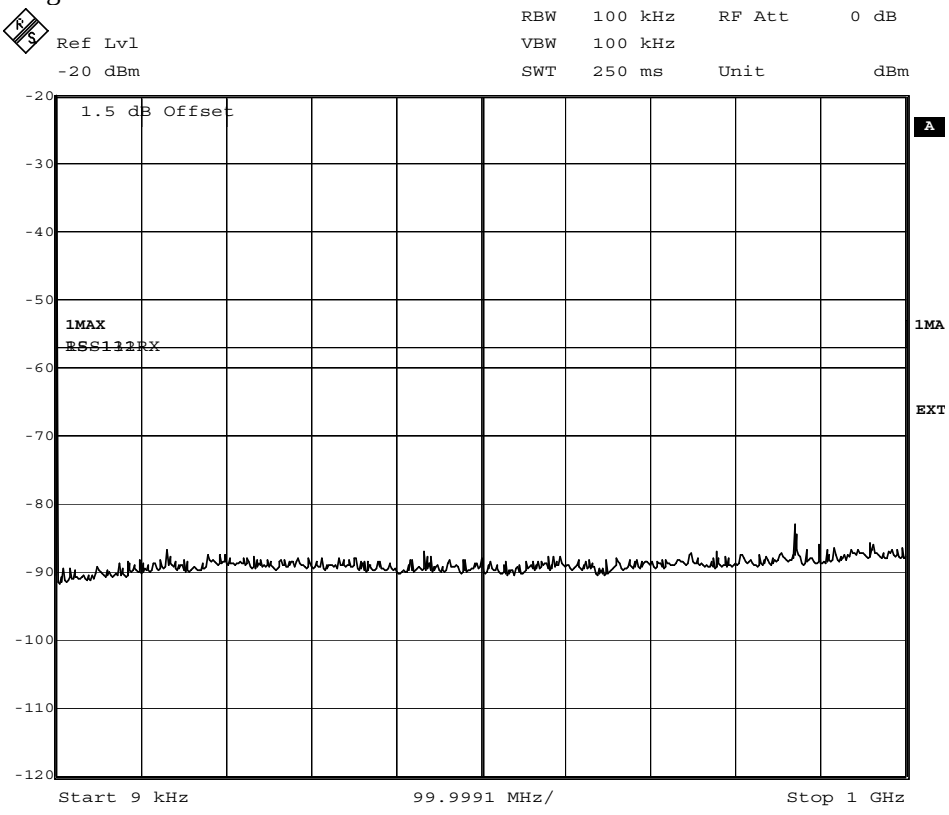
Note: During the measurement on the RX port Ant 2 the combined TX/RX port Ant1 was terminated with 50 ohm, the TX was active at maximum power 46 dBm in single carrier mode with Test model 1.

Limit

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

Emission below limit?	Yes

Diagram 1


RBW 100 kHz
RF Att 0 dB
Ref Lvl
VBW 100 kHz
-20 dBm
SWT 250 ms
Unit dBm
1.5 dB Offset
A
1MAX
RSS112RX
1MA
EXT
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
Start 9 kHz
99.9991 MHz/
Stop 1 GHz
Date: 10.OCT.2007 09:25:23

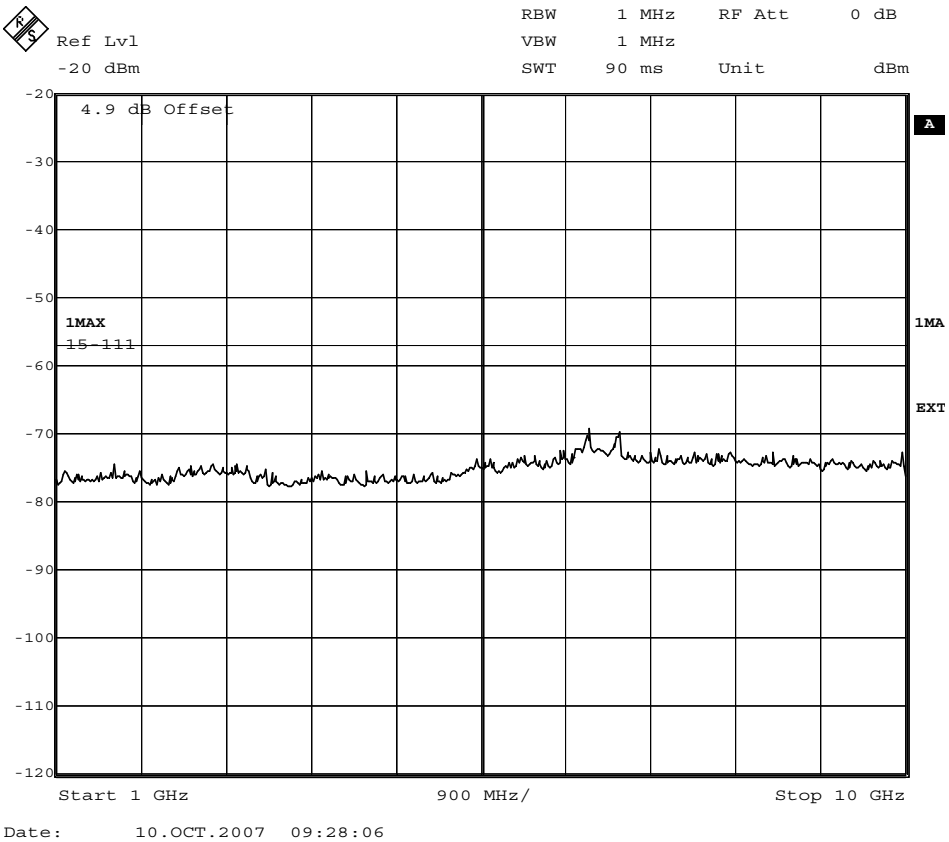
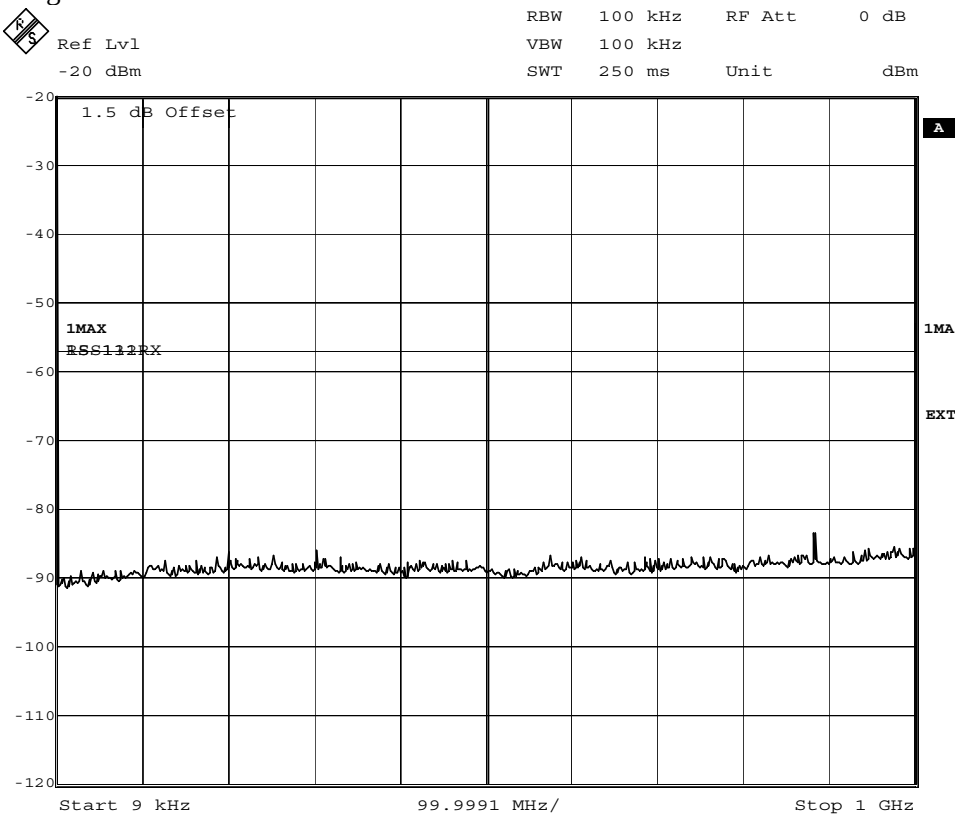

RBW 1 MHz
RF Att 0 dB
Ref Lvl
VBW 1 MHz
-20 dBm
SWT 90 ms
Unit dBm
4.9 dB Offset
A
1MAX
15-111
1MA
EXT
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
Start 1 GHz
900 MHz/
Stop 10 GHz
Date: 10.OCT.2007 09:28:06

Diagram 2


Ref Lvl
-20 dBm
RBW 100 kHz
VBW 100 kHz
SWT 250 ms
RF Att 0 dB
Unit dBm
1.5 dB Offset
A
1MAX
1MA
EXT
Start 9 kHz
99.9991 MHz/
Stop 1 GHz
Date: 10.OCT.2007 09:13:34

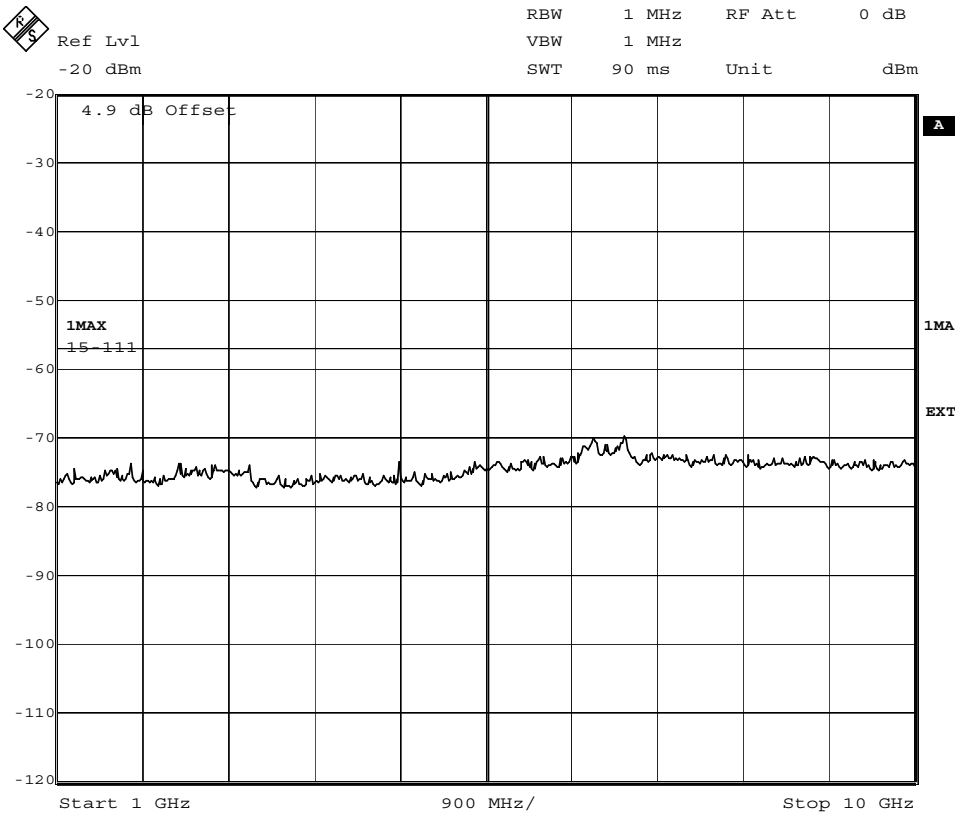
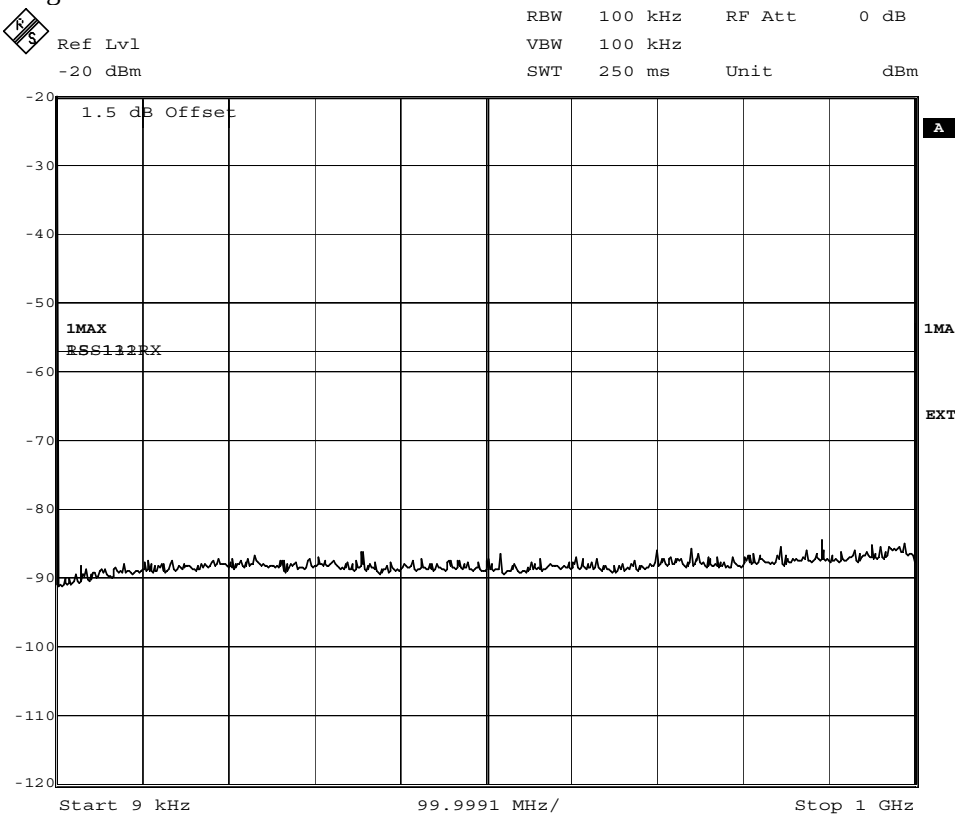
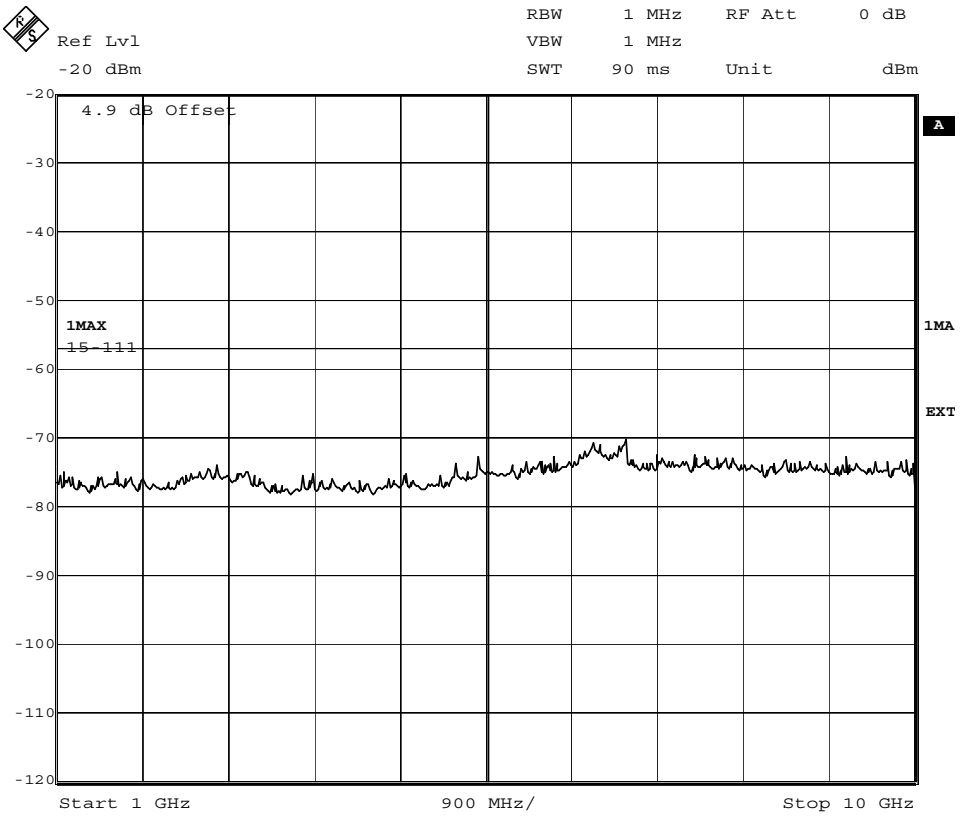

Ref Lvl
-20 dBm
RBW 1 MHz
VBW 1 MHz
SWT 90 ms
RF Att 0 dB
Unit dBm
4.9 dB Offset
A
1MAX
1MA
EXT
Start 1 GHz
900 MHz/
Stop 10 GHz
Date: 10.OCT.2007 09:09:29

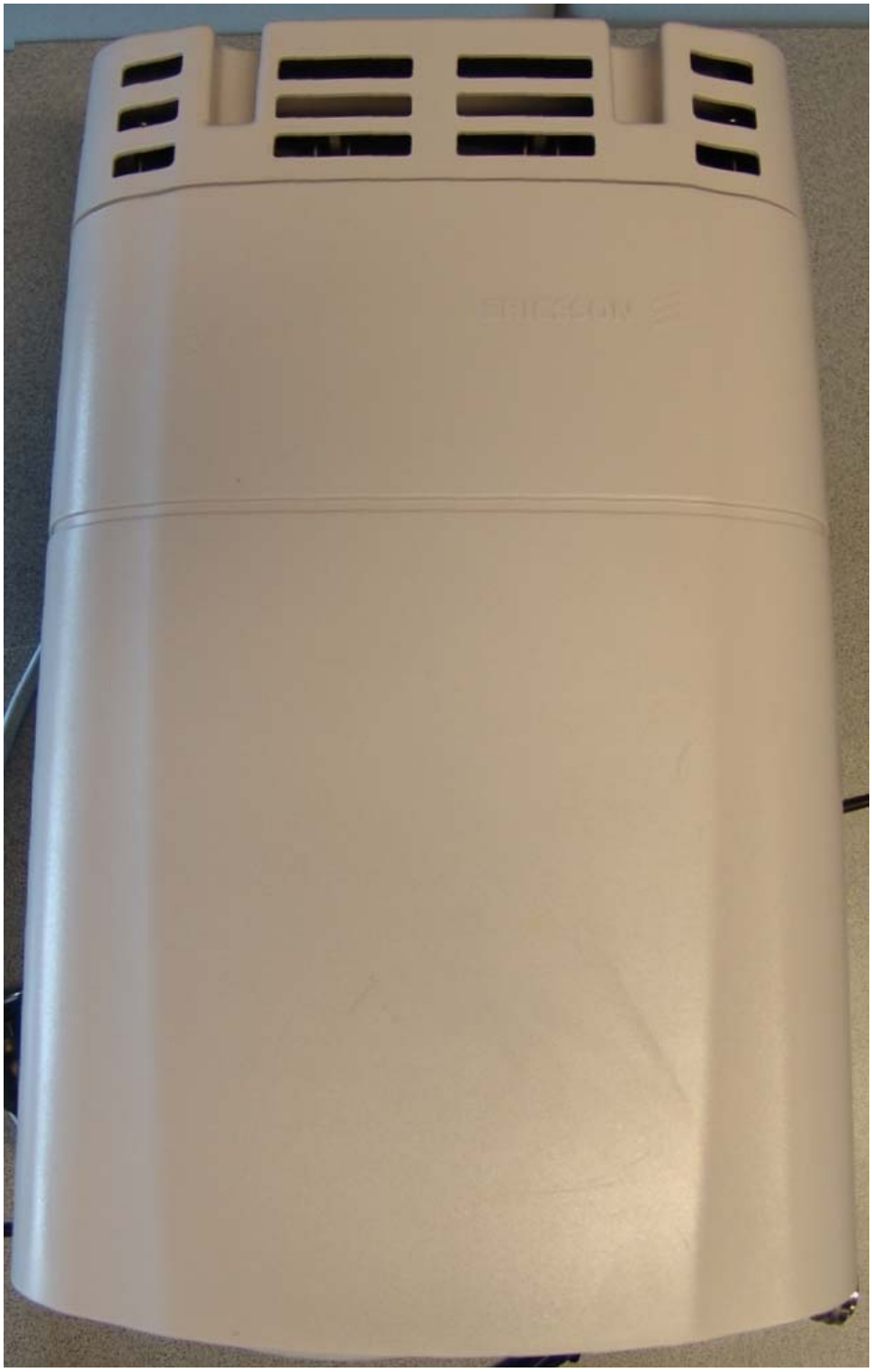
Diagram 3


RBW 100 kHz
RF Att 0 dB
VBW 100 kHz
Ref Lvl
-20 dBm
SWT 250 ms
Unit dBm
1.5 dB Offset
A
1MAX
1MA
EXT
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
Start 9 kHz
99.9991 MHz/
Stop 1 GHz
Date: 10.OCT.2007 09:18:18

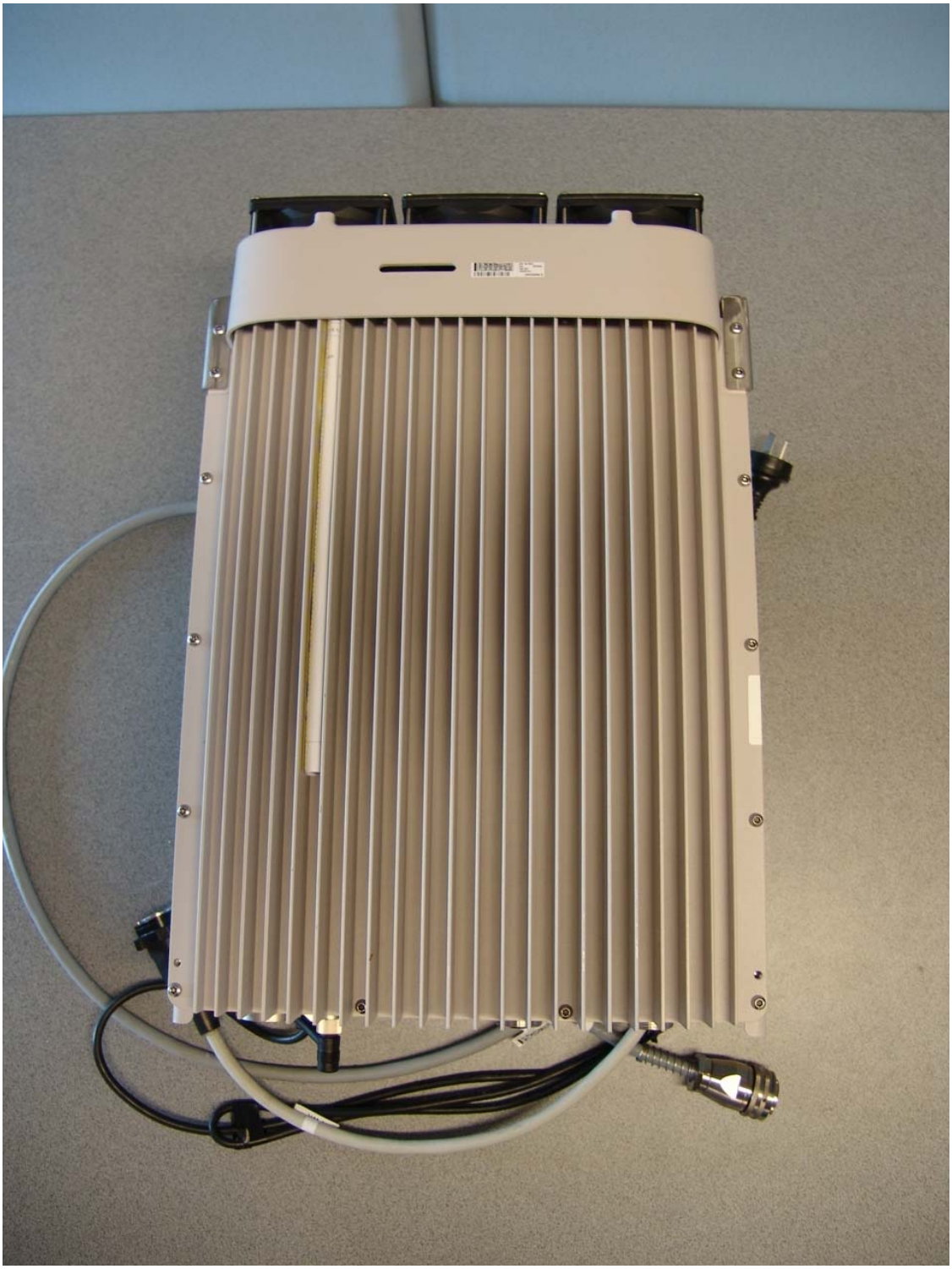

RBW 1 MHz
RF Att 0 dB
VBW 1 MHz
Ref Lvl
-20 dBm
SWT 90 ms
Unit dBm
4.9 dB Offset
A
1MAX
1MA
EXT
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
-120
Start 1 GHz
900 MHz/
Stop 10 GHz
Date: 10.OCT.2007 09:19:25

External photos RRU22 0840, KRC 161 134/5 revision R1B

Front side



Front side, solar covers removed



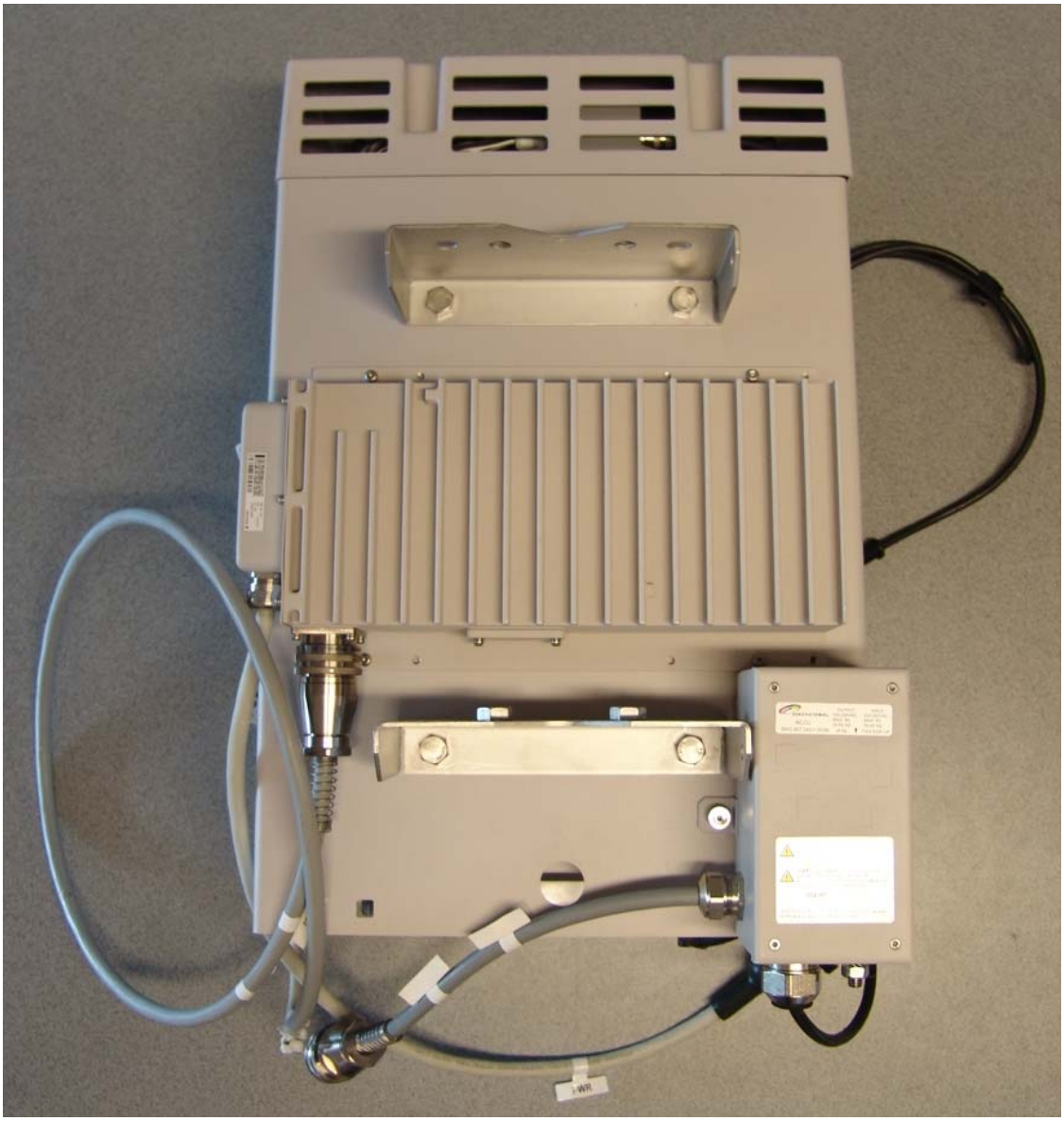
Left side

Right side

The pictures show the AC-outdoor configuration, PSU and ACCU attached, including interconnecting cables.

Rear side, DC-configuration (PSU and ACCU removed)

Rear side,
AC outdoor configuration, PSU and ACCU attached, including interconnecting cables



View on bottom side with EUT ports

View on top side fan units (solar cover removed)