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Date	Reference	Page
2012-02-24	FX108941-21	1 (2)

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No. 5 Lize East Street
Chaoyang District, Beijing 100102
P. R. China

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

(7 appendices)

Test object

RUS 01 B2, product KRC 118 66/1, revision R2F

Summary

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

Note 1: Above RSS-133 items are given as cross-reference only. Measurements were performed according to ANSI procedures referenced by FCC and covered by SP's accreditation.

SP Technical Research Institute of Sweden
Electronics - EMC

Performed by

Reinhold Reul

Examined by

Christer Karlsson

Table of contents

Description - Equipment Under Test (EUT)

Equipment:	RUS 01 B2 radio equipment 1900 MHz single and multi-carrier, operating in GSM mode.
TX frequency band:	1930 - 1990 MHz
Modulations:	GMSK, 8PSK, 16QAM, 32QAM and AQPSK

Nominal maximum output power: Per configuration and modulation, RMS value in [dBm]

	GMSK	8PSK	16QAM	32QAM	AQPSK
Mode: Single carrier, 1 x	47.8	47.8	47.8	47.8	47.8
Mode: Multi carrier, 2 x	44.8	44.8	44.5	44.1	44.8
Mode: Multi carrier, 3 x	43.0	42.4	41.0	40.6	42.3
Mode: Multi carrier, 4 x	41.8	39.9	38.5	38.1	39.8

Nominal supply voltage: -48 V DC

Purpose of test

The purpose of this test is to justify a Class II Permissive Change of the test object to include the use of the modulations 16QAM, 32QAM and AQSPK in SCPIR 0 dB. This report verifies maintained performance characteristics of affected items by re-testing the updated equipment and comparing results for GMSK modulation with results for the new modulations.

Tested configurations and set-ups

Single and multi-carrier modes were used as documented in the respective appendix. The EUT was activated at the maximum nominal RF output power per activated carrier and random data was transmitted in all time slots, with the various modulations being tested one at a time. Connections and reference points for measurements are shown in the set-ups below.

Test frequencies used

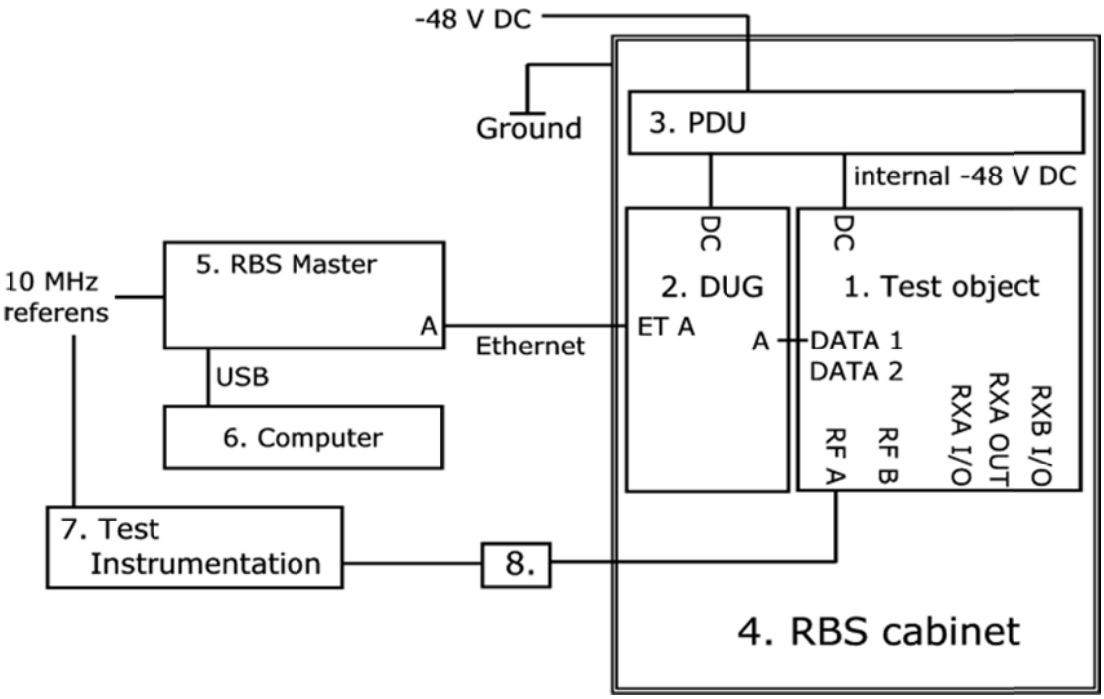
In single carrier mode:

Channel	ARFCN	Frequency	Comment
B	512	1930.2 MHz	TX band lowest possible frequency
B+1	513	1930.4 MHz	TX alternate low frequency, one channel into band
M	661	1960.0 MHz	TX band center frequency
T-1	809	1989.6 MHz	TX alternate high frequency, one channel into band
T	810	1989.8 MHz	TX band highest possible frequency

In multi-carrier mode:

Channel	ARFCN	Frequency	Comment
B+1	513	1930.4 MHz	TX low multi-carrier bottom frequency used
B+9	521	1932.0 MHz	TX high multi-carrier bottom frequency used
M-4	657	1959.2 MHz	TX low multi-carrier mid frequency used
M+4	665	1960.8 MHz	TX high multi-carrier mid frequency used
T-9	801	1988.0 MHz	TX low multi-carrier top frequency used
T-1	809	1989.6 MHz	TX high multi-carrier top frequency used

Test set-up, conducted measurements



Test object

1. RUS 01 B2, product KRC 118 66/1, revision R2F, SN CB4G844133 with FCC ID: TA8BKRC11866-1 and IC: 287AB-BS118661

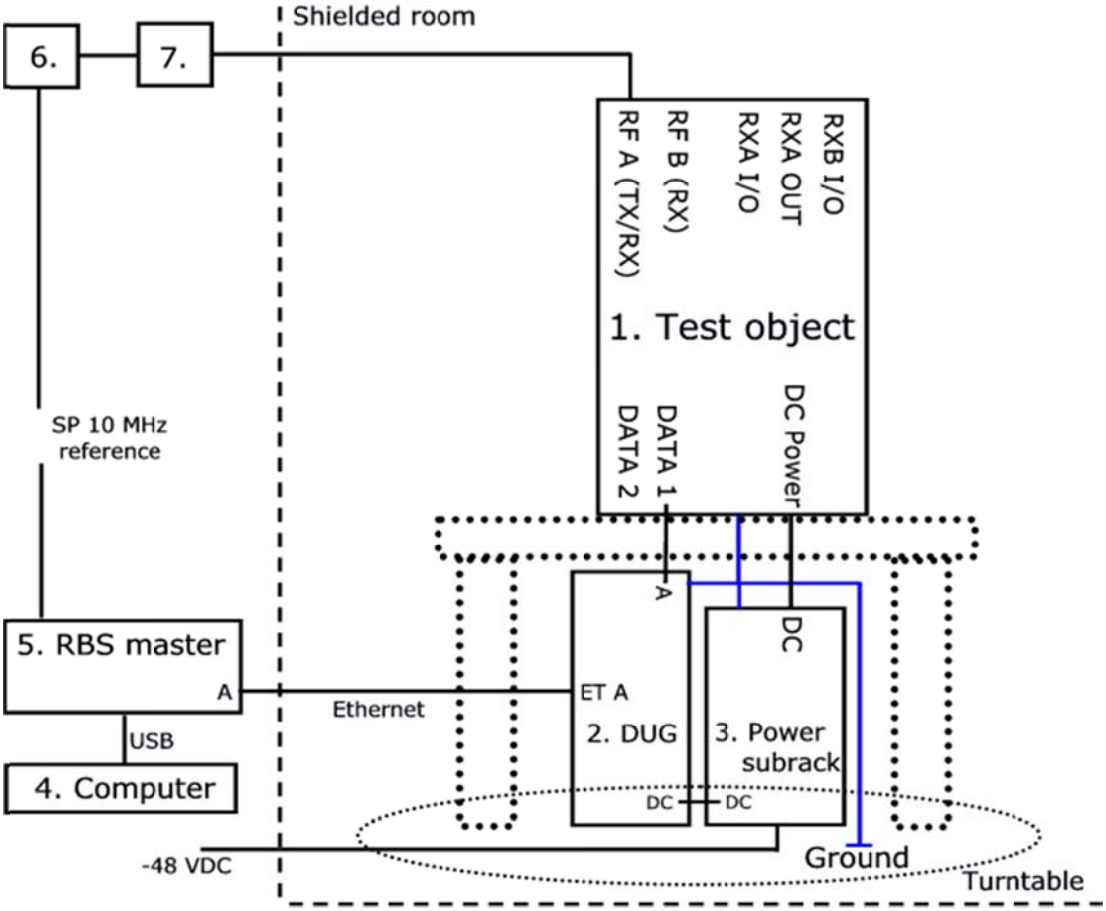
Functional test equipment

2. Digital unit DUG 20 01,
   product KDU 137 569/1, revision R2A, SN C823667528
3. Power distribution unit PDU 02 01,
   product BMG 980 336/4, revision R2A, SN BJ31528316
4. RBS 6201 cabinet, BAMS 1000778792, external connections:

Interface	Type of port:
-48 V DC to internal DC connection port	DC power
Ground strap to frame grounding point	Ground
DUG port ET A to RBS master 2E port A using shielded Ethernet multi-wire RJ-45 connectors, using transmission mode E1	Telecom

5. RBS Master 2E hardware,
   product LPY 107 1007/3, revision R1C/A, SN T01E6555543, BAMS 1000878432
6. Laptop Compaq nc6220, S/N: CNU54722NZ, BAMS 1000208319,
   with RBS Master 2E control software
7. Measurement equipment specified in respective appendix or
   client supplied Agilent MXA Signal Analyser model N9020A 20 Hz – 3.6 GHz,
   BAMS 1000785533 used to verify the modulation schemes
8. Attenuator / filter listed under test equipment in respective appendix

Test set-up, radiated emission



Test object

1. RUS 01 B2, product KRC 118 66/1, revision R2F, SN CB4G844133 with FCC ID: TA8BKRC11866-1 and IC: 287AB-BS118661

Functional test equipment

2. Digital unit DUG 20 01, product KDU 137 569/1, revision R2A, SN C823667528
3. Power sub-rack, details see below
4. Laptop Compaq nc6220, S/N: CNU54722NZ, BAMS 1000208319, with RBS Master 2E control software
5. RBS Master 2E hardware, product LPY 107 1007/3, revision R1C/A, SN T01E6555543, BAMS 1000878432, using shielded Ethernet multi-wire with RJ-45 connectors and transmission mode E1 to DUG port ET A
6. Rohde & Schwarz ESI40 (SP 503 125) for signal monitoring or 50 ohm termination
7. Attenuator 30 dB, SP 900229

Power sub-rack modules:

Pos.	Unit	Product Number	Revision	Serial Number
	Power subrack	SXK 109 8115/1	R2A	-
1	PDU 01 01	BMG 980 336/2	R4F	BJ31532384
2	PDU 01 01	BMG 980 336/2	R4F	BJ31532382
3	SHU 01 01	BGK 901 18/1	R3C	BJ31446269
4	DUMMY	SXK 109 8257/1	R1F	-
5	DUMMY	SXK 109 8257/1	R1F	-
6	PFU	KFE 101 11621	R1B	BR80910495
7	DUMMY	SXK 109 8257/1	R1F	-
8	DUMMY	SXK 109 8257/1	R1F	-
9	PCF 02 01	KFE 101 1157/1	R1C	BW95301450

Test object connections

Interface	Type of port
-48.0 V DC	DC power
Ground strap connected to shell in stand-alone radiated test, Grounding through RBS cabinet frame in conducted test	Ground
RF A, 7/16” female RF connector, combined TX/RX	RF/Antenna
RF B, 7/16” female RF connector, unconnected, RX only	RF/Antenna
Data 1, connected to DUG port A	Signal
Data 2, unconnected	Signal
RXA I/O, unconnected	Signal
RXA OUT, unconnected	Signal
RXB I/O, unconnected	Signal

Test object software

Software	Revision
CXP 104 0013/07	R65F

References

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

ANSI C63.4-2009
ANSI/TIA/EIA-603-C-2004
ANSI/TIA/EIA 136-280-D-2002
CFR 47 part 2, October 1st, 2010
CFR 47 part 24, October 1st, 2010
RSS-Gen, Issue 3
RSS-133, Issue 5

Reservation

The test results in this report apply only to the particular Equipment Under Test (EUT) as declared in the report.

Delivery of test object

The test object was delivered: 2011-12-07

Test equipment

Measurement equipment	Calibration Due	SP number
Anechoic chamber, Hertz	2013-10	15:116
Boonton 4500A RF Peak power meter/analyser	2012-11	503 144
Boonton Power sensor 56518-S/4	2012-11	503 146
Rohde & Schwarz FSQ40	2012-07	504 143
Rohde & Schwarz FSIQ40	2012-07	503 738
Rohde & Schwarz ESI40	2012-07	503 125
Rohde & Schwarz Vector Network Analyser	2012-07	503 687
Chase bilog antenna CBL 6121A	2014-10	502 460
Schaffner Reference Dipole BSRD6500	2012-03	502 181
EMCO Horn Antenna 3115	2014-01	502 175
EMCO Horn Antenna 3115	2014-01	501 548
MITEQ Low Noise Amplifier	2012-08	503 277
Flann Std gain horn 20240-20	2014-03	503 674
Attenuator 40 dB	2012-08	504 159
Attenuator 30 dB	2012-08	900 229
Attenuator 30 dB	2012-05	503 870
Attenuator 10 dB	2012-08	900 118
High pass filter	2012-08	504 200
High pass filter	2012-10	503 740
Multimeter Fluke 87	2012-05	502 190
Testo 615 temperature and humidity meter	2012-03	503 498
Testo 635 temperature and humidity meter	2013-05	504 203

Uncertainties

Measurement and test instrument uncertainties are described in the quality assurance documentation ”SP-QD 10885”. The uncertainties are calculated with a coverage factor k=2 (95% level of confidence).

Test engineers

Jörgen Wassholm, Martin Nilsson, Martin Forsberg and Reinhold Reul, SP

Manufacturer’s representative

Hua Yang, Ericsson (China) Communications Company Ltd

RF Power output measurements according to CFR 47 2.1046 / RSS-133 6.4

Date	Temperature	Humidity
2012-01-02	22 °C ± 3 °C	30 % ± 5 %
2012-01-03	22 °C ± 3 °C	24 % ± 5 %

Test set-up and procedure

Measurements were made at EUT port RF A. The output was connected to a peak power analyser via a 50 ohm attenuator.

Measurement equipment	SP number
Boonton 4500A RF Peak power meter/analyzer	503 144
Boonton Power sensor 56518-S/4	503 146
Attenuator	503 870
Attenuator	900 118
Multimeter Fluke 87	502 190
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 0.7 dB

Results

Single carrier 1x47.8 dBm, RBS master 2E setting 48

Transmitter power (dBm)		
Modulation	ARFCN (Frequency)	Peak / RMS
16QAM	512 (1930.2 MHz)	52.4 / 47.3
GMSK	661 (1960.0 MHz)	48.2 / 47.4
16QAM	661 (1960.0 MHz)	52.2 / 47.2
32QAM	661 (1960.0 MHz)	52.5 / 47.2
AQPSK	661 (1960.0 MHz)	51.3 / 47.4
16QAM	810 (1989.8 MHz)	52.1 / 47.0

The highest measured PAR was 5.3 dB.

Multi carrier 2x44.8 dBm, RBS master 2E setting 45 per carrier, 2 active carriers

Aggregated transmitter power (dBm)		
Modulation	ARFCNs (Frequencies)	Peak / RMS
16QAM	513 & 521 (1930.4 MHz & 1932.0 MHz)	55.0 / 47.1
GMSK	657 & 665 (1959.2 MHz & 1960.8 MHz)	51.1 / 47.3
16QAM	657 & 665 (1959.2 MHz & 1960.8 MHz)	55.1 / 47.0
32QAM	657 & 665 (1959.2 MHz & 1960.8 MHz)	54.5 / 46.5
AQPSK	657 & 665 (1959.2 MHz & 1960.8 MHz)	54.2 / 47.3
16QAM	809 & 801 (1989.6 MHz & 1988.0 MHz)	54.8 / 46.7

The highest measured PAR with 2 carriers was 8.1 dB.
The theoretical RMS power per carrier is 3 dB below the aggregated measured RMS value.

Limits

According to CFR § 24 there are no conducted limits at the antenna connector.

§ 24.232: The peak-to-average (PAR) ratio shall not exceed 13 dB. Base stations with an emission bandwidth of 1 MHz or less are limited to 1640 watts equivalent isotropically radiated power (EIRP).

RSS-133: Base station transmitters operating within the frequency range 1930 – 1995 MHz shall not exceed 100 W output power. The peak-to-average (PAR) ratio shall not exceed 13 dB. 1640 W EIRP shall not be exceeded (according SRSP-510).

Complies?	Yes

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

Date	Temperature	Humidity
2012-01-02	22 °C ± 3 °C	30 % ± 5 %
2012-01-03	22 °C ± 3 °C	24 % ± 5 %

Test set-up and procedure

Measurements were made with EUT port RF A connected to a spectrum analyser with the RMS detector activated. The spectrum analyser was connected to an external 10 MHz reference standard during the measurements.

Measurement equipment	SP number
Boonton 4500A RF Peak power meter/analyzer	503 144
Boonton Power sensor 56518-S/4	503 146
Attenuator	503 870
Attenuator	900 118
Multimeter Fluke 87	502 190
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB, 1.33 kHz

Results

Configuration: Single carrier, RBS master 2E setting 48

Diagram	Channel (Frequency)	Modulation	OBW	
1	B (1930.2MHz)	16QAM	241	kHz
2	M (1960.0 MHz)	GMSK	241	kHz
3	M (1960.0 MHz)	16QAM	240	kHz
4	M (1960.0 MHz)	32QAM	240	kHz
5	M (1960.0 MHz)	AQPSK	238	kHz
6	T (1989.8 MHz)	16QAM	241	kHz

Appendix 3

Diagram 1:

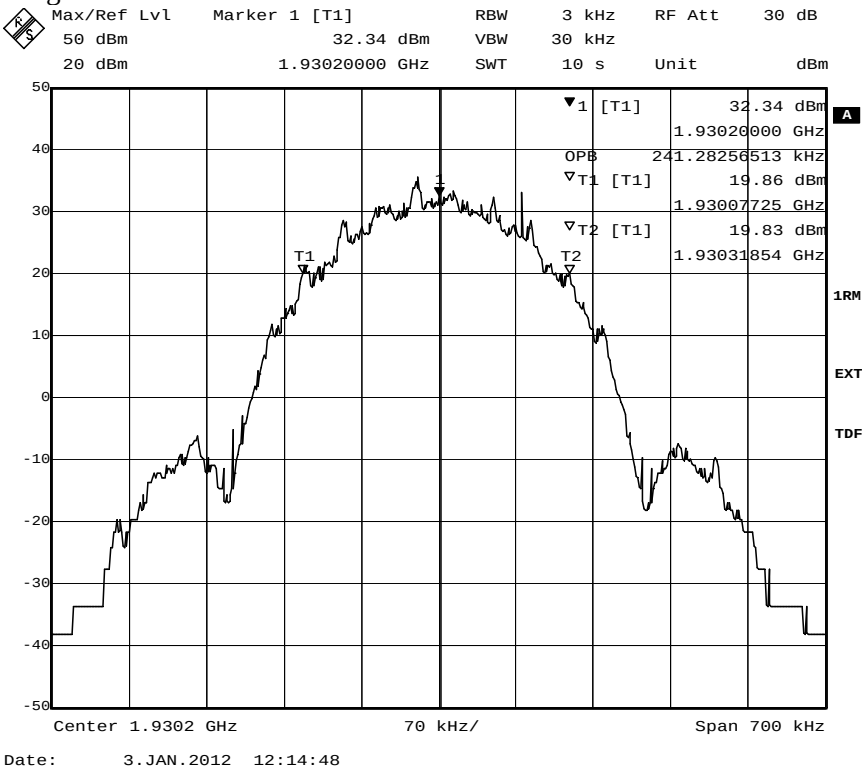


Diagram 2:

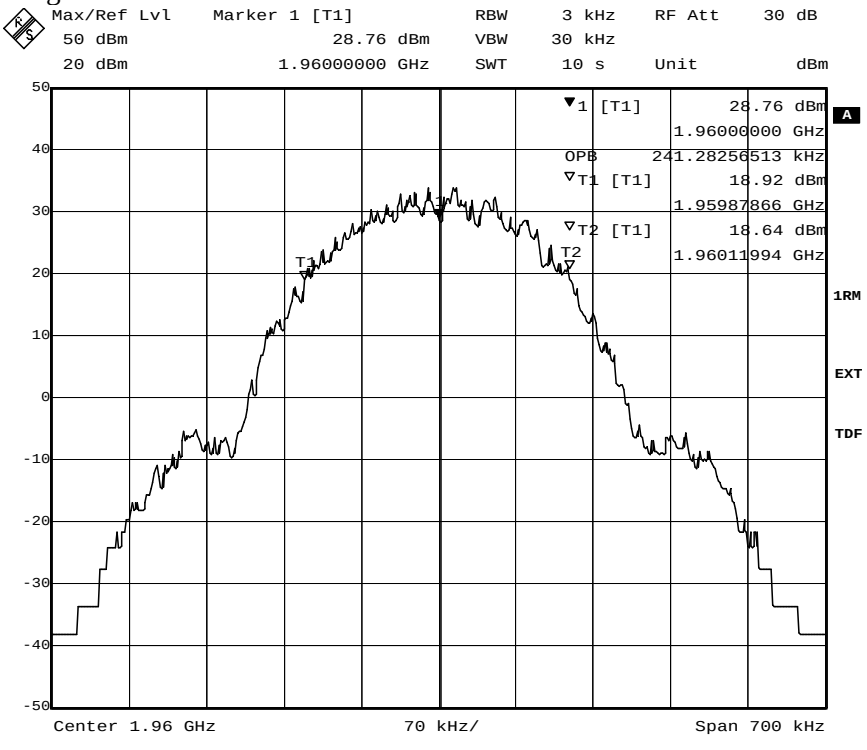
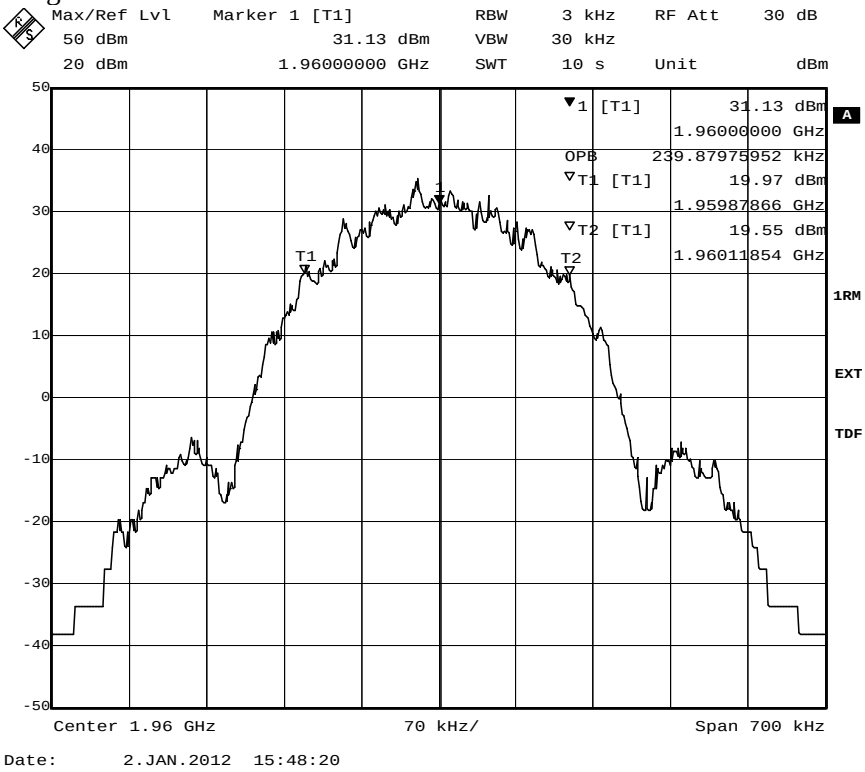
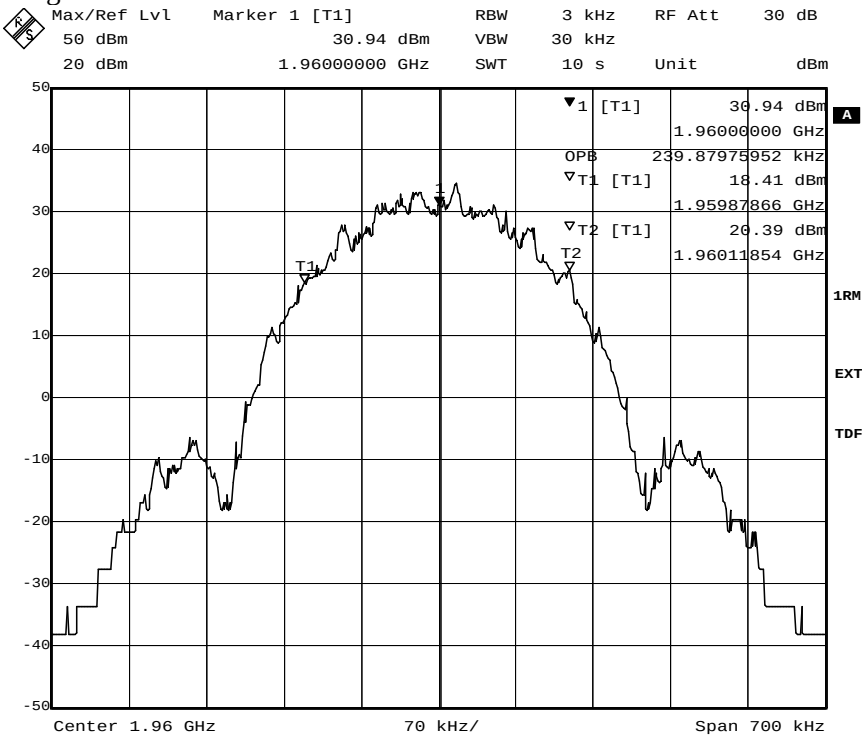


Diagram 3:



Date: 2.JAN.2012 15:48:20

Diagram 4:



Date: 2.JAN.2012 15:32:03

Diagram 5:

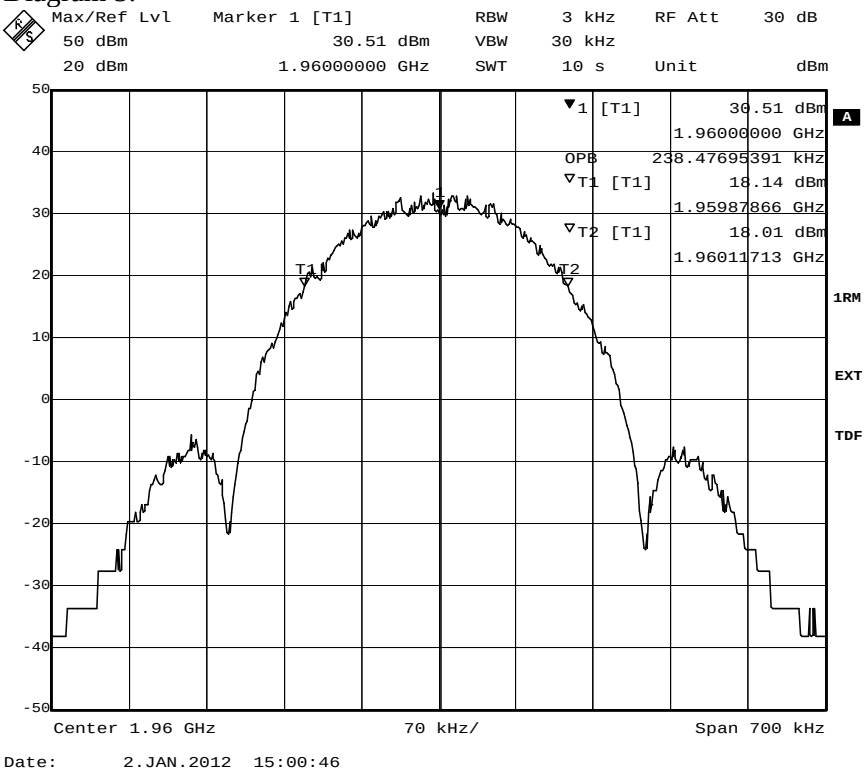
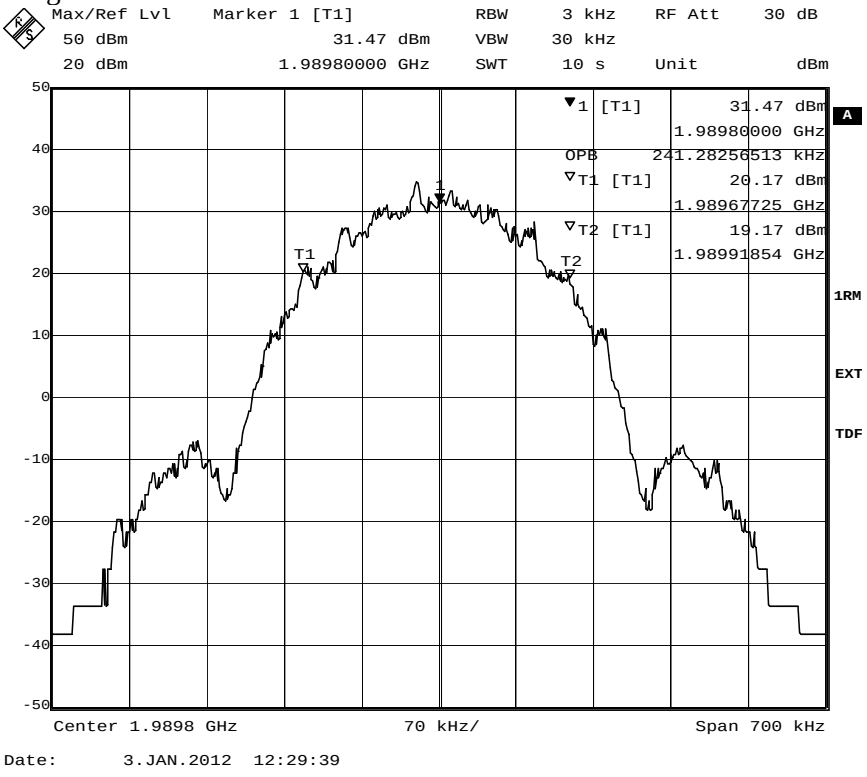


Diagram 6:



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

Date	Temperature	Humidity
2012-01-03	22 °C ± 3 °C	24 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §24.238. The EUT port RF A 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 standard allows a RBW of 1% of the EBW within the 1st MHz off the band-edge and requires a RBW of 1 MHz for offsets beyond 1 MHz. Where a reduced RBW was used the limit line was adapted by (10*log(RBWused/1 MHz) dB.

Measurement equipment	SP number
Rohde & Schwarz FSIQ40	503 738
Attenuator	503 870
Attenuator	900 118
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

Configuration single carrier 1x47.8 dBm

Modulation 16QAM:

Diagram	Channel	Power setting	RMS power measured
1 a, b, c	B	40	39.5 dBm
2 a, b, c	B+1	48	47.2 dBm
3 a, b, c	T-1	48	47.0 dBm
4 a, b, c	T	40	39.3 dBm

Modulation 32QAM:

Diagram	Channel	Power setting	RMS power measured
5 a, b, c	B	40	39.5 dBm
6 a, b, c	B+1	48	47.1 dBm
7 a, b, c	T-1	48	46.9 dBm
8 a, b, c	T	40	39.2 dBm

Modulation AQPSK:

Diagram	Channel	Power setting	RMS power measured
9 a, b, c	B	40	39.6 dBm
10 a, b, c	B+1	48	47.2 dBm
11 a, b, c	T-1	48	47.1 dBm
12 a, b, c	T	42	41.1 dBm

The diagrams are shown on the following pages.

Remark

Above given measured RMS values for the channels B and T adjacent to the frequency band edges are the maximum output power that can be used on the respective channel to meet band-edge requirements.

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 a:

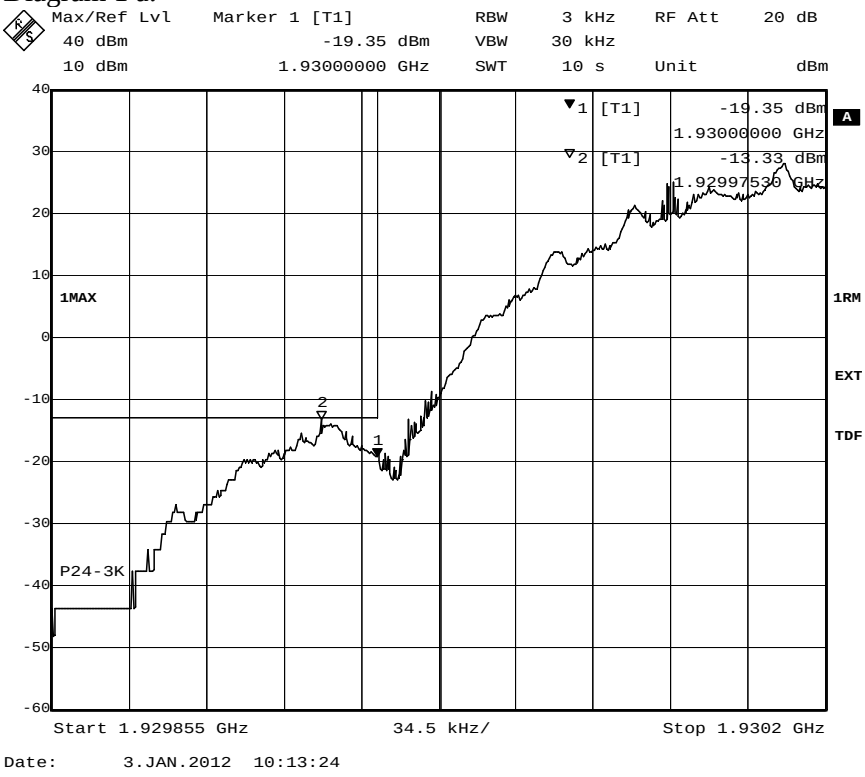


Diagram 1 b:

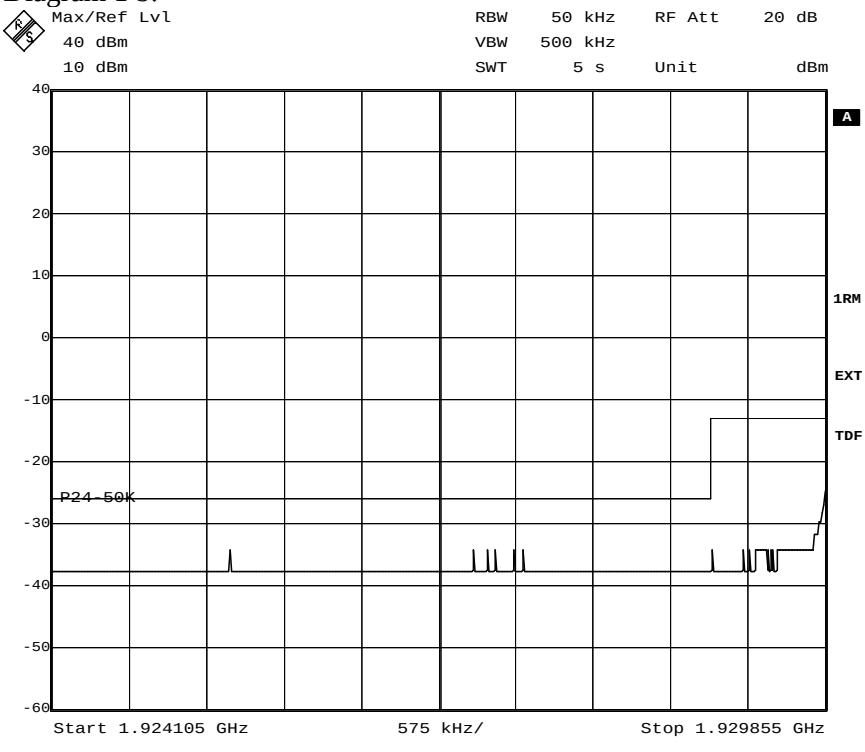


Diagram 1 c:

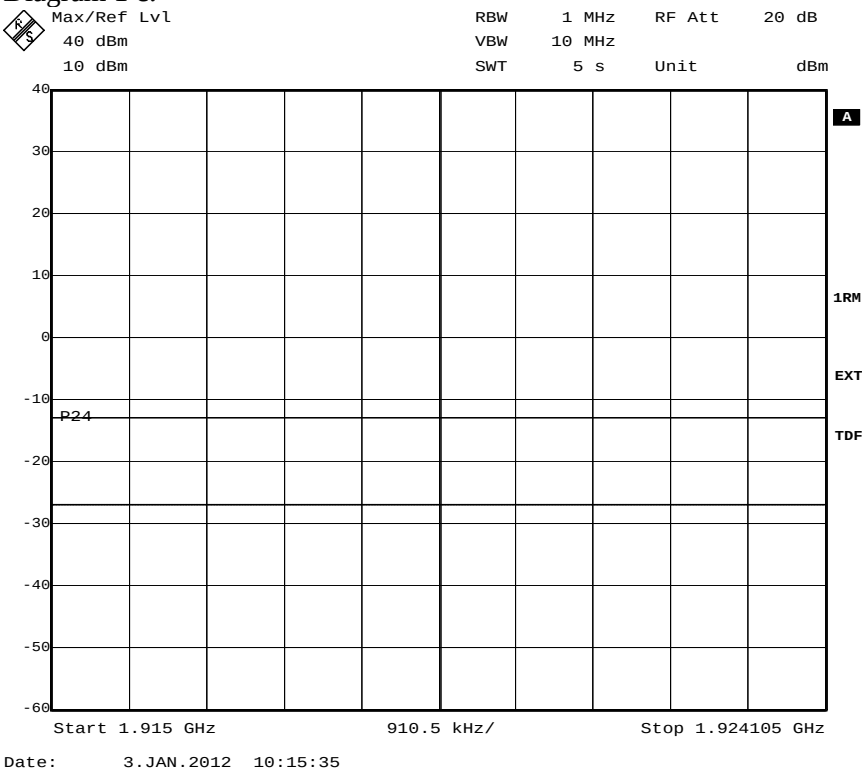

Max/Ref Lvl
40 dBm
10 dBm
RBW 1 MHz
VBW 10 MHz
SWT 5 s
RF Att 20 dB
Unit dBm
40
30
20
10
0
-10
-20
-30
-40
-50
-60
A
1RM
EXT
TDF
P24
Start 1.915 GHz
910.5 kHz/
Stop 1.924105 GHz
Date: 3.JAN.2012 10:15:35

Diagram 2 a:

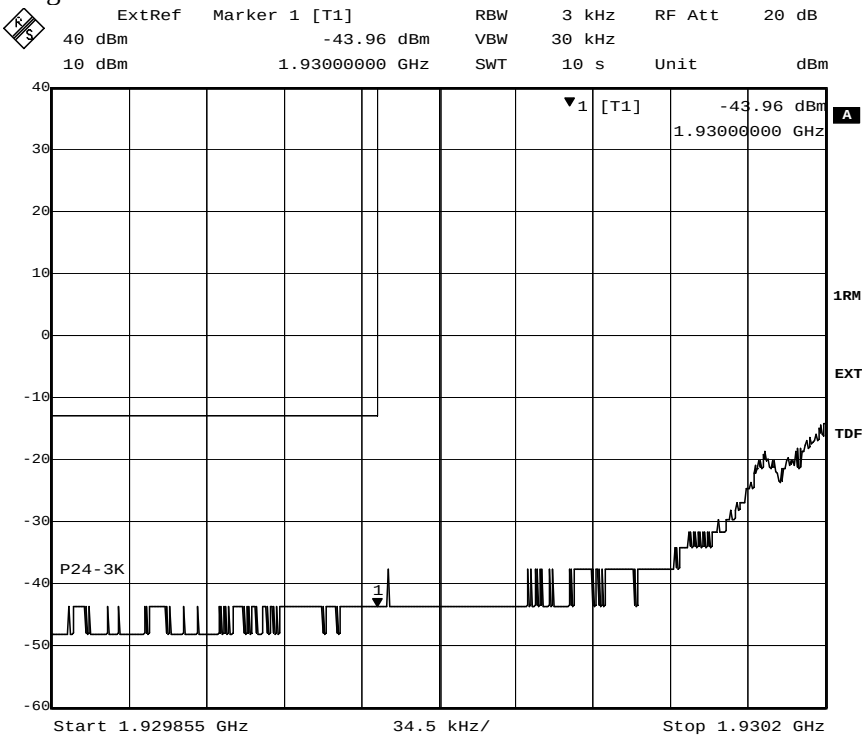


Diagram 2 b:

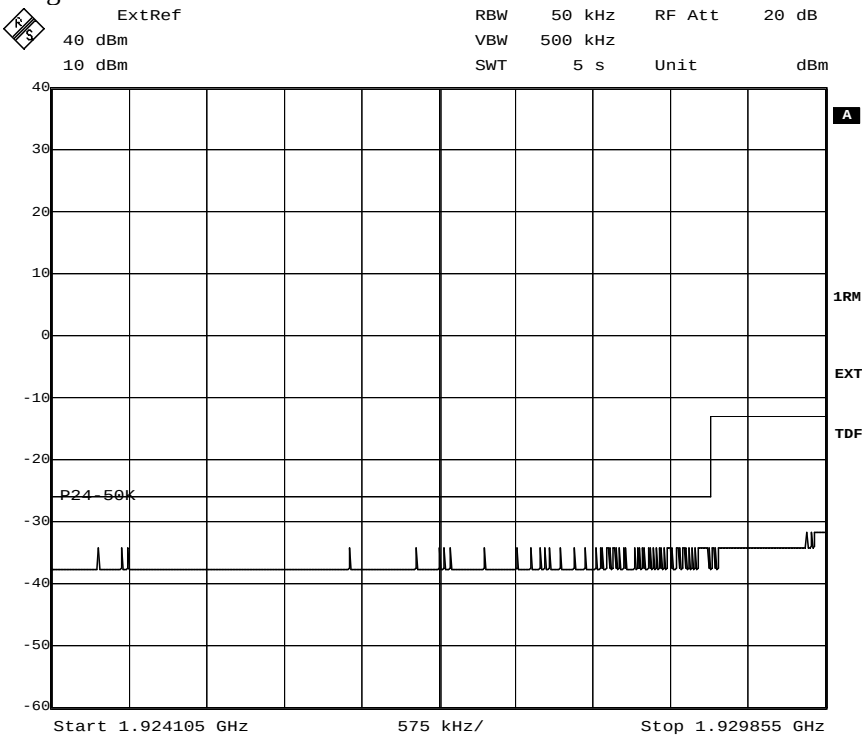


Diagram 2 c:

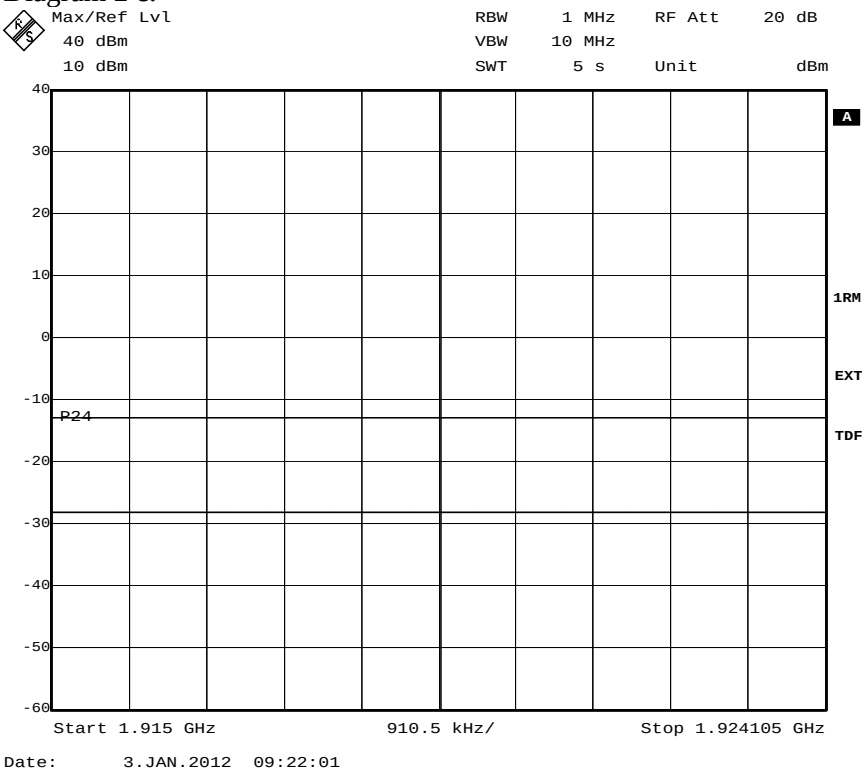

Max/Ref Lvl
40 dBm
10 dBm
RBW 1 MHz
VBW 10 MHz
SWT 5 s
RF Att 20 dB
Unit dBm
40
30
20
10
0
-10
-20
-30
-40
-50
-60
A
1RM
EXT
TDF
P24
Start 1.915 GHz
910.5 kHz/
Stop 1.924105 GHz
Date: 3.JAN.2012 09:22:01

Diagram 3 a:

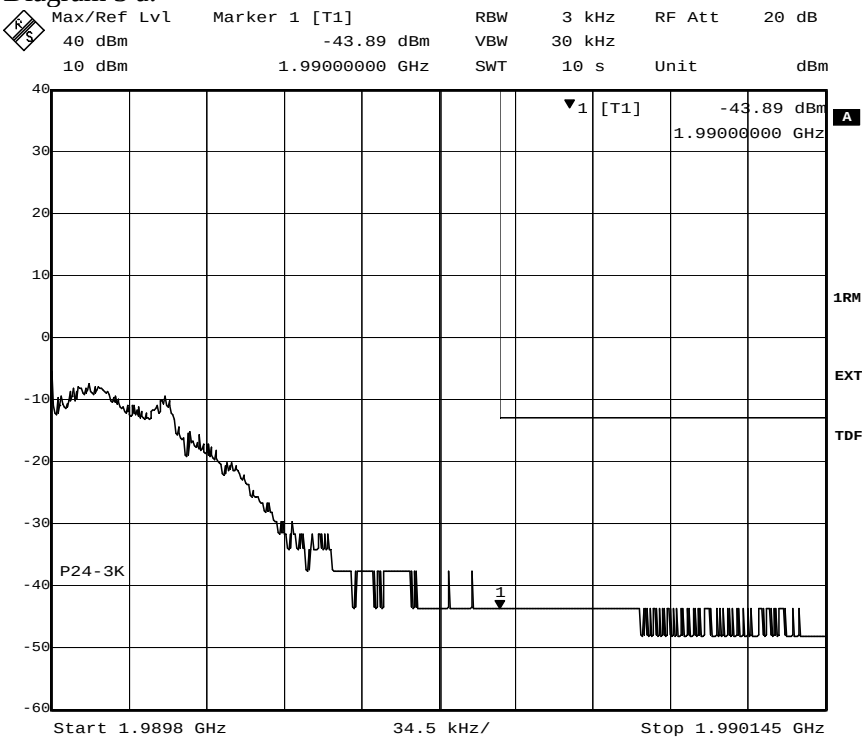


Diagram 3 b:

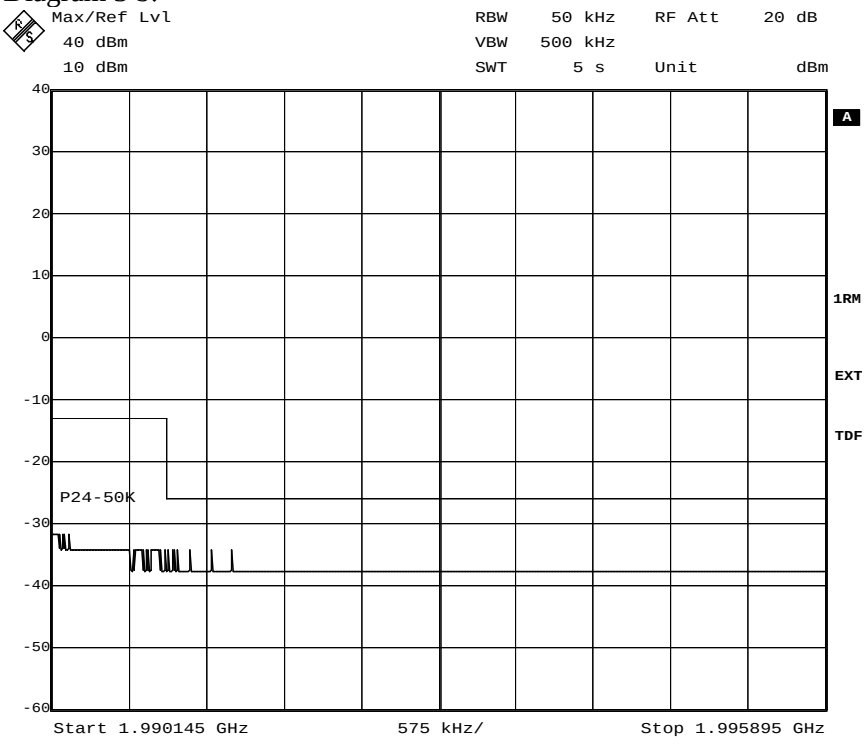
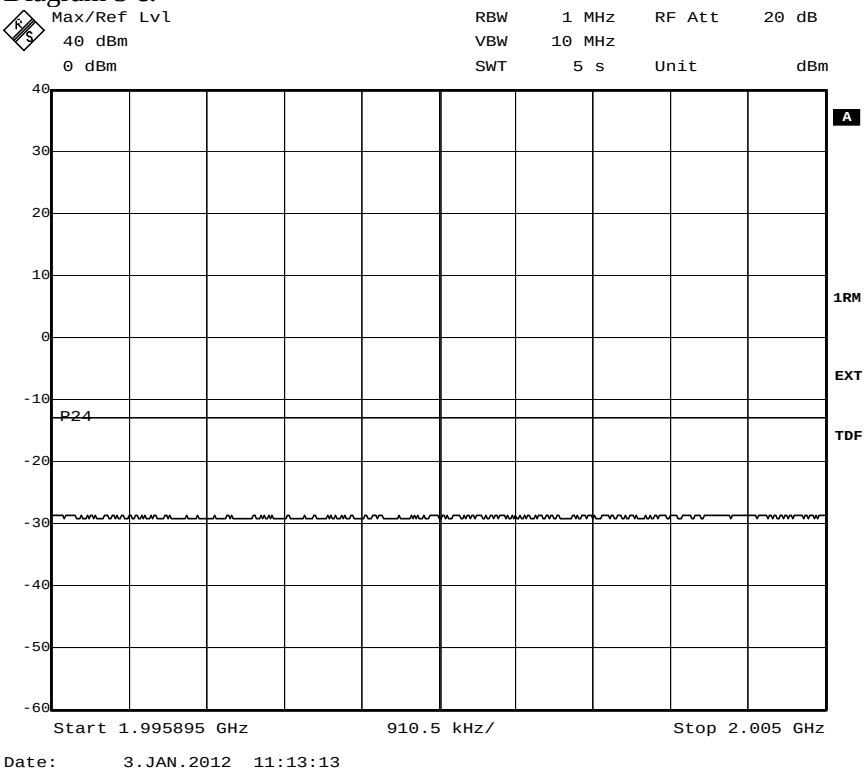


Diagram 3 c:


Max/Ref Lvl
40 dBm
0 dBm
RBW 1 MHz
VBW 10 MHz
SWT 5 s
RF Att 20 dB
Unit dBm
40
30
20
10
0
-10
-20
-30
-40
-50
-60
A
1RM
EXT
TDF
P24
Start 1.995895 GHz
910.5 kHz/
Stop 2.005 GHz
Date: 3.JAN.2012 11:13:13

Appendix 4

Diagram 4 a:

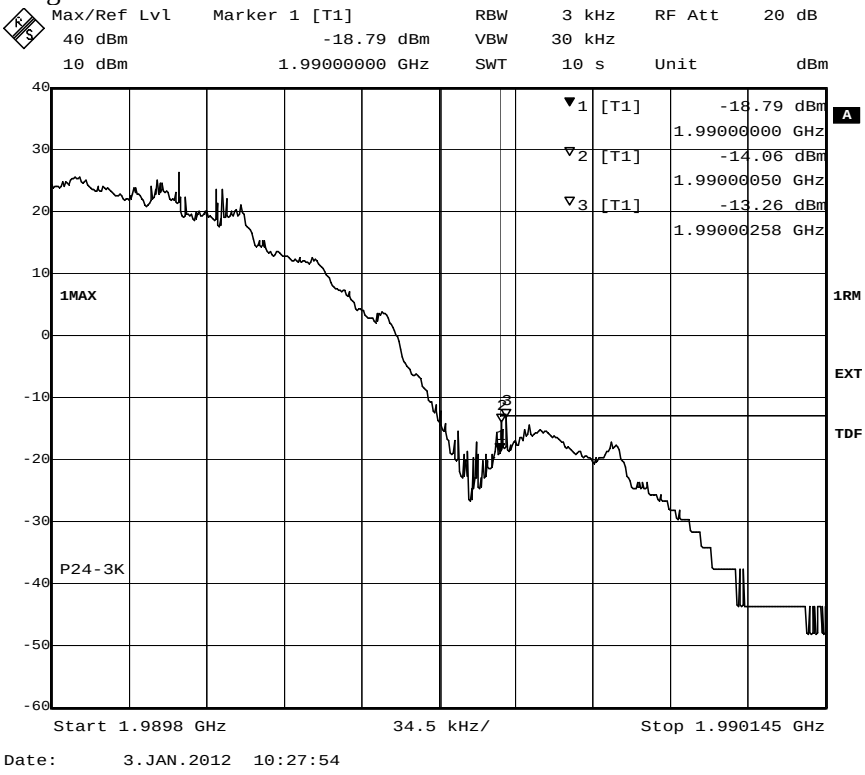


Diagram 4 b:

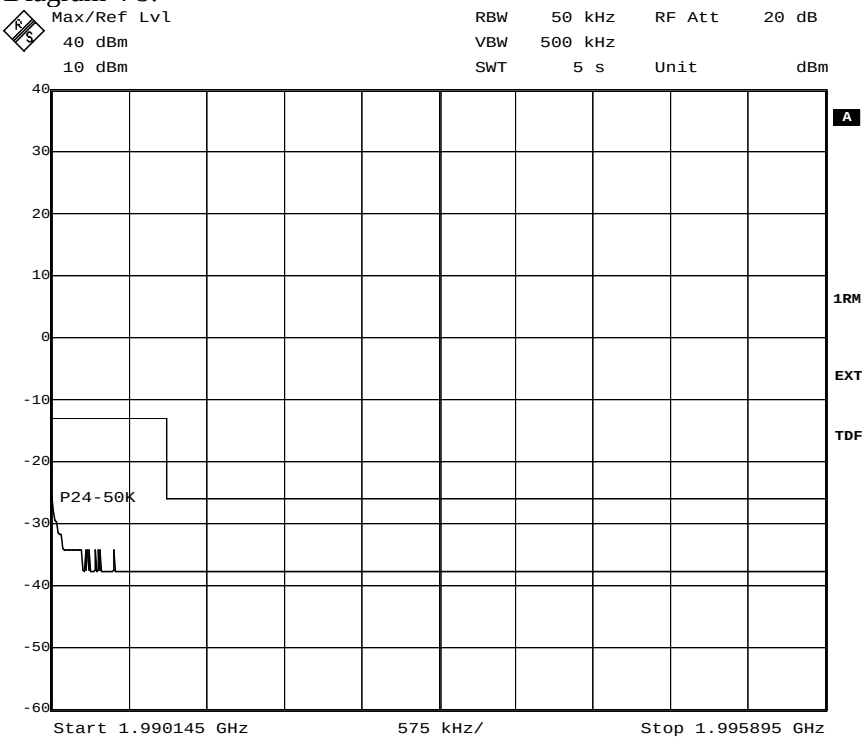


Diagram 4 c:

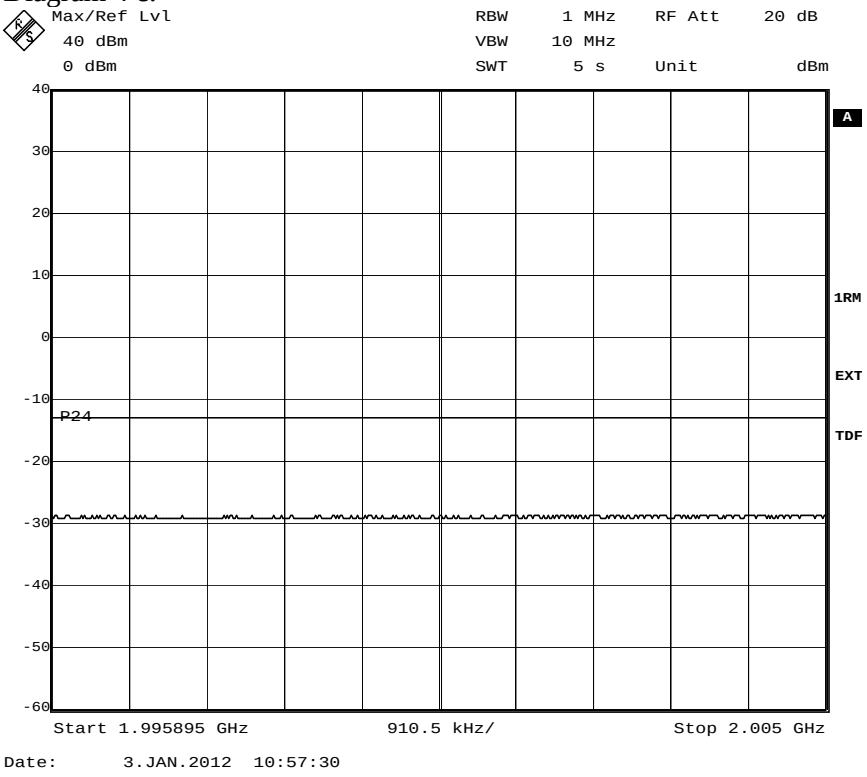

Max/Ref Lvl
40 dBm
0 dBm
RBW 1 MHz
VBW 10 MHz
SWT 5 s
RF Att 20 dB
Unit dBm
40
30
20
10
0
-10
-20
-30
-40
-50
-60
P24
A
1RM
EXT
TDF
Start 1.995895 GHz
910.5 kHz/
Stop 2.005 GHz
Date: 3.JAN.2012 10:57:30

Diagram 5 a:

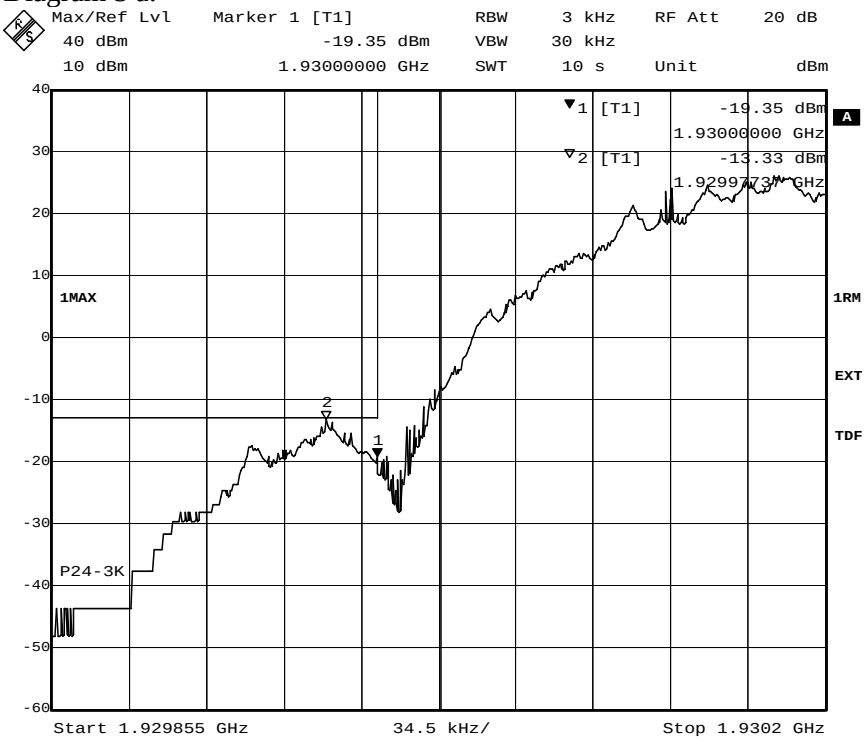


Diagram 5 b:

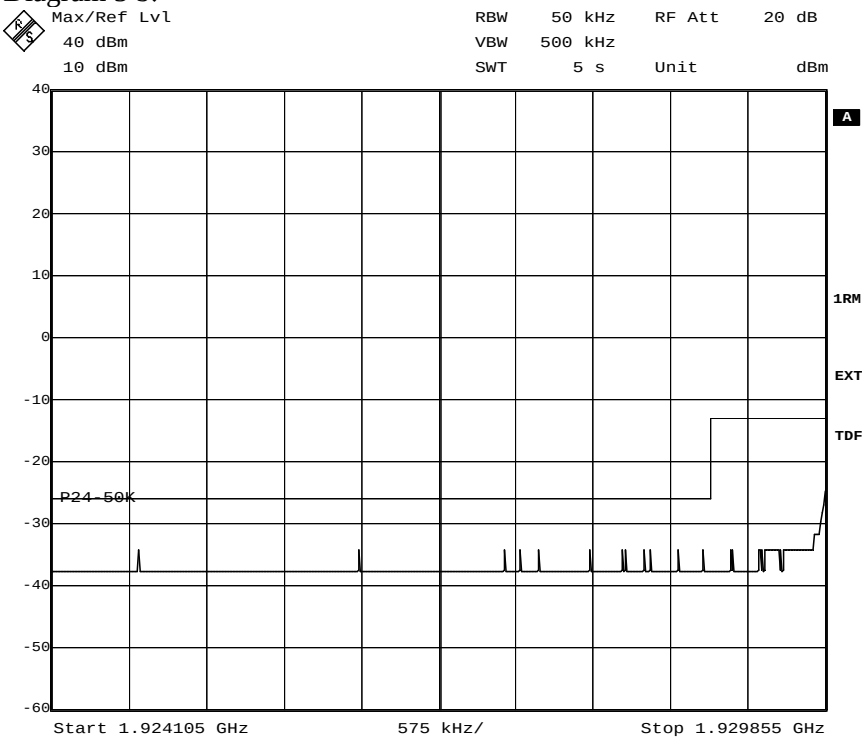


Diagram 5 c:

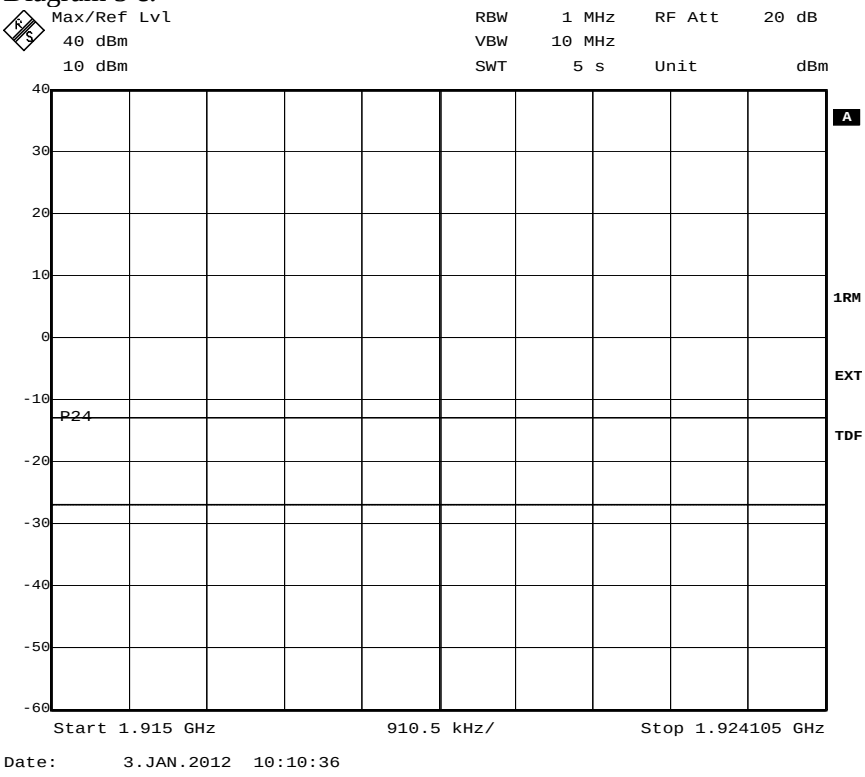

Max/Ref Lvl
40 dBm
10 dBm
RBW 1 MHz
VBW 10 MHz
SWT 5 s
RF Att 20 dB
Unit dBm
40
30
20
10
0
-10
-20
-30
-40
-50
-60
P24
A
1RM
EXT
TDF
Start 1.915 GHz
910.5 kHz/
Stop 1.924105 GHz
Date: 3.JAN.2012 10:10:36

Diagram 6 a:

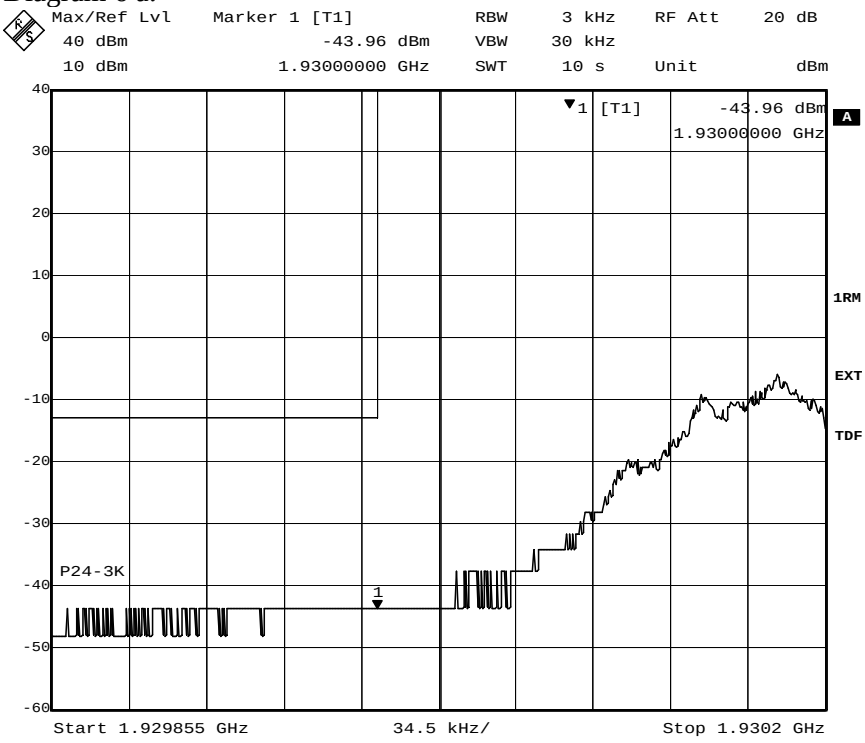


Diagram 6 b:

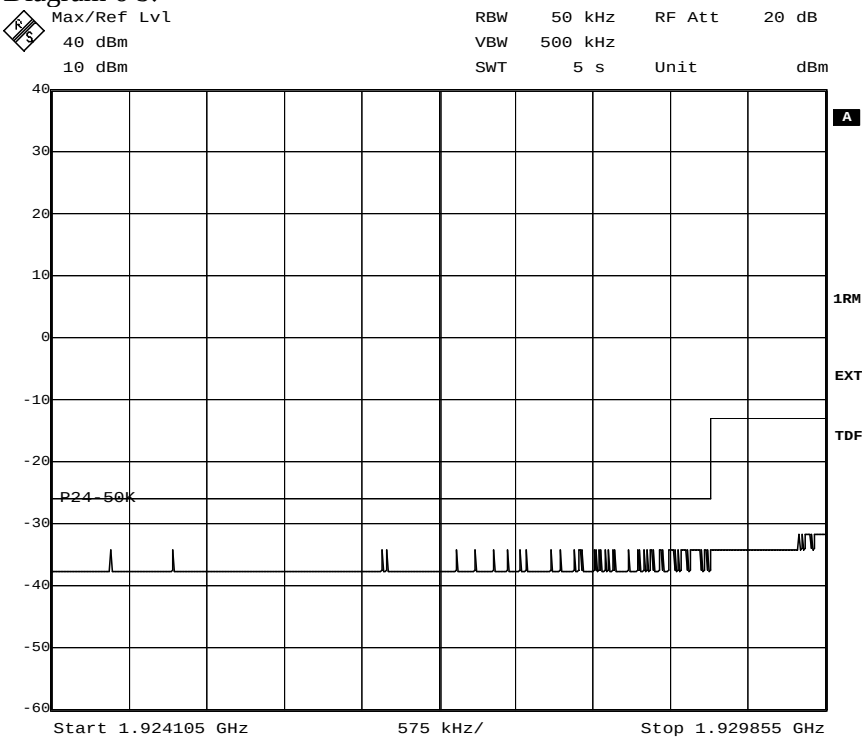


Diagram 6 c:

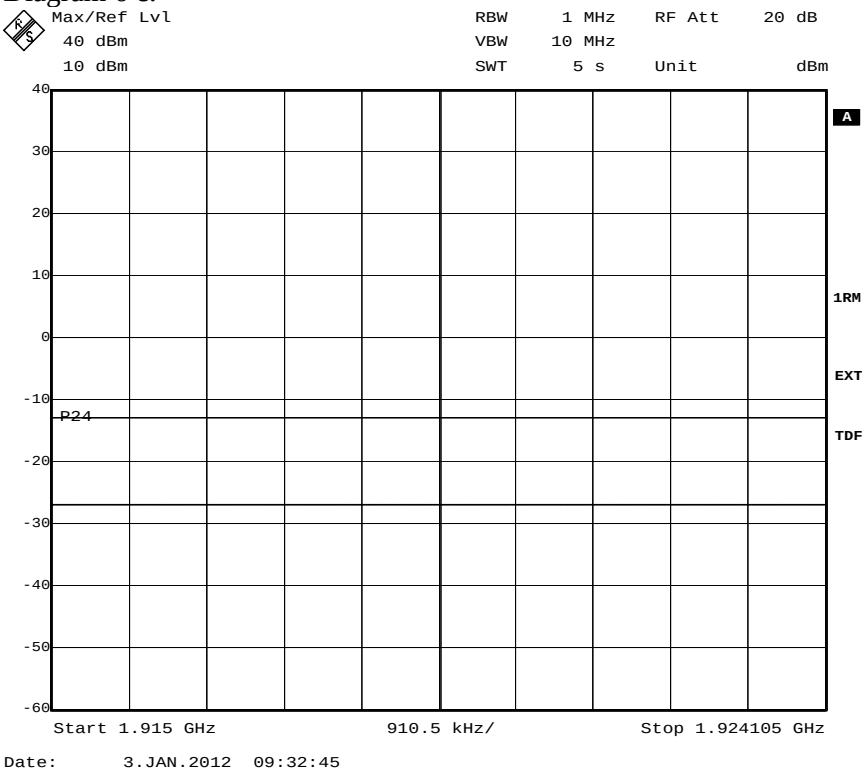

Max/Ref Lvl
40 dBm
10 dBm
RBW 1 MHz
VBW 10 MHz
SWT 5 s
RF Att 20 dB
Unit dBm
40
30
20
10
0
-10
-20
-30
-40
-50
-60
P24
A
1RM
EXT
TDF
Start 1.915 GHz
910.5 kHz/
Stop 1.924105 GHz
Date: 3.JAN.2012 09:32:45

Diagram 7 a:

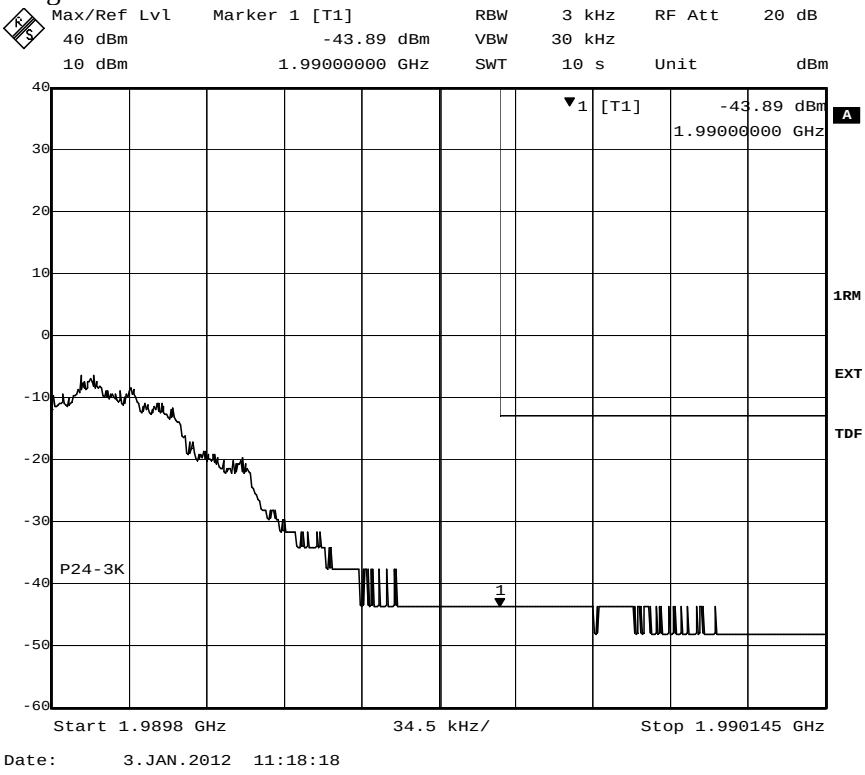


Diagram 7 b:

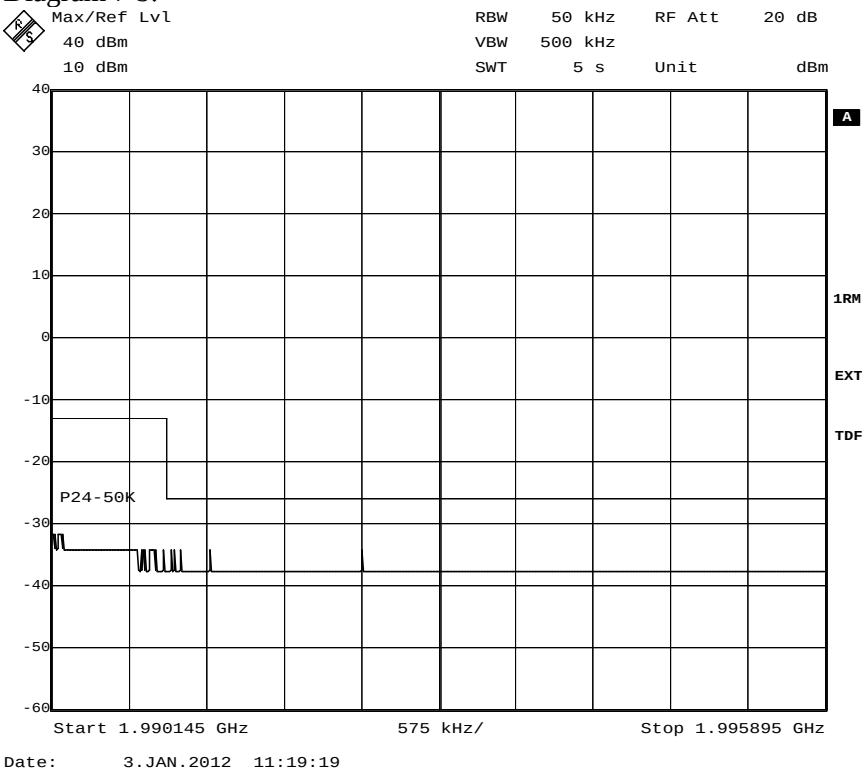


Diagram 7 c:

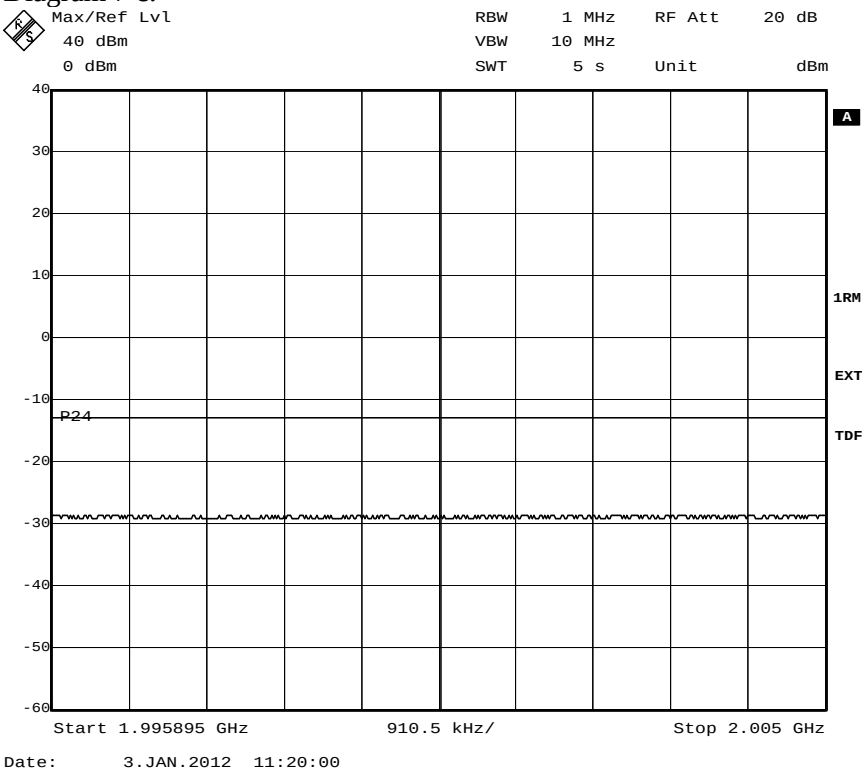

Max/Ref Lvl
40 dBm
0 dBm
RBW 1 MHz
VBW 10 MHz
SWT 5 s
RF Att 20 dB
Unit dBm
A
1RM
EXT
TDF
P24
Start 1.995895 GHz
910.5 kHz/
Stop 2.005 GHz
Date: 3.JAN.2012 11:20:00

Diagram 8 a:

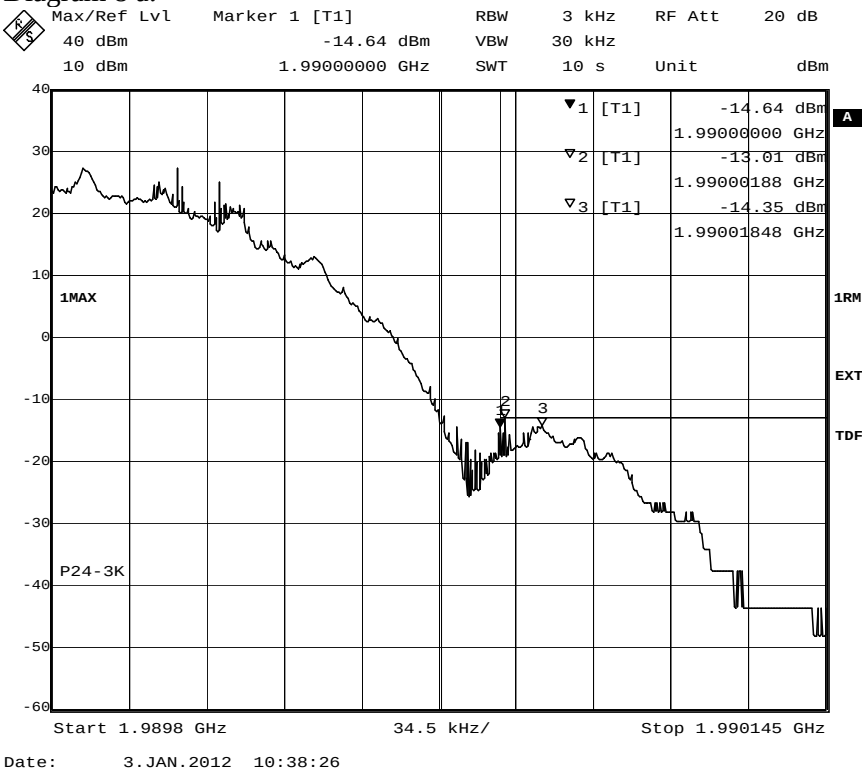


Diagram 8 b:

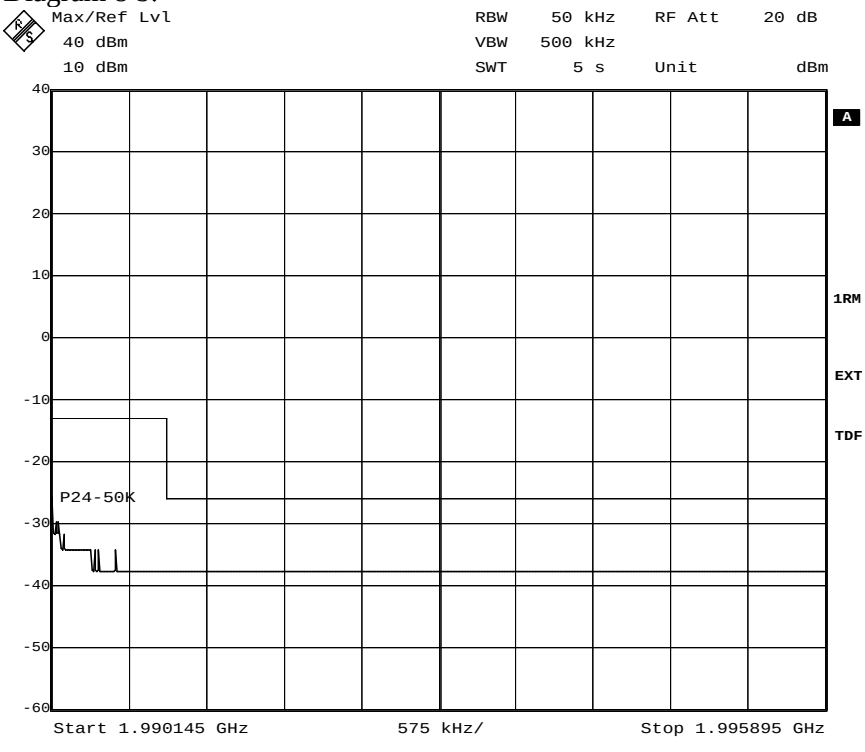


Diagram 8 c:

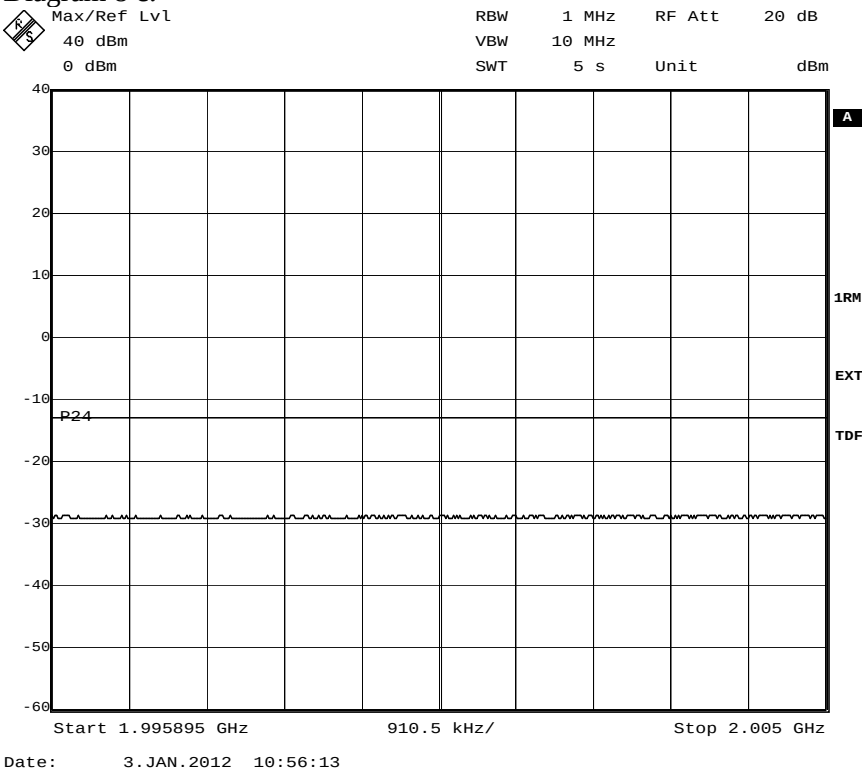
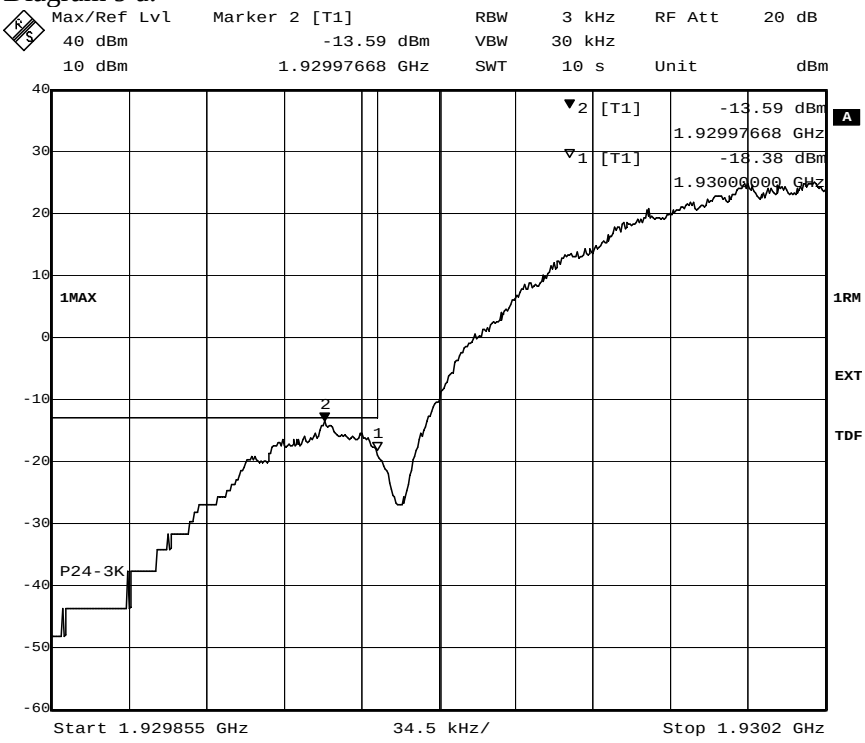
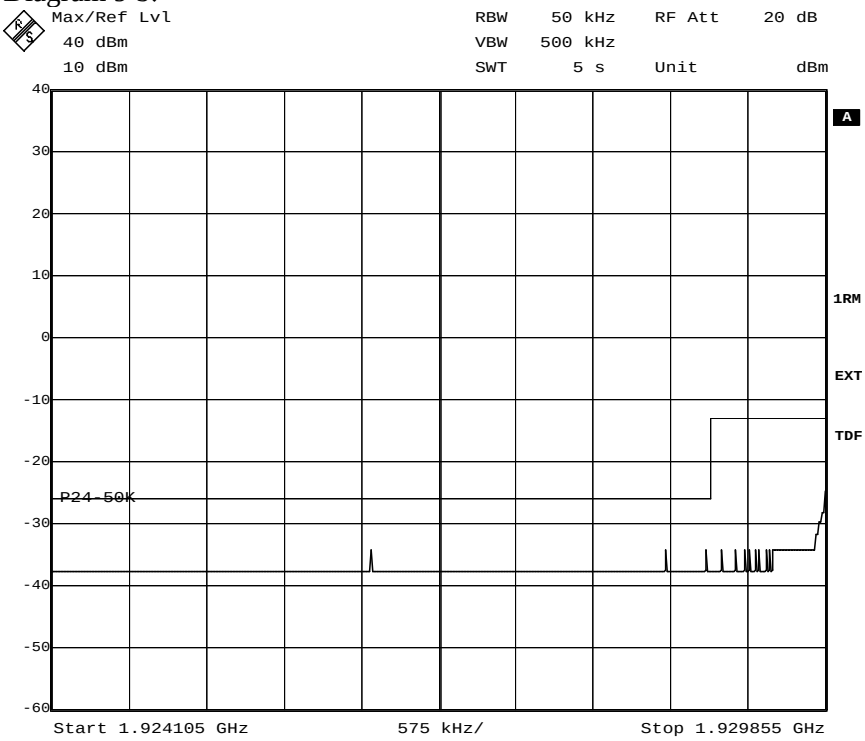

Max/Ref Lvl
40 dBm
0 dBm
RBW 1 MHz
VBW 10 MHz
SWT 5 s
RF Att 20 dB
Unit dBm
40
30
20
10
0
-10
-20
-30
-40
-50
-60
P24
A
1RM
EXT
TDF
Start 1.995895 GHz
910.5 kHz/
Stop 2.005 GHz
Date: 3.JAN.2012 10:56:13

Diagram 9 a:



Date: 3.JAN.2012 09:44:00

Diagram 9 b:



Date: 3.JAN.2012 09:45:07

Diagram 9 c:

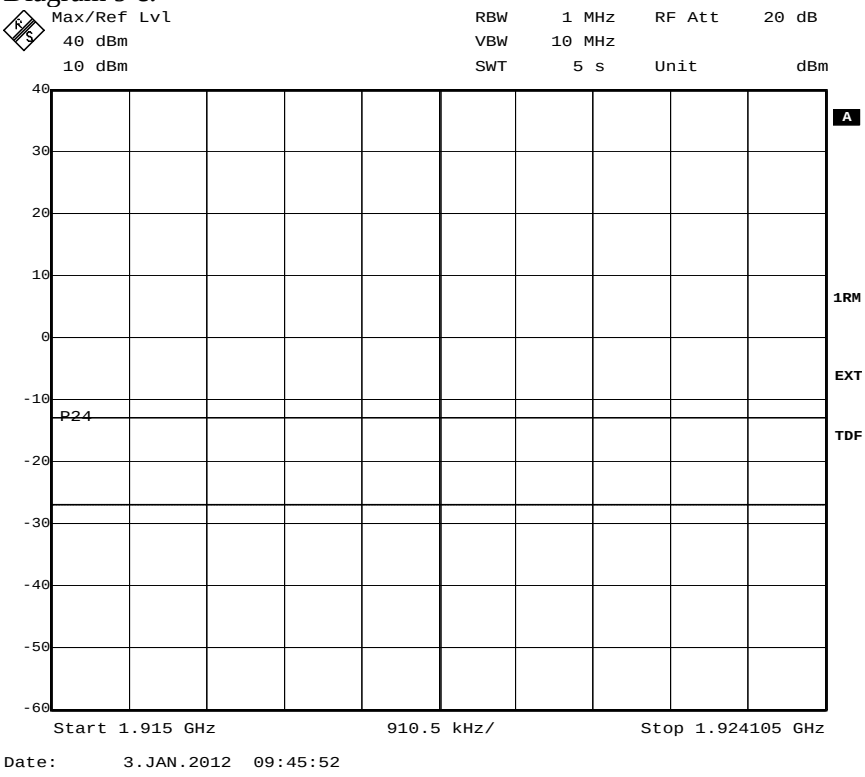

Max/Ref Lvl
40 dBm
10 dBm
RBW 1 MHz
VBW 10 MHz
SWT 5 s
RF Att 20 dB
Unit dBm
40
30
20
10
0
-10
-20
-30
-40
-50
-60
A
1RM
EXT
TDF
P24
Start 1.915 GHz
910.5 kHz/
Stop 1.924105 GHz
Date: 3.JAN.2012 09:45:52

Diagram 10 a:

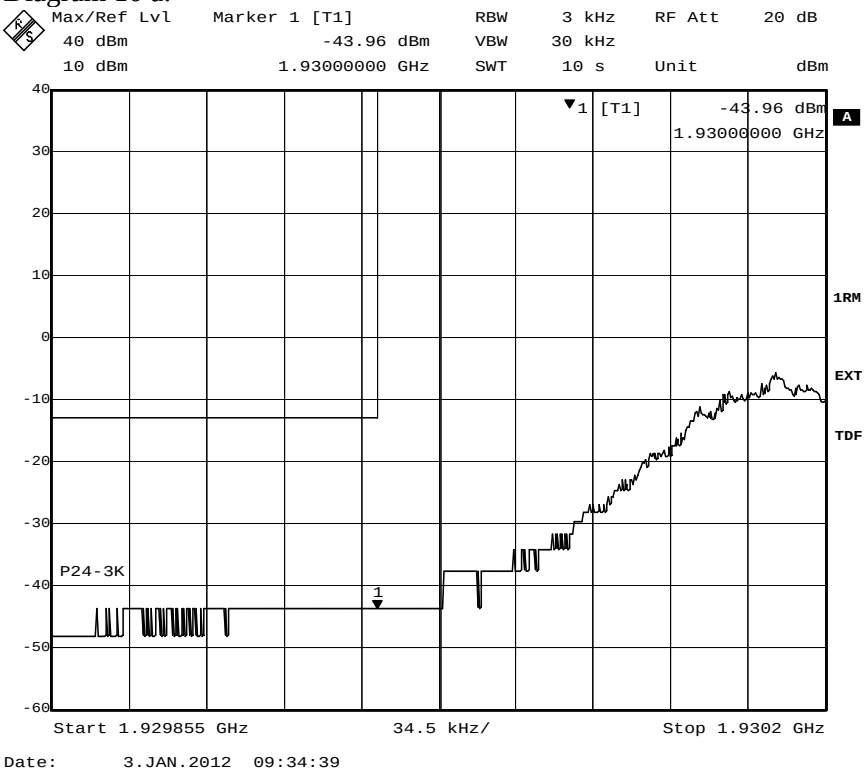


Diagram 10 b:

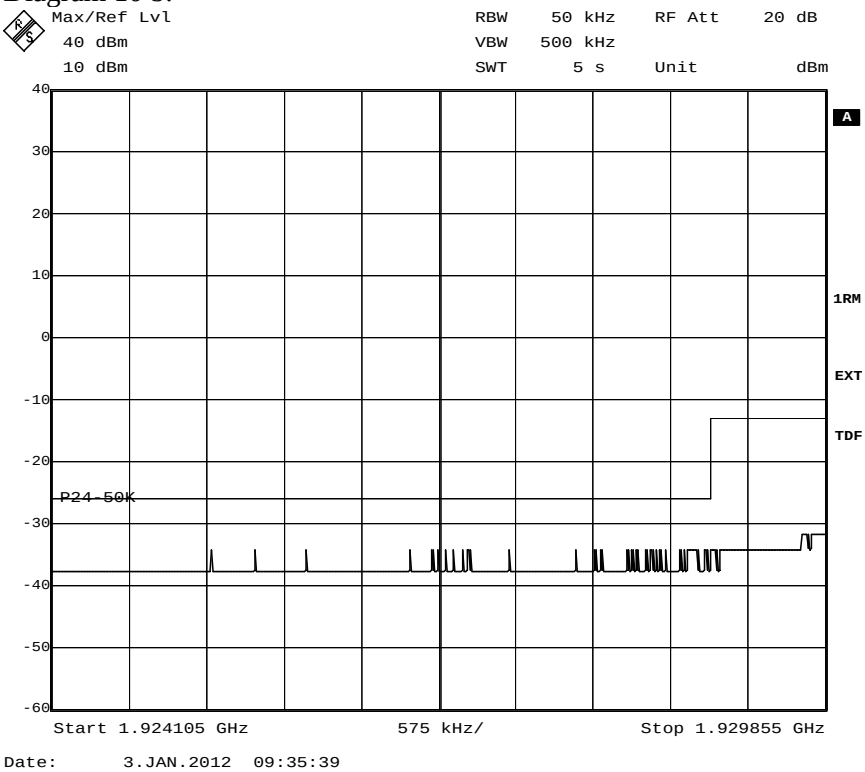


Diagram 10 c:

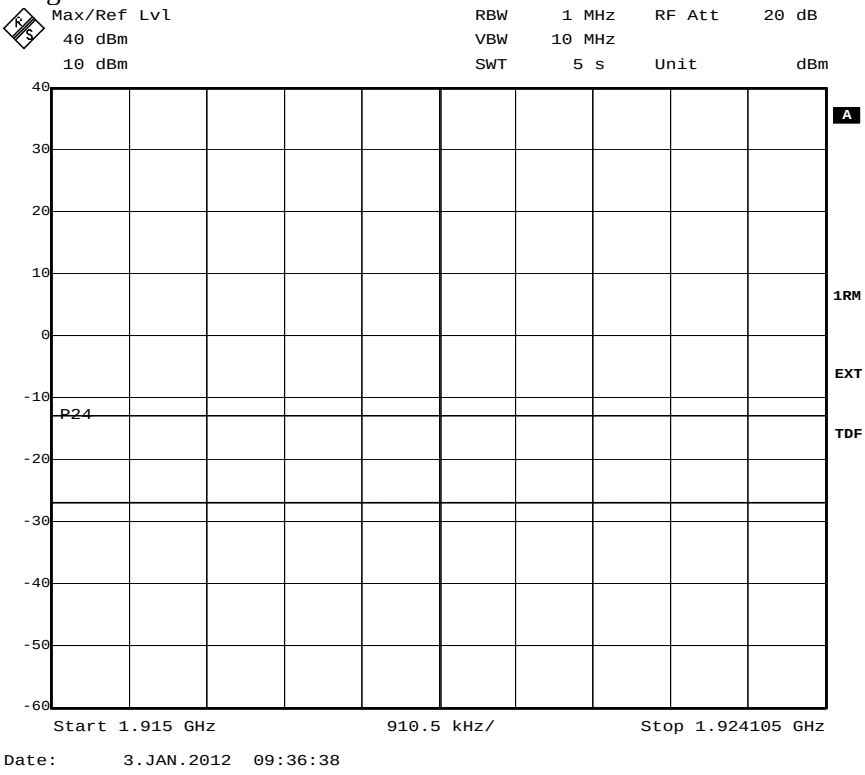

Max/Ref Lvl
40 dBm
10 dBm
RBW 1 MHz
VBW 10 MHz
SWT 5 s
RF Att 20 dB
Unit dBm
40
30
20
10
0
-10
-20
-30
-40
-50
-60
P24
A
1RM
EXT
TDF
Start 1.915 GHz
910.5 kHz/
Stop 1.924105 GHz
Date: 3.JAN.2012 09:36:38

Diagram 11 a:

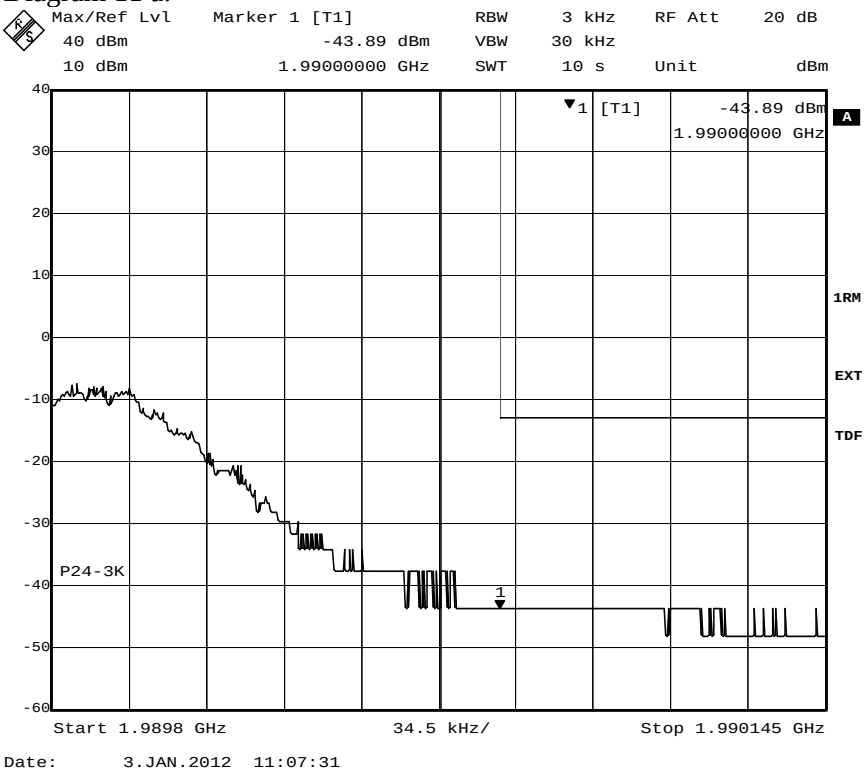


Diagram 11 b:

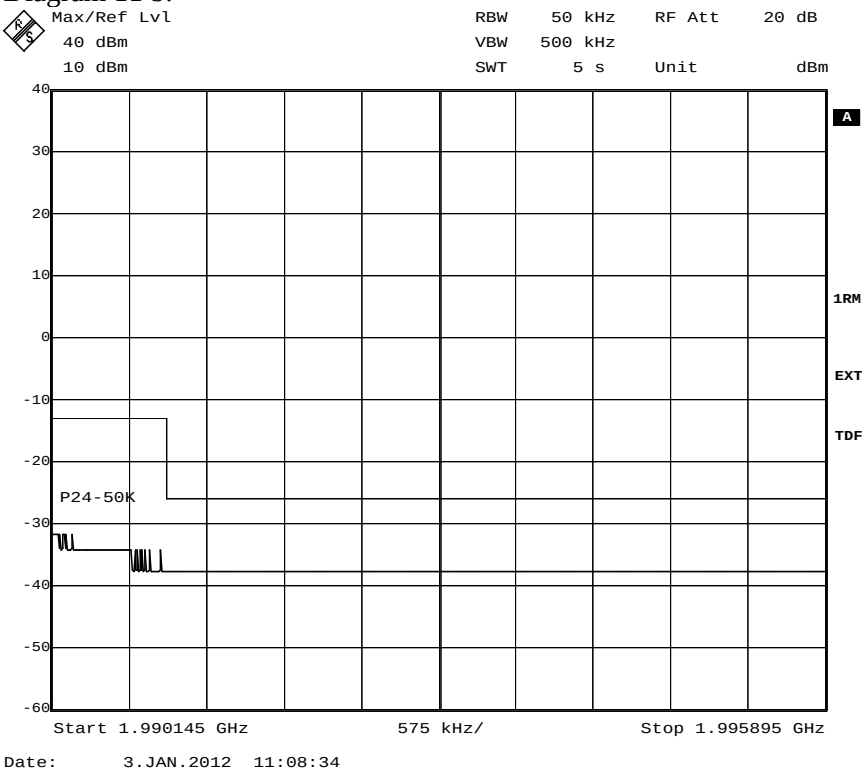


Diagram 11 c:

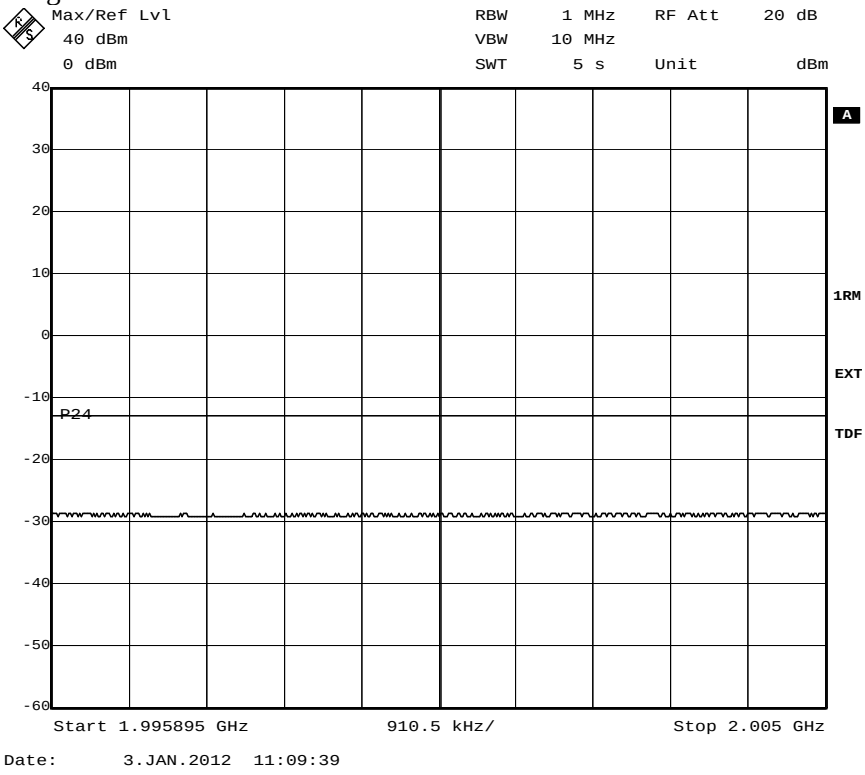

Max/Ref Lvl
40 dBm
0 dBm
RBW 1 MHz
VBW 10 MHz
SWT 5 s
RF Att 20 dB
Unit dBm
40
30
20
10
0
-10
-20
-30
-40
-50
-60
P24
A
1RM
EXT
TDF
Start 1.995895 GHz
910.5 kHz/
Stop 2.005 GHz
Date: 3.JAN.2012 11:09:39

Diagram 12 a:

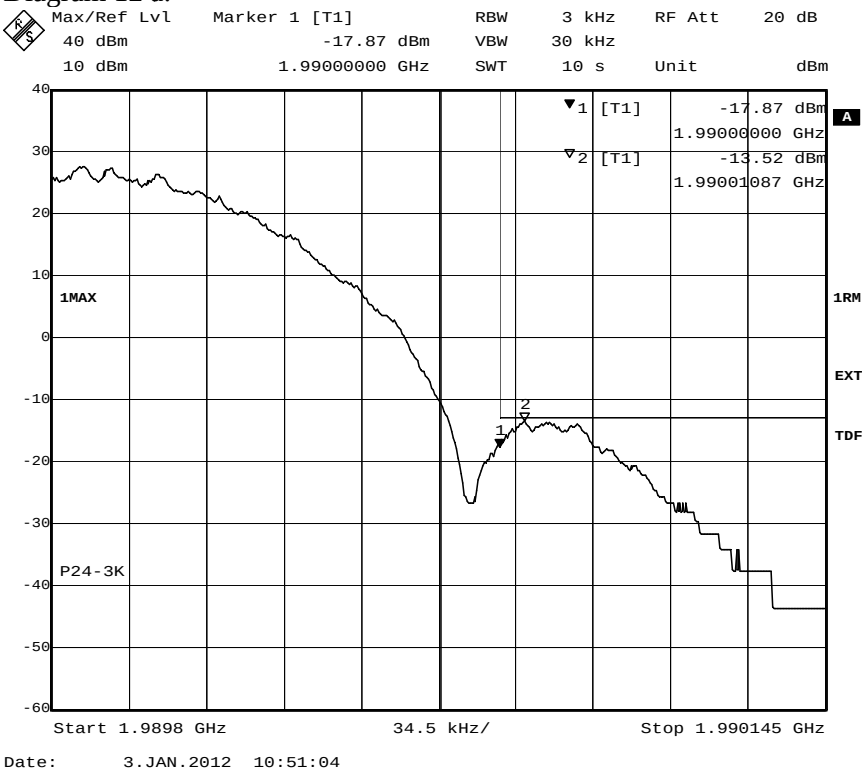


Diagram 12 b:

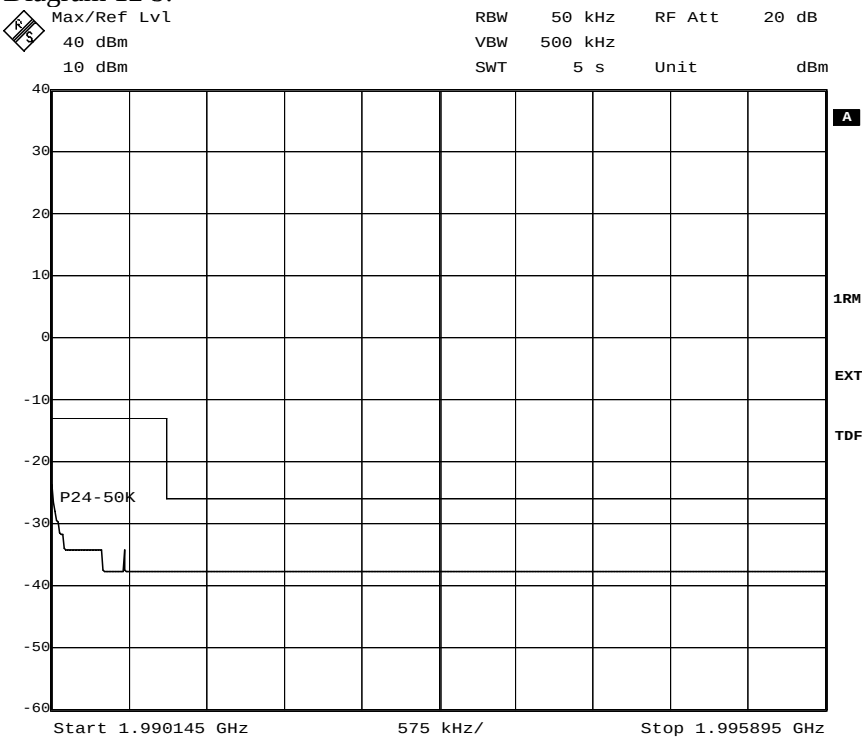
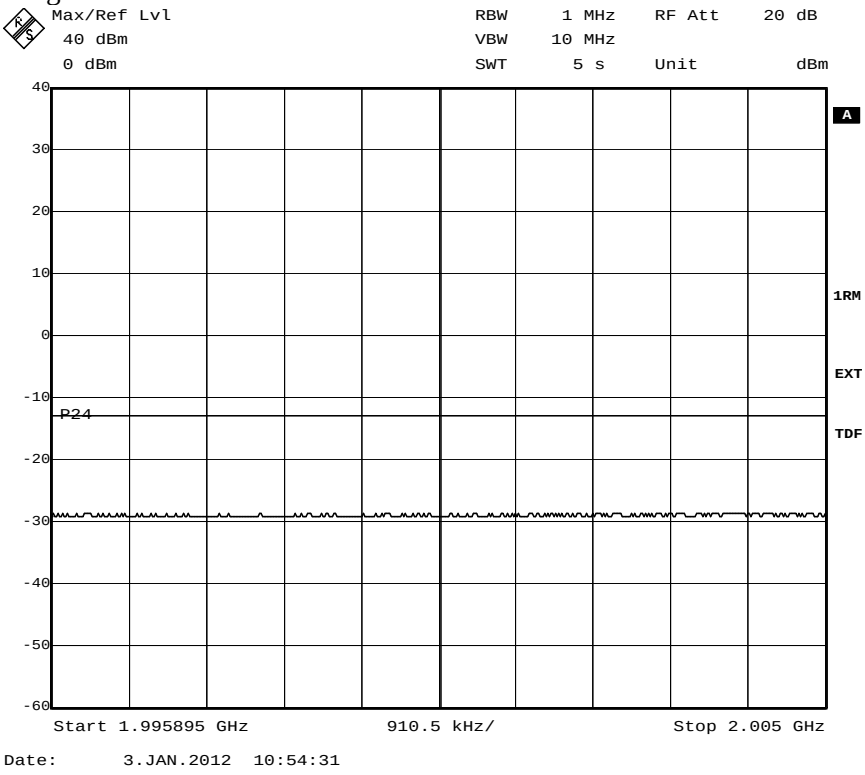


Diagram 12 c:


Max/Ref Lvl
40 dBm
0 dBm
RBW 1 MHz
VBW 10 MHz
SWT 5 s
RF Att 20 dB
Unit dBm
40
30
20
10
0
-10
-20
-30
-40
-50
-60
A
1RM
EXT
TDF
P24
Start 1.995895 GHz
910.5 kHz/
Stop 2.005 GHz
Date: 3.JAN.2012 10:54:31

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

Date	Temperature	Humidity
2012-01-02	22 °C ± 3 °C	30 % ± 5 %
2012-01-03	22 °C ± 3 °C	24 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §24.238. EUT port RF A was via an attenuator connected to a spectrum analyser. 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. The spectrum analyser was connected to an external 10 MHz reference standard during the measurements.

Measurement equipment	SP number
Rohde & Schwarz FSIQ	503 738
Rohde & Schwarz FSQ	504 143
Attenuator	504 159
Attenuator	503 870
Attenuator	900 118
Attenuator	900 691
High pass filter	504 200
High pass filter	503 740
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

Single carrier 1x47.8 dBm, RBS master 2E setting 48

Diagram	Channel	Modulation	Measured range
1 a, b, c	B	16QAM	9 kHz – 25 GHz
2 a, b, c	M	GMSK	9 kHz – 25 GHz
3 a, b, c	M	16QAM	9 kHz – 25 GHz
4 a, b, c	M	32QAM	9 kHz – 25 GHz
5 a, b, c	M	AQPSK	9 kHz – 25 GHz
6 a, b, c	T	16QAM	9 kHz – 25 GHz

Multi carrier 2x44.8 dBm, RBS master 2E setting 45 per carrier, 2 carriers active

Diagram	Channels	Modulation	Measured range
7 a – d	(B+1) & (B+9)	16QAM	9 kHz – 25 GHz
8 a – d	(M-4) & (M+4)	GMSK	9 kHz – 25 GHz
9 a – d	(M-4) & (M+4)	16QAM	9 kHz – 25 GHz
10 a – d	(M-4) & (M+4)	32QAM	9 kHz – 25 GHz
11 a – d	(M-4) & (M+4)	AQPSK	9 kHz – 25 GHz
12 a – d	(T-1) & (T-9)	16QAM	9 kHz – 25 GHz

The diagrams are shown on the following pages.

Remarks

The emission at 9 kHz on some plots was not generated by the test object. A complementary measurement with a smaller RBW showed that it was related to the LO feed-through.
The highest internal frequency declared by the client was 2.47 GHz, thus the upper frequency boundary for emission measurements was set to cover 10 x 2.5 GHz = 25 GHz.

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 a:

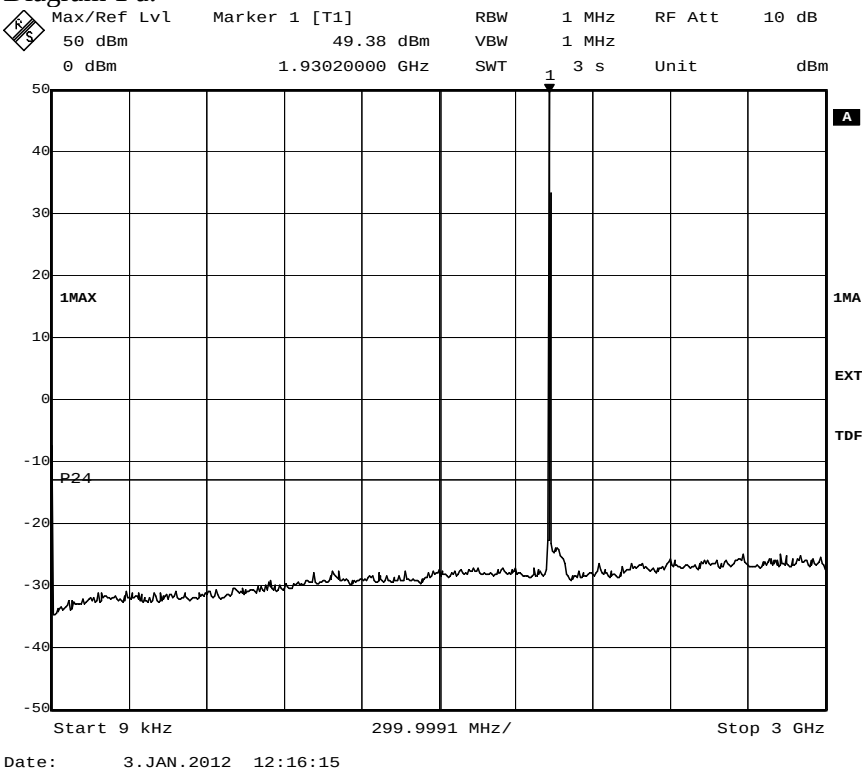


Diagram 1 b:

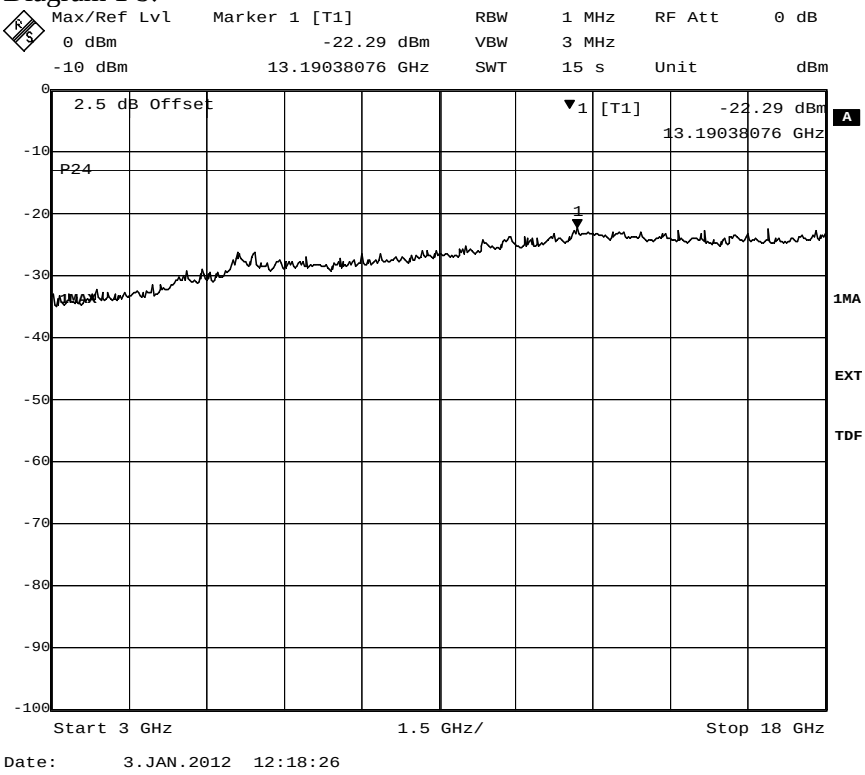


Diagram 1 c:

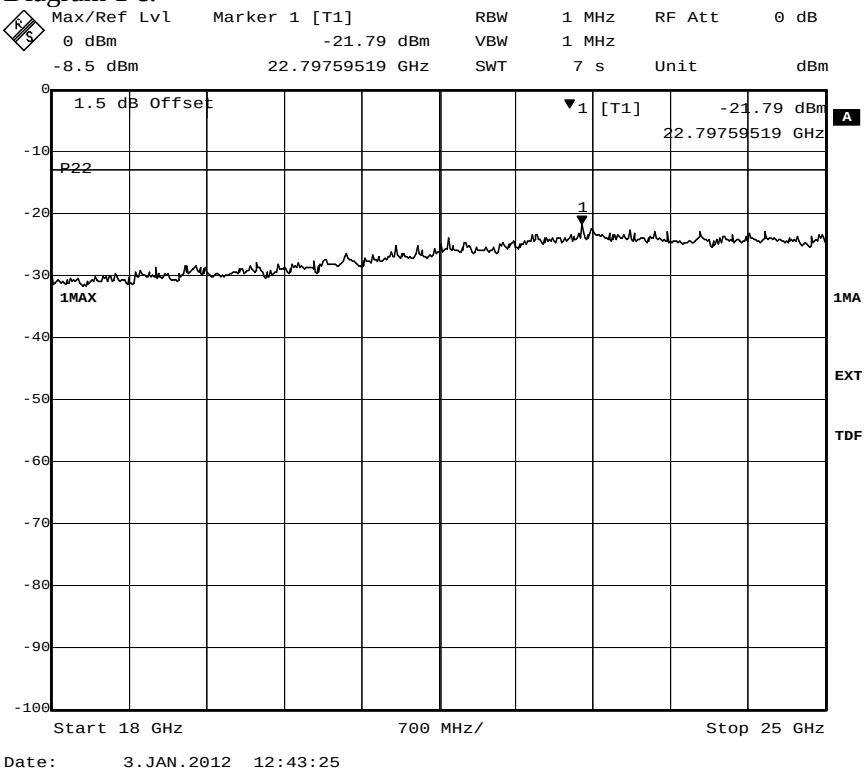

Max/Ref Lvl
0 dBm
-8.5 dBm
Marker 1 [T1]
-21.79 dBm
22.79759519 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7 s
RF Att 0 dB
Unit dBm
1.5 dB Offset
1 [T1]
-21.79 dBm
22.79759519 GHz
P22
1MAX
1MA
EXT
TDF
Start 18 GHz
700 MHz/
Stop 25 GHz
Date: 3.JAN.2012 12:43:25

Diagram 2 a:

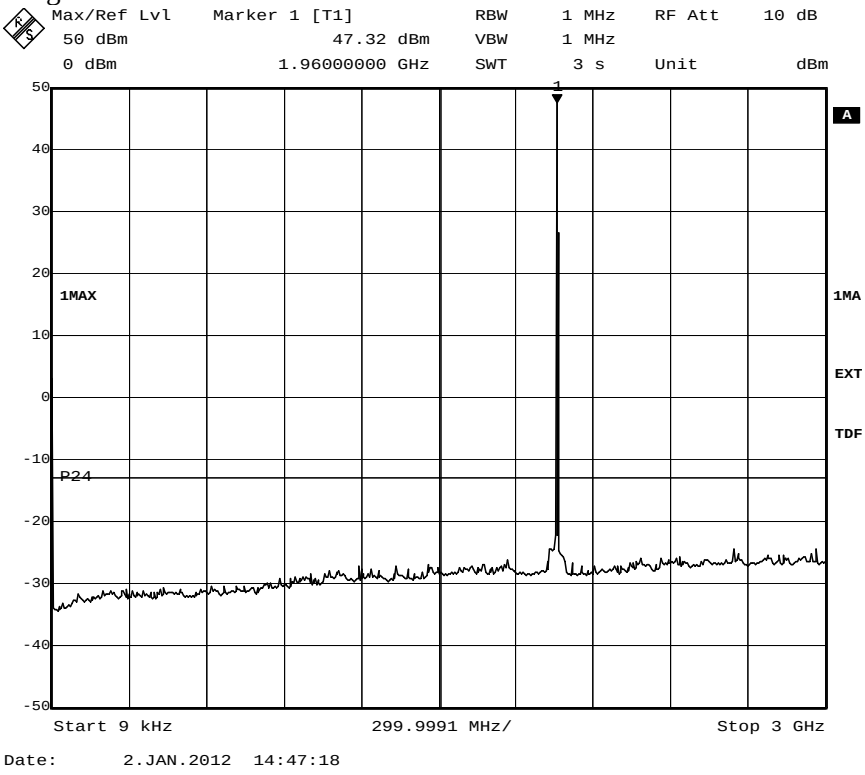


Diagram 2 b:

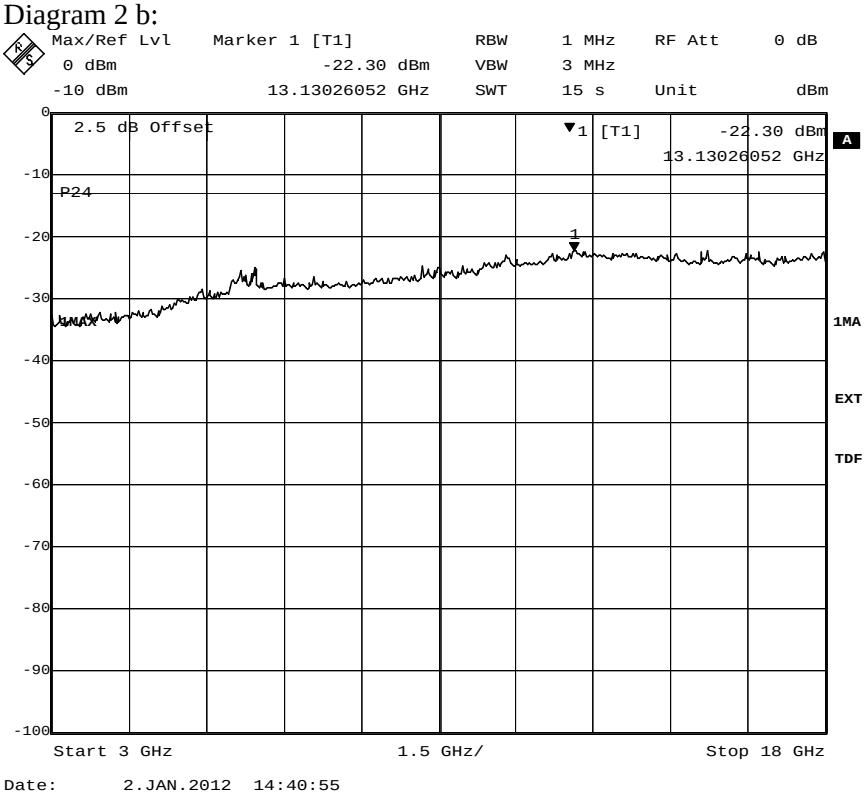


Diagram 2 c:

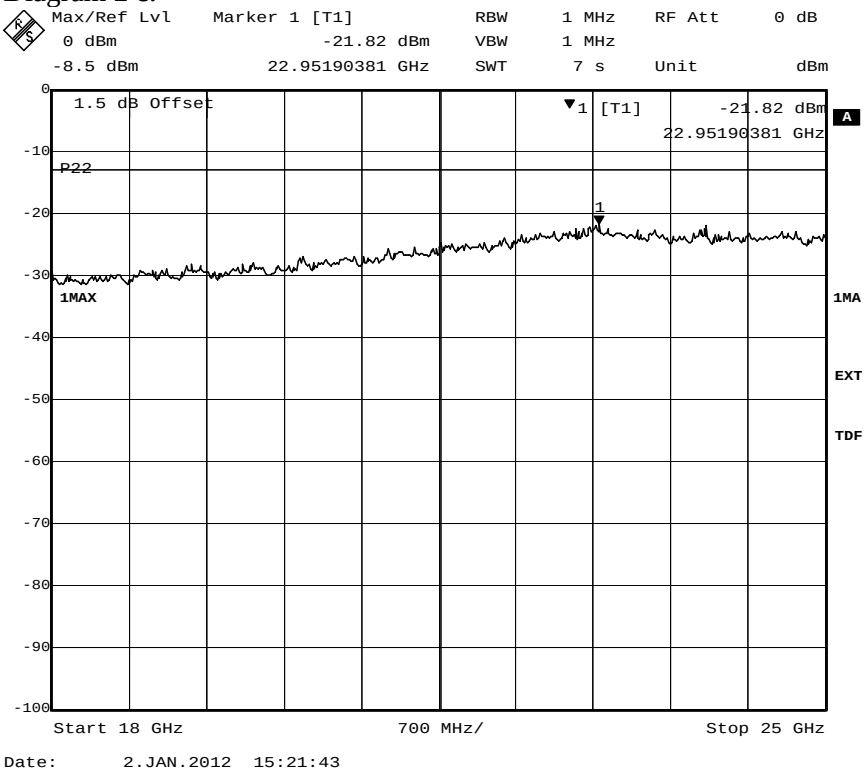

Max/Ref Lvl
0 dBm
-8.5 dBm
Marker 1 [T1]
-21.82 dBm
22.95190381 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7 s
RF Att 0 dB
Unit dBm
1.5 dB Offset
1 [T1]
-21.82 dBm
22.95190381 GHz
P22
1MAX
A
1MA
EXT
TDF
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Start 18 GHz
700 MHz/
Stop 25 GHz
Date: 2.JAN.2012 15:21:43

Diagram 3 a:

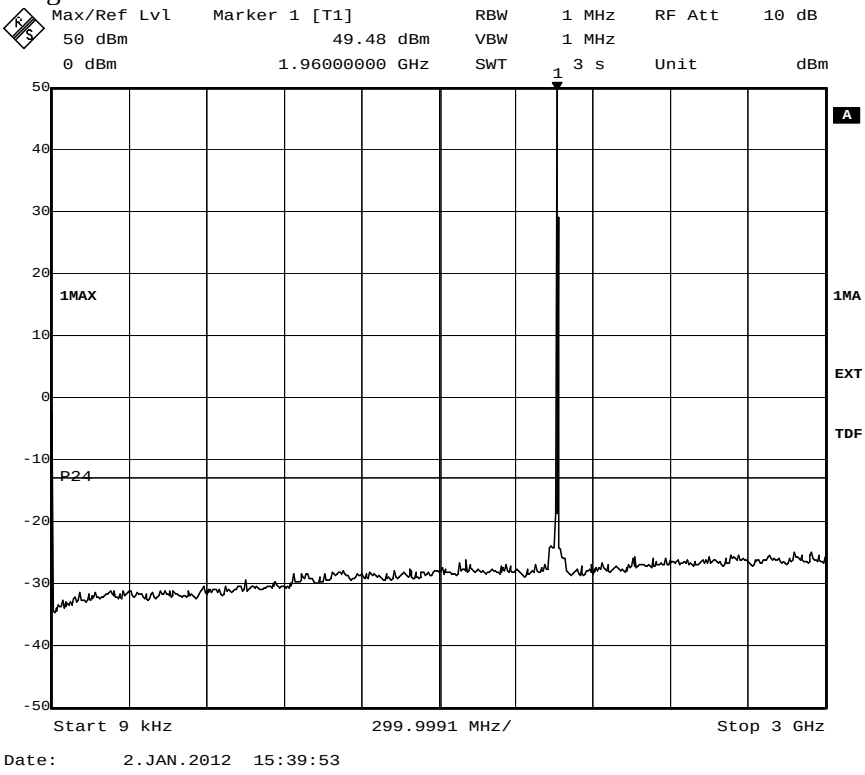


Diagram 3 b:

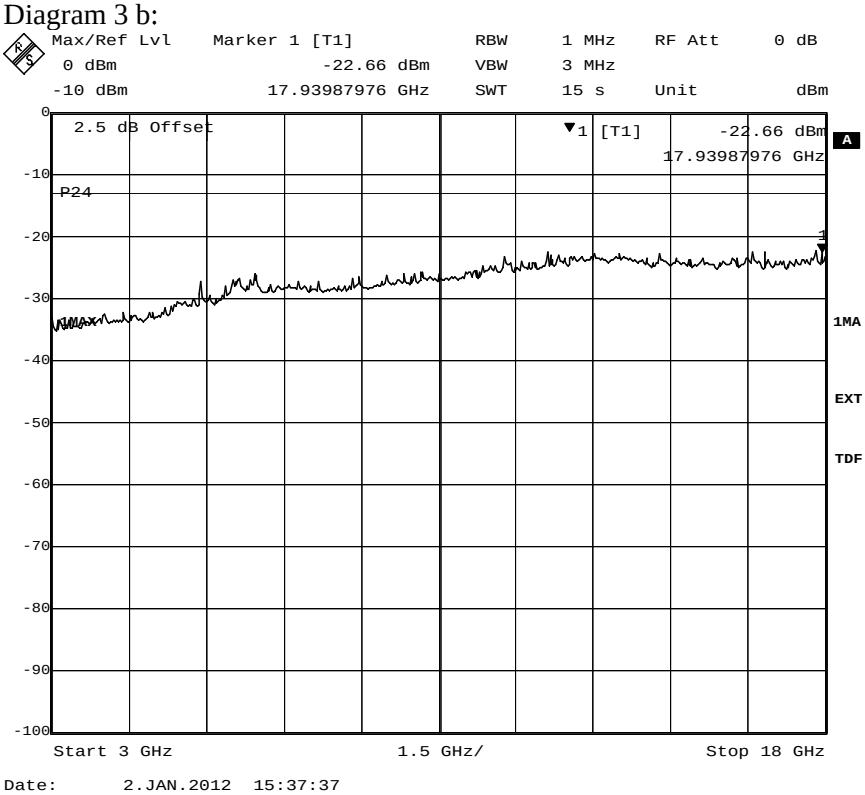


Diagram 3 c:

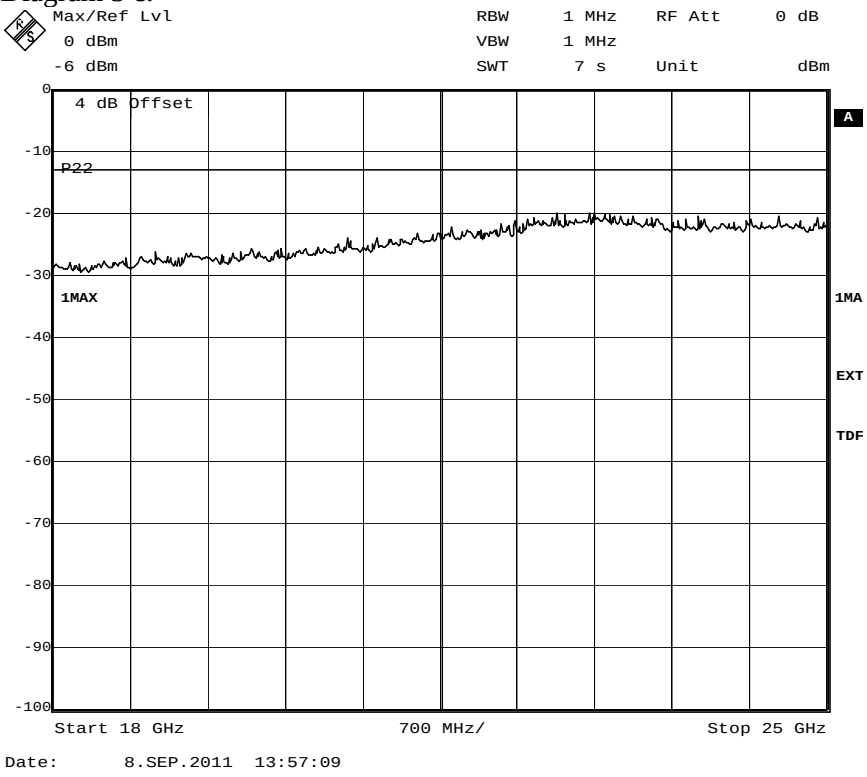

Max/Ref Lvl
0 dBm
-6 dBm
RBW 1 MHz
VBW 1 MHz
SWT 7 s
RF Att 0 dB
Unit dBm
4 dB Offset
P22
1MAX
A
1MA
EXT
TDF
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Start 18 GHz
700 MHz/
Stop 25 GHz
Date: 8.SEP.2011 13:57:09

Diagram 4 a:

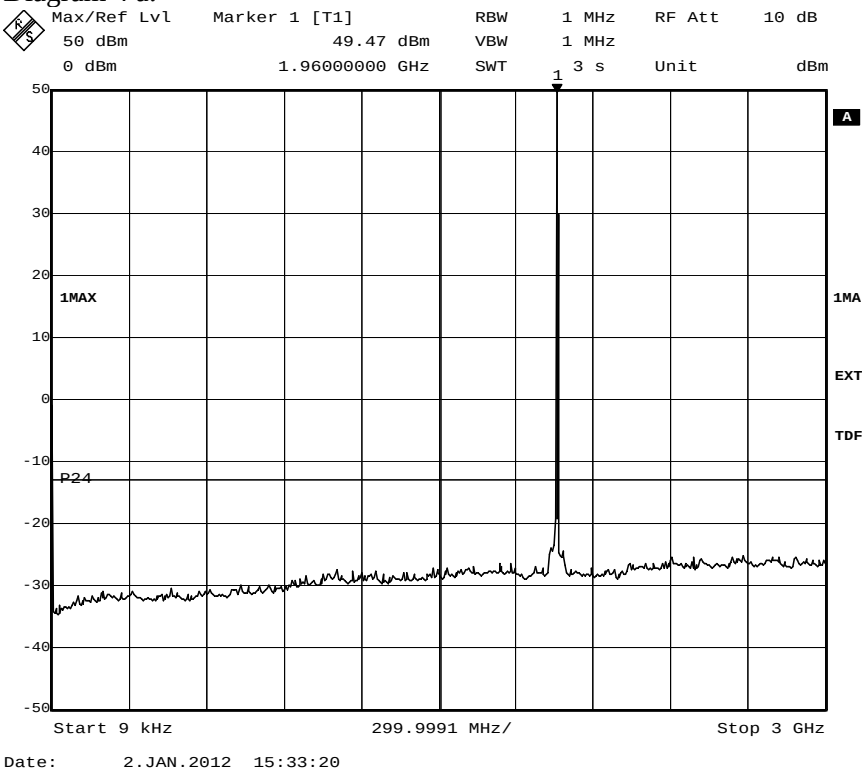


Diagram 4 b:

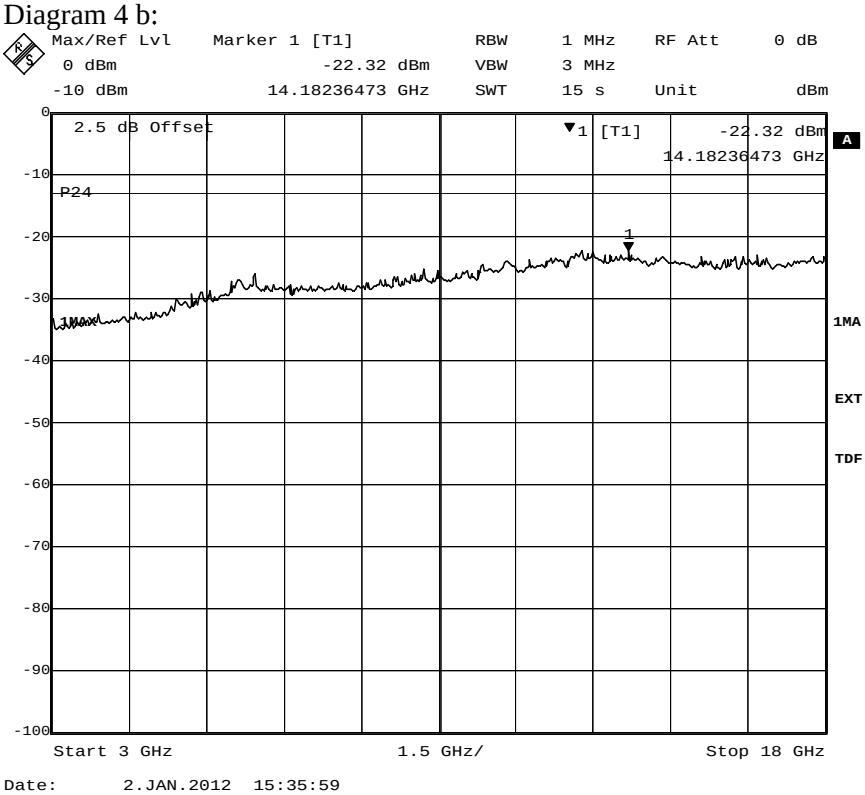


Diagram 4 c:

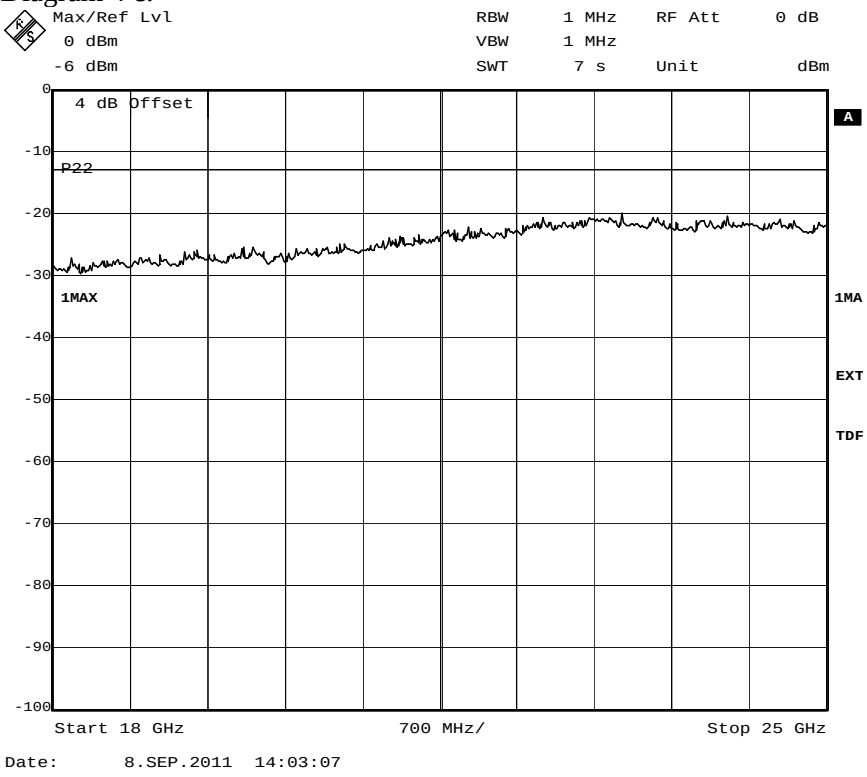

Max/Ref Lvl
0 dBm
-6 dBm
RBW 1 MHz
VBW 1 MHz
SWT 7 s
RF Att 0 dB
Unit dBm
4 dB Offset
P22
1MAX
A
1MA
EXT
TDF
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Start 18 GHz
700 MHz/
Stop 25 GHz
Date: 8.SEP.2011 14:03:07

Diagram 5 a:

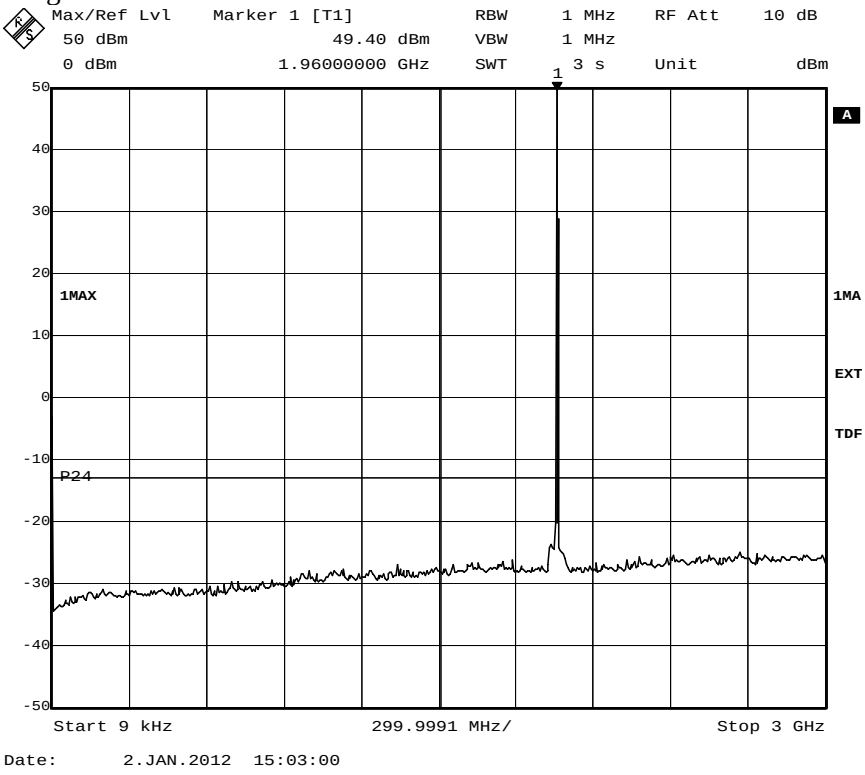


Diagram 5 b:

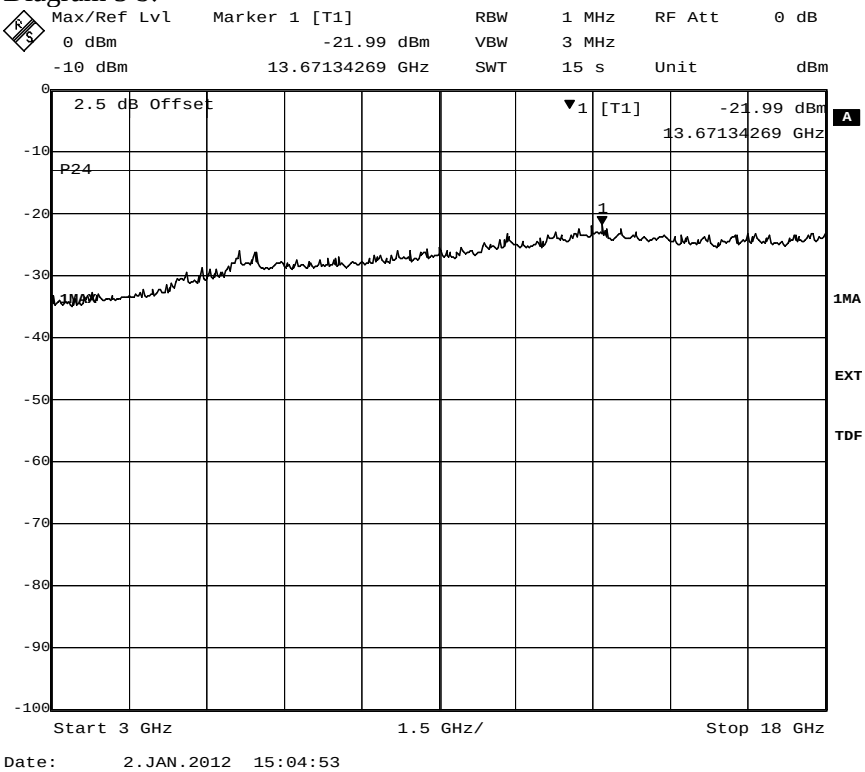


Diagram 5 c:

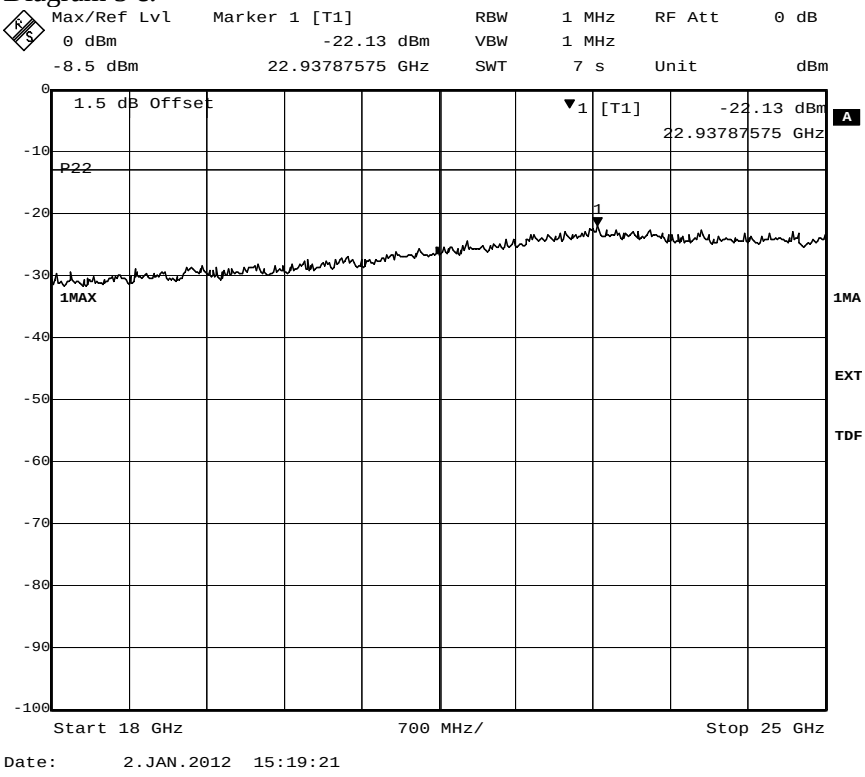

Max/Ref Lvl
0 dBm
-8.5 dBm
Marker 1 [T1]
-22.13 dBm
22.93787575 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7 s
RF Att 0 dB
Unit dBm
1.5 dB Offset
1 [T1]
-22.13 dBm
22.93787575 GHz
P22
1MAX
1MA
EXT
TDF
Start 18 GHz
700 MHz/
Stop 25 GHz
Date: 2.JAN.2012 15:19:21

Diagram 6 a:

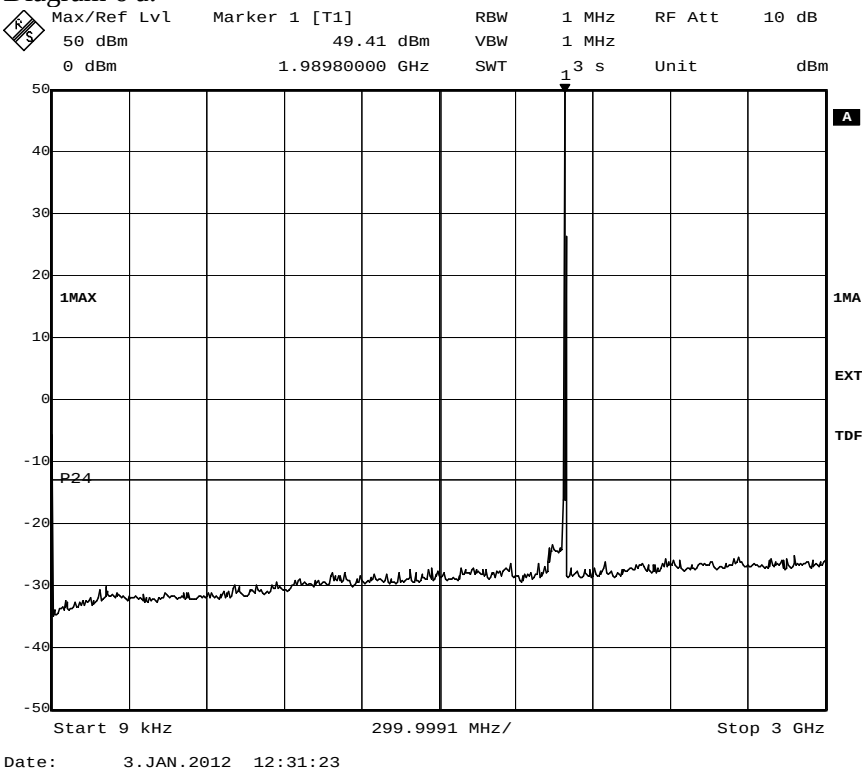


Diagram 6 b:

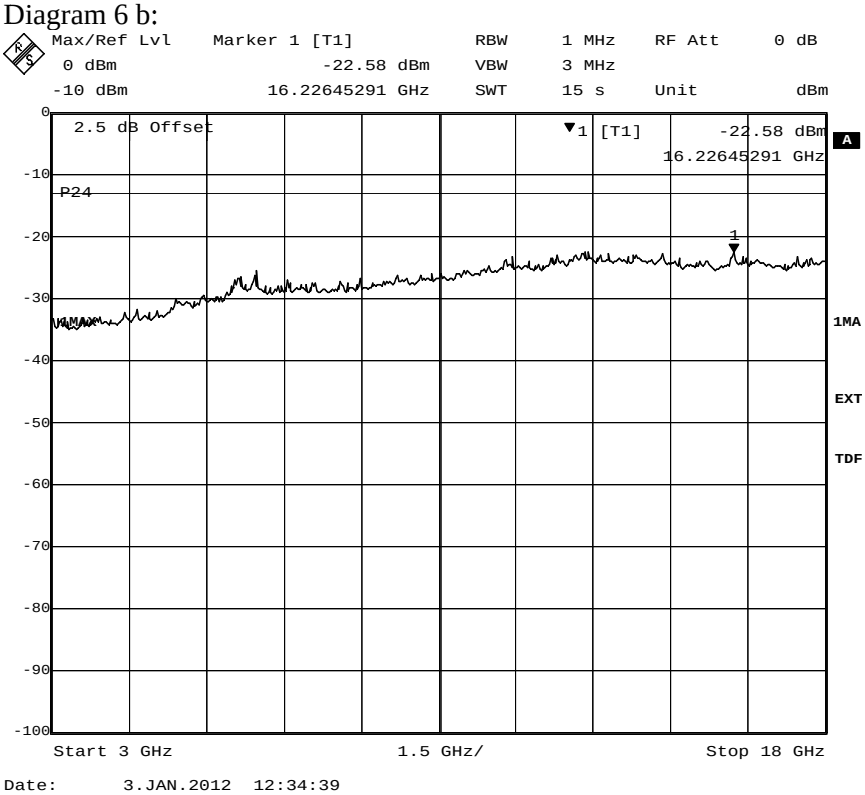


Diagram 6 c:

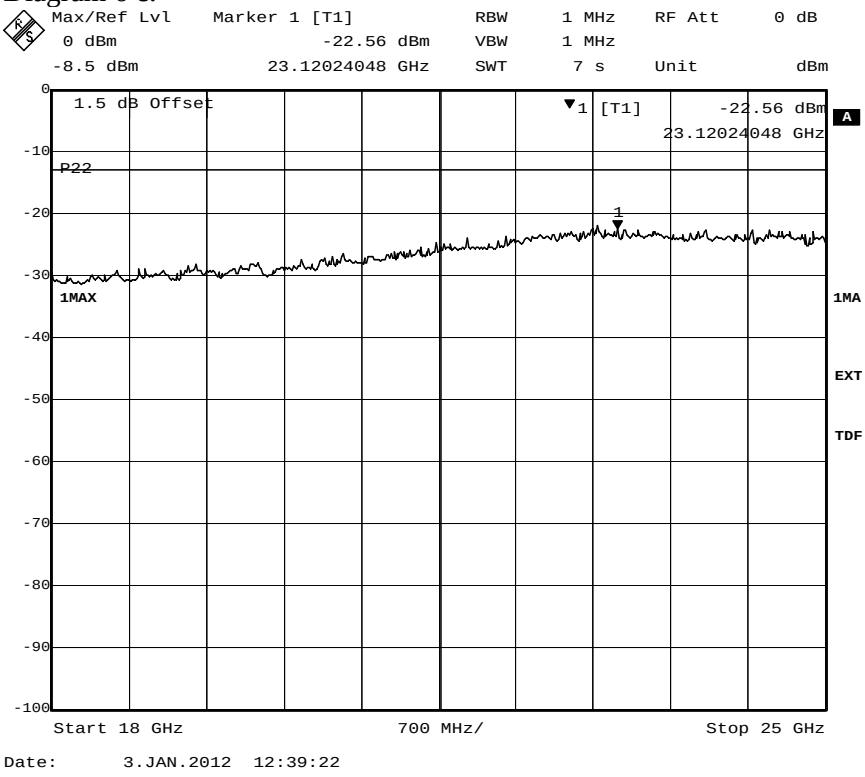

Max/Ref Lvl
0 dBm
-8.5 dBm
Marker 1 [T1]
-22.56 dBm
23.12024048 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7 s
RF Att 0 dB
Unit dBm
1.5 dB Offset
1 [T1]
-22.56 dBm
23.12024048 GHz
P22
1MAX
1MA
EXT
TDF
Start 18 GHz
700 MHz/
Stop 25 GHz
Date: 3.JAN.2012 12:39:22

Diagram 7 a:

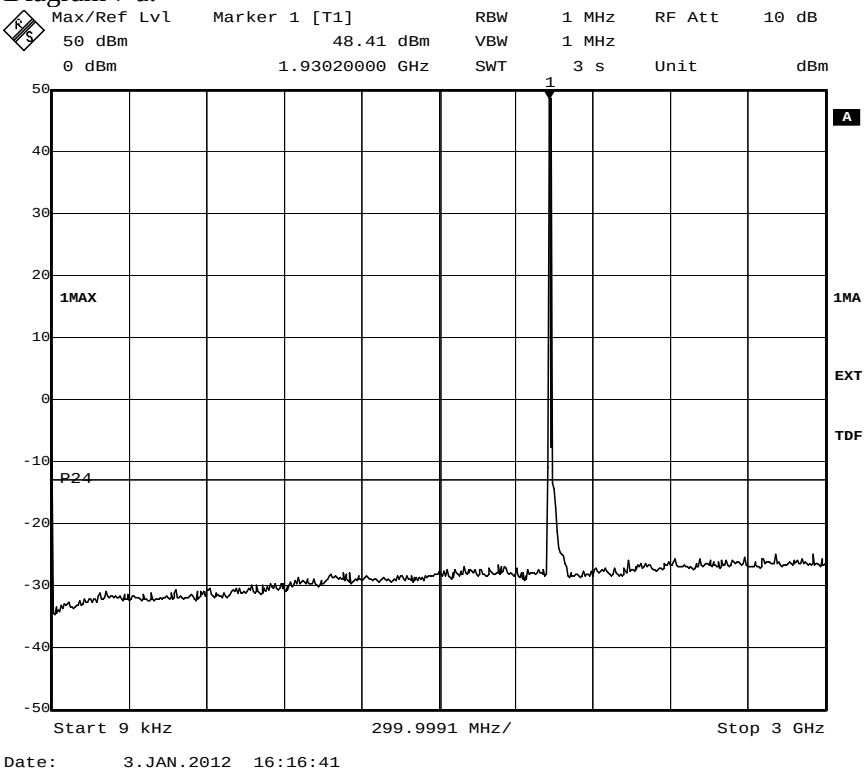


Diagram 7 b:

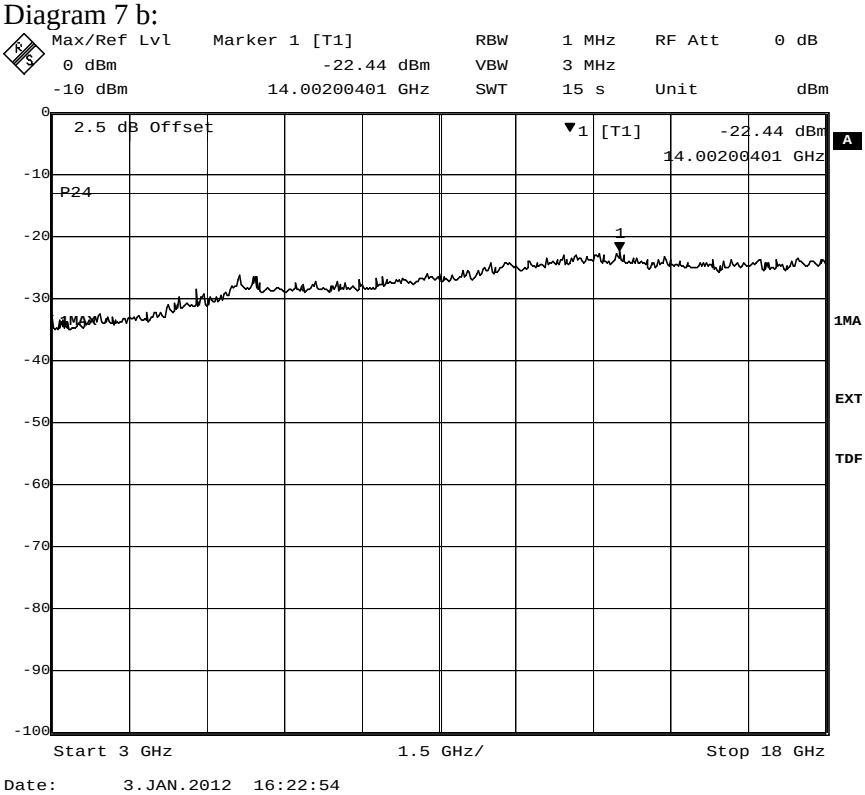


Diagram 7 c:

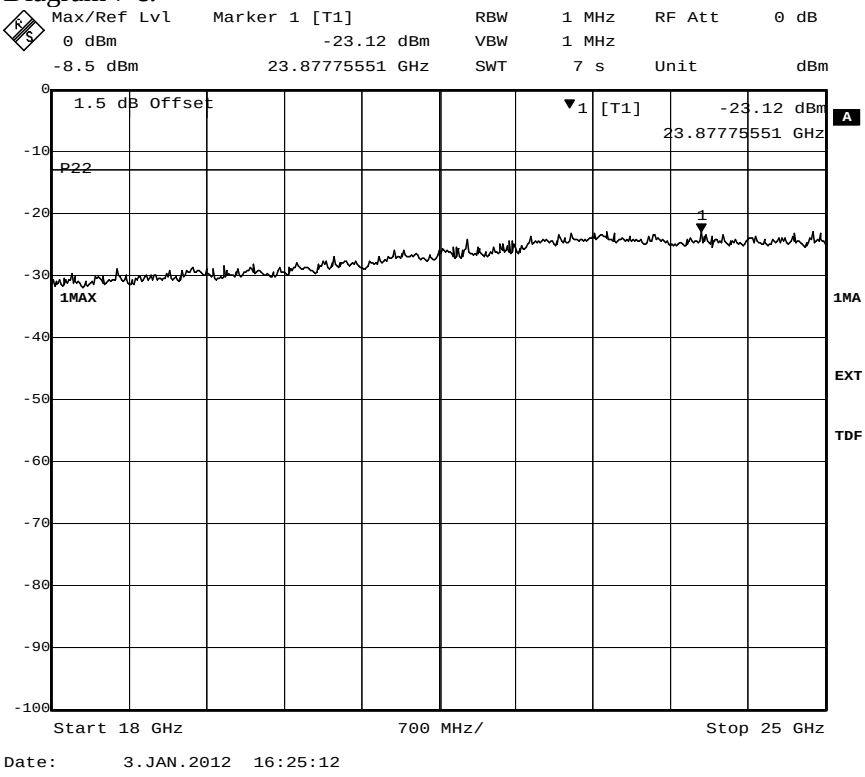

Max/Ref Lvl
0 dBm
-8.5 dBm
Marker 1 [T1]
-23.12 dBm
23.87775551 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7 s
RF Att 0 dB
Unit dBm
1.5 dB Offset
1 [T1]
-23.12 dBm
23.87775551 GHz
P22
1MAX
A
1MA
EXT
TDF
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Start 18 GHz
700 MHz/
Stop 25 GHz
Date: 3.JAN.2012 16:25:12

Diagram 8 a:

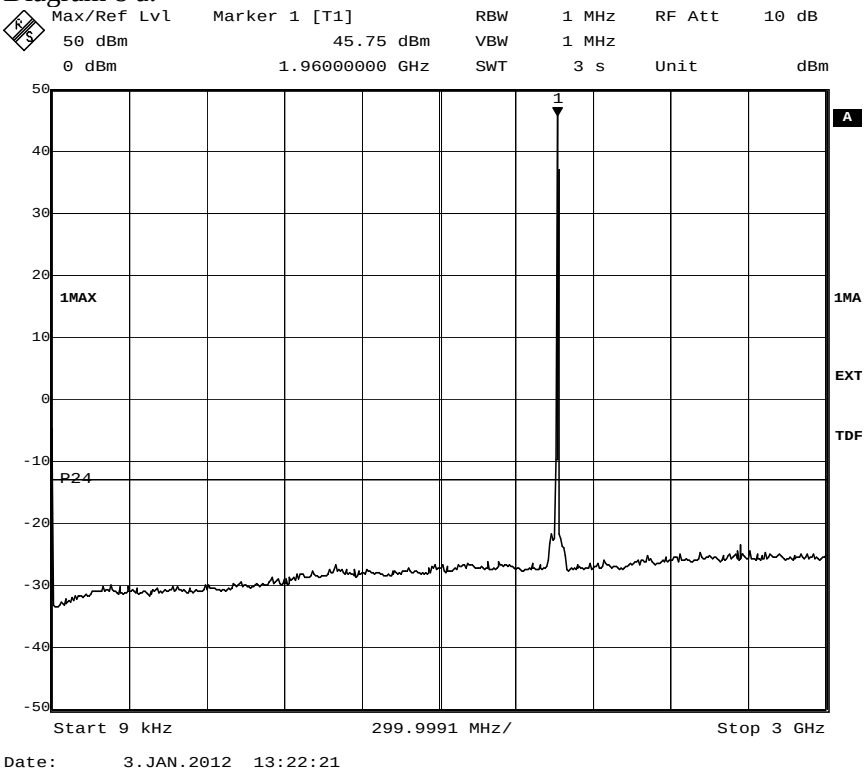


Diagram 8 b:

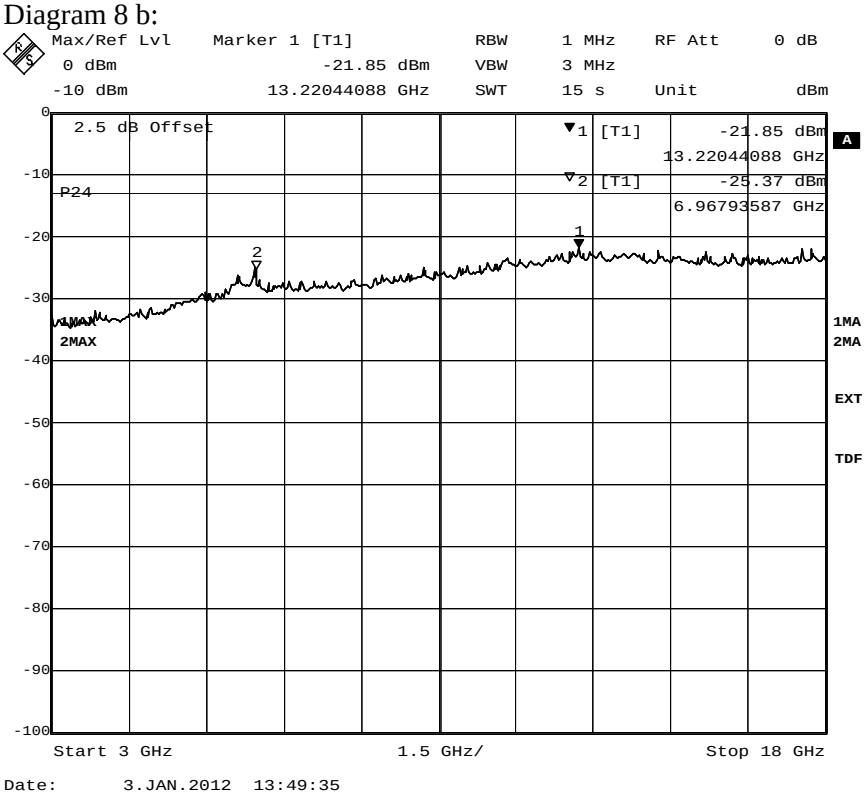


Diagram 8 c:

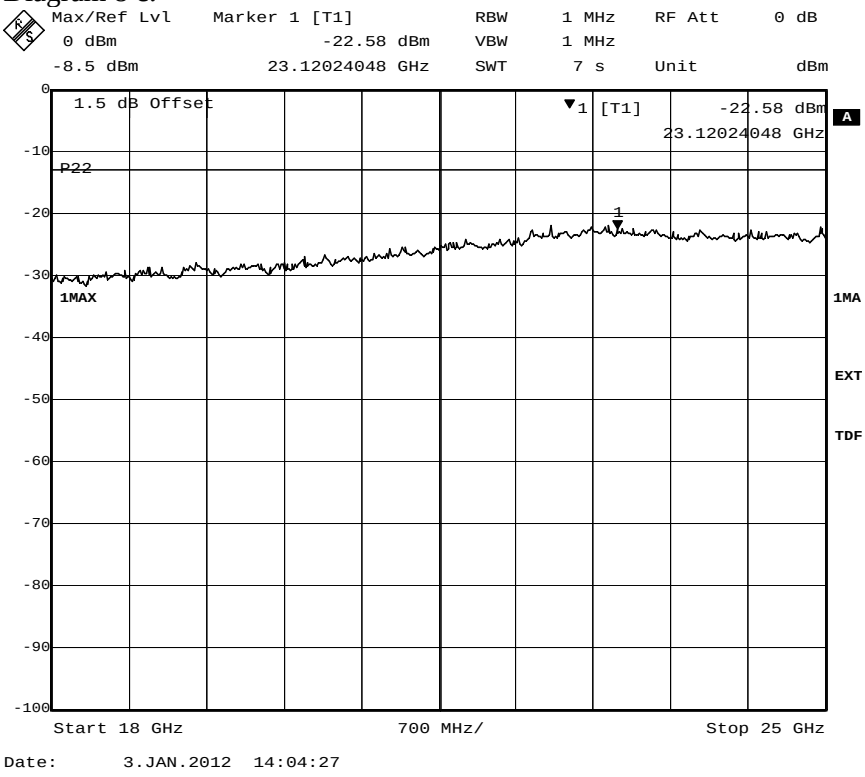

Max/Ref Lvl
0 dBm
-8.5 dBm
Marker 1 [T1]
-22.58 dBm
23.12024048 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7 s
RF Att 0 dB
Unit dBm
1.5 dB Offset
1 [T1]
-22.58 dBm
23.12024048 GHz
P22
1MAX
1MA
EXT
TDF
Start 18 GHz
700 MHz/
Stop 25 GHz
Date: 3.JAN.2012 14:04:27

Diagram 9 a:

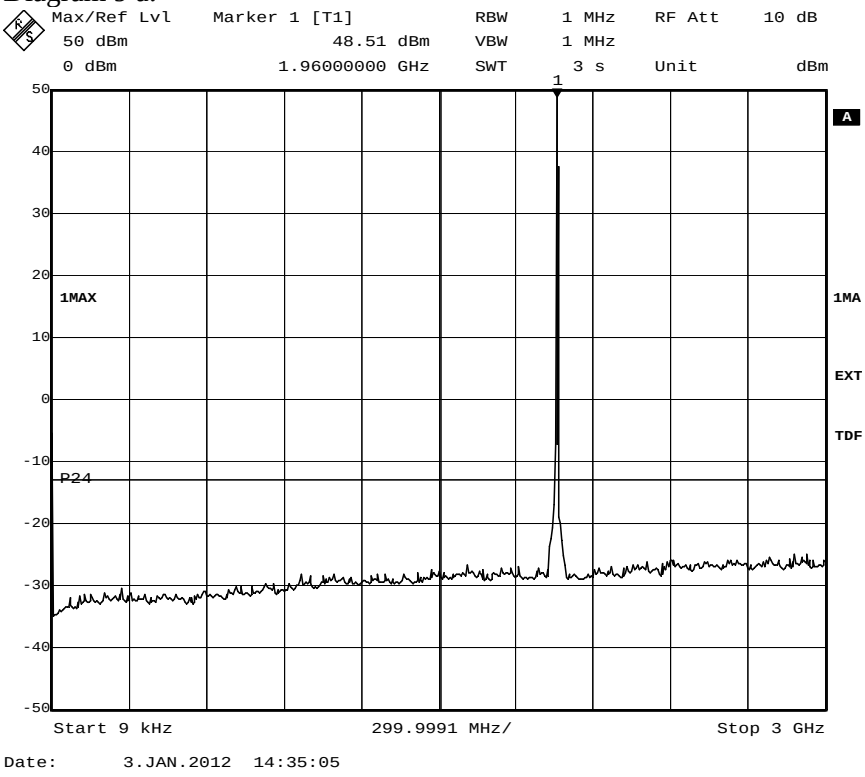
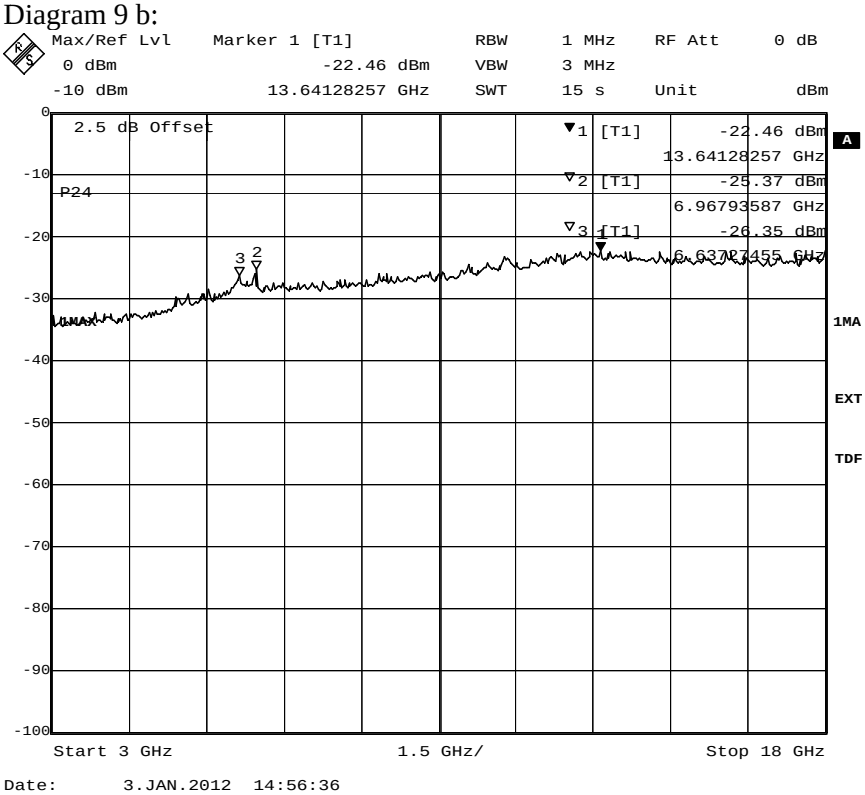


Diagram 9 b:



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

Diagram 9 c:

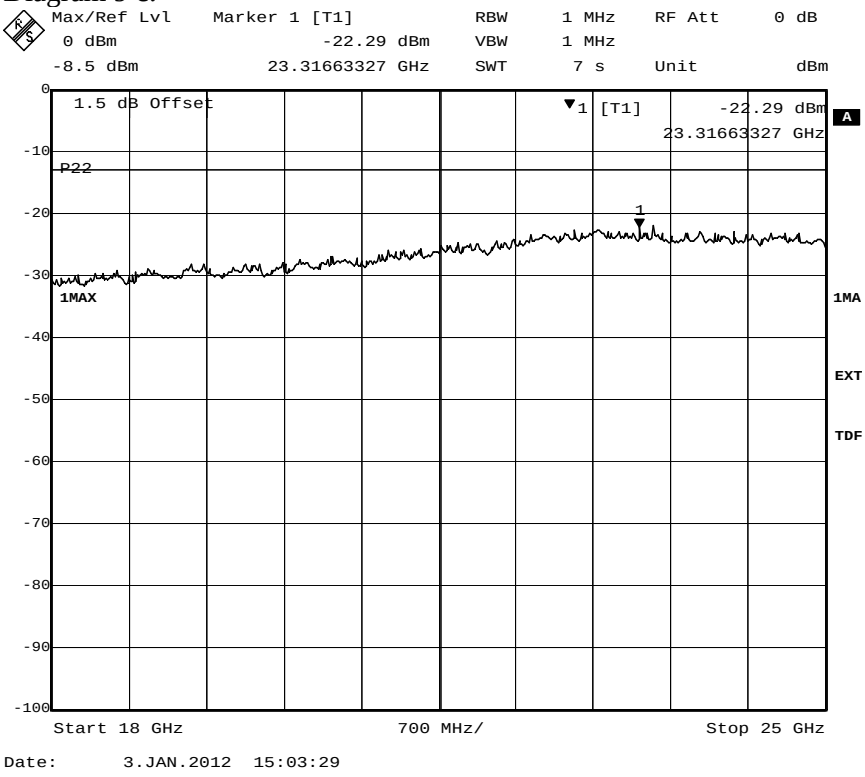

Max/Ref Lvl
0 dBm
-8.5 dBm
Marker 1 [T1]
-22.29 dBm
23.31663327 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7 s
RF Att 0 dB
Unit dBm
1.5 dB Offset
1 [T1]
-22.29 dBm
23.31663327 GHz
A
P22
1MAX
1MA
EXT
TDF
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Start 18 GHz
700 MHz/
Stop 25 GHz
Date: 3.JAN.2012 15:03:29

Diagram 10 a:

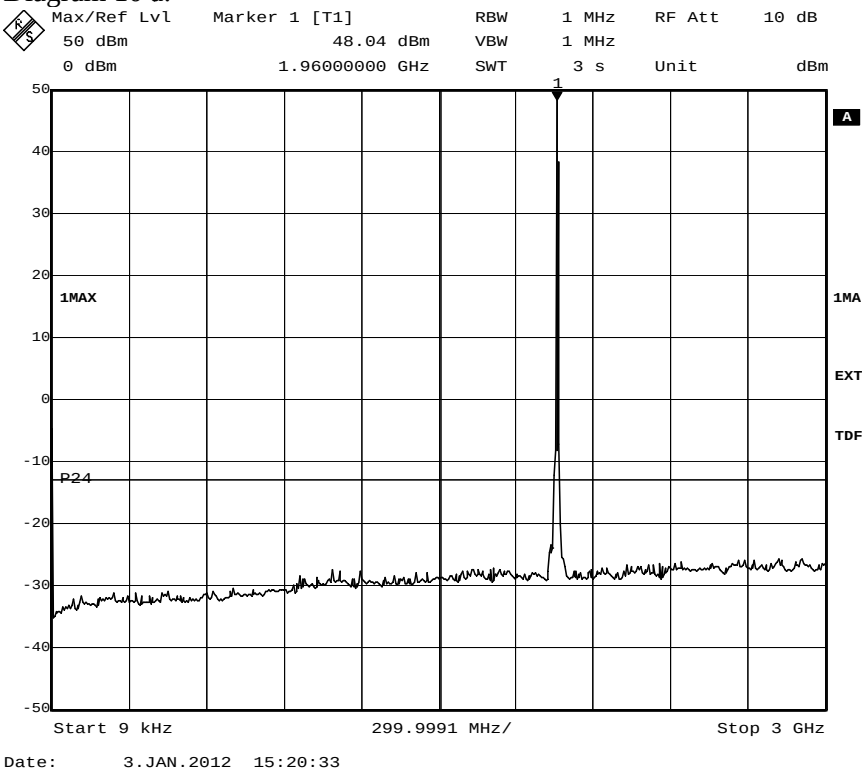
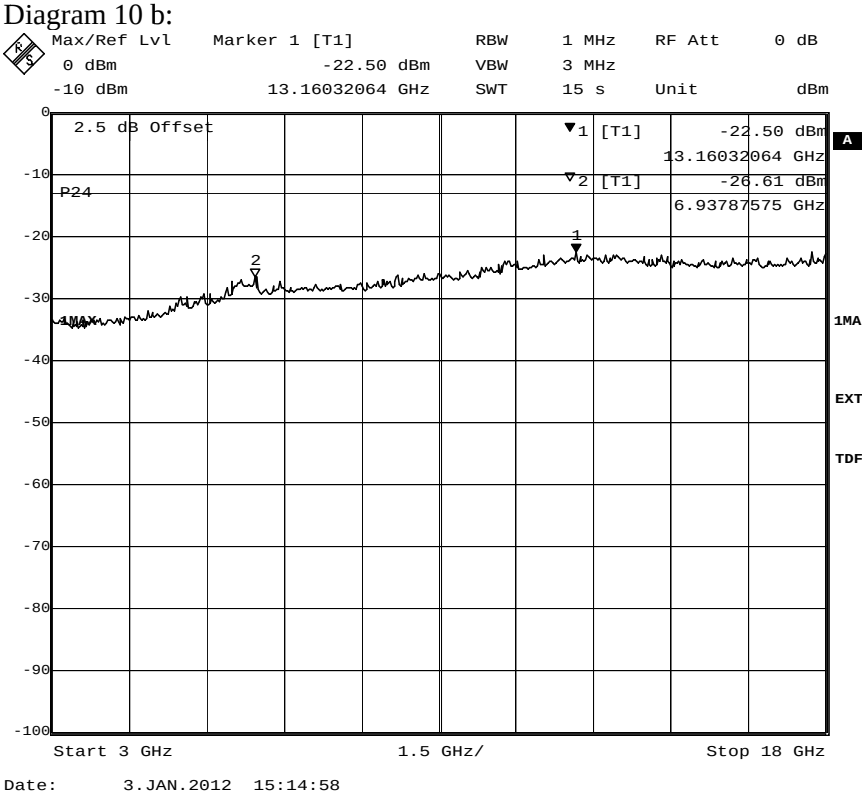


Diagram 10 b:



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

Diagram 10 c:

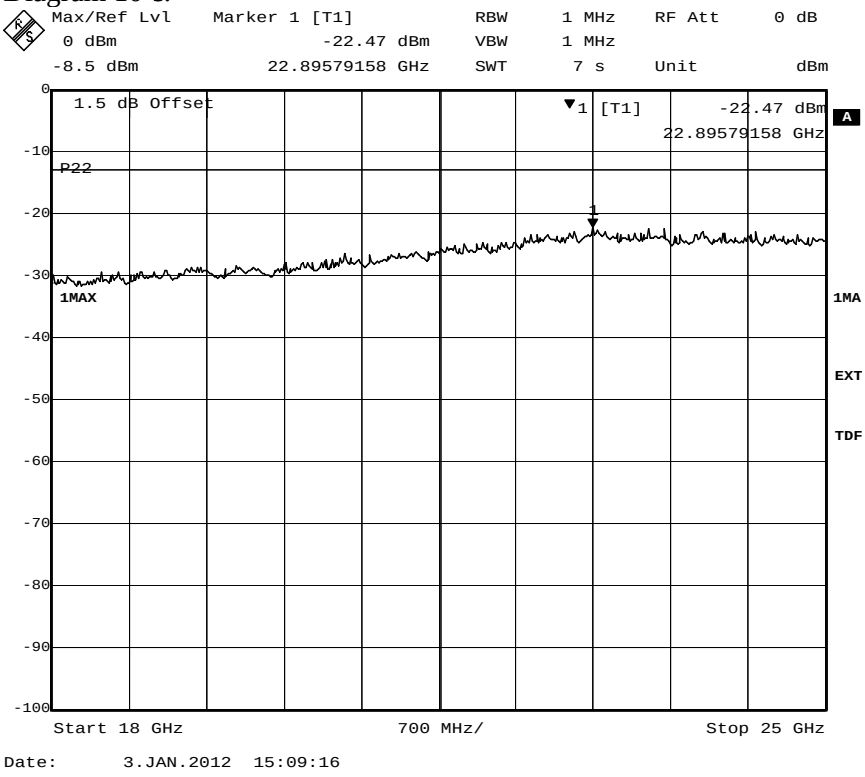

Max/Ref Lvl
0 dBm
-8.5 dBm
Marker 1 [T1]
-22.47 dBm
22.89579158 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7 s
RF Att 0 dB
Unit dBm
1.5 dB Offset
1 [T1]
-22.47 dBm
22.89579158 GHz
P22
1MAX
A
1MA
EXT
TDF
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Start 18 GHz
700 MHz/
Stop 25 GHz
Date: 3.JAN.2012 15:09:16

Diagram 11 a:

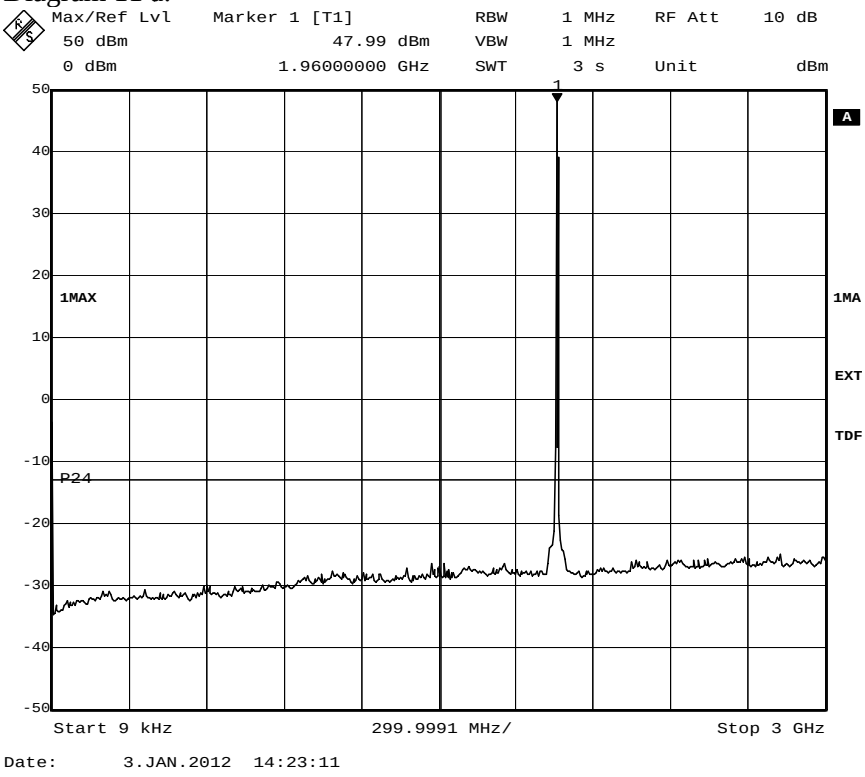
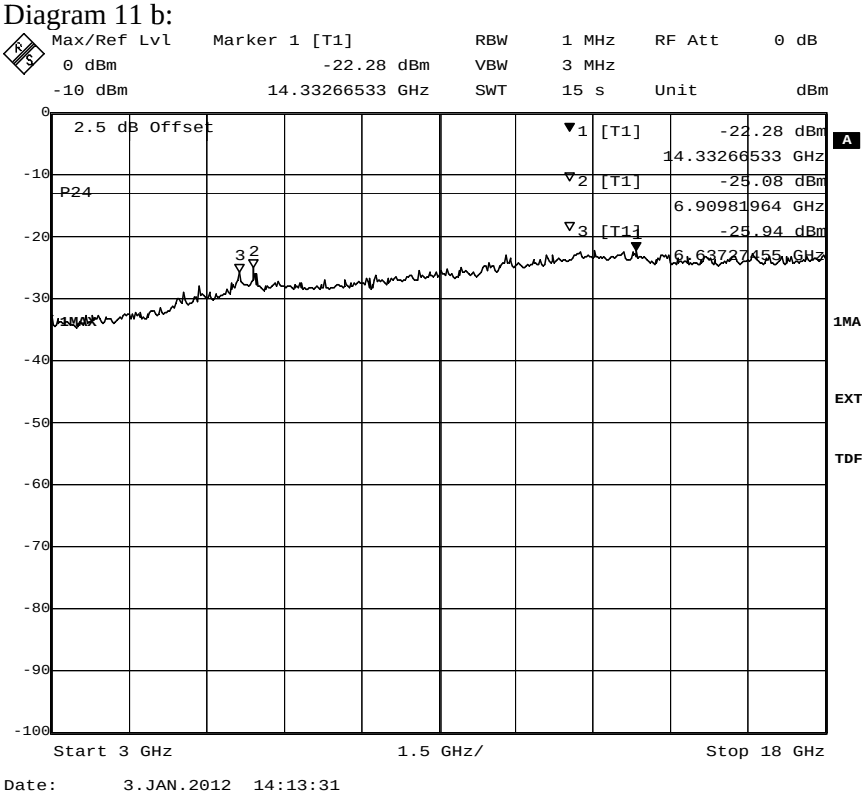


Diagram 11 b:



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

Diagram 11 c:

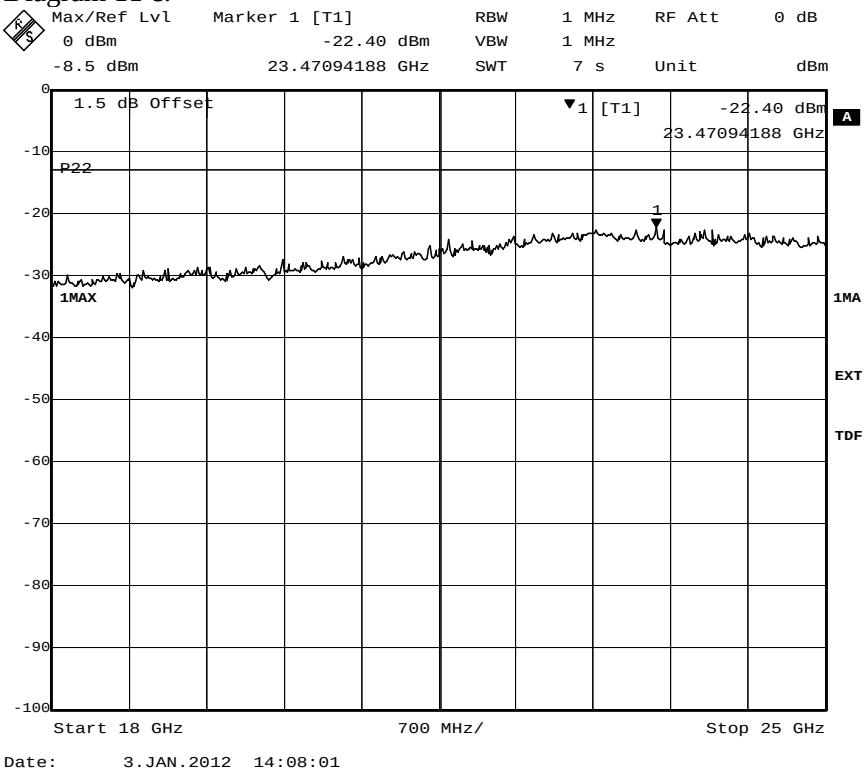

Max/Ref Lvl
0 dBm
-8.5 dBm
Marker 1 [T1]
-22.40 dBm
23.47094188 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7 s
RF Att 0 dB
Unit dBm
1.5 dB Offset
1 [T1]
-22.40 dBm
23.47094188 GHz
P22
1MAX
A
1MA
EXT
TDF
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Start 18 GHz
700 MHz/
Stop 25 GHz
Date: 3.JAN.2012 14:08:01

Diagram 12 a:

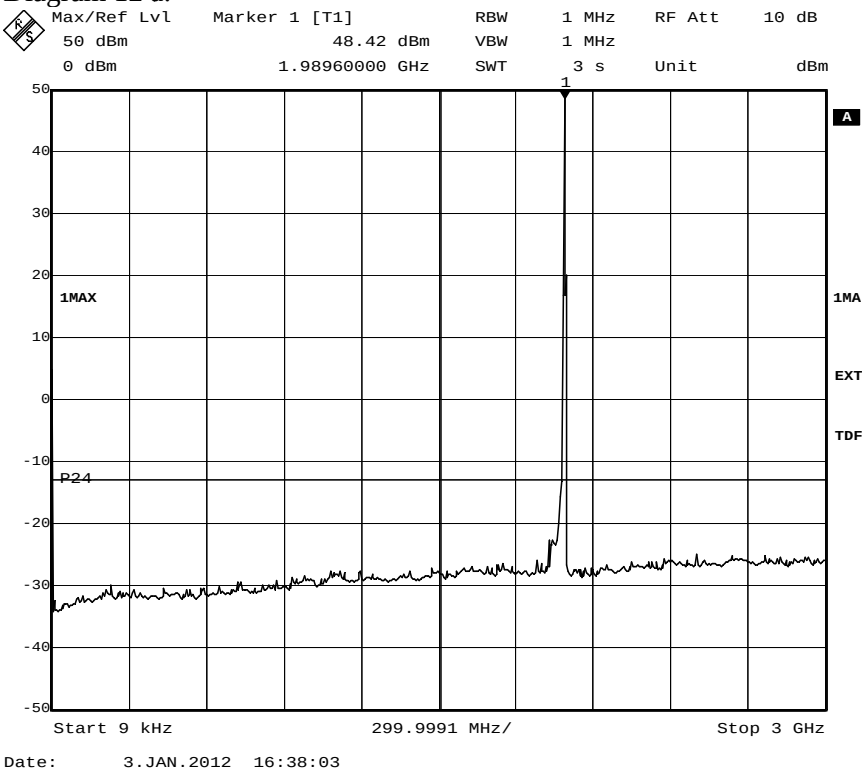


Diagram 12 b:

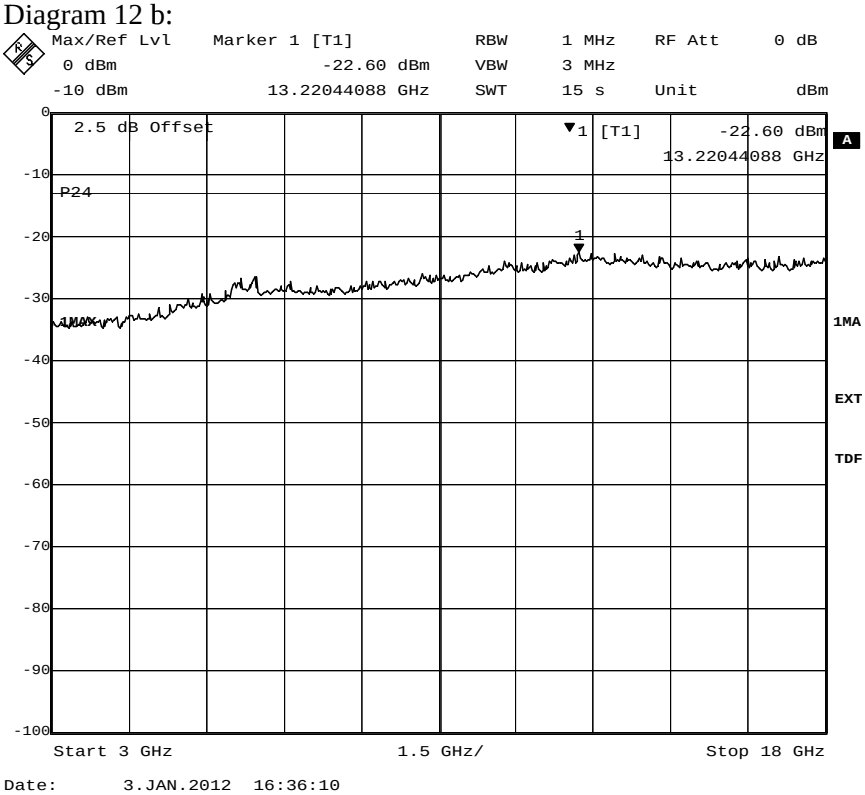
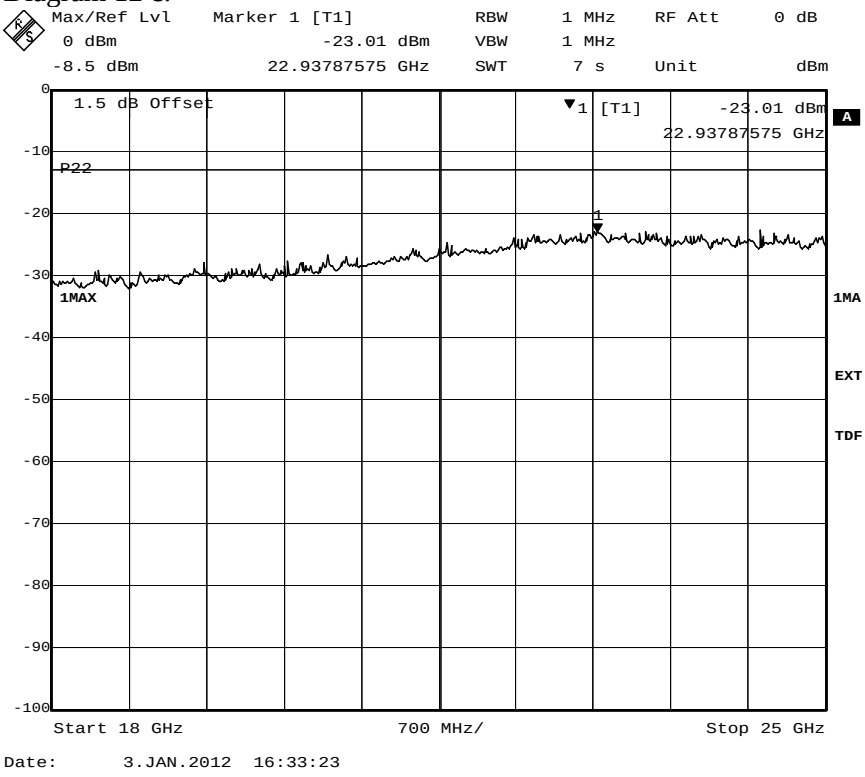


Diagram 12 c:


Max/Ref Lvl
0 dBm
-8.5 dBm
Marker 1 [T1]
-23.01 dBm
22.93787575 GHz
RBW 1 MHz
VBW 1 MHz
SWT 7 s
RF Att 0 dB
Unit dBm
1.5 dB Offset
1 [T1]
-23.01 dBm
22.93787575 GHz
A
P22
1MAX
1MA
EXT
TDF
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Start 18 GHz
700 MHz/
Stop 25 GHz
Date: 3.JAN.2012 16:33:23

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

Date	Temperature	Humidity
2012-01-12	23 °C ± 3 °C	28 % ± 5 %

Test set-up and procedure

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 1 m in the frequency range 18 – 25 GHz. The measurements were performed in Effective Radiated Power (ERP). A fully anechoic chamber was used during the measurements. The chamber is regularly calibrated with the substitution method and from that calibration an ERP correction factor is derived. The correction factor was used as a transducer to get the readings in ERP.

The measurement procedure was as the following:

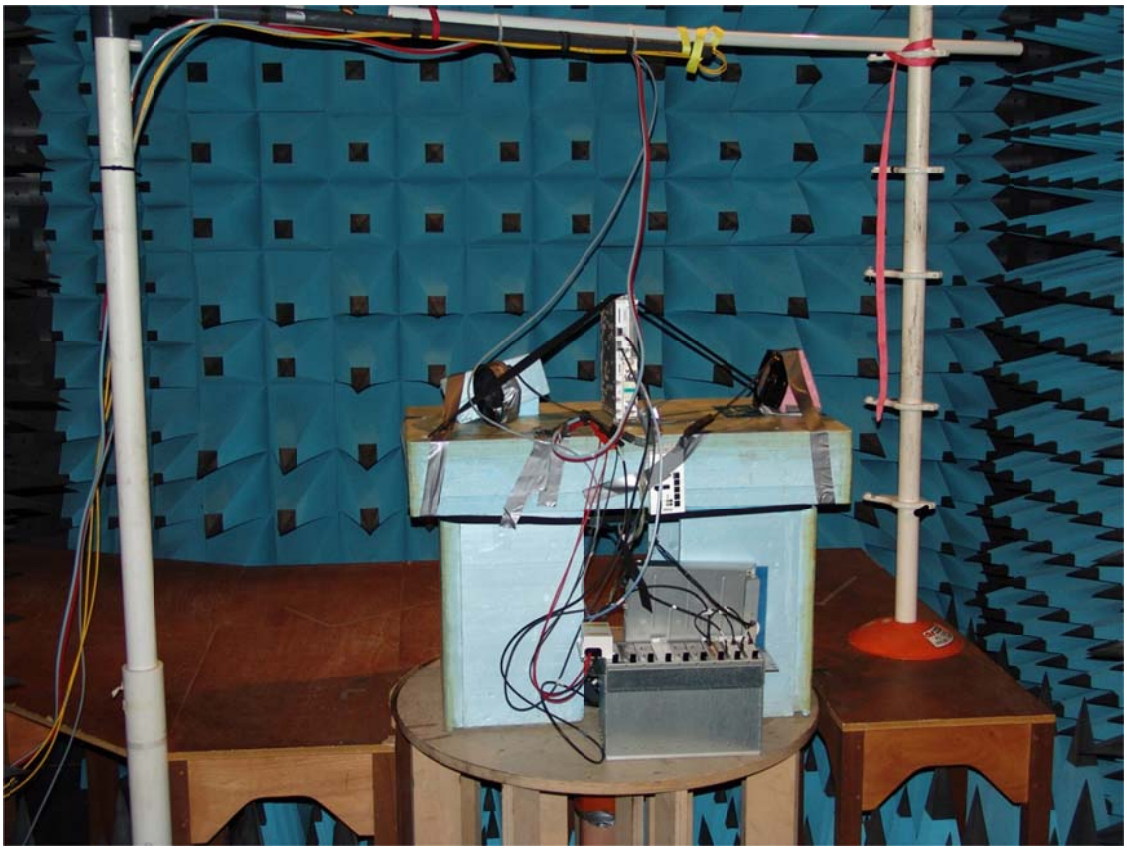
1. A pre-measurement was first performed with peak detector. The EUT was continuously measured in 360 degrees.
2. Spurious radiation on frequencies closer than 6 dB to the limit was re-measured with RMS detector and with the substitution method according to the standard.

EUT configuration: Single carrier, 1x47.8 dBm, TX channel M (1960.0 MHz).

The highest internal frequency as declared by the client was 2.4576 GHz, thus the choice of the upper frequency boundary was set to 10 x 2.5 GHz = 25 GHz for emission measurements.

Measurement equipment	SP number
Anechoic chamber, Hertz	15:116
R&S FSIQ40 Signal Analyser	503 738
R&S EMI Test Receiver ESI40	503 125
Chase bilog antenna CBL 6121A	502 460
Schaffner Reference Dipole BSRD6500	503 649
EMCO Horn Antenna 3115	502 175
EMCO Horn Antenna 3115	501 548
MITEQ Low Noise Amplifier	503 277
R&S Vector Network Analyser	503 687
High pass filter	504 200
Attenuator	900 229
Testo 615 temperature and humidity meter	503 498

The test set-up is shown in the picture below:



Results

Modulation GMSK

Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
30-25 000	All emission > 20 dB below limit	All emission > 20 dB below limit

Modulation 16QAM

Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
30-25 000	All emission > 20 dB below limit	All emission > 20 dB below limit

Modulation 32QAM

Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
30-25 000	All emission > 20 dB below limit	All emission > 20 dB below limit

Modulation AQPSK

Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
30-25 000	All emission > 20 dB below limit	All emission > 20 dB below limit

Measurement uncertainty: 3.1 dB

Limits

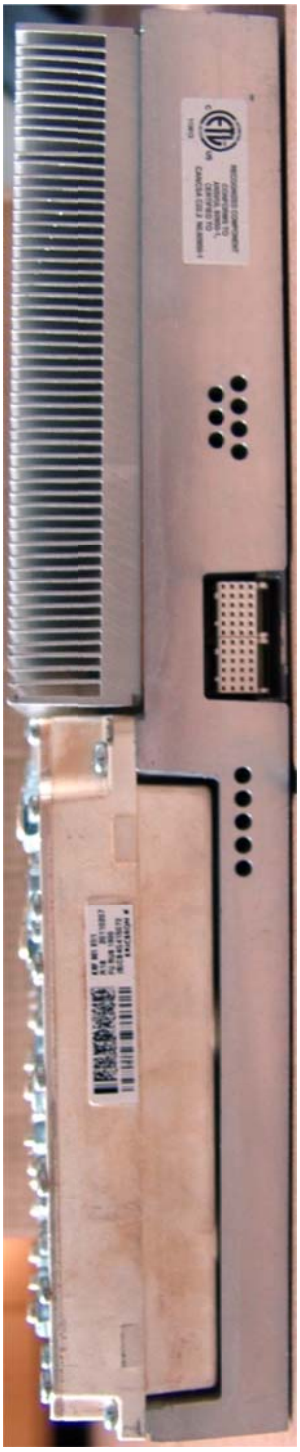
The power of any emission outside the frequency band shall be attenuated below the transmitter power (P) by at least 43 + 10 log P dB.

Complies?	Yes

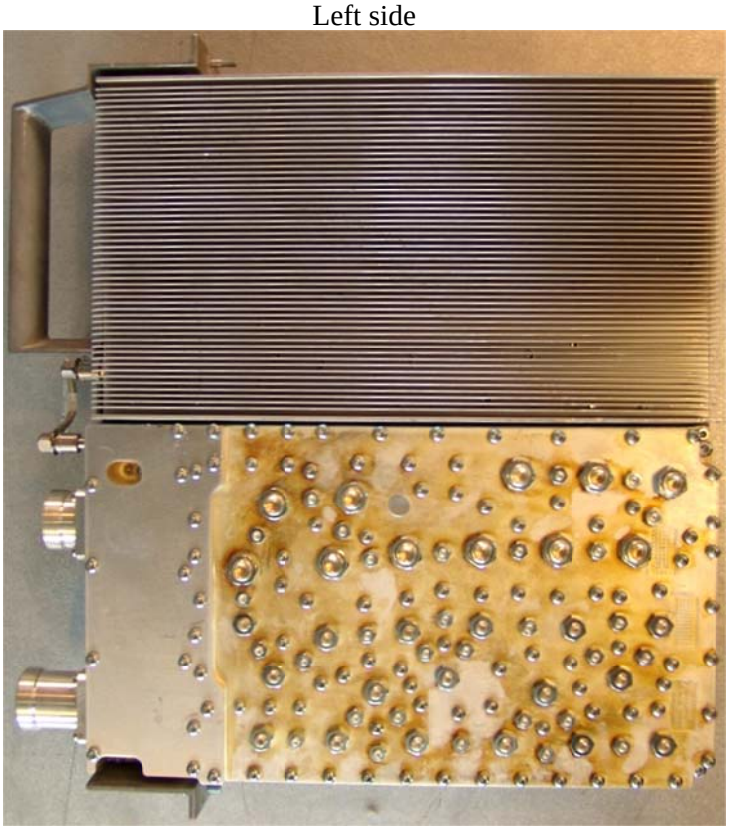
Photos of the test object

Front side

Rear side



Left side



Right side