REPORT
issued by an FCC listed Laboratory Reg. no. 93866
The test sites comply with RSS-Gen, IC file no: 3482A

Date 2011-11-03 | Reference FX108944-F24L | Page 1 (2)

1002
ISO/IEC 17025

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164 80 Stockholm

Radio measurements on RUS 01 B2 1900 MHz radio equipment with FCC ID:TA8AKRC11866-2 and IC:287AB-AS118662

(9 appendices)

Test object

RUS 01 B2, KRC 118 66/2 Rev R1A, serial no: CB4J462260

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
2.1055 / RSS-133 6.3	Frequency stability	Yes	7
Industry Canada RSS-133			
RSS-133 6.6	Receiver spurious emissions	Yes	8

Note: 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

Jonas Bremholt

Examined by

Christer Karlsson

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Frequency stability	Appendix 7
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Description of test object

Equipment:	Radio equipment RUS 01 B2 running in LTE mode
Frequency bands:	TX: 1930 – 1990 MHz RX: 1850 – 1910 MHz The highest and lowest EARFCNs and the corresponding frequencies for each supported channel BW configuration are listed below and are pursuant to 3GPP TS 36.141 section 5.7 Channel arrangement
Supported channel bandwidth configurations	1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz and 20 MHz
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 49 dBm (1x80 W)
Number of antenna ports:	TX/RX: 1 RX only: 1
Nominal supply voltage:	-48 VDC

Tested frequencies and EARFCNs for TX measurements

EARFCN Downlink	Frequency [MHz]	Comment
607	1930.7	TX bottom (B) frequency in 1.4 MHz BW configuration
615	1931.5	TX bottom (B) frequency in 3 MHz BW configuration
625	1932.5	TX bottom (B) frequency in 5 MHz BW configuration
650	1935.0	TX bottom (B) frequency in 10 MHz BW configuration
675	1937.5	TX bottom (B) frequency in 15 MHz BW configuration
700	1940.0	TX bottom (B) frequency in 20 MHz BW configuration
900	1960.0	TX band mid (M) frequency in all BW configurations
1100	1980.0	TX top (T) frequency in 20 MHz BW configuration
1125	1982.5	TX top (T) frequency in 15 MHz BW configuration
1150	1985.0	TX top (T) frequency in 10 MHz BW configuration
1175	1987.5	TX top (T) frequency in 5 MHz BW configuration
1185	1988.5	TX top (T) frequency in 3 MHz BW configuration
1193	1989.3	TX top (T) frequency in 1.4 MHz BW configuration

Tested frequency and EARFCN for RX measurement

EARFCN	Frequency [MHz]	Comment
18900	1880.0	RX band mid (M) frequency in all BW configurations

Each corresponding uplink (RX) channel was offset by +18000 from above given downlink EARFCN.

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

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 1.4 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 unless noted otherwise. All measurements were performed with the test object configured for maximum transmit power.

Conducted measurements

The EUT was mounted into a RBS 6201 cabinet and supplied by the cabinet's internal -48 V DC. TX parameters were measured at port RF A with port RF B terminated into 50 ohm. RX spurious emission conducted was measured at port RF B with port RF A activated with E-TM1.1 in channel BW configuration 1.4 MHz on the TX band center frequency (M). Port RF A was terminated into 50 ohm.

Radiated measurements

The test object was tested stand-alone. It was powered with -48 VDC. All measurements were performed with the test object configured for maximum transmitter output power at port RF A. The port RF A was via a RF attenuator connected to a spectrum analyzer outside the shielded chamber for signal monitoring. Antenna port RF B was unterminated.

Purpose of test

The purpose of the tests is to verify compliance to the performance characteristics specified in applicable parts of FCC CFR 47, IC RSS-133 and IC RSS-Gen.

References

Measurements were done according to relevant parts of the following standards:
ANSI C63.4-2009
ANSI/TIA/EIA-603-C-2004
3GPP TS 36.141, version 8.5.0
CFR 47 part 2, October 1st , 2010
CFR 47 part 24 Subpart E, October 1st, 2010
RSS-133 Issue 5
RSS-Gen Issue 3

Measurement equipment

Measurement equipment	Calibration Due	SP number
Test site Tesla	2012-10	503 881
R&S FSIQ 40	2012-07	503 738
R&S FSQ 40	2012-07	504 143
R&S ESI 26	2012-07	503 292
Control computer with R&S software EMC32 version 8.20.1	-	503 479
High pass filter	2012-07	504 199
High pass filter	2012-07	504 200
High pass filter	2012-07	503 739
High pass filter	2012-07	503 740
RF attenuator	2012-07	504 159
RF attenuator	2012-07	900 233
Boonton RF Peak power meter/analyzer	2011-10	503 144
Boonton Power sensor 56518-S/4	2012-10	503 145
Chase Bilog Antenna CBL 6111A	2011-10	503 182
EMCO Horn Antenna 3115	2014-01	502 175
Std.gain horn FLANN model 20240-20	-	503 674
µComp Nordic, Low Noise Amplifier	2012-07	504 160
MITEQ Low Noise Amplifier	2012-07	503 285
Temperature cabinet	-	503 360
Multimeter Fluke 87	2012-05	502 190
Testo 625, Temperature and humidity meter	2012-06	504 188
Testo 635 Temperature and humidity meter	2012-05	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).

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: 2011-05-26.

Manufacturer’s representative

Christer Gustavsson, Ericsson AB

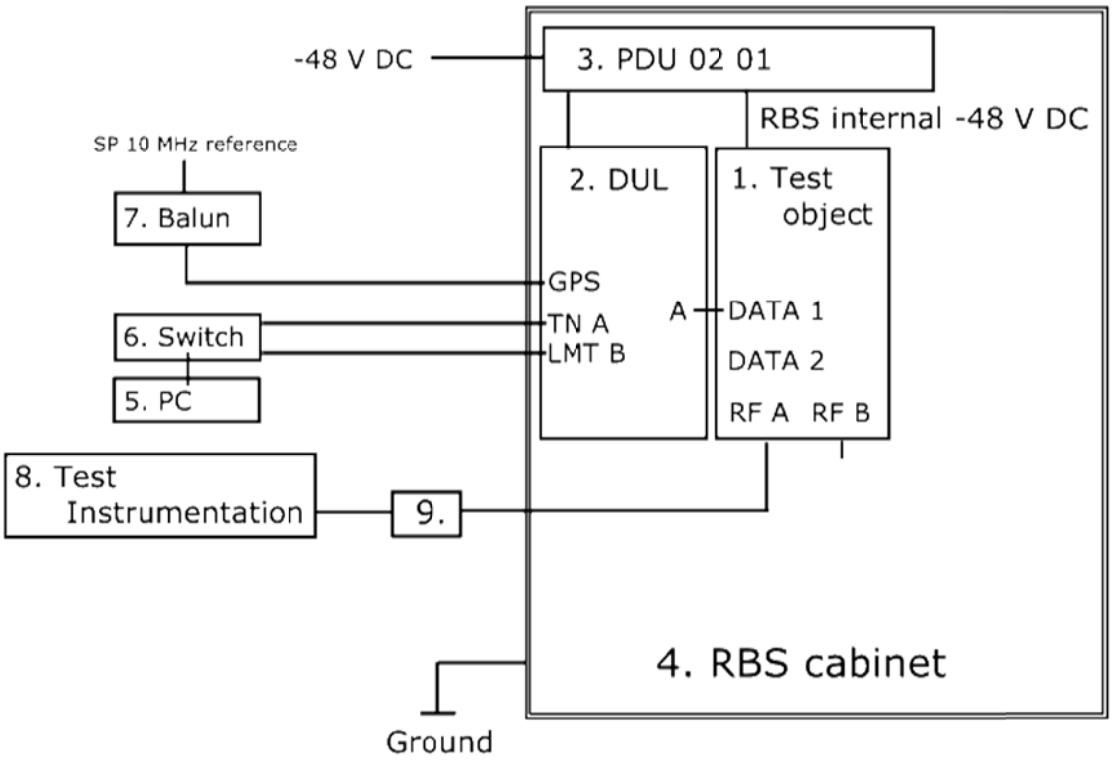
Test engineers

Andreas Johnson, Jörgen Wassholm, and Jonas Bremholt

Test participant(-s)

Anita Qu and Xiang Yue, Ericsson CBC (Partly present)

Test set-up conducted TX measurements at port RF A



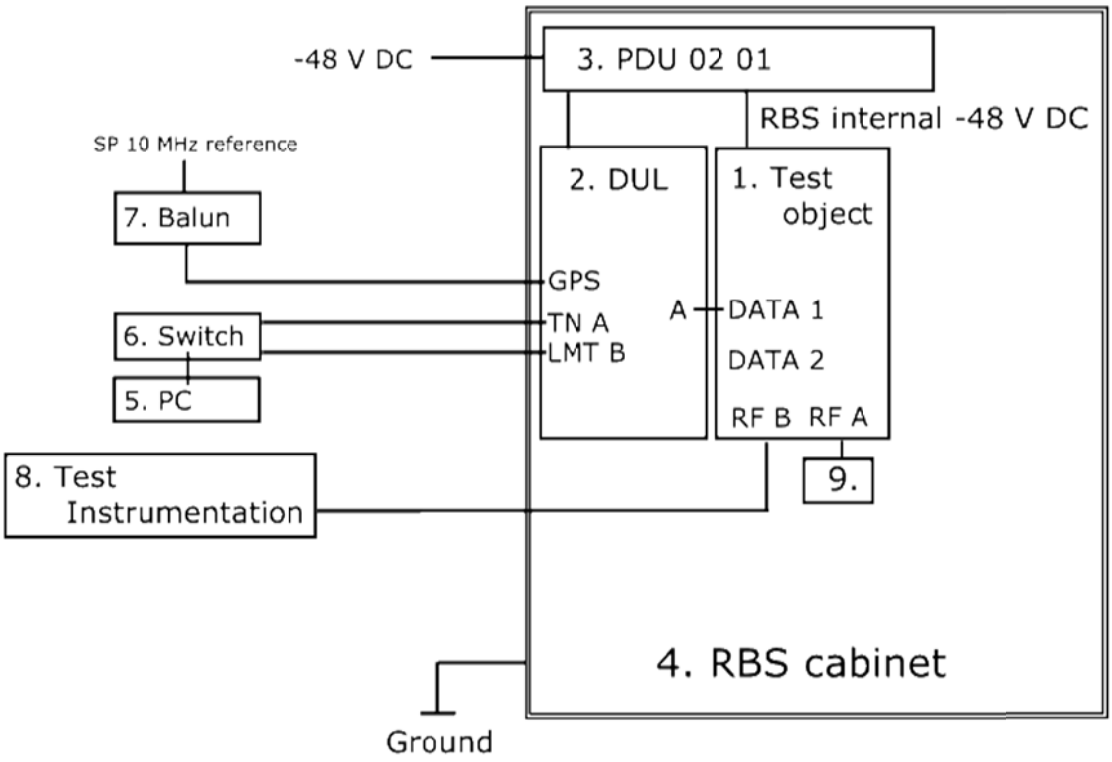
Test object

1. RUS 01 B2, KRC 118 66/2, revision R1A, S/N: CB4J462260
   FCC ID:TA8AKRC11866-2 and IC:287AB-AS118662

Functional test equipment

2. DUL 20 01, KDU 137 533/4, revision R1C, S/N: C84H365178
3. PDU 02 01, BMG 980 336/4, revision R2A, S/N: BJ31528316
4. RBS 6201 cabinet, BAMS 1000778792
5. Controlling laptop HP Elitebook 8730w, SN CNU 942532V, BAMS 1000757967 running software MOSHELL V8.0k
6. Fast Ethernet Switch: NETGEAR 10/100 Mbps model: FS108
7. Balun for 10 MHz reference, converting BNC to RJ-45 connector
8. SP test instrument according measurement equipment list
9. Attenuator and filter according measurement equipment list

Test set-up conducted RX measurements at port RF B



Test object

1. RUS 01 B2, KRC 118 66/2, revision R1A, S/N: CB4J462260
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Functional test equipment

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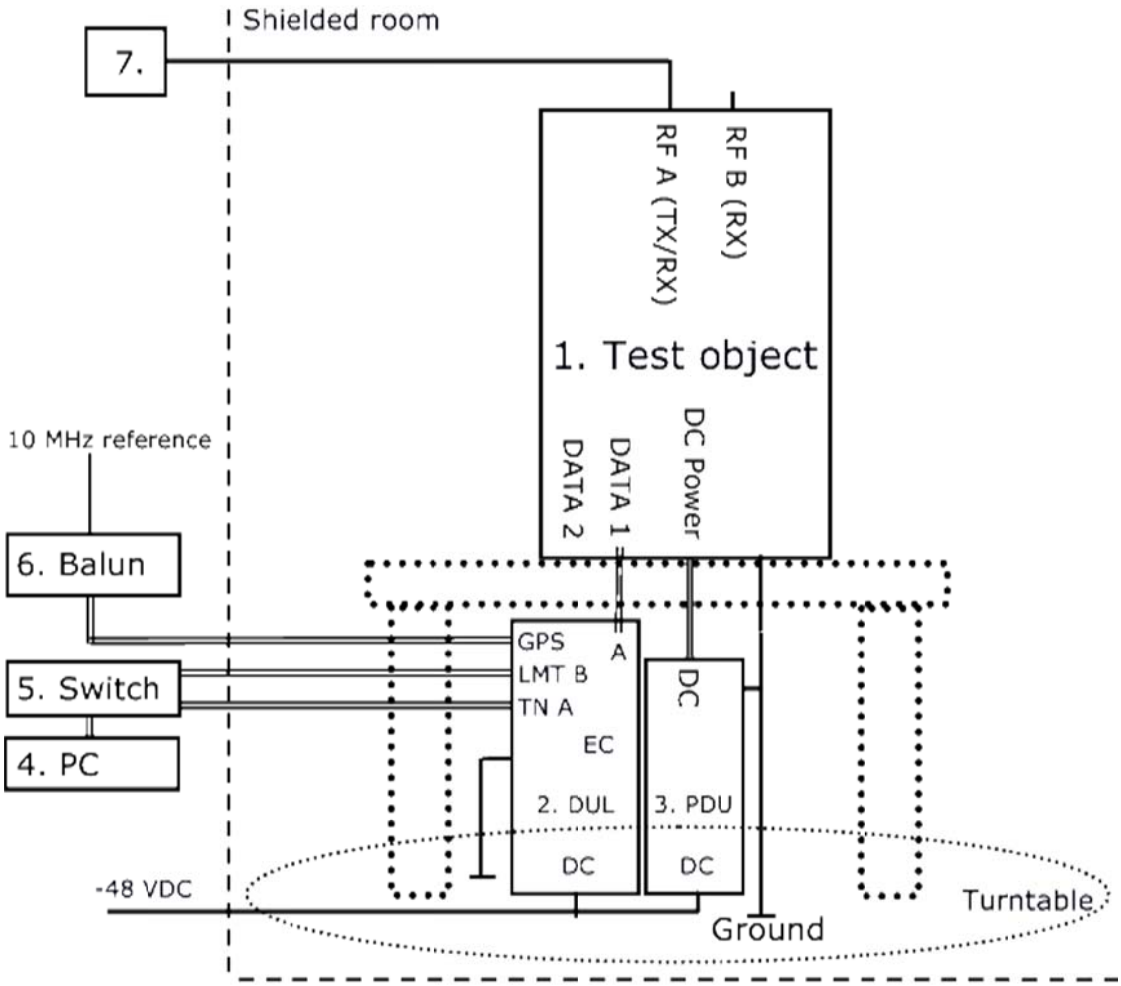
3. PDU 02 01, BMG 980 336/4, revision R2A, S/N: BJ31528316
4. RBS 6201 cabinet, BAMS 1000778792
5. Controlling laptop HP Elitebook 8730w, SN CNU 942532V, BAMS 1000757967 running software MOSHELL V8.0k
6. Fast Ethernet Switch: NETGEAR 10/100 Mbps model: FS108
7. Balun for 10 MHz reference, converting BNC to RJ-45 connector
8. SP test instrument according measurement equipment list
9. 50 ohm termination

Test set-up, radiated measurements



Test object

1 RUS 01 B2, KRC 118 66/2, revision R1A, S/N: CB4J462260
(FCC ID:TA8AKRC11866-2 / IC:287AB-AS118662)

Functional test equipment

2. DUL 20 01, KDU 137 533/4, revision R1C, S/N: CB4H365178,
hosted in SUP 6601 1/BFL 901 009/1 Rev R3B, S/N. BR81262569
3. Power Distribution Unit PDU 02 01, BMG 980 336/4 Rev R2A, S/N: BJ31534775
4. Laptop computor:Mobile Workstation, HP Elite book BAMS – 1000757967
with MOSHELL Ver. 8.0k
5. Fast Ethernet Switch: NETGEAR 10/100 Mbps model: FS108
6. Balun for 10 MHz reference, converting BNC to RJ-45 connector
7. 50 ohm terminator

Test object ports

Interface:	Type of port:
Ground connection during stand alone radiated emission test, in normal use grounded via cabinet	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, connected to Port “A” at DUL	Signal
Data 2, unused	Signal
RXA I/O cross connecter, unused	Signal
RXA OUT cross connecter, unused	Signal
RXB I/O cross connecter, unused	Signal

RBS software

Software	Revision
CXP 102 051/10	R9FE

RF power output measurements according to CFR 47 §24.232 / IC RSS-133 6.4

Date	Temperature	Humidity
2011-06-29	22 °C ± 3 °C	30 % ± 5 %

Test set-up and procedure

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

Measurement equipment	SP number
Boonton RF Peak power meter/analyzer	503 144
Boonton Power sensor 56518-S/4	503 146
RF attenuator	504 159
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 0.7 dB

Results

Measured output power level at connector RF A

Test conditions	Transmitter power RMS (dBm) / PAR (dB)		
	Frequency B	Frequency M	Frequency T
BW configuration 1.4 MHz	48.4/ 6.8	48.6/ 6.6	48.4/ 6.7
BW configuration 3 MHz	48.5/ 6.7	48.6/ 6.6	48.4/ 6.6
BW configuration 5 MHz	48.5/ 6.6	48.5/ 6.5	48.4/ 6.6
BW configuration 10 MHz	48.4/ 6.8	48.3/ 6.5	48.4/ 6.6
BW configuration 15 MHz	48.3/ 7.2	48.2/ 6.5	48.2/ 6.7
BW configuration 20 MHz	48.2/ 7.2	48.1/ 6.5	48.1/ 6.9

Limits

§24.232 Federal Register / Vol. 73, No. 86
The maximum output power may not exceed 1640 W (EIRP).
The Peak to Average Ratio (PAR) may not exceed 13 dB.

RSS-133: The average equivalent isotropically radiated power (e.i.r.p.) for transmitters shall not exceed the limits given in SRSP-510. Moreover, base station transmitters operating in the band 1930-1995 MHz shall not have output power exceeding 100 watts.
In addition, when the transmitter power is measured in terms of average value, the peak-to-average ratio(PAR) of the power shall not exceed 13 dB.

Complies?	Yes

Occupied bandwidth measurements according to CFR 472.1049 / IC RSS-Gen 4.6.1

Date	Temperature	Humidity
2011-06-29 to 2011-07-02	22-23 °C ± 3 °C	30-35 % ± 5 %

Test set-up and procedure

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

Measurement equipment	SP number
Rohde & Schwarz signal analyzer FSQ40	504 143
RF attenuator	504 159
Testo 615 temperature and humidity meter	503 498

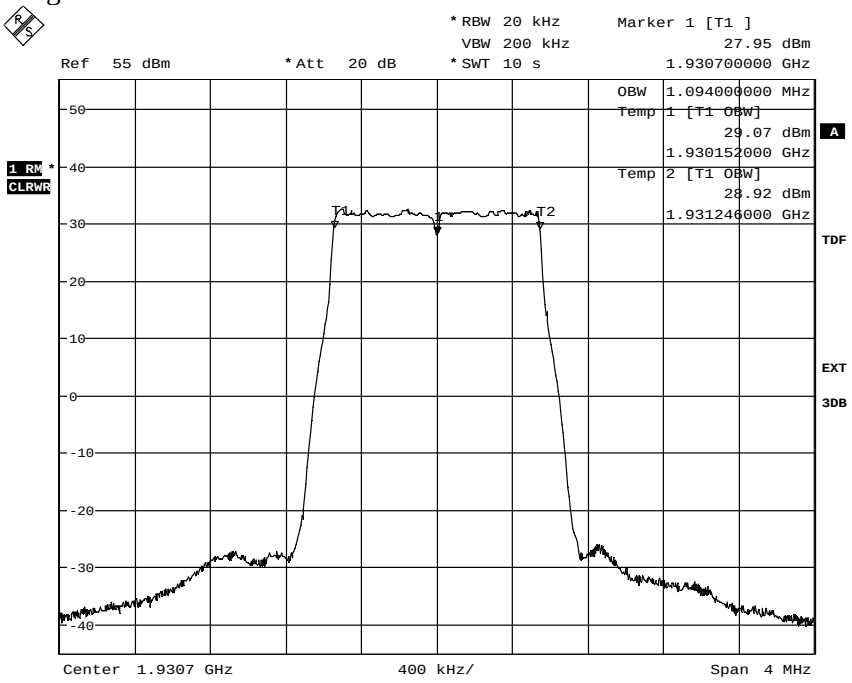
Measurement uncertainty: 3.7 dB

Results

Diagram	BW configuration	Tested frequency	Occupied BW (99%) [MHz]
1	1.4 MHz	B	1.094
2	20 MHz	B	17.860
3	1.4 MHz	M	1.094
4	3 MHz	M	2.698
5	5 MHz	M	4.480
6	10 MHz	M	8.940
7	15 MHz	M	13.420
8	20 MHz	M	17.860
9	1.4 MHz	T	1.094
10	20 MHz	T	17.840

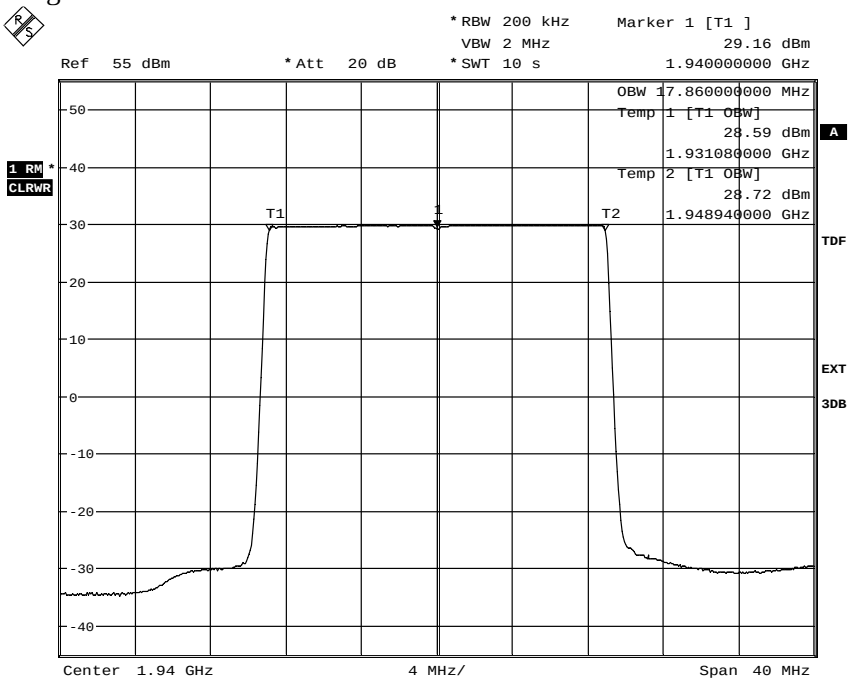
Appendix 3

Diagram 1



Date: 30.JUN.2011 09:11:10

Diagram 2



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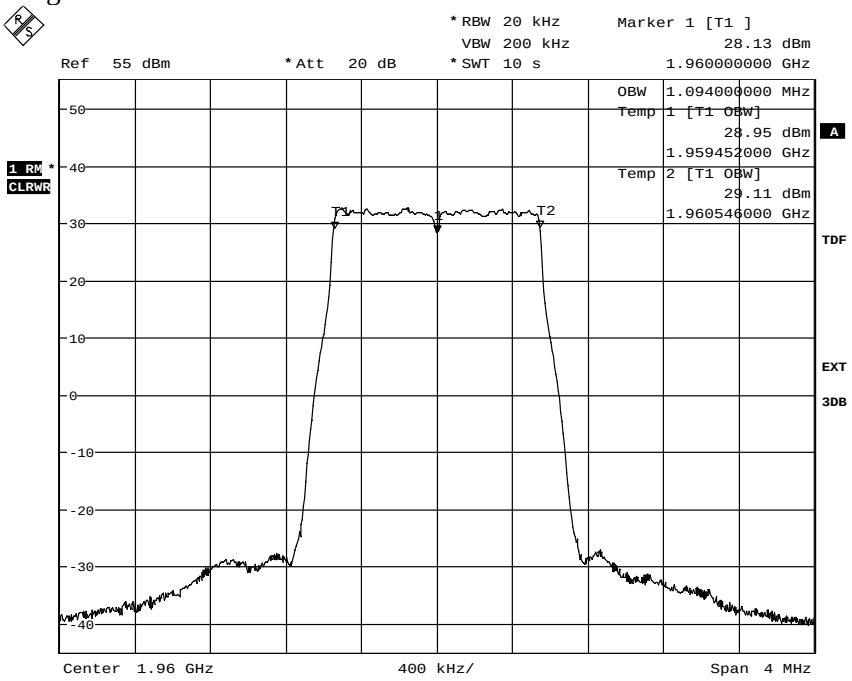
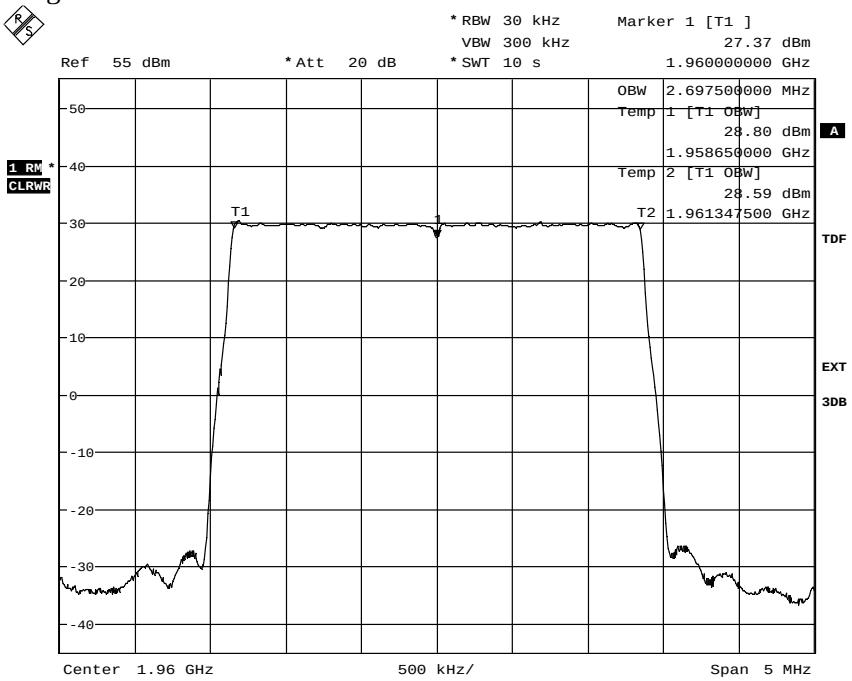
Appendix 3

Diagram 3



Date: 29.JUN.2011 12:33:32

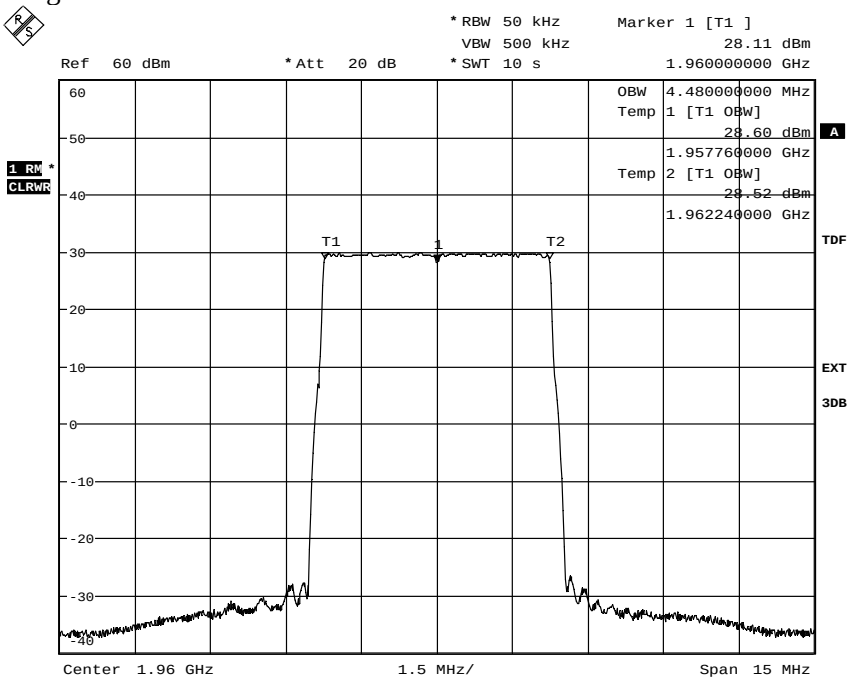
Diagram 4



Date: 29.JUN.2011 13:09:11

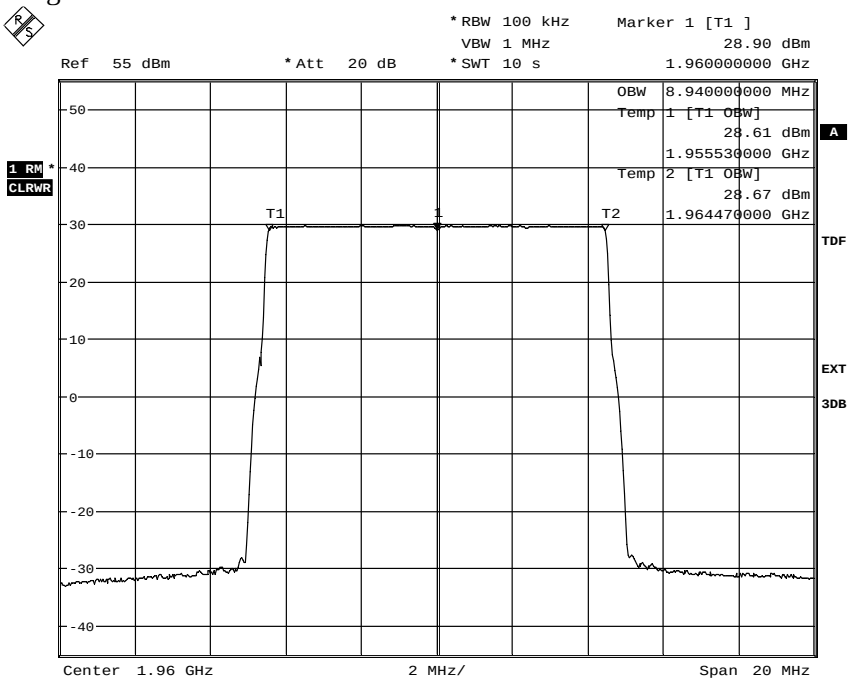
Appendix 3

Diagram 5



Date: 29.JUN.2011 13:21:36

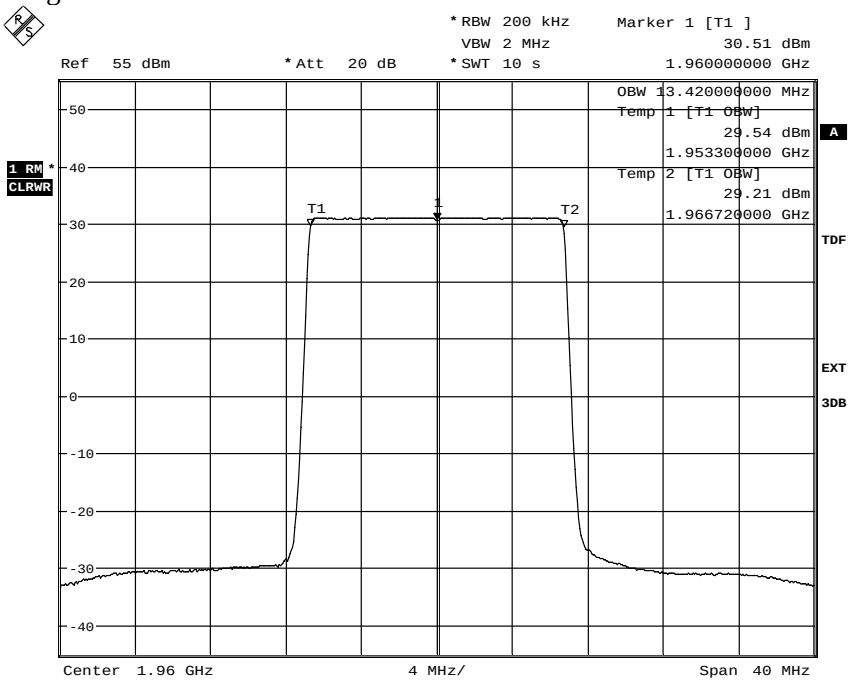
Diagram 6



Date: 2.JUL.2011 10:01:18

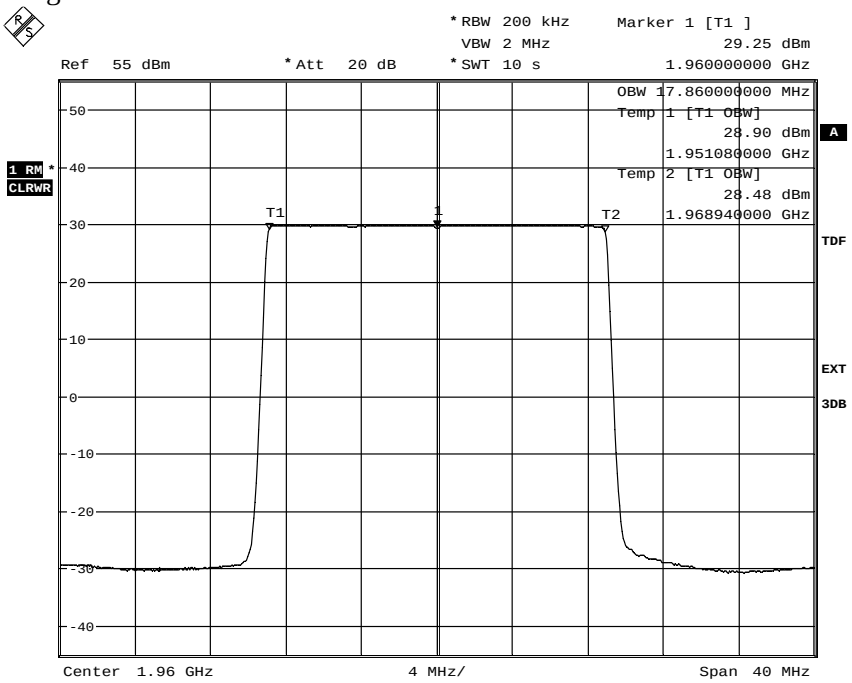
Appendix 3

Diagram 7



Date: 2.JUL.2011 10:33:50

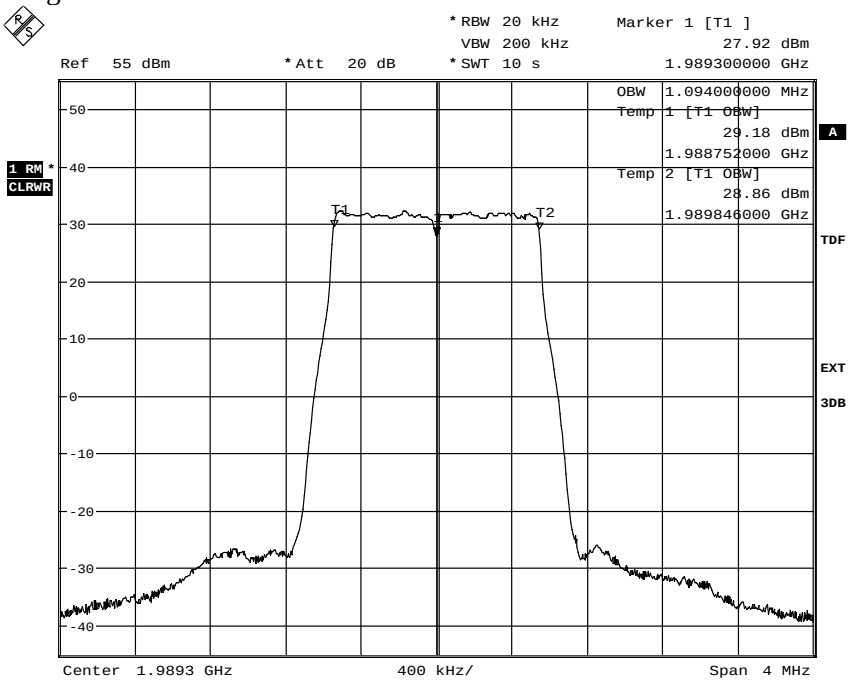
Diagram 8



Date: 2.JUL.2011 10:42:25

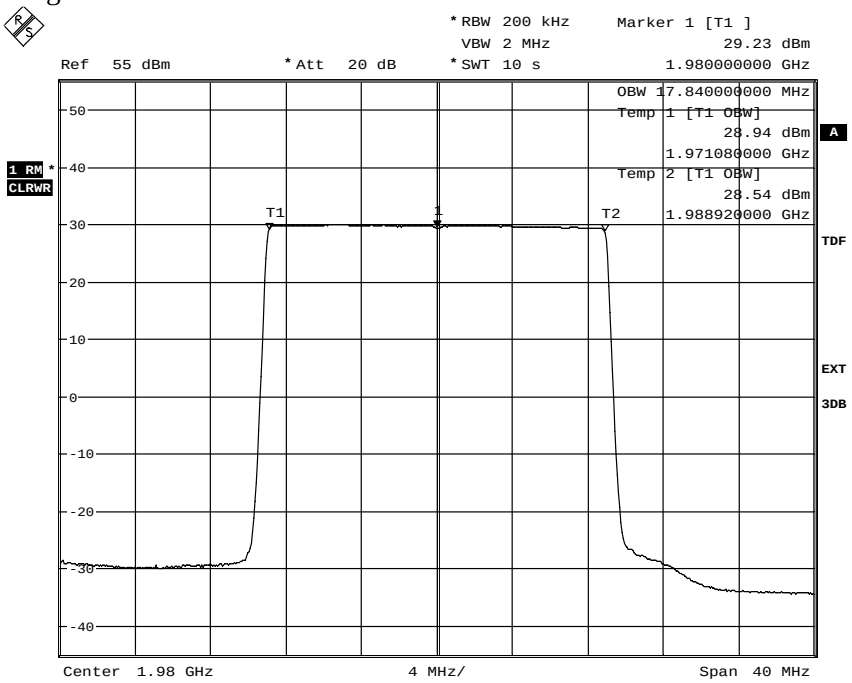
Appendix 3

Diagram 9



Date: 2.JUL.2011 13:24:08

Diagram 10



Date: 2.JUL.2011 12:23:34

Band edge measurements according to CFR 47 §24.238 / IC RSS-133 6.5

Date	Temperature	Humidity
2011-06-30 to 2011-07-03	22-23 °C ± 3 °C	30-35 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §24.238. 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 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.

In cases where a smaller RBW was used than that specified by the rules, the limit was adjusted to compensate for the reduced RBW. In the frequency range up to 1 MHz away from the band edges the measured values of the emission bandwidth reported below were used for the calculation of the limit.

BW configuration	Emission BW [MHz]	RBW used	Adjusted limit [dBm]
1.4 MHz	1.120	10 kHz	-13.49
3 MHz	2.733	10 kHz	-17.37
5 MHz	4.540	10 kHz	-19.57
10 MHz	9.060	100 kHz	-
15 MHz	13.620	200 kHz	-
20 MHz	18.100	200 kHz	-

In the frequency ranges 1924 to 1929 and 1991 to 1996 MHz a RBW of 200 kHz were used instead of 1 MHz, in this case the limit has been adjusted to -20 dBm.

Measurement equipment	SP number
R&S FSQ	504 143
RF attenuator	504 159
Testo 615 temperature and humidity meter	503 498

Measurement uncertainty: 3.7 dB

Results

Diagram	BW configuration	Tested frequency
1 a+b+c	1.4 MHz	B
2 a+b+c	3 MHz	B
3 a+b+c	5 MHz	B
4 a+b+c	10 MHz	B
5 a+b+c	15 MHz	B
6 a+b+c	20 MHz	B
7 a+b+c	1.4 MHz	T
8 a+b+c	3 MHz	T
9 a+b+c	5 MHz	T
10 a+b+c	10 MHz	T
11 a+b+c	15 MHz	T
12 a+b+c	20 MHz	T

Limits

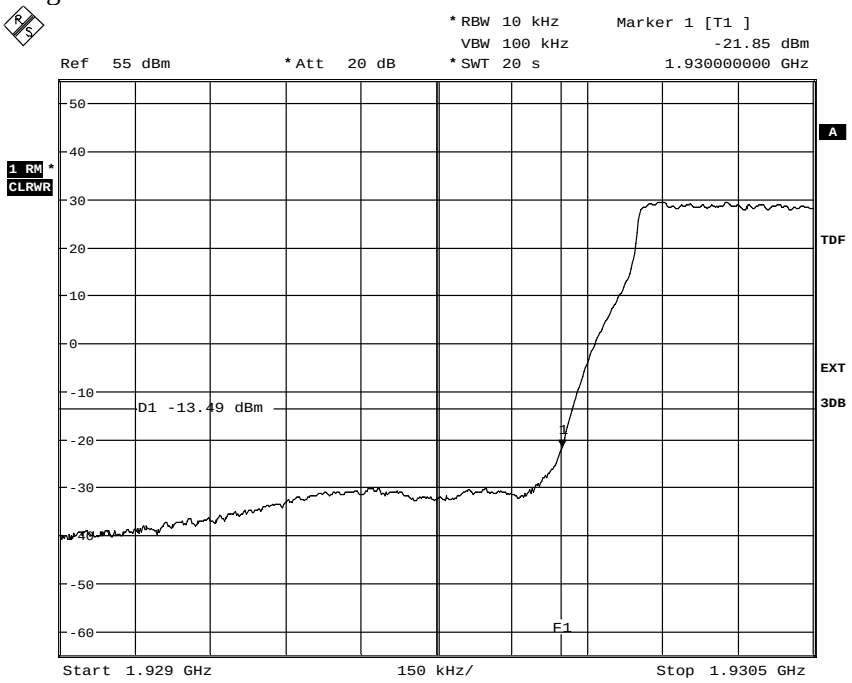
CFR 47 §24.238 and RSS-133 6.5

Outside a licensee's frequency band(s) of operation the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, resulting in a limit of -13 dBm.

Complies?	Yes

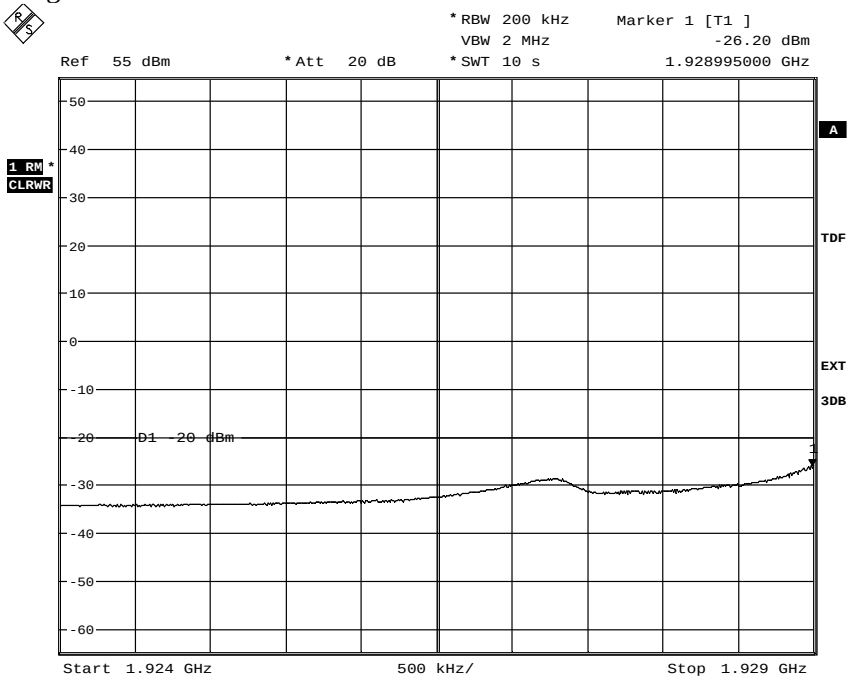
Appendix 4

Diagram 1 a



Date: 3.JUL.2011 14:11:56

Diagram 1 b

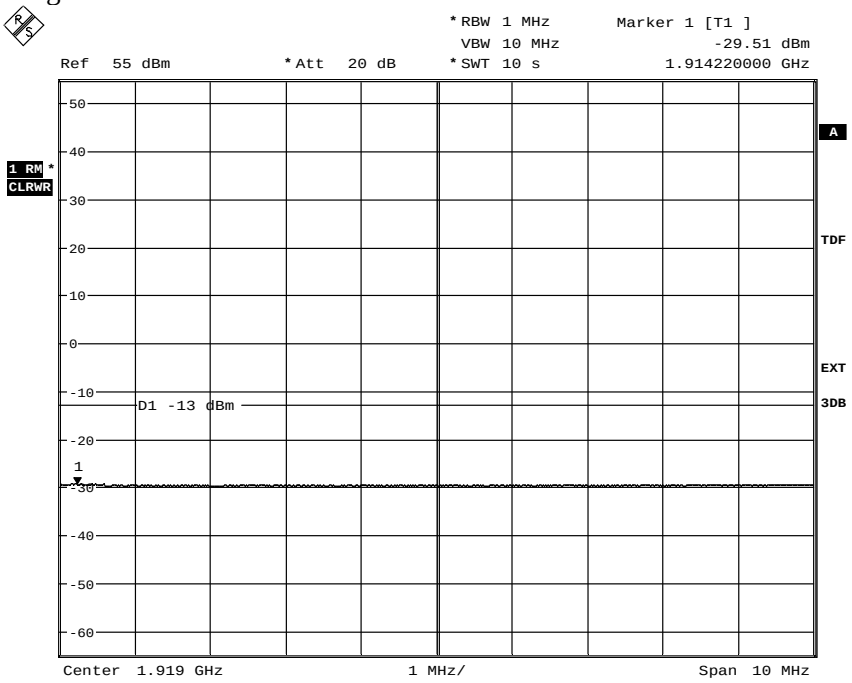


Date: 30.JUN.2011 09:00:20

The emission at 1929 MHz was -18.87 dBm measured with the channel power method with 1 MHz channel bandwidth.

Appendix 4

Diagram 1 c



Date: 30.JUN.2011 09:03:22

Appendix 4

Diagram 2 a

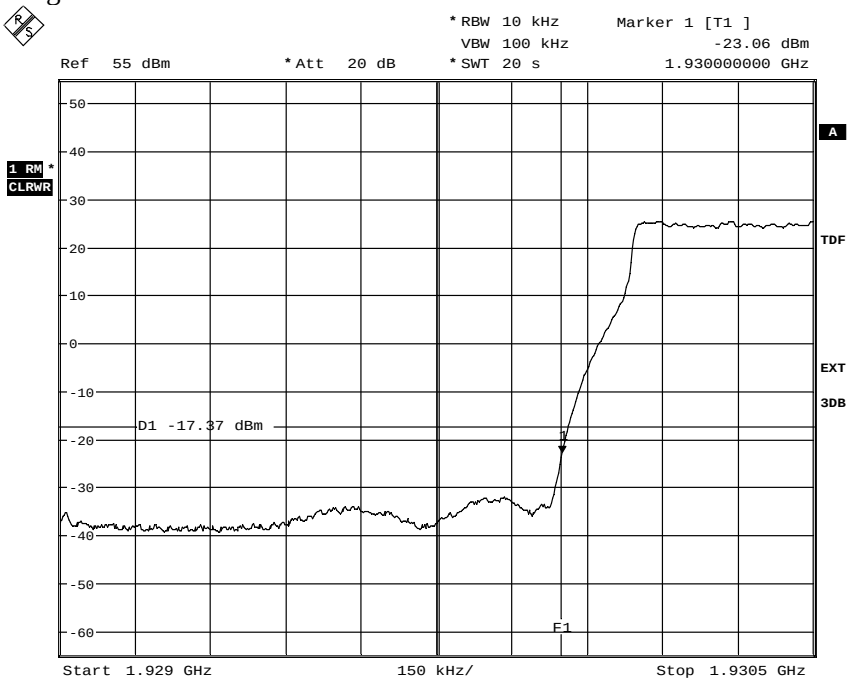


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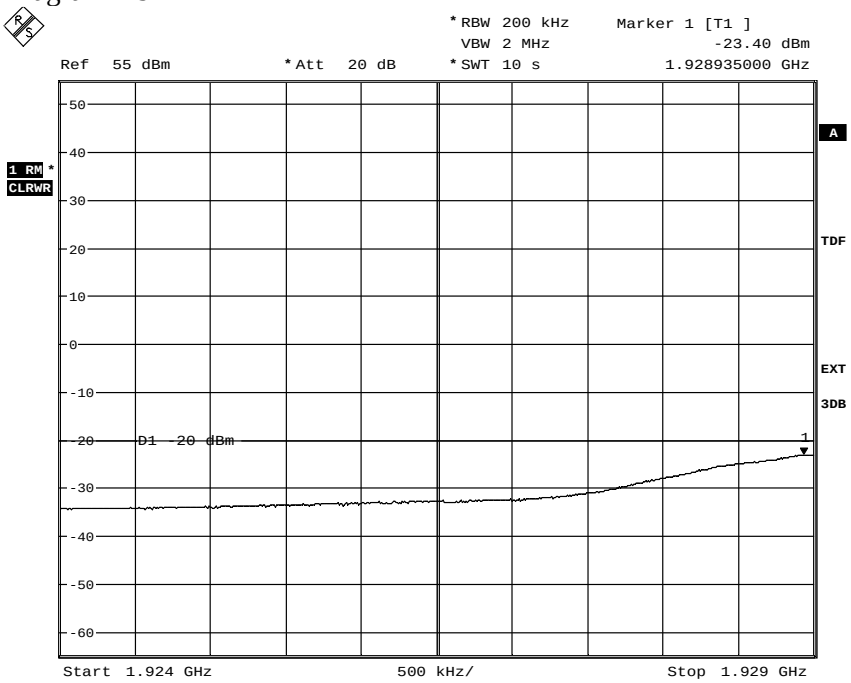
Diagram 2 b

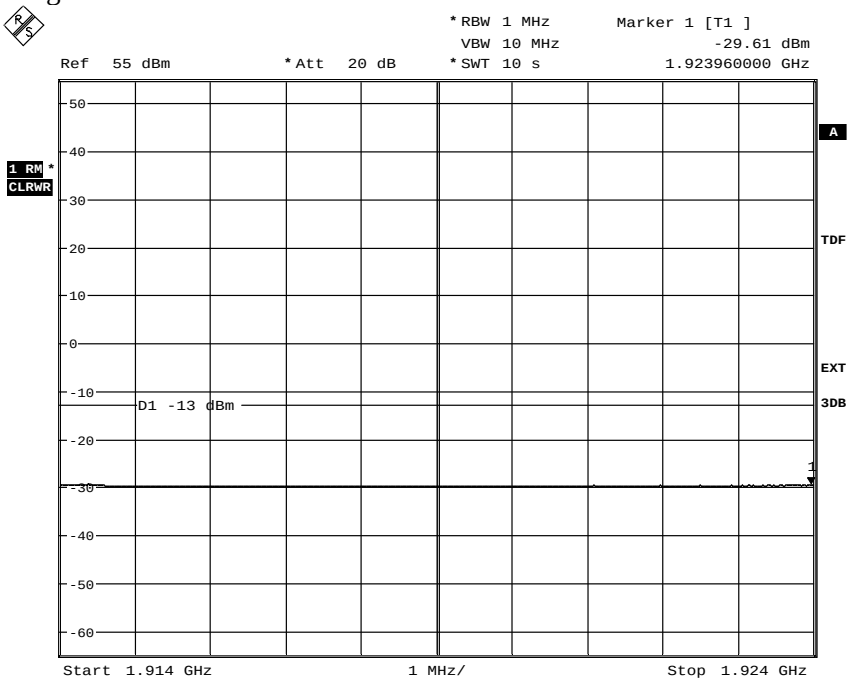


Date: 29.JUN.2011 15:43:19

The emission at 1929 MHz was -18.25 dBm measured with the channel power method with 1 MHz channel bandwidth.

Appendix 4

Diagram 2 c



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Appendix 4

Diagram 3 a

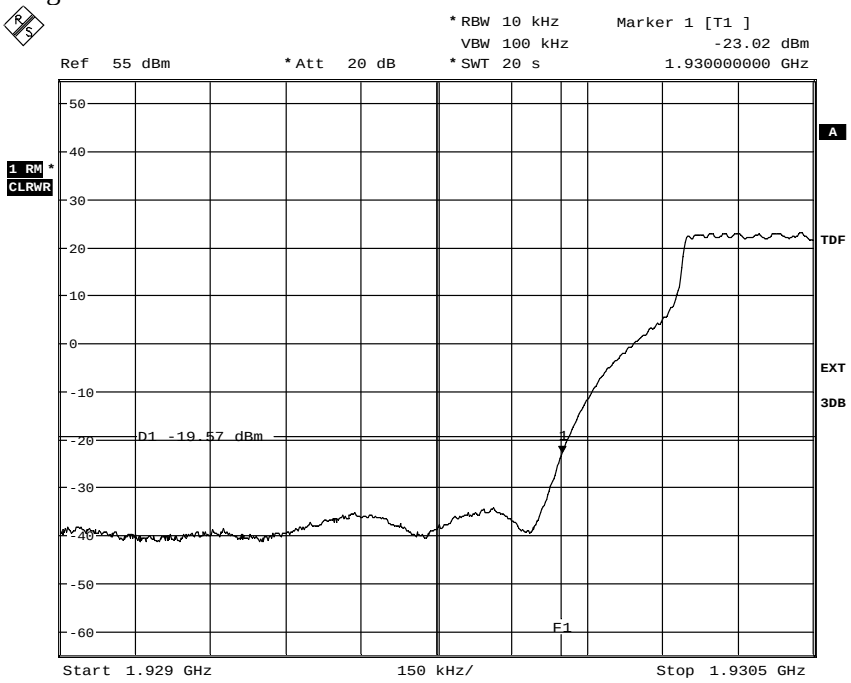

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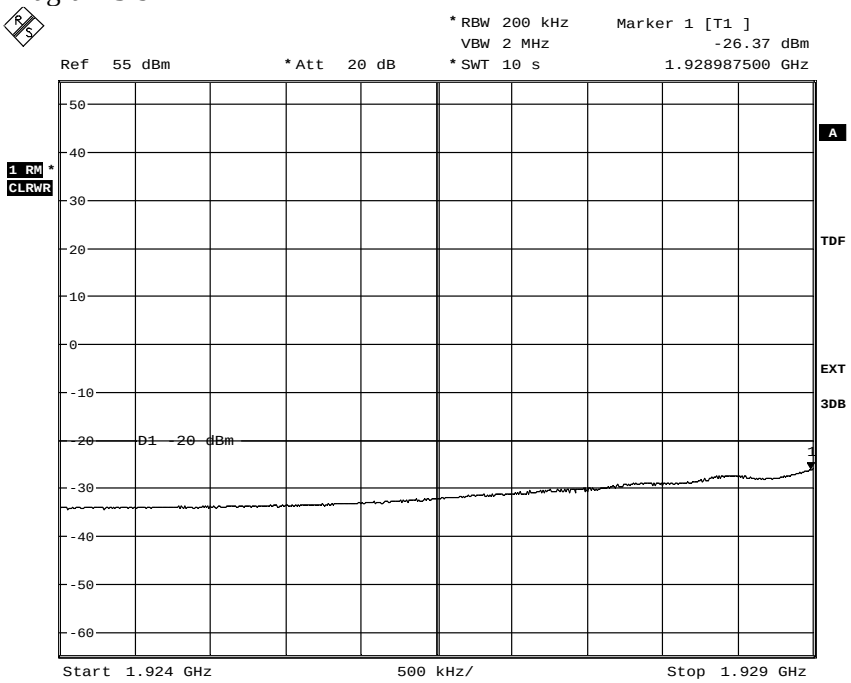
Diagram 3 b

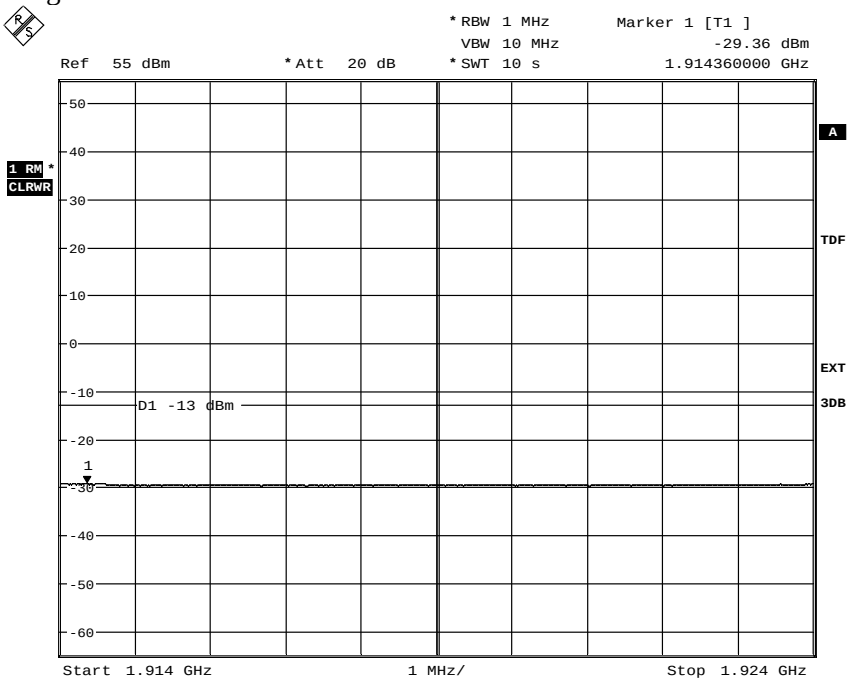


Date: 2.JUL.2011 14:16:14

The emission at 1929 MHz was -20.85 dBm measured with the channel power method with 1 MHz channel bandwidth.

Appendix 4

Diagram 3 c



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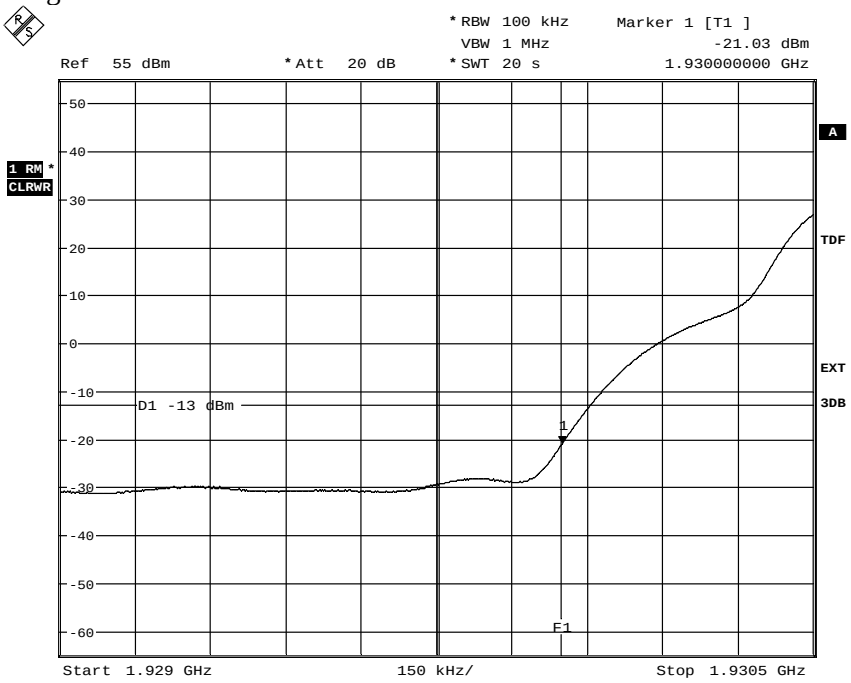
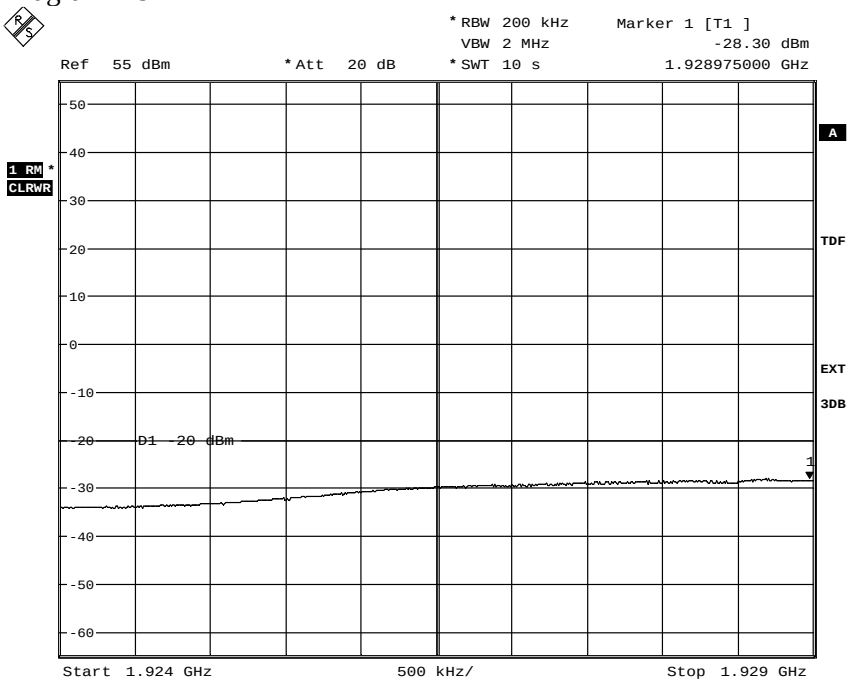
Appendix 4

Diagram 4 a



Date: 2.JUL.2011 14:36:25

Diagram 4 b

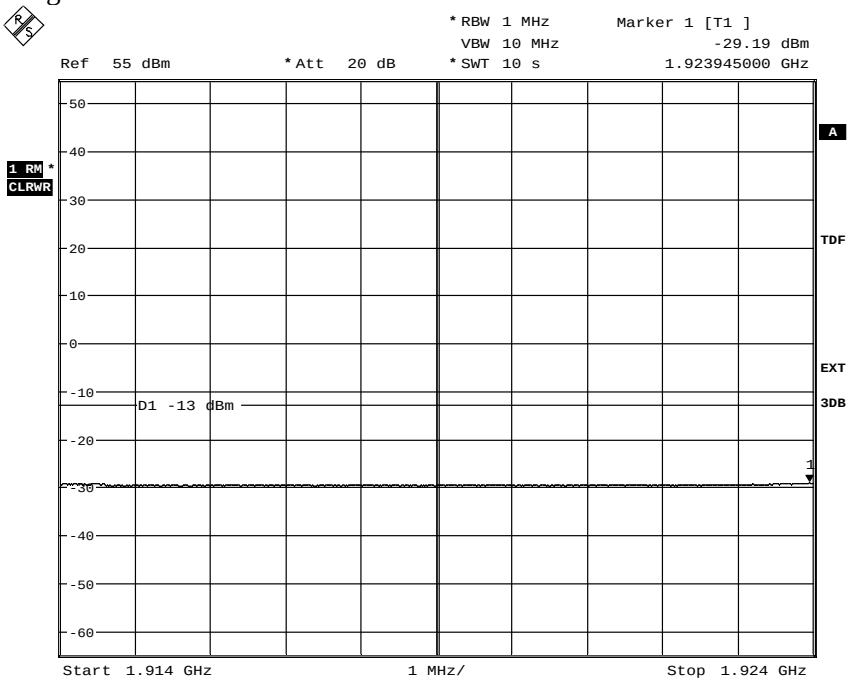


Date: 2.JUL.2011 14:32:25

The emission at 1929 MHz was -21.74 dBm measured with the channel power method with 1 MHz channel bandwidth.

Appendix 4

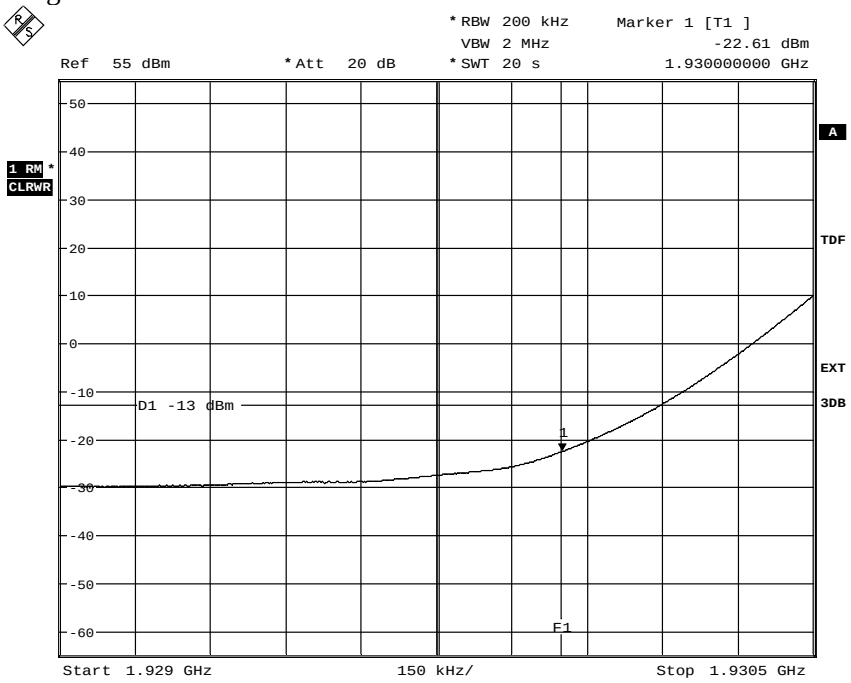
Diagram 4 c



Date: 2.JUL.2011 14:30:32

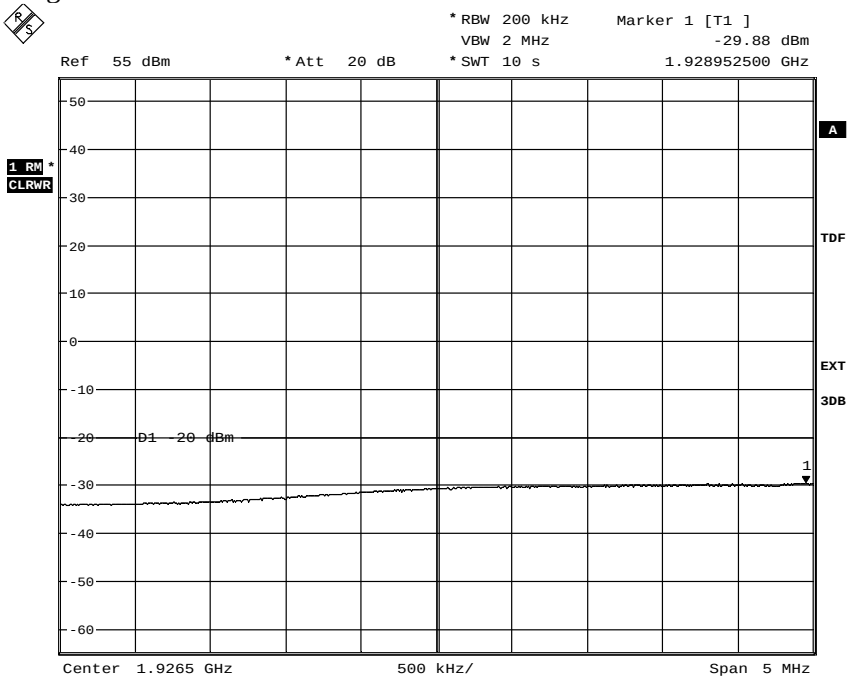
Appendix 4

Diagram 5 a



Date: 2.JUL.2011 14:47:13

Diagram 5 b

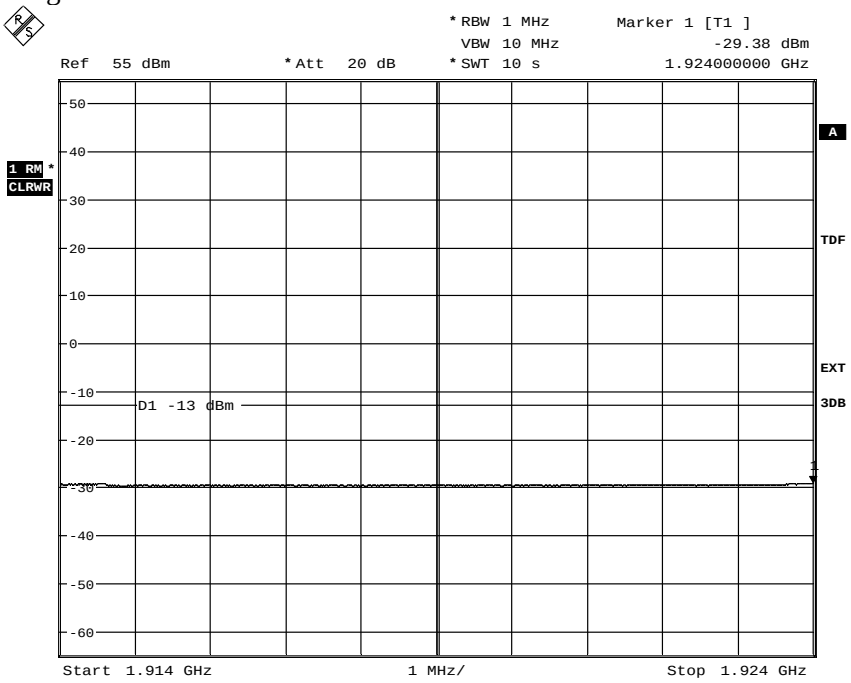


Date: 2.JUL.2011 15:01:03

The emission at 1929 MHz was -23.20 dBm measured with the channel power method with 1 MHz channel bandwidth.

Appendix 4

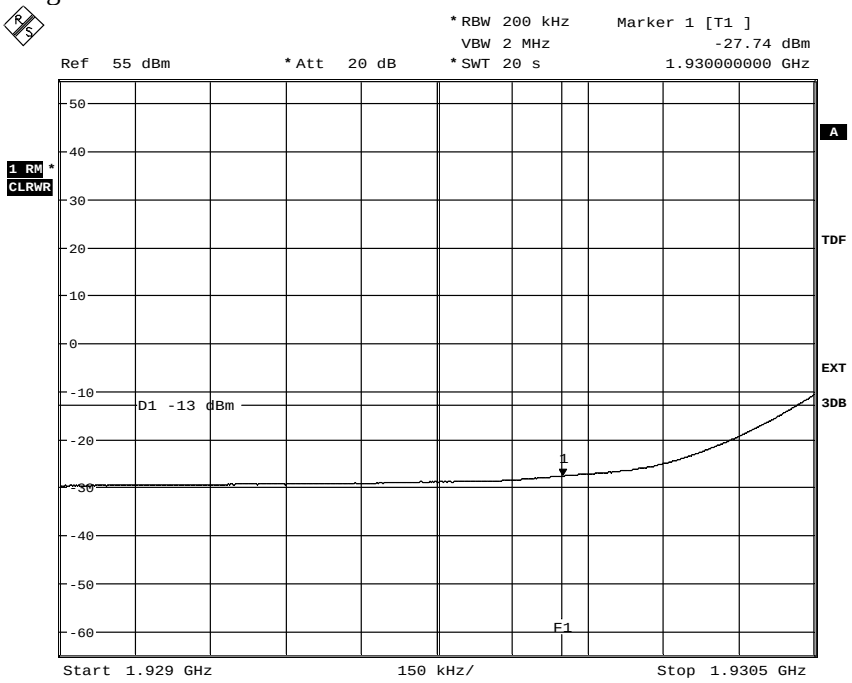
Diagram 5 c



Date: 2.JUL.2011 14:57:05

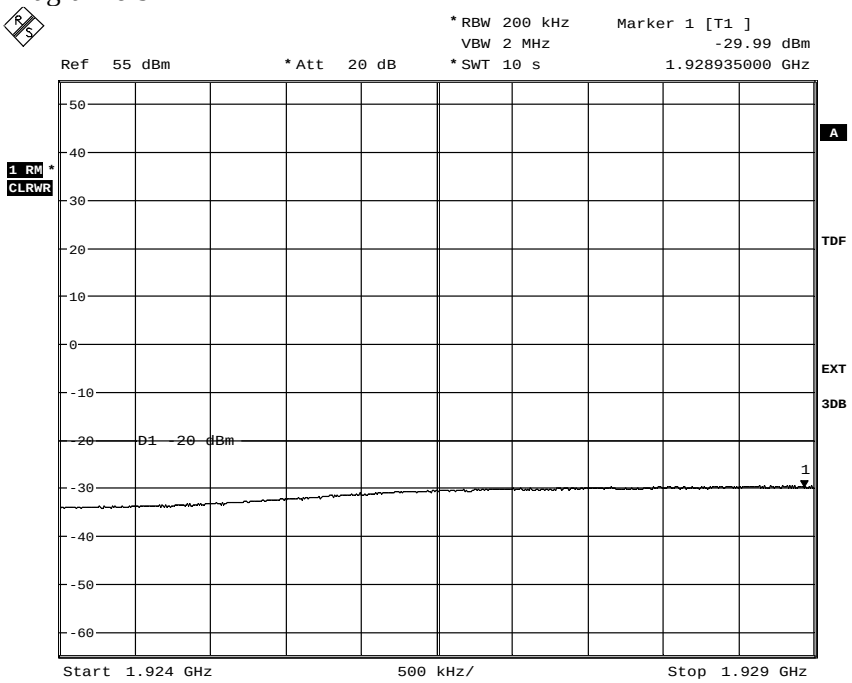
Appendix 4

Diagram 6 a



Date: 2.JUL.2011 11:12:27

Diagram 6 b

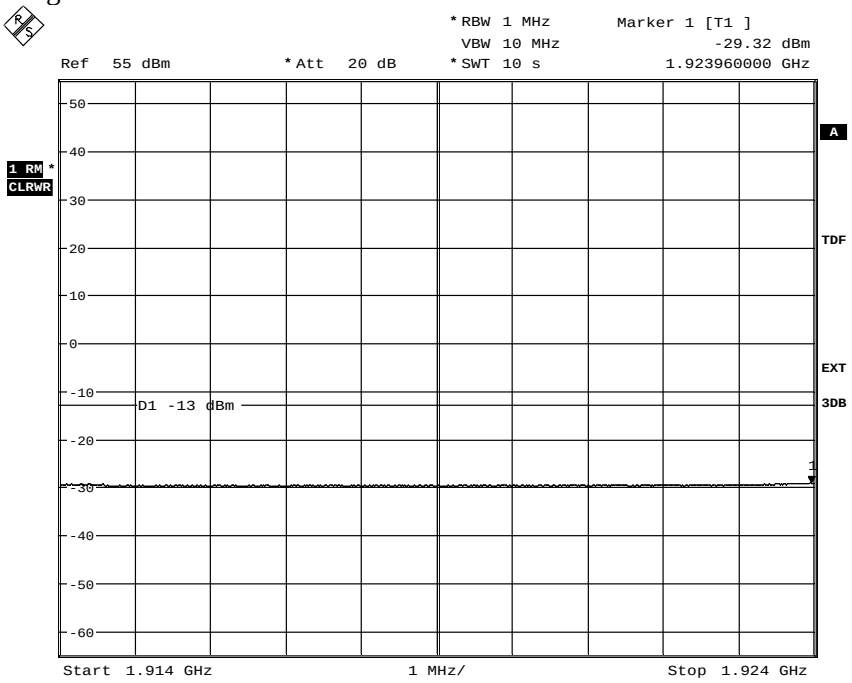


Date: 2.JUL.2011 11:15:56

The emission at 1929 MHz was -23.13 dBm measured with the channel power method with 1 MHz channel bandwidth.

Appendix 4

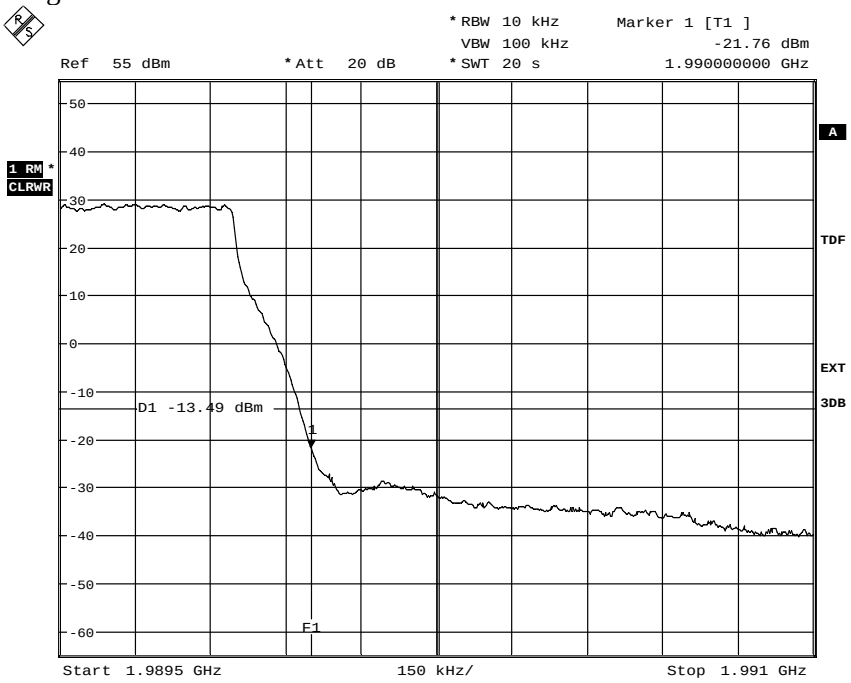
Diagram 6 c



Date: 2.JUL.2011 11:22:20

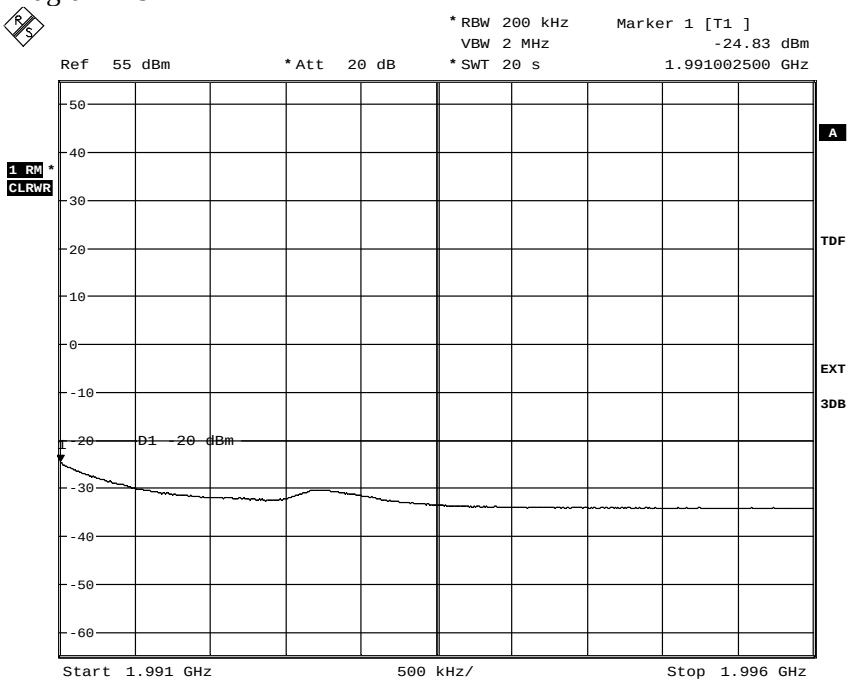
Appendix 4

Diagram 7 a



Date: 2.JUL.2011 13:28:33

Diagram 7 b

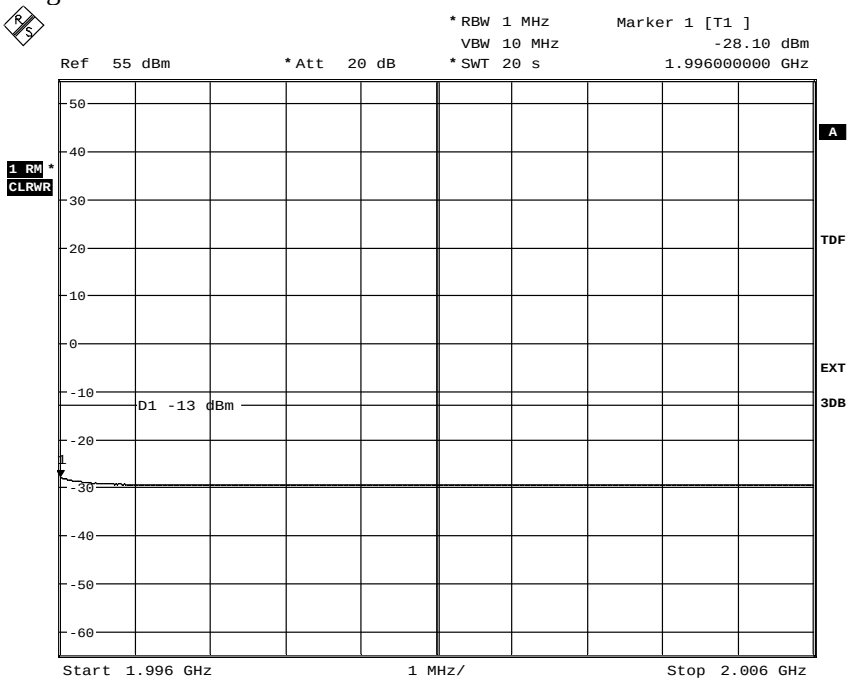


Date: 2.JUL.2011 13:31:55

The emission at 1991 MHz was -18.84 dBm measured with the channel power method with 1 MHz channel bandwidth.

Appendix 4

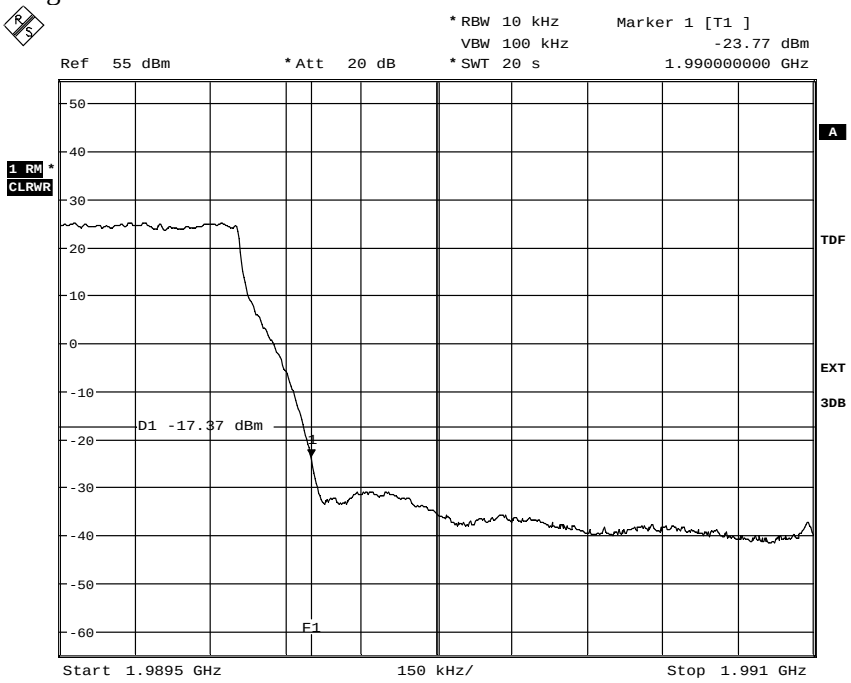
Diagram 7 c



Date: 2.JUL.2011 13:34:00

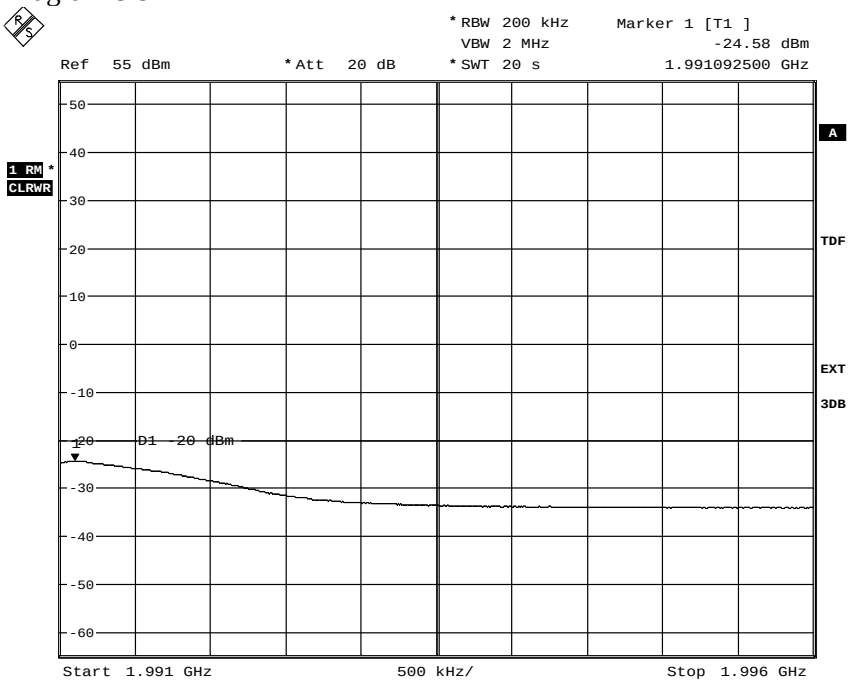
Appendix 4

Diagram 8 a



Date: 3.JUL.2011 10:39:01

Diagram 8 b

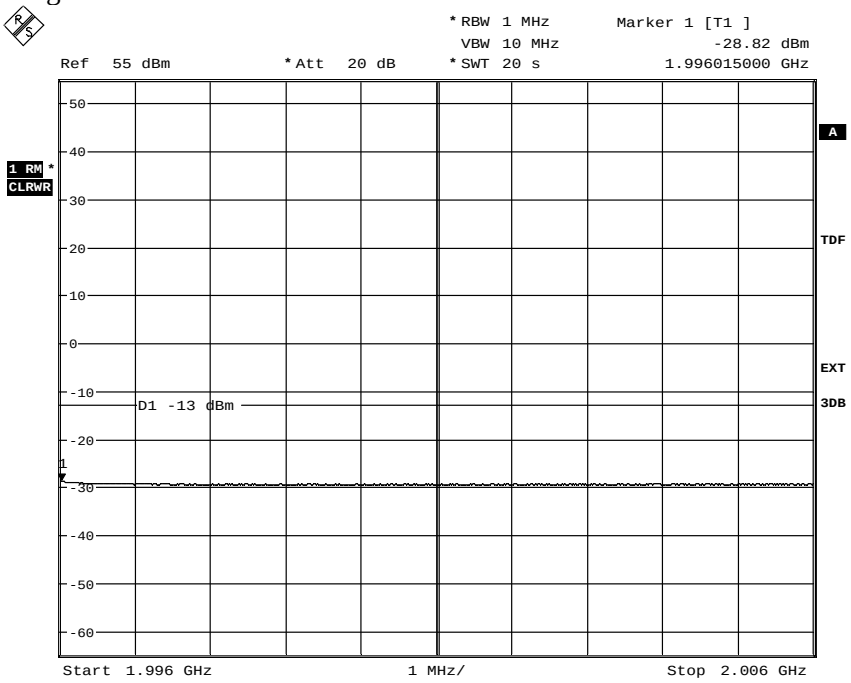


Date: 3.JUL.2011 10:44:48

The emission at 1991 MHz was -19.14 dBm measured with the channel power method with 1 MHz channel bandwidth.

Appendix 4

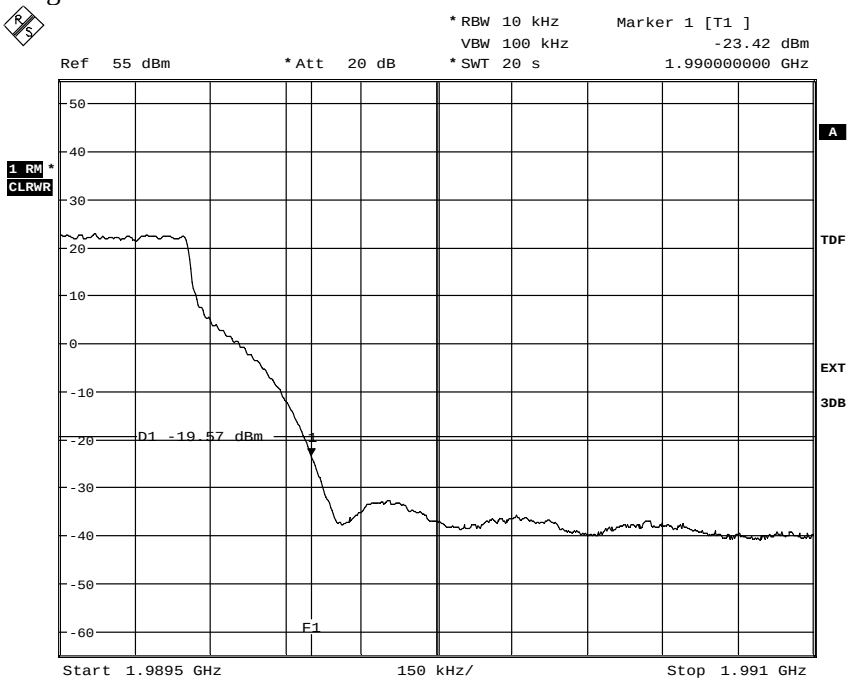
Diagram 8 c



Date: 3.JUL.2011 10:46:19

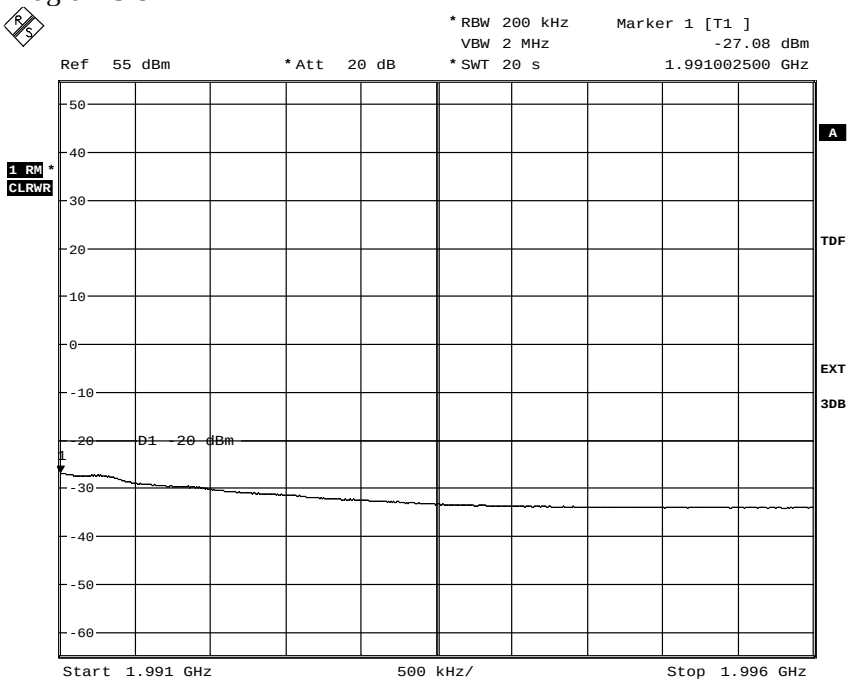
Appendix 4

Diagram 9 a



Date: 3.JUL.2011 11:21:45

Diagram 9 b

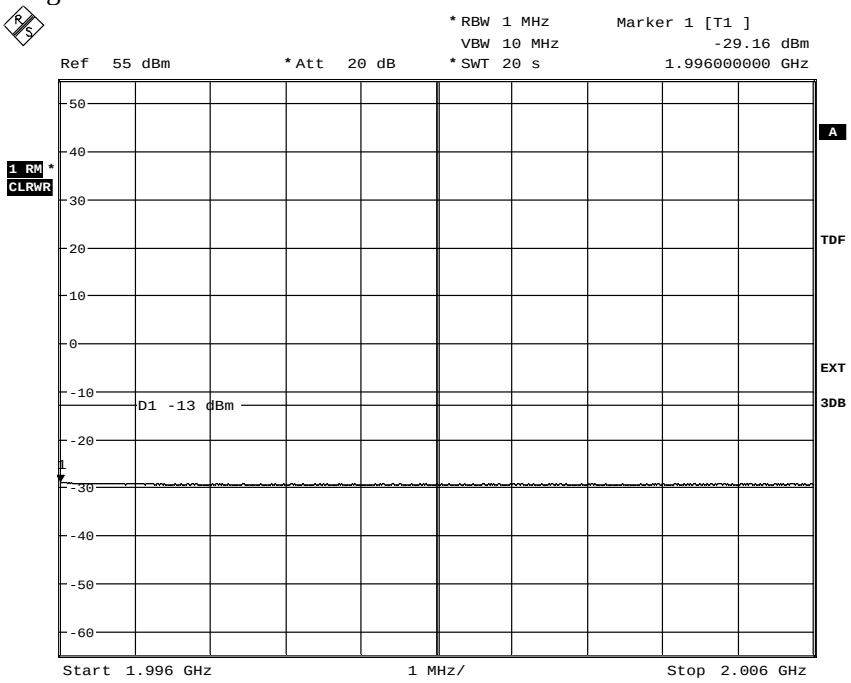


Date: 3.JUL.2011 11:14:56

The emission at 1991 MHz was -20.32 dBm measured with the channel power method with 1 MHz channel bandwidth.

Appendix 4

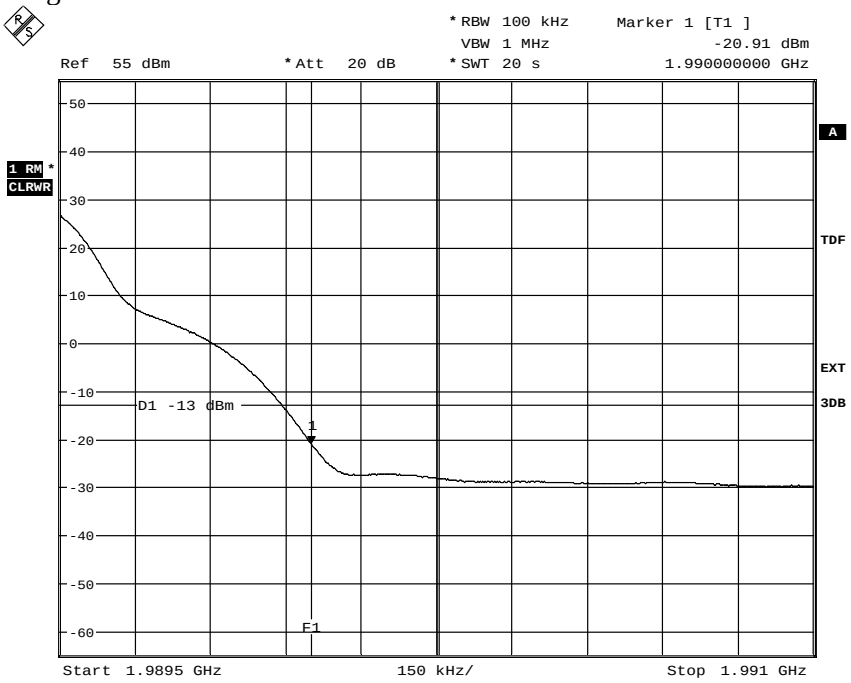
Diagram 9 c



Date: 3.JUL.2011 11:13:13

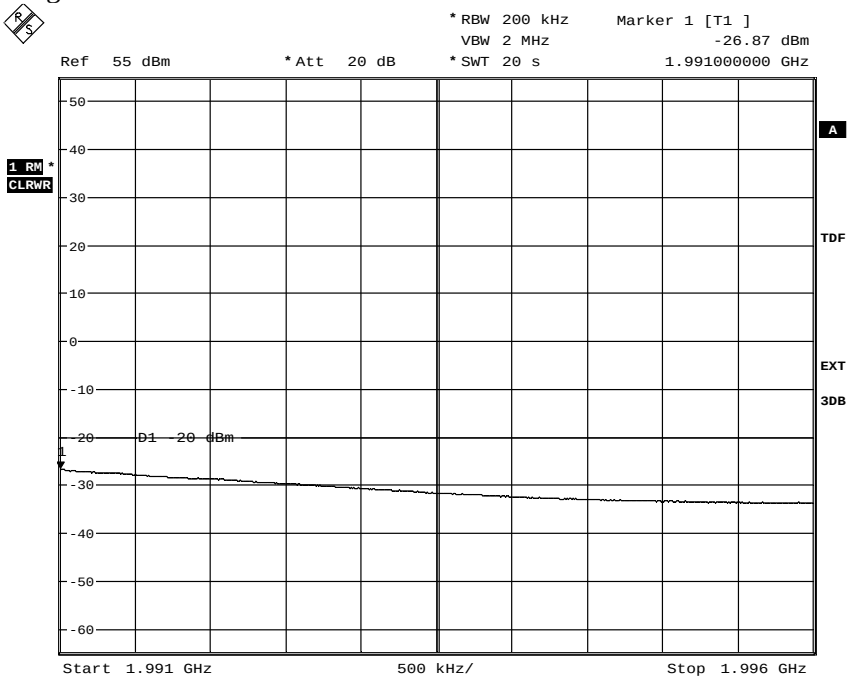
Appendix 4

Diagram 10 a



Date: 3.JUL.2011 13:24:06

Diagram 10 b

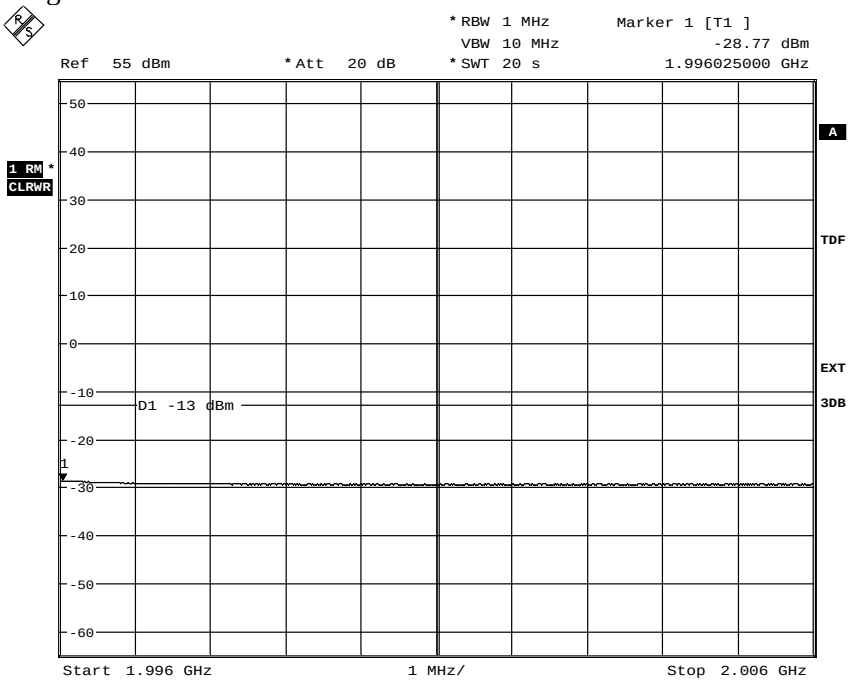


Date: 3.JUL.2011 13:32:49

The emission at 1991 MHz was -20.50 dBm measured with the channel power method with 1 MHz channel bandwidth.

Appendix 4

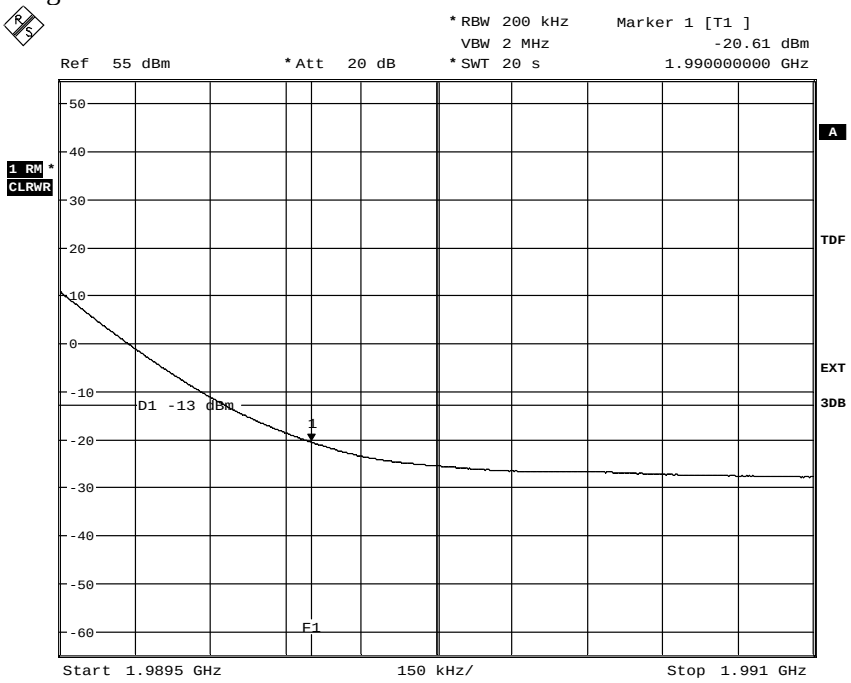
Diagram 10 c



Date: 3.JUL.2011 13:35:21

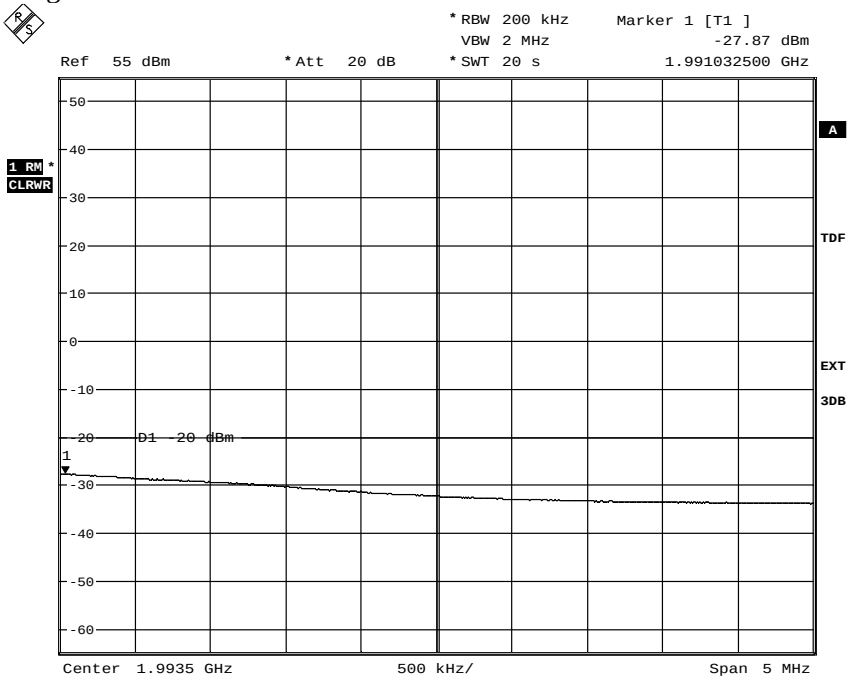
Appendix 4

Diagram 11 a



Date: 3.JUL.2011 13:56:22

Diagram 11 b

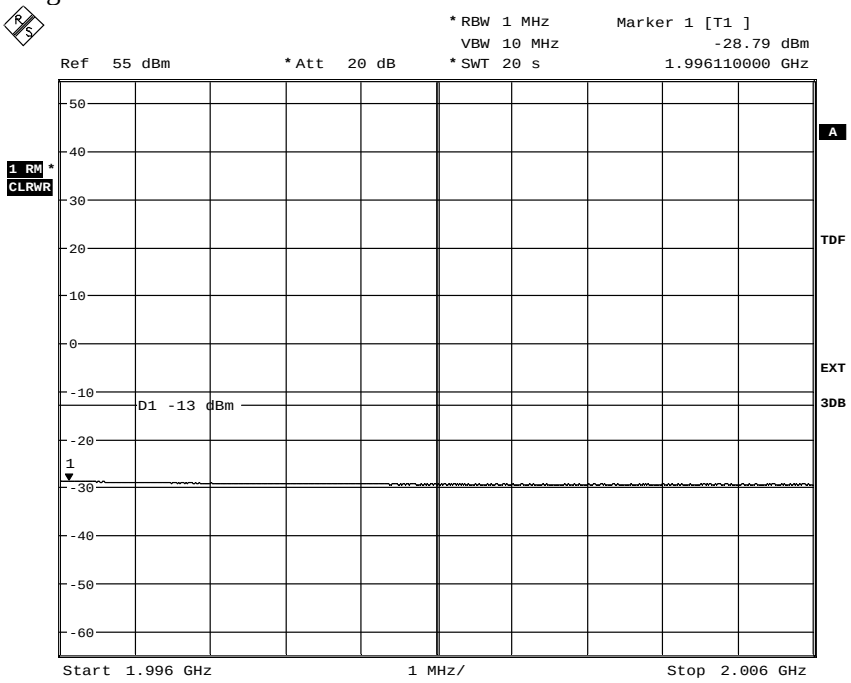


Date: 3.JUL.2011 14:01:28

The emission at 1991 MHz was -21.25 dBm measured with the channel power method with 1 MHz channel bandwidth.

Appendix 4

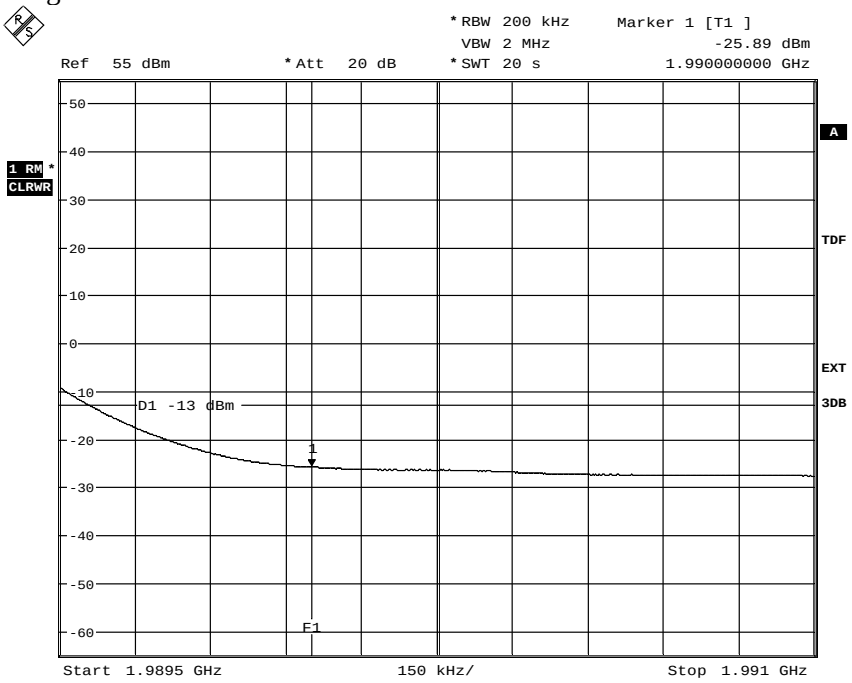
Diagram 11 c



Date: 3.JUL.2011 13:54:53

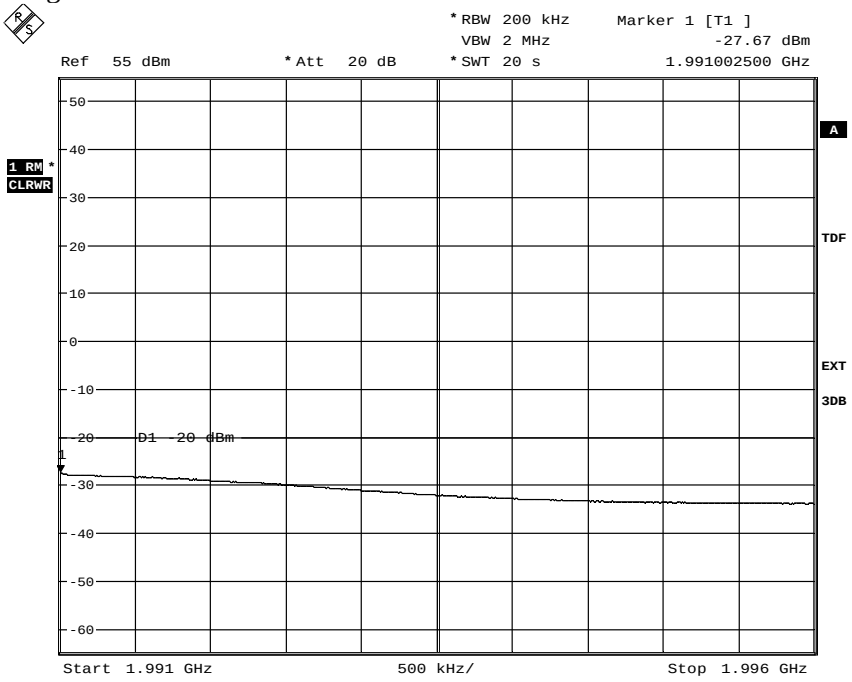
Appendix 4

Diagram 12 a



Date: 2.JUL.2011 12:27:10

Diagram 12 b

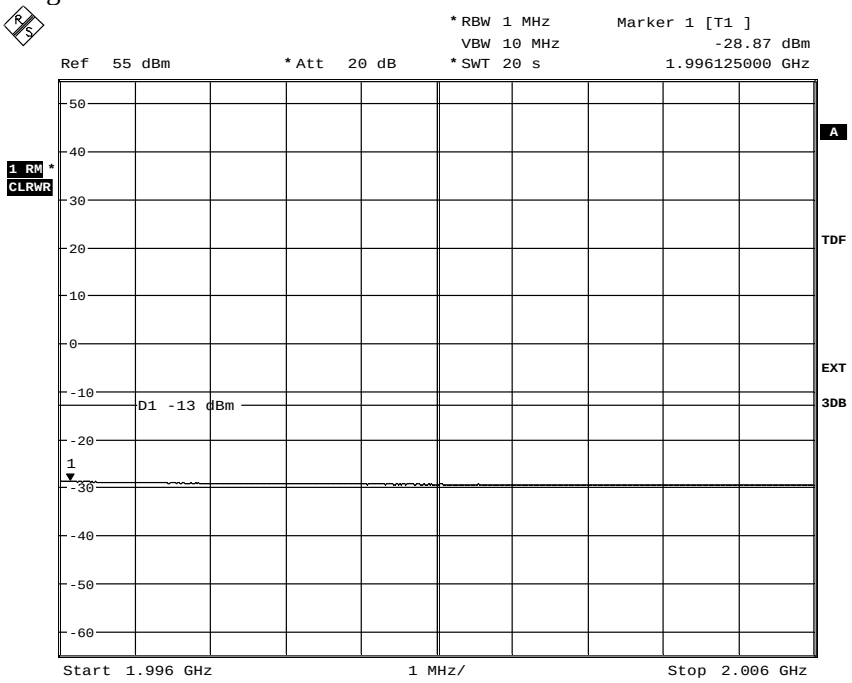


Date: 2.JUL.2011 12:31:34

The emission at 1991 MHz was -21.23 dBm measured with the channel power method with 1 MHz channel bandwidth.

Appendix 4

Diagram 12 c



Date: 2.JUL.2011 12:34:34

Conducted spurious emission measurements according to CFR 47 §24.238 / IC RSS-133 6.5

Date	Temperature	Humidity
2011-06-29 to 2011-07-03	22-23 °C ± 3 °C	30-35 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §24.238. The output was connected to a spectrum analyzer with a RBW of 1 MHz. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements. A pre-measurement was performed with the PEAK detector activated. Emission close to or above the limit with the PEAK detector is measured with the RMS detector activated and the level of the emission is determined with the substitution method.

Measurement equipment	SP number
R&S FSQ	504 143
RF attenuator	504 159
High pass filter	504 200
RF attenuator	900 229
High pass filter	503 740
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

Diagram	BW configuration / [MHz]	Tested frequency
1	1.4	B
2	20	B
3	1.4	M
4	3	M
5	5	M
6	10	M
7	15	M
8	20	M
9	1.4	T
10	20	T

The diagrams are shown in appendix 5.1

Remark

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 as declared by the client was 2.4576 GHz, thus the choice of the upper frequency boundary was set to 10x2.5 GHz = 25 GHz for emission measurements.

Limits

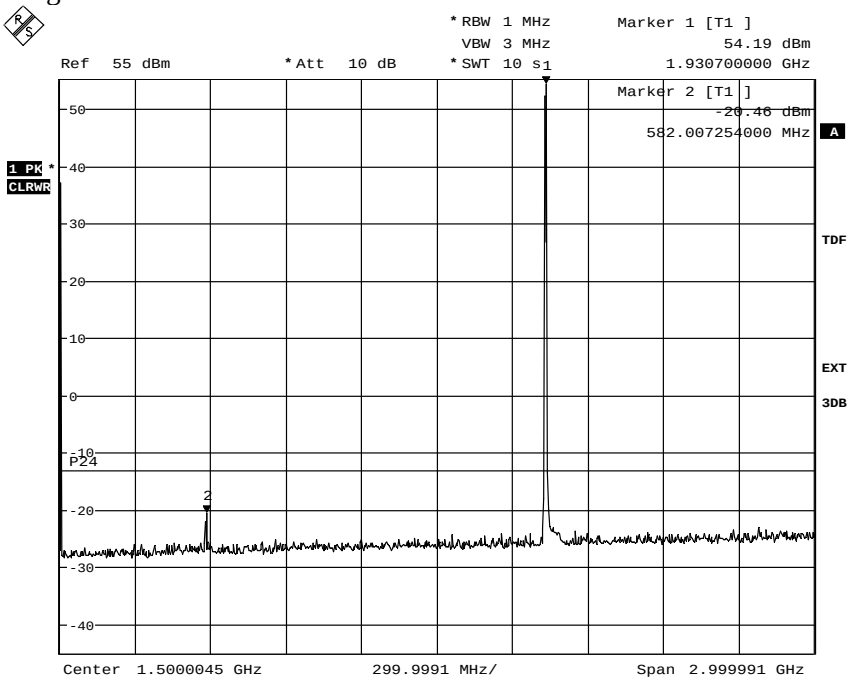
§24.238 and RSS-133 6.5

Outside a licensee's frequency band(s) of operation the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, resulting in a limit of -13 dBm per 1 MHz RBW.

Complies?	Yes

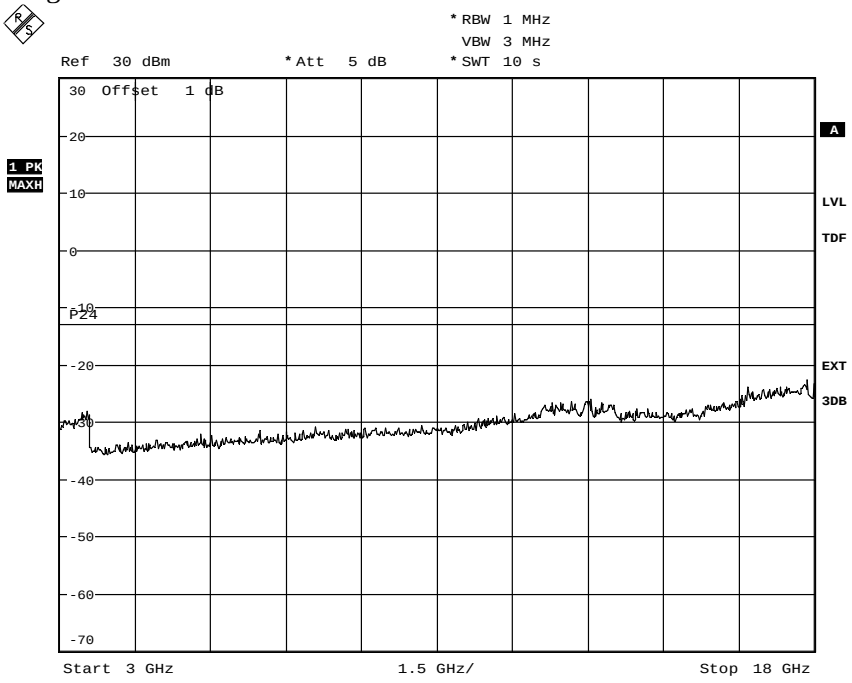
Appendix 5

Diagram 1a:



Date: 30.JUN.2011 09:05:32

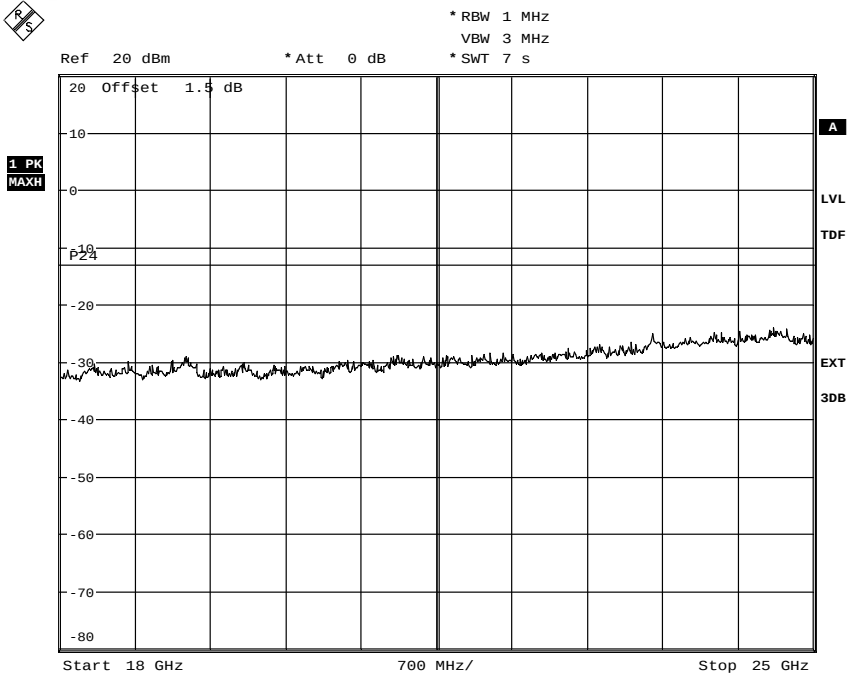
Diagram 1b:



Date: 30.JUN.2011 09:19:57

Appendix 5

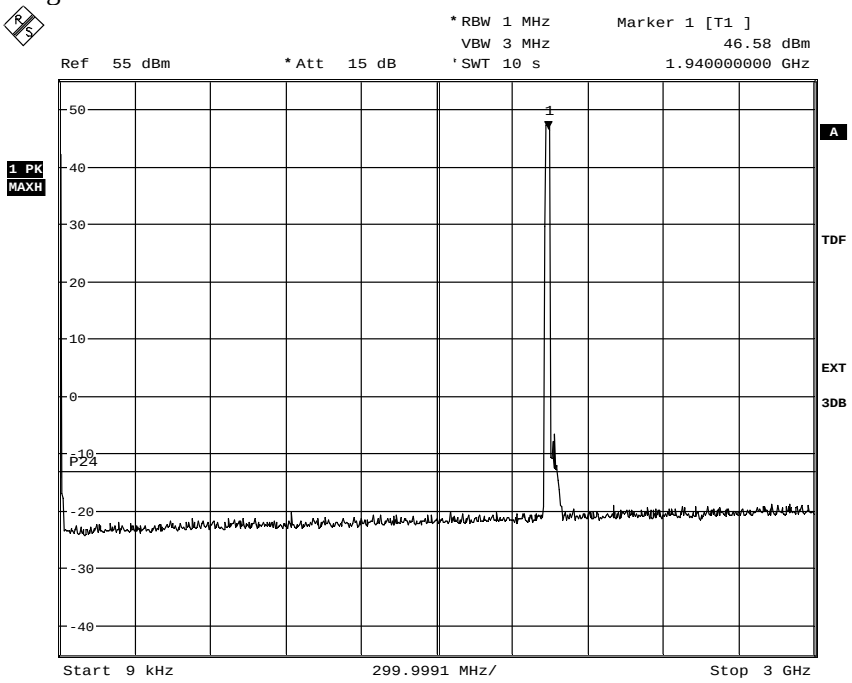
Diagram 1c:



Date: 3.JUL.2011 15:36:18

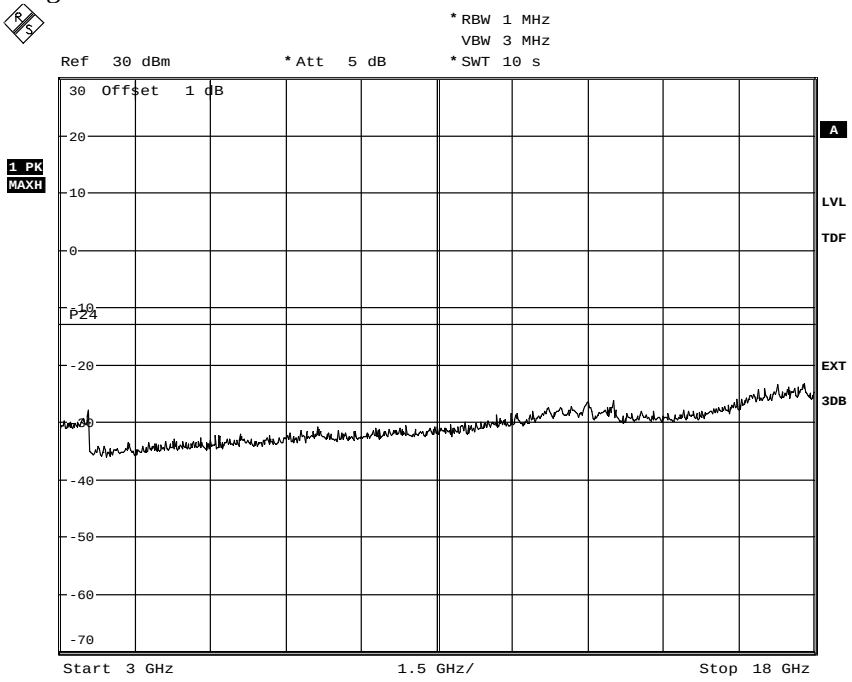
Appendix 5

Diagram 2a:



Date: 2.JUL.2011 11:25:04

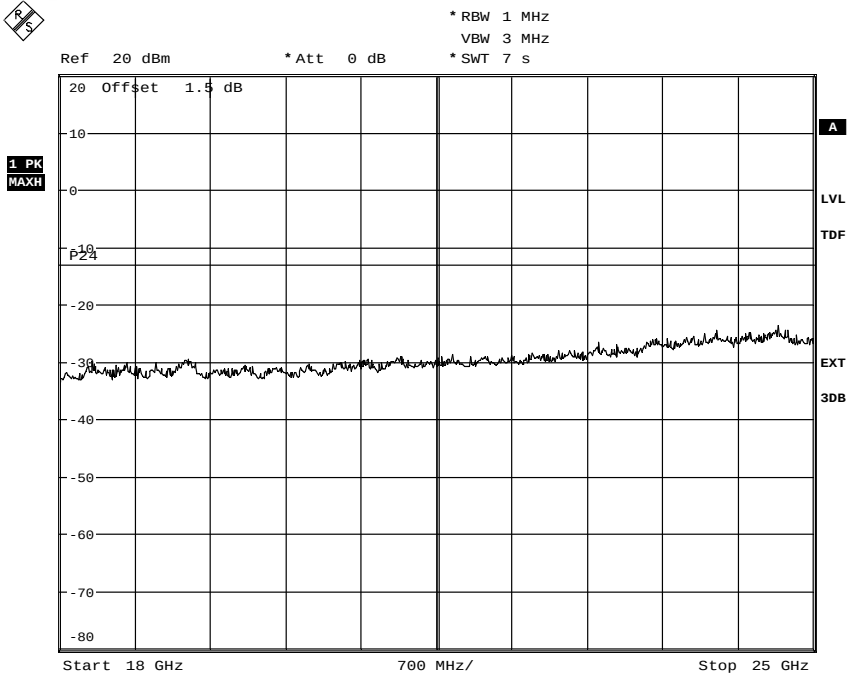
Diagram 2b:



Date: 2.JUL.2011 11:27:37

Appendix 5

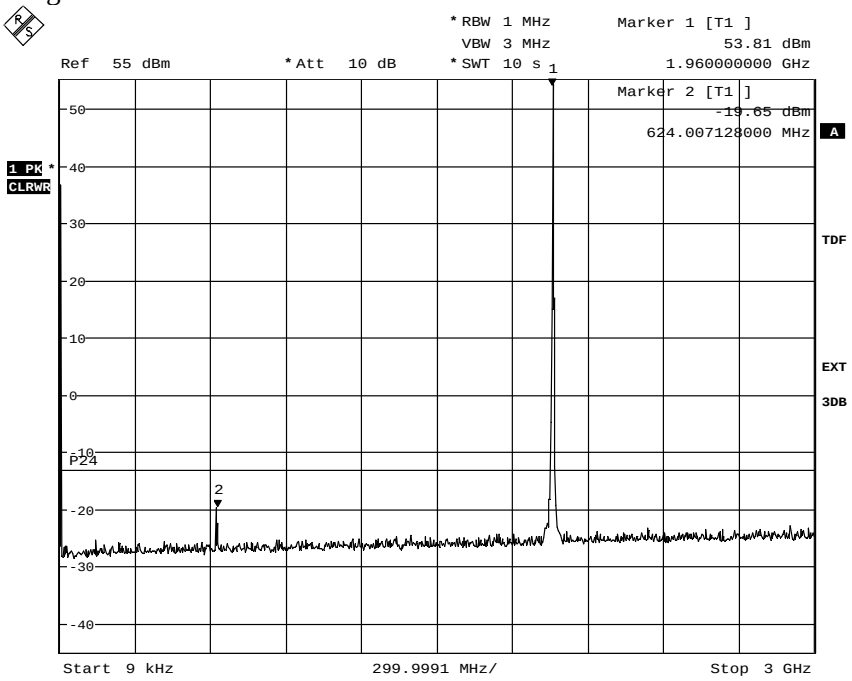
Diagram 2c:



Date: 3.JUL.2011 15:16:45

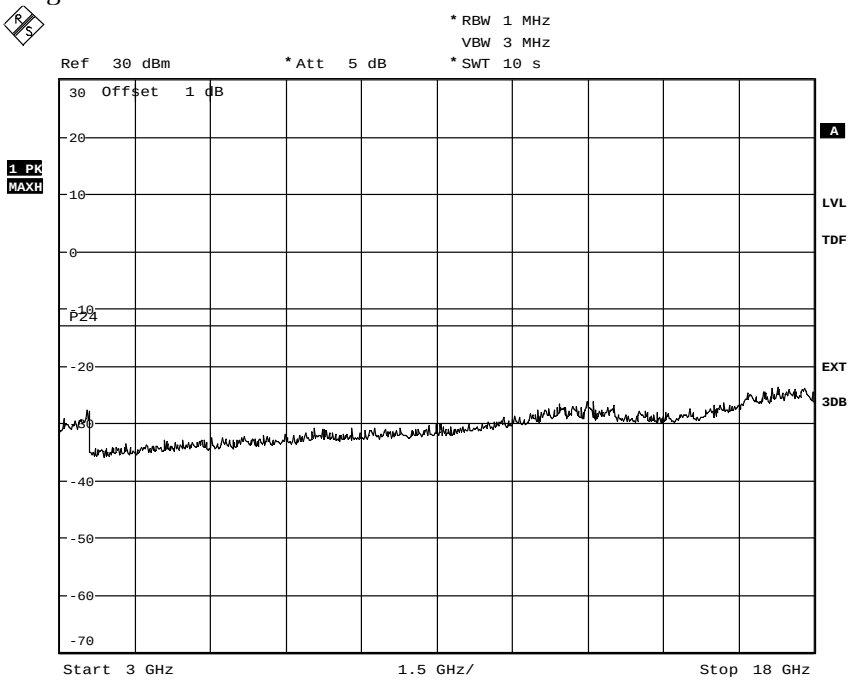
Appendix 5

Diagram 3a:



Date: 29.JUN.2011 12:49:12

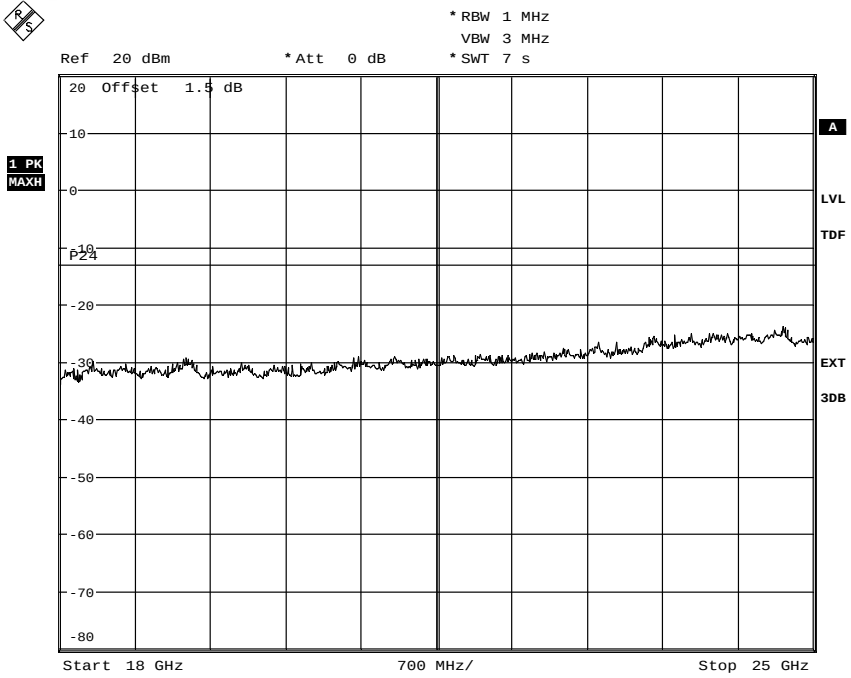
Diagram 3b:



Date: 29.JUN.2011 12:57:58

Appendix 5

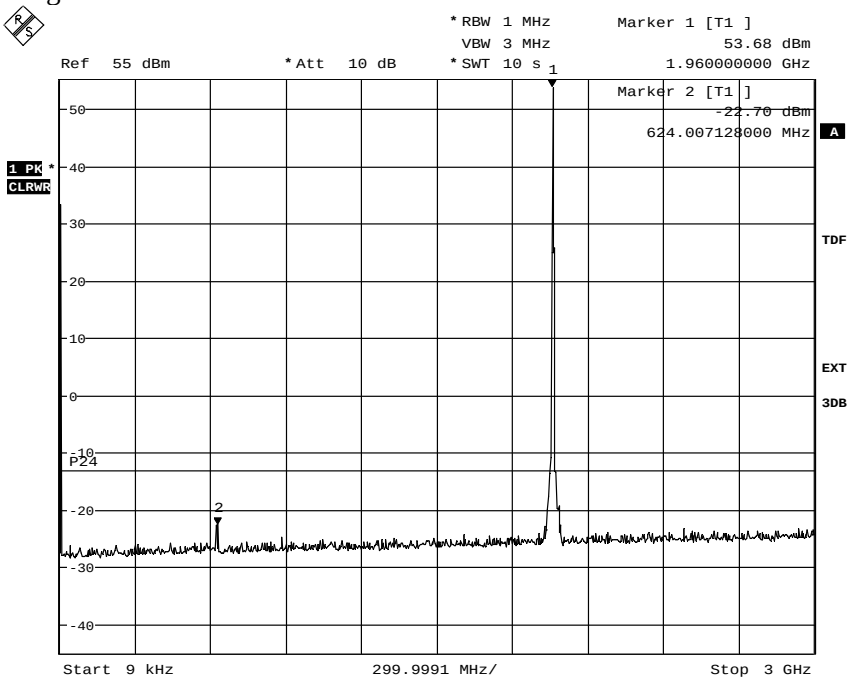
Diagram 3c:



Date: 3.JUL.2011 14:38:50

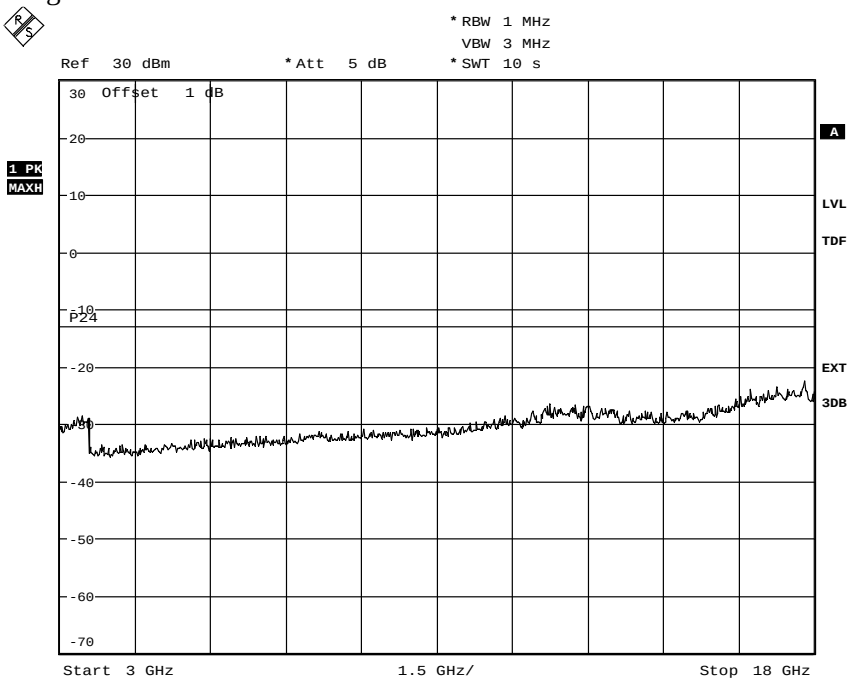
Appendix 5

Diagram 4a:



Date: 29.JUN.2011 13:06:13

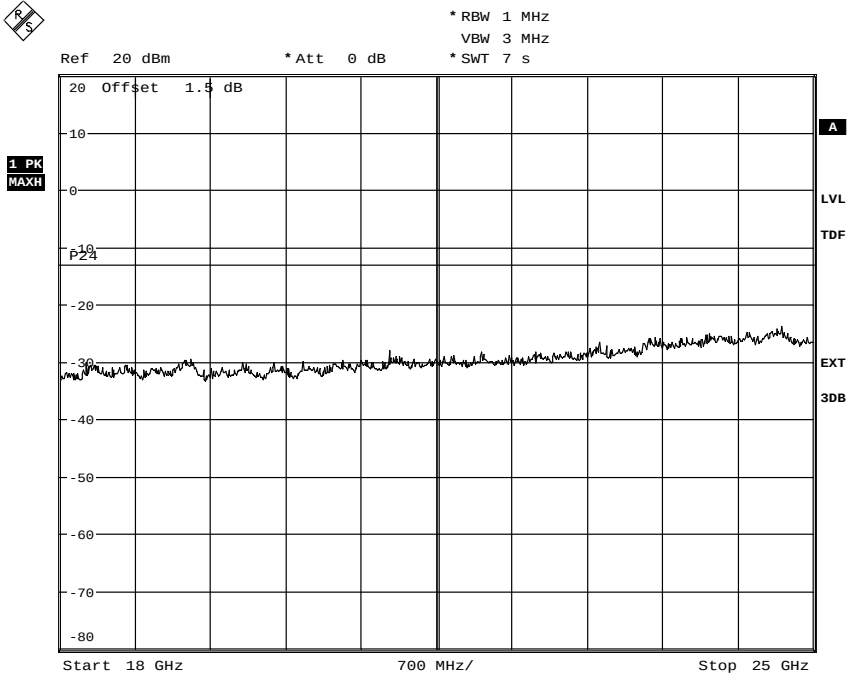
Diagram 4b:



Date: 29.JUN.2011 13:01:52

Appendix 5

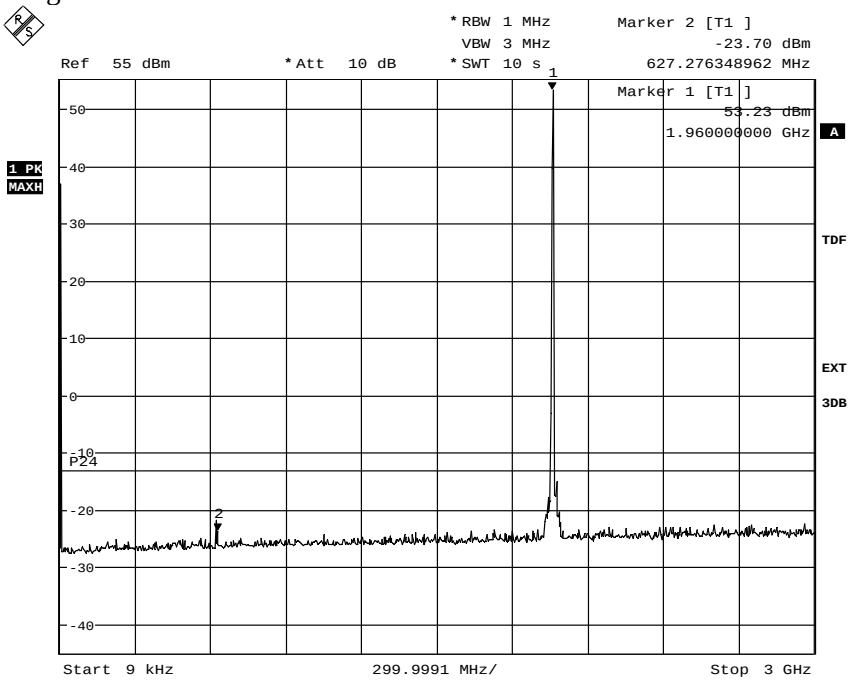
Diagram 4c:



Date: 3.JUL.2011 14:42:42

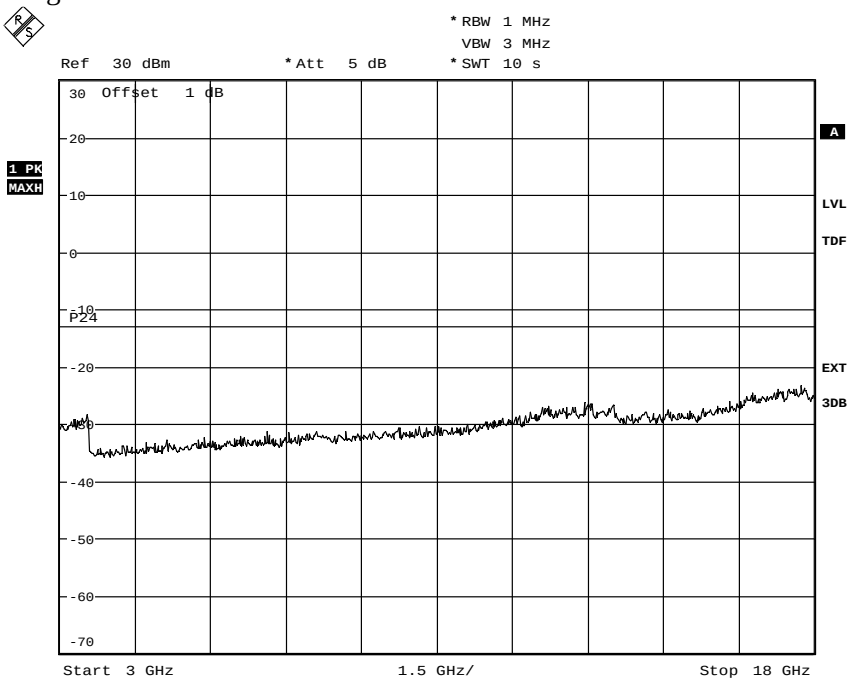
Appendix 5

Diagram 5a:



Date: 29.JUN.2011 13:24:49

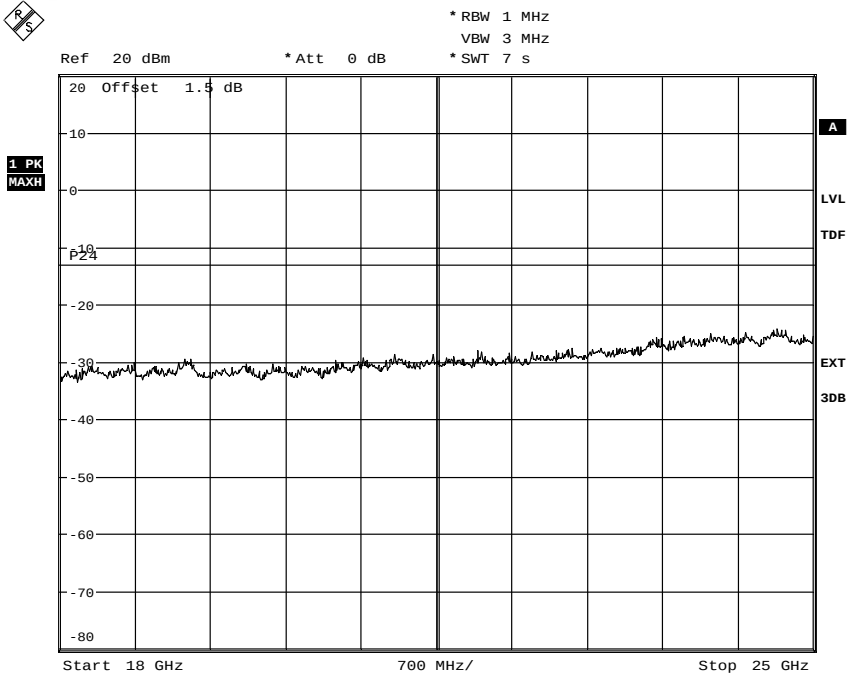
Diagram 5b:



Date: 29.JUN.2011 13:51:44

Appendix 5

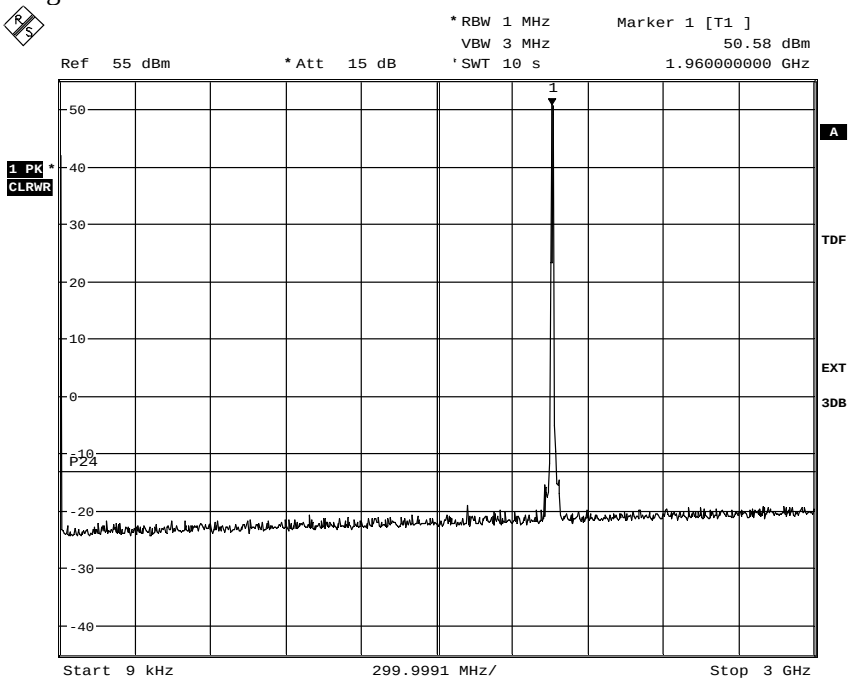
Diagram 5c:



Date: 3.JUL.2011 14:53:01

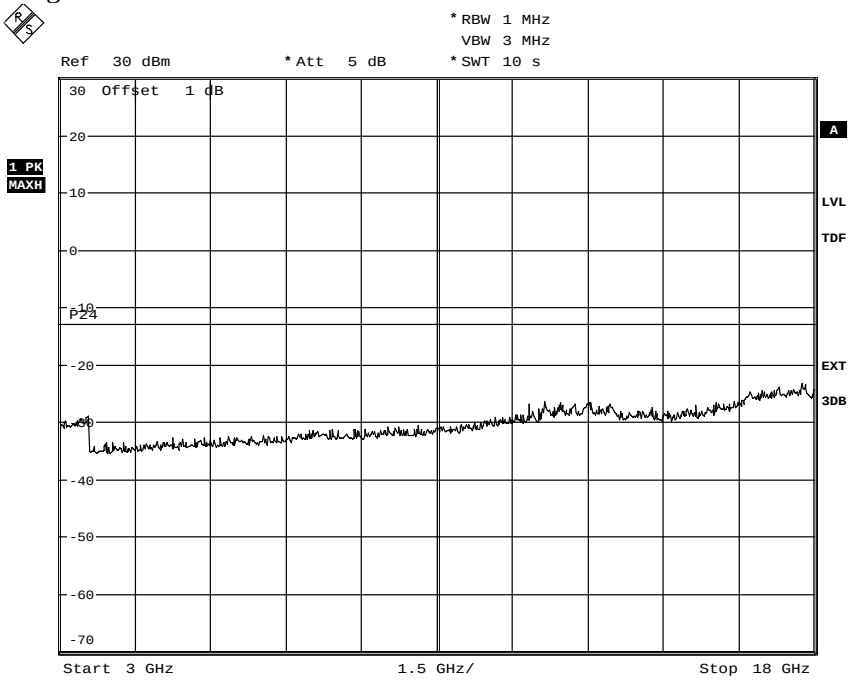
Appendix 5

Diagram 6a:



Date: 2.JUL.2011 10:05:17

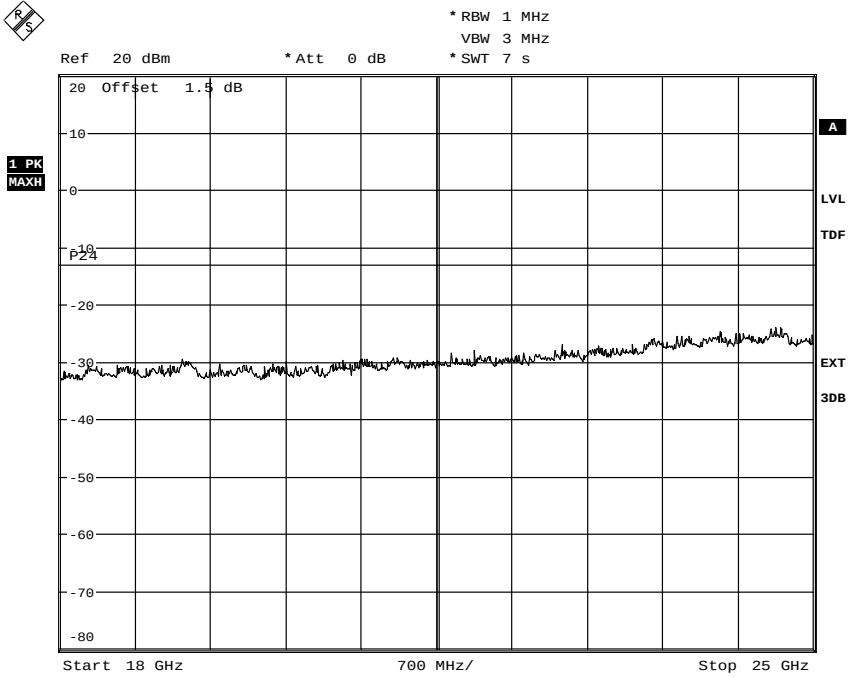
Diagram 6b:



Date: 2.JUL.2011 10:10:27

Appendix 5

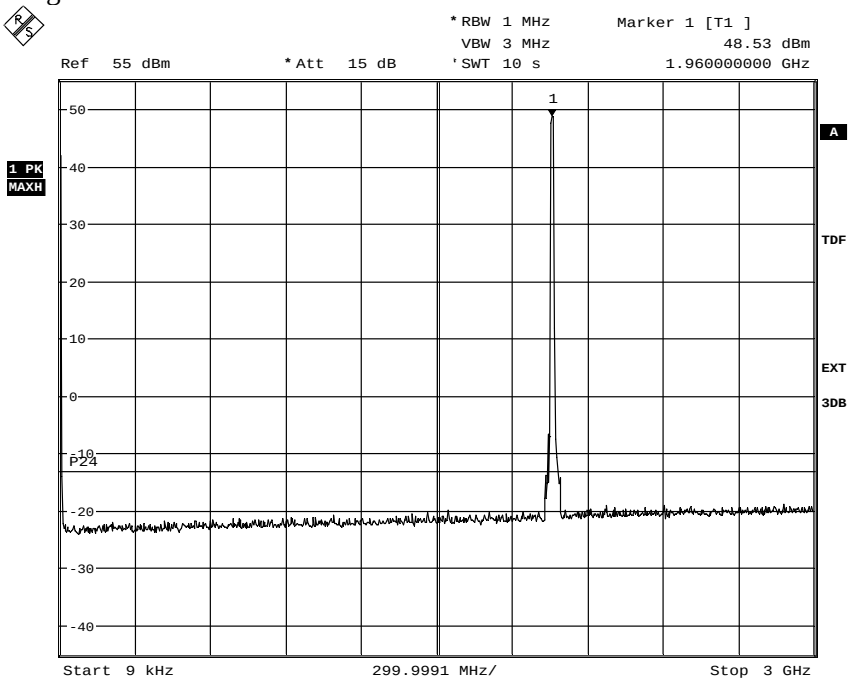
Diagram 6c:



Date: 3.JUL.2011 14:58:06

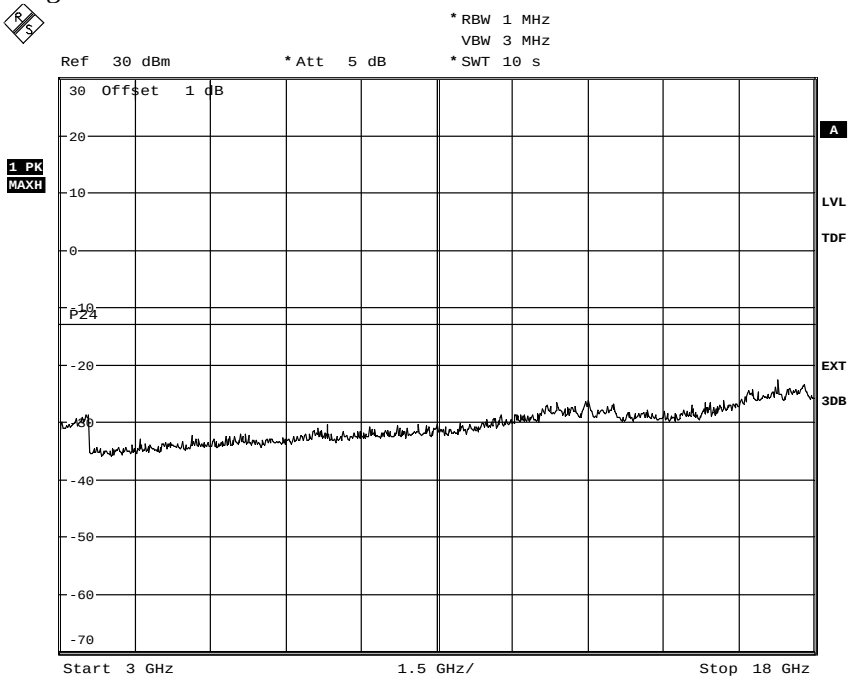
Appendix 5

Diagram 7a:



Date: 2.JUL.2011 10:31:08

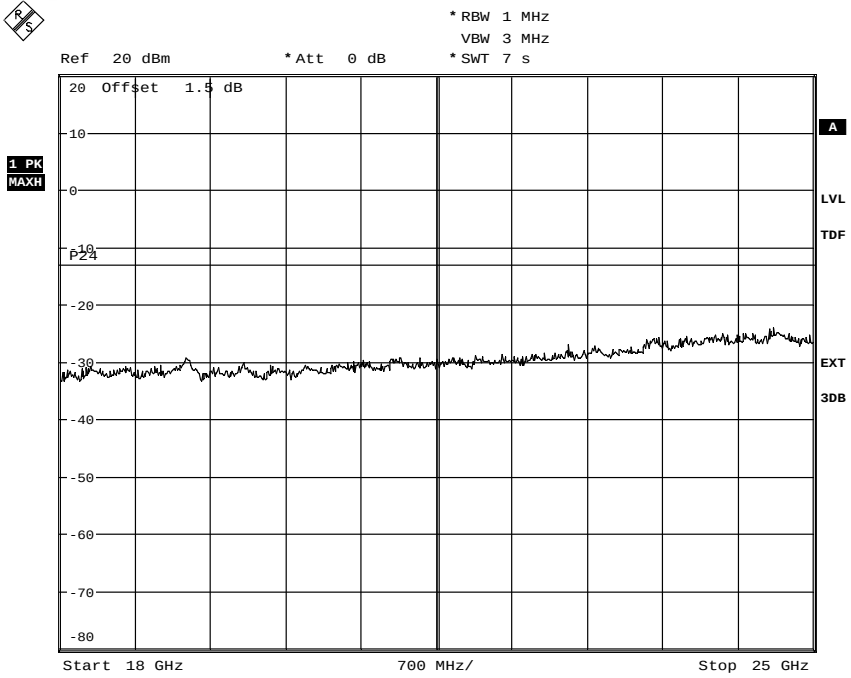
Diagram 7b:



Date: 2.JUL.2011 10:28:58

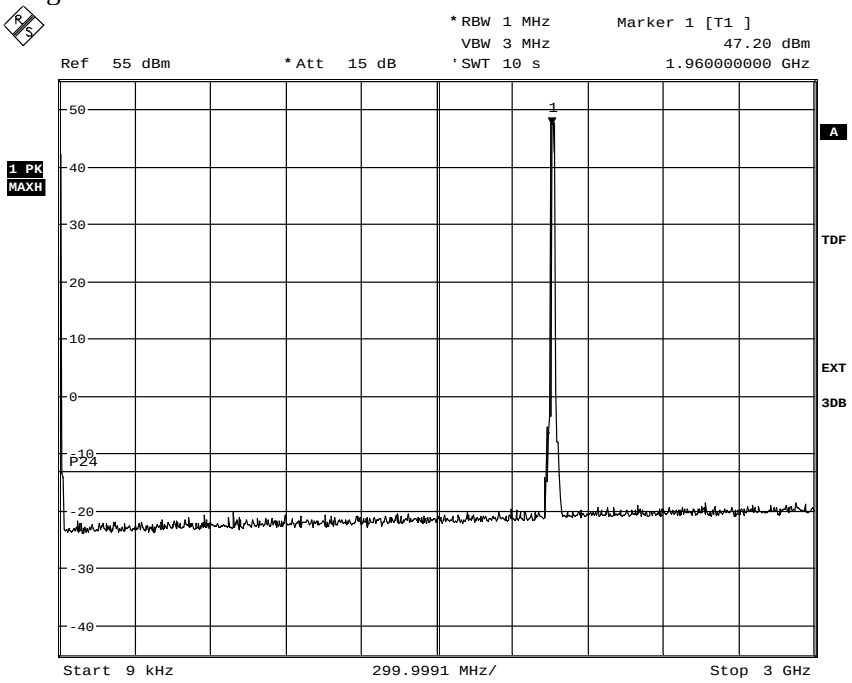
Appendix 5

Diagram 7c:



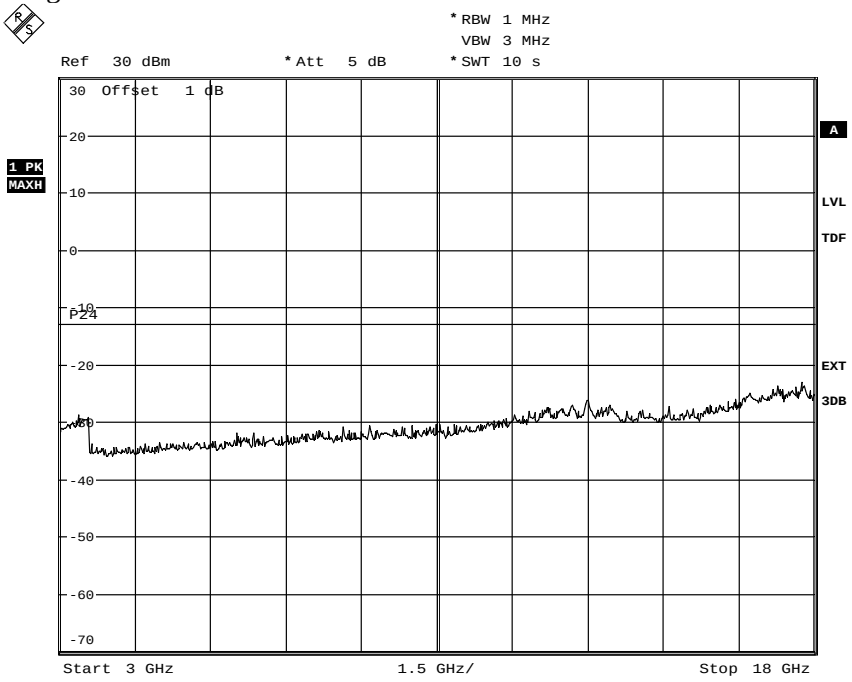
Appendix 5

Diagram 8a:



Date: 2.JUL.2011 10:48:02

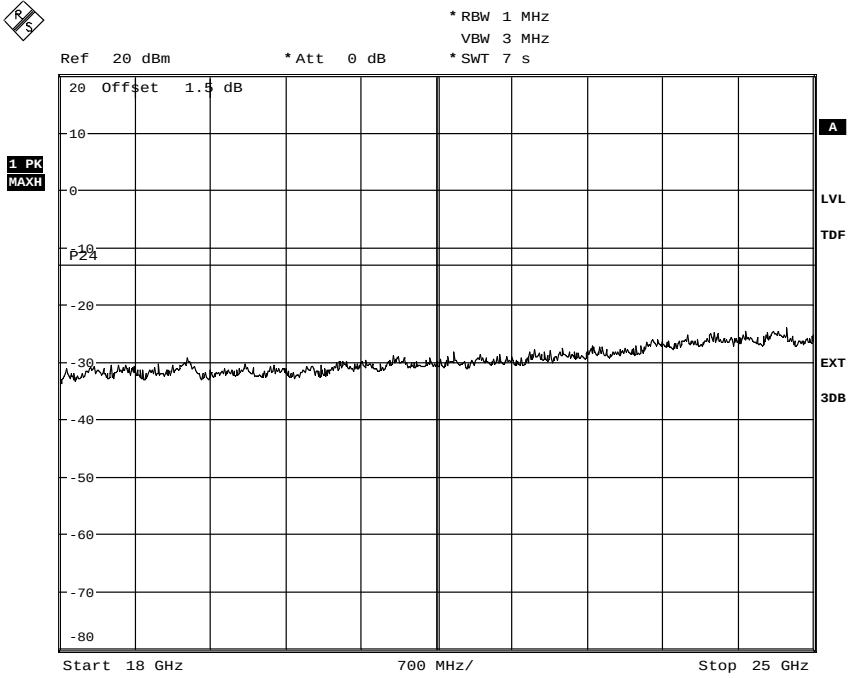
Diagram 8b:



Date: 2.JUL.2011 10:50:41

Appendix 5

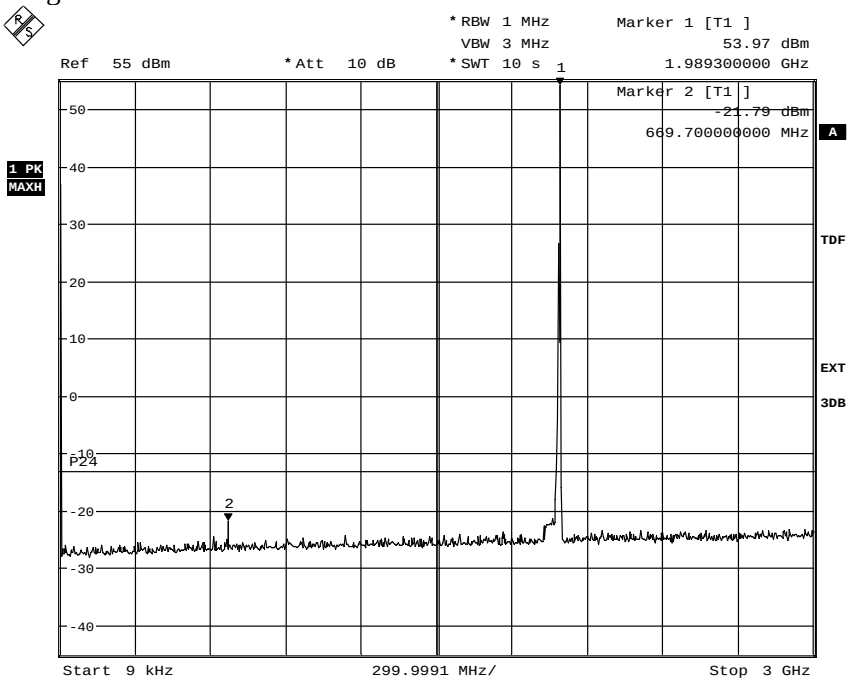
Diagram 8c:



Date: 3.JUL.2011 15:09:12

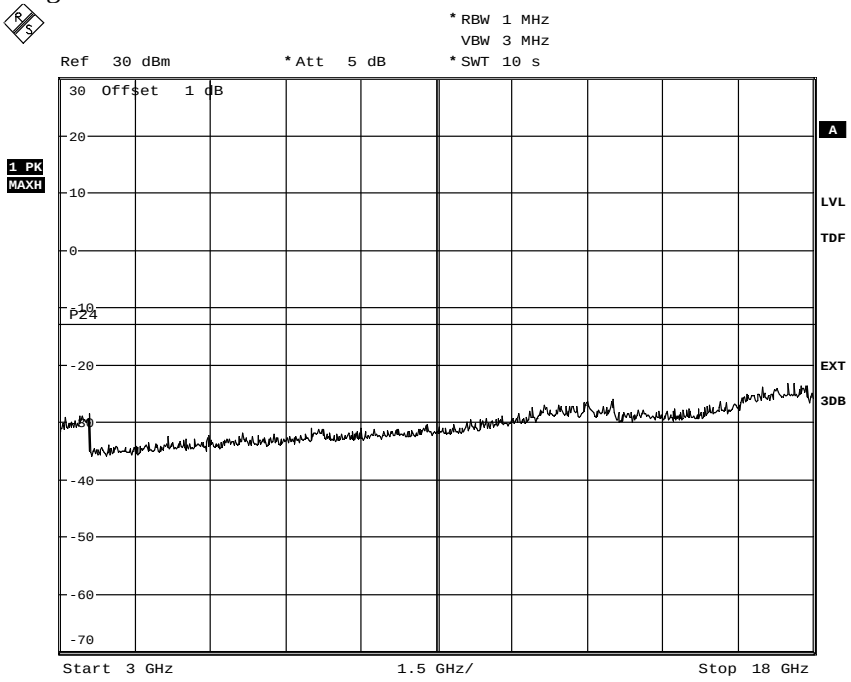
Appendix 5

Diagram 9a:



Date: 2.JUL.2011 13:17:21

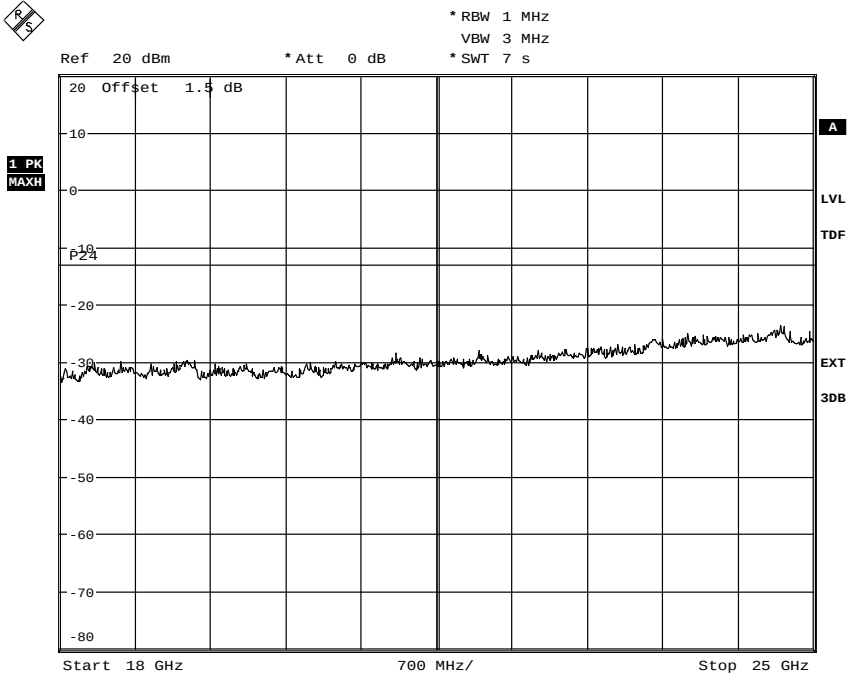
Diagram 9b:



Date: 2.JUL.2011 13:04:01

Appendix 5

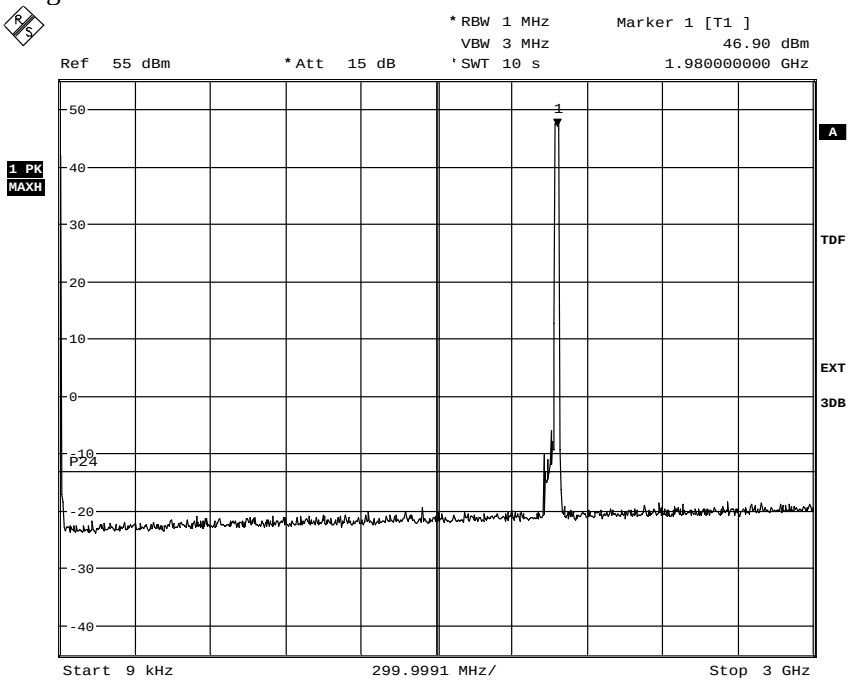
Diagram 9c:



Date: 3.JUL.2011 15:30:35

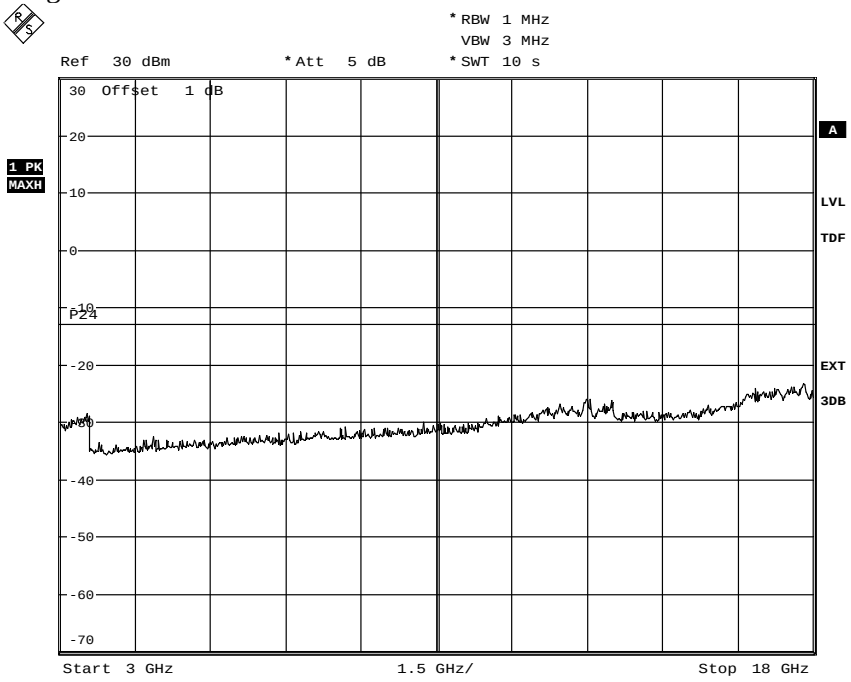
Appendix 5

Diagram 10a:



Date: 2.JUL.2011 12:51:22

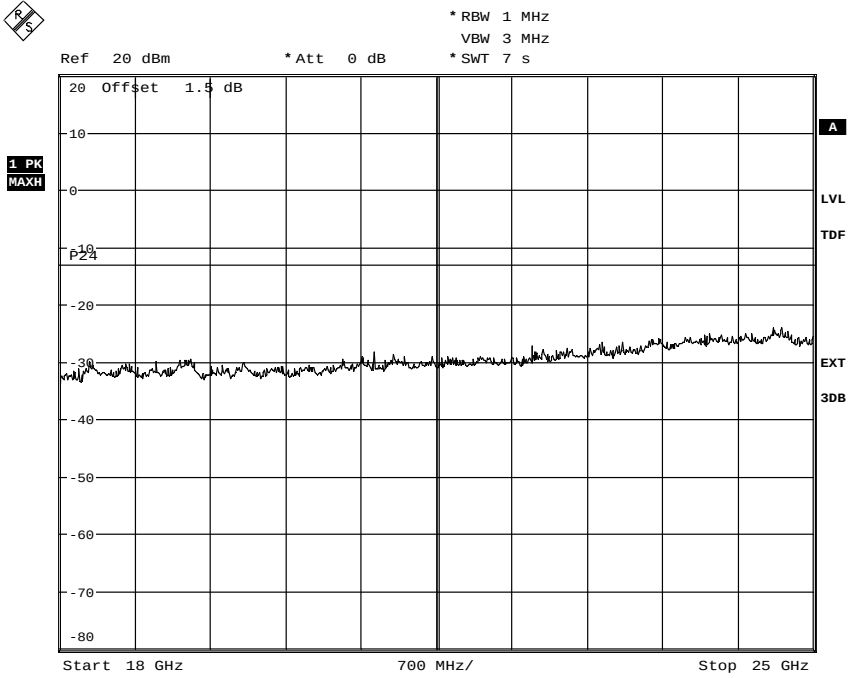
Diagram 10b:



Date: 2.JUL.2011 12:54:31

Appendix 5

Diagram 10c:



Date: 3.JUL.2011 15:22:53

Field strength of spurious radiation measurements according to CFR 47 §24.238 / IC RSS-133 6.5

Date	Temperature	Humidity
2011-06-14 to 2011-06-17	23-24°C ± 3°C	38-53 % ± 5 %

Test set-up and procedure

The test sites are listed at FCC, Columbia with registration number: 93866. The test site complies with RSS-Gen, Industry Canada file no. 3482A-1.

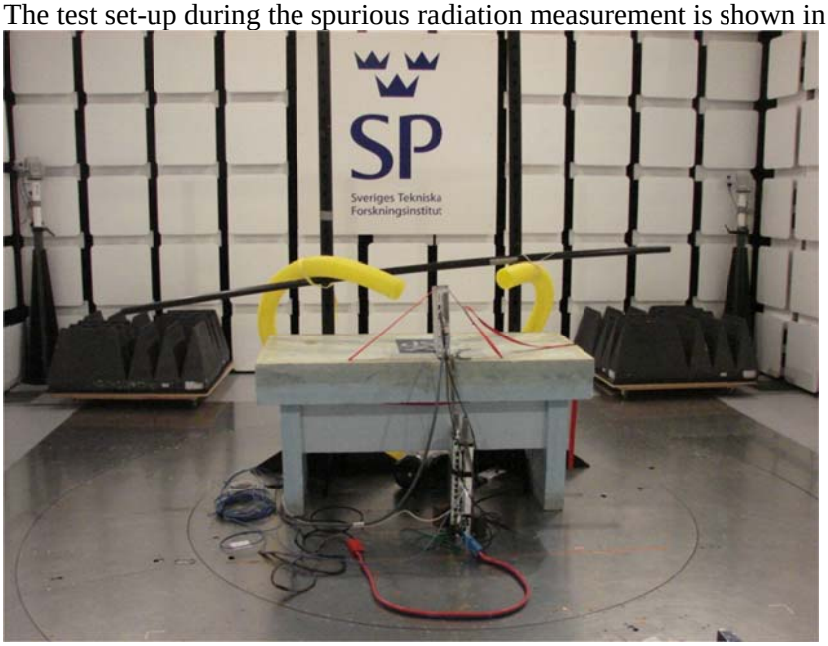
The measurements were performed with both horizontal and vertical polarization of the antenna. The antenna distance was 3 m in the frequency range 30 MHz – 18 GHz and 1m in the frequency range 18 - 25 GHz.

In the frequency range 30 MHz - 25 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 in the pre-measurement is scanned 0-360 degrees and the antenna is scanned 1- 4 m for maximum response. The emission is then measured with the RMS detector and the RMS value is reported. Frequencies closer than 10 dB to the limit when measured with the RMS detector were measured with the substitution method according to the standard.

The test set-up during the spurious radiation measurement is shown in the picture below:



Measurement equipment

Measurement equipment	SP number
Test site Tesla	503 881
R&S ESI 26	503 292
Control computer	503 479
Software: R&S EMC32, ver. 8.20.1	503 745
Chase Bilog antenna CBL 6111A	503 182
µCorp Nordic, Low Noise Amplifier	504 160
Miteq, Low Noise Amplifier	503 285
EMCO Horn Antenna 3115	502 175
Standard gain antenna 20240-20	503 674
High pass filter, Wainright	504 200
High pass filter, RLC Electronics	503 739
Testo 625 temperature and humidity meter	504 188

Results

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:

3.2 dB up to 18 GHz, 3.6 dB above 18 GHz

Limits

§24.238 and RSS-133 6.5

Outside a licensee's frequency band(s) of operation the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, resulting in a limit of -13 dBm per 1 MHz RBW.

Complies?	Yes

Frequency stability measurements according to CFR 47 §24.235 / IC RSS 133 6.3

Date	Temperature (test equipment)	Humidity (test equipment)
2011-06-19 to 2011-06-21	22-24°C ± 3 °C	43-58% ± 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 2	501 031
Rohde & Schwarz signal analyzer FSQ40	504 143
RF attenuator	504 159
Testo 635, Temperature and humidity meter	504 203
Rotronic temperature and humidity meter	502 946
Multimeter Fluke 87	502 190

Results

Nominal transmitter frequency was 1960.0 MHz in channel bandwidth configuration 5 MHz.
Rated output power level at connector RF A (maximum): 49 dBm (80 W).

Test conditions		Frequency error (Hz)
Supply voltage DC (V)	T (°C)	Test model E-TM1.1
-48.0	+20	-3
-55.2	+20	-3
-40.8	+20	-3
-48.0	+30	-4
-48.0	+40	-4
-48.0	+50	-4
-48.0	+10	-3
-48.0	0	-4
-48.0	-10	-3
-48.0	-20	-4
-48.0	-30	-8
Maximum freq. error (Hz)		8
Measurement uncertainty		$< \pm 1 \times 10^{-7}$

Remark

It was deemed sufficient to test one combination of TX frequency, channel bandwidth configuration and test model (modulation), as all combinations share a common internal reference to derive the TX frequency from.

Limits

According to 3GPP TS 36.141, section 6.5.1.5:
The frequency Error shall be within ±(0.05 PPM+12 Hz) (±110 Hz).

§24.235 The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

RSS-133 The carrier frequency shall not depart from the reference frequency, in excess of ±1.0 ppm for base stations.

Complies?	Yes

Receiver spurious emissions measurements according to RSS-133 6.6

Date	Temperature	Humidity
2011-07-03	22 °C ± 3 °C	34 % ± 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 with test model E-TM1.1 in channel bandwidth configuration 1.4 MHz.

Measurement equipment	SP number
R&S FSQ40	504 143
RF attenuator (RF A)	900 229
Testo 635, Temperature and humidity meter	504 203

Result

The nominal RX frequency was 1880 MHz.

	Tested port, frequency range
Diagram 1a+b	RX B, 30 MHz – 12.5 GHz

Remark

The highest internal frequency as declared by the client was 2.4576 GHz, thus the choice of the upper frequency boundary was set to 5x2.5 GHz = 12.5 GHz for emission measurements.

Limit

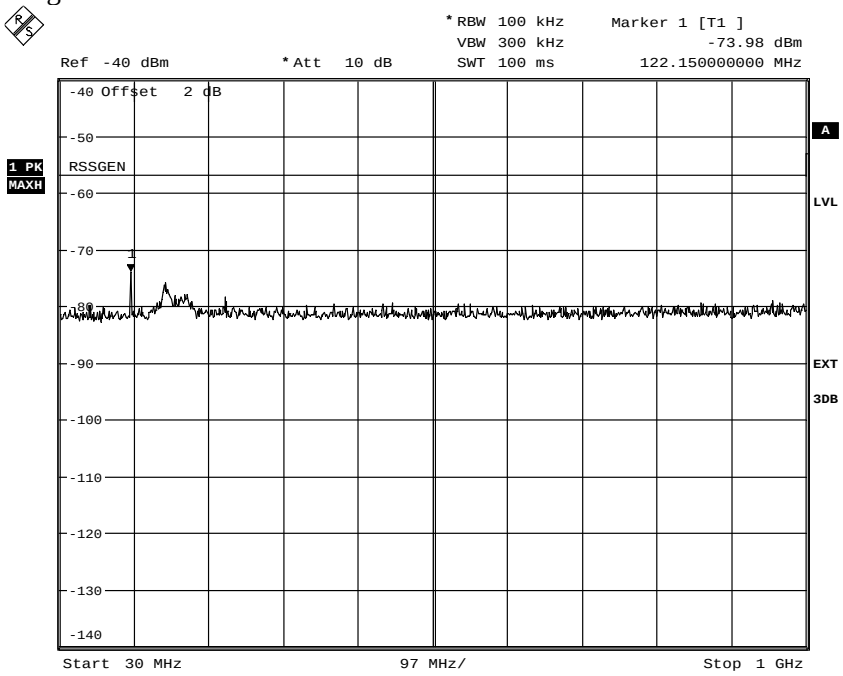
RSS-Gen 6.2 Antenna Conducted limits

Receiver spurious emissions at any discrete frequency shall not exceed 2 nanowatts (-57 dBm) in the band 30-1000 MHz, and 5 nanowatts (-53 dBm) above 1000 MHz.

Emission below limit?	Yes

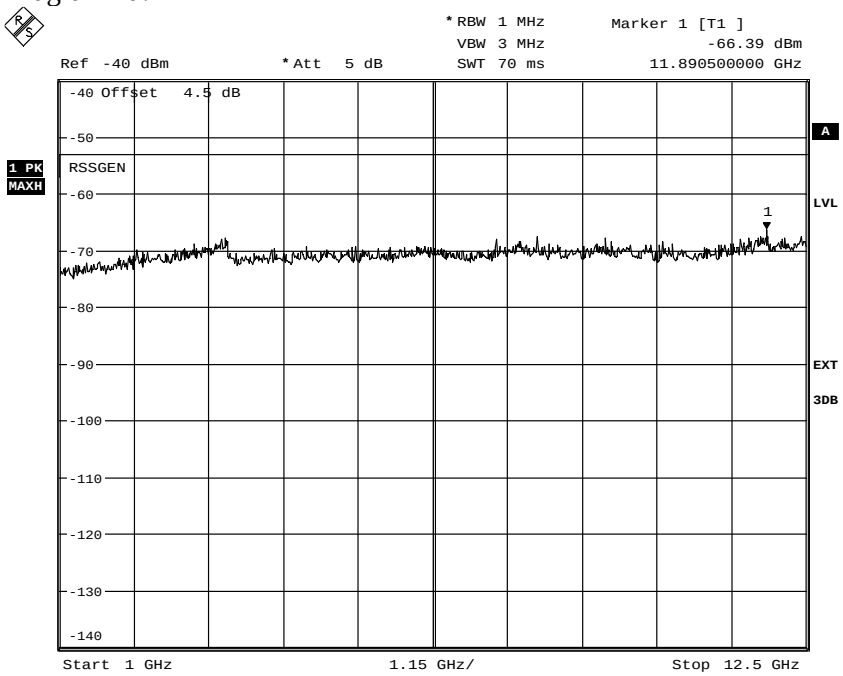
Appendix 8

Diagram 1a:



Date: 3.JUL.2011 17:22:44

Diagram 1a:



Date: 3.JUL.2011 17:24:37

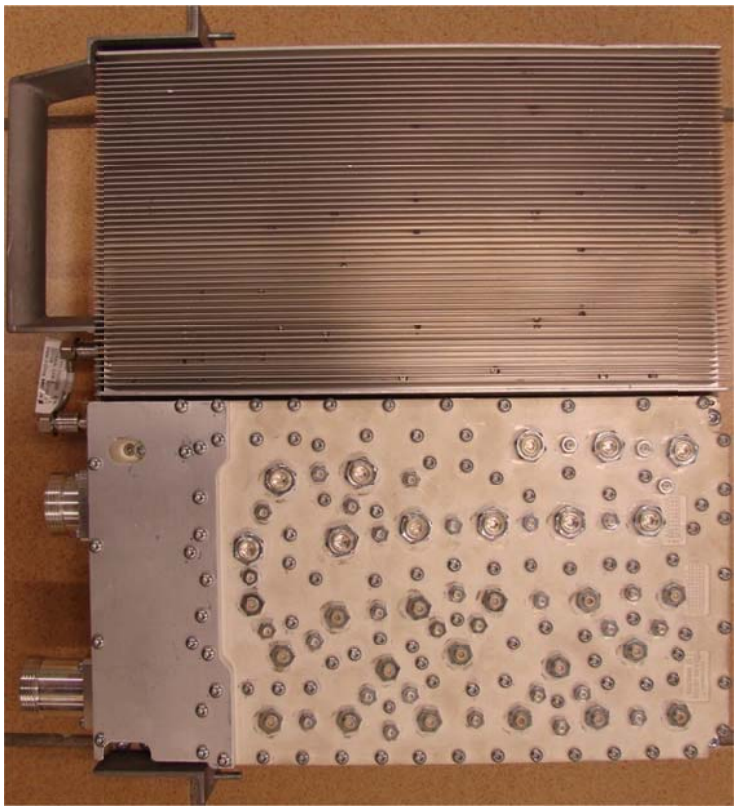
External photos

Front side

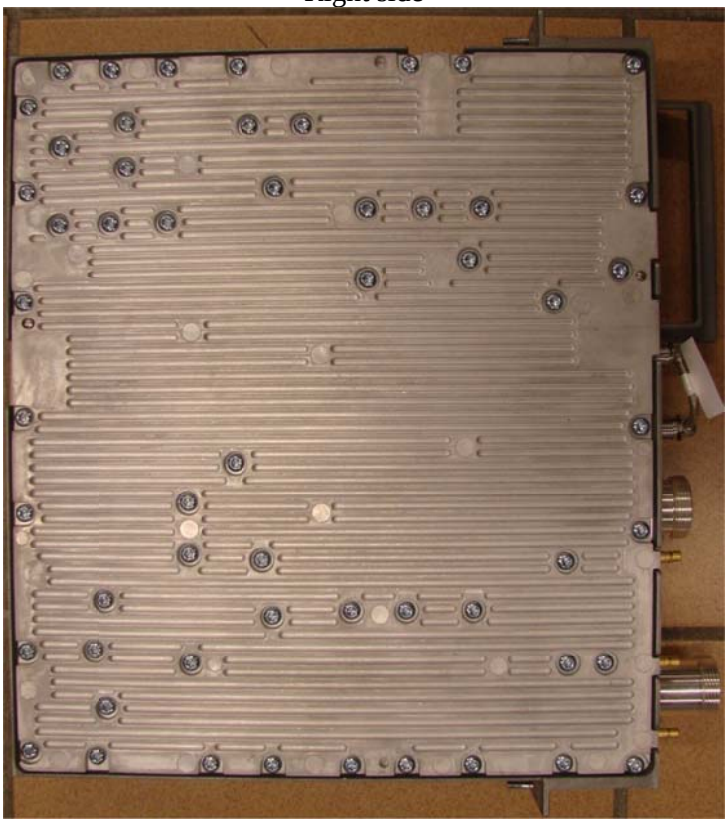
Rear side

Appendix 9

Left side



Right side



Appendix 9

Bottom side

Top side