REPORT

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The test sites comply with RSS-Gen, file no: IC 3482A

Date	Reference	Page
2010-09-27	FX015190-F24	1 (2)

1002
ISO/IEC 17025

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Measurements on RUS 01 B2 1900 MHz radio equipment with FCC ID: TA8AKRC11866-1 and IC: 287AB-AS118661

(9 appendices)

Test object

RUS 01 B2, product (1P)KRC 118 66/1, revision (21P)R1A

Summary

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

Standard		Compliant	Appendix	Remarks
FCC CFR 47 / IC RSS-133 Issue 5				
2.1046 / RSS-133 6.4	RF power output	Yes	2	-
2.1049 / RSS-133 6.5	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	-
FCC CFR 47 / IC RSS-Gen Issue 2				
15.111 / RSS-Gen 4.10	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 Sveriges Tekniska Forskningsinstitut
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Technical Manager

Reinhold Reul
Technical Officer

FCC ID: TA8AKRC11866-1
IC: 287AB-AS118661

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FCC ID: TA8AKRC11866-1
IC: 287AB-AS118661

Appendix 1

Description of test object

Equipment:	LTE radio equipment RUS 01 B2
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 47.8 dBm (1x60 W)
Number of antenna ports:	TX/RX: 1 RX only: 1
Nominal supply voltage:	-48 VDC

Tested frequencies and EARFCNs for TX measurements

EARFCN	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

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 and supplied by functional test equipment with -48 VDC. The active port RF A was terminated into 50 ohm outside the test chamber.
Port RF B was in stand-by mode and terminated into 50 ohm directly at the port.

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 C63.4-2003
ANSI/TIA/EIA-603-B-2002
3GPP TS 36.141, version 8.5.0
CFR 47 part 2, October 1st , 2009
CFR 47 part 24, October 1st, 2009
RSS-133 Issue 5
RSS-Gen Issue 2

Measurement equipment

Measurement equipment	Calibration Due	SP number
Test site Tesla	2010-10	503 881
R&S FSIQ 40	2011-07	503 738
R&S FSQ 40	2011-07	504 143
R&S ESI 26	2011-07	503 292
Control computer with R&S software EMC32 version 8.20.1	-	503 479
High pass filter 3 GHz	2011-07	503 739
High pass filter 3 GHz	2011-03	504 200
RF attenuator 40 dB	2011-06	504 159
RF attenuator 30 dB	2011-07	900 229
RF step attenuator	2011-06	503 096
Boonton RF Peak power meter/analyzer	2010-10	503 144
Boonton Power sensor 56518-S/4	2012-02	503 146
Chase Bilog antenna CBL 6111A	2011-10	503 182
EMCO Horn Antenna 3115	2011-01	502 175
Std.gain horn mod 20240-20	-	503 674
MITEQ Low Noise Amplifier	2011-06	503 285
µComp Nordic, Low Noise Amplifier	2011-07	504 160
Climate chamber 2	2010-11	501 031
Multimeter Fluke 87	2011-03	502 190
Testo 635 temperature and humidity meter	2011-03	504 203
Testo 625 temperature and humidity meter	2011-08	504 188
Testo 615 temperature and humidity meter	2012-04	503 498

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: 2010-09-13.

Manufacturer’s representative

Anders Johansson, Ericsson AB

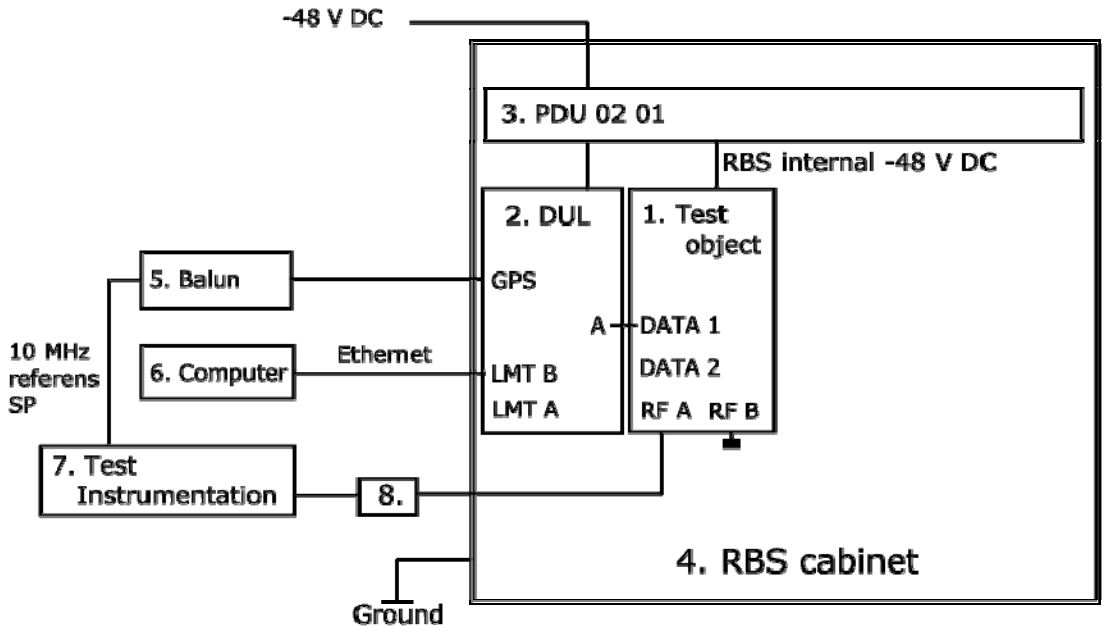
Test engineers

Jörgen Wassholm, Andreas Johnson, Jonas Bremholt and Reinhold Reul

Test participants

Samir Catic and Christer Gustavsson, Ericsson AB

Test set-up conducted TX measurements at port RF A



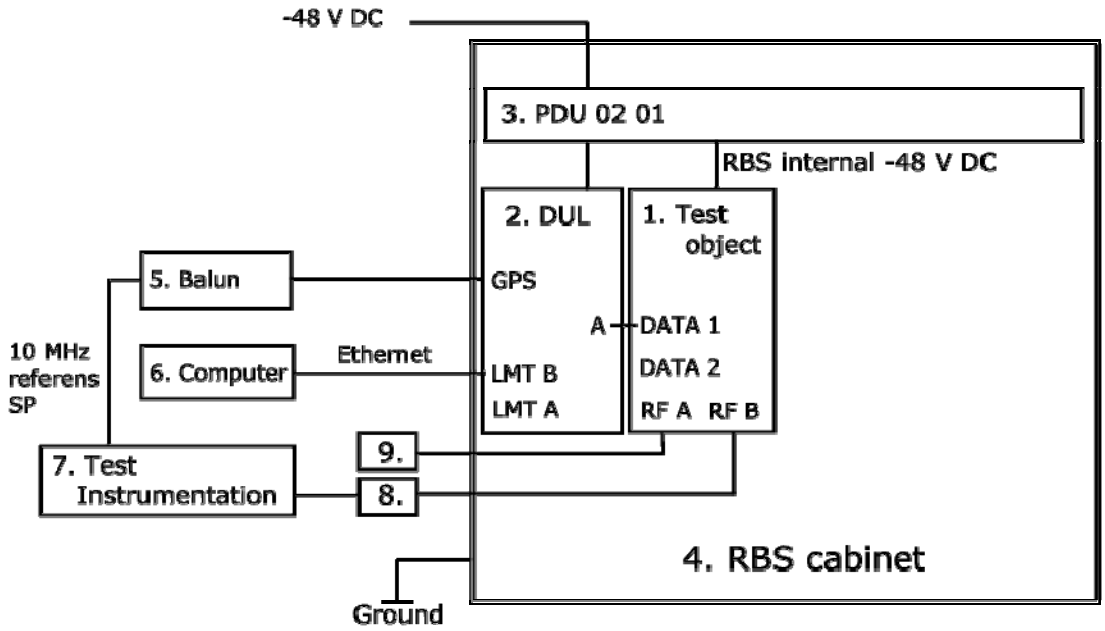
Test object

1. RUS 01 B2, product (1P)KRC 118 66/1, revision (21P)R1A, SN(S)CB40823600
   FCC ID: TA8AKRC11866-1 and IC: 287AB-AS118661
   with software CXP 102 051/10 Rev R5DM

Functional test equipment

2. DUL 20 01, product (1P)KDU 137 533/4, revision (21P)R1A, SN (S)C823562999
3. PDU 02 01, product BMG 980 336/4, revision R2A, SN (S)BJ31528316
4. RBS 6201 cabinet, BAMS 1000778792
5. Balun for 10 MHz reference, converting BNC to RJ-45 connector
6. Controlling laptop HP Elitebook 8730w, SN CNU 942532V, BAMS 1000757967
   running software MOSHELL V8.0k
7. SP test instrument according measurement quipment list
8. Attenuator and filter according measurement equipment list

Test set-up conducted RX measurements at port RF B



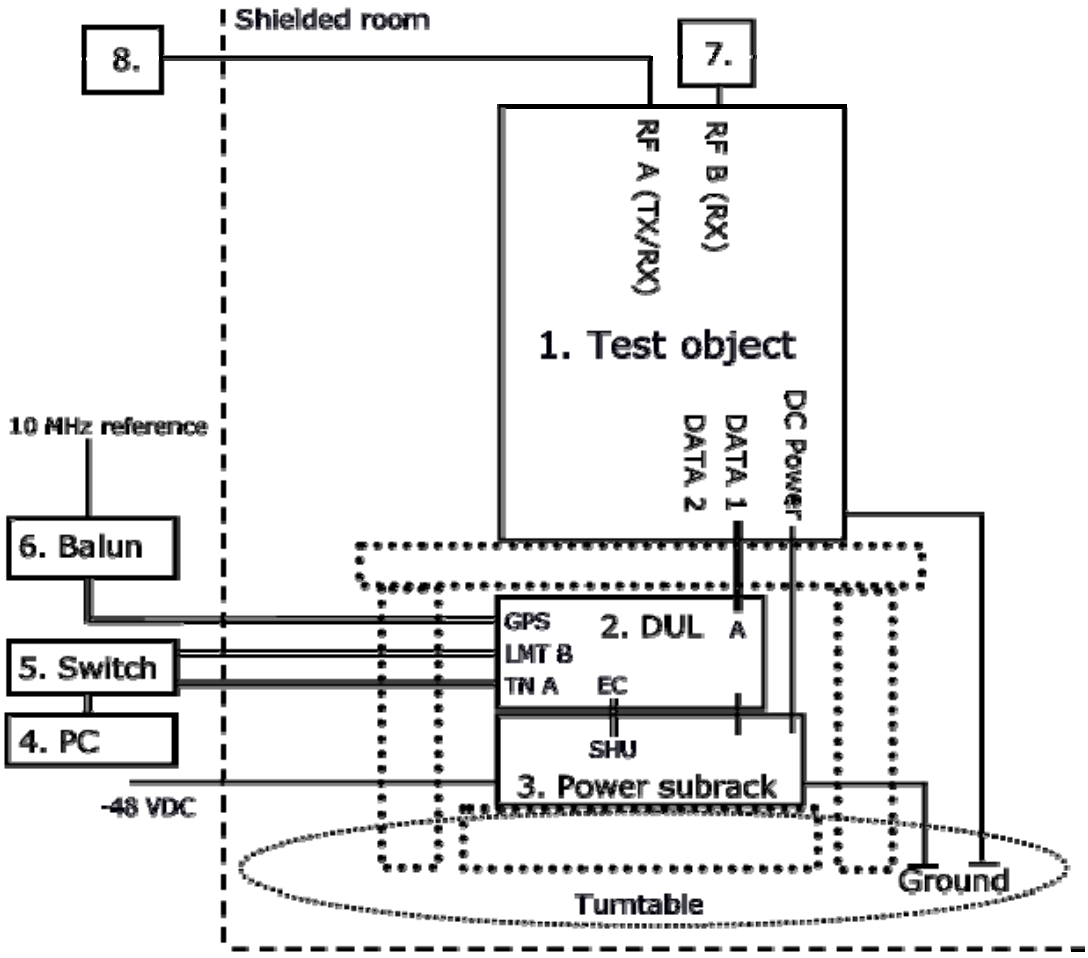
Test object

1. RUS 01 B2, product (1P)KRC 118 66/1, revision (21P)R1A, SN(S)CB40823600
   FCC ID: TA8AKRC11866-1 and IC: 287AB-AS118661
   with software CXP 102 051/10 Rev R5DM

Functional test equipment

2. DUL 20 01, product (1P)KDU 137 533/4, revision (21P)R1A, SN (S)C823562999
3. PDU 02 01, product BMG 980 336/4, revision R2A, SN (S)BJ31528316
4. RBS 6201 cabinet, BAMS 1000778792
5. Balun for 10 MHz reference, converting BNC to RJ-45 connector
6. Controlling laptop HP Elitebook 8730w, SN CNU 942532V, BAMS 1000757967
   running software MOSHELL V8.0k
7. SP test instrument according measurement equipment list
8. Attenuator and filter according measurement equipment list
9. Attenuator according measurement equipment list and 50 ohm termination

Test set-up, radiated measurements



Test object

1 RUS 01 B2, product (1P)KRC 118 66/1, revision (21P)R1A, SN(S)C823562988
FCC ID: TA8AKRC11866-1 and IC: 287AB-AS118661
with software CXP 102 051/10 Rev R5DM

Functional test equipment

2. DUL 2001, product (1P)KDU 137 533/4, revision (21P)R1A, SN (S)C823562988
3. Power subrack, individual components are listed below
4. Laptop computor:Mobile Workstation, HP Elite book BAMS – 1000757968
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 termination
8. Attenuator 40 dB according measurement equipment list and 50 ohm termination

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

Components of the power sub-rack used during radiated emission test

Position	Product name	Product number	R-state	Serial number
1	PDU 01 01	BMG 980 336/2	R4F	(S)BJ31532384
2	PDU 01 01	BMG 980 336/2	R4F	(S)BJ31532382
3	SHU 01 01	BGK 901 18/1	R3C	(S)BJ31446269
4	DUMMY	SXK 109 8257/1	R1F	-
5	DUMMY	SXK 109 8257/1	R1F	-
6	DUMMY	SXK 109 8257/1	R1F	-
7	DUMMY	SXK 109 8257/1	R1F	-
8	DUMMY	SXK 109 8257/1	R1F	-
9	PCF 02 01	KFE 101 1157/1	R1C	(S)BW95301450

Note: The power subrack is functional test equipment in the context of this test report.

Test object software during both radiated and conducted measurements

Software	Revision
CXP 102 051/10	R5DM

FCC ID: TA8AKRC11866-1
IC: 287AB-AS118661

Appendix 2

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

Date	Temperature	Humidity
2010-09-14	22 °C ± 3 °C	49 % ± 5 %
2010-09-15	22 °C ± 3 °C	46 % ± 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	900 229
Testo 615, temperature and humidity meter	503 498

Measurement uncertainty: 0.7 dB

Results

Measured output power level at connector RF A

Test conditions T_{nom} 22 °C / V_{nom} -48.0 V DC	Transmitter power RMS (dBm) / CREST (dB)		
	Frequency B	Frequency M	Frequency T
BW configuration 1.4 MHz	47.8/ 7.1	47.8 / 7.1	47.7/ 7.0
BW configuration 3 MHz	48.0/ 6.9	48.1 / 6.8	47.8/ 6.8
BW configuration 5 MHz	47.9/ 6.7	48.0 / 6.6	47.9/ 6.6
BW configuration 10 MHz	48.0 / 7.1	48.1 / 6.6	47.9 / 6.8
BW configuration 15 MHz	47.9 / 7.6	47.9 / 6.7	47.9 / 7.0
BW configuration 20 MHz	47.8 / 7.6	47.8 / 6.7	47.8 / 7.1

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 of the power shall not exceed 13 dB.

Complies?	Yes

FCC ID: TA8AKRC11866-1
IC: 287AB-AS118661

Appendix 3

Occupied bandwidth measurements according to 47 CFR 2.1049 / IC RSS-133 6.5

Date	Temperature	Humidity
2010-09-14	22 °C ± 3 °C	49 % ± 5 %
2010-09-15	22 °C ± 3 °C	46 % ± 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	900 229
Testo 615 temperature and humidity meter	503 498

Measurement uncertainty: 3.7 dB

Results

The results are shown in appendix 3.1

Diagram	BW configuration	Tested frequency	OBW / [MHz]
1	1.4 MHz	B	1.094
2	20 MHz	B	17.875
3	1.4 MHz	M	1.094
4	3 MHz	M	2.698
5	5 MHz	M	4.485
6	10 MHz	M	8.940
7	15 MHz	M	13.410
8	20 MHz	M	17.850
9	1.4 MHz	T	1.094
10	20 MHz	T	17.850

FCC ID: TA8AKRC11866-1
IC: 287AB-AS118661

Appendix 3.1

Diagram 1

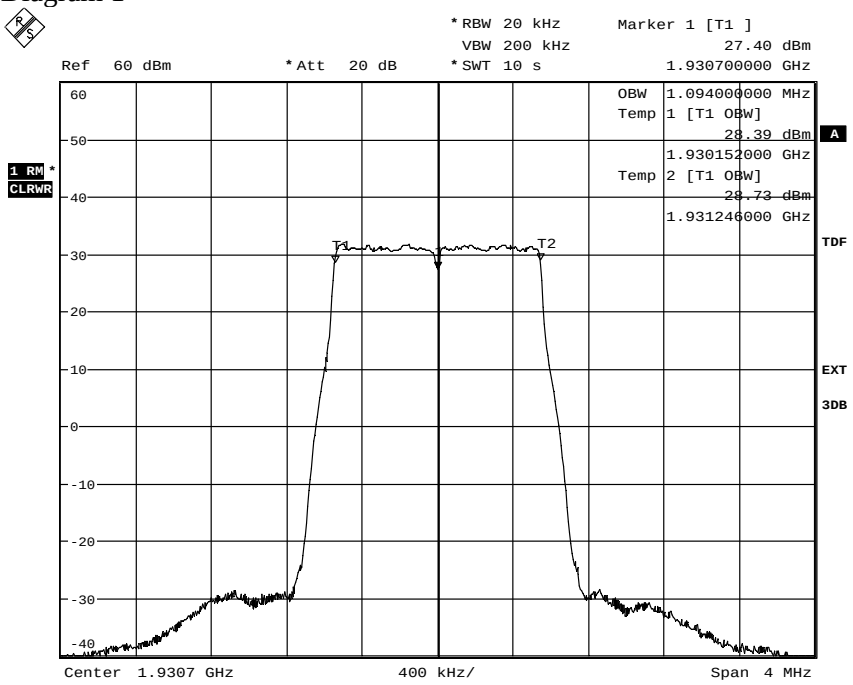


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Diagram 2

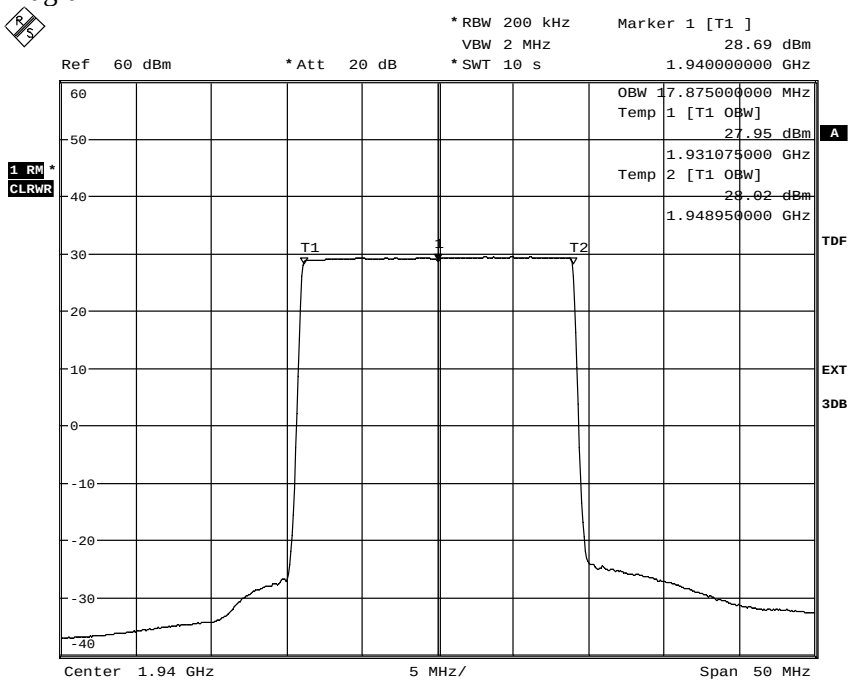

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Diagram 3

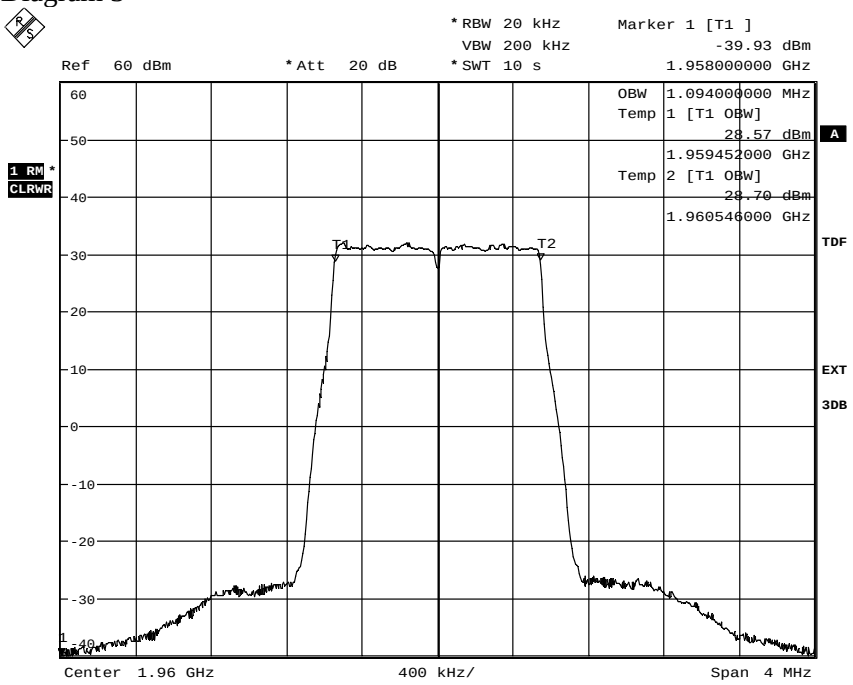

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Diagram 4

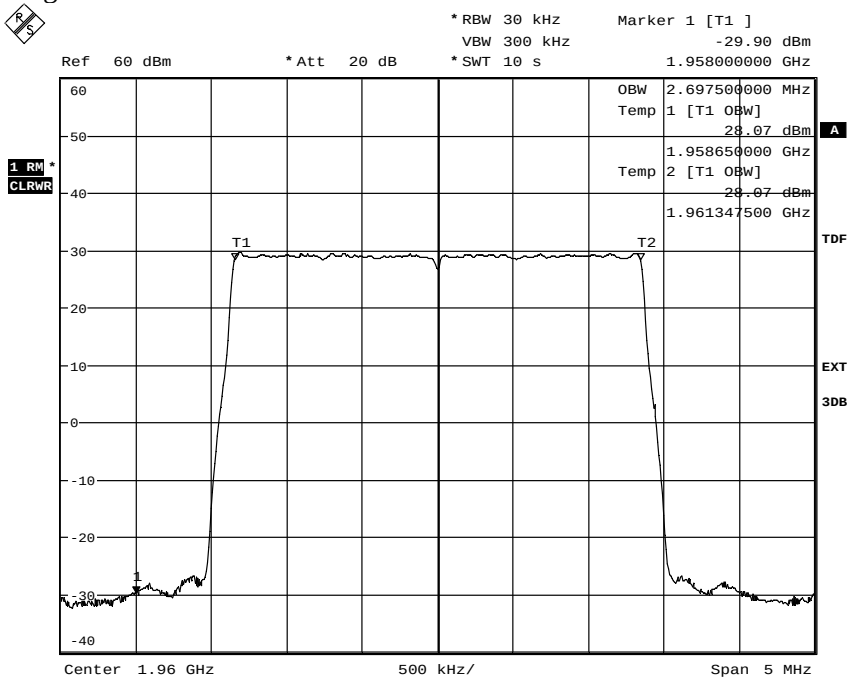

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Diagram 5

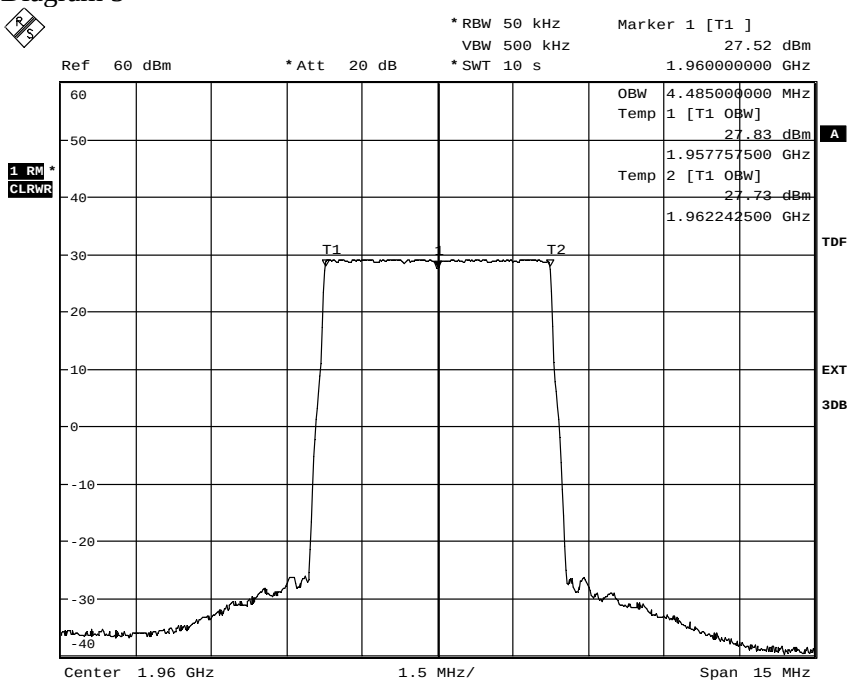

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Diagram 6

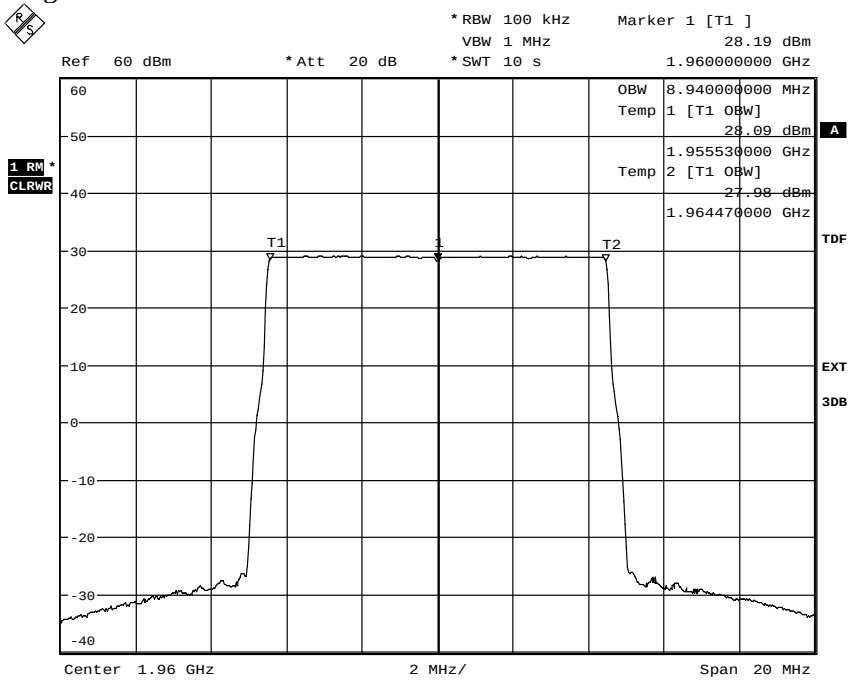

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Diagram 7

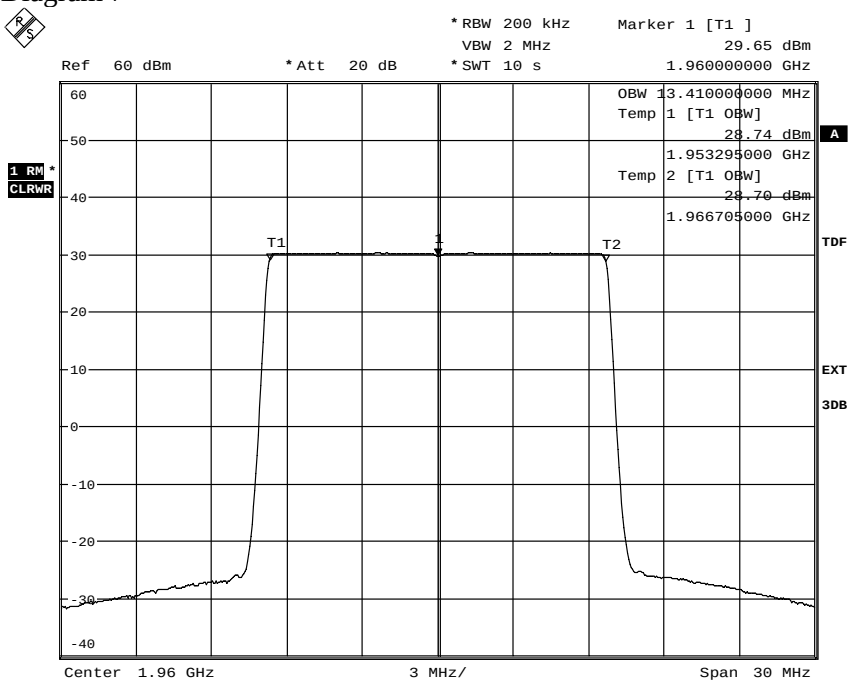

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Diagram 8

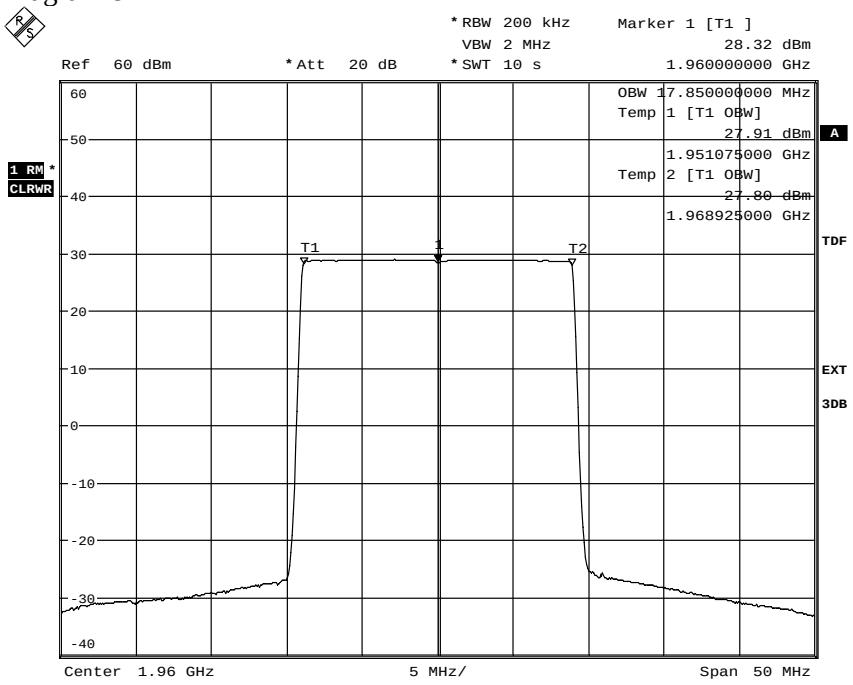

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Diagram 9

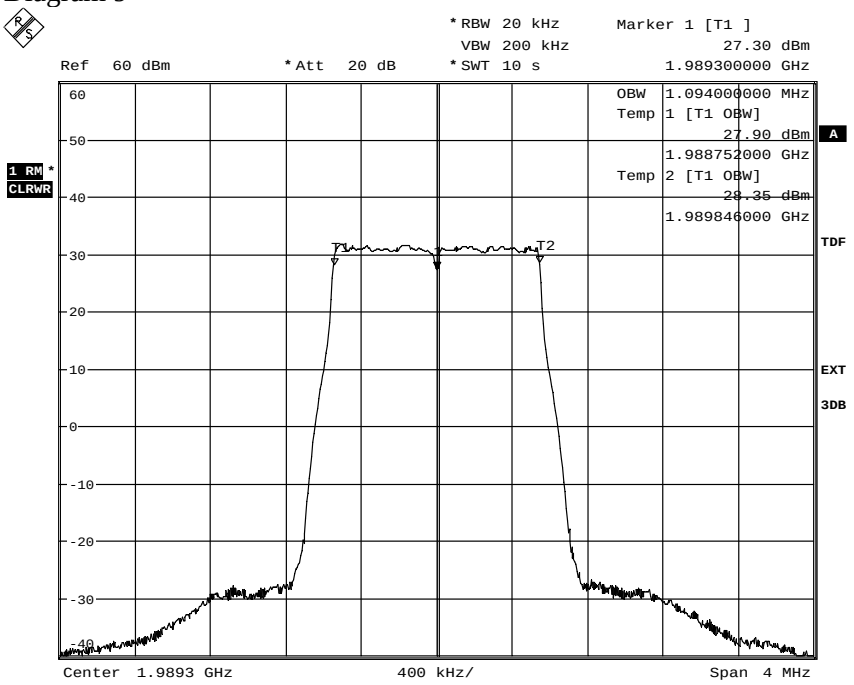

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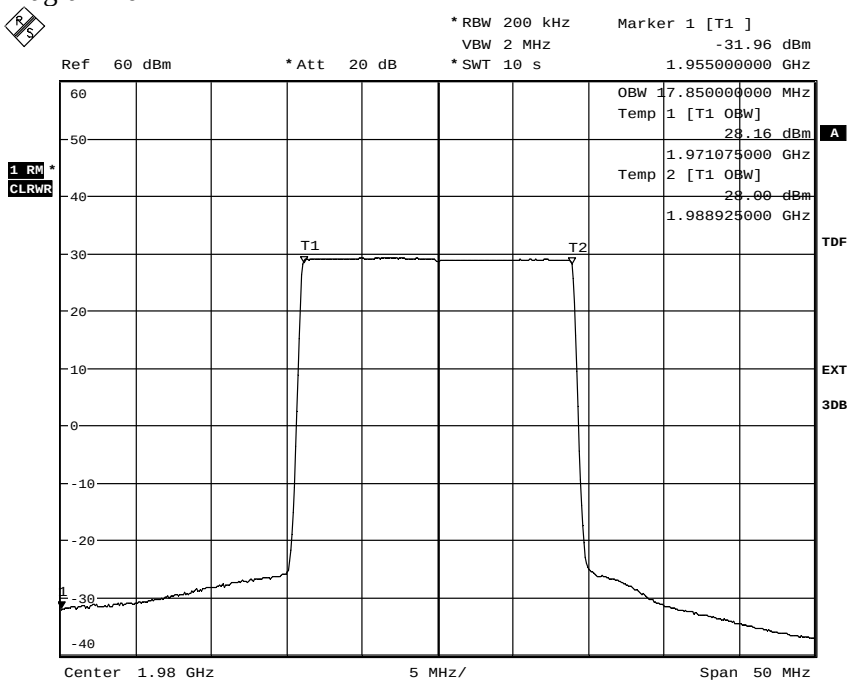
Diagram 10



Date: 15.SEP.2010 10:16:44

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

Date	Temperature	Humidity
2010-09-14	22 °C ± 3 °C	49 % ± 5 %
2010-09-15	22 °C ± 3 °C	46 % ± 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.

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

Measurement equipment	SP number
R&S FSQ	504 143
RF attenuator	900 229
Testo 615 temperature and humidity meter	503 498

Measurement uncertainty: 3.7 dB

Results

The results are shown in appendix 4.1

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

Limits

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

Complies?	Yes

FCC ID: TA8AKRC11866-1
IC: 287AB-AS118661

Appendix 4.1

Diagram 1 a

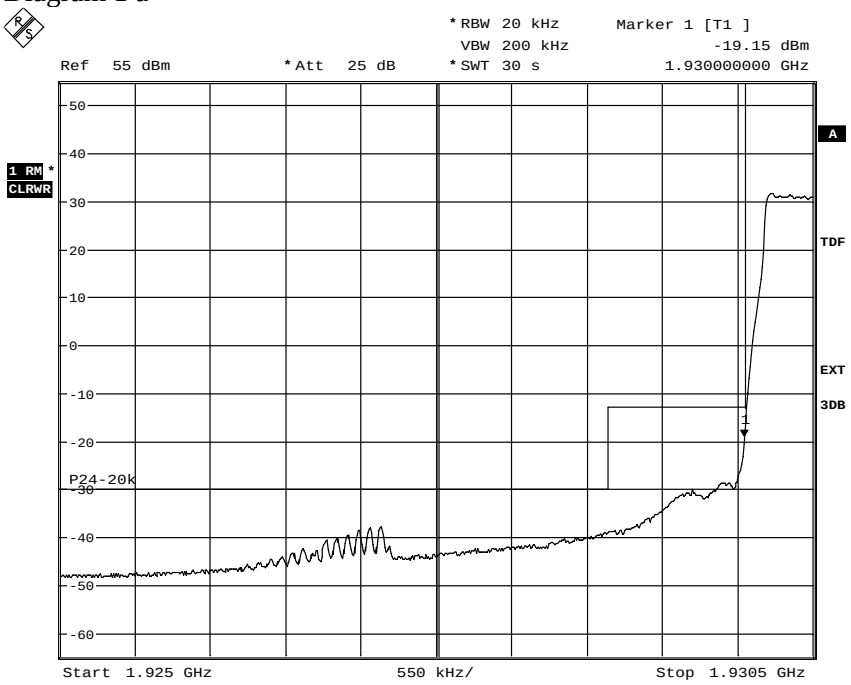


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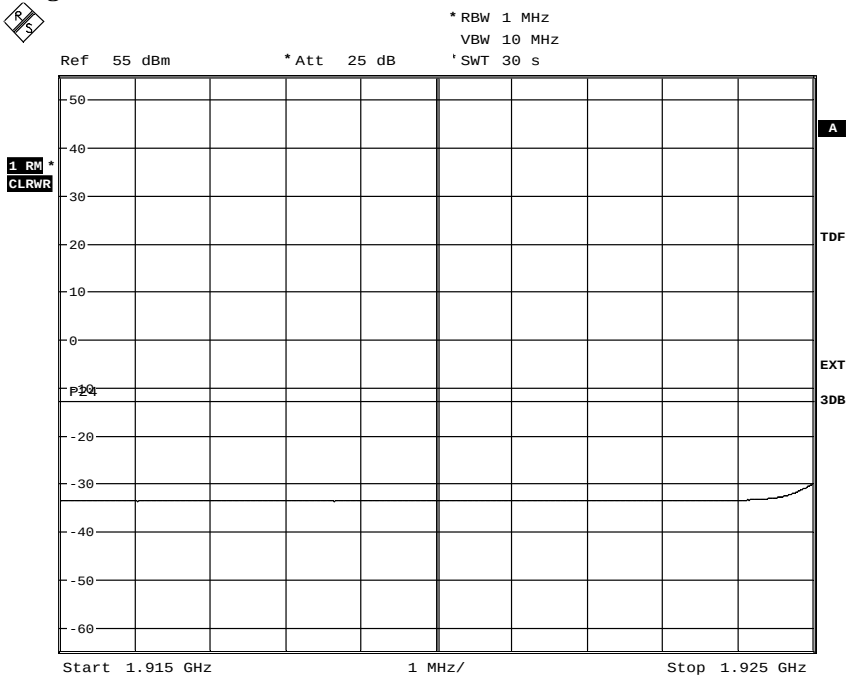
Diagram 1 b



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FCC ID: TA8AKRC11866-1
IC: 287AB-AS118661

Appendix 4.1

Diagram 2 a

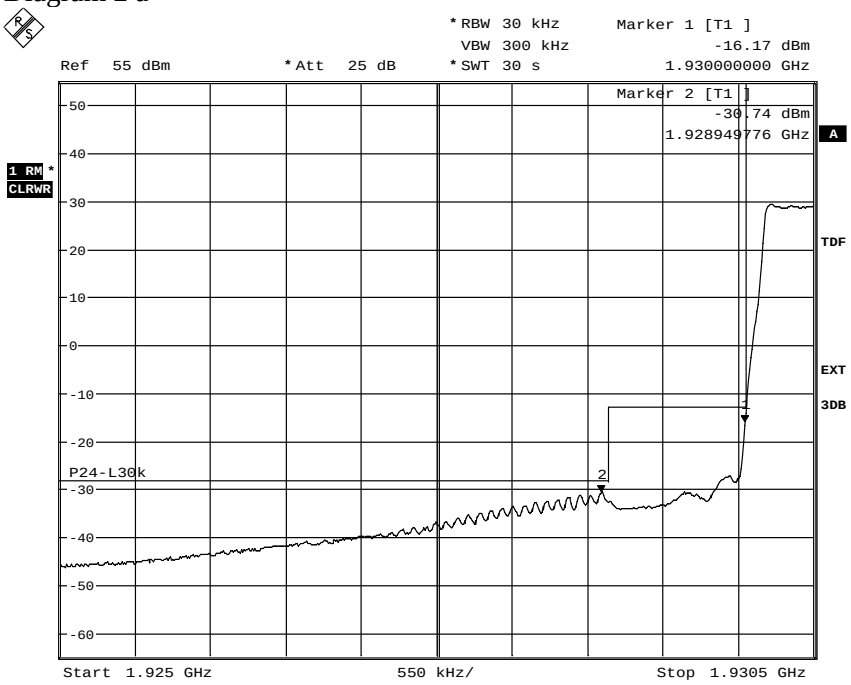

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Diagram 2 b

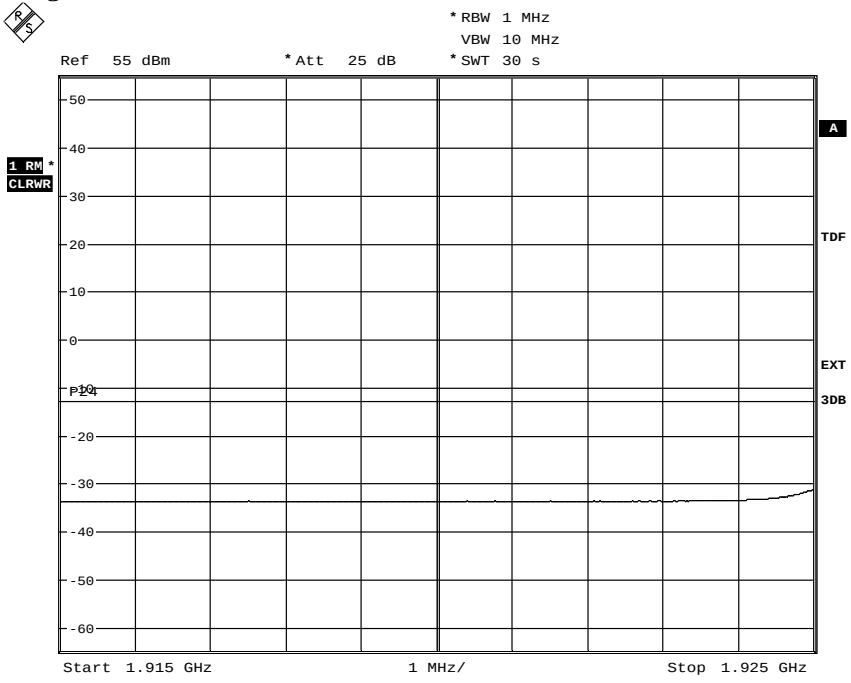

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Diagram 3 a

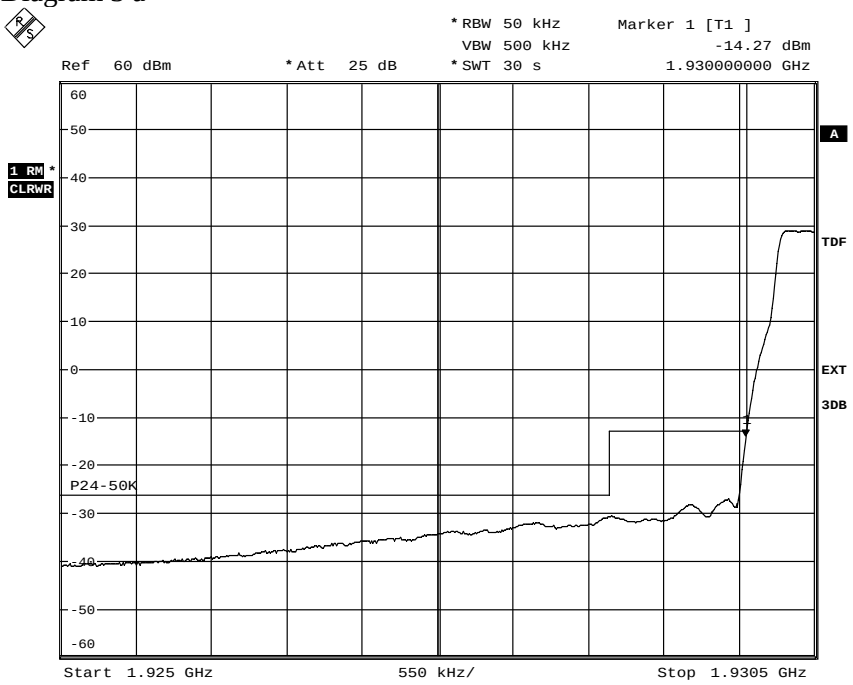

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Diagram 3 b

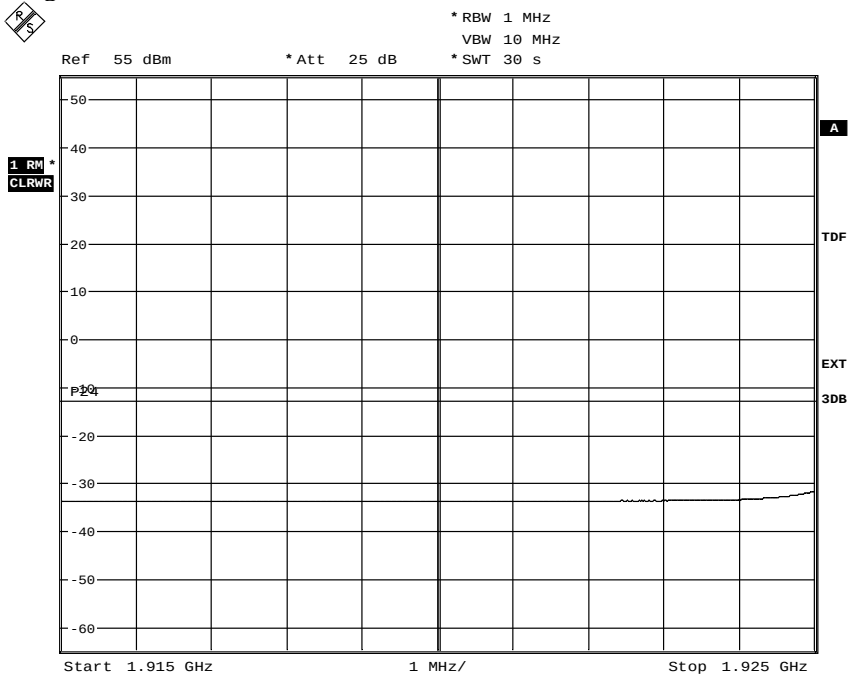

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Diagram 4 a

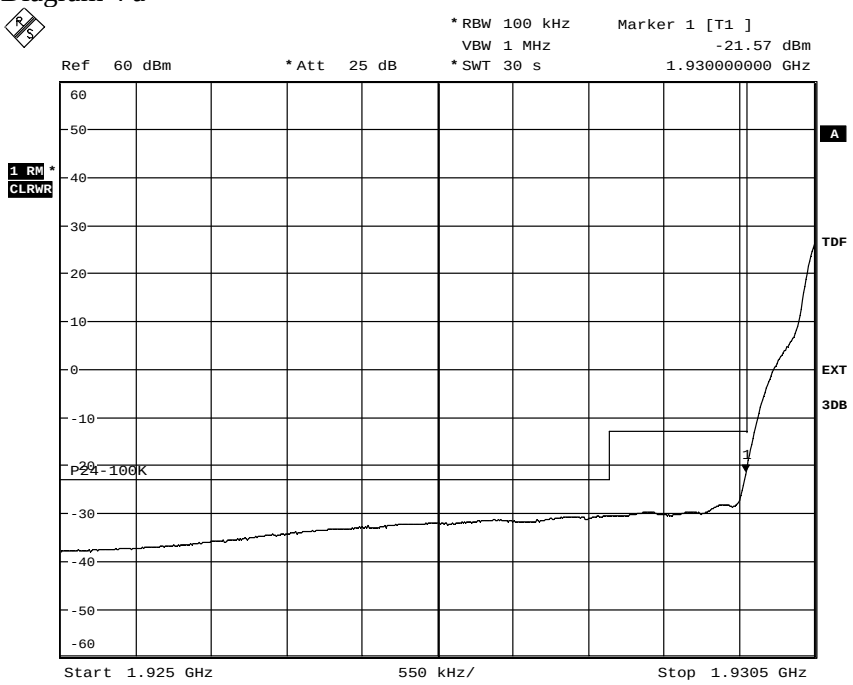

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Diagram 4 b

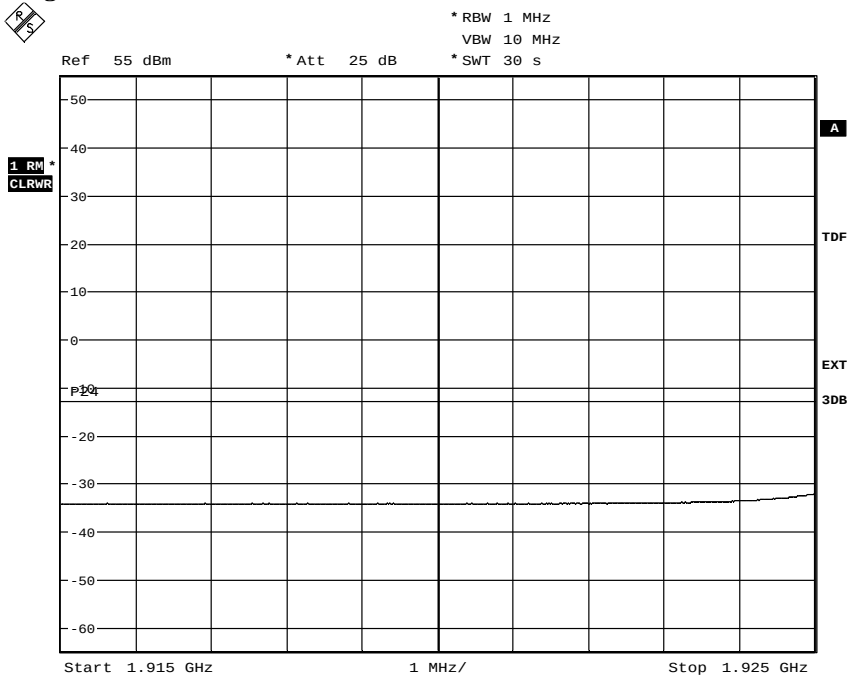

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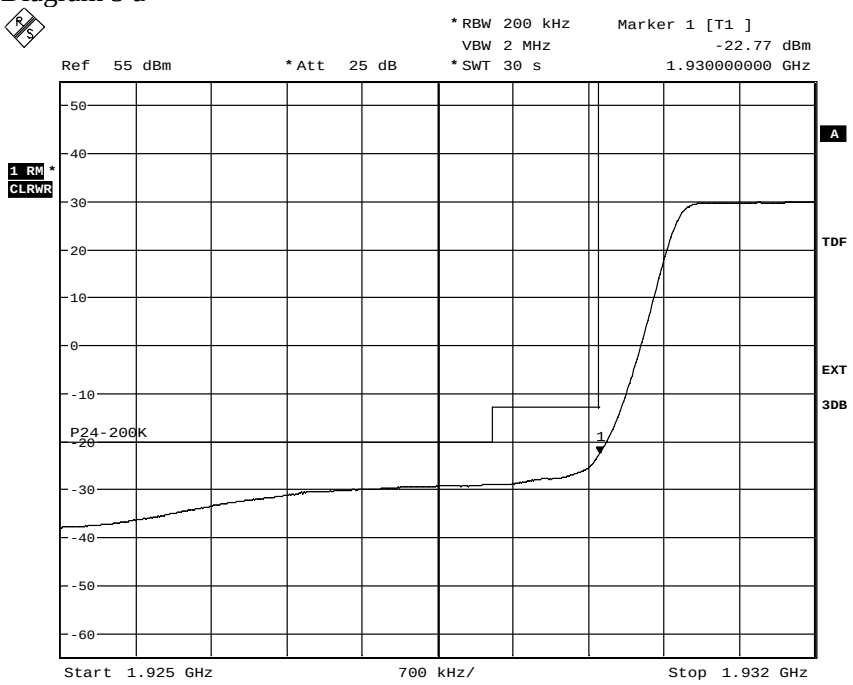
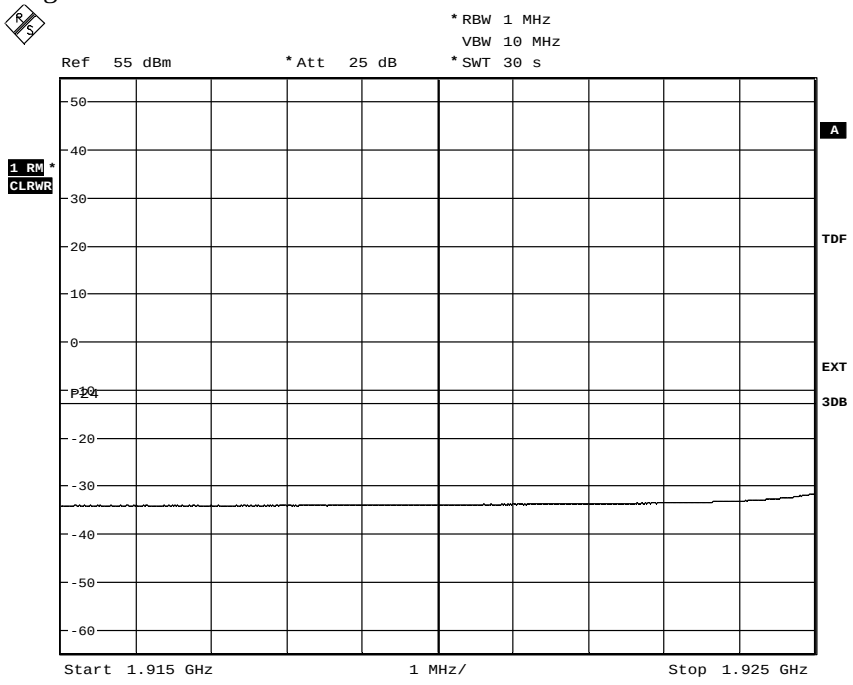
Diagram 5 a



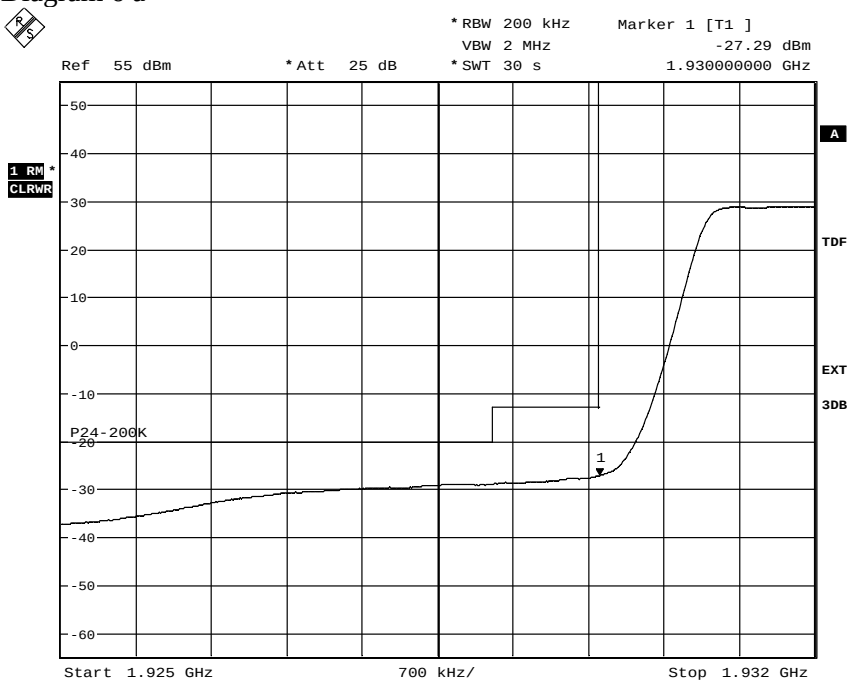
Date: 15.SEP.2010 14:30:56

Diagram 5 b



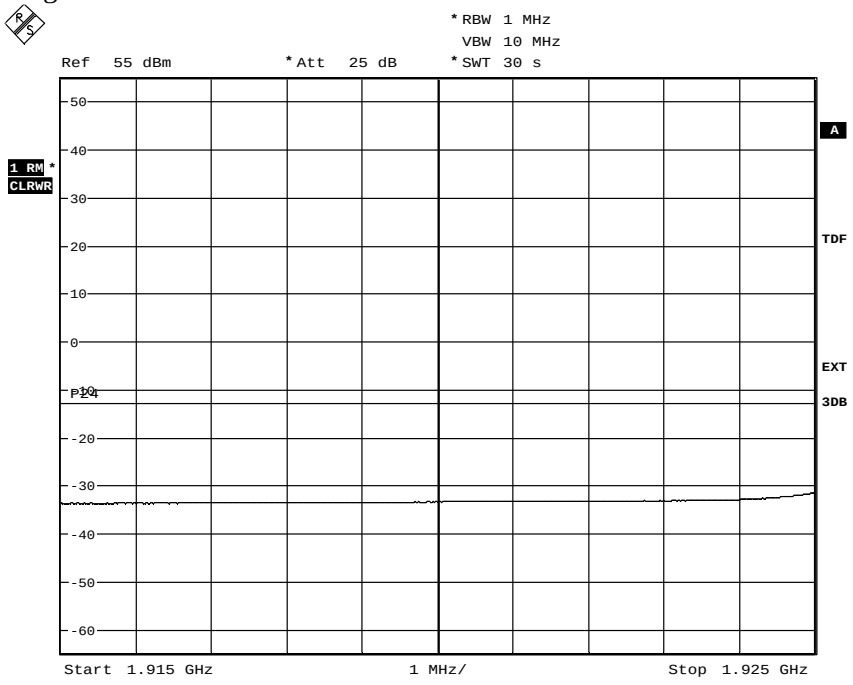
Date: 15.SEP.2010 14:32:18

Diagram 6 a



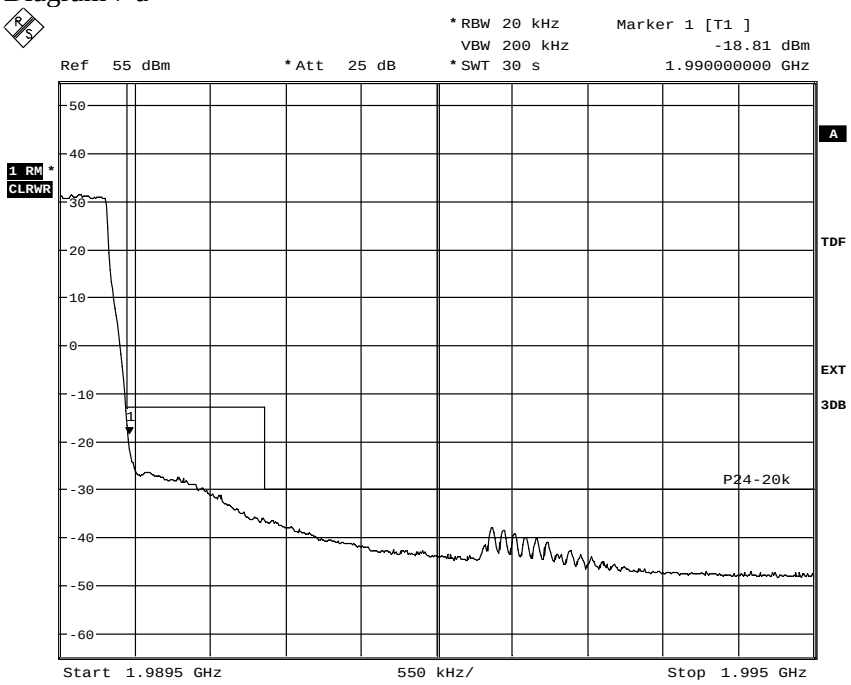
Date: 14.SEP.2010 15:56:49

Diagram 6 b



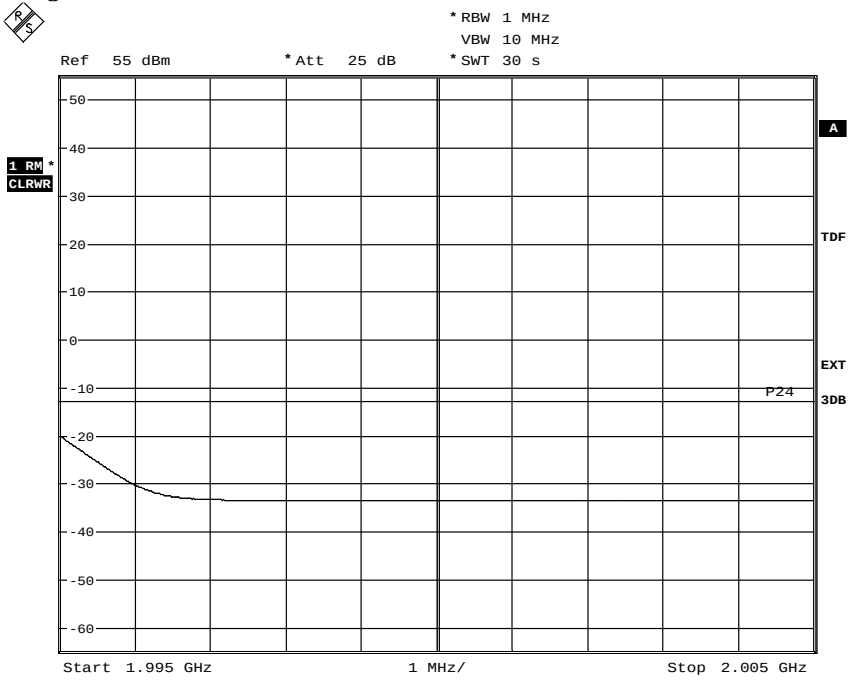
Date: 14.SEP.2010 15:59:45

Diagram 7 a



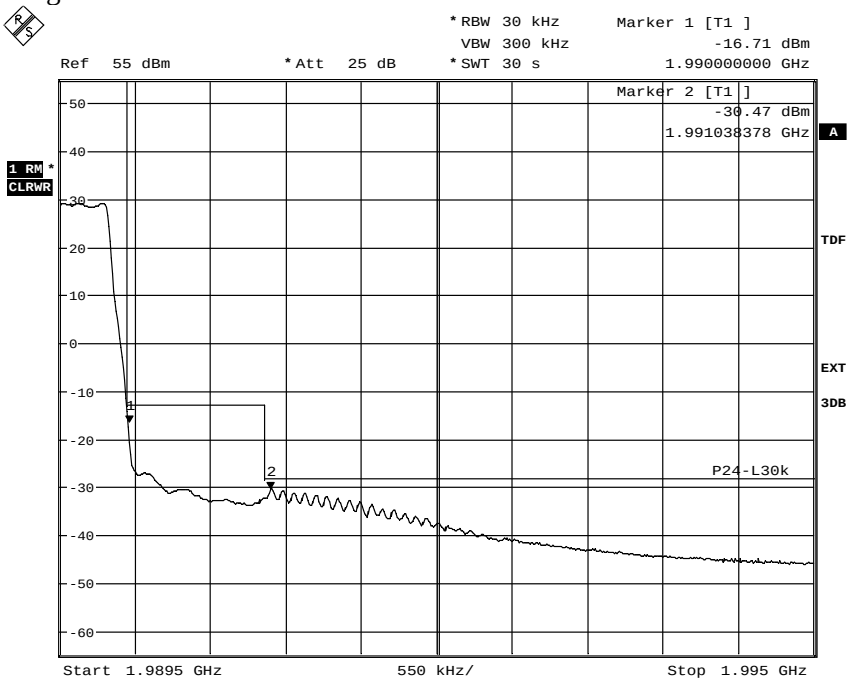
Date: 14.SEP.2010 18:29:25

Diagram 7 b



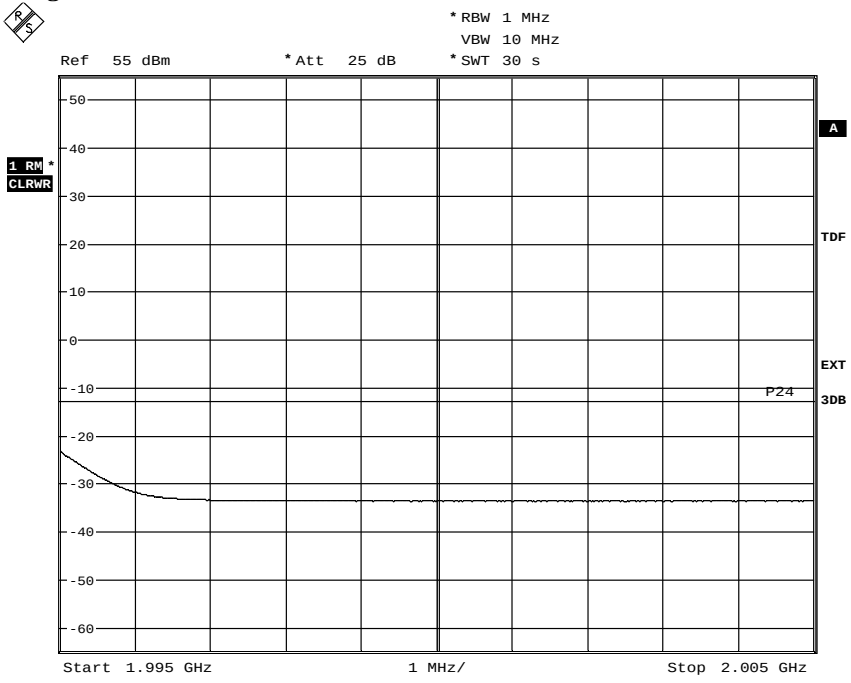
Date: 14.SEP.2010 18:33:50

Diagram 8 a



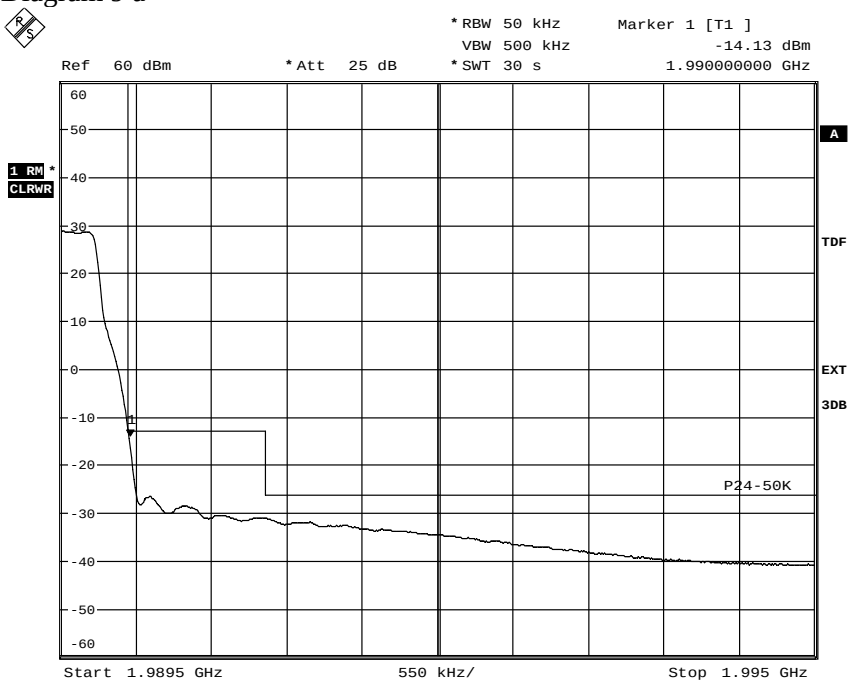
Date: 14.SEP.2010 20:02:12

Diagram 8 b



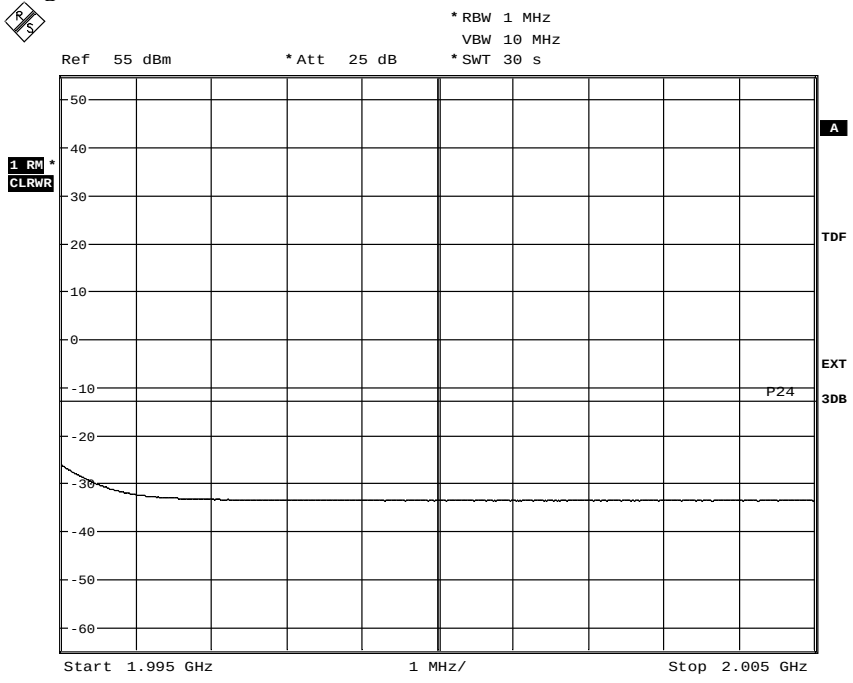
Date: 14.SEP.2010 20:05:05

Diagram 9 a



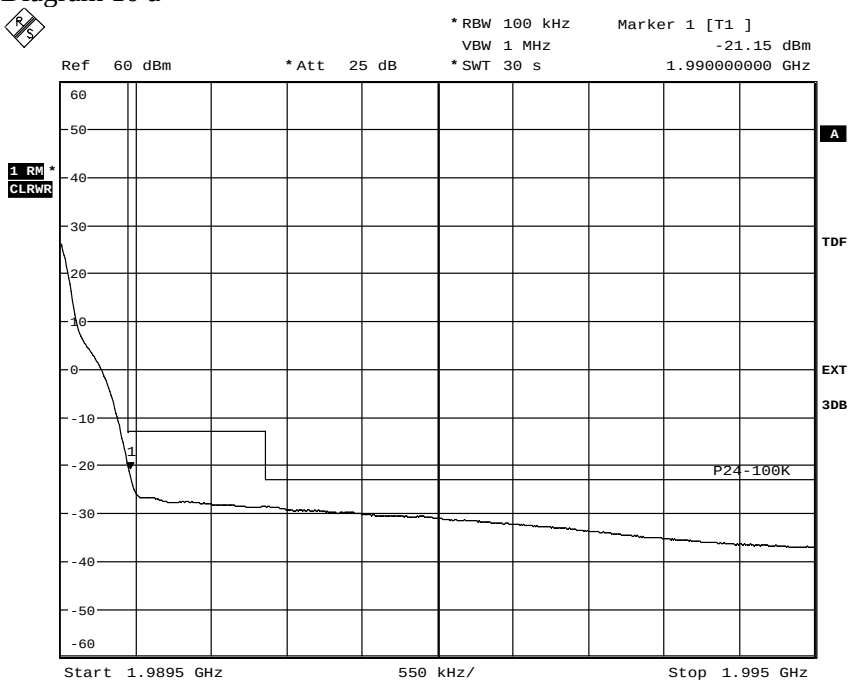
Date: 14.SEP.2010 20:32:02

Diagram 9 b



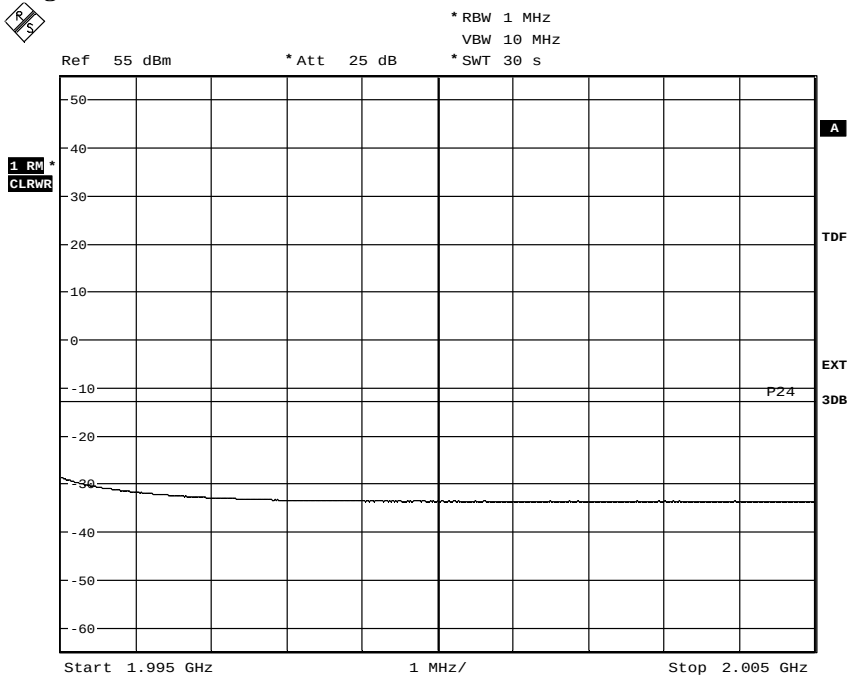
Date: 14.SEP.2010 20:13:44

Diagram 10 a



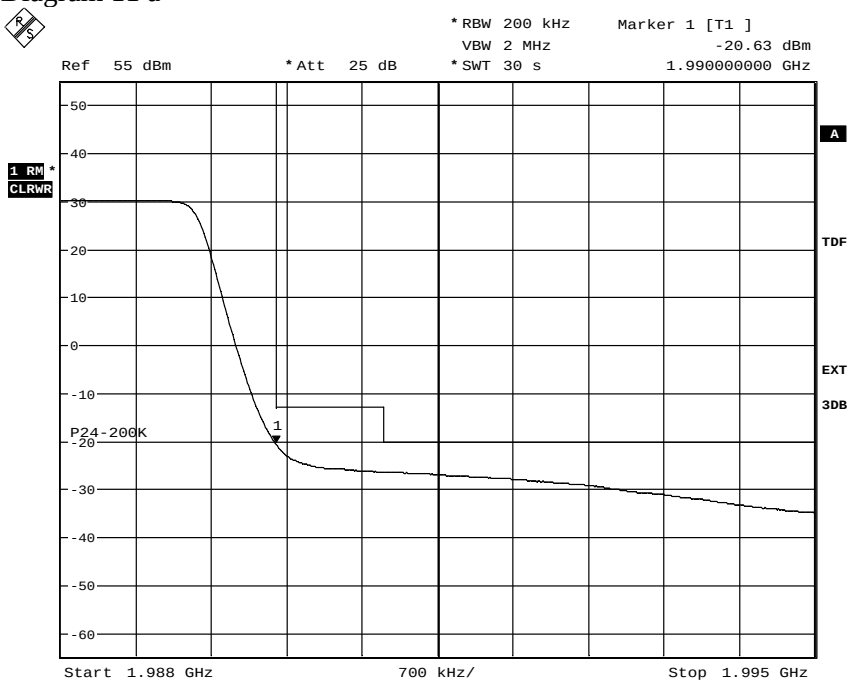
Date: 15.SEP.2010 08:50:15

Diagram 10 b



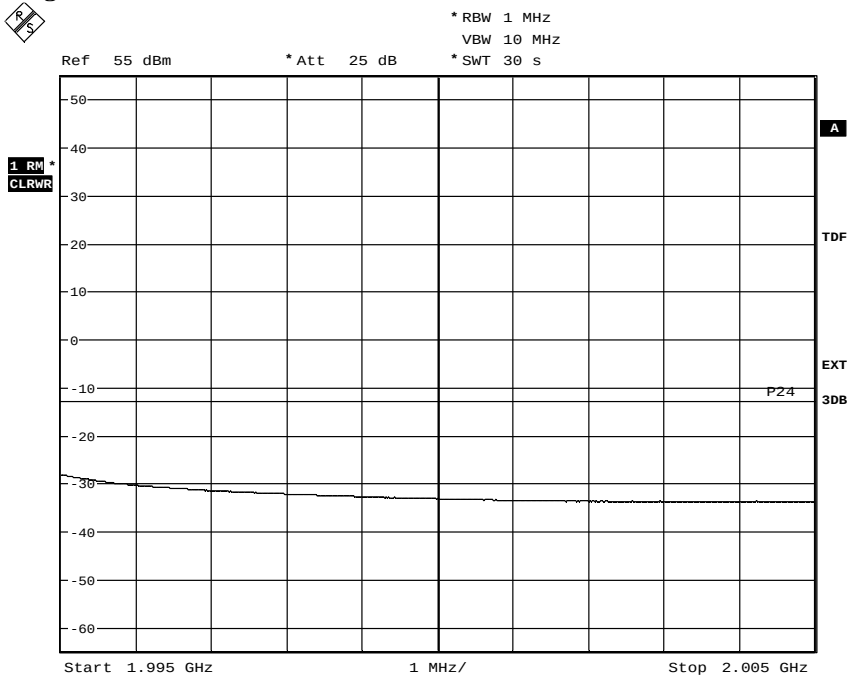
Date: 15.SEP.2010 08:52:53

Diagram 11 a



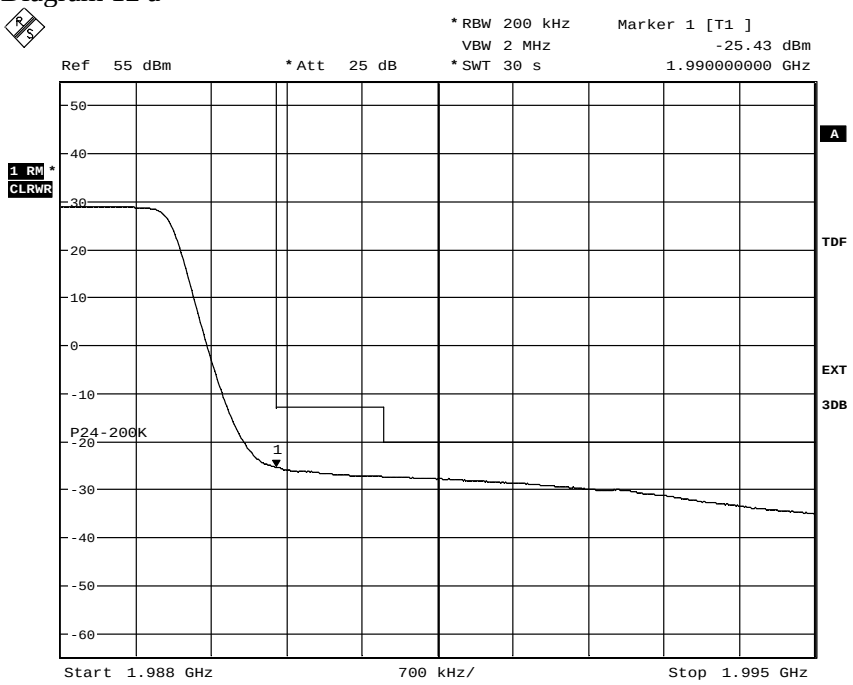
Date: 15.SEP.2010 09:41:33

Diagram 11 b



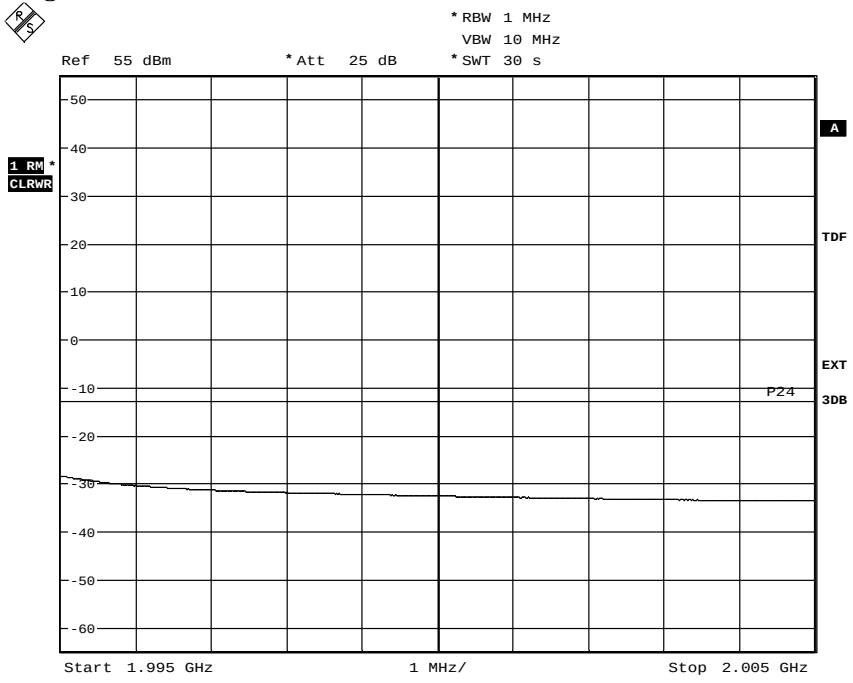
Date: 15.SEP.2010 09:45:47

Diagram 12 a



Date: 15.SEP.2010 10:19:54

Diagram 12 b



Date: 15.SEP.2010 10:22:23

FCC ID: TA8AKRC11866-1
IC: 287AB-AS118661

Appendix 5

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

Date	Temperature	Humidity
2010-09-14	22 °C ± 3 °C	49 % ± 5 %
2010-09-15	22 °C ± 3 °C	46 % ± 5 %

Test set-up and procedure

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

Measurement equipment	SP number
R&S FSQ	504 143
RF attenuator	900 229
High pass filter	504 200
Testo 615 temperature and humidity meter	503 498

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

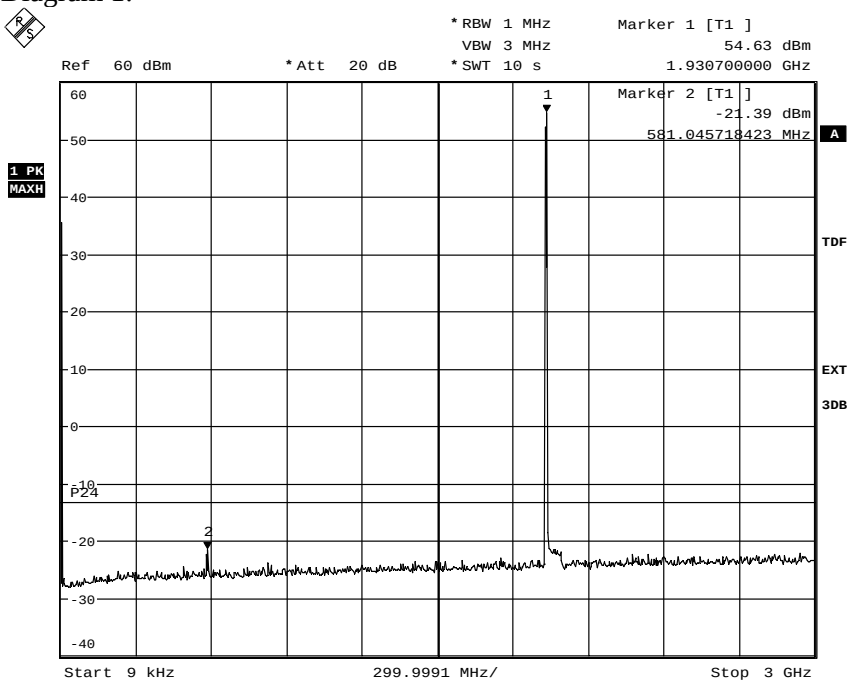
The emission at 9 kHz on some plots was not generated by the test object. A complementary measurement with a smaller RBW showed that it was related to the LO feed-through.

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.

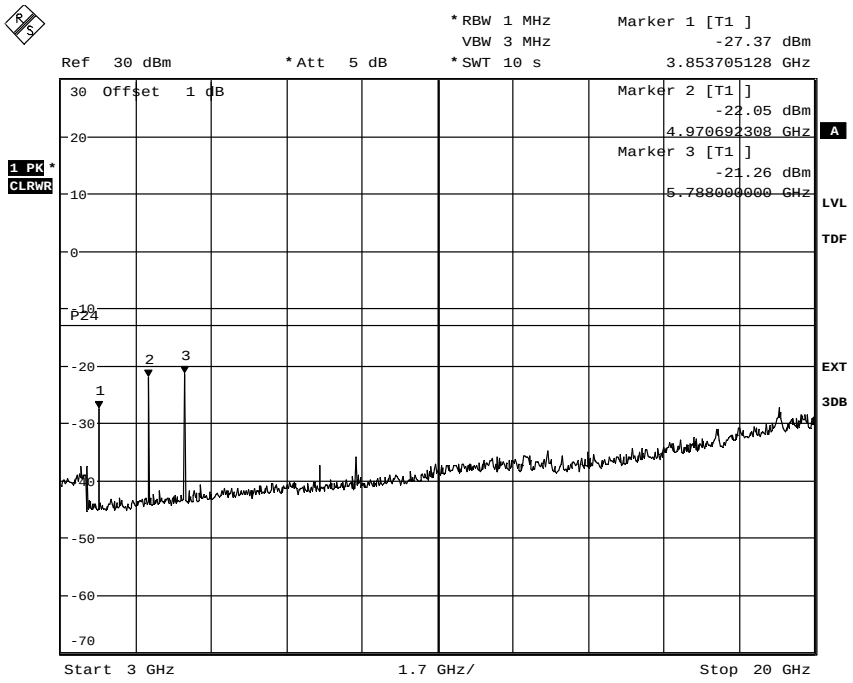
Complies?	Yes

Diagram 1:



Date: 14.SEP.2010 10:29:47

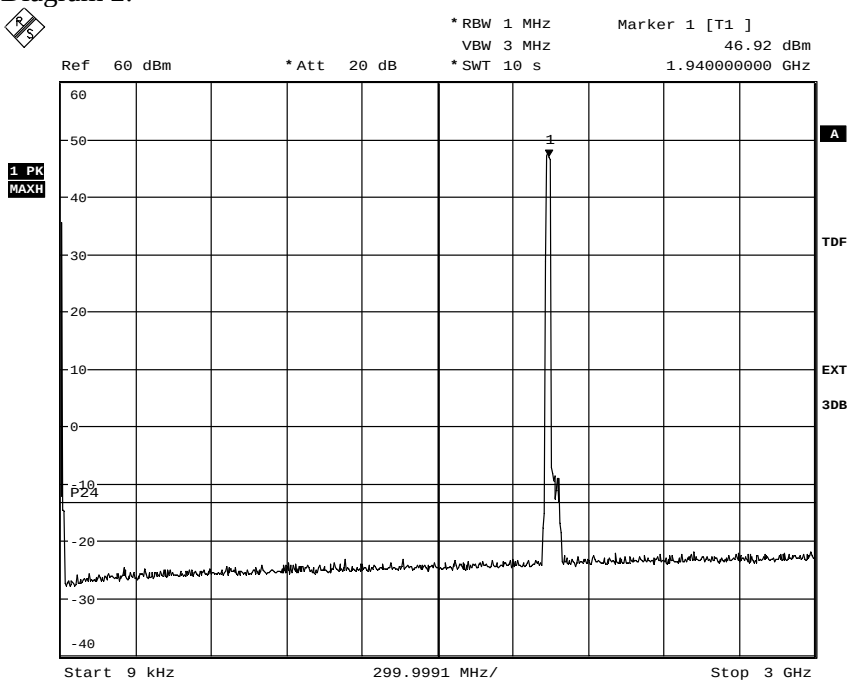
Note: The emission at 581 MHz did not exceed an RMS-value of -33 dBm.



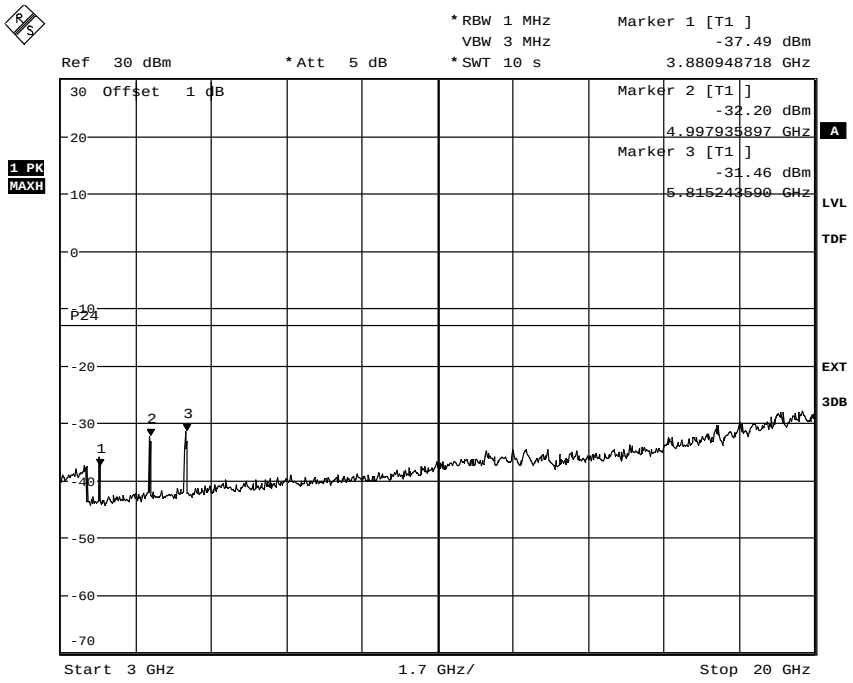
Date: 14.SEP.2010 09:15:20

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

Diagram 2:



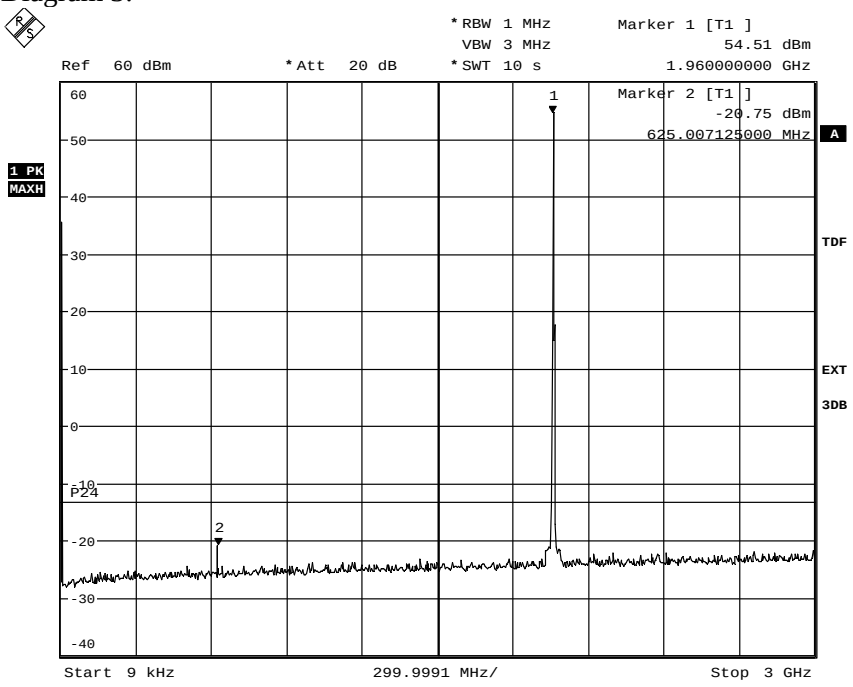
Date: 14.SEP.2010 15:38:50



Date: 14.SEP.2010 15:44:33

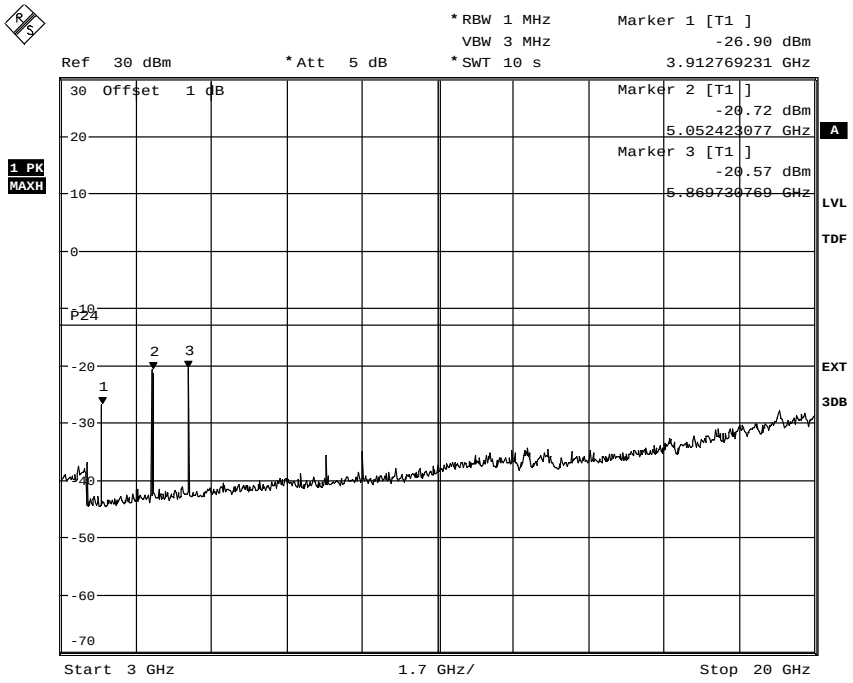
Note: Above marked emissions did not exceed an RMS-value of -33 dBm.

Diagram 3:



Date: 14.SEP.2010 16:22:57

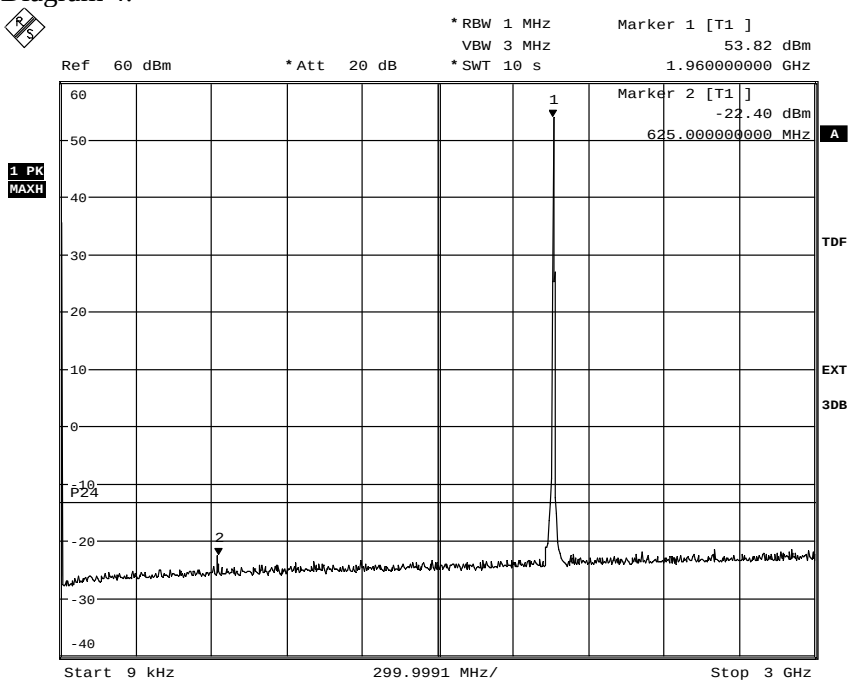
Note: The emission at 675 MHz did not exceed an RMS-value of -33 dBm.



Date: 14.SEP.2010 16:33:04

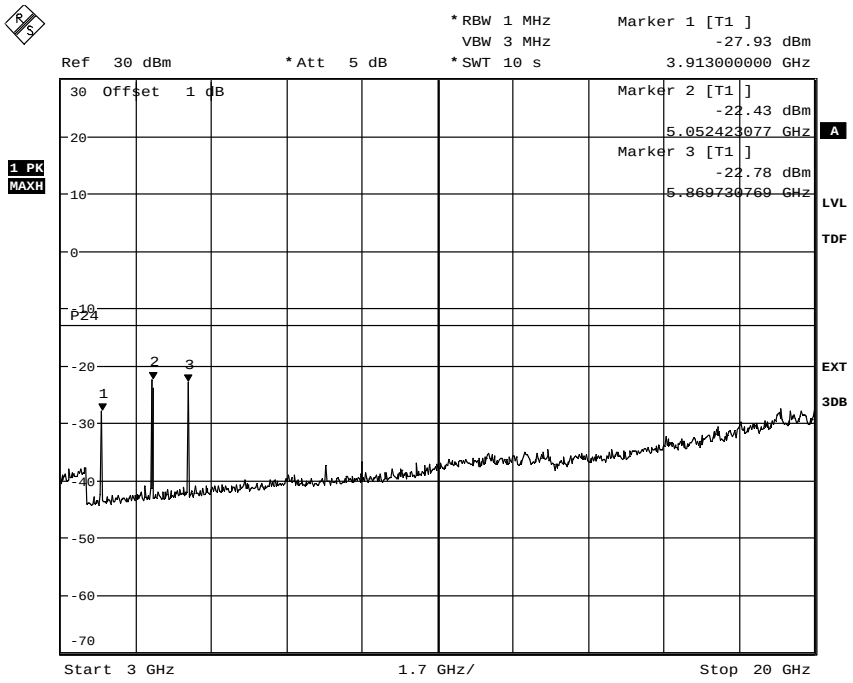
Note: Above marked emissions did not exceed an RMS-value of -33 dBm.

Diagram 4:



Date: 14.SEP.2010 17:01:31

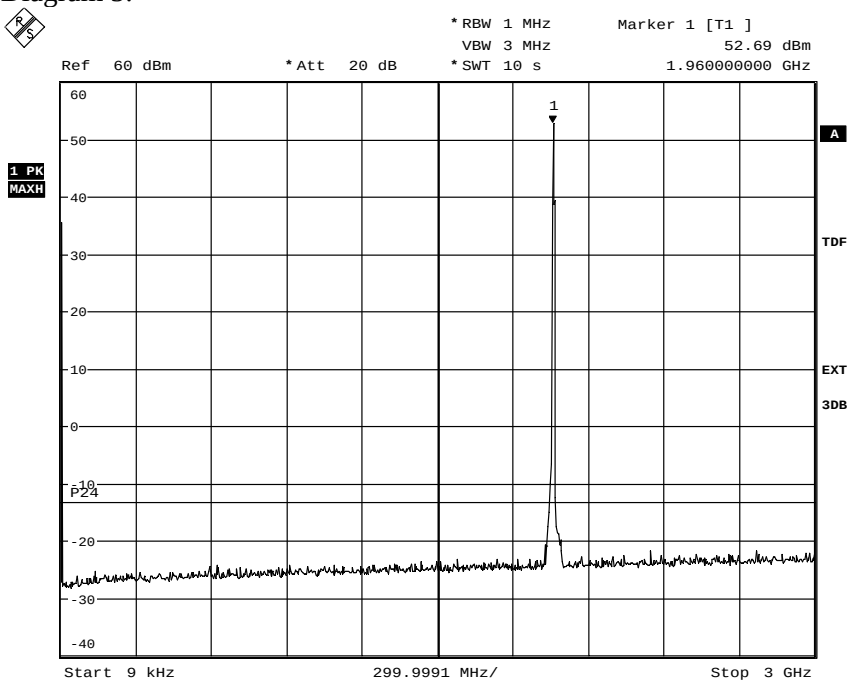
Note: The emission at 625 MHz did not exceed an RMS-value of -33 dBm.



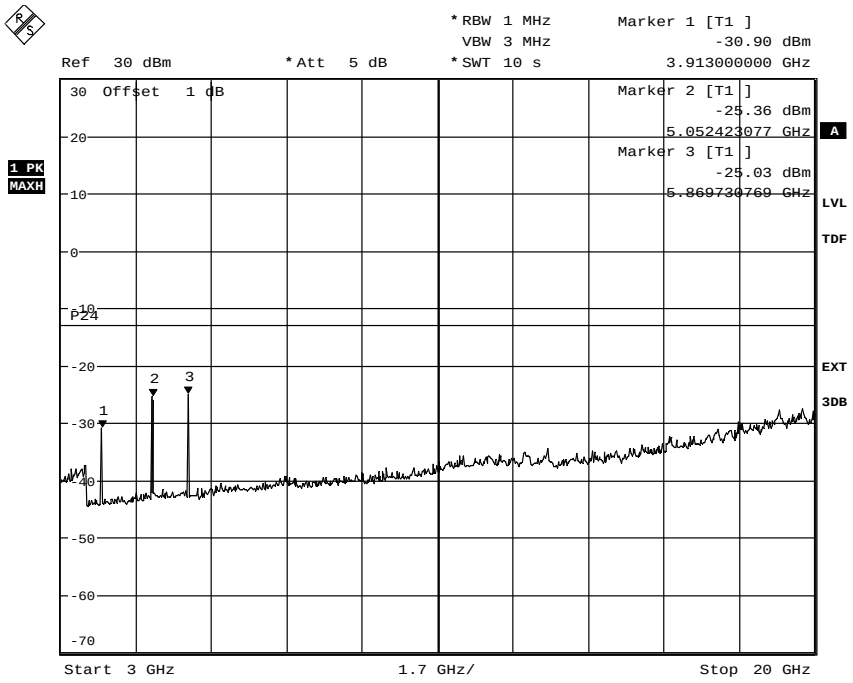
Date: 14.SEP.2010 17:05:52

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

Diagram 5:



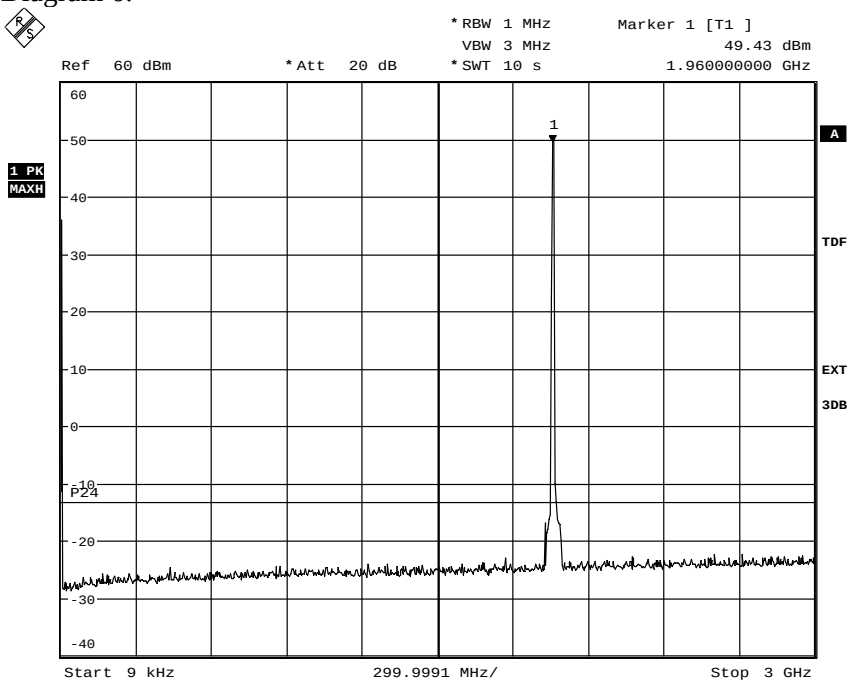
Date: 14.SEP.2010 17:25:37



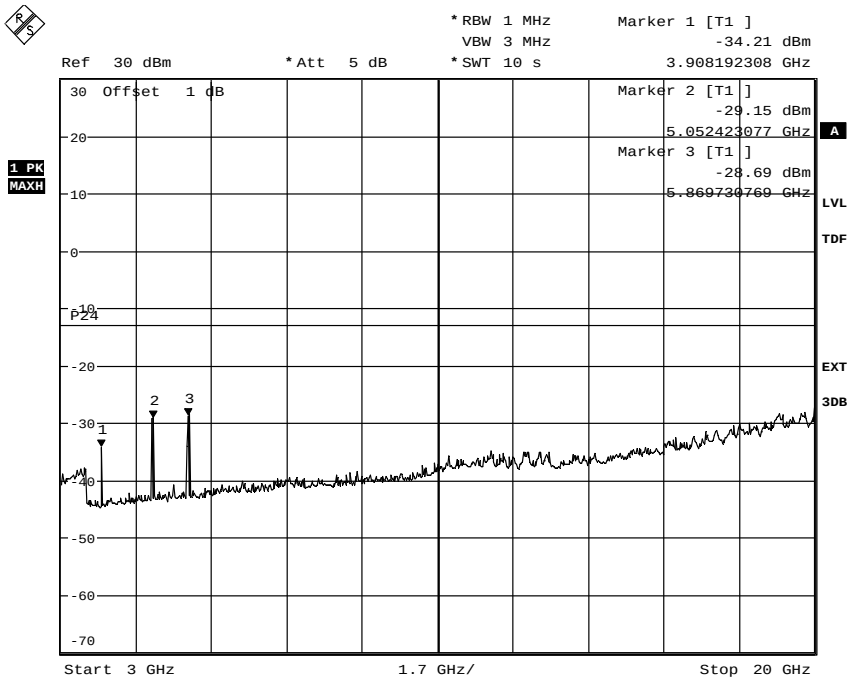
Date: 14.SEP.2010 17:32:11

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

Diagram 6:



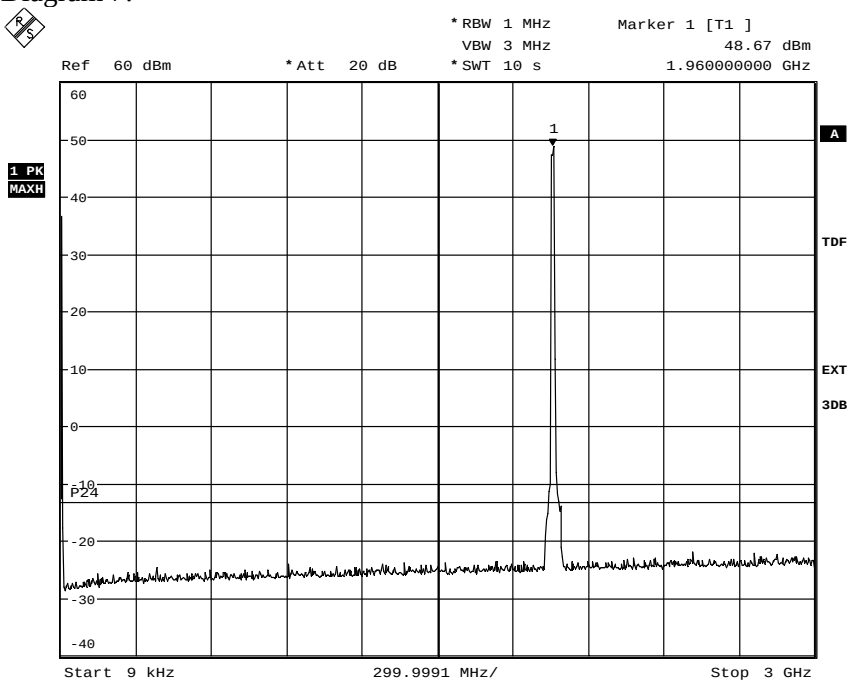
Date: 15.SEP.2010 10:48:12



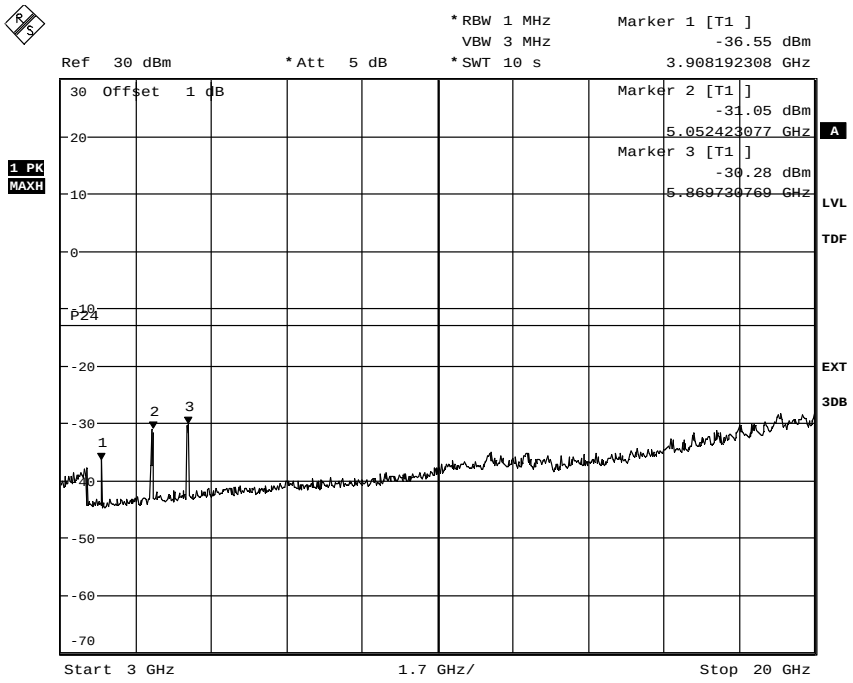
Date: 15.SEP.2010 10:50:20

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

Diagram 7:



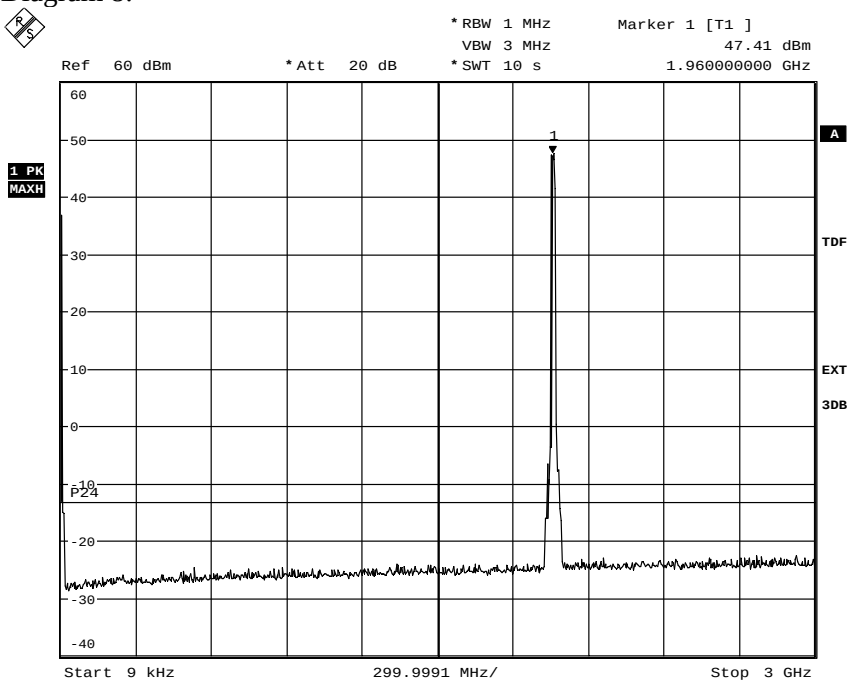
Date: 15.SEP.2010 13:09:45



Date: 15.SEP.2010 13:11:58

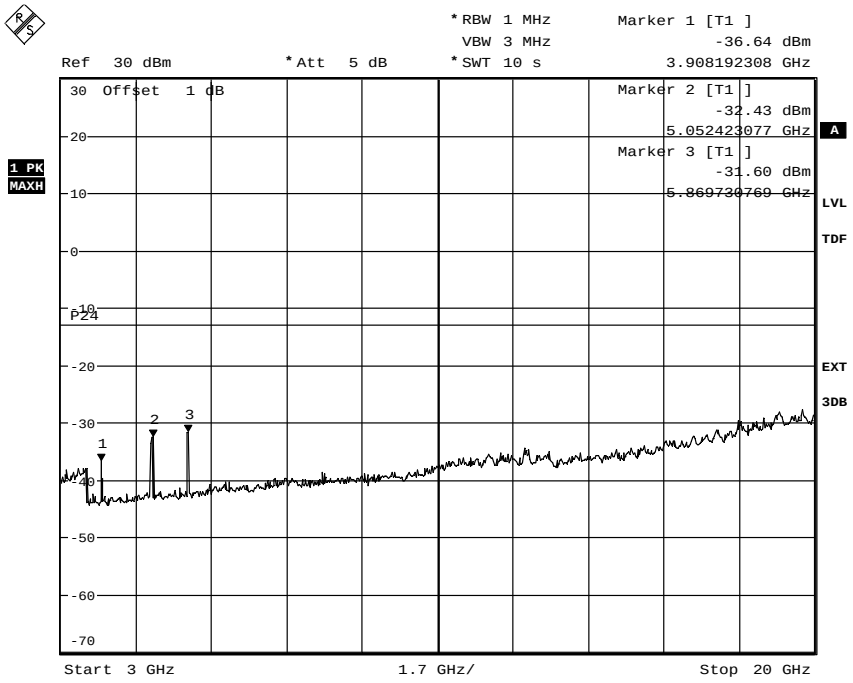
Note: Above marked emissions did not exceed an RMS-value of -33 dBm.

Diagram 8:



Date: 15.SEP.2010 13:28:12

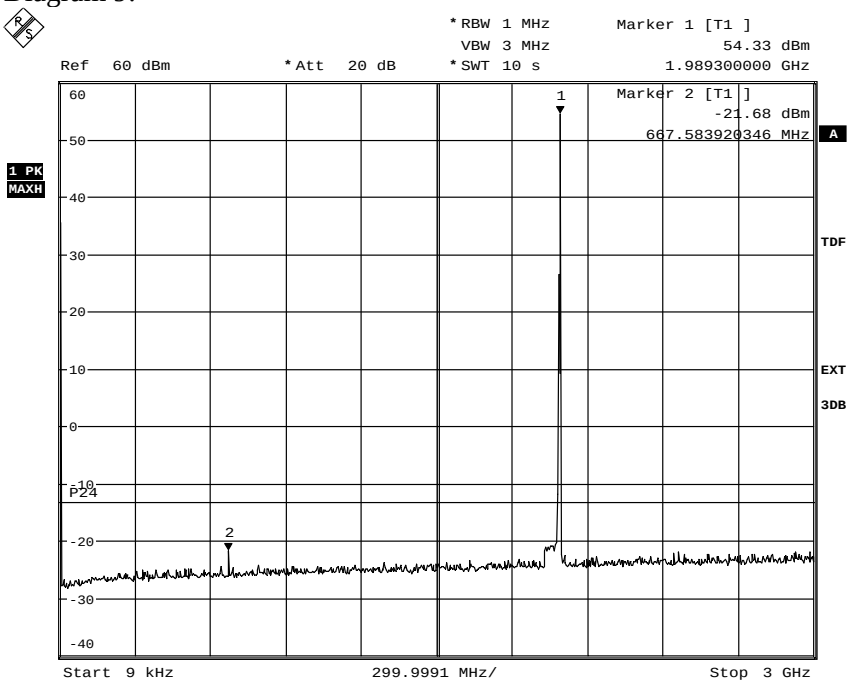
Note: The low frequency emission close to DC was related to instrument LO-leakage.



Date: 15.SEP.2010 13:37:10

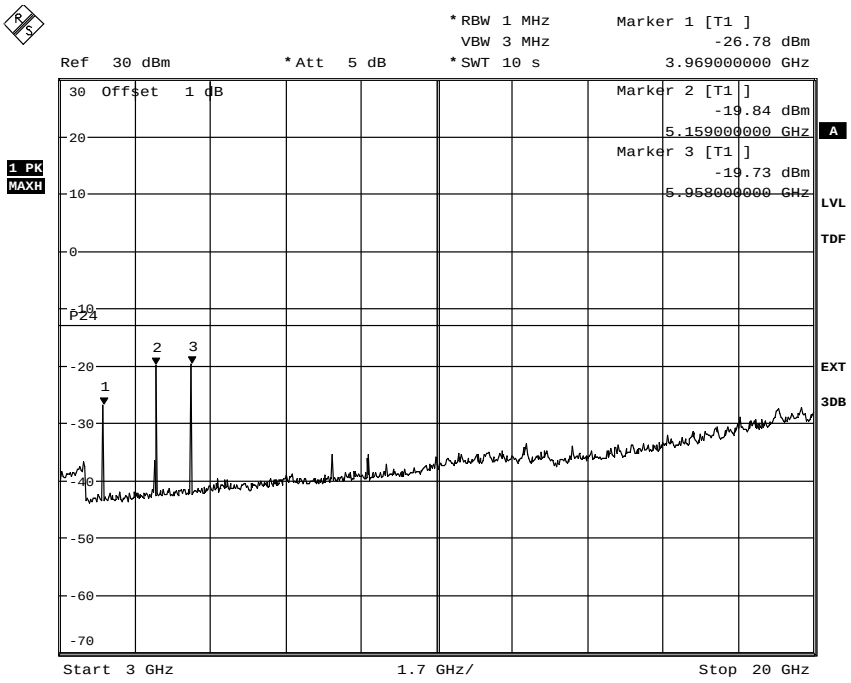
Note: Above marked emissions did not exceed an RMS-value of -33 dBm.

Diagram 9:



Date: 14.SEP.2010 18:57:20

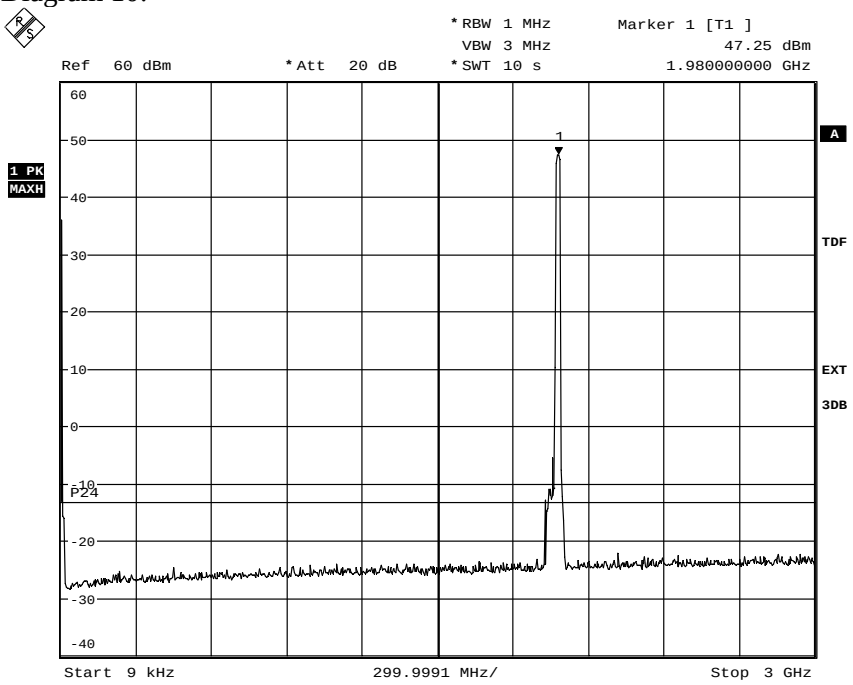
Note: The emission at 670 MHz did not exceed an RMS-value of -33 dBm.



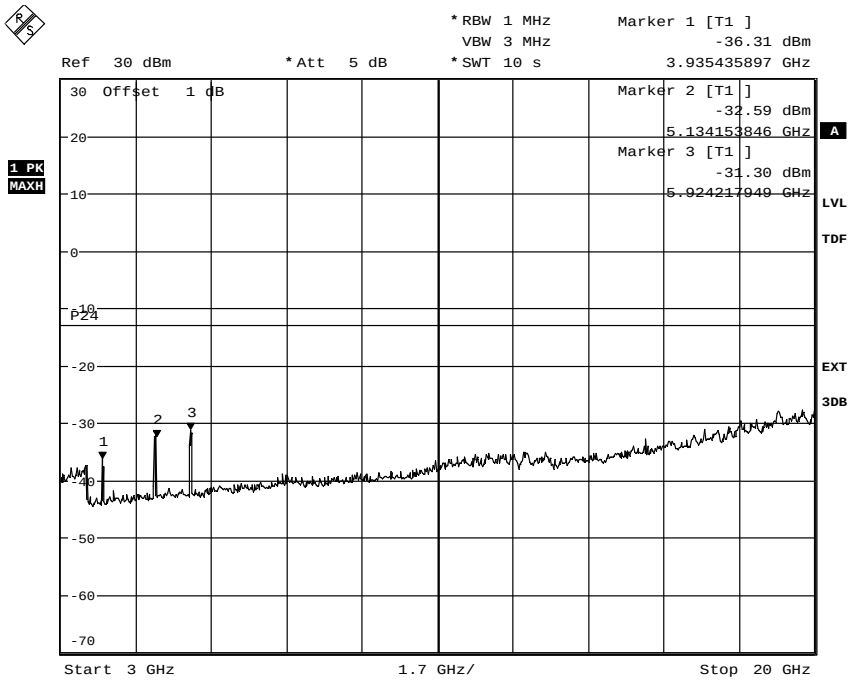
Date: 14.SEP.2010 19:11:15

Note: Above marked emissions did not exceed an RMS-value of -32.6 dBm.

Diagram 10:



Date: 15.SEP.2010 10:25:34



Date: 15.SEP.2010 10:33:14

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

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Appendix 6

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

Date	Temperature	Humidity
2010-09-13	23 °C ± 3 °C	51 % ± 5 %
2010-09-14	23 °C ± 3 °C	46 % ± 5 %
2010-09-15	23 °C ± 3 °C	47 % ± 5 %
2010-09-16	22 °C ± 3 °C	45 % ± 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, Issue 2, Industry Canada file no. IC 3482A-1.

The measurements were performed with both horizontal and vertical polarisation of the antenna. The antenna distance was 3 m in the frequency range 30 MHz – 18 GHz and 1m in the frequency range 18-20 GHz.

A pre-measurement was first performed:
In the frequency range 30 MHz-20 GHz the measurement was performed in power with a RBW of 1 MHz. A propagation loss in free space was calculated. The used formula was,

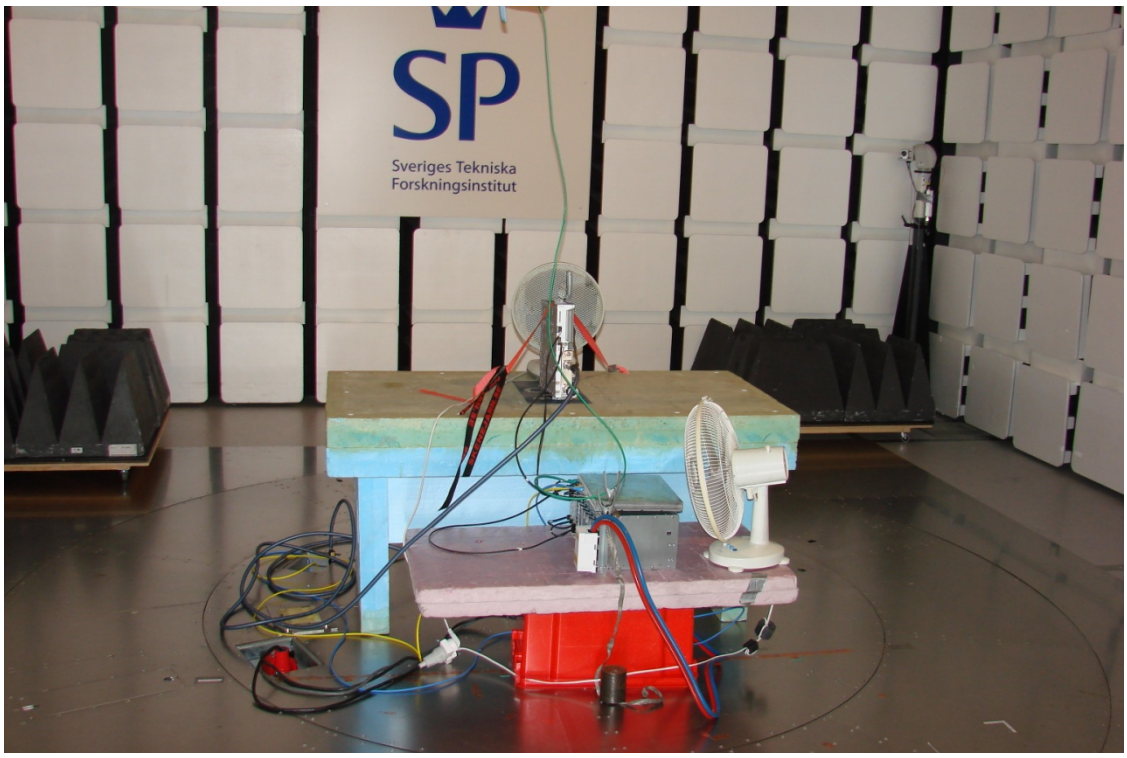
$\gamma = 20\log\left(\frac{4\pi D}{\lambda}\right)$, γ is the propagation loss and D is the antenna distance.

The measurement procedure was as the following:

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

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

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



Note: The fans were required for thermal relief. The equipment lacks sufficient passive cooling capacity when tested stand-alone outside a RBS cabinet.

Results

Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
30-20 000	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

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

Complies?	Yes

Frequency stability measurements according to 47 CFR 2.1055 / IC RSS 133 6.3

Date	Temperature	Humidity
2010-09-16 - 2010-09-21	23 °C ± 3 °C (valid for test equipment)	37-48 % ± 5 % (valid for test equipment)

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	900 229
RF attenuator	504 159
Testo 635, Temperature and humidity meter	504 203
Testo 625, Temperature and humidity meter	504 188
Rotronic temperature and humidity meter	502 946
Multimeter Fluke 87	502 190

Results

Nominal transmitter frequency was 1960.0 MHz in channel bandwidth configuration 1.4 MHz.
Rated output power level at connector RF A (maximum): 47.8 dBm (60 W).

Test conditions		Frequency error (Hz)
Supply voltage DC (V)	T (°C)	Test model E-TM1.1
-48.0	+20	+11
-55.2	+20	+8
-40.8	+20	+10
-48.0	+30	+9
-48.0	+40	+7
-48.0	+50	+2
-48.0	+10	+4
-48.0	0	+8
-48.0	-10	TX disabled (Note 1)
-48.0	-20	N.T.
-48.0	-30	N.T.
Maximum freq. error (Hz)		11
Measurement uncertainty		$< \pm 1 \times 10^{-7}$

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

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).

Complies?	Yes

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Appendix 8

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

Date	Temperature	Humidity
2010-09-15	22 °C ± 3 °C	46 % ± 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
RF step attenuator 10 dB	503 096
Testo 615 temperature and humidity meter	503 498

Result

The results are shown in appendix 8.1:

The nominal RX frequency was 1880 MHz.

	Tested port, frequency range
Diagram 1	RX B, 9 KHz – 1 GHz
Diagram 2	RX B, 1 GHz – 10 GHz

Remark

It was deemed sufficient to measure RX conducted emissions with only the worst case TX configuration. The upper frequency bound 10 GHz was chosen to cover 5x 1990 MHz, the upper TX frequency band edge and client delared highest frequency.

Limit

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

Emission below limit?	Yes

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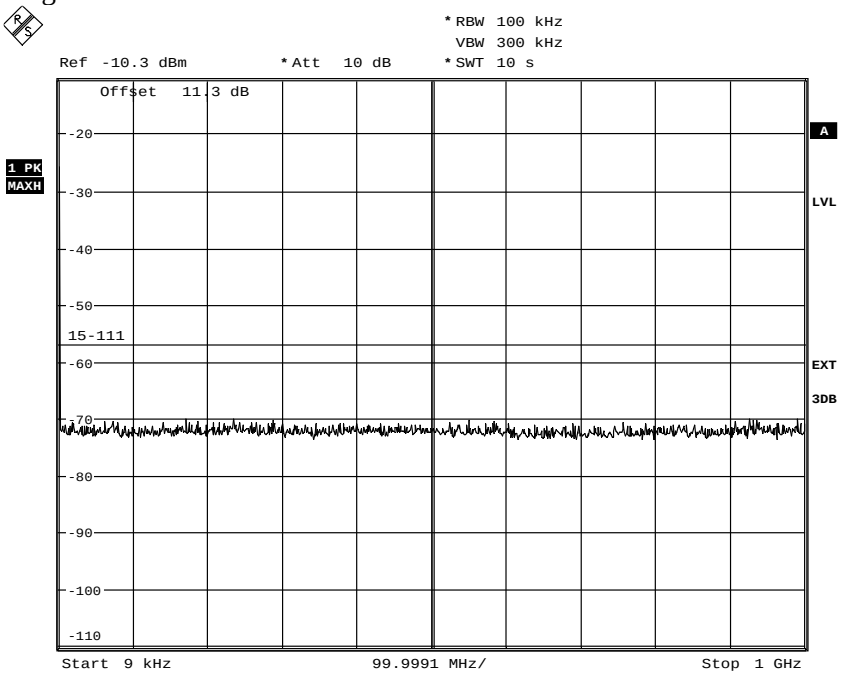
Appendix 8.1

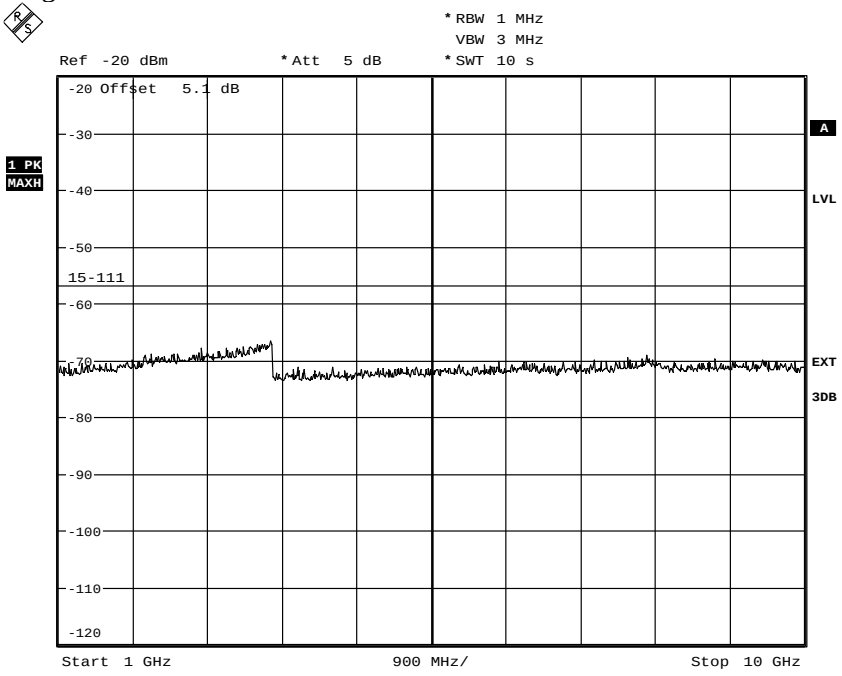
Diagram 1:



Date: 15.SEP.2010 16:02:12

Note: The emission at 9 kHz was related to LO feed-through and shall be ignored, as found from a complementary measurement with a smaller RBW.

Diagram 2:



Date: 15.SEP.2010 16:06:07

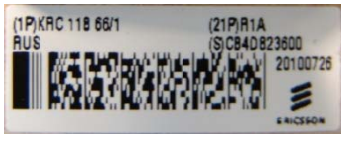
FCC ID: TA8AKRC11866-1
IC: 287AB-AS118661

Appendix 9

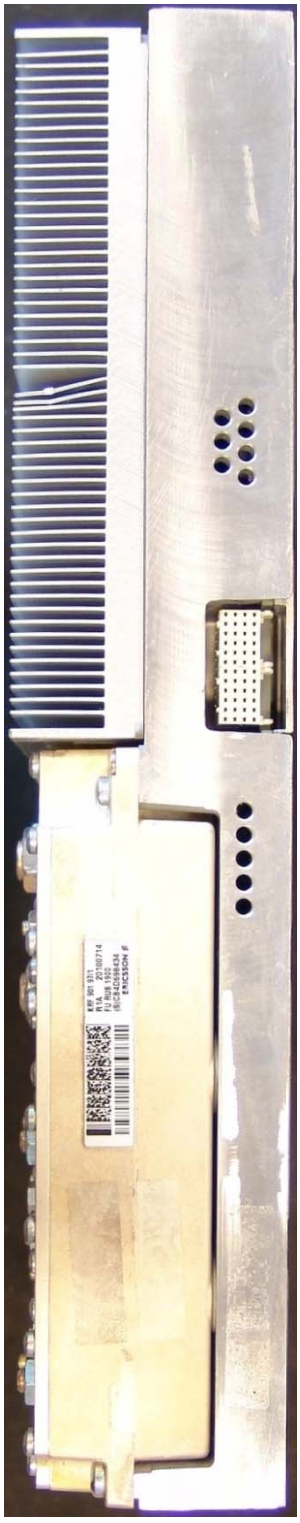
External photos

Photos show the sample used for conducted measurements.

Front side



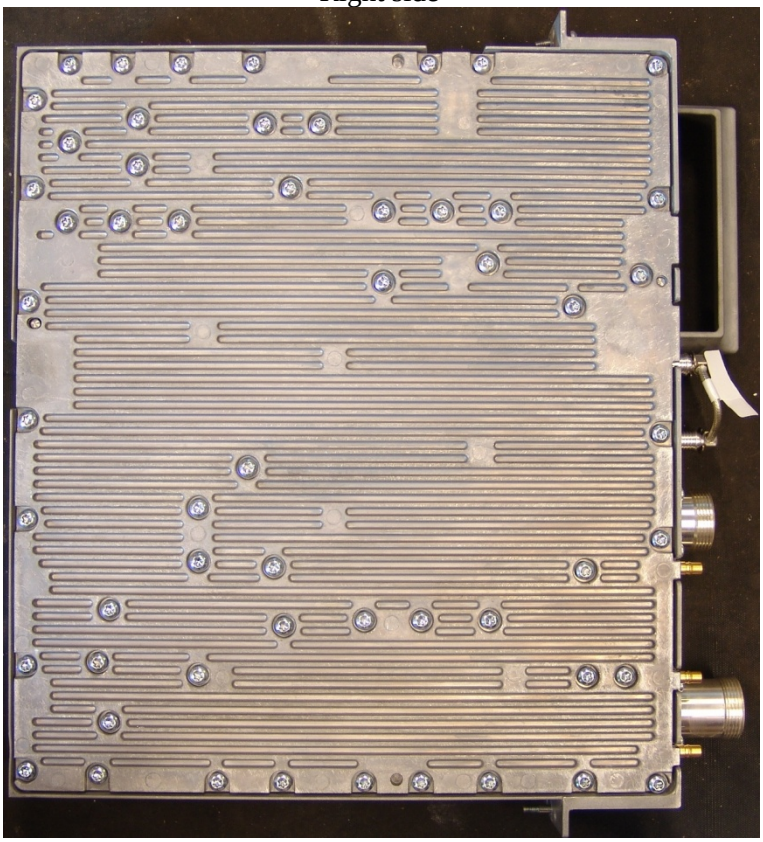
Rear side



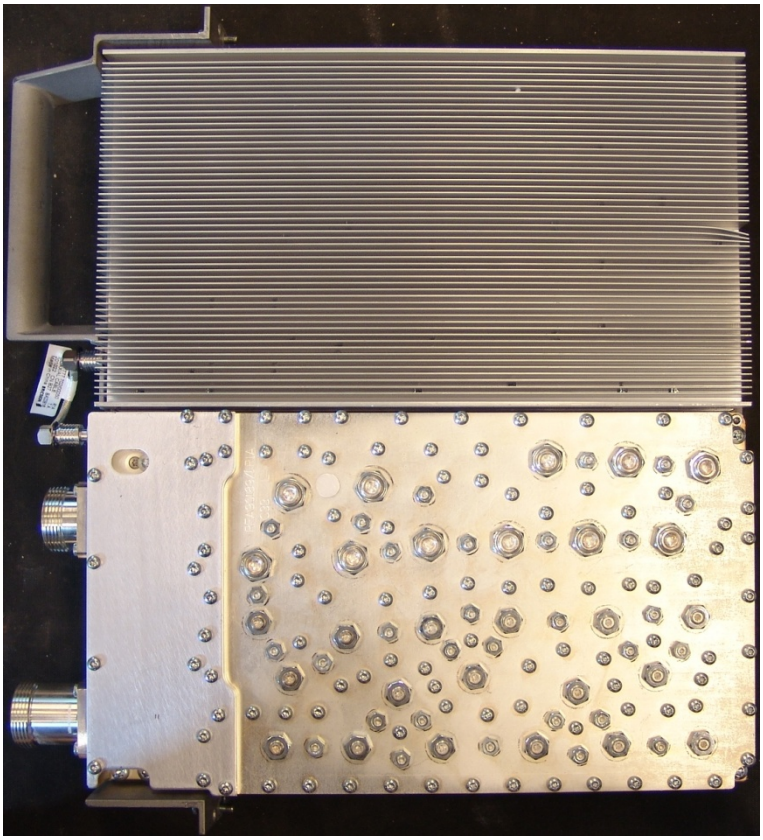
FCC ID: TA8AKRC11866-1
IC: 287AB-AS118661

Appendix 9

Right side



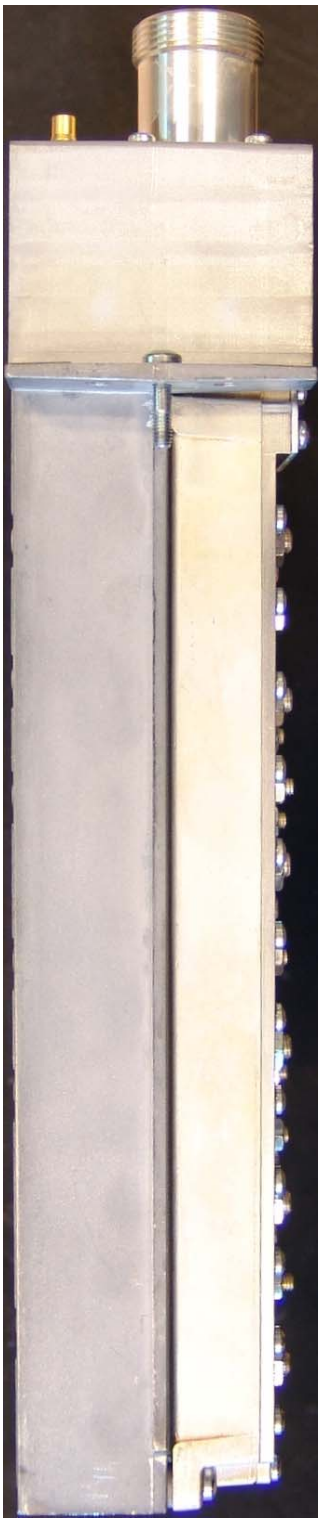
Left side



FCC ID: TA8AKRC11866-1
IC: 287AB-AS118661

Appendix 9

Bottom side



Top side