REPORT

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

Date	Reference	Page
2011-09-28	FX112894-F22G	1 (2)

1002
ISO/IEC 17025

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164 80 Stockholm

Radio measurements on RUS 01 B5 850 MHz radio equipment with FCC ID:TA8AKRC11864-3 and IC:287AB-AS118643

(9 appendices)

Test object

RUS 01 B5, KRC 118 64/3, revision R1A, serial no: C824850036

Summary

Standard		Compliant	Appendix
FCC CFR 47 / IC RSS-132			
2.1046 / RSS-132 4.4	RF power output	Yes	2
2.1049 / RSS-Gen 4.6.1	Occupied bandwidth	Yes	3
2.1051 / RSS-132 4.5	Band edge	Yes	4
2.1051 / RSS-132 4.5	Spurious emission at antenna terminals	Yes	5
2.1053 / RSS-132 4.5	Field strength of spurious radiation	Yes	6
2.1055 / RSS-132 4.3	Frequency stability	Yes	7
FCC CFR 47/ Industry Canada RSS-132 Issue 2			
RSS-132 4.6	Receiver spurious emissions	Yes	8

Note1: Above RSS-132 items are given as cross-reference only. Measurements were performed according to ANSI procedures referenced by FCC and covered by SP's accreditation.

Note 2: The channel adjacent to the lower and higher band edge cannot be used. The lowest usable channel is 129 (869.4 MHz) and the highest usable channel is 250 (893.6 MHz).

SP Technical Research Institute of Sweden
Electronics - EMC

Performed by

Jonas Bremholt

Examined by

Christer Karlsson

Table of contents

Description – Test object

Equipment:	Radio equipment RUS 01 B5 running in GSM mode supporting single and multi carrier
Antenna ports:	RF A: TX/RX port RF B: RX port
Frequency bands:	TX: 869– 894 MHz RX: 824 – 849 MHz
Modulations:	GMSK, 8-PSK, AQPSK, 16QAM, and 32QAM
Nominal output power: (Maximum)	Single carrier: 1x 47.8 dBm (1x 60W) Multi carrier: 2x 46 dBm (2x 40W) 4x 43 dBm (4x 20W)
Nominal power voltage:	-48 VDC

Tested channels

Channel	ARFCN	Frequency (MHz) Downlink	Uplink
B	128	869.2	824.2
B+1	129	869.4	824.4
B+5	133	870.2	825.2
B+9	137	871.0	826.0
B+10	138	871.2	826.2
B+15	143	872.2	827.2
M-5	143	872.2	827.2
M	190	881.6	836.6
M+5	195	882.6	837.6
M+10	200	883.6	838.6
T-15	236	890.8	845.8
T-10	241	891.8	846.8
T-9	242	892.0	847.0
T-5	246	892.8	847.8
T-1	250	893.6	848.6
T	251	893.8	848.8

Used RF configurations

Unless noted otherwise, following configurations were used:

Single Carrier (One carrier configuration):

Cell	1	1	1
Channel	B	M	T

Multi Carrier 1x2 (Two carrier configuration):

Cell	1	2
Channels	B	B+10
Channels	T	T-10

Multi Carrier 1x4 (Four carrier configuration):

Cell	1	2	3	4
Channels	B	B+5	B+10	B+15
Channels	M	M-5	M+5	M+10
Channels	T	T-5	T-10	T-15

Operation mode during measurements

Unless otherwise stated, all measurements were performed with the test object transmitting pseudorandom data in all timeslots and settings for maximum transmitter output power applicable for each configuration. All supported modulations were tested to find worst case configuration. Occupied bandwidth and frequency error were only measured with single carrier configuration. For AQPSK modulation the SCPIR is 0 dB.

Conducted measurements

The test object was mounted into an RBS 6201 cabinet and powered by the cabinets internal -48 VDC. All RF conducted TX measurements were performed at antenna port RF A, with antenna port RF B terminated into 50 ohm. All RX measurements were performed at antenna port RF B, with the test object antenna port RF A transmitting at maximum output power into a 50 ohm termination.

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 FSIQ spectrum analyzer outside the shielded chamber for signal monitoring. Antenna port RF B was left unterminated. The modulation 8-PSK was found to be representative for worst case setting for the radiated spurious measurements.

Purpose of test

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

References

Measurements were done according to relevant parts of the following standards:
ANSI 63.4-2009
ANSI/TIA/EIA-603-C-2004
ANSI/TIA/EIA 136-280-D-2002
J-STD007A Vol 1
CFR 47 part 2, October 1st , 2010
CFR 47 part 22, October 1st, 2010
RSS-Gen Issue 3
RSS-132 Issue 2

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 2011-08-08.

Manufacturer’s representative

Christer Gustavsson, Ericsson AB

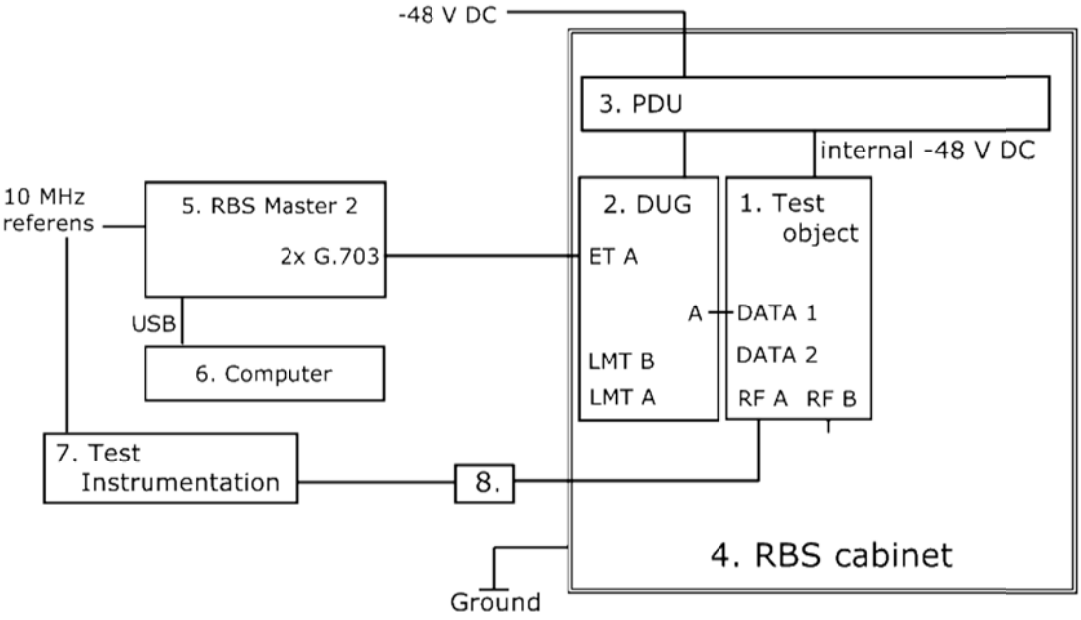
Test engineers

Tomas Lennhager, Andreas Johnson, Jörgen Wassholm, Reinhold Reul and Jonas Bremholt

Test participant

Xiang Yue, Ericsson CBC (Partly present)

Test set-up conducted measurements TX



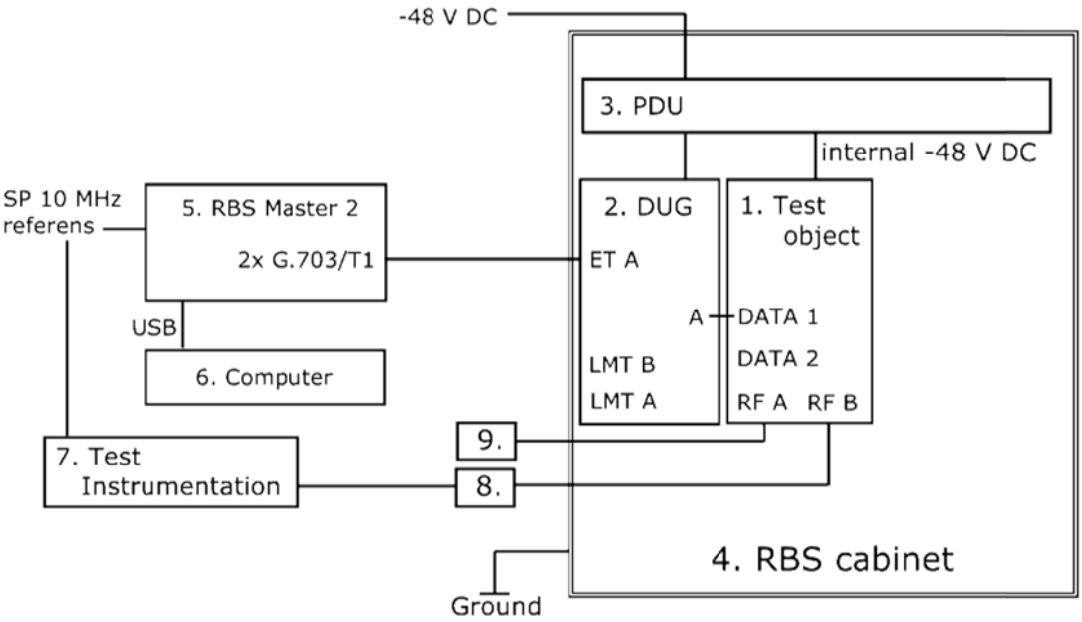
Test object

1. RUS 01 B5, KRC 118 64/3, revision R1A, S/N: C824850036
   (FCC ID: TA8AKRC11864-3 and IC: 287AB-AS118643)

Functional test equipment

2. DUG 20 01, KDU 137 569/1, revision R2A, C823667528
3. PDU 02 01, BMG 980 336/4, revision R2A, SN BJ31528316
4. RBS 6201 cabinet, BAMS 1000778792
5. RBS Master 2, LPY 107 1007/3, revision R1C, BAMS 1001086304
6. Computer, Compaq nc6220, BAMS – 1000208319
   running software RBS Master2, version R8B02
7. SP test instrument according measurement equipment list
8. Attenuator and filter according measurement equipment list

Test set-up conducted measurements RX



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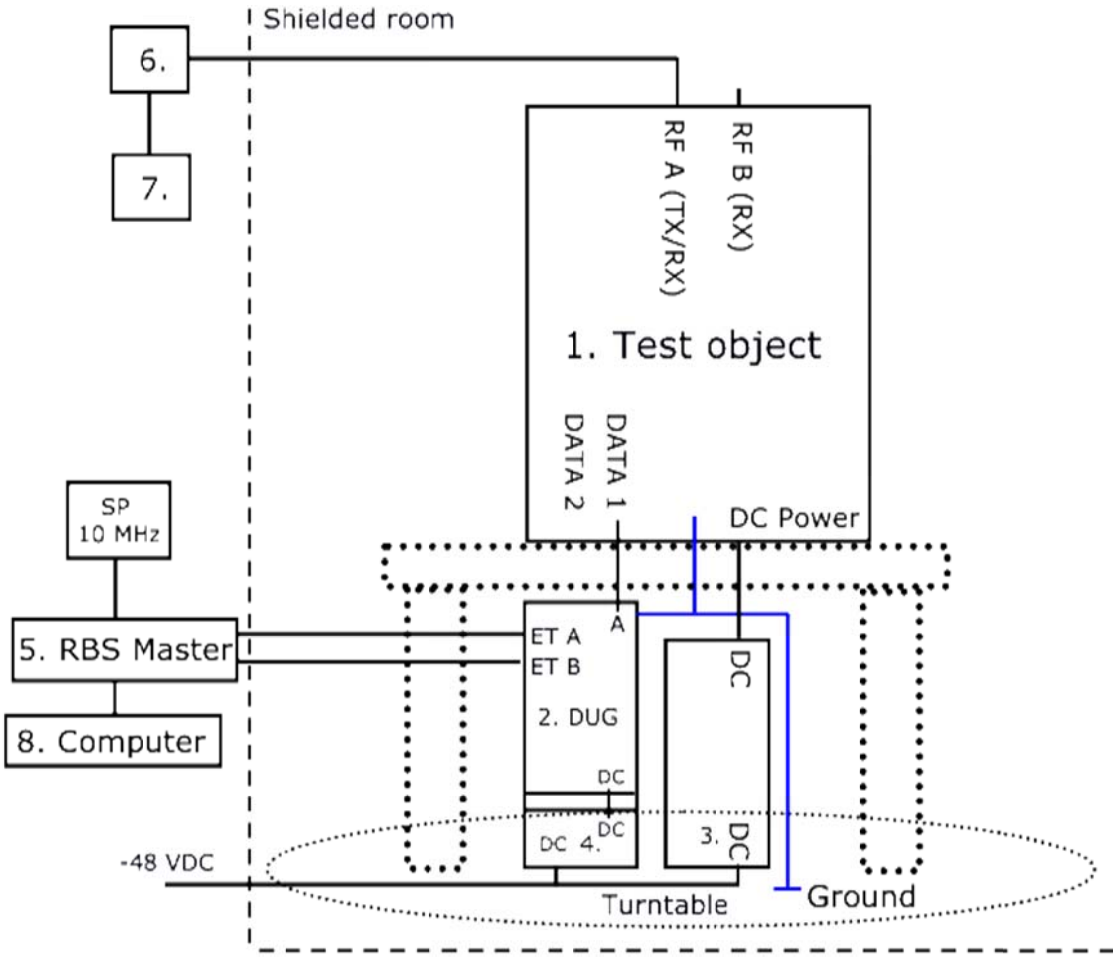
5. RBS Master 2, LPY 107 1007/3, revision R1C, BAMS 1001086304
6. Computer, Compaq nc6220, BAMS – 1000208319
   running software RBS Master2, version R8B02
7. SP test instrument according measurement equipment list
8. Attenuator and filter according measurement equipment list
9. Attenuator and 50 ohm termination

Test set-up radiated measurements



Test object

1. RUS 01 B5, KRC 118 64/3, revision R1A, S/N: C824850036
   (FCC ID: TA8AKRC11864-3 and IC: 287AB-AS118643)

Functional test equipment

2. DUG 20 01, KDU 137 569/1, revision R2A, C823667528
3. Power subrack, see below for hardware details
4. SUP 6601 1/BFL 901 009/1 Rev R3B, S/N. BR81262569
5. RBS Master 2, LPY 107 1007/**3**, revision R1C, BAMS 1001086304
6. Attenuator, Weinschel model 57-40-34 s/n: ML394
7. Spectrum analyzer, Rohde & Schwarz FSIQ 40, SP 503 738, for supervision purposes
8. Computer, Compaq nc6220, BAMS – 1000092619
   running software RBS Master2, version R8B02

Test object interfaces	**Type of port:**
Power configuration: -48 VDC	DC Power
Ground via RBS frame during conducted measurements, Ground via ground strap during radiated stand-alone measurements	Ground
Antenna port RF A, combined TX/RX, female 7/16 connector	Antenna
Antenna port RF B, RX only, female 7/16 connector	Antenna
Cross connect RX A, not supported, omitted in set-up drawings above	-
Cross connect RX B, not supported, omitted in set-up drawings above	-
RXA CO-site, not supported, omitted in set-up drawings above	-
Data 1, connected to DUG port A	Signal
Data 2, not supported	-

RBS software

Software	Revision
CXP 104 0013/06 (G12AG7)	P4BB

RF power output measurements according to CFR 47 §22.913 / IC RSS-132 4.4

Date	Temperature	Humidity
2011-09-07 to 2011-09-12	22-23 °C ± 3 °C	41-67 % ± 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	503 145
RF attenuator	504 159
Multimeter Fluke 87	502 190
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 0.7 dB

Results

Single carrier: Rated output power level at port RF A (maximum):

Transmitter power (dBm/ dB) RMS / PAR				
Channel	B	M	T	Nominal
GMSK	47.0/ 0.9	47.2/ 0.9	47.4/ 0.8	47.8
AQPSK	46.8/ 4.1	47.1/ 4.2	46.7/ 4.2	47.8
8-PSK	47.0/ 3.8	47.3/ 3.8	46.8/ 3.8	47.8
16QAM	46.9/ 5.1	47.2/ 5.2	46.8/ 5.1	47.8
32QAM	46.8/ 5.4	47.1/ 5.4	46.7/ 5.4	47.8

Multi carrier 1x2: Rated output power level at port RF A (maximum):

Transmitter power (dBm) per carrier RMS				
Channel	B	M	T	Nominal
GMSK	45.3	45.5	45.1	46.0
AQPSK	45.1	45.3	45.0	46.0
8-PSK	45.2	45.4	45.1	46.0
16QAM	44.8	45.0	44.7	45.7
32QAM	44.4	44.6	44.3	45.3

Multi carrier 1x2: Rated output power level at port RF A (maximum):

Transmitter combined power (dBm) RMS				
Channel	B+(B+10)	M+(M+10)	T+(T-10)	Nominal
GMSK	48.3	48.5	48.1	49.0
AQPSK	48.1	48.3	48.0	49.0
8-PSK	48.2	48.4	48.1	49.0
16QAM	47.8	48.0	47.7	48.7
32QAM	47.4	47.6	47.3	48.3

Multi carrier 1x4: Rated output power level at port RF A (maximum):

Transmitter power (dBm) per carrier RMS				
Channel	B	M	T	Nominal
GMSK	42.1	42.4	42.2	43.0
AQPSK	40.1	40.2	40.1	41.0
8-PSK	40.2	40.6	40.4	41.1
16QAM	39.2	39.3	39.1	39.7
32QAM	38.7	38.9	38.7	39.3

Multi carrier 1x4: Rated output power level at port RF A (maximum):

Transmitter combined power (dBm) RMS				
Channel	B+(B+5)+ (B+10)+(B+15)	M+(M-5)+ (M+10)+(M+15)	T+(T-5)+ (T-10)+(T-15)	Nominal
GMSK	48.1	48.4	48.2	49.0
AQPSK	46.1	46.2	46.1	47.0
8-PSK	46.2	46.6	46.4	47.1
16QAM	45.2	45.3	45.1	45.7
32QAM	44.7	44.9	44.7	45.3

Limits

According to CFR 47/ RSS there are no conducted limits at the antenna connector.

CFR § 22.913/ SRSP-503 5.1: The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts (57 dBm).

RSS-132: The transmitter output power shall not exceed the limits given in SRSP-503

Complies?	Yes

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

Date	Temperature	Humidity
2011-09-07 to 2011-09-08	22 °C ± 3 °C	48-58 % ± 5 %

Test set-up and procedure

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

Measurement equipment	SP number
Rohde & Schwarz FSQ	504 143
RF attenuator	504 159
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

The results are shown in appendix 3.1

Diagram	Modulation	Tested frequency	Occupied BW (99%) [kHz]	Emission BW (99.75%) [kHz]
1	GMSK	B	241.0	282.5
2	AQPSK	B	230.0	268.5
3	8-PSK	B	238.5	274.5
4	16QAM	B	241.0	276.5
5	32QAM	B	240.5	276.0
6	GMSK	M	241.0	282.5
7	AQPSK	M	230.0	268.0
8	8-PSK	M	238.0	274.5
9	16QAM	M	241.0	277.5
10	32QAM	M	241.0	276.0
11	GMSK	T	241.0	282.0
12	AQPSK	T	230.0	268.0
13	8-PSK	T	237.5	275.0
14	16QAM	T	241.0	276.5
15	32QAM	T	241.0	276.0

Diagram 1

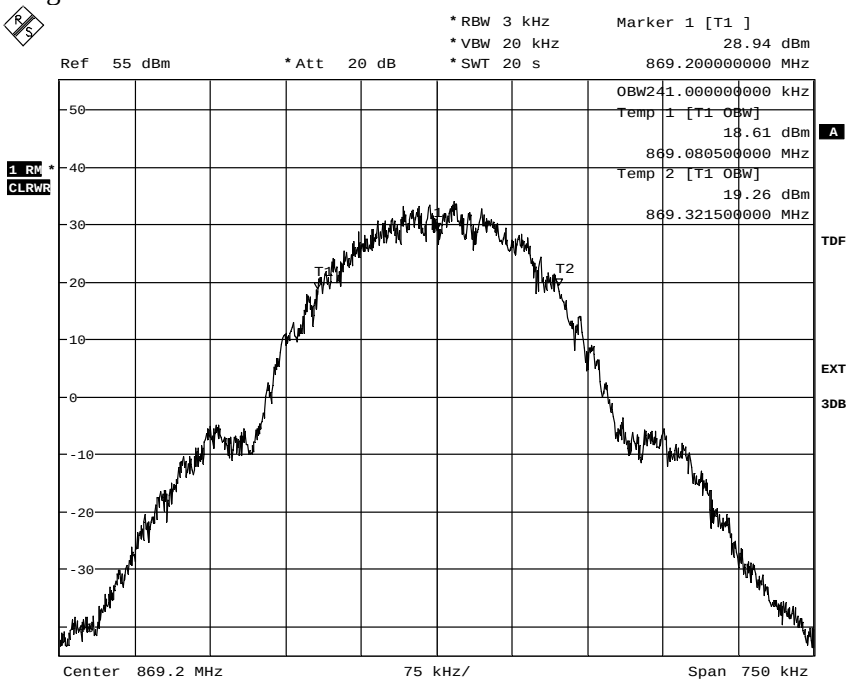


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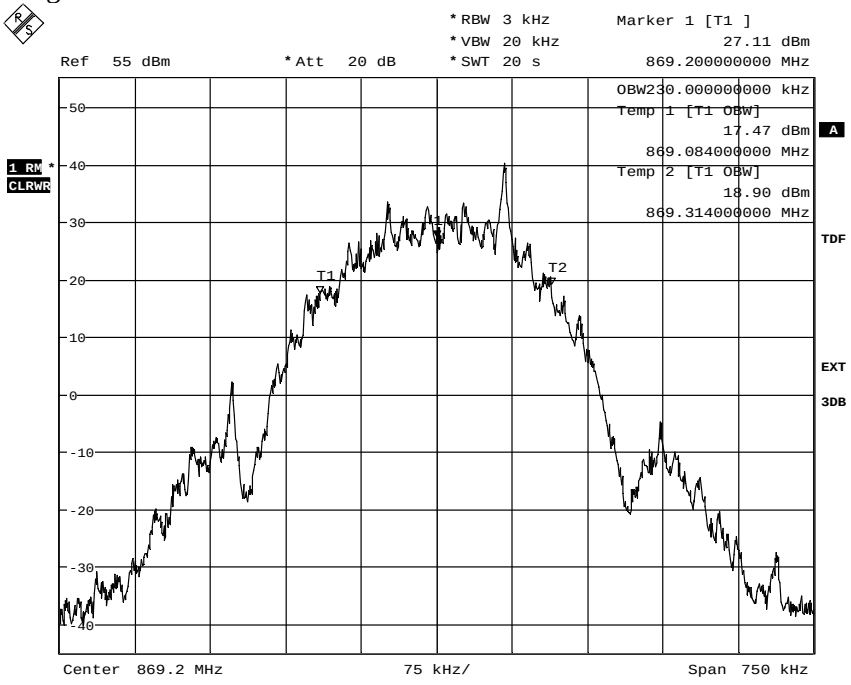
Diagram 2



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FCC ID:TA8AKRC11864-3 Appendix 3
IC:287AB-AS118643

Diagram 3

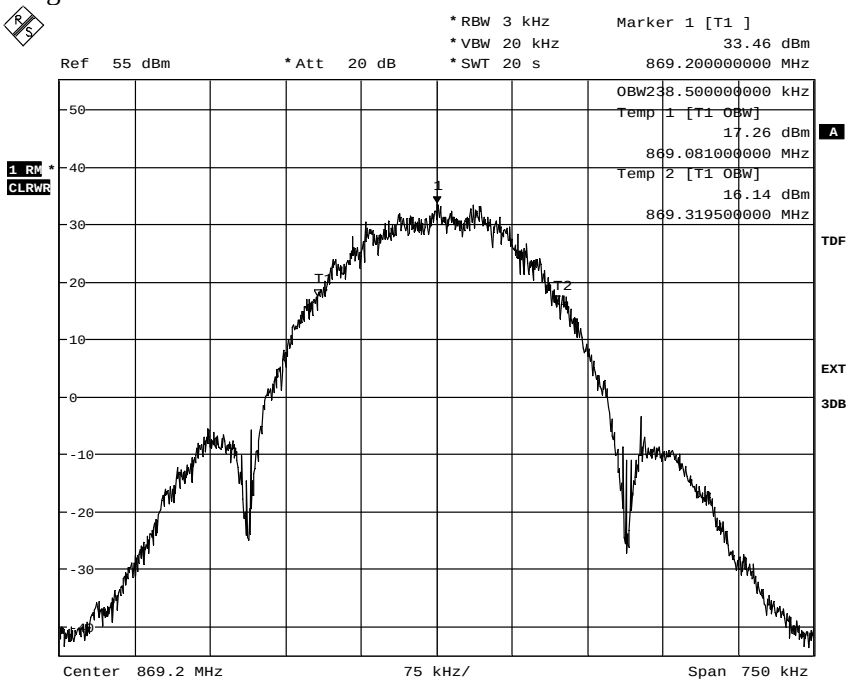

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Diagram 4

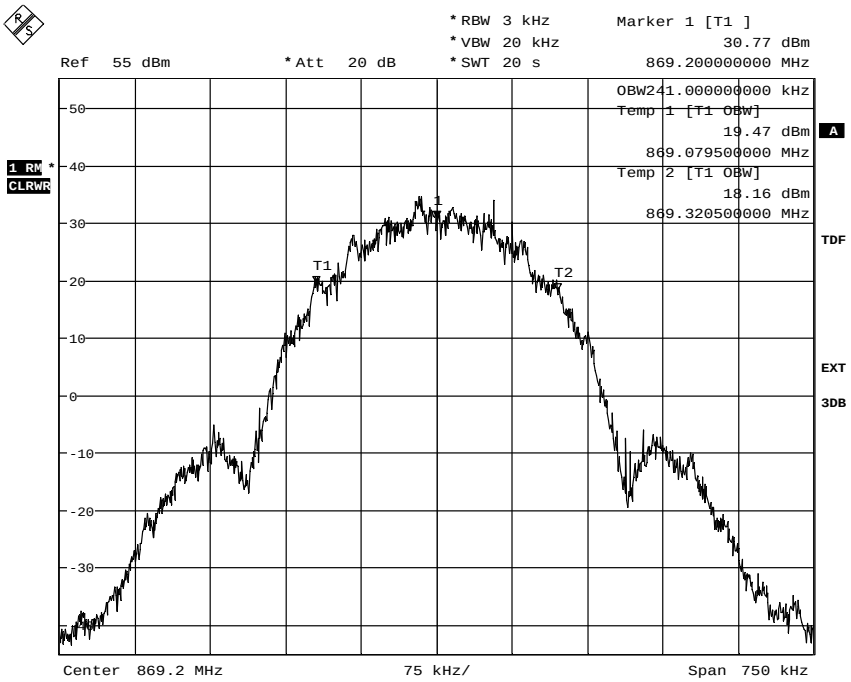

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Diagram 5

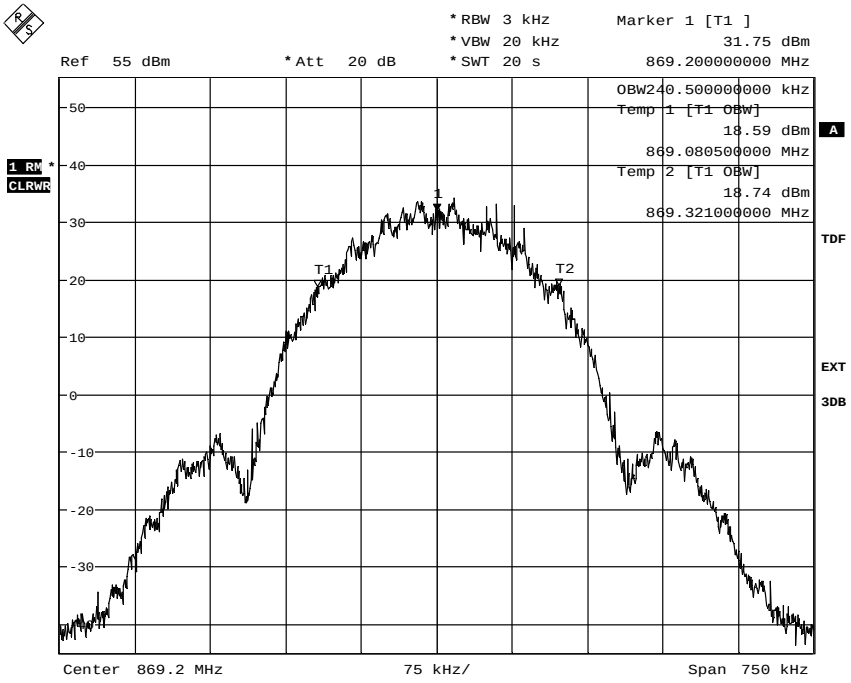

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Diagram 6

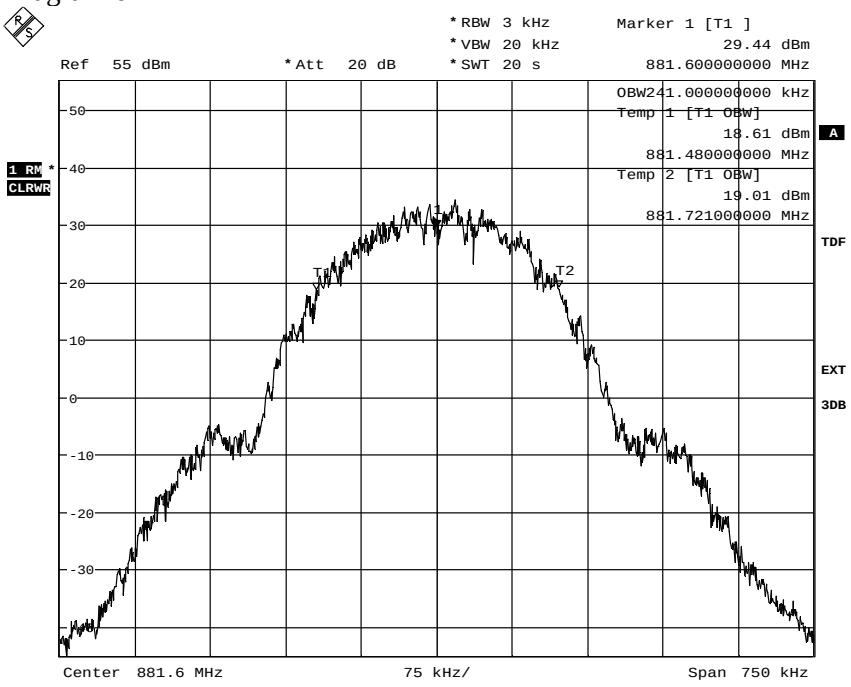

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Diagram 7

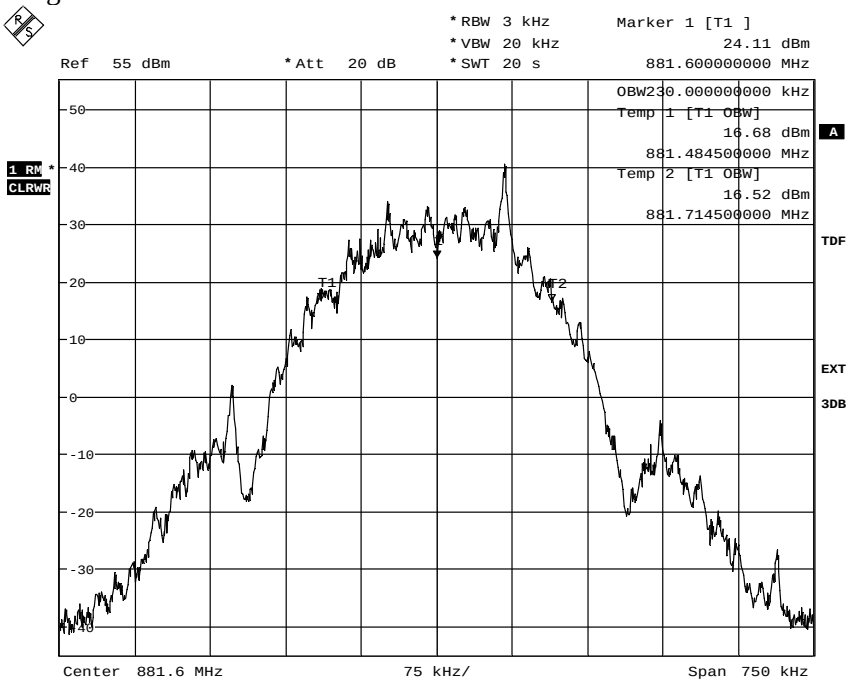

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Diagram 8

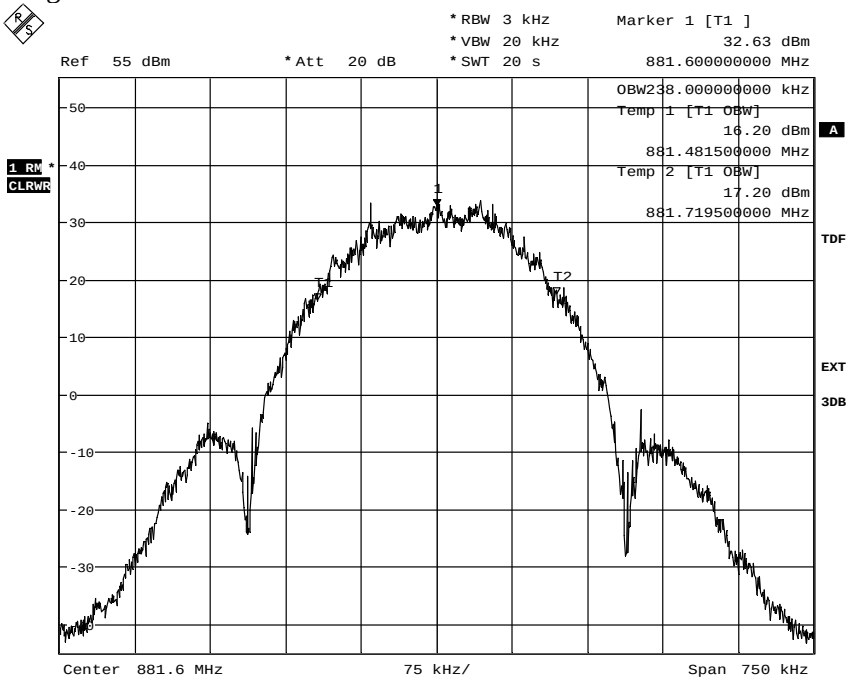

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Diagram 9

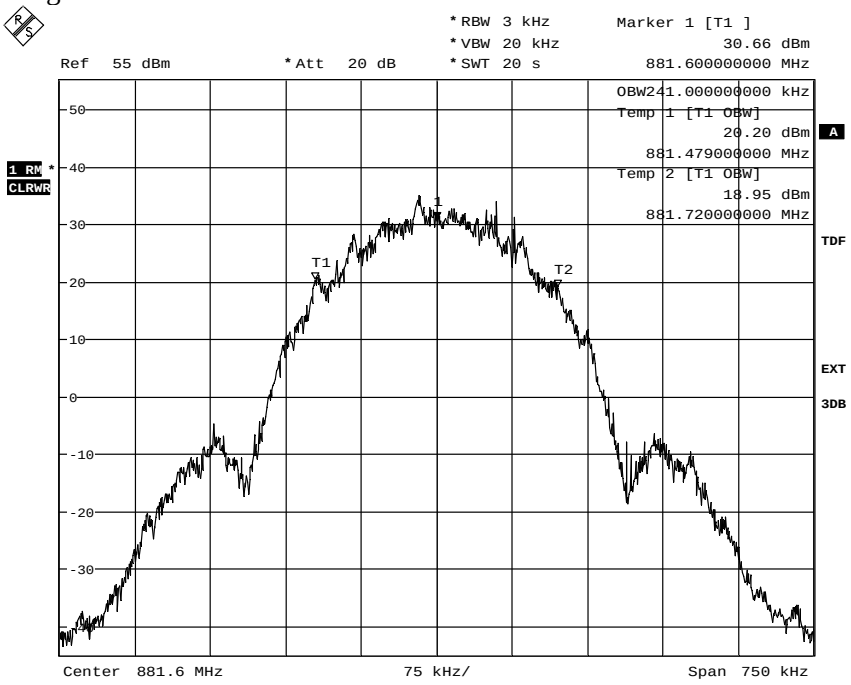

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Diagram 10

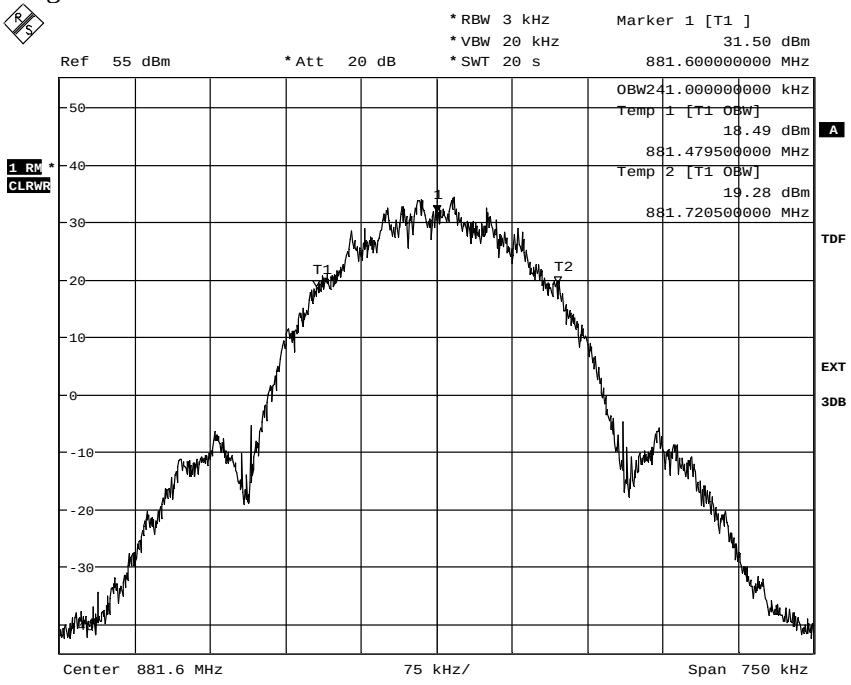

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Diagram 11

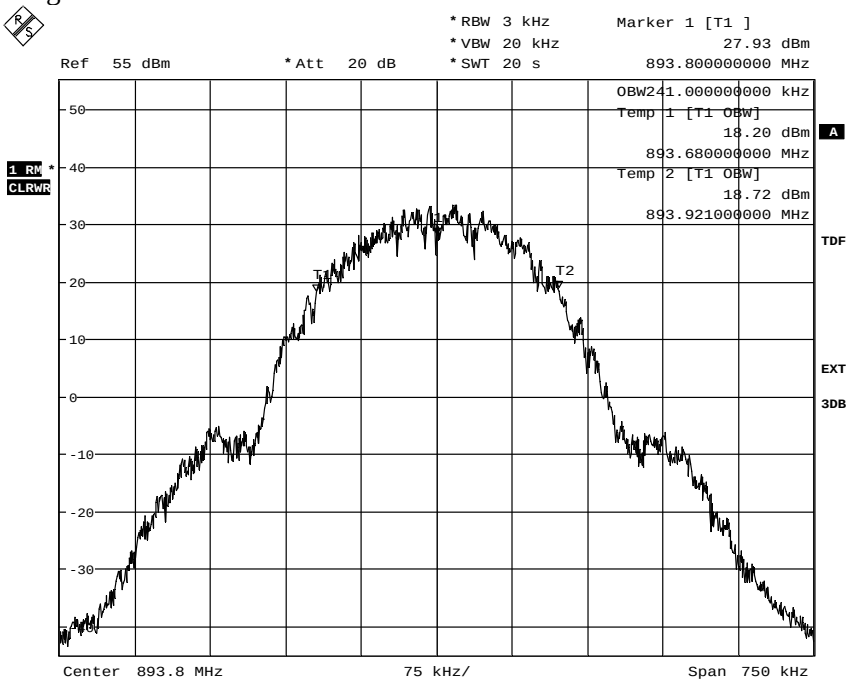

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Diagram 12

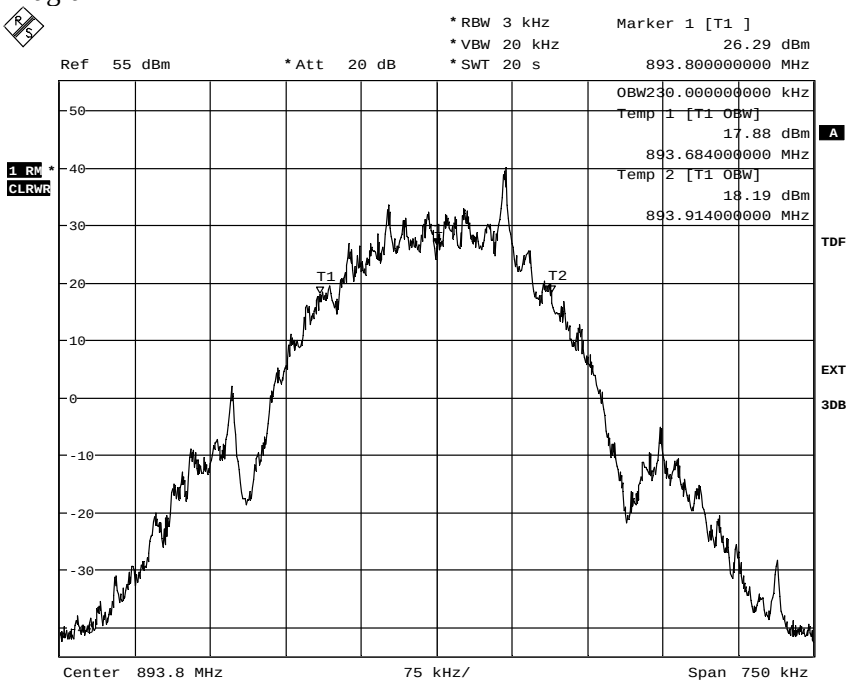

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Diagram 13

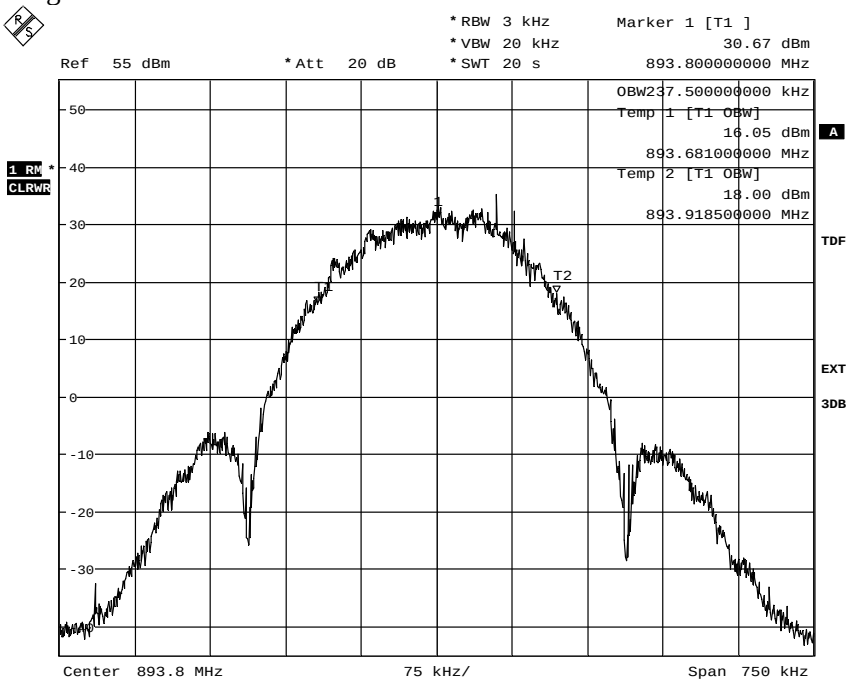

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Diagram 14

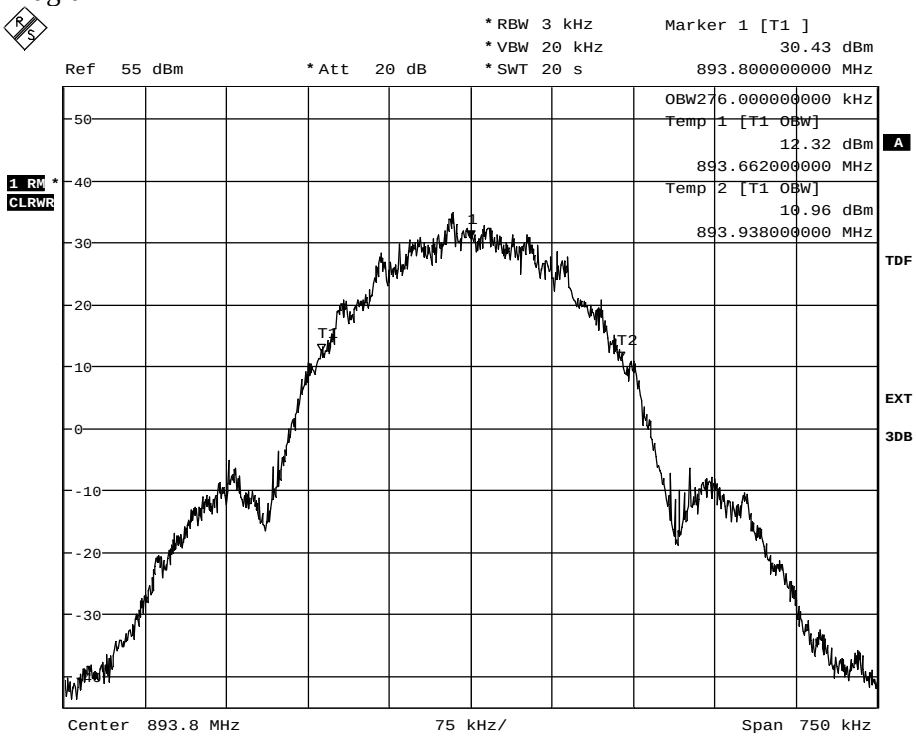

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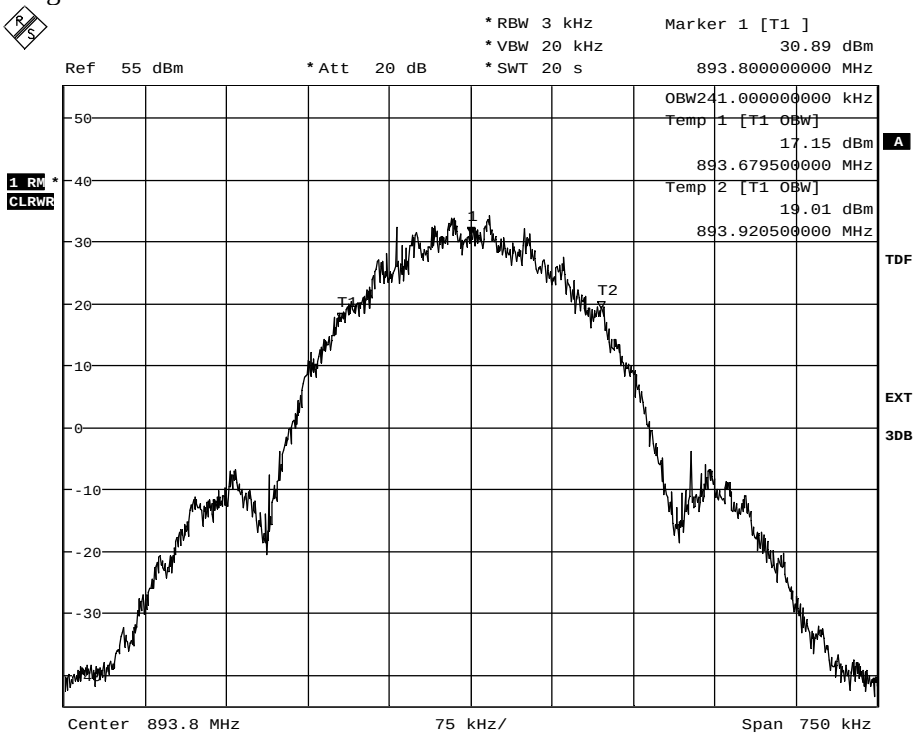
Diagram 15



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Band edge measurements according to 47 CFR 2.1051, 22.917 / IC RSS-132 4.5

Date	Temperature	Humidity
2011-09-07 to 2011-09-10	22-23 °C ± 3 °C	38-58 % ± 5 %

Test set-up and procedure

The measurements were made per definition in §22.917. The output was connected to a spectrum analyzer with the RMS detector activated. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements. A RBW of 3 kHz (1% of EBW) was used up to 1 MHz away from the band edges, from 1 MHz to 6 MHz away from the band edges a RBW of 100 kHz was used.

Measurement equipment	SP number
R&S FSQ	504 143
RF attenuator	504 159
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

Single carrier:

		Channel	Modulation
Diagram	1 a,b:	B+1	GMSK
Diagram	2 a,b:	B+1	AQPSK
Diagram	3 a,b:	B+1	8-PSK
Diagram	4 a,b:	B+1	16QAM
Diagram	5 a,b:	B+1	32QAM
Diagram	6 a,b:	T-1	GMSK
Diagram	7 a,b:	T-1	AQPSK
Diagram	8 a,b:	T-1	8-PSK
Diagram	9 a,b:	T-1	16QAM
Diagram	10 a,b:	T-1	32QAM

Multi carrier 1x2 (2 carriers):

		Channel	Modulation
Diagram	11 a,b:	B+1, B+9	GMSK
Diagram	12 a,b:	B+1, B+9	AQPSK
Diagram	13 a,b:	B+1, B+9	8-PSK
Diagram	14 a,b:	B+1, B+9	16QAM
Diagram	15 a,b:	B+1, B+9	32QAM
Diagram	16 a,b:	T-1, T-9	GMSK
Diagram	17 a,b:	T-1, T-9	AQPSK
Diagram	18 a,b:	T-1, T-9	8-PSK
Diagram	19 a,b:	T-1, T-9	16QAM
Diagram	20 a,b:	T-1, T-9	32QAM

Remark

The channel adjacent to the lower and higher band edge cannot be used. The lowest usable channel is 129 (869.4 MHz) and the highest usable channel is 250 (1989.6 MHz).

Limits

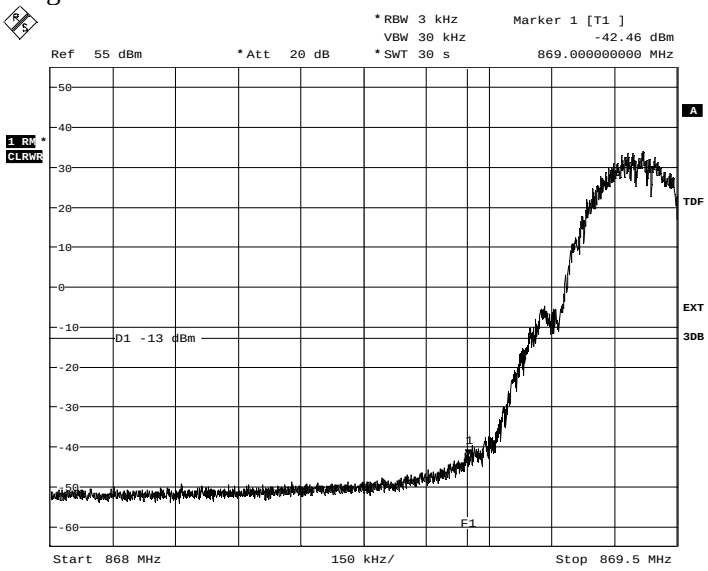
CFR 47, §22.917 / RSS-132 4.5

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

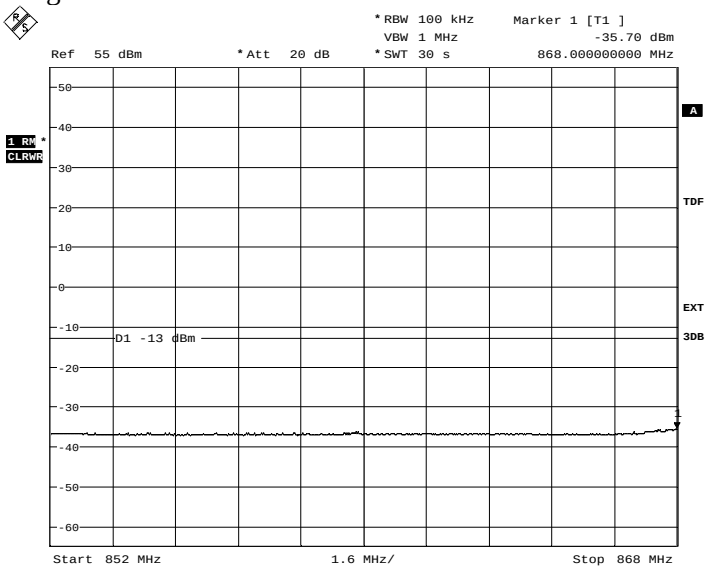
FCC ID:TA8AKRC11864-3 Appendix 4
IC:287AB-AS118643

Diagram 1a:



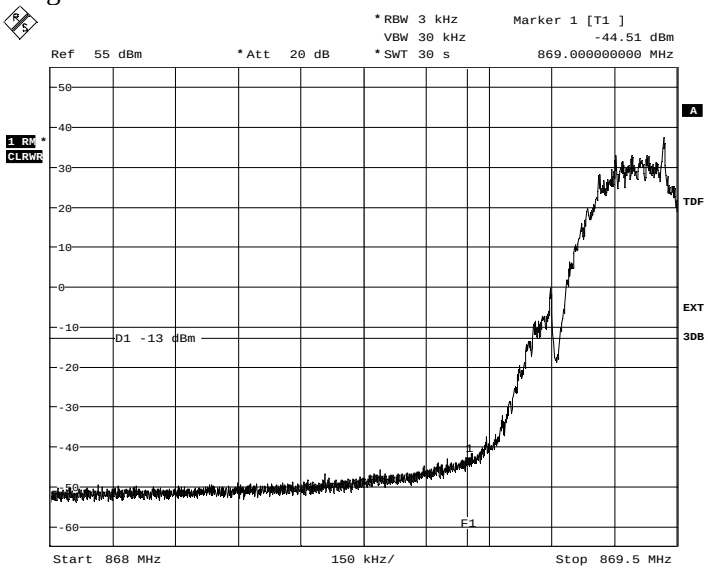
Date: 6.SEP.2011 16:18:25

Diagram 1b:



Date: 6.SEP.2011 16:19:55

Diagram 2a:



Date: 6.SEP.2011 16:14:36

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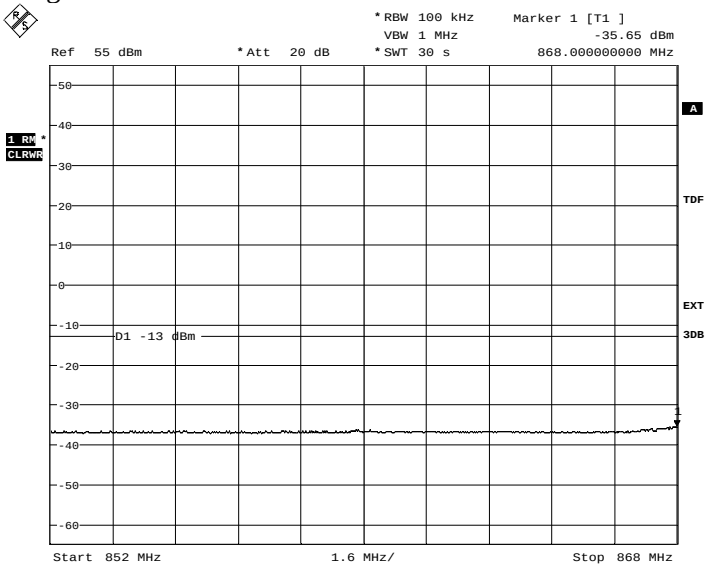
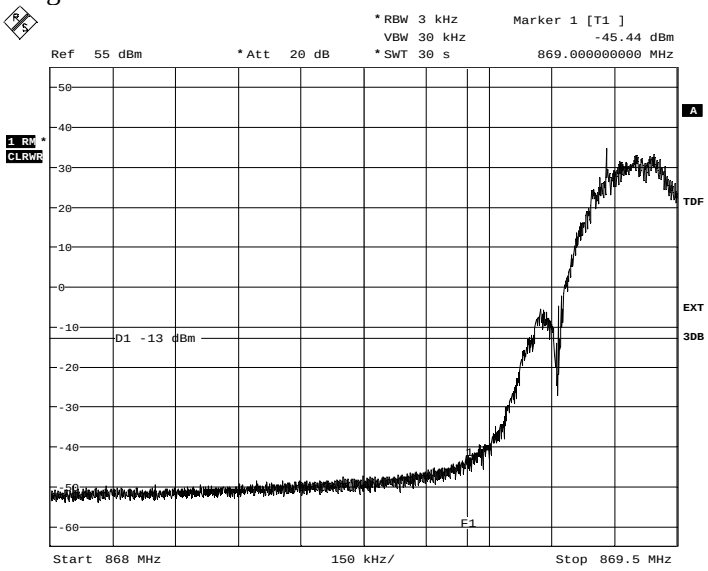


Date: 6.SEP.2011 16:09:43

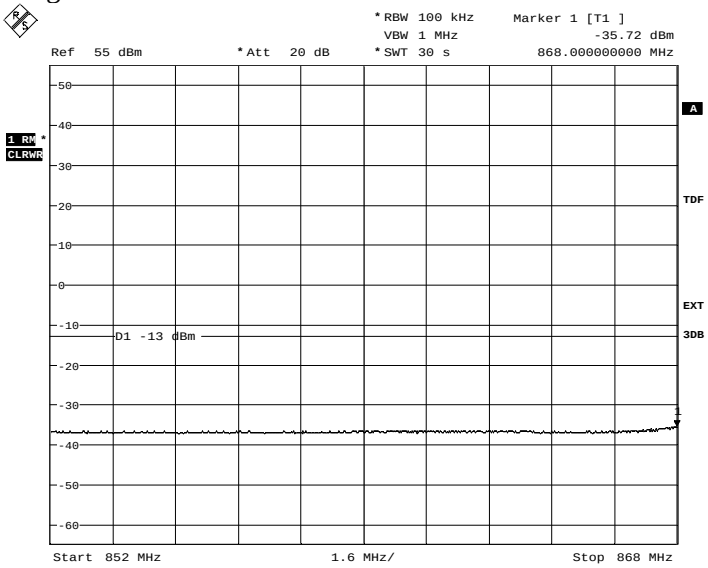
FCC ID:TA8AKRC11864-3 Appendix 4
IC:287AB-AS118643

Diagram 3a:



Date: 6.SEP.2011 16:24:25

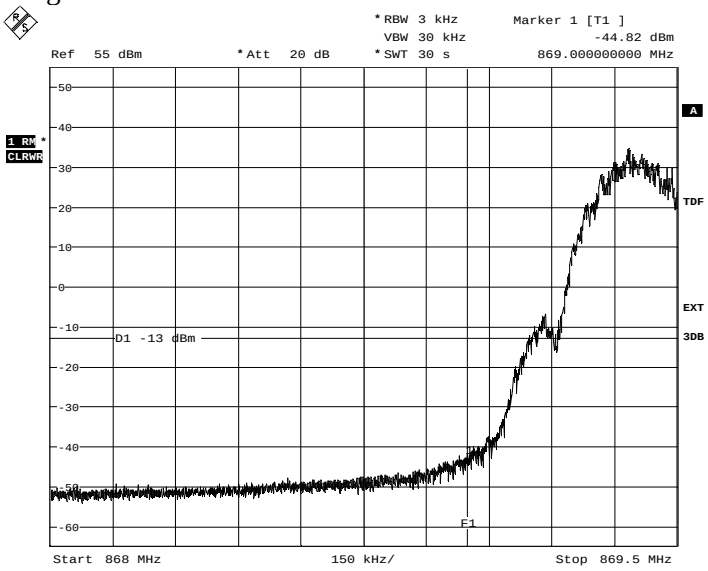
Diagram 3b:



Date: 6.SEP.2011 16:22:33

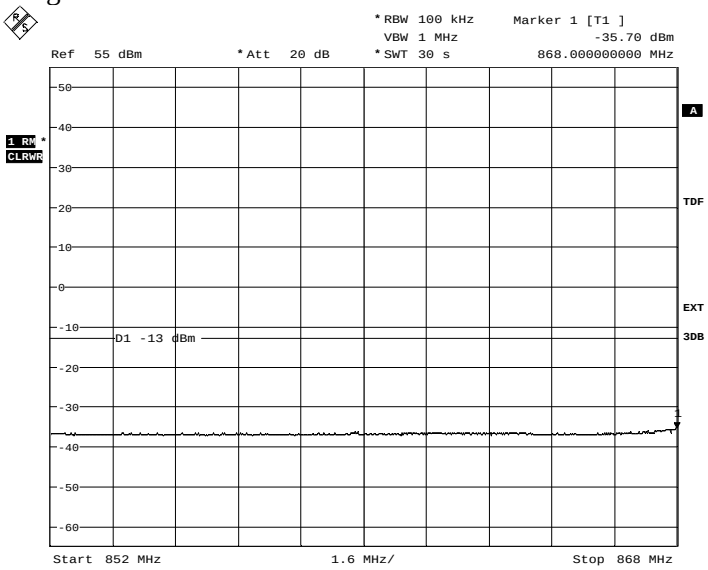
FCC ID:TA8AKRC11864-3 Appendix 4
IC:287AB-AS118643

Diagram 4a:



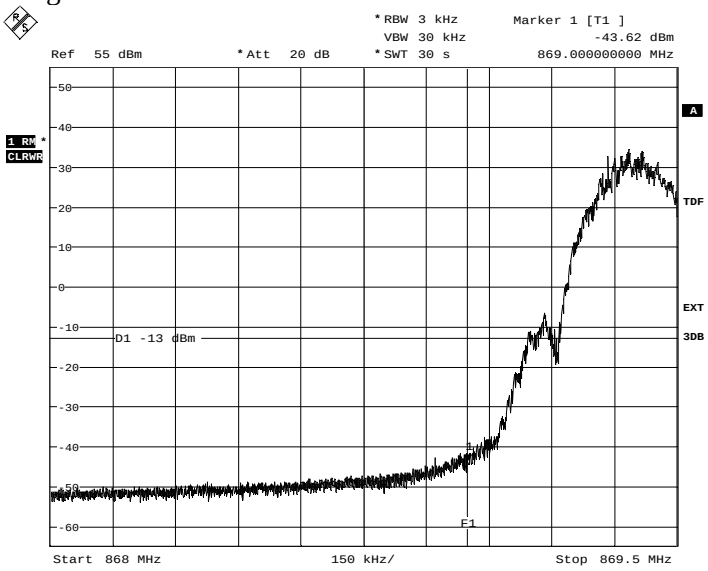
Date: 6.SEP.2011 16:27:12

Diagram 4b:



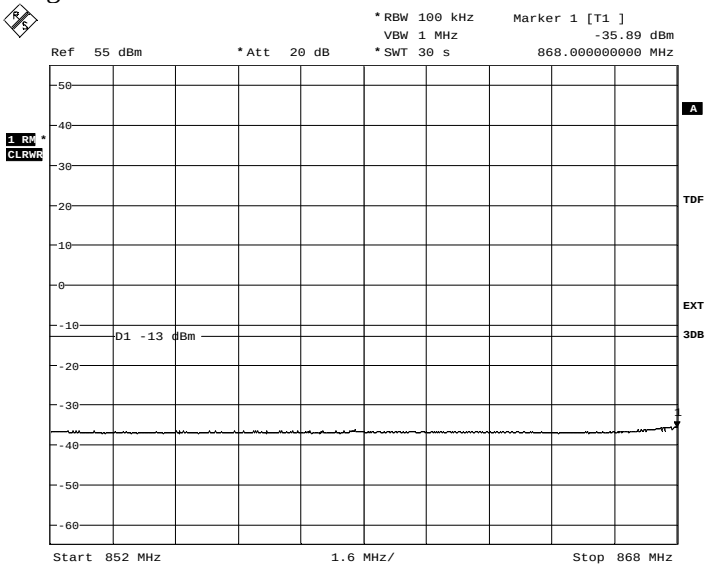
Date: 6.SEP.2011 16:28:35

Diagram 5a:



Date: 6.SEP.2011 16:32:53

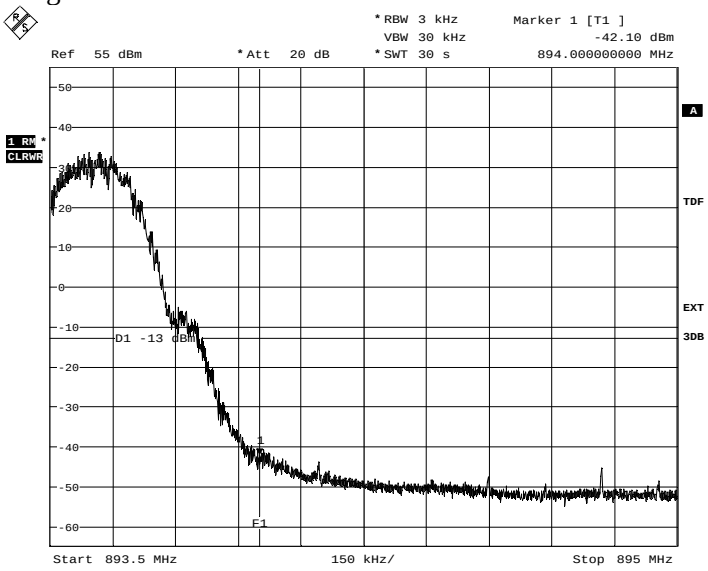
Diagram 5b:



Date: 6.SEP.2011 16:31:15

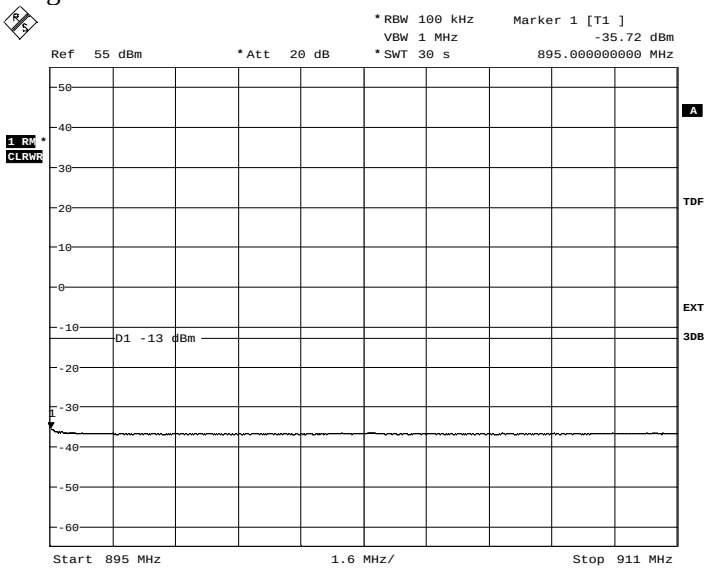
FCC ID:TA8AKRC11864-3 Appendix 4
IC:287AB-AS118643

Diagram 6a:



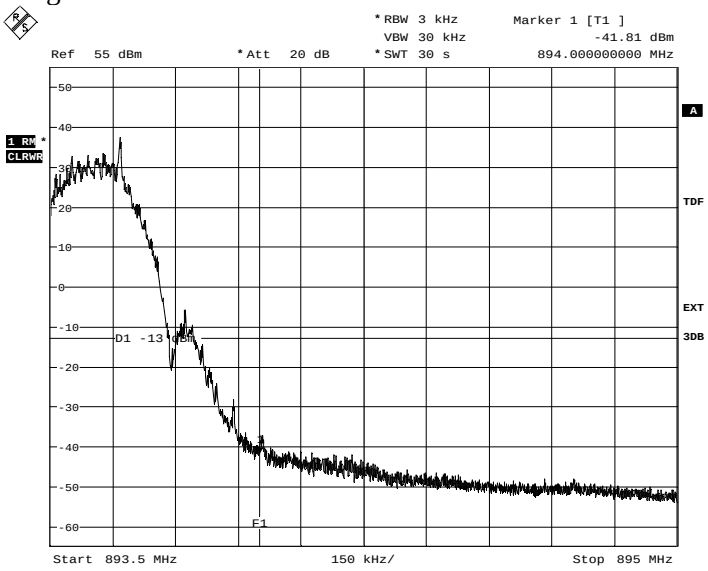
Date: 6.SEP.2011 15:14:29

Diagram 6b:



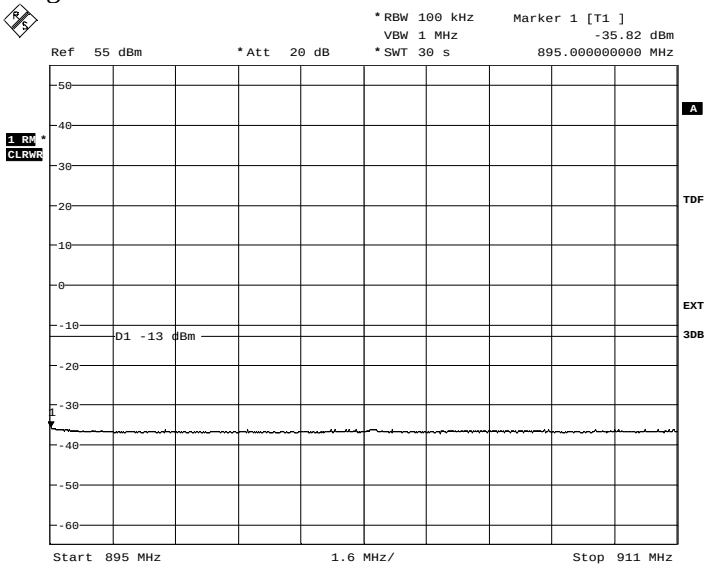
Date: 6.SEP.2011 15:23:33

Diagram 7a:



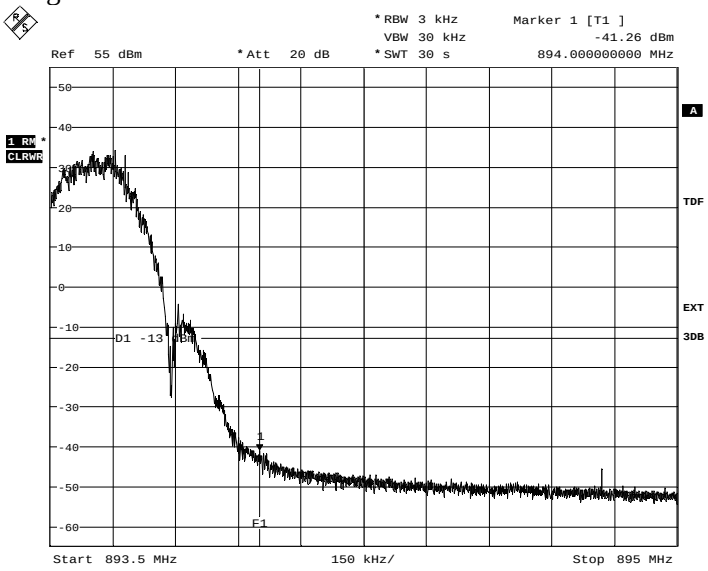
Date: 6.SEP.2011 15:45:00

Diagram 7b:



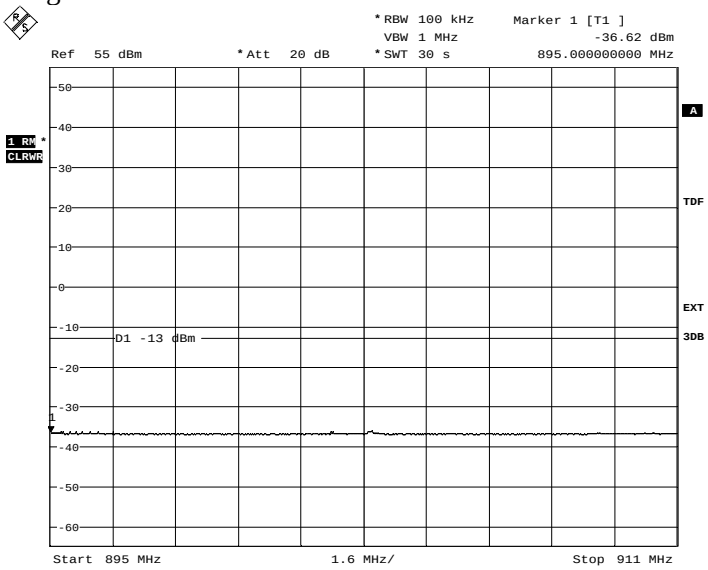
Date: 6.SEP.2011 15:46:54

Diagram 8a:



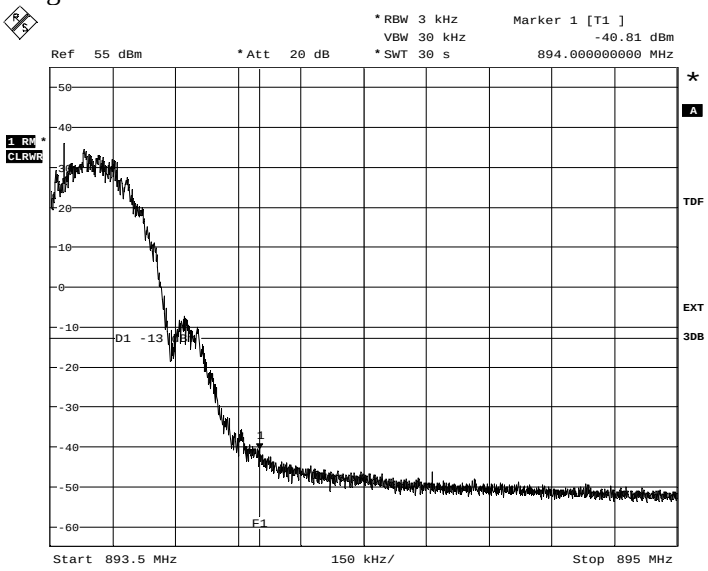
Date: 6.SEP.2011 15:29:27

Diagram 8b:



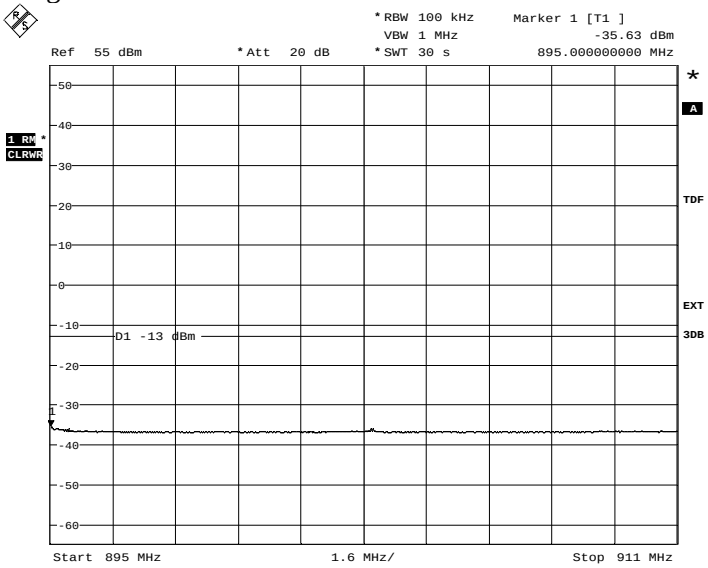
Date: 6.SEP.2011 15:26:41

Diagram 9a:



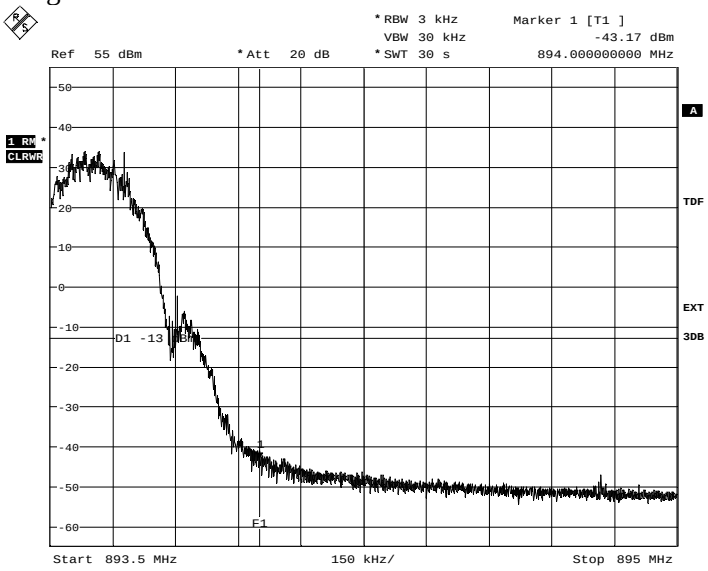
Date: 6.SEP.2011 15:35:05

Diagram 9b:



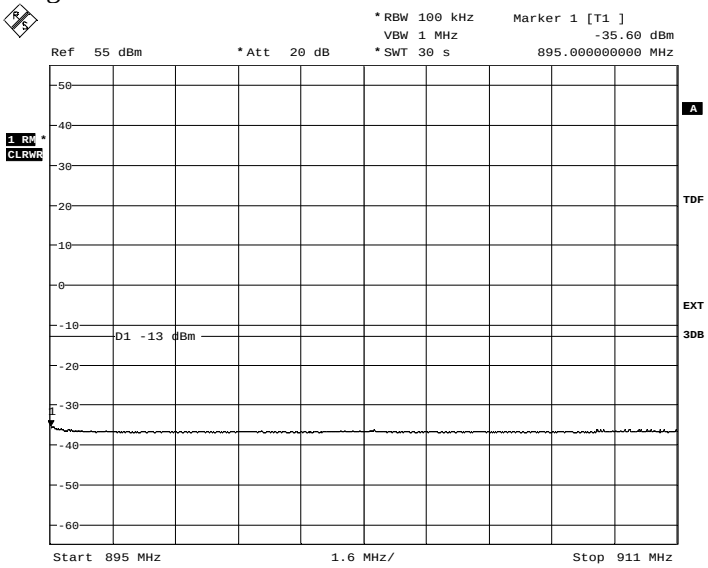
Date: 6.SEP.2011 15:36:55

Diagram 10a:



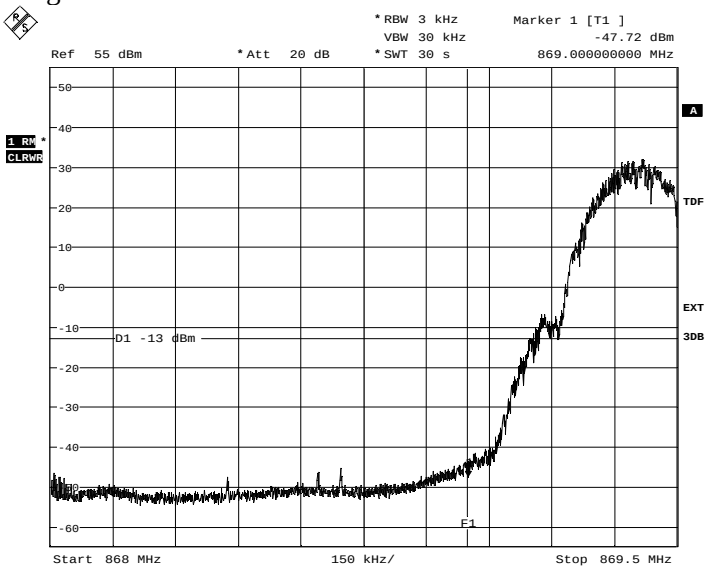
Date: 6.SEP.2011 15:41:38

Diagram 10b:



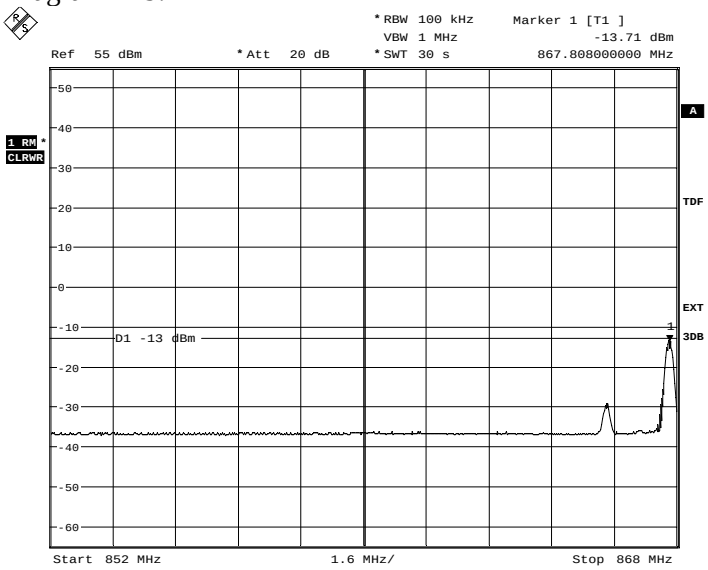
Date: 6.SEP.2011 15:40:28

Diagram 11a:



Date: 8.SEP.2011 12:54:36

Diagram 11b:



Date: 16.SEP.2011 12:56:41

FCC ID:TA8AKRC11864-3 Appendix 4
IC:287AB-AS118643

Diagram 12a:

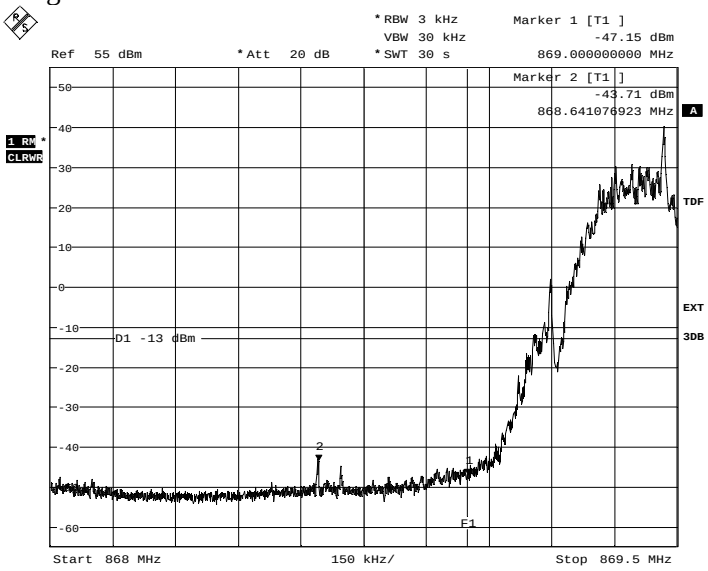


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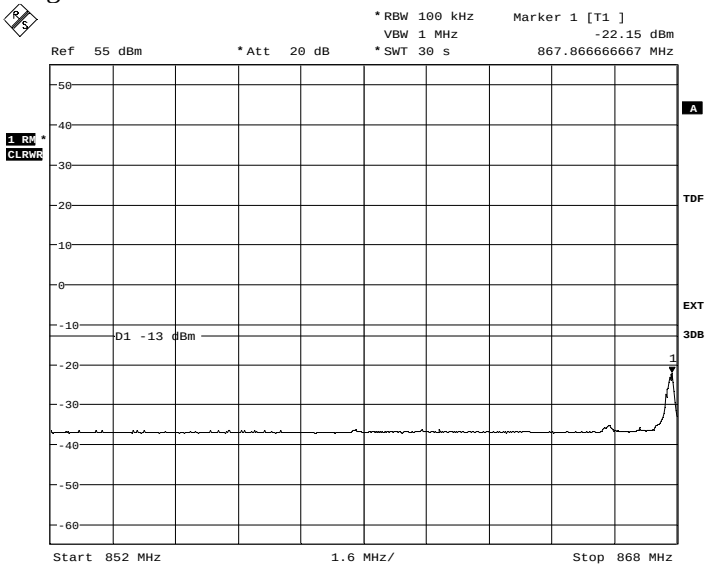
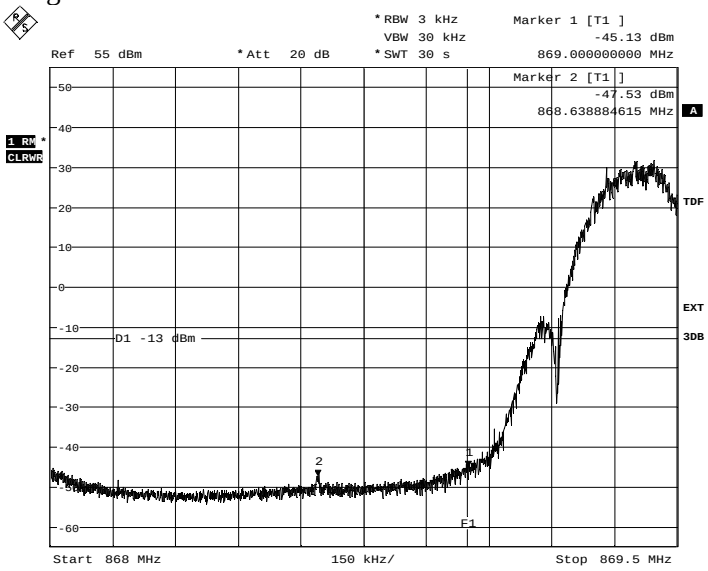
Diagram 12b:



Date: 8.SEP.2011 13:05:53

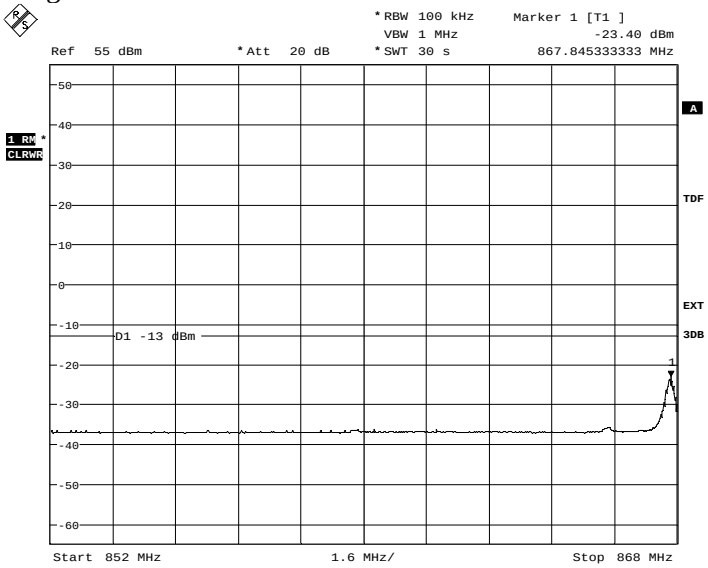
FCC ID:TA8AKRC11864-3 Appendix 4
IC:287AB-AS118643

Diagram 13a:



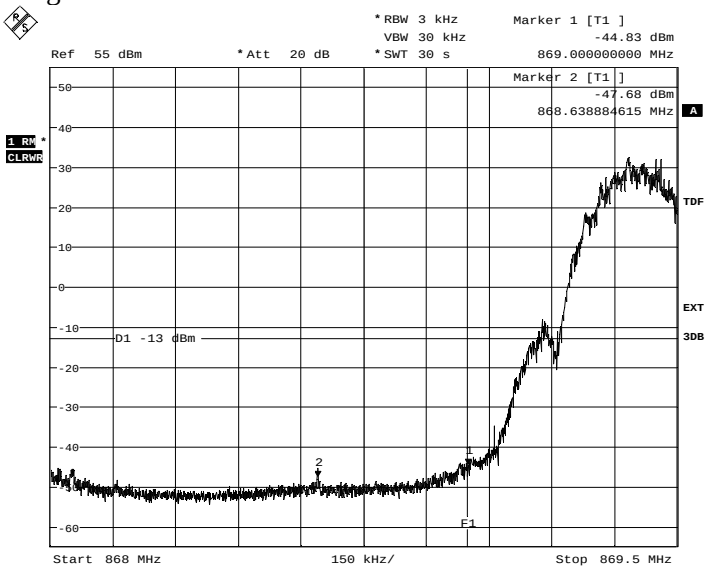
Date: 8.SEP.2011 13:20:10

Diagram 13b:



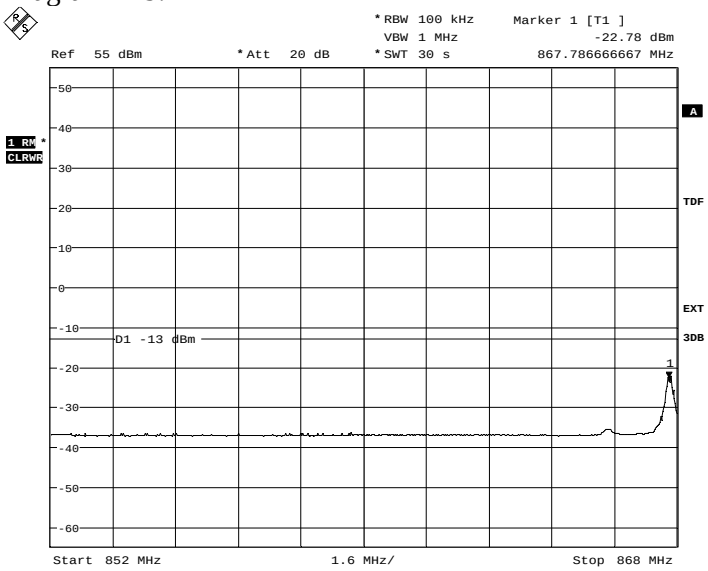
Date: 8.SEP.2011 13:17:51

Diagram 14a:



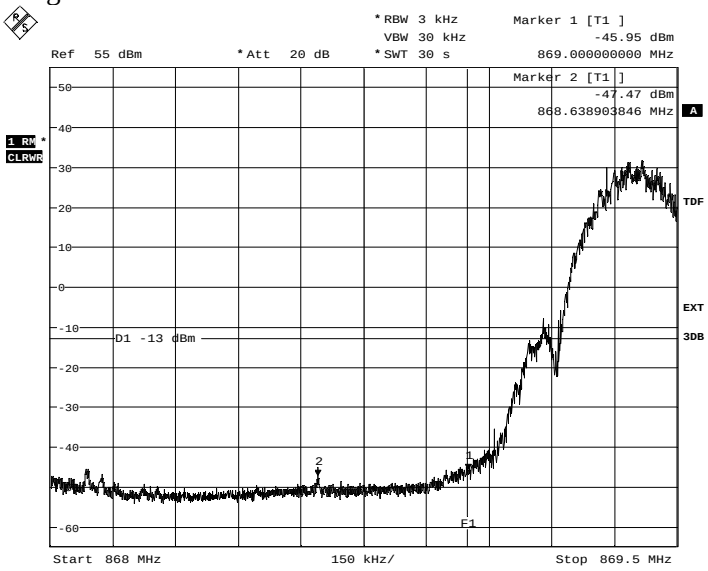
Date: 8.SEP.2011 13:25:38

Diagram 14b:



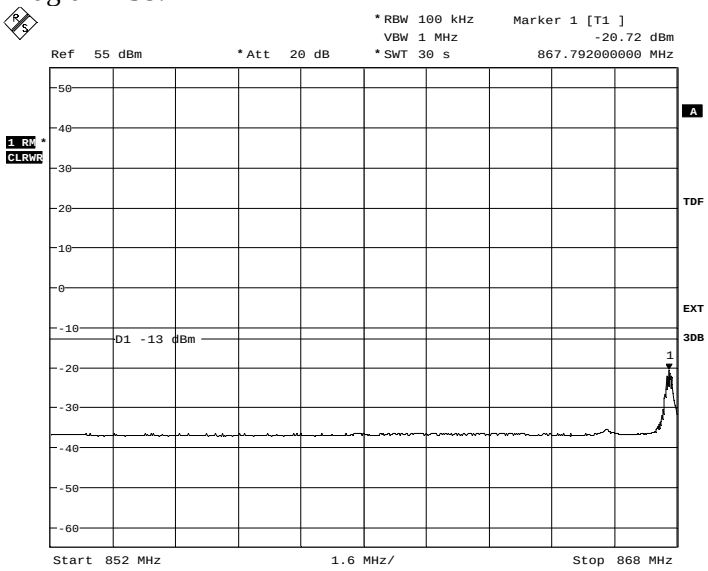
Date: 8.SEP.2011 13:28:18

Diagram 15a:



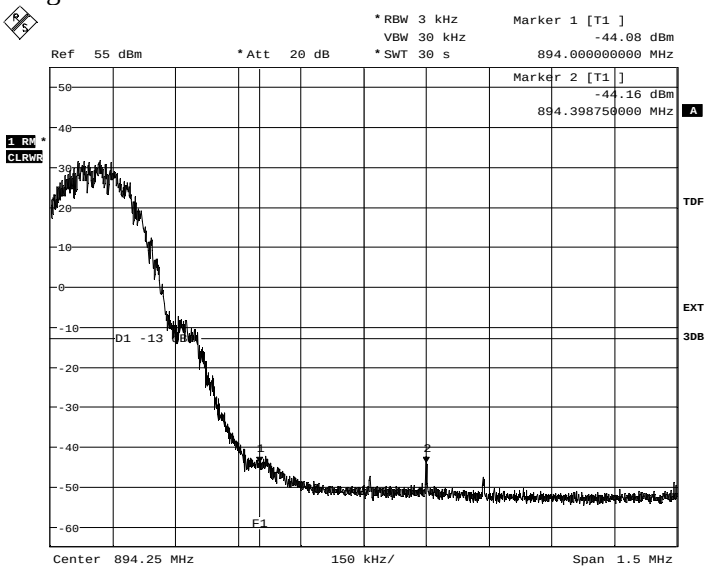
Date: 8.SEP.2011 13:45:20

Diagram 15b:



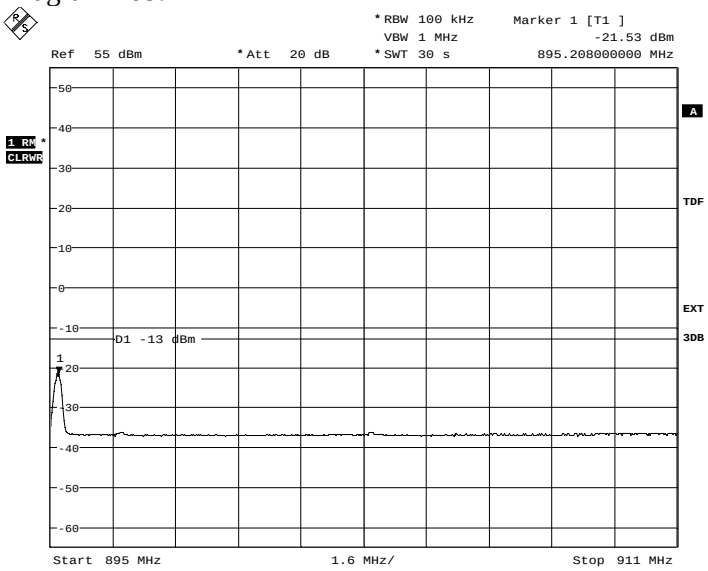
Date: 8.SEP.2011 13:43:04

Diagram 16a:



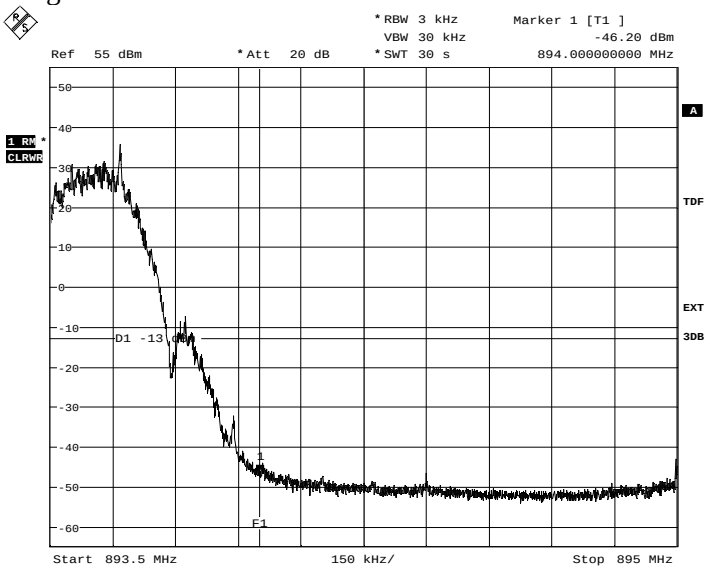
Date: 8.SEP.2011 14:15:23

Diagram 16b:



Date: 8.SEP.2011 14:18:02

Diagram 17a:



Date: 8.SEP.2011 15:32:01

Diagram 17b:

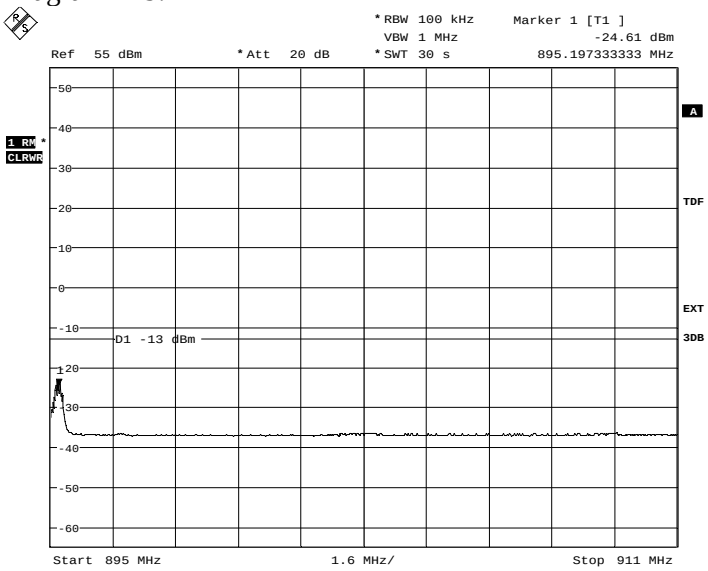


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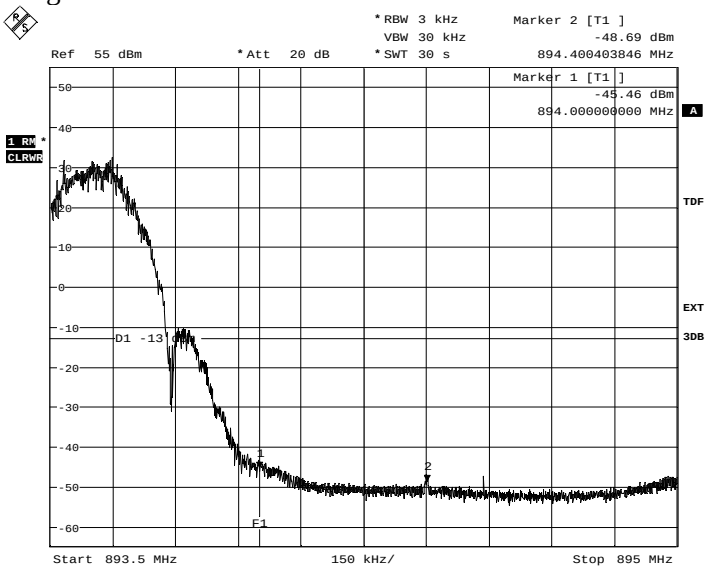
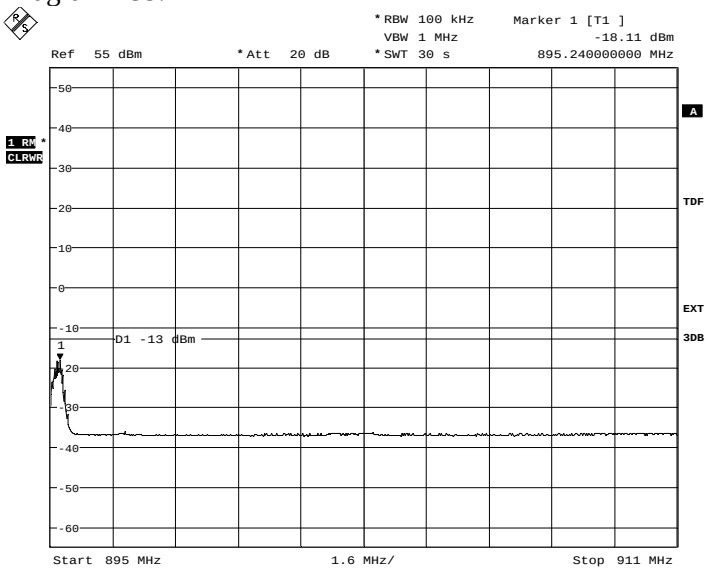
Diagram 18a:



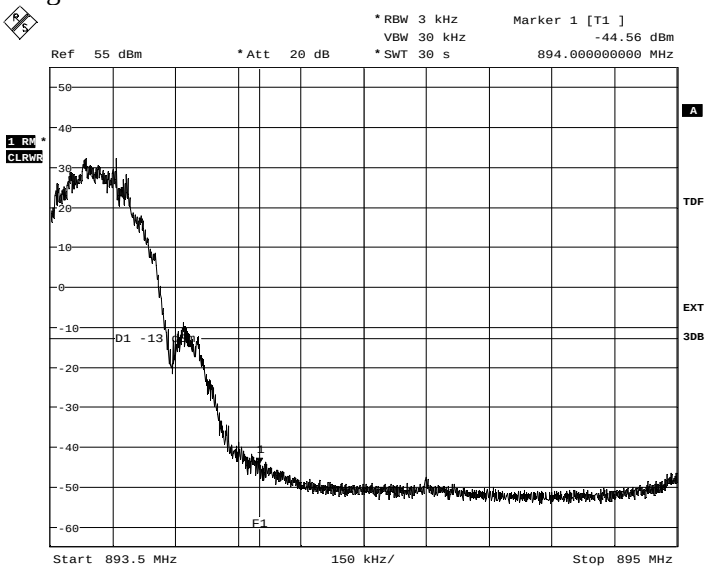
Date: 8.SEP.2011 14:23:07

Diagram 18b:



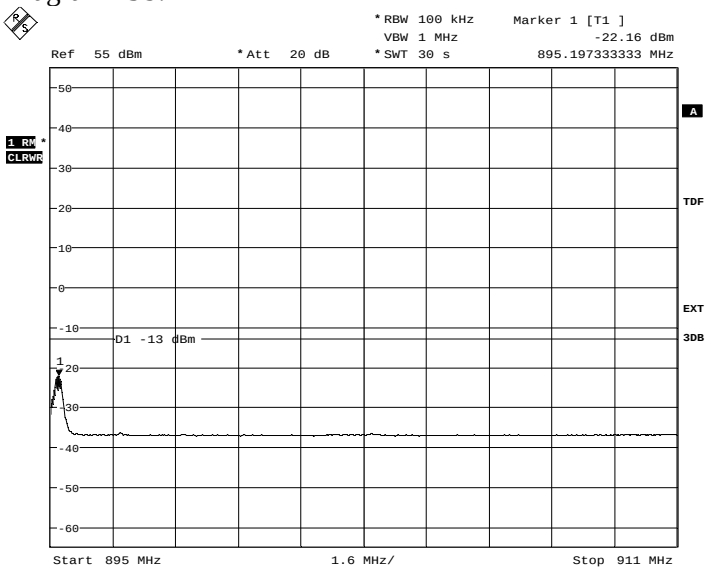
Date: 8.SEP.2011 14:21:03

Diagram 19a:



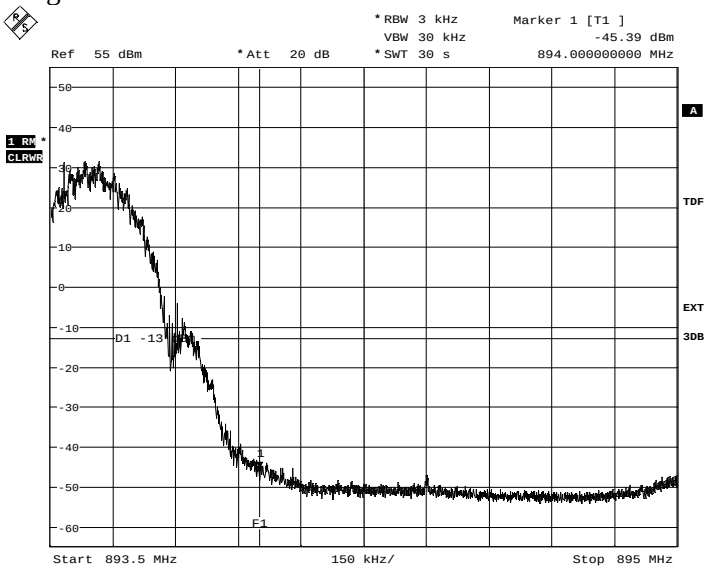
Date: 8.SEP.2011 15:41:17

Diagram 19b:



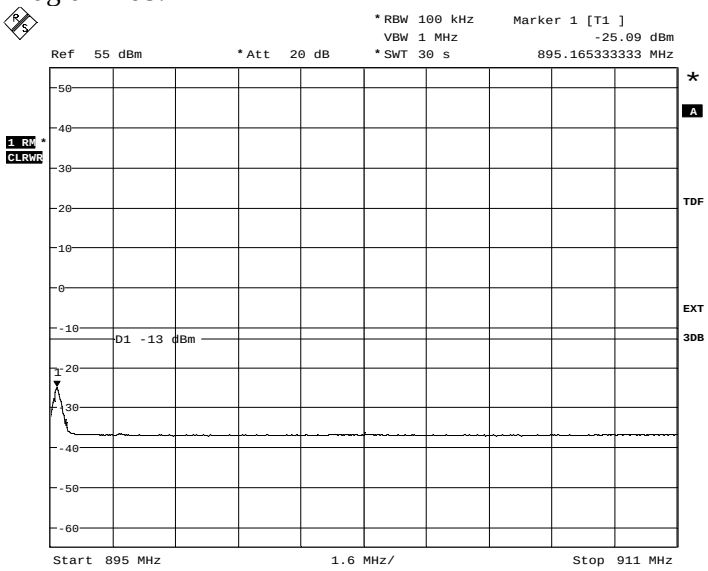
Date: 8.SEP.2011 15:37:40

Diagram 20a:



Date: 8.SEP.2011 15:44:28

Diagram 20b:



Date: 8.SEP.2011 15:45:58

Conducted spurious emission measurements according to CFR 47 2.1051/ IC RSS-132 4.5

Date	Temperature	Humidity
2011-09-07 to 2011-09-12	22-23 °C ± 3 °C	38-67 % ± 5 %

Test set-up and procedure

The measurements were made with a resolution bandwidth of 1 MHz instead of 100 kHz. The output was connected to a spectrum analyzer with the RMS detector activated.

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

The results are shown in appendix 5

Single carrier

		Channel	Modulation
Diagram	1 a-e:	B	GMSK
Diagram	2 a-e:	B	AQPSK
Diagram	3 a-e:	B	8-PSK
Diagram	4 a-e:	B	16QAM
Diagram	5 a-e:	B	32QAM
Diagram	6 a-e:	M	GMSK
Diagram	7 a-e:	M	AQPSK
Diagram	8 a-e:	M	8-PSK
Diagram	9 a-e:	M	16QAM
Diagram	10a-e:	M	32QAM
Diagram	11 a-e:	T	GMSK
Diagram	12 a-e:	T	AQPSK
Diagram	13 a-e:	T	8-PSK
Diagram	14 a-e:	T	16QAM
Diagram	15 a-e:	T	32QAM

Multi carrier 1x2 (2 carriers):

Diagram 16 a-e: M+(M+10) GMSK

Multi carrier 1x4 (4 carriers):

Diagram 17 a-e: (M-5)+M+(M+10)+(M+15) GMSK

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 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.

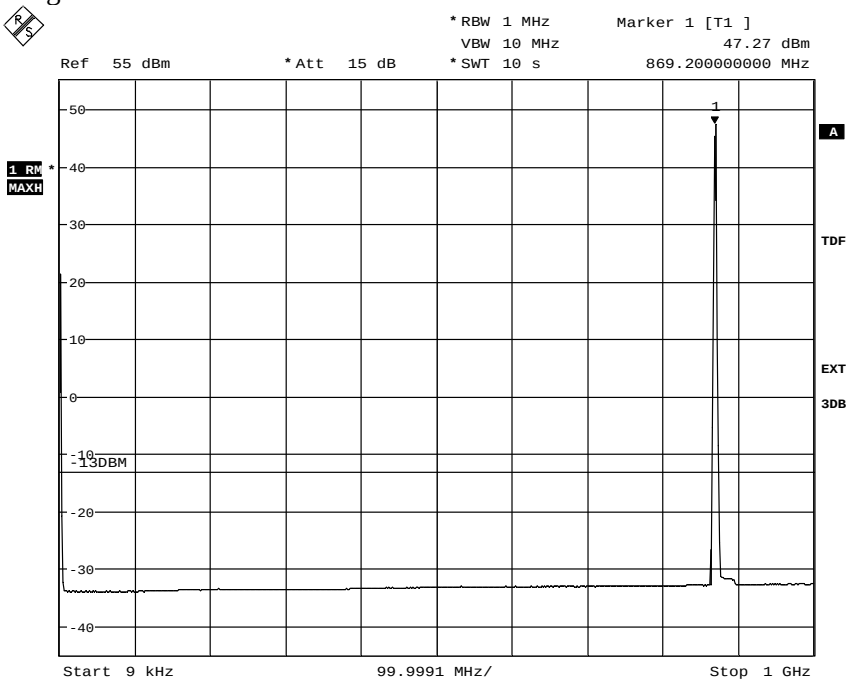
Limits

CFR 47, 22.917 / RSS-132 4.5

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 100 kHz RBW.

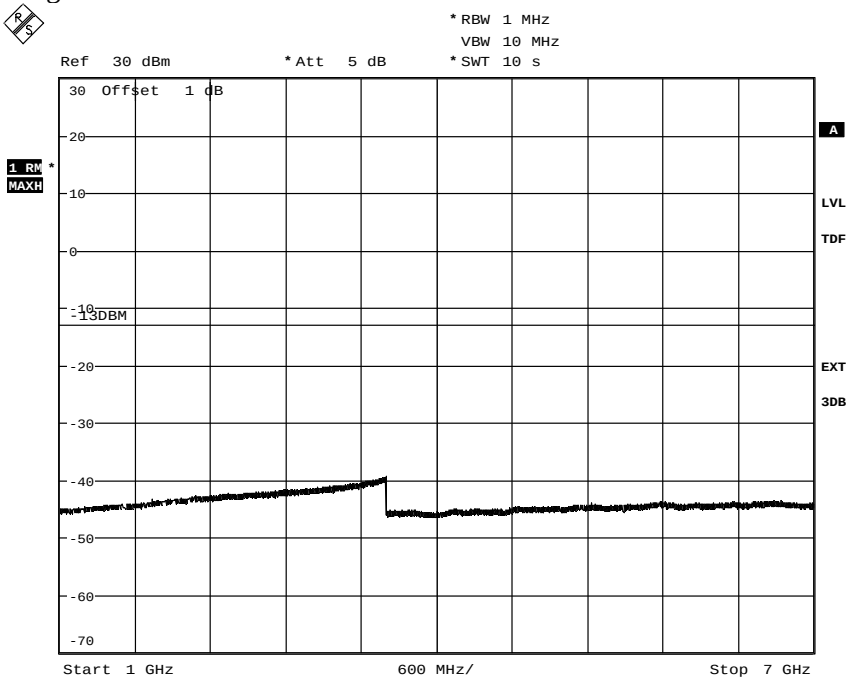
Complies?	Yes

Diagram 1a



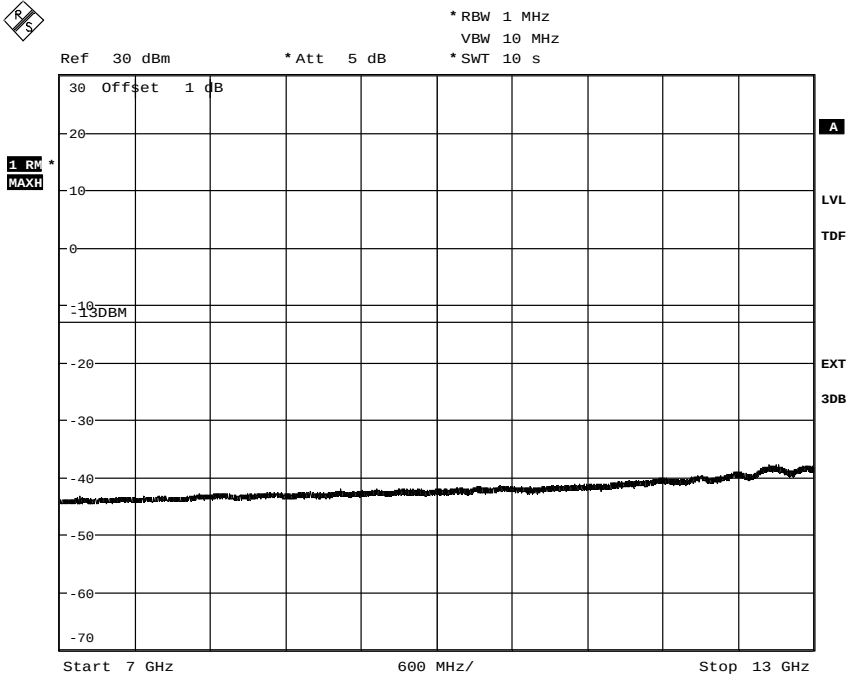
Date: 7.SEP.2011 09:25:45

Diagram 1b



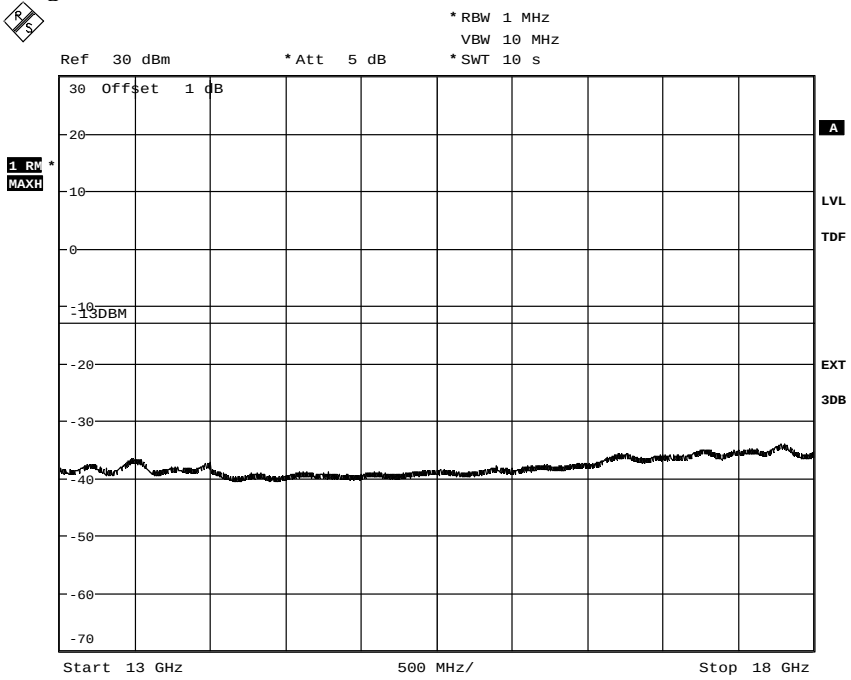
Date: 7.SEP.2011 10:43:23

Diagram 1c



Date: 7.SEP.2011 10:40:08

Diagram 1d



Date: 7.SEP.2011 10:38:49

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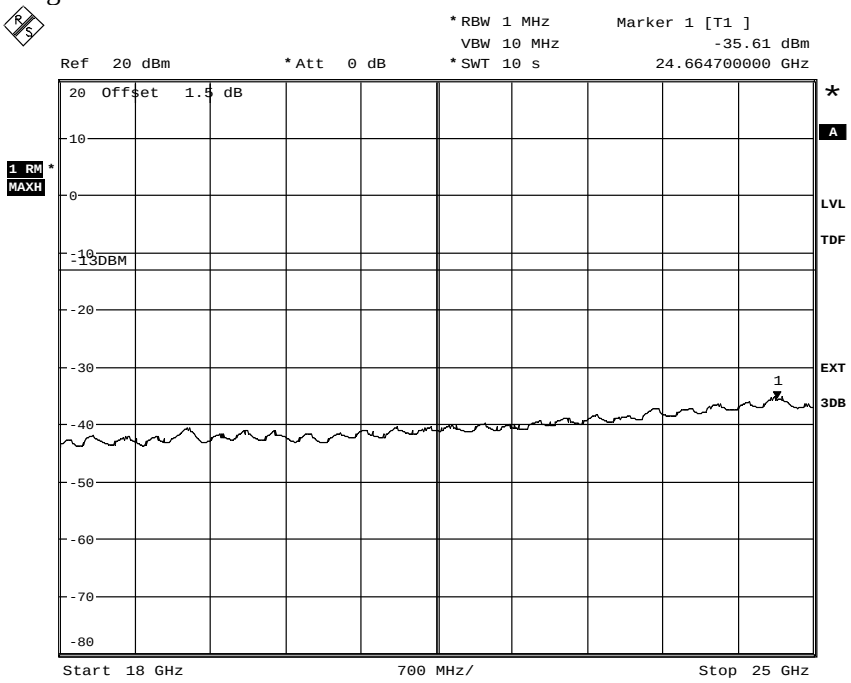
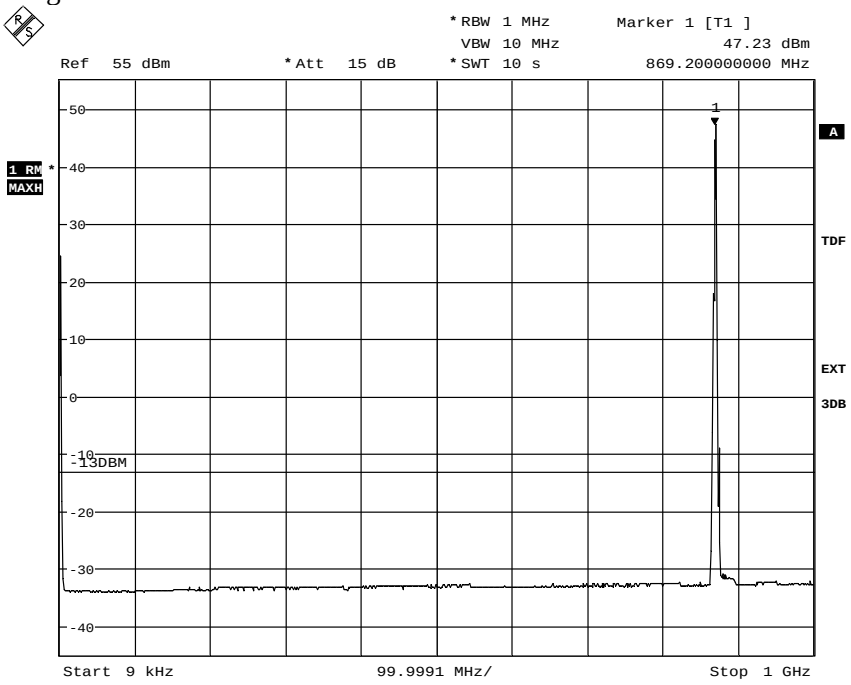
Diagram 1e



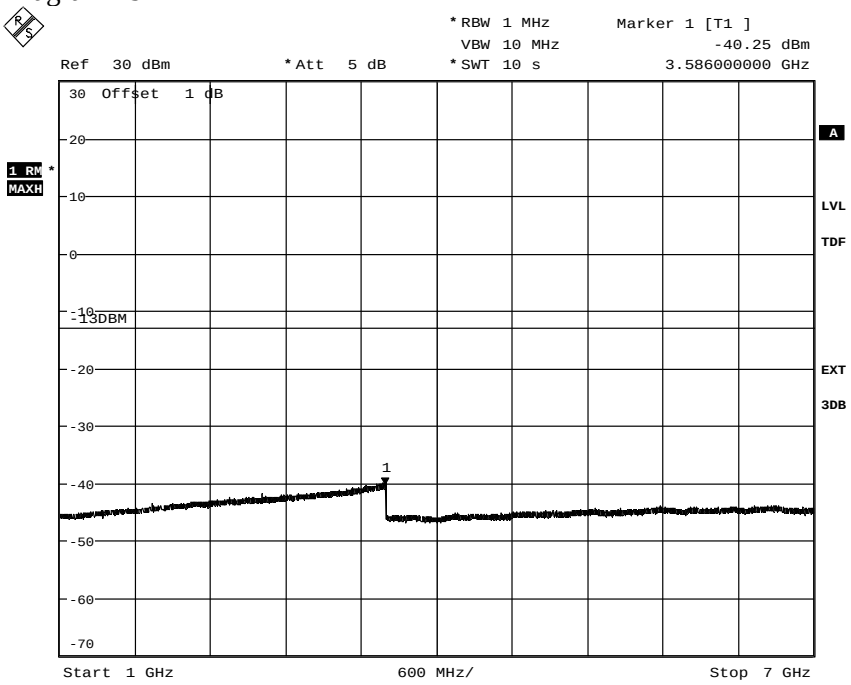
Date: 12.SEP.2011 11:55:20

Diagram 2a



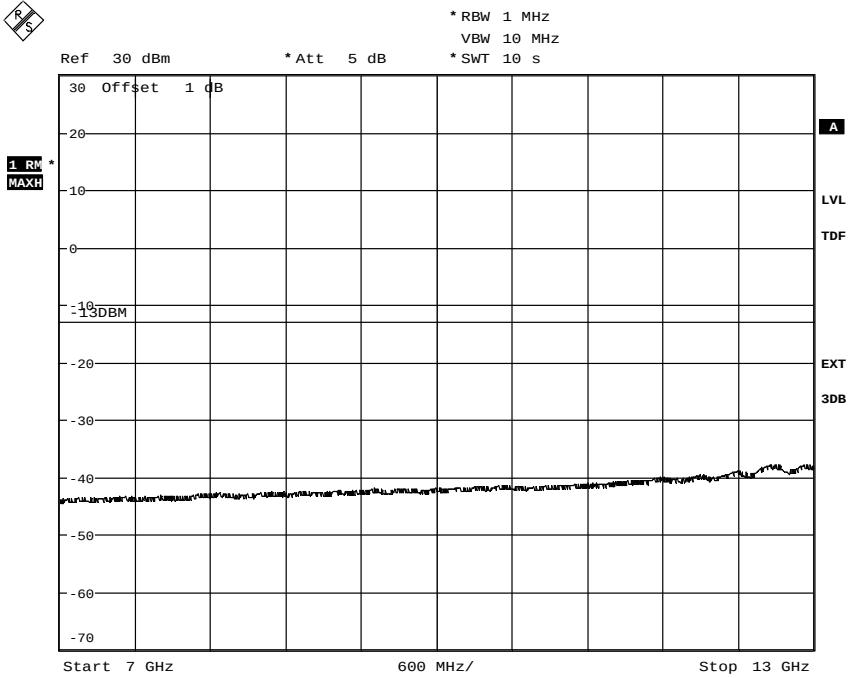
Date: 7.SEP.2011 10:19:56

Diagram 2b



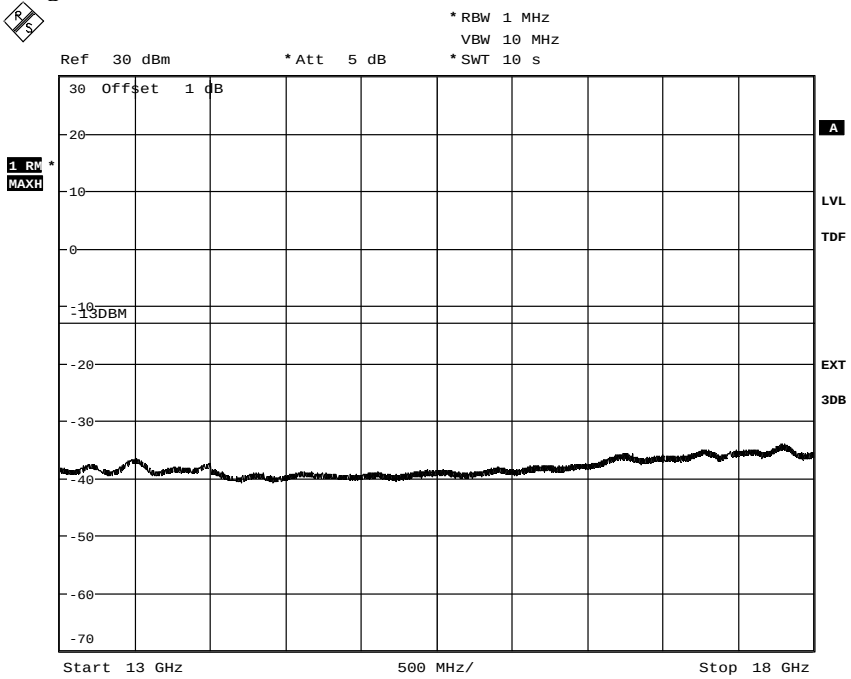
Date: 7.SEP.2011 13:02:29

Diagram 2c



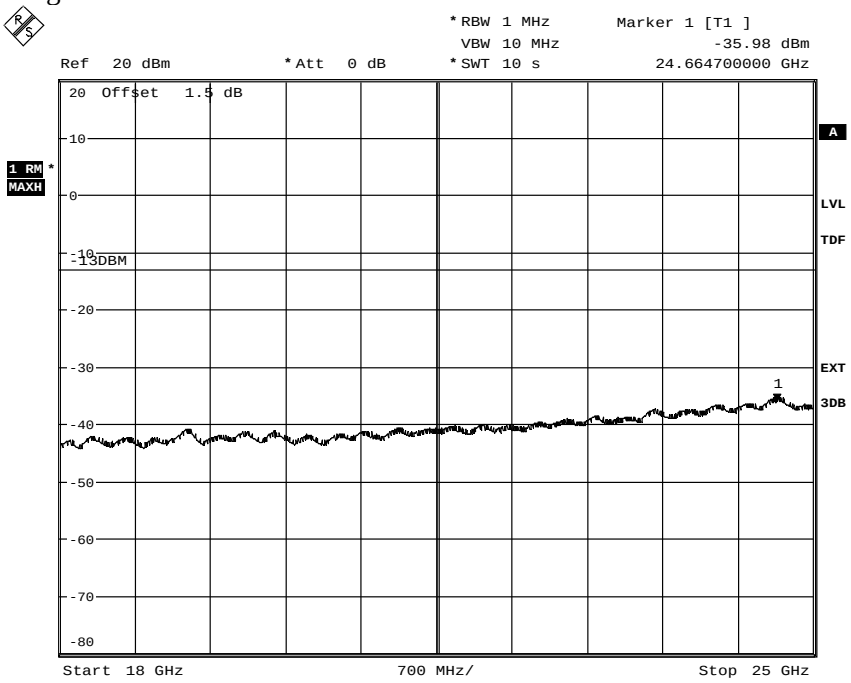
Date: 7.SEP.2011 10:30:37

Diagram 2d



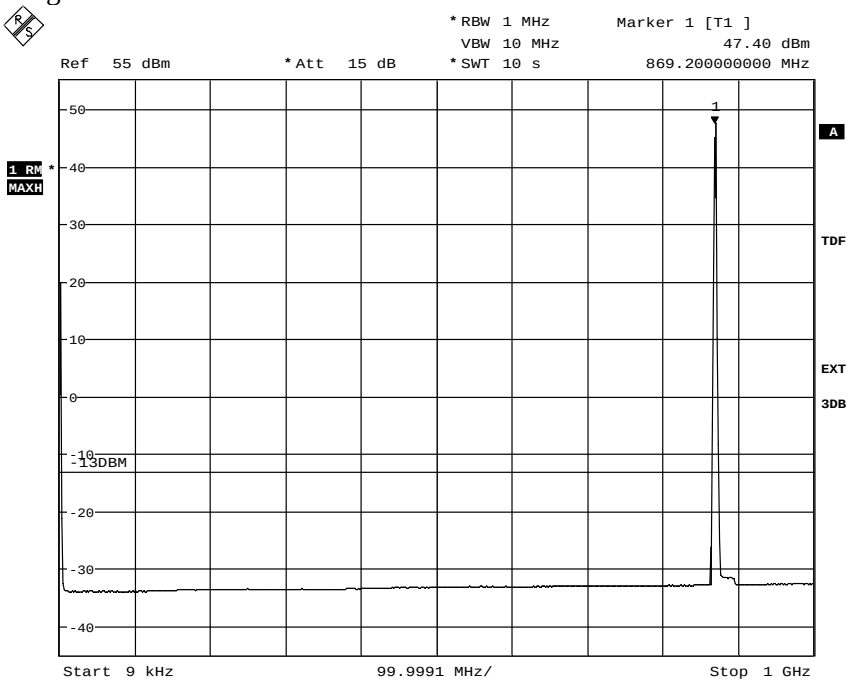
Date: 7.SEP.2011 10:36:22

Diagram 2e



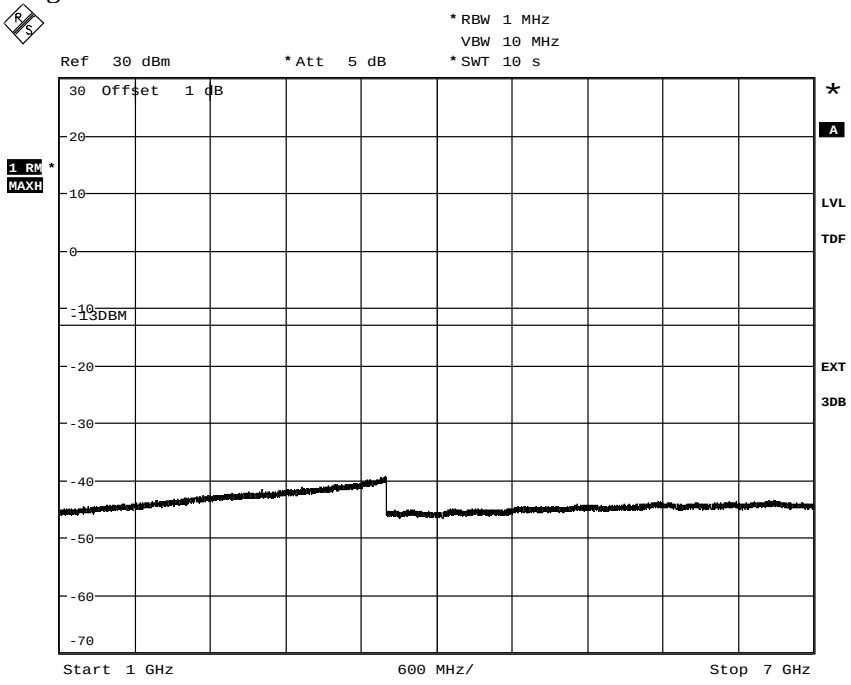
Date: 12.SEP.2011 11:57:24

Diagram 3a



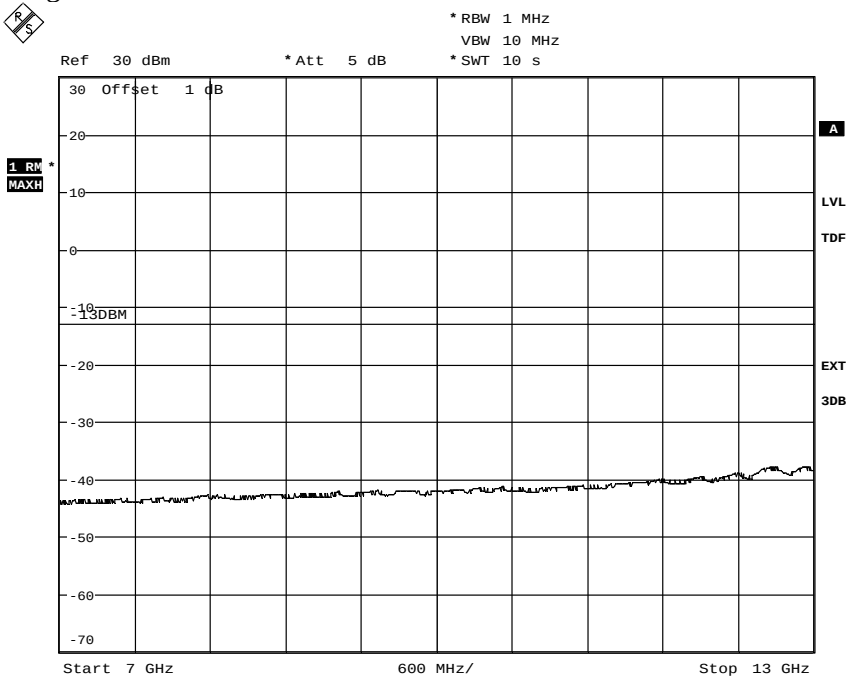
Date: 7.SEP.2011 09:16:01

Diagram 3b



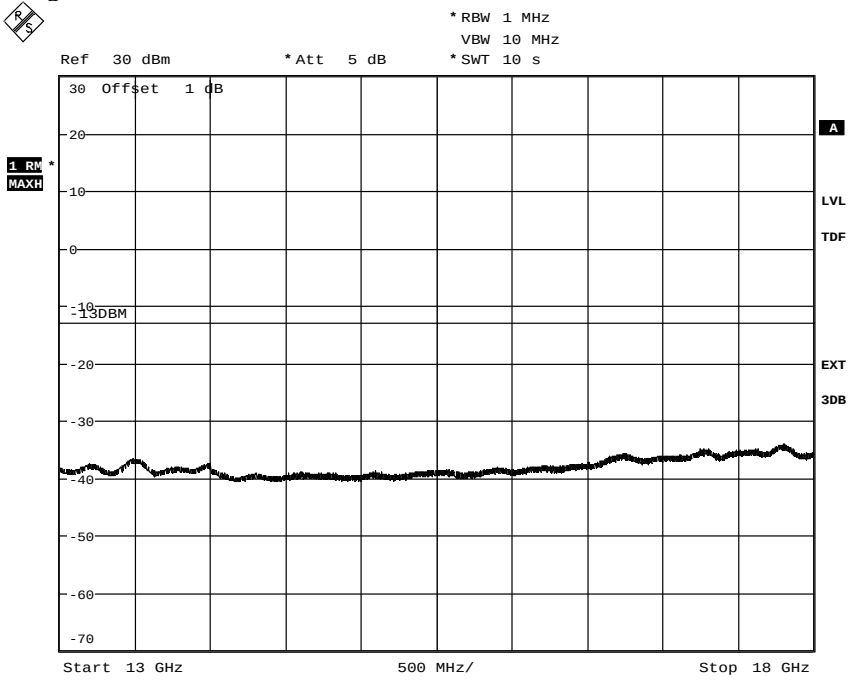
Date: 7.SEP.2011 10:48:08

Diagram 3c



Date: 7.SEP.2011 10:52:12

Diagram 3d



Date: 7.SEP.2011 10:53:50

Diagram 3e

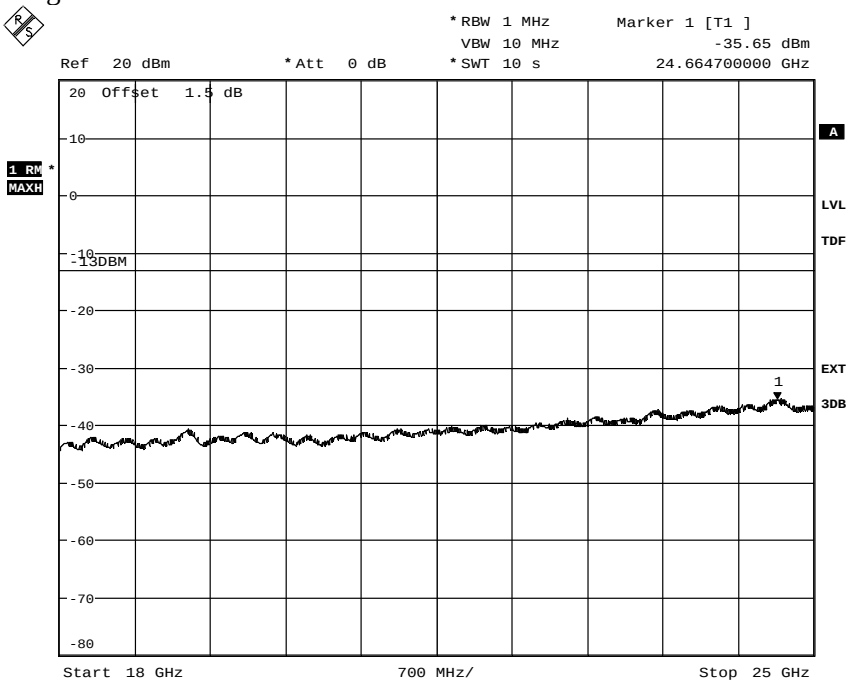


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Diagram 4a

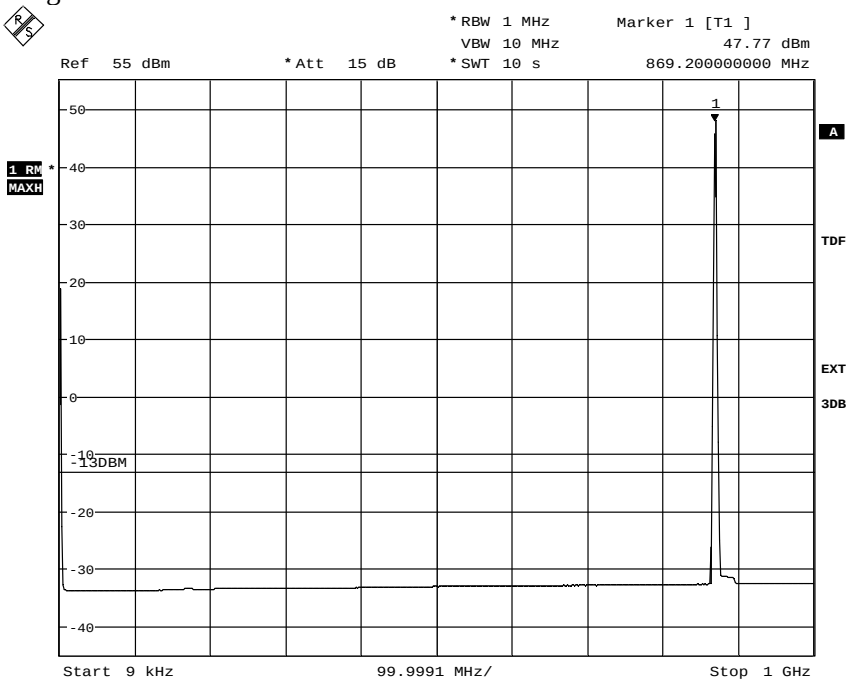

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Diagram 4b

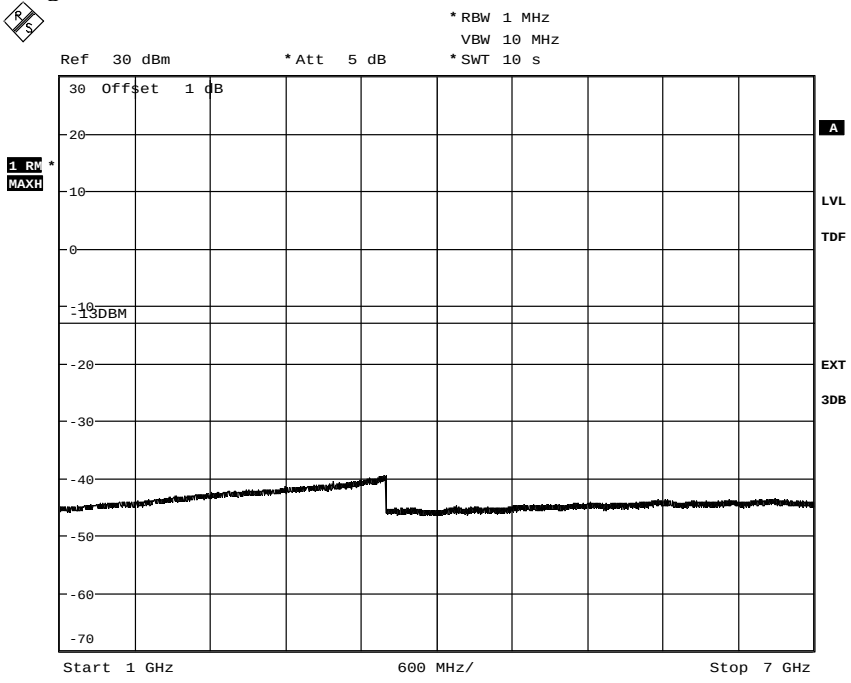

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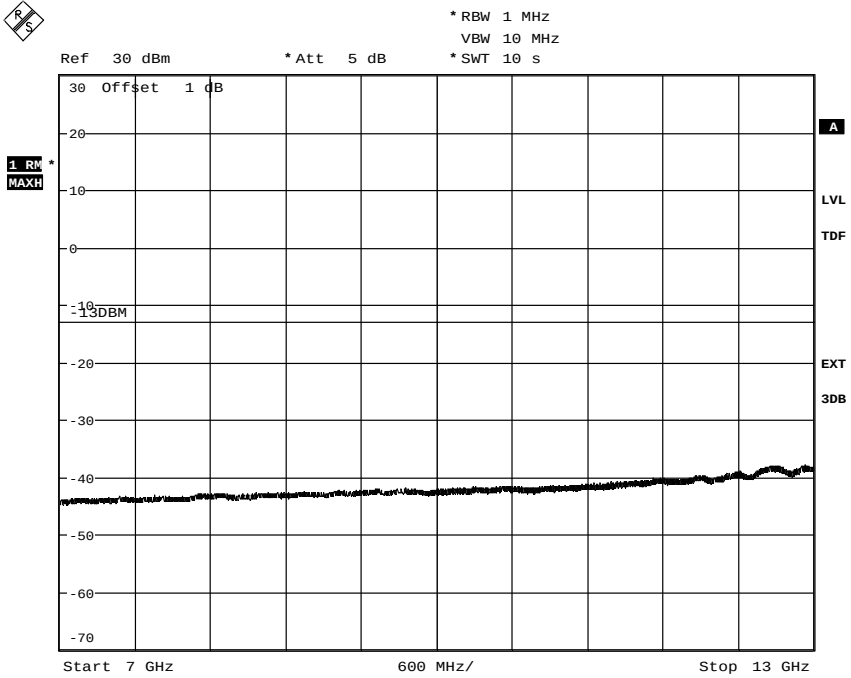
Diagram 4c



Date: 7.SEP.2011 10:59:21

Diagram 4d

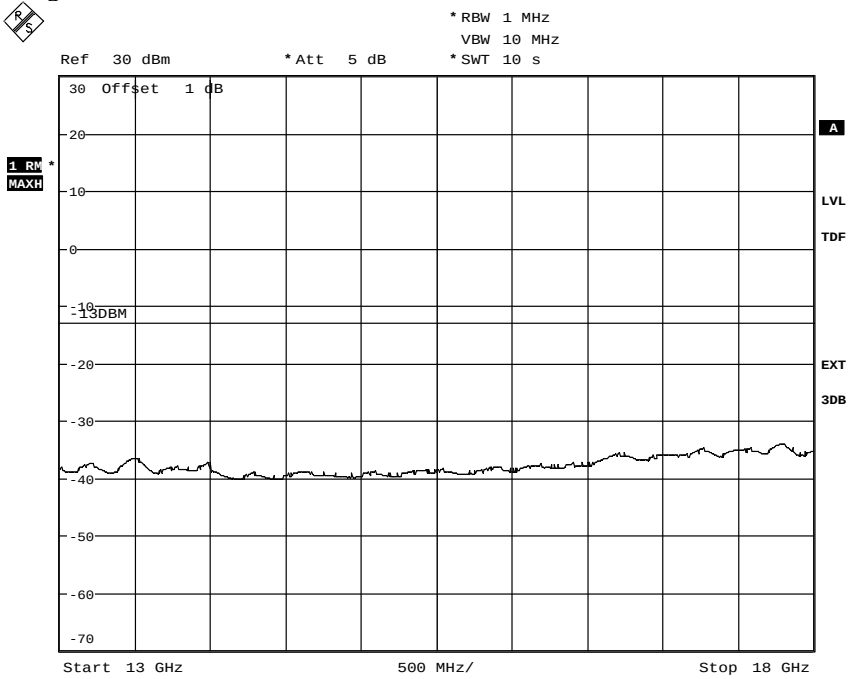


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Diagram 4e

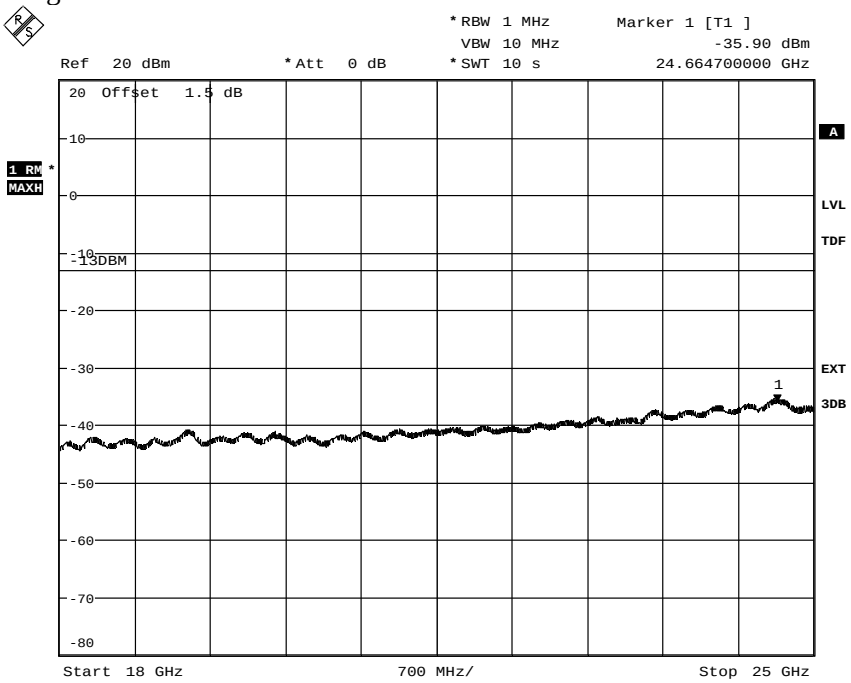

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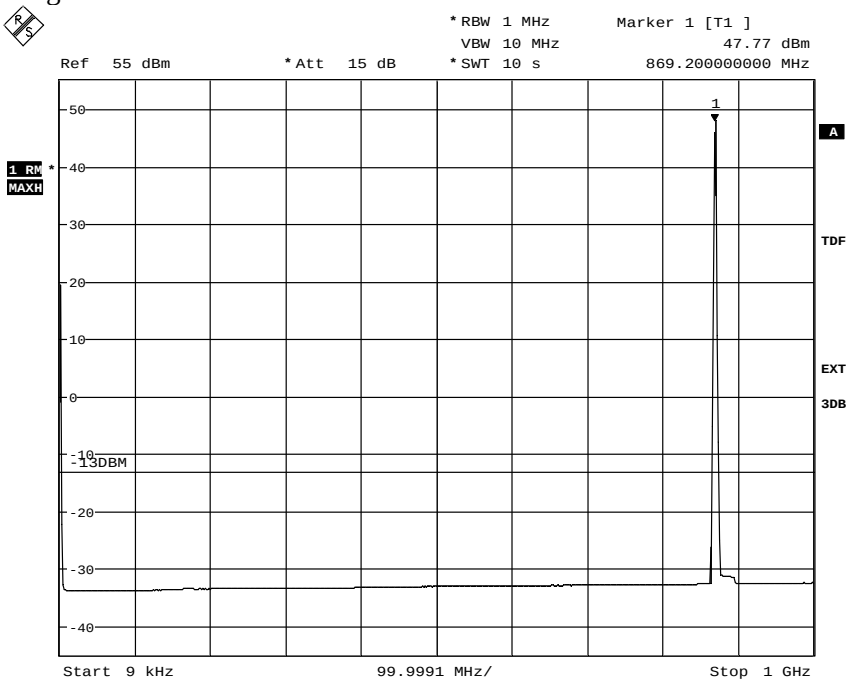
Diagram 5a



Date: 7.SEP.2011 09:12:50

Diagram 5b

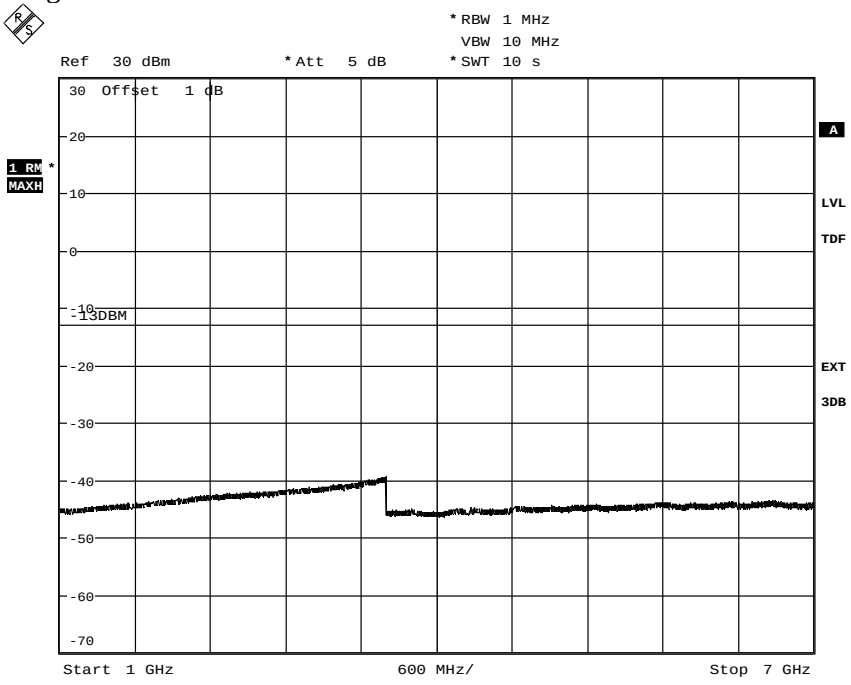


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Diagram 5c

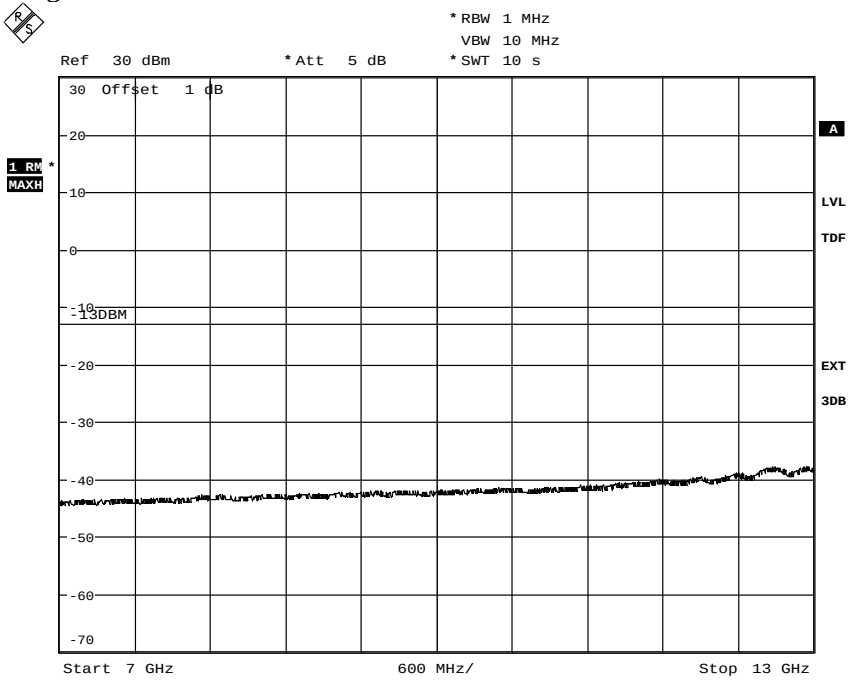

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Diagram 5d

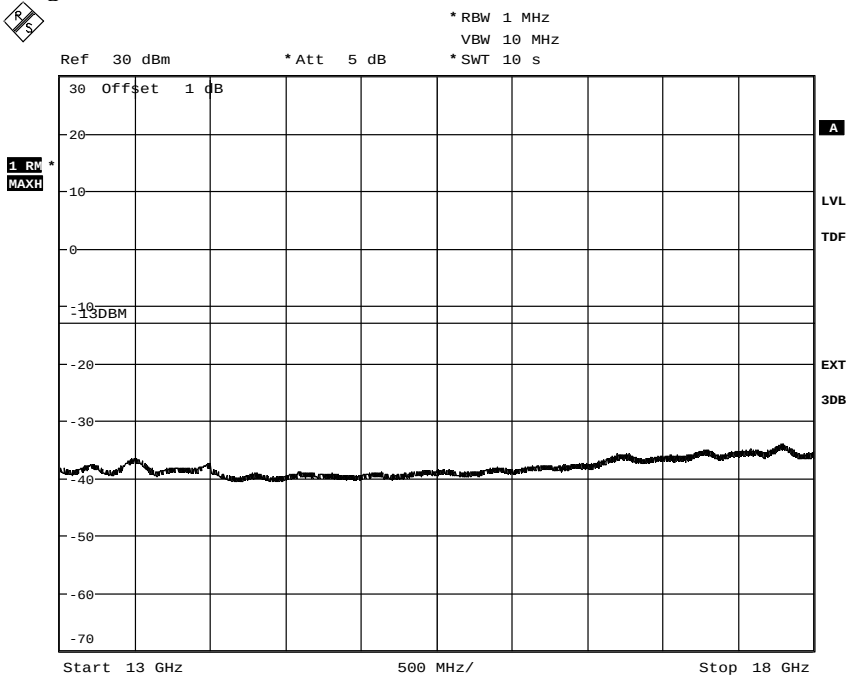

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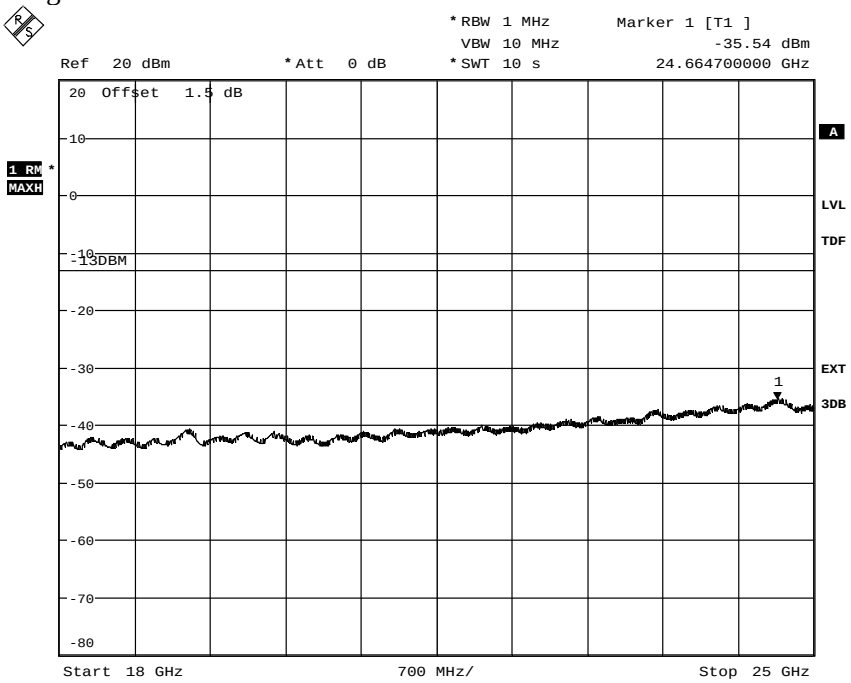
Diagram 5e



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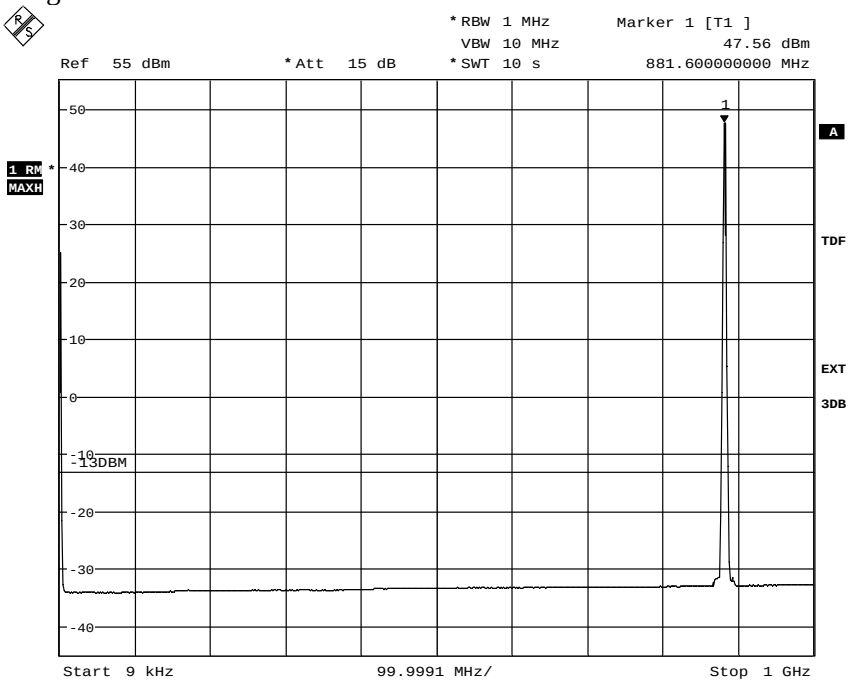

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Diagram 6b

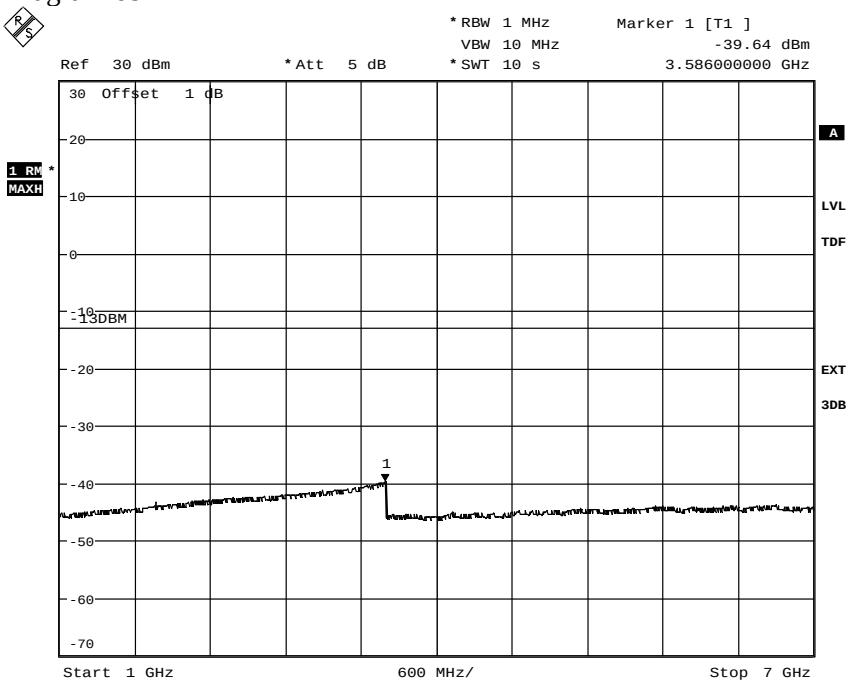

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Diagram 6c

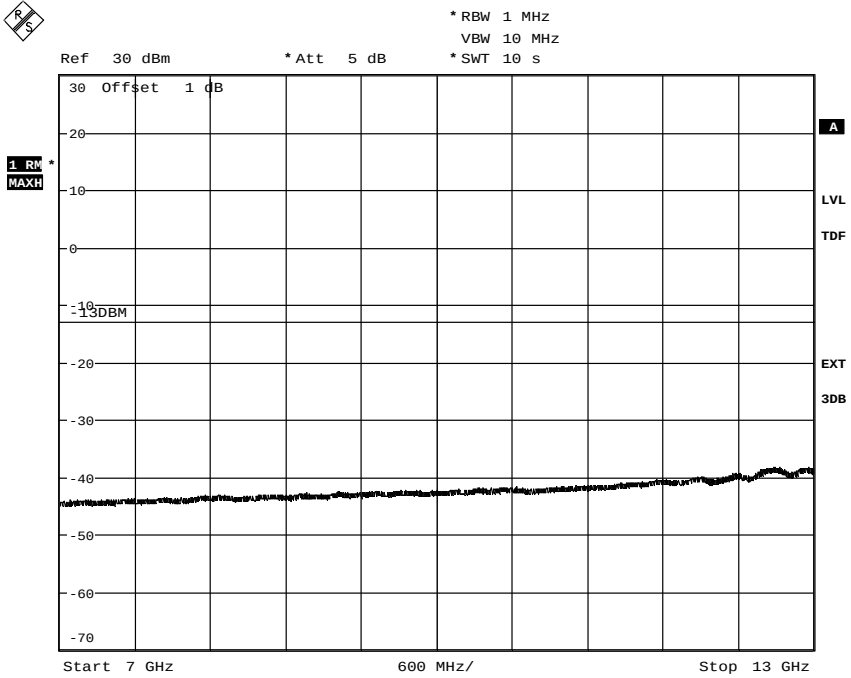

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Diagram 6d

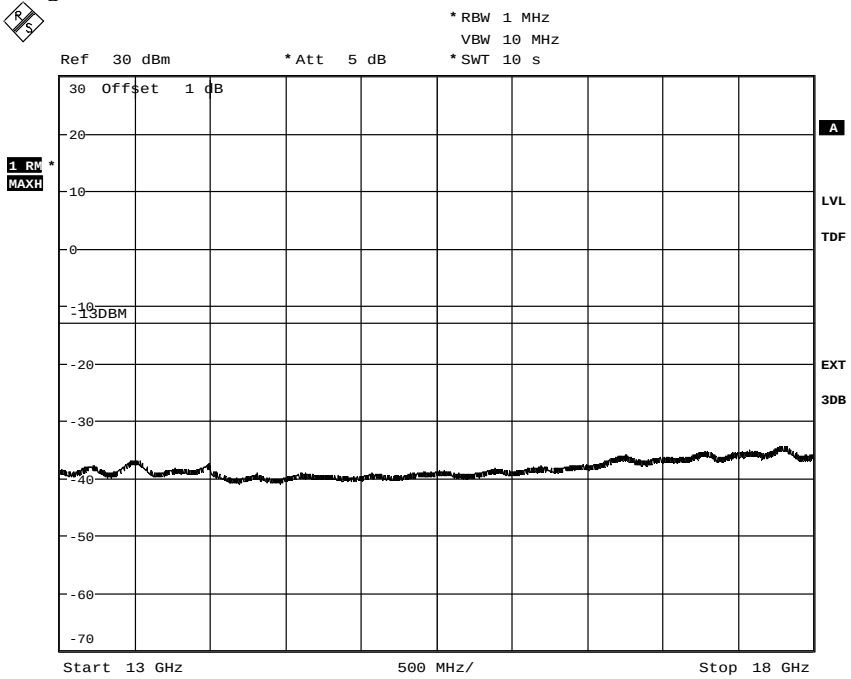

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Diagram 6e

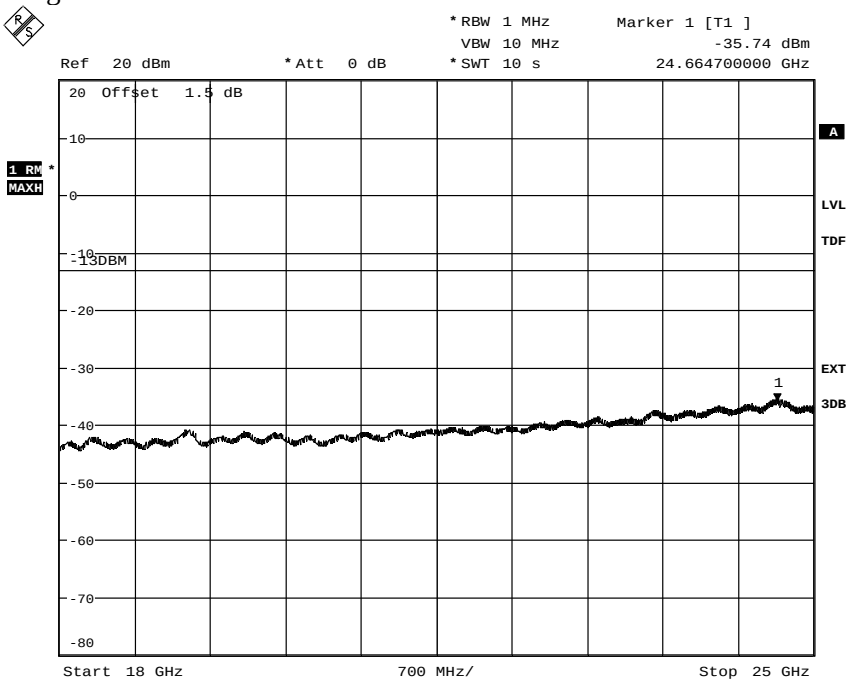

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Diagram 7a

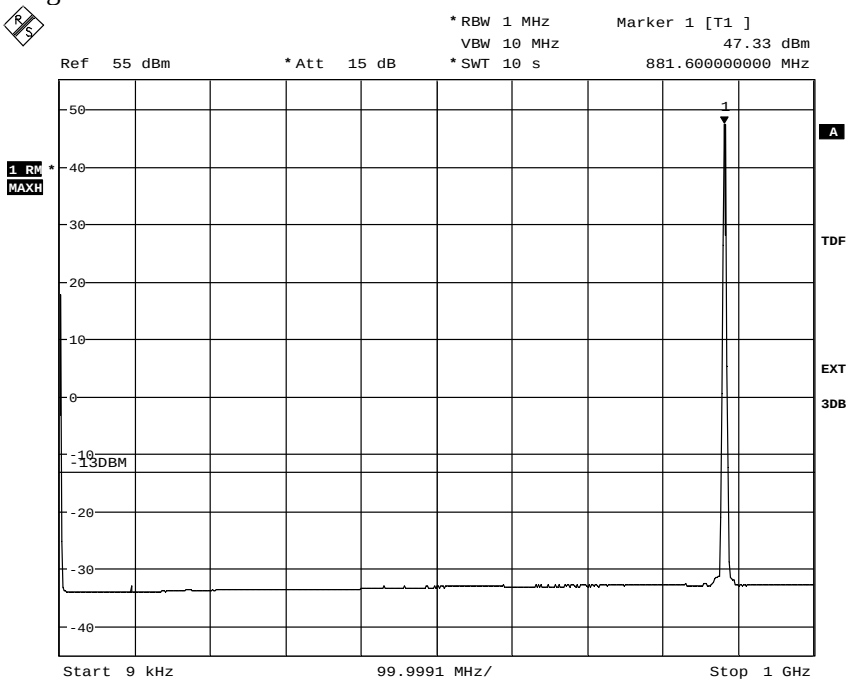

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Diagram 7b

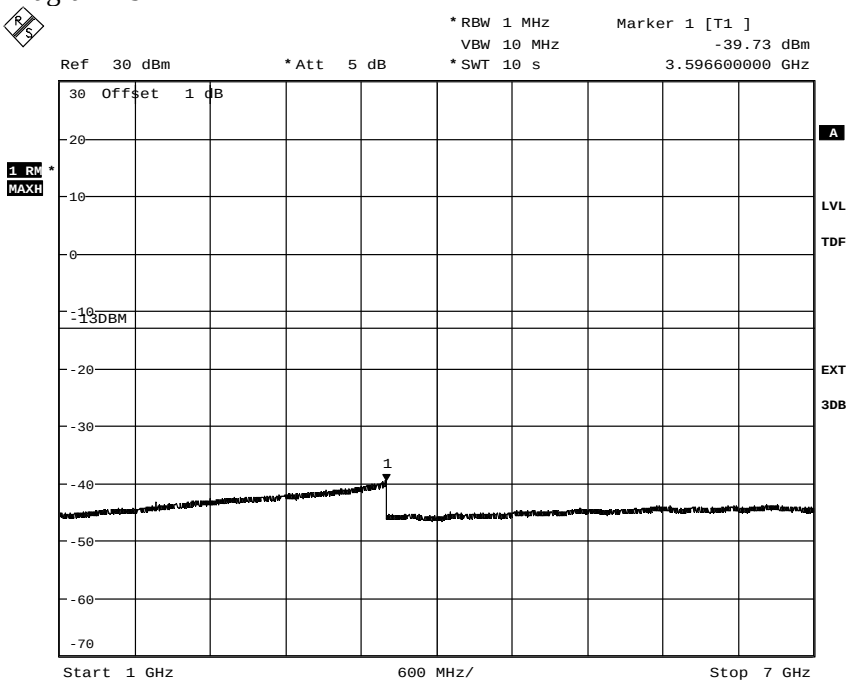

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Diagram 7c

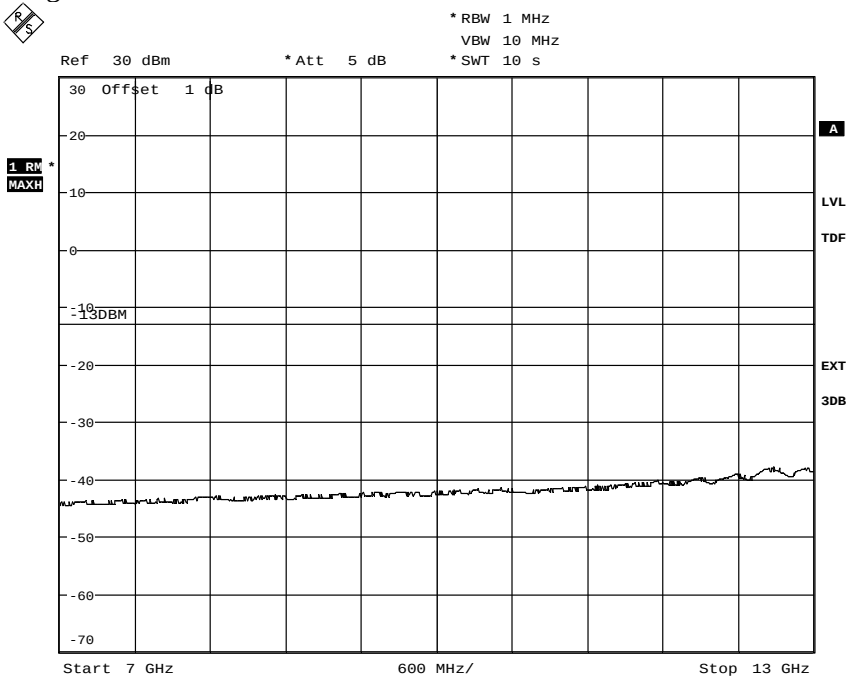

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Diagram 7d

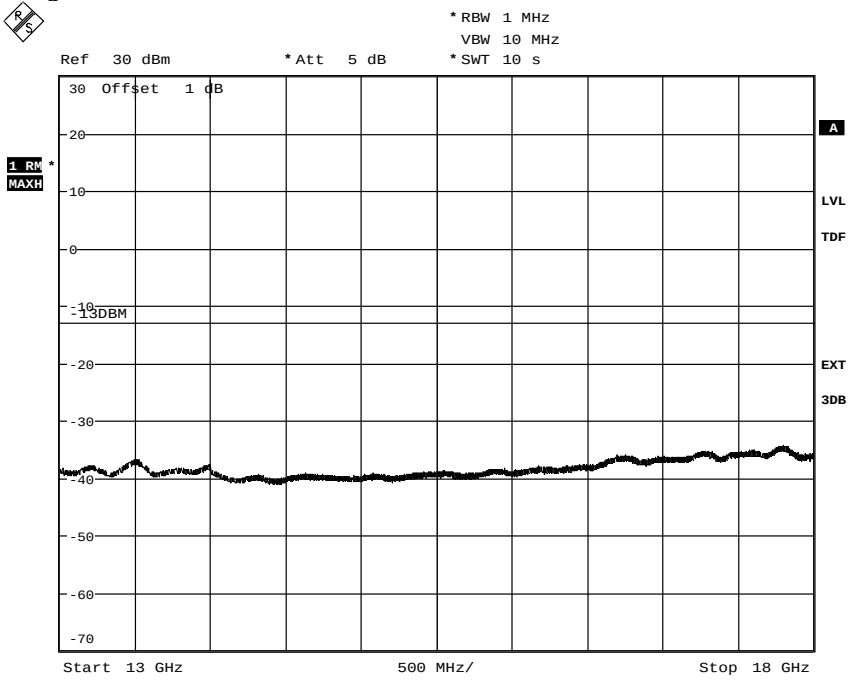

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Diagram 7e

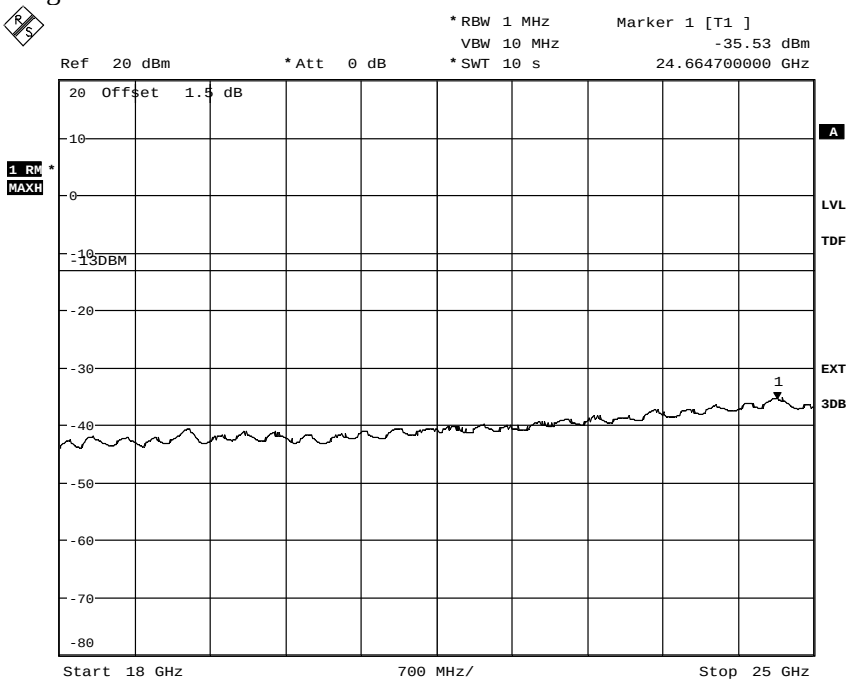

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Diagram 8a

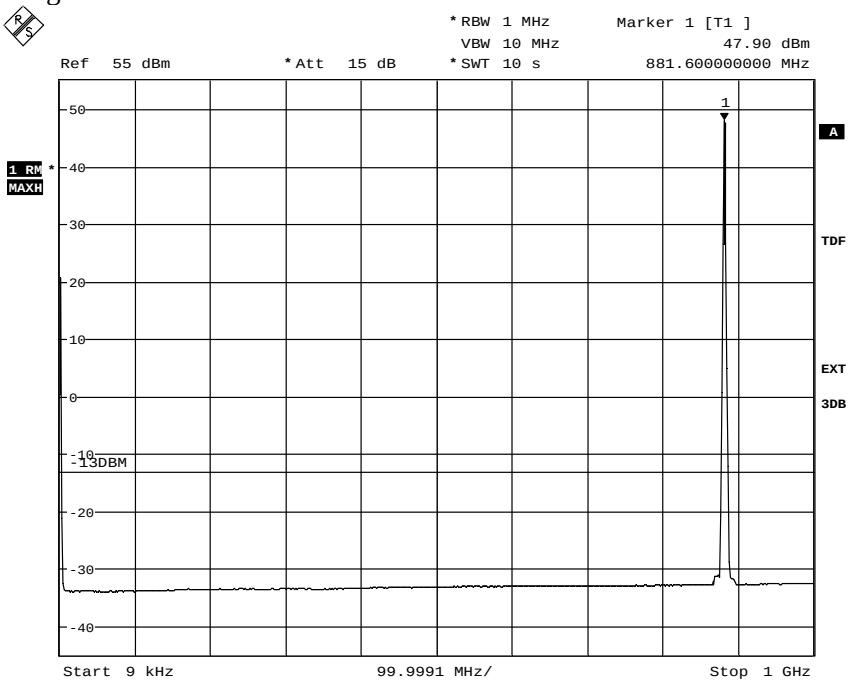

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Diagram 8b

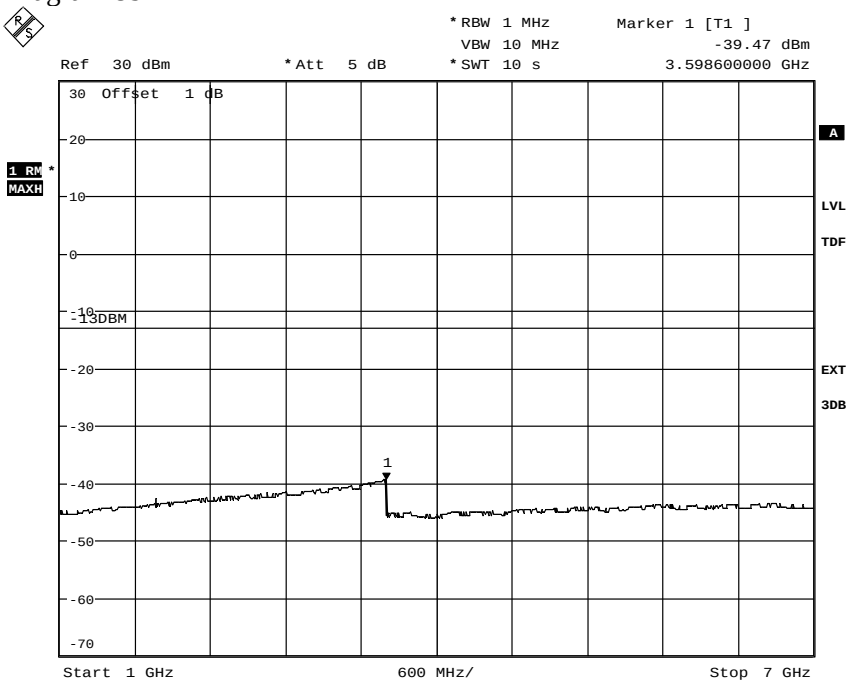

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Diagram 8c

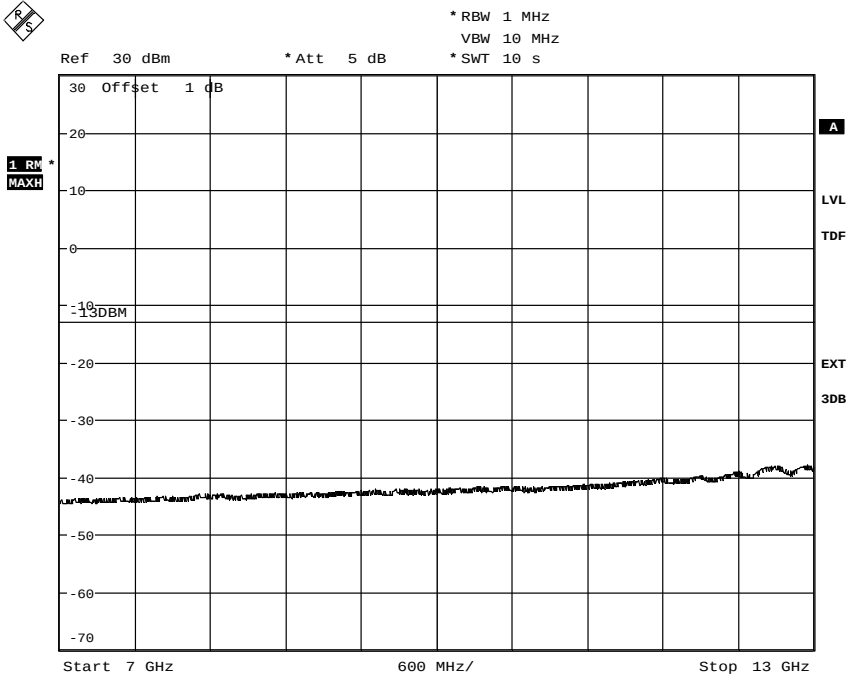

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Diagram 8d

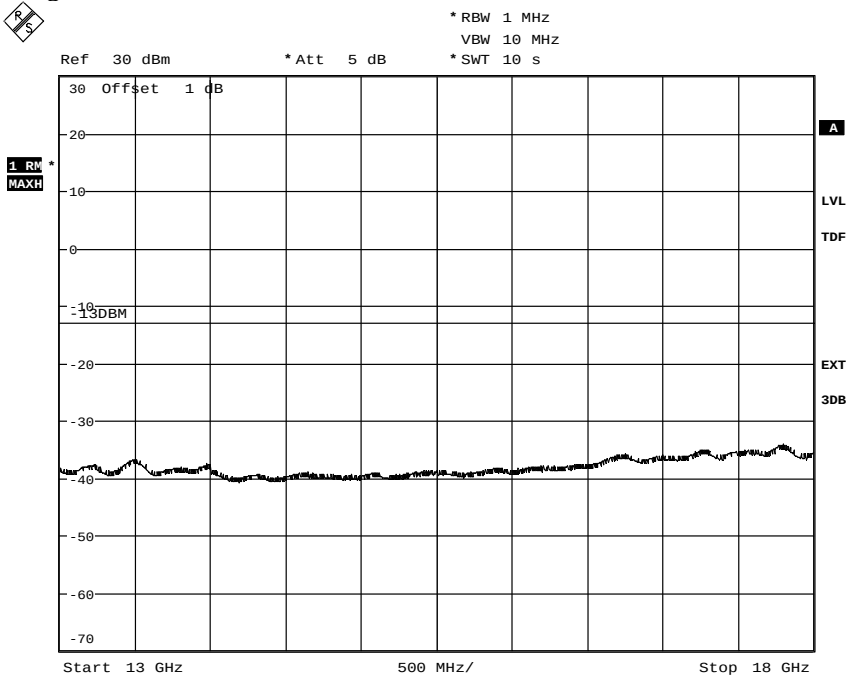

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Diagram 8e

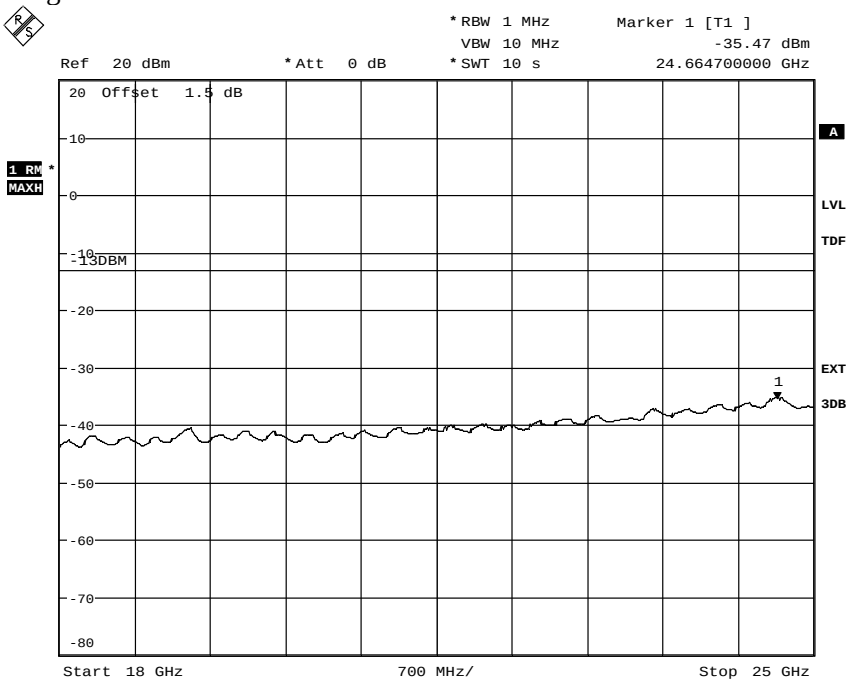

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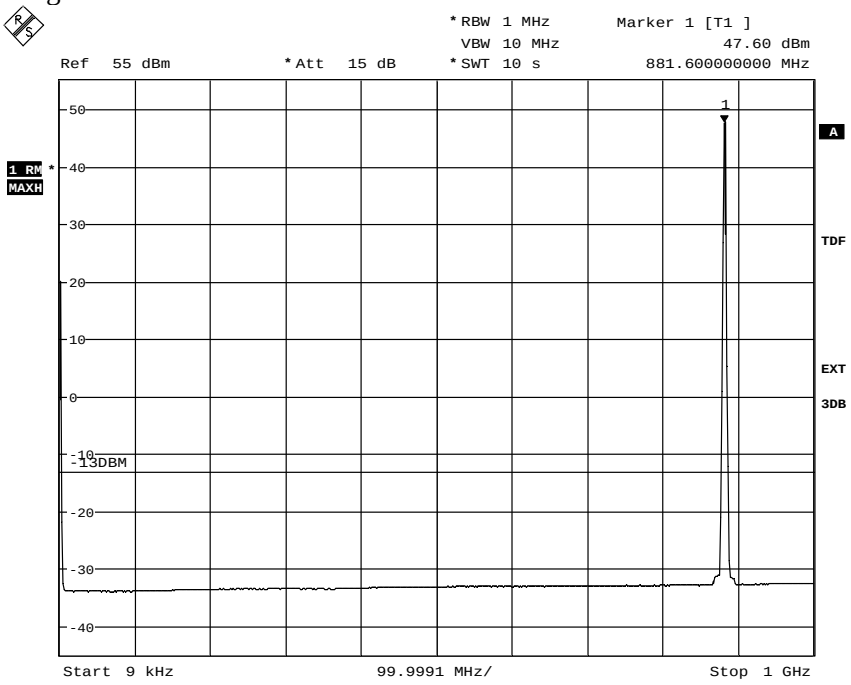
Diagram 9a



Date: 7.SEP.2011 12:09:46

Diagram 9b

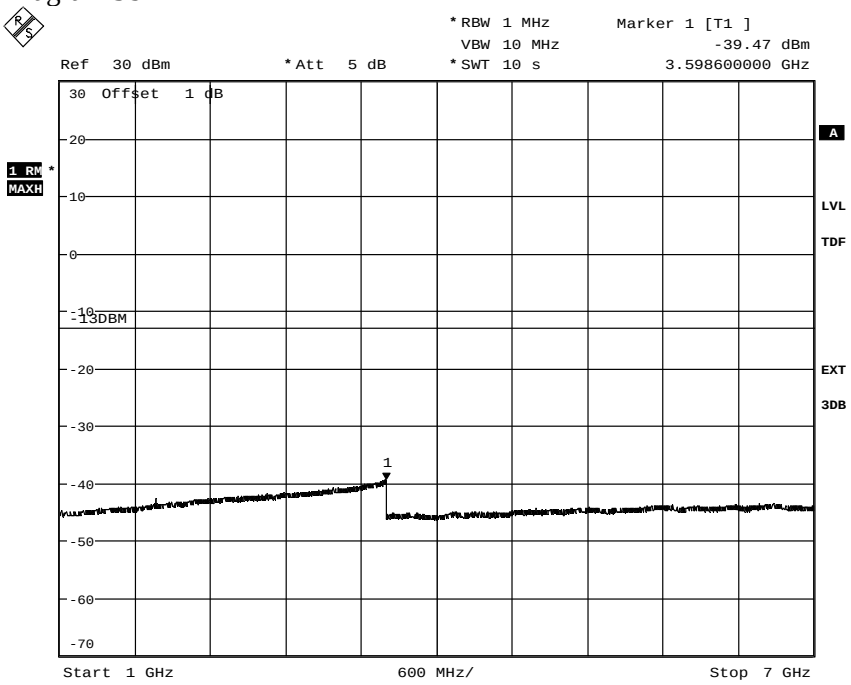


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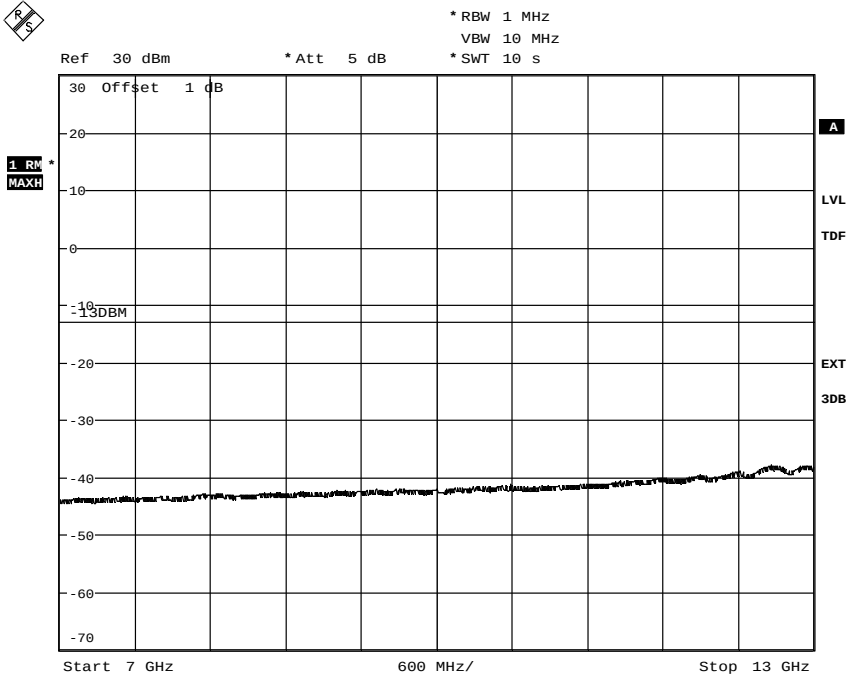
Diagram 9c



Date: 7.SEP.2011 12:11:50

Diagram 9d

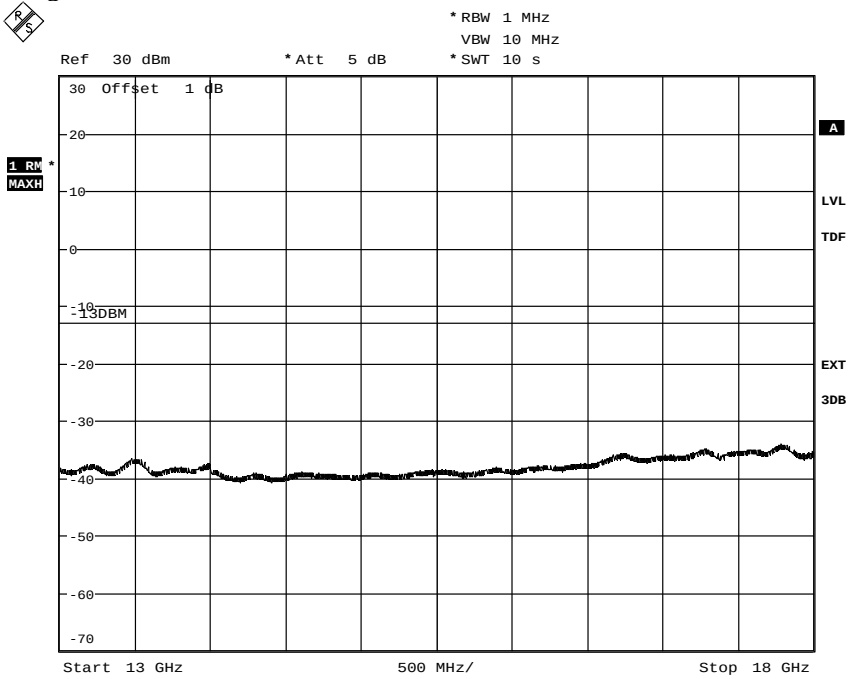


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Diagram 9e

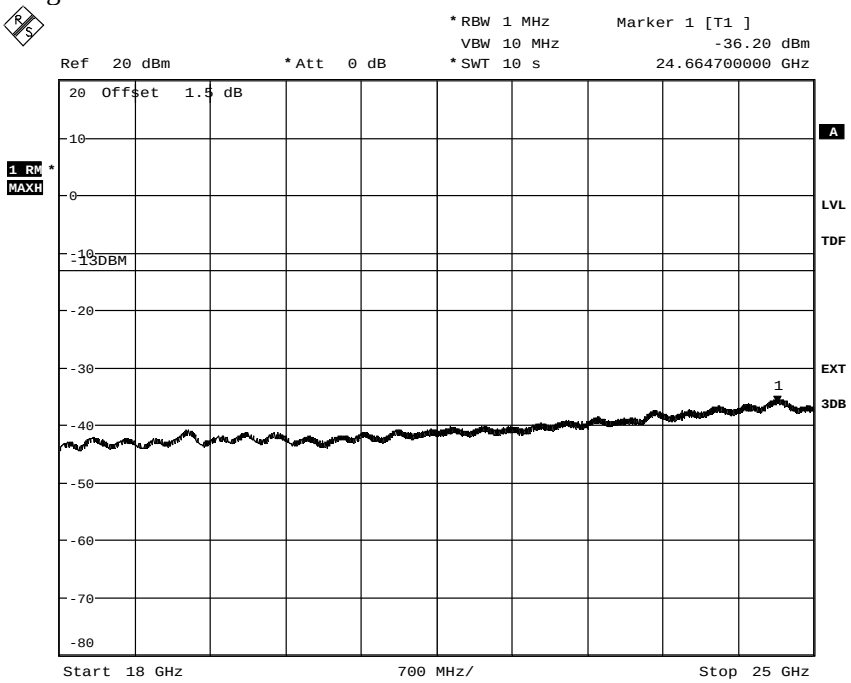

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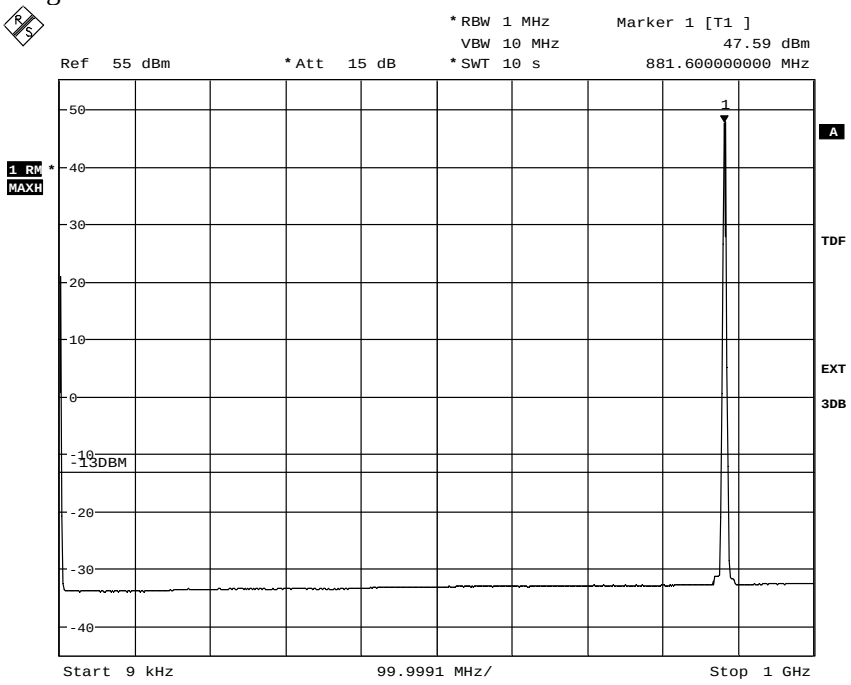
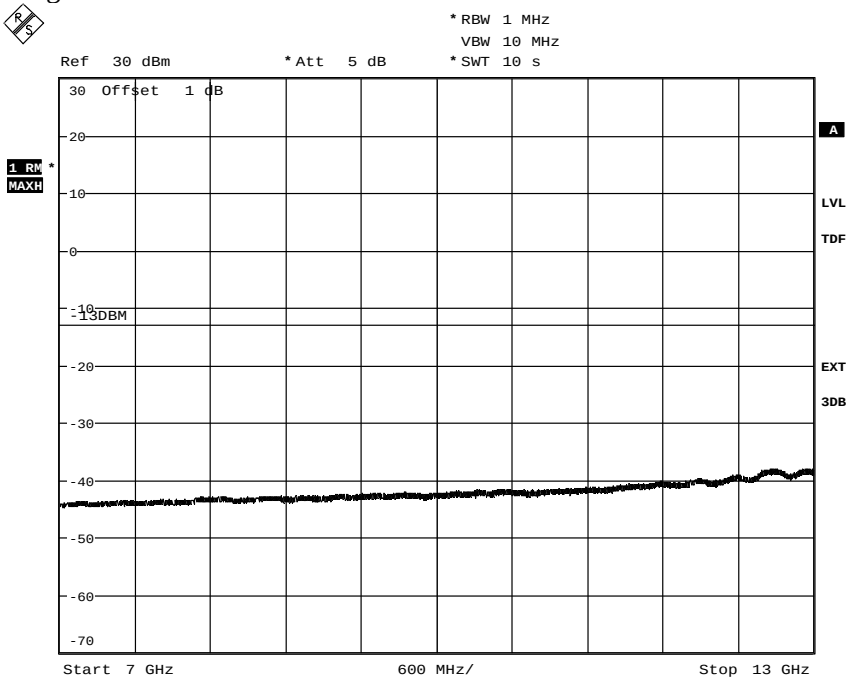
Diagram 10a



Date: 7.SEP.2011 12:07:38

Diagram 10b



Date: 7.SEP.2011 12:01:24

Diagram 10c

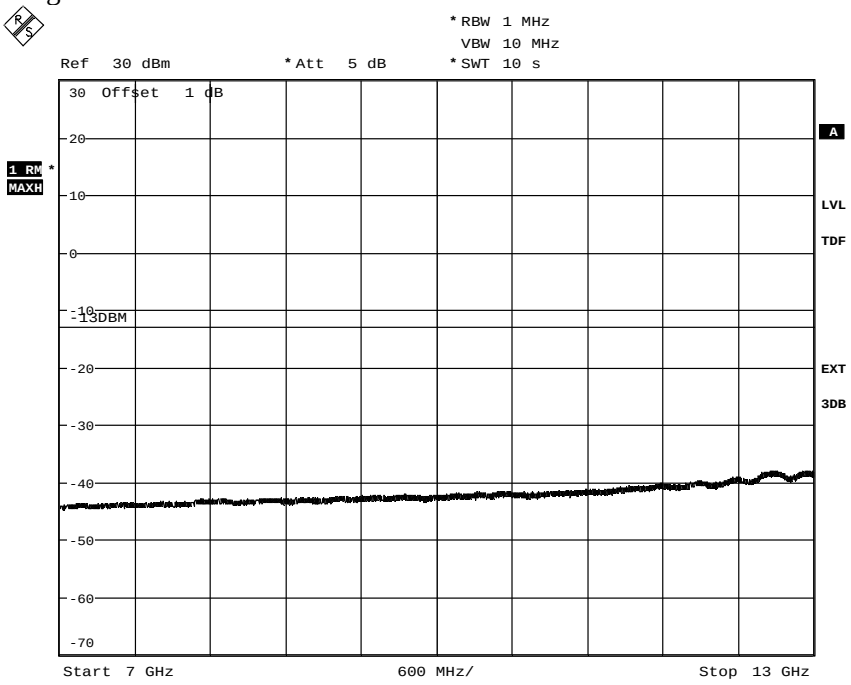


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Diagram 10d

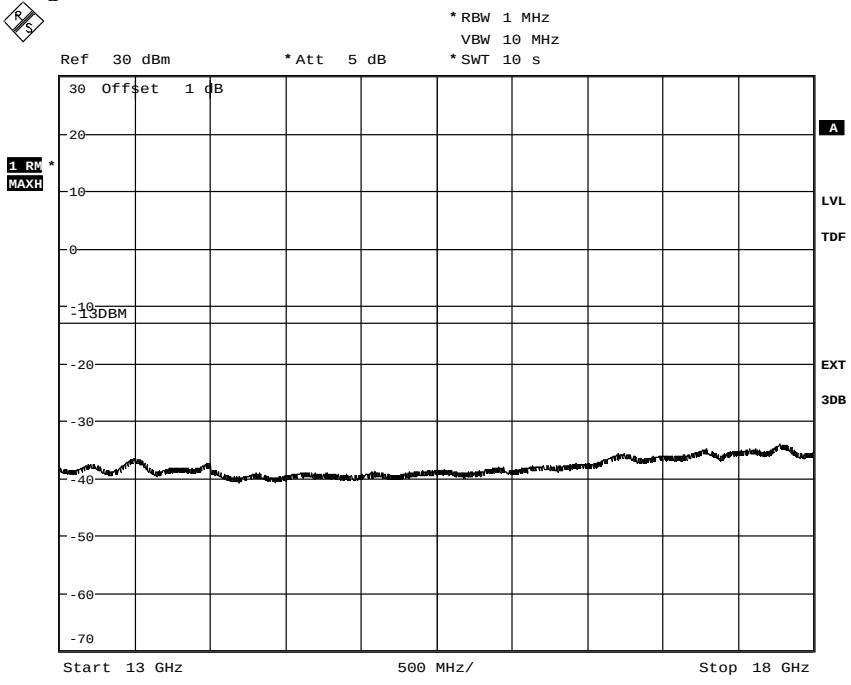

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Diagram 10e

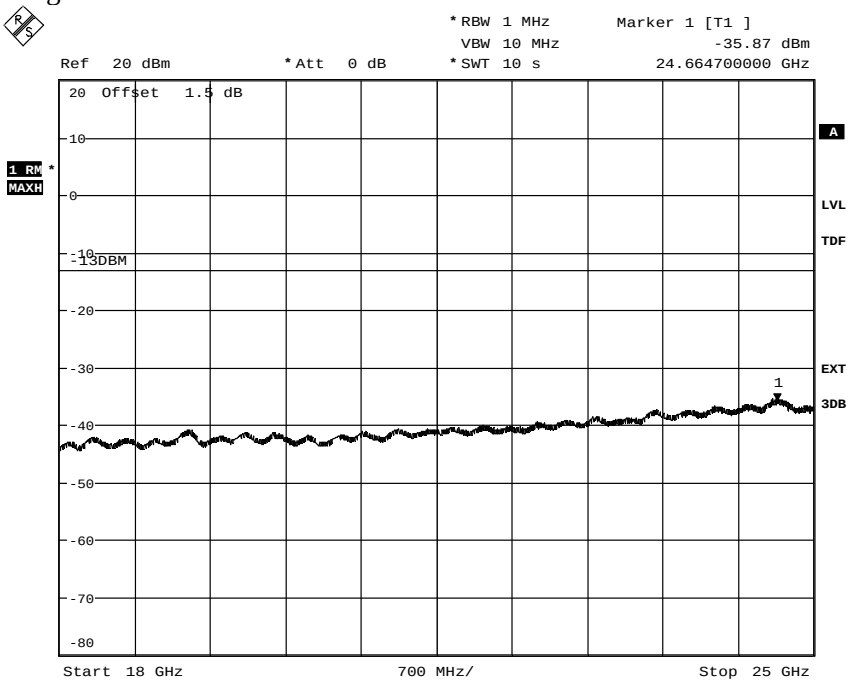

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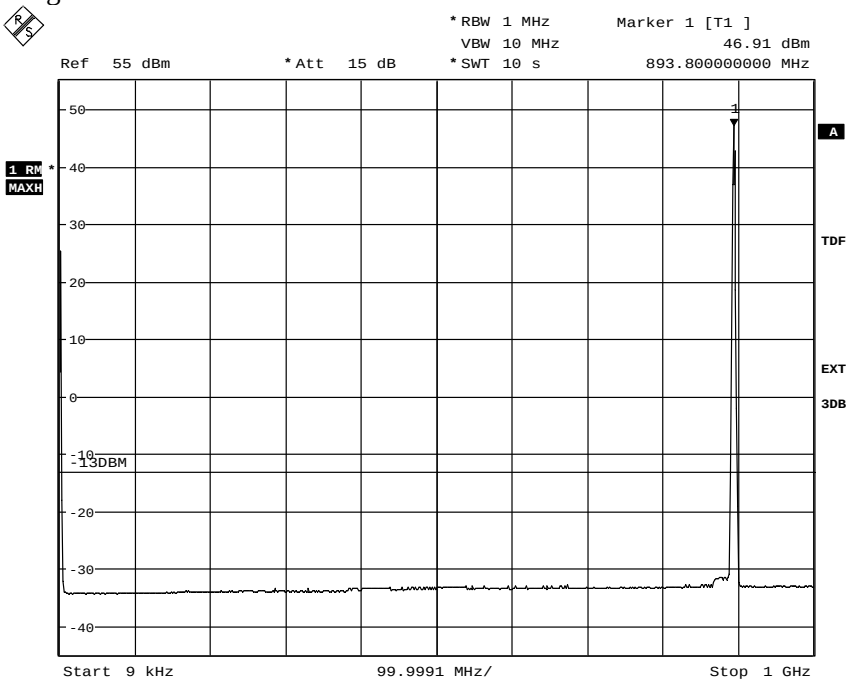
Diagram 11a



Date: 7.SEP.2011 15:59:45

Diagram 11b

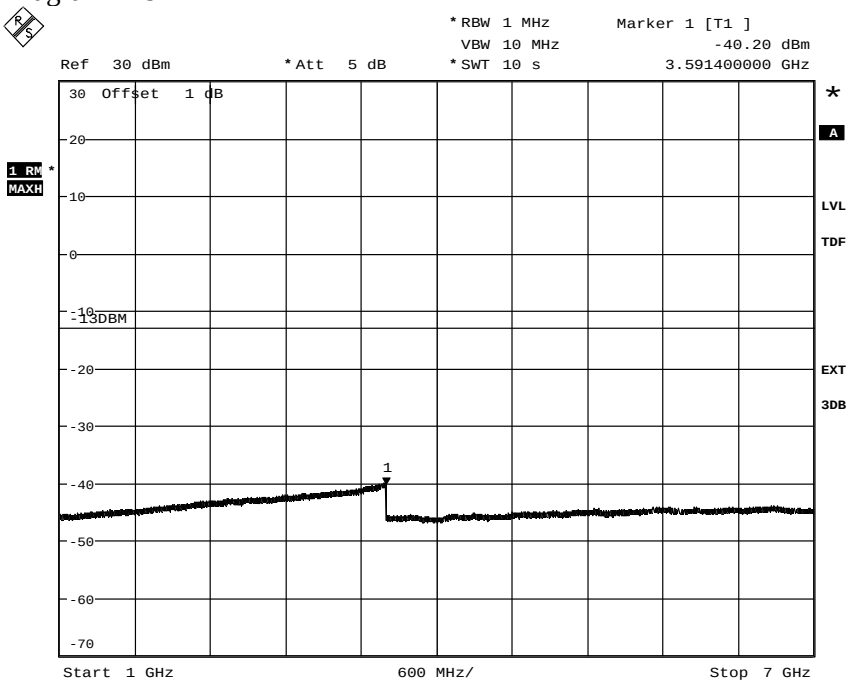


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Diagram 11c

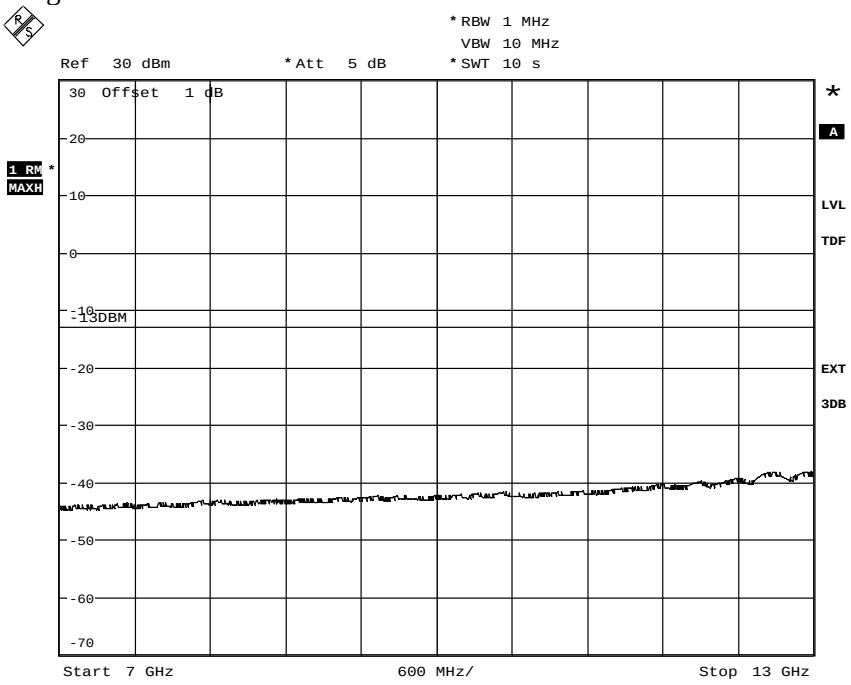

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Diagram 11d

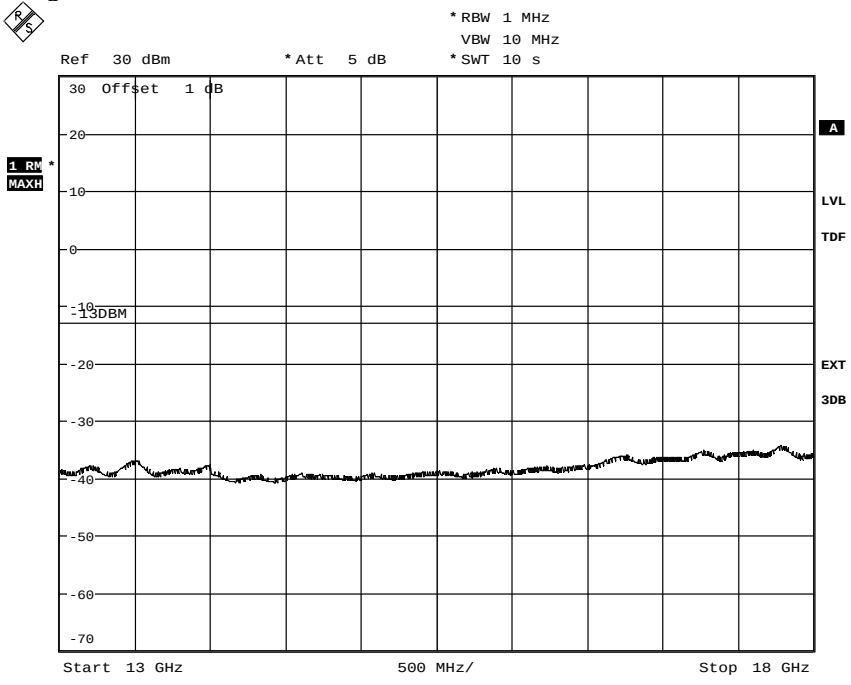

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Diagram 11e

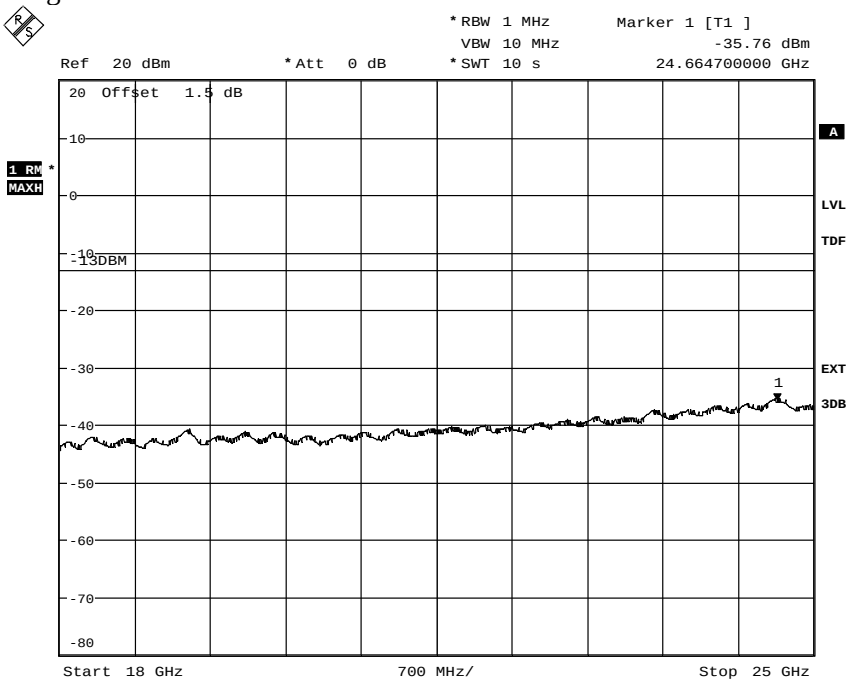

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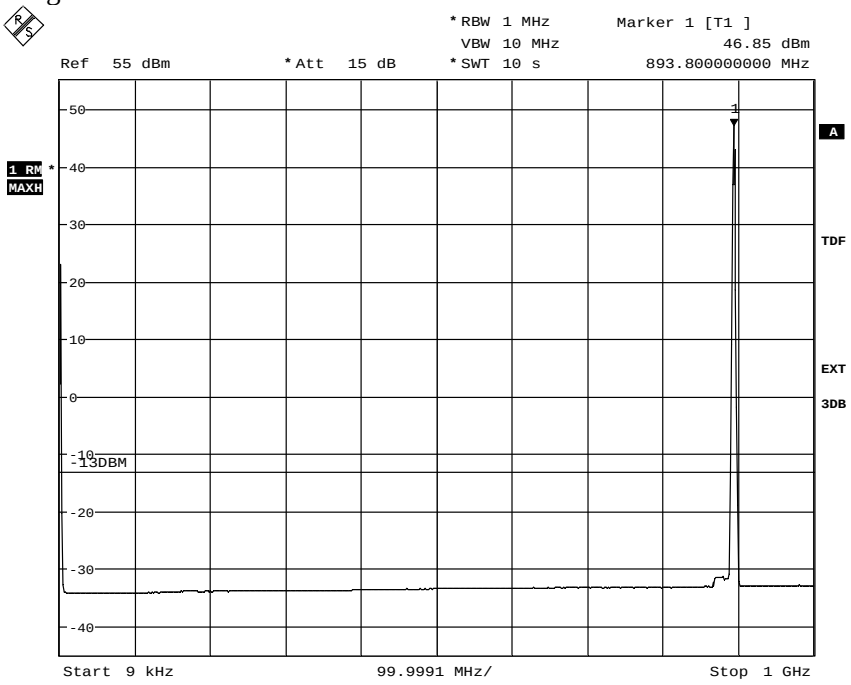
Diagram 12a



Date: 7.SEP.2011 13:11:34

Diagram 12b

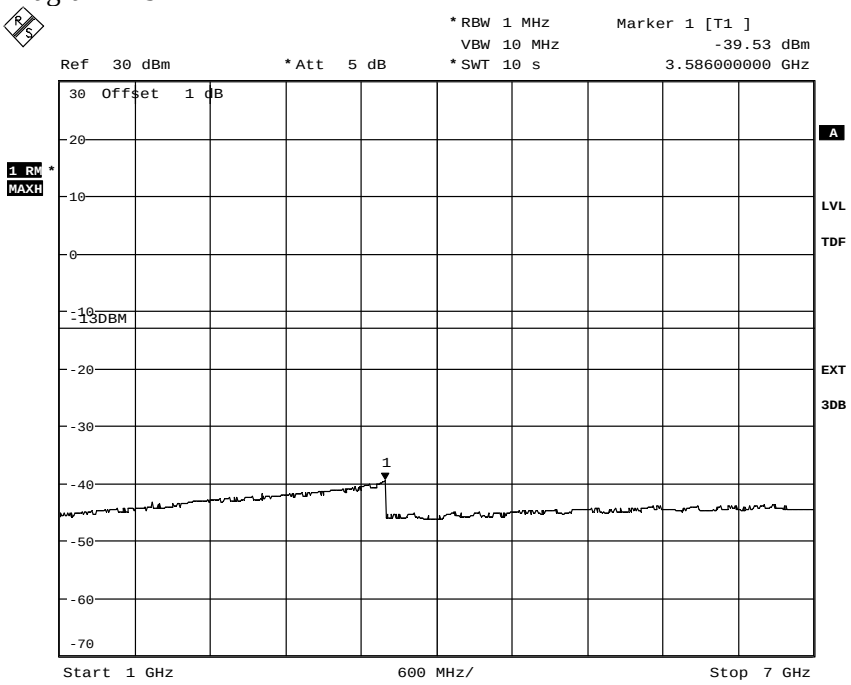


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Diagram 12c

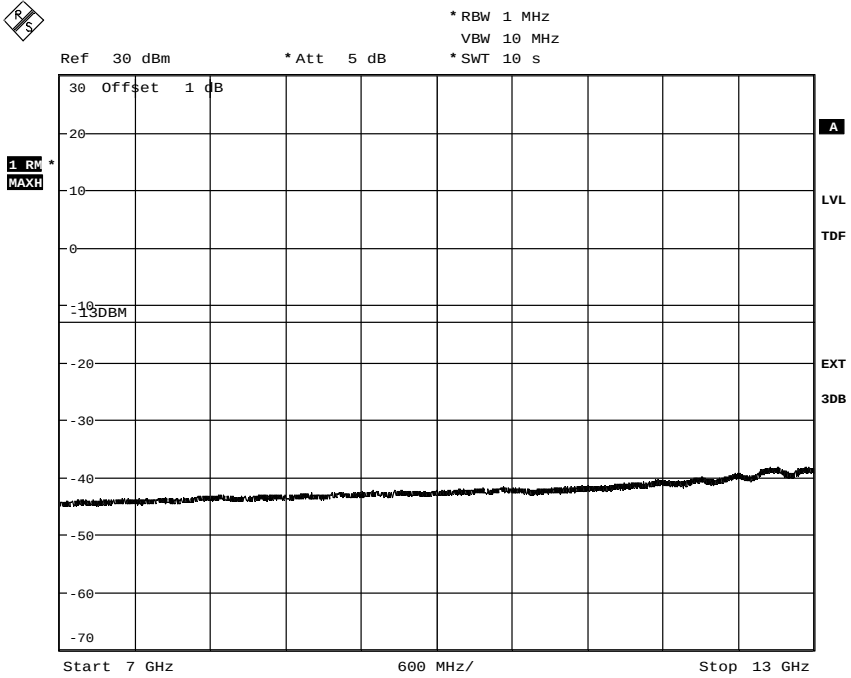

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Diagram 12d

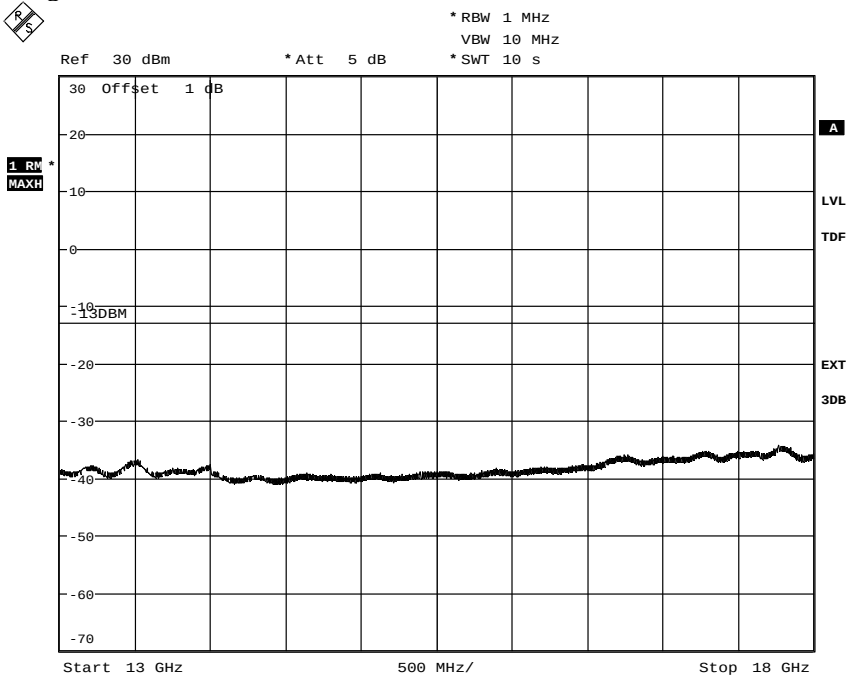

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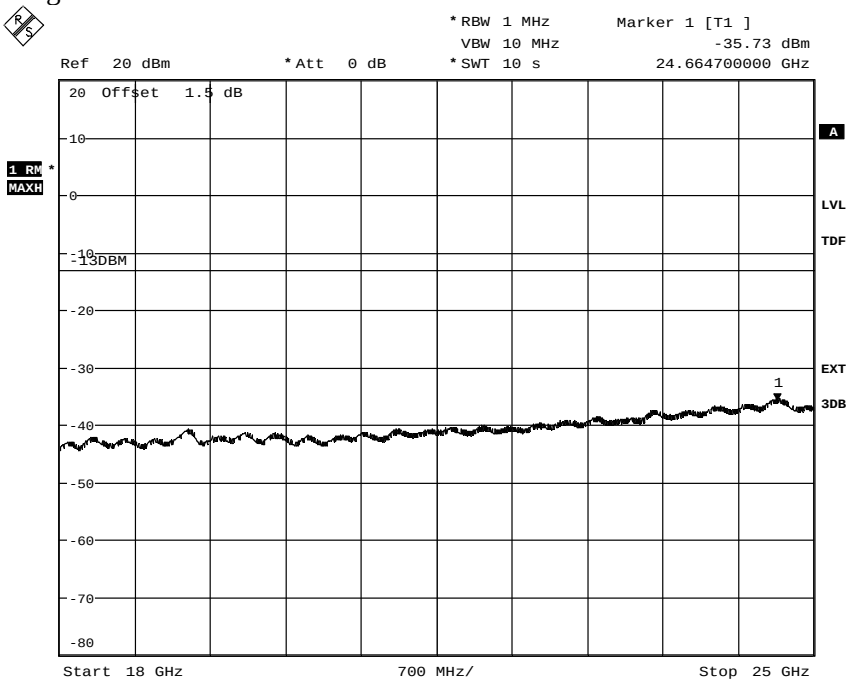
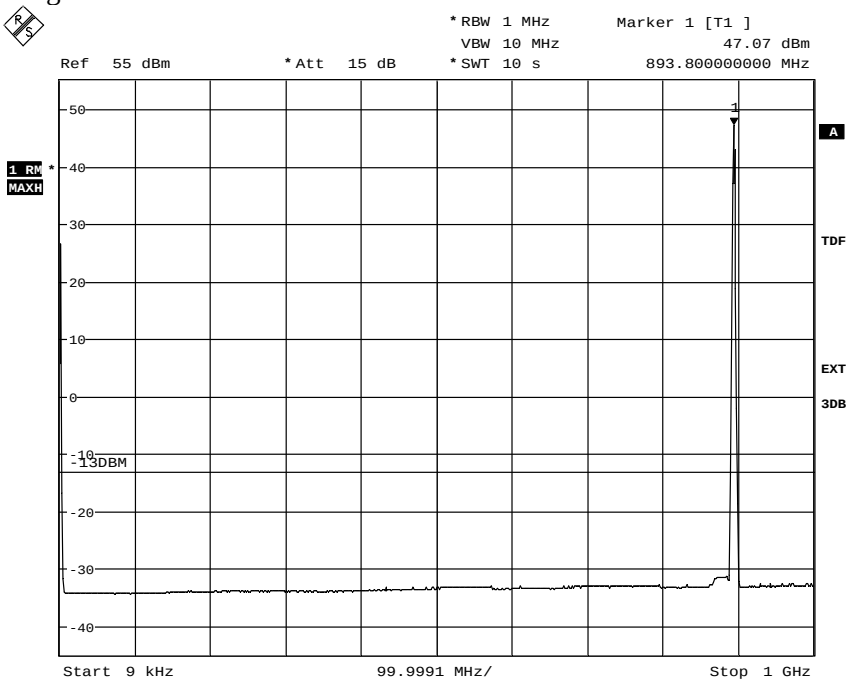
Diagram 12e



Date: 12.SEP.2011 15:19:36

Diagram 13a



Date: 7.SEP.2011 15:48:21

Diagram 13b

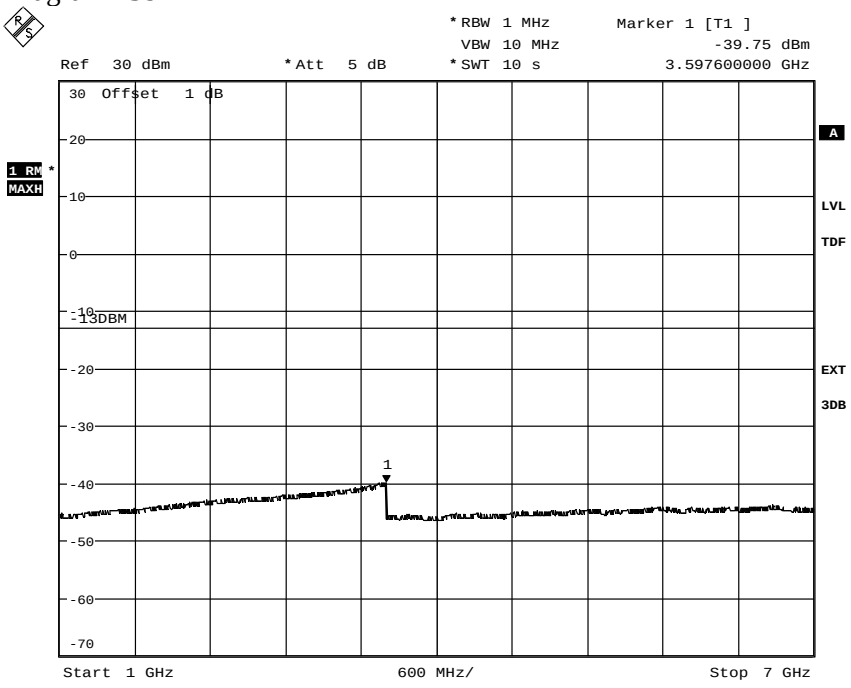


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Diagram 13c

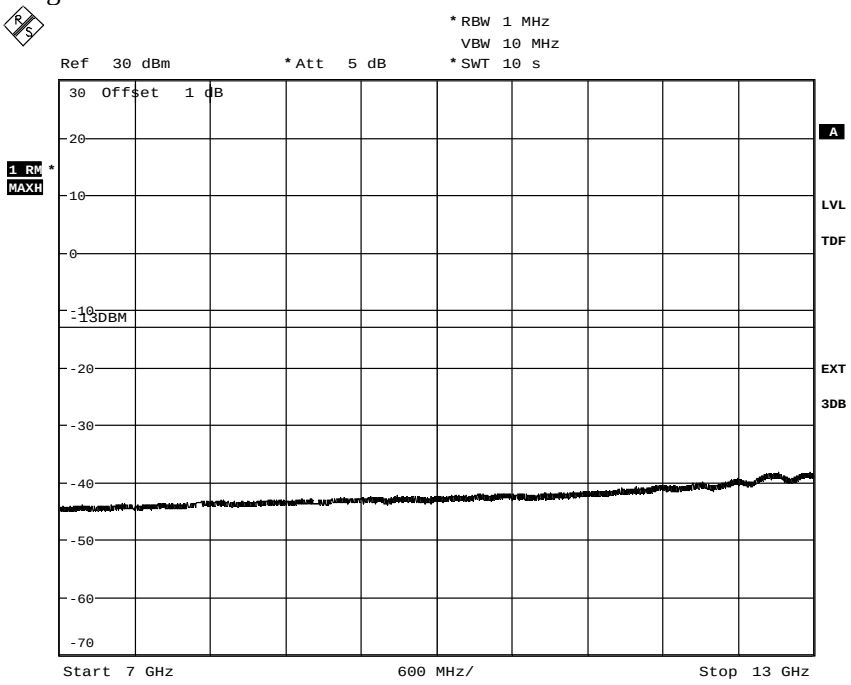

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Diagram 13d

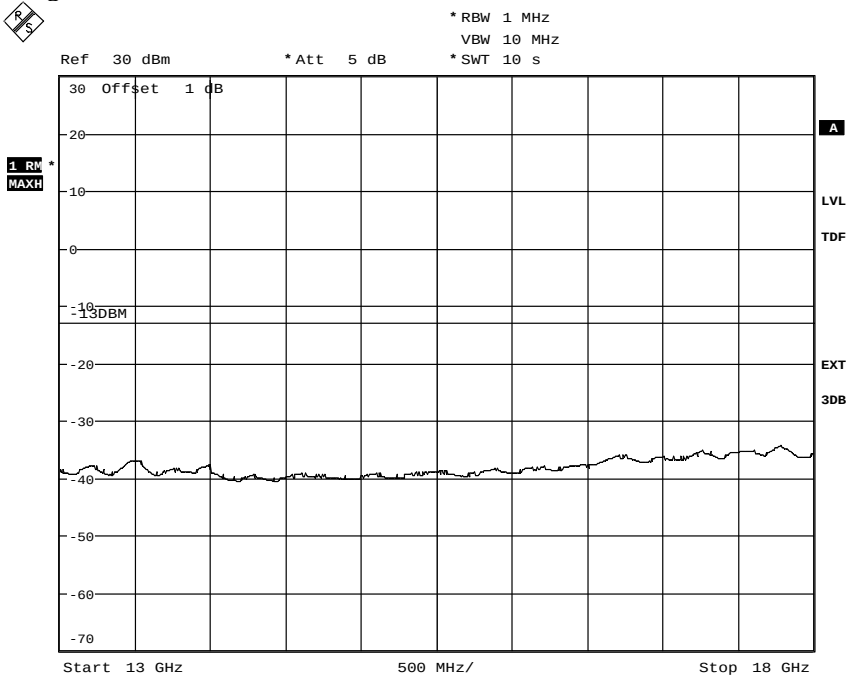

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Diagram 13e

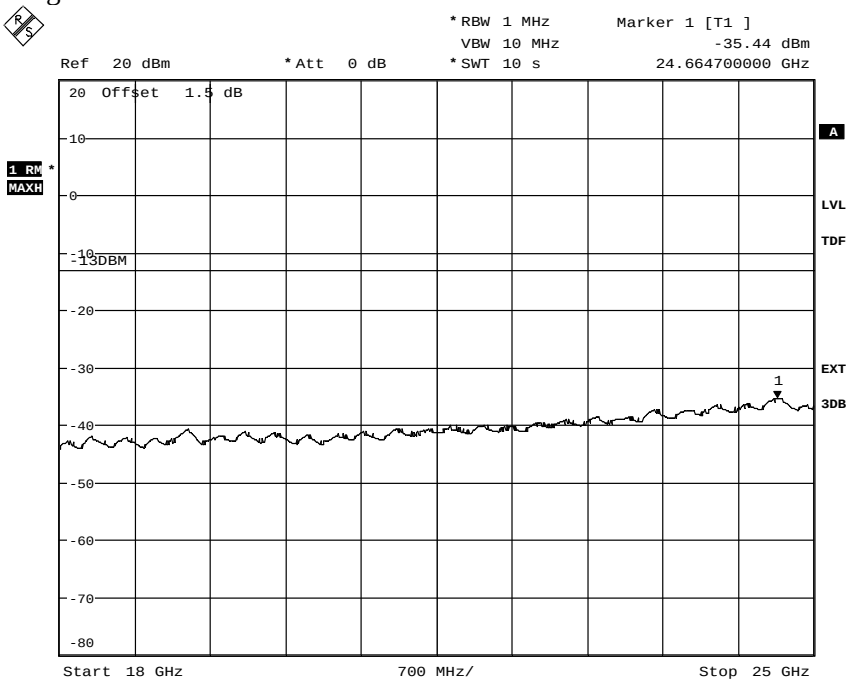

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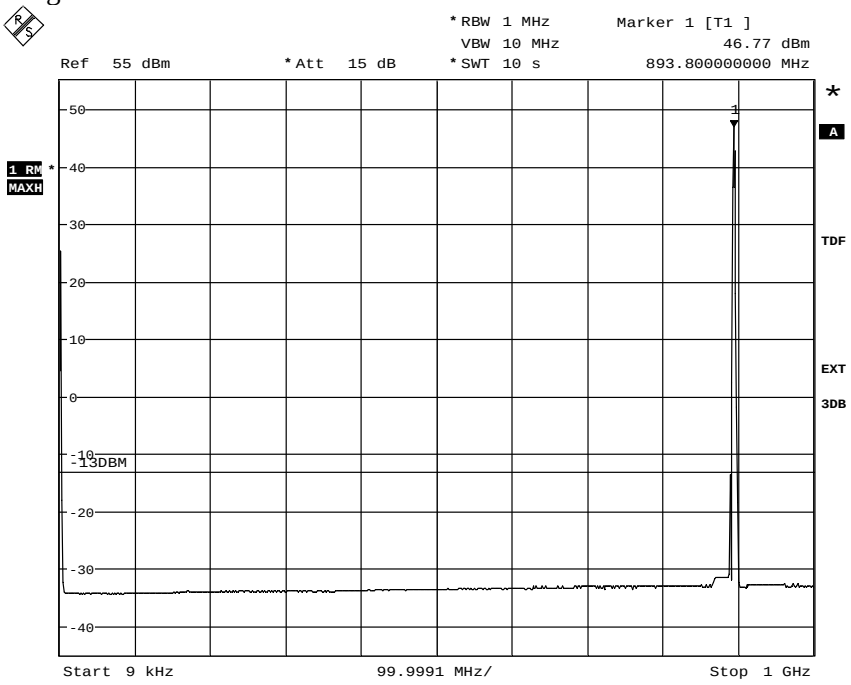
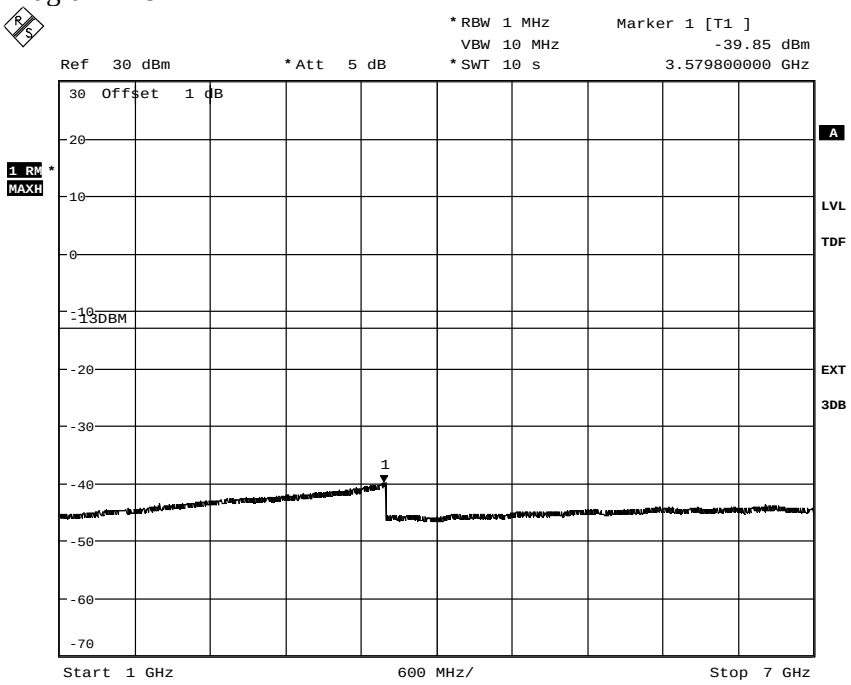
Diagram 14a



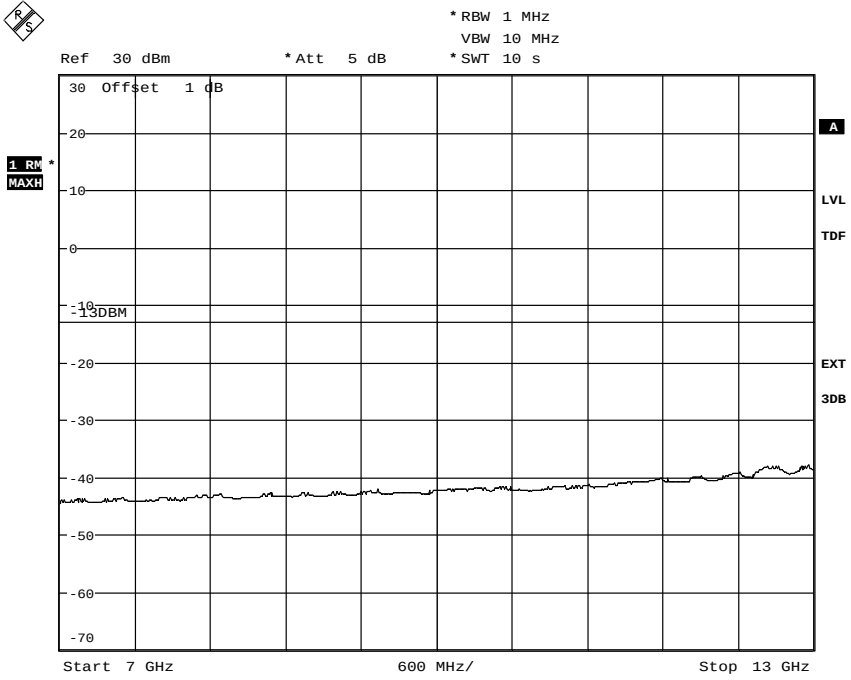
Date: 7.SEP.2011 15:09:51

Diagram 14b



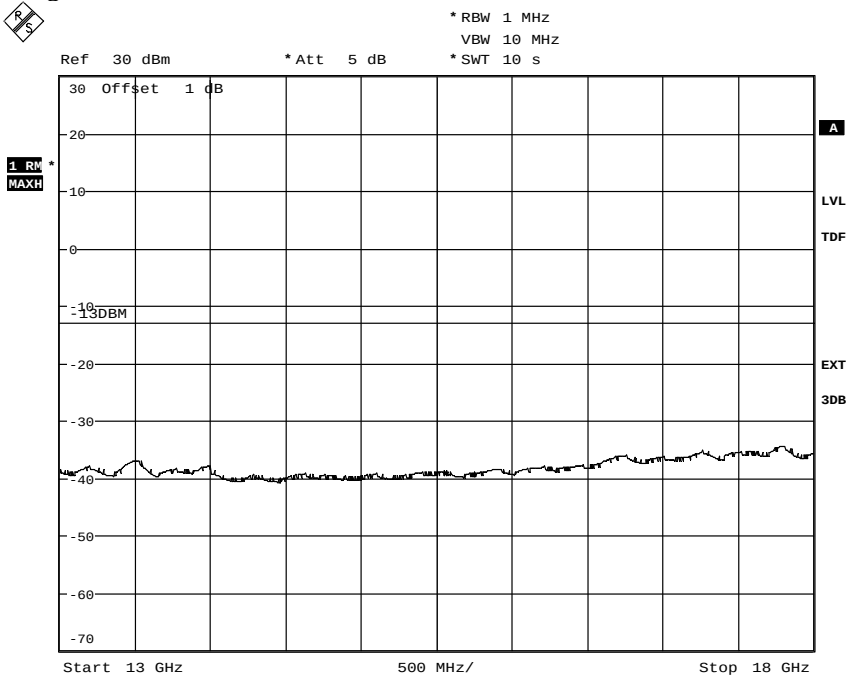
Date: 7.SEP.2011 15:12:35

Diagram 14c



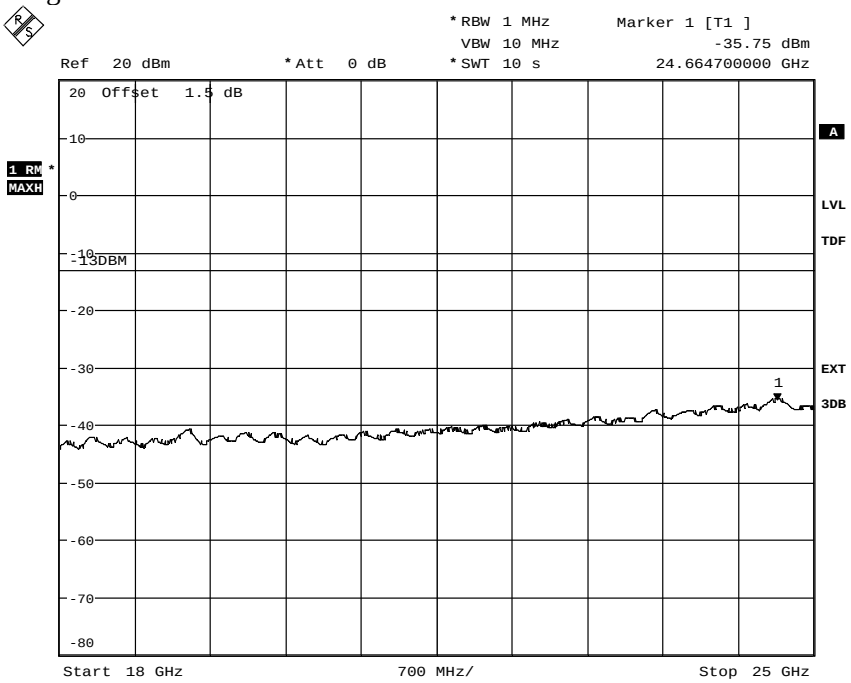
Date: 7.SEP.2011 15:37:36

Diagram 14d



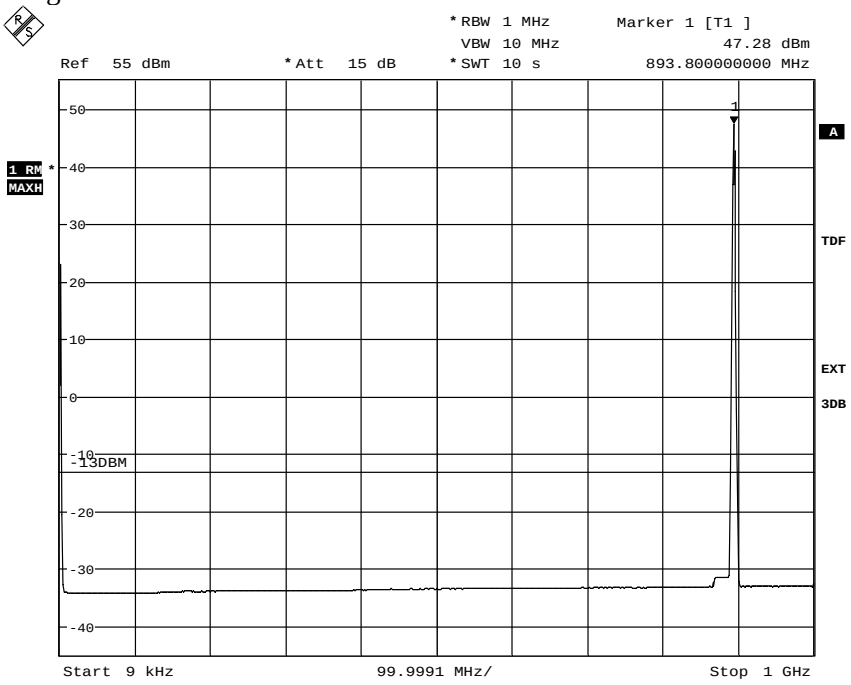
Date: 7.SEP.2011 15:39:51

Diagram 14e



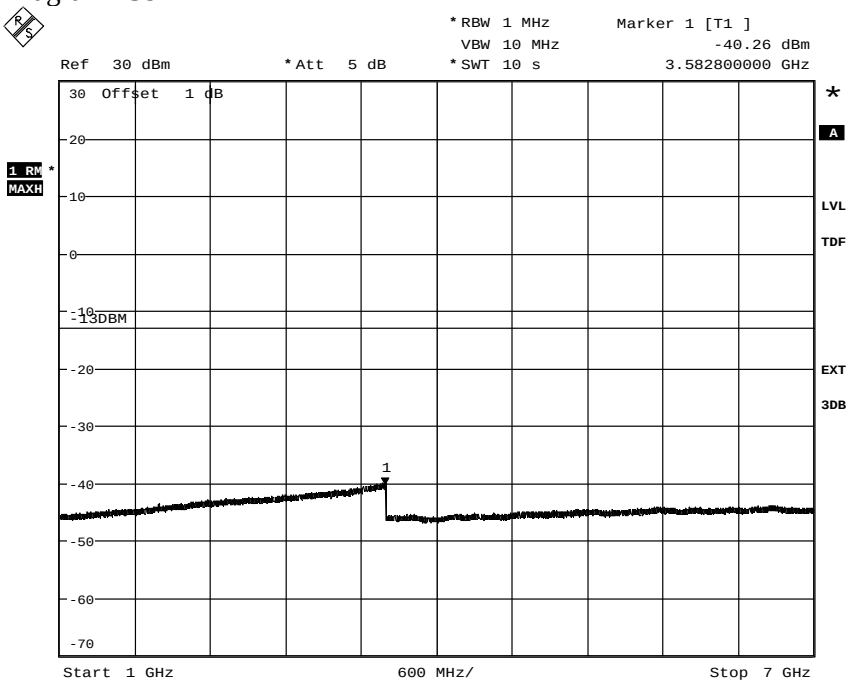
Date: 12.SEP.2011 15:14:19

Diagram 15a



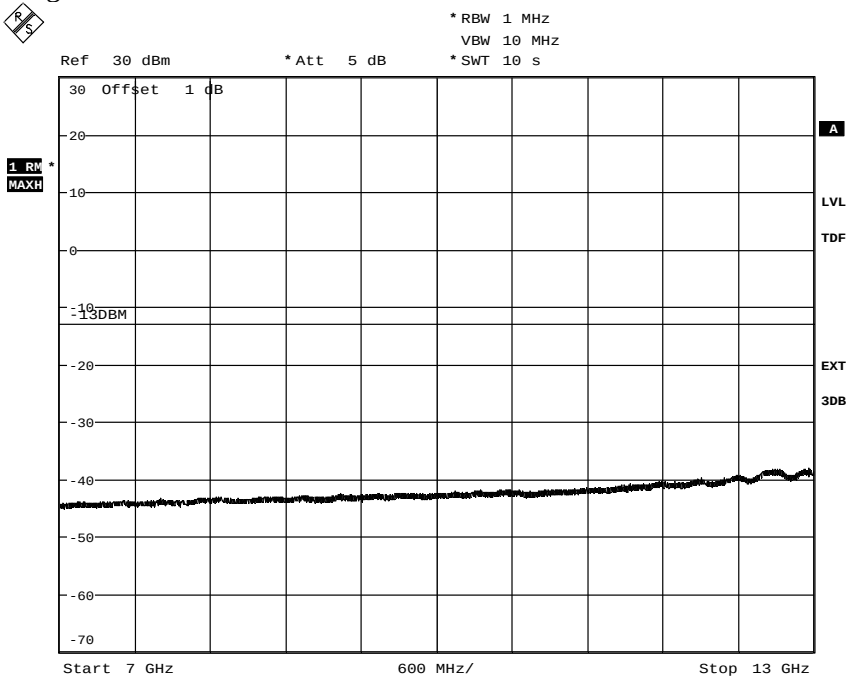
Date: 7.SEP.2011 13:24:49

Diagram 15b



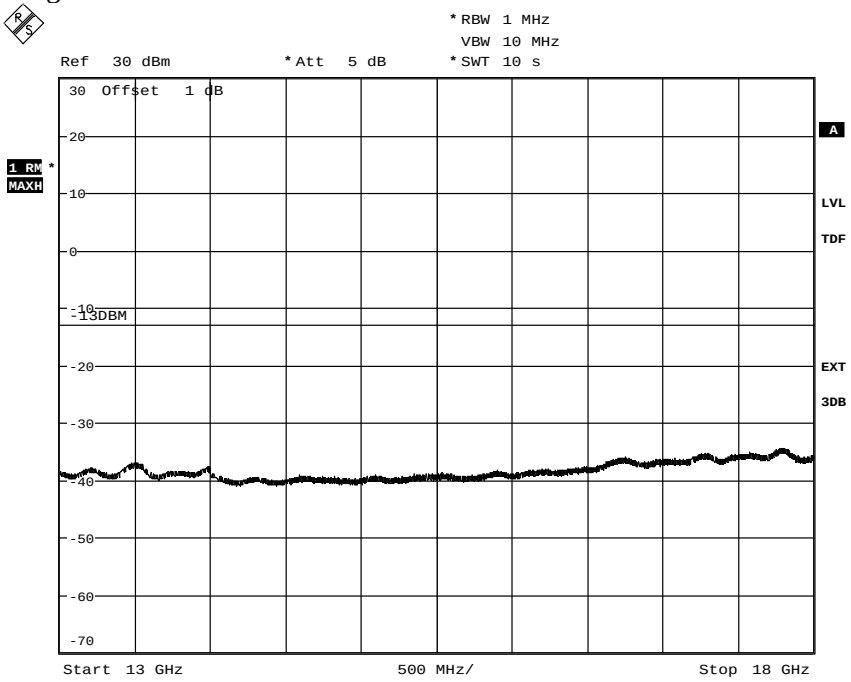
Date: 7.SEP.2011 13:30:15

Diagram 15c



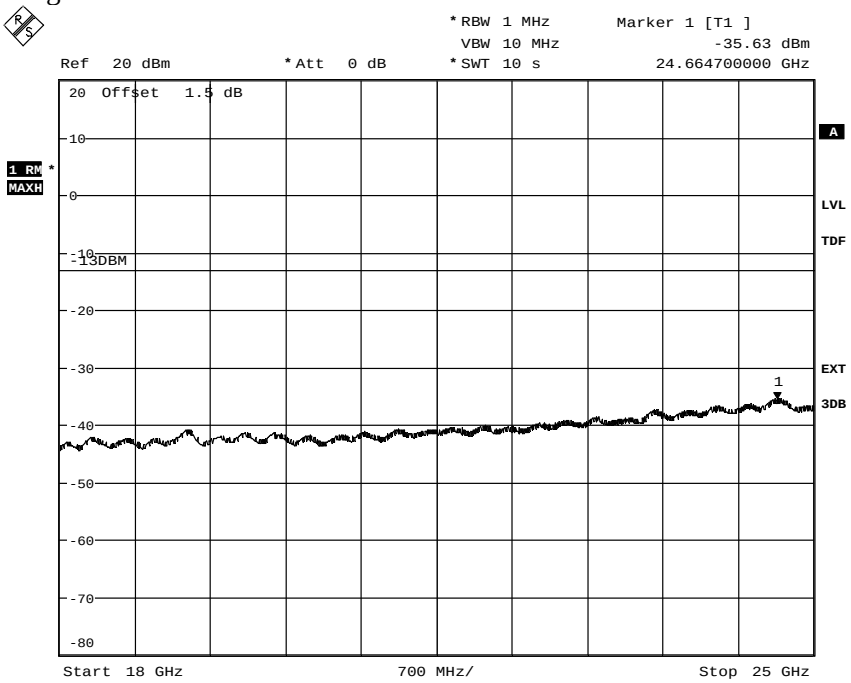
Date: 7.SEP.2011 13:26:36

Diagram 15d



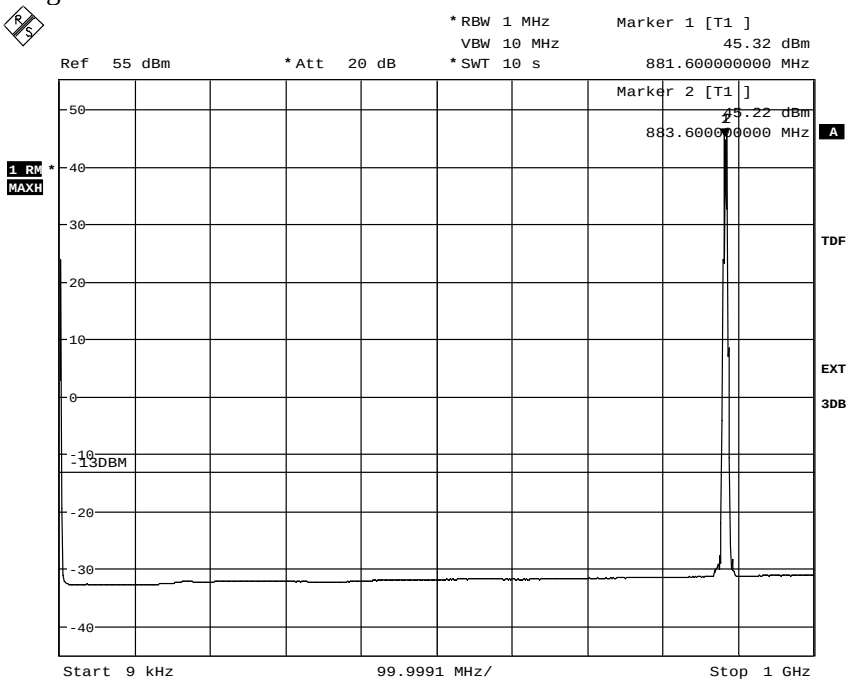
Date: 7.SEP.2011 13:28:19

Diagram 15e



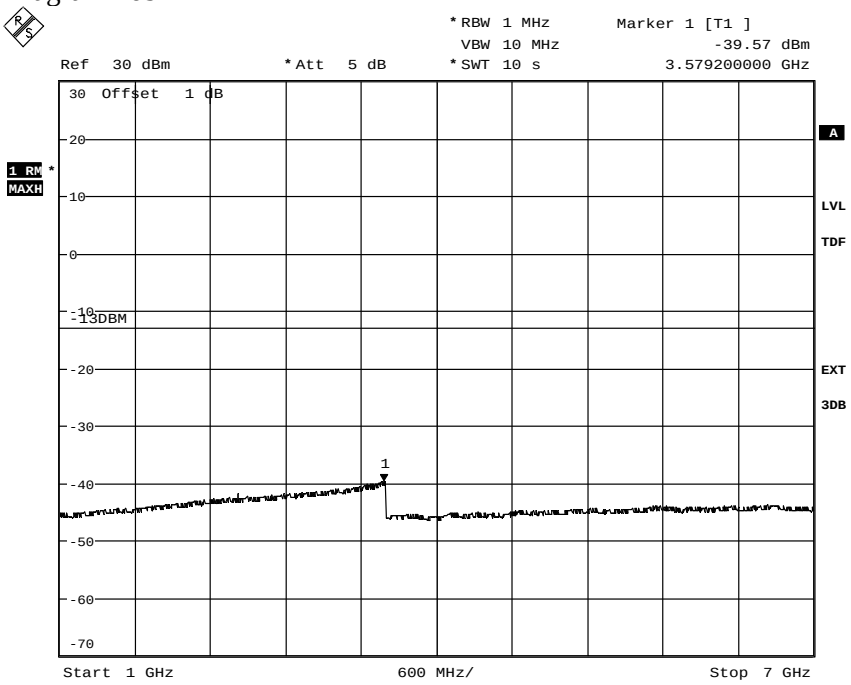
Date: 12.SEP.2011 15:17:50

Diagram 16a



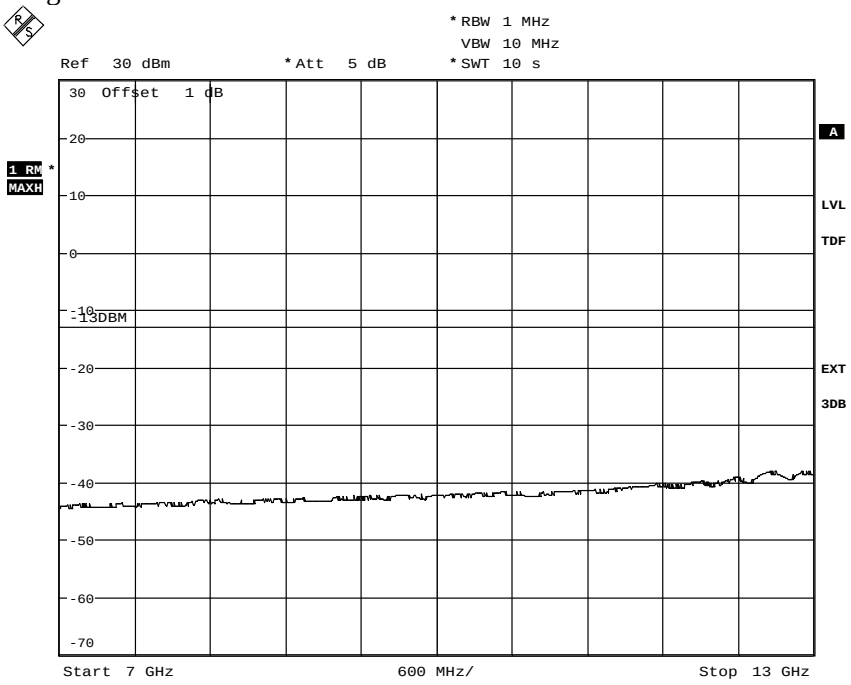
Date: 8.SEP.2011 09:14:01

Diagram 16b



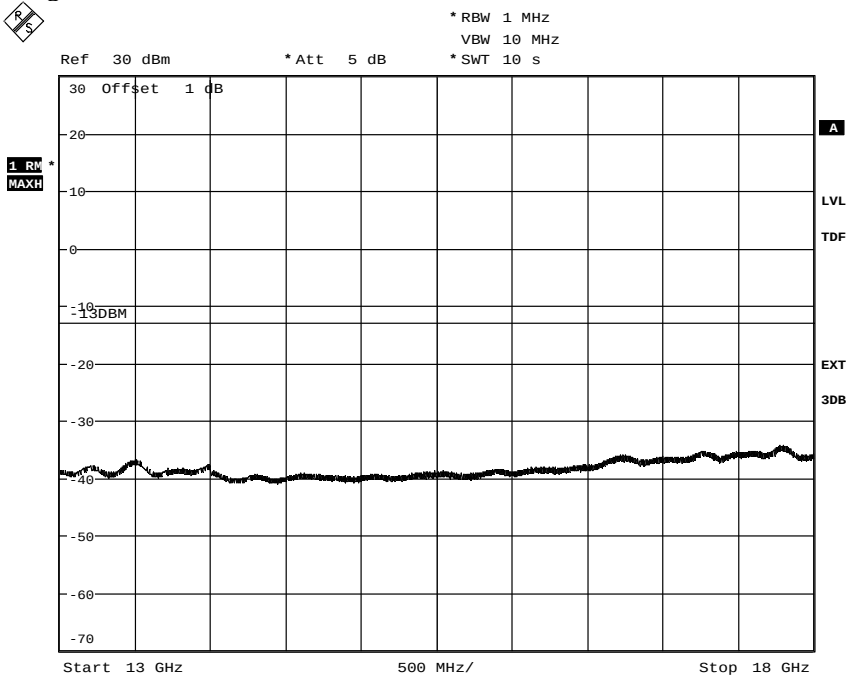
Date: 8.SEP.2011 09:31:45

Diagram 16c



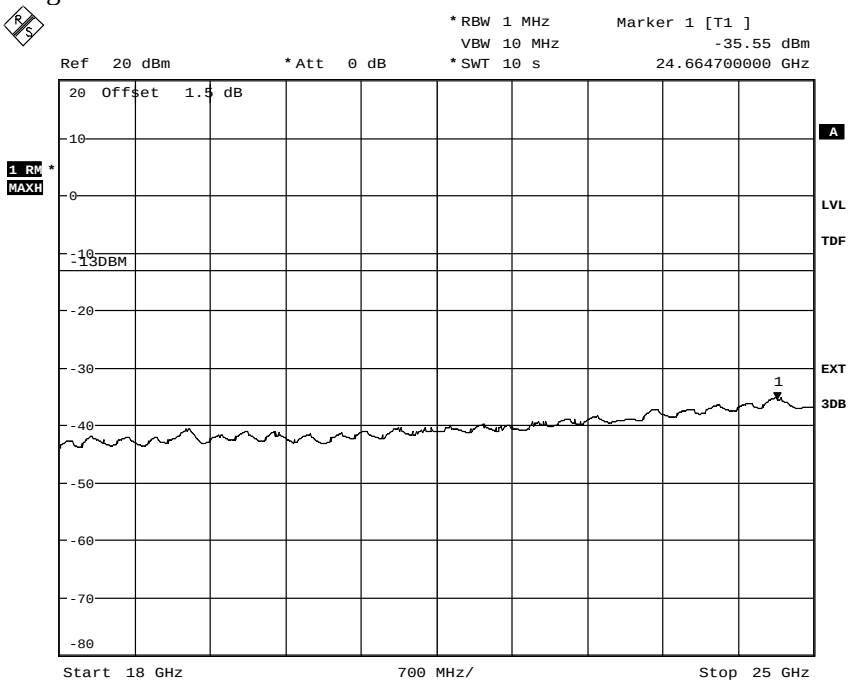
Date: 8.SEP.2011 09:36:03

Diagram 16d



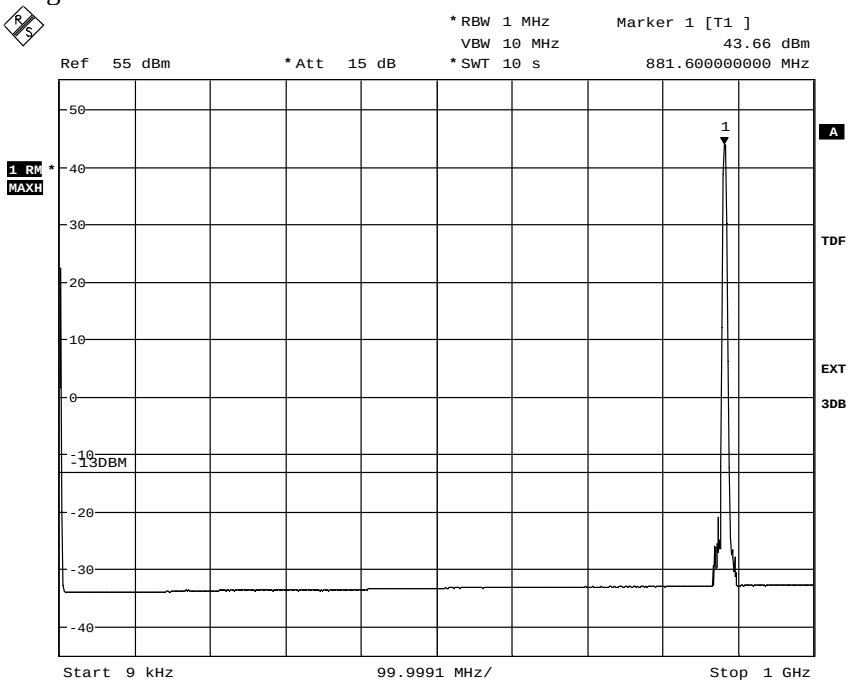
Date: 8.SEP.2011 09:37:39

Diagram 16e



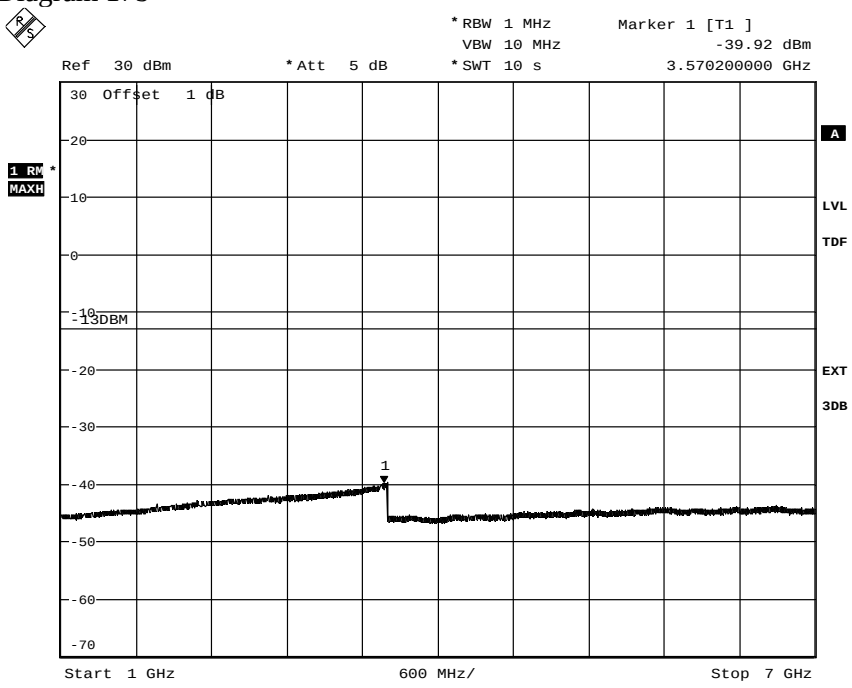
Date: 10.SEP.2011 11:28:45

Diagram 17a



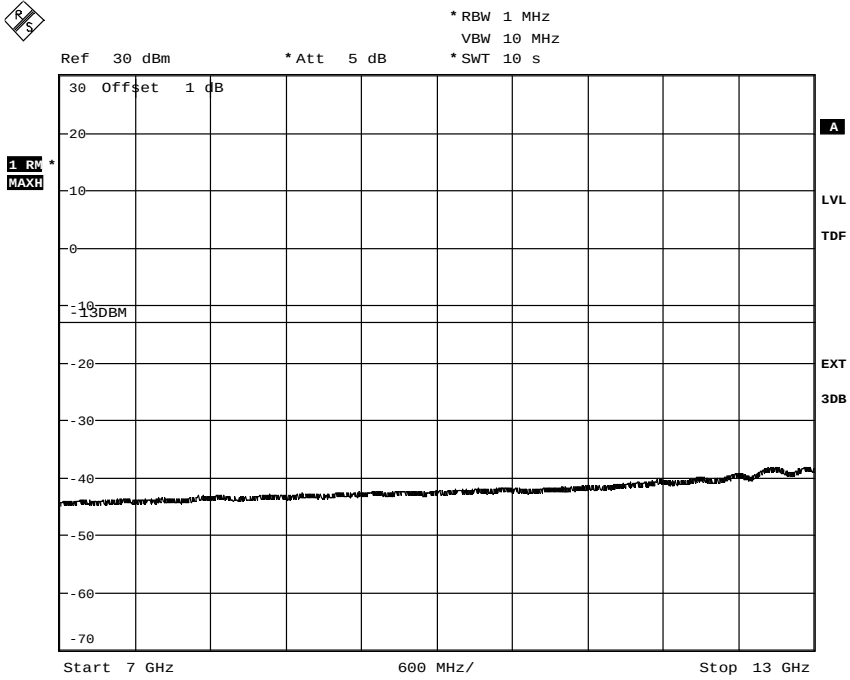
Date: 10.SEP.2011 11:55:38

Diagram 17b



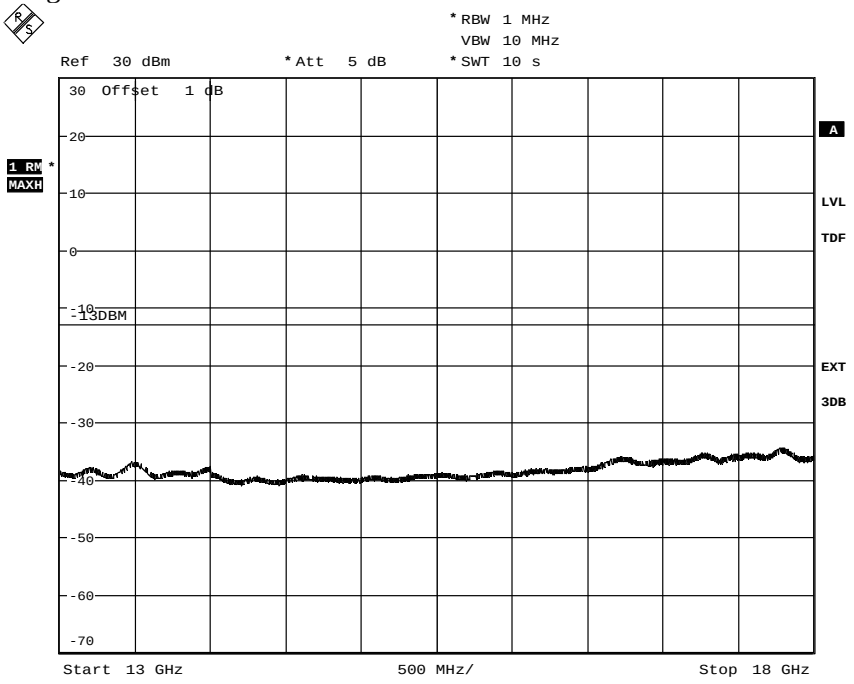
Date: 10.SEP.2011 11:58:19

Diagram 17c



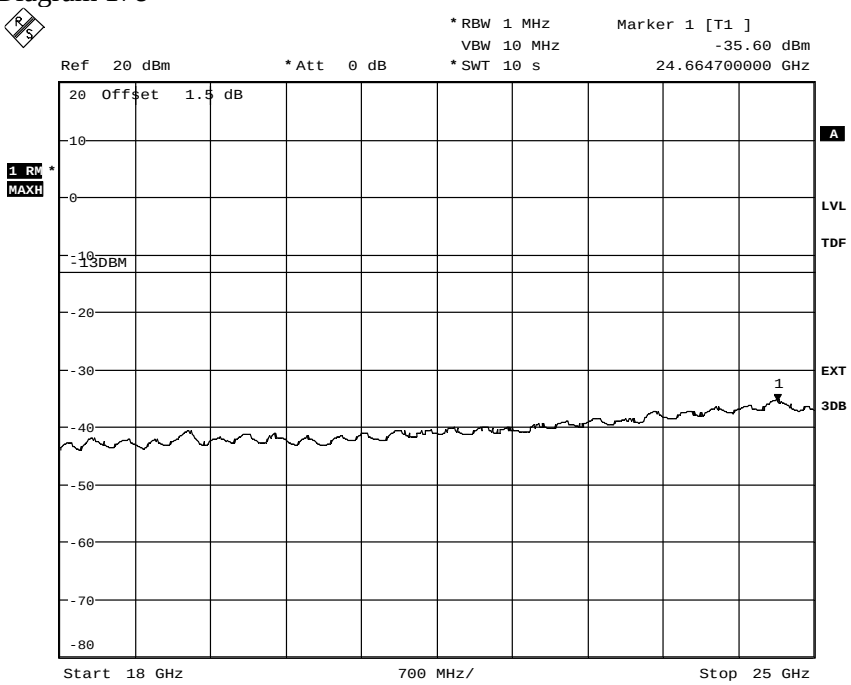
Date: 10.SEP.2011 12:40:48

Diagram 17d



Date: 10.SEP.2011 12:42:26

Diagram 17e


*RBW 1 MHz
VBW 10 MHz
*SWT 10 s
Marker 1 [T1]
-35.60 dBm
24.664700000 GHz
Ref 20 dBm
*Att 0 dB
20 Offset 1.5 dB
1 RM *
MAXH
A
LVL
TDF
-13DBM
EXT
3DB
Start 18 GHz
700 MHz/
Stop 25 GHz
Date: 10.SEP.2011 11:50:02

FCC ID:TA8AKRC11864-3 Appendix 6
IC:287AB-AS118643

Field strength of spurious radiation measurements according to 47 CFR 2.1053, 22.917 / IC RSS-132 4.5

Date	Temperature	Humidity
2011-08-11 to 2011-08-16	23°C to 24°C ± 3°C	48 % to 64 % ± 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.

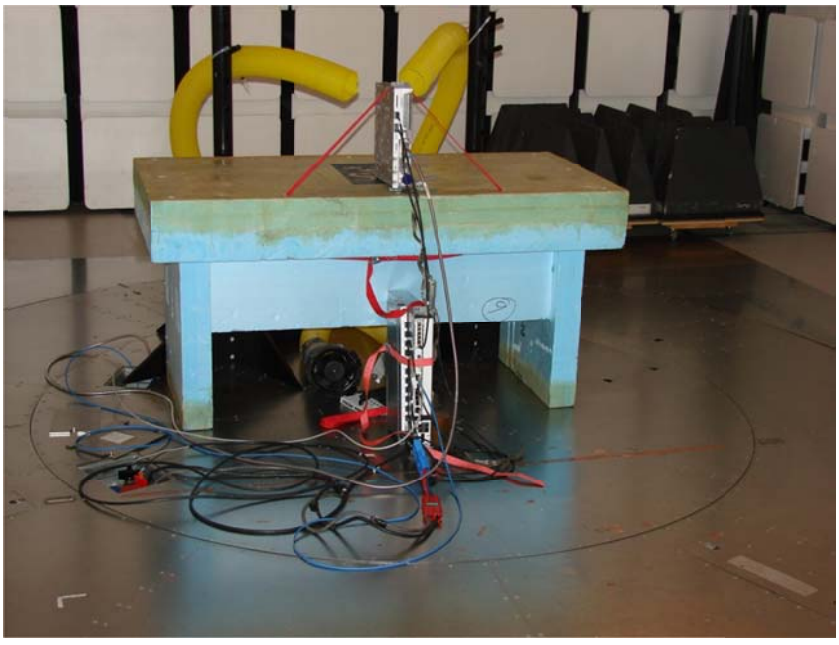
The measurements were performed with both horizontal and vertical polarisation of the antenna. The antenna distance was 3 m in the frequency range 30 MHz – 18 GHz and 1m in the frequency range 18 - 25 GHz.

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

Tested configurations

Single Carrier (One carrier configuration):

Cell	1	1	1
Channel	B	M	T

Multi Carrier 1x2 (Two carrier configuration):

Cell	1	2
Channels	B	B+10
Channels	T	T-10

Multi Carrier 1x4 (Four carrier configuration):

Cell	1	2	3	4
Channels	B	B+5	B+10	B+15
Channels	T	T-5	T-10	T-15

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

§22.917 / RSS-132 4.5

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 §22.355 / IC RSS 132 4.5

Date	Temperature (test equipment)	Humidity (test equipment)
2011-09-02 to 2011-09-04	22-24°C ± 3 °C	41-52% ± 5 %

Test set-up and procedure

The measurements were made per J-STD-007A Vol 1. 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
Rohde & Schwarz signal analyzer FSQ40	504 143
RF attenuator	504 159
Testo 635, Temperature and humidity meter	504 203
Temperature cabinet	503 360
Multimeter Fluke 87	502 190

Results

Nominal Voltage -48 V DC
Maximum output power at mid channel (M), GMSK modulation

Test conditions		Frequency error (Hz)
Supply voltage DC (V)	T (°C)	GMSK
-48.0	+20	+4
-55.2	+20	-4
-40.8	+20	+4
-48.0	+30	-5
-48.0	+40	+10
-48.0	+50	-5
-48.0	+10	-8
-48.0	0	-5
-48.0	-10	-7
-48.0	-20	+9
-48.0	-30	+5
Maximum freq. error (Hz)		10
Measurement uncertainty		$< \pm 1 \times 10^{-7}$

Limit

§ 22.355 Frequency tolerance
The carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances of ±1.5 ppm for base stations.

RSS-132, 4.3 Frequency stability
The carrier frequency shall not depart from the reference frequency in excess of ±1.5 ppm for base stations

Complies?	Yes

Receiver spurious emissions measurements according to FCC CFR 47 / IC RSS-132 4.6.

Date	Temperature	Humidity
2011-09-13	22 °C ± 3 °C	48 % ± 5 %

Test set-up and procedure

The measurements were performed according to ANSI C63.4.

Measurements were performed on the receiver antenna terminal (RF B). In the frequency range 9 kHz-1000 MHz the measurement is first performed with peak detector. Emission on frequencies close to or above the limit is re-measured with quasi-peak detector. The AVG detector was used in the frequency range 1-12.5 GHz.

Measurement equipment	SP number
Rohde & Schwarz FSQ 40	504 143
RF attenuator (RF A)	900 229
Testo 635 temperature and humidity meter	504 203

Result

	Channel
Diagram 1a-c	B
Diagram 2a-c	M
Diagram 3a-c	T

A frequency component at 482.15 kHz was measured to -57.5 dBm with Quasi-peak detector activated.

Note: During the measurement on the RX port RF B the combined TX/RX port RF A was terminated into 50 ohm, the TX was active in single carrier mode transmitting GMSK.

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

§15.111 Antenna power conduction limits for receivers

The power at the antenna terminal at any frequency within the range of measurements specified in §15.33 shall not exceed 2.0 nanowatts (-57 dBm).

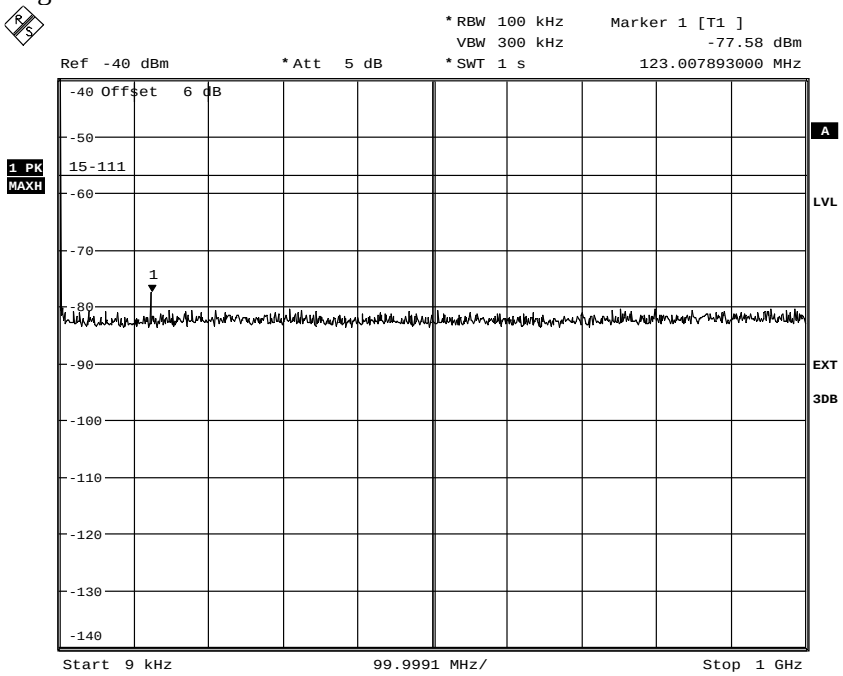
RSS-Gen 6.2 Antenna Conducted limits

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

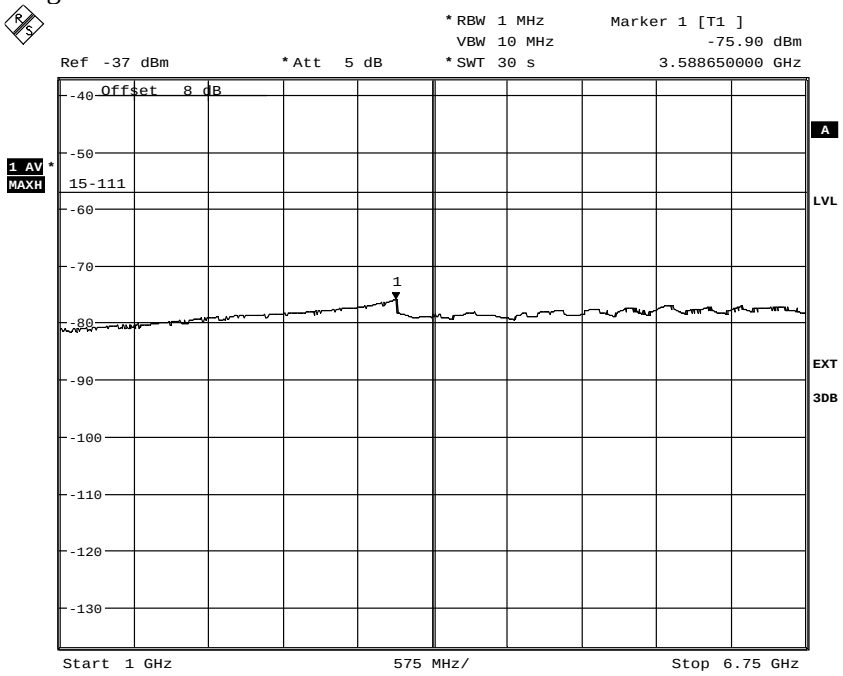
Appendix 8

Diagram 1a



Date: 26.SEP.2011 14:35:46

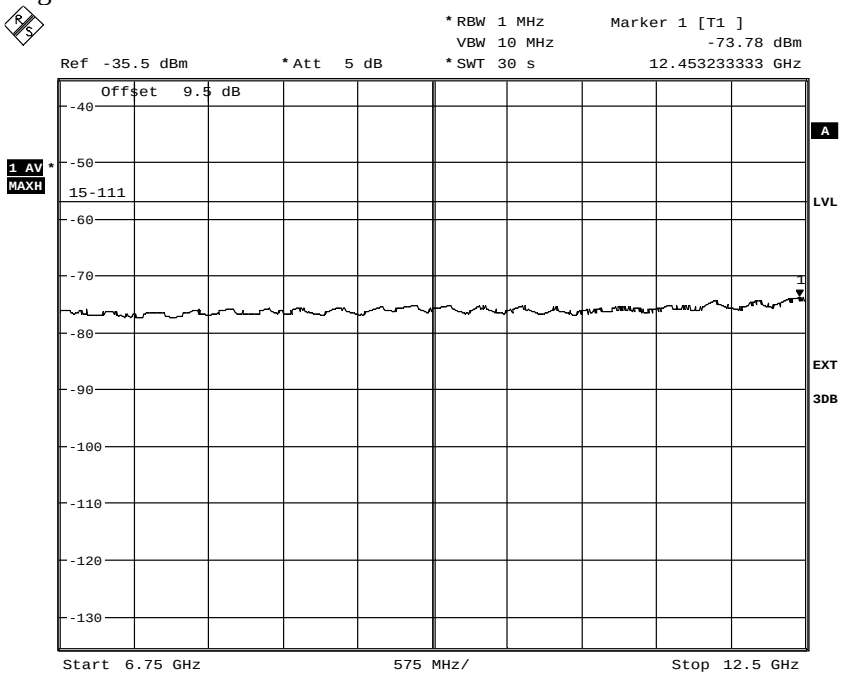
Diagram 1b



Date: 26.SEP.2011 15:00:41

Appendix 8

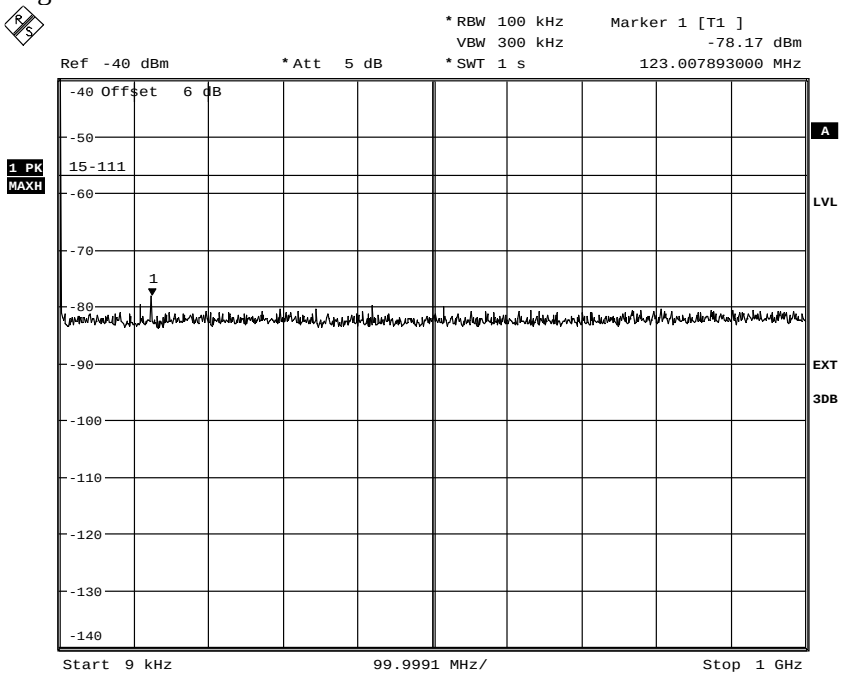
Diagram 1c



Date: 26.SEP.2011 15:02:27

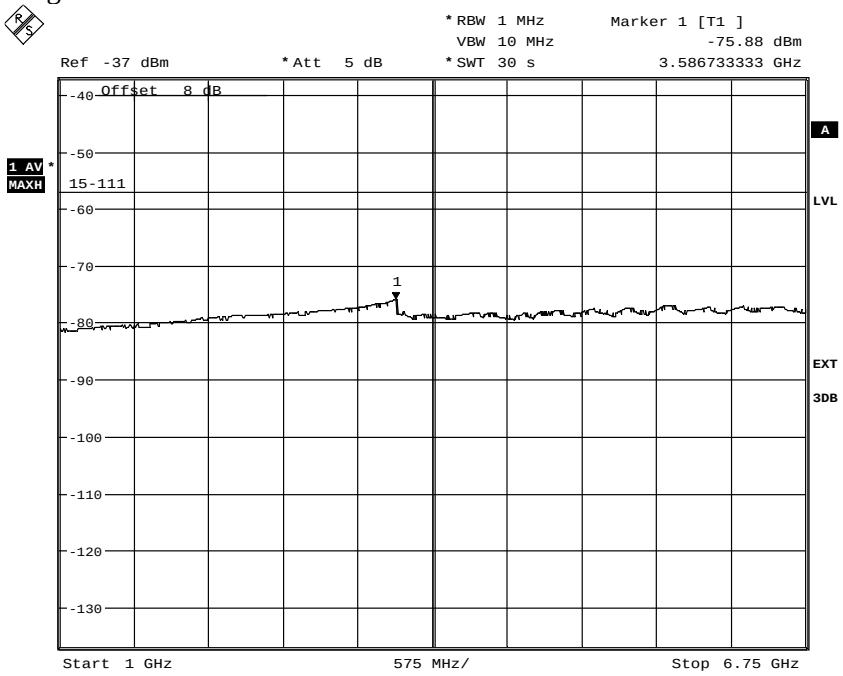
Appendix 8

Diagram 2a



Date: 26.SEP.2011 14:37:42

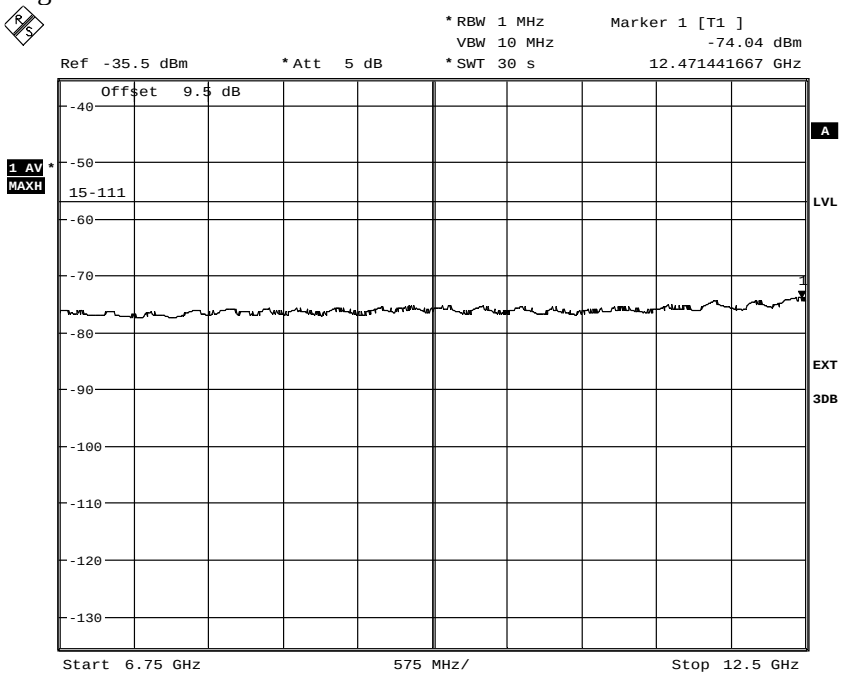
Diagram 2b



Date: 26.SEP.2011 14:58:52

Appendix 8

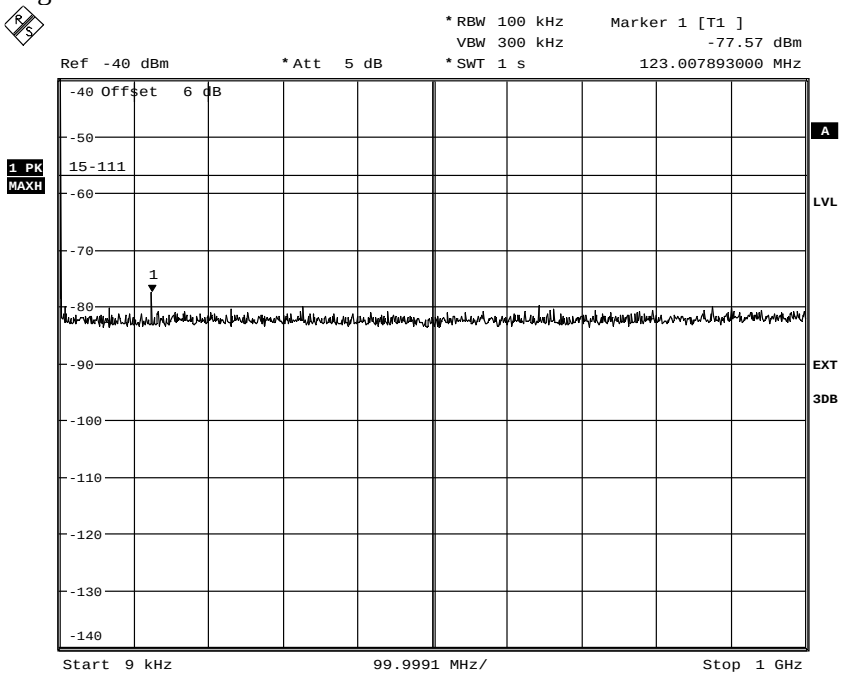
Diagram 2c



Date: 26.SEP.2011 14:57:17

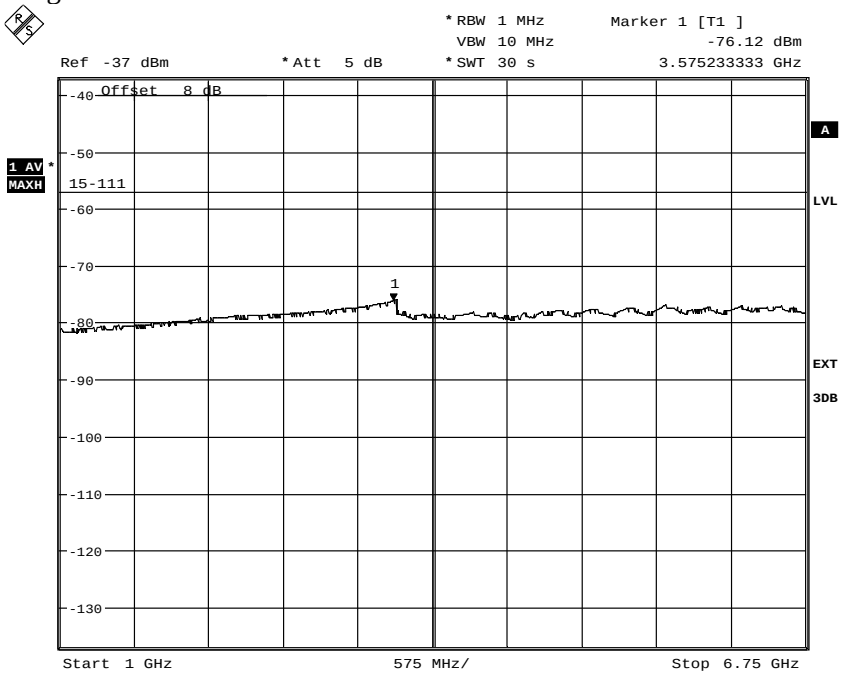
Appendix 8

Diagram 3a



Date: 26.SEP.2011 14:39:59

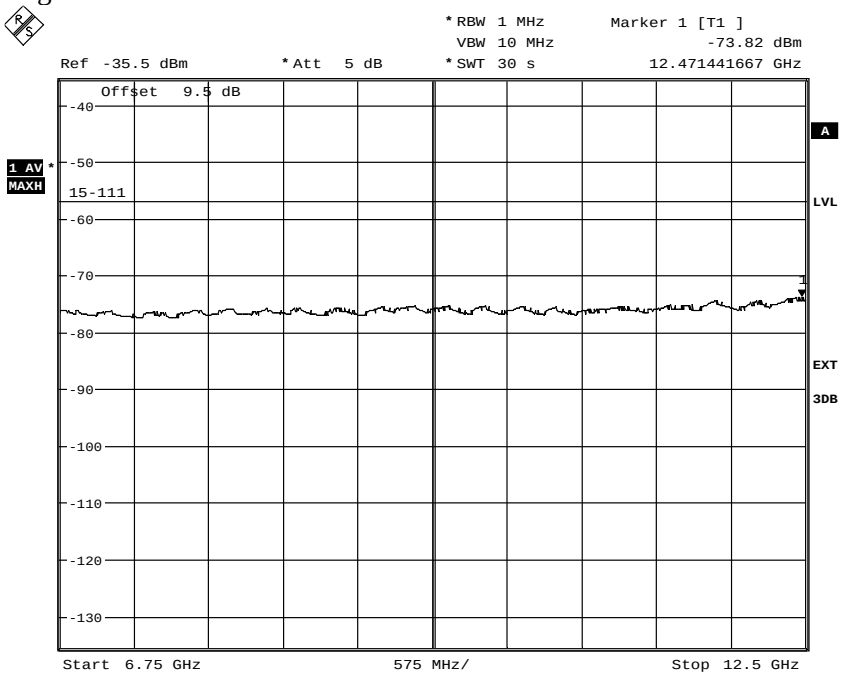
Diagram 3b



Date: 26.SEP.2011 14:46:32

Appendix 8

Diagram 3c



Date: 26.SEP.2011 14:49:42

External photos

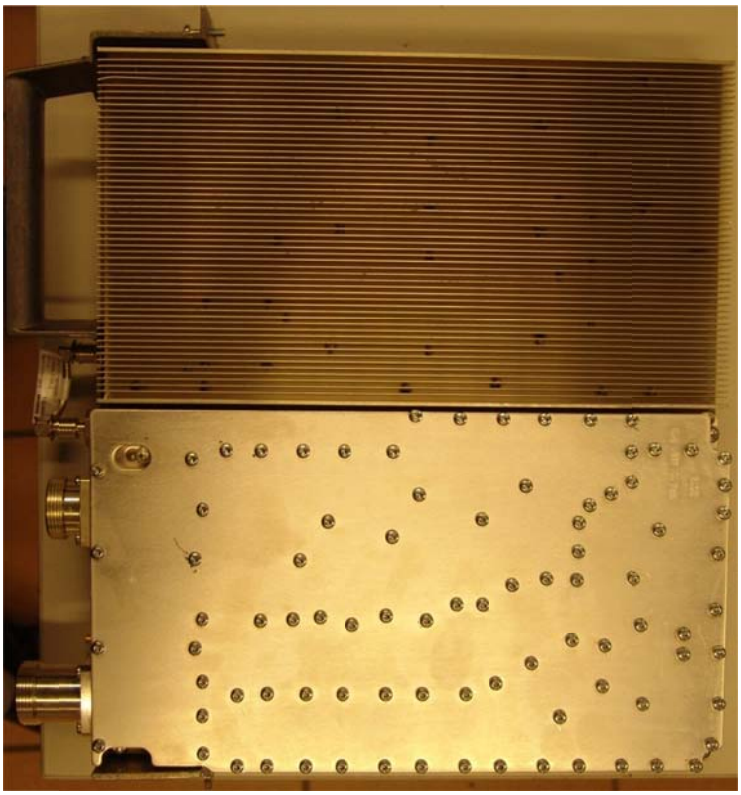
Photos show the sample used for conducted measurements

Front side

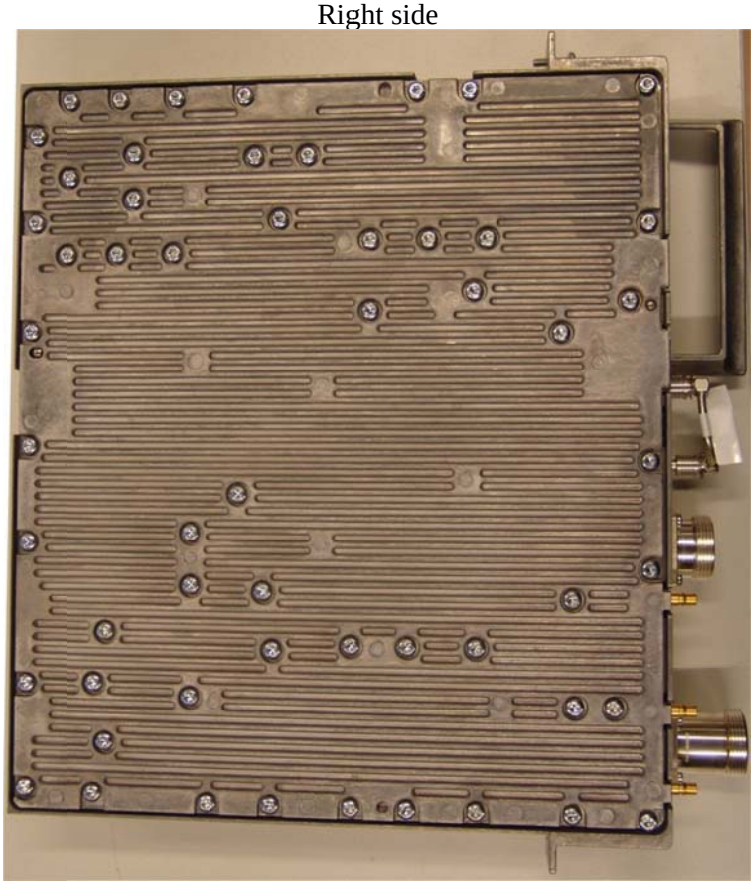
Rear side

Appendix 9

Left side

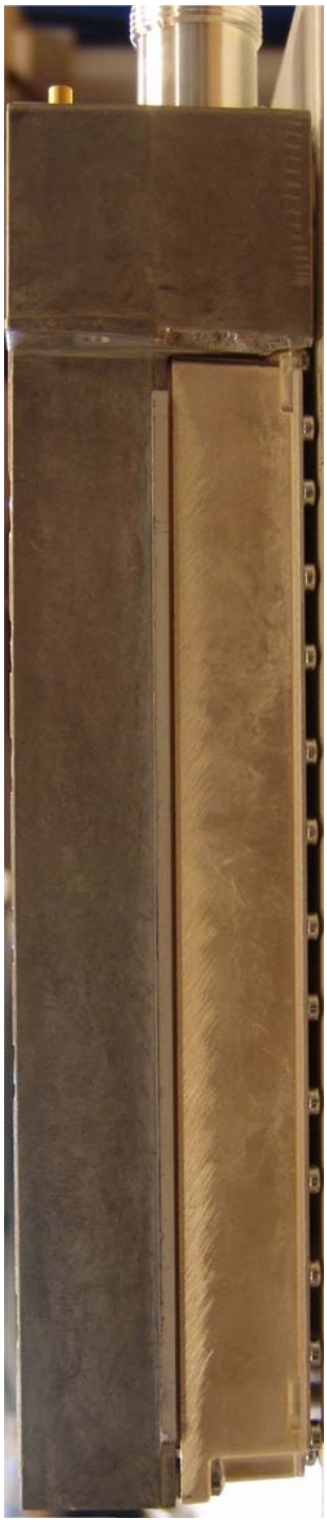


Right side



Appendix 9

Bottom side



Top side