REPORT
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The test site complies with RSS-Gen, IC file no: 3482A

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1002
ISO/IEC 17025

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Class II permissive change measurements on RRUS 01 B5 850 MHz radio equipment with FCC ID: TA8AKRC11870-3 and IC: 287AB-AS118703

(7 appendices)

Test object

RRUS 01 B5, product KRC 118 70/3, revision R1C

See appendix 1 for general information. Appendix 7 shows photos of the test object.

Summary

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

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

SP Technical Research Institute of Sweden
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Prepared by
Reinhold Reul

Examined by
Christer Karlsson

Table of contents

Description – Test object

Equipment:	Multi standard multi mode radio equipment RRUS 01 B5 supporting WCDMA and GSM in single or multi carrier configurations.
Antenna ports:	1 combined TX/RX port and 1 RX port
Frequency bands:	TX: 869 – 894 MHz RX: 824 – 849 MHz
Modulations:	QPSK, 16QAM and 64QAM (WCDMA) GMSK, AQPSK, 8PSK, 16QAM, and 32QAM (GSM)
Number of carriers:	A total of maximal 4 carriers can be set up at a time
Nominal output power: (Maximum)	49 dBm (80 W) total aggregated RF output power configurable as 20, 40, 60 or 80 W per single carrier.
Channel distributions:	Contiguous and Non-contiguous spectrum, maximal 20 MHz aggregated spectrum for all active carriers
WCDMA supported	
Nominal channel bandwidth:	4.2 to 5 MHz configurable in steps of 100 kHz
Nominal channel spacing:	4.4 to 5 MHz configurable in steps of 100 kHz
GSM supported	
Nominal channel bandwidth:	modulation dependent
Nominal channel spacing:	200 kHz, minimum 600 kHz between multi-carrier GSM
Nominal supply voltage:	-48 VDC

WCDMA operation mode

Measurements were performed with the test object transmitting Test model TM1 as defined in 3GPP TS 25.141, using one WCDMA carrier in 5 MHz BW configuration, with 64 DPCH:s at 30 ksps (SF=128) and QPSK Modulation. These settings were considered representative for all traffic scenarios and used for all measurements unless noted otherwise.

GSM operation mode

The scope of this report addresses GSM in Multi-RAT/Multi-carrier usage, using 2 activated GSM carriers, with BCCH filling and all GSM timeslots activated, using GMSK modulation and individual encryption sets A5/1 and A5/2 for the 2 GSM carriers. GSM intelligent power management (IPM) and MCPA overbooking were excluded from the scope of this test.
The settings were defined by the client.

Configurations used

The test object was powered with -48 VDC. All active WCDMA and GSM carriers transmitted pseudorandom data with the maximum transmitter output power applicable for the respective configuration. Among the available configurations the below documented variants were chosen for the scope of this report, using good engineering practice to identify a worst-case scenario per test parameter.

Configuration 1:

GSM			**WCDMA**
Carrier	1 (30 W)	2 (30 W)	1 (20 W)
Downlink	129 (869.4 MHz)	137 (871.0 MHz)	4420 (884.0 MHz)
Uplink	129 (824.4 MHz)	137 (826.0 MHz)	4195 (839.0 MHz)

Configuration 2:

GSM			**WCDMA**
TRX	1 (30 W)	2 (30 W)	1 (20 W)
Downlink	129 (869.4 MHz)	137 (871.0 MHz)	4369 (873.8 MHz)
Uplink	129 (824.4 MHz)	137 (826.0 MHz)	4144 (828.8 MHz)

Configuration 3:

GSM			**WCDMA**
TRX	1(30 W)	2 (30 W)	1 (20 W)
Downlink	242 (892.0 MHz)	250 (893.6 MHz)	4403 (880.6 MHz)
Uplink	242 (847.0 MHz)	250 (848.6 MHz)	4178 (835.6 MHz)

Configuration 4:

GSM			**WCDMA**
TRX	1 (30 W)	2 (30 W)	1 (20 W)
Downlink	180 (879.6 MHz)	239 (891.4 MHz)	4427 (885.4 MHz)
Uplink	180 (834.6 MHz)	239 (846.4 MHz)	4202 (840.4 MHz)

Configuration 5:

GSM			**WCDMA**
TRX	1 (30 W)	2 (30 W)	1 (20 W)
Downlink	140 (871.6 MHz)	199 (883.4 MHz)	1037 (877.5 MHz)
Uplink	140 (826.6MHz)	199 (838.4 MHz)	812 (832.5 MHz)

Configuration 6:

WCDMA	
TRX	1 (80 W)
Downlink	4357 (871.4 MHz)
Uplink	4132 (826.4 MHz)

Configuration 7:

WCDMA	
TRX	1 (80 W)
Downlink	4408 (881.6 MHz)
Uplink	4183 (836.6 MHz)

Configuration 8:

WCDMA	
TRX	1 (80 W)
Downlink	4458 (891.6 MHz)
Uplink	4233 (846.6 MHz)

Conducted measurements

TX measurements were done at antenna port RF A (combined TX/RX), with antenna port RF B terminated into 50 ohm. RX measurements were done at antenna port RF B (RX only), with antenna port RF A terminated into 50 ohm.

Radiated measurements

The signal from the transmitting antenna port RF A was via an RF cable routed to functional test equipment outside the test site for signal monitoring. Antenna port RF B was left unterminated.

Purpose of test

The purpose of this test is to justify a Class II Permissive Change. The use of multi- standard radio (MSR) for the radio access technologies GSM and WCDMA running in Contiguous and Non-contiguous mode shall be included. In WCDMA mode the RF output power shall be verified to be within tolerance after a software upgrade ensuring correct setting of WCDMA output power.

References

Measurements were done according to relevant parts of the following standards:
ANSI C63.4-2009
ANSI/TIA/EIA-603-C-2004
3GPP TS 25.141, version 8.5.0
CFR 47 part 2, October 1st , 2011
CFR 47 part 22 Subpart H, October 1st, 2011
RSS-132 Issue 2
RSS-Gen Issue 3

Measurement equipment

Measurement equipment	Calibration Due	SP number
Test site Tesla	2014-01	503 881
R&S FSIQ 40	2013-07	503 738
R&S FSQ 40	2013-07	504 143
R&S ESU 26	2013-03	901 553
Control computer with R&S software EMC32 version 8.52.0	-	503 745
High pass filter	2013-08	504 199
High pass filter	2013-08	504 200
High pass filter	2013-08	503 739
High pass filter	2013-08	503 740
High pass filter	2013-01	901 373
RF attenuator	2013-08	504 159
RF attenuator	2013-08	900 691
RF attenuator	2013-08	503 248
Chase Bilog Antenna CBL 6111A	2014-10	503 182
EMCO Horn Antenna 3115	2014-01	502 175
Std.gain horn FLANN model 20240-20	2014-03	503 674
µComp Nordic, Low Noise Amplifier	2013-08	901 545
MITEQ Low Noise Amplifier	2013-08	503 285
Multimeter Fluke 87	2013-08	502 190
Testo 625 temperature and humidity meter	2013-06	504 188
Testo 635 temperature and humidity meter	2013-06	504 203

Uncertainties

Measurement and test instrument uncertainties are described in the quality assurance documentation ”SP-QD 10885”. The measurement uncertainties can be found in the table below. 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 hardware was delivered 2012-05-04.

Manufacturer's representative

Christer Gustavsson, Ericsson AB

Test engineers

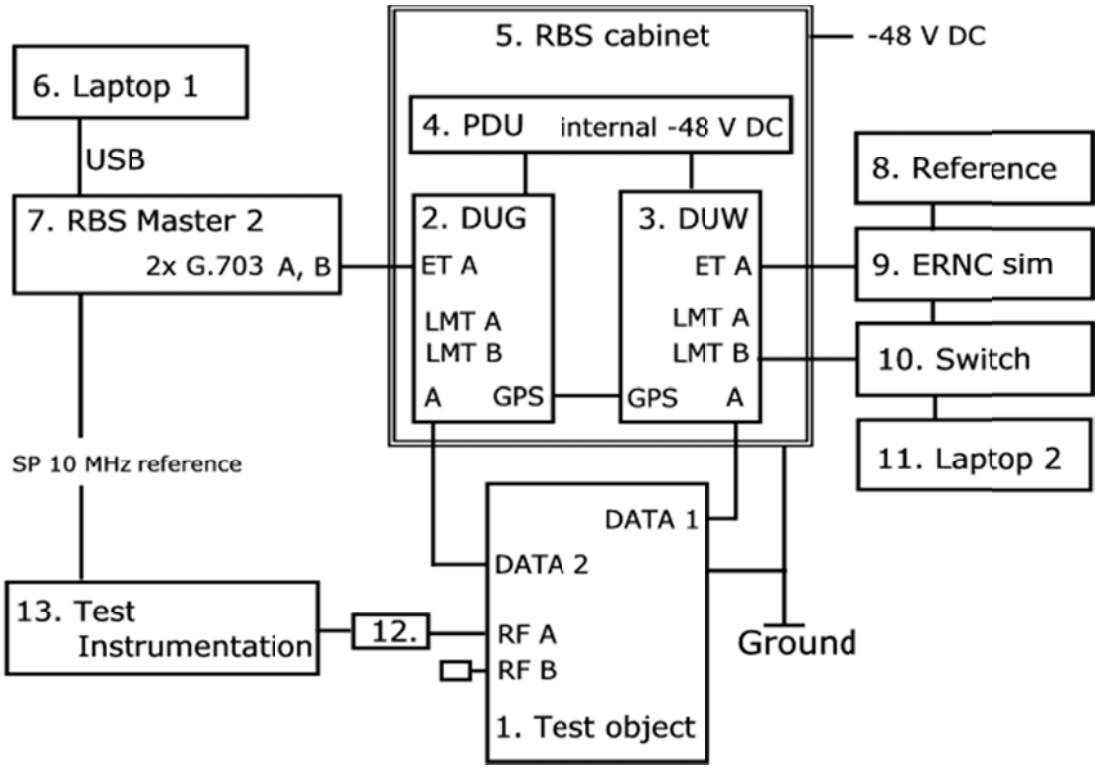
Kexin Chen, Hyder Khalaf, Tomas Isbring, Martin Theorin, Jörgen Wassholm and Reinhold Reul.

Test participant

None

Test set-up conducted measurements

(TX set-up shown, for RX test RF A & RF B connections were exchanged, see text below)



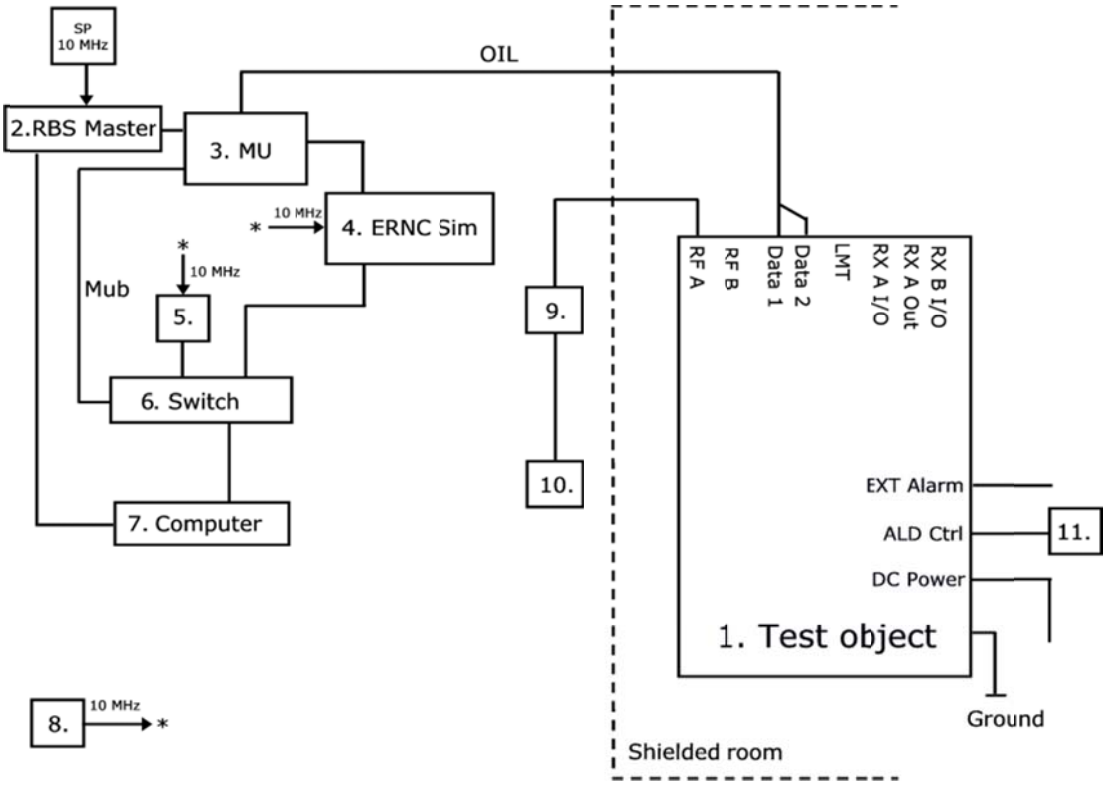
Test object

1. RRUS 01 B5, product KRC 118 70/3, revision R1C, S/N: C8258000001
   (FCC ID: TA8AKRC11870-3 and IC: 287AB-AS118703)
   with pre-installed software (PIS) CXP9017316/ 1_R39UG

Functional test equipment

2. DUG 20 01 KDU 137 569/1, revision R2B, S/N: CB23667528
3. DUW 30 01 KDU 127 161/3, revision R4C, S/N: C824609611
4. PDU 02 01, BMG 980 336/4, revision R2A, S/N BJ31528316
5. RBS 6201 cabinet, BAMS 1000778792
6. HP laptop computer 1, BAMS 1000208319
7. RBS Master hardware, 2E LPY 107 1007/3, BAMS 1000878432
8. 10 MHz reference, Symmetricom model 8040, BAMS 1000714186
9. ERNC sim 127, BAMS 1000660988
10. Switch Netgear FS726T
11. HP laptop computer 2, BAMS 1001052032
12. For TX measurement RF attenuator on port RF A, 50 ohm termination on port RF B.
    For RX measurement RF attenuator on port RF B, 50 ohm termination on port RF A.
13. SP test instrument according measurement equipment list

Test set-up radiated measurements



Test object

1. RRUS 01 B5, product KRC 118 70/3, revision R1C, S/N: C825785064
(FCC ID: TA8AKRC11870-3 and IC: 287AB-AS118703)
with pre-installed software (PIS) CXP 901 7316/1_R39UG

Functional test equipment

2. RBS Master 2E, LPY 107 1007/3, rev R1C/A BAMS – 1000878432
3. Main Unit: RBS 6601, details given below
4. ERNC sim 127, BAMS 1000660988
5. NTP server, Symmetricom, BAMS – 1000714181
6. Fast Ethernet switch, Netgear FS726 & Netgear GSM7212
7 Computer HP Elitbook, BAMS – 1001052043
8. 10 MHz reference, Symmetricom model 8040, BAMS – 1000714186
9. Attenuator
10. Signal analyzer, Rohde & Schwarz FSIQ 40, SP 503 738 for monitoring
11. RET – Remote Electrical Tilt unit

RBS 6601 Main Units

Product name	Product number	R-state	Serial number
PDU 02 01	BMG 980 336/4	R2A	BJ31534775
SUP 6601	1/BFL 901 009/1	R1B	BR80867188
DUG 20 01	KDU 137 569/1	R2A	C823667528
DUMMY	SXK 109 8971/1	R1A	-
SUP 6601	1/BFL 901 009/1	R3B	BR81526585
DUW 30 01	KDU 127 161/3	R4C	C824609611

Test object interfaces	Type of port:
Power: -48 VDC	DC Power
Port RF A, 7/16 female connector	Antenna
Port RF B, 7/16 female connector,	Antenna
Data 1, Optical Interface Link, single mode opto fibre	Telecom
Data 2, Optical Interface Link, single mode opto fibre	Telecom
LMT, for maintenance use only, only connected during conducted test	Telecom
RX A Out, not supported, unconnected	Antenna
RX A I/O, not supported, unconnected	Antenna
RX B I/O, not supported, unconnected	Antenna
EXT Alarm, shielded multi-wire (only connected in radiated test)	Signal
ALD Ctrl, shielded multi-wire (only connected in radiated test)	Signal
Ground wire	Ground

RBS software

WCDMA

Software	Revision
CXP 901 8350/1	R4A02

GSM

Software	Revision
CXP 102 083/10	R9DE

RF power output measurements according to 47 CFR 2.1046, 22.913 / RSS-132 4.4

Date	Temperature	Humidity
2012-08-21	23 °C ± 3 °C	54 % ± 5 %
2012-08-22	23 °C ± 3 °C	55 % ± 5 %

Test set-up and procedure

The test object was connected to a signal analyzer measuring output power in CDF mode. A resolution bandwidth of 50 MHz was used. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements.

Measurement equipment	SP number
R&S FSQ40	504 143
RF attenuator	504 159
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 1.1 dB

Results

Nominal RF output power at antenna port RF A is 49 dBm (80 W).

Transmitter output power		
	RMS value (dBm)	
Configuration 1:	48.4	Diagram 1
Configuration 2:	48.5	Diagram 2
Configuration 3:	48.4	Diagram 3
Configuration 4:	48.2	Diagram 4
Configuration 5:	48.4	Diagram 5
Configuration 6:	48.6	Diagram 6
Configuration 7:	48.6	Diagram 7
Configuration 8:	48.5	Diagram 8

The configurations are described in appendix 1. Diagrams are shown on the following pages.

Note

Mean (RMS) power, Peak power and Crest factor in below diagrams always refer to the aggregated signal constellation being measured.

RMS output power was considered for the worst-case configurations and compliance assessment. Peak power and Crest factor are given for informative purpose only.

Limits

According to CFR 47/ RSS-132 there are no conducted limits at the antenna connector.

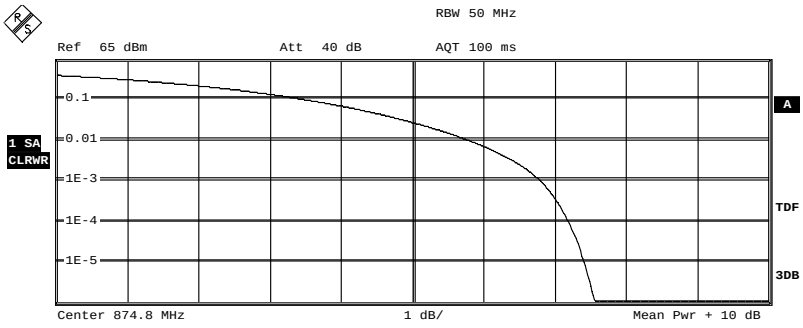
CFR § 22.913/ SRSP-503 5.1: The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts (57 dBm).

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

Complies?	Yes

Appendix 2

Diagram 1:

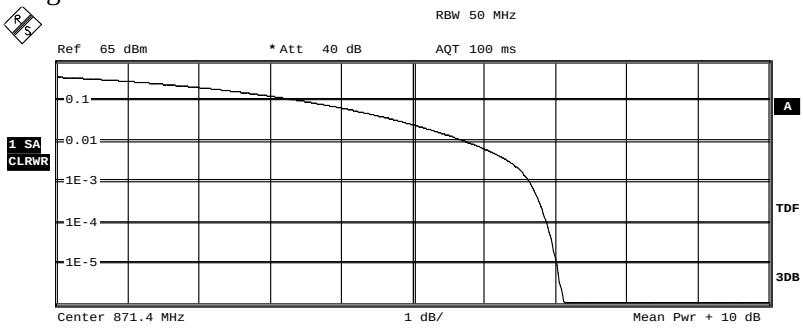


Complementary Cumulative Distribution Function
NOF samples: 6400000, Usable BW: 37.9MHz

	Trace 1
Mean	48.43 dBm
Peak	56.16 dBm
Crest	7.73 dB
10 %	3.53 dB
1 %	5.79 dB
.1 %	6.79 dB
.01 %	7.18 dB

Date: 21.AUG.2012 10:47:33

Diagram 2:

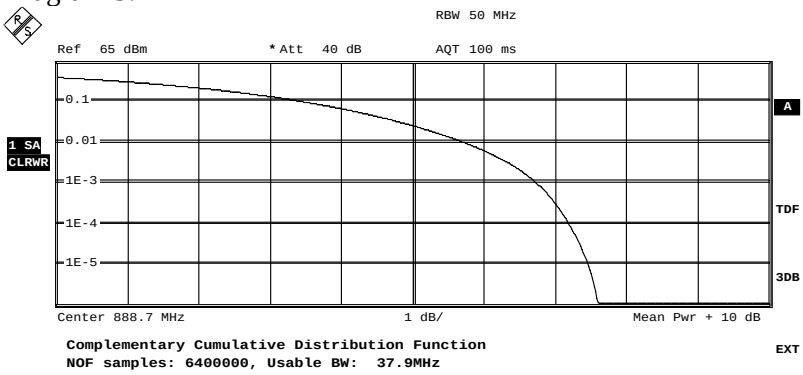


Complementary Cumulative Distribution Function
NOF samples: 6400000, Usable BW: 37.9MHz

	Trace 1
Mean	48.46 dBm
Peak	55.79 dBm
Crest	7.33 dB
10 %	3.51 dB
1 %	5.77 dB
.1 %	6.65 dB
.01 %	6.89 dB

Date: 21.AUG.2012 12:48:05

Diagram 3:

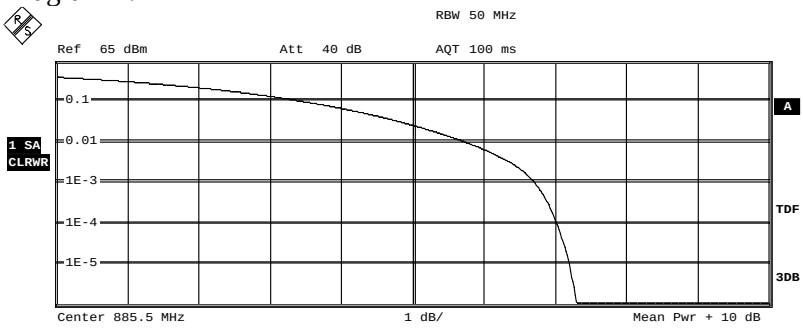


Complementary Cumulative Distribution Function
NOF samples: 6400000, Usable BW: 37.9MHz

	Trace 1
Mean	48.41 dBm
Peak	56.15 dBm
Crest	7.74 dB
10 %	3.51 dB
1 %	5.72 dB
.1 %	6.73 dB
.01 %	7.20 dB

Date: 21.AUG.2012 15:03:48

Diagram 4:

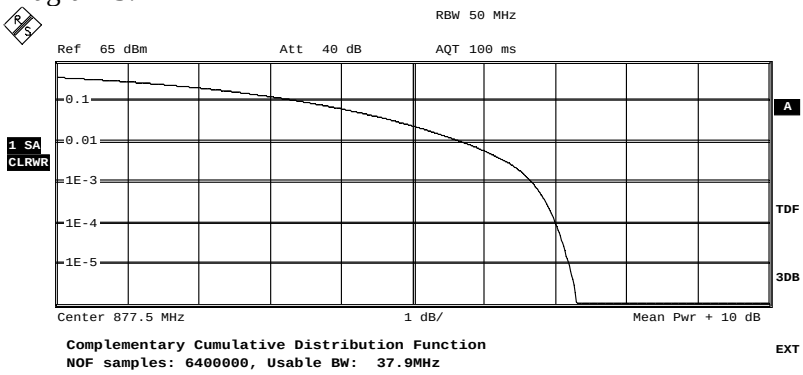


Complementary Cumulative Distribution Function
NOF samples: 6400000, Usable BW: 37.9MHz

	Trace 1
Mean	48.21 dBm
Peak	55.57 dBm
Crest	7.36 dB
10 %	3.51 dB
1 %	5.75 dB
.1 %	6.71 dB
.01 %	7.02 dB

Date: 22.AUG.2012 12:10:12

Diagram 5:

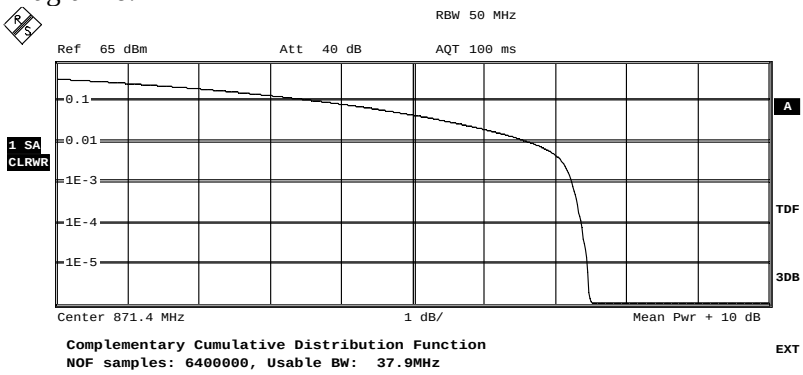


Complementary Cumulative Distribution Function
NOF samples: 6400000, Usable BW: 37.9MHz

	Trace 1
Mean	48.39 dBm
Peak	55.75 dBm
Crest	7.36 dB
10 %	3.49 dB
1 %	5.72 dB
.1 %	6.68 dB
.01 %	7.02 dB

Date: 22.AUG.2012 12:33:45

Diagram 6:

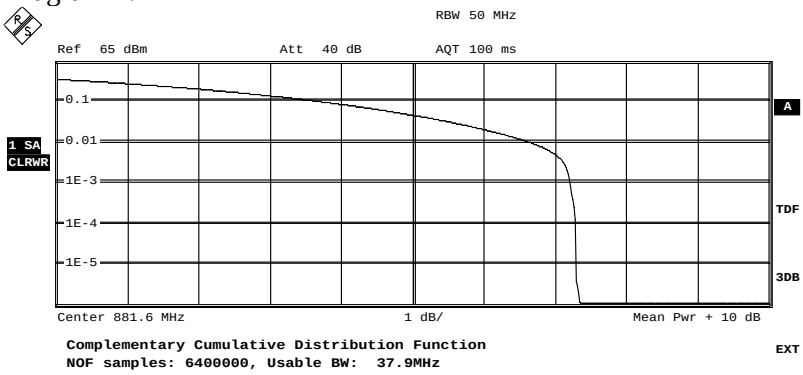


Complementary Cumulative Distribution Function
NOF samples: 6400000, Usable BW: 37.9MHz

	Trace 1
Mean	48.61 dBm
Peak	56.14 dBm
Crest	7.54 dB
10 %	3.77 dB
1 %	6.65 dB
.1 %	7.24 dB
.01 %	7.37 dB

Date: 22.AUG.2012 15:11:52

Diagram 7:

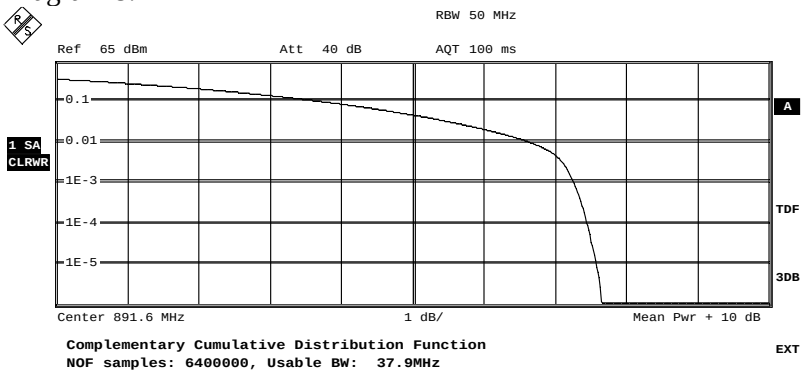


Complementary Cumulative Distribution Function
NOF samples: 6400000, Usable BW: 37.9MHz

	Trace 1
Mean	48.62 dBm
Peak	55.98 dBm
Crest	7.36 dB
10 %	3.77 dB
1 %	6.65 dB
.1 %	7.21 dB
.01 %	7.29 dB

Date: 22.AUG.2012 15:17:23

Diagram 8:



Complementary Cumulative Distribution Function
NOF samples: 6400000, Usable BW: 37.9MHz

	Trace 1
Mean	48.52 dBm
Peak	56.24 dBm
Crest	7.72 dB
10 %	3.77 dB
1 %	6.65 dB
.1 %	7.28 dB
.01 %	7.45 dB

Date: 22.AUG.2012 15:23:27

Conducted spurious emission measurements according to 47 CFR 2.1051, 22.917 / RSS-132 4.5

Date	Temperature	Humidity
2012-08-21	23 °C ± 3 °C	54 % ± 5 %
2012-08-22	23 °C ± 3 °C	55 % ± 5 %

Test set-up and procedure

The test object was via an attenuator/filter connected to a spectrum analyzer with the RMS detector activated and an external 10 MHz reference connected.

Wide-band measurements were made with a resolution bandwidth of 1 MHz instead of 100 kHz as RSS-132 specifies a resolution bandwidth of 1 MHz for equipment with an emission bandwidth of ≥4 MHz. For IM emission zoom (plots sub-labeled 'f') it was deemed that the GSM carriers were the major source of the emission and thus 100 kHz RBW was used.

Measurement equipment	SP number
R&S FSQ	504 143
RF attenuator	504 159
RF attenuator	900 691
High pass filter	504 199
High pass filter	503 740
High pass filter	503 739
Testo 635 temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results

Diagram 1 a-f Configuration 1
Diagram 2 a-f Configuration 2
Diagram 3 a-f Configuration 3
Diagram 4 a-f Configuration 4
Diagram 5 a-f Configuration 5

The configurations are described in appendix 1. Diagrams are shown on the following pages.

Remark

The emission at 9 kHz on the 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 upper frequency boundary was set to 10 x 2.5 GHz = 25 GHz for emission measurements.

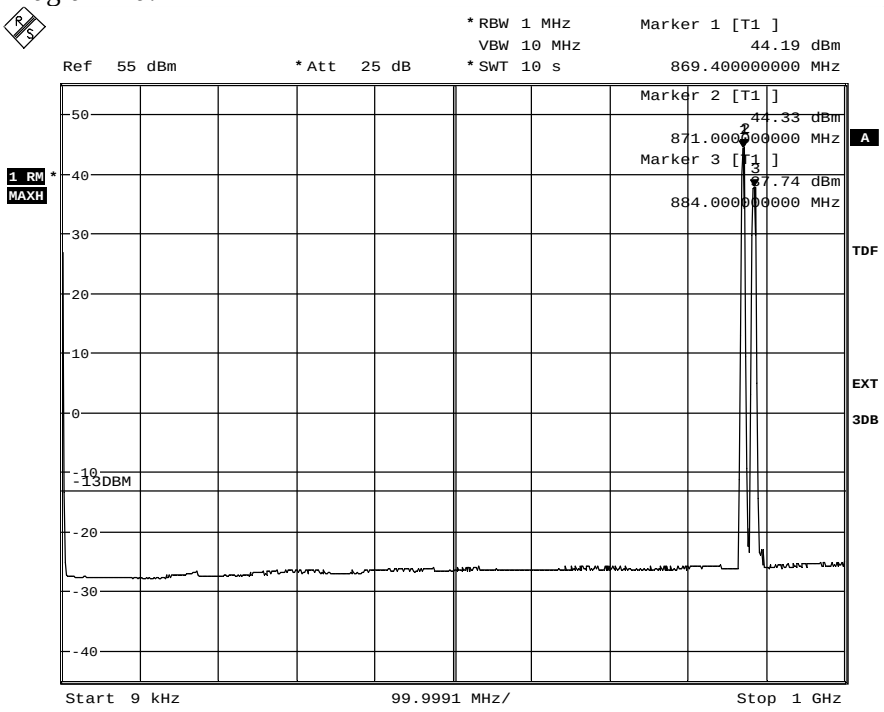
Limits

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

Complies?	Yes

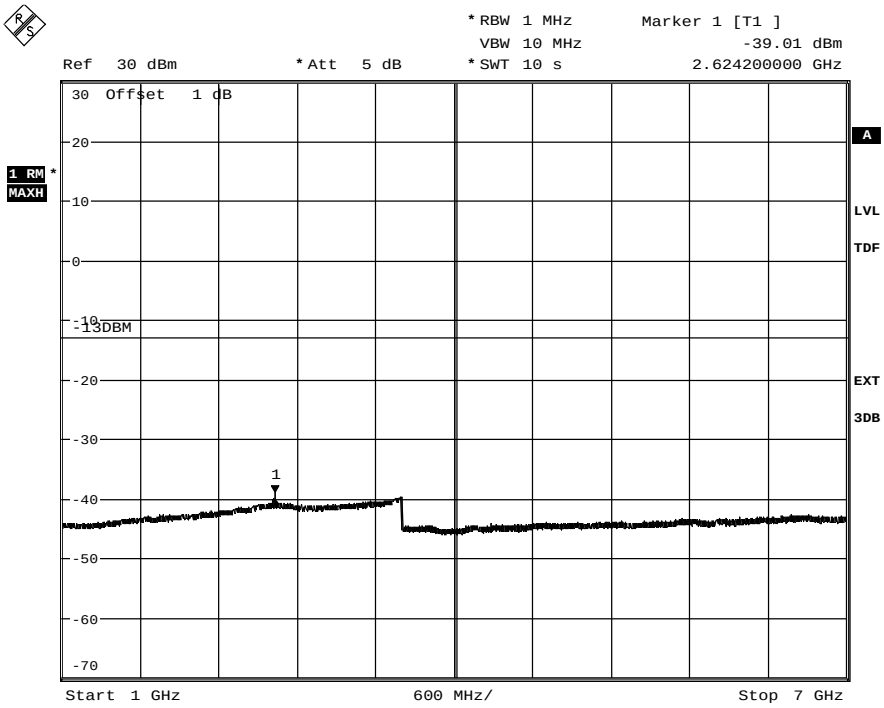
Appendix 3

Diagram 1 a:



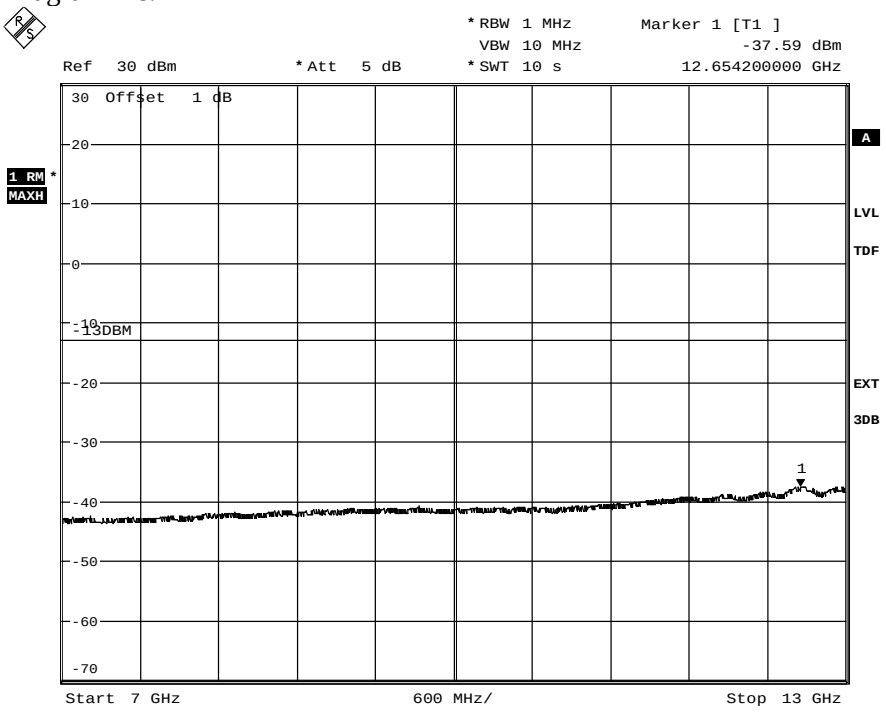
Date: 21.AUG.2012 11:02:10

Diagram 1 b:



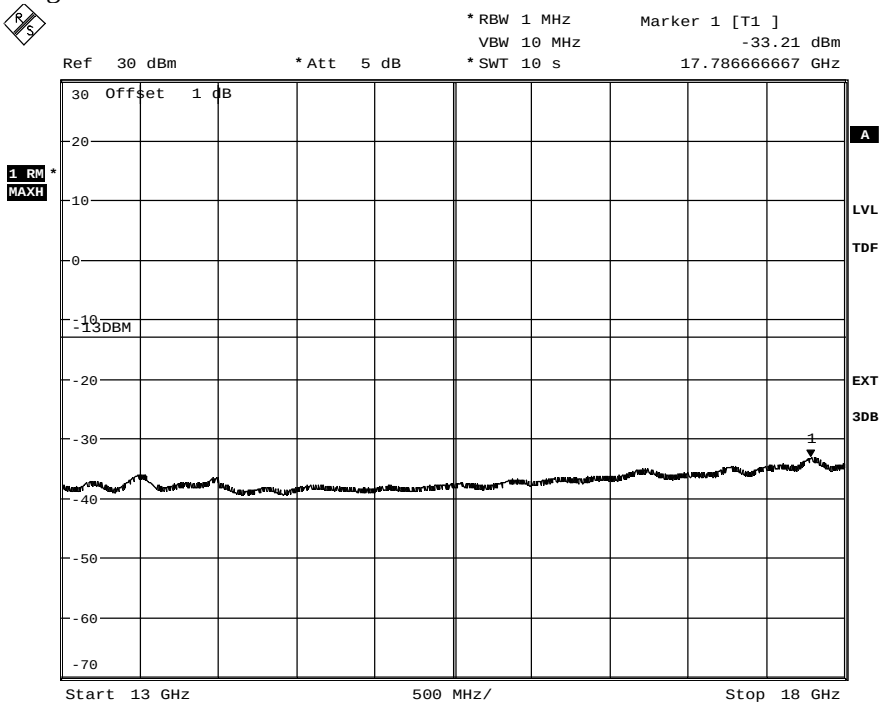
Date: 21.AUG.2012 11:13:20

Diagram 1 c:



Date: 21.AUG.2012 11:14:20

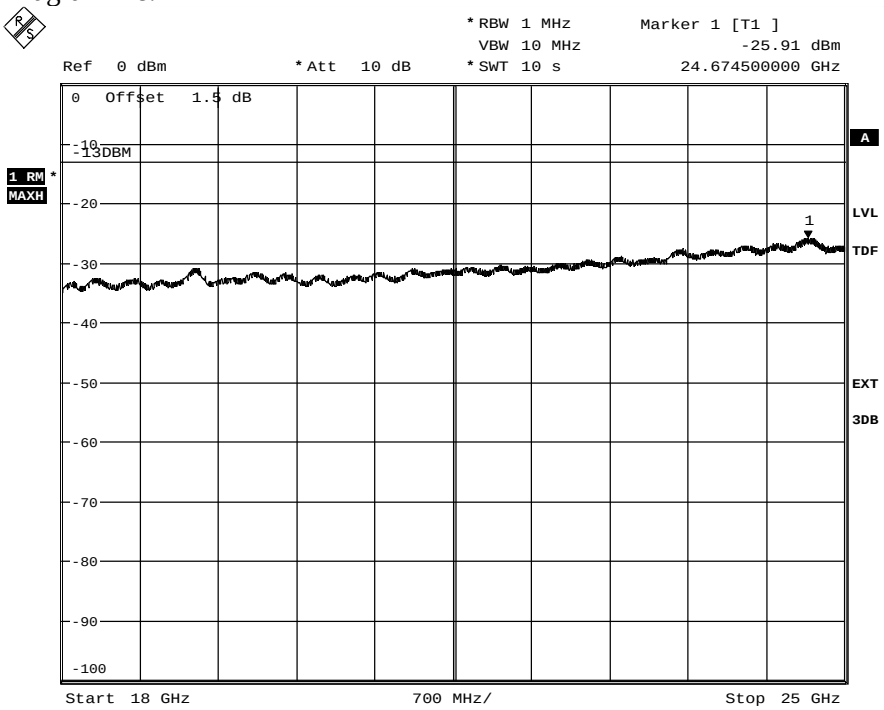
Diagram 1 d:



Date: 21.AUG.2012 11:15:17

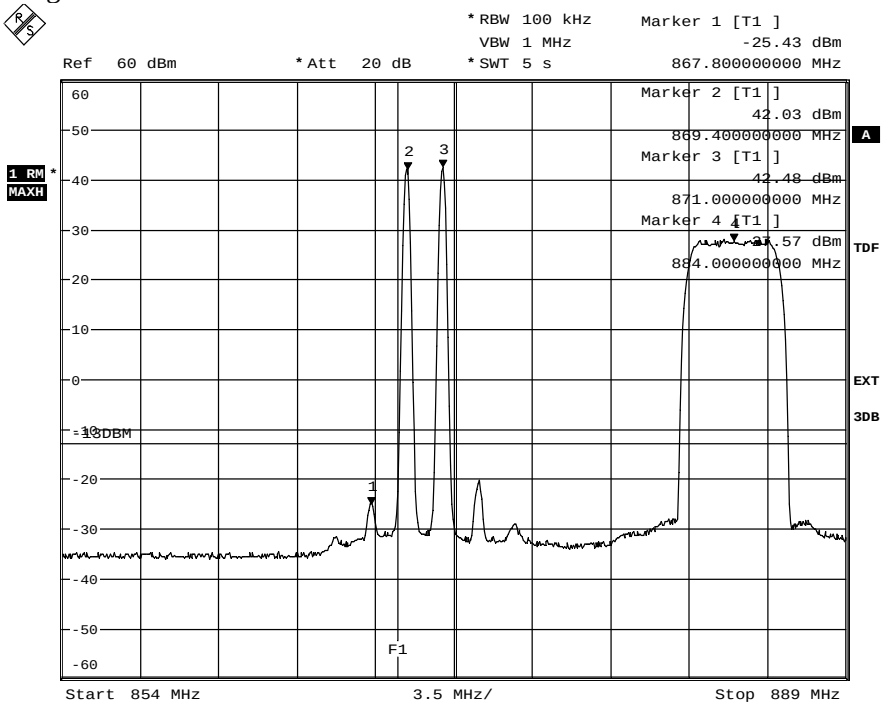
Appendix 3

Diagram 1 e:



Date: 22.AUG.2012 09:12:03

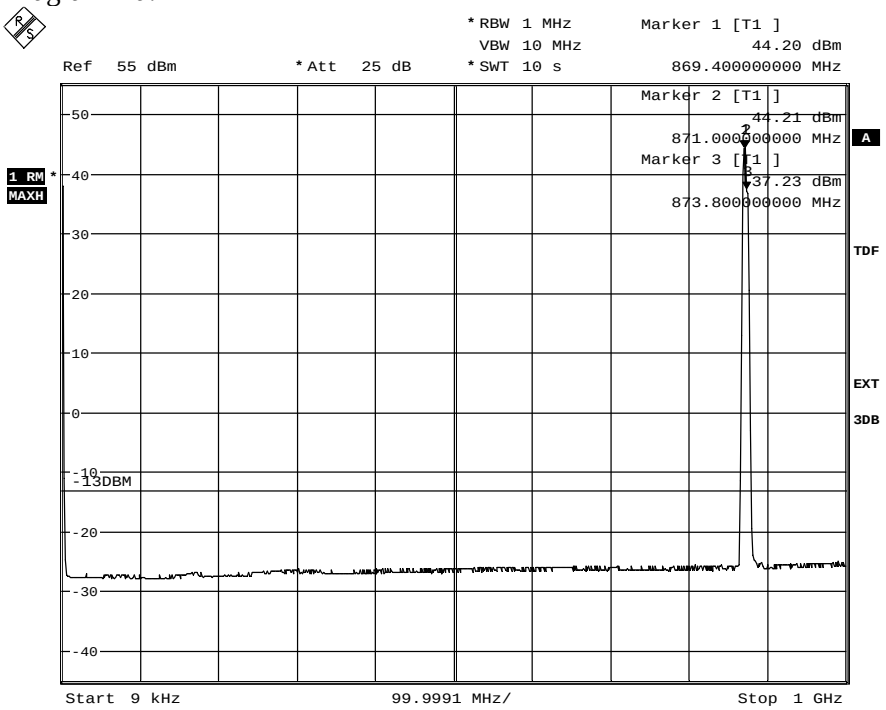
Diagram 1 f:



Date: 22.AUG.2012 09:16:27

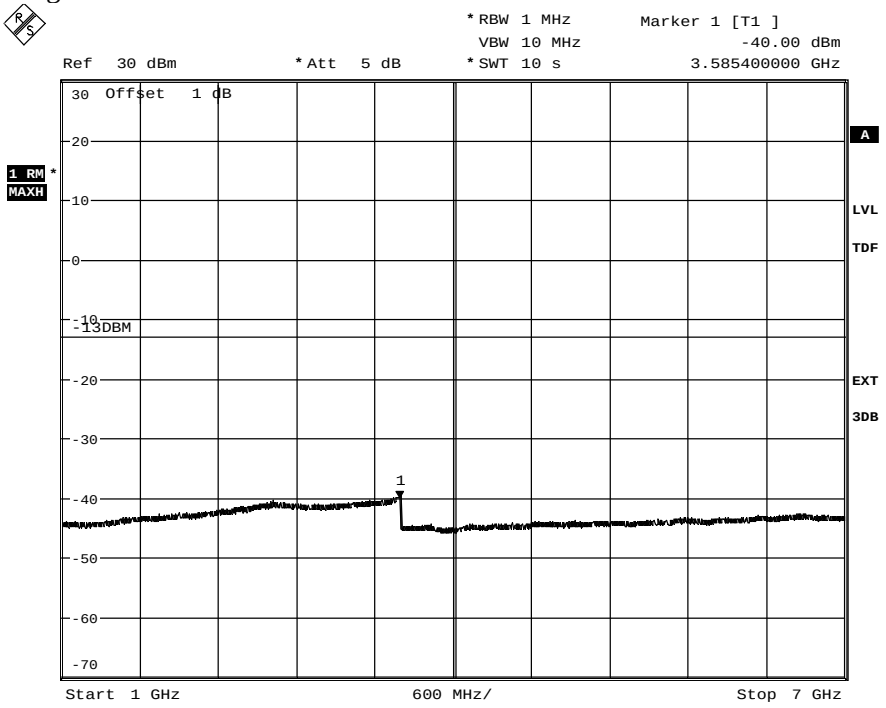
Appendix 3

Diagram 2 a:



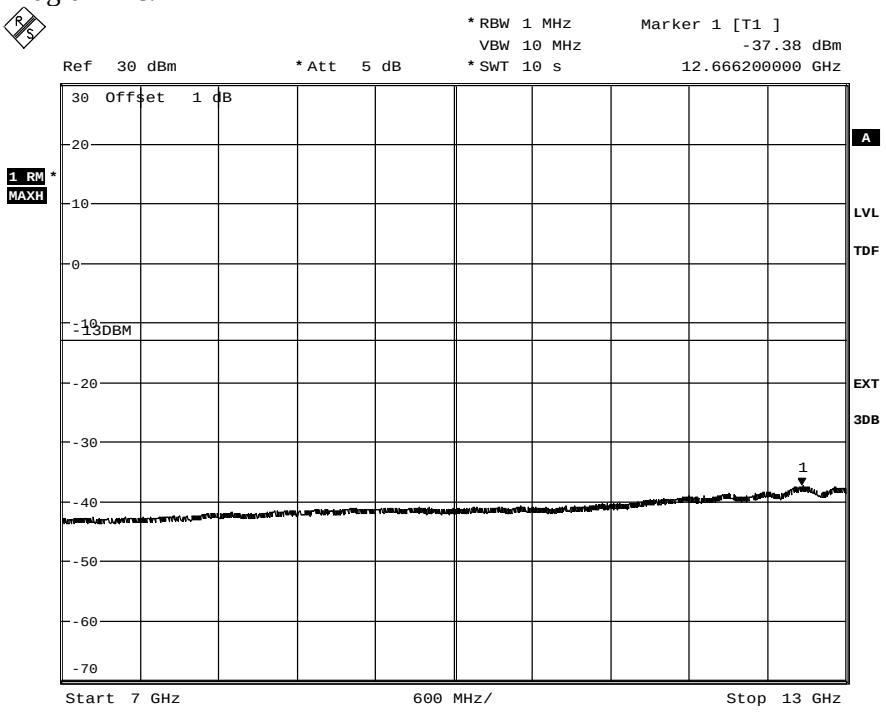
Date: 21.AUG.2012 12:49:38

Diagram 2 b:



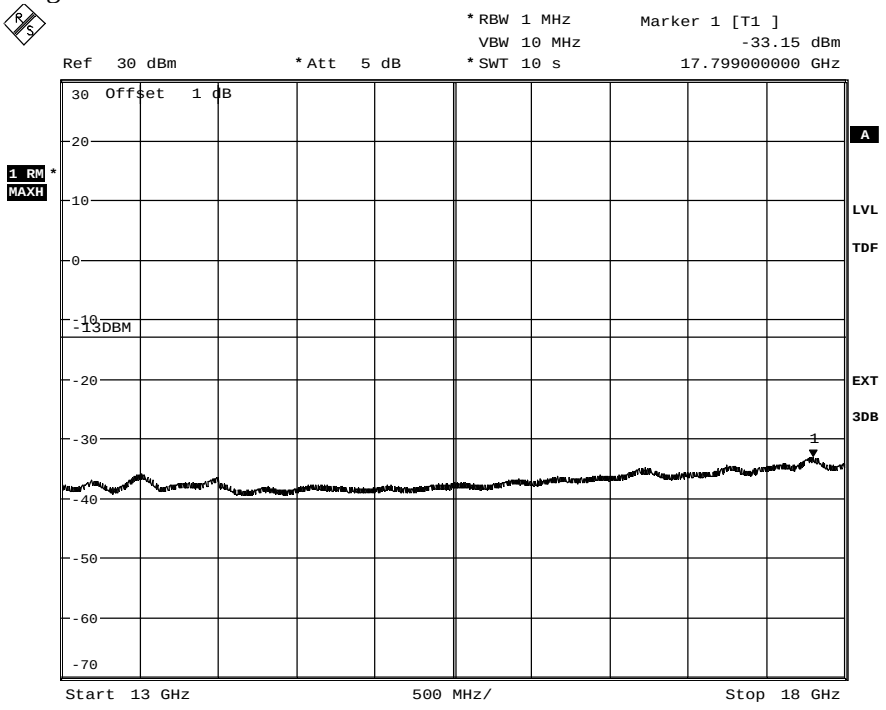
Date: 21.AUG.2012 12:53:34

Diagram 2 c:



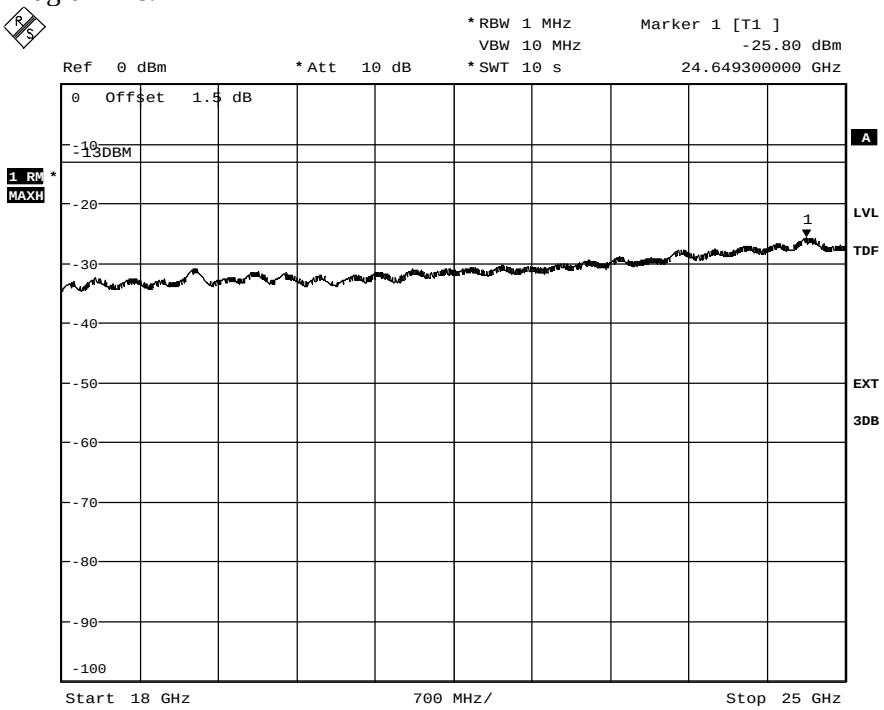
Date: 21.AUG.2012 12:54:19

Diagram 2 d:



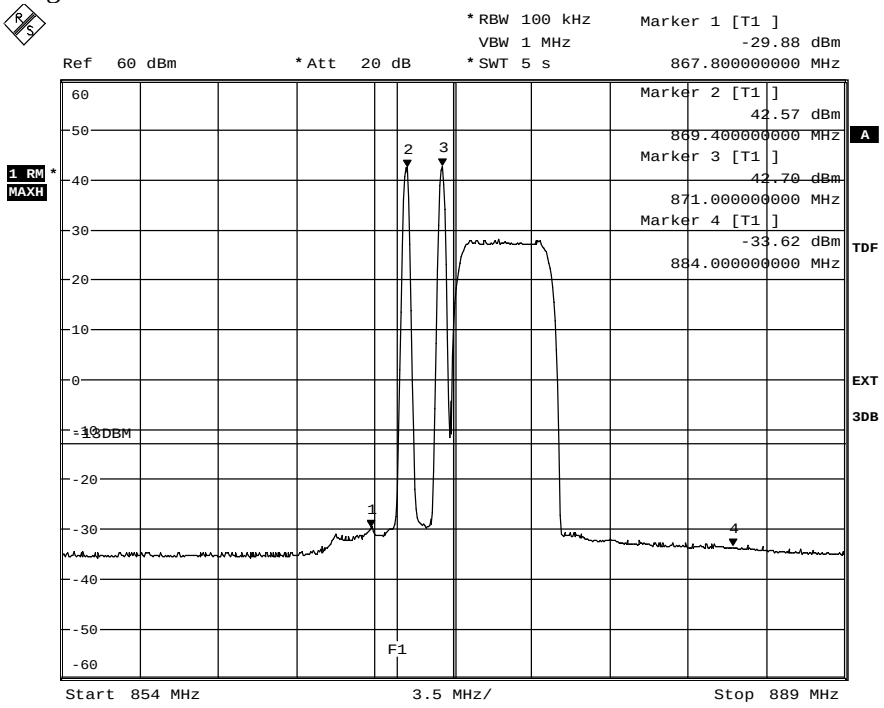
Date: 21.AUG.2012 12:55:04

Diagram 2 e:



Date: 22.AUG.2012 10:02:48

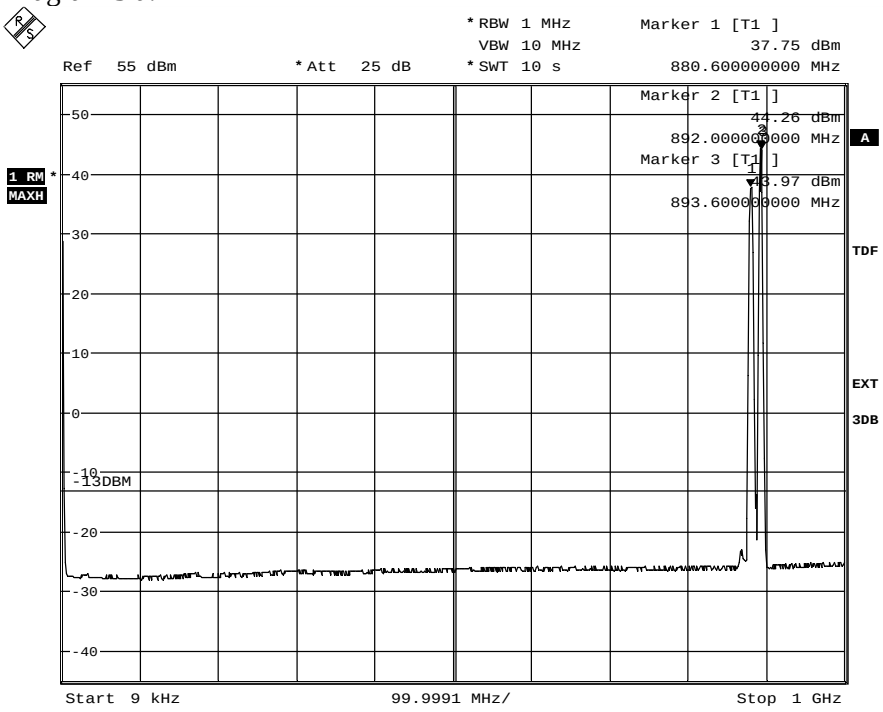
Diagram 2f:



Date: 22.AUG.2012 09:59:11

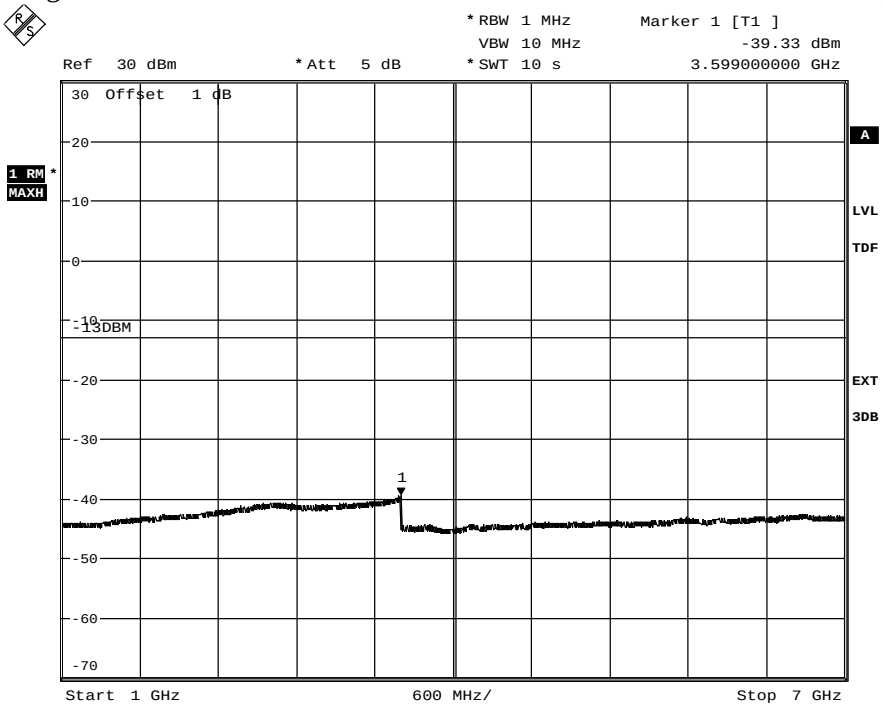
Appendix 3

Diagram 3 a:



Date: 21.AUG.2012 15:08:37

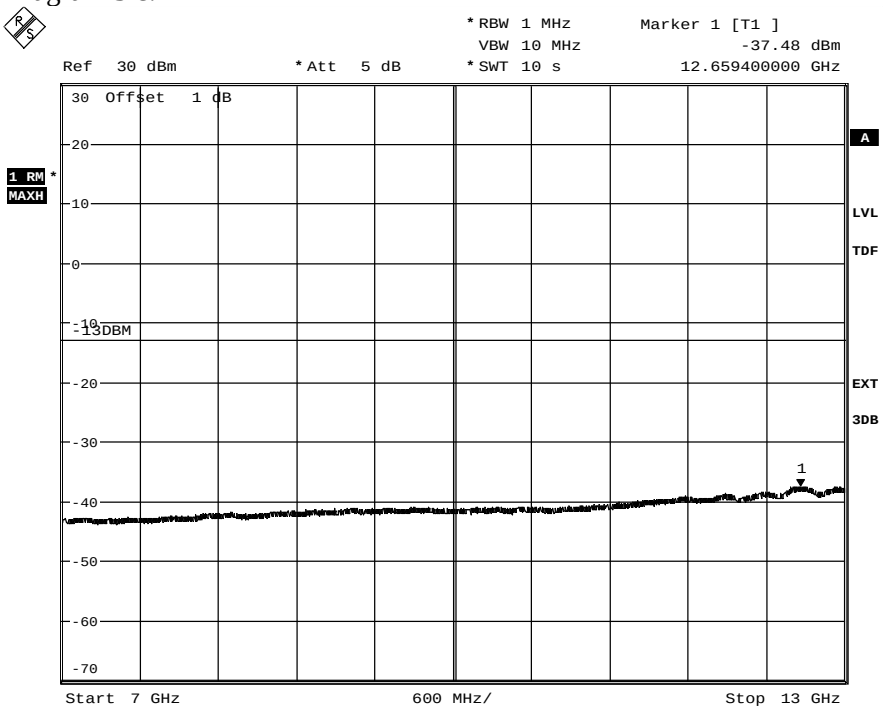
Diagram 3 b:



Date: 21.AUG.2012 15:09:49

Appendix 3

Diagram 3 c:



Date: 21.AUG.2012 15:10:31

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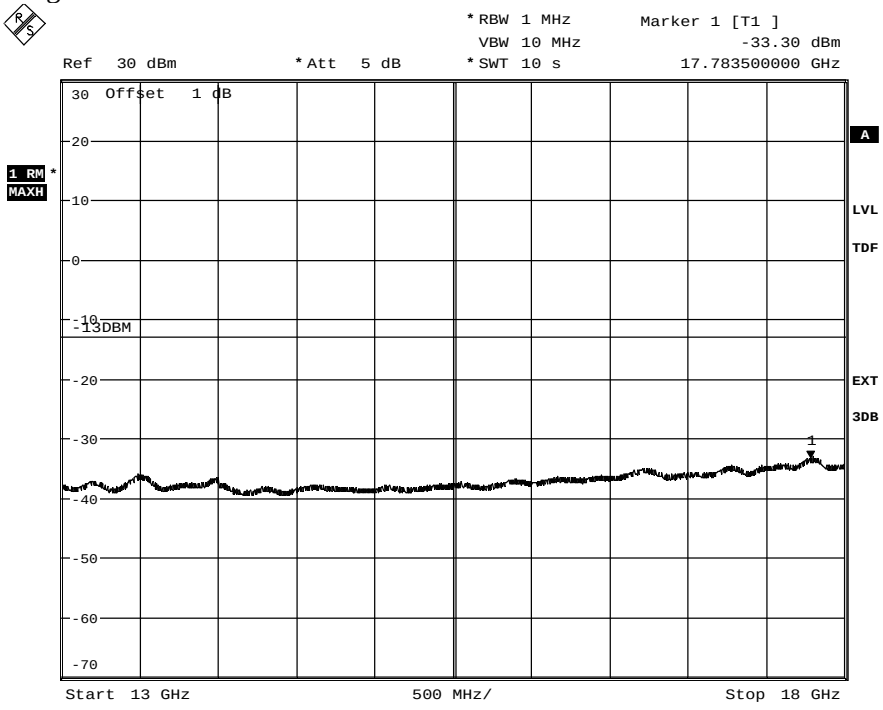
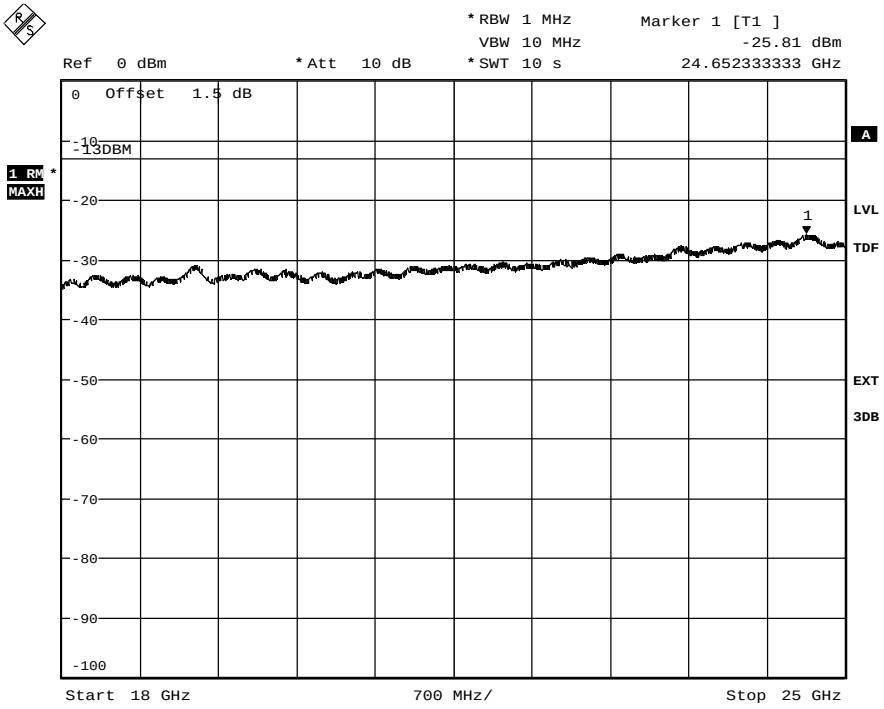


Date: 21.AUG.2012 15:11:29

Appendix 3

Diagram 3 e:



Date: 22.AUG.2012 10:53:04

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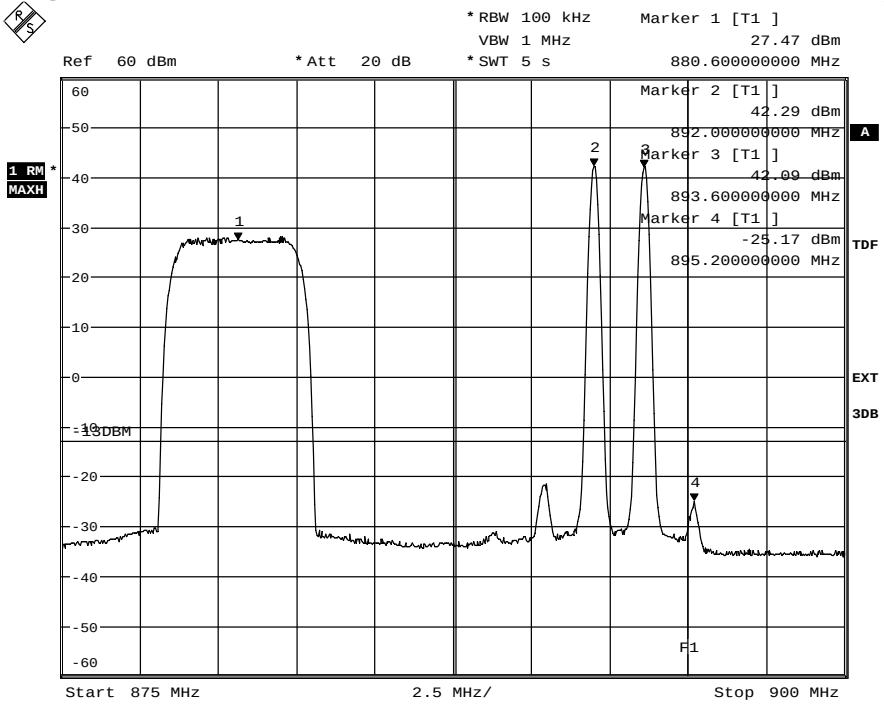
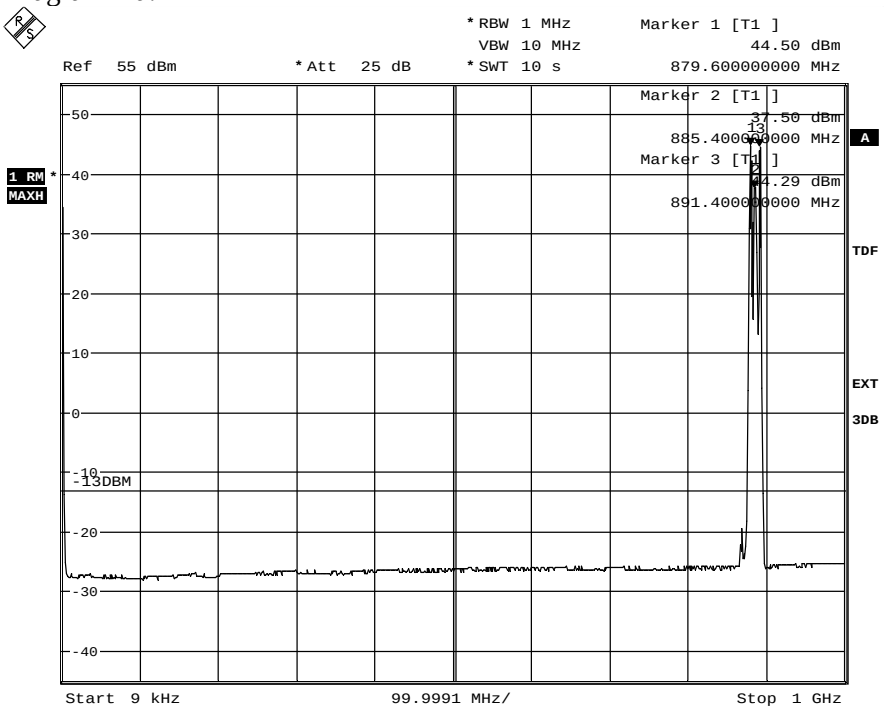


Date: 22.AUG.2012 10:46:16

Appendix 3

Diagram 4 a:



Date: 22.AUG.2012 11:58:30

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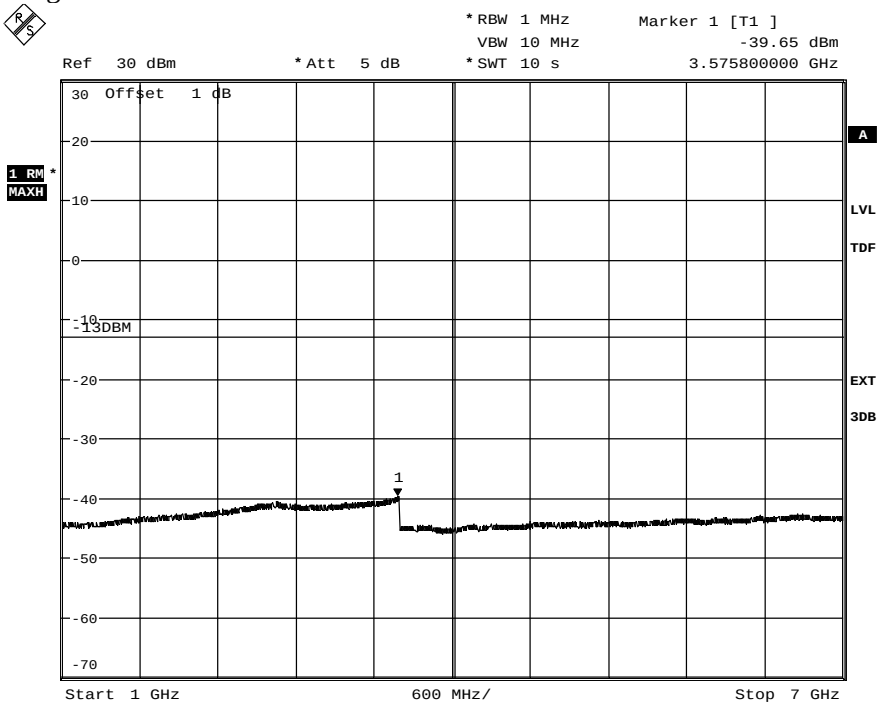

Date: 22.AUG.2012 12:01:45

Appendix 3

Diagram 4 c:

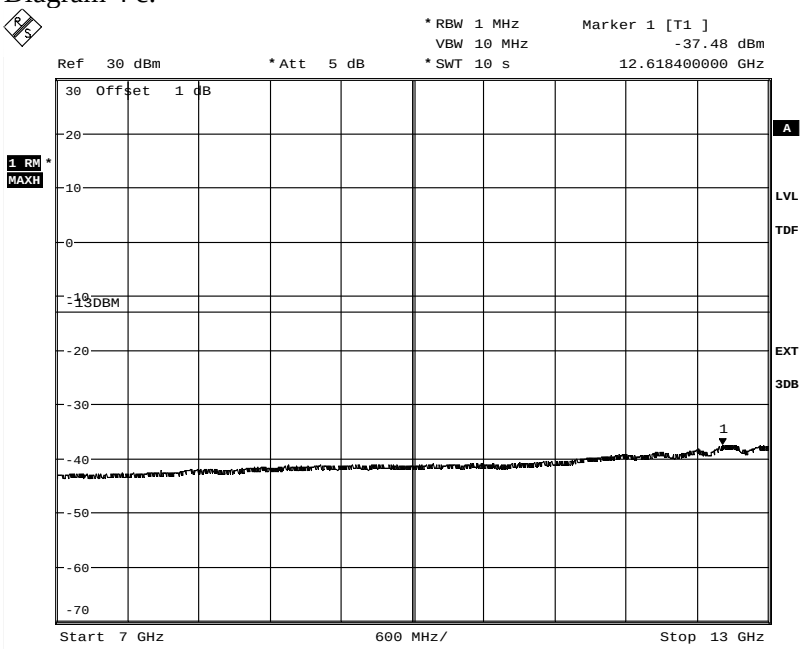

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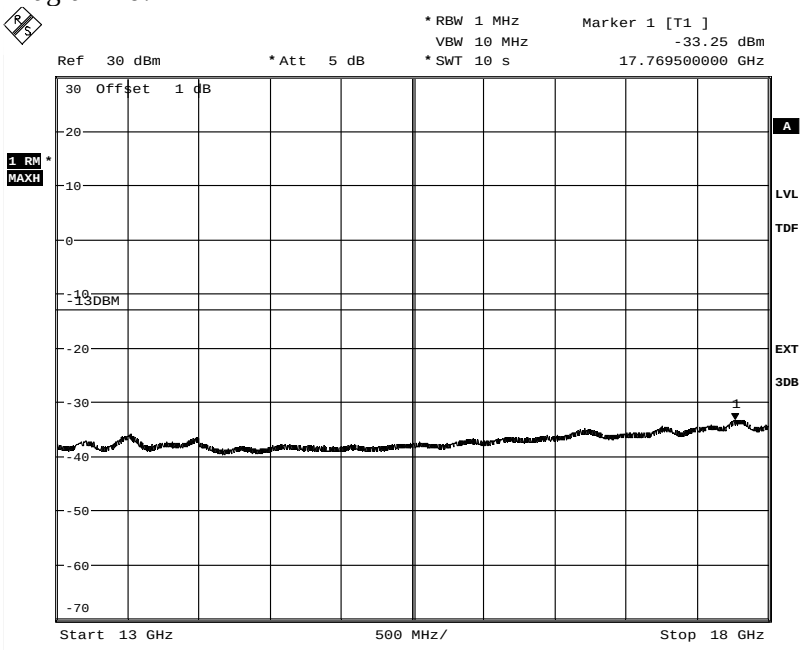
Diagram4 d:



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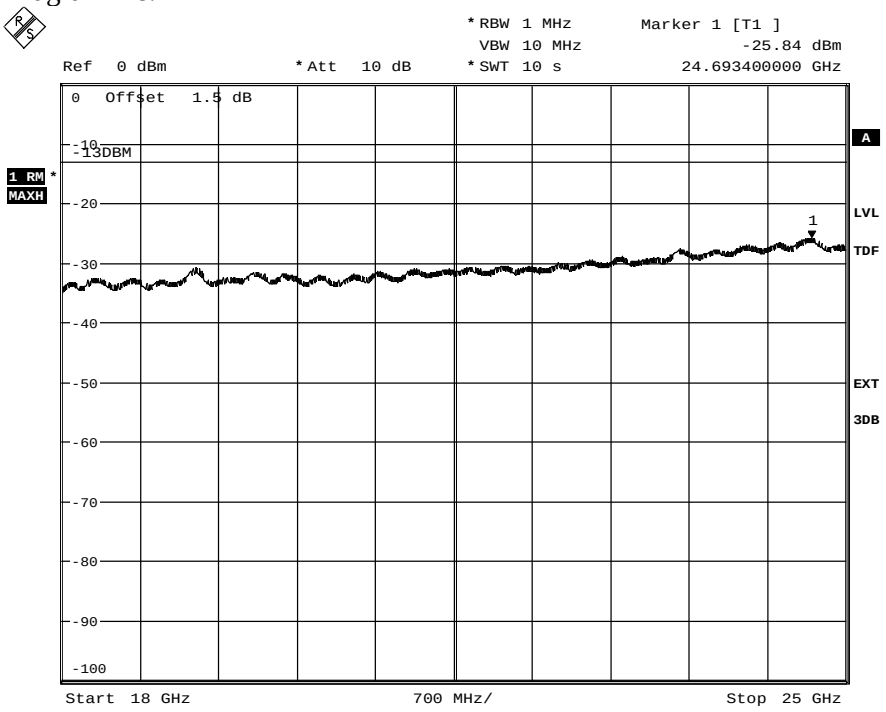
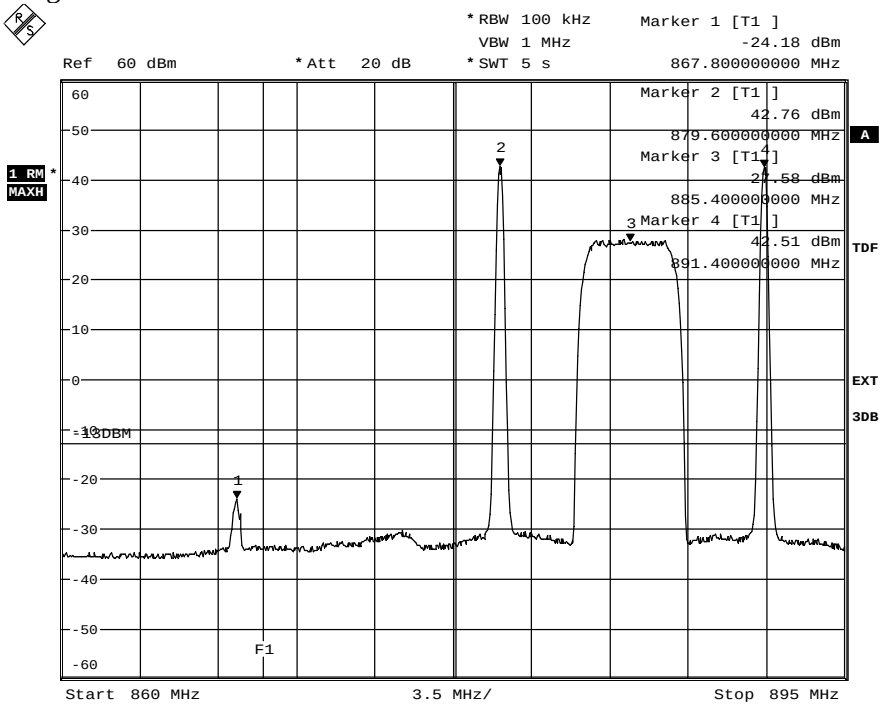


Date: 22.AUG.2012 12:07:07

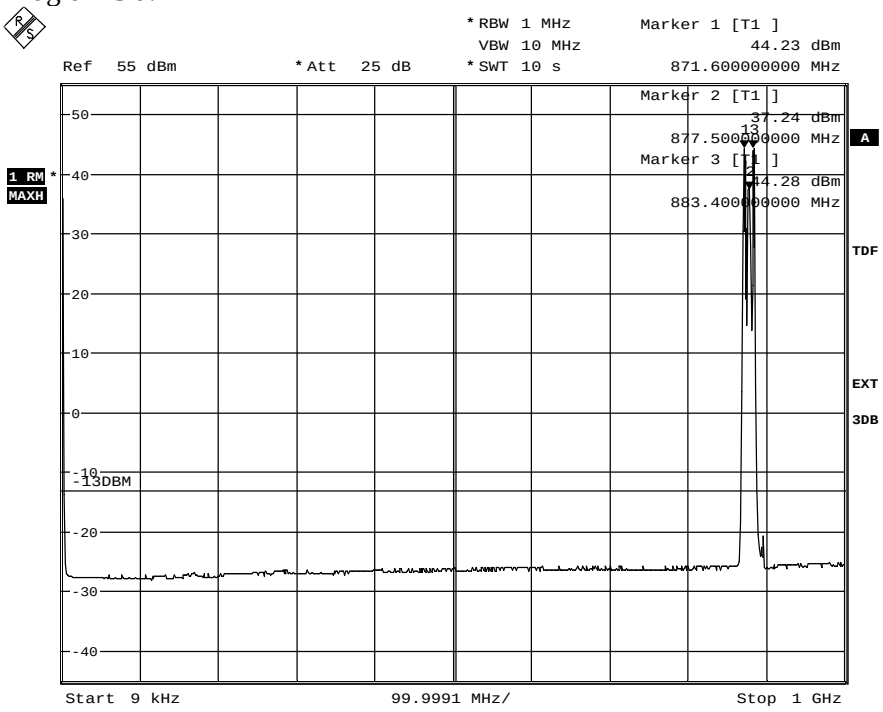
Diagram 4 f:



Date: 22.AUG.2012 11:56:28

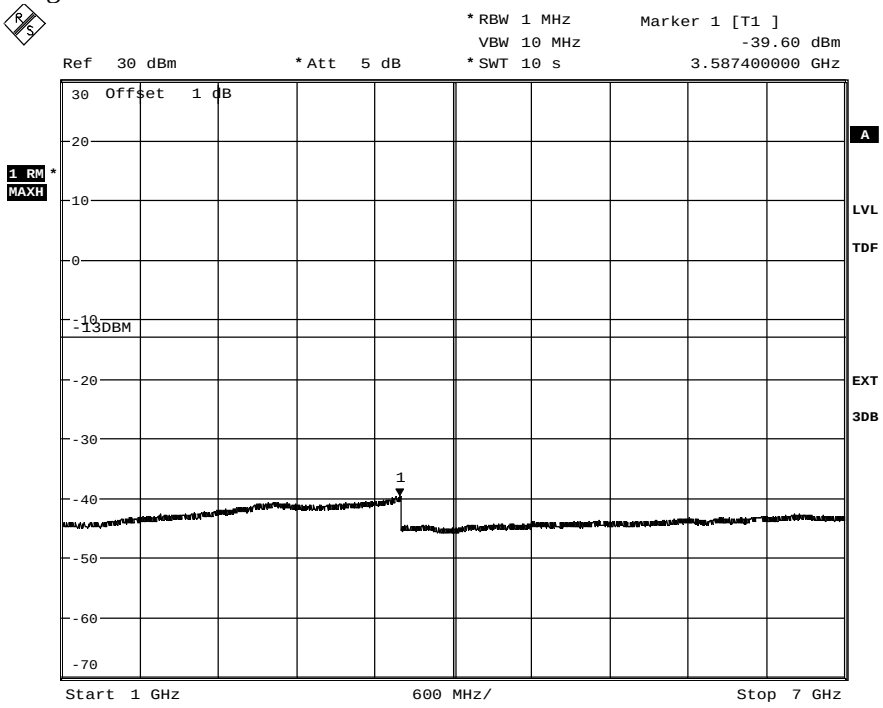
Appendix 3

Diagram 5 a:



Date: 22.AUG.2012 12:37:51

Diagram 5 b:



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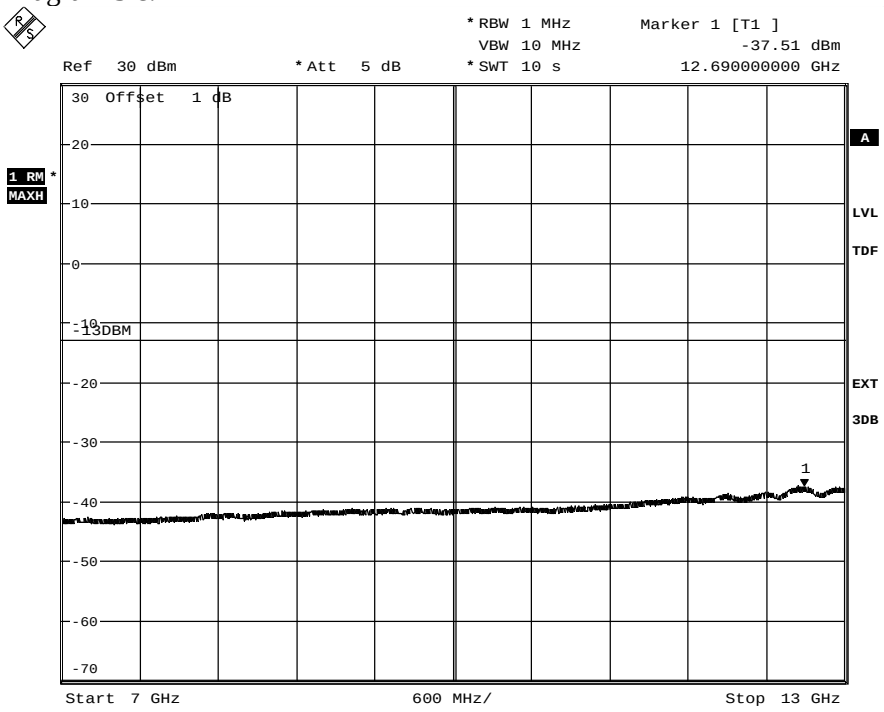
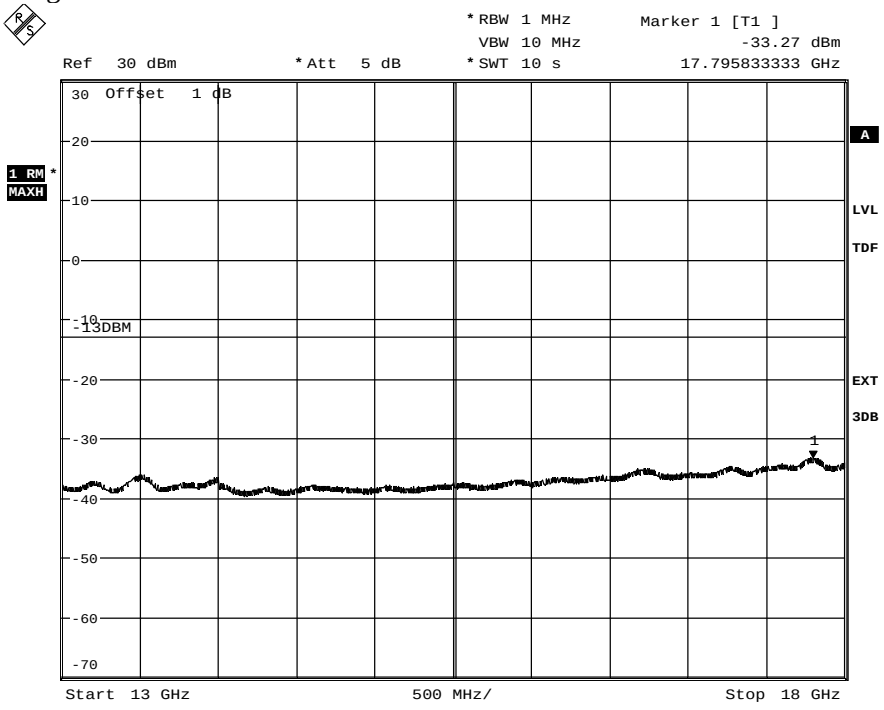


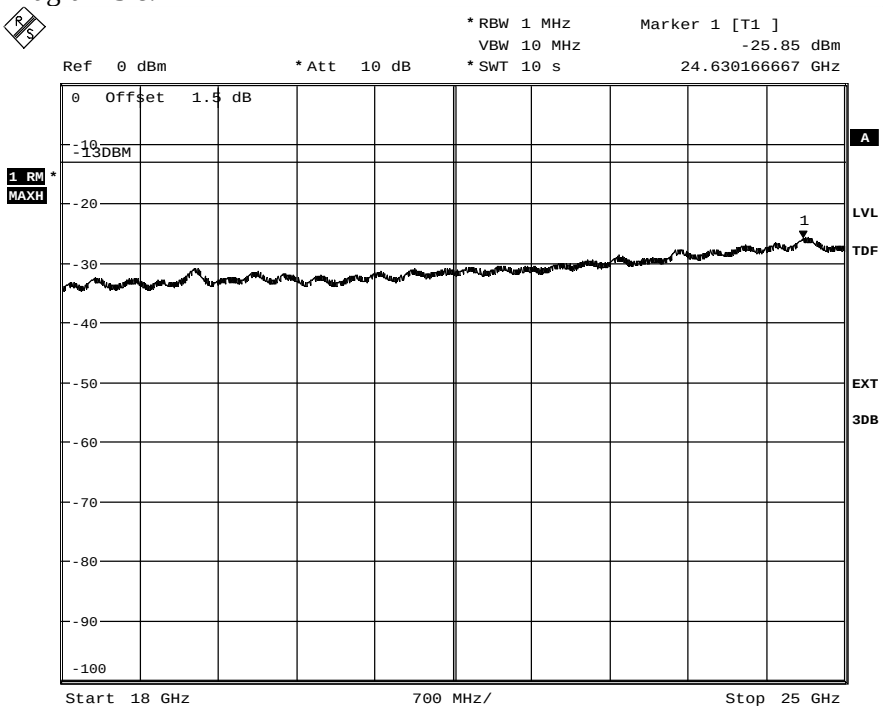
Date: 22.AUG.2012 12:40:10

Diagram 5 d:



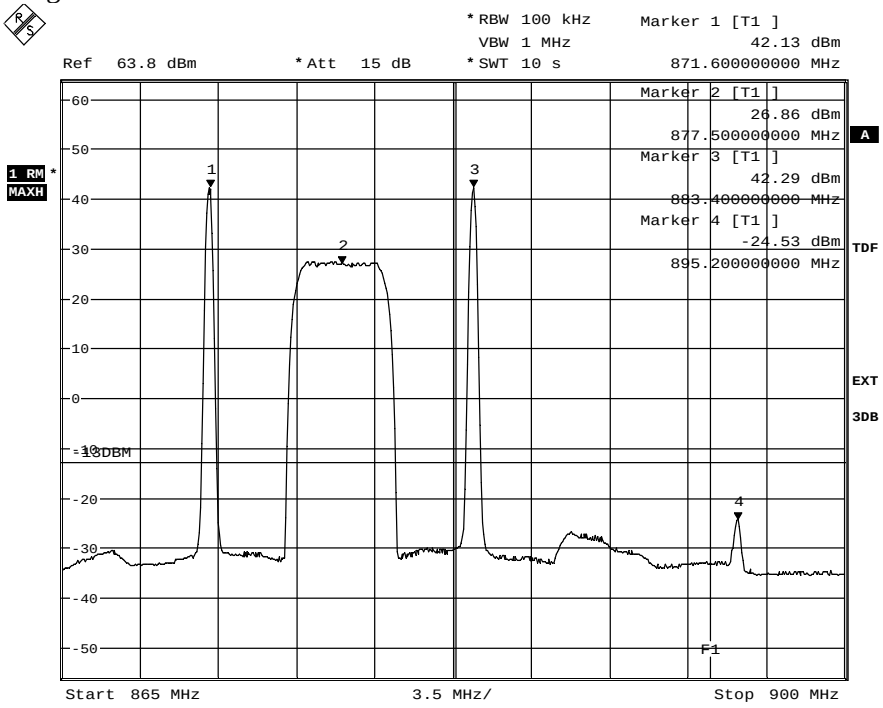
Date: 22.AUG.2012 12:40:59

Diagram 5 e:



Date: 22.AUG.2012 12:43:07

Diagram 5 f:



Date: 22.AUG.2012 12:36:07

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

Date	Temperature	Humidity
2012-05-04 to 2012-05-07	23 °C ± 3 °C	34 % ± 5 %

Test set-up and procedure

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

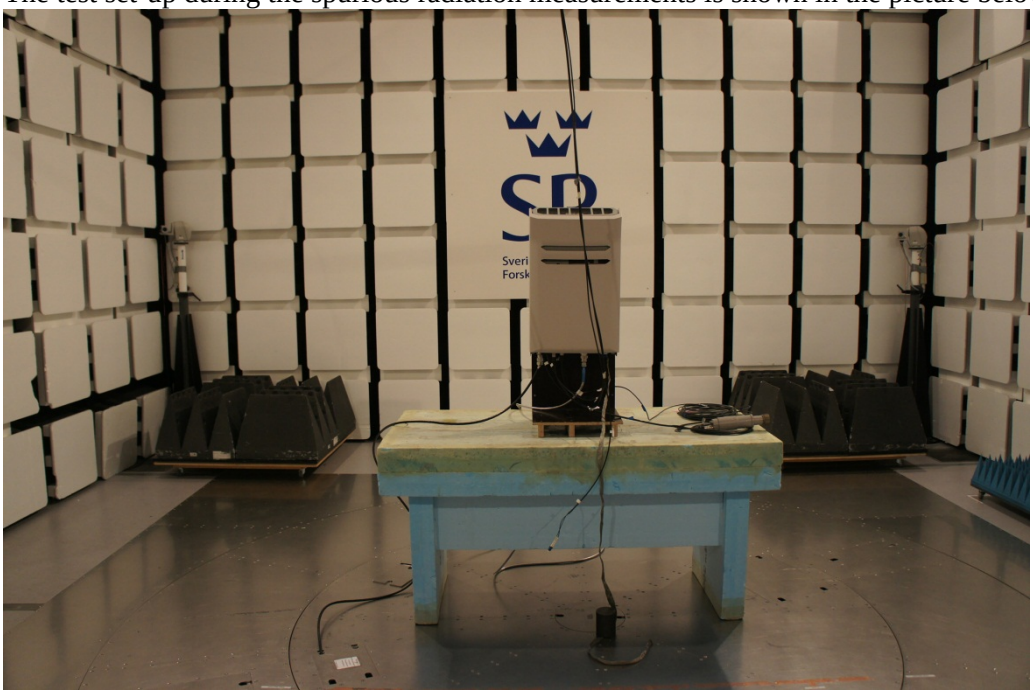
The measurements were performed with both horizontal and vertical polarization of the antenna. The antenna distance was 3 m in the frequency range 30 MHz – 18 GHz and 1m in the frequency range 18 - 25 GHz.

In the frequency range 30 MHz - 25 GHz the measurement was performed in power with a RBW of 1 MHz. A propagation loss in free space was calculated. The used formula was $\gamma = 20\log\left(\frac{4\pi D}{\lambda}\right)$, γ is the propagation loss and D is the antenna distance.

The measurement procedure was as the following:

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

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



Measurement equipment

Measurement equipment	SP number
Test site Tesla	503 881
R&S ESU 26	901 553
Software: R&S EMC32, ver. 8.52.0	503 745
Chase Bilog antenna CBL 6111A	503 182
µCorp Nordic, Low Noise Amplifier	901 545
Miteq, Low Noise Amplifier	503 285
EMCO Horn Antenna 3115	502 175
Standard gain antenna 20240-20	503 674
High pass filter	901 373
Testo 625 temperature and humidity meter	504 188

Tested configurations:

Configuration 1
Configuration 2
Configuration 3

Results

Diagram 1a-c: Configuration 2, representing worst case

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

Remark

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

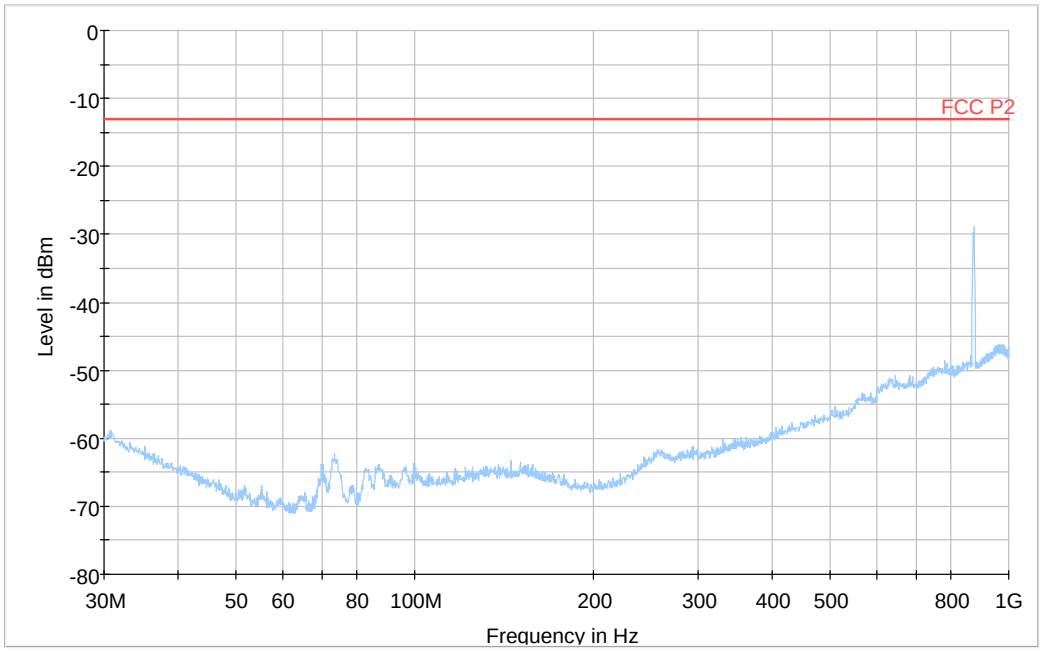
Limits

§22.917 and RSS-132 4.5

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.

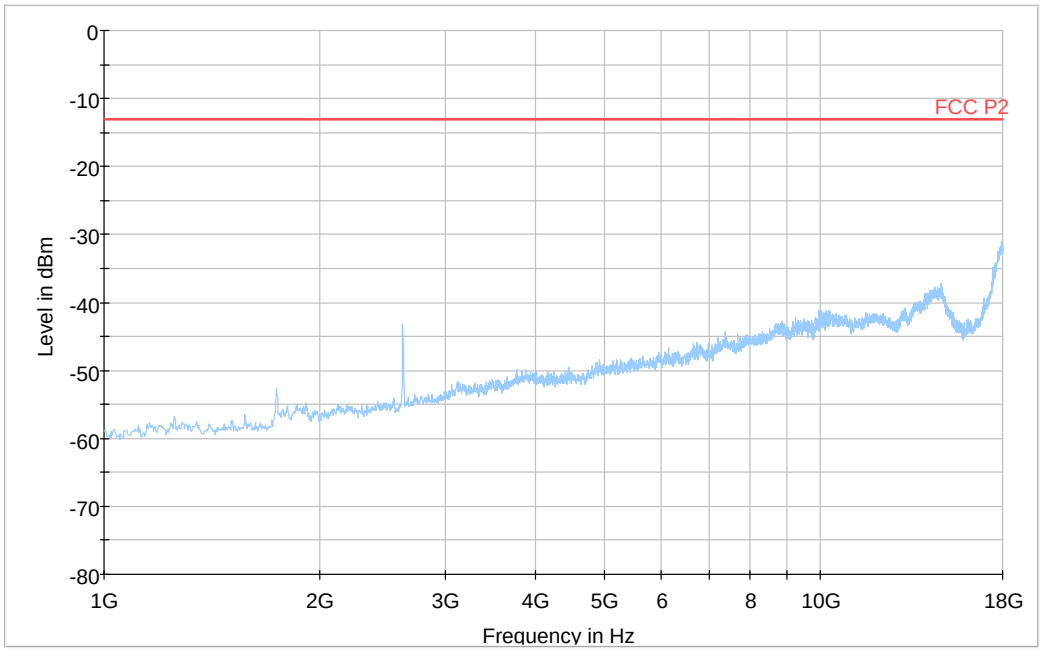
Complies?	Yes

Diagram 1a:



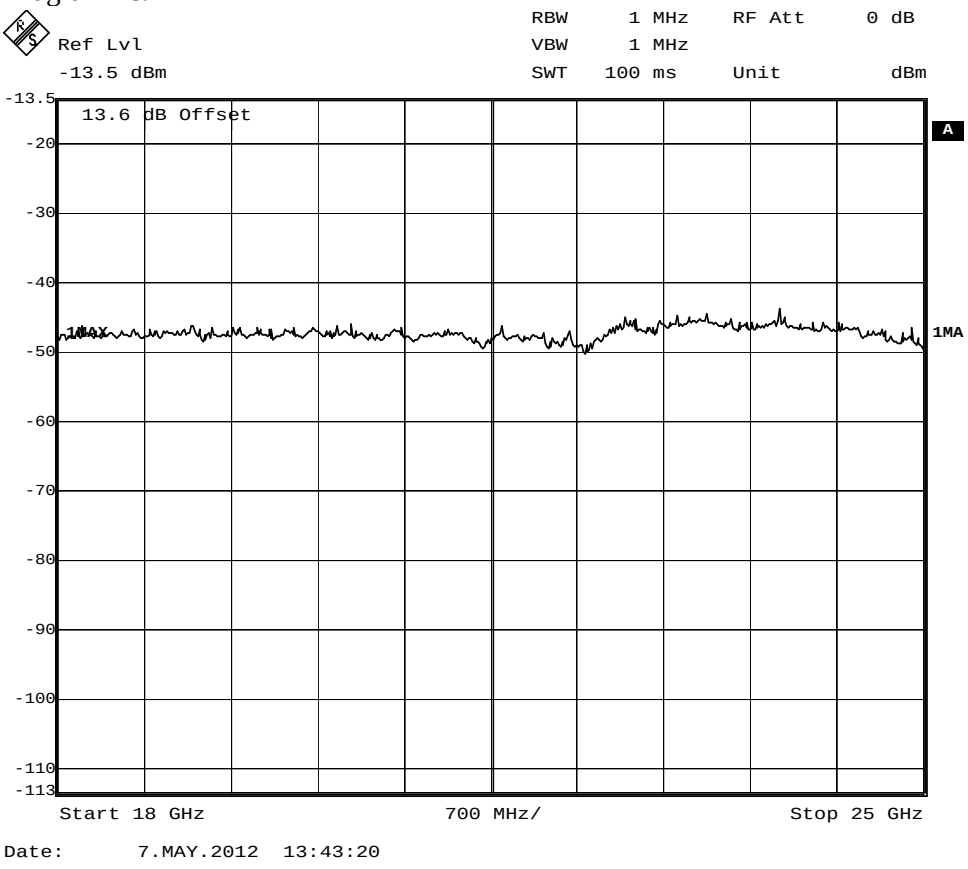
Note : The emission between 869 and 894 MHz are the TX carrier signals and shall be ignored in this context.

Diagram 1b:



Appendix 4

Diagram 1c:



Frequency stability measurements according to CFR 47 §2.1055, 22.355 / and IC RSS-132 4.3

Date	Temperature (test equipment)	Humidity (test equipment)
2012-06-08 to 2012-06-13	22-23 °C ± 3 °C	36-47 % ± 5 %

Test set-up and procedure

The measurement was made per 3GPP TS 25.141. The output was connected to a spectrum analyzer. The spectrum analyzer was connected to an external 10 MHz reference standard during the measurements.

Measurement equipment	SP number
R&S FSQ 40	504 143
RF attenuator	504 159
Testo 635 temperature and humidity meter	504 203
Climate chamber 2	501 031

Results

Nominal Voltage -48 V DC. Configuration 7 was used (mid-channel).

Test conditions		Frequency error (Hz)
Supply voltage DC (V)	T (°C)	
-48.0	+20	-7
-55.2	+20	-9
-40.8	+20	-8
-48.0	+30	-5
-48.0	+40	-4
-48.0	+50	-5
-48.0	+10	+9
-48.0	0	+5
-48.0	-10	-5
-48.0	-20	+7
-48.0	-30	+12
Maximum freq. error (Hz)		12
Measurement uncertainty		$< \pm 1 \times 10^{-7}$

Limits

Limits (according to 3GPP TS 25.141)
The frequency error shall be within ± 0.05 PPM ± 12 Hz (±56.1 Hz).

Complies?	Yes

Receiver spurious emissions measurements according to FCC CFR 47, 15.111 / IC RSS-132 4.6., RSS-Gen 6.2

Date	Temperature	Humidity
2012-08-23	22 °C ± 3 °C	48 % ± 5 %

Test set-up and procedure

The measurements were performed according to ANSI C63.4.

Measurements were performed at the receiver antenna port RF B, with RF A transmitting a single carrier WCDMA signal at maximum output power into a 50 ohm termination.

In the frequency range 9 kHz – 1 GHz the measurement was first performed with peak detector. Emission on frequencies close to or above the limit is re-measured with quasi-peak detector. In the frequency range 1-12.5 GHz the AVG detector was used.

Measurement equipment	SP number
Rohde & Schwarz FSQ 40	504 143
RF attenuator (connected to port RF A)	504 159
RF attenuator (connected to port RF B)	503 248
Testo 635 temperature and humidity meter	504 203

Result

Diagram 1 a & b Configuration 6
Diagram 2 a & b Configuration 7
Diagram 3 a & b Configuration 8

The configurations are described in appendix 1. Diagrams are shown on the following pages.

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 5 x 2.5 GHz = 12.5 GHz.
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.
Where multiple limits apply, the most stringent limit was applied for compliance assessment.

Limit

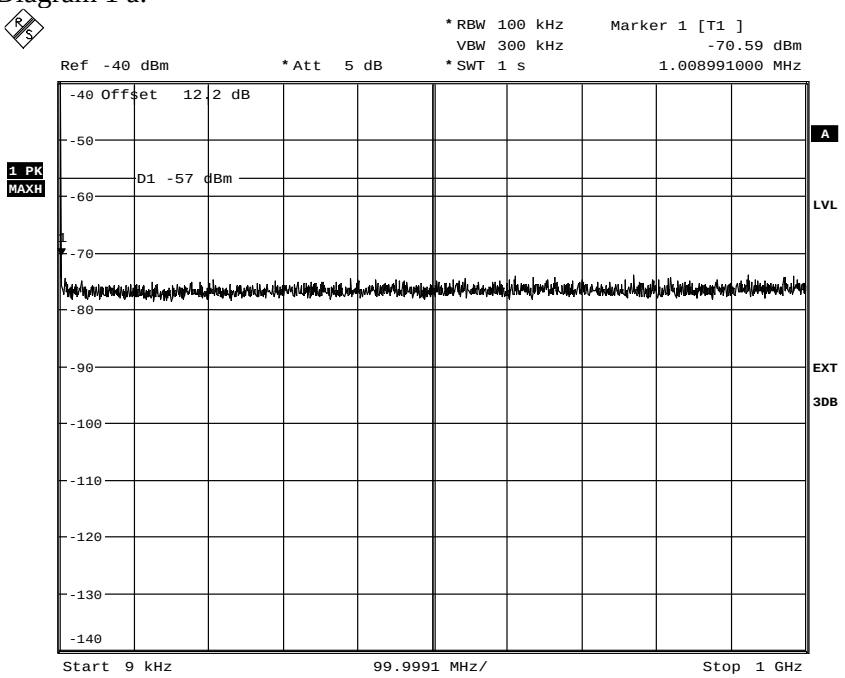
§15.111 Antenna power conduction limits for receivers
The power at the antenna terminal at any frequency within the range of measurements specified in §15.33 shall not exceed 2.0 nanowatts (-57 dBm).

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.

Compliant	Yes

Appendix 6

Diagram 1 a:



Date: 23.AUG.2012 10:00:30

Diagram 1 b:

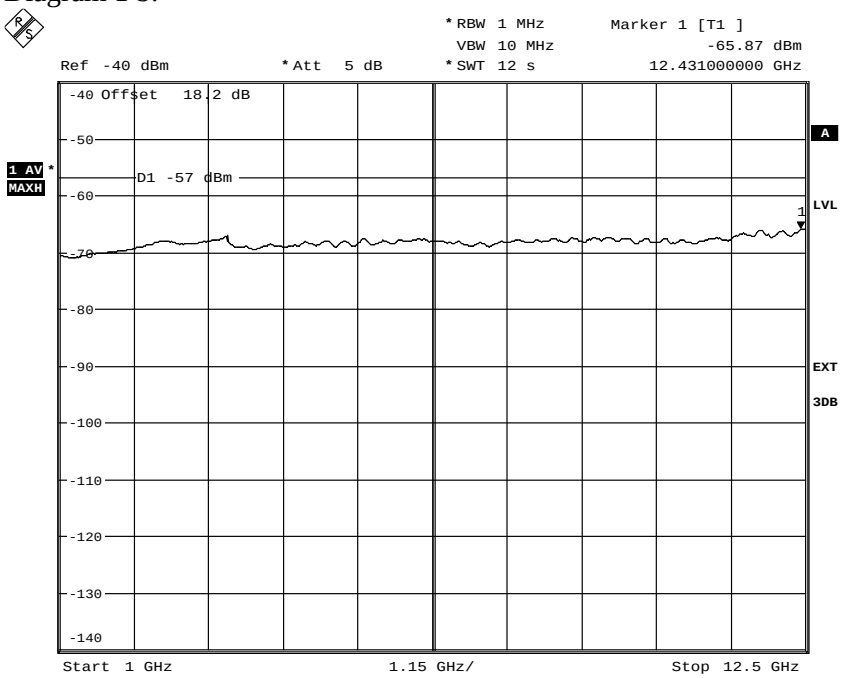


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Diagram 2 a:

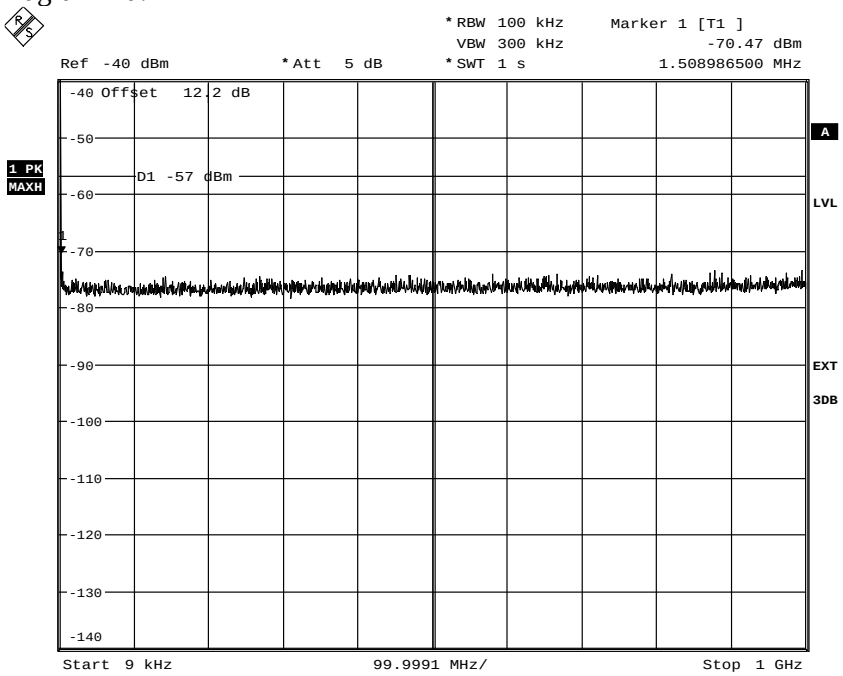

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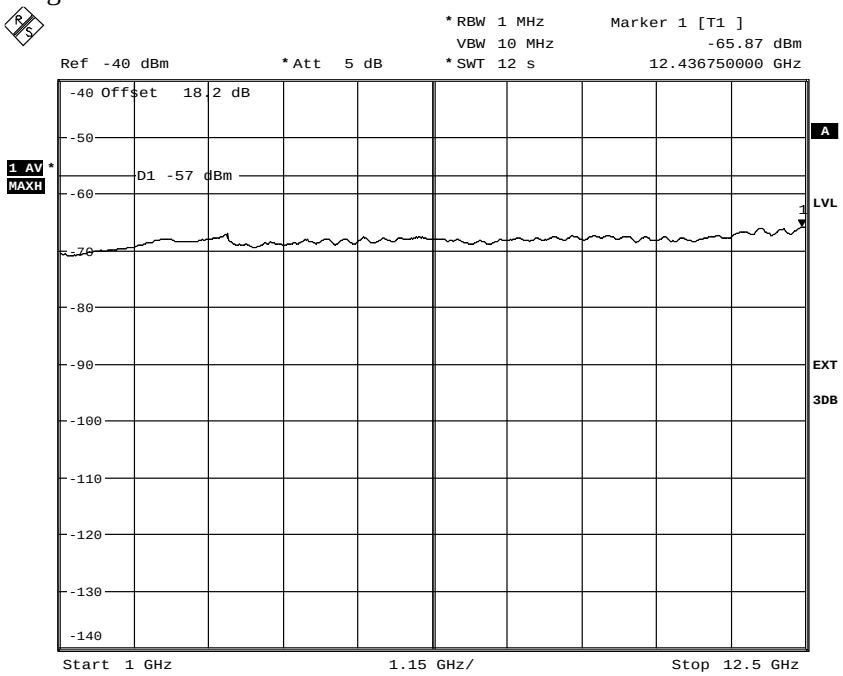
Diagram 2 b:



Date: 23.AUG.2012 09:02:54

Diagram 3 a:

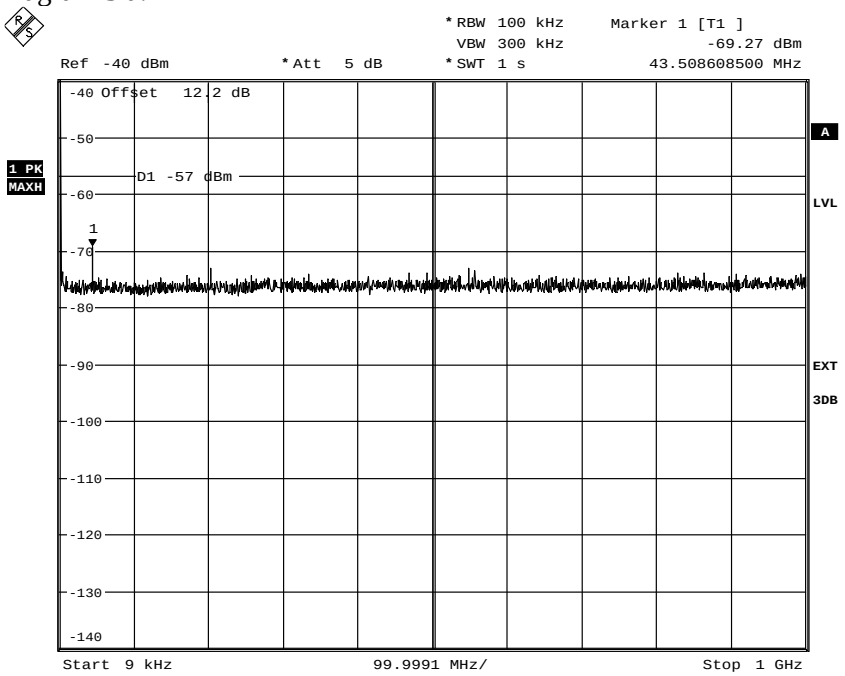


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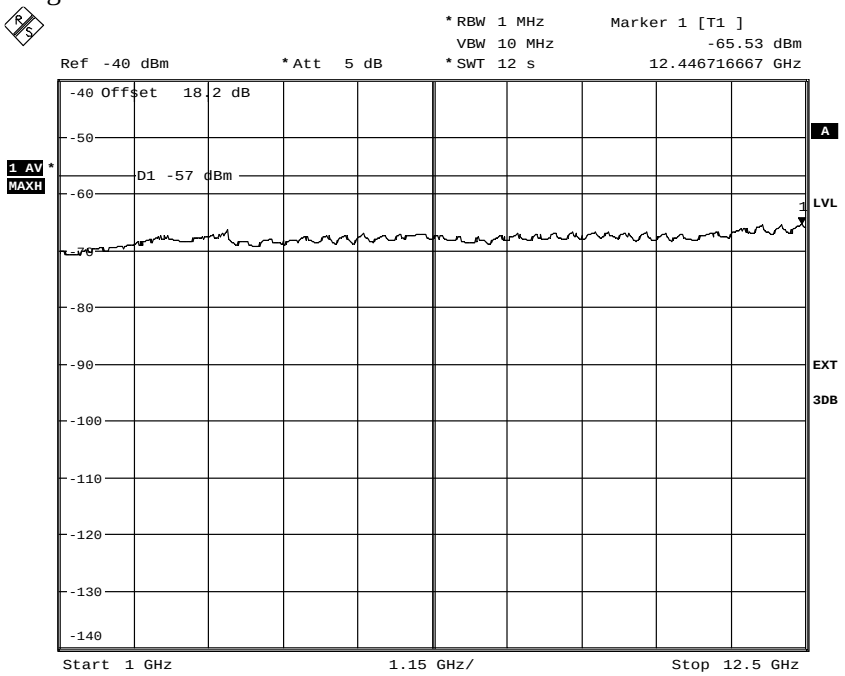
Diagram 3 b:



Date: 23.AUG.2012 07:53:57

External photos

The photos show the sample used for conducted measurements.

Front Side

Label mounted under plastic cover:

Appendix 7

Rear Side

Right side

Appendix 7

Left side

Bottom Side

Top Side