Test report no. : 215168-4

Item tested : CC1120EM-868-915

Type of equipment : Low power transceiver module 903.5 – 926.5 MHz

FCC ID : ZAT1120EM900

Client : Texas Instruments Norway AS

FCC Part 15.249
Low Power Transmitter
902-928 MHz Band

RSS-210, Issue 8
Low-Power Licence-exempt Radiocommunications devices
902 – 928 MHz Band

28 November 2012

Authorized by : .....
Frode Sveinsen
Technical Verificator

CONTENTS

1 GENERAL INFORMATION

1.1 Testhouse info

Name :	Nemko AS
Address :	Nemko Kjeller Instituttveien 6, Box 96 NO-2027 Kjeller, NORWAY
Telephone :	+47 64 84 57 00
Fax :	+47 64 84 57 05
Email:	comlab@nemko.no
FCC test firm :	994405
IC OATS :	2040D-1
Total Number of Pages:	33

1.2 Client information

Name :	Texas Instruments Norway AS
Address :	Gaustadalléen 21, NO-0349 Oslo, Norway
Telephone :	+47 22 95 85 44
Fax :	+47 22 95 85 46

Contact:

Name :	Dag Grini
Telephone :	+47 22 95 83 01
E-mail :	d.grini@ti.com

1.3 Manufacturer

Same as client

2 TEST INFORMATION

2.1 Test item

Name :	Texas Instruments
Model/version :	CC1120EM-868-915
FCC ID:	ZAT1120EM900
IC ID:	451H-1120EM900
Serial number :	0852
Hardware identity and/or version:	1.1.0
Software identity and/or version :	-
Frequency Range :	903.5 – 926.5 MHz
Number of Channels :	3
Operating Modes :	TX and RX
Type of Modulation :	2-GFSK
Data rate:	38.4kbit/s
User Frequency Adjustment :	None, Software controlled
Conducted Output Power :	0.12 mW
Type of Power Supply :	Battery (tested with 2 AA batteries)
Antenna Connector :	SMA female
Antenna type:	Pulse W5017, rod antenna
Antenna Diversity Supported :	None

Description of test item

The CC1120EM-868-915 is an RF-transceiver module, which is hosted on a TrxEB motherboard during testing..

2.2 Test environment

2.2.1 Normal test condition

Temperature:	20 – 21 °C
Relative humidity:	29 – 43 %
Normal test voltage:	3.3 V DC

The values are the limit registered during the test period.

2.3 Test period

Item received date:	2012-10-20
Test period :	from 2012-10-26 -2012-11-02

3 TEST REPORT SUMMARY

3.1 General

Manufacturer: Texas Instruments

Model No.: CC1120EM-868-915

All measurements are traceable to national standards.

The tests were conducted for the purpose of demonstrating compliance with FCC CFR 47 Part 15.249 and Industry Canada RSS-210, Issue 8 and RSS-GEN, Issue 3.

Radiated tests were conducted in accordance with ANSI C63.4-2003 and ANSI C63.10-2009. The radiated tests were made in a semi-anechoic chamber at measuring distances of 3 and 10 meters.

☒ New Submission ☐ Production Unit

☐ Class II Permissive Change ☒ Pre-production Unit

DXT Equipment Code ☐ Family Listing

THIS TEST REPORT RELATES ONLY TO THE ITEM (S) TESTED.

Deviations from, additions to, or exclusions from the test specifications are described in "Summary of Test Data".

TEST REPORT #: 215168-4

TESTED BY: _____ DATE: 2012-11-26

Thomas Danglé, Test engineer

3.2 Test summary

Name of test	FCC Part 15 reference	RSS-210 Issue 8 & RSS-GEN Issue 3	Result
Supply Voltage Variations	15.31(e)	N/A	Complies [1]
Antenna Requirement	15.203	7.1.4 (RSS-GEN)	N/A [2]
Power-line Conducted Emission	15.207(c)	7.2.2 (RSS-GEN)	N/A [1]
Occupied Bandwidth	N/A	4.6.1 (RSS-GEN)	-
Peak Power Output	15.249(a)(c)	A2.9	Complies
Band edge Emissions	15.249(d)	A.2.9	Complies
Spurious Emissions (Radiated)	15.249 (e) 15.209	A2.9 4.9 (RSS-GEN)	Complies

[1] EUT is battery powered.

[2] No antenna included in this test report

RSS Gen issue 3 covers section 7 & 6

RSS 210 issue 8 covers section A2.9

3.3 Description of modification for modification filing

Not applicable.

3.4 Comments

The channels are selected by pressing a button on the mother board, TrxEB. The measurements are performed at channels near top , near middle and near bottom . And the output level is set to maximum in the software. The EUT complies at these channels.

The radiated measurements are tested on three axis.

Two fully charged AA batteries are used.

3.5 Family list rationale

Not Applicable.

4 TEST RESULTS

4.1 Occupied bandwidth

Para. No.: RSS-Gen 4.6.1

Test Performed By: Thomas Danglé	**Date of Test: 02-Nov-2012**

Test Results: Complies

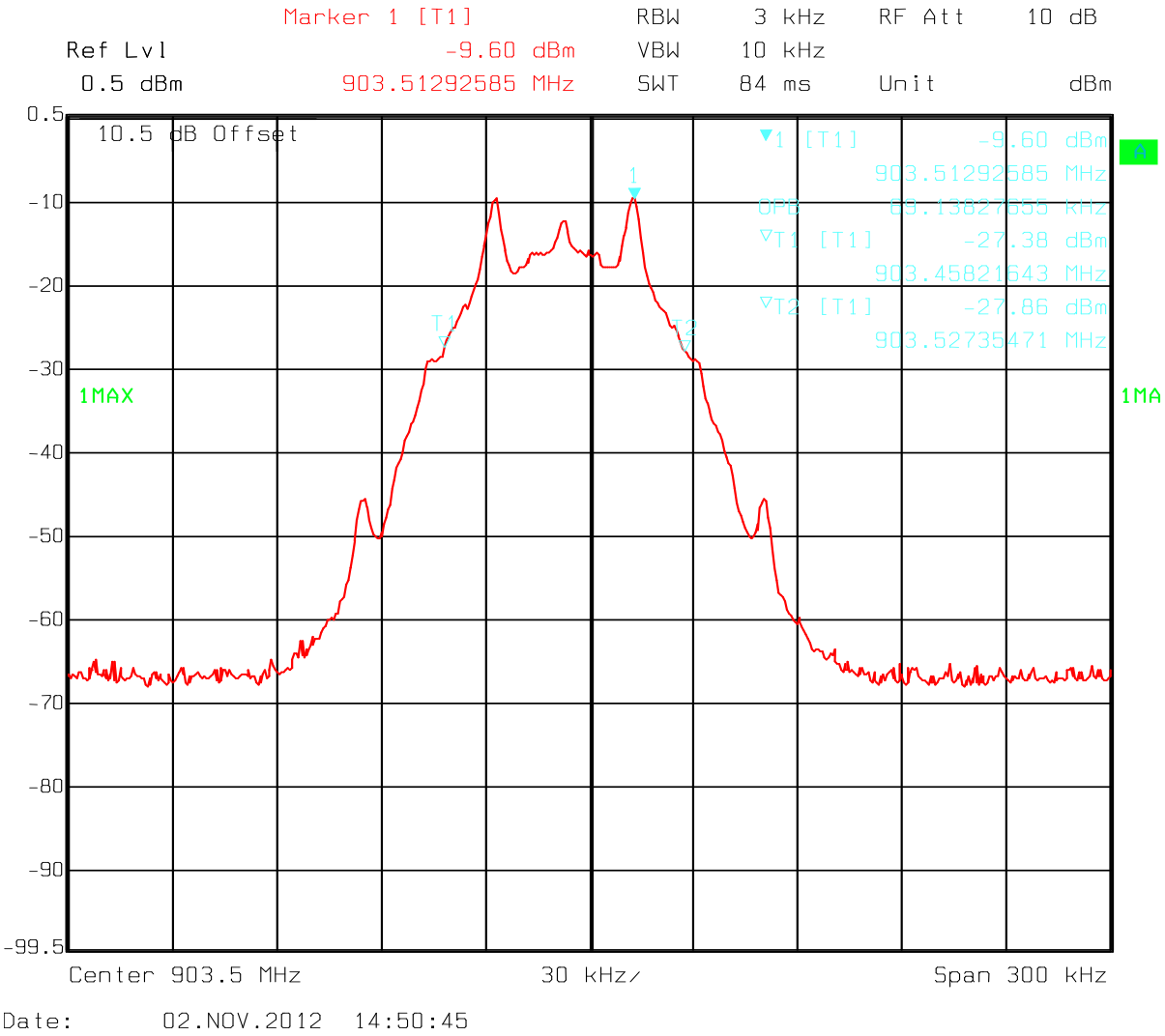
Measurement Data:

Data Rate	**OBW (kHz)**		
	903.500MHz	**915.000MHz**	**926.500MHz**
38.4kbps	69.14	69.14	69.14

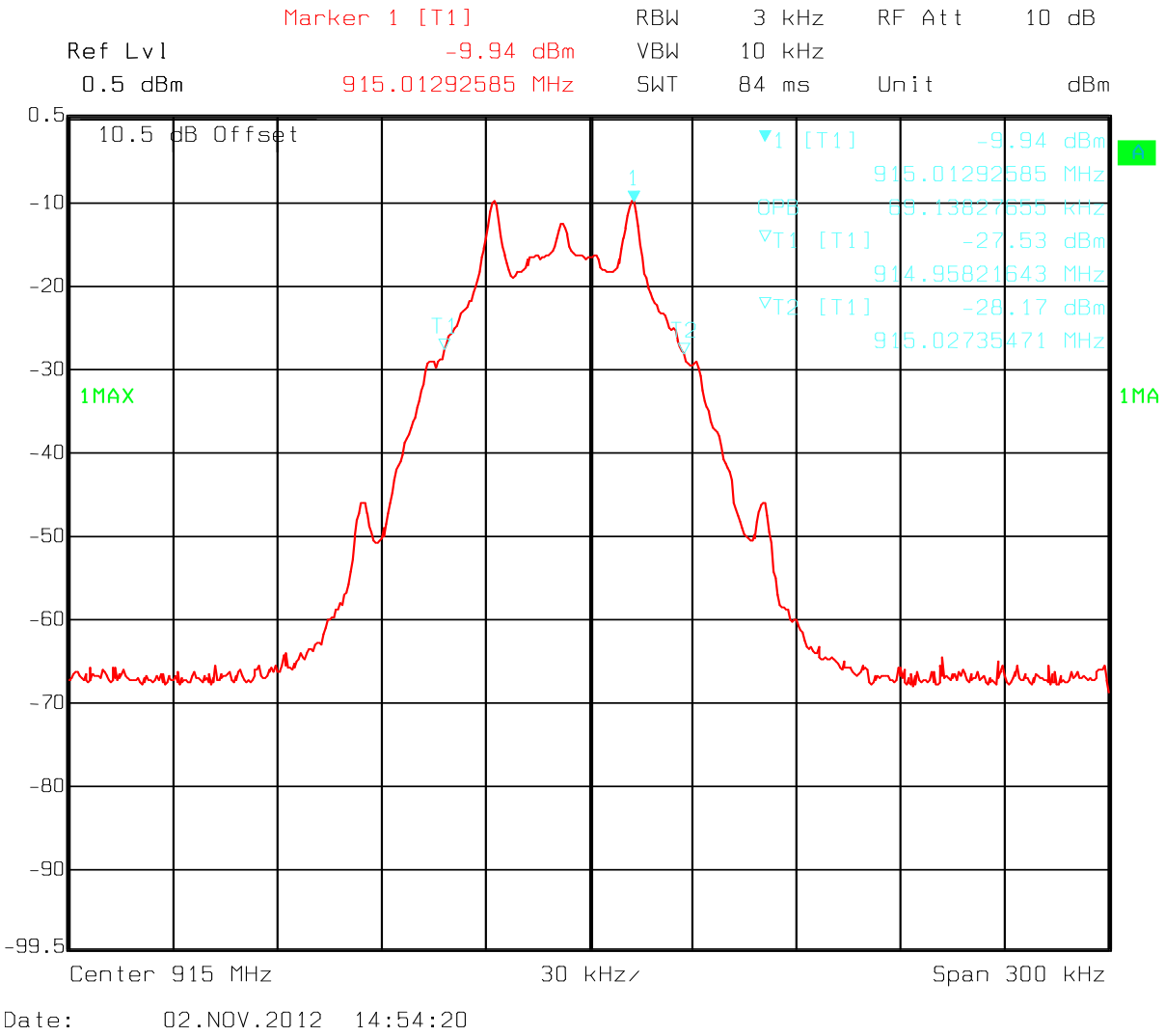
Measured Conducted

Requirements:

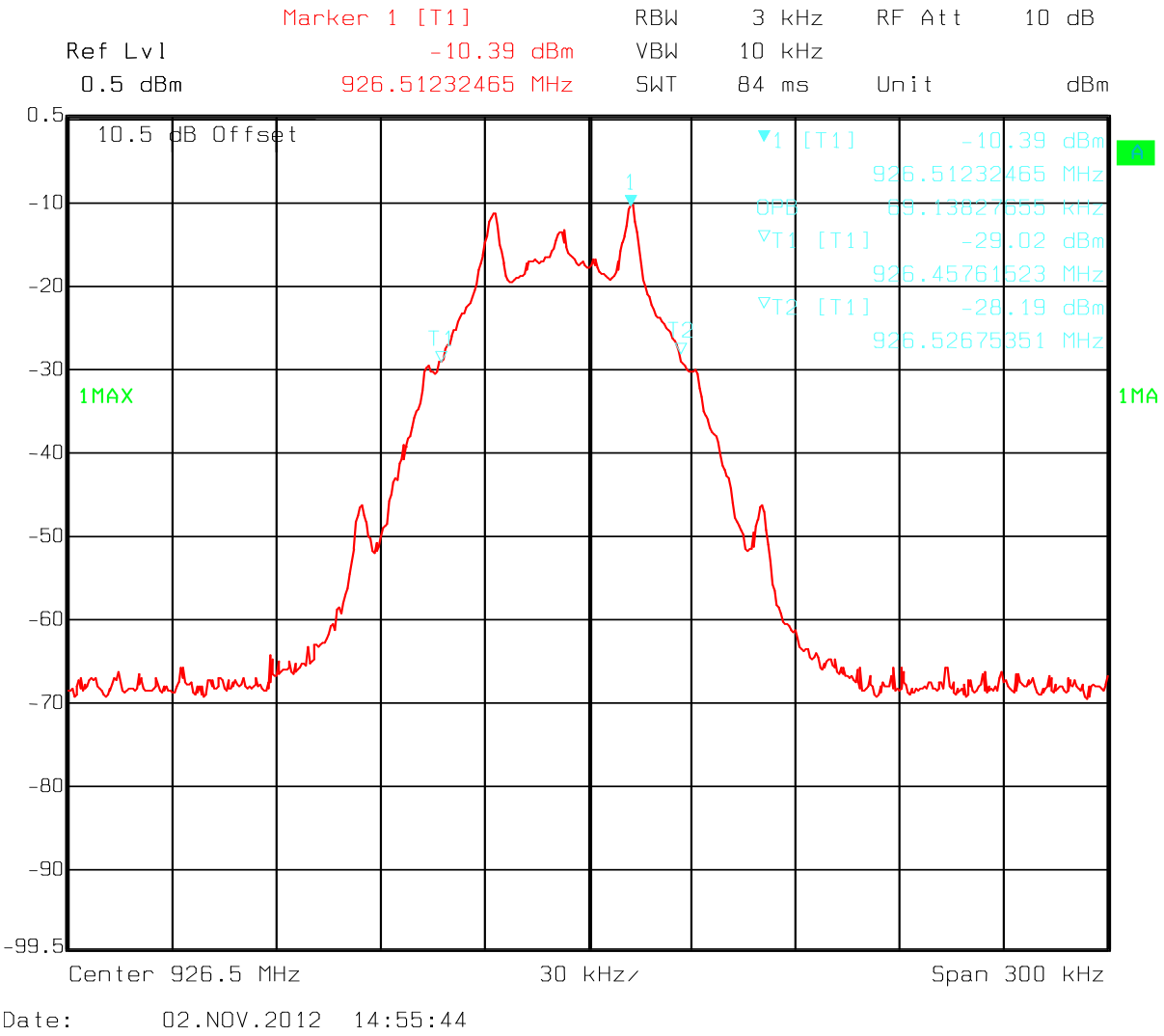
For information only



903.5 MHz – OBW – 69.14 kHz – Conducted measurement



915 MHz – OBW – 69.14 kHz – Conducted measurement



926.5 MHz – OBW – 69.14 kHz – Conducted measurement

4.2 Peak power output

Para. No.: 15.249 (a) / A2.9

Test Performed By: Thomas Danglé	**Date of Test: 26-Oct and 02-Nov-2012**

Test Results: Complies

Measurement data:

Maximum conducted peak output power

RF channel	**903.5MHz**	**915MHz**	**926.5MHz**
@ 38.4kbps, Measured value (dBm)	-9.06	-9.33	-9.77

Maximum field strength

RF channel	**903.5MHz**	**915MHz**	**926.5MHz**
VP: Measured value (dBµV/m)	91.70	91.41	90.07
HP: Measured value (dBµV/m)	87.25	87.77	84.72

Calculated erp & antenna gain

RF channel	**903.5MHz**	**915MHz**	**926.5MHz**
Radiated power (mW)	0.27	0.25	0.19
Radiated e.r.p. (dBm)	-5.68	-5.97	-7.31
Antenna gain dBd	3.38	3.36	2.46

Radiated measurements are performed at 3 m distance.

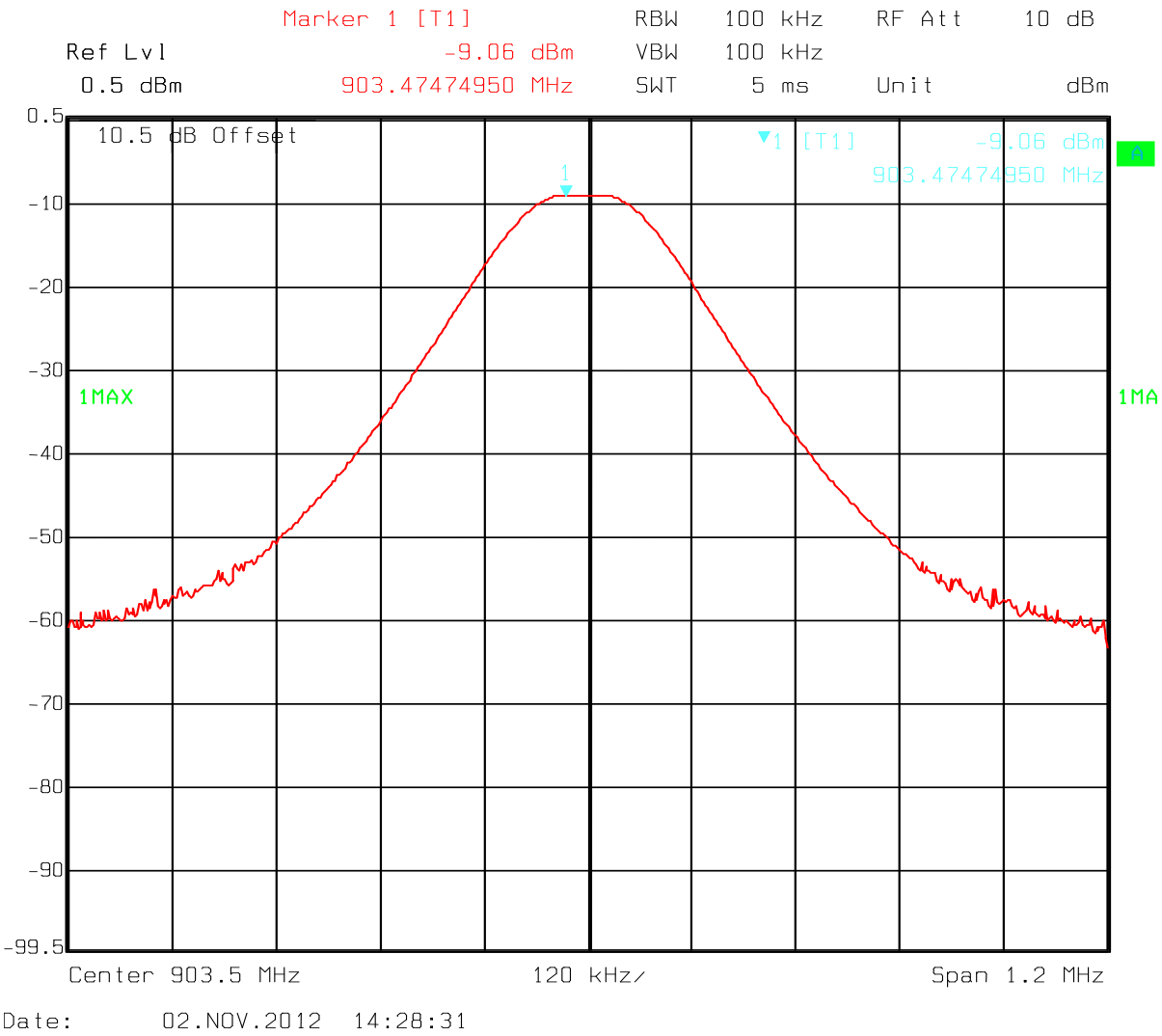
Radiated Power is calculated from measured field strength by the formulas in KDB 412172 D01 Determining ERP and EIRP v01.

Detachable antenna?	☒ Yes	☐ No
If detachable, is the antenna connector non-standard?	☒ Yes	☐ No
SMA connector		

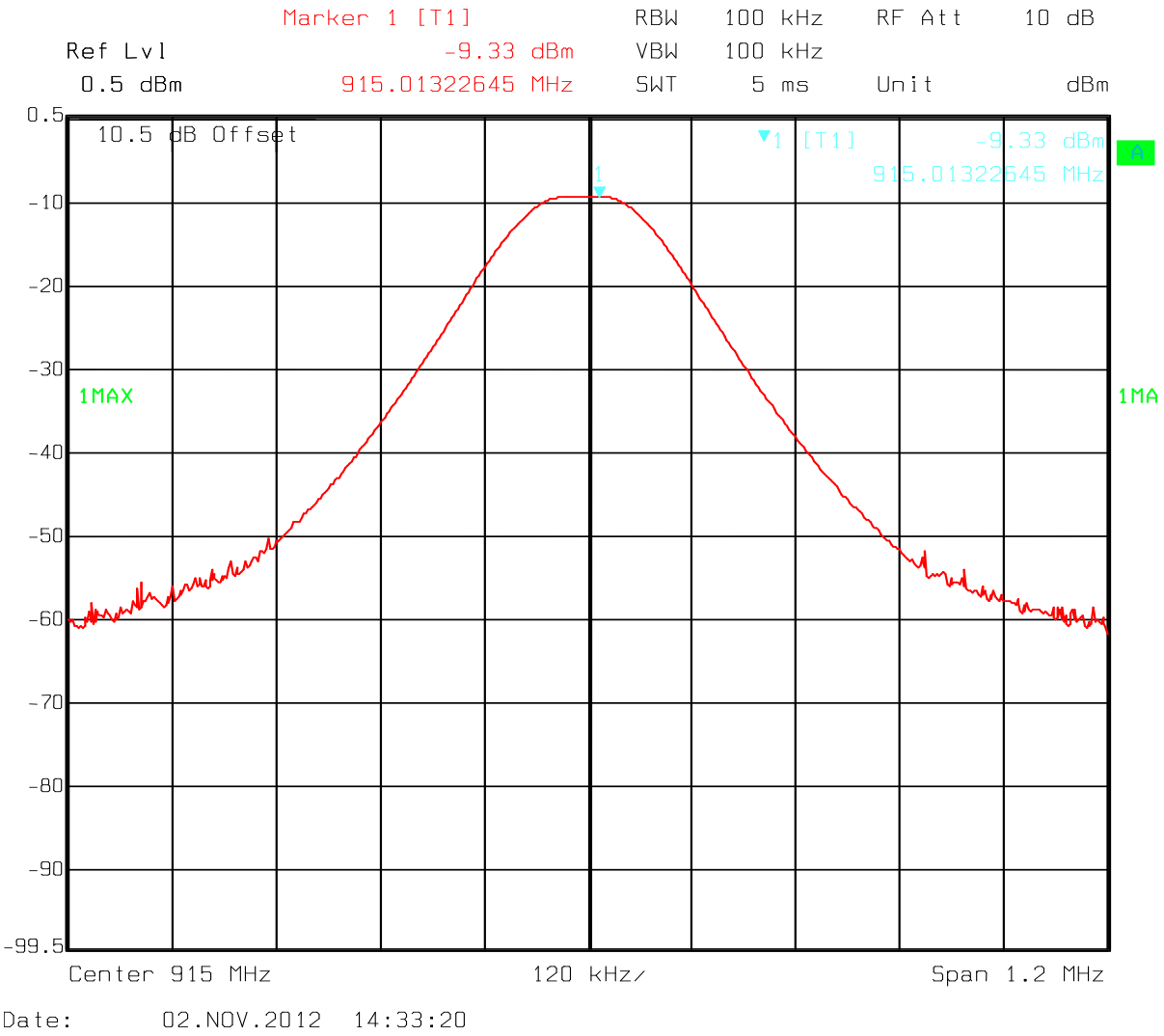
New batteries are used.

Requirements:

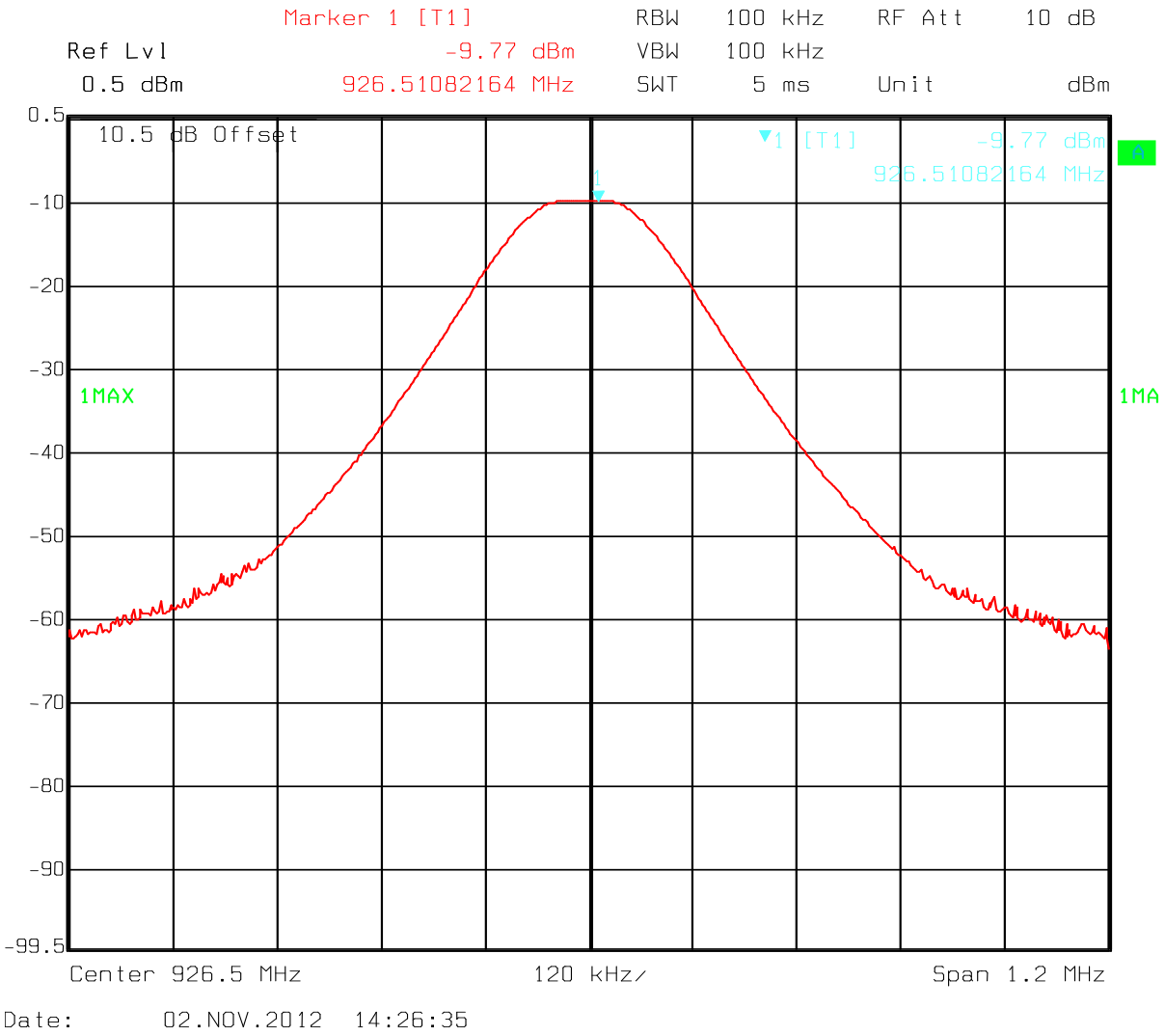
The maximum peak output power shall be ≤ 94dBµV/m



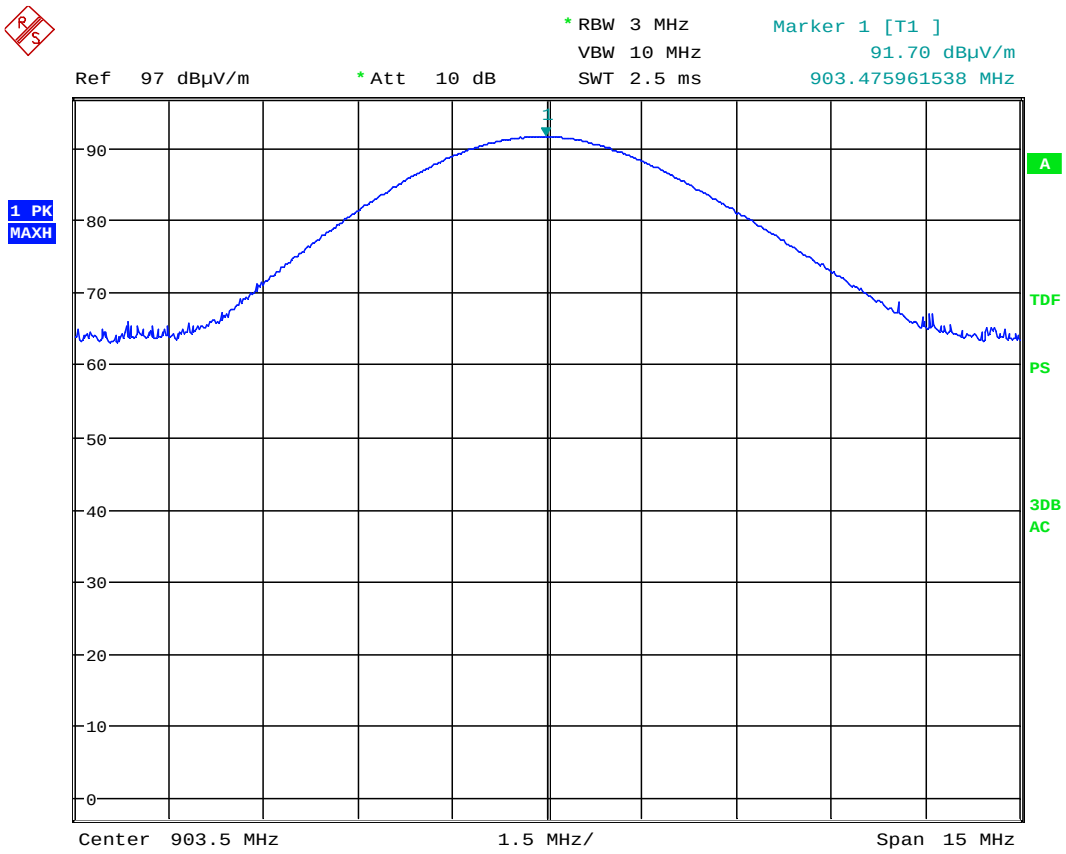
Conducted power – 903.5MHz



Conducted power – 915MHz

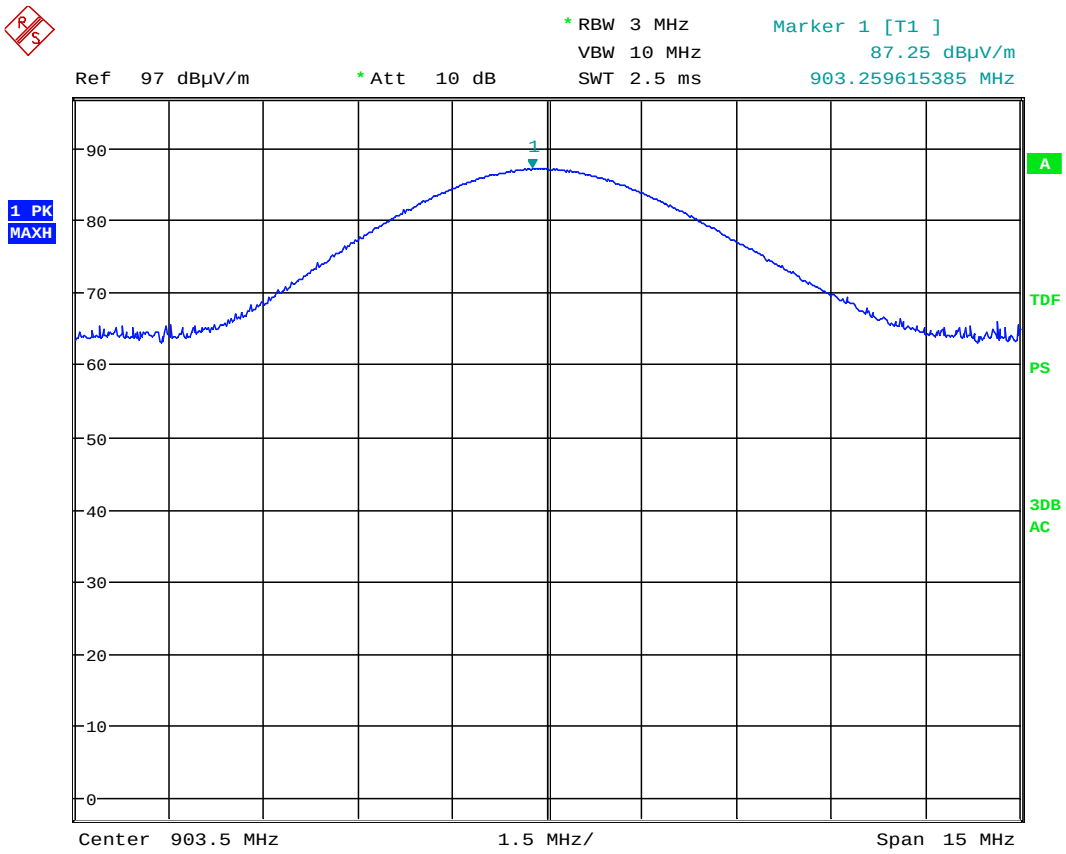


Conducted power – 926.5MHz



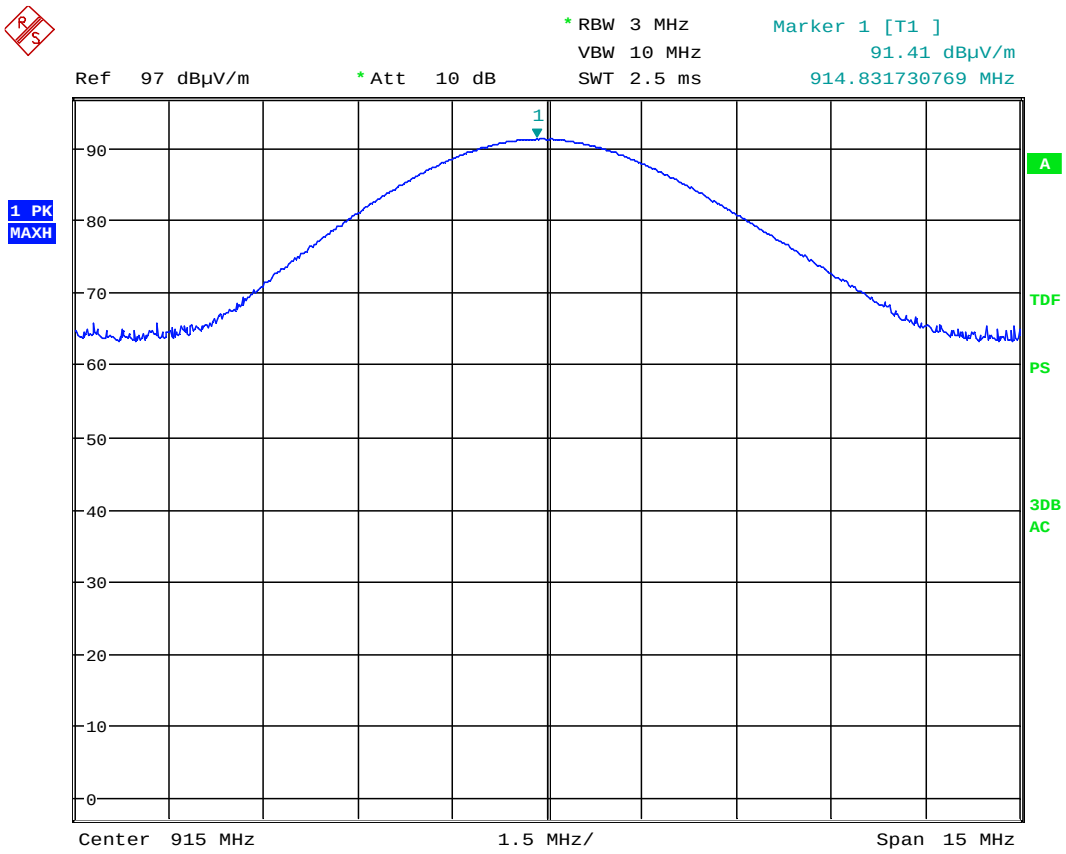
Date: 26.OCT.2012 17:03:52

VP: 903.5MHz – Field strength



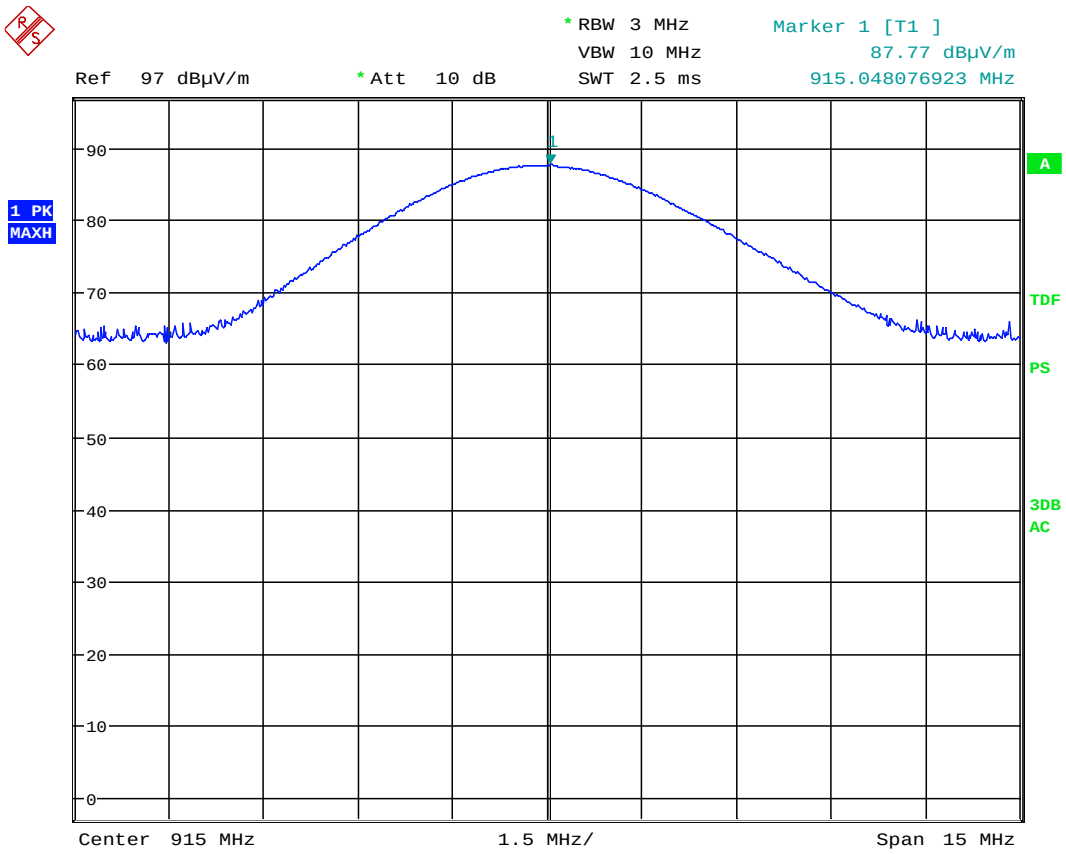
Date: 26.OCT.2012 17:02:12

HP: 903.5MHz – Field strength



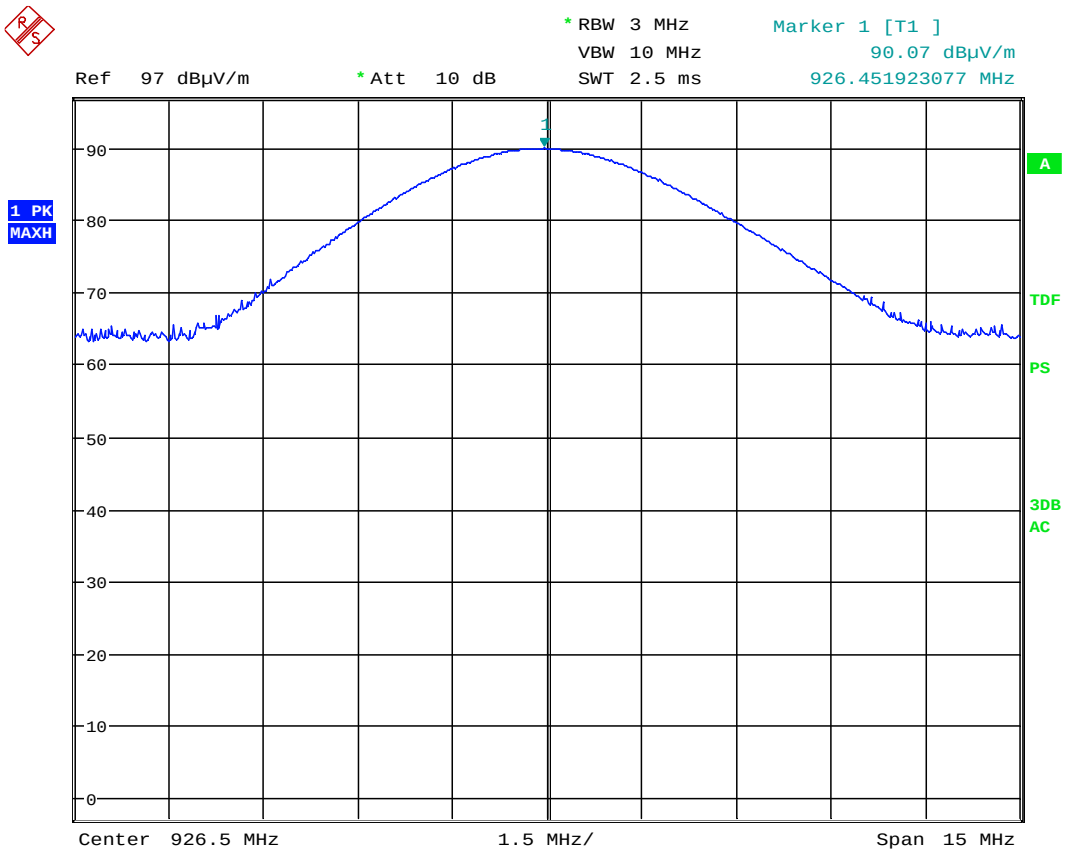
Date: 26.OCT.2012 17:16:01

VP: 915MHz – Field strength



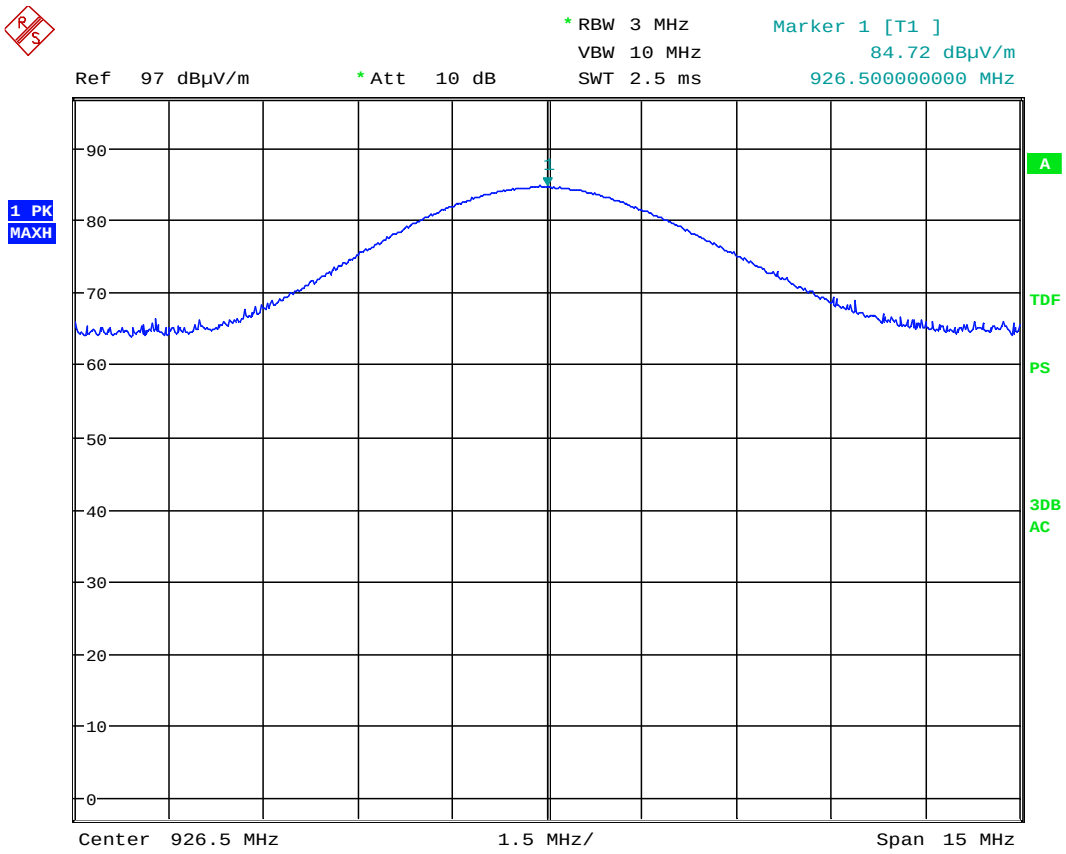
Date: 26.OCT.2012 17:14:31

HP: 915MHz – Field strength



Date: 26.OCT.2012 17:23:50

VP: 926.5MHz – Field strength



Date: 26.OCT.2012 17:30:16

HP: 926.5MHz – Field strength

4.3 Spurious emissions (radiated)

Para. No.: 15.209 / 15.249 (e) / A2.9 / 4.9

Test Performed By: Thomas Danglé	**Date of Test: 26-Oct and 29-Oct -2012**

Test Results: Complies

Measurement Data:

Radiated Emissions with antenna, 1-10 GHz

1-10 GHz measured at a distance of 3m.

Measured with Peak Detector:

Frequency	Dist. corr. factor	Field strength, Peak	Duty cycle corr. factor	Limit	Margin
GHz	dB	dBµV/m	dB	dBµV/m	dB
1 - 3	0	<46	-	74	>28
3 – 8.5	0	<52	-	74	>22
8.5 - 10	0	<53	-	74	>21

Average Detector:

Frequency	Dist. corr. factor	Field strength, AV	Duty cycle corr. factor	Limit	Margin
GHz	dB	dBµV/m	dB	dBµV/m	dB
1 - 3	0	<46	-	54	>8
3 – 8.5	0	<52	-	54	>2
8.5 - 10	0	<53	-	54	>1

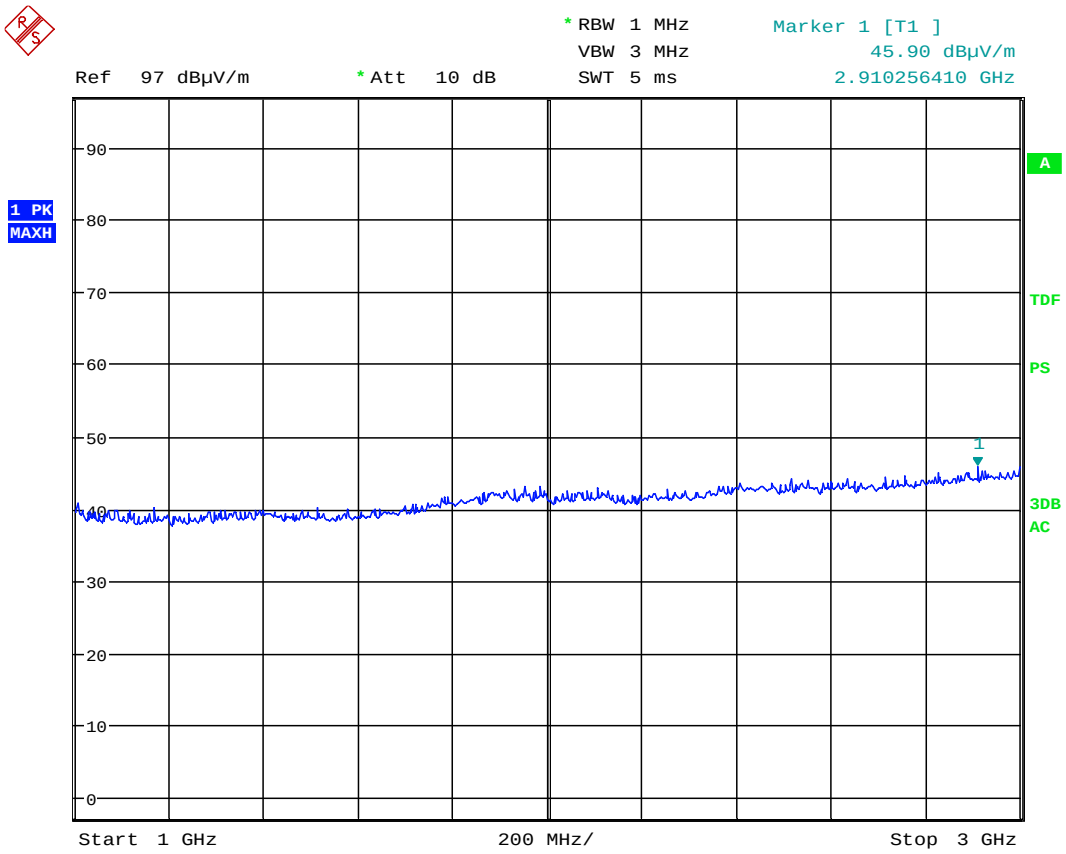
The maximum is observed in Vertical polarization

The test sample was transmitting with 100% duty cycle for all tests.

Antenna factor, amplifier gain and cable loss are included in spectrum analyzer "Transducer factor".

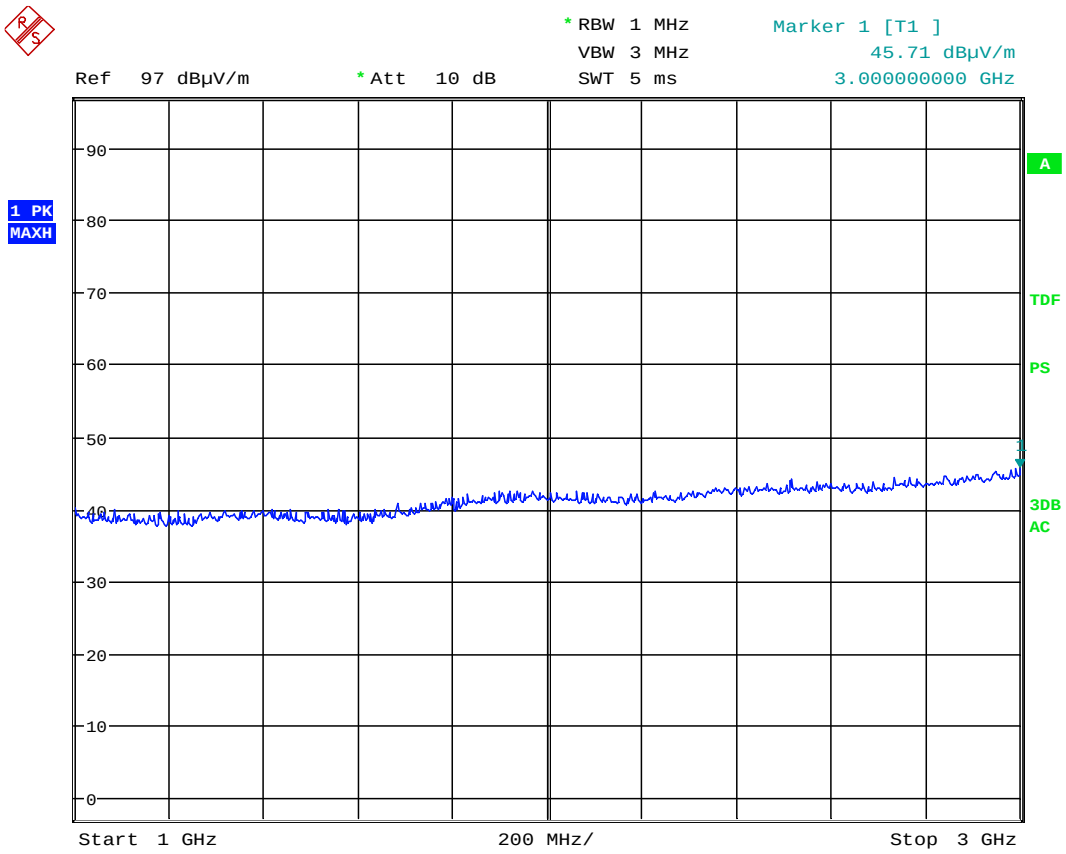
Requirement:

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.



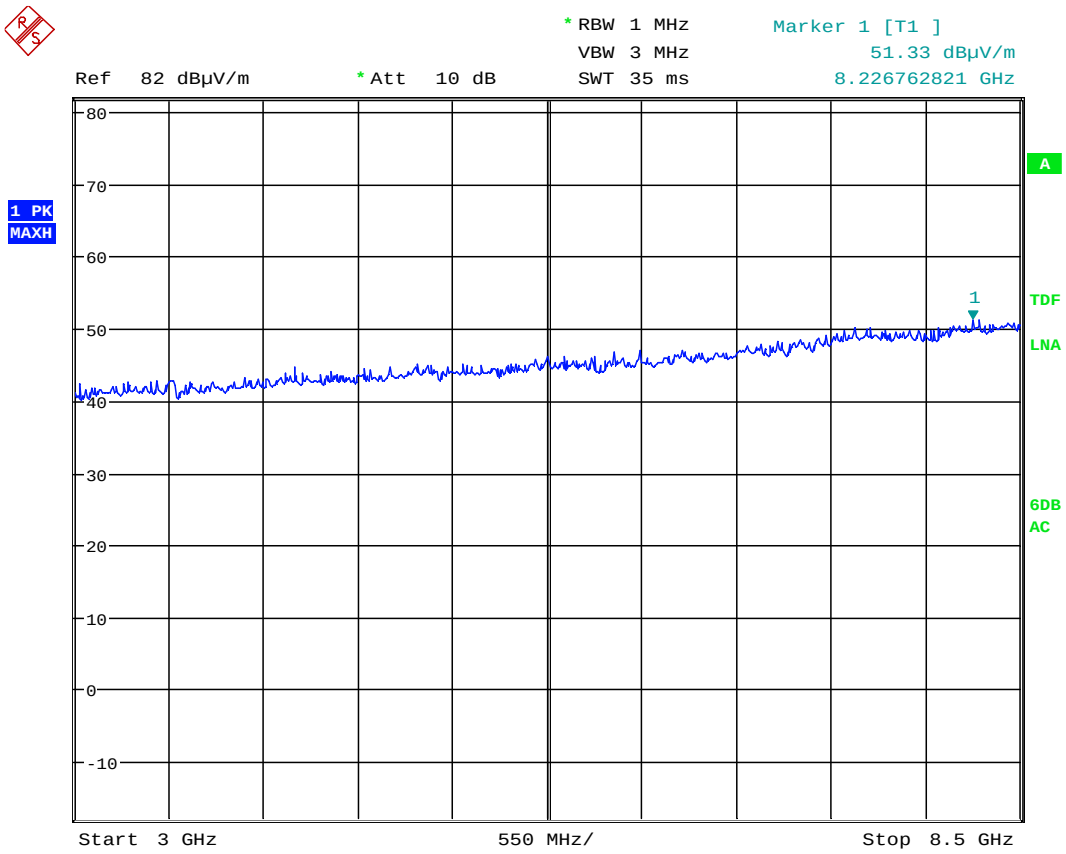
Date: 26.OCT.2012 18:05:31

VP: pre-view scan 1 - 3 GHz –Pk with HP-filter



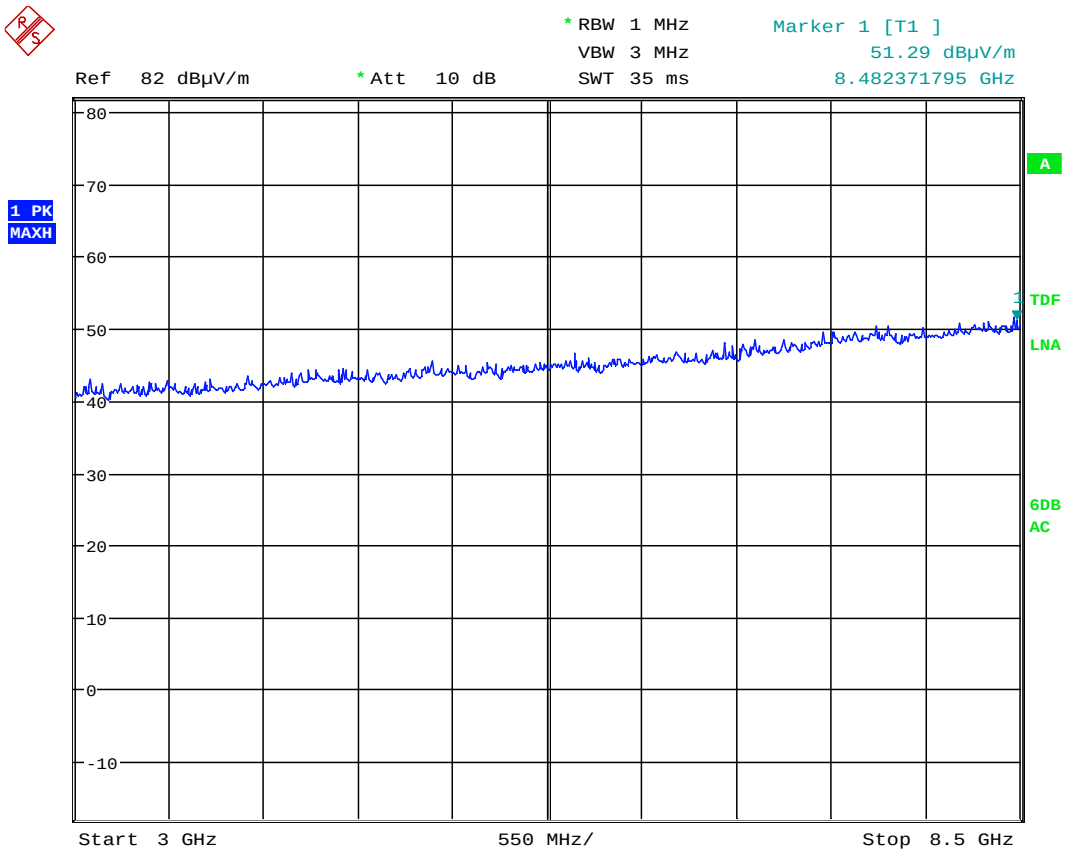
Date: 26.OCT.2012 18:09:26

HP: pre-view scan 1 - 3 GHz –Pk with HP-filter



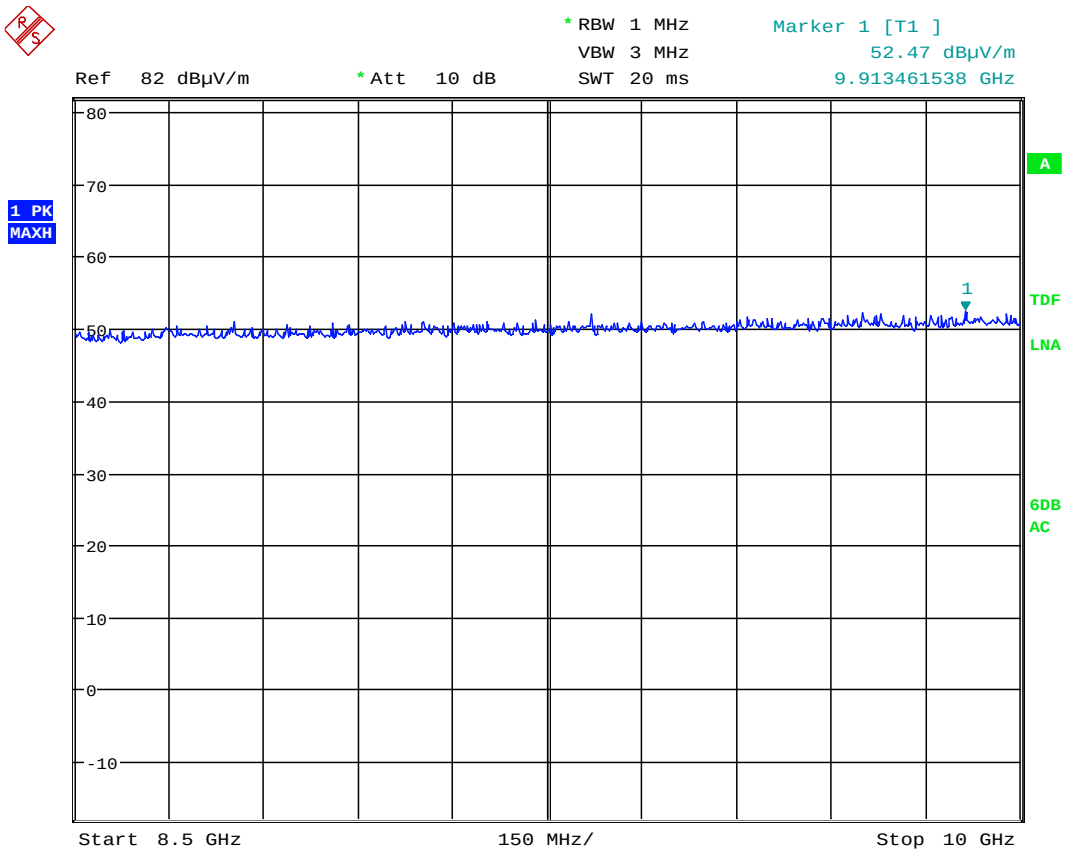
Date: 26.OCT.2012 18:17:57

VP: pre-view scan 3 - 8.5 GHz –Pk with HP-filter



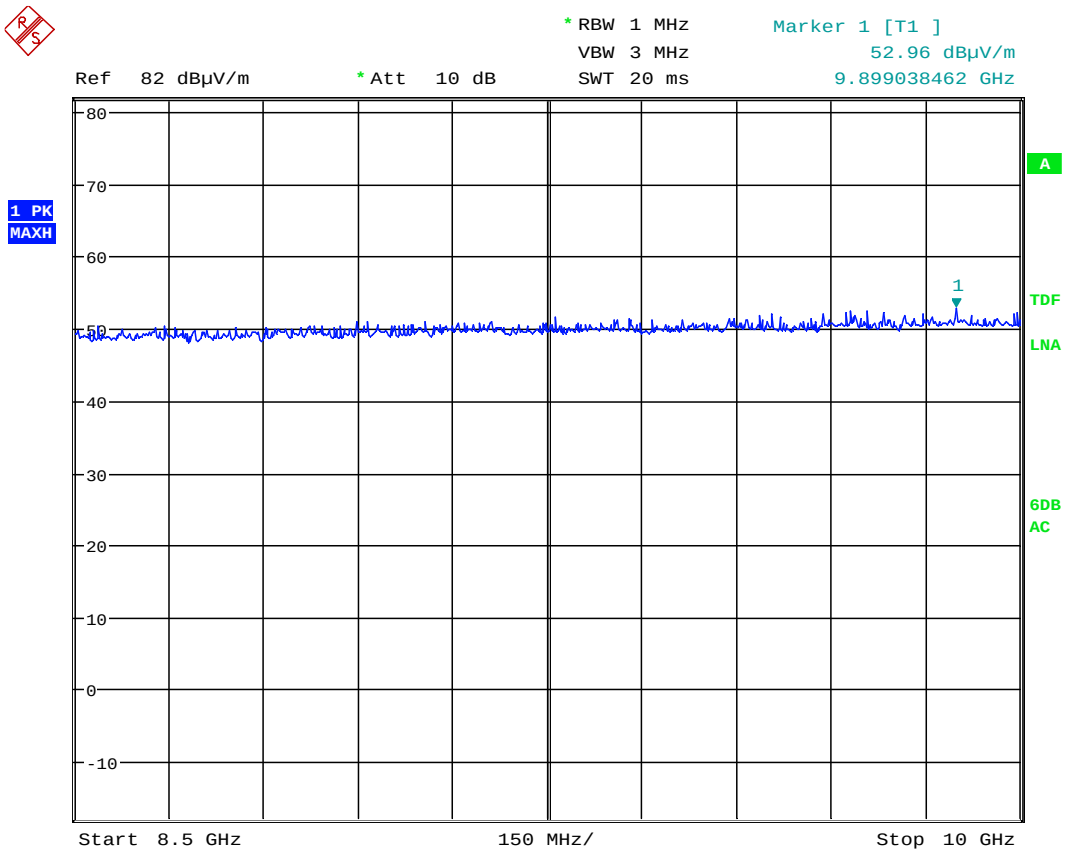
Date: 26.OCT.2012 18:19:37

HP: pre-view scan 3 - 8.5 GHz –Pk with HP-filter



Date: 26.OCT.2012 18:31:46

VP: pre-view scan 8.5 - 10 GHz –Pk with HP-filter



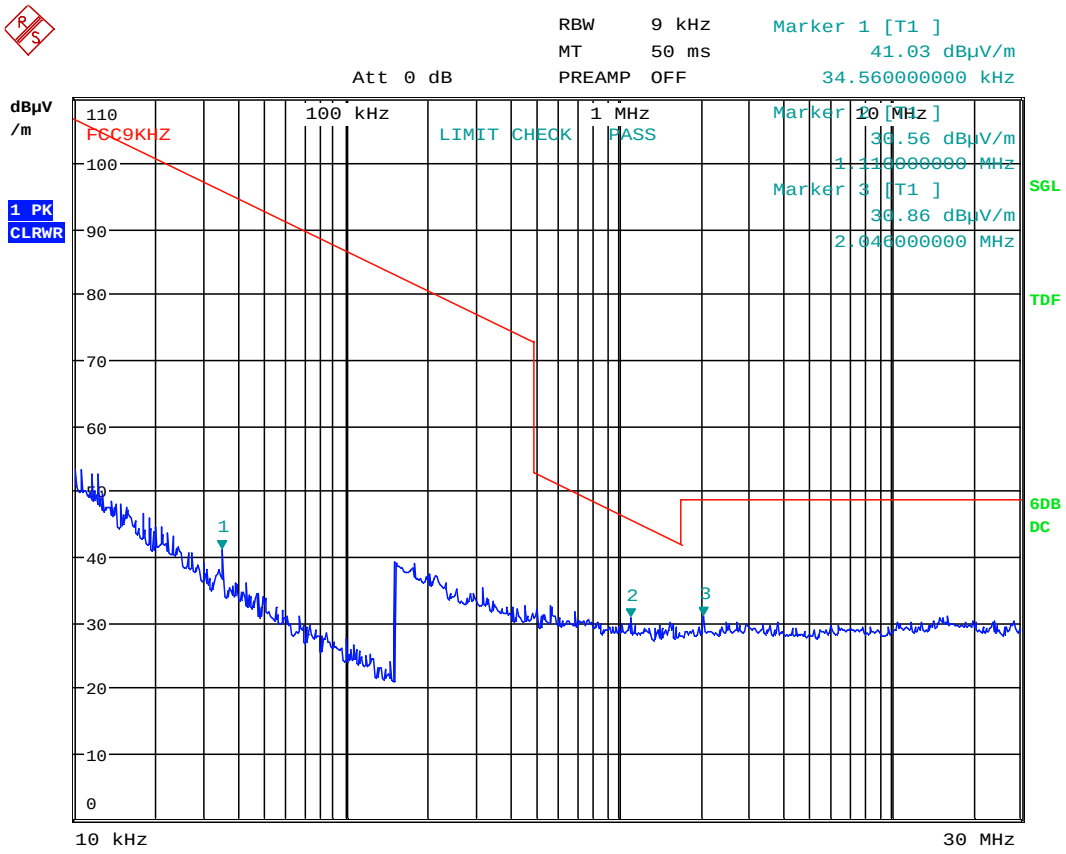
Date: 26.OCT.2012 18:34:12

HP: pre-view scan 8.5 - 10 GHz –Pk with HP-filter

Radiated emissions 9kHz – 30 MHz.

Detector: Peak

Measuring distance 10 m.



Date: 29.OCT.2012 08:46:39

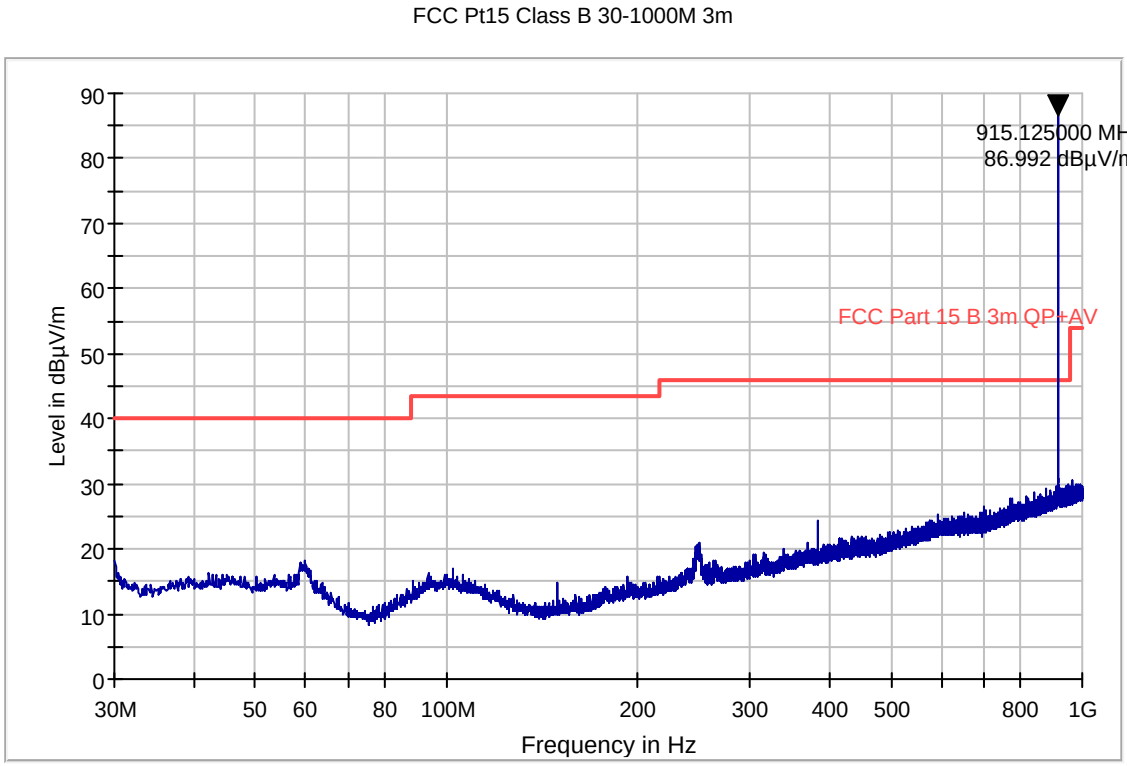
Radiated emissions 30 – 1000 MHz.

Detector: Peak

Measuring distance 3 m.

The graph shows peak scan and highest values. Since there is no spurious found no QP values are measured.

FCC Pt15 Class B 30-1000 MHz 3m



The marker shows the transmitter carrier at channel 915 MHz

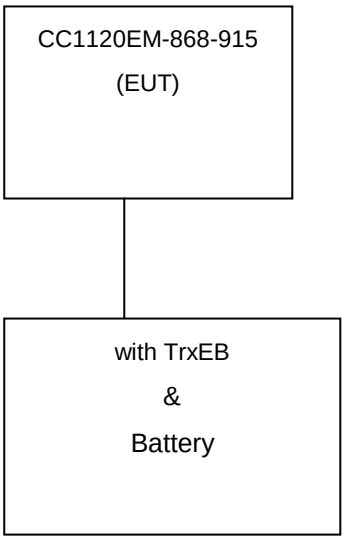
5 LIST OF TEST EQUIPMENT

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment and ancillaries are identified (numbered) by the Test Laboratory.

No.	Model number	Description	Manufacturer	Ref. no.	Cal. date	Cal. Due
1.	ESU40	EMI Receiver	Rohde & Schwarz	LR1639	2010.06	2013.06
2.	3115	Antenna horn	EMCO	LR 1330	2010.08.05	2013.08.05
3.	6810.17A	Attenuator	Suhner	LR 1185	2011.10.18	2013.10.18
4.	87V	Multimeter, Digital	Fluke	LR1599	2010.12.15	2012.12.15
5.	8449B	Amplifier	Hewlett Packard	LR 1322	2012.09.20	2013.09.20
6.	HFH2-Z2	Antenna loop	Rohde and Schwarz	LR 285	2010.10.08	2013.10.08
7.	10855A	Amplifier	Hewlett Packard	LR 1445	2012.09.20	2013.09.20
8.	HL223	Antenna log.per	Rohde & Schwarz	LR 1261	2010.05.09	2013.05.09
9.	HK116	Antenna biconic	Rohde & Schwarz	LR 1260	2010.05.09	2013.05.09
10.	LNA6900	Amplifier, low noise	Teseq	LR1593	2011.11.24	2013.11.24
11.	VULB9163	Antenna Trilog	Schwarzbeck	LR1616	2011.08.29	2013.08.29
12.	6HC 1500-18000	HP filter	Trithlic	LR1612	Cal b4 use	
13.	FA210A1010003030	Microwave cable	Rosenberger	LR1566	Cal b4 use	
14.	FSEK30	Spectrum analyzer	Rohde & Schwarz	LR1337	2010.12.15	2012.12.15

6 BLOCK DIAGRAM

6.1 System set up for radiated measurements



Test equipment: 1- 12

6.2 Test site radiated emission