

Test Report

Product	Wireless Alarm Transceiver Module	
Name and address of the applicant	Ascom Sweden AB Grimbodalen 2, P.O. Box 8783, Goteborg, SE-40276, Sweden	
Name and address of the manufacturer	Ascom Sweden AB Grimbodalen 2, P.O. Box 8783, Goteborg, SE-40276, Sweden	
Model	NIRX-1AB	
Rating	5.0 Vdc	
Trademark	Ascom	
Serial number	/	
Additional information	900MHz Transceiver	
Tested according to	FCC Part 15.249 Low Power Transmitter. 902 – 928MHz band Industry Canada RSS-210, Issue 8 Low Power Licence-Exempt Radiocommunications Devices 902 – 928MHz band	
Order number	251949	
Tested in period	2014.02.18 – 2014.02.19	
Issue date	2014.05.16	
Name and address of the testing laboratory	 Instituttveien 6 Kjeller, Norway FCC No: 994405 IC OATS: 2040D-1 TEL: (+47) 22 96 03 30 FAX: (+47) 22 96 05 50	
 Prepared by [G.Suhanthakumar]  Approved by [Frode Sveinsen]		
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1 TEST INFORMATION

1.1 Test item

Name :	Ascom
Model/version :	NIRX-1AB
FCC ID:	BXZNIRX
IC ID:	3724B-NIRX
Serial number :	-
Hardware identity and/or version:	-
Software identity and/or version :	-
Frequency Range :	916.2125 – 920.2125 MHz
Number of Channels :	11
Operating Modes :	TX and RX
Type of Modulation :	4-GFSK
Data rate:	19.2 kbit/s
User Frequency Adjustment :	None, Software controlled
Cal. Conducted Output Power :	0.374 mW
Type of Power Supply :	5Vdc
Antenna Connector :	N/A
Antenna type:	PCB antenna
Declared antenna gain dBd:	0
Antenna Diversity Supported :	None

Description of test item

The NIRX is a 900 MHz radio transceiver module that is intended to be mounted inside other products for wireless alarm handling. It has its own on-board microcontroller.

1.2 Test environment

1.2.1 Normal test condition

Temperature:	20.6 – 21.2 °C
Relative humidity:	40 - 42 %
Normal test voltage:	5.0 Vdc

The values are the limit registered during the test period.

1.3 Test period

Item received date:	2014-02-18
Test period :	from 2014-02-18 - 2014-02-19

2 TEST REPORT SUMMARY

2.1 General

Manufacturer: Ascom
Model No.: NIRX

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 KDB 558074 D01 DTS Measurement Guidance v03r01. 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 APPLIES ONLY TO THE ITEM(S) AND CONFIGURATIONS TESTED.

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

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2.2 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
Antenna Requirement	15.203	7.1.4 (RSS-GEN)	N/A ¹
Power-line Conducted Emission	15.207(c)	7.2.2 (RSS-GEN)	Complies
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 PCB antenna only

RSS Gen issue 3 covers section 7 & 6

RSS 210 issue 8 covers section A2.9

2.3 Description of modification for modification filing

Not applicable.

2.4 Comments

The channels were selected with the use of dedicated test software from the manufacturer.

The radiated measurements are tested on three axis.

2.5 Family list rationale

Not Applicable.

3 TEST RESULTS

3.1 Power Line Conducted Emissions

Para. No.: 15.207 (a)

Test Performed By: G.Suhandhakumar

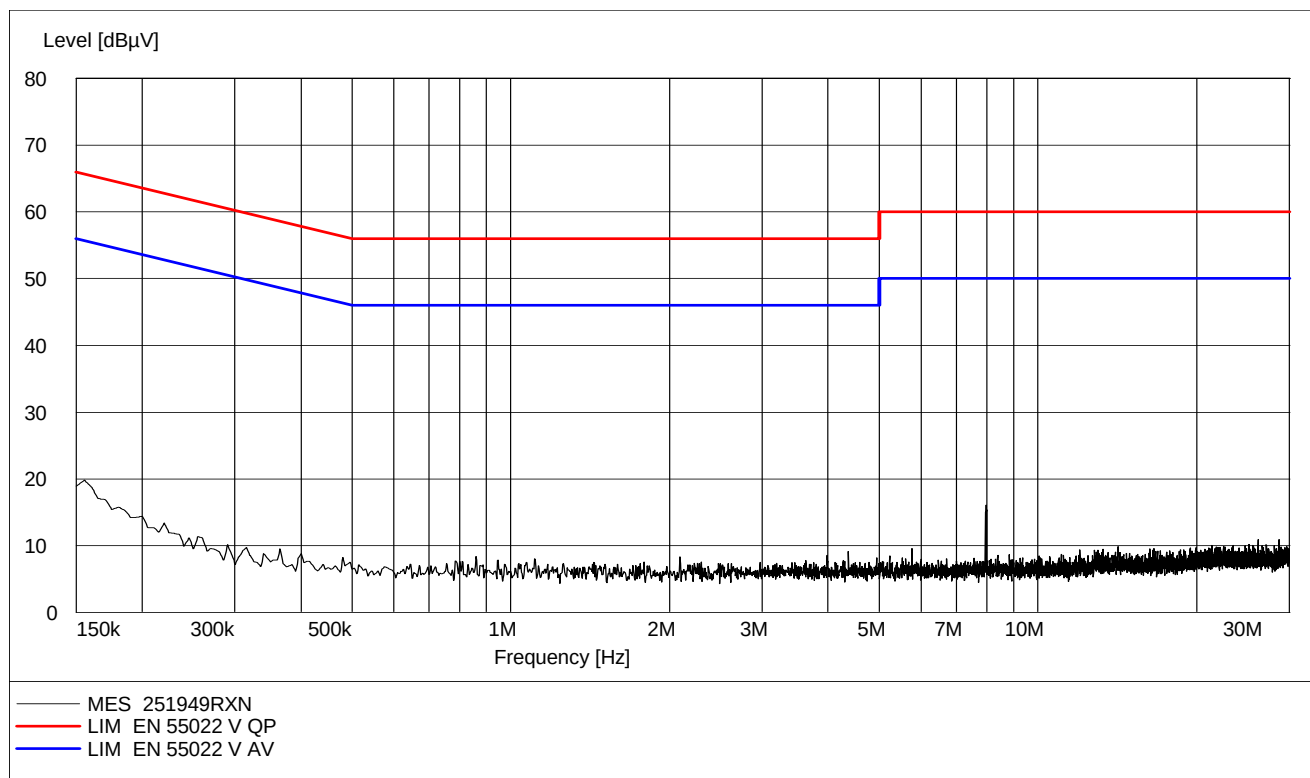
Date of Test: 2014.02.19

Measurement procedure: ANSI C63.4-2003 using 50 μ H/50 ohms LISN.

Test Results: Complies

Measurement Data: See attached graph, (Peak detector).

Measured with Oltronix power supply type B32-10R , 5Vdc



3.2 Transmitter Frequency Stability

Para. No.: 15.31(m)/7.2.4

Test Performed By: G.Suwanthakumar

Date of Test: 18.02.2014

Measurement Data:

Temperature	Channel nr.	Given Frequency (MHz)	Measured value (MHz)	Deviation (Hz)
20 ° C	-	916.2125	916.212660	160
	-	918.2125	918.212740	240
	-	920.2125	920.212740	240

Comment: Reported for information only. There are no requirements to frequency tolerance for low power devices in the 902-928 MHz band certified to 15.249 or RSS 210

3.3 20 dB Bandwidth

Para. No.: RSS-Gen

Test Performed By: G.Suwanthakumar

Date of Test: 2014.02.18

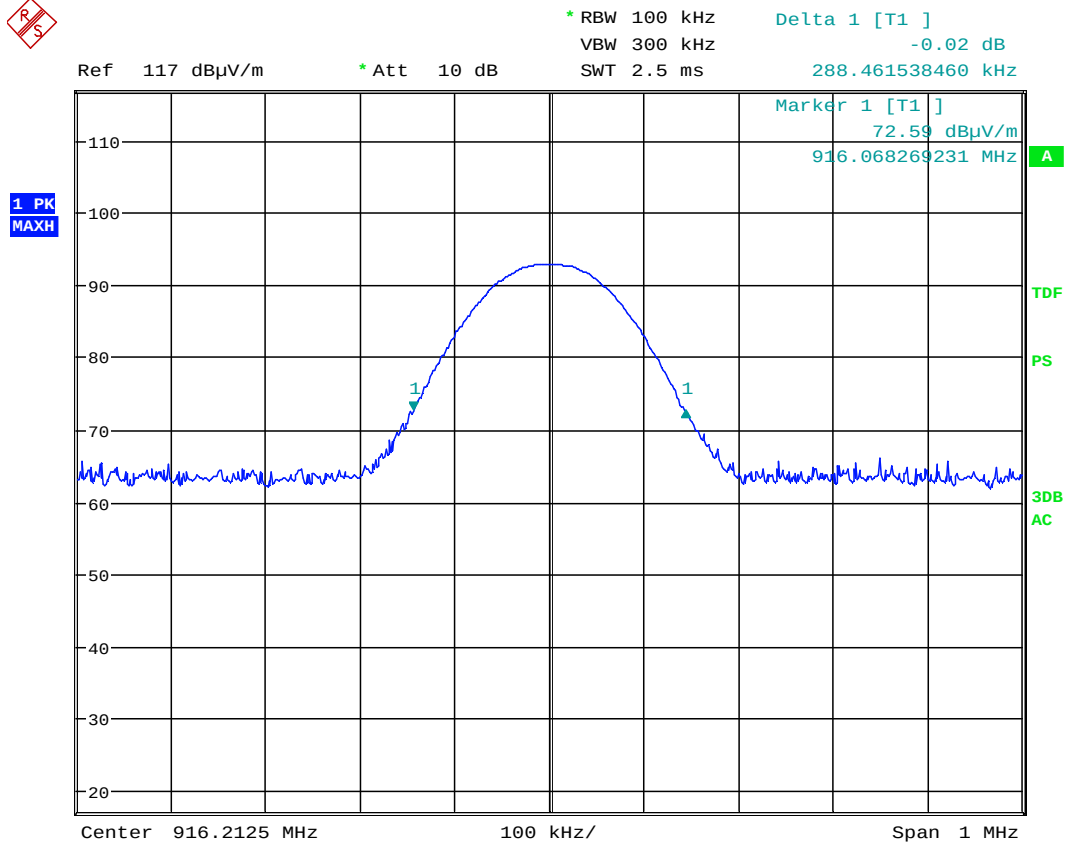
Test Results: Complies

Measurement Data:

Data Rate	20 dB Bandwidth (kHz)		
	916.2125MHz	918.2125MHz	920.2125MHz
19.2kbps	288.46	-	294.87

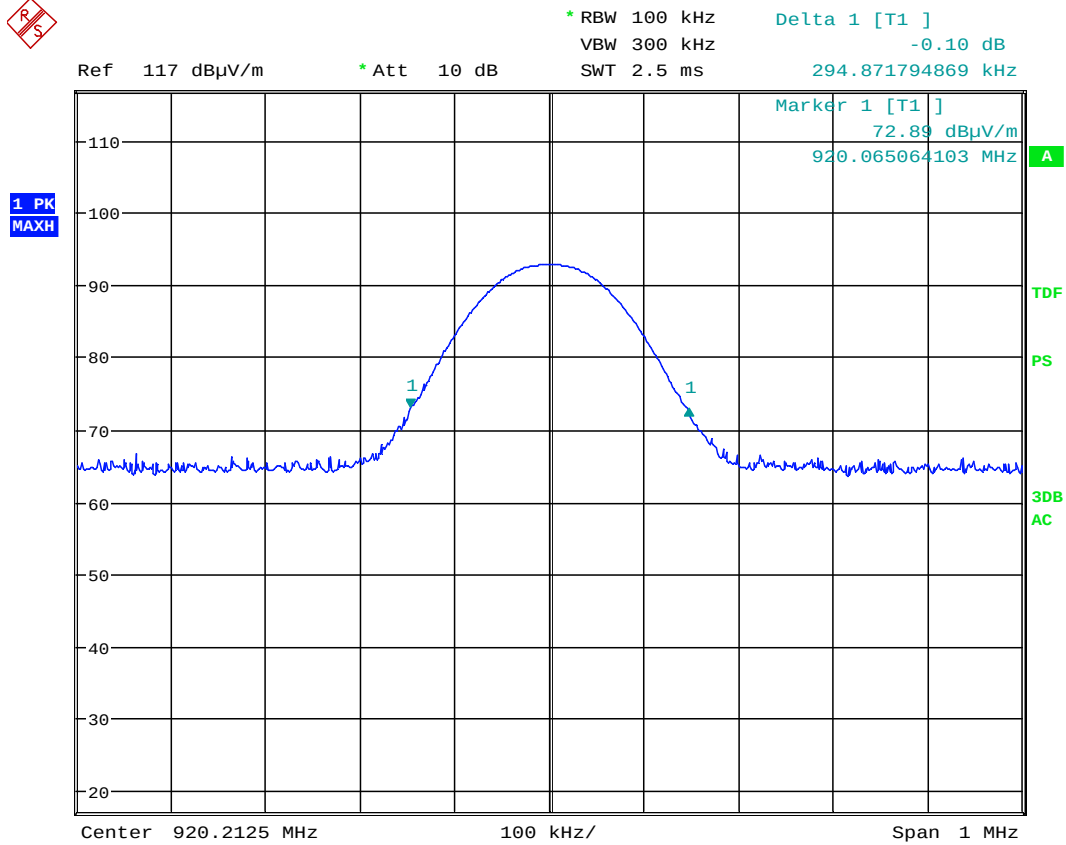
Requirements:

For information only



Date: 18.FEB.2014 13:04:40

916.2125MHz – 20 dB bandwidth



Date: 18.FEB.2014 12:59:58

920.2125 MHz – 20 dB bandwidth

3.4 Peak power output

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

Test Performed By: G.Suwanthakumar	Date of Test: 2014.02.18
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Test Results: Complies

Measurement data:

Maximum field strength

RF channel	916.2125MHz	918.2125MHz	920.2125MHz
VP: Measured value (dBμV/m)	92.39	90.88	92.29
HP: Measured value (dBμV/m)	93.11	91.68	92.99

Calculated erp

RF channel	916.2125MHz	918.2125MHz	920.2125MHz
Radiated power (mW)	0.374	0.269	0.363
Radiated e.r.p. (dBm)	-4.27	-5.69	-4.39
Declared antenna gain dBd	0	0	0
Calculated conducted power (mW)	0.374	0.269	0.363

Radiated measurements are performed at 3 m distance.

Tested according to KDB 558074 D01 DTS Meas Guidance v03r01, Section 9.1.1.

EIRP is calculated according to KDB 558074 D01 DTS Meas Guidance v03r01, Section 12.2.2. (e)

The maximum field strength is obtained in XY plane and Vertical polarization.

Detachable antenna?

☐ Yes ☒ No

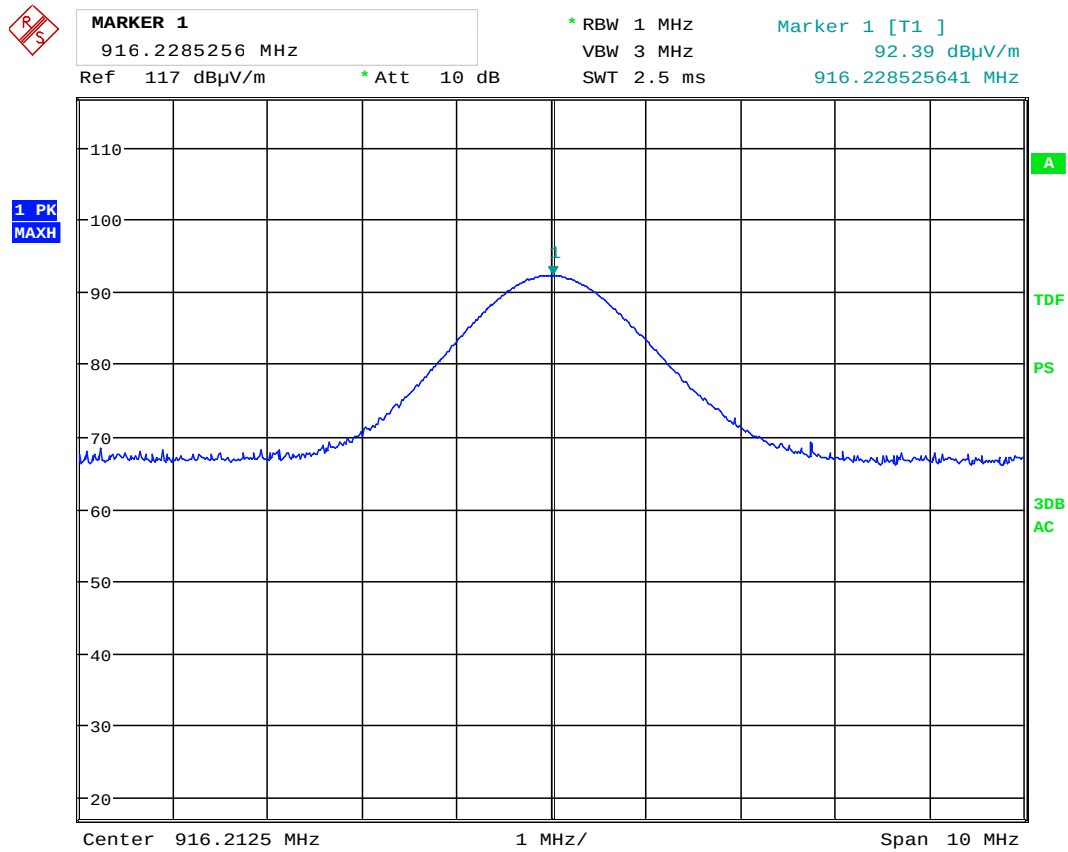
If detachable, is the antenna connector non-standard?

☐ Yes ☐ No

New batteries were used.

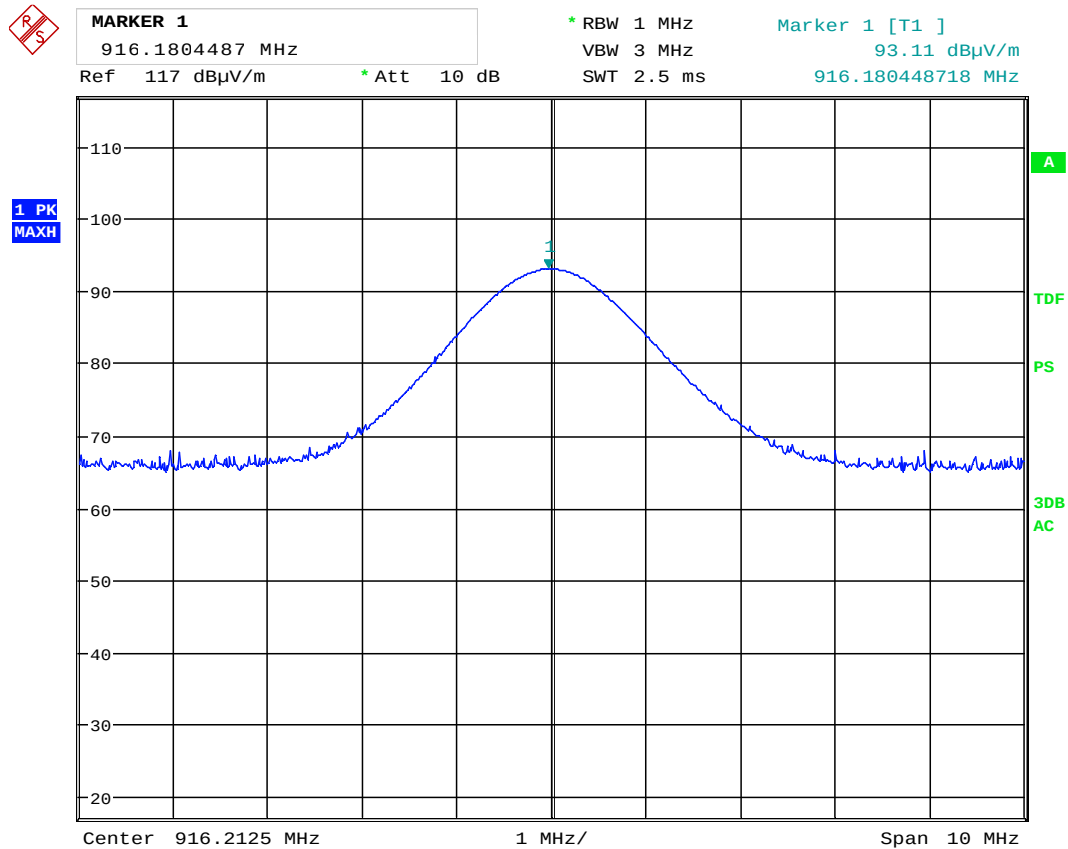
Requirements:

The maximum peak output power shall be $\leq 94\text{dB}\mu\text{V/m}$



Date: 18.FEB.2014 13:08:42

VP: 916.2125MHz – Field strength



Date: 18.FEB.2014 13:02:27

HP: 916.2125MHz – Field strength

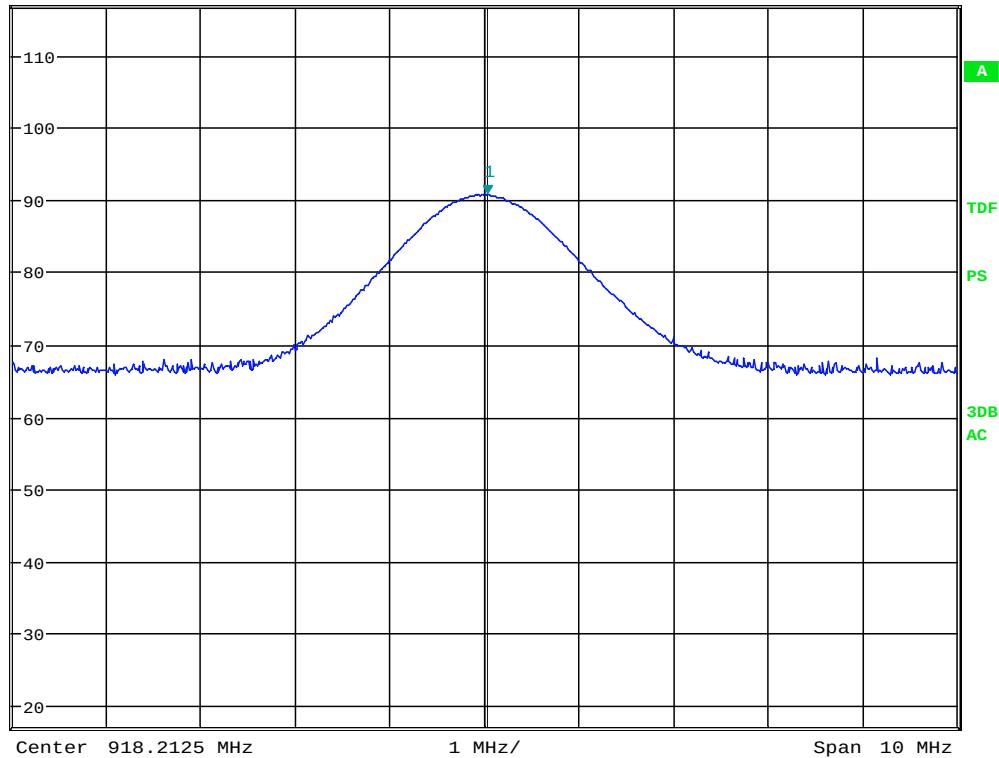


MARKER 1
918.2445513 MHz
Ref 117 dB μ V/m * Att 10 dB

* RBW 1 MHz
VBW 3 MHz
SWT 2.5 ms

Marker 1 [T1]
90.88 dB μ V/m
918.244551282 MHz

1 PK
MAXH



Date: 18.FEB.2014 13:16:26

VP: 918.2125MHz – Field strength

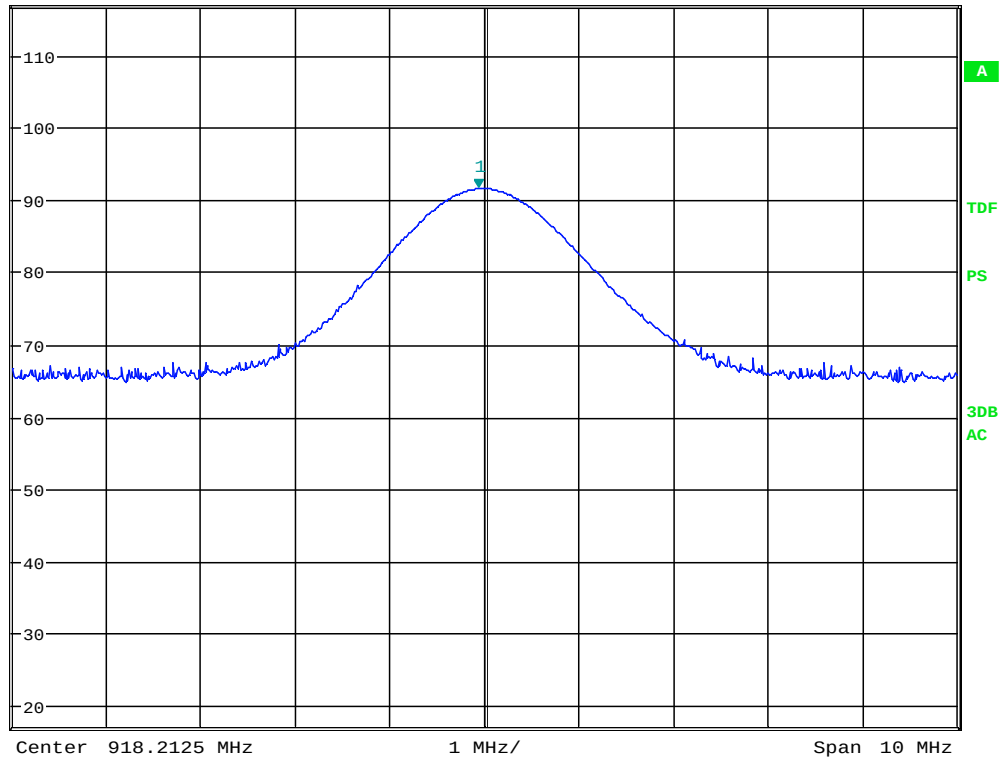


MARKER 1
918.1483974 MHz
Ref 117 dBμV/m * Att 10 dB

* RBW 1 MHz
VBW 3 MHz
SWT 2.5 ms

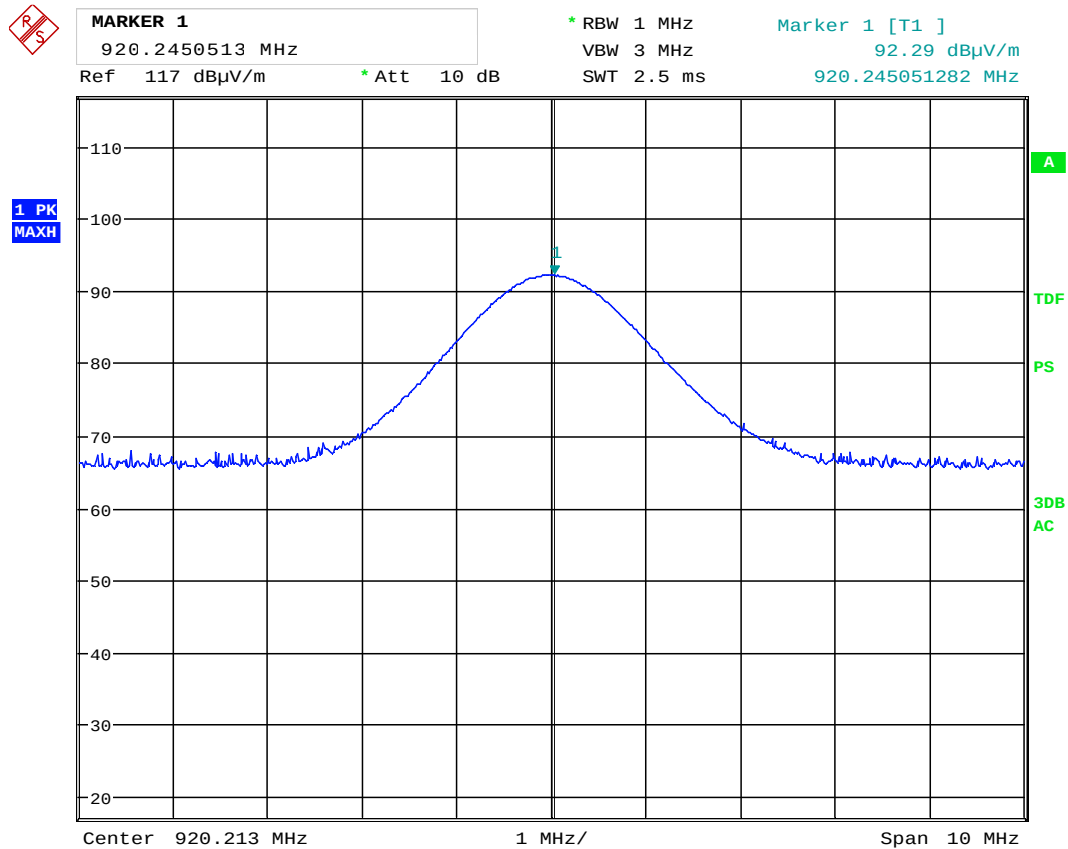
Marker 1 [T1]
91.68 dBμV/m
918.148397436 MHz

1 PK
MAXH



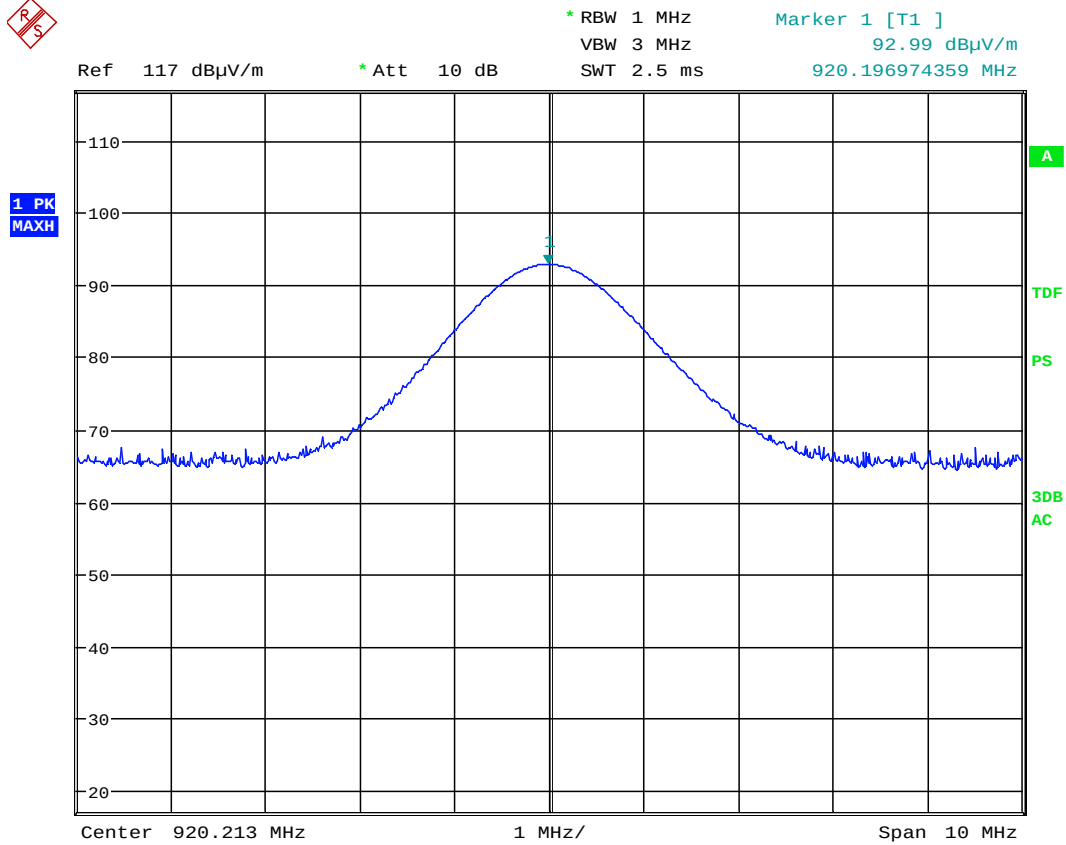
Date: 18.FEB.2014 13:13:04

HP: 918.2125MHz – Field strength



Date: 18.FEB.2014 12:55:38

VP: 920.2125MHz – Field strength



Date: 18.FEB.2014 12:53:40

HP: 920.2125MHz – Field strength

3.5 Spurious emissions (radiated)

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

Test Performed By: G.Suwanthakumar	Date of Test: 2014.02.18 – 2014.02.19
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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	Channel	Field strength, Peak	Duty cycle corr. factor	Limit	Margin
GHz	MHz	dBμV/m	dB	dBμV/m	dB
1.832	916.2125	49.58	-	74	24.42
1.836	918.2125	50.73	-	74	23.27
1.840	920.2125	50.82	-	74	23.18
2.748	916.2125	50.07	-	74	23.93
2.754	918.2125	47.84	-	74	26.16
2.760	920.2125	47.37	-	74	26.63
3.664	916.2125	48.86	-	74	25.14
3.672	918.2125	48.90	-	74	25.1
3.680	920.2125	48.84	-	74	25.16
4 - 10	All channels	None detected	-	-	-

Average Detector:

Frequency	Channel	Field strength, Peak	Duty cycle corr. factor	Limit	Margin
GHz	MHz	dBμV/m	dB	dBμV/m	dB
1.832	916.2125	46.65	-	54	7.35
1.836	918.2125	48.27	-	54	5.73
1.840	920.2125	48.49	-	54	5.51
2.748	916.2125	45.71	-	54	8.29
2.754	918.2125	42.79	-	54	11.21
2.760	920.2125	42.37	-	54	11.63
3.664	916.2125	42.99	-	54	11.01
3.672	918.2125	42.79	-	54	11.21
3.680	920.2125	43.16	-	54	10.84
4 - 10	All channels	None detected	-	-	-

Tested according to KDB 558074 D01 DTS Measurement Guidance v03r01, Section 13.1 & 13.3.2.

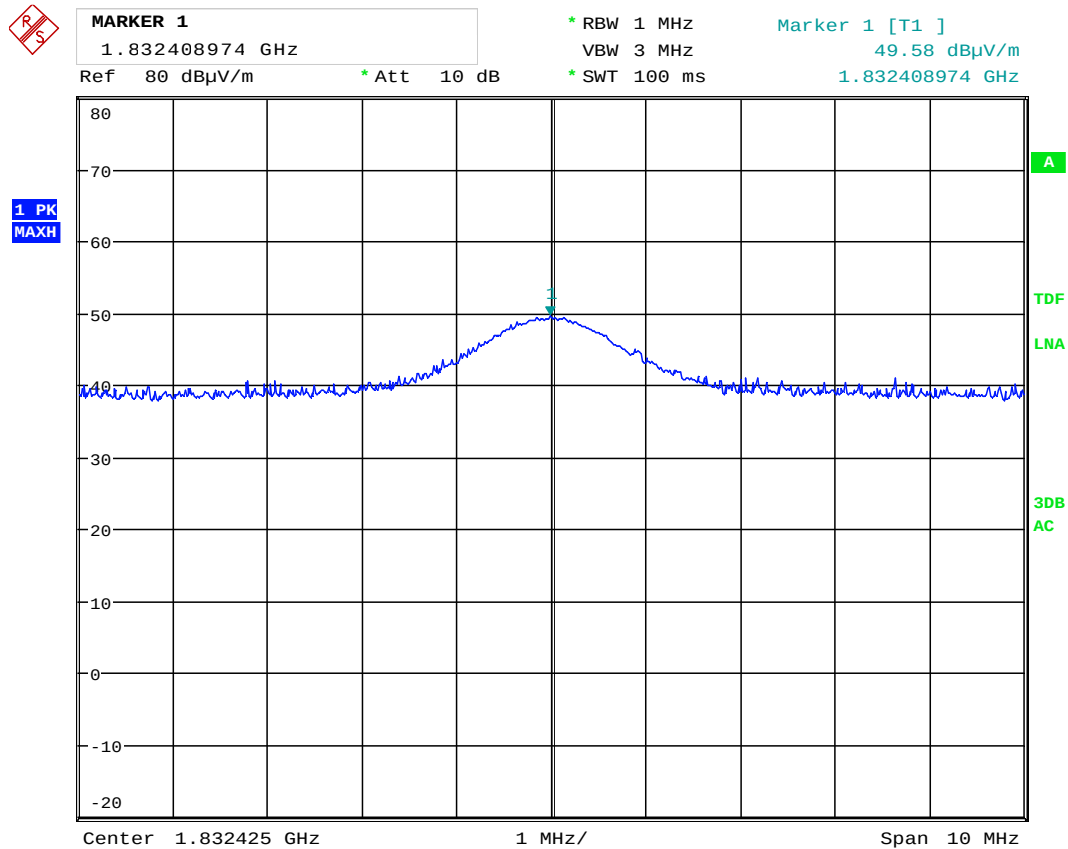
The maximum is observed in Vertical polarization for 2nd harmonic & Horizontal polarization for 3rd & 4th Harmonic.

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".

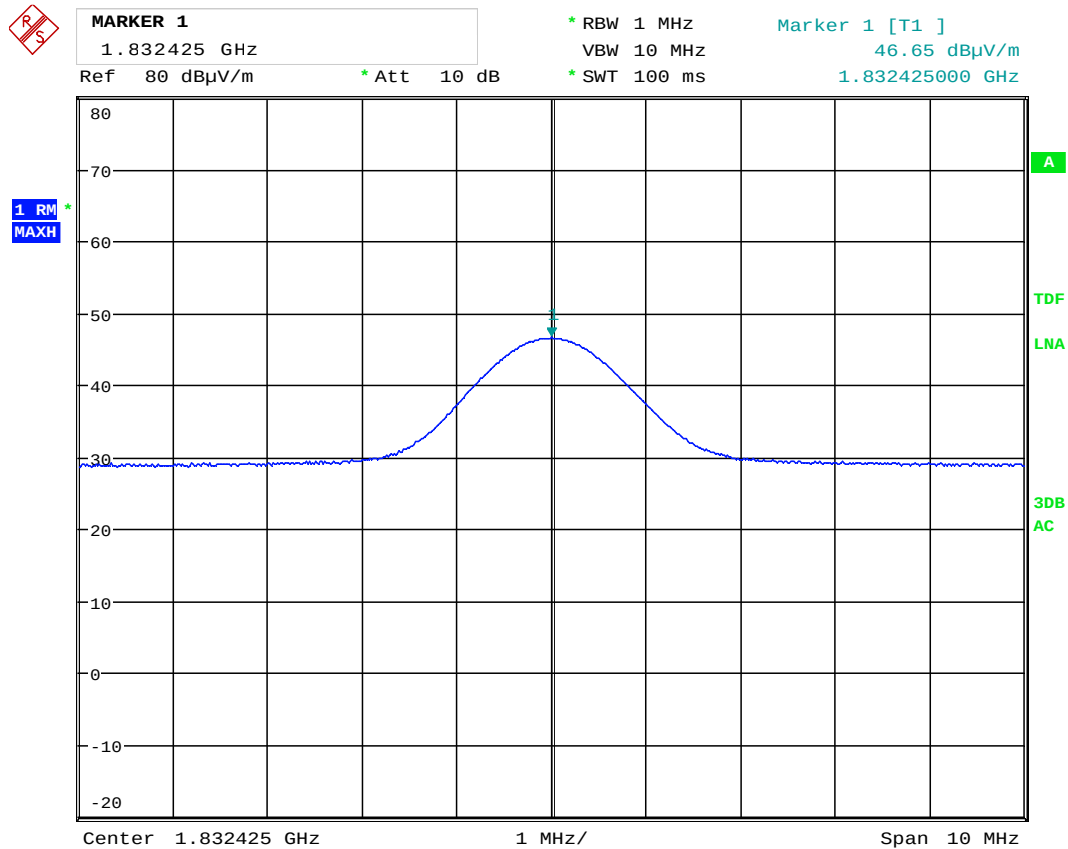
Requirement:

(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: 18.FEB.2014 14:15:51

VP: 2nd Harmonic -Pk with HP-filter - ch 916.2125MHz



Date: 18.FEB.2014 14:15:18

VP: 2nd Harmonic -Av with HP-filter - ch 916.2125MHz



MARKER 1

1.836425 GHz

Ref 80 dBμV/m

* Att 10 dB

* RBW 1 MHz

VBW 3 MHz

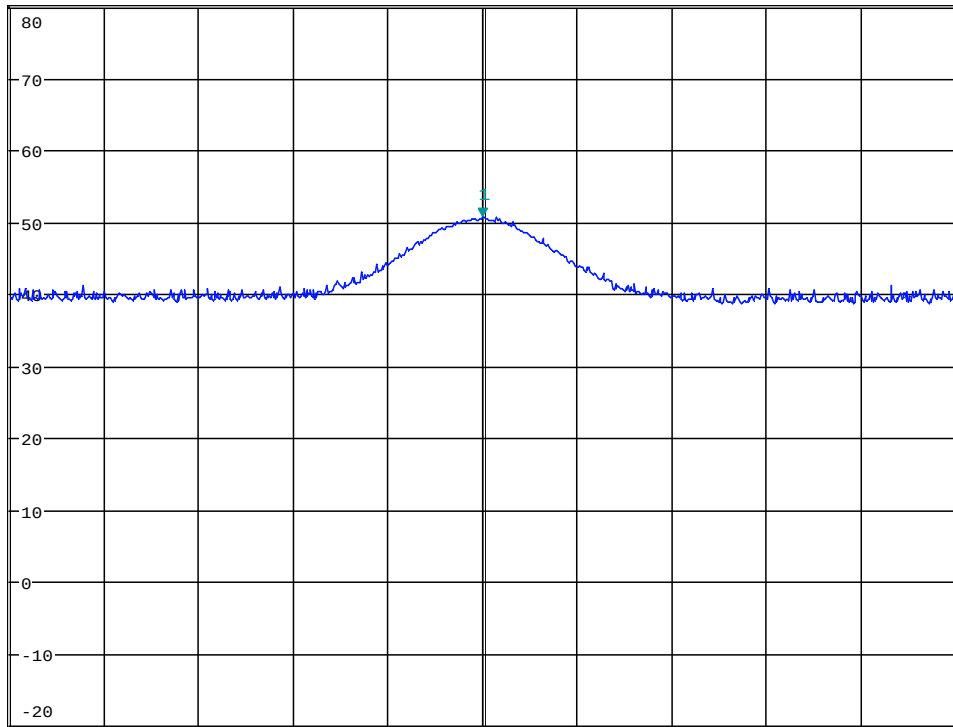
* SWT 100 ms

Marker 1 [T1]

50.73 dBμV/m

1.836425000 GHz

1 PK
MAXH



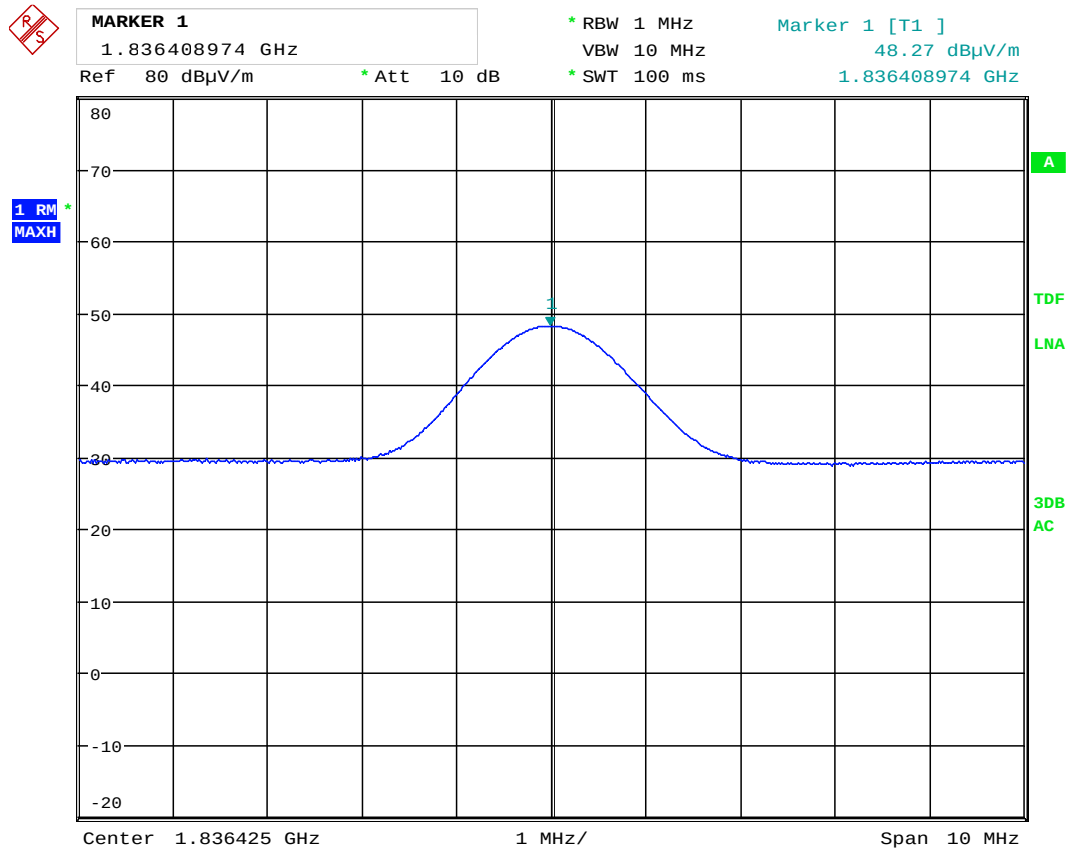
Center 1.836425 GHz

1 MHz/

Span 10 MHz

Date: 18.FEB.2014 14:10:39

VP: 2nd Harmonic -Pk with HP-filter - ch 918.2125MHz



Date: 18.FEB.2014 14:11:07

VP: 2nd Harmonic -Av with HP-filter - ch 918.2125MHz

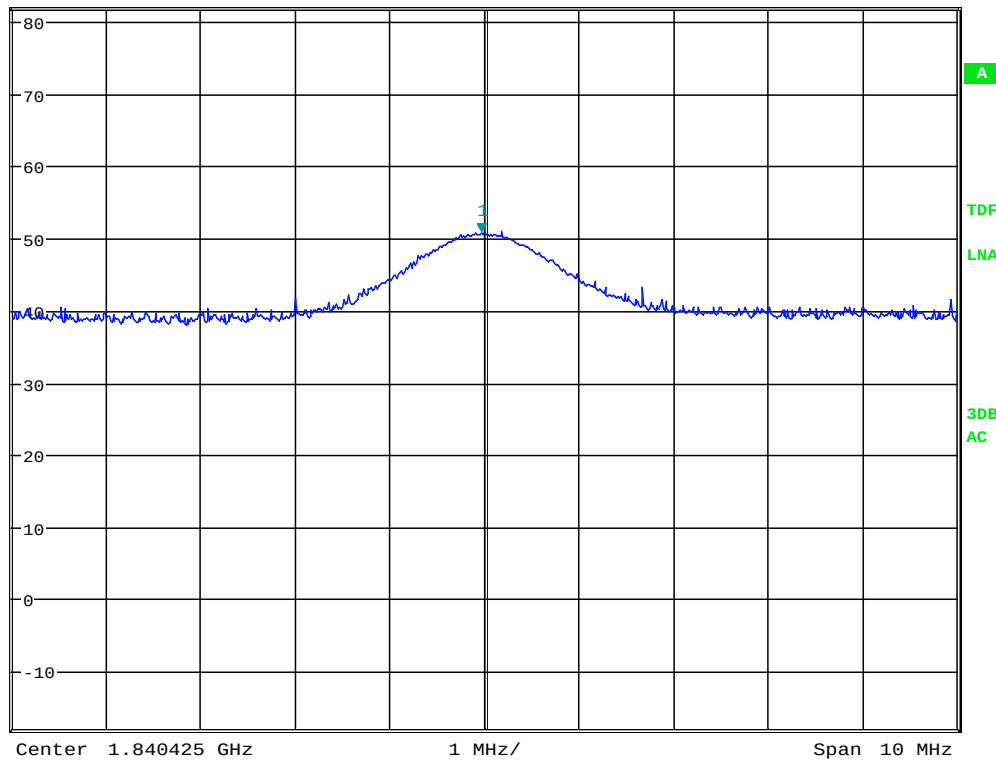


MARKER 1
1.840392949 GHz
Ref 82 dBμV/m * Att 10 dB

* RBW 1 MHz
VBW 3 MHz
* SWT 100 ms

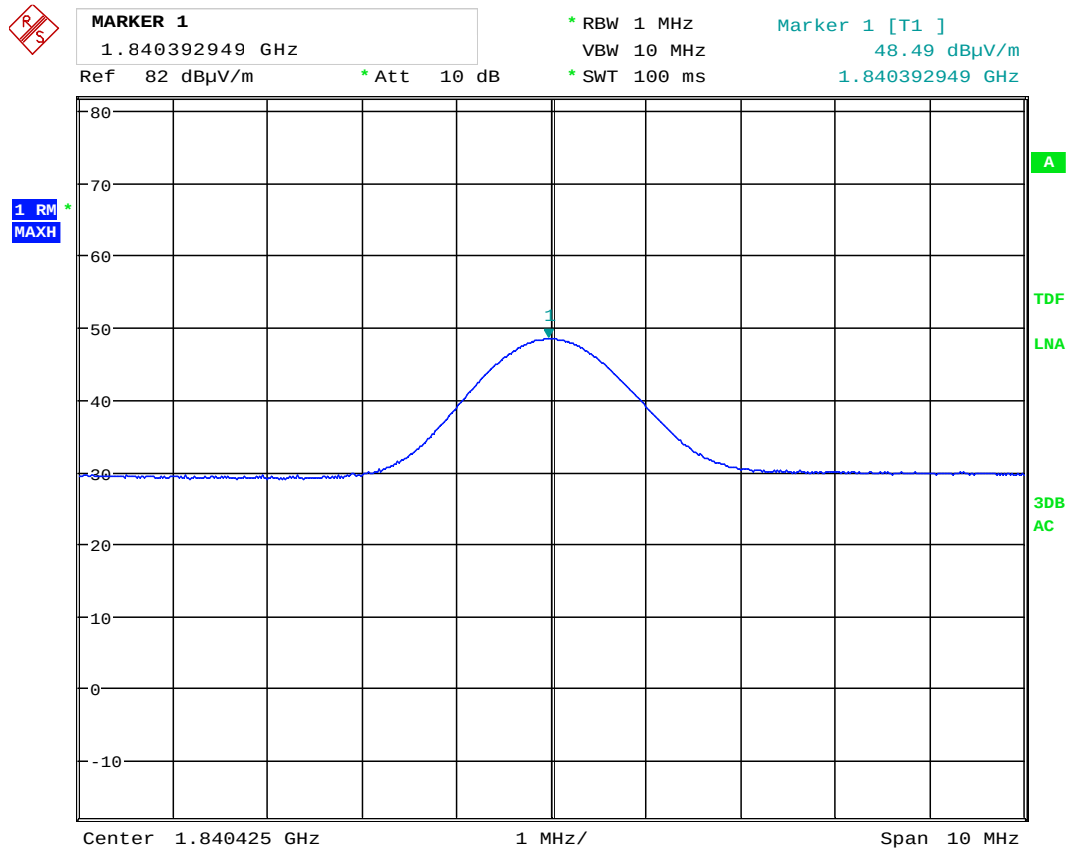
Marker 1 [T1]
50.82 dBμV/m
1.840392949 GHz

1 PK
MAXH



Date: 18.FEB.2014 13:49:09

VP: 2nd Harmonic -Pk with HP-filter - ch 920.2125MHz



Date: 18.FEB.2014 13:51:29

VP: 2nd Harmonic -Av with HP-filter - ch 920.2125MHz

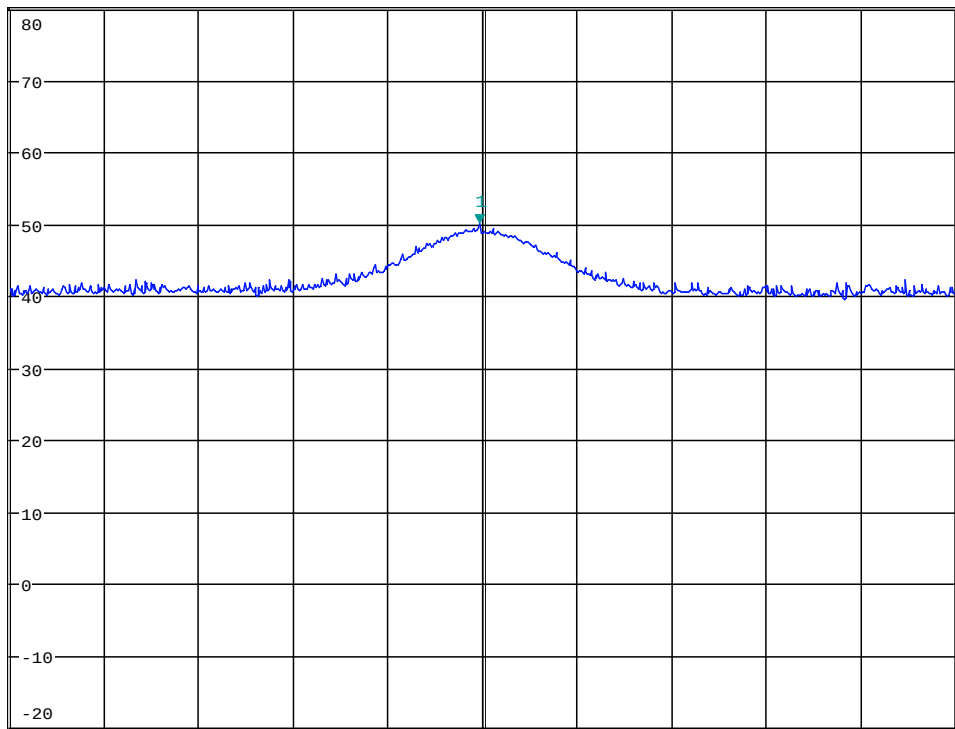


MARKER 1
2.748605449 GHz
Ref 80 dBμV/m * Att 10 dB

* RBW 1 MHz
VBW 3 MHz
* SWT 100 ms

Marker 1 [T1]
50.07 dBμV/m
2.748605449 GHz

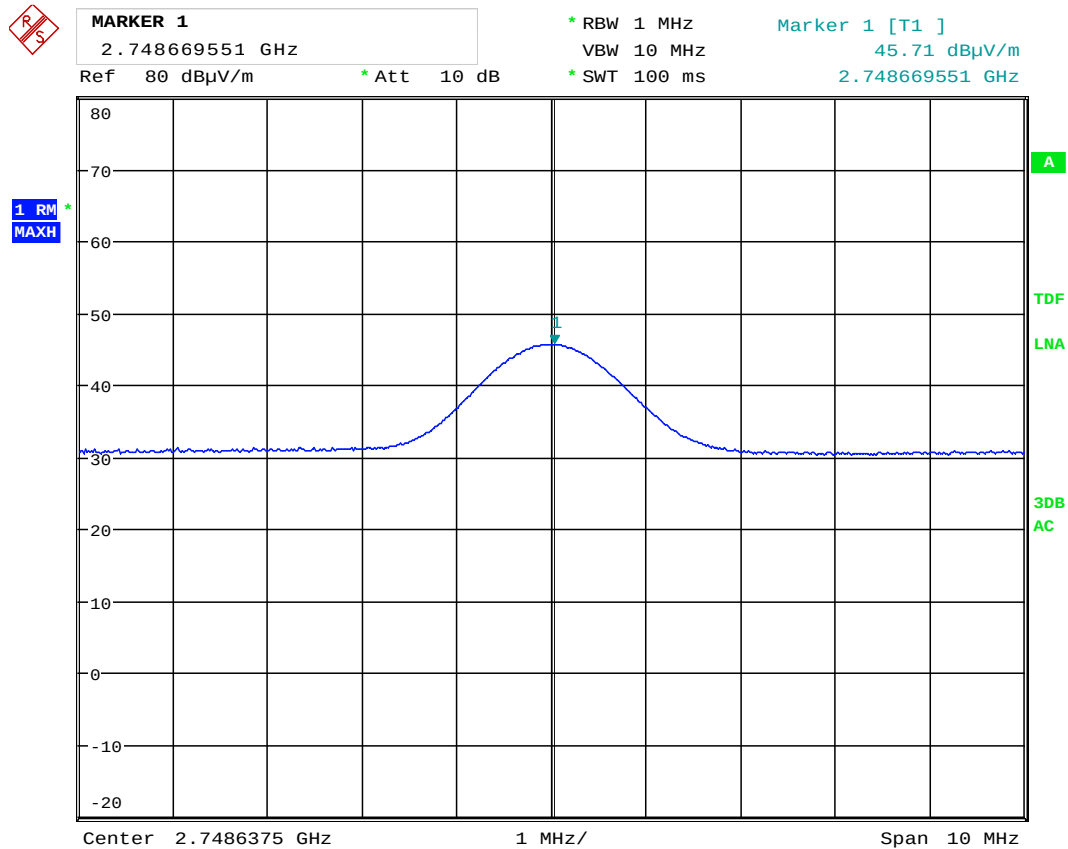
1 PK
MAXH



Center 2.7486375 GHz 1 MHz/ Span 10 MHz

Date: 18.FEB.2014 14:14:08

HP: 3rd Harmonic -Pk with HP-filter - ch 916.2125MHz



Date: 18.FEB.2014 14:14:29

HP: 3rd Harmonic -Av with HP-filter - ch 916.2125MHz



MARKER 1

2.754461218 GHz

Ref 80 dBμV/m

* Att 10 dB

* RBW 1 MHz

VBW 3 MHz

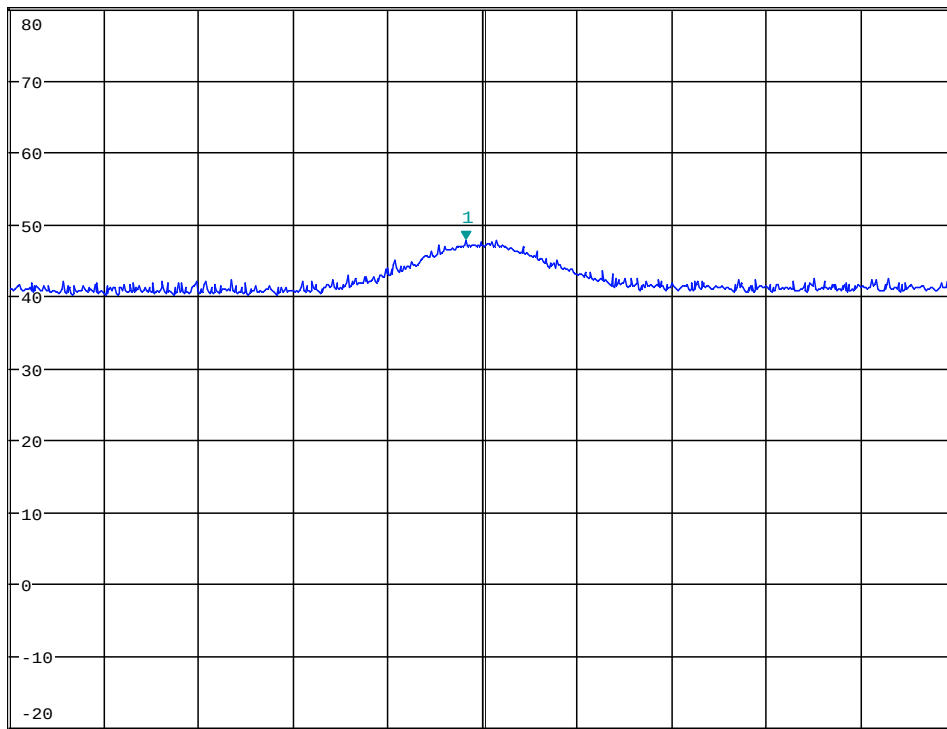
* SWT 100 ms

Marker 1 [T1]

47.84 dBμV/m

2.754461218 GHz

1 PK
MAXH



Center 2.7546375 GHz

1 MHz/

Span 10 MHz

Date: 18.FEB.2014 14:13:00

HP: 3rd Harmonic -Pk with HP-filter - ch 918.2125MHz



MARKER 1

2.7546375 GHz

Ref 80 dBμV/m

* Att 10 dB

* RBW 1 MHz

VBW 10 MHz

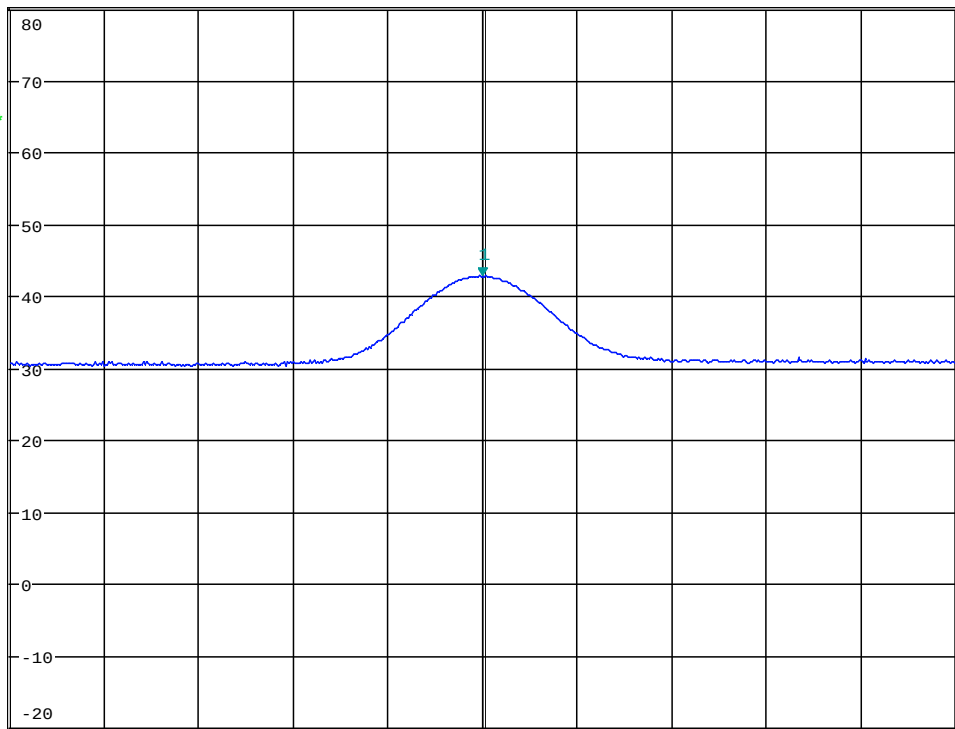
* SWT 100 ms

Marker 1 [T1]

42.79 dBμV/m

2.754637500 GHz

1 RM
MAXH



Center 2.7546375 GHz

1 MHz/

Span 10 MHz

Date: 18.FEB.2014 14:11:57

HP: 3rd Harmonic -Av with HP-filter - ch 918.2125MHz



MARKER 1

2.760573897 GHz

Ref 82 dBμV/m

* Att 10 dB

* RBW 1 MHz

VBW 3 MHz

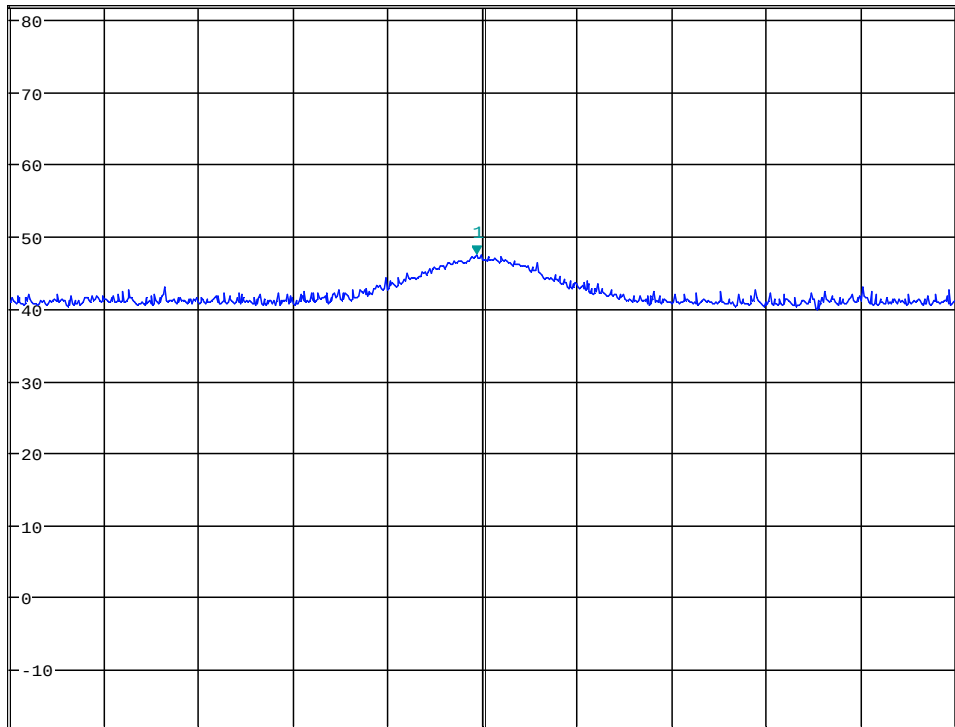
* SWT 100 ms

Marker 1 [T1]

47.37 dBμV/m

2.760573897 GHz

1 PK
MAXH



Center 2.760638 GHz

1 MHz/

Span 10 MHz

Date: 18.FEB.2014 14:02:58

HP: 3rd Harmonic -Pk with HP-filter - ch 920.2125MHz



MARKER 1

2.760638 GHz

Ref 82 dBμV/m

* Att 10 dB

* RBW 1 MHz

VBW 10 MHz

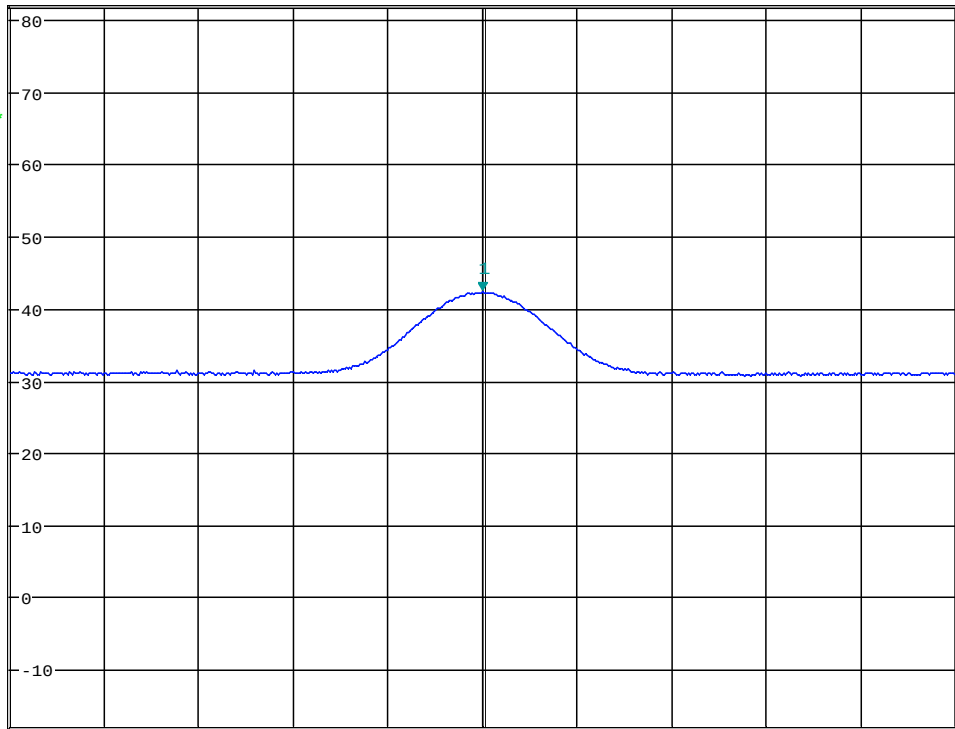
* SWT 100 ms

Marker 1 [T1]

42.37 dBμV/m

2.760638000 GHz

1 RM
MAXH



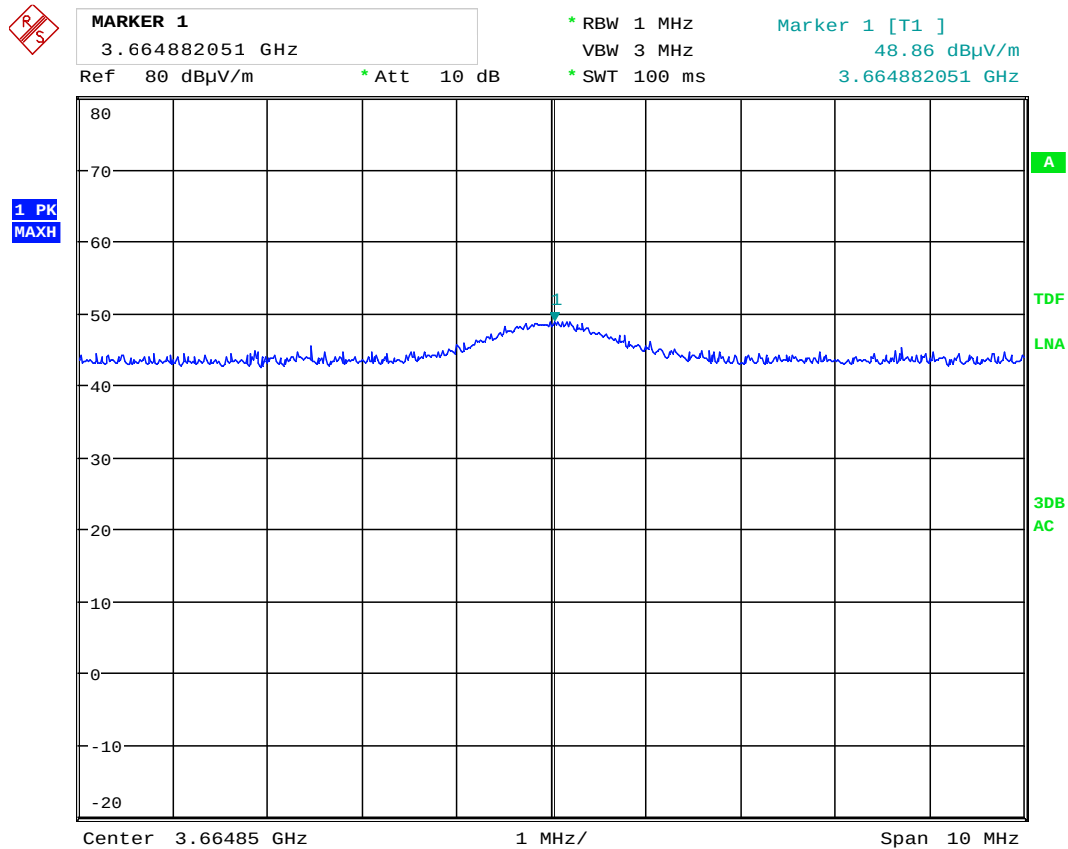
Center 2.760638 GHz

1 MHz/

Span 10 MHz

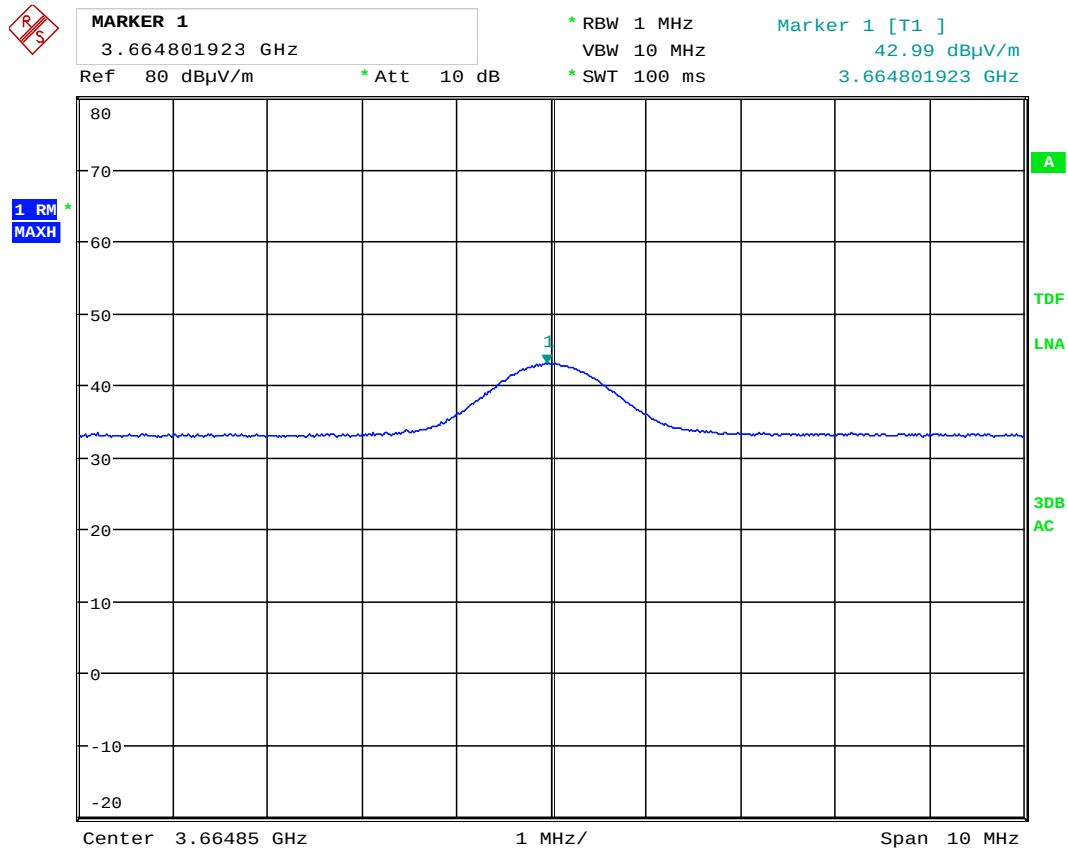
Date: 18.FEB.2014 14:03:29

HP: 3rd Harmonic -Av with HP-filter - ch 920.2125MHz



Date: 18.FEB.2014 14:19:48

HP: 4th Harmonic -Pk with HP-filter – ch 916.2125MHz



Date: 18.FEB.2014 14:20:26

HP: 4th Harmonic -Av with HP-filter - ch 916.2125MHz

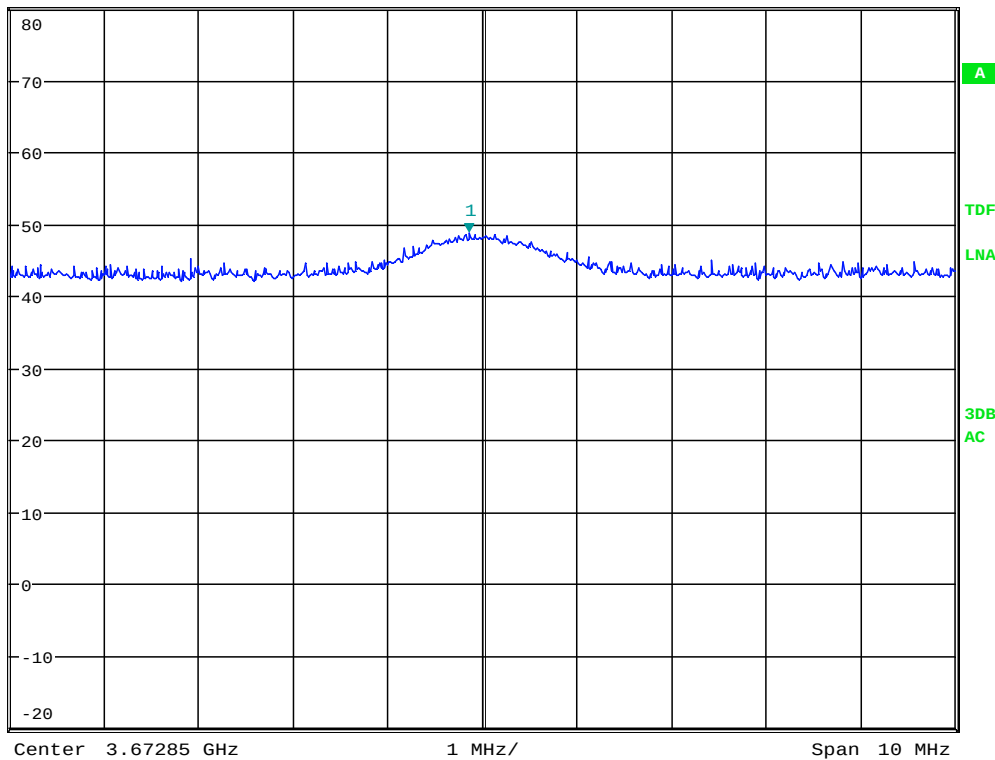


MARKER 1
3.672705769 GHz
Ref 80 dBμV/m * Att 10 dB

* RBW 1 MHz
VBW 3 MHz
* SWT 100 ms

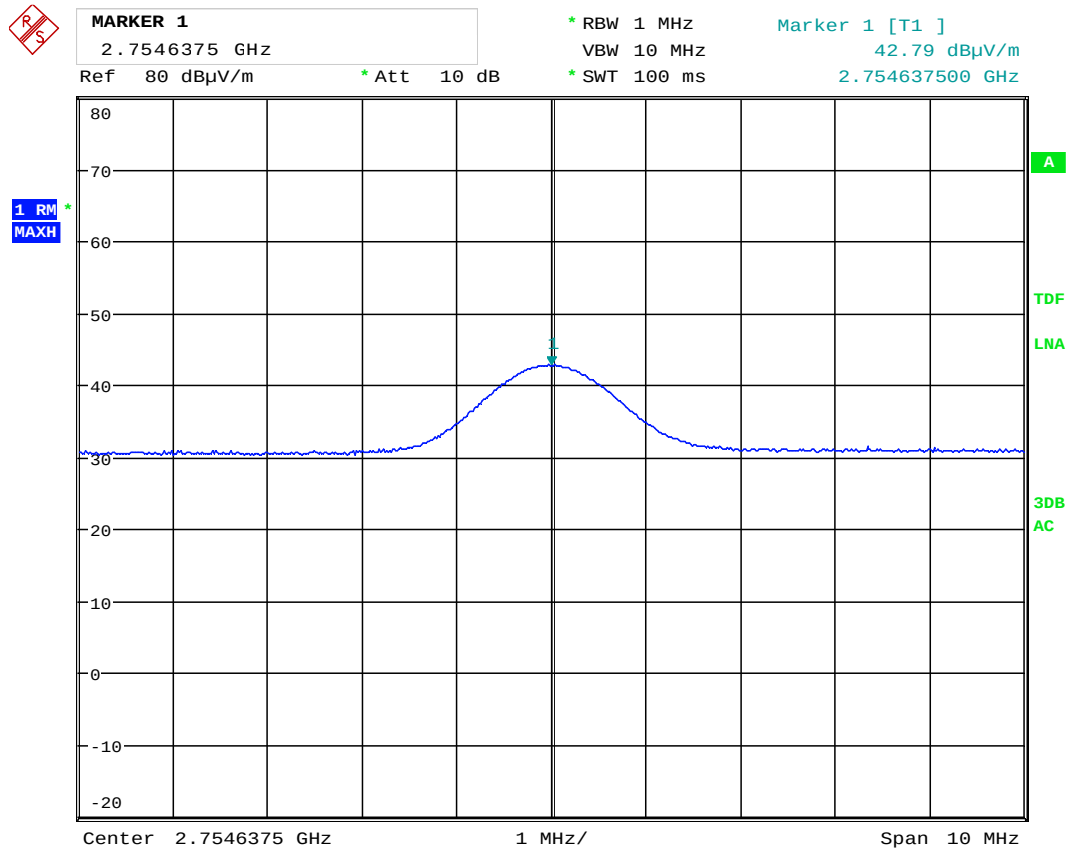
Marker 1 [T1]
48.90 dBμV/m
3.672705769 GHz

1 PK
MAXH



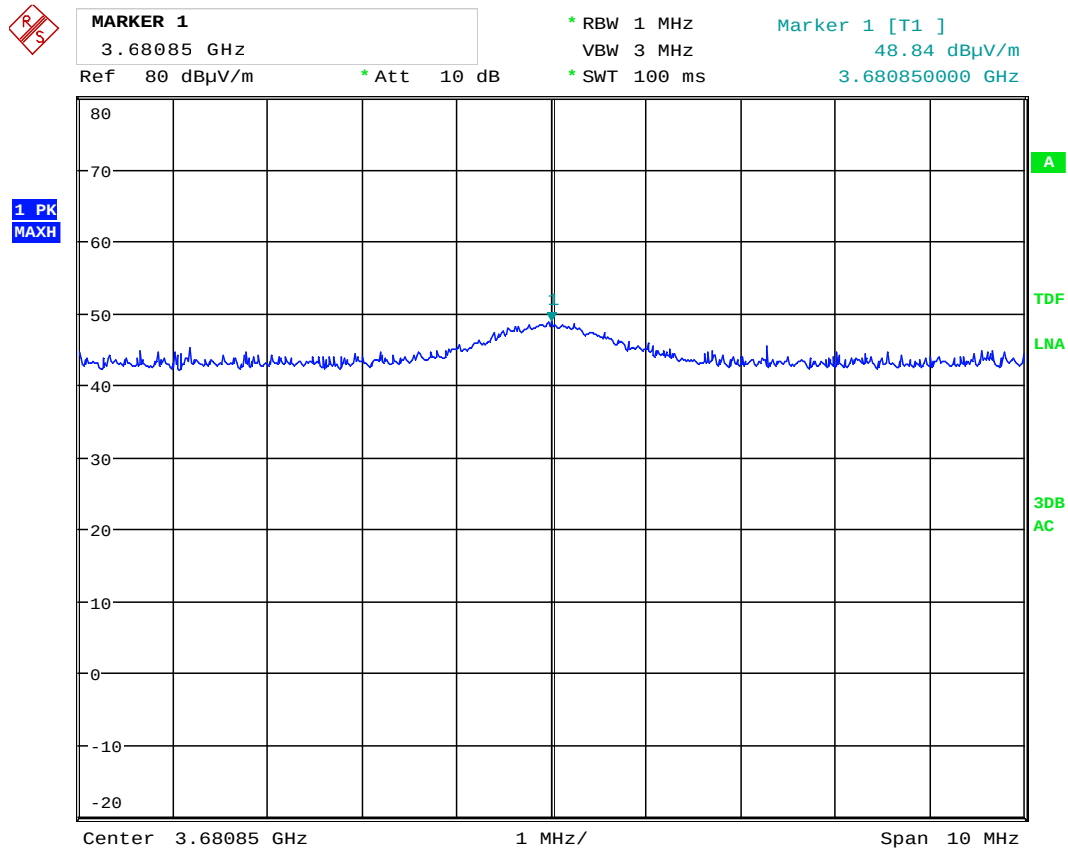
Date: 18.FEB.2014 14:23:50

HP: 4th Harmonic -Pk with HP-filter - ch 918.2125MHz



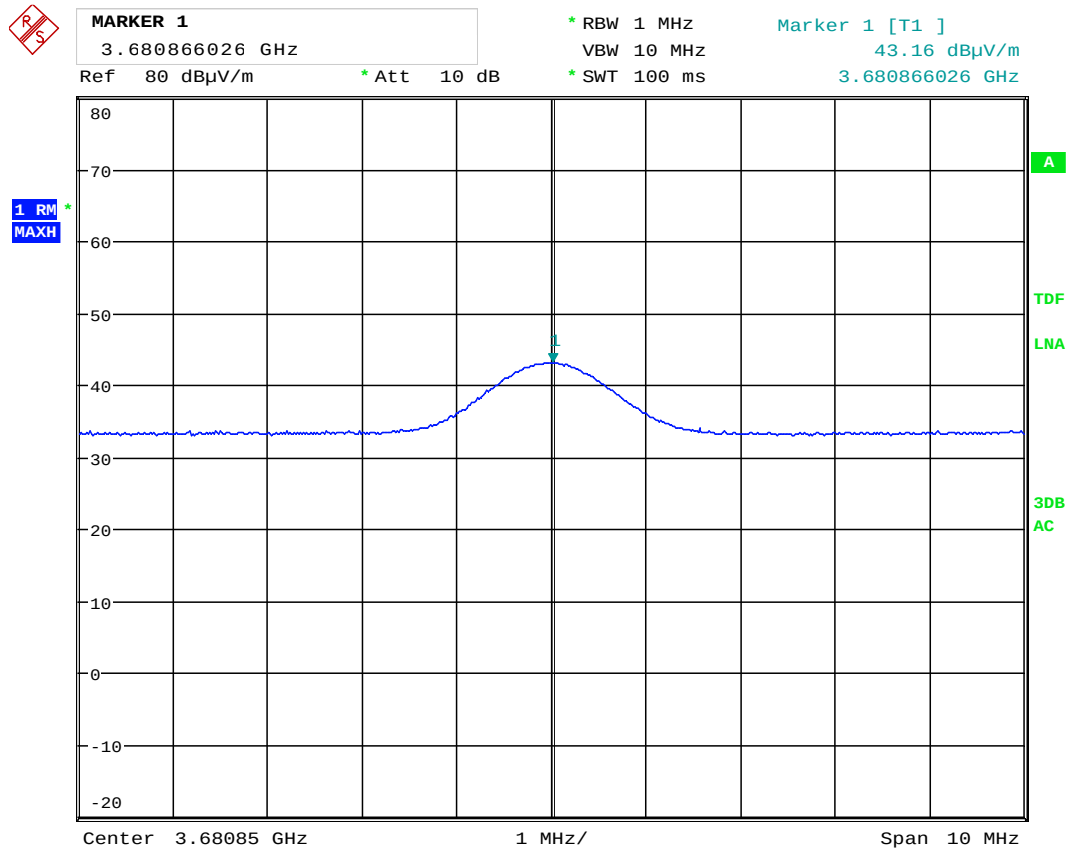
Date: 18.FEB.2014 14:11:57

HP: 4th Harmonic -Av with HP-filter - ch 918.2125MHz



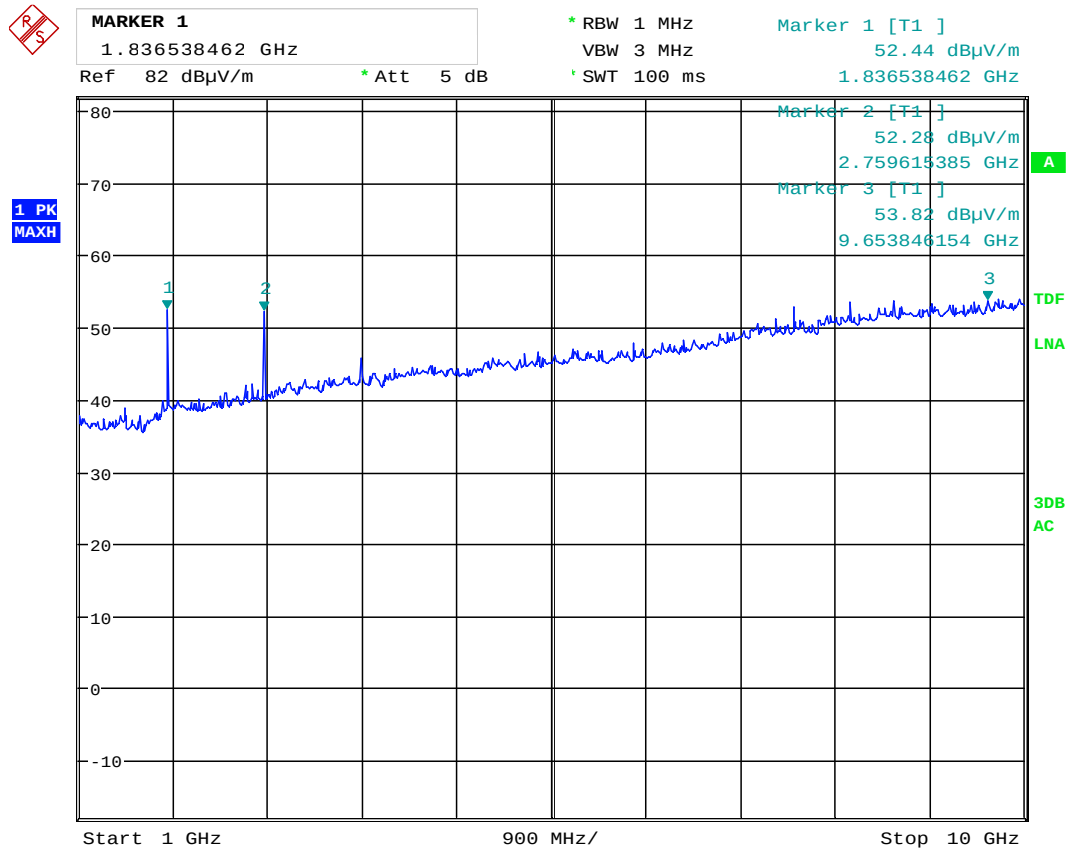
Date: 18.FEB.2014 14:23:11

HP: 4th Harmonic -Pk with HP-filter – ch 920.2125MHz



Date: 18.FEB.2014 14:22:48

HP: 4th Harmonic -Av with HP-filter - ch 920.2125MHz



Date: 18.FEB.2014 14:06:01

VP: pre-view scan 1 - 10 GHz –Peak scan with HP-filter – ch 920.2125MHz



MARKER 1

1.836538462 GHz

Ref 82 dBμV/m

* Att 5 dB

* RBW 1 MHz

VBW 3 MHz

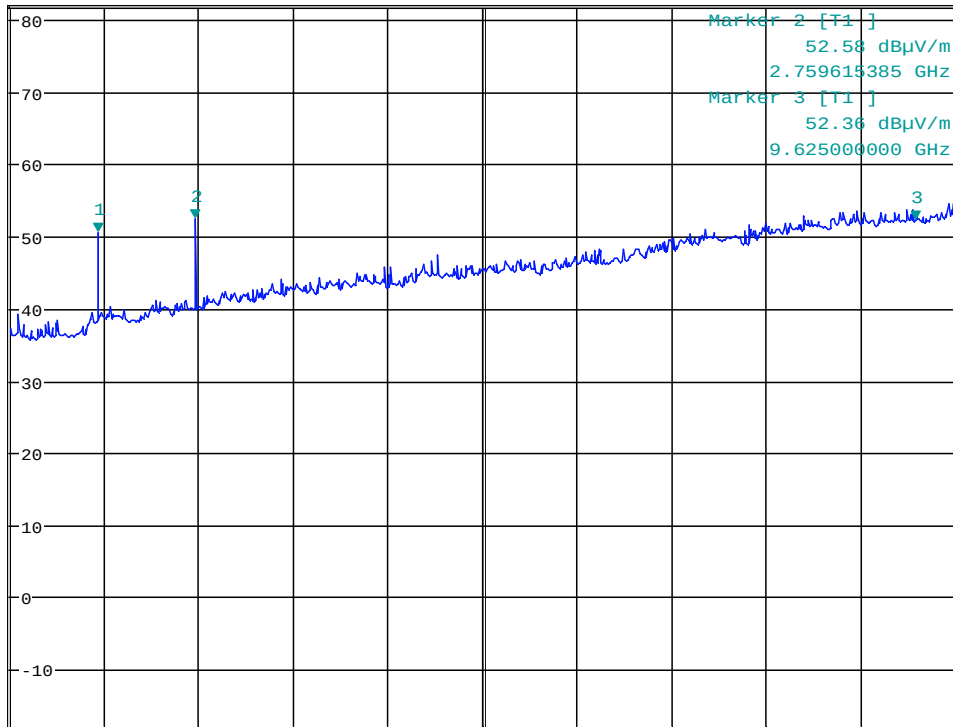
* SWT 100 ms

Marker 1 [T1]

50.66 dBμV/m

1.836538462 GHz

1 PK
MAXH



Start 1 GHz

900 MHz/

Stop 10 GHz

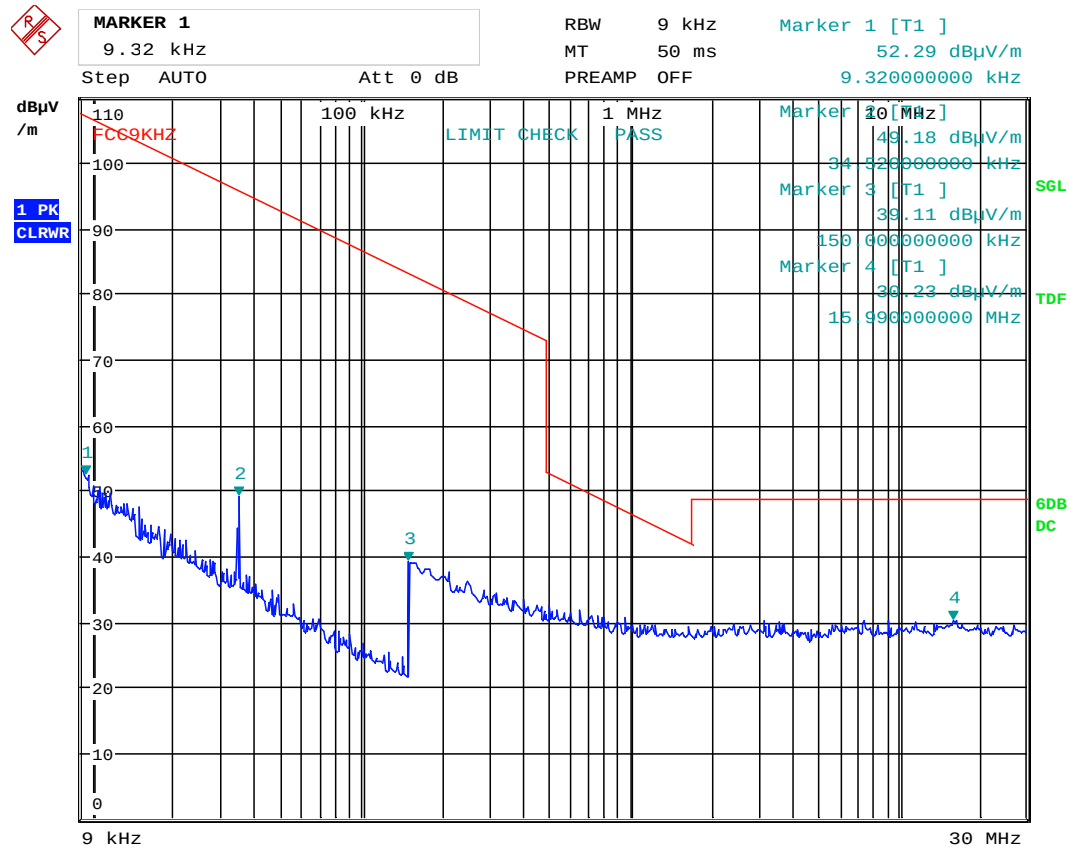
Date: 18.FEB.2014 14:04:53

HP: pre-view scan 1 - 10 GHz -Peak scan with HP-filter - ch 920.2125MHz

Radiated emissions 9kHz – 30 MHz.

Detector: Peak

Measuring distance 10 m.



Date: 18.FEB.2014 10:35:24

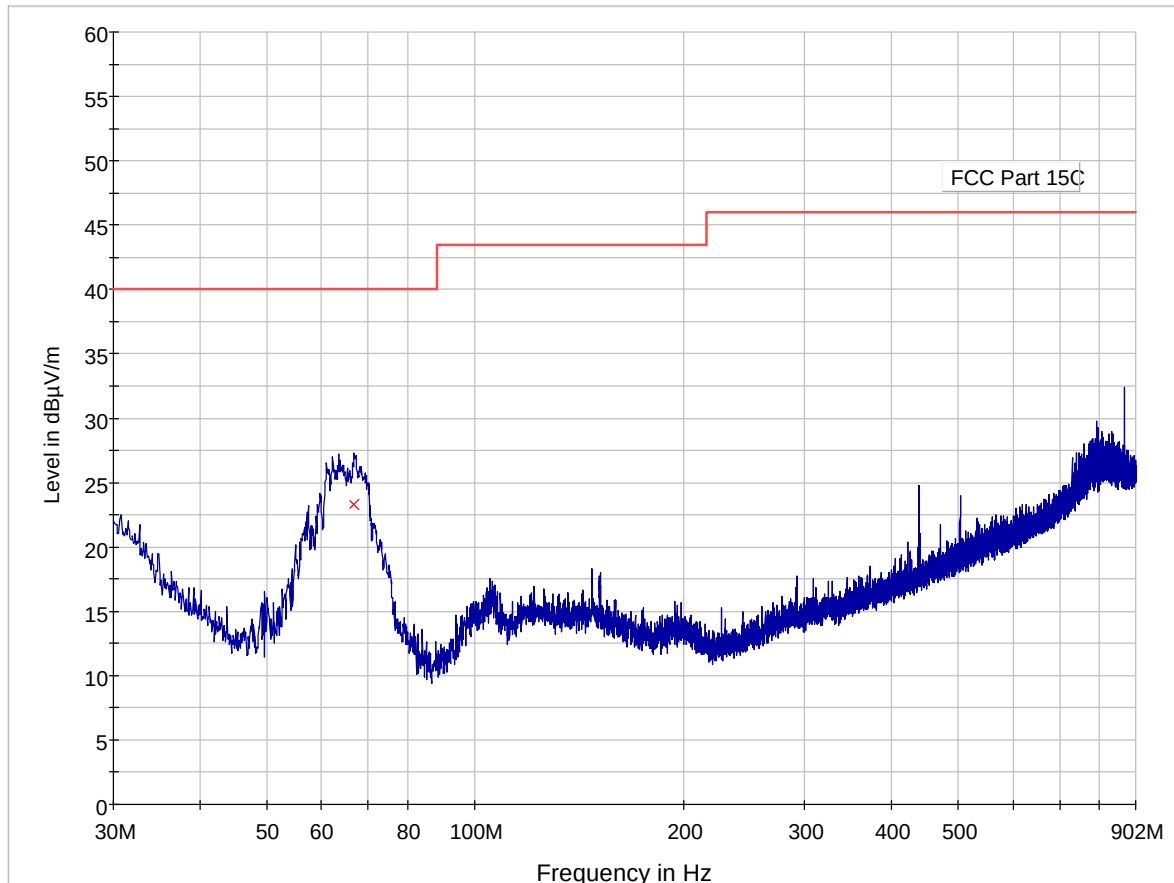
Radiated emissions 30 – 1000 MHz.

Detector: Peak

Measuring distance 3 m.

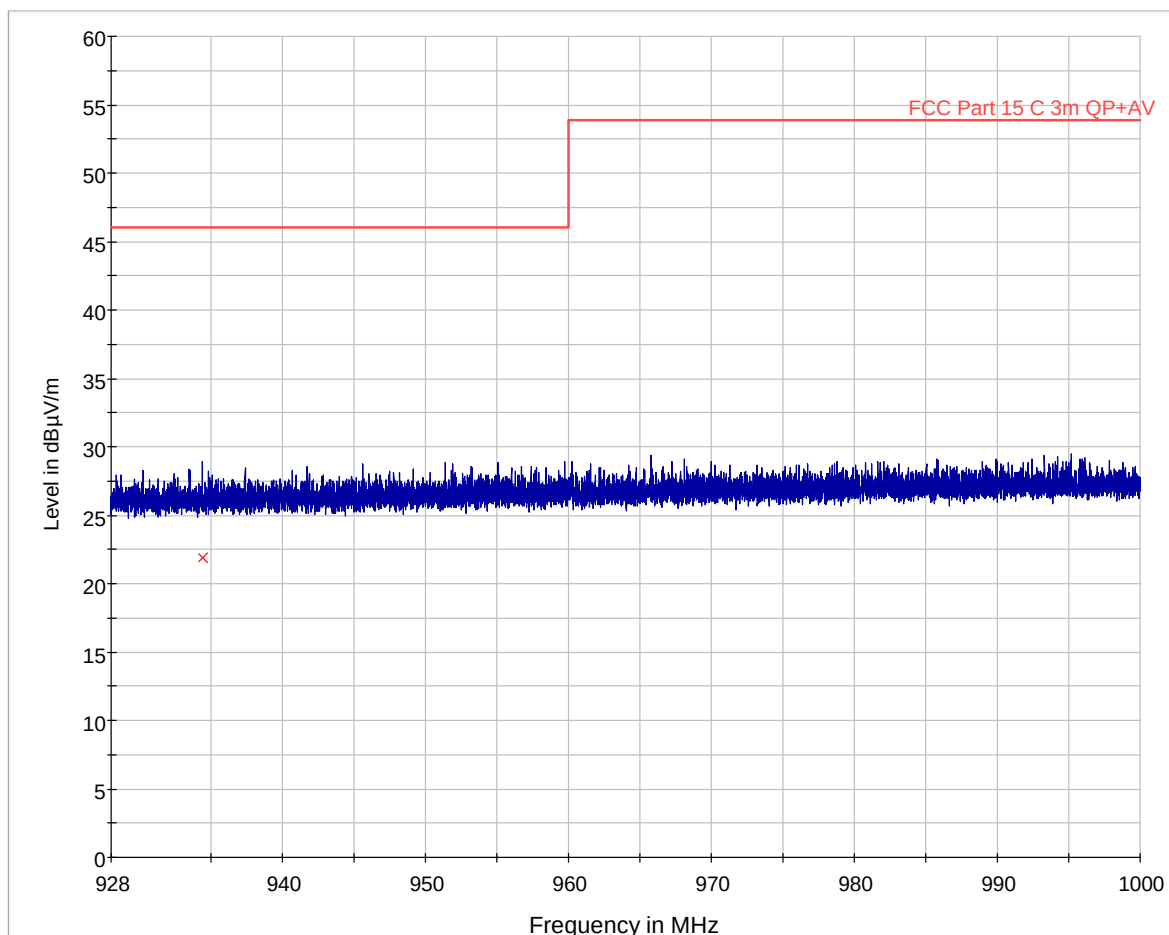
The graph shows peak scan and highest values. Since there is no spurious found no QP values are measured.

FCC Pt15 C 30-1000 MHz 3m



30 - 902MHz - channel 916.2125MHz

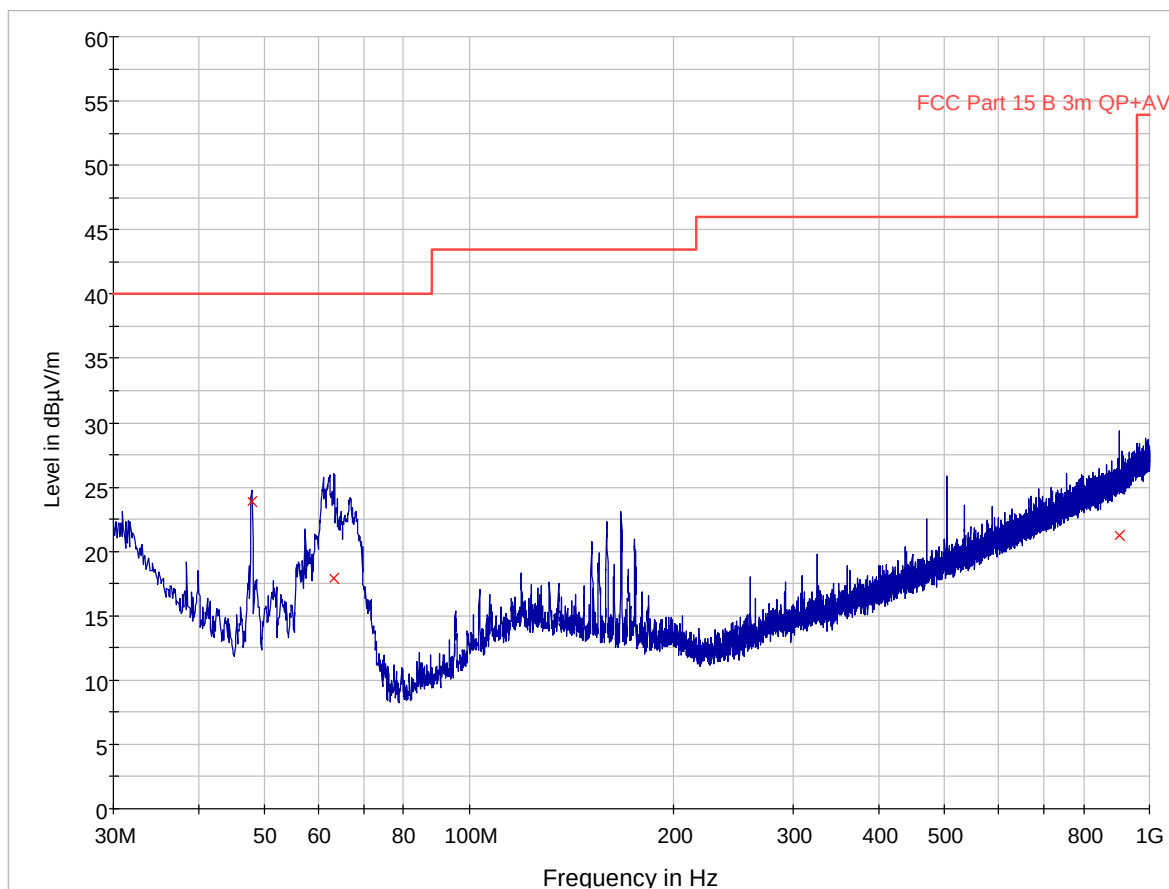
Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Margin (dB)	Limit (dBμV/m)	Comment
66.927585	23.3	120.000	16.7	40.0	



928 - 1000MHz – Channel 920.2125MHz

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Margin (dB)	Limit (dBµV/m)	Comment
934.416118	21.9	120.000	24.1	46.0	

Part 15B in RX mode



30 - 1000MHz @3m

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
47.910989	23.9	1000.0	120.000	100.0	V	243.0	-12.2	16.1	40.0	
63.313273	17.9	1000.0	120.000	126.0	V	36.0	-15.6	22.1	40.0	
902.618759	21.2	1000.0	120.000	314.0	V	5.0	1.4	24.8	46.0	



MARKER 1

4.935897436 GHz

Ref 77 dB μ V/m

* Att 5 dB

* RBW 1 MHz

VBW 3 MHz

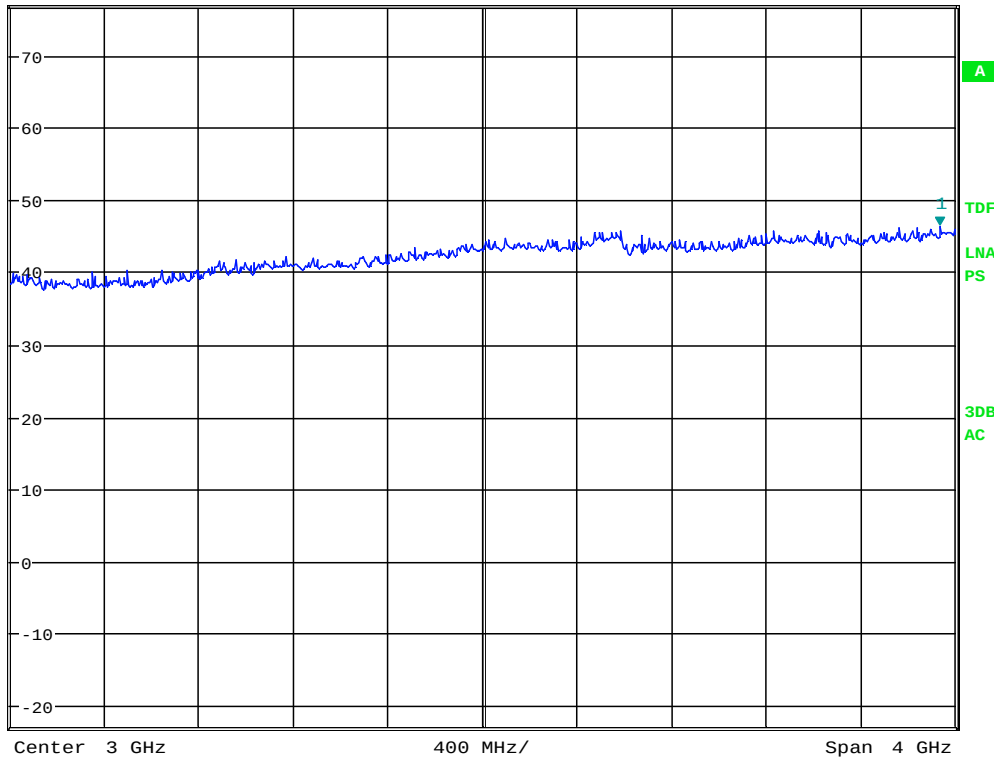
SWT 25 ms

Marker 1 [T1]

46.41 dB μ V/m

4.935897436 GHz

1 PK
MAXH



Date: 19.FEB.2014 10:50:06

VP/HP in Rx mode: 1 - 5GHz

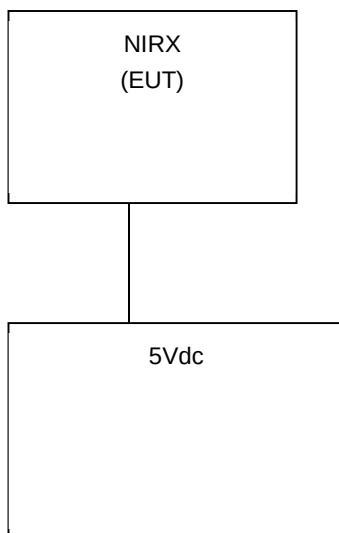
4 LIST OF TEST EQUIPMENT

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.	Instrument/ ancillary	Type of instrument/ ancillary	Manufacturer	Ref. no.	Cal. Date	Cal. Due
1	ESU40	EMI Receiver	Rohde & Schwarz	LR1639	2013.06	2014.06
2	3115	Antenna horn	EMCO	LR 1330	2014.01.05	2015.01.05
3	JB3	Antenna bilog	Sunol Sceiences Inc.	N-4525	2013.12	2014.12
4	8449B	Pre-amplifier	Hewlett Packard	LR 1322	2013.09.27	2014.09.27
5	LNA6900	Pre-amplifier	Teseq	LR 1593	2013.11	2014.11
6	6812B	Power Supply	Agilent	LR 1515	2013.10.28	2014.10.28
7	ESH3-Z2	Pulse Limiter	Rohde & Schwarz	N-3821	2013.11	2015.11
8	ESCS 30	Measuring Receiver	Rohde & Schwarz	N-3529	2013.08	2014.08
9	ESH3-Z5	Two Line V-Network	Rohde & Schwarz	N-3558	2013.02	2015.02
10	Model 87 V	Multimeter	Fluke	LR 1598	2012.12.14	2014.12.14
11	6810.17A	10 attenuator	Suhner	LR 1143	2012.09.15	2014.09.15
12	FA210A1010003030	Microwave cable	Rosenberger	LR1566	Cal b4 use	
13	6HC 1000-18000	HP Filter	Trithlic	-	Cal b4 use	
14	6HC 2500-18000	HP Filter	Trithlic	LR1615	Cal b4 use	
15	B32-10R	Power Supply	Oltronix	LR1021	Cal b4 use	

5 BLOCK DIAGRAM

5.1 System set up for radiated measurements



Test equipment: 1- 12

5.2 Test site radiated emission

