



FCC Test Report

FCC Part 15.247 for DSSS systems/ CANADA RSS-210

FOR:

MOBILE BASE STATION 2 LOW PROFILE (MBS2-LP)

MODEL #: MBS2-LP

WIRELESS MATRIX CORPORATION
12369-B SUNRISE VALLEY DRIVE
RESTON, VA 20191
U.S.A

FCC ID: P5IMBS2LP
IC ID: 1478A-MBS2LP

TEST REPORT #: EMC_1069_2005_WLAN
DATE: OCTOBER 27, 2005



TTI-P-G 081/94-A0

Accredited according to ISO/IEC 17025



Bluetooth Qualification
Test Facility
(BQTF)



FCC listed # 101450

IC recognized # 3925

CETECOM Inc.

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1 Assessment

The following is in compliance with the applicable criteria specified in FCC rules Part 15.247 of the Code of Federal Regulations and in compliance with the applicable criteria specified in Industry Canada rules RSS210.

Company	Description	Model #
WIRELESS MATRIX CORP.	MOBILE BASE STATION 2 LOW PROFILE (MBS2-LP)	MBS2-LP



2005-10-27
Neelesh Raj
Project Leader



2005-10-27
Lothar Schmidt
Test Lab Manager

The test results of this test report relate exclusively to the test item specified in Identification of the Equipment under Test. The CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of the CETECOM Inc USA.



2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	EMC
Address:	411 Dixon Landing Road Milpitas, CA 95035 U.S.A.
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
Responsible Test Lab Manager:	Lothar Schmidt
Responsible Project Leader:	Neelesh Raj
Date of test:	2005-10-10 to 2005-10-11

2.2 Identification of the Client

Applicant's Name:	Wireless Matrix Corporation
Street Address:	12369-B Sunrise Valley Drive
City/Zip Code	Reston, VA 20164
Country	USA
Contact Person:	Darryl Strucko
Phone No.	703.262.4021
Fax:	703.262.3085
e-mail:	Darryl.strucko@wrx-us.com

2.3 Identification of the Manufacturer

Manufacturer's Name:	Wireless Matrix Corporation
Manufacturers Address:	12369-B Sunrise Valley Drive
City/Zip Code	Reston, VA 20191
Country	USA

3 Equipment under Test (EUT)

3.1 Identification of the Equipment under Test

Marketing Name:	Mobile Base Station 2 Low Profile (MBS2-LP)
Description:	Satellite, GPRS, 802.11, GPS in one unit with RS-232 and Ethernet capabilities.
Model No:	MBS2-LP
FCC ID:	P5IMBS2LP
IC ID:	1478A-MBS2LP
Frequency Range:	2400-2483.5MHz
Type(s) of Modulation:	CCK (802.11b)
Number of Channels:	11
Antenna Type:	ELEVATED DIPOLE KEYFOB(RX ONLY), INVERTED F
Output Power:	0.641W EIRP@2412MHz



4 Subject Of Investigation

The objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT as specified by requirements listed in FCC rules Part 15.247 of Title 47 of the Code of Federal Regulations and Industry Canada rules RSS210.

The EUT carries pre-certified CISCO WLAN module model# AIR-LMC352 with FCC ID: LDK102040 & IC ID: 24611032079A317.

This test report covers full radiated testing as per FCC 15.247 on EUT with WLAN module. All conducted measurements are covered under *test report# MFA_p0080005*.

5 Measurements

5.1 MAXIMUM PEAK OUTPUT POWER § 15.247 (RADIATED)

5.1.1 LIMIT SUB CLAUSE § 15.247 (b) (1) (2) (3) (4)

Frequency range	RF power output
2400-2483.5 MHz	36dBm EIRP

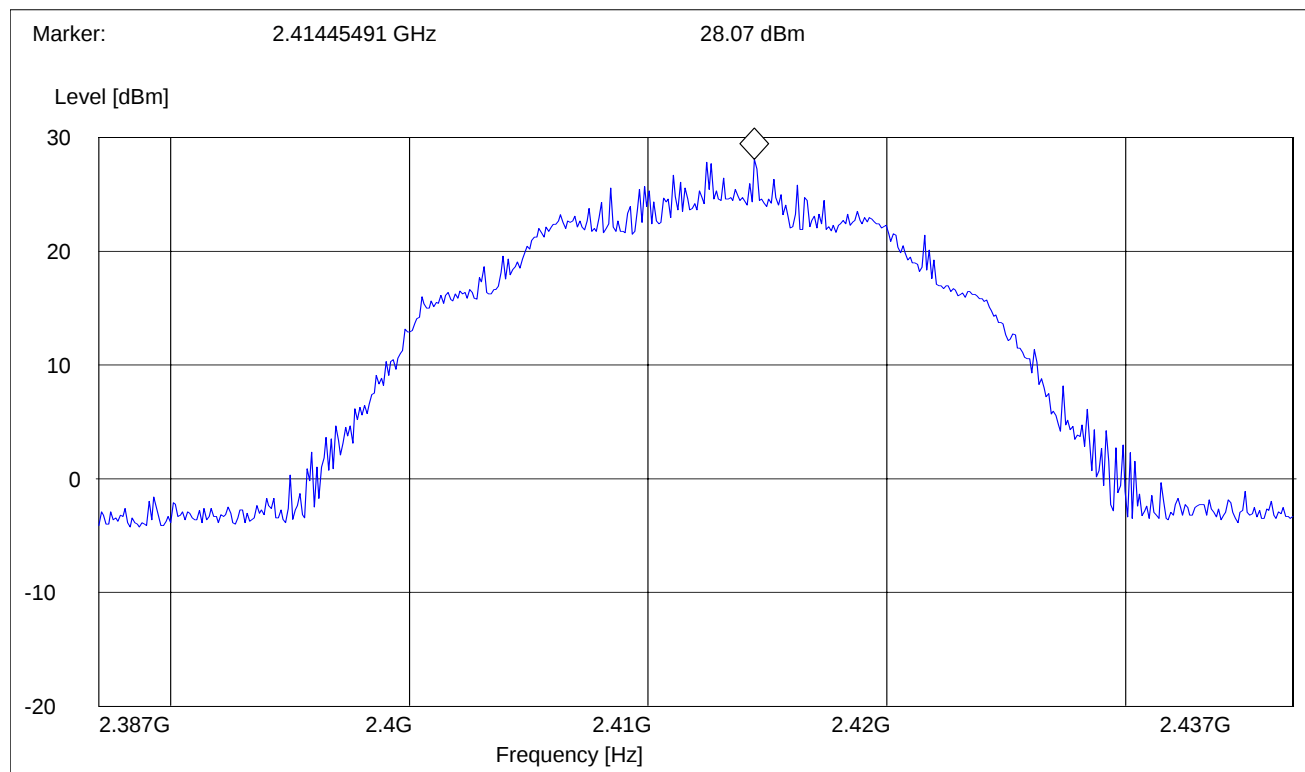
*limit is based upon antenna gain of less than or equal to 6dBi.

5.1.2 EIRP b MODE:

TEST CONDITIONS		MAXIMUM PEAK OUTPUT POWER (dBm)		
Frequency (MHz)		2412	2437	2462
T _{nom} (23)°C	V _{nom} VDC	28.07	27.87	27.71
Measurement uncertainty		±0.5dBm		

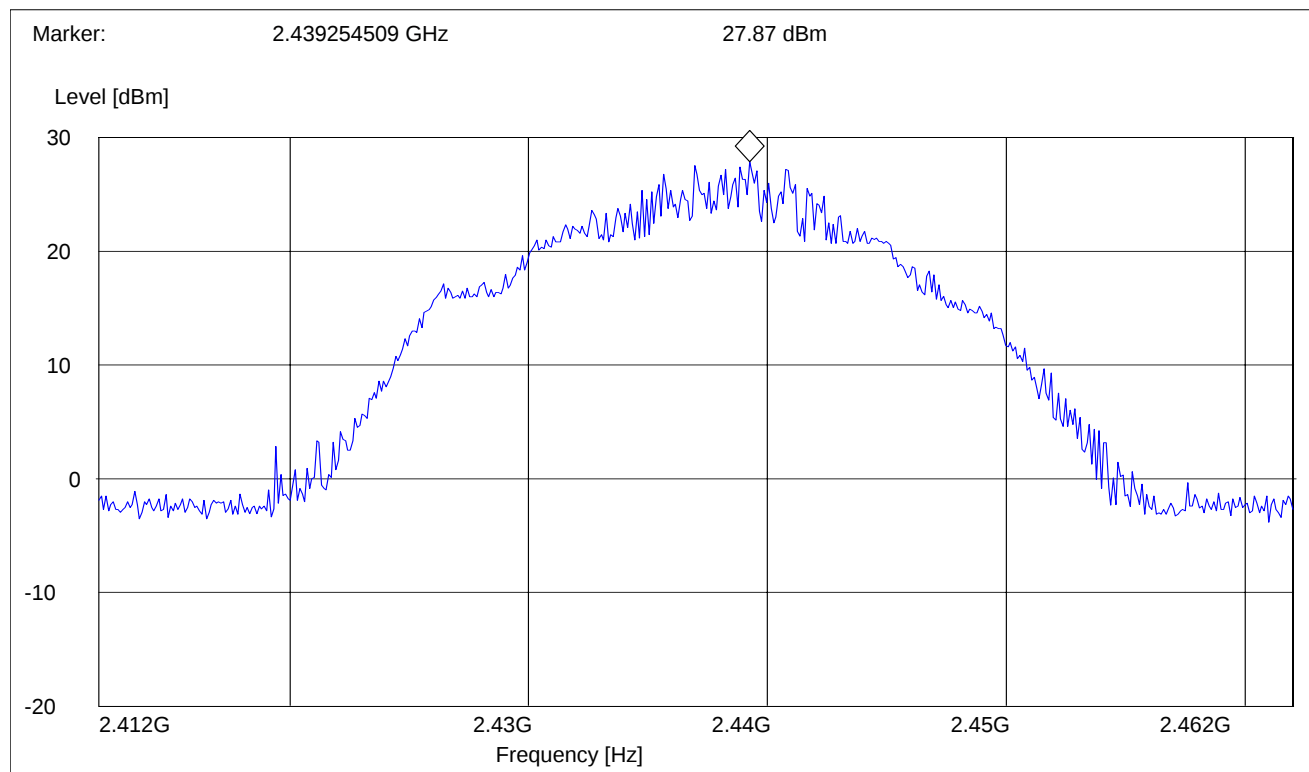
EIRP b Mode (2412MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
2387 MHz	2437 MHz	Max Peak	Coupled	10 MHz



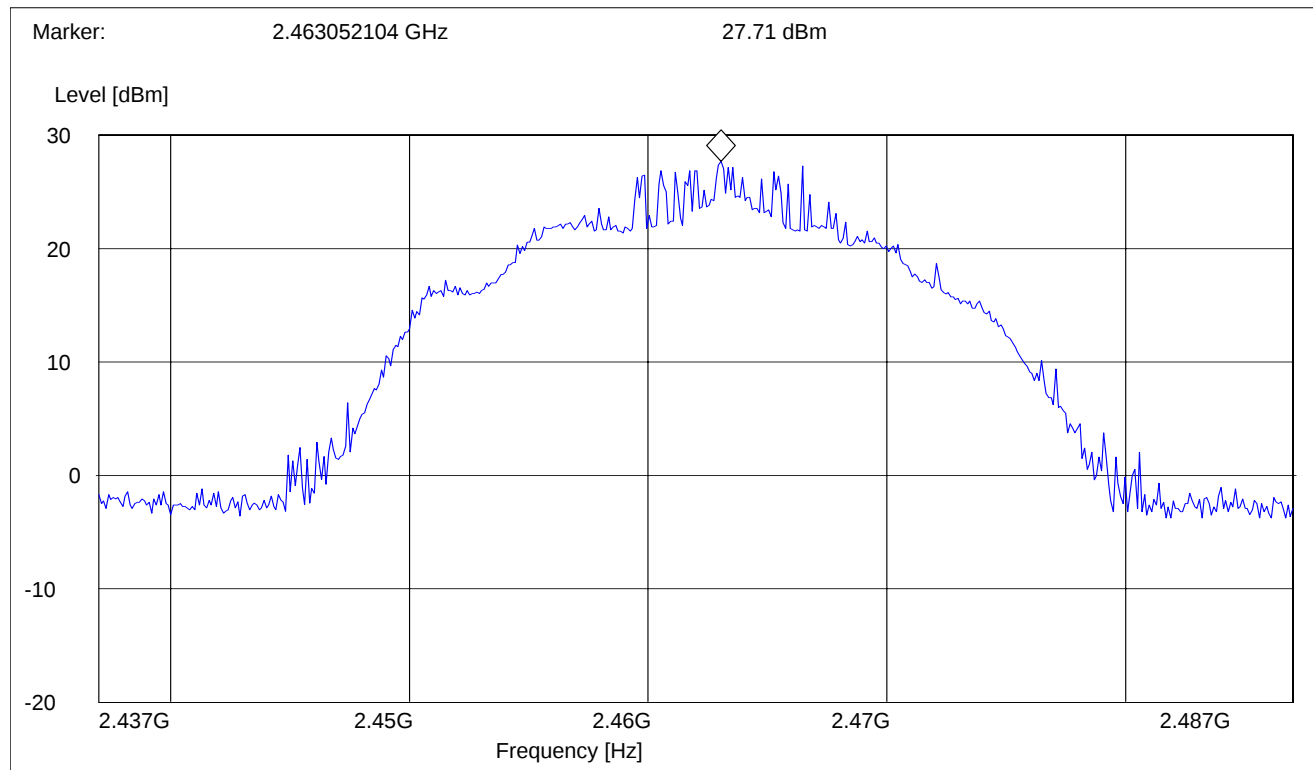
EIRP b Mode (2437MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
2312 MHz	2462 MHz	Max Peak	Coupled	10 MHz



EIRP b Mode (2462MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	IF BW
2437 MHz	2487 MHz	Max Peak	Coupled	10 MHz



5.2 RESTRICTED BAND EDGE COMPLIANCE RADIATED §15.247/15.205

5.2.1 LIMITS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

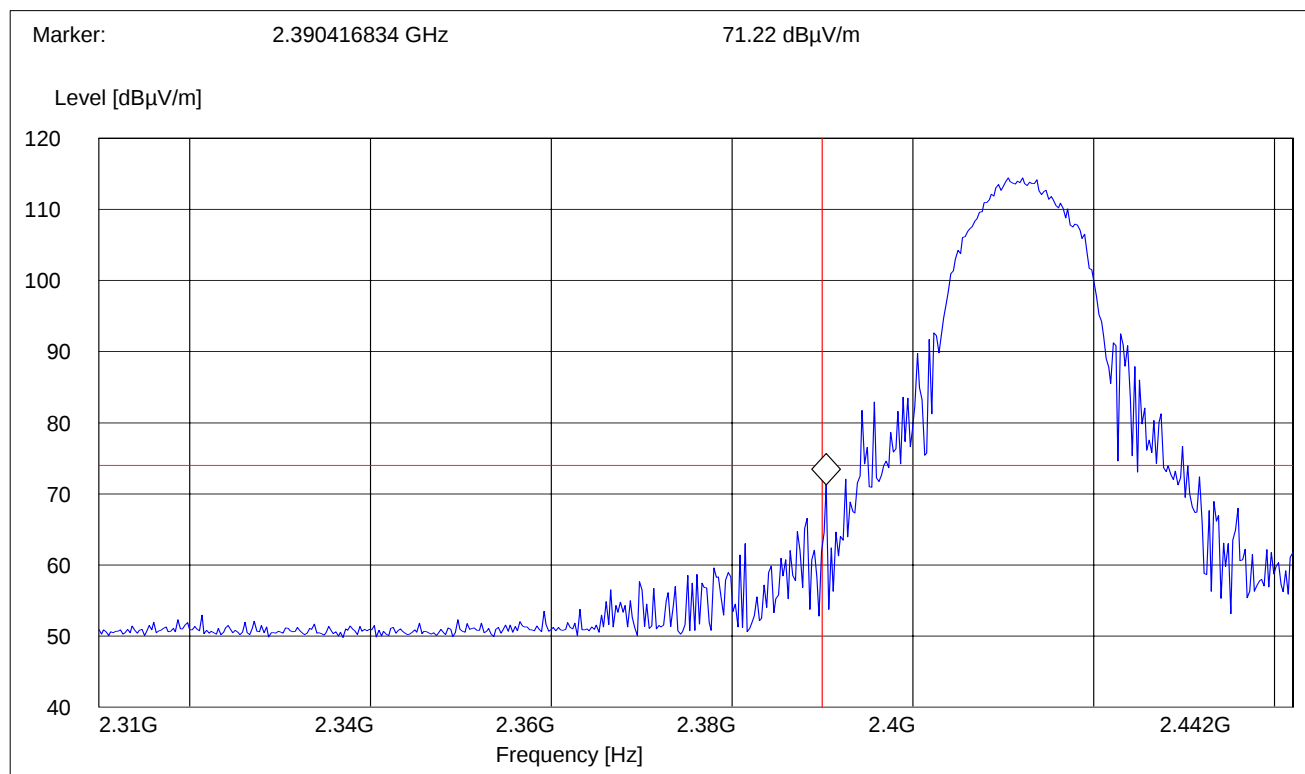
MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

*PEAK LIMIT= 74dBuV

*AVG. LIMIT= 54dBuV

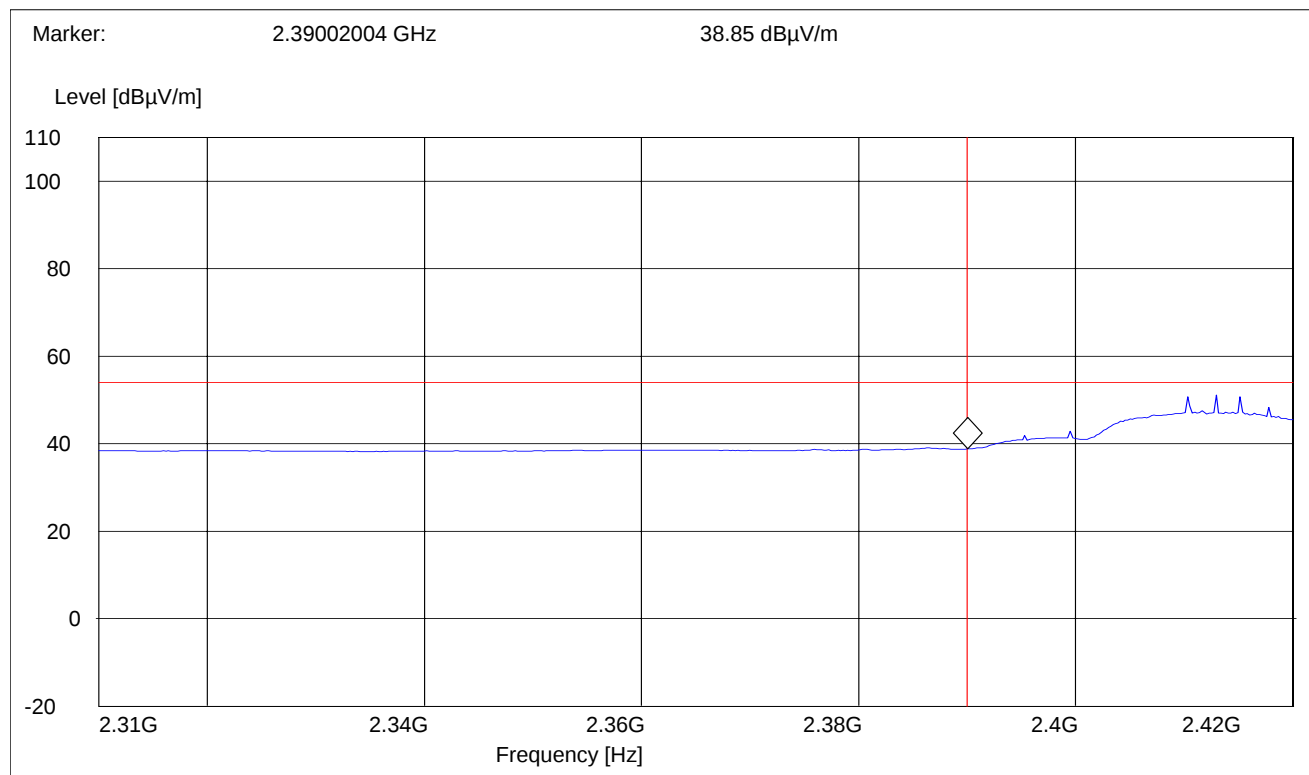
5.2.2 b MODE (2412MHz)**PEAK**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
2310 MHz	2412 MHz	Max Peak	Coupled	1 MHz	1 MHz



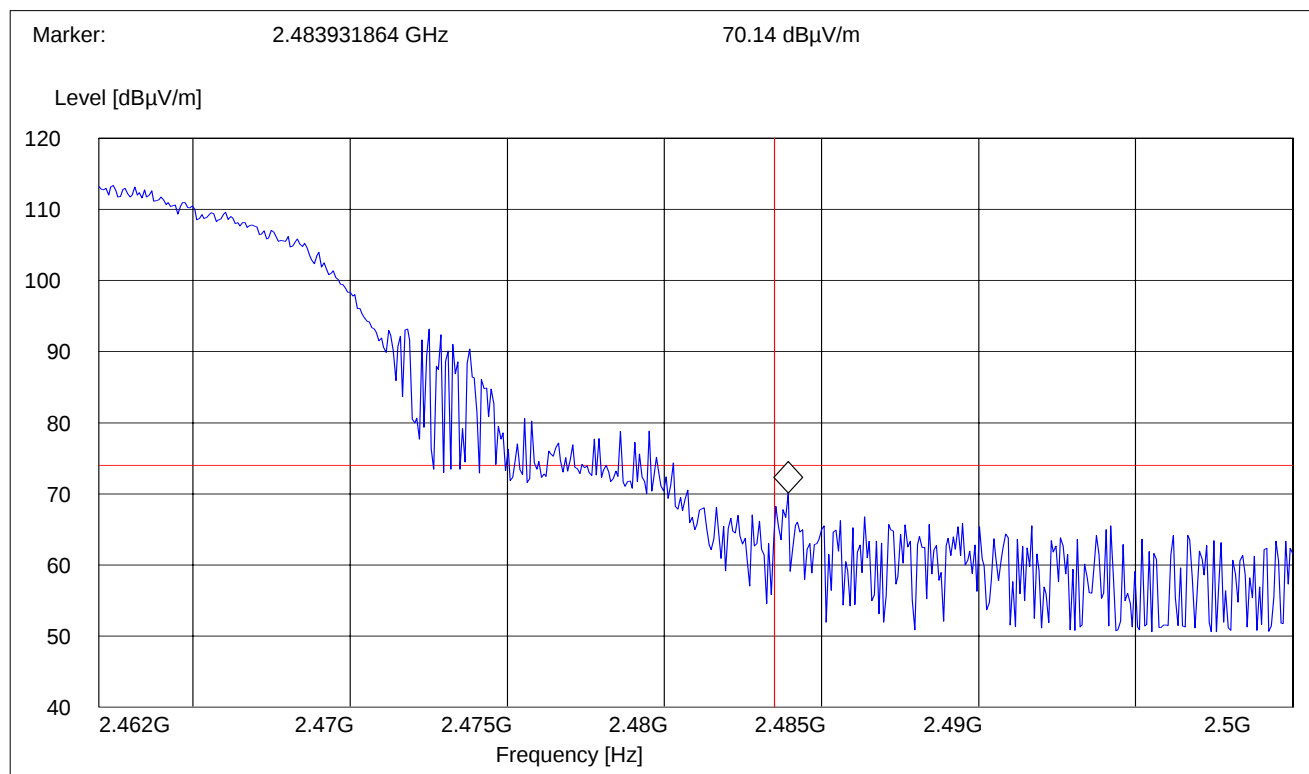
AVG

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
2310 MHz	2412 MHz	Max Peak	Coupled	1 MHz	10 Hz



5.2.3 b MODE (2462MHz)**PEAK**

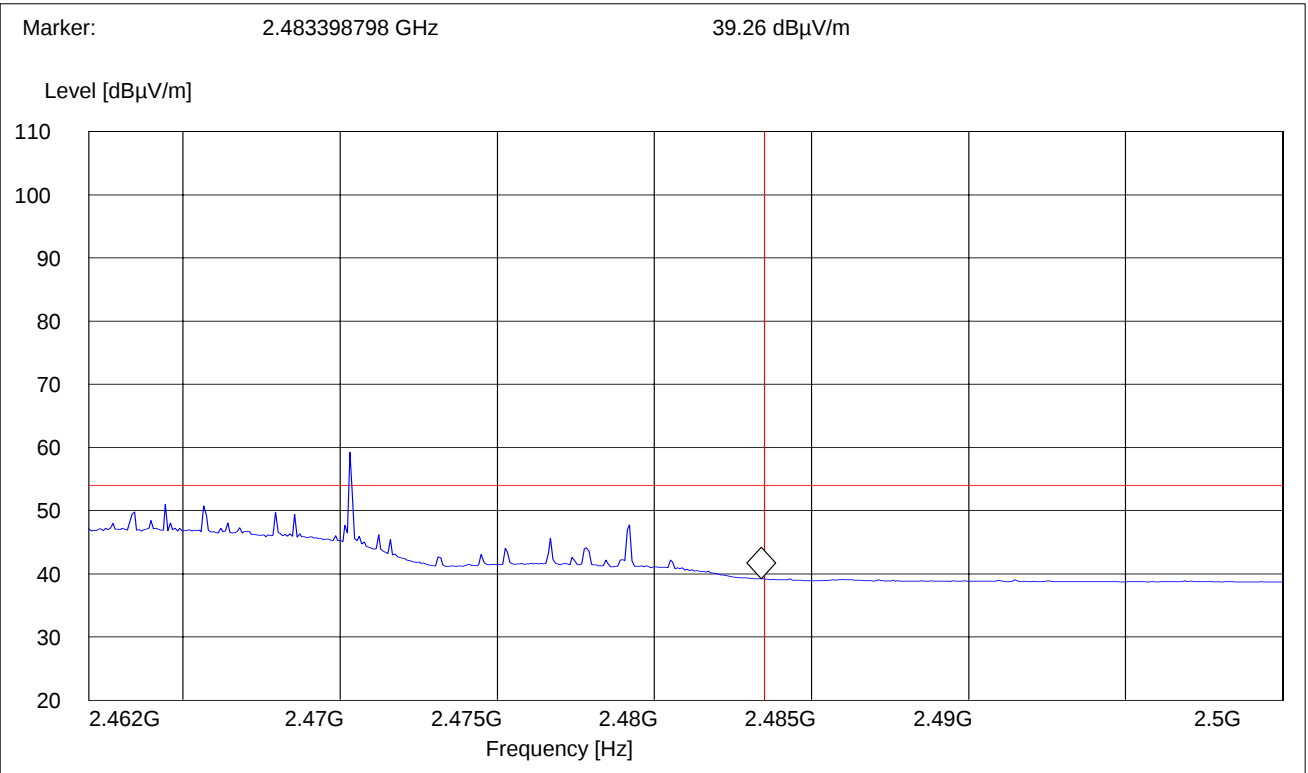
Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
2462 MHz	2500 MHz	Max Peak	Coupled	1 MHz	1 MHz





AVG

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
2462 MHz	2500 MHz	Max Peak	Coupled	1 MHz	10 Hz



5.3 TRANSMITTER SPURIOUS EMISSIONS RADIATED § 15.247/15.205/15.209

5.3.1 LIMITS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

***PEAK LIMIT= 74dBuV**

***AVG. LIMIT= 54dBuV**

NOTE:

1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3 and 25 GHz very short cable connections to the antenna was used to minimize the noise level.

2. All measurements are done in peak mode using a quasi-peak/average limit , unless specified with the plots.

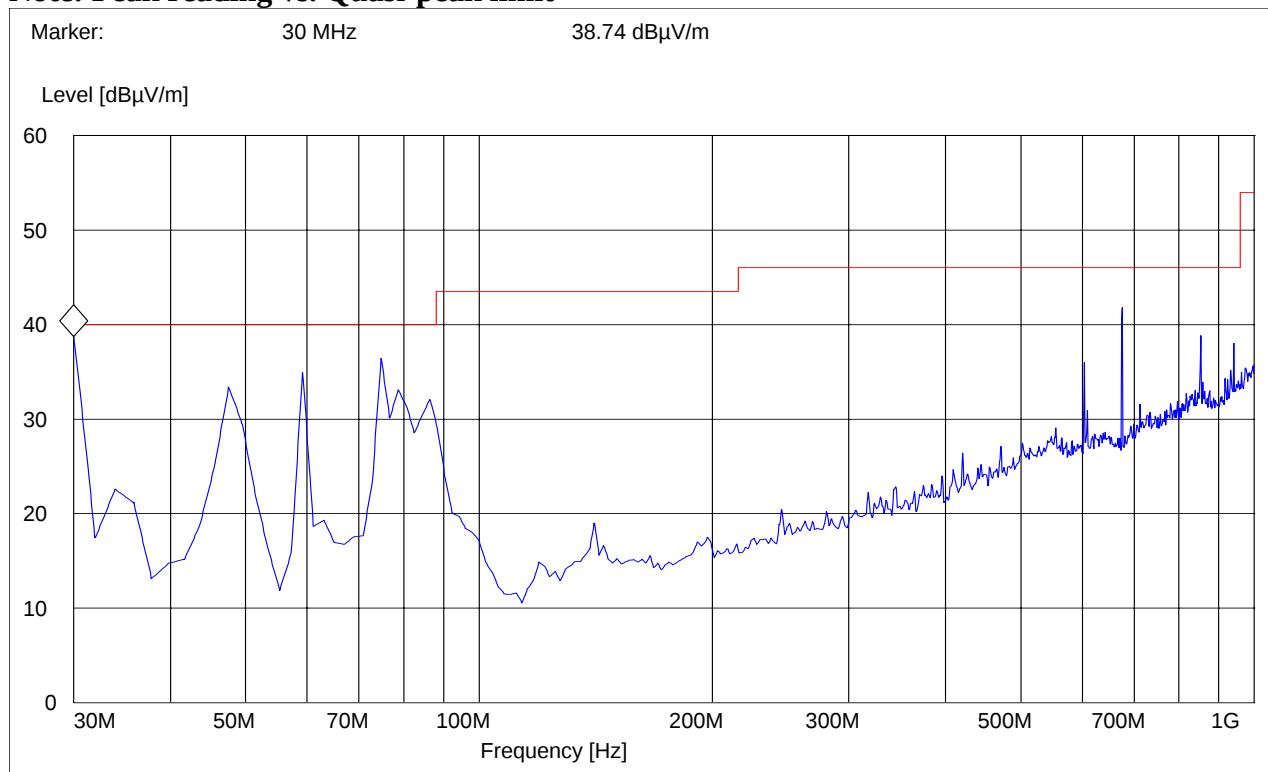
Results for the radiated measurements below 30MHz according § 15.33

Frequency	Measured values	Remarks
9KHz – 30MHz	No emissions found, caused by the EUT	This is valid for all the tested channels

5.3.2 RESULTS b MODE

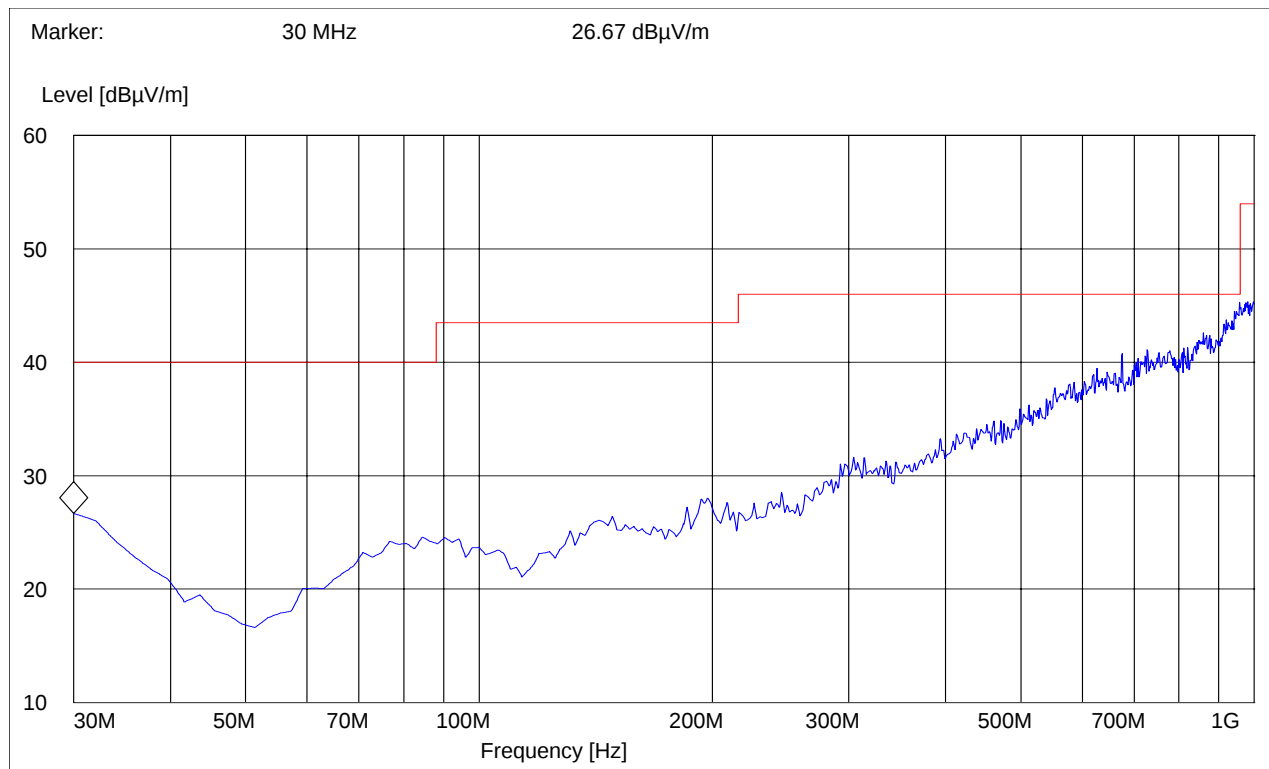
30MHz – 1GHz**Antenna: vertical**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

Note: This plot is valid for low, mid, high channels (worst-case plot)**Note: Peak reading vs. Quasi-peak limit**

30MHz – 1GHz**Antenna: horizontal**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

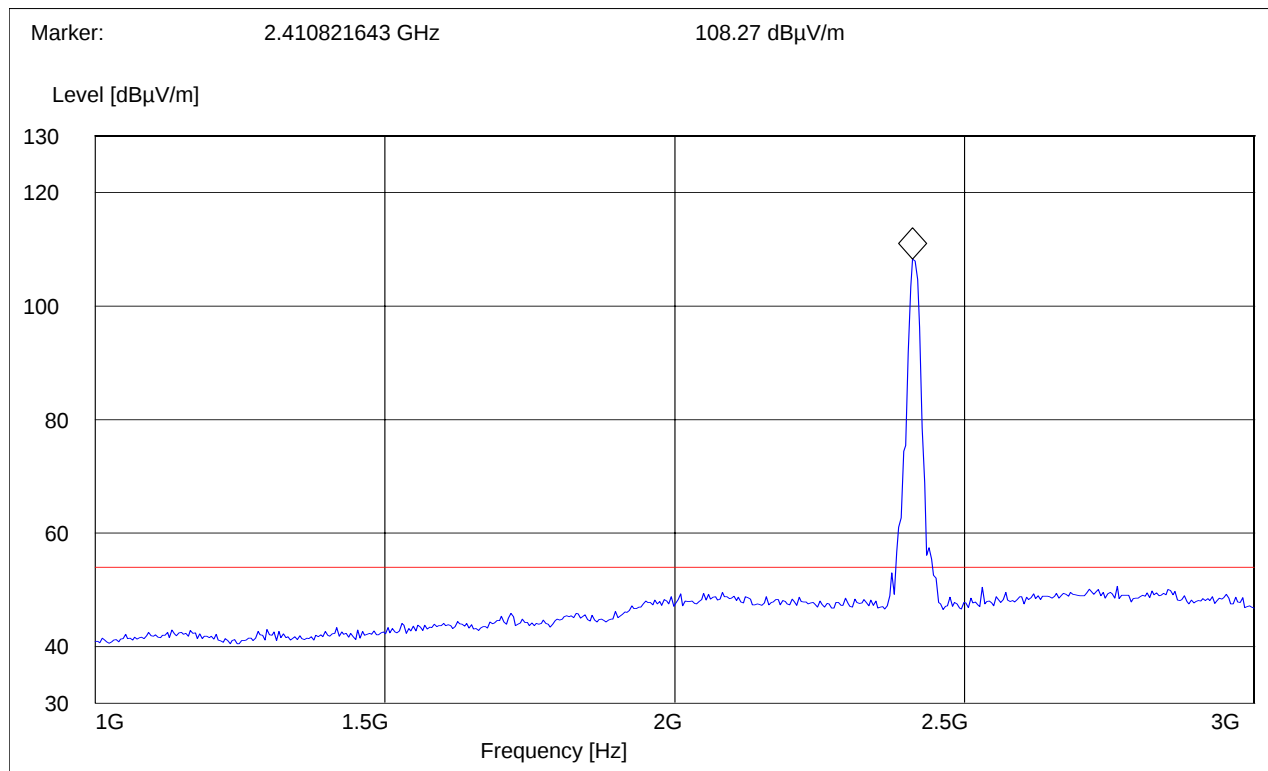
Note: This plot is valid for low, mid, high channels (worst-case plot)**Note: Peak reading vs. Quasi-peak limit**

1-3GHz (2412MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz

Note: The peaks above the limit line is the carrier freq.

Note: Peak Reading vs. Average limit

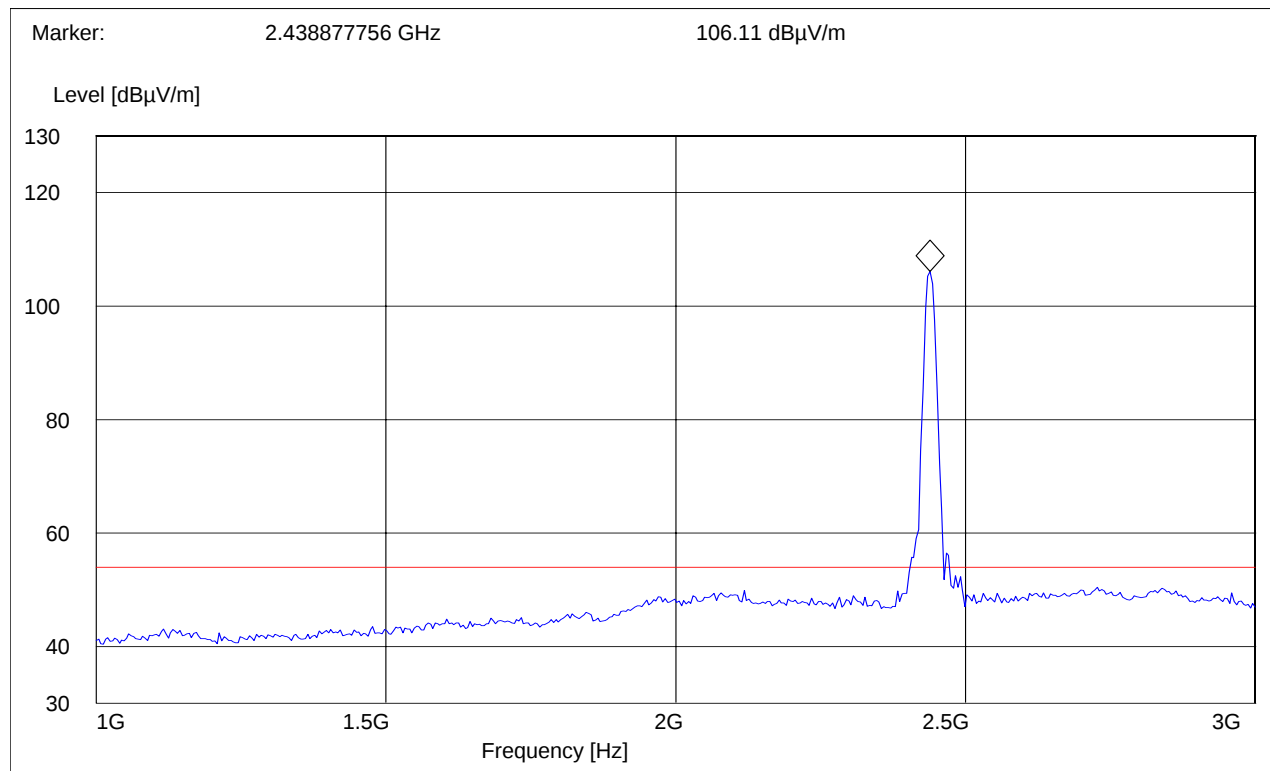


1-3GHz (2437MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz

Note: The peaks above the limit line is the carrier freq.

Note: Peak Reading vs. Average limit

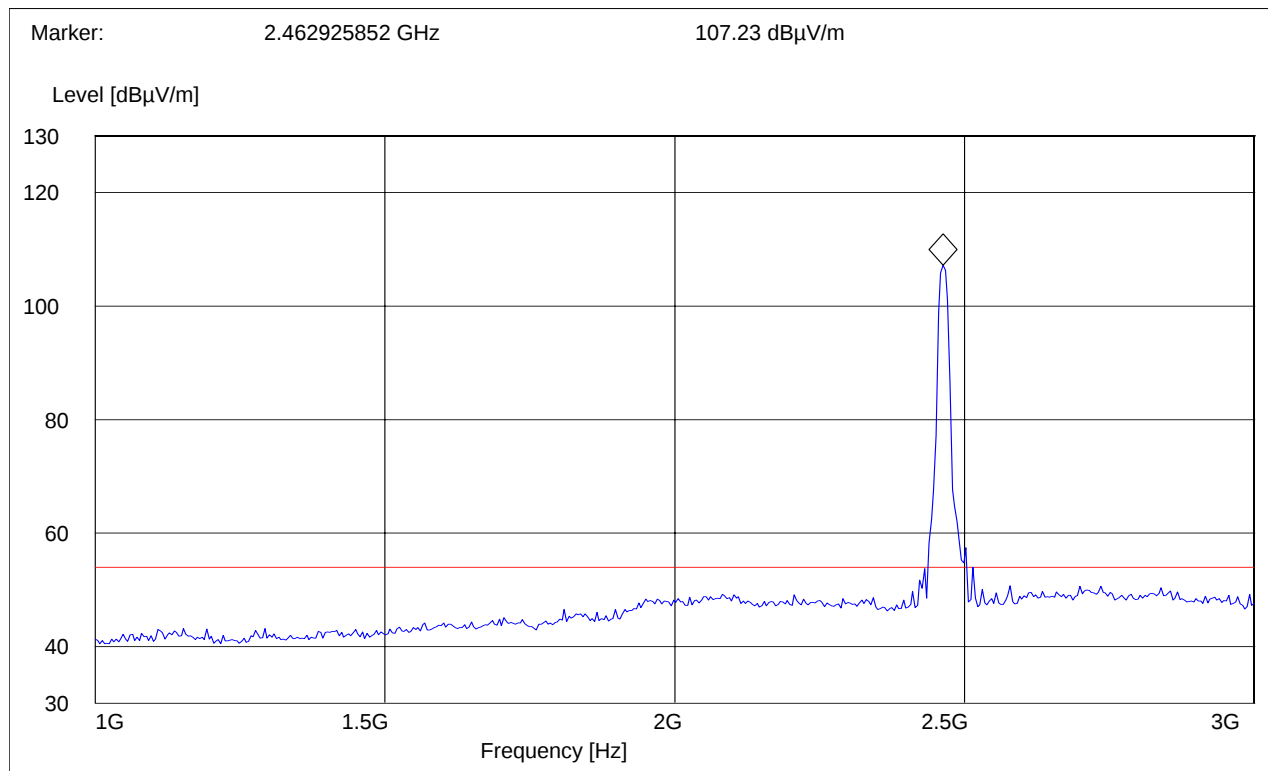


1-3GHz (2462MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz

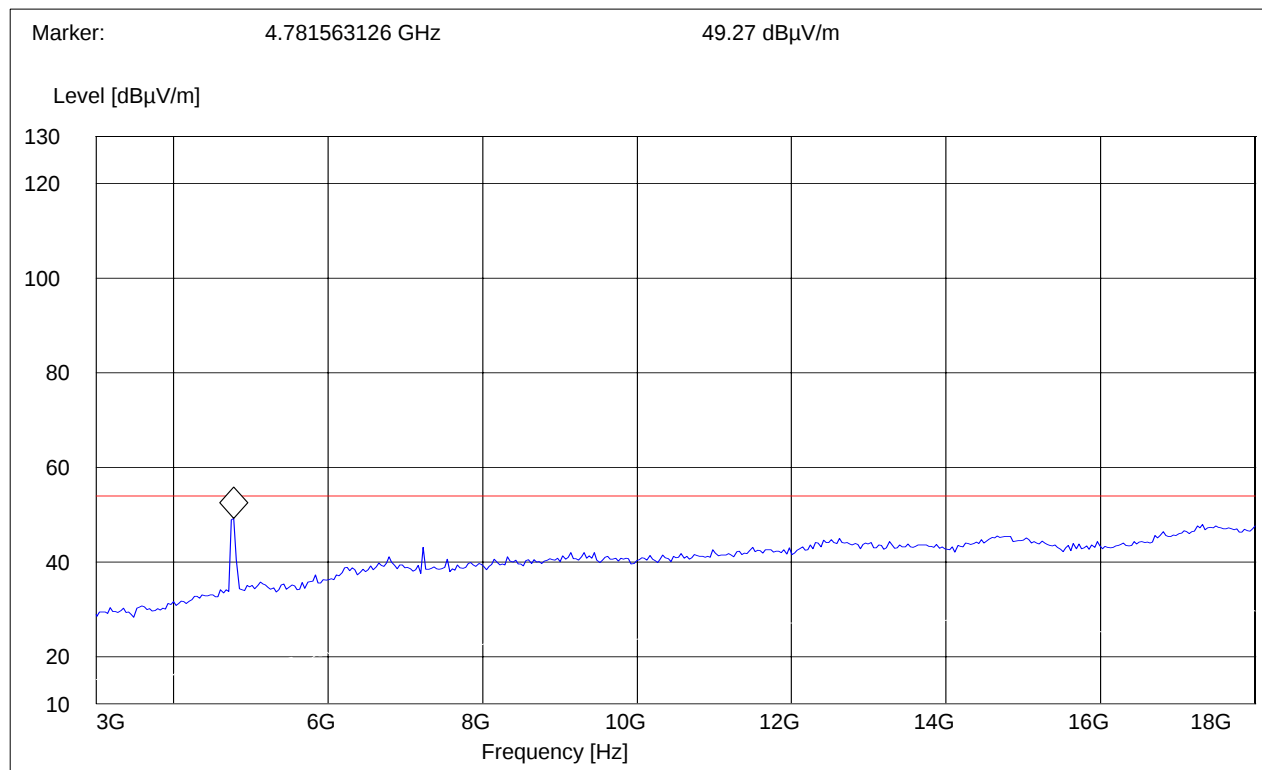
Note: The peaks above the limit line is the carrier freq.

Note: Peak Reading vs. Average limit



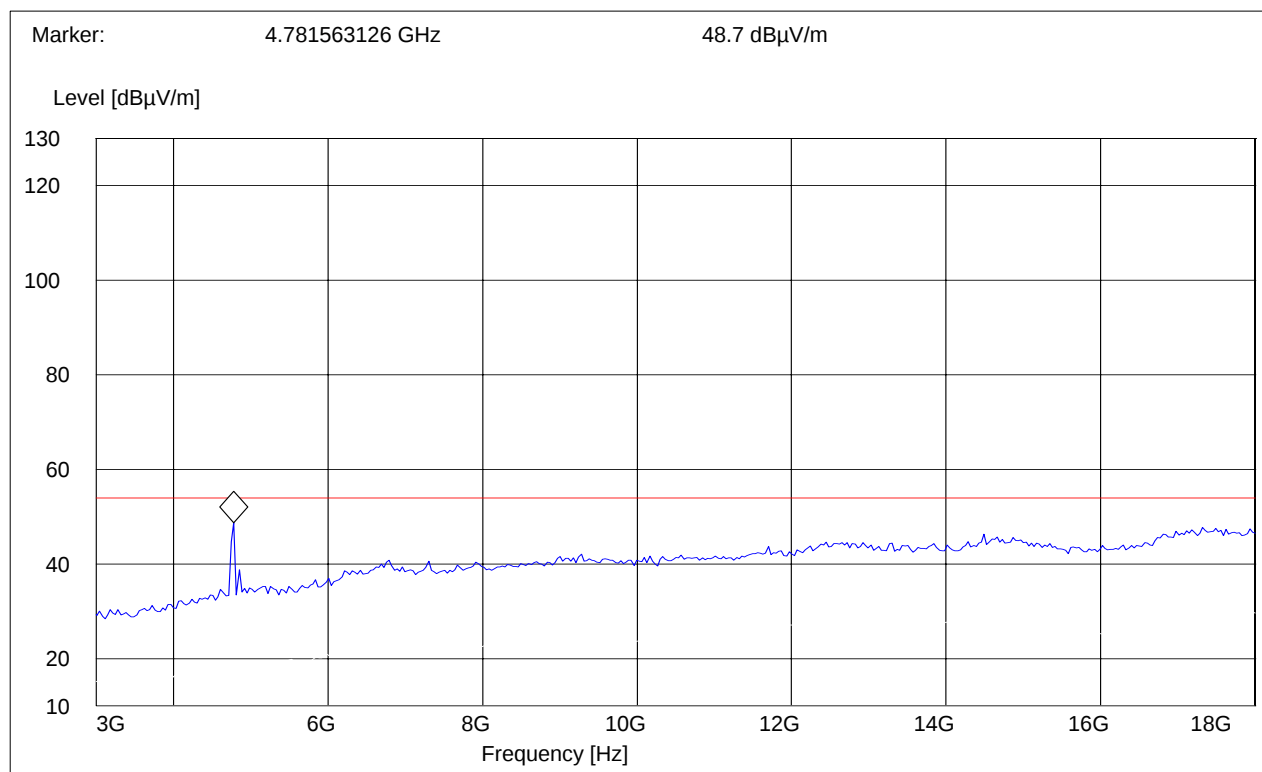
3-18GHz (2412MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz

Note: Peak Reading vs. Average limit

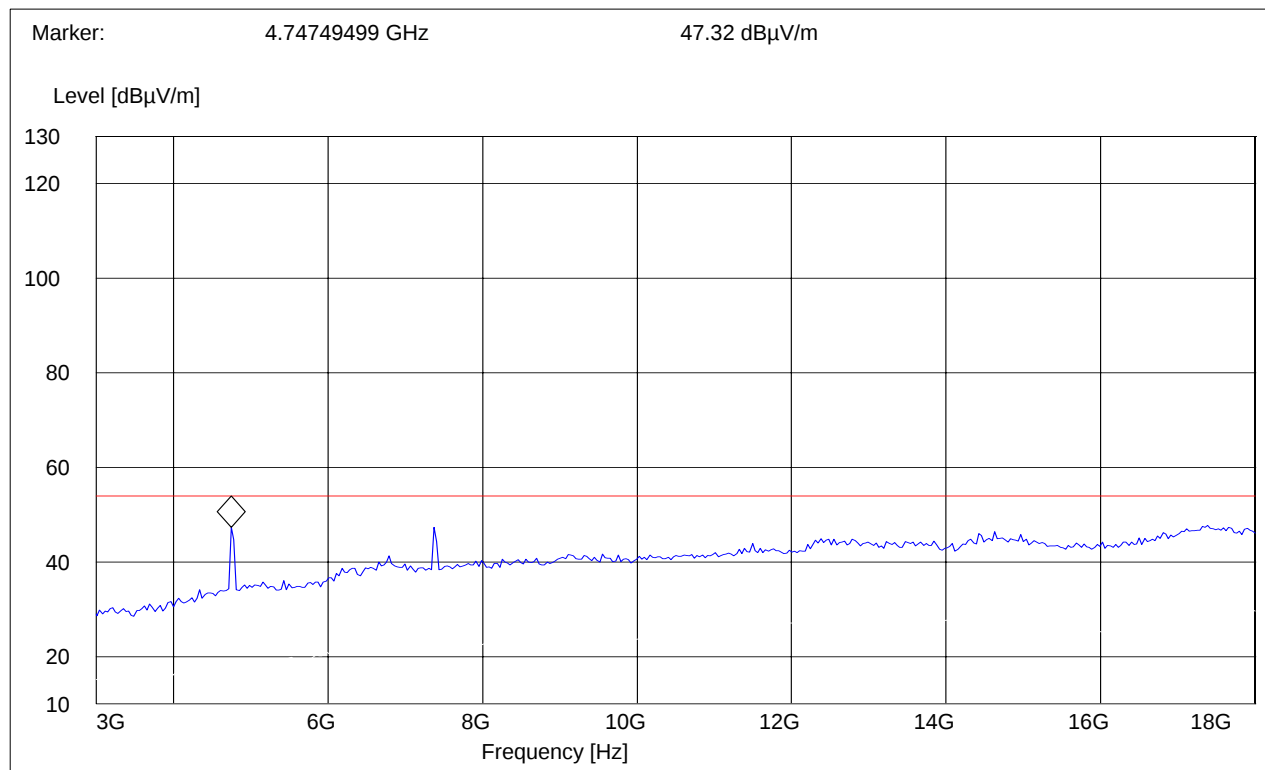
3-18GHz (2437MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz

Note: Peak Reading vs. Average limit

3-18GHz (2462MHz)

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz

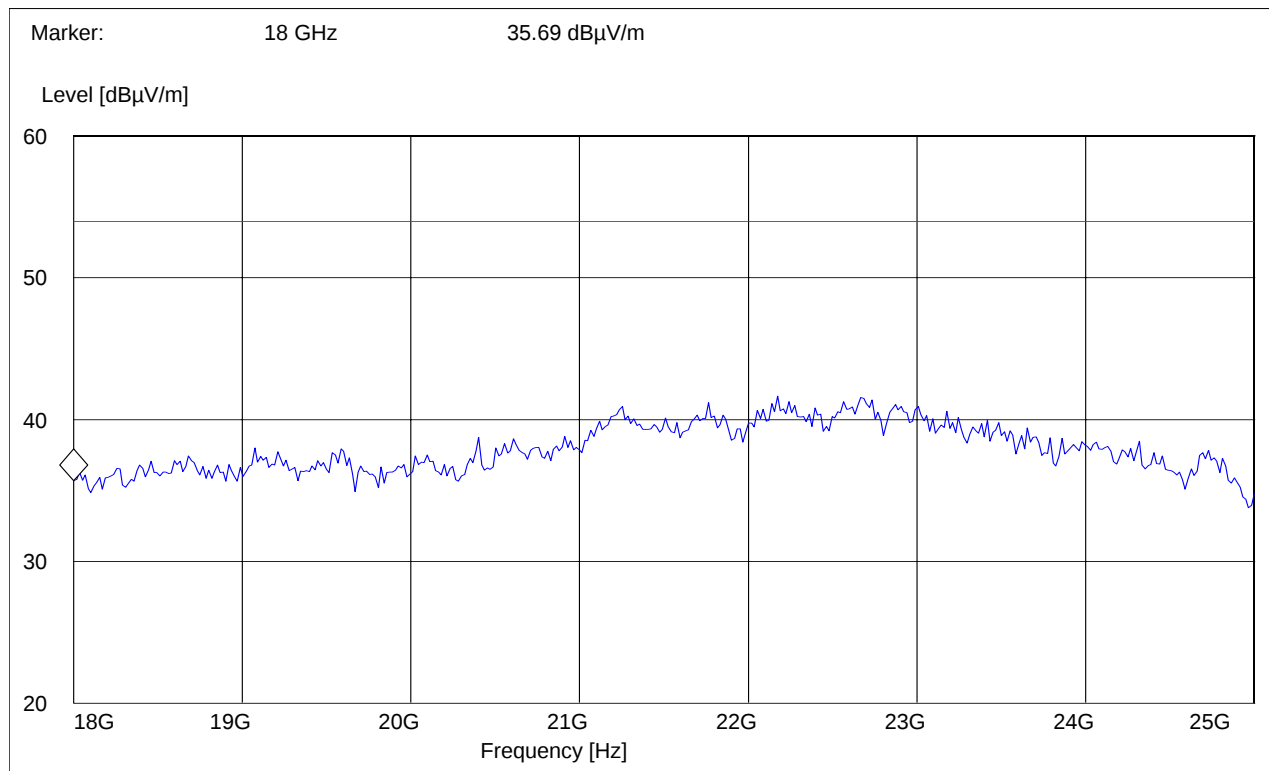
Note: Peak Reading vs. Average limit

18-25GHz

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
18GHz	25GHz	Max Peak	Coupled	1 MHz	1 MHz

Note: This plot is valid for low, mid, high channels (worst-case plot)

Note: Peak Reading vs. Average limit



5.4 RECEIVER SPURIOUS RADIATION § 15.209/RSS210

5.4.1 LIMITS

Frequency (MHz)	Field strength (µV/m)	Measurement distance (m)
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
above 960	500	3

NOTE:

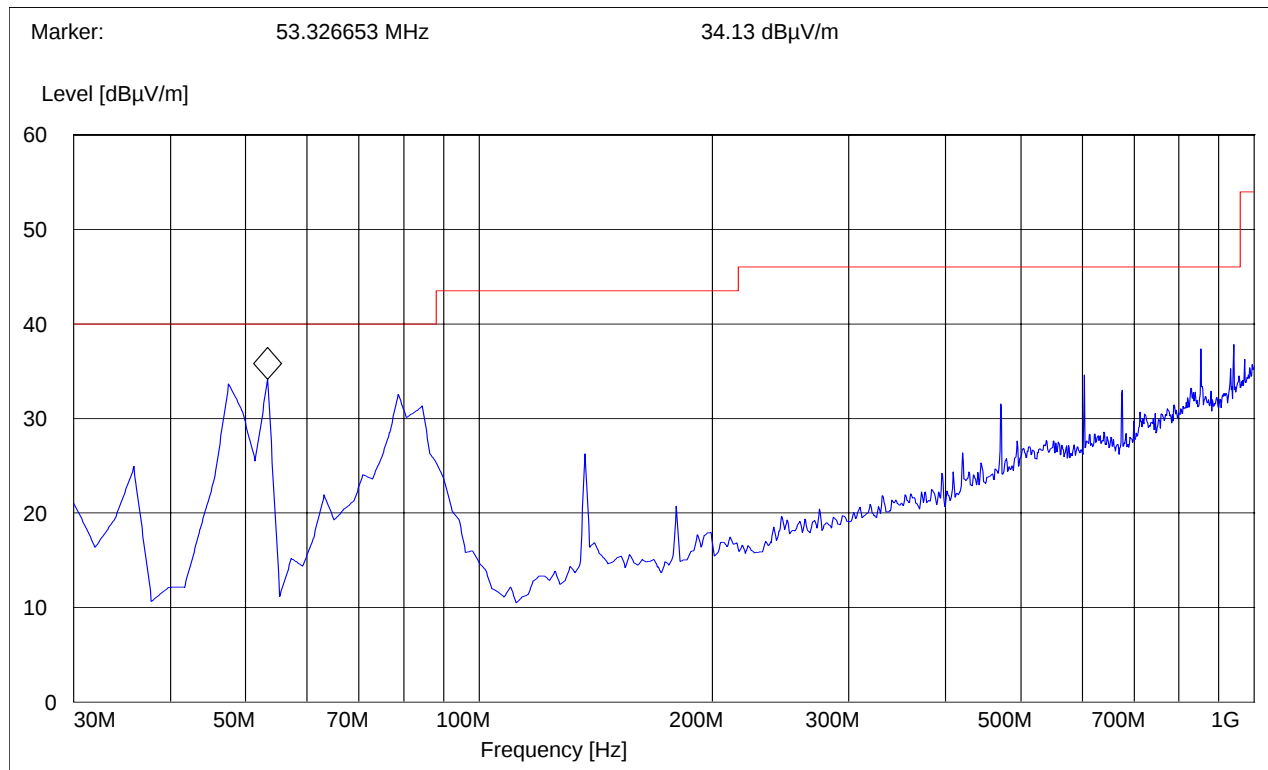
1. The radiated emissions were done with different settings, using the relevant pre-amplifiers for the relevant frequency ranges. This is the reason that the graphs show different noise levels. In the range between 3 and 25 GHz very short cable connections to the antenna was used to minimize the noise level.

2. All measurements are done in peak mode using a quasi-peak/average limit , unless specified with the plots.

5.4.2 RESULTS

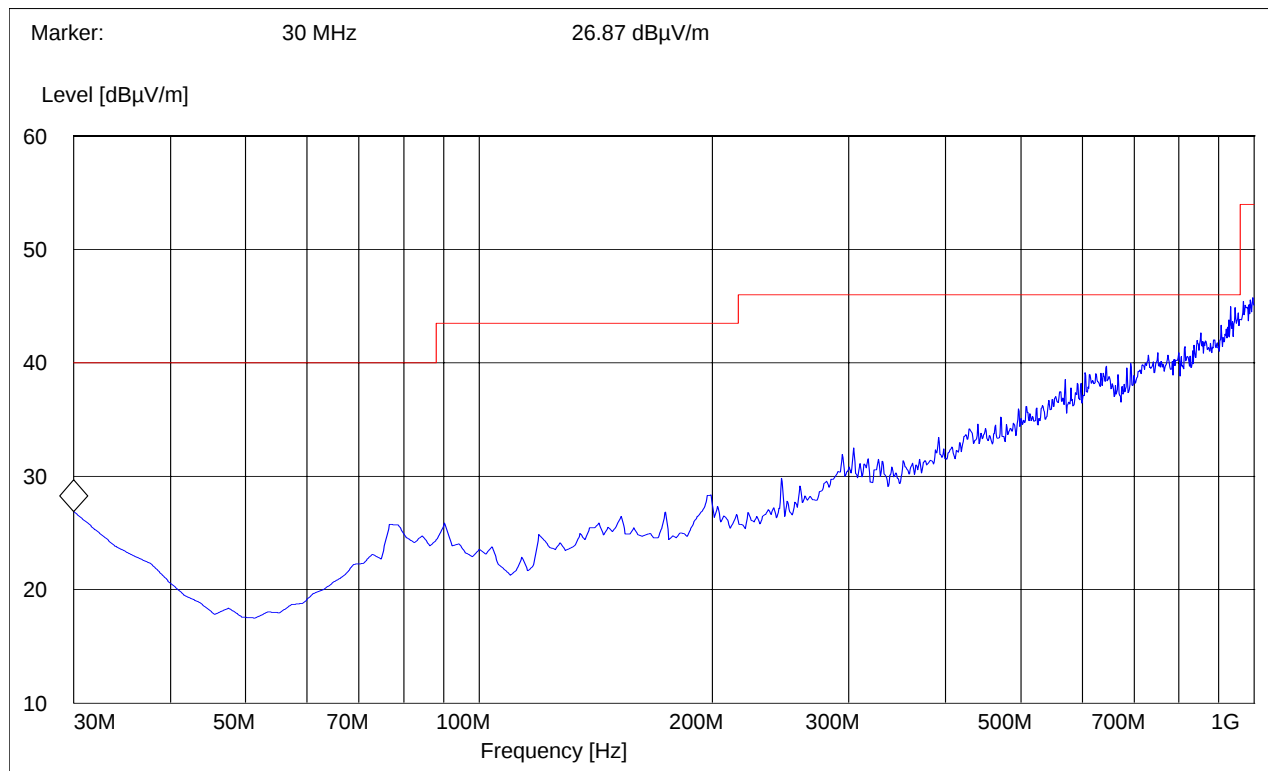
30MHz – 1GHz**Antenna: vertical**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

Note: Peak Reading vs. Quasi-peak limit

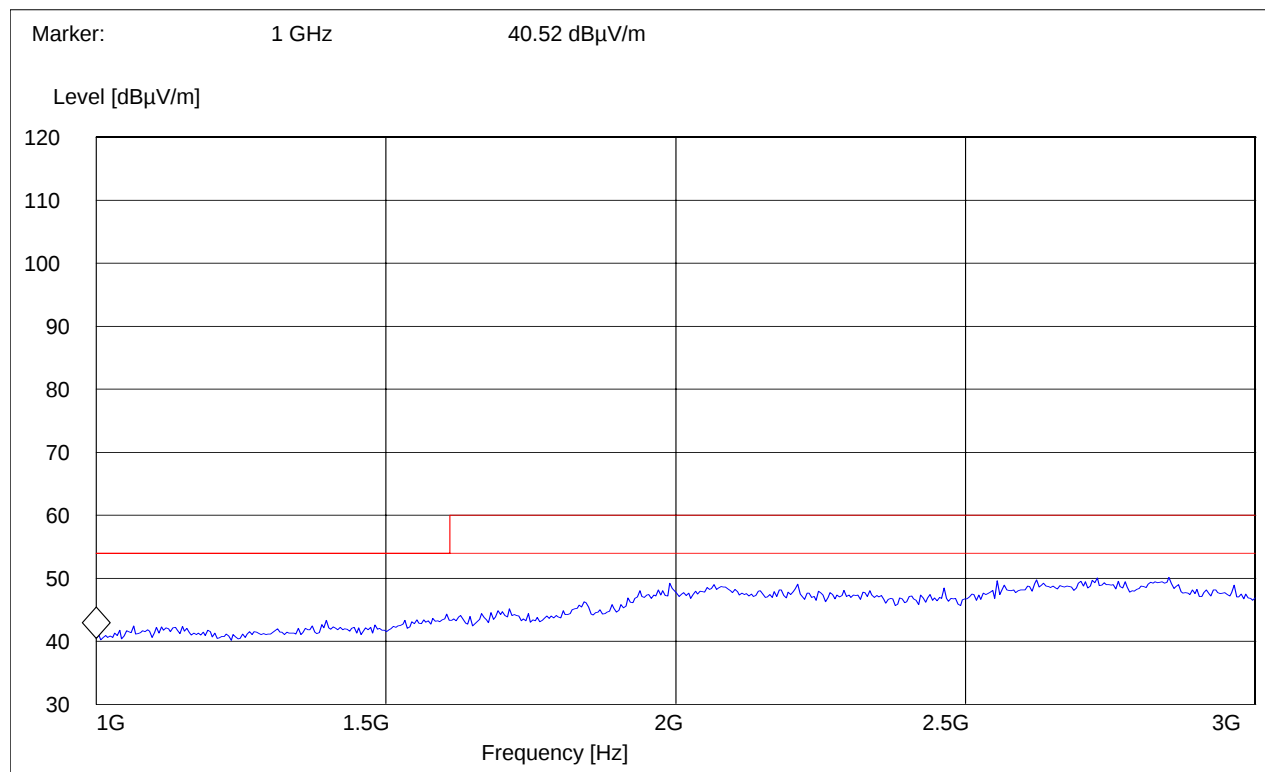
30MHz – 1GHz**Antenna: horizontal**

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
30MHz	1GHz	Max Peak	Coupled	100 KHz	100 KHz

Note: Peak Reading vs. Quasi-peak limit

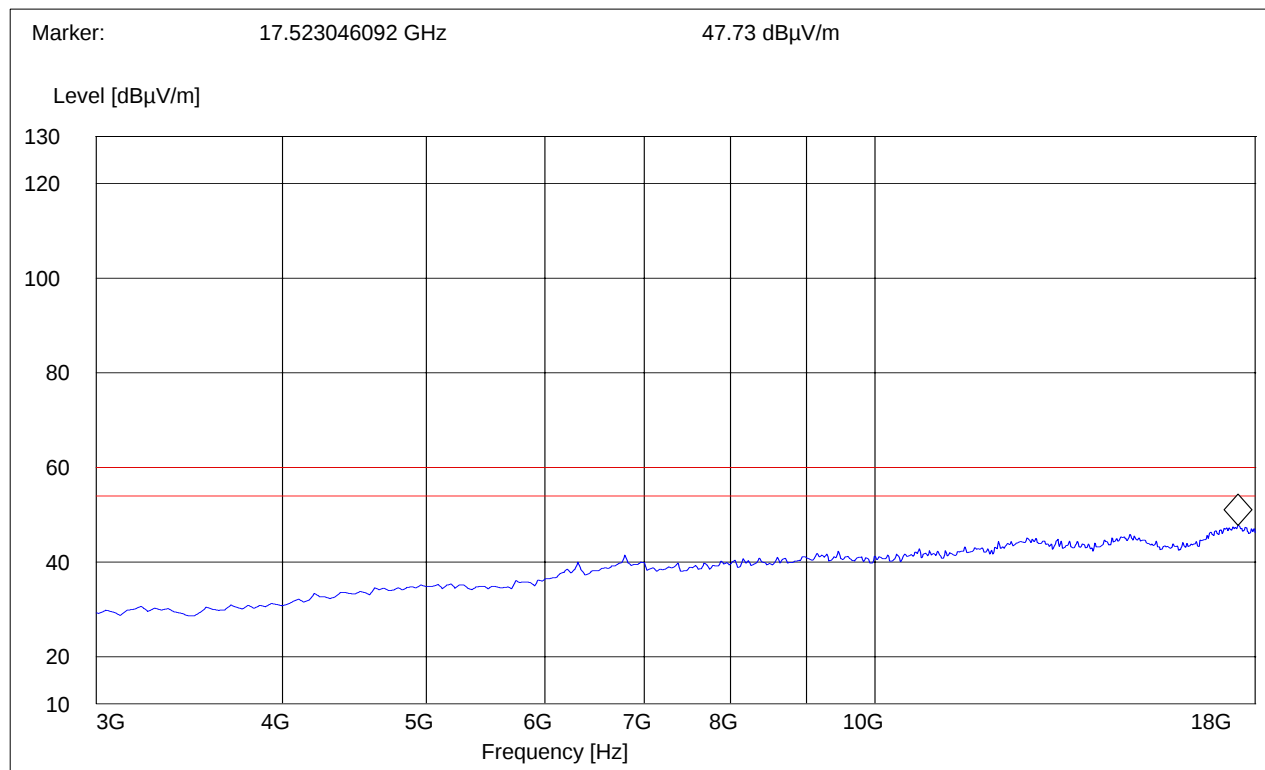
1-3GHz

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
1GHz	3GHz	Max Peak	Coupled	1 MHz	1 MHz

Note: Peak Reading vs. Average limit

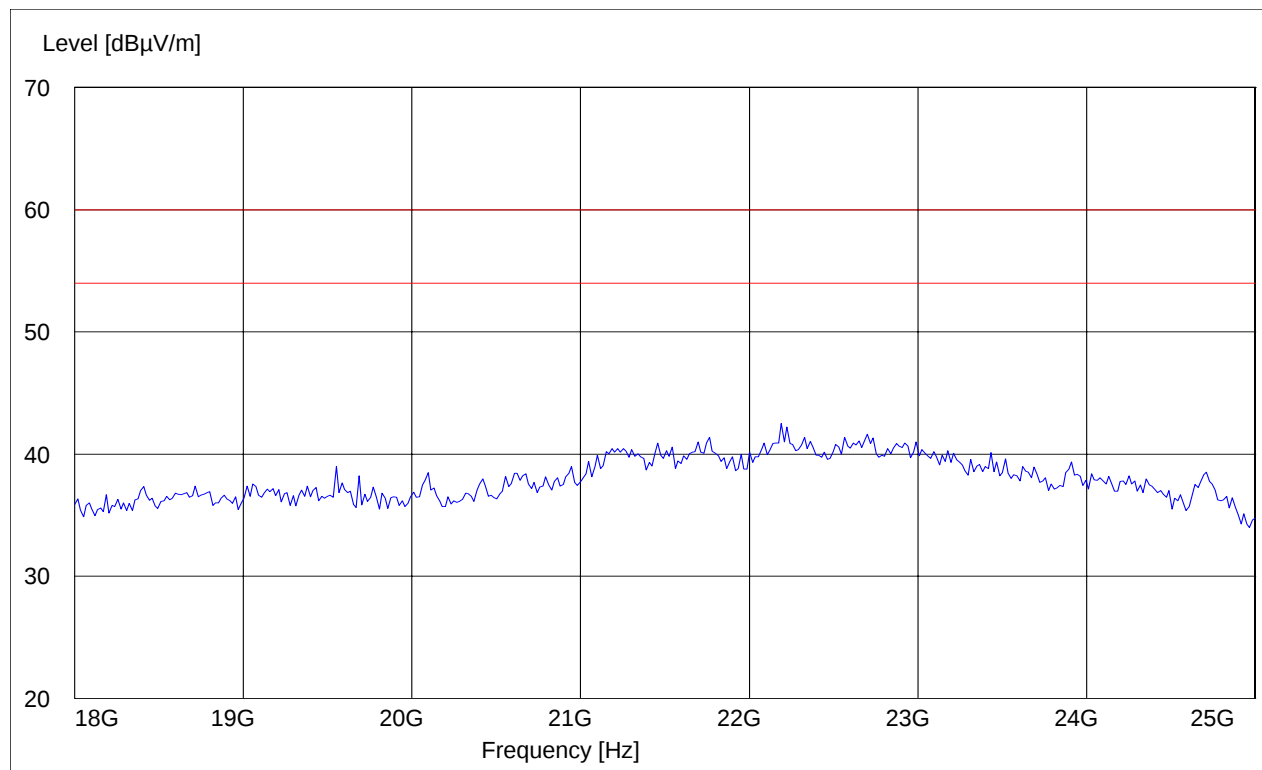
3-18GHz

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
3GHz	18GHz	Max Peak	Coupled	1 MHz	1 MHz

Note: Peak Reading vs. Average limit

18-25GHz

Start Frequency	Stop Frequency	Detector	Meas. Time	RBW	VBW
18GHz	25GHz	Max Peak	Coupled	1 MHz	1 MHz

Note: Peak Reading vs. Average limit

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5.5 AC POWER LINE CONDUCTED EMISSIONS § 15.107/207

This test does not apply to this EUT

5.6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Type	Manufacturer	Serial No.
01	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	826880/010
03	Biconilog Antenna	3141	EMCO	0005-1186
04	Horn Antenna (700M-18GHz)	SAS-200/571	AH Systems	325
05	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240
06	2-3GHz Band reject filter	BRM50701	Microtronics	6
07	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02
08	Pre-Amplifier	TS-ANA	Rohde & Schwarz	--
09	Pre-Amplifier	JS4-00102600	Miteq	00616

5.7 BLOCK DIAGRAMS

Radiated Testing

