



Test Report

FCC Part 15.247

Industry Canada RSS210

DTS Devices operating in range 2400-2483.5MHz & 5725-5850 MHz

Model #: PCG-31111L

**Sony Corporation
1-7-1 Konan, Minato-ku,
Tokyo, 108-0075**

Japan

FCC ID: AK8PCG31111L

IC ID: 409B-PCG31111L

TEST REPORT #: EMC_SONYE_034_09002_15.247_PCG31111L

DATE: 2009-12-02



**FCC listed
A2LA Accredited**

**IC recognized #
3462B**

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CETECOM Inc. is a Delaware Corporation with Corporation number: 2113686

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8 REVISION HISTORY _____ 67

1 Assessment

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

Company	Description	Model #
SONY Corporation	Personal Computer	PCG-31111L

This report is reviewed by:

Marc Douat

2009-12-02 Compliance (Test Lab Manager)

Date	Section	Name	Signature
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This report is prepared by:

Satya Radhakrishna

2009-12-02 Compliance (EMC Project Engineer)

Date	Section	Name	Signature
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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 Project Leader:	Satya Radhakrishna
Date of test:	2009-11-23 to 2009-11-30

2.2 Identification of the Client

APPLICANT	
Applicant (Company Name)	Sony Corporation
Street Address	1-7-1 Konan, Minato-ku,
City/Zip Code	Tokyo, 108-0075
Country	Japan
Contact Person	Michio Kobayashi
Telephone	+81-263-72-5696
Fax	+81-263-72-9755
e-mail	<u>Michio.Kobayashi@jp.sony.com</u>

2.3 Identification of the Manufacturer

MANUFACTURER (If different from Applicant)	
Applicant (Firm Name):	Sony EMCS Corporation
Contact Person:	Michio Kobayashi
Telephone:	+81-263-72-5696
Fax:	+81-263-72-9755
Address Line 1:	5432 Toyoshima,
City:	Azumino-shi, Nagano
Postal Code:	399-8282,
Country:	Japan
e-mail:	<u>Michio.Kobayashi@jp.sony.com</u>

3 Equipment under Test (EUT)

3.1 Specification of the Equipment under Test

EUT	
Marketing Name of EUT (if not same as Model No.):	PCG-31111L
Description:	Personal Computer
Model No:	PCG-31111L
FCC ID:	AK8PCG31111L
IC ID:	409B-PCG31111L

Frequency Range:	2400-2483.5MHz Channel 1, 6, 11 for 802.11b/g and 802.11n HT20 mode Channel 2, 6, 10 for 802.11n HT40 mode 5725-5850 MHz 802.11 n HT 20 mode 802.11 n HT 40 mode 802.11 a
Type(s) of Modulation:	OFDM
Antenna Type:	PIFA: 2400-2500 MHz Chain A 0.36 dBi/ Chain B 1.1 dBi Peak Gain 5725-5850 MHz Chain A 2.34 dBi/ Chain B 0.67 dBi Peak Gain
Max Output Power:	Radiated EIRP: <u>2400-2483.5MHz</u> 802.11b : Chain A 17.16 dBm (52 mW): Chain B 17.9 dBm (61.66mW) 802.11g: Chain A 17.1 dBm (51.29 mW) : Chain B 17.74 dBm (59.43 mW) 802.11n HT20:Chain A 17.1 dBm (51.29 mW):Chain B 17.74 dBm(59.43mW) 802.11n HT40:Chain A 16.9 dBm (48.98 mW):Chain B 17.54 dBm (56.75mW) <u>5725-5850 MHz</u> 802.11a: Chain A 19.28 dBm (84.72 mW): Chain B 17.61 dBm(57.68mW) 802.11n HT20:Chain A 18.98 dBm(79.068 mW):Chain B 17.51 dBm(56.36mW) 802.11n HT40:ChainA 19.23dBm (83.75mW):Chain B 17.46 dBm(55.72mW)

3.2 Identification of the Equipment under Test (EUT)

EUT #	TYPE	MANF.	MODEL	SERIAL #
1	EUT	Sony Corporation	PCG-31111L	DVT 14920 1100004 IMEI: 980004000203030

3.3 Identification of Accessory equipment

AE #	TYPE	MANF.	MODEL	SERIAL #
1	AC/DC ADAPTER	Sony Corporation	VGP-AC19V32	1480955310064148

4 Subject Of Investigation

All testing was performed on the product referred to in Section 3 as EUT. EUT operates in the band 2400-2483.5MHz in legacy 802.11b/g and 802.11n mode.

The device contains the Intel 622ANHML WLAN module with FCC ID PD9622ANH and IC ID 1000M-622AN. The conducted test data is contained in the test report# INTEL-090601F. Based on the output power values that are reported, radiated testing was performed on the bands and chains with the highest reported values.

The objective of the measurements done by Cetecom Inc. was to measure the performance of the EUT operating under all operating modes as specified by Sony per requirements listed in FCC rules Part 15.247 of Title 47 of the Code of Federal Regulations. The maximization of portable equipment is conducted in accordance with ANSI C63.4

5 Radiated Measurements

5.1 Maximum Peak Output Power § 15.247 (b)(1) (Radiated)

5.1.1 Limits

FCC15.247 (b) (1): 4W (36dBm), with antenna gain < 6dBi.

RSS-210 A8.4 (4): 4W (36dBm)

EIRP is calculated as $EIRP = \text{Conducted Peak Power (dBm)} + \text{Peak Antenna Gain (dBi)}$

2400-2500 MHz Chain A 0.36 dBi/ Chain B 1.1 dBi Peak Gain

5725-5850 MHz Chain A 2.34 dBi/ Chain B 0.67 dBi Peak Gain

5.1.2 Results:

EIRP 802.11 a/b/g Mode:

TEST CONDITIONS $T_{nom}(23)^{\circ}C$, V_{nom}	Channel Frequency	EIRP (dBm) Chain A	EIRP (mW) Chain A	EIRP (dBm) Chain B	EIRP (mW) Chain B	Verdict
Sub-band 1: 2400-2483.5MHz (802.11b)	2412	16.96	49.66	17.9	61.66	PASS
	2437	17.16	52.00	17.7	58.88	PASS
	2462	17.06	50.82	17.9	61.66	PASS
Sub-band 1: 2400-2483.5MHz (802.11g)	2412	15.9	38.90	16.94	49.43	PASS
	2437	17.1	51.29	17.74	59.43	PASS
	2462	16	39.81	16.94	49.43	PASS

EIRP 802.11n HT20 MODE:

TEST CONDITIONS $T_{nom}(23)^{\circ}C$, V_{nom}	Channel Frequency	EIRP (dBm) Chain A	EIRP (mW) Chain A	EIRP (dBm) Chain B	EIRP (mW) Chain B	Verdict
Sub-band 1: 2400-2483.5MHz	2412	15.3	33.88	15.84	38.37	PASS
	2437	17.1	51.29	17.74	59.43	PASS
	2462	15	31.62	15.64	36.64	PASS

EIRP 802.11n HT40 MODE:

TEST CONDITIONS $T_{nom}(23)^{\circ}C$, V_{nom}	Channel Frequency	EIRP (dBm) Chain A	EIRP (mW) Chain A	EIRP (dBm) Chain B	EIRP (mW) Chain B	Verdict
Sub-band 1: 2400-2483.5MHz	2422	12.8	19.05	13.54	22.59	PASS
	2437	16.9	48.98	17.54	56.75	PASS
	2452	12.9	19.50	13.54	22.59	PASS

EIRP 802.11 a Sub-band 4: 5725-5850MHz

TEST CONDITIONS T _{nom} (23)°C, V _{nom}	Channel Frequency	EIRP (dBm) Chain A	EIRP (mW) Chain A	EIRP (dBm) Chain B	EIRP (mW) Chain B	Verdict
Sub-band 4: 5725-5850MHz	5745	19.08	80.91	17.31	53.83	PASS
	5785	19.28	84.72	17.51	56.36	PASS
	5825	18.98	79.07	17.61	57.68	PASS

EIRP 802.11n HT20 MODE Sub-band 4: 5725-5850MHz

TEST CONDITIONS T _{nom} (23)°C, V _{nom}	Channel Frequency	EIRP (dBm) Chain A	EIRP (mW) Chain A	EIRP (dBm) Chain B	EIRP (mW) Chain B	Verdict
Sub-band 4: 5725-5850MHz	5745	18.98	79.068	17.51	56.36	PASS
	5785	18.88	77.268	17.31	53.83	PASS
	5825	18.98	79.068	17.41	55.08	PASS

EIRP 802.11n HT40 MODE Sub-band 4: 5725-5850MHz

TEST CONDITIONS T _{nom} (23)°C, V _{nom}	Channel Frequency	EIRP (dBm) Chain A	EIRP (mW) Chain A	EIRP (dBm) Chain B	EIRP (mW) Chain B	Verdict
Sub-band 4: 5725-5850MHz	5745	19.23	83.75	17.46	55.72	PASS
	5785	19.13	81.85	17.46	55.72	PASS

Note: In the 2400-2483.5 band the highest values of power in chain A were reported in 802.11b the highest values of power in chain B were reported with respect to the 802.11g. The emission measurements were performed in these modes.

Note: In the 5725-5850 band the highest values of power in chain A and B were reported in 802.11a. The emission measurements were performed in this mode.

5.2 Restricted Band Edge Compliance §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/m

*AVG. LIMIT= 54dBuV/m

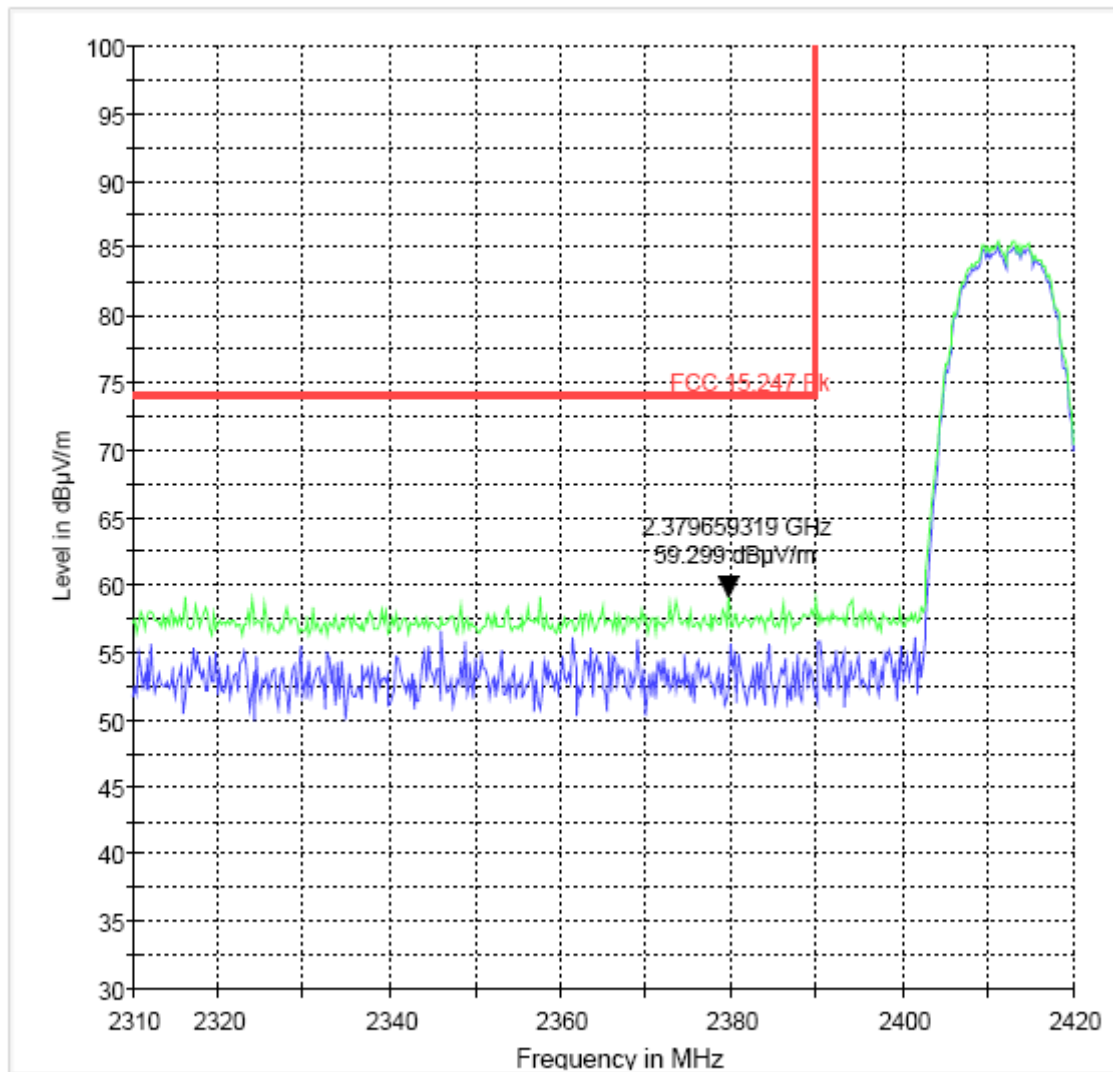
Notes:

1. Radiated emissions are maximized by rotating the EUT 360° at 0.5 meter height increments between 1 and 4 meters.
2. Measurements were performed with the EUT in X, Y and Z orientations with the measurement antenna in both horizontal and vertical polarity. The plots below show the results of the worst case orientation and polarity.

5.2.2 802.11b chain A

Lower band edge PEAK

FCC 15.247 LBE Pk 3m



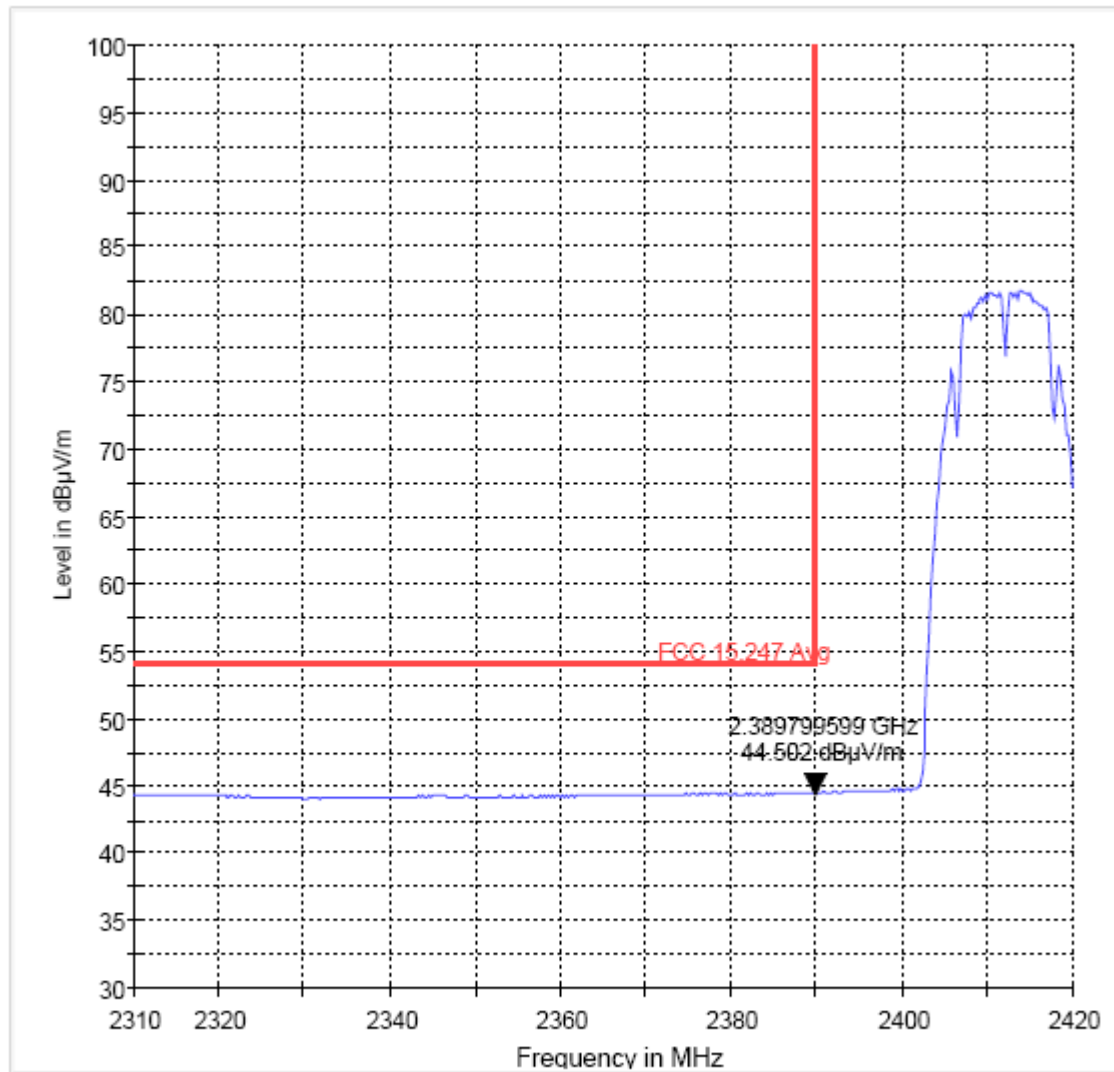
MaxPeak-ClearWrite

MaxPeak-MaxHold

FCC 15.247 Pk

Lower band edge Average

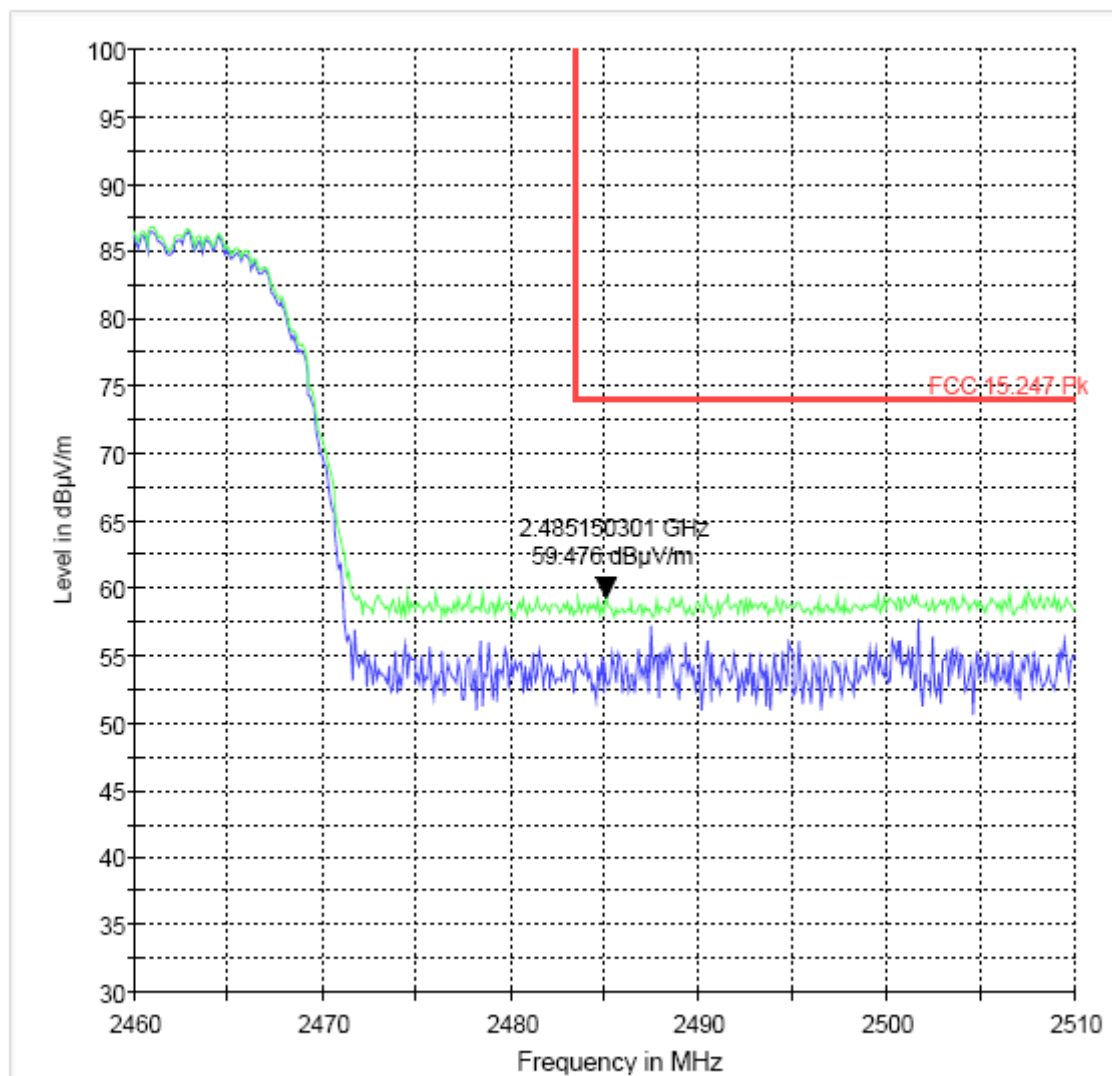
FCC 15.247 LBE Avg 3m



MaxPeak-MaxHold Average-MaxHold FCC 15.247 Avg

High band edge PEAK

FCC 15.247 HBE Pk 3m



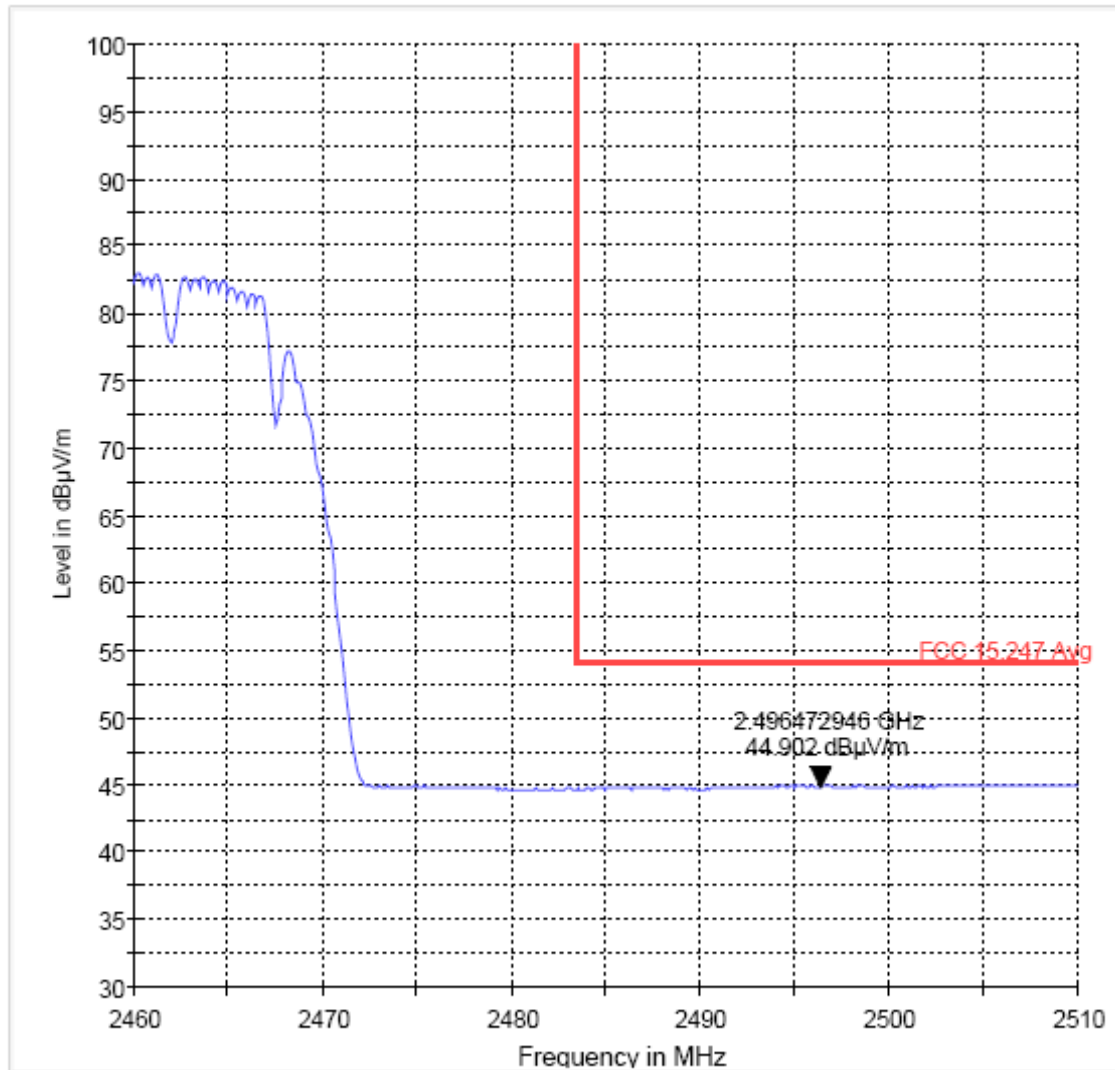
MaxPeak-ClearWrite

MaxPeak-MaxHold

FCC 15.247 Pk

High band edge Average

FCC 15.247 HBE Avg 3m



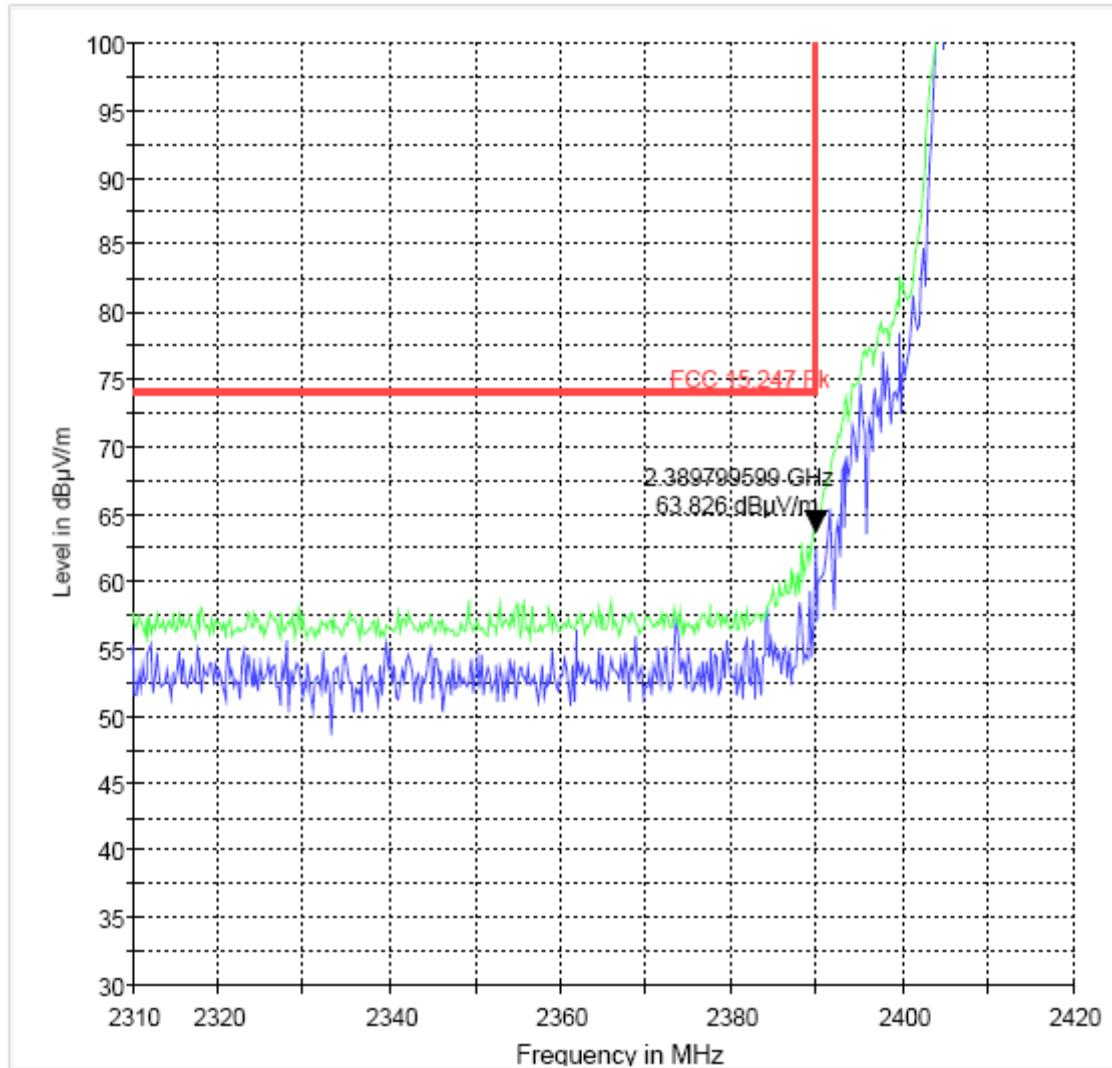
MaxPeak-MaxHold

FCC 15.247 Avg

5.2.3 802.11g Chain B

Lower Band Edge Peak

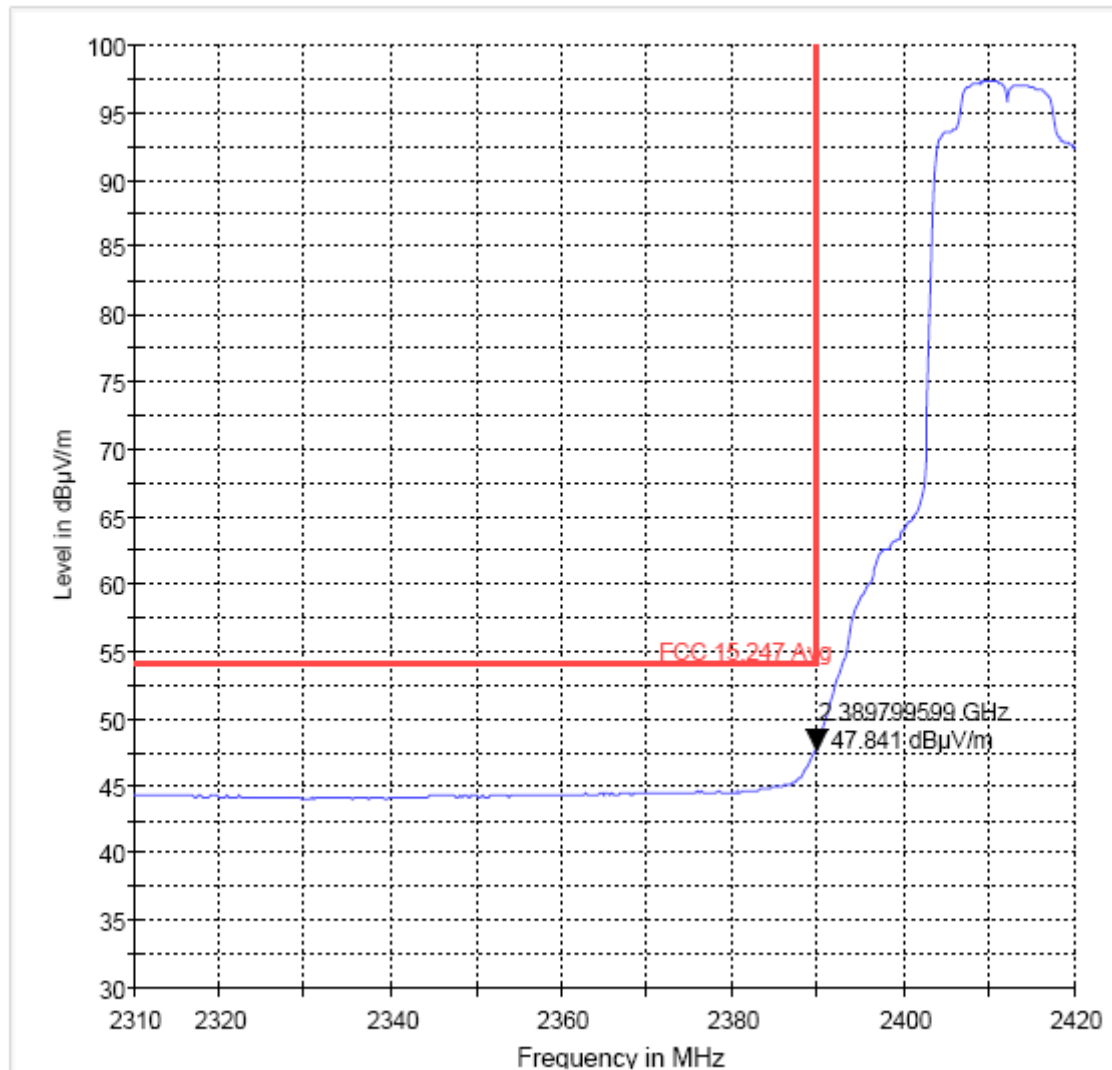
FCC 15.247 LBE Pk 3m



— MaxPeak-ClearWrite — MaxPeak-MaxHold — FCC 15.247 Pk

Lower band edge Average

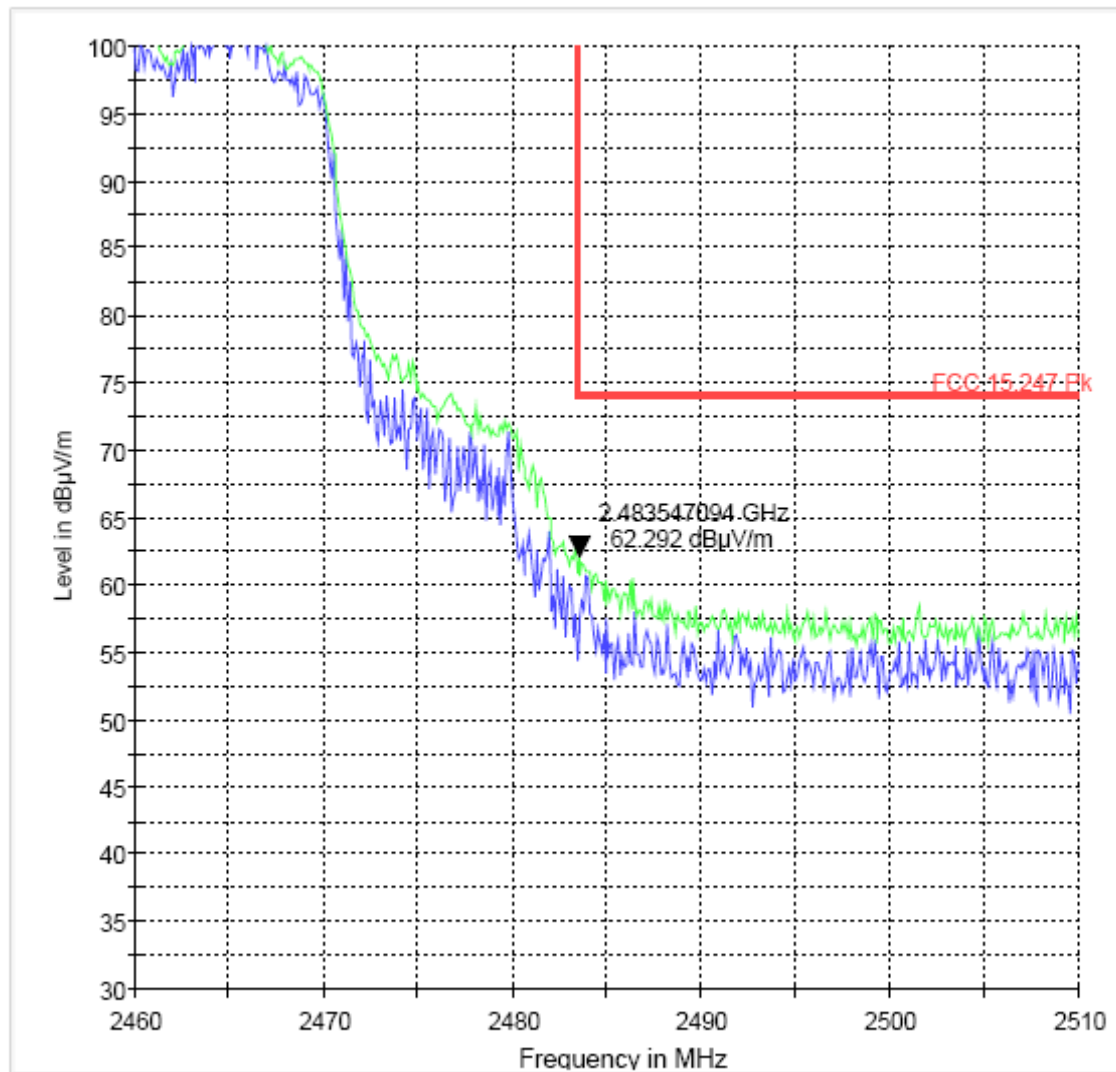
FCC 15.247 LBE Avg 3m



MaxPeak-MaxHold Average-MaxHold FCC 15.247 Avg

High band edge PEAK

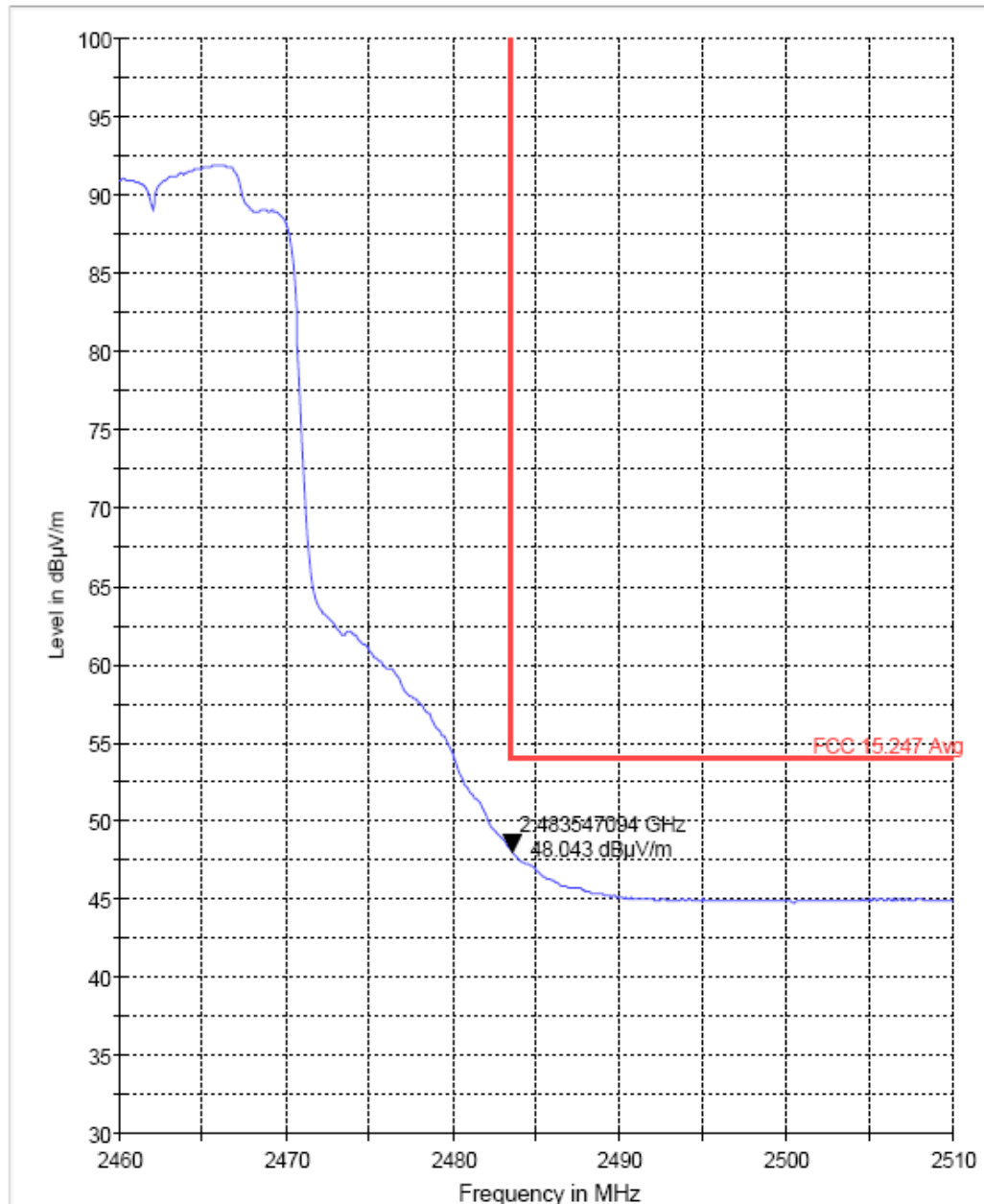
FCC 15.247 HBE Pk 3m



MaxPeak-ClearWrite MaxPeak-MaxHold FCC 15.247 Pk

High band edge Average

FCC 15.247 HBE Avg 3m

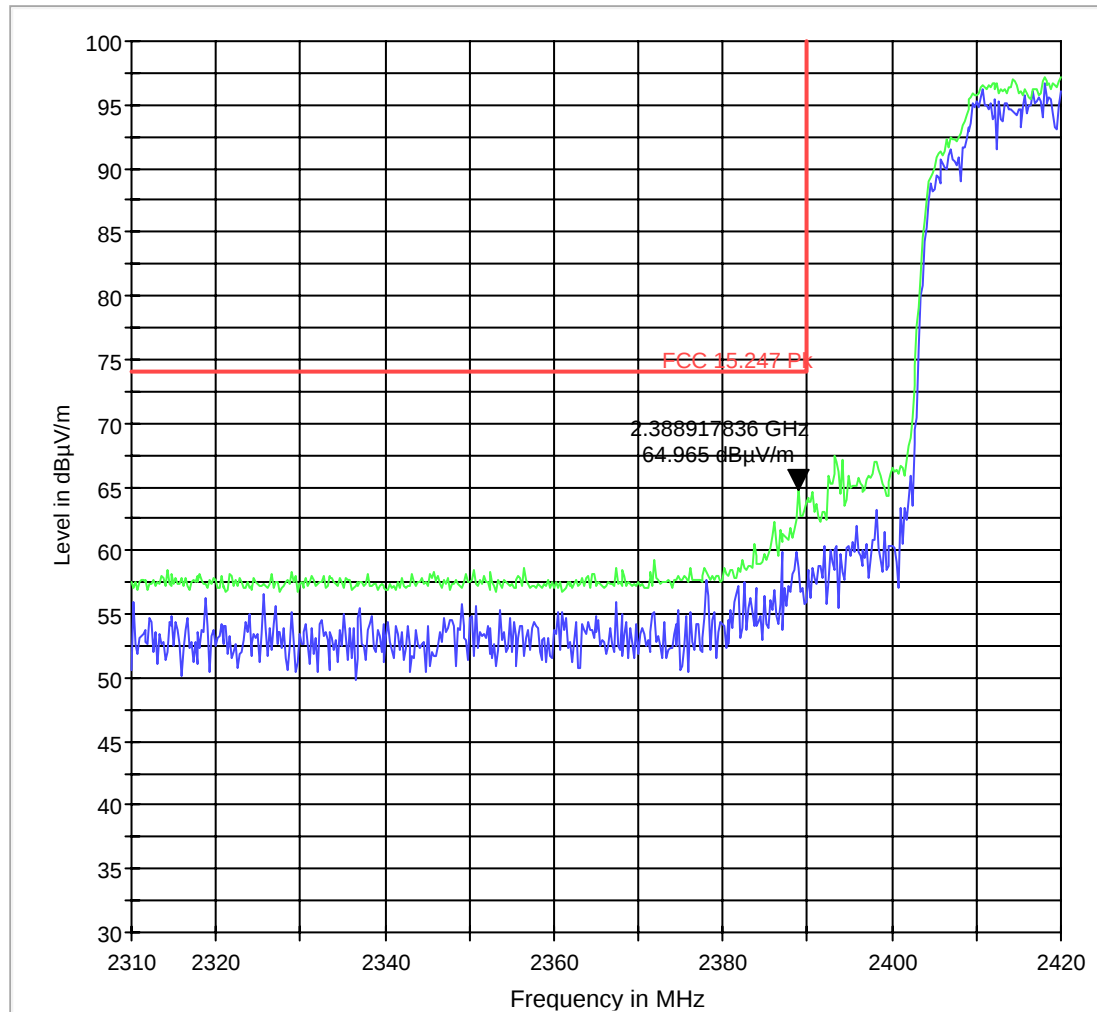


— MaxPeak-MaxHold — FCC 15.247 Avg

5.2.4 802.11n HT40 MODE chain A

Lower band edge PEAK

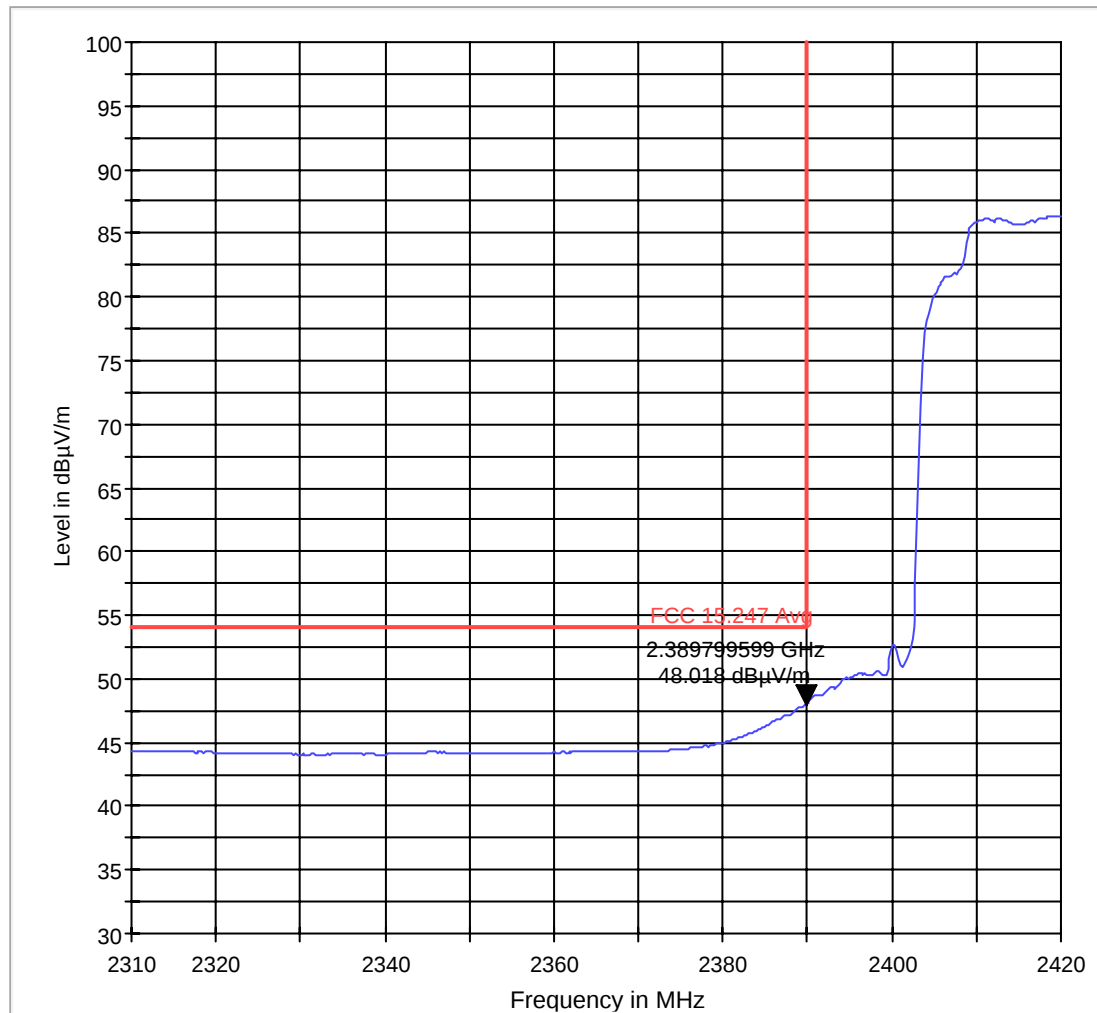
FCC 15.247 LBE Pk 3m



MaxPeak-ClearWrite MaxPeak-MaxHold FCC 15.247 Pk

Lower band edge Average

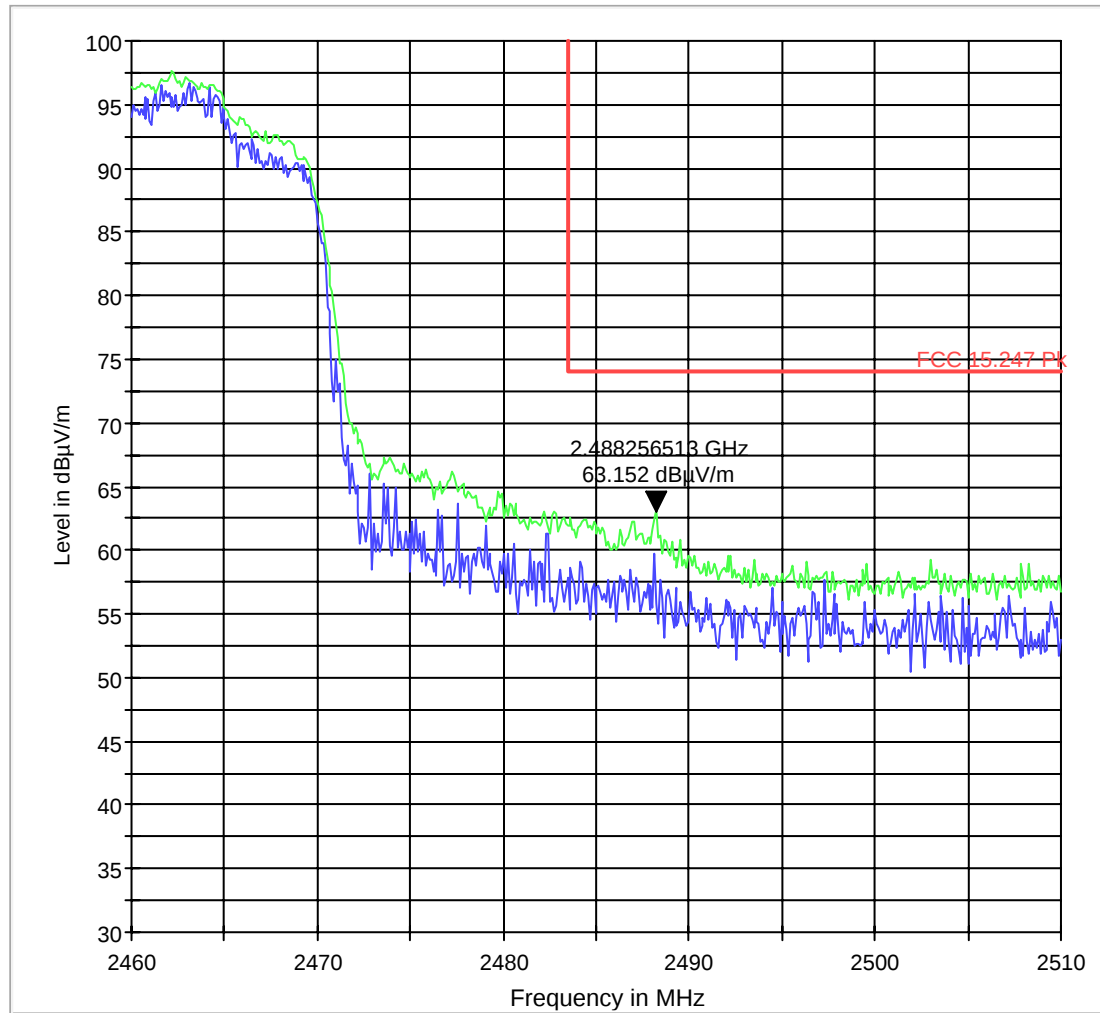
FCC 15.247 LBE Avg 3m



MaxPeak-MaxHold Average-MaxHold FCC 15.247 Avg

High band edge PEAK

FCC 15.247 HBE Pk 3m



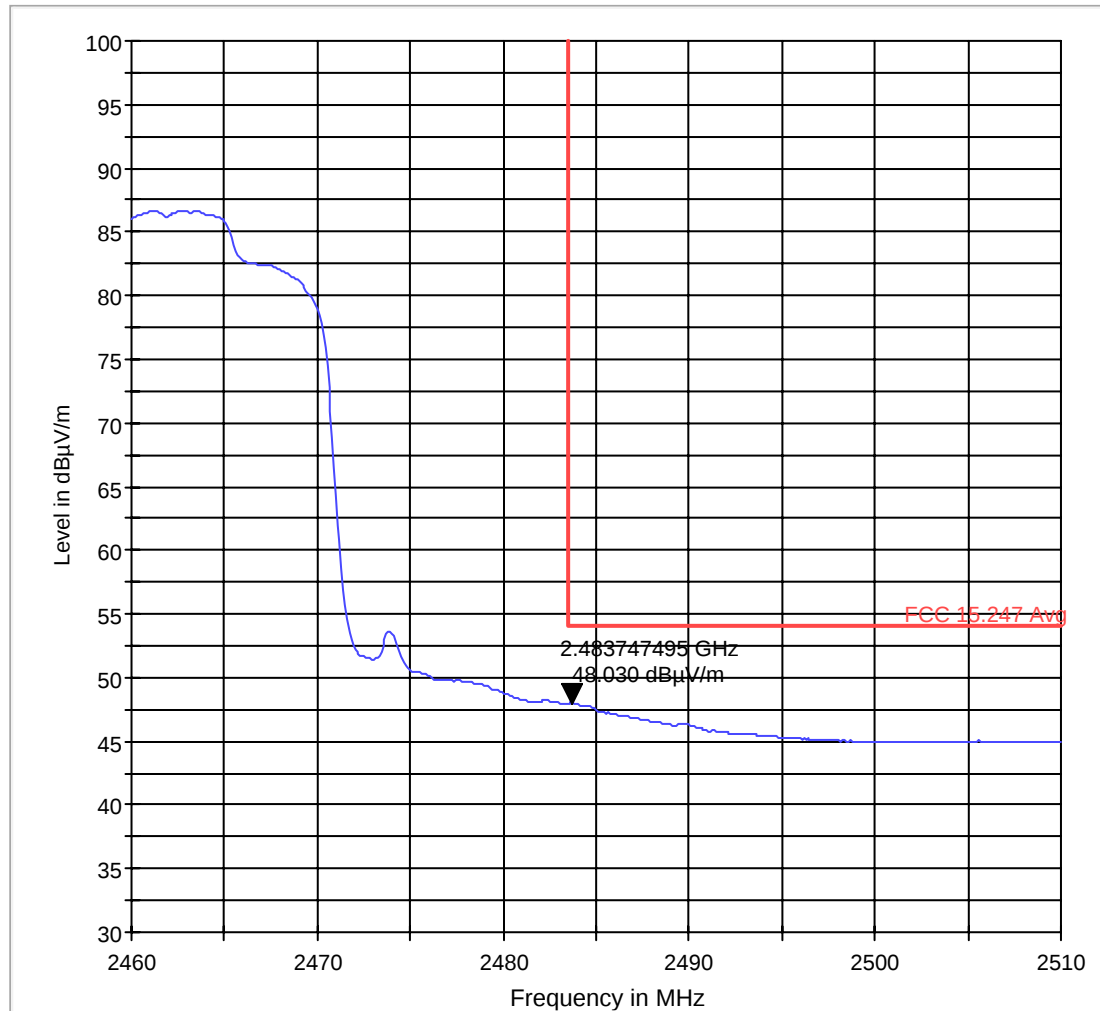
MaxPeak-ClearWrite

MaxPeak-MaxHold

FCC 15.247 Pk

High band edge Average

FCC 15.247 HBE Avg 3m



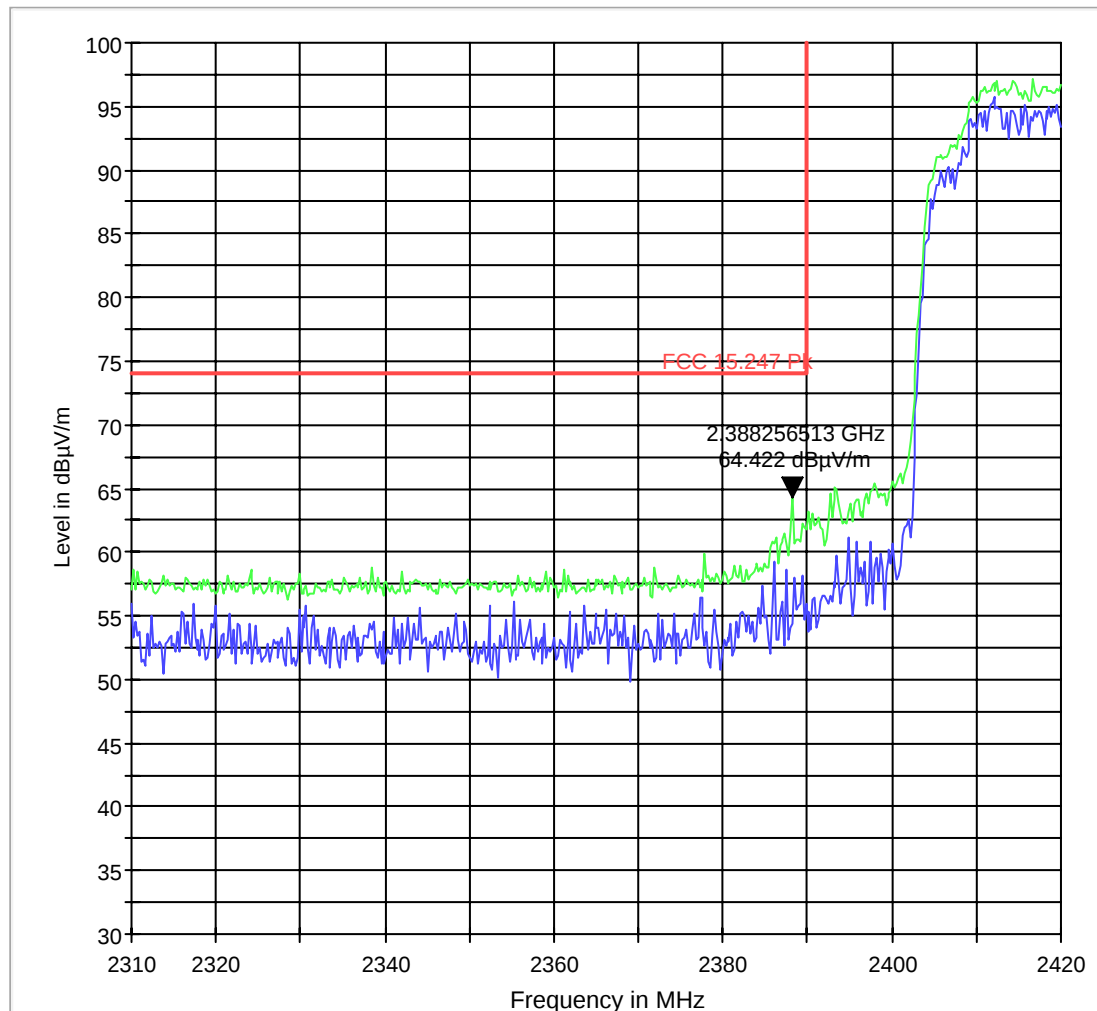
MaxPeak-MaxHold

FCC 15.247 Avg

5.2.5 802.11n HT40 MODE chain B

Lower band edge PEAK

FCC 15.247 LBE Pk 3m



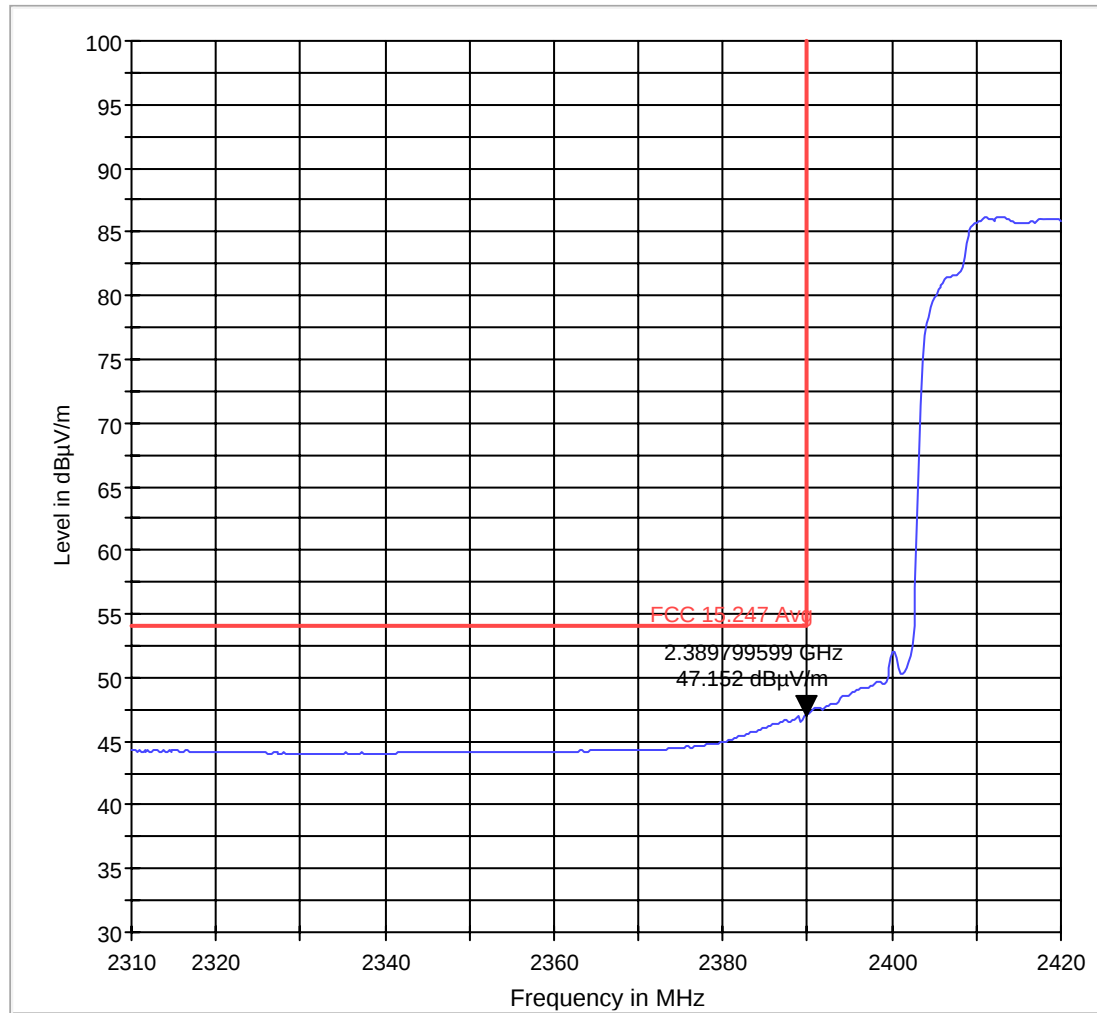
MaxPeak-ClearWrite

MaxPeak-MaxHold

FCC 15.247 Pk

Lower band edge Average

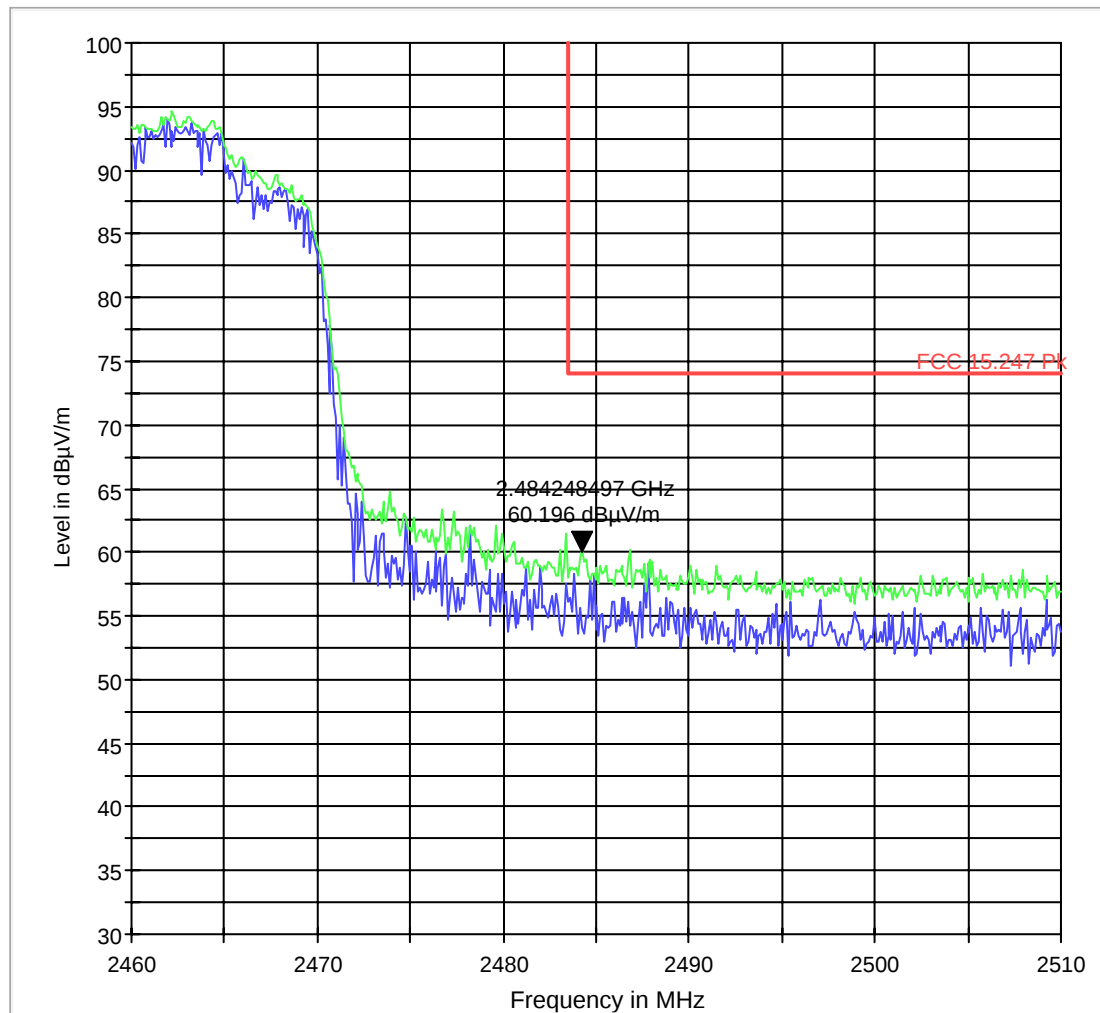
FCC 15.247 LBE Avg 3m



MaxPeak-MaxHold Average-MaxHold FCC 15.247 Avg

High band edge PEAK

FCC 15.247 HBE Pk 3m



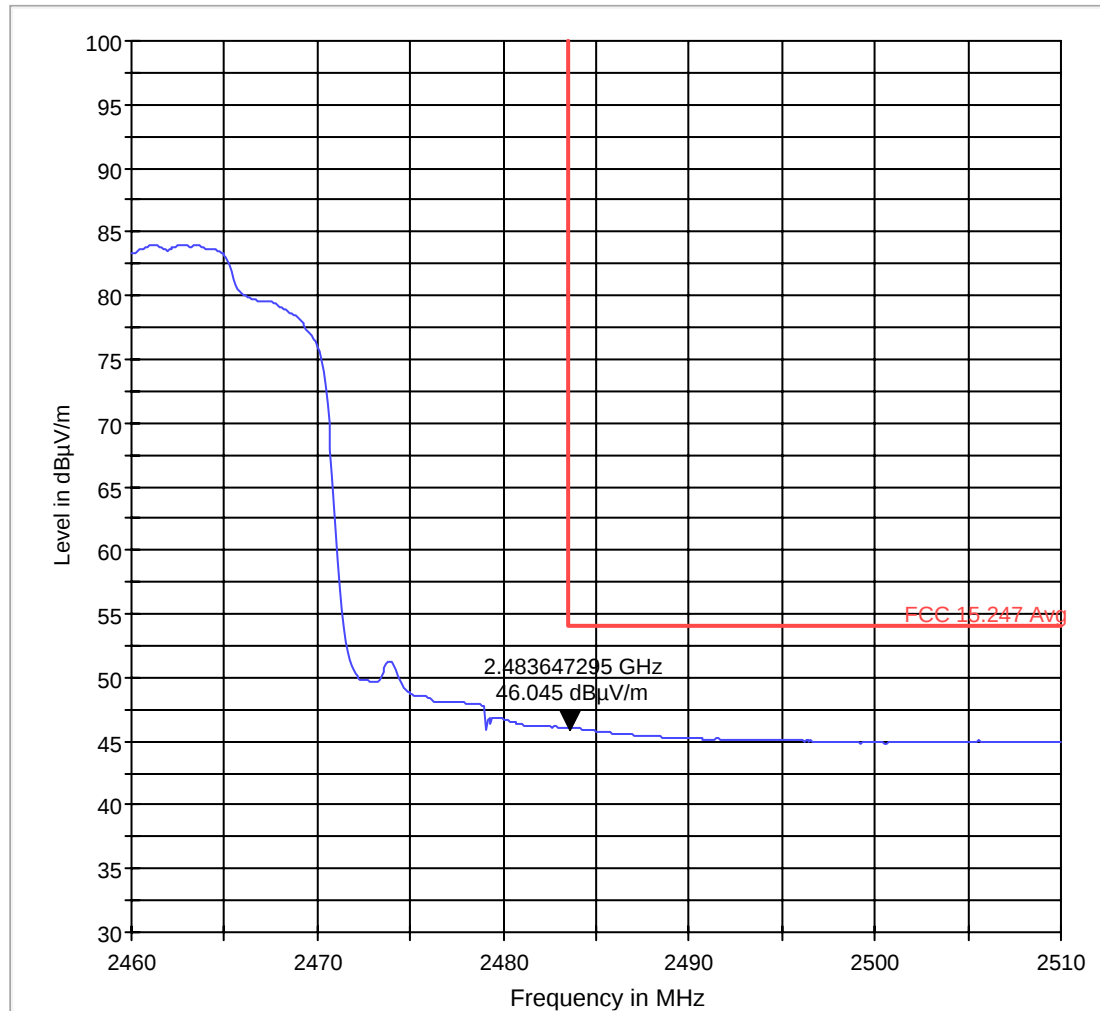
MaxPeak-ClearWrite

MaxPeak-MaxHold

FCC 15.247 Pk

High band edge Average

FCC 15.247 HBE Avg 3m



MaxPeak-MaxHold

FCC 15.247 Avg

5.3 Transmitter Spurious Emission § 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/m

*AVG. LIMIT= 54dBuV/m

Notes:

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 an average limit , unless specified with the plots.
3. Radiated emissions are maximized by rotating the EUT 360° at 0.5 meter height increments between 1 and 4 meters.
4. Measurements were performed with the EUT in X, Y and Z orientations with the measurement antenna in both horizontal and vertical polarity. The plots below show the results of the worst case orientation and polarity

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 Sub-band 1 802.11b/g MODE

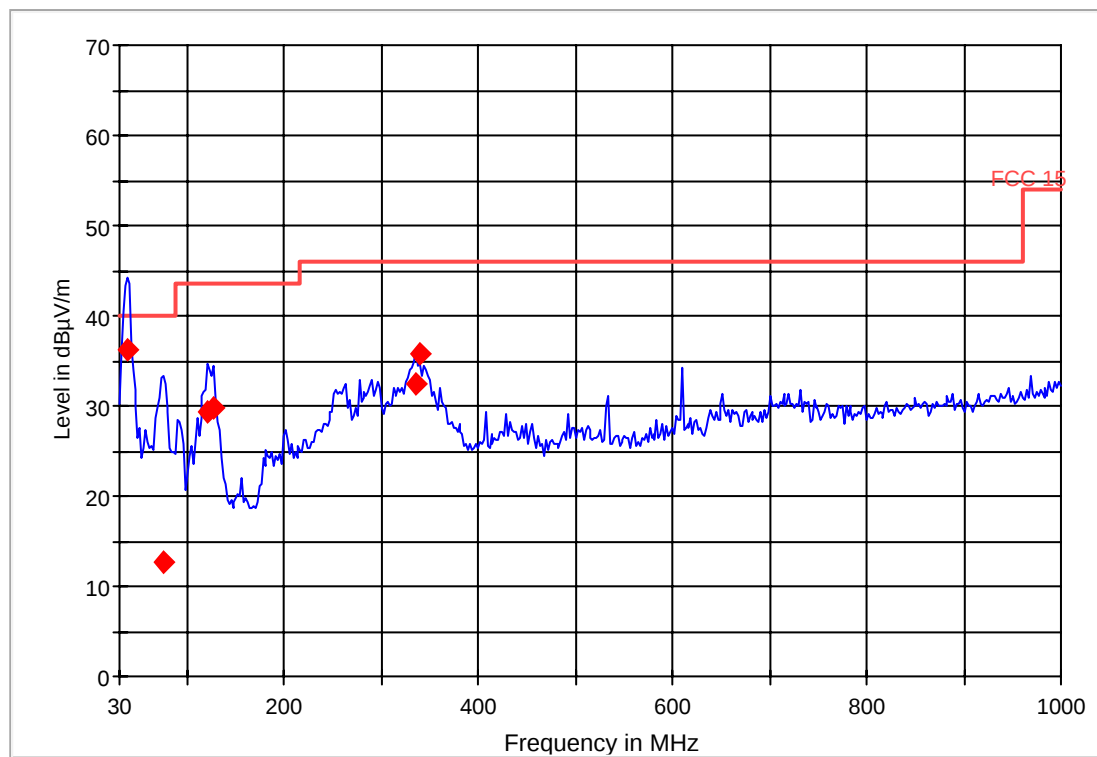
30MHz – 1GHz

802.11b chain A –ch1

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
37.850875	36.2	20.000	120.000	100.0	V	10.0	5.9	3.8	40.0
74.759575	12.8	20.000	120.000	100.0	V	98.0	9.3	27.2	40.0
121.821320	29.2	20.000	120.000	100.0	V	292.0	8.1	14.3	43.5
126.795455	29.8	20.000	120.000	122.0	V	249.0	8.3	13.7	43.5
335.872201	32.5	20.000	120.000	100.0	V	22.0	16.3	13.5	46.0
338.680614	35.8	20.000	120.000	122.0	V	0.0	16.4	10.2	46.0

FCC 15 30-1000MHz



— FCC 15.LimitLine

— Preview Result 1

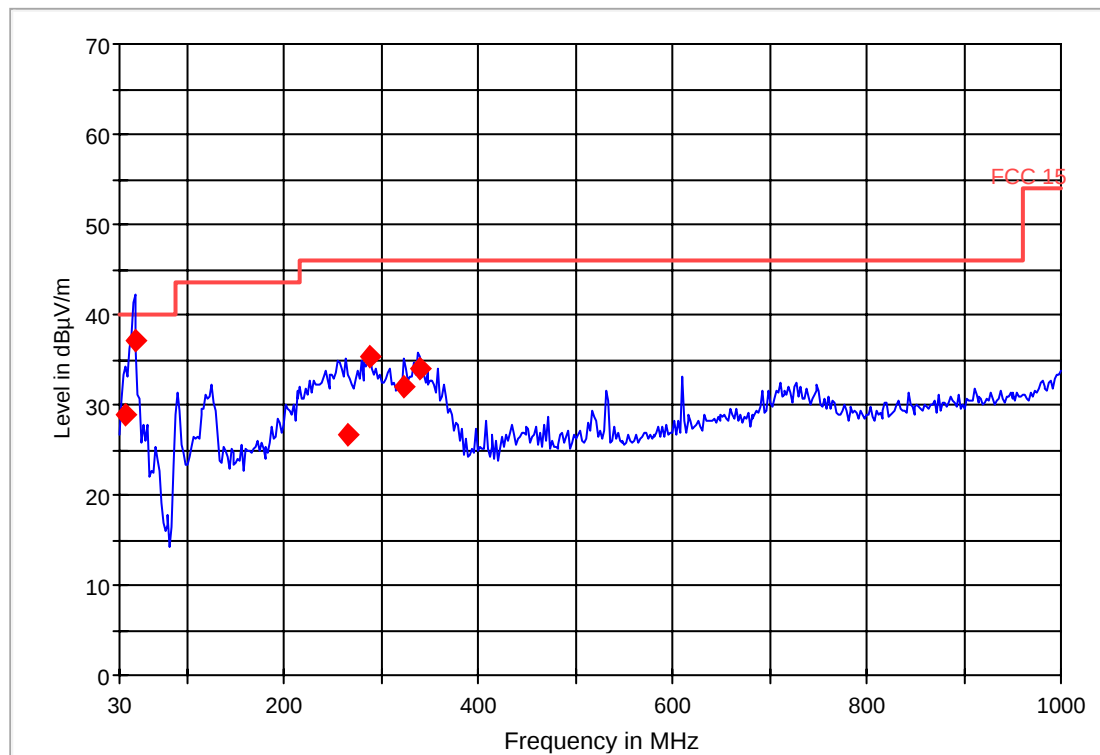


Final Result 1

802.11b chain A –ch6**Final Result 1**

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
35.966301	28.8	20.000	120.000	100.0	V	107.0	6.3	11.2	40.0
45.693050	37.1	20.000	120.000	141.0	V	158.0	6.2	2.9	40.0
264.414183	26.7	20.000	120.000	172.0	H	270.0	14.0	19.3	46.0
288.794354	35.4	20.000	120.000	100.0	H	69.0	15.4	10.6	46.0
323.504364	32.1	20.000	120.000	123.0	V	0.0	16.0	13.9	46.0
338.650881	33.9	20.000	120.000	122.0	V	10.0	16.4	12.1	46.0

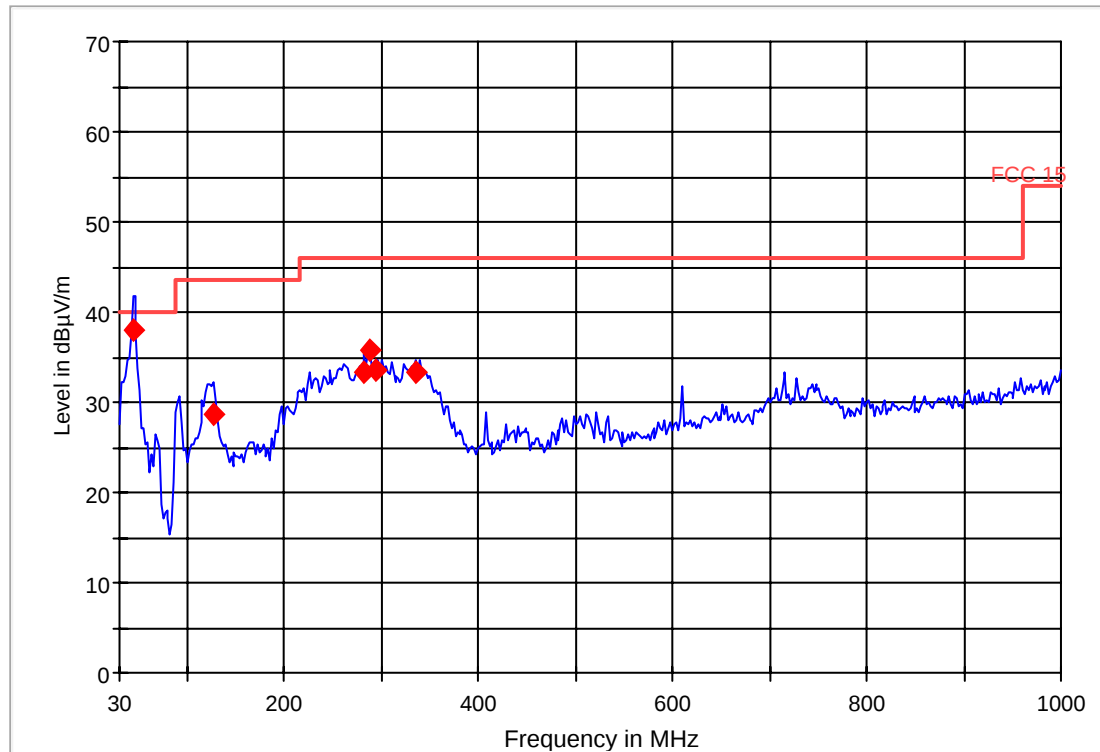
FCC 15 30-1000MHz



802.11b chain A -ch11**Final Result 1**

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
45.424673	38.0	20.000	120.000	153.0	V	177.0	6.2	2.0	40.0
126.588978	28.7	20.000	120.000	145.0	V	112.0	8.3	14.8	43.5
282.645925	33.4	20.000	120.000	120.0	H	249.0	15.0	12.6	46.0
288.753883	35.7	20.000	120.000	119.0	H	68.0	15.4	10.3	46.0
294.902380	33.5	20.000	120.000	120.0	H	69.0	15.8	12.5	46.0
335.852048	33.3	20.000	120.000	120.0	V	22.0	16.3	12.7	46.0

FCC 15 30-1000MHz



— FCC 15.LimitLine

— Preview Result 1

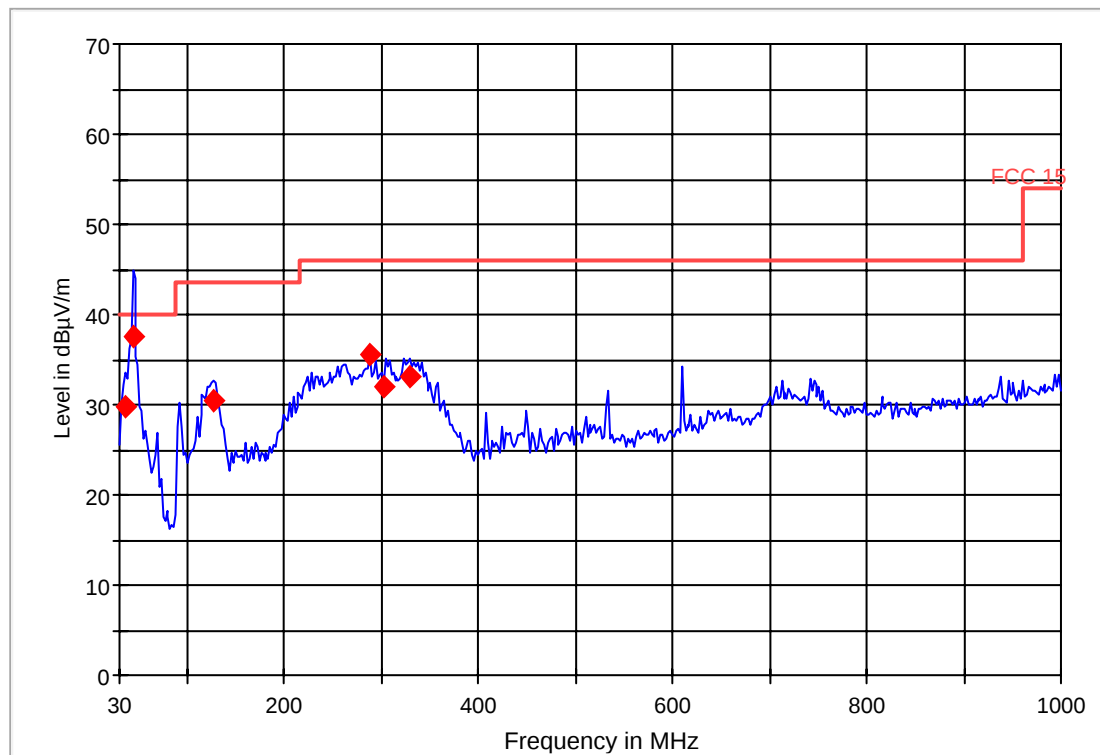


Final Result 1

802.11g chain B –ch1**Final Result 1**

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
35.835612	29.9	20.000	120.000	121.0	V	22.0	6.3	10.1	40.0
43.807772	37.6	20.000	120.000	121.0	V	68.0	6.0	2.4	40.0
126.583880	30.4	20.000	120.000	121.0	V	1.0	8.3	13.1	43.5
288.753883	35.6	20.000	120.000	121.0	H	68.0	15.4	10.4	46.0
303.292884	32.1	20.000	120.000	121.0	H	270.0	16.3	13.9	46.0
328.761308	33.2	20.000	120.000	121.0	V	22.0	16.1	12.8	46.0

FCC 15 30-1000MHz

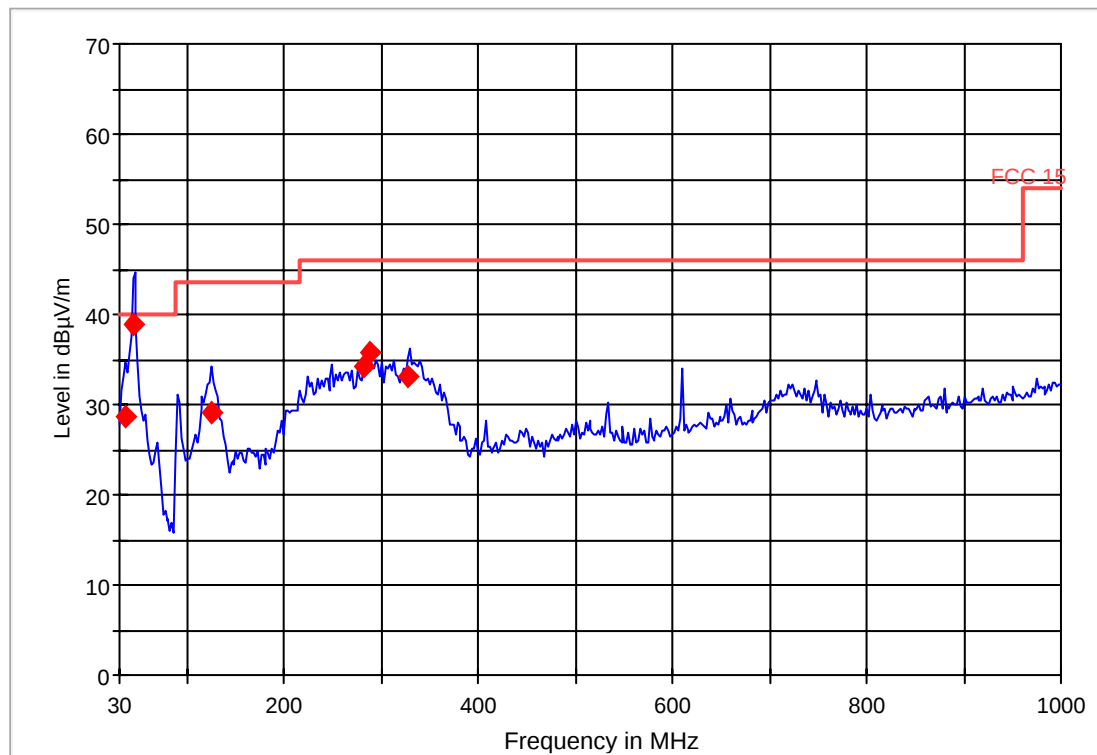


— FCC 15.LimitLine
 — Preview Result 1
 ◆ Final Result 1

802.11g chain B -ch6**Final Result 1**

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
35.753752	28.6	20.000	120.000	121.0	V	112.0	6.3	11.4	40.0
45.444755	38.8	20.000	120.000	120.0	V	10.0	6.2	1.2	40.0
125.698718	29.1	20.000	120.000	121.0	V	68.0	8.2	14.4	43.5
282.606268	34.1	20.000	120.000	119.0	H	68.0	15.0	11.9	46.0
288.771227	35.8	20.000	120.000	120.0	H	69.0	15.4	10.2	46.0
327.889949	33.0	20.000	120.000	121.0	V	22.0	16.1	13.0	46.0

FCC 15 30-1000MHz



— FCC 15.LimitLine

— Preview Result 1



Final Result 1

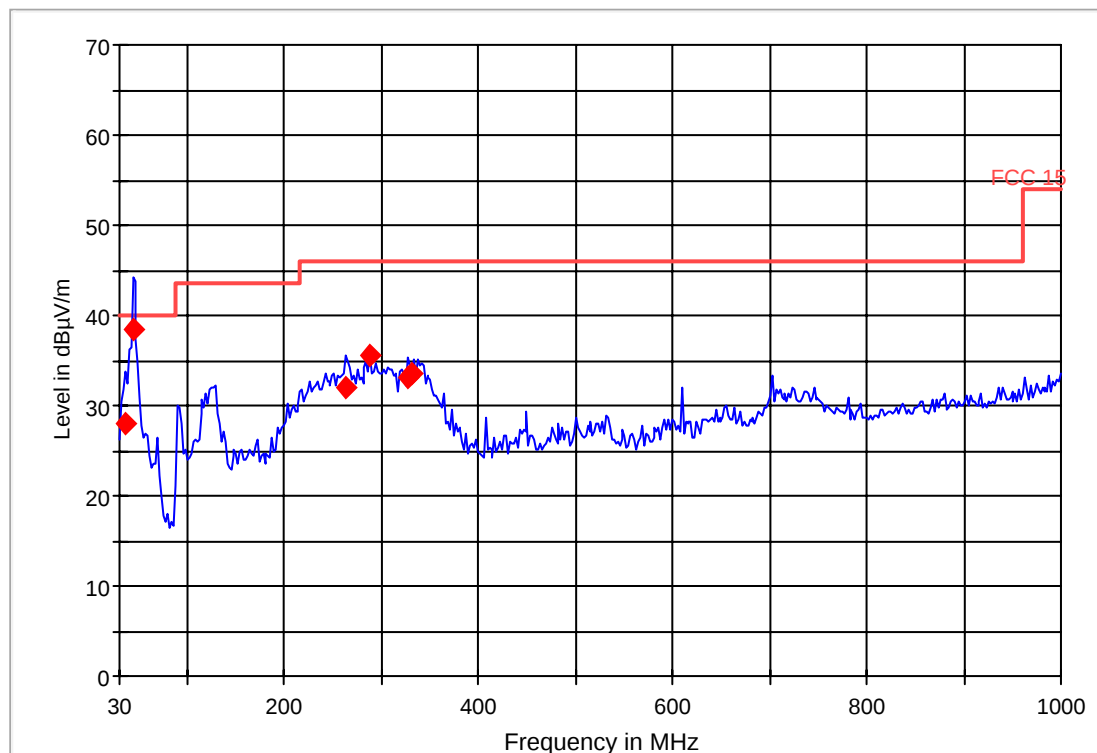
802.11g chain B –ch11**Final Result 1**

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
35.849256	28.0	20.000	120.000	142.0	V	22.0	6.3	12.0	40.0
43.785051	38.4	20.000	120.000	120.0	V	202.0	6.0	1.6	40.0
263.976229	31.9	20.000	120.000	120.0	H	104.0	14.0	14.1	46.0
288.782790	35.5	20.000	120.000	120.0	H	69.0	15.4	10.5	46.0
326.171497	33.0	20.000	120.000	120.0	V	22.0	16.0	13.0	46.0
332.348389	33.6	20.000	120.000	120.0	V	9.0	16.2	12.4	46.0

(continuation of the "Final Result 1" table from column 10 ...)

Frequency (MHz)	Comment
35.849256	
43.785051	
263.976229	
288.782790	
326.171497	
332.348389	

FCC 15 30-1000MHz



— FCC 15.LimitLine

— Preview Result 1

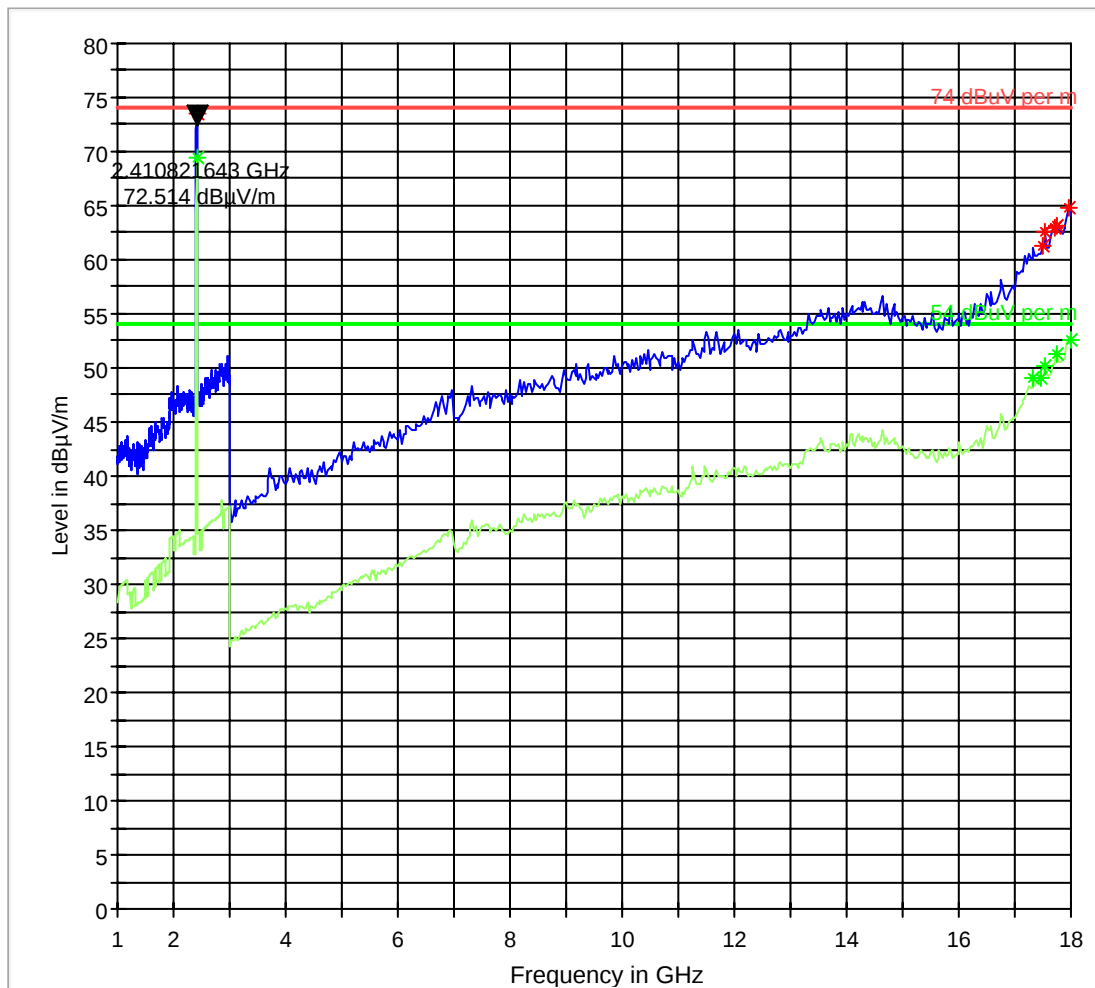


◆ Final Result 1

802.11b chain A 1-18GHz (CH1)

Note: Marker placed on transmit signal

FCC 15 1-18GHz



74 dBuV per m.LimitLine
Preview Result 2

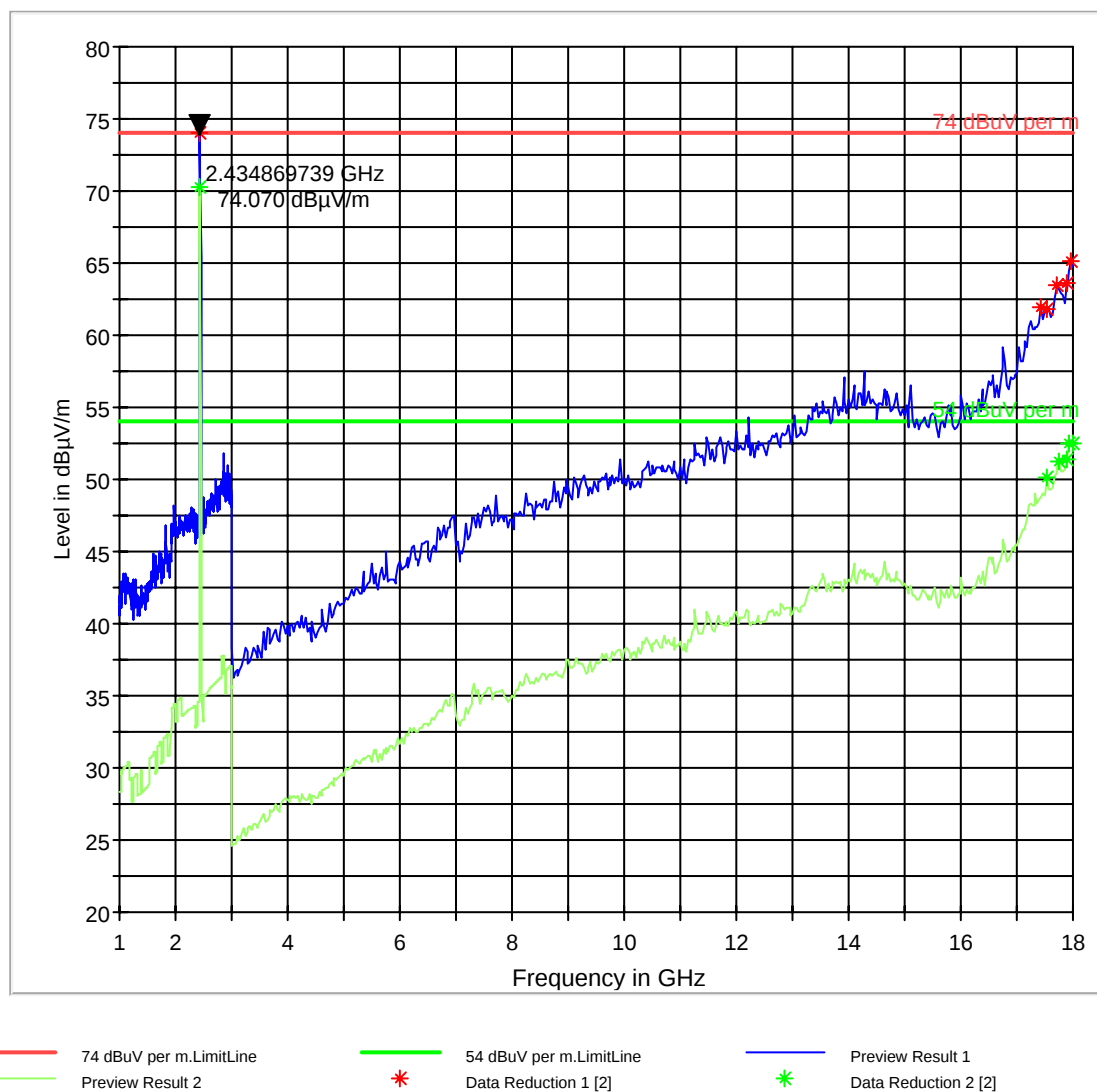
54 dBuV per m.LimitLine
* Data Reduction 1 [2]

Preview Result 1
* Data Reduction 2 [2]

802.11b chain A 1-18GHz (CH6)

Note: Marker placed on transmit signal

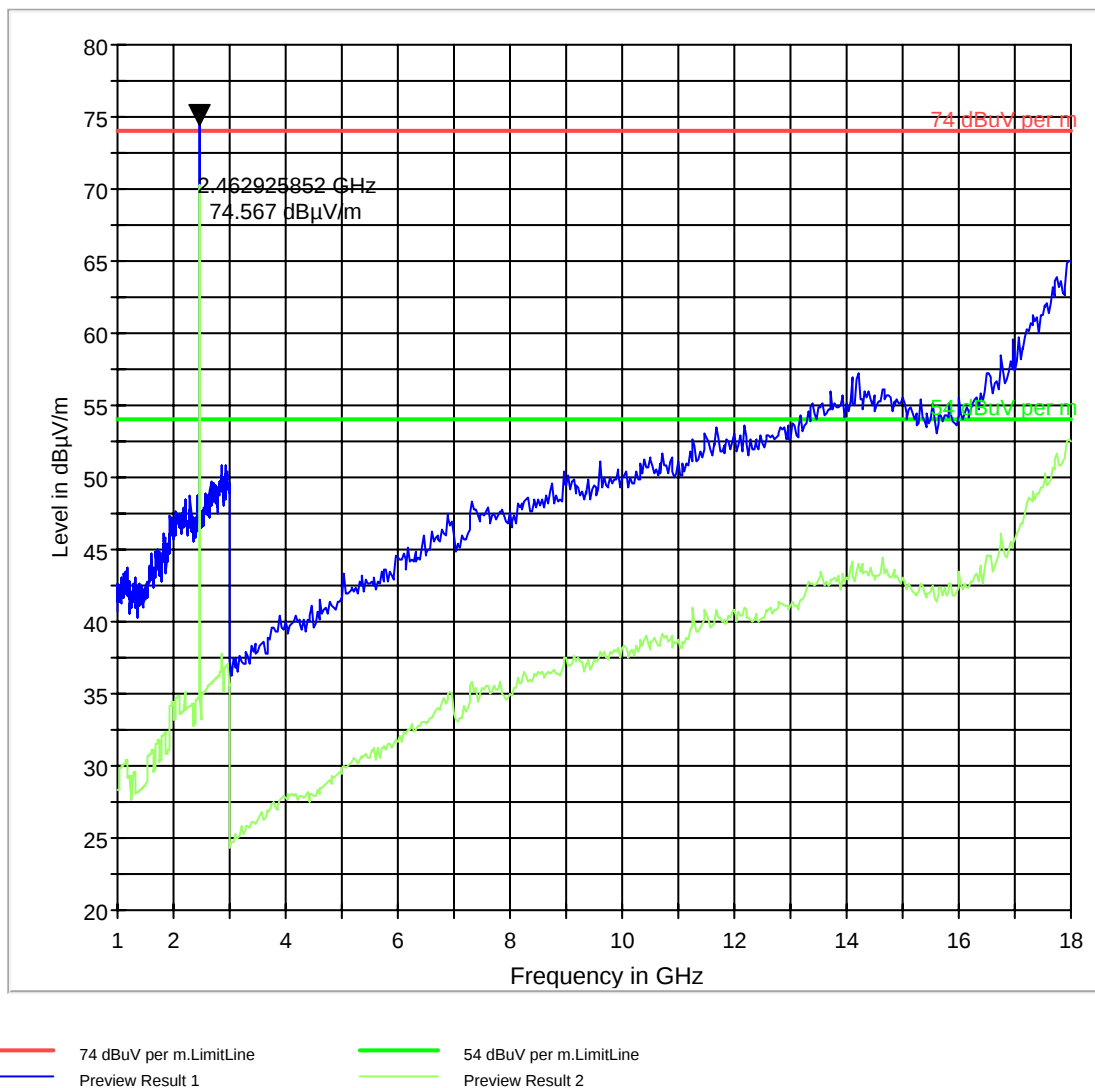
FCC 15 1-18GHz



802.11b chain A 1-18GHz (CH11)

Note: Marker placed on transmit signal

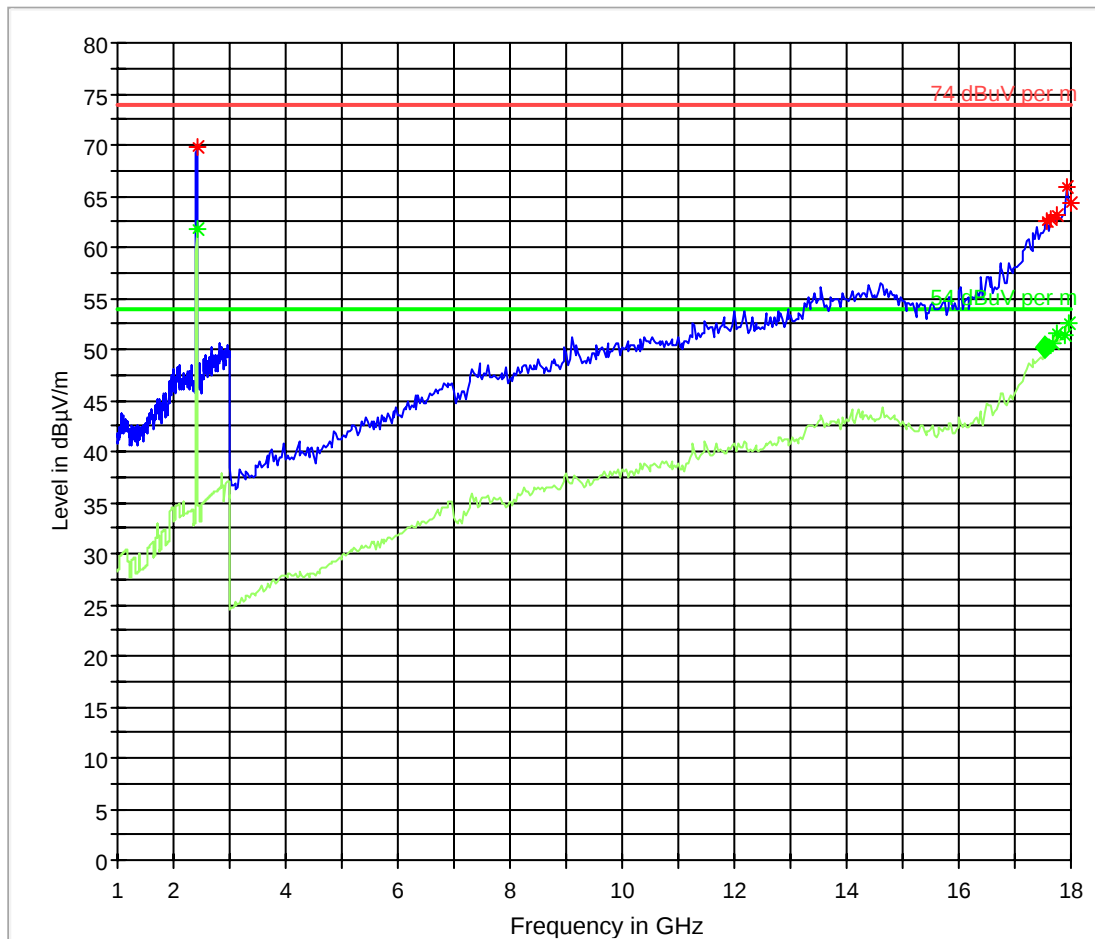
FCC 15 1-18GHz



802.11g chain B 1-18GHz (CH1)

Note: Signal over the limit is transmit signal

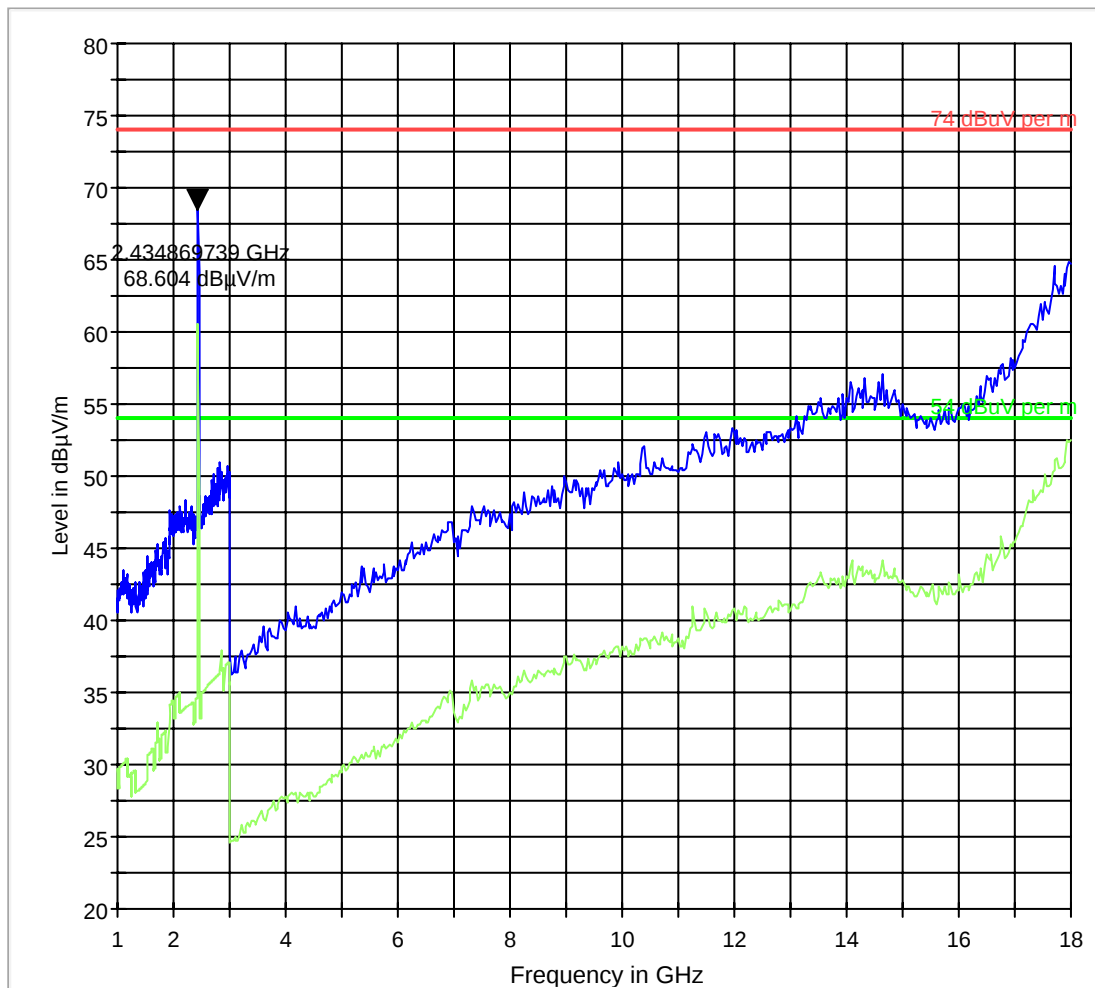
FCC 15 1-18GHz



802.11g chain B 1-18GHz (CH6)

Note: Marker placed on transmit signal

FCC 15 1-18GHz

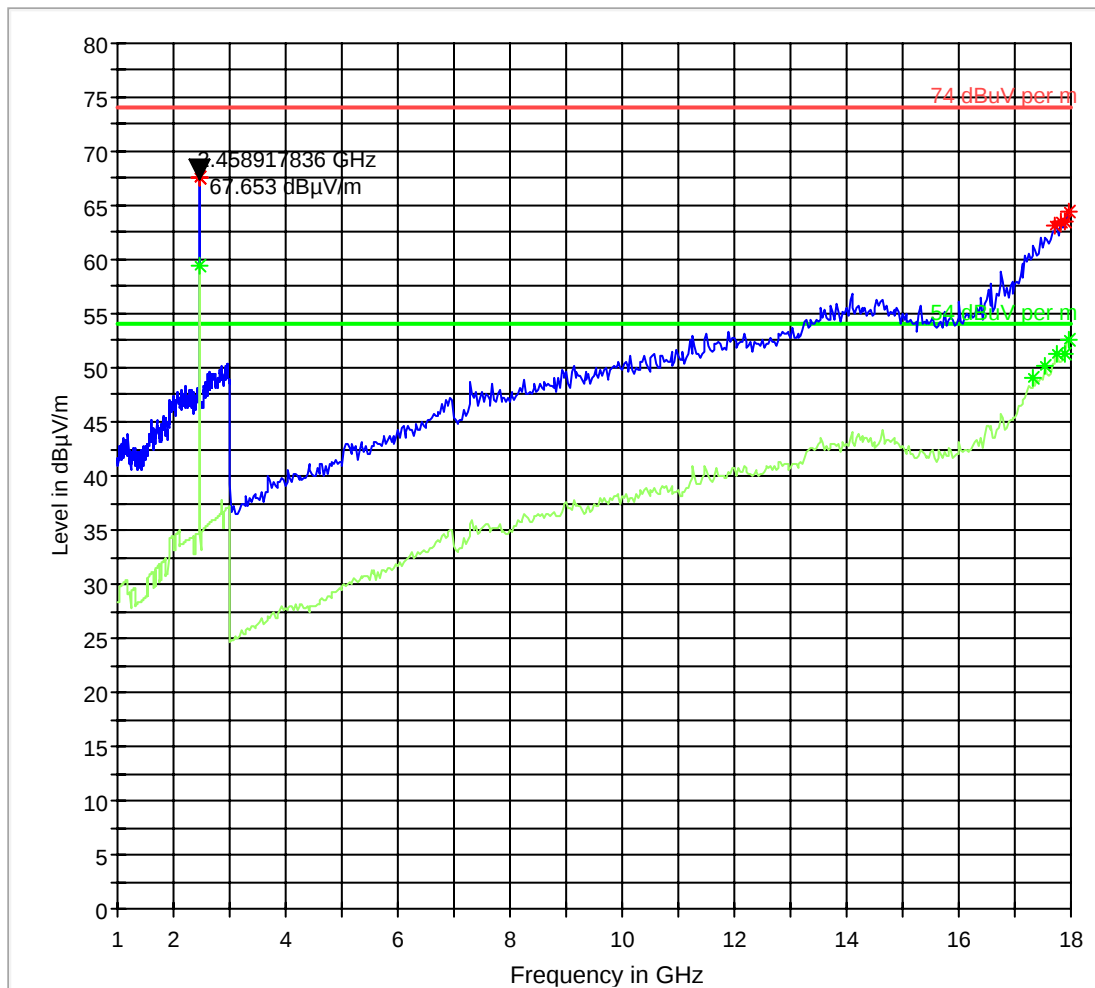


74 dBuV per m.LimitLine
54 dBuV per m.LimitLine
Preview Result 1
Preview Result 2

802.11g chain B 1-18GHz (CH11)

Note: Marker placed on transmit signal

FCC 15 1-18GHz



74 dBμV per m.LimitLine
Preview Result 2

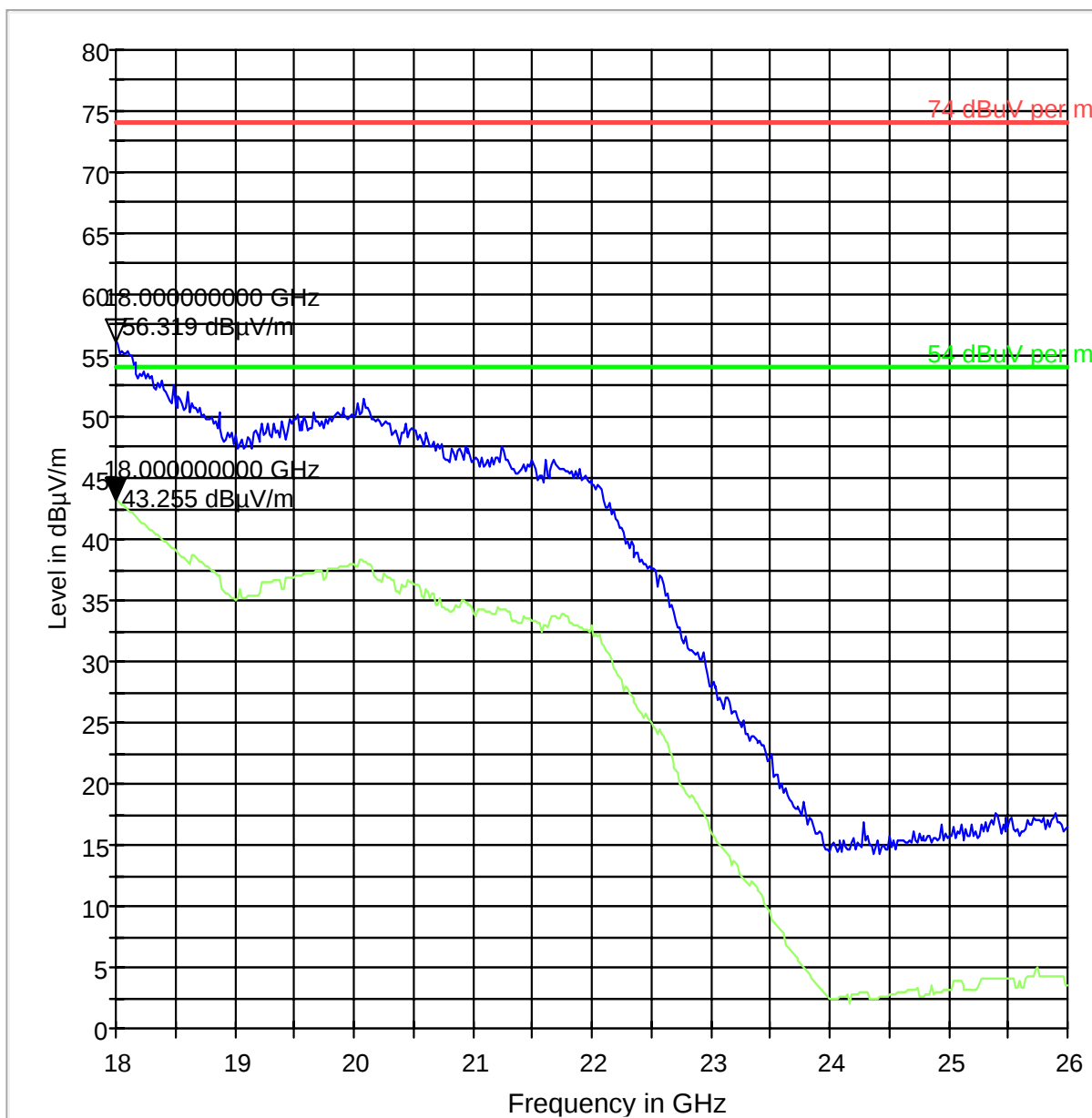
54 dBμV per m.LimitLine
* Data Reduction 1 [2]

Preview Result 1
* Data Reduction 2 [2]

18-25GHz 802.11b Chain A CH 11

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

FCC 15 18-26GHz



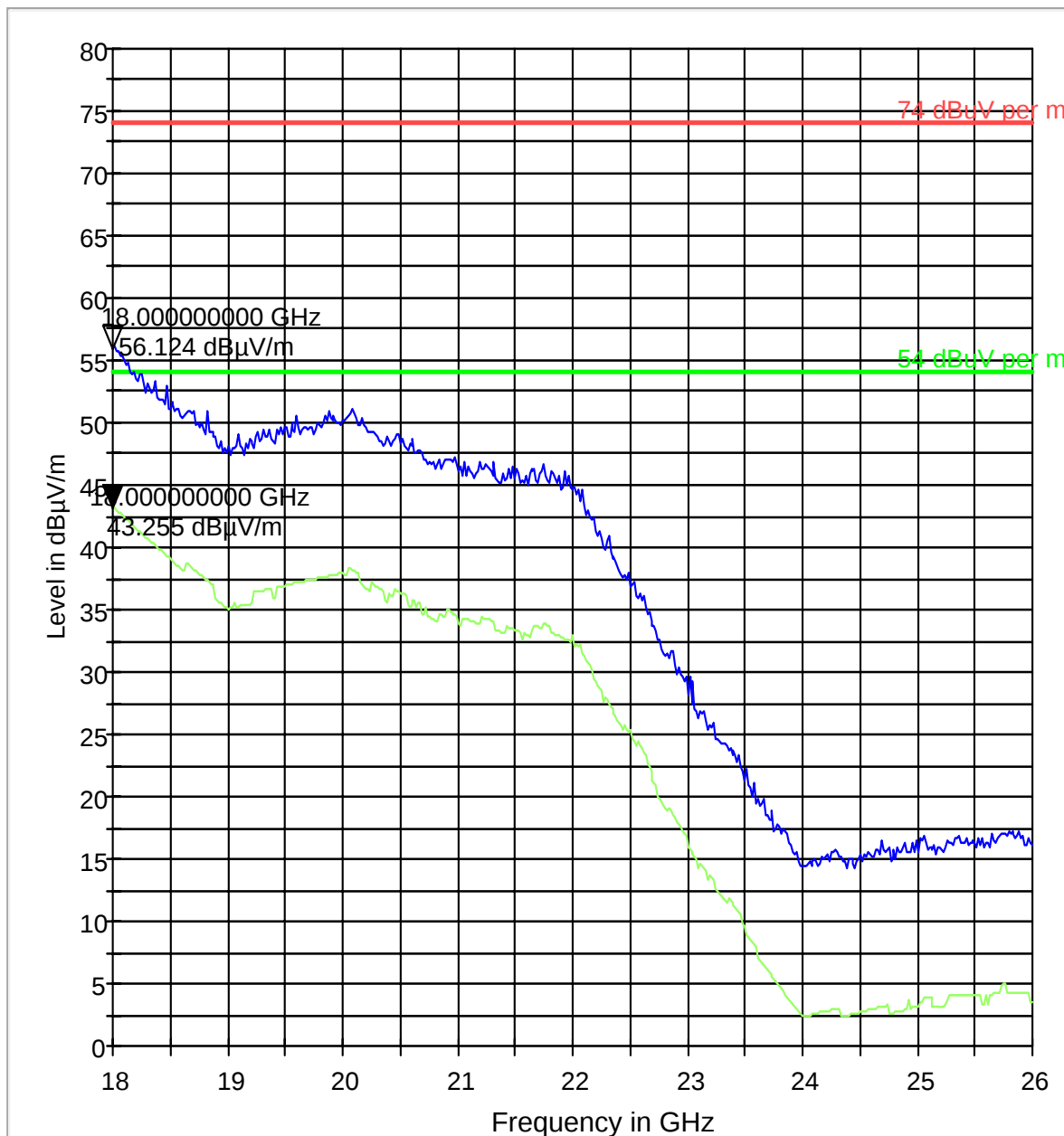
74 dBuV per m.LimitLine
Preview Result 1

54 dBuV per m.LimitLine
Preview Result 2

18-25GHz 802.11g Chain B CH 6

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

FCC 15 18-26GHz



74 dBuV per m.LimitLine
Preview Result 1

54 dBuV per m.LimitLine
Preview Result 2

5.3.3 RESULTS 2400-2483.5MHz 802.11n HT40 MODE

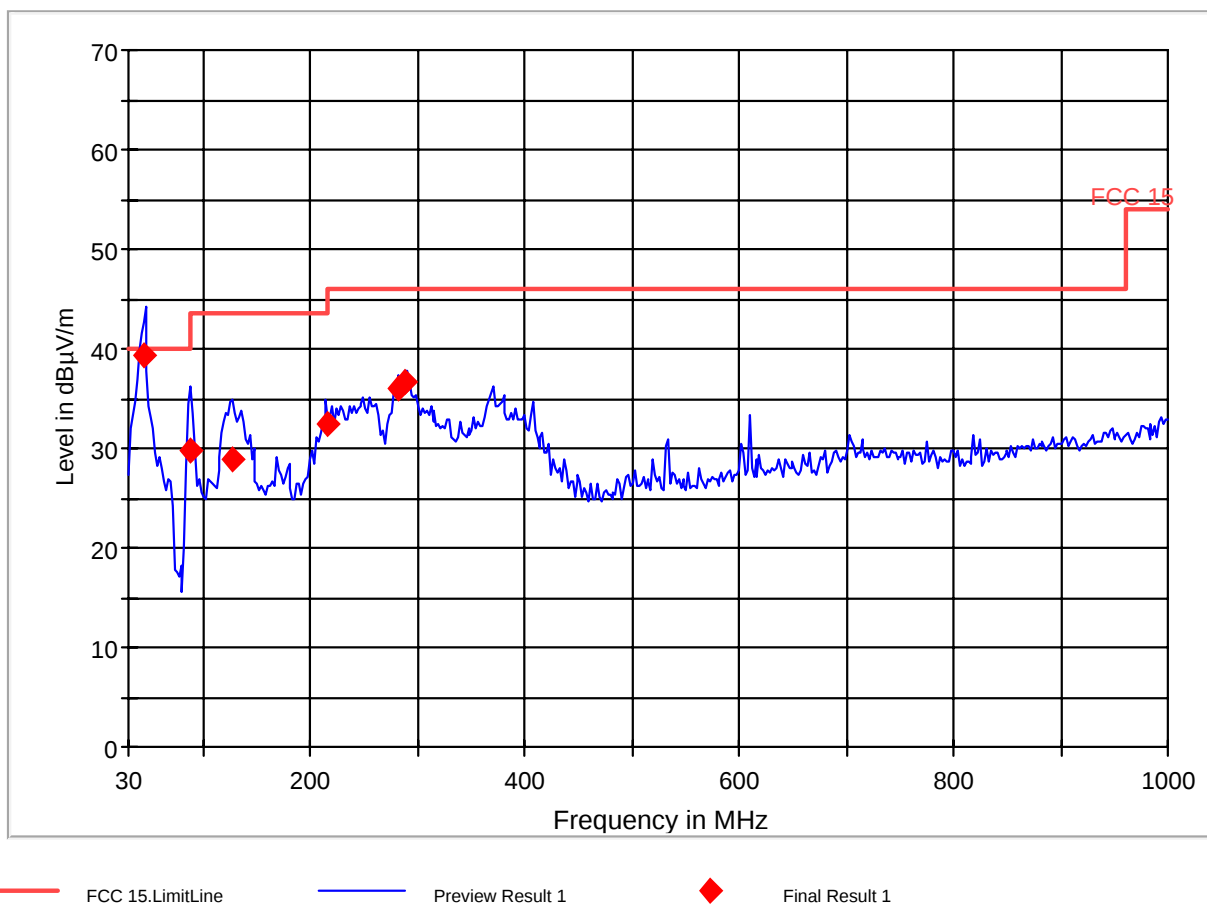
30MHz – 1GHz-802.11n HT40 MODE-Chain A

Worst Case High Channel

Final Result 1

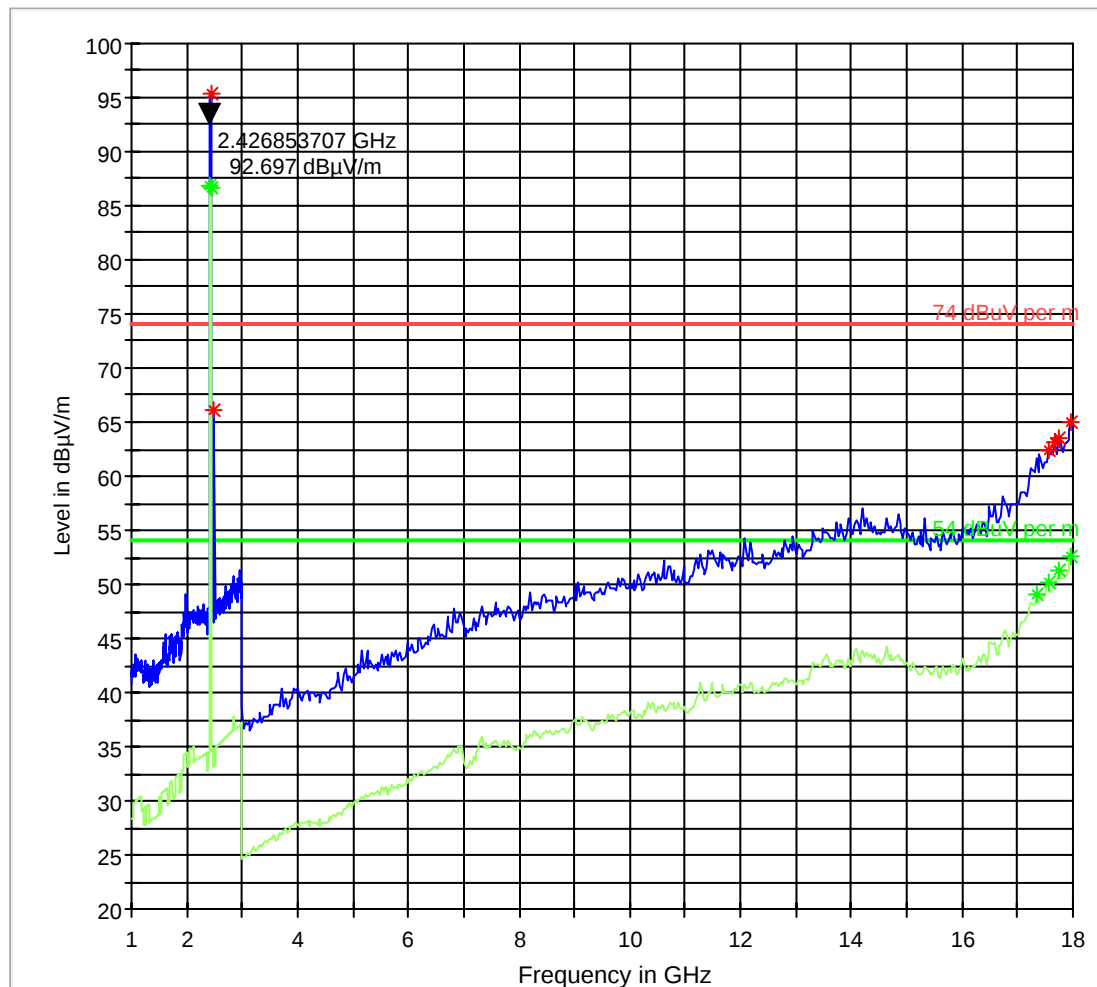
Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
45.451602	39.4	20.000	120.000	121.0	V	69.0	6.2	0.6	40.0
87.191253	29.8	20.000	120.000	121.0	V	287.0	10.1	10.2	40.0
126.605547	29.0	20.000	120.000	121.0	V	9.0	8.3	14.5	43.5
216.015741	32.4	20.000	120.000	144.0	H	90.0	12.7	13.6	46.0
282.027430	36.1	20.000	120.000	120.0	H	287.0	14.9	9.9	46.0
287.340083	36.7	20.000	120.000	121.0	H	278.0	15.3	9.3	46.0

FCC 15 30-1000MHz



1-18GHz (2422MHz)

FCC 15 1-18GHz



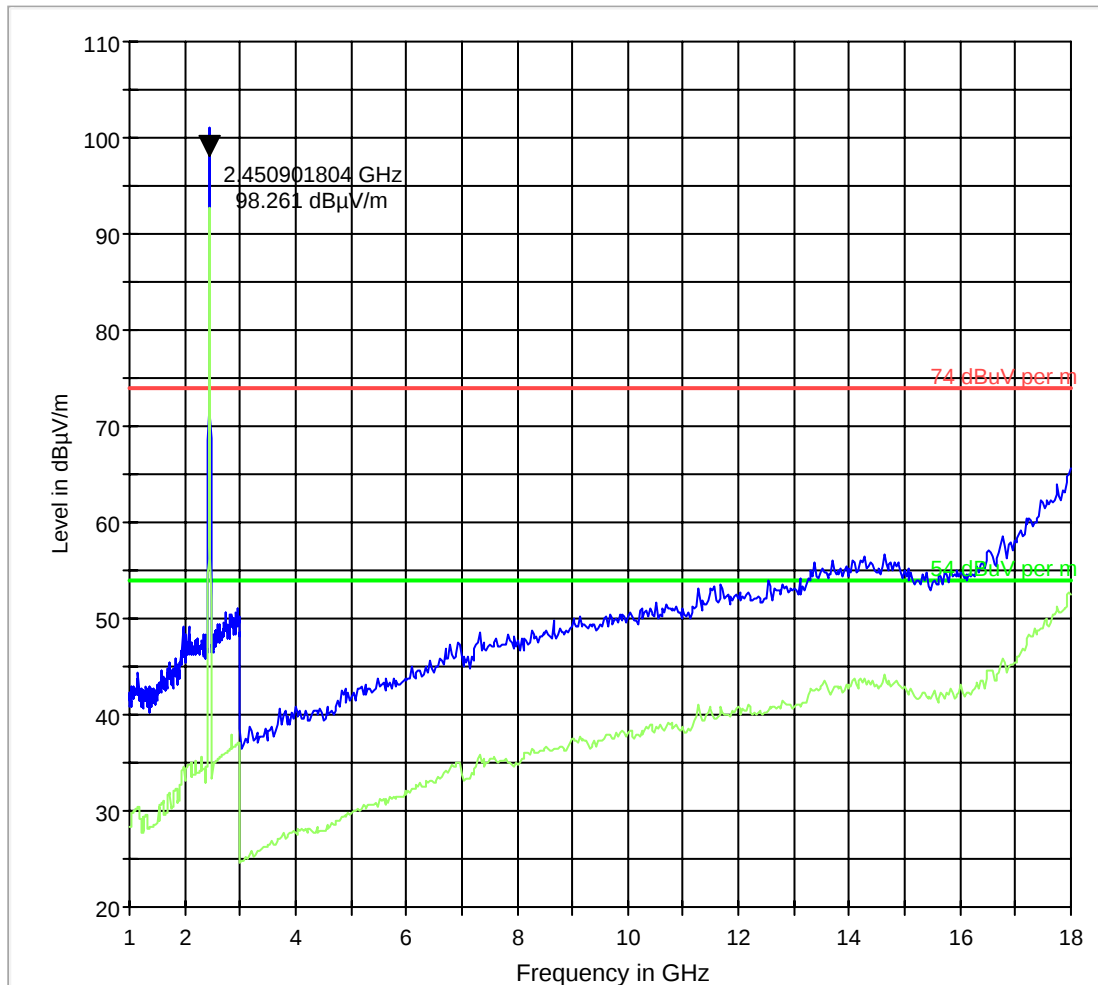
74 dBuV per m.LimitLine
Preview Result 2

54 dBuV per m.LimitLine
* Data Reduction 1 [2]

Preview Result 1
* Data Reduction 2 [2]

1-18GHz (2437MHz)

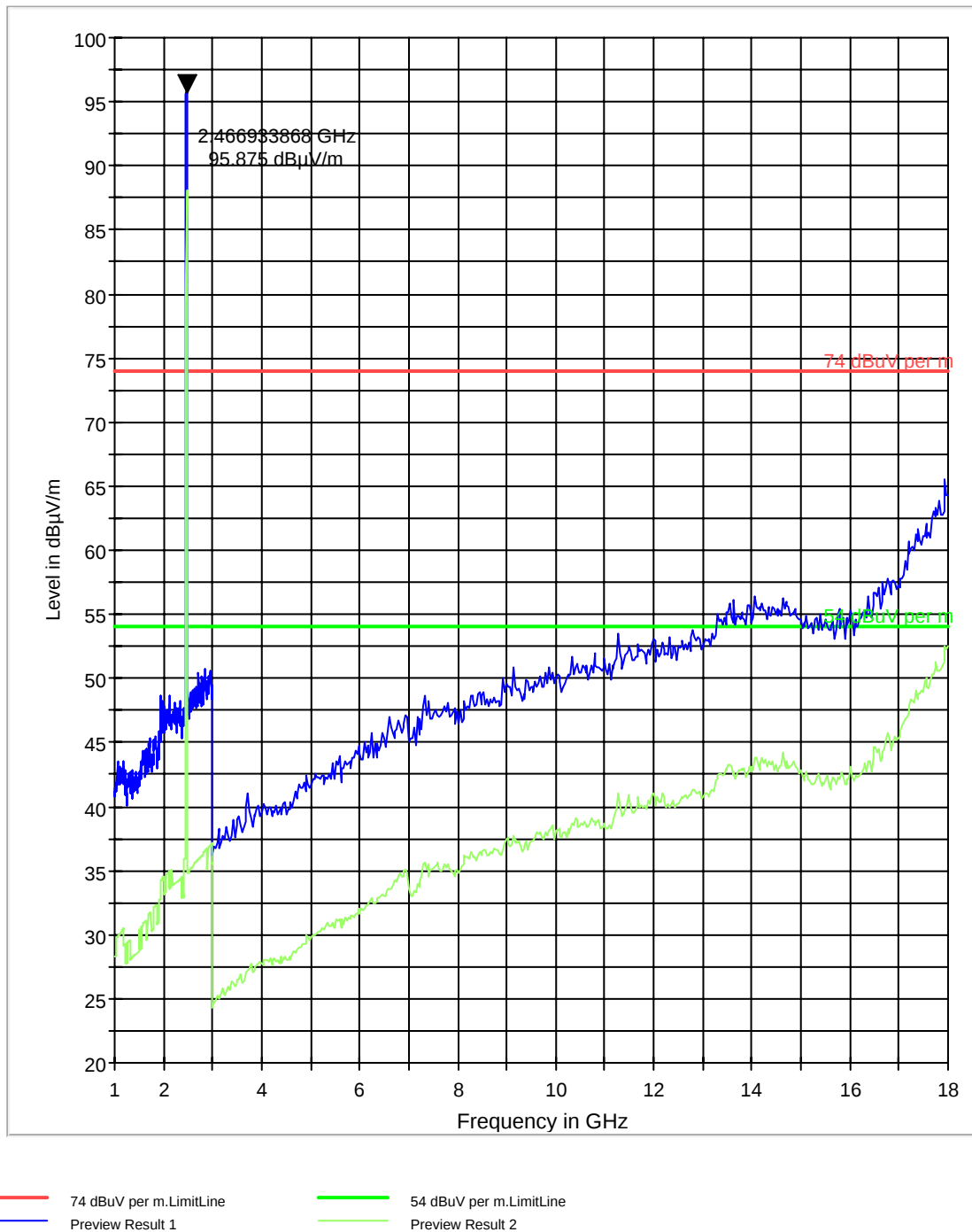
FCC 15 1-18GHz



— 74 dBμV per m.LimitLine
— Preview Result 1
— 54 dBμV per m.LimitLine
— Preview Result 2

1-18GHz (2452MHz)

FCC 15 1-18GHz



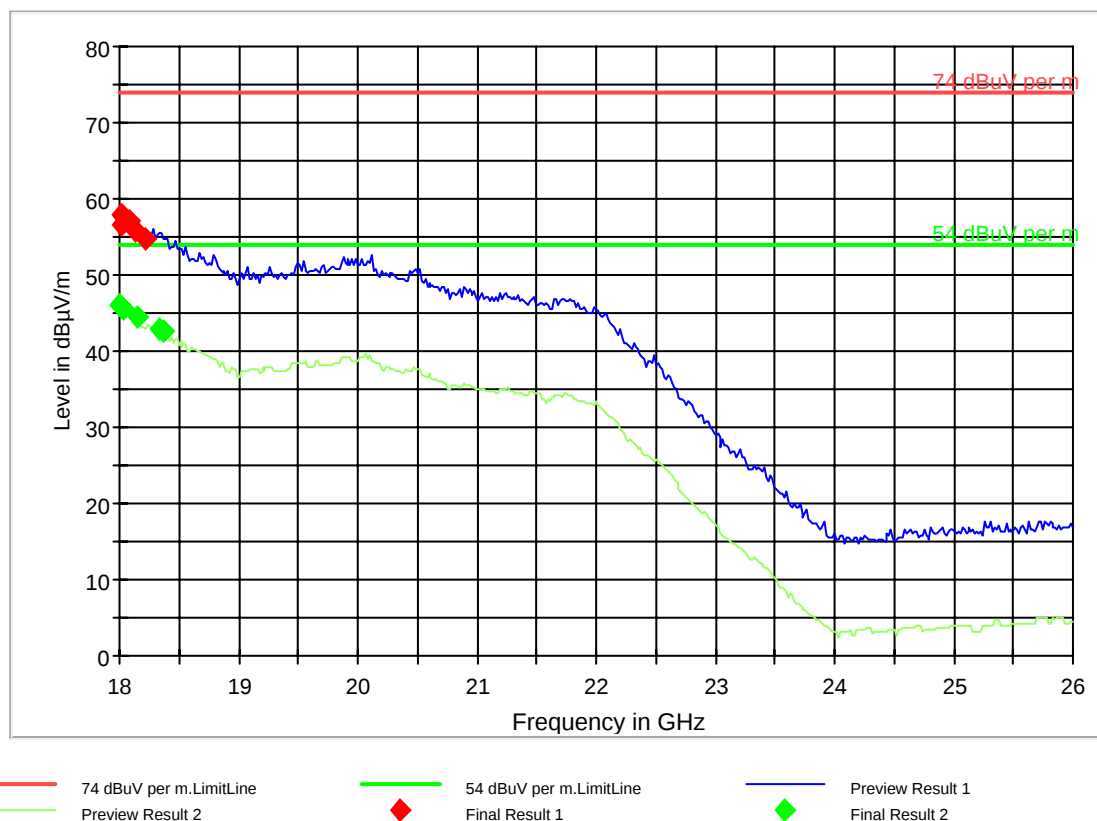
18-26.5GHz**Note:** This plot is valid for low, mid, high channels (worst-case plot)**Final Result 1**

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
18012.752481	57.9	20.000	1000.000	120.0	V	268.0	28.7	16.1	74.0
18022.545090	56.6	20.000	1000.000	120.0	H	1.0	28.0	17.4	74.0
18024.930178	57.8	20.000	1000.000	120.0	V	188.0	28.6	16.2	74.0
18088.079768	57.0	20.000	1000.000	120.0	V	292.0	28.1	17.0	74.0
18128.686666	55.7	20.000	1000.000	120.0	H	249.0	27.1	18.3	74.0
18224.988535	54.9	20.000	1000.000	120.0	V	112.0	26.9	19.1	74.0

(continuation of the "Final Result 1" table from column 10 ...)

Frequency (MHz)	Comment
18012.752481	
18022.545090	
18024.930178	
18088.079768	
18128.686666	
18224.988535	

FCC 15 18-26GHz



2400-2483.5 MHz 802.11n HT40 MODE-Chain B

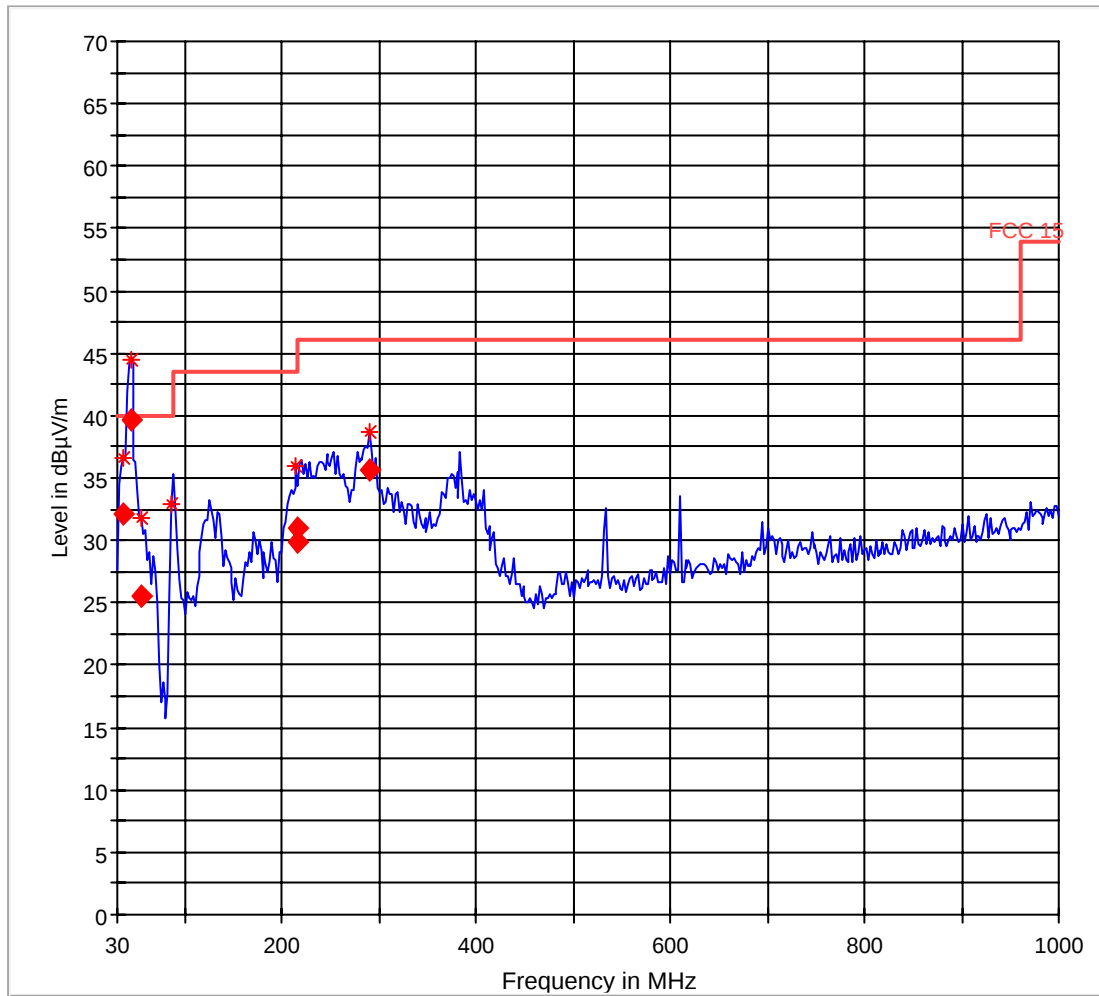
30MHz – 1GHz

Worst Case Mid Channel

Final Measurement Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
35.821969	32.2	20.000	120.000	152.0	V	69.0	6.3	7.8	40.0
43.707275	39.7	20.000	120.000	122.0	V	87.0	5.9	0.3	40.0
55.061754	25.5	20.000	120.000	122.0	V	22.0	7.3	15.5	40.0
215.282460	31.0	20.000	120.000	145.0	H	90.0	12.6	12.5	43.5
215.282460	29.9	20.000	120.000	122.0	H	90.0	12.6	13.6	43.5
290.856458	35.7	20.000	120.000	122.0	H	277.0	15.6	10.3	46.0

FCC 15 30-1000MHz



— FCC 15.LimitLine
* Data Reduction 1 [1]

— Preview Result 1
◆ Final Measurement Result 1

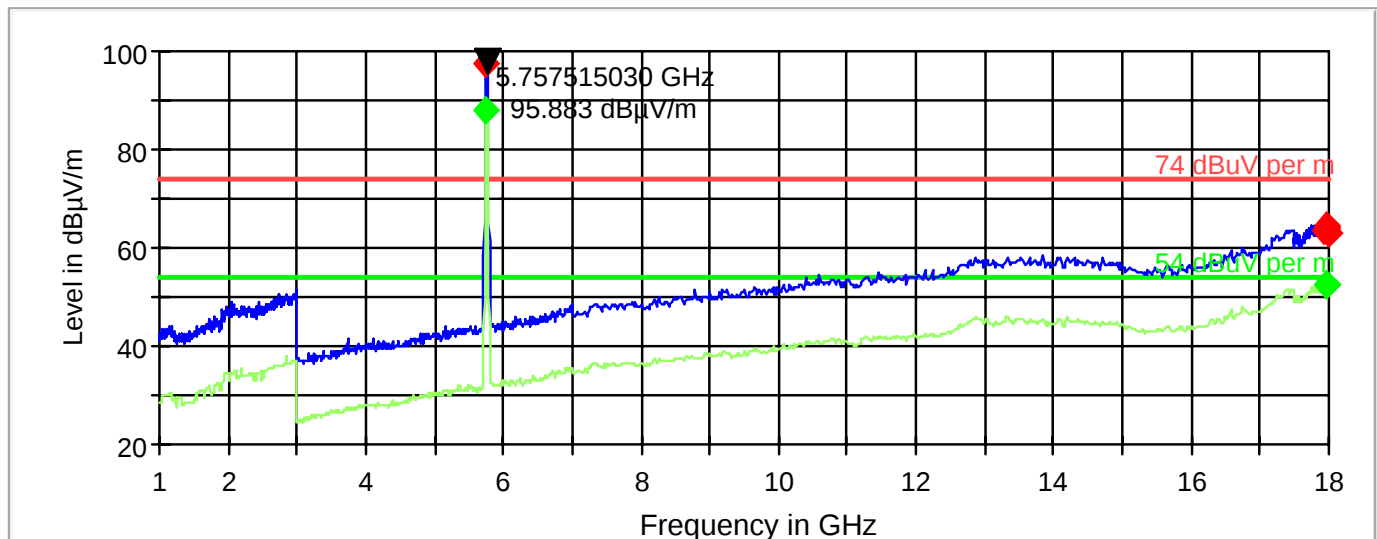
1-18GHz (2422MHz)

Marker over limit denotes transmit Channel

Final Result 1

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
5752.842109	97.4	20.000	1000.000	120.0	V	166.0	6.0	-23.4	74.0
17944.860713	63.7	20.000	1000.000	145.0	H	266.0	29.8	10.3	74.0
17954.778882	64.1	20.000	1000.000	120.0	V	112.0	30.1	9.9	74.0
17961.602773	64.7	20.000	1000.000	145.0	V	159.0	30.0	9.3	74.0
17974.866677	63.5	20.000	1000.000	120.0	H	187.0	29.8	10.5	74.0
17997.557042	63.2	20.000	1000.000	120.0	V	112.0	29.8	10.8	74.0

FCC 15 1-18GHz



74 dBμV per m.LimitLine

Preview Result 2

54 dBμV per m.LimitLine

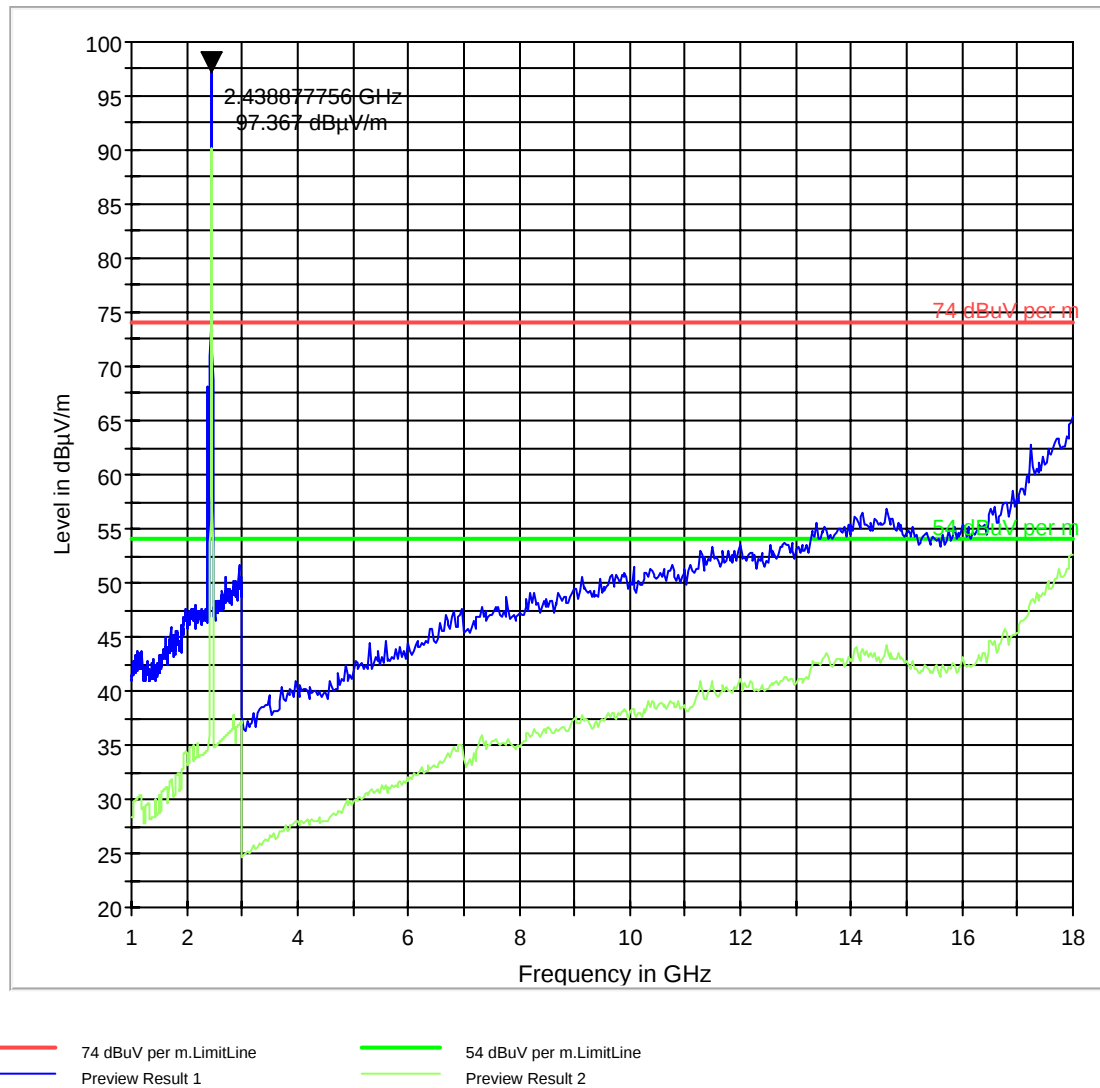
Final Result 1

Preview Result 1

Final Result 2

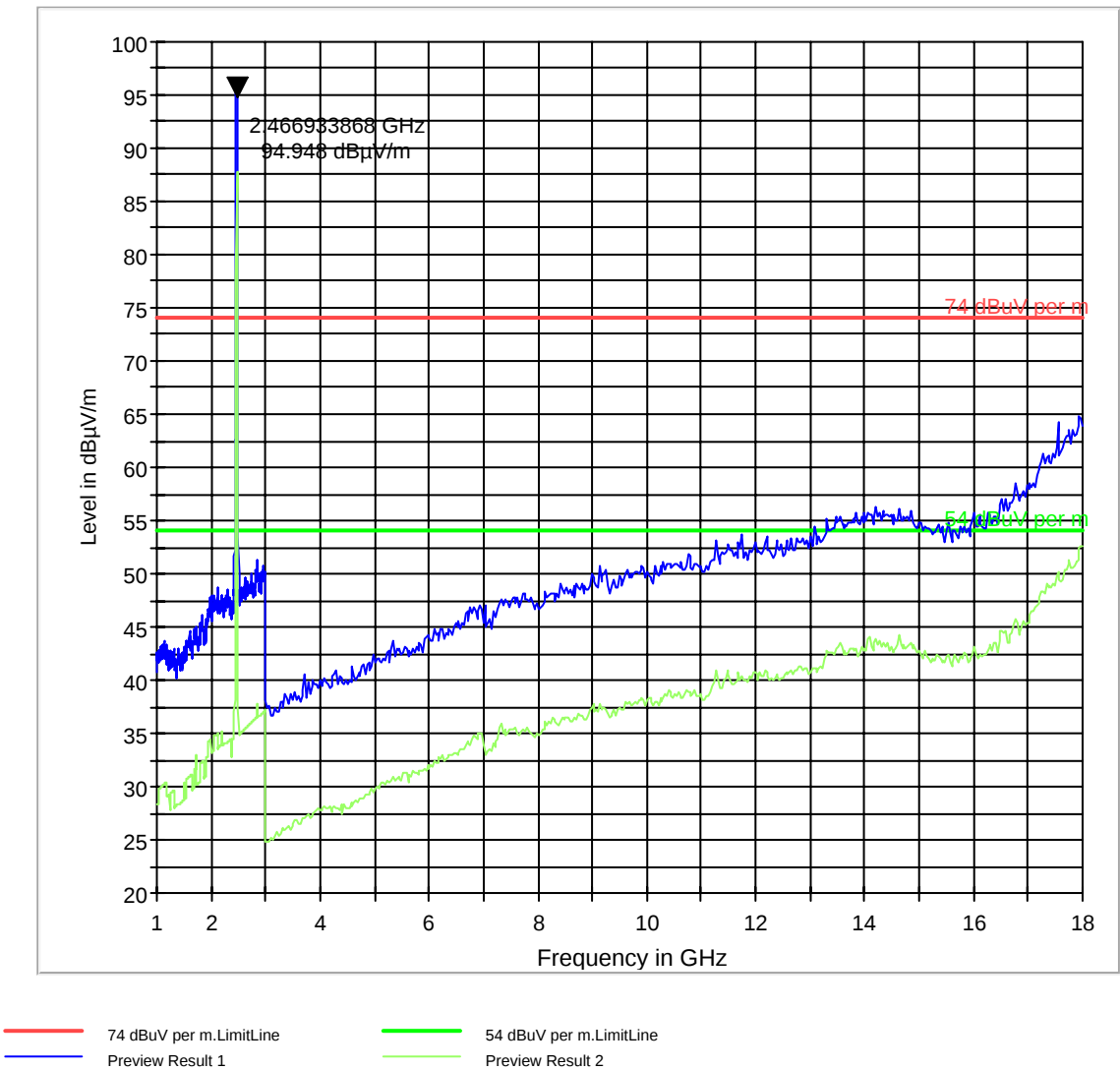
1-18GHz (2437MHz)

FCC 15 1-18GHz



1-18GHz (2452MHz)

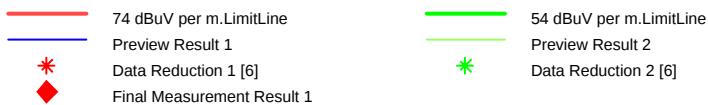
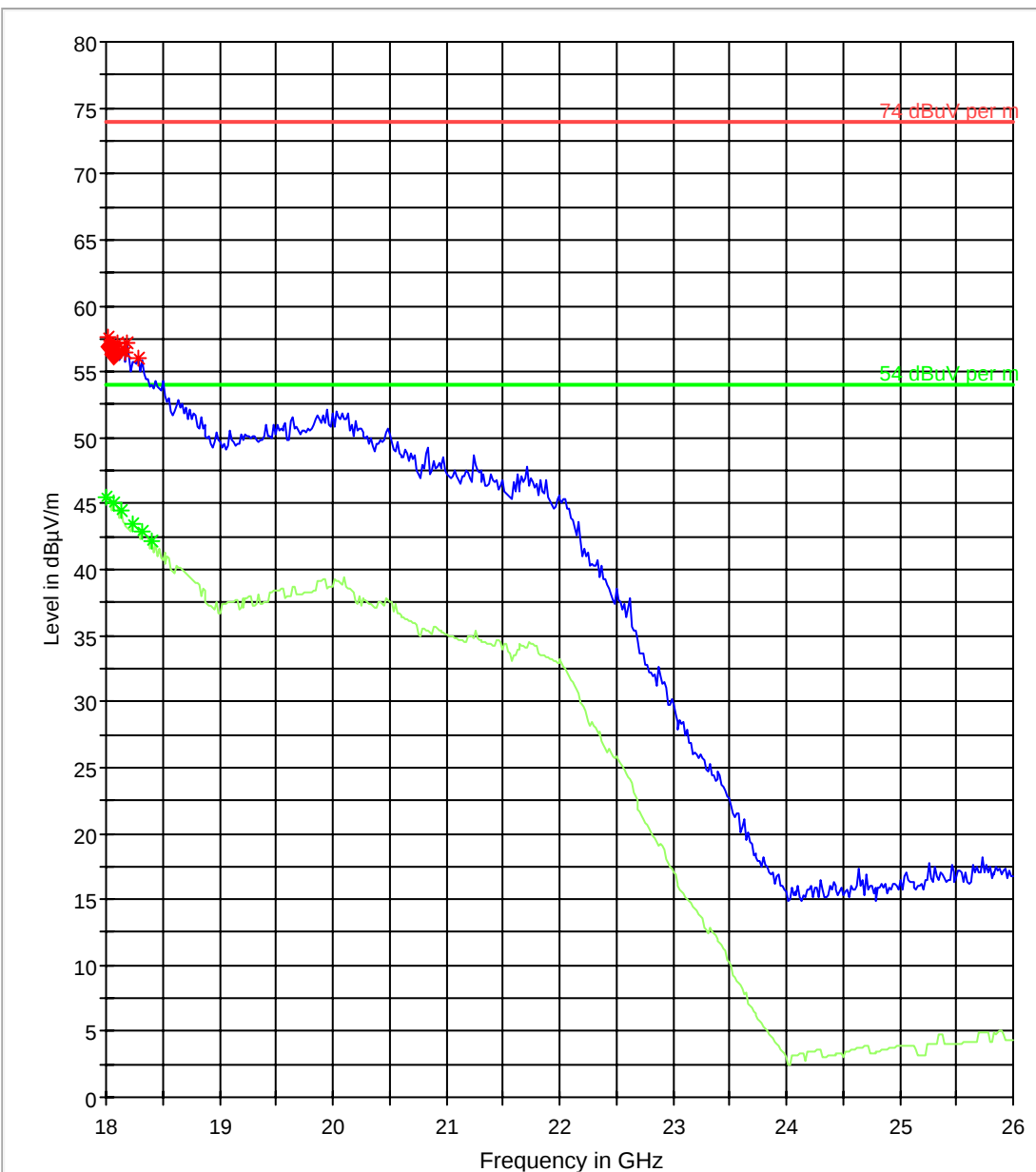
FCC 15 1-18GHz



18-26.5GHz

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

FCC 15 18-26GHz



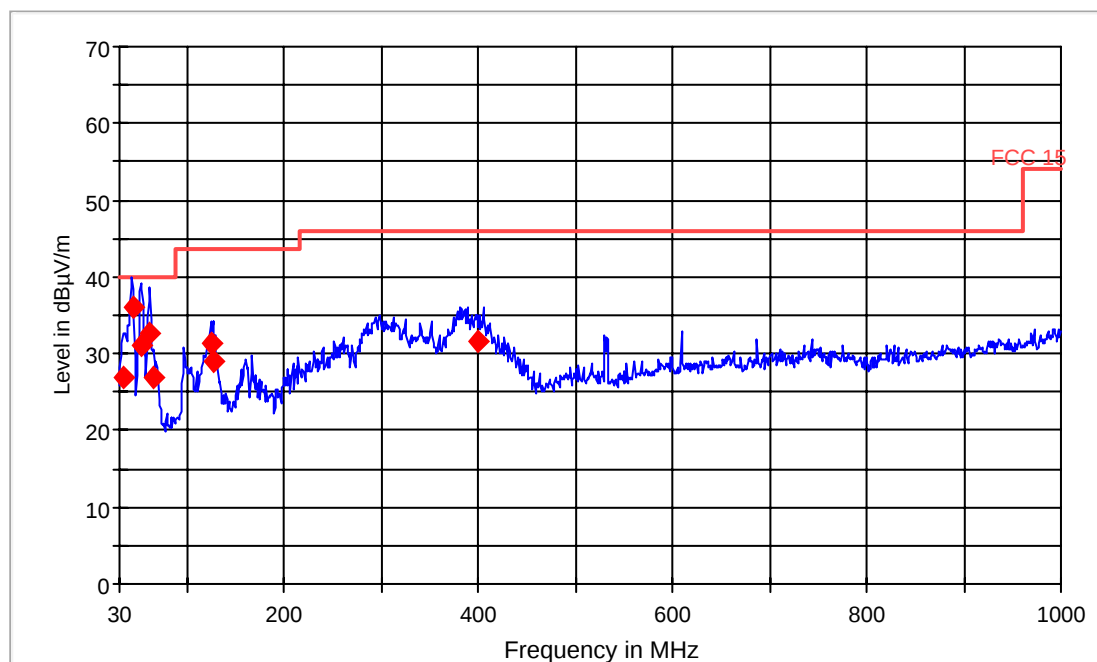
5.3.4 RESULTS 5725-5850 MHz 802.11a/ 802.11n HT20 MODE

In the frequency band 5725-5850 MHz, 802.11a had higher values of reported output power than 802.11n HT20 so all the spurious emission measurements were performed in 802.11a.

30MHz – 1GHz-802.11a Chain AB 5785 MHz

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
34.208986	26.8	20.000	120.000	152.0	V	135.0	6.6	13.2	40.0
44.226933	36.2	20.000	120.000	120.0	V	278.0	6.0	3.8	40.0
53.561813	31.2	20.000	120.000	189.0	V	225.0	7.1	8.8	40.0
61.764571	32.6	20.000	120.000	179.0	V	31.0	8.1	7.4	40.0
64.192735	26.9	20.000	120.000	234.0	V	87.0	8.4	13.1	40.0
125.451330	31.3	20.000	120.000	120.0	V	266.0	8.2	12.2	43.5
127.249486	29.0	20.000	120.000	151.0	V	45.0	8.3	14.5	43.5
399.170057	31.5	20.000	120.000	120.0	H	245.0	18.4	14.5	46.0

FCC 15 30-1000MHz



— FCC 15.LimitLine

— Preview Result 1



Final Result 1

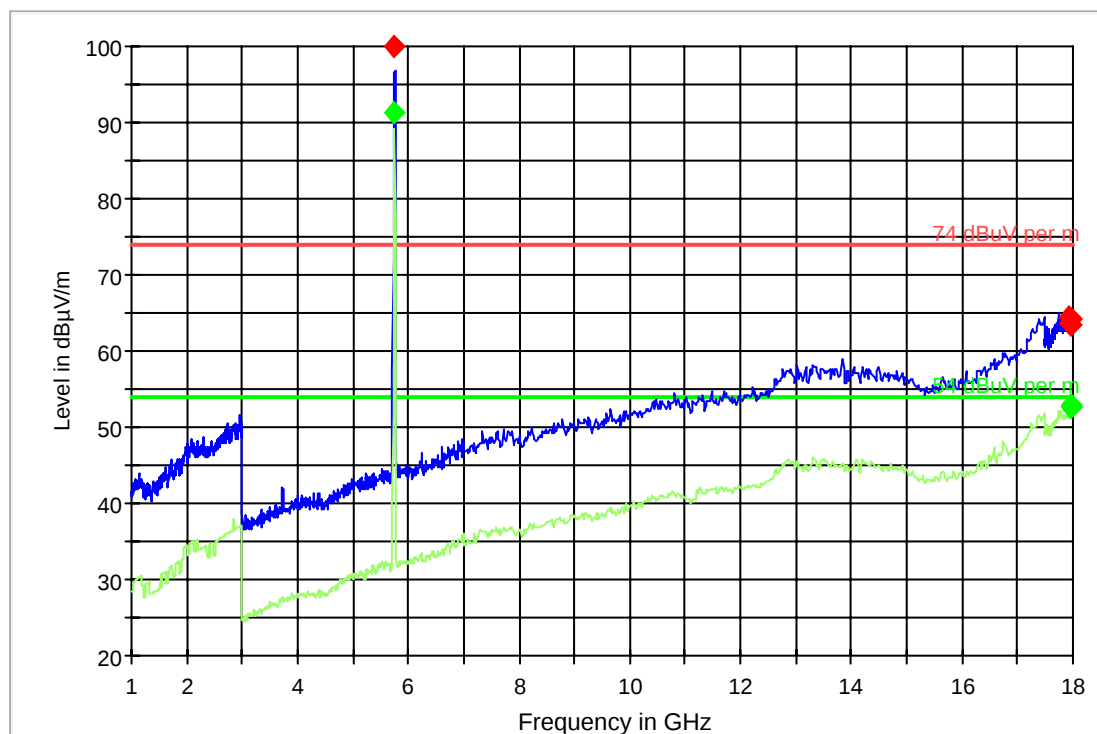
Chain A 1GHz -18GHz

Signal over the limit is transmit frequency

Final Result 1

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
5752.380586	99.9	20.000	1000.000	120.0	V	292.0	6.0	-25.9	74.0
17942.101884	64.4	20.000	1000.000	145.0	V	159.0	29.8	9.6	74.0
17943.287080	63.6	20.000	1000.000	120.0	V	97.0	29.9	10.4	74.0
17962.432484	64.3	20.000	1000.000	145.0	H	69.0	29.9	9.7	74.0
17971.339023	63.3	20.000	1000.000	145.0	V	69.0	29.9	10.7	74.0
17981.624184	64.1	20.000	1000.000	120.0	V	177.0	29.8	9.9	74.0

FCC 15 1-18GHz



74 dBμV per m.LimitLine
Preview Result 2

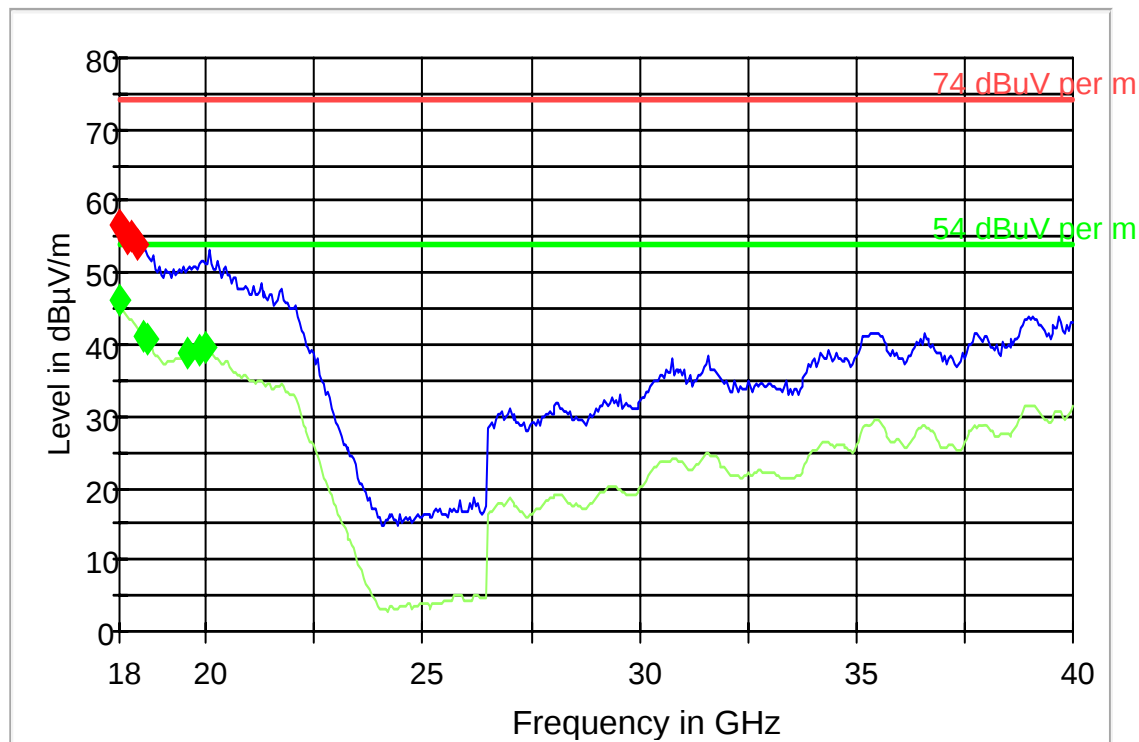
54 dBμV per m.LimitLine
Final Result 1

Preview Result 1
Final Result 2

Chain A 18GHz-40GHz**Final Result 1**

Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
18020.455830	56.9	20.000	1000.000	120.0	H	159.0	28.0	17.1	74.0
18201.024233	54.8	20.000	1000.000	120.0	H	70.0	26.5	19.2	74.0
18286.687182	55.0	20.000	1000.000	120.0	V	22.0	26.4	19.0	74.0
18406.621694	54.1	20.000	1000.000	120.0	V	1.0	25.4	19.9	74.0

FCC 15 18-40GHz



— 74 dBuV per m.LimitLine — 54 dBuV per m.LimitLine — Preview Result 1
— Preview Result 2 ◆ Final Result 1 ◆ Final Result 2

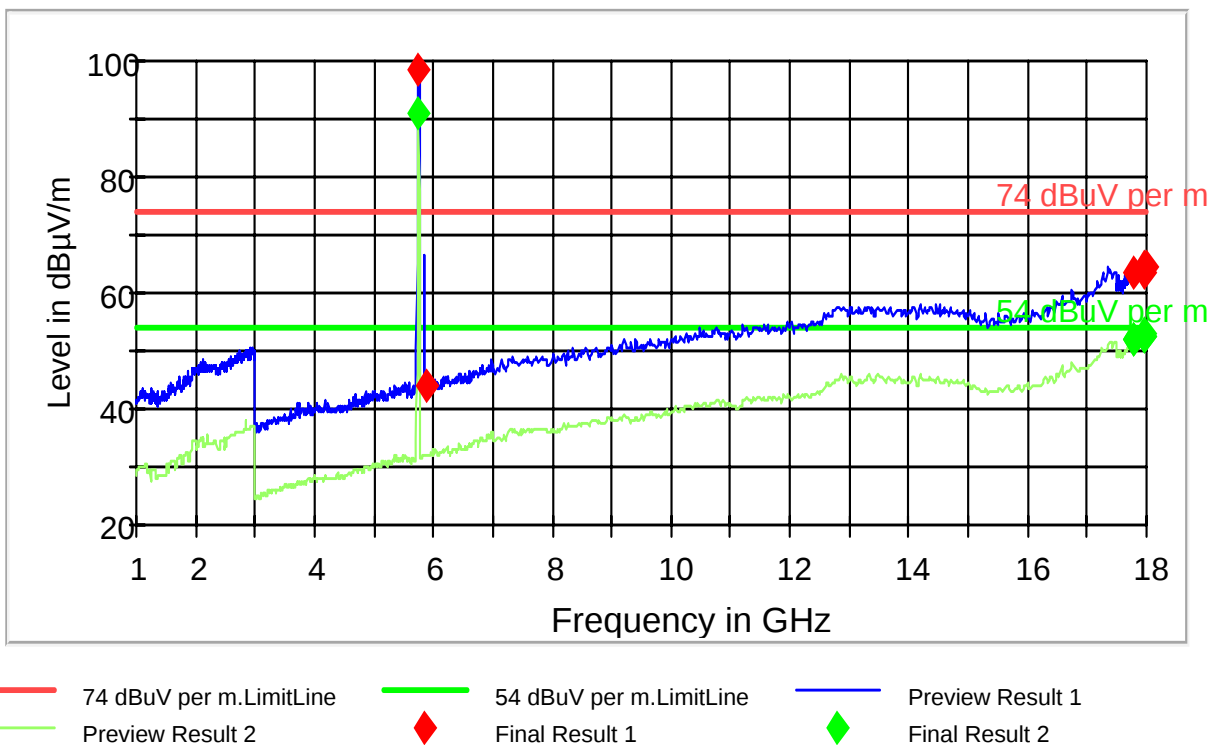
Chain B 1GHz -18GHz

Signal over the limit is transmit frequency

Final Result 1

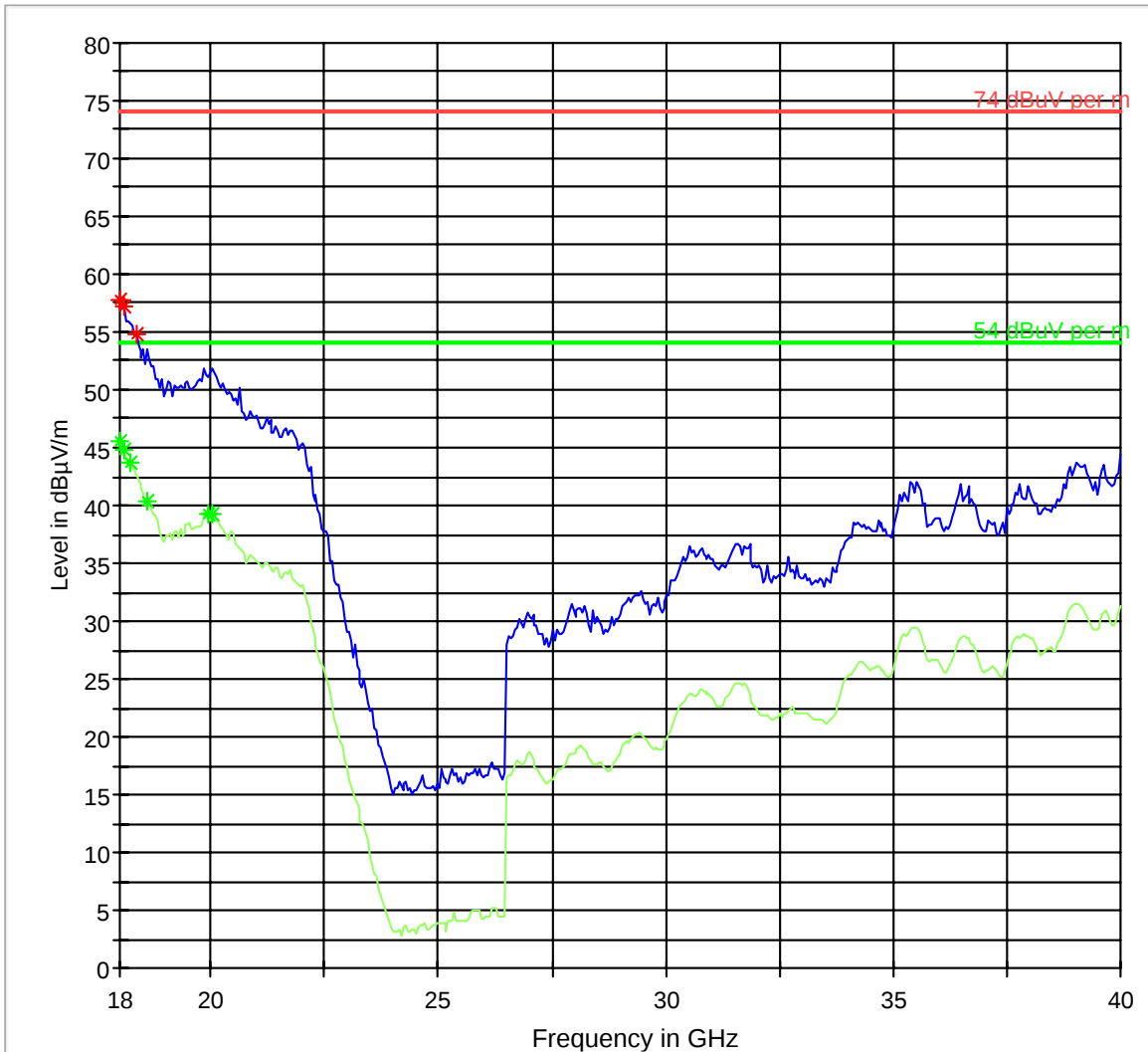
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
5752.611348	98.6	20.000	1000.000	120.0	V	168.0	6.0	-24.6	74.0
5868.125282	43.9	20.000	1000.000	120.0	V	166.0	6.0	30.1	74.0
17774.037728	63.4	20.000	1000.000	145.0	V	292.0	29.1	10.6	74.0
17968.108152	64.4	20.000	1000.000	145.0	V	249.0	29.9	9.6	74.0
17978.726408	63.7	20.000	1000.000	120.0	V	268.0	29.9	10.3	74.0
17989.927007	64.3	20.000	1000.000	145.0	H	202.0	29.7	9.7	74.0

FCC 15 1-18GHz



Chain B 18GHz-40GHz

FCC 15 18-40GHz



74 dBμV per m.LimitLine
Preview Result 2

54 dBμV per m.LimitLine
Data Reduction 1 [6]

Preview Result 1
Data Reduction 2 [6]

5.4 Receiver Spurious Emission § 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 an average limit unless specified with the plots.
3. There are no measurable emissions up to 18GHz in Rx mode.
4. Receiver spurious emissions reported here are the worse case emissions for all receiver modes and between two receiving chains.

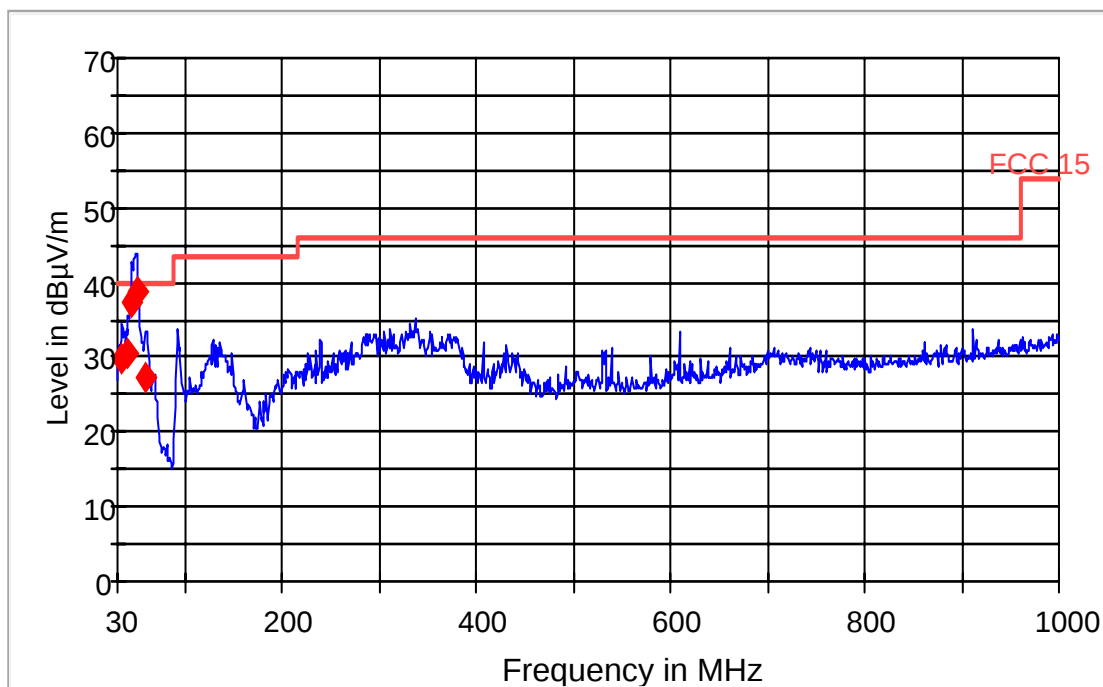
5.4.2 RESULTS

30MHz – 1GHz chain AB

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

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
34.709419	29.8	20.000	120.000	120.0	V	180.0	6.5	10.2	40.0
41.302605	30.5	20.000	120.000	120.0	V	270.0	5.6	9.5	40.0
45.070140	37.2	20.000	120.000	120.0	V	270.0	6.1	2.8	40.0
49.779559	38.8	20.000	120.000	120.0	V	180.0	6.7	1.2	40.0
59.198397	27.4	20.000	120.000	120.0	V	180.0	7.8	12.6	40.0

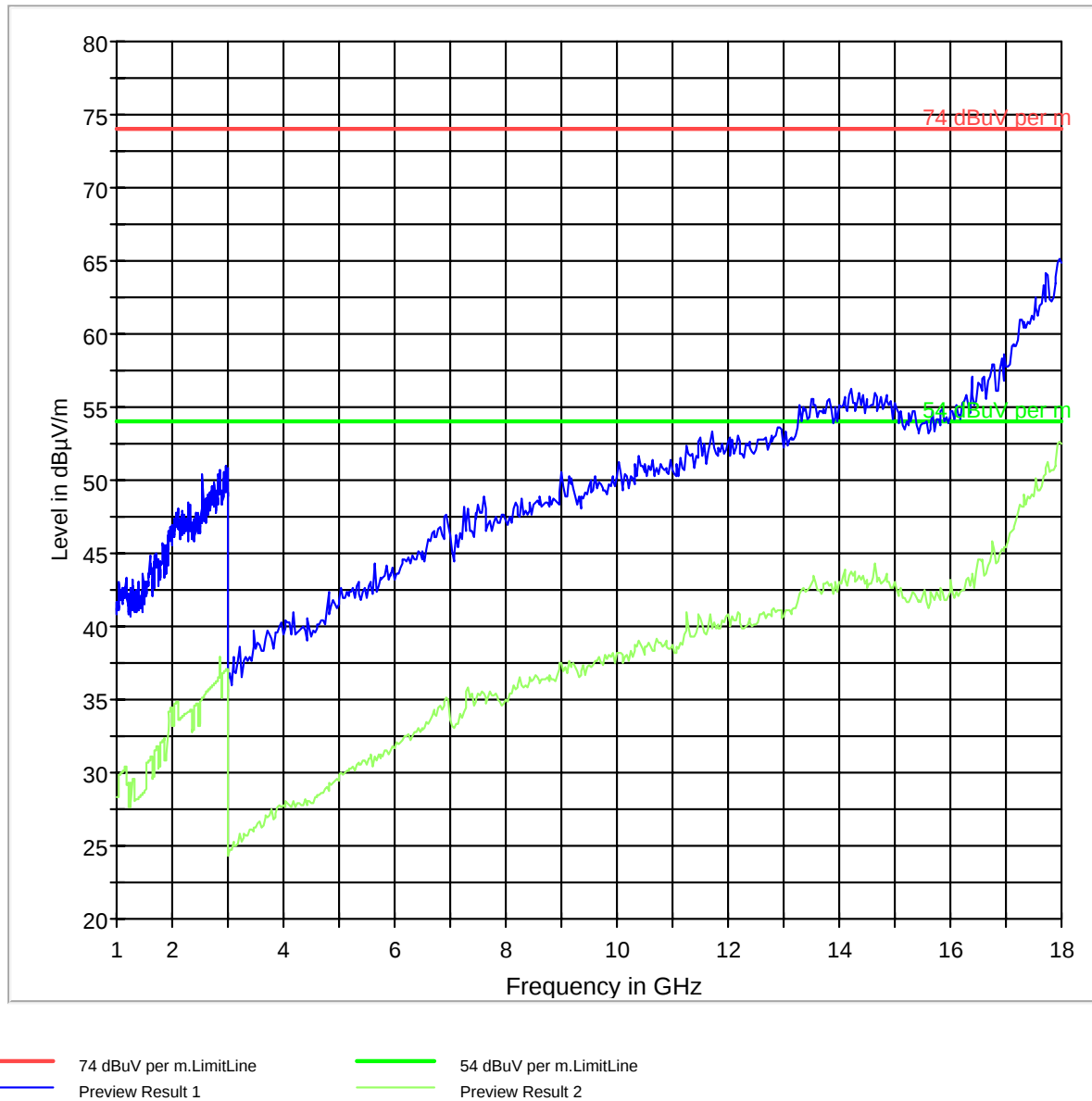
FCC 15 30-1000MHz



— FCC 15.LimitLine — Preview Result 1 ♦ Final Result 1

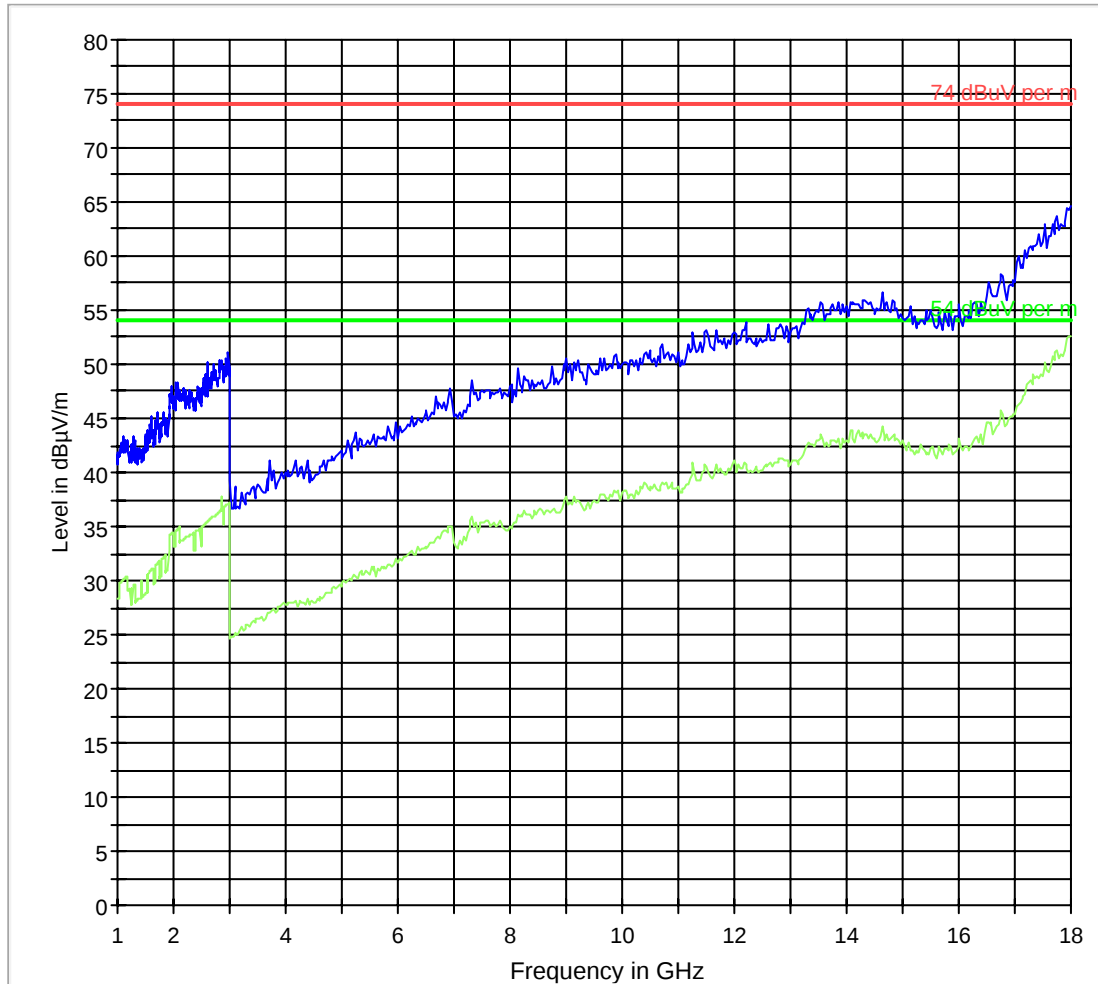
1-18GHz Chain A

FCC 15 1-18GHz



1-18GHz Chain B

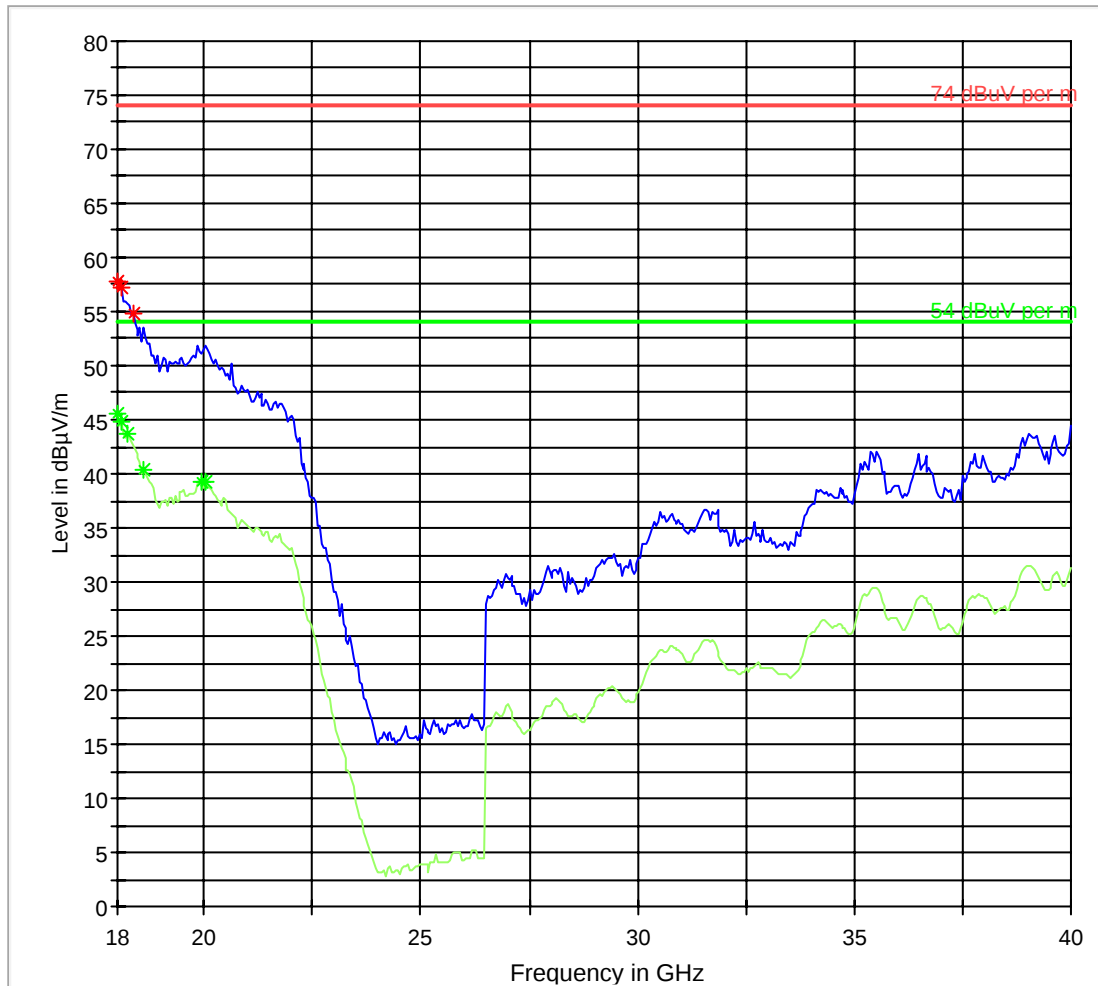
FCC 15 1-18GHz



— 74 dBuV per m.LimitLine
— Preview Result 1
— 54 dBuV per m.LimitLine
— Preview Result 2

18 GHz -40GHz Chain AB

FCC 15 18-40GHz



— 74 dBμV per m.LimitLine
— 54 dBμV per m.LimitLine
— Preview Result 1
— Preview Result 2
* Data Reduction 1 [6]
* Data Reduction 2 [6]

5.5 AC POWER LINE CONDUCTED EMISSIONS § 15.107/207**5.5.1 LIMITS****Technical specification: 15.107 / 15.207 (Revised as of August 20, 2002)**

§15.107 (a) Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Limit

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-Peak	Average
0.15 – 0.5	66 to 56*	56 to 46*
0.5 – 5	56	46
5 – 30	60	50
* Decreases with logarithm of the frequency		

ANALYZER SETTINGS: RBW = 10KHz**VBW = 10KHz**

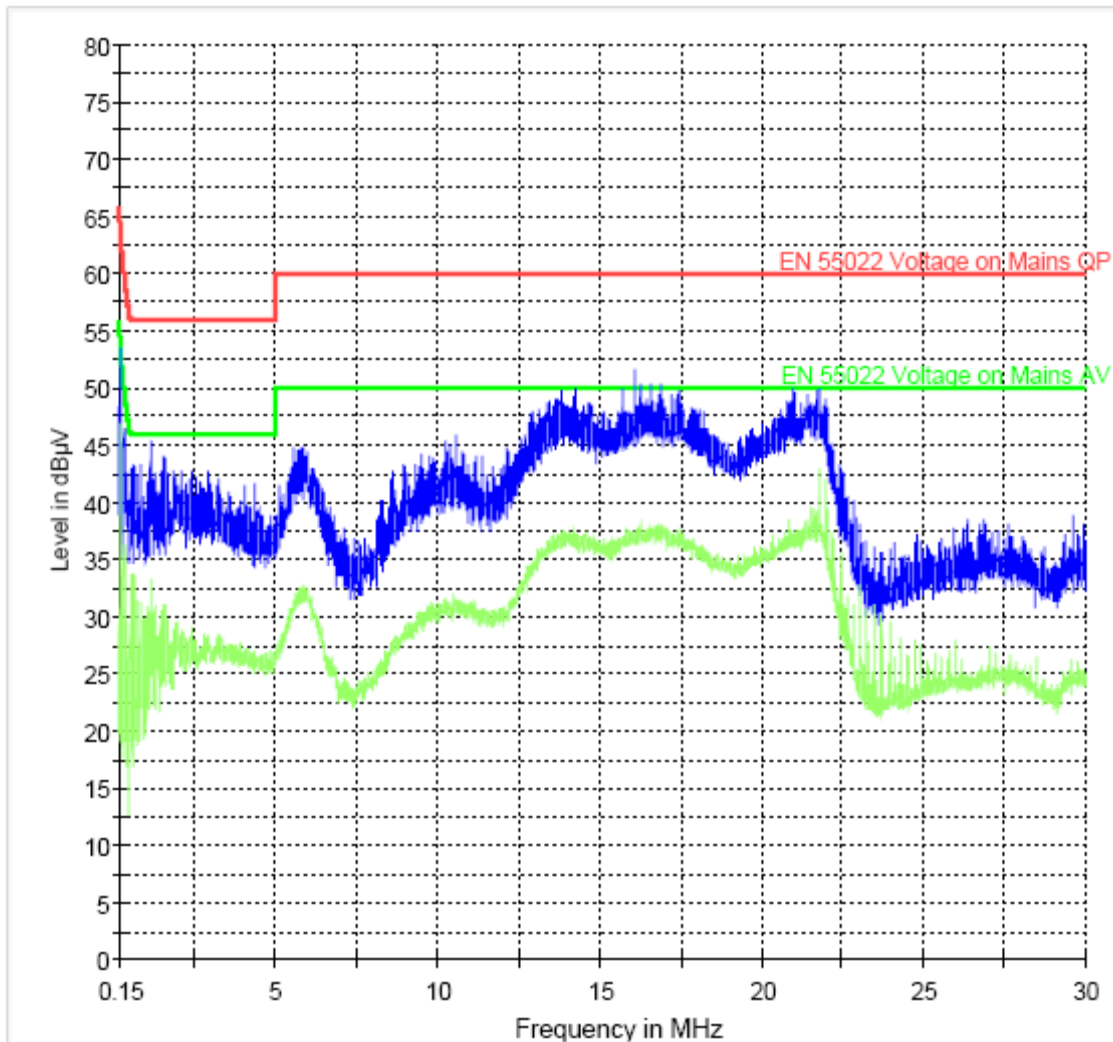
Note: AC Line Conducted Emission reported here are the worse cases among all operating modes.

5.5.2 RESULTS

Mode 802.11g:

Note: Plot contains results of both Line and Neutral Measurements

CISPR 22 Mains Conducted



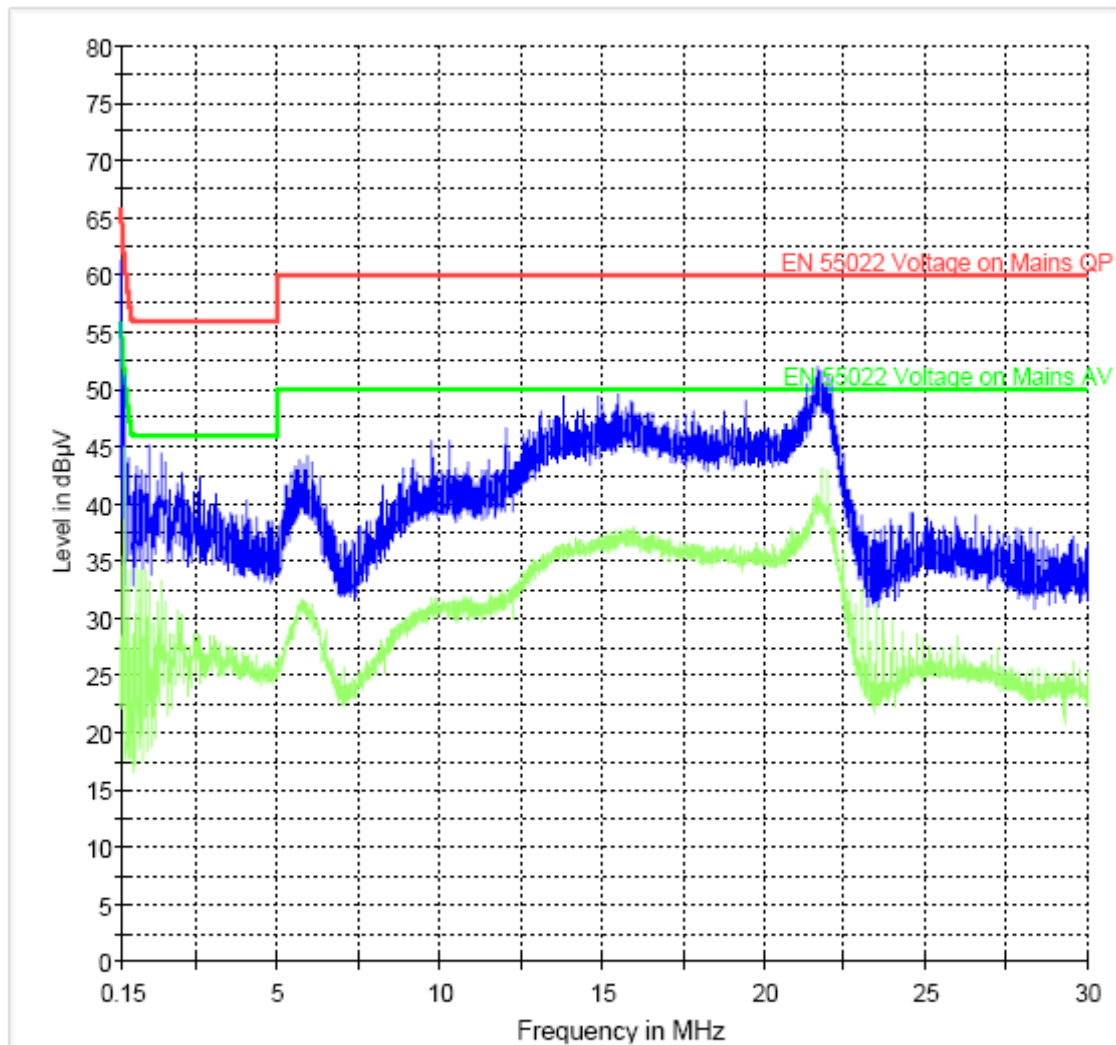
EN 55022 Voltage on Mains QP.LimitLine
Preview Result 1

EN 55022 Voltage on Mains AV.LimitLine
Preview Result 2

Mode 802.11a:

Note: Plot contains results of both Line and Neutral Measurements

CISPR 22 Mains Conducted



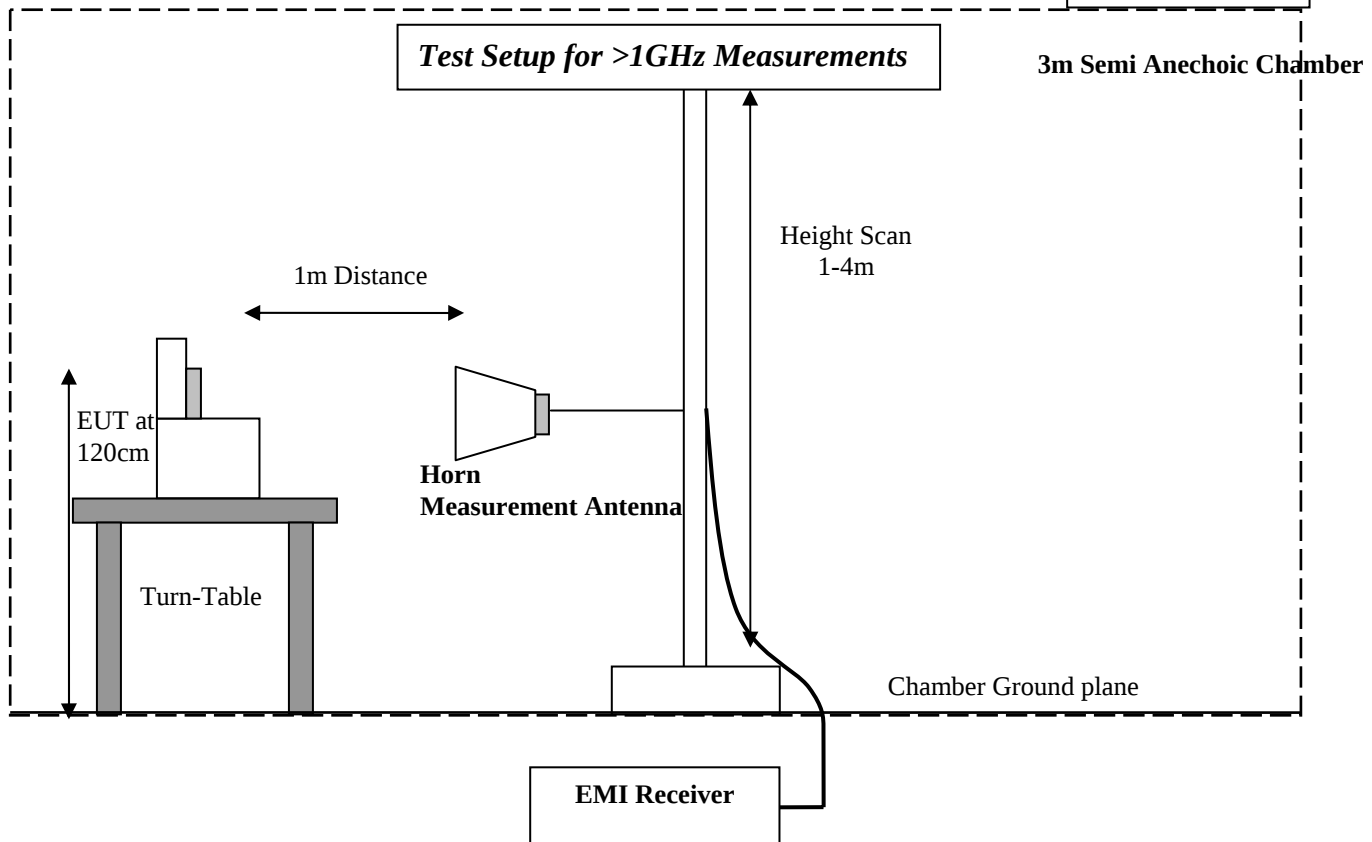
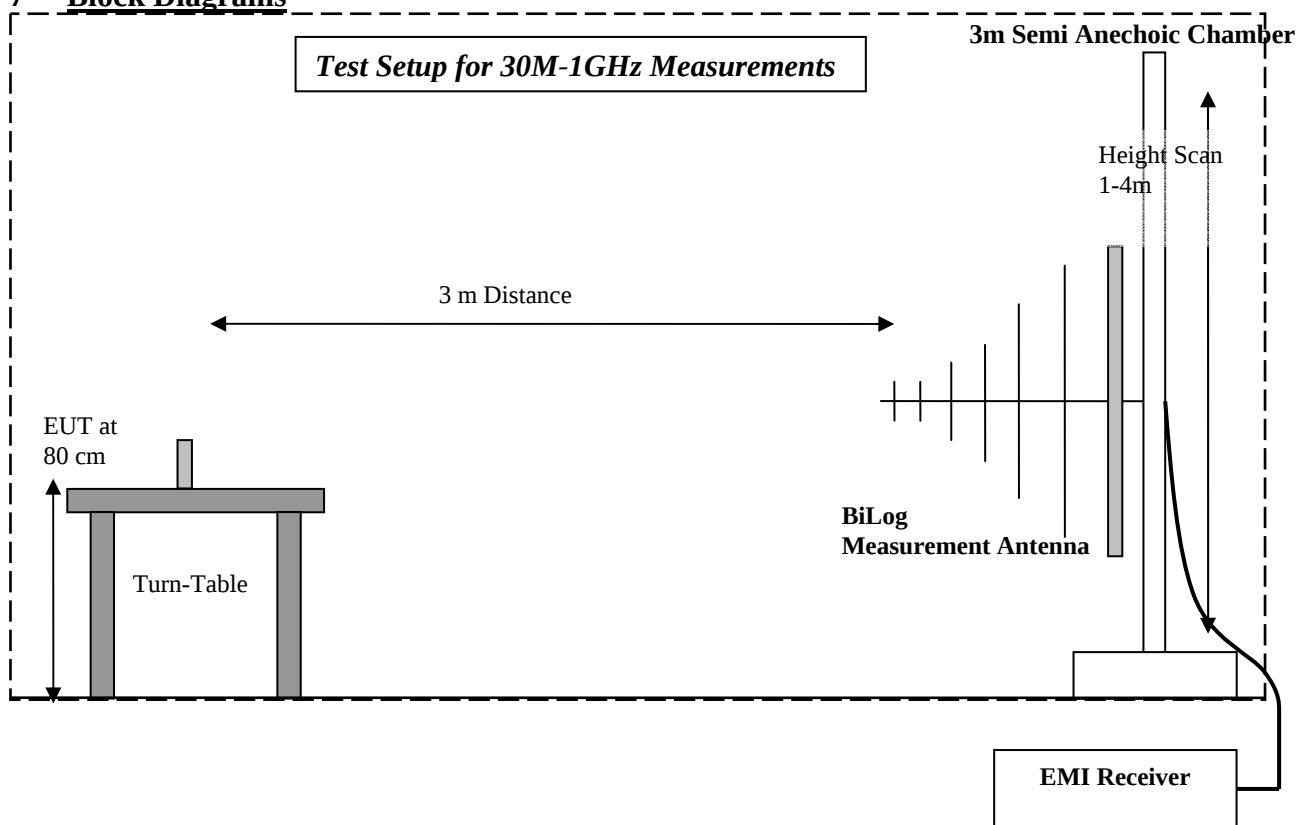
EN 55022 Voltage on Mains QP.LimitLine
Preview Result 1

EN 55022 Voltage on Mains AV.LimitLine
Preview Result 2

6 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

No	Instrument/Ancillary	Type	Manufacturer	Serial No.	Cal Due	Interval
01	Spectrum Analyzer	ESIB 40	Rohde & Schwarz	100107	May 2010	1 year
02	Spectrum Analyzer	FSEM 30	Rohde & Schwarz	100017	May 2010	1 year
03	Signal Generator	SMY02	Rohde & Schwarz	836878/011	May 2010	1 year
04	Power-Meter	NRVD	Rohde & Schwarz	0857.8008.02	May 2010	1 year
05	Biconilog Antenna	3141	EMCO	0005-1186	June 2011	2 year
06	Horn Antenna (1-18GHz)	SAS-200/571	AH Systems	325	June 2011	2 year
07	Horn Antenna (18-26.5GHz)	3160-09	EMCO	1240	June 2011	2 year
08	Power Splitter	11667B	Hewlett Packard	645348	n/a	n/a
09	High Pass Filter	5HC2700	Trilithic Inc.	9926013	n/a	n/a
10	High Pass Filter	4HC1600	Trilithic Inc.	9922307	n/a	n/a
11	Pre-Amplifier	JS4-00102600	Miteq	00616	May 2010	1 year
12	Power Sensor	URV5-Z2	Rohde & Schwarz	DE30807	May 2010	1 year
13	Digital Radio Comm. Tester	CMD-55	Rohde & Schwarz	847958/008	May 2010	1 year
14	Universal Radio Comm. Tester	CMU 200	Rohde & Schwarz	832221/06	May 2010	1 year
15	LISN	ESH3-Z5	Rohde & Schwarz	836679/003	May 2010	1 year
16	Loop Antenna	6512	EMCO	00049838	July 2011	2 years

7 Block Diagrams



Test Report #: EMC_SONYE_034_09002_15.247_PCG31111L



Date of Report: 2009-12-02

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8 Revision History

2009-12-02:

EMC_SONYE_034_09002_15.247_PCG31111L: Original report