



FCC / ISED Test Report

For:

Collins Aerospace

Marketing Name:

CCR-3000

Model Name:

AP-151 Rev A

Product Description:

Cabin Connect Router

FCC ID: Contain N7NEM91

Contain TK4WLE3002HX

IC: Contain 2417C-EM91

Contain 7849A-WLE3002HX

Applied Rules and Standards:

47 CFR Part 15.247 (DTS)

RSS-247 Issue 3 (DTS) & RSS-Gen Issue 5

REPORT #: EMC_ARINC_001_23001_FCC_15_247

DATE: 2024-07-25



A2LA Accredited

IC recognized #
3462B

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1 **Assessment**

The following device was evaluated against the applicable criteria specified in FCC rules Parts 15.247 of Title 47 of the Code of Federal Regulations and the relevant ISED Canada standard RSS-247.

No deviations were ascertained.

Company	Description	Model #
Collins Aerospace	Cabin Connect Router	AP-151 Rev A

Responsible for the Report:

2024-07-25	Compliance	Cheng Song (EMC Engineer)	
Date	Section	Name	Signature

The test results of this test report relate exclusively to the test item specified in Section3.
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 CETECOM Inc. USA.

2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
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EMC Lab Manager:	Alvin Ilarina
Responsible Project Leader:	Rami Saman

2.2 Identification of the Client

Client's Name:	Collins Aerospace
Street Address:	1901 W 143rd St.
City/Zip Code	Burnsville MN 55306
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	CCX Technologies Inc.
Manufacturers Address:	1565 Carling Ave, Suite 700
City/Zip Code	Ottawa, Ontario
Country	Canada

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Model No:	AP-151 Rev A
Marketing Name:	CCR-3000
HW Version :	822-3742-00x
SW Version :	1.9.0.2
FCC ID :	Contain N7NEM91 Contain TK4WLE3002HX
IC :	Contain 2417C-EM91 Contain 7849A-WLE3002HX
FWIN:	N/A
HVIN:	WLE3002HX
PMN:	N/A
Product Description:	Cabin Connect Router
Power Supply / Rated operating Voltage Range:	20.5/28/32.2 VDC
Operating Temperature Range	-40C +70C
Sample Revision	production-red label
EUT Dimensions	5.18 inches x 4.64 inches x 1.90 inches (L x W x H) (132 mm x 118mm x 49mm)
Note: All information provided by the client.	

3.2 Radio Specifications

Embedded Radio Technologies	Sierra Wireless EM9191, Compex Systems WLE3002HX
Frequency Range / number of channels:	Cell LTE/3G/4G: 1, 2, 3, 4, 5, 7, 8, 12, 13, 14, 17, 18, 19, 20, 25, 26, 28, 29, 30, 32, 34, 38, 39, 40, 41, 42, 43, 46, 48, 66, 7 5G NR: n2, n5, n7, n25, n38, n41, n48, n66, n71, n77, n78 WiFi: 2.4GHz/5GHz
Antenna Type / Gain	IK-201, IK -200; The antenna specifications and gain details can be found in the datasheets provided by the client.
Note: All information provided by the client.	

3.3 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	4TLTR1	822-3742-00x	1.9.0.2	-

3.4 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number
1	Gnd/Discrete Box	663-0089-936	-	-
2	Laptop	Dell Latitude	-	-

3.5 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#1 + AE#1 + AE#2	-

3.6 Mode of Operation

Mode of Operation	Description of Operating modes	Additional Information
Op. 1	WiFi 2.4GHz 802.11g 6Mbps Power Setting: 30	WiFi was tested on Low, Mid, and High channels at the maximum allowed power setting. The client provides a Ground/Discrete Box and a laptop for communicating with the device and sending commands to configure the WiFi radio into a specific mode. The iPerf3 command was used to simulate a scenario with the highest traffic communication between the server and client device. This mode configuration, designed for worst-case scenarios, is not intended for end-user applications.

3.7 Justification for Worst Case Mode of Operation

During the testing process the WiFi radio was tested with transmitter sets to low, mid and high channels at the maximum power, as it is described in section 3.6 of this document; representing the worst case mode of operation.

For radiated measurements, all data in this report shows the worst case between horizontal and vertical antenna polarizations and for all orientations of the EUT.

4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to evaluate the compliance of the EUT against the relevant requirements specified in section 1.

5 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	NA	NP	Result
§15.247(a)(1) RSS-247 5.2(a)	Emission Bandwidth	Nominal	-	☐	☐	☒	Note 1 Note 2
§15.247(e) RSS-247 5.2(b)	Power Spectral Density	Nominal	-	☐	☐	☒	Note 1 Note 2
§15.247(b)(1) RSS-247 5.4(d)	Maximum Conducted Output Power and EIRP	Nominal	-	☐	☐	☒	Note 1 Note 2
§15.247(d) RSS-247 5.5	Band edge compliance Unrestricted Band Edges	Nominal	-	☐	☐	☒	Note 1 Note 2
§15.247; 15.209; 15.205 RSS-Gen 8.9; 8.10	Band edge compliance Restricted Band Edges	Nominal	-	☐	☐	☒	Note 1 Note 2
§15.247(d); §15.209 RSS-Gen 6.13	TX Spurious emissions- Radiated	Nominal	Op. 1	☒	☐	☐	Complies
§15.207(a) RSS Gen 8.8	AC Conducted Emissions	Nominal	-	☐	☒	☐	Note 1 Note 3

Note 1: NA= Not Applicable; NP= Not Performed.

Note 2: The WiFi test results are leveraged from Report # 2301RSU014-U1, corresponding to FCC ID: TK4WLE3002HX; IC: 7849A-WLE3002HX.

Note 3: The EUT does not utilize power from public mains, hence testing for AC line conducted emissions is not applicable in this case.

6 Measurement Uncertainty

6.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=2.

Measurement System		EMC 1	EMC 2
Conducted emissions (mains port)	150 kHz – 30 MHz	2.47 dB	N/A
Radiated emissions	9 kHz – 30 MHz	2.68 dB	2.53 dB
	30 – 100 MHz	4.21 dB	3.85 dB
	100 MHz – 1 GHz	5.51 dB	5.24 dB
	1 – 6 GHz	5.0 dB	4.88 dB
	6 – 18 GHz	4.76 dB	4.58 dB
	18 – 40 GHz	4.65 dB	4.61 dB

6.2 Environmental Conditions during Testing:

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25°C
- Relative humidity: 40-60%

Deviating test conditions are indicated at individual test description where applicable.

6.3 Date of Testing:

2024-06-06 – 2024-07-15

6.4 Decision Rule:

Cetecom advanced follows ILAC G8:2019 chapter 4.2.1 (Simple Acceptance Rule).

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3. The measurement uncertainty is mentioned in this test report, See chapter 9, but is not taken into account – neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong.

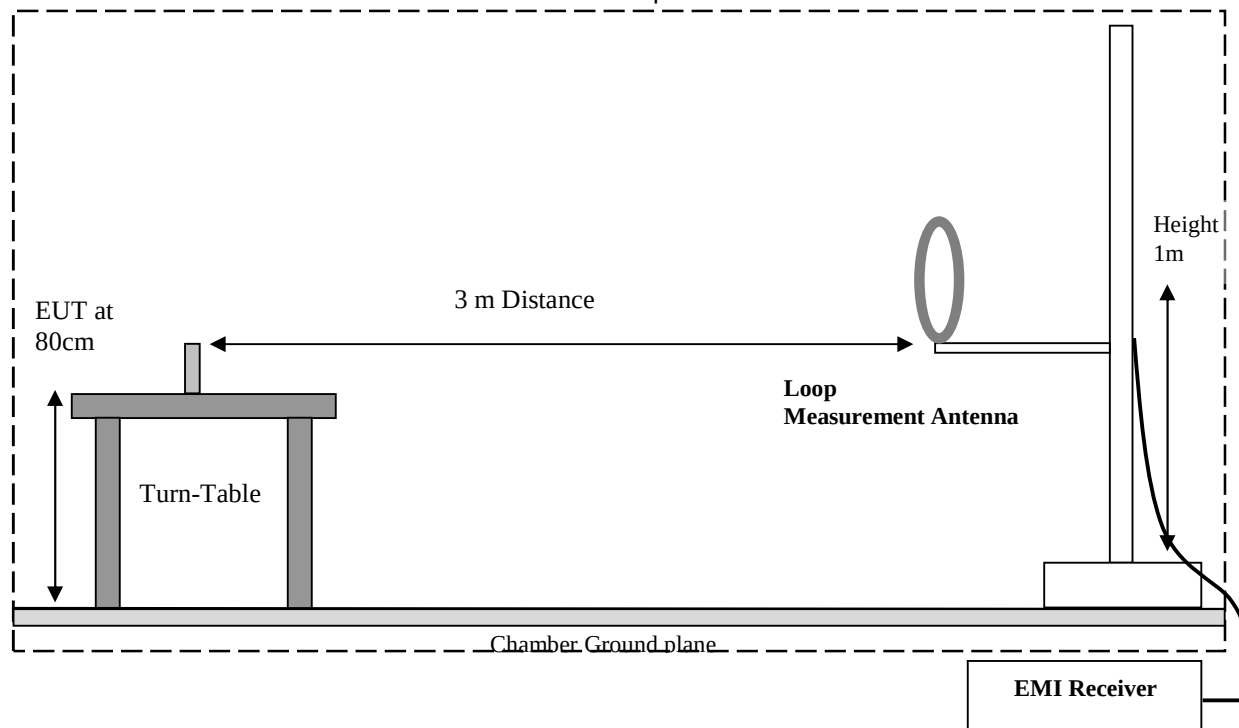
7 Measurement Procedures

7.1 Radiated Measurement

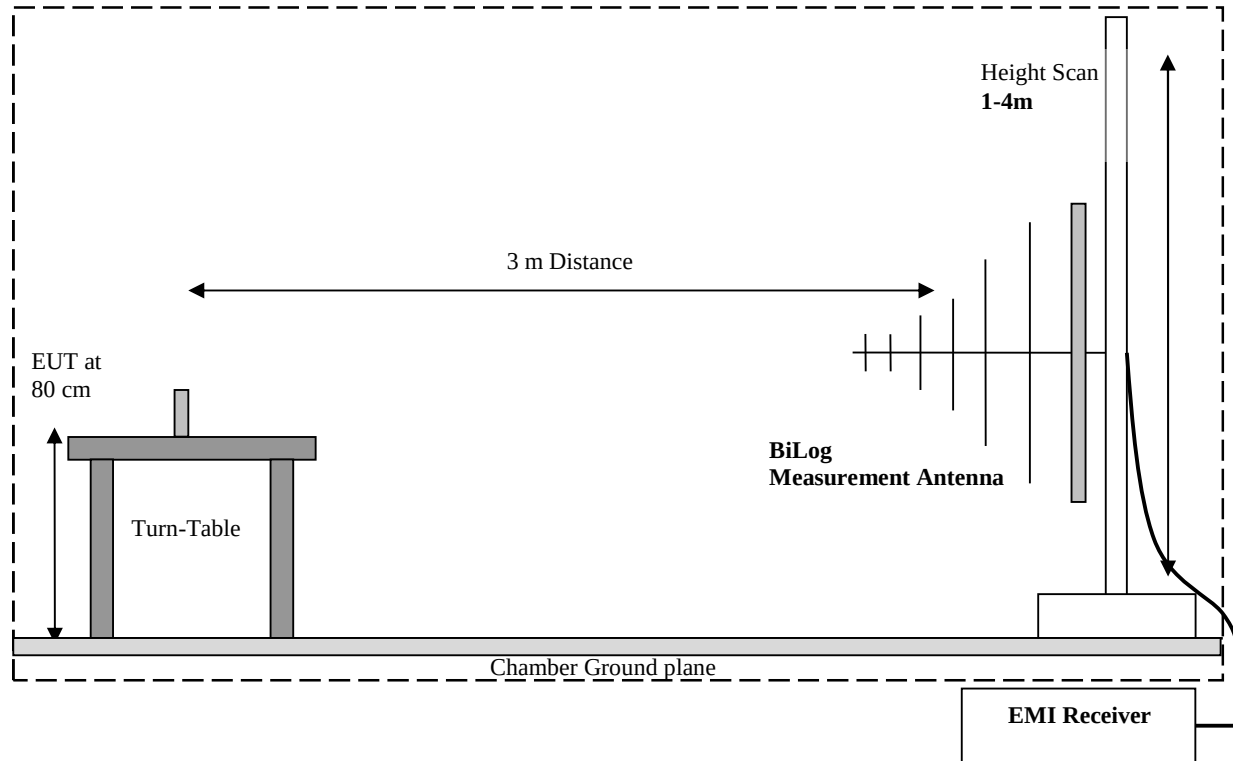
The radiated measurement is performed according to ANSI C63.10 (2013)

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The Test-SW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn antennas are used to cover frequencies up to 40 GHz.

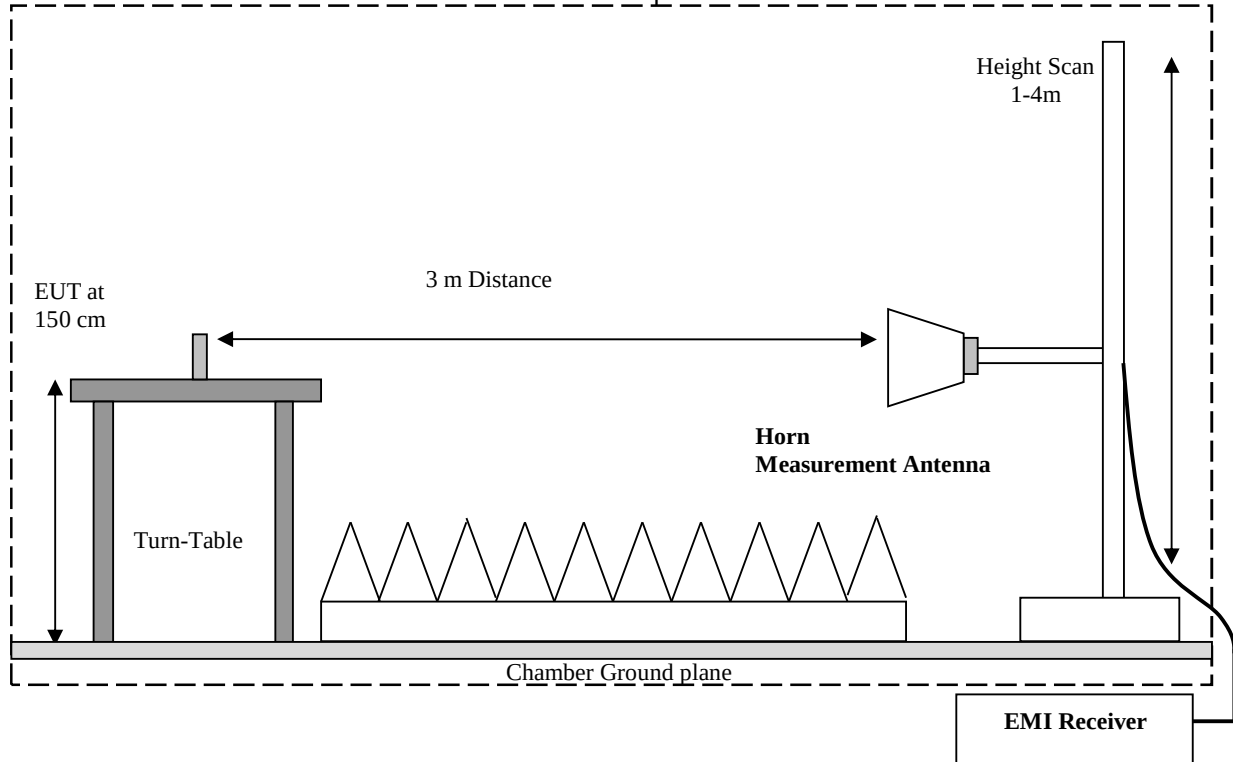
Radiated Emissions Test Setup below 30MHz Measurements



Radiated Emissions Test Setup 30MHz-1GHz Measurements



Radiated Emissions Test Setup above 1GHz Measurements



7.1.1 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

1. Measured reading in dB μ V
2. Cable Loss between the receiving antenna and SA in dB and
3. Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

$$FS \text{ (dB}\mu\text{V/m)} = \text{Measured Value on SA (dB}\mu\text{V)} + \text{Cable Loss (dB)} + \text{Antenna Factor (dB/m)}$$

Example:

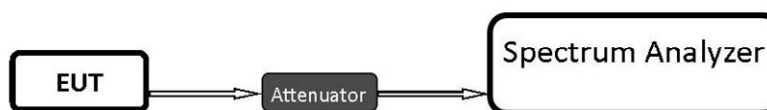
Frequency (MHz)	Measured SA (dB μ V)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dB μ V/m)
1000	80.5	3.5	14	98.0

7.2 Power Line Conducted Measurement Procedure

AC Power Line conducted emissions measurements performed according to: ANSI C63.4 (2014)

7.3 RF Conducted Measurement Procedure

Testing procedures are based on 558074 D01 15.247 Meas Guidance v05r02 – “GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES” - April 2, 2019, by the Federal Communications Commission, Office of Engineering and Technology, Laboratory Division.



- Connect the equipment as shown in the above diagram.
- Adjust the settings of the SA (Rohde-Schwarz Spectrum Analyzer) to connect the EUT at the required mode of test.
- Measurements are to be performed with the EUT set to the low, middle and high channels and for worst case modulation schemes.

8 Test Result Data

8.1 Radiated Transmitter Spurious Emissions and Restricted Bands

8.1.1 Measurement according to ANSI C63.10 (2013)

Spectrum Analyzer Settings:

- Frequency = 9 KHz – 30 MHz
- RBW = 9 KHz
- Detector: Peak

- Frequency = 30 MHz – 1 GHz
- Detector = Peak / Quasi-Peak
- RBW= 120 KHz (<1GHz)

- Frequency > 1 GHz
- Detector = Peak / Average
- RBW = 1 MHz

- Radiated spurious emissions shall be measured for the transmit frequencies, transmit power, and data rate for the lowest, middle and highest channel in each frequency band of operation and for the highest gain antenna for each antenna type, and using the appropriate parameters and test requirements.
- The highest (or worst-case) data rate shall be recorded for each measurement.
- For testing frequencies below 30 MHz at distance other than the specified in the standard, the limit conversion is calculated by using the FCC materials for the ANSI 63 committee issued on January, 27 1991.

8.1.2 Limits:

FCC §15.247

- In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

FCC §15.209 & RSS-Gen 8.9

- Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency of emission (MHz)	Field strength (μV/m)	Measurement Distance (m)	Field strength @ 3m (dBμV/m)
0.009–0.490	2400/F(kHz) / -----	300	-
0.490–1.705	24000/F(kHz) / -----	30	-
1.705–30.0	30 / (29.5)	30	-
30–88	100	3	40 dBμV/m
88–216	150	3	43.5 dBμV/m
216–960	200	3	46 dBμV/m
Above 960	500	3	54 dBμV/m

FCC §15.205 & RSS-Gen 8.10

- 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
10.495-0.505	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	Above 38.6
13.36-13.41			

- Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
 *PEAK LIMIT= 74 dBμV/m
 *AVG. LIMIT= 54 dBμV/m

8.1.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Setting
22.0° C	1	Op. 1	30

8.1.4 Measurement result:

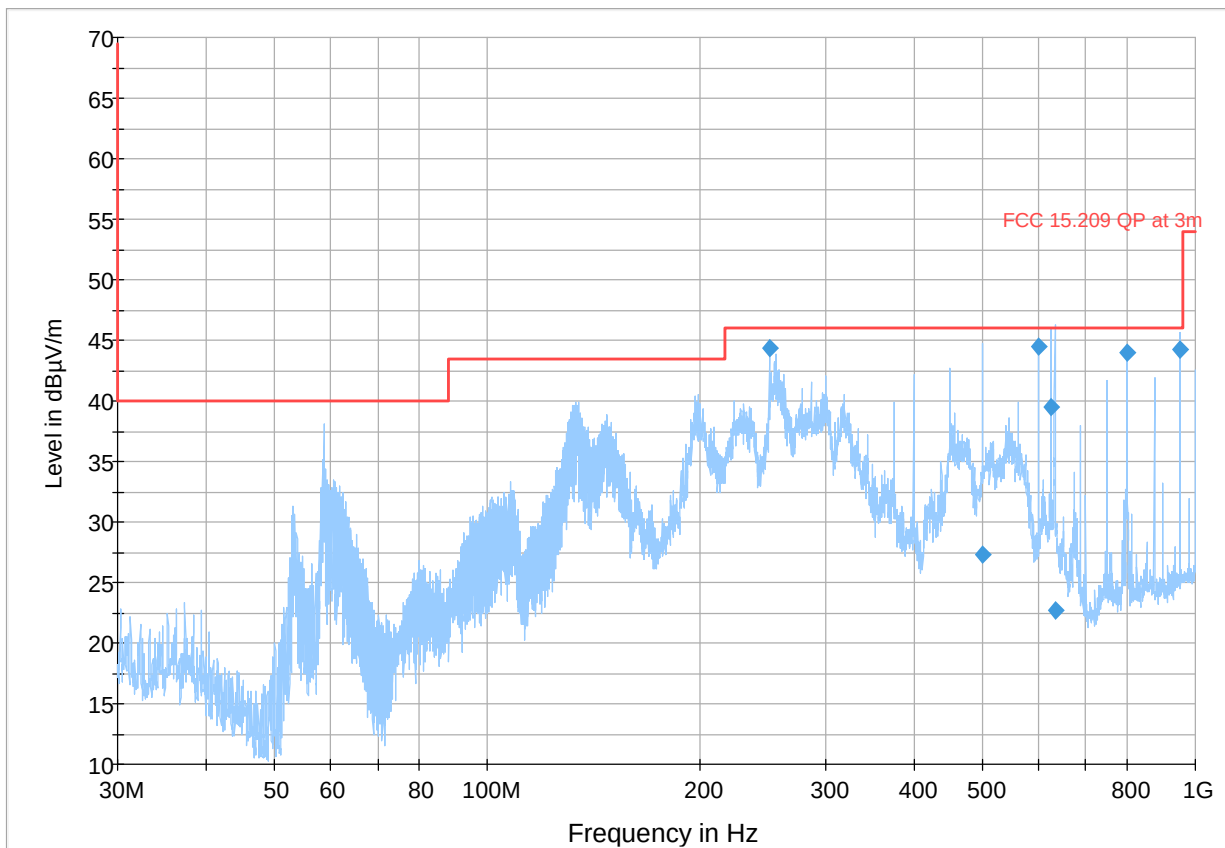
Plot #	Channel #	Scan Frequency	Limit	Result
1-5	Low	9 kHz – 26 GHz	See section 8.1.2	Pass
6-10	Mid	9 kHz – 26 GHz	See section 8.1.2	Pass
11-15	High	9 kHz – 26 GHz	See section 8.1.2	Pass

8.1.5 Measurement Plots:

IDLE

Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBμV)	Comment
249.972	44.298	46.02	1.72	500.0	120.000	107.0	H	79.0	-11.0	-33.8	0.0	22.8	55.3	
499.965	27.328	46.02	18.69	500.0	120.000	134.0	H	267.0	-8.9	-32.8	0.0	23.9	36.2	
599.996	44.466	46.02	1.55	500.0	120.000	134.0	H	313.0	-7.5	-32.6	0.0	25.0	52.0	
624.974	39.540	46.02	6.48	500.0	120.000	100.0	H	255.0	-6.7	-32.4	0.0	25.6	46.3	
633.364	22.751	46.02	23.27	500.0	120.000	107.0	V	28.0	-6.2	-32.3	0.0	26.1	28.9	
800.010	43.990	46.02	2.03	500.0	120.000	156.0	H	118.0	-4.1	-32.0	0.0	27.9	48.1	
950.021	44.262	46.02	1.76	500.0	120.000	107.0	V	243.0	-2.2	-31.5	0.0	29.3	46.4	



Preview Result 1-PK+ FCC 15.209 QP at 3m Final_Result QPK

Note 1: The plot above illustrates the radiated emissions levels of the EUT operating in full function mode with all radios disabled. As shown in the plots and final measurement results, the emissions from the unintentional radiator comply with the FCC 15.209 limit. Consequently, frequencies outside the restricted band of operation as per FCC 15.205, but with emissions levels exceeding the FCC 15.209 limit, are attributed to the intentional radiator. Therefore, these test results cannot be judged as a fail verdict.

Note 2: The emissions requirement outlined in FCC 15.247(d) is satisfied based on the results provided in Report No. 2301RSU014-U1, Appendix A.5, Conducted Band Edge and Out-of-Band Emissions Test Result, corresponding to FCC ID: TK4WLE3002HX and IC: 7849A-WLE3002HX.

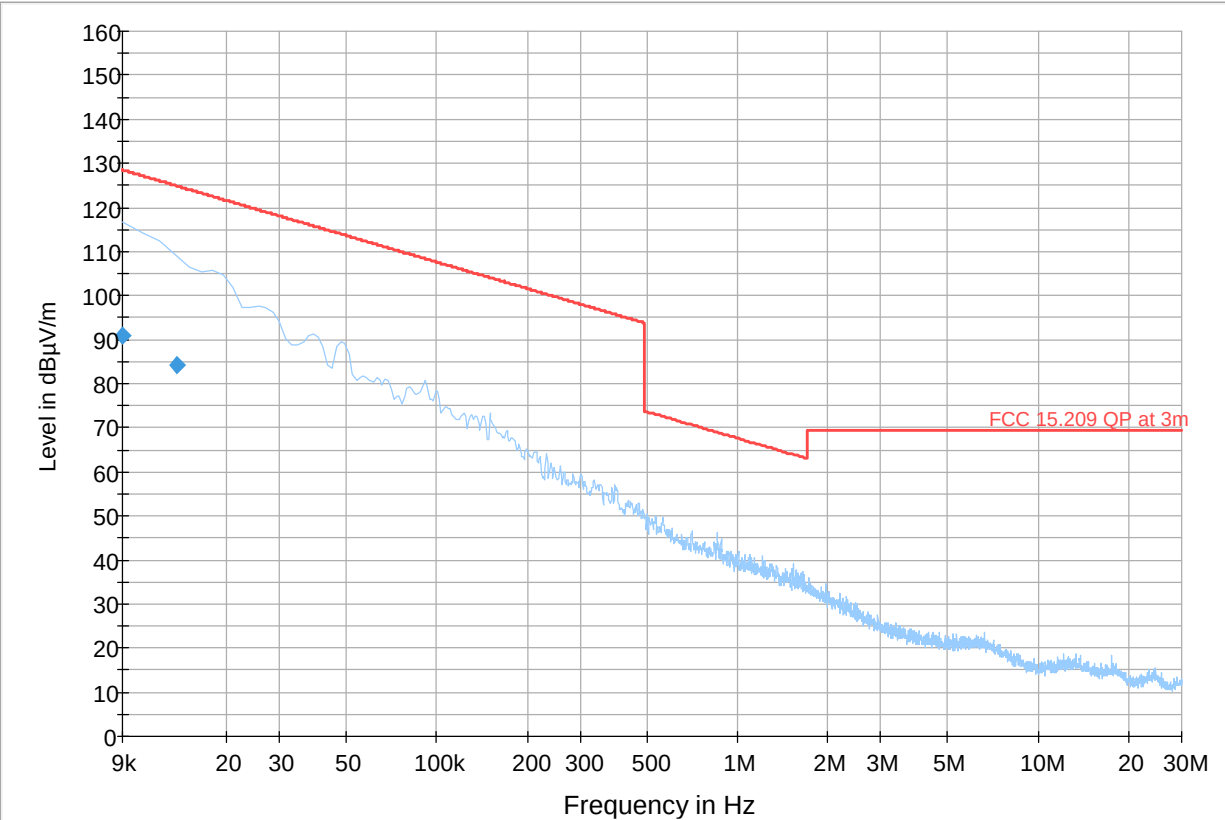


802.11g 6Mbps Channel 1

Plot # 1

Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Measurement Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Correction (dB/m)	Signal Path (dB)	Preamplifier (dB)	Trd Corr. (dB/m)	Raw Rec (dBμV)	Comment
0.009	91.097	---	128.50	37.40	500.0	0.200	100.0	V	73.0	60.5	0.2	-25.7	86.0	30.6	
0.014	84.403	---	124.90	40.50	500.0	0.200	100.0	V	25.0	57.8	0.2	-26.5	84.1	26.6	

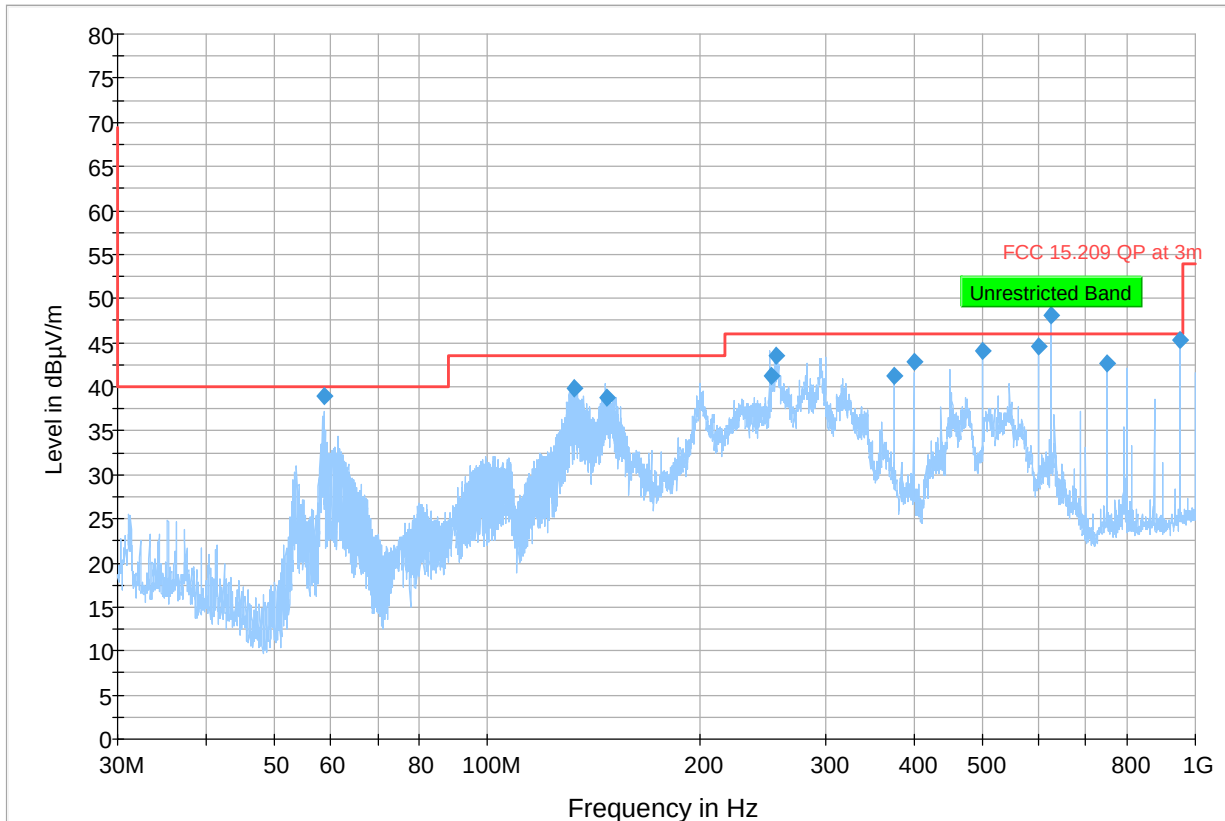


AVG_MAXH Final_Result QPK
PK+_MAXH Final_Result PK+
FCC 15.209 QP at 3m

Plot # 2

Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Measurement Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Correction (dB/m)	Signature (dB)	Preamplifier (dB)	Trd Corr. (dB/m)	Raw Rec (dBμV)	Comment
58.684	38.953	---	40.00	1.05	500.0	120.000	338.0	H	144.0	-22.0	-	0.0	12.7	61.0	
132.609	39.904	---	43.50	3.60	500.0	120.000	239.0	H	54.0	-9.5	-	0.0	24.8	49.4	
147.560	38.710	---	43.50	4.79	500.0	120.000	170.0	H	30.0	-9.1	-	0.0	25.1	47.8	
251.440	41.217	---	46.02	4.80	500.0	120.000	107.0	H	74.0	-11.8	-	0.0	22.0	53.0	
255.229	43.498	---	46.02	2.52	500.0	120.000	117.0	H	86.0	-14.3	-	0.0	19.4	57.8	
374.997	41.238	---	46.02	4.78	500.0	120.000	100.0	H	212.0	-11.7	-	0.0	21.6	52.9	
400.012	42.797	---	46.02	3.22	500.0	120.000	100.0	H	156.0	-10.5	-	0.0	22.7	53.3	
499.991	44.055	---	46.02	1.97	500.0	120.000	100.0	H	277.0	-8.9	-	0.0	23.9	53.0	
600.023	44.503	---	46.02	1.52	500.0	120.000	151.0	H	306.0	-7.5	-	0.0	25.1	52.0	
624.993	48.107	---	46.02	-2.09	500.0	120.000	100.0	H	257.0	-6.7	-	0.0	25.6	54.8	
749.979	42.702	---	46.02	3.32	500.0	120.000	100.0	H	319.0	-4.5	-	0.0	27.4	47.2	
950.035	45.314	---	46.02	0.71	500.0	120.000	107.0	V	255.0	-2.2	-	0.0	29.3	47.5	



AVG_MAXH Final_Result QPK

PK+_MAXH Final_Result PK+

FCC 15.209 QP at 3m

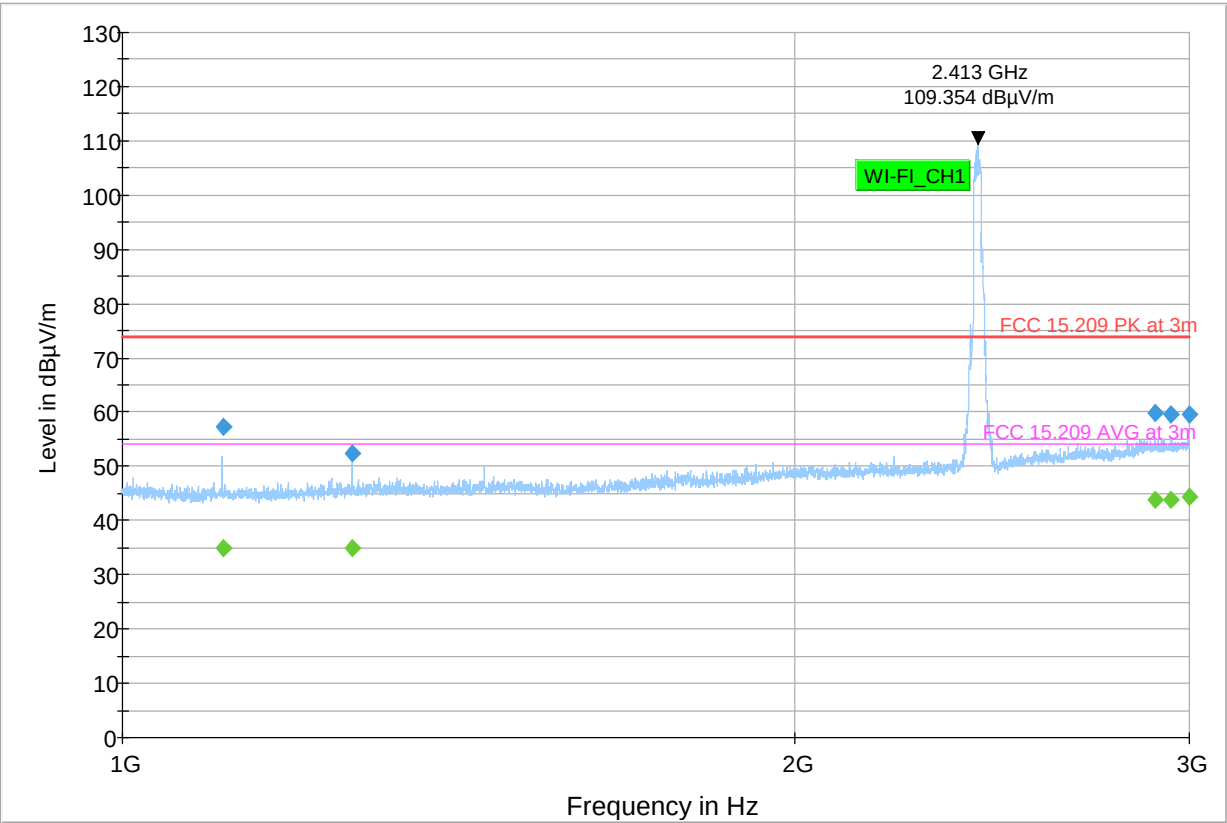
Note: The frequency 624.993 MHz does not fall within the restricted bands of operation as defined in FCC 15.205. Therefore, the FCC 15.209 radiated emission limits do not apply to emissions at 624.993 MHz.



Plot # 3

Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBμV)
1108.666	57.253	---	73.98	16.73	500.0	1000.000	167.0	V	65.0	29.2	4.4	0.0	24.8	28.1
1108.666	---	34.848	53.98	19.13	500.0	1000.000	167.0	V	65.0	29.2	4.4	0.0	24.8	5.7
1267.571	---	34.926	53.98	19.05	500.0	1000.000	219.0	H	329.0	29.7	4.5	0.0	25.1	5.3
1267.571	52.479	---	73.98	21.50	500.0	1000.000	219.0	H	329.0	29.7	4.5	0.0	25.1	22.8
2894.622	---	43.775	53.98	10.20	500.0	1000.000	217.0	H	212.0	35.5	6.2	0.0	29.3	8.3
2894.622	59.711	---	73.98	14.27	500.0	1000.000	217.0	H	212.0	35.5	6.2	0.0	29.3	24.2
2944.670	59.660	---	73.98	14.32	500.0	1000.000	337.0	V	105.0	35.7	6.1	0.0	29.6	24.0
2944.670	---	43.808	53.98	10.17	500.0	1000.000	337.0	V	105.0	35.7	6.1	0.0	29.6	8.2
2999.469	---	44.499	53.98	9.48	500.0	1000.000	354.0	H	354.0	36.1	6.1	0.0	30.0	8.4
2999.469	59.686	---	73.98	14.29	500.0	1000.000	354.0	H	354.0	36.1	6.1	0.0	30.0	23.6

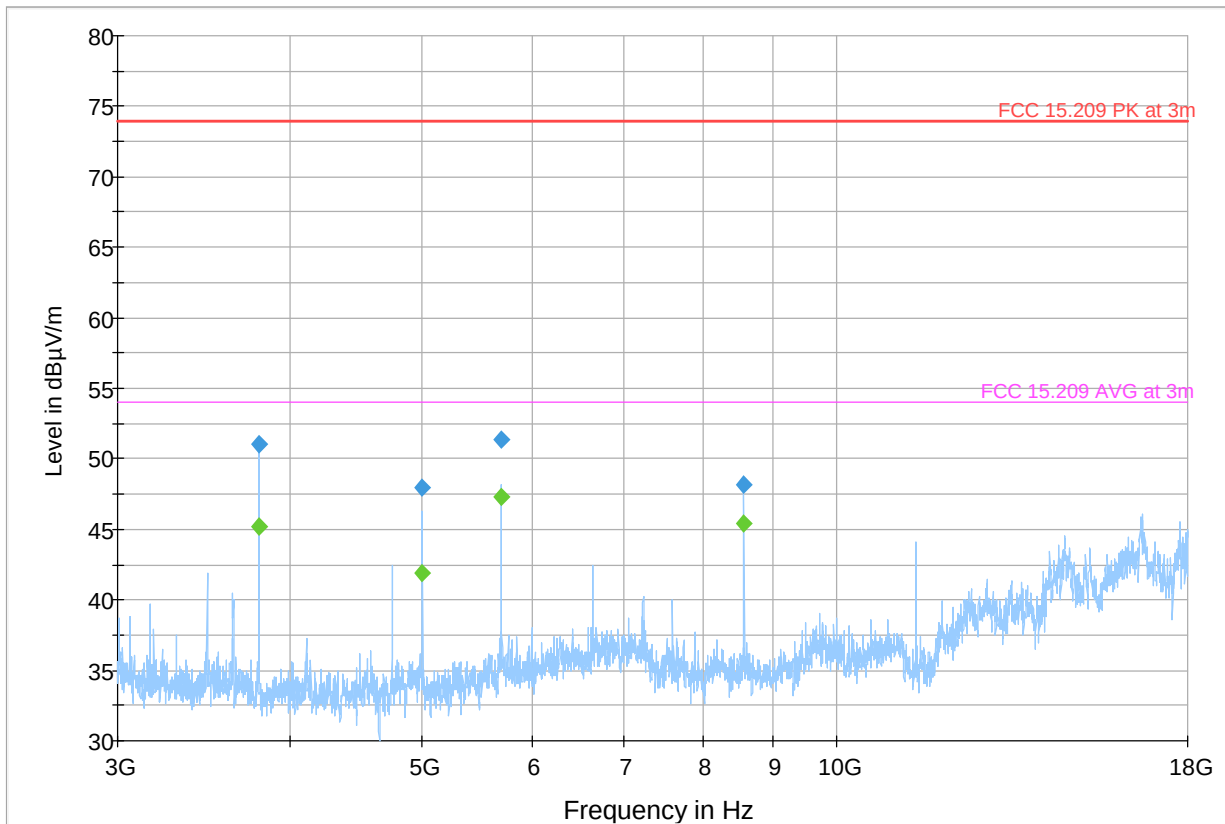


AVG_MAXH PK+_MAXH FCC 15.209 PK at 3m
FCC 15.209 AVG at 3m Final_Result PK+ Final_Result CAV

Plot # 4

Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBμV)
3799.750	51.071	---	73.98	22.91	500.0	1000.000	203.0	V	262.0	-6.6	6.2	-45.9	33.1	57.6
3799.750	---	45.173	53.98	8.81	500.0	1000.000	203.0	V	262.0	-6.6	6.2	-45.9	33.1	51.7
4999.750	---	41.918	53.98	12.06	500.0	1000.000	254.0	V	299.0	-4.2	7.5	-45.8	34.1	46.1
4999.750	47.947	---	73.98	26.03	500.0	1000.000	254.0	V	299.0	-4.2	7.5	-45.8	34.1	52.2
5700.250	---	47.244	53.98	6.74	500.0	1000.000	107.0	V	303.0	-2.6	7.7	-45.4	35.1	49.8
5700.250	51.379	---	73.98	22.60	500.0	1000.000	107.0	V	303.0	-2.6	7.7	-45.4	35.1	54.0
8564.750	48.174	---	73.98	25.81	500.0	1000.000	212.0	V	291.0	-2.4	9.4	-47.6	35.8	50.6
8564.750	---	45.390	53.98	8.59	500.0	1000.000	212.0	V	291.0	-2.4	9.4	-47.6	35.8	47.8



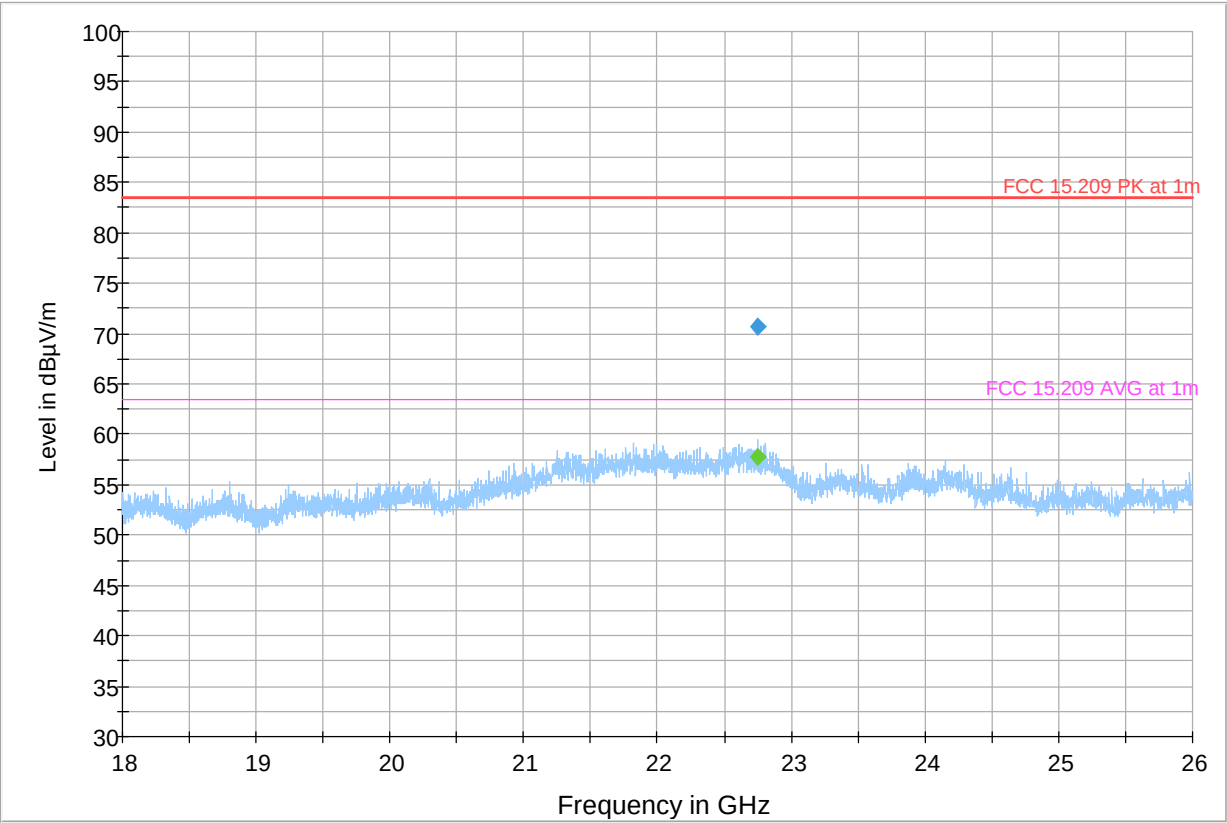
AVG_MAXH PK+_MAXH FCC 15.209 PK at 3m
FCC 15.209 AVG at 3m Final_Result PK+ Final_Result CAV



Plot # 5

Final Result

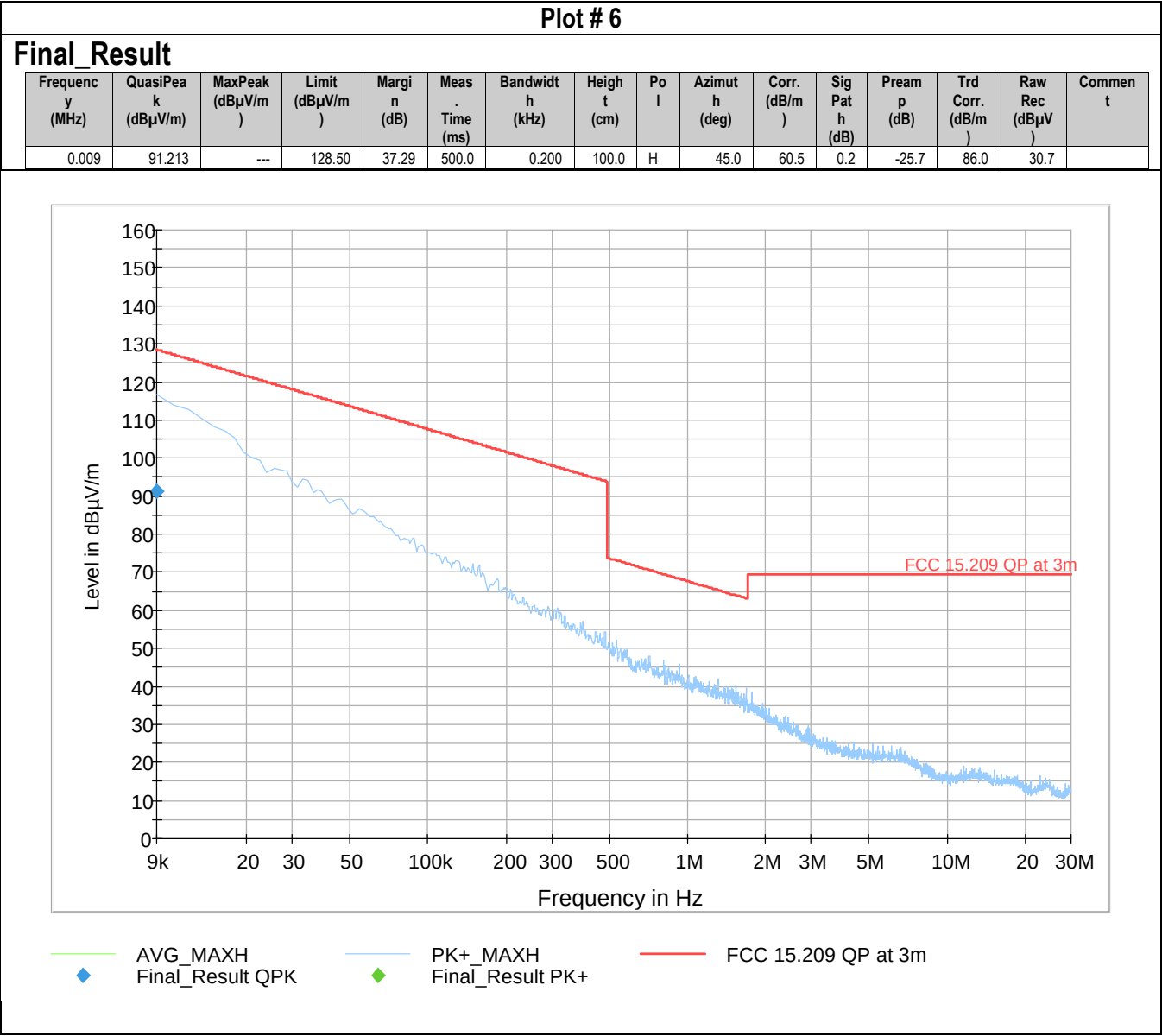
Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBμV)
22752.000	---	57.790	63.50	5.71	500.0	1000.000	212.0	H	-45.0	23.1	9.8	2.8	10.6	34.7
22752.000	70.686	---	83.50	12.81	500.0	1000.000	212.0	H	-45.0	23.1	9.8	2.8	10.6	47.6



AVG_MAXH PK+_MAXH FCC 15.209 PK at 1m
FCC 15.209 AVG at 1m Final_Result PK+ Final_Result CAV



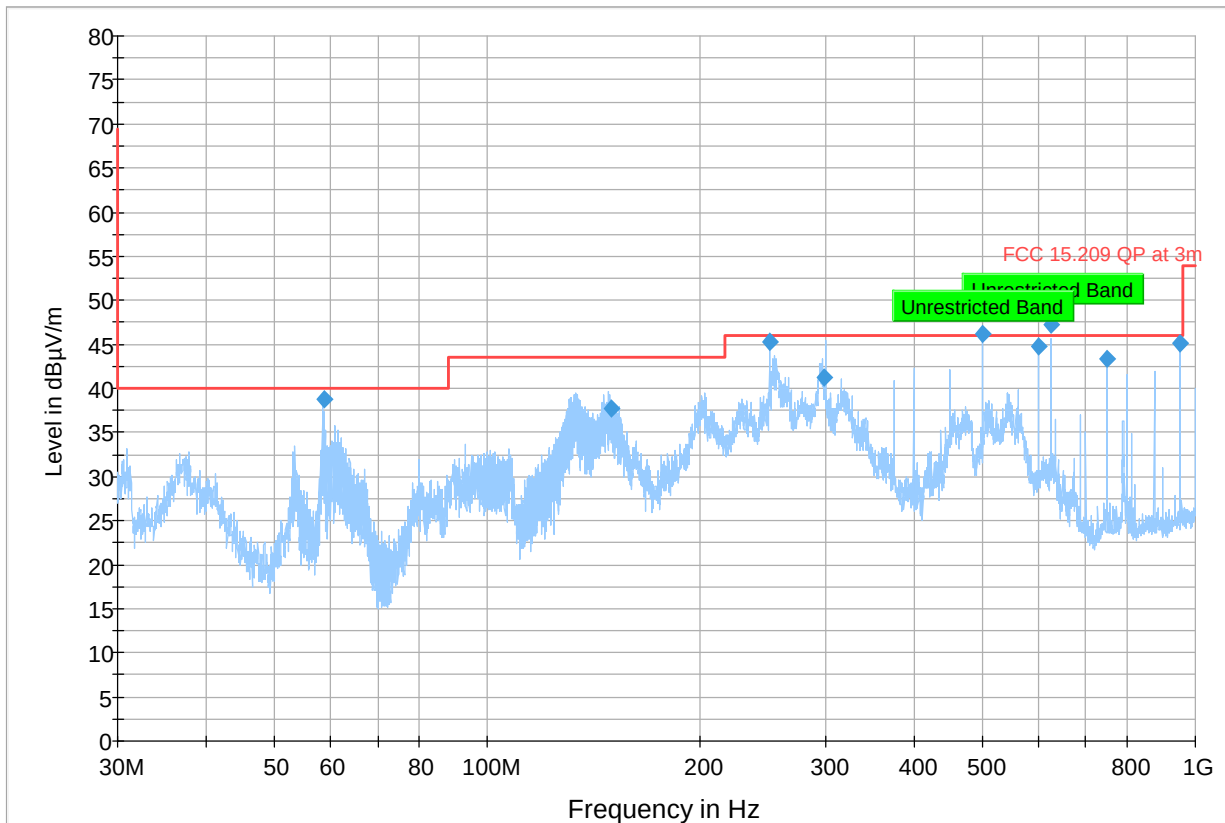
802.11g 6Mbps Channel 6



Plot # 7

Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Measurement Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Correction (dB/m)	Signature (dB)	Preamplifier (dB)	Trd Corr. (dB/m)	Raw Rec (dBμV)	Comment
58.651	38.755	---	40.00	1.25	500.0	120.000	366.0	H	134.0	-22.0	-	0.0	12.7	60.8	
149.378	37.756	---	43.50	5.74	500.0	120.000	150.0	H	34.0	-9.2	-	0.0	25.1	46.9	
250.002	45.306	---	46.02	0.71	500.0	120.000	107.0	H	82.0	-11.0	-	0.0	22.8	56.3	
298.599	41.217	---	46.02	4.80	500.0	120.000	107.0	H	224.0	-13.7	-	0.0	19.9	54.9	
499.992	46.238	---	46.02	-0.22	500.0	120.000	107.0	V	167.0	-9.1	-	0.0	23.6	55.4	
600.020	44.690	---	46.02	1.33	500.0	120.000	136.0	H	308.0	-7.5	-	0.0	25.1	52.2	
624.993	47.238	---	46.02	-1.22	500.0	120.000	100.0	H	218.0	-6.7	-	0.0	25.6	54.0	
750.023	43.316	---	46.02	2.70	500.0	120.000	100.0	H	144.0	-4.5	-	0.0	27.4	47.8	
950.034	45.194	---	46.02	0.83	500.0	120.000	107.0	V	256.0	-2.2	-	0.0	29.3	47.4	



◆ AVG_MAXH Final_Result QPK
 ◆ PK+_MAXH Final_Result PK+
 — FCC 15.209 QP at 3m

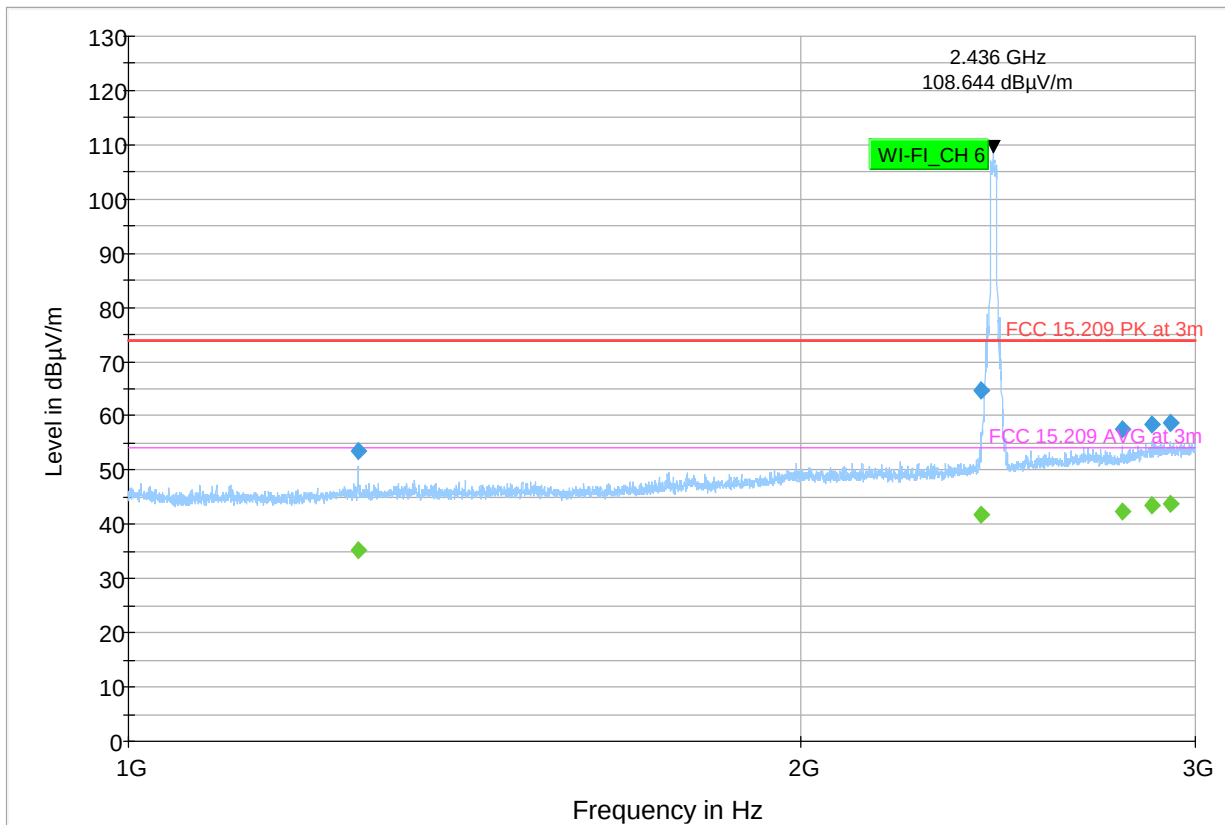
Note 1: The frequency 624.993 MHz does not fall within the restricted bands of operation as defined in FCC 15.205. Therefore, the FCC 15.209 radiated emission limits do not apply to emissions at 624.993 MHz.

Note 2: The frequency 499.992 MHz does not fall within the restricted bands of operation as defined in FCC 15.205. Therefore, the FCC 15.209 radiated emission limits do not apply to emissions at 499.992 MHz.

Plot # 8

Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBμV)
1267.712	53.660	---	73.98	20.32	500.0	1000.000	177.0	V	222.0	29.6	4.5	0.0	25.1	24.0
1267.712	---	35.162	53.98	18.82	500.0	1000.000	177.0	V	222.0	29.6	4.5	0.0	25.1	5.5
2406.143	---	41.785	53.98	12.19	500.0	1000.000	359.0	H	62.0	33.6	5.5	0.0	28.1	8.2
2406.143	64.756	---	73.98	9.22	500.0	1000.000	359.0	H	62.0	33.6	5.5	0.0	28.1	31.2
2784.414	57.482	---	73.98	16.50	500.0	1000.000	286.0	V	129.0	34.9	5.9	0.0	29.0	22.6
2784.414	---	42.373	53.98	11.61	500.0	1000.000	286.0	V	129.0	34.9	5.9	0.0	29.0	7.5
2870.227	---	43.637	53.98	10.34	500.0	1000.000	320.0	H	91.0	35.4	6.2	0.0	29.2	8.3
2870.227	58.490	---	73.98	15.49	500.0	1000.000	320.0	H	91.0	35.4	6.2	0.0	29.2	23.1
2923.122	---	43.735	53.98	10.24	500.0	1000.000	356.0	V	176.0	35.5	6.1	0.0	29.5	8.2
2923.122	58.704	---	73.98	15.28	500.0	1000.000	356.0	V	176.0	35.5	6.1	0.0	29.5	23.2

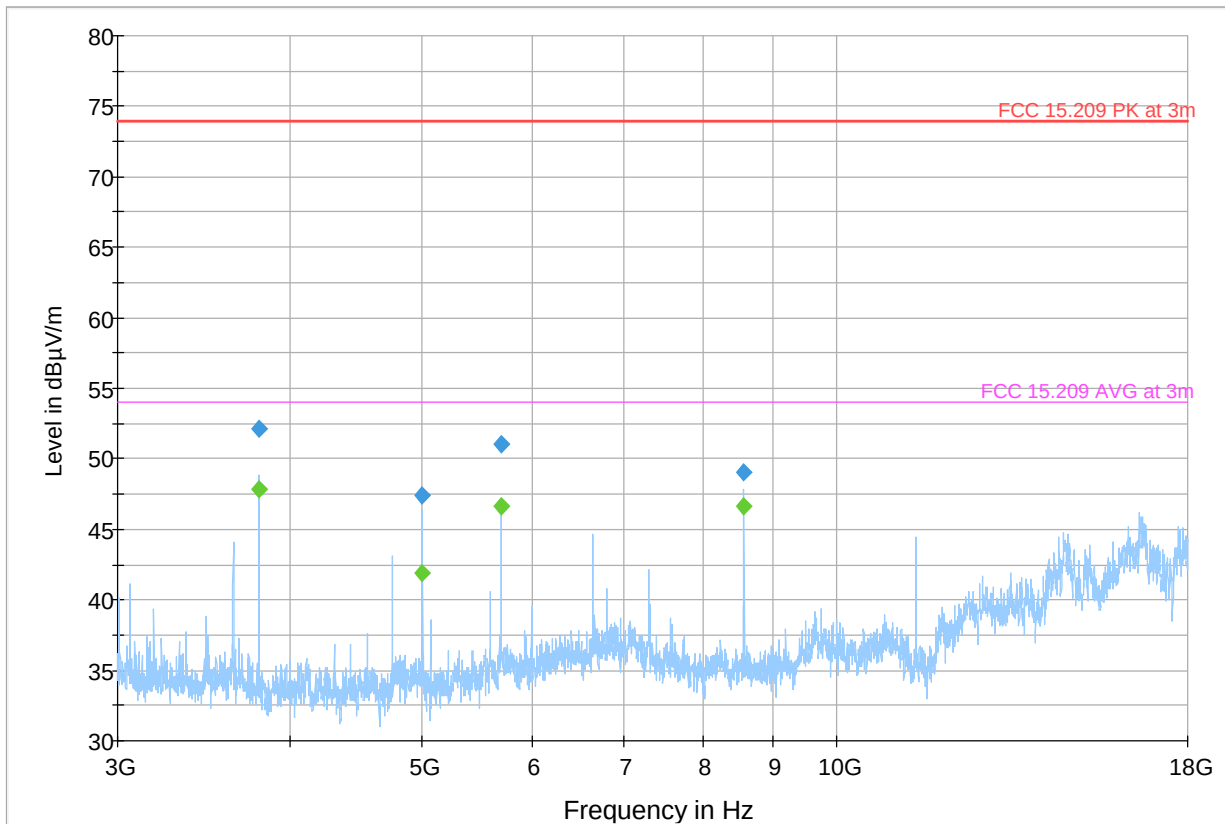


AVG_MAXH PK+_MAXH FCC 15.209 PK at 3m
FCC 15.209 AVG at 3m Final_Result PK+ Final_Result CAV

Plot # 9

Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBμV)
3800.000	---	47.794	53.98	6.19	500.0	1000.000	202.0	V	260.0	-6.6	6.2	-45.9	33.1	54.4
3800.000	52.107	---	73.98	21.87	500.0	1000.000	202.0	V	260.0	-6.6	6.2	-45.9	33.1	58.7
4999.750	47.411	---	73.98	26.57	500.0	1000.000	253.0	V	300.0	-4.2	7.5	-45.8	34.1	51.6
4999.750	---	41.895	53.98	12.08	500.0	1000.000	253.0	V	300.0	-4.2	7.5	-45.8	34.1	46.1
5700.250	---	46.609	53.98	7.37	500.0	1000.000	135.0	V	300.0	-2.6	7.7	-45.4	35.1	49.2
5700.250	51.043	---	73.98	22.94	500.0	1000.000	135.0	V	300.0	-2.6	7.7	-45.4	35.1	53.6
8564.750	49.089	---	73.98	24.89	500.0	1000.000	294.0	V	282.0	-2.4	9.4	-47.6	35.8	51.5
8564.750	---	46.620	53.98	7.36	500.0	1000.000	294.0	V	282.0	-2.4	9.4	-47.6	35.8	49.0

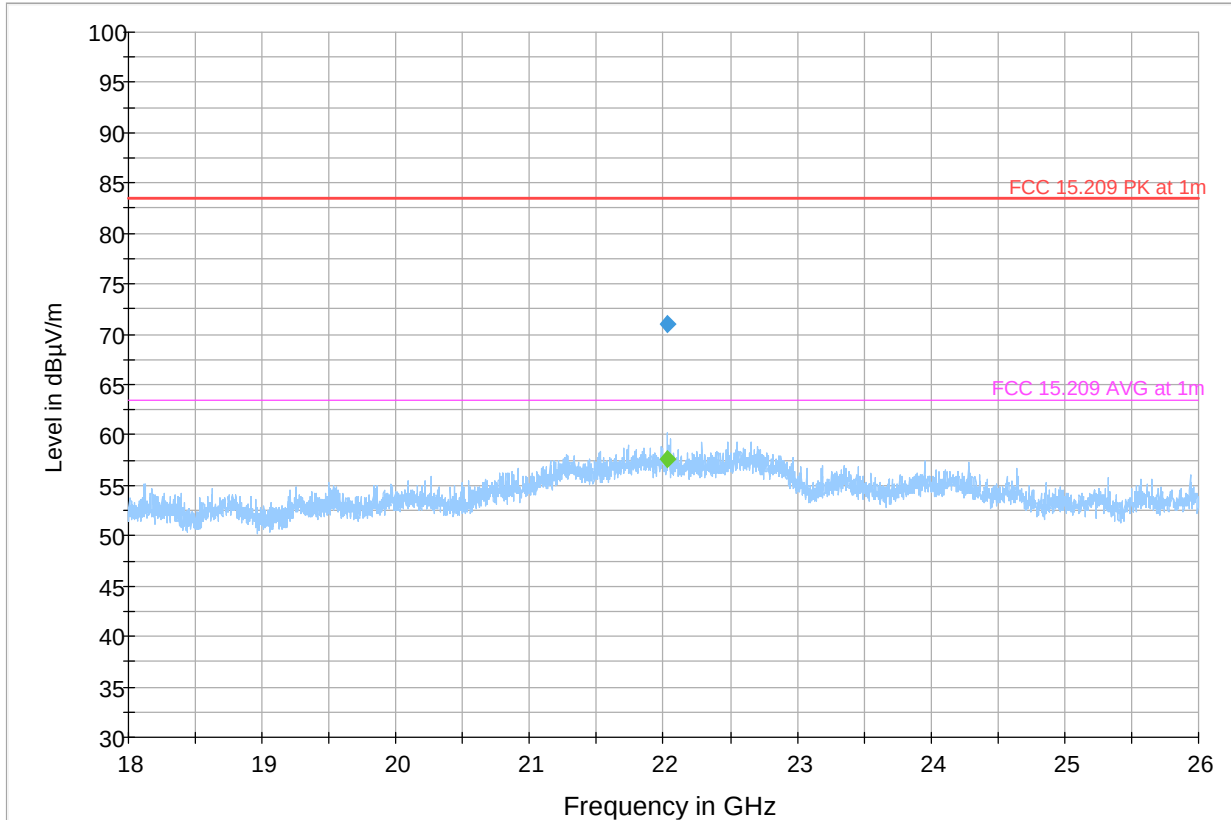


AVG_MAXH PK+_MAXH FCC 15.209 PK at 3m
FCC 15.209 AVG at 3m Final_Result PK+ Final_Result CAV

Plot # 10

Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBμV)
22032.750	---	57.673	63.50	5.83	500.0	1000.000	325.0	H	257.0	22.5	9.8	3.3	9.4	35.2
22032.750	71.031	---	83.50	12.47	500.0	1000.000	325.0	H	257.0	22.5	9.8	3.3	9.4	48.5



AVG_MAXH PK+_MAXH FCC 15.209 PK at 1m
FCC 15.209 AVG at 1m Final_Result PK+ Final_Result CAV

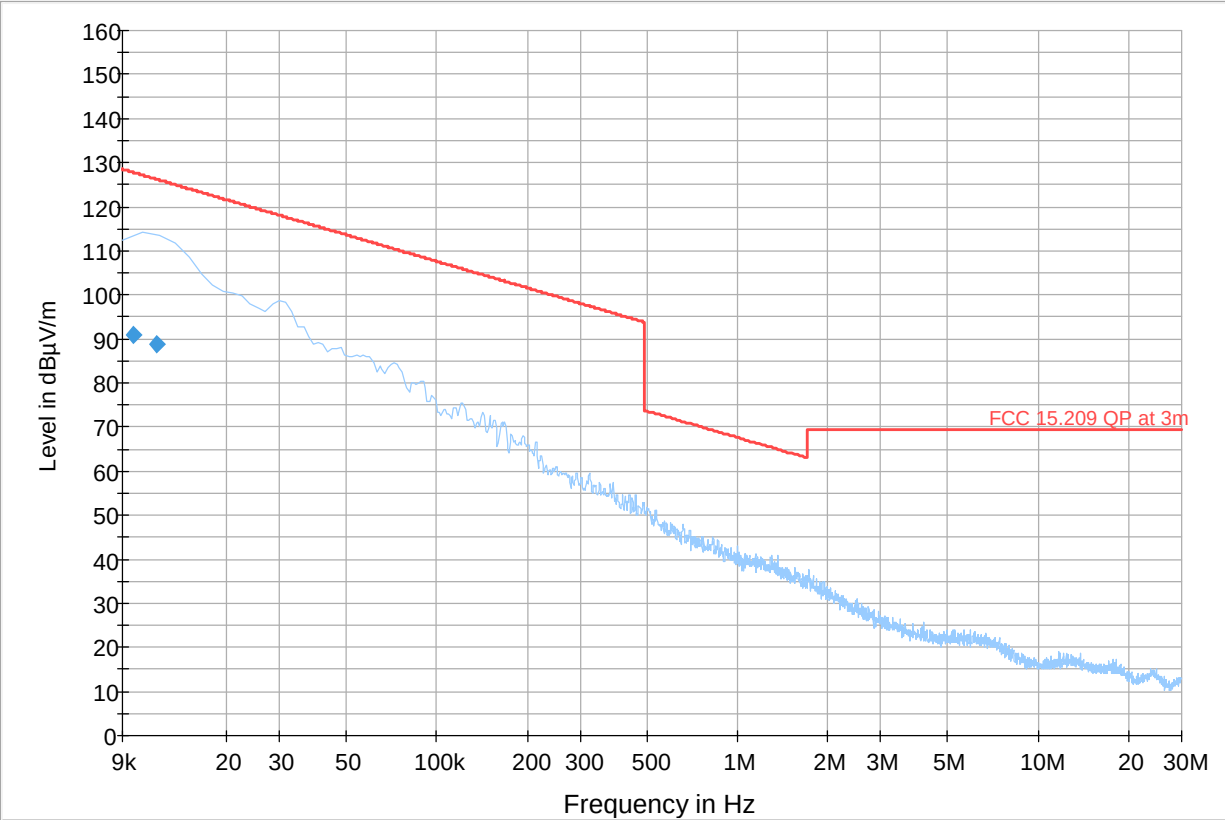


802.11g 6Mbps Channel 11

Plot # 11

Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Measurement Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Correction (dB/m)	Signal Path (dB)	Preamplifier (dB)	Trd Corr. (dB/m)	Raw Rec (dBμV)	Comment
0.010	90.790	---	127.80	37.01	500.0	0.200	100.0	H	45.0	60.3	0.2	-25.8	85.9	30.5	
0.012	88.818	---	126.28	37.46	500.0	0.200	100.0	H	310.0	59.2	0.2	-26.1	85.1	29.7	

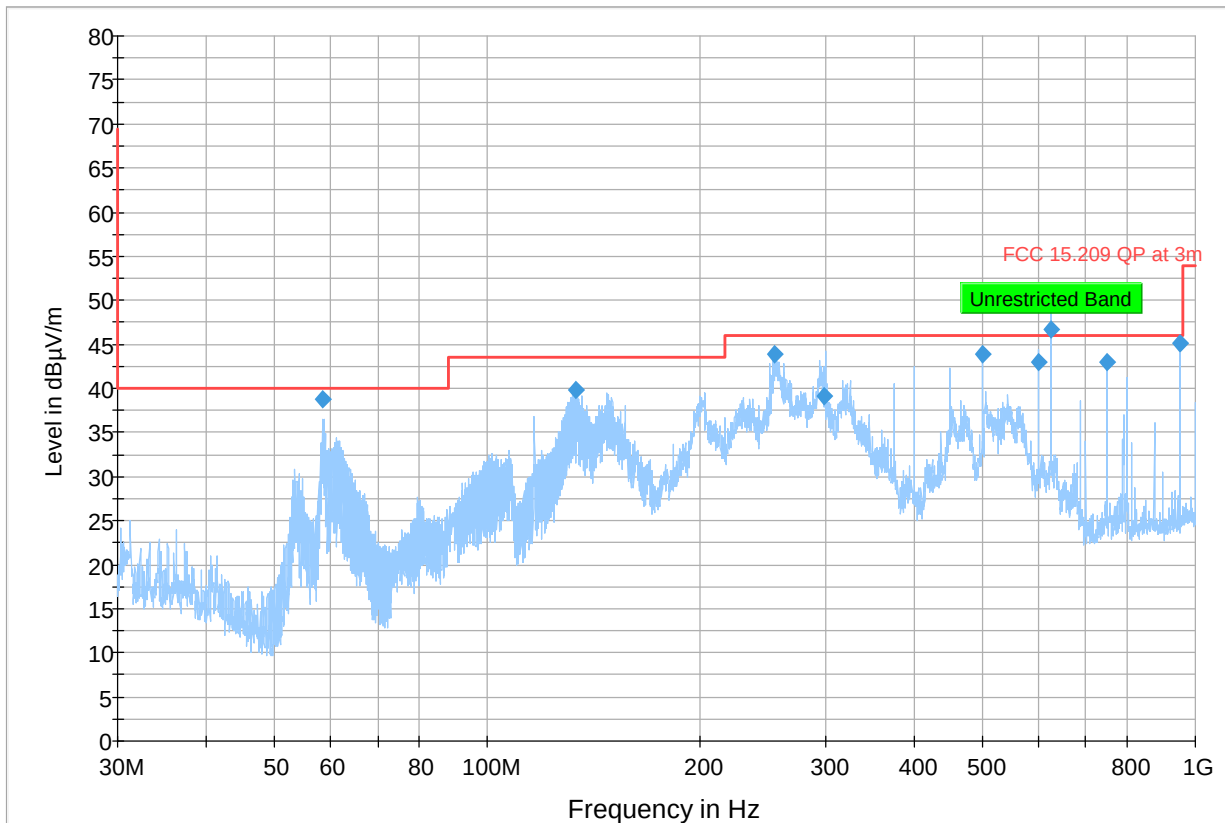


AVG_MAXH Final_Result QPK
PK+_MAXH Final_Result PK+
FCC 15.209 QP at 3m

Plot # 12

Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Measurement Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Correction (dB/m)	Signature (dB)	Preamplifier (dB)	Trd Corr. (dB/m)	Raw Rec (dBμV)	Comment
58.369	38.739	---	40.00	1.26	500.0	120.000	308.0	H	123.0	-21.9	-	0.0	12.7	60.7	
133.254	39.767	---	43.50	3.73	500.0	120.000	215.0	H	49.0	-9.4	-	0.0	24.8	49.2	
254.761	43.913	---	46.02	2.11	500.0	120.000	100.0	H	74.0	-14.1	-	0.0	19.7	58.0	
298.895	39.076	---	46.02	6.95	500.0	120.000	100.0	H	221.0	-13.7	-	0.0	19.9	52.7	
499.994	43.861	---	46.02	2.16	500.0	120.000	100.0	H	280.0	-8.9	-	0.0	23.9	52.8	
600.022	42.954	---	46.02	3.07	500.0	120.000	147.0	H	298.0	-7.5	-	0.0	25.1	50.5	
624.989	46.777	---	46.02	-0.76	500.0	120.000	100.0	H	214.0	-6.7	-	0.0	25.6	53.5	
749.984	43.076	---	46.02	2.94	500.0	120.000	100.0	H	147.0	-4.5	-	0.0	27.4	47.6	
950.035	45.030	---	46.02	0.99	500.0	120.000	117.0	V	250.0	-2.2	-	0.0	29.3	47.2	



AVG_MAXH Final_Result QPK

PK+_MAXH Final_Result PK+

FCC 15.209 QP at 3m

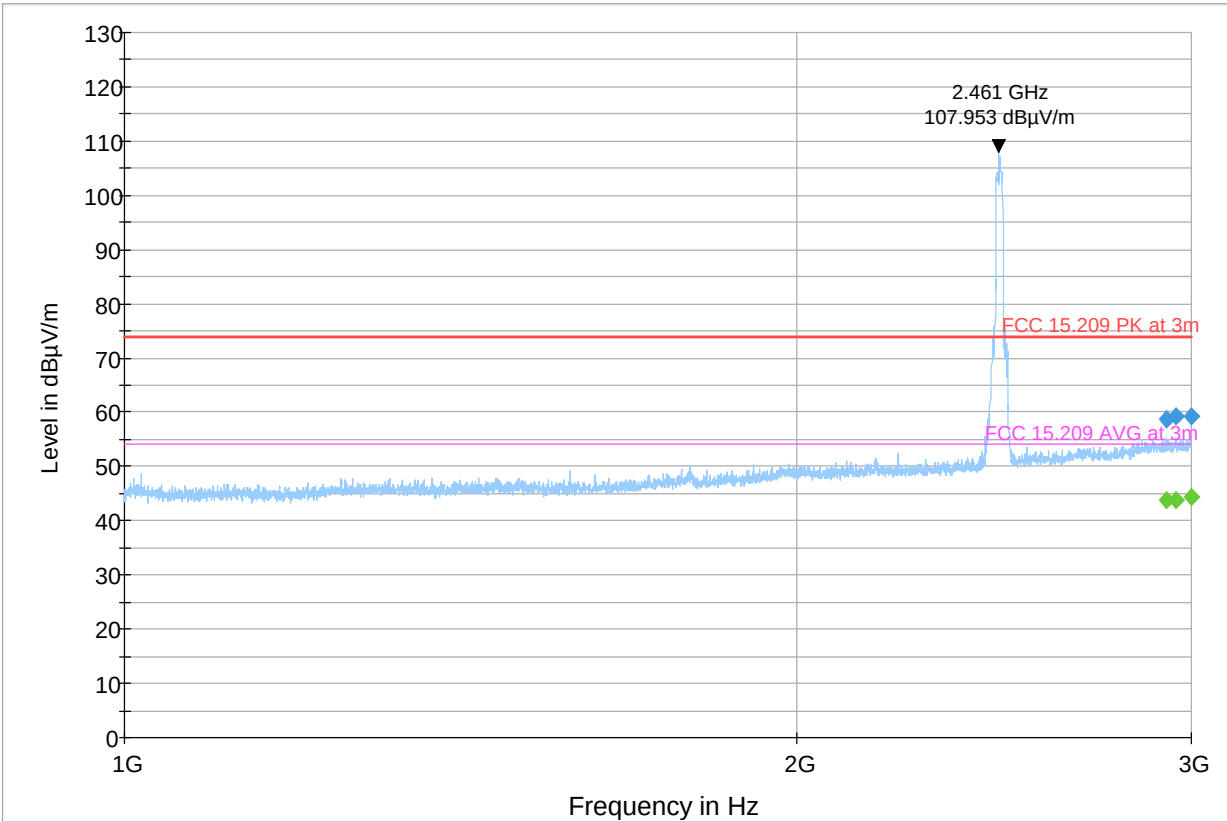
Note: The frequency 624.989 MHz does not fall within the restricted bands of operation as defined in FCC 15.205. Therefore, the FCC 15.209 radiated emission limits do not apply to emissions at 624.989 MHz.



Plot # 13

Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBμV)
2925.850	58.685	---	73.98	15.29	500.0	1000.000	276.0	V	59.0	35.5	6.1	0.0	29.5	23.1
2925.850	---	43.738	53.98	10.24	500.0	1000.000	276.0	V	59.0	35.5	6.1	0.0	29.5	8.2
2952.637	---	43.791	53.98	10.19	500.0	1000.000	185.0	H	260.0	35.7	6.1	0.0	29.7	8.1
2952.637	59.220	---	73.98	14.76	500.0	1000.000	185.0	H	260.0	35.7	6.1	0.0	29.7	23.5
2998.429	59.235	---	73.98	14.74	500.0	1000.000	293.0	V	303.0	35.9	6.1	0.0	29.9	23.3
2998.429	---	44.311	53.98	9.67	500.0	1000.000	293.0	V	303.0	35.9	6.1	0.0	29.9	8.4



AVG_MAXH
FCC 15.209 AVG at 3m

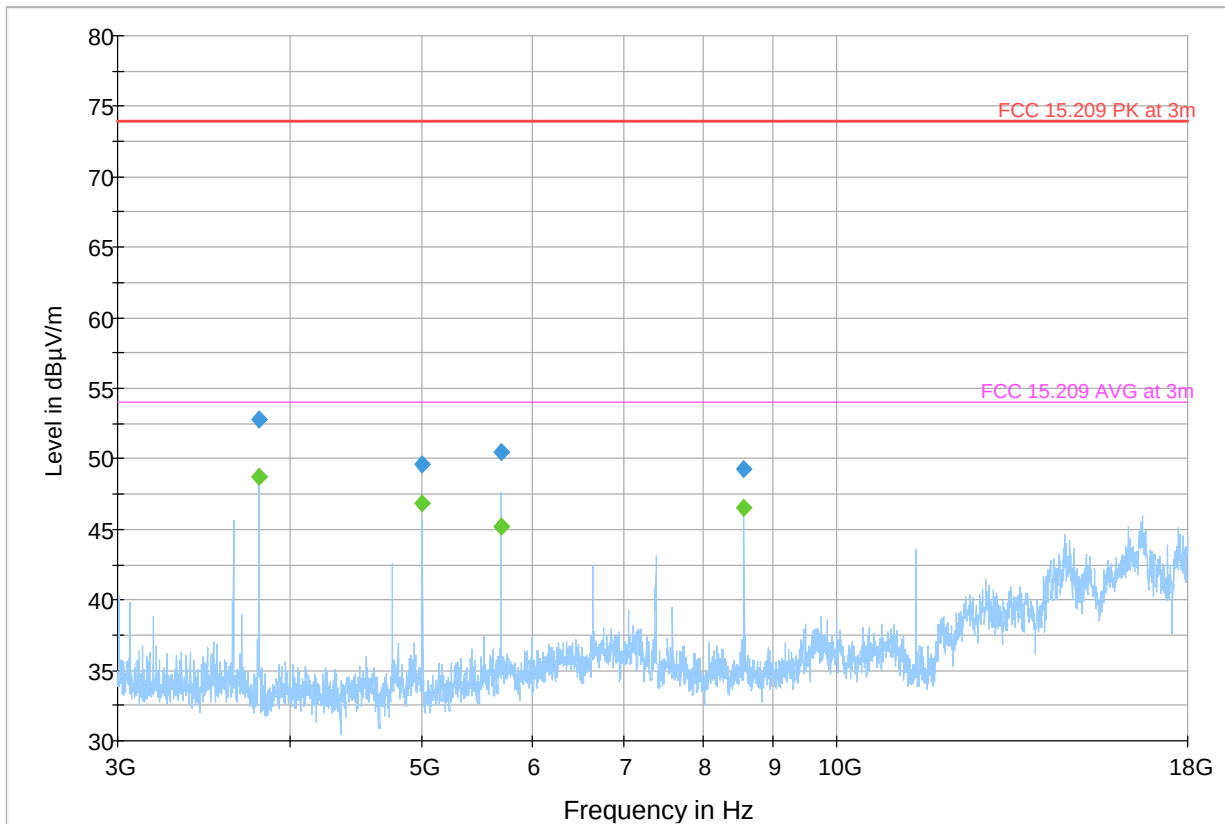
PK+_MAXH
Final_Result PK+

FCC 15.209 PK at 3m
Final_Result CAV

Plot # 14

Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBμV)
3800.000	---	48.681	53.98	5.30	500.0	1000.000	276.0	V	272.0	-6.6	6.2	-45.9	33.1	55.2
3800.000	52.786	---	73.98	21.19	500.0	1000.000	276.0	V	272.0	-6.6	6.2	-45.9	33.1	59.3
5000.250	49.605	---	73.98	24.37	500.0	1000.000	262.0	V	300.0	-4.2	7.5	-45.8	34.1	53.8
5000.250	---	46.903	53.98	7.08	500.0	1000.000	262.0	V	300.0	-4.2	7.5	-45.8	34.1	51.1
5700.000	50.513	---	73.98	23.47	500.0	1000.000	134.0	V	300.0	-2.6	7.7	-45.4	35.1	53.1
5700.000	---	45.243	53.98	8.74	500.0	1000.000	134.0	V	300.0	-2.6	7.7	-45.4	35.1	47.9
8564.750	---	46.543	53.98	7.44	500.0	1000.000	273.0	V	283.0	-2.4	9.4	-47.6	35.8	48.9
8564.750	49.240	---	73.98	24.74	500.0	1000.000	273.0	V	283.0	-2.4	9.4	-47.6	35.8	51.6

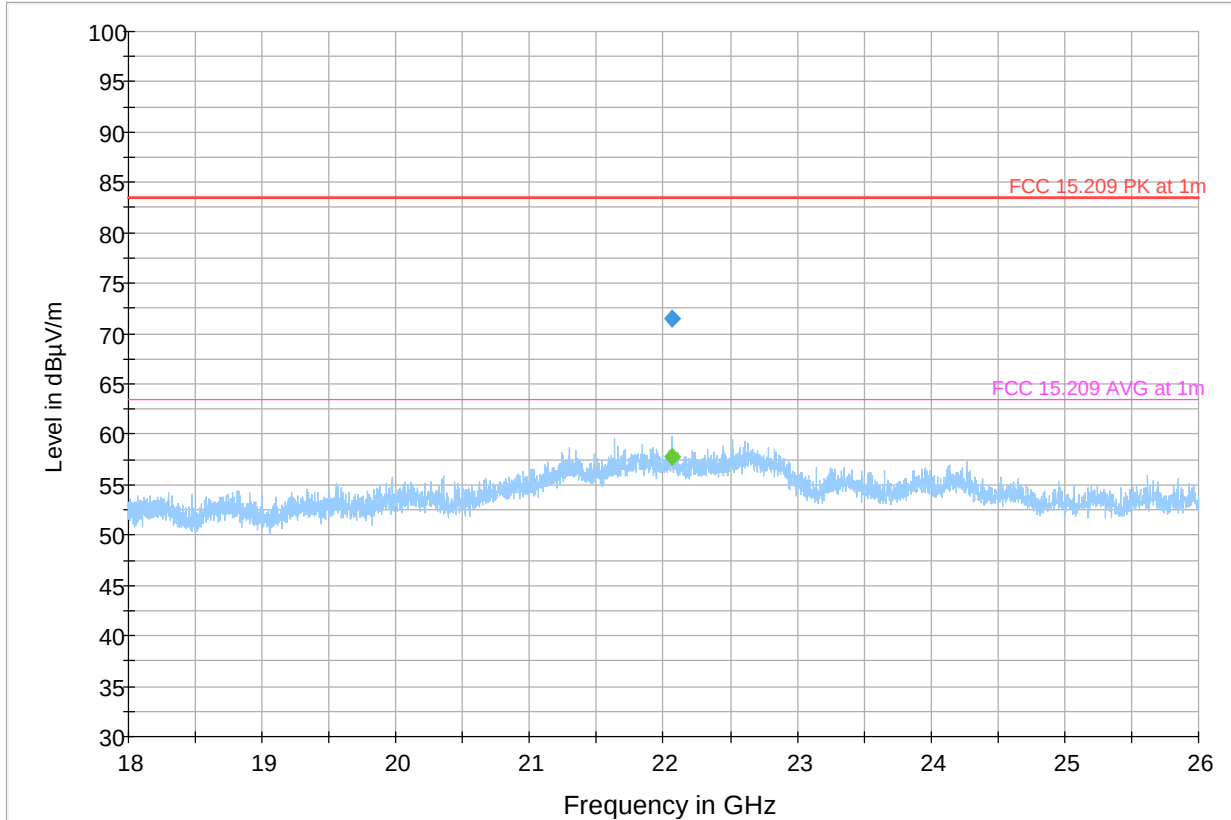


— AVG_MAXH — PK+_MAXH — FCC 15.209 PK at 3m
— FCC 15.209 AVG at 3m ◆ Final_Result PK+ ◆ Final_Result CAV

Plot # 15

Final Result

Frequency (MHz)	MaxPeak (dBμV/m)	CAverage (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)	Raw Rec (dBμV)
22064.750	---	57.720	63.50	5.78	500.0	1000.000	100.0	H	149.0	22.4	9.8	3.3	9.4	35.3
22064.750	71.471	---	83.50	12.03	500.0	1000.000	100.0	H	149.0	22.4	9.8	3.3	9.4	49.0



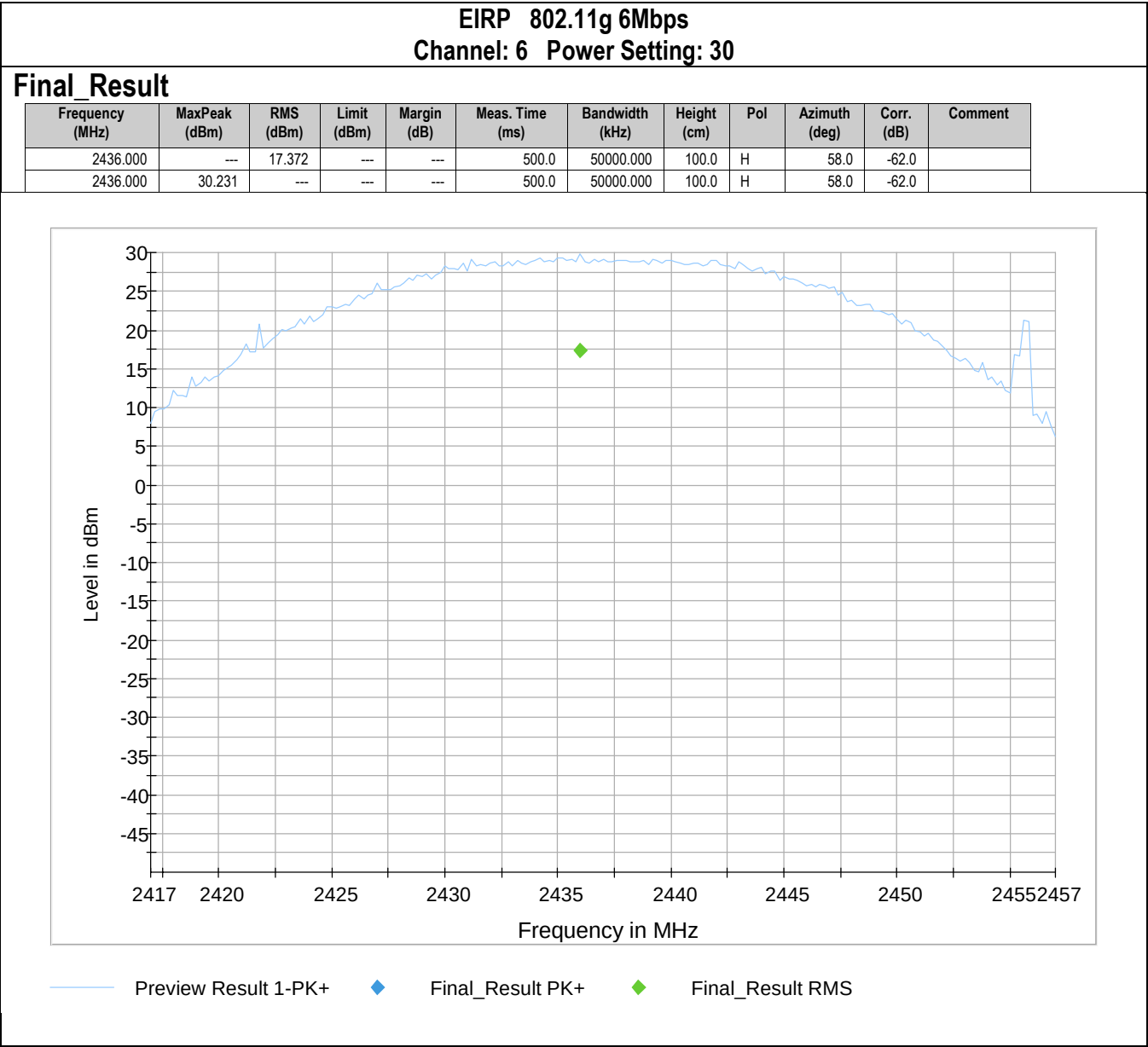
AVG_MAXH PK+_MAXH FCC 15.209 PK at 1m
FCC 15.209 AVG at 1m Final_Result PK+ Final_Result CAV



8.2 EIRP / Output Power Verification

The measurement results presented in this section are intended solely to verify if the radio specifications of the EUT have any significant deviations from the original measurement results documented in the initial reports or grants.

The EIRP / Output Power Verification results will not be used for RF exposure evaluation or certification purposes.



9 Test setup photos

Setup photos are included in supporting file name: "EMC_ARINC_001_23001_Setup_Photos_WiFi"

10 Test Equipment And Ancillaries Used For Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
Passive Loop Antenna	EMCO	6512	00164698	3 Years	9/6/2023
BILOG ANTENNA	A.H. SYSTEMS	BiLA2G	569	3 Years	10/30/2023
HORN ANTENNA	EMCO	3115	00035111	3 Years	10/26/2023
HORN ANTENNA	ETS LINDGREN	3117-PA	00167061	3 Years	9/25/2023
HORN ANTENNA	ETS LINDGREN	3116C-PA	00166821	3 Years	10/26/2023
ESW.EMI TEST RECEIVER	ROHDE & SCHWARZ	ESW44	101715	3 Years	10/24/2023
DIGITAL THERMOMETER	Control Company	4410,90080-03	230712972	3 Years	10/18/2023

Note: Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.

Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.

Test Report #: EMC_ARINC_001_23001_FCC_15_247

Date of Report 2024-07-25

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FCC ID: Contain N7NEM91
Contain TK4WLE3002HX
IC: Contain 2417C-EM91
Contain 7849A-WLE3002HX



11 History

Date	Report Name	Changes to report	Prepared by
2024-07-25	EMC_ARINC_001_23001_FCC_15_247	Initial Version	Cheng Song

<<< The End >>>