



FCC Test Report

For:

Rivian Automotive, LLC

Model #:

Telematics Control Module

Product Description:

The Telematics Control Module (TCM) is a connectivity module integrated into a vehicular application.

FCC ID: 2AW3A-1NAT20TCM

Applied Rules and Standards:

47 CFR Part 15.247 (DTS)

REPORT #: EMC_RIVIA-008-21001_FCC_15.247_Wi-Fi_DTS

DATE: 5/6/2021



A2LA Accredited

IC recognized #
3462B

CETECOM Inc.

411 Dixon Landing Road ♦ Milpitas, CA 95035 ♦ U.S.A.

Phone: + 1 (408) 586 6200 ♦ Fax: + 1 (408) 586 6299 ♦ E-mail: info@cetecom.com ♦ <http://www.cetecom.com>

CETECOM Inc. is a Delaware Corporation with Corporation number: 2905571



TABLE OF CONTENTS

1 ASSESSMENT..... 3

2 ADMINISTRATIVE DATA 4

2.1 IDENTIFICATION OF THE TESTING LABORATORY ISSUING THE EMC TEST REPORT 4

2.2 IDENTIFICATION OF THE CLIENT 4

2.3 IDENTIFICATION OF THE MANUFACTURER..... 4

3 EQUIPMENT UNDER TEST (EUT)..... 5

3.1 EUT SPECIFICATIONS 5

3.2 EUT SAMPLE DETAILS 6

3.3 ACCESSORY EQUIPMENT (AE) DETAILS..... 7

3.4 TEST SAMPLE CONFIGURATION 7

3.5 MODE OF OPERATION DETAILS 8

3.6 JUSTIFICATION FOR WORST CASE MODE OF OPERATION..... 8

4 SUBJECT OF INVESTIGATION 9

5 MEASUREMENT RESULTS SUMMARY 9

6 MEASUREMENT UNCERTAINTY..... 10

6.1 ENVIRONMENTAL CONDITIONS DURING TESTING:..... 10

6.2 DATES OF TESTING: 10

7 MEASUREMENT PROCEDURES 11

7.1 RADIATED MEASUREMENT..... 11

8 TEST RESULT DATA 14

8.1 COMBINING EMISSIONS AND COMPUTING DIRECTIONAL AND ARRAY GAIN FROM DEVICES WITH MULTIPLE OUTPUTS, AND EIRP 14

8.2 RADIATED TRANSMITTER SPURIOUS EMISSIONS AND RESTRICTED BANDS 15

9 TEST SETUP PHOTOS..... 29

10 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTING 29

11 HISTORY 30



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.

No deviations were ascertained.

According to section 5 of this report, the overall result is Pass.

Company	Description	Model #
Rivian Automotive, LLC	The Telematics Control Module (TCM) is a connectivity module integrated into a vehicular application.	Telematics Control Module

Responsible for Testing Laboratory:

5/6/2021	Compliance	Wang, Kevin (EMC Lab Manager)	
Date	Section	Name	Signature

Responsible for the Report:

5/6/2021	Compliance	Ghanma, Issa (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
Fax:	+1 (408) 586 6299
EMC Lab Manager:	Wang, Kevin
Responsible Project Leader:	Saman, Rami

2.2 Identification of the Client

Applicant's Name:	Rivian Automotive, LLC
Street Address:	607 Hansen Way
City/Zip Code	Palo Alto, CA 94304
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Client /-----
Manufacturers Address:	-----
City/Zip Code	-----
Country	-----

3 Equipment Under Test (EUT)

3.1 EUT Specifications

Model No:	Telematics Control Module
FCC-ID :	2AW3A-1NAT20TCM
HW Version :	Rev. F
SW Version :	2.23
Product Description:	The Telematics Control Module (TCM) is a connectivity module integrated into a vehicular application.
Frequency Range / number of channels:	Nominal band: 2400 MHz – 2483.5 MHz; Center to center: 2412 MHz (ch 1) – 2462 MHz (ch 11), 11 channels
Power Supply/ Rated Operating Voltage Range:	Low 9.9 V DC, Nominal 13.5 V DC, High 16.0 V DC
Operating Temperature Range:	Low -40° C, Nominal 20° C, High 85° C
Antenna Information as declared:	<ul style="list-style-type: none"> ❖ Antenna 1(Spoiler) <ul style="list-style-type: none"> • Type : External • Manufacturer : TE • Maximum Gain @ 2430 MHz : 4.1 dBi • Rivian part number : PT00039248 • TE part number : 955-012-201 ❖ Antenna 2 (Front) <ul style="list-style-type: none"> • Type : External • Manufacturer : TE • Maximum Gain @ 2420 MHz : 6.2 dBi • Rivian part number : PT00014349 • TE part number : 956-012-001
EUT Dimensions:	13.5" x 7.1" x 1.1"
Sample Revision:	<input type="checkbox"/> Prototype Unit; <input type="checkbox"/> Production Unit; <input checked="" type="checkbox"/> Pre-Production

Other Radios included in the device:	<ul style="list-style-type: none"> ❖ Bluetooth BR/EDR (Disabled) ❖ Bluetooth Low Energy 4.2 (Disabled) <u>See Note 1</u> ❖ Wi-Fi 5 GHz a/g/n/ac ❖ GPS/GNSS: <ul style="list-style-type: none"> • UBLOX NEO - M8L - 04A Standalone GNSS receiver • GEMALTO AIAS5 – GNSS receiver module integrated with the cellular modem 	
Wi-Fi Module information		
Name and number:	UBLOX JODY-W1	
FCC ID:	XPYJODYW167	
Modulation	802.11b	CCK and DSSS
	802.11g/n	OFDM
Supported data rates	IEEE Std. 802.11(xxxx)	Data Rate / MCS
	802.11b	1-11 Mbps
	802.11g	6-54 Mbps
	802.11n SISO	MCS 0-7 (150 Mbps)
	802.11n 2x2 MIMO	MCS 8-15 (300 Mbps)
Supported channel bandwidth	20 MHz	

Note 1: Referring to "TCM Operational Description_21April2021.pdf"; During TCM boot-up, the device does not load any Bluetooth drivers which means that the firmware is not downloaded.

3.2 EUT Sample details

EUT #	IMEI	HW Version	SW Version	Notes/Comments
1	35959910000118	Rev. F	2.23	Radiated measurement

3.3 Accessory Equipment (AE) details

AE #	Type	Rivian Part Number	TE Part Number	Manufacturer
1	External antenna LTE Main	PT00039249	955-922-501	TE
2	External antenna LTE Diversity	PT00039250	955-922-401	TE
3	External antenna Wi-Fi/BT	PT00039248	955-012-201	TE
4	External antenna Wi-Fi/BT	PT00014349	956-012-001	TE
5	External antenna Aux GNSS	PT00014353	956-514-201	TE

3.4 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#1 + AE#1, 2, 3, 4, 5	-

3.5 Mode of Operation details

Mode of Operation	Description of Operating modes	Additional Information
Op. 1	Wi-Fi 2.4 GHz + GSM850 Co-TX	<ul style="list-style-type: none"> ❖ TeraTerm terminal used to communicate with the device, and sending commands provided by client, that will not available to end-user, to configure the Wi-Fi radio: <ul style="list-style-type: none"> • Power level : 15 dBm • Select TX paths : MIMO • Mode : 802.11n • Transmit mode : Continuous TX • Duty cycle : ~ 100% • Hopping : No • Hopping Type : Single Frequency • Channel BW : 20 MHz • Channel : 1, 6, 11 • Data rate : MCS8 ❖ TeraTerm terminal used to communicate with the device, and sending AT commands to connect the Co-transmitter (GSM850) to the base station (CMW500).

Note: Refer to "TCM Operational Description_21April2021.pdf" for Wi-Fi RF Power setting table.

3.6 Justification for Worst Case Mode of Operation

During the testing process, the EUT was tested with transmitter sets on low, mid and high channels, and highest possible duty cycle and output power.

For radiated measurements;

- All data in this report show the worst case of Wi-Fi radio in simultaneous transmission mode with the strongest power of other radio emission of host product (GSM850) transmitting at the highest output power band representing worst case transmission mode.
- All data in this report show 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 assess the performance of the EUT according to the relevant requirements specified in FCC rules Part 15.247 of Title 47 of the Code of Federal Regulations.

This test report is to support a request for new equipment authorization under:

- FCC ID: 2AW3A-1NAT20TCM

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.

5 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	NA	NP	Result
§15.247(a)(1)	Emission Bandwidth	Nominal	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	See Note 1 See Note 2
§15.247(e)	Power Spectral Density	Nominal	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	See Note 1 See Note 2
§15.247(b)(1)	Maximum Conducted Output Power and EIRP	Nominal	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	See Note 1 See Note 2
§15.247(d)	Band edge compliance Unrestricted Band Edges	Nominal	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	See Note 1 See Note 2
§15.247; 15.209; 15.205	Band edge compliance Restricted Band Edges	Nominal	-	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	See Note 1 See Note 2
§15.247(d); §15.209	TX Spurious emissions-Radiated	Nominal	Op.1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Complies
§15.207(a)	AC Conducted Emissions	Nominal	-	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	See Note 1 See Note 3

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

Note 2: Leveraged from UBLOX JODY-W1 certification report # MDE_UBLOX_1828_FCCd under FCC: XPYJODYW167;

Note 3: The EUT is powered by a vehicular 12 V DC; hence this test does not apply.

6 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 $k=1$.

Radiated measurement

9 kHz to 30 MHz	± 2.5 dB (Magnetic Loop Antenna)
30 MHz to 1000 MHz	± 2.0 dB (Biconilog Antenna)
1 GHz to 40 GHz	± 2.3 dB (Horn Antenna)

According to TR 102 273 a multiplicative propagation of error is assumed for RF measurement systems. For this reason the RMS method is applied to dB values and not to linear values as appropriate for additive propagation of error. Also used: <http://physics.nist.gov/cuu/Uncertainty/typeb.html>. The above calculated uncertainties apply to direct application of the Substitution method. The Substitution method is always used when the EUT comes closer than 3 dB to the limit.

6.1 Environmental Conditions During Testing:

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

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

6.2 Dates of Testing:

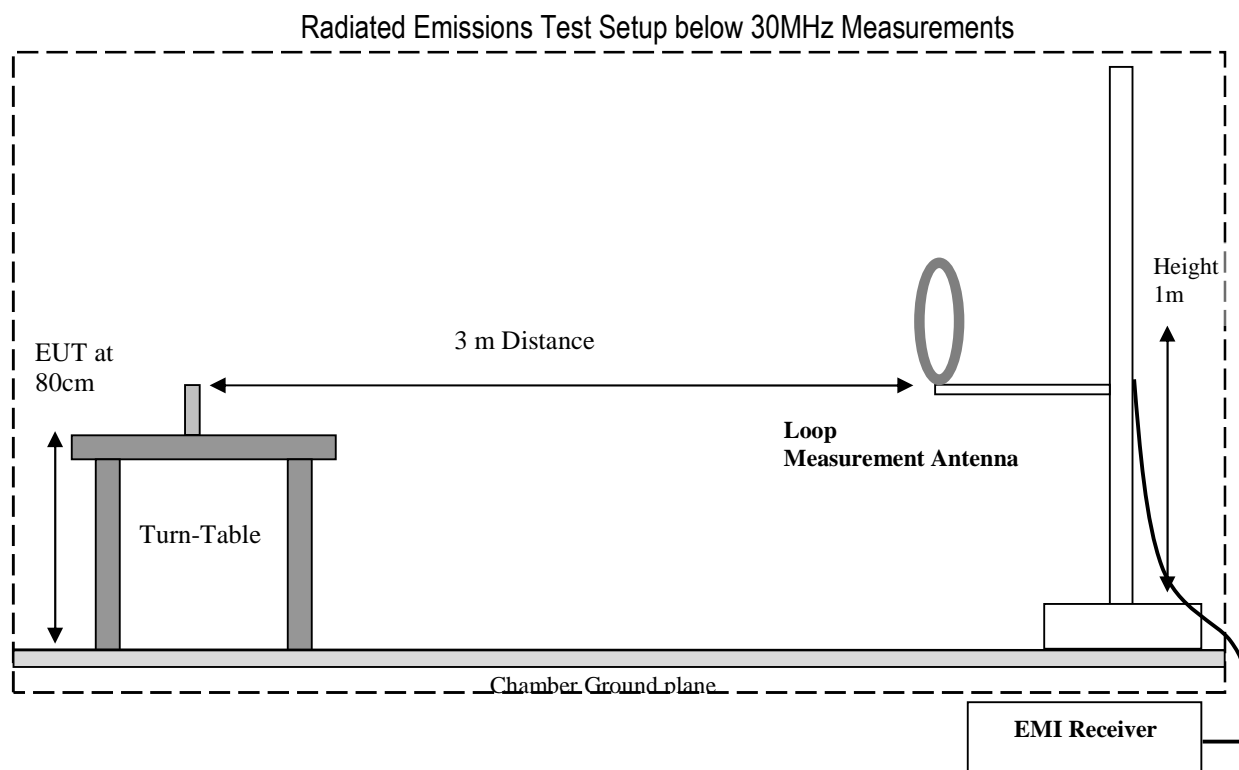
1/18/2021 – 1/19/2021

7 Measurement Procedures

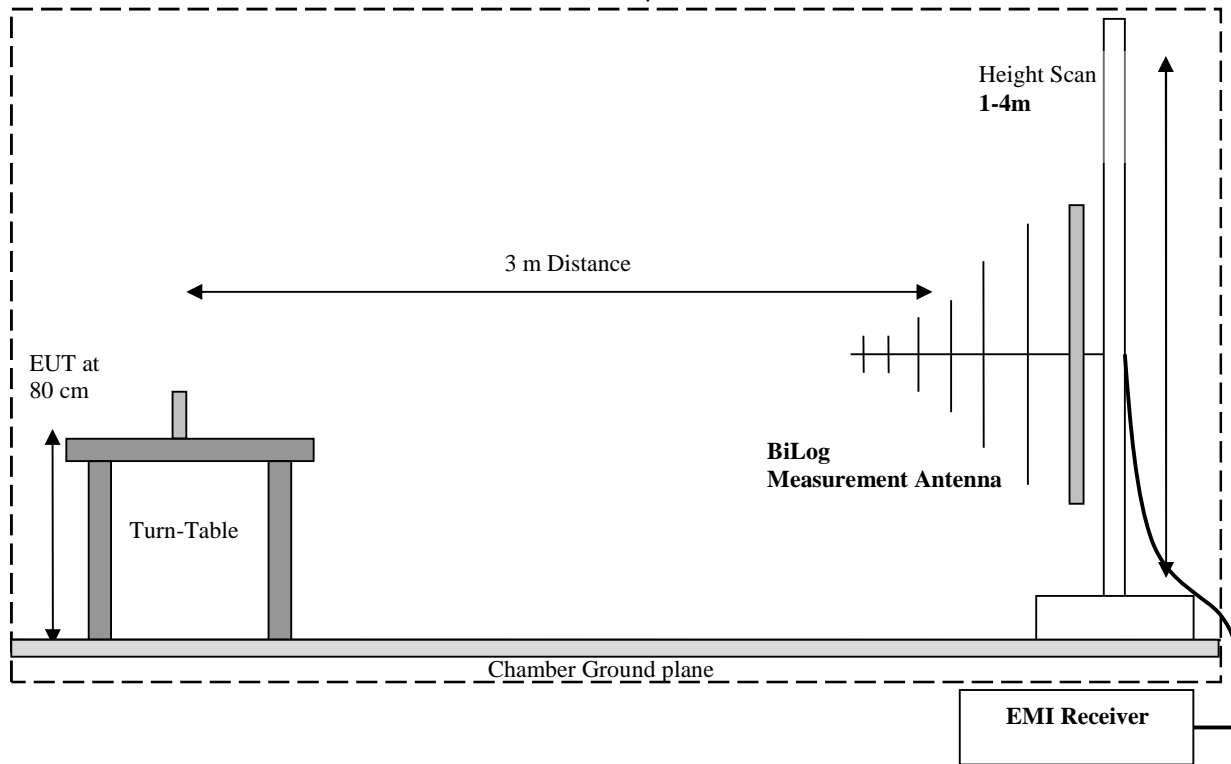
7.1 Radiated Measurement

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

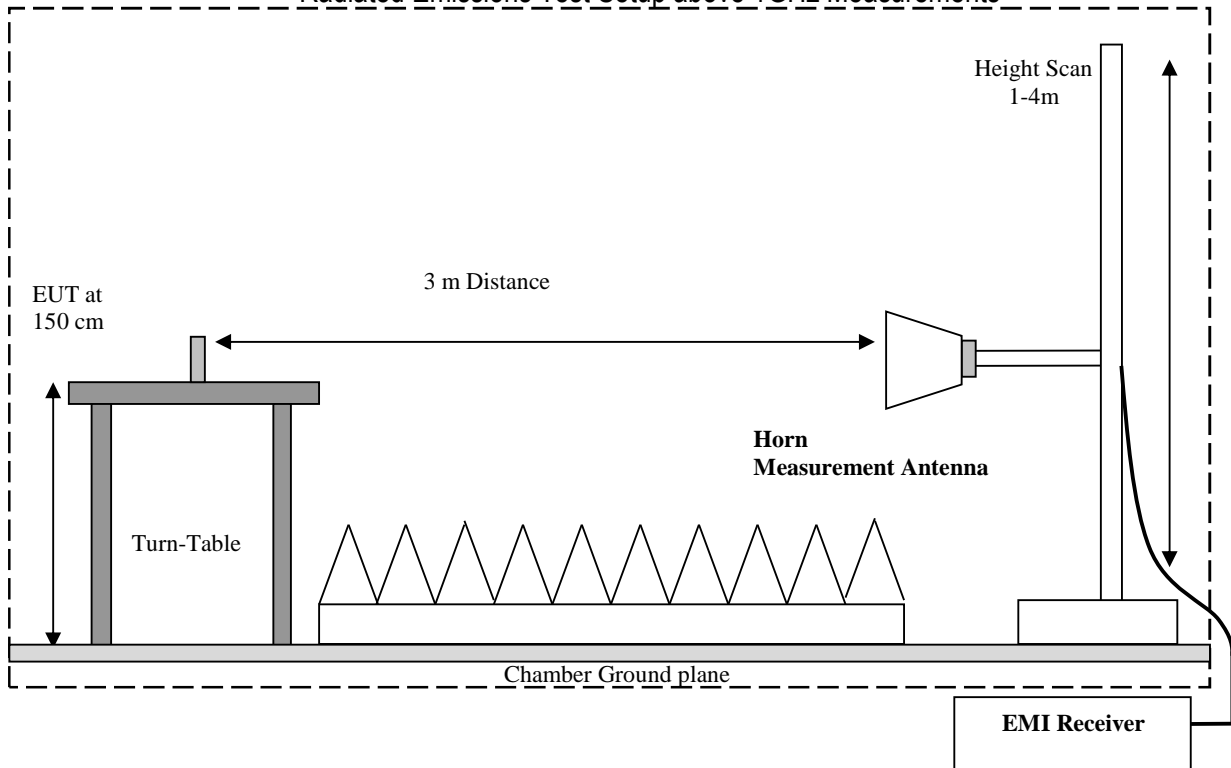
- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency range with R&S Test-SW EMC32 for 360° continuous measurement of the turntable, two orthogonal positions of the EUT and both antenna polarizations. This procedure exceeds the requirement of the above 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 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

8 Test Result Data

8.1 Combining emissions and computing directional and array gain from devices with multiple outputs, and EIRP

According KDB 662911;

- E) 1) In-Band Power Measurements
 - The measure-and-sum technique shall be used for measuring in-band transmit power of a device. Total power is the sum of the conducted power levels measured at the various output ports.
- F) 2) Directional Gain Calculation for In-Band Measurements
 - d) Unequal antenna gains, with equal transmit power. For antenna gains given by G_1, G_2, \dots, G_N dBi
 - (i) If transmit signals are correlated then
 Directional gain = $10 \log [(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2 / NANT]$ dBi [Note the "20"s in the denominator of each exponent and the square of the sum of terms; the object is to combine the signal levels coherently.]

Frequency (MHz)	EUT Operating Mode	MIMO RMS Output power (dBm/W)	FCC limit corrected for gain > 6 dBi (dBm/W)	EIRP Accounting for directional gain (dBm/W)	Result
2412 – 2462	802.11n MIMO	17.5 \ 0.056	27.78 \ 0.599	25.72 \ 0.374	Pass

- Directional gain = $10 * \text{Log}_{10} [(10^{4.1/20} + 10^{6.2/20})^2 / 2] \rightarrow 8.22$ dBi
- Limit corrected for gain > 6 dBi = $30 - (8.22 - 6) \rightarrow 27.78$ dBm $\rightarrow 0.599$ W

8.2 Radiated Transmitter Spurious Emissions and Restricted Bands

8.2.1 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 at distance other than the specified in the standard, the limit conversion is calculated by using 40 dB/decade extrapolation factor as follow: Conversion factor (CF) = $40 \log (D/d) = 40 \log (300m / 3m) = 80dB$

8.2.2 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

- 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

- 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

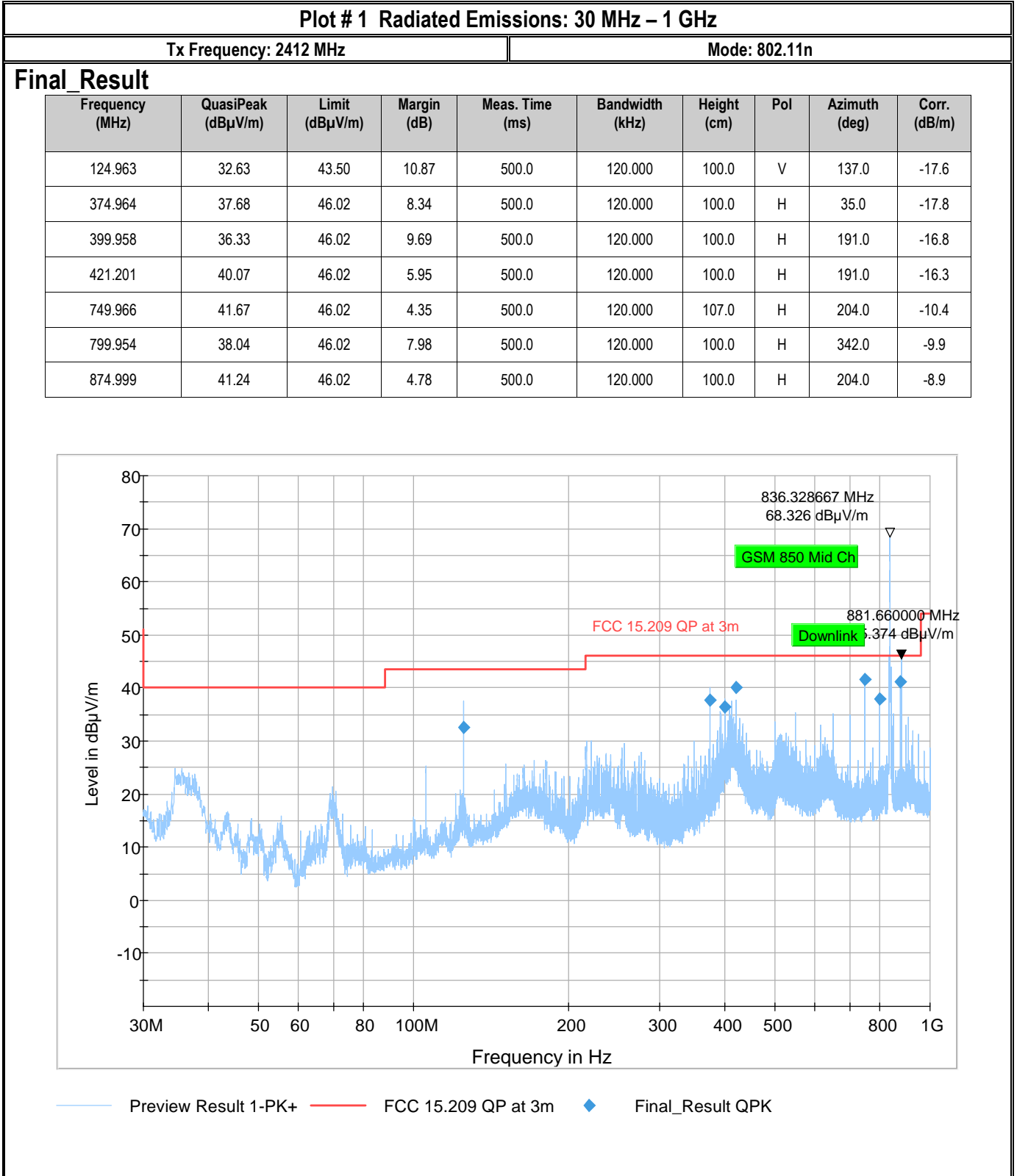
8.2.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
23.8°C	1	Op. 1	12 V AC

8.2.4 Measurement result:

Plot #	Scan Frequency	Channel #	Lowest margin emissions (dB μ V/m)	Limit	Result
1 – 3	30 MHz – 18 GHz	Low	41.67	See section 8.1.2	Pass
4 – 8	9 kHz – 40 GHz	Mid	43.72	See section 8.1.2	Pass
9 – 11	30 MHz – 18 GHz	High	43.84	See section 8.1.2	Pass

8.2.5 Measurement Plots:



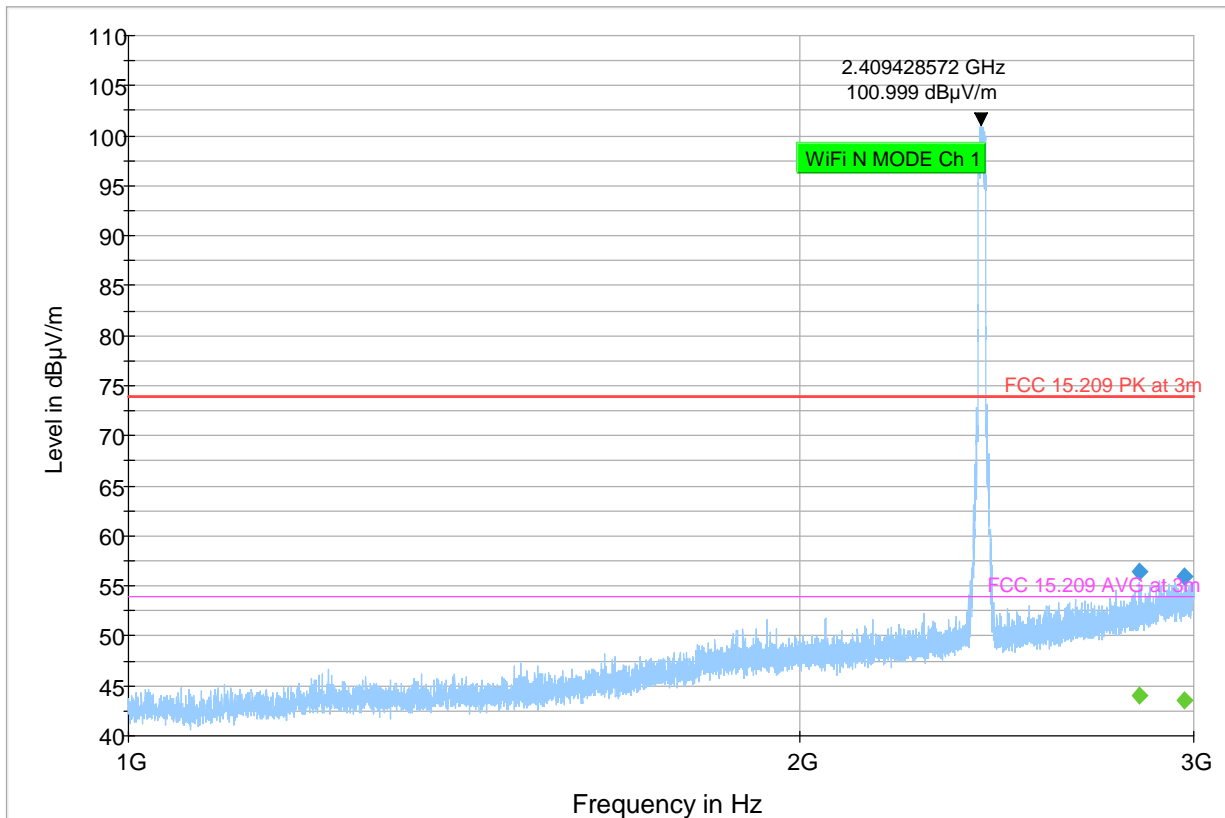
Plot # 2 Radiated Emissions: 1 – 3 GHz

Tx Frequency: 2412 MHz

Mode: 802.11n

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)
2836.143	---	43.96	53.98	10.02	500.0	1000.000	167.0	V	-45.0	34.5
2836.143	56.47	---	73.98	17.51	500.0	1000.000	167.0	V	-45.0	34.5
2971.714	---	43.61	53.98	10.37	500.0	1000.000	191.0	V	93.0	35.2
2971.714	55.89	---	73.98	18.09	500.0	1000.000	191.0	V	93.0	35.2



- ◆ Preview Result 1-PK+ Final_Result PK+
- FCC 15.209 PK at 3m
- FCC 15.209 AVG at 3m
- ◆ Final_Result CAV

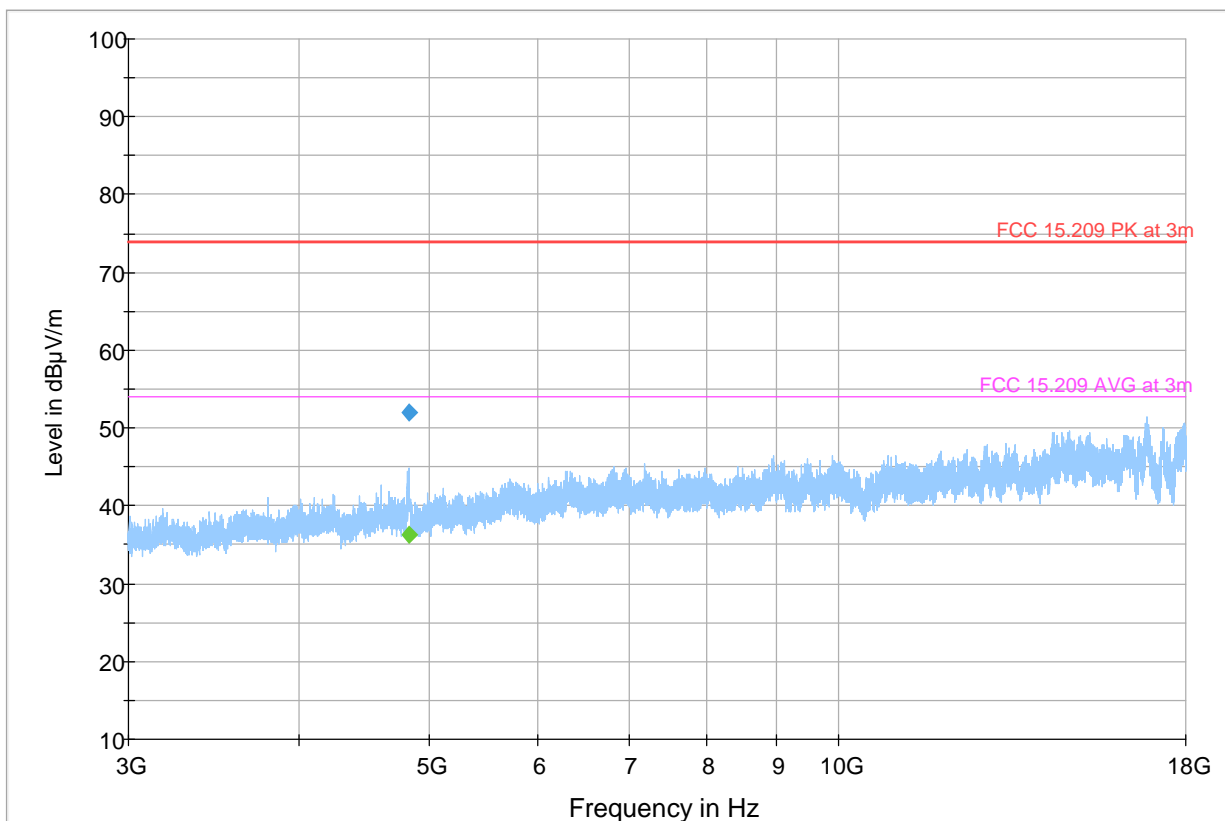
Plot # 3 Radiated Emissions: 3 – 18 GHz

Tx Frequency: 2412 MHz

Mode: 802.11n

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)
4824.250	---	36.20	53.98	17.78	500.0	1000.000	259.0	V	23.0	-3.4
4824.250	52.11	---	73.98	21.87	500.0	1000.000	259.0	V	23.0	-3.4



- ◆ Preview Result 1-PK+ — FCC 15.209 PK at 3m — FCC 15.209 AVG at 3m
- ◆ Final_Result PK+ ◆ Final_Result CAV

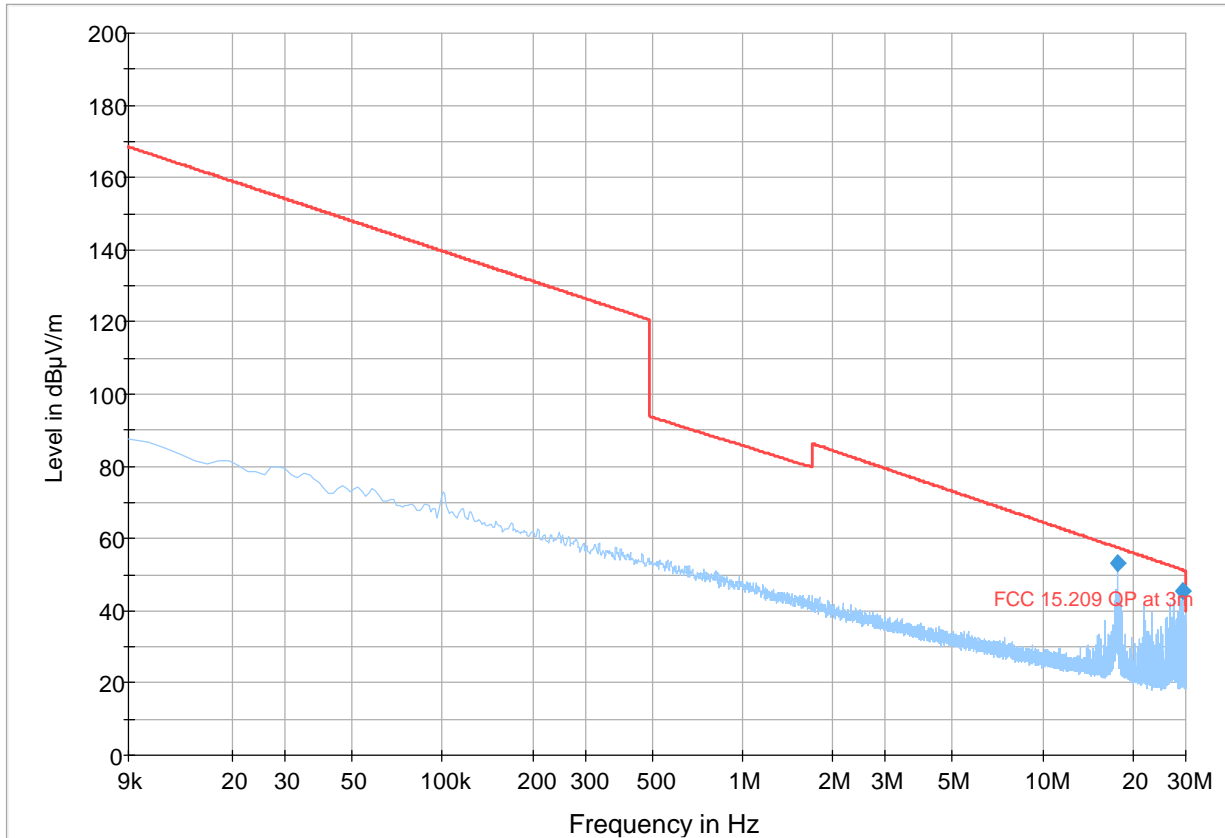
Plot # 4 Radiated Emissions: 9 KHz – 30 MHz

Tx Frequency: 2437 MHz

Mode: 802.11n

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)
17.693	53.08	57.54	4.46	500.0	9.000	202.0	V	14.0	16.9
29.235	45.67	51.36	5.68	500.0	9.000	221.0	V	-16.0	16.3



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



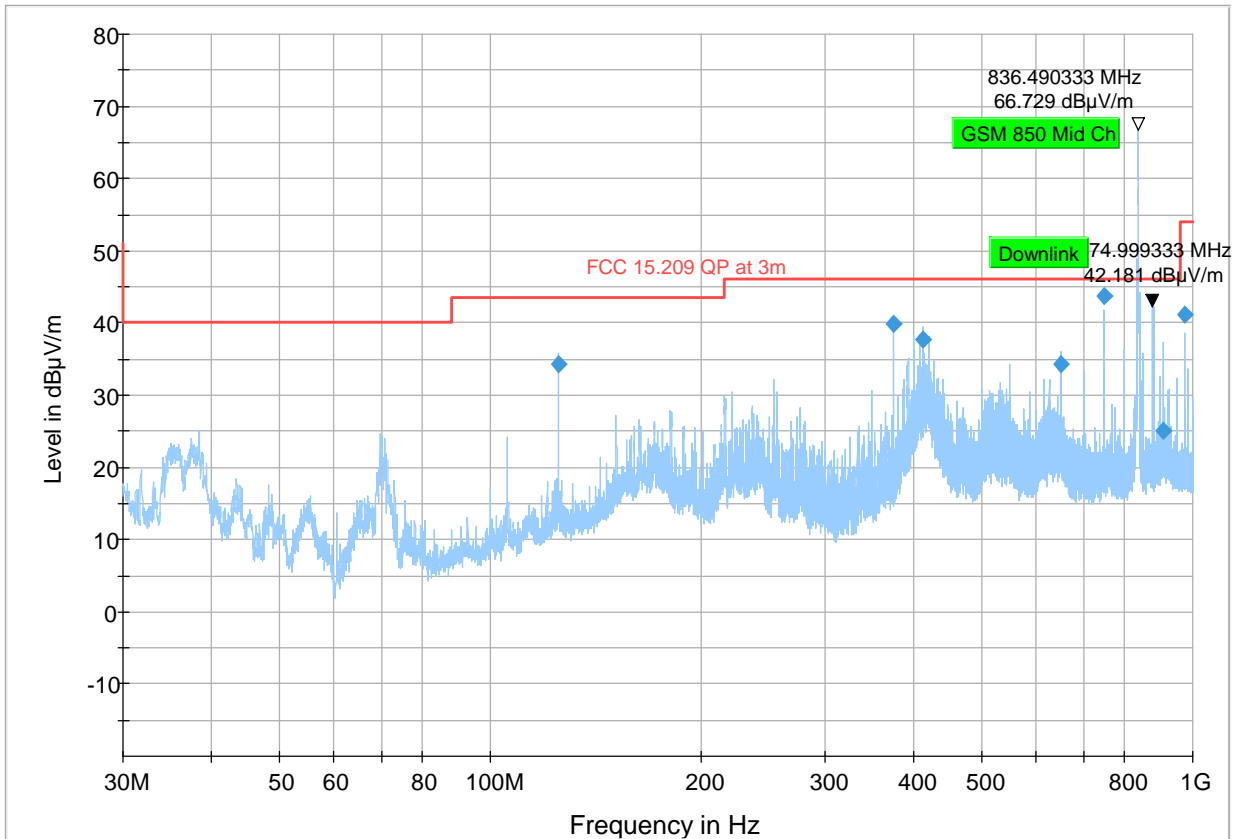
Plot # 5 Radiated Emissions: 30 MHz – 1 GHz

Tx Frequency: 2437 MHz

Mode: 802.11n

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)
124.963	34.37	43.50	9.13	500.0	120.000	100.0	V	112.0	-17.6
374.997	39.77	46.02	6.25	500.0	120.000	100.0	H	36.0	-17.8
413.570	37.82	46.02	8.20	500.0	120.000	100.0	H	192.0	-16.5
649.959	34.19	46.02	11.83	500.0	120.000	125.0	V	88.0	-12.4
749.999	43.72	46.02	2.30	500.0	120.000	107.0	H	207.0	-10.4
907.947	25.02	46.02	21.00	500.0	120.000	237.0	V	346.0	-8.9
974.586	41.21	53.98	12.77	500.0	120.000	100.0	V	314.0	-8.1



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

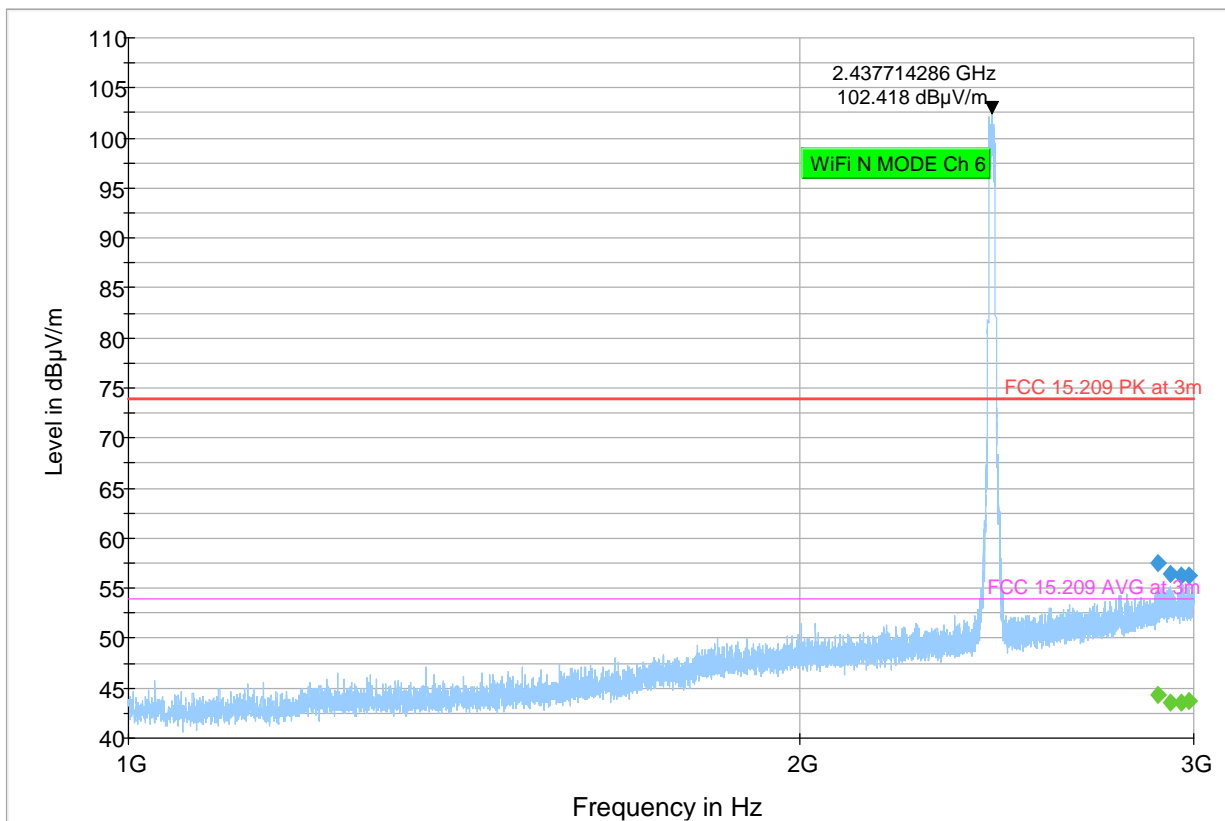
Plot # 6 Radiated Emissions: 1 – 3 GHz

Tx Frequency: 2437 MHz

Mode: 802.11n

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)
2893.000	57.45	---	73.98	16.53	500.0	1000.000	212.0	V	204.0	34.8
2893.000	---	44.39	53.98	9.59	500.0	1000.000	212.0	V	204.0	34.8
2931.143	---	43.64	53.98	10.34	500.0	1000.000	125.0	V	48.0	35.1
2931.143	56.49	---	73.98	17.49	500.0	1000.000	125.0	V	48.0	35.1
2964.000	56.21	---	73.98	17.77	500.0	1000.000	134.0	V	269.0	35.2
2964.000	---	43.61	53.98	10.37	500.0	1000.000	134.0	V	269.0	35.2
2984.714	---	43.67	53.98	10.31	500.0	1000.000	175.0	H	-18.0	35.3
2984.714	56.29	---	73.98	17.69	500.0	1000.000	175.0	H	-18.0	35.3

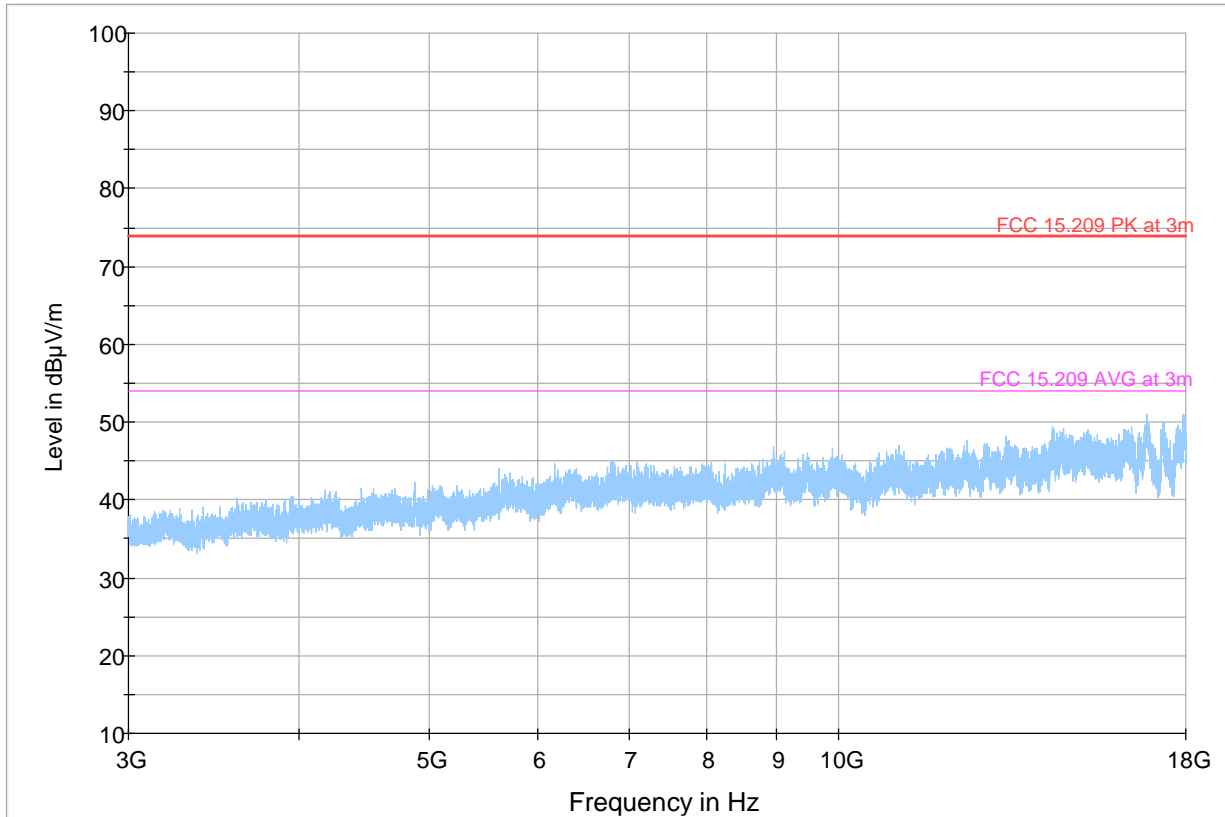


- ◆ Preview Result 1-PK+ — FCC 15.209 PK at 3m — FCC 15.209 AVG at 3m
- ◆ Final_Result PK+ ◆ Final_Result CAV

Plot # 7 Radiated Emissions: 3 – 18 GHz

Tx Frequency: 2437 MHz

Mode: 802.11n

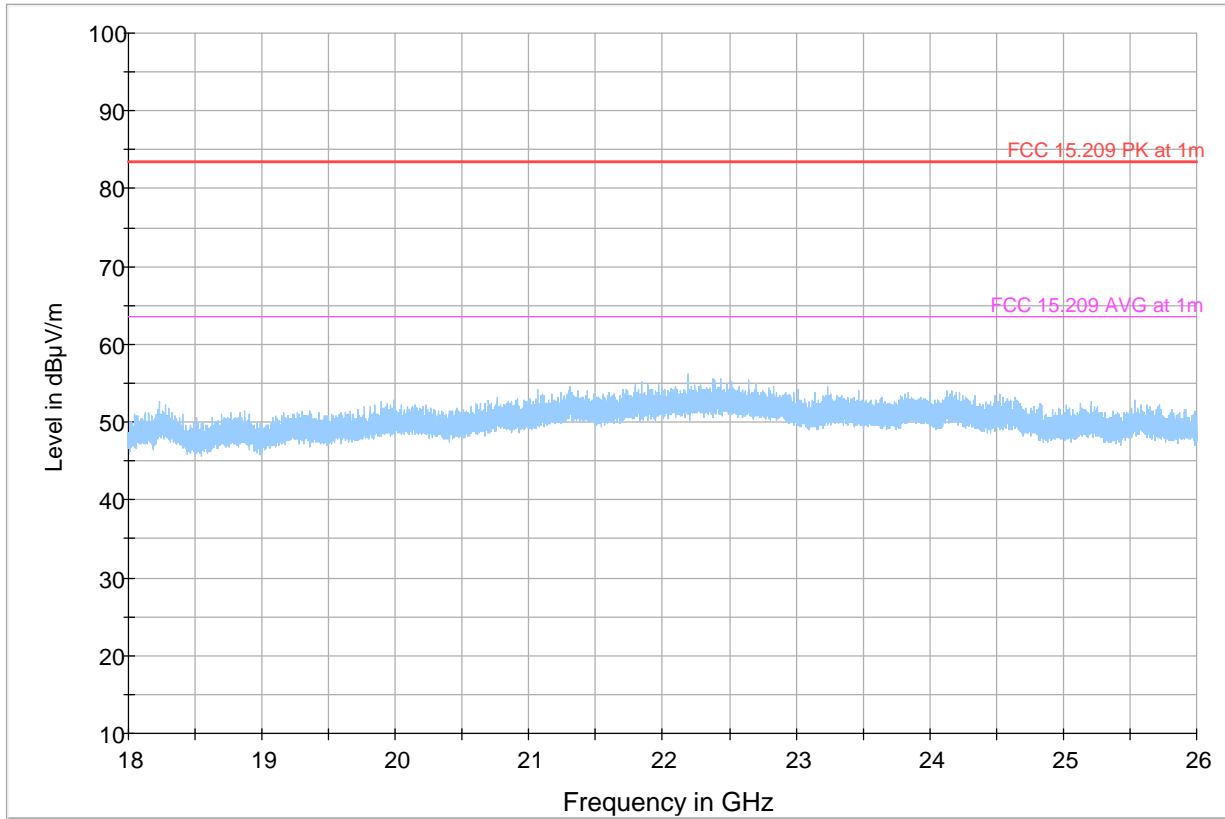


- Preview Result 1-PK+ * Critical_Freqs PK+ — FCC 15.209 PK at 3m
- FCC 15.209 AVG at 3m ◆ Final_Result PK+ ◆ Final_Result CAV

Plot # 8 Radiated Emissions: 18 – 26 GHz

Tx Frequency: 2437 MHz

Mode: 802.11n



- Preview Result 1-PK+ *
- FCC 15.209 AVG at 1m ◆
- Critical_Freqs PK+ ◆
- Final_Result PK+ ◆
- FCC 15.209 PK at 1m ◆
- Final_Result CAV ◆

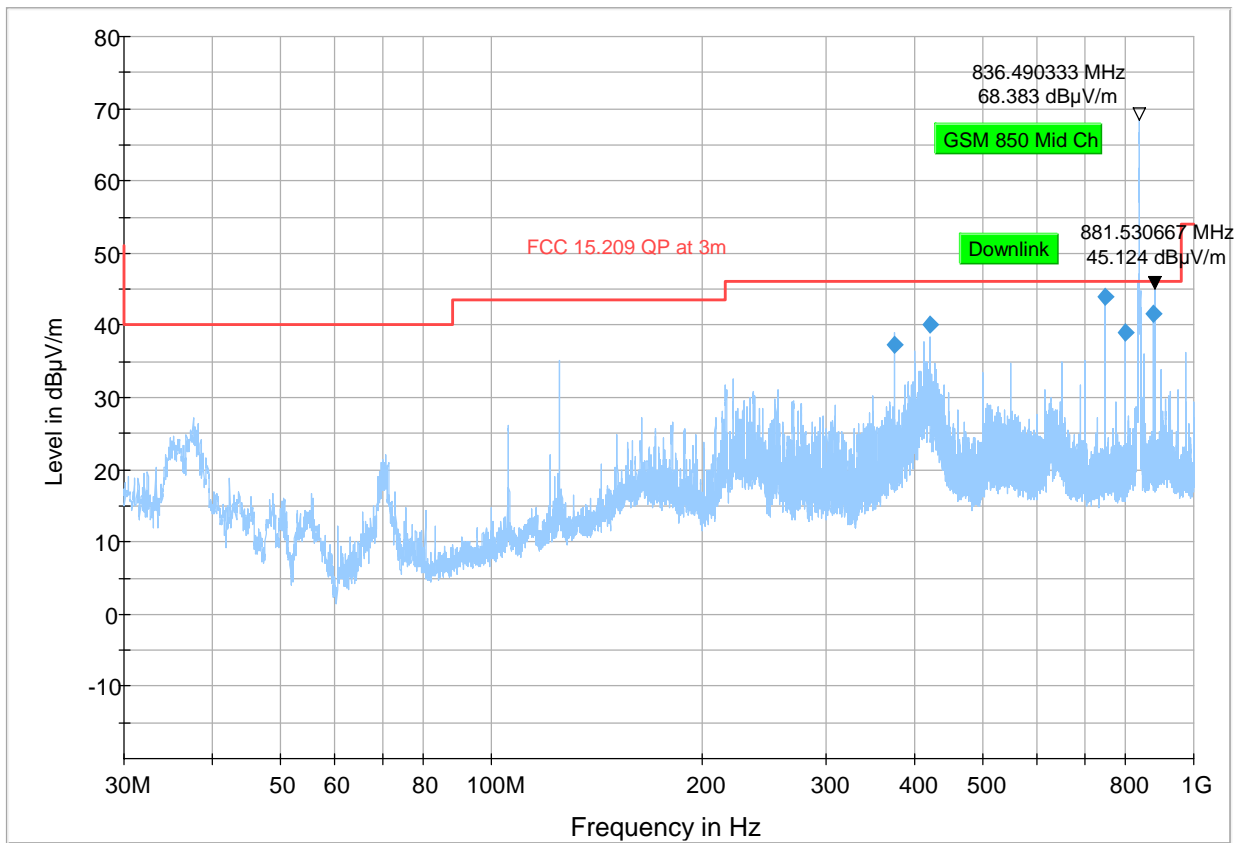
Plot # 9 Radiated Emissions: 30 MHz – 1 GHz

Tx Frequency: 2462 MHz

Mode: 802.11n

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)
374.964	37.37	46.02	8.65	500.0	120.000	100.0	H	36.0	-17.8
421.169	40.12	46.02	5.90	500.0	120.000	100.0	H	194.0	-16.3
749.999	43.84	46.02	2.18	500.0	120.000	107.0	H	203.0	-10.4
799.954	38.91	46.02	7.11	500.0	120.000	100.0	H	342.0	-9.9
874.999	41.50	46.02	4.52	500.0	120.000	211.0	H	212.0	-8.9



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

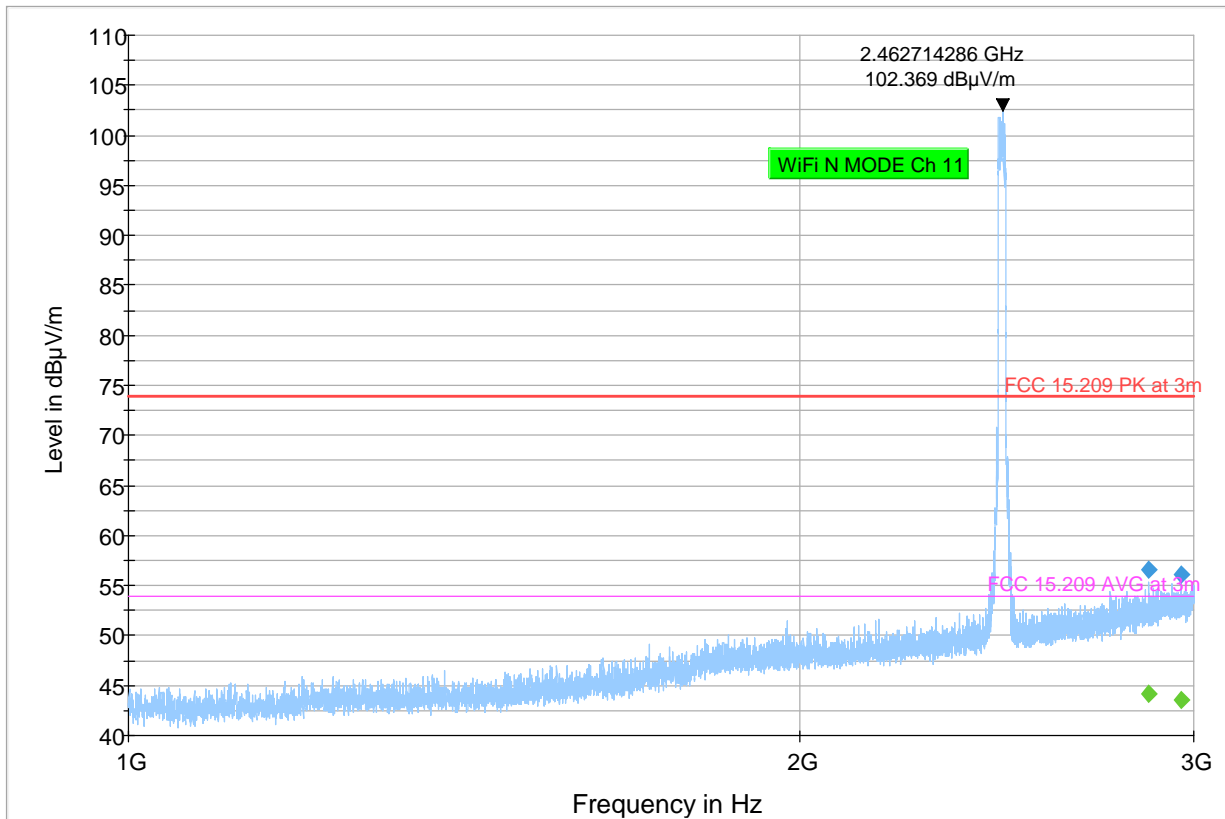
Plot # 10 Radiated Emissions: 1 – 3 GHz

Tx Frequency: 2462 MHz

Mode: 802.11n

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)
2864.286	56.62	---	73.98	17.36	500.0	1000.000	235.0	H	249.0	34.6
2864.286	---	44.17	53.98	9.81	500.0	1000.000	235.0	H	249.0	34.6
2961.143	56.09	---	73.98	17.89	500.0	1000.000	325.0	H	221.0	35.2
2961.143	---	43.58	53.98	10.39	500.0	1000.000	325.0	H	221.0	35.2

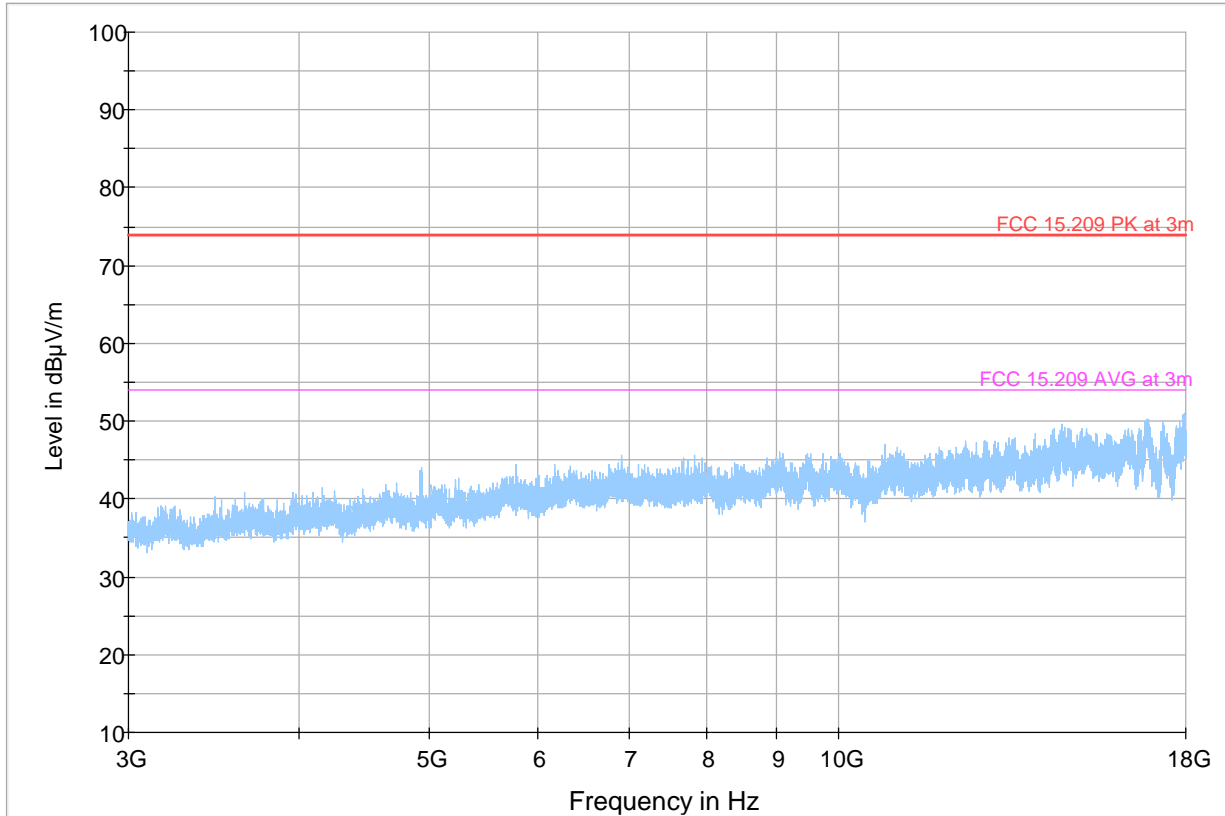


- ◆ Preview Result 1-PK+ Final_Result PK+
- ◆ FCC 15.209 PK at 3m Final_Result CAV
- ◆ FCC 15.209 AVG at 3m

Plot # 11 Radiated Emissions: 3 – 18 GHz

Tx Frequency: 2462 MHz

Mode: 802.11n



- Preview Result 1-PK+ * Critical_Freqs PK+
- FCC 15.209 AVG at 3m ♦ Final_Result PK+
- FCC 15.209 PK at 3m ♦ Final_Result CAV



9 Test setup photos

Setup photos are included in supporting file name: "EMC_RIVIA-008-21001_FCC_Setup_Photos.pdf"

10 Test Equipment And Ancillaries Used For Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
ACTIVE LOOP ANTENNA	ETS LINDGREN	6507	00161344	3 YEARS	10/30/2020
Biconilog Antenna	ETS Lindgren	3142E	00166067	3 YEARS	3/20/2020
Horn Antenna	ETS Lindgren	3115	00035114	3 YEARS	10/10/2020
HORN ANTENNA	ETS LINDGREN	3117-PA	00215984	3 YEARS	1/31/2021
HORN ANTENNA	ETS LINDGREN	3116C	00070497	3 YEARS	11/23/2020
EMI Receiver	R&S	ESU40	100251	3 YEARS	7/16/2019
Digital Thermometer/Chilled Mirror Hygrometer	Control Company	36934-164	191872028	3 YEARS	1/10/2019

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.



11 History

Date	Report Name	Changes to report	Report prepared by
5/6/2021	EMC_RIVIA-008-21001_FCC_15.247_WIFI_DTS	Initial Version	Ghanma, Issa

<<< The End >>>
