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Computational Systems, Inc.
RSE TEST REPORT

SCOPE OF WORK
FCC AND ISED RADIATED SPURIOUS EMISSIONS – AMS2140 MACHINERY HEALTH ANALYZER

REPORT NUMBER
103295173LEX-005

ISSUE DATE	**[REVISED DATE]**
4/1/2018	4/1/2018

PAGES
44

DOCUMENT CONTROL NUMBER
Non-Specific EMC Report Shell Rev. December 2017

EMC TEST REPORT

(Radiated Spurious Emissions)

Report Number: 103295173LEX-005
Project Number: G103295173

Report Issue Date: 4/1/2018

Model(s) Tested: AMS2140 Machinery Health Analyzer

Standards: FCC Title 47 CFR Part 15 Subpart C
RSS-247 Issue 2

Tested by:
Intertek Testing Services NA, Inc.
731 Enterprise Dr.
Lexington, KY 40510
USA

Client:
Computational Systems, Inc.
835 Innovation Drive
Knoxville, TN 37932-2563
USA

Report prepared by

Bryan Taylor, Team Leader

Report reviewed by

Brian Lackey Project Engineer

Table of Contents

1 Introduction and Conclusion

The tests indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining test sections are the verbatim text from the actual data sheets used during the investigation. These test sections include the test name, the specified test Method, a list of the actual Test Equipment Used, documentation Photos, Results and raw Data. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product tested **complies** with the requirements of the standard(s) indicated. The results obtained in this test report pertain only to the item(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

The INTERTEK-Lexington is located at 731 Enterprise Drive, Lexington Kentucky, 40510. The radiated emission test site is a 10-meter semi-anechoic chamber. The chamber meets the characteristics of CISPR 16-1 and ANSI C63.4. For measurements, a remotely controlled flush-mount metal-top turntable is used to rotate the EUT a full 360 degrees. A remote controlled non-conductive antenna mast is used to scan the antenna height from one to four meters. The test site is listed with the FCC under registration number 485103. The test site is listed with Industry Canada under site number IC 2042M-1.

2 Test Summary

Section	Test full name	Result
6	Conducted Output Power	Pass
7	Radiated Spurious Emissions (2.4GHz WiFi, Bluetooth) (ANSI C63.10: 2013)	Pass

Testing was limited to radiated spurious emissions and conducted output power. The module report (FCCID: PV7-WIBEAR11N-SF1) covers all other items.

3 Client Information

This product was tested at the request of the following:

Client Information	
Client Name:	Computational Systems, Inc.
Address:	835 Innovation Drive Knoxville, TN 37932-2563 USA
Contact:	Dwayne Beeler
Telephone:	(856)675-2400
Email:	Dwayne.beeler@emerson.com
Manufacturer Information	
Manufacturer Name:	Computational Systems, Inc.
Manufacturer Address:	835 Innovation Drive Knoxville, TN 37932-2563 USA

4 Description of Equipment under Test and Variant Models

Equipment Under Test	
Product Name	AMS2140 Machinery Health Analyzer
Model Number	AMS2140
Serial Number	Test Sample 1
Receive Date	12/28/2017
Test Start Date	12/28/2017
Test End Date	1/5/2018
Device Received Condition	Good
Test Sample Type	Production
Rated Voltage	15VDC
Rated Current	4A
Rated Frequency	DC
Number of Phases	1 (AC / DC Power Adapter)

Description of Equipment Under Test (provided by client)
The AMS2140 Machinery Health Analyzer was a machinery health analyzer fitted with a Bluetooth / WiFi transmitter module. It can used with a strap which goes around the users neck and allows the AMS2140 to hang against the body.

4.1 Variant Models:

There were no variant models covered by this evaluation.

5 System Setup and Method

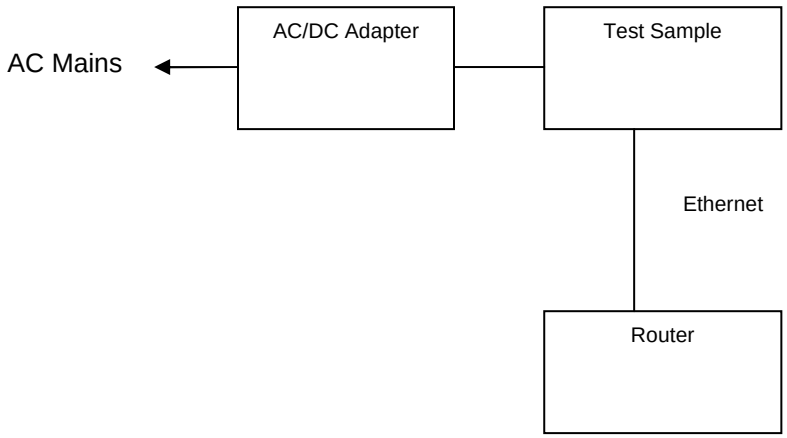
5.1 Method:

Configuration as required by ANSI C63.4: 2014

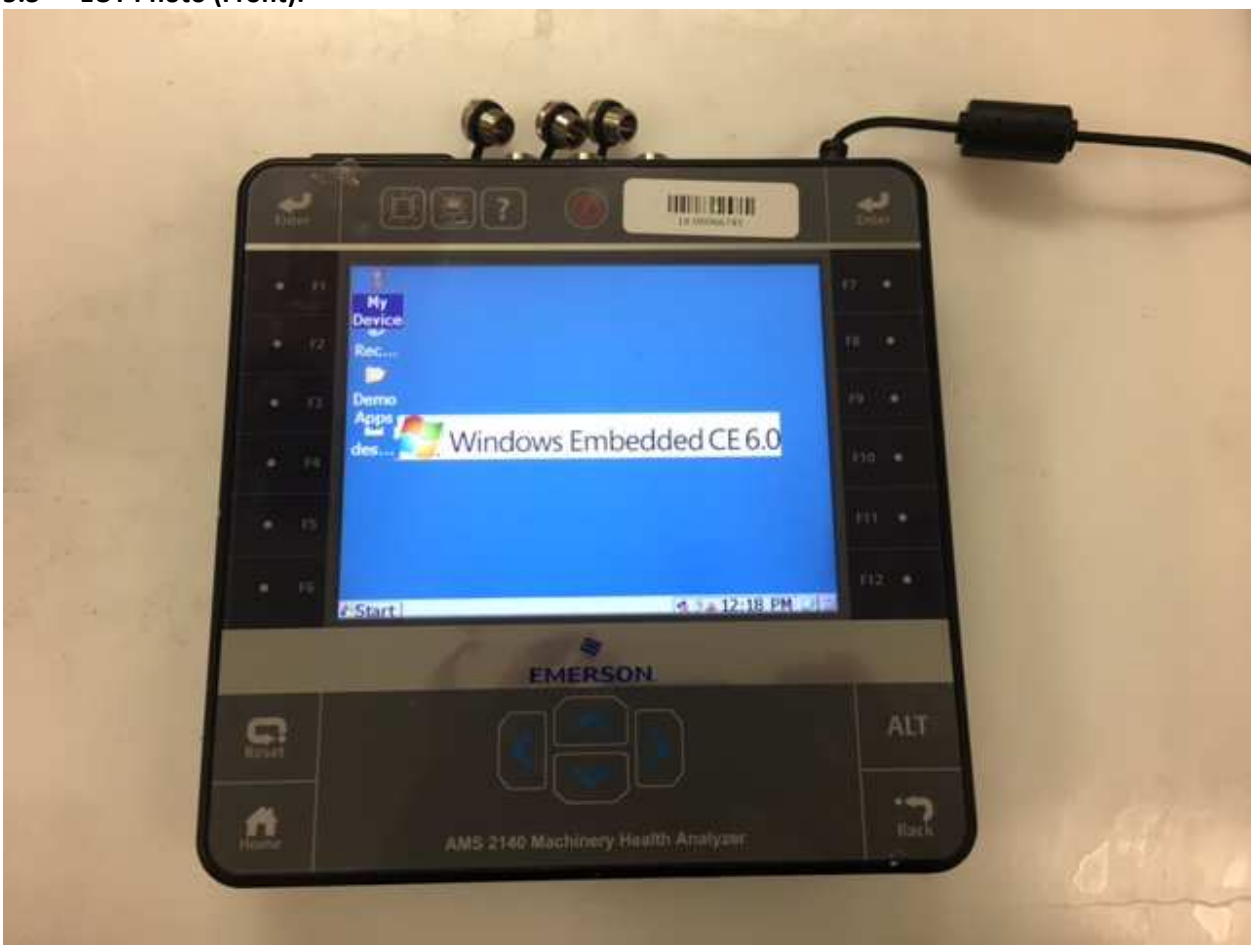
No.	Descriptions of EUT Exercising
1	Transmitting an 802.11b, g, or n signal
2	Transmitting a Bluetooth signal
3	Radios Idle / Receive Mode

Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
A	DC Cable	2m	None	Yes	AC / DC Power Adapter
B	Ethernet Cable	20m	None	None	Router
C	Transducer Cables (3)	1m	Yes	None	Un-Terminated
D	AC Cable	2m	None	None	AC Power Source

5.2 EUT Block Diagram:



5.3 EUT Photo (Front):



5.4 EUT Photo (Back):

6 Conducted Output Power

6.1 Test Limits:

§ 15.247 (b)(1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

§ 15.247(b)(3): For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the *maximum conducted output power* is the highest total transmit power occurring in any mode.

§ 15.247(b)(4): The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

6.2 Test Procedure:

ANSI C63.10:2013 § 11.9.1.3 and KDB Publication No. 558074: Guidance on Measurements for Digital Transmission Systems (47 CFR 15.247). The average output power was measured using a wideband power sensor.

6.3 Test Equipment Used:

Description	Serial Number	Manufacturer	Model	Cal. Date	Cal. Due
Wideband Power Sensor	100155	Rohde&Schwarz	NRP-Z81	9/20/2017	9/20/2018

6.4 Test Results:

The device was found to be **compliant**. The peak output power was less than the limit.

WiFi Conducted Output Power

Mode	Data Rate	Channel	Freq. (MHz)	Average Power (dBm)
802.11b	1Mbps	1	2412	18.80
		6	2437	18.90
		11	2463	18.70
802.11g	6Mbps	1	2412	15.80
		6	2437	15.80
		11	2463	15.70
802.11n20	0MCS	1	2412	15.70
		6	2437	15.80
		11	2463	15.60
802.11n40	0MCS	3	2422	15.60
		6	2437	15.70
		9	2452	15.50

Bluetooth Conducted Output Power

Mode	Data Rate	Channel	Freq. (MHz)	Average Power (dBm)
BT	GFSK	0	2402	8.30
		39	2441	8.50
		78	2480	8.40
BT	Pi/4-DQPSK	0	2402	8.20
		39	2441	8.30
		78	2480	8.30
BT	8DPSK	0	2402	8.30
		39	2441	8.20
		78	2480	8.10

7 Radiated Emissions

7.1 Method

Tests are performed in accordance with ANSI C63.10: 2013

TEST SITE: 10m ALSE

Site Designation: 10m Chamber

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	3.9dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	4.0dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.7dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	4.7dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	4.7dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	4.7dB	5.5 dB

As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required.

7.2 Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CF - AG

Where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 52.0 dBµV
AF = 7.4 dB/m
CF = 1.6 dB
AG = 29.0 dB
FS = 32 dBµV/m

To convert from dBµV to µV or mV the following was used:

$UF = 10^{(NF / 20)}$ where UF = Net Reading in µV
NF = Net Reading in dBµV

Example:

FS = RA + AF + CF – AG = 52.0 + 7.4 + 1.6 – 29.0 = 32.0
$UF = 10^{(32\ dB\mu V / 20)}$ = 39.8 µV/m

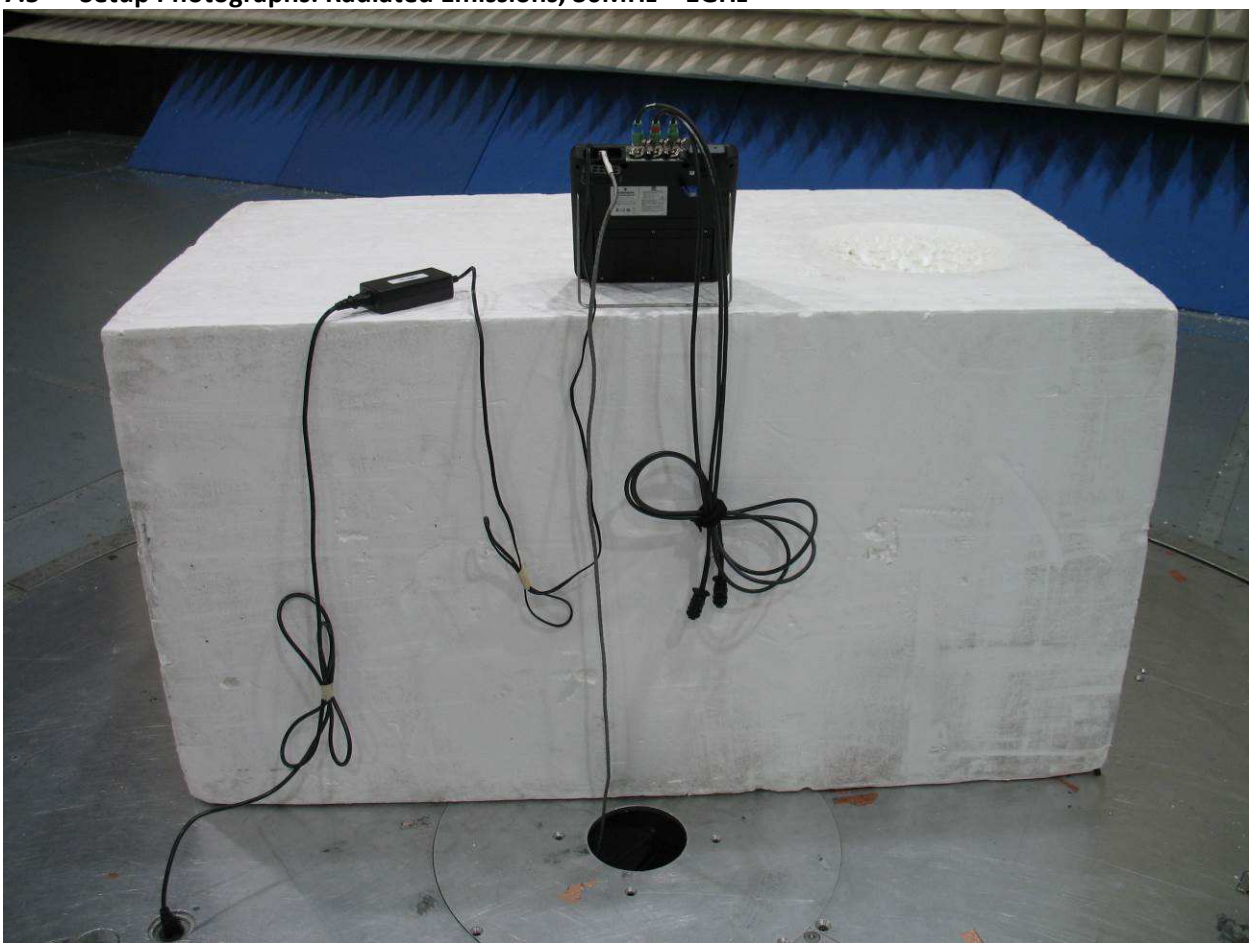
7.3 Test Equipment Used:

Description	Asset	Manufacturer	Model	Cal Date	Cal Due
EMI Test Receiver	3900	Rohde&Schwarz	ESU40	9/20/2017	9/20/2018
Bilog Antenna	3133	ETS Lindgren	3142C	4/6/2017	4/6/2018
Horn Antenna	3780	ETS Lindgren	3117	6/1/2017	6/1/2018
Horn Antenna (18 - 40GHz)	117798	ETS	3116c	6/5/2017	6/5/2018
40GHz Preamplifier	3921	Rohde & Schwarz	TS-PR40	11/29/2017	11/29/2018
System Controller	4096	ETS Lindgren	2090	Verify at Time of Use	Verify at Time of Use
System Controller	3957	Sunol Sciences	SC99V	Verify at Time of Use	Verify at Time of Use
3m Cable Antenna→Preamp	3074			11/29/2017	11/29/2018
3m Cable Preamplifier	3918	TS-PR18	122005	11/29/2017	11/29/2018
3m Cable Preamp→Chamber	2588			11/29/2017	11/29/2018
3m Cable Chamber→Control Room	2593			11/29/2017	11/29/2018
3m Cable Control Room→Receiver	2592			11/29/2017	11/29/2018
10m Cable Antenna→Preamp	3339			11/29/2017	11/29/2018
10m Cable Preamplifier	7019	ZX60-3018G-S+	SUU63801252	11/29/2017	11/29/2018
10m Cable Preamp→Chamber	3172			11/29/2017	11/29/2018
10m Cable Chamber→Control Room	2590			11/29/2017	11/29/2018
10m Cable Control Room→Receiver	2589			11/29/2017	11/29/2018

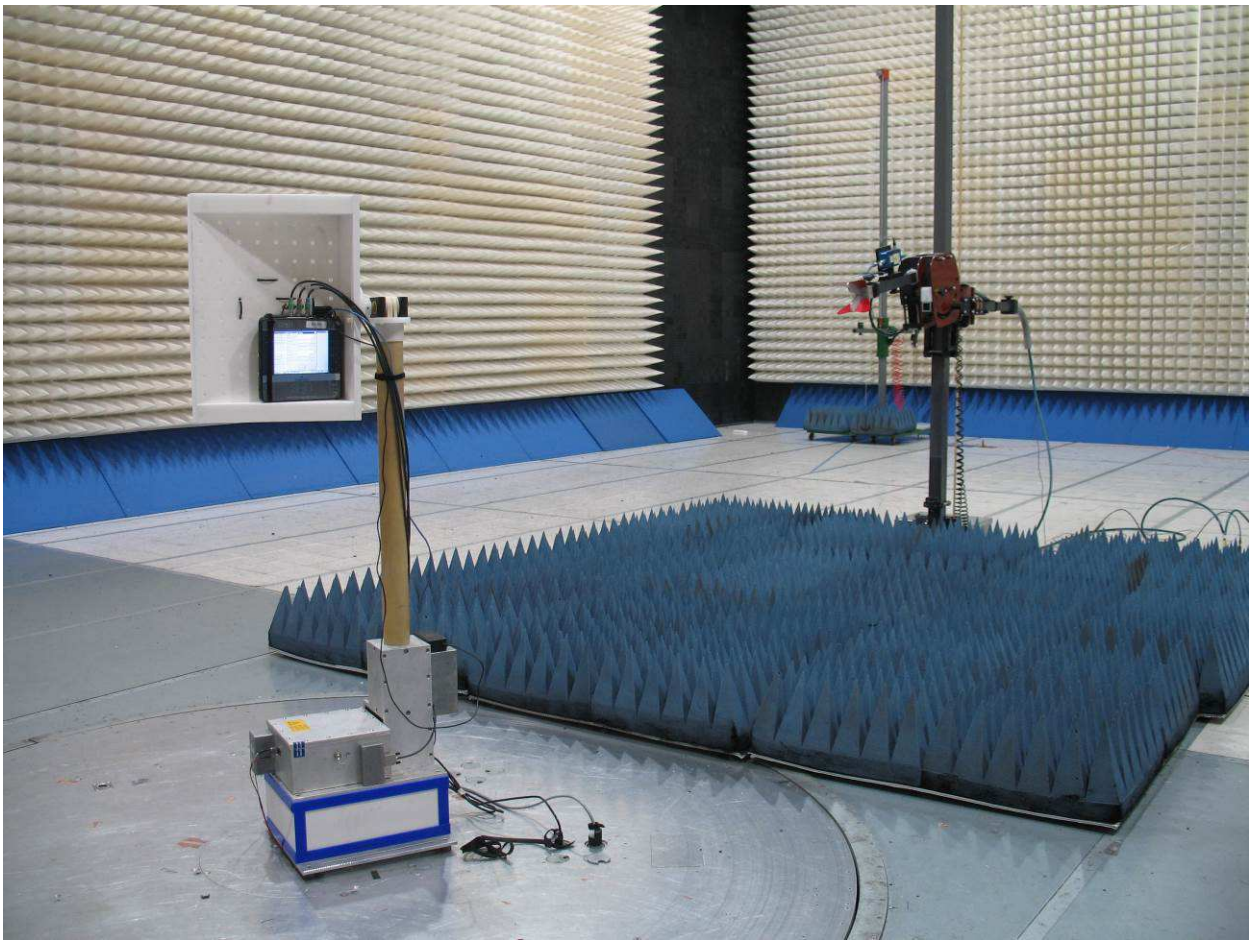
7.4 Software Utilized:

Name	Manufacturer	Version
EMC32	Rohde & Schwarz	Version 9.15.02

7.5 Setup Photographs: Radiated Emissions, 30MHz – 1GHz



7.6 Setup Photographs: Radiated Emissions, 1GHz – 18GHz



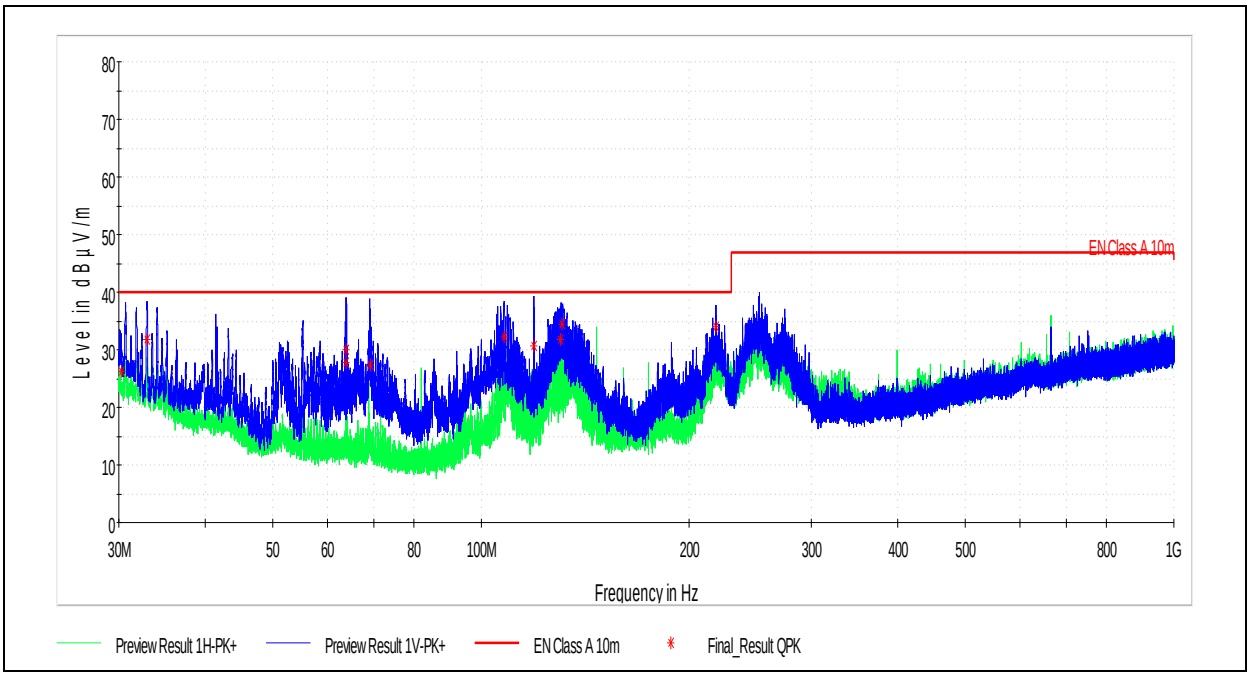
*For emission measurements above 1GHz the test sample was mounted to a multi-axis positioner with a height of 1.5m above the ground plane. This multi-axis positioner allowed for maximizing the test sample across three orthogonal planes during the measurement process.

7.7 Results:

The sample tested was found to Comply.

Test Personnel:	Bryan Taylor	Test Date:	12/28/2017 – 1/5/2018
Supervising/Reviewing Engineer: (Where Applicable)	NA	Limit Applied:	FCC Part 15.209
Product Standard:	FCC Part 15C, RSS-247	Ambient Temperature:	22.4 °C
Input Voltage:	15VDC	Relative Humidity:	32.6 %
Pretest Verification w / Ambient Signals or BB Source:	Yes	Atmospheric Pressure:	989.5 mbar

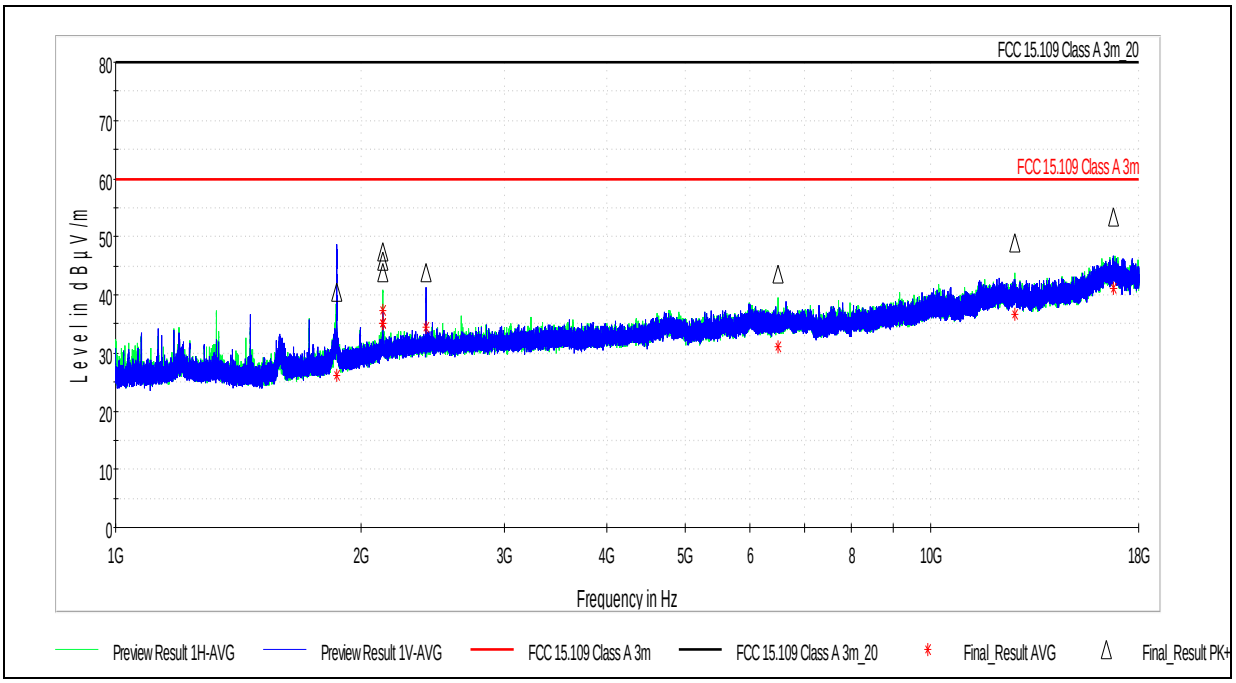
7.8 Plots/Data: Radiated Emissions (802.11b, Below 1GHz)



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
30.294000	26.31	40.00	13.69	120.000	105.3	V	280.0	1.0
32.950800	31.68	40.00	8.32	120.000	105.6	V	0.0	-0.4
63.832100	30.01	40.00	9.99	120.000	171.5	V	109.0	-8.4
63.889400	27.68	40.00	12.32	120.000	193.4	V	0.0	-8.4
69.185700	27.27	40.00	12.73	120.000	191.9	V	202.0	-8.8
107.971900	32.19	40.00	7.81	120.000	128.9	V	92.0	-7.9
119.191000	30.69	40.00	9.31	120.000	110.2	V	195.0	-8.5
130.189100	31.85	40.00	8.15	120.000	101.7	V	264.0	-8.5
130.718900	34.39	40.00	5.61	120.000	117.3	V	307.0	-8.4
218.281700	34.08	40.00	5.92	120.000	101.0	V	184.0	-3.4

7.9 Plots/Data: Radiated Emissions (Idle Mode, 1GHz – 18GHz)



Final_Result_PK+

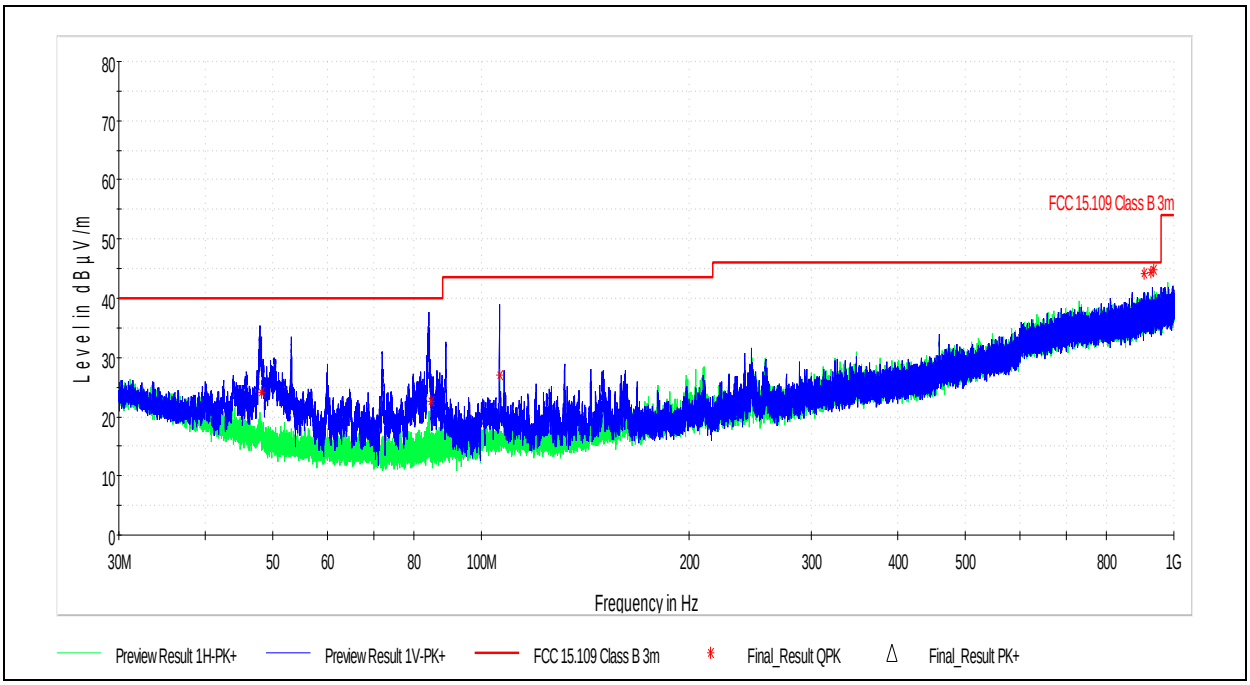
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1868.754000	40.37	80.00	39.63	1000.000	188.0	V	50.0	0.9
2127.640500	45.88	80.00	34.12	1000.000	158.0	H	8.0	2.8
2128.117500	43.89	80.00	36.11	1000.000	149.0	V	-10.0	2.8
2128.164000	47.36	80.00	32.64	1000.000	175.0	H	0.0	2.8
2403.327000	43.83	80.00	36.17	1000.000	163.0	V	24.0	3.9
6500.995500	43.67	80.00	36.33	1000.000	162.0	H	50.0	10.4
12681.487000	49.05	80.00	30.95	1000.000	136.0	V	50.0	16.8
16778.627500	53.37	80.00	26.63	1000.000	134.0	V	20.0	21.8

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1868.754000	26.07	60.00	33.93	1000.000	188.0	V	50.0	0.9
2127.640500	35.07	60.00	24.93	1000.000	158.0	H	8.0	2.8
2128.117500	35.14	60.00	24.86	1000.000	149.0	V	-10.0	2.8
2128.164000	37.25	60.00	22.75	1000.000	175.0	H	0.0	2.8
2403.327000	34.39	60.00	25.61	1000.000	163.0	V	24.0	3.9
6500.995500	30.96	60.00	29.04	1000.000	162.0	H	50.0	10.4
12681.487000	36.54	60.00	23.46	1000.000	136.0	V	50.0	16.8
16778.627500	41.03	60.00	18.97	1000.000	134.0	V	20.0	21.8

7.10 Plots/Data: Radiated Emissions (802.11b, Below 1GHz)

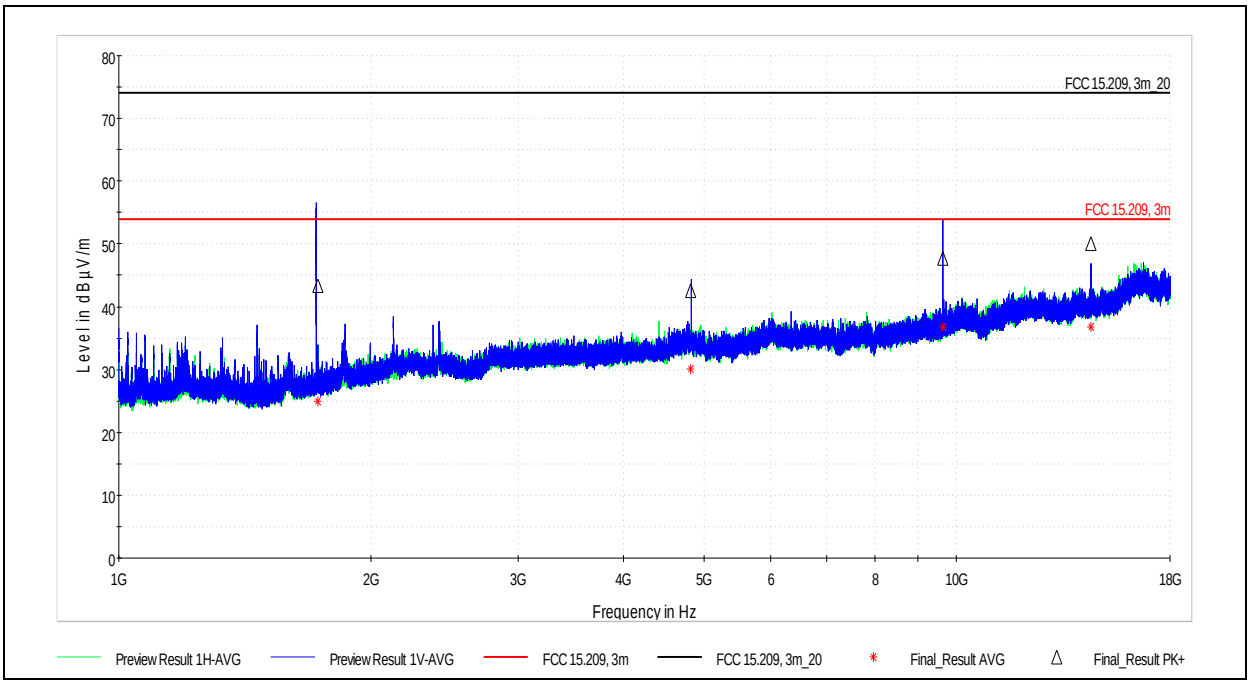
(Worst case is shown and is representative of all channels)



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
48.204000	24.03	40.00	15.97	120.000	104.7	V	313.0	17.0
84.718000	22.66	40.00	17.34	120.000	145.2	V	0.0	16.2
106.460000	27.09	43.52	16.43	120.000	105.3	V	0.0	16.8
905.280000	44.18	46.02	1.84	120.000	263.4	V	202.0	35.8
925.960000	44.50	46.02	1.52	120.000	202.4	V	54.0	36.0
936.660000	44.83	46.02	1.19	120.000	335.1	H	314.0	36.1

7.11 Plots/Data: Radiated Emissions (802.11b, Channel 1)



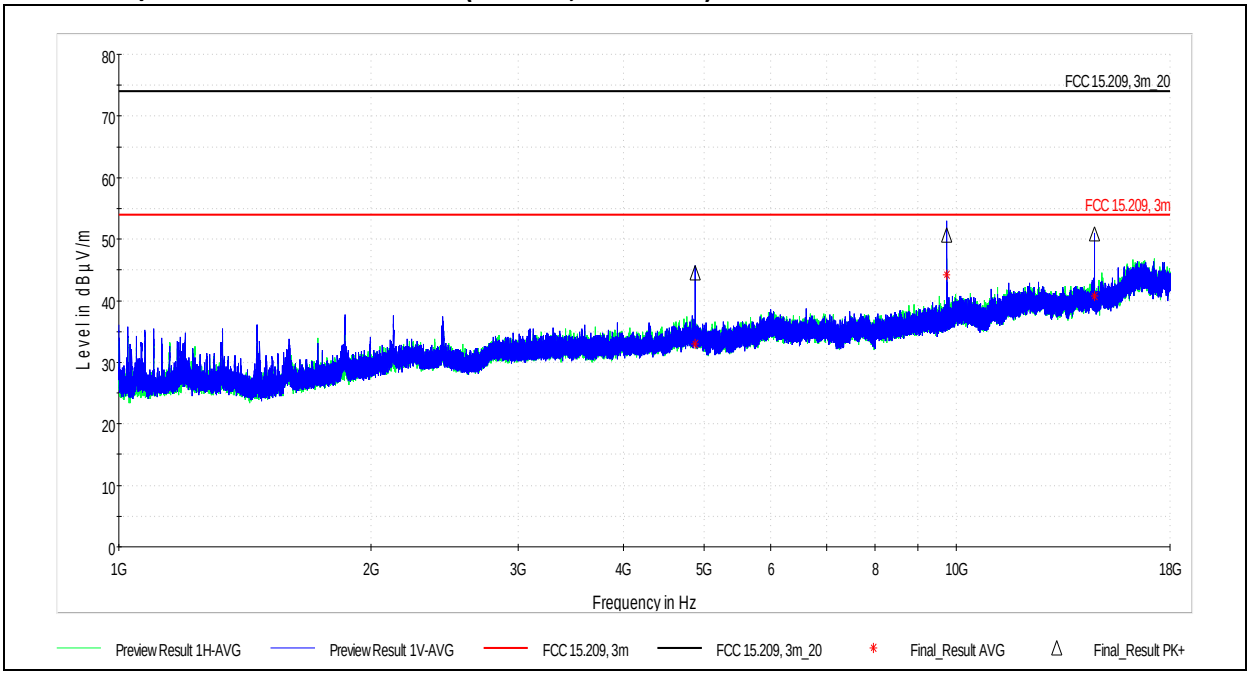
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1728.868500	43.38	74.00	30.62	1000.000	139.0	V	50.0	-0.1
4817.212500	42.65	74.00	31.35	1000.000	147.0	H	19.0	7.7
9648.052000	47.72	74.00	26.28	1000.000	200.0	H	37.0	13.5
14468.295500	50.10	74.00	23.90	1000.000	156.0	H	50.0	17.3

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
1728.868500	24.99	54.00	29.01	1000.000	139.0	V	50.0	-0.1
4817.212500	30.15	54.00	23.85	1000.000	147.0	H	19.0	7.7
9648.052000	36.88	54.00	17.12	1000.000	200.0	H	37.0	13.5
14468.295500	36.84	54.00	17.16	1000.000	156.0	H	50.0	17.3

7.12 Plots/Data: Radiated Emissions (802.11b, Channel 6)



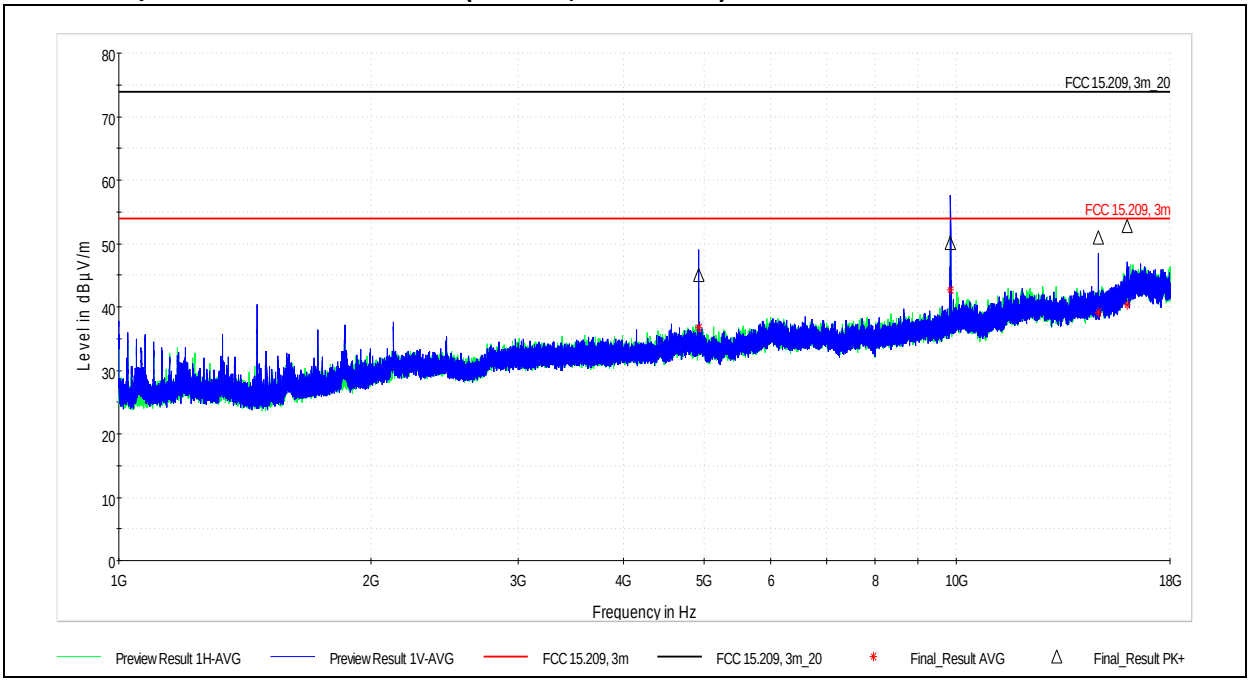
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4873.836000	44.58	74.00	29.42	1000.000	200.0	H	50.0	7.4
9748.035000	50.75	74.00	23.25	1000.000	200.0	H	50.0	13.7
14621.576000	50.82	74.00	23.18	1000.000	200.0	H	38.0	17.4

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4873.836000	32.96	54.00	21.04	1000.000	200.0	H	50.0	7.4
9748.035000	44.25	54.00	9.75	1000.000	200.0	H	50.0	13.7
14621.576000	40.71	54.00	13.29	1000.000	200.0	H	38.0	17.4

7.13 Plots/Data: Radiated Emissions (802.11b, Channel 11)



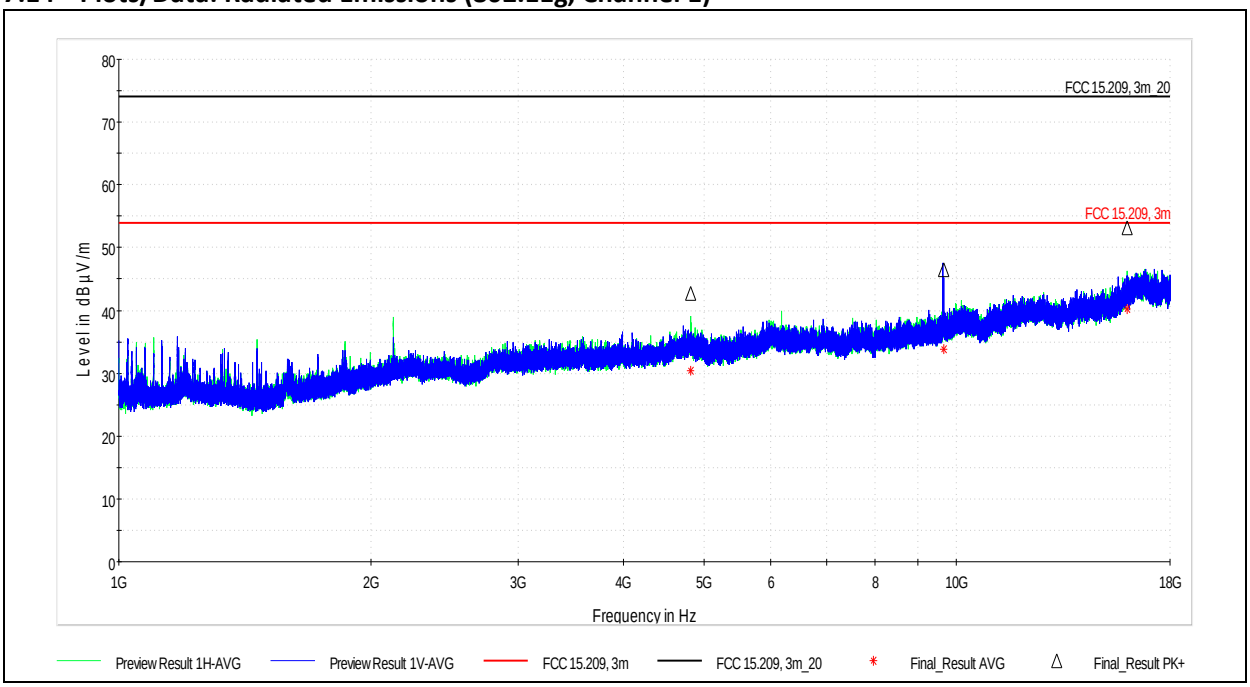
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4923.991500	45.06	74.00	28.94	1000.000	200.0	H	36.0	7.4
9847.925000	50.01	74.00	23.99	1000.000	172.0	H	50.0	13.9
14771.450000	51.01	74.00	22.99	1000.000	177.0	H	38.0	17.8
16002.326500	52.71	74.00	21.29	1000.000	200.0	H	37.0	21.5

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4923.991500	36.71	54.00	17.29	1000.000	200.0	H	36.0	7.4
9847.925000	42.68	54.00	11.32	1000.000	172.0	H	50.0	13.9
14771.450000	39.13	54.00	14.87	1000.000	177.0	H	38.0	17.8
16002.326500	40.24	54.00	13.76	1000.000	200.0	H	37.0	21.5

7.14 Plots/Data: Radiated Emissions (802.11g, Channel 1)



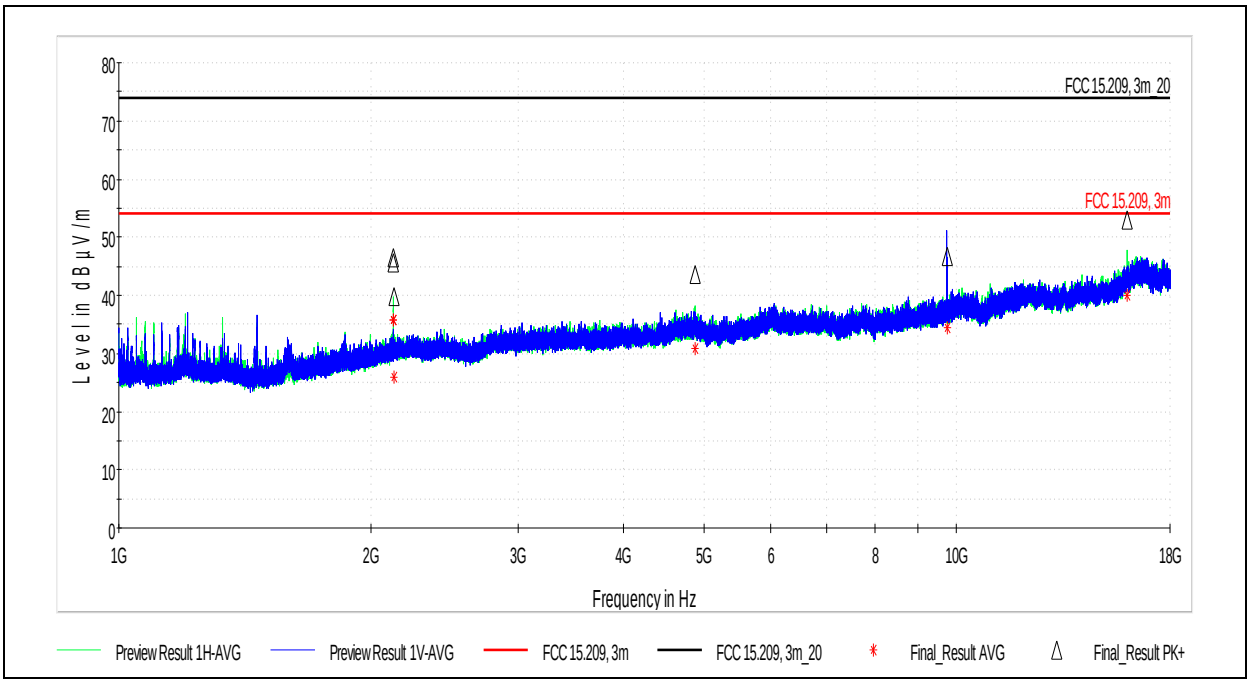
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4819.270500	42.74	74.00	31.26	1000.000	170.0	H	50.0	7.7
9653.376000	46.46	74.00	27.54	1000.000	168.0	H	39.0	13.5
16005.419500	53.21	74.00	20.79	1000.000	200.0	V	50.0	21.5

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4819.270500	30.46	54.00	23.54	1000.000	170.0	H	50.0	7.7
9653.376000	33.87	54.00	20.13	1000.000	168.0	H	39.0	13.5
16005.419500	40.21	54.00	13.79	1000.000	200.0	V	50.0	21.5

7.15 Plots/Data: Radiated Emissions (802.11g, Channel 6)



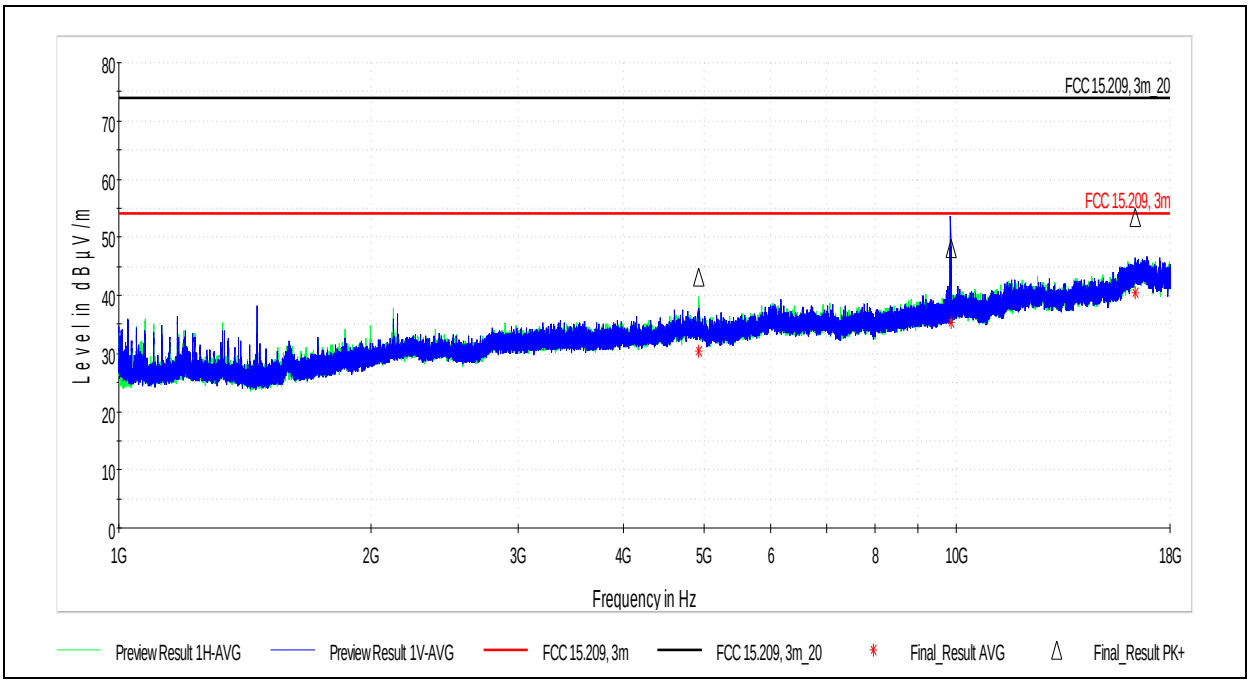
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2128.176500	45.66	74.00	28.34	1000.000	200.0	H	39.0	2.8
2128.380500	46.58	74.00	27.42	1000.000	228.0	H	33.0	2.8
2129.571500	39.88	74.00	34.12	1000.000	146.0	V	50.0	2.8
4877.361500	43.66	74.00	30.34	1000.000	135.0	V	50.0	7.4
9754.449000	46.78	74.00	27.22	1000.000	153.0	V	50.0	13.7
16001.169500	52.92	74.00	21.08	1000.000	143.0	H	28.0	21.4

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2128.176500	35.76	54.00	18.24	1000.000	200.0	H	39.0	2.8
2128.380500	35.79	54.00	18.21	1000.000	228.0	H	33.0	2.8
2129.571500	25.99	54.00	28.01	1000.000	146.0	V	50.0	2.8
4877.361500	30.89	54.00	23.11	1000.000	135.0	V	50.0	7.4
9754.449000	34.39	54.00	19.61	1000.000	153.0	V	50.0	13.7
16001.169500	40.04	54.00	13.96	1000.000	143.0	H	28.0	21.4

7.16 Plots/Data: Radiated Emissions (802.11g, Channel 11)



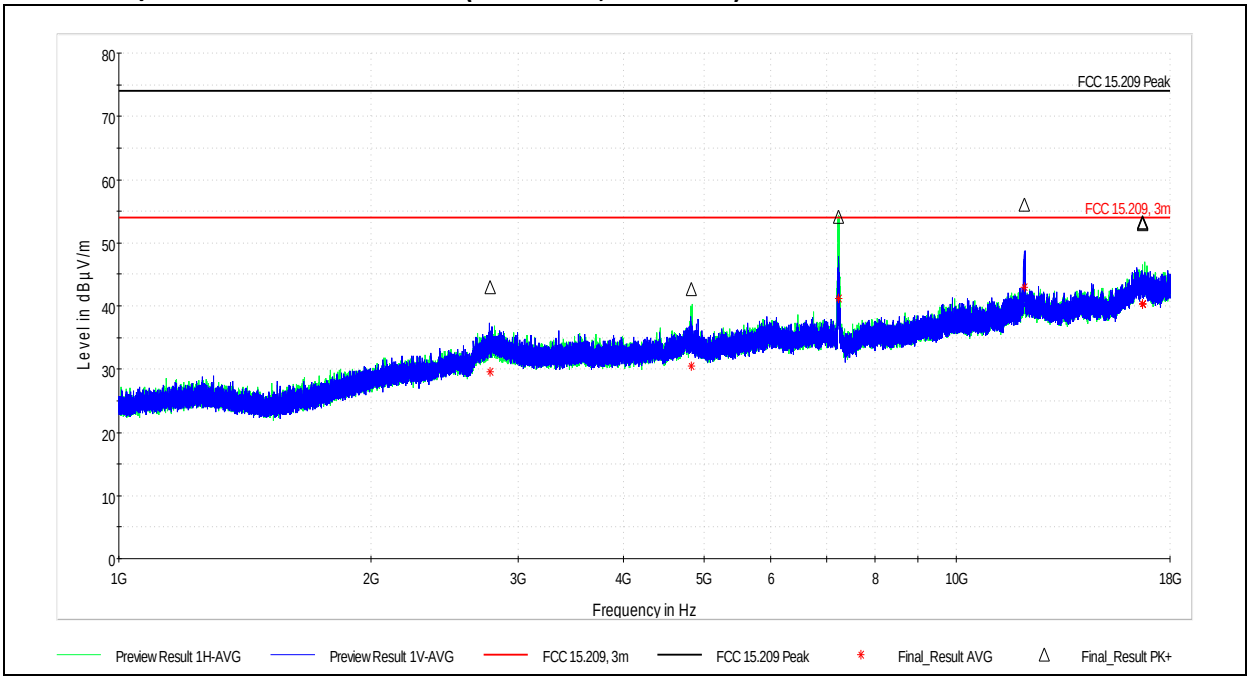
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4923.919500	43.15	74.00	30.85	1000.000	200.0	V	50.0	7.4
9849.572000	48.04	74.00	25.96	1000.000	135.0	V	50.0	13.9
16370.215500	53.32	74.00	20.68	1000.000	200.0	V	22.0	21.1

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4923.919500	30.34	54.00	23.66	1000.000	200.0	V	50.0	7.4
9849.572000	35.40	54.00	18.60	1000.000	135.0	V	50.0	13.9
16370.215500	40.48	54.00	13.52	1000.000	200.0	V	22.0	21.1

7.17 Plots/Data: Radiated Emissions (802.11n20, Channel 1)



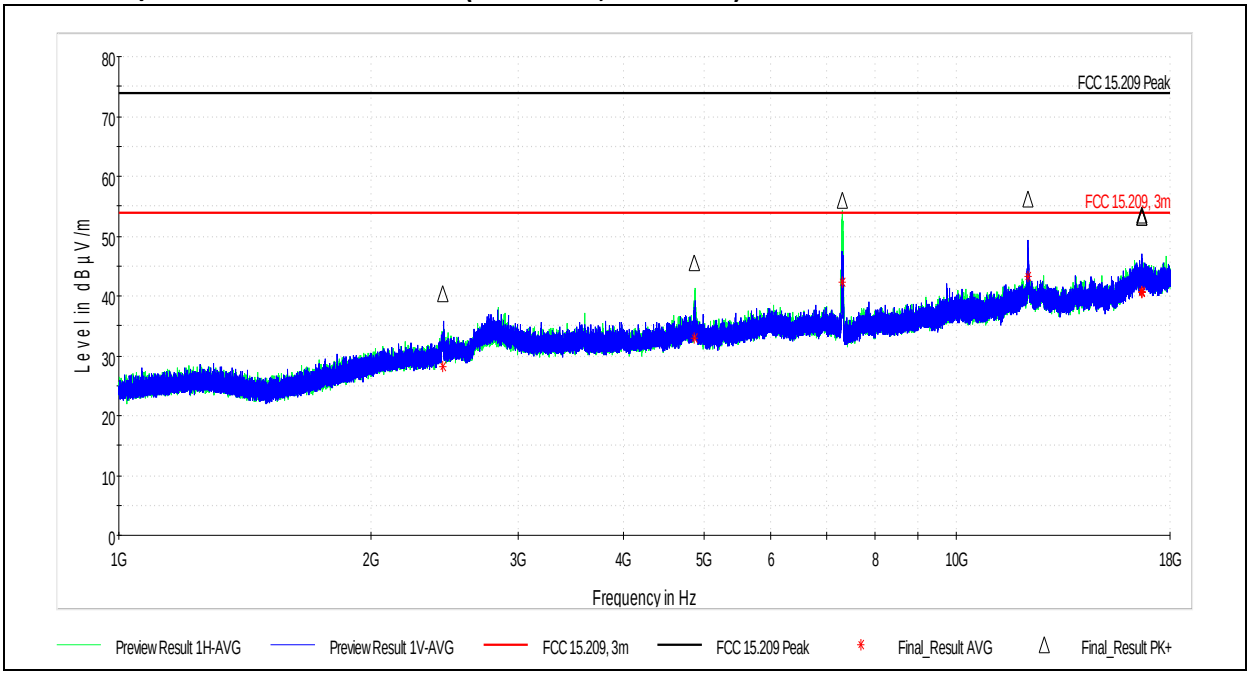
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2776.939000	42.92	74.00	31.08	1000.000	100.0	V	50.0	4.2
4827.284500	42.72	74.00	31.28	1000.000	133.0	H	34.0	7.4
7242.121500	54.17	74.00	19.83	1000.000	200.0	V	39.0	10.4
12062.948500	56.00	74.00	18.00	1000.000	200.0	V	28.0	17.3
16692.031500	53.15	74.00	20.85	1000.000	154.0	H	34.0	21.5
16698.432000	52.91	74.00	21.09	1000.000	200.0	V	38.0	21.4
16698.957000	53.19	74.00	20.81	1000.000	156.0	H	180.0	21.4

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2776.939000	29.53	54.00	24.47	1000.000	100.0	V	50.0	4.2
4827.284500	30.47	54.00	23.53	1000.000	133.0	H	34.0	7.4
7242.121500	41.24	54.00	12.76	1000.000	200.0	V	39.0	10.4
12062.948500	42.98	54.00	11.02	1000.000	200.0	V	28.0	17.3
16692.031500	40.28	54.00	13.72	1000.000	154.0	H	34.0	21.5
16698.432000	40.27	54.00	13.73	1000.000	200.0	V	38.0	21.4
16698.957000	40.27	54.00	13.73	1000.000	156.0	H	180.0	21.4

7.18 Plots/Data: Radiated Emissions (802.11n20, Channel 6)



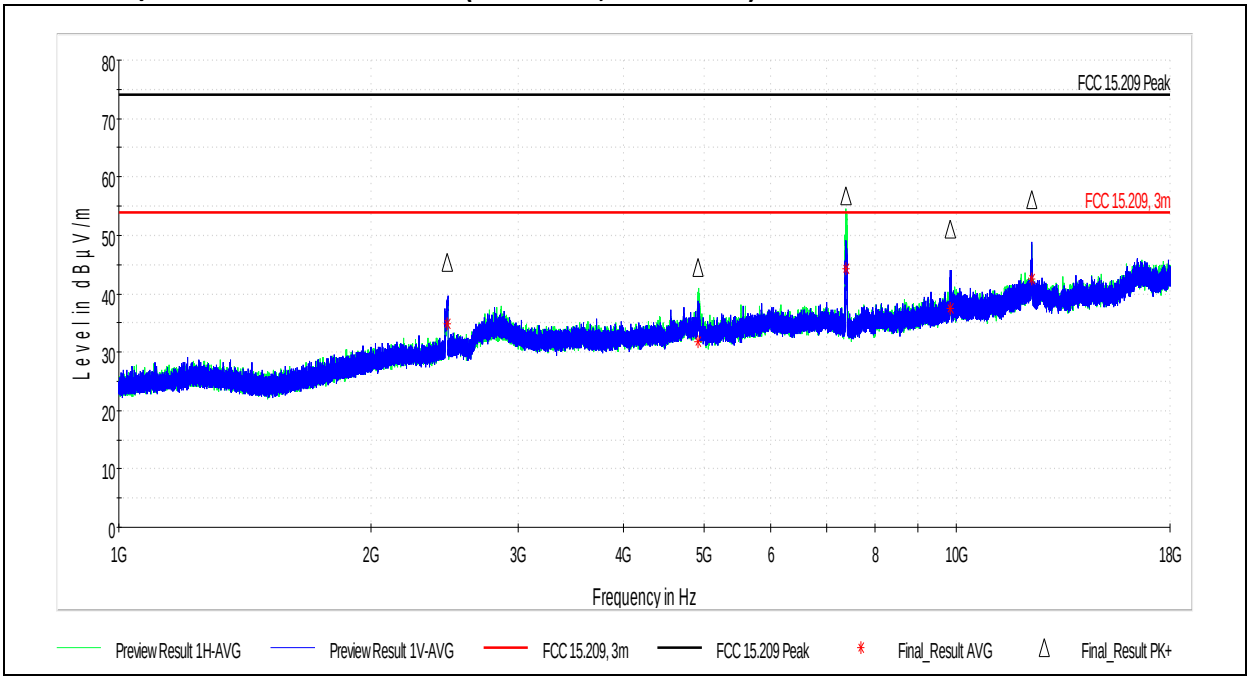
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2438.943500	40.33	74.00	33.67	1000.000	200.0	V	50.0	3.9
4869.271500	45.61	74.00	28.39	1000.000	100.0	H	0.0	7.4
7307.860500	55.95	74.00	18.05	1000.000	188.0	V	50.0	10.5
12189.405000	56.15	74.00	17.85	1000.000	200.0	V	20.0	17.2
16659.974000	53.50	74.00	20.50	1000.000	255.0	V	214.0	21.5
16665.933500	53.23	74.00	20.77	1000.000	170.0	H	38.0	21.5
16667.531000	53.18	74.00	20.82	1000.000	134.0	V	14.0	21.5

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2438.943500	28.19	54.00	25.81	1000.000	200.0	V	50.0	3.9
4869.271500	32.89	54.00	21.11	1000.000	100.0	H	0.0	7.4
7307.860500	42.29	54.00	11.71	1000.000	188.0	V	50.0	10.5
12189.405000	43.19	54.00	10.81	1000.000	200.0	V	20.0	17.2
16659.974000	40.67	54.00	13.33	1000.000	255.0	V	214.0	21.5
16665.933500	40.55	54.00	13.45	1000.000	170.0	H	38.0	21.5
16667.531000	40.57	54.00	13.43	1000.000	134.0	V	14.0	21.5

7.19 Plots/Data: Radiated Emissions (802.11n20, Channel 11)



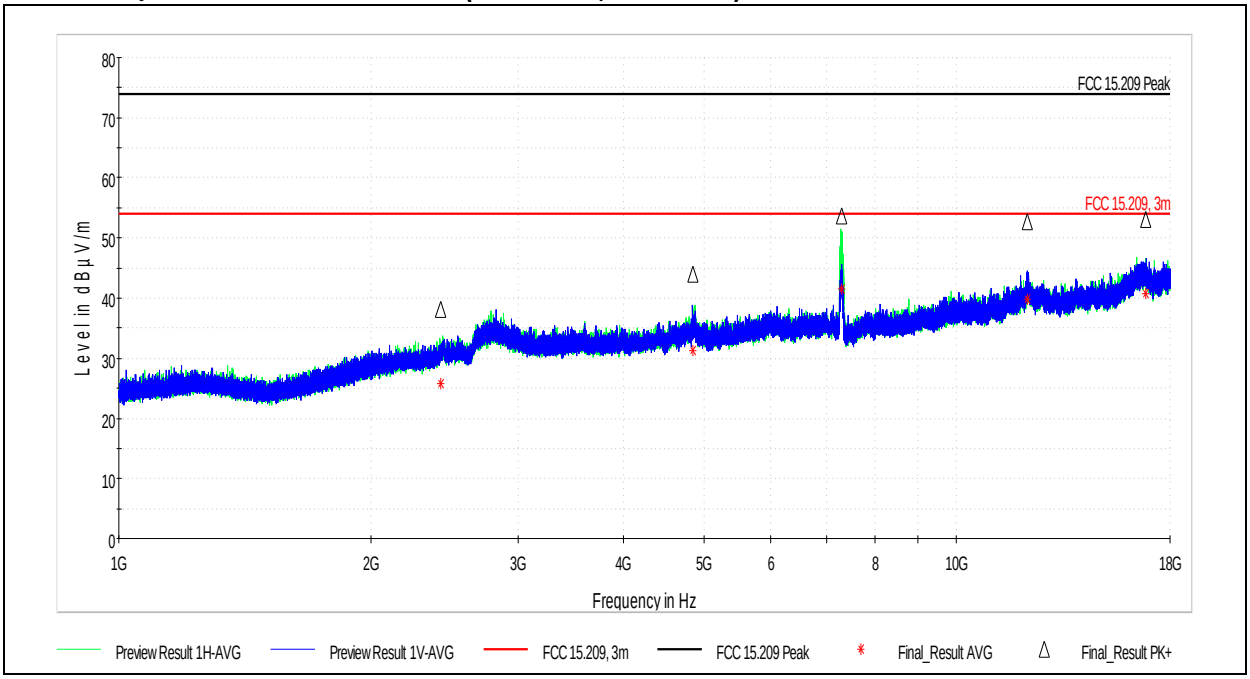
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2469.677500	45.29	74.00	28.71	1000.000	200.0	V	50.0	3.9
4921.175500	44.59	74.00	29.41	1000.000	136.0	H	18.0	7.3
7391.200000	56.67	74.00	17.33	1000.000	200.0	V	50.0	10.7
9840.439500	51.07	74.00	22.93	1000.000	200.0	V	50.0	14.0
12315.064500	56.12	74.00	17.88	1000.000	188.0	V	50.0	17.1

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2469.677500	34.80	54.00	19.20	1000.000	200.0	V	50.0	3.9
4921.175500	31.87	54.00	22.13	1000.000	136.0	H	18.0	7.3
7391.200000	44.27	54.00	9.73	1000.000	200.0	V	50.0	10.7
9840.439500	37.42	54.00	16.58	1000.000	200.0	V	50.0	14.0
12315.064500	42.48	54.00	11.52	1000.000	188.0	V	50.0	17.1

7.20 Plots/Data: Radiated Emissions (802.11n40, Channel 3)



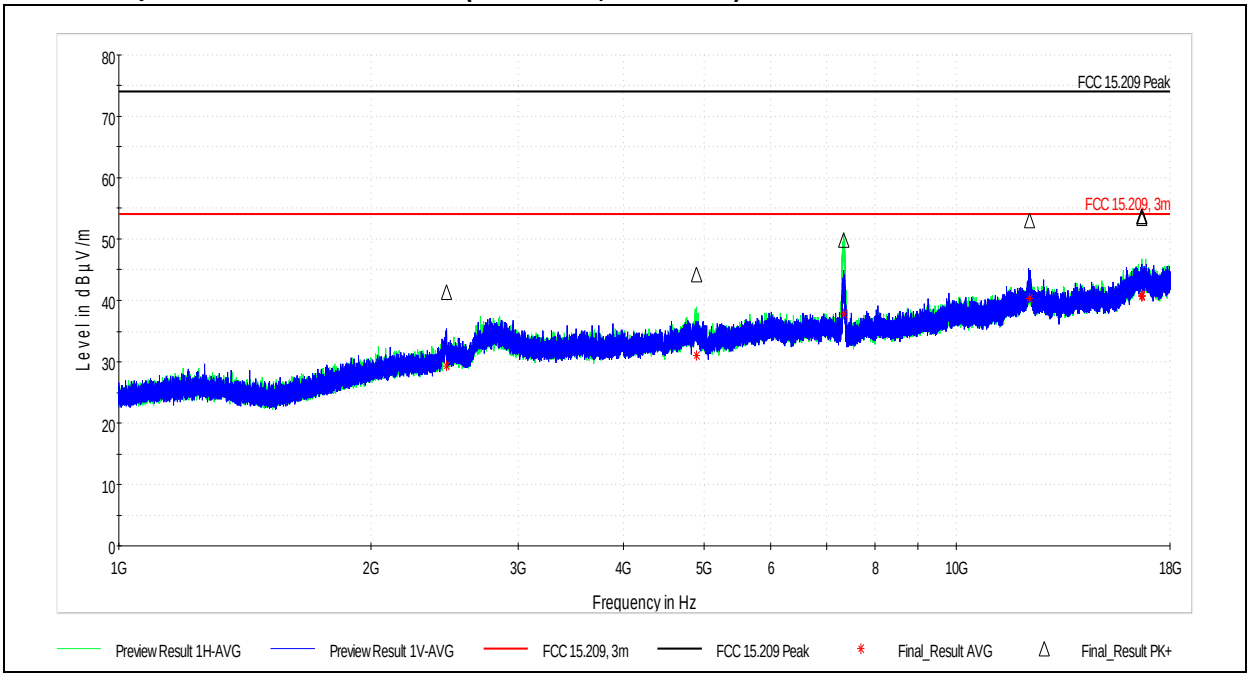
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2422.266000	38.02	74.00	35.98	1000.000	100.0	V	50.0	3.9
4851.114500	44.04	74.00	29.96	1000.000	100.0	H	14.0	7.4
7294.830500	53.64	74.00	20.36	1000.000	200.0	V	50.0	10.4
12159.257500	52.64	74.00	21.36	1000.000	200.0	V	38.0	17.2
16839.115000	53.00	74.00	21.00	1000.000	162.0	H	50.0	21.6

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2422.266000	25.81	54.00	28.19	1000.000	100.0	V	50.0	3.9
4851.114500	31.26	54.00	22.74	1000.000	100.0	H	14.0	7.4
7294.830500	41.56	54.00	12.44	1000.000	200.0	V	50.0	10.4
12159.257500	39.81	54.00	14.19	1000.000	200.0	V	38.0	17.2
16839.115000	40.69	54.00	13.31	1000.000	162.0	H	50.0	21.6

7.21 Plots/Data: Radiated Emissions (802.11n40, Channel 6)



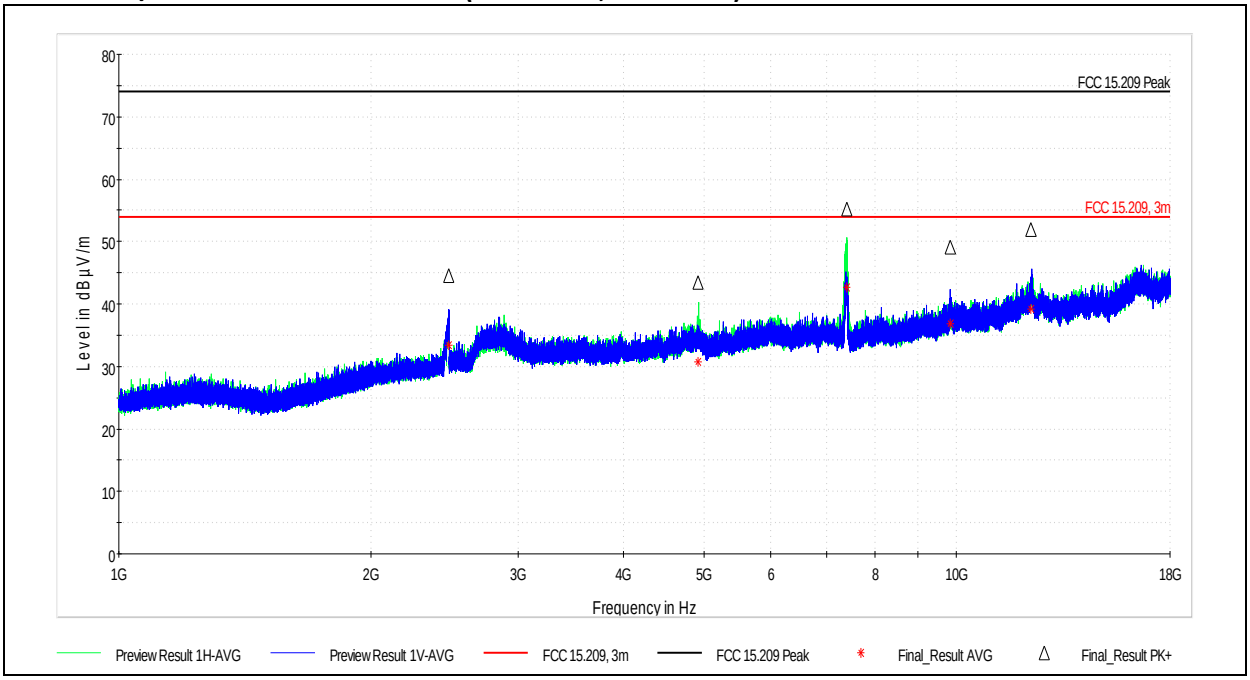
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2461.250500	41.33	74.00	32.67	1000.000	175.0	V	50.0	3.9
4893.720000	44.26	74.00	29.74	1000.000	100.0	H	22.0	7.4
7337.122500	49.81	74.00	24.19	1000.000	200.0	H	50.0	10.5
12240.319500	53.04	74.00	20.96	1000.000	200.0	V	23.0	17.2
16649.778500	53.70	74.00	20.30	1000.000	148.0	H	36.0	21.6
16653.455000	53.65	74.00	20.35	1000.000	171.0	V	50.0	21.5
16654.505000	53.47	74.00	20.53	1000.000	300.0	H	301.0	21.5

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2461.250500	29.36	54.00	24.64	1000.000	175.0	V	50.0	3.9
4893.720000	31.03	54.00	22.97	1000.000	100.0	H	22.0	7.4
7337.122500	37.84	54.00	16.16	1000.000	200.0	H	50.0	10.5
12240.319500	40.38	54.00	13.62	1000.000	200.0	V	23.0	17.2
16649.778500	40.77	54.00	13.23	1000.000	148.0	H	36.0	21.6
16653.455000	40.71	54.00	13.29	1000.000	171.0	V	50.0	21.5
16654.505000	40.74	54.00	13.26	1000.000	300.0	H	301.0	21.5

7.22 Plots/Data: Radiated Emissions (802.11n40, Channel 9)



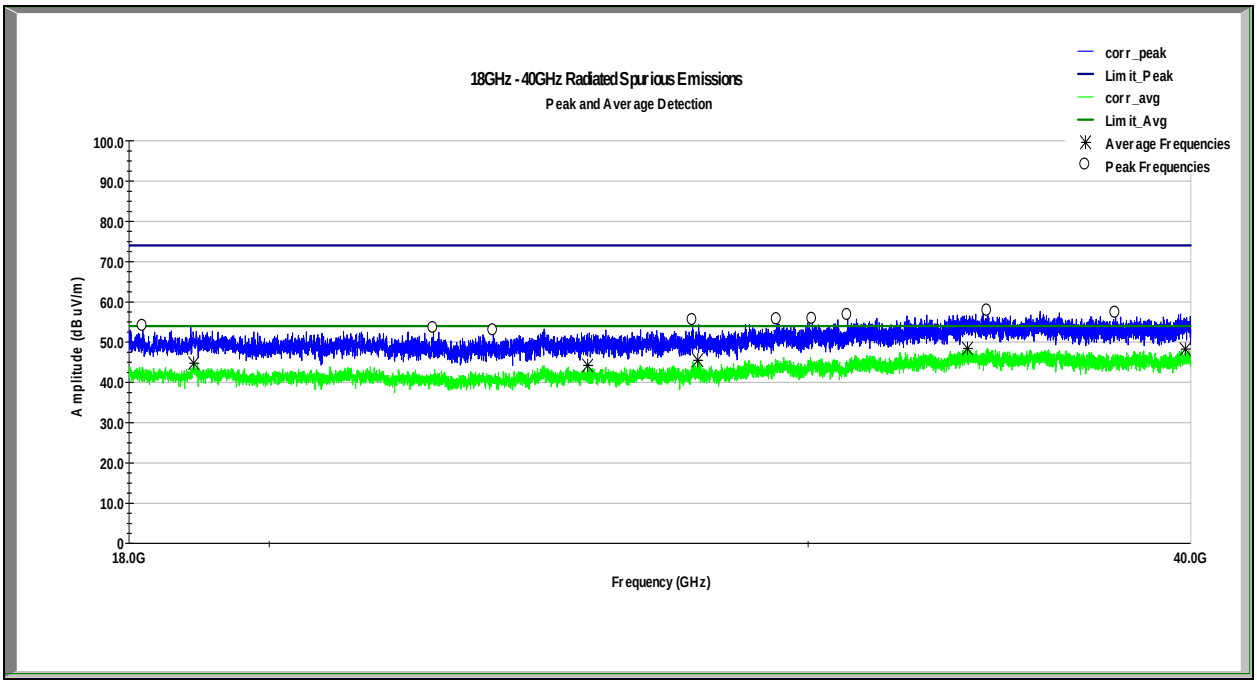
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2478.336000	44.50	74.00	29.50	1000.000	174.0	V	50.0	3.9
4919.743500	43.39	74.00	30.61	1000.000	100.0	H	20.0	7.3
7396.664000	55.25	74.00	18.75	1000.000	200.0	V	38.0	10.7
9841.686500	49.04	74.00	24.96	1000.000	200.0	V	36.0	14.0
12287.482500	51.92	74.00	22.08	1000.000	182.0	V	32.0	17.1

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
2478.336000	33.43	54.00	20.57	1000.000	174.0	V	50.0	3.9
4919.743500	30.77	54.00	23.23	1000.000	100.0	H	20.0	7.3
7396.664000	42.59	54.00	11.41	1000.000	200.0	V	38.0	10.7
9841.686500	36.81	54.00	17.19	1000.000	200.0	V	36.0	14.0
12287.482500	39.21	54.00	14.79	1000.000	182.0	V	32.0	17.1

7.23 Plots/Data: Radiated Emissions (802.11b, 18-40GHz)



Final_Result_PK+

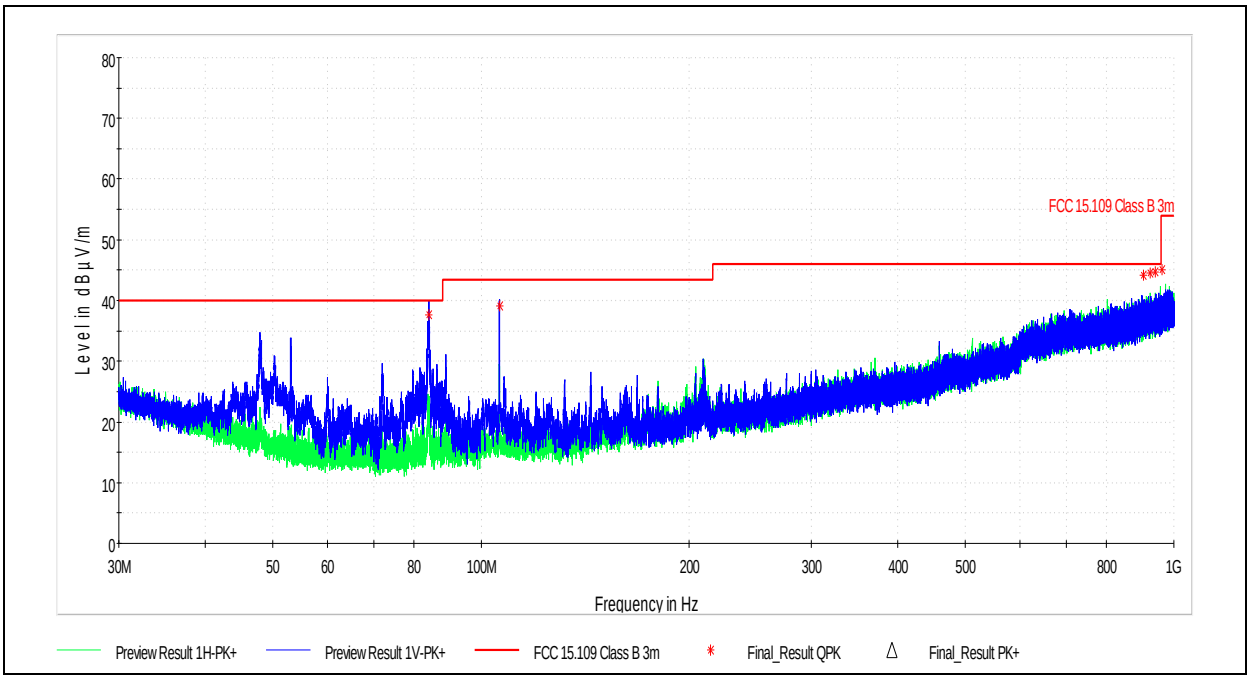
Frequency (GHz)	Peak (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)
18.189 GHz	53.90	74.00	20.10
22.633 GHz	53.43	74.00	20.57
23.676 GHz	52.79	74.00	21.21
27.506 GHz	55.37	74.00	18.63
29.304 GHz	55.54	74.00	18.46
30.096 GHz	55.67	74.00	18.33
30.905 GHz	56.61	74.00	17.39
34.331 GHz	57.68	74.00	16.32
37.804 GHz	57.15	74.00	16.85

Final_Result_AVG

Frequency (GHz)	Average (dBuV/m)	Limit (dBuV/m)	Average Margin (dB)
18.898 GHz	44.75	54.00	29.25
25.414 GHz	44.23	54.00	29.77
27.610 GHz	45.50	54.00	28.50
33.820 GHz	48.42	54.00	25.58
39.837 GHz	48.26	54.00	25.74

7.24 Plots/Data: Radiated Emissions (Bluetooth, GFSK, Below 1GHz)

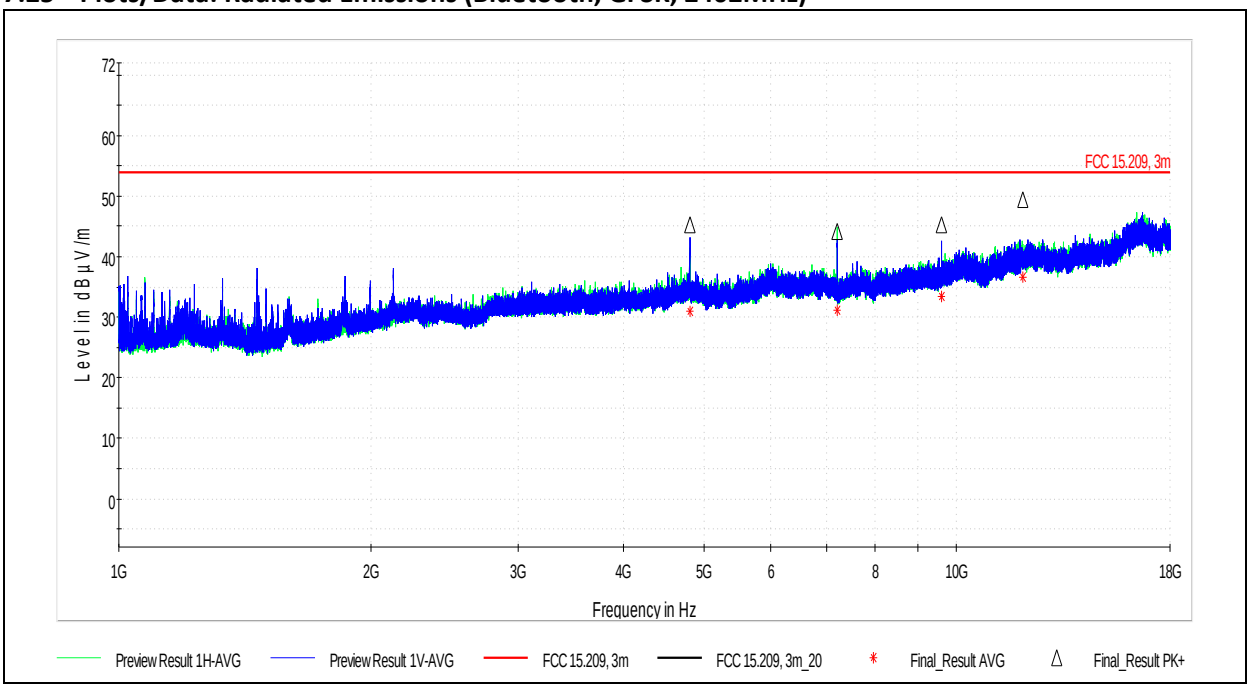
(Worst case is shown and is representative of all channels)



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
83.965000	37.67	40.00	2.33	120.000	104.6	V	7.0	16.1
106.320000	39.08	43.52	4.44	120.000	109.7	V	0.0	16.8
903.460000	44.15	46.02	1.87	120.000	248.3	V	165.0	35.8
924.780000	44.46	46.02	1.56	120.000	329.8	H	218.0	36.0
939.660000	44.76	46.02	1.26	120.000	331.7	H	184.0	36.0
960.920000	45.00	54.00	9.00	120.000	405.0	H	72.0	36.2

7.25 Plots/Data: Radiated Emissions (Bluetooth, GFSK, 2402MHz)



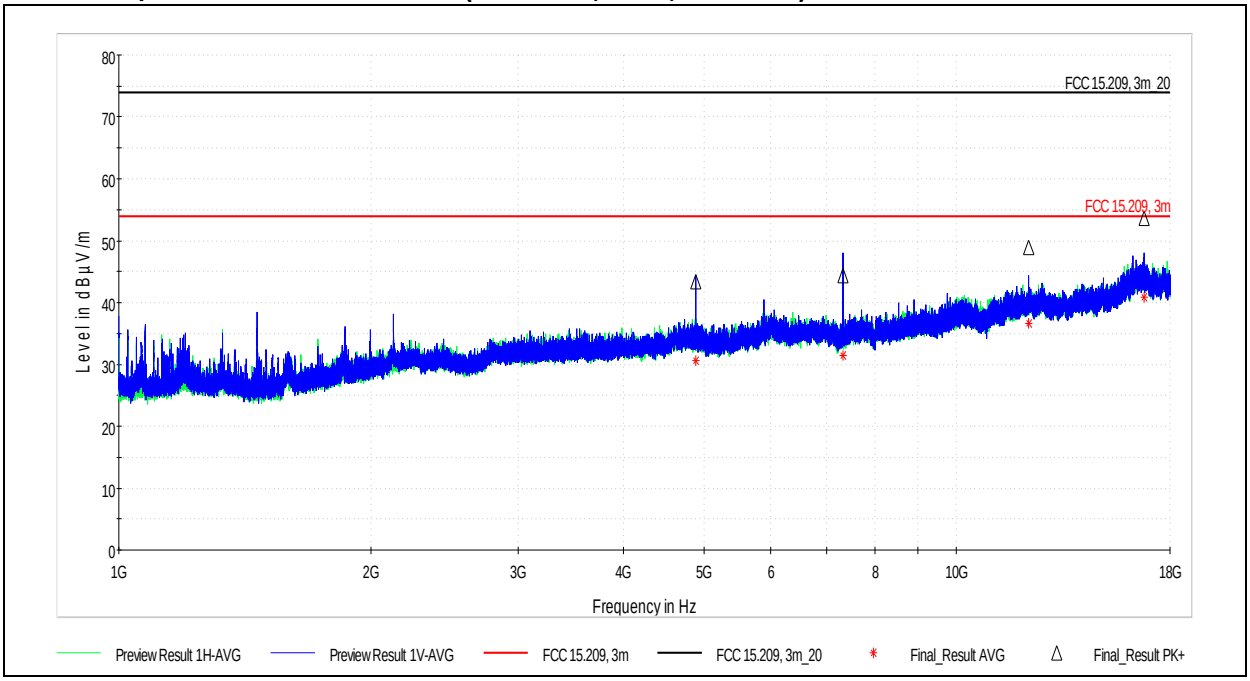
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4803.614000	45.33	74.00	28.67	1000.000	131.0	H	50.0	7.8
7212.531500	44.21	74.00	29.79	1000.000	179.0	H	50.0	10.3
9609.087500	45.29	74.00	28.71	1000.000	175.0	H	50.0	13.5
12003.774000	49.32	74.00	24.68	1000.000	124.0	V	50.0	17.2

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4803.614000	31.05	54.00	22.95	1000.000	131.0	H	50.0	7.8
7212.531500	31.13	54.00	22.87	1000.000	179.0	H	50.0	10.3
9609.087500	33.38	54.00	20.62	1000.000	175.0	H	50.0	13.5
12003.774000	36.60	54.00	17.40	1000.000	124.0	V	50.0	17.2

7.26 Plots/Data: Radiated Emissions (Bluetooth, GFSK, 2442MHz)



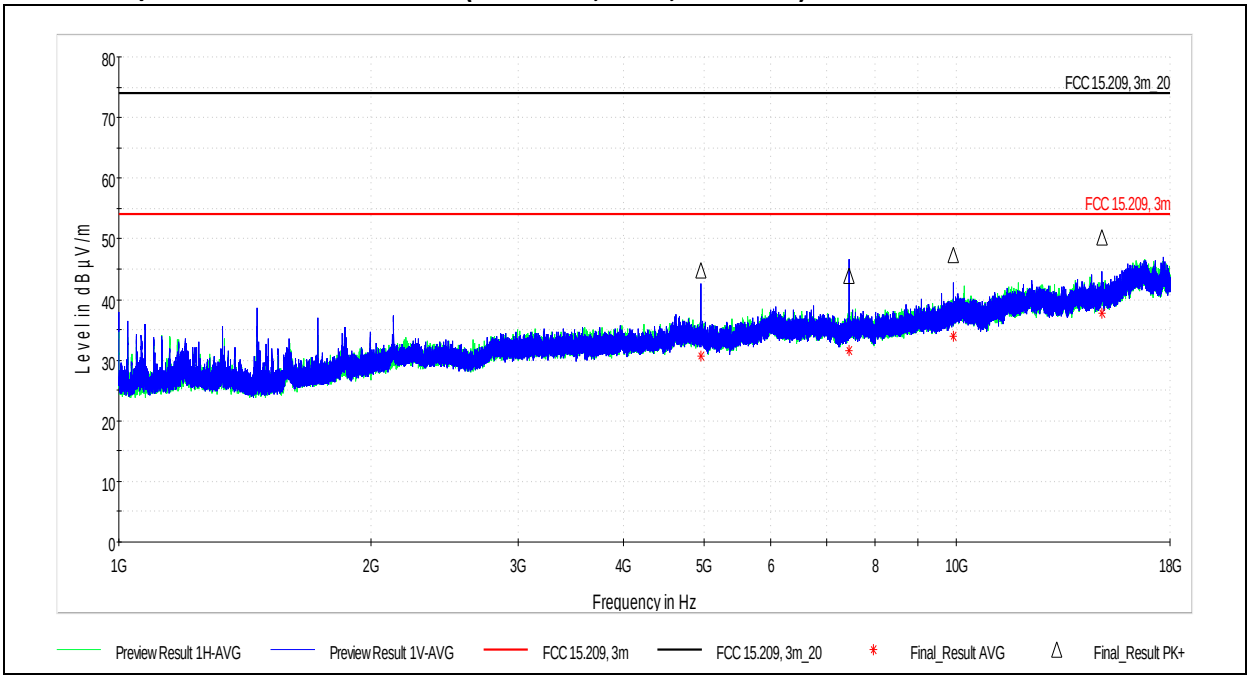
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4883.910500	43.28	74.00	30.72	1000.000	100.0	H	50.0	7.4
7332.527500	44.29	74.00	29.71	1000.000	158.0	V	50.0	10.5
12205.298500	48.93	74.00	25.07	1000.000	175.0	V	24.0	17.0
16748.075000	53.63	74.00	20.37	1000.000	135.0	H	50.0	21.7

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4883.910500	30.54	54.00	23.46	1000.000	100.0	H	50.0	7.4
7332.527500	31.43	54.00	22.57	1000.000	158.0	V	50.0	10.5
12205.298500	36.56	54.00	17.44	1000.000	175.0	V	24.0	17.0
16748.075000	40.91	54.00	13.09	1000.000	135.0	H	50.0	21.7

7.27 Plots/Data: Radiated Emissions (Bluetooth, GFSK, 2480MHz)



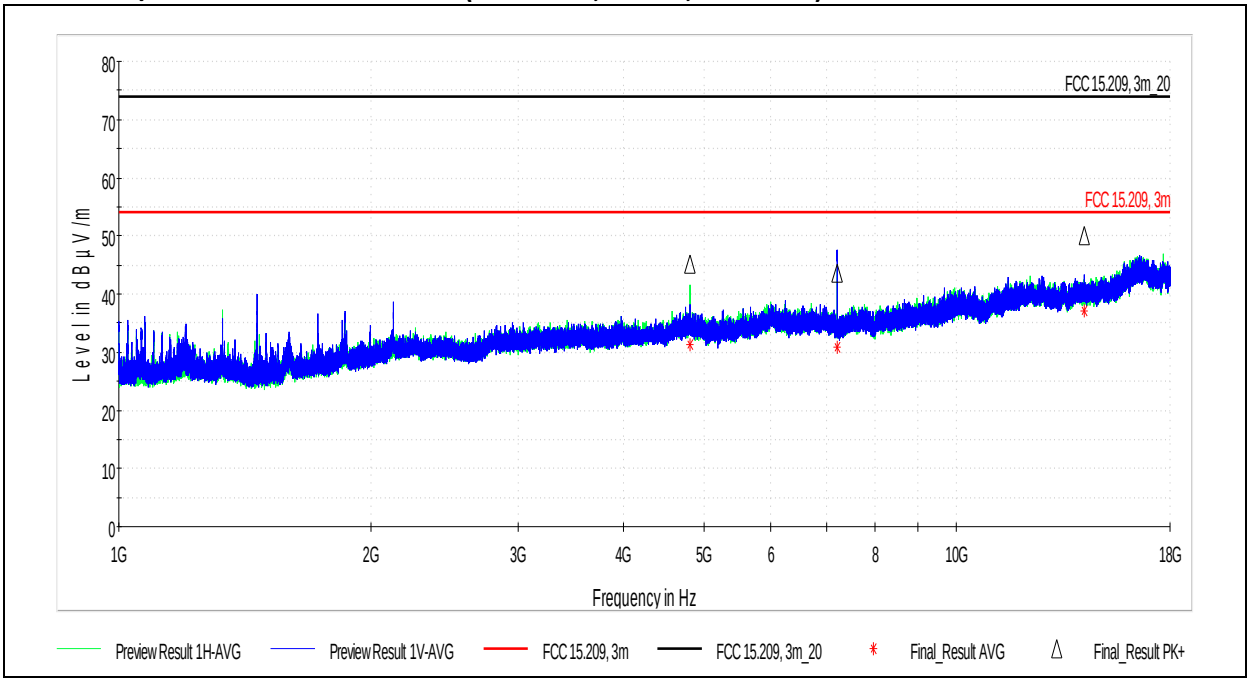
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4959.668000	44.73	74.00	29.27	1000.000	200.0	V	50.0	7.2
7443.998500	43.81	74.00	30.19	1000.000	179.0	H	50.0	10.8
9915.694500	47.43	74.00	26.57	1000.000	200.0	V	39.0	14.0
14930.736000	50.31	74.00	23.69	1000.000	177.0	V	37.0	18.7

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4959.668000	30.59	54.00	23.41	1000.000	200.0	V	50.0	7.2
7443.998500	31.57	54.00	22.43	1000.000	179.0	H	50.0	10.8
9915.694500	33.87	54.00	20.13	1000.000	200.0	V	39.0	14.0
14930.736000	37.72	54.00	16.28	1000.000	177.0	V	37.0	18.7

7.28 Plots/Data: Radiated Emissions (Bluetooth, 8DPSK, 2402MHz)



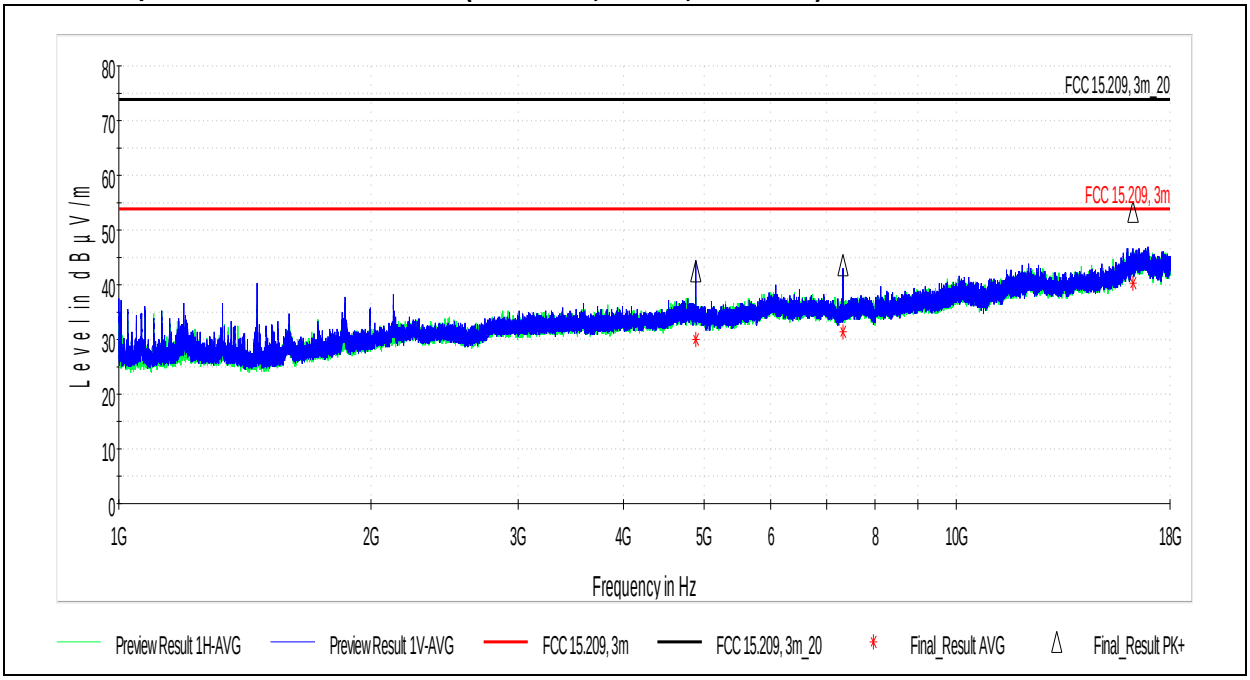
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4804.174000	45.17	74.00	28.83	1000.000	133.0	H	50.0	7.8
7202.287500	43.57	74.00	30.43	1000.000	183.0	H	34.0	10.2
14210.864000	50.02	74.00	23.98	1000.000	181.0	V	50.0	17.6

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4804.174000	31.22	54.00	22.78	1000.000	133.0	H	50.0	7.8
7202.287500	30.79	54.00	23.21	1000.000	183.0	H	34.0	10.2
14210.864000	37.13	54.00	16.87	1000.000	181.0	V	50.0	17.6

7.29 Plots/Data: Radiated Emissions (Bluetooth, 8DPSK, 2442MHz)



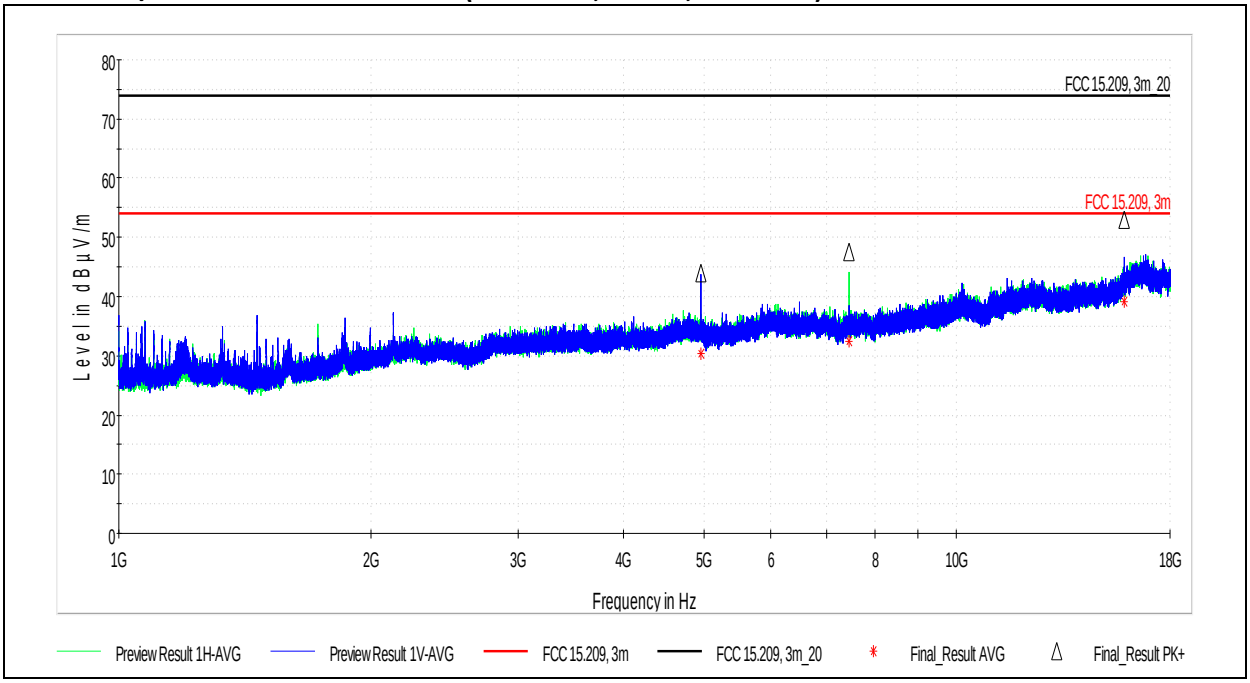
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4884.894000	42.55	74.00	31.45	1000.000	171.0	H	50.0	7.4
7323.202000	43.69	74.00	30.31	1000.000	177.0	H	50.0	10.5
16253.937000	53.36	74.00	20.64	1000.000	200.0	V	29.0	21.2

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4884.894000	30.07	54.00	23.93	1000.000	171.0	H	50.0	7.4
7323.202000	31.37	54.00	22.63	1000.000	177.0	H	50.0	10.5
16253.937000	40.20	54.00	13.80	1000.000	200.0	V	29.0	21.2

7.30 Plots/Data: Radiated Emissions (Bluetooth, 8DPSK, 2480MHz)



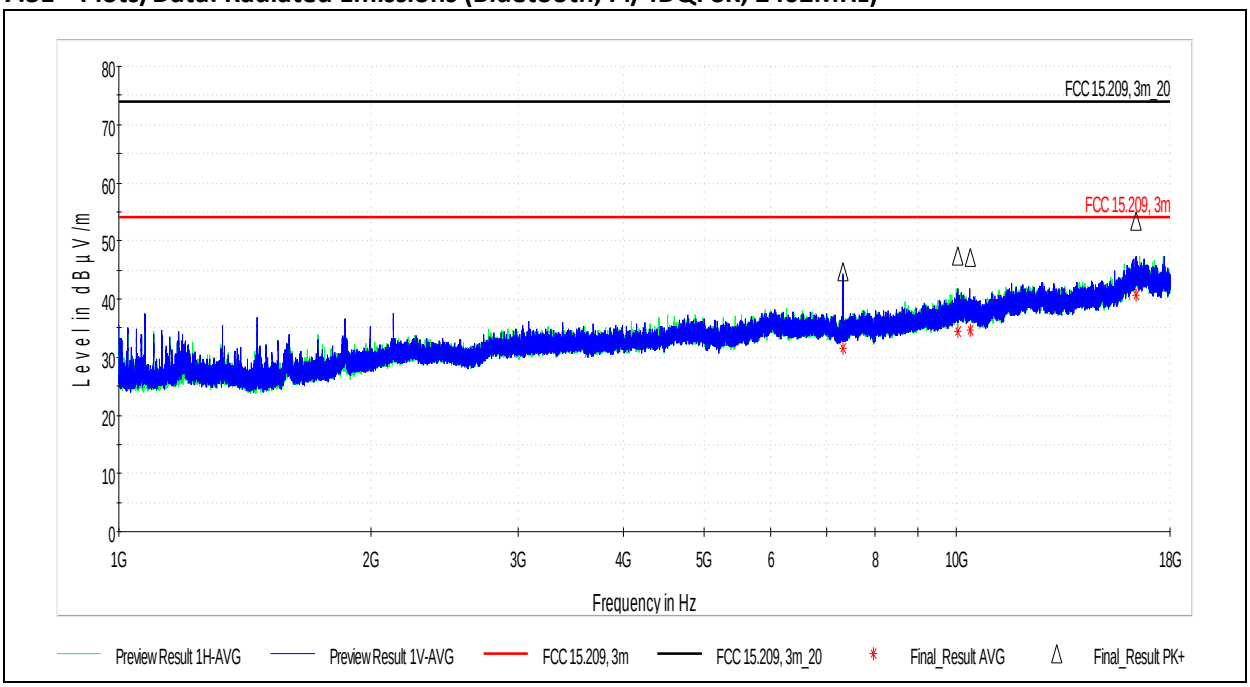
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4960.401000	43.92	74.00	30.08	1000.000	173.0	V	24.0	7.2
7440.827000	47.54	74.00	26.46	1000.000	200.0	V	50.0	10.7
15852.232500	52.98	74.00	21.02	1000.000	168.0	V	28.0	20.4

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4960.401000	30.32	54.00	23.68	1000.000	173.0	V	24.0	7.2
7440.827000	32.56	54.00	21.44	1000.000	200.0	V	50.0	10.7
15852.232500	39.24	54.00	14.76	1000.000	168.0	V	28.0	20.4

7.31 Plots/Data: Radiated Emissions (Bluetooth, Pi/4DQPSK, 2402MHz)



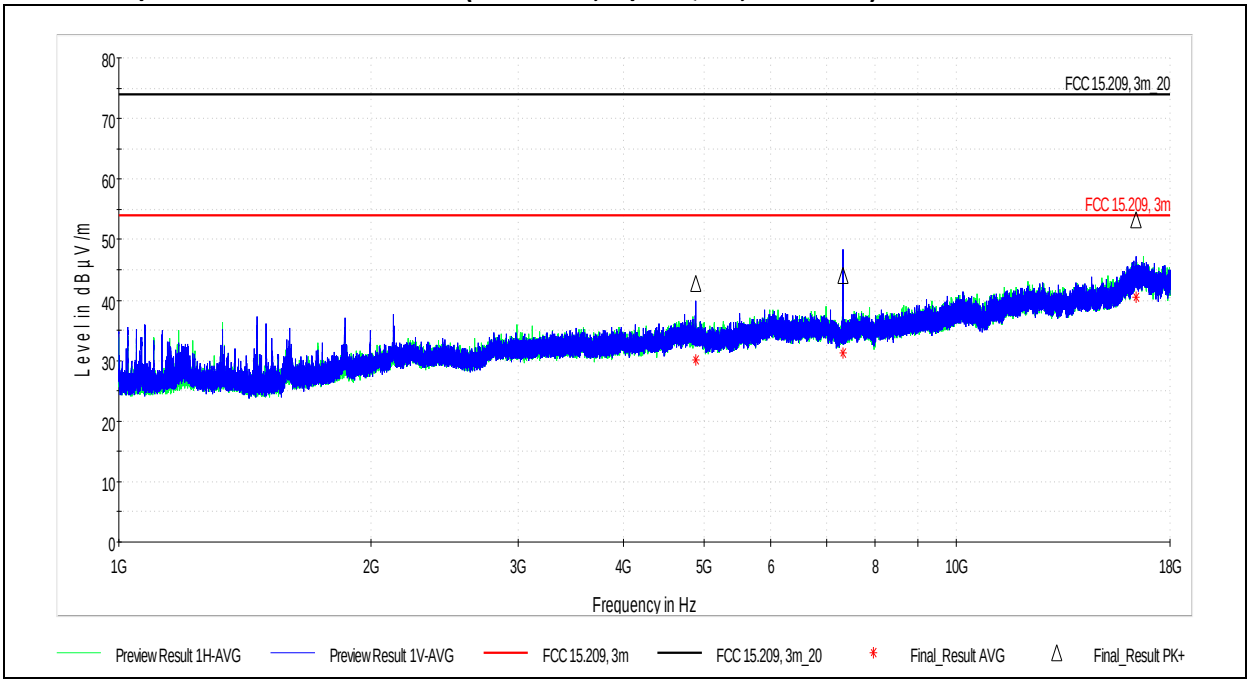
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
7332.386500	44.69	74.00	29.31	1000.000	186.0	H	0.0	10.5
10031.889000	47.32	74.00	26.68	1000.000	200.0	V	50.0	14.4
10388.968500	47.17	74.00	26.83	1000.000	184.0	V	50.0	14.6
16386.882500	53.32	74.00	20.68	1000.000	169.0	V	50.0	21.3

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
7332.386500	31.47	54.00	22.53	1000.000	186.0	H	0.0	10.5
10031.889000	34.48	54.00	19.52	1000.000	200.0	V	50.0	14.4
10388.968500	34.69	54.00	19.31	1000.000	184.0	V	50.0	14.6
16386.882500	40.62	54.00	13.38	1000.000	169.0	V	50.0	21.3

7.32 Plots/Data: Radiated Emissions (Bluetooth, Pi/4DQPSK, 2442MHz)



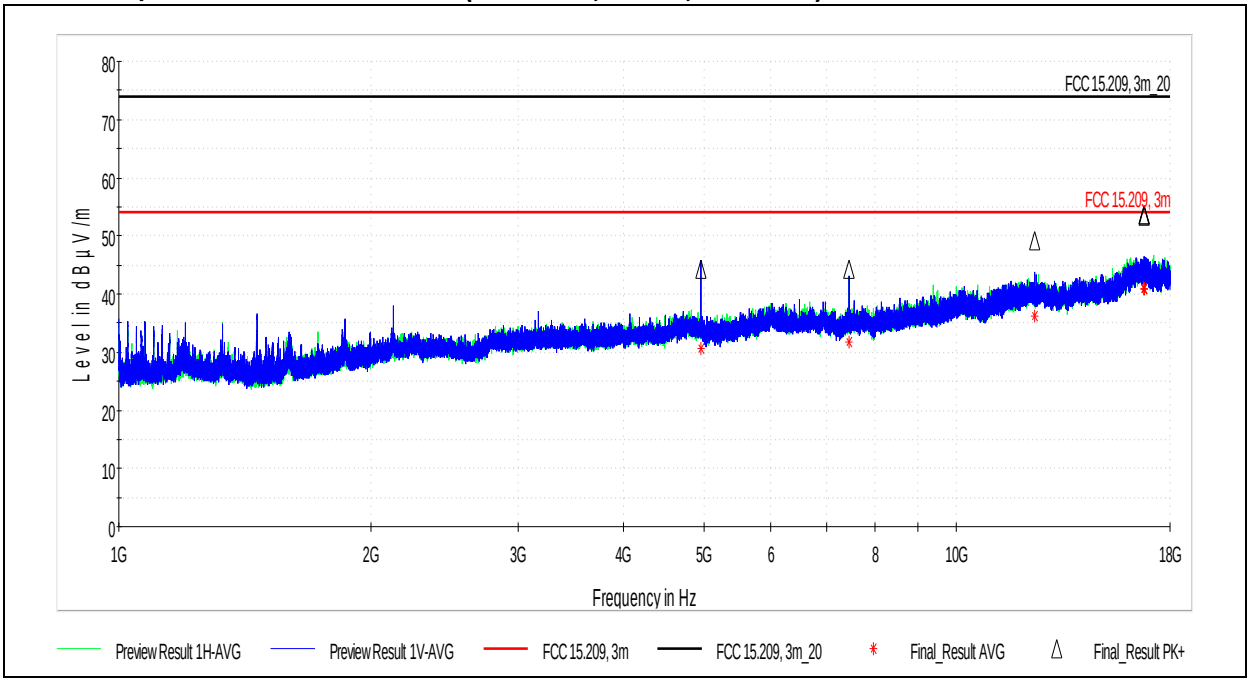
Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4883.794500	42.76	74.00	31.24	1000.000	135.0	H	50.0	7.4
7321.046500	44.10	74.00	29.90	1000.000	163.0	V	50.0	10.5
16383.412500	53.18	74.00	20.82	1000.000	183.0	V	50.0	21.2

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4883.794500	30.13	54.00	23.87	1000.000	135.0	H	50.0	7.4
7321.046500	31.22	54.00	22.78	1000.000	163.0	V	50.0	10.5
16383.412500	40.52	54.00	13.48	1000.000	183.0	V	50.0	21.2

7.33 Plots/Data: Radiated Emissions (Bluetooth, 8DPSK, 2480MHz)

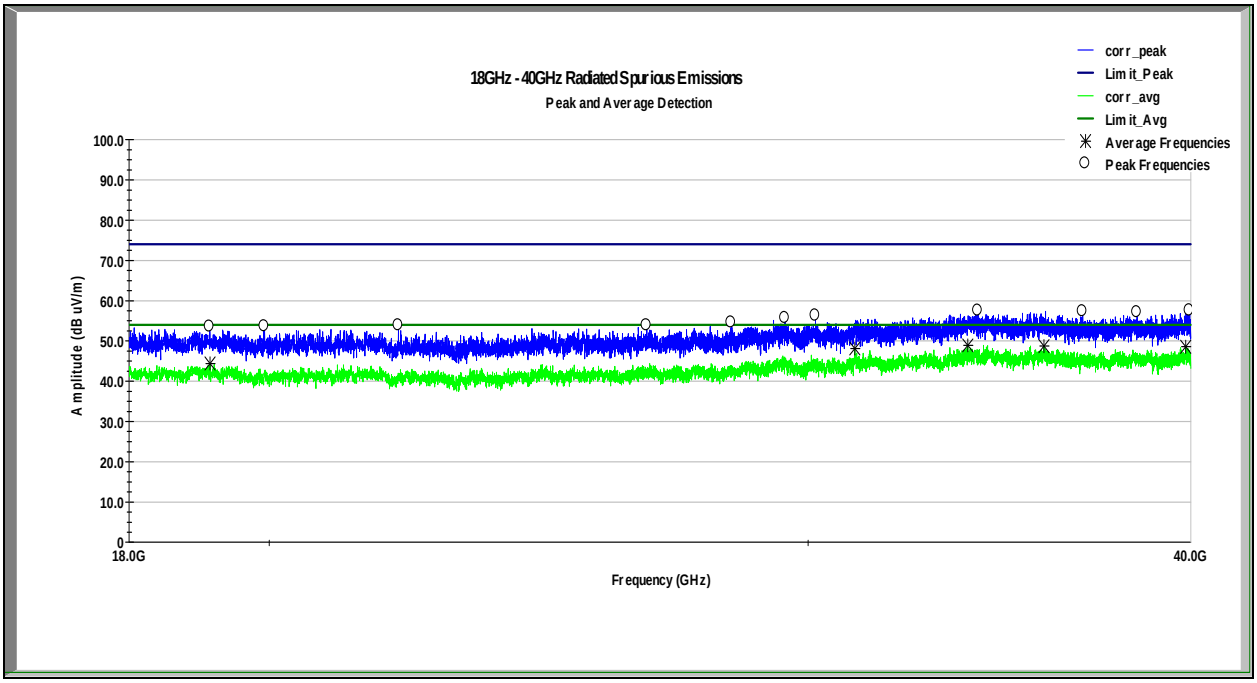


Final_Result_PK+

Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4960.010000	44.21	74.00	29.79	1000.000	200.0	V	50.0	7.2
7446.722500	44.26	74.00	29.74	1000.000	145.0	H	30.0	10.8
12394.983000	49.13	74.00	24.87	1000.000	161.0	V	14.0	16.5
16767.266500	53.43	74.00	20.57	1000.000	194.0	V	0.0	21.7
16771.822000	53.71	74.00	20.29	1000.000	200.0	V	34.0	21.8
16777.639000	53.57	74.00	20.43	1000.000	200.0	H	34.0	21.8

Final_Result_AVG

Frequency (MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
4960.010000	30.69	54.00	23.31	1000.000	200.0	V	50.0	7.2
7446.722500	31.66	54.00	22.34	1000.000	145.0	H	30.0	10.8
12394.983000	36.20	54.00	17.80	1000.000	161.0	V	14.0	16.5
16767.266500	40.91	54.00	13.09	1000.000	194.0	V	0.0	21.7
16771.822000	40.90	54.00	13.10	1000.000	200.0	V	34.0	21.8
16777.639000	40.89	54.00	13.11	1000.000	200.0	H	34.0	21.8



Scan_Result_PK+

Frequency (GHz)	Peak (dBuV/m)	Peak Limit (dBuV/m)	Peak Margin (dB)
19.129 GHz	53.44	74.00	20.56
19.932 GHz	53.53	74.00	20.47
22.044 GHz	53.82	74.00	20.18
26.571 GHz	53.79	74.00	20.21
28.316 GHz	54.45	74.00	19.55
29.484 GHz	55.61	74.00	18.39
30.166 GHz	56.20	74.00	17.80
34.089 GHz	57.42	74.00	16.58
36.880 GHz	57.24	74.00	16.76
38.420 GHz	57.04	74.00	16.96
39.971 GHz	57.47	74.00	16.53

Scan_Result_AVG

Frequency (GHz)	Average (dBuV/m)	Limit (dBuV/m)	Average Margin (dB)
19.131 GHz	44.40	54.00	9.6
31.070 GHz	48.09	54.00	5.91
33.825 GHz	48.89	54.00	5.11
35.820 GHz	48.71	54.00	5.29
39.853 GHz	48.55	54.00	5.45

8 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	4/1/2018	103295173LEX-005	BCT	BL	Original Issue