



FCC / ISED Test Report

For:

Lennox Industries Inc.

Model:

Lennox S40 Smart Thermostat

Product Description:

Smart thermostat to control residential HVAC system

FCC ID: 2A6F9-S4024B

IC: 28687-S4024B

Applied Rules and Standards:

47 CFR Part 15.247 (DTS)

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

REPORT #: EMC_LEN NX_017_25001_FCC_15_247_BLE

DATE: 2025-05-23



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 Name	Product Description	Model
Lennox Industries Inc.	Smart Thermostat to control residential HVAC system	Lennox S40 Smart Thermostat

Report Reviewer:

2025-05-23 Compliance (Senior Manager Regulatory Services)
Alvin, Ilarina

Alvin
ILARINA
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by Alvin ILARINA
Date: 2025.05.23
18:23:16 -07'00'

Date	Section	Name	Signature
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Responsible for the Report:

2025-05-23 Compliance (EMC Engineer)
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Date	Section	Name	Signature
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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:	Alvin, Ilarina
Responsible Project Leader:	Shane Hao

2.2 Identification of the Client

Applicant's Name:	Lennox Industries Inc.
Street Address:	PO Box 799900
City/Zip Code	Dallas TX 75379
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

Product Description:	Smart thermostat to control residential HVAC system
Model Name:	Lennox S40 Smart Thermostat
Marketing Name:	Lennox S40 Smart Thermostat
HW Version:	A
SW Version:	4.35.0145
FCC-ID:	2A6F9-S4024B
IC:	28687-S4024B
Radio information as declared	WLAN: • Murata LBEE59B1LV • FCC ID: VPYLBEE59B1LV, IC: 772C-LBEE59B1LV • Supports 2.4GHz and 5GHz frequencies, with only UNII-1 channels enabled for 5GHz Wi-Fi. BLE: • Silicon Labs BGM210PA32JIA2 • FCC ID: QOQGM210P; IC: 5123A-GM210P
Antenna information as declared	WLAN: • Model: B34X.W3.1.334 • Type: Flexible Printed Circuit (FPC) antenna • Frequency: 2.4 GHz – 5.8 GHz • Gain: 3.5 dBi BLE: • Model: B43X.W0.1.334 • Type: Flexible Printed Circuit (FPC) antenna • Frequency: 2.4 – 2.5 GHz • Gains: 2.5 dBi
Power Supply/ Rated Operating Voltage Range	24VAC±6VAC, 60Hz
Operating Temperature Range	Low: 0 °C, High: 40 °C
Sample Revision	☒ Production ☐ Pre-Production
EUT Dimensions	179mm x 113.5mm x 24.58mm
Weight	Max 300 grams
EUT Diameter	☒ < 60 cm ☐ Other _____
Note: The EUT specifications in the table above were provided by the applicant.	

3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	25B05900127	A	4.35.0145	Radiated Emissions

3.3 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number	Comments
1	Laptop	P135G	Dell	12243628947	Support laptop provided by Cetecom to exercise device.
2	Power Supply	PS-AC2420D	AC/AC ADAPTER	N/A	-
3	Equipment Interface Module	103861-04	Lennox Ind	22x18	

3.4 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#1+AE#2, AE#3 + AE 1	The EUT power by 120VAC to 12 VAC power supply.

3.5 Mode of Operation details

Mode of Operation	Description of Operating modes	Additional Information
Op. 1	BLE (Power Setting: 19) Co-Tx with 802.11g 6Mbps Channel 6 (Power Setting: 17) And 802.11a 6Mbps Channel 36 (Power Setting: 17)	During testing, BLE was configured to operate at the rated output power setting on channels 0, 19, and 39. To represent the worst-case scenario, the selected WiFi radio transmitted simultaneously with the BLE radio. The EUT was set for continuous BLE and WiFi transmission on the specified channels using an application not intended for end-user deployment.

3.6 Justification for Mode of Operation

During testing, the EUT was evaluated with transmitters set to BLE low, mid, and high channels, operating simultaneously with the WiFi radio to simulate the worst-case scenario. For radiated measurements, the data in this report reflects the worst-case results between horizontal and vertical antenna polarizations and all EUT orientations.

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 Radiated Spurious Emissions	Nominal	Op. 1	☒	☐	☐	Complies
§15.207(a) RSS Gen 8.8	AC Conducted Emissions	Nominal	Op. 1	☒	☐	☐	Complies

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

Note 2: The BLE test results are leveraged from Report #: RF190408C21-2, corresponding to FCC ID: QOQGM210P; IC: 5123A-GM210P.

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 $k=2$.

Radiated measurement

Measurement System		EMC Lab 1	EMC Lab 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	4.39 dB	3.85 dB
	100 MHz – 1 GHz	5.65 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

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 3dB 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:

2025-04-23 – 2025-05-07

6.3 Decision Rule:

Cetecom Inc follows ILAC G8:09/2019 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.

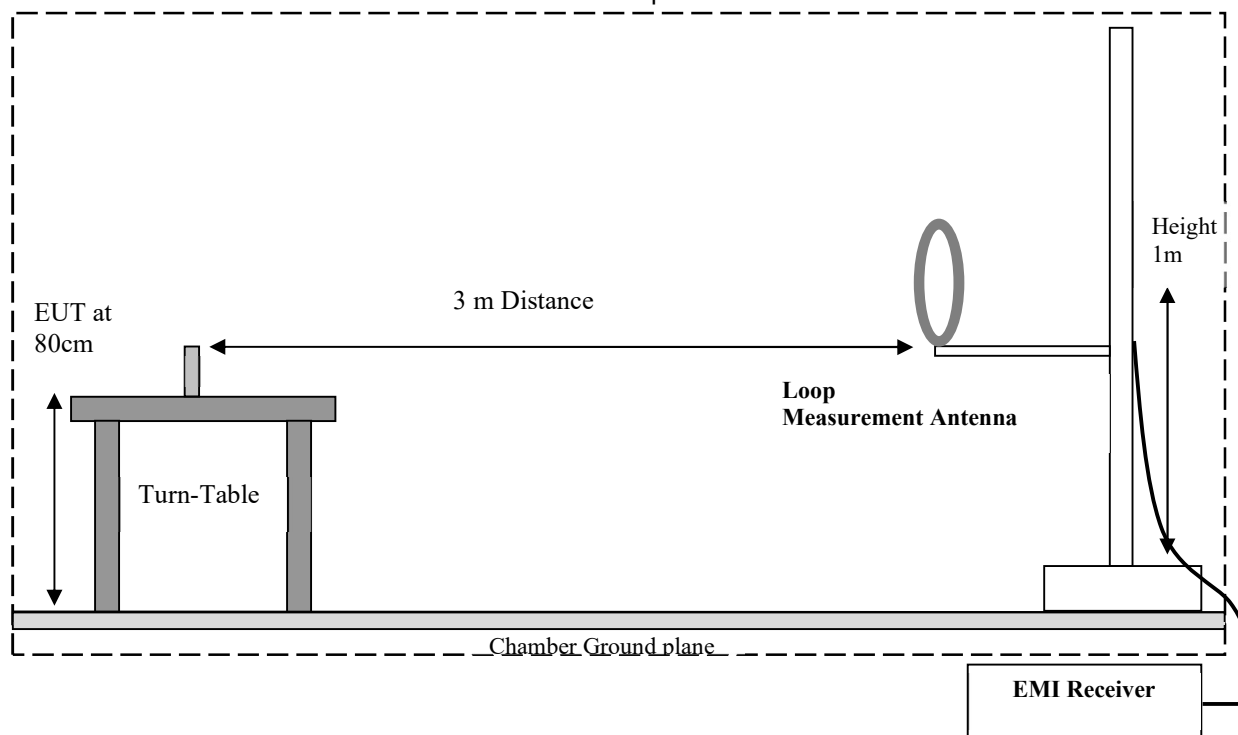
7 Measurement Procedures

7.1 Radiated Measurement

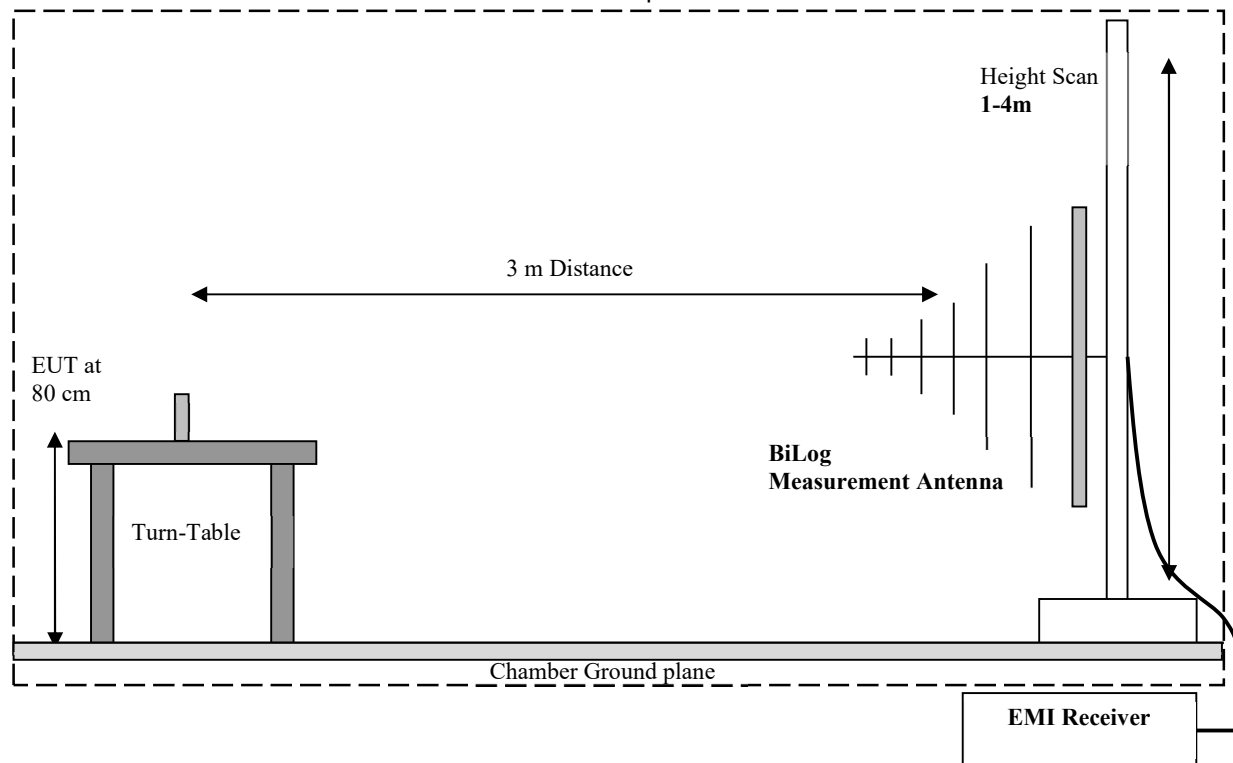
The radiated measurement is performed according to ANSI C63.10 (2013)

- 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.

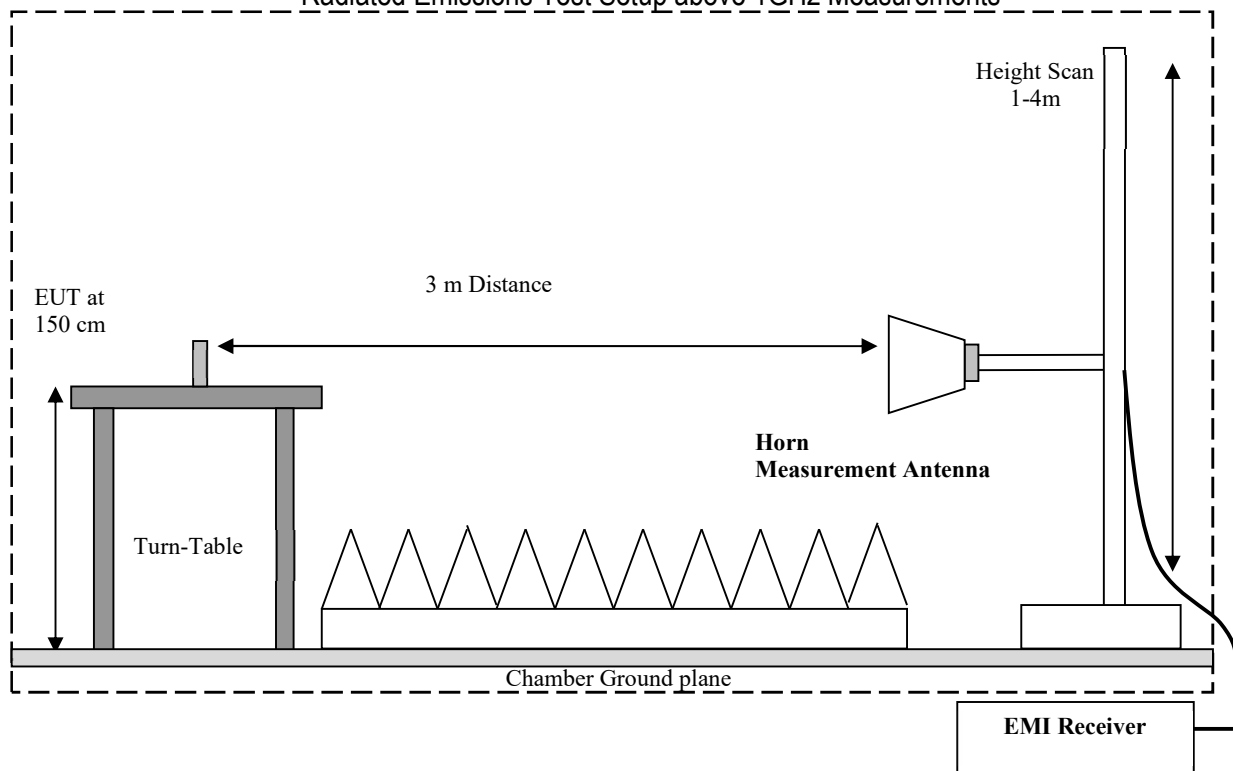
Radiated Emissions Test Setup below 30MHz Measurements



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:

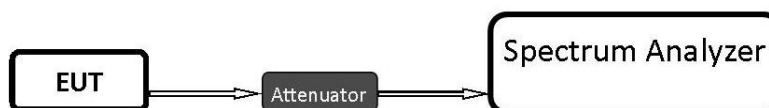
Frequency (MHz)	Measured SA (dB μ V)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dB μ V/m)
1000	80.5	3.5	14	98.0

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 Input
22° C	1	Op. 1	120 VAC

8.1.4 Measurement result:

Plot #	BLE Channel #	Scan Frequency	Limit	Result
1-5	BLE Low + Wi-Fi 2.4GHz	9 kHz – 26 GHz	See section 8.1.2	Pass
6-10	BLE MID + Wi-Fi 2.4GHz	9 kHz – 26 GHz	See section 8.1.2	Pass
11-15	BLE HIGH + Wi-Fi 2.4GHz	9 kHz – 26 GHz	See section 8.1.2	Pass
16-20	BLE Low + Wi-Fi 5GHz	9 kHz – 26 GHz	See section 8.1.2	Pass

Note: Co-transmission was performed in the worst-case scenario based on the power measurement.

8.1.5 Measurement Plots:

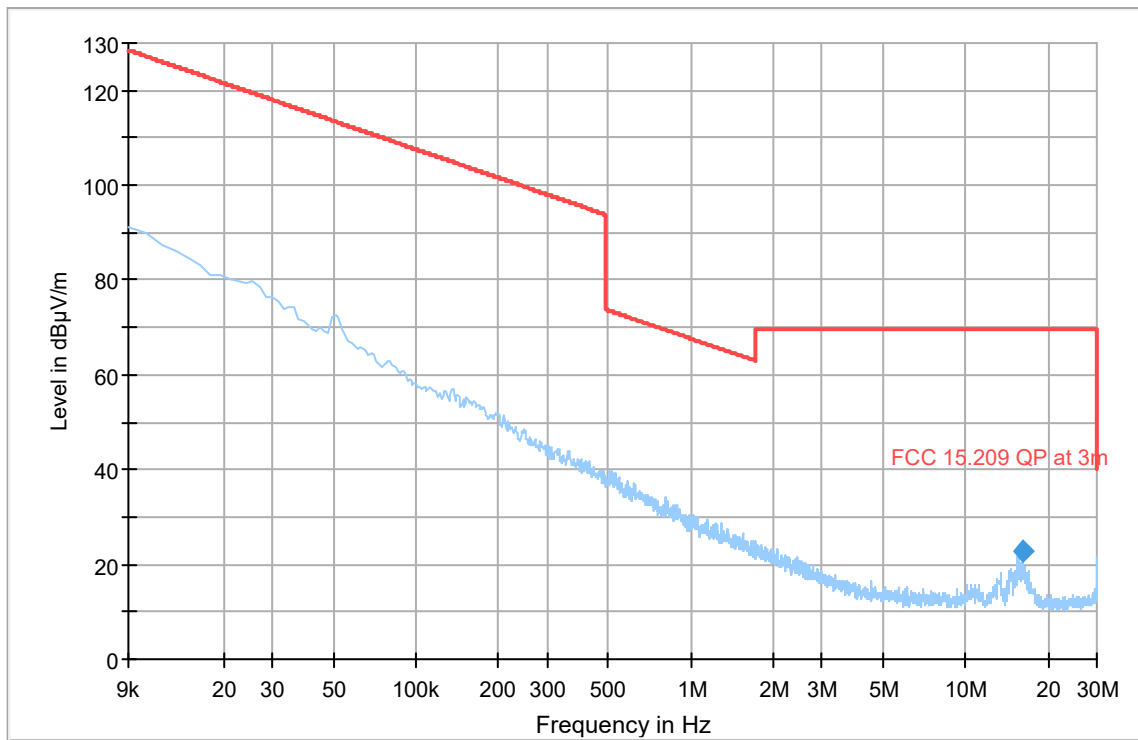
Plot # 1 Radiated Emissions: 9kHz - 30 MHz

Tx Frequency: 2402 MHz

GFSK (PHY: 2M,)

Final Result

Frequency (MHz)	QuasiPeak (dBμV/m)	DET 2 (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
16.228	22.90	---	69.50	46.60	500.0	9.0	120.0	H	37.0	5.1	



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

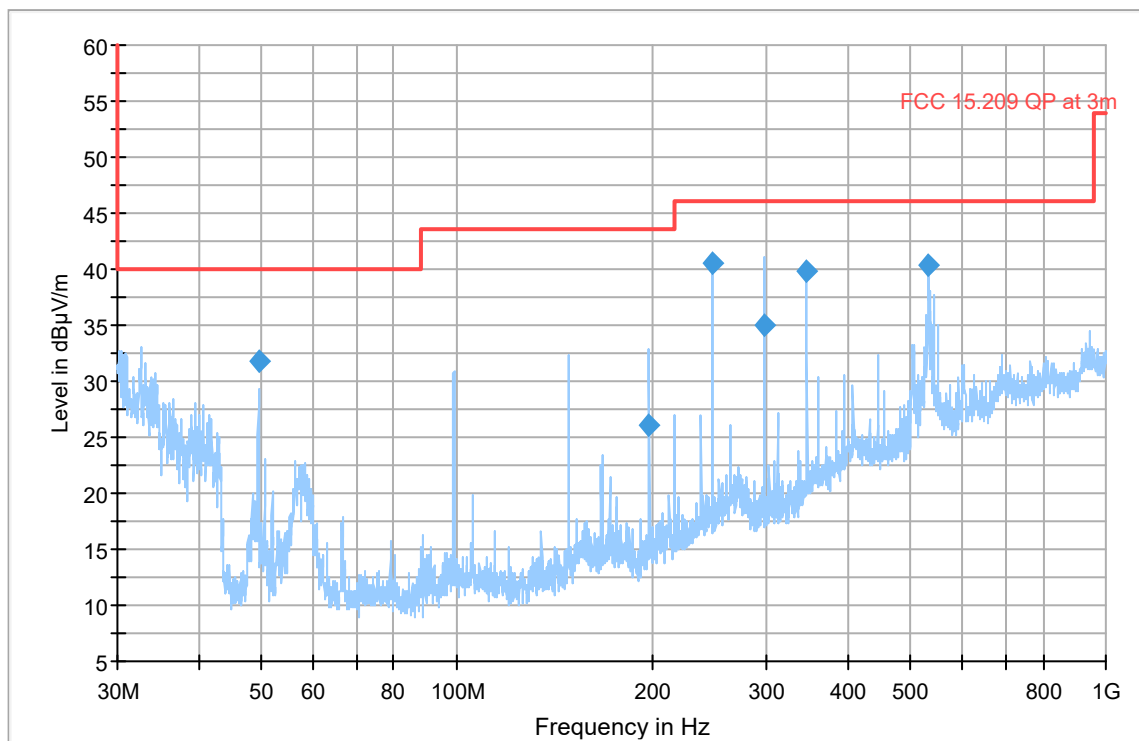
Plot # 2 Radiated Emissions: 30 MHz – 1 GHz

Tx Frequency: 2402 MHz

GFSK (PHY: 2M,)

Final_Result

Frequency (MHz)	QuasiPeak (dBμV/m)	DET 2 (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
49.497	31.78	---	40.00	8.22	500.0	120.0	100.0	V	-44.0	-21.8	
197.980	26.05	---	43.50	17.45	500.0	120.0	156.0	H	113.0	-17.6	
247.498	40.49	---	46.02	5.53	500.0	120.0	111.0	H	156.0	-15.3	
296.993	34.98	---	46.02	11.04	500.0	120.0	134.0	H	111.0	-14.1	
346.487	39.84	---	46.02	6.18	500.0	120.0	111.0	H	274.0	-11.7	
532.994	40.41	---	46.02	5.61	500.0	120.0	186.0	H	342.0	-5.2	



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

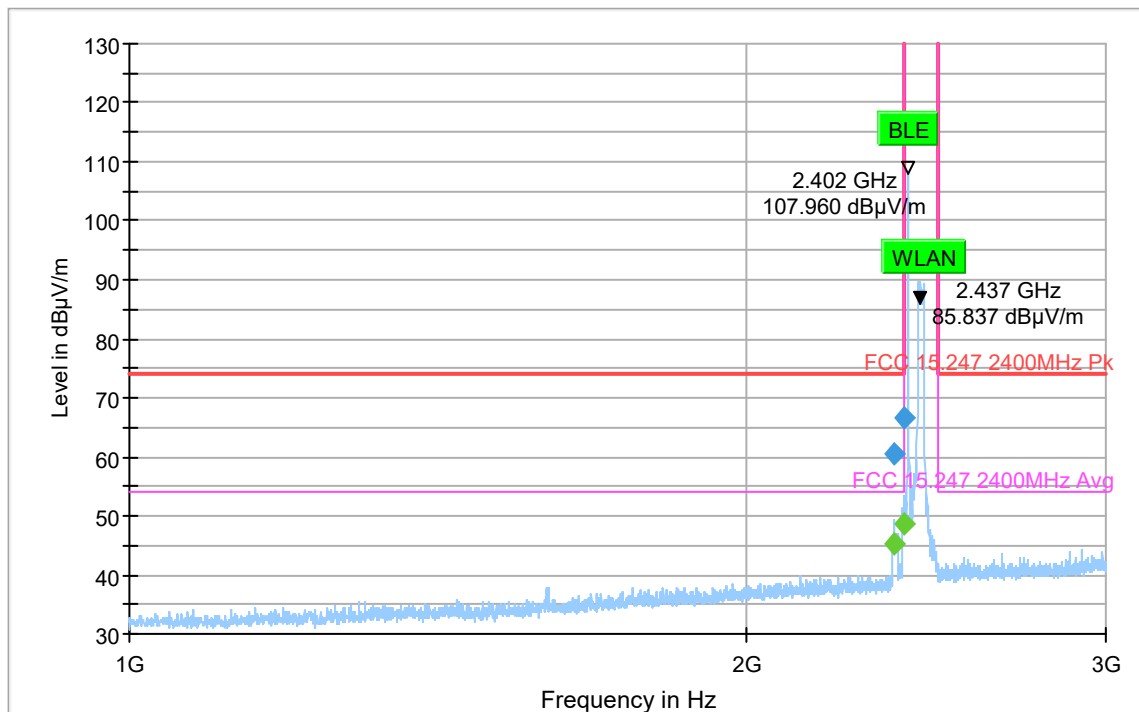
Plot # 3 Radiated Emissions: 1 – 3 GHz

Tx Frequency: 2402 MHz

GFSK (PHY: 2M,)

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)	Comment
2364.000	---	45.15	54.00	8.85	500.0	1000.0	272.0	H	130.0	32.9	
2364.000	60.53	---	74.00	13.47	500.0	1000.0	272.0	H	130.0	32.9	
2389.000	---	48.70	54.00	5.30	500.0	1000.0	100.0	H	185.0	33.1	
2389.000	66.58	---	74.00	7.42	500.0	1000.0	100.0	H	185.0	33.1	

 Preview Result 1-PK+
Final_Result PK+ FCC 15.247 2400MHz Pk
Final_Result CAV FCC 15.247 2400MHz Avg

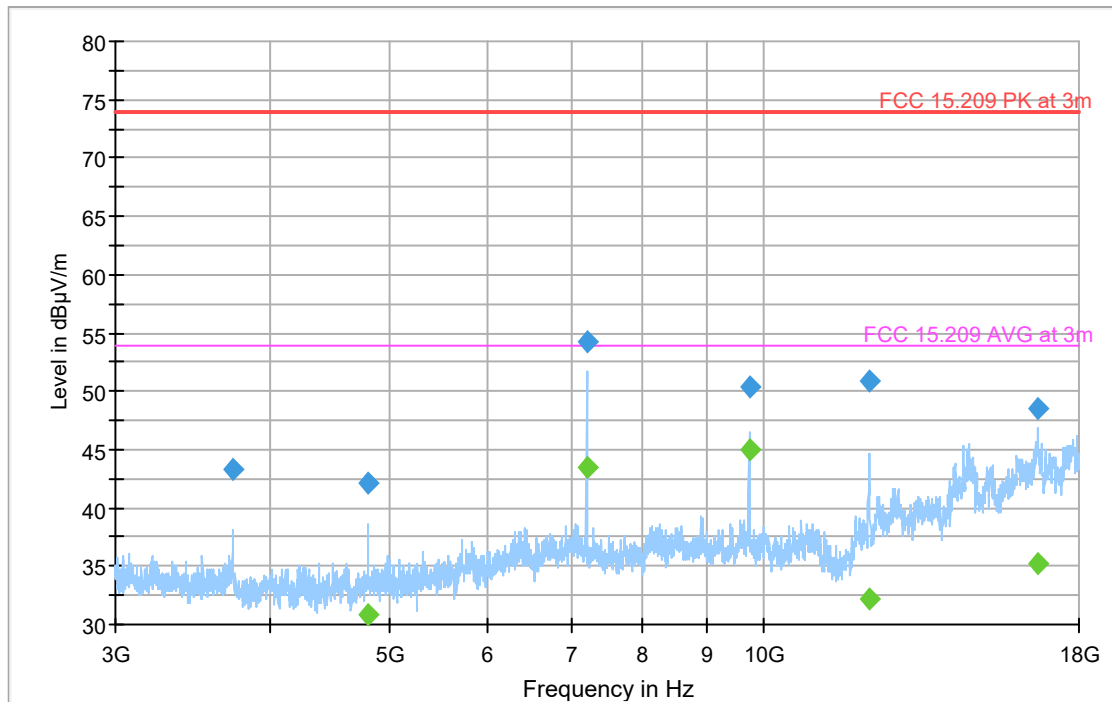
Plot # 4 Radiated Emissions: 3 – 18 GHz

Tx Frequency: 2402 MHz

GFSK (PHY: 2M,)

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)
3731.377	43.349	---	73.98	30.63	500.0	1000.0	126.0	H	189.0	-6.3	6.3	-45.6	33.0	49.7
3731.377	---	28.744	53.98	25.23	500.0	1000.0	126.0	H	189.0	-6.3	6.3	-45.6	33.0	35.1
4803.500	42.119	---	73.98	31.86	500.0	1000.0	197.0	H	236.0	-4.7	6.8	-45.6	34.1	46.8
4803.500	---	30.845	53.98	23.13	500.0	1000.0	197.0	H	236.0	-4.7	6.8	-45.6	34.1	35.5
7205.131	54.301	---	73.98	19.68	500.0	1000.0	116.0	H	131.0	-1.9	9.0	-46.8	36.0	56.2
7205.131	---	43.421	53.98	10.56	500.0	1000.0	116.0	H	131.0	-1.9	9.0	-46.8	36.0	45.3
9747.920	50.329	---	73.98	23.65	500.0	1000.0	100.0	V	230.0	0.9	10.6	-46.8	37.1	49.4
9747.920	---	45.018	53.98	8.96	500.0	1000.0	100.0	V	230.0	0.9	10.6	-46.8	37.1	44.1
12182.017	50.878	---	73.98	23.10	500.0	1000.0	169.0	H	198.0	4.4	11.6	-45.8	38.6	46.4
12182.017	---	32.246	53.98	21.73	500.0	1000.0	169.0	H	198.0	4.4	11.6	-45.8	38.6	27.8
16684.396	48.512	---	73.98	25.47	500.0	1000.0	302.0	H	224.0	14.2	15.1	-42.2	41.3	34.3
16684.396	---	35.296	53.98	18.68	500.0	1000.0	302.0	H	224.0	14.2	15.1	-42.2	41.3	21.1



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

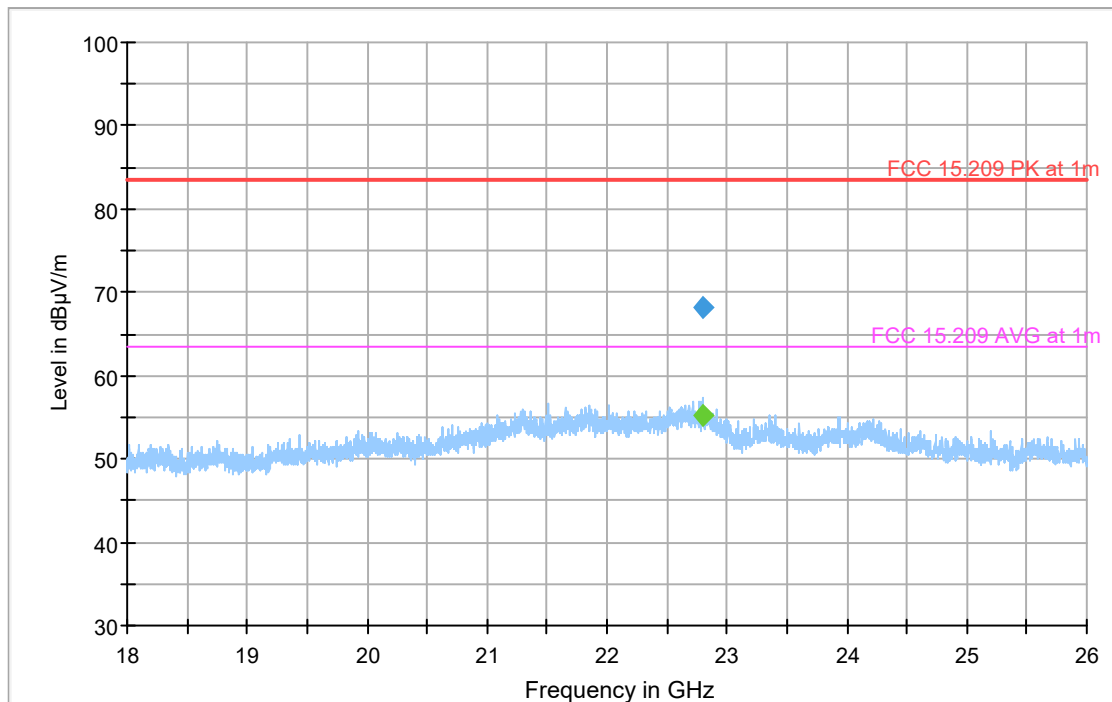
Plot # 5 Radiated Emissions: 18 – 26 GHz

Tx Frequency: 2402 MHz

GFSK (PHY: 2M,)

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)
22803.000	---	55.316	63.50	8.18	500.0	1000.0	100.0	H	88.0	20.2	9.7	0.0	10.5	35.1
22803.000	68.083	---	83.50	15.42	500.0	1000.0	100.0	H	88.0	20.2	9.7	0.0	10.5	47.9



AVG_MAXH
FCC 15.209 AVG at 1m

PK+_MAXH
Final_Result PK+

FCC 15.209 PK at 1m
Final_Result CAV

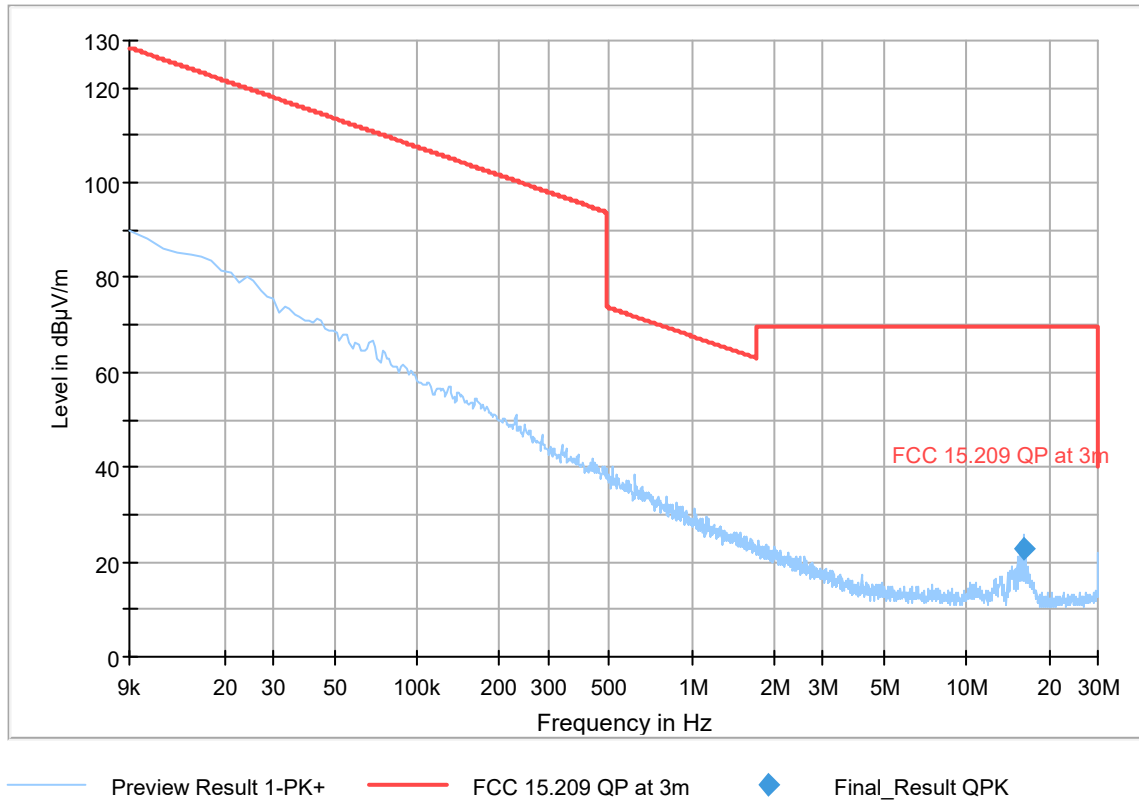
Plot # 6 Radiated Emissions: 9 KHz – 30 MHz

Tx Frequency: 2440 MHz

GFSK (PHY: 2M,)

Final_Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	DET 2 (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
16.228	22.93	---	69.50	46.57	500.0	9.0	120.0	V	184.0	5.1	



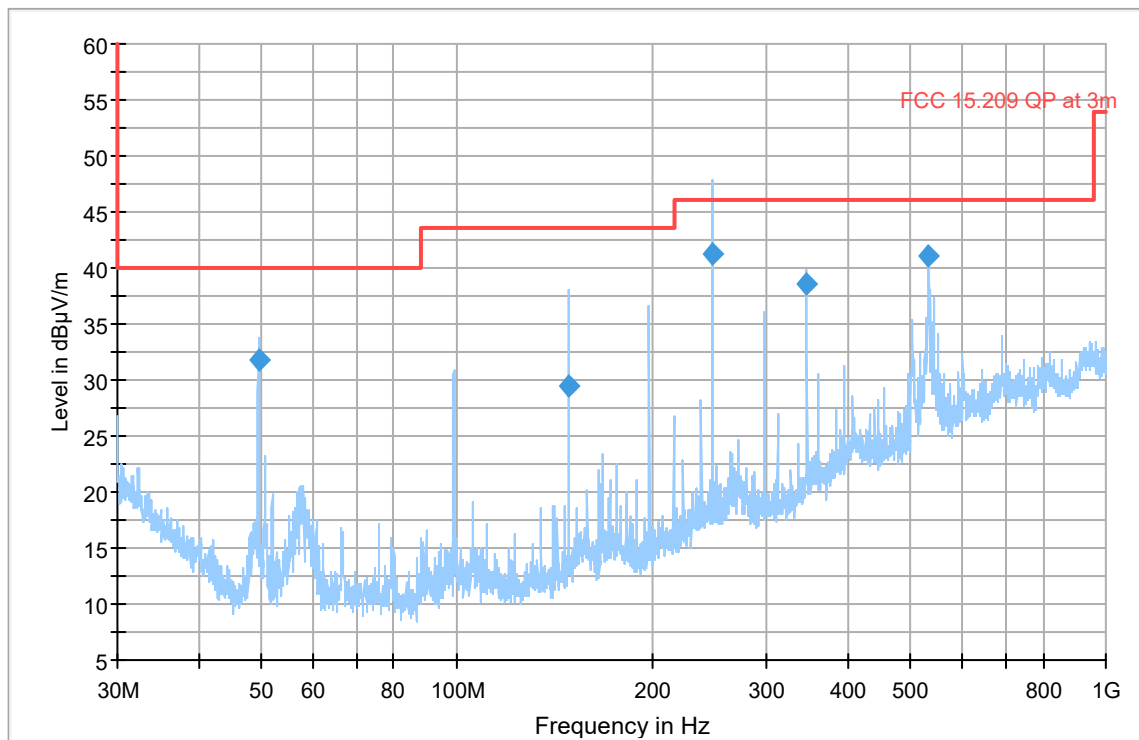
Plot # 7 Radiated Emissions: 30 MHz – 1 GHz

Tx Frequency: 2440 MHz

GFSK (PHY: 2M,)

Final_Result

Frequency (MHz)	QuasiPeak (dBμV/m)	DET 2 (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
49.497	31.85	---	40.00	8.15	500.0	120.0	100.0	V	70.0	-21.8	
148.486	29.51	---	43.50	13.99	500.0	120.0	145.0	V	215.0	-18.8	
247.498	41.19	---	46.02	4.83	500.0	120.0	122.0	H	145.0	-15.3	
346.487	38.66	---	46.02	7.36	500.0	120.0	106.0	H	289.0	-11.7	
533.527	41.16	---	46.02	4.86	500.0	120.0	141.0	H	-12.0	-5.1	



Preview Result 1-PK+

FCC 15.209 QP at 3m



Final_Result QPK

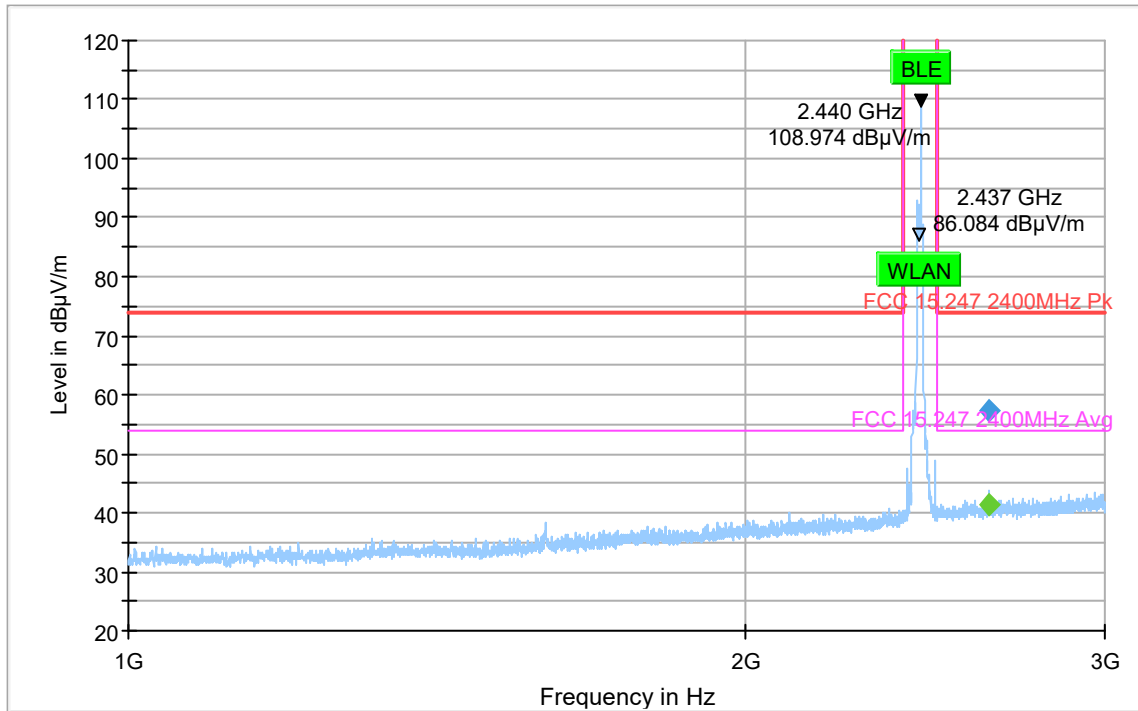
Plot # 8 Radiated Emissions: 1 – 3 GHz

Tx Frequency: 2440 MHz

GFSK (PHY: 2M,)

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)	Comment
2632.000	---	41.35	54.00	12.65	500.0	1000.0	199.0	V	201.0	35.0	
2632.000	57.29	---	74.00	16.71	500.0	1000.0	199.0	V	201.0	35.0	

◆ Preview Result 1-PK+
Final_Result PK+◆ FCC 15.247 2400MHz Pk
Final_Result CAV

◆ FCC 15.247 2400MHz Avg

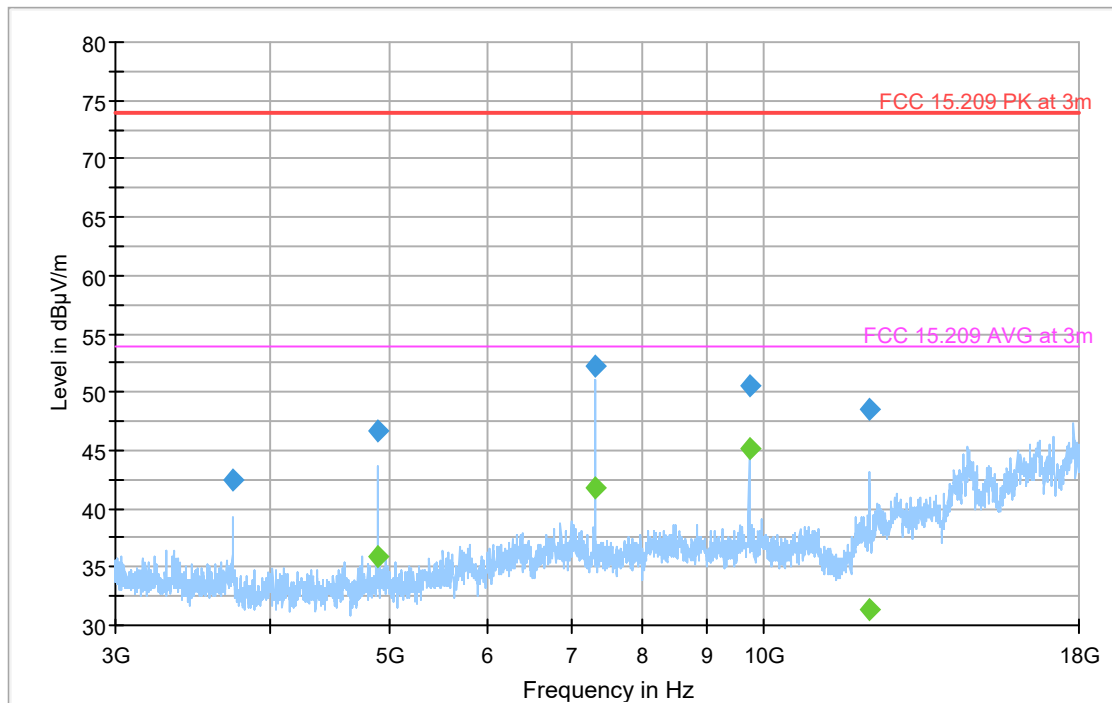
Plot # 9 Radiated Emissions: 3 – 18 GHz

Tx Frequency: 2440 MHz

GFSK (PHY: 2M,)

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)
3729.000	---	27.062	53.98	26.92	500.0	1000.0	221.0	H	170.0	-6.3	6.3	-45.6	33.0	33.3
3729.000	42.495	---	73.98	31.48	500.0	1000.0	221.0	H	170.0	-6.3	6.3	-45.6	33.0	48.8
4879.444	46.610	---	73.98	27.37	500.0	1000.0	127.0	H	252.0	-4.7	7.0	-45.9	34.1	51.3
4879.444	---	35.888	53.98	18.09	500.0	1000.0	127.0	H	252.0	-4.7	7.0	-45.9	34.1	40.6
7320.250	---	41.708	53.98	12.27	500.0	1000.0	100.0	H	129.0	-1.6	9.0	-46.5	35.9	43.3
7320.250	52.179	---	73.98	21.80	500.0	1000.0	100.0	H	129.0	-1.6	9.0	-46.5	35.9	53.8
9747.940	---	45.170	53.98	8.81	500.0	1000.0	100.0	V	217.0	0.9	10.6	-46.8	37.1	44.2
9747.940	50.586	---	73.98	23.39	500.0	1000.0	100.0	V	217.0	0.9	10.6	-46.8	37.1	49.6
12177.788	48.553	---	73.98	25.43	500.0	1000.0	242.0	H	134.0	4.4	11.6	-45.9	38.6	44.2
12177.788	---	31.298	53.98	22.68	500.0	1000.0	242.0	H	134.0	4.4	11.6	-45.9	38.6	26.9



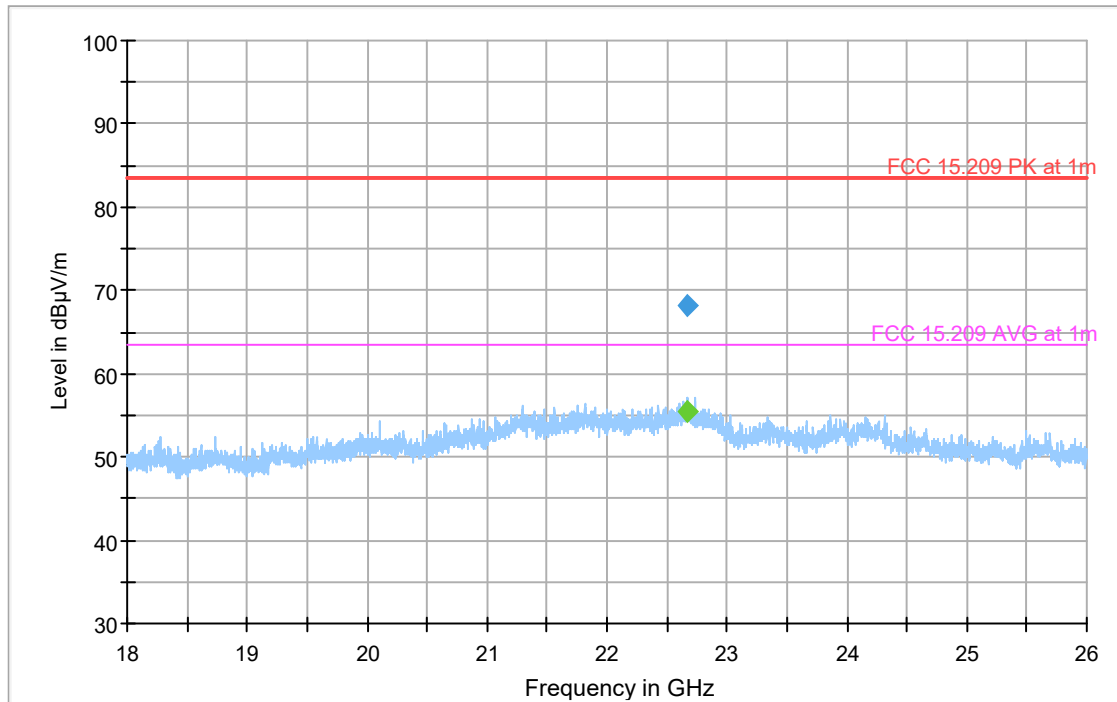
Plot # 10 Radiated Emissions: 18 – 26 GHz

Tx Frequency: 2440 MHz

GFSK (PHY: 2M,)

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)
22671.500	---	55.441	63.50	8.06	500.0	1000.0	246.0	H	266.0	20.4	9.8	0.0	10.6	35.1
22671.500	68.161	---	83.50	15.34	500.0	1000.0	246.0	H	266.0	20.4	9.8	0.0	10.6	47.8



— AVG_MAXH
— FCC 15.209 AVG at 1m

— PK+ _MAXH
◆ Final_Result PK+

— FCC 15.209 PK at 1m
◆ Final_Result CAV

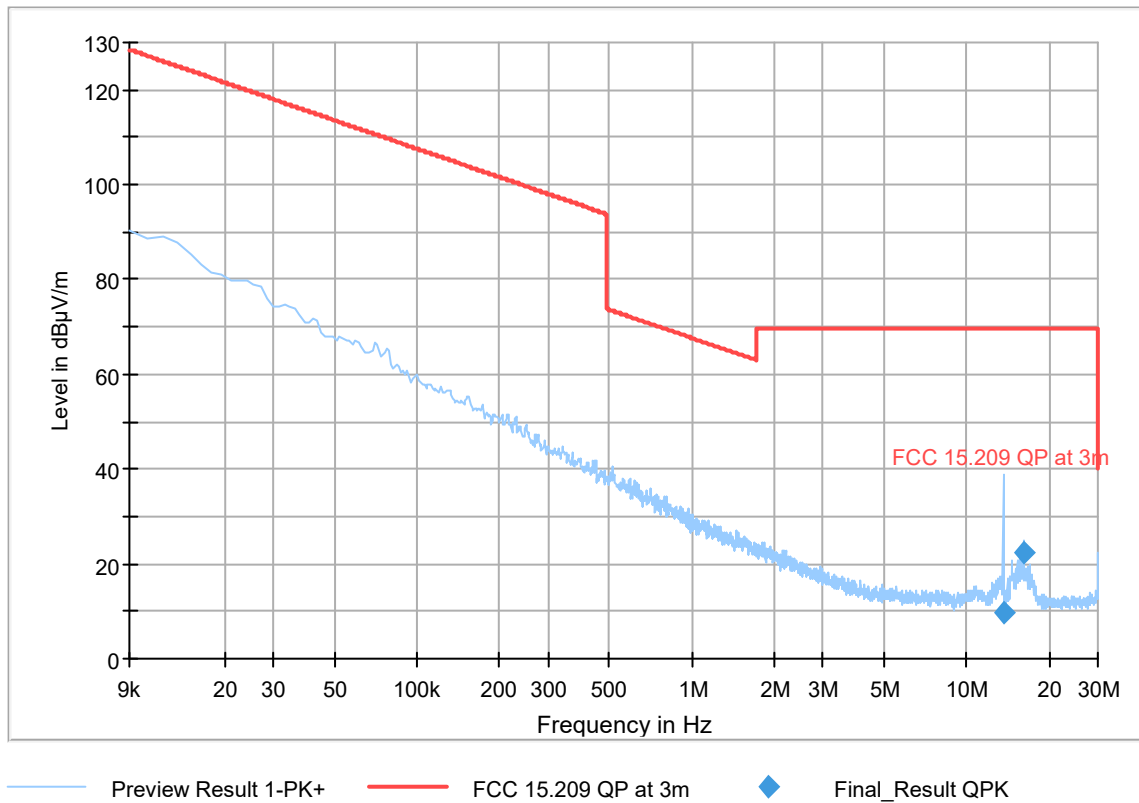
Plot # 11 Radiated Emissions: 9kHz - 30 MHz

Tx Frequency: 2480 MHz

GFSK (PHY: 2M,)

Final_Result

Frequency (MHz)	QuasiPeak (dB μ V/m)	DET 2 (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
13.559	9.60	---	69.50	59.90	500.0	9.0	120.0	H	167.0	5.5	
16.227	22.41	---	69.50	47.09	500.0	9.0	120.0	V	359.0	5.1	



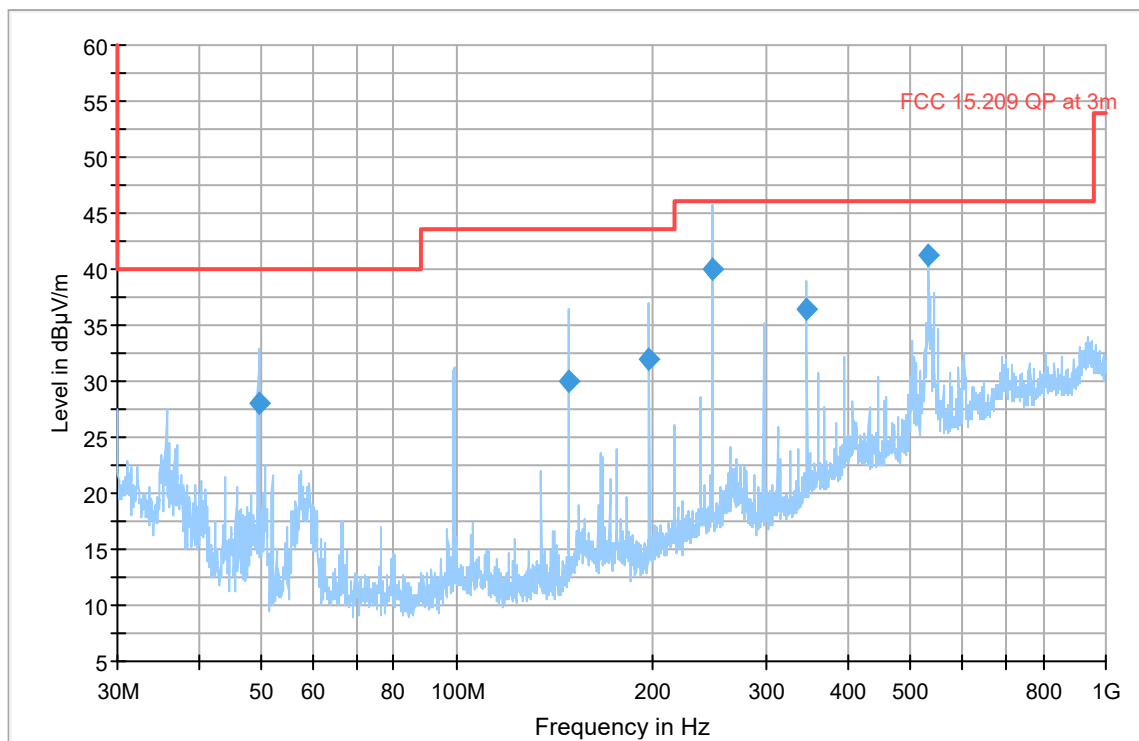
Plot # 12 Radiated Emissions: 30 MHz – 1 GHz

Tx Frequency: 2480 MHz

GFSK (PHY: 2M,)

Final_Result

Frequency (MHz)	QuasiPeak (dBμV/m)	DET 2 (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
49.497	28.12	---	40.00	11.88	500.0	120.0	100.0	V	-11.0	-21.8	
148.486	29.95	---	43.50	13.55	500.0	120.0	209.0	H	48.0	-18.8	
198.004	32.02	---	43.50	11.48	500.0	120.0	139.0	H	40.0	-17.6	
247.498	40.09	---	46.02	5.93	500.0	120.0	106.0	H	244.0	-15.3	
346.511	36.39	---	46.02	9.63	500.0	120.0	293.0	H	287.0	-11.7	
533.527	41.23	---	46.02	4.79	500.0	120.0	141.0	H	333.0	-5.1	



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

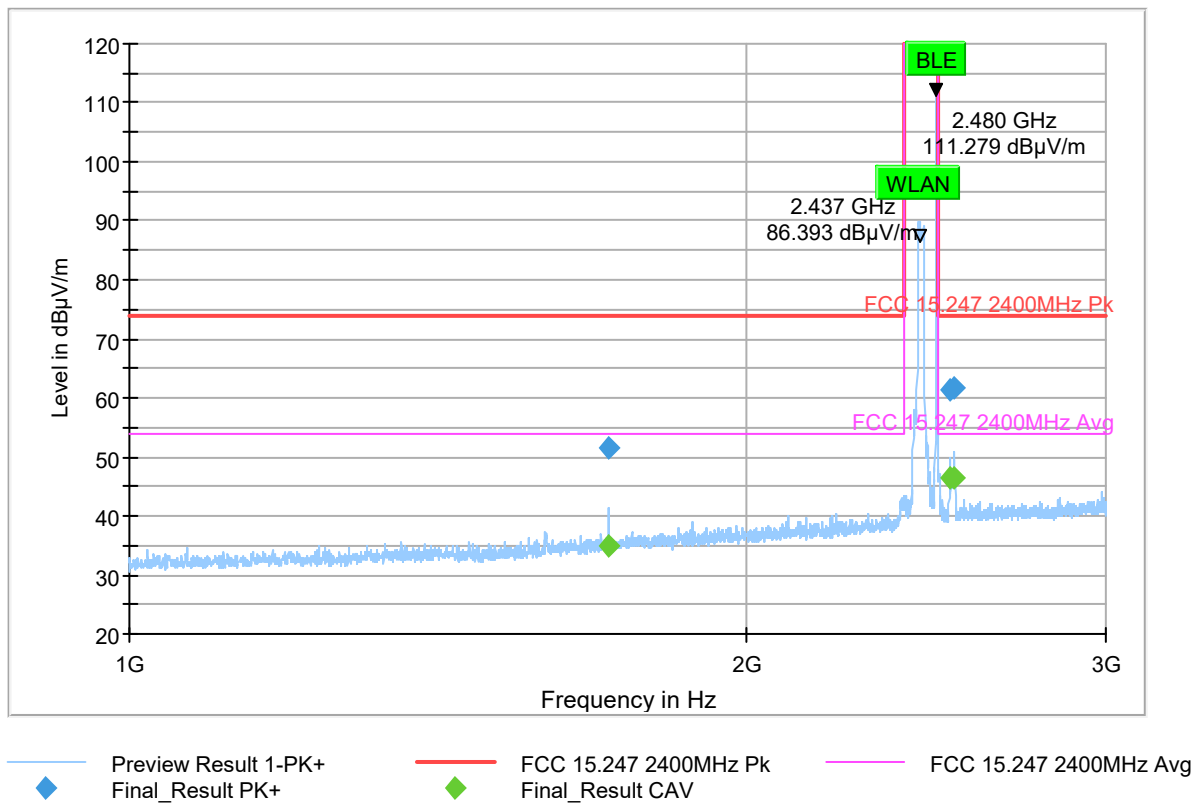
Plot # 13 Radiated Emissions: 1 – 3 GHz

Tx Frequency: 2480 MHz

GFSK (PHY: 2M,)

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)	Comment
1716.000	---	34.95	54.00	19.05	500.0	1000.0	227.0	V	247.0	30.9	
1716.000	51.63	---	74.00	22.37	500.0	1000.0	227.0	V	247.0	30.9	
2518.500	61.35	---	74.00	12.65	500.0	1000.0	141.0	H	133.0	34.1	
2518.500	---	46.48	54.00	7.52	500.0	1000.0	141.0	H	133.0	34.1	
2528.500	61.56	---	74.00	12.44	500.0	1000.0	154.0	V	218.0	34.4	
2528.500	---	46.52	54.00	7.48	500.0	1000.0	154.0	V	218.0	34.4	



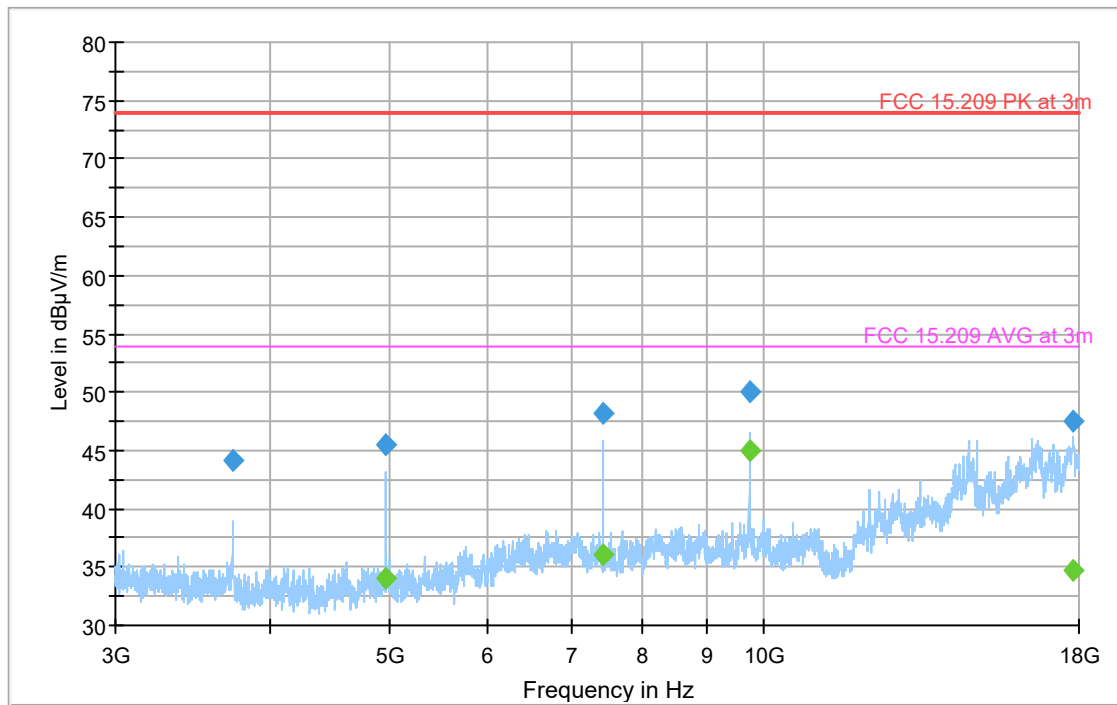
Plot # 14 Radiated Emissions: 3 – 18 GHz

Tx Frequency: 2480 MHz

GFSK (PHY: 2M,)

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)
3731.768	44.087	---	73.98	29.89	500.0	1000.0	134.0	H	171.0	-6.3	6.3	-45.6	33.0	50.4
3731.768	---	29.229	53.98	24.75	500.0	1000.0	134.0	H	171.0	-6.3	6.3	-45.6	33.0	35.5
4960.449	---	34.085	53.98	19.89	500.0	1000.0	170.0	H	256.0	-4.8	6.7	-45.7	34.1	38.9
4960.449	45.512	---	73.98	28.47	500.0	1000.0	170.0	H	256.0	-4.8	6.7	-45.7	34.1	50.4
7440.640	48.183	---	73.98	25.80	500.0	1000.0	100.0	V	152.0	-1.6	9.2	-46.7	35.9	49.8
7440.640	---	36.114	53.98	17.87	500.0	1000.0	100.0	V	152.0	-1.6	9.2	-46.7	35.9	37.7
9747.956	49.974	---	73.98	24.01	500.0	1000.0	100.0	V	214.0	0.9	10.6	-46.8	37.1	49.0
9747.956	---	44.900	53.98	9.08	500.0	1000.0	100.0	V	214.0	0.9	10.6	-46.8	37.1	44.0
17791.611	47.555	---	73.98	26.42	500.0	1000.0	363.0	H	155.0	14.4	15.5	-42.6	41.5	33.1
17791.611	---	34.700	53.98	19.28	500.0	1000.0	363.0	H	155.0	14.4	15.5	-42.6	41.5	20.3



AVG_MAXH
FCC 15.209 AVG at 3m

PK+_MAXH
Final_Result PK+

FCC 15.209 PK at 3m
Final_Result CAV

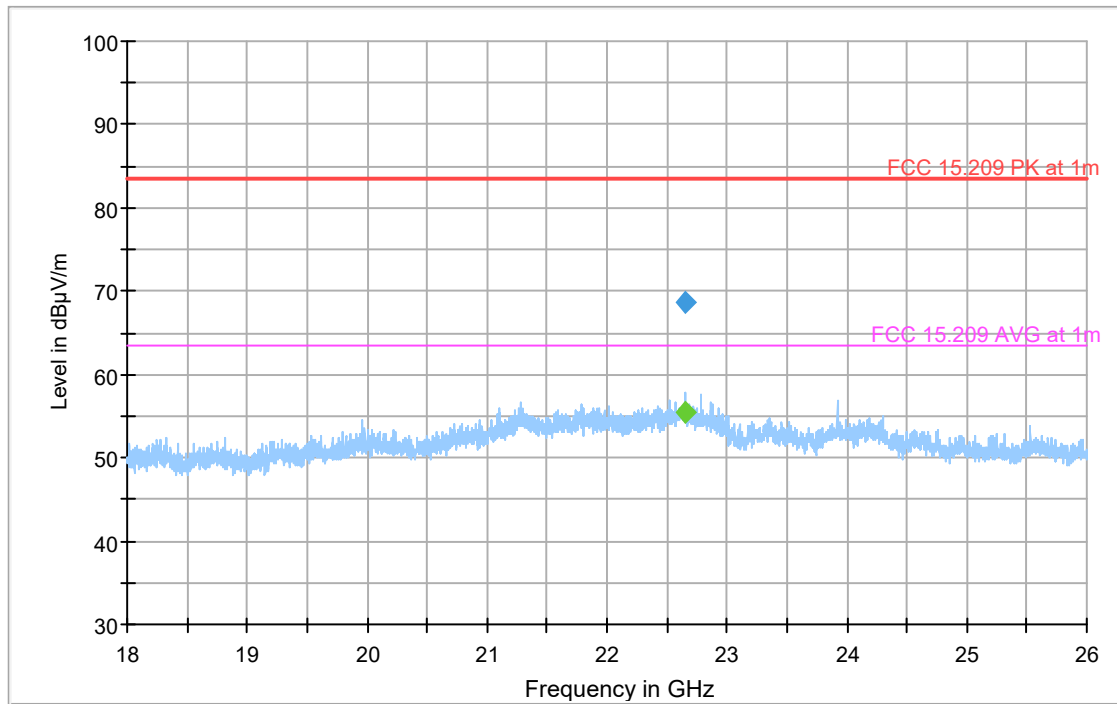
Plot # 15 Radiated Emissions: 18 – 26 GHz

Tx Frequency: 2480 MHz

GFSK (PHY: 2M,)

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)
22650.500	---	55.416	63.50	8.08	500.0	1000.0	100.0	V	93.0	20.3	9.8	0.0	10.6	35.1
22650.500	68.696	---	83.50	14.80	500.0	1000.0	100.0	V	93.0	20.3	9.8	0.0	10.6	48.4



AVG_MAXH
FCC 15.209 AVG at 1m

PK+ MAXH
Final_Result PK+

FCC 15.209 PK at 1m
Final_Result CAV

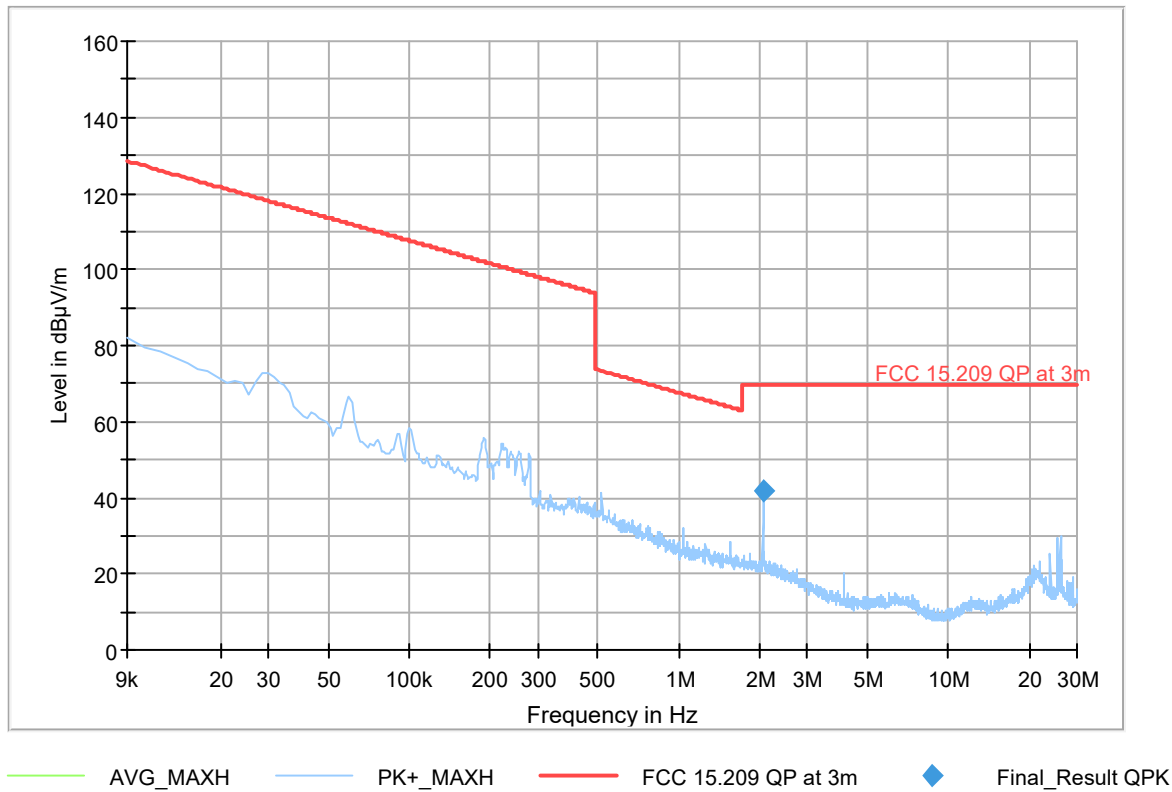
Plot # 16 Radiated Emissions: 9kHz - 30 MHz

Tx Frequency: 2402 MHz

GFSK (PHY: 2M,)

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)
2.056	41.848	69.50	27.65	500.0	9.0	100.0	H	180.0	13.1	0.3	-28.7	41.6	28.7



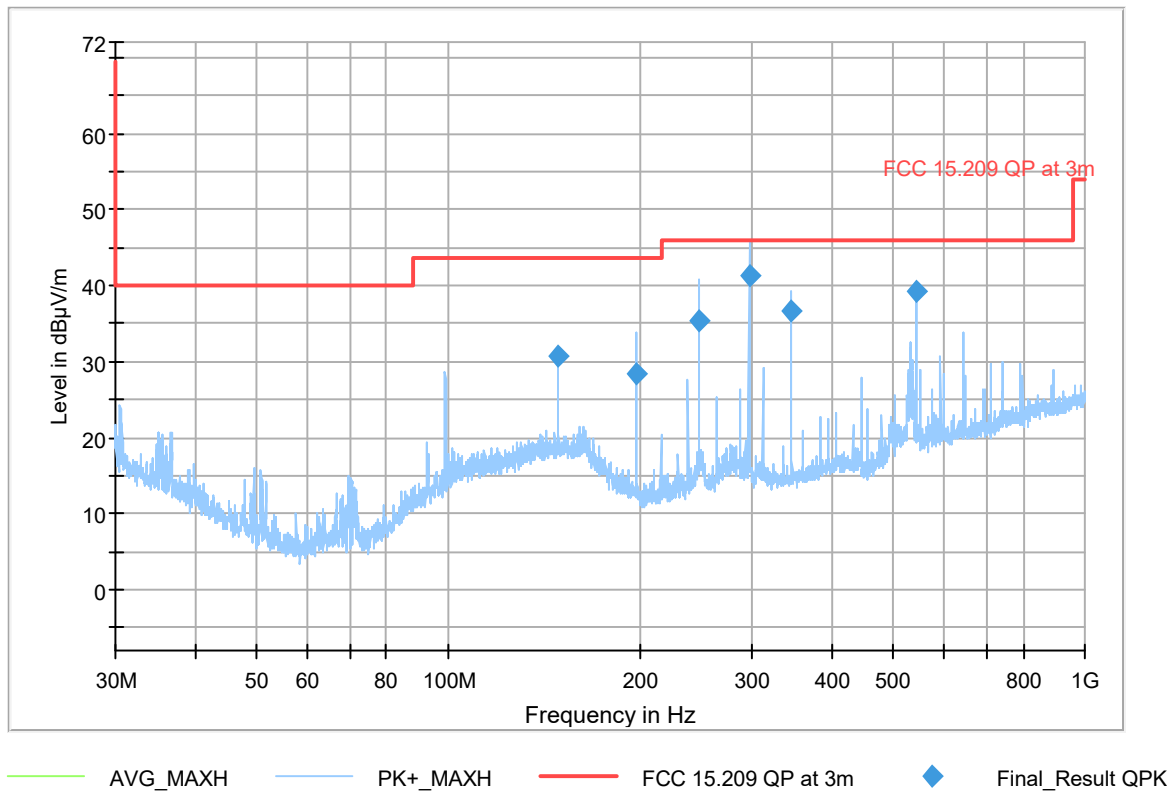
Plot # 17 Radiated Emissions: 30 MHz – 1 GHz

Tx Frequency: 2402 MHz

GFSK (PHY: 2M,)

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)
148.499	30.799	43.50	12.70	500.0	120.0	160.0	H	163.0	-9.3	-34.4	0.0	25.1	40.1
197.999	28.504	43.50	15.00	500.0	120.0	161.0	V	209.0	-15.3	-34.2	0.0	18.9	43.8
247.499	35.271	46.02	10.75	500.0	120.0	127.0	H	59.0	-11.6	-34.0	0.0	22.4	46.9
296.993	41.332	46.02	4.69	500.0	120.0	125.0	H	100.0	-13.9	-33.8	0.0	19.9	55.2
346.498	36.740	46.02	9.28	500.0	120.0	100.0	H	277.0	-12.8	-33.6	0.0	20.9	49.5
544.489	39.237	46.02	6.78	500.0	120.0	144.0	H	355.0	-8.5	-32.9	0.0	24.4	47.8



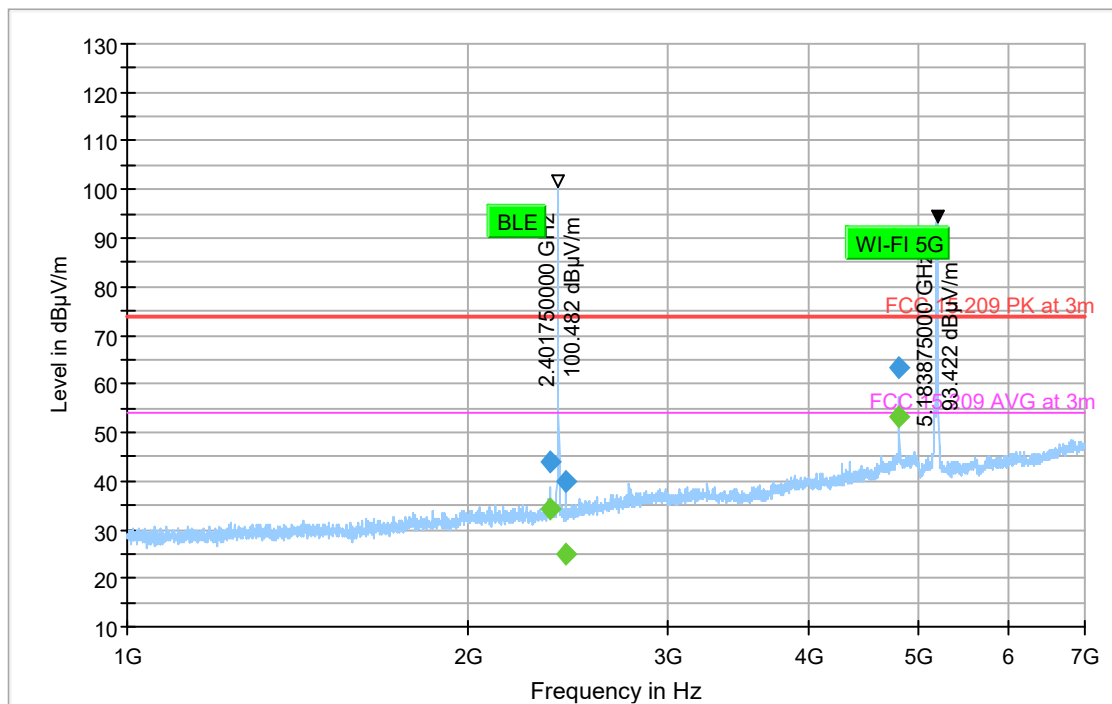
Plot # 18 Radiated Emissions: 1 – 3 GHz

Tx Frequency: 2402 MHz

GFSK (PHY: 2M,)

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)
2363.450	---	34.120	53.98	19.86	500.0	1000.0	229.0	V	138.0	5.7	-22.2	0.0	27.9	28.4
2363.450	44.077	---	73.98	29.90	500.0	1000.0	229.0	V	138.0	5.7	-22.2	0.0	27.9	38.4
2440.413	39.742	---	73.98	34.24	500.0	1000.0	107.0	V	54.0	5.9	-22.2	0.0	28.1	33.8
2440.413	---	25.088	53.98	28.89	500.0	1000.0	107.0	V	54.0	5.9	-22.2	0.0	28.1	19.2
4803.400	---	53.092	53.98	0.89	500.0	1000.0	228.0	H	233.0	12.6	-20.4	0.0	33.0	40.5
4803.400	63.247	---	73.98	10.73	500.0	1000.0	228.0	H	233.0	12.6	-20.4	0.0	33.0	50.6

◆ PK+_MAXH
Final_Result PK+◆ FCC 15.209 PK at 3m
Final_Result CAV

— FCC 15.209 AVG at 3m

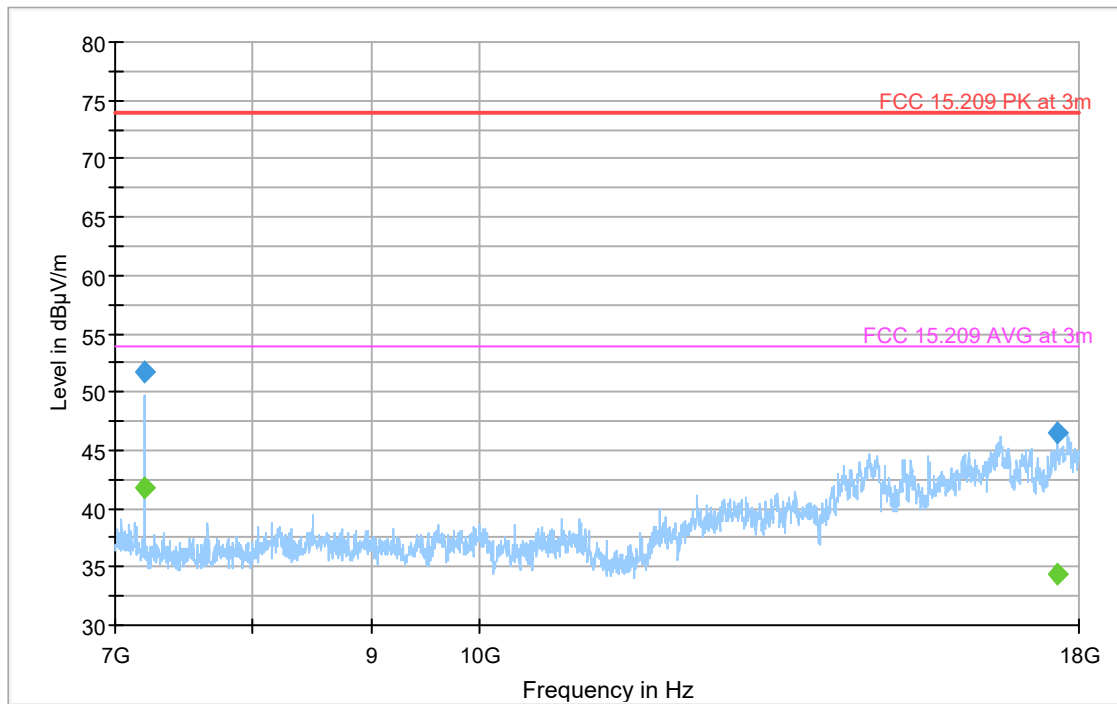
Plot # 19 Radiated Emissions: 3 – 18 GHz

Tx Frequency: 2402 MHz

GFSK (PHY: 2M,)

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)
7205.500	51.667	---	73.98	22.31	500.0	1000.0	125.0	H	132.0	-1.9	9.0	-46.8	36.0	53.5
7205.500	---	41.813	53.98	12.17	500.0	1000.0	125.0	H	132.0	-1.9	9.0	-46.8	36.0	43.7
17635.250	46.529	---	73.98	27.45	500.0	1000.0	171.0	H	328.0	13.9	15.3	-42.8	41.4	32.6
17635.250	---	34.356	53.98	19.62	500.0	1000.0	171.0	H	328.0	13.9	15.3	-42.8	41.4	20.4



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

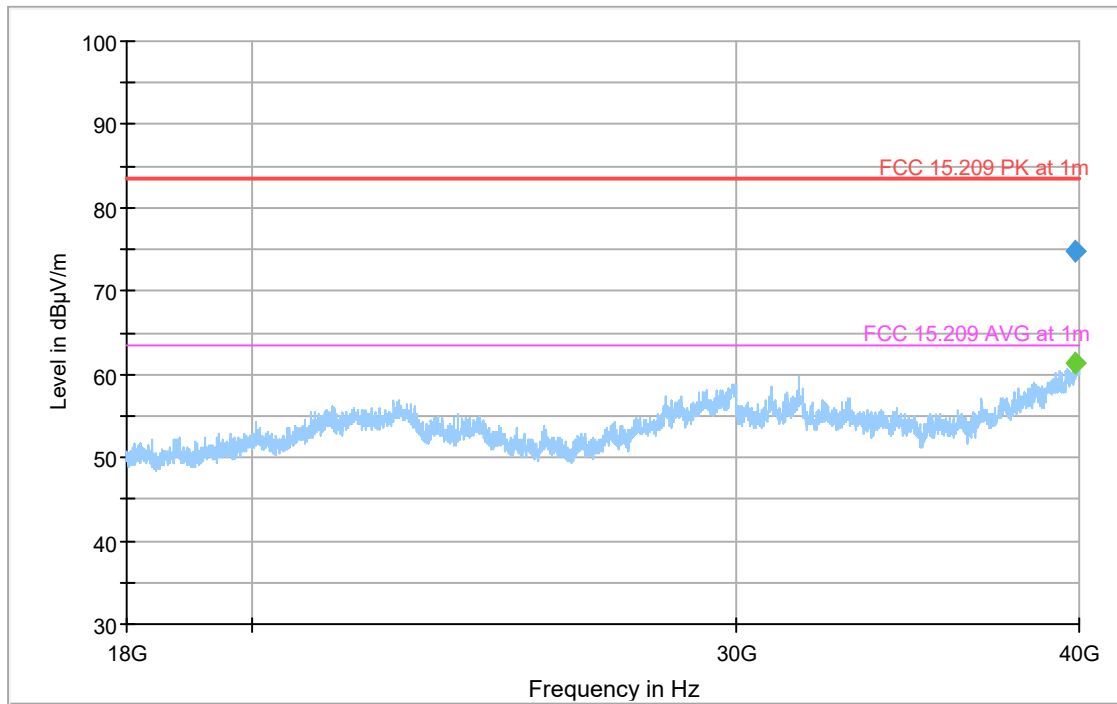
Plot # 20 Radiated Emissions: 18 – 26 GHz

Tx Frequency: 2402 MHz

GFSK (PHY: 2M,)

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)
39863.438	---	61.288	63.50	2.21	500.0	1000.0	212.0	H	252.0	24.2	12.7	0.0	11.5	37.1
39863.438	74.725	---	83.50	8.78	500.0	1000.0	212.0	H	252.0	24.2	12.7	0.0	11.5	50.6



AVG_MAXH
FCC 15.209 AVG at 1m

PK+ _MAXH
Final_Result PK+

FCC 15.209 PK at 1m
Final_Result CAV

8.2 AC Power Line Conducted Emissions

8.2.1 Measurement according to ANSI C63.4

Analyzer Settings:

- RBW = 9 KHz (CISPR Bandwidth)
- Detector: Peak / Average for Pre-scan
- Quasi-Peak/Average for Final Measurements

8.2.2 Limits: §15.207 & RSS-Gen 8.8

FCC §15.207(a) & RSS-Gen 8.8

- Except as shown in paragraphs (b) and (c) of this section of the CFR, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table (1), as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between frequency ranges.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*Decreases with the logarithm of the frequency.

8.2.3 Test conditions and setup:

Ambient Temperature ©	EUT Set-Up #	EUT operating mode	Power Input
22° C	1	Op. 1	120 Vac to 12 Vac

8.2.4 Measurement Result:

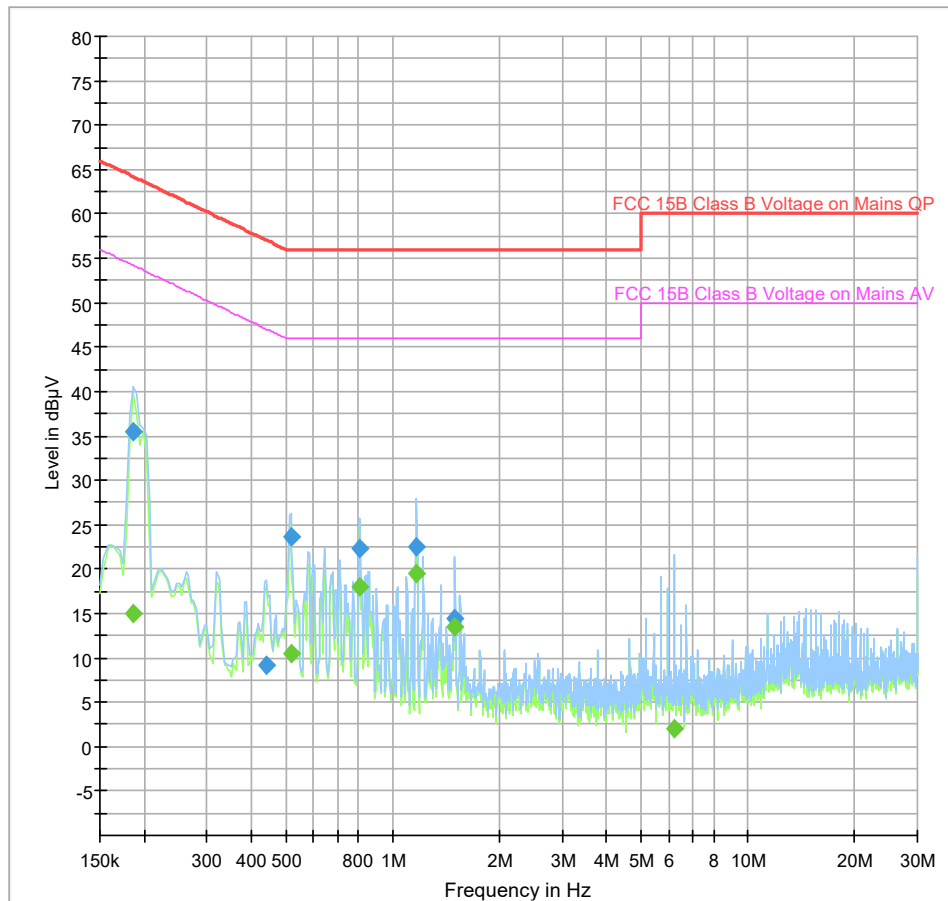
Plot #	Port	Scan Frequency	Limit	Result
1	AC Mains	150 kHz – 30 MHz	See section 8.2.2	Pass

8.2.5 Measurement Plots:

Plot # 1 AC Conducted Emissions: 150 KHz – 30 MHz

Final_Result

Frequency (MHz)	QuasiPeak (dBμV)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.186	---	14.95	54.20	39.25	1000.0	9.0	L1	GND	10.0
0.186	35.56	---	64.20	28.64	1000.0	9.0	L1	GND	10.0
0.440	9.11	---	57.05	47.94	1000.0	9.0	L1	GND	9.9
0.517	---	10.47	46.00	35.53	1000.0	9.0	L1	GND	9.9
0.517	23.57	---	56.00	32.43	1000.0	9.0	L1	GND	9.9
0.808	---	18.05	46.00	27.95	1000.0	9.0	L1	GND	9.9
0.808	22.34	---	56.00	33.66	1000.0	9.0	L1	GND	9.9
1.167	---	19.54	46.00	26.46	1000.0	9.0	L1	GND	9.9
1.167	22.48	---	56.00	33.52	1000.0	9.0	L1	GND	9.9
1.497	---	13.56	46.00	32.44	1000.0	9.0	L1	GND	9.9
1.497	14.37	---	56.00	41.63	1000.0	9.0	L1	GND	9.9
6.205	---	2.05	50.00	47.95	1000.0	9.0	L1	GND	9.9



AVG_MAXH
FCC 15B Class B Voltage on Mains QP
Final_Result QPK

PK+_MAXH
FCC 15B Class B Voltage on Mains AV
Final_Result CAV

9 Test setup photos

Setup photos are included in supporting file name: "EMC_LENXX_017_25001_FCC_15_247_Setup_Photos"

10 Test Equipment And Ancillaries Used For Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
Active Monopole	Com-Power Corp.	AM-741R	10200112	3 Years	11/09/2023
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
Signal Analyzer	R&S	FSV40	101022	3 Years	09/25/2023
Multimeter	Fluke	115	56090717MV	3 Years	09/26/2023
Software	EMC32	Version 10.50.40	-	-	-

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	Prepared by
2025-05-22	EMC_LENXX_017_25001_FCC_15_247_BLE	Initial Version	Cheng Song

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