FCC / ISED Test Report

For:
Life360, Inc.

Model Number:
TP401

Market Name:
Life360 PET GPS

Product Description:
Life360 PET GPS

Applied Rules and Standards:
47 CFR Part 15.247 (DTS)
RSS-247 Issue 3 (DTS) & RSS-Gen Issue 5

FCC ID: 2AKLITP401
IC: 11858A-TP401

REPORT #: EMC_JIOBI_013_25001_FCC_15_247_BTLE

DATE: 2025-06-17

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 No.
Life360, Inc.	Life360 PET GPS	TP401

Report Reviewer:

Date	Section	Name	Signature
2025-06-17	Compliance	Alvin, Ilarina (Senior Manager Regulatory Services)	Alvin ILARINA Digitally signed by Alvin ILARINA Date: 2025.06.17 16:38:47 -07'00'

Responsible for the Report:

Date	Section	Name	Signature
2025-06-17	Compliance	Cheng Song (EMC Engineer)	Cheng Song CN = Cheng Song email = cheng.song@cetecom.com C = US O = CETECOM INC. 2025.06.17 18:58:41 -07'00'

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
Senior Manager Regulatory Services:	Alvin, Ilarina
Responsible Project Leader:	Ruby, Hall

2.2 Identification of the Client

Applicant's Name:	Life360, Inc.
Street Address:	1900 S NORFOLK ST Suite 310
City/Zip Code	San Mateo CA 94403
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	TP401
Marketing Name	Life360 PET GPS
HW Version	TP401
SW Version	BT 64.22.51.7 Rftest MCU FW, 01-006 Wifi FW, 51441 Cell Modem FW
FCC ID	2AKLITP401
IC	11858A-TP401
Product Description	Life360 PET GPS
Radio Information as declared	**Cellular Modules** • Model: LBAD0ZZ2GD • FCC ID: HSW-TY2GD • IC: 4492A-TY2GD **Bluetooth** • Model: nRF5340 • Bluetooth Low Energy v5.4 **WLAN** • Model: DA16200MOD-AAC4WA32 • 802.11b/g/n
Antenna Information as declared	• 2.4 GHz Antenna (Bluetooth/BLE/802.11b/g/n) - Model: 410-10152-00 • Cellular Antenna
Power Supply/ Rated Operating Voltage Range	Nominal 3.8 VDC
Operating Temperature Range	-10 ºC to +60 ºC
Sample Revision	☐Prototype ☐Production ■Pre-Production
EUT Dimensions	50.2mm x 35.7mm x 16.7mm
Weight	<1.0 lb
Note: Details about the Equipment Under Test (EUT) are provided by the client or applicant.	

3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	0002	TP401	BT 64.22.51.7 Rftest MCU FW, 01-006 Wifi FW, 51441 Cell Modem FW	Radiated and AC Conducted Emissions
2	0005	TP401	BT 64.22.51.7 Rftest MCU FW, 01-006 Wifi FW, 51441 Cell Modem FW	Conducted RF

3.3 Accessory Equipment (AE) details

AE #	Type	Model	Manufacturer	Serial Number
1	20W Wall Charger	A2348	Anker	ATC95L0F11403953

3.4 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#1 + AE#1	External antennas were connected to the EUT during testing.
2	EUT#2 + AE#1	The measurement equipment was connected to the 50-ohm RF port of the EUT for conducted measurements.

3.5 Mode of Operation details

Mode of Operation	Description of Operating modes	Additional Information
Op. 1	BLE	The EUT was configured to operate in Bluetooth Low Energy (BLE) continuous transmission mode utilizing test software that is not accessible to the end user. During the testing process, measurements were conducted using the BLE physical layer configured at data rate of 1 Mbps.

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

4 Subject of Investigation

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

5 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	NA	NP	Result
§15.247(a)(1) RSS-247 5.2(a)	Emission Bandwidth	Nominal	Op. 1	■	☐	☐	Complies
§15.247(e) RSS-247 5.2(b)	Power Spectral Density	Nominal	Op. 1	■	☐	☐	Complies
§15.247(b)(1) RSS-247 5.4(d)	Maximum Conducted Output Power and EIRP	Nominal	Op. 1	■	☐	☐	Complies
§15.247(d) RSS-247 5.5	Band edge compliance Unrestricted Band Edges	Nominal	Op. 1	■	☐	☐	Complies
§15.247; 15.209; 15.205 RSS-Gen 8.9; 8.10	Band edge compliance Restricted Band Edges	Nominal	Op. 1	■	☐	☐	Complies
§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: NA= Not Applicable; NP= Not Performed.

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 1	EMC 2
Conducted emissions (mains port)	150 kHz – 30 MHz	2.47 dB	N/A
Radiated emissions	9 kHz – 30 MHz	2.68 dB	2.53 dB
	30 – 100 MHz	4.39 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

RF conducted measurement ±0.5 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:

2025-05-23 – 2025-06-03

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

Testing is performed according to the guidelines provided in ANSI C63.4-2014 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. The results are split up into up to 3 frequency ranges due to antenna bandwidth restrictions and according to ANSI C63.4 chap. 4.5. A loop antenna is used for 9 kHz – 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and Horn antennas are used to cover frequencies above 1 GHz.

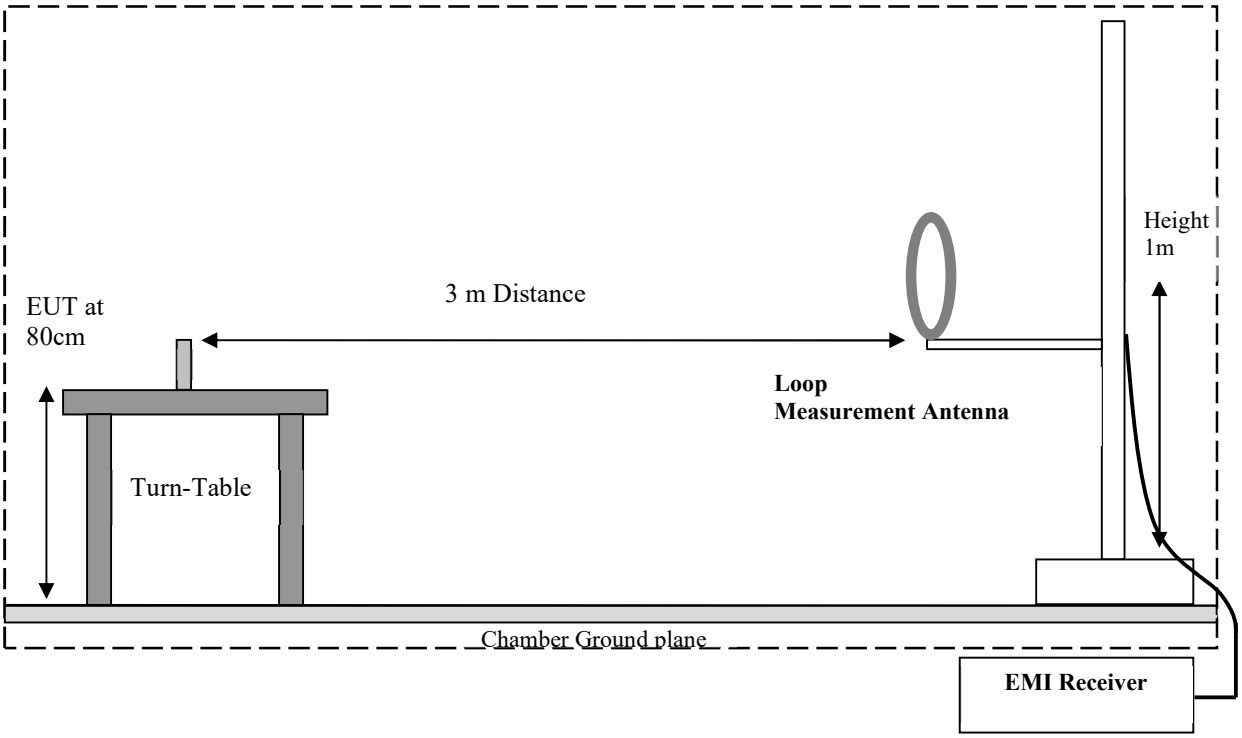
Step 1:

- The exploratory measurement is accomplished by running a matrix of sweeps over the required frequency range with R&S Test-SW EMC32 and continuous turntable movements during Preview (360°), two orthogonal positions of the EUT, and both antenna polarizations (Horizontal/Vertical) at three antenna heights (1, 1.5, 2 meters). This procedure exceeds the requirement of the above standards to cover the 3 orthogonal axes of the EUT. A max peak detector is utilized during the exploratory measurement. Test-SW creates an overall maximum trace for all sweeps and saves the settings for each point of this trace. The maximum trace is part of the test report.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above and step 2 is not being performed.

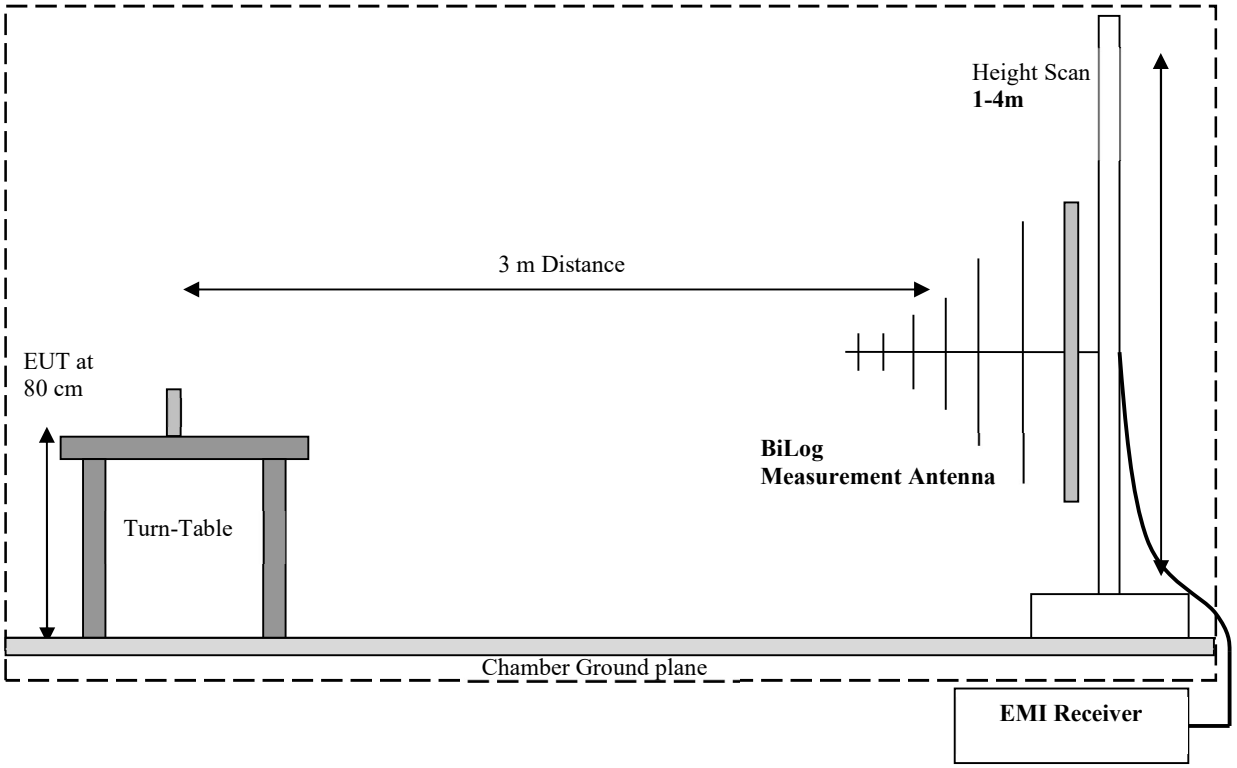
Step 2:

- The 6 highest emissions (emission level 6 dB higher than the noise floor and margin to the limit < 20 dB) 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.
- Add a marker to the highest emissions that does not exceed the margin threshold for final measurement.
- The maxima are then put through the final measurement and again maximized in a 90-degree range of the turntable, fine search in the frequency domain, and height scan between 1m and 4m
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.

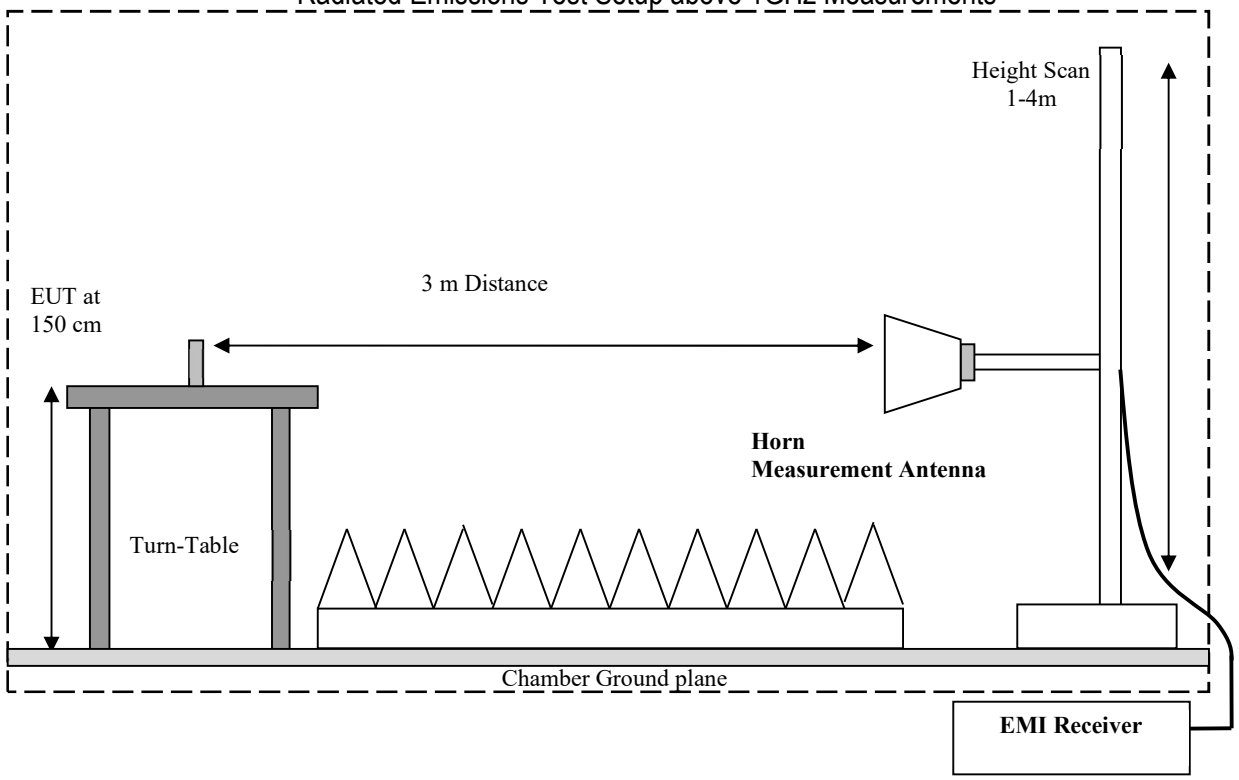
Radiated Emissions Test Setup below 30MHz Measurements



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 dBµV
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 (dBµV/m) = Measured Value on SA (dBµV) + Cable Loss (dB) + Antenna Factor (dB/m)

Example:

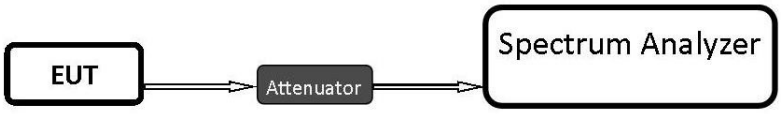
Frequency (MHz)	Measured SA (dBµV)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dBµV/m)
1000	80.5	3.5	14	98.0

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 Maximum Peak Conducted Output Power

8.1.1 Measurement according to FCC 558074 D01 15.247 Meas Guidance v05r02, and ANSI C63.10 Clause 11.

Spectrum Analyzer settings:

- RBW ≥ DTS bandwidth
- VBW ≥ 3 x RBW
- Span ≥ 3 x RBW
- Sweep = Auto couple
- Detector function = Peak
- Trace = Max hold
- Use peak marker function to determine the peak amplitude level

8.1.2 Limits:

Maximum Peak Output Power:

- FCC §15.247 (b): 1 W
- IC RSS-247: 1 W

8.1.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna Gain
22° C	2	Op. 1	120 VAC	1.63 dBi

8.1.4 Measurement result:

Test #	PHY	Frequency (MHz)	Maximum Peak Conducted Output Power (dBm)	EIRP (dBm)	Limit (dBm)	Result
1	LE 1M	2402	12.5	14.13	30 (Pk) / 36 (EIRP)	Pass
2	LE 1M	2440	12.7	14.33	30 (Pk) / 36 (EIRP)	Pass
3	LE 1M	2480	12.3	13.93	30 (Pk) / 36 (EIRP)	Pass

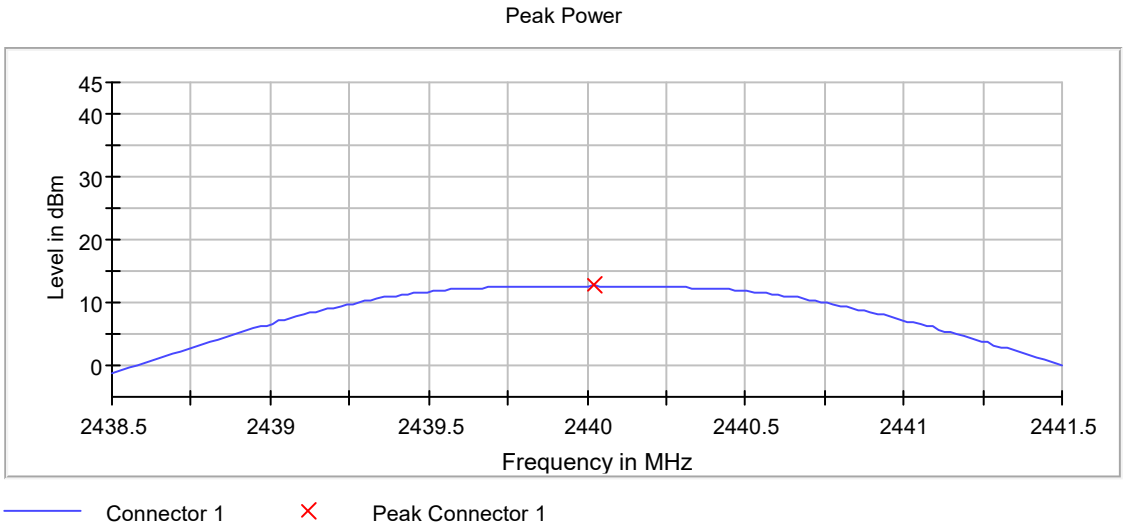
Note: For certain test cases where the measurement plots were determined to be similar, only the plot corresponding to the worst-case configuration is presented in the following section

8.1.5 Measurement Plots:

Peak output power (Sweep) (2440 MHz; 10.000 dBm; 1 MHz)

Result

DUT Frequency (MHz)	Peak Power (dBm)	Limit Max (dBm)	Result
2440.000000	12.7	30.0	PASS



8.2 Power Spectral Density

8.2.1 Measurement according to FCC 558074 D01 15.247 Meas Guidance v05r02, and ANSI C63.10 Clause 11.

Spectrum Analyzer settings for Peak PSD method:

- Set analyzer center frequency to DTS channel center frequency
- Set the span to 1.5 x DTS bandwidth
- Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz
- Set the VBW ≥ 3 x RBW
- Detector = Peak
- Sweep time = Auto couple
- Trace mode = Max hold
- Allow trace to fully stabilize
- Use the peak marker function to determine the maximum amplitude level within the RBW
- If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat

8.2.2 Limits:

FCC§15.247(e) & RSS-247 5.2(b)

- For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

8.2.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna Gain
22° C	2	Op. 1	120 VAC	1.63 dBi

8.2.4 Measurement result:

Test #	PHY	Frequency (MHz)	Maximum Power Spectral Density (dBm/3 kHz)	Limit (dBm / 3 kHz)	Result
1	LE 1M	2402	2.539	8	Pass
2	LE 1M	2440	2.654	8	Pass
3	LE 1M	2480	2.213	8	Pass

Note: For certain test cases where the measurement plots were determined to be similar, only the plot corresponding to the worst-case configuration is presented in the following section.

8.2.5 Measurement Plots:

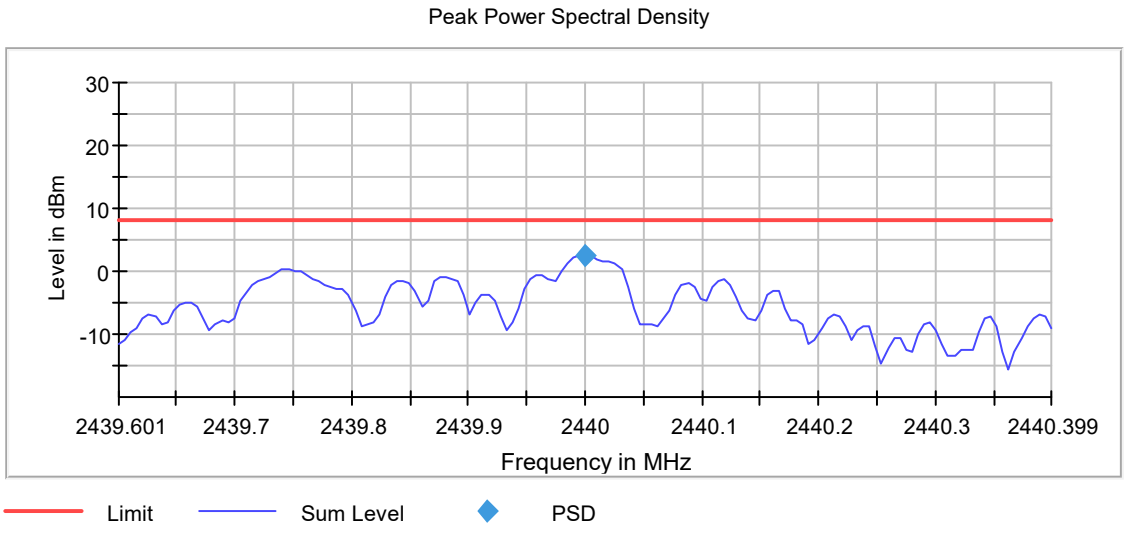
Peak Power Spectral Density (2440 MHz; 10.000 dBm; 1 MHz)

Result

DUT Frequency (MHz)	Frequency (MHz)	PSD (dBm)	Limit Max (dBm)	Result
2440.000000	2440.000000	2.654	8.0	PASS

Ports

Port	State
1	used



8.3 Band Edge Compliance

8.3.1 Measurement according to FCC 558074 D01 15.247 Meas Guidance v05r02, and ANSI C63.10 Clause 11.

Spectrum Analyzer settings for band edge:

- Set the center frequency and span to encompass frequency range to be measured
- RBW = 100 kHz
- VBW ≥ 3 x RBW
- Sweep Time: Auto couple
- Detector = Peak
- Trace = Max hold
- Allow trace to fully stabilize
- Use the peak marker function to determine the maximum amplitude level
- Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge

8.3.2 Limits non restricted band:

FCC§15.247 (d)

- 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)).

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- 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 30dB instead of 20dB.

Spectrum Analyzer settings for restricted band:

- Peak measurements are made using a peak detector and RBW=1 MHz

8.3.3 Limits restricted band §15.247/15.209/15.205 and RSS-Gen 8.9/8.10

- *PEAK LIMIT= 74 dBµV/m @3m =-21.23 dBm
- *AVG. LIMIT= 54 dBµV/m @3m =-41.23 dBm
- Start frequency & stop frequency according to frequency range specified in the restricted band table in FCC section 15.205 & RSS-Gen 8.10
- Measurements with a peak detector were used to show compliance to average limits, thus showing compliance to both peak and average limits.

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

8.3.4 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna Gain
22° C	2	Op. 1	120 VAC	1.63 dBi

8.3.5 Measurement result:

Test #	EUT operating mode	PHY	Band Edge	Level (dBm)	Margin (dB)	Limit (dBm)	Result
1	Op. 1	LE 1M	Lower, Non-restricted (conducted)	-36.7	28.9	-7.8	Pass

8.3.6 Measurement Plots:

Band Edge low (2402 MHz; 10.000 dBm; 1 MHz)

Result

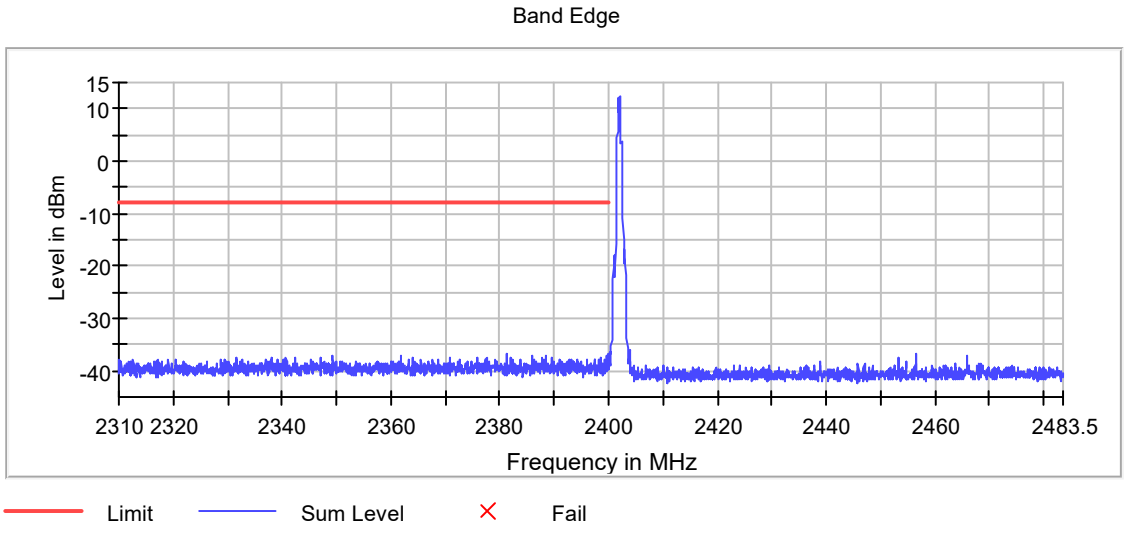
DUT Frequency (MHz)	Result
2402.000000	PASS

Inband Peak

Frequency (MHz)	Level (dBm)
2402.013824	12.2

Measurements

Frequency (MHz)	Level (dBm)	Margin (dB)	Limit (dBm)	Result
2399.900000	-36.7	28.9	-7.8	PASS
2381.200000	-36.8	29.0	-7.8	PASS
2349.350000	-37.0	29.2	-7.8	PASS
2385.850000	-37.1	29.3	-7.8	PASS
2361.950000	-37.1	29.3	-7.8	PASS
2399.550000	-37.2	29.5	-7.8	PASS
2381.150000	-37.3	29.5	-7.8	PASS
2388.500000	-37.3	29.5	-7.8	PASS
2399.850000	-37.3	29.5	-7.8	PASS
2399.500000	-37.3	29.5	-7.8	PASS
2388.550000	-37.4	29.6	-7.8	PASS
2340.750000	-37.4	29.6	-7.8	PASS
2387.900000	-37.5	29.7	-7.8	PASS
2382.050000	-37.5	29.7	-7.8	PASS
2389.600000	-37.5	29.7	-7.8	PASS



8.4 Emission Bandwidth 6dB and 99% Occupied Bandwidth

8.4.1 Measurement according to FCC 558074 D01 15.247 Meas Guidance v05r02, and ANSI C63.10 Clause 11.

Spectrum Analyzer settings:

6dB (DTS) Bandwidth:

- Set RBW = 100 kHz
- Set the video bandwidth (VBW) ≥ 3 x RBW
- Detector = Peak
- Trace mode = Max hold
- Sweep = Auto couple
- Allow the trace to stabilize
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

99% Occupied Bandwidth:

- Set frequency = nominal EUT channel center frequency
- Set Span = 1.5 x to 5.0 x OBW
- Set RBW = 1% to 5% of OBW
- Set the video bandwidth (VBW) ≈ 3 x RBW
- Detector = Peak
- Trace mode = Max hold
- Sweep = Auto couple
- Allow the trace to stabilize
- Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth
- If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

8.4.2 Limits:

FCC §15.247(a)(2) and RSS-247 5.2(a)

- Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

8.4.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
22° C	2	Op. 1	120 VAC

8.4.4 Measurement result:

Test #	Frequency (MHz)	PHY	6dB Emissions Bandwidth (MHz)	Limit (MHz)	Result
1	2402	LE 1M	0.571428	> 0.5	Pass
2	2440	LE 1M	0.532467	> 0.5	Pass
3	2480	LE 1M	0.584415	> 0.5	Pass

Note: For certain test cases where the measurement plots were determined to be similar, only the plot corresponding to the worst-case configuration is presented in the following section.

Test #	Frequency (MHz)	PHY	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
4	2402	LE 1M	1.050000	N/A	Pass
5	2440	LE 1M	1.050000	N/A	Pass
6	2480	LE 1M	1.055000	N/A	Pass

Note: For certain test cases where the measurement plots were determined to be similar, only the plot corresponding to the worst-case configuration is presented in the following section.

8.4.5 Measurement Plots:

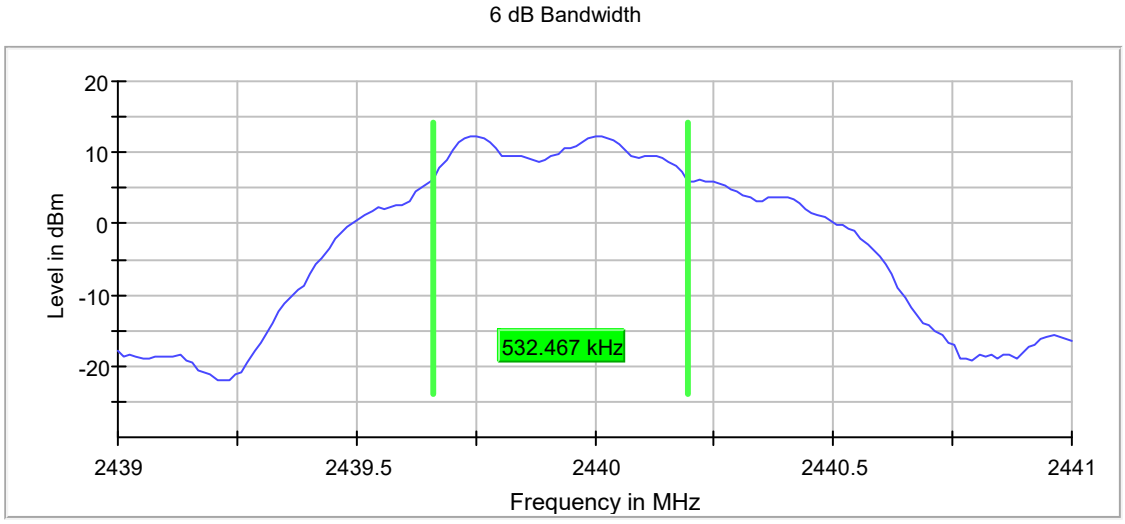
Minimum Emission Bandwidth 6 dB (2440 MHz; 10.000 dBm; 1 MHz)

6 dB Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2440.000000	0.532467	0.500000	---	2439.662338	2440.194805

(continuation of the "6 dB Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Max Level (dBm)	Result
2440.000000	12.2	PASS



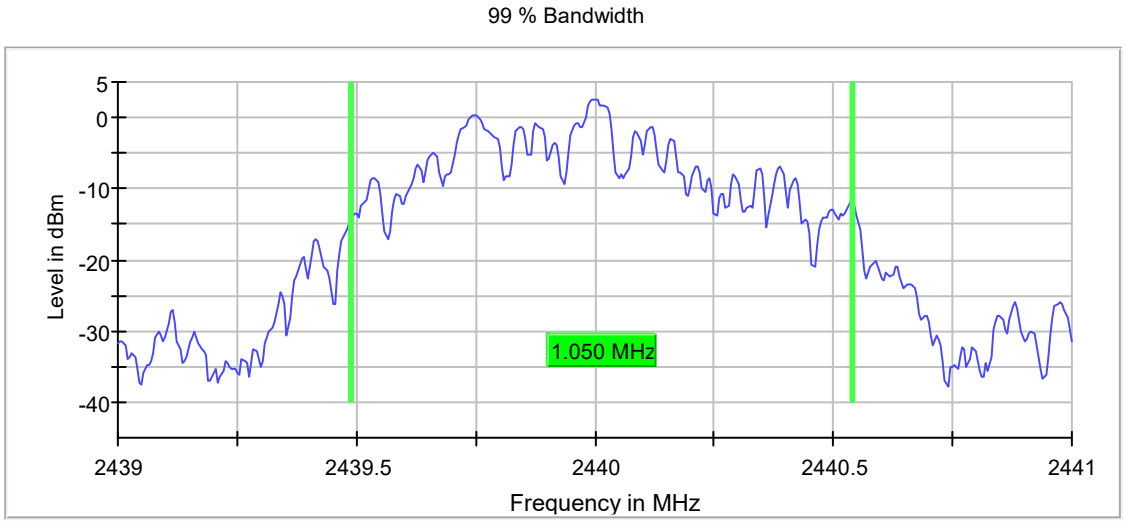
Occupied Channel Bandwidth 99% (2440 MHz; 10.000 dBm; 1 MHz)

99 % Bandwidth

DUT Frequency (MHz)	Bandwidth (MHz)	Limit Min (MHz)	Limit Max (MHz)	Band Edge Left (MHz)	Band Edge Right (MHz)
2440.000000	1.050000	---	---	2439.490000	2440.540000

(continuation of the "99 % Bandwidth" table from column 6 ...)

DUT Frequency (MHz)	Result
2440.000000	PASS



8.5 Radiated Transmitter Spurious Emissions and Restricted Bands

8.5.1 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.

8.5.2 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
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	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

8.5.3 Test conditions and setup:

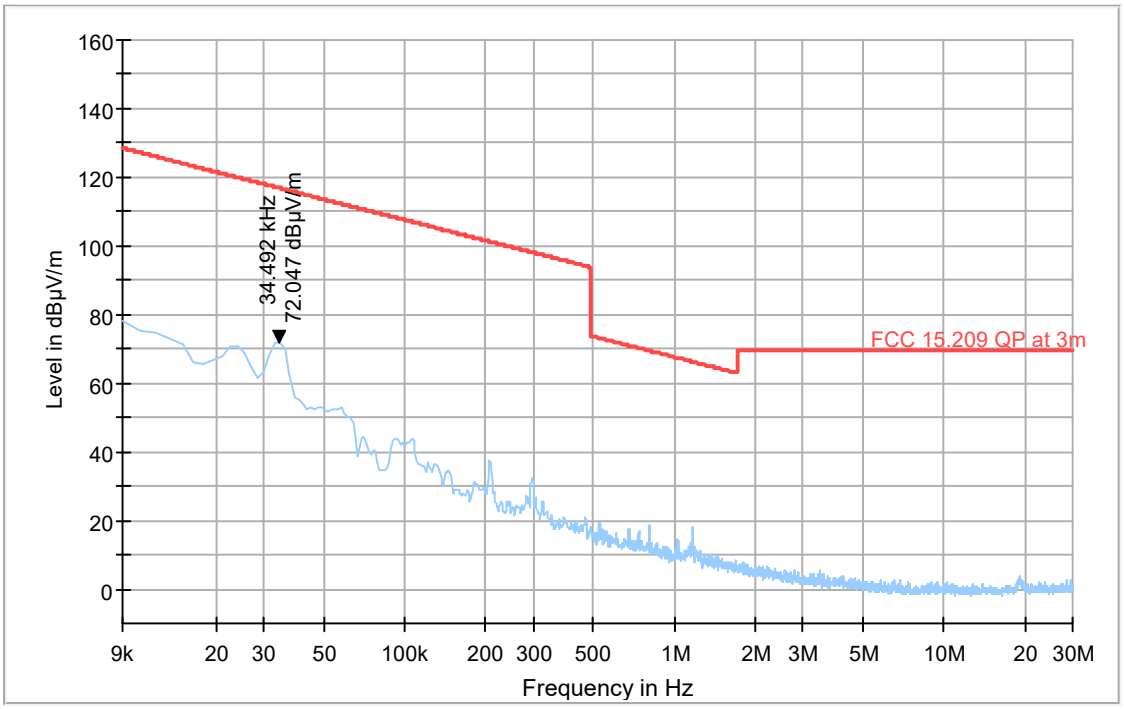
Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
22° C	1	Op. 1	120 VAC

8.5.4 Measurement result:

Plot #	Channel #	PHY	Scan Frequency	Limit	Result
1-5	Low	LE 1M	9 kHz – 26 GHz	See section 8.5.2	Pass
6-10	Mid	LE 1M	9 kHz – 26 GHz	See section 8.5.2	Pass
11-15	High	LE 1M	9 kHz – 26 GHz	See section 8.5.2	Pass
16	High	LE 1M	Upper Restricted Band Edge	See section 8.5.2	Pass

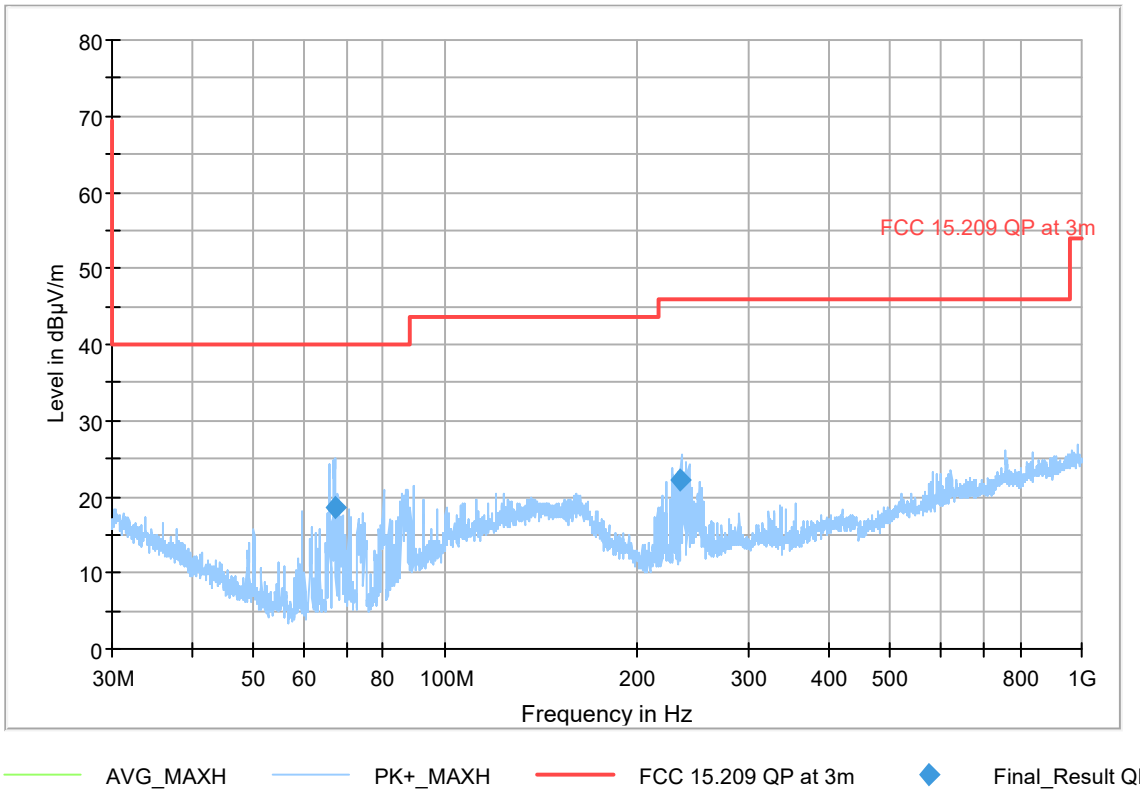
8.5.5 Measurement Plots:

Plot # 1



Plot # 2

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)
67.115	18.564	40.00	21.44	500.0	120.0	188.0	V	126.0	-21.9	-34.8	0.0	12.9	40.5
234.863	22.254	46.02	23.77	500.0	120.0	196.0	H	268.0	-15.3	-34.0	0.0	18.7	37.5

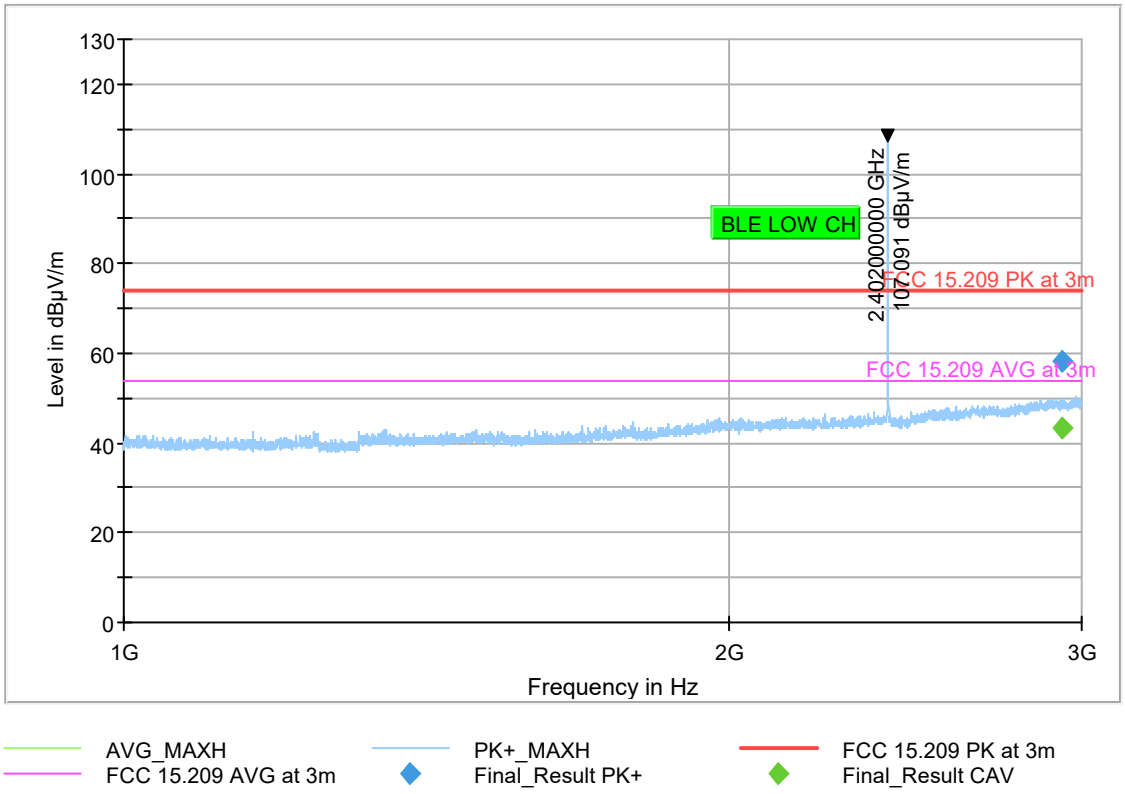


Plot # 3

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)
2935.950	---	43.410	53.98	10.57	500.0	1000.0	400.0	V	320.0	35.5	5.9	0.0	29.5
2935.950	58.201	---	73.98	15.78	500.0	1000.0	400.0	V	320.0	35.5	5.9	0.0	29.5

(continuation of the "Final_Result" table from column 19 ...)

Frequency (MHz)	Raw Rec (dBµV)
2935.950	7.9
2935.950	22.7

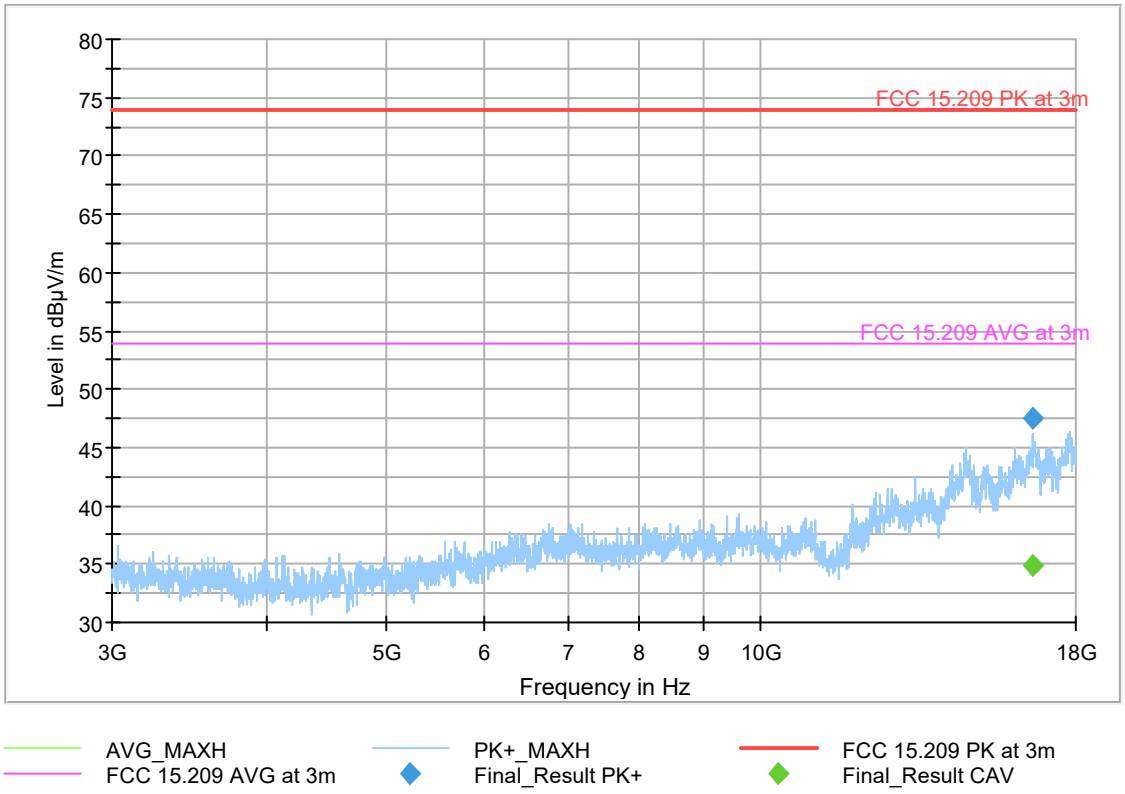


Plot # 4

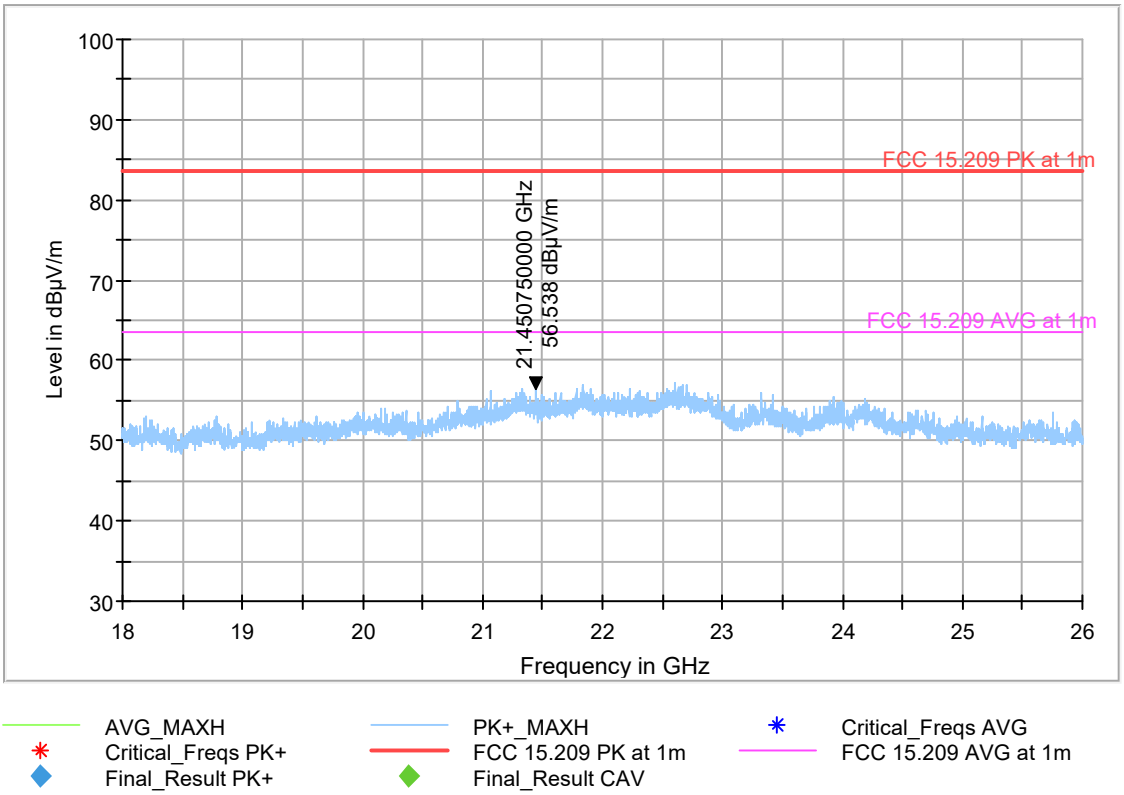
Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)
16631.500	---	34.815	53.98	19.16	500.0	1000.0	377.0	V	288.0	13.8	15.2	-42.6	41.2
16631.500	47.555	---	73.98	26.42	500.0	1000.0	377.0	V	288.0	13.8	15.2	-42.6	41.2

(continuation of the "Final_Result" table from column 19 ...)

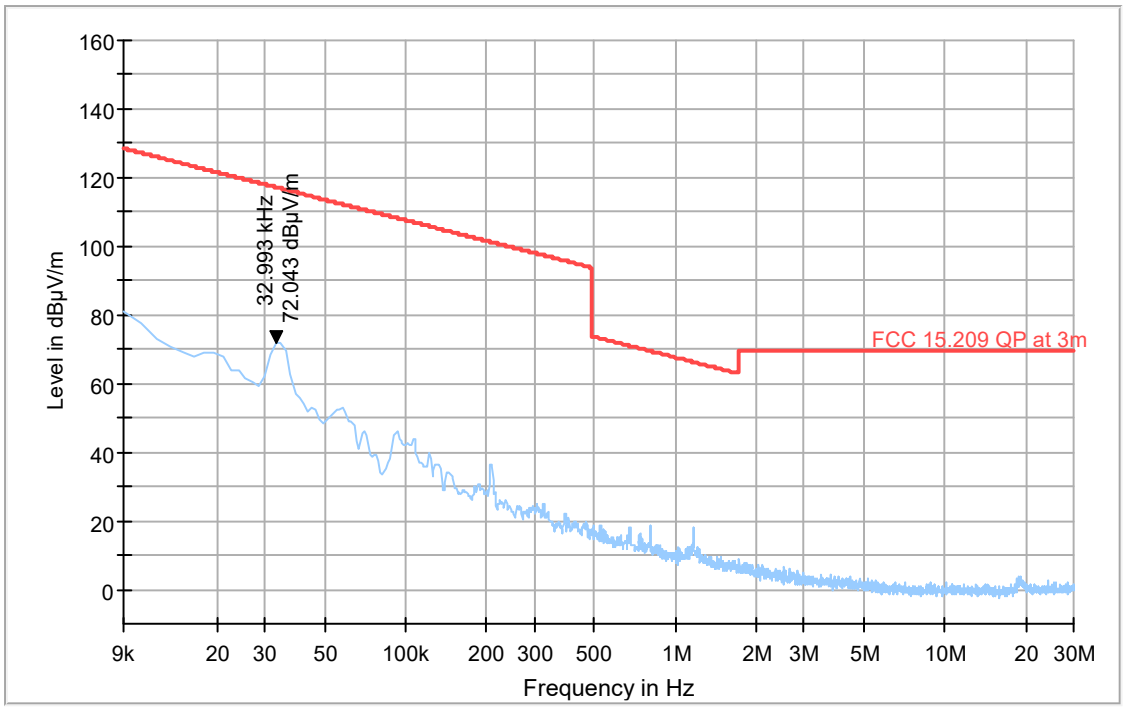
Frequency (MHz)	Raw Rec (dBµV)
16631.500	21.0
16631.500	33.8



Plot # 5

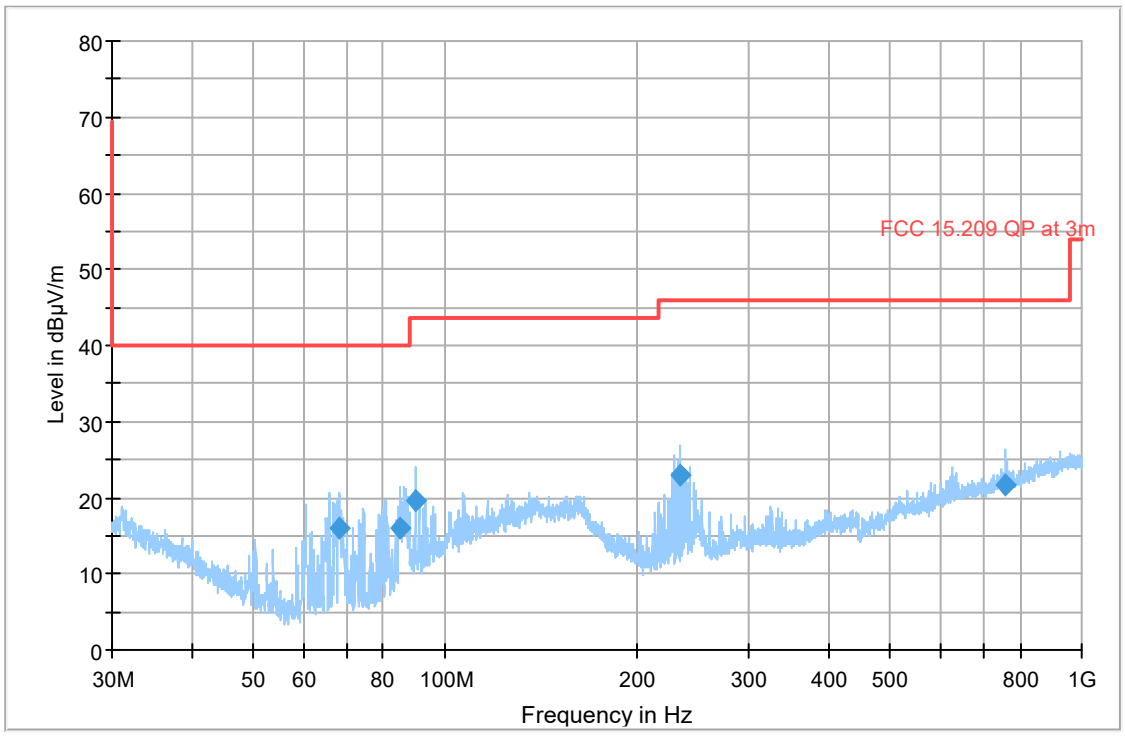

100
90
80
70
60
50
40
30
18
19
20
21
22
23
24
25
26
Level in dBµV/m
Frequency in GHz
FCC 15.209 PK at 1m
FCC 15.209 AVG at 1m
21.450750000 GHz
56.538 dBµV/m
AVG_MAXH
Critical_Freqs PK+
Final_Result PK+
PK+_MAXH
FCC 15.209 PK at 1m
Final_Result CAV
Critical_Freqs AVG
FCC 15.209 AVG at 1m

Plot # 6


160
140
120
100
80
60
40
20
0
Level in dBµV/m
32.993 kHz
72.043 dBµV/m
FCC 15.209 QP at 3m
9k
20
30
50
100k
200
300
500
1M
2M
3M
5M
10M
20
30M
Frequency in Hz
AVG_MAXH
PK+_MAXH
Critical_Freqs AVG
Critical_Freqs PK+
FCC 15.209 QP at 3m
Final_Result QPK

Plot # 7

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)
68.049	16.122	40.00	23.88	500.0	120.0	258.0	V	108.0	-22.5	-34.8	0.0	12.4	38.6
85.021	16.052	40.00	23.95	500.0	120.0	130.0	V	109.0	-17.6	-34.7	0.0	17.1	33.6
89.777	19.587	43.50	23.91	500.0	120.0	161.0	V	156.0	-16.1	-34.6	0.0	18.5	35.7
234.766	23.038	46.02	22.98	500.0	120.0	205.0	H	257.0	-15.3	-34.0	0.0	18.7	38.3
760.628	21.661	46.02	24.36	500.0	120.0	197.0	V	218.0	-4.8	-32.3	0.0	27.5	26.5

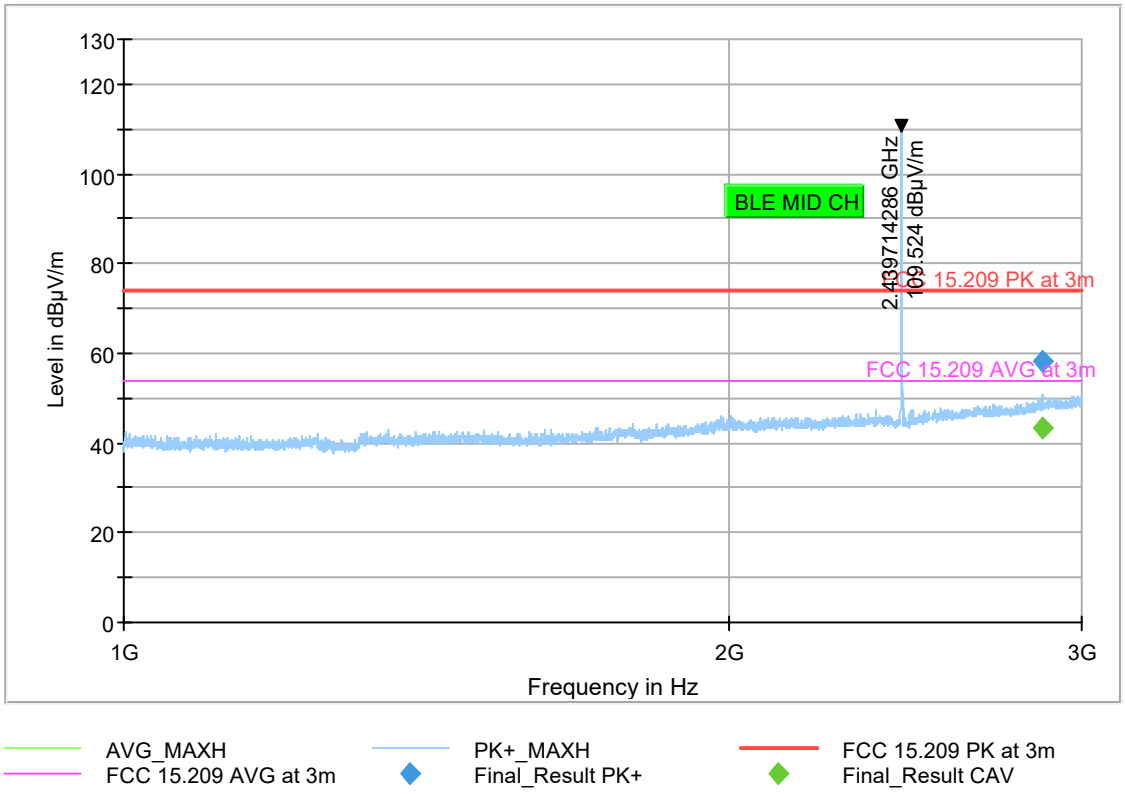


Plot # 8

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)
2866.950	---	43.134	53.98	10.85	500.0	1000.0	185.0	V	9.0	35.1	5.9	0.0	29.2
2866.950	58.381	---	73.98	15.60	500.0	1000.0	185.0	V	9.0	35.1	5.9	0.0	29.2

(continuation of the "Final_Result" table from column 19 ...)

Frequency (MHz)	Raw Rec (dBµV)
2866.950	8.0
2866.950	23.3

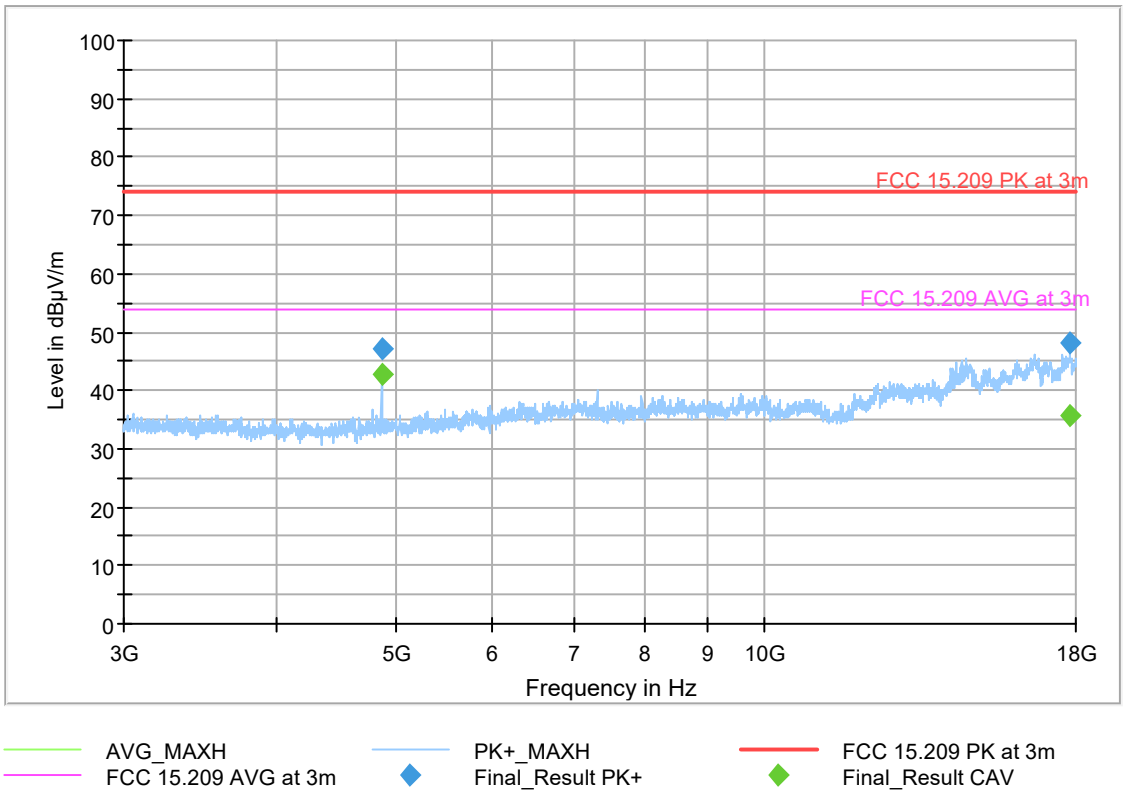


Plot # 9

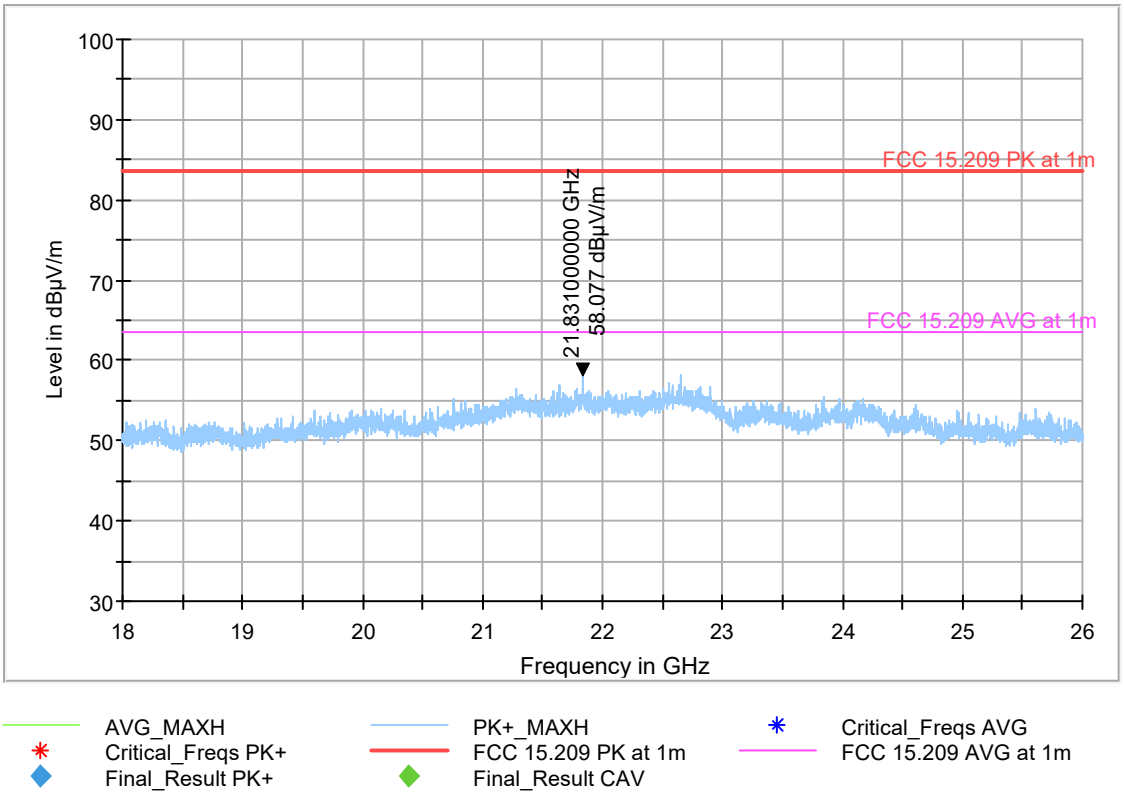
Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)
4872.000	---	42.733	53.98	11.25	500.0	1000.0	100.0	H	74.0	-4.8	7.0	-45.9	34.1
4872.000	46.985	---	73.98	26.99	500.0	1000.0	100.0	H	74.0	-4.8	7.0	-45.9	34.1
17796.250	---	35.599	53.98	18.38	500.0	1000.0	188.0	H	140.0	14.4	15.5	-42.6	41.5
17796.250	48.247	---	73.98	25.73	500.0	1000.0	188.0	H	140.0	14.4	15.5	-42.6	41.5

(continuation of the "Final_Result" table from column 19 ...)

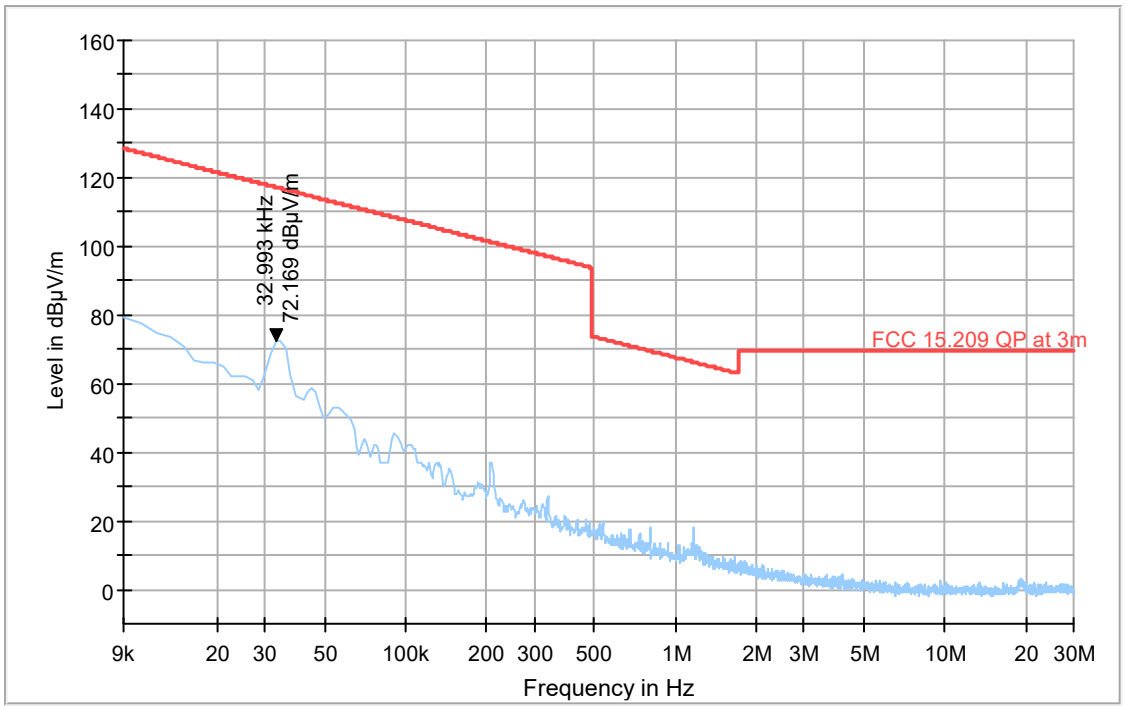
Frequency (MHz)	Raw Rec (dBµV)
4872.000	47.5
4872.000	51.7
17796.250	21.2
17796.250	33.8



Plot # 10

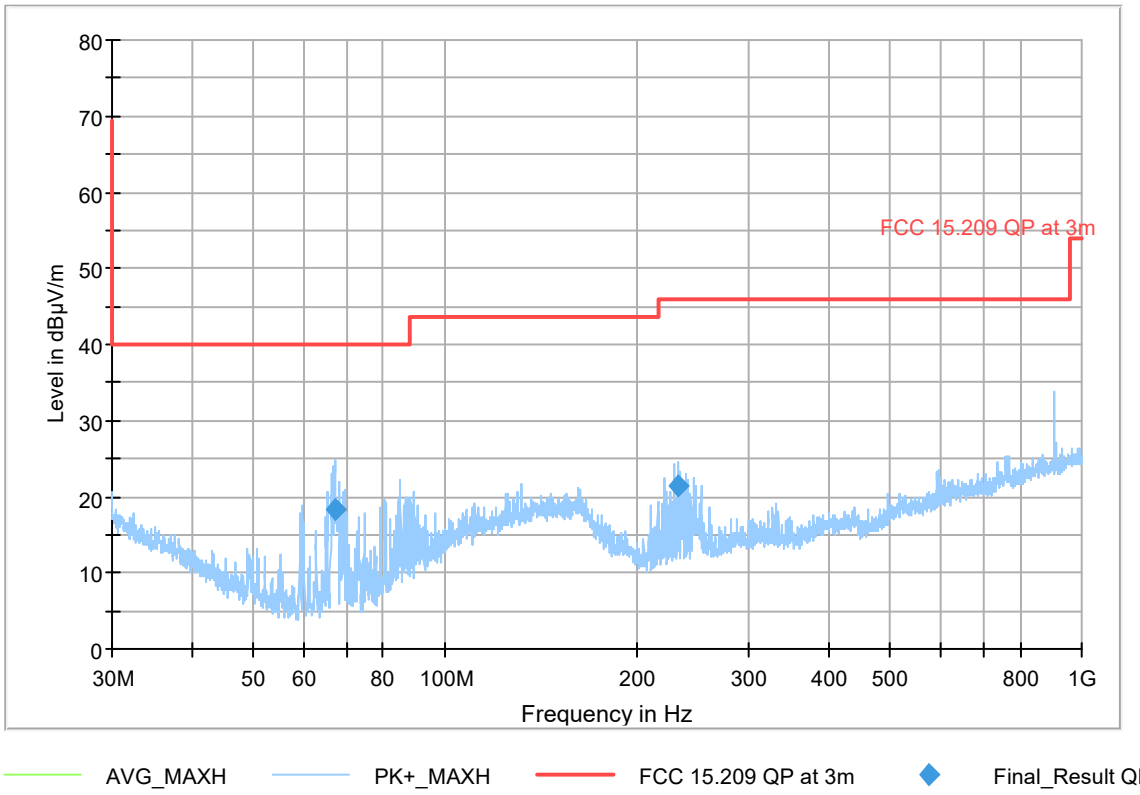

100
90
80
70
60
50
40
30
18
19
20
21
22
23
24
25
26
Level in dBµV/m
Frequency in GHz
FCC 15.209 PK at 1m
FCC 15.209 AVG at 1m
21.831000000 GHz
58.077 dBµV/m
AVG_MAXH
Critical_Freqs PK+
Final_Result PK+
PK+_MAXH
FCC 15.209 PK at 1m
Final_Result CAV
Critical_Freqs AVG
FCC 15.209 AVG at 1m

Plot # 11


160
140
120
100
80
60
40
20
0
Level in dBµV/m
32.993 kHz
72.169 dBµV/m
FCC 15.209 QP at 3m
9k
20
30
50
100k
200
300
500
1M
2M
3M
5M
10M
20
30M
Frequency in Hz
AVG_MAXH
PK+_MAXH
Critical_Freqs AVG
Critical_Freqs PK+
FCC 15.209 QP at 3m
Final_Result QPK

Plot # 12

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)
67.152	18.421	40.00	21.58	500.0	120.0	143.0	V	223.0	-21.9	-34.8	0.0	12.9	40.4
233.020	21.540	46.02	24.48	500.0	120.0	188.0	H	268.0	-15.4	-34.0	0.0	18.6	37.0

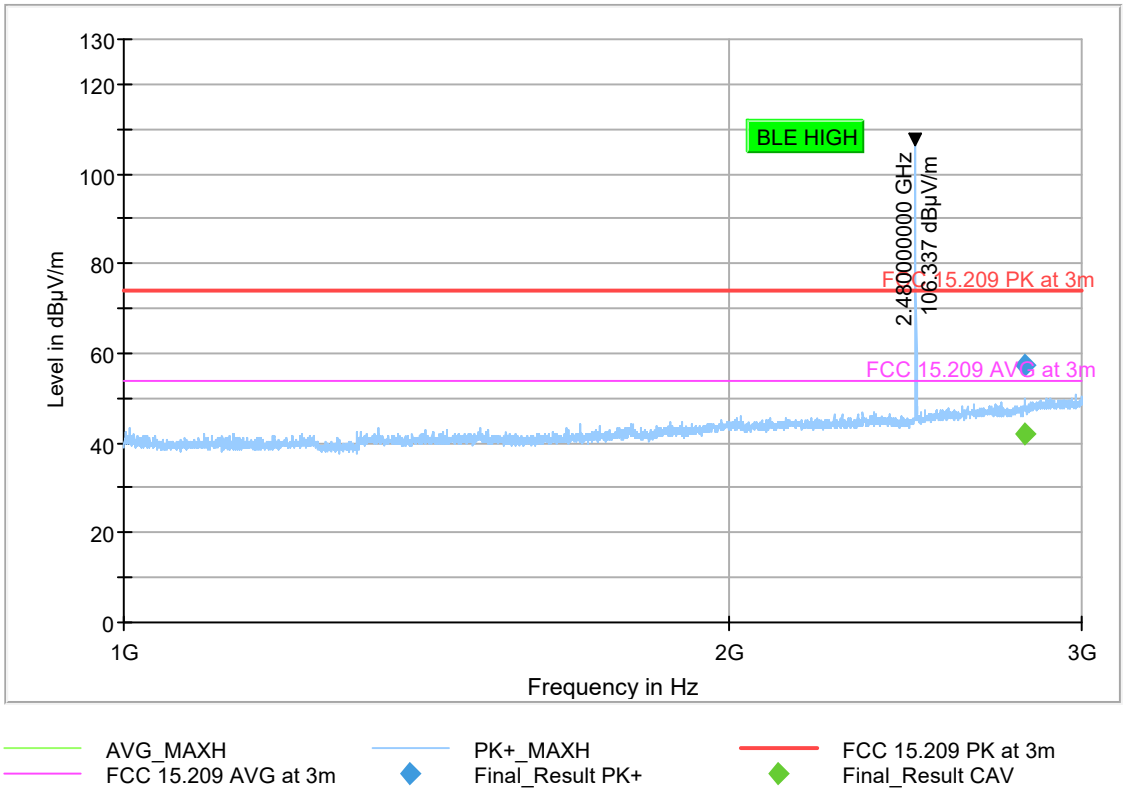


Plot # 13

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)
2809.336	57.517	---	73.98	16.46	500.0	1000.0	135.0	H	134.0	34.6	5.7	0.0	28.9
2809.336	---	42.127	53.98	11.85	500.0	1000.0	135.0	H	134.0	34.6	5.7	0.0	28.9

(continuation of the "Final_Result" table from column 19 ...)

Frequency (MHz)	Raw Rec (dBµV)
2809.336	22.9
2809.336	7.5

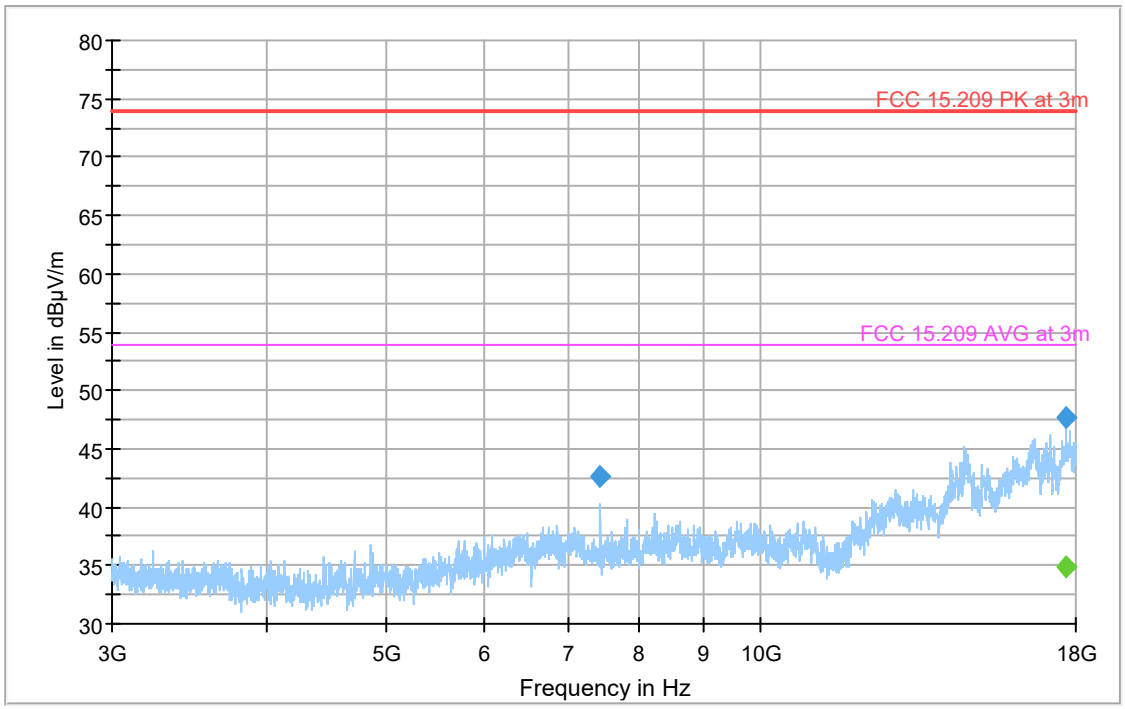


Plot # 14

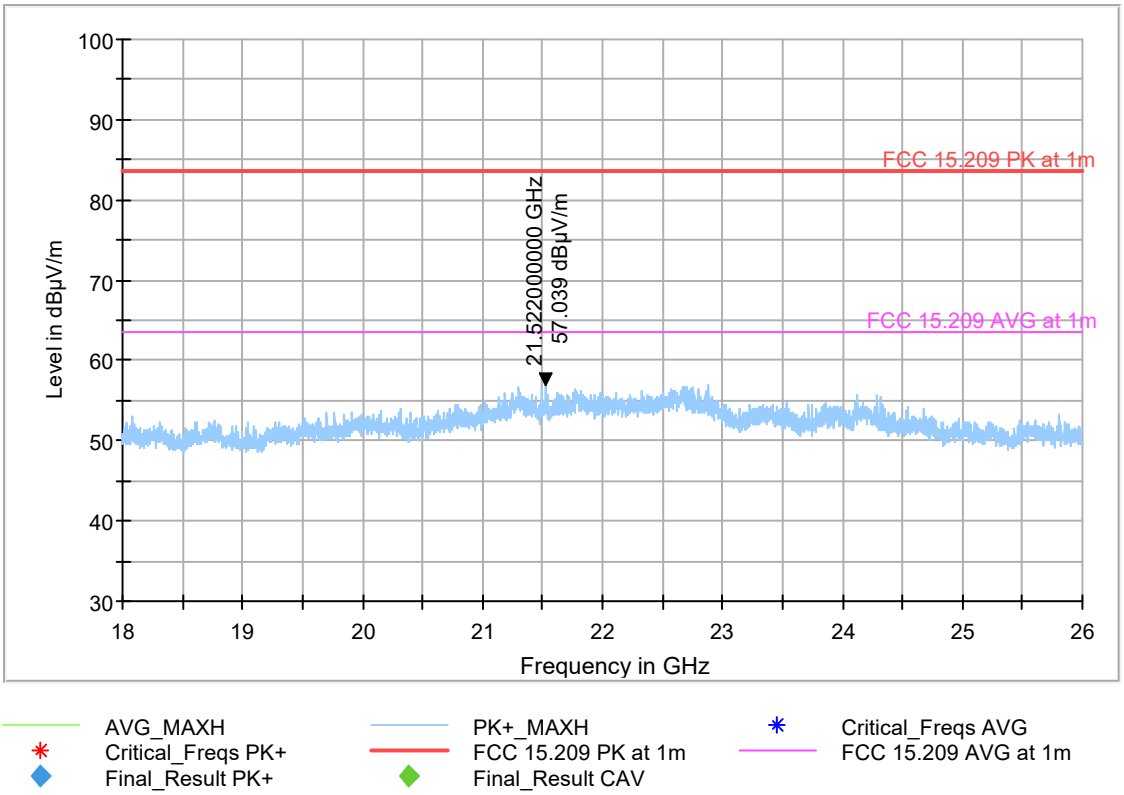
Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Sig Path (dB)	Preamp (dB)	Trd Corr. (dB/m)
7440.250	---	27.612	53.98	26.37	500.0	1000.0	360.0	V	226.0	-1.6	9.2	-46.7	35.9
7440.250	42.623	---	73.98	31.36	500.0	1000.0	360.0	V	226.0	-1.6	9.2	-46.7	35.9
17695.500	---	34.881	53.98	19.10	500.0	1000.0	365.0	H	-6.0	14.1	15.4	-42.7	41.4
17695.500	47.759	---	73.98	26.22	500.0	1000.0	365.0	H	-6.0	14.1	15.4	-42.7	41.4

(continuation of the "Final_Result" table from column 19 ...)

Frequency (MHz)	Raw Rec (dBµV)
7440.250	29.2
7440.250	44.2
17695.500	20.8
17695.500	33.6



Plot # 15

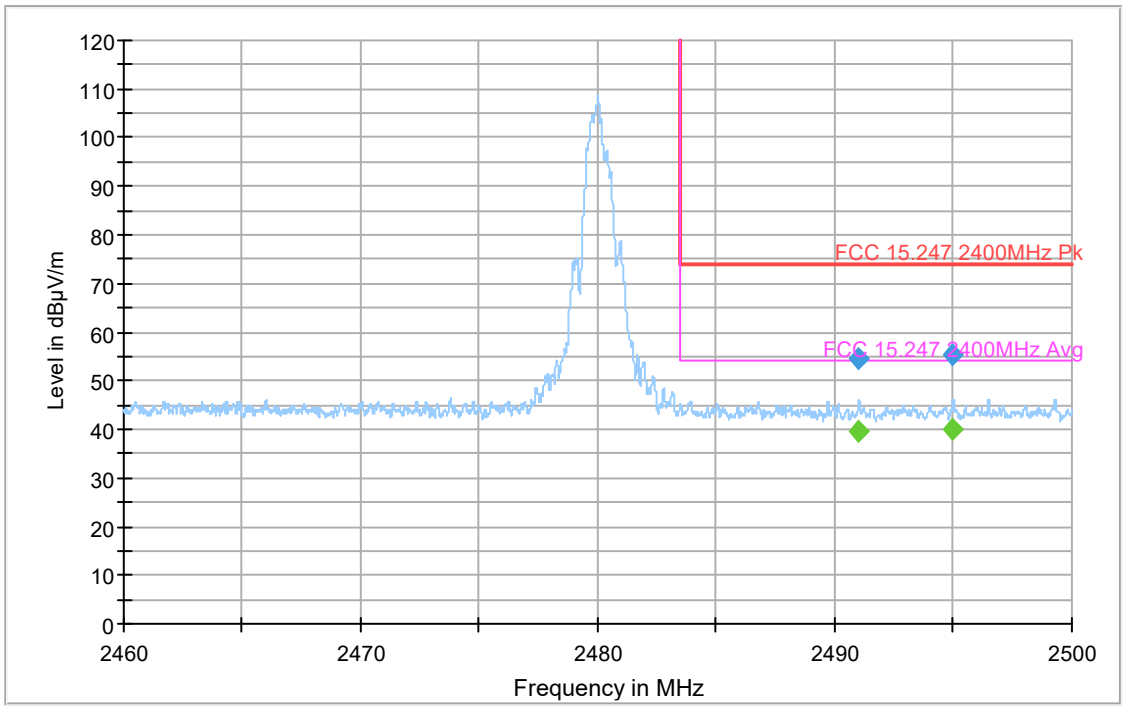

100
90
80
70
60
50
40
30
Level in dBµV/m
18
19
20
21
22
23
24
25
26
Frequency in GHz
FCC 15.209 PK at 1m
FCC 15.209 AVG at 1m
21.522000000 GHz
57.039 dBµV/m
AVG_MAXH
Critical_Freqs PK+
Final_Result PK+
PK+_MAXH
FCC 15.209 PK at 1m
Final_Result CAV
Critical_Freqs AVG
FCC 15.209 AVG at 1m

Plot # 16

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)
2491.011	54.735	---	74.00	19.27	500.0	1000.0	275.0	H	182.0	33.7	5.4	0.0	28.4
2491.011	---	39.667	54.00	14.33	500.0	1000.0	275.0	H	182.0	33.7	5.4	0.0	28.4
2494.994	55.442	---	74.00	18.56	500.0	1000.0	250.0	V	87.0	33.7	5.3	0.0	28.4
2494.994	---	39.810	54.00	14.19	500.0	1000.0	250.0	V	87.0	33.7	5.3	0.0	28.4

(continuation of the "Final_Result" table from column 19 ...)

Frequency (MHz)	Raw Rec (dBµV)
2491.011	21.0
2491.011	5.9
2494.994	21.7
2494.994	6.1



8.6 AC Power Line Conducted Emissions

8.6.1 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

8.6.2 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 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between frequency ranges.

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

*Decreases with the logarithm of the frequency.

8.6.3 Test conditions and setup:

Ambient Temperature ©	EUT Set-Up #	EUT operating mode	Power line (L1, L2, L3, N)	Power Input
22° C	1	Op. 1	Line & Neutral	120 VAC

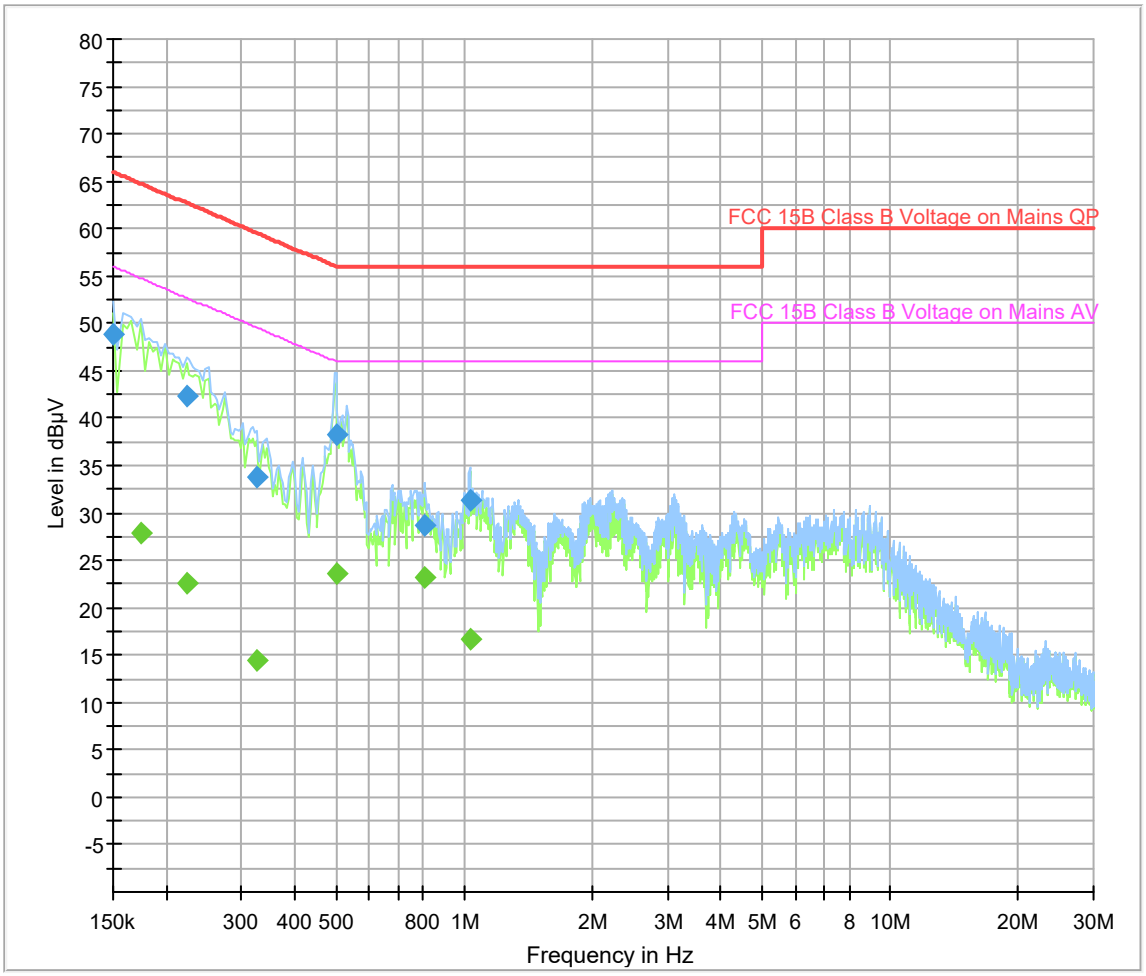
8.6.4 Measurement Result:

Plot #	Port	EUT Set-Up #:	EUT operating mode	Scan Frequency	Limit	Result
1	AC Mains	1	Op. 1	150 kHz – 30 MHz	See section 8.6.2	Pass

8.6.5 Measurement Plots:

Plot # 1

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.150	48.80	---	66.00	17.20	1000.0	9.0	N	GND	10.2
0.174	---	27.79	54.76	26.96	1000.0	9.0	N	GND	10.1
0.223	42.29	---	62.72	20.43	1000.0	9.0	N	GND	10.1
0.223	---	22.55	52.72	30.17	1000.0	9.0	N	GND	10.1
0.327	---	14.51	49.52	35.01	1000.0	9.0	N	GND	10.0
0.327	33.85	---	59.52	25.66	1000.0	9.0	N	GND	10.0
0.501	38.30	---	56.00	17.70	1000.0	9.0	N	GND	9.9
0.501	---	23.58	46.00	22.42	1000.0	9.0	N	GND	9.9
0.808	---	23.26	46.00	22.74	1000.0	9.0	N	GND	9.9
0.808	28.71	---	56.00	27.29	1000.0	9.0	N	GND	9.9
1.033	31.37	---	56.00	24.63	1000.0	9.0	L1	GND	9.9
1.033	---	16.62	46.00	29.38	1000.0	9.0	L1	GND	9.9



9 Test setup photos

Setup photos are included in supporting file name: "EMC_JIOBI_013_25001_FCC_15_247_Setup_Photos"

10 Test Equipment and Ancillaries Used for Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
PASSIVE LOOP ANTENNA	ETS LINDGREN	6512	000164698	3 Years	09/06/2023
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	-	-	-
LISN	FCC	FCC-LISN-50-25-2-08	08014	2 Years	10/06/2023
TEST RECEIVER	R&S	ESW44	103143	2 Years	09/12/2024
Software	EMC32	Version 11.40.00	-	-	-

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
2025-06-17	EMC_JIOBI_013_25001_FCC_15_247_BTLEI	Initial Version	Alvin ILARINA

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