JVIS USA, INC.
TEST REPORT

SCOPE OF WORK
EMC TESTING – 15W Wireless Charger, Model Number: 99237200

REPORT NUMBER
104661128MPK-001

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TEST REPORT

(FULL COMPLIANCE)

Report Number: 104661128MPK-001
Project Number: G104661128

Report Issue Date: June 03, 2021

Product Designation: 15W Wireless Charger
Model Number: 99237200

FCC ID: 2AZX6-1LCID350001

Standards: FCC Part 15 Subpart C (15.209)
RSS-216 Issue 2

for

JVIS USA, Inc.

Tested by:
Intertek
1365 Adams Court
Menlo Park, CA 94025 USA

Client:
JVIS USA, Inc.
52048 Shelby Parkway
Shelby Twp, MI 48315 USA

Report prepared by

Minh Ly / Senior Project Engineer

Report reviewed by

Krishna Vemuri / EMC Manager

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.

2 Executive Test Plan and Test Summary

Tests were performed to the following standards per FCC Part 15 Subpart C (15.209) and RSS 216 Issue 2.

Radiated Emissions
ANSI 63.10 2013, ICES-001 Issue 5

AC Mains Conducted Emissions
ANSI 63.10 2013, ICES-001 Issue 5

Test Plan & Summary

The EUT shall be tested according to the table below:

FCC Part 15 Subpart C (15.209) & RSS-216 Emissions Test Requirements Summary of Results			
TEST	**REFERENCE FCC 15C**	**REFERENCE RSS-216**	**RESULTS**
Radiated Emissions	15.209	6.2.2.1	Complies
Line Conducted Emissions	15.207	6.2.2.2	Not applicable[1]
Occupied Bandwidth	15.215(c)	RSS-GEN	Complies
Antenna requirement	15.203	RSS-GEN	Complies[2]

[1] The EUT does not connect AC mains in normal usage. The EUT is DC powered through the vehicle batteries.

[2] The EUT utilizes an internal Antenna.

3 Client Information, Environmental Conditions, Performance Level

This EUT was tested at the request of:

Client: JVIS USA, Inc.
52048 Shelby Parkway
Shelby Twp, MI 48315 USA

Contact: Karl Krohn
Telephone: (586) 884-5834
Email: krohn@jvisusallc.com.

4 Description of Equipment Under Test and Variant Models

Equipment Under Test			
Description	**Manufacturer**	**Model/Part Number**	**Serial Number**
15W Wireless Charger	JVIS USA, Inc.	99237200	0004

Receive Date:	May 03, 2021	**Test Started:**	May 04, 2021
Received Condition:	Good	**Test Completed:**	May 24, 2021
Type:	Production		

Description of Equipment Under Test (provided by client)
The 15W Wireless Charger is mounted under the surface of the center counsel. It is connected to the vehicle harness and is supplied with 12v DC with ignition on command. There is no communication with the vehicle. When the phone being charged is removed from the charging pad the charging transmission stops, and the device goes into sleep mode until a device is placed back on the charger.

Radio Information (provided by client)	
FCC Identifier	2AZX6-1LCID350001
Operating Frequency	Charger coil is operated between 119.62kHz
Number of Channels	1
Type of Modulation	FSK Modulation
Antenna Type	Internal Antenna

Equipment Under Test Power Configuration

Rated Voltage	Rated Power	Rated Frequency	Number of Phases
$12V_{DC}$	15W	N/A	N/A

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	A load was placed on the Charging Pad and continuously charging through inductive wireless power transfer technique.

Software used by the EUT:

No.	Descriptions of EUT Exercising
1	NA

Variant Models:

None.

5 System Setup and Method

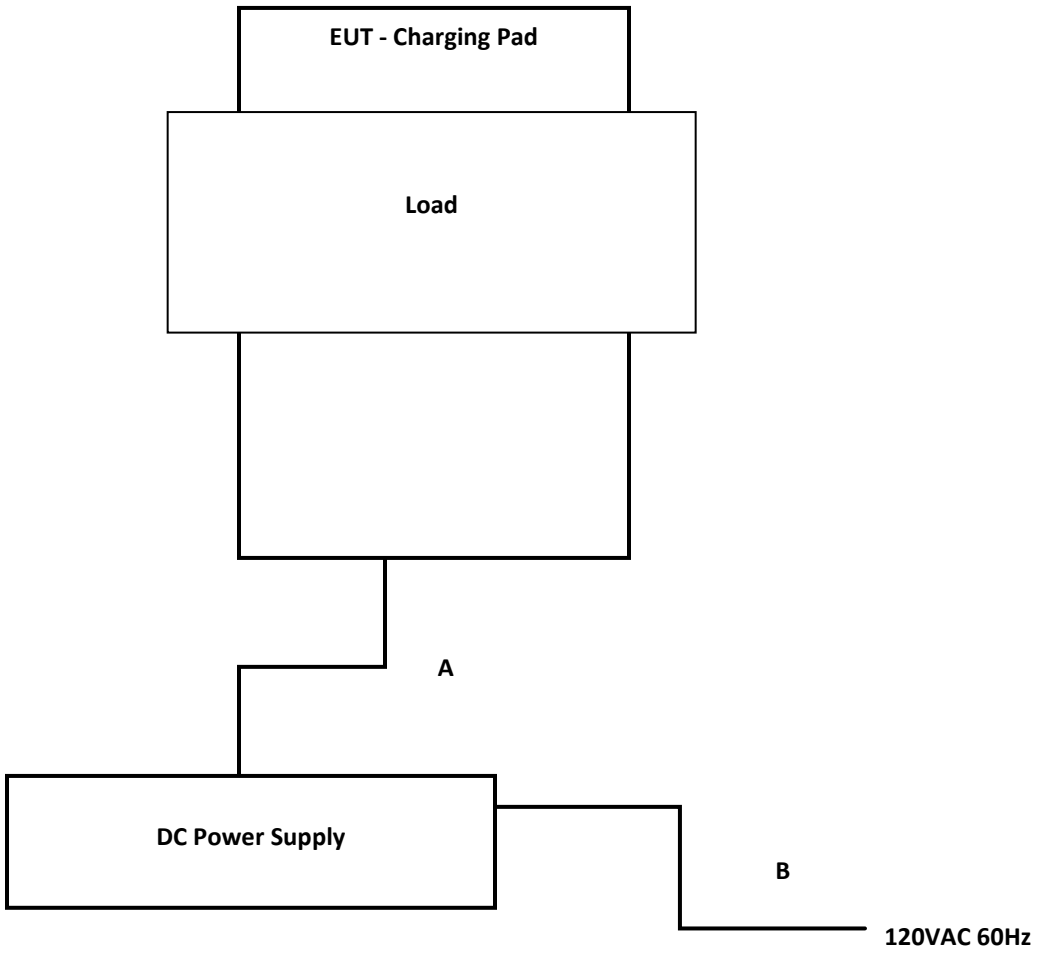
Cables					
ID	**Description**	**Length**	**Shielding**	**Ferrites**	**Termination**
A	DC Power cable	1m	No	No	DC Power Supply
B	Power cable	2m	No	No	120VAC 60Hz

Support Equipment		
Description	**Manufacturer**	**Model Number**
Load	N/A	N/A

5.1 Method:

All other measurements were made in accordance with the procedures in part 2 of CFR 47, ANSI C63.10: 2013, ANSI C63.4-2014 & RSS-GEN Issue 5.

5.2 EUT Block Diagram:



5.3 EUT Picture:

5.4 Justification:

The EUT was configured for testing in a typical configuration, as specified by JVIS USA, Inc.

5.5 Modifications to the EUT

No modifications were made by the manufacturer or Intertek to bring the EUT into compliance for radiated emissions testing.

6 Radiated Emissions (FCC Part 15 Subpart C (15.209) & RSS 216)

6.1 Method:

Tests are performed in accordance with FCC Part 15 Subpart C (15.209) & RSS 216.

TEST SITE: 10m ALSE

10m ALSE**:** The test facility is located at 1365 Adams Court, Menlo Park, California. The test site is a 10-meter semi-anechoic chamber. The site meets the characteristics of ANSI C63.4:2014. 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.
Above 1 GHz an antenna mast with boresight capabilities is used.

The A2LA certificate number for this site is 1755-01

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-200 MHz	4.7 dB	6.3 dB
Radiated Emissions, 10m	200-1000 MHz	4.6 dB	6.3 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, based on CISPR 22 and CISPR 11.

6.2 Procedure:

Radiated Measurements Below 30 MHz
During the test the EUT is rotated and the measuring antenna angles are varied during the search for maximum signal level.

Radiated emissions are taken at ten meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Measurements for below 30 MHz were made at 10 meters. Data results below are corrected for distance back to 30 meters.

Radiated Measurements Above 30 MHz
During the test the EUT is rotated and the measuring antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters.

Radiated emissions are taken at ten meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance. Measurements for above 30 MHz were made at 10 meters.

Radiated emission measurements were performed from 9kHz to 1 GHz.
Analyzer resolution is:

200Hz or greater for 9kHz to 150kHz
9 kHz or greater for 150kHz to 30 MHz
120 kHz or greater for 30MHz to 1000 MHz
For those frequencies quasi-peak detector applies

Data includes of the worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

Field Strength 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 is as follows:

FS = RA + AF + CF – AG – DCF

Where FS = Field Strength in dB (μV/m)

RA = Receiver Amplitude (including preamplifier) in dB (μV)
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB (1/m)
AG = Amplifier Gain in dB
DCF = Distance Correction Factor

Note: FS was measured with loop antenna below 30MHz

6.3 Test Equipment Used:

See Section 8.0 for specific equipment used for this test.

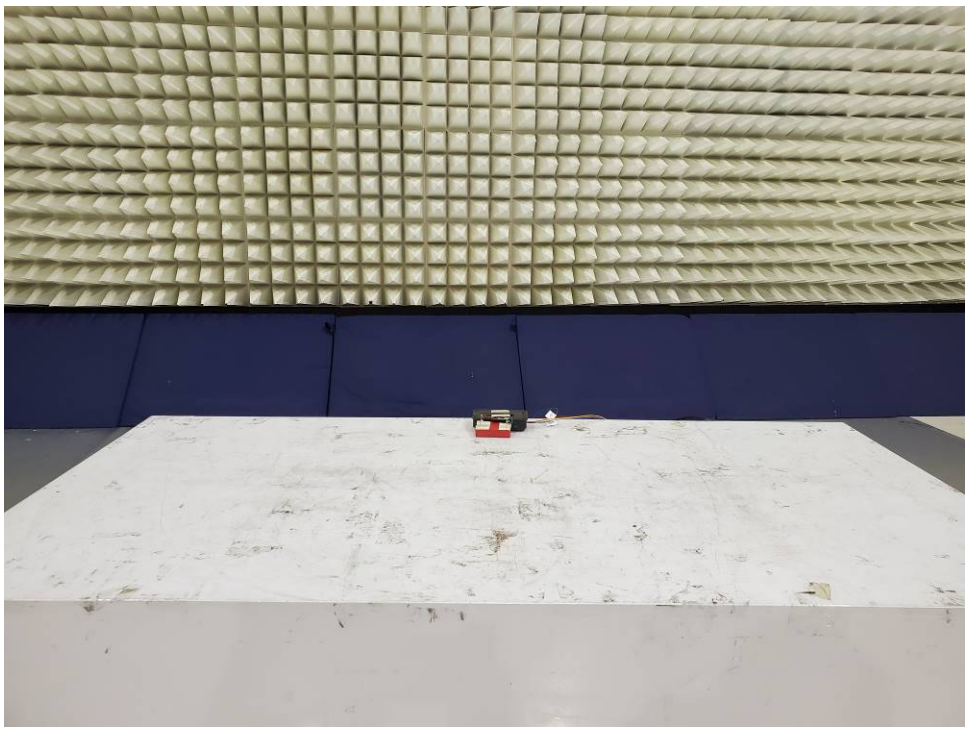
Software Utilized:

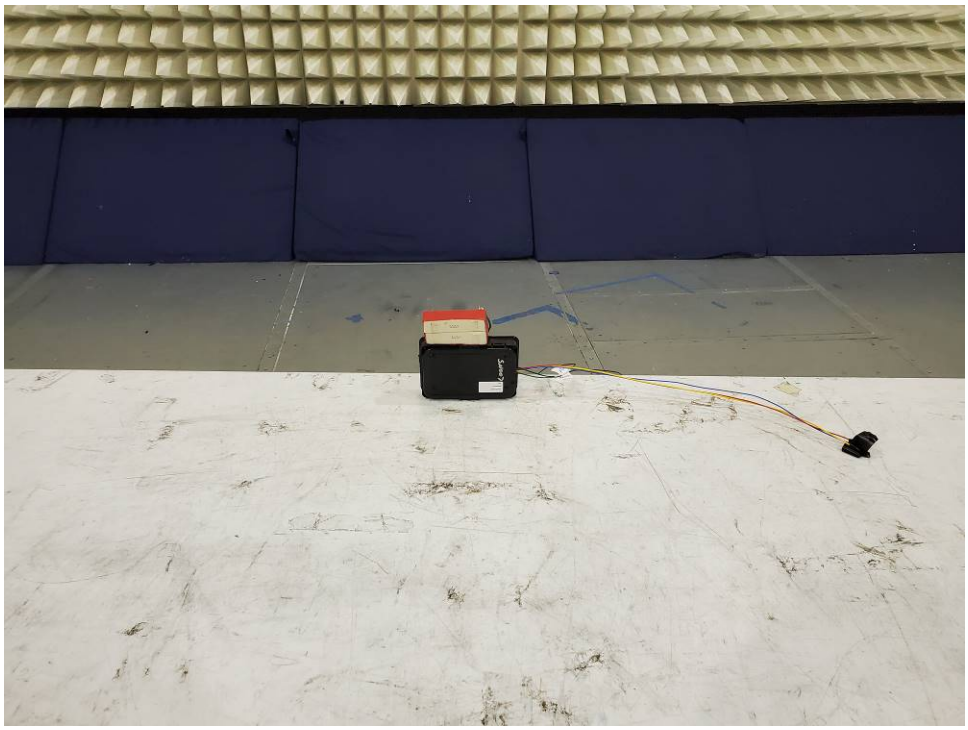
Name	Manufacturer	Version
BAT-EMC	NEXIO	3.20.0.14

6.4 Results:

The sample tested was found to Comply.

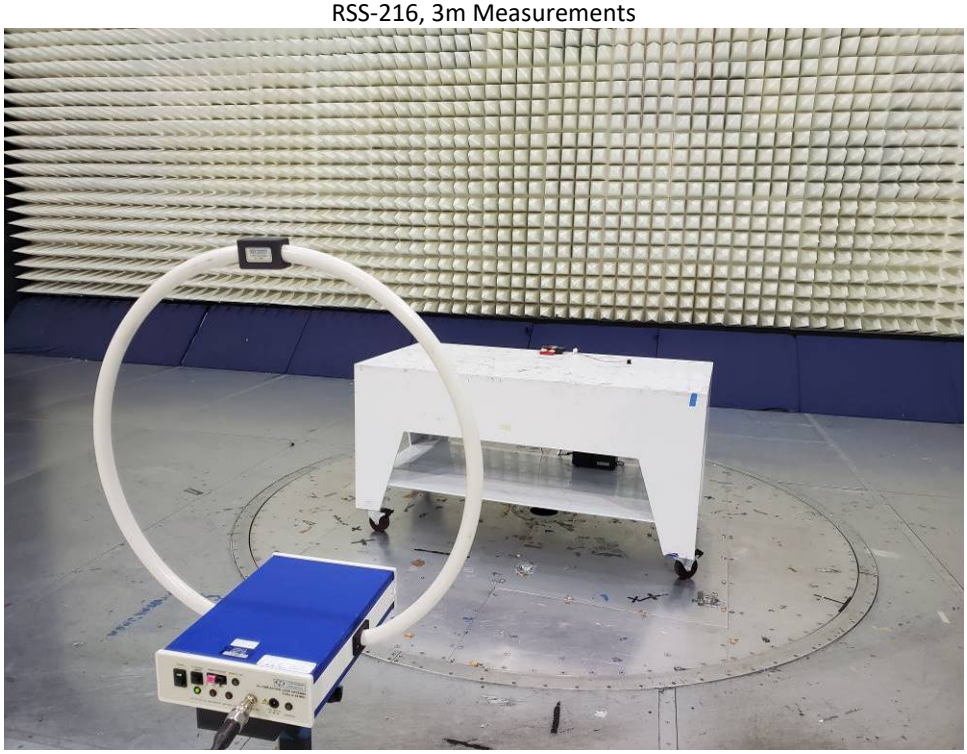
6.5 Setup Photographs:

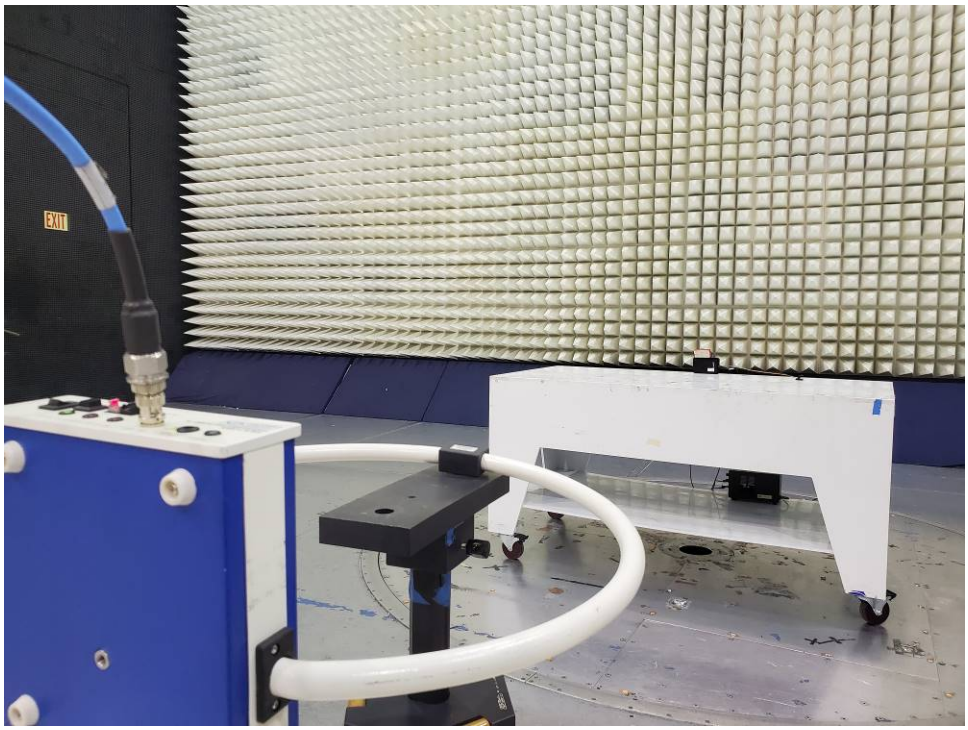




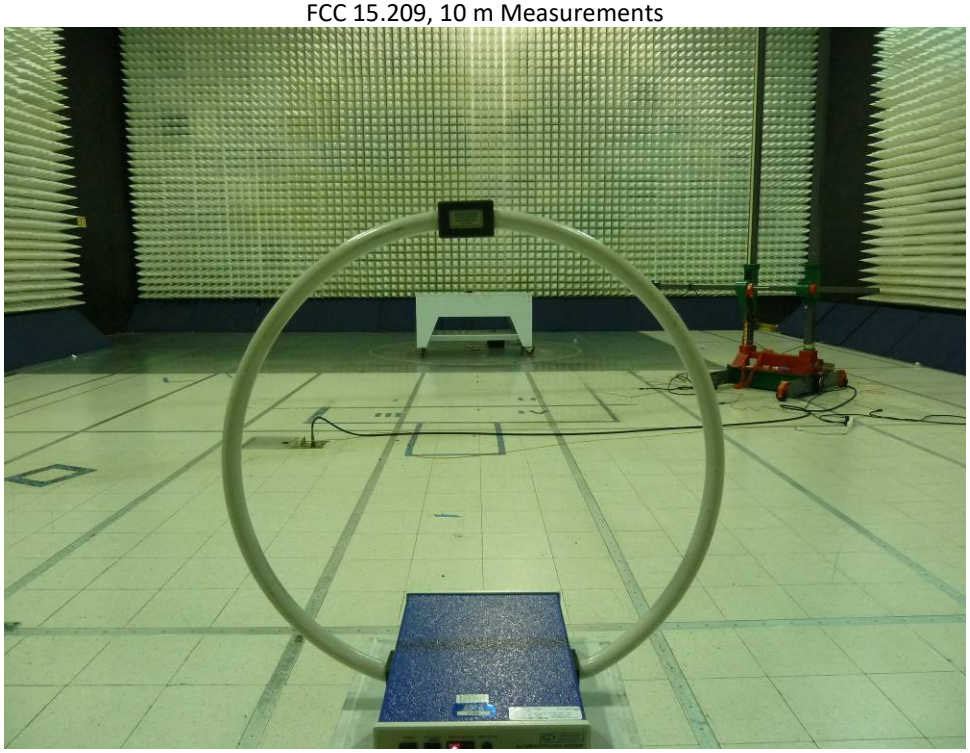
Setup Photographs (Continued):

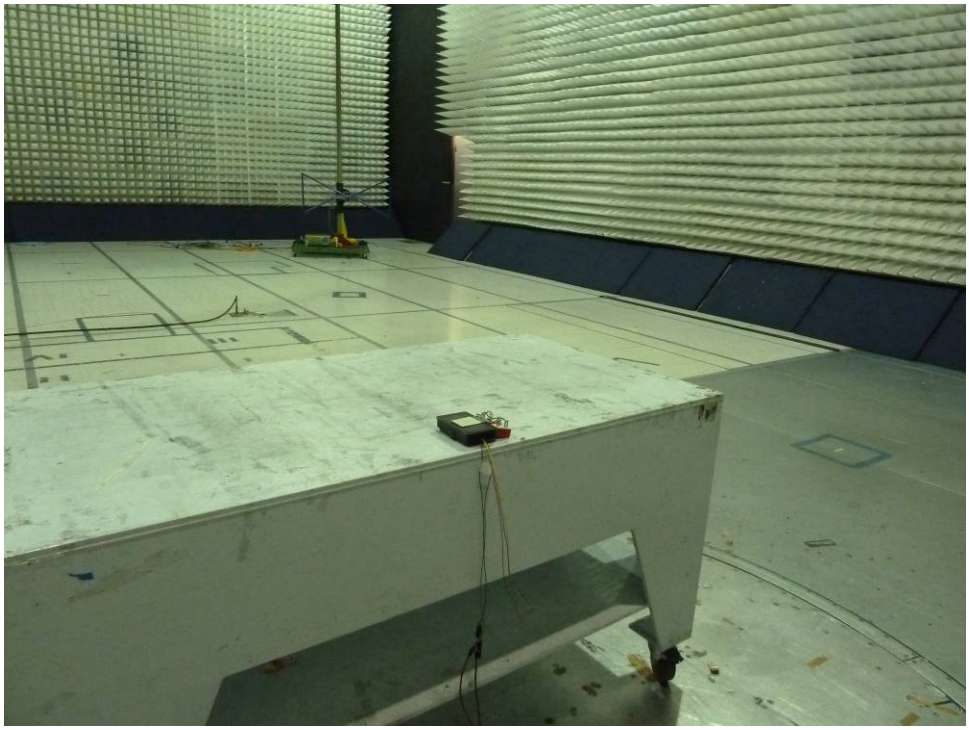
RSS-216, 3m Measurements





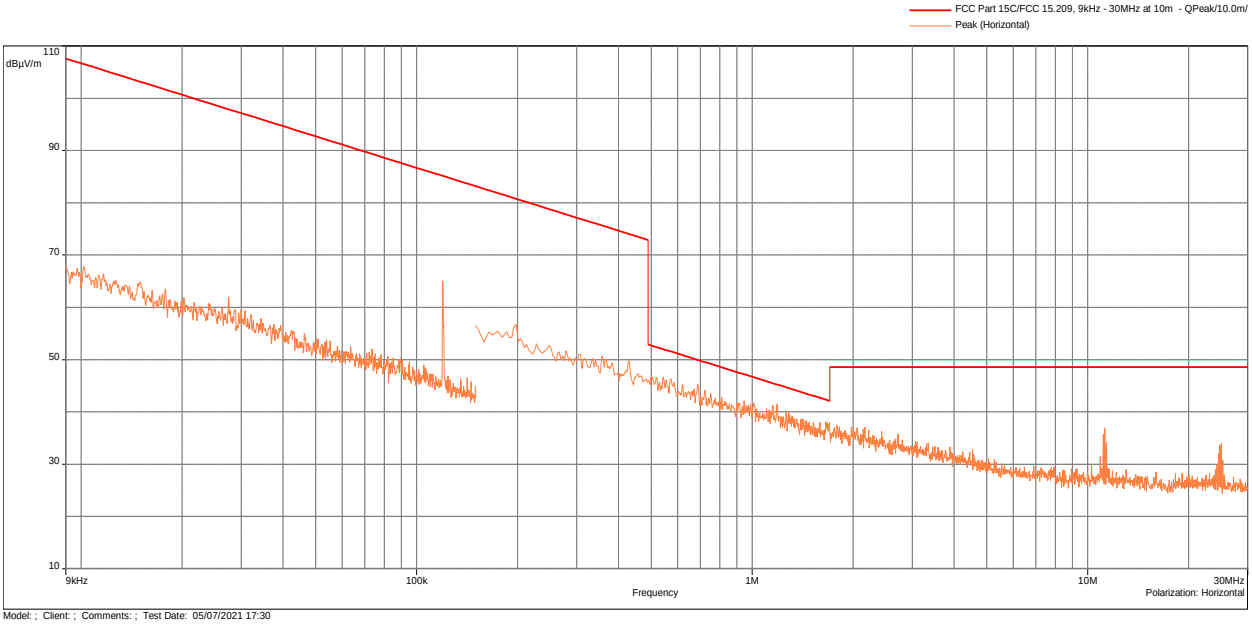
FCC 15.209, 10 m Measurements



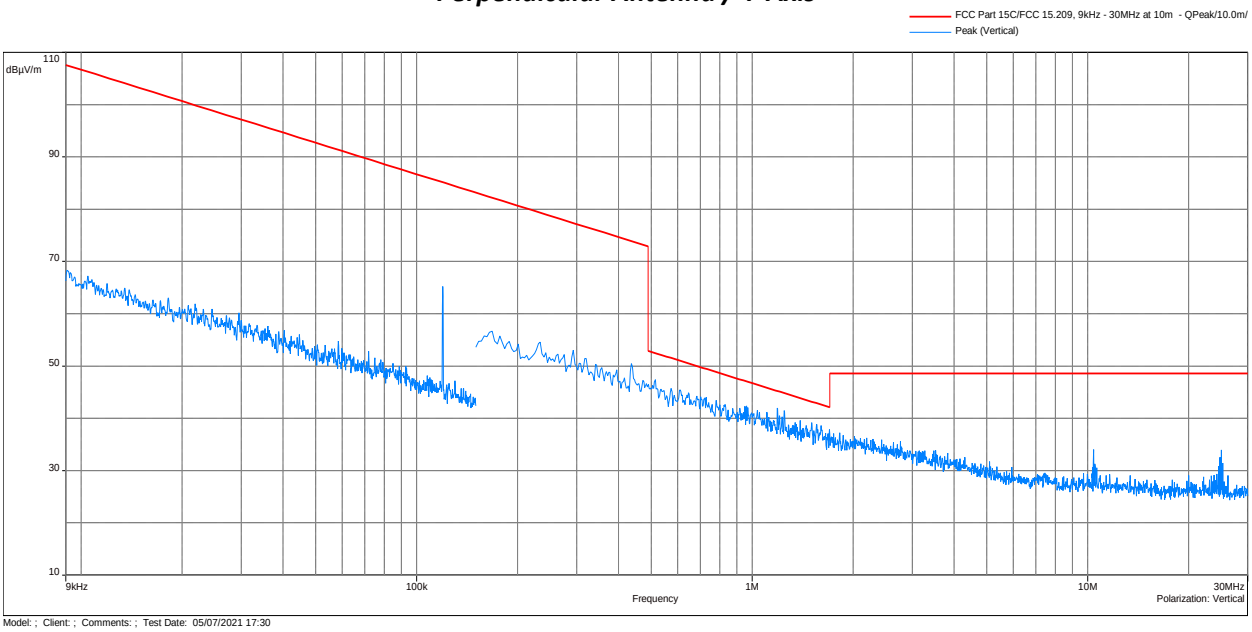


6.6 Plots/Data:

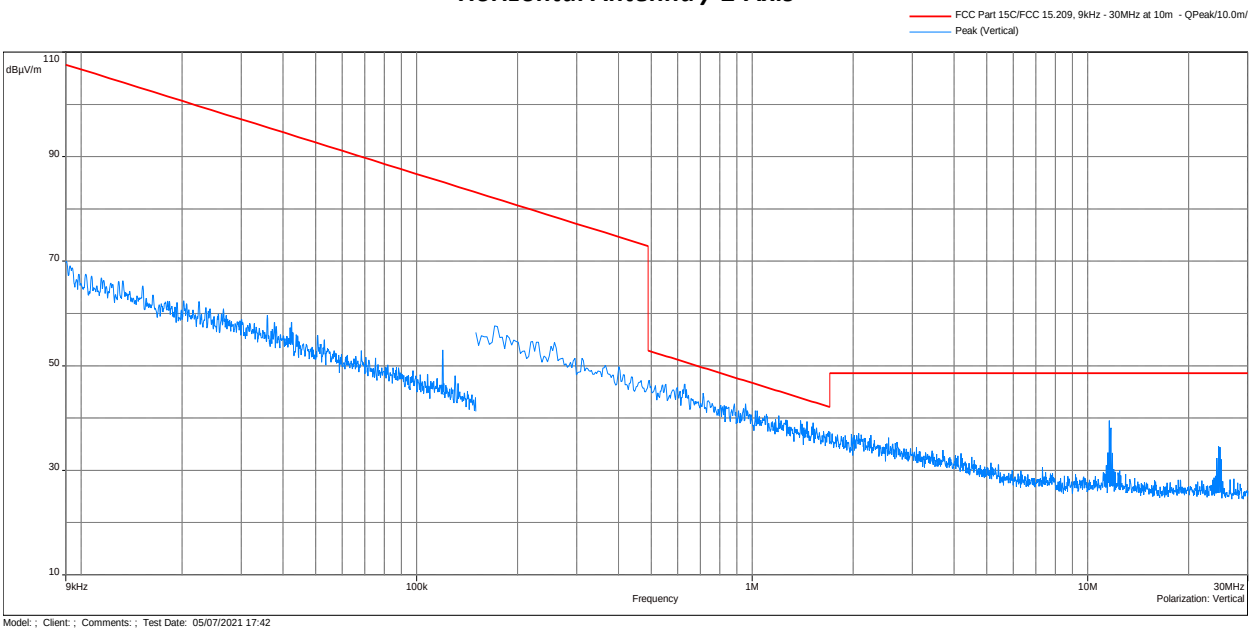
FCC Part 15 Subpart C (15.209) Radiated Disturbance, 9 kHz – 30 MHz, Parallel Antenna / X-Axis



FCC Part 15 Subpart C (15.209) Radiated Disturbance, 9 kHz – 30 MHz, Perpendicular Antenna / Y-Axis

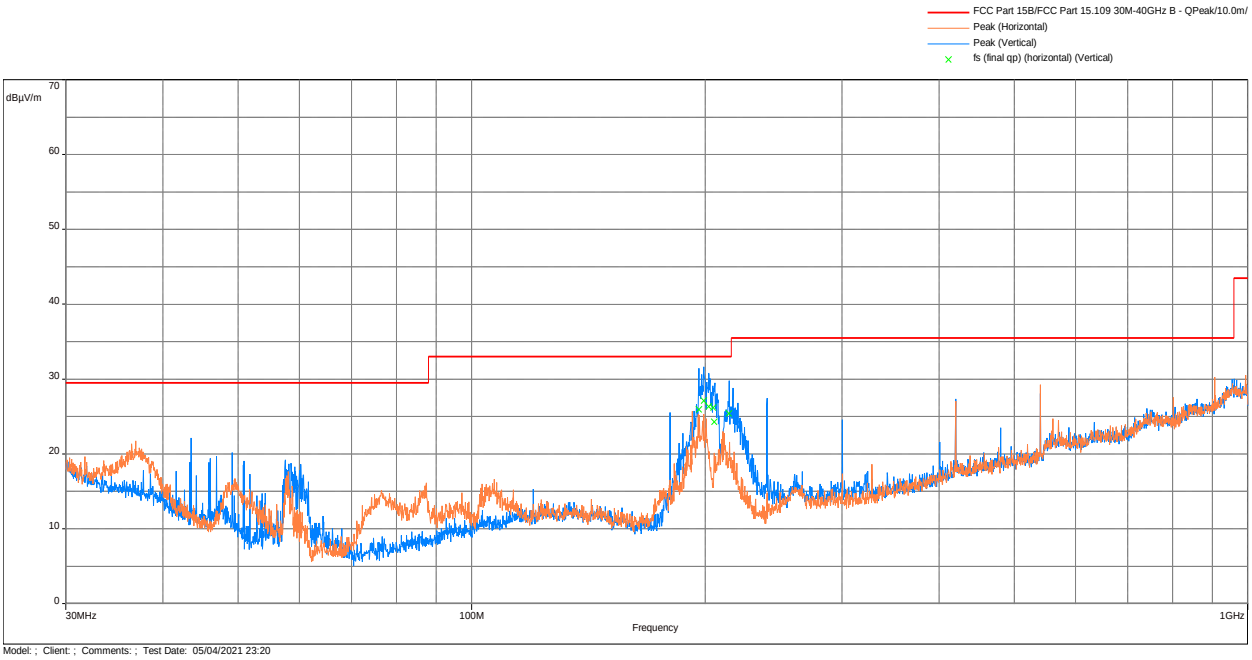


FCC Part 15 Subpart C (15.209) Radiated Disturbance, 9 kHz – 30 MHz, Horizontal Antenna / Z-Axis



Frequency (MHz)	Peak (dBµV/m)	Lim.Q-Peak (dBµV/m)	Margin (dB)	Angle (°)	Axis	Correction (dB)
0.1196	65.08	85.14	-20.06	187.50	X Axis	13.52
0. 1196	65.26	85.14	-19.88	274.00	Y Axis	13.52
0. 1196	53.01	85.14	-32.13	6.75	Z Axis	13.52
10.406	34.05	48.60	-14.55	184.75	Y Axis	15.44
11.245	36.88	48.60	-11.72	179.75	X Axis	15.46
11.603	39.55	48.60	-9.05	129.00	Z Axis	15.46
24.526	34.63	48.60	-13.97	309.25	Z Axis	14.32
25.003	33.95	48.60	-14.65	259.25	X Axis	14.13
25.003	33.95	48.60	-14.65	23.00	Y Axis	14.13

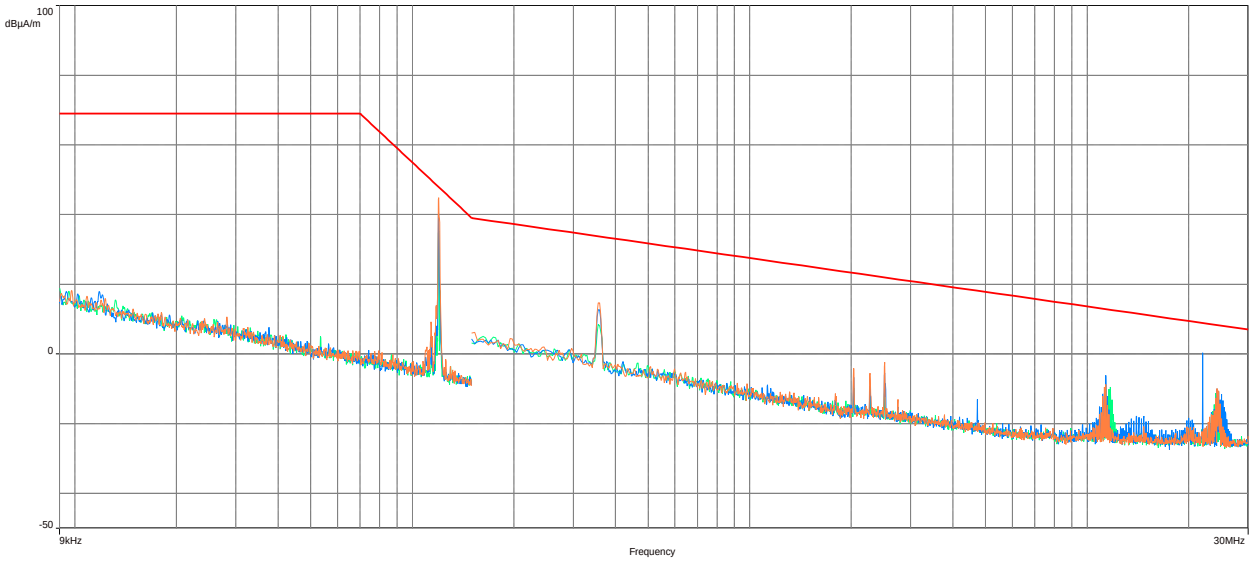
FCC Part 15 Subpart C (15.209) Radiated Disturbance, 30 MHz – 1000 MHz



Frequency (MHz)	QP (dBµV/m)	Limit (dB(uV/m))	Margin (dB)	Azimuth (deg)	Height (m)	Polarity	RA (dBuV)	Correction (dB)
196.341	26.0	33.0	-7.0	274.5	1.6	Vertical	43.1	-17.1
199.145	27.1	33.0	-5.9	229.8	1.3	Vertical	44.1	-17.0
201.995	26.3	33.0	-6.7	288.8	1.3	Vertical	43.2	-16.9
204.696	26.2	33.0	-6.8	258.3	1.0	Vertical	43.0	-16.8
205.484	24.3	33.0	-8.7	295.8	1.3	Vertical	41.1	-16.8
214.584	25.4	33.0	-7.6	237.8	2.2	Vertical	42.4	-17.1

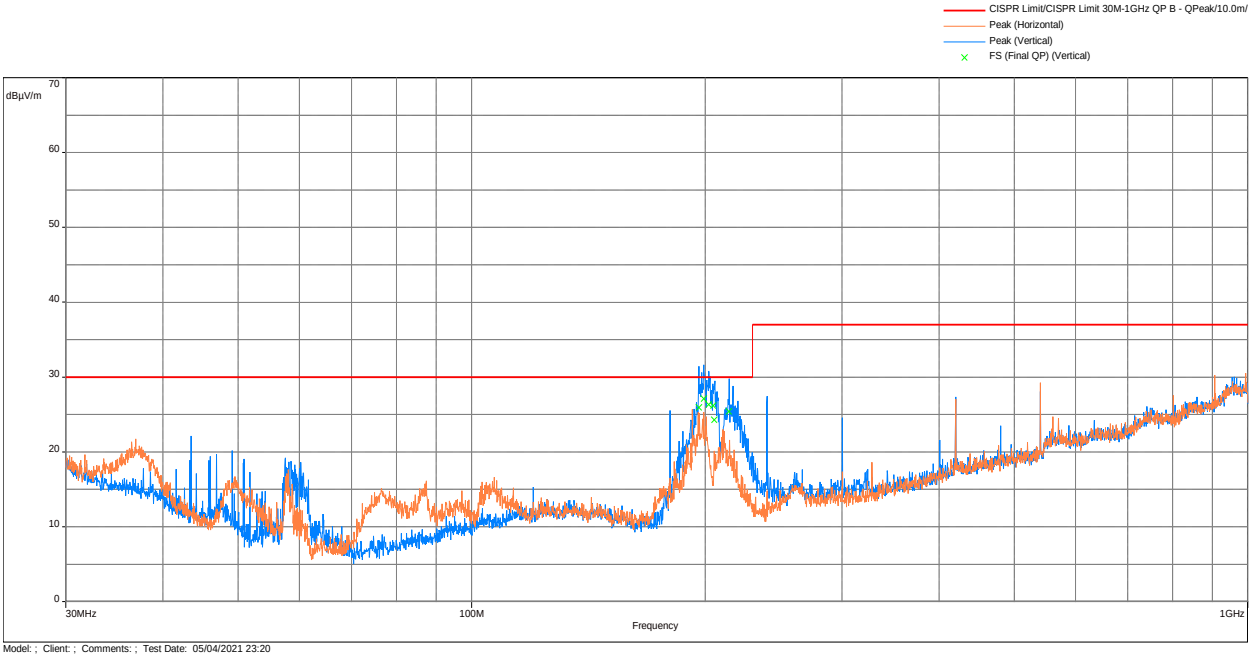
Result: **Complies** by 5.9 for FCC Part 15 Subpart C (15.209)

RSS 216 Radiated Disturbance, 9 kHz – 30 MHz
Parallel Antenna / X-Axis, Perpendicular Antenna / Y-Axis, Horizontal Antenna / Z-Axis



Frequency (MHz)	Peak (dBµA/m)	Lim.Q-Peak (dBµA/m)	Margin (dB)	Angle (°)	Axis	Correction (dB)
0.1196	44.9	47.9	-3.0	188	X Axis	-37.9
0. 1196	40.3	47.9	-7.6	103	Y Axis	-37.9
0. 1196	35.4	47.9	-12.6	172	Z Axis	-37.9
0.359	14.7	33.7	-19.0	188	X Axis	-38.0
11.365	-6.1	12.9	-18.9	196	Y Axis	-35.9
11.723	-9.5	12.7	-22.1	258	Z Axis	-35.9
22.021	0.4	8.7	-8.3	285	Y Axis	-36.6
24.284	-9.8	8.3	-18.1	317	X Axis	-36.9

RSS-216 Radiated Disturbance, 30 MHz – 1000 MHz



Frequency (MHz)	QP (dBµV/m)	Lim. QPeak (dBµV/m)	Margin (dB)	Height (m)	Angle (°)	Comment	Correction (dB)
196.341	26.0	30.0	-4.0	274.5	1.6	Vertical	43.1
199.145	27.1	30.0	-2.9	229.8	1.3	Vertical	44.1
201.995	26.3	30.0	-3.7	288.8	1.3	Vertical	43.2
204.696	26.2	30.0	-3.8	258.3	1.0	Vertical	43.0
205.484	24.3	30.0	-5.7	295.8	1.3	Vertical	41.1
214.584	25.4	30.0	-4.6	237.8	2.2	Vertical	42.4

Result: **Complies** by 2.9dB for RSS-216

Test Personnel:	Minh Ly	Test Dates:	May 05-07, 2021
Supervising/Reviewing Engineer: (Where Applicable)			
Product Standard:	FCC Part 15 Subpart C (15.209), RSS-216	Limit Applied:	FCC Part 15.209 & RSS-216
Input Voltage:	12V DC		
Pretest Verification w/ Ambient Signals or BB Source:	BB Source	Ambient Temperature:	21 ºC
		Relative Humidity:	46.9 %
		Atmospheric Pressure:	30 inHG

Deviations, Additions, or Exclusions: None

7 Conducted Emissions (FCC Part 15 Subpart C (15.207) & RSS 216)

7.1 Method

Tests are performed in accordance with FCC Part 15 Subpart C (15.207) & RSS 216.

TEST SITE: 10m ALSE

10m ALSE**:** The test facility is located at 1365 Adams Court, Menlo Park, California. The test site is a 10-meter semi-anechoic chamber. The site meets the characteristics of ANSI C63.4:2014.

The A2LA certificate number for this site is 1755-01

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
AC Line Conducted Emissions	150 kHz - 30 MHz	2.1 dB	3.4dB

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, based on CISPR 22 and CISPR 11.

7.2 Procedure:

Measurements are carried out using quasi-peak and average detector receivers in accordance with CISPR 16. An AMN is required to provide a defined impedance at high frequencies across the power feed at the point of measurement of terminal voltage and also to provide isolation of the circuit under test from the ambient noise on the power lines. An AMN as defined in CISPR 16 shall be used.

The EUT is located so that the distance between the boundary of the EUT and the closest surface of the AMN is 0.8m.

Where a flexible mains cord is provided by the manufacturer, this shall be 1m long or if in excess of 1m, the excess cable is folded back and forth as far as possible so as to form a bundle not exceeding 0.4m in length.

The EUT is arranged and connected with cables terminated in accordance with the product specification.

Conducted disturbance is measured between the phase lead and the reference ground, and between the neutral lead and the reference ground. Both measured values are reported.

The EUT, where intended for tabletop use, is placed on a table whose top is 0.8m above the ground plane. A vertical, metal reference plane is placed 0.4m from the EUT. The vertical metal reference-plane is at least 2m by 2m. The EUT shall be kept at least 0.8m from any other metal surface or other ground plane not being part of the EUT. The table is constructed of non-conductive materials. Its dimensions are 1m by 1.5m, but may be extended for larger EUT.

Floor standing EUT are placed on a horizontal metal ground plane and isolated from the ground plane by resting on an insulating material. The metal ground plane extends at least 0.5m beyond the boundaries of the EUT and has minimum dimensions of 2m by 2m.

EUT was placed in transmission mode then tested for conducted emissions per 15.207 to ensure the device complies with 15.207.

7.3 Results:

Result:	Not applicable. The EUT does not connect AC mains in normal usage. The EUT is DC powered through the vehicle batteries.

8 Occupied Bandwidth

FCC 15.215

8.1 Requirements

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage.

8.2 Procedure

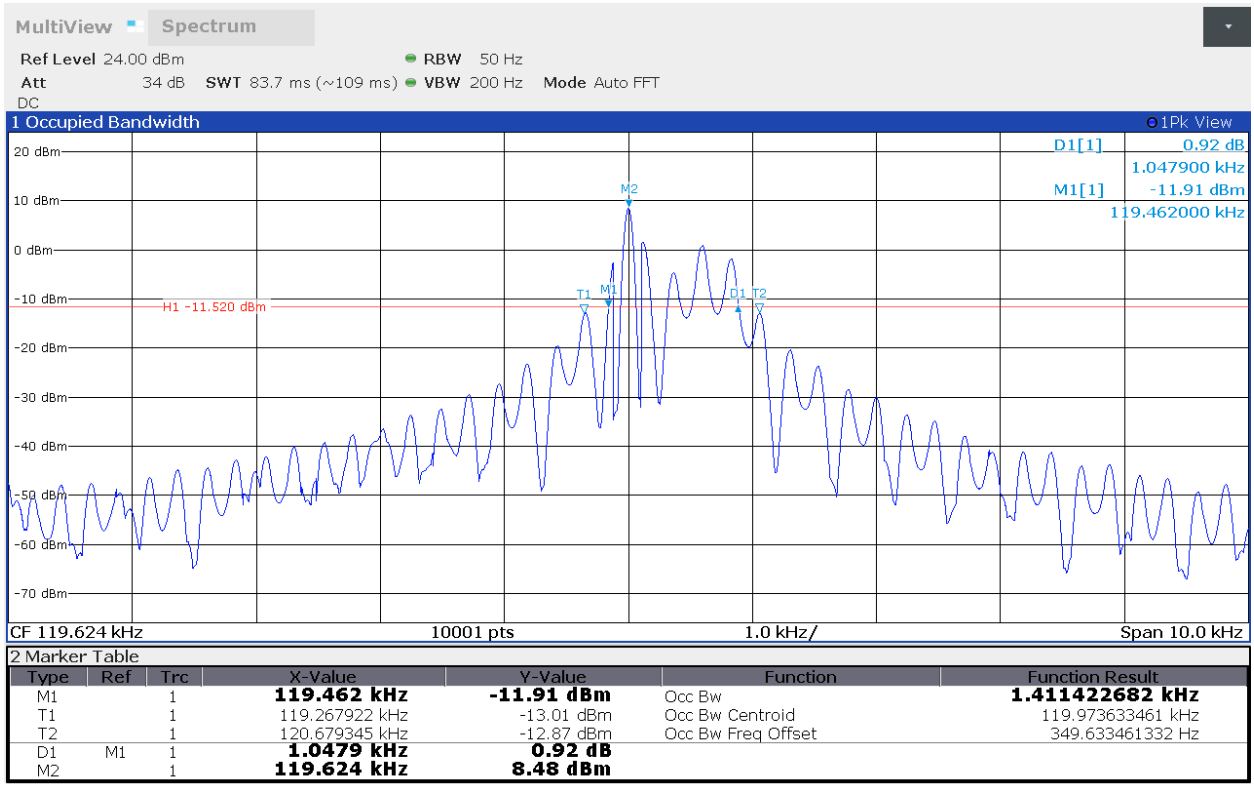
The EUT was setup to transmit in normal operating condition.

Measurements were made with the loop antenna in close proximity of the EUT. Following the procedures of ANSI 63.10: 2013, the 20dB bandwidth measurements were taken. The following plots show Occupied Bandwidth.

8.3 Test Results

Frequency (kHz)	-20 dB Channel Bandwidth (kHz)	99% Channel Bandwidth (kHz)
119.624	1.047	1.411

-20dB & 99% Channel Bandwidth Plot



17:21:19 24.05.2021

9 List of Test Equipment

Emissions Test Equipment List

Equipment	Manufacturer	Model/Type	Serial #	Cal Int	Cal Due
EMI Receiver	Rohde and Schwarz	ESU40	ITS 00961	12	03/09/22
BI-Log Antenna	Teseq	CBL 6111D	ITS 01505	12	03/22/22
Pre-Amplifier	Sonoma Instrument	310N	ITS 01714	12	11/13/21
Active Loop Antenna	Com-Power	AL-130R	ITS 01589	12	11/04/21
10m Semi-anechoic chamber	Panashield	10m Chamber	ITS 00984	36	07/29/23

10 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
1	June 03, 2021	104661128MPK-001	ML	KV	Original Issue

END OF REPORT