DePuy Synthes Products, Inc.
TEST REPORT

SCOPE OF WORK
Emissions testing on the eG1 Wireless Hand Control System consists of the reusable Receiver for Wireless Hand Control, EG1A (Receiver) and the disposable Wireless Hand Control, EG1A (Wireless Hand Control).

REPORT NUMBER
104697163BOX-018

ISSUE DATE
October 31, 2021

[REVISED DATE]
Original Issue

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

EMISSIONS TEST REPORT

(FULL COMPLIANCE)

Report Number: 104697163BOX-018
Project Number: G104697163

Report Issue Date: October 31, 2021

Model(s) Tested: Receiver for Wireless Hand Control and Wireless Hand Control, Model: EG1A
Model(s) Partially Tested: None
Model(s) Not Tested but declared equivalent by the client: None

Standards: CFR47 FCC Part 15.247 Subpart C: 10/2021,
CFR47 FCC Part 15 Subpart B: 10/2021,
RSS-247 Issue 2 February 2017,
ISED ICES-003 Issue 7 October 15, 2020,
RSS-Gen Issue 5 April 2018 +Amendment 1 March 2019,
RSS-102 Issue 5 March 2015

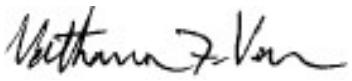
Tested by:
Intertek Testing Services NA, Inc.
70 Codman Hill Road
Boxborough, MA 01719
USA

Client:
DePuy Synthes Products Inc.
4500 Riverside Drive
Palm Beach Gardens, FL 33410
USA

Report prepared by

Kouma Sinn / EMC Engineering Supervisor

Report reviewed by



Vathana Ven / EMC Engineering Supervisor

Table of Contents

1 Introduction and Conclusion

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

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

2 Test Summary

Section	Test full name	Result
3	Client Information	--
4	Description of Equipment Under Test and Variant Models	--
5	System Setup and Method	--
6	Maximum Peak Output Power and Human RF exposure CFR47 FCC Part 15 Subpart C:10/2021, Section 15.247 (b)(3) RSS-247 Issue 2 February 2017, RSS-102 Issue 5 March 2015	Pass
7	6 dB Bandwidth and Occupied Bandwidth CFR47 FCC Part 15 Subpart C: 10/2021, Section 15.247 (a)(2) RSS-247 Issue 2 February 2017	Pass
8	Maximum Power Spectral Density CFR47 FCC Part 15 Subpart C: 10/2021, Section 15.247 (e) RSS-247 Issue 2 February 2017	Pass
9	Band Edge Compliance CFR47 FCC Part 15 Subpart C: 10/2021, Section 15.247 (d) RSS-247 Issue 2: 02/2017)	Pass
10	Transmitter spurious emissions CFR47 FCC Part 15 Subpart C: 10/2021, Section 15.247 (d) RSS-247 Issue 2 February 2017	Pass
11	Digital Device and Receiver Radiated Spurious Emissions (CFR47 FCC Part 15 Subpart B 15.109: 10/2021, ISED ICES-003 Issue 7 October 15, 2020	Pass
--	AC Mains Conducted Emissions FCC 47CFR Part 15.107: 10/2021 ISED ICES-003 Issue 7 October 15, 2020	N/A*
12	Revision History	--

*Test not applicable as the EUT is battery powered only.

3 Client Information

This EUT was tested at the request of:

Client: DePuy Synthes Products Inc
4500 Riverside Drive
Palm Beach Gardens, FL 33410
USA

Contact: Mike Senkowicz
Telephone: (561) 494-3737
Fax: None
Email: MSENKOWI@ITS.JNJ.COM

4 Description of Equipment Under Test and Variant Models

Manufacturer: DePuy Synthes Products Inc
4500 Riverside Drive
Palm Beach Gardens, FL 33410

Equipment Under Test			
Description	Manufacturer	Model Number	Serial Number
Receiver for Wireless Hand Control	DePuy Synthes Products Inc	EG1A	Not Labelled
Wireless Hand Control	DePuy Synthes Products Inc	EG1A	Not Labelled

Receive Date:	09/11/2021 and 09/17/2021
Received Condition:	Good
Type:	Production

Description of Equipment Under Test (provided by client)
The eG1 Wireless Hand Control System consists of the reusable Receiver for Wireless Hand Control, EG1A (Receiver) and the disposable Wireless Hand Control, EG1A (Wireless Hand Control). Device communicates wirelessly through the receiver to allow the user to regulate/adjust the eG1 High Speed System speed /RPM. The eG1 High Speed System is intended for cutting and shaping bone including the cranium and spine.

Equipment Under Test Power Configuration			
Rated Voltage	Rated Current	Rated Frequency	Number of Phases
3 VDC	0.02 A	DC	N/A

Operating modes of the EUT:

No.	Descriptions of EUT Exercising
1	The EUT was set to transmit continuously at Low, Mid, and High channels with modulation at 100 % duty cycle.
2	The EUT was set to receive

Software used by the EUT:

No.	Descriptions of EUT Exercising
1	None

Radio/Receiver Characteristics	
Frequency Band(s)	2405-2475 MHz
Modulation Type(s)	GFSK
Maximum Output Power	Low Channel (2405 MHz): 4.31 dBm Mid Channel (2440 MHz): 4.45 dBm High Channel (2475 MHz): 4.64 dBm
Test Channels	Low Channel (2405 MHz) Mid Channel (2440 MHz) High Channel (2475 MHz)
Occupied Bandwidth	Low Channel (2405 MHz): 2.277 MHz Mid Channel (2440 MHz): 2.306 MHz High Channel (2475 MHz): 2.257 MHz
6 dB Bandwidth	Low Channel (2405 MHz): 1560 kHz Mid Channel (2440 MHz): 1580 kHz High Channel (2475 MHz): 1380 kHz
Frequency Hopper: Number of Hopping Channels	N/A
Frequency Hopper: Channel Dwell Time	N/A
Frequency Hopper: Max interval between two instances of use of the same channel	N/A
MIMO Information (# of Transmit and Receive antenna ports)	1
Equipment Type	Standalone
Antenna Type and Gain	Integrated, 1.5 dBi

Variant Models:

The following variant models were not tested as part of this evaluation, but have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

None

5 System Setup and Method

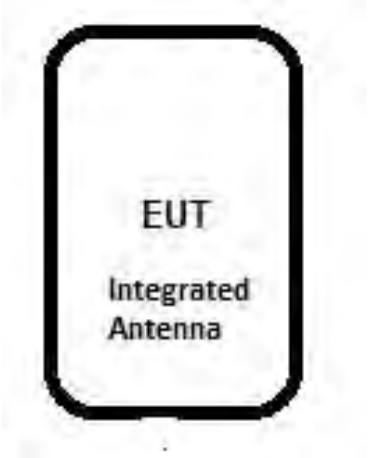
Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
--	None	--	--	--	--

Support Equipment			
Description	Manufacturer	Model Number	Serial Number
None	--	--	--

5.1 Method:

Configuration as required by Configuration as required by FCC Part 15 Subpart C 15.247: 10/2021, FCC Part 15 Subpart B: 10/2021, RSS 247 Issue 2: 02/2017, ISED ICES-003 Issue 7 October 15, 2020, RSS-Gen Issue 5 April 2018 +Amendment 1 March 2019, RSS-102 Issue 5 March 2015, ANSI C 63.10: 2013, ANSI C 63.4: 2014, and 558074 D0115.247Meas Guidancev05r02.

5.2 EUT Block Diagram:



6 Maximum Peak Output Power and Human RF exposure

6.1 Method

Tests are performed in accordance with CFR47 FCC Part 15.247, RSS-247, RSS-102, ANSI C63.10, and KDB 558074 D0115.247Meas Guidancev05r02. Note the antenna-port conducted method was not possible so, the radiated method was used per ANSI C63.10 Section 11.3.

TEST SITE: AMAP Lab

6.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV005'	Weather Station	Davis	6250	MS191218083	02/07/2021	02/07/2022
ROS005-1'	Signal and Spectrum Analyzer	Rohde and Shwartz	FSW43	100646	10/27/2020	10/27/2021
CEN001'	DC-40GHz attenuator 20dB	Centric RF	C411-20	CEN001	01/22/2021	01/22/2022
CBLHF2012-2M-1'	2m 9kHz-40GHz Coaxial Cable - SET1	Huber & Suhner	SF102	252675001	02/19/2021	02/19/2022

Software Utilized:

Name	Manufacturer	Version
None	--	--

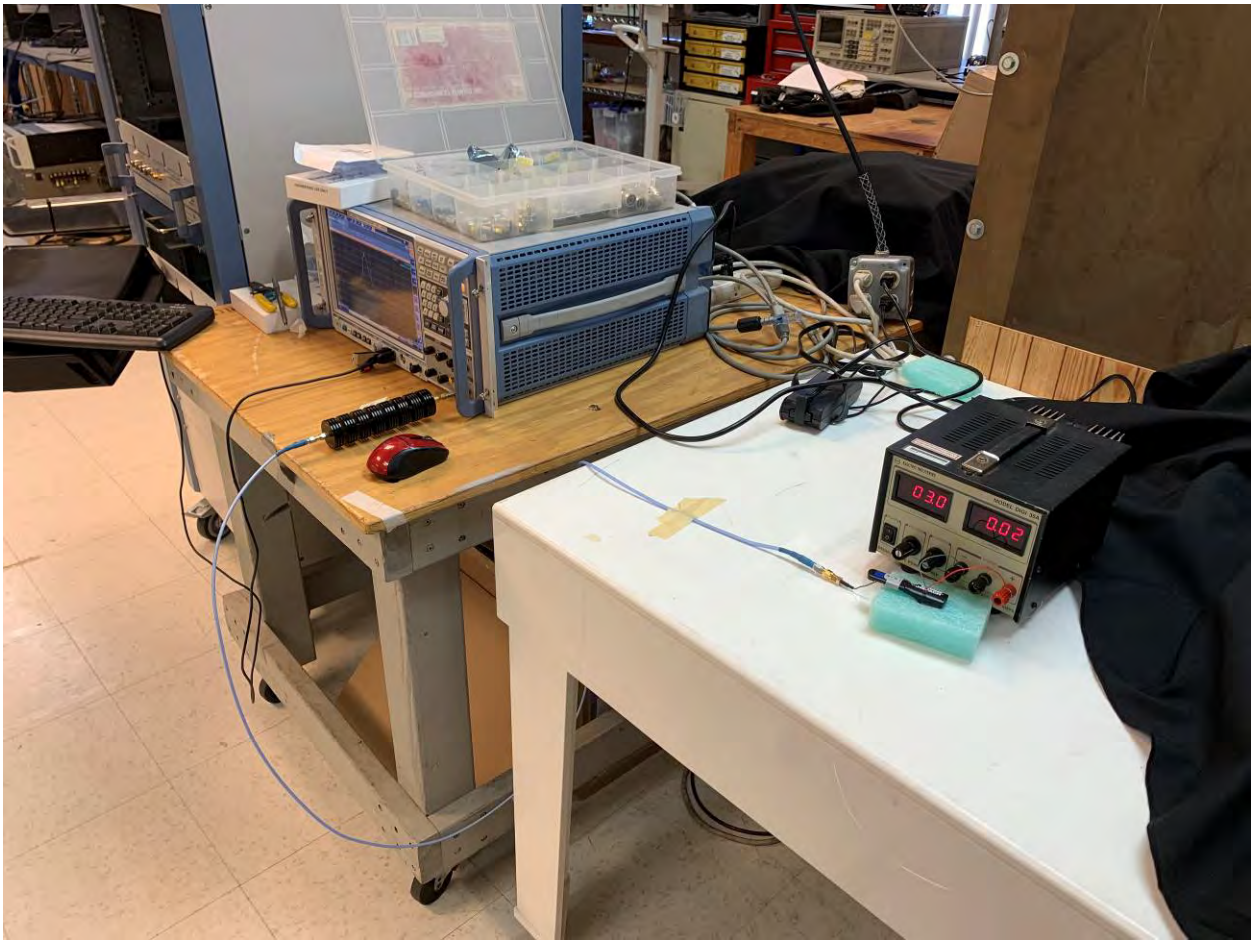
6.3 Results:

The sample tested was found to Comply.

§15.247 (b) (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt or 30 dBm.

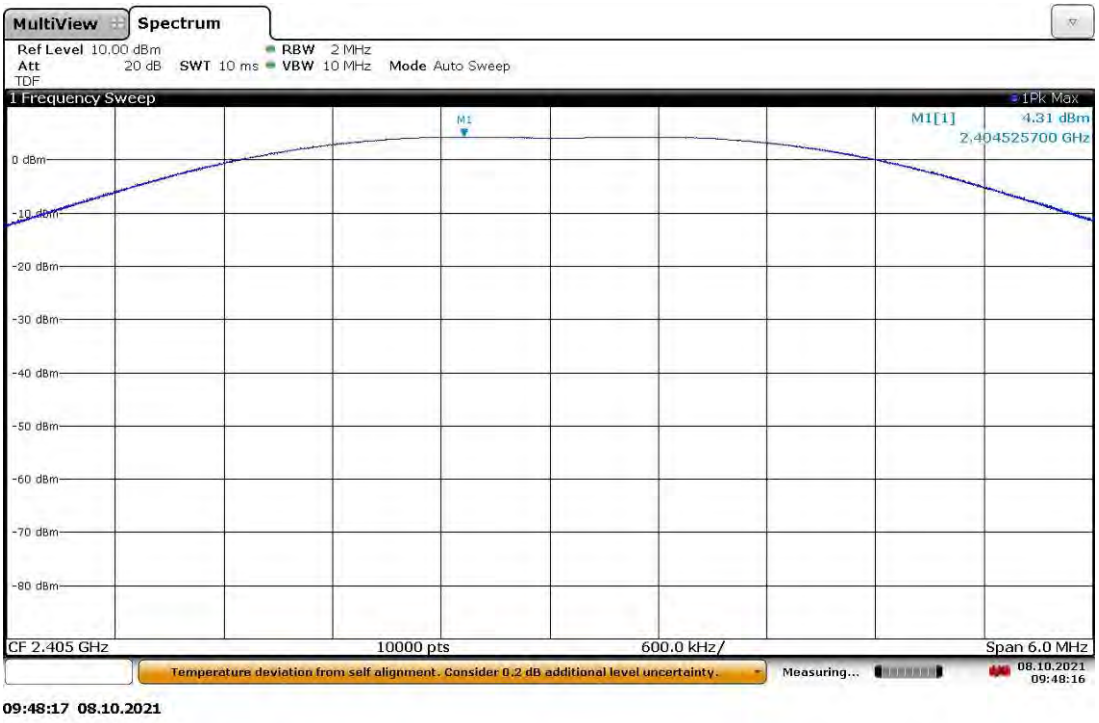
Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)	Margin (dB)
2405	4.31	30	-25.69
2440	4.45	30	-25.55
2480	4.64	30	-25.36

6.4 Setup Photograph:

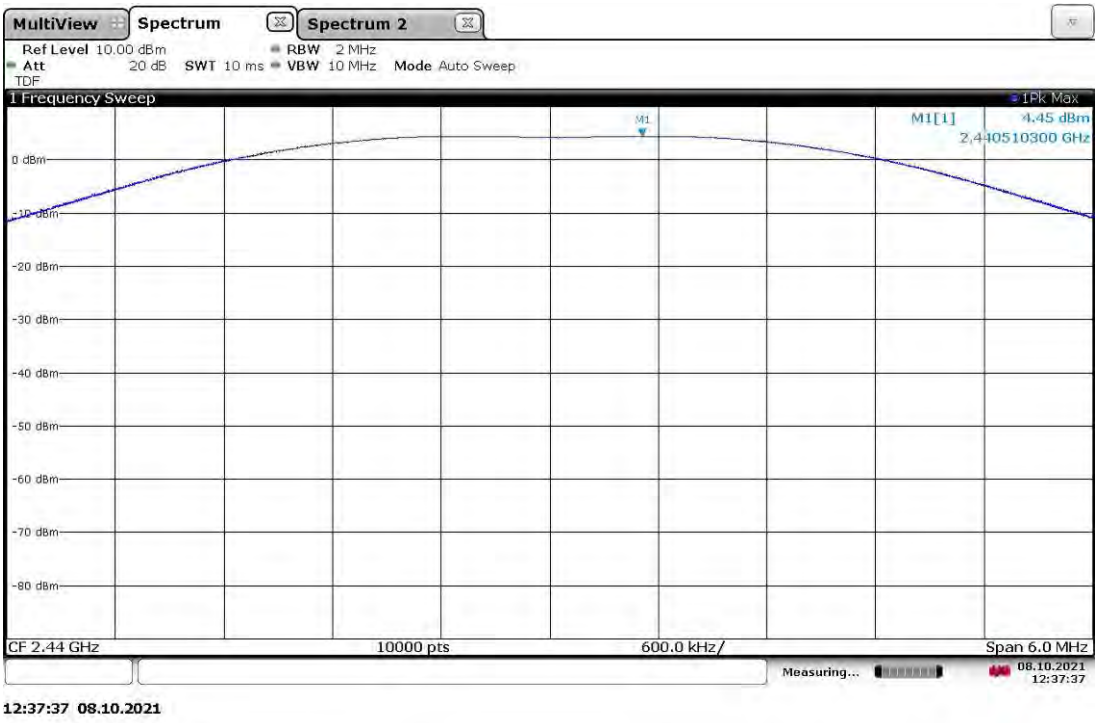


6.5 Test Data:

Low Channel Conducted Power



Mid Channel Conducted Power



Notes: Cable and external attenuator's factors were internally compensated as TDF.

High Channel Conducted Power

Notes: Cable and external attenuator's factors were internally compensated as TDF.

Test Personnel:	Kouma Sinn KPS	Test Date:	10/08/2021
Supervising/Reviewing Engineer: (Where Applicable)	Vathana Ven VSV		
Product Standard:	CFR47 FCC Part 15.247 RSS-247, RSS-102	Limit Applied:	See report section 6.3
Input Voltage:	3VDC From Ext. P/S	Ambient Temperature:	24 ºC
Pretest Verification w/ Ambient Signals or BB Source:	**N/A**	Relative Humidity:	51 %
		Atmospheric Pressure:	1012 mbars

Deviations, Additions, or Exclusions: None

7 6 dB Bandwidth and Occupied Bandwidth

7.1 Method

Tests are performed in accordance with CFR47 FCC Part 15.247, RSS-247, and ANSI C63.10.

TEST SITE: AMAP Lab

7.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV005'	Weather Station	Davis	6250	MS191218083	02/07/2021	02/07/2022
ROS005-1'	Signal and Spectrum Analyzer	Rohde and Shwartz	FSW43	100646	10/27/2020	10/27/2021
CEN001'	DC-40GHz attenuator 20dB	Centric RF	C411-20	CEN001	01/22/2021	01/22/2022
CBLHF2012-2M-1'	2m 9kHz-40GHz Coaxial Cable - SET1	Huber & Suhner	SF102	252675001	02/19/2021	02/19/2022

Software Utilized:

Name	Manufacturer	Version
None	--	--

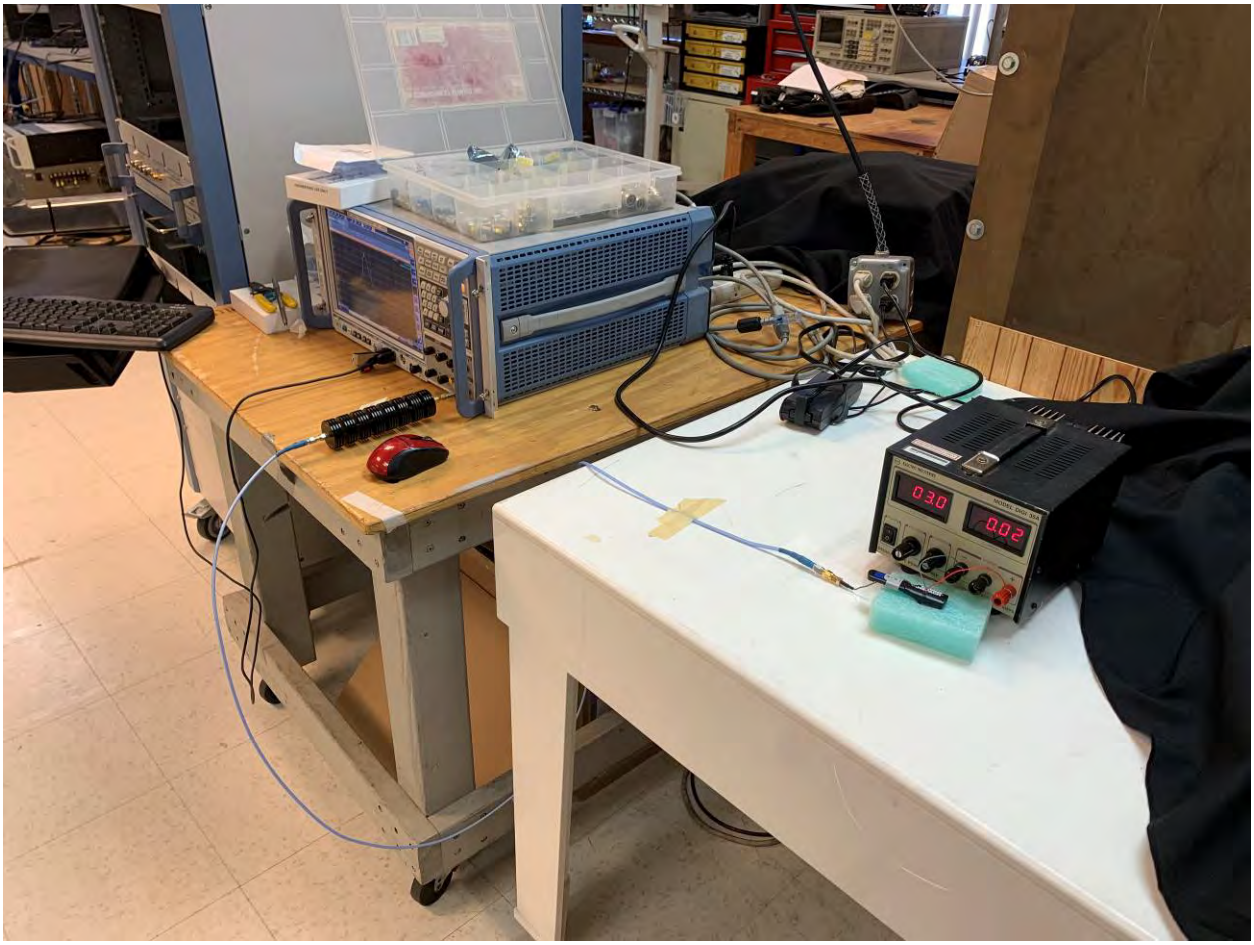
7.3 Results:

The sample tested was found to Comply.

§15.247 (a) (2) 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.

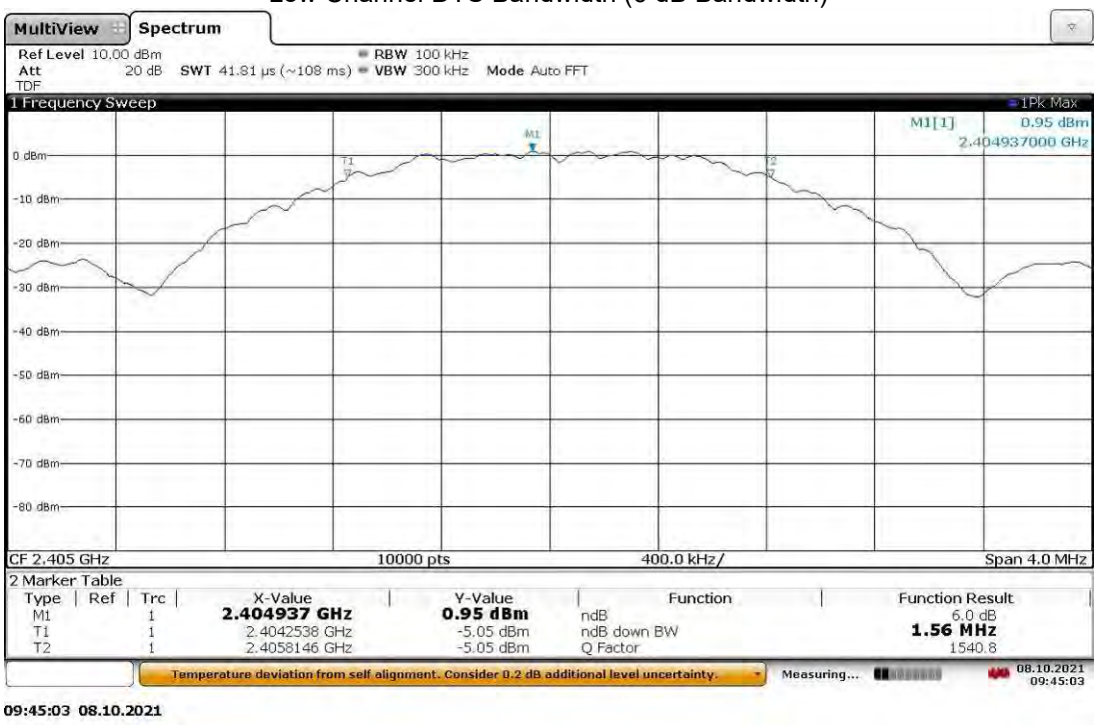
Frequency	DTS Bandwidth (6 dB Bandwidth)	Occupied Bandwidth
(MHz)	(kHz)	(MHz)
2405	1560	2.277
2440	1580	2.306
2475	1380	2.257

7.4 Setup Photograph:

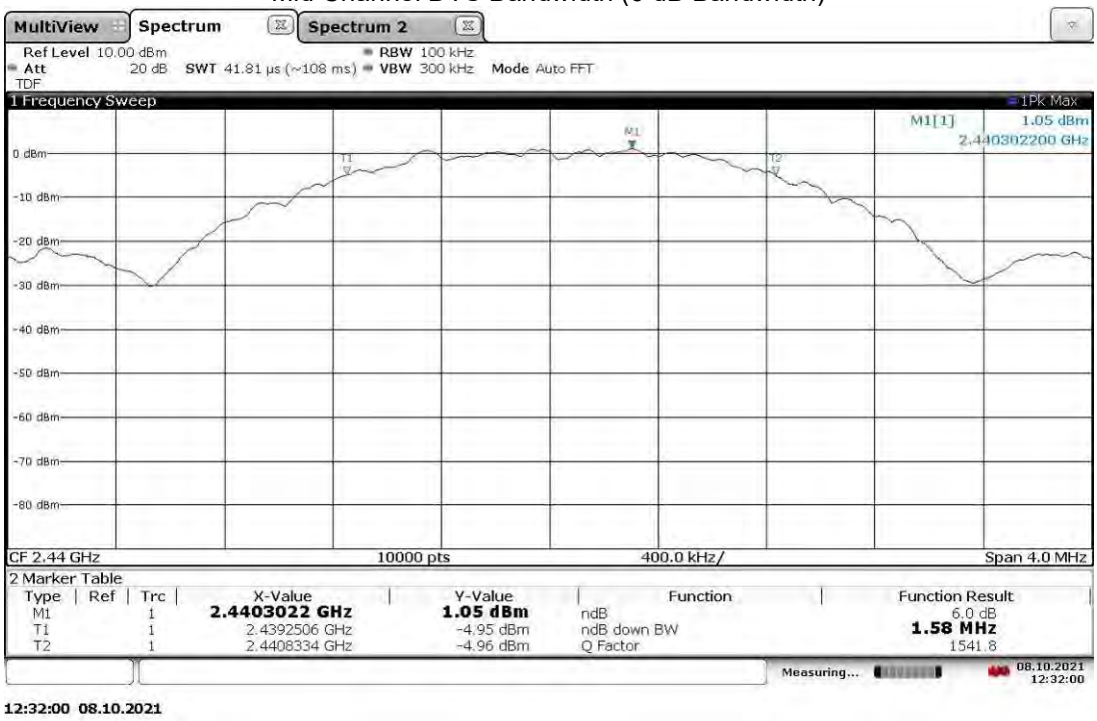


7.5 Plots/Data:

Low Channel DTS Bandwidth (6 dB Bandwidth)

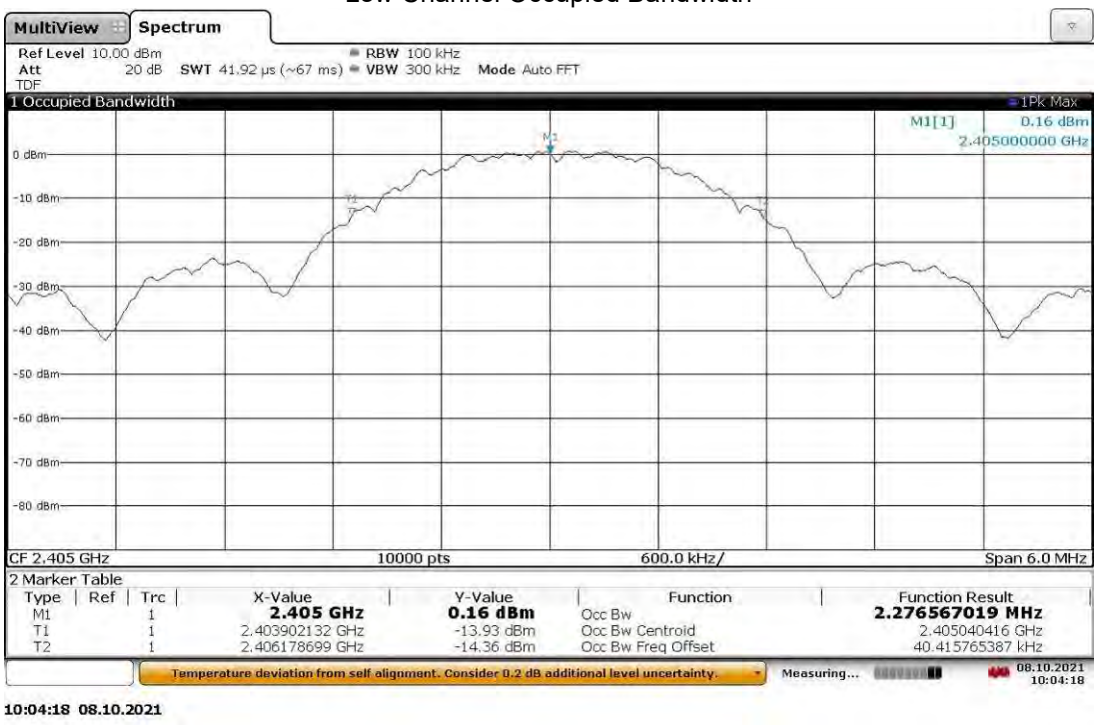


Mid Channel DTS Bandwidth (6 dB Bandwidth)

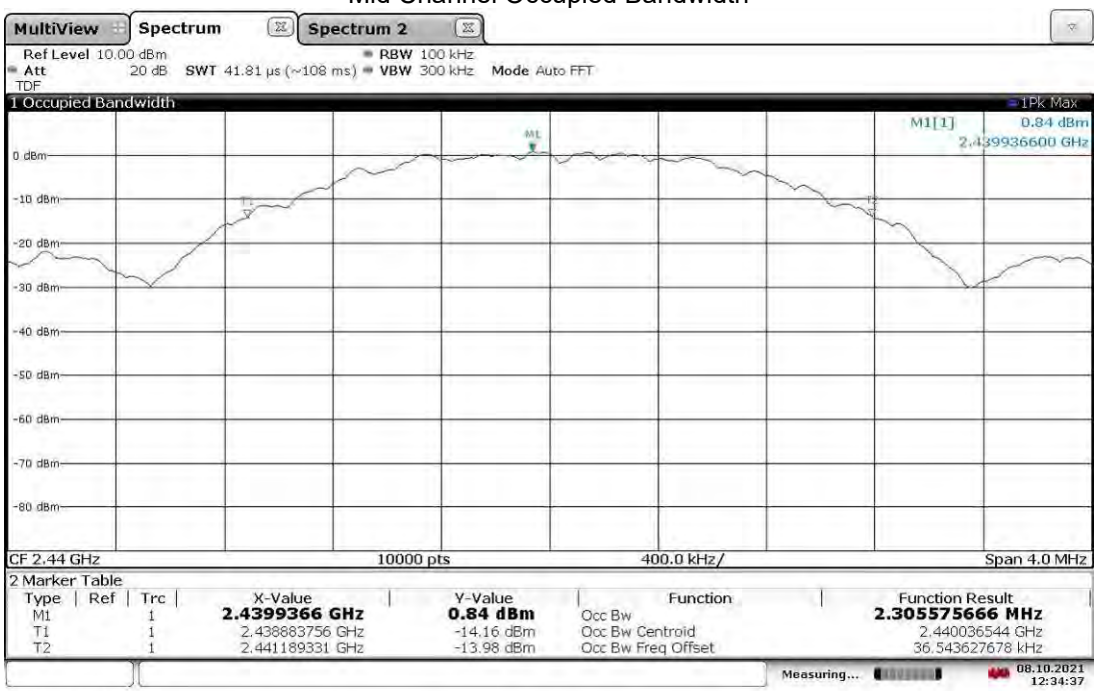


High Channel DTS Bandwidth (6 dB Bandwidth)

Low Channel Occupied Bandwidth



Mid Channel Occupied Bandwidth



12:34:38 08.10.2021

High Channel Occupied Bandwidth

11:57:30 08.10.2021

Test Personnel:	Kouma Sinn KPS	Test Date:	10/08/2021
Supervising/Reviewing Engineer: (Where Applicable)	Vathana Ven VSV		
Product Standard:	CFR47 FCC Part 15.247 RSS-247	Limit Applied:	See report section 7.3
Input Voltage:	3VDC From Ext. P/S	Ambient Temperature:	24 ºC
Pretest Verification w/ Ambient Signals or BB Source:	N/A	Relative Humidity:	51 %
		Atmospheric Pressure:	1012 mbars

Deviations, Additions, or Exclusions: None

8 Maximum Power Spectral Density

8.1 Method

Tests are performed in accordance with CFR47 FCC Part 15.247, RSS-247, and ANSI C63.10.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

8.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV005'	Weather Station	Davis	6250	MS191218083	02/07/2021	02/07/2022
ROS005-1'	Signal and Spectrum Analyzer	Rohde and Shwartz	FSW43	100646	10/27/2020	10/27/2021
CEN001'	DC-40GHz attenuator 20dB	Centric RF	C411-20	CEN001	01/22/2021	01/22/2022
CBLHF2012-2M-1'	2m 9kHz-40GHz Coaxial Cable - SET1	Huber & Suhner	SF102	252675001	02/19/2021	02/19/2022

Software Utilized:

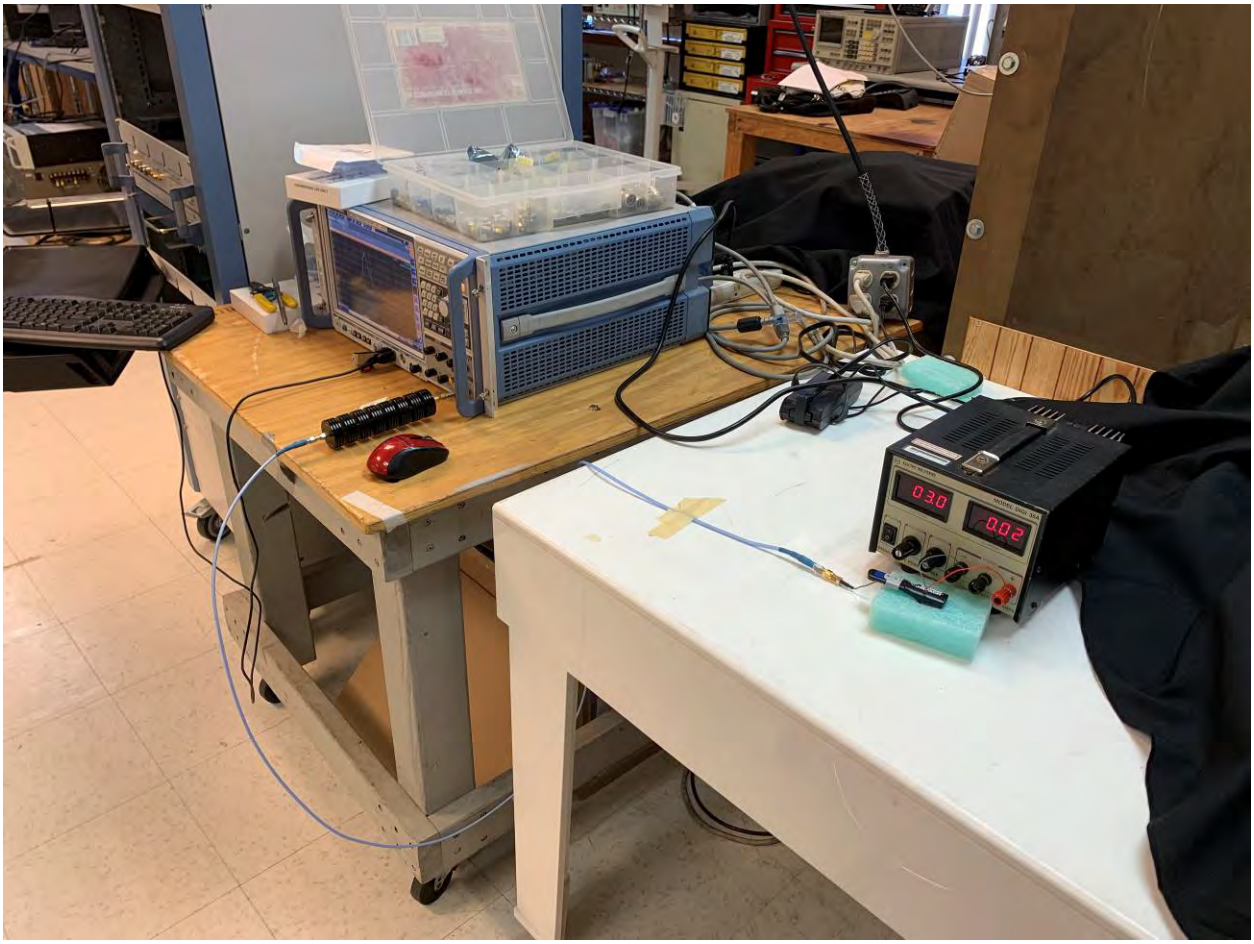
Name	Manufacturer	Version
None	--	--

8.3 Results:

The sample tested was found to Comply.

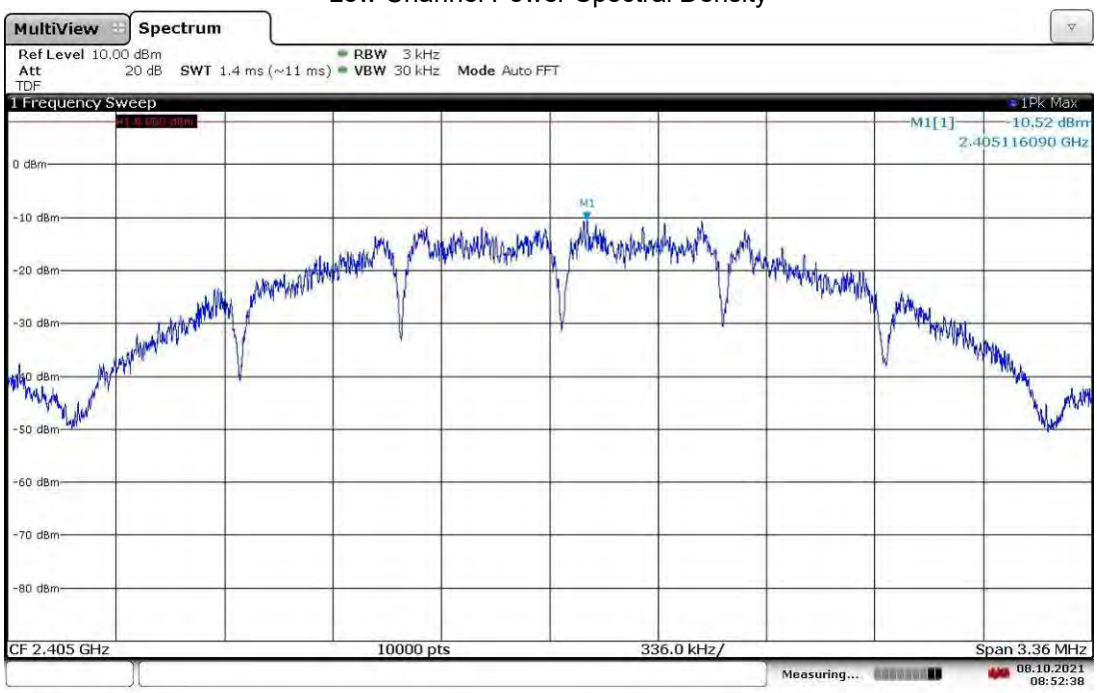
§15.247 (e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

8.4 Setup Photograph:

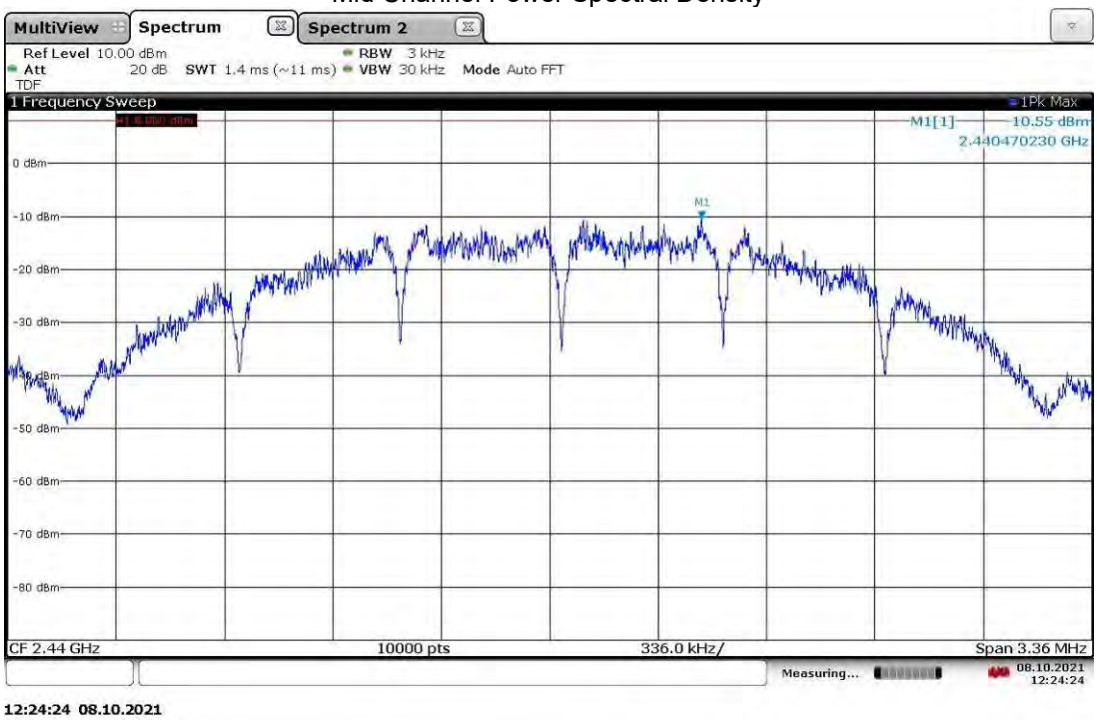


8.5 Test Data:

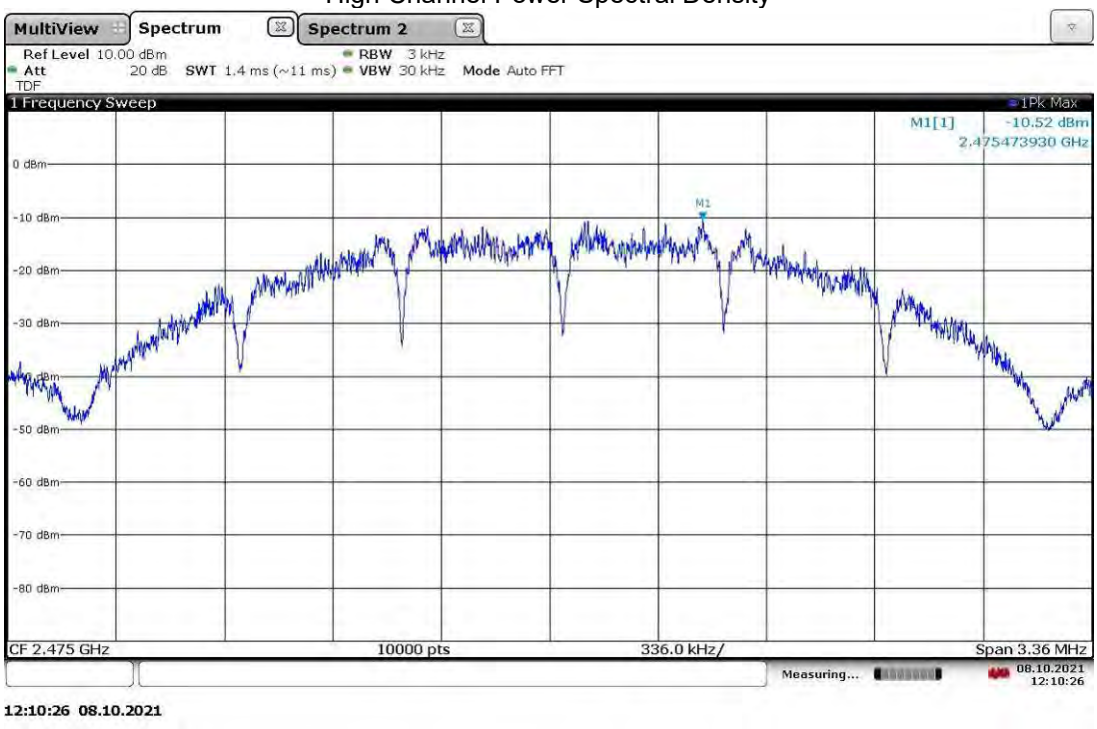
Low Channel Power Spectral Density



Mid Channel Power Spectral Density



High Channel Power Spectral Density



Test Personnel:	Kouma Sinn KPS	Test Date:	10/08/2021
Supervising/Reviewing Engineer: (Where Applicable)	Vathana Ven VJV		
Product Standard:	CFR47 FCC Part 15.247 RSS-247	Limit Applied:	See report section 8.3
Input Voltage:	3 VDC From Ext. P/S	Ambient Temperature:	24 ºC
Pretest Verification w/ Ambient Signals or BB Source:	**N/A**	Relative Humidity:	51 %
		Atmospheric Pressure:	1012 mbars

Deviations, Additions, or Exclusions: None

9 Band Edge Compliance

9.1 Method

Tests are performed in accordance with FCC Part 15 Subpart C 15.247 RSS 247, ANSI C 63.10, and ANSI C 63.4.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	4.6dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	5.3 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.5 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	5.2 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	5.0 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	5.0 dB	5.5 dB

As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculation

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

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

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

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

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

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

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

Example:

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

9.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007'	Weather Station Vantage Vue	Davis	6250	MS191212003	03/20/2021	03/20/2022
ETS002'	1-18GHz DRG Horn Antenna	ETS Lindgren	3117	00143260	08/24/2021	08/24/2022
145-420'	Receiver to floor cable	Utiflex	UFB311A-2-0591-70070	145-420	02/17/2021	02/17/2022
145-421'	10m Ant to Pre-amp	Utiflex	UFB311A-0-3346-50050	145-421	02/16/2021	02/16/2022
145-422'	10Amp Pre-amp to under floor	Utiflex	UFB311A-0-2756-70070	145-422	02/17/2021	02/17/2022
145-414'	Cables 145-400 145-403 145-405 145-409	Huber + Suhner	3m Track A cables	multiple	07/09/2021	07/09/2022

Software Utilized:

Name	Manufacturer	Version
None	--	--

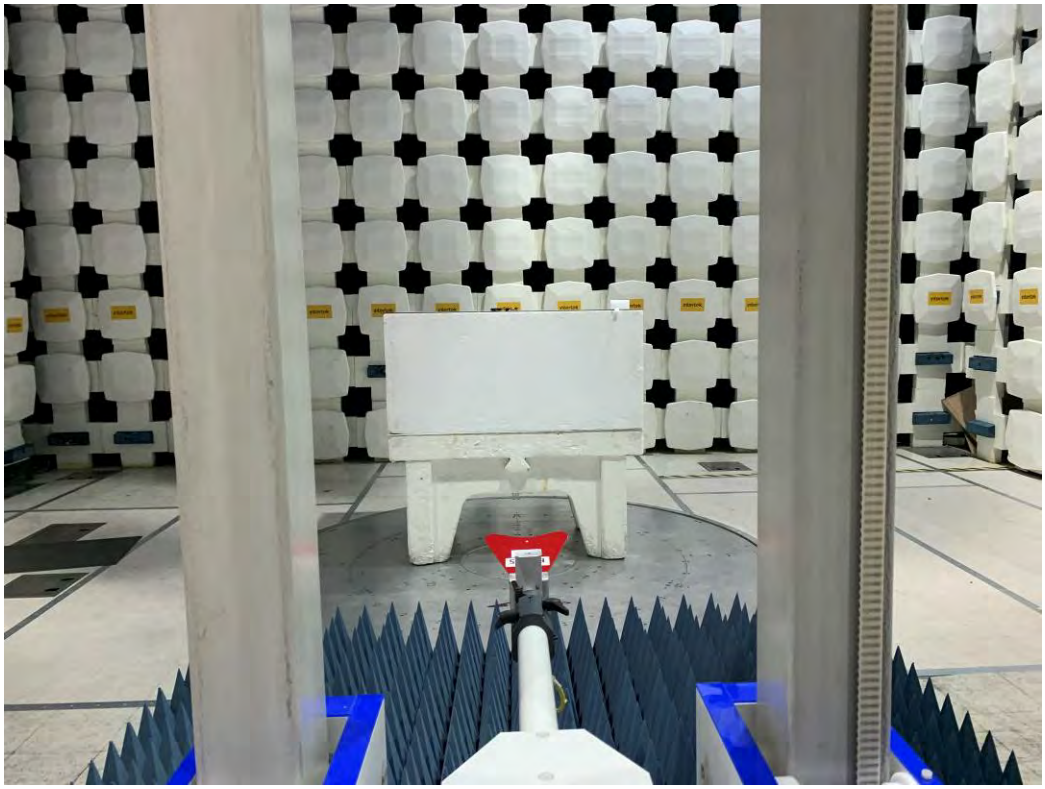
9.3 Results:

The sample tested was found to Comply.

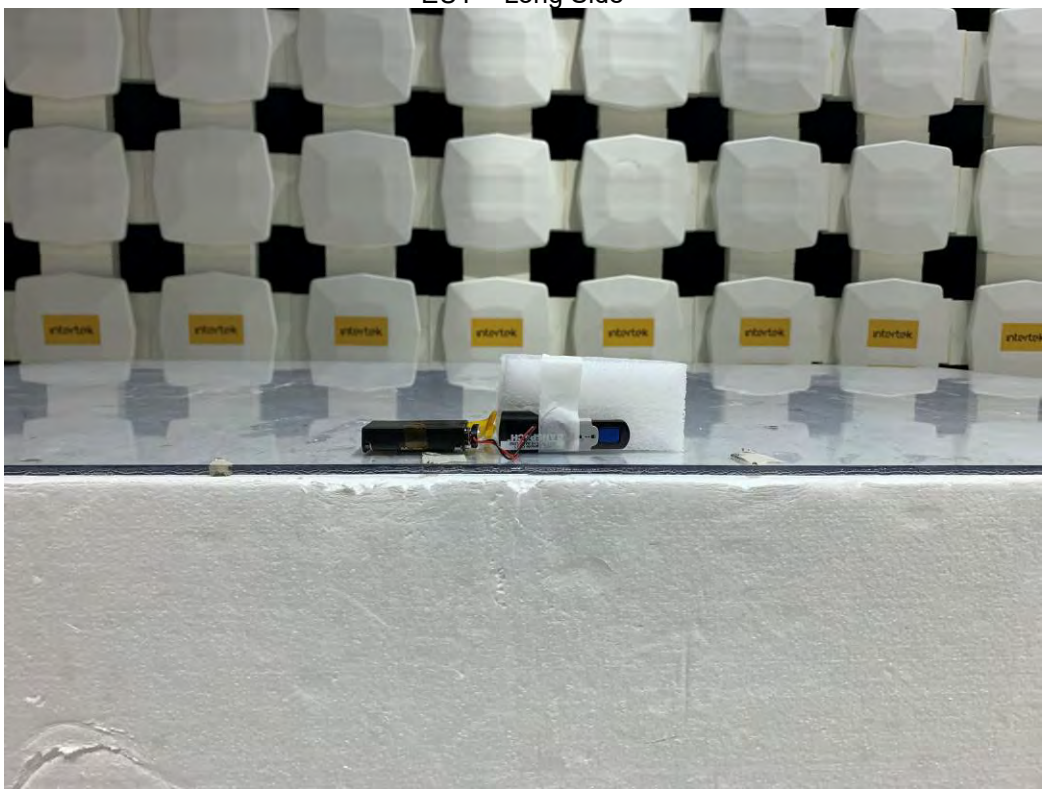
15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that 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))

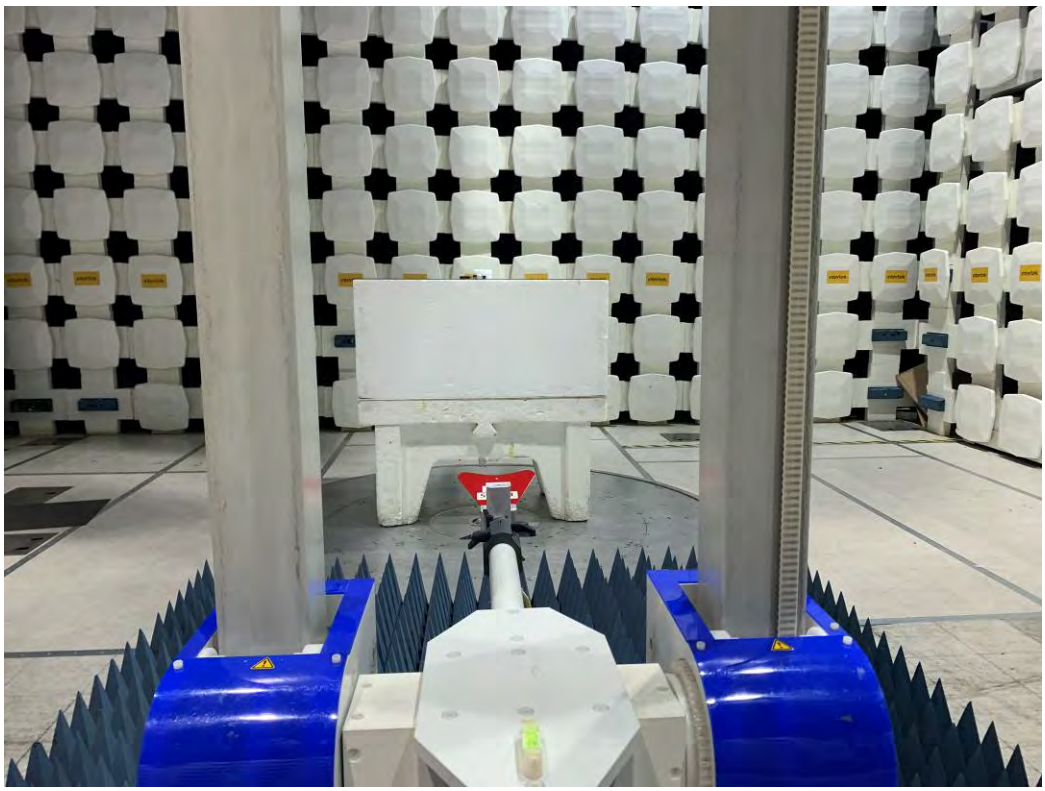
9.4 Setup Photographs:

EUT – Flat

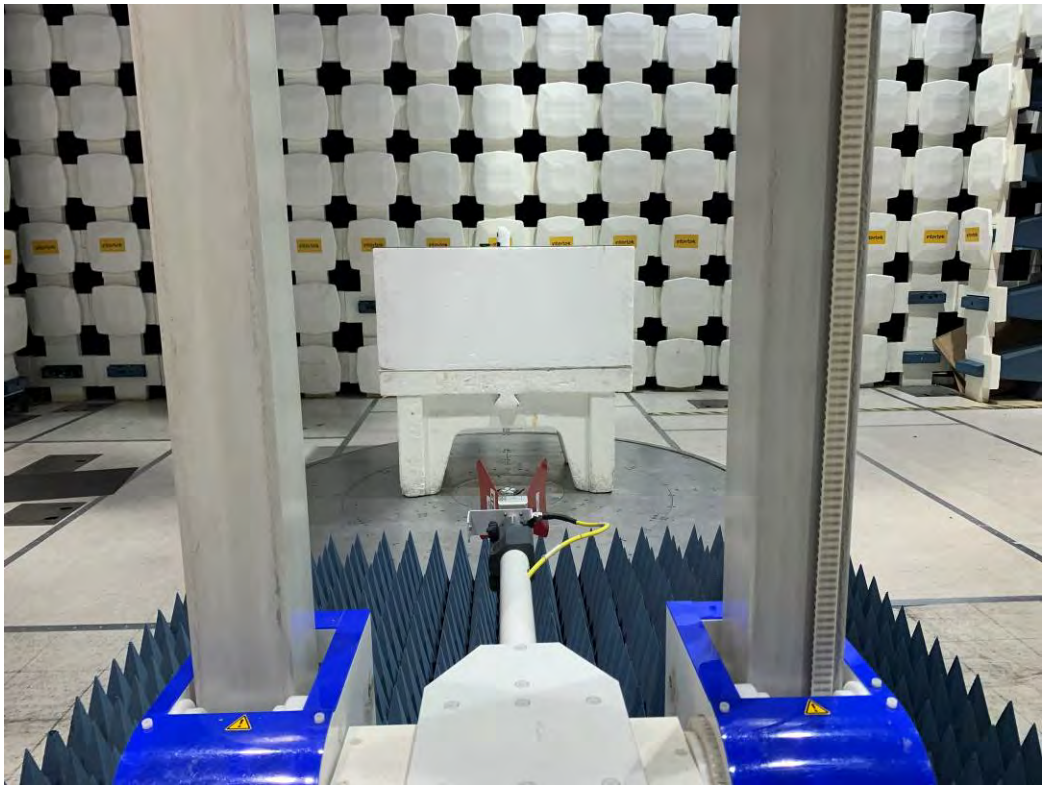


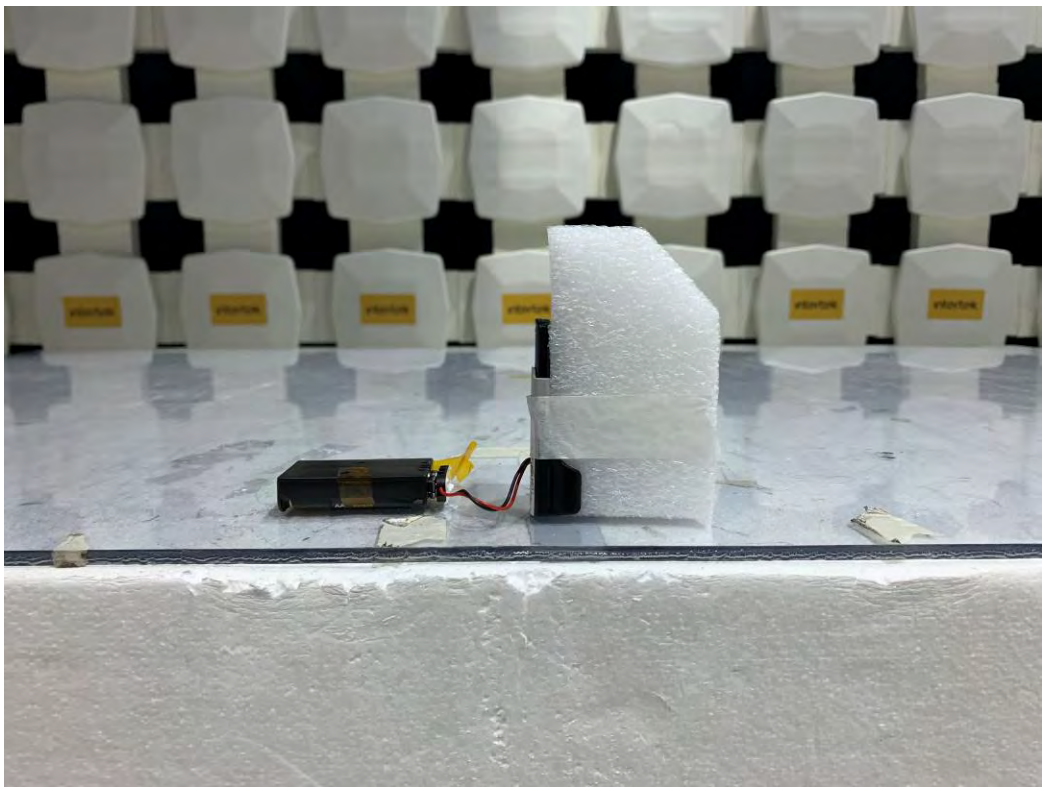
EUT – Long Side





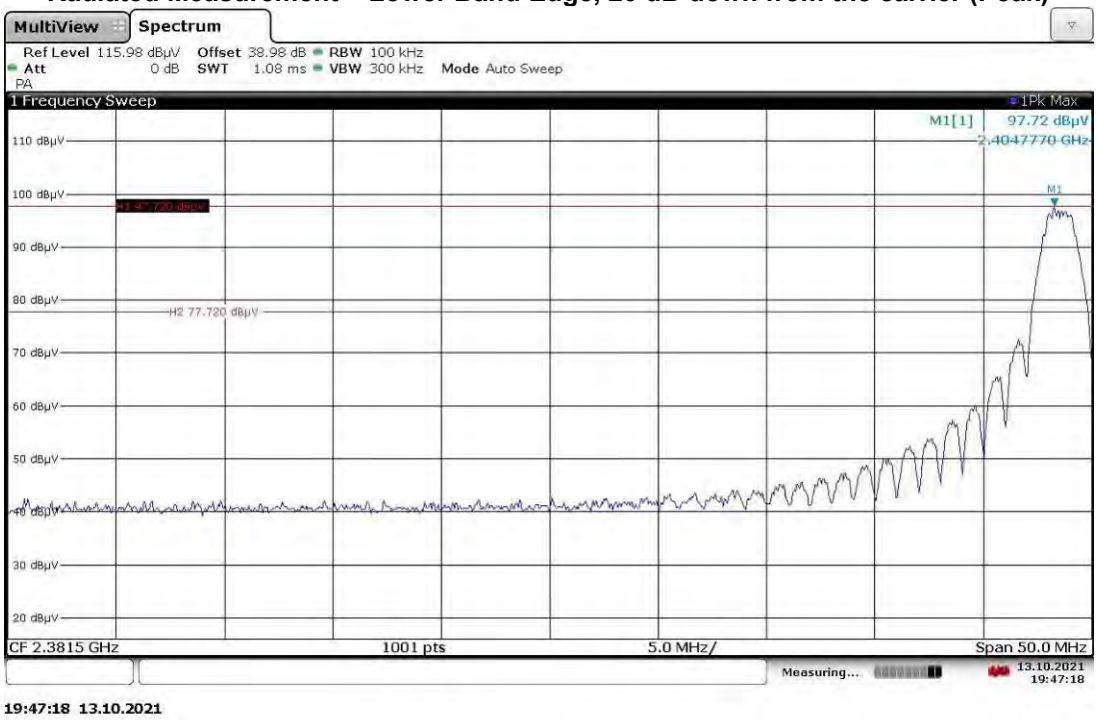
EUT – Short Side



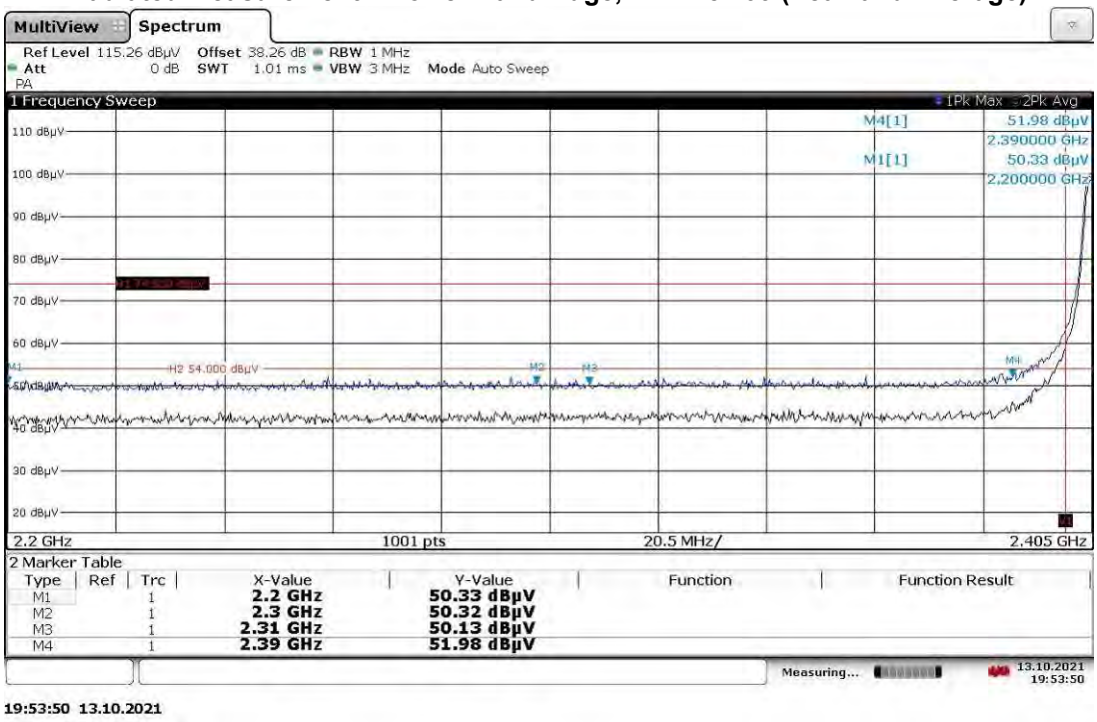


9.5 Test Data:

Radiated Measurement – Lower Band Edge, 20 dB down from the carrier (Peak)

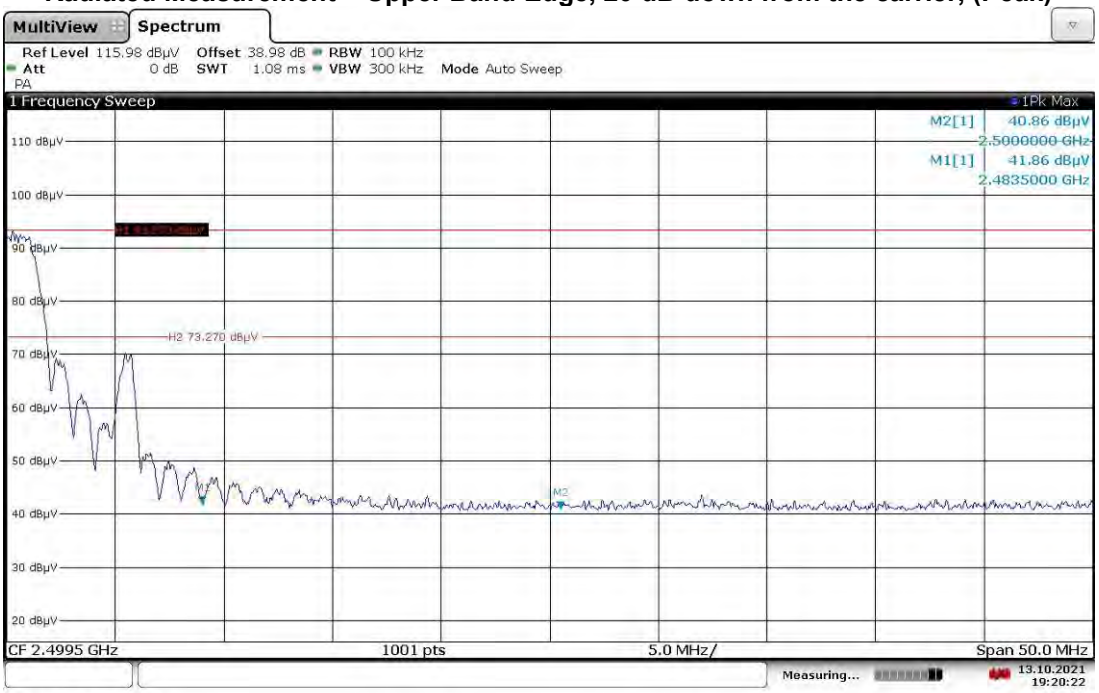


Radiated Measurement – Lower Band Edge, FCC 15.209 (Peak and Average)



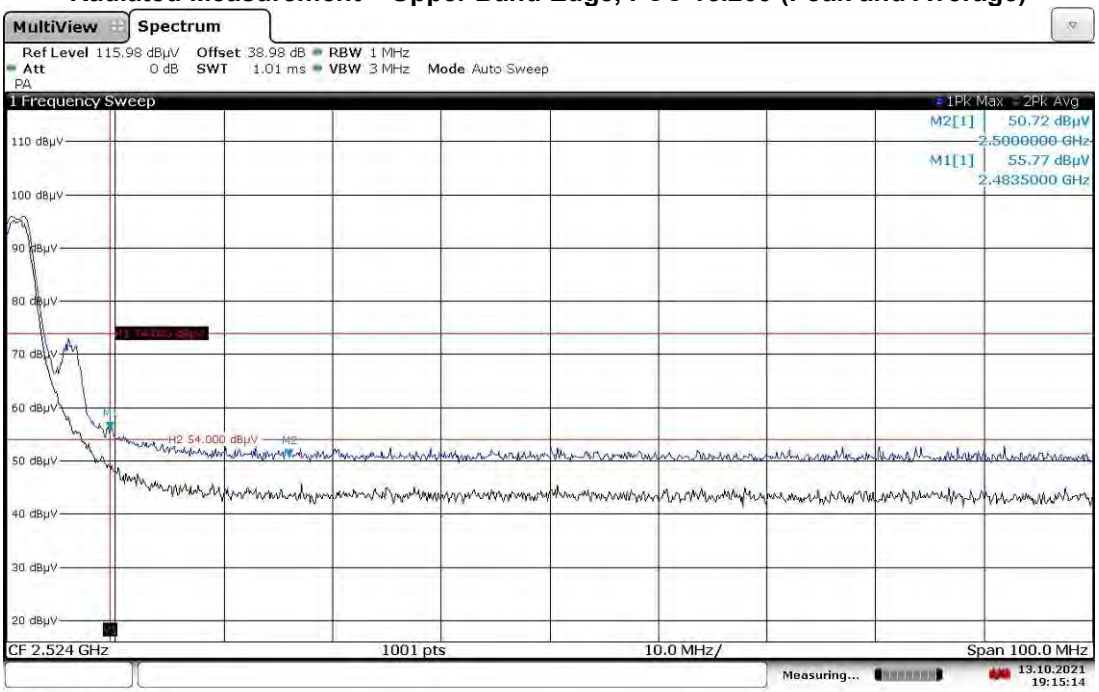
Note: Antenna and cable factors were internally compensated as Ref Offset.

Radiated Measurement – Upper Band Edge, 20 dB down from the carrier, (Peak)



19:20:22 13.10.2021

Radiated Measurement – Upper Band Edge, FCC 15.209 (Peak and Average)



19:15:14 13.10.2021

Note: Antenna and cable factors were internally compensated as Ref Offset.

Test Personnel:	Kouma Sinn KPS	Test Date:	10/13/2021
Supervising/Reviewing Engineer: (Where Applicable)	Vathana Ven VJV		
Product Standard:	CFR47 FCC Part 15.247 RSS-247	Limit Applied:	See report section 9.3
Input Voltage:	Battery Powered	Ambient Temperature:	25 ºC
Pretest Verification w/ Ambient Signals or BB Source:	**N/A**	Relative Humidity:	38 %
		Atmospheric Pressure:	1004 mbars

Notes:

Worst-case orientation and antenna polarity from output power measurements were used for all testing.

Deviations, Additions, or Exclusions: None

10 Transmitter spurious emissions

10.1 Method

Tests are performed in accordance with FCC Part 15 Subpart C 15.247, FCC Part 15 Subpart B, RSS 247 ICES 003, ANSI C 63.10, and ANSI C 63.4.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	4.6dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	5.3 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.5 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	5.2 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	5.0 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	5.0 dB	5.5 dB

As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculation

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

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

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

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

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

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

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

Example:

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

Alternately, when BAT-EMC Emission Software is used, the “Level” includes all losses and gains and is compared directly in the “Margin” column to the “Limit”. The “Correction” includes Antenna Factor, Preamp, and Cable Loss. These are already accounted for in the “Level” column.

10.2 Test Equipment Used:

Test equipment used for conducted measurements on 10/08/2021

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV005'	Weather Station	Davis	6250	MS191218083	02/07/2021	02/07/2022
ROS005-1'	Signal and Spectrum Analyzer	Rohde and Shwartz	FSW43	100646	10/27/2020	10/27/2021
CEN001'	DC-40GHz attenuator 20dB	Centric RF	C411-20	CEN001	01/22/2021	01/22/2022
CBLHF2012-2M-1	2m 9kHz-40GHz Coaxial Cable - SET1	Huber & Suhner	SF102	252675001	02/19/2021	02/19/2022

Software Utilized:

Name	Manufacturer	Version
None	--	--

Test equipment used for conducted measurements on 10/20/2021

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007'	Weather Station Vantage Vue	Davis	6250	MS191212003	03/20/2021	03/20/2022
145108'	EMI Test Receiver (20Hz - 40GHz)	Rohde & Schwarz	ESIB40	100209	06/22/2021	06/22/2022
CEN001'	DC-40GHz attenuator 20dB	Centric RF	C411-20	CEN001	01/22/2021	01/22/2022
CBLHF2012-2M-2'	2m 9kHz-40GHz Coaxial Cable - SET2	Huber & Suhner	SF102	252675002	02/10/2021	02/10/2022

Software Utilized:

Name	Manufacturer	Version
None	--	--

Test equipment used for radiated measurements

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV007'	Weather Station Vantage Vue	Davis	6250	MS191212003	03/20/2021	03/20/2022
145108'	EMI Test Receiver (20Hz - 40GHz)	Rohde & Schwarz	ESIB40	100209	06/22/2021	06/22/2022
IW001'	2 meter cable	Insulated Wire	2801-NPS	001	10/07/2020	10/07/2021
145145'	Broadband Hybrid Antenna 30 MHz - 3 GHz	Sunol Sciences Corp.	JB3	A122313	06/09/2021	06/09/2022
HS002'	DC-18GHz cable 1.5M long	Huber & Suhner	SucoFlex 106A	HS002	11/25/2020	11/25/2021
PRE11'	50dB gain pre-amp	Pasternack	PRE11	PRE11	09/02/2021	09/02/2022
IW006'	DC-18GHz cable 8.4m long	Insulated Wire	2800-NPS	IW006	11/25/2020	11/25/2021
HS003'	10m under floor cable	Huber-Schuner	10m-1	HS003	02/17/2021	02/17/2022
IW001'	2 meter cable	Insulated Wire	2801-NPS	001	10/07/2020	10/07/2021
ETS002'	1-18GHz DRG Horn Antenna	ETS Lindgren	3117	00143260	08/24/2021	08/24/2022
IW002	2 meter Armored cable	Insulated Wire	2800-NPS	002	09/23/2020	09/23/2021
IW003'	8.4 meter cable	Insulated Wire	2800-NPS	003	10/08/2020	10/08/2021
PRE12'	Pre-amplifier	Com Power	PAM-118A	18040117	12/07/2020	12/07/2021
145-414'	Cables 145-400 145-403 145-405 145-409	Huber + Suhner	3m Track A cables	multiple	07/09/2021	07/09/2022
REA008'	band reject filter 2.4GHz	Reactel, Inc	12RX7-2441.75-x140 S	17-01	07/28/2021	07/28/2022
REA004'	3GHz High Pass Filter	Reactel, Inc	7HSX-3G/18G-S11	06-1	02/19/2021	02/19/2022
REA006'	18GHz High Pass Filter	Reactel, Inc	7HS-18G/40G K11	(06)1	04/23/2021	04/23/2022
EMC04'	ANTENNA, RIDGED GUIDE, 18-40 GHZ	EMCO	3116	2090	01/28/2021	01/28/2022
ETS003'	9kHz-30MHz Active Loop Antenna	ETS Lindgren	6502	00143396	08/26/2021	08/26/2022
CBL051'	9kHz to 1GHz BNC/ BNC Cable	Belden	RG58A/U	none	04/16/2021	04/16/2022
PRE8'	PREAMPLFIER 1- 40 GHz	MITEQ	NSP4000-NF	507145	11/25/2020	11/25/2021
CBLHF2012 -2M-2'	2m 9kHz-40GHz Coaxial Cable - SET2	Huber & Suhner	SF102	252675002	02/10/2021	02/10/2022

Software Utilized:

Name	Manufacturer	Version
BAT-EMC	Nexio	3.18.0.16

10.3 Results:

The sample tested was found to Comply.

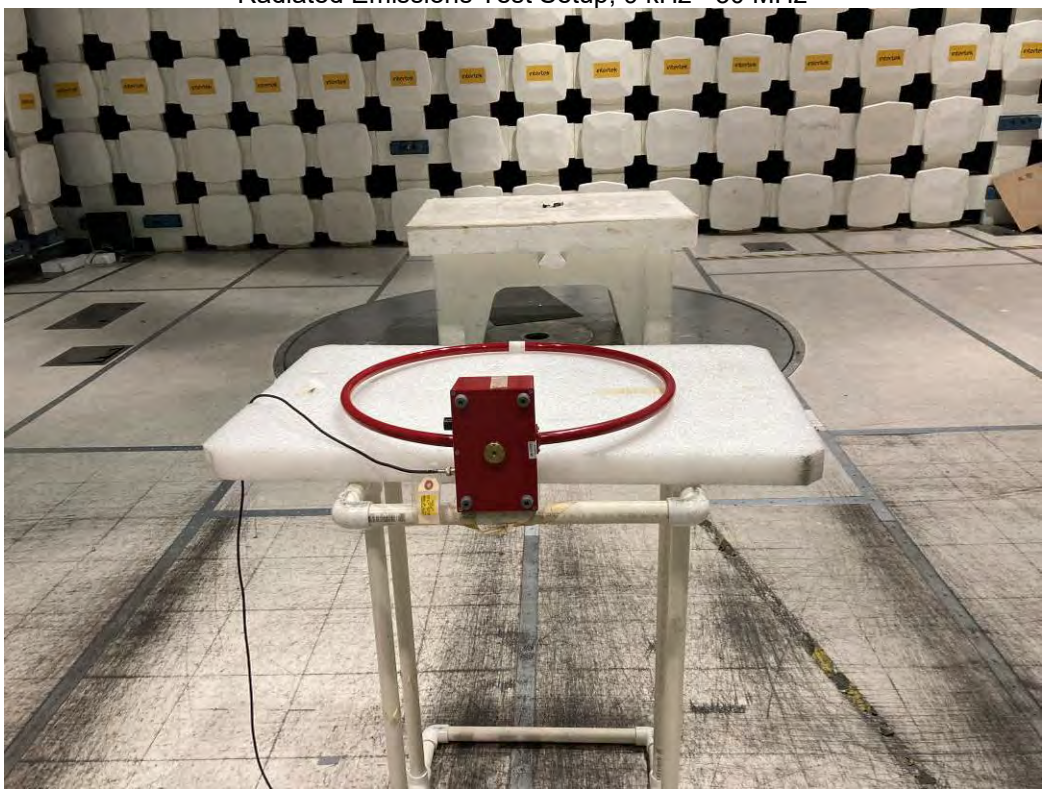
15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that 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))

10.4 Setup Photographs:

Antenna Port Conducted Spurious Emissions Setup

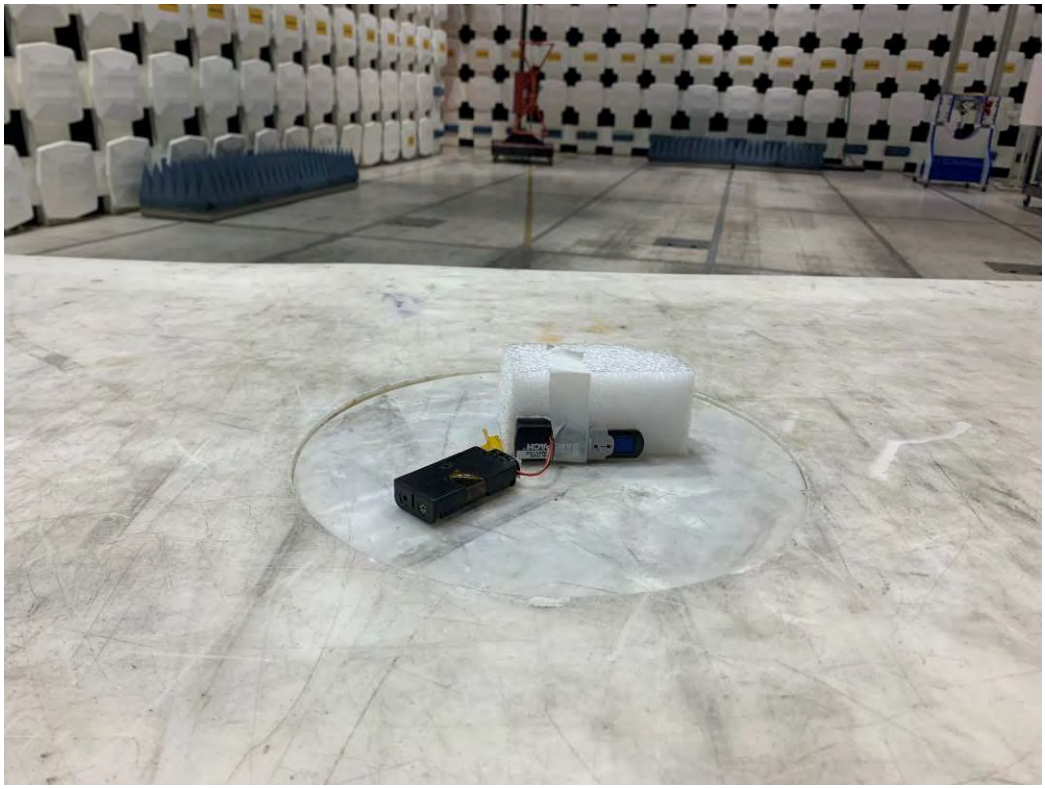
Radiated Emissions Test Setup, 9 kHz - 30 MHz

Radiated Emissions Test Setup, 9 kHz - 30 MHz

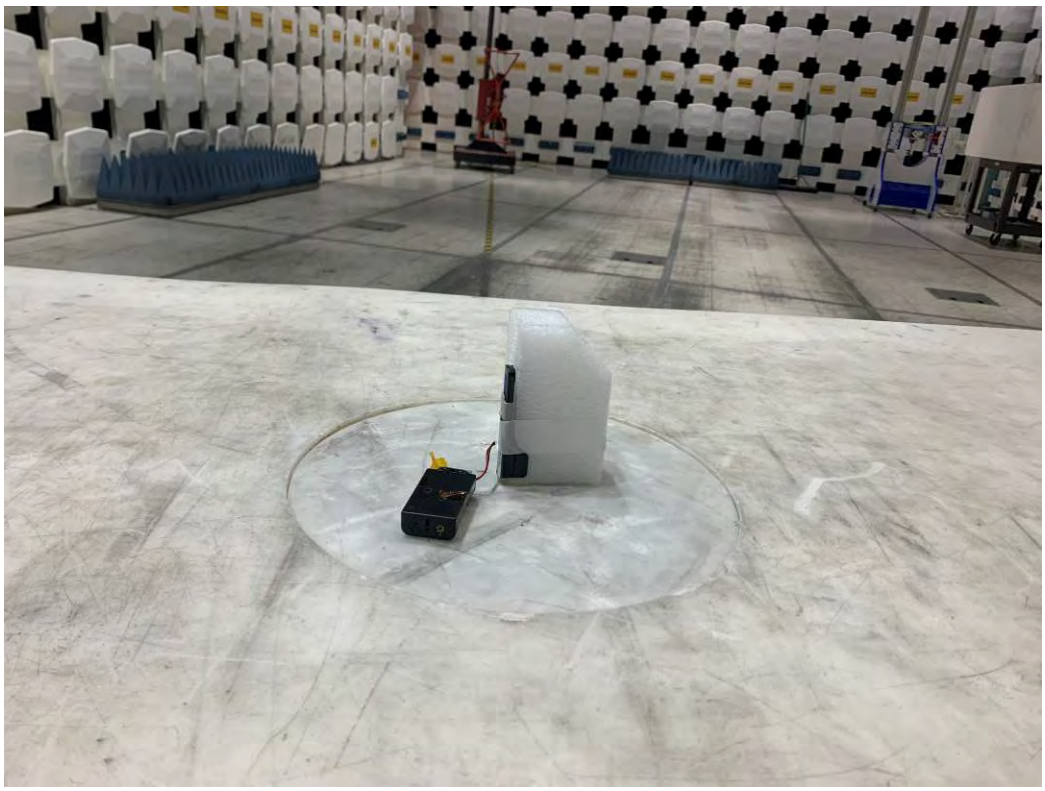


Radiated Emissions Test Setup (Flat), 30-1000 MHz

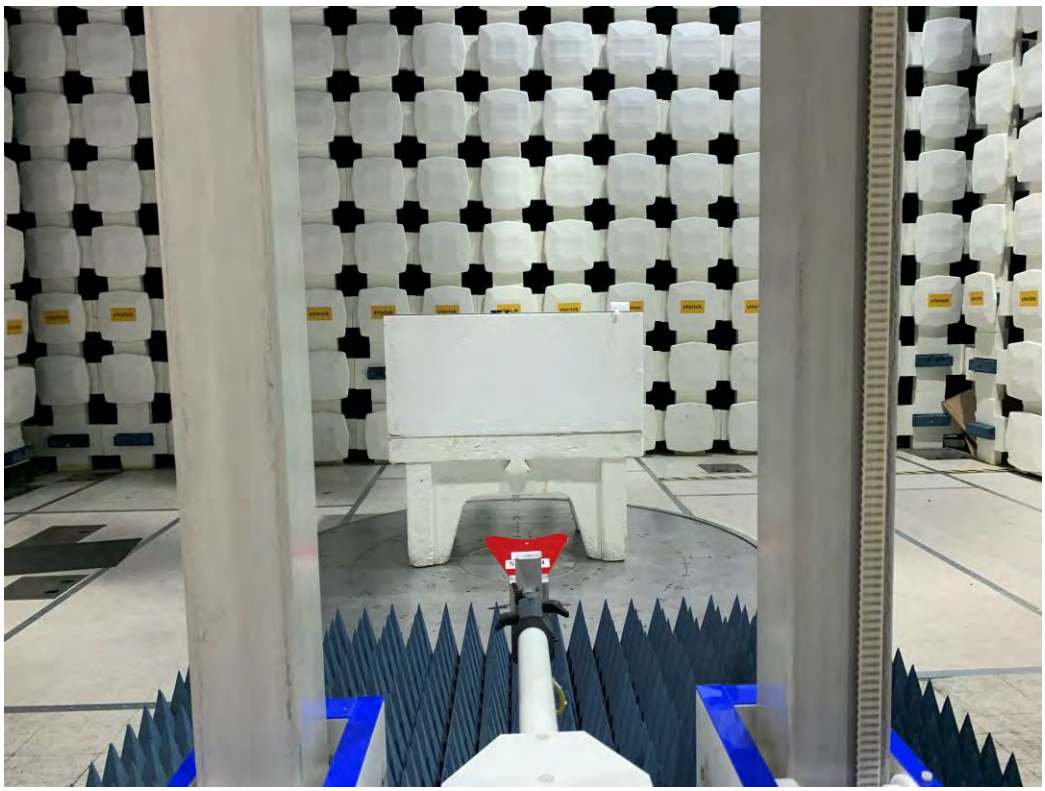
Radiated Emissions Test Setup (Long Side), 30-1000 MHz



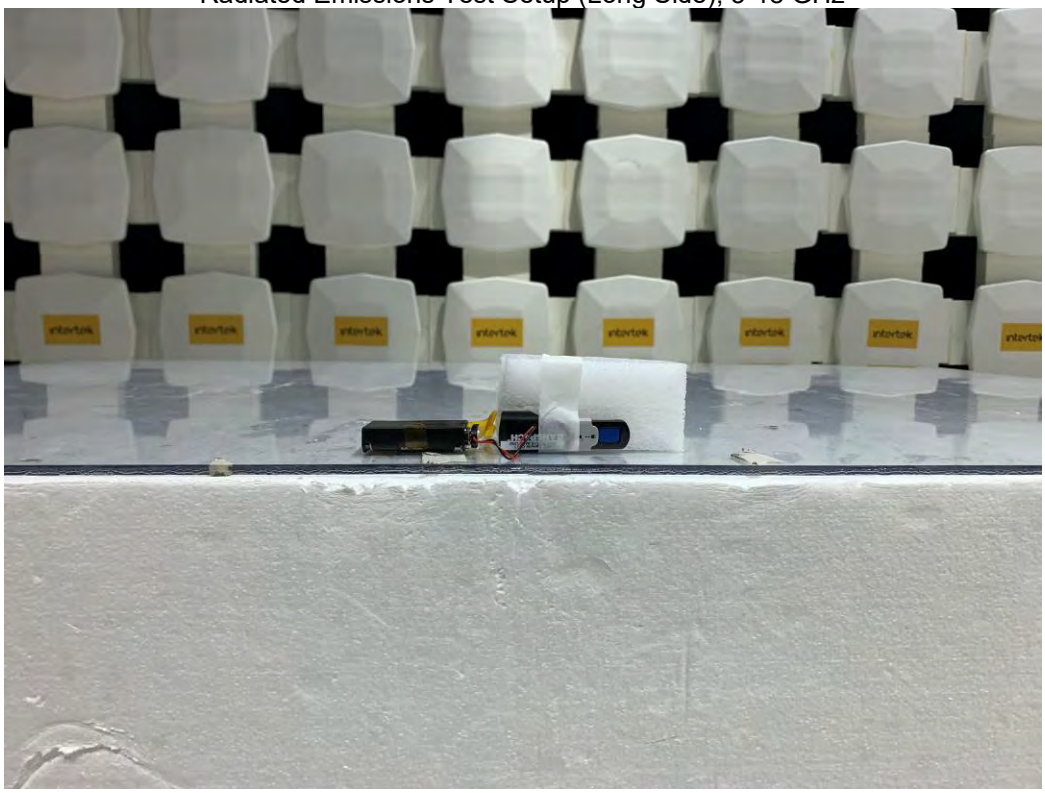
Radiated Emissions Test Setup (Short Side), 30-1000 MHz

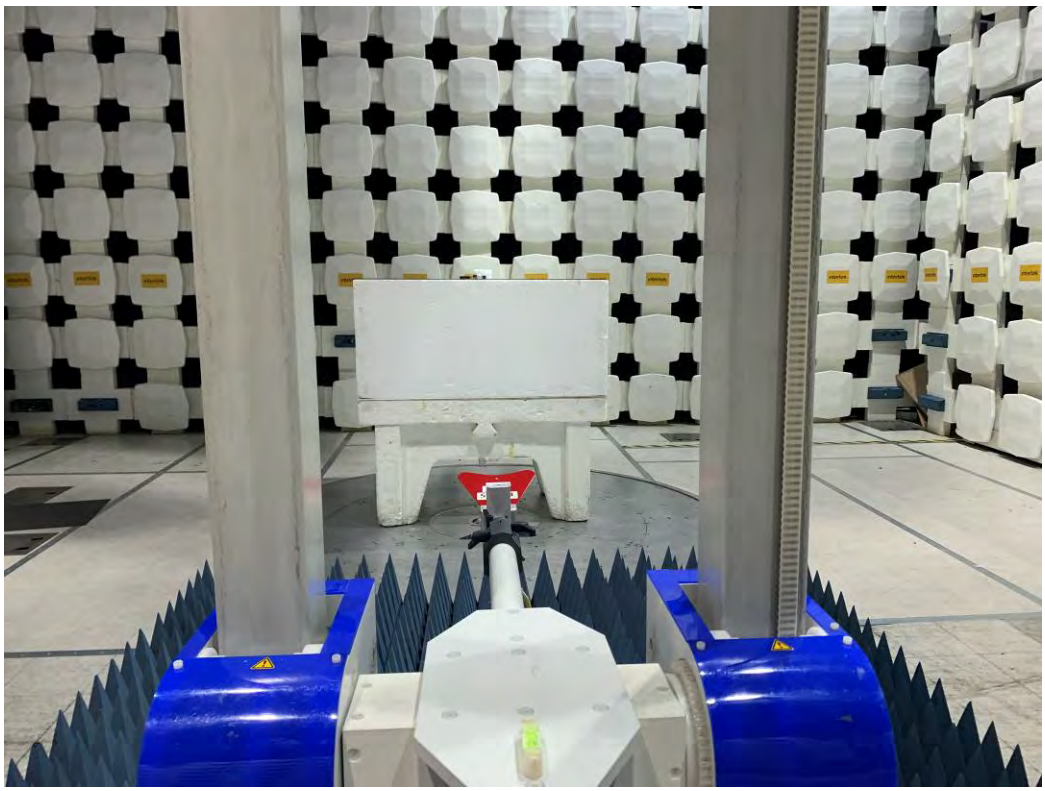


Radiated Emissions Test Setup (Flat), 3-18 GHz

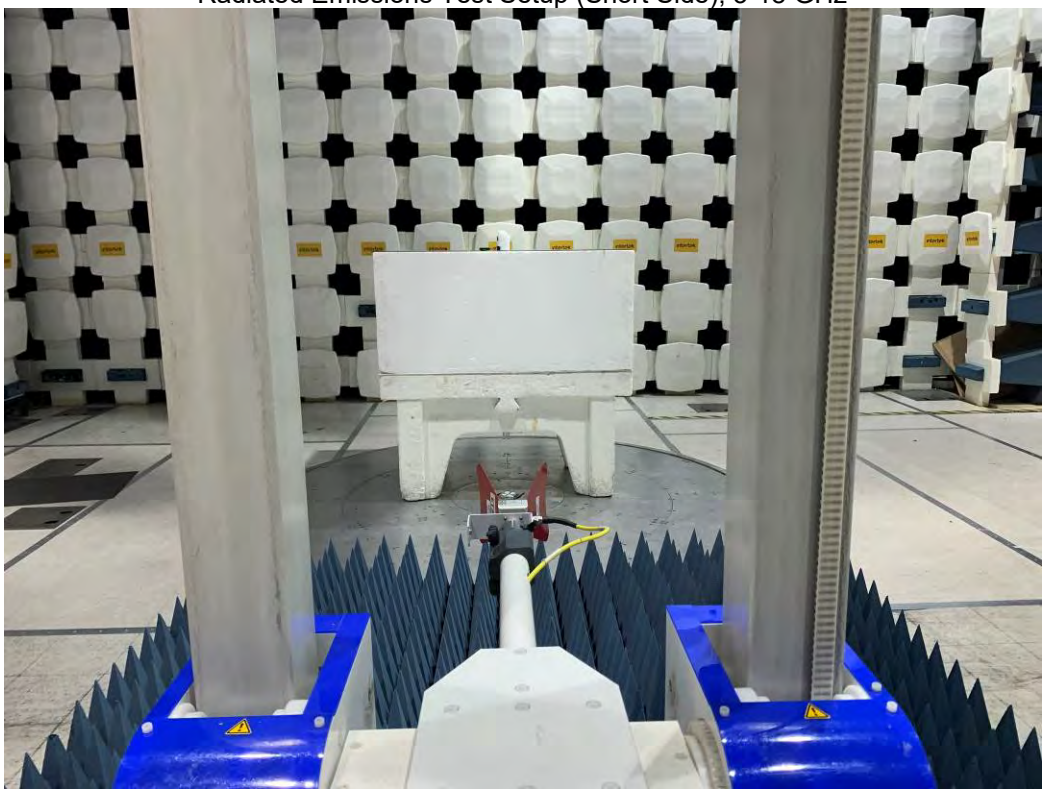


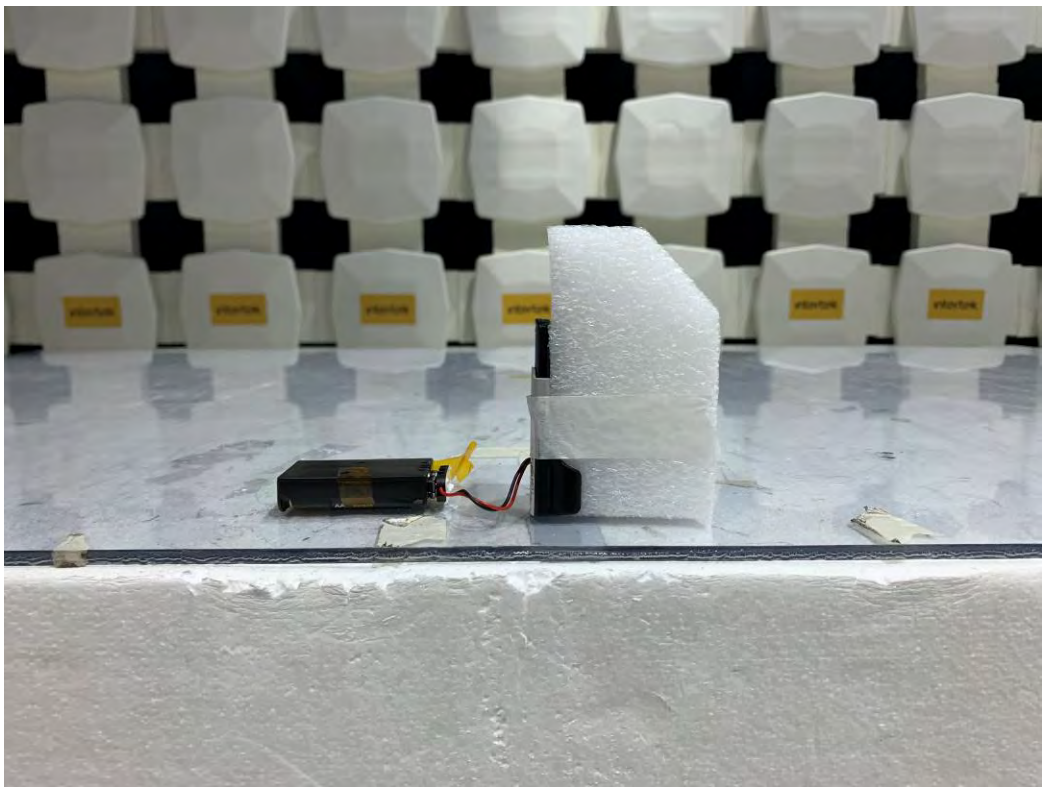
Radiated Emissions Test Setup (Long Side), 3-18 GHz



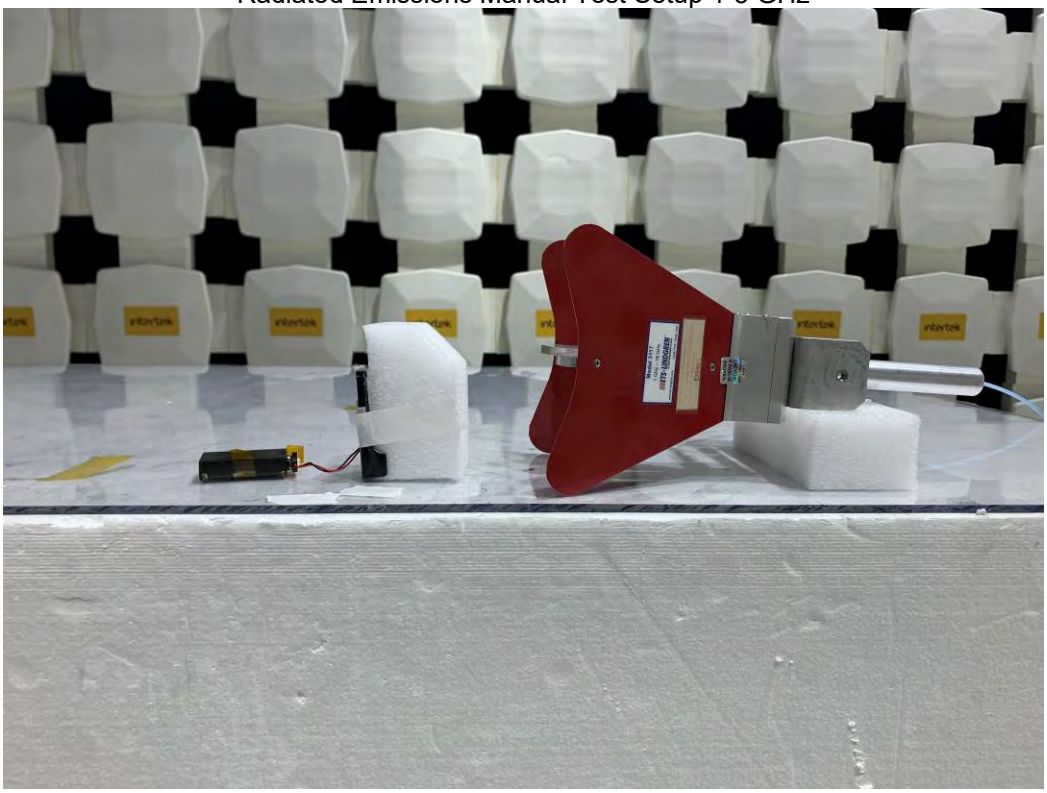


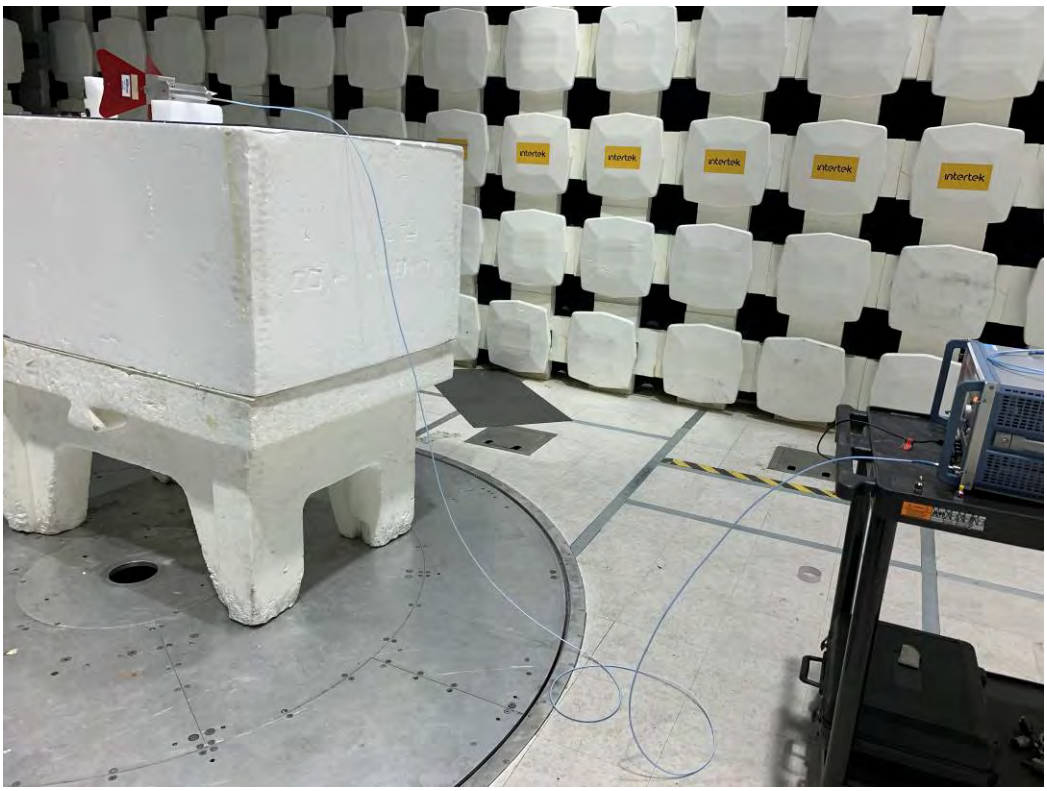
Radiated Emissions Test Setup (Short Side), 3-18 GHz



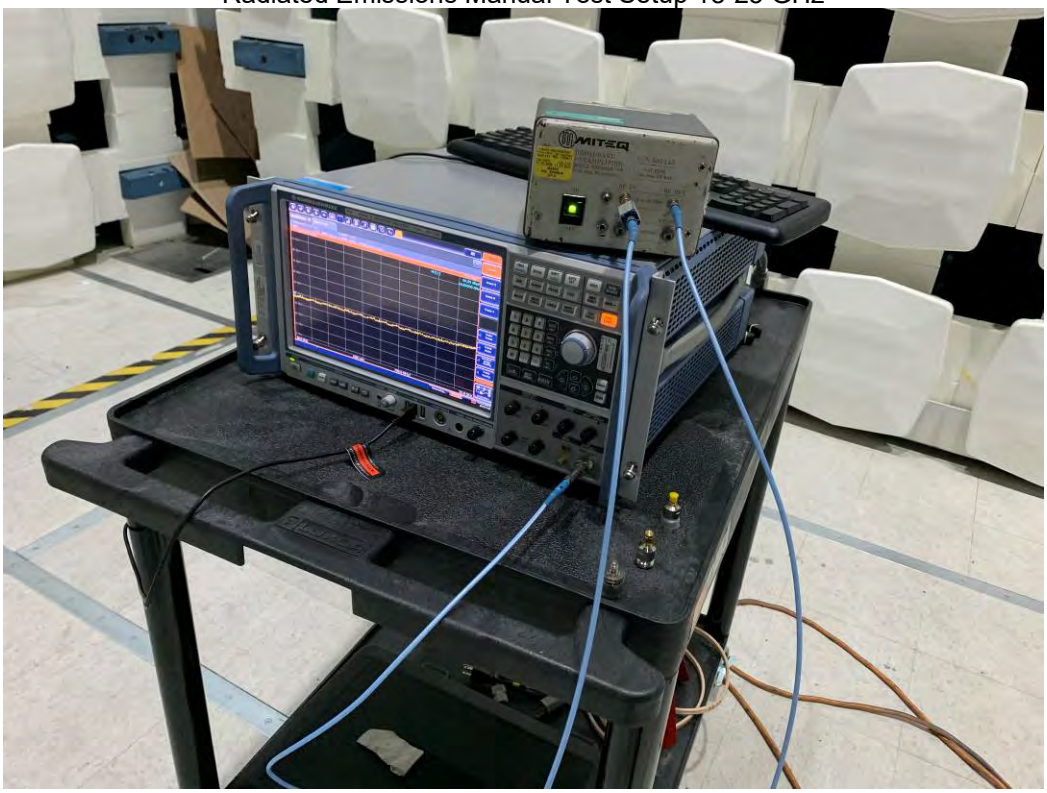


Radiated Emissions Manual Test Setup 1-3 GHz





Radiated Emissions Manual Test Setup 18-25 GHz

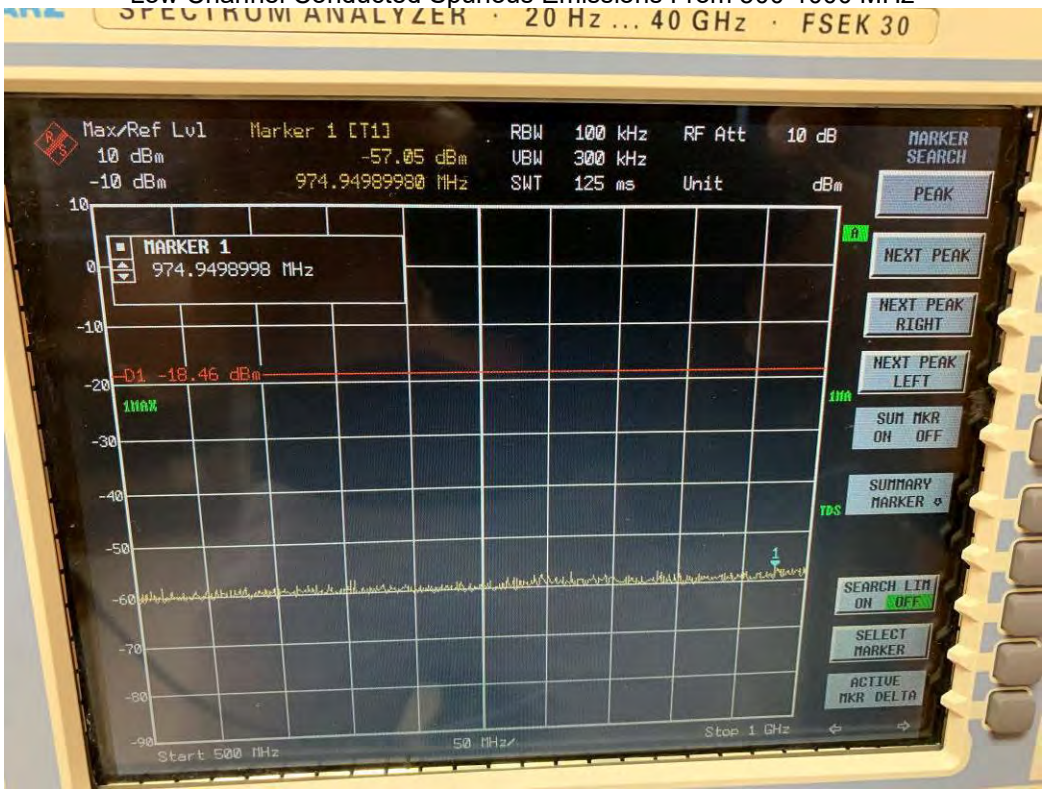


10.5 Plots/Data:

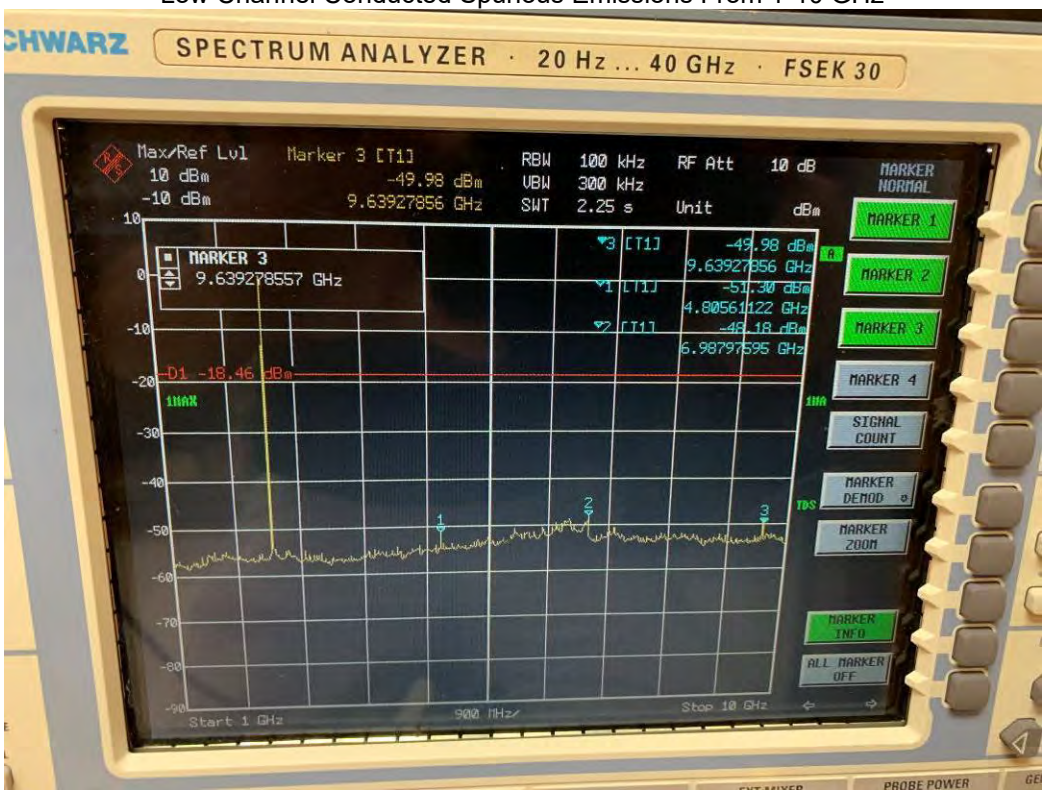
Low Channel Conducted Spurious Emissions From 9 kHz-30 MHz

Low Channel Conducted Spurious Emissions From 30-500 MHz

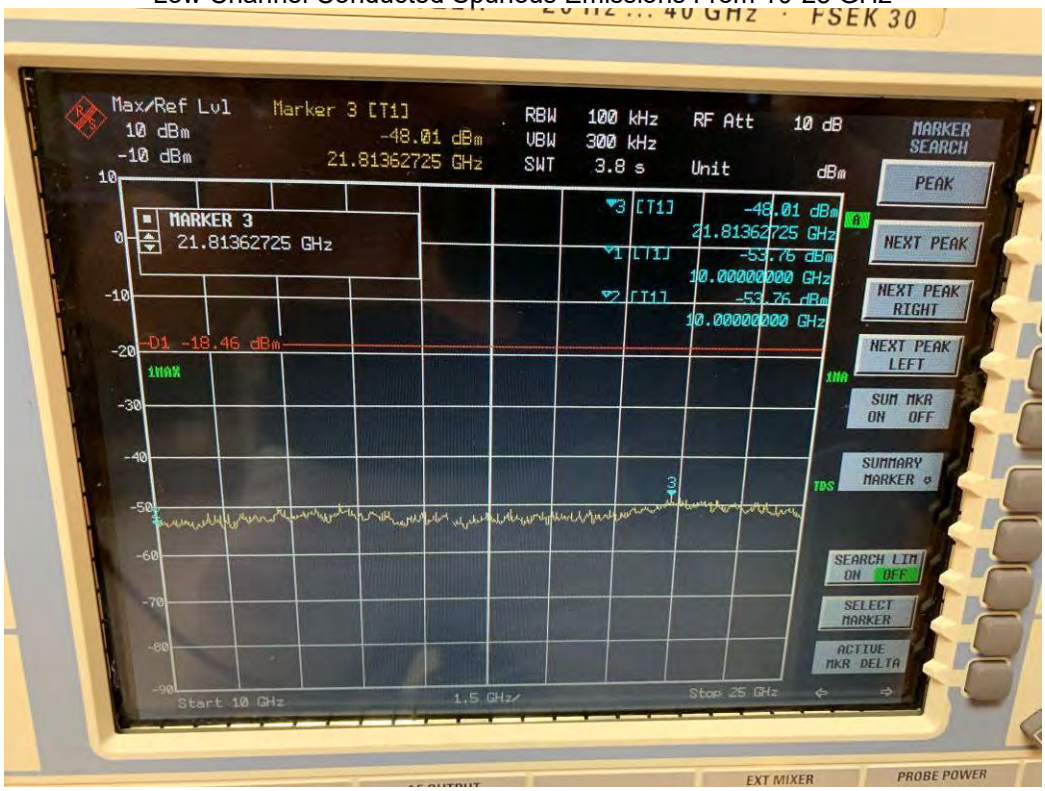
Low Channel Conducted Spurious Emissions From 500-1000 MHz



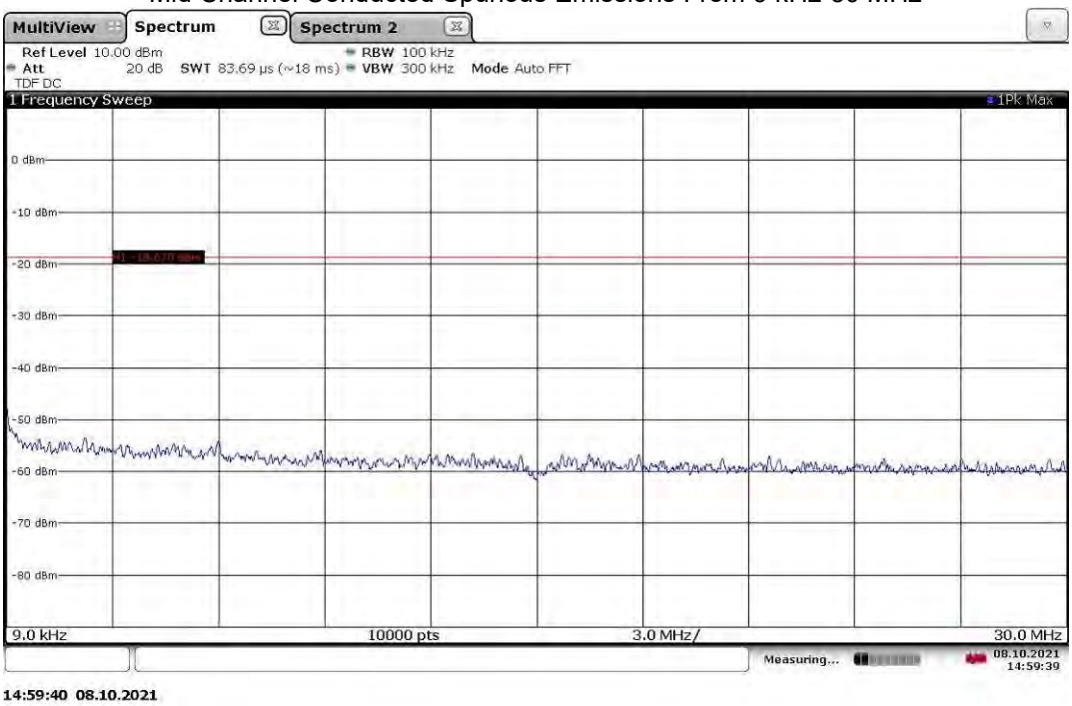
Low Channel Conducted Spurious Emissions From 1-10 GHz



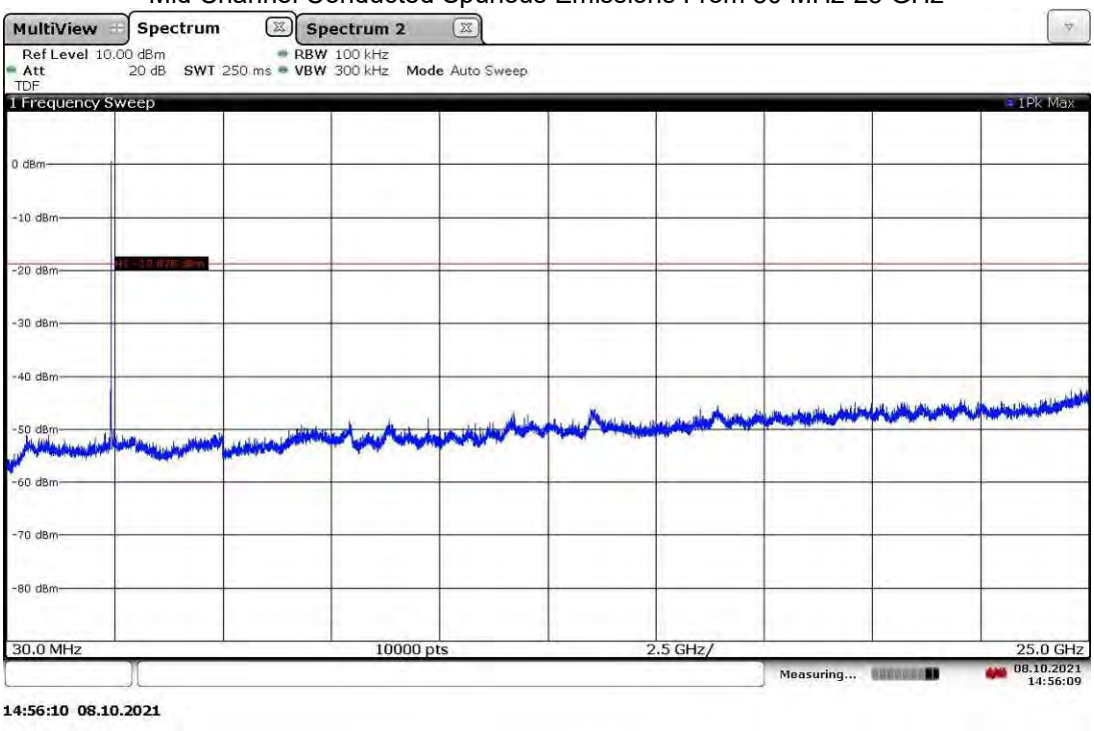
Low Channel Conducted Spurious Emissions From 10-25 GHz



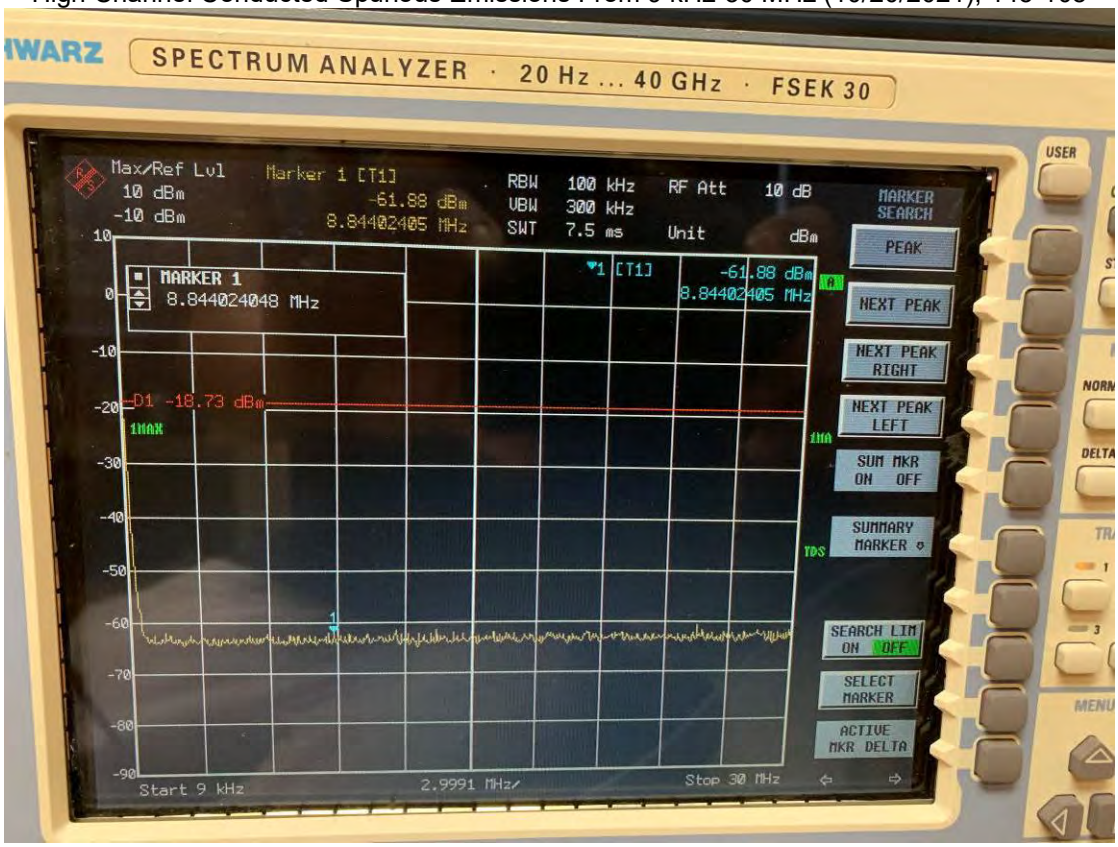
Mid Channel Conducted Spurious Emissions From 9 kHz-30 MHz



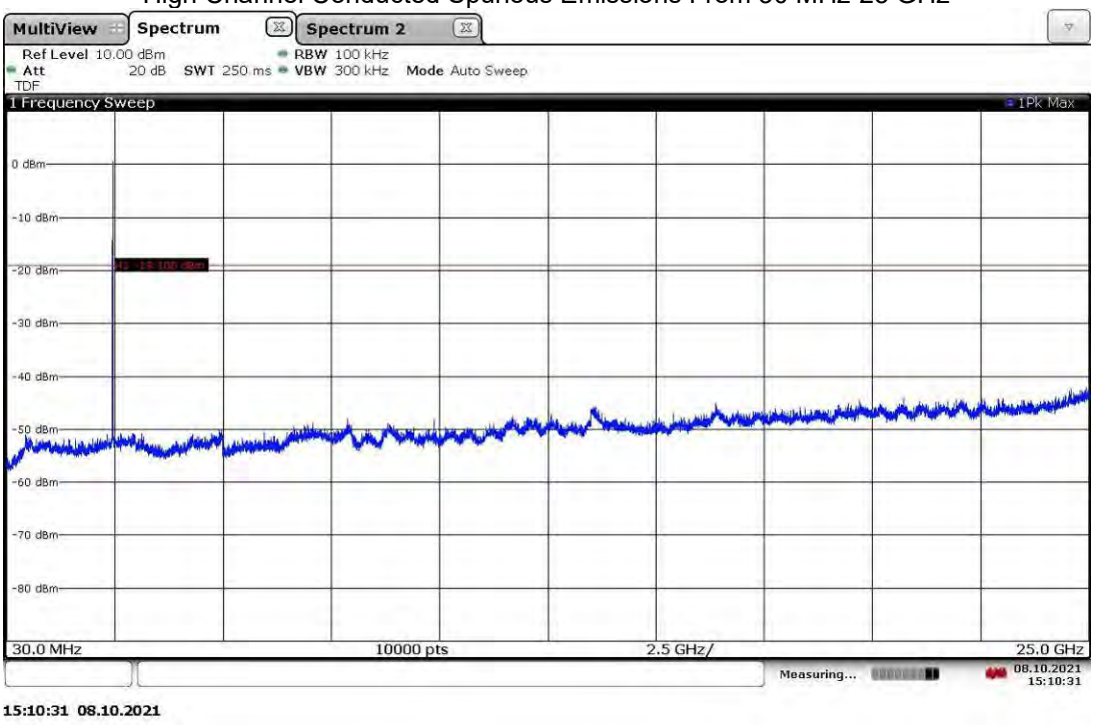
Mid Channel Conducted Spurious Emissions From 30 MHz-25 GHz



High Channel Conducted Spurious Emissions From 9 kHz-30 MHz (10/20/2021), 145-108



High Channel Conducted Spurious Emissions From 30 MHz-25 GHz

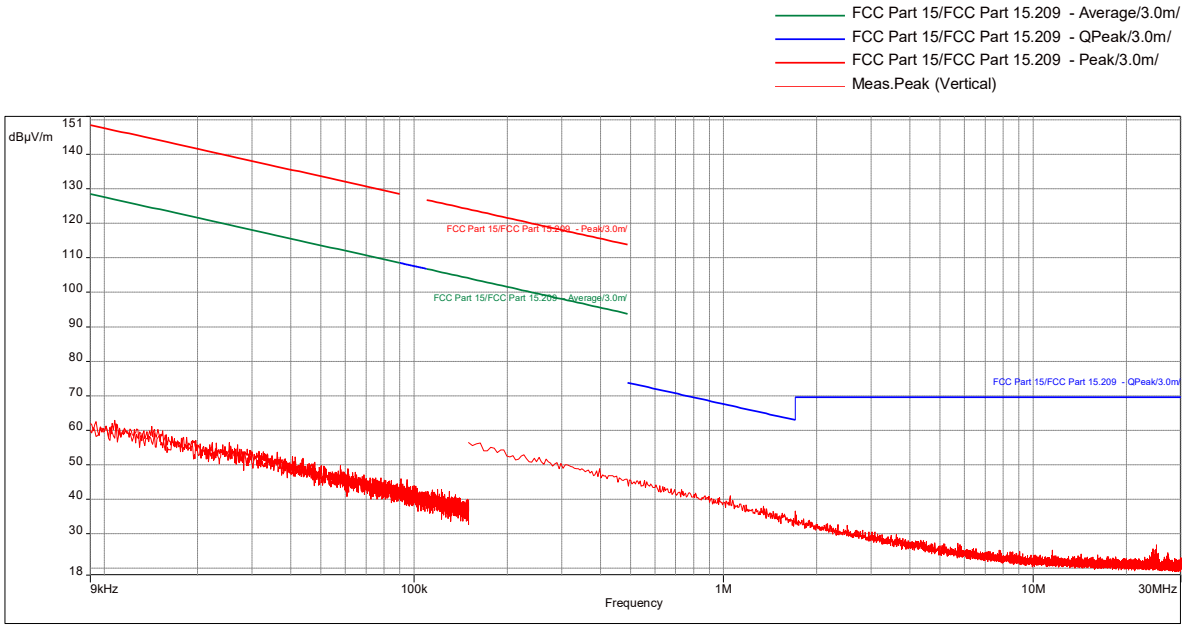


Mid Channel Radiated Spurious Emissions From 9 kHz-30 MHz

Test Information:

Date and Time	10/17/2021 11:14:05 AM
Client and Project Number	Depuy
Engineer	Vathana Ven
Temperature	22 C
Humidity	49 %
Atmospheric Pressure	996 mbar
Comments	RE 9kHz-30MHz Loop antenna, Electric Field, 3M Location (FCC 15.209)_Wireless_HC_Tx Mid CH

Graph:



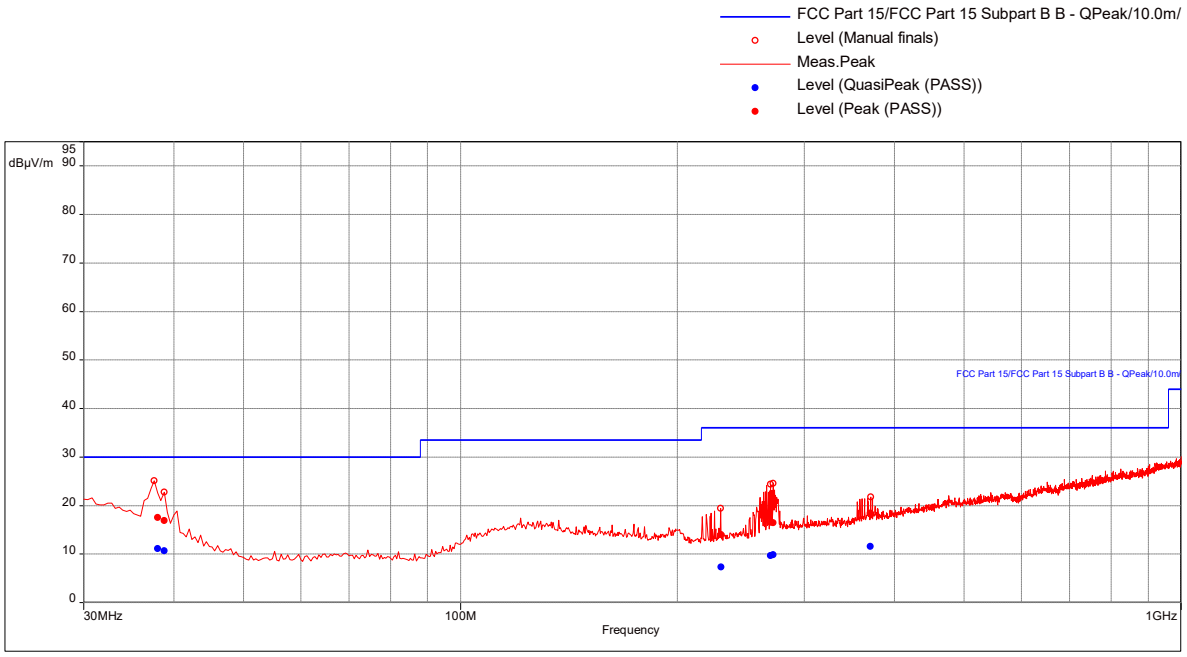
Results: No emissions were detected.

Low Channel Radiated Spurious Emissions (Short Side) From 30-1000 MHz

Test Information:

Date and Time	9/15/2021 12:38:13 PM
Client and Project Number	DePuy
Engineer	Kouma Sinn
Temperature	24 C
Humidity	45 %
Atmospheric Pressure	1004 mbar
Comments	Scan 1: Wireless-HC, Tx: Ch11, Short Side, RE 30-1000MHz SA mode

Graph:



Results:

QuasiPeak (PASS) (6)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
38.10526316	11.14	30.00	-18.86	110.00	2.36	Vertical	120000.00	-18.20
38.64210526	10.62	30.00	-19.38	118.00	1.87	Vertical	120000.00	-18.57
229.9157895	7.35	36.00	-28.65	0.00	1.99	Vertical	120000.00	-20.84
269.3894737	9.70	36.00	-26.30	357.00	2.39	Horizontal	120000.00	-18.54
271.4421053	9.88	36.00	-26.12	337.00	1.83	Horizontal	120000.00	-18.42
370.4210526	11.55	36.00	-24.45	214.00	1.06	Vertical	120000.00	-16.40

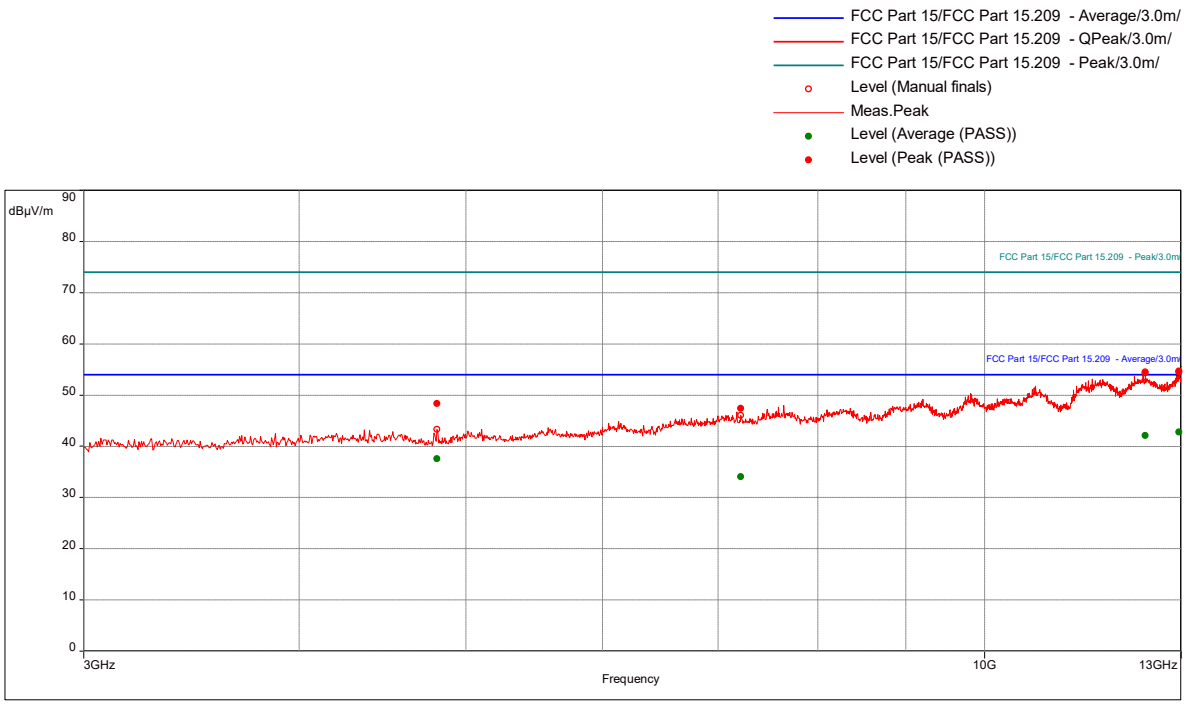
Notes: FCC Part 15 Subpart B Class B limit is identical to FCC Part 15 Subpart C Section 15.209.

Low Channel Radiated Spurious Emissions (Short Side) From 3-25 GHz

Test Information:

Date and Time	9/25/2021 7:18:57 PM
Client and Project Number	Depuy
Engineer	Kouma Sinn
Temperature	22 C
Humidity	46 %
Atmospheric Pressure	1008 mbar
Comments	Scan 15: Wireless-HC, Tx: Ch11 2405 MHz, Short Side, RE 3-13 GHz SA mode

Graph:



Results:

Peak (PASS) (4)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4811.052632	48.36	74.00	-25.64	100.00	1.35	Vertical	1000000.00	0.55
7222.368421	47.38	74.00	-26.62	134.00	2.65	Vertical	1000000.00	4.83
12397.10526	54.31	74.00	-19.69	60.00	3.39	Vertical	1000000.00	13.17
12959.21053	54.65	74.00	-19.35	63.00	3.64	Vertical	1000000.00	14.67

Average (PASS) (4)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4811.052632	37.59	54.00	-16.41	100.00	1.35	Vertical	1000000.00	0.55
7222.368421	34.07	54.00	-19.93	134.00	2.65	Vertical	1000000.00	4.83
12397.10526	42.06	54.00	-11.94	60.00	3.39	Vertical	1000000.00	13.17
12959.21053	42.80	54.00	-11.20	63.00	3.64	Vertical	1000000.00	14.67

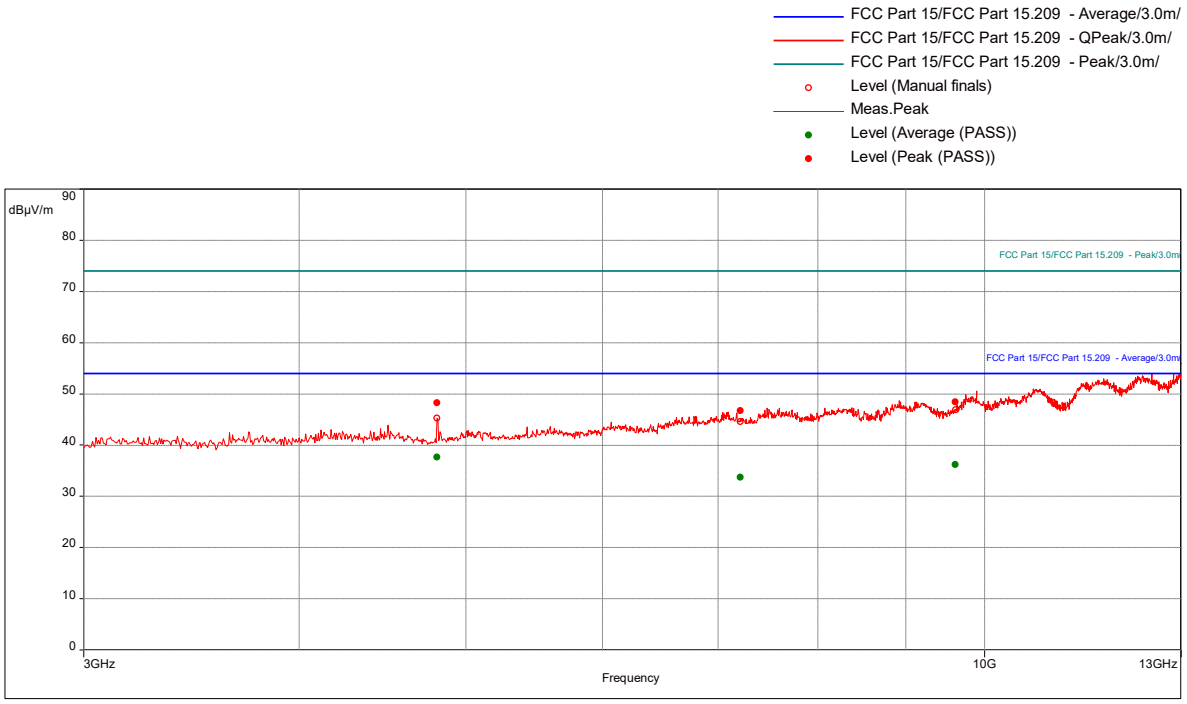
Notes: Scan from 1-3 GHz and 13-25 GHz were performed manually at 10 cm distance with no emission was detected above test instrument noise floor.

Low Channel Radiated Spurious Emissions (Long Side) From 3-25 GHz

Test Information:

Date and Time	9/25/2021 7:21:40 PM
Client and Project Number	Depuy
Engineer	Kouma Sinn
Temperature	22 C
Humidity	46 %
Atmospheric Pressure	1008 mbar
Comments	Scan 16: Wireless-HC, Tx: Ch11 2405 MHz, Long Side, RE 3-13 GHz SA mode

Graph:



Results:

Peak (PASS) (3)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4811.052632	48.23	74.00	-25.77	328.00	1.10	Horizontal	1000000.00	0.55
7215.526316	46.70	74.00	-27.30	202.00	2.90	Vertical	1000000.00	4.81
9615.526316	48.42	74.00	-25.58	349.00	1.55	Vertical	1000000.00	7.55

Average (PASS) (3)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4811.052632	37.67	54.00	-16.33	328.00	1.10	Horizontal	1000000.00	0.55
7215.526316	33.70	54.00	-20.30	202.00	2.90	Vertical	1000000.00	4.81
9615.526316	36.18	54.00	-17.82	349.00	1.55	Vertical	1000000.00	7.55

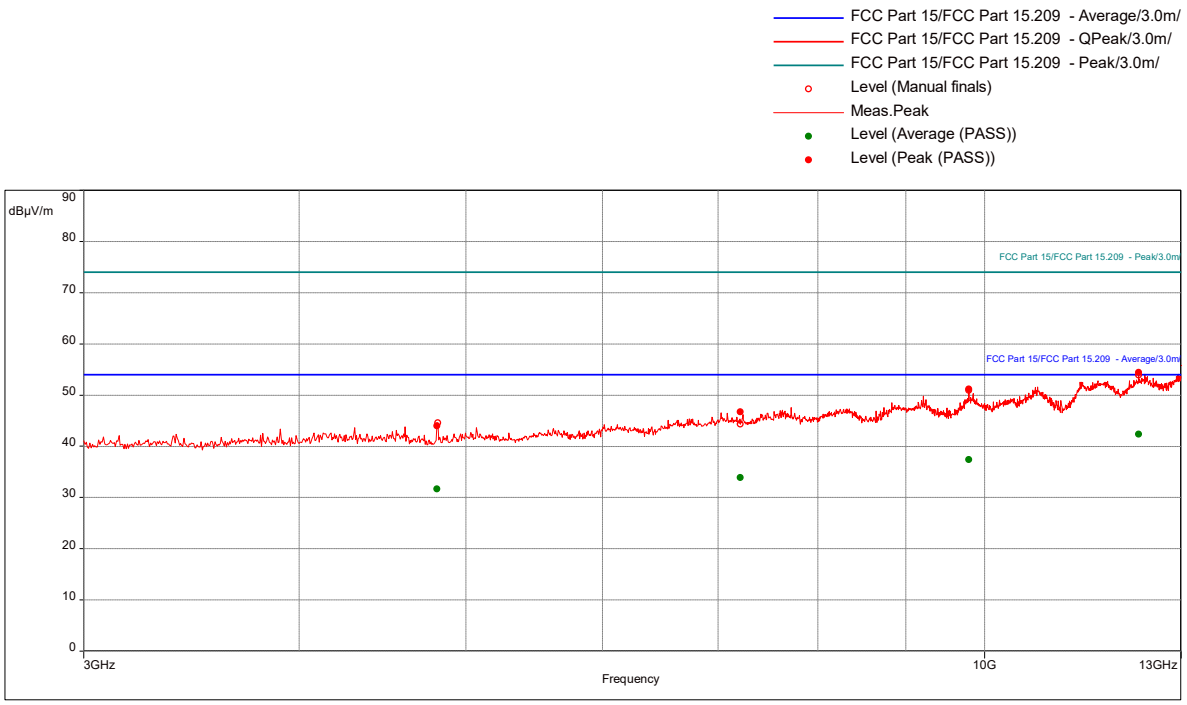
Notes: Scan from 1-3 GHz and 13-25 GHz were performed manually at 10 cm distance with no emission was detected above test instrument noise floor.

Low Channel Radiated Spurious Emissions (Flat) From 3-25 GHz

Test Information:

Date and Time	9/25/2021 7:46:34 PM
Client and Project Number	Depuy
Engineer	Kouma Sinn
Temperature	22 C
Humidity	46 %
Atmospheric Pressure	1008 mbar
Comments	Scan 17: Wireless-HC, Tx: Ch11 2405 MHz, Flat, RE 3-13 GHz SA mode

Graph:



Results:

Peak (PASS) (4)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4811.315789	44.02	74.00	-29.98	122.00	3.54	Horizontal	1000000.00	0.55
7214.473684	46.70	74.00	-27.30	22.00	1.90	Vertical	1000000.00	4.81
9790.526316	51.19	74.00	-22.81	282.00	1.65	Vertical	1000000.00	7.58
12279.73684	54.44	74.00	-19.56	67.00	1.55	Vertical	1000000.00	13.05

Average (PASS) (4)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4811.315789	31.67	54.00	-22.33	122.00	3.54	Horizontal	1000000.00	0.55
7214.473684	33.85	54.00	-20.15	22.00	1.90	Vertical	1000000.00	4.81
9790.526316	37.36	54.00	-16.64	282.00	1.65	Vertical	1000000.00	7.58
12279.73684	42.39	54.00	-11.61	67.00	1.55	Vertical	1000000.00	13.05

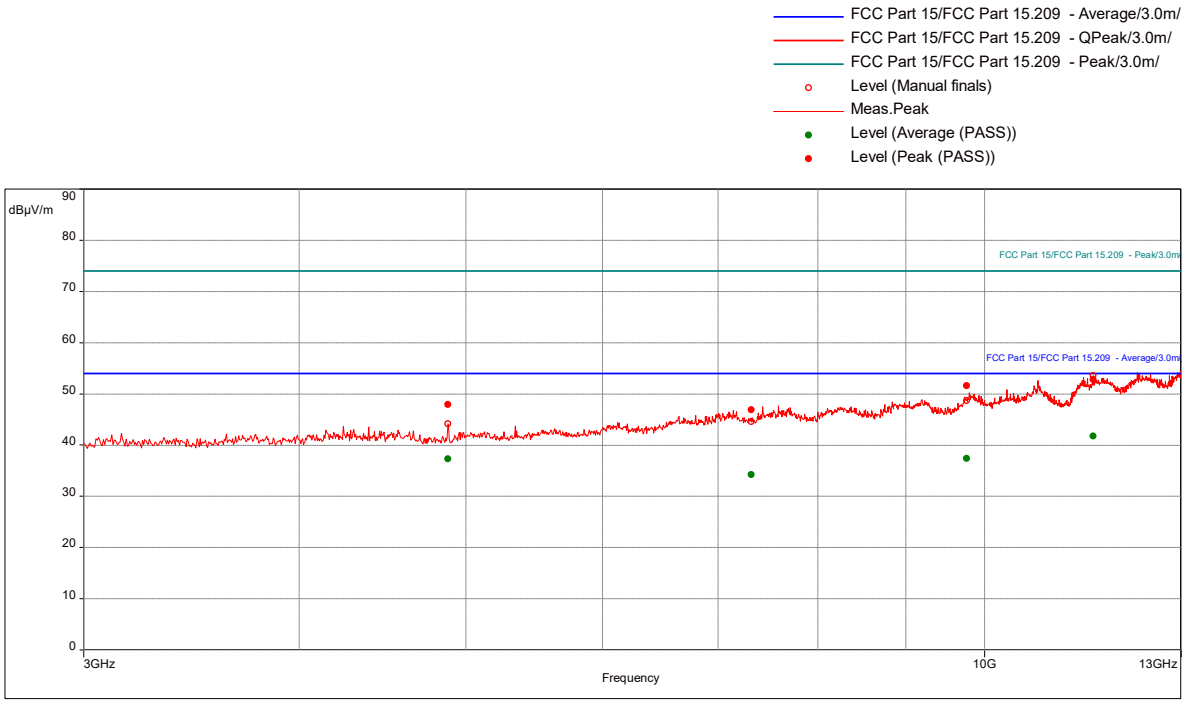
Notes: Scan from 1-3 GHz and 13-25 GHz were performed manually at 10 cm distance with no emission was detected above test instrument noise floor.

Mid Channel Radiated Spurious Emissions (Short Side) From 3-25 GHz

Test Information:

Date and Time	9/25/2021 9:16:59 PM
Client and Project Number	Depuy
Engineer	Kouma Sinn
Temperature	22 C
Humidity	46 %
Atmospheric Pressure	1008 mbar
Comments	Scan 19: Wireless-HC, Tx: Ch18 2440 MHz, Short Side, RE 3-13 GHz SA mode

Graph:



Results:

Peak (PASS) (4)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4879.210526	47.87	74.00	-26.13	100.00	1.40	Vertical	1000000.00	0.61
7317.894737	46.89	74.00	-27.11	204.00	1.45	Vertical	1000000.00	5.00
9760.263158	51.56	74.00	-22.44	11.00	2.30	Vertical	1000000.00	7.58
11560.78947	52.79	74.00	-21.21	59.00	2.65	Vertical	1000000.00	12.72

Average (PASS) (4)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4879.210526	37.30	54.00	-16.70	100.00	1.40	Vertical	1000000.00	0.61
7317.894737	34.20	54.00	-19.80	204.00	1.45	Vertical	1000000.00	5.00
9760.263158	37.35	54.00	-16.65	11.00	2.30	Vertical	1000000.00	7.58
11560.78947	41.77	54.00	-12.23	59.00	2.65	Vertical	1000000.00	12.72

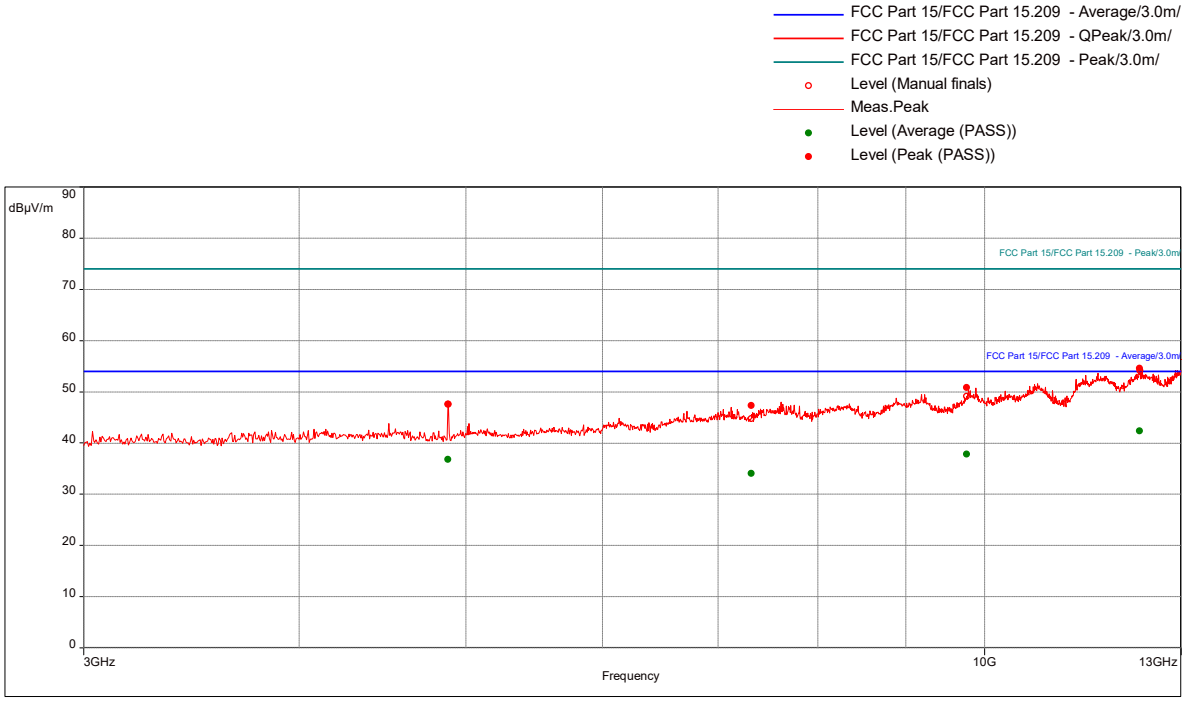
Notes: Scan from 1-3 GHz and 13-25 GHz were performed manually at 10 cm distance with no emission was detected above test instrument noise floor.

Mid Channel Radiated Spurious Emissions (Long Side) From 3-25 GHz

Test Information:

Date and Time	9/25/2021 9:50:06 PM
Client and Project Number	Depuy
Engineer	Kouma Sinn
Temperature	22 C
Humidity	46 %
Atmospheric Pressure	1008 mbar
Comments	Scan 20: Wireless-HC, Tx: Ch18 2440 MHz, Long Side, RE 3-13 GHz SA mode

Graph:



Results:

Peak (PASS) (4)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4881.315789	47.60	74.00	-26.40	182.00	1.60	Horizontal	1000000.00	0.61
7318.157895	47.28	74.00	-26.72	178.00	3.44	Vertical	1000000.00	5.00
9757.894737	50.79	74.00	-23.21	11.00	1.05	Vertical	1000000.00	7.58
12301.84211	54.58	74.00	-19.42	30.00	3.84	Horizontal	1000000.00	13.07

Average (PASS) (4)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4881.315789	36.76	54.00	-17.24	182.00	1.60	Horizontal	1000000.00	0.61
7318.157895	34.10	54.00	-19.90	178.00	3.44	Vertical	1000000.00	5.00
9757.894737	37.86	54.00	-16.14	11.00	1.05	Vertical	1000000.00	7.58
12301.84211	42.31	54.00	-11.69	30.00	3.84	Horizontal	1000000.00	13.07

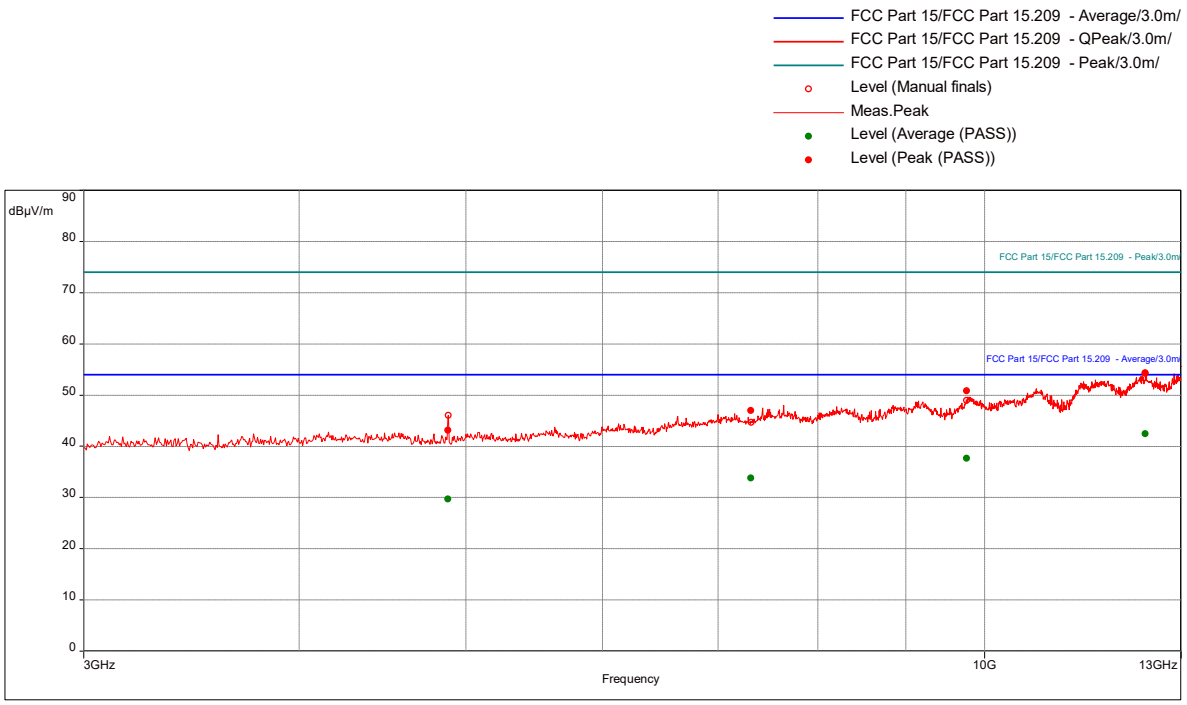
Notes: Scan from 1-3 GHz and 13-25 GHz were performed manually at 10 cm distance with no emission was detected above test instrument noise floor.

Mid Channel Radiated Spurious Emissions (Flat) From 3-25 GHz

Test Information:

Date and Time	9/25/2021 8:19:00 PM
Client and Project Number	Depuy
Engineer	Kouma Sinn
Temperature	22 C
Humidity	46 %
Atmospheric Pressure	1008 mbar
Comments	Scan 18: Wireless-HC, Tx: Ch18 2440 MHz, Flat, RE 3-13 GHz SA mode

Graph:



Results:

Peak (PASS) (4)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4881.578947	43.16	74.00	-30.84	306.00	3.84	Horizontal	1000000.00	0.61
7317.368421	47.01	74.00	-26.99	18.00	1.15	Vertical	1000000.00	5.00
9761.842105	50.79	74.00	-23.21	101.00	3.39	Vertical	1000000.00	7.58
12393.15789	54.30	74.00	-19.70	134.00	1.15	Vertical	1000000.00	13.17

Average (PASS) (4)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4881.578947	29.71	54.00	-24.29	306.00	3.84	Horizontal	1000000.00	0.61
7317.368421	33.84	54.00	-20.16	18.00	1.15	Vertical	1000000.00	5.00
9761.842105	37.63	54.00	-16.37	101.00	3.39	Vertical	1000000.00	7.58
12393.15789	42.46	54.00	-11.54	134.00	1.15	Vertical	1000000.00	13.17

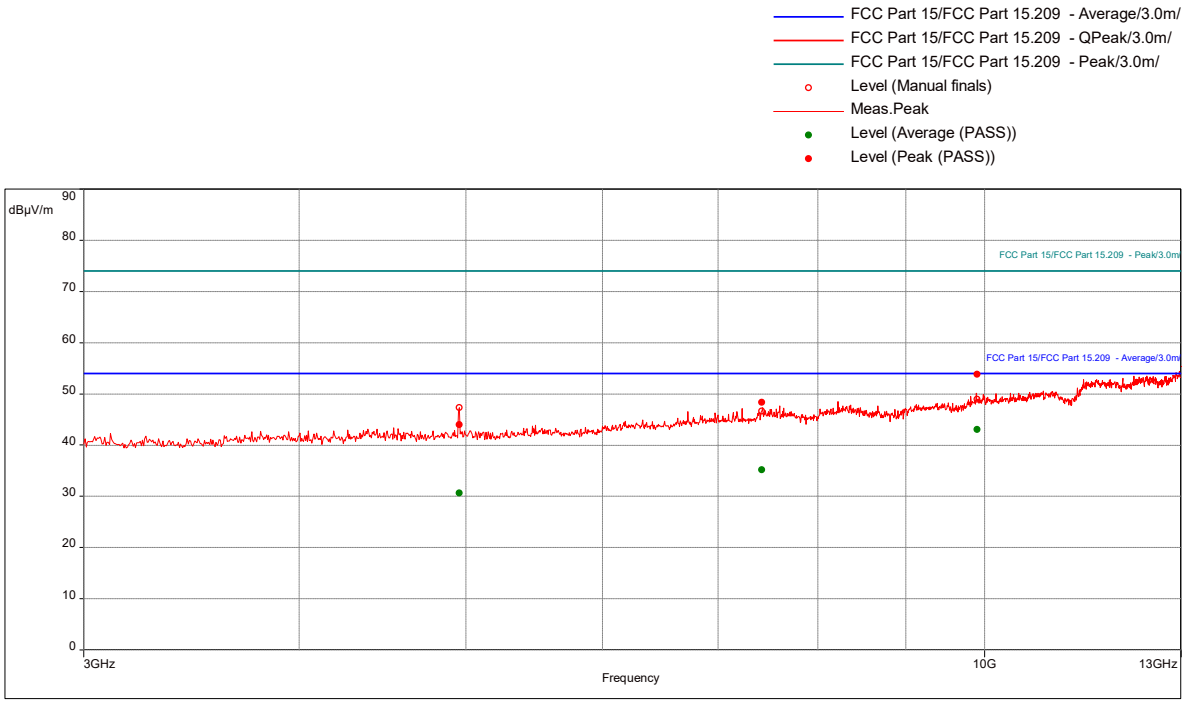
Notes: Scan from 1-3 GHz and 13-25 GHz were performed manually at 10 cm distance with no emission was detected above test instrument noise floor.

High Channel Radiated Spurious Emissions (Short Side) From 3-25 GHz

Test Information:

Date and Time	10/11/2021 2:52:18 PM
Client and Project Number	Depuy
Engineer	Kouma Sinn
Temperature	23 C
Humidity	55 %
Atmospheric Pressure	1005 mbar
Comments	Scan 28: Handpiece, Tx: Ch25, (FCC 1.5m, short side), RE 3-13 GHz SA mode

Graph:



Results:

Peak (PASS) (3)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4956.052632	44.00	74.00	-30.00	68.00	1.02	Vertical	1000000.00	0.89
7426.052632	48.37	74.00	-25.63	68.00	1.95	Horizontal	1000000.00	5.26
9898.157895	53.84	74.00	-20.16	278.00	2.05	Horizontal	1000000.00	7.99

Average (PASS) (3)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4956.052632	30.66	54.00	-23.34	68.00	1.02	Vertical	1000000.00	0.89
7426.052632	35.18	54.00	-18.82	68.00	1.95	Horizontal	1000000.00	5.26
9898.157895	43.06	54.00	-10.94	278.00	2.05	Horizontal	1000000.00	7.99

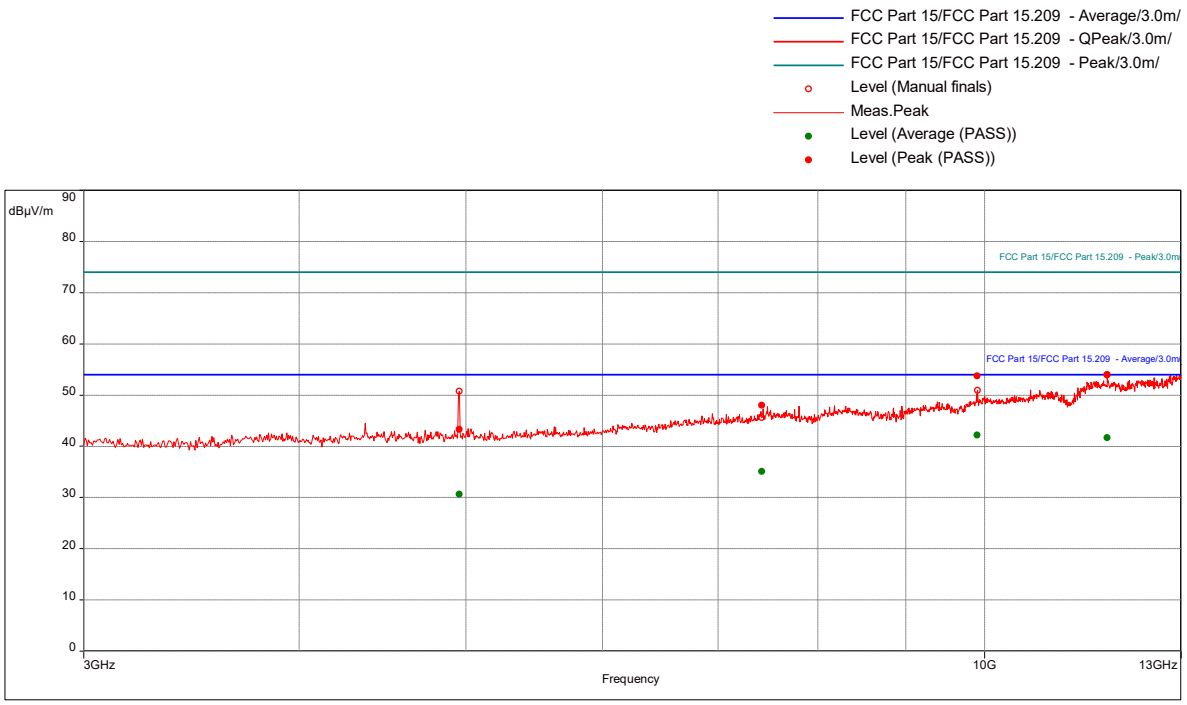
Notes: Scan from 1-3 GHz and 13-25 GHz were performed manually at 10 cm distance with no emission was detected above test instrument noise floor.

High Channel Radiated Spurious Emissions (Long Side) From 3-25 GHz

Test Information:

Date and Time	10/11/2021 3:10:37 PM
Client and Project Number	Depuy
Engineer	Kouma Sinn
Temperature	23 C
Humidity	55 %
Atmospheric Pressure	1005 mbar
Comments	Scan 29: Handpiece, Tx: Ch25, (FCC 1.5m, long side), RE 3-13 GHz SA mode

Graph:



Results:

Peak (PASS) (4)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4955.263158	43.34	74.00	-30.66	321.00	3.64	Horizontal	1000000.00	0.88
7426.052632	47.98	74.00	-26.02	32.00	2.60	Horizontal	1000000.00	5.26
9902.105263	53.73	74.00	-20.27	168.00	1.50	Vertical	1000000.00	8.01
11781.05263	54.03	74.00	-19.97	126.00	2.85	Vertical	1000000.00	12.80

Average (PASS) (4)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4955.263158	30.66	54.00	-23.34	321.00	3.64	Horizontal	1000000.00	0.88
7426.052632	35.09	54.00	-18.91	32.00	2.60	Horizontal	1000000.00	5.26
9902.105263	42.19	54.00	-11.81	168.00	1.50	Vertical	1000000.00	8.01
11781.05263	41.69	54.00	-12.31	126.00	2.85	Vertical	1000000.00	12.80

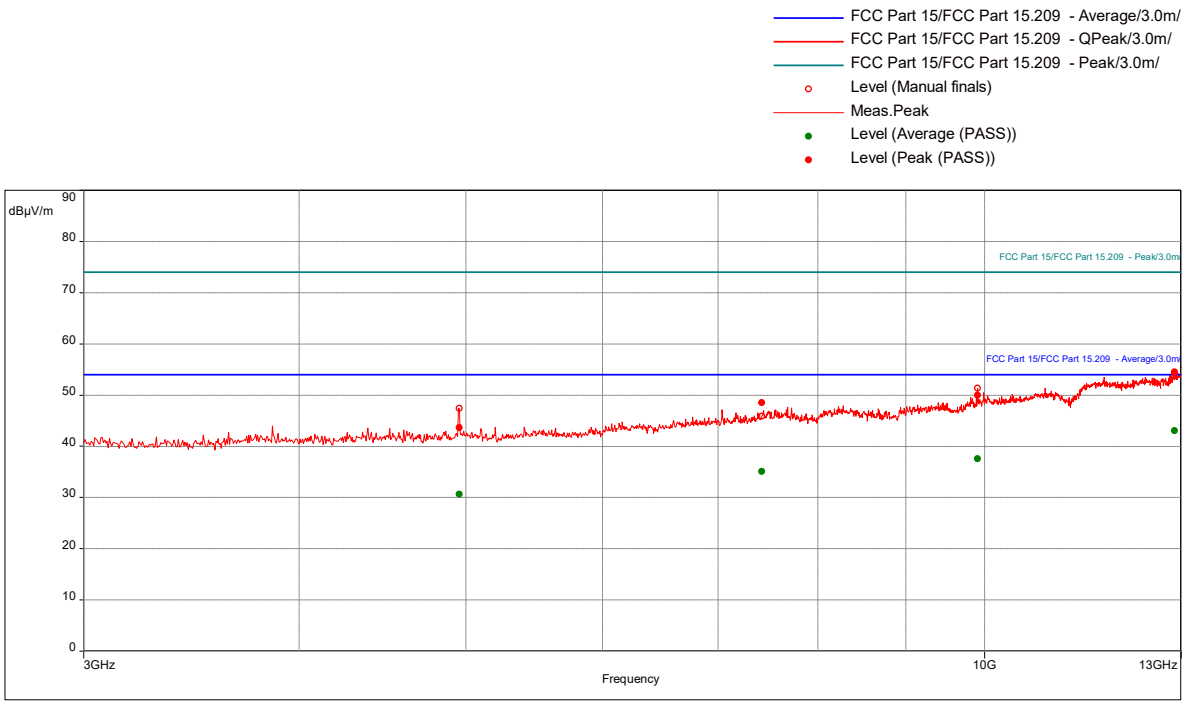
Notes: Scan from 1-3 GHz and 13-25 GHz were performed manually at 10 cm distance with no emission was detected above test instrument noise floor.

High Channel Radiated Spurious Emissions (Flat) From 3-25 GHz

Test Information:

Date and Time	10/11/2021 2:49:18 PM
Client and Project Number	Depuy
Engineer	Kouma Sinn
Temperature	23 C
Humidity	55 %
Atmospheric Pressure	1005 mbar
Comments	Scan 27: Handpiece, Tx: Ch25, (FCC 1.5m, Flat), RE 3-13 GHz SA mode

Graph:



Results:

Peak (PASS) (4)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4955.526316	43.61	74.00	-30.39	61.00	3.94	Horizontal	1000000.00	0.88
7423.421053	48.50	74.00	-25.50	242.00	3.94	Horizontal	1000000.00	5.26
9906.578947	49.94	74.00	-24.06	198.00	1.55	Vertical	1000000.00	8.03
12885.52632	54.47	74.00	-19.53	278.00	1.50	Horizontal	1000000.00	14.78

Average (PASS) (4)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
4955.526316	30.62	54.00	-23.38	61.00	3.94	Horizontal	1000000.00	0.88
7423.421053	35.08	54.00	-18.92	242.00	3.94	Horizontal	1000000.00	5.26
9906.578947	37.57	54.00	-16.43	198.00	1.55	Vertical	1000000.00	8.03
12885.52632	43.08	54.00	-10.92	278.00	1.50	Horizontal	1000000.00	14.78

Notes: Scan from 1-3 GHz and 13-25 GHz were performed manually at 10 cm distance with no emission was detected above test instrument noise floor.

Radiated Emissions

Company: Depuy
Model #: Wireless-HC
Serial #: FCC Sample Ch11, FCC Sample Ch18, FCC Sample Ch25
Engineers: Kouma Sinn Location: 10M
Project #: G104228375 Date(s): 09/25/21
Standard: 15.247/RSS-247
Receiver: ROS005-1 Limit Distance (m): 3
PreAmp: PRE8 Test Distance (m): 0.1

Antenna & Cables: LF Bands: N, LF, HF, SHF
Antenna: EMC04 EMC04
Cable(s): CBLHF2021-2M-2 CBLHF2012-2M-1
Barometer: DAV007 Filter: REA006 REA004
Temp/Humidity/Pressure: 24 C 37% 1006 mbar

PreAmp Used? (Y or N): Y Voltage/Frequency: Internal Battery Frequency Range: 13-25 GHz

Net = Reading (dBuV/m) + Antenna Factor (dB1/m) + Cable Loss (dB) - Preamp Factor (dB) - Distance Factor (dB)

Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor, RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	Reading dB(uV)	Antenna Factor dB(1/m)	Cable Loss dB	Pre-amp Factor dB	Distance Factor dB	Net dB(uV/m)	Limit dB(uV/m)	Margin dB	Bandwidth	FCC	IC
Manually scan was performed at a distance of 10 cm with no emissions were detected above the measuring equipment noise floor.													

Test Personnel: Kouma Sinn KPS
Vathana F. Ven VFV
Supervising/Reviewing Engineer: (Where Applicable) N/A
Product Standard: CFR47 FCC Part 15.247, RSS-247
Input Voltage: Battery Powered

Pretest Verification w/ Ambient Signals or BB Source: BB Source

Test Date: 08/10/2021, 09/15/2021, 09/25/2021, 10/11/2021
10/17/2021
Limit Applied: See report section 10.3
Ambient Temperature: 23, 24, 22, 23, 22 ºC
Relative Humidity: 50, 45, 46, 55, 49 %
Atmospheric Pressure: 1002, 1004, 1008, 1005, 996 mbars

Deviations, Additions, or Exclusions: None

11 Digital Device and Receiver Radiated Spurious Emissions

11.1 Method

Tests are performed in accordance with FCC Part 15 Subpart B, ICES 003, and ANSI C 63.4.

TEST SITE: 10m ALSE

The 10m ALSE is 13m (Length) x 21m (Depth) x 10m (Height) with the effective size in terms of space from the tips of the absorber is 12m (Length) x 20m (Depth) x 8.5m (Height). This chamber achieves broadband performance using a unique arrangement of hybrid and ferrite tile absorber. This chamber has a built in 3m diameter turntable (Embedded type). The metal structure of the table makes electrical connection around the entire circumference of the turntable to the ground plane with a metal brush type connection. The turntable is located on one end of the chamber and the antennas are mounted 3 and 10 meters away at the other end of the chamber on the adjustable an Antenna Mast. The antenna mast is a non-conductive bore sighted type with remote control of antenna height and polarization. The Antenna Mast and the turntable can be remotely controlled through the controller located in the adjacent Control room. A Styrofoam table 80 cm high is used for table-top equipment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
Radiated Emissions, 10m	30-1000 MHz	4.6dB	6.3 dB
Radiated Emissions, 3m	30-1000 MHz	5.3 dB	6.3 dB
Radiated Emissions, 3m	1-6 GHz	4.5 dB	5.2 dB
Radiated Emissions, 3m	6-15 GHz	5.2 dB	5.5 dB
Radiated Emissions, 3m	15-18 GHz	5.0 dB	5.5 dB
Radiated Emissions, 3m	18-40 GHz	5.0 dB	5.5 dB

As shown in the table above our radiated emissions U_{lab} is less than the corresponding U_{CISPR} reference value in CISPR 16-4-2 Table 1, hence the compliance of the product is only based on the measured value, and no measurement uncertainty correction is required, based on CISPR 22 and CISPR 11 (for 2006 and later revisions) Clause 11.

Sample Calculation

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

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

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

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

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

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

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

Example:

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

Alternately, when BAT-EMC Emission Software is used, the “Level” includes all losses and gains and is compared directly in the “Margin” column to the “Limit”. The “Correction” includes Antenna Factor, Preamp, and Cable Loss. These are already accounted for in the “Level” column.

11.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV005'	Weather Station	Davis	6250	MS191218083	02/07/2021	02/07/2022
145108'	EMI Test Receiver (20Hz - 40GHz)	Rohde & Schwarz	ESIB40	100209	06/22/2020	06/22/2022
PRE10'	30-1000MHz pre-amp	ITS	PRE10	PRE10	02/17/2021	02/17/2022
145145'	Broadband Hybrid Antenna 30 MHz - 3 GHz	Sunol Sciences Corp.	JB3	A122313	06/10/2021	06/09/2022
IW001'	2 meter cable	Insulated Wire	2801-NPS	001	10/07/2020	10/07/2021
HS001'	DC-18GHz cable 1.5m long	Huber & Suhner	SucoFlex 106A	HS001	10/07/2020	10/07/2021
IW003'	8.4 meter cable	Insulated Wire	2800-NPS	003	10/08/2020	10/08/2021
145-422'	10Amp Pre-amp to under floor	Utiflex	UFB311A-0-2756-70070	145-422	02/17/2021	02/17/2022
HS003'	10m under floor cable	Huber-Schuner	10m-1	HS003	02/17/2021	02/17/2022
ETS005'	1-18GHz horn antenna	ETS-Lindgren	3117	00218279	09/28/2020	09/28/2021
ROS005-1'	Signal and Spectrum Analyzer	Rohde and Shwartz	FSW43	100646	10/27/2020	10/27/2021
145019'	Active Loop Antenna (9 KHz to 30 MHz)	EMCO	6502/1	9902-3267	02/17/2021	02/17/2022
PRE12'	Pre-amplifier	Com Power	PAM-118A	18040117	12/07/2020	12/07/2021

Software Utilized:

Name	Manufacturer	Version
BAT-EMC	Nexio	3.18.0.16

11.3 Results:

The sample tested was found to Comply.

§15.109 Radiated emission limits.

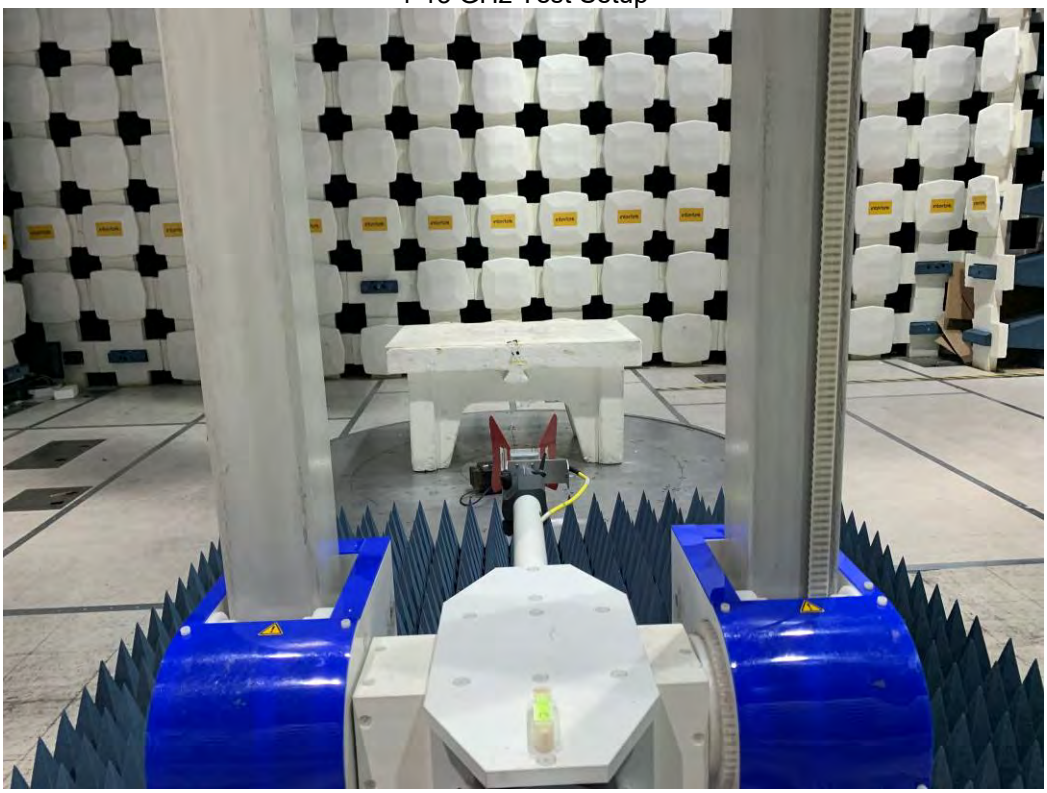
The field strength of radiated emissions form unintentional radiators at a distance of 3 meters shall not exceed the following values.

Frequency of emission (MHz)	Field strength (microvolts/meter)	Field strength (dBµV/m)
30-88	100	40.00
88-216	150	43.52
216-960	200	46.02
Above 960	500	54.00

11.4 Setup Photographs:

30-1000 MHz Test Setup

1-13 GHz Test Setup



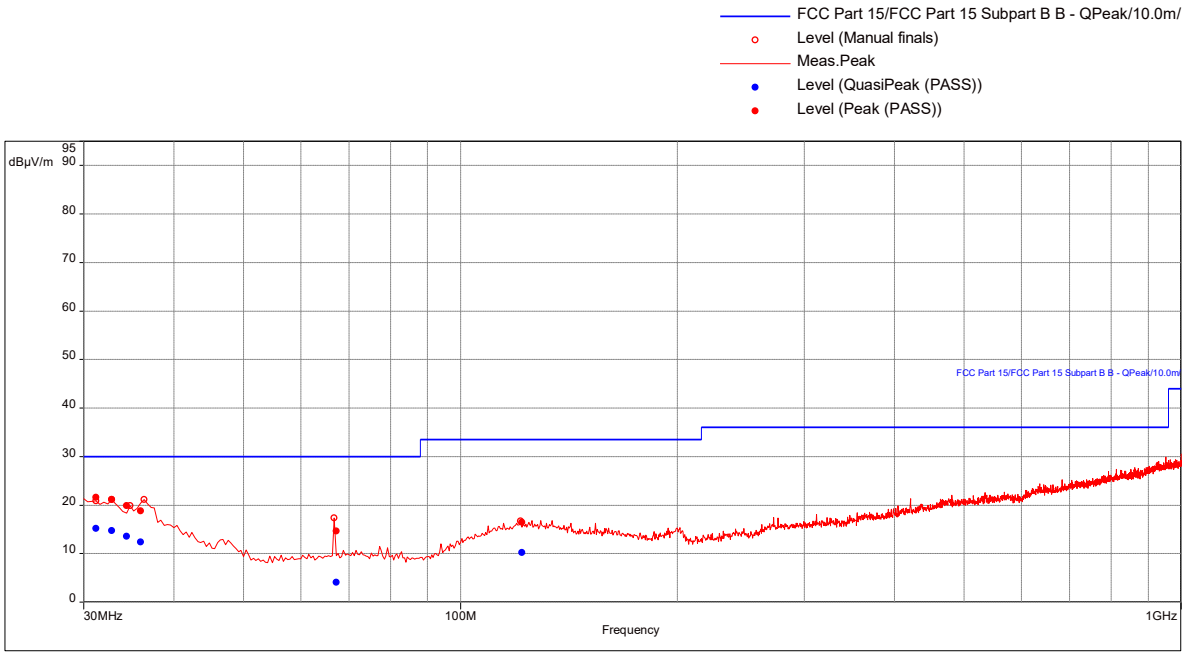
11.5 Plots/Data:

Receive at Low Channel 11, 30-1000 MHz

Test Information:

Date and Time	10/11/2021 11:16:36 AM
Client and Project Number	Depuy
Engineer	Kouma Sinn
Temperature	23 C
Humidity	55 %
Atmospheric Pressure	1005 mbar
Comments	Scan 23: Handpiece, Rx: Ch11, (FCC 80 cm), RE 30-1000MHz SA mode

Graph:



Results:

QuasiPeak (PASS) (6)

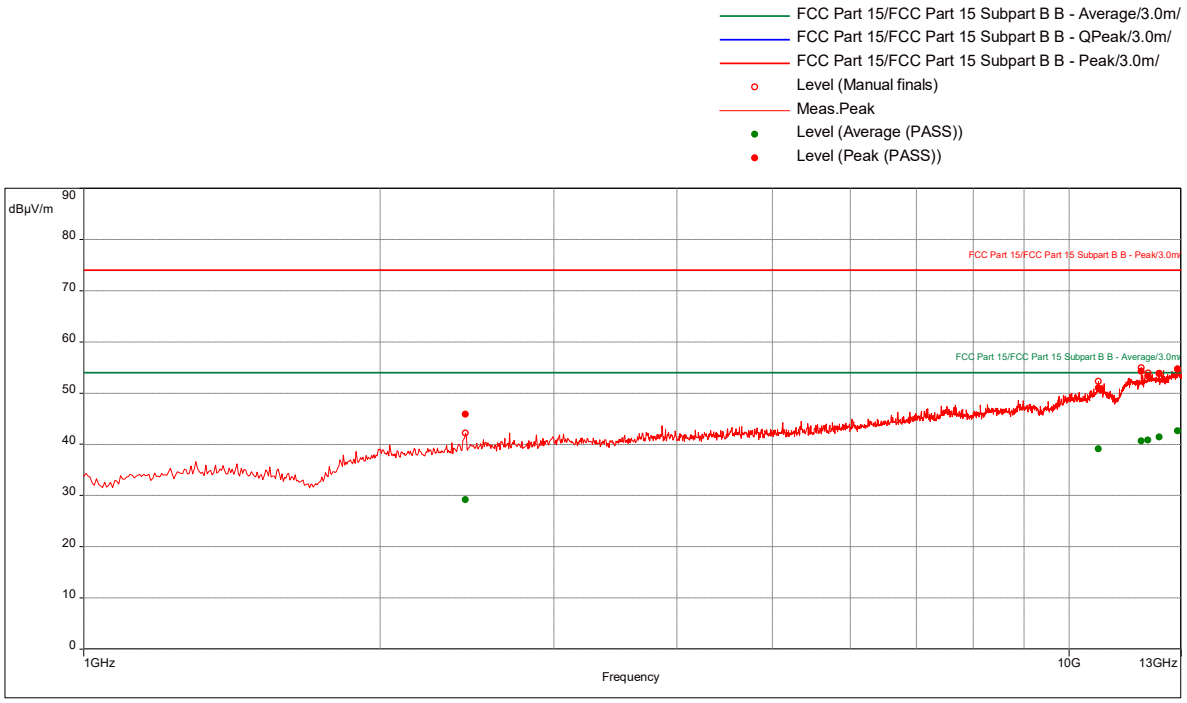
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
31.29473684	15.17	30.00	-14.83	184.00	1.10	Vertical	120000.00	-14.18
32.64210526	14.70	30.00	-15.30	10.00	1.02	Vertical	120000.00	-14.59
34.38947368	13.56	30.00	-16.44	313.00	1.66	Vertical	120000.00	-15.69
36.17894737	12.38	30.00	-17.62	111.00	1.94	Vertical	120000.00	-16.97
67.05263158	4.10	30.00	-25.90	111.00	1.01	Vertical	120000.00	-24.94
121.7052632	10.23	33.50	-23.27	9.00	3.07	Horizontal	120000.00	-18.61

Receive at Low Channel 11, 1-13 GHz

Test Information:

Date and Time	10/11/2021 12:47:58 PM
Client and Project Number	Depuy
Engineer	Kouma Sinn
Temperature	23 C
Humidity	55 %
Atmospheric Pressure	1005 mbar
Comments	Scan 24: Handpiece, Rx: Ch11, (FCC 80 cm), RE 1-13 GHz SA mode

Graph:



Results:

Peak (PASS) (6)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
2440.789474	45.87	74.00	-28.13	75.00	1.11	Vertical	1000000.00	-3.42
10714.47368	51.03	74.00	-22.97	133.00	1.75	Vertical	1000000.00	10.44
11842.36842	54.21	74.00	-19.79	104.00	2.85	Vertical	1000000.00	12.85
12031.84211	53.30	74.00	-20.70	314.00	3.89	Vertical	1000000.00	12.94
12351.31579	53.82	74.00	-20.18	25.00	3.50	Vertical	1000000.00	13.22
12899.73684	54.70	74.00	-19.30	190.00	2.55	Vertical	1000000.00	14.85

Average (PASS) (6)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW (Hz)	Correction (dB)
2440.789474	29.15	54.00	-24.85	75.00	1.11	Vertical	1000000.00	-3.42
10714.47368	39.11	54.00	-14.89	133.00	1.75	Vertical	1000000.00	10.44
11842.36842	40.63	54.00	-13.37	104.00	2.85	Vertical	1000000.00	12.85
12031.84211	40.78	54.00	-13.22	314.00	3.89	Vertical	1000000.00	12.94
12351.31579	41.40	54.00	-12.60	25.00	3.50	Vertical	1000000.00	13.22
12899.73684	42.63	54.00	-11.37	190.00	2.55	Vertical	1000000.00	14.85

Test Personnel:	Kouma Sinn KPS	Test Date:	10/11/2021
Supervising/Reviewing Engineer: (Where Applicable)	Vathana F. Ven VFV		
Product Standard:	FCC Part 15 Subpart B, ISED ICES-003	Limit Applied:	See report section 11.3
Input Voltage:	Battery Powered and Ext. P/S	Ambient Temperature:	23 ºC
Pretest Verification w/ Ambient Signals or BB Source:	BB Source	Relative Humidity:	55 %
		Atmospheric Pressure:	1005 mbars

Deviations, Additions, or Exclusions: None

12 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	10/31/2021	104697163BOX-018	KPS	VFV	Original Issue