DePuy Synthes Products, Inc.

TEST REPORT

SCOPE OF WORK
Emissions testing on the Transceiver (Console Receiver), Model EG1A, for Wireless Hand Control

REPORT NUMBER
104697163BOX-018a

ISSUE DATE
November 17, 2021

[REVISED DATE]
Original Issue

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

(FULL COMPLIANCE)

Report Number: 104697163BOX-018a
Project Number: G104697163

Report Issue Date: November 17, 2021

Model(s) Tested:	Transceiver (Console Receiver), 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
(Permissive Change)

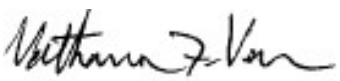
Tested by:
Intertek Testing Services NA, Inc.
70 Codman Hill Road
Boxborough, MA 01719
USA

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

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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
12	AC Mains Conducted Emissions FCC 47CFR Part 15.107: 10/2021 ISED ICES-003 Issue 7 October 15, 2020	Pass
13	Revision History	--

Notes: The transceiver for the console used the same radio as the wireless hand control except it has additional digital electronics. So, only radiated spurious emission test was repeated. Data from Intertek report #104697163BOX-018 for Maximum Peak Output Power, 6 dB and Occupied Bandwidth, Maximum Power Spectral Density were reused in this report.

3 Client Intrformation

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

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

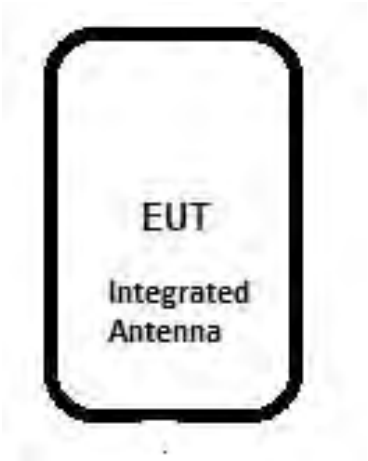
Cables					
ID	Description	Length (m)	Shielding	Ferrites	Termination
--	None	--	--	--	--

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:

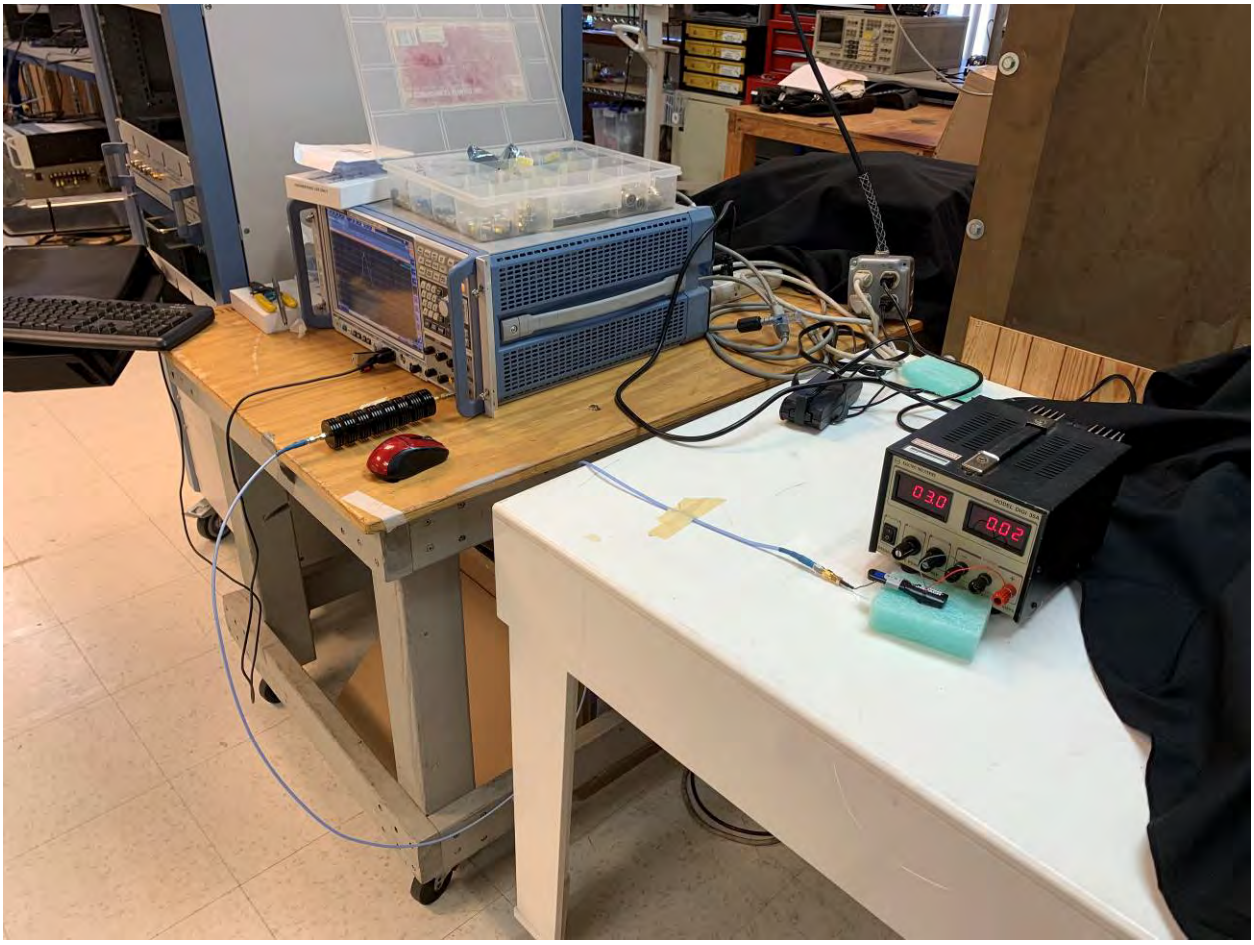
The sample tested was found to Comply.

§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

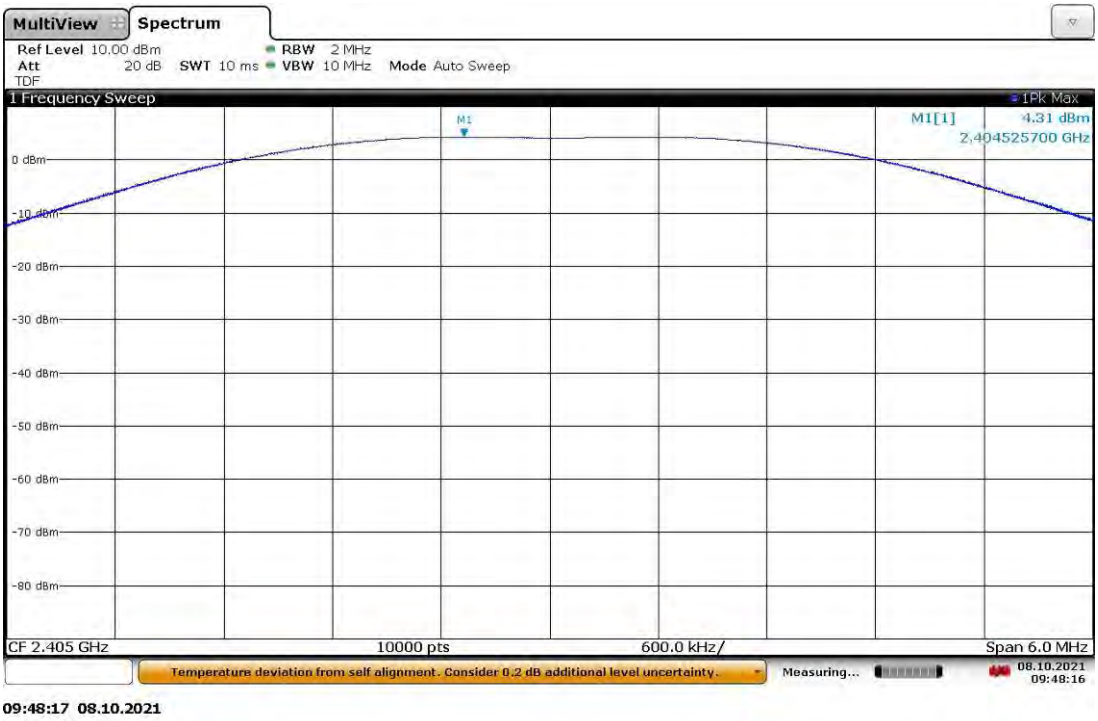
Notes: The transceiver for the console used the same radio as the wireless hand control except it has additional digital electronics. So, only radiated spurious emission test was repeated. Data from Intertek report #104697163BOX-018 for Maximum Peak Output Power, 6 dB and Occupied Bandwidth, Maximum Power Spectral Density were reused in this report.

6.4 Setup Photograph:

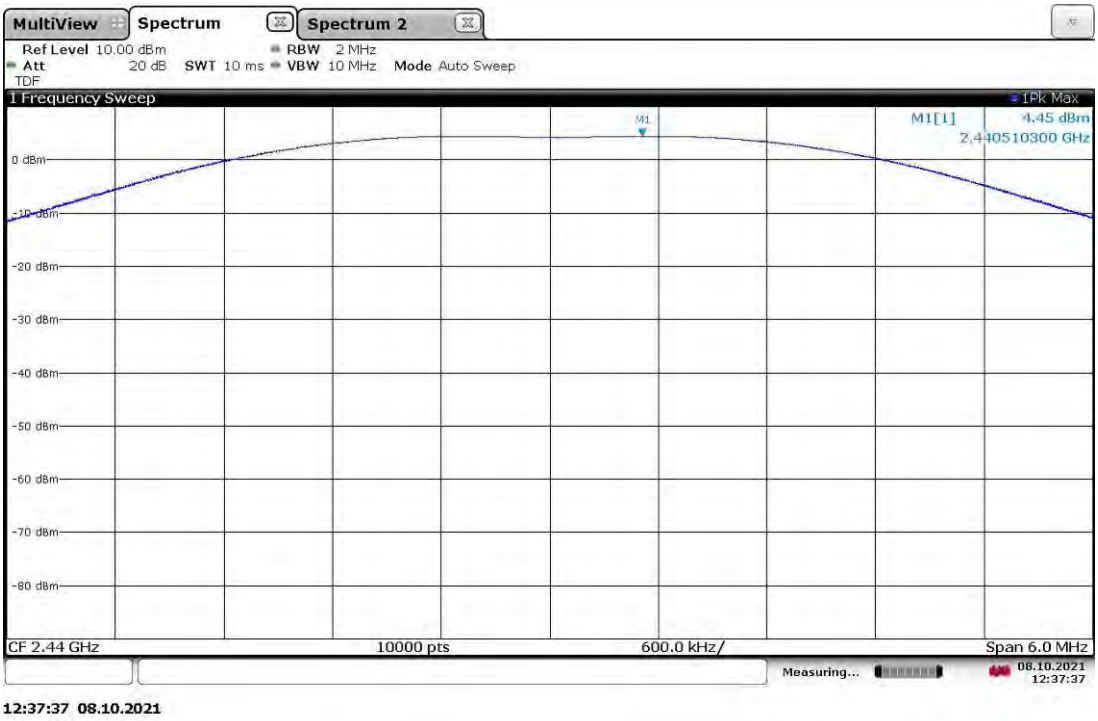


6.5 Test Data:

Low Channel Conducted Power

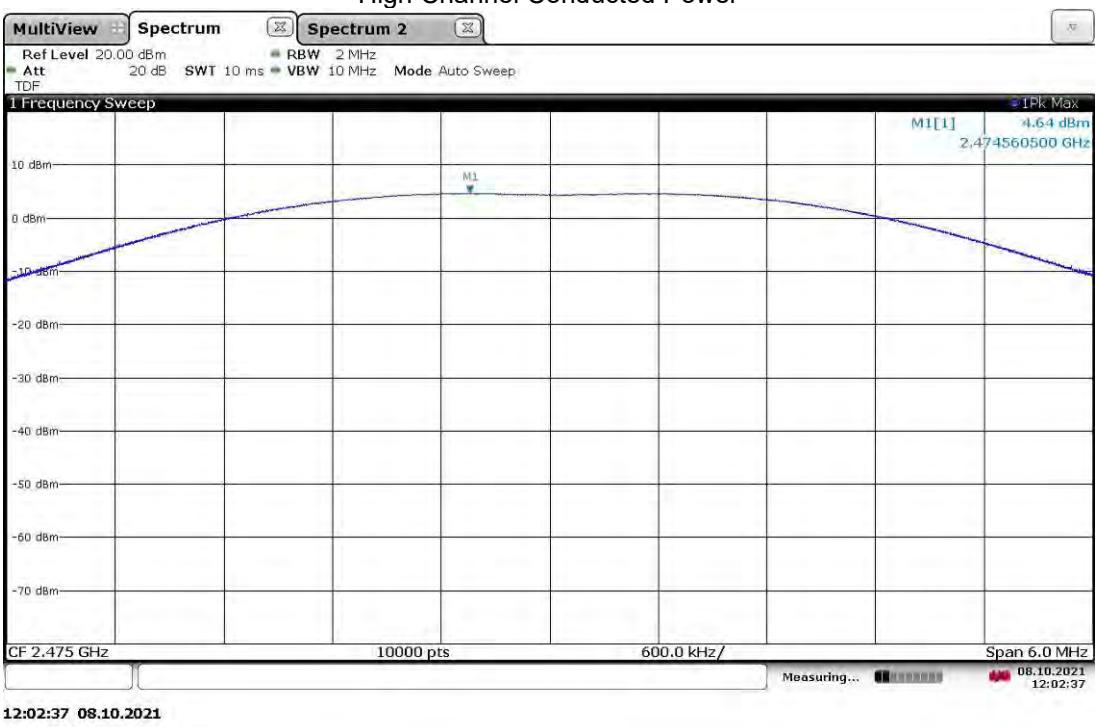


Mid Channel Conducted Power



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:	Power via console at 120VAC 60Hz		
Pretest Verification w/ Ambient Signals or BB Source:	**N/A**	Ambient Temperature:	24 ºC
		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:

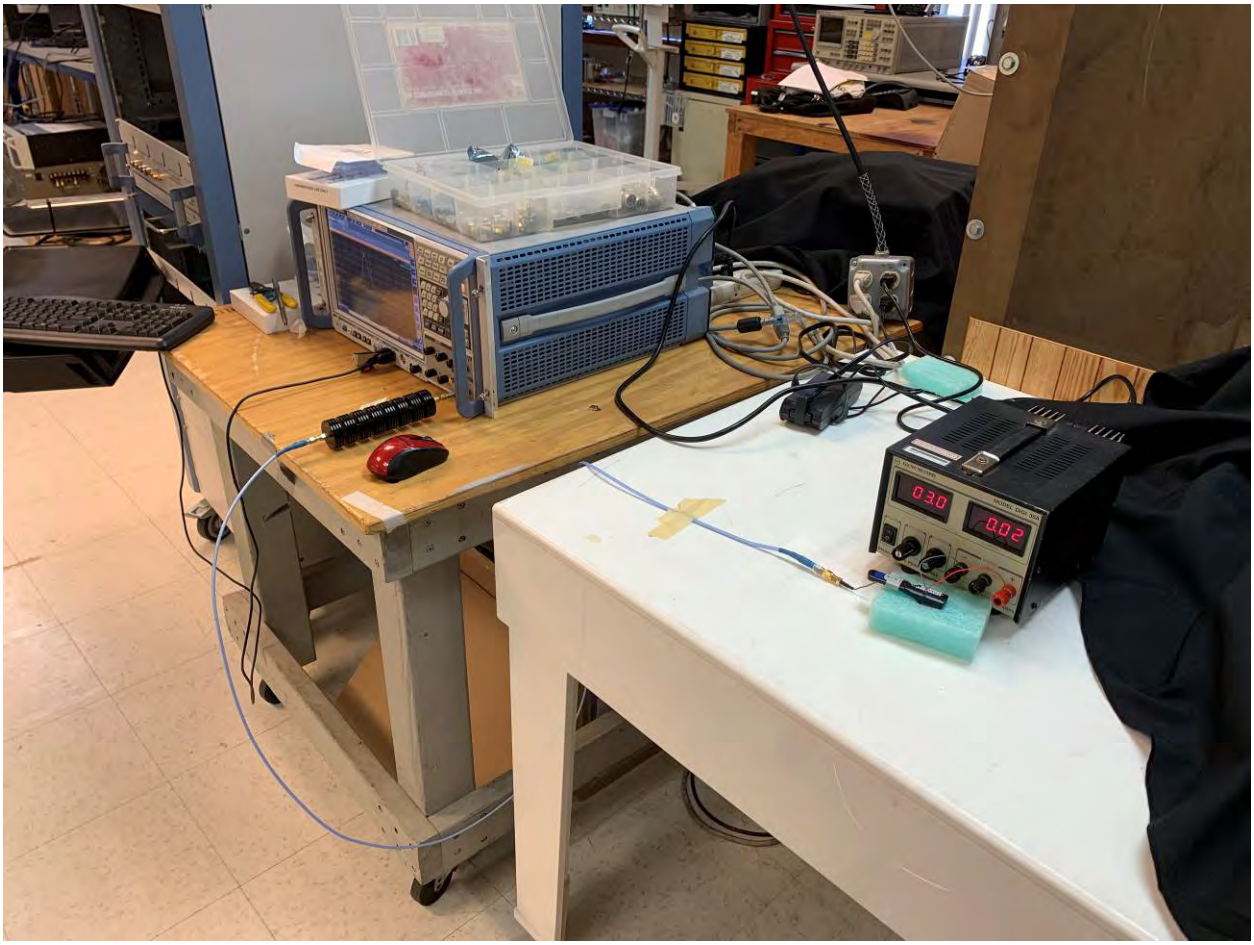
The sample tested was found to Comply.

§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

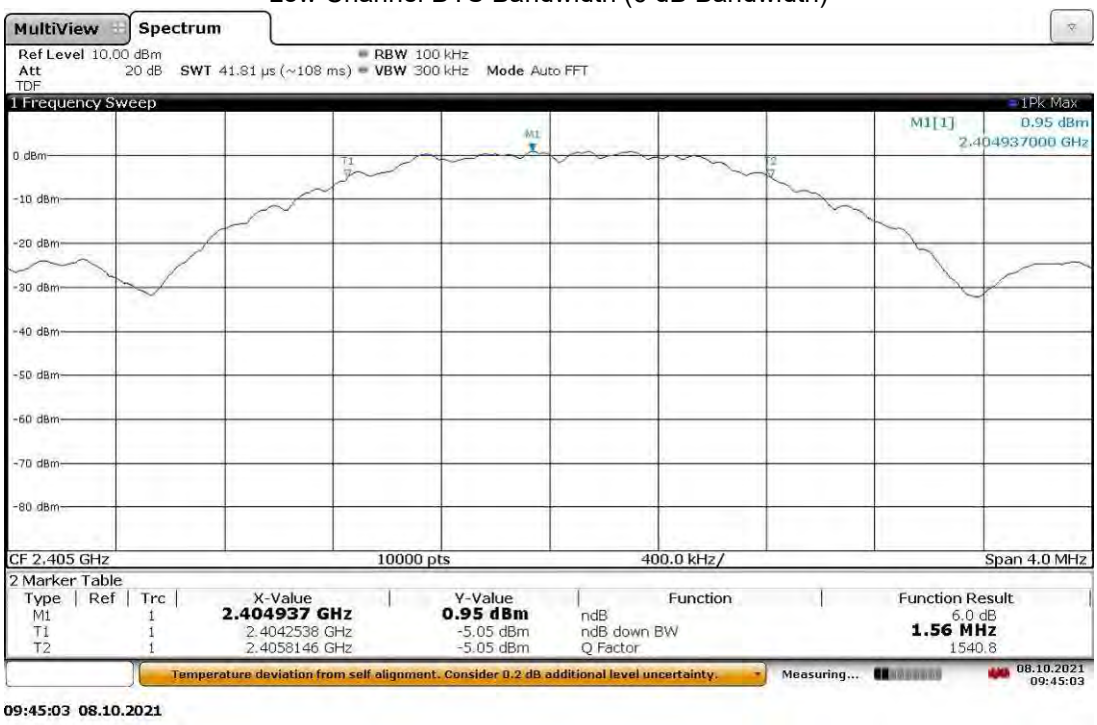
Notes: The transceiver for the console used the same radio as the wireless hand control except it has additional digital electronics. So, only radiated spurious emission test was repeated. Data from Intertek report #104697163BOX-018 for Maximum Peak Output Power, 6 dB and Occupied Bandwidth, Maximum Power Spectral Density were reused in this report.

7.4 Setup Photograph:

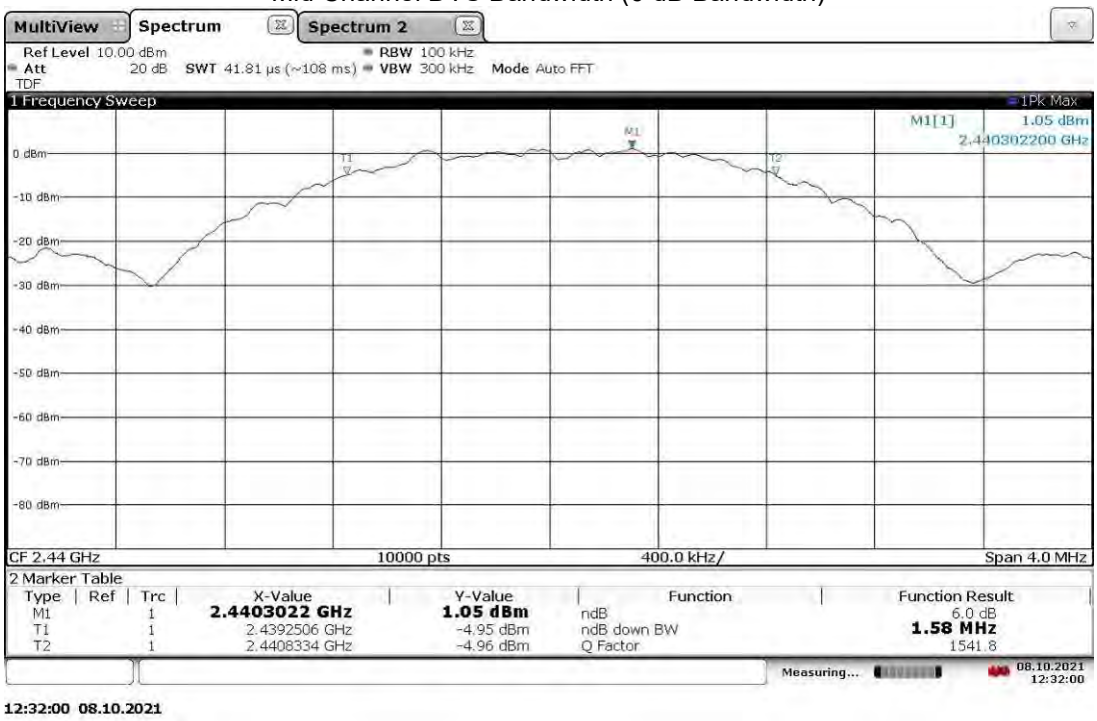


7.5 Plots/Data:

Low Channel DTS Bandwidth (6 dB Bandwidth)

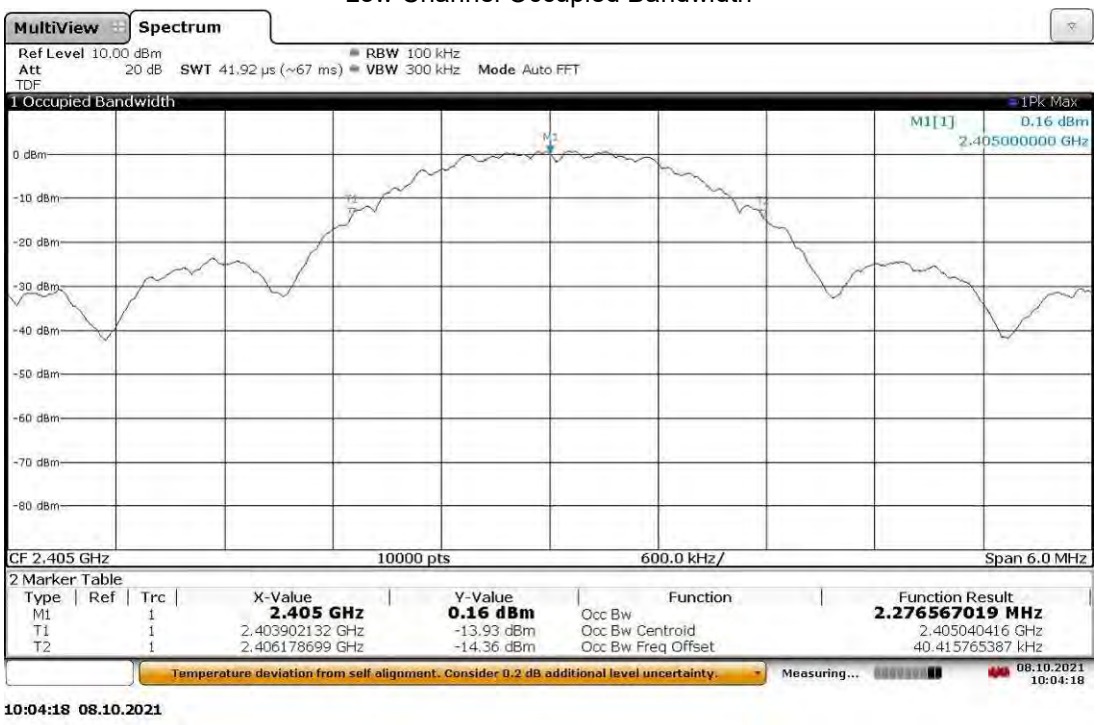


Mid Channel DTS Bandwidth (6 dB Bandwidth)

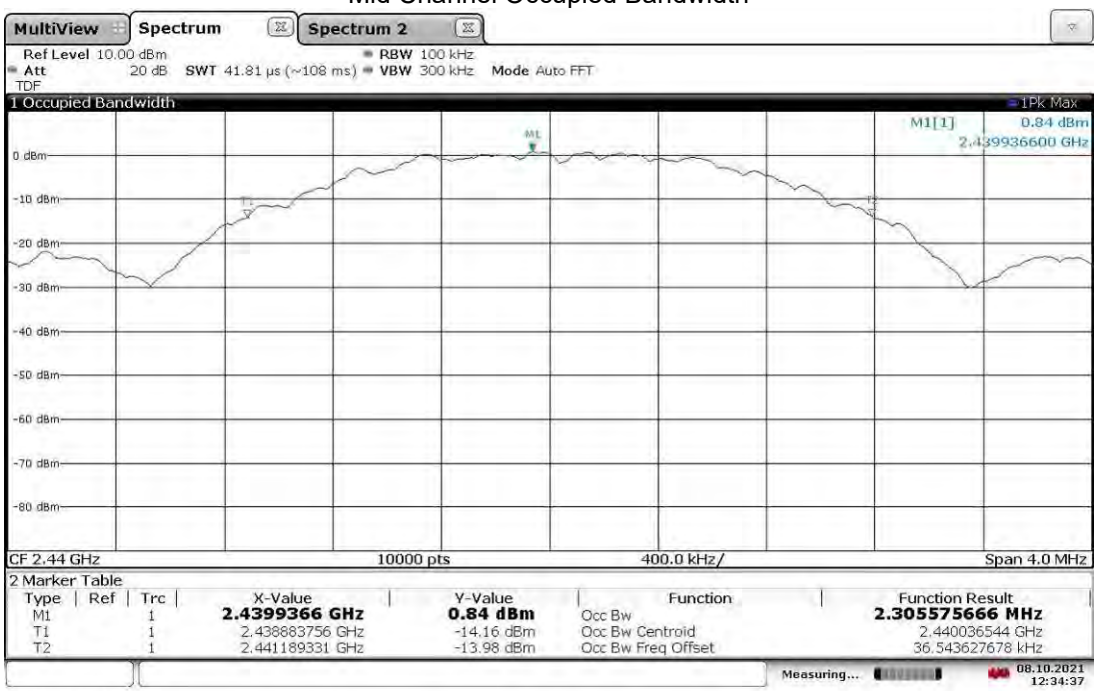


High Channel DTS Bandwidth (6 dB Bandwidth)

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 VJV		
Product Standard:	CFR47 FCC Part 15.247 RSS-247	Limit Applied:	See report section 7.3
Input Voltage:	Powered via console at 120VAC 60Hz	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	--	--

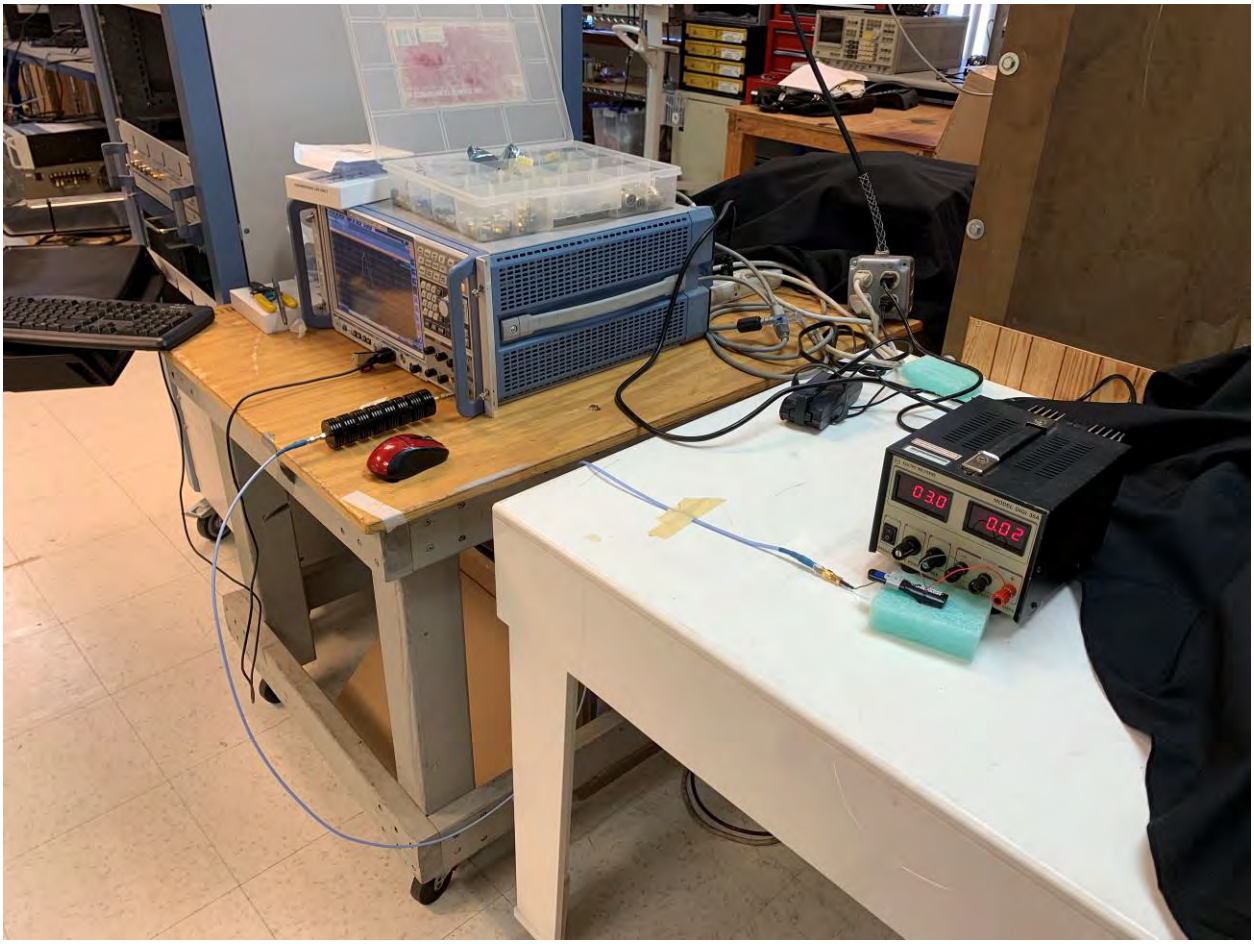
8.3 Results:

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.

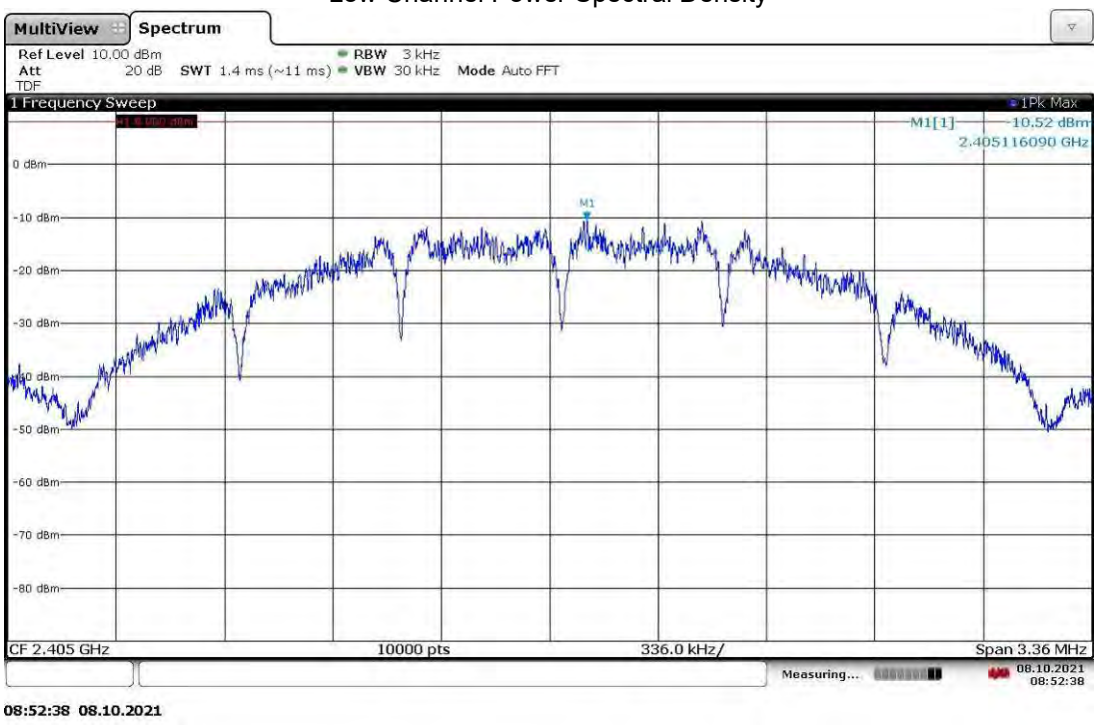
Notes: The transceiver for the console used the same radio as the wireless hand control except it has additional digital electronics. So, only radiated spurious emission test was repeated. Data from Intertek report #104697163BOX-018 for Maximum Peak Output Power, 6 dB and Occupied Bandwidth, Maximum Power Spectral Density were reused in this report.

8.4 Setup Photograph:

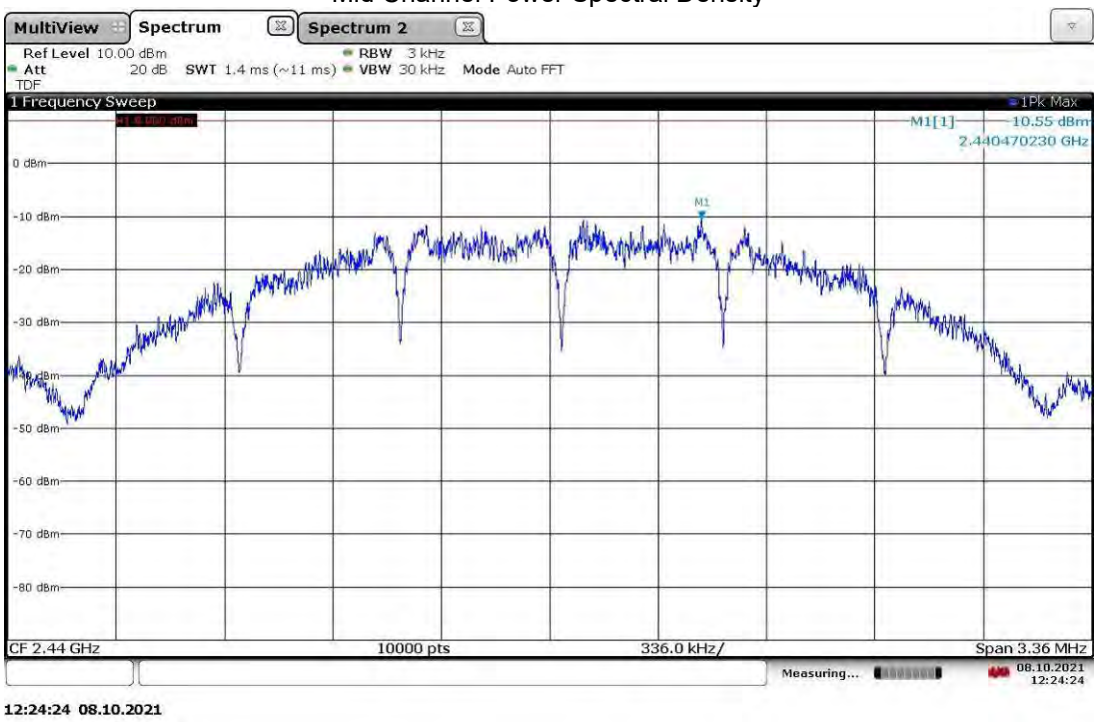


8.5 Test Data:

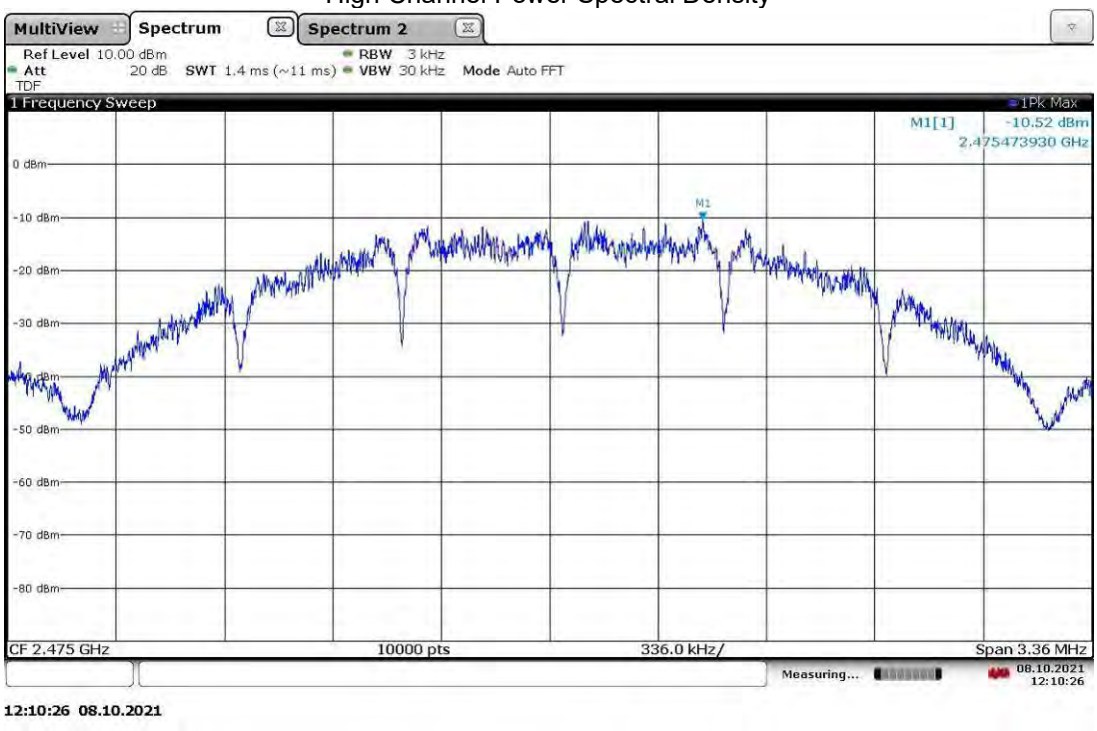
Low Channel Power Spectral Density



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:	Powered via console at 120VAC 60Hz		
Pretest Verification w/ Ambient Signals or BB Source:	**N/A**	Ambient Temperature:	24 ºC
		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
ROS005-1'	Signal and Spectrum Analyzer	Rohde and Shwartz	FSW43	100646	10/27/2020	10/27/2021

Software Utilized:

Name	Manufacturer	Version
None	--	--

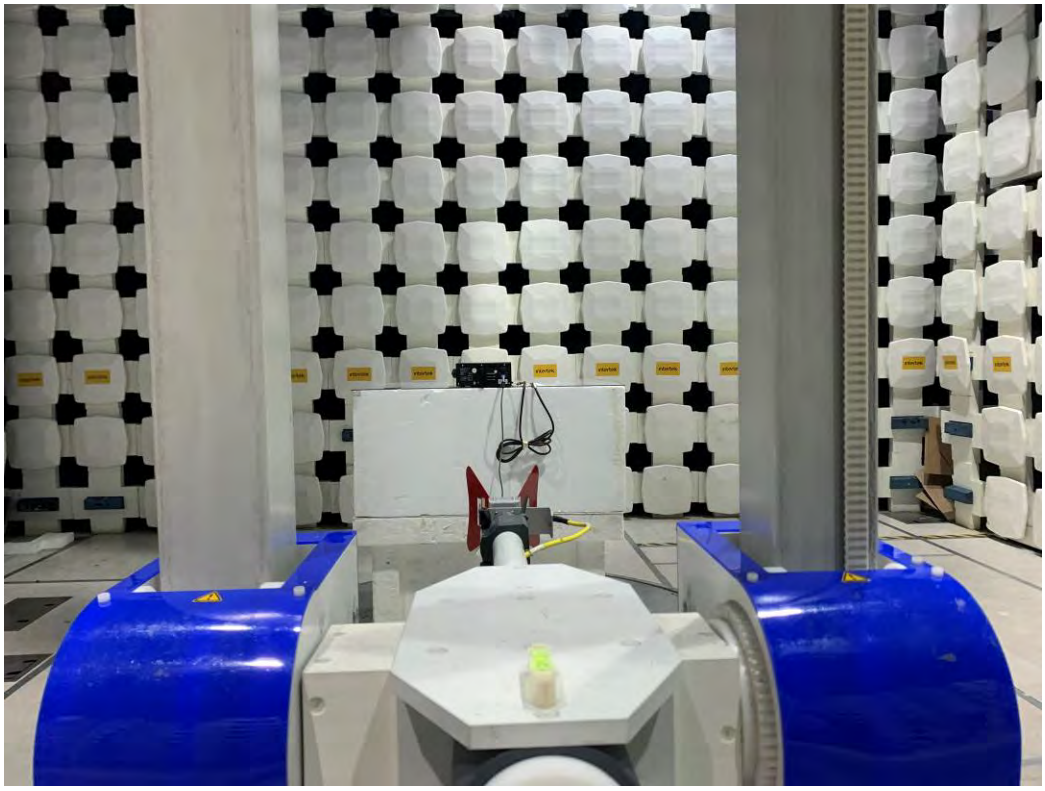
9.3 Results:

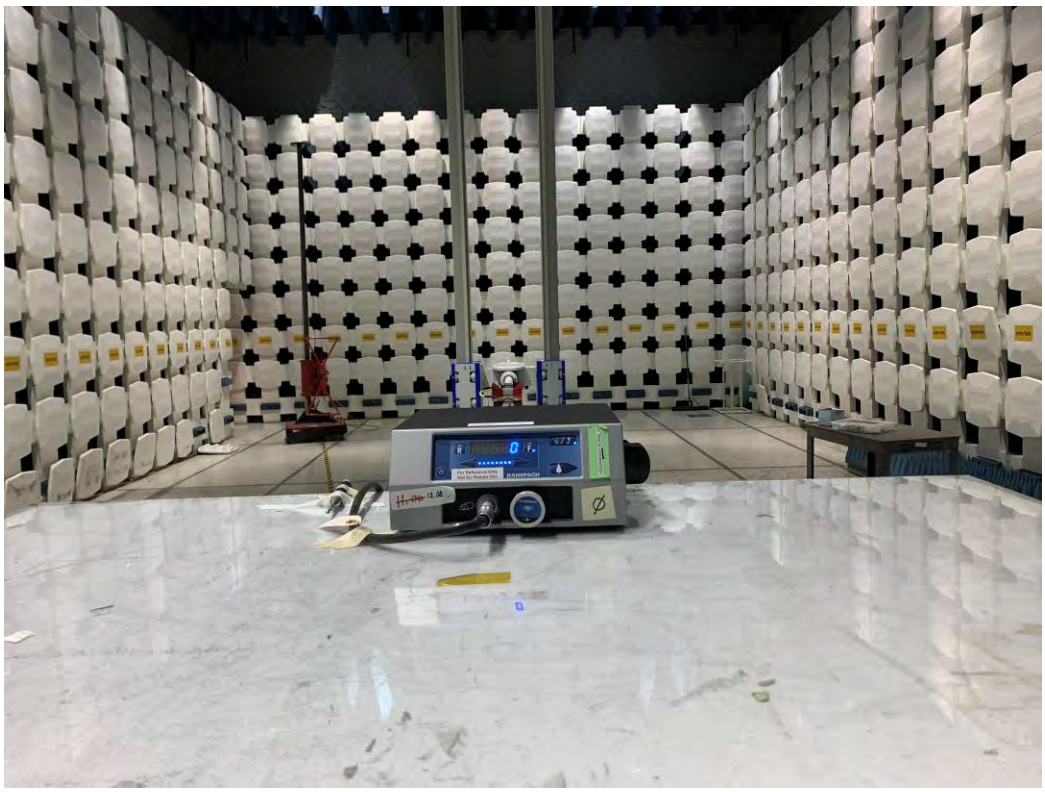
The sample tested was found to Comply.

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))

Notes: The transceiver for the console used the same radio as the wireless hand control except it has additional digital electronics. So, only radiated spurious emission test was repeated. Data from Intertek report #104697163BOX-018 for Maximum Peak Output Power, 6 dB and Occupied Bandwidth, Maximum Power Spectral Density, band edge compliance were reused in this report.

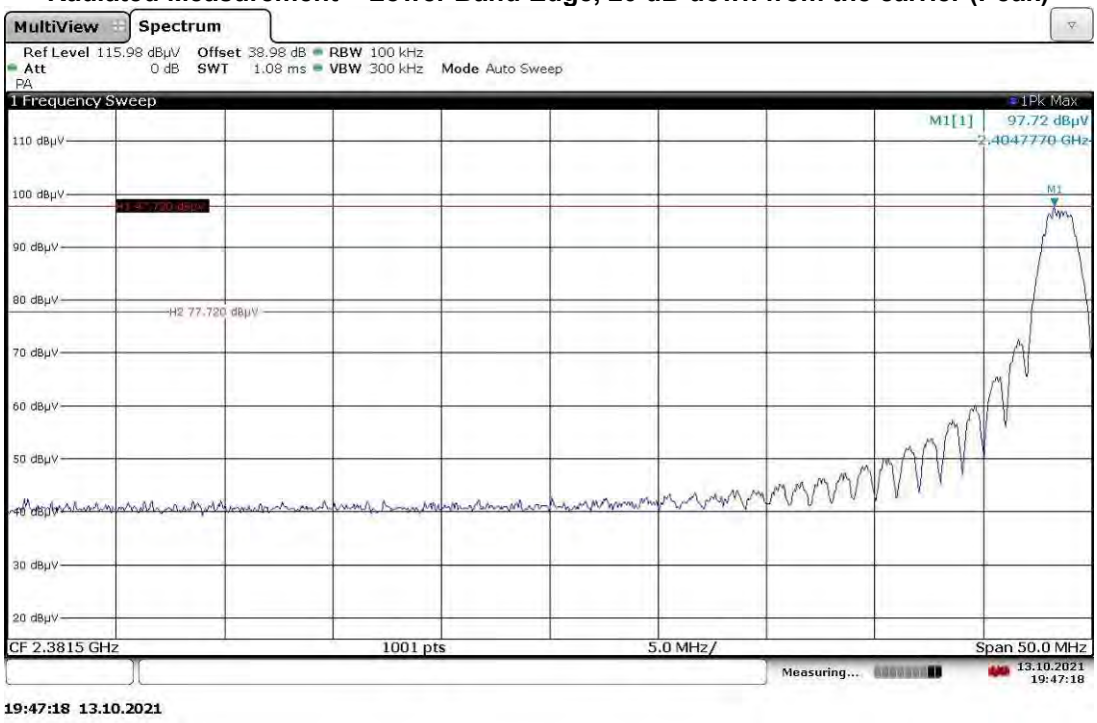
9.4 Setup Photographs:



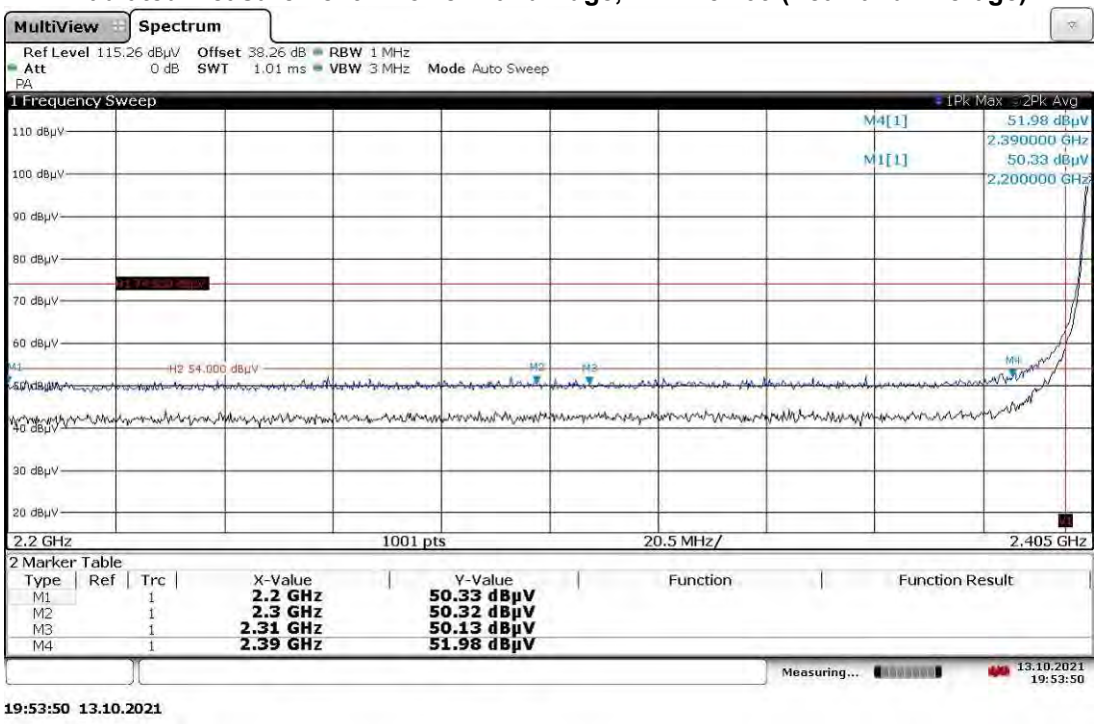


9.5 Test Data:

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

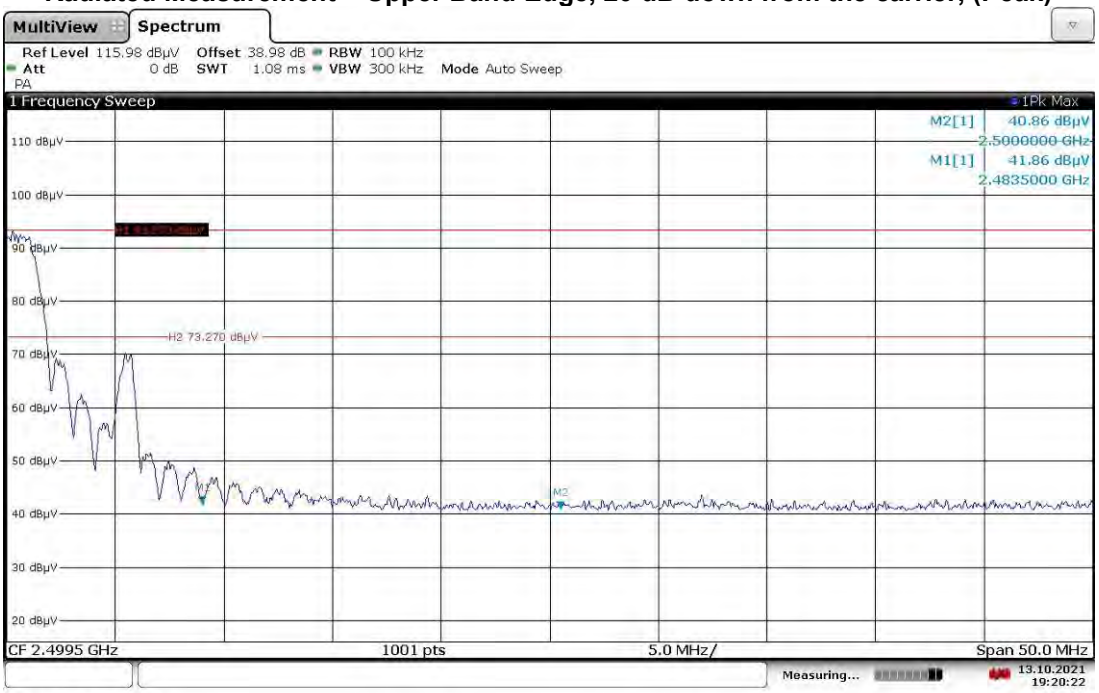


Radiated Measurement – Lower Band Edge, FCC 15.209 (Peak and Average)



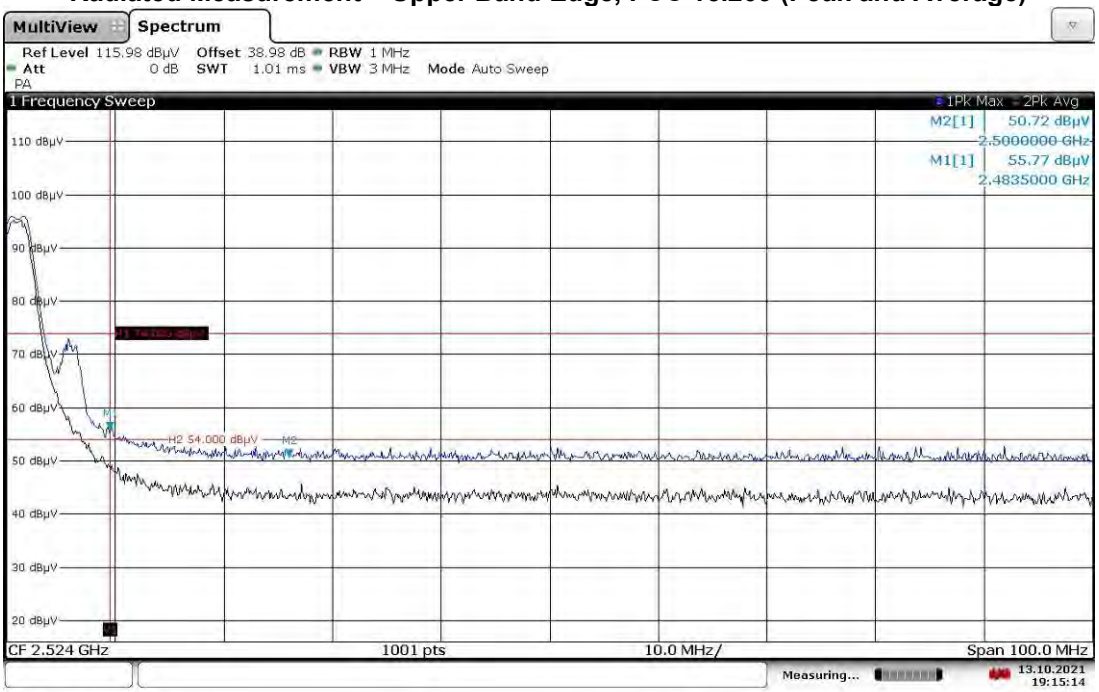
Note: Antenna and cable factors were internally compensated as Ref Offset.

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:	Power via console at 120VAC 60Hz	Ambient Temperature:	25 ºC
Pretest Verification w/ Ambient Signals or BB Source:	**N/A**	Relative Humidity:	38 %
		Atmospheric Pressure:	1004 mbars

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:

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

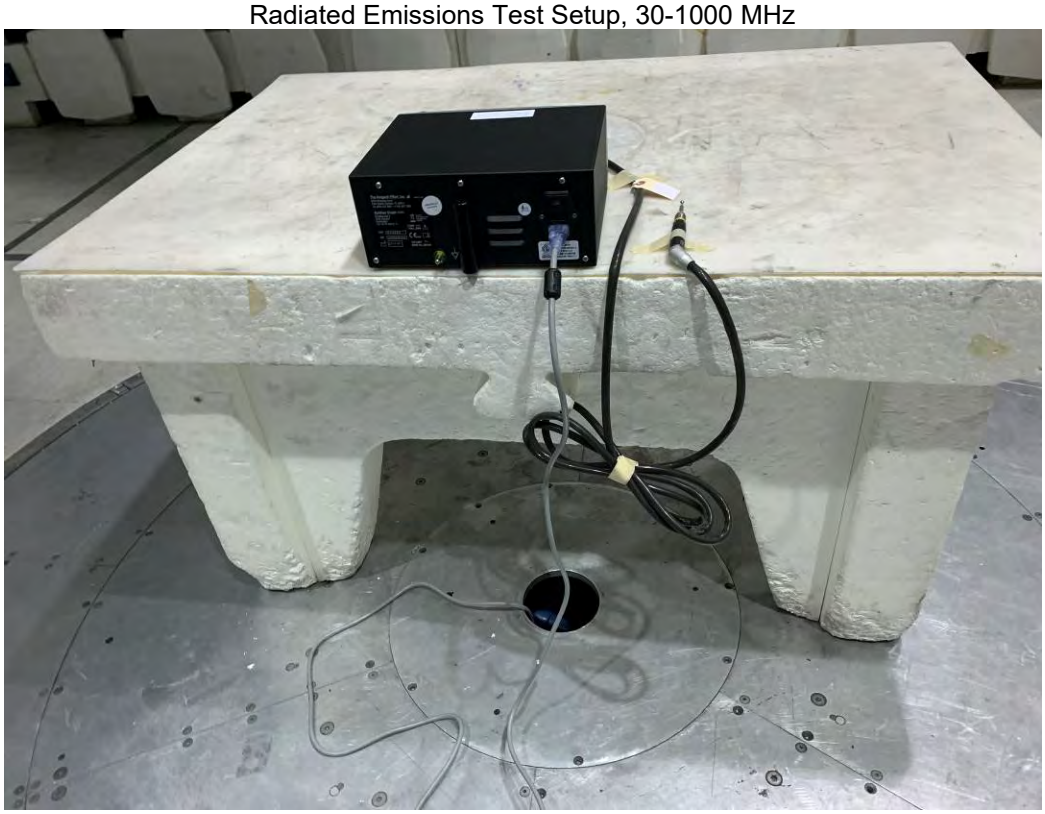
10.3 Results:

The sample tested was found to Comply.

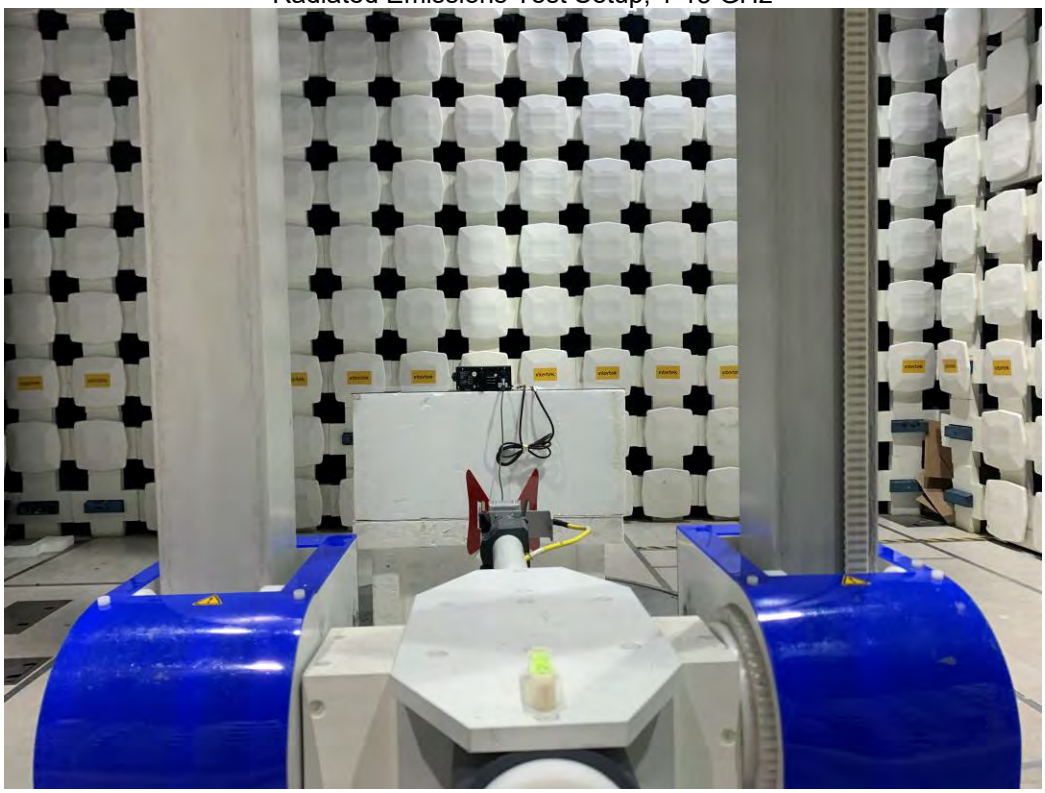
15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that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

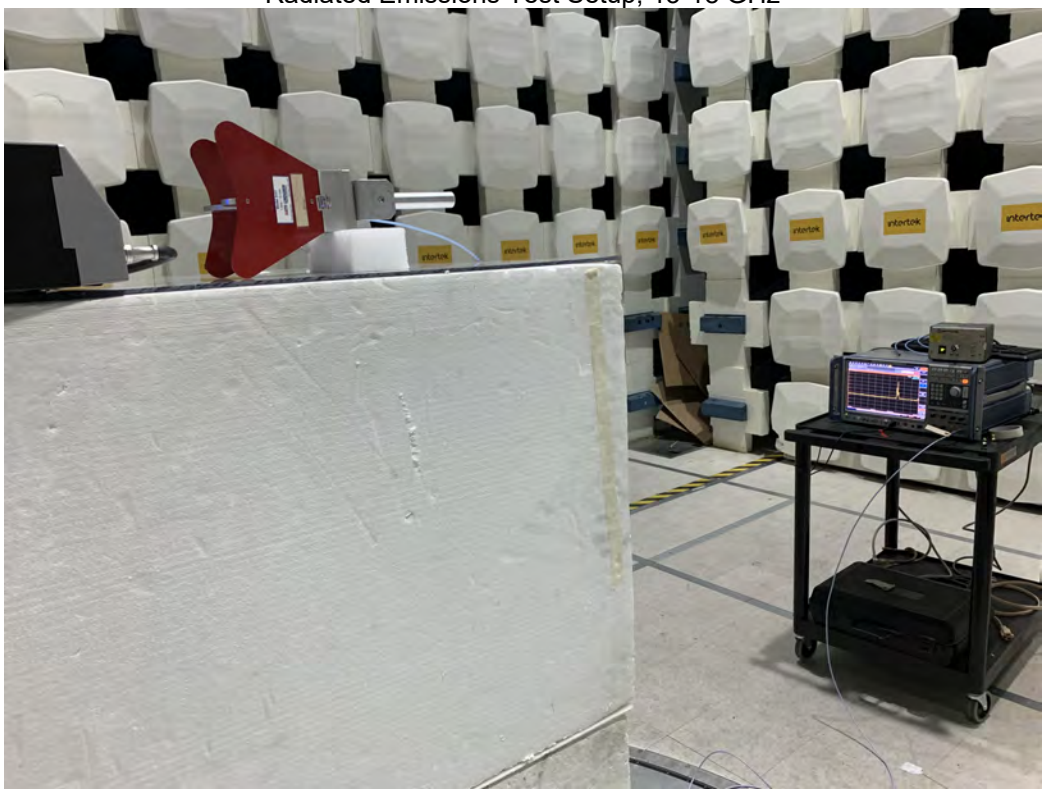
Radiated Emissions Test Setup, 30-1000 MHz

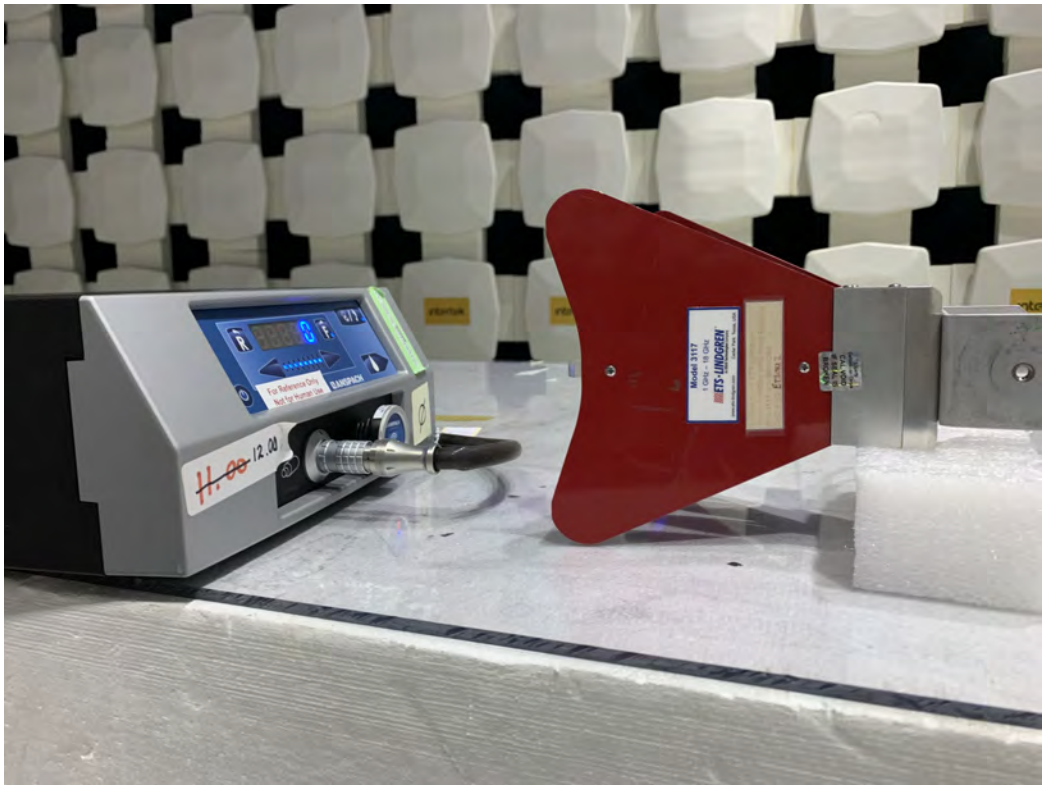


Radiated Emissions Test Setup, 1-13 GHz

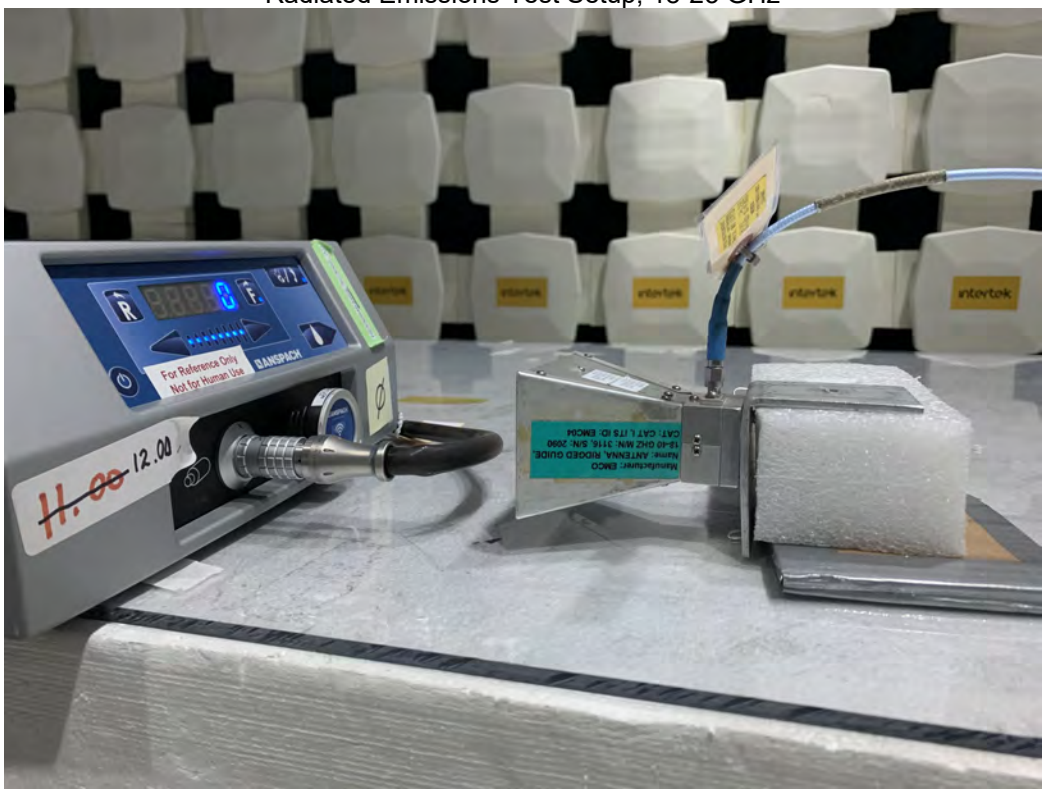


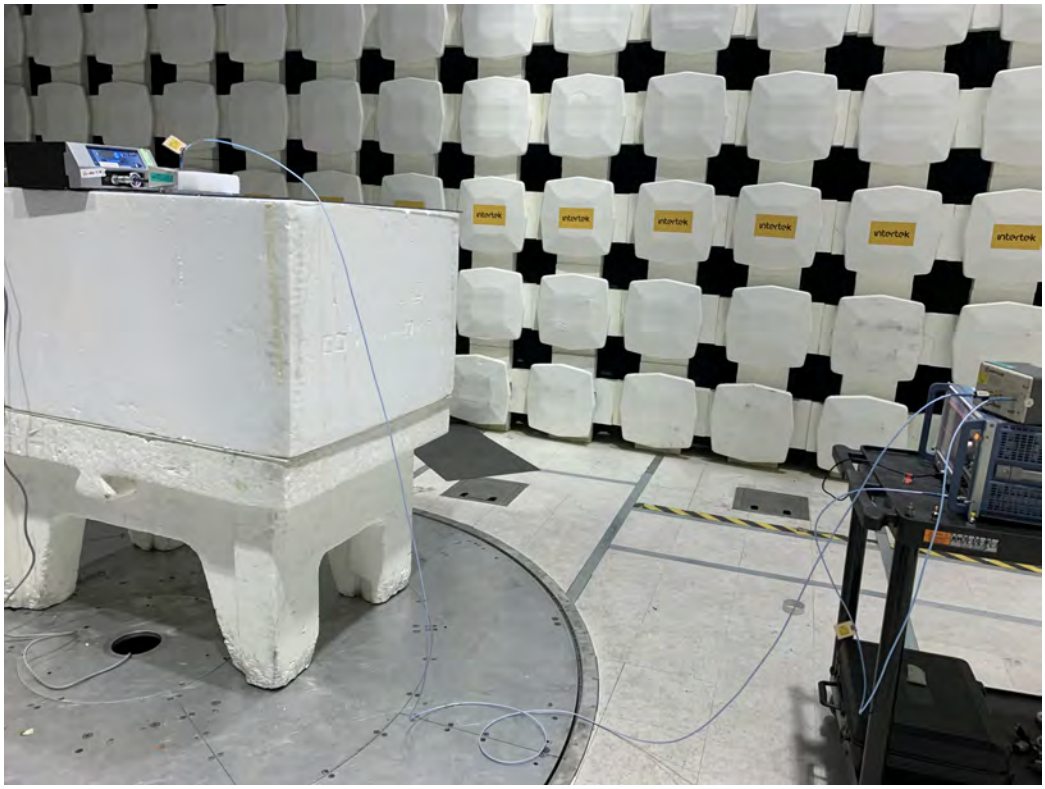
Radiated Emissions Test Setup, 13-18 GHz





Radiated Emissions Test Setup, 18-25 GHz





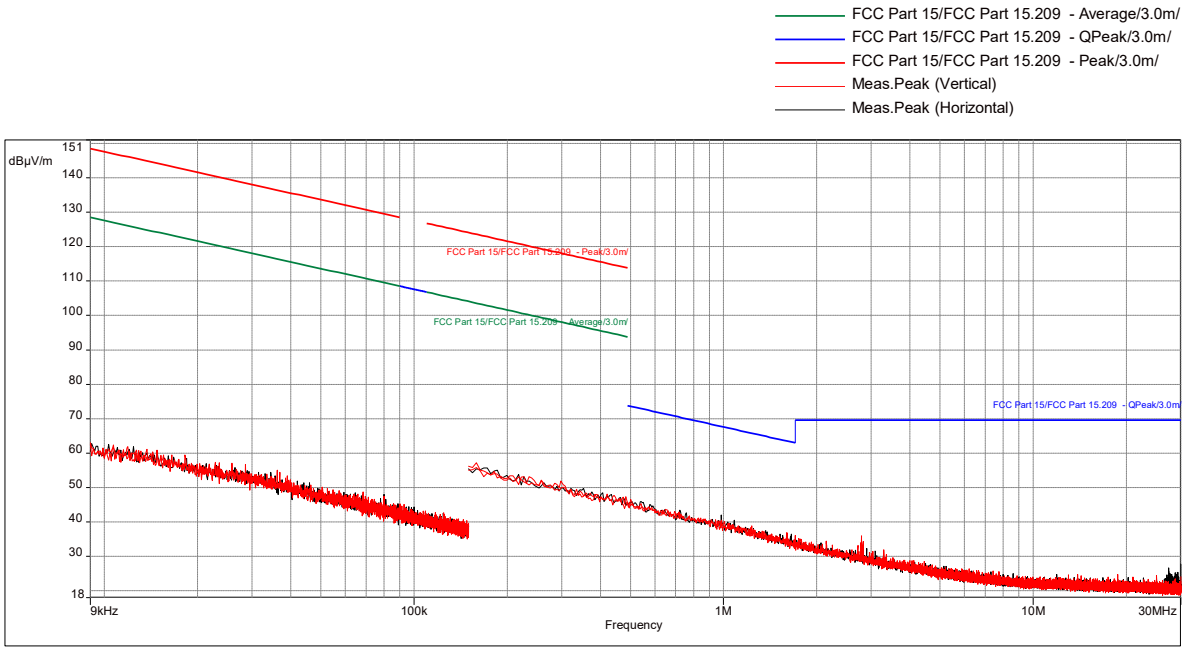
10.5 Plots/Data:

Low Channel Radiated Spurious Emissions From 9 kHz-30 MHz

Test Information:

Date and Time	10/1/2021 5:21:56 PM
Client and Project Number	Depuy_G104697163
Engineer	Vathana Ven
Temperature	23 deg C
Humidity	34%
Atmospheric Pressure	1010 mB
Comments	RE 9kHz-30MHz Loop antenna, Electric Field, 3M Location (FCC 15.209) 120VAC 60Hz_Console Tx mode_Low CH11

Graph:



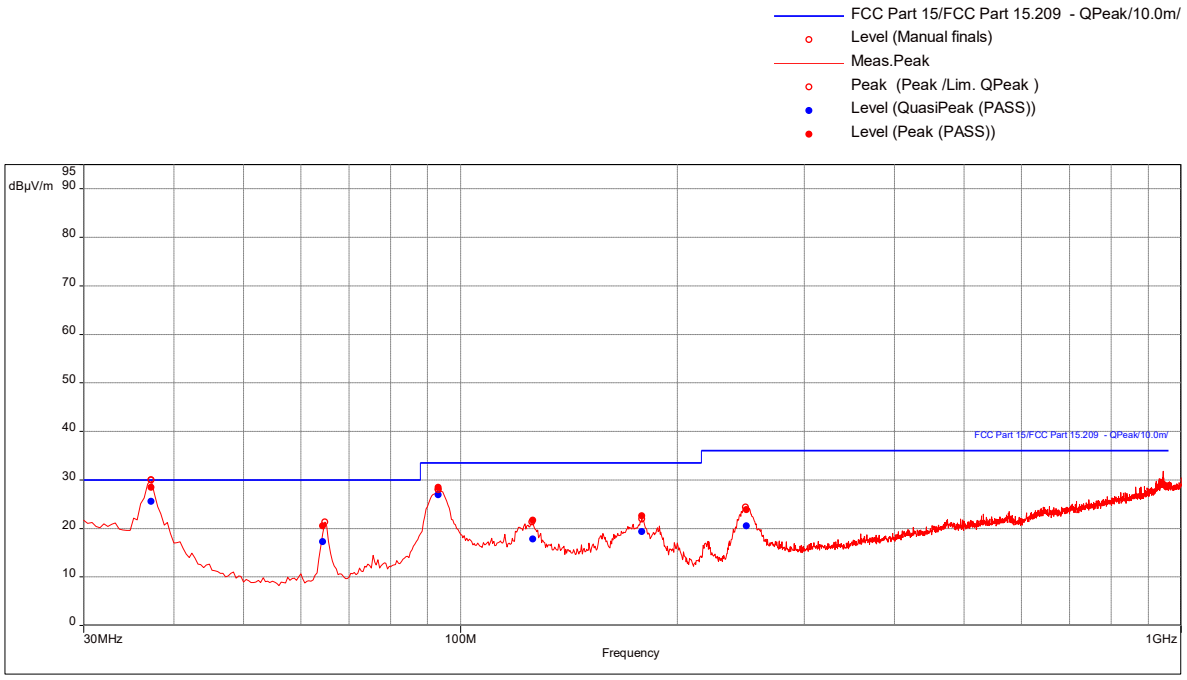
Results: No emissions were detected.

Low Channel Radiated Spurious Emissions From 30-1000 MHz

Test Information:

Date and Time	10/1/2021 7:00:07 PM
Client and Project Number	Depuy_G104697163
Engineer	Vathana Ven
Temperature	23 deg C
Humidity	34%
Atmospheric Pressure	1010 mB
Comments	RE 30-1000MHz_120VAC 60Hz_Console Tx mode_Low CH11

Graph:



Results:

QuasiPeak (PASS) (6)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
37.16842105	25.58	30.00	-4.42	111.00	1.00	Vertical	120000.00	-17.60
64.45263158	17.24	30.00	-12.76	321.00	1.41	Vertical	120000.00	-25.13
93.2	26.94	33.50	-6.56	350.00	4.00	Horizontal	120000.00	-24.28
125.8526316	17.77	33.50	-15.73	0.00	3.70	Horizontal	120000.00	-18.49
178.4315789	19.31	33.50	-14.19	10.00	4.00	Horizontal	120000.00	-20.82
249.0526316	20.51	36.00	-15.49	81.00	2.11	Horizontal	120000.00	-20.33

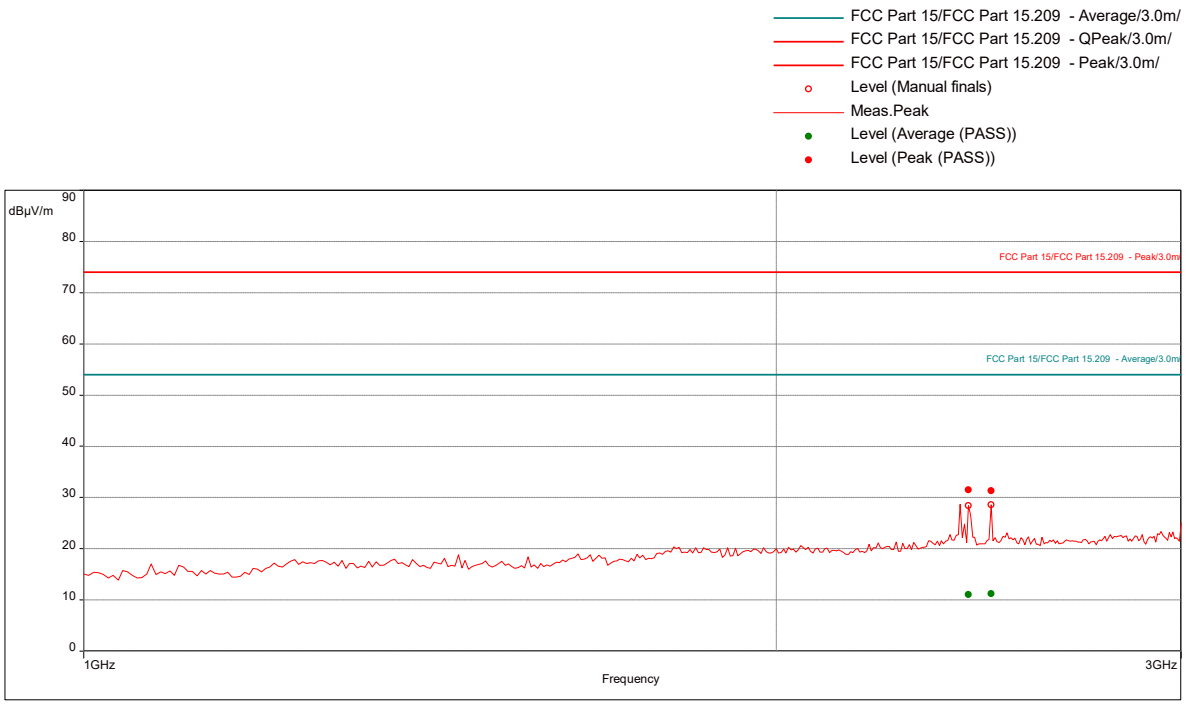
Notes: FCC Part 15 Subpart B Class B limit is identical to FCC Part 15 Subpart C Section 15.209.

Low Channel Radiated Spurious Emissions, 1-3 GHz

Test Information:

Date and Time	10/1/2021 10:13:04 PM
Client and Project Number	Depuy_G104697163
Engineer	Vathana Ven
Temperature	23 deg C
Humidity	34%
Atmospheric Pressure	1010 mB
Comments	RE 1 to 3 GHz_230VAC 50Hz_Console Tx mode_Low CH11_15.209

Graph:



Results:

Peak (PASS) (2)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
2426.052632	31.50	74.00	-42.50	146.00	3.50	Horizontal	1000000.00	-3.53
2480.263158	31.34	74.00	-42.66	4.00	3.94	Vertical	1000000.00	-3.01

Average (PASS) (2)

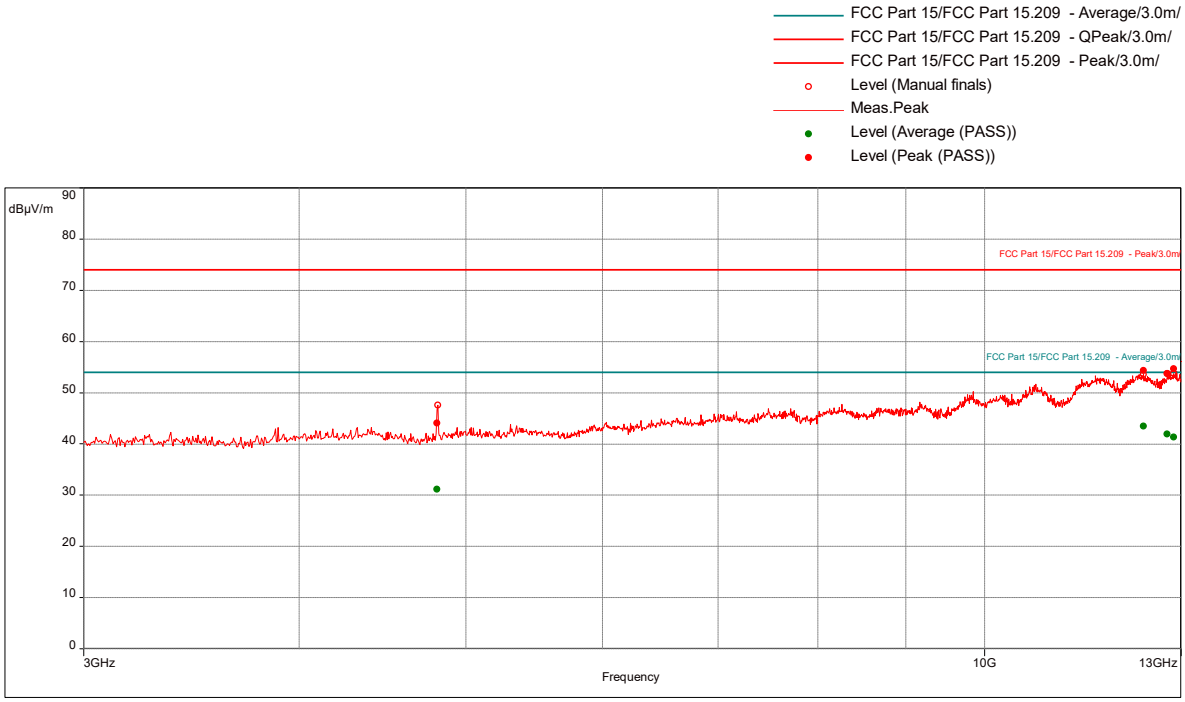
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
2426.052632	11.00	54.00	-43.00	146.00	3.50	Horizontal	1000000.00	-3.53
2480.263158	11.25	54.00	-42.75	4.00	3.94	Vertical	1000000.00	-3.01

Low Channel Radiated Spurious Emissions, 3-25 GHz

Test Information:

Date and Time	10/1/2021 10:32:50 PM
Client and Project Number	Depuy_G104697163
Engineer	Vathana Ven
Temperature	23 deg C
Humidity	34%
Atmospheric Pressure	1010 mB
Comments	RE 3 to 13 GHz_230VAC 50Hz_Console Tx mode_Low CH11_15.209

Graph:



Results:

Peak (PASS) (4)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
4810.789474	44.03	74.00	-29.97	277.00	2.35	Vertical	1000000.00	0.65
12365.78947	54.31	74.00	-19.69	60.00	3.40	Horizontal	1000000.00	13.22
12761.31579	53.74	74.00	-20.26	299.00	3.69	Horizontal	1000000.00	14.38
12870.52632	54.65	74.00	-19.35	17.00	2.30	Vertical	1000000.00	14.71

Average (PASS) (4)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
4810.789474	31.14	54.00	-22.86	277.00	2.35	Vertical	1000000.00	0.65
12365.78947	43.46	54.00	-10.54	60.00	3.40	Horizontal	1000000.00	13.22
12761.31579	41.92	54.00	-12.08	299.00	3.69	Horizontal	1000000.00	14.38
12870.52632	41.29	54.00	-12.71	17.00	2.30	Vertical	1000000.00	14.71

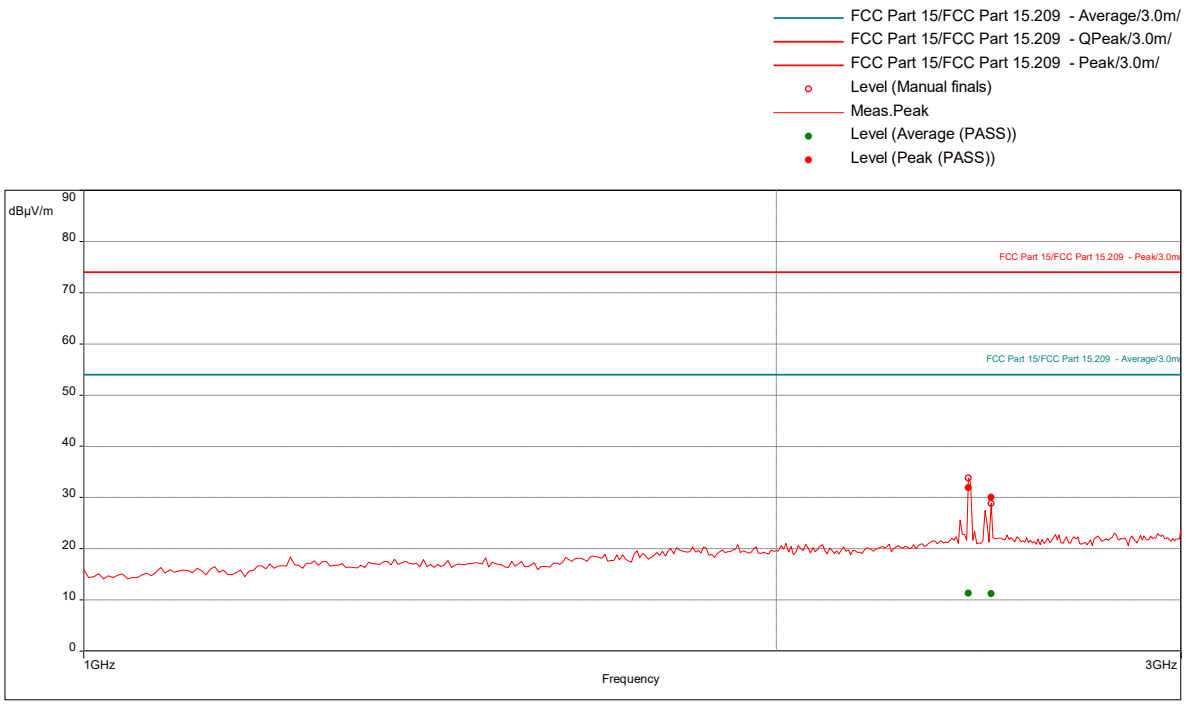
Notes: Scan from 13-25 GHz were performed manually at 10 cm distance with no emission was detected above test instrument noise floor.

Mid Channel Radiated Spurious Emissions, 1-3 GHz

Test Information:

Date and Time	10/1/2021 10:00:46 PM
Client and Project Number	Depuy_G104697163
Engineer	Vathana Ven
Temperature	23 deg C
Humidity	34%
Atmospheric Pressure	1010 mB
Comments	RE 1 to 3 GHz_230VAC 50Hz_Console Tx mode_Mid CH18_15.209

Graph:



Results:

Peak (PASS) (2)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
2426.052632	31.90	74.00	-42.10	53.00	3.45	Vertical	1000000.00	-3.53
2479.736842	30.02	74.00	-43.98	299.00	1.00	Horizontal	1000000.00	-3.01

Average (PASS) (2)

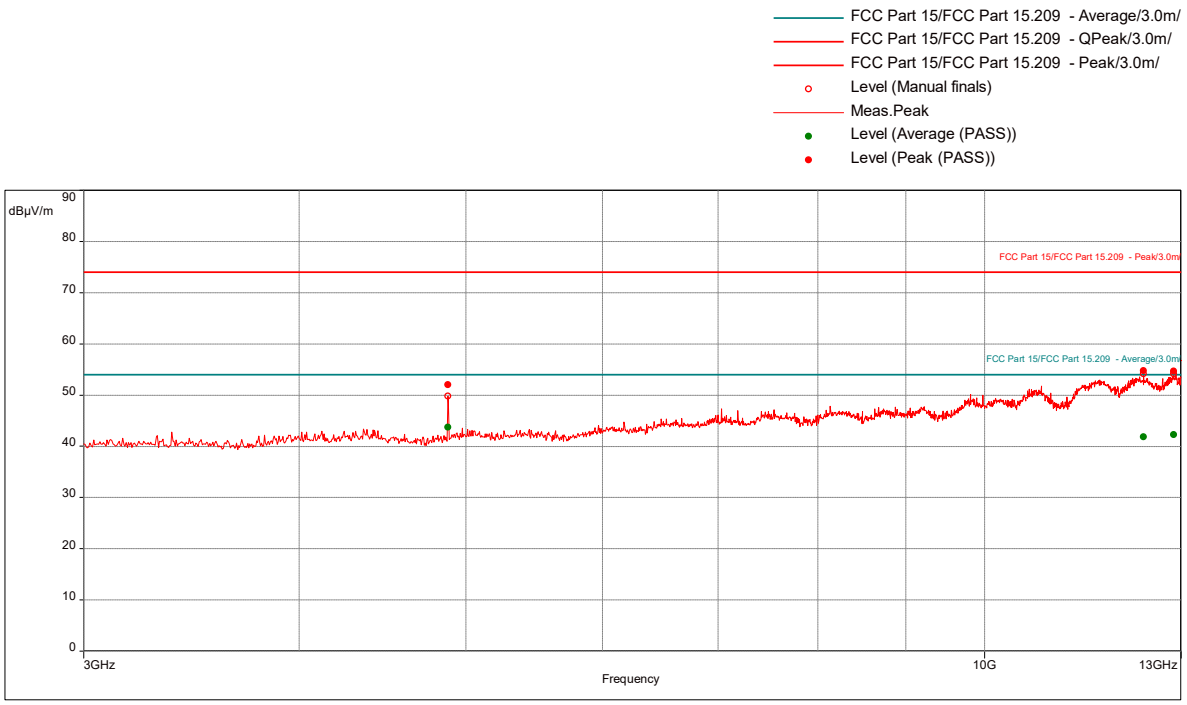
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
2426.052632	11.27	54.00	-42.73	53.00	3.45	Vertical	1000000.00	-3.53
2479.736842	11.25	54.00	-42.75	299.00	1.00	Horizontal	1000000.00	-3.01

Mid Channel Radiated Spurious Emissions, 3-25 GHz

Test Information:

Date and Time	10/1/2021 10:56:31 PM
Client and Project Number	Depuy_G104697163
Engineer	Vathana Ven
Temperature	23 deg C
Humidity	34%
Atmospheric Pressure	1010 mB
Comments	RE 3 to 13 GHz_230VAC 50Hz_Console Tx mode_Mid CH18_15.209

Graph:



Results:

Peak (PASS) (3)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
4881.052632	52.06	74.00	-21.94	357.00	1.15	Vertical	1000000.00	0.73
12366.57895	54.72	74.00	-19.28	265.00	3.64	Vertical	1000000.00	13.22
12870.78947	54.65	74.00	-19.35	32.00	3.35	Vertical	1000000.00	14.71

Average (PASS) (3)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
4881.052632	43.76	54.00	-10.24	357.00	1.15	Vertical	1000000.00	0.73
12366.57895	41.85	54.00	-12.15	265.00	3.64	Vertical	1000000.00	13.22
12870.78947	42.31	54.00	-11.69	32.00	3.35	Vertical	1000000.00	14.71

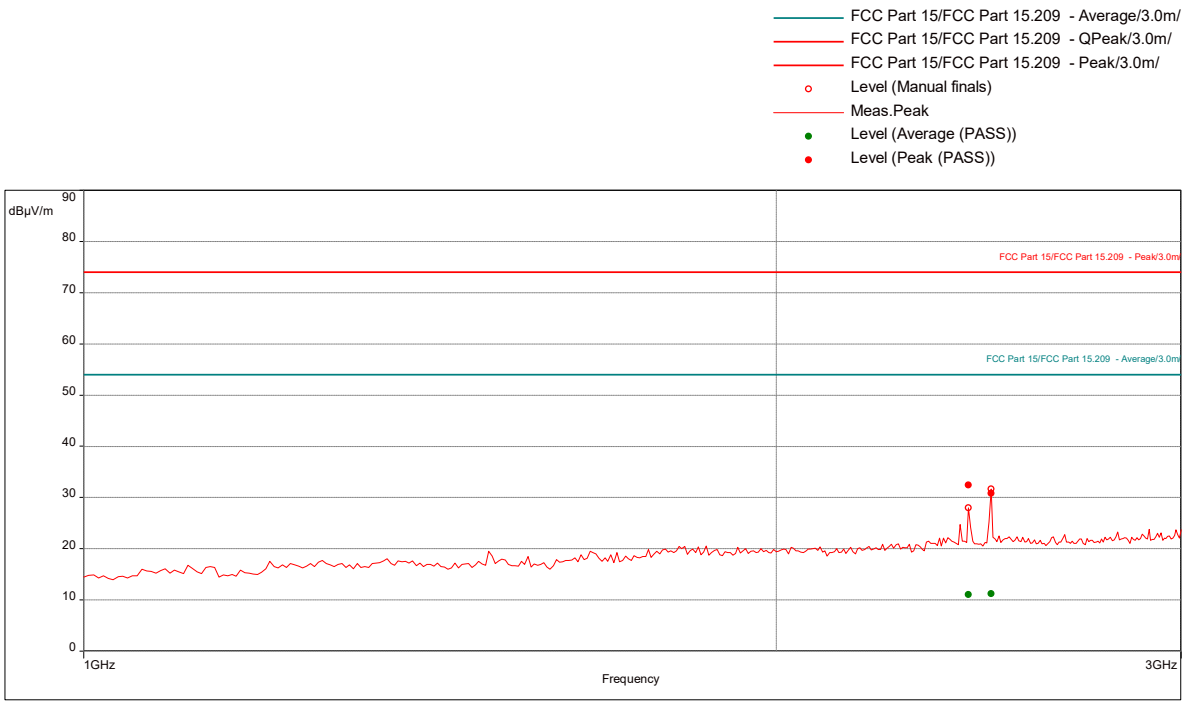
Notes: Scan from 13-25 GHz were performed manually at 10 cm distance with no emission was detected above test instrument noise floor.

High Channel Radiated Spurious Emissions, 1-3 GHz

Test Information:

Date and Time	10/1/2021 9:46:48 PM
Client and Project Number	Depuy_G104697163
Engineer	Vathana Ven
Temperature	23 deg C
Humidity	34%
Atmospheric Pressure	1010 mB
Comments	RE 1 to 3 GHz_230VAC 50Hz_Console Tx mode_High CH25

Graph:



Results:

Peak (PASS) (2)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
2425.789474	32.45	74.00	-41.55	86.00	1.35	Vertical	1000000.00	-3.54
2479.736842	30.79	74.00	-43.21	18.00	1.30	Vertical	1000000.00	-3.01

Average (PASS) (2)

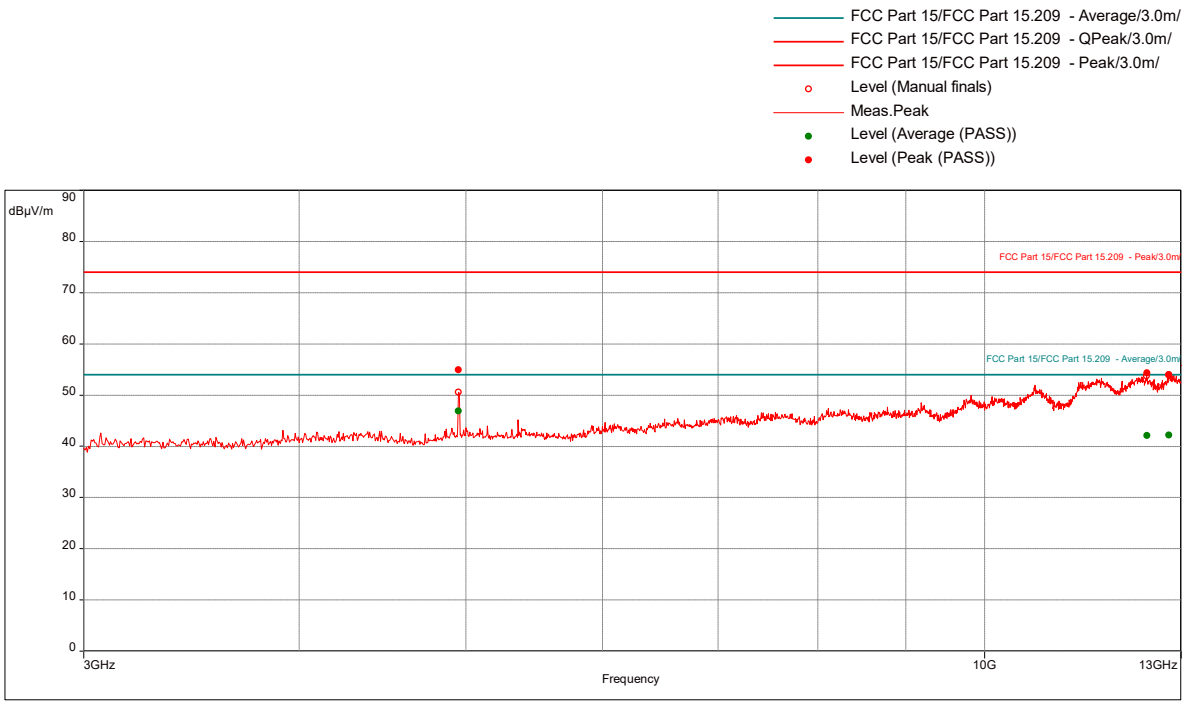
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
2425.789474	11.00	54.00	-43.00	86.00	1.35	Vertical	1000000.00	-3.54
2479.736842	11.25	54.00	-42.75	18.00	1.30	Vertical	1000000.00	-3.01

High Channel Radiated Spurious Emissions, 3-25 GHz

Test Information:

Date and Time	10/1/2021 11:16:49 PM
Client and Project Number	Depuy_G104697163
Engineer	Vathana Ven
Temperature	23 deg C
Humidity	34%
Atmospheric Pressure	1010 mB
Comments	RE 3 to 13 GHz_230VAC 50Hz_Console Tx mode_High CH25_15.209

Graph:



Results:

Peak (PASS) (3)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
4949.210526	54.96	74.00	-19.04	0.00	1.30	Vertical	1000000.00	0.86
12418.94737	54.36	74.00	-19.64	176.00	2.90	Vertical	1000000.00	13.27
12788.68421	53.99	74.00	-20.01	198.00	2.85	Horizontal	1000000.00	14.47

Average (PASS) (3)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
4949.210526	46.90	54.00	-7.10	0.00	1.30	Vertical	1000000.00	0.86
12418.94737	42.11	54.00	-11.89	176.00	2.90	Vertical	1000000.00	13.27
12788.68421	42.19	54.00	-11.81	198.00	2.85	Horizontal	1000000.00	14.47

Notes: Scan from 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 #: Transceiver (Receiver Console)
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
PreAmp Used? (Y or N): Y Voltage/Frequency: 120VAC 60Hz Frequency Range: 18-25 GHz

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

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 — Test Date: 09/25/2021
Vathana F. Ven VFV — 10/01/2021
Supervising/Reviewing Engineer: (Where Applicable) N/A
Product Standard: CFR47 FCC Part 15.247, RSS-247 — Limit Applied: See report section 10.3
Input Voltage: Powered via console at 120VAC 60Hz
Pretest Verification w/ Ambient Signals or BB Source: BB Source — Ambient Temperature: 24, 23 ºC
Relative Humidity: 37, 34 %
Atmospheric Pressure: 1006, 1010 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.

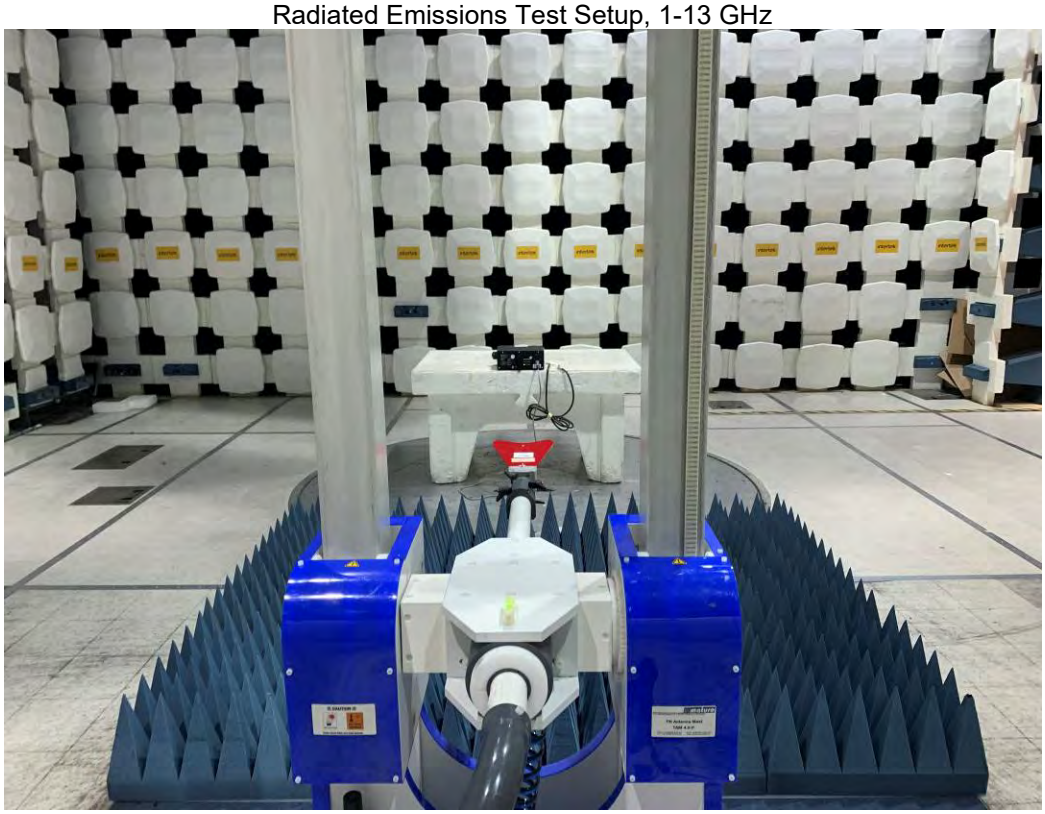
The field strength of radiated emissions form unintentional radiators at a distance of 3 meters shall not exceed the following values.

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:

Radiated Emissions Test Setup, 30-1000 MHz

Radiated Emissions Test Setup, 1-13 GHz



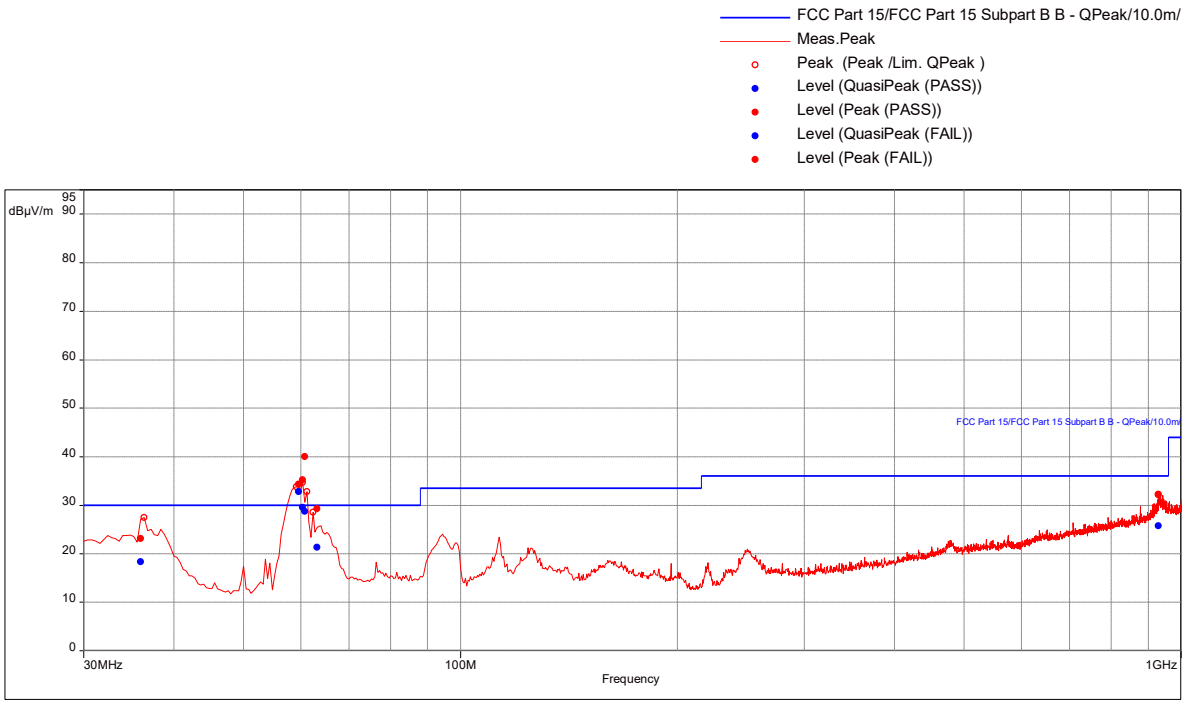
11.5 Plots/Data:

Console Transceiver in Receive Mode @ Mid Channel, 120VAC 60Hz, RE 30-1000MHz

Test Information:

Date and Time	9/25/2021 12:58:54 PM
Client and Project Number	Depuy
Engineer	Kouma Sinn
Temperature	22 C
Humidity	46 %
Atmospheric Pressure	1008 mbar
Comments	Scan 10: Console Transceiver in Receive Mode @ Mid Channel, 120VAC 60Hz, RE 30-1000MHz SA mode

Graph:



Results:

QuasiPeak (FAIL) (1)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
59.57894737	32.75	30.00	2.75	306.00	1.91	Vertical	120000.00	-25.58

QuasiPeak (PASS) (5)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
35.95789474	18.32	30.00	-11.68	148.00	2.02	Vertical	120000.00	-16.82
60.43157895	29.53	30.00	-0.47	231.00	2.56	Vertical	120000.00	-25.48
60.63157895	28.76	30.00	-1.24	275.00	2.58	Vertical	120000.00	-25.46
63	21.36	30.00	-8.64	268.00	2.15	Vertical	120000.00	-25.29
929.6315789	25.70	36.00	-10.30	257.00	3.03	Horizontal	120000.00	-5.58

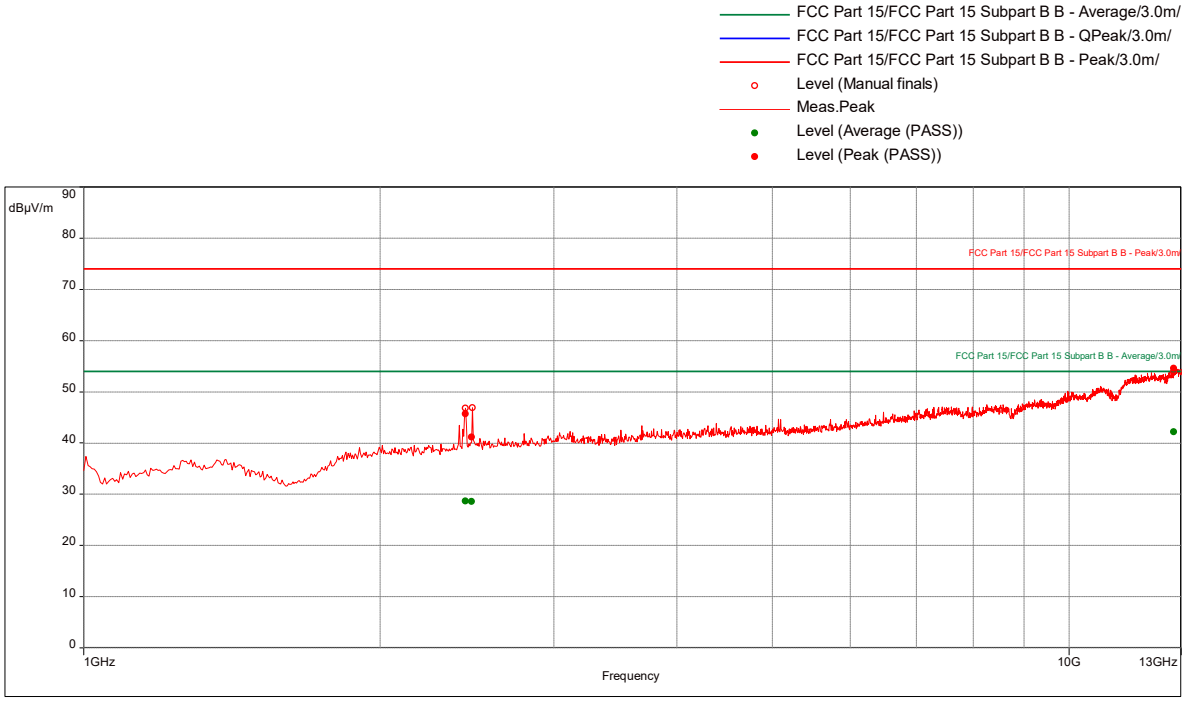
Notes: The non-compliant emission is from the console not from the receiver under test. The emission was verified by removing the receiver from the console and this signal is still present at the same level.

Console Transceiver in Receive Mode @ Mid Channel, 120VAC 60Hz, 1-13 GHz

Test Information:

Date and Time	10/13/2021 4:49:52 PM
Client and Project Number	Depuy
Engineer	Kouma Sinn
Temperature	25 C
Humidity	38 %
Atmospheric Pressure	1004 mbar
Comments	Scan 30: Console Transceiver, Rx Mid, 120VAC 60Hz, RE 1-13 GHz SA mode

Graph:



Results:

Peak (PASS) (3)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
2437.631579	45.65	74.00	-28.35	272.00	1.00	Vertical	1000000.00	-3.44
2475.526316	41.15	74.00	-32.85	226.00	1.06	Vertical	1000000.00	-3.05
12779.47368	54.55	74.00	-19.45	151.00	2.60	Vertical	1000000.00	14.44

Average (PASS) (3)

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Azimuth (°)	Height (m)	Pol.	RBW	Correction (dB)
2437.631579	28.71	54.00	-25.29	272.00	1.00	Vertical	1000000.00	-3.44
2475.526316	28.58	54.00	-25.42	226.00	1.06	Vertical	1000000.00	-3.05
12779.47368	42.22	54.00	-11.78	151.00	2.60	Vertical	1000000.00	14.44

Test Personnel:	Kouma Sinn KPS	Test Date:	09/25/2021, 10/13/2021
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:	Powered via console at 120VAC 60Hz	Ambient Temperature:	22, 25 ºC
Pretest Verification w/ Ambient Signals or BB Source:	BB Source	Relative Humidity:	46, 38 %
		Atmospheric Pressure:	1008, 1004 mbars

Deviations, Additions, or Exclusions: None

12 AC Mains Conducted Emissions

12.1 Method

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

TEST SITE: EMC Lab

The EMC Lab has one Semi-anechoic Chamber and one Shielded Chamber. AC Mains Power is available at 120, 230, and 277 Single Phase; 208, 400, and 480 3-Phase. Large reference ground-planes are installed in the general lab area to facilitate EMC work not requiring a shielded environment.

Measurement Uncertainty

Measurement	Frequency Range	Expanded Uncertainty (k=2)	Ucispr
AC Line Conducted Emissions	150 kHz - 30 MHz	2.0 dB	3.4 dB
Telco Port Emissions	150 kHz - 30 MHz	3.7 dB	5.0 dB
AC Line Conducted Emissions	9 kHz - 150 MHz	2.2 dB	3.4 dB

As shown in the table above our conducted 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 Calculations

The following is how net line-conducted readings were determined:

NF = RF + LF + CF + AF
Where NF = Net Reading in dBμV
RF = Reading from receiver in dBμV
LF = LISN or ISN Correction Factor in dB
CF = Cable Correction Factor in dB
AF = Attenuator Loss Factor in dB

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:
NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 dBμV
$UF = 10^{(49.1\ dB\mu V / 20)}$ = 285.1 μV/m

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 LISN Factor, Attenuator, and Cable Loss. These are already accounted for in the “Level” column.

12.2 Test Equipment Used:

Asset	Description	Manufacturer	Model	Serial	Cal Date	Cal Due
DAV005'	Weather Station	Davis	6250	MS191218083	02/07/2021	02/07/2022
DS23'	Attenuator, 20dB	Mini Circuits	20dB, 50 ohm	DS23	10/30/2020	10/30/2021
ROS002'	9kHz to 3GHz EMI Test Receiver	Rohde & Schwartz	ESCI 1166.5950K03	100067	06/24/2021	06/24/2022
LISN32'	LISN - CISPR16 Compliant 9kHz-30MHz	Com-Power	LI-215A	191955	05/11/2021	05/11/2022
CBL2014-1'	RG58C/U, BNC (M)	Pomona	2249-C-180	CBL2014-1	02/04/2021	02/04/2022
HEW42'	Power Source - 16A	Hewlett Packard	6843A	3531A00114	VBU	Verified
147238'	Digital Multimeter (Full Color)	Fluke	187	89300560	05/04/2021	05/04/2022

Software Utilized:

Name	Manufacturer	Version
BAT-EMC	Nexio	3.18.0.16

12.3 Results:

The sample tested was found to Comply.

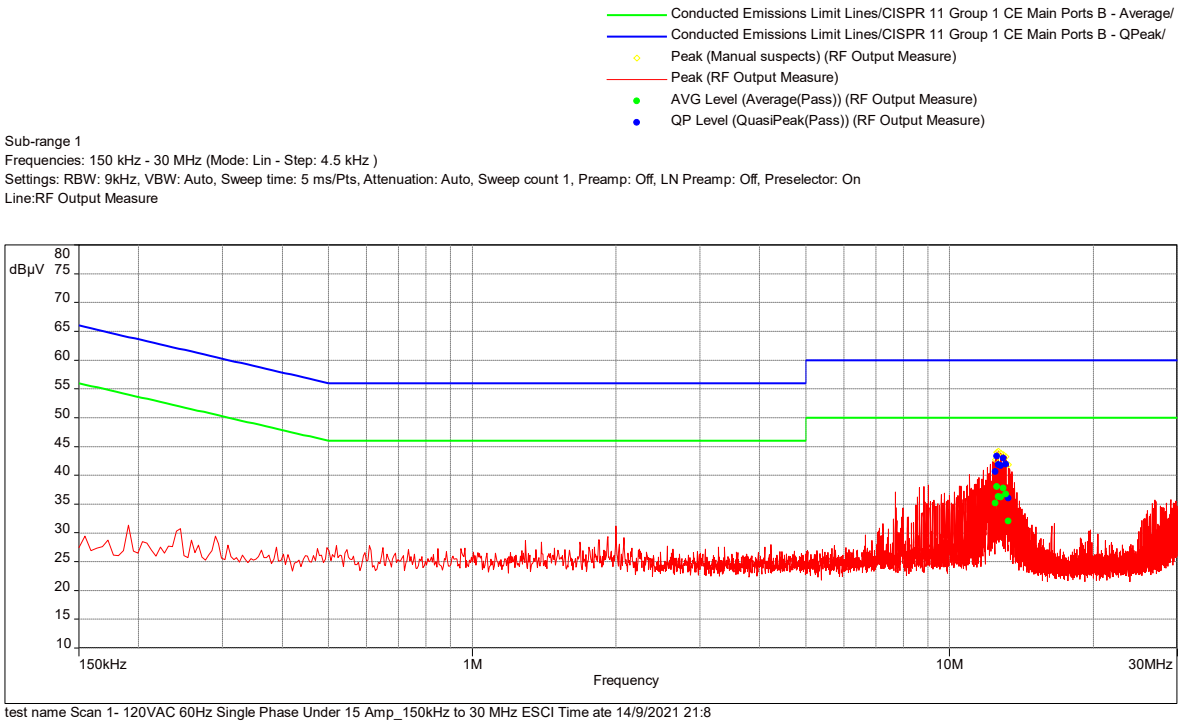
12.4 Setup Photographs:

12.5 Plots/Data:

Test Information:

Date and Time	9/14/2021 8:56:55 PM
Client and Project Number	DePuy G104697163
Engineer	Paul Bacchiocchi
Temperature	22 deg C
Humidity	60%
Atmospheric Pressure	1008mbars
Comments	Scan 1- **120VAC 60Hz** Single Phase Under 15 Amp_150kHz to 30 MHz ESCI

Graph:



Results:

QuasiPeak(Pass) (7)

Frequency (MHz)	QP Level (dBµV)	QP Limit (dBuV)	QP Margin (dB)	Line	RBW	Meas.Time	Correction (dB)
12.4795	40.64	60.00	-19.36	Neutral	9k	0.01	20.52
12.5605	43.32	60.00	-16.68	Phase 1	9k	0.01	20.51
12.64	41.85	60.00	-18.15	Neutral	9k	0.01	20.53
12.7995	41.69	60.00	-18.31	Neutral	9k	0.01	20.53
12.9595	42.96	60.00	-17.04	Phase 1	9k	0.01	20.51
13.1185	41.93	60.00	-18.07	Phase 1	9k	0.01	20.52
13.282	36.05	60.00	-23.95	Neutral	9k	0.01	20.54

Average(Pass) (7)

Frequency (MHz)	AVG Level (dBµV)	AVG Limit (dBuV)	AVG Margin (dB)	Line	RBW	Meas.Time	Correction (dB)
12.4795	35.20	50.00	-14.80	Neutral	9k	0.01	20.52
12.5605	38.02	50.00	-11.98	Phase 1	9k	0.01	20.51
12.64	36.31	50.00	-13.69	Neutral	9k	0.01	20.53
12.7995	36.24	50.00	-13.76	Neutral	9k	0.01	20.53
12.9595	37.78	50.00	-12.22	Phase 1	9k	0.01	20.51
13.1185	36.72	50.00	-13.28	Phase 1	9k	0.01	20.52
13.282	32.07	50.00	-17.93	Neutral	9k	0.01	20.54

Test Personnel:	Paul Bacchiocchi	Test Date:	09/14/2021
Supervising/Reviewing Engineer: (Where Applicable)	N/A		
Product Standard:	FCC Part 15 Subpart B, ISED ICES-003	Limit Applied:	Class B
Input Voltage:	120VAC 60Hz		
		Ambient Temperature:	22 ºC
Pretest Verification w/ Signal generator:	**Yes**	Relative Humidity:	60 %
		Atmospheric Pressure:	1008 mbars

Deviations, Additions, or Exclusions: None

13 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	11/17/2021	104697163BOX-018a	KPS	VFV	Original Issue