

# iRobot Corporation

## TEST REPORT

**SCOPE OF WORK**

FCC PART 15.247 TRANSMITTERS CO-LOCATION

**REPORT NUMBER**

104798049BOX-001

**ISSUE DATE**

02/15/2022

**[REVISED DATE]**

Original Issue

**PAGES**

33

**DOCUMENT CONTROL NUMBER**

Non-Specific Radio Report Shell Rev. December 2017  
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# TRANSMITTERS CO-LOCATION TEST REPORT

(FULL COMPLIANCE)

**Report Number:** 104798049BOX-001

**Project Number:** G104798049

**Report Issue Date:** 02/15/2022

**Model(s) Tested:** CREATE 3

**Model(s) Partially Tested:** None

**Model(s) Not Tested but declared equivalent by the client:** None

**Standards:** CFR47 FCC Part 15.247 Subpart C: 02/2022,  
CFR47 FCC Part 15 Subpart B: 02/2022,  
RSS-247 Issue 2 February 2017,  
ICES-003 Issue 7, October 2020,  
RSS-Gen Issue 5 April 2018,  
RSS-102 Issue 5 March 2015  
(Transmitters Co-location)

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

Client:  
iRobot Corporation  
8 Crosby Dr Mail Stop 12-2  
Bedford, MA 01730  
USA

Report prepared by



Vathana Ven / EMC Engineering Supervisor

Report reviewed by



Kouma Sinn / EMC Engineering Supervisor

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## 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       | Human RF exposure<br>CFR47 FCC Part 15 Subpart C:01/2022, Section 15.247 (b)(3)<br>RSS-247 Issue 2 February 2017, RSS-102 Issue 5 March 2015 | Pass   |
| 7       | Transmitter spurious emissions<br>CFR47 FCC Part 15 Subpart C: 01/2022, Section 15.247 (d)<br>RSS-247 Issue 2 February 2017                  | Pass   |
| 8       | Band Edge Compliance<br>CFR47 FCC Part 15 Subpart C: 01/2022, Section 15.247 (d)<br>RSS-247 Issue 2: 02/2017)                                | Pass   |
| 9       | Revision History                                                                                                                             | --     |

\*Notes: Co-location testing with two radios incorporated in the EUT.

### 3 Client Information

This EUT was tested at the request of:

**Client:** iRobot Corporation  
8 Crosby Dr Mail Stop 12-2  
Bedford, MA 01730  
USA

**Contact:** Kyle Neffendorf  
**Telephone:** +1 (781) 430-3061  
**Fax:** None  
**Email:** kneffendorf@irobot.com

### 4 Description of Equipment Under Test and Variant Models

**Manufacturer:** iRobot Corporation  
8 Crosby Dr Mail Stop 12-2  
Bedford, MA 01730  
USA

| Equipment Under Test |                    |              |                       |
|----------------------|--------------------|--------------|-----------------------|
| Description          | Manufacturer       | Model Number | Serial Number         |
| Robot                | iRobot Corporation | CREATE 3     | RCI3020J210813E102219 |

|                     |            |
|---------------------|------------|
| Receive Date:       | 09/14/2021 |
| Received Condition: | Good       |
| Type:               | Production |

#### Description of Equipment Under Test (provided by client)

The EUT is robot which has the following pre-approved transmitters incorporated.

- 1) Bluetooth BLE Module 2402.0MHz - 2480.0MHz TX +7.76dBm (Conducted) 0.008W (EIRP)

Laird Technologies, Inc.  
FCC ID: SQGBT850  
IC: Not available  
Antenna : Antegral antenna, Peak Gain: 2dBi .

- 2) WiFi Module 2412.0MHz - 2462.0MHz TX +25.02dBm 0.80W EIRP

iRobot Corporation  
FCC ID: UFE-AXFY1  
IC: Not available  
Antenna: Antegral antenna, Peak Gain: 4dBi

| Equipment Under Test Power Configuration |               |                 |                  |
|------------------------------------------|---------------|-----------------|------------------|
| Rated Voltage                            | Rated Current | Rated Frequency | Number of Phases |
| Internal Battery                         | N/A           | N/A             | N/A              |

**Operating modes of the EUT:**

| No. | Descriptions of EUT Exercising           |
|-----|------------------------------------------|
| 1   | All transmitters transmit simultaneously |
|     |                                          |

**Software used by the EUT:**

| No. | Descriptions of EUT Exercising                                                    |
|-----|-----------------------------------------------------------------------------------|
| 1   | Each radio was pre-programmed to transmit low, mid, high channels using Tera Term |
|     |                                                                                   |

**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

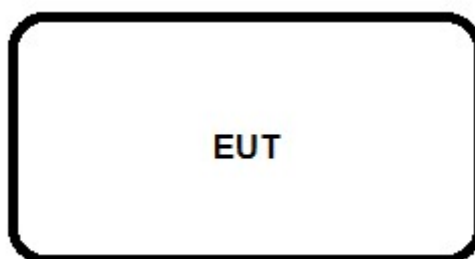
**5 System Setup and Method**

| 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: 01/2022, FCC Part 15 Subpart B: 01/2022, RSS 247 Issue 2: 02/2017, ISSED ICES-003 Issue 7, October 2020, ANSI C 63.10: 2013, ANSI C 63.4: 2014 and KDB 551693 Grant Comments DR02-42299.

**5.2 EUT Block Diagram:**

## 6 Human RF exposure

### 6.1 Results:

The sample tested was found to Comply. The calculated maximum power density at 20 cm distance is less than the limits for general population / uncontrolled exposure.

### 6.2 Human RF Exposure Calculation

The EUT incorporated two radios as indicated below.

#### FCC §1.1310 Radiofrequency radiation exposure limits

Table 1 below sets forth limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic field.

**Table 1 – Limits for Maximum Permissible Exposure (MPE)**

| Frequency range (MHz)                                          | Electric field strength (V/m) | Magnetic field strength (A/m) | Power Density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposure</b>         |                               |                               |                                     |                          |
| 0.3-3.0                                                        | 614                           | 1.63                          | *100                                | 6                        |
| 3.0-30                                                         | 1842/f                        | 4.89/f                        | *900/f <sup>2</sup>                 | 6                        |
| 30-300                                                         | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300-1,500                                                      |                               |                               | f/300                               | 6                        |
| 1,500-100,000                                                  |                               |                               | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3-1.34                                                       | 614                           | 1.63                          | *100                                | 30                       |
| 1.34-30                                                        | 842/f                         | 2.19/f                        | *180/f <sup>2</sup>                 | 30                       |
| 30-300                                                         | 27.5                          | 0.073                         | 0.2                                 | 30                       |
| 300-1,500                                                      |                               |                               | f/1500                              | 30                       |
| 1,500-100,000                                                  |                               |                               | 1.0                                 | 30                       |

F = frequency in MHz

\* = Plane-wave equivalent power density

#### ISED RSS-102 Issue 5

Table 2 below sets forth limits for the RF field strength.

**Table 2 – RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)**

| Frequency range (MHz) | Electric field strength (V/m rms) | Magnetic field strength (A/m rms)        | Power Density (W/m <sup>2</sup> ) | Reference Period (minutes) |
|-----------------------|-----------------------------------|------------------------------------------|-----------------------------------|----------------------------|
| 0.003-10              | 83                                | 90                                       | -                                 | Instantaneous*             |
| 0.1-10                | -                                 | 0.73/ f                                  | -                                 | 6**                        |
| 1.1-10                | 87/ f <sup>0.5</sup>              | -                                        | -                                 | 6**                        |
| 10-20                 | 27.46                             | 0.0728                                   | -2                                | 6                          |
| 20-48                 | 58.07/ f <sup>0.25</sup>          | 0.1540/ f <sup>0.25</sup>                | 8.944/ f <sup>0.5</sup>           | 6                          |
| 48-300                | 22.06                             | 0.05852                                  | 1.291                             | 6                          |
| 300-6000              | 3.142 f <sup>0.3417</sup>         | 0.008335 f <sup>0.3417</sup>             | 0.02619 f <sup>0.6834</sup>       | 6                          |
| 6000-15000            | 61.4                              | 0.163                                    | 10                                | 6                          |
| 15000-150000          | 61.4                              | 0.163                                    | 10                                | 616000/ f <sup>1.2</sup>   |
| 150000-300000         | 0.158 f <sup>0.5</sup>            | 4.21 x 10 <sup>-4</sup> f <sup>0.5</sup> | 6.67 x 10 <sup>-5</sup> f         | 616000/f <sup>1.2</sup>    |

Note: f is frequency in MHz. \*Based on nerve stimulation (NS)

\*\*Based on specific absorption rate (SAR)

### 6.3 Method

An MPE evaluation was performed in order to show that the device was compliant with FCC §2.1091 and ISCED RSS-102. The maximum power density was calculated for each transmitter at a separation distance of 20 cm. The calculation was performed using the maximum gain from the internal and external antennas declared by the manufacturer.

The maximum permissible exposure (MPE) is predicted by using the following equation:

$$S = PG/4\pi R^2$$

where: S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

P = power input to the antenna (in appropriate units, e.g., mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

| Technology         | Frequency (MHz) | Conducted Power (dBm) | Antenna Gain (dBi) | EIRP Power (dBm) | EIRP Power (mW) | PD @ 20cm (mW/cm <sup>2</sup> ) | FCC PD Limits (mW/cm <sup>2</sup> ) | % of FCC Limit |
|--------------------|-----------------|-----------------------|--------------------|------------------|-----------------|---------------------------------|-------------------------------------|----------------|
| 2.4 GHz WiFi Radio | 2442            | 25.02                 | 4.00               | 29.02            | 797.99          | 0.1588                          | 1                                   | 15.88          |
| BLE                | 2441            | 7.76                  | 2.00               | 9.02             | 7.98            | 0.0016                          | 1                                   | 0.16           |
| <b>Total %:</b>    |                 |                       |                    |                  |                 |                                 |                                     | <b>16.03</b>   |

\*Output power data were taken from Intertek test report #104076035BOX-001c

and International Certification Corp. test report #FR791801AD

| Technology         | Frequency (MHz) | Conducted Power (dBm) | Antenna Gain (dBi) | EIRP Power (dBm) | EIRP Power (mW) | PD @ 20cm (W/cm <sup>2</sup> ) | ISED PD Limits (W/cm <sup>2</sup> ) | % of FCC Limit |
|--------------------|-----------------|-----------------------|--------------------|------------------|-----------------|--------------------------------|-------------------------------------|----------------|
| 2.4 GHz WiFi Radio | 2442            | 25.02                 | 4.00               | 29.02            | 797.99          | 1.5876                         | 5.41                                | 29.34          |
| BLE                | 2441            | 7.76                  | 2.00               | 9.02             | 7.98            | 0.0159                         | 5.41                                | 0.29           |
| <b>Total %:</b>    |                 |                       |                    |                  |                 |                                |                                     | <b>29.64</b>   |

\*Output power data were taken from Intertek test report #104076035BOX-001c

and International Certification Corp. test report #FR791801AD

Using the following equation to calculate total power density:

$$\sum_{i=1}^n \frac{S_i}{(MPE)_i} \leq 1$$

Where S<sub>i</sub> – power density for i = 1, 2,..., n

n – number of antennas transmitting simultaneously,

(MPE)<sub>i</sub> – limit of MPE for i = 1, 2,..., n

FCC:  $\Sigma(S_i/MPE_i) = 15.88 + 0.16 = 16.03 \% < 100 \%$

ISED Canada:  $\Sigma(S_i/MPE_i) = 29.34 + 0.29 = 29.64 \% < 100 \%$

Test Personnel: Vathana Ven   
Supervising/Reviewing  
Engineer:  
(Where Applicable) N/A  
Product Standard: FCC Part 15.247, RSS-247  
Input Voltage: RSS-102  
Pretest Verification w/  
Ambient Signals or  
BB Source: Internal Battery Powered  
N/A

Test Date: 02/02/2022Limit Applied: Per Co-location RequirementsAmbient Temperature: N/ARelative Humidity: N/AAtmospheric Pressure: N/A

Deviations, Additions, or Exclusions: None

## 7 Transmitter spurious emissions

### 7.1 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) | Ucisp  |
|-------------------------|-----------------|----------------------------|--------|
| 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 dB $\mu$ V/m
- RA = Receiver Amplitude (including preamplifier) in dB $\mu$ V
- 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 dB $\mu$ V 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 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

RA = 52.0 dB $\mu$ V  
AF = 7.4 dB/m  
CF = 1.6 dB  
AG = 29.0 dB  
FS = 32 dB $\mu$ V/m

To convert from dB $\mu$ V to  $\mu$ V or mV the following was used:

$$UF = 10^{(NF / 20)} \text{ where } UF = \text{Net Reading in } \mu\text{V}$$
$$NF = \text{Net Reading in dB}\mu\text{V}$$

#### Example:

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

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.

**7.2 Test Equipment Used:**

| Asset           | Description                                  | Manufacturer         | Model                | Serial      | Cal Date   | Cal Due    |
|-----------------|----------------------------------------------|----------------------|----------------------|-------------|------------|------------|
| DAV007'         | Weather Station Vantage Vue                  | Davis                | 6250                 | MS191212003 | 03/22/2021 | 03/22/2022 |
| 145108'         | EMI Test Receiver (20Hz – 40GHz)             | Rohde & Schwarz      | ESIB40               | 100209      | 06/22/2021 | 06/22/2022 |
| 145-406'        | 10m Track A In-floor Cable #1                | Huber + Suhner       | sucoflex 160-19220mm | 001         | 07/22/2021 | 07/22/2022 |
| HS002'          | DC-18GHz cable 1.4m long                     | Huber & Suhner       | SucoFlex 106A        | HS002       | 11/25/2020 | 11/25/2021 |
| PRE10'          | 30-1000MHz pre-amp                           | ITS                  | PRE10                | PRE10       | 02/17/2021 | 02/17/2022 |
| IW006'          | DC-18GHz cable 8.4m long                     | Insulated Wire       | 2800-NPS             | IW006       | 11/25/2020 | 11/25/2021 |
| 145145'         | Broadband Hybrid Antenna 30 MHz - 3 GHz      | Sunol Sciences Corp. | JB3                  | A122313     | 06/09/2021 | 06/09/2022 |
| PRE12'          | 500MHz – 18GHz 40dB Gain Preamp              | COM-POWER            | PAM-118A             | 18040117    | 12/07/2020 | 12/07/2021 |
| 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 |
| 145-422'        | 10Amp Pre-amp to under floor                 | Utiflex              | UFB311A-0-2756-70070 | 145-422     | 02/17/2021 | 02/17/2022 |
| REA004'         | 3GHz High Pass Filter                        | Reactel, Inc         | 7HSX-3G/18G-S11      | 06-1        | 02/19/2021 | 02/19/2022 |
| HS003'          | 10m under floor cable                        | Huber-Schuner        | 10m-1                | HS003       | 02/17/2021 | 02/17/2022 |
| REA008'         | band reject filter 2.4GHz                    | Reactel, Inc         | 12RX7-2441.75-x140 S | 17-01       | 07/28/2021 | 07/28/2022 |
| PRE9'           | 100MHz-40GHz Preamp                          | MITEQ                | NSP4000-NFG          | 1260417     | 09/24/2020 | 09/24/2021 |
| CBLHF2012-5M-2' | 5m 9kHz-40GHz Coaxial Cable - SET2           | Huber & Suhner       | SF102                | 252676002   | 02/19/2021 | 02/19/2022 |
| IW001'          | 2 meter cable                                | Insulated Wire       | 2801-NPS             | 001         | 01/08/2020 | 10/08/2021 |
| 145-424'        | 9kHz to 40GHz Cable                          | Huber and Suhner     | Sucoflex             | 145-424     | 02/17/2021 | 02/17/2022 |
| ROS005-1'       | Signal and Spectrum Analyzer                 | Rohde and Shwartz    | FSW43                | 100646      | 10/27/2020 | 10/27/2021 |
| CBLSHF204'      | Cable, SMA - SMA, 9kHz -40GHz, (Cable Kit 5) | Huber + Suhner       | Sucoflex 102EA       | 234714001   | 12/10/2020 | 12/10/2021 |

**Software Utilized:**

| Name               | Manufacturer | Version    |
|--------------------|--------------|------------|
| BAT-EMC            | Nexio        | 3.17.0.3   |
| EMI Boxborough.xls | Intertek     | 08/27/2010 |

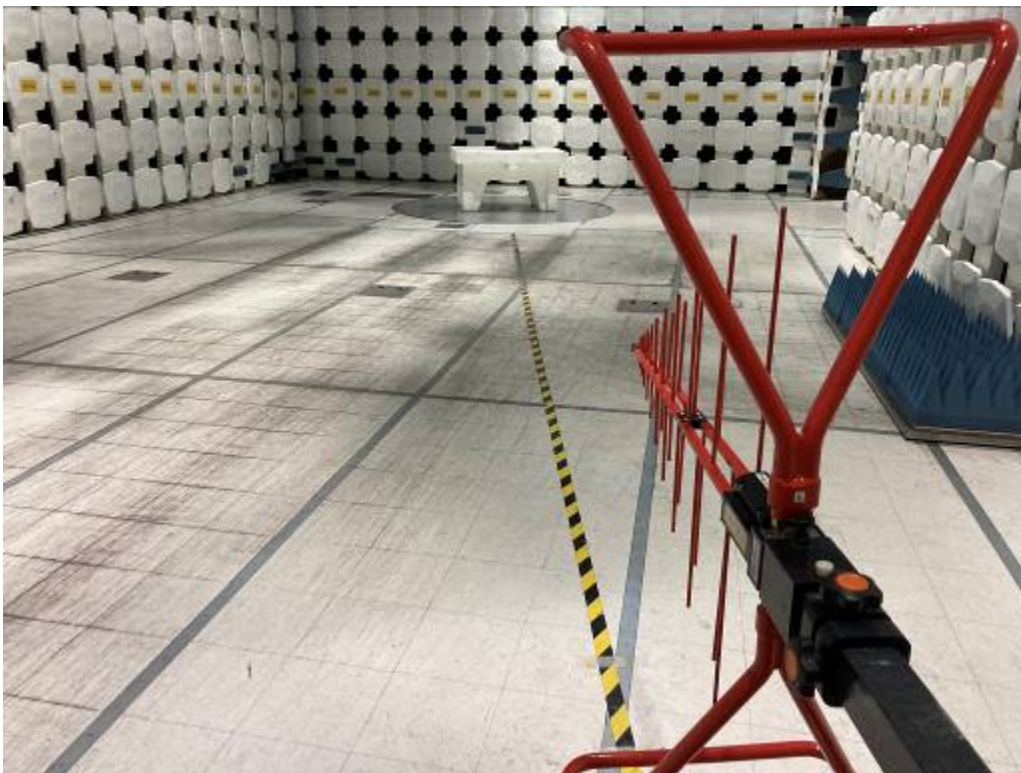
**7.3 Results:**

The sample tested was found to Comply.

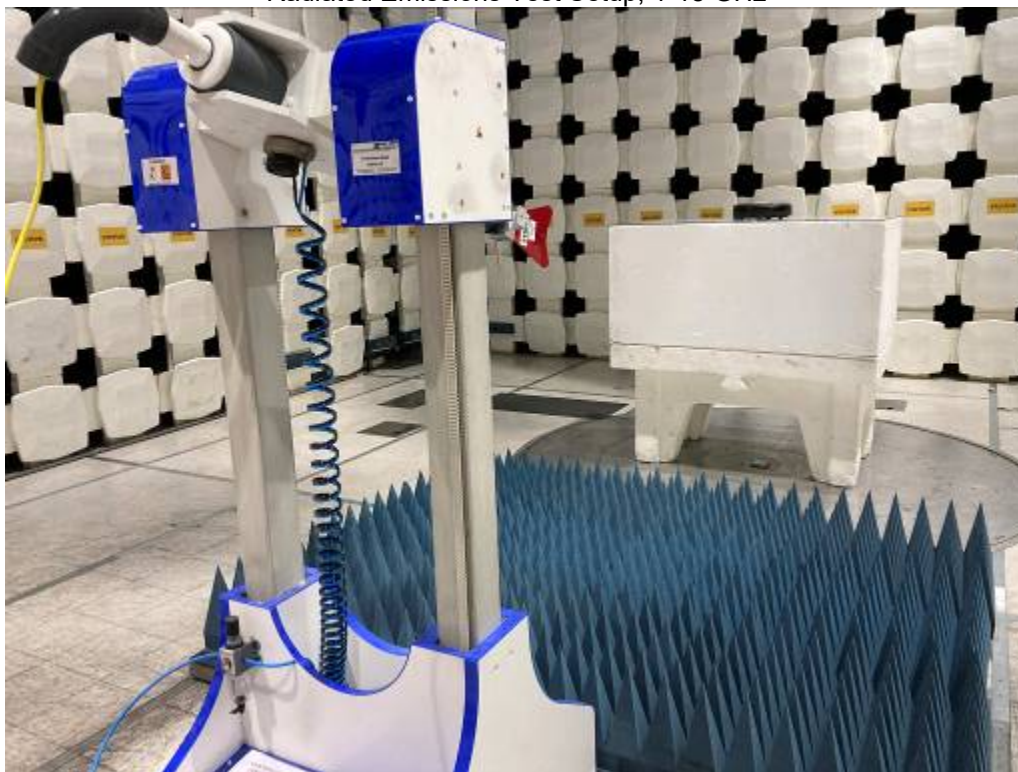
15.247 (d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that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

#### 7.4 Setup Photographs:

Radiated Emissions Test Setup, Below 1000 MHz



Radiated Emissions Test Setup, 1-18 GHz



Radiated Emissions Test Setup, 18-26 GHz



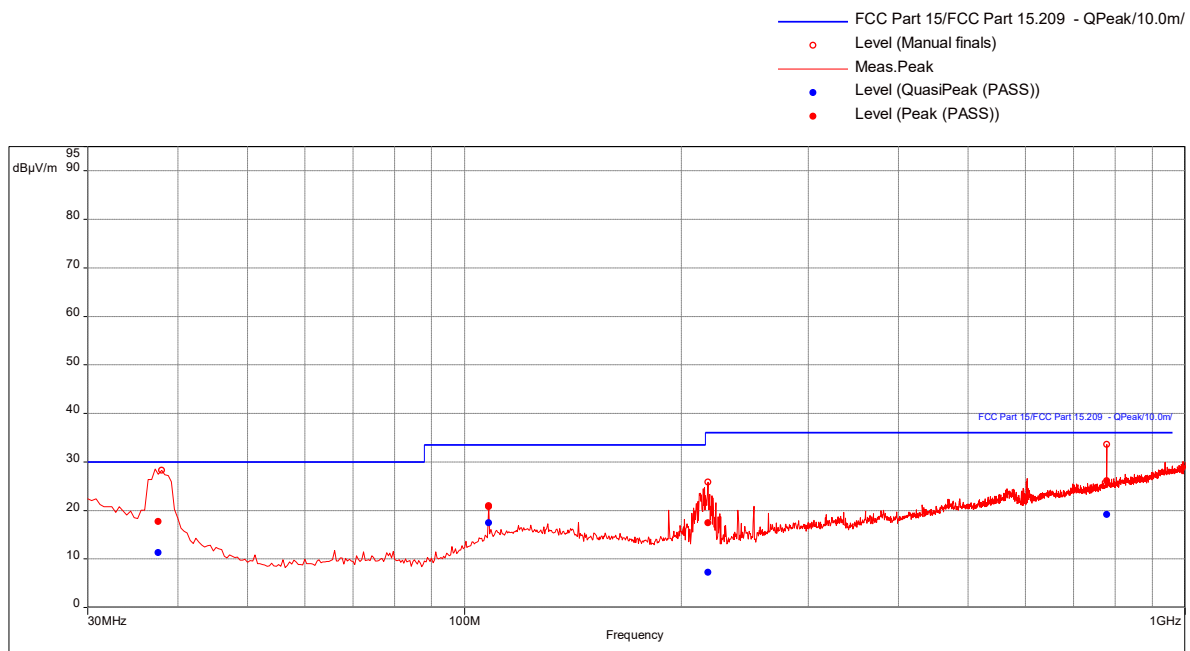
## 7.5 Plots/Data:

All Radios Transmit @ Low Channel, 30-1000 MHz

### Test Information:

|                           |                                                                                              |
|---------------------------|----------------------------------------------------------------------------------------------|
| Date and Time             | 9/14/2021 5:47:41 PM                                                                         |
| Client and Project Number | iRobot G104798049                                                                            |
| Engineer                  | Vathana Ven                                                                                  |
| Temperature               | 24 deg C                                                                                     |
| Humidity                  | 38%                                                                                          |
| Atmospheric Pressure      | 1008 mB                                                                                      |
| Comments                  | RE 30-1000MHz_Battery_802.11n HT40, MCS6, 40MHz BW_Low CH (2412MHz), BLE Tx Low CH (2412MHz) |

### Graph:



### Results:

#### QuasiPeak (PASS) (4)

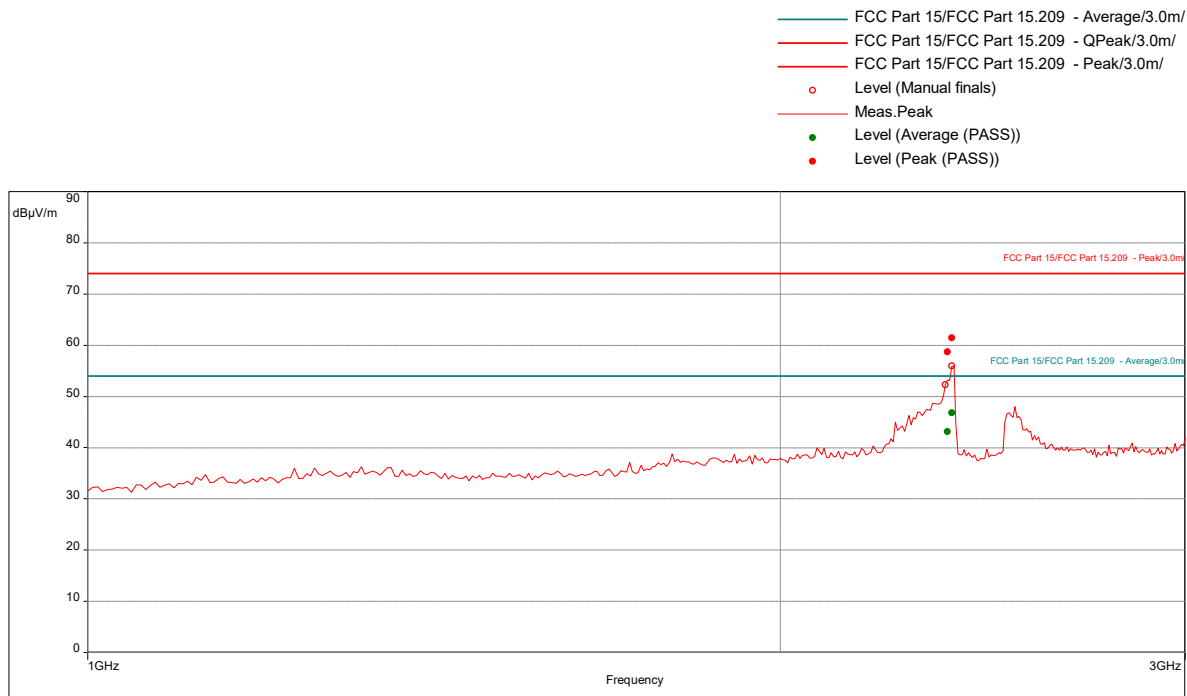
| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol.       | RBW (Hz)  | Correction (dB) |
|-----------------|----------------|----------------|-------------|-------------|------------|------------|-----------|-----------------|
| 37.74736842     | 11.27          | 30.00          | -18.73      | 118.00      | 3.68       | Vertical   | 120000.00 | -17.98          |
| 108             | 17.43          | 33.50          | -16.07      | 69.00       | 2.62       | Horizontal | 120000.00 | -20.17          |
| 217.7894737     | 7.19           | 36.00          | -28.81      | 233.00      | 1.36       | Vertical   | 120000.00 | -21.33          |
| 778.3473684     | 19.18          | 36.00          | -16.82      | 359.00      | 2.75       | Horizontal | 120000.00 | -8.12           |

All Radios Transmit @ Low Channel, 1-3 GHz

**Test Information:**

|                           |                                                                                             |
|---------------------------|---------------------------------------------------------------------------------------------|
| Date and Time             | 9/14/2021 10:44:40 PM                                                                       |
| Client and Project Number | iRobot_G104798049                                                                           |
| Engineer                  | Vathana Ven                                                                                 |
| Temperature               | 24 deg C                                                                                    |
| Humidity                  | 38%                                                                                         |
| Atmospheric Pressure      | 1008 mB                                                                                     |
| Comments                  | RE 1 to 3GHz_Battery_802.11n HT40, MCS6, 40MHz BW_Low CH (2412MHz), BLE Tx Low CH (2412MHz) |

**Graph:**



**Results:**

Peak (PASS) (2)

| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol.     | RBW (Hz)   | Correction (dB) |
|-----------------|----------------|----------------|-------------|-------------|------------|----------|------------|-----------------|
| 2364.210526     | 58.68          | 74.00          | -15.32      | 157.00      | 3.30       | Vertical | 1000000.00 | -3.29           |
| 2376.578947     | 61.46          | 74.00          | -12.54      | 152.00      | 3.74       | Vertical | 1000000.00 | -3.24           |

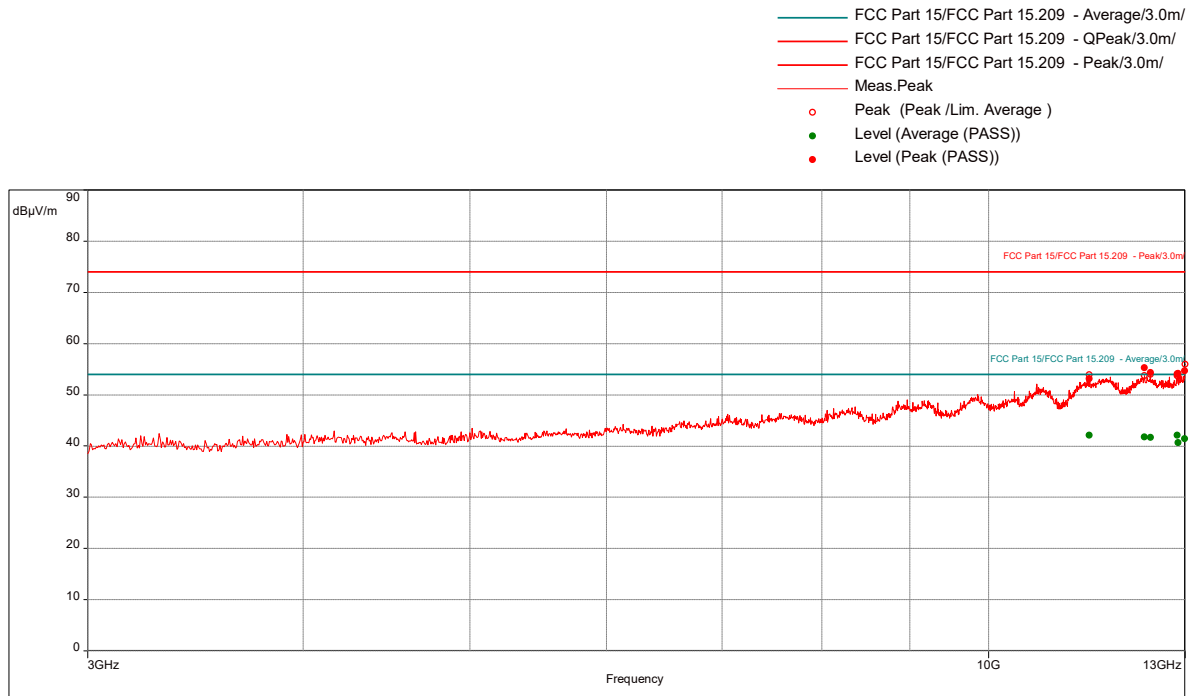
Average (PASS) (2)

| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol.     | RBW (Hz)   | Correction (dB) |
|-----------------|----------------|----------------|-------------|-------------|------------|----------|------------|-----------------|
| 2364.210526     | 43.09          | 54.00          | -10.91      | 157.00      | 3.30       | Vertical | 1000000.00 | -3.29           |
| 2376.578947     | 46.84          | 54.00          | -7.16       | 152.00      | 3.74       | Vertical | 1000000.00 | -3.24           |

## All Radios Transmit @ Low Channel, 3-13 GHz

**Test Information:**

|                           |                                                                                              |
|---------------------------|----------------------------------------------------------------------------------------------|
| Date and Time             | 9/14/2021 10:56:21 PM                                                                        |
| Client and Project Number | iRobot G104798049                                                                            |
| Engineer                  | Vathana Ven                                                                                  |
| Temperature               | 24 deg C                                                                                     |
| Humidity                  | 38%                                                                                          |
| Atmospheric Pressure      | 1008 mB                                                                                      |
| Comments                  | RE 3 to 13GHz_Battery_802.11n HT40, MCS6, 40MHz BW_Low CH (2412MHz), BLE Tx Low CH (2412MHz) |

**Graph:****Results:****Peak (PASS) (6)**

| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol.       | RBW (Hz)   | Correction (dB) |
|-----------------|----------------|----------------|-------------|-------------|------------|------------|------------|-----------------|
| 11433.94737     | 53.09          | 74.00          | -20.91      | 350.00      | 2.30       | Horizontal | 1000000.00 | 12.51           |
| 12313.68421     | 55.28          | 74.00          | -18.72      | 39.00       | 2.45       | Horizontal | 1000000.00 | 13.42           |
| 12412.10526     | 54.33          | 74.00          | -19.67      | 0.00        | 1.35       | Horizontal | 1000000.00 | 13.50           |
| 12864.21053     | 54.09          | 74.00          | -19.91      | 82.00       | 1.15       | Horizontal | 1000000.00 | 14.90           |
| 12879.73684     | 54.15          | 74.00          | -19.85      | 204.00      | 3.89       | Horizontal | 1000000.00 | 14.95           |
| 12995.78947     | 54.65          | 74.00          | -19.35      | 4.00        | 2.85       | Vertical   | 1000000.00 | 15.19           |

**Average (PASS) (6)**

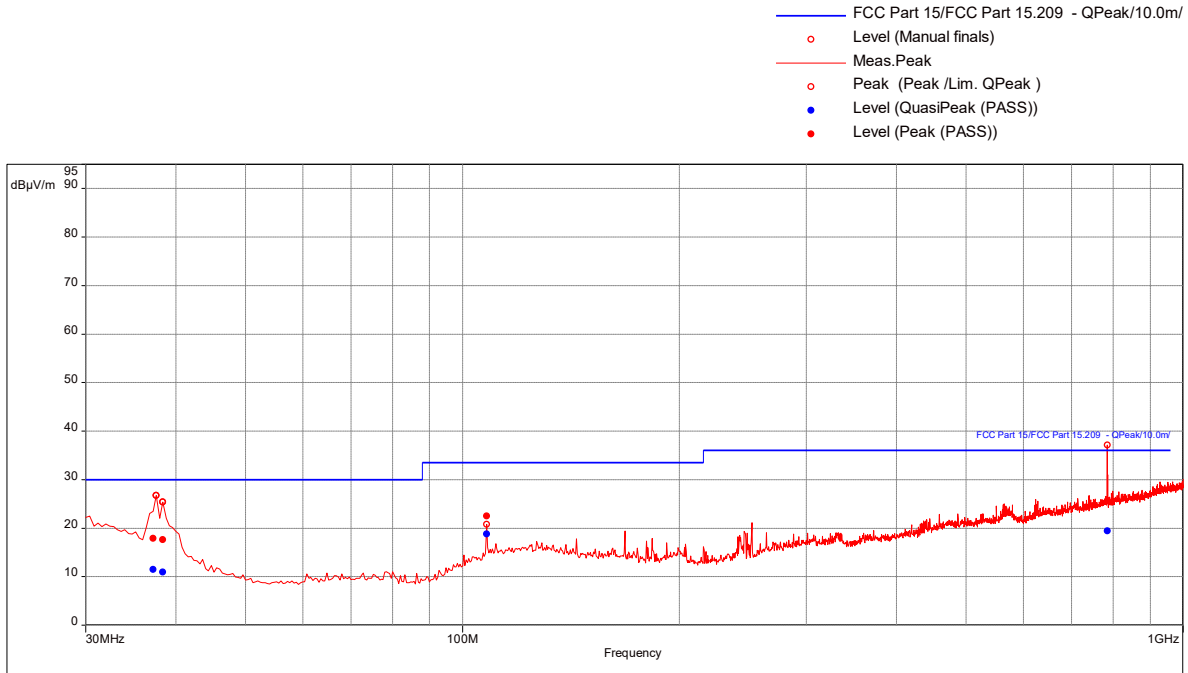
| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol.       | RBW (Hz)   | Correction (dB) |
|-----------------|----------------|----------------|-------------|-------------|------------|------------|------------|-----------------|
| 11433.94737     | 42.09          | 54.00          | -11.91      | 350.00      | 2.30       | Horizontal | 1000000.00 | 12.51           |
| 12313.68421     | 41.71          | 54.00          | -12.29      | 39.00       | 2.45       | Horizontal | 1000000.00 | 13.42           |
| 12412.10526     | 41.63          | 54.00          | -12.37      | 0.00        | 1.35       | Horizontal | 1000000.00 | 13.50           |
| 12864.21053     | 42.13          | 54.00          | -11.87      | 82.00       | 1.15       | Horizontal | 1000000.00 | 14.90           |
| 12879.73684     | 40.68          | 54.00          | -13.32      | 204.00      | 3.89       | Horizontal | 1000000.00 | 14.95           |
| 12995.78947     | 41.43          | 54.00          | -12.57      | 4.00        | 2.85       | Vertical   | 1000000.00 | 15.19           |

**All Radios Transmit @ Mid Channel, 30-1000 MHz**

**Test Information:**

|                           |                                                                                              |
|---------------------------|----------------------------------------------------------------------------------------------|
| Date and Time             | 9/14/2021 6:46:41 PM                                                                         |
| Client and Project Number | iRobot G104798049                                                                            |
| Engineer                  | Vathana Ven                                                                                  |
| Temperature               | 24 deg C                                                                                     |
| Humidity                  | 38%                                                                                          |
| Atmospheric Pressure      | 1008 mB                                                                                      |
| Comments                  | RE 30-1000MHz_Battery_802.11n HT40, MCS6, 40MHz BW_Mid CH (2442MHz), BLE Tx Mid CH (2442MHz) |

**Graph:**



**Results:**

**QuasiPeak (PASS) (4)**

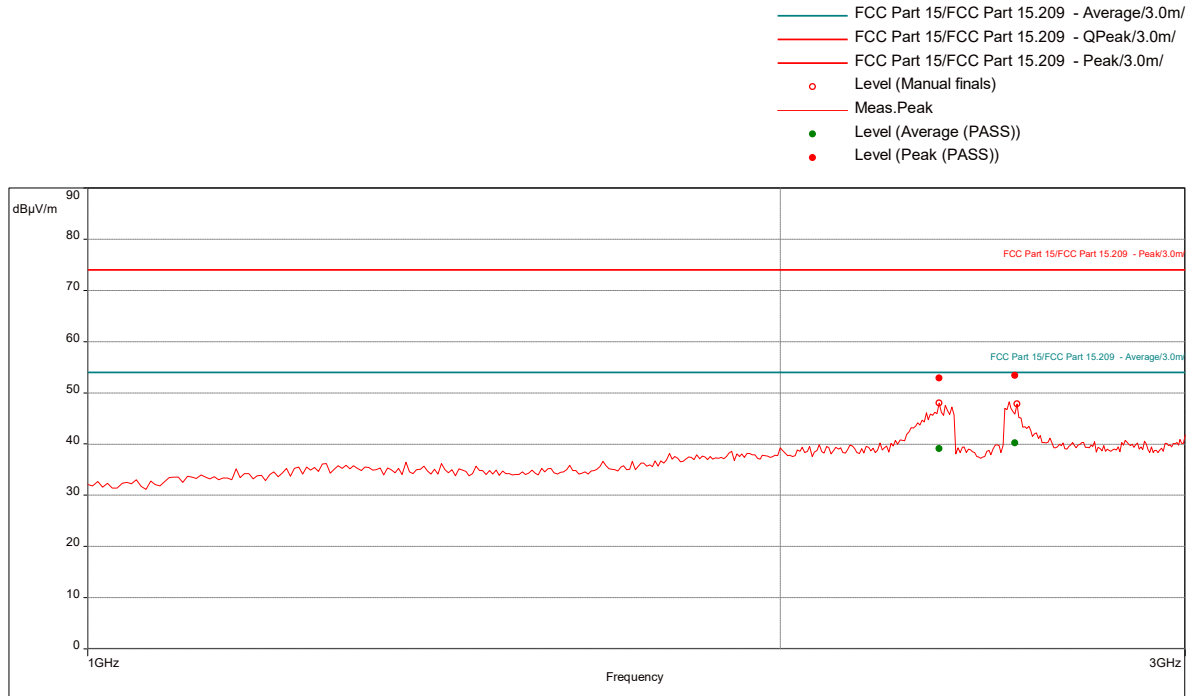
| Frequency (MHz) | Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol.       | RBW (Hz)  | Correction (dB) |
|-----------------|----------------|----------------|-------------|-------------|------------|------------|-----------|-----------------|
| 37.31578947     | 11.48          | 30.00          | -18.52      | 119.00      | 3.41       | Vertical   | 120000.00 | -17.72          |
| 38.30526316     | 10.91          | 30.00          | -19.09      | 52.00       | 1.55       | Vertical   | 120000.00 | -18.34          |
| 108             | 18.84          | 33.50          | -14.66      | 125.00      | 3.31       | Horizontal | 120000.00 | -20.17          |
| 785.2736842     | 19.40          | 36.00          | -16.60      | 355.00      | 1.80       | Horizontal | 120000.00 | -7.90           |

All Radios Transmit @ Mid Channel, 1-3 GHz

**Test Information:**

|                           |                                                                                             |
|---------------------------|---------------------------------------------------------------------------------------------|
| Date and Time             | 9/14/2021 10:15:10 PM                                                                       |
| Client and Project Number | iRobot G104798049                                                                           |
| Engineer                  | Vathana Ven                                                                                 |
| Temperature               | 24 deg C                                                                                    |
| Humidity                  | 38%                                                                                         |
| Atmospheric Pressure      | 1008 mB                                                                                     |
| Comments                  | RE 1 to 3GHz_Battery_802.11n HT40, MCS6, 40MHz BW_Mid CH (2442MHz), BLE Tx Mid CH (2442MHz) |

**Graph:**



**Results:**

Peak (PASS) (2)

| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol.     | RBW (Hz)   | Correction (dB) |
|-----------------|----------------|----------------|-------------|-------------|------------|----------|------------|-----------------|
| 2344.210526     | 52.88          | 74.00          | -21.12      | 147.00      | 3.35       | Vertical | 1000000.00 | -3.39           |
| 2531.052632     | 53.39          | 74.00          | -20.61      | 146.00      | 3.64       | Vertical | 1000000.00 | -3.16           |

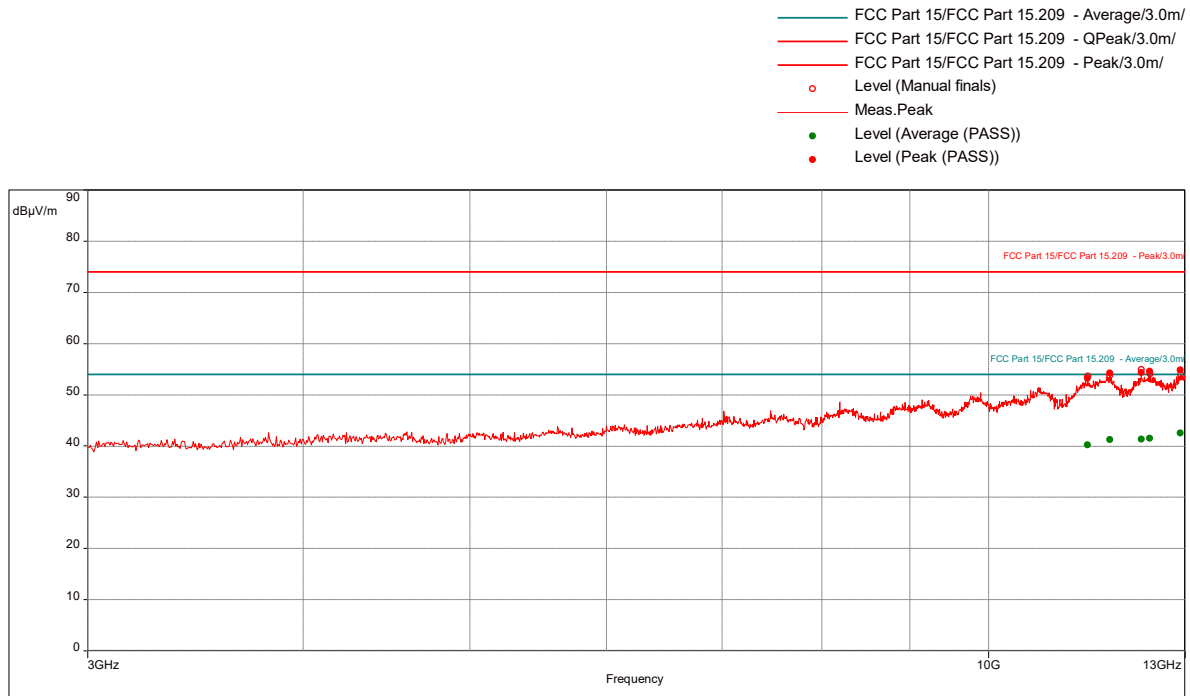
Average (PASS) (2)

| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol.     | RBW (Hz)   | Correction (dB) |
|-----------------|----------------|----------------|-------------|-------------|------------|----------|------------|-----------------|
| 2344.210526     | 39.14          | 54.00          | -14.86      | 147.00      | 3.35       | Vertical | 1000000.00 | -3.39           |
| 2531.052632     | 40.20          | 54.00          | -13.80      | 146.00      | 3.64       | Vertical | 1000000.00 | -3.16           |

## All Radios Transmit @ Mid Channel, 3-13 GHz

**Test Information:**

|                           |                                                                                              |
|---------------------------|----------------------------------------------------------------------------------------------|
| Date and Time             | 9/14/2021 9:47:50 PM                                                                         |
| Client and Project Number | iRobot G104798049                                                                            |
| Engineer                  | Vathana Ven                                                                                  |
| Temperature               | 24 deg C                                                                                     |
| Humidity                  | 38%                                                                                          |
| Atmospheric Pressure      | 1008 mB                                                                                      |
| Comments                  | RE 3 to 13GHz_Battery_802.11n HT40, MCS6, 40MHz BW_Mid CH (2442MHz), BLE Tx Mid CH (2442MHz) |

**Graph:****Results:****Peak (PASS) (5)**

| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol.       | RBW (Hz)   | Correction (dB) |
|-----------------|----------------|----------------|-------------|-------------|------------|------------|------------|-----------------|
| 11412.36842     | 53.23          | 74.00          | -20.77      | 24.00       | 3.84       | Vertical   | 1000000.00 | 12.40           |
| 11752.89474     | 54.23          | 74.00          | -19.77      | 290.00      | 1.00       | Vertical   | 1000000.00 | 13.16           |
| 12258.68421     | 54.35          | 74.00          | -19.65      | 248.00      | 3.69       | Horizontal | 1000000.00 | 13.39           |
| 12401.05263     | 54.57          | 74.00          | -19.43      | 31.00       | 3.89       | Vertical   | 1000000.00 | 13.50           |
| 12922.36842     | 54.88          | 74.00          | -19.12      | 291.00      | 1.00       | Horizontal | 1000000.00 | 15.06           |

**Average (PASS) (5)**

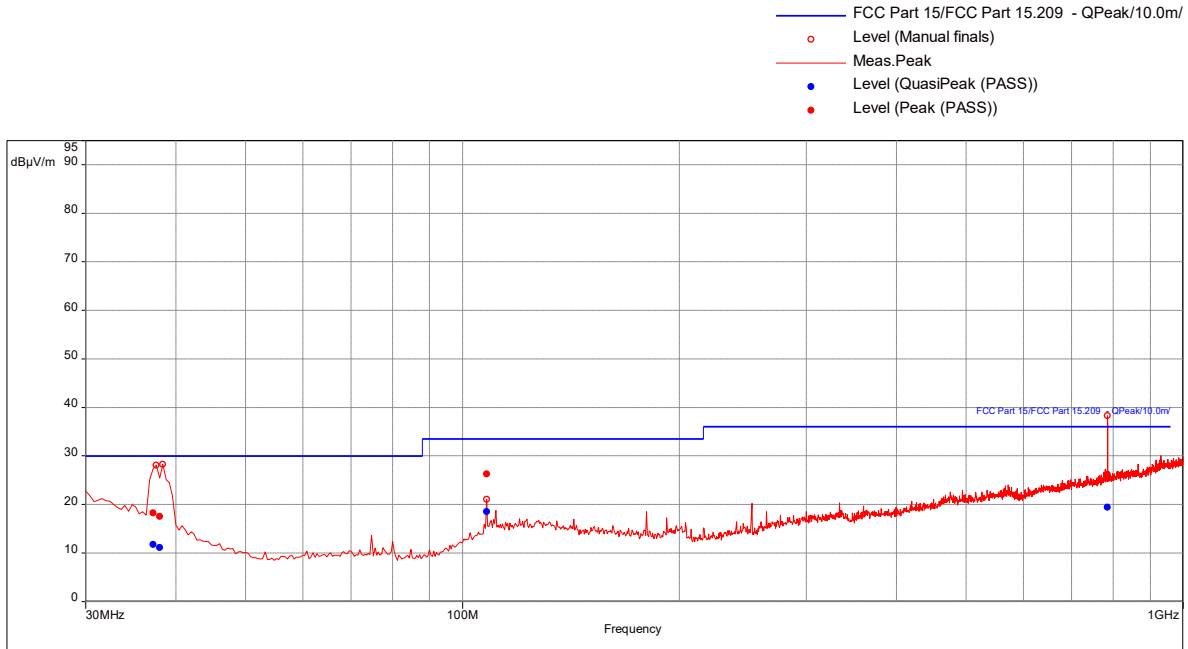
| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol.       | RBW (Hz)   | Correction (dB) |
|-----------------|----------------|----------------|-------------|-------------|------------|------------|------------|-----------------|
| 11412.36842     | 40.19          | 54.00          | -13.81      | 24.00       | 3.84       | Vertical   | 1000000.00 | 12.40           |
| 11752.89474     | 41.23          | 54.00          | -12.77      | 290.00      | 1.00       | Vertical   | 1000000.00 | 13.16           |
| 12258.68421     | 41.35          | 54.00          | -12.65      | 248.00      | 3.69       | Horizontal | 1000000.00 | 13.39           |
| 12401.05263     | 41.46          | 54.00          | -12.54      | 31.00       | 3.89       | Vertical   | 1000000.00 | 13.50           |
| 12922.36842     | 42.54          | 54.00          | -11.46      | 291.00      | 1.00       | Horizontal | 1000000.00 | 15.06           |

All Radios Transmit @ High Channel, 30-1000 MHz

**Test Information:**

|                           |                                                                                                |
|---------------------------|------------------------------------------------------------------------------------------------|
| Date and Time             | 9/14/2021 7:52:27 PM                                                                           |
| Client and Project Number | iRobot_G104798049                                                                              |
| Engineer                  | Vathana Ven                                                                                    |
| Temperature               | 24 deg C                                                                                       |
| Humidity                  | 38%                                                                                            |
| Atmospheric Pressure      | 1008 mB                                                                                        |
| Comments                  | RE 30-1000MHz_Battery_802.11n HT40, MCS6, 40MHz BW_High CH (2462MHz), BLE Tx High CH (2462MHz) |

**Graph:**



**Results:**

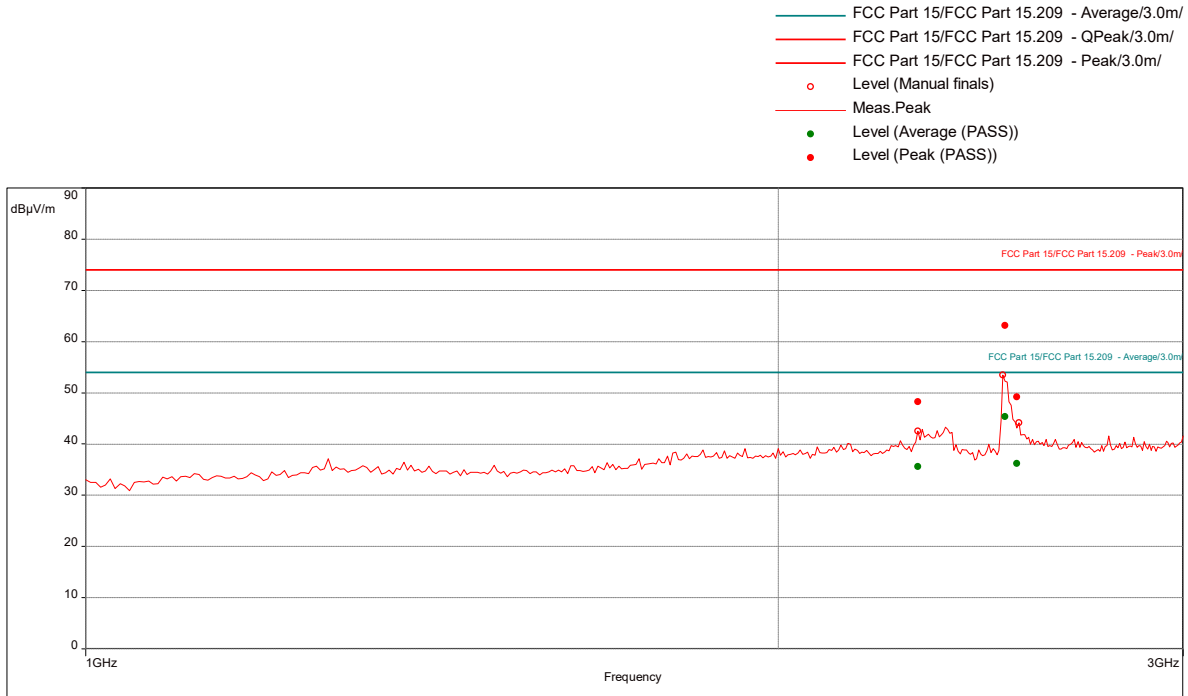
QuasiPeak (PASS) (4)

| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol.       | RBW (Hz)  | Correction (dB) |
|-----------------|----------------|----------------|-------------|-------------|------------|------------|-----------|-----------------|
| 37.06315789     | 11.73          | 30.00          | -18.27      | 111.00      | 2.57       | Vertical   | 120000.00 | -17.57          |
| 37.98947368     | 11.12          | 30.00          | -18.88      | 118.00      | 2.90       | Vertical   | 120000.00 | -18.13          |
| 108             | 18.56          | 33.50          | -14.94      | 96.00       | 2.50       | Horizontal | 120000.00 | -20.17          |
| 785.1894737     | 19.41          | 36.00          | -16.59      | 24.00       | 1.30       | Vertical   | 120000.00 | -7.88           |

## All Radios Transmit @ High Channel, 1-3 GHz

**Test Information:**

|                           |                                                                                               |
|---------------------------|-----------------------------------------------------------------------------------------------|
| Date and Time             | 9/14/2021 8:54:56 PM                                                                          |
| Client and Project Number | iRobot G104798049                                                                             |
| Engineer                  | Vathana Ven                                                                                   |
| Temperature               | 24 deg C                                                                                      |
| Humidity                  | 38%                                                                                           |
| Atmospheric Pressure      | 1008 mB                                                                                       |
| Comments                  | RE 1 to 3GHz_Battery_802.11n HT40, MCS6, 40MHz BW_High CH (2462MHz), BLE Tx High CH (2462MHz) |

**Graph:****Results:****Peak (PASS) (3)**

| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol.     | RBW (Hz)   | Correction (dB) |
|-----------------|----------------|----------------|-------------|-------------|------------|----------|------------|-----------------|
| 2300            | 48.25          | 74.00          | -25.75      | 182.00      | 3.74       | Vertical | 1000000.00 | -3.76           |
| 2507.894737     | 63.12          | 74.00          | -10.88      | 189.00      | 3.59       | Vertical | 1000000.00 | -3.17           |
| 2540.263158     | 49.16          | 74.00          | -24.84      | 191.00      | 3.49       | Vertical | 1000000.00 | -3.15           |

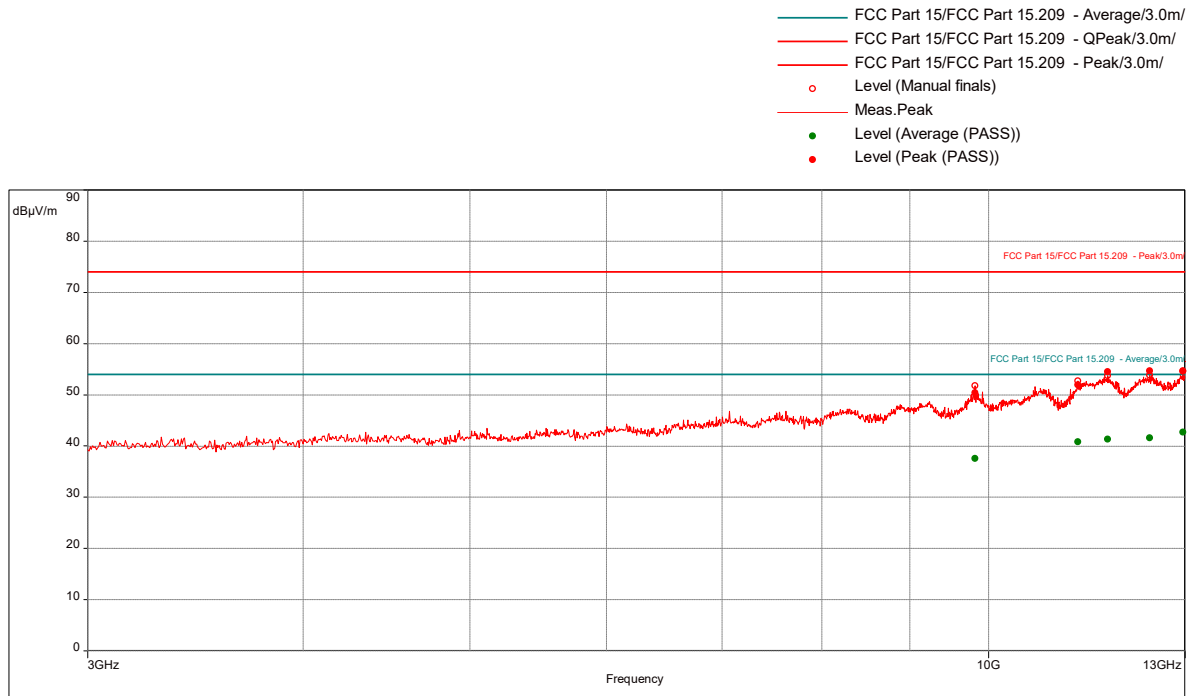
**Average (PASS) (3)**

| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol.     | RBW (Hz)   | Correction (dB) |
|-----------------|----------------|----------------|-------------|-------------|------------|----------|------------|-----------------|
| 2300            | 35.56          | 54.00          | -18.44      | 182.00      | 3.74       | Vertical | 1000000.00 | -3.76           |
| 2507.894737     | 45.38          | 54.00          | -8.62       | 189.00      | 3.59       | Vertical | 1000000.00 | -3.17           |
| 2540.263158     | 36.20          | 54.00          | -17.80      | 191.00      | 3.49       | Vertical | 1000000.00 | -3.15           |

## All Radios Transmit @ High Channel, 3-13 GHz

**Test Information:**

|                           |                                                                                                |
|---------------------------|------------------------------------------------------------------------------------------------|
| Date and Time             | 9/14/2021 9:16:01 PM                                                                           |
| Client and Project Number | iRobot G104798049                                                                              |
| Engineer                  | Vathana Ven                                                                                    |
| Temperature               | 24 deg C                                                                                       |
| Humidity                  | 38%                                                                                            |
| Atmospheric Pressure      | 1008 mB                                                                                        |
| Comments                  | RE 3 to 13GHz_Battery_802.11n HT40, MCS6, 40MHz BW_High CH (2462MHz), BLE Tx High CH (2462MHz) |

**Graph:****Results:**

## Peak (PASS) (5)

| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol.       | RBW (Hz)   | Correction (dB) |
|-----------------|----------------|----------------|-------------|-------------|------------|------------|------------|-----------------|
| 9818.684211     | 50.41          | 74.00          | -23.59      | 262.00      | 3.69       | Horizontal | 1000000.00 | 7.84            |
| 11265           | 51.97          | 74.00          | -22.03      | 133.00      | 3.10       | Horizontal | 1000000.00 | 11.75           |
| 11719.21053     | 54.49          | 74.00          | -19.51      | 198.00      | 3.79       | Vertical   | 1000000.00 | 13.16           |
| 12401.31579     | 54.71          | 74.00          | -19.29      | 104.00      | 3.94       | Vertical   | 1000000.00 | 13.50           |
| 12961.84211     | 54.69          | 74.00          | -19.31      | 211.00      | 3.30       | Vertical   | 1000000.00 | 15.14           |

## Average (PASS) (5)

| Frequency (MHz) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Azimuth (°) | Height (m) | Pol.       | RBW (Hz)   | Correction (dB) |
|-----------------|----------------|----------------|-------------|-------------|------------|------------|------------|-----------------|
| 9818.684211     | 37.53          | 54.00          | -16.47      | 262.00      | 3.69       | Horizontal | 1000000.00 | 7.84            |
| 11265           | 40.80          | 54.00          | -13.20      | 133.00      | 3.10       | Horizontal | 1000000.00 | 11.75           |
| 11719.21053     | 41.29          | 54.00          | -12.71      | 198.00      | 3.79       | Vertical   | 1000000.00 | 13.16           |
| 12401.31579     | 41.57          | 54.00          | -12.43      | 104.00      | 3.94       | Vertical   | 1000000.00 | 13.50           |
| 12961.84211     | 42.68          | 54.00          | -11.32      | 211.00      | 3.30       | Vertical   | 1000000.00 | 15.14           |

**13-25 GHz on Low, Mid, and High Channels Radiated Emissions**

Company: iRobot Corporation  
 Model #:   
 Serial #: RCI3020J210813E102219  
 Engineers: Vathana Ven  
 Project #: G103836530 Date(s): 09/14/21  
 Standard: FCC Part 15.247 & 15.209  
 Receiver: ROS005-1 Limit Distance (m): 3  
 PreAmp: PRE9 Test Distance (m): 3  
 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 |
|----------------------------------------------------------------------------------------------------------------------------|-----------------|---------------|----------------|------------------------|---------------|-------------------|--------------------|--------------|----------------|-----------|-----------|
| Testing was performed manually at 10cm from the EUT. No emissions were detected at low, mid, and high channels on all axis |                 |               |                |                        |               |                   |                    |              |                |           |           |

Test Personnel: Vathana Ven  
 Supervising/Reviewing Engineer: N/A  
 (Where Applicable) CFR47 FCC Part 15.247  
 Product Standard: RSS-247  
 Input Voltage: Internal Battery Powered

Test Date: 09/14/2021

Limit Applied: See report section 7.3

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

Ambient Temperature: 24 °C

Relative Humidity: 38 %

Atmospheric Pressure: 1008 mbars

Deviations, Additions, or Exclusions: None

## 8 Band Edge Compliance

### 8.1 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) | Ucisp  |
|-------------------------|-----------------|----------------------------|--------|
| 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 dB $\mu$ V/m
- RA = Receiver Amplitude (including preamplifier) in dB $\mu$ V
- 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 dB $\mu$ V 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 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

RA = 52.0 dB $\mu$ V  
AF = 7.4 dB/m  
CF = 1.6 dB  
AG = 29.0 dB  
FS = 32 dB $\mu$ V/m

To convert from dB $\mu$ V to  $\mu$ V or mV the following was used:

$UF = 10^{(NF / 20)}$  where UF = Net Reading in  $\mu$ V  
NF = Net Reading in dB $\mu$ V

### Example:

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

## 8.2 Test Equipment Used:

Test equipment used on 09/17/2021

| Asset     | Description                  | Manufacturer      | Model                | Serial      | Cal Date   | Cal Due    |
|-----------|------------------------------|-------------------|----------------------|-------------|------------|------------|
| DAV007    | Weather Station Vantage Vue  | Davis             | 6250                 | MS191212003 | 03/22/2021 | 03/22/2022 |
| HS002     | DC-18GHz cable 1.4m long     | Huber & Suhner    | SucoFlex 106A        | HS002       | 11/25/2020 | 11/25/2021 |
| IW006     | DC-18GHz cable 8.4m long     | Insulated Wire    | 2800-NPS             | IW006       | 11/25/2020 | 11/25/2021 |
| 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 |
| ROS005-1' | Signal and Spectrum Analyzer | Rohde and Shwartz | FSW43                | 100646      | 10/27/2020 | 10/27/2021 |

Test equipment used on 11/05/2021

| Asset   | Description                            | Manufacturer    | Model                | Serial      | Cal Date   | Cal Due    |
|---------|----------------------------------------|-----------------|----------------------|-------------|------------|------------|
| DAV007  | Weather Station Vantage Vue            | Davis           | 6250                 | MS191212003 | 03/22/2021 | 03/22/2022 |
| 145108  | EMI Test Receiver (20Hz – 40GHz)       | Rohde & Schwarz | ESIB40               | 100209      | 06/22/2021 | 06/22/2022 |
| 145-420 | Receiver to floor cable                | Utiflex         | UFB311A-2-0591-70070 | 145-420     | 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 |
| 145-422 | 10Amp Pre-amp to under floor           | Utiflex         | UFB311A-0-2756-70070 | 145-422     | 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 |
| ETS002  | 1-18GHz DRG Horn Antenna               | ETS Lindgren    | 3117                 | 00143260    | 08/24/2021 | 08/24/2022 |

### Software Utilized:

| Name | Manufacturer | Version |
|------|--------------|---------|
| None | --           | --      |

## 8.3 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))

#### 8.4 Setup Photograph:

Test Setup



## 8.5 Plots/Data:

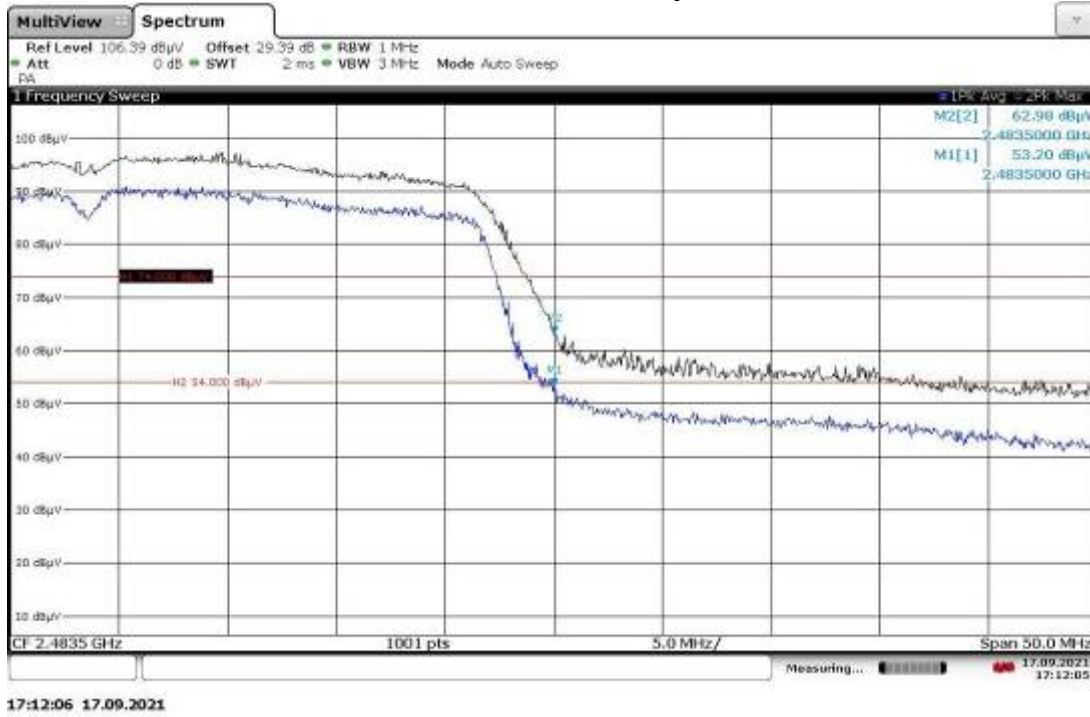
Lower Band Edge With FCC 15.209 limits (74 dBμV/m Peak and 54 dBμV/m Average),  
Worst-case Polarity – Horizontal



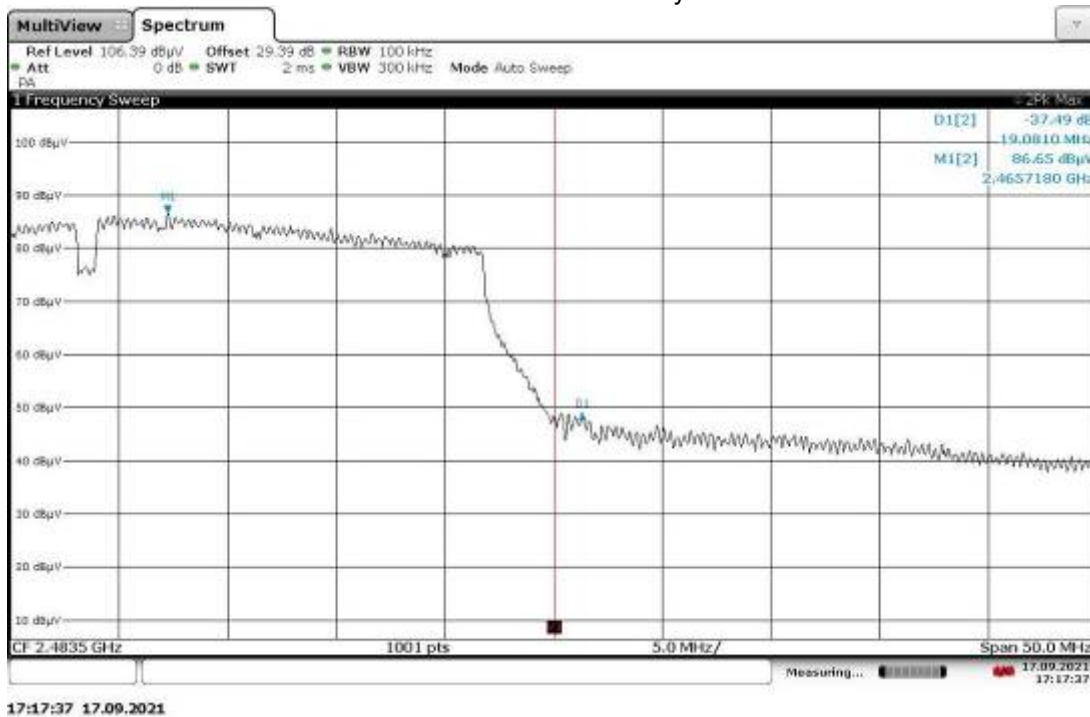
Upper Band Edge With FCC § 15.247 (d), 20 dB down from the peak carrier  
Worst-case Polarity – Horizontal



Upper Band Edge With FCC 15.209 limits (74 dBμV/m Peak and 54 dBμV/m Average),  
Worst-case Polarity – Vertical



Upper Band Edge With FCC § 15.247 (d), 20 dB down from the peak carrier  
Worst-case Polarity – Vertical



**Radiated Emissions**

Company: iRobot Corporation  
 Model #: CREATE 3  
 Serial #: RCI3020J210813E102219  
 Engineers: Vathana Ven  
 Project #: G104798049  
 Standard: FCC Part 15C, 15.247  
 Receiver: R & S ESI (145-108) 06-22-2022  
 PreAmp: NONE  
 PreAmp Used? (Y or N): N  
 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

Antenna & Cables: HF Bands: N, LF, HF, SHF  
 Antenna: 2021-3MH 08\_24\_2022.txt 2021-3MH 08\_24\_2022.txt  
 Cable(s): 145-416 3mTrkB 10-03-2014.txt NONE.  
 Location: 10M Chamber Barometer: DAV007 Filter: NONE  
 Date(s): 09/17/2021, 11/05/2021  
 Temp/Humidity/Pressure: 21, 21 deg C 22, 23% 1008, 986 mB  
 Limit Distance (m): 3  
 Test Distance (m): 3  
 Voltage/Frequency: Battery power Frequency Range: See below

| 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 |
|----------------------------|-----------------|---------------|----------------|------------------------|---------------|-------------------|--------------------|--------------|----------------|-----------|-----------|-----|----|
| Lower Band Edge Compliance |                 |               |                |                        |               |                   |                    |              |                |           |           |     |    |
| PK                         | H               | 2390.000      | 28.04          | 31.80                  | 7.10          | 0.00              | 0.00               | 66.94        | 74.00          | -7.06     | 1/3 MHz   | RB  | RB |
| AVG                        | H               | 2390.000      | 11.90          | 31.80                  | 7.10          | 0.00              | 0.00               | 50.80        | 54.00          | -3.20     | 1/3 MHz   | RB  | RB |
| Upper Band Edge Compliance |                 |               |                |                        |               |                   |                    |              |                |           |           |     |    |
| PK                         | V               | 2483.500      | 23.51          | 32.51                  | 6.99          | 0.00              | 0.00               | 63.01        | 74.00          | -10.99    | 1/3 MHz   | RB  |    |
| AVG                        | V               | 2483.500      | 13.81          | 32.51                  | 6.99          | 0.00              | 0.00               | 53.31        | 54.00          | -0.69     | 1/3 MHz   | RB  |    |

Test Personnel: Kouma Sinn *KPS*  
 Supervising/Reviewing Engineer: Vathana Ven *VSV*  
 (Where Applicable) CFR47 FCC Part 15.247  
 Product Standard: RSS-247  
 Input Voltage: Internal Battery Powered

Test Date: 09/17/2021, 11/05/2021

Limit Applied: See report section 8.3

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

Ambient Temperature: 21, 21 °C

Relative Humidity: 22, 23 %

Atmospheric Pressure: 1008, 986 mbars

Deviations, Additions, or Exclusions: None

**9 Revision History**

| Revision Level | Date       | Report Number    | Prepared By    | Reviewed By    | Notes          |
|----------------|------------|------------------|----------------|----------------|----------------|
| 0              | 02/15/2022 | 104798049BOX-001 | VFV <i>VFV</i> | KPS <i>KPS</i> | Original Issue |
|                |            |                  |                |                |                |
|                |            |                  |                |                |                |
|                |            |                  |                |                |                |
|                |            |                  |                |                |                |
|                |            |                  |                |                |                |