

| Certificate # 1514.1                                                    |                                                                              |
|-------------------------------------------------------------------------|------------------------------------------------------------------------------|
| Test Type:                                                              | Emissions                                                                    |
| Product Type:                                                           | Wireless Earbud                                                              |
| Product Name/Number:                                                    | Model 408R                                                                   |
|                                                                         | A94408R<br>3232A-408R                                                        |
| Prepared For:                                                           | Product Assurance Engineering Department<br>Bose Corporation                 |
| Name of manufacturing<br>agency applying for<br>equipment type approval | Bose Corporation                                                             |
| Postal Address of<br>manufacturing Agency                               | The Mountain<br>Framingham MA 01701<br>USA                                   |
| Test Results:                                                           | Pass                                                                         |
| Applicable Standards:                                                   | FCC 47 CFR PART 15 SUBPART C<br>ISED RSS-247 ISSUE 2<br>ISED RSS-GEN ISSUE 5 |
| Report Number:                                                          | EMC.441408.23.167.6                                                          |
|                                                                         |                                                                              |

General Comments/Special Test Conditions:

This report relates only to the items tested. This report covers EMC marking requirements for *Enter product and any special modifications or test conditions.* 

|                                    | Print Name   | Signature      | Date      |
|------------------------------------|--------------|----------------|-----------|
| Prepared By:                       | Bryan Cerqua | Bryon H Cerque | 8/15/2023 |
| Electrical Engineer Review*<br>By: | Kenneth Lee  | Henry          | 8/16/2023 |

\* Since every test result is separately reviewed after its completion, the electrical engineer review indicated above represents a higher-level review to ensure this report lists and contains all applicable and appropriate requirements.

If the report carries the "accredited" logo, the reviewer must verify all the tests in this report are covered under the current ISO17025 accreditation. The A2LA-accredited logo must be removed if any of the tests in the report are not performed under the current scope of accreditation. It is the responsibility or the reviewer to ensure the A2LA advertising policy is followed.



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# Test Report Summary

### Product Information:

### Description

Truly Wireless In Ear (TWIE) earbud. The bud uses Bluetooth classic (BT) Bluetooth Low Energy (BLE), and Qualcomm High Speed (QHS). The QHS is used for bud-to-bud communications. The role of master/puppet can be changed to best meet radio link conditions during operation. The unit is not supplied with an AC to USB adapter. The antenna is an inverted F with a maximum gain of 0.58 dBi (Left Earbud) and 0.86 dBi (Right Earbud) formed by Laser Direct Sequence on the inside of the top cover of the earbud.

#### **EUT** Condition

Product was as built in the factory. For the conducted measurements the antenna was removed, and coaxial cable was installed in its place. Where necessary USB debug wires were added to allow control of the Radio.

#### Scope:

This report covers EMC requirements. FCC or ISED, FHSS low power transceiver.

#### Test Objective:

Verify product meets all applicable EMC requirements.

#### Results:

Product complies with all applicable EMC requirements. All final results represent worst-case emissions and/or immunity.

#### Conclusions:

The device under test (D.U.T.):

[X] meets all test standards on page 1 of this report.





# Test Results Summary

| TEST NAME                         | TEST RESULT<br>PASS or N/A | COMMENT(S) |
|-----------------------------------|----------------------------|------------|
| On Time and Duty Cycle            | N/A                        |            |
| 99% Occupied Bandwidth            | N/A                        |            |
| 20dB Occupied Bandwidth           | Pass                       |            |
| Hopping Frequency Separation      | Pass                       |            |
| Number of Hopping Channels        | Pass                       |            |
| Average Time of Occupancy         | Pass                       |            |
| Output Power                      | Pass                       |            |
| Conducted Spurious Emissions      | Pass                       |            |
| RF Conducted Emissions – AC Mains | Pass                       |            |
| RF Radiated Emissions 30MHz -1GHz | Pass                       |            |
| Radiated RF Emissions 1-25GHz     | Pass                       |            |
| Radiated Band Edge                | Pass                       |            |

# **Environmental Conditions**

| -  |     |      |
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| Am | hia | nt.  |
| АШ | ne  | III. |
|    |     |      |

| Temperature:   | 22±4°C           |
|----------------|------------------|
| Humidity:      | 30-60%RH         |
| Mains Voltage: | 120VAC, 5VDC USB |

# FCC Test Site Accreditation:

| <u>Firm</u><br><u>Name</u> | Location                                   | Expiration<br>Date | Accreditation                                              | MRA | Designation<br>Number | Contact           | Contact<br>Title   | Address                          | PO<br>Box | <u>Mail</u><br>Stop | <u>City</u> | <u>State</u>  | Zip<br>Code | <u>Country</u>   | <u>Email</u>        | Phone                | <u>Fax</u>         |
|----------------------------|--------------------------------------------|--------------------|------------------------------------------------------------|-----|-----------------------|-------------------|--------------------|----------------------------------|-----------|---------------------|-------------|---------------|-------------|------------------|---------------------|----------------------|--------------------|
| Bose<br>Corporation        | 1 New York<br>Avenue,<br>Framingham,<br>MA |                    | American<br>Association for<br>Laboratory<br>Accreditation | N/A | US1088                | Mr. Cable<br>Best | Quality<br>Manager | Mail Stop<br>450 The<br>Mountain | N/A       | 450                 | Framingham  | Massachusetts | 01701       | United<br>States | Cable_Best@bose.com | 1 508<br>766<br>6137 | 508<br>766<br>1145 |

# Canadian Test Site Registration:

| BOSE CORPORATION              | US0210 | RSS-GEN (2019-02-11) | RECOGNIZED<br>UNTIL: |
|-------------------------------|--------|----------------------|----------------------|
| 1 New York Avenue             |        | RSS-210 (2019-02-11) | 2024-07-31           |
| Framingham, MA                |        | RSS-247 (2019-02-11) |                      |
| 01701                         |        | RSS-248 (2021-11-19) | A2LA                 |
| UNITED STATES                 |        |                      | ISO/IEC              |
|                               |        |                      | 17025:2017           |
| Company Number: 3232A         |        |                      | Expires:             |
|                               |        |                      | 2024-07-31           |
| Contact:                      |        |                      |                      |
| Mario Espinal                 |        |                      |                      |
| <u>mario_espinal@bose.com</u> |        |                      |                      |
|                               |        |                      |                      |



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# **RF Conducted Measurements**

# On Time and Duty Cycle

| Project number (Integrity):  | 408R            | Build Phase:                                                                            | C1.5         |             |      |                       |  |
|------------------------------|-----------------|-----------------------------------------------------------------------------------------|--------------|-------------|------|-----------------------|--|
| Tested by:                   | Mike Royer      |                                                                                         | Date:        | May 12, 202 | 23   |                       |  |
|                              |                 |                                                                                         |              |             | -    |                       |  |
| Requirements<br>Standard(s): |                 |                                                                                         | Referenced S | tandard(s): | ANS  | GI C62.10:2013-11.6-b |  |
| EUT powered with:            | 5V USB          | Temp / Humidity:                                                                        | n/a          | Test locat  | ion: | Braun Room            |  |
|                              |                 |                                                                                         |              |             |      |                       |  |
| Test equipment used TN's:    | 2409            | 2409                                                                                    |              |             |      |                       |  |
| EUT Serial number(s):        | 084808M3051E0   | 084808M3051E012A1                                                                       |              |             |      |                       |  |
| EUT Software installed:      | 1.4.10+g2edc594 |                                                                                         |              |             |      |                       |  |
| EUT Modification(s):         | Product was tes | Product was tested as built except the antenna was disconnected and a coaxial cable was |              |             |      |                       |  |
|                              | installed.      |                                                                                         |              |             |      |                       |  |

## Conclusion:

This test is for information only.

## Limits:

None; for reporting purposes only.

### Procedure:

ANSI C63.10, Section 11.6: Zero-Span Spectrum Analyzer Method.

### **Equipment Used:**

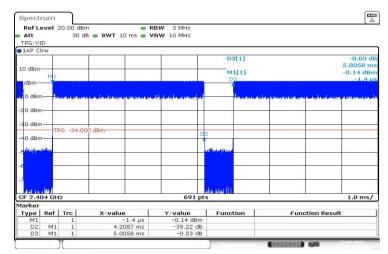
| TN   | Description                        | Model | S/N    | Manufacturer       | Most Recent<br>Calibration | Calibration<br>Due Date |
|------|------------------------------------|-------|--------|--------------------|----------------------------|-------------------------|
| 2409 | Signal and<br>Spectrum<br>Analyzer | FSV40 | 101413 | Rohde &<br>Schwarz | 22-Mar-2023                | 21-Mar-2024             |



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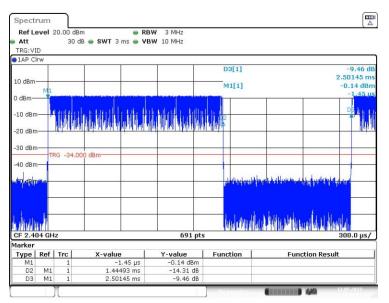
Duty cycles shown in the table below represent maximum duty cycle in test mode using maximum packet length.

| Mode   | ON Time<br>(msec) | Period<br>(msec) | Duty Cycle x<br>(linear) | Duty<br>Cycle<br>(%) | Duty Cycle<br>Correction Factor<br>(dB) |
|--------|-------------------|------------------|--------------------------|----------------------|-----------------------------------------|
| QHS-P2 | 4.209             | 5.006            | 0.841                    | 84                   | 237.6                                   |
| QHS-P6 | 1.445             | 2.501            | 0.577                    | 58                   | 692.0                                   |









Date: 12.MAY.2023 17:30:01

QHS-P6

Bose Corporation, 1 New York Ave, Framingham, MA 01701, USA Tel: (508) 766-6000 Fax: (508) 766-1145 Without written permission of laboratory, this report shall not be reproduced except in full. Report Number: EMC.441408.23.167.6 Form FL300959 Rev 06 BOSE CONFIDENTIAL



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# 99% Occupied Bandwidth

| Project number (Integrity):  | 408R            | Build Phase:            | C1.5             |               |       |                      |
|------------------------------|-----------------|-------------------------|------------------|---------------|-------|----------------------|
| Tested by:                   | Mike Royer      |                         | Date:            | May 15, 202   | 23    |                      |
|                              |                 |                         |                  |               | •     |                      |
| Requirements<br>Standard(s): |                 |                         | Referenced S     | tandard(s):   | ANS   | GI C63.10:2013-6.9.3 |
| EUT powered with:            | 5V USB          | Temp / Humidity:        | n/a              | Test locat    | ion:  | Braun Room           |
|                              |                 |                         |                  |               |       |                      |
| Test equipment used TN's:    | 2409            |                         |                  |               |       |                      |
| EUT Serial number(s):        | 084808M3051E0   | 12A1                    |                  |               |       |                      |
| EUT Software installed:      | 1.4.10+g2edc594 |                         |                  |               |       |                      |
| EUT Modification(s):         | Product was tes | ted as built except the | e antenna was di | isconnected a | and a | coaxial cable was    |
|                              | installed.      | -                       |                  |               |       |                      |

### Conclusion:

This test is for information only.

### Limits:

None; for reporting purposes only.

### Procedure:

The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq$  1-5% of the 99% Occupied Bandwidth. The VBW is set to  $\geq$  RBW.



### QHS-P2 Data Collection:

| Channel | Frequency<br>(MHz) | 99% Bandwidth<br>(MHz) |
|---------|--------------------|------------------------|
| Low     | 2404               | 2.384                  |
| Middle  | 2440               | 2.381                  |
| High    | 2478               | 2.358                  |



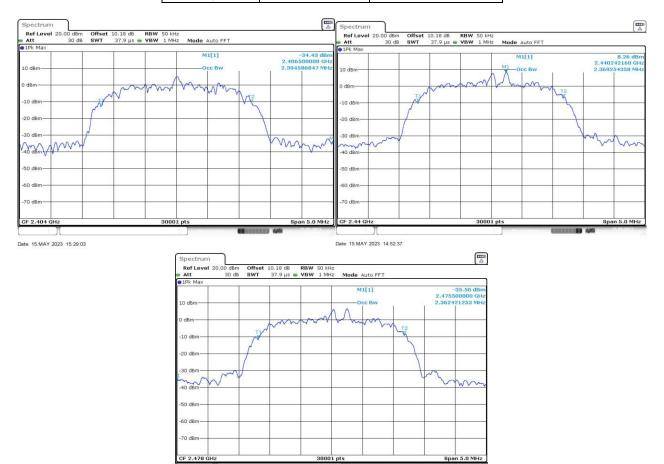


Date: 15.MAY.2023 15:18:56



### QHS-P6 Data Collection:

| Channel | Frequency<br>(MHz) | 99% Bandwidth<br>(MHz) |
|---------|--------------------|------------------------|
| Low     | 2404               | 2.394                  |
| Middle  | 2440               | 2.369                  |
| High    | 2478               | 2.362                  |



Equipment Used:

| TN   | Description                     | Model | S/N    | Manufacturer       | Most Recent<br>Calibration | Calibration Due<br>Date |
|------|---------------------------------|-------|--------|--------------------|----------------------------|-------------------------|
| 2409 | Signal and Spectrum<br>Analyzer | FSV40 | 101413 | Rohde &<br>Schwarz | 22-Mar-2023                | 21-Mar-2024             |

Date: 15.MAY.2023 15:30:57



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# 20dB Occupied Bandwidth

| Project number (Integrity): | 408R            | Build Phase:                                                                            | C1.5                    |             |                         |  |
|-----------------------------|-----------------|-----------------------------------------------------------------------------------------|-------------------------|-------------|-------------------------|--|
| Tested by:                  | Mike Royer      |                                                                                         | Date:                   | May 12, 202 | 23                      |  |
|                             |                 |                                                                                         | -                       |             |                         |  |
| Requirements                | FCC §15.247 (2  |                                                                                         | Referenced S            | tandard(s). | ANSI 63.10:2013 - 6.9.2 |  |
| Standard(s):                | RSS-247 5.2 (a) |                                                                                         | Referenced Standard(s): |             | ANSI 05.10.2015 - 0.9.2 |  |
| EUT powered with:           | 5V USB          | Temp / Humidity:                                                                        | n/a                     | Test locat  | ion: Braun Room         |  |
|                             |                 |                                                                                         |                         |             |                         |  |
| Test equipment used TN's:   | 2409            |                                                                                         |                         |             |                         |  |
| EUT Serial number(s):       | 084808M3051E0   | 084808M3051E012A1                                                                       |                         |             |                         |  |
| EUT Software installed:     | 1.4.10+g2edc594 |                                                                                         |                         |             |                         |  |
| EUT Modification(s):        | Product was tes | Product was tested as built except the antenna was disconnected and a coaxial cable was |                         |             |                         |  |
|                             | installed.      |                                                                                         |                         |             |                         |  |

## Conclusion:

This test is for information only.

### Limits:

None; for reporting purposes only.

### Procedure:

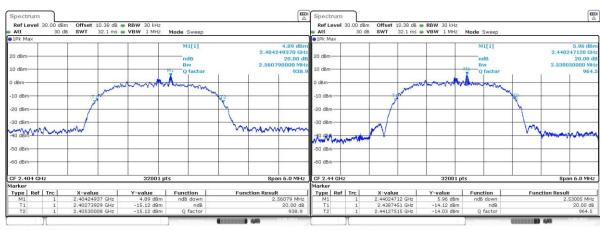
The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq$  1-5% of the 20dB bandwidth. The VBW is set to  $\geq$  RBW.



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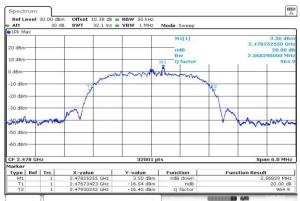
### QHS-P2 Data Collection:

| Setting | BW MHz |
|---------|--------|
| Low     | 2.561  |
| Mid     | 2.530  |
| High    | 2.586  |



Date: 12.MAY.2023 16:23:55

Date: 12.MAY.2023 16:26:50

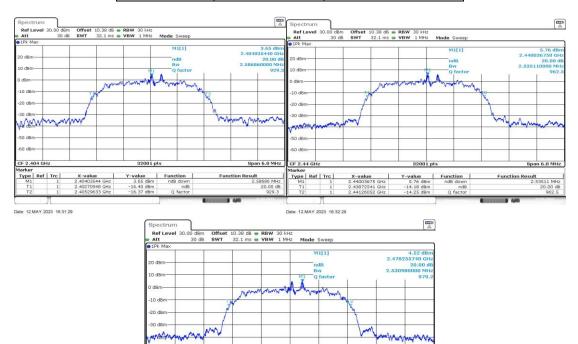


Date: 12.MAY.2023 16:29:25



### QHS-P6 Data Collection:

| Channel | Frequency<br>(MHz) | 20dB Bandwidth<br>(MHz) |
|---------|--------------------|-------------------------|
| Low     | 2402               | 2.587                   |
| Middle  | 2441               | 2.535                   |
| High    | 2480               | 2.531                   |



Date: 12.MAY.2023 16:34:09

X-value .47825574 GH

CF 2.478

Type Ref Trc

## Equipment Used:

| TN   | Description                     | Model | S/N    | Manufacturer       | Most Recent<br>Calibration | Calibration Due<br>Date |
|------|---------------------------------|-------|--------|--------------------|----------------------------|-------------------------|
| 2409 | Signal and Spectrum<br>Analyzer | FSV40 | 101413 | Rohde &<br>Schwarz | 22-Mar-2023                | 21-Mar-2024             |

 Y-value
 Function

 4.52 dBm
 ndB down

 -15.50 dBm
 ndB

 -15.49 dBm
 Q factor

Function Result 2.53098



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# Hopping Frequency Separation

| Project number (Integrity): | 408R            | Build Phase:                                                                           | C1.5                         |              |                        |  |  |  |
|-----------------------------|-----------------|----------------------------------------------------------------------------------------|------------------------------|--------------|------------------------|--|--|--|
| Tested by:                  | Mike Royer      |                                                                                        | Date:                        | May 15, 2023 |                        |  |  |  |
|                             |                 | ()                                                                                     |                              |              |                        |  |  |  |
| Requirements                | FCC 15.247 (a)  |                                                                                        | Referenced Standard(s): ANSI |              | ANSI C63.10-2013 7.8.2 |  |  |  |
| Standard(s):                | RSS-247 5.1 (b) |                                                                                        |                              |              | ANOI 003.10-2013 7:0.2 |  |  |  |
| EUT powered with:           | 5V USB          | Temp / Humidity:                                                                       | n/a                          | Test locat   | tion: Braun room       |  |  |  |
|                             |                 |                                                                                        |                              |              |                        |  |  |  |
| Test equipment used TN's:   | 2409            |                                                                                        |                              |              |                        |  |  |  |
| EUT Serial number(s):       | 084808M3051E0   | 12A1                                                                                   |                              |              |                        |  |  |  |
| EUT Software installed:     | 1.4.10+g2edc594 | 1.4.10+g2edc594                                                                        |                              |              |                        |  |  |  |
| EUT Modification(s):        | Product was tes | roduct was tested as built except the antenna was disconnected and a coaxial cable was |                              |              |                        |  |  |  |
|                             | installed.      |                                                                                        |                              |              |                        |  |  |  |

### Conclusion:

Hopping frequencies are separated by 2 MHz which is more than the required minimum of 25kHz and more than 2/3 of the 20dB bandwidth of the hopping channel which would be 1.8 MHz.

# Limits:

FCC §15.247 (a) (1)

### RSS-247 (5.1) (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hoping channel, whichever is greater.

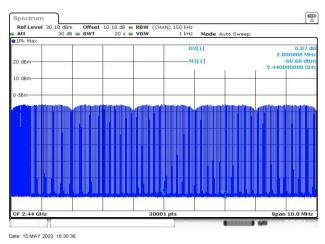
Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

## **Equipment Used:**

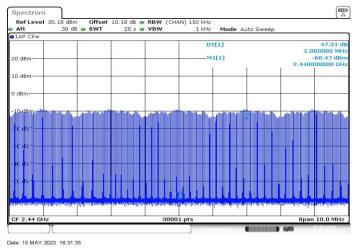
| TN   | Description                     | Model | S/N    | Manufacturer       | Most Recent<br>Calibration | Calibration Due<br>Date |
|------|---------------------------------|-------|--------|--------------------|----------------------------|-------------------------|
| 2409 | Signal and Spectrum<br>Analyzer | FSV40 | 101413 | Rohde &<br>Schwarz | 22-Mar-2023                | 21-Mar-2024             |







QHS-P2 hopping



QHS-P6 hopping

Note: slight dips in the profile are visible every 2 divisions.



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|----|----|----|---|---|
|    |    |    |   | _ |

# Number of Hopping Channels

| Project number (Integrity): | 408R            | Build Phase:                                                                            | C1.5                             |  |                        |  |  |  |
|-----------------------------|-----------------|-----------------------------------------------------------------------------------------|----------------------------------|--|------------------------|--|--|--|
| Tested by:                  | Mike Royer      |                                                                                         | Date: May 15, 2023               |  |                        |  |  |  |
|                             |                 |                                                                                         |                                  |  |                        |  |  |  |
| Requirements                | FCC 15.247 (a)  | (1) (iii)                                                                               | Referenced Standard(s): ANSI C63 |  | ANSI C63.10-2013 7.8.3 |  |  |  |
| Standard(s):                | RSS-247 5.1 (d) |                                                                                         |                                  |  | ANSI C03.10-2013 7.8.3 |  |  |  |
| EUT powered with:           | 5V USB          | Temp / Humidity:                                                                        | n/a Test location: Braun Room    |  |                        |  |  |  |
|                             |                 |                                                                                         |                                  |  |                        |  |  |  |
| Test equipment used TN's:   | 2409            |                                                                                         |                                  |  |                        |  |  |  |
| EUT Serial number(s):       | 084808M3051E0   | 12A1                                                                                    |                                  |  |                        |  |  |  |
| EUT Software installed:     | 1.4.10+g2edc594 | 1.4.10+g2edc594                                                                         |                                  |  |                        |  |  |  |
| EUT Modification(s):        | Product was tes | Product was tested as built except the antenna was disconnected and a coaxial cable was |                                  |  |                        |  |  |  |
|                             | installed.      | •                                                                                       |                                  |  |                        |  |  |  |

### Conclusion:

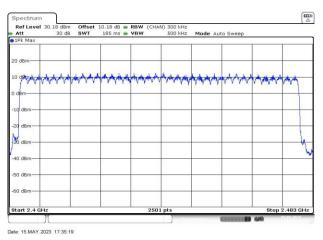
Bose Model 408R uses 38 hopping channels in normal operation and always uses at least 20, both of which are more than the required 15.

### Limits:

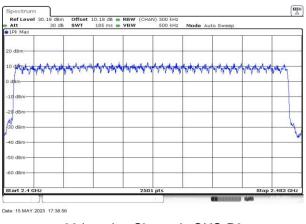
FCC 15.247 (a) (1) (iii), RSS-247 5.1 (d) Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.







38 hopping Channels QHS-P2



38 hopping Channels QHS-P6

### **Equipment Used:**

| TN   | Description                     | Model | S/N    | Manufacturer       | Most Recent<br>Calibration | Calibration Due<br>Date |
|------|---------------------------------|-------|--------|--------------------|----------------------------|-------------------------|
| 2409 | Signal and Spectrum<br>Analyzer | FSV40 | 101413 | Rohde &<br>Schwarz | 22-Mar-2023                | 21-Mar-2024             |



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# Average Time of Occupancy

| Project number (Integrity): | 408R                          | Build Phase:                                                                            | C1.5                                |  |                      |                      |  |
|-----------------------------|-------------------------------|-----------------------------------------------------------------------------------------|-------------------------------------|--|----------------------|----------------------|--|
| Tested by:                  | Mike Royer Date: May 22, 2023 |                                                                                         |                                     |  |                      |                      |  |
|                             |                               |                                                                                         | -                                   |  | -                    |                      |  |
| Requirements                | FCC 15.247 (a)                |                                                                                         | Referenced Standard(s): ANSI        |  | SI C63.10-2013 7.8.4 |                      |  |
| Standard(s):                | RSS-247 5.1 (d)               |                                                                                         |                                     |  |                      | 01 003.10-2013 1.0.4 |  |
| EUT powered with:           | 5V USB                        | Temp / Humidity:                                                                        | dity: n/a Test location: Braun Room |  |                      | Braun Room           |  |
|                             |                               |                                                                                         |                                     |  |                      |                      |  |
| Test equipment used TN's:   | 2409                          |                                                                                         |                                     |  |                      |                      |  |
| EUT Serial number(s):       | 084808M3051E0                 | 12A1                                                                                    |                                     |  |                      |                      |  |
| EUT Software installed:     | 1.4.10+g2edc594               | 1.4.10+g2edc594                                                                         |                                     |  |                      |                      |  |
| EUT Modification(s):        | Product was tes               | Product was tested as built except the antenna was disconnected and a coaxial cable was |                                     |  |                      |                      |  |
|                             | installed.                    | -                                                                                       |                                     |  |                      |                      |  |

### Conclusion:

The highest time of occupancy in any mode is 276 mS which meets the 400mS limit by 124mS.

## Limit:

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

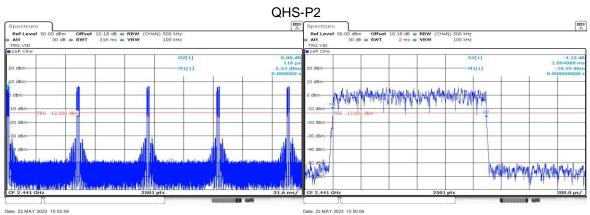
When hopping with Bluetest3 as in this test, there are 40 hopping channels \* 400 mS = 16 seconds. Set the observation time to 0.316 seconds and count the pulses. Then multiply by 16/0.316=50.6 to get the number of pulses in 16 seconds.

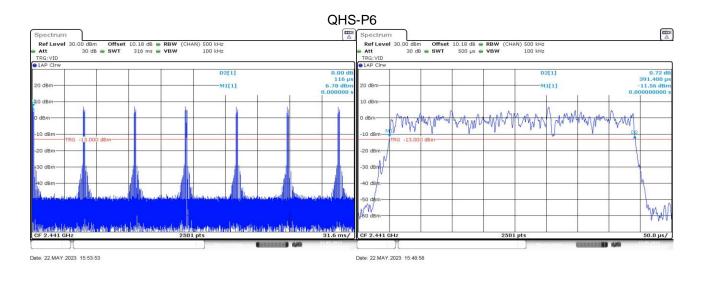


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# Data Collection:

| Channel | Frequency<br>(MHz) | Mode   | Pulse<br>Width<br>(mS) | Number<br>of<br>pulses in<br>0.316 S | Number of<br>pulses in<br>16S<br>(X 50.6) | Time of occupancy<br>(Pulse Width X<br>Number of pulses)<br>(mS) | Limit<br>(mS) | Margin<br>(mS) | Result |
|---------|--------------------|--------|------------------------|--------------------------------------|-------------------------------------------|------------------------------------------------------------------|---------------|----------------|--------|
| Middle  | 2440               | QHS-P2 | 1.094                  | 5                                    | 253                                       | 276                                                              | 400           | 124            | Pass   |
| Middle  | 2440               | QHS-P6 | 0.391                  | 7                                    | 354                                       | 138                                                              | 400           | 262            | Pass   |





# **Equipment Used:**

| TN   | Description       | Model | S/N    | Manufacturer    | Most Recent Calibration | Calibration Due Date |
|------|-------------------|-------|--------|-----------------|-------------------------|----------------------|
| 2409 | Spectrum Analyzer | FSV40 | 101413 | Rohde & Schwarz | 22-Mar-2023             | 21-Mar-2024          |



|--|

# Output Power

| Project number (Integrity): | 408R                   | Build Phase:          | C1.5                 |                  |                   |  |
|-----------------------------|------------------------|-----------------------|----------------------|------------------|-------------------|--|
| Tested by:                  | Mike Royer             |                       | Date:                | May 17, 2023     |                   |  |
|                             |                        |                       |                      |                  |                   |  |
| Requirements                | FCC 15.247             | (b) (3)               | Reference            | d ANSI 63.10:20  | 13 11 0 1 1       |  |
| Standard(s):                | RSS-247 5.4            | (b)                   | Standard(s)          | : ANSI 03.10.20  | 15 - 11.9.1.1     |  |
| EUT powered with:           | 5V USB                 | Temp /<br>Humidity:   | n/a                  | Test location:   | Braun Room        |  |
|                             |                        |                       |                      |                  |                   |  |
| Test equipment used TN's:   | 2409                   |                       |                      |                  |                   |  |
| EUT Serial number(s):       | 084808M3051            | 084808M3051E012A1     |                      |                  |                   |  |
| EUT Software installed:     | 1.4.10+g2edc594        |                       |                      |                  |                   |  |
| EUT Modification(s):        | Product was installed. | tested as built excep | t the antenna was di | sconnected and a | coaxial cable was |  |

## Conclusion:

The unit passes output power by 8.41 dB.

# Limits:

FCC §15.247 (b) (1)

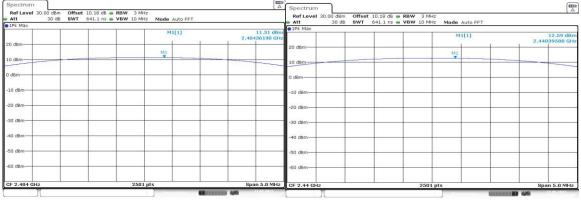
RSS-247 5.4 (b)

The device maintains a minimum of 20 hopping channels. The limit is 21 dBm.



### QHS-P2 Data Collection:

| Cł | hannel  | Frequency<br>(MHz) | Output Power<br>(dBm) | Limit<br>(dB) | Margin<br>(dB) | Result |
|----|---------|--------------------|-----------------------|---------------|----------------|--------|
|    | Low     | 2404               | 11.31                 | 21            | 9.69           | Pass   |
| Ν  | ∕liddle | 2440               | 12.59                 | 21            | 8.41           | Pass   |
|    | High    | 2478               | 11.48                 | 21            | 9.52           | Pass   |



Date: 17.MAY.2023 15:24:55

Date: 17.MAY.2023 15:26:32

| Ref Level 30.00 dBm<br>Att 30 dB | 0.18 dB 👄  <br>41.1 ns 👄 |      |       | Auto FFT |           |            |
|----------------------------------|--------------------------|------|-------|----------|-----------|------------|
| 1Pk Max                          | <br>                     |      |       |          |           |            |
|                                  |                          |      | M     | 1[1]     |           | 11.48 dB   |
| 20 dBm                           |                          | 2    |       |          | <br>2.4// | 00010 0    |
| 56539-45-1333                    | <br>                     | MI   |       |          |           |            |
| 10 dBm                           | <br>                     | -    | -     |          | <br>      |            |
|                                  |                          |      |       |          |           |            |
| 0 dBm                            |                          |      | -     |          | 1         |            |
|                                  |                          |      |       |          |           |            |
| -10 dBm                          |                          |      |       |          |           |            |
| -20 dBm                          |                          |      |       |          |           |            |
| 20 0011                          |                          |      |       |          | 1         |            |
| -30 dBm                          |                          | _    |       |          |           |            |
| 0.04035-80300                    |                          |      |       |          |           |            |
| -40 dBm                          |                          |      |       |          | -         |            |
|                                  |                          |      |       |          |           |            |
| -50 dBm                          |                          |      | -     |          |           | <u> </u>   |
| -60 dBm                          |                          |      |       |          |           |            |
| -oo ubiii                        |                          |      |       |          |           |            |
| CF 2.478 GHz                     |                          | 0.50 | 1 pts |          | 0         | in 5.0 MH: |

Date: 17.MAY.2023 15:28:40



\_B05/E

### **QHS-P6Data Collection:**

| hannel                      | Frequency<br>(MHz)                                                                                                              | Output Power<br>(dBm)       |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | onal Gain<br>IBi)                             | Limit<br>(dB)       | Margin<br>(dB)        | Result                                |
|-----------------------------|---------------------------------------------------------------------------------------------------------------------------------|-----------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|---------------------|-----------------------|---------------------------------------|
| Low                         | 2404                                                                                                                            | 11.2                        | <u>29</u>     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                             | 21                  | 8.71                  | Pass                                  |
| Viddle                      | 2440                                                                                                                            | 12.5                        | 56            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                             | 21                  | 7.44                  | Pass                                  |
| High                        | 2478                                                                                                                            | 11.4                        | 19            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1                                             | 21                  | 8.51                  | Pass                                  |
| Spectrum<br>Ref Level 30.00 | dBm Offset 10.18 dB - RBW 3<br>80 dB SWT 641.1 ns - VBW 10                                                                      | MHz<br>MHz Mode Auto FFT    |               | Ref Le                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | rum<br>evel 30.00 dBm Offset 1<br>30 dB SWT 6 | 0.18 dB • RBW 3 MHz | Mode Auto FFT         |                                       |
| • 1Pk Max                   |                                                                                                                                 | M1[1]                       |               | 11.29 dBm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | ы                                             |                     | M1[1]                 | 12.56 dBm                             |
| 20 dBm                      |                                                                                                                                 | M1                          | 2             | 40436390 GHz 20 dBm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                               | MI                  |                       | 2.44010800 GHz                        |
| 10 dBm                      |                                                                                                                                 |                             |               | 10 dBm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                               | ¥                   |                       |                                       |
| 0 dBm                       |                                                                                                                                 |                             |               | 0 dBm-                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                               |                     |                       |                                       |
| -10 dBm                     |                                                                                                                                 |                             |               | -10 dBm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                               |                     |                       |                                       |
| -20 dBm                     |                                                                                                                                 |                             |               | -20 dBm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                               |                     |                       |                                       |
| -30 dBm                     |                                                                                                                                 |                             |               | -30 dBm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                               |                     |                       |                                       |
| -40 dBm                     |                                                                                                                                 |                             |               | -40 dBm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                               |                     |                       | · · · · · · · · · · · · · · · · · · · |
| -50 dBm                     |                                                                                                                                 |                             |               | -50 dBm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                               |                     |                       |                                       |
| -60 dBm                     |                                                                                                                                 |                             |               | -60 dBm                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <u> </u>                                      |                     |                       |                                       |
|                             |                                                                                                                                 |                             |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                               |                     |                       |                                       |
| CF 2.404 GHz                | 532.40<br>Spectrun                                                                                                              |                             | <b>6</b>      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | + GHz                                         | 2501 pts            |                       | Spon 5.0 MHz                          |
|                             | 532.40<br>Spectrum<br>Ref Leve<br>● Att<br>● 1Pk Max<br>20 dBm<br>10 dBm<br>-10 dBm<br>-20 dBm<br>-30 dBm<br>-40 dBm            |                             | et 10.18 dB 😁 | Date: 17.N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Π                                             |                     | Constant P            | Span 3.0 MHz                          |
|                             | 532.40<br>Ref Love<br>● Att<br>● 1Pk Max<br>20 dBm<br>10 dBm<br>-10 dBm<br>-20 dBm<br>-30 dBm                                   | 1 30.00 dBm Offs            | et 10.18 dB 😁 | Date: 17.M<br>RBW 3 MHz<br>VBW 10 MHz M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | JL<br>IAY 2023 15:36:47<br>Ode Auto FFT       |                     | ()<br>()<br>1.49 dBm  | Span S.U.MHz                          |
|                             | 532.40<br>Spectrum<br>Ref Leve<br>● Att<br>● 1Pk Max<br>20 dBm<br>10 dBm<br>-10 dBm<br>-20 dBm<br>-30 dBm<br>-50 dBm<br>-50 dBm | 30.00 dBm Offs<br>30 dB SWT | et 10.18 dB 😁 | Date 17.4      D | JL<br>IAY 2023 15:36:47<br>Ode Auto FFT       |                     | 1.49 dBm<br>22000 GHz | Span S.U.MHz                          |
|                             | 532.40<br>Spectrun<br>Ref Leve<br>→ Att<br>● 1Pk Max<br>20 dBm<br>10 dBm<br>-10 dBm<br>-20 dBm<br>-30 dBm<br>-40 dBm<br>-50 dBm | 30.00 dBm Offs<br>30 dB SWT | et 10.18 dB 😁 | Date: 17.M<br>RBW 3 MHz<br>VBW 10 MHz M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | M1[1]                                         |                     | ()<br>()<br>1.49 dBm  | Span S.U.MHz                          |

## **Equipment Used:**

| TN   | Description                     | Model | S/N    | Manufacturer       | Most Recent<br>Calibration | Calibration Due<br>Date |
|------|---------------------------------|-------|--------|--------------------|----------------------------|-------------------------|
| 2409 | Signal and Spectrum<br>Analyzer | FSV40 | 101413 | Rohde &<br>Schwarz | 22-Mar-2023                | 21-Mar-2024             |



| 1 | :7 | 77 | 7   | - |
|---|----|----|-----|---|
|   |    |    | . / | _ |

# **Conducted Spurious Emissions**

| Project number (Integrity): | 408R          | Build Phase:          | C1.5                 |               |       |                   |
|-----------------------------|---------------|-----------------------|----------------------|---------------|-------|-------------------|
| Tested by:                  | Mike Royer    |                       | Date:                | May 22, 202   | 23    |                   |
|                             |               |                       |                      |               | -     |                   |
| Requirements                | FCC §15.247   | 7 (d)                 | Referenced S         | tandard(c)    |       | SI 63.10 (7.8.8)  |
| Standard(s):                | RSS-247 5.5   |                       | Keleleliceu 3        | lanuaru(s).   | AINC  | 51 03. 10 (7.0.0) |
| EUT powered with:           | 5V USB        | Temp /<br>Humidity:   | n/a                  | Test locat    | ion:  | Braun Room        |
|                             |               |                       |                      |               |       |                   |
| Test equipment used TN's:   | 2409          |                       |                      |               |       |                   |
| EUT Serial number(s):       | 084808M3051   | LE012A1               |                      |               |       |                   |
| EUT Software installed:     | 1.4.10+g2edc5 | 1.4.10+g2edc594       |                      |               |       |                   |
| EUT Modification(s):        | Product was   | tested as built excep | ot the antenna was d | isconnected a | and a | coaxial cable was |
|                             | installed.    |                       |                      |               |       |                   |

### Conclusion:

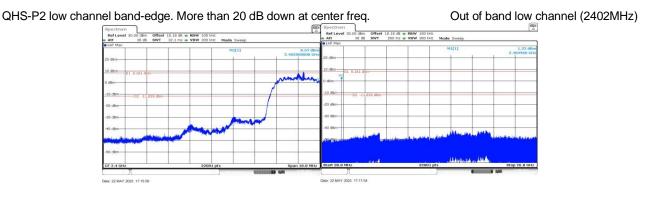
The Bose Model 408R passes Conducted Spurious Emissions by more than 10dB.

### Limits

FCC §15.247 (d), RSS-247 5.5

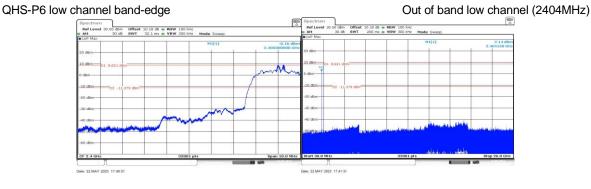
Output power was measured based on the use of a peak measurement; therefore, the required attenuation is 20 dB.

## Data Collection:



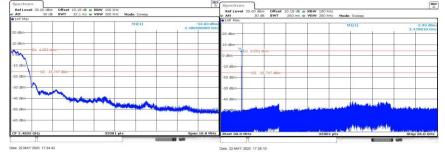


| <br>:/// | 47 | - |
|----------|----|---|



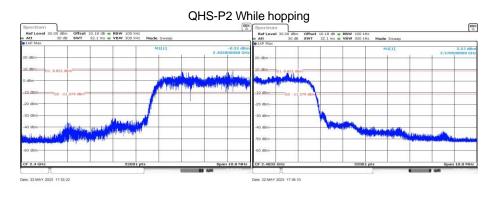
#### QHS-P2 high channel band-edge

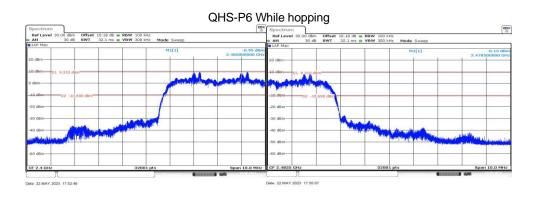
#### Out of band high channel (2480MHz)











## Equipment Used:

| TN   | Description                     | Model | S/N    | Manufacturer       | Most Recent<br>Calibration | Calibration Due<br>Date |
|------|---------------------------------|-------|--------|--------------------|----------------------------|-------------------------|
| 2409 | Signal and Spectrum<br>Analyzer | FSV40 | 101413 | Rohde &<br>Schwarz | 21-Mar-2023                | 22-Mar-2024             |





# RF Radiated Emissions 30MHz -1GHz

# **Test Information:**

| Project number (Integrity): |                            | Build Phase:           | Pre-C1       |             |                    |
|-----------------------------|----------------------------|------------------------|--------------|-------------|--------------------|
| Tested by:                  | M. Mehrmann                |                        | Date:        | 8+9 Februar | ry 2023            |
|                             |                            |                        |              | -           |                    |
| Requirements Standard(s):   | FCC §15.247 (d section 5.5 | ) and RSS-247          | Referenced S | tandard(s): |                    |
| EUT powered with:           |                            | Temp / Humidity:       |              | Test locat  | ion: Maxwell House |
|                             |                            |                        |              |             |                    |
| Test equipment used TN's:   | 644,2319,1541,2            | 2077,1277-22           |              |             |                    |
| EUT Serial number(s):       | Left; 084803M30            | Left; 084803M3003B005A |              |             |                    |
| EOT Serial humber(s).       | Right: 084803M             | 3003B004A              |              |             |                    |
| EUT Software installed:     | 0.0.19 diag code           | 9                      |              |             |                    |
| EUT Modification(s):        | None                       |                        |              |             |                    |

## Objective/Summary/Conclusion:

Passes FCC 15.247 and RSS-247 Section 5.5 requirements with a worst-case passing margin of 16.0 dB at 700 MHz.

# Additional EUT Information:

The EUT was tested in a 3m Semi Anechoic Chamber on an insulating turntable 80 cm high.

The device was scanned in three orthogonal axis and no signals were detected.

### **Test Setup Details:**

EUT Emissions levels contained within this report are calculated on the following basis:

**Radiated Emission Level (dBµV/m)** = EMI Receiver Reading (dBµV) + Antenna Correction Factor (dB/m) – Preamplifier Gain (dB) + Cable Loss (dB)



| _8051 |
|-------|
|       |

# Data Collection:

| EUT S/N:   | Right Bud  | Power applied: |  | Plot# | 1 |
|------------|------------|----------------|--|-------|---|
| EUT Mods:  |            |                |  |       |   |
| EUT Setup: |            |                |  |       |   |
| Comments:  | Position X |                |  |       |   |

| Spectrum                           |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                  |                       |             |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |                | ₽          |
|------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|-----------------------|-------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------|------------|
| Ref Level                          | <b>لل</b><br>80.00 (                    | dBµV/m                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | RBW (CISPR)                                                                                                      | 120 kHz               |             |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |                |            |
| 🖷 Att                              |                                         | 10 dB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | SWT                     | 133 ms                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                  | 1 MHz                 | Mode        | sweep                      | Input 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | DC                 |                |            |
| PS TDF                             |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                  |                       |             |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |                |            |
| <mark>⊙</mark> 1Pk View <b>⊙</b> 2 | 2Pk Vie                                 | W                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                  |                       |             |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                    |                |            |
| Limit Ch                           |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                         | 100 MH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | PASS                                                                                                             | M                     | 1[1]        |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 18.                | )1 dB          | βµV/m      |
| 70 dbippnCIS                       | PR32                                    | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                         | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | PASS                                                                                                             | 1                     |             |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 99                 | 9.984          | 2 MHz      |
| /odbpv/m                           | 1                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                  | M                     | 2[1]        |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 21.                | 12 dB          | βµV/m      |
| 60 dBµV/m                          |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                         | 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                  |                       |             |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 300                | 1.007          | 7 MHz      |
|                                    | 1                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                  | 1                     |             |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 1                  |                |            |
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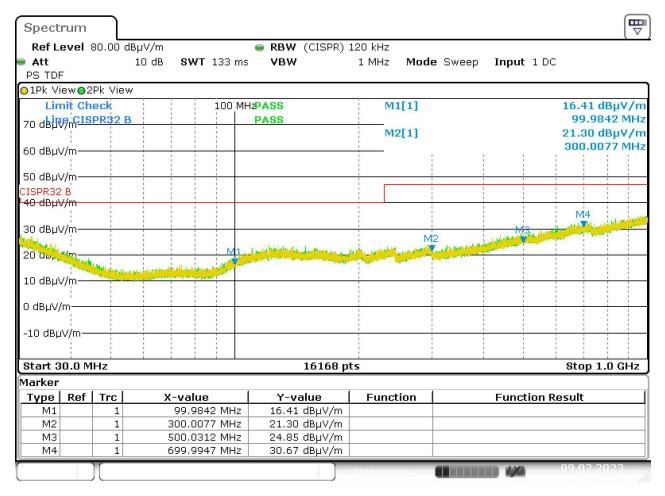
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### Limits:

|                     | Freq Range L    |                  | nits (dBuV Q     | P <sup>1</sup> ) | Comments                                   |
|---------------------|-----------------|------------------|------------------|------------------|--------------------------------------------|
| Standard            | (MHz)           | Clas             | ss A             | Class B          | Measurements above 1 GHz are made using    |
|                     |                 | 10 m             | 3 m <sup>2</sup> | 3 m              | average and peak detectors.                |
|                     | 30-88           | 39               | 49               | 40               | Mains cables draped to floor, not bundled. |
| FCC §15.247 (d)     | 88-216          | 43.5             | 53.5             | 43.5             | *For measurements above 1 GHz, peak        |
| RSS-247 Section 5.5 | 216-960         | 46.5             | 56.5             | 46               | limits must also be met that are 20 dB     |
|                     | >960            | 49.5*            | 59.5*            | 54*              | higher than average limits.                |
|                     | andwidth and De | etector Settings | 6:               |                  |                                            |
| Freq. Range (MHz)   | RBW (kHz)       | VBW (kHz)        | Detector         |                  |                                            |
| 30 – 1000           | 120             | >300             | QP               |                  |                                            |
| > 1000              | 1000            | >1000            | Pk an            | d AVG            |                                            |

## Equipment Used:

| TN   | Description                                                                           | Model               | S/N     | Manufacturer             | Most Recent<br>Calibration | Calibration<br>Due Date | Most Recent<br>Verification | Verification<br>Due Date |
|------|---------------------------------------------------------------------------------------|---------------------|---------|--------------------------|----------------------------|-------------------------|-----------------------------|--------------------------|
| 1541 | Antenna<br>30MHz -<br>6GHz                                                            | JB6                 | A050807 | Sunol Sciences<br>Corp   | 14-Dec-2021                | 14-Dec-2023             |                             |                          |
| 3062 | RF Cable<br>10MHz-<br>18GHz, low<br>loss LL142<br>coax, 26<br>feet, "N"<br>connectors | SCE18110505-<br>312 | N/A     | Fairview<br>Microwave[2] |                            |                         | 01-Sep-2022                 | 01-Sep-2023              |
| 2077 | Maxwell<br>House RE<br>Pre-amp<br>(20MHz-<br>3GHz)                                    | N/A                 | N/A     | Bose<br>Corporation      |                            |                         | 01-Sep-2022                 | 01-Sep-2023              |
| 2319 | EMI Test<br>Receiver                                                                  | ESR26               | 101276  | Rohde &<br>Schwarz       | 29-Mar-<br>2023            | 28-Mar-<br>2024         |                             |                          |



## Uncertainty:

| Uncertainty Budget              |                     |                |            |                       |  |  |
|---------------------------------|---------------------|----------------|------------|-----------------------|--|--|
|                                 |                     |                |            |                       |  |  |
| Title:                          | Radiat              | ed RF Emissio  | ons (30MH  | z-1GHz)               |  |  |
|                                 |                     |                |            |                       |  |  |
| Source of Uncertainty           | Value<br>units:± dB | Distribution   | Divisor    | Uncertainty<br>(± dB) |  |  |
| Receiver - absolute level       | 0.3                 | Rect.          | 1.73       | 0.17                  |  |  |
| Receiver - frequency response   | 0.8                 | Rect.          | 1.73       | 0.46                  |  |  |
| Receiver - attenuator switching | 0.2                 | Rect.          | 1.73       | 0.12                  |  |  |
| Receiver - bandwidth switching  | 0.2                 | Rect.          | 1.73       | 0.12                  |  |  |
| Receiver - display              | 0.5                 | Rect.          | 1.73       | 0.29                  |  |  |
| Antenna factor                  | 0.8                 | Norm.          | 2.00       | 0.38                  |  |  |
| Antenna directivity             | 1.0                 | Norm.          | 2.00       | 0.50                  |  |  |
| Preamp correction factor        | 0.5                 | Norm.          | 2.00       | 0.25                  |  |  |
| Cable correction factor         | 0.5                 | Norm.          | 2.00       | 0.25                  |  |  |
| Site imperfection - NSA         | 4.0                 | Triang.        | 2.45       | 1.63                  |  |  |
| Test table impact               | 1.1                 | Rect.          | 1.73       | 0.64                  |  |  |
|                                 | ,                   |                |            |                       |  |  |
|                                 |                     |                |            |                       |  |  |
|                                 | 1.98                |                |            |                       |  |  |
|                                 | 2.00                |                |            |                       |  |  |
| Exte                            | ended uncert        | ainty (95% coi | nfidence): | 3.97                  |  |  |





# Radiated Spurious Emissions 1-25GHz

| Project number<br>(Integrity): | 408R            | Build Phase:            | C1.5                |                    |                    |
|--------------------------------|-----------------|-------------------------|---------------------|--------------------|--------------------|
| Tested by:                     | Mike Royer      |                         | Date:               | June 12, 2023      | 3                  |
|                                |                 |                         |                     |                    | 1                  |
| Requirements                   | FCC §15.247 (d) |                         | Deferenced          | Standard(a)        | ANSI C63.10-2013   |
| Standard(s):                   | RSS-247 Section | n 5.5                   | Referenced          | I Standard(s):     | ANSI C03.10-2013   |
| EUT powered with:              | Battery         | Temp / Humidity:        | N/A                 | Test locat         | ion: Marconi Manor |
|                                |                 |                         |                     |                    |                    |
| Test equipment used<br>TN's:   | 1663,3685,2349  | ,2602,2414              |                     |                    |                    |
| EUT Serial                     | Left            | 084803M30               | 51D038A1            |                    |                    |
| number(s):                     | Right           | 084808M30               | 51D019A1            |                    |                    |
| EUT Software                   | 0.4.10          |                         |                     |                    |                    |
| installed:                     |                 |                         |                     |                    |                    |
| EUT Modification(s):           | USB Debug wire  | es were attached to the | earbud to allow cor | ntrol of the radio | ).                 |

## Conclusion:

The Bose model 408R passes radiated emissions from 1-25GHz.

The peak emissions maximum is below the average limit in all cases.

1-18 GHz, the maximum emission was 53.1 dBuV/m peak, noise floor. The limit is 54 dBuV/m and the margin is 0.9 dB. 18-25 GHz. The maximum emission was 59.2. The limit is 74 dBuV/m, and the margin is 14.8 dB.

### Procedure:

Per 558074 D01 15.247 Meas Guidance v05r02:

Each mode tested was measured at all 10 Harmonics, at the low, middle, and high transmit frequencies.

EUT was taped to a bamboo skewer and stuck into the test support at 150cm above the floor. From there the table was rotated and the antenna scanned up down and horizontal and vertical polarizations.

A notch filter was used to block the fundamental emission from overloading the measurement equipment including the preamplifier and the spectrum analyzer.

The signal duty cycle was set to 100%

Limit calculation:

The E field in the far field observes the inverse square law. So that the difference in field strength difference in decibels is;

$$20 \log\left(\frac{D1}{D2}\right) = 20 \log 10 = 20$$

Peak limit of 74 becomes 94 dBuV at 30cm.

Average limit of 54 becomes 74 dBuV at 30cm.



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|---|------|--|
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# Data Collection:

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |           |               |                |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                      | -                |                  |                    |                        |                |         |   |       |   |
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| Date: 13.JUN.2023 15:49:10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           | Date          | : 13.JUN.2     | 023 15:         | 49:10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                      |                  |                  |                    |                        |                |         |   |       |   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |           |               |                |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                      |                  |                  |                    |                        |                |         |   |       |   |





|    | FCC 15.247d and RSS-247 Section 5.5 @ 3 Meters |           |           |          |                                     |        |        |            |         |            |                      |  |
|----|------------------------------------------------|-----------|-----------|----------|-------------------------------------|--------|--------|------------|---------|------------|----------------------|--|
| MK | Emission                                       | Measured  | Measured  | FCC 15   | FCC 15.247d and RSS-247 Section 5.5 |        |        |            | Receivi | ng Antenna | *Average detector    |  |
| #  | Frequency                                      | Amplitude | Amplitude | Limit    | Limit                               | Margin | Margin | Azimuth    | Pol     | Height     | used for frequencies |  |
|    | (MHz)                                          | (dBµV/m)  | (dBµV/m)  | (dBµV/m) | (dBµV/m)                            | (dB)   | (dB)   | (0°closest | (H/V)   | (Meters)   | above 1 GHz.         |  |
|    |                                                | QP/AVG*   | Peak      | QP/AVG*  | Peak                                | QP/AVG | Peak   | to ant)    |         |            | Notes/Mode           |  |
| 1  | 4806                                           | 36.70     | 48.70     | 54.0     | 74.0                                | 17.3   | 25.3   | 0          | V       | 1.50       | Signal Maximized     |  |
| 2  | 7212                                           | 31.30     | 44.50     | 54.0     | 74.0                                | 22.7   | 29.5   | 0          | Н       | 1.50       | Noise floor          |  |
| 3  | 9611                                           | 41.70     | 51.80     | 54.0     | 74.0                                | 12.3   | 22.2   | 0          | Н       | 1.50       | Signal Maximized     |  |
| 4  | 12020                                          | 34.80     | 48.20     | 54.0     | 74.0                                | 19.2   | 25.8   | 0          | V       | 1.50       | Noise floor          |  |
| 5  | 14424                                          | 34.70     | 48.20     | 54.0     | 74.0                                | 19.3   | 25.8   | 0          | Н       | 1.50       | Noise floor          |  |
| 6  | 16828                                          | 38.20     | 51.80     | 54.0     | 74.0                                | 15.8   | 22.2   | 0          | V       | 1.50       | Noise floor          |  |

|    | FCC 15.247d and RSS-247 Section 5.5 @ 30 cm |           |           |          |             |             |         |            |                   |          |                      |
|----|---------------------------------------------|-----------|-----------|----------|-------------|-------------|---------|------------|-------------------|----------|----------------------|
| MK | Emission                                    | Measured  | Measured  | FCC 15   | .247d and R | SS-247 Sect | ion 5.5 | Table      | Receiving Antenna |          | *Average detector    |
| #  | Frequency                                   | Amplitude | Amplitude | Limit    | Limit       | Margin      | Margin  | Azimuth    | Pol               | Height   | used for frequencies |
|    | (MHz)                                       | (dBµV/m)  | (dBµV/m)  | (dBµV/m) | (dBµV/m)    | (dB)        | (dB)    | (0°closest | (H/V)             | (Meters) | above 1 GHz.         |
|    |                                             | QP/AVG*   | Peak      | QP/AVG*  | Peak        | QP/AVG      | Peak    | to ant)    |                   |          | Notes/Mode           |
| 1  | 19230                                       | 46.80     | 59.20     | 74.0     | 94.0        | 27.2        | 34.8    |            |                   |          | Signal Maximized     |
| 2  | 21636                                       | 40.70     | 54.20     | 74.0     | 94.0        | 33.3        | 39.8    |            |                   |          | Noise floor          |
| 3  | 24040                                       | 40.90     | 54.40     | 74.0     | 94.0        | 33.1        | 39.6    |            |                   |          | Noise floor          |

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| EUT S/N:       | Right  |             | Power applied: | Battery |  |
| EUT Mods:      |        |             |                |         |  |
| EUT Setup:     | QHS P2 | Mid channel |                |         |  |
| Comments:      |        |             |                |         |  |

|    | FCC 15.247d and RSS-247 Section 5.5 @ 3 Meters |           |           |          |                                     |        |        |            |         |            |                      |
|----|------------------------------------------------|-----------|-----------|----------|-------------------------------------|--------|--------|------------|---------|------------|----------------------|
| MK | Emission                                       | Measured  | Measured  | FCC 15   | FCC 15.247d and RSS-247 Section 5.5 |        |        |            | Receivi | ng Antenna | *Average detector    |
| #  | Frequency                                      | Amplitude | Amplitude | Limit    | Limit                               | Margin | Margin | Azimuth    | Pol     | Height     | used for frequencies |
|    | (MHz)                                          | (dBµV/m)  | (dBµV/m)  | (dBµV/m) | (dBµV/m)                            | (dB)   | (dB)   | (0°closest | (H/V)   | (Meters)   | above 1 GHz.         |
|    |                                                | QP/AVG*   | Peak      | QP/AVG*  | Peak                                | QP/AVG | Peak   | to ant)    |         |            | Notes/Mode           |
| 1  | 4880                                           | 36.80     | 48.80     | 54.0     | 74.0                                | 17.2   | 25.2   | 0          | V       | 1.50       | Signal Maximized     |
| 2  | 7320                                           | 31.90     | 45.00     | 54.0     | 74.0                                | 22.1   | 29.0   | 0          | Н       | 1.50       | Noise floor          |
| 3  | 9761                                           | 41.90     | 52.20     | 54.0     | 74.0                                | 12.1   | 21.8   | 0          | Н       | 1.50       | Signal Maximized     |
| 4  | 12200                                          | 36.40     | 49.80     | 54.0     | 74.0                                | 17.6   | 24.2   | 0          | V       | 1.50       | Noise floor          |
| 5  | 14640                                          | 36.10     | 49.50     | 54.0     | 74.0                                | 17.9   | 24.5   | 0          | Н       | 1.50       | Noise floor          |
| 6  | 17080                                          | 38.80     | 52.20     | 54.0     | 74.0                                | 15.2   | 21.8   | 0          | V       | 1.50       | Noise floor          |

|    | FCC 15.247d and RSS-247 Section 5.5 @ 30 cm |           |           |          |             |             |          |            |                   |          |                      |
|----|---------------------------------------------|-----------|-----------|----------|-------------|-------------|----------|------------|-------------------|----------|----------------------|
| MK | Emission                                    | Measured  | Measured  | FCC 15   | .247d and R | SS-247 Sect | tion 5.5 | Table      | Receiving Antenna |          | *Average detector    |
| #  | Frequency                                   | Amplitude | Amplitude | Limit    | Limit       | Margin      | Margin   | Azimuth    | Pol               | Height   | used for frequencies |
|    | (MHz)                                       | (dBµV/m)  | (dBµV/m)  | (dBµV/m) | (dBµV/m)    | (dB)        | (dB)     | (0°closest | (H/V)             | (Meters) | above 1 GHz.         |
|    |                                             | QP/AVG*   | Peak      | QP/AVG*  | Peak        | QP/AVG      | Peak     | to ant)    |                   |          | Notes/Mode           |
| 1  | 19518                                       | 45.20     | 58.80     | 74.0     | 94.0        | 28.8        | 35.2     |            |                   |          | Signal Maximized     |
| 2  | 21960                                       | 41.60     | 55.50     | 74.0     | 94.0        | 32.4        | 38.5     |            |                   |          | Noise floor          |
| 3  | 24400                                       | 44.60     | 57.20     | 74.0     | 94.0        | 29.4        | 36.8     |            |                   |          | Noise floor          |

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| EUT S/N:      | Right               | Power applied: | Battery |  |  |
| EUT Mods:     |                     |                |         |  |  |
| EUT Setup:    | QHS P2 High channel |                |         |  |  |
| Comments:     |                     |                |         |  |  |

|    | FCC 15.247d and RSS-247 Section 5.5 @ 3 Meters |           |           |          |                                     |        |        |            |         |            |                      |  |
|----|------------------------------------------------|-----------|-----------|----------|-------------------------------------|--------|--------|------------|---------|------------|----------------------|--|
| MK | Emission                                       | Measured  | Measured  | FCC 15   | FCC 15.247d and RSS-247 Section 5.5 |        |        |            | Receivi | ng Antenna | *Average detector    |  |
| #  | Frequency                                      | Amplitude | Amplitude | Limit    | Limit                               | Margin | Margin | Azimuth    | Pol     | Height     | used for frequencies |  |
|    | (MHz)                                          | (dBµV/m)  | (dBµV/m)  | (dBµV/m) | (dBµV/m)                            | (dB)   | (dB)   | (0°closest | (H/V)   | (Meters)   | above 1 GHz.         |  |
|    |                                                | QP/AVG*   | Peak      | QP/AVG*  | Peak                                | QP/AVG | Peak   | to ant)    |         |            | Notes/Mode           |  |
| 1  | 4957                                           | 33.00     | 45.50     | 54.0     | 74.0                                | 21.0   | 28.5   | 0          | V       | 1.50       | Signal Maximized     |  |
| 2  | 7434                                           | 32.00     | 45.10     | 54.0     | 74.0                                | 22.0   | 28.9   | 0          | Н       | 1.50       | Noise floor          |  |
| 3  | 9913                                           | 40.10     | 51.50     | 54.0     | 74.0                                | 13.9   | 22.5   | 0          | Н       | 1.50       | Signal Maximized     |  |
| 4  | 12390                                          | 35.10     | 48.10     | 54.0     | 74.0                                | 18.9   | 25.9   | 0          | V       | 1.50       | Noise floor          |  |
| 5  | 14868                                          | 37.30     | 50.50     | 54.0     | 74.0                                | 16.7   | 23.5   | 0          | Н       | 1.50       | Noise floor          |  |
| 6  | 17346                                          | 39.50     | 53.10     | 54.0     | 74.0                                | 14.5   | 20.9   | 0          | V       | 1.50       | Noise floor          |  |

|    | FCC 15.247d and RSS-247 Section 5.5 @ 30 cm |           |           |          |             |             |          |            |                   |          |                      |
|----|---------------------------------------------|-----------|-----------|----------|-------------|-------------|----------|------------|-------------------|----------|----------------------|
| MK | Emission                                    | Measured  | Measured  | FCC 15   | .247d and R | SS-247 Sect | tion 5.5 | Table      | Receiving Antenna |          | *Average detector    |
| #  | Frequency                                   | Amplitude | Amplitude | Limit    | Limit       | Margin      | Margin   | Azimuth    | Pol               | Height   | used for frequencies |
|    | (MHz)                                       | (dBµV/m)  | (dBµV/m)  | (dBµV/m) | (dBµV/m)    | (dB)        | (dB)     | (0°closest | (H/V)             | (Meters) | above 1 GHz.         |
|    |                                             | QP/AVG*   | Peak      | QP/AVG*  | Peak        | QP/AVG      | Peak     | to ant)    |                   |          | Notes/Mode           |
| 1  | 19822                                       | 43.80     | 56.80     | 74.0     | 94.0        | 30.2        | 37.2     |            |                   |          | Signal Maximized     |
| 2  | 22302                                       | 40.40     | 53.70     | 74.0     | 94.0        | 33.6        | 40.3     |            |                   |          | Noise floor          |
| 3  | 24780                                       | 40.70     | 53.90     | 74.0     | 94.0        | 33.3        | 40.1     |            |                   |          | Noise floor          |

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| EUT S/N:    | Right              | Power applied: | Battery |  |
| EUT Mods:   |                    |                |         |  |
| EUT Setup:  | QHS P6 Low channel |                |         |  |
| Comments:   |                    |                |         |  |

|    | FCC 15.247d and RSS-247 Section 5.5 @ 3 Meters |           |           |          |                      |             |         |            |         |            |                      |  |  |  |
|----|------------------------------------------------|-----------|-----------|----------|----------------------|-------------|---------|------------|---------|------------|----------------------|--|--|--|
| MK | Emission                                       | Measured  | Measured  | FCC 15   | .247d and R          | SS-247 Sect | ion 5.5 | Table      | Receivi | ng Antenna | *Average detector    |  |  |  |
| #  | Frequency                                      | Amplitude | Amplitude | Limit    | Limit Limit Margin A |             |         |            | Pol     | Height     | used for frequencies |  |  |  |
|    | (MHz)                                          | (dBµV/m)  | (dBµV/m)  | (dBµV/m) | (dBµV/m)             | (dB)        | (dB)    | (0°closest | (H/V)   | (Meters)   | above 1 GHz.         |  |  |  |
|    |                                                | QP/AVG*   | Peak      | QP/AVG*  | Peak                 | QP/AVG      | Peak    | to ant)    |         |            | Notes/Mode           |  |  |  |
| 1  | 4808                                           | 36.60     | 47.80     | 54.0     | 74.0                 | 17.4        | 26.2    | 0          | V       | 1.50       | Signal Maximized     |  |  |  |
| 2  | 7212                                           | 31.30     | 44.90     | 54.0     | 74.0                 | 22.7        | 29.1    | 0          | Н       | 1.50       | Noise floor          |  |  |  |
| 3  | 9616                                           | 38.00     | 51.30     | 54.0     | 74.0                 | 16.0        | 22.7    | 0          | Н       | 1.50       | Signal Maximized     |  |  |  |
| 4  | 12020                                          | 35.30     | 48.40     | 54.0     | 74.0                 | 18.7        | 25.6    | 0          | V       | 1.50       | Noise floor          |  |  |  |
| 5  | 14424                                          | 34.80     | 47.70     | 54.0     | 74.0                 | 19.2        | 26.3    | 0          | Н       | 1.50       | Noise floor          |  |  |  |
| 6  | 16828                                          | 38.20     | 51.90     | 54.0     | 74.0                 | 15.8        | 22.1    | 0          | V       | 1.50       | Noise floor          |  |  |  |

|    | FCC 15.247d and RSS-247 Section 5.5 @ 30 cm |           |           |          |             |             |          |            |         |            |                      |  |  |  |
|----|---------------------------------------------|-----------|-----------|----------|-------------|-------------|----------|------------|---------|------------|----------------------|--|--|--|
| MK | Emission                                    | Measured  | Measured  | FCC 15   | .247d and R | SS-247 Sect | tion 5.5 | Table      | Receivi | ng Antenna | *Average detector    |  |  |  |
| #  | Frequency                                   | Amplitude | Amplitude | Limit    | Limit       | Margin      | Margin   | Azimuth    | Pol     | Height     | used for frequencies |  |  |  |
|    | (MHz)                                       | (dBµV/m)  | (dBµV/m)  | (dBµV/m) | (dBµV/m)    | (dB)        | (dB)     | (0°closest | (H/V)   | (Meters)   | above 1 GHz.         |  |  |  |
|    |                                             | QP/AVG*   | Peak      | QP/AVG*  | Peak        | QP/AVG      | Peak     | to ant)    |         |            | Notes/Mode           |  |  |  |
| 1  | 19232                                       | 41.70     | 55.30     | 74.0     | 94.0        | 32.3        | 38.7     |            |         |            | Signal Maximized     |  |  |  |
| 2  | 21636                                       | 41.20     | 54.70     | 74.0     | 94.0        | 32.8        | 39.3     |            |         |            | Noise floor          |  |  |  |
| 3  | 24040                                       | 41.70     | 55.20     | 74.0     | 94.0        | 32.3        | 38.8     |            |         |            | Noise floor          |  |  |  |

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|    | FCC 15.247d and RSS-247 Section 5.5 @ 3 Meters |           |           |          |             |             |         |            |         |            |                      |  |  |
|----|------------------------------------------------|-----------|-----------|----------|-------------|-------------|---------|------------|---------|------------|----------------------|--|--|
| MK | Emission                                       | Measured  | Measured  | FCC 15   | .247d and R | SS-247 Sect | ion 5.5 | Table      | Receivi | ng Antenna | *Average detector    |  |  |
| #  | Frequency                                      | Amplitude | Amplitude | Limit    | Limit       | Margin      | Margin  | Azimuth    | Pol     | Height     | used for frequencies |  |  |
|    | (MHz)                                          | (dBµV/m)  | (dBµV/m)  | (dBµV/m) | (dBµV/m)    | (dB)        | (dB)    | (0°closest | (H/V)   | (Meters)   | above 1 GHz.         |  |  |
|    |                                                | QP/AVG*   | Peak      | QP/AVG*  | Peak        | QP/AVG      | Peak    | to ant)    |         |            | Notes/Mode           |  |  |
| 1  | 4880                                           | 35.90     | 47.40     | 54.0     | 74.0        | 18.1        | 26.6    | 0          | V       | 1.50       | Signal Maximized     |  |  |
| 2  | 7320                                           | 31.80     | 45.10     | 54.0     | 74.0        | 22.2        | 28.9    | 0          | Н       | 1.50       | Noise floor          |  |  |
| 3  | 9760                                           | 39.40     | 51.90     | 54.0     | 74.0        | 14.6        | 22.1    | 0          | Н       | 1.50       | Signal Maximized     |  |  |
| 4  | 12200                                          | 36.60     | 49.70     | 54.0     | 74.0        | 17.4        | 24.3    | 0          | V       | 1.50       | Noise floor          |  |  |
| 5  | 14640                                          | 36.20     | 49.80     | 54.0     | 74.0        | 17.8        | 24.2    | 0          | Н       | 1.50       | Noise floor          |  |  |
| 6  | 17080                                          | 38.80     | 52.20     | 54.0     | 74.0        | 15.2        | 21.8    | 0          | V       | 1.50       | Noise floor          |  |  |

|    | FCC 15.247d and RSS-247 Section 5.5 @ 30 cm |           |           |          |             |             |          |            |                   |          |                      |  |  |  |
|----|---------------------------------------------|-----------|-----------|----------|-------------|-------------|----------|------------|-------------------|----------|----------------------|--|--|--|
| MK | Emission                                    | Measured  | Measured  | FCC 15   | .247d and R | SS-247 Sect | tion 5.5 | Table      | Receiving Antenna |          | *Average detector    |  |  |  |
| #  | Frequency                                   | Amplitude | Amplitude | Limit    | Limit       | Margin      | Margin   | Azimuth    | Pol               | Height   | used for frequencies |  |  |  |
|    | (MHz)                                       | (dBµV/m)  | (dBµV/m)  | (dBµV/m) | (dBµV/m)    | (dB)        | (dB)     | (0°closest | (H/V)             | (Meters) | above 1 GHz.         |  |  |  |
|    |                                             | QP/AVG*   | Peak      | QP/AVG*  | Peak        | QP/AVG      | Peak     | to ant)    |                   |          | Notes/Mode           |  |  |  |
| 1  | 19520                                       | 41.00     | 54.40     | 74.0     | 94.0        | 33.0        | 39.6     |            |                   |          | Noise floor          |  |  |  |
| 2  | 21960                                       | 40.50     | 53.80     | 74.0     | 94.0        | 33.5        | 40.2     |            |                   |          | Noise floor          |  |  |  |
| 3  | 24400                                       | 40.50     | 53.50     | 74.0     | 94.0        | 33.5        | 40.5     |            |                   |          | Noise floor          |  |  |  |

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| Certificate # | 7 1314.1           |                |         |     |     |
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| EUT S/N:      | Right              | Power applied: | Battery | Plo | ot# |
| EUT Mods:     |                    |                |         |     |     |
| EUT Setup:    | QHS P6 High channe | əl             |         |     |     |
| Comments:     |                    |                |         |     |     |

|    | FCC 15.247d and RSS-247 Section 5.5 @ 3 Meters |           |           |          |             |             |         |            |         |            |                      |  |  |  |
|----|------------------------------------------------|-----------|-----------|----------|-------------|-------------|---------|------------|---------|------------|----------------------|--|--|--|
| MK | Emission                                       | Measured  | Measured  | FCC 15   | .247d and R | SS-247 Sect | ion 5.5 | Table      | Receivi | ng Antenna | *Average detector    |  |  |  |
| #  | Frequency                                      | Amplitude | Amplitude | Limit    | Limit       | Margin      | Margin  | Azimuth    | Pol     | Height     | used for frequencies |  |  |  |
|    | (MHz)                                          | (dBµV/m)  | (dBµV/m)  | (dBµV/m) | (dBµV/m)    | (dB)        | (dB)    | (0°closest | (H/V)   | (Meters)   | above 1 GHz.         |  |  |  |
|    |                                                | QP/AVG*   | Peak      | QP/AVG*  | Peak        | QP/AVG      | Peak    | to ant)    |         |            | Notes/Mode           |  |  |  |
| 1  | 4960                                           | 33.60     | 45.10     | 54.0     | 74.0        | 20.4        | 28.9    | 0          | V       | 1.50       | Signal Maximized     |  |  |  |
| 2  | 7434                                           | 32.00     | 45.50     | 54.0     | 74.0        | 22.0        | 28.5    | 0          | Н       | 1.50       | Noise floor          |  |  |  |
| 3  | 9920                                           | 38.90     | 51.40     | 54.0     | 74.0        | 15.1        | 22.6    | 0          | Н       | 1.50       | Signal Maximized     |  |  |  |
| 4  | 12390                                          | 34.90     | 48.00     | 54.0     | 74.0        | 19.1        | 26.0    | 0          | V       | 1.50       | Noise floor          |  |  |  |
| 5  | 14868                                          | 36.80     | 50.10     | 54.0     | 74.0        | 17.2        | 23.9    | 0          | Н       | 1.50       | Noise floor          |  |  |  |
| 6  | 17346                                          | 39.50     | 52.90     | 54.0     | 74.0        | 14.5        | 21.1    | 0          | V       | 1.50       | Noise floor          |  |  |  |

|    | FCC 15.247d and RSS-247 Section 5.5 @ 30 cm |           |           |          |             |             |         |            |         |            |                      |  |  |  |
|----|---------------------------------------------|-----------|-----------|----------|-------------|-------------|---------|------------|---------|------------|----------------------|--|--|--|
| MK | Emission                                    | Measured  | Measured  | FCC 15   | .247d and R | SS-247 Sect | ion 5.5 | Table      | Receivi | ng Antenna | *Average detector    |  |  |  |
| #  | Frequency                                   | Amplitude | Amplitude | Limit    | Limit       | Margin      | Margin  | Azimuth    | Pol     | Height     | used for frequencies |  |  |  |
|    | (MHz)                                       | (dBµV/m)  | (dBµV/m)  | (dBµV/m) | (dBµV/m)    | (dB)        | (dB)    | (0°closest | (H/V)   | (Meters)   | above 1 GHz.         |  |  |  |
|    |                                             | QP/AVG*   | Peak      | QP/AVG*  | Peak        | QP/AVG      | Peak    | to ant)    |         |            | Notes/Mode           |  |  |  |
| 1  | 19824                                       | 41.00     | 54.30     | 74.0     | 94.0        | 33.0        | 39.7    |            |         |            | Noise floor          |  |  |  |
| 2  | 22302                                       | 40.60     | 54.20     | 74.0     | 94.0        | 33.4        | 39.8    |            |         |            | Noise floor          |  |  |  |
| 3  | 24780                                       | 40.40     | 53.90     | 74.0     | 94.0        | 33.6        | 40.1    |            |         |            | Noise floor          |  |  |  |

## Limits:

|                     | Freq Range       | Lim             | nits (dBuV Q   | P <sup>1</sup> ) | Comments                                   |
|---------------------|------------------|-----------------|----------------|------------------|--------------------------------------------|
| Standard            | dard (MHz)       |                 | Class A        |                  | Measurements above 1 GHz are made using    |
|                     |                  |                 | 3 m            | 3 m              | average and peak detectors.                |
|                     | 30-88            | 39              | 49             | 40               | Mains cables draped to floor, not bundled. |
| FCC 15.247d and     | 88-216           | 43.5            | 53.5           | 43.5             | *For measurements above 1 GHz, peak        |
| RSS-247 Section 5.5 | 216-960          | 46.5            | 56.5           | 46               | limits must also be met that are 20 dB     |
|                     | >960             | 49.5*           | 59.5*          | 54*              | higher than average limits.                |
| E                   | Bandwidth and De | etector Setting | IS:            |                  |                                            |
| Freq. Range (MHz)   | RBW (kHz)        | VBW (kHz)       | Detector<br>QP |                  |                                            |
| 30 – 1000           | 120              | >300            |                |                  |                                            |
| > 1000              | 1000             | >1000           | Pk an          | d AVG            |                                            |



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# Equipment Used:

| т    | Description                                          | Model                                  | S/N              | Manufacturer          | Most<br>Recent<br>Calibration | Calibration<br>Due Date | Most<br>Recent<br>Verification | Verification<br>Due Date |
|------|------------------------------------------------------|----------------------------------------|------------------|-----------------------|-------------------------------|-------------------------|--------------------------------|--------------------------|
| 1663 | EMI Test<br>Receiver                                 | ESU40                                  | 100098           | Rohde &<br>Schwarz    | 20-Mar-<br>2023               | 19-Mar-<br>2024         |                                |                          |
| 3685 | Marconi<br>Manor 3M<br>mast position<br>RE cable set | 3 cables (TN's<br>2373, 2479,<br>2357) |                  |                       |                               |                         | 28-Mar-2023                    | 27-Mar-2024              |
| 2349 | Double Ridge<br>Waveguide<br>Horn Antenna<br>1-18GHz | 3117                                   | 00152406         | ETS Lindgren          | 24-Feb-<br>2023               | 23-Feb-<br>2025         |                                |                          |
| 2602 | Miteq pre-<br>amp 1-18GHz<br>35dB                    | AFS42-<br>01001800-28-<br>10P-42       | N/A              | Miteq                 |                               |                         | 07-Jul-2022                    | 07-Jul-2023              |
| 2414 | Band Reject<br>Filter<br>(2.4GHz)                    | BRM50702-07                            | 003              | Micro-Tronics         | 13-Jan-2015                   |                         | 28-Mar-2023                    | 27-Mar-2024              |
| 1757 | 18GHz-40GHz<br>Preamp                                | JS4018004000-<br>30-8P-A1              | 1406279          | Miteq                 |                               |                         | 07-Jul-2022                    | 07-Jul-2023              |
| 1596 | Horn Antenna<br>18GHz -<br>26.5GHz                   | AT4640                                 | 309234           | Amplifier<br>Research |                               |                         |                                |                          |
| 2368 | RF Cable<br>30MHz-<br>26.5GHz                        | TRU-210                                | TRU-<br>12767-35 | TRU<br>Corporation    |                               |                         | 28-Mar-2023                    | 27-Mar-2024              |

### Uncertainty:

| Unce                                                                 | ertainty Budget     |                            |         |                       |  |  |  |
|----------------------------------------------------------------------|---------------------|----------------------------|---------|-----------------------|--|--|--|
| Ti                                                                   | tle: Radiated       | Radiated Emissions (>1GHz) |         |                       |  |  |  |
| Source of Uncertainty                                                | Value<br>units:± dB | Distribution               | Divisor | Uncertainty<br>(± dB) |  |  |  |
| Receiver - absolute level                                            | 0.3                 | Rect.                      | 1.73    | 0.17                  |  |  |  |
| Receiver - frequency response                                        | 2.0                 | Rect.                      | 1.73    | 1.16                  |  |  |  |
| Receiver - attenuator switching                                      | 0.2                 | Rect.                      | 1.73    | 0.12                  |  |  |  |
| Receiver - bandwidth switching                                       | 0.2                 | Rect.                      | 1.73    | 0.12                  |  |  |  |
| Receiver - display                                                   | 0.5                 | Rect.                      | 1.73    | 0.29                  |  |  |  |
| Antenna factor                                                       | 0.4                 | Norm.                      | 2.00    | 0.20                  |  |  |  |
| Antenna directivity                                                  | 1.0                 | Norm.                      | 2.00    | 0.50                  |  |  |  |
| Preamp correction factor                                             | 0.5                 | Norm.                      | 2.00    | 0.25                  |  |  |  |
| Cable correction factor                                              | 0.5                 | Norm.                      | 2.00    | 0.25                  |  |  |  |
| Site imperfection - NSA                                              | 3.0                 | Triang.                    | 2.45    | 1.22                  |  |  |  |
| Test table impact                                                    | 1.7                 | Rect.                      | 1.73    | 0.98                  |  |  |  |
| Combined uncertainty (RSS):                                          |                     |                            |         |                       |  |  |  |
| Coverage factor (2 sigma):<br>Extended uncertainty (95% confidence): |                     |                            |         |                       |  |  |  |



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# Radiated Band Edge

| Project number (Integrity): | 408R                                                                       | Build Phase:     | C1.5                      |  |                    |                  |  |  |  |
|-----------------------------|----------------------------------------------------------------------------|------------------|---------------------------|--|--------------------|------------------|--|--|--|
| Tested by:                  | Mike Royer                                                                 |                  | Date: 2 June, 2023        |  | 3                  | 3                |  |  |  |
|                             |                                                                            |                  |                           |  |                    |                  |  |  |  |
|                             | FCC §15.247 (d)                                                            |                  |                           |  |                    |                  |  |  |  |
| Requirements Standard(s):   | RSS -247 Section 5.5                                                       |                  | Referenced Standard(s): A |  | ANS                | ANSI C63.10-2013 |  |  |  |
|                             |                                                                            |                  |                           |  |                    |                  |  |  |  |
| EUT powered with:           | Battery                                                                    | Temp / Humidity: | N/A Test loca             |  | ion: Marconi Manor |                  |  |  |  |
|                             |                                                                            |                  | *                         |  |                    | •                |  |  |  |
| Test equipment used TN's:   | 1663,2929,2349,3685                                                        |                  |                           |  |                    |                  |  |  |  |
| EUT Serial number(s):       | 084803M3051E02                                                             | 21A1             |                           |  |                    |                  |  |  |  |
| EUT Software installed:     | 1.4.10+g2edc594                                                            |                  |                           |  |                    |                  |  |  |  |
| EUT Modification(s):        | USB Debug wires were attached to the earbud to allow control of the radio. |                  |                           |  |                    |                  |  |  |  |

## Conclusion:

The Bose model 408R passes Radiated Band Edge.

## Procedure:

The EUT was taped to a bamboo skewer and stuck into the test support at 150cm above the floor. From there the table was rotated and the antenna scanned up down and horizontal and vertical polarizations.

A high dynamic range pre-amp was used to ensure that overloading was avoided.

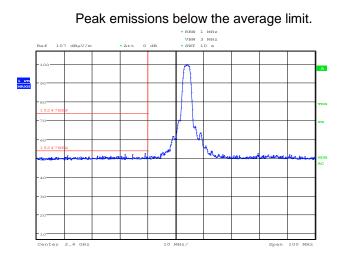
For lower band edge measurements, the transmit frequency was 2404 MHz.

For upper band edge measurements, the transmit frequency was 2478 MHz.





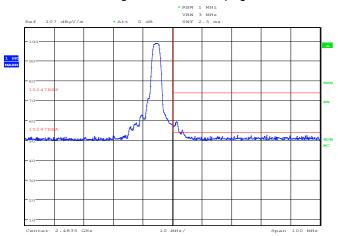
QHS-P2 low channel band edge



Date: 2.JUN.2023 17:30:53

QHS-P2 high channel band edge Peak measurement

Peak emissions not below the average limit, see next page for reduced video bandwidth method.



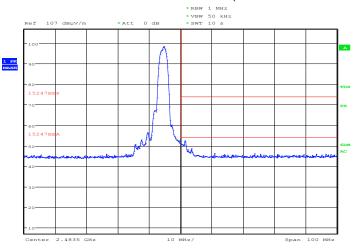
Date: 2.JUN.2023 17:03:06

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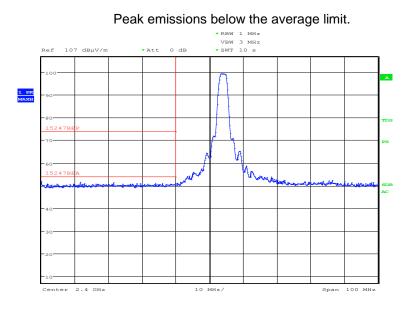


QHS-P2 high channel band edge Average measurement

#### Reduced video bandwidth method. (VBW = 50 kHz > 1/Ton).



Date: 2.JUN.2023 17:05:09



#### QHS-P6 low channel band edge

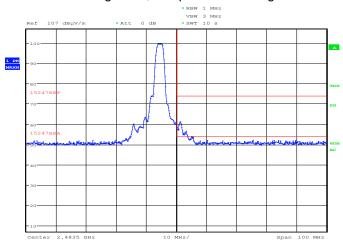
Date: 2.JUN.2023 17:36:42



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|----|----|----|---|-----|
|    | _  | _  |   | - 1 |

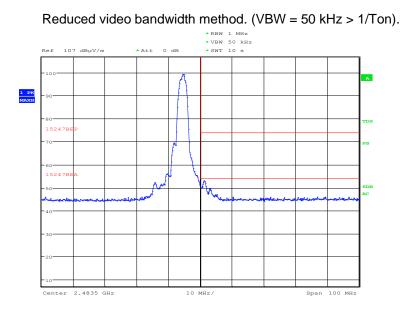
#### QHS-P6 high channel band edge Peak Measurement

Peak emissions not below average limit, see plot below using reduced video bandwidth method.



Date: 2.JUN.2023 17:12:04

QHS-P6 high channel band edge Average Measurement.



Date: 2.JUN.2023 17:13:52





### Limits:

|                   | Freq Range Limits (dBuV QP <sup>1</sup> ) |           |            |         | Comments                                   |
|-------------------|-------------------------------------------|-----------|------------|---------|--------------------------------------------|
| Standard          | (MHz)                                     | Class A   |            | Class B | Measurements above 1 GHz are made using    |
|                   |                                           | 10 m      | 3 m        | 3 m     | average and peak detectors.                |
|                   | 30-88                                     | 39        | 49         | 40      | Mains cables draped to floor, not bundled. |
|                   | 88-216                                    | 43.5      | 53.5       | 43.5    | *For measurements above 1 GHz, peak        |
| or RSS-GEN        | 216-960                                   | 46.5      | 56.5       | 46      | limits must also be met that are 20 dB     |
|                   | >960                                      | 49.5*     | 59.5*      | 54*     | higher than average limits.                |
|                   |                                           |           | Class A    | Class B | Mains cables bundled not draped to floor.  |
|                   |                                           |           | 3 m        | 3 m     | *For measurements above 1 GHz, peak        |
|                   | 30-230                                    |           | 50         | 40      | limits must also be met that are 20 dB     |
| CISPR 32          | 230-1000                                  |           | 57         | 47      | higher than average limits.                |
| CISER 32          | Freq Range<br>(GHz)                       |           |            |         |                                            |
|                   | 1-3                                       |           | 56*        | 50*     |                                            |
|                   | 3-6                                       |           | 60*        | 54*     |                                            |
| E                 | andwidth and D                            |           |            |         |                                            |
| Freq. Range (MHz) | RBW (kHz)                                 | VBW (kHz) | ) Detector |         |                                            |
| 30 - 1000         | 120                                       | >300      | QP         |         |                                            |
| > 1000            | 1000                                      | >1000     | Pk and AVG |         |                                            |

## **Equipment Used:**

| TN   | Description                                                 | Model                                  | S/N      | Manufacturer       | Most Recent<br>Calibration | Calibration<br>Due Date | Most Recent<br>Verification | Verification<br>Due Date |
|------|-------------------------------------------------------------|----------------------------------------|----------|--------------------|----------------------------|-------------------------|-----------------------------|--------------------------|
| 1663 | EMI Test Receiver                                           | ESU40                                  | 100098   | Rohde &<br>Schwarz | 20-Mar-2023                | 19-Mar-2024             |                             |                          |
| 2929 | Mini-circuits band-edge<br>pre-amp 300 MHz - 8<br>GHz 20 dB | ZX60HV-83LN+                           | N/A      | Mini-Circuits      |                            |                         | 28-Mar-2023                 | 27-Mar-2024              |
| 2349 | Double Ridge Waveguide<br>Horn Antenna 1-18GHz              | 3117                                   | 00152406 | ETS Lindgren       | 24-Feb-2023                | 23-Feb-2025             |                             |                          |
| 3685 | Marconi Manor 3M mast position RE cable set                 | 3 cables (TN's<br>2373, 2479,<br>2357) |          |                    |                            |                         | 28-Mar-2023                 | 27-Mar-2024              |



## Uncertainty:

| Uncertainty Budget                     |                     |                            |         |                       |  |  |  |
|----------------------------------------|---------------------|----------------------------|---------|-----------------------|--|--|--|
| Title:                                 | Radiated            | Radiated Emissions (>1GHz) |         |                       |  |  |  |
| Source of Uncertainty                  | Value<br>units:± dB | Distribution               | Divisor | Uncertainty<br>(± dB) |  |  |  |
| Receiver - absolute level              | 0.3                 | Rect.                      | 1.73    | 0.17                  |  |  |  |
| Receiver - frequency response          | 2.0                 | Rect.                      | 1.73    | 1.16                  |  |  |  |
| Receiver - attenuator switching        | 0.2                 | Rect.                      | 1.73    | 0.12                  |  |  |  |
| Receiver - bandwidth switching         | 0.2                 | Rect.                      | 1.73    | 0.12                  |  |  |  |
| Receiver - display                     | 0.5                 | Rect.                      | 1.73    | 0.29                  |  |  |  |
| Antenna factor                         | 0.4                 | Norm.                      | 2.00    | 0.20                  |  |  |  |
| Antenna directivity                    | 1.0                 | Norm.                      | 2.00    | 0.50                  |  |  |  |
| Preamp correction factor               | 0.5                 | Norm.                      | 2.00    | 0.25                  |  |  |  |
| Cable correction factor                | 0.5                 | Norm.                      | 2.00    | 0.25                  |  |  |  |
| Site imperfection - NSA                | 3.0                 | Triang.                    | 2.45    | 1.22                  |  |  |  |
| Test table impact                      | 1.7                 | Rect.                      | 1.73    | 0.98                  |  |  |  |
| Combined uncertainty (RSS):            |                     |                            |         |                       |  |  |  |
| Coverage factor (2 sigma):             |                     |                            |         |                       |  |  |  |
| Extended uncertainty (95% confidence): |                     |                            |         |                       |  |  |  |

# End of report