



# **RADIO TEST REPORT**

**Test Report No. : 12990291S-A**

**Applicant** : Sony Corporation, Japan and Sony Group Companies  
**Type of Equipment** : AV RECEIVER  
**Model No.** : XAV-AX5500  
**FCC ID** : AK8XAVAX5500  
**Test regulation** : FCC Part 15 Subpart C: 2019  
**Test Result** : Complied (Refer to SECTION 3.2)

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. This test report covers Radio technical requirements.  
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.

**Date of test:** August 5 to 8, 2019

**Representative test engineer:**

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**Approved by:**

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CERTIFICATE 1266.03

- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
- ☒ There is no testing item of "Non-accreditation".

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## Reference: Abbreviations

|                |                                            |                |                                                                                                       |
|----------------|--------------------------------------------|----------------|-------------------------------------------------------------------------------------------------------|
| AC             | Alternating Current                        | QP             | Quasi-Peak                                                                                            |
| AFH            | Adaptive Frequency Hopping                 | QPSK           | Quadri-Phase Shift Keying                                                                             |
| AM             | Amplitude Modulation                       | RBW            | Resolution Band Width                                                                                 |
| Amp, AMP       | Amplifier                                  | RDS            | Radio Data System                                                                                     |
| Ant, ANT       | Antenna                                    | RE             | Transmitter unwanted emissions in the spurious domain and Receiver spurious emissions (Radiated) test |
| AP             | Access Point                               | RE (directive) | Radio Equipment                                                                                       |
| AT             | Antenna Terminal conducted test            | RF             | Radio Frequency                                                                                       |
| Atten., ATT    | Attenuator                                 | RMS            | Root Mean Square                                                                                      |
| AV             | Average                                    | Rx             | Receiving                                                                                             |
| BPSK           | Binary Phase-Shift Keying                  | SA, S/A        | Spectrum Analyzer                                                                                     |
| BR             | Bluetooth Basic Rate                       | SG             | Signal Generator                                                                                      |
| BT             | Bluetooth                                  | SVSWR          | Site-Voltage Standing Wave Ratio                                                                      |
| BT LE          | Bluetooth Low Energy                       | TR             | Test Receiver                                                                                         |
| BW             | BandWidth                                  | Tx             | Transmitting                                                                                          |
| Cal Int        | Calibration Interval                       | VBW            | Video BandWidth                                                                                       |
| CCK            | Complementary Code Keying                  | Vert.          | Vertical                                                                                              |
| Ch., CH        | Channel                                    | WLAN           | Wireless LAN                                                                                          |
| CW             | Continuous Wave                            |                |                                                                                                       |
| DBPSK          | Differential BPSK                          | EN             | European Norm                                                                                         |
| DC             | Direct Current                             | EU             | European Union                                                                                        |
| DQPSK          | Differential QPSK                          | IEEE           | Institute of Electrical and Electronics Engineers                                                     |
| DSSS           | Direct Sequence Spread Spectrum            | ILAC           | International Laboratory Accreditation Conference                                                     |
| EDR            | Enhanced Data Rate                         | MRA            | Mutual Recognition Arrangement                                                                        |
| EIRP, e.i.r.p. | Equivalent Isotropically Radiated Power    | NIST           | National Institute of Standards and Technology                                                        |
| EMC            | ElectroMagnetic Compatibility              |                |                                                                                                       |
| EMI            | ElectroMagnetic Interference               |                |                                                                                                       |
| ERP, e.r.p.    | Effective Radiated Power                   |                |                                                                                                       |
| EUT            | Equipment Under Test                       |                |                                                                                                       |
| Fac.           | Factor                                     |                |                                                                                                       |
| FHSS           | Frequency Hopping Spread Spectrum          |                |                                                                                                       |
| FM             | Frequency Modulation                       |                |                                                                                                       |
| Freq.          | Frequency                                  | A2LA           | The American Association for Laboratory Accreditation                                                 |
| GFSK           | Gaussian Frequency-Shift Keying            |                |                                                                                                       |
| GNSS           | Global Navigation Satellite System         |                |                                                                                                       |
| GPS            | Global Positioning System                  |                |                                                                                                       |
| Hori.          | Horizontal                                 |                |                                                                                                       |
| IF             | Intermediate Frequency                     |                |                                                                                                       |
| LIMS           | Laboratory Information Management System   |                |                                                                                                       |
| MCS            | Modulation and Coding Scheme               |                |                                                                                                       |
| NS             | No signal detect.                          |                |                                                                                                       |
| NSA            | Normalized Site Attenuation                |                |                                                                                                       |
| OBW            | Occupied Band Width                        |                |                                                                                                       |
| OFDM           | Orthogonal Frequency Division Multiplexing |                |                                                                                                       |
| P/M            | Power meter                                |                |                                                                                                       |
| PCB            | Printed Circuit Board                      |                |                                                                                                       |
| PER            | Packet Error Rate                          |                |                                                                                                       |
| PHY            | Physical Layer                             |                |                                                                                                       |
| PK             | Peak                                       |                |                                                                                                       |
| PN             | Protocol Number                            |                |                                                                                                       |
| PRBS           | Pseudo-Random Bit Sequence                 |                |                                                                                                       |
| PSD            | Power Spectral Density                     |                |                                                                                                       |
| QAM            | Quadrature Amplitude Modulation            |                |                                                                                                       |

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## **SECTION 1: Customer information**

|                  |   |                                                                                                                 |
|------------------|---|-----------------------------------------------------------------------------------------------------------------|
| Company Name     | : | Sony Corporation, Japan and Sony Group Companies                                                                |
| Address          | : | 700/402 Moo. 7, Amata City Chonburi Industrial Estate, Don<br>Hua Roh, Muang Chonburi, Chonburi 20000, Thailand |
| Telephone Number | : | +66 38 214900 17 Ext : 1932                                                                                     |
| Contact Person   | : | Jumroen Phaoenchoke                                                                                             |

The information provided from the customer is as follows;

- Applicant, Type of Equipment, Model No., FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (E.U.T.)
- SECTION 4: Operation of E.U.T. during testing

\* The laboratory is exempted from liability of any test results affected from the above information in SECTION 2 and 4.

## **SECTION 2: Equipment under test (E.U.T.)**

### **2.1 Identification of E.U.T.**

|                                                        |   |                                                                                            |
|--------------------------------------------------------|---|--------------------------------------------------------------------------------------------|
| Type of Equipment                                      | : | AV RECEIVER                                                                                |
| Model No.                                              | : | XAV-AX5500                                                                                 |
| Serial No.                                             | : | Refer to SECTION 4.2                                                                       |
| Rating                                                 | : | DC 12 V                                                                                    |
| Receipt Date of Sample<br>(Information from test lab.) | : | August 5, 2019                                                                             |
| Country of Mass-production                             | : | Thailand                                                                                   |
| Condition of EUT                                       | : | Engineering prototype<br>(Not for Sale: This sample is equivalent to mass-produced items.) |
| Modification of EUT                                    | : | No Modification by the test lab.                                                           |

### **2.2 Product Description**

Model: XAV-AX5500 (referred to as the EUT in this report) is an AV RECEIVER.

## **Radio Specification**

### **Bluetooth (BDR / EDR function)**

|                        |   |                                   |
|------------------------|---|-----------------------------------|
| Radio Type             | : | Transceiver                       |
| Frequency of Operation | : | 2402 MHz - 2480 MHz               |
| Modulation             | : | FHSS, GFSK, $\pi/4$ -DQPSK, 8DPSK |
| Antenna type           | : | Meander Monopole antenna          |
| Antenna Gain           | : | -0.63 dBi                         |
| Clock frequency        | : | 26 MHz (Crystal)                  |

## SECTION 3: Test specification, procedures & results

### 3.1 Test Specification

Test Specification : FCC Part 15 Subpart C  
 FCC Part 15 final revised on July 19, 2019 and effective August 19, 2019 except 15.258

Title : FCC 47 CFR Part 15 Radio Frequency Device Subpart C Intentional Radiators  
 Section 15.207 Conducted limits  
 Section 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz,  
 and 5725-5850 MHz

\* The revision on July 19, 2019, does not affect the test specification applied to the EUT.

\* Also the EUT complies with FCC Part 15 Subpart B.

### 3.2 Procedures and results

| Item                                     | Test Procedure                                                           | Specification                                                              | Worst Margin                                                                                                                                                                                                                                                  | Results          | Remarks                                         |
|------------------------------------------|--------------------------------------------------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|-------------------------------------------------|
| Conducted Emission                       | FCC: ANSI C63.10-2013<br>6. Standard test methods<br>ISED: RSS-Gen 8.8   | FCC: Section 15.207<br>ISED: RSS-Gen 8.8                                   | -                                                                                                                                                                                                                                                             | N/A              | *1)                                             |
| Carrier Frequency Separation             | FCC: KDB 558074 D01<br>15.247 Meas Guidance v05r02<br>ISED: -            | FCC: Section 15.247(a)(1)<br>ISED: RSS-247 5.1 (b)                         | See data.                                                                                                                                                                                                                                                     | Complied a)      | Conducted                                       |
| 20dB Bandwidth                           | FCC: KDB 558074 D01<br>15.247 Meas Guidance v05r02<br>ISED: -            | FCC: Section 15.247(a)(1)<br>ISED: RSS-247 5.1 (a)                         |                                                                                                                                                                                                                                                               | Complied a)      | Conducted                                       |
| Number of Hopping Frequency              | FCC: KDB 558074 D01<br>15.247 Meas Guidance v05r02<br>ISED: -            | FCC: Section 15.247(a)(1)(iii)<br>ISED: RSS-247 5.1 (d)                    |                                                                                                                                                                                                                                                               | Complied b)      | Conducted                                       |
| Dwell time                               | FCC: KDB 558074 D01<br>15.247 Meas Guidance v05r02<br>ISED: -            | FCC: Section 15.247(a)(1)(iii)<br>ISED: RSS-247 5.1 (d)                    |                                                                                                                                                                                                                                                               | Complied c)      | Conducted                                       |
| Maximum Peak Output Power                | FCC: KDB 558074 D01<br>15.247 Meas Guidance v05r02<br>ISED: RSS-Gen 6.12 | FCC: Section 15.247(a)(b)(1)<br>ISED: RSS-247 5.4 (b)                      |                                                                                                                                                                                                                                                               | Complied d)      | Conducted                                       |
| Spurious Emission & Band Edge Compliance | FCC: KDB 558074 D01<br>15.247 Meas Guidance v05r02<br>ISED: RSS-Gen 6.13 | FCC: Section 15.247(d)<br>ISED: RSS-247 5.5<br>RSS-Gen 8.9<br>RSS-Gen 8.10 | 3.2 dB<br>490.947 MHz, QP, Hori.<br>Mode: Tx DH5_2402 MHz<br><br>3.2 dB<br>490.945 MHz, QP, Hori.<br>Mode: Tx DH5_2441 MHz<br><br>3.2 dB<br>490.945 MHz, QP, Hori.<br>Mode: Tx DH5_2480 MHz<br><br>3.2 dB<br>490.946 MHz, QP, Hori.<br>Mode: Tx 3DH5_2402 MHz | Complied e) / f) | Conducted/<br>Radiated<br>(above 30 MHz)<br>*2) |

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

\*1) The test is not applicable since the EUT does not have AC power ports.

\*2) Radiated test was selected over 30 MHz based on section 15.247(d).

a) Refer to APPENDIX 1 (data of 20dB Bandwidth, 99%Occupied Bandwidth and Carrier Frequency Separation)

b) Refer to APPENDIX 1 (data of Number of Hopping Frequency)

c) Refer to APPENDIX 1 (data of Dwell time)

d) Refer to APPENDIX 1 (data of Maximum Peak Output Power)

e) Refer to APPENDIX 1 (data of Conducted Spurious Emission)

f) Refer to APPENDIX 1 (data of Radiated Spurious Emission)

Symbols:

Complied The data of this test item has enough margin, more than the measurement uncertainty.

Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.

\* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.

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### **FCC Part 15.31 (e)**

The EUT provides stable voltage constantly to the wireless transmitter regardless of input voltage. Instead of a new battery, DC power supply was used for the test. That does not affect the test result, therefore the EUT complies with the requirement.

### **FCC Part 15.203 Antenna requirement**

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement.

### **3.3 Addition to standard**

| Item                                                                                                                                                                                   | Test Procedure | Specification | Worst margin | Results     | Remarks   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------|--------------|-------------|-----------|
| 99% Occupied Bandwidth                                                                                                                                                                 | RSS-Gen 6.7    | ISED: -       | N/A          | Complied a) | Conducted |
| Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.<br>a) Refer to APPENDIX 1 (data of 20dB Bandwidth, 99%Occupied Bandwidth and Carrier Frequency Separation) |                |               |              |             |           |

Other than above, no addition, exclusion nor deviation has been made from the standard.

### **3.4 Uncertainty**

There is no applicable rule of uncertainty in this applied standard. Therefore, the results are derived depending on whether or not laboratory uncertainty is applied.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor  $k=2$ .  
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| Item                                             | Frequency range | Uncertainty (+/-) |                |                |                |
|--------------------------------------------------|-----------------|-------------------|----------------|----------------|----------------|
|                                                  |                 | No. 1 SAC / SR    | No. 2 SAC / SR | No. 3 SAC / SR | No. 4 SAC / SR |
| Conducted emission (AC Mains) LISN               | 150 kHz-30 MHz  | 2.9 dB            | 2.8 dB         | 2.9 dB         | 2.9 dB         |
| Radiated emission<br>(Measurement distance: 3 m) | 9 kHz-30 MHz    | 3.0 dB            | 3.0 dB         | 3.1 dB         | -              |
|                                                  | 30 MHz-200 MHz  | 4.6 dB            | 4.6 dB         | 4.7 dB         | -              |
|                                                  | 200 MHz-1 GHz   | 6.0 dB            | 6.0 dB         | 6.1 dB         | -              |
|                                                  | 1 GHz-6 GHz     | 4.8 dB            | 4.8 dB         | 4.8 dB         | -              |
|                                                  | 6 GHz-18 GHz    | 5.4 dB            | 5.4 dB         | 5.4 dB         | -              |
| Radiated emission<br>(Measurement distance: 1 m) | 18 GHz-40 GHz   | 5.6 dB            | 5.6 dB         | 5.6 dB         | -              |
|                                                  | 1 GHz-18 GHz    | 5.7 dB            | 5.7 dB         | 5.7 dB         | -              |
|                                                  | 18 GHz-40 GHz   | 5.9 dB            | 5.9 dB         | 5.9 dB         | -              |

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

| Antenna terminal test                                   | Uncertainty (+/-) |
|---------------------------------------------------------|-------------------|
| Power Measurement above 1 GHz (Average Detector)_SPM-06 | 0.81 dB           |
| Power Measurement above 1 GHz (Peak Detector)_SPM-06    | 1.53 dB           |
| Power Measurement above 1 GHz (Average Detector)_SPM-07 | 0.95 dB           |
| Power Measurement above 1 GHz (Peak Detector)_SPM-07    | 1.21 dB           |
| Power Measurement above 1 GHz (Average Detector)_SPM-13 | 0.90 dB           |
| Power Measurement above 1 GHz (Peak Detector)_SPM-13    | 1.04 dB           |
| Spurious emission (Conducted) below 1GHz                | 1.8 dB            |
| Spurious emission (Conducted) 1 GHz-3 GHz               | 1.7 dB            |
| Spurious emission (Conducted) 3 GHz-18 GHz              | 2.3 dB            |
| Spurious emission (Conducted) 18 GHz-26.5 GHz           | 2.4 dB            |
| Spurious emission (Conducted) 26.5 GHz-40 GHz           | 2.4 dB            |
| Bandwidth Measurement                                   | 0.61 %            |
| Duty cycle and Time Measurement                         | 0.012 %           |

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### 3.5 Test Location

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A2LA Certificate Number: 1266.03 (FCC Test Firm Registration Number: 626366, ISED Lab Company Number: 2973D)

| Test site                  | Width x Depth x Height (m) | Size of reference ground plane (m) / horizontal conducting plane | Maximum measurement distance |
|----------------------------|----------------------------|------------------------------------------------------------------|------------------------------|
| No.1 Semi-anechoic chamber | 20.6 x 11.3 x 7.65         | 20.6 x 11.3                                                      | 10 m                         |
| No.2 Semi-anechoic chamber | 20.6 x 11.3 x 7.65         | 20.6 x 11.3                                                      | 10 m                         |
| No.3 Semi-anechoic chamber | 12.7 x 7.7 x 5.35          | 12.7 x 7.7                                                       | 5 m                          |
| No.4 Semi-anechoic chamber | 8.1 x 5.1 x 3.55           | 8.1 x 5.1                                                        | -                            |
| No.1 Shielded room         | 6.8 x 4.1 x 2.7            | 6.8 x 4.1                                                        | -                            |
| No.2 Shielded room         | 6.8 x 4.1 x 2.7            | 6.8 x 4.1                                                        | -                            |
| No.3 Shielded room         | 6.3 x 4.7 x 2.7            | 6.3 x 4.7                                                        | -                            |
| No.4 Shielded room         | 4.4 x 4.7 x 2.7            | 4.4 x 4.7                                                        | -                            |
| No.5 Shielded room         | 7.8 x 6.4 x 2.7            | 7.8 x 6.4                                                        | -                            |
| No.6 Shielded room         | 7.8 x 6.4 x 2.7            | 7.8 x 6.4                                                        | -                            |
| No.8 shielded room         | 3.45 x 5.5 x 2.4           | 3.45 x 5.5                                                       | -                            |
| No.1 Measurement room      | 2.55 x 4.1 x 2.5           | -                                                                | -                            |

### 3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.



## **SECTION 4: Operation of E.U.T. during testing**

### **4.1 Operating Mode(s)**

Bluetooth (BT): Transmitting (Tx), Payload: PRBS9

Details of Operating Mode(s)

| Test Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Mode                                                    | Tested frequency                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------|
| Spurious Emission<br>(Conducted/Radiated)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Tx (Hopping Off) DH5, 3DH5                              | 2402 MHz<br>2441 MHz<br>2480 MHz |
| Carrier Frequency Separation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Tx (Hopping On) DH5, 3DH5                               | 2402 MHz<br>2441 MHz<br>2480 MHz |
| 20dB Bandwidth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Tx (Hopping Off) DH5, 3DH5                              | 2402 MHz<br>2441 MHz<br>2480 MHz |
| Number of Hopping Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Tx (Hopping On) DH5, 3DH5                               | -                                |
| Dwell time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Tx (Hopping On),<br>-DH1, DH3, DH5<br>-3DH1, 3DH3, 3DH5 | -                                |
| Maximum Peak Output Power                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Tx (Hopping Off) DH5, 2DH5, 3DH5                        | 2402 MHz<br>2441 MHz<br>2480 MHz |
| Band Edge Compliance<br>(Conducted)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Tx DH5, 3DH5<br>-Hopping On<br>-Hopping Off             | 2402 MHz<br>2480 MHz             |
| 99% Occupied Bandwidth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Tx DH5, 3DH5<br>-Hopping On<br>-Hopping Off             | 2402 MHz<br>2441 MHz<br>2480 MHz |
| <p>*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload length (except Dwell time test)</p> <p>*2DH mode (2Mb/s EDR: pi/4DQPSK) was excluded for other tests than power measurement by using 3DH mode (3 Mb/s EDR: 8DPSK) as a representative.</p> <p>* It is considered that the non-tested packet type (e.g. inquiry) can be omitted as it is complied with above all the test items based on Bluetooth Core specification.</p> <p>*EUT has the power settings by the software as follows;<br/> Power settings:   BDR:   Ext.=23, Int.=39<br/>                           EDR:   Ext.=73, Int.=48<br/> Software:           CSR BlueSuite BlueTest Version 2.5.8</p> <p>*This setting of software is the worst case.<br/> Any conditions under the normal use do not exceed the condition of setting.<br/> In addition, end users cannot change the settings of the output power of the product.</p> |                                                         |                                  |

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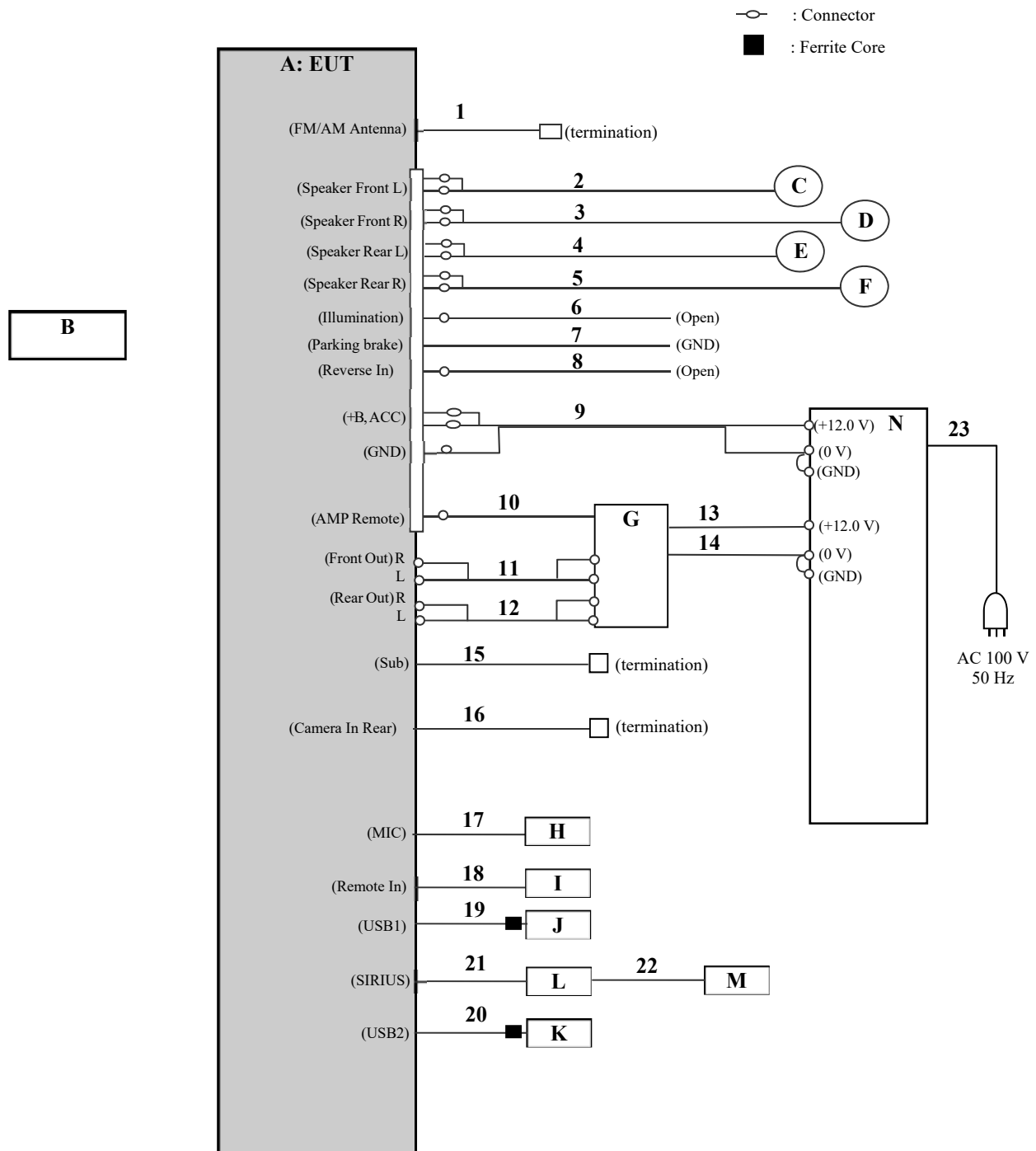
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## 4.2 Configuration and peripherals



\* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.

#### Description of EUT and Support equipment

| No. | Item                            | Model number | Serial number      | Manufacturer  | Remarks |
|-----|---------------------------------|--------------|--------------------|---------------|---------|
| A   | AV RECEIVER                     | XAV-AX5500   | 017 *1)<br>018 *2) | Sony          | EUT     |
| B   | Remote Commander                | RM-X170      | -                  | Sony          | -       |
| C   | Speaker 1                       | IS-10        | -                  | Sony          | -       |
| D   | Speaker 2                       | IS-10        | -                  | Sony          | -       |
| E   | Speaker 3                       | XS-GTF1625R  | -                  | Sony          | -       |
| F   | Speaker 4                       | XS-GTF1625R  | -                  | Sony          | -       |
| G   | Stereo Power Amplifier          | XM-4S-020    | -                  | Sony          | -       |
| H   | Microphone                      | -            | -                  | Sony          | -       |
| I   | Remote Controller               | RM-X4S       | -                  | Sony          | -       |
| J   | USB Memory                      | SDK-USM4GU   | -                  | Sony          | -       |
| K   | USB Memory                      | SDK-USM4GU   | -                  | Sony          | -       |
| L   | SIRIUS XM Connect Vehicle Tuner | SXV300       | 1627               | XM Network    | -       |
| M   | Vehicle Satellite Radio Antenna | NGVA3        | 1624A              | XM Network    | -       |
| N   | DC Power Supply                 | PAN35-10A    | NA000955           | Kikusui Corp. | -       |

\*1) Used for Radiated emissions tests.

\*2) Used for Antenna terminal conducted tests

#### List of cables used

| No. | Name                  | Length (m) | Shield     |            | Remarks |
|-----|-----------------------|------------|------------|------------|---------|
|     |                       |            | Cable      | Connector  |         |
| 1   | FM antenna            | 1.0        | Shielded   | Shielded   | -       |
| 2   | Speaker (1)           | 0.15+2.4   | Unshielded | Unshielded | -       |
| 3   | Speaker (2)           | 0.15+2.4   | Unshielded | Unshielded | -       |
| 4   | Speaker (3)           | 0.15+1.9   | Unshielded | Unshielded | -       |
| 5   | Speaker (4)           | 0.15+1.9   | Unshielded | Unshielded | -       |
| 6   | Illumination          | 0.15+1.0   | Unshielded | Unshielded | -       |
| 7   | Parking               | 2.0        | Unshielded | Unshielded | -       |
| 8   | Reverse In            | 0.15+1.0   | Unshielded | Unshielded | -       |
| 9   | DC Power              | 0.15+1.3   | Unshielded | Unshielded | -       |
| 10  | AMP Remote            | 0.15+1.4   | Unshielded | Unshielded | -       |
| 11  | RCA (Front Audio Out) | 5.1        | Shielded   | Shielded   | -       |
| 12  | RCA (Rear Audio Out)  | 5.2        | Shielded   | Shielded   | -       |
| 13  | DC Power (+)          | 1.1+1.5    | Unshielded | Unshielded | -       |
| 14  | DC Power (-)          | 1.1+1.5    | Unshielded | Unshielded | -       |
| 15  | RCA (Sub Audio Out)   | 1.2        | Shielded   | Shielded   | -       |
| 16  | RCA (Rear Camera)     | 3.0        | Shielded   | Shielded   | -       |
| 17  | Microphone            | 3.5        | Shielded   | Shielded   | -       |
| 18  | REMOTE IN             | 0.15+1.1   | Shielded   | Shielded   | -       |
| 19  | USB                   | 0.1+1.3    | Shielded   | Shielded   | -       |
| 20  | USB                   | 0.1+1.3    | Shielded   | Shielded   | -       |
| 21  | Tuner                 | 0.6        | Shielded   | Shielded   | -       |
| 22  | Radio Antenna         | 7.1        | Shielded   | Shielded   | -       |
| 23  | AC                    | 1.9        | Unshielded | Unshielded | -       |

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## **SECTION 5: Radiated Spurious Emission**

### **Test Procedure**

[For below 1 GHz]

EUT was placed on a platform of nominal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane. The table is made of expanded polystyrol and expanded polypropylene and the table top is covered with polycarbonate. That has very low permittivity. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.

The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.

The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).

The test was made with the detector (RBW/VBW) in the following table.

When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

#### **Test Antennas are used as below;**

|              |                   |                  |             |
|--------------|-------------------|------------------|-------------|
| Frequency    | 30 MHz to 200 MHz | 200 MHz to 1 GHz | Above 1 GHz |
| Antenna Type | Biconical         | Logperiodic      | Horn        |

In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

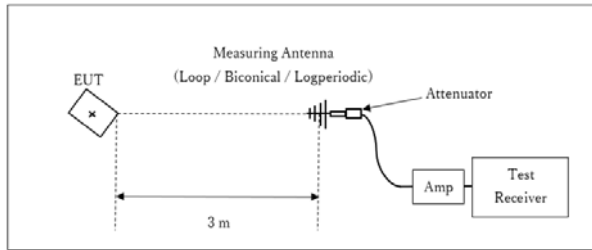
**20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9 (ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).**

|                 |               |                          |                                                                                                       |                              |
|-----------------|---------------|--------------------------|-------------------------------------------------------------------------------------------------------|------------------------------|
| Frequency       | Below 1 GHz   | Above 1 GHz              |                                                                                                       | 20 dBc                       |
| Instrument used | Test Receiver | Spectrum Analyzer        |                                                                                                       | Spectrum Analyzer            |
| Detector        | QP            | PK                       | AV *1)                                                                                                | PK                           |
| IF Bandwidth    | BW 120 kHz    | RBW: 1 MHz<br>VBW: 3 MHz | RBW: 1 MHz<br>VBW: 1/T<br>(T: burst length, refer to Burst rate confirmation sheet)<br>Detector: Peak | RBW: 100 kHz<br>VBW: 300 kHz |

\*1) Average Power Measurement was performed based on KDB 558074 D01 15.247 Meas Guidance v05r02.

**Figure 2: Test Setup**

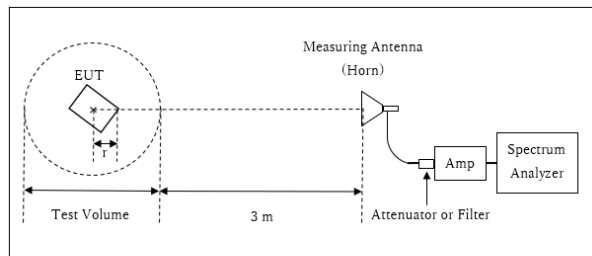
Below 1 GHz



x : Center of turn table

Test Distance: 3 m

1 GHz - 13 GHz



r : Radius of an outer periphery of EUT

x : Center of turn table

Distance Factor:  $20 \times \log (3.9 \text{ m} / 3.0 \text{ m}) = 2.27\text{dB}$

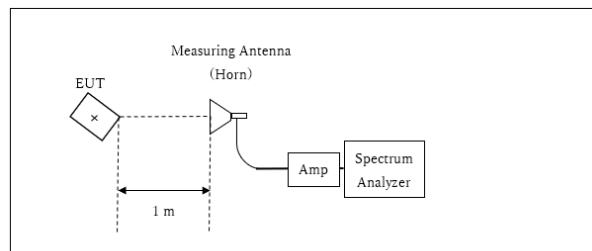
\* Test Distance:  $(3 + \text{Test Volume} / 2) - r = 3.9 \text{ m}$

Test Volume : 2.0 m

(Test Volume has been calibrated based on CISPR 16-1-4.)

r = 0.1 m

13 GHz - 26.5 GHz



x : Center of turn table

Distance Factor:  $20 \times \log (1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

\*Test Distance: 1 m

- The carrier level and noise levels were confirmed at each position of 0 deg. and 30 deg. of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

| Antenna polarization | Carrier | Spurious (Below 1 GHz) | Spurious (1 GHz - 2.8 GHz) | Spurious (2.8 GHz - 13 GHz) | Spurious (13 GHz - 18 GHz) | Spurious (18 GHz - 26.5 GHz) |
|----------------------|---------|------------------------|----------------------------|-----------------------------|----------------------------|------------------------------|
| Horizontal           | 0 deg.  | 0 deg.                 | 0 deg.                     | 0 deg.                      | 0 deg.                     | 0 deg.                       |
| Vertical             | 30 deg. | 0 deg.                 | 30 deg.                    | 30 deg.                     | 0 deg.                     | 0 deg.                       |

The test results and limit are rounded off to one decimal place, so some differences might be observed.

**Measurement range** : 30 MHz - 26.5 GHz

**Test data** : APPENDIX

**Test result** : Pass

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## **SECTION 6: Antenna Terminal Conducted Tests**

### **Test Procedure**

The tests were made with below setting connected to the antenna port.

| Test                                             | Span                                    | RBW             | VBW                | Sweep time                                                     | Detector         | Trace       | Instrument used                  |
|--------------------------------------------------|-----------------------------------------|-----------------|--------------------|----------------------------------------------------------------|------------------|-------------|----------------------------------|
| 20dB Bandwidth                                   | 3 MHz                                   | 30 kHz          | 100 kHz            | Auto                                                           | Peak             | Max Hold    | Spectrum Analyzer                |
| 99% Occupied Bandwidth *1)                       | Enough width to display emission skirts | 1 to 5 % of OBW | Three times of RBW | Auto                                                           | Peak             | Max Hold    | Spectrum Analyzer                |
| Maximum Peak Output Power                        | -                                       | -               | -                  | Auto                                                           | Peak Average *2) | -           | Power Meter (Sensor: 160 MHz BW) |
| Carrier Frequency Separation                     | 3 MHz                                   | 100 kHz         | 300 kHz            | Auto                                                           | Peak             | Max Hold    | Spectrum Analyzer                |
| Number of Hopping Frequency                      | 30 MHz                                  | 100 kHz         | 300 kHz            | Auto                                                           | Peak             | Max Hold    | Spectrum Analyzer                |
| Dwell Time                                       | Zero Span                               | 100 kHz, 1 MHz  | 300 kHz, 3 MHz     | As necessary capture the entire dwell time per hopping channel | Peak             | Clear Write | Spectrum Analyzer                |
| Conducted Spurious Emission *3)                  | 9 kHz to 150 kHz                        | 200 Hz          | 620 Hz             | Auto                                                           | Peak             | Max Hold    | Spectrum Analyzer                |
|                                                  | 150 kHz to 30 MHz                       | 10 kHz          | 30 kHz             |                                                                |                  |             |                                  |
|                                                  | 30 MHz to 25 GHz                        | 100 kHz         | 300 kHz            |                                                                |                  |             |                                  |
| Conducted Spurious Emission Band Edge compliance | 10 MHz                                  | 100 kHz         | 300 kHz            | Auto                                                           | Peak             | Max Hold    | Spectrum Analyzer                |

\*1) Peak hold was applied as Worst-case measurement.

\*2) Reference data

\*3) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.

Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.

(9 kHz -150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 kHz)

The test results and limit are rounded off to two decimals place, so some differences might be observed.  
The equipment and cables were not used for factor 0 dB of the data sheets.

**Test data : APPENDIX**

**Test result : Pass**

## **APPENDIX 1: Test data**

### **20dB Bandwidth, 99%Occupied Bandwidth and Carrier Frequency Separation**

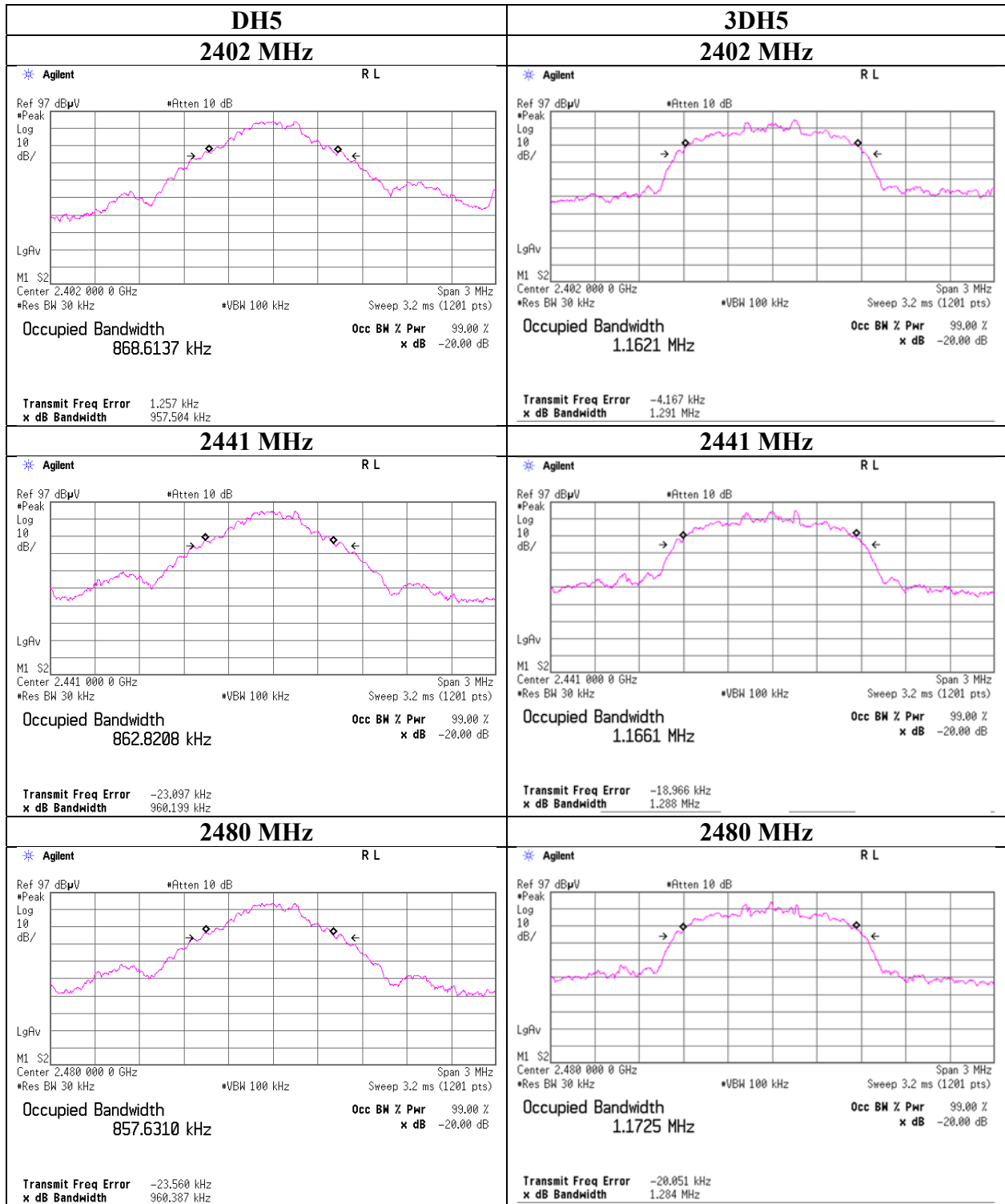
Report No. 12990291S-A  
Test place Shonan EMC Lab. No.5 Shielded Room  
Date August 8, 2019  
Temperature / Humidity 25 deg. C / 53 % RH  
Engineer Kazuya Noda  
Mode Tx, Hopping Off, Tx, Hopping On

| Mode | Freq.<br>[MHz] | 20dB Bandwidth<br>[MHz] | 99% Occupied<br>Bandwidth<br>[kHz] | Carrier Frequency<br>Separation<br>[MHz] | Limit for Carrier<br>Frequency separation<br>[MHz] |
|------|----------------|-------------------------|------------------------------------|------------------------------------------|----------------------------------------------------|
| DH5  | 2402.0         | 0.958                   | 868.6137                           | 1.000                                    | $\geq 0.638$                                       |
| DH5  | 2441.0         | 0.960                   | 862.8208                           | 1.000                                    | $\geq 0.640$                                       |
| DH5  | 2480.0         | 0.960                   | 857.6310                           | 1.000                                    | $\geq 0.640$                                       |
| DH5  | Hopping On     | -                       | 78553.6000                         | -                                        | -                                                  |
| 3DH5 | 2402.0         | 1.291                   | 1162.1000                          | 1.000                                    | $\geq 0.860$                                       |
| 3DH5 | 2441.0         | 1.288                   | 1166.1000                          | 1.000                                    | $\geq 0.859$                                       |
| 3DH5 | 2480.0         | 1.284                   | 1172.5000                          | 1.000                                    | $\geq 0.856$                                       |
| 3DH5 | Hopping On     | -                       | 78659.2000                         | -                                        | -                                                  |

Limit: Two-thirds of 20dB Bandwidth or 25kHz (whichever is greater).

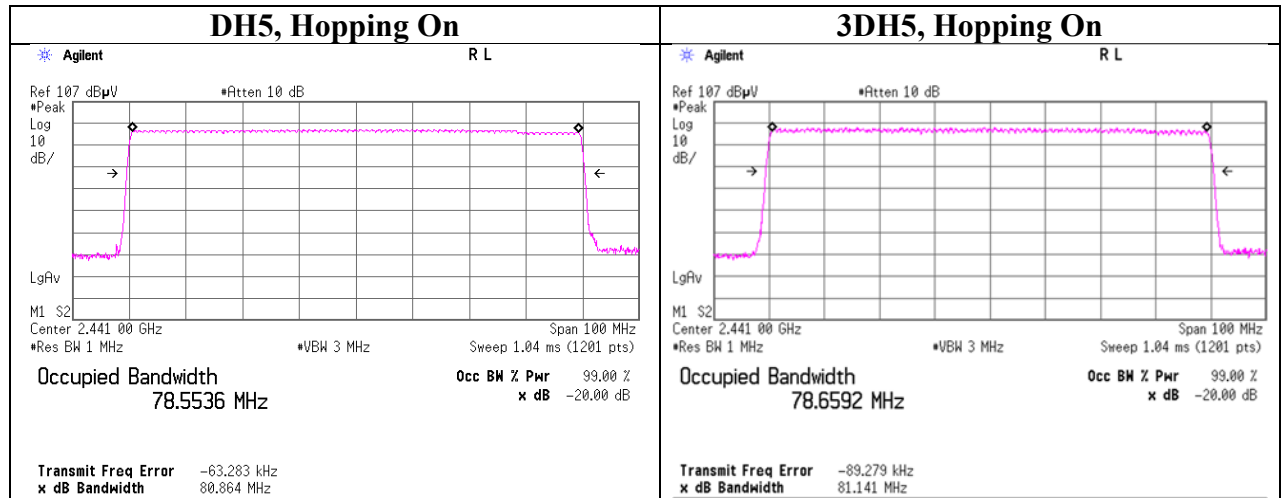
No limit applies to 20dB Bandwidth.

## 20dB Bandwidth and 99% Occupied Bandwidth





## 20dB Bandwidth and 99% Occupied Bandwidth



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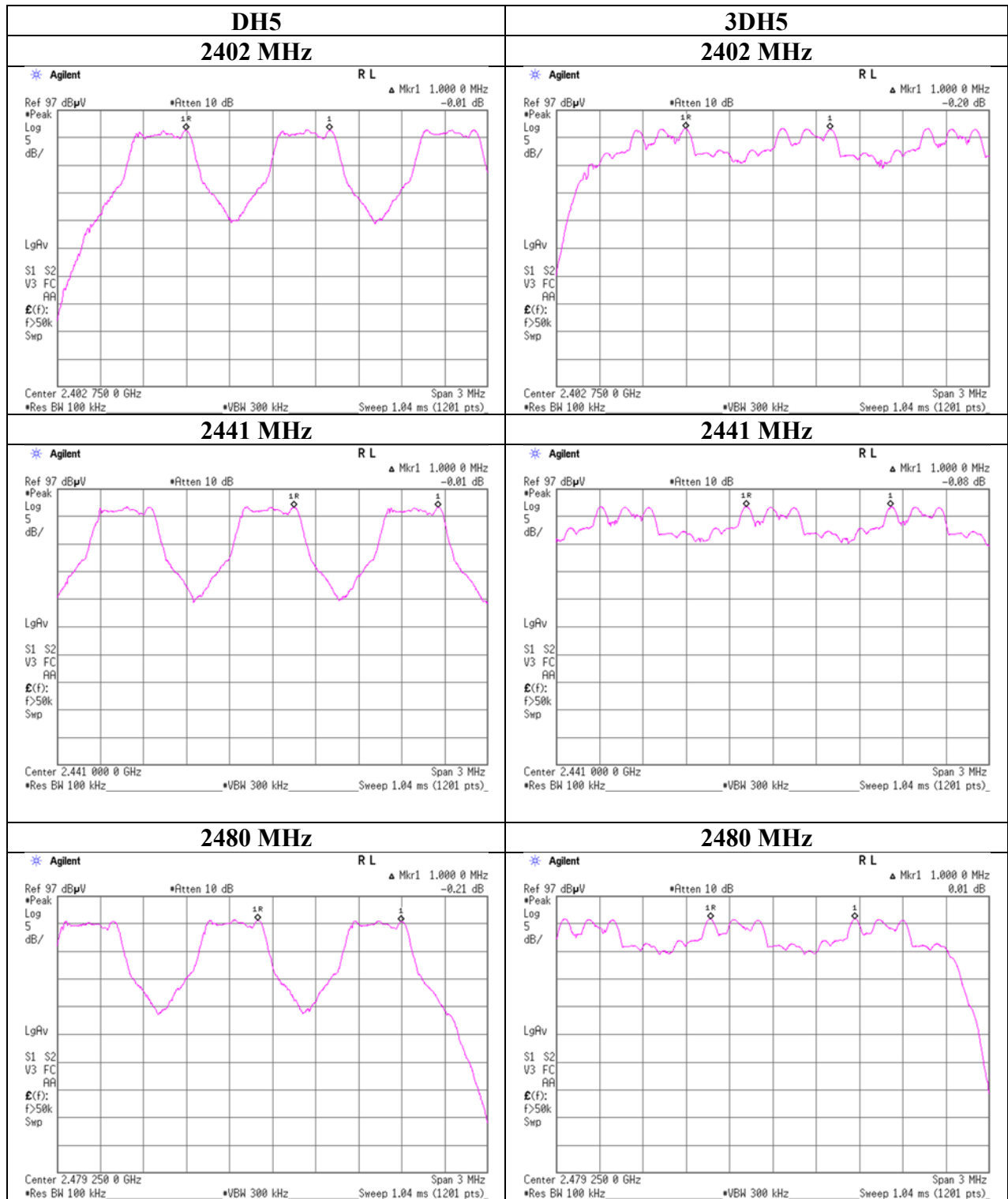
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## Carrier Frequency Separation



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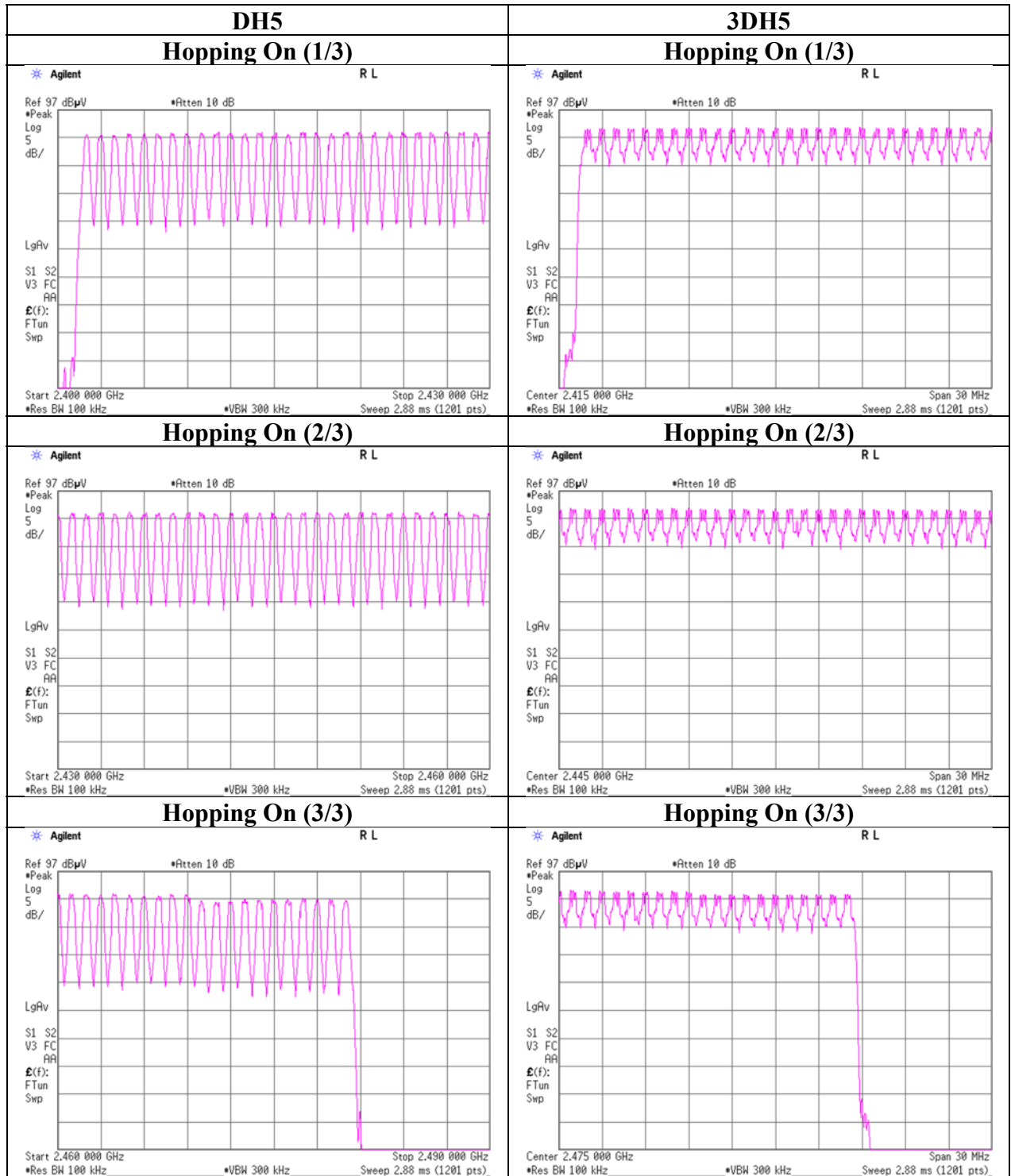
### **Number of Hopping Frequency**

Report No. 12990291S-A  
Test place Shonan EMC Lab. No.5 Shielded Room  
Date August 8, 2019  
Temperature / Humidity 25 deg. C / 53 % RH  
Engineer Kazuya Noda  
Mode Tx, Hopping On

| Mode | Number of channel<br>[channels] | Limit<br>[channels] |
|------|---------------------------------|---------------------|
| DH5  | 79                              | $\geq 15$           |
| 3DH5 | 79                              | $\geq 15$           |

Test was not performed at AFH mode whose number of hopping channel is 20 channels because this Bluetooth radio is in compliance of Bluetooth Specification.

## Number of Hopping Frequency



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## Dwell time

|                        |                                    |
|------------------------|------------------------------------|
| Report No.             | 12990291S-A                        |
| Test place             | Shonan EMC Lab. No.5 Shielded Room |
| Date                   | August 8, 2019                     |
| Temperature / Humidity | 25 deg. C / 53 % RH                |
| Engineer               | Kazuya Noda                        |
| Mode                   | Tx, Hopping On                     |

| Mode | Number of transmission<br>in a 31.6(79 Hopping x 0.4)<br>/ 12.8 (32 Hopping x 0.4) second period |          |             |           | Length of<br>transmission<br>[msec] | Result<br>[msec] | Limit<br>[msec] |
|------|--------------------------------------------------------------------------------------------------|----------|-------------|-----------|-------------------------------------|------------------|-----------------|
| DH1  | 51.0 times /                                                                                     | 5 sec. x | 31.6 sec. = | 323 times | 0.416                               | 135              | 400             |
| DH3  | 26.0 times /                                                                                     | 5 sec. x | 31.6 sec. = | 165 times | 1.675                               | 276              | 400             |
| DH5  | 17.0 times /                                                                                     | 5 sec. x | 31.6 sec. = | 108 times | 2.920                               | 315              | 400             |
| 3DH1 | 51.0 times /                                                                                     | 5 sec. x | 31.6 sec. = | 323 times | 0.436                               | 141              | 400             |
| 3DH3 | 26.0 times /                                                                                     | 5 sec. x | 31.6 sec. = | 165 times | 1.696                               | 280              | 400             |
| 3DH5 | 17.0 times /                                                                                     | 5 sec. x | 31.6 sec. = | 108 times | 2.948                               | 318              | 400             |

Sample Calculation

Result = Number of transmission x Length of transmission

\*Average data of 5 tests.(except Inquiry)

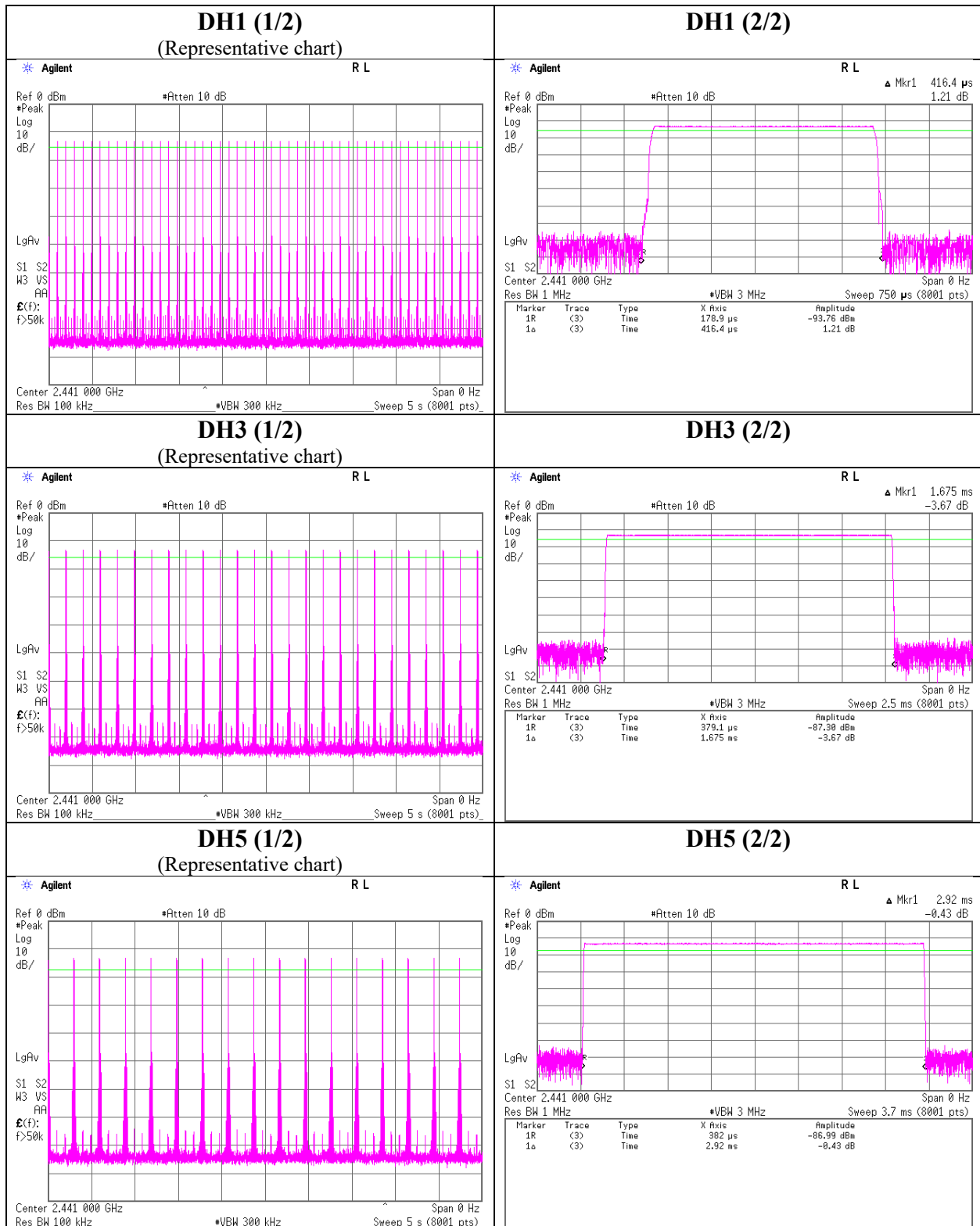
| Mode | Sampling [times] |    |    |    |    | Average<br>[times] |
|------|------------------|----|----|----|----|--------------------|
|      | 1                | 2  | 3  | 4  | 5  |                    |
| DH1  | 51               | 51 | 51 | 51 | 51 | 51                 |
| DH3  | 26               | 26 | 26 | 26 | 26 | 26                 |
| DH5  | 17               | 17 | 17 | 17 | 17 | 17                 |
| 3DH1 | 51               | 51 | 51 | 51 | 51 | 51                 |
| 3DH3 | 26               | 26 | 26 | 26 | 26 | 26                 |
| 3DH5 | 17               | 17 | 17 | 17 | 17 | 17                 |

Sample Calculation

Average = Summation (Sampling 1 to 5) / 5

This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in  $N \times 0.4s$ , where  $N$  is the number of channels being used in the hopping sequence ( $20 \leq N \leq 79$ ), is always less than  $0.4s$  regardless of packet size. This is confirmed in the test report for  $N = 79$ .

## Dwell time



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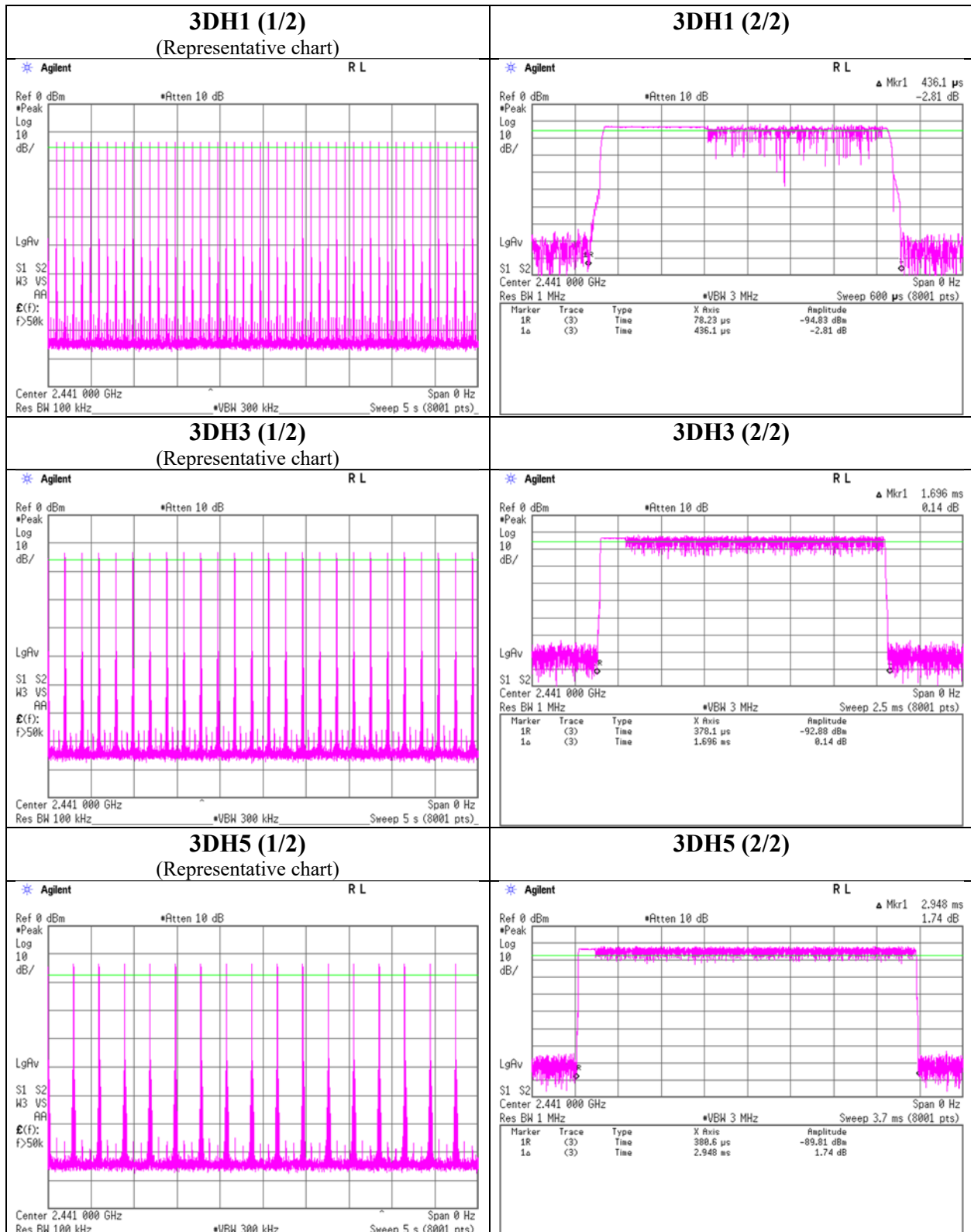
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## Dwell time



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## Maximum Peak Output Power

Report No. 12990291S-A  
Test place Shonan EMC Lab. No.5 Shielded Room  
Date August 8, 2019  
Temperature / Humidity 25 deg. C / 53 % RH  
Engineer Kazuya Noda  
Mode Tx, Hopping Off

| Mode | Freq.<br>[MHz] | Reading<br>[dBm] | Cable<br>Loss<br>[dB] | Atten.<br>Loss<br>[dB] | Conducted Power |      |       |      |                | e.i.r.p. for RSS-247     |        |      |       |      |                |
|------|----------------|------------------|-----------------------|------------------------|-----------------|------|-------|------|----------------|--------------------------|--------|------|-------|------|----------------|
|      |                |                  |                       |                        | Result          |      | Limit |      | Margin<br>[dB] | Antenna<br>Gain<br>[dBi] | Result |      | Limit |      | Margin<br>[dB] |
|      |                |                  |                       |                        | [dBm]           | [mW] | [dBm] | [mW] |                |                          | [dBm]  | [mW] | [dBm] | [mW] |                |
| DH5  | 2402.0         | -13.02           | 1.84                  | 9.89                   | -1.29           | 0.74 | 20.96 | 125  | 22.25          | -0.63                    | -1.92  | 0.64 | 36.02 | 4000 | 37.94          |
| DH5  | 2441.0         | -12.64           | 1.86                  | 9.89                   | -0.89           | 0.81 | 20.96 | 125  | 21.85          | -0.63                    | -1.52  | 0.70 | 36.02 | 4000 | 37.54          |
| DH5  | 2480.0         | -13.50           | 1.88                  | 9.89                   | -1.73           | 0.67 | 20.96 | 125  | 22.69          | -0.63                    | -2.36  | 0.58 | 36.02 | 4000 | 38.38          |
| 2DH5 | 2402.0         | -11.84           | 1.84                  | 9.89                   | -0.11           | 0.97 | 20.96 | 125  | 21.07          | -0.63                    | -0.74  | 0.84 | 36.02 | 4000 | 36.76          |
| 2DH5 | 2441.0         | -11.56           | 1.86                  | 9.89                   | 0.19            | 1.04 | 20.96 | 125  | 20.77          | -0.63                    | -0.44  | 0.90 | 36.02 | 4000 | 36.46          |
| 2DH5 | 2480.0         | -12.42           | 1.88                  | 9.89                   | -0.65           | 0.86 | 20.96 | 125  | 21.61          | -0.63                    | -1.28  | 0.74 | 36.02 | 4000 | 37.30          |
| 3DH5 | 2402.0         | -11.37           | 1.84                  | 9.89                   | 0.36            | 1.09 | 20.96 | 125  | 20.60          | -0.63                    | -0.27  | 0.94 | 36.02 | 4000 | 36.29          |
| 3DH5 | 2441.0         | -11.18           | 1.86                  | 9.89                   | 0.57            | 1.14 | 20.96 | 125  | 20.39          | -0.63                    | -0.06  | 0.99 | 36.02 | 4000 | 36.08          |
| 3DH5 | 2480.0         | -12.16           | 1.88                  | 9.89                   | -0.39           | 0.91 | 20.96 | 125  | 21.35          | -0.63                    | -1.02  | 0.79 | 36.02 | 4000 | 37.04          |

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

e.i.r.p. Result = Conducted Power Result + Antenna Gain

Test was not performed at AFH mode, because the decrease of number of channel (min: 20ch) at AFH mode does not influence on the output power and bandwidth of the EUT.

As this device had AFH mode and frequency separation could not meet the requirement of over 20dB BW without 2/3 relaxation, 125mW power limit was applied to it.



## Average Output Power (Reference data for RF Exposure)

|                        |                                    |
|------------------------|------------------------------------|
| Report No.             | 12990291S-A                        |
| Test place             | Shonan EMC Lab. No.5 Shielded Room |
| Date                   | August 8, 2019                     |
| Temperature / Humidity | 25 deg. C / 53 % RH                |
| Engineer               | Kazuya Noda                        |
| Mode                   | Tx, Hopping Off                    |

| Mode | Freq.<br>[MHz] | Reading<br>[dBm] | Cable<br>Loss<br>[dB] | Atten.<br>Loss<br>[dB] | Result<br>(Time average) |      | Duty<br>factor<br>[dB] | Result<br>(Burst power average) |      |
|------|----------------|------------------|-----------------------|------------------------|--------------------------|------|------------------------|---------------------------------|------|
|      |                |                  |                       |                        | [dBm]                    | [mW] |                        | [dBm]                           | [mW] |
| DH5  | 2402.0         | -14.98           | 1.84                  | 9.89                   | -3.25                    | 0.47 | 1.08                   | -2.17                           | 0.61 |
| DH5  | 2441.0         | -14.55           | 1.86                  | 9.89                   | -2.80                    | 0.52 | 1.08                   | -1.72                           | 0.67 |
| DH5  | 2480.0         | -15.66           | 1.88                  | 9.89                   | -3.89                    | 0.41 | 1.08                   | -2.81                           | 0.52 |
| 2DH5 | 2402.0         | -15.97           | 1.84                  | 9.89                   | -4.24                    | 0.38 | 1.05                   | -3.19                           | 0.48 |
| 2DH5 | 2441.0         | -15.54           | 1.86                  | 9.89                   | -3.79                    | 0.42 | 1.05                   | -2.74                           | 0.53 |
| 2DH5 | 2480.0         | -16.51           | 1.88                  | 9.89                   | -4.74                    | 0.34 | 1.05                   | -3.69                           | 0.43 |
| 3DH5 | 2402.0         | -15.83           | 1.84                  | 9.89                   | -4.10                    | 0.39 | 1.05                   | -3.05                           | 0.50 |
| 3DH5 | 2441.0         | -15.46           | 1.86                  | 9.89                   | -3.71                    | 0.43 | 1.05                   | -2.66                           | 0.54 |
| 3DH5 | 2480.0         | -16.43           | 1.88                  | 9.89                   | -4.66                    | 0.34 | 1.05                   | -3.61                           | 0.44 |

Sample Calculation:

Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

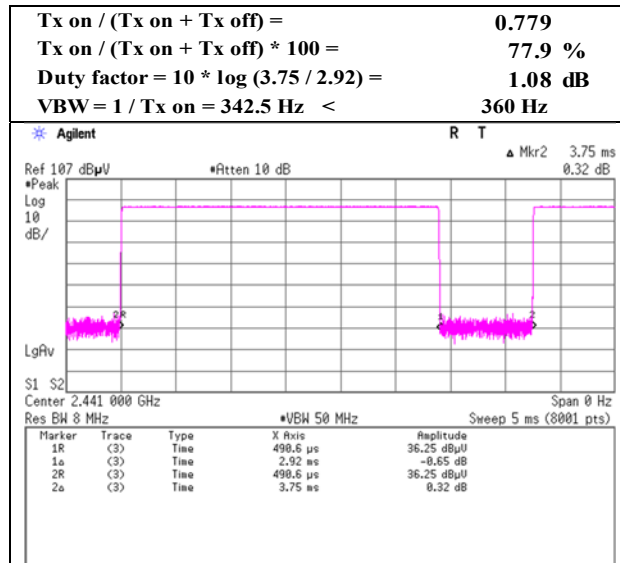
Result (Burst power average) = Time average + Duty factor

\*The equipment and cables were not used for factor 0 dB of the data sheets.

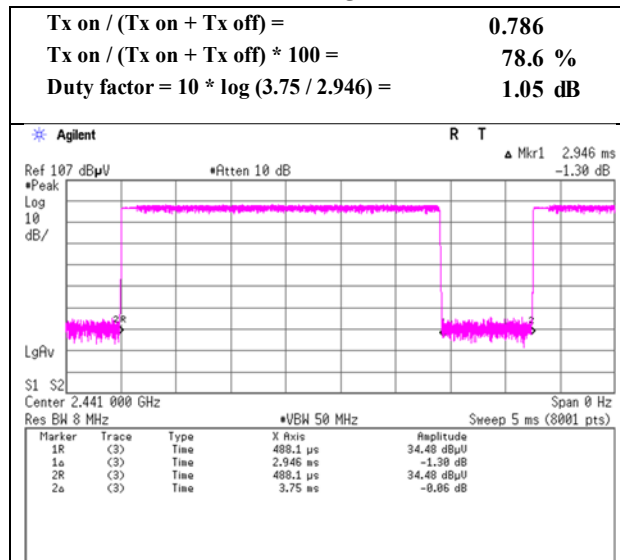
## Burst Rate Confirmation

Report No. 12990291S-A  
Test place Shonan EMC Lab. No.5 Shielded Room  
Date August 8, 2019  
Temperature / Humidity 25 deg. C / 53 % RH  
Engineer Kazuya Noda  
Mode Tx, Hopping Off

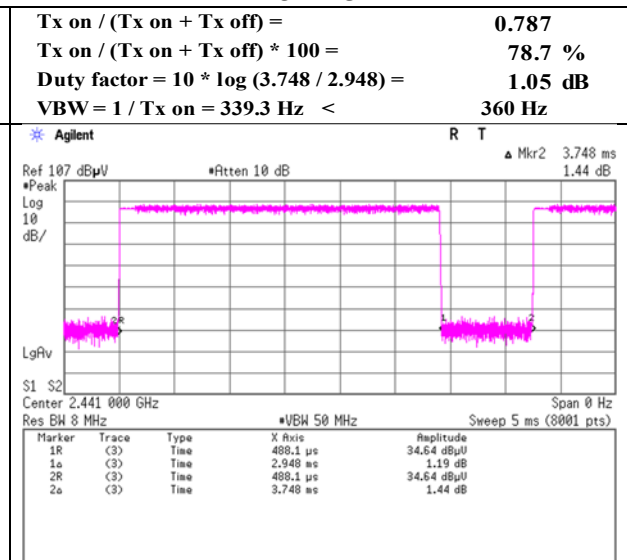
### DH5



### 2DH5



### 3DH5



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## Radiated Spurious Emission

|                        |                               |                     |                     |
|------------------------|-------------------------------|---------------------|---------------------|
| Report No.             | 12990291S-A                   |                     |                     |
| Test place             | Shonan EMC Lab.               |                     |                     |
| Semi Anechoic Chamber  | No.2                          | No.3                | No.2                |
| Date                   | August 6, 2019                | August 5, 2019      | August 6, 2019      |
| Temperature / Humidity | 23 deg. C / 60 % RH           | 24 deg. C / 51 % RH | 23 deg. C / 60 % RH |
| Engineer               | Makoto Hosaka                 | Kazuya Noda         | Makoto Hosaka       |
|                        | (30 MHz -1000 MHz)            | (1 GHz -13 GHz)     | (13 GHz – 26.5 GHz) |
| Mode                   | Tx, Hopping Off, DH5 2402 MHz |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 132.423            | QP       | 42.30             | 14.05              | 8.32         | 31.85        | 0.00                    | 32.82              | 43.50             | 10.6           | 255            | 26             |             |
| Hori.    | 134.128            | QP       | 44.00             | 14.11              | 8.36         | 31.85        | 0.00                    | 34.62              | 43.50             | 8.8            | 252            | 21             |             |
| Hori.    | 144.459            | QP       | 40.00             | 14.57              | 8.61         | 31.84        | 0.00                    | 31.34              | 43.50             | 12.1           | 214            | 341            |             |
| Hori.    | 423.229            | QP       | 44.70             | 16.10              | 7.71         | 31.66        | 0.00                    | 36.85              | 46.00             | 9.1            | 100            | 166            |             |
| Hori.    | 457.088            | QP       | 44.60             | 16.77              | 7.92         | 31.65        | 0.00                    | 37.64              | 46.00             | 8.3            | 101            | 315            |             |
| Hori.    | 490.947            | QP       | 48.80             | 17.56              | 8.04         | 31.63        | 0.00                    | 42.77              | 46.00             | 3.2            | 100            | 284            |             |
| Hori.    | 495.010            | QP       | 43.80             | 17.64              | 8.05         | 31.62        | 0.00                    | 37.87              | 46.00             | 8.1            | 100            | 290            |             |
| Hori.    | 2390.000           | PK       | 47.46             | 28.33              | 14.15        | 41.59        | 2.27                    | 50.62              | 73.90             | 23.2           | 143            | 128            |             |
| Hori.    | 4804.000           | PK       | 51.74             | 31.62              | 6.44         | 42.88        | 2.27                    | 49.19              | 73.90             | 24.7           | 157            | 123            |             |
| Hori.    | 7206.000           | PK       | 48.67             | 37.23              | 7.87         | 42.92        | 2.27                    | 53.12              | 73.90             | 20.7           | 100            | 0              |             |
| Hori.    | 9608.000           | PK       | 48.58             | 38.84              | 9.17         | 43.17        | 2.27                    | 55.69              | 73.90             | 18.2           | 100            | 0              |             |
| Hori.    | 2390.000           | AV       | 35.51             | 28.33              | 14.15        | 41.59        | 2.27                    | 38.67              | 53.90             | 15.2           | 143            | 128            | VBW: 360 Hz |
| Hori.    | 4804.000           | AV       | 43.24             | 31.62              | 6.44         | 42.88        | 2.27                    | 40.69              | 53.90             | 13.2           | 157            | 123            | VBW: 360 Hz |
| Hori.    | 7206.000           | AV       | 36.98             | 37.23              | 7.87         | 42.92        | 2.27                    | 41.43              | 53.90             | 12.4           | 100            | 0              | VBW: 360 Hz |
| Hori.    | 9608.000           | AV       | 36.95             | 38.84              | 9.17         | 43.17        | 2.27                    | 44.06              | 53.90             | 9.8            | 100            | 0              | VBW: 360 Hz |
| Vert.    | 134.149            | QP       | 38.10             | 14.11              | 8.36         | 31.85        | 0.00                    | 28.72              | 43.50             | 14.7           | 240            | 12             |             |
| Vert.    | 2390.000           | PK       | 48.04             | 28.33              | 14.15        | 41.59        | 2.27                    | 51.20              | 73.90             | 22.7           | 196            | 354            |             |
| Vert.    | 4804.000           | PK       | 54.29             | 31.62              | 6.44         | 42.88        | 2.27                    | 51.74              | 73.90             | 22.1           | 224            | 204            |             |
| Vert.    | 7206.000           | PK       | 48.61             | 37.23              | 7.87         | 42.92        | 2.27                    | 53.06              | 73.90             | 20.8           | 100            | 0              |             |
| Vert.    | 9608.000           | PK       | 48.96             | 38.84              | 9.17         | 43.17        | 2.27                    | 56.07              | 73.90             | 17.8           | 100            | 0              |             |
| Vert.    | 2390.000           | AV       | 35.57             | 28.33              | 14.15        | 41.59        | 2.27                    | 38.73              | 53.90             | 15.1           | 196            | 354            | VBW: 360 Hz |
| Vert.    | 4804.000           | AV       | 46.72             | 31.62              | 6.44         | 42.88        | 2.27                    | 44.17              | 53.90             | 9.7            | 224            | 204            | VBW: 360 Hz |
| Vert.    | 7206.000           | AV       | 37.12             | 37.23              | 7.87         | 42.92        | 2.27                    | 41.57              | 53.90             | 12.3           | 100            | 0              | VBW: 360 Hz |
| Vert.    | 9608.000           | AV       | 37.07             | 38.84              | 9.17         | 43.17        | 2.27                    | 44.18              | 53.90             | 9.7            | 100            | 0              | VBW: 360 Hz |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.27\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

\* These results have sufficient margin without taking account Dwell time factor.

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark  |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|---------|
| Hori.    | 2402.000           | PK       | 85.97             | 28.31              | 14.16        | 41.60        | 2.27                    | 89.11              | -                 | -              | Carrier |
| Hori.    | 2400.000           | PK       | 40.13             | 28.31              | 14.15        | 41.60        | 2.27                    | 43.26              | 69.11             | 25.8           |         |
| Vert.    | 2402.000           | PK       | 89.01             | 28.31              | 14.16        | 41.60        | 2.27                    | 92.15              | -                 | -              | Carrier |
| Vert.    | 2400.000           | PK       | 40.31             | 28.31              | 14.15        | 41.60        | 2.27                    | 43.44              | 72.15             | 28.7           |         |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.27\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

**UL Japan, Inc.**

**Shonan EMC Lab.**

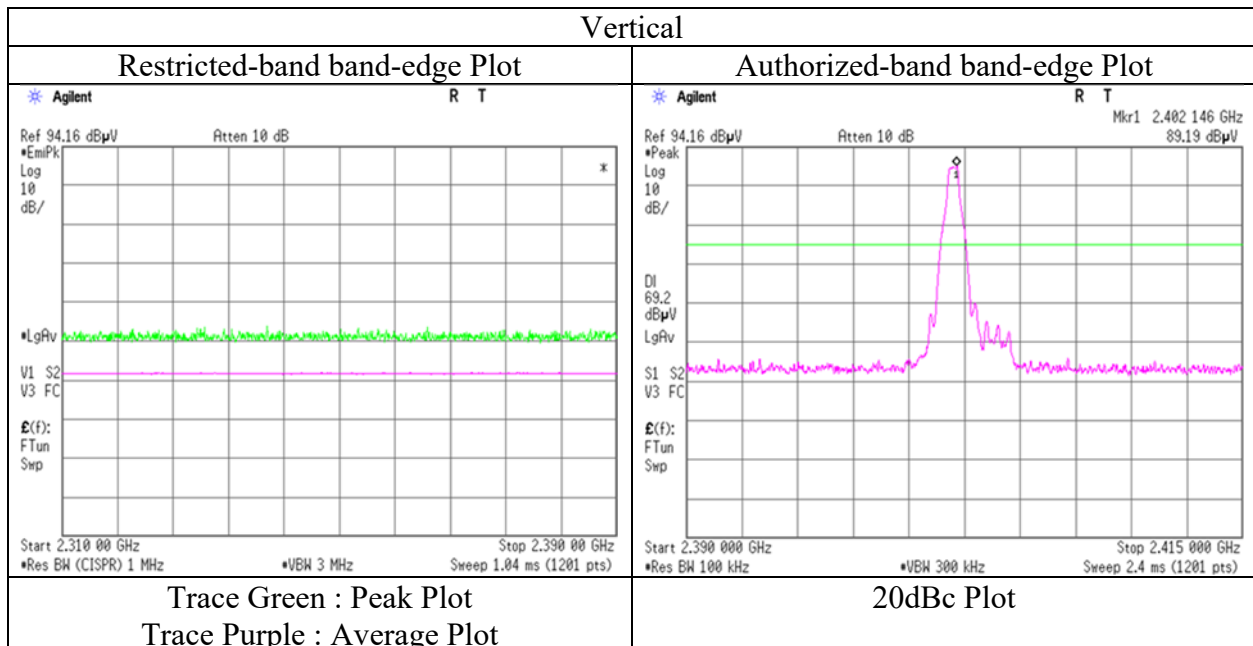
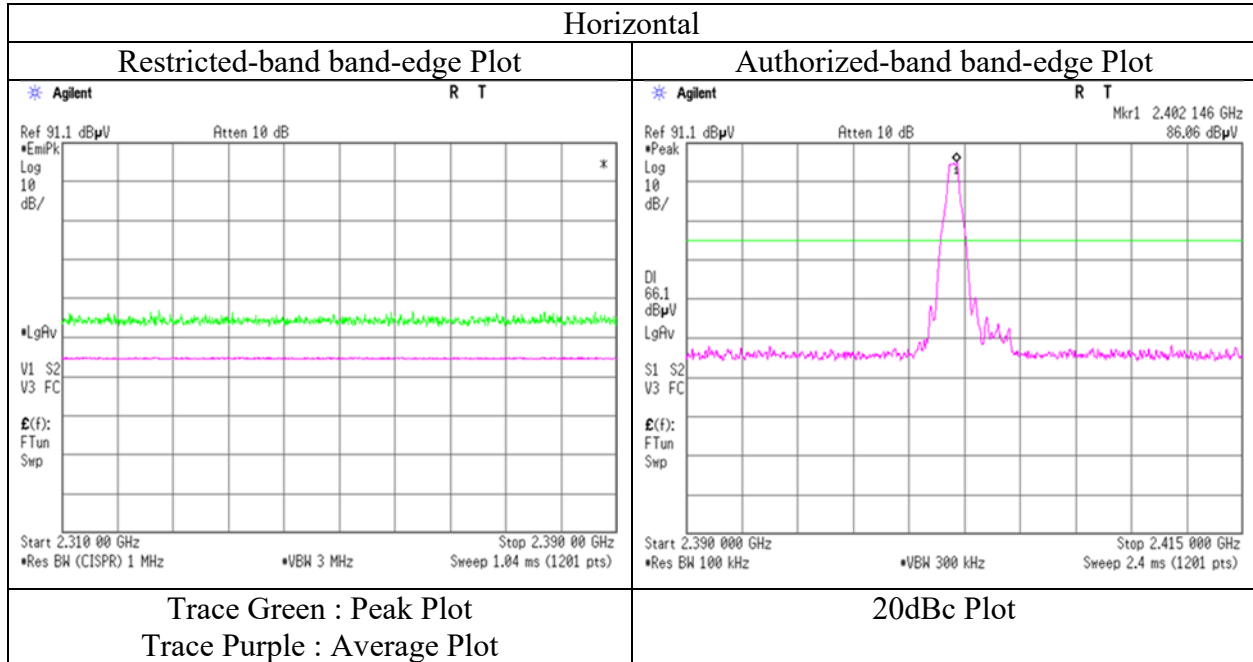
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## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                               |                     |                     |
|------------------------|-------------------------------|---------------------|---------------------|
| Report No.             | 12990291S-A                   | No.3                | No.2                |
| Test place             | Shonan EMC Lab.               | August 5, 2019      | August 6, 2019      |
| Semi Anechoic Chamber  | No.2                          | 24 deg. C / 51 % RH | 23 deg. C / 60 % RH |
| Date                   | August 6, 2019                | Kazuya Noda         | Makoto Hosaka       |
| Temperature / Humidity | 23 deg. C / 60 % RH           | (1 GHz - 13 GHz)    | (13 GHz - 26.5 GHz) |
| Engineer               | Makoto Hosaka                 | (30 MHz - 1000 MHz) |                     |
| Mode                   | Tx, Hopping Off, DH5 2402 MHz |                     |                     |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

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## Radiated Spurious Emission

|                        |                               |                     |                     |
|------------------------|-------------------------------|---------------------|---------------------|
| Report No.             | 12990291S-A                   |                     |                     |
| Test place             | Shonan EMC Lab.               |                     |                     |
| Semi Anechoic Chamber  | No.2                          | No.3                | No.2                |
| Date                   | August 6, 2019                | August 5, 2019      | August 6, 2019      |
| Temperature / Humidity | 23 deg. C / 60 % RH           | 24 deg. C / 51 % RH | 23 deg. C / 60 % RH |
| Engineer               | Makoto Hosaka                 | Kazuya Noda         | Makoto Hosaka       |
|                        | (30 MHz -1000 MHz)            | (1 GHz -13 GHz)     | (13 GHz – 26.5 GHz) |
| Mode                   | Tx, Hopping Off, DH5 2441 MHz |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 130.687            | QP       | 41.80             | 13.84              | 8.27         | 31.86        | 0.00                    | 32.05              | 43.50             | 11.4           | 270            | 27             |             |
| Hori.    | 132.402            | QP       | 41.60             | 14.04              | 8.32         | 31.85        | 0.00                    | 32.11              | 43.50             | 11.3           | 237            | 23             |             |
| Hori.    | 423.228            | QP       | 44.70             | 16.10              | 7.71         | 31.66        | 0.00                    | 36.85              | 46.00             | 9.1            | 100            | 167            |             |
| Hori.    | 457.084            | QP       | 44.50             | 16.77              | 7.92         | 31.65        | 0.00                    | 37.54              | 46.00             | 8.4            | 100            | 317            |             |
| Hori.    | 490.945            | QP       | 48.80             | 17.56              | 8.04         | 31.63        | 0.00                    | 42.77              | 46.00             | 3.2            | 100            | 285            |             |
| Hori.    | 495.018            | QP       | 44.00             | 17.64              | 8.05         | 31.62        | 0.00                    | 38.07              | 46.00             | 7.9            | 100            | 287            |             |
| Hori.    | 4882.000           | PK       | 50.82             | 31.71              | 6.49         | 42.89        | 2.27                    | 48.40              | 73.90             | 25.5           | 158            | 132            |             |
| Hori.    | 7323.000           | PK       | 48.27             | 37.39              | 7.96         | 43.15        | 2.27                    | 52.74              | 73.90             | 21.1           | 100            | 0              |             |
| Hori.    | 9764.000           | PK       | 48.19             | 39.34              | 9.22         | 43.01        | 2.27                    | 56.01              | 73.90             | 17.8           | 100            | 0              |             |
| Hori.    | 4882.000           | AV       | 41.34             | 31.71              | 6.49         | 42.89        | 2.27                    | 38.92              | 53.90             | 14.9           | 158            | 132            | VBW: 360 Hz |
| Hori.    | 7323.000           | AV       | 36.98             | 37.39              | 7.96         | 43.15        | 2.27                    | 41.45              | 53.90             | 12.4           | 100            | 0              | VBW: 360 Hz |
| Hori.    | 9764.000           | AV       | 36.61             | 39.34              | 9.22         | 43.01        | 2.27                    | 44.43              | 53.90             | 9.4            | 100            | 0              | VBW: 360 Hz |
| Vert.    | 142.714            | QP       | 38.00             | 14.57              | 8.58         | 31.85        | 0.00                    | 29.30              | 43.50             | 14.2           | 100            | 256            |             |
| Vert.    | 144.445            | QP       | 40.00             | 14.57              | 8.61         | 31.84        | 0.00                    | 31.34              | 43.50             | 12.1           | 100            | 287            |             |
| Vert.    | 4882.000           | PK       | 54.84             | 31.71              | 6.49         | 42.89        | 2.27                    | 52.42              | 73.90             | 21.4           | 193            | 202            |             |
| Vert.    | 7323.000           | PK       | 48.43             | 37.39              | 7.96         | 43.15        | 2.27                    | 52.90              | 73.90             | 21.0           | 100            | 0              |             |
| Vert.    | 9764.000           | PK       | 48.39             | 39.34              | 9.22         | 43.01        | 2.27                    | 56.21              | 73.90             | 17.6           | 100            | 0              |             |
| Vert.    | 4882.000           | AV       | 47.73             | 31.71              | 6.49         | 42.89        | 2.27                    | 45.31              | 53.90             | 8.5            | 193            | 202            | VBW: 360 Hz |
| Vert.    | 7323.000           | AV       | 37.50             | 37.39              | 7.96         | 43.15        | 2.27                    | 41.97              | 53.90             | 11.9           | 100            | 0              | VBW: 360 Hz |
| Vert.    | 9764.000           | AV       | 37.23             | 39.34              | 9.22         | 43.01        | 2.27                    | 45.05              | 53.90             | 8.8            | 100            | 0              | VBW: 360 Hz |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.27\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

\* These results have sufficient margin without taking account Dwell time factor.

## Radiated Spurious Emission

|                        |                               |                     |                     |
|------------------------|-------------------------------|---------------------|---------------------|
| Report No.             | 12990291S-A                   |                     |                     |
| Test place             | Shonan EMC Lab.               |                     |                     |
| Semi Anechoic Chamber  | No.2                          | No.3                | No.2                |
| Date                   | August 6, 2019                | August 5, 2019      | August 6, 2019      |
| Temperature / Humidity | 23 deg. C / 60 % RH           | 24 deg. C / 51 % RH | 23 deg. C / 60 % RH |
| Engineer               | Makoto Hosaka                 | Kazuya Noda         | Makoto Hosaka       |
|                        | (30 MHz -1000 MHz)            | (1 GHz -13 GHz)     | (13 GHz – 26.5 GHz) |
| Mode                   | Tx, Hopping Off, DH5 2480 MHz |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark      |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|-------------|
| Hori.    | 130.682         | QP       | 41.80          | 13.84           | 8.27      | 31.86     | 0.00                 | 32.05           | 43.50          | 11.4        | 272         | 28          |             |
| Hori.    | 132.402         | QP       | 41.50          | 14.04           | 8.32      | 31.85     | 0.00                 | 32.01           | 43.50          | 11.4        | 238         | 22          |             |
| Hori.    | 146.157         | QP       | 39.50          | 14.65           | 8.65      | 31.84     | 0.00                 | 30.96           | 43.50          | 12.5        | 223         | 353         |             |
| Hori.    | 423.228         | QP       | 44.80          | 16.10           | 7.71      | 31.66     | 0.00                 | 36.95           | 46.00          | 9.0         | 100         | 172         |             |
| Hori.    | 457.086         | QP       | 44.80          | 16.77           | 7.92      | 31.65     | 0.00                 | 37.84           | 46.00          | 8.1         | 100         | 316         |             |
| Hori.    | 490.945         | QP       | 48.80          | 17.56           | 8.04      | 31.63     | 0.00                 | 42.77           | 46.00          | 3.2         | 100         | 284         |             |
| Hori.    | 495.014         | QP       | 43.70          | 17.64           | 8.05      | 31.62     | 0.00                 | 37.77           | 46.00          | 8.2         | 100         | 284         |             |
| Hori.    | 2483.500        | PK       | 47.89          | 28.24           | 14.23     | 41.62     | 2.27                 | 51.01           | 73.90          | 22.8        | 162         | 138         |             |
| Hori.    | 2584.000        | PK       | 48.96          | 28.25           | 14.32     | 41.66     | 2.27                 | 52.14           | 73.90          | 21.7        | 159         | 241         |             |
| Hori.    | 2636.000        | PK       | 49.03          | 28.29           | 14.35     | 41.68     | 2.27                 | 52.26           | 73.90          | 21.6        | 157         | 240         |             |
| Hori.    | 4960.000        | PK       | 52.53          | 31.96           | 6.54      | 42.91     | 2.27                 | 50.39           | 73.90          | 23.5        | 152         | 131         |             |
| Hori.    | 7440.000        | PK       | 48.83          | 37.56           | 8.03      | 43.38     | 2.27                 | 53.31           | 73.90          | 20.5        | 100         | 0           |             |
| Hori.    | 9920.000        | PK       | 47.59          | 39.18           | 9.26      | 42.84     | 2.27                 | 55.46           | 73.90          | 18.4        | 100         | 0           |             |
| Hori.    | 2483.500        | AV       | 35.77          | 28.24           | 14.23     | 41.62     | 2.27                 | 38.89           | 53.90          | 15.0        | 162         | 138         | VBW: 360 Hz |
| Hori.    | 2584.000        | AV       | 39.36          | 28.25           | 14.32     | 41.66     | 2.27                 | 42.54           | 53.90          | 11.3        | 159         | 241         | VBW: 360 Hz |
| Hori.    | 2636.000        | AV       | 39.43          | 28.29           | 14.35     | 41.68     | 2.27                 | 42.66           | 53.90          | 11.2        | 157         | 240         | VBW: 360 Hz |
| Hori.    | 4960.000        | AV       | 40.29          | 31.96           | 6.54      | 42.91     | 2.27                 | 38.15           | 53.90          | 15.7        | 152         | 131         | VBW: 360 Hz |
| Hori.    | 7440.000        | AV       | 37.51          | 37.56           | 8.03      | 43.38     | 2.27                 | 41.99           | 53.90          | 11.9        | 100         | 0           | VBW: 360 Hz |
| Hori.    | 9920.000        | AV       | 36.60          | 39.18           | 9.26      | 42.84     | 2.27                 | 44.47           | 53.90          | 9.4         | 100         | 0           | VBW: 360 Hz |
| Vert.    | 144.436         | QP       | 40.50          | 14.57           | 8.61      | 31.84     | 0.00                 | 31.84           | 43.50          | 11.6        | 100         | 288         |             |
| Vert.    | 2483.500        | PK       | 47.46          | 28.24           | 14.23     | 41.62     | 2.27                 | 50.58           | 73.90          | 23.3        | 110         | 349         |             |
| Vert.    | 2584.000        | PK       | 50.32          | 28.25           | 14.32     | 41.66     | 2.27                 | 53.50           | 73.90          | 20.4        | 153         | 340         |             |
| Vert.    | 2636.000        | PK       | 49.89          | 28.29           | 14.35     | 41.68     | 2.27                 | 53.12           | 73.90          | 20.7        | 141         | 339         |             |
| Vert.    | 4960.000        | PK       | 52.76          | 31.96           | 6.54      | 42.91     | 2.27                 | 50.62           | 73.90          | 23.2        | 156         | 201         |             |
| Vert.    | 7440.000        | PK       | 48.95          | 37.56           | 8.03      | 43.38     | 2.27                 | 53.43           | 73.90          | 20.4        | 100         | 0           |             |
| Vert.    | 9920.000        | PK       | 48.24          | 39.18           | 9.26      | 42.84     | 2.27                 | 56.11           | 73.90          | 17.7        | 100         | 0           |             |
| Vert.    | 2483.500        | AV       | 35.82          | 28.24           | 14.23     | 41.62     | 2.27                 | 38.94           | 53.90          | 14.9        | 110         | 349         | VBW: 360 Hz |
| Vert.    | 2584.000        | AV       | 41.33          | 28.25           | 14.32     | 41.66     | 2.27                 | 44.51           | 53.90          | 9.3         | 153         | 340         | VBW: 360 Hz |
| Vert.    | 2636.000        | AV       | 40.86          | 28.29           | 14.35     | 41.68     | 2.27                 | 44.09           | 53.90          | 9.8         | 141         | 339         | VBW: 360 Hz |
| Vert.    | 4960.000        | AV       | 43.88          | 31.96           | 6.54      | 42.91     | 2.27                 | 41.74           | 53.90          | 12.1        | 156         | 201         | VBW: 360 Hz |
| Vert.    | 7440.000        | AV       | 37.52          | 37.56           | 8.03      | 43.38     | 2.27                 | 42.00           | 53.90          | 11.9        | 100         | 0           | VBW: 360 Hz |
| Vert.    | 9920.000        | AV       | 36.66          | 39.18           | 9.26      | 42.84     | 2.27                 | 44.53           | 53.90          | 9.3         | 100         | 0           | VBW: 360 Hz |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.9 m / 3.0 m) = 2.27 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

\* These results have sufficient margin without taking account Dwell time factor.

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**Shonan EMC Lab.**

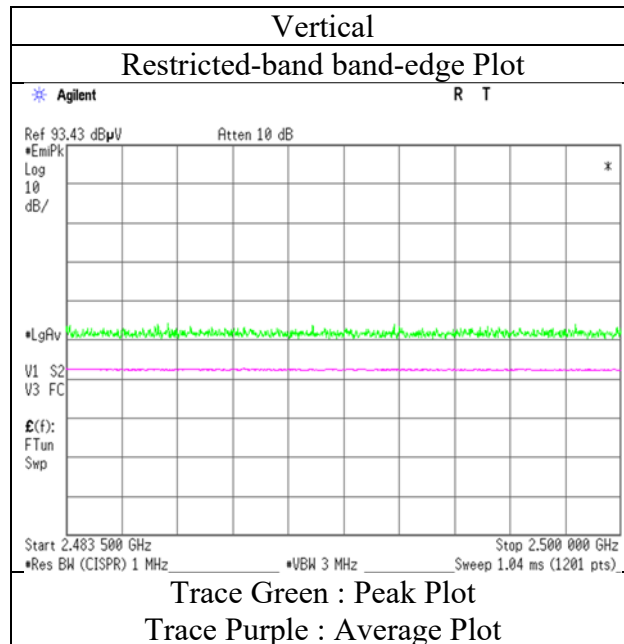
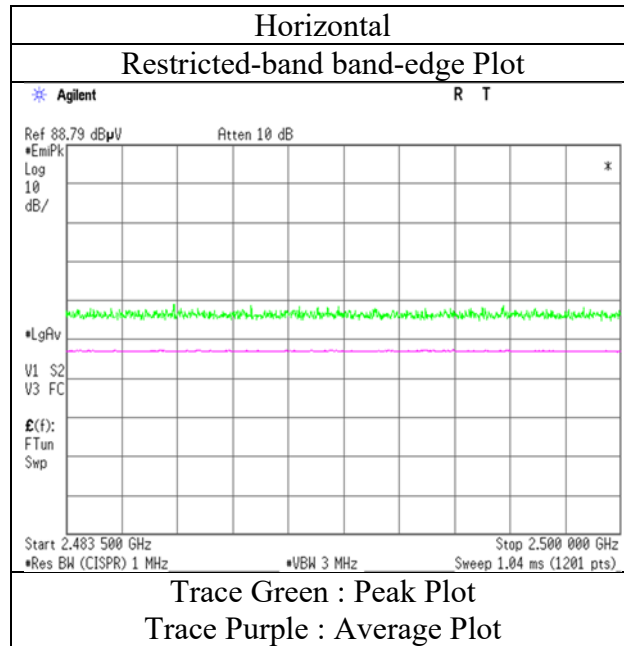
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## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                               |                     |                     |
|------------------------|-------------------------------|---------------------|---------------------|
| Report No.             | 12990291S-A                   |                     |                     |
| Test place             | Shonan EMC Lab.               |                     |                     |
| Semi Anechoic Chamber  | No.2                          | No.3                | No.2                |
| Date                   | August 6, 2019                | August 5, 2019      | August 6, 2019      |
| Temperature / Humidity | 23 deg. C / 60 % RH           | 24 deg. C / 51 % RH | 23 deg. C / 60 % RH |
| Engineer               | Makoto Hosaka                 | Kazuya Noda         | Makoto Hosaka       |
|                        | (30 MHz -1000 MHz)            | (1 GHz -13 GHz)     | (13 GHz – 26.5 GHz) |
| Mode                   | Tx, Hopping Off, DH5 2480 MHz |                     |                     |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

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## Radiated Spurious Emission

|                        |                                |                     |                     |
|------------------------|--------------------------------|---------------------|---------------------|
| Report No.             | 12990291S-A                    |                     |                     |
| Test place             | Shonan EMC Lab.                |                     |                     |
| Semi Anechoic Chamber  | No.2                           | No.3                | No.2                |
| Date                   | August 6, 2019                 | August 5, 2019      | August 6, 2019      |
| Temperature / Humidity | 23 deg. C / 60 % RH            | 24 deg. C / 51 % RH | 23 deg. C / 60 % RH |
| Engineer               | Makoto Hosaka                  | Kazuya Noda         | Makoto Hosaka       |
|                        | (30 MHz -1000 MHz)             | (1 GHz -13 GHz)     | (13 GHz – 26.5 GHz) |
| Mode                   | Tx, Hopping Off, 3DH5 2402 MHz |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 130.697            | QP       | 42.00             | 13.84              | 8.27         | 31.86        | 0.00                    | 32.25              | 43.50             | 11.2           | 238            | 22             |             |
| Hori.    | 132.420            | QP       | 41.50             | 14.05              | 8.32         | 31.85        | 0.00                    | 32.02              | 43.50             | 11.4           | 256            | 18             |             |
| Hori.    | 146.185            | QP       | 39.70             | 14.66              | 8.65         | 31.84        | 0.00                    | 31.17              | 43.50             | 12.3           | 209            | 342            |             |
| Hori.    | 423.228            | QP       | 45.30             | 16.10              | 7.71         | 31.66        | 0.00                    | 37.45              | 46.00             | 8.5            | 100            | 320            |             |
| Hori.    | 457.085            | QP       | 44.80             | 16.77              | 7.92         | 31.65        | 0.00                    | 37.84              | 46.00             | 8.1            | 100            | 320            |             |
| Hori.    | 490.946            | QP       | 48.80             | 17.56              | 8.04         | 31.63        | 0.00                    | 42.77              | 46.00             | 3.2            | 100            | 287            |             |
| Hori.    | 495.020            | QP       | 44.30             | 17.64              | 8.05         | 31.62        | 0.00                    | 38.37              | 46.00             | 7.6            | 100            | 260            |             |
| Hori.    | 2390.000           | PK       | 47.66             | 28.33              | 14.15        | 41.59        | 2.27                    | 50.82              | 73.90             | 23.0           | 123            | 128            |             |
| Hori.    | 4804.000           | PK       | 50.72             | 31.62              | 6.44         | 42.88        | 2.27                    | 48.17              | 73.90             | 25.7           | 147            | 113            |             |
| Hori.    | 7206.000           | PK       | 48.23             | 37.23              | 7.87         | 42.92        | 2.27                    | 52.68              | 73.90             | 21.2           | 100            | 0              |             |
| Hori.    | 9608.000           | PK       | 49.12             | 38.84              | 9.17         | 43.17        | 2.27                    | 56.23              | 73.90             | 17.6           | 100            | 0              |             |
| Hori.    | 2390.000           | AV       | 35.61             | 28.33              | 14.15        | 41.59        | 2.27                    | 38.77              | 53.90             | 15.1           | 123            | 128            | VBW: 360 Hz |
| Hori.    | 4804.000           | AV       | 39.97             | 31.62              | 6.44         | 42.88        | 2.27                    | 37.42              | 53.90             | 16.4           | 147            | 113            | VBW: 360 Hz |
| Hori.    | 7206.000           | AV       | 37.65             | 37.23              | 7.87         | 42.92        | 2.27                    | 42.10              | 53.90             | 11.8           | 100            | 0              | VBW: 360 Hz |
| Hori.    | 9608.000           | AV       | 37.67             | 38.84              | 9.17         | 43.17        | 2.27                    | 44.78              | 53.90             | 9.1            | 100            | 0              | VBW: 360 Hz |
| Vert.    | 144.466            | QP       | 41.10             | 14.57              | 8.61         | 31.84        | 0.00                    | 32.44              | 43.50             | 11.0           | 100            | 290            |             |
| Vert.    | 2390.000           | PK       | 48.06             | 28.33              | 14.15        | 41.59        | 2.27                    | 51.22              | 73.90             | 22.6           | 151            | 356            |             |
| Vert.    | 4804.000           | PK       | 52.83             | 31.62              | 6.44         | 42.88        | 2.27                    | 50.28              | 73.90             | 23.6           | 259            | 182            |             |
| Vert.    | 7206.000           | PK       | 48.99             | 37.23              | 7.87         | 42.92        | 2.27                    | 53.44              | 73.90             | 20.4           | 100            | 0              |             |
| Vert.    | 9608.000           | PK       | 49.21             | 38.84              | 9.17         | 43.17        | 2.27                    | 56.32              | 73.90             | 17.5           | 100            | 0              |             |
| Vert.    | 2390.000           | AV       | 35.66             | 28.33              | 14.15        | 41.59        | 2.27                    | 38.82              | 53.90             | 15.0           | 151            | 356            | VBW: 360 Hz |
| Vert.    | 4804.000           | AV       | 42.92             | 31.62              | 6.44         | 42.88        | 2.27                    | 40.37              | 53.90             | 13.5           | 259            | 182            | VBW: 360 Hz |
| Vert.    | 7206.000           | AV       | 37.69             | 37.23              | 7.87         | 42.92        | 2.27                    | 42.14              | 53.90             | 11.7           | 100            | 0              | VBW: 360 Hz |
| Vert.    | 9608.000           | AV       | 37.62             | 38.84              | 9.17         | 43.17        | 2.27                    | 44.73              | 53.90             | 9.1            | 100            | 0              | VBW: 360 Hz |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.27\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

\* These results have sufficient margin without taking account Dwell time factor.

### 20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark  |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|---------|
| Hori.    | 2402.000           | PK       | 86.55             | 28.31              | 14.16        | 41.60        | 2.27                    | 89.69              | -                 | -              | Carrier |
| Hori.    | 2400.000           | PK       | 41.58             | 28.31              | 14.15        | 41.60        | 2.27                    | 44.71              | 69.69             | 24.9           |         |
| Vert.    | 2402.000           | PK       | 90.32             | 28.31              | 14.16        | 41.60        | 2.27                    | 93.46              | -                 | -              | Carrier |
| Vert.    | 2400.000           | PK       | 42.83             | 28.31              | 14.15        | 41.60        | 2.27                    | 45.96              | 73.46             | 27.5           |         |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.27\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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**Shonan EMC Lab.**

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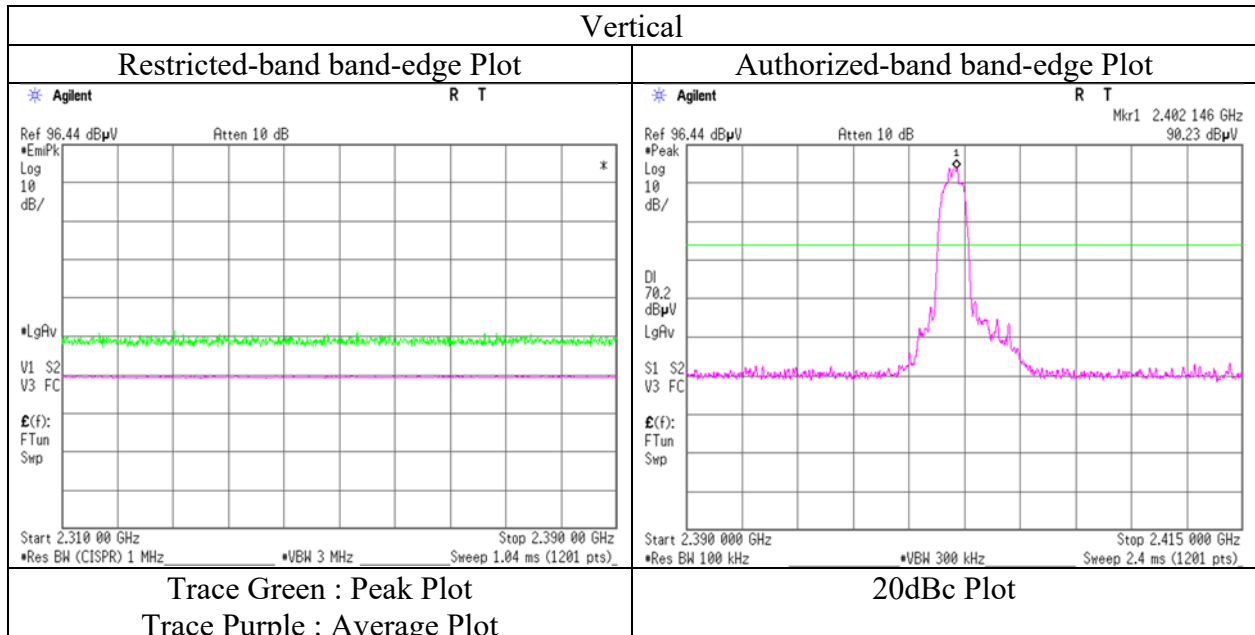
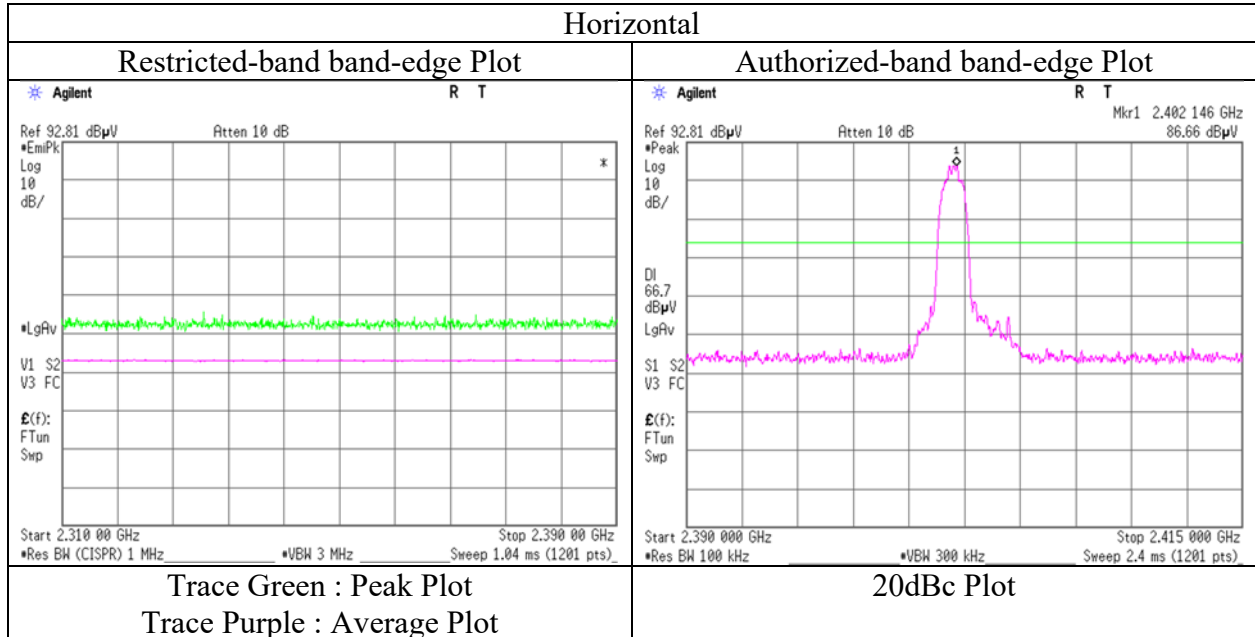
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## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                                |                     |                     |
|------------------------|--------------------------------|---------------------|---------------------|
| Report No.             | 12990291S-A                    | No.3                | No.2                |
| Test place             | Shonan EMC Lab.                | August 5, 2019      | August 6, 2019      |
| Semi Anechoic Chamber  | No.2                           | 24 deg. C / 51 % RH | 23 deg. C / 60 % RH |
| Date                   | August 6, 2019                 | Kazuya Noda         | Makoto Hosaka       |
| Temperature / Humidity | 23 deg. C / 60 % RH            | (1 GHz - 13 GHz)    | (13 GHz - 26.5 GHz) |
| Engineer               | Makoto Hosaka                  | (30 MHz - 1000 MHz) |                     |
| Mode                   | Tx, Hopping Off, 3DH5 2402 MHz |                     |                     |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

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## Radiated Spurious Emission

|                        |                                |                     |                     |
|------------------------|--------------------------------|---------------------|---------------------|
| Report No.             | 12990291S-A                    |                     |                     |
| Test place             | Shonan EMC Lab.                |                     |                     |
| Semi Anechoic Chamber  | No.2                           | No.3                | No.2                |
| Date                   | August 6, 2019                 | August 5, 2019      | August 6, 2019      |
| Temperature / Humidity | 23 deg. C / 60 % RH            | 24 deg. C / 51 % RH | 23 deg. C / 60 % RH |
| Engineer               | Makoto Hosaka                  | Kazuya Noda         | Makoto Hosaka       |
|                        | (30 MHz -1000 MHz)             | (1 GHz -13 GHz)     | (13 GHz – 26.5 GHz) |
| Mode                   | Tx, Hopping Off, 3DH5 2441 MHz |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 130.730            | QP       | 41.80             | 13.84              | 8.27         | 31.86        | 0.00                    | 32.05              | 43.50             | 11.4           | 240            | 23             |             |
| Hori.    | 132.450            | QP       | 41.70             | 14.05              | 8.32         | 31.85        | 0.00                    | 32.22              | 43.50             | 11.2           | 155            | 20             |             |
| Hori.    | 146.183            | QP       | 40.00             | 14.66              | 8.65         | 31.84        | 0.00                    | 31.47              | 43.50             | 12.0           | 210            | 343            |             |
| Hori.    | 423.224            | QP       | 45.50             | 16.10              | 7.71         | 31.66        | 0.00                    | 37.65              | 46.00             | 8.3            | 100            | 321            |             |
| Hori.    | 457.088            | QP       | 45.00             | 16.77              | 7.92         | 31.65        | 0.00                    | 38.04              | 46.00             | 7.9            | 100            | 320            |             |
| Hori.    | 490.947            | QP       | 48.60             | 17.56              | 8.04         | 31.63        | 0.00                    | 42.57              | 46.00             | 3.4            | 100            | 288            |             |
| Hori.    | 495.014            | QP       | 44.60             | 17.64              | 8.05         | 31.62        | 0.00                    | 38.67              | 46.00             | 7.3            | 100            | 290            |             |
| Hori.    | 4882.000           | PK       | 50.65             | 31.71              | 6.49         | 42.89        | 2.27                    | 48.23              | 73.90             | 25.6           | 155            | 115            |             |
| Hori.    | 7323.000           | PK       | 48.42             | 37.39              | 7.96         | 43.15        | 2.27                    | 52.89              | 73.90             | 21.0           | 100            | 0              |             |
| Hori.    | 9764.000           | PK       | 48.43             | 39.34              | 9.22         | 43.01        | 2.27                    | 56.25              | 73.90             | 17.6           | 100            | 0              |             |
| Hori.    | 4882.000           | AV       | 39.76             | 31.71              | 6.49         | 42.89        | 2.27                    | 37.34              | 53.90             | 16.5           | 155            | 115            | VBW: 360 Hz |
| Hori.    | 7323.000           | AV       | 37.38             | 37.39              | 7.96         | 43.15        | 2.27                    | 41.85              | 53.90             | 12.0           | 100            | 0              | VBW: 360 Hz |
| Hori.    | 9764.000           | AV       | 37.06             | 39.34              | 9.22         | 43.01        | 2.27                    | 44.88              | 53.90             | 9.0            | 100            | 0              | VBW: 360 Hz |
| Vert.    | 144.469            | QP       | 41.50             | 14.57              | 8.61         | 31.84        | 0.00                    | 32.84              | 43.50             | 10.6           | 100            | 289            |             |
| Vert.    | 4882.000           | PK       | 50.94             | 31.71              | 6.49         | 42.89        | 2.27                    | 48.52              | 73.90             | 25.3           | 166            | 206            |             |
| Vert.    | 7323.000           | PK       | 48.86             | 37.39              | 7.96         | 43.15        | 2.27                    | 53.33              | 73.90             | 20.5           | 100            | 0              |             |
| Vert.    | 9764.000           | PK       | 48.31             | 39.34              | 9.22         | 43.01        | 2.27                    | 56.13              | 73.90             | 17.7           | 100            | 0              |             |
| Vert.    | 4882.000           | AV       | 39.44             | 31.71              | 6.49         | 42.89        | 2.27                    | 37.02              | 53.90             | 16.8           | 166            | 206            | VBW: 360 Hz |
| Vert.    | 7323.000           | AV       | 36.02             | 37.39              | 7.96         | 43.15        | 2.27                    | 40.49              | 53.90             | 13.4           | 100            | 0              | VBW: 360 Hz |
| Vert.    | 9764.000           | AV       | 35.72             | 39.34              | 9.22         | 43.01        | 2.27                    | 43.54              | 53.90             | 10.3           | 100            | 0              | VBW: 360 Hz |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz :  $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.27\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

\* These results have sufficient margin without taking account Dwell time factor.

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## Radiated Spurious Emission

|                        |                                |                     |                     |
|------------------------|--------------------------------|---------------------|---------------------|
| Report No.             | 12990291S-A                    |                     |                     |
| Test place             | Shonan EMC Lab.                |                     |                     |
| Semi Anechoic Chamber  | No.2                           | No.3                | No.2                |
| Date                   | August 6, 2019                 | August 5, 2019      | August 6, 2019      |
| Temperature / Humidity | 23 deg. C / 60 % RH            | 24 deg. C / 51 % RH | 23 deg. C / 60 % RH |
| Engineer               | Makoto Hosaka                  | Kazuya Noda         | Makoto Hosaka       |
|                        | (30 MHz -1000 MHz)             | (1 GHz -13 GHz)     | (13 GHz – 26.5 GHz) |
| Mode                   | Tx, Hopping Off, 3DH5 2480 MHz |                     |                     |

(\* PK: Peak, AV: Average, QP: Quasi-Peak)

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 132.411            | QP       | 42.30             | 14.04              | 8.32         | 31.85        | 0.00                    | 32.81              | 43.50             | 10.6           | 243            | 23             |             |
| Hori.    | 134.135            | QP       | 40.80             | 14.11              | 8.36         | 31.85        | 0.00                    | 31.42              | 43.50             | 12.0           | 253            | 20             |             |
| Hori.    | 146.169            | QP       | 39.10             | 14.65              | 8.65         | 31.84        | 0.00                    | 30.56              | 43.50             | 12.9           | 211            | 340            |             |
| Hori.    | 423.229            | QP       | 46.00             | 16.10              | 7.71         | 31.66        | 0.00                    | 38.15              | 46.00             | 7.8            | 100            | 174            |             |
| Hori.    | 457.086            | QP       | 45.00             | 16.77              | 7.92         | 31.65        | 0.00                    | 38.04              | 46.00             | 7.9            | 100            | 320            |             |
| Hori.    | 490.943            | QP       | 48.50             | 17.56              | 8.04         | 31.63        | 0.00                    | 42.47              | 46.00             | 3.5            | 100            | 287            |             |
| Hori.    | 495.005            | QP       | 44.00             | 17.64              | 8.05         | 31.62        | 0.00                    | 38.07              | 46.00             | 7.9            | 100            | 261            |             |
| Hori.    | 2483.500           | PK       | 48.14             | 28.24              | 14.23        | 41.62        | 2.27                    | 51.26              | 73.90             | 22.6           | 155            | 137            |             |
| Hori.    | 2584.000           | PK       | 48.41             | 28.25              | 14.32        | 41.66        | 2.27                    | 51.59              | 73.90             | 22.3           | 171            | 246            |             |
| Hori.    | 2636.000           | PK       | 47.93             | 28.29              | 14.35        | 41.68        | 2.27                    | 51.16              | 73.90             | 22.7           | 164            | 245            |             |
| Hori.    | 4960.000           | PK       | 50.88             | 31.96              | 6.54         | 42.91        | 2.27                    | 48.74              | 73.90             | 25.1           | 152            | 131            |             |
| Hori.    | 7440.000           | PK       | 48.85             | 37.56              | 8.03         | 43.38        | 2.27                    | 53.33              | 73.90             | 20.5           | 100            | 0              |             |
| Hori.    | 9920.000           | PK       | 47.62             | 39.18              | 9.26         | 42.84        | 2.27                    | 55.49              | 73.90             | 18.4           | 100            | 0              |             |
| Hori.    | 2483.500           | AV       | 35.61             | 28.24              | 14.23        | 41.62        | 2.27                    | 38.73              | 53.90             | 15.1           | 155            | 137            | VBW: 360 Hz |
| Hori.    | 2584.000           | AV       | 37.18             | 28.25              | 14.32        | 41.66        | 2.27                    | 40.36              | 53.90             | 13.5           | 171            | 246            | VBW: 360 Hz |
| Hori.    | 2636.000           | AV       | 36.91             | 28.29              | 14.35        | 41.68        | 2.27                    | 40.14              | 53.90             | 13.7           | 164            | 245            | VBW: 360 Hz |
| Hori.    | 4960.000           | AV       | 39.91             | 31.96              | 6.54         | 42.91        | 2.27                    | 37.77              | 53.90             | 16.1           | 152            | 131            | VBW: 360 Hz |
| Hori.    | 7440.000           | AV       | 37.55             | 37.56              | 8.03         | 43.38        | 2.27                    | 42.03              | 53.90             | 11.8           | 100            | 0              | VBW: 360 Hz |
| Hori.    | 9920.000           | AV       | 36.61             | 39.18              | 9.26         | 42.84        | 2.27                    | 44.48              | 53.90             | 9.4            | 100            | 0              | VBW: 360 Hz |
| Vert.    | 144.465            | QP       | 40.60             | 14.57              | 8.61         | 31.84        | 0.00                    | 31.94              | 43.50             | 11.5           | 100            | 293            |             |
| Vert.    | 2483.500           | PK       | 48.31             | 28.24              | 14.23        | 41.62        | 2.27                    | 51.43              | 73.90             | 22.4           | 123            | 350            |             |
| Vert.    | 2584.000           | PK       | 49.12             | 28.25              | 14.32        | 41.66        | 2.27                    | 52.30              | 73.90             | 21.6           | 153            | 242            |             |
| Vert.    | 2636.000           | PK       | 49.84             | 28.29              | 14.35        | 41.68        | 2.27                    | 53.07              | 73.90             | 20.8           | 151            | 335            |             |
| Vert.    | 4960.000           | PK       | 51.43             | 31.96              | 6.54         | 42.91        | 2.27                    | 49.29              | 73.90             | 24.6           | 157            | 201            |             |
| Vert.    | 7440.000           | PK       | 48.76             | 37.56              | 8.03         | 43.38        | 2.27                    | 53.24              | 73.90             | 20.6           | 100            | 0              |             |
| Vert.    | 9920.000           | PK       | 47.93             | 39.18              | 9.26         | 42.84        | 2.27                    | 55.80              | 73.90             | 18.1           | 100            | 0              |             |
| Vert.    | 2483.500           | AV       | 35.77             | 28.24              | 14.23        | 41.62        | 2.27                    | 38.89              | 53.90             | 15.0           | 123            | 350            | VBW: 360 Hz |
| Vert.    | 2584.000           | AV       | 39.62             | 28.25              | 14.32        | 41.66        | 2.27                    | 42.80              | 53.90             | 11.1           | 153            | 242            | VBW: 360 Hz |
| Vert.    | 2636.000           | AV       | 39.97             | 28.29              | 14.35        | 41.68        | 2.27                    | 43.20              | 53.90             | 10.7           | 151            | 335            | VBW: 360 Hz |
| Vert.    | 4960.000           | AV       | 41.59             | 31.96              | 6.54         | 42.91        | 2.27                    | 39.45              | 53.90             | 14.4           | 157            | 201            | VBW: 360 Hz |
| Vert.    | 7440.000           | AV       | 37.54             | 37.56              | 8.03         | 43.38        | 2.27                    | 42.02              | 53.90             | 11.8           | 100            | 0              | VBW: 360 Hz |
| Vert.    | 9920.000           | AV       | 36.71             | 39.18              | 9.26         | 42.84        | 2.27                    | 44.58              | 53.90             | 9.3            | 100            | 0              | VBW: 360 Hz |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

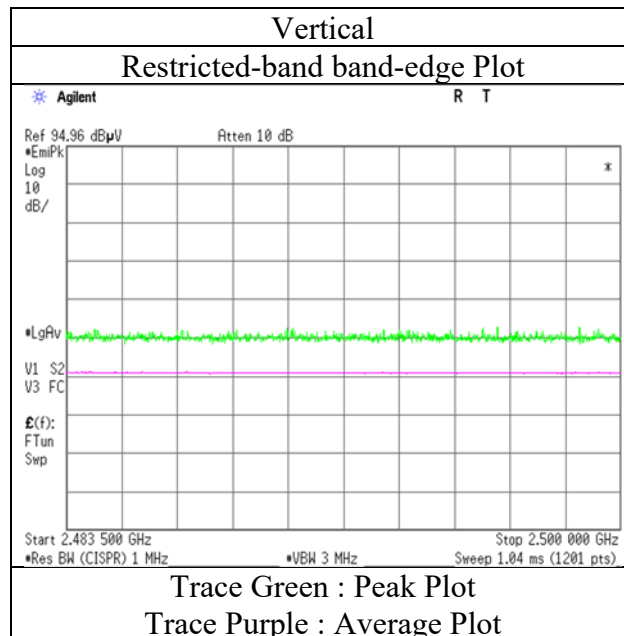
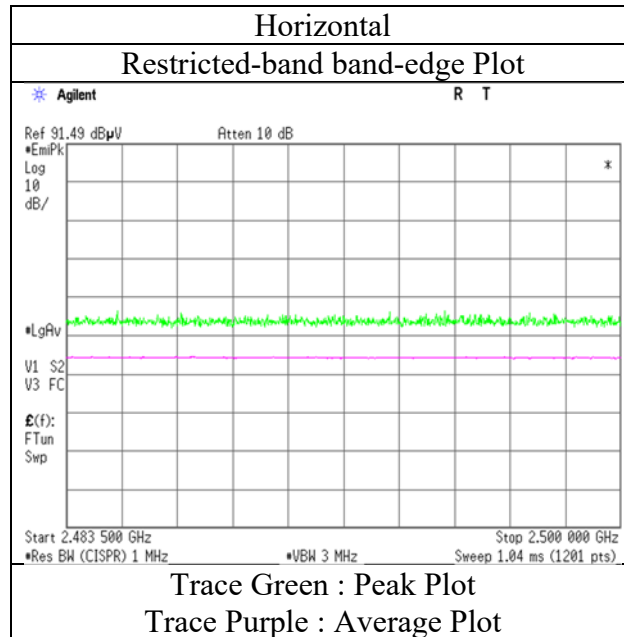
Distance factor : 1 GHz - 13 GHz :  $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.27\text{ dB}$

13 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

\* These results have sufficient margin without taking account Dwell time factor.

## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                                |                     |                     |
|------------------------|--------------------------------|---------------------|---------------------|
| Report No.             | 12990291S-A                    |                     |                     |
| Test place             | Shonan EMC Lab.                |                     |                     |
| Semi Anechoic Chamber  | No.2                           | No.3                | No.2                |
| Date                   | August 6, 2019                 | August 5, 2019      | August 6, 2019      |
| Temperature / Humidity | 23 deg. C / 60 % RH            | 24 deg. C / 51 % RH | 23 deg. C / 60 % RH |
| Engineer               | Makoto Hosaka                  | Kazuya Noda         | Makoto Hosaka       |
|                        | (30 MHz -1000 MHz)             | (1 GHz -13 GHz)     | (13 GHz – 26.5 GHz) |
| Mode                   | Tx, Hopping Off, 3DH5 2480 MHz |                     |                     |

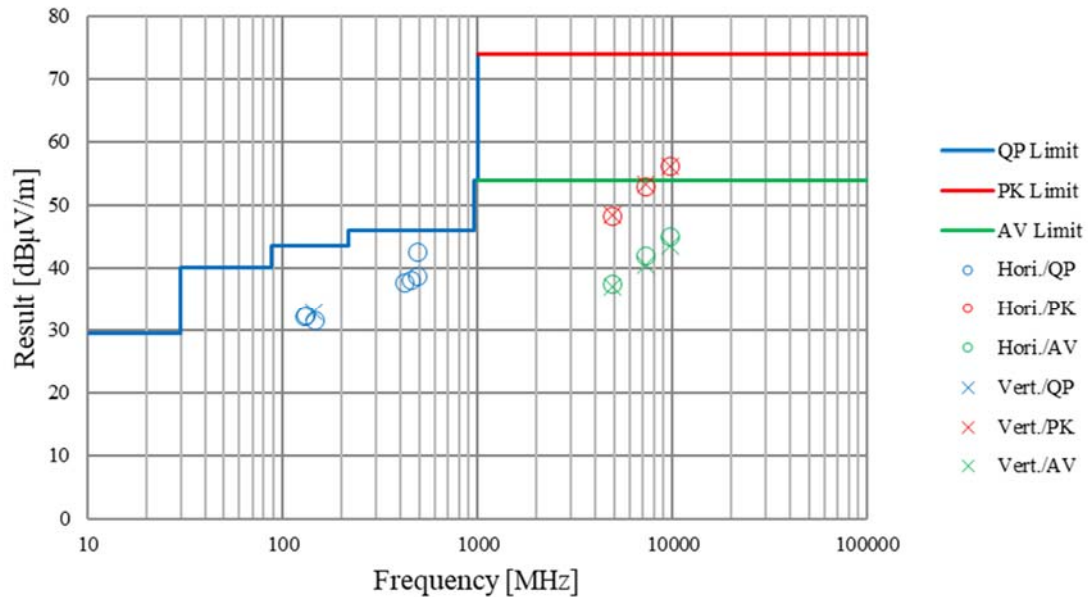


\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.

Final result of restricted band edge was shown in tabular data.

**Radiated Spurious Emission**  
**(Plot data, Worst case)**

|                        |                                |                     |                     |
|------------------------|--------------------------------|---------------------|---------------------|
| Report No.             | 12990291S-A                    |                     |                     |
| Test place             | Shonan EMC Lab.                |                     |                     |
| Semi Anechoic Chamber  | No.2                           | No.3                | No.2                |
| Date                   | August 6, 2019                 | August 5, 2019      | August 6, 2019      |
| Temperature / Humidity | 23 deg. C / 60 % RH            | 24 deg. C / 51 % RH | 23 deg. C / 60 % RH |
| Engineer               | Makoto Hosaka                  | Kazuya Noda         | Makoto Hosaka       |
|                        | (30 MHz -1000 MHz)             | (1 GHz -13 GHz)     | (13 GHz – 26.5 GHz) |
| Mode                   | Tx, Hopping Off, 3DH5 2441 MHz |                     |                     |

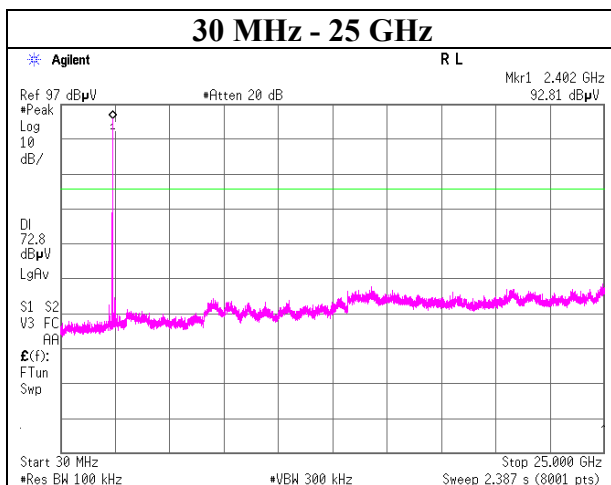
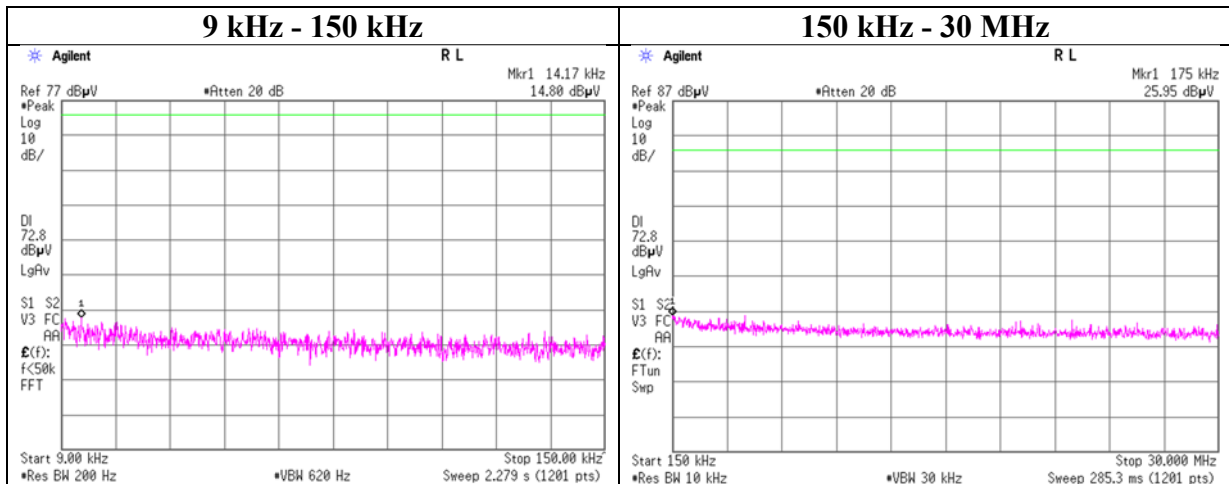


\*These plots data contains sufficient number to show the trend of characteristic features for EUT.

## Conducted Spurious Emission

Report No. 12990291S-A  
Test place Shonan EMC Lab. No.5 Shielded Room  
Date August 8, 2019  
Temperature / Humidity 25 deg. C / 53 % RH  
Engineer Kazuya Noda  
Mode Tx, Hopping Off, DH5

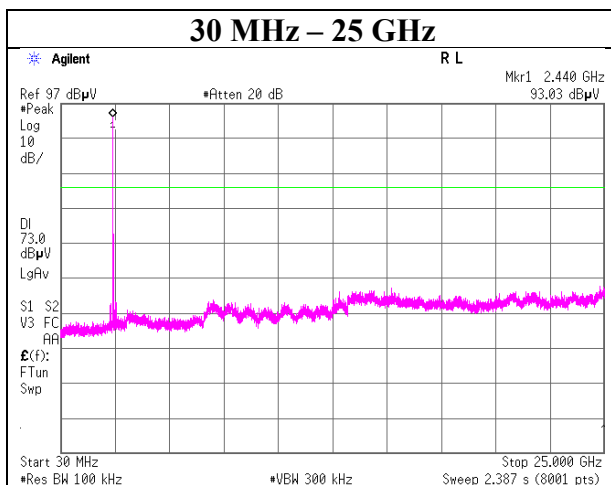
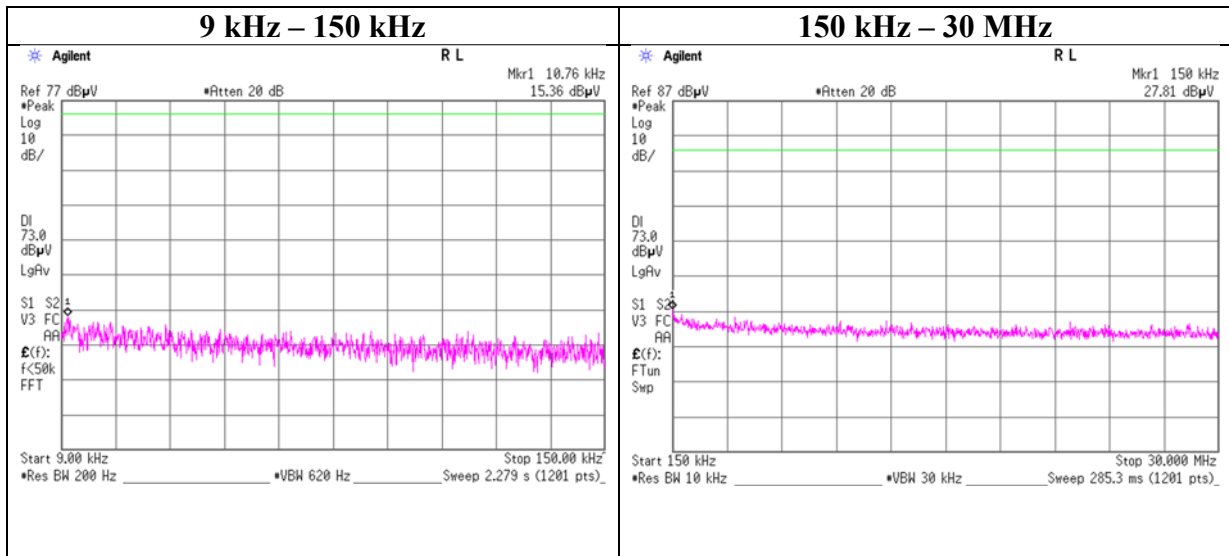
### 2402 MHz



## Conducted Spurious Emission

Report No. 12990291S-A  
Test place Shonan EMC Lab. No.5 Shielded Room  
Date August 8, 2019  
Temperature / Humidity 25 deg. C / 53 % RH  
Engineer Kazuya Noda  
Mode Tx, Hopping Off, DH5

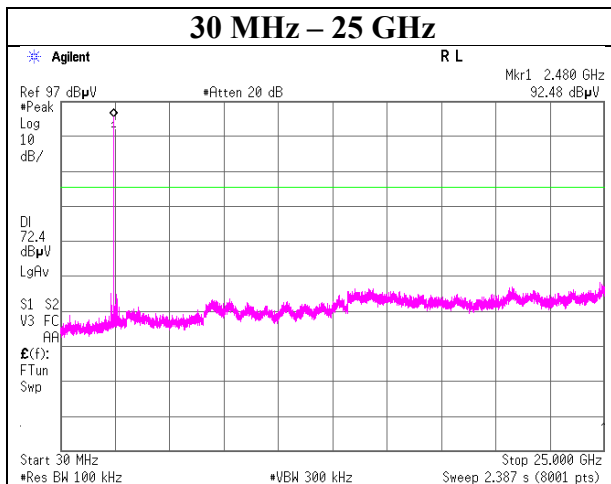
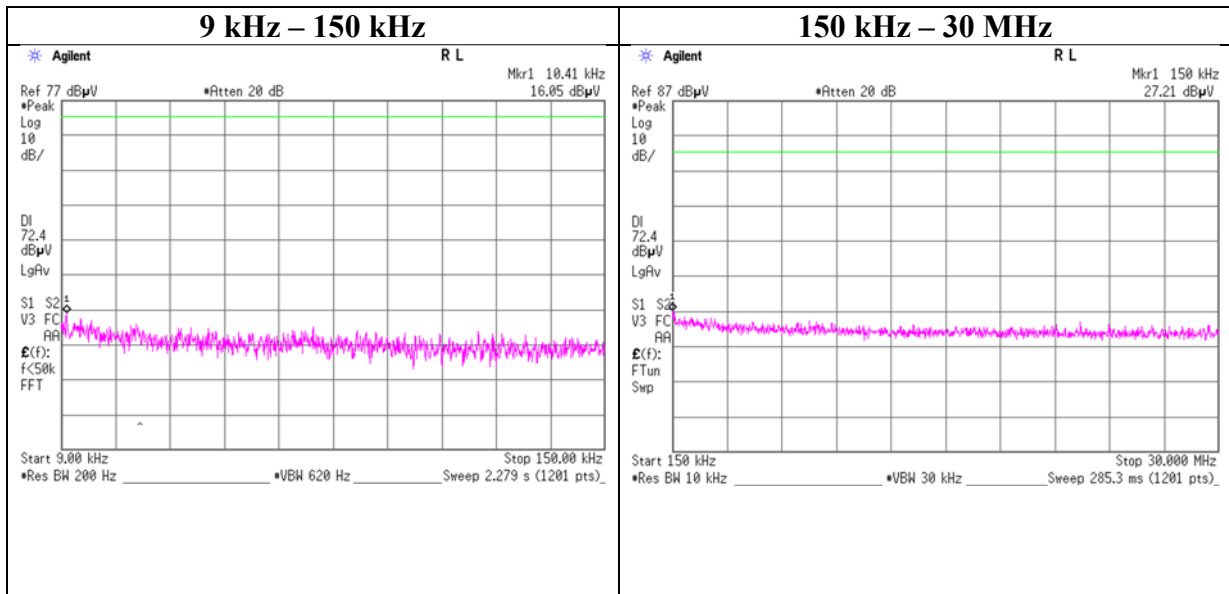
### 2441 MHz



## Conducted Spurious Emission

Report No. 12990291S-A  
Test place Shonan EMC Lab. No.5 Shielded Room  
Date August 8, 2019  
Temperature / Humidity 25 deg. C / 53 % RH  
Engineer Kazuya Noda  
Mode Tx, Hopping Off, DH5

### 2480 MHz



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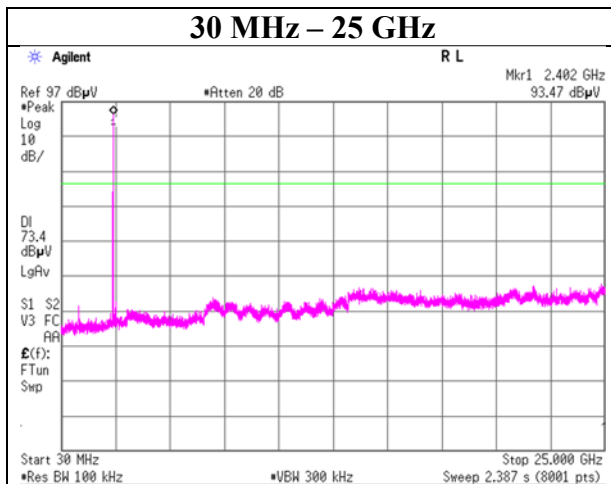
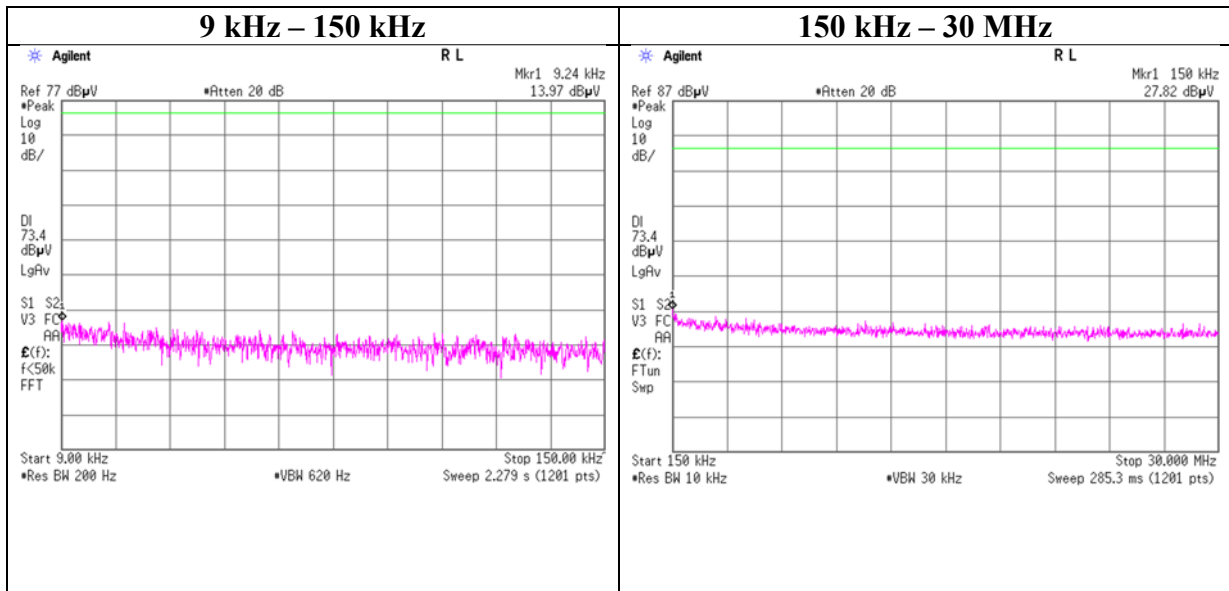
Facsimile : +81 463 50 6401



## Conducted Spurious Emission

Report No. 12990291S-A  
Test place Shonan EMC Lab. No.5 Shielded Room  
Date August 8, 2019  
Temperature / Humidity 25 deg. C / 53 % RH  
Engineer Kazuya Noda  
Mode Tx, Hopping Off, 3DH5

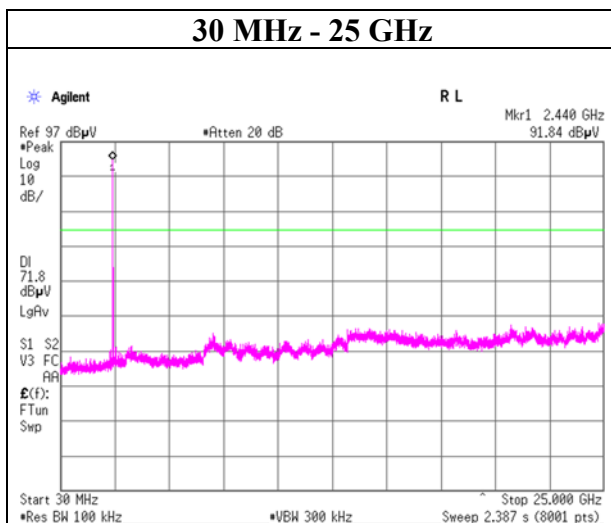
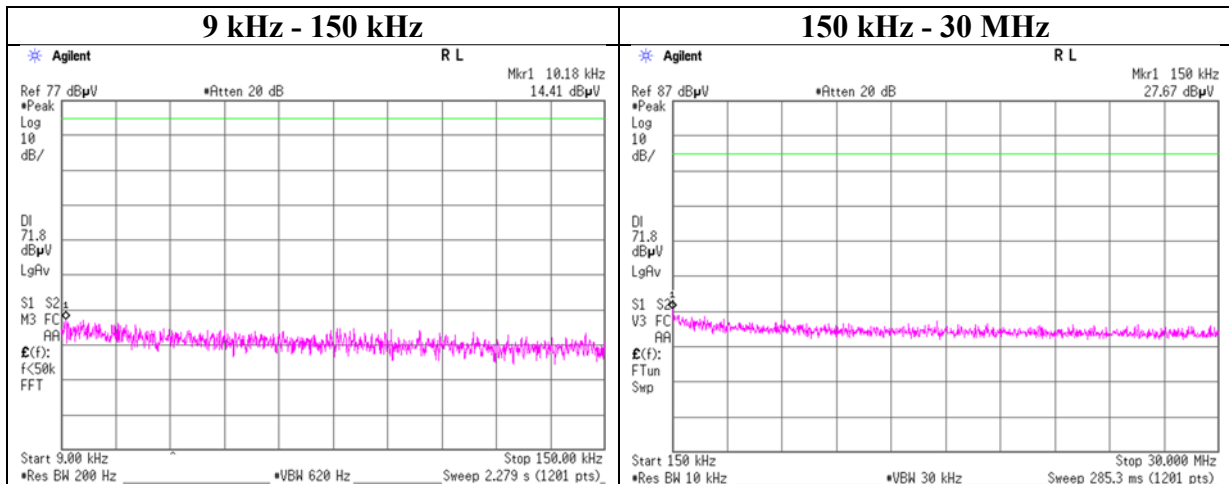
### 2402 MHz



## Conducted Spurious Emission

Report No. 12990291S-A  
Test place Shonan EMC Lab. No.5 Shielded Room  
Date August 8, 2019  
Temperature / Humidity 25 deg. C / 53 % RH  
Engineer Kazuya Noda  
Mode Tx, Hopping Off, 3DH5

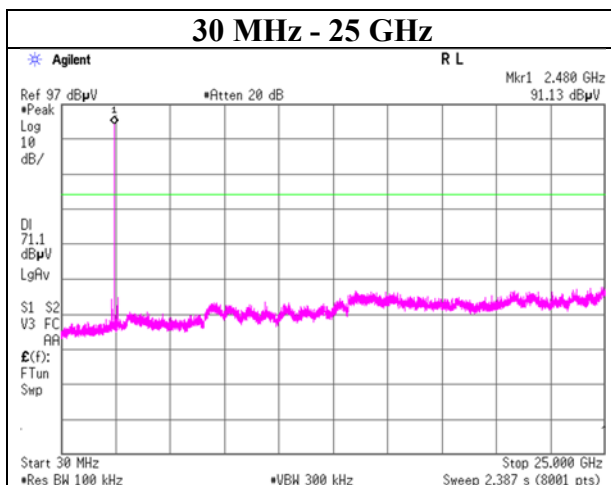
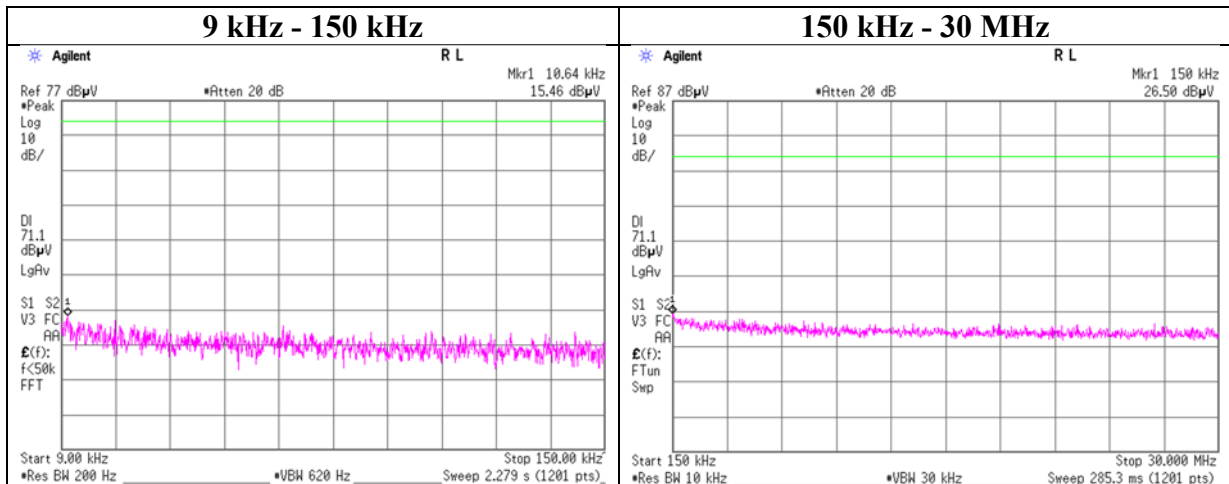
### 2441 MHz



## Conducted Spurious Emission

Report No. 12990291S-A  
Test place Shonan EMC Lab. No.5 Shielded Room  
Date August 8, 2019  
Temperature / Humidity 25 deg. C / 53 % RH  
Engineer Kazuya Noda  
Mode Tx, Hopping Off, 3DH5

### 2480 MHz



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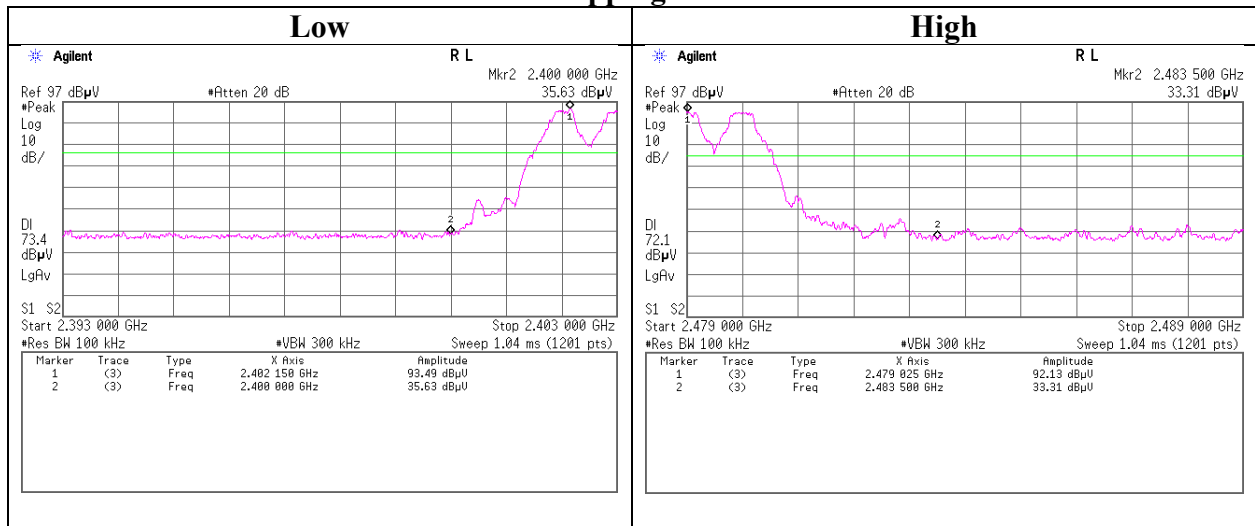
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

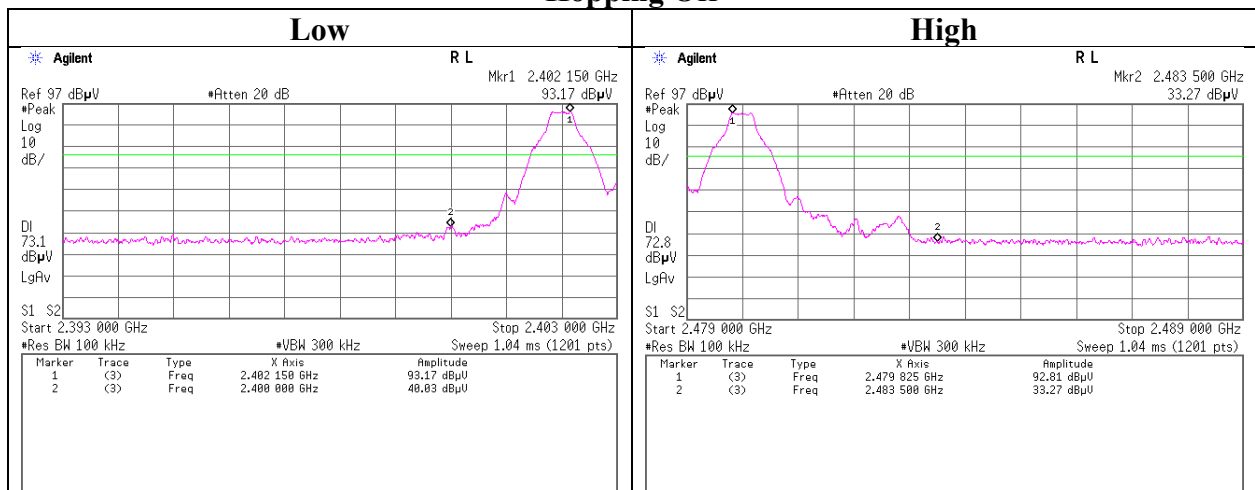
## Conducted Emission Band Edge compliance

Report No. 12990291S-A  
Test place Shonan EMC Lab. No.5 Shielded Room  
Date August 8, 2019  
Temperature / Humidity 25 deg. C / 53 % RH  
Engineer Kazuya Noda  
Mode Tx DH5

### Hopping On



### Hopping Off



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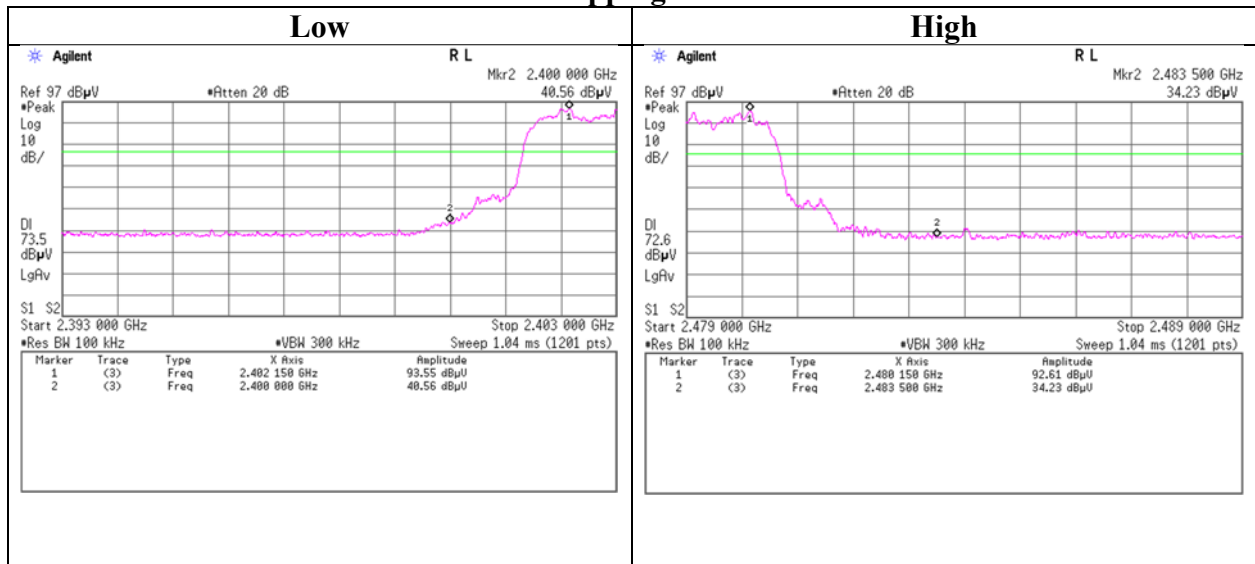
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

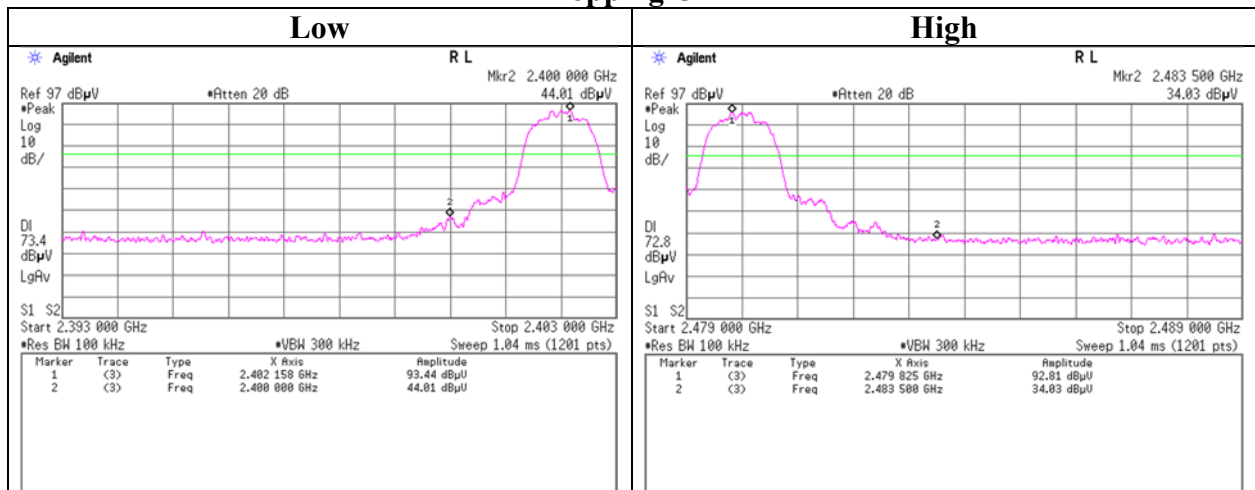
## Conducted Emission Band Edge compliance

|                        |                                    |
|------------------------|------------------------------------|
| Report No.             | 12990291S-A                        |
| Test place             | Shonan EMC Lab. No.5 Shielded Room |
| Date                   | August 8, 2019                     |
| Temperature / Humidity | 25 deg. C / 53 % RH                |
| Engineer               | Kazuya Noda                        |
| Mode                   | Tx 3DH5                            |

### Hopping On



### Hopping Off



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## APPENDIX 2: Test instruments

### Test Instruments (1 / 2)

| Local ID       | Test Name | LIMS ID | Description           | Manufacturer     | Model                  | Serial        | Last Calibration Date | Calibration Due Date | Calibration Interval (Month) |
|----------------|-----------|---------|-----------------------|------------------|------------------------|---------------|-----------------------|----------------------|------------------------------|
| KTS-07         | AT        | 145111  | Digital Tester        | SANWA            | PC500                  | 7019232       | 2018/10/17            | 2019/10/31           | 12                           |
| SAT10-16       | AT        | 160494  | Attenuator            | Weinschel Corp.  | 54A-10                 | 83406         | 2018/12/6             | 2019/12/30           | 12                           |
| SCC-G32        | AT        | 145183  | Coaxial Cable         | Junkosha         | MWX241-02000KMSK MS    | OCT-09-13-005 | 2018/11/25            | 2019/11/30           | 12                           |
| SOS-09         | AT        | 146318  | Humidity Indicator    | A&D              | AD-5681                | 4061484       | 2018/12/5             | 2019/12/31           | 12                           |
| SPM-07         | AT        | 146247  | Power Meter           | AGILENT          | 8990B                  | MY5100272     | 2019/7/16             | 2020/7/31            | 12                           |
| SPSS-04        | AT        | 146310  | Power sensor          | AGILENT          | N1923A                 | MY5326009     | 2019/7/16             | 2020/7/31            | 12                           |
| SSA-02         | AT        | 145800  | Spectrum Analyzer     | AGILENT          | E4448A                 | MY48250106    | 2019/4/4              | 2020/4/30            | 12                           |
| COTS-SEMI-5    | RE        | 170932  | EMI Software          | TSJ              | TEPTO-DV3(RE,CE,ME,PE) | -             | -                     | -                    | -                            |
| KJM-02         | RE        | 146432  | Measure               | TAJIMA           | GL19-55                | -             | -                     | -                    | -                            |
| KSA-08         | RE        | 145089  | Spectrum Analyzer     | AGILENT          | E4446A                 | MY46180525    | 2018/10/7             | 2019/10/31           | 12                           |
| SAEC-02(NSA)   | RE        | 145563  | Semi-Anechoic Chamber | TDK              | SAEC-02(NSA)           | 2             | 2019/4/4              | 2020/4/30            | 12                           |
| SAEC-02(SVSWR) | RE        | 145598  | Semi-Anechoic Chamber | TDK              | SAEC-02(SVSWR)         | 2             | 2019/5/9              | 2020/5/31            | 12                           |
| SAEC-03(SVSWR) | RE        | 145566  | Semi-Anechoic Chamber | TDK              | SAEC-03(SVSWR)         | 3             | 2019/5/3              | 2020/5/31            | 12                           |
| KTS-07         | AT        | 145111  | Digital Tester        | SANWA            | PC500                  | 7019232       | 2018/10/17            | 2019/10/31           | 12                           |
| SAT10-16       | AT        | 160494  | Attenuator            | Weinschel Corp.  | 54A-10                 | 83406         | 2018/12/6             | 2019/12/30           | 12                           |
| SCC-G32        | AT        | 145183  | Coaxial Cable         | Junkosha         | MWX241-02000KMSK MS    | OCT-09-13-005 | 2018/11/25            | 2019/11/30           | 12                           |
| SOS-09         | AT        | 146318  | Humidity Indicator    | A&D              | AD-5681                | 4061484       | 2018/12/5             | 2019/12/31           | 12                           |
| SPM-07         | AT        | 146247  | Power Meter           | AGILENT          | 8990B                  | MY5100272     | 2019/7/16             | 2020/7/31            | 12                           |
| SPSS-04        | AT        | 146310  | Power sensor          | AGILENT          | N1923A                 | MY5326009     | 2019/7/16             | 2020/7/31            | 12                           |
| SSA-02         | AT        | 145800  | Spectrum Analyzer     | AGILENT          | E4448A                 | MY48250106    | 2019/4/4              | 2020/4/30            | 12                           |
| COTS-SEMI-5    | RE        | 170932  | EMI Software          | TSJ              | TEPTO-DV3(RE,CE,ME,PE) | -             | -                     | -                    | -                            |
| KJM-02         | RE        | 146432  | Measure               | TAJIMA           | GL19-55                | -             | -                     | -                    | -                            |
| KSA-08         | RE        | 145089  | Spectrum Analyzer     | AGILENT          | E4446A                 | MY46180525    | 2018/10/7             | 2019/10/31           | 12                           |
| SAEC-02(NSA)   | RE        | 145563  | Semi-Anechoic Chamber | TDK              | SAEC-02(NSA)           | 2             | 2019/4/4              | 2020/4/30            | 12                           |
| SAEC-02(SVSWR) | RE        | 145598  | Semi-Anechoic Chamber | TDK              | SAEC-02(SVSWR)         | 2             | 2019/5/9              | 2020/5/31            | 12                           |
| SAEC-03(SVSWR) | RE        | 145566  | Semi-Anechoic Chamber | TDK              | SAEC-03(SVSWR)         | 3             | 2019/5/3              | 2020/5/31            | 12                           |
| SAF-02         | RE        | 145004  | Pre Amplifier         | SONOMA           | 310N                   | 290212        | 2019/2/5              | 2020/2/29            | 12                           |
| SAF-05         | RE        | 145128  | Pre Amplifier         | Toyo Corporation | TPA0118-36             | 1440490       | 2019/7/12             | 2020/7/31            | 12                           |
| SAF-06         | RE        | 145005  | Pre Amplifier         | Toyo Corporation | TPA0118-36             | 1440491       | 2019/2/8              | 2020/2/29            | 12                           |

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## Test Instruments (2 / 2)

| Local ID                       | Test Name | LIMS ID | Description               | Manufacturer                         | Model                               | Serial                  | Last Calibration Date | Calibration Due Date | Calibration Interval (Month) |
|--------------------------------|-----------|---------|---------------------------|--------------------------------------|-------------------------------------|-------------------------|-----------------------|----------------------|------------------------------|
| SAF-08                         | RE        | 145007  | Pre Amplifier             | Toyo Corporation                     | HAP18-26W                           | 19                      | 2019/3/5              | 2020/3/31            | 12                           |
| SAT10-06                       | RE        | 145137  | Attenuator                | AGILENT                              | 8493C-010                           | 74865                   | 2018/11/25            | 2019/11/30           | 12                           |
| SAT3-11                        | RE        | 150921  | Attenuator                | JFW                                  | 50HF-003N                           | -                       | 2019/1/25             | 2020/1/31            | 12                           |
| SAT6-14                        | RE        | 167095  | Attenuator                | JFW                                  | 50HF-006N                           | -                       | 2019/2/5              | 2020/2/29            | 12                           |
| SBA-02                         | RE        | 145022  | Biconical Antenna         | Schwarzbeck                          | BBA9106                             | 91032665                | 2019/4/1              | 2020/4/30            | 12                           |
| SCC-B1/B3/B5/B7/B8/B13/SRSE-02 | RE        | 144975  | Coaxial Cable&RF Selector | Fujikura/Fujikura/Suhner/Suhner/TOYO | 8D2W/12DSF A/141PE/141PE/141PE/141P | -/0901-270(RF Selector) | 2019/4/19             | 2020/4/30            | 12                           |
| SCC-B2/B4/B6/B7/B8/B13/SRSE-02 | RE        | 144976  | Coaxial Cable&RF Selector | Fujikura/Fujikura/Suhner/Suhner/TOYO | 8D2W/12DSF A/141PE/141PE/141PE/141P | -/0901-270(RF Selector) | 2019/4/19             | 2020/4/30            | 12                           |
| SCC-G05                        | RE        | 145039  | Coaxial Cable             | Junkosha                             | J12J102207-00                       | APR-30-15-037           | 2019/1/25             | 2020/1/31            | 12                           |
| SCC-G40                        | RE        | 166491  | Coaxial Cable             | Junkosha                             | MWX221-01000NFSN MS/B               | 1612S005                | 2019/1/25             | 2020/1/31            | 12                           |
| SCC-G43                        | RE        | 156380  | Coaxial Cable             | HUBER+SUNER                          | SUCOFLEX_104 E                      | SN MY 13406/4E          | 2019/7/3              | 2020/7/31            | 12                           |
| SCC-G45                        | RE        | 168301  | Coaxial Cable             | HUBER+SUNER                          | SUCOFLEX 102 E                      | 800137/2E A             | 2019/3/26             | 2020/3/31            | 12                           |
| SCC-G56                        | RE        | 179539  | Coaxial Cable             | Huber+Suhner                         | SUCOFLEX 104                        | 803289/4                | 2019/5/16             | 2020/5/31            | 12                           |
| SCC-G57                        | RE        | 179540  | Coaxial Cable             | Huber+Suhner                         | SUCOFLEX 102                        | 802815/2                | 2019/5/16             | 2020/5/31            | 12                           |
| SCC-G58                        | RE        | 183047  | Coaxial Cable             | HUBER+SUNER                          | SUCOFLEX 104                        | 800287/4A               | 2019/7/23             | 2020/7/31            | 12                           |
| SFL-18                         | RE        | 145305  | Highpass Filter           | MICRO-TRONICS                        | HPM50111                            | 119                     | 2019/4/16             | 2020/4/30            | 12                           |
| SHA-02                         | RE        | 145384  | Horn Antenna              | Schwarzbeck                          | BBHA9120D                           | 9120D-726               | 2019/6/26             | 2020/6/30            | 12                           |
| SHA-03                         | RE        | 145501  | Horn Antenna              | Schwarzbeck                          | BBHA9120D                           | 9120D-739               | 2019/6/26             | 2020/6/30            | 12                           |
| SHA-04                         | RE        | 145512  | Horn Antenna              | ETS LINDGREN                         | Sep-60                              | LM3640                  | 2019/6/26             | 2020/6/30            | 12                           |
| SJM-09                         | RE        | 145336  | Measure                   | PROMART                              | SEN1935                             | -                       | -                     | -                    | -                            |
| SLA-06                         | RE        | 145528  | Logperiodic Antenna       | Schwarzbeck                          | VUSLP9111B                          | 195                     | 2019/4/1              | 2020/4/30            | 12                           |
| SOS-03                         | RE        | 146317  | Humidity Indicator        | A&D                                  | AD-5681                             | 4063325                 | 2018/10/25            | 2019/10/31           | 12                           |
| SOS-05                         | RE        | 146293  | Humidity Indicator        | A&D                                  | AD-5681                             | 4062518                 | 2018/10/25            | 2019/10/31           | 12                           |
| STR-07                         | RE        | 146209  | Test Receiver             | Rohde & Schwarz                      | ESU26                               | 100484                  | 2018/9/26             | 2019/9/30            | 12                           |
| STS-02                         | RE        | 145793  | Digital Hitester          | HIOKI                                | 3805-50                             | 80997819                | 2019/4/2              | 2020/4/30            | 12                           |
| STS-03                         | RE        | 146210  | Digital Hitester          | HIOKI                                | 3805-50                             | 80997823                | 2018/10/16            | 2019/10/31           | 12                           |

\*Hyphens for Last Calibration Date, Calibration Due Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test item: RE: Radiated Emission test  
AT: Antenna Terminal Conducted test

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