



# **RADIO TEST REPORT**

**Test Report No. : 11624584H-C**

**Applicant** : VAIO Corporation  
**Type of Equipment** : Digital Music Score  
**Model No.** : DMS-W1  
**FCC ID** : 2AL4MDMS-W1  
**Test regulation** : FCC Part 15 Subpart C: 2017  
\*Bluetooth part  
**Test Result** : Complied

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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 above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
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)

**Date of test:** April 17 to May 16, 2017

**Representative test engineer:**

  
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**Approved by:**

  
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Leader  
Consumer Technology Division



NVLAP LAB CODE: 200572-0

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13-EM-F0429

## REVISION HISTORY

**Original Test Report No.: 11624584H-C**

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## **SECTION 1: Customer information**

|                  |   |                                                     |
|------------------|---|-----------------------------------------------------|
| Company Name     | : | VAIO Corporation                                    |
| Address          | : | 5432 Toyoshina, Azumino-shi, Nagano, 399-8282 Japan |
| Telephone Number | : | +81-263-50-7391                                     |
| Facsimile Number | : | +81-263-50-7015                                     |
| Contact Person   | : | Masami Ogawa                                        |

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

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

|                            |   |                                                                                           |
|----------------------------|---|-------------------------------------------------------------------------------------------|
| Type of Equipment          | : | Digital Music Score                                                                       |
| Model No.                  | : | DMS-W1                                                                                    |
| Serial No.                 | : | Refer to Section 4, Clause 4.2                                                            |
| Rating                     | : | DC 5.0 V (USB), DC 3.7 V (Battery)                                                        |
| Receipt Date of Sample     | : | April 17, 2017                                                                            |
| Country of Mass-production | : | Japan                                                                                     |
| Condition of EUT           | : | Production 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: DMS-W1 (referred to as the EUT in this report) is a Digital Music Score.

### **General Specification**

|                                    |   |                                                                         |
|------------------------------------|---|-------------------------------------------------------------------------|
| Clock frequency(ies) in the system | : | 996 MHz, 630 MHz, 650 MHz, 528 MHz, 480 MHz, 26 MHz, 24 MHz, 32.768 kHz |
| Operating Temperature              | : | +5 deg. C - +35 deg. C                                                  |

### **Radio Specification**

|                      |   |                      |
|----------------------|---|----------------------|
| Radio Type           | : | Transceiver          |
| Power Supply (inner) | : | DC 1.8 V / DC 3.15 V |

|                           | IEEE802.11b                       | IEEE802.11g/n<br>(20 M band)              | IEEE802.11a/n<br>(20 M band)                                                            | IEEE802.11n<br>(40 M band)                                                  | Bluetooth Ver.3.0<br>with EDR function<br>*1) |
|---------------------------|-----------------------------------|-------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------|
| Frequency<br>of operation | 2412<br>MHz-2462MHz               | 2412 MHz<br>-2462MHz                      | 5180 MHz -5240MHz<br>5260 MHz -5320MHz<br>5500 MHz -5580MHz<br>5660 MHz-5700 MHz<br>*2) | 5190 MHz -5230MHz<br>5270 MHz -5310MHz<br>5510 MHz -5550 MHz<br>5670MHz *2) | 2402 MHz -2480MHz                             |
| Type of modulation        | DSSS<br>(CCK, DQPSK,<br>DBPSK)    | OFDM-CCK<br>(64QAM, 16QAM,<br>QPSK, BPSK) | OFDM (64QAM, 16QAM, QPSK, BPSK)                                                         |                                                                             | FHSS (GFSK,<br>$\pi/4$ -DQPSK, 8-DPSK)        |
| Channel spacing           | 5MHz                              |                                           | 20MHz                                                                                   | 40MHz                                                                       | 1MHz                                          |
| Antenna type              | monopole pattern antenna          |                                           |                                                                                         |                                                                             |                                               |
| Antenna Gain              | 0.3 dBi                           |                                           | 2.6 dBi                                                                                 |                                                                             | 0.3 dBi                                       |
| Antenna Connector<br>type | Surface mounted coaxial connector |                                           |                                                                                         |                                                                             | Surface mounted<br>coaxial connector          |

\*1) This test report applies for Bluetooth Ver3.0 with EDR function.

\*2) 5600 MHz-5650 MHz is not used.

\*Wireless LAN and Bluetooth do not transmit simultaneously.

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## **SECTION 3: Test specification, procedures & results**

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C  
FCC Part 15 final revised on June 14, 2017 and effective July 14, 2017

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.207 Conducted limits  
Section 15.247 Operation within the bands 902-928MHz,  
2400-2483.5MHz, and 5725-5850MHz

\* The revision on June 14, 2017, 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>IC: RSS-Gen 8.8 | FCC: Section 15.207<br>IC: RSS-Gen 8.8                                  | QP<br>17.1 dB, 0.15000 MHz, L<br>AV<br>18.1 dB, 0.50660 MHz, N | Complied | -                                               |
| Carrier Frequency Separation                                                                                                                          | FCC: FCC Public Notice<br>DA 00-705<br>IC: -                         | FCC: Section15.247(a)(1)<br>IC: RSS-247 5.1 (b)                         | See data.                                                      | Complied | Conducted                                       |
| 20dB Bandwidth                                                                                                                                        | FCC: FCC Public Notice<br>DA 00-705<br>IC: -                         | FCC: Section15.247(a)(1)<br>IC: RSS-247 5.1 (a)                         |                                                                | Complied | Conducted                                       |
| Number of Hopping Frequency                                                                                                                           | FCC: FCC Public Notice<br>DA 00-705<br>IC: -                         | FCC: Section15.247(a)(1)(iii)<br>IC: RSS-247 5.1 (d)                    |                                                                | Complied | Conducted                                       |
| Dwell time                                                                                                                                            | FCC: FCC Public Notice<br>DA 00-705<br>IC: -                         | FCC: Section15.247(a)(1)(iii)<br>IC: RSS-247 5.1 (d)                    |                                                                | Complied | Conducted                                       |
| Maximum Peak Output Power                                                                                                                             | FCC: FCC Public Notice<br>DA 00-705<br>IC: RSS-Gen 6.12              | FCC: Section15.247(a)(b)(1)<br>IC: RSS-247 5.4 (b)                      |                                                                | Complied | Conducted                                       |
| Spurious Emission & Band Edge Compliance                                                                                                              | FCC: FCC Public Notice<br>DA 00-705<br>IC: RSS-Gen 6.13              | FCC: Section15.247(d)<br>IC: RSS-247 5.5<br>RSS-Gen 8.9<br>RSS-Gen 8.10 | 9.3dB<br>7206.000 MHz, AV, Vert.                               | Complied | Conducted/<br>Radiated<br>(above 30 MHz)<br>*1) |
| Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.<br>*1) Radiated test was selected over 30 MHz based on section 15.247(d). |                                                                      |                                                                         |                                                                |          |                                                 |

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

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

This EUT provides stable voltage(DC 1.8 V/3.15 V) constantly to RF Part regardless of input voltage. Therefore, this 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 of Section 15.203.

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### 3.3 Addition to standard

| Item                   | Test Procedure  | Specification | Worst margin | Results | Remarks   |
|------------------------|-----------------|---------------|--------------|---------|-----------|
| 99% Occupied Bandwidth | IC: RSS-Gen 6.6 | IC: -         | N/A          | -       | Conducted |

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

### 3.4 Uncertainty

#### EMI

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor  $k=2$ .  
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| Antenna terminal test Uncertainty (+/-) |             |                                      |               |                |                    |                   |               |
|-----------------------------------------|-------------|--------------------------------------|---------------|----------------|--------------------|-------------------|---------------|
| Power meter                             |             | Conducted emission and Power density |               |                | Conducted emission |                   | Channel power |
| Below 1 GHz                             | Above 1 GHz | Below 1 GHz                          | 1 GHz - 3 GHz | 3 GHz - 18 GHz | 18 GHz - 26.5 GHz  | 26.5 GHz - 40 GHz |               |
| 0.9 dB                                  | 1.0 dB      | 1.4 dB                               | 1.5 dB        | 2.8 dB         | 2.8 dB             | 2.9 dB            | 2.6 dB        |

| Frequency range      | Conducted emission using AMN(LISN) (+/-) |
|----------------------|------------------------------------------|
| 0.009 MHz - 0.15 MHz | 3.5 dB                                   |
| 0.15 MHz - 30 MHz    | 3.0 dB                                   |

| Test distance | Radiated emission (+/-)<br>9 kHz - 30 MHz |
|---------------|-------------------------------------------|
| 3 m           | 3.8 dB                                    |
| 10 m          | 3.7 dB                                    |

| Polarity   | Radiated emission (Below 1 GHz) |                    |                  |                    |
|------------|---------------------------------|--------------------|------------------|--------------------|
|            | (3 m*) (+/-)                    |                    | (10 m*) (+/-)    |                    |
|            | 30 MHz - 200 MHz                | 200 MHz - 1000 MHz | 30 MHz - 200 MHz | 200 MHz - 1000 MHz |
| Horizontal | 5.0 dB                          | 5.3 dB             | 5.0 dB           | 5.0 dB             |
| Vertical   | 4.7 dB                          | 5.9 dB             | 5.0 dB           | 5.1 dB             |

| Radiated emission (Above 1 GHz) |                |                   |                   |                |
|---------------------------------|----------------|-------------------|-------------------|----------------|
| (3 m*) (+/-)                    |                | (1 m*) (+/-)      |                   | (10 m*) (+/-)  |
| 1 GHz - 6 GHz                   | 6 GHz - 18 GHz | 10 GHz - 26.5 GHz | 26.5 GHz - 40 GHz | 1 GHz - 18 GHz |
| 5.2 dB                          | 5.4 dB         | 5.5 dB            | 5.5 dB            | 5.4 dB         |

\*Measurement distance

#### Conducted Emission test

The data listed in this test report has enough margin, more than the site margin.

#### Radiated emission test

The data listed in this test report has enough margin, more than the site margin.

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### 3.5 Test Location

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| Test site                  | IC Registration Number | Width x Depth x Height (m) | Size of reference ground plane (m) / horizontal conducting plane | Other rooms            | Maximum measurement distance |
|----------------------------|------------------------|----------------------------|------------------------------------------------------------------|------------------------|------------------------------|
| No.1 semi-anechoic chamber | 2973C-1                | 19.2 x 11.2 x 7.7          | 7.0 x 6.0                                                        | No.1 Power source room | 10 m                         |
| No.2 semi-anechoic chamber | 2973C-2                | 7.5 x 5.8 x 5.2            | 4.0 x 4.0                                                        | -                      | 3 m                          |
| No.3 semi-anechoic chamber | 2973C-3                | 12.0 x 8.5 x 5.9           | 6.8 x 5.75                                                       | No.3 Preparation room  | 3 m                          |
| No.3 shielded room         | -                      | 4.0 x 6.0 x 2.7            | N/A                                                              | -                      | -                            |
| No.4 semi-anechoic chamber | 2973C-4                | 12.0 x 8.5 x 5.9           | 6.8 x 5.75                                                       | No.4 Preparation room  | 3 m                          |
| No.4 shielded room         | -                      | 4.0 x 6.0 x 2.7            | N/A                                                              | -                      | -                            |
| No.5 semi-anechoic chamber | -                      | 6.0 x 6.0 x 3.9            | 6.0 x 6.0                                                        | -                      | -                            |
| No.6 shielded room         | -                      | 4.0 x 4.5 x 2.7            | 4.0 x 4.5                                                        | -                      | -                            |
| No.6 measurement room      | -                      | 4.75 x 5.4 x 3.0           | 4.75 x 4.15                                                      | -                      | -                            |
| No.7 shielded room         | -                      | 4.7 x 7.5 x 2.7            | 4.7 x 7.5                                                        | -                      | -                            |
| No.8 measurement room      | -                      | 3.1 x 5.0 x 2.7            | N/A                                                              | -                      | -                            |
| No.9 measurement room      | -                      | 8.8 x 4.6 x 2.8            | 2.4 x 2.4                                                        | -                      | -                            |
| No.11 measurement room     | -                      | 6.2 x 4.7 x 3.0            | 4.8 x 4.6                                                        | -                      | -                            |

\* Size of vertical conducting plane (for Conducted Emission test) : 2.0 m x 2.0 m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

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

Refer to APPENDIX.

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

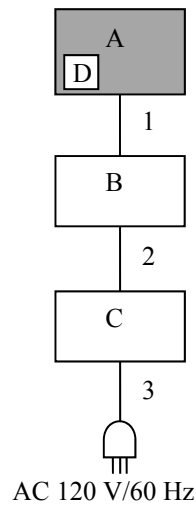
### **4.1 Operating Mode(s)**

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

Details of Operating Mode(s)

| Test Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Mode                                                    | Tested frequency                 |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|----------------------------------|
| Conducted Emission,<br>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 test items based on Bluetooth Core specification.</p> <p>*EUT has the power settings by the software as follows;</p> <p>Power settings:     DH5:                     -0.8 dBm<br/>                          2DH5/3DH5:         -6.8 dBm</p> <p>Software:             MAC F/W version : Rev. 8.9.0.0.48<br/>                          PHY F/W version : Rev. 8.2.0.0.232 (FDSP: 1.162)</p> <p>*This setting of software is the worst case.</p> <p>Any conditions under the normal use do not exceed the condition of setting.</p> <p>In addition, end users cannot change the settings of the output power of the product.</p> |                                                         |                                  |

## 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     | Remark |
|-----|---------------------|----------------|-----------------------|------------------|--------|
| A   | Digital Music Score | DMS-W1         | 38 *1), *2)<br>10 *3) | VAIO Corporation | EUT    |
| B   | Laptop PC           | VJZ13AA11N     | SKU013PVT1-S-06       | VAIO Corporation | -      |
| C   | AC Adapter          | VGP-AC19V74    | 1492510110002343      | SONY             | -      |
| D   | Micro SD Card       | SDSDH-008G-J95 | 6356PKA053ES          | SanDisk          | -      |

### List of cables used

| No. | Name      | Length (m)         | Shield     |            | Remark |
|-----|-----------|--------------------|------------|------------|--------|
|     |           |                    | Cable      | Connector  |        |
| 1   | USB Cable | 1.0 *1)<br>2.5 *2) | Shielded   | Shielded   | -      |
| 2   | DC Cable  | 1.8                | Unshielded | Unshielded | -      |
| 3   | AC Cable  | 2.0                | Unshielded | Unshielded | -      |

\*1) Used for Conducted emission

\*2) Used for Radiated emission

\*3) Used for Antenna terminal conducted tests

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## **SECTION 5: Conducted Emission**

### **Test Procedure and conditions**

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane.

The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

#### **For the tests on EUT with other peripherals (as a whole system)**

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50 ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber.

The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

|                          |                            |
|--------------------------|----------------------------|
| <b>Detector</b>          | <b>: QP and CISPR AV</b>   |
| <b>Measurement range</b> | <b>: 0.15 MHz - 30 MHz</b> |
| <b>Test data</b>         | <b>: APPENDIX</b>          |
| <b>Test result</b>       | <b>: Pass</b>              |

## **SECTION 6: Radiated Spurious Emission**

### **Test Procedure**

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane. 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 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

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 (IC) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (IC).**

|                 |               |                                                          |                              |                                                          |
|-----------------|---------------|----------------------------------------------------------|------------------------------|----------------------------------------------------------|
| Frequency       | Below 1 GHz   | Above 1 GHz                                              |                              | 20 dBc                                                   |
| Instrument used | Test Receiver | Spectrum Analyzer                                        |                              | Spectrum Analyzer                                        |
| Detector        | QP            | PK                                                       | AV                           | PK                                                       |
| IF Bandwidth    | BW 120 kHz    | RBW: 1 MHz<br>VBW: 3 MHz                                 | RBW: 1 MHz<br>VBW: 10 Hz *1) | RBW: 100 kHz<br>VBW: 300 kHz                             |
| Test Distance   | 3 m           | 4.3 m*2) (1 GHz – 10 GHz),<br>1 m*3) (10 GHz – 26.5 GHz) |                              | 4.3 m*2) (1 GHz – 10 GHz),<br>1 m*3) (10 GHz – 26.5 GHz) |

\*1) Although DA 00-705 accepts VBW = 10 Hz for AV measurements, it was confirmed that superfluous smoothing was not performed.

\*2) Distance Factor:  $20 \times \log(4.3 \text{ m}/3.0 \text{ m}) = 3.13 \text{ dB}$

\*3) Distance Factor:  $20 \times \log(1.0 \text{ m}/3.0 \text{ m}) = -9.5 \text{ dB}$

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

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 7: 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: 50MHz BW) |
| Carrier Frequency Separation                     | 3 MHz                                   | 30 kHz          | 100 kHz            | Auto                                                           | Peak             | Max Hold    | Spectrum Analyzer              |
| Number of Hopping Frequency                      | 30 MHz                                  | 300 kHz         | 1 MHz              | 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                       | 9.1 kHz         | 27 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 = 9.1 kHz)

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

**Test data : APPENDIX**  
**Test result : Pass**

## APPENDIX 1: Test data

### Conducted Emission

#### DATA OF CONDUCTED EMISSION TEST

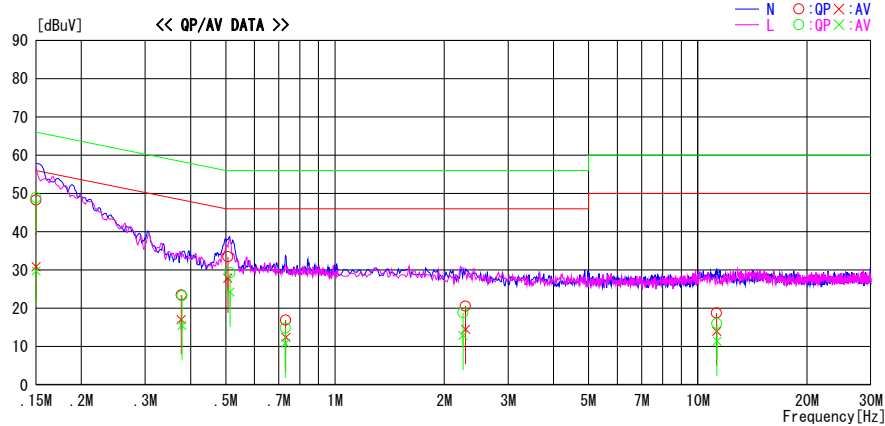
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber  
Date : 2017/05/16

Report No. : 11624584H

Temp./Humi. : 24 deg. C / 42 % RH  
Engineer : Hironobu Ohnishi

Mode / Remarks : Tx DH5 2441 MHz

LIMIT : FCC15.207 QP  
FCC15.207 AV

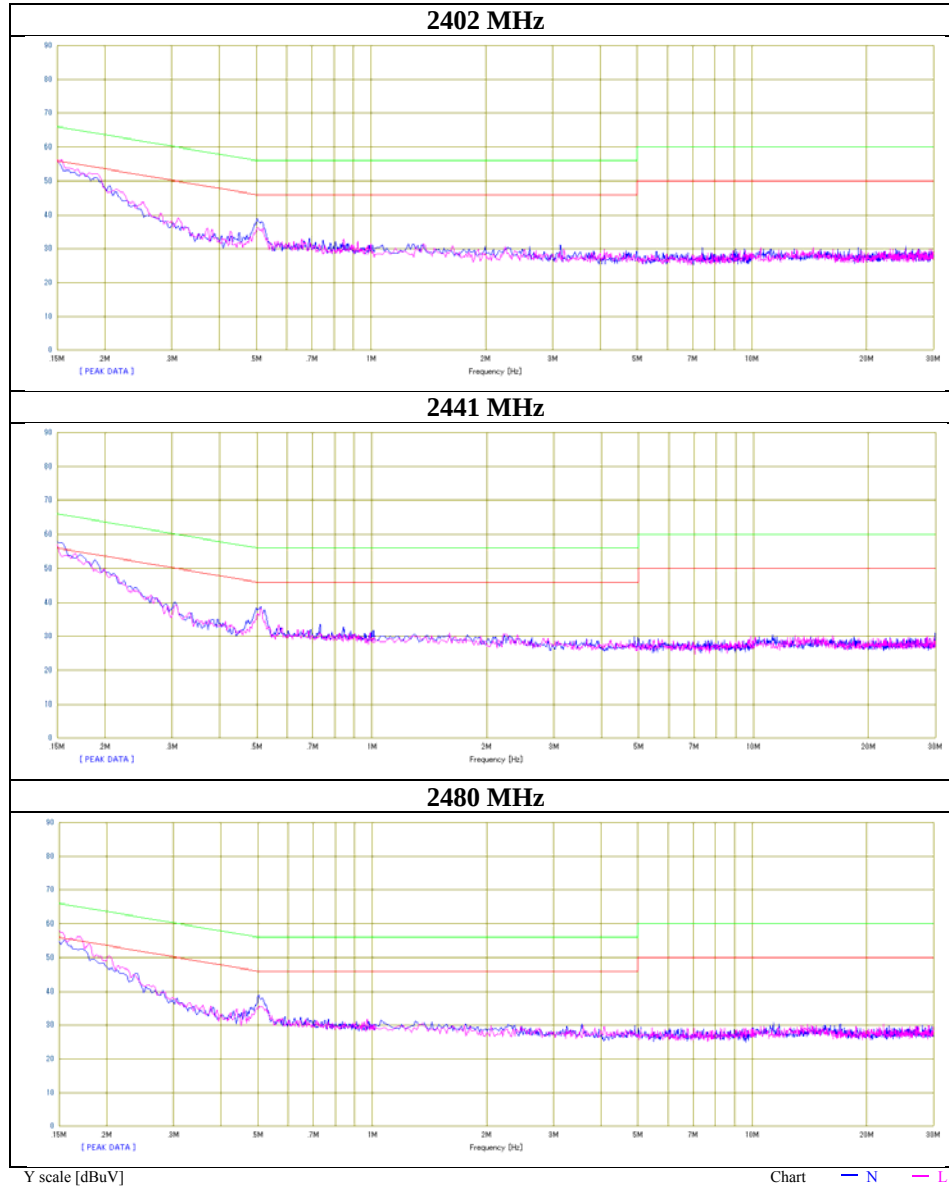


| Frequency<br>[MHz] | Reading Level |              | Corr.<br>Factor | Results      |              | Limit        |              | Margin     |            | Phase | Comment |
|--------------------|---------------|--------------|-----------------|--------------|--------------|--------------|--------------|------------|------------|-------|---------|
|                    | QP<br>[dBuV]  | AV<br>[dBuV] |                 | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dB] | AV<br>[dB] |       |         |
| 0.15000            | 35.1          | 17.7         | 13.2            | 48.3         | 30.9         | 66.0         | 56.0         | 17.7       | 25.1       | N     |         |
| 0.37680            | 10.3          | 3.9          | 13.2            | 23.5         | 17.1         | 58.3         | 48.3         | 34.8       | 31.2       | N     |         |
| 0.50660            | 20.2          | 14.6         | 13.3            | 33.5         | 27.9         | 56.0         | 46.0         | 22.5       | 18.1       | N     |         |
| 0.73145            | 3.6           | -0.9         | 13.3            | 16.9         | 12.4         | 56.0         | 46.0         | 39.1       | 33.6       | N     |         |
| 2.28935            | 7.0           | 0.9          | 13.6            | 20.6         | 14.5         | 56.0         | 46.0         | 35.4       | 31.5       | N     |         |
| 11.26593           | 4.4           | -0.3         | 14.3            | 18.7         | 14.0         | 60.0         | 50.0         | 41.3       | 36.0       | N     |         |
| 0.15000            | 35.7          | 16.6         | 13.2            | 48.9         | 29.8         | 66.0         | 56.0         | 17.1       | 26.2       | L     |         |
| 0.37866            | 10.1          | 2.3          | 13.2            | 23.3         | 15.5         | 58.3         | 48.3         | 35.0       | 32.8       | L     |         |
| 0.51370            | 16.0          | 10.9         | 13.3            | 29.3         | 24.2         | 56.0         | 46.0         | 26.7       | 21.8       | L     |         |
| 0.73000            | 1.5           | -2.4         | 13.3            | 14.8         | 10.9         | 56.0         | 46.0         | 41.2       | 35.1       | L     |         |
| 2.25300            | 5.2           | -0.7         | 13.6            | 18.8         | 12.9         | 56.0         | 46.0         | 37.2       | 33.1       | L     |         |
| 11.28667           | 1.7           | -2.9         | 14.3            | 16.0         | 11.4         | 60.0         | 50.0         | 44.0       | 38.6       | L     |         |

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + CABLE + ATTEN)  
Except for the above table: adequate margin data below the limits.

## Conducted Emission

|                        |                                         |
|------------------------|-----------------------------------------|
| Test place             | Ise EMC Lab. No.2 Semi Anechoic Chamber |
| Report No.             | 11624584H                               |
| Date                   | May 16, 2017                            |
| Temperature / Humidity | 24 deg. C / 42 % RH                     |
| Engineer               | Hironobu Ohnishi                        |
| Mode                   | Tx, Hopping Off, DH5                    |



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## Conducted Emission

### DATA OF CONDUCTED EMISSION TEST

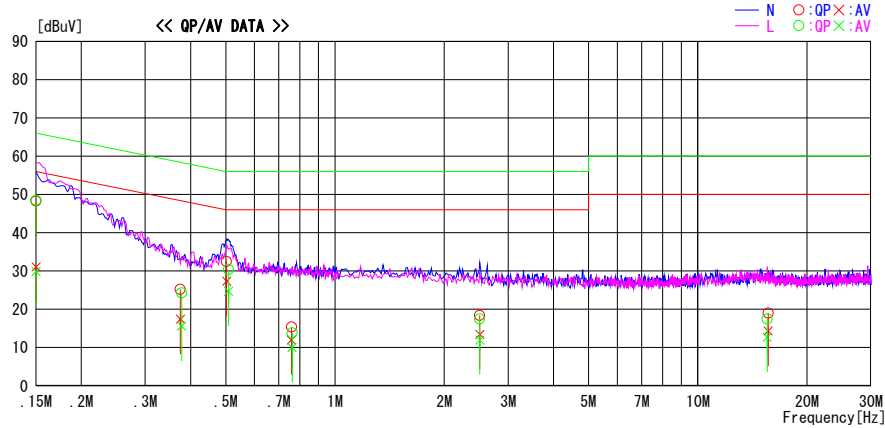
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber  
Date : 2017/05/16

Report No. : 11624584H

Temp./Humi. : 24 deg. C / 42 % RH  
Engineer : Hironobu Ohnishi

Mode / Remarks : Tx 3DH5 2441 MHz

LIMIT : FCC15.207 QP  
FCC15.207 AV



| Frequency<br>[MHz] | Reading Level |              | Corr.<br>Factor | Results      |              | Limit        |              | Margin     |            | Phase | Comment |
|--------------------|---------------|--------------|-----------------|--------------|--------------|--------------|--------------|------------|------------|-------|---------|
|                    | QP<br>[dBuV]  | AV<br>[dBuV] |                 | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dBuV] | AV<br>[dBuV] | QP<br>[dB] | AV<br>[dB] |       |         |
| 0.15000            | 35.1          | 17.9         | 13.2            | 48.3         | 31.1         | 66.0         | 56.0         | 17.7       | 24.9       | N     |         |
| 0.37510            | 12.0          | 4.2          | 13.2            | 25.2         | 17.4         | 58.4         | 48.4         | 33.2       | 31.0       | N     |         |
| 0.50265            | 19.2          | 14.0         | 13.3            | 32.5         | 27.3         | 56.0         | 46.0         | 23.5       | 18.7       | N     |         |
| 0.75900            | 2.1           | -1.3         | 13.3            | 15.4         | 12.0         | 56.0         | 46.0         | 40.6       | 34.0       | N     |         |
| 2.50679            | 4.8           | -0.2         | 13.6            | 18.4         | 13.4         | 56.0         | 46.0         | 37.6       | 32.6       | N     |         |
| 15.63085           | 4.4           | -0.3         | 14.6            | 19.0         | 14.3         | 60.0         | 50.0         | 41.0       | 35.7       | N     |         |
| 0.15000            | 35.3          | 16.7         | 13.2            | 48.5         | 29.9         | 66.0         | 56.0         | 17.5       | 26.1       | L     |         |
| 0.37800            | 11.1          | 2.4          | 13.2            | 24.3         | 15.6         | 58.3         | 48.3         | 34.0       | 32.7       | L     |         |
| 0.50910            | 17.1          | 11.4         | 13.3            | 30.4         | 24.7         | 56.0         | 46.0         | 25.6       | 21.3       | L     |         |
| 0.76190            | 0.5           | -3.3         | 13.3            | 13.8         | 10.0         | 56.0         | 46.0         | 42.2       | 36.0       | L     |         |
| 2.50679            | 3.9           | -1.6         | 13.6            | 17.5         | 12.0         | 56.0         | 46.0         | 38.5       | 34.0       | L     |         |
| 15.53060           | 2.9           | -1.9         | 14.6            | 17.5         | 12.7         | 60.0         | 50.0         | 42.5       | 37.3       | L     |         |

CHART : WITH FACTOR, Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + ATTN + CABLE)  
Except for the above table : adequate margin data below the limits.

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Ise EMC Lab.

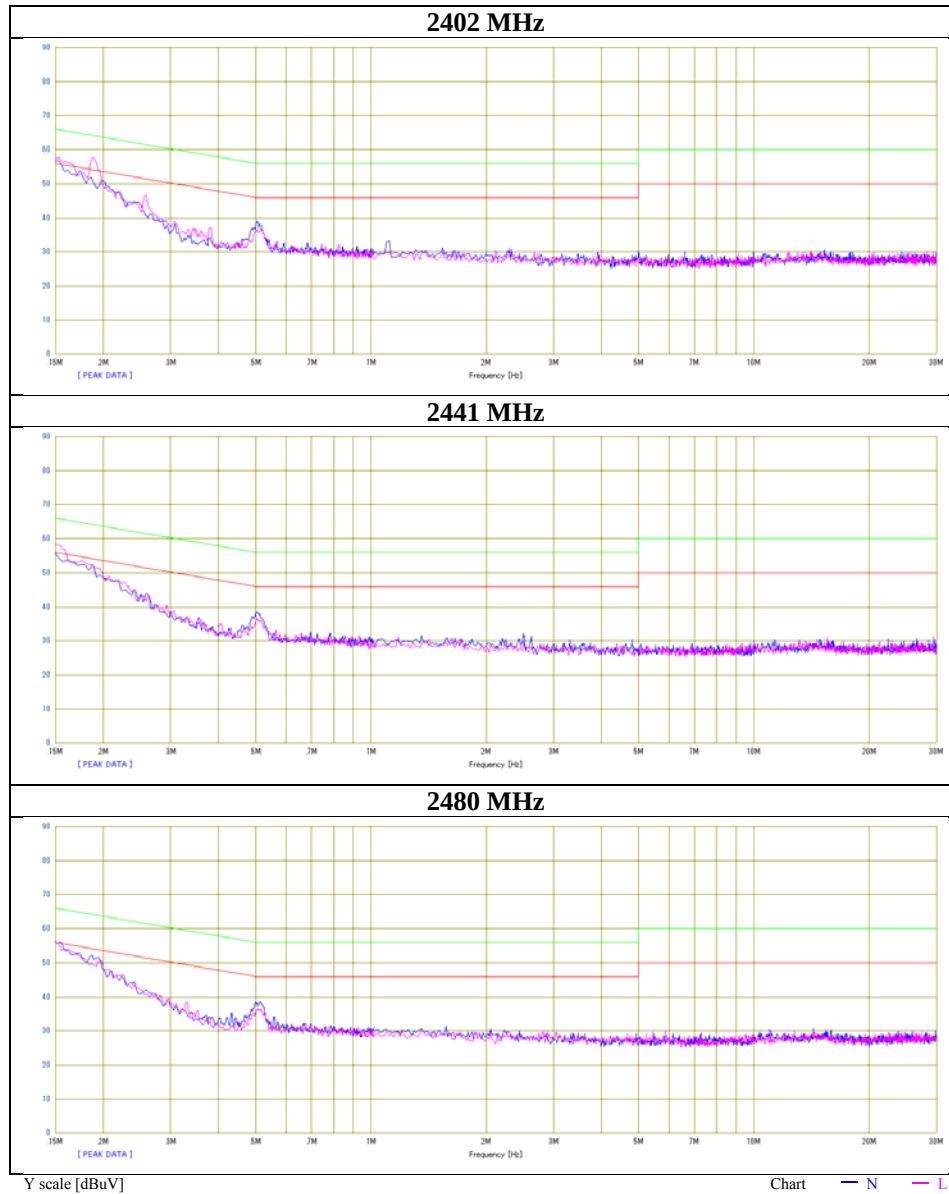
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## Conducted Emission

|                        |                                         |
|------------------------|-----------------------------------------|
| Test place             | Ise EMC Lab. No.2 Semi Anechoic Chamber |
| Report No.             | 11624584H                               |
| Date                   | May 16, 2017                            |
| Temperature / Humidity | 24 deg. C / 42 % RH                     |
| Engineer               | Hironobu Ohnishi                        |
| Mode                   | Tx, Hopping Off, 3DH5                   |



## **20dB Bandwidth and Carrier Frequency Separation**

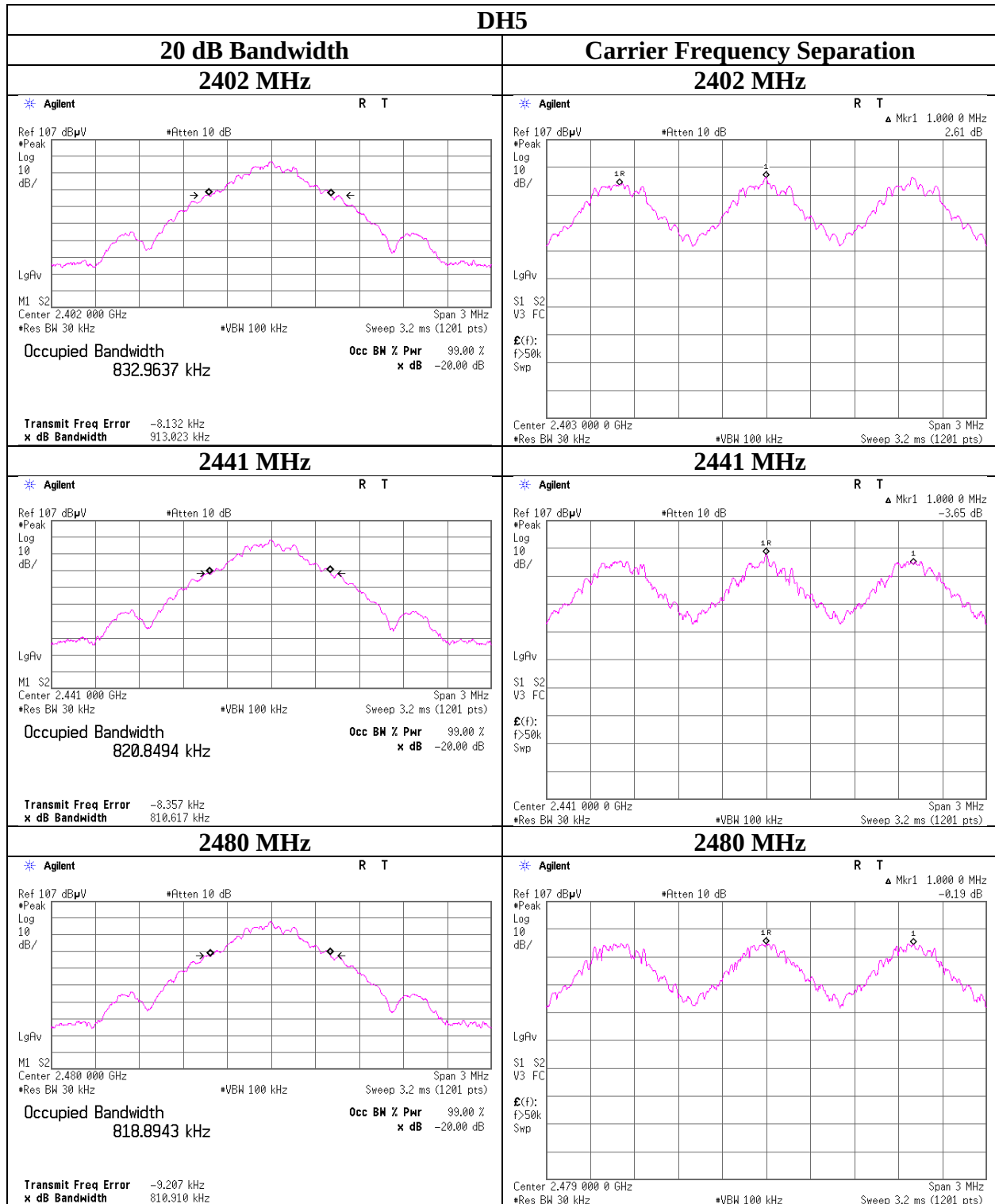
Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11624584H  
Date : May 8, 2017  
Temperature / Humidity : 24 deg. C / 41 % RH  
Engineer : Takumi Shimada  
Mode : Tx, Hopping Off, DH5

| Mode | Freq.<br>[MHz] | 20dB Bandwidth<br>[MHz] | Carrier Frequency<br>Separation<br>[MHz] | Limit for Carrier<br>Frequency separation<br>[MHz] |
|------|----------------|-------------------------|------------------------------------------|----------------------------------------------------|
| DH5  | 2402.0         | 0.913                   | 1.000                                    | $\geq 0.609$                                       |
| DH5  | 2441.0         | 0.811                   | 1.000                                    | $\geq 0.541$                                       |
| DH5  | 2480.0         | 0.811                   | 1.000                                    | $\geq 0.541$                                       |
| 3DH5 | 2402.0         | 1.283                   | 1.000                                    | $\geq 0.855$                                       |
| 3DH5 | 2441.0         | 1.286                   | 1.000                                    | $\geq 0.857$                                       |
| 3DH5 | 2480.0         | 1.283                   | 1.000                                    | $\geq 0.855$                                       |

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

No limit applies to 20dB Bandwidth.

## 20dB Bandwidth and Carrier Frequency Separation



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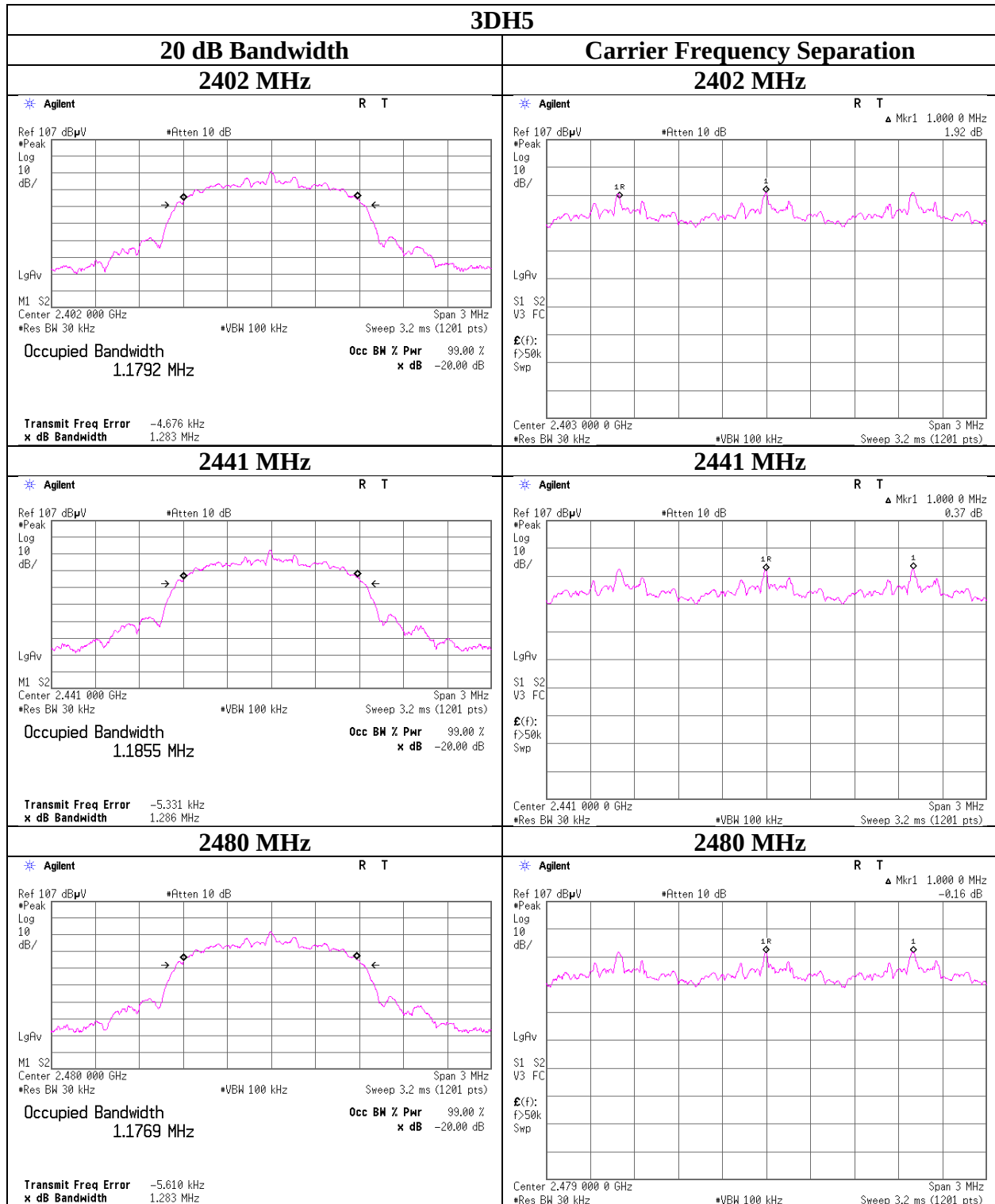
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## 20dB Bandwidth and Carrier Frequency Separation



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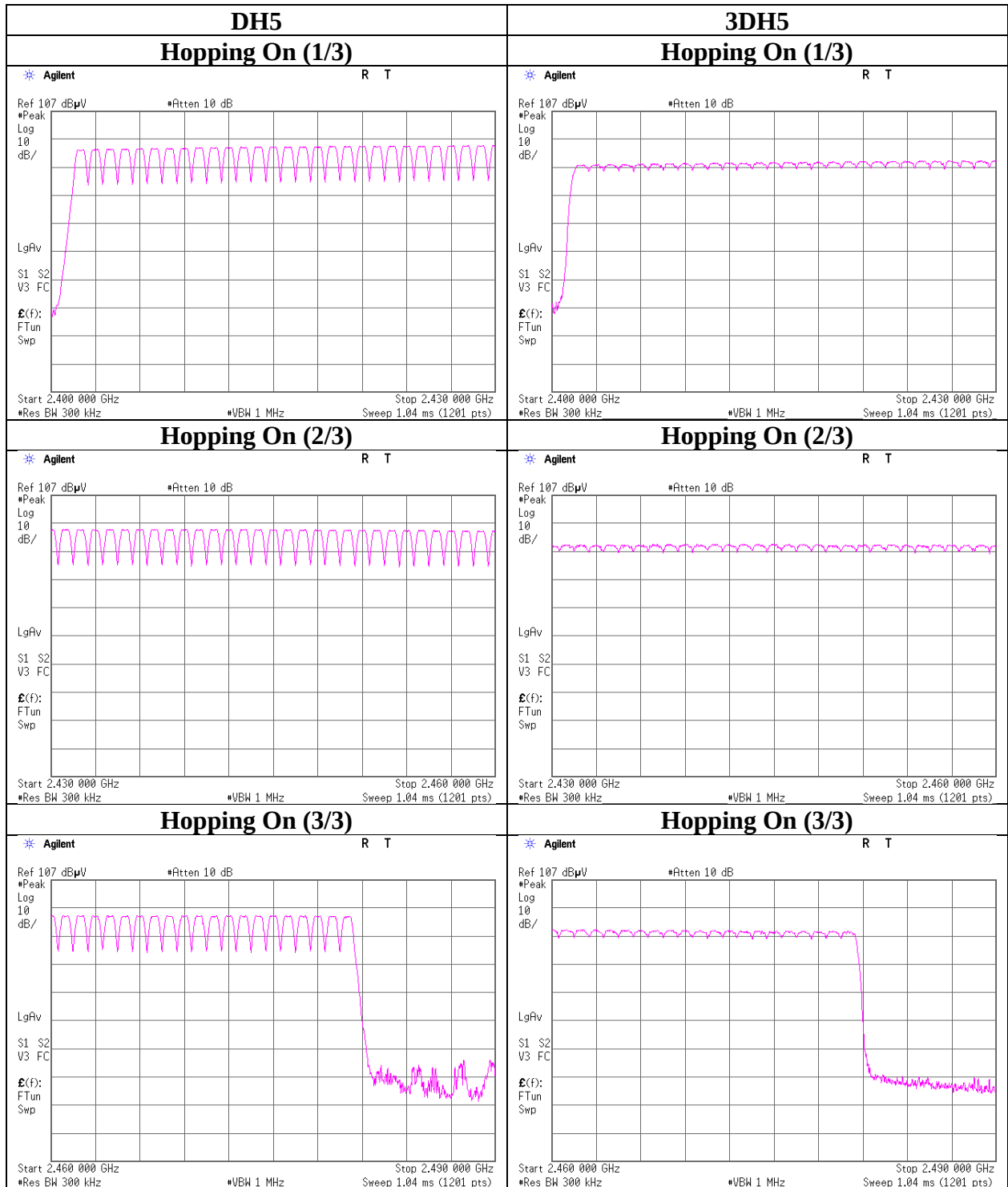
### **Number of Hopping Frequency**

Test place                      Ise EMC Lab. No.6 Measurement Room  
Report No.                    11624584H  
Date                            May 8, 2017  
Temperature / Humidity    24 deg. C / 41 % RH  
Engineer                      Takumi Shimada  
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

Test place : Ise EMC Lab. No.11 Measurement Room  
Report No. : 11624584H  
Date : May 8, 2017  
Temperature / Humidity : 25 deg. C / 40 % RH  
Engineer : Takumi Shimada  
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  | 50.0 times                                                                                       | / | 5 sec. | x | 31.6 sec. =                         | 316 times        | 400             |
| DH3  | 24.6 times                                                                                       | / | 5 sec. | x | 31.6 sec. =                         | 156 times        | 400             |
| DH5  | 19.6 times                                                                                       | / | 5 sec. | x | 31.6 sec. =                         | 124 times        | 400             |
| 3DH1 | 49.6 times                                                                                       | / | 5 sec. | x | 31.6 sec. =                         | 314 times        | 400             |
| 3DH3 | 23.6 times                                                                                       | / | 5 sec. | x | 31.6 sec. =                         | 150 times        | 400             |
| 3DH5 | 16.6 times                                                                                       | / | 5 sec. | x | 31.6 sec. =                         | 105 times        | 400             |

Sample Calculation

Result = Number of transmission x Length of transmission

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

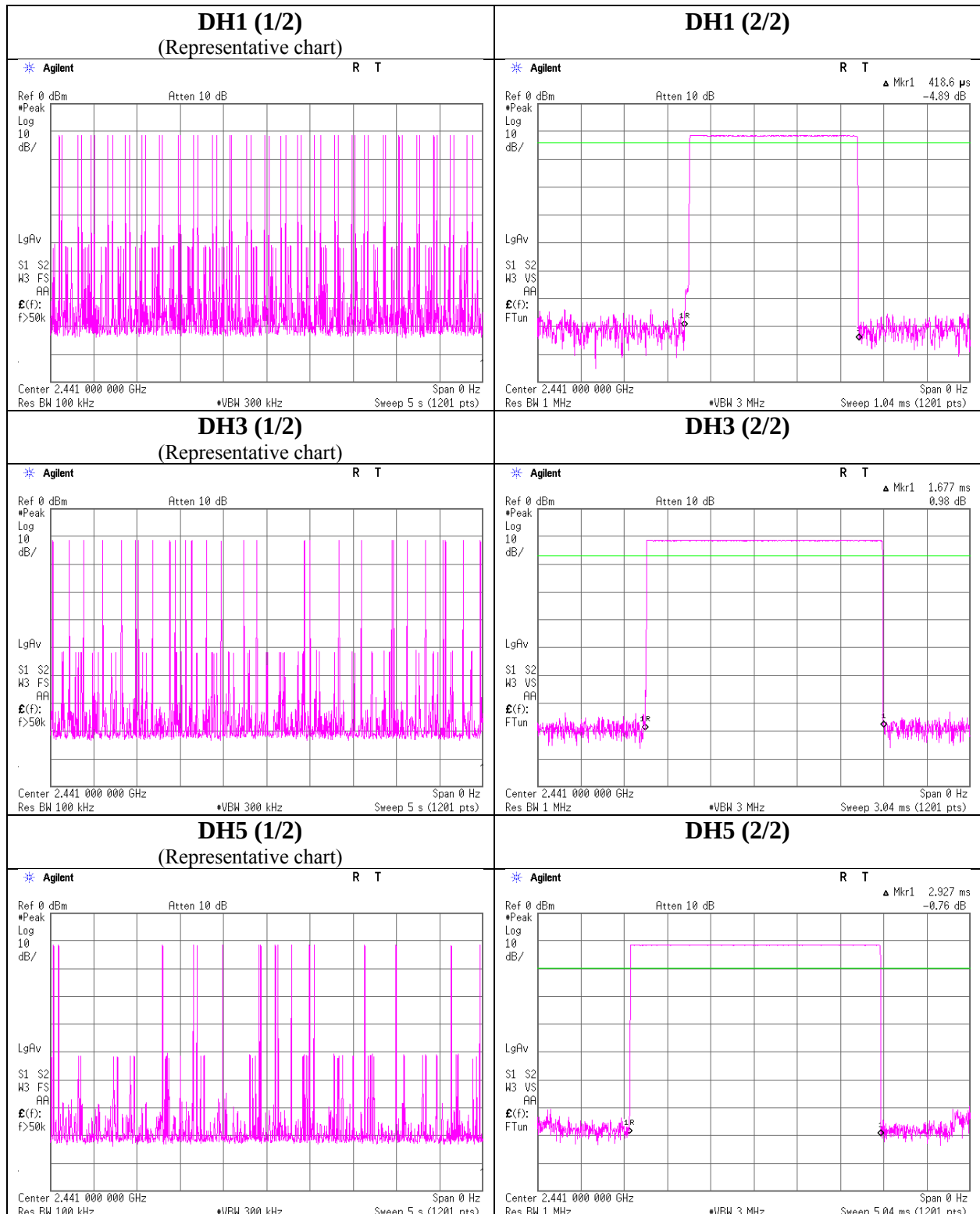
| Mode | Sampling [times] |    |    |    |    | Average<br>[times] |
|------|------------------|----|----|----|----|--------------------|
|      | 1                | 2  | 3  | 4  | 5  |                    |
| DH1  | 50               | 50 | 50 | 50 | 50 | 50                 |
| DH3  | 27               | 24 | 24 | 24 | 24 | 24.6               |
| DH5  | 17               | 21 | 20 | 17 | 23 | 19.6               |
| 3DH1 | 49               | 49 | 50 | 50 | 50 | 49.6               |
| 3DH3 | 21               | 24 | 24 | 23 | 26 | 23.6               |
| 3DH5 | 13               | 21 | 15 | 14 | 20 | 16.6               |

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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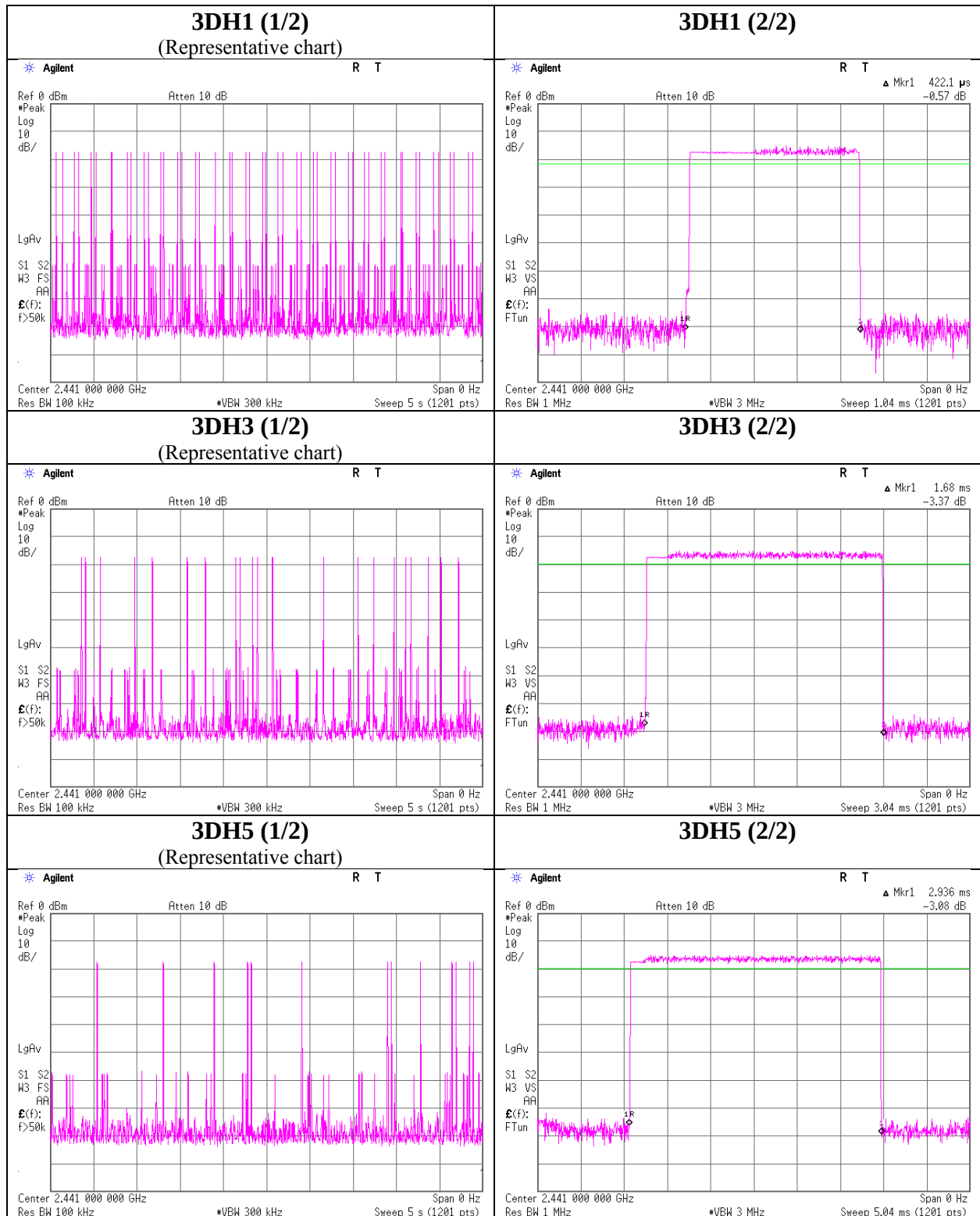
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## Dwell time



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### Maximum Peak Output Power

Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11624584H  
Date : April 18, 2017  
Temperature / Humidity : 24 deg. C / 41 % RH  
Engineer : Takumi Shimada  
Mode : Tx, Hopping Off

| Mode | Freq.<br>[MHz] | Reading<br>[dBm] | Cable<br>Loss<br>[dB] | Atten.<br>Loss<br>[dB] | Result |      | Limit |      | Margin<br>[dB] |
|------|----------------|------------------|-----------------------|------------------------|--------|------|-------|------|----------------|
|      |                |                  |                       |                        | [dBm]  | [mW] | [dBm] | [mW] |                |
| DH5  | 2402.0         | -11.82           | 0.70                  | 9.48                   | -1.64  | 0.69 | 20.96 | 125  | 22.60          |
| DH5  | 2441.0         | -10.25           | 0.70                  | 9.48                   | -0.07  | 0.98 | 20.96 | 125  | 21.03          |
| DH5  | 2480.0         | -11.03           | 0.70                  | 9.48                   | -0.85  | 0.82 | 20.96 | 125  | 21.81          |
| 2DH5 | 2402.0         | -15.33           | 0.70                  | 9.48                   | -5.15  | 0.31 | 20.96 | 125  | 26.11          |
| 2DH5 | 2441.0         | -13.82           | 0.70                  | 9.48                   | -3.64  | 0.43 | 20.96 | 125  | 24.60          |
| 2DH5 | 2480.0         | -14.45           | 0.70                  | 9.48                   | -4.27  | 0.37 | 20.96 | 125  | 25.23          |
| 3DH5 | 2402.0         | -15.16           | 0.70                  | 9.48                   | -4.98  | 0.32 | 20.96 | 125  | 25.94          |
| 3DH5 | 2441.0         | -13.21           | 0.70                  | 9.48                   | -3.03  | 0.50 | 20.96 | 125  | 23.99          |
| 3DH5 | 2480.0         | -14.10           | 0.70                  | 9.48                   | -3.92  | 0.41 | 20.96 | 125  | 24.88          |

Sample Calculation:

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

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 SAR testing)

|                        |                                    |
|------------------------|------------------------------------|
| Test place             | Ise EMC Lab. No.6 Measurement Room |
| Report No.             | 11624584H                          |
| Date                   | April 18, 2017                     |
| Temperature / Humidity | 24 deg. C / 41 % RH                |
| Engineer               | Takumi Shimada                     |
| 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         | -12.04           | 0.70                  | 9.48                   | -1.86                    | 0.65 | 1.05                   | -0.81                           | 0.83 |
| DH5  | 2441.0         | -11.78           | 0.70                  | 9.48                   | -1.60                    | 0.69 | 1.05                   | -0.55                           | 0.88 |
| DH5  | 2480.0         | -12.82           | 0.70                  | 9.48                   | -2.64                    | 0.54 | 1.05                   | -1.59                           | 0.69 |
| 2DH5 | 2402.0         | -18.10           | 0.70                  | 9.48                   | -7.92                    | 0.16 | 1.05                   | -6.87                           | 0.21 |
| 2DH5 | 2441.0         | -17.91           | 0.70                  | 9.48                   | -7.73                    | 0.17 | 1.05                   | -6.68                           | 0.21 |
| 2DH5 | 2480.0         | -18.56           | 0.70                  | 9.48                   | -8.38                    | 0.15 | 1.05                   | -7.33                           | 0.18 |
| 3DH5 | 2402.0         | -18.12           | 0.70                  | 9.48                   | -7.94                    | 0.16 | 1.05                   | -6.89                           | 0.20 |
| 3DH5 | 2441.0         | -17.99           | 0.70                  | 9.48                   | -7.81                    | 0.17 | 1.05                   | -6.76                           | 0.21 |
| 3DH5 | 2480.0         | -18.63           | 0.70                  | 9.48                   | -8.45                    | 0.14 | 1.05                   | -7.40                           | 0.18 |

Sample Calculation:

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

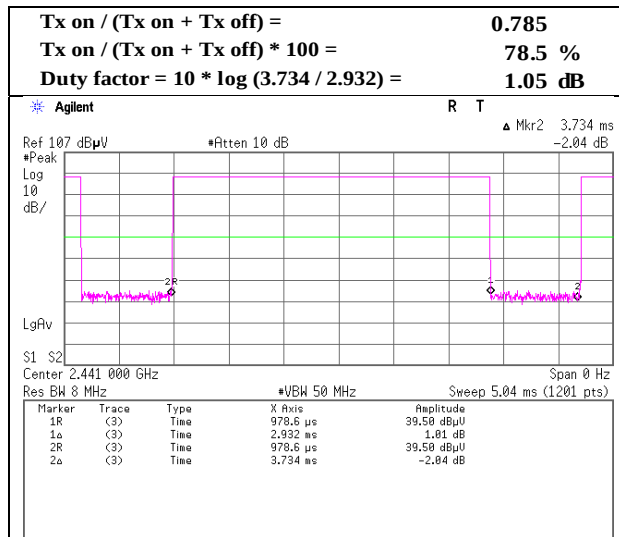
Result (Burst power average) = Time average + Duty factor

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

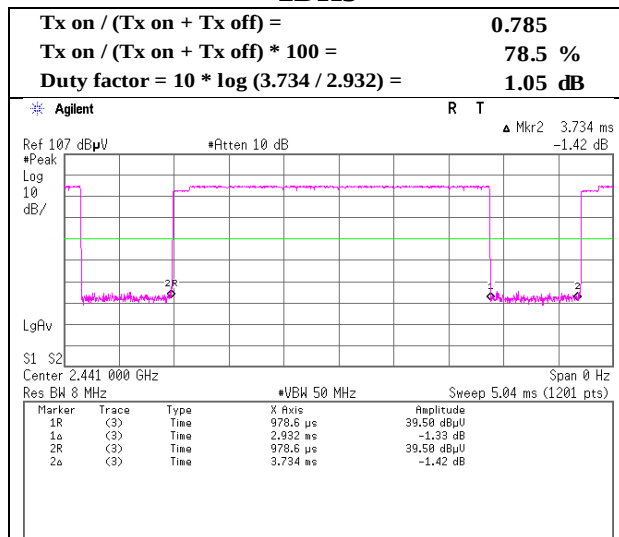
## Burst Rate Confirmation

|                        |                                    |
|------------------------|------------------------------------|
| Test place             | Ise EMC Lab. No.6 Measurement Room |
| Report No.             | 11624584H                          |
| Date                   | April 18, 2017                     |
| Temperature / Humidity | 24 deg. C / 41 % RH                |
| Engineer               | Takumi Shimada                     |
| Mode                   | Tx, Hopping Off                    |

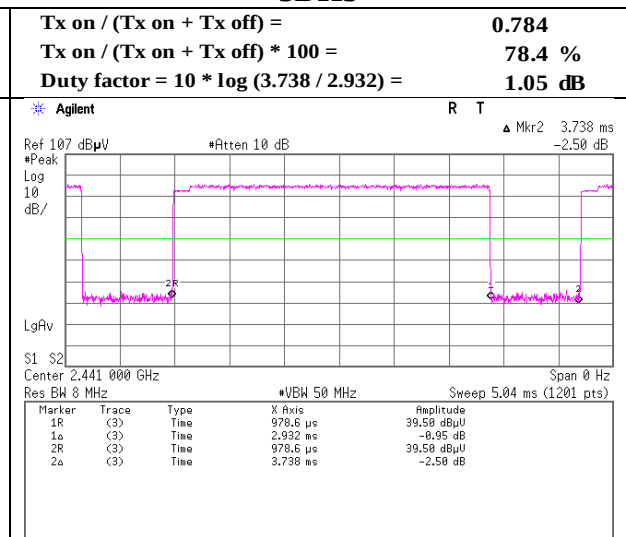
### DH5



### 2DH5



### 3DH5



## Radiated Spurious Emission

|                        |                                   |                                |                                 |
|------------------------|-----------------------------------|--------------------------------|---------------------------------|
| Report No.             | 11624584H                         |                                |                                 |
| Test place             | Ise EMC Lab.                      |                                |                                 |
| Semi Anechoic Chamber  | No.3                              | No.4                           | No.4                            |
| Date                   | April 17, 2017                    | April 22, 2017                 | April 23, 2017                  |
| Temperature / Humidity | 21 deg. C / 59 % RH               | 21 deg. C / 41 % RH            | 19 deg. C / 37 % RH             |
| Engineer               | Shuichi Ohyama<br>(1 GHz -10 GHz) | Tomoki Matsui<br>(Below 1 GHz) | Tomoki Matsui<br>(Above 10 GHz) |
| Mode                   | Tx, Hopping Off, DH5 2402 MHz     |                                |                                 |

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|---------------------|--------------------|-------------------|----------------|-------------|
| Hori     | 64.165             | QP       | 35.1              | 6.8                | 7.8          | 32.1         | -                   | 17.6               | 40.0              | 22.4           |             |
| Hori     | 154.129            | QP       | 36.0              | 15.2               | 8.7          | 32.0         | -                   | 27.9               | 43.5              | 15.6           |             |
| Hori     | 162.277            | QP       | 36.1              | 15.6               | 8.8          | 32.0         | -                   | 28.5               | 43.5              | 15.0           |             |
| Hori     | 180.499            | QP       | 32.0              | 16.3               | 9.0          | 32.0         | -                   | 25.3               | 43.5              | 18.2           |             |
| Hori     | 186.569            | QP       | 32.3              | 16.3               | 9.0          | 32.0         | -                   | 25.6               | 43.5              | 17.9           |             |
| Hori     | 240.728            | QP       | 39.3              | 11.6               | 9.5          | 31.9         | -                   | 28.5               | 46.0              | 17.5           |             |
| Hori     | 2390.000           | PK       | 41.5              | 26.7               | 6.5          | 32.4         | -                   | 42.3               | 73.9              | 31.6           |             |
| Hori     | 4804.000           | PK       | 38.3              | 31.0               | 8.7          | 31.4         | -                   | 46.6               | 73.9              | 27.3           | Floor noise |
| Hori     | 7206.000           | PK       | 39.3              | 35.7               | 10.0         | 32.1         | -                   | 52.9               | 73.9              | 21.0           | Floor noise |
| Hori     | 9608.000           | PK       | 39.4              | 37.2               | 10.6         | 32.9         | -                   | 54.3               | 73.9              | 19.6           | Floor noise |
| Hori     | 2390.000           | AV       | 29.2              | 26.7               | 6.5          | 32.4         | -                   | 30.0               | 53.9              | 23.9           |             |
| Hori     | 4804.000           | AV       | 26.1              | 31.0               | 8.7          | 31.4         | -                   | 34.4               | 53.9              | 19.5           | Floor noise |
| Hori     | 7206.000           | AV       | 27.4              | 35.7               | 10.0         | 32.1         | -                   | 41.0               | 53.9              | 12.9           | Floor noise |
| Hori     | 9608.000           | AV       | 27.4              | 37.2               | 10.6         | 32.9         | -                   | 42.3               | 53.9              | 11.6           | Floor noise |
| Vert     | 50.000             | QP       | 41.0              | 10.8               | 7.6          | 32.1         | -                   | 27.3               | 40.0              | 12.7           |             |
| Vert     | 72.017             | QP       | 35.5              | 6.2                | 7.9          | 32.1         | -                   | 17.5               | 40.0              | 22.5           |             |
| Vert     | 82.500             | QP       | 35.5              | 7.2                | 8.1          | 32.1         | -                   | 18.7               | 40.0              | 21.3           |             |
| Vert     | 143.995            | QP       | 34.4              | 14.6               | 8.7          | 32.0         | -                   | 25.7               | 43.5              | 17.8           |             |
| Vert     | 162.273            | QP       | 35.4              | 15.6               | 8.8          | 32.0         | -                   | 27.8               | 43.5              | 15.7           |             |
| Vert     | 240.728            | QP       | 33.5              | 11.6               | 9.5          | 31.9         | -                   | 22.7               | 46.0              | 23.3           |             |
| Vert     | 2390.000           | PK       | 41.9              | 26.7               | 6.5          | 32.4         | -                   | 42.7               | 73.9              | 31.2           |             |
| Vert     | 4804.000           | PK       | 38.3              | 31.0               | 8.7          | 31.4         | -                   | 46.6               | 73.9              | 27.3           | Floor noise |
| Vert     | 7206.000           | PK       | 41.2              | 35.7               | 10.0         | 32.1         | -                   | 54.8               | 73.9              | 19.1           |             |
| Vert     | 9608.000           | PK       | 39.4              | 37.2               | 10.6         | 32.9         | -                   | 54.3               | 73.9              | 19.6           | Floor noise |
| Vert     | 2390.000           | AV       | 29.3              | 26.7               | 6.5          | 32.4         | -                   | 30.1               | 53.9              | 23.8           |             |
| Vert     | 4804.000           | AV       | 26.1              | 31.0               | 8.7          | 31.4         | -                   | 34.4               | 53.9              | 19.5           | Floor noise |
| Vert     | 7206.000           | AV       | 31.0              | 35.7               | 10.0         | 32.1         | -                   | 44.6               | 53.9              | 9.3            |             |
| Vert     | 9608.000           | AV       | 27.4              | 37.2               | 10.6         | 32.9         | -                   | 42.3               | 53.9              | 11.6           | Floor noise |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (4.3 m / 3.0 m) = 3.13 dB  
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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

**20dBc Data Sheet**

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant<br>Factor<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark  |
|----------|--------------------|----------|-------------------|-------------------------|--------------|--------------|--------------------|-------------------|----------------|---------|
| Hori     | 2402.000           | PK       | 92.2              | 26.7                    | 6.5          | 32.4         | 93.0               | -                 | -              | Carrier |
| Hori     | 2400.000           | PK       | 37.6              | 26.7                    | 6.5          | 32.4         | 38.4               | 73.0              | 34.6           |         |
| Vert     | 2402.000           | PK       | 93.1              | 26.7                    | 6.5          | 32.4         | 93.9               | -                 | -              | Carrier |
| Vert     | 2400.000           | PK       | 38.2              | 26.7                    | 6.5          | 32.4         | 39.0               | 73.9              | 34.9           |         |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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**Ise EMC Lab.**

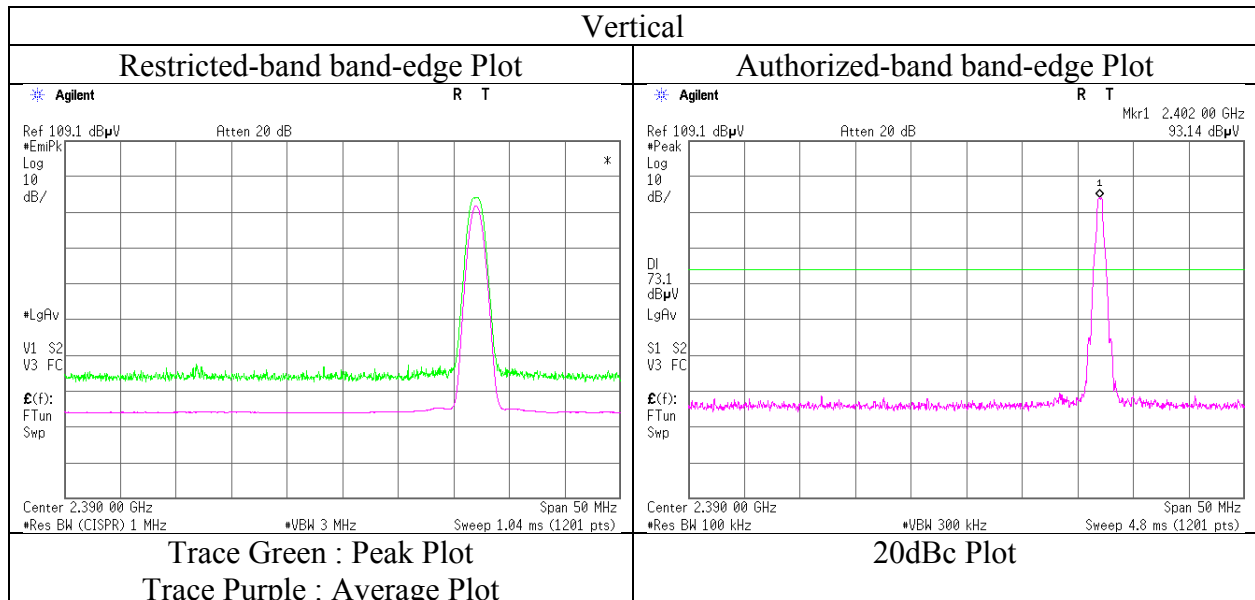
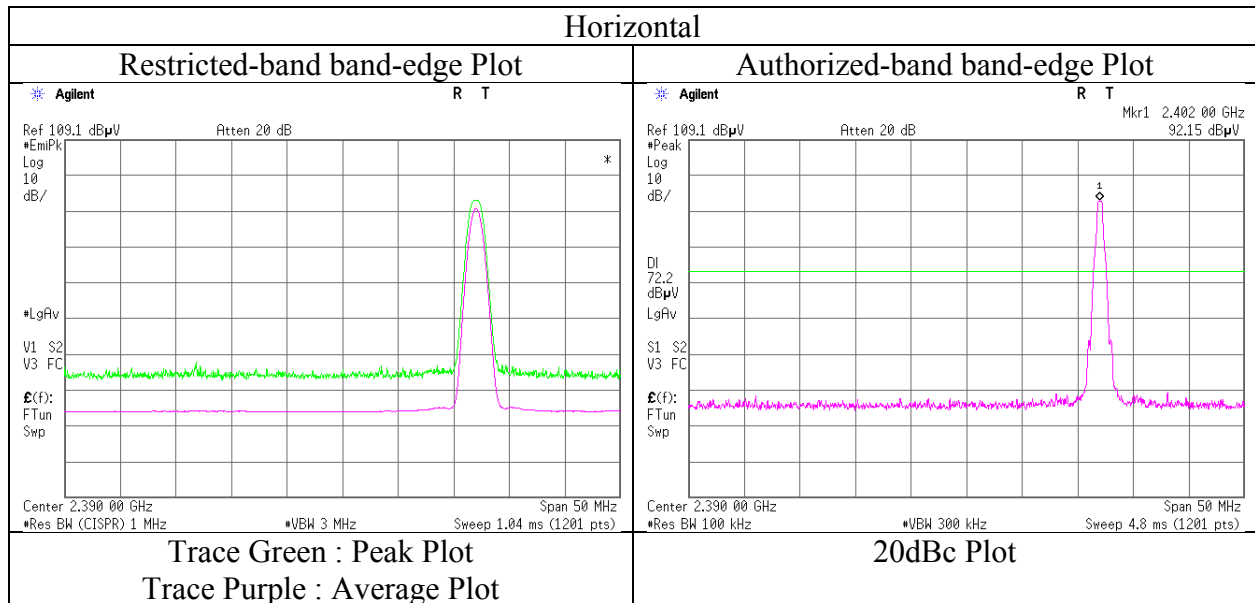
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## Radiated Spurious Emission (Reference Plot for band-edge)

|                        |                                   |
|------------------------|-----------------------------------|
| Report No.             | 11624584H                         |
| Test place             | Ise EMC Lab.                      |
| Semi Anechoic Chamber  | No.3                              |
| Date                   | April 17, 2017                    |
| Temperature / Humidity | 21 deg. C / 59 % RH               |
| Engineer               | Shuichi Ohyama<br>(1 GHz -10 GHz) |
| Mode                   | Tx, Hopping Off, DH5 2402 MHz     |



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

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## Radiated Spurious Emission

|                        |                               |                     |                     |
|------------------------|-------------------------------|---------------------|---------------------|
| Report No.             | 11624584H                     |                     |                     |
| Test place             | Ise EMC Lab.                  |                     |                     |
| Semi Anechoic Chamber  | No.3                          | No.4                | No.4                |
| Date                   | April 17, 2017                | April 22, 2017      | April 23, 2017      |
| Temperature / Humidity | 21 deg. C / 59 % RH           | 21 deg. C / 41 % RH | 19 deg. C / 37 % RH |
| Engineer               | Shuichi Ohyama                | Tomoki Matsui       | Tomoki Matsui       |
|                        | (1 GHz -10 GHz)               | (Below 1 GHz)       | (Above 10 GHz)      |
| Mode                   | Tx, Hopping Off, DH5 2441 MHz |                     |                     |

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|---------------------|--------------------|-------------------|----------------|-------------|
| Hori     | 64.230             | QP       | 35.4              | 6.8                | 7.8          | 32.1         | -                   | 17.9               | 40.0              | 22.1           |             |
| Hori     | 154.129            | QP       | 35.7              | 15.2               | 8.7          | 32.0         | -                   | 27.6               | 43.5              | 15.9           |             |
| Hori     | 162.277            | QP       | 36.0              | 15.6               | 8.8          | 32.0         | -                   | 28.4               | 43.5              | 15.1           |             |
| Hori     | 180.499            | QP       | 32.4              | 16.3               | 9.0          | 32.0         | -                   | 25.7               | 43.5              | 17.8           |             |
| Hori     | 186.569            | QP       | 32.3              | 16.3               | 9.0          | 32.0         | -                   | 25.6               | 43.5              | 17.9           |             |
| Hori     | 240.728            | QP       | 39.4              | 11.6               | 9.5          | 31.9         | -                   | 28.6               | 46.0              | 17.4           |             |
| Hori     | 4882.000           | PK       | 38.7              | 31.3               | 8.7          | 31.4         | -                   | 47.3               | 73.9              | 26.6           | Floor noise |
| Hori     | 7323.000           | PK       | 40.1              | 35.6               | 9.9          | 32.2         | -                   | 53.4               | 73.9              | 20.5           | Floor noise |
| Hori     | 9764.000           | PK       | 39.8              | 37.2               | 10.6         | 33.0         | -                   | 54.6               | 73.9              | 19.3           | Floor noise |
| Hori     | 4882.000           | AV       | 25.8              | 31.3               | 8.7          | 31.4         | -                   | 34.4               | 53.9              | 19.5           | Floor noise |
| Hori     | 7323.000           | AV       | 28.3              | 35.6               | 9.9          | 32.2         | -                   | 41.6               | 53.9              | 12.3           | Floor noise |
| Hori     | 9764.000           | AV       | 26.9              | 37.2               | 10.6         | 33.0         | -                   | 41.7               | 53.9              | 12.2           | Floor noise |
| Vert     | 50.000             | QP       | 41.0              | 10.8               | 7.6          | 32.1         | -                   | 27.3               | 40.0              | 12.7           |             |
| Vert     | 73.125             | QP       | 35.5              | 6.2                | 7.9          | 32.1         | -                   | 17.5               | 40.0              | 22.5           |             |
| Vert     | 83.490             | QP       | 35.2              | 7.3                | 8.1          | 32.1         | -                   | 18.5               | 40.0              | 21.5           |             |
| Vert     | 143.995            | QP       | 34.2              | 14.6               | 8.7          | 32.0         | -                   | 25.5               | 43.5              | 18.0           |             |
| Vert     | 162.273            | QP       | 35.3              | 15.6               | 8.8          | 32.0         | -                   | 27.7               | 43.5              | 15.8           |             |
| Vert     | 559.255            | QP       | 24.1              | 18.5               | 11.4         | 32.1         | -                   | 21.9               | 46.0              | 24.1           |             |
| Vert     | 4882.000           | PK       | 38.7              | 31.3               | 8.7          | 31.4         | -                   | 47.3               | 73.9              | 26.6           | Floor noise |
| Vert     | 7323.000           | PK       | 40.8              | 35.6               | 9.9          | 32.2         | -                   | 54.1               | 73.9              | 19.8           |             |
| Vert     | 9764.000           | PK       | 39.8              | 37.2               | 10.6         | 33.0         | -                   | 54.6               | 73.9              | 19.3           | Floor noise |
| Vert     | 4882.000           | AV       | 25.8              | 31.3               | 8.7          | 31.4         | -                   | 34.4               | 53.9              | 19.5           | Floor noise |
| Vert     | 7323.000           | AV       | 29.8              | 35.6               | 9.9          | 32.2         | -                   | 43.1               | 53.9              | 10.8           |             |
| Vert     | 9764.000           | AV       | 26.9              | 37.2               | 10.6         | 33.0         | -                   | 41.7               | 53.9              | 12.2           | Floor noise |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (4.3 m / 3.0 m) = 3.13 dB  
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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

## Radiated Spurious Emission

|                        |                                   |                                |                                 |
|------------------------|-----------------------------------|--------------------------------|---------------------------------|
| Report No.             | 11624584H                         |                                |                                 |
| Test place             | Ise EMC Lab.                      |                                |                                 |
| Semi Anechoic Chamber  | No.3                              | No.4                           | No.4                            |
| Date                   | April 17, 2017                    | April 22, 2017                 | April 23, 2017                  |
| Temperature / Humidity | 21 deg. C / 59 % RH               | 21 deg. C / 41 % RH            | 19 deg. C / 37 % RH             |
| Engineer               | Shuichi Ohyama<br>(1 GHz -10 GHz) | Tomoki Matsui<br>(Below 1 GHz) | Tomoki Matsui<br>(Above 10 GHz) |
| Mode                   | Tx, Hopping Off, DH5 2480 MHz     |                                |                                 |

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|---------------------|--------------------|-------------------|----------------|-------------|
| Hori     | 64.230             | QP       | 33.2              | 6.8                | 7.8          | 32.1         | -                   | 15.7               | 40.0              | 24.3           |             |
| Hori     | 158.211            | QP       | 36.5              | 15.4               | 8.8          | 32.0         | -                   | 28.7               | 43.5              | 14.8           |             |
| Hori     | 162.277            | QP       | 35.4              | 15.6               | 8.8          | 32.0         | -                   | 27.8               | 43.5              | 15.7           |             |
| Hori     | 178.473            | QP       | 31.4              | 16.2               | 9.0          | 32.0         | -                   | 24.6               | 43.5              | 18.9           |             |
| Hori     | 186.569            | QP       | 32.2              | 16.3               | 9.0          | 32.0         | -                   | 25.5               | 43.5              | 18.0           |             |
| Hori     | 240.728            | QP       | 39.4              | 11.6               | 9.5          | 31.9         | -                   | 28.6               | 46.0              | 17.4           |             |
| Hori     | 2483.500           | PK       | 44.3              | 26.8               | 6.6          | 32.4         | -                   | 45.3               | 73.9              | 28.6           |             |
| Hori     | 4960.000           | PK       | 39.0              | 31.5               | 8.7          | 31.3         | -                   | 47.9               | 73.9              | 26.0           | Floor noise |
| Hori     | 7440.000           | PK       | 39.2              | 35.5               | 10.0         | 32.2         | -                   | 52.5               | 73.9              | 21.4           | Floor noise |
| Hori     | 9920.000           | PK       | 39.4              | 37.2               | 10.7         | 33.1         | -                   | 54.2               | 73.9              | 19.7           | Floor noise |
| Hori     | 2483.500           | AV       | 31.6              | 26.8               | 6.6          | 32.4         | -                   | 32.6               | 53.9              | 21.3           |             |
| Hori     | 4960.000           | AV       | 26.2              | 31.5               | 8.7          | 31.3         | -                   | 35.1               | 53.9              | 18.8           | Floor noise |
| Hori     | 7440.000           | AV       | 27.3              | 35.5               | 10.0         | 32.2         | -                   | 40.6               | 53.9              | 13.3           | Floor noise |
| Hori     | 9920.000           | AV       | 26.7              | 37.2               | 10.7         | 33.1         | -                   | 41.5               | 53.9              | 12.4           | Floor noise |
| Vert     | 50.000             | QP       | 41.3              | 10.8               | 7.6          | 32.1         | -                   | 27.6               | 40.0              | 12.4           |             |
| Vert     | 68.652             | QP       | 32.6              | 6.2                | 7.9          | 32.1         | -                   | 14.6               | 40.0              | 25.4           |             |
| Vert     | 82.892             | QP       | 35.1              | 7.2                | 8.1          | 32.1         | -                   | 18.3               | 40.0              | 21.7           |             |
| Vert     | 143.995            | QP       | 35.3              | 14.6               | 8.7          | 32.0         | -                   | 26.6               | 43.5              | 16.9           |             |
| Vert     | 162.273            | QP       | 33.8              | 15.6               | 8.8          | 32.0         | -                   | 26.2               | 43.5              | 17.3           |             |
| Vert     | 408.840            | QP       | 26.7              | 15.9               | 10.5         | 32.0         | -                   | 21.1               | 46.0              | 24.9           |             |
| Vert     | 2483.500           | PK       | 44.4              | 26.8               | 6.6          | 32.4         | -                   | 45.4               | 73.9              | 28.5           |             |
| Vert     | 4960.000           | PK       | 39.4              | 31.5               | 8.7          | 31.3         | -                   | 48.3               | 73.9              | 25.6           | Floor noise |
| Vert     | 7440.000           | PK       | 40.4              | 35.5               | 10.0         | 32.2         | -                   | 53.7               | 73.9              | 20.2           |             |
| Vert     | 9920.000           | PK       | 39.4              | 37.2               | 10.7         | 33.1         | -                   | 54.2               | 73.9              | 19.7           | Floor noise |
| Vert     | 2483.500           | AV       | 32.0              | 26.8               | 6.6          | 32.4         | -                   | 33.0               | 53.9              | 20.9           |             |
| Vert     | 4960.000           | AV       | 26.5              | 31.5               | 8.7          | 31.3         | -                   | 35.4               | 53.9              | 18.5           | Floor noise |
| Vert     | 7440.000           | AV       | 29.2              | 35.5               | 10.0         | 32.2         | -                   | 42.5               | 53.9              | 11.4           |             |
| Vert     | 9920.000           | AV       | 26.7              | 37.2               | 10.7         | 33.1         | -                   | 41.5               | 53.9              | 12.4           | Floor noise |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

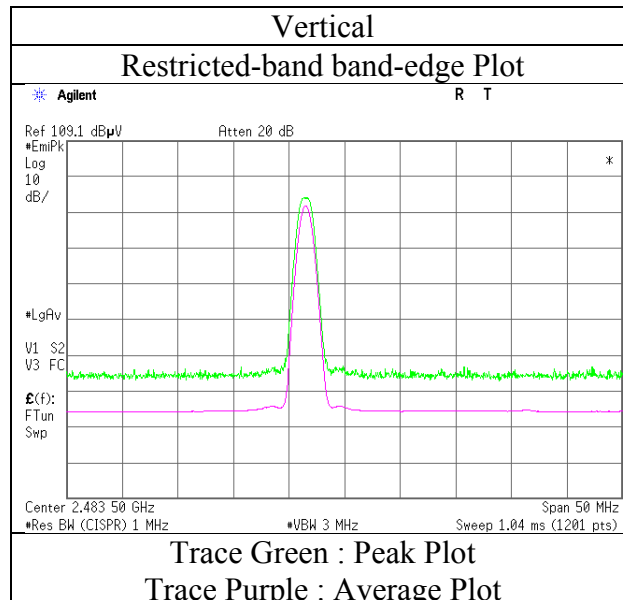
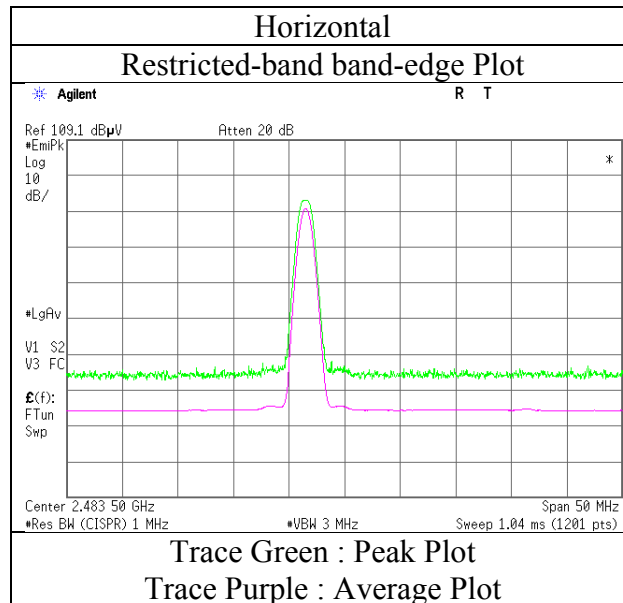
\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor:     1 GHz - 10 GHz     20log (4.3 m / 3.0 m) = 3.13 dB  
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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

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

|                        |                                   |
|------------------------|-----------------------------------|
| Report No.             | 11624584H                         |
| Test place             | Ise EMC Lab.                      |
| Semi Anechoic Chamber  | No.3                              |
| Date                   | April 17, 2017                    |
| Temperature / Humidity | 21 deg. C / 59 % RH               |
| Engineer               | Shuichi Ohyama<br>(1 GHz -10 GHz) |
| Mode                   | Tx, Hopping Off, DH5 2480 MHz     |



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

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## Radiated Spurious Emission

|                        |                                |                     |                     |
|------------------------|--------------------------------|---------------------|---------------------|
| Report No.             | 11624584H                      |                     |                     |
| Test place             | Ise EMC Lab.                   |                     |                     |
| Semi Anechoic Chamber  | No.3                           | No.4                | No.4                |
| Date                   | April 17, 2017                 | April 22, 2017      | April 23, 2017      |
| Temperature / Humidity | 21 deg. C / 59 % RH            | 21 deg. C / 41 % RH | 19 deg. C / 37 % RH |
| Engineer               | Shuichi Ohyama                 | Tomoki Matsui       | Tomoki Matsui       |
|                        | (1 GHz -10 GHz)                | (Below 1 GHz)       | (Above 10 GHz)      |
| Mode                   | Tx, Hopping Off, 3DH5 2402 MHz |                     |                     |

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|---------------------|--------------------|-------------------|----------------|-------------|
| Hori     | 64.230             | QP       | 35.4              | 6.8                | 7.8          | 32.1         | -                   | 17.9               | 40.0              | 22.1           |             |
| Hori     | 158.211            | QP       | 36.5              | 15.4               | 8.8          | 32.0         | -                   | 28.7               | 43.5              | 14.8           |             |
| Hori     | 162.277            | QP       | 36.6              | 15.6               | 8.8          | 32.0         | -                   | 29.0               | 43.5              | 14.5           |             |
| Hori     | 180.499            | QP       | 32.1              | 16.3               | 9.0          | 32.0         | -                   | 25.4               | 43.5              | 18.1           |             |
| Hori     | 186.569            | QP       | 32.3              | 16.3               | 9.0          | 32.0         | -                   | 25.6               | 43.5              | 17.9           |             |
| Hori     | 240.728            | QP       | 39.4              | 11.6               | 9.5          | 31.9         | -                   | 28.6               | 46.0              | 17.4           |             |
| Hori     | 2390.000           | PK       | 41.4              | 26.7               | 6.5          | 32.4         | -                   | 42.2               | 73.9              | 31.7           |             |
| Hori     | 4804.000           | PK       | 39.5              | 31.0               | 8.7          | 31.4         | -                   | 47.8               | 73.9              | 26.1           | Floor noise |
| Hori     | 7206.000           | PK       | 39.9              | 35.7               | 10.0         | 32.1         | -                   | 53.5               | 73.9              | 20.4           | Floor noise |
| Hori     | 9608.000           | PK       | 39.5              | 37.2               | 10.6         | 32.9         | -                   | 54.4               | 73.9              | 19.5           | Floor noise |
| Hori     | 2390.000           | AV       | 28.7              | 26.7               | 6.5          | 32.4         | -                   | 29.5               | 53.9              | 24.4           |             |
| Hori     | 4804.000           | AV       | 26.6              | 31.0               | 8.7          | 31.4         | -                   | 34.9               | 53.9              | 19.0           | Floor noise |
| Hori     | 7206.000           | AV       | 28.0              | 35.7               | 10.0         | 32.1         | -                   | 41.6               | 53.9              | 12.3           | Floor noise |
| Hori     | 9608.000           | AV       | 27.7              | 37.2               | 10.6         | 32.9         | -                   | 42.6               | 53.9              | 11.3           | Floor noise |
| Vert     | 50.000             | QP       | 41.0              | 10.8               | 7.6          | 32.1         | -                   | 27.3               | 40.0              | 12.7           |             |
| Vert     | 68.652             | QP       | 35.4              | 6.2                | 7.9          | 32.1         | -                   | 17.4               | 40.0              | 22.6           |             |
| Vert     | 82.393             | QP       | 35.5              | 7.1                | 8.1          | 32.1         | -                   | 18.6               | 40.0              | 21.4           |             |
| Vert     | 143.995            | QP       | 34.4              | 14.6               | 8.7          | 32.0         | -                   | 25.7               | 43.5              | 17.8           |             |
| Vert     | 162.273            | QP       | 35.1              | 15.6               | 8.8          | 32.0         | -                   | 27.5               | 43.5              | 16.0           |             |
| Vert     | 427.910            | QP       | 26.5              | 16.3               | 10.7         | 32.0         | -                   | 21.5               | 46.0              | 24.5           |             |
| Vert     | 2390.000           | PK       | 42.0              | 26.7               | 6.5          | 32.4         | -                   | 42.8               | 73.9              | 31.1           |             |
| Vert     | 4804.000           | PK       | 38.8              | 31.0               | 8.7          | 31.4         | -                   | 47.1               | 73.9              | 26.8           | Floor noise |
| Vert     | 7206.000           | PK       | 40.1              | 35.7               | 10.0         | 32.1         | -                   | 53.7               | 73.9              | 20.2           | Floor noise |
| Vert     | 9608.000           | PK       | 39.8              | 37.2               | 10.6         | 32.9         | -                   | 54.7               | 73.9              | 19.2           | Floor noise |
| Vert     | 2390.000           | AV       | 28.8              | 26.7               | 6.5          | 32.4         | -                   | 29.6               | 53.9              | 24.3           |             |
| Vert     | 4804.000           | AV       | 26.7              | 31.0               | 8.7          | 31.4         | -                   | 35.0               | 53.9              | 18.9           | Floor noise |
| Vert     | 7206.000           | AV       | 28.0              | 35.7               | 10.0         | 32.1         | -                   | 41.6               | 53.9              | 12.3           | Floor noise |
| Vert     | 9608.000           | AV       | 27.2              | 37.2               | 10.6         | 32.9         | -                   | 42.1               | 53.9              | 11.8           | Floor noise |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (4.3 m / 3.0 m) = 3.13 dB  
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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

**20dBc Data Sheet**

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant<br>Factor<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark  |
|----------|--------------------|----------|-------------------|-------------------------|--------------|--------------|--------------------|-------------------|----------------|---------|
| Hori     | 2402.000           | PK       | 86.6              | 26.7                    | 6.5          | 32.4         | 87.4               | -                 | -              | Carrier |
| Hori     | 2400.000           | PK       | 36.0              | 26.7                    | 6.5          | 32.4         | 36.8               | 67.4              | 30.6           |         |
| Vert     | 2402.000           | PK       | 87.6              | 26.7                    | 6.5          | 32.4         | 88.4               | -                 | -              | Carrier |
| Vert     | 2400.000           | PK       | 36.8              | 26.7                    | 6.5          | 32.4         | 37.6               | 68.4              | 30.8           |         |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

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**Ise EMC Lab.**

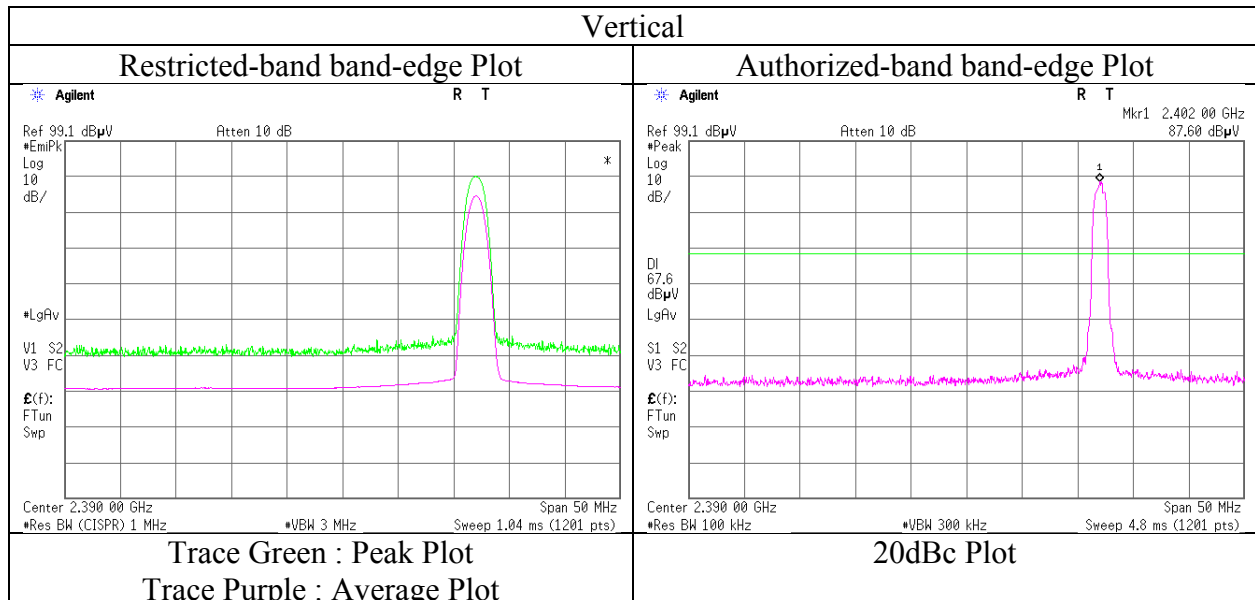
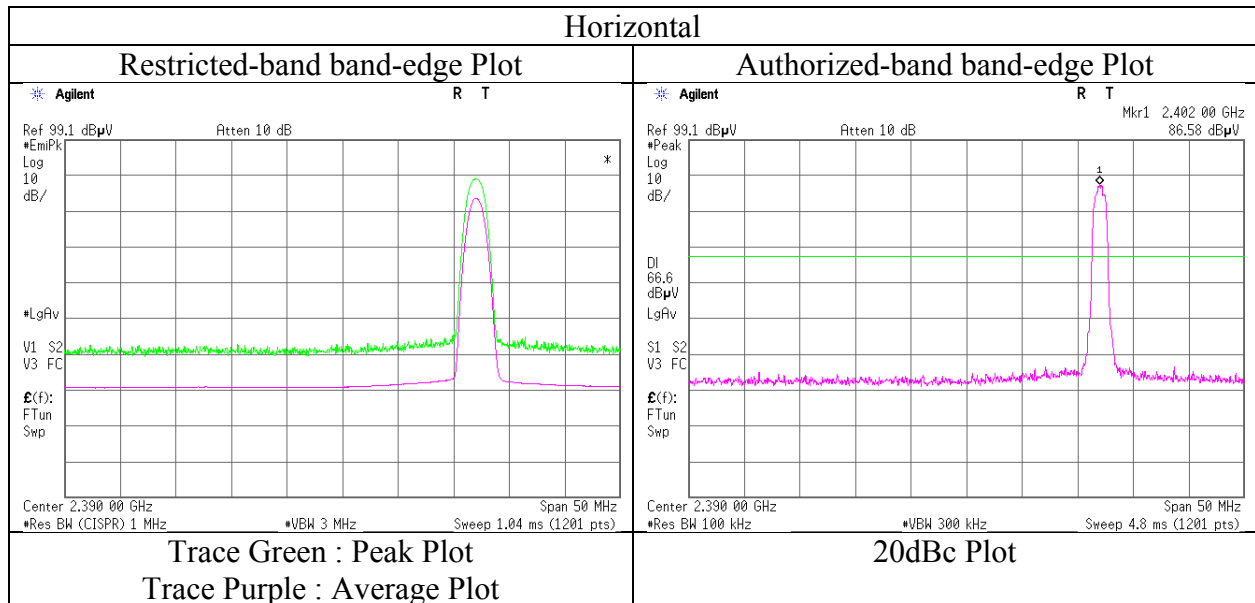
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

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

|                        |                                   |
|------------------------|-----------------------------------|
| Report No.             | 11624584H                         |
| Test place             | Ise EMC Lab.                      |
| Semi Anechoic Chamber  | No.3                              |
| Date                   | April 17, 2017                    |
| Temperature / Humidity | 21 deg. C / 59 % RH               |
| Engineer               | Shuichi Ohyama<br>(1 GHz -10 GHz) |
| Mode                   | Tx, Hopping Off, 3DH5 2402 MHz    |



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

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## Radiated Spurious Emission

|                        |                                   |                                |                                 |
|------------------------|-----------------------------------|--------------------------------|---------------------------------|
| Report No.             | 11624584H                         |                                |                                 |
| Test place             | Ise EMC Lab.                      |                                |                                 |
| Semi Anechoic Chamber  | No.3                              | No.4                           | No.4                            |
| Date                   | April 17, 2017                    | April 22, 2017                 | April 23, 2017                  |
| Temperature / Humidity | 21 deg. C / 59 % RH               | 21 deg. C / 41 % RH            | 19 deg. C / 37 % RH             |
| Engineer               | Shuichi Ohyama<br>(1 GHz -10 GHz) | Tomoki Matsui<br>(Below 1 GHz) | Tomoki Matsui<br>(Above 10 GHz) |
| Mode                   | Tx, Hopping Off, 3DH5 2441 MHz    |                                |                                 |

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|---------------------|--------------------|-------------------|----------------|-------------|
| Hori     | 64.230             | QP       | 35.4              | 6.8                | 7.8          | 32.1         | -                   | 17.9               | 40.0              | 22.1           |             |
| Hori     | 158.211            | QP       | 36.4              | 15.4               | 8.8          | 32.0         | -                   | 28.6               | 43.5              | 14.9           |             |
| Hori     | 162.277            | QP       | 36.0              | 15.6               | 8.8          | 32.0         | -                   | 28.4               | 43.5              | 15.1           |             |
| Hori     | 178.473            | QP       | 31.2              | 16.2               | 9.0          | 32.0         | -                   | 24.4               | 43.5              | 19.1           |             |
| Hori     | 186.569            | QP       | 32.0              | 16.3               | 9.0          | 32.0         | -                   | 25.3               | 43.5              | 18.2           |             |
| Hori     | 240.728            | QP       | 39.4              | 11.6               | 9.5          | 31.9         | -                   | 28.6               | 46.0              | 17.4           |             |
| Hori     | 4882.000           | PK       | 38.8              | 31.3               | 8.7          | 31.4         | -                   | 47.4               | 73.9              | 26.5           | Floor noise |
| Hori     | 7323.000           | PK       | 40.5              | 35.6               | 9.9          | 32.2         | -                   | 53.8               | 73.9              | 20.1           | Floor noise |
| Hori     | 9764.000           | PK       | 40.0              | 37.2               | 10.6         | 33.0         | -                   | 54.8               | 73.9              | 19.1           | Floor noise |
| Hori     | 4882.000           | AV       | 26.0              | 31.3               | 8.7          | 31.4         | -                   | 34.6               | 53.9              | 19.3           | Floor noise |
| Hori     | 7323.000           | AV       | 27.8              | 35.6               | 9.9          | 32.2         | -                   | 41.1               | 53.9              | 12.8           | Floor noise |
| Hori     | 9764.000           | AV       | 26.4              | 37.2               | 10.6         | 33.0         | -                   | 41.2               | 53.9              | 12.7           | Floor noise |
| Vert     | 50.000             | QP       | 41.0              | 10.8               | 7.6          | 32.1         | -                   | 27.3               | 40.0              | 12.7           |             |
| Vert     | 68.652             | QP       | 32.6              | 6.2                | 7.9          | 32.1         | -                   | 14.6               | 40.0              | 25.4           |             |
| Vert     | 82.233             | QP       | 34.1              | 7.1                | 8.0          | 32.1         | -                   | 17.1               | 40.0              | 22.9           |             |
| Vert     | 143.995            | QP       | 34.4              | 14.6               | 8.7          | 32.0         | -                   | 25.7               | 43.5              | 17.8           |             |
| Vert     | 162.273            | QP       | 34.1              | 15.6               | 8.8          | 32.0         | -                   | 26.5               | 43.5              | 17.0           |             |
| Vert     | 558.517            | QP       | 23.2              | 18.5               | 11.4         | 32.1         | -                   | 21.0               | 46.0              | 25.0           |             |
| Vert     | 4882.000           | PK       | 38.8              | 31.3               | 8.7          | 31.4         | -                   | 47.4               | 73.9              | 26.5           | Floor noise |
| Vert     | 7323.000           | PK       | 40.2              | 35.6               | 9.9          | 32.2         | -                   | 53.5               | 73.9              | 20.4           | Floor noise |
| Vert     | 9764.000           | PK       | 40.2              | 37.2               | 10.6         | 33.0         | -                   | 55.0               | 73.9              | 18.9           | Floor noise |
| Vert     | 4882.000           | AV       | 25.9              | 31.3               | 8.7          | 31.4         | -                   | 34.5               | 53.9              | 19.4           | Floor noise |
| Vert     | 7323.000           | AV       | 28.0              | 35.6               | 9.9          | 32.2         | -                   | 41.3               | 53.9              | 12.6           | Floor noise |
| Vert     | 9764.000           | AV       | 26.8              | 37.2               | 10.6         | 33.0         | -                   | 41.6               | 53.9              | 12.3           | Floor noise |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (4.3 m / 3.0 m) = 3.13 dB  
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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

## Radiated Spurious Emission

|                        |                                   |                                |                                 |
|------------------------|-----------------------------------|--------------------------------|---------------------------------|
| Report No.             | 11624584H                         |                                |                                 |
| Test place             | Ise EMC Lab.                      |                                |                                 |
| Semi Anechoic Chamber  | No.3                              | No.4                           | No.4                            |
| Date                   | April 17, 2017                    | April 22, 2017                 | April 23, 2017                  |
| Temperature / Humidity | 21 deg. C / 59 % RH               | 21 deg. C / 41 % RH            | 19 deg. C / 37 % RH             |
| Engineer               | Shuichi Ohyama<br>(1 GHz -10 GHz) | Tomoki Matsui<br>(Below 1 GHz) | Tomoki Matsui<br>(Above 10 GHz) |
| Mode                   | Tx, Hopping Off, 3DH5 2480 MHz    |                                |                                 |

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty Factor<br>[dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|---------------------|--------------------|-------------------|----------------|-------------|
| Hori     | 64.230             | QP       | 33.1              | 6.8                | 7.8          | 32.1         | -                   | 15.6               | 40.0              | 24.4           |             |
| Hori     | 158.211            | QP       | 36.5              | 15.4               | 8.8          | 32.0         | -                   | 28.7               | 43.5              | 14.8           |             |
| Hori     | 162.277            | QP       | 35.4              | 15.6               | 8.8          | 32.0         | -                   | 27.8               | 43.5              | 15.7           |             |
| Hori     | 178.473            | QP       | 31.1              | 16.2               | 9.0          | 32.0         | -                   | 24.3               | 43.5              | 19.2           |             |
| Hori     | 186.569            | QP       | 31.5              | 16.3               | 9.0          | 32.0         | -                   | 24.8               | 43.5              | 18.7           |             |
| Hori     | 240.728            | QP       | 39.4              | 11.6               | 9.5          | 31.9         | -                   | 28.6               | 46.0              | 17.4           |             |
| Hori     | 2483.500           | PK       | 43.5              | 26.8               | 6.6          | 32.4         | -                   | 44.5               | 73.9              | 29.4           |             |
| Hori     | 4960.000           | PK       | 39.1              | 31.5               | 8.7          | 31.3         | -                   | 48.0               | 73.9              | 25.9           | Floor noise |
| Hori     | 7440.000           | PK       | 40.1              | 35.5               | 10.0         | 32.2         | -                   | 53.4               | 73.9              | 20.5           | Floor noise |
| Hori     | 9920.000           | PK       | 41.2              | 37.2               | 10.7         | 33.1         | -                   | 56.0               | 73.9              | 17.9           | Floor noise |
| Hori     | 2483.500           | AV       | 30.1              | 26.8               | 6.6          | 32.4         | -                   | 31.1               | 53.9              | 22.8           |             |
| Hori     | 4960.000           | AV       | 26.4              | 31.5               | 8.7          | 31.3         | -                   | 35.3               | 53.9              | 18.6           | Floor noise |
| Hori     | 7440.000           | AV       | 27.7              | 35.5               | 10.0         | 32.2         | -                   | 41.0               | 53.9              | 12.9           | Floor noise |
| Hori     | 9920.000           | AV       | 27.9              | 37.2               | 10.7         | 33.1         | -                   | 42.7               | 53.9              | 11.2           | Floor noise |
| Vert     | 50.000             | QP       | 41.3              | 10.8               | 7.6          | 32.1         | -                   | 27.6               | 40.0              | 12.4           |             |
| Vert     | 73.089             | QP       | 33.5              | 6.2                | 7.9          | 32.1         | -                   | 15.5               | 40.0              | 24.5           |             |
| Vert     | 82.892             | QP       | 35.1              | 7.2                | 8.1          | 32.1         | -                   | 18.3               | 40.0              | 21.7           |             |
| Vert     | 143.995            | QP       | 35.3              | 14.6               | 8.7          | 32.0         | -                   | 26.6               | 43.5              | 16.9           |             |
| Vert     | 162.273            | QP       | 33.4              | 15.6               | 8.8          | 32.0         | -                   | 25.8               | 43.5              | 17.7           |             |
| Vert     | 240.728            | QP       | 33.1              | 11.6               | 9.5          | 31.9         | -                   | 22.3               | 46.0              | 23.7           |             |
| Vert     | 2483.500           | PK       | 44.6              | 26.8               | 6.6          | 32.4         | -                   | 45.6               | 73.9              | 28.3           |             |
| Vert     | 4960.000           | PK       | 39.4              | 31.5               | 8.7          | 31.3         | -                   | 48.3               | 73.9              | 25.6           | Floor noise |
| Vert     | 7440.000           | PK       | 40.5              | 35.5               | 10.0         | 32.2         | -                   | 53.8               | 73.9              | 20.1           | Floor noise |
| Vert     | 9920.000           | PK       | 40.6              | 37.2               | 10.7         | 33.1         | -                   | 55.4               | 73.9              | 18.5           | Floor noise |
| Vert     | 2483.500           | AV       | 30.5              | 26.8               | 6.6          | 32.4         | -                   | 31.5               | 53.9              | 22.4           |             |
| Vert     | 4960.000           | AV       | 26.4              | 31.5               | 8.7          | 31.3         | -                   | 35.3               | 53.9              | 18.6           | Floor noise |
| Vert     | 7440.000           | AV       | 27.6              | 35.5               | 10.0         | 32.2         | -                   | 40.9               | 53.9              | 13.0           | Floor noise |
| Vert     | 9920.000           | AV       | 27.8              | 37.2               | 10.7         | 33.1         | -                   | 42.6               | 53.9              | 11.3           | Floor noise |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

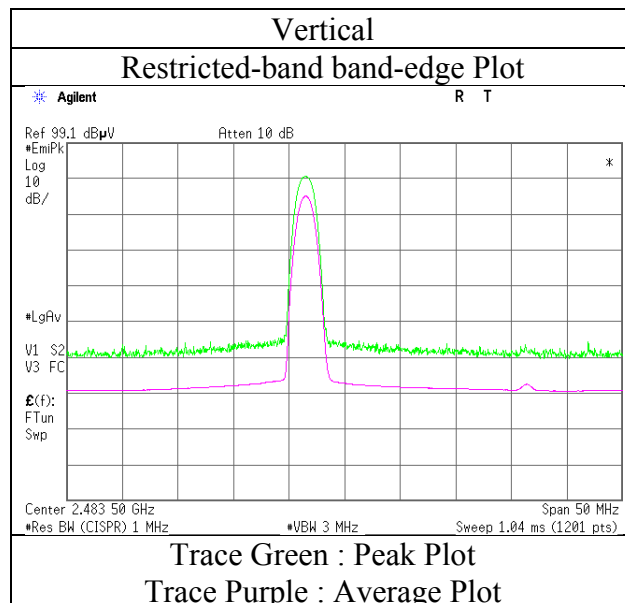
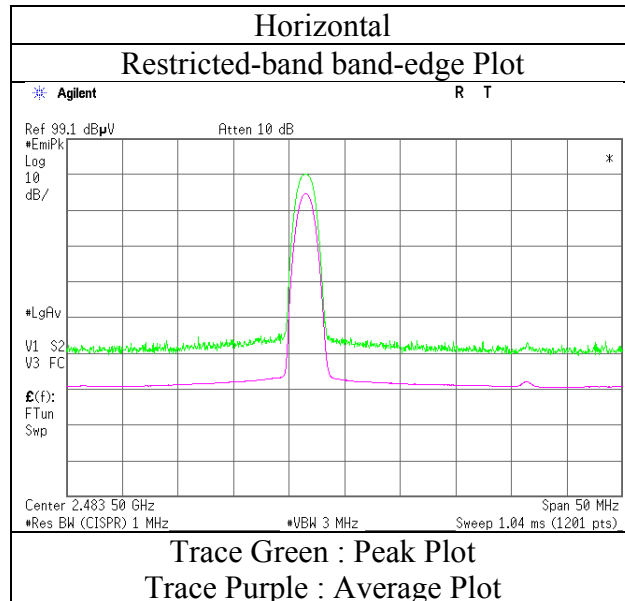
\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (4.3 m / 3.0 m) = 3.13 dB  
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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

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

|                        |                                   |
|------------------------|-----------------------------------|
| Report No.             | 11624584H                         |
| Test place             | Ise EMC Lab.                      |
| Semi Anechoic Chamber  | No.3                              |
| Date                   | April 17, 2017                    |
| Temperature / Humidity | 21 deg. C / 59 % RH               |
| Engineer               | Shuichi Ohyama<br>(1 GHz -10 GHz) |
| Mode                   | Tx, Hopping Off, 3DH5 2480 MHz    |



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

**UL Japan, Inc.**

**Ise EMC Lab.**

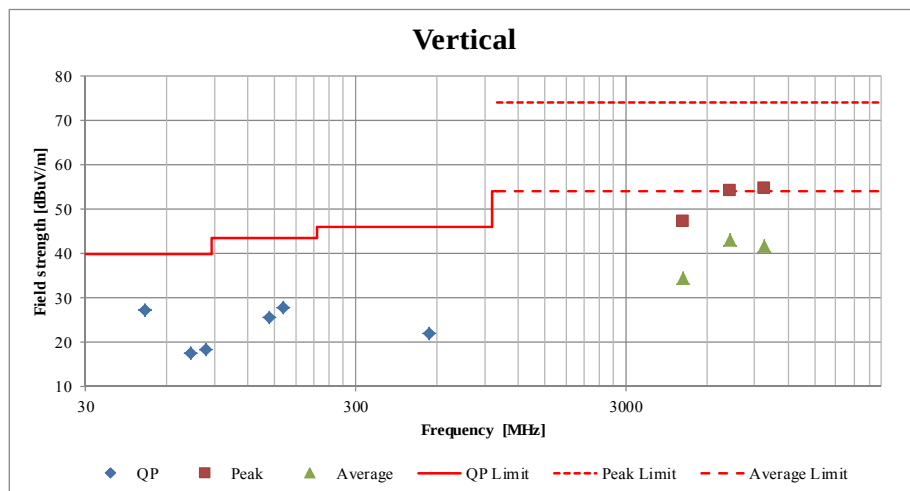
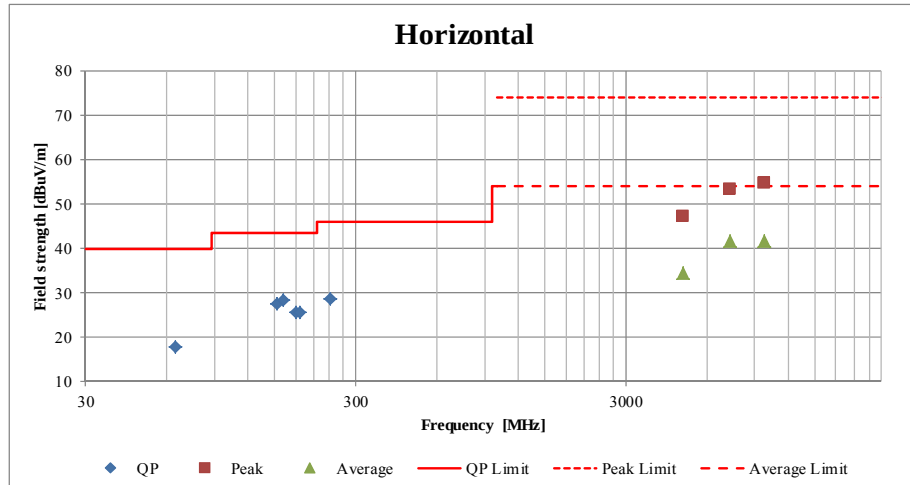
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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

|                        |                                   |                                |                                 |
|------------------------|-----------------------------------|--------------------------------|---------------------------------|
| Report No.             | 11624584H                         |                                |                                 |
| Test place             | Ise EMC Lab.                      |                                |                                 |
| Semi Anechoic Chamber  | No.3                              | No.4                           | No.4                            |
| Date                   | April 17, 2017                    | April 22, 2017                 | April 23, 2017                  |
| Temperature / Humidity | 21 deg. C / 59 % RH               | 21 deg. C / 41 % RH            | 19 deg. C / 37 % RH             |
| Engineer               | Shuichi Ohyama<br>(1 GHz -10 GHz) | Tomoki Matsui<br>(Below 1 GHz) | Tomoki Matsui<br>(Above 10 GHz) |
| Mode                   | Tx, Hopping Off, DH5 2441 MHz     |                                |                                 |



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

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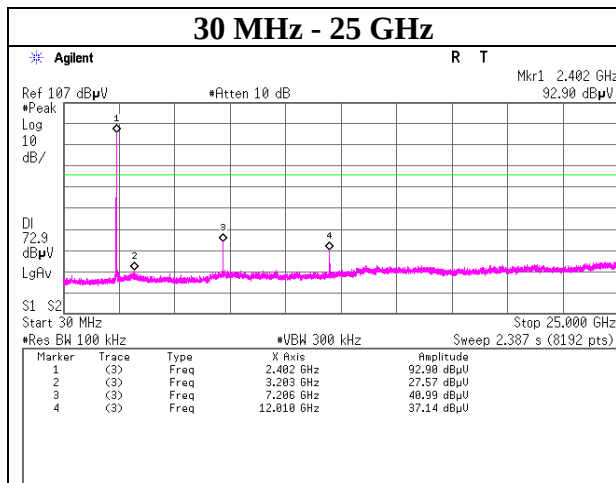
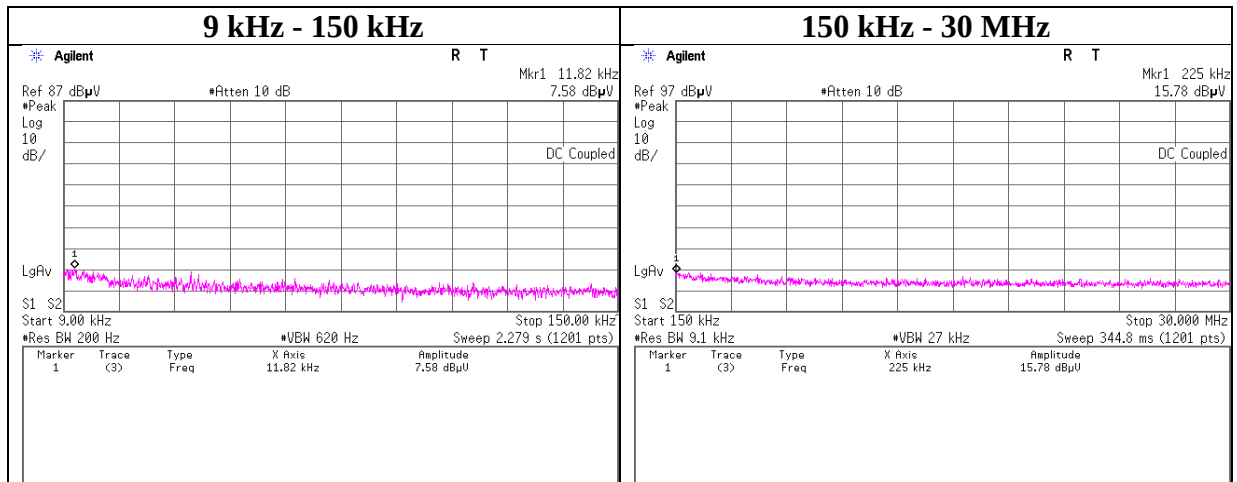
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

|                        |                                    |
|------------------------|------------------------------------|
| Test place             | Ise EMC Lab. No.6 Measurement Room |
| Report No.             | 11624584H                          |
| Date                   | April 18, 2017                     |
| Temperature / Humidity | 24 deg. C / 41 % RH                |
| Engineer               | Takumi Shimada                     |
| Mode                   | Tx, Hopping Off, DH5               |

### 2402 MHz



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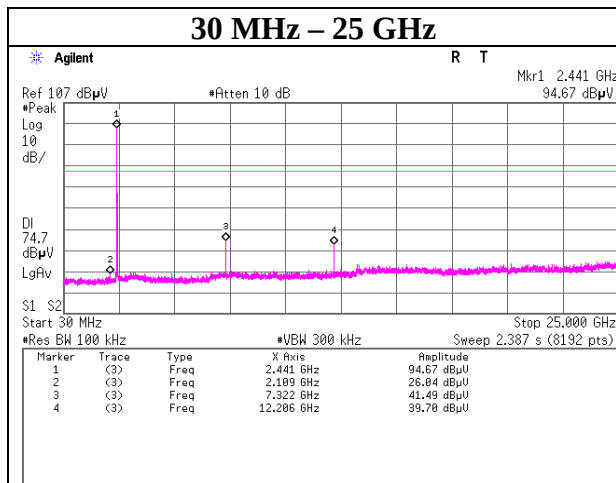
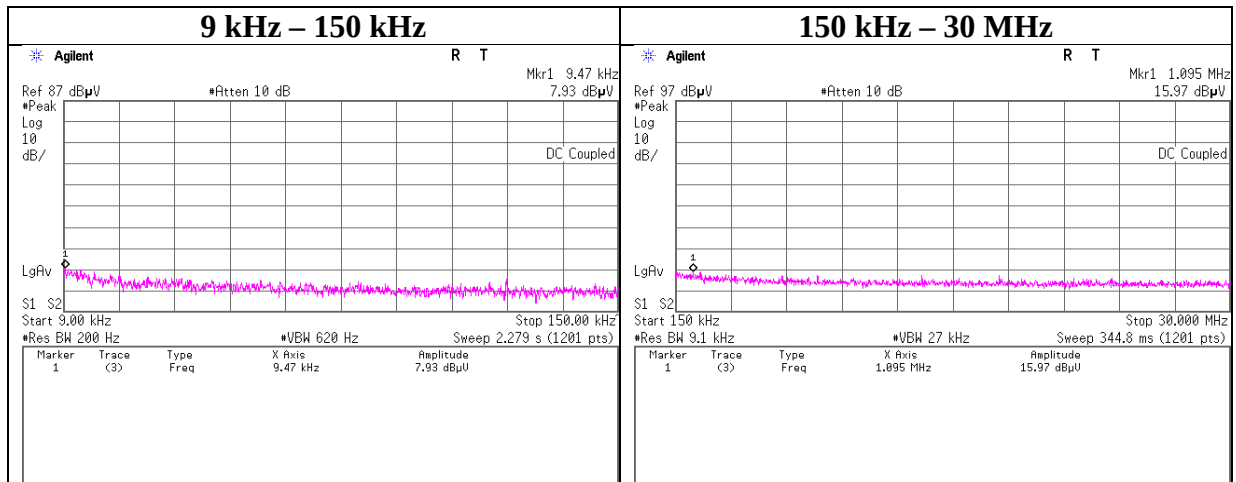
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

|                        |                                    |
|------------------------|------------------------------------|
| Test place             | Ise EMC Lab. No.6 Measurement Room |
| Report No.             | 11624584H                          |
| Date                   | April 18, 2017                     |
| Temperature / Humidity | 24 deg. C / 41 % RH                |
| Engineer               | Takumi Shimada                     |
| Mode                   | Tx, Hopping Off, DH5               |

### 2441 MHz



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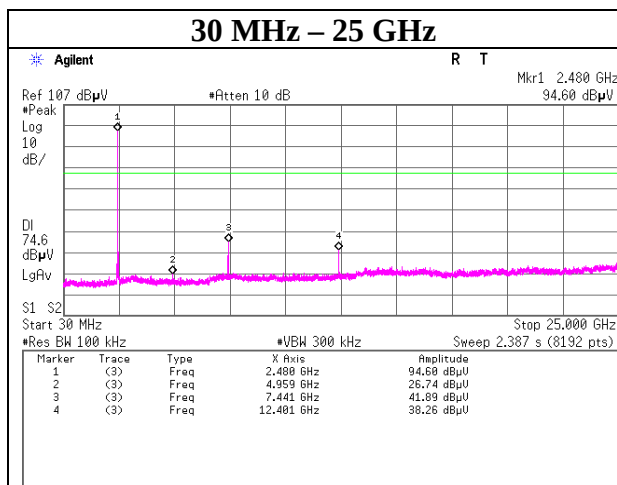
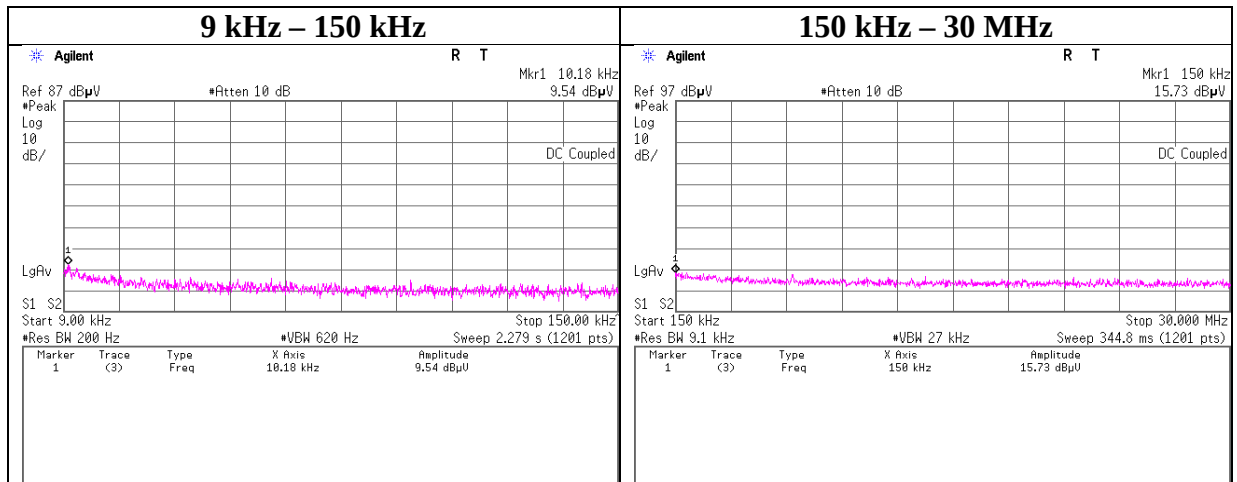
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

|                        |                                    |
|------------------------|------------------------------------|
| Test place             | Ise EMC Lab. No.6 Measurement Room |
| Report No.             | 11624584H                          |
| Date                   | April 18, 2017                     |
| Temperature / Humidity | 24 deg. C / 41 % RH                |
| Engineer               | Takumi Shimada                     |
| Mode                   | Tx, Hopping Off, DH5               |

### 2480 MHz



**UL Japan, Inc.**

**Ise EMC Lab.**

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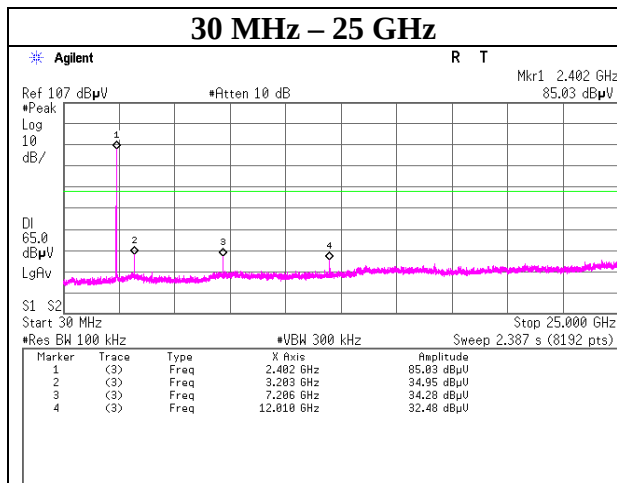
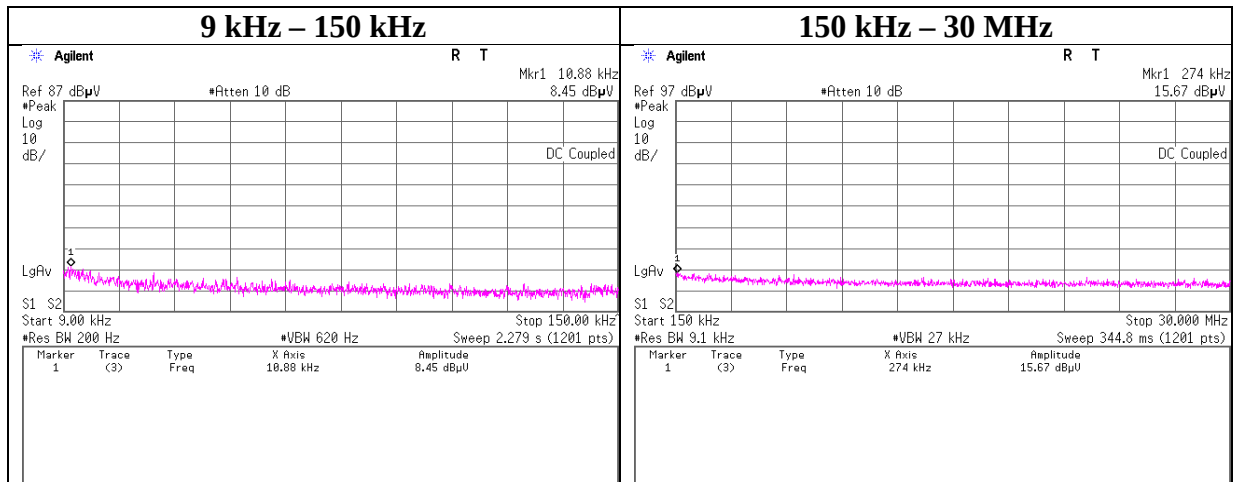
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

|                        |                                    |
|------------------------|------------------------------------|
| Test place             | Ise EMC Lab. No.6 Measurement Room |
| Report No.             | 11624584H                          |
| Date                   | April 18, 2017                     |
| Temperature / Humidity | 24 deg. C / 41 % RH                |
| Engineer               | Takumi Shimada                     |
| Mode                   | Tx, Hopping Off, 3DH5              |

### 2402 MHz



**UL Japan, Inc.**

**Ise EMC Lab.**

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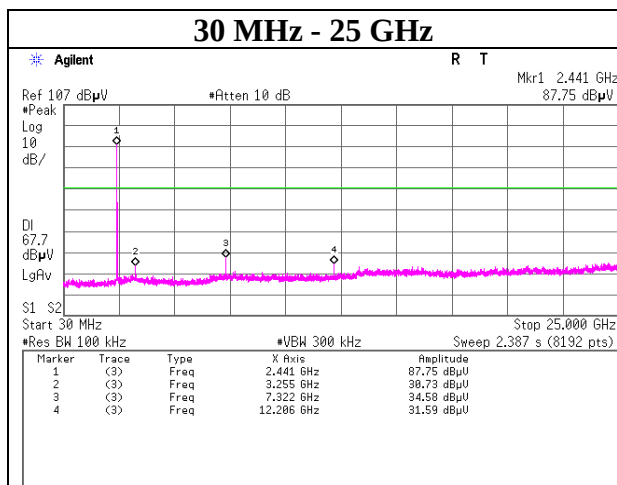
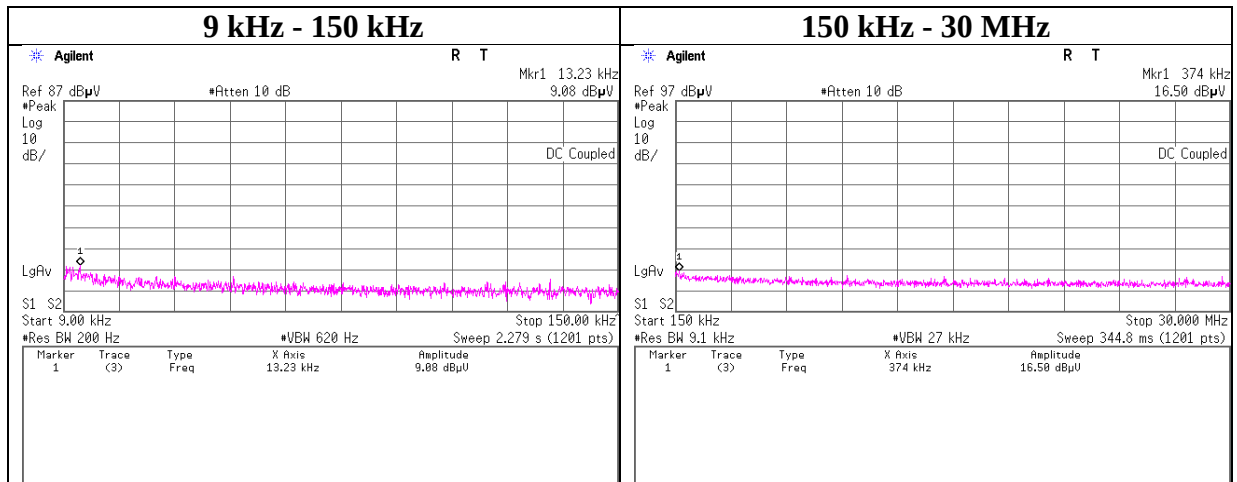
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

|                        |                                    |
|------------------------|------------------------------------|
| Test place             | Ise EMC Lab. No.6 Measurement Room |
| Report No.             | 11624584H                          |
| Date                   | April 18, 2017                     |
| Temperature / Humidity | 24 deg. C / 41 % RH                |
| Engineer               | Takumi Shimada                     |
| Mode                   | Tx, Hopping Off, 3DH5              |

### 2441 MHz



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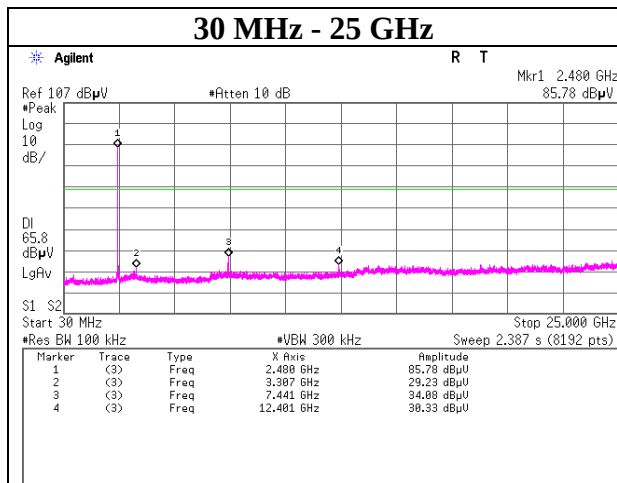
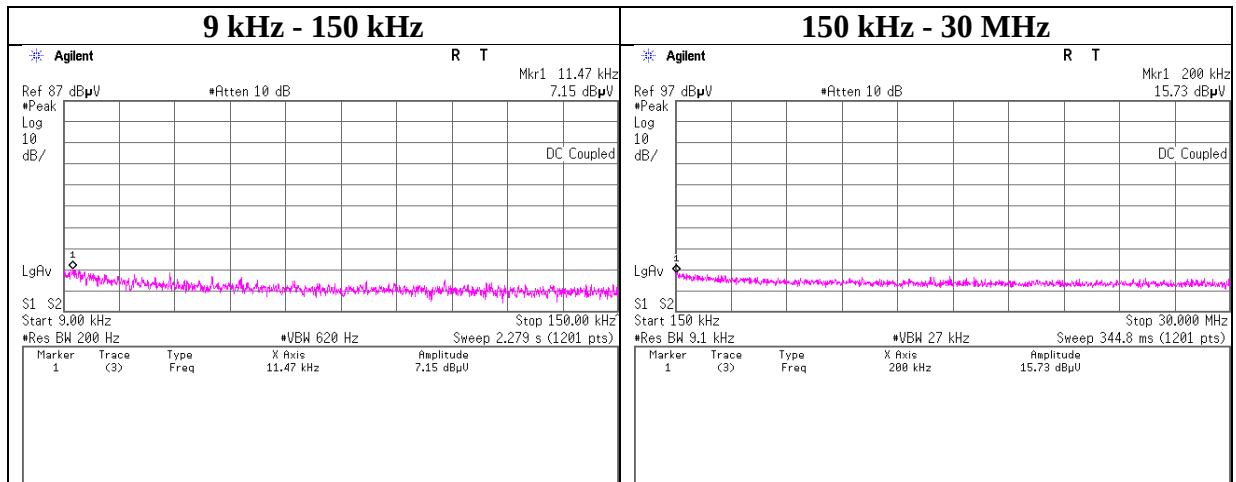
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

|                        |                                    |
|------------------------|------------------------------------|
| Test place             | Ise EMC Lab. No.6 Measurement Room |
| Report No.             | 11624584H                          |
| Date                   | April 18, 2017                     |
| Temperature / Humidity | 24 deg. C / 41 % RH                |
| Engineer               | Takumi Shimada                     |
| Mode                   | Tx, Hopping Off, 3DH5              |

### 2480 MHz



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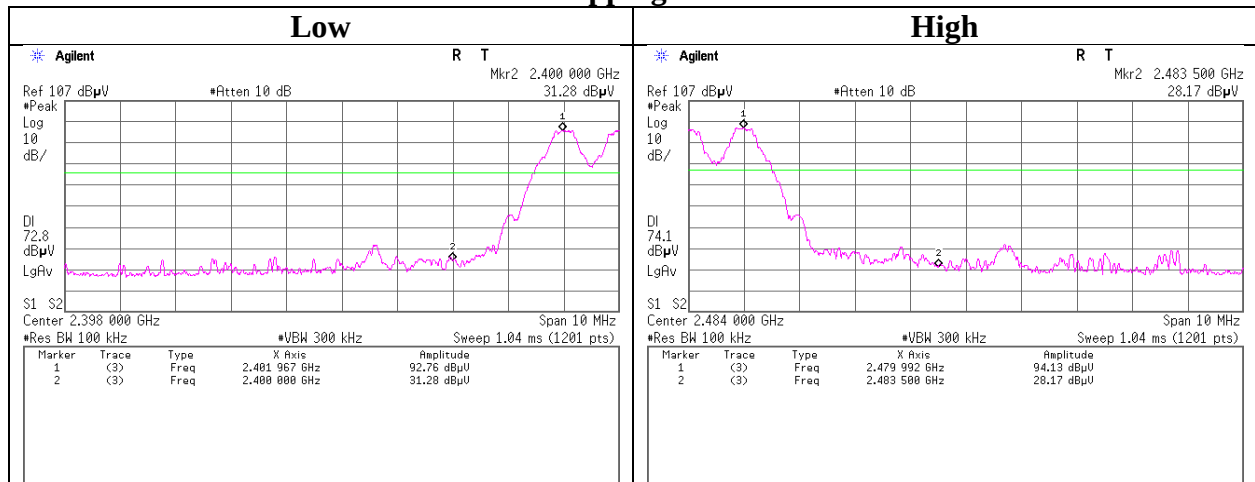
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

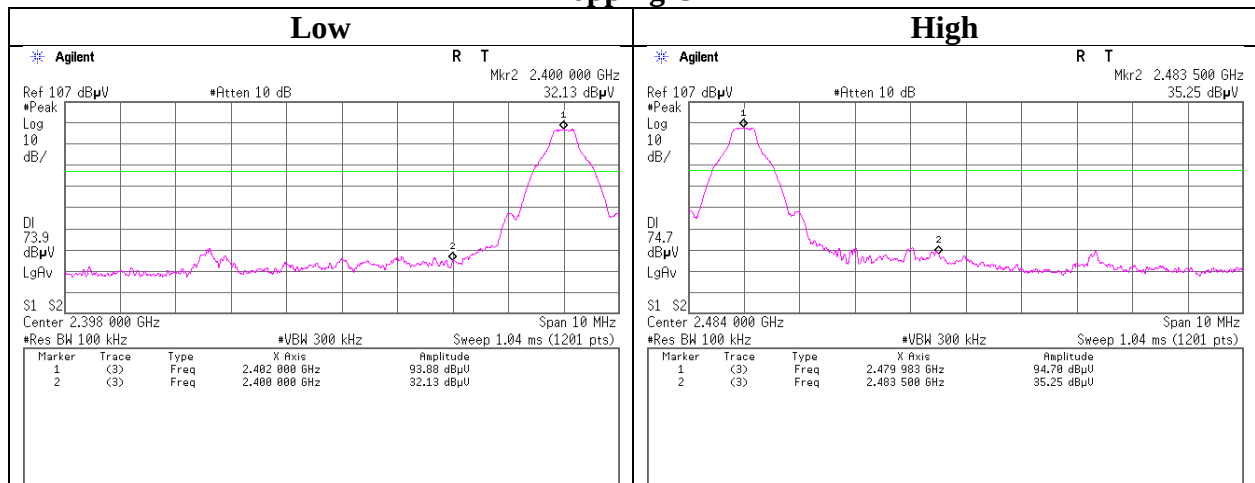
## Conducted Emission Band Edge compliance

Test place : Ise EMC Lab. No.6 Measurement Room  
Report No. : 11624584H  
Date : May 8, 2017  
Temperature / Humidity : 24 deg. C / 41 % RH  
Engineer : Takumi Shimada  
Mode : Tx DH5

### Hopping On



### Hopping Off



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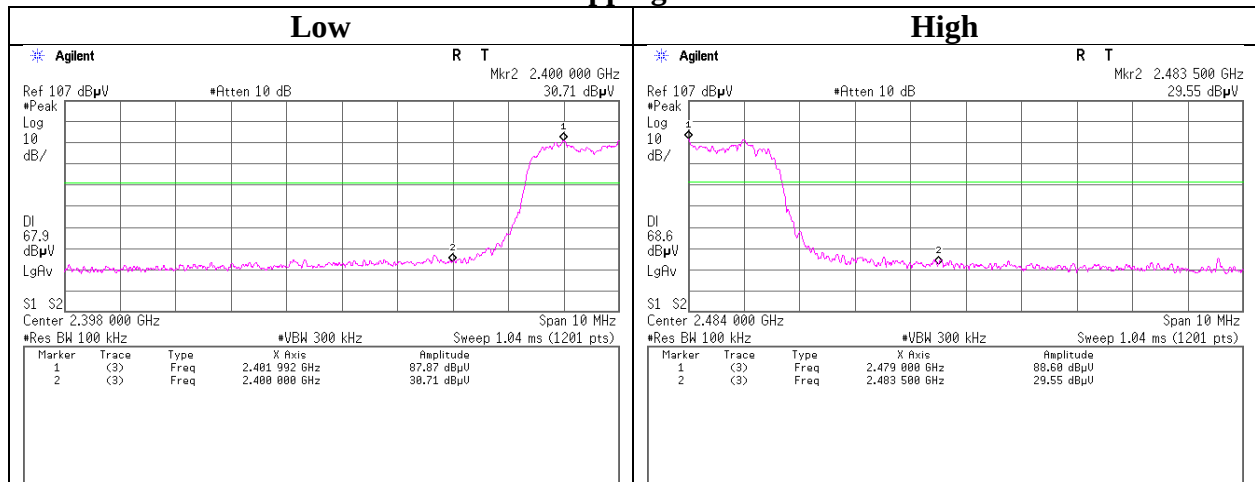
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

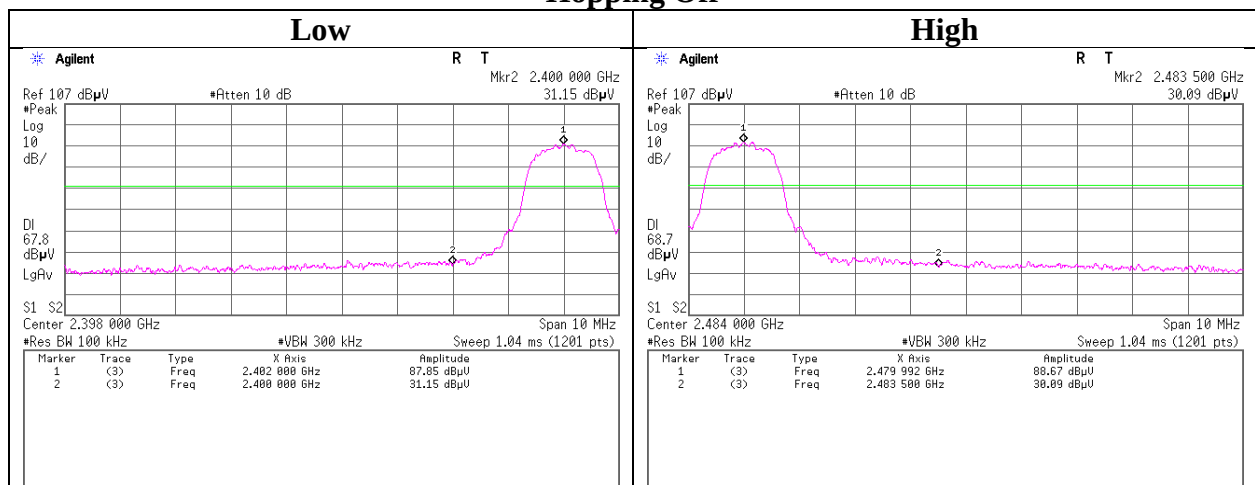
## Conducted Emission Band Edge compliance

|                        |                                    |
|------------------------|------------------------------------|
| Test place             | Ise EMC Lab. No.6 Measurement Room |
| Report No.             | 11624584H                          |
| Date                   | May 8, 2017                        |
| Temperature / Humidity | 24 deg. C / 41 % RH                |
| Engineer               | Takumi Shimada                     |
| Mode                   | Tx 3DH5                            |

### Hopping On



### Hopping Off



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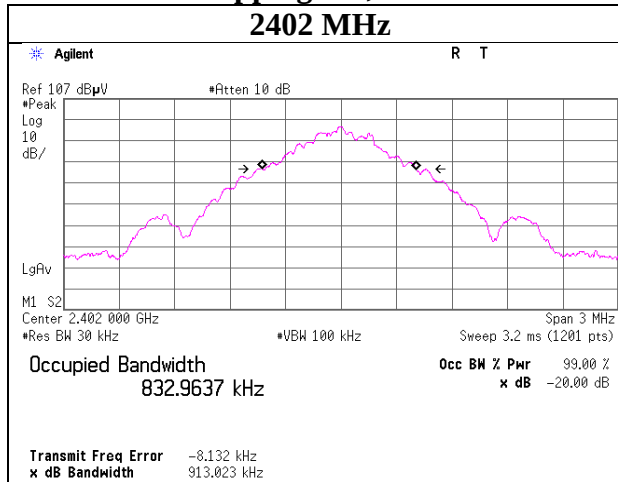
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

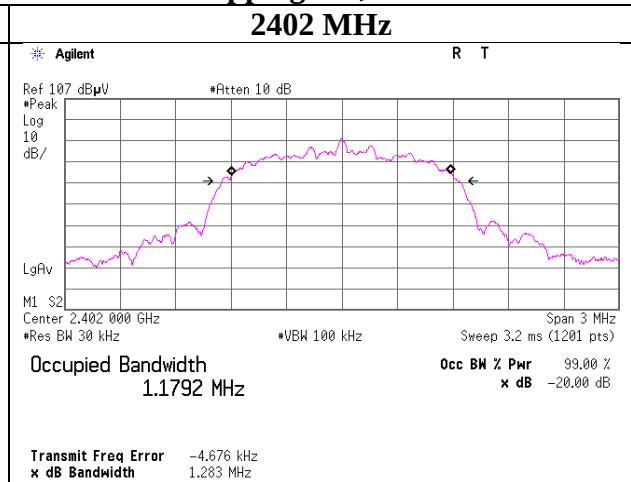
## 99% Occupied Bandwidth

|                        |                                    |
|------------------------|------------------------------------|
| Test place             | Ise EMC Lab. No.6 Measurement Room |
| Report No.             | 11624584H                          |
| Date                   | April 18, 2017                     |
| Temperature / Humidity | 24 deg. C / 41 % RH                |
| Engineer               | Takumi Shimada                     |
| Mode                   | Tx Hopping Off                     |

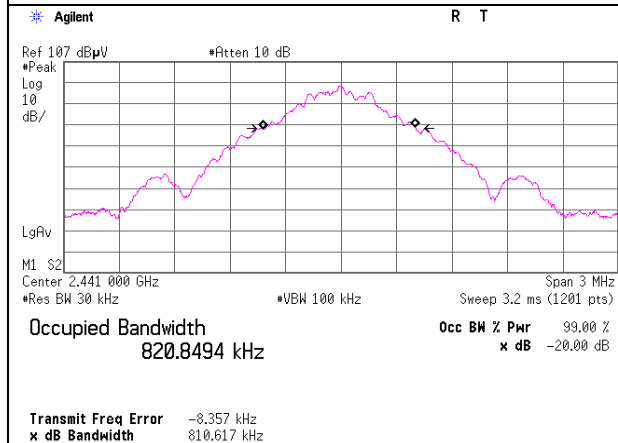
### Hopping Off, DH5



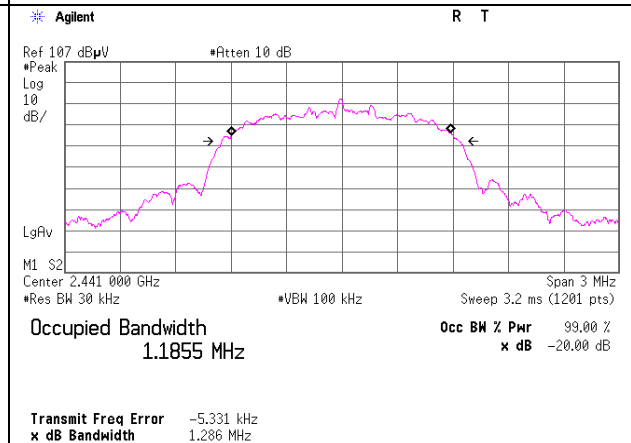
### Hopping Off, 3DH5



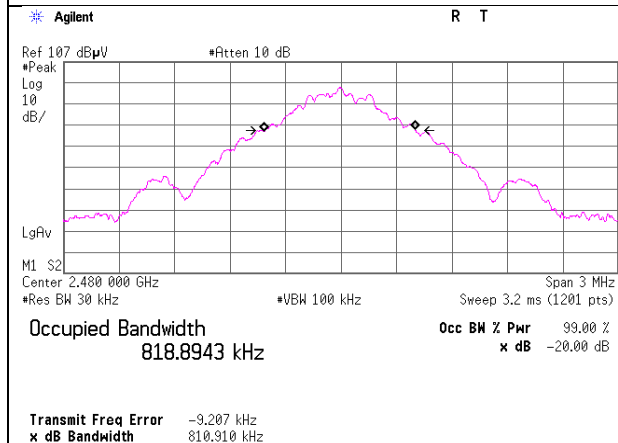
### 2441 MHz



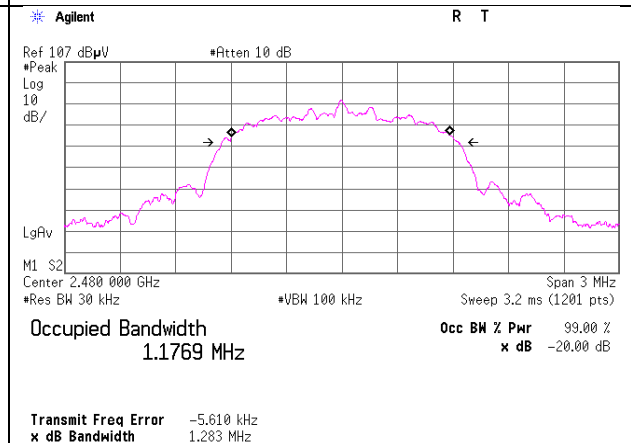
### 2441 MHz



### 2480 MHz



### 2480 MHz



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**Ise EMC Lab.**

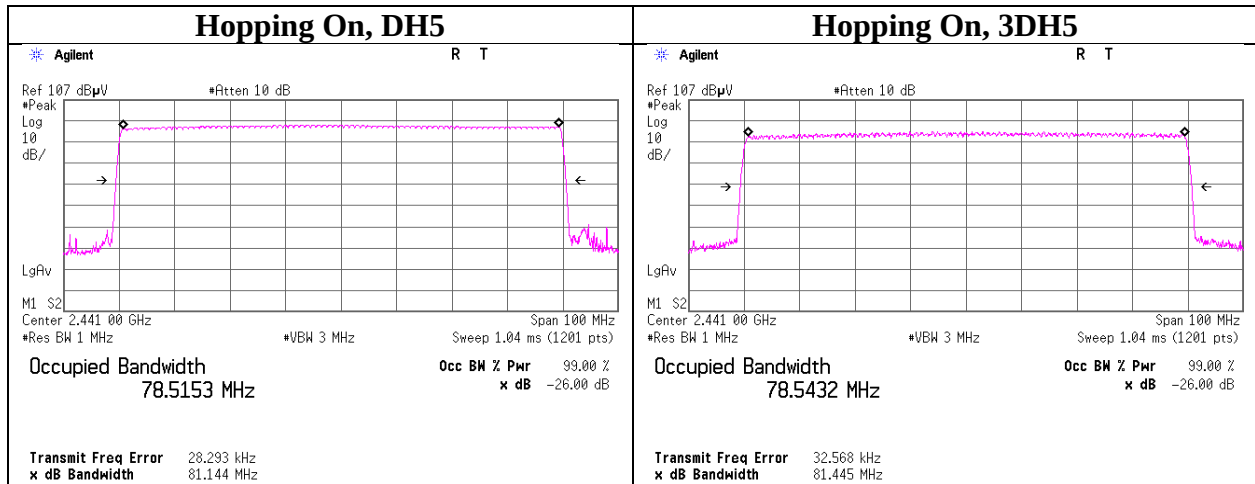
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## 99% Occupied Bandwidth

|                        |                                    |
|------------------------|------------------------------------|
| Test place             | Ise EMC Lab. No.6 Measurement Room |
| Report No.             | 11624584H                          |
| Date                   | May 8, 2017                        |
| Temperature / Humidity | 24 deg. C / 41 % RH                |
| Engineer               | Takumi Shimada                     |
| Mode                   | Tx Hopping On                      |



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## APPENDIX 2: Test instruments

### Test equipment

| Control No. | Instrument                       | Manufacturer         | Model No                                               | Serial No                       | Test Item | Calibration Date *<br>Interval(month) |
|-------------|----------------------------------|----------------------|--------------------------------------------------------|---------------------------------|-----------|---------------------------------------|
| MAEC-02     | Semi Anechoic Chamber(NSA)       | TDK                  | Semi Anechoic Chamber 3m                               | DA-06902                        | CE        | 2016/08/02 * 12                       |
| MOS-22      | Thermo-Hygrometer                | Custom               | CTH-201                                                | 0003                            | CE        | 2016/12/13 * 12                       |
| MJM-14      | Measure                          | KOMELON              | KMC-36                                                 | -                               | CE        | -                                     |
| COTS-MEMI   | EMI measurement program          | TSJ                  | TEPTO-DV                                               | -                               | CE/RE     | -                                     |
| MSA-04      | Spectrum Analyzer                | Agilent              | E4448A                                                 | US44300523                      | CE        | 2016/11/10 * 12                       |
| MTR-03      | Test Receiver                    | Rohde & Schwarz      | ESCI                                                   | 100300                          | CE        | 2016/10/21 * 12                       |
| MLS-23      | LISN(AMN)                        | Schwarzbeck          | NSLK8127                                               | 8127-729                        | CE        | 2016/07/07 * 12                       |
| MCC-13      | Coaxial Cable                    | Fujikura             | 3D-2W(12m)/<br>5D-2W(5m)/<br>5D-2W(0.8m)/<br>5D-2W(1m) | -                               | CE        | 2017/02/24 * 12                       |
| MAT-65      | Attenuator(13dB)                 | JFW Industries, Inc. | 50FP-013H2 N                                           | -                               | CE        | 2016/12/21 * 12                       |
| MMM-01      | Digital Tester                   | Fluke                | FLUKE 26-3                                             | 78030611                        | CE        | 2016/08/23 * 12                       |
| MPM-16      | Power Meter                      | Agilent              | 8990B                                                  | MY51000271                      | AT        | 2016/04/07 * 12 *1)                   |
| MPSE-23     | Power sensor                     | Agilent              | N1923A                                                 | MY54070004                      | AT        | 2016/04/07 * 12 *1)                   |
| MAT-90      | Attenuator                       | Weinschel Associates | WA56-10                                                | 56100306                        | AT        | 2016/06/09 * 12                       |
| MOS-29      | Thermo-Hygrometer                | Custom               | CTH-201                                                | 2901                            | AT        | 2017/01/20 * 12                       |
| MCC-66      | Microwave Cable<br>1G-40GHz      | Suhner               | SUCOFLEX102                                            | 28636/2                         | AT        | 2017/04/04 * 12                       |
| MCC-64      | Coaxial Cable                    | UL Japan             | -                                                      | -                               | AT        | 2017/03/24 * 12                       |
| MAT-10      | Attenuator(10dB)                 | Weinschel Corp       | 2                                                      | BL1173                          | AT        | 2016/11/28 * 12                       |
| MOS-14      | Thermo-Hygrometer                | Custom               | CTH-201                                                | 1401                            | AT        | 2017/01/20 * 12                       |
| MAEC-03     | Semi Anechoic Chamber(NSA)       | TDK                  | Semi Anechoic Chamber 3m                               | DA-10005                        | RE        | 2016/10/20 * 12                       |
| MOS-13      | Thermo-Hygrometer                | Custom               | CTH-180                                                | 1301                            | RE        | 2017/01/20 * 12                       |
| MJM-16      | Measure                          | KOMELON              | KMC-36                                                 | -                               | RE        | -                                     |
| MSA-16      | Spectrum Analyzer                | Agilent              | E4440A                                                 | MY46186390                      | RE        | 2017/02/21 * 12                       |
| MHA-20      | Horn Antenna 1-18GHz             | Schwarzbeck          | BBHA9120D                                              | 258                             | RE        | 2016/05/29 * 12 *1)                   |
| MCC-167     | Microwave Cable                  | Junkosha             | MWX221                                                 | 1404S374(1m) /<br>1405S074(5m)  | RE        | 2016/05/20 * 12 *1)                   |
| MPA-11      | MicroWave System Amplifier       | Agilent              | 83017A                                                 | MY39500779                      | RE        | 2017/03/21 * 12                       |
| MMM-08      | DIGITAL HiTESTER                 | Hioki                | 3805                                                   | 051201197                       | RE        | 2017/01/19 * 12                       |
| MHF-25      | High Pass Filter<br>3.5-18.0GHz  | UL Japan             | HPF SELECTOR                                           | 001                             | RE        | 2016/09/21 * 12                       |
| MAEC-04     | Semi Anechoic Chamber(NSA)       | TDK                  | Semi Anechoic Chamber 3m                               | DA-10005                        | RE        | 2016/10/19 * 12                       |
| MOS-15      | Thermo-Hygrometer                | Custom               | CTH-180                                                | 1501                            | RE        | 2017/01/20 * 12                       |
| MJM-26      | Measure                          | KOMELON              | KMC-36                                                 | -                               | RE        | -                                     |
| MTR-10      | EMI Test Receiver                | Rohde & Schwarz      | ESR26                                                  | 101408                          | RE        | 2017/01/12 * 12                       |
| MBA-05      | Biconical Antenna                | Schwarzbeck          | BBA9106                                                | 1302                            | RE        | 2016/11/23 * 12                       |
| MLA-23      | Logperiodic Antenna(200-1000MHz) | Schwarzbeck          | VUSLP9111B                                             | 911B-192                        | RE        | 2017/01/26 * 12                       |
| MCC-50      | Coaxial Cable                    | UL Japan             | -                                                      | -                               | RE        | 2016/06/20 * 12                       |
| MAT-97      | Attenuator                       | KEYSIGHT             | 8491A                                                  | MY52462282                      | RE        | 2016/10/31 * 12                       |
| MPA-14      | Pre Amplifier                    | SONOMA INSTRUMENT    | 310                                                    | 260833                          | RE        | 2017/03/27 * 12                       |
| MMM-10      | DIGITAL HiTESTER                 | Hioki                | 3805                                                   | 051201148                       | RE        | 2017/01/19 * 12                       |
| MSA-10      | Spectrum Analyzer                | Agilent              | E4448A                                                 | MY46180655                      | RE        | 2016/08/17 * 12                       |
| MHA-21      | Horn Antenna 1-18GHz             | Schwarzbeck          | BBHA9120D                                              | 9120D-557                       | RE        | 2016/09/28 * 12                       |
| MCC-141     | Microwave Cable                  | Junkosha             | MWX221                                                 | 1305S002R(1m) /<br>1405S146(5m) | RE        | 2016/06/21 * 12                       |
| MPA-12      | MicroWave System Amplifier       | Agilent              | 83017A                                                 | 00650                           | RE        | 2016/10/21 * 12                       |
| MHA-17      | Horn Antenna 15-40GHz            | Schwarzbeck          | BBHA9170                                               | BBHA9170307                     | RE        | 2016/06/24 * 12                       |
| MHF-26      | High Pass Filter<br>3.5-18.0GHz  | UL Japan             | HPF SELECTOR                                           | 002                             | RE        | 2016/09/19 * 12                       |

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**\*1) This test equipment was used for the tests before the expiration date of the calibration.**

**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:**            **CE: Conducted Emission test**  
                         **RE: Radiated Emission test**  
                         **AT: Antenna Terminal Conducted test**