



# RADIO TEST REPORT

Test Report No. : 12366336H-A-R2

**Applicant** : Ascensia Diabetes Care Holdings AG  
**Type of EUT** : CONTOUR NEXT  
**Model Number of EUT** : 7901  
**Test regulation** : FCC Part 15 Subpart C: 2020  
**Test Result** : Complied (Refer to SECTION 3.2)

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
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 covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
6. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
7. 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.
8. The information provided from the customer for this report is identified in SECTION 1.
9. This report is a revised version of 12366336H-A-R1. 12366336H-A-R1 is replaced with this report.

**Date of test:** June 27 to July 12, 2018

**Representative test engineer:**

*J. Nagatomi*  
Junki Nagatomi  
Engineer

Consumer Technology Division

**Approved by:**

*S. Miyazono*  
Shinichi Miyazono  
Engineer

Consumer Technology Division



This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.  
\*As for the range of Accreditation in NVLAP, you may refer to the WEB address,  
[http://japan.ul.com/resources/emc\\_accredited/](http://japan.ul.com/resources/emc_accredited/)

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

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## **REVISION HISTORY**

**Original Test Report No.: 12366336H-A**

| Revision        | Test report No. | Date             | Page revised          | Contents                                                                   |
|-----------------|-----------------|------------------|-----------------------|----------------------------------------------------------------------------|
| -<br>(Original) | 12366336H-A     | December 5, 2018 | -                     | -                                                                          |
| 1               | 12366336H-A-R1  | July 1, 2019     | corresponding<br>page | Correction due to ISO 17025 revision                                       |
| 1               | 12366336H-A-R1  | July 1, 2019     | P.1                   | Change of NVLAP logo to NVLAP<br>combined ILAC MRA mark                    |
| 1               | 12366336H-A-R1  | July 1, 2019     | P.1, 6                | Update of FCC version                                                      |
| 1               | 12366336H-A-R1  | July 1, 2019     | P.9                   | Correction of Configuration and<br>peripherals in Clause 4.2               |
| 2               | 12366336H-A-R2  | October 20, 2020 | corresponding<br>page | Correction due to ISO 17025 revision                                       |
| 2               | 12366336H-A-R2  | October 20, 2020 | P.1, 7                | Update of FCC version                                                      |
| 2               | 12366336H-A-R2  | October 20, 2020 | P.3                   | Addition of the Abbreviations list                                         |
| 2               | 12366336H-A-R2  | October 20, 2020 | P.6                   | Addition of the following variant model;<br>CONTOUR NEXT GEN (7902, 7902H) |

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Facsimile : +81 596 24 8124

## Reference: Abbreviations (Including words undescribed in this report)

|                |                                                                 |         |                                                     |
|----------------|-----------------------------------------------------------------|---------|-----------------------------------------------------|
| A2LA           | The American Association for Laboratory Accreditation           | MCS     | Modulation and Coding Scheme                        |
| AC             | Alternating Current                                             | MRA     | Mutual Recognition Arrangement                      |
| AFH            | Adaptive Frequency Hopping                                      | N/A     | Not Applicable                                      |
| AM             | Amplitude Modulation                                            | NIST    | National Institute of Standards and Technology      |
| Amp, AMP       | Amplifier                                                       | NS      | No signal detect.                                   |
| ANSI           | American National Standards Institute                           | NSA     | Normalized Site Attenuation                         |
| Ant, ANT       | Antenna                                                         | NVLAP   | National Voluntary Laboratory Accreditation Program |
| AP             | Access Point                                                    | OBW     | Occupied Band Width                                 |
| ASK            | Amplitude Shift Keying                                          | OFDM    | Orthogonal Frequency Division Multiplexing          |
| Atten., ATT    | Attenuator                                                      | P/M     | Power meter                                         |
| AV             | Average                                                         | PCB     | Printed Circuit Board                               |
| BPSK           | Binary Phase-Shift Keying                                       | PER     | Packet Error Rate                                   |
| BR             | Bluetooth Basic Rate                                            | PHY     | Physical Layer                                      |
| BT             | Bluetooth                                                       | PK      | Peak                                                |
| BT LE          | Bluetooth Low Energy                                            | PN      | Pseudo random Noise                                 |
| BW             | BandWidth                                                       | PRBS    | Pseudo-Random Bit Sequence                          |
| Cal Int        | Calibration Interval                                            | PSD     | Power Spectral Density                              |
| CCK            | Complementary Code Keying                                       | QAM     | Quadrature Amplitude Modulation                     |
| Ch., CH        | Channel                                                         | QP      | Quasi-Peak                                          |
| CISPR          | Comite International Special des Perturbations Radioelectriques | QPSK    | Quadri-Phase Shift Keying                           |
| CW             | Continuous Wave                                                 | RBW     | Resolution Band Width                               |
| DBPSK          | Differential BPSK                                               | RDS     | Radio Data System                                   |
| DC             | Direct Current                                                  | RE      | Radio Equipment                                     |
| D-factor       | Distance factor                                                 | RF      | Radio Frequency                                     |
| DFS            | Dynamic Frequency Selection                                     | RMS     | Root Mean Square                                    |
| DQPSK          | Differential QPSK                                               | RSS     | Radio Standards Specifications                      |
| DSSS           | Direct Sequence Spread Spectrum                                 | Rx      | Receiving                                           |
| EDR            | Enhanced Data Rate                                              | SA, S/A | Spectrum Analyzer                                   |
| EIRP, e.i.r.p. | Equivalent Isotropically Radiated Power                         | SG      | Signal Generator                                    |
| EMC            | ElectroMagnetic Compatibility                                   | SVSWR   | Site-Voltage Standing Wave Ratio                    |
| EMI            | ElectroMagnetic Interference                                    | TR      | Test Receiver                                       |
| EN             | European Norm                                                   | Tx      | Transmitting                                        |
| ERP, e.r.p.    | Effective Radiated Power                                        | VBW     | Video BandWidth                                     |
| EU             | European Union                                                  | Vert.   | Vertical                                            |
| EUT            | Equipment Under Test                                            | WLAN    | Wireless LAN                                        |
| Fac.           | Factor                                                          |         |                                                     |
| FCC            | Federal Communications Commission                               |         |                                                     |
| FHSS           | Frequency Hopping Spread Spectrum                               |         |                                                     |
| FM             | Frequency Modulation                                            |         |                                                     |
| Freq.          | Frequency                                                       |         |                                                     |
| FSK            | Frequency Shift Keying                                          |         |                                                     |
| GFSK           | Gaussian Frequency-Shift Keying                                 |         |                                                     |
| GNSS           | Global Navigation Satellite System                              |         |                                                     |
| GPS            | Global Positioning System                                       |         |                                                     |
| Hori.          | Horizontal                                                      |         |                                                     |
| ICES           | Interference-Causing Equipment Standard                         |         |                                                     |
| IEC            | International Electrotechnical Commission                       |         |                                                     |
| IEEE           | Institute of Electrical and Electronics Engineers               |         |                                                     |
| IF             | Intermediate Frequency                                          |         |                                                     |
| ILAC           | International Laboratory Accreditation Conference               |         |                                                     |
| ISED           | Innovation, Science and Economic Development Canada             |         |                                                     |
| ISO            | International Organization for Standardization                  |         |                                                     |
| JAB            | Japan Accreditation Board                                       |         |                                                     |
| LAN            | Local Area Network                                              |         |                                                     |
| LIMS           | Laboratory Information Management System                        |         |                                                     |

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**Ise EMC Lab.**

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

Telephone : +81 596 24 8999

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## **SECTION 1: Customer information**

### **[Applicant]**

|              |   |                                                 |
|--------------|---|-------------------------------------------------|
| Company Name | : | Ascensia Diabetes Care Holdings AG              |
| Address      | : | Peter Merian-Strasse 90 4052 Basel, Switzerland |

### **[Manufacturer]**

|                  |   |                                               |
|------------------|---|-----------------------------------------------|
| Company Name     | : | PHC Corporation                               |
| Address          | : | 2131-1 Minamigata, Toon, Ehime 791-0395 Japan |
| Telephone Number | : | +81-70-1499-9786                              |
| Facsimile Number | : | +81-89-966-2890                               |
| Contact Person   | : | Masahiro Kishida                              |

The information provided from the customer is as follows;

- Applicant, Type of EUT, Model Number of EUT on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (EUT) other than the Receipt Date
- SECTION 4: Operation of EUT during testing
- \* The laboratory is exempted from liability of any test results affected from the above information in SECTION 2 and 4.

## **SECTION 2: Equipment under test (EUT)**

### **2.1 Identification of EUT**

|                            |   |                                                                                           |
|----------------------------|---|-------------------------------------------------------------------------------------------|
| Type                       | : | CONTOUR NEXT                                                                              |
| Model Number               | : | 7901                                                                                      |
| Serial Number              | : | Refer to Section 4, Clause 4.2                                                            |
| Rating                     | : | DC 3.0 V                                                                                  |
| Receipt Date               | : | June 26, 2018                                                                             |
| Country of Mass-production | : | Japan                                                                                     |
| Condition                  | : | Production prototype<br>(Not for Sale: This sample is equivalent to mass-produced items.) |
| Modification               | : | No Modification by the test lab                                                           |

### **2.2 Product Description**

Model: 7901 (referred to as the EUT in this report) is a CONTOUR NEXT.

### **Radio Specification**

#### **Bluetooth Low Energy (Ver.4.2)**

|                        |   |                        |
|------------------------|---|------------------------|
| Equipment Type         | : | Transceiver            |
| Frequency of Operation | : | 2402 MHz – 2480 MHz    |
| Type of Modulation     | : | GFSK                   |
| Antenna Type           | : | Pattern Antenna        |
| Antenna Gain           | : | 2.41 dBi               |
| Operating Temperature  | : | 0 deg. C to +55 deg. C |

### **Variant models**

Tested model; 7901 has following variant models;

| CONTOUR NEXT                | CONTOUR NEXT GEN | CONTOUR PLUS ELITE |
|-----------------------------|------------------|--------------------|
| 7901(Tested model)<br>7901H | 7902<br>7902H    | 7926<br>7926H      |

The differences between above variant model's type of equipment are intended country of destination and corresponding test strip.

The differences between above variant model's model No. are range of measurement results displayed and displayed unit.

These models are completely identical in Electrical characteristics and configuration.

## SECTION 3: Test specification, procedures & results

### 3.1 Test Specification

Test Specification : FCC Part 15 Subpart C  
FCC Part 15 final revised on October 13, 2020

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 does not affect the test result conducted before its effective date.

\* 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 | FCC: Section 15.207                            | N/A                                       | N/A             | *1)                                                               |
|                                            | IC: RSS-Gen 8.8                                   | IC: RSS-Gen 8.8                                |                                           |                 |                                                                   |
| 6dB Bandwidth                              | FCC: KDB 558074 D01 15.247<br>Meas Guidance v05   | FCC: Section 15.247(a)(2)                      | See data.                                 | Complied a)     | Conducted                                                         |
|                                            | IC: -                                             | IC: RSS-247 5.2(a)                             |                                           |                 |                                                                   |
| Maximum Peak Output Power                  | FCC: KDB 558074 D01 15.247<br>Meas Guidance v05   | FCC: Section 15.247(b)(3)                      |                                           | Complied b)     | Conducted                                                         |
|                                            | IC: RSS-Gen 6.12                                  | IC: RSS-247 5.4(d)                             |                                           |                 |                                                                   |
| Power Density                              | FCC: KDB 558074 D01 15.247<br>Meas Guidance v05   | FCC: Section 15.247(e)                         |                                           | Complied c)     | Conducted                                                         |
|                                            | IC: -                                             | IC: RSS-247 5.2(b)                             |                                           |                 |                                                                   |
| Spurious Emission<br>Restricted Band Edges | FCC: KDB 558074 D01 15.247<br>Meas Guidance v05   | FCC: Section 15.247(d)                         | 5.6 dB<br>2387.903 MHz, AV,<br>Horizontal | Complied d), e) | Conducted<br>(below 30 MHz)/<br>Radiated<br>(above 30 MHz)<br>*2) |
|                                            | IC: RSS-Gen 6.13                                  | IC: RSS-247 5.5<br>RSS-Gen 8.9<br>RSS-Gen 8.10 |                                           |                 |                                                                   |

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

\*1) The test is not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line and during USB communication EUT cannot transmit Radio frequency.

\*2) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 DTS Meas Guidance v04 12.2.7.

a) Refer to APPENDIX 1 (data of 6 dB Bandwidth and 99 % Occupied Bandwidth)

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

c) Refer to APPENDIX 1 (data of Power Density)

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

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

Symbols:

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

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

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

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**Ise EMC Lab.**

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

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

The test was performed with the New Battery and the stable voltage was supplied to the EUT during the tests. Therefore, the EUT complies with the requirement.

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

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

## **3.3 Addition to standard**

| Item                   | Test Procedure  | Specification | Worst margin | Results  | Remarks   |
|------------------------|-----------------|---------------|--------------|----------|-----------|
| 99% Occupied Bandwidth | IC: RSS-Gen 6.7 | IC: -         | N/A          | Complied | Conducted |

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

## **3.4 Uncertainty**

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

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor  $k=2$ .

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### **Antenna Terminal test**

| Test Item                                        | Uncertainty (+/-) |
|--------------------------------------------------|-------------------|
| 6 dB Bandwidth / 99 % Occupied Bandwidth         | 0.96 %            |
| Maximum Peak Output Power / Average Output Power | 1.3 dB            |
| Burst Rate                                       | 0.10 %            |
| Power Density                                    | 2.7 dB            |
| Conducted Spurious Emission                      | 2.7 dB            |

### **Radiated emission**

| Measurement distance | Frequency range                                | Uncertainty (+/-) |
|----------------------|------------------------------------------------|-------------------|
| 3 m                  | 9 kHz to 30 MHz                                | 3.3 dB            |
| 10 m                 |                                                | 3.2 dB            |
| 3 m                  | 30 MHz to 200 MHz (Horizontal)<br>(Vertical)   | 4.8 dB            |
|                      |                                                | 5.0 dB            |
|                      | 200 MHz to 1000 MHz (Horizontal)<br>(Vertical) | 5.2 dB            |
|                      |                                                | 6.3 dB            |
| 10 m                 | 30 MHz to 200 MHz (Horizontal)<br>(Vertical)   | 4.8 dB            |
|                      |                                                | 4.9 dB            |
|                      | 200 MHz to 1000 MHz (Horizontal)<br>(Vertical) | 5.0 dB            |
|                      |                                                | 5.0 dB            |
| 3 m                  | 1 GHz to 6 GHz                                 | 5.0 dB            |
|                      | 6 GHz to 18 GHz                                | 5.3 dB            |
| 1 m                  | 10 GHz to 26.5 GHz                             | 5.8 dB            |
|                      | 26.5 GHz to 40 GHz                             | 5.8 dB            |
| 10 m                 | 1 GHz to 18 GHz                                | 5.2 dB            |

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

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### 3.5 Test Location

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\*NVLAP Lab. code: 200572-0 / FCC Test Firm Registration Number: 199967 / ISED Lab Company Number: 2973C

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| Test site                  | 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 | 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 | 7.5 x 5.8 x 5.2            | 4.0 x 4.0                                                        | -                      | 3 m                          |
| No.3 semi-anechoic chamber | 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 | 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.5 measurement room      | 6.4 x 6.4 x 3.0            | 6.4 x 6.4                                                        | -                      | -                            |
| 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            | 3.1 x 5.0                                                        | -                      | -                            |
| No.9 measurement room      | 8.8 x 4.6 x 2.8            | 2.4 x 2.4                                                        | -                      | -                            |

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

Refer to APPENDIX.

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Facsimile : +81 596 24 8124

## SECTION 4: Operation of EUT during testing

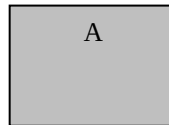
### 4.1 Operating Mode(s)

Bluetooth (BT) Low Energy (LE): Transmitting (Tx)

| Test Item                                                                                                                                                                                                                                                                                                                                                                                   | Operating Mode | Tested Frequency                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------------|
| Spurious Emission<br>6dB Bandwidth<br>Maximum Peak Output Power<br>Power Density<br>99% Occupied Bandwidth                                                                                                                                                                                                                                                                                  | Tx BT LE       | 2402 MHz<br>2440 MHz<br>2480 MHz |
| <p>*Power of the EUT was set by the software as follows;<br/> Power settings: 0dBm<br/> Software: DE (Digital Engine): 01.10<br/> RFE (RF Engine): 01.10</p> <p>This setting of software is the worst case.<br/> Any conditions under the normal use do not exceed the condition of setting.<br/> In addition, end users cannot change the settings of the output power of the product.</p> |                |                                  |

### 4.2 Configuration and peripherals

[Radiated emission test]



[Antenna Terminal Conducted test]



\* Setup was taken into consideration and test data was taken under worse case conditions.

### Description of EUT

| No. | Item         | Model number | Serial number              | Manufacturer    | Remarks |
|-----|--------------|--------------|----------------------------|-----------------|---------|
| A   | CONTOUR NEXT | 7901         | P202482 *1)<br>P200225 *2) | PHC Corporation | EUT     |

\*1) Used for Antenna Terminal conducted test

\*2) Used for Radiated Emission test

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

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Facsimile : +81 596 24 8124

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

### **Test Procedure**

It was measured based on "8.5 and 8.6 of KDB 558074 D01 15.247 Meas Guidance v05".

[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.

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

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

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

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

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

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

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

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

### **20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(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 *1)                                                                                                                                                                                   | PK                          |
| IF Bandwidth    | BW 120 kHz    | RBW: 1 MHz<br>VBW: 3 MHz | Average Power Method:<br>RBW: 1 MHz<br>VBW: 3 MHz<br>Detector:<br>Power Averaging (RMS)<br>Trace: 100 traces<br>If duty cycle was less than 98%, a duty factor was added to the results. | RBW: 100 kHz<br>VBW: 300kHz |

\*1) Average Power Measurement was performed based on ANSI C63.10-2013.

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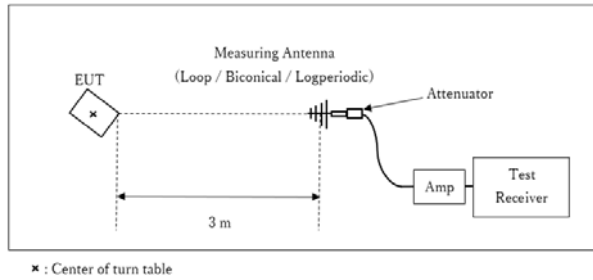
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Facsimile : +81 596 24 8124

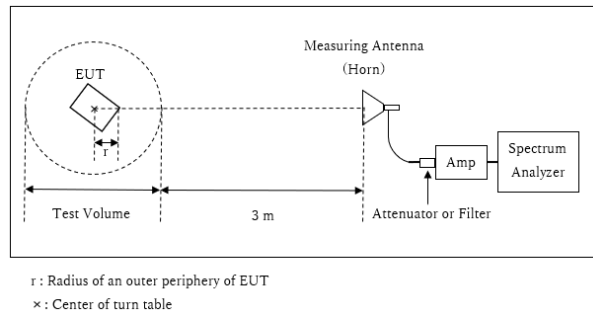
## Test Setup

Below 1 GHz



Test Distance: 3 m

1 GHz - 10 GHz



Distance Factor:  $20 \times \log (3.75 \text{ m} / 3.0 \text{ m}) = 1.94 \text{ dB}$

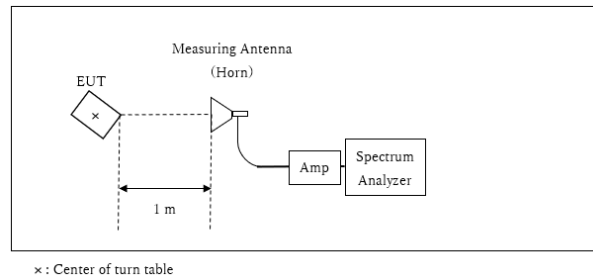
\* Test Distance:  $(3 + \text{Test Volume} / 2) - r = 3.75 \text{ m}$

Test Volume : 1.5 m

(Test Volume has been calibrated based on CISPR 16-1-4.)  
r = 0.0 m

\* The test was performed with r = 0.0 m since EUT is small and it was the rather conservative condition.

10 GHz - 26.5 GHz



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

\*Test Distance: 1 m

- 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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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

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

### **Test Procedure**

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

| Test                            | Span                                    | RBW             | VBW                | Sweep time | Detector             | Trace    | Instrument used                 |
|---------------------------------|-----------------------------------------|-----------------|--------------------|------------|----------------------|----------|---------------------------------|
| 6dB Bandwidth                   | 20 MHz                                  | 100 kHz         | 300 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/<br>Average *2) | -        | Power Meter (Sensor: 50 MHz BW) |
| Peak Power Density              | 1.5 times the 6dB Bandwidth             | 3 kHz           | 10 kHz             | Auto       | Peak                 | Max Hold | Spectrum Analyzer *3)           |
| Conducted Spurious Emission *4) | 9kHz to 150kHz                          | 200 Hz          | 620 Hz             | Auto       | Peak                 | Max Hold | Spectrum Analyzer               |
|                                 | 150kHz to 30MHz                         | 9.1 kHz         | 27 kHz             |            |                      |          |                                 |

\*1) Peak hold was applied as Worst-case measurement.  
\*2) Reference data  
\*3) Section 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013".  
\*4) 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 low enough as shown in the chart.

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

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

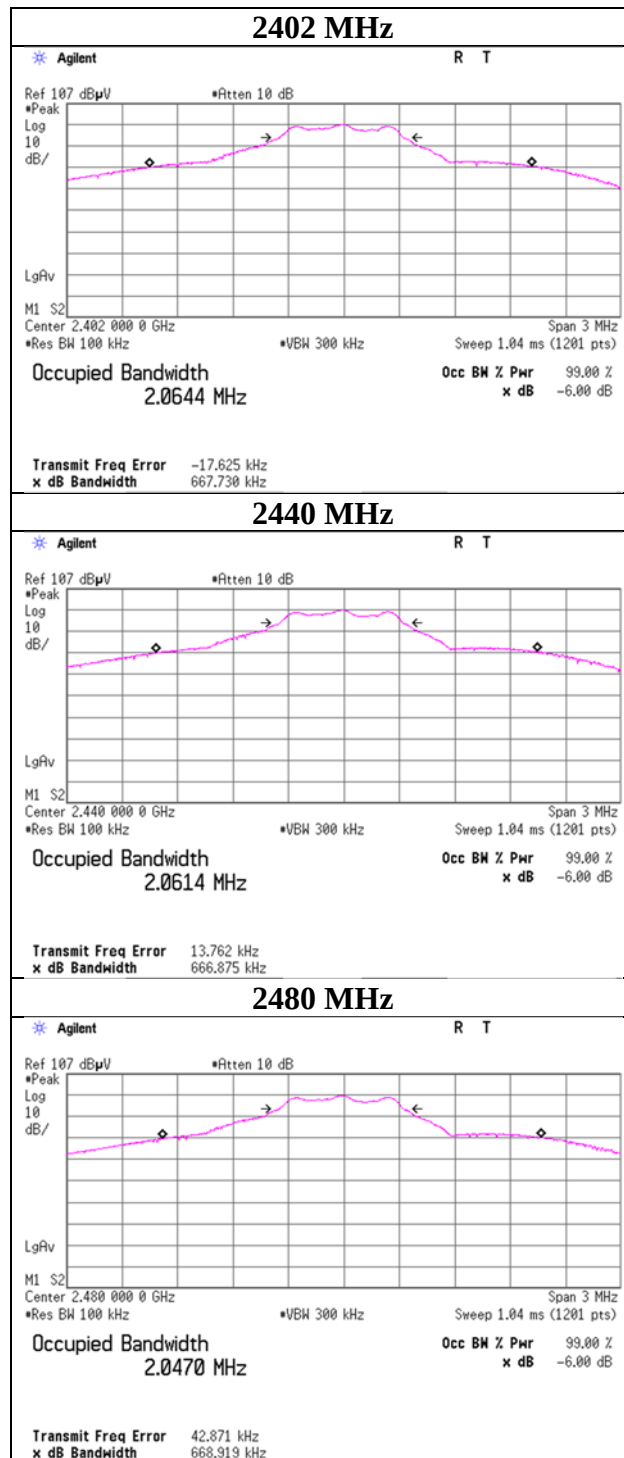
## **APPENDIX 1: Test data**

### **6 dB Bandwidth and 99 % Occupied Bandwidth**

Report No. 12366336H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date June 27, 2018  
Temperature / Humidity 23 deg. C / 62 % RH  
Engineer Takafumi Noguchi  
Mode Tx BT LE

| Mode  | Frequency<br>[MHz] | 99% Occupied<br>Bandwidth<br>[kHz] | 6dB Bandwidth<br>[MHz] | Limit for<br>6dB Bandwidth<br>[MHz] |
|-------|--------------------|------------------------------------|------------------------|-------------------------------------|
| BT LE | 2402               | 1344.7                             | 0.668                  | > 0.5000                            |
|       | 2440               | 1352.1                             | 0.667                  | > 0.5000                            |
|       | 2480               | 1338.4                             | 0.669                  | > 0.5000                            |

## 6dB Bandwidth



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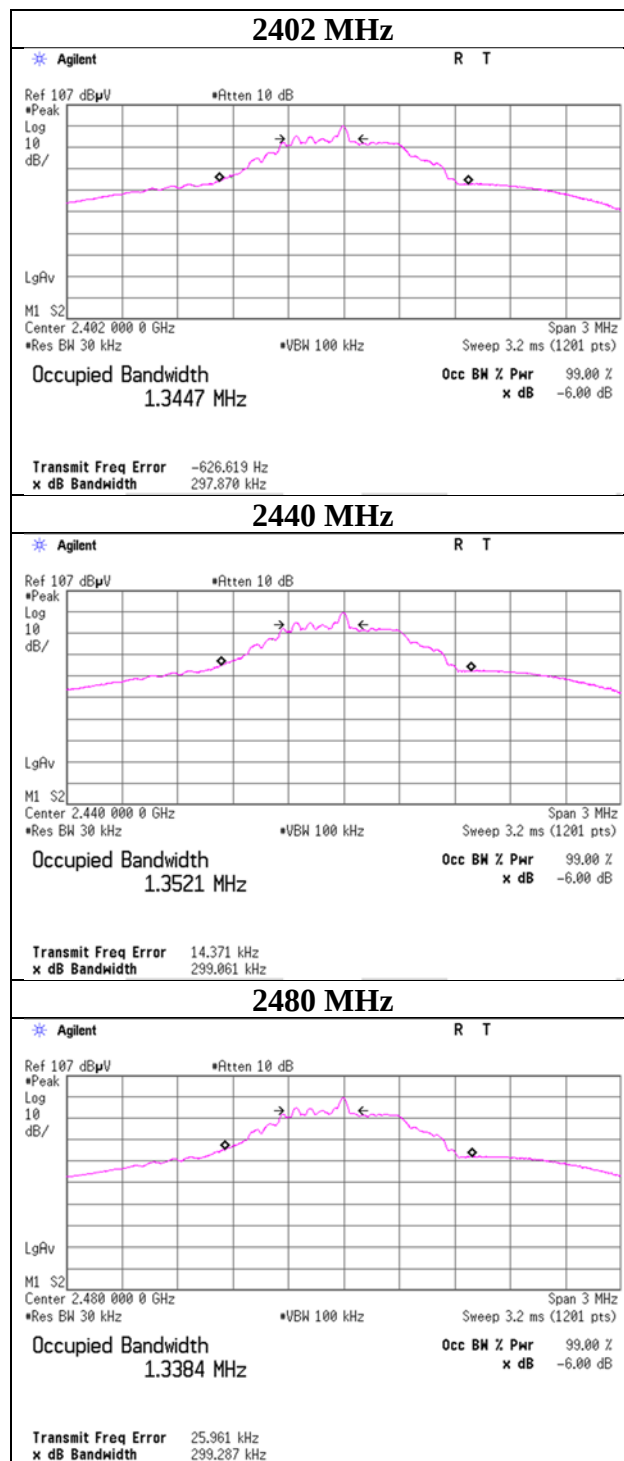
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## 99% Occupied Bandwidth



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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

### **Maximum Peak Output Power**

Report No. 12366336H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date June 27, 2018  
Temperature / Humidity 23 deg. C / 62 % RH  
Engineer Takafumi Noguchi  
Mode Tx BT LE

| Freq.<br>[MHz] | Reading<br>[dBm] | Cable<br>Loss<br>[dB] | Atten.<br>Loss<br>[dB] | Conducted Power |      |       |      |                |
|----------------|------------------|-----------------------|------------------------|-----------------|------|-------|------|----------------|
|                |                  |                       |                        | Result          |      | Limit |      | Margin<br>[dB] |
|                |                  |                       |                        | [dBm]           | [mW] | [dBm] | [mW] |                |
| 2402           | -0.17            | 0.16                  | 0.00                   | -0.01           | 1.00 | 30.00 | 1000 | 30.01          |
| 2440           | -0.26            | 0.16                  | 0.00                   | -0.10           | 0.98 | 30.00 | 1000 | 30.10          |
| 2480           | -0.38            | 0.16                  | 0.00                   | -0.22           | 0.95 | 30.00 | 1000 | 30.22          |

Sample Calculation:

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

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

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

Report No. 12366336H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date June 27, 2018  
Temperature / Humidity 23 deg. C / 62 % RH  
Engineer Takafumi Noguchi  
Mode Tx BT LE

| 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] |
| 2402           | -1.97            | 0.16                  | 0.00                   | -1.81                    | 0.66 | 1.69                   | -0.12                           | 0.97 |
| 2440           | -2.07            | 0.16                  | 0.00                   | -1.91                    | 0.64 | 1.69                   | -0.22                           | 0.95 |
| 2480           | -2.18            | 0.16                  | 0.00                   | -2.02                    | 0.63 | 1.69                   | -0.33                           | 0.93 |

Sample Calculation:

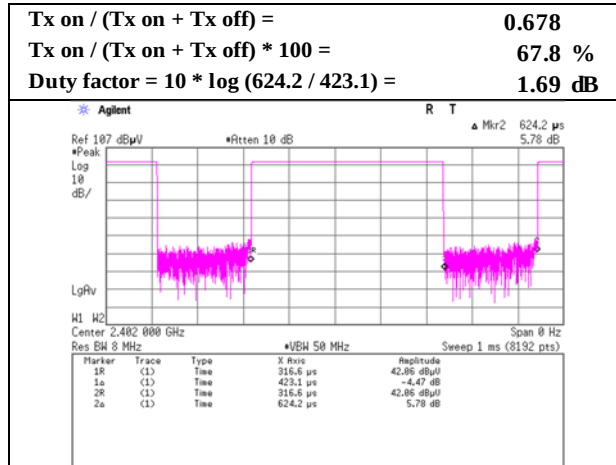
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

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

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

## Burst rate confirmation

Report No. 12366336H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date June 27, 2018  
Temperature / Humidity 23 deg. C / 62 % RH  
Engineer Takafumi Noguchi  
Mode Tx BT LE



\* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

## Radiated Spurious Emission

|                        |                                    |                                      |                                 |
|------------------------|------------------------------------|--------------------------------------|---------------------------------|
| Report No.             | 12366336H                          |                                      |                                 |
| Test place             | Ise EMC Lab.                       |                                      |                                 |
| Semi Anechoic Chamber  | No.2                               | No.2                                 | No.2                            |
| Date                   | July 11, 2018                      | July 12, 2018 (day)                  | July 12, 2018 (night)           |
| Temperature / Humidity | 20 deg. C / 62 % RH                | 22 deg. C / 58 % RH                  | 24 deg. C / 60 % RH             |
| Engineer               | Ryota Yamanaka<br>(1 GHz - 10 GHz) | Akihiko Maeda<br>(10 GHz - 26.5 GHz) | Junki Nagatomi<br>(Below 1 GHz) |
| Mode                   | Tx BT LE 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     | 37.998             | QP       | 24.8              | 15.5               | 6.8          | 30.5         | -                   | 16.6               | 40.0              | 23.4           |             |
| Hori     | 114.997            | QP       | 24.3              | 12.4               | 7.6          | 30.2         | -                   | 14.1               | 43.5              | 29.4           |             |
| Hori     | 180.003            | QP       | 24.9              | 16.1               | 8.0          | 29.8         | -                   | 19.2               | 43.5              | 24.3           |             |
| Hori     | 273.003            | QP       | 23.3              | 12.8               | 8.7          | 29.3         | -                   | 15.5               | 46.0              | 30.5           |             |
| Hori     | 470.995            | QP       | 23.7              | 16.8               | 9.6          | 29.9         | -                   | 20.2               | 46.0              | 25.8           |             |
| Hori     | 824.995            | QP       | 22.4              | 20.9               | 11.1         | 28.5         | -                   | 25.9               | 46.0              | 20.1           |             |
| Hori     | 2350.052           | PK       | 51.3              | 27.4               | 5.0          | 34.4         | -                   | 49.3               | 73.9              | 24.6           |             |
| Hori     | 2389.996           | PK       | 57.5              | 27.7               | 5.0          | 34.4         | -                   | 55.8               | 73.9              | 18.1           |             |
| Hori     | 2390.000           | PK       | 57.6              | 27.7               | 5.0          | 34.4         | -                   | 55.9               | 73.9              | 18.0           |             |
| Hori     | 4804.000           | PK       | 44.3              | 31.2               | 7.3          | 33.7         | -                   | 49.1               | 73.9              | 24.8           | Floor noise |
| Hori     | 7206.000           | PK       | 43.9              | 35.5               | 8.6          | 33.6         | -                   | 54.4               | 73.9              | 19.5           | Floor noise |
| Hori     | 9608.000           | PK       | 44.4              | 38.4               | 7.3          | 33.9         | -                   | 56.2               | 73.9              | 17.7           | Floor noise |
| Hori     | 2350.052           | AV       | 45.0              | 27.4               | 5.0          | 34.4         | 1.7                 | 44.7               | 53.9              | 9.2            | *1)         |
| Hori     | 2389.996           | AV       | 42.0              | 27.7               | 5.0          | 34.4         | 1.7                 | 42.0               | 53.9              | 11.9           | *1)         |
| Hori     | 2390.000           | AV       | 42.0              | 27.7               | 5.0          | 34.4         | 1.7                 | 42.0               | 53.9              | 11.9           | *1)         |
| Hori     | 4804.000           | AV       | 34.1              | 31.2               | 7.3          | 33.7         | -                   | 38.9               | 53.9              | 15.0           | Floor noise |
| Hori     | 7206.000           | AV       | 34.9              | 35.5               | 8.6          | 33.6         | -                   | 45.4               | 53.9              | 8.5            | Floor noise |
| Hori     | 9608.000           | AV       | 36.0              | 38.4               | 7.3          | 33.9         | -                   | 47.8               | 53.9              | 6.1            | Floor noise |
| Vert     | 37.998             | QP       | 24.9              | 15.5               | 6.8          | 30.5         | -                   | 16.7               | 40.0              | 23.3           |             |
| Vert     | 114.997            | QP       | 24.3              | 12.4               | 7.6          | 30.2         | -                   | 14.1               | 43.5              | 29.4           |             |
| Vert     | 180.003            | QP       | 23.9              | 16.1               | 8.0          | 29.8         | -                   | 18.2               | 43.5              | 25.3           |             |
| Vert     | 273.003            | QP       | 23.2              | 12.8               | 8.7          | 29.3         | -                   | 15.4               | 46.0              | 30.6           |             |
| Vert     | 470.995            | QP       | 23.6              | 16.8               | 9.6          | 29.9         | -                   | 20.1               | 46.0              | 25.9           |             |
| Vert     | 824.995            | QP       | 22.4              | 20.9               | 11.1         | 28.5         | -                   | 25.9               | 46.0              | 20.1           |             |
| Vert     | 2350.008           | PK       | 51.5              | 27.4               | 5.0          | 34.4         | -                   | 49.5               | 73.9              | 24.4           |             |
| Vert     | 2389.820           | PK       | 57.1              | 27.7               | 5.0          | 34.4         | -                   | 55.4               | 73.9              | 18.5           |             |
| Vert     | 2390.000           | PK       | 57.4              | 27.7               | 5.0          | 34.4         | -                   | 55.7               | 73.9              | 18.2           |             |
| Vert     | 4804.000           | PK       | 44.3              | 31.2               | 7.3          | 33.7         | -                   | 49.1               | 73.9              | 24.8           | Floor noise |
| Vert     | 7206.000           | PK       | 43.9              | 35.5               | 8.6          | 33.6         | -                   | 54.4               | 73.9              | 19.5           | Floor noise |
| Vert     | 9608.000           | PK       | 44.4              | 38.4               | 7.3          | 33.9         | -                   | 56.2               | 73.9              | 17.7           | Floor noise |
| Vert     | 2350.008           | AV       | 45.4              | 27.4               | 5.0          | 34.4         | 1.7                 | 45.1               | 53.9              | 8.8            | *1)         |
| Vert     | 2389.820           | AV       | 41.6              | 27.7               | 5.0          | 34.4         | 1.7                 | 41.6               | 53.9              | 12.3           | *1)         |
| Vert     | 2390.000           | AV       | 42.0              | 27.7               | 5.0          | 34.4         | 1.7                 | 42.0               | 53.9              | 11.9           | *1)         |
| Vert     | 4804.000           | AV       | 34.1              | 31.2               | 7.3          | 33.7         | -                   | 38.9               | 53.9              | 15.0           | Floor noise |
| Vert     | 7206.000           | AV       | 34.9              | 35.5               | 8.6          | 33.6         | -                   | 45.4               | 53.9              | 8.5            | Floor noise |
| Vert     | 9608.000           | AV       | 36.0              | 38.4               | 7.3          | 33.9         | -                   | 47.8               | 53.9              | 6.1            | Floor noise |

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

\*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(3.75 m / 3.0 m) = 1.94 dB  
10 GHz - 26.5 GHz 20log(1.0 m / 3.0 m) = -9.5 dB

\*1) Not Out of Band emission(Leakage Power)

### 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       | 98.9              | 27.7                    | 5.0          | 34.4         | 97.2             | -               | -              | Carrier |
| Hori     | 2400.000           | PK       | 65.7              | 27.8                    | 5.0          | 34.4         | 64.1             | 77.2            | 13.1           |         |
| Vert     | 2402.000           | PK       | 98.2              | 27.7                    | 5.0          | 34.4         | 96.5             | -               | -              | Carrier |
| Vert     | 2400.000           | PK       | 65.0              | 27.8                    | 5.0          | 34.4         | 63.4             | 76.5            | 13.1           |         |

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

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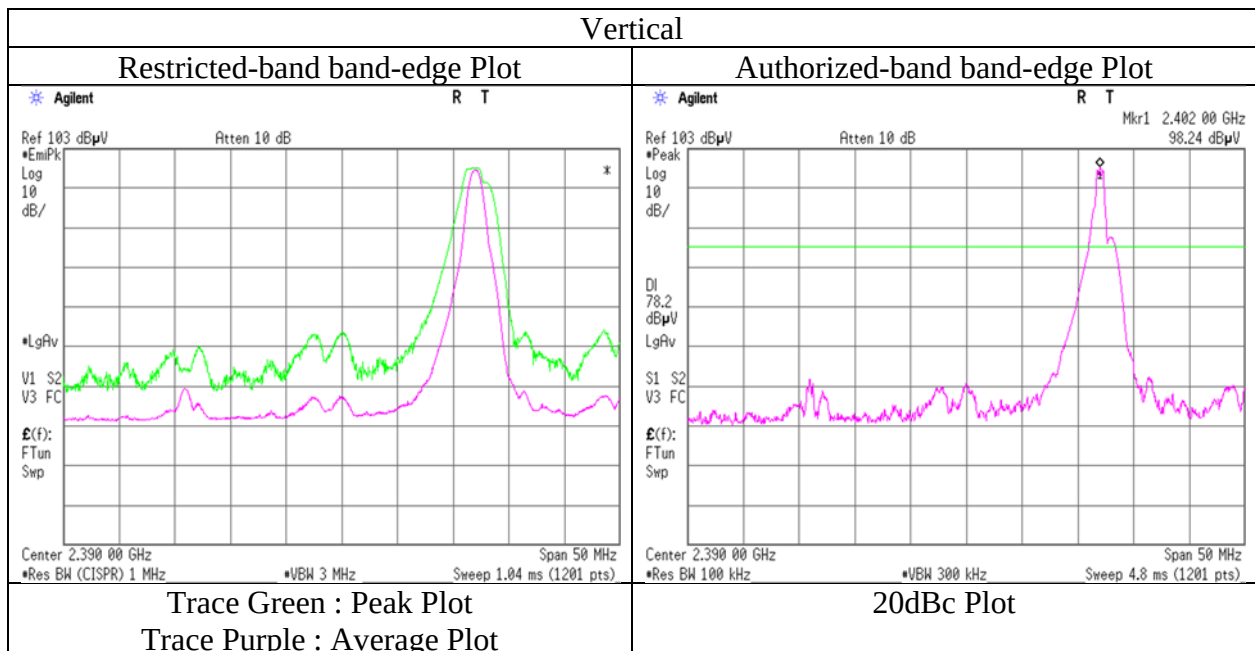
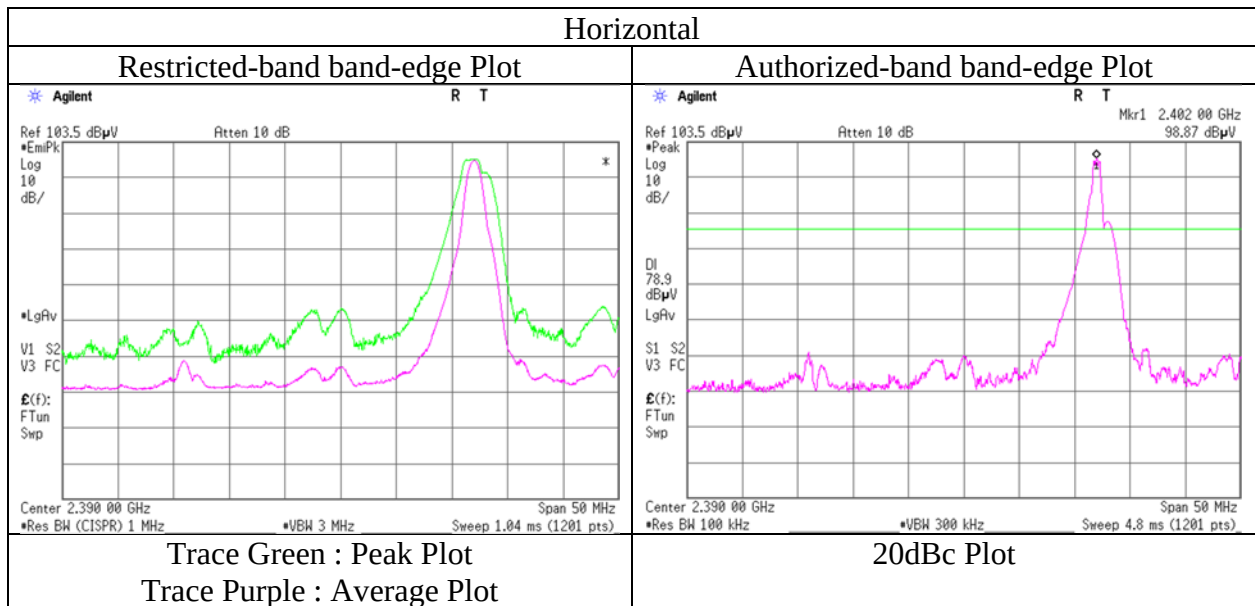
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

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

Report No. 12366336H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.2  
Date July 11, 2018  
Temperature / Humidity 20 deg. C / 62 % RH  
Engineer Ryota Yamanaka  
(1 GHz - 10 GHz)  
Mode Tx BT LE 2402 MHz



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

**UL Japan, Inc.**

**Ise EMC Lab.**

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Facsimile : +81 596 24 8124

## Radiated Spurious Emission

|                        |                     |                     |                       |
|------------------------|---------------------|---------------------|-----------------------|
| Report No.             | 12366336H           |                     |                       |
| Test place             | Ise EMC Lab.        |                     |                       |
| Semi Anechoic Chamber  | No.2                | No.2                | No.2                  |
| Date                   | July 11, 2018       | July 12, 2018 (day) | July 12, 2018 (night) |
| Temperature / Humidity | 20 deg. C / 60 % RH | 22 deg. C / 58 % RH | 24 deg. C / 60 % RH   |
| Engineer               | Junki Nagatomi      | Akihiko Maeda       | Junki Nagatomi        |
|                        | (1 GHz - 10 GHz)    | (10 GHz - 26.5 GHz) | (Below 1 GHz)         |
| Mode                   | Tx BT LE 2440 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     | 37.998             | QP       | 24.8              | 15.5               | 6.8          | 30.5         | -                   | 16.6               | 40.0              | 23.4           |             |
| Hori     | 114.997            | QP       | 24.3              | 12.4               | 7.6          | 30.2         | -                   | 14.1               | 43.5              | 29.4           |             |
| Hori     | 180.003            | QP       | 24.0              | 16.1               | 8.0          | 29.8         | -                   | 18.3               | 43.5              | 25.2           |             |
| Hori     | 273.003            | QP       | 23.3              | 12.8               | 8.7          | 29.3         | -                   | 15.5               | 46.0              | 30.5           |             |
| Hori     | 470.995            | QP       | 23.7              | 16.8               | 9.6          | 29.9         | -                   | 20.2               | 46.0              | 25.8           |             |
| Hori     | 824.995            | QP       | 22.3              | 20.9               | 11.1         | 28.5         | -                   | 25.8               | 46.0              | 20.2           |             |
| Hori     | 2387.903           | PK       | 53.2              | 27.7               | 5.0          | 34.4         | -                   | 51.5               | 73.9              | 22.4           |             |
| Hori     | 2492.045           | PK       | 51.8              | 27.6               | 5.1          | 34.4         | -                   | 50.1               | 73.9              | 23.8           |             |
| Hori     | 4880.000           | PK       | 42.5              | 31.5               | 7.3          | 33.7         | -                   | 47.6               | 73.9              | 26.3           | Floor noise |
| Hori     | 7320.000           | PK       | 43.6              | 35.9               | 8.7          | 33.6         | -                   | 54.6               | 73.9              | 19.3           | Floor noise |
| Hori     | 9760.000           | PK       | 44.0              | 38.6               | 7.3          | 34.0         | -                   | 55.9               | 73.9              | 18.0           | Floor noise |
| Hori     | 2387.903           | AV       | 48.3              | 27.7               | 5.0          | 34.4         | 1.7                 | 48.3               | 53.9              | 5.6            | *1)         |
| Hori     | 2492.045           | AV       | 46.5              | 27.6               | 5.1          | 34.4         | 1.7                 | 46.5               | 53.9              | 7.4            | *1)         |
| Hori     | 4880.000           | AV       | 34.3              | 31.5               | 7.3          | 33.7         | -                   | 39.4               | 53.9              | 14.5           | Floor noise |
| Hori     | 7320.000           | AV       | 34.6              | 35.9               | 8.7          | 33.6         | -                   | 45.6               | 53.9              | 8.3            | Floor noise |
| Hori     | 9760.000           | AV       | 34.5              | 38.6               | 7.3          | 34.0         | -                   | 46.4               | 53.9              | 7.5            | Floor noise |
| Vert     | 37.998             | QP       | 24.8              | 15.5               | 6.8          | 30.5         | -                   | 16.6               | 40.0              | 23.4           |             |
| Vert     | 114.997            | QP       | 24.3              | 12.4               | 7.6          | 30.2         | -                   | 14.1               | 43.5              | 29.4           |             |
| Vert     | 180.003            | QP       | 23.9              | 16.1               | 8.0          | 29.8         | -                   | 18.2               | 43.5              | 25.3           |             |
| Vert     | 273.003            | QP       | 23.2              | 12.8               | 8.7          | 29.3         | -                   | 15.4               | 46.0              | 30.6           |             |
| Vert     | 470.995            | QP       | 23.7              | 16.8               | 9.6          | 29.9         | -                   | 20.2               | 46.0              | 25.8           |             |
| Vert     | 824.995            | QP       | 22.4              | 20.9               | 11.1         | 28.5         | -                   | 25.9               | 46.0              | 20.1           |             |
| Vert     | 2387.903           | PK       | 52.4              | 27.7               | 5.0          | 34.4         | -                   | 50.7               | 73.9              | 23.2           |             |
| Vert     | 2492.132           | PK       | 52.3              | 27.6               | 5.1          | 34.4         | -                   | 50.6               | 73.9              | 23.3           |             |
| Vert     | 4880.000           | PK       | 42.5              | 31.5               | 7.3          | 33.7         | -                   | 47.6               | 73.9              | 26.3           | Floor noise |
| Vert     | 7320.000           | PK       | 43.6              | 35.9               | 8.7          | 33.6         | -                   | 54.6               | 73.9              | 19.3           | Floor noise |
| Vert     | 9760.000           | PK       | 44.0              | 38.6               | 7.3          | 34.0         | -                   | 55.9               | 73.9              | 18.0           | Floor noise |
| Vert     | 2387.903           | AV       | 46.5              | 27.7               | 5.0          | 34.4         | 1.7                 | 46.5               | 53.9              | 7.4            | *1)         |
| Vert     | 2492.132           | AV       | 46.4              | 27.6               | 5.1          | 34.4         | 1.7                 | 46.4               | 53.9              | 7.5            | *1)         |
| Vert     | 4880.000           | AV       | 34.3              | 31.5               | 7.3          | 33.7         | -                   | 39.4               | 53.9              | 14.5           | Floor noise |
| Vert     | 7320.000           | AV       | 34.6              | 35.9               | 8.7          | 33.6         | -                   | 45.6               | 53.9              | 8.3            | Floor noise |
| Vert     | 9760.000           | AV       | 34.5              | 38.6               | 7.3          | 34.0         | -                   | 46.4               | 53.9              | 7.5            | Floor noise |

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

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

Distance factor:      1 GHz - 10 GHz       $20\log(3.75\text{ m} / 3.0\text{ m}) = 1.94\text{ dB}$   
                                 10 GHz - 26.5 GHz       $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

## Radiated Spurious Emission

|                        |                     |                     |                       |
|------------------------|---------------------|---------------------|-----------------------|
| Report No.             | 12366336H           |                     |                       |
| Test place             | Ise EMC Lab.        |                     |                       |
| Semi Anechoic Chamber  | No.2                | No.2                | No.2                  |
| Date                   | July 11, 2018       | July 12, 2018 (day) | July 12, 2018 (night) |
| Temperature / Humidity | 20 deg. C / 60 % RH | 22 deg. C / 58 % RH | 24 deg. C / 60 % RH   |
| Engineer               | Junki Nagatomi      | Akihiko Maeda       | Junki Nagatomi        |
|                        | (1 GHz - 10 GHz)    | (10 GHz - 26.5 GHz) | (Below 1 GHz)         |
| Mode                   | Tx BT LE 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     | 37.998             | QP       | 24.8              | 15.5               | 6.8          | 30.5         | -                   | 16.6               | 40.0              | 23.4           |             |
| Hori     | 114.997            | QP       | 24.3              | 12.4               | 7.6          | 30.2         | -                   | 14.1               | 43.5              | 29.4           |             |
| Hori     | 180.003            | QP       | 24.9              | 16.1               | 8.0          | 29.8         | -                   | 19.2               | 43.5              | 24.3           |             |
| Hori     | 273.003            | QP       | 23.3              | 12.8               | 8.7          | 29.3         | -                   | 15.5               | 46.0              | 30.5           |             |
| Hori     | 470.995            | QP       | 23.7              | 16.8               | 9.6          | 29.9         | -                   | 20.2               | 46.0              | 25.8           |             |
| Hori     | 824.995            | QP       | 22.3              | 20.9               | 11.1         | 28.5         | -                   | 25.8               | 46.0              | 20.2           |             |
| Hori     | 2483.500           | PK       | 55.2              | 27.5               | 5.1          | 34.4         | -                   | 53.4               | 73.9              | 20.5           |             |
| Hori     | 2493.573           | PK       | 57.9              | 27.6               | 5.1          | 34.4         | -                   | 56.2               | 73.9              | 17.7           |             |
| Hori     | 4960.000           | PK       | 43.4              | 31.7               | 7.4          | 33.7         | -                   | 48.8               | 73.9              | 25.1           | Floor noise |
| Hori     | 7440.000           | PK       | 42.4              | 36.1               | 8.6          | 33.6         | -                   | 53.5               | 73.9              | 20.4           | Floor noise |
| Hori     | 9920.000           | PK       | 44.1              | 38.5               | 7.4          | 34.0         | -                   | 56.0               | 73.9              | 17.9           | Floor noise |
| Hori     | 2483.500           | AV       | 44.1              | 27.5               | 5.1          | 34.4         | 1.7                 | 44.0               | 53.9              | 9.9            | *1)         |
| Hori     | 2493.573           | AV       | 37.9              | 27.6               | 5.1          | 34.4         | 1.7                 | 37.9               | 53.9              | 16.0           | *1)         |
| Hori     | 4960.000           | AV       | 34.1              | 31.7               | 7.4          | 33.7         | -                   | 39.5               | 53.9              | 14.4           | Floor noise |
| Hori     | 7440.000           | AV       | 34.2              | 36.1               | 8.6          | 33.6         | -                   | 45.3               | 53.9              | 8.6            | Floor noise |
| Hori     | 9920.000           | AV       | 34.8              | 38.5               | 7.4          | 34.0         | -                   | 46.7               | 53.9              | 7.2            | Floor noise |
| Vert     | 37.998             | QP       | 24.8              | 15.5               | 6.8          | 30.5         | -                   | 16.6               | 40.0              | 23.4           |             |
| Vert     | 114.997            | QP       | 24.4              | 12.4               | 7.6          | 30.2         | -                   | 14.2               | 43.5              | 29.3           |             |
| Vert     | 180.003            | QP       | 23.8              | 16.1               | 8.0          | 29.8         | -                   | 18.1               | 43.5              | 25.4           |             |
| Vert     | 273.003            | QP       | 23.2              | 12.8               | 8.7          | 29.3         | -                   | 15.4               | 46.0              | 30.6           |             |
| Vert     | 470.995            | QP       | 23.6              | 16.8               | 9.6          | 29.9         | -                   | 20.1               | 46.0              | 25.9           |             |
| Vert     | 824.995            | QP       | 22.4              | 20.9               | 11.1         | 28.5         | -                   | 25.9               | 46.0              | 20.1           |             |
| Vert     | 2483.500           | PK       | 54.3              | 27.5               | 5.1          | 34.4         | -                   | 52.5               | 73.9              | 21.4           |             |
| Vert     | 2493.633           | PK       | 57.4              | 27.6               | 5.1          | 34.4         | -                   | 55.7               | 73.9              | 18.2           |             |
| Vert     | 4960.000           | PK       | 43.4              | 31.7               | 7.4          | 33.7         | -                   | 48.8               | 73.9              | 25.1           | Floor noise |
| Vert     | 7440.000           | PK       | 42.4              | 36.1               | 8.6          | 33.6         | -                   | 53.5               | 73.9              | 20.4           | Floor noise |
| Vert     | 9920.000           | PK       | 44.1              | 38.5               | 7.4          | 34.0         | -                   | 56.0               | 73.9              | 17.9           | Floor noise |
| Vert     | 2483.500           | AV       | 42.4              | 27.5               | 5.1          | 34.4         | 1.7                 | 42.3               | 53.9              | 11.6           | *1)         |
| Vert     | 2493.633           | AV       | 39.6              | 27.6               | 5.1          | 34.4         | 1.7                 | 39.6               | 53.9              | 14.3           | *1)         |
| Vert     | 4960.000           | AV       | 34.1              | 31.7               | 7.4          | 33.7         | -                   | 39.5               | 53.9              | 14.4           | Floor noise |
| Vert     | 7440.000           | AV       | 34.2              | 36.1               | 8.6          | 33.6         | -                   | 45.3               | 53.9              | 8.6            | Floor noise |
| Vert     | 9920.000           | AV       | 34.8              | 38.5               | 7.4          | 34.0         | -                   | 46.7               | 53.9              | 7.2            | Floor noise |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor  
\*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 (3.75 m / 3.0 m) = 1.94 dB  
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

\*1) Not Out of Band emission(Leakage Power)

### 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     | 2480.000           | PK       | 99.5              | 27.5                    | 5.1          | 34.4         | 97.7             | -               | -              | Carrier |
| Hori     | 2531.980           | PK       | 49.5              | 27.9                    | 5.1          | 34.4         | 48.1             | 77.7            | 29.6           |         |
| Vert     | 2480.000           | PK       | 98.5              | 27.5                    | 5.1          | 34.4         | 96.7             | -               | -              | Carrier |
| Vert     | 2531.985           | PK       | 47.7              | 27.9                    | 5.1          | 34.4         | 46.3             | 76.7            | 30.4           |         |

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

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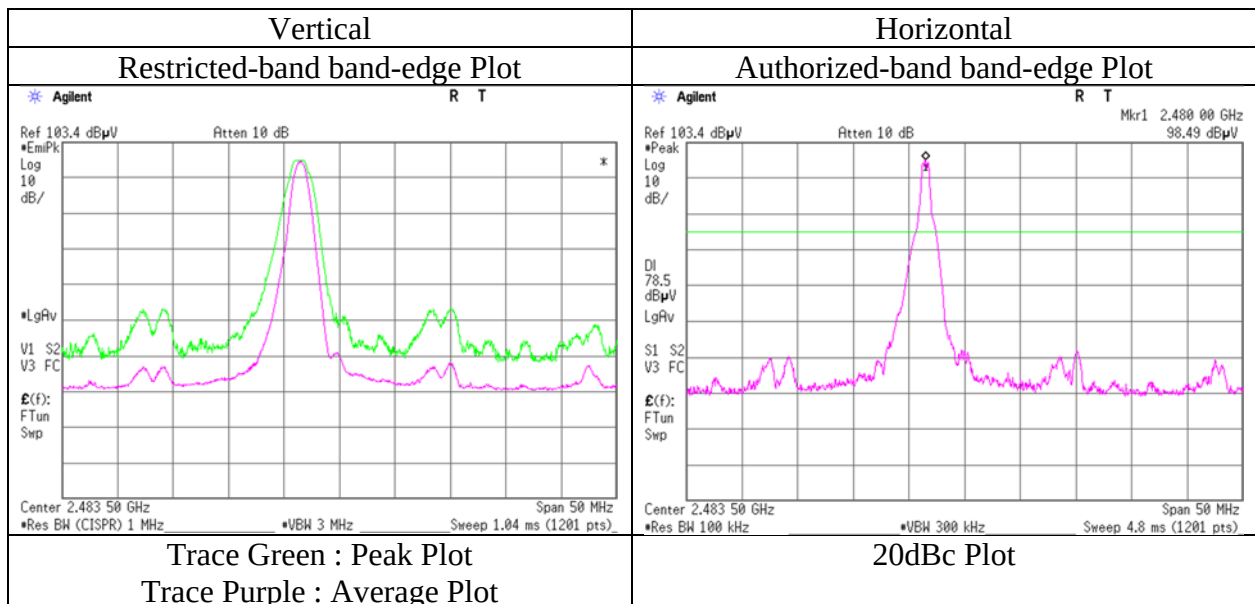
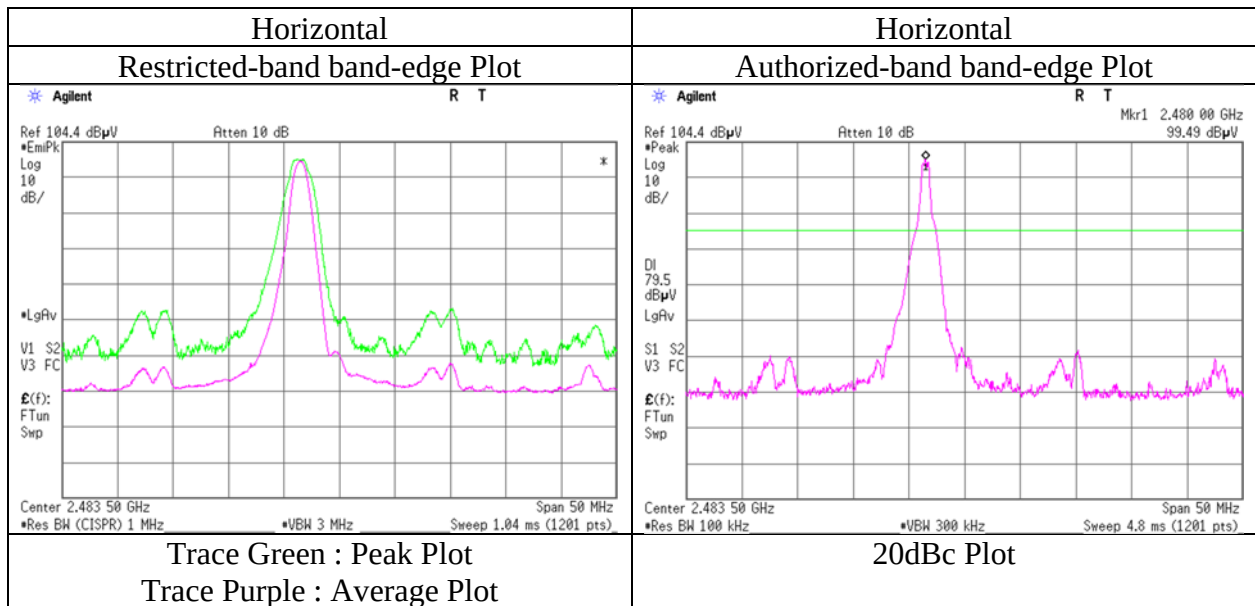
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Facsimile : +81 596 24 8124

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

|                        |                     |
|------------------------|---------------------|
| Report No.             | 12366336H           |
| Test place             | Ise EMC Lab.        |
| Semi Anechoic Chamber  | No.2                |
| Date                   | July 11, 2018       |
| Temperature / Humidity | 20 deg. C / 60 % RH |
| Engineer               | Junki Nagatomi      |
|                        | (1 GHz - 10 GHz)    |
| Mode                   | Tx BT LE 2480 MHz   |



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

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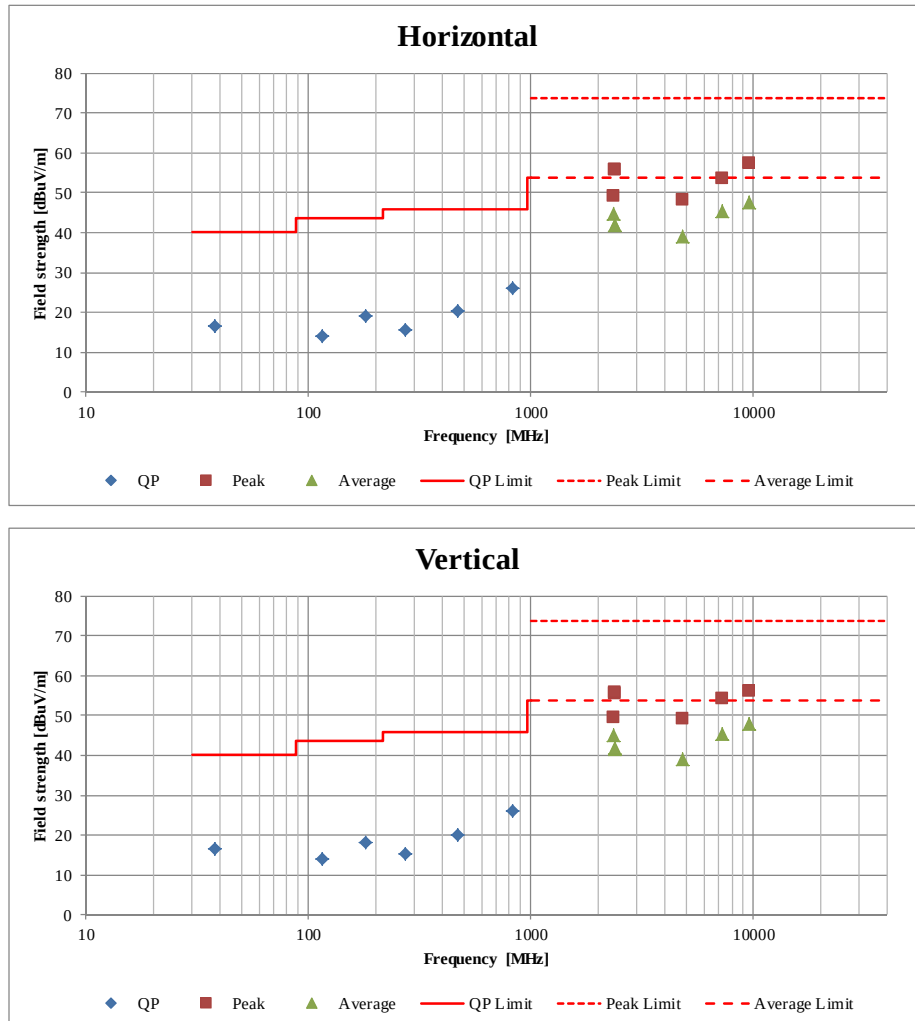
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## **Radiated Spurious Emission** **(Plot data, Worst case)**

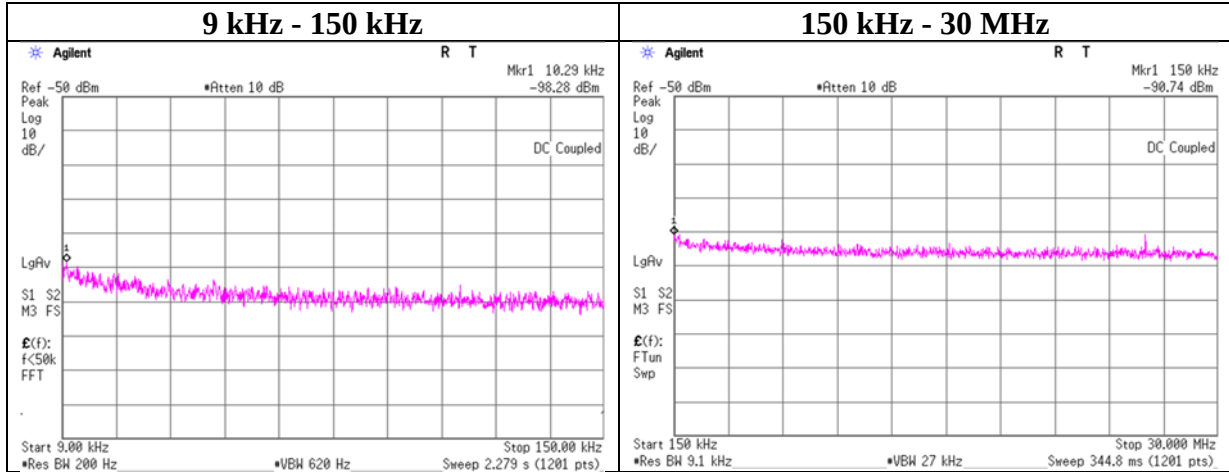
|                        |                     |                     |                       |
|------------------------|---------------------|---------------------|-----------------------|
| Report No.             | 12366336H           | No.2                | No.2                  |
| Test place             | Ise EMC Lab.        | July 12, 2018 (day) | July 12, 2018 (night) |
| Semi Anechoic Chamber  | No.2                | 22 deg. C / 58 % RH | 24 deg. C / 60 % RH   |
| Date                   | July 11, 2018       | Akihiko Maeda       | Junki Nagatomi        |
| Temperature / Humidity | 20 deg. C / 62 % RH | (10 GHz - 26.5 GHz) | (Below 1 GHz)         |
| Engineer               | Ryota Yamanaka      |                     |                       |
| Mode                   | Tx BT LE 2402 MHz   |                     |                       |



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

## Conducted Spurious Emission

Report No. 12366336H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date June 27, 2018  
Temperature / Humidity 23 deg. C / 62 % RH  
Engineer Takafumi Noguchi  
Mode Tx BT LE 2402 MHz



| Frequency<br>[kHz] | Reading<br>[dBm] | Cable<br>Loss<br>[dB] | Attenuator<br>Loss<br>[dB] | Antenna<br>Gain<br>[dBi] | N<br>(Number<br>of Output) | EIRP<br>[dBm] | Distance<br>[m] | Ground<br>bounce<br>[dB] | E<br>(field strength)<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark |
|--------------------|------------------|-----------------------|----------------------------|--------------------------|----------------------------|---------------|-----------------|--------------------------|-----------------------------------|-------------------|----------------|--------|
| 10.29              | -98.3            | 0.16                  | 10.0                       | 2.4                      | 1                          | -85.7         | 300             | 6.0                      | -24.4                             | 47.3              | 71.7           |        |
| 150.00             | -90.7            | 0.26                  | 10.0                       | 2.4                      | 1                          | -78.0         | 300             | 6.0                      | -16.8                             | 24.0              | 40.8           |        |

$E \text{ [dBuV/m]} = \text{EIRP [dBm]} - 20 \log (\text{Distance [m]}) + \text{Ground bounce [dB]} + 104.8 \text{ [dBuV/m]}$

$\text{EIRP [dBm]} = \text{Reading [dBm]} + \text{Cable loss [dB]} + \text{Attenuator Loss [dB]} + \text{Antenna gain [dBi]} + 10 * \log (N)$

N: Number of output

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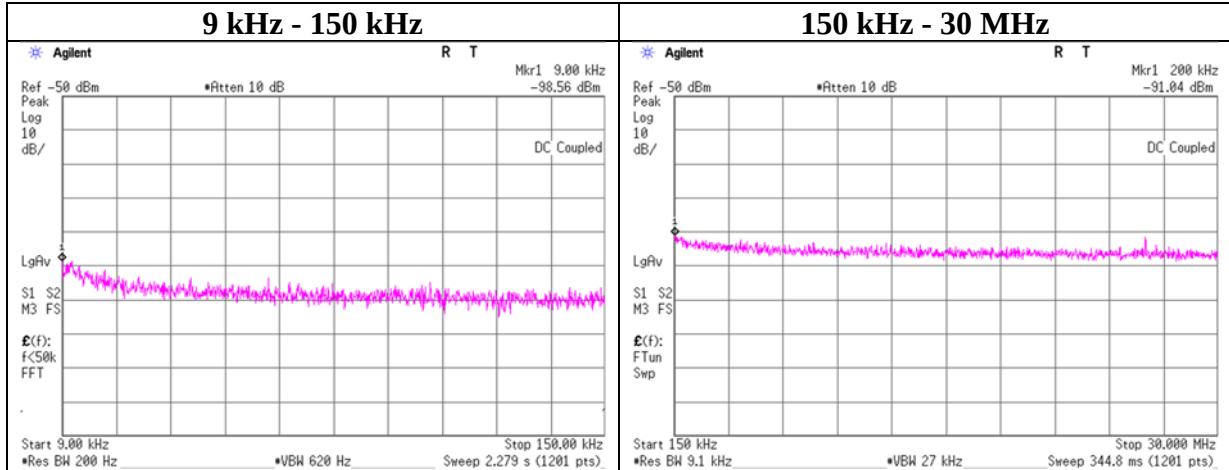
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Conducted Spurious Emission

Report No. 12366336H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date June 27, 2018  
Temperature / Humidity 23 deg. C / 62 % RH  
Engineer Takafumi Noguchi  
Mode Tx BT LE 2440 MHz



| Frequency<br>[kHz] | Reading<br>[dBm] | Cable<br>Loss<br>[dB] | Attenuator<br>Loss<br>[dB] | Antenna<br>Gain<br>[dBi] | N<br>(Number<br>of Output) | EIRP<br>[dBm] | Distance<br>[m] | Ground<br>bounce<br>[dB] | E<br>(field strength)<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark |
|--------------------|------------------|-----------------------|----------------------------|--------------------------|----------------------------|---------------|-----------------|--------------------------|-----------------------------------|-------------------|----------------|--------|
| 9.00               | -98.6            | 0.16                  | 10.0                       | 2.4                      | 1                          | -86.0         | 300             | 6.0                      | -24.7                             | 48.5              | 73.2           |        |
| 200.00             | -91.0            | 0.16                  | 10.0                       | 2.4                      | 1                          | -78.4         | 300             | 6.0                      | -17.2                             | 21.5              | 38.7           |        |

$$E \text{ [dBuV/m]} = \text{EIRP [dBm]} - 20 \log (\text{Distance [m]}) + \text{Ground bounce [dB]} + 104.8 \text{ [dBuV/m]}$$

$$\text{EIRP [dBm]} = \text{Reading [dBm]} + \text{Cable loss [dB]} + \text{Attenuator Loss [dB]} + \text{Antenna gain [dBi]} + 10 * \log (N)$$

N: Number of output

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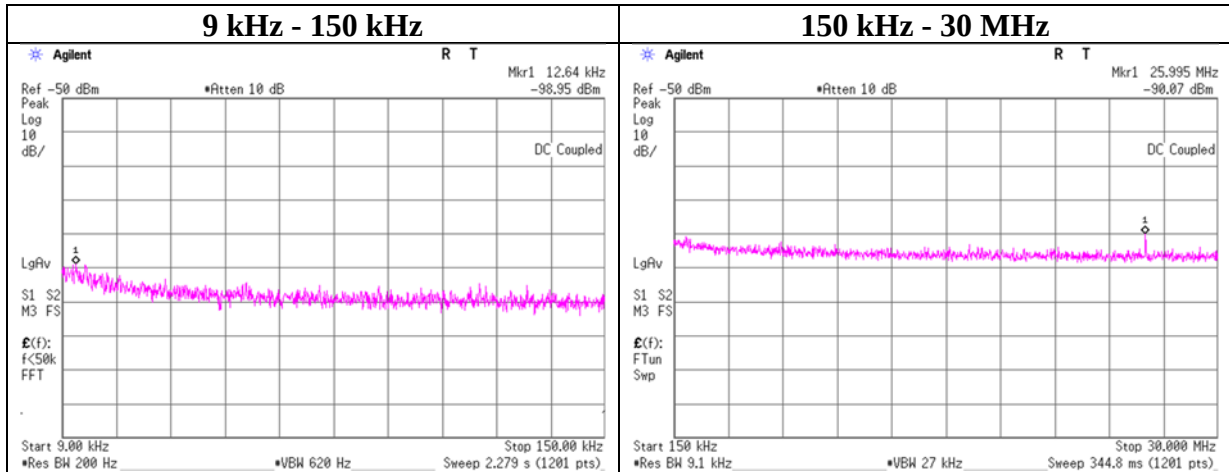
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Facsimile : +81 596 24 8124

## Conducted Spurious Emission

Report No. 12366336H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date June 27, 2018  
Temperature / Humidity 23 deg. C / 62 % RH  
Engineer Takafumi Noguchi  
Mode Tx BT LE 2480 MHz



| Frequency<br>[kHz] | Reading<br>[dBm] | Cable<br>Loss<br>[dB] | Attenuator<br>Loss<br>[dB] | Antenna<br>Gain<br>[dBi] | N<br>(Number<br>of Output) | EIRP<br>[dBm] | Distance<br>[m] | Ground<br>bounce<br>[dB] | E<br>(field strength)<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Remark |
|--------------------|------------------|-----------------------|----------------------------|--------------------------|----------------------------|---------------|-----------------|--------------------------|-----------------------------------|-------------------|----------------|--------|
| 12.64              | -99.0            | 0.16                  | 10.0                       | 2.4                      | 1                          | -86.3         | 300             | 6.0                      | -25.1                             | 45.5              | 70.6           |        |
| 25995.00           | -90.1            | 0.16                  | 10.0                       | 2.4                      | 1                          | -77.5         | 30              | 6.0                      | 3.8                               | 29.5              | 25.7           |        |

$E \text{ [dBuV/m]} = \text{EIRP [dBm]} - 20 \log (\text{Distance [m]}) + \text{Ground bounce [dB]} + 104.8 \text{ [dBuV/m]}$

$\text{EIRP [dBm]} = \text{Reading [dBm]} + \text{Cable loss [dB]} + \text{Attenuator Loss [dB]} + \text{Antenna gain [dBi]} + 10 * \log (N)$

N: Number of output

## **Power Density**

Report No. 12366336H  
Test place Ise EMC Lab. No.6 Measurement Room  
Date June 27, 2018  
Temperature / Humidity 23 deg. C / 62 % RH  
Engineer Takafumi Noguchi  
Mode Tx BT LE

| Freq.<br>[MHz] | Reading<br>[dBm] | Cable<br>Loss<br>[dB] | Atten.<br>Loss<br>[dB] | Result<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] |
|----------------|------------------|-----------------------|------------------------|-----------------|----------------|----------------|
| 2402.00        | -23.10           | 0.16                  | 10.04                  | -12.90          | 8.00           | 20.90          |
| 2440.00        | -23.32           | 0.16                  | 10.04                  | -13.12          | 8.00           | 21.12          |
| 2480.00        | -23.53           | 0.16                  | 10.04                  | -13.33          | 8.00           | 21.33          |

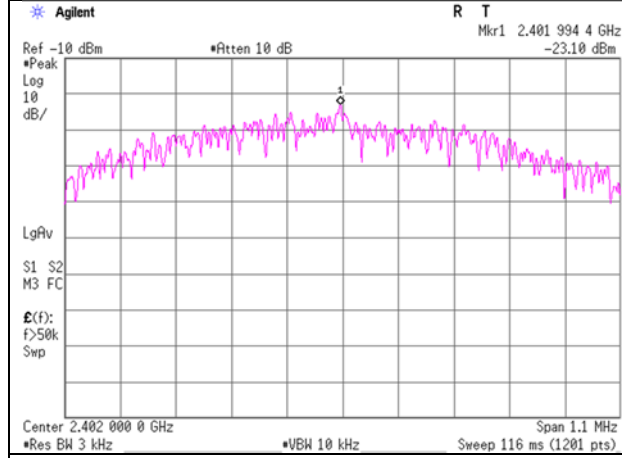
Sample Calculation:

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

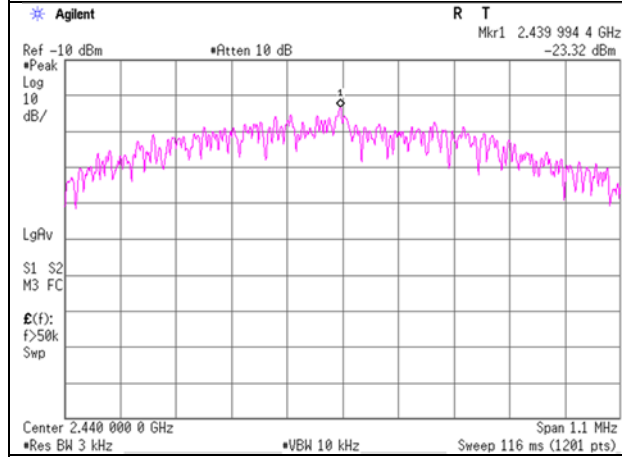
## Power Density

### BT LE

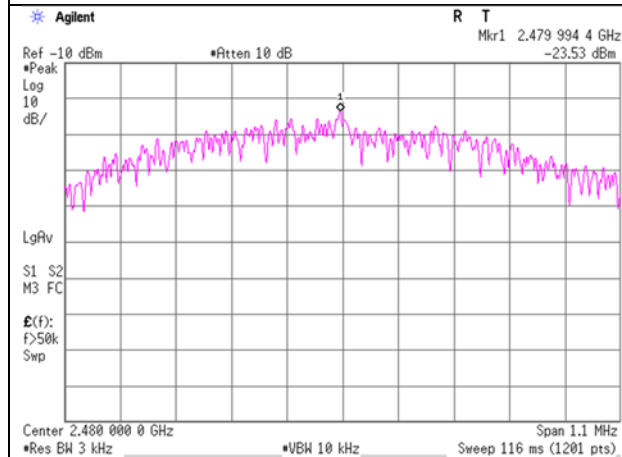
#### 2402 MHz



#### 2440 MHz



#### 2480 MHz



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

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Facsimile : +81 596 24 8124

## APPENDIX 2: Test instruments

### Test Instruments

| Test item | LIMS ID | Description                      | Manufacturer      | Model                    | Serial                        | Last Calibration Date | Calibration Due Date | Cal Int |
|-----------|---------|----------------------------------|-------------------|--------------------------|-------------------------------|-----------------------|----------------------|---------|
| RE        | 141203  | Attenuator(6dB)                  | Weinschel Corp    | 2                        | BK7970                        | 11/14/2017            | 11/30/2018           | 12      |
| RE        | 141317  | Coaxial Cable                    | Fujikura/Agilent  | -                        | -                             | 2/23/2018             | 2/28/2019            | 12      |
| RE        | 141578  | Pre Amplifier                    | AGILENT           | 8447D                    | 2944A10845                    | 9/27/2017             | 9/30/2018            | 12      |
| RE        | 141942  | Test Receiver                    | Rohde & Schwarz   | ESCI                     | 100300                        | 8/21/2017             | 8/31/2018            | 12      |
| RE        | 141427  | Biconical Antenna                | Schwarzbeck       | VHA9103B                 | 8031                          | 5/31/2018             | 5/31/2019            | 12      |
| RE        | 141232  | High Pass Filter 3.5-18.0GHz     | UL Japan          | HPF SELECTOR             | 001                           | 9/22/2017             | 9/30/2018            | 12      |
| RE        | 141503  | Horn Antenna 18-26.5GHz          | EMCO              | Sep-60                   | 1265                          | 6/6/2018              | 6/30/2019            | 12      |
| RE        | 141392  | Microwave Cable                  | Junkosha          | MWX221                   | 1604S253(1 m) / 1608S087(5 m) | 8/4/2017              | 8/31/2018            | 12      |
| RE        | 141884  | Spectrum Analyzer                | AGILENT           | E4448A                   | MY44020357                    | 11/7/2017             | 11/30/2018           | 12      |
| RE        | 141512  | Horn Antenna 1-18GHz             | Schwarzbeck       | BBHA9120D                | 254                           | 6/6/2018              | 6/30/2019            | 12      |
| RE        | 141542  | Digital Tester                   | Fluke Corporation | FLUKE 26-3               | 78030611                      | 8/7/2017              | 8/31/2018            | 12      |
| RE        | 141265  | Logperiodic Antenna(200-1000MHz) | Schwarzbeck       | VUSLP9111B               | 911B-190                      | 5/31/2018             | 5/31/2019            | 12      |
| RE        | 141579  | Pre Amplifier                    | AGILENT           | 8449B                    | 3008A02142                    | 1/23/2018             | 1/31/2019            | 12      |
| RE        | 142182  | Measure                          | KOMELON           | KMC-36                   | -                             | -                     | -                    | -       |
| RE/AT     | 141556  | Thermo-Hygrometer                | CUSTOM            | CTH-201                  | 0003                          | 12/21/2017            | 12/31/2018           | 12      |
| RE        | 142004  | AC2_Semi Anechoic Chamber(NSA)   | TDK               | Semi Anechoic Chamber 3m | DA-06902                      | 8/31/2017             | 8/31/2018            | 12      |
| RE        | 142006  | AC2_Semi Anechoic Chamber(SVSWR) | TDK               | Semi Anechoic Chamber 3m | DA-06902                      | 4/2/2018              | 4/30/2019            | 12      |
| RE        | 141152  | EMI measurement program          | TSJ               | TEPTO-DV                 | -                             | -                     | -                    | -       |
| AT        | 141269  | Attenuator(10dB) 1-18GHz         | Orient Microwave  | BX10-0476-00             | -                             | 3/12/2018             | 3/31/2019            | 12      |
| AT        | 141855  | Spectrum Analyzer                | AGILENT           | E4440A                   | MY46187750                    | 11/17/2017            | 11/30/2018           | 12      |
| AT        | 141810  | Power Meter                      | ANRITSU           | ML2495A                  | 824014                        | 11/16/2017            | 11/30/2018           | 12      |
| AT        | 141832  | Power sensor                     | ANRITSU           | MA2411B                  | 738174                        | 11/16/2017            | 11/30/2018           | 12      |
| AT        | 141561  | Thermo-Hygrometer                | CUSTOM            | CTH-201                  | 1401                          | 1/24/2018             | 1/31/2019            | 12      |

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

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

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

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

Test item:

RE: Radiated Emission test

AT: Antenna Terminal Conducted test

UL Japan, Inc.

Ise EMC Lab.

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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124