



# **RADIO TEST REPORT**

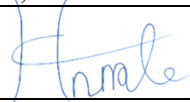
**Test Report No. : 14118411H-C-R1**

**Applicant** : ICOM Incorporated  
**Type of EUT** : WLAN TRANSCEIVER  
**Model Number of EUT** : IP110H  
**FCC ID** : AFJ399500  
**Test regulation** : FCC Part 15 Subpart C: 2021  
**Test result** : Complied (Refer to SECTION 3)

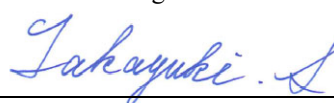
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2. The results in this report apply only to the sample tested.
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4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by the A2LA accreditation body.
6. This test report covers Radio technical requirements.  
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan, Inc. has been accredited.
9. The information provided from the customer for this report is identified in Section 1.
10. This report is a revised version of 14118411H-C. 14118411H-C is replaced with this report.

**Date of test:** December 3, 2021 to March 15, 2022

**Representative test engineer:**

  
Hiroki Numata  
Engineer

**Approved by:**

  
Takayuki Shimada  
Leader



CERTIFICATE 5107.02

- ☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan, Inc.
- ☒ 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.: 14118411H-C**

| Revision        | Test report No. | Date              | Page revised | Contents                                                                                              |
|-----------------|-----------------|-------------------|--------------|-------------------------------------------------------------------------------------------------------|
| -<br>(Original) | 14118411H-C     | February 14, 2022 | -            | -                                                                                                     |
| 1               | 14118411H-C-R1  | March 15, 2022    | P1           | Updated Date of test:<br>December 3, 2021 to January 20, 2022<br>→ December 3, 2021 to March 15, 2022 |
| 1               | 14118411H-C-R1  | March 15, 2022    | P45, 47      | Remeasured Power Density of<br>2422 MHz, 2452 MHz                                                     |
| 1               | 14118411H-C-R1  | March 15, 2022    | P48          | Updated Last Calibration Dates of Local ID:<br>- MOS-24<br>- MMM-12                                   |

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

|                |                                                                 |         |                                                |
|----------------|-----------------------------------------------------------------|---------|------------------------------------------------|
| A2LA           | The American Association for Laboratory Accreditation           | LIMS    | Laboratory Information Management System       |
| AC             | Alternating Current                                             | MCS     | Modulation and Coding Scheme                   |
| AFH            | Adaptive Frequency Hopping                                      | MRA     | Mutual Recognition Arrangement                 |
| AM             | Amplitude Modulation                                            | N/A     | Not Applicable                                 |
| Amp, AMP       | Amplifier                                                       | NIST    | National Institute of Standards and Technology |
| ANSI           | American National Standards Institute                           | NS      | No signal detect.                              |
| Ant, ANT       | Antenna                                                         | NSA     | Normalized Site Attenuation                    |
| AP             | Access Point                                                    | OBW     | Occupied BandWidth                             |
| 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    | Quadrature Phase Shift Keying                  |
| CW             | Continuous Wave                                                 | RBW     | Resolution BandWidth                           |
| 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                                               | RNSS    | Radio Navigation Satellite Service             |
| DSSS           | Direct Sequence Spread Spectrum                                 | RSS     | Radio Standards Specifications                 |
| DUT            | Device Under Test                                               | 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, T/R | Test Receiver                                  |
| EN             | European Norm                                                   | Tx      | Transmitting                                   |
| ERP, e.r.p.    | Effective Radiated Power                                        | VBW     | Video BandWidth                                |
| ETSI           | European Telecommunications Standards Institute                 | Vert.   | Vertical                                       |
| EU             | European Union                                                  | WLAN    | Wireless LAN                                   |
| EUT            | Equipment Under Test                                            |         |                                                |
| 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                                              |         |                                                |

**UL Japan, Inc.**

**Ise EMC Lab.**

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

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## **SECTION 1: Customer information**

|                  |   |                                                       |
|------------------|---|-------------------------------------------------------|
| Company Name     | : | ICOM Incorporated                                     |
| Address          | : | 1-1-32, Kamiminami, Hirano-Ku, Osaka, 547-0003, Japan |
| Telephone Number | : | +81-6-6794-7783                                       |
| Contact Person   | : | Atushi Tomiyama                                       |

The information provided from the customer is as follows;

- Applicant, Type of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
  - Operating/Test Mode(s) (Mode(s)) on all the relevant pages
  - SECTION 1: Customer information
  - SECTION 2: Equipment under test (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          | : | WLAN TRANSCEIVER                                                                           |
| Model Number  | : | IP110H                                                                                     |
| Serial Number | : | Refer to SECTION 4.2                                                                       |
| Receipt Date  | : | November 26, 2021                                                                          |
| Condition     | : | Engineering 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: IP110H (referred to as the EUT in this report) is a WLAN TRANSCEIVER.

### **General Specification**

|        |   |                              |
|--------|---|------------------------------|
| Rating | : | DC 3.75 V (Internal battery) |
|--------|---|------------------------------|

## **Radio Specification**

### **WLAN (IEEE802.11b/g/n-20/n-40)**

|                        |                                                                          |
|------------------------|--------------------------------------------------------------------------|
| Radio Type             | Transceiver                                                              |
| Frequency of Operation | [20 MHz Band] 2412 MHz to 2462 MHz<br>[40 MHz Band] 2422 MHz to 2452 MHz |
| Modulation             | DSSS, OFDM                                                               |
| Antenna type           | Split ring (internal)                                                    |
| Antenna Gain           | 1.15 dBi                                                                 |

### **WLAN (IEEE802.11a/n-20/n-40/ac-20/ac-40/ac-80)**

|                        |                                                                                                                                                                                                                                                                                                                         |
|------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Radio Type             | Transceiver                                                                                                                                                                                                                                                                                                             |
| Frequency of Operation | [20 MHz Band]<br>5180 MHz to 5240 MHz<br>5260 MHz to 5320 MHz<br>5500 MHz to 5580 MHz, 5660 MHz to 5700 MHz<br>5745 MHz to 5825 MHz<br>[40 MHz Band]<br>5190 MHz, 5230 MHz<br>5270 MHz, 5310 MHz<br>5510 MHz, 5550 MHz, 5670 MHz<br>5755 MHz, 5795 MHz<br>[80 MHz Band]<br>5210 MHz<br>5290 MHz<br>5530 MHz<br>5775 MHz |
| Modulation             | OFDM                                                                                                                                                                                                                                                                                                                    |
| Antenna type           | Split ring (internal)                                                                                                                                                                                                                                                                                                   |
| Antenna Gain           | 0.15 dBi (5180 MHz to 5320 MHz)<br>0.62 dBi (5500 MHz to 5825 MHz)                                                                                                                                                                                                                                                      |

### **Bluetooth (BR / EDR function) \*1)**

|                        |                                        |
|------------------------|----------------------------------------|
| Radio Type             | Transceiver                            |
| Frequency of Operation | 2402 MHz - 2480 MHz                    |
| Modulation             | FHSS                                   |
| Antenna type           | $\lambda/4$ printed inverted F antenna |
| Antenna Gain           | -1.5 dBi                               |

\*This report applies to WLAN (2.4 GHz band) part.

\*1) The test is not applicable to Bluetooth (BR / EDR function) part since the approved module (FCC ID: VIYHRM1016) is mounted on the EUT.

## SECTION 3: Test specification, procedures & results

### 3.1 Test Specification

Test Specification : FCC Part 15 Subpart C  
FCC Part 15 final revised on May 3, 2021 and effective July 2, 2021

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

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

### 3.2 Procedures and results

| Item                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Test Procedure                                                              | Specification                                                              | Worst margin                          | Results             | Remarks                                                           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------|---------------------------------------|---------------------|-------------------------------------------------------------------|
| Conducted Emission                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | FCC: ANSI C63.10-2013<br>6. Standard test methods<br>ISED: RSS-Gen 8.8      | FCC: Section 15.207<br>ISED: RSS-Gen 8.8                                   | -                                     | N/A                 | *1)                                                               |
| 6dB Bandwidth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | FCC: KDB 558074 D01<br>15.247<br>Meas Guidance v05r02<br>ISED: -            | FCC: Section<br>15.247(a)(2)<br>ISED: RSS-247 5.2(a)                       | See data.                             | Complied<br>a)      | Conducted                                                         |
| Maximum Peak<br>Output Power                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | FCC: KDB 558074 D01<br>15.247<br>Meas Guidance v05r02<br>ISED: RSS-Gen 6.12 | FCC: Section<br>15.247(b)(3)<br>ISED: RSS-247 5.4(d)                       |                                       | Complied<br>b)      | Conducted                                                         |
| Power Density                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | FCC: KDB 558074 D01<br>15.247<br>Meas Guidance v05r02<br>ISED: -            | FCC: Section 15.247(e)<br>ISED: RSS-247 5.2(b)                             |                                       | Complied<br>c)      | Conducted                                                         |
| Spurious Emission<br>Restricted Band<br>Edges                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | FCC: KDB 558074 D01<br>15.247<br>Meas Guidance v05r02<br>ISED: RSS-Gen 6.13 | FCC: Section 15.247(d)<br>ISED: RSS-247 5.5<br>RSS-Gen 8.9<br>RSS-Gen 8.10 | 0.7 dB, 2390.0 MHz,<br>AV, Horizontal | Complied#<br>d), e) | Conducted<br>(below 30 MHz)/<br>Radiated<br>(above 30 MHz)<br>*2) |
| <p>Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.</p> <p>*1) The test is not applicable since the user manual specifies that EUT is powered off (transmission is stopped) during the charging.</p> <p>*2) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02 8.5 and 8.6.</p> <p>a) Refer to APPENDIX 1 (data of 6 dB Bandwidth and 99 % Occupied Bandwidth)</p> <p>b) Refer to APPENDIX 1 (data of Maximum Peak Output Power)</p> <p>c) Refer to APPENDIX 1 (data of Power Density)</p> <p>d) Refer to APPENDIX 1 (data of Conducted Spurious Emission)</p> <p>e) Refer to APPENDIX 1 (data of Radiated Spurious Emission)</p> <p>Symbols:</p> <p>Complied The data of this test item has enough margin, more than the measurement uncertainty.</p> <p>Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.</p> |                                                                             |                                                                            |                                       |                     |                                                                   |

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

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**Ise EMC Lab.**

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Telephone : +81 596 24 8999

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

The EUT is a battery-operated device and test was performed with the full-charged battery. 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.

### **3.3 Addition to standard**

| Item                                                                        | Test Procedure    | Specification | Worst margin | Results | Remarks   |
|-----------------------------------------------------------------------------|-------------------|---------------|--------------|---------|-----------|
| 99% Occupied Bandwidth                                                      | ISED: RSS-Gen 6.7 | ISED: -       | N/A          | -<br>a) | Conducted |
| a) Refer to APPENDIX 1 (data of 6 dB Bandwidth and 99 % Occupied Bandwidth) |                   |               |              |         |           |

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 (+/-) |
|--------------------------------------------------|-------------------|
| 20 dB Bandwidth / 99 % Occupied Bandwidth        | 0.96 %            |
| Maximum Peak Output Power / Average Output Power | 1.4 dB            |
| Carrier Frequency Separation                     | 0.42 %            |
| Dwell time / Burst rate                          | 0.10 %            |
| Conducted Spurious Emission                      | 2.6 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            |
|                      |                                                | 4.8 dB            |
|                      | 200 MHz to 1000 MHz (Horizontal)<br>(Vertical) | 5.0 dB            |
|                      |                                                | 5.0 dB            |
|                      |                                                |                   |
| 3 m                  | 1 GHz to 6 GHz                                 | 4.9 dB            |
|                      | 6 GHz to 18 GHz                                | 5.2 dB            |
| 1 m                  | 10 GHz to 26.5 GHz                             | 5.5 dB            |
|                      | 26.5 GHz to 40 GHz                             | 5.5 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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

### 3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

\*A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 884919

ISED Lab Company Number: 2973C / CAB identifier: JP0002

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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                                                        | -                      | -                            |
| No.10 shielded room        | 3.8 x 2.8 x 2.8            | 3.8 x 2.8                                                        | -                      | -                            |
| No.11 measurement room     | 4.0 x 3.4 x 2.5            | N/A                                                              | -                      | -                            |
| No.12 measurement room     | 2.6 x 3.4 x 2.5            | N/A                                                              | -                      | -                            |

\* Size of vertical conducting plane (for Conducted Emission test) : 2.0 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.

## **SECTION 4: Operation of EUT during testing**

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

Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals - ” of TCB Council Workshop October 2009.

| Mode                                                                                                                                                                                                                                                                                                                                                                                                                                          | Remarks*     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| IEEE 802.11b (11b)                                                                                                                                                                                                                                                                                                                                                                                                                            | 11 Mbps, PN9 |
| IEEE 802.11g (11g)                                                                                                                                                                                                                                                                                                                                                                                                                            | 54 Mbps, PN9 |
| IEEE 802.11n SISO 20 MHz BW (11n-20)                                                                                                                                                                                                                                                                                                                                                                                                          | MCS 5, PN9   |
| IEEE 802.11n SISO 40 MHz BW (11n-40)                                                                                                                                                                                                                                                                                                                                                                                                          | MCS 5, PN9   |
| *The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)                                                                                                                                                                                                                                                                                                                                       |              |
| *Power of the EUT was set by the software as follows;<br>- Power settings: 11b: 13, 11g: 10, 11n-20: 13, 11n-40: 12<br>- Software: MFG Tool for IP200H<br>(Date: 2020.03.27 Storage location: Driven by connected PC)<br>*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. |              |

\*The details of Operating mode(s)

| Test Item                                                                                                                                                                                                                                                                                              | Operating Mode | Tested frequency |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------|
| Radiated Spurious Emission (Below 1 GHz)                                                                                                                                                                                                                                                               | Tx 11n-20 *1)  | 2437 MHz         |
| Radiated Spurious Emission (Above 1 GHz),<br>6dB Bandwidth,<br>Maximum Peak Output Power,<br>Power Density,<br>99% Occupied Bandwidth                                                                                                                                                                  | Tx 11b         | 2412 MHz         |
|                                                                                                                                                                                                                                                                                                        | Tx 11n-20 *2)  | 2437 MHz         |
|                                                                                                                                                                                                                                                                                                        |                | 2462 MHz         |
|                                                                                                                                                                                                                                                                                                        | Tx 11n-40      | 2422 MHz         |
|                                                                                                                                                                                                                                                                                                        |                | 2437 MHz         |
| Conducted Spurious Emission                                                                                                                                                                                                                                                                            | Tx 11n-20 *1)  | 2452 MHz         |
| *1) The mode was tested as a representative, because it had the highest power at antenna terminal test.<br>*2) Since 11g and 11n-20 have the same modulation method and no differences in transmitting specification, test was performed on the representative mode that had the highest output power. |                |                  |

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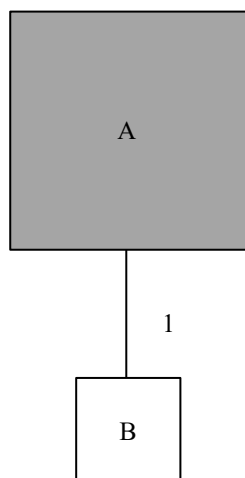
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Facsimile : +81 596 24 8124

## 4.2 Configuration and peripherals

### Radiated Spurious Emission test



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

### Description of EUT and Support equipment

| No. | Item             | Model number | Serial number | Manufacturer      | Remarks |
|-----|------------------|--------------|---------------|-------------------|---------|
| A   | WLAN TRANSCEIVER | IP110H       | 1             | ICOM Incorporated | EUT     |
| B   | Microphone       | HM-179PI     | -             | ICOM Incorporated | -       |

### List of cables used

| No. | Name             | Length (m) | Shield     |            | Remarks |
|-----|------------------|------------|------------|------------|---------|
|     |                  |            | Cable      | Connector  |         |
| 1   | Microphone Cable | 1.0        | Unshielded | Unshielded | -       |

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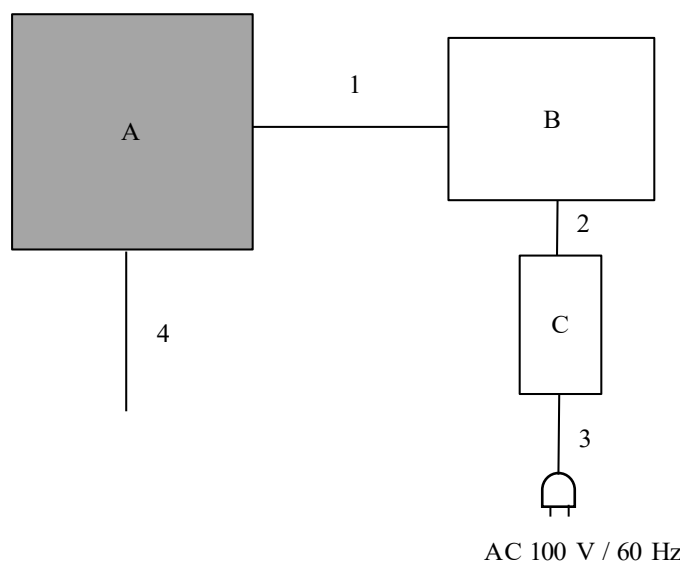
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Antenna Terminal Conducted tests



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

### Description of EUT and Support equipment

| No. | Item             | Model number | Serial number               | Manufacturer      | Remarks |
|-----|------------------|--------------|-----------------------------|-------------------|---------|
| A   | WLAN TRANSCEIVER | IP110H       | 12                          | ICOM Incorporated | EUT     |
| B   | Laptop PC        | X1 Carbon    | R9-OH8OBW 15/9              | Lenovo            | -       |
| C   | AC Adapter       | ADLX45NCC2A  | 8SSA10E75794C1SG<br>59R0GHF | Lenovo            | -       |

### List of cables used

| No. | Name      | Length (m) | Shield     |            | Remarks |
|-----|-----------|------------|------------|------------|---------|
|     |           |            | Cable      | Connector  |         |
| 1   | USB Cable | 1.1        | Shielded   | Shielded   | -       |
| 2   | DC Cable  | 1.4        | Unshielded | Unshielded | -       |
| 3   | AC Cable  | 1.0        | Unshielded | Unshielded | -       |
| 4   | DC Cable  | 2.3        | Unshielded | Unshielded | *1)     |

\*1) This cable is not used for test, and it also doesn't affect the test results.

## **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 v05r02".

[For below 1 GHz]

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 Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

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

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

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

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

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

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

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

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

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

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

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

|                 |               |                          |                                                                                                                                                                                                                               |                              |
|-----------------|---------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Frequency       | Below 1 GHz   | Above 1 GHz              |                                                                                                                                                                                                                               | 20 dBc                       |
| Instrument used | Test Receiver | Spectrum Analyzer        |                                                                                                                                                                                                                               | Spectrum Analyzer            |
| Detector        | QP            | PK                       | AV *1)                                                                                                                                                                                                                        | PK                           |
| IF Bandwidth    | BW 120 kHz    | RBW: 1 MHz<br>VBW: 3 MHz | 11.12.2.5.1<br>RBW: 1 MHz<br>VBW: 3 MHz<br>Detector:<br>Power Averaging (RMS)<br>Trace: 100 traces<br>11.12.2.5.2<br>The duty cycle was less than 98% for detected noise, a duty factor was added to the 11.12.2.5.1 results. | RBW: 100 kHz<br>VBW: 300 kHz |

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

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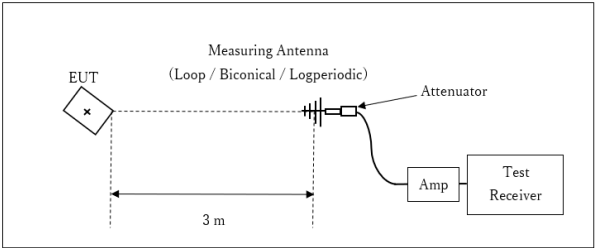
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Facsimile : +81 596 24 8124

Figure 2: Test Setup

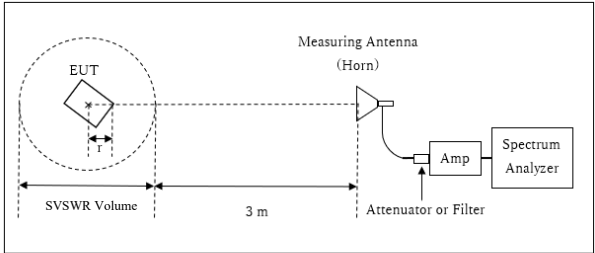
Below 1 GHz



x : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz

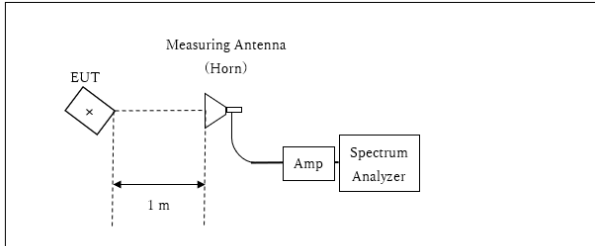


r : Radius of an outer periphery of EUT  
x : Center of turn table

Distance Factor:  $20 \times \log (3.95 \text{ m} / 3.0 \text{ m}) = 2.39 \text{ dB}$   
\* Test Distance:  $(3 + \text{SVSWR Volume} / 2) - r = 3.95 \text{ m}$

SVSWR Volume : 2.0 m  
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)  
 $r = 0.05 \text{ m}$

10 GHz - 26.5 GHz



x : Center of turn table

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

Test data

Test result

: 30 MHz - 26.5 GHz

: APPENDIX

: Pass

## 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/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) *5) | 9kHz to 150kHz<br>150kHz to 30MHz       | 200 Hz<br>9.1 kHz | 620 Hz<br>27 kHz   | Auto       | Peak             | Max Hold | Spectrum Analyzer               |

\*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.  
 (9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 9.1 kHz).  
 \*5) The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohms. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to  $45.5 - 51.5 = -6.0$  dBuA/m, which has the same margin, 3 dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

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

Test data : APPENDIX  
 Test result : Pass

## **APPENDIX 1: Test data**

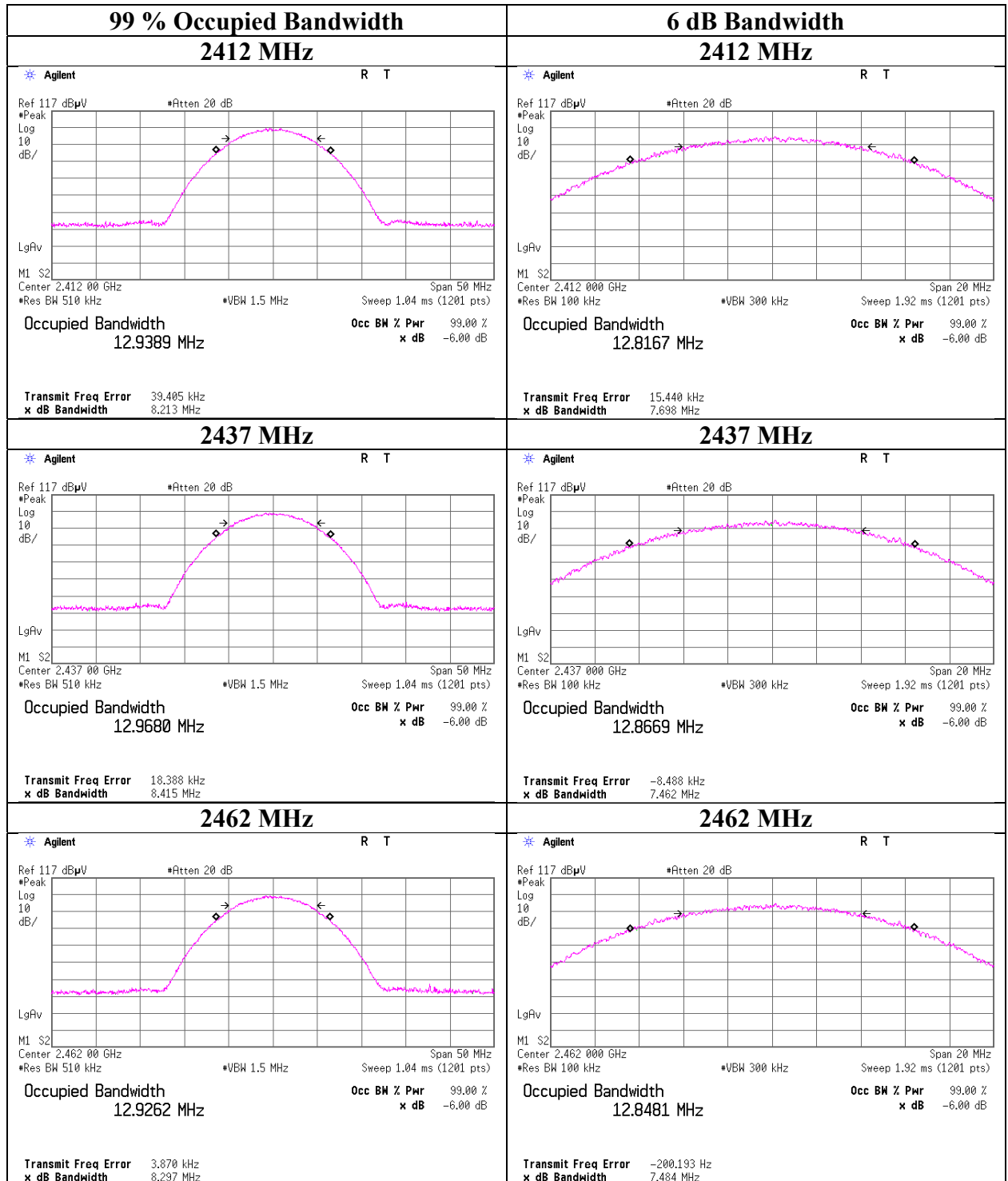
### **99 % Occupied Bandwidth and 6 dB Bandwidth**

|                        |                                    |
|------------------------|------------------------------------|
| Report No.             | 14118411H                          |
| Test place             | Ise EMC Lab. No.6 Measurement Room |
| Date                   | December 15, 2021                  |
| Temperature / Humidity | 24 deg. C / 28 % RH                |
| Engineer               | Nachi Konegawa                     |
| Mode                   | Tx                                 |

| Mode   | Frequency<br>[MHz] | 99 % Occupied<br>Bandwidth<br>[kHz] | 6 dB Bandwidth<br>[MHz] | Limit for<br>6 dB Bandwidth<br>[MHz] |
|--------|--------------------|-------------------------------------|-------------------------|--------------------------------------|
| 11b    | 2412               | 12938.9                             | 7.698                   | > 0.5000                             |
|        | 2437               | 12968.0                             | 7.462                   | > 0.5000                             |
|        | 2462               | 12926.2                             | 7.484                   | > 0.5000                             |
| 11g    | 2412               | 17173.3                             | 16.507                  | > 0.5000                             |
|        | 2437               | 17245.8                             | 16.493                  | > 0.5000                             |
|        | 2462               | 17151.4                             | 16.511                  | > 0.5000                             |
| 11n-20 | 2412               | 18228.7                             | 17.717                  | > 0.5000                             |
|        | 2437               | 18276.9                             | 17.718                  | > 0.5000                             |
|        | 2462               | 18267.6                             | 17.716                  | > 0.5000                             |
| 11n-40 | 2422               | 36937.6                             | 36.485                  | > 0.5000                             |
|        | 2437               | 37000.6                             | 36.474                  | > 0.5000                             |
|        | 2452               | 36961.3                             | 36.454                  | > 0.5000                             |

## 99 % Occupied Bandwidth and 6 dB Bandwidth

11b



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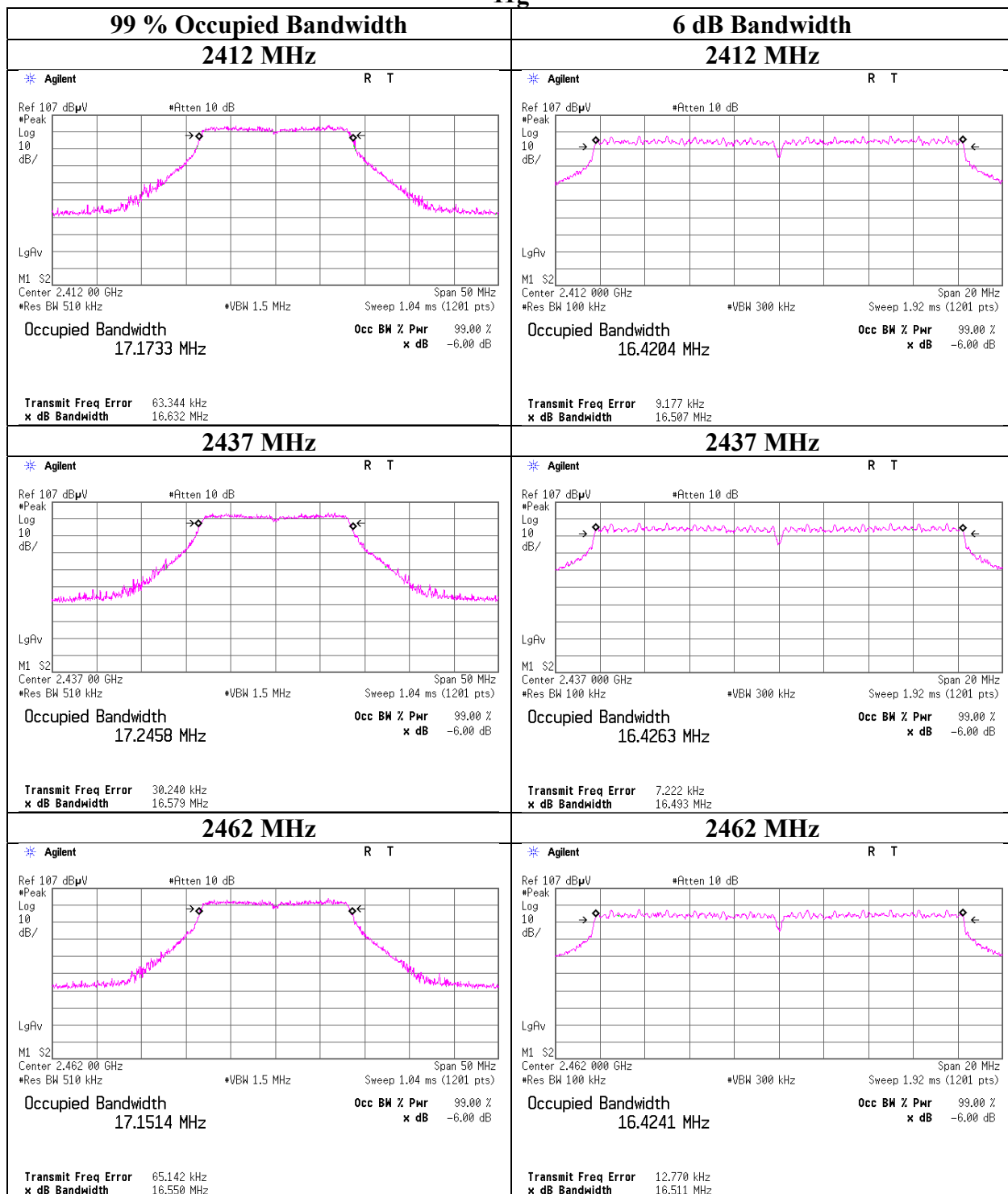
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## 99 % Occupied Bandwidth and 6 dB Bandwidth

11g



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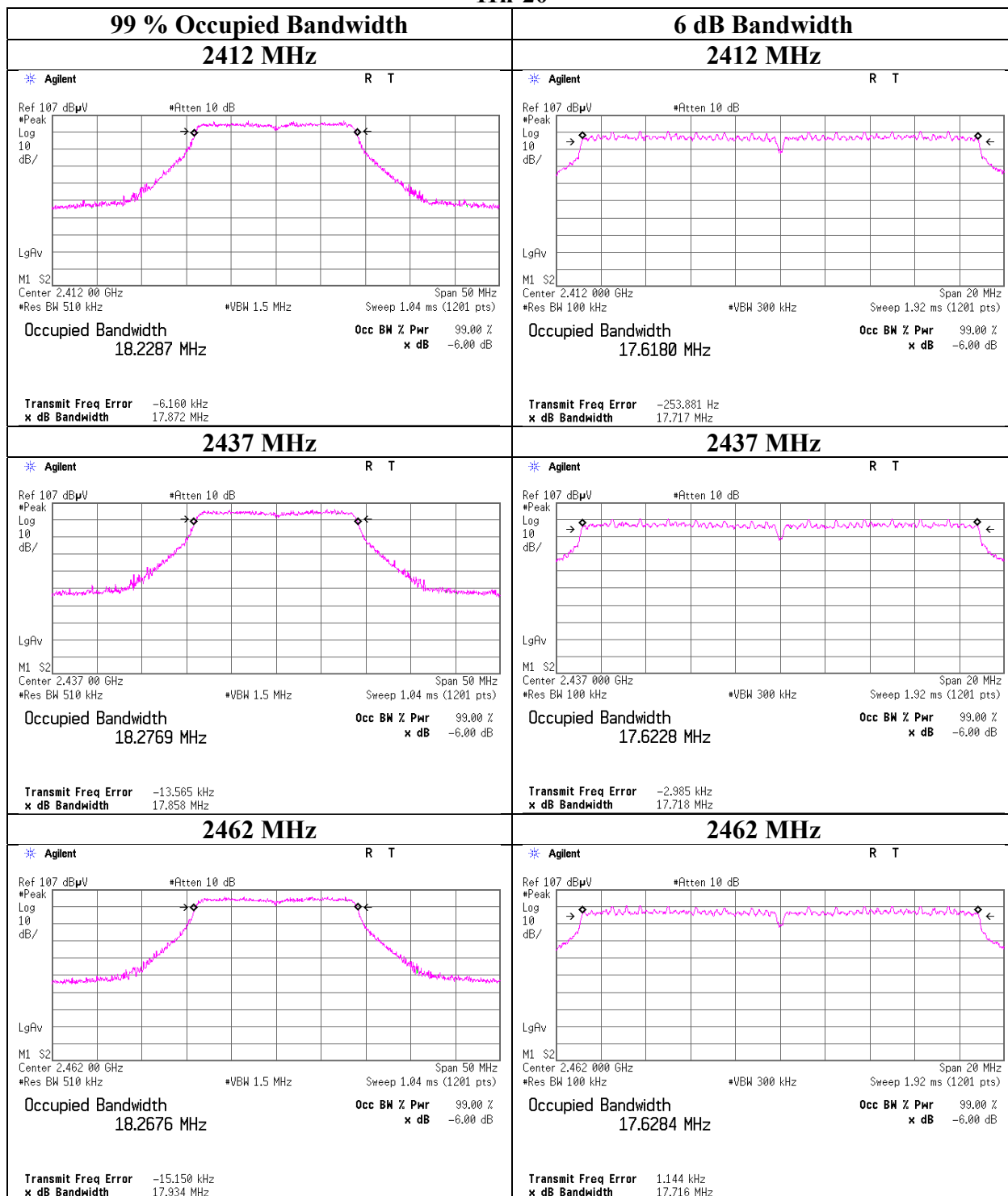
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## 99 % Occupied Bandwidth and 6 dB Bandwidth

11n-20



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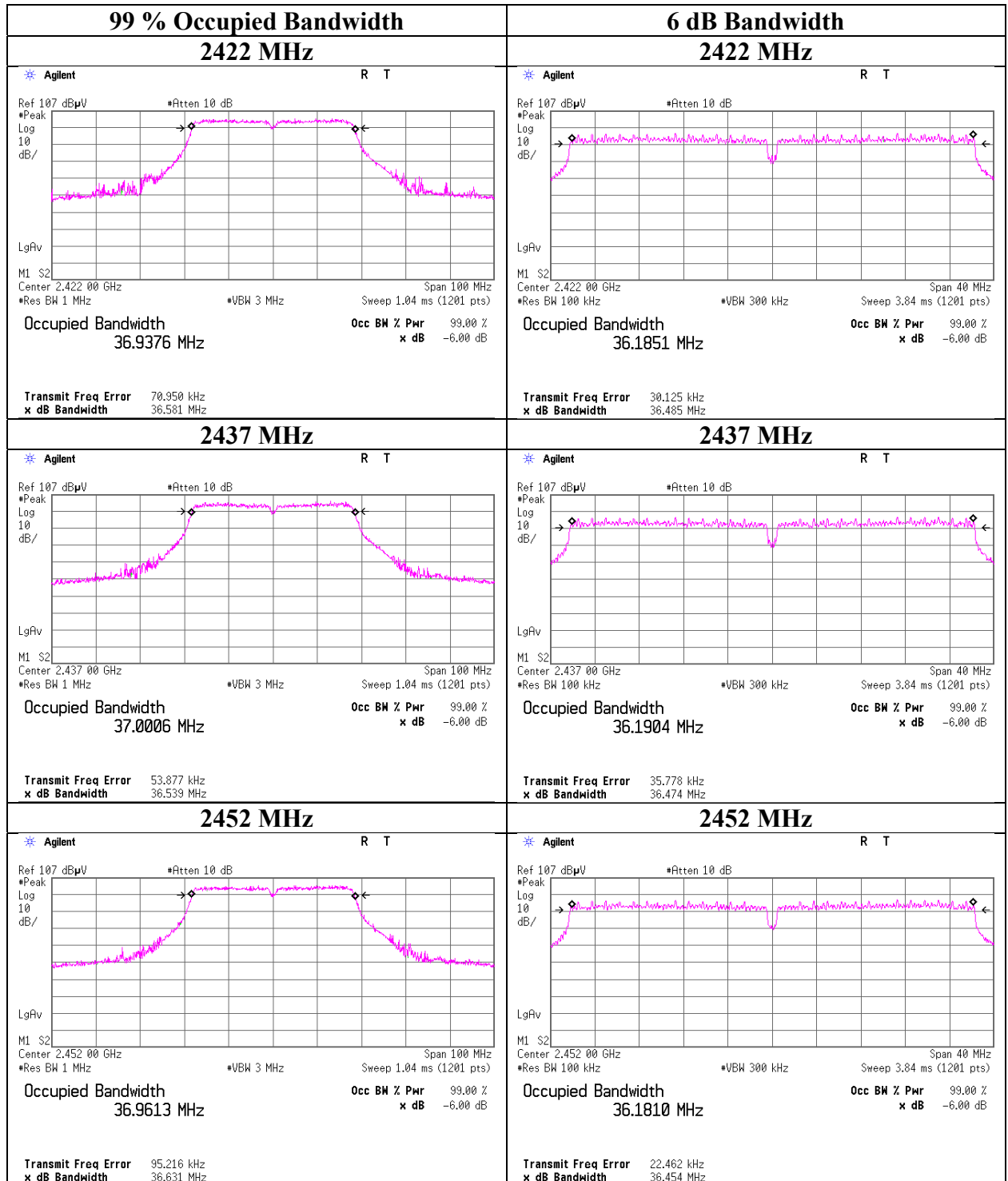
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## 99 % Occupied Bandwidth and 6 dB Bandwidth

11n-40



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## Maximum Peak Output Power

|                        |                                    |                     |
|------------------------|------------------------------------|---------------------|
| Report No.             | 14118411H                          |                     |
| Test place             | Ise EMC Lab. No.6 Measurement Room |                     |
| Date                   | December 3, 2021                   | December 15, 2021   |
| Temperature / Humidity | 25 deg. C / 24 % RH                | 24 deg. C / 28 % RH |
| Engineer               | Kiyoshiro Okazaki                  | Nachi Konegawa      |
| Mode                   | Tx 11b                             |                     |

|       |         |            |             | Conducted Power |       |       |      |        | e.i.r.p. for RSS-247 |        |       |       |      |        |
|-------|---------|------------|-------------|-----------------|-------|-------|------|--------|----------------------|--------|-------|-------|------|--------|
| Freq. | Reading | Cable Loss | Atten. Loss | Result          |       | Limit |      | Margin | Antenna Gain         | Result |       | Limit |      | Margin |
| [MHz] | [dBm]   | [dB]       | [dB]        | [dBm]           | [mW]  | [dBm] | [mW] | [dB]   | [dBi]                | [dBm]  | [mW]  | [dBm] | [mW] | [dB]   |
| 2412  | 4.93    | 1.86       | 10.04       | 16.83           | 48.19 | 30.00 | 1000 | 13.17  | 1.15                 | 17.98  | 62.80 | 36.02 | 4000 | 18.04  |
| 2437  | 4.80    | 1.89       | 10.04       | 16.73           | 47.14 | 30.00 | 1000 | 13.27  | 1.15                 | 17.88  | 61.44 | 36.02 | 4000 | 18.14  |
| 2462  | 4.52    | 1.89       | 10.04       | 16.45           | 44.19 | 30.00 | 1000 | 13.55  | 1.15                 | 17.60  | 57.59 | 36.02 | 4000 | 18.42  |

Sample Calculation:

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

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

2437MHz

| Rate   | Reading | Remark |
|--------|---------|--------|
| [Mbps] | [dBm]   |        |
| 1      | 3.44    |        |
| 2      | 3.45    |        |
| 5.5    | 3.44    |        |
| 11     | 3.46    | *      |

\*: Worst Rate

All comparison were carried out on same frequency and measurement factors.

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## Maximum Peak Output Power

|                        |                                              |
|------------------------|----------------------------------------------|
| Report No.             | 14118411H                                    |
| Test place             | Ise EMC Lab. No.6 Measurement Room           |
| Date                   | December 3, 2021      December 15, 2021      |
| Temperature / Humidity | 25 deg. C / 24 % RH      24 deg. C / 28 % RH |
| Engineer               | Kiyoshiro Okazaki      Nachi Konegawa        |
| Mode                   | Tx 11g                                       |

|       |         |            |             | Conducted Power |        |       |      |        | e.i.r.p. for RSS-247 |        |        |       |      |        |
|-------|---------|------------|-------------|-----------------|--------|-------|------|--------|----------------------|--------|--------|-------|------|--------|
| Freq. | Reading | Cable Loss | Atten. Loss | Result          |        | Limit |      | Margin | Antenna Gain         | Result |        | Limit |      | Margin |
| [MHz] | [dBm]   | [dB]       | [dB]        | [dBm]           | [mW]   | [dBm] | [mW] | [dB]   | [dBi]                | [dBm]  | [mW]   | [dBm] | [mW] | [dB]   |
| 2412  | 9.07    | 1.86       | 10.04       | 20.97           | 125.01 | 30.00 | 1000 | 9.03   | 1.15                 | 22.12  | 162.91 | 36.02 | 4000 | 13.90  |
| 2437  | 9.12    | 1.89       | 10.04       | 21.05           | 127.48 | 30.00 | 1000 | 8.95   | 1.15                 | 22.20  | 166.12 | 36.02 | 4000 | 13.82  |
| 2462  | 8.64    | 1.89       | 10.04       | 20.57           | 114.11 | 30.00 | 1000 | 9.43   | 1.15                 | 21.72  | 148.71 | 36.02 | 4000 | 14.30  |

Sample Calculation:

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

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

2437MHz

| Rate   | Reading | Remark |
|--------|---------|--------|
| [Mbps] | [dBm]   |        |
| 6      | 4.21    |        |
| 9      | 4.40    |        |
| 12     | 4.38    |        |
| 18     | 4.72    |        |
| 24     | 7.66    |        |
| 36     | 9.19    |        |
| 48     | 8.97    |        |
| 54     | 10.17   | *      |

\*: Worst Rate

All comparison were carried out on same frequency and measurement factors.

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## Maximum Peak Output Power

|                        |                                    |                     |
|------------------------|------------------------------------|---------------------|
| Report No.             | 14118411H                          |                     |
| Test place             | Ise EMC Lab. No.6 Measurement Room |                     |
| Date                   | December 3, 2021                   | December 15, 2021   |
| Temperature / Humidity | 25 deg. C / 24 % RH                | 24 deg. C / 28 % RH |
| Engineer               | Kiyoshiro Okazaki                  | Nachi Konegawa      |
| Mode                   | Tx 11n-20                          |                     |

|       |         |            |             | Conducted Power |        |       |      |        | e.i.r.p. for RSS-247 |        |        |       |      |        |
|-------|---------|------------|-------------|-----------------|--------|-------|------|--------|----------------------|--------|--------|-------|------|--------|
| Freq. | Reading | Cable Loss | Atten. Loss | Result          |        | Limit |      | Margin | Antenna Gain         | Result |        | Limit |      | Margin |
| [MHz] | [dBm]   | [dB]       | [dB]        | [dBm]           | [mW]   | [dBm] | [mW] | [dB]   | [dBi]                | [dBm]  | [mW]   | [dBm] | [mW] | [dB]   |
| 2412  | 11.78   | 1.86       | 10.04       | 23.68           | 233.31 | 30.00 | 1000 | 6.32   | 1.15                 | 24.83  | 304.04 | 36.02 | 4000 | 11.19  |
| 2437  | 11.76   | 1.89       | 10.04       | 23.69           | 234.12 | 30.00 | 1000 | 6.31   | 1.15                 | 24.84  | 305.09 | 36.02 | 4000 | 11.18  |
| 2462  | 11.70   | 1.89       | 10.04       | 23.63           | 230.85 | 30.00 | 1000 | 6.37   | 1.15                 | 24.78  | 300.84 | 36.02 | 4000 | 11.24  |

Sample Calculation:

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

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

2437MHz

| Rate   | Reading | Remark |
|--------|---------|--------|
| [Mbps] | [dBm]   |        |
| 0      | 8.29    |        |
| 1      | 8.24    |        |
| 2      | 8.39    |        |
| 3      | 12.33   |        |
| 4      | 12.54   |        |
| 5      | 13.24   | *      |
| 6      | 12.32   |        |
| 7      | 12.70   |        |

\*: Worst Rate

All comparison were carried out on same frequency and measurement factors.

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## Maximum Peak Output Power

|                        |                                    |                     |
|------------------------|------------------------------------|---------------------|
| Report No.             | 14118411H                          |                     |
| Test place             | Ise EMC Lab. No.6 Measurement Room |                     |
| Date                   | December 3, 2021                   | December 16, 2021   |
| Temperature / Humidity | 25 deg. C / 24 % RH                | 24 deg. C / 28 % RH |
| Engineer               | Kiyoshiro Okazaki                  | Nachi Konegawa      |
| Mode                   | Tx 11n-40                          |                     |

|       |         |            |             | Conducted Power |        |       |      |        | e.i.r.p. for RSS-247 |        |        |       |      |        |
|-------|---------|------------|-------------|-----------------|--------|-------|------|--------|----------------------|--------|--------|-------|------|--------|
| Freq. | Reading | Cable Loss | Atten. Loss | Result          |        | Limit |      | Margin | Antenna Gain         | Result |        | Limit |      | Margin |
| [MHz] | [dBm]   | [dB]       | [dB]        | [dBm]           | [mW]   | [dBm] | [mW] | [dB]   | [dBi]                | [dBm]  | [mW]   | [dBm] | [mW] | [dB]   |
| 2422  | 11.59   | 1.86       | 10.04       | 23.49           | 223.32 | 30.00 | 1000 | 6.51   | 1.15                 | 24.64  | 291.03 | 36.02 | 4000 | 11.38  |
| 2437  | 11.55   | 1.89       | 10.04       | 23.48           | 223.07 | 30.00 | 1000 | 6.52   | 1.15                 | 24.63  | 290.69 | 36.02 | 4000 | 11.39  |
| 2452  | 11.01   | 1.90       | 10.04       | 22.95           | 197.37 | 30.00 | 1000 | 7.05   | 1.15                 | 24.10  | 257.21 | 36.02 | 4000 | 11.92  |

Sample Calculation:

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

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

2437MHz

| Rate   | Reading | Remark |
|--------|---------|--------|
| [Mbps] | [dBm]   |        |
| 0      | 7.69    |        |
| 1      | 7.56    |        |
| 2      | 7.37    |        |
| 3      | 11.74   |        |
| 4      | 11.86   |        |
| 5      | 12.77   | *      |
| 6      | 12.13   |        |
| 7      | 12.03   |        |

\*: Worst Rate

All comparison were carried out on same frequency and measurement factors.

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### Average Output Power (Reference data for SAR testing)

|                        |                                    |
|------------------------|------------------------------------|
| Report No.             | 14118411H                          |
| Test place             | Ise EMC Lab. No.6 Measurement Room |
| Date                   | December 15, 2021                  |
| Temperature / Humidity | 24 deg. C / 28 % RH                |
| Engineer               | Nachi Konegawa                     |
| Mode                   | Tx                                 |

#### 11b 1 Mbps

| 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]  |
| 2412           | 2.16             | 1.86                  | 10.04                  | 14.06                    | 25.46 | 0.03                   | 14.09                           | 25.64 |
| 2437           | 2.15             | 1.89                  | 10.04                  | 14.08                    | 25.61 | 0.03                   | 14.11                           | 25.79 |
| 2462           | 2.00             | 1.89                  | 10.04                  | 13.93                    | 24.74 | 0.03                   | 13.96                           | 24.91 |

#### 11g 6 Mbps

| 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]  |
| 2412           | -1.31            | 1.86                  | 10.04                  | 10.59                    | 11.45 | 0.24                   | 10.83                           | 12.10 |
| 2437           | -1.39            | 1.89                  | 10.04                  | 10.54                    | 11.34 | 0.24                   | 10.78                           | 11.98 |
| 2462           | -1.52            | 1.89                  | 10.04                  | 10.41                    | 11.00 | 0.24                   | 10.65                           | 11.62 |

#### 11n-20 MCS 0

| 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]  |
| 2412           | 1.23             | 1.86                  | 10.04                  | 13.13                    | 20.56 | 0.36                   | 13.49                           | 22.33 |
| 2437           | 1.30             | 1.89                  | 10.04                  | 13.23                    | 21.06 | 0.36                   | 13.59                           | 22.88 |
| 2462           | 1.14             | 1.89                  | 10.04                  | 13.07                    | 20.29 | 0.36                   | 13.43                           | 22.05 |

#### 11n-40 MCS 0

| 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]  |
| 2422           | -0.01            | 1.86                  | 10.04                  | 11.89                    | 15.45 | 0.46                   | 12.35                           | 17.18 |
| 2437           | 0.01             | 1.89                  | 10.04                  | 11.94                    | 15.65 | 0.46                   | 12.40                           | 17.40 |
| 2452           | -0.02            | 1.90                  | 10.04                  | 11.92                    | 15.57 | 0.46                   | 12.38                           | 17.31 |

Sample Calculation:

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

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

**The average output power was measured with the lowest order modulation and lowest data rate configuration in each IEEE 802.11 mode based on KDB 248227 D01.**

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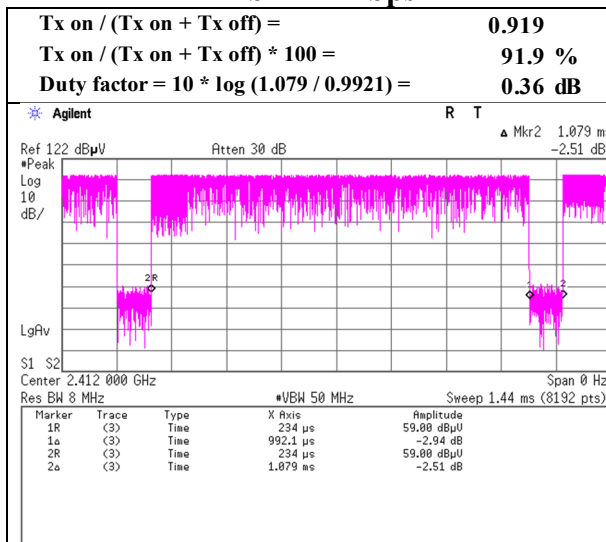
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

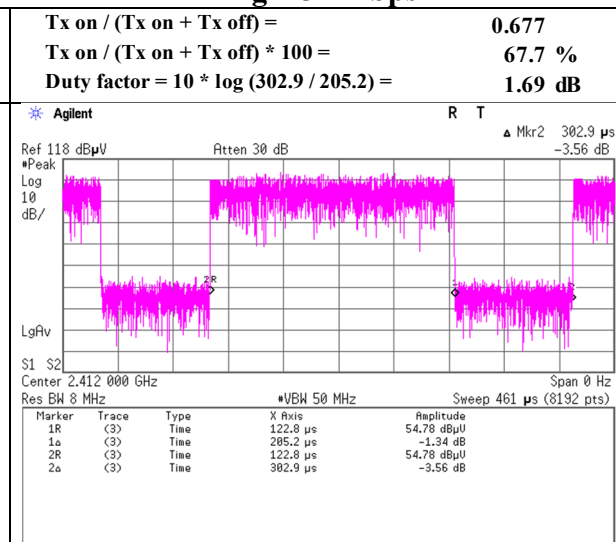
## Burst rate confirmation

|                        |                                         |
|------------------------|-----------------------------------------|
| Report No.             | 14118411H                               |
| Test place             | Ise EMC Lab. No.3 Semi Anechoic Chamber |
| Date                   | December 6, 2021                        |
| Temperature / Humidity | 21 deg. C / 41 % RH                     |
| Engineer               | Takafumi Noguchi                        |
| Mode                   | Tx                                      |

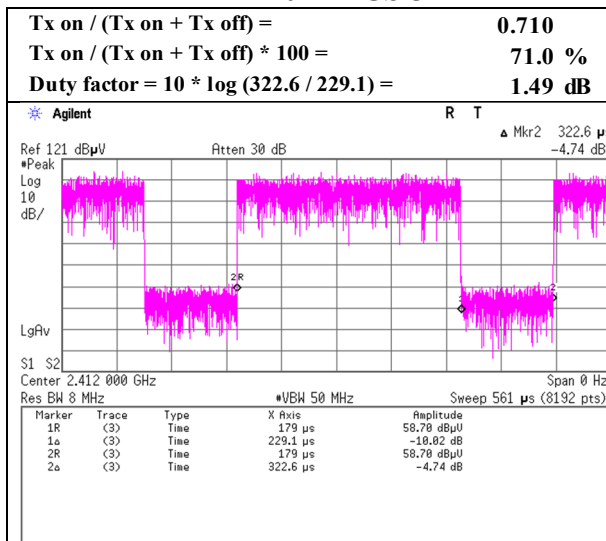
### 11b 11 Mbps



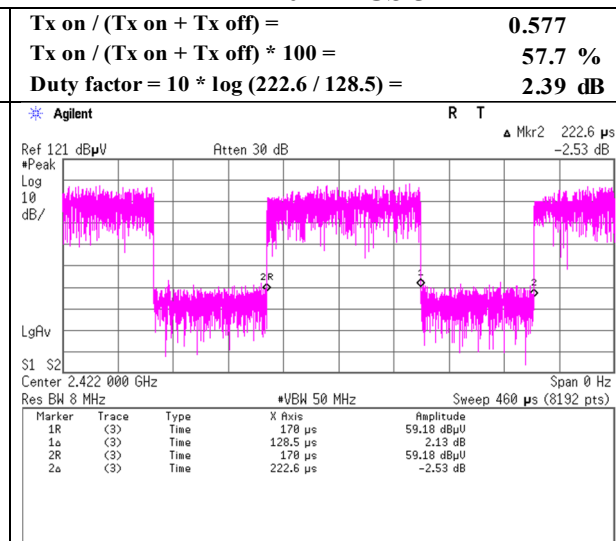
### 11g 54 Mbps



### 11n-20 MCS 5



### 11n-40 MCS 5



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

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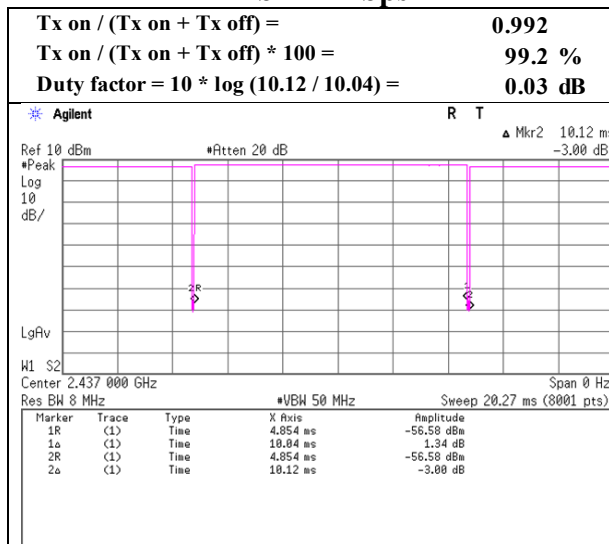
Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

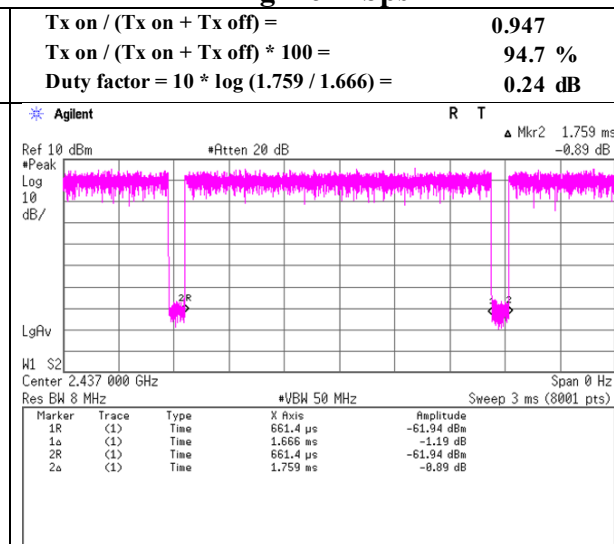
## Burst rate confirmation

|                        |                                    |
|------------------------|------------------------------------|
| Report No.             | 14118411H                          |
| Test place             | Ise EMC Lab. No.6 Measurement Room |
| Date                   | December 15, 2021                  |
| Temperature / Humidity | 24 deg. C / 28 % RH                |
| Engineer               | Nachi Konegawa                     |
| Mode                   | Tx                                 |

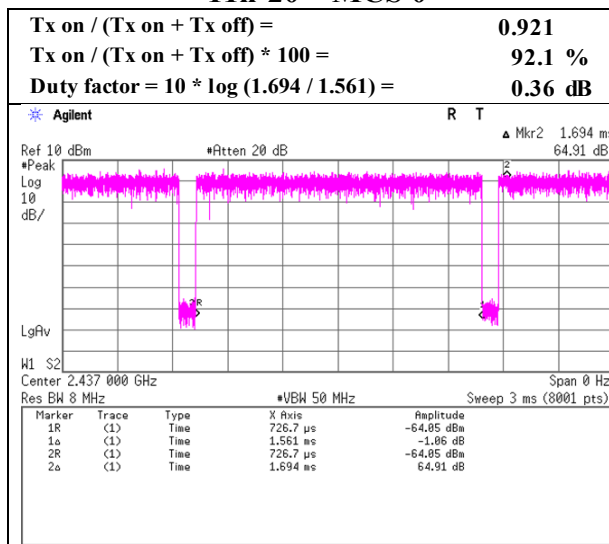
### 11b 1 Mbps



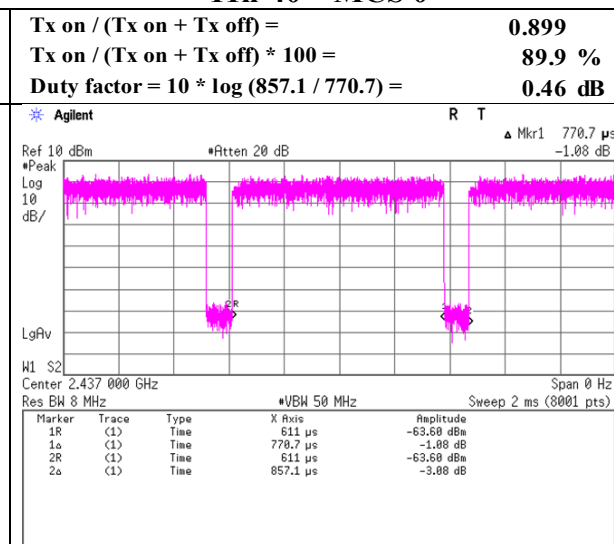
### 11g 6 Mbps



### 11n-20 MCS 0



### 11n-40 MCS 0



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

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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Radiated Spurious Emission

|                        |                     |                     |
|------------------------|---------------------|---------------------|
| Report No.             | 14118411H           |                     |
| Test place             | Ise EMC Lab.        |                     |
| Semi Anechoic Chamber  | No.3                | No.3                |
| Date                   | December 6, 2021    | December 9, 2021    |
| Temperature / Humidity | 21 deg. C / 41 % RH | 24 deg. C / 43 % RH |
| Engineer               | Takafumi Noguchi    | Takumi Nishida      |
|                        | (1 GHz - 10 GHz)    | (10 GHz - 26.5 GHz) |
| Mode                   | Tx 11b 2412 MHz     |                     |

| Polarity    | Frequency | Reading<br>(QP / PK) | Reading<br>(AV) | Ant.<br>Factor | Loss | Gain | Duty<br>Factor | Result<br>(QP / PK) | Result<br>(AV) | Limit<br>(QP / PK) | Limit<br>(AV) | Margin<br>(QP / PK) | Margin<br>(AV) | Remark      |
|-------------|-----------|----------------------|-----------------|----------------|------|------|----------------|---------------------|----------------|--------------------|---------------|---------------------|----------------|-------------|
| [Hori/Vert] | [MHz]     | [dBuV]               | [dBuV]          | [dB/m]         | [dB] | [dB] | [dB]           | [dBuV/m]            | [dBuV/m]       | [dBuV/m]           | [dBuV/m]      | [dB]                | [dB]           |             |
| Hori.       | 2390.0    | 53.5                 | 44.0            | 27.6           | 4.9  | 32.6 | 0.4            | 53.5                | 44.3           | 73.9               | 53.9          | 20.5                | 9.6            | *1)         |
| Hori.       | 4824.0    | 40.7                 | 32.3            | 31.5           | 6.9  | 31.6 | -              | 47.4                | 39.1           | 73.9               | 53.9          | 26.5                | 14.8           | Floor noise |
| Hori.       | 7236.0    | 42.1                 | 33.9            | 35.8           | 8.0  | 32.6 | -              | 53.2                | 45.0           | 73.9               | 53.9          | 20.7                | 8.9            | Floor noise |
| Hori.       | 9648.0    | 42.0                 | 32.8            | 38.8           | 8.8  | 33.0 | -              | 56.6                | 47.3           | 73.9               | 53.9          | 17.4                | 6.6            | Floor noise |
| Vert.       | 2390.0    | 52.7                 | 43.5            | 27.6           | 4.9  | 32.6 | 0.4            | 52.6                | 43.7           | 73.9               | 53.9          | 21.3                | 10.2           | *1)         |
| Vert.       | 4824.0    | 40.7                 | 32.3            | 31.5           | 6.9  | 31.6 | -              | 47.4                | 39.1           | 73.9               | 53.9          | 26.5                | 14.8           | Floor noise |
| Vert.       | 7236.0    | 42.1                 | 33.9            | 35.8           | 8.0  | 32.6 | -              | 53.2                | 45.0           | 73.9               | 53.9          | 20.7                | 8.9            | Floor noise |
| Vert.       | 9648.0    | 42.0                 | 32.8            | 38.8           | 8.8  | 33.0 | -              | 56.6                | 47.3           | 73.9               | 53.9          | 17.4                | 6.6            | Floor noise |

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

Result (AV) = 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).

\*QP detector was used up to 1GHz.

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

### 20dBc Data Sheet

| Polarity    | Frequency | Reading<br>(PK) | Ant<br>Factor | Loss | Gain | Result   | Limit    | Margin | Remark  |
|-------------|-----------|-----------------|---------------|------|------|----------|----------|--------|---------|
| [Hori/Vert] | [MHz]     | [dBuV]          | [dB/m]        | [dB] | [dB] | [dBuV/m] | [dBuV/m] | [dB]   |         |
| Hori.       | 2412.0    | 102.9           | 27.5          | 4.9  | 32.6 | 102.8    | -        | -      | Carrier |
| Hori.       | 2400.0    | 47.3            | 27.5          | 4.9  | 32.6 | 47.2     | 82.8     | 35.6   |         |
| Vert.       | 2412.0    | 101.7           | 27.5          | 4.9  | 32.6 | 101.6    | -        | -      | Carrier |
| Vert.       | 2400.0    | 46.3            | 27.5          | 4.9  | 32.6 | 46.2     | 81.6     | 35.4   |         |

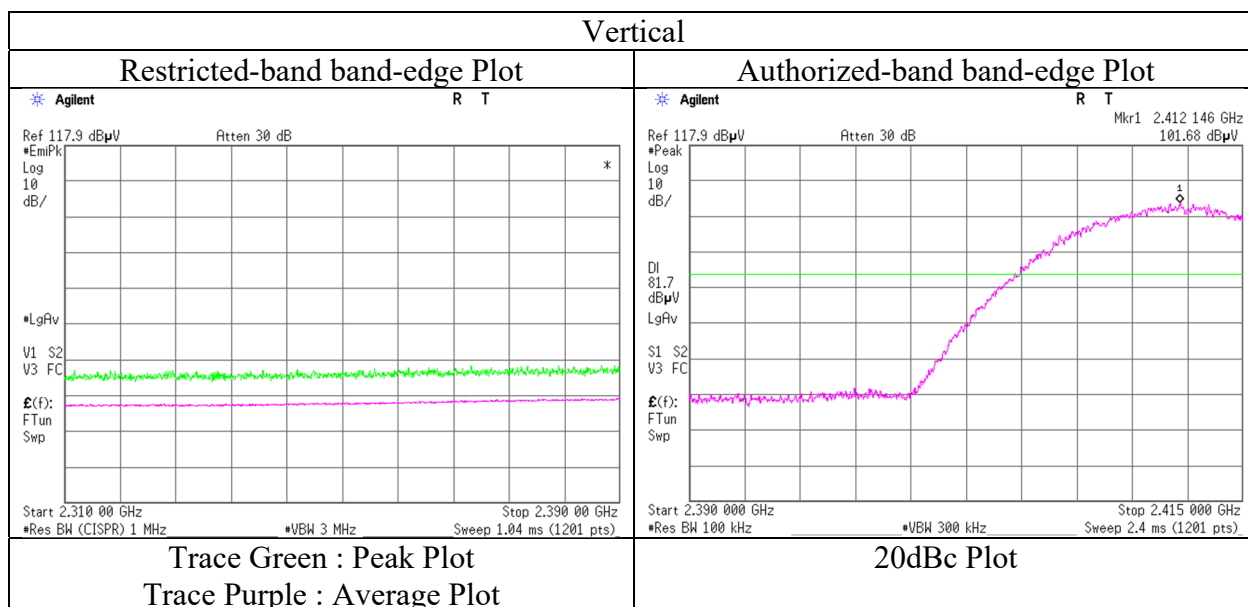
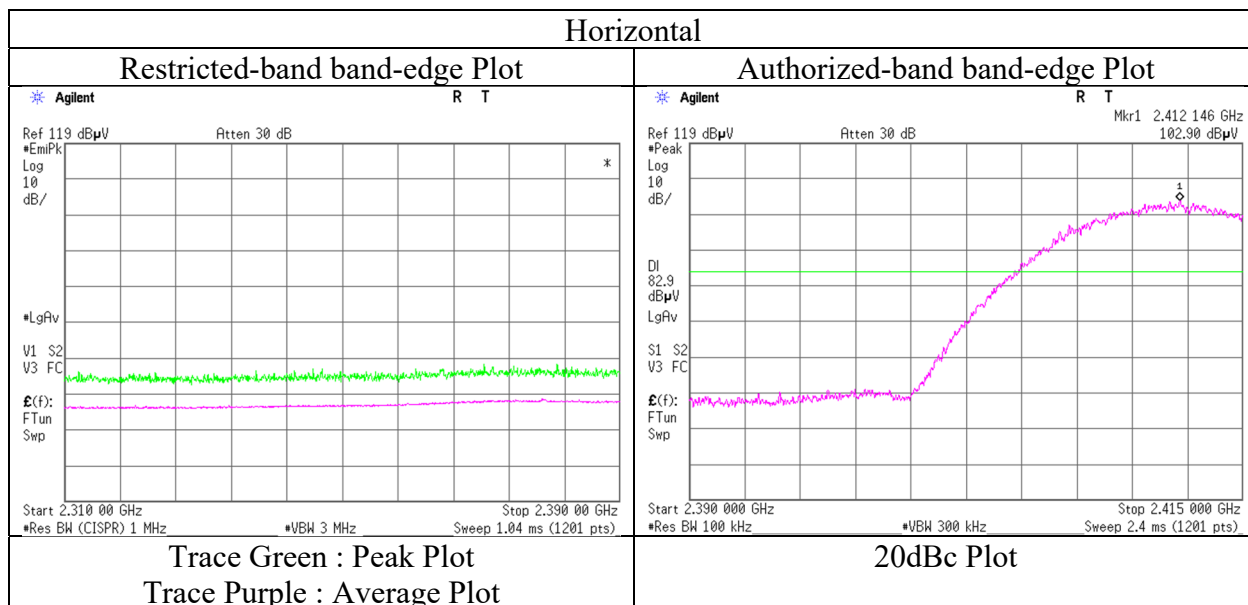
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz 20log (3.95 m / 3.0 m) = 2.39 dB

10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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

|                        |                     |
|------------------------|---------------------|
| Report No.             | 14118411H           |
| Test place             | Ise EMC Lab.        |
| Semi Anechoic Chamber  | No.3                |
| Date                   | December 6, 2021    |
| Temperature / Humidity | 21 deg. C / 41 % RH |
| Engineer               | Takafumi Noguchi    |
|                        | (1 GHz - 10 GHz)    |
| Mode                   | Tx 11b 2412 MHz     |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.  
Final result of restricted band edge was shown in tabular data.

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**Ise EMC Lab.**

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

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## Radiated Spurious Emission

|                        |                     |                     |
|------------------------|---------------------|---------------------|
| Report No.             | 14118411H           |                     |
| Test place             | Ise EMC Lab.        |                     |
| Semi Anechoic Chamber  | No.3                | No.3                |
| Date                   | December 6, 2021    | December 9, 2021    |
| Temperature / Humidity | 21 deg. C / 41 % RH | 24 deg. C / 43 % RH |
| Engineer               | Takafumi Noguchi    | Takumi Nishida      |
|                        | (1 GHz - 10 GHz)    | (10 GHz - 26.5 GHz) |
| Mode                   | Tx 11b 2437 MHz     |                     |

| Polarity    | Frequency | Reading<br>(QP / PK) | Reading<br>(AV) | Ant.<br>Factor | Loss | Gain | Duty<br>Factor | Result<br>(QP / PK) | Result<br>(AV) | Limit<br>(QP / PK) | Limit<br>(AV) | Margin<br>(QP / PK) | Margin<br>(AV) | Remark      |
|-------------|-----------|----------------------|-----------------|----------------|------|------|----------------|---------------------|----------------|--------------------|---------------|---------------------|----------------|-------------|
| [Hori/Vert] | [MHz]     | [dBuV]               | [dBuV]          | [dB/m]         | [dB] | [dB] | [dB]           | [dBuV/m]            | [dBuV/m]       | [dBuV/m]           | [dBuV/m]      | [dB]                | [dB]           |             |
| Hori.       | 4874.0    | 40.7                 | 32.4            | 31.5           | 6.9  | 31.6 | -              | 47.5                | 39.2           | 73.9               | 53.9          | 26.5                | 14.8           | Floor noise |
| Hori.       | 7311.0    | 42.2                 | 33.9            | 35.9           | 8.0  | 32.7 | -              | 53.4                | 45.1           | 73.9               | 53.9          | 20.6                | 8.8            | Floor noise |
| Hori.       | 9748.0    | 42.0                 | 32.9            | 39.1           | 8.8  | 33.1 | -              | 56.9                | 47.7           | 73.9               | 53.9          | 17.1                | 6.2            | Floor noise |
| Vert.       | 4874.0    | 40.7                 | 32.4            | 31.5           | 6.9  | 31.6 | -              | 47.5                | 39.2           | 73.9               | 53.9          | 26.5                | 14.8           | Floor noise |
| Vert.       | 7311.0    | 42.2                 | 33.9            | 35.9           | 8.0  | 32.7 | -              | 53.4                | 45.1           | 73.9               | 53.9          | 20.6                | 8.8            | Floor noise |
| Vert.       | 9748.0    | 42.0                 | 32.9            | 39.1           | 8.8  | 33.1 | -              | 56.9                | 47.7           | 73.9               | 53.9          | 17.1                | 6.2            | Floor noise |

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

Result (AV)= 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).

\*QP detector was used up to 1GHz.

|                  |                   |                                                         |
|------------------|-------------------|---------------------------------------------------------|
| Distance factor: | 1 GHz - 10 GHz    | $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.39\text{ dB}$ |
|                  | 10 GHz - 26.5 GHz | $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$  |

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## Radiated Spurious Emission

|                        |                     |                     |
|------------------------|---------------------|---------------------|
| Report No.             | 14118411H           |                     |
| Test place             | Ise EMC Lab.        |                     |
| Semi Anechoic Chamber  | No.3                | No.3                |
| Date                   | December 7, 2021    | December 9, 2021    |
| Temperature / Humidity | 20 deg. C / 43 % RH | 24 deg. C / 43 % RH |
| Engineer               | Hiroki Numata       | Takumi Nishida      |
|                        | (1 GHz - 10 GHz)    | (10 GHz - 26.5 GHz) |
| Mode                   | Tx 11b 2462 MHz     |                     |

| Polarity    | Frequency | Reading<br>(QP / PK) | Reading<br>(AV) | Ant.<br>Factor | Loss | Gain | Duty<br>Factor | Result<br>(QP / PK) | Result<br>(AV) | Limit<br>(QP / PK) | Limit<br>(AV) | Margin<br>(QP / PK) | Margin<br>(AV) | Remark      |
|-------------|-----------|----------------------|-----------------|----------------|------|------|----------------|---------------------|----------------|--------------------|---------------|---------------------|----------------|-------------|
| [Hori/Vert] | [MHz]     | [dBuV]               | [dBuV]          | [dB/m]         | [dB] | [dB] | [dB]           | [dBuV/m]            | [dBuV/m]       | [dBuV/m]           | [dBuV/m]      | [dB]                | [dB]           |             |
| Hori.       | 2483.5    | 54.2                 | 46.1            | 27.4           | 5.0  | 32.5 | 0.4            | 54.1                | 46.3           | 73.9               | 53.9          | 19.8                | 7.6            | *1)         |
| Hori.       | 4924.0    | 40.4                 | 32.3            | 31.6           | 7.8  | 31.6 | -              | 48.3                | 40.1           | 73.9               | 53.9          | 25.7                | 13.8           | Floor noise |
| Hori.       | 7386.0    | 41.4                 | 33.9            | 36.0           | 9.3  | 32.7 | -              | 54.1                | 46.6           | 73.9               | 53.9          | 19.8                | 7.3            | Floor noise |
| Hori.       | 9848.0    | 40.7                 | 31.9            | 39.2           | 9.9  | 33.1 | -              | 56.6                | 47.8           | 73.9               | 53.9          | 17.3                | 6.1            | Floor noise |
| Vert.       | 2483.5    | 50.6                 | 40.7            | 27.4           | 5.0  | 32.5 | 0.4            | 50.5                | 40.9           | 73.9               | 53.9          | 23.4                | 13.0           | *1)         |
| Vert.       | 4924.0    | 40.1                 | 32.3            | 31.6           | 7.8  | 31.6 | -              | 47.9                | 40.1           | 73.9               | 53.9          | 26.0                | 13.8           | Floor noise |
| Vert.       | 7386.0    | 41.5                 | 34.0            | 36.0           | 9.3  | 32.7 | -              | 54.2                | 46.7           | 73.9               | 53.9          | 19.7                | 7.2            | Floor noise |
| Vert.       | 9848.0    | 40.6                 | 31.8            | 39.2           | 9.9  | 33.1 | -              | 56.6                | 47.8           | 73.9               | 53.9          | 17.3                | 6.1            | Floor noise |

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

Result (AV) = 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).

\*QP detector was used up to 1GHz.

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

|                  |                   |                                                         |
|------------------|-------------------|---------------------------------------------------------|
| Distance factor: | 1 GHz - 10 GHz    | $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.39\text{ dB}$ |
|                  | 10 GHz - 26.5 GHz | $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$  |

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**Ise EMC Lab.**

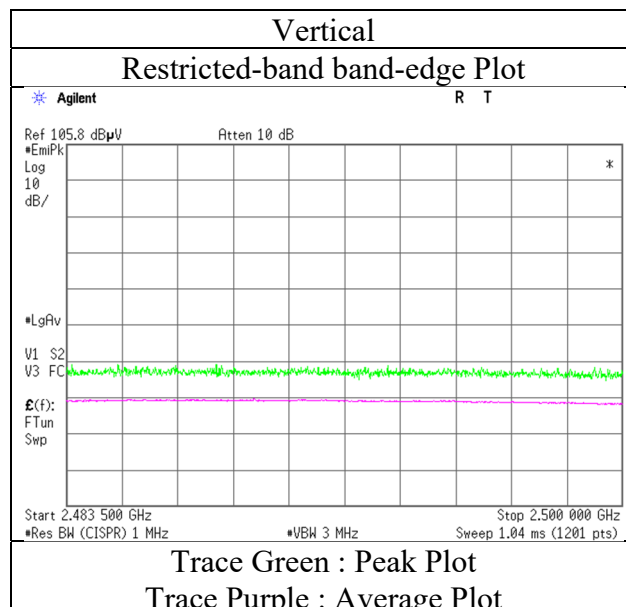
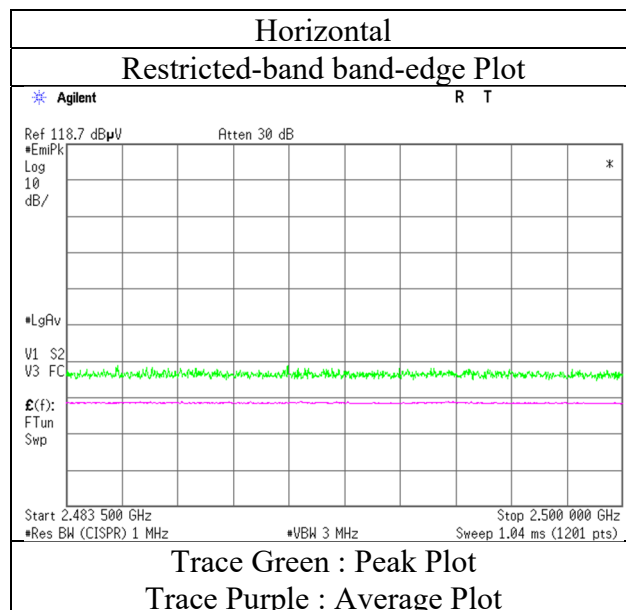
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Facsimile : +81 596 24 8124

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

Report No. 14118411H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.3  
Date December 7, 2021  
Temperature / Humidity 20 deg. C / 43 % RH  
Engineer Hiroki Numata  
(1 GHz - 10 GHz)  
Mode Tx 11b 2462 MHz



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.  
Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

|                        |                     |                     |
|------------------------|---------------------|---------------------|
| Report No.             | 14118411H           |                     |
| Test place             | Ise EMC Lab.        |                     |
| Semi Anechoic Chamber  | No.3                | No.3                |
| Date                   | December 6, 2021    | December 9, 2021    |
| Temperature / Humidity | 21 deg. C / 41 % RH | 24 deg. C / 43 % RH |
| Engineer               | Takafumi Noguchi    | Takumi Nishida      |
|                        | (1 GHz - 10 GHz)    | (10 GHz - 26.5 GHz) |
| Mode                   | Tx 11n-20 2412 MHz  |                     |

| Polarity<br>[Hori/Vert] | Frequency<br>[MHz] | Reading<br>(QP / PK)<br>[dBuV] | Reading<br>(AV)<br>[dBuV] | Ant.<br>Factor<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor<br>[dB] | Result<br>(QP / PK)<br>[dBuV/m] | Result<br>(AV)<br>[dBuV/m] | Limit<br>(QP / PK)<br>[dBuV/m] | Limit<br>(AV)<br>[dBuV/m] | Margin<br>(QP / PK)<br>[dB] | Margin<br>(AV)<br>[dB] | Remark      |
|-------------------------|--------------------|--------------------------------|---------------------------|--------------------------|--------------|--------------|------------------------|---------------------------------|----------------------------|--------------------------------|---------------------------|-----------------------------|------------------------|-------------|
| Hori.                   | 2390.0             | 60.5                           | 49.3                      | 27.6                     | 4.9          | 32.6         | 1.5                    | 60.4                            | 50.7                       | 73.9                           | 53.9                      | 13.5                        | 3.2                    | *1)         |
| Hori.                   | 4824.0             | 40.7                           | 32.3                      | 31.5                     | 6.9          | 31.6         | -                      | 47.5                            | 39.1                       | 73.9                           | 53.9                      | 26.4                        | 14.8                   | Floor noise |
| Hori.                   | 7236.0             | 42.2                           | 34.0                      | 35.8                     | 8.0          | 32.6         | -                      | 53.3                            | 45.1                       | 73.9                           | 53.9                      | 20.6                        | 8.8                    | Floor noise |
| Hori.                   | 9648.0             | 42.2                           | 32.9                      | 38.8                     | 8.8          | 33.0         | -                      | 56.8                            | 47.4                       | 73.9                           | 53.9                      | 17.1                        | 6.5                    | Floor noise |
| Vert.                   | 2390.0             | 61.3                           | 49.0                      | 27.6                     | 4.9          | 32.6         | 1.5                    | 61.2                            | 50.4                       | 73.9                           | 53.9                      | 12.7                        | 3.5                    | *1)         |
| Vert.                   | 4824.0             | 40.7                           | 32.3                      | 31.5                     | 6.9          | 31.6         | -                      | 47.5                            | 39.1                       | 73.9                           | 53.9                      | 26.4                        | 14.8                   | Floor noise |
| Vert.                   | 7236.0             | 42.2                           | 34.0                      | 35.8                     | 8.0          | 32.6         | -                      | 53.3                            | 45.1                       | 73.9                           | 53.9                      | 20.6                        | 8.8                    | Floor noise |
| Vert.                   | 9648.0             | 42.2                           | 32.9                      | 38.8                     | 8.8          | 33.0         | -                      | 56.8                            | 47.4                       | 73.9                           | 53.9                      | 17.1                        | 6.5                    | Floor noise |

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

Result (AV) = 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).

\*QP detector was used up to 1GHz.

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

### 20dBc Data Sheet

| Polarity<br>[Hori/Vert] | Frequency<br>[MHz] | Reading<br>(PK)<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.                   | 2412.0             | 98.6                      | 27.5                    | 4.9          | 32.6         | 98.4               | -                 | -              | Carrier |
| Hori.                   | 2400.0             | 64.4                      | 27.5                    | 4.9          | 32.6         | 64.2               | 78.4              | 14.2           |         |
| Vert.                   | 2412.0             | 97.0                      | 27.5                    | 4.9          | 32.6         | 96.8               | -                 | -              | Carrier |
| Vert.                   | 2400.0             | 63.0                      | 27.5                    | 4.9          | 32.6         | 62.9               | 76.8              | 13.9           |         |

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

Distance factor: 1 GHz - 10 GHz 20log (3.95 m / 3.0 m) = 2.39 dB

10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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**Ise EMC Lab.**

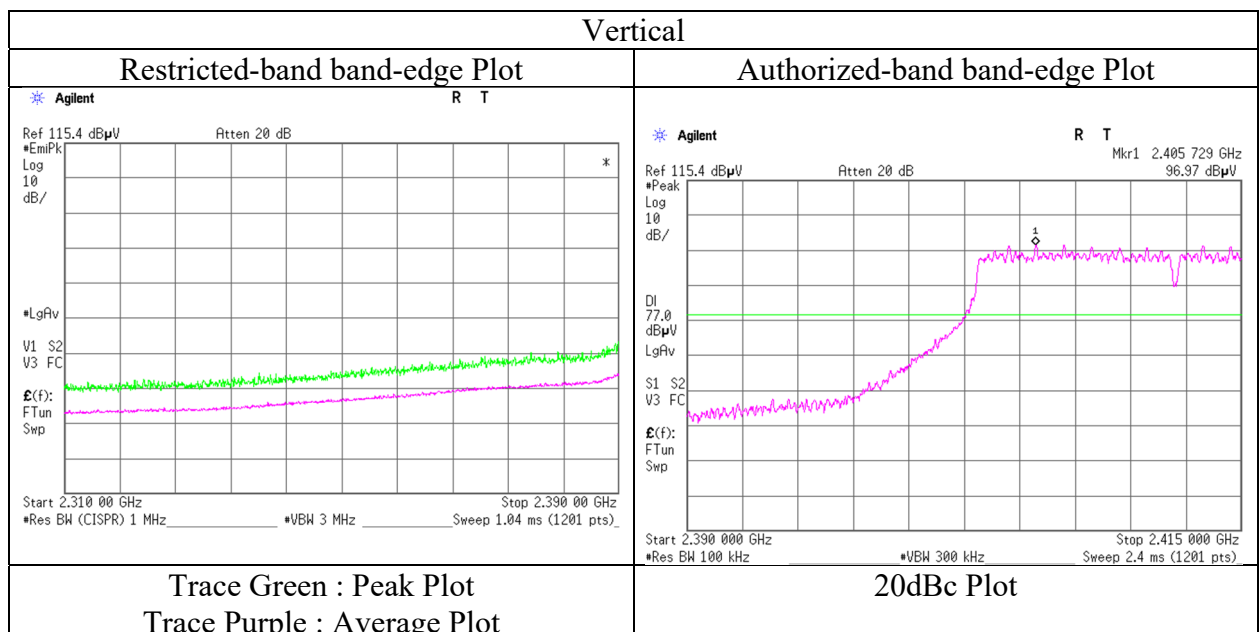
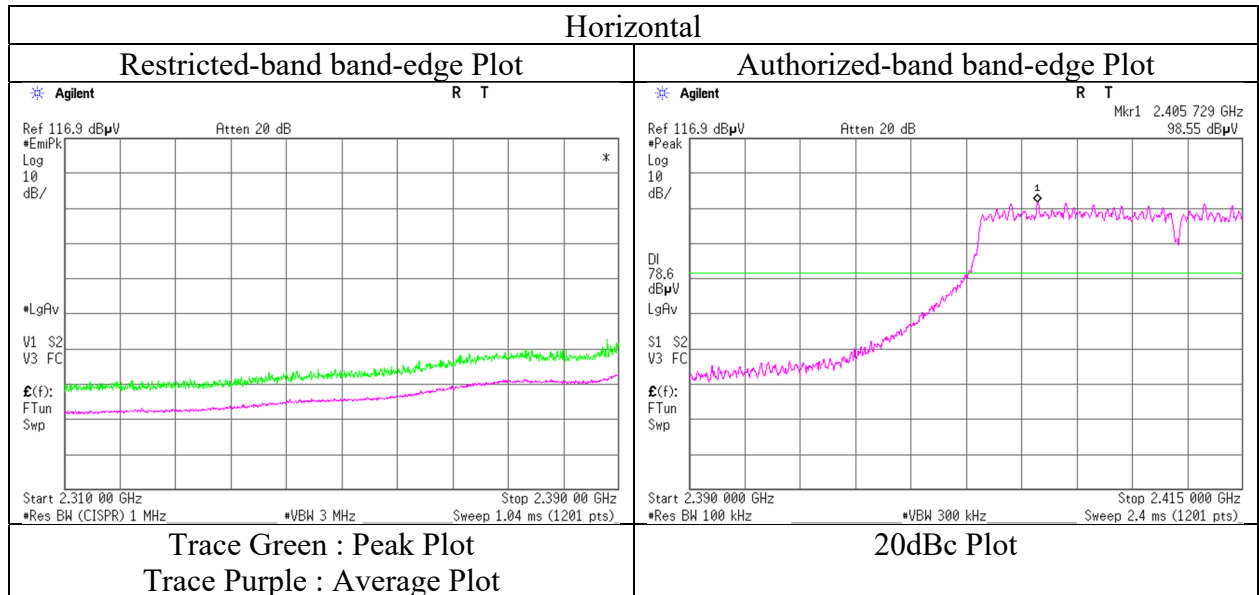
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

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

|                        |                                      |
|------------------------|--------------------------------------|
| Report No.             | 14118411H                            |
| Test place             | Ise EMC Lab.                         |
| Semi Anechoic Chamber  | No.3                                 |
| Date                   | December 6, 2021                     |
| Temperature / Humidity | 21 deg. C / 41 % RH                  |
| Engineer               | Takafumi Noguchi<br>(1 GHz - 10 GHz) |
| Mode                   | Tx 11n-20 2412 MHz                   |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.  
Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

|                        |                     |                     |                     |
|------------------------|---------------------|---------------------|---------------------|
| Report No.             | 14118411H           | No.3                | No.4                |
| Test place             | Ise EMC Lab.        |                     |                     |
| Semi Anechoic Chamber  | No.3                | No.3                | No.4                |
| Date                   | December 6, 2021    | December 9, 2021    | December 18, 2021   |
| Temperature / Humidity | 21 deg. C / 41 % RH | 24 deg. C / 43 % RH | 21 deg. C / 38 % RH |
| Engineer               | Takafumi Noguchi    | Takumi Nishida      | Nachi Konegawa      |
|                        | (1 GHz - 10 GHz)    | (10 GHz - 26.5 GHz) | (Below 1 GHz)       |
| Mode                   | Tx 11n-20 2437 MHz  |                     |                     |

| Polarity<br>[Hori/Vert] | Frequency<br>[MHz] | Reading<br>(QP / PK)<br>[dBuV] | Reading<br>(AV)<br>[dBuV] | Ant.<br>Factor<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor<br>[dB] | Result<br>(QP / PK)<br>[dBuV/m] | Result<br>(AV)<br>[dBuV/m] | Limit<br>(QP / PK)<br>[dBuV/m] | Limit<br>(AV)<br>[dBuV/m] | Margin<br>(QP / PK)<br>[dB] | Margin<br>(AV)<br>[dB] | Remark      |
|-------------------------|--------------------|--------------------------------|---------------------------|--------------------------|--------------|--------------|------------------------|---------------------------------|----------------------------|--------------------------------|---------------------------|-----------------------------|------------------------|-------------|
| Hori.                   | 34.7               | 22.1                           | -                         | 16.9                     | 7.1          | 32.0         | -                      | 14.0                            | -                          | 40.0                           | -                         | 26.0                        | -                      | Floor noise |
| Hori.                   | 46.2               | 22.5                           | -                         | 12.6                     | 7.3          | 32.0         | -                      | 10.3                            | -                          | 40.0                           | -                         | 29.7                        | -                      | Floor noise |
| Hori.                   | 159.7              | 22.7                           | -                         | 15.4                     | 8.4          | 32.0         | -                      | 14.6                            | -                          | 43.5                           | -                         | 28.9                        | -                      | Floor noise |
| Hori.                   | 348.4              | 22.8                           | -                         | 15.2                     | 9.7          | 31.9         | -                      | 15.9                            | -                          | 46.0                           | -                         | 30.1                        | -                      | Floor noise |
| Hori.                   | 500.0              | 26.7                           | -                         | 18.0                     | 10.7         | 32.0         | -                      | 23.4                            | -                          | 46.0                           | -                         | 22.6                        | -                      |             |
| Hori.                   | 756.3              | 21.8                           | -                         | 20.4                     | 11.7         | 31.9         | -                      | 22.0                            | -                          | 46.0                           | -                         | 24.0                        | -                      | Floor noise |
| Hori.                   | 4874.0             | 40.6                           | 32.3                      | 31.5                     | 6.9          | 31.6         | -                      | 47.4                            | 39.1                       | 73.9                           | 53.9                      | 26.5                        | 14.8                   | Floor noise |
| Hori.                   | 7311.0             | 42.2                           | 33.9                      | 35.9                     | 8.0          | 32.7         | -                      | 53.4                            | 45.1                       | 73.9                           | 53.9                      | 20.5                        | 8.8                    | Floor noise |
| Hori.                   | 9748.0             | 42.3                           | 32.9                      | 39.1                     | 8.8          | 33.1         | -                      | 57.2                            | 47.7                       | 73.9                           | 53.9                      | 16.8                        | 6.2                    | Floor noise |
| Vert.                   | 34.7               | 22.0                           | -                         | 16.9                     | 7.1          | 32.0         | -                      | 13.9                            | -                          | 40.0                           | -                         | 26.1                        | -                      | Floor noise |
| Vert.                   | 46.2               | 22.5                           | -                         | 12.6                     | 7.3          | 32.0         | -                      | 10.3                            | -                          | 40.0                           | -                         | 29.7                        | -                      | Floor noise |
| Vert.                   | 159.7              | 22.8                           | -                         | 15.4                     | 8.4          | 32.0         | -                      | 14.7                            | -                          | 43.5                           | -                         | 28.8                        | -                      | Floor noise |
| Vert.                   | 348.4              | 22.9                           | -                         | 15.2                     | 9.7          | 31.9         | -                      | 16.0                            | -                          | 46.0                           | -                         | 30.0                        | -                      | Floor noise |
| Vert.                   | 500.0              | 28.8                           | -                         | 18.0                     | 10.7         | 32.0         | -                      | 25.5                            | -                          | 46.0                           | -                         | 20.5                        | -                      |             |
| Vert.                   | 756.3              | 21.7                           | -                         | 20.4                     | 11.7         | 31.9         | -                      | 21.9                            | -                          | 46.0                           | -                         | 24.1                        | -                      | Floor noise |
| Vert.                   | 4874.0             | 40.6                           | 32.3                      | 31.5                     | 6.9          | 31.6         | -                      | 47.4                            | 39.1                       | 73.9                           | 53.9                      | 26.5                        | 14.8                   | Floor noise |
| Vert.                   | 7311.0             | 42.2                           | 33.9                      | 35.9                     | 8.0          | 32.7         | -                      | 53.4                            | 45.1                       | 73.9                           | 53.9                      | 20.5                        | 8.8                    | Floor noise |
| Vert.                   | 9748.0             | 42.3                           | 32.9                      | 39.1                     | 8.8          | 33.1         | -                      | 57.2                            | 47.7                       | 73.9                           | 53.9                      | 16.8                        | 6.2                    | Floor noise |

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

Result (AV)= 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).

\*QP detector was used up to 1GHz.

Distance factor:      1 GHz - 10 GHz       $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.39\text{ dB}$   
                              10 GHz - 26.5 GHz       $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

## Radiated Spurious Emission

|                        |                     |                     |
|------------------------|---------------------|---------------------|
| Report No.             | 14118411H           |                     |
| Test place             | Ise EMC Lab.        |                     |
| Semi Anechoic Chamber  | No.3                | No.3                |
| Date                   | December 7, 2021    | December 9, 2021    |
| Temperature / Humidity | 20 deg. C / 43 % RH | 24 deg. C / 43 % RH |
| Engineer               | Hiroki Numata       | Takumi Nishida      |
|                        | (1 GHz - 10 GHz)    | (10 GHz - 26.5 GHz) |
| Mode                   | Tx 11n-20 2462 MHz  |                     |

| Polarity    | Frequency | Reading<br>(QP / PK) | Reading<br>(AV) | Ant.<br>Factor | Loss | Gain | Duty<br>Factor | Result<br>(QP / PK) | Result<br>(AV) | Limit<br>(QP / PK) | Limit<br>(AV) | Margin<br>(QP / PK) | Margin<br>(AV) | Remark      |
|-------------|-----------|----------------------|-----------------|----------------|------|------|----------------|---------------------|----------------|--------------------|---------------|---------------------|----------------|-------------|
| [Hori/Vert] | [MHz]     | [dBuV]               | [dBuV]          | [dB/m]         | [dB] | [dB] | [dB]           | [dBuV/m]            | [dBuV/m]       | [dBuV/m]           | [dBuV/m]      | [dB]                | [dB]           |             |
| Hori.       | 2483.5    | 59.9                 | 48.9            | 27.4           | 5.6  | 32.5 | 1.5            | 60.3                | 50.8           | 73.9               | 53.9          | 13.6                | 3.1            | *1)         |
| Hori.       | 4924.0    | 40.9                 | 32.3            | 31.6           | 7.8  | 31.6 | -              | 48.7                | 40.1           | 73.9               | 53.9          | 25.2                | 13.8           | Floor noise |
| Hori.       | 7386.0    | 41.3                 | 33.8            | 36.0           | 9.3  | 32.7 | -              | 54.0                | 46.5           | 73.9               | 53.9          | 19.9                | 7.5            | Floor noise |
| Hori.       | 9848.0    | 40.7                 | 31.9            | 39.2           | 9.9  | 33.1 | -              | 56.6                | 47.8           | 73.9               | 53.9          | 17.3                | 6.1            | Floor noise |
| Vert.       | 2483.5    | 55.9                 | 46.0            | 27.4           | 5.6  | 32.5 | 1.5            | 56.3                | 47.9           | 73.9               | 53.9          | 17.6                | 6.0            | *1)         |
| Vert.       | 4924.0    | 40.4                 | 32.3            | 31.6           | 7.8  | 31.6 | -              | 48.3                | 40.1           | 73.9               | 53.9          | 25.7                | 13.8           | Floor noise |
| Vert.       | 7386.0    | 41.4                 | 33.8            | 36.0           | 9.3  | 32.7 | -              | 54.1                | 46.5           | 73.9               | 53.9          | 19.8                | 7.4            | Floor noise |
| Vert.       | 9848.0    | 40.2                 | 31.9            | 39.2           | 9.9  | 33.1 | -              | 56.2                | 47.8           | 73.9               | 53.9          | 17.7                | 6.1            | Floor noise |

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

Result (AV) = 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).

\*QP detector was used up to 1GHz.

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

|                  |                   |                                                         |
|------------------|-------------------|---------------------------------------------------------|
| Distance factor: | 1 GHz - 10 GHz    | $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.39\text{ dB}$ |
|                  | 10 GHz - 26.5 GHz | $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$  |

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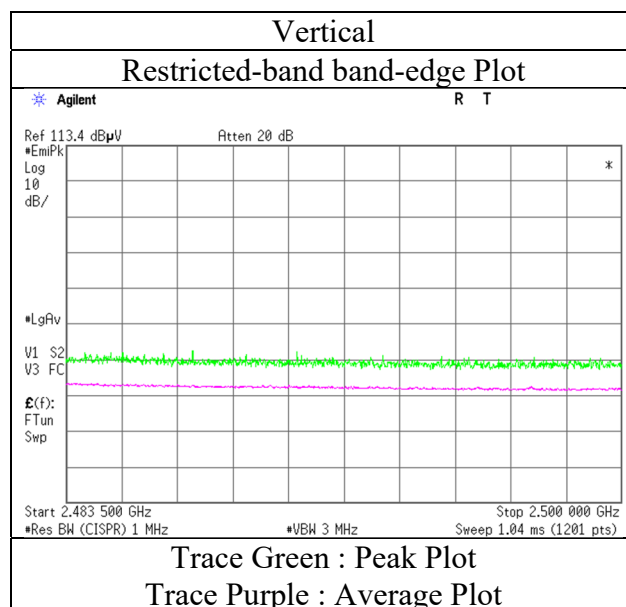
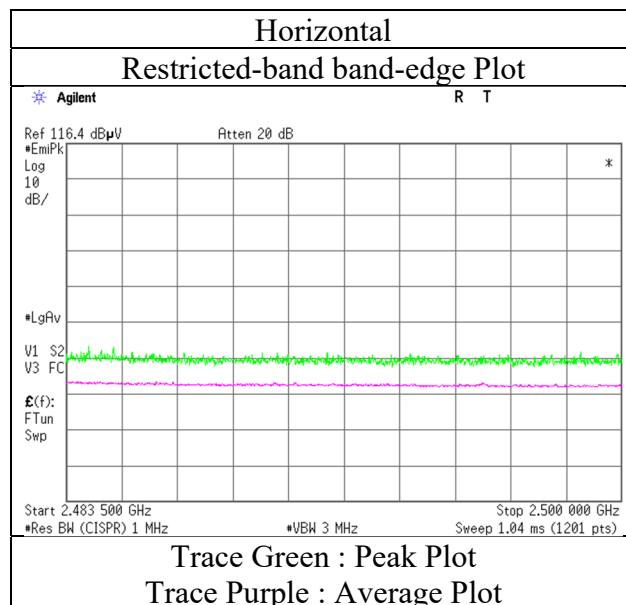
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

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

Report No. 14118411H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.3  
Date December 7, 2021  
Temperature / Humidity 20 deg. C / 43 % RH  
Engineer Hiroki Numata  
(1 GHz - 10 GHz)  
Mode Tx 11n-20 2462 MHz



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.  
Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

|                        |                     |                     |
|------------------------|---------------------|---------------------|
| Report No.             | 14118411H           | No.3                |
| Test place             | Ise EMC Lab.        | No.3                |
| Semi Anechoic Chamber  | No.3                | No.3                |
| Date                   | December 6, 2021    | December 9, 2021    |
| Temperature / Humidity | 21 deg. C / 41 % RH | 24 deg. C / 43 % RH |
| Engineer               | Takafumi Noguchi    | Takumi Nishida      |
|                        | (1 GHz - 10 GHz)    | (10 GHz - 26.5 GHz) |
| Mode                   | Tx 11n-40 2422 MHz  |                     |

| Polarity<br>[Hori/Vert] | Frequency<br>[MHz] | Reading<br>(QP / PK)<br>[dBuV] | Reading<br>(AV)<br>[dBuV] | Ant.<br>Factor<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Duty<br>Factor<br>[dB] | Result<br>(QP / PK)<br>[dBuV/m] | Result<br>(AV)<br>[dBuV/m] | Limit<br>(QP / PK)<br>[dBuV/m] | Limit<br>(AV)<br>[dBuV/m] | Margin<br>(QP / PK)<br>[dB] | Margin<br>(AV)<br>[dB] | Remark      |
|-------------------------|--------------------|--------------------------------|---------------------------|--------------------------|--------------|--------------|------------------------|---------------------------------|----------------------------|--------------------------------|---------------------------|-----------------------------|------------------------|-------------|
| Hori.                   | 2390.0             | 62.6                           | 50.9                      | 27.6                     | 4.9          | 32.6         | 2.4                    | 62.5                            | 53.2                       | 73.9                           | 53.9                      | 11.4                        | 0.7                    | *1)         |
| Hori.                   | 4844.0             | 40.8                           | 32.4                      | 31.5                     | 6.9          | 31.6         | -                      | 47.6                            | 39.1                       | 73.9                           | 53.9                      | 26.3                        | 14.8                   | Floor noise |
| Hori.                   | 7266.0             | 42.2                           | 34.2                      | 35.8                     | 8.0          | 32.6         | -                      | 53.4                            | 45.3                       | 73.9                           | 53.9                      | 20.6                        | 8.6                    | Floor noise |
| Hori.                   | 9688.0             | 42.2                           | 32.9                      | 39.0                     | 8.8          | 33.1         | -                      | 56.9                            | 47.6                       | 73.9                           | 53.9                      | 17.0                        | 6.3                    | Floor noise |
| Vert.                   | 2390.0             | 61.7                           | 50.3                      | 27.6                     | 4.9          | 32.6         | 2.4                    | 61.6                            | 52.6                       | 73.9                           | 53.9                      | 12.3                        | 1.3                    | *1)         |
| Vert.                   | 4844.0             | 40.8                           | 32.4                      | 31.5                     | 6.9          | 31.6         | -                      | 47.6                            | 39.1                       | 73.9                           | 53.9                      | 26.3                        | 14.8                   | Floor noise |
| Vert.                   | 7266.0             | 42.2                           | 34.2                      | 35.8                     | 8.0          | 32.6         | -                      | 53.4                            | 45.3                       | 73.9                           | 53.9                      | 20.6                        | 8.6                    | Floor noise |
| Vert.                   | 9688.0             | 42.2                           | 32.9                      | 39.0                     | 8.8          | 33.1         | -                      | 56.9                            | 47.6                       | 73.9                           | 53.9                      | 17.0                        | 6.3                    | Floor noise |

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

Result (AV) = 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).

\*QP detector was used up to 1GHz.

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

### 20dBc Data Sheet

| Polarity<br>[Hori/Vert] | Frequency<br>[MHz] | Reading<br>(PK)<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.                   | 2422.0             | 94.2                      | 27.5                    | 4.9          | 32.6         | 94.1               | -                 | -              | Carrier |
| Hori.                   | 2400.0             | 62.4                      | 27.5                    | 4.9          | 32.6         | 62.3               | 74.1              | 11.7           |         |
| Vert.                   | 2422.0             | 93.2                      | 27.5                    | 4.9          | 32.6         | 93.0               | -                 | -              | Carrier |
| Vert.                   | 2400.0             | 61.6                      | 27.5                    | 4.9          | 32.6         | 61.5               | 73.0              | 11.5           |         |

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

Distance factor: 1 GHz - 10 GHz 20log (3.95 m / 3.0 m) = 2.39 dB

10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

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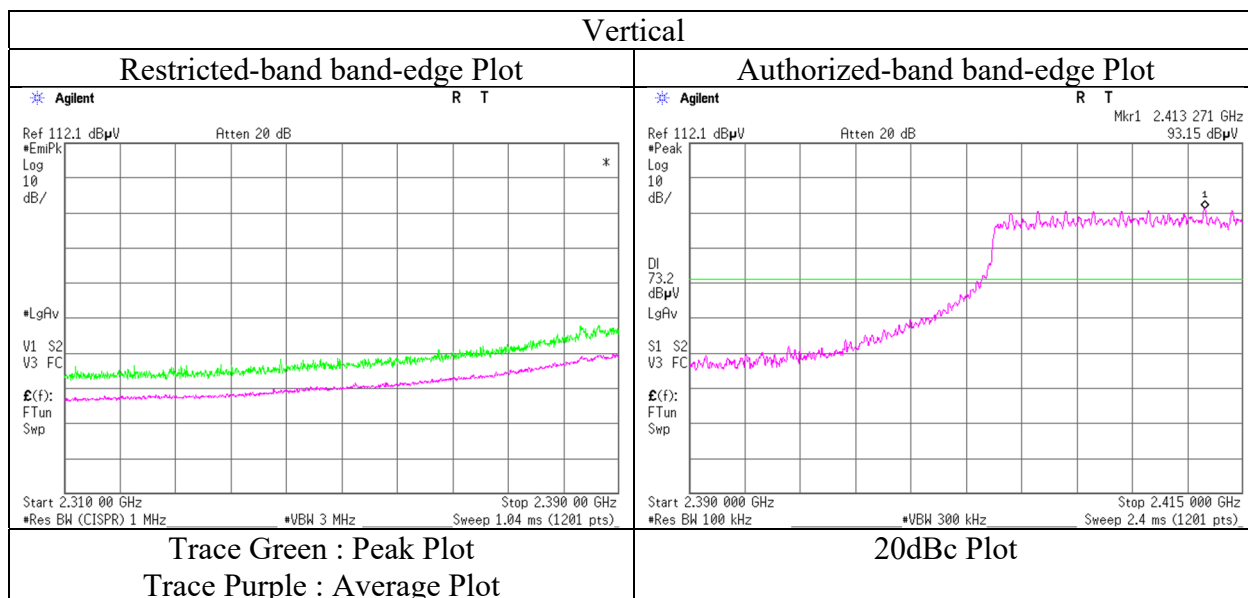
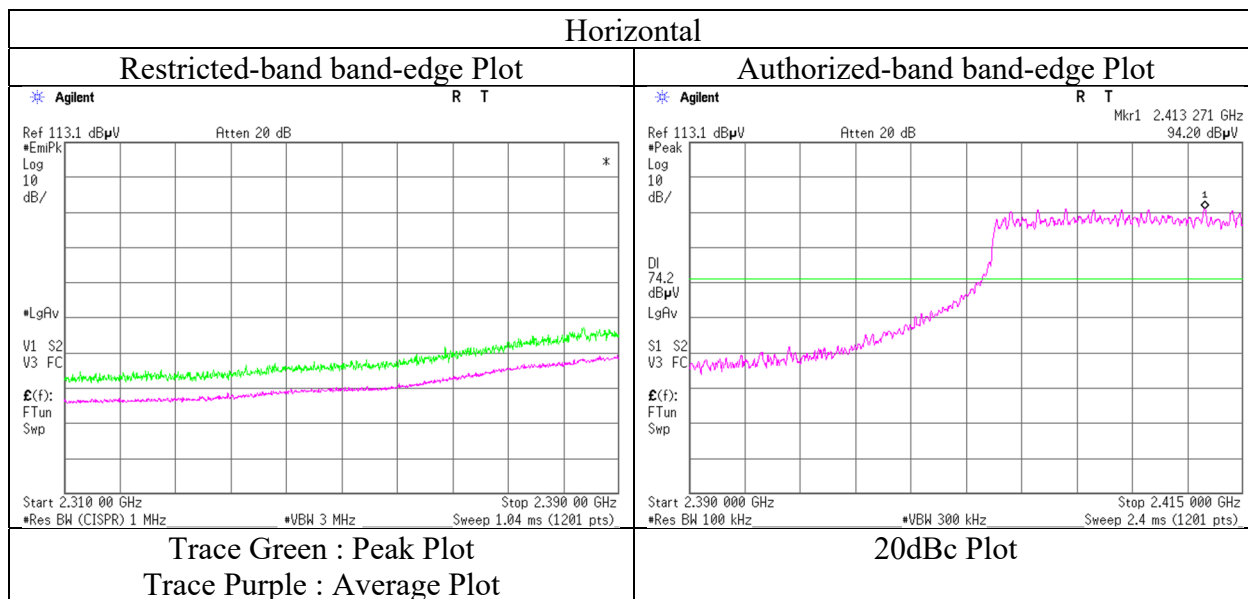
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

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

|                        |                                      |
|------------------------|--------------------------------------|
| Report No.             | 14118411H                            |
| Test place             | Ise EMC Lab.                         |
| Semi Anechoic Chamber  | No.3                                 |
| Date                   | December 6, 2021                     |
| Temperature / Humidity | 21 deg. C / 41 % RH                  |
| Engineer               | Takafumi Noguchi<br>(1 GHz - 10 GHz) |
| Mode                   | Tx 11n-40 2422 MHz                   |



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.  
Final result of restricted band edge was shown in tabular data.

## Radiated Spurious Emission

|                        |                     |                     |
|------------------------|---------------------|---------------------|
| Report No.             | 14118411H           |                     |
| Test place             | Ise EMC Lab.        |                     |
| Semi Anechoic Chamber  | No.3                | No.3                |
| Date                   | December 6, 2021    | December 9, 2021    |
| Temperature / Humidity | 21 deg. C / 41 % RH | 24 deg. C / 43 % RH |
| Engineer               | Takafumi Noguchi    | Takumi Nishida      |
|                        | (1 GHz - 10 GHz)    | (10 GHz - 26.5 GHz) |
| Mode                   | Tx 11n-40 2437 MHz  |                     |

| Polarity    | Frequency | Reading<br>(QP / PK) | Reading<br>(AV) | Ant.<br>Factor | Loss | Gain | Duty<br>Factor | Result<br>(QP / PK) | Result<br>(AV) | Limit<br>(QP / PK) | Limit<br>(AV) | Margin<br>(QP / PK) | Margin<br>(AV) | Remark      |
|-------------|-----------|----------------------|-----------------|----------------|------|------|----------------|---------------------|----------------|--------------------|---------------|---------------------|----------------|-------------|
| [Hori/Vert] | [MHz]     | [dBuV]               | [dBuV]          | [dB/m]         | [dB] | [dB] | [dB]           | [dBuV/m]            | [dBuV/m]       | [dBuV/m]           | [dBuV/m]      | [dB]                | [dB]           |             |
| Hori.       | 4874.0    | 40.6                 | 32.4            | 31.5           | 6.9  | 31.6 | -              | 47.4                | 39.2           | 73.9               | 53.9          | 26.5                | 14.7           | Floor noise |
| Hori.       | 7311.0    | 42.2                 | 33.9            | 35.9           | 8.0  | 32.7 | -              | 53.4                | 45.1           | 73.9               | 53.9          | 20.5                | 8.8            | Floor noise |
| Hori.       | 9748.0    | 42.4                 | 32.9            | 39.1           | 8.8  | 33.1 | -              | 57.2                | 47.7           | 73.9               | 53.9          | 16.7                | 6.2            | Floor noise |
| Vert.       | 4874.0    | 40.6                 | 32.4            | 31.5           | 6.9  | 31.6 | -              | 47.4                | 39.2           | 73.9               | 53.9          | 26.5                | 14.7           | Floor noise |
| Vert.       | 7311.0    | 42.2                 | 33.9            | 35.9           | 8.0  | 32.7 | -              | 53.4                | 45.1           | 73.9               | 53.9          | 20.5                | 8.8            | Floor noise |
| Vert.       | 9748.0    | 42.4                 | 32.9            | 39.1           | 8.8  | 33.1 | -              | 57.2                | 47.7           | 73.9               | 53.9          | 16.7                | 6.2            | Floor noise |

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

Result (AV)= 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).

\*QP detector was used up to 1GHz.

|                  |                   |                                                         |
|------------------|-------------------|---------------------------------------------------------|
| Distance factor: | 1 GHz - 10 GHz    | $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.39\text{ dB}$ |
|                  | 10 GHz - 26.5 GHz | $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$  |

**UL Japan, Inc.**

**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

|                        |                     |                     |
|------------------------|---------------------|---------------------|
| Report No.             | 14118411H           |                     |
| Test place             | Ise EMC Lab.        |                     |
| Semi Anechoic Chamber  | No.3                | No.3                |
| Date                   | December 7, 2021    | December 9, 2021    |
| Temperature / Humidity | 20 deg. C / 43 % RH | 24 deg. C / 43 % RH |
| Engineer               | Hiroki Numata       | Takumi Nishida      |
|                        | (1 GHz - 10 GHz)    | (10 GHz - 26.5 GHz) |
| Mode                   | Tx 11n-40 2452 MHz  |                     |

| Polarity    | Frequency | Reading<br>(QP / PK) | Reading<br>(AV) | Ant.<br>Factor | Loss | Gain | Duty<br>Factor | Result<br>(QP / PK) | Result<br>(AV) | Limit<br>(QP / PK) | Limit<br>(AV) | Margin<br>(QP / PK) | Margin<br>(AV) | Remark      |
|-------------|-----------|----------------------|-----------------|----------------|------|------|----------------|---------------------|----------------|--------------------|---------------|---------------------|----------------|-------------|
| [Hori/Vert] | [MHz]     | [dBuV]               | [dBuV]          | [dB/m]         | [dB] | [dB] | [dB]           | [dBuV/m]            | [dBuV/m]       | [dBuV/m]           | [dBuV/m]      | [dB]                | [dB]           |             |
| Hori.       | 2483.5    | 62.0                 | 48.3            | 27.4           | 5.6  | 32.5 | 2.4            | 62.5                | 51.1           | 73.9               | 53.9          | 11.4                | 2.8            | *1)         |
| Hori.       | 4904.0    | 40.9                 | 32.3            | 31.6           | 7.8  | 31.6 | -              | 48.7                | 40.1           | 73.9               | 53.9          | 25.3                | 13.8           | Floor noise |
| Hori.       | 7356.0    | 41.4                 | 33.7            | 36.0           | 9.3  | 32.7 | -              | 54.0                | 46.4           | 73.9               | 53.9          | 19.9                | 7.5            | Floor noise |
| Hori.       | 9808.0    | 40.8                 | 31.9            | 39.2           | 9.9  | 33.1 | -              | 56.8                | 47.9           | 73.9               | 53.9          | 17.2                | 6.0            | Floor noise |
| Vert.       | 2483.5    | 59.9                 | 46.1            | 27.4           | 5.6  | 32.5 | 2.4            | 60.3                | 49.0           | 73.9               | 53.9          | 13.6                | 4.9            | *1)         |
| Vert.       | 4904.0    | 40.3                 | 32.4            | 31.6           | 7.8  | 31.6 | -              | 48.1                | 40.2           | 73.9               | 53.9          | 25.8                | 13.7           | Floor noise |
| Vert.       | 7356.0    | 41.4                 | 33.6            | 36.0           | 9.3  | 32.7 | -              | 54.1                | 46.3           | 73.9               | 53.9          | 19.8                | 7.6            | Floor noise |
| Vert.       | 9808.0    | 40.5                 | 31.9            | 39.2           | 9.9  | 33.1 | -              | 56.4                | 47.9           | 73.9               | 53.9          | 17.5                | 6.1            | Floor noise |

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

Result (AV)= 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).

\*QP detector was used up to 1GHz.

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

|                  |                   |                                                         |
|------------------|-------------------|---------------------------------------------------------|
| Distance factor: | 1 GHz - 10 GHz    | $20\log(3.95\text{ m} / 3.0\text{ m}) = 2.39\text{ dB}$ |
|                  | 10 GHz - 26.5 GHz | $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$  |

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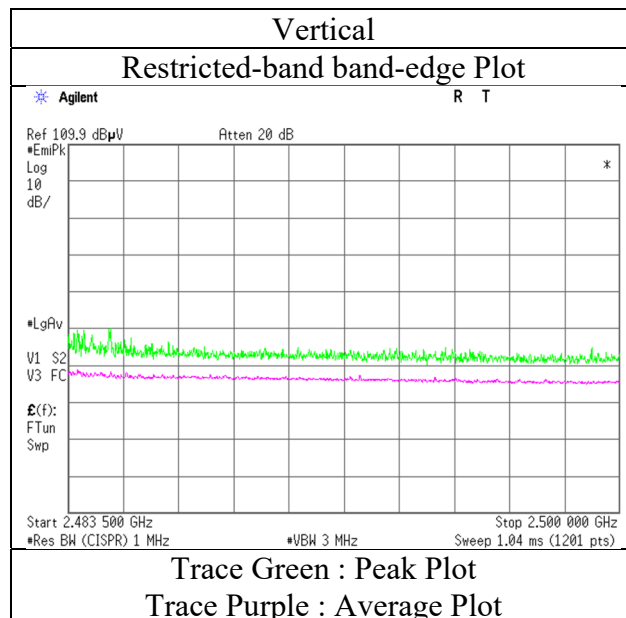
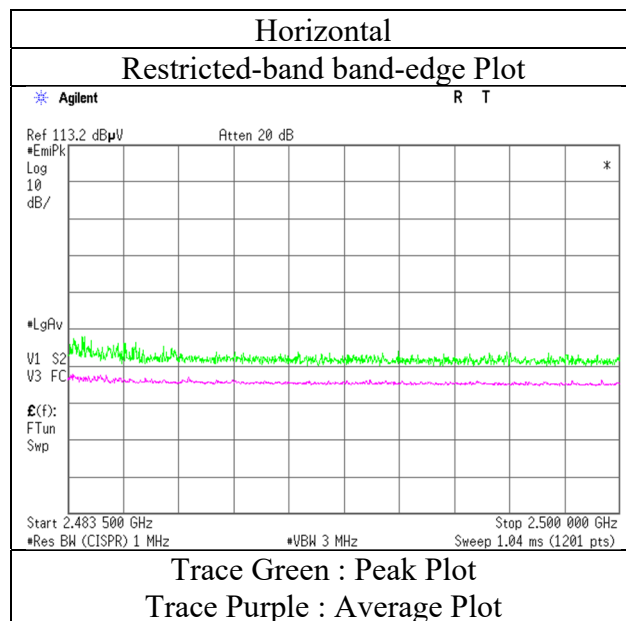
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Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

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

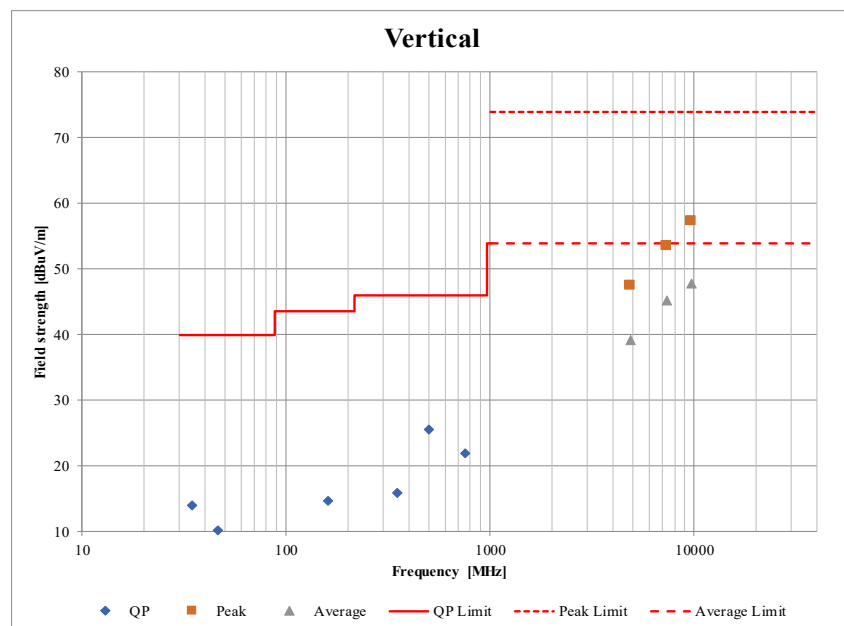
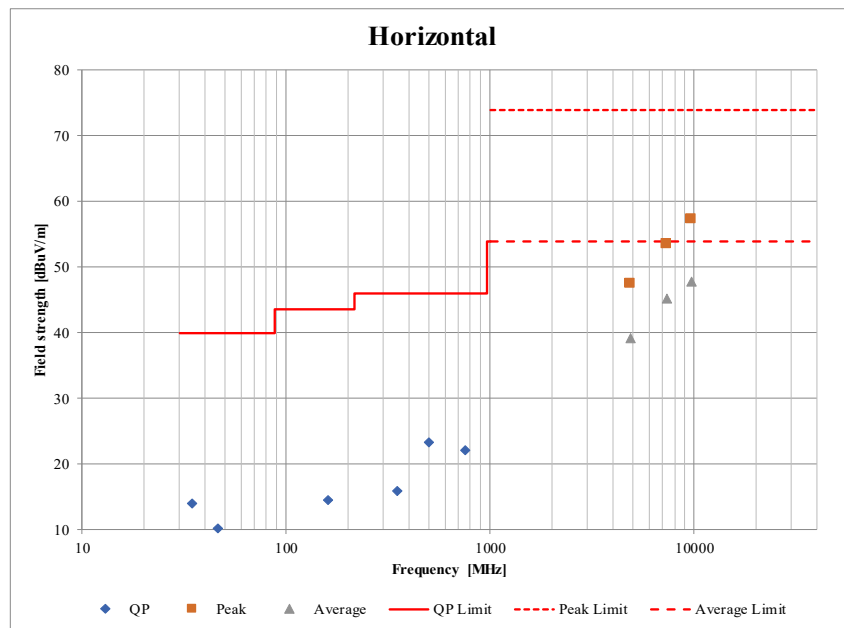
Report No. 14118411H  
Test place Ise EMC Lab.  
Semi Anechoic Chamber No.3  
Date December 7, 2021  
Temperature / Humidity 20 deg. C / 43 % RH  
Engineer Hiroki Numata  
(1 GHz - 10 GHz)  
Mode Tx 11n-40 2452 MHz



\* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.  
Final result of restricted band edge was shown in tabular data.

**Radiated Spurious Emission**  
**(Plot data, Worst case mode for Maximum Peak Output Power )**

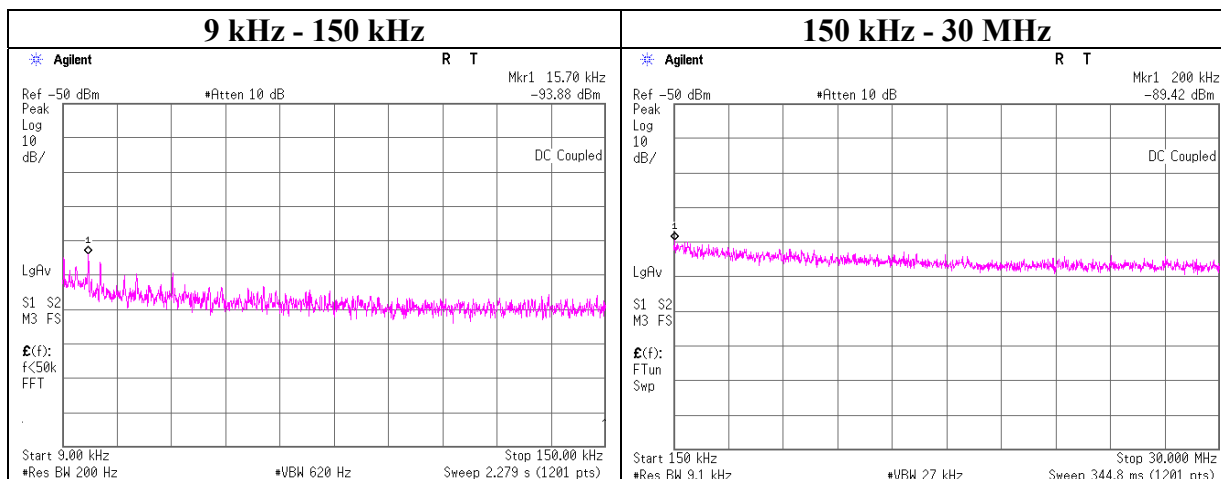
|                        |                                      |                                       |                                 |
|------------------------|--------------------------------------|---------------------------------------|---------------------------------|
| Report No.             | 14118411H                            |                                       |                                 |
| Test place             | Ise EMC Lab.                         |                                       |                                 |
| Semi Anechoic Chamber  | No.3                                 | No.3                                  | No.4                            |
| Date                   | December 6, 2021                     | December 9, 2021                      | December 18, 2021               |
| Temperature / Humidity | 21 deg. C / 41 % RH                  | 24 deg. C / 43 % RH                   | 21 deg. C / 38 % RH             |
| Engineer               | Takafumi Noguchi<br>(1 GHz - 10 GHz) | Takumi Nishida<br>(10 GHz - 26.5 GHz) | Nachi Konegawa<br>(Below 1 GHz) |
| Mode                   | Tx 11n-20 2437 MHz                   |                                       |                                 |



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

## Conducted Spurious Emission

|                        |                                    |
|------------------------|------------------------------------|
| Report No.             | 14118411H                          |
| Test place             | Ise EMC Lab. No.6 Measurement Room |
| Date                   | December 15, 2021                  |
| Temperature / Humidity | 24 deg. C / 28 % RH                |
| Engineer               | Nachi Konegawa                     |
| Mode                   | Tx 11n-20 2437 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 |
|--------------------|------------------|-----------------------|----------------------------|---------------------------|----------------------------|---------------|-----------------|--------------------------|-----------------------------------|-------------------|----------------|--------|
| 15.70              | -93.9            | 0.08                  | 9.8                        | 2.0                       | 1                          | -82.0         | 300             | 6.0                      | -20.7                             | 43.6              | 64.3           |        |
| 200.00             | -89.4            | 0.34                  | 9.9                        | 2.0                       | 1                          | -77.2         | 300             | 6.0                      | -16.0                             | 21.5              | 37.5           |        |

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

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

N: Number of output

\*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

## Power Density

|                        |                                    |                     |                     |
|------------------------|------------------------------------|---------------------|---------------------|
| Report No.             | 14118411H                          |                     |                     |
| Test place             | Ise EMC Lab. No.6 Measurement Room |                     |                     |
| Date                   | December 15, 2021                  | January 20, 2022    | March 15, 2022      |
| Temperature / Humidity | 24 deg. C / 28 % RH                | 24 deg. C / 40 % RH | 25 deg. C / 30 % RH |
| Engineer               | Nachi Konegawa                     | Nachi Konegawa      | Nachi Konegawa      |
| Mode                   | Tx                                 |                     |                     |

11b

| Freq. | Reading     | Cable Loss | Atten. Loss | Result        | Limit         | Margin |
|-------|-------------|------------|-------------|---------------|---------------|--------|
| [MHz] | dBm / 3 kHz | [dB]       | [dB]        | [dBm / 3 kHz] | [dBm / 3 kHz] | [dB]   |
| 2412  | -15.09      | 2.16       | 10.02       | -2.91         | 8.00          | 10.91  |
| 2437  | -14.45      | 2.19       | 10.02       | -2.24         | 8.00          | 10.24  |
| 2462  | -15.38      | 2.20       | 10.02       | -3.16         | 8.00          | 11.16  |

11g

| Freq. | Reading     | Cable Loss | Atten. Loss | Result        | Limit         | Margin |
|-------|-------------|------------|-------------|---------------|---------------|--------|
| [MHz] | dBm / 3 kHz | [dB]       | [dB]        | [dBm / 3 kHz] | [dBm / 3 kHz] | [dB]   |
| 2412  | -26.78      | 2.16       | 10.02       | -14.60        | 8.00          | 22.60  |
| 2437  | -27.68      | 2.19       | 10.02       | -15.47        | 8.00          | 23.47  |
| 2462  | -26.75      | 2.20       | 10.02       | -14.53        | 8.00          | 22.53  |

11n-20

| Freq. | Reading     | Cable Loss | Atten. Loss | Result        | Limit         | Margin |
|-------|-------------|------------|-------------|---------------|---------------|--------|
| [MHz] | dBm / 3 kHz | [dB]       | [dB]        | [dBm / 3 kHz] | [dBm / 3 kHz] | [dB]   |
| 2412  | -24.56      | 2.16       | 10.02       | -12.38        | 8.00          | 20.38  |
| 2437  | -23.62      | 2.19       | 10.02       | -11.41        | 8.00          | 19.41  |
| 2462  | -22.61      | 2.20       | 10.02       | -10.39        | 8.00          | 18.39  |

11n-40

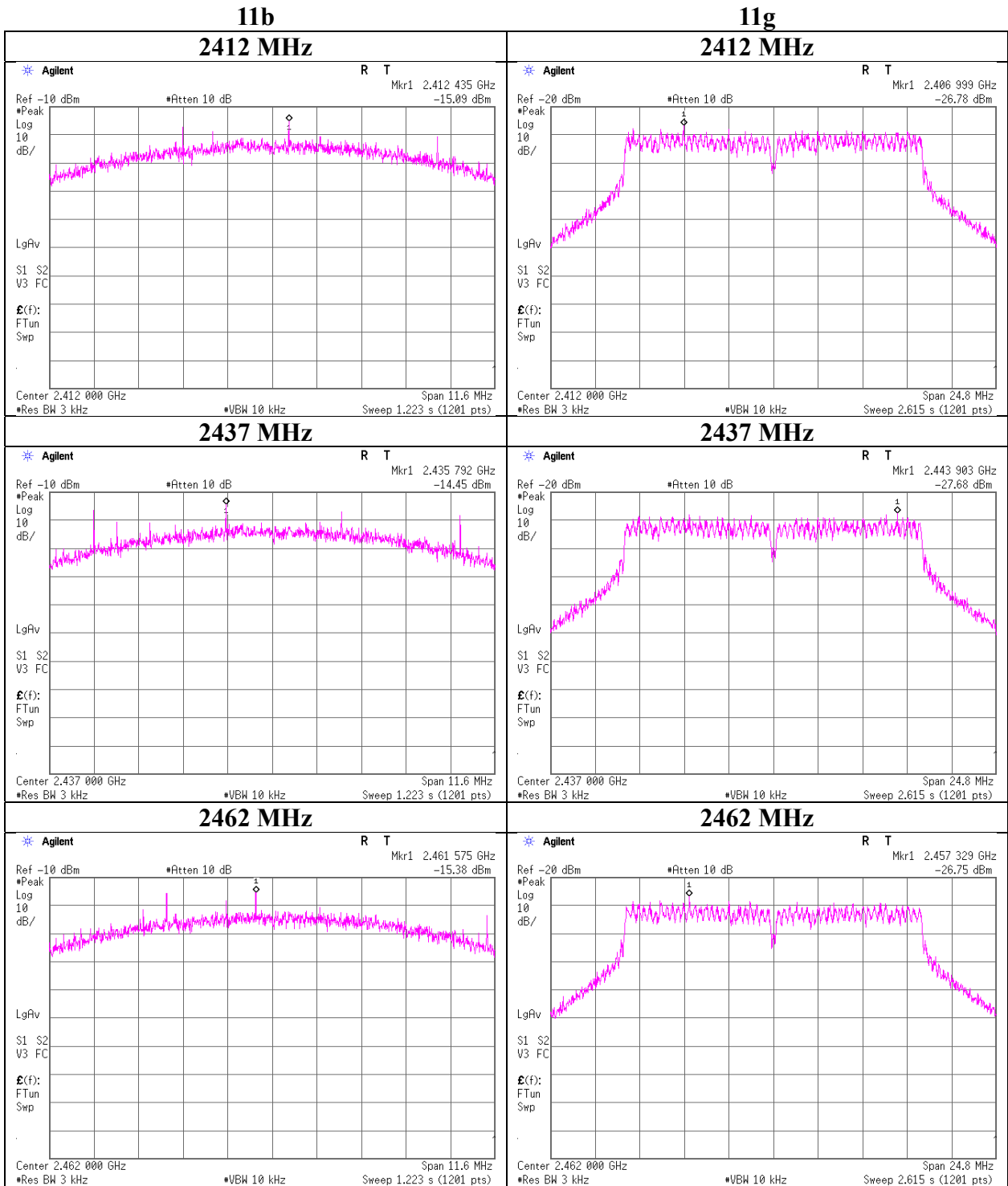
| Freq. | Reading     | Cable Loss | Atten. Loss | Result        | Limit         | Margin |
|-------|-------------|------------|-------------|---------------|---------------|--------|
| [MHz] | dBm / 3 kHz | [dB]       | [dB]        | [dBm / 3 kHz] | [dBm / 3 kHz] | [dB]   |
| 2422  | -28.42      | 2.16       | 10.02       | -16.24        | 8.00          | 24.24  |
| 2437  | -29.50      | 2.19       | 10.02       | -17.29        | 8.00          | 25.29  |
| 2452  | -29.30      | 2.20       | 10.02       | -17.08        | 8.00          | 25.08  |

Sample Calculation:

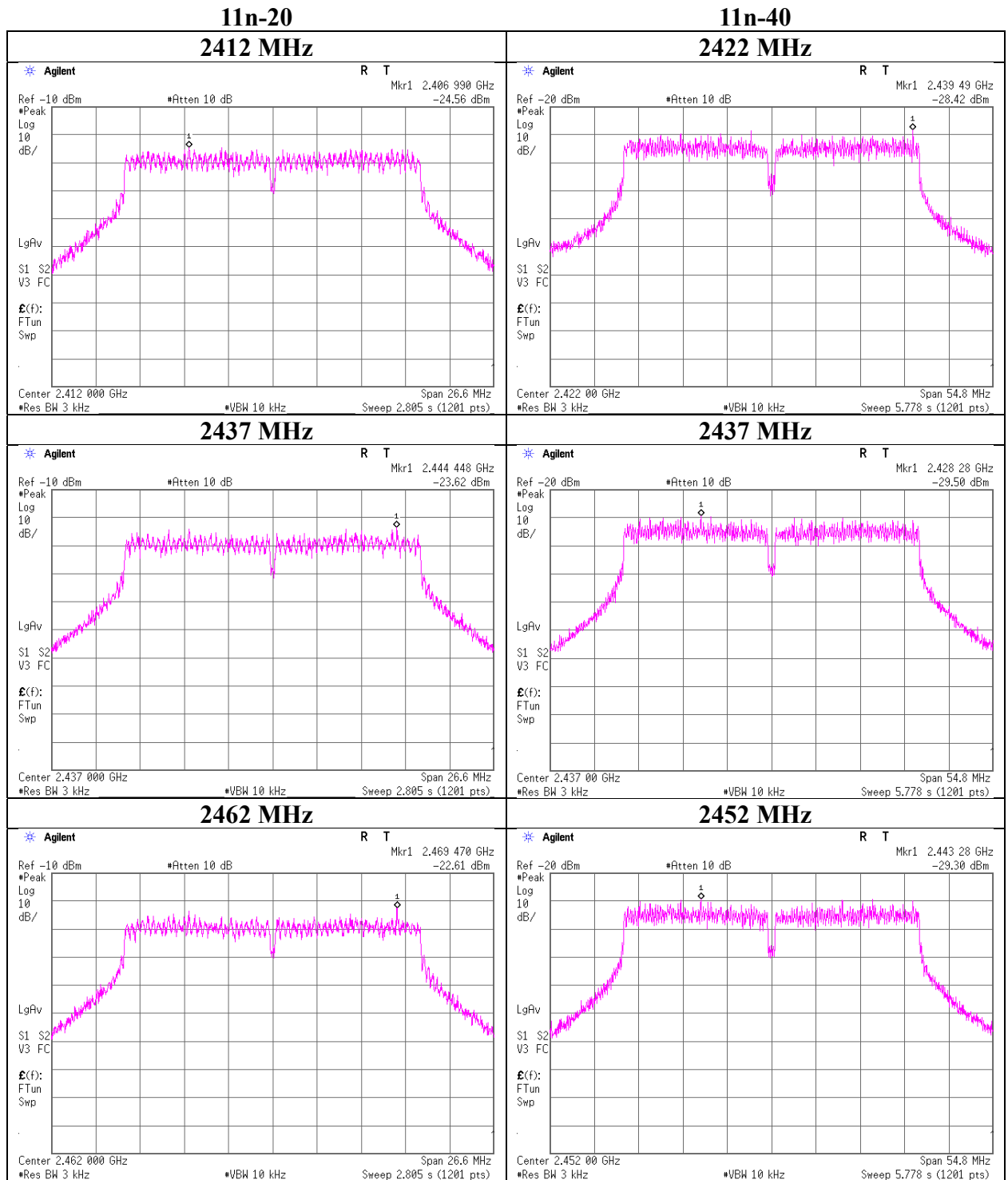
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

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

Power Density



## Power Density



UL Japan, Inc.

Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## APPENDIX 2: Test instruments

### Test equipment (1/2)

| Test Item | Local ID          | LIMS ID | Description                       | Manufacturer                       | Model                    | Serial                        | Last Calibration Date | Cal Int |
|-----------|-------------------|---------|-----------------------------------|------------------------------------|--------------------------|-------------------------------|-----------------------|---------|
| RE        | MSA-03            | 141884  | Spectrum Analyzer                 | Keysight Technologies Inc          | E4448A                   | MY44020357                    | 03/10/2021            | 12      |
| RE        | MHA-20            | 141507  | Horn Antenna 1-18GHz              | Schwarzbeck<br>Mess-Elektronik OHG | BBHA9120D                | 258                           | 11/09/2021            | 12      |
| RE        | MCC-231           | 177964  | Microwave Cable                   | Junkosha INC.                      | MMX221                   | 1901S329(1m)/<br>1902S579(5m) | 03/04/2021            | 12      |
| RE        | MPA-11            | 141580  | MicroWave System Amplifier        | Keysight Technologies Inc          | 83017A                   | MY39500779                    | 03/03/2021            | 12      |
| RE        | MHF-06            | 141404  | High Pass Filter 3.5-24GHz        | TOKIMEC                            | TF323DCA                 | 601                           | 05/18/2021            | 12      |
| RE        | MAEC-03           | 142008  | AC3_Semi Anechoic Chamber(NSA)    | TDK                                | Semi Anechoic Chamber 3m | DA-10005                      | 05/22/2020            | 24      |
| RE        | MOS-13            | 141554  | Thermo-Hygrometer                 | CUSTOM. Inc                        | CTH-201                  | 1301                          | 01/15/2021            | 12      |
| RE        | MMM-08            | 141532  | DIGITAL HiTESTER                  | HIOKI E.E.<br>CORPORATION          | 3805                     | 51201197                      | 01/07/2021            | 12      |
| RE        | MJM-16            | 142183  | Measure                           | KOMELON                            | KMC-36                   | -                             | -                     | -       |
| RE        | COTS-<br>MEMI-02  | 178648  | EMI measurement program           | TSJ<br>(Techno Science Japan)      | TEPTO-DV                 | -                             | -                     | -       |
| RE        | MAEC-03-<br>SVSWR | 142013  | AC3_Semi Anechoic Chamber(SVSWR)  | TDK                                | Semi Anechoic Chamber 3m | DA-10005                      | 04/01/2021            | 24      |
| RE        | MHF-25            | 141232  | High Pass Filter 3.5-18.0GHz      | UL Japan                           | HPF SELECTOR             | 001                           | 09/30/2021            | 12      |
| RE        | MHA-16            | 141513  | Horn Antenna 15-40GHz             | Schwarzbeck<br>Mess-Elektronik OHG | BBHA9170                 | BBHA9170306                   | 06/07/2021            | 12      |
| RE        | MAEC-04           | 142011  | AC4_Semi Anechoic Chamber(NSA)    | TDK                                | Semi Anechoic Chamber 3m | DA-10005                      | 05/25/2020            | 24      |
| RE        | MOS-15            | 141562  | Thermo-Hygrometer                 | CUSTOM. Inc                        | CTH-201                  | 0010                          | 01/15/2021            | 12      |
| RE        | MMM-10            | 141545  | DIGITAL HiTESTER                  | HIOKI E.E.<br>CORPORATION          | 3805                     | 51201148                      | 01/07/2021            | 12      |
| RE        | MJM-29            | 142230  | Measure                           | KOMELON                            | KMC-36                   | -                             | -                     | -       |
| RE        | MAT-34            | 141331  | Attenuator(6dB)                   | TME                                | UFA-01                   | -                             | 02/02/2021            | 12      |
| RE        | MBA-05            | 141425  | Biconical Antenna                 | Schwarzbeck<br>Mess-Elektronik OHG | VHA9103+<br>BBA9106      | VHA 91031302                  | 08/28/2021            | 12      |
| RE        | MCC-50            | 141397  | Coaxial Cable                     | UL Japan                           | -                        | -                             | 11/03/2021            | 12      |
| RE        | MLA-23            | 141267  | Logperiodic Antenna (200-1000MHz) | Schwarzbeck<br>Mess-Elektronik OHG | VUSLP9111B               | 9111B-192                     | 08/28/2021            | 12      |
| RE        | MPA-14            | 141583  | Pre Amplifier                     | SONOMA<br>INSTRUMENT               | 310                      | 260833                        | 02/18/2021            | 12      |
| RE        | MTR-10            | 141951  | EMI Test Receiver                 | Rohde & Schwarz                    | ESR26                    | 101408                        | 03/09/2021            | 12      |
| AT        | MOS-24            | 90289   | Thermo-Hygrometer                 | CUSTOM. Inc                        | CTH-201                  | 0005                          | 01/10/2022            | 12      |
| AT        | MMM-12            | 141547  | DIGITAL HiTESTER                  | HIOKI E.E.<br>CORPORATION          | 3805                     | 60500120                      | 02/01/2022            | 12      |
| AT        | MJM-24            | 142225  | Measure                           | ASKUL                              | -                        | -                             | -                     | -       |
| AT        | MRENT-130         | 141855  | Spectrum Analyzer                 | Keysight Technologies Inc          | E4440A                   | MY46187750                    | 11/28/2021            | 12      |
| AT        | MPM-13            | 141810  | Power Meter                       | Anritsu Corporation                | ML2495A                  | 824014                        | 12/14/2020            | 12      |

### UL Japan, Inc.

#### Ise EMC Lab.

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124

## Test equipment (2/2)

| Test Item | Local ID | LIMS ID | Description                         | Manufacturer              | Model        | Serial     | Last Calibration Date | Cal Int |
|-----------|----------|---------|-------------------------------------|---------------------------|--------------|------------|-----------------------|---------|
| AT        | MPSE-18  | 141832  | Power sensor                        | Anritsu Corporation       | MA2411B      | 738174     | 12/14/2020            | 12      |
| AT        | MAT-23   | 141361  | Attenuator(10dB) 1-18GHz            | Orient Microwave          | BX10-0476-00 | -          | 04/07/2021            | 12      |
| AT        | MCC-66   | 141328  | Microwave Cable 1G-40GHz            | Suhner                    | SUCOFLEX102  | 28636/2    | 04/16/2021            | 12      |
| AT        | MOS-14   | 141561  | Thermo-Hygrometer                   | CUSTOM. Inc               | CTH-201      | 1401       | 01/15/2021            | 12      |
| AT        | MMM-18   | 141558  | Digital Tester(TRUE RMS MULTIMETER) | Fluke Corporation         | 115          | 17930030   | 05/24/2021            | 12      |
| AT        | MSA-13   | 141900  | Spectrum Analyzer                   | Keysight Technologies Inc | E4440A       | MY46185823 | 09/30/2021            | 12      |
| AT        | MCC-144  | 141414  | Microwave Cable                     | Junkosha                  | MWX221       | 1207S407   | 08/11/2021            | 12      |
| AT        | MAT-58   | 141334  | Attenuator(10dB)                    | Suhner                    | 6810.19.A    | -          | 12/08/2021            | 12      |
| AT        | MCC-64   | 141327  | Coaxial Cable                       | UL Japan                  | -            | -          | 02/03/2021            | 12      |
| AT        | MAT-10   | 141156  | Attenuator(10dB)                    | Weinschel Corp            | 2            | BL1173     | 11/09/2021            | 12      |

\*Hyphens for Last Calibration 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.

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

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

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

**UL Japan, Inc.**

**Ise EMC Lab.**

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

Telephone : +81 596 24 8999

Facsimile : +81 596 24 8124