

# RADIO TEST REPORT

## Test Report No. 15457916H-A-R1

|                     |                             |
|---------------------|-----------------------------|
| Customer            | Sony Group Corporation      |
| Description of EUT  | Digital Wireless Microphone |
| Model Number of EUT | DWM-30                      |
| FCC ID              | AK8DWM30                    |
| Test Regulation     | FCC Part 15 Subpart C       |
| Test Result         | Complied                    |
| Issue Date          | December 18, 2024           |
| Remarks             | RF remote part              |

**Representative Test Engineer**Yuichiro Yamazaki  
Engineer**Approved By**Akihiko Maeda  
Leader

CERTIFICATE 5107.02

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- ☒ There is no testing item of "Non-accreditation".

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## **REVISION HISTORY**

### **Original Test Report No.: 15457916H-A**

This report is a revised version of 15457916H-A. 15457916H-A is replaced with this report.

| Revision     | Test Report No. | Date              | Page Revised Contents                                                                                                                                                     |
|--------------|-----------------|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| - (Original) | 15457916H-A     | October 24, 2024  | -                                                                                                                                                                         |
| 1            | 15457916H-A-R1  | December 18, 2024 | Section 2.1<br>Modified receipt date.<br>September 5, 2024: Antenna Terminal Conducted test sample<br>October 2, 2024: Radiated emissions test sample<br>→October 2, 2024 |

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

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

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## **SECTION 1: Customer Information**

|                  |                                                               |
|------------------|---------------------------------------------------------------|
| Company Name     | Sony Global Manufacturing & Operations Corporation            |
| Address          | Kisarazu Site 8-4 Shiomi, Kisarazu-shi, Chiba, 292-0834 Japan |
| Telephone Number | +81-438-37-4704                                               |
| Contact Person   | Youhei Hisano                                                 |

**\*Remarks:**

Sony Global Manufacturing & Operations Corporation (Subsidiary Company Name) is on behalf of the applicant: Sony Group Corporation.

The information provided by the customer is as follows;

- Customer, Description 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 and Test Date
- SECTION 4: Operation of EUT during testing

## **SECTION 2: Equipment Under Test (EUT)**

### **2.1 Identification of EUT**

|               |                                                                                            |
|---------------|--------------------------------------------------------------------------------------------|
| Description   | Digital Wireless Microphone                                                                |
| Model Number  | DWM-30                                                                                     |
| Serial Number | Refer to SECTION 4.2                                                                       |
| Condition     | Engineering prototype<br>(Not for Sale: This sample is equivalent to mass-produced items.) |
| Modification  | No Modification by the test lab                                                            |
| Receipt Date  | October 2, 2024                                                                            |
| Test Date     | October 8 and 10, 2024                                                                     |

## 2.2 Product Description

### General Specification

|                       |                       |
|-----------------------|-----------------------|
| Rating                | DC 3.0 V              |
| Operating temperature | 0 deg. C to 50 deg. C |

### Radio Specification

This report contains data provided by the customer which can impact the validity of results. UL Japan, Inc. is only responsible for the validity of results after the integration of the data provided by the customer. The data provided by the customer is marked "a)" in the table below.

#### <Radio microphone part>

|                            |                                                                                           |
|----------------------------|-------------------------------------------------------------------------------------------|
| Radio type                 | Transmitter                                                                               |
| Modulation type            | $\pi/4$ shift QPSK                                                                        |
| Emission designator        | 192KG1D, 192KG1E                                                                          |
| Channel spacing            | 25 kHz                                                                                    |
| Frequency of Operation     | 470.125 MHz to 607.875 MHz<br>614.125 MHz to 615.875 MHz                                  |
| RF power                   | 470.125 MHz to 607.875 MHz: 25 mW, 10 mW, 2 mW<br>614.125 MHz to 615.875 MHz: 10 mW, 2 mW |
| Antenna Gain <sup>a)</sup> | 1.05 dBi                                                                                  |
| AF Specification           | 20 Hz to 22000 Hz, Maximum input: -16 dBu (MIC level, ATT 0 dB)                           |

#### <RF remote part>

|                                |                      |
|--------------------------------|----------------------|
| Radio Type                     | Transceiver          |
| Modulation type                | DSSS                 |
| Frequency of Operation         | 2405 MHz to 2475 MHz |
| Channel spacing                | 5 MHz                |
| Method of frequency generation | Synthesizer          |
| Antenna Gain <sup>a)</sup>     | -8.27 dBi            |

## SECTION 3: Test Specification, Procedures & Results

### 3.1 Test Specification

|                    |                                                                                                                                                                                                              |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Specification | FCC Part 15 Subpart C<br>The latest version on the first day of the testing period                                                                                                                           |
| Title              | FCC 47 CFR Part 15 Radio Frequency Device Subpart C Intentional Radiators<br>Section 15.207 Conducted limits<br>Section 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz,<br>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 15.247(a)(2)<br>ISED: RSS-247 5.2(a)                          | See data.                                | Complied | Conducted                                                   |
| Maximum Peak Output Power               | FCC: KDB 558074 D01<br>15.247<br>Meas Guidance v05r02<br>ISED: RSS-Gen 6.12 | FCC: Section 15.247(b)(3)<br>ISED: RSS-247 5.4(d)                          |                                          | Complied | 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 | Conducted                                                   |
| Spurious Emission Restricted Band 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 | 14.3 dB<br>4880.0 MHz,<br>AV, Horizontal | Complied | Conducted (below 30 MHz)/<br>Radiated (above 30 MHz)<br>*2) |

Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593.

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

\*1) The test is not applicable since the EUT operates in RF mode only by battery and not by USB power supply.

\*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.

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

The test was performed with the New Battery and the stable voltage was supplied to the EUT during the tests. Therefore, 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          | -       | Conducted |

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

### 3.4 Uncertainty

Measurement uncertainty is not taken into account when stating conformity with a specified requirement.  
Note: When margins obtained from test results are less than the measurement uncertainty, the test results may exceed the limit.

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

#### Radiated emission

| Measurement distance | Frequency range     | Unit       | Calculated Uncertainty (+/-) |
|----------------------|---------------------|------------|------------------------------|
| 3 m                  | 9 kHz to 30 MHz     | dB         | 3.3                          |
| 10 m                 |                     | dB         | 3.1                          |
| 3 m                  | 30 MHz to 200 MHz   | Horizontal | 4.7                          |
|                      |                     | Vertical   | 4.7                          |
|                      | 200 MHz to 1000 MHz | Horizontal | 4.8                          |
|                      |                     | Vertical   | 6.0                          |
| 10 m                 | 30 MHz to 200 MHz   | Horizontal | 5.2                          |
|                      |                     | Vertical   | 5.1                          |
|                      | 200 MHz to 1000 MHz | Horizontal | 5.2                          |
|                      |                     | Vertical   | 5.2                          |
| 3 m                  | 1 GHz to 6 GHz      | dB         | 5.1                          |
|                      | 6 GHz to 18 GHz     | dB         | 5.4                          |
| 1 m                  | 10 GHz to 18 GHz    | dB         | 5.4                          |
|                      | 18 GHz to 26.5 GHz  | dB         | 5.3                          |
|                      | 26.5 GHz to 40 GHz  | dB         | 4.8                          |
| 0.5 m                | 26.5 GHz to 40 GHz  | dB         | 5.0                          |

#### Antenna Terminal Conducted

| Item                                                                | Unit   | Calculated Uncertainty (+/-) |
|---------------------------------------------------------------------|--------|------------------------------|
| Antenna terminated conducted emission / Power density / Burst power | dB     | 3.47                         |
| Adjacent channel power (ACP)                                        | dB     | 2.28                         |
| Bandwidth (OBW)                                                     | %      | 0.96                         |
| Time readout (time span upto 100 msec)                              | %      | 0.11                         |
| Time readout (time span upto 1000 msec)                             | %      | 0.11                         |
| Time readout (time span upto 60 sec)                                | %      | 0.02                         |
| Power measurement (Power meter < 8 GHz)                             | dB     | 1.46                         |
| Power measurement (Call box < 6 GHz)                                | dB     | 1.69                         |
| Frequency readout (Frequency counter)                               | ppm    | 0.67                         |
| Frequency readout (Spectrum analyzer frequency readout function)    | ppm    | 2.13                         |
| Temperature (constant temperature bath)                             | deg. C | 0.69                         |
| Humidity (constant temperature bath)                                | %RH    | 2.98                         |
| Modulation characteristics                                          | %      | 6.93                         |
| Frequency for mobile                                                | ppm    | 0.08                         |
| Contention-based protocol                                           | dB     | 2.26                         |

### 3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

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

Telephone: +81-596-24-8999

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

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

| 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                                                              | -                      | -                            |
| Large Chamber              | 16.9 x 22.1 x 10.17        | 16.9 x 22.1                                                      | -                      | 10 m                         |
| Small Chamber              | 5.3 x 6.69 x 3.59          | 5.3 x 6.69                                                       | -                      | -                            |

### 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)

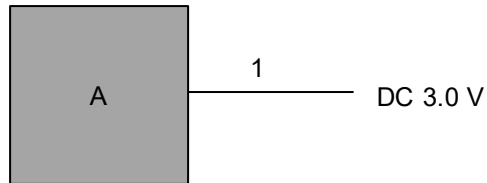
| Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Remarks*                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Transmitting (Tx)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 2405 MHz<br>2440 MHz<br>2475 MHz |
| <p>*Transmitting duty was 100 % on all tests.</p> <p>*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)</p> <p>*Power of the EUT was set by the software as follows;<br/> Power Setting: 1.0 dBm<br/> Software: V0.20<br/> (Date: July 9, 2024, Storage location: EUT memory)</p> <p>*This setting of software is the worst case.<br/> Any conditions under the normal use do not exceed the condition of setting.<br/> In addition, end users cannot change the settings of the output power of the product.</p> |                                  |

\*The Details of Operating Mode(s)

| Test Item                                                                                                                                                                                                                                                                                                              | Operating Mode | Tested Frequency                 |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|----------------------------------|
| Radiated Spurious Emission (Below 1 GHz)<br>Conducted Spurious Emission                                                                                                                                                                                                                                                | Tx             | 2475 MHz *1)                     |
| Radiated Spurious Emission (Above 1 GHz),<br>6dB Bandwidth,<br>Maximum Peak Output Power,<br>Power Density,<br>99% Occupied Bandwidth                                                                                                                                                                                  | Tx             | 2405 MHz<br>2440 MHz<br>2475 MHz |
| <p>*1) Conducted emissions and Spurious emissions for frequencies below 1 GHz were limited to the channel that had the highest power during the antenna terminal test, as preliminary testing indicated that changing the operating frequency had no significant impact on the emissions in those frequency bands.</p> |                |                                  |

## 4.2 Configuration and Peripherals

### Antenna Terminal Conducted test



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

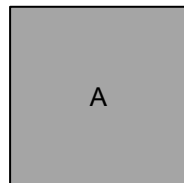
#### Description of EUT

| No. | Item                        | Model number | Serial Number | Manufacturer           | Remarks |
|-----|-----------------------------|--------------|---------------|------------------------|---------|
| A   | Digital Wireless Microphone | DWM-30       | 001           | Sony Group Corporation | EUT     |

#### List of Cables Used

| No. | Name     | Length (m) | Shield     |            | Remarks |
|-----|----------|------------|------------|------------|---------|
|     |          |            | Cable      | Connector  |         |
| 1   | DC Cable | 2.1        | Unshielded | Unshielded | -       |

### Radiated Emission



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

#### Description of EUT

| No. | Item                        | Model number | Serial Number | Manufacturer           | Remarks |
|-----|-----------------------------|--------------|---------------|------------------------|---------|
| A   | Digital Wireless Microphone | DWM-30       | 1011          | Sony Group Corporation | EUT     |

## 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, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

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

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        |

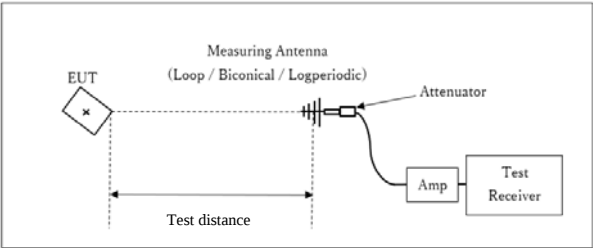
In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired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

Figure 1: Test Setup

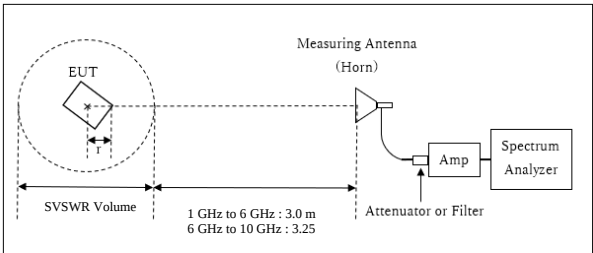
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz to 10 GHz



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

[1 GHz to 6 GHz]

Distance Factor:  $20 \times \log (3.65 \text{ m} / 3.0 \text{ m}) = 1.71 \text{ dB}$

\* Test Distance:  $(3 + \text{SVSWR Volume} / 2) - r = 3.65 \text{ m}$

SVSWR Volume : 1.5 m

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

r = 0.1 m

[6 GHz to 10 GHz]

Distance Factor:  $20 \times \log (3.65 \text{ m} / 3.0 \text{ m}) = 1.71 \text{ dB}$

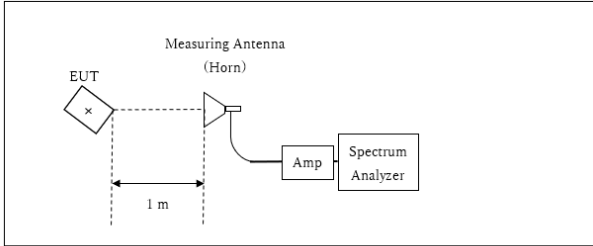
\* Test Distance:  $(3.25 + \text{SVSWR Volume} / 2) - r = 3.65 \text{ m}$

SVSWR Volume : 1.0 m

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

r = 0.1 m

10 GHz to 26.5 GHz



× : 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.

Test results are rounded off and limit are rounded down, so some differences might be observed.

Measurement Range : 30 MHz to 26.5 GHz  
Test Data : APPENDIX  
Test Result : 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                       | 5 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     | -        | 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 *2)           |
| Conducted Spurious Emission *3) *4) | 9 kHz to 150 kHz<br>150 kHz to 30 MHz   | 200 Hz<br>10 kHz | 620 Hz<br>30 kHz   | Auto       | Peak     | Max Hold | Spectrum Analyzer               |

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

\*2) Section 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013".

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

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

\*4) 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.

Test results are rounded off and limit are rounded down, 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**

|                        |                                    |
|------------------------|------------------------------------|
| Test place             | Ise EMC Lab. No.6 Measurement Room |
| Date                   | October 8, 2024                    |
| Temperature / Humidity | 23 deg. C / 60 % RH                |
| Engineer               | Yuichiro Yamazaki                  |
| Mode                   | Tx                                 |

| Frequency<br>[MHz] | 99% Occupied<br>Bandwidth<br>[kHz] | 6dB Bandwidth<br>[MHz] | Limit for<br>6dB Bandwidth<br>[MHz] |
|--------------------|------------------------------------|------------------------|-------------------------------------|
| 2405               | 2403.3                             | 1.600                  | > 0.5000                            |
| 2440               | 2450.9                             | 1.617                  | > 0.5000                            |
| 2475               | <b>2498.8</b>                      | 1.634                  | > 0.5000                            |

99 % Occupied Bandwidth and 6 dB Bandwidth

| 99 % Occupied Bandwidth<br>2405 MHz                                                                                                                                                                                                                                                                                                                                                | 6 dB Bandwidth<br>2405 MHz                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <div><p>Agilent R T</p><p>Ref 10 dBm Atten 20 dB</p><p>Peak Log 10 dB/</p><p>LgAv</p><p>M1 S2</p><p>Center 2.405 000 GHz</p><p>Res BW 30 kHz</p><p>VBW 100 kHz</p><p>Span 10 MHz</p><p>Sweep 10.56 ms (1201 pts)</p><p>Occupied Bandwidth 2.4033 MHz</p><p>Occ BW % Pwr 99.00 %</p><p>x dB -6.00 dB</p><p>Transmit Freq Error -11.426 kHz</p><p>x dB Bandwidth 1.464 MHz</p></div> | <div><p>Agilent R T</p><p>Ref 10 dBm Atten 20 dB</p><p>Peak Log 10 dB/</p><p>LgAv</p><p>M1 S2</p><p>Center 2.405 000 GHz</p><p>Res BW 100 kHz</p><p>VBW 300 kHz</p><p>Span 5 MHz</p><p>Sweep 1.04 ms (1201 pts)</p><p>Occupied Bandwidth 2.3476 MHz</p><p>Occ BW % Pwr 99.00 %</p><p>x dB -6.00 dB</p><p>Transmit Freq Error -18.338 kHz</p><p>x dB Bandwidth 1.600 MHz</p></div> |
| 2440 MHz                                                                                                                                                                                                                                                                                                                                                                           | 2440 MHz                                                                                                                                                                                                                                                                                                                                                                          |
| <div><p>Agilent R T</p><p>Ref 10 dBm Atten 20 dB</p><p>Peak Log 10 dB/</p><p>LgAv</p><p>M1 S2</p><p>Center 2.440 000 GHz</p><p>Res BW 30 kHz</p><p>VBW 100 kHz</p><p>Span 10 MHz</p><p>Sweep 10.56 ms (1201 pts)</p><p>Occupied Bandwidth 2.4509 MHz</p><p>Occ BW % Pwr 99.00 %</p><p>x dB -6.00 dB</p><p>Transmit Freq Error -8.803 kHz</p><p>x dB Bandwidth 1.538 MHz</p></div>  | <div><p>Agilent R T</p><p>Ref 10 dBm Atten 20 dB</p><p>Peak Log 10 dB/</p><p>LgAv</p><p>M1 S2</p><p>Center 2.440 000 GHz</p><p>Res BW 100 kHz</p><p>VBW 300 kHz</p><p>Span 5 MHz</p><p>Sweep 1.04 ms (1201 pts)</p><p>Occupied Bandwidth 2.4056 MHz</p><p>Occ BW % Pwr 99.00 %</p><p>x dB -6.00 dB</p><p>Transmit Freq Error -21.045 kHz</p><p>x dB Bandwidth 1.617 MHz</p></div> |
| 2475 MHz                                                                                                                                                                                                                                                                                                                                                                           | 2475 MHz                                                                                                                                                                                                                                                                                                                                                                          |
| <div><p>Agilent R T</p><p>Ref 10 dBm Atten 20 dB</p><p>Peak Log 10 dB/</p><p>LgAv</p><p>M1 S2</p><p>Center 2.475 000 GHz</p><p>Res BW 30 kHz</p><p>VBW 100 kHz</p><p>Span 10 MHz</p><p>Sweep 10.56 ms (1201 pts)</p><p>Occupied Bandwidth 2.4988 MHz</p><p>Occ BW % Pwr 99.00 %</p><p>x dB -6.00 dB</p><p>Transmit Freq Error -12.413 kHz</p><p>x dB Bandwidth 1.548 MHz</p></div> | <div><p>Agilent R T</p><p>Ref 10 dBm Atten 20 dB</p><p>Peak Log 10 dB/</p><p>LgAv</p><p>M1 S2</p><p>Center 2.475 000 GHz</p><p>Res BW 100 kHz</p><p>VBW 300 kHz</p><p>Span 5 MHz</p><p>Sweep 1.04 ms (1201 pts)</p><p>Occupied Bandwidth 2.4490 MHz</p><p>Occ BW % Pwr 99.00 %</p><p>x dB -6.00 dB</p><p>Transmit Freq Error -16.043 kHz</p><p>x dB Bandwidth 1.634 MHz</p></div> |

## Maximum Peak Output Power

Test place                      Ise EMC Lab. No.6 Measurement Room  
Date                              October 8, 2024  
Temperature / Humidity      23 deg. C / 60 % RH  
Engineer                        Yuichiro Yamazaki  
Mode                              Tx

| Freq. | Reading | Cable<br>Loss | Atten.<br>Loss | Conducted Power |             |       |      |        | Antenna<br>Gain | e.i.r.p. for RSS-247 |             |       |      |        |
|-------|---------|---------------|----------------|-----------------|-------------|-------|------|--------|-----------------|----------------------|-------------|-------|------|--------|
|       |         |               |                | Result          |             | Limit |      | Margin |                 | Result               |             | Limit |      | Margin |
|       |         |               |                | [dBm]           | [mW]        | [dBm] | [mW] |        |                 | [dBm]                | [mW]        |       |      |        |
|       |         |               |                |                 |             |       |      |        |                 |                      |             |       |      |        |
| [MHz] | [dBm]   | [dB]          | [dB]           | [dBm]           | [mW]        | [dBm] | [mW] | [dB]   | [dBi]           | [dBm]                | [mW]        | [dBm] | [mW] | [dB]   |
| 2405  | -10.95  | 1.65          | 10.07          | 0.77            | 1.19        | 30.00 | 1000 | 29.23  | -8.27           | -7.50                | 0.18        | 36.02 | 4000 | 43.52  |
| 2440  | -11.13  | 1.66          | 10.07          | 0.60            | 1.15        | 30.00 | 1000 | 29.40  | -8.27           | -7.67                | 0.17        | 36.02 | 4000 | 43.69  |
| 2475  | -10.67  | 1.67          | 10.07          | <b>1.07</b>     | <b>1.28</b> | 30.00 | 1000 | 28.93  | -8.27           | <b>-7.20</b>         | <b>0.19</b> | 36.02 | 4000 | 43.22  |

Sample Calculation:

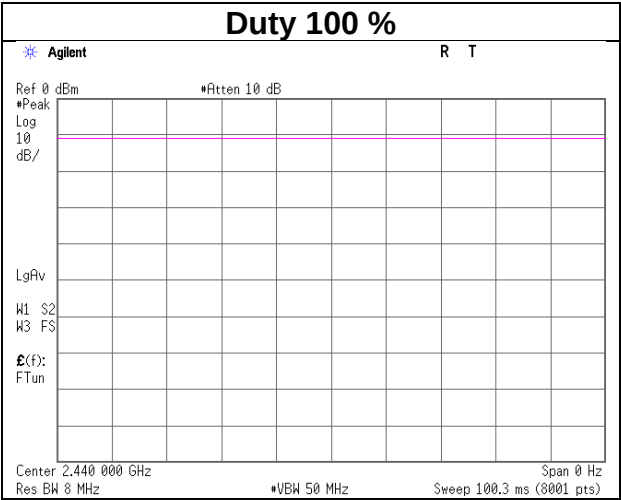
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

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

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

Burst rate confirmation

Test place Ise EMC Lab. No.6 Measurement Room  
Date October 8, 2024  
Temperature / Humidity 23 deg. C / 60 % RH  
Engineer Yuichiro Yamazaki  
Mode Tx



**Radiated Spurious Emission**

Test place                      Ise EMC Lab.  
Semi Anechoic Chamber      No.2  
Date                              October 10, 2024  
Temperature / Humidity        21 deg. C / 50 % RH  
Engineer                        Junki Nagatomi  
                                        (Above 1 GHz)  
Mode                              Tx 2405 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    | 46.3                 | 37.6            | 27.6           | 4.7  | 36.0 | -              | 42.6                | 33.8           | 73.9               | 53.9          | 31.3                | 20.1           |             |
| Hori.       | 4810.0    | 47.0                 | 35.0            | 31.3           | 6.9  | 35.6 | -              | 49.5                | 37.5           | 73.9               | 53.9          | 24.4                | 16.4           |             |
| Hori.       | 7215.0    | 44.5                 | 35.7            | 35.4           | 8.1  | 35.6 | -              | 52.3                | 43.5           | 73.9               | 53.9          | 21.6                | 10.4           | Floor noise |
| Hori.       | 9620.0    | 44.9                 | 35.9            | 35.8           | 8.6  | 36.1 | -              | 53.2                | 44.2           | 73.9               | 53.9          | 20.7                | 9.7            | Floor noise |
| Vert.       | 2390.0    | 46.2                 | 37.1            | 27.6           | 4.7  | 36.0 | -              | 42.5                | 33.3           | 73.9               | 53.9          | 31.4                | 20.6           |             |
| Vert.       | 4810.0    | 45.6                 | 36.7            | 31.3           | 6.9  | 35.6 | -              | 48.1                | 39.3           | 73.9               | 53.9          | 25.8                | 14.6           |             |
| Vert.       | 7215.0    | 44.5                 | 35.7            | 35.4           | 8.1  | 35.6 | -              | 52.3                | 43.5           | 73.9               | 53.9          | 21.6                | 10.4           | Floor noise |
| Vert.       | 9620.0    | 45.0                 | 35.9            | 35.8           | 8.6  | 36.1 | -              | 53.3                | 44.2           | 73.9               | 53.9          | 20.6                | 9.7            | 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.

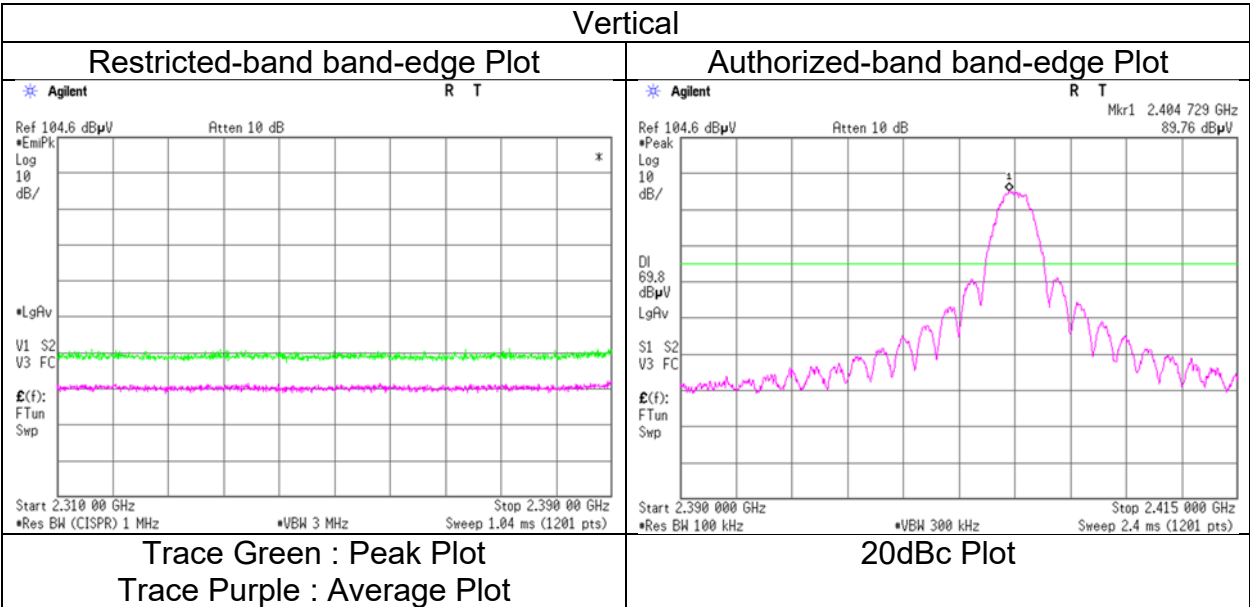
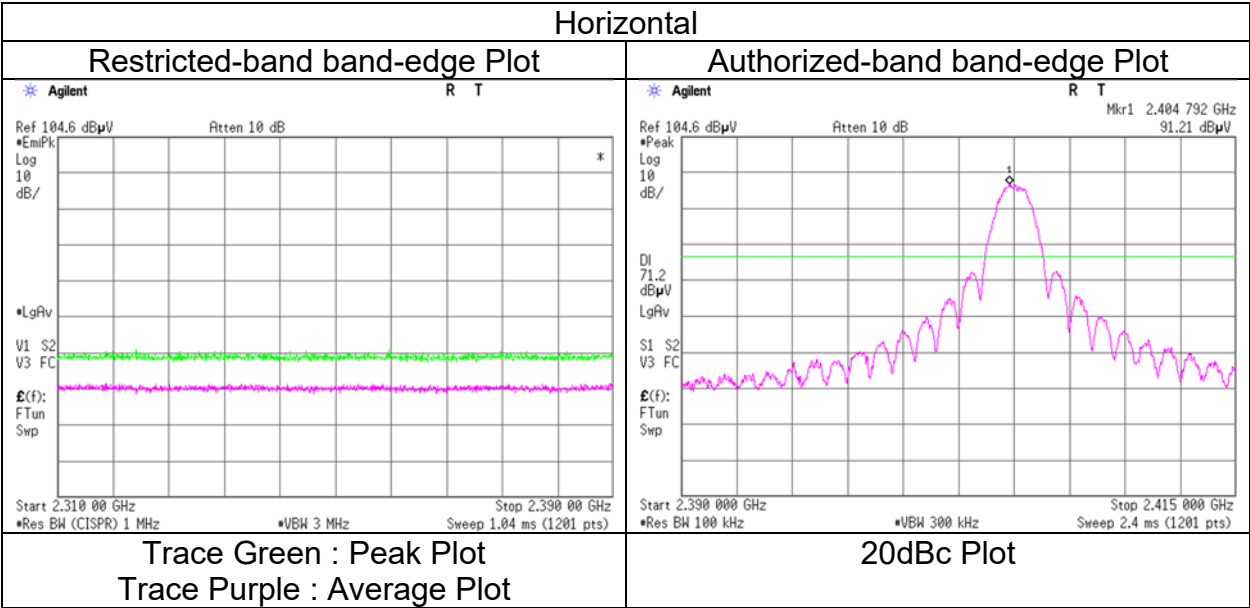
**20dBc Data Sheet**

| 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.       | 2405.0    | 91.2            | 27.5          | 4.7  | 36.0 | 87.4     | -        | -      | Carrier |
| Hori.       | 2400.0    | 50.8            | 27.5          | 4.7  | 36.0 | 47.0     | 67.4     | 20.5   |         |
| Vert.       | 2405.0    | 89.8            | 27.5          | 4.7  | 36.0 | 86.0     | -        | -      | Carrier |
| Vert.       | 2400.0    | 49.7            | 27.5          | 4.7  | 36.0 | 45.9     | 66.0     | 20.0   |         |

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)  
Distance factor:  
1 GHz - 6 GHz                      20log (3.65 m / 3.0 m) = 1.71 dB  
6 GHz - 10 GHz                    20log (3.65 m / 3.0 m) = 1.71 dB  
10 GHz - 26.5 GHz                20log (1.0 m / 3.0 m) = -9.5 dB

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

|                        |                     |
|------------------------|---------------------|
| Test place             | Ise EMC Lab.        |
| Semi Anechoic Chamber  | No.2                |
| Date                   | October 10, 2024    |
| Temperature / Humidity | 21 deg. C / 50 % RH |
| Engineer               | Junki Nagatomi      |
|                        | (1 GHz to 10 GHz)   |
| Mode                   | Tx 2405 MHz         |



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

**Radiated Spurious Emission**

Test place                      Ise EMC Lab.  
Semi Anechoic Chamber      No.2  
Date                              October 10, 2024  
Temperature / Humidity       21 deg. C / 50 % RH  
Engineer                        Junki Nagatomi  
                                        (Above 1 GHz)  
Mode                              Tx 2440 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.       | 4880.0    | 46.1                 | 37.8            | 31.3           | 6.1  | 35.6 | -              | 47.9                | 39.7           | 73.9               | 53.9          | 26.0                | 14.3           |             |
| Hori.       | 7320.0    | 44.0                 | 35.7            | 35.4           | 8.1  | 35.6 | -              | 51.8                | 43.5           | 73.9               | 53.9          | 22.1                | 10.4           | Floor noise |
| Hori.       | 9760.0    | 45.5                 | 36.0            | 35.9           | 8.6  | 36.2 | -              | 53.9                | 44.4           | 73.9               | 53.9          | 20.0                | 9.5            | Floor noise |
| Vert.       | 4880.0    | 45.6                 | 36.5            | 31.3           | 6.9  | 35.6 | -              | 48.2                | 39.0           | 73.9               | 53.9          | 25.8                | 14.9           |             |
| Vert.       | 7320.0    | 45.3                 | 35.7            | 35.4           | 8.1  | 35.6 | -              | 53.2                | 43.5           | 73.9               | 53.9          | 20.8                | 10.4           | Floor noise |
| Vert.       | 9760.0    | 45.7                 | 36.0            | 35.9           | 8.6  | 36.2 | -              | 54.1                | 44.4           | 73.9               | 53.9          | 19.8                | 9.5            | 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.

Distance factor:      1 GHz - 6 GHz      20log (3.65 m / 3.0 m) = 1.71 dB  
                             6 GHz - 10 GHz      20log (3.65 m / 3.0 m) = 1.71 dB  
                             10 GHz - 26.5 GHz      20log (1.0 m / 3.0 m) = -9.5 dB

## Radiated Spurious Emission

Test place  
Semi Anechoic Chamber  
Date  
Temperature / Humidity  
Engineer

Ise EMC Lab.  
No.2  
October 10, 2024  
23 deg. C / 50 % RH  
Yuta Moriya  
(Below 1 GHz)  
Tx 2475 MHz

No.2  
October 10, 2024  
21 deg. C / 50 % RH  
Junki Nagatomi  
(Above 1 GHz)

Mode

| Polarity    | Frequency | Reading (QP / PK) | Reading (AV) | Ant. Factor | Loss | Gain | Duty Factor | Result (QP / PK) | Result (AV) | Limit (QP / PK) | Limit (AV) | Margin (QP / PK) | Margin (AV) | Remark      |
|-------------|-----------|-------------------|--------------|-------------|------|------|-------------|------------------|-------------|-----------------|------------|------------------|-------------|-------------|
| [Hori/Vert] | [MHz]     | [dBuV]            | [dBuV]       | [dB/m]      | [dB] | [dB] | [dB]        | [dBuV/m]         | [dBuV/m]    | [dBuV/m]        | [dBuV/m]   | [dB]             | [dB]        |             |
| Hori.       | 46.4      | 20.9              | -            | 12.6        | 6.9  | 28.5 | -           | 11.9             | -           | 40.0            | -          | 28.1             | -           |             |
| Hori.       | 61.1      | 22.0              | -            | 7.4         | 7.0  | 28.5 | -           | 7.9              | -           | 40.0            | -          | 32.1             | -           |             |
| Hori.       | 78.7      | 20.7              | -            | 6.8         | 7.2  | 28.5 | -           | 6.2              | -           | 40.0            | -          | 33.8             | -           |             |
| Hori.       | 300.0     | 19.2              | -            | 13.7        | 8.7  | 27.7 | -           | 13.9             | -           | 46.0            | -          | 32.2             | -           |             |
| Hori.       | 420.0     | 19.7              | -            | 16.1        | 9.4  | 28.6 | -           | 16.6             | -           | 46.0            | -          | 29.4             | -           |             |
| Hori.       | 700.0     | 20.0              | -            | 19.8        | 10.5 | 29.2 | -           | 21.0             | -           | 46.0            | -          | 25.0             | -           |             |
| Hori.       | 2483.5    | 47.6              | 38.6         | 27.5        | 4.8  | 36.0 | -           | 43.8             | 34.8        | 73.9            | 53.9       | 30.1             | 19.1        |             |
| Hori.       | 4950.0    | 43.8              | 35.2         | 31.4        | 6.9  | 35.6 | -           | 46.5             | 37.9        | 73.9            | 53.9       | 27.4             | 16.0        |             |
| Hori.       | 7425.0    | 44.1              | 35.2         | 35.4        | 8.1  | 35.7 | -           | 52.0             | 43.0        | 73.9            | 53.9       | 22.0             | 10.9        | Floor noise |
| Hori.       | 9900.0    | 45.1              | 35.7         | 36.1        | 8.7  | 36.2 | -           | 53.7             | 44.2        | 73.9            | 53.9       | 20.3             | 9.7         | Floor noise |
| Vert.       | 46.4      | 24.5              | -            | 12.6        | 6.9  | 28.5 | -           | 15.5             | -           | 40.0            | -          | 24.5             | -           |             |
| Vert.       | 61.1      | 27.0              | -            | 7.4         | 7.0  | 28.5 | -           | 12.9             | -           | 40.0            | -          | 27.1             | -           |             |
| Vert.       | 78.7      | 27.9              | -            | 6.8         | 7.2  | 28.5 | -           | 13.4             | -           | 40.0            | -          | 26.6             | -           |             |
| Vert.       | 300.0     | 19.3              | -            | 13.7        | 8.7  | 27.7 | -           | 14.0             | -           | 46.0            | -          | 32.1             | -           |             |
| Vert.       | 420.0     | 19.8              | -            | 16.1        | 9.4  | 28.6 | -           | 16.7             | -           | 46.0            | -          | 29.3             | -           |             |
| Vert.       | 700.0     | 20.2              | -            | 19.8        | 10.5 | 29.2 | -           | 21.2             | -           | 46.0            | -          | 24.8             | -           |             |
| Vert.       | 2483.5    | 46.5              | 37.7         | 27.5        | 4.8  | 36.0 | -           | 42.7             | 33.9        | 73.9            | 53.9       | 31.3             | 20.0        |             |
| Vert.       | 4950.0    | 43.4              | 35.0         | 31.4        | 6.9  | 35.6 | -           | 46.0             | 37.7        | 73.9            | 53.9       | 27.9             | 16.3        |             |
| Vert.       | 7425.0    | 44.3              | 35.2         | 35.4        | 8.1  | 35.7 | -           | 52.2             | 43.0        | 73.9            | 53.9       | 21.7             | 10.9        | Floor noise |
| Vert.       | 9900.0    | 44.0              | 35.7         | 36.1        | 8.7  | 36.2 | -           | 52.6             | 44.2        | 73.9            | 53.9       | 21.3             | 9.7         | 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).

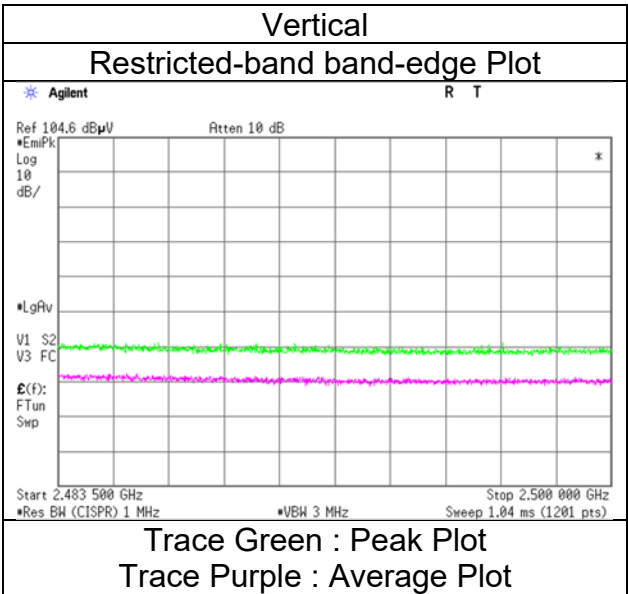
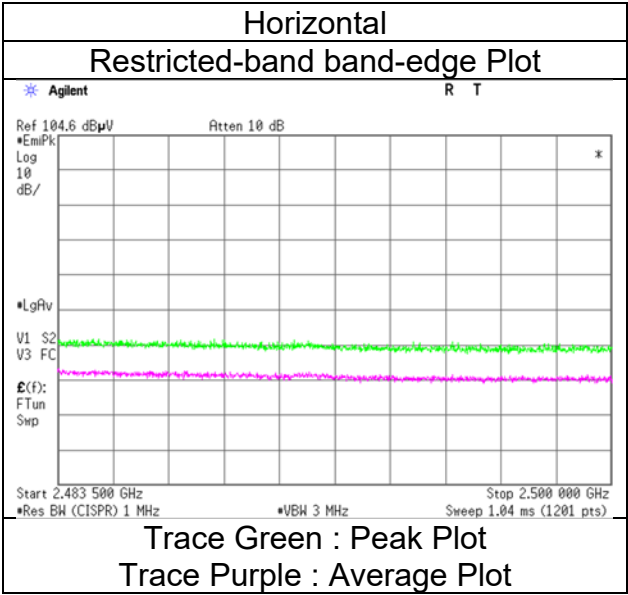
\*QP detector was used up to 1GHz.

|                  |                   |                                                            |
|------------------|-------------------|------------------------------------------------------------|
| Distance factor: | 1 GHz - 6 GHz     | $20\log(3.65 \text{ m} / 3.0 \text{ m}) = 1.71 \text{ dB}$ |
|                  | 6 GHz - 10 GHz    | $20\log(3.65 \text{ m} / 3.0 \text{ m}) = 1.71 \text{ dB}$ |
|                  | 10 GHz - 26.5 GHz | $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.5 \text{ dB}$  |

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

Test place  
Semi Anechoic Chamber  
Date  
Temperature / Humidity  
Engineer  
  
Mode

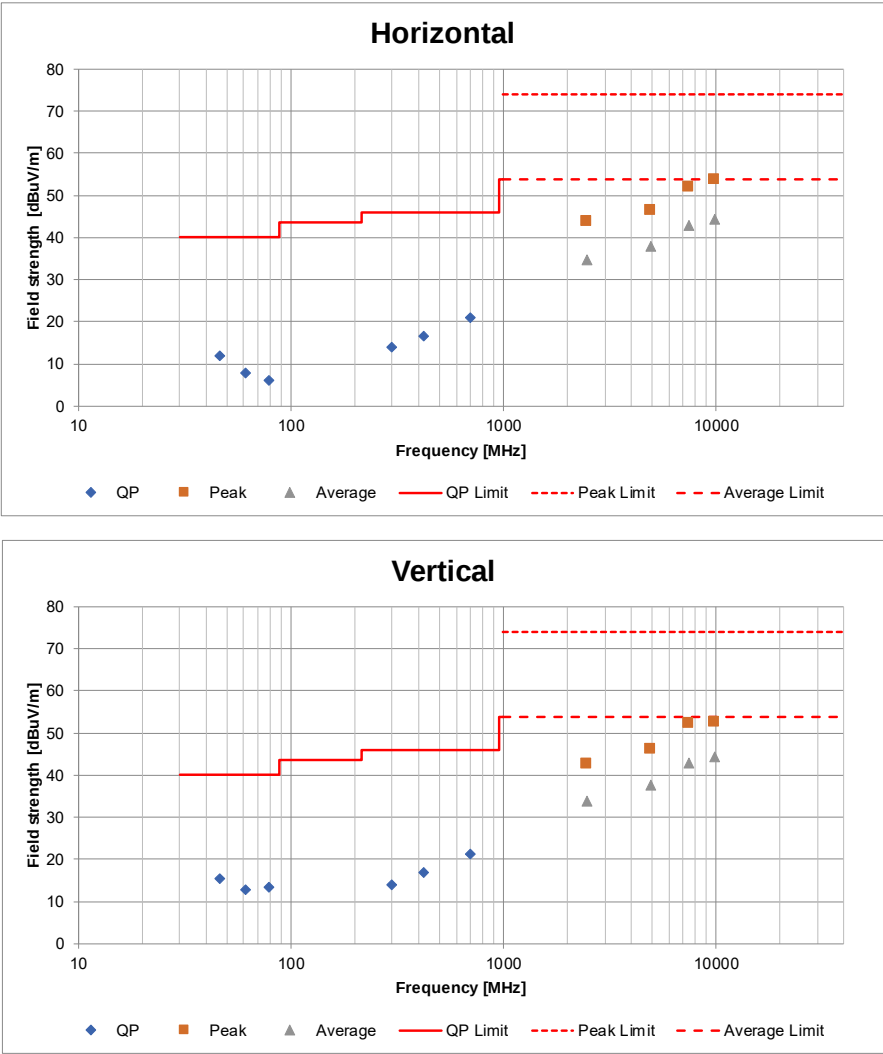
Ise EMC Lab.  
No.2  
October 10, 2024  
21 deg. C / 50 % RH  
Junki Nagatomi  
(Above 1 GHz)  
Tx 2475 MHz



\* 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)**

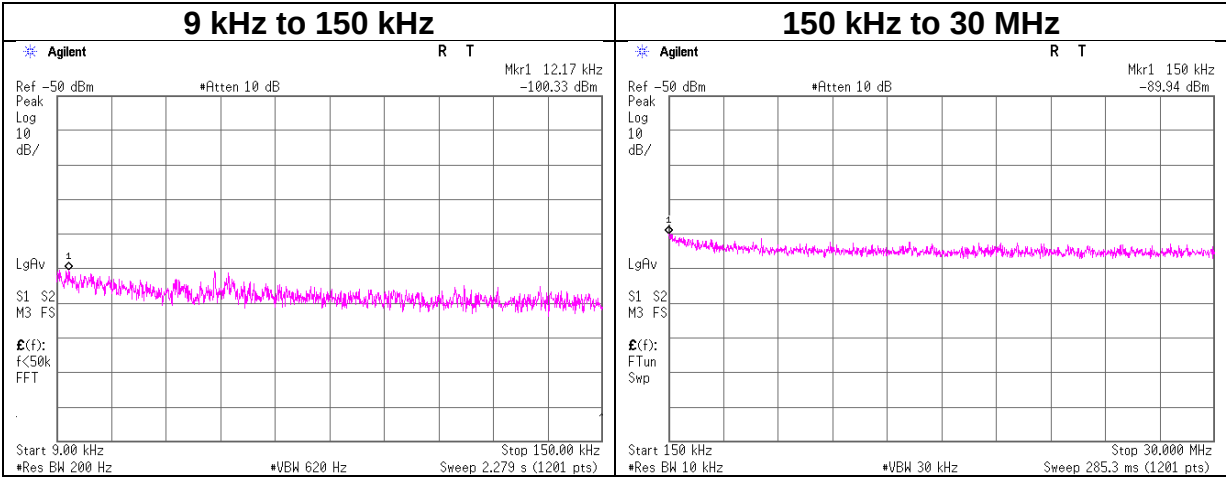
|                        |                              |                                 |
|------------------------|------------------------------|---------------------------------|
| Test place             | Ise EMC Lab.                 | No.2                            |
| Semi Anechoic Chamber  | No.2                         | No.2                            |
| Date                   | October 10, 2024             | October 10, 2024                |
| Temperature / Humidity | 23 deg. C / 50 % RH          | 21 deg. C / 50 % RH             |
| Engineer               | Yuta Moriya<br>(Below 1 GHz) | Junki Nagatomi<br>(Above 1 GHz) |
| Mode                   | Tx 2475 MHz                  |                                 |



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

Conducted Spurious Emission

Test place                   Ise EMC Lab. No.6 Measurement Room  
Date                         October 8, 2024  
Temperature / Humidity   23 deg. C / 60 % RH  
Engineer                  Yuichiro Yamazaki  
Mode                       Tx 2475 MHz



| Frequency | Reading | Cable Loss | Attenuator Loss | Antenna Gain* | N                  | EIRP  | Distance | Ground bounce | E                         | Limit    | Margin | Remark |
|-----------|---------|------------|-----------------|---------------|--------------------|-------|----------|---------------|---------------------------|----------|--------|--------|
| [kHz]     | [dBm]   | [dB]       | [dB]            | [dBi]         | (Number of Output) | [dBm] | [m]      | [dB]          | (field strength) [dBuV/m] | [dBuV/m] | [dB]   |        |
| 12.17     | -100.3  | 0.60       | 9.8             | 2.0           | 1                  | -87.9 | 300      | 6.0           | -26.6                     | 45.8     | 72.4   |        |
| 150.00    | -89.9   | 0.61       | 9.8             | 2.0           | 1                  | -77.5 | 300      | 6.0           | -16.2                     | 24.0     | 40.2   |        |

E [dBuV/m] = EIRP [dBm] - 20 log (Distance [m]) + Ground bounce [dB] + 104.8 [dBuV/m]  
EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + 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

|                        |                                    |
|------------------------|------------------------------------|
| Test place             | Ise EMC Lab. No.6 Measurement Room |
| Date                   | October 8, 2024                    |
| Temperature / Humidity | 23 deg. C / 60 % RH                |
| Engineer               | Yuichiro Yamazaki                  |
| Mode                   | Tx                                 |

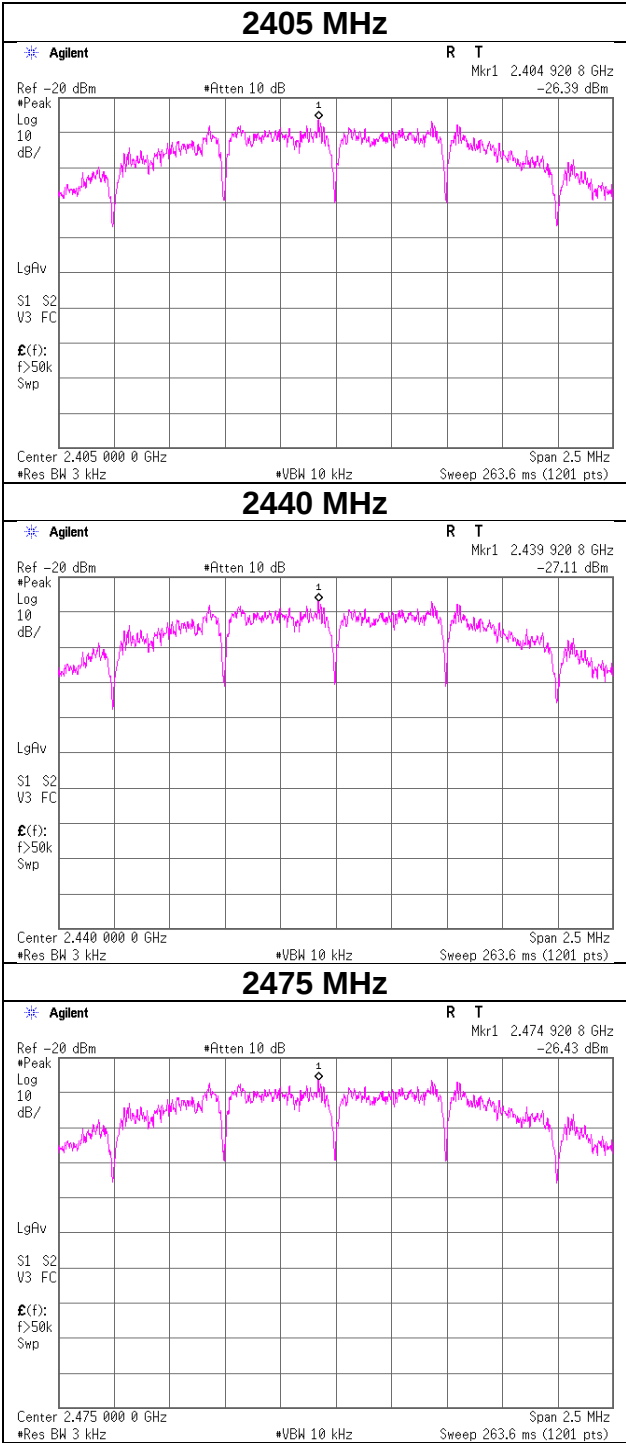
| Freq. | Reading       | Cable Loss | Atten. Loss | Result        | Limit         | Margin |
|-------|---------------|------------|-------------|---------------|---------------|--------|
| [MHz] | [dBm / 3 kHz] | [dB]       | [dB]        | [dBm / 3 kHz] | [dBm / 3 kHz] | [dB]   |
| 2405  | -26.39        | 2.23       | 10.07       | <b>-14.09</b> | 8.00          | 22.09  |
| 2440  | -27.11        | 2.24       | 10.07       | -14.80        | 8.00          | 22.80  |
| 2475  | -26.43        | 2.25       | 10.07       | -14.11        | 8.00          | 22.11  |

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



## APPENDIX 2: Test Instruments

### Test Equipment

| Test Item | LIMS ID | Description                         | Manufacturer                    | Model                    | Serial     | Last Calibration Date | Cal Int |
|-----------|---------|-------------------------------------|---------------------------------|--------------------------|------------|-----------------------|---------|
| AT        | 141156  | Attenuator(10dB)                    | Weinschel Corp                  | 2                        | BL1173     | 11/17/2023            | 12      |
| AT        | 141327  | Coaxial Cable                       | UL Japan                        | -                        | -          | 02/09/2024            | 12      |
| AT        | 141328  | Microwave Cable 1G-40GHz            | Suhner                          | SUCOFLEX102              | 28636/2    | 04/01/2024            | 12      |
| AT        | 141334  | Attenuator(10dB)                    | Suhner                          | 6810.19.A                | -          | 12/12/2023            | 12      |
| AT        | 141414  | Microwave Cable                     | Junkosha                        | MWX221                   | 1207S407   | 07/06/2024            | 12      |
| AT        | 141558  | Digital Tester(TRUE RMS MULTIMETER) | Fluke Corporation               | 115                      | 17930030   | 05/17/2024            | 12      |
| AT        | 141805  | Power Meter                         | Anritsu Corporation             | ML2495A                  | 6K00003338 | 08/22/2024            | 12      |
| AT        | 141840  | Power sensor                        | Anritsu Corporation             | MA2411B                  | 011737     | 08/22/2024            | 12      |
| AT        | 141899  | Spectrum Analyzer                   | Keysight Technologies Inc       | E4448A                   | MY46180655 | 05/09/2024            | 12      |
| AT        | 142225  | Tape Measure                        | ASKUL                           | -                        | -          | -                     | -       |
| AT        | 244712  | Thermo-Hygrometer                   | HIOKI E.E. CORPORATION          | LR5001                   | 231202106  | 01/25/2024            | 12      |
| RE        | 141232  | High Pass Filter 3.5-18.0GHz        | UL Japan                        | HPF SELECTOR             | 001        | 09/13/2024            | 12      |
| RE        | 141265  | Logperiodic Antenna (200-1000MHz)   | Schwarzbeck Mess-Elektronik OHG | VUSLP9111B               | 9111B-190  | 07/10/2024            | 12      |
| RE        | 141317  | Coaxial Cable                       | UL Japan                        | -                        | -          | 09/11/2024            | 12      |
| RE        | 141427  | Biconical Antenna                   | Schwarzbeck Mess-Elektronik OHG | VHA9103B+ BBA9106        | 08031      | 07/30/2024            | 12      |
| RE        | 141503  | Horn Antenna 18-26.5GHz             | EMCO                            | 3160-09                  | 1265       | 06/25/2024            | 12      |
| RE        | 141511  | Horn Antenna 1-18GHz                | Schwarzbeck Mess-Elektronik OHG | BBHA9120D                | 253        | 09/09/2024            | 12      |
| RE        | 141542  | Digital Tester                      | Fluke Corporation               | FLUKE 26-3               | 78030611   | 08/06/2024            | 12      |
| RE        | 141576  | Pre Amplifier                       | Keysight Technologies Inc       | 8449B                    | 3008A01671 | 02/17/2024            | 12      |
| RE        | 141594  | Pre Amplifier                       | Keysight Technologies Inc       | 8447D                    | 2944A10150 | 02/17/2024            | 12      |
| RE        | 141903  | Spectrum Analyzer                   | Keysight Technologies Inc       | E4440A                   | MY46186390 | 01/26/2024            | 12      |
| RE        | 141951  | EMI Test Receiver                   | Rohde & Schwarz                 | ESR26                    | 101408     | 05/17/2024            | 12      |
| RE        | 142004  | AC2_Semi Anechoic Chamber(NSA)      | TDK                             | Semi Anechoic Chamber 3m | DA-06902   | 12/12/2023            | 24      |
| RE        | 142006  | AC2_Semi Anechoic Chamber(SVSWR)    | TDK                             | Semi Anechoic Chamber 3m | DA-06902   | 04/17/2023            | 24      |
| RE        | 142228  | Measure, Tape, Steel                | KOMELON                         | KMC-36                   | -          | -                     | -       |
| RE        | 178648  | EMI measurement program             | TSJ (Techno Science Japan)      | TEPTO-DV                 | -          | -                     | -       |
| RE        | 220646  | Attenuator                          | Huber+Suhner                    | 6806_N-50-1              | -          | 03/12/2024            | 12      |
| RE        | 238713  | Double Ridge Horn Antenna           | Schwarzbeck Mess-Elektronik OHG | BBHA 9120 C              | 688        | 09/02/2024            | 12      |
| RE        | 244707  | Thermo-Hygrometer                   | HIOKI E.E. CORPORATION          | LR5001                   | 231202102  | 01/25/2024            | 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:

AT: Antenna Terminal Conducted test

RE: Radiated Emission