

# RADIO TEST REPORT

## Test Report No. 14781152S-A-R3

|                     |                            |
|---------------------|----------------------------|
| Customer            | Canon Inc.                 |
| Description of EUT  | Wireless Module            |
| Model Number of EUT | ES205                      |
| FCC ID              | AZD248                     |
| Test Regulation     | FCC Part 15 Subpart C      |
| Test Result         | Complied                   |
| Issue Date          | July 5, 2024               |
| Remarks             | Bluetooth (BR / EDR) parts |

**Representative Test Engineer**Yosuke Murakami  
Engineer**Approved By**Toyokazu Imamura  
Engineer

CERTIFICATE 1266.03

- ☐ 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".

Report Cover Page - Form-ULID-003532 (DCS:13-EM-F0429) Issue# 23.0

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- The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan, Inc. has been accredited.
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- The laboratory is not responsible for information provided by the customer which can impact the validity of the results.
- For test report(s) referred in this report, the latest version (including any revisions) is always referred.

# REVISION HISTORY

## Original Test Report No.: 14781152S-A

This report is a revised version of 14781152S-A-R2. 14781152S-A-R2 is replaced with this report.

| Revision        | Test Report No. | Date          | Page Revised Contents                                                                                                                                                                         |
|-----------------|-----------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| -<br>(Original) | 14781152S-A     | June 7, 2024  | -                                                                                                                                                                                             |
| 1               | 14781152S-A-R1  | June 13, 2024 | Section 2 Added rating: DC 1.8 V                                                                                                                                                              |
| 2               | 14781152S-A-R2  | June 26, 2024 | Cover page Corrected FCC ID: AZD 248 to AZD248                                                                                                                                                |
|                 |                 |               | Section 2.2 Addition of the value of the Directional Gain.                                                                                                                                    |
|                 |                 |               | Section 3 Modification of FCC Part 15.31 (e)                                                                                                                                                  |
|                 |                 |               | From: The RF Module has its own regulator. The RF Module is constantly provided voltage through the regulator regardless of input voltage. Therefore, this EUT complies with the requirement. |
|                 |                 |               | To: The module is constantly provided the stable voltage (DC 3.3 V / 1.8 V) from the host device regardless of input voltage. Therefore, this EUT complies with the requirement.              |
|                 |                 |               | P13 and 14<br>Modification of cable length for No.1, No.2: 0.01 => 0.02                                                                                                                       |
|                 |                 |               | P20 to 22<br>Correction of Limit2(AV) line.                                                                                                                                                   |
| 3               | 14781152S-A-R3  | July 5, 2024  | Appendix 1<br>Addition of Burst Rate Confirmation                                                                                                                                             |
|                 |                 |               | Section 2.2 Adjusted table for the antenna gain                                                                                                                                               |

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

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

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## **SECTION 1: Customer Information**

|                  |                                                          |
|------------------|----------------------------------------------------------|
| Company Name     | Canon Inc.                                               |
| Address          | 30-2, Shimomaruko 3-chome, Ohta-ku, Tokyo 146-8501 Japan |
| Telephone Number | +81-3-5482-4941                                          |
| Contact Person   | Yasuhito Yukita                                          |

The information provided from 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   | Wireless Module                                                                            |
| Model Number  | ES205                                                                                      |
| 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  | May 8, 2023                                                                                |
| Test Date     | June 5, 2023 to January 30, 2024                                                           |

### **2.2 Product Description**

#### **General Specification**

|                       |                          |
|-----------------------|--------------------------|
| Rating                | DC 3.3 V / DC 1.8 V      |
| Operating temperature | -40 deg. C to +85 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.

### Bluetooth (BR/EDR/BTLE)

|                            |                                           |
|----------------------------|-------------------------------------------|
| Equipment Type             | Transceiver                               |
| Frequency of Operation     | 2402 MHz to 2480 MHz                      |
| Type of Modulation         | FHSS, GFSK / $\pi/4$ -DQPSK, 8DPSK / GFSK |
| Antenna Type               | Monopole Antenna                          |
| Antenna Gain <sup>a)</sup> | 2.67 dBi                                  |

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

|                            |                                                                                 |
|----------------------------|---------------------------------------------------------------------------------|
| Equipment Type             | Transceiver                                                                     |
| Frequency of Operation     | 2412 MHz to 2462 MHz                                                            |
| Type of Modulation         | DSSS, OFDM<br>OFDMA: (20 MHz band): 26/52/106/242-tone RU                       |
| Antenna Type               | Monopole Antenna                                                                |
| Antenna Gain <sup>a)</sup> | Antenna Gain      Directinal Gain *1)<br>2.67 dBi                      5.69 dBi |

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

|                            |                              |                                                                                                                                                                                                                                              |                                |
|----------------------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Equipment Type             | Transceiver                  |                                                                                                                                                                                                                                              |                                |
| Frequency of Operation     | 20 MHz Band:                 | 5180 MHz to 5240 MHz<br>5260 MHz to 5320 MHz<br>5500 MHz to 5700 MHz<br>5745 MHz to 5825 MHz<br>5955 MHz to 6415 MHz<br>6435 MHz to 6515 MHz<br>6535 MHz to 6875 MHz (*6875 MHz:straddle ch)<br>6895 MHz to 7095 MHz                         |                                |
|                            | 40 MHz Band                  | 5190 MHz to 5230 MHz<br>5270 MHz to 5310 MHz<br>5510 MHz to 5670 MHz<br>5755 MHz to 5795 MHz<br>5965 MHz to 6405 MHz<br>6445 MHz to 6525 MHz (*6525 MHz:straddle ch)<br>6565 MHz to 6885 MHz (*6885 MHz:straddle ch)<br>6925 MHz to 7085 MHz |                                |
|                            | 80 MHz band                  | 5210 MHz<br>5290 MHz<br>5530 MHz to 5610 MHz<br>5775 MHz<br>5985 MHz to 6385 MHz<br>6465 MHz to 6545 MHz (*6545 MHz:straddle ch)<br>6625 MHz to 6865 MHz (*6865 MHz:straddle ch)<br>6945 MHz to 7025 MHz                                     |                                |
| Type of Modulation         | OFDM                         |                                                                                                                                                                                                                                              |                                |
|                            | OFDMA<br>(IEEE802.11ax only) | (20 MHz band): 26/52/106/242-tone RU                                                                                                                                                                                                         |                                |
|                            |                              | (40 MHz band): 26/52/106/242/484-tone RU                                                                                                                                                                                                     |                                |
|                            |                              | (80 MHz band): 26/52/106/242/484/996-tone RU                                                                                                                                                                                                 |                                |
| Antenna Type               | Monopole Antenna             |                                                                                                                                                                                                                                              |                                |
| Antenna Gain <sup>a)</sup> | Antenna Gain                 | Directinal Gain *1)                                                                                                                                                                                                                          | Band                           |
|                            | 5.14 dBi                     | 8.16 dBi                                                                                                                                                                                                                                     | (WLAN UNII-1 and UNII-2A band) |
|                            | 3.53 dBi                     | 6.55 dBi                                                                                                                                                                                                                                     | (WLAN UNII-2C band)            |
|                            | 3.05 dBi                     | 6.07 dBi                                                                                                                                                                                                                                     | (WLAN UNII-3 band)             |
|                            | 1.61 dBi                     | 4.63 dBi                                                                                                                                                                                                                                     | (WLAN UNII-5 and UNII-6 band)  |
|                            | 0.60 dBi                     | 3.62 dBi                                                                                                                                                                                                                                     | (WLAN UNII-7 and UNII-8 band)  |

\*1) Directional Gain = Antenna Gain + Arry Gain

Arry Gain =  $10 * \log (\text{Number of transmit Antennas} / \text{Number of spatial streams})$

Number of transmit Antennas = 2, Number of spatial streams = 1

## 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 |

### 3.2 Procedures and Results

| Item                                     | Test Procedure                                                                         | Specification                                                                           | Worst Margin                                                                                                                                                                                                                                               | Results  | Remarks                                         |
|------------------------------------------|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------------------------------------------|
| Conducted Emission                       | <b>FCC:</b> ANSI C63.10-2013<br>6. Standard test methods<br><b>ISED:</b> RSS-Gen 8.8   | <b>FCC:</b> Section 15.207<br><b>ISED:</b> RSS-Gen 8.8                                  | 27.0 dB<br><br>0.15000 MHz<br>QP, N<br>Mode: DH5<br>2441 MHz With Tx<br>11ax-40 (OFDM),<br>5510 MHz/<br>DH5 2441 MHz<br>With Tx 11ax-40<br>(OFDM), 6445<br>MHz<br><br>0.17324 MHz<br>QP, N<br>Mode: DH5<br>2441 MHz With Tx<br>11ax-40 (OFDM),<br>5510 MHz | Complied | -                                               |
| Carrier Frequency Separation             | <b>FCC:</b> KDB 558074 D01 15.247<br>Meas Guidance v05r02<br><b>ISED:</b> -            | <b>FCC:</b> Section15.247(a)(1)<br><b>ISED:</b> RSS-247 5.1 (b)                         | See data.                                                                                                                                                                                                                                                  | Complied | Conducted                                       |
| 20 dB Bandwidth                          | <b>FCC:</b> KDB 558074 D01 15.247<br>Meas Guidance v05r02<br><b>ISED:</b> -            | <b>FCC:</b> Section15.247(a)(1)<br><b>ISED:</b> RSS-247 5.1 (a)                         |                                                                                                                                                                                                                                                            | Complied | Conducted                                       |
| Number of Hopping Frequency              | <b>FCC:</b> KDB 558074 D01 15.247<br>Meas Guidance v05r02<br><b>ISED:</b> -            | <b>FCC:</b> Section15.247(a)(1)(iii)<br><b>ISED:</b> RSS-247 5.1 (d)                    |                                                                                                                                                                                                                                                            | Complied | Conducted                                       |
| Dwell time                               | <b>FCC:</b> KDB 558074 D01 15.247<br>Meas Guidance v05r02<br><b>ISED:</b> -            | <b>FCC:</b> Section15.247(a)(1)(iii)<br><b>ISED:</b> RSS-247 5.1 (d)                    |                                                                                                                                                                                                                                                            | Complied | Conducted                                       |
| Maximum Peak Output Power                | <b>FCC:</b> KDB 558074 D01 15.247<br>Meas Guidance v05r02<br><b>ISED:</b> RSS-Gen 6.12 | <b>FCC:</b> Section15.247(b)(1)<br><b>ISED:</b> RSS-247 5.4 (b)                         |                                                                                                                                                                                                                                                            | Complied | Conducted                                       |
| Spurious Emission & Band Edge Compliance | <b>FCC:</b> KDB 558074 D01 15.247<br>Meas Guidance v05r02<br><b>ISED:</b> RSS-Gen 6.13 | <b>FCC:</b> Section15.247(d)<br><b>ISED:</b> RSS-247 5.5<br>RSS-Gen 8.9<br>RSS-Gen 8.10 | 6.3 dB<br>3202.667 MHz,<br>AV, Vert.,<br>Mode: Tx,<br>Hopping Off,<br>3DH5 2402 MHz                                                                                                                                                                        | Complied | Conducted/<br>Radiated<br>(above 30 MHz)<br>*1) |

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

#### FCC Part 15.31 (e)

The module is constantly provided the stable voltage (DC 3.3 V / 1.8 V) from the host device regardless of input voltage. Therefore, this EUT complies with the requirement.

#### FCC Part 15.203 Antenna requirement

The EUT has a unique coupling/antenna connector (MHF-4L (IPEX)). Therefore the equipment complies with the requirement of 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  $k = 2$ .

| Item                                             | Frequency range    | Uncertainty (+/-) |
|--------------------------------------------------|--------------------|-------------------|
| Conducted Emission (AC Mains) LISN               | 150 kHz to 30 MHz  | 3.2 dB            |
| Radiated Emission<br>(Measurement distance: 3 m) | 9 kHz to 30 MHz    | 3.3 dB            |
|                                                  | 30 MHz to 200 MHz  | 4.9 dB            |
|                                                  | 200 MHz to 1 GHz   | 6.2 dB            |
|                                                  | 1 GHz to 6 GHz     | 4.7 dB            |
|                                                  | 6 GHz to 10 GHz    | 5.3 dB            |
| Radiated Emission<br>(Measurement distance: 1 m) | 10 GHz to 18 GHz   | 5.6 dB            |
|                                                  | 18 GHz to 26.5 GHz | 5.8 dB            |

| Antenna terminal test                                         | Uncertainty (+/-) |
|---------------------------------------------------------------|-------------------|
| Power Measurement above 1 GHz (Average Detector) SPM-06       | 1.1 dB            |
| Power Measurement above 1 GHz (Peak Detector) SPM-06          | 1.8 dB            |
| Power Measurement above 1 GHz (Average Detector) SPM-07       | 1.0 dB            |
| Power Measurement above 1 GHz (Peak Detector) SPM-07          | 1.2 dB            |
| Power Measurement above 1 GHz (Average Detector) SPM-13       | 0.81 dB           |
| Power Measurement above 1 GHz (Peak Detector) SPM-13          | 1.1 dB            |
| Spurious Emission (Conducted) below 1 GHz                     | 0.91 dB           |
| Conducted Emissions Power Density Measurement 1 GHz to 3 GHz  | 1.3 dB            |
| Conducted Emissions Power Density Measurement 3 GHz to 18 GHz | 2.5 dB            |
| Spurious Emission (Conducted) 18 GHz to 26.5 GHz              | 2.8 dB            |
| Spurious Emission (Conducted) 26.5 GHz to 40 GHz              | 2.6 dB            |
| Bandwidth Measurement                                         | 0.012 %           |
| Duty Cycle and Time Measurement                               | 0.27 %            |
| Temperature_SCH-01                                            | 0.96 deg.C.       |
| Humidity_SCH-01                                               | 4.0 %             |
| Temperature_SCH-02                                            | 2.2 deg.C.        |
| Voltage                                                       | 0.74 %            |



### 3.5 Test Location

UL Japan, Inc. Shonan EMC Lab.

1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 Japan

Telephone: +81-463-50-6400

A2LA Certificate Number: 1266.03

(FCC test firm registration number: 626366, ISED lab company number: 2973D / CAB identifier: JP0001)

| Test room                          | Width x Depth x Height (m) | Size of reference ground plane (m) / horizontal conducting plane | Maximum measurement distance |
|------------------------------------|----------------------------|------------------------------------------------------------------|------------------------------|
| No.1 Semi-anechoic chamber (SAC1)  | 20.6 x 11.3 x 7.65         | 20.6 x 11.3                                                      | 10 m                         |
| No.2 Semi-anechoic chamber (SAC2)  | 20.6 x 11.3 x 7.65         | 20.6 x 11.3                                                      | 10 m                         |
| No.3 Semi-anechoic chamber (SAC3)  | 12.7 x 7.7 x 5.35          | 12.7 x 7.7                                                       | 5 m                          |
| No.4 Semi-anechoic chamber (SAC4)  | 8.1 x 5.1 x 3.55           | 8.1 x 5.1                                                        | -                            |
| Wireless anechoic chamber 1 (WAC1) | 9.5 x 6.0 x 5.4            | 9.5 x 6.0                                                        | 3 m                          |
| Wireless anechoic chamber 2 (WAC2) | 9.5 x 6.0 x 5.4            | 9.5 x 6.0                                                        | 3 m                          |
| No.1 Shielded room                 | 6.8 x 4.1 x 2.7            | 6.8 x 4.1                                                        | -                            |
| No.2 Shielded room                 | 6.8 x 4.1 x 2.7            | 6.8 x 4.1                                                        | -                            |
| No.3 Shielded room                 | 6.3 x 4.7 x 2.7            | 6.3 x 4.7                                                        | -                            |
| No.4 Shielded room                 | 4.4 x 4.7 x 2.7            | 4.4 x 4.7                                                        | -                            |
| No.5 Shielded room                 | 7.8 x 6.4 x 2.7            | 7.8 x 6.4                                                        | -                            |
| No.6 Shielded room                 | 7.8 x 6.4 x 2.7            | 7.8 x 6.4                                                        | -                            |
| No.8 Shielded room                 | 3.45 x 5.5 x 2.4           | 3.45 x 5.5                                                       | -                            |
| No.1 Measurement room              | 2.55 x 4.1 x 2.5           | -                                                                | -                            |
| No.2 Measurement room              | 4.5 x 3.5 x 2.5            | -                                                                | -                            |
| Wireless shielded room 1           | 3.0 x 4.5 x 2.7            | 3.0 x 4.5                                                        | -                            |
| Wireless shielded room 2           | 3.0 x 4.5 x 2.7            | 3.0 x 4.5                                                        | -                            |

### 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)**

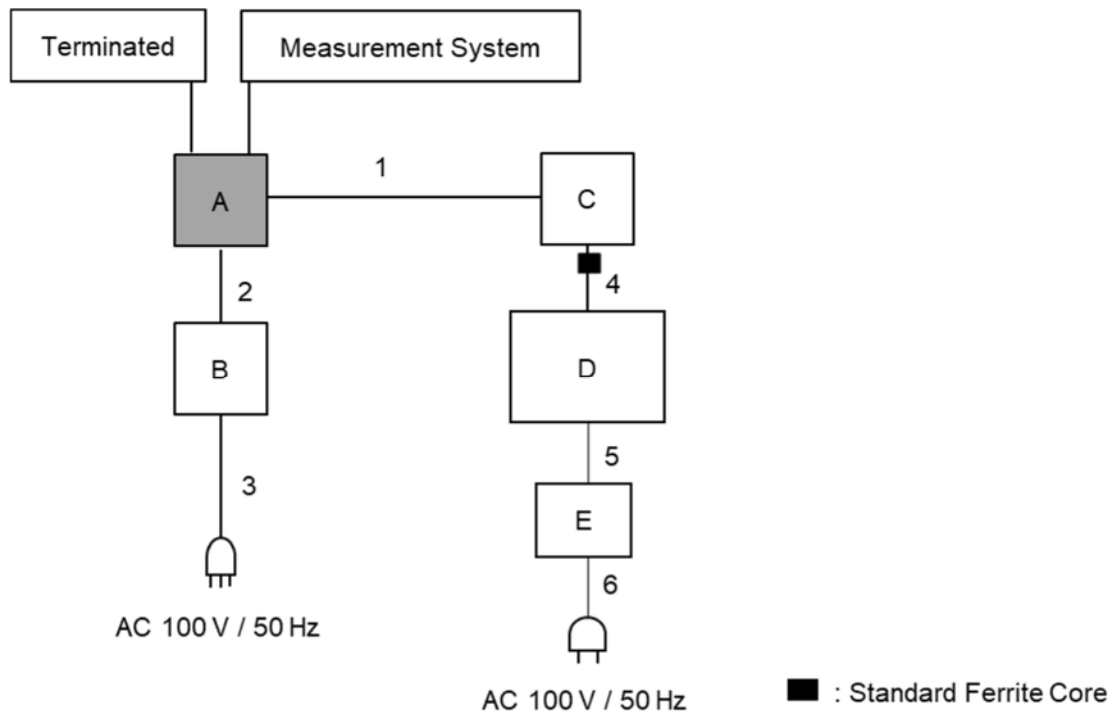
| <b>Mode</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <b>Remarks*</b>          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Bluetooth (BT)                                                                                                                                                                                                                                                                                                                                                                                                                                                               | BR / EDR, Payload: PRBS9 |
| <p>*EUT has the power settings by the software as follows;<br/>Power Setting: BR:6.0 dBm, EDR:3.0 dBm<br/>Software: 18.53 (For WLAN)<br/>001.002.087.0186 (For Bluetooth)<br/>(Date: 2023.06.05, Storage location: Driven by connected PC)</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> |                          |

Details of Operating Mode(s)

| Test Item                                                                                                                                                                                                                                                                                                       | Mode                                                                                 | Hopping   | Tested Frequency                 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-----------|----------------------------------|
| Conducted Emission                                                                                                                                                                                                                                                                                              | Tx DH5 *1)                                                                           | Off       | 2441 MHz                         |
| Radiated Spurious Emission (Below 1 GHz)                                                                                                                                                                                                                                                                        | Tx DH5 *1)                                                                           | Off       | 2441 MHz                         |
|                                                                                                                                                                                                                                                                                                                 | Tx 3DH5                                                                              | Off       | 2402 MHz<br>2441 MHz<br>2480 MHz |
| Radiated Spurious Emission (Above 1 GHz),<br>Conducted Spurious Emission                                                                                                                                                                                                                                        | Tx DH5<br>Tx 3DH5                                                                    | Off       | 2402 MHz<br>2441 MHz<br>2480 MHz |
| Radiated Spurious Emission ,<br>Conducted Spurious Emission                                                                                                                                                                                                                                                     | Tx DH5 with Tx, 11ax-40 (OFDM), 5510 MHz                                             | Off       | 2441 MHz                         |
|                                                                                                                                                                                                                                                                                                                 | Tx DH5 with Tx, 11ax-40 (OFDM), 6445 MHz                                             |           |                                  |
| Carrier Frequency Separation                                                                                                                                                                                                                                                                                    | Tx DH5<br>Tx 3DH5                                                                    | On        | -                                |
| 20 dB Bandwidth                                                                                                                                                                                                                                                                                                 | Tx DH5<br>Tx 3DH5                                                                    | Off       | 2402 MHz<br>2441 MHz<br>2480 MHz |
| Number of Hopping Frequency                                                                                                                                                                                                                                                                                     | Tx DH5<br>Tx 3DH5                                                                    | On        | -                                |
| Dwell time                                                                                                                                                                                                                                                                                                      | Tx DH1, DH3, DH5<br>Tx 3DH1, 3DH3, 3DH5                                              | On        | -                                |
| Maximum Peak Output Power                                                                                                                                                                                                                                                                                       | Tx DH5<br>Tx 2DH5<br>Tx 3DH5                                                         | Off       | 2402 MHz<br>2441 MHz<br>2480 MHz |
| Band Edge Compliance (Radiated)                                                                                                                                                                                                                                                                                 | Tx DH5 with Tx 11ax-40 (OFDM), 5510 MHz<br>Tx 3DH5 with Tx 11ax-40 (OFDMA), 5510 MHz | Off       | 2402 MHz<br>2480 MHz             |
|                                                                                                                                                                                                                                                                                                                 | Tx DH5 with Tx 11ax-40 (OFDM), 6445 MHz<br>Tx 3DH5 with Tx 11ax-40 (OFDMA), 6445 MHz |           |                                  |
| Band Edge Compliance (Conducted)                                                                                                                                                                                                                                                                                | Tx DH5<br>Tx 3DH5                                                                    | On<br>Off | 2402 MHz<br>2480 MHz             |
| 99 % Occupied Bandwidth                                                                                                                                                                                                                                                                                         | Tx DH5<br>Tx 3DH5                                                                    | On        | 2402 MHz                         |
|                                                                                                                                                                                                                                                                                                                 |                                                                                      | Off       | 2441 MHz<br>2480 MHz             |
| *As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload length (except Dwell time test)                                                                                                                                                             |                                                                                      |           |                                  |
| *2DH mode (2Mb/s EDR: pi/4DQPSK) was excluded for other tests than power measurement by using 3DH mode (3 Mb/s EDR: 8DPSK) as a representative.                                                                                                                                                                 |                                                                                      |           |                                  |
| *It is considered that the non-tested packet type (e.g. inquiry) can be omitted as it is complied with above all the test items based on Bluetooth Core specification.                                                                                                                                          |                                                                                      |           |                                  |
| *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. |                                                                                      |           |                                  |

## 4.2 Configuration and Peripherals

<For Antenna Terminal Conducted Tests>



### Description of EUT and Support Equipment

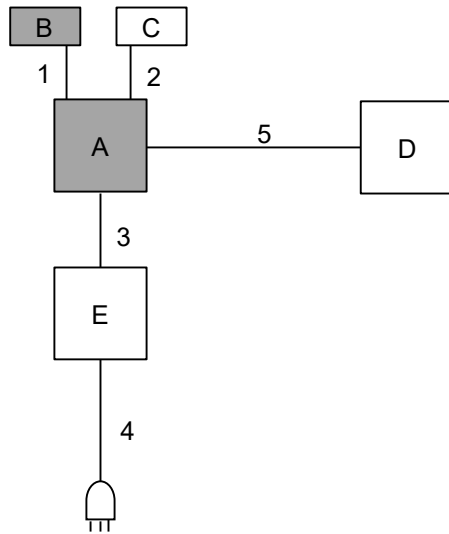
| No. | Item                     | Model number | Serial Number | Manufacturer             | Remarks |
|-----|--------------------------|--------------|---------------|--------------------------|---------|
| A   | Wireless module          | ES205        | B5            | Canon Inc.               | EUT *1) |
| B   | Power Supply (DC)        | PW16-5ADP    | 19100034      | GW Instek                | -       |
| C   | UART-USB converter board | -            | BP001         | Canon Inc.               | -       |
| D   | Laptop PC                | HP 250 G9/CT | JPH318LWC6    | HP                       | -       |
| E   | AC Adapter               | TPN-LA15     | -             | Lite-On Technology Corp. | -       |

\*1) With Jig board

### List of Cables Used

| No. | Name | Length (m) | Shield     |            | Remarks |
|-----|------|------------|------------|------------|---------|
|     |      |            | Cable      | Connector  |         |
| 1   | UART | 0.1        | Unshielded | Unshielded | -       |
| 2   | DC   | 0.9        | Unshielded | Unshielded | -       |
| 3   | AC   | 2.0        | Unshielded | Unshielded | -       |
| 4   | USB  | 1.0        | Shielded   | Shielded   | -       |
| 5   | DC   | 1.7        | Unshielded | Unshielded | -       |
| 6   | AC   | 0.9        | Unshielded | Unshielded | -       |

<For Radiated Emission tests and Conducted Emission tests>



AC 100 V / 50 Hz  
AC 120 V / 60 Hz \*1)

\*1) Only Conducted emission tests

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

#### Description of EUT and Support Equipment

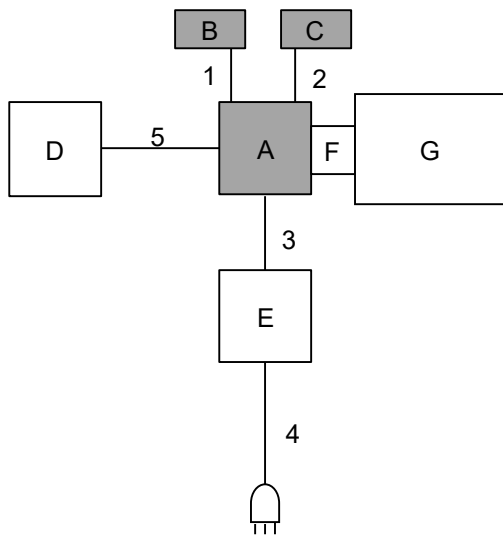
| No. | Item                     | Model number | Serial Number | Manufacturer              | Remarks    |
|-----|--------------------------|--------------|---------------|---------------------------|------------|
| A   | Wireless module          | ES205        | B4            | Canon Inc.                | EUT *2)    |
| B   | Antenna                  | 19AA-10-tmp  | 1             | Canon Inc.                | EUT (Ant0) |
| C   | Antenna                  | 19AA-10-tmp  | 2             | Canon Inc.                | - (Ant1)   |
| D   | UART-USB converter board | -            | BP006         | Canon Inc.                | -          |
| E   | Power Supply (DC)        | PAN35-10A    | DE001677      | Kikusui Electronics Corp. | -          |

\*2) With Jig board

#### List of Cables Used

| No. | Name    | Length (m) | Shield     |            | Remarks |
|-----|---------|------------|------------|------------|---------|
|     |         |            | Cable      | Connector  |         |
| 1   | Antenna | 0.02       | Shielded   | Shielded   | -       |
| 2   | Antenna | 0.02       | Shielded   | Shielded   | -       |
| 3   | DC      | 0.9 + 1.0  | Unshielded | Unshielded | -       |
| 4   | AC      | 0.9        | Unshielded | Unshielded | -       |
| 5   | UART    | 0.1        | Unshielded | Unshielded | -       |

< For Radiated Emission tests and Conducted Emission tests (Simultaneous transmission of BT and WLAN)>



AC 100 V / 50 Hz

AC 120 V / 60 Hz \*1)

\*1) Only Conducted emission 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   | Wireless module          | ES205               | B4            | Canon Inc.                | EUT *2)    |
| B   | Antenna                  | 19AA-10-tmp         | 1             | Canon Inc.                | EUT (Ant0) |
| C   | Antenna                  | 19AA-10-tmp         | 2             | Canon Inc.                | EUT (Ant1) |
| D   | UART-USB converter board | -                   | BP006         | Canon Inc.                | -          |
| E   | Power Supply (DC)        | PAN35-10A           | DE001677      | Kikusui Electronics Corp. | -          |
| F   | Interface board          | WJIG2021_2          | A15           | Canon Inc.                | -          |
| G   | Raspberry Pi board       | 600-90768-01 REV2.0 | 2-2           | Infineon Technologies AG  | -          |

\*2) With Jig board

#### List of Cables Used

| No. | Name    | Length (m) | Shield     |            | Remarks |
|-----|---------|------------|------------|------------|---------|
|     |         |            | Cable      | Connector  |         |
| 1   | Antenna | 0.02       | Shielded   | Shielded   | -       |
| 2   | Antenna | 0.02       | Shielded   | Shielded   | -       |
| 3   | DC      | 0.9 + 1.0  | Unshielded | Unshielded | -       |
| 4   | AC      | 0.9        | Unshielded | Unshielded | -       |
| 5   | UART    | 0.1        | Unshielded | Unshielded | -       |

## **SECTION 5: Conducted Emission**

### **Test Procedure and Conditions**

EUT was placed on a urethane platform of nominal size, 1.0 m by .2.0 m, raised 0.8 m above the conducting ground plane.

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

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

I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a shielded room.

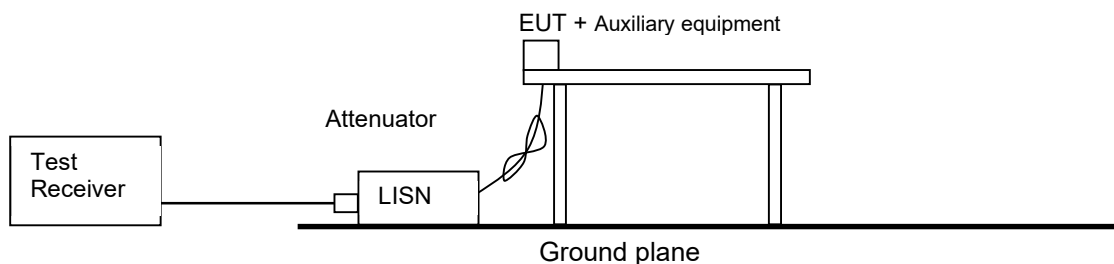
The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

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

|                          |                             |
|--------------------------|-----------------------------|
| <b>Detector</b>          | <b>: QP and CISPR AV</b>    |
| <b>Measurement Range</b> | <b>: 0.15 MHz to 30 MHz</b> |
| <b>Test Data</b>         | <b>: APPENDIX</b>           |
| <b>Test Result</b>       | <b>: Pass</b>               |

**Figure 1: Test Setup**



## SECTION 6: Radiated Spurious Emission

### Test Procedure

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 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. 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.

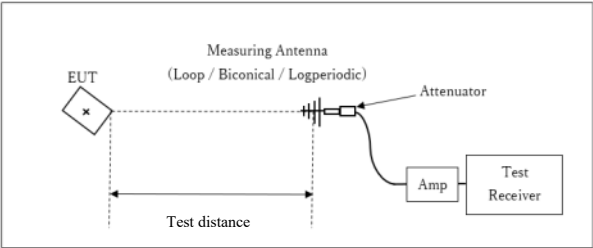
### 20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9 (ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

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



Figure 2: Test Setup

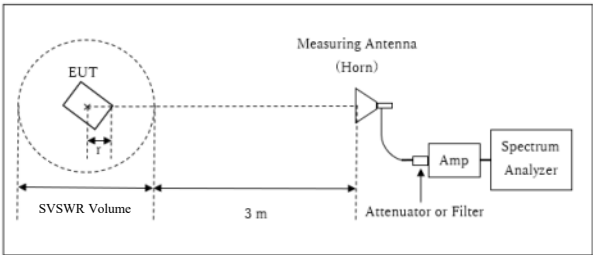
Below 1 GHz



x : Center of turn table

Test Distance: 3 m

1 GHz to 10 GHz



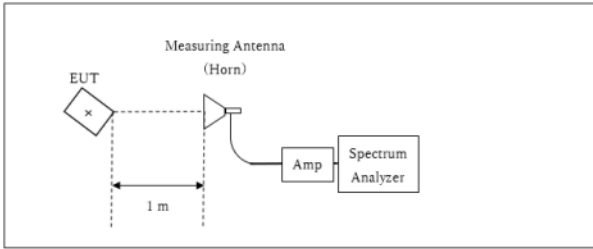
r : Radius of an outer periphery of EUT  
x : Center of turn table

Distance Factor:  $20 \times \log (3.995 \text{ m} / 3.0 \text{ m}) = 2.49 \text{ dB}$   
\* Test Distance:  $(3 + \text{SVSWR Volume} / 2) - r = 3.995 \text{ m}$

SVSWR Volume : 2.0 m  
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)  
 $r = 0.005 \text{ m}$

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

10 GHz to 26.5 GHz



x : Center of turn table

Distance Factor:  $20 \times \log (1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$   
\*Test Distance: 1 m

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT and Antenna 0, Antenna 1 to see the position of maximum noise, and the test was made at the position that has the maximum noise.

EUT

|            | Below 1 GHz | 1 to 10 GHz | 10 to 18 GHz | Above 18 GHz |
|------------|-------------|-------------|--------------|--------------|
| Horizontal | X           | Z           | X            | X            |
| Vertical   | X           | X           | X            | X            |

Antenna 0 (ANT 0)

|            | Below 1 GHz | 1 to 10 GHz | 10 to 18 GHz | Above 18 GHz |
|------------|-------------|-------------|--------------|--------------|
| Horizontal | X           | X           | X            | X            |
| Vertical   | X           | Y           | X            | X            |

Antenna 1 (ANT 1)

|            | Below 1 GHz | 1 to 10 GHz | 10 to 18 GHz | Above 18 GHz |
|------------|-------------|-------------|--------------|--------------|
| Horizontal | X           | X           | X            | X            |
| Vertical   | X           | Y           | X            | X            |

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

**Measurement Range** : 30 MHz to 26.5 GHz  
**Test Data** : APPENDIX  
**Test Result** : Pass

## SECTION 7: Antenna Terminal Conducted Tests

### Test Procedure

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

| Test                                             | Span                                    | RBW             | VBW                | Sweep time                                                     | Detector         | Trace        | Instrument Used                  |
|--------------------------------------------------|-----------------------------------------|-----------------|--------------------|----------------------------------------------------------------|------------------|--------------|----------------------------------|
| 20 dB Bandwidth                                  | 3 MHz                                   | 30 kHz          | 91 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 *1) | Spectrum Analyzer                |
| Maximum Peak Output Power                        | -                                       | -               | -                  | Auto                                                           | Peak Average *2) | -            | Power Meter (Sensor: 160 MHz BW) |
| Carrier Frequency Separation                     | 3 MHz                                   | 100 kHz         | 300 kHz            | Auto                                                           | Peak             | Max Hold     | Spectrum Analyzer                |
| Number of Hopping Frequency                      | 30 MHz                                  | 300 kHz         | 1 MHz              | Auto                                                           | Peak             | Max Hold     | Spectrum Analyzer                |
| Dwell Time                                       | Zero Span                               | 100 kHz, 1 MHz  | 300 kHz, 3 MHz     | As necessary capture the entire dwell time per hopping channel | Peak             | Clear Write  | Spectrum Analyzer                |
| Conducted Spurious Emission *3) *4)              | 9 kHz to 150 kHz                        | 200 Hz          | 620 Hz             | Auto                                                           | Peak             | Max Hold     | Spectrum Analyzer                |
|                                                  | 150 kHz to 30 MHz                       | 10 kHz          | 30 kHz             |                                                                |                  |              |                                  |
|                                                  | 30 MHz to 25 GHz                        | 100 kHz         | 300 kHz            |                                                                |                  |              |                                  |
| Conducted Spurious Emission Band Edge compliance | 10 MHz                                  | 100 kHz         | 300 kHz            | Auto                                                           | Peak             | Max Hold     | Spectrum Analyzer                |

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

\*2) Reference data

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

Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.  
(9 kHz -150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 kHz)

\*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.

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

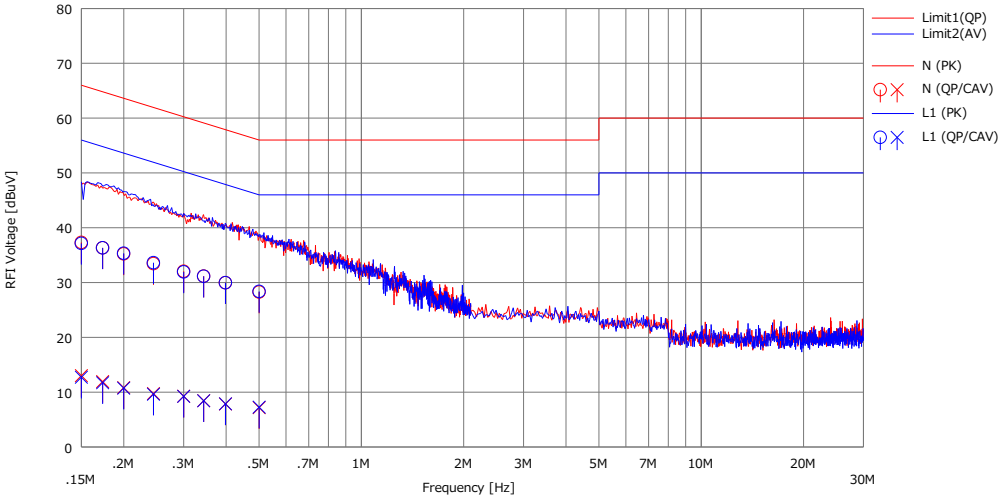
Test Result : Pass

APPENDIX 1: Test data

Conducted Emission

Test place Shonan EMC Lab. No.3 Shielded Room  
Date January 30, 2024  
Temperature / Humidity 22 deg. C / 27 % RH  
Engineer Makoto Hosaka  
Mode Tx, Hopping Off, DH5 2441 MHz

Limit: FCC Part 15 Subpart C (15.207)



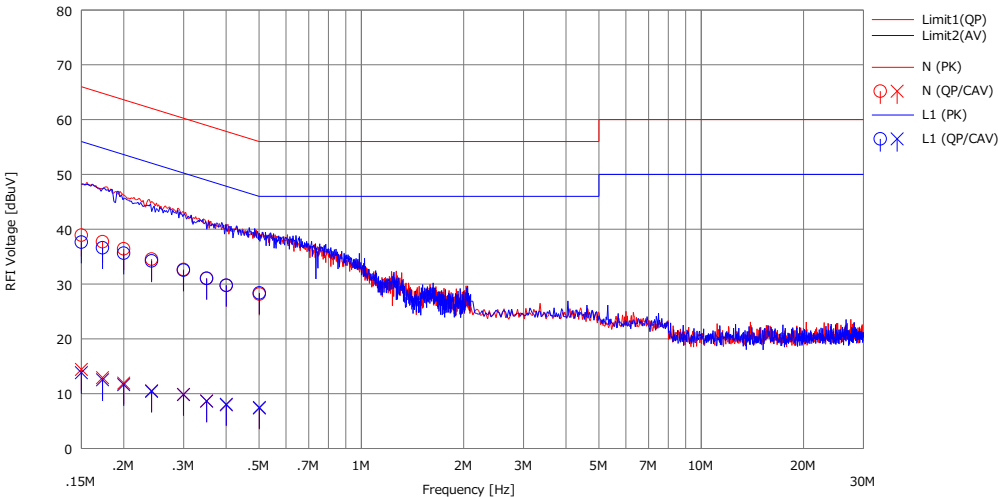
| No. | Freq.<br>[MHz] | Reading |        | C.Fac | Results |        | Limit  |        | Margin |      | Phase | Comment |
|-----|----------------|---------|--------|-------|---------|--------|--------|--------|--------|------|-------|---------|
|     |                | <QP>    | <CAV>  |       | <QP>    | <CAV>  | <QP>   | <AV>   | <QP>   | <AV> |       |         |
|     |                | [dBuV]  | [dBuV] |       | [dBuV]  | [dBuV] | [dBuV] | [dBuV] | [dB]   | [dB] |       |         |
| 1   | 0.15000        | 24.90   | 0.60   | 12.42 | 37.32   | 13.02  | 66.00  | 56.00  | 28.6   | 42.9 | N     |         |
| 2   | 0.17325        | 23.90   | -0.50  | 12.42 | 36.32   | 11.92  | 64.80  | 54.80  | 28.4   | 42.8 | N     |         |
| 3   | 0.19993        | 22.80   | -1.60  | 12.42 | 35.22   | 10.82  | 63.61  | 53.61  | 28.3   | 42.7 | N     |         |
| 4   | 0.24454        | 21.00   | -2.70  | 12.44 | 33.44   | 9.74   | 61.94  | 51.94  | 28.5   | 42.2 | N     |         |
| 5   | 0.30011        | 19.60   | -3.20  | 12.45 | 32.05   | 9.25   | 60.24  | 50.24  | 28.1   | 40.9 | N     |         |
| 6   | 0.34371        | 18.70   | -4.00  | 12.45 | 31.15   | 8.45   | 59.11  | 49.11  | 27.9   | 40.6 | N     |         |
| 7   | 0.39832        | 17.50   | -4.60  | 12.45 | 29.95   | 7.85   | 57.89  | 47.89  | 27.9   | 40.0 | N     |         |
| 8   | 0.50050        | 15.80   | -5.30  | 12.46 | 28.26   | 7.16   | 56.00  | 46.00  | 27.7   | 38.8 | N     |         |
| 9   | 0.15000        | 24.70   | 0.30   | 12.43 | 37.13   | 12.73  | 66.00  | 56.00  | 28.8   | 43.2 | L1    |         |
| 10  | 0.17325        | 23.90   | -0.70  | 12.42 | 36.32   | 11.72  | 64.80  | 54.80  | 28.4   | 43.0 | L1    |         |
| 11  | 0.19993        | 22.90   | -1.70  | 12.43 | 35.33   | 10.73  | 63.61  | 53.61  | 28.2   | 42.8 | L1    |         |
| 12  | 0.24454        | 21.20   | -2.80  | 12.42 | 33.62   | 9.62   | 61.94  | 51.94  | 28.3   | 42.3 | L1    |         |
| 13  | 0.30011        | 19.50   | -3.20  | 12.44 | 31.94   | 9.24   | 60.24  | 50.24  | 28.3   | 41.0 | L1    |         |
| 14  | 0.34371        | 18.70   | -4.00  | 12.43 | 31.13   | 8.43   | 59.11  | 49.11  | 27.9   | 40.6 | L1    |         |
| 15  | 0.39832        | 17.50   | -4.60  | 12.46 | 29.96   | 7.86   | 57.89  | 47.89  | 27.9   | 40.0 | L1    |         |
| 16  | 0.50050        | 15.90   | -5.20  | 12.47 | 28.37   | 7.27   | 56.00  | 46.00  | 27.6   | 38.7 | L1    |         |

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN)+Cable+ATT)[dB]  
LISN(AMN): 145542

Conducted Emission

Test place Shonan EMC Lab. No.3 Shielded Room  
Date January 29, 2024  
Temperature / Humidity 20 deg. C / 27 % RH  
Engineer Yusuke Tanikawara  
Mode Tx, Hopping Off, DH5 2441 MHz  
with Tx, 11ax-40 (OFDM), 5510 MHz

Limit: FCC Part 15 Subpart C (15.207)



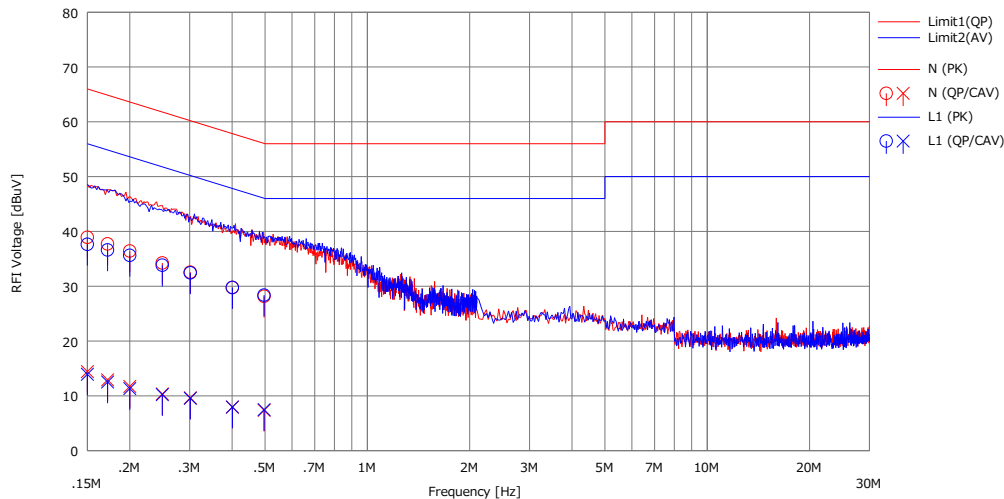
| No. | Freq.<br>[MHz] | Reading |        | C.Fac | Results |        | Limit  |        | Margin |      | Phase | Comment |
|-----|----------------|---------|--------|-------|---------|--------|--------|--------|--------|------|-------|---------|
|     |                | <QP>    | <CAV>  |       | <QP>    | <CAV>  | <QP>   | <AV>   | <QP>   | <AV> |       |         |
|     |                | [dBuV]  | [dBuV] |       | [dBuV]  | [dBuV] | [dBuV] | [dBuV] | [dB]   | [dB] |       |         |
| 1   | 0.15000        | 26.50   | 2.00   | 12.42 | 38.92   | 14.42  | 66.00  | 56.00  | 27.0   | 41.5 | N     |         |
| 2   | 0.17324        | 25.30   | 0.50   | 12.42 | 37.72   | 12.92  | 64.80  | 54.80  | 27.0   | 41.8 | N     |         |
| 3   | 0.19992        | 24.00   | -0.50  | 12.42 | 36.42   | 11.92  | 63.61  | 53.61  | 27.1   | 41.6 | N     |         |
| 4   | 0.24137        | 22.10   | -1.90  | 12.44 | 34.54   | 10.54  | 62.05  | 52.05  | 27.5   | 41.5 | N     |         |
| 5   | 0.29959        | 20.20   | -2.60  | 12.45 | 32.65   | 9.85   | 60.25  | 50.25  | 27.6   | 40.4 | N     |         |
| 6   | 0.35068        | 18.60   | -3.80  | 12.45 | 31.05   | 8.65   | 58.95  | 48.95  | 27.9   | 40.3 | N     |         |
| 7   | 0.40063        | 17.30   | -4.50  | 12.45 | 29.75   | 7.95   | 57.84  | 47.84  | 28.0   | 39.8 | N     |         |
| 8   | 0.50103        | 15.70   | -5.10  | 12.46 | 28.16   | 7.36   | 56.00  | 46.00  | 27.8   | 38.6 | N     |         |
| 9   | 0.15000        | 25.20   | 1.40   | 12.43 | 37.63   | 13.83  | 66.00  | 56.00  | 28.3   | 42.1 | L1    |         |
| 10  | 0.17324        | 24.20   | 0.10   | 12.42 | 36.62   | 12.52  | 64.80  | 54.80  | 28.1   | 42.2 | L1    |         |
| 11  | 0.19992        | 23.20   | -0.80  | 12.43 | 35.63   | 11.63  | 63.61  | 53.61  | 27.9   | 41.9 | L1    |         |
| 12  | 0.24137        | 21.80   | -2.00  | 12.42 | 34.22   | 10.42  | 62.05  | 52.05  | 27.8   | 41.6 | L1    |         |
| 13  | 0.29959        | 20.10   | -2.60  | 12.44 | 32.54   | 9.84   | 60.25  | 50.25  | 27.7   | 40.4 | L1    |         |
| 14  | 0.35068        | 18.60   | -3.80  | 12.43 | 31.03   | 8.63   | 58.95  | 48.95  | 27.9   | 40.3 | L1    |         |
| 15  | 0.40063        | 17.30   | -4.40  | 12.46 | 29.76   | 8.06   | 57.84  | 47.84  | 28.0   | 39.7 | L1    |         |
| 16  | 0.50103        | 15.90   | -5.00  | 12.47 | 28.37   | 7.47   | 56.00  | 46.00  | 27.6   | 38.5 | L1    |         |

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN)+Cable+ATT)[dB]  
LISN(AMN): 145542

Conducted Emission

Test place Shonan EMC Lab. No.3 Shielded Room  
Date January 29, 2024  
Temperature / Humidity 20 deg. C / 27 % RH  
Engineer Yusuke Tanikawara  
Mode Tx, Hopping Off, DH5 2441 MHz  
with Tx, 11ax-40 (OFDM), 6445 MHz

Limit: FCC Part 15 Subpart C (15.207)



| No. | Freq.<br>[MHz] | Reading |        | C.Fac | Results |        | Limit  |        | Margin |      | Phase | Comment |
|-----|----------------|---------|--------|-------|---------|--------|--------|--------|--------|------|-------|---------|
|     |                | <QP>    | <CAV>  |       | <QP>    | <CAV>  | <QP>   | <AV>   | <QP>   | <AV> |       |         |
|     |                | [dBuV]  | [dBuV] |       | [dBuV]  | [dBuV] | [dBuV] | [dBuV] | [dB]   | [dB] |       |         |
| 1   | 0.15000        | 26.50   | 2.00   | 12.42 | 38.92   | 14.42  | 66.00  | 56.00  | 27.0   | 41.5 | N     |         |
| 2   | 0.17201        | 25.30   | 0.50   | 12.42 | 37.72   | 12.92  | 64.86  | 54.86  | 27.1   | 41.9 | N     |         |
| 3   | 0.20003        | 24.00   | -0.70  | 12.42 | 36.42   | 11.72  | 63.61  | 53.61  | 27.1   | 41.8 | N     |         |
| 4   | 0.24931        | 21.80   | -2.10  | 12.44 | 34.24   | 10.34  | 61.78  | 51.78  | 27.5   | 41.4 | N     |         |
| 5   | 0.30134        | 20.10   | -2.80  | 12.45 | 32.55   | 9.65   | 60.21  | 50.21  | 27.6   | 40.5 | N     |         |
| 6   | 0.40079        | 17.30   | -4.50  | 12.45 | 29.75   | 7.95   | 57.84  | 47.84  | 28.0   | 39.8 | N     |         |
| 7   | 0.49692        | 15.70   | -5.10  | 12.46 | 28.16   | 7.36   | 56.05  | 46.05  | 27.8   | 38.6 | N     |         |
| 8   | 0.15000        | 25.20   | 1.50   | 12.43 | 37.63   | 13.93  | 66.00  | 56.00  | 28.3   | 42.0 | L1    |         |
| 9   | 0.17201        | 24.20   | 0.10   | 12.42 | 36.62   | 12.52  | 64.86  | 54.86  | 28.2   | 42.3 | L1    |         |
| 10  | 0.20003        | 23.20   | -1.10  | 12.43 | 35.63   | 11.33  | 63.61  | 53.61  | 27.9   | 42.2 | L1    |         |
| 11  | 0.24931        | 21.40   | -2.20  | 12.42 | 33.82   | 10.22  | 61.78  | 51.78  | 27.9   | 41.5 | L1    |         |
| 12  | 0.30134        | 20.00   | -2.90  | 12.44 | 32.44   | 9.54   | 60.21  | 50.21  | 27.7   | 40.6 | L1    |         |
| 13  | 0.40079        | 17.30   | -4.50  | 12.46 | 29.76   | 7.96   | 57.84  | 47.84  | 28.0   | 39.8 | L1    |         |
| 14  | 0.49692        | 15.90   | -5.00  | 12.47 | 28.37   | 7.47   | 56.05  | 46.05  | 27.6   | 38.5 | L1    |         |

Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(LISN(AMN)+Cable+ATT)[dB]  
LISN(AMN): 145542

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

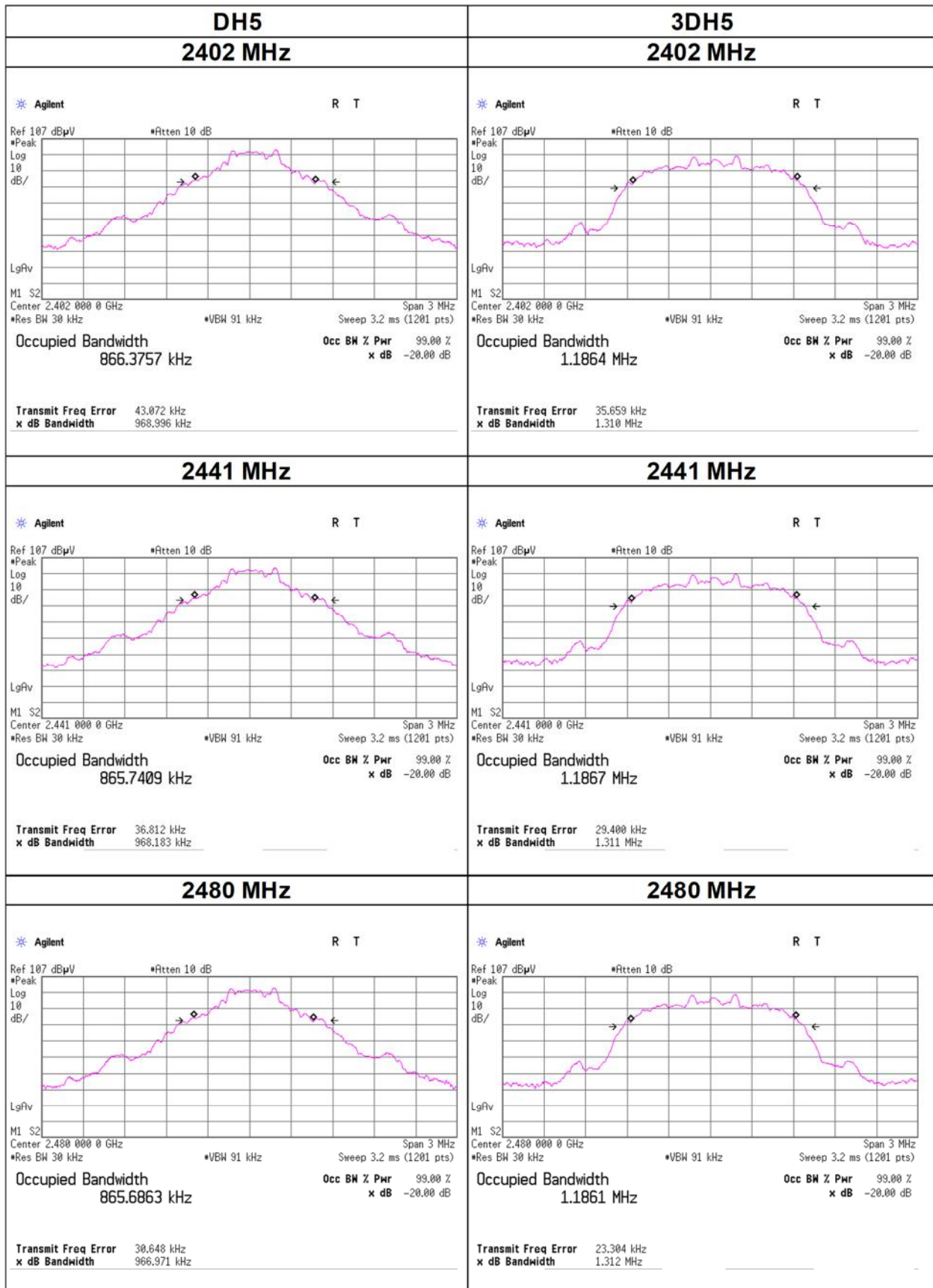
|                        |                                    |                     |
|------------------------|------------------------------------|---------------------|
| Test place             | Shonan EMC Lab. No.5 Shielded Room |                     |
| Date                   | June 5, 2023                       | June 6, 2023        |
| Temperature / Humidity | 26 deg. C / 46 % RH                | 26 deg. C / 40 % RH |
| Engineer               | Yosuke Murakami                    |                     |
| Mode                   | Tx, Hopping Off, Tx, Hopping On    |                     |

| Mode | Freq.<br>[MHz] | 20 dB Bandwidth<br>[MHz] | 99 % Occupied<br>Bandwidth<br>[kHz] | Carrier Frequency<br>Separation<br>[MHz] | Limit for Carrier<br>Frequency separation<br>[MHz] |
|------|----------------|--------------------------|-------------------------------------|------------------------------------------|----------------------------------------------------|
| DH5  | 2402.0         | 0.969                    | 866.4                               | 1.000                                    | >= 0.646                                           |
| DH5  | 2441.0         | 0.968                    | 865.7                               | 1.000                                    | >= 0.645                                           |
| DH5  | 2480.0         | 0.967                    | 865.7                               | 1.000                                    | >= 0.645                                           |
| DH5  | Hopping On     | -                        | 78622.7                             | -                                        | -                                                  |
| 3DH5 | 2402.0         | 1.310                    | 1186.4                              | 1.000                                    | >= 0.873                                           |
| 3DH5 | 2441.0         | 1.311                    | 1186.7                              | 1.000                                    | >= 0.874                                           |
| 3DH5 | 2480.0         | 1.312                    | 1186.1                              | 1.000                                    | >= 0.875                                           |
| 3DH5 | Hopping On     | -                        | 78706.8                             | -                                        | -                                                  |

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

No limit applies to 20 dB Bandwidth.

## 20 dB Bandwidth and 99 % Occupied Bandwidth

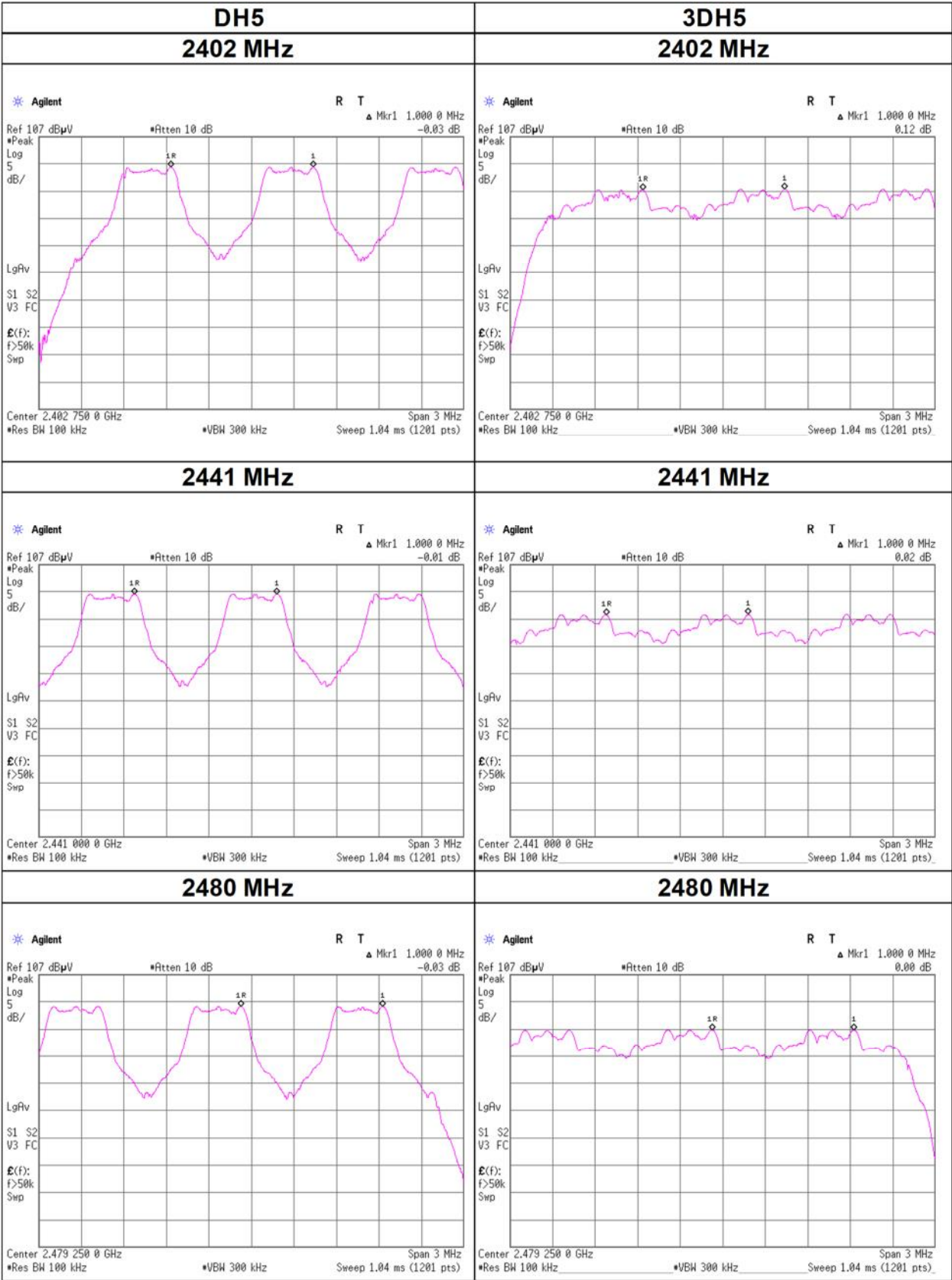




20 dB Bandwidth and 99 % Occupied Bandwidth



**Carrier Frequency Separation**



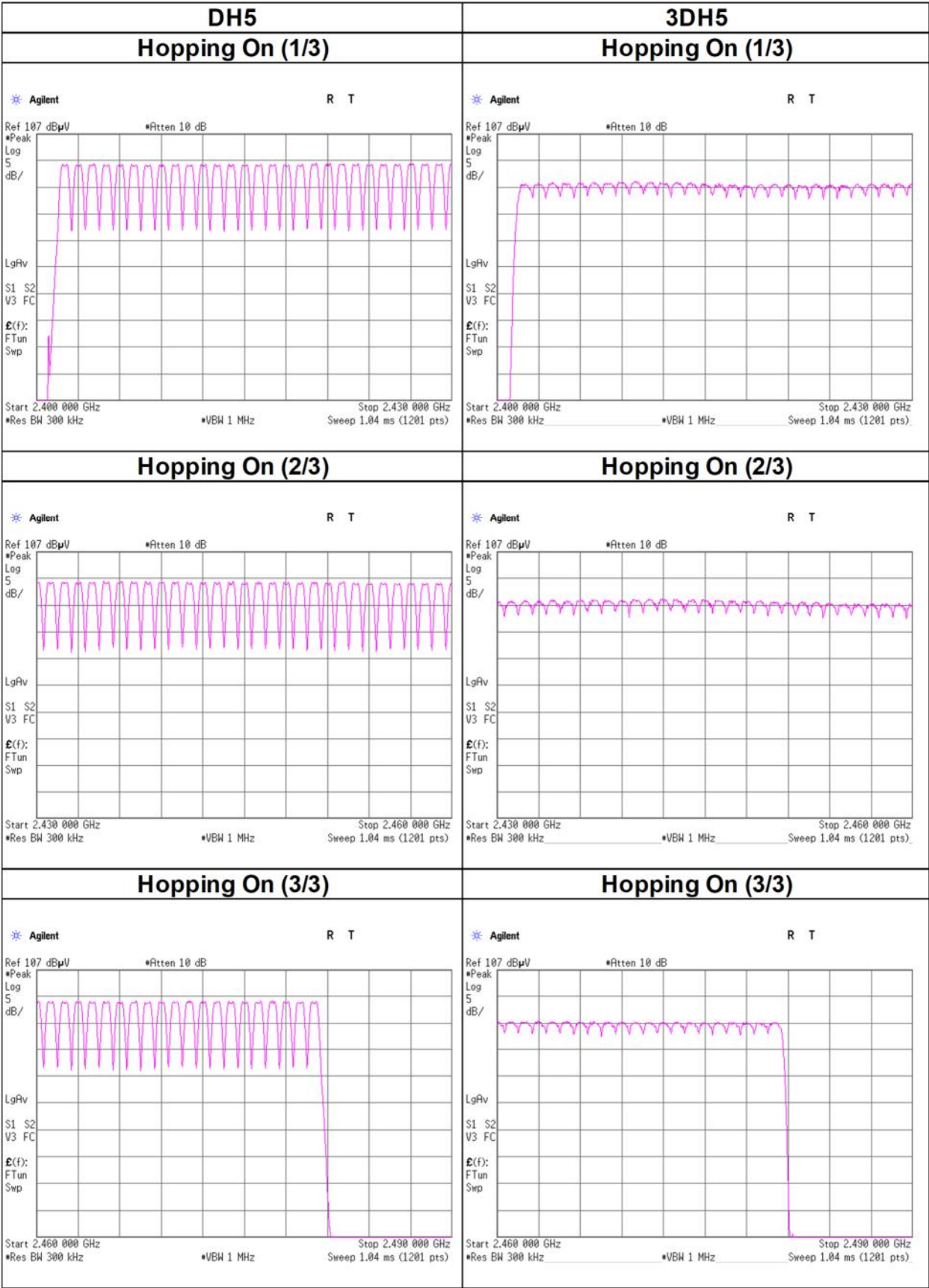
### **Number of Hopping Frequency**

Test place                      Shonan EMC Lab. No.5 Shielded Room  
Date                              June 6, 2023  
Temperature / Humidity      26 deg. C / 40 % RH  
Engineer                        Yosuke Murakami  
Mode                              Tx, Hopping On

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

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

Number of Hopping Frequency



## Dwell time

Test place Shonan EMC Lab. No.5 Shielded Room  
Date June 6, 2023  
Temperature / Humidity 26 deg. C / 40 % RH  
Engineer Yosuke Murakami  
Mode Tx, Hopping On

| Mode | Number of transmission<br>in a 31.6 (79 Hopping x 0.4) | Length of<br>transmission<br>[ms] | Result<br>[ms] | Limit<br>[ms] |
|------|--------------------------------------------------------|-----------------------------------|----------------|---------------|
| DH1  | 51.6 times / 5 s x 31.6 s = 327 times                  | 0.387                             | 126            | 400           |
| DH3  | 26.2 times / 5 s x 31.6 s = 166 times                  | 1.644                             | 273            | 400           |
| DH5  | 19.6 times / 5 s x 31.6 s = 124 times                  | 2.891                             | 358            | 400           |
| 3DH1 | 51.4 times / 5 s x 31.6 s = 325 times                  | 0.393                             | 128            | 400           |
| 3DH3 | 26.6 times / 5 s x 31.6 s = 169 times                  | 1.645                             | 278            | 400           |
| 3DH5 | 21.0 times / 5 s x 31.6 s = 133 times                  | 2.897                             | 385            | 400           |

Sample Calculation

Result = Number of transmission x Length of transmission

\*Average data of 5 tests.

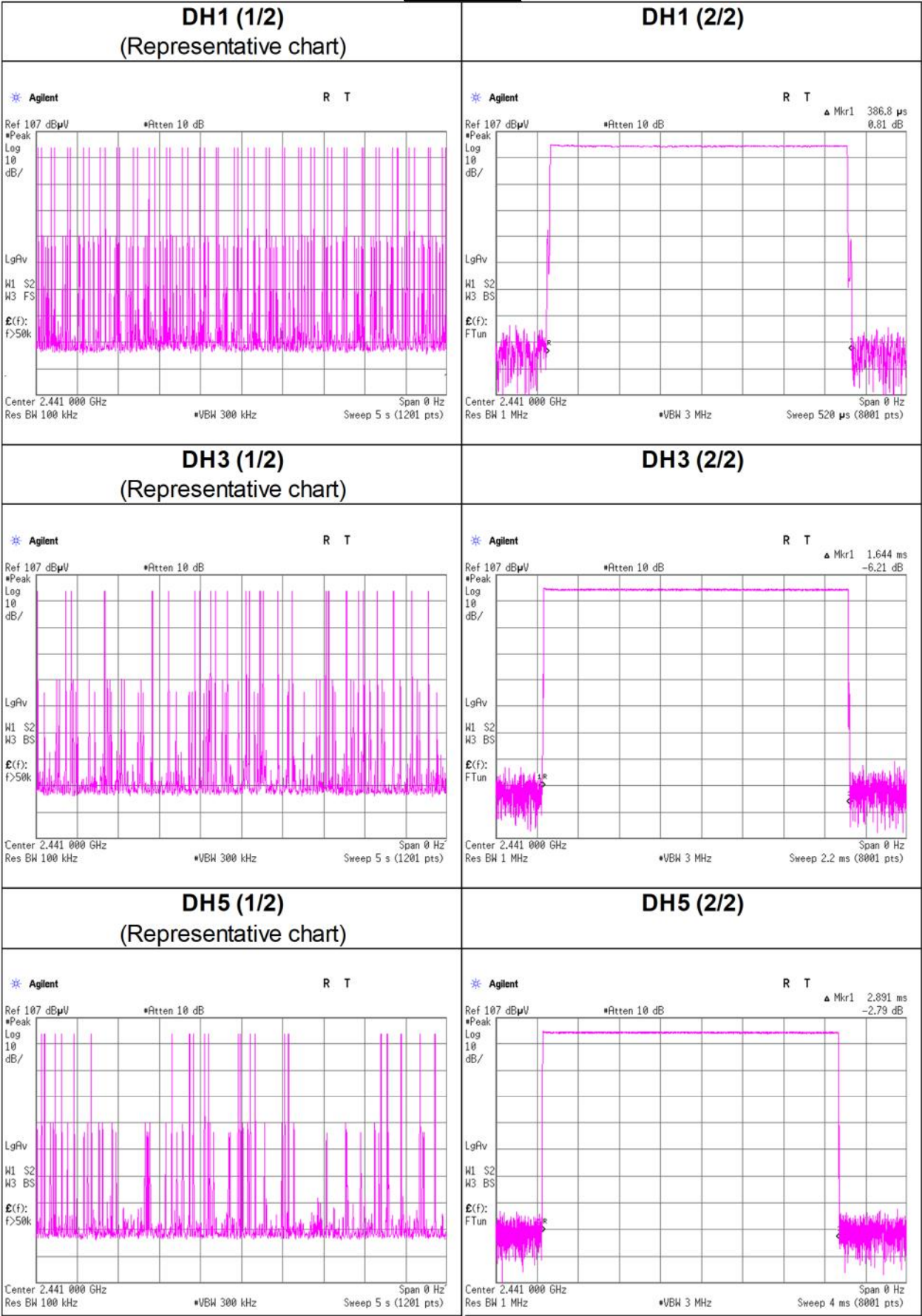
| Mode | Sampling [times] |    |    |    |    | Average<br>[times] |
|------|------------------|----|----|----|----|--------------------|
|      | 1                | 2  | 3  | 4  | 5  |                    |
| DH1  | 52               | 51 | 52 | 51 | 52 | 51.6               |
| DH3  | 26               | 27 | 27 | 26 | 25 | 26.2               |
| DH5  | 21               | 19 | 18 | 22 | 18 | 19.6               |
| 3DH1 | 52               | 51 | 51 | 51 | 52 | 51.4               |
| 3DH3 | 28               | 27 | 25 | 26 | 27 | 26.6               |
| 3DH5 | 22               | 20 | 20 | 20 | 22 | 21                 |

Sample Calculation

Average = Summation (Sampling 1 to 5) / 5

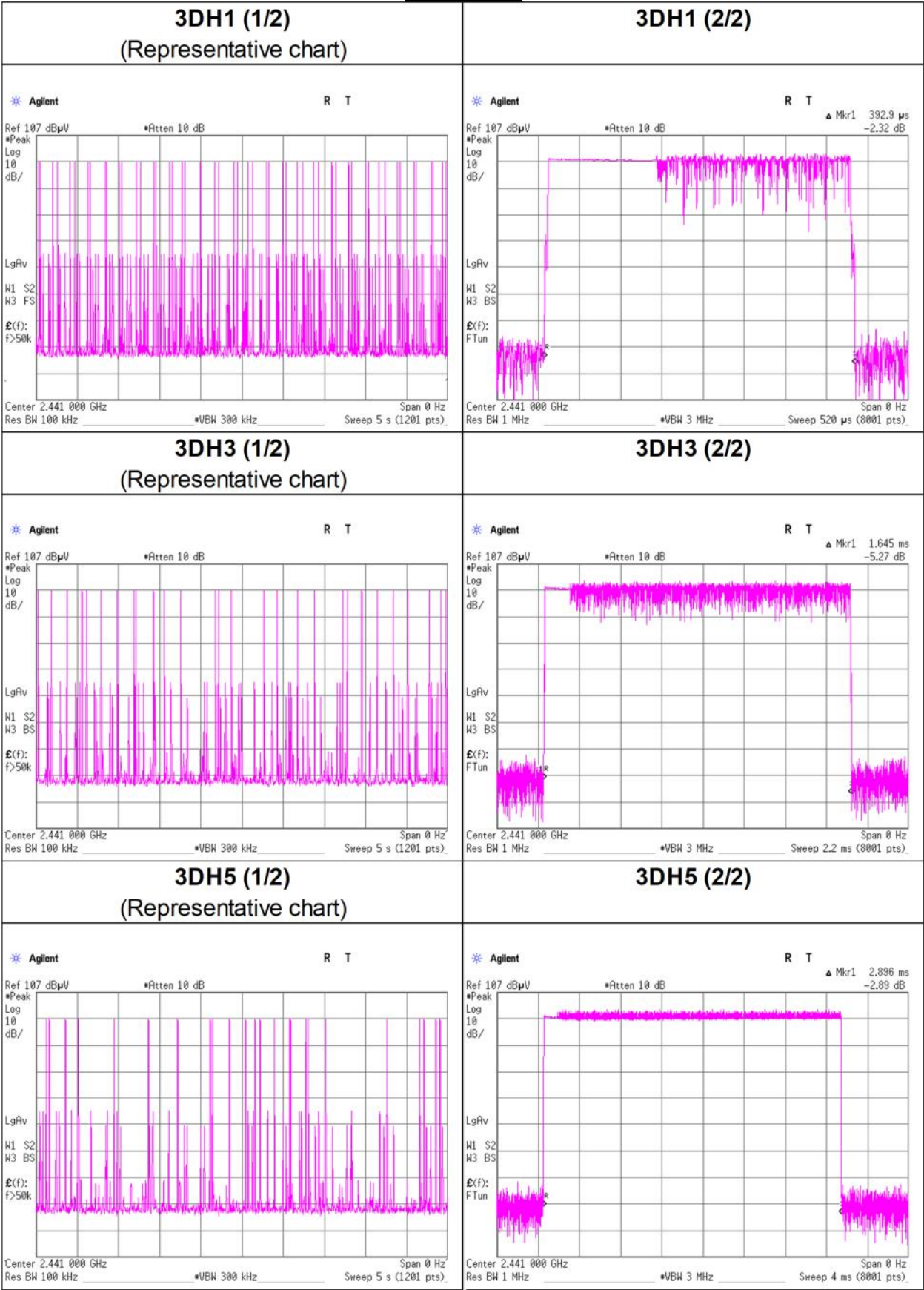
This device complies with the Bluetooth protocol for FHSS operation, employing a pseudo random channel selection and hopping rate to ensure that the occupancy time in  $N \times 0.4$  s, where N is the number of channels being used in the hopping sequence ( $20 \leq N \leq 79$ ), is always less than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

Dwell time





Dwell time



## Maximum Peak Output Power

Test place Shonan EMC Lab. No.5 Shielded Room  
Date June 5, 2023  
Temperature / Humidity 26 deg. C / 46 % RH  
Engineer Yosuke Murakami  
Mode Tx, Hopping Off

### Maximum peak output power

| Maximum Peak Output Power |       |         |            |             | Conducted Power |      |       |      |        | e.i.r.p. for RSS-247 |        |       |       |      |        |
|---------------------------|-------|---------|------------|-------------|-----------------|------|-------|------|--------|----------------------|--------|-------|-------|------|--------|
| Mode                      | Freq. | Reading | Cable Loss | Atten. Loss | Result          |      | Limit |      | Margin | Antenna Gain         | Result |       | Limit |      | Margin |
|                           |       |         |            |             | [dBm]           | [mW] | [dBm] | [mW] |        |                      | [dB]   | [dBi] | [dBm] | [mW] |        |
| DH5                       | 2402  | -5.23   | 1.51       | 9.82        | 6.10            | 4.07 | 20.97 | 125  | 14.87  | 2.67                 | 8.77   | 7.53  | 36.02 | 4000 | 27.25  |
| DH5                       | 2441  | -5.06   | 1.53       | 9.82        | 6.29            | 4.26 | 20.97 | 125  | 14.68  | 2.67                 | 8.96   | 7.87  | 36.02 | 4000 | 27.06  |
| DH5                       | 2480  | -5.32   | 1.54       | 9.82        | 6.04            | 4.02 | 20.97 | 125  | 14.93  | 2.67                 | 8.71   | 7.43  | 36.02 | 4000 | 27.31  |
| 2DH5                      | 2402  | -6.94   | 1.51       | 9.82        | 4.39            | 2.75 | 20.97 | 125  | 16.58  | 2.67                 | 7.06   | 5.08  | 36.02 | 4000 | 28.96  |
| 2DH5                      | 2441  | -6.59   | 1.53       | 9.82        | 4.76            | 2.99 | 20.97 | 125  | 16.21  | 2.67                 | 7.43   | 5.53  | 36.02 | 4000 | 28.59  |
| 2DH5                      | 2480  | -7.50   | 1.54       | 9.82        | 3.86            | 2.43 | 20.97 | 125  | 17.11  | 2.67                 | 6.53   | 4.50  | 36.02 | 4000 | 29.49  |
| 3DH5                      | 2402  | -6.18   | 1.51       | 9.82        | 5.15            | 3.27 | 20.97 | 125  | 15.82  | 2.67                 | 7.82   | 6.05  | 36.02 | 4000 | 28.20  |
| 3DH5                      | 2441  | -6.06   | 1.53       | 9.82        | 5.29            | 3.38 | 20.97 | 125  | 15.68  | 2.67                 | 7.96   | 6.25  | 36.02 | 4000 | 28.06  |
| 3DH5                      | 2480  | -7.07   | 1.54       | 9.82        | 4.29            | 2.69 | 20.97 | 125  | 16.68  | 2.67                 | 6.96   | 4.97  | 36.02 | 4000 | 29.06  |

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.

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

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

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

### Average power (Reference data for RF Exposure)

| Mode | Freq.<br>[MHz] | Reading<br>[dBm] | Cable<br>Loss<br>[dB] | Atten.<br>Loss<br>[dB] | Result<br>(Time average) |      | Duty<br>factor<br>[dB] | Result<br>(Burst power average) |      |
|------|----------------|------------------|-----------------------|------------------------|--------------------------|------|------------------------|---------------------------------|------|
|      |                |                  |                       |                        | [dBm]                    | [mW] |                        | [dBm]                           | [mW] |
| DH5  | 2402           | -7.04            | 1.51                  | 9.82                   | 4.29                     | 2.69 | 1.13                   | 5.42                            | 3.48 |
| DH5  | 2441           | -6.80            | 1.53                  | 9.82                   | 4.55                     | 2.85 | 1.13                   | 5.68                            | 3.70 |
| DH5  | 2480           | -7.10            | 1.54                  | 9.82                   | 4.26                     | 2.67 | 1.13                   | 5.39                            | 3.46 |
| 2DH5 | 2402           | -10.70           | 1.51                  | 9.82                   | 0.63                     | 1.16 | 1.12                   | 1.75                            | 1.50 |
| 2DH5 | 2441           | -10.36           | 1.53                  | 9.82                   | 0.99                     | 1.26 | 1.12                   | 2.11                            | 1.63 |
| 2DH5 | 2480           | -11.38           | 1.54                  | 9.82                   | -0.02                    | 1.00 | 1.12                   | 1.10                            | 1.29 |
| 3DH5 | 2402           | -10.40           | 1.51                  | 9.82                   | 0.93                     | 1.24 | 1.12                   | 2.05                            | 1.60 |
| 3DH5 | 2441           | -10.25           | 1.53                  | 9.82                   | 1.10                     | 1.29 | 1.12                   | 2.22                            | 1.67 |
| 3DH5 | 2480           | -11.38           | 1.54                  | 9.82                   | -0.02                    | 1.00 | 1.12                   | 1.10                            | 1.29 |

Sample Calculation:

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

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

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

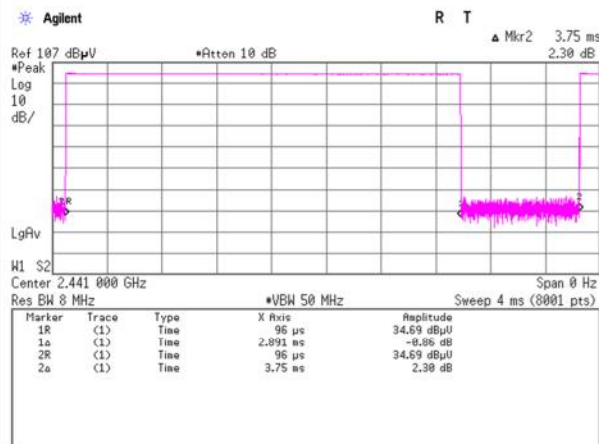


**Burst Rate Confirmation**

Test place                      Shonan EMC Lab. No.5 Shielded Room  
Date                              June 5, 2023  
Temperature / Humidity      26 deg. C / 46 % RH  
Engineer                        Yosuke Murakami  
Mode                              Tx, Hopping Off

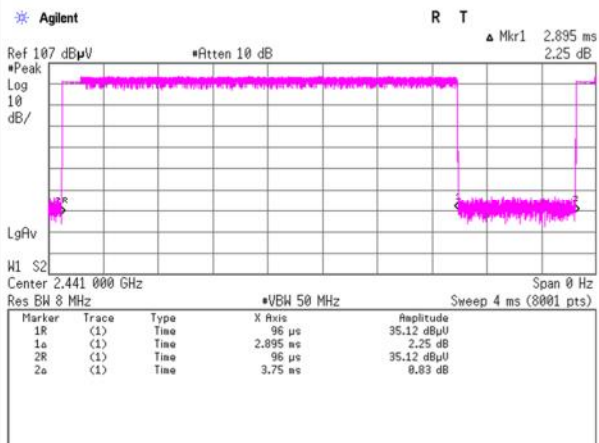
**DH5**

Tx on / (Tx on + Tx off) =                      **0.771**  
Tx on / (Tx on + Tx off) \* 100 =                **77.1 %**  
Duty factor =  $10 * \log (3.75 / 2.891) =$         **1.13 dB**  
VBW: 1 / on time = 345.9 Hz <                **360.00 Hz**



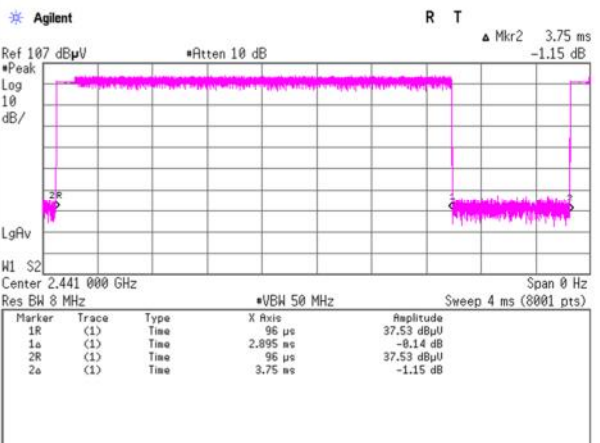
**2DH5**

Tx on / (Tx on + Tx off) =                      **0.772**  
Tx on / (Tx on + Tx off) \* 100 =                **77.2 %**  
Duty factor =  $10 * \log (3.75 / 2.895) =$         **1.12 dB**  
VBW: 1 / on time = 345.42 Hz <                **360.00 Hz**



**3DH5**

Tx on / (Tx on + Tx off) =                      **0.772**  
Tx on / (Tx on + Tx off) \* 100 =                **77.2 %**  
Duty factor =  $10 * \log (3.75 / 2.895) =$         **1.12 dB**  
VBW: 1 / on time = 345.42 Hz <                **360.00 Hz**



## Radiated Spurious Emission

|                        |                               |                     |                      |
|------------------------|-------------------------------|---------------------|----------------------|
| Test place             | Shonan EMC Lab.               |                     |                      |
| Semi Anechoic Chamber  | SAC 3                         | SAC 3               | SAC 3                |
| Date                   | June 27, 2023                 | June 28, 2023       | June 29, 2023        |
| Temperature / Humidity | 23 deg.C, 51 %RH              | 22 deg.C, 45 %RH    | 20 deg.C, 54 %RH     |
| Engineer               | Hiromasa Sato                 | Shiro Kobayashi     | Yasumasa Owaki       |
|                        | ( 1 GHz -2.8 GHz )            | ( 2.8 GHz -10 GHz ) | ( 10 GHz -26.5 GHz ) |
| Mode                   | Tx, Hopping Off, DH5 2402 MHz |                     |                      |

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark      |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|-------------|
| Hori.    | 2390.000        | PK       | 48.02          | 27.98           | 14.48     | 41.61     | 2.49                 | 51.36           | 73.9           | 22.5        | 224         | 271         | -           |
| Hori.    | 3202.667        | PK       | 53.75          | 28.86           | 6.55      | 41.91     | 2.49                 | 49.74           | 73.9           | 24.1        | 241         | 279         | -           |
| Hori.    | 4804.000        | PK       | 51.51          | 31.39           | 7.39      | 42.87     | 2.49                 | 49.91           | 73.9           | 23.9        | 314         | 139         | -           |
| Hori.    | 7206.000        | PK       | 51.31          | 37.12           | 8.73      | 43.34     | 2.49                 | 56.31           | 73.9           | 17.5        | 204         | 161         | -           |
| Hori.    | 9608.000        | PK       | 48.43          | 38.58           | 9.90      | 43.12     | 2.49                 | 56.28           | 73.9           | 17.6        | 150         | 0           | -           |
| Hori.    | 2390.000        | AV       | 35.41          | 27.98           | 14.48     | 41.61     | 2.49                 | 38.75           | 53.9           | 15.1        | 224         | 271         | VBW:360 Hz  |
| Hori.    | 3202.667        | AV       | 47.85          | 28.86           | 6.55      | 41.91     | 2.49                 | 43.84           | 53.9           | 10.0        | 241         | 279         | VBW:360 Hz  |
| Hori.    | 4804.000        | AV       | 42.49          | 31.39           | 7.39      | 42.87     | 2.49                 | 40.89           | 53.9           | 13.0        | 314         | 139         | VBW:360 Hz  |
| Hori.    | 7206.000        | AV       | 41.20          | 37.12           | 8.73      | 43.34     | 2.49                 | 46.20           | 53.9           | 7.7         | 204         | 161         | VBW:360 Hz  |
| Hori.    | 9608.000        | AV       | 36.65          | 38.58           | 9.90      | 43.12     | 2.49                 | 44.50           | 53.9           | 9.4         | 150         | 0           | Floor noise |
| Vert.    | 2390.000        | PK       | 47.67          | 27.98           | 14.48     | 41.61     | 2.49                 | 51.01           | 73.9           | 22.8        | 118         | 251         | -           |
| Vert.    | 3202.667        | PK       | 54.28          | 28.86           | 6.55      | 41.91     | 2.49                 | 50.27           | 73.9           | 23.6        | 284         | 319         | -           |
| Vert.    | 4804.000        | PK       | 49.64          | 31.39           | 7.39      | 42.87     | 2.49                 | 48.04           | 73.9           | 25.8        | 158         | 262         | -           |
| Vert.    | 7206.000        | PK       | 50.07          | 37.12           | 8.73      | 43.34     | 2.49                 | 55.07           | 73.9           | 18.8        | 237         | 291         | -           |
| Vert.    | 9608.000        | PK       | 48.17          | 38.58           | 9.90      | 43.12     | 2.49                 | 56.02           | 73.9           | 17.8        | 150         | 0           | -           |
| Vert.    | 2390.000        | AV       | 35.28          | 27.98           | 14.48     | 41.61     | 2.49                 | 38.62           | 53.9           | 15.2        | 118         | 251         | VBW:360 Hz  |
| Vert.    | 3202.667        | AV       | 48.96          | 28.86           | 6.55      | 41.91     | 2.49                 | 44.95           | 53.9           | 8.9         | 284         | 319         | VBW:360 Hz  |
| Vert.    | 4804.000        | AV       | 38.39          | 31.39           | 7.39      | 42.87     | 2.49                 | 36.79           | 53.9           | 17.1        | 158         | 262         | VBW:360 Hz  |
| Vert.    | 7206.000        | AV       | 38.43          | 37.12           | 8.73      | 43.34     | 2.49                 | 43.43           | 53.9           | 10.4        | 237         | 291         | VBW:360 Hz  |
| Vert.    | 9608.000        | AV       | 37.11          | 38.58           | 9.90      | 43.12     | 2.49                 | 44.96           | 53.9           | 8.9         | 150         | 0           | Floor noise |

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

Distance factor : 1 GHz - 10 GHz :  $20\log(3.995\text{ m} / 3.0\text{ m}) = 2.49\text{ dB}$

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

\*These results have sufficient margin without taking account Duty cycle correction factor.

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark  |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|---------|
| Hori.    | 2402.000        | PK       | 99.65          | 27.97           | 14.49     | 41.61     | 2.49                 | 102.99          | -              | -           | Carrier |
| Hori.    | 2400.000        | PK       | 40.16          | 27.97           | 14.49     | 41.61     | 2.49                 | 43.50           | 82.9           | 39.4        | -       |
| Vert.    | 2402.000        | PK       | 96.05          | 27.97           | 14.49     | 41.61     | 2.49                 | 99.39           | -              | -           | Carrier |
| Vert.    | 2400.000        | PK       | 39.33          | 27.97           | 14.49     | 41.61     | 2.49                 | 42.67           | 79.3           | 36.6        | -       |

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

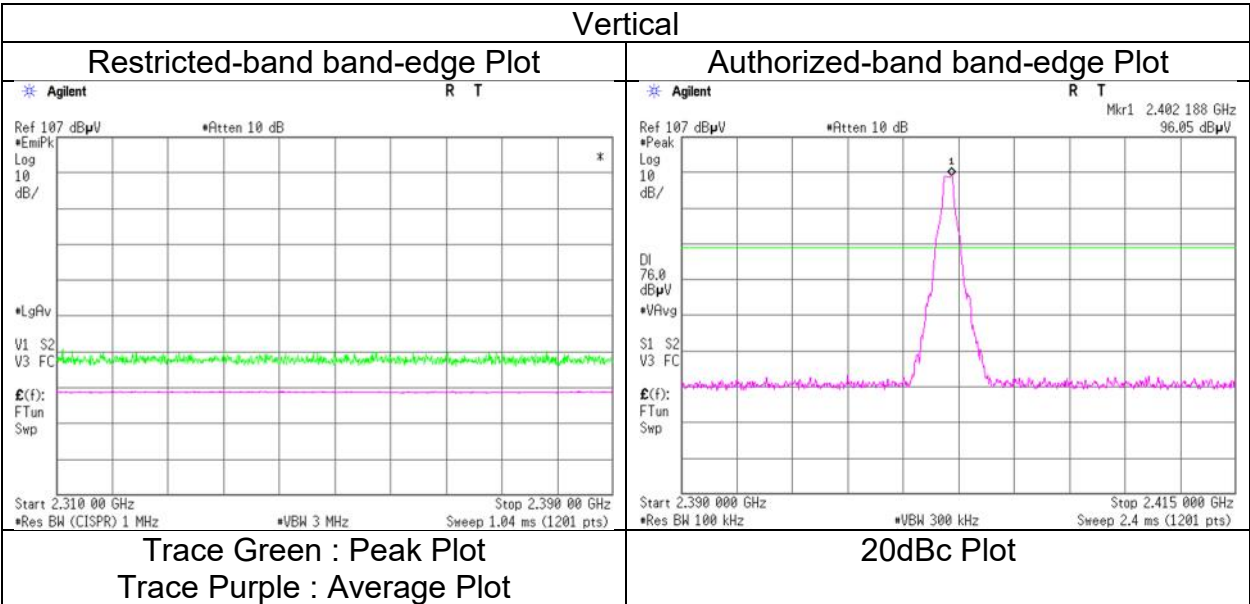
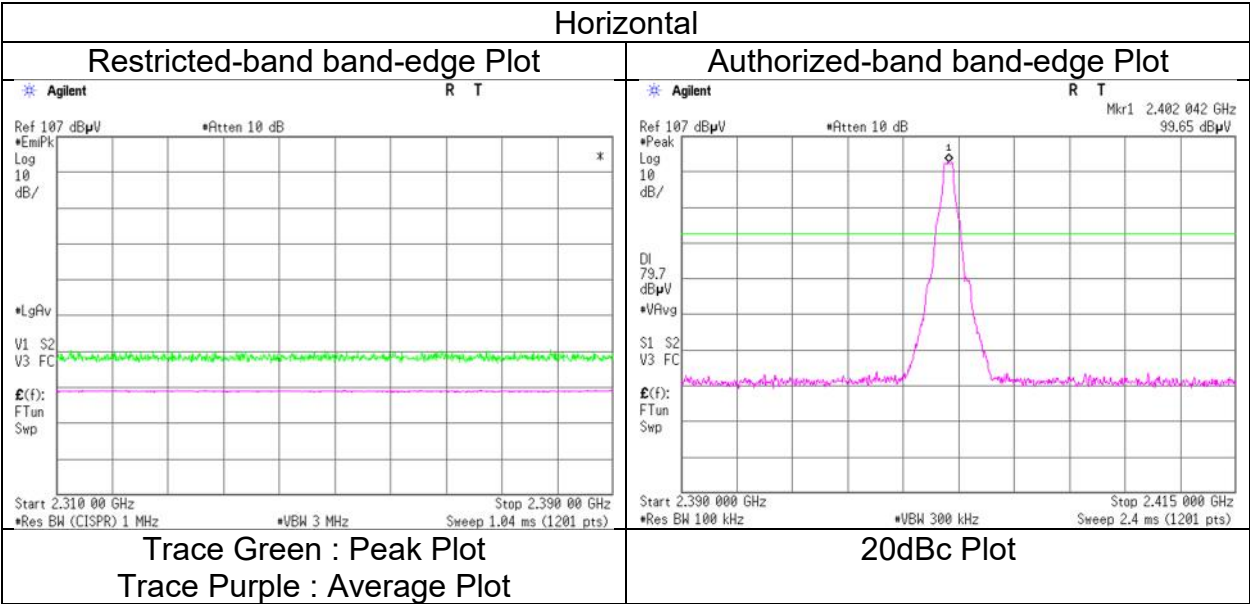
Distance factor : 1 GHz - 10 GHz :  $20\log(3.995\text{ m} / 3.0\text{ m}) = 2.49\text{ dB}$

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

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

Test place  
Semi Anechoic Chamber  
Date  
Temperature / Humidity  
Engineer  
Mode

Shonan EMC Lab.  
SAC 3  
June 27, 2023  
23 deg.C, 51 %RH  
Hiromasa Sato  
Tx, Hopping Off, DH5 2402 MHz



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

## Radiated Spurious Emission

|                        |                               |                    |                     |                      |
|------------------------|-------------------------------|--------------------|---------------------|----------------------|
| Test place             | Shonan EMC Lab.               |                    |                     |                      |
| Semi Anechoic Chamber  | SAC 3                         | SAC 3              | SAC 3               | SAC 3                |
| Date                   | June 30, 2023                 | June 27, 2023      | June 28, 2023       | June 29, 2023        |
| Temperature / Humidity | 20 deg.C, 54 %RH              | 23 deg.C, 51 %RH   | 22 deg.C, 45 %RH    | 20 deg.C, 54 %RH     |
| Engineer               | Yasumasa Owaki                | Hirumasa Sato      | Shiro Kobayashi     | Yasumasa Owaki       |
|                        | ( 30 MHz -1 GHz )             | ( 1 GHz -2.8 GHz ) | ( 2.8 GHz -10 GHz ) | ( 10 GHz -26.5 GHz ) |
| Mode                   | Tx, Hopping Off, DH5 2441 MHz |                    |                     |                      |

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark      |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|-------------|
| Hori.    | 30.421          | QP       | 23.60          | 18.86           | 6.61      | 32.20     | 0.00                 | 16.87           | 40.0           | 23.1        | 314         | 329         | -           |
| Hori.    | 591.900         | QP       | 23.00          | 19.19           | 9.87      | 31.95     | 0.00                 | 20.11           | 46.0           | 25.8        | 100         | 168         | -           |
| Hori.    | 864.355         | QP       | 22.60          | 21.93           | 10.84     | 31.27     | 0.00                 | 24.10           | 46.0           | 21.9        | 225         | 276         | -           |
| Hori.    | 941.960         | QP       | 22.40          | 22.04           | 11.09     | 30.78     | 0.00                 | 24.75           | 46.0           | 21.2        | 146         | 146         | -           |
| Hori.    | 3254.667        | PK       | 52.39          | 28.67           | 6.59      | 41.96     | 2.49                 | 48.18           | 73.9           | 25.7        | 294         | 193         | -           |
| Hori.    | 4882.000        | PK       | 50.52          | 31.52           | 7.43      | 42.88     | 2.49                 | 49.08           | 73.9           | 24.8        | 316         | 173         | -           |
| Hori.    | 7323.000        | PK       | 49.47          | 37.26           | 8.80      | 43.42     | 2.49                 | 54.60           | 73.9           | 19.3        | 312         | 161         | -           |
| Hori.    | 9764.000        | PK       | 49.43          | 39.02           | 10.00     | 43.00     | 2.49                 | 57.94           | 73.9           | 15.9        | 150         | 0           | -           |
| Hori.    | 3254.667        | AV       | 46.22          | 28.67           | 6.59      | 41.96     | 2.49                 | 42.01           | 53.9           | 11.8        | 294         | 193         | VBW:360 Hz  |
| Hori.    | 4882.000        | AV       | 40.86          | 31.52           | 7.43      | 42.88     | 2.49                 | 39.42           | 53.9           | 14.4        | 316         | 173         | VBW:360 Hz  |
| Hori.    | 7323.000        | AV       | 37.67          | 37.26           | 8.80      | 43.42     | 2.49                 | 42.80           | 53.9           | 11.1        | 312         | 161         | VBW:360 Hz  |
| Hori.    | 9764.000        | AV       | 36.62          | 39.02           | 10.00     | 43.00     | 2.49                 | 45.13           | 53.9           | 8.7         | 150         | 0           | Floor noise |
| Vert.    | 30.064          | QP       | 22.70          | 18.99           | 6.61      | 32.20     | 0.00                 | 16.10           | 40.0           | 23.9        | 172         | 312         | -           |
| Vert.    | 497.208         | QP       | 22.80          | 17.86           | 9.47      | 31.93     | 0.00                 | 18.20           | 46.0           | 27.8        | 165         | 333         | -           |
| Vert.    | 807.297         | QP       | 22.70          | 20.83           | 10.65     | 31.62     | 0.00                 | 22.56           | 46.0           | 23.4        | 110         | 4           | -           |
| Vert.    | 935.446         | QP       | 22.50          | 22.07           | 11.07     | 30.83     | 0.00                 | 24.81           | 46.0           | 21.1        | 100         | 350         | -           |
| Vert.    | 3254.667        | PK       | 54.31          | 28.67           | 6.59      | 41.96     | 2.49                 | 50.10           | 73.9           | 23.8        | 143         | 317         | -           |
| Vert.    | 4882.000        | PK       | 50.63          | 31.52           | 7.43      | 42.88     | 2.49                 | 49.19           | 73.9           | 24.7        | 166         | 272         | -           |
| Vert.    | 7323.000        | PK       | 48.93          | 37.26           | 8.80      | 43.42     | 2.49                 | 54.06           | 73.9           | 19.8        | 314         | 303         | -           |
| Vert.    | 9764.000        | PK       | 49.39          | 39.02           | 10.00     | 43.00     | 2.49                 | 57.90           | 73.9           | 16.0        | 150         | 0           | -           |
| Vert.    | 3254.667        | AV       | 47.69          | 28.67           | 6.59      | 41.96     | 2.49                 | 43.48           | 53.9           | 10.4        | 143         | 317         | VBW:360 Hz  |
| Vert.    | 4882.000        | AV       | 39.55          | 31.52           | 7.43      | 42.88     | 2.49                 | 38.11           | 53.9           | 15.7        | 166         | 272         | VBW:360 Hz  |
| Vert.    | 7323.000        | AV       | 37.64          | 37.26           | 8.80      | 43.42     | 2.49                 | 42.77           | 53.9           | 11.1        | 314         | 303         | VBW:360 Hz  |
| Vert.    | 9764.000        | AV       | 37.06          | 39.02           | 10.00     | 43.00     | 2.49                 | 45.57           | 53.9           | 8.3         | 150         | 0           | Floor noise |

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

Distance factor : 1 GHz - 10 GHz:  $20\log(3.995\text{ m} / 3.0\text{ m}) = 2.49\text{ dB}$

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

\*These results have sufficient margin without taking account Duty cycle correction factor.

## Radiated Spurious Emission

|                        |                               |                     |                      |
|------------------------|-------------------------------|---------------------|----------------------|
| Test place             | Shonan EMC Lab.               |                     |                      |
| Semi Anechoic Chamber  | SAC 3                         | SAC 3               | SAC 3                |
| Date                   | June 27, 2023                 | June 28, 2023       | June 29, 2023        |
| Temperature / Humidity | 23 deg.C, 51 %RH              | 22 deg.C, 45 %RH    | 20 deg.C, 54 %RH     |
| Engineer               | Hiromasa Sato                 | Shiro Kobayashi     | Yasumasa Owaki       |
|                        | ( 1 GHz -2.8 GHz )            | ( 2.8 GHz -10 GHz ) | ( 10 GHz -26.5 GHz ) |
| Mode                   | Tx, Hopping Off, DH5 2480 MHz |                     |                      |

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark      |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|-------------|
| Hori.    | 2483.500        | PK       | 48.76          | 27.89           | 14.59     | 41.64     | 2.49                 | 52.09           | 73.9           | 21.8        | 118         | 269         | -           |
| Hori.    | 3306.667        | PK       | 51.93          | 28.51           | 6.63      | 42.00     | 2.49                 | 47.56           | 73.9           | 26.3        | 251         | 289         | -           |
| Hori.    | 4960.000        | PK       | 50.14          | 31.73           | 7.49      | 42.89     | 2.49                 | 48.96           | 73.9           | 24.9        | 286         | 151         | -           |
| Hori.    | 7440.000        | PK       | 48.60          | 37.42           | 8.87      | 43.50     | 2.49                 | 53.88           | 73.9           | 20.0        | 150         | 0           | -           |
| Hori.    | 9920.000        | PK       | 48.85          | 38.95           | 10.09     | 42.89     | 2.49                 | 57.49           | 73.9           | 16.4        | 150         | 0           | -           |
| Hori.    | 2483.500        | AV       | 36.21          | 27.89           | 14.59     | 41.64     | 2.49                 | 39.54           | 53.9           | 14.3        | 118         | 269         | -           |
| Hori.    | 3306.667        | AV       | 44.97          | 28.51           | 6.63      | 42.00     | 2.49                 | 40.60           | 53.9           | 13.3        | 251         | 289         | VBW:360 Hz  |
| Hori.    | 4960.000        | AV       | 39.06          | 31.73           | 7.49      | 42.89     | 2.49                 | 37.88           | 53.9           | 16.0        | 286         | 151         | VBW:360 Hz  |
| Hori.    | 7440.000        | AV       | 37.01          | 37.42           | 8.87      | 43.50     | 2.49                 | 42.29           | 53.9           | 11.6        | 150         | 0           | Floor noise |
| Hori.    | 9920.000        | AV       | 36.80          | 38.95           | 10.09     | 42.89     | 2.49                 | 45.44           | 53.9           | 8.4         | 150         | 0           | Floor noise |
| Vert.    | 2483.500        | PK       | 47.67          | 27.89           | 14.59     | 41.64     | 2.49                 | 51.00           | 73.9           | 22.9        | 159         | 247         | -           |
| Vert.    | 3306.667        | PK       | 53.33          | 28.51           | 6.63      | 42.00     | 2.49                 | 48.96           | 73.9           | 24.9        | 141         | 313         | -           |
| Vert.    | 4960.000        | PK       | 50.78          | 31.73           | 7.49      | 42.89     | 2.49                 | 49.60           | 73.9           | 24.3        | 181         | 265         | -           |
| Vert.    | 7440.000        | PK       | 49.59          | 37.42           | 8.87      | 43.50     | 2.49                 | 54.87           | 73.9           | 19.0        | 238         | 78          | -           |
| Vert.    | 9920.000        | PK       | 48.94          | 38.95           | 10.09     | 42.89     | 2.49                 | 57.58           | 73.9           | 16.3        | 150         | 0           | -           |
| Vert.    | 2483.500        | AV       | 35.76          | 27.89           | 14.59     | 41.64     | 2.49                 | 39.09           | 53.9           | 14.8        | 159         | 247         | -           |
| Vert.    | 3306.667        | AV       | 46.98          | 28.51           | 6.63      | 42.00     | 2.49                 | 42.61           | 53.9           | 11.2        | 141         | 313         | VBW:360 Hz  |
| Vert.    | 4960.000        | AV       | 39.35          | 31.73           | 7.49      | 42.89     | 2.49                 | 38.17           | 53.9           | 15.7        | 181         | 265         | VBW:360 Hz  |
| Vert.    | 7440.000        | AV       | 39.65          | 37.42           | 8.87      | 43.50     | 2.49                 | 44.93           | 53.9           | 8.9         | 238         | 78          | VBW:360 Hz  |
| Vert.    | 9920.000        | AV       | 36.22          | 38.95           | 10.09     | 42.89     | 2.49                 | 44.86           | 53.9           | 9.0         | 150         | 0           | Floor noise |

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

Distance factor : 1 GHz - 10 GHz :  $20\log(3.995\text{ m} / 3.0\text{ m}) = 2.49\text{ dB}$

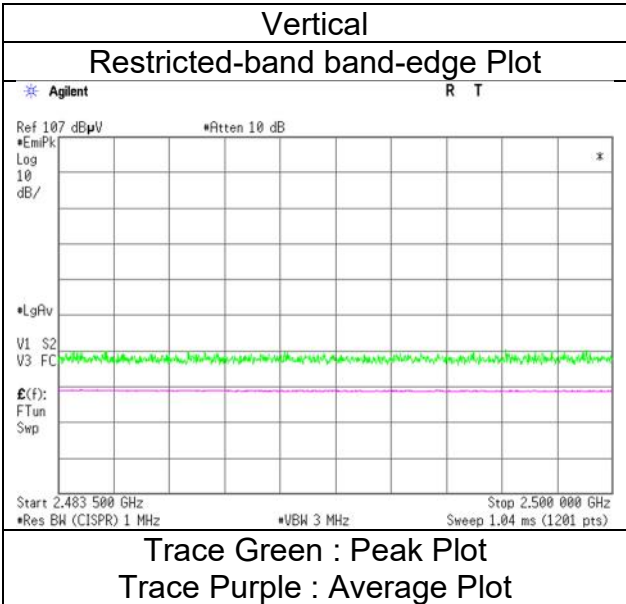
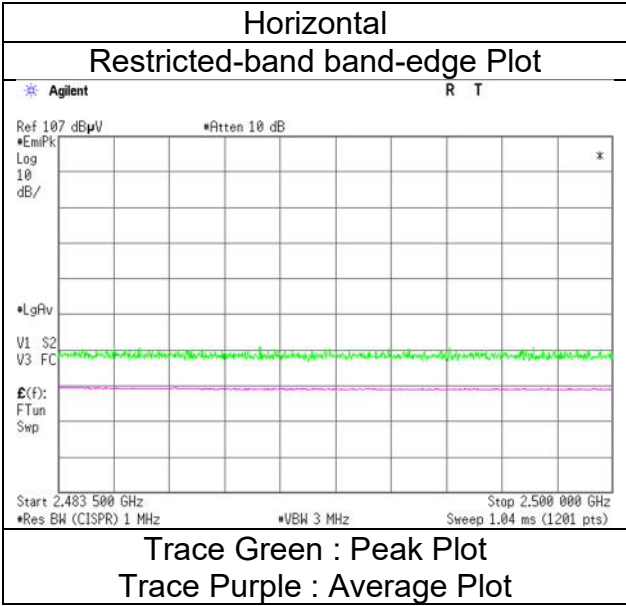
10 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

\*These results have sufficient margin without taking account Duty cycle correction factor.

**Radiated Spurious Emission**  
**(Reference Plot for bandto edge)**

Test place  
Semi Anechoic Chamber  
Date  
Temperature / Humidity  
Engineer  
Mode

Shonan EMC Lab.  
SAC 3  
June 27, 2023  
23 deg.C, 51 %RH  
Hiromasa Sato  
Tx, Hopping Off, DH5 2480 MHz



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

## Radiated Spurious Emission

|                        |                                |                    |                     |                      |
|------------------------|--------------------------------|--------------------|---------------------|----------------------|
| Test place             | Shonan EMC Lab.                |                    |                     |                      |
| Semi Anechoic Chamber  | SAC 3                          | SAC 3              | SAC 3               | SAC 3                |
| Date                   | June 30, 2023                  | June 27, 2023      | June 28, 2023       | June 29, 2023        |
| Temperature / Humidity | 20 deg.C, 54 %RH               | 23 deg.C, 51 %RH   | 22 deg.C, 45 %RH    | 20 deg.C, 54 %RH     |
| Engineer               | Yasumasa Owaki                 | Hiromasa Sato      | Shiro Kobayashi     | Yasumasa Owaki       |
|                        | ( 30 MHz -1 GHz )              | ( 1 GHz -2.8 GHz ) | ( 2.8 GHz -10 GHz ) | ( 10 GHz -26.5 GHz ) |
| Mode                   | Tx, Hopping Off, 3DH5 2402 MHz |                    |                     |                      |

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark      |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|-------------|
| Hori.    | 2390.000        | PK       | 47.65          | 27.98           | 14.48     | 41.61     | 2.49                 | 50.99           | 73.9           | 22.9        | 250         | 255         | -           |
| Hori.    | 3202.667        | PK       | 53.95          | 28.86           | 6.55      | 41.91     | 2.49                 | 49.94           | 73.9           | 23.9        | 169         | 270         | -           |
| Hori.    | 4804.000        | PK       | 49.05          | 31.39           | 7.39      | 42.87     | 2.49                 | 47.45           | 73.9           | 26.4        | 150         | 0           | -           |
| Hori.    | 7206.000        | PK       | 48.66          | 37.12           | 8.73      | 43.34     | 2.49                 | 53.66           | 73.9           | 20.2        | 150         | 0           | -           |
| Hori.    | 9608.000        | PK       | 48.44          | 38.58           | 9.90      | 43.12     | 2.49                 | 56.29           | 73.9           | 17.6        | 150         | 0           | -           |
| Hori.    | 2390.000        | AV       | 35.49          | 27.98           | 14.48     | 41.61     | 2.49                 | 38.83           | 53.9           | 15.0        | 250         | 255         | -           |
| Hori.    | 3202.667        | AV       | 48.37          | 28.86           | 6.55      | 41.91     | 2.49                 | 44.36           | 53.9           | 9.5         | 169         | 270         | VBW:360 Hz  |
| Hori.    | 4804.000        | AV       | 36.62          | 31.39           | 7.39      | 42.87     | 2.49                 | 35.02           | 53.9           | 18.8        | 150         | 0           | Floor noise |
| Hori.    | 7206.000        | AV       | 36.47          | 37.12           | 8.73      | 43.34     | 2.49                 | 41.47           | 53.9           | 12.4        | 150         | 0           | Floor noise |
| Hori.    | 9608.000        | AV       | 36.60          | 38.58           | 9.90      | 43.12     | 2.49                 | 44.45           | 53.9           | 9.4         | 150         | 0           | Floor noise |
| Vert.    | 2390.000        | PK       | 46.92          | 27.98           | 14.48     | 41.61     | 2.49                 | 50.26           | 73.9           | 23.6        | 136         | 271         | -           |
| Vert.    | 3202.667        | PK       | 55.89          | 28.86           | 6.55      | 41.91     | 2.49                 | 51.88           | 73.9           | 22.0        | 198         | 318         | -           |
| Vert.    | 4804.000        | PK       | 48.04          | 31.39           | 7.39      | 42.87     | 2.49                 | 46.44           | 73.9           | 27.4        | 150         | 0           | -           |
| Vert.    | 7206.000        | PK       | 48.29          | 37.12           | 8.73      | 43.34     | 2.49                 | 53.29           | 73.9           | 20.6        | 150         | 0           | -           |
| Vert.    | 9608.000        | PK       | 48.13          | 38.58           | 9.90      | 43.12     | 2.49                 | 55.98           | 73.9           | 17.9        | 150         | 0           | -           |
| Vert.    | 2390.000        | AV       | 35.45          | 27.98           | 14.48     | 41.61     | 2.49                 | 38.79           | 53.9           | 15.1        | 136         | 271         | -           |
| Vert.    | 3202.667        | AV       | 51.59          | 28.86           | 6.55      | 41.91     | 2.49                 | 47.58           | 53.9           | 6.3         | 198         | 318         | VBW:360 Hz  |
| Vert.    | 4804.000        | AV       | 37.00          | 31.39           | 7.39      | 42.87     | 2.49                 | 35.40           | 53.9           | 18.5        | 150         | 0           | Floor noise |
| Vert.    | 7206.000        | AV       | 36.81          | 37.12           | 8.73      | 43.34     | 2.49                 | 41.81           | 53.9           | 12.0        | 150         | 0           | Floor noise |
| Vert.    | 9608.000        | AV       | 37.25          | 38.58           | 9.90      | 43.12     | 2.49                 | 45.10           | 53.9           | 8.8         | 150         | 0           | Floor noise |

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

Distance factor : 1 GHz - 10 GHz :  $20\log(3.995\text{ m} / 3.0\text{ m}) = 2.49\text{ dB}$

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

\*These results have sufficient margin without taking account Duty cycle correction factor.

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark  |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|---------|
| Hori.    | 2402.000        | PK       | 95.29          | 27.97           | 14.49     | 41.61     | 2.49                 | 98.63           | -              | -           | Carrier |
| Hori.    | 2400.000        | PK       | 39.83          | 27.97           | 14.49     | 41.61     | 2.49                 | 43.17           | 78.6           | 35.4        | -       |
| Vert.    | 2402.000        | PK       | 94.96          | 27.97           | 14.49     | 41.61     | 2.49                 | 98.30           | -              | -           | Carrier |
| Vert.    | 2400.000        | PK       | 39.55          | 27.97           | 14.49     | 41.61     | 2.49                 | 42.89           | 78.3           | 35.4        | -       |

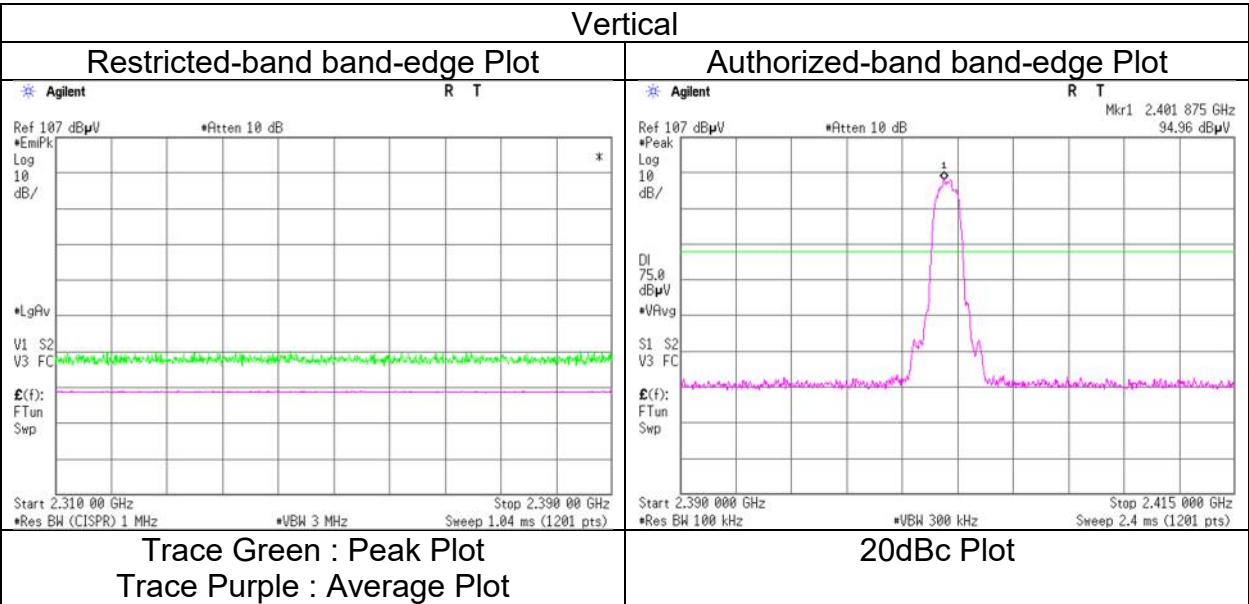
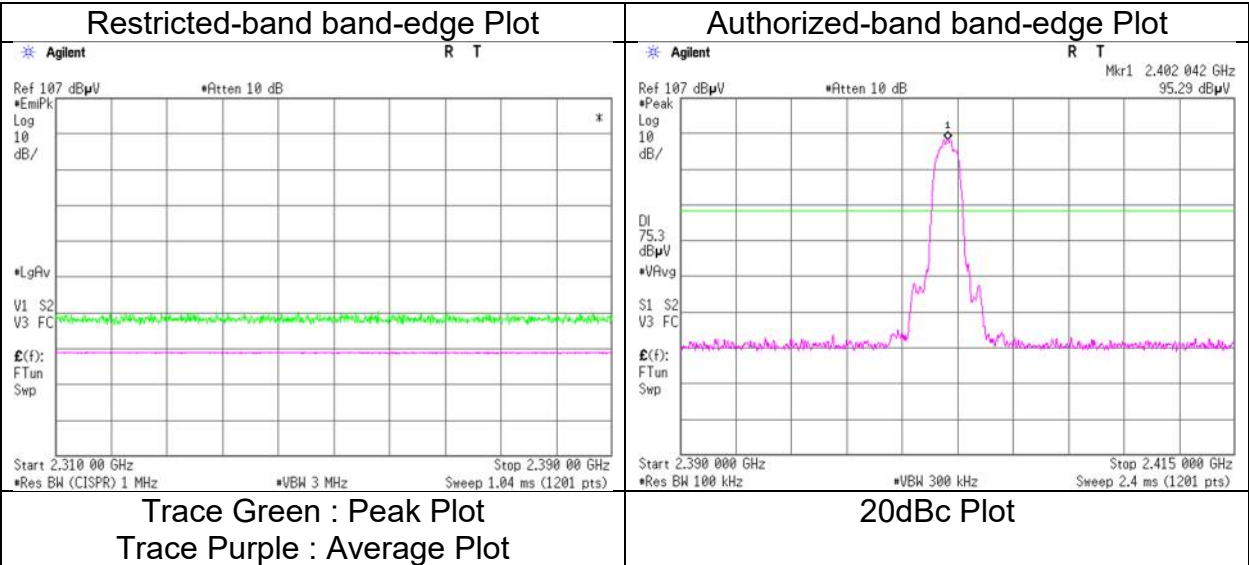
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.995\text{ m} / 3.0\text{ m}) = 2.49\text{ dB}$

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

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

|                        |                                |
|------------------------|--------------------------------|
| Test place             | Shonan EMC Lab.                |
| Semi Anechoic Chamber  | SAC 3                          |
| Date                   | June 27, 2023                  |
| Temperature / Humidity | 23 deg.C, 51 %RH               |
| Engineer               | Hiromasa Sato                  |
| Mode                   | Tx, Hopping Off, 3DH5 2402 MHz |



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



## Radiated Spurious Emission

|                        |                                |                    |                     |                      |
|------------------------|--------------------------------|--------------------|---------------------|----------------------|
| Test place             | Shonan EMC Lab.                |                    |                     |                      |
| Semi Anechoic Chamber  | SAC 3                          | SAC 3              | SAC 3               | SAC 3                |
| Date                   | June 30, 2023                  | June 27, 2023      | June 28, 2023       | June 29, 2023        |
| Temperature / Humidity | 20 deg.C, 54 %RH               | 23 deg.C, 51 %RH   | 22 deg.C, 45 %RH    | 20 deg.C, 54 %RH     |
| Engineer               | Yasumasa Owaki                 | Hiomasa Sato       | Shiro Kobayashi     | Yasumasa Owaki       |
|                        | ( 30 MHz -1 GHz )              | ( 1 GHz -2.8 GHz ) | ( 2.8 GHz -10 GHz ) | ( 10 GHz -26.5 GHz ) |
| Mode                   | Tx, Hopping Off, 3DH5 2441 MHz |                    |                     |                      |

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark      |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|-------------|
| Hori.    | 3254.667        | PK       | 51.48          | 28.67           | 6.59      | 41.96     | 2.49                 | 47.27           | 73.9           | 26.6        | 160         | 353         | -           |
| Hori.    | 4882.000        | PK       | 48.34          | 31.52           | 7.43      | 42.88     | 2.49                 | 46.90           | 73.9           | 27.0        | 150         | 0           | -           |
| Hori.    | 7323.000        | PK       | 48.11          | 37.26           | 8.80      | 43.42     | 2.49                 | 53.24           | 73.9           | 20.6        | 150         | 0           | -           |
| Hori.    | 9764.000        | PK       | 49.26          | 39.02           | 10.00     | 43.00     | 2.49                 | 57.77           | 73.9           | 16.1        | 150         | 0           | -           |
| Hori.    | 3254.667        | AV       | 44.36          | 28.67           | 6.59      | 41.96     | 2.49                 | 40.15           | 53.9           | 13.7        | 160         | 353         | VBW:360 Hz  |
| Hori.    | 4882.000        | AV       | 36.45          | 31.52           | 7.43      | 42.88     | 2.49                 | 35.01           | 53.9           | 18.8        | 150         | 0           | Floor noise |
| Hori.    | 7323.000        | AV       | 36.28          | 37.26           | 8.80      | 43.42     | 2.49                 | 41.41           | 53.9           | 12.4        | 150         | 0           | Floor noise |
| Hori.    | 9764.000        | AV       | 36.47          | 39.02           | 10.00     | 43.00     | 2.49                 | 44.98           | 53.9           | 8.9         | 150         | 0           | Floor noise |
| Vert.    | 3254.667        | PK       | 54.64          | 28.67           | 6.59      | 41.96     | 2.49                 | 50.43           | 73.9           | 23.4        | 186         | 300         | -           |
| Vert.    | 4882.000        | PK       | 48.83          | 31.52           | 7.43      | 42.88     | 2.49                 | 47.39           | 73.9           | 26.5        | 150         | 0           | -           |
| Vert.    | 7323.000        | PK       | 48.15          | 37.26           | 8.80      | 43.42     | 2.49                 | 53.28           | 73.9           | 20.6        | 150         | 0           | -           |
| Vert.    | 9764.000        | PK       | 49.08          | 39.02           | 10.00     | 43.00     | 2.49                 | 57.59           | 73.9           | 16.3        | 150         | 0           | -           |
| Vert.    | 3254.667        | AV       | 50.36          | 28.67           | 6.59      | 41.96     | 2.49                 | 46.15           | 53.9           | 7.7         | 186         | 300         | VBW:360 Hz  |
| Vert.    | 4882.000        | AV       | 36.49          | 31.52           | 7.43      | 42.88     | 2.49                 | 35.05           | 53.9           | 18.8        | 150         | 0           | Floor noise |
| Vert.    | 7323.000        | AV       | 36.50          | 37.26           | 8.80      | 43.42     | 2.49                 | 41.63           | 53.9           | 12.2        | 150         | 0           | Floor noise |
| Vert.    | 9764.000        | AV       | 36.39          | 39.02           | 10.00     | 43.00     | 2.49                 | 44.90           | 53.9           | 9.0         | 150         | 0           | Floor noise |

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

Distance factor : 1 GHz - 10 GHz :  $20\log(3.995\text{ m} / 3.0\text{ m}) = 2.49\text{ dB}$

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

\*These results have sufficient margin without taking account Duty cycle correction factor.

## Radiated Spurious Emission

|                        |                                |                    |                     |                      |
|------------------------|--------------------------------|--------------------|---------------------|----------------------|
| Test place             | Shonan EMC Lab.                |                    |                     |                      |
| Semi Anechoic Chamber  | SAC 3                          | SAC 3              | SAC 3               | SAC 3                |
| Date                   | June 30, 2023                  | June 27, 2023      | June 28, 2023       | June 29, 2023        |
| Temperature / Humidity | 20 deg.C, 54 %RH               | 23 deg.C, 51 %RH   | 22 deg.C, 45 %RH    | 20 deg.C, 54 %RH     |
| Engineer               | Yasumasa Owaki                 | Hiromasa Sato      | Shiro Kobayashi     | Yasumasa Owaki       |
|                        | ( 30 MHz -1 GHz )              | ( 1 GHz -2.8 GHz ) | ( 2.8 GHz -10 GHz ) | ( 10 GHz -26.5 GHz ) |
| Mode                   | Tx, Hopping Off, 3DH5 2480 MHz |                    |                     |                      |

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark      |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|-------------|
| Hori.    | 2483.500        | PK       | 48.97          | 27.89           | 14.59     | 41.64     | 2.49                 | 52.30           | 73.9           | 21.6        | 152         | 283         | -           |
| Hori.    | 3306.667        | PK       | 52.37          | 28.51           | 6.63      | 42.00     | 2.49                 | 48.00           | 73.9           | 25.9        | 245         | 354         | -           |
| Hori.    | 4960.000        | PK       | 47.73          | 31.73           | 7.49      | 42.89     | 2.49                 | 46.55           | 73.9           | 27.3        | 150         | 0           | -           |
| Hori.    | 7440.000        | PK       | 48.42          | 37.42           | 8.87      | 43.50     | 2.49                 | 53.70           | 73.9           | 20.2        | 150         | 0           | -           |
| Hori.    | 9920.000        | PK       | 47.61          | 38.95           | 10.09     | 42.89     | 2.49                 | 56.25           | 73.9           | 17.6        | 150         | 0           | -           |
| Hori.    | 2483.500        | AV       | 35.63          | 27.89           | 14.59     | 41.64     | 2.49                 | 38.96           | 53.9           | 14.9        | 152         | 283         | -           |
| Hori.    | 3306.667        | AV       | 43.23          | 28.51           | 6.63      | 42.00     | 2.49                 | 38.86           | 53.9           | 15.0        | 245         | 354         | VBW:360 Hz  |
| Hori.    | 4960.000        | AV       | 36.77          | 31.73           | 7.49      | 42.89     | 2.49                 | 35.59           | 53.9           | 18.3        | 150         | 0           | Floor noise |
| Hori.    | 7440.000        | AV       | 37.27          | 37.42           | 8.87      | 43.50     | 2.49                 | 42.55           | 53.9           | 11.3        | 150         | 0           | Floor noise |
| Hori.    | 9920.000        | AV       | 36.52          | 38.95           | 10.09     | 42.89     | 2.49                 | 45.16           | 53.9           | 8.7         | 150         | 0           | Floor noise |
| Vert.    | 2483.500        | PK       | 47.98          | 27.89           | 14.59     | 41.64     | 2.49                 | 51.31           | 73.9           | 22.5        | 154         | 250         | -           |
| Vert.    | 3306.667        | PK       | 56.35          | 28.51           | 6.63      | 42.00     | 2.49                 | 51.98           | 73.9           | 21.9        | 229         | 313         | -           |
| Vert.    | 4960.000        | PK       | 48.53          | 31.73           | 7.49      | 42.89     | 2.49                 | 47.35           | 73.9           | 26.5        | 150         | 0           | -           |
| Vert.    | 7440.000        | PK       | 47.69          | 37.42           | 8.87      | 43.50     | 2.49                 | 52.97           | 73.9           | 20.9        | 150         | 0           | -           |
| Vert.    | 9920.000        | PK       | 47.44          | 38.95           | 10.09     | 42.89     | 2.49                 | 56.08           | 73.9           | 17.8        | 150         | 0           | -           |
| Vert.    | 2483.500        | AV       | 35.51          | 27.89           | 14.59     | 41.64     | 2.49                 | 38.84           | 53.9           | 15.0        | 154         | 250         | -           |
| Vert.    | 3306.667        | AV       | 51.33          | 28.51           | 6.63      | 42.00     | 2.49                 | 46.96           | 53.9           | <b>6.9</b>  | 229         | 313         | VBW:360 Hz  |
| Vert.    | 4960.000        | AV       | 36.78          | 31.73           | 7.49      | 42.89     | 2.49                 | 35.60           | 53.9           | 18.3        | 150         | 0           | Floor noise |
| Vert.    | 7440.000        | AV       | 37.14          | 37.42           | 8.87      | 43.50     | 2.49                 | 42.42           | 53.9           | 11.4        | 150         | 0           | Floor noise |
| Vert.    | 9920.000        | AV       | 36.47          | 38.95           | 10.09     | 42.89     | 2.49                 | 45.11           | 53.9           | 8.7         | 150         | 0           | Floor noise |

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

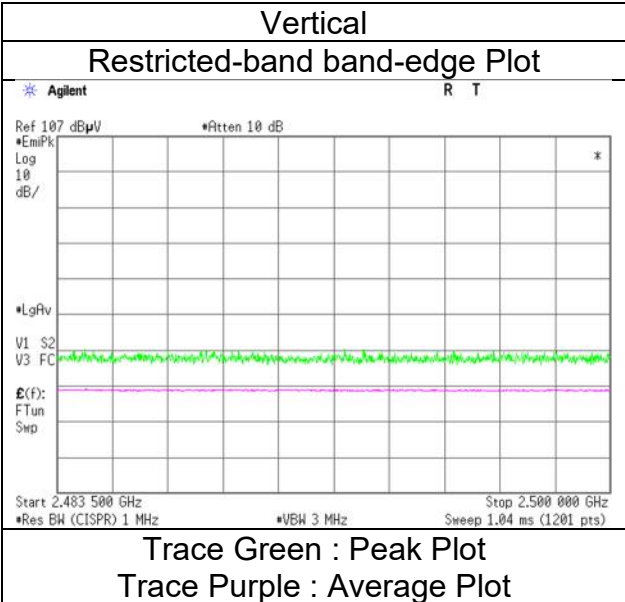
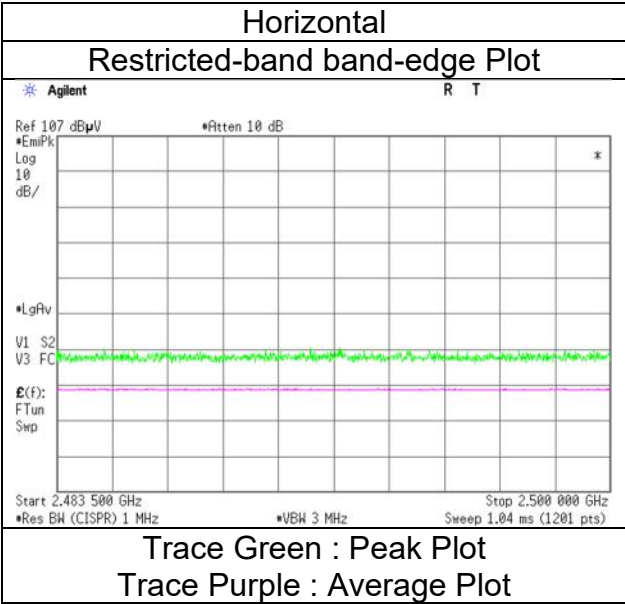
Distance factor : 1 GHz - 10 GHz :  $20\log(3.995\text{ m} / 3.0\text{ m}) = 2.49\text{ dB}$

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

\*These results have sufficient margin without taking account Duty cycle correction factor.

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

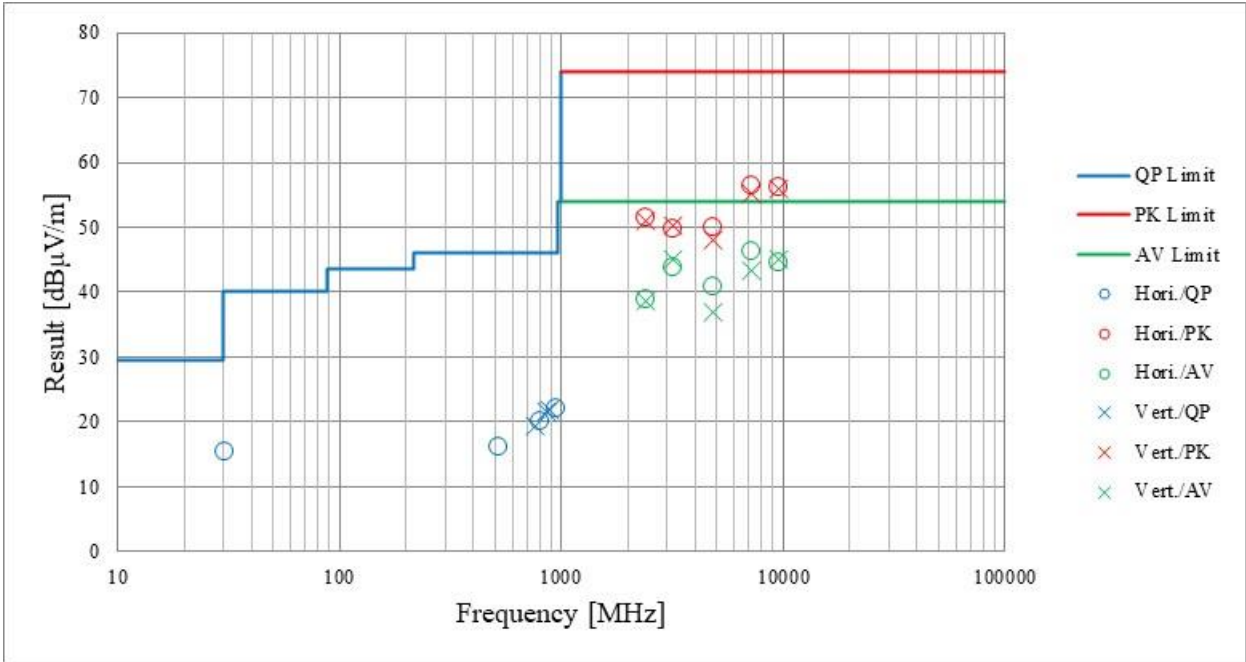
|                        |                                |
|------------------------|--------------------------------|
| Test place             | Shonan EMC Lab.                |
| Semi Anechoic Chamber  | SAC 3                          |
| Date                   | June 27, 2023                  |
| Temperature / Humidity | 23 deg.C, 51 %RH               |
| Engineer               | Hiromasa Sato                  |
| Mode                   | Tx, Hopping Off, 3DH5 2480 MHz |



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

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

|                        |                               |                     |                      |
|------------------------|-------------------------------|---------------------|----------------------|
| Test place             | Shonan EMC Lab.               |                     |                      |
| Semi Anechoic Chamber  | SAC 3                         | SAC 3               | SAC 3                |
| Date                   | June 27, 2023                 | June 28, 2023       | June 29, 2023        |
| Temperature / Humidity | 23 deg.C, 51 %RH              | 22 deg.C, 45 %RH    | 20 deg.C, 54 %RH     |
| Engineer               | Hiromasa Sato                 | Shiro Kobayashi     | Yasumasa Owaki       |
|                        | ( 1 GHz -2.8 GHz )            | ( 2.8 GHz -10 GHz ) | ( 10 GHz -26.5 GHz ) |
| Mode                   | Tx, Hopping Off, DH5 2441 MHz |                     |                      |



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

## Radiated Spurious Emission

|                        |                                                              |
|------------------------|--------------------------------------------------------------|
| Test place             | Shonan EMC Lab.                                              |
| Semi Anechoic Chamber  | SAC 3                                                        |
| Date                   | December 2, 2023                                             |
| Temperature / Humidity | 20 deg.C, 39 %RH                                             |
| Engineer               | Takahiro Suzuki<br>( 1 GHz - 2.8 GHz )                       |
| Mode                   | Tx Hopping off DH5 2402 MHz With Tx 11ax-40 (OFDM), 5510 MHz |

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

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark     |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|------------|
| Hori.    | 2390.000           | PK       | 47.02             | 27.98              | 14.41        | 41.61        | 2.49                    | 50.29              | 73.9              | 23.6           | 129            | 28             | -          |
| Hori.    | 2390.000           | AV       | 34.03             | 27.98              | 14.41        | 41.61        | 2.49                    | 37.30              | 53.9              | 16.6           | 129            | 28             | VBW:360 Hz |
| Vert.    | 2390.000           | PK       | 49.56             | 27.98              | 14.41        | 41.61        | 2.49                    | 52.83              | 73.9              | 21.0           | 114            | 154            | -          |
| Vert.    | 2390.000           | AV       | 36.42             | 27.98              | 14.41        | 41.61        | 2.49                    | 39.69              | 53.9              | <b>14.2</b>    | 114            | 154            | VBW:360 Hz |

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

Distance factor : 1 GHz - 10 GHz :  $20 \log (3.995 \text{ m} / 3.0 \text{ m}) = 2.49 \text{ dB}$

$$10 \text{ GHz} - 40 \text{ GHz}: 20 \log (1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$$

\*These results have sufficient margin without taking account Duty cycle correction factor.

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark  |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|---------|
| Hori.    | 2402.000        | PK       | 99.37          | 27.97           | 14.42     | 41.61     | 2.49                 | 102.64          | -              | -           | Carrier |
| Hori.    | 2400.000        | PK       | 39.41          | 27.97           | 14.41     | 41.61     | 2.49                 | 42.67           | 82.6           | 39.9        | -       |
| Vert.    | 2402.000        | PK       | 98.70          | 27.97           | 14.42     | 41.61     | 2.49                 | 101.97          | -              | -           | Carrier |
| Vert.    | 2400.000        | PK       | 40.09          | 27.97           | 14.41     | 41.61     | 2.49                 | 43.35           | 81.9           | 38.5        | -       |

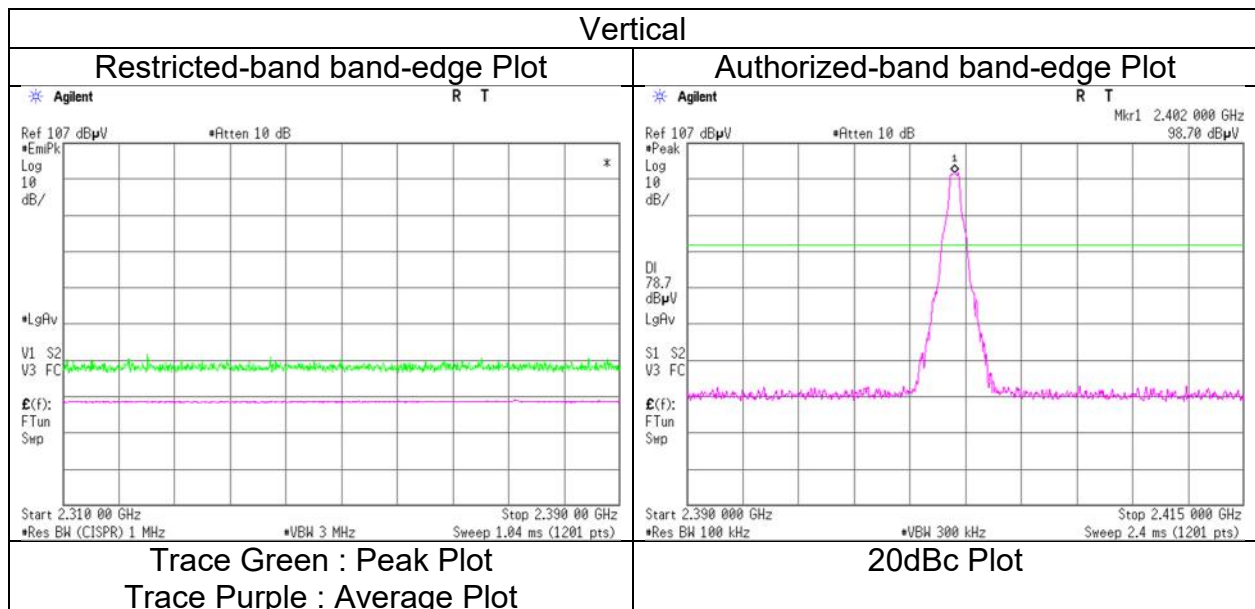
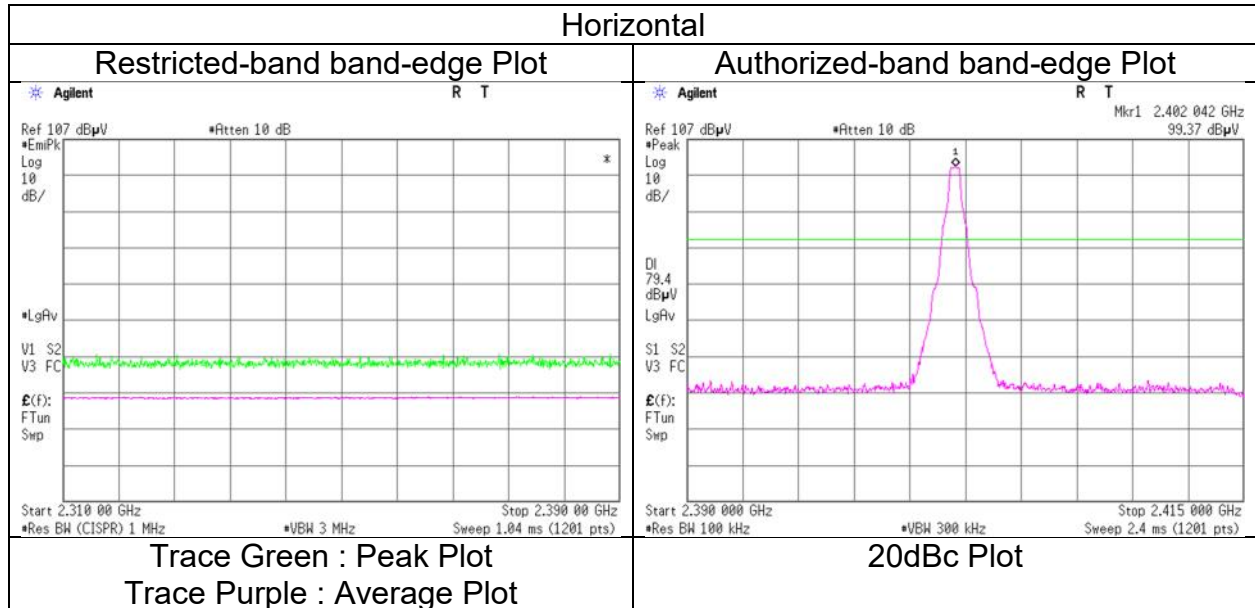
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz:  $20\log (3.995 \text{ m} / 3.0 \text{ m}) = 2.49 \text{ dB}$

$$10 \text{ GHz} - 40 \text{ GHz}: 20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$$

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

|                        |                                                              |
|------------------------|--------------------------------------------------------------|
| Test place             | Shonan EMC Lab.                                              |
| Semi Anechoic Chamber  | SAC 3                                                        |
| Date                   | December 2, 2023                                             |
| Temperature / Humidity | 20 deg.C, 39 %RH                                             |
| Engineer               | Takahiro Suzuki                                              |
| Mode                   | Tx Hopping off DH5 2402 MHz With Tx 11ax-40 (OFDM), 5510 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

|                        |                                                              |                    |                     |                    |                      |
|------------------------|--------------------------------------------------------------|--------------------|---------------------|--------------------|----------------------|
| Test place             | Shonan EMC Lab.                                              |                    |                     |                    |                      |
| Semi Anechoic Chamber  | SAC 3                                                        | SAC 3              | SAC 3               | SAC 3              | SAC 3                |
| Date                   | January 24, 2024                                             | December 2, 2024   | January 18, 2024    | January 10, 2024   | January 23, 2024     |
| Temperature / Humidity | 21 deg.C, 24 %RH                                             | 20 deg.C, 39 %RH   | 23 deg.C, 27 %RH    | 23 deg.C, 24 %RH   | 23 deg.C, 30 %RH     |
| Engineer               | Yosuke Murakami                                              | Takahiro Suzuki    | Yosuke Murakami     | Takayuki Kobayashi | Kouki Yamada         |
|                        | ( 30 MHz -1 GHz )                                            | ( 1 GHz -2.8 GHz ) | ( 2.8 GHz -10 GHz ) | ( 10 GHz -18 GHz ) | ( 18 GHz -26.5 GHz ) |
| Mode                   | Tx Hopping off DH5 2441 MHz With Tx 11ax-40 (OFDM), 5510 MHz |                    |                     |                    |                      |

| (* PK: Peak, AV: Average, QP: Quasi-Peak) |                 |          |                |                 |           |           |                      |                 |                |             |             |             |                          |
|-------------------------------------------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|--------------------------|
| Polarity                                  | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark                   |
| Hori.                                     | 30.297          | QP       | 22.50          | 18.90           | 6.48      | 32.20     | 0.00                 | 15.68           | 40.0           | 24.3        | 100         | 0           | -                        |
| Hori.                                     | 33.995          | QP       | 21.60          | 17.52           | 6.56      | 32.20     | 0.00                 | 13.48           | 40.0           | 26.5        | 100         | 0           | -                        |
| Hori.                                     | 856.099         | QP       | 21.10          | 21.76           | 10.82     | 31.32     | 0.00                 | 22.36           | 46.0           | 23.6        | 100         | 0           | -                        |
| Hori.                                     | 894.699         | QP       | 20.70          | 21.97           | 10.94     | 31.09     | 0.00                 | 22.52           | 46.0           | 23.4        | 100         | 0           | -                        |
| Hori.                                     | 931.606         | QP       | 20.40          | 22.08           | 11.06     | 30.85     | 0.00                 | 22.69           | 46.0           | 23.3        | 100         | 0           | -                        |
| Hori.                                     | 3254.666        | PK       | 51.64          | 28.67           | 6.23      | 41.96     | 2.49                 | 47.07           | 71.4           | 24.3        | 131         | 358         | -                        |
| Hori.                                     | 4882.000        | PK       | 49.22          | 31.52           | 7.02      | 42.88     | 2.49                 | 47.37           | 71.4           | 24.0        | 202         | 180         | -                        |
| Hori.                                     | 7323.000        | PK       | 48.79          | 37.26           | 8.55      | 43.42     | 2.49                 | 53.67           | 71.4           | 17.7        | 333         | 254         | -                        |
| Hori.                                     | 9764.000        | PK       | 48.78          | 39.02           | 9.77      | 43.00     | 2.49                 | 57.06           | 71.4           | 14.3        | 150         | 0           | -                        |
| Hori.                                     | 3254.666        | AV       | 44.35          | 28.67           | 6.23      | 41.96     | 2.49                 | 39.78           | 51.4           | 11.6        | 131         | 358         | VBW:360 Hz               |
| Hori.                                     | 4882.000        | AV       | 38.34          | 31.52           | 7.02      | 42.88     | 2.49                 | 36.49           | 51.4           | 14.9        | 202         | 180         | VBW:360 Hz               |
| Hori.                                     | 7323.000        | AV       | 37.07          | 37.26           | 8.55      | 43.42     | 2.49                 | 41.95           | 51.4           | 9.4         | 333         | 254         | VBW:360 Hz               |
| Hori.                                     | 9764.000        | AV       | 36.25          | 39.02           | 9.77      | 43.00     | 2.49                 | 44.53           | 51.4           | 6.8         | 150         | 0           | VBW:360 Hz, Floor noise  |
| Vert.                                     | 31.297          | QP       | 22.40          | 18.54           | 6.50      | 32.20     | 0.00                 | 15.24           | 40.0           | 24.7        | 100         | 0           | -                        |
| Vert.                                     | 880.016         | QP       | 20.90          | 22.01           | 10.90     | 31.18     | 0.00                 | 22.63           | 46.0           | 23.3        | 100         | 0           | -                        |
| Vert.                                     | 928.714         | QP       | 20.60          | 22.11           | 11.05     | 30.87     | 0.00                 | 22.89           | 46.0           | 23.1        | 100         | 0           | -                        |
| Vert.                                     | 3254.666        | PK       | 52.57          | 28.67           | 6.23      | 41.96     | 2.49                 | 48.00           | 71.4           | 23.4        | 111         | 350         | -                        |
| Vert.                                     | 4882.000        | PK       | 50.68          | 31.52           | 7.02      | 42.88     | 2.49                 | 48.83           | 71.4           | 22.5        | 380         | 293         | -                        |
| Vert.                                     | 7323.000        | PK       | 50.46          | 37.26           | 8.55      | 43.42     | 2.49                 | 55.34           | 71.4           | 16.0        | 213         | 295         | -                        |
| Vert.                                     | 9764.000        | PK       | 48.88          | 39.02           | 9.77      | 43.00     | 2.49                 | 57.16           | 71.4           | 14.2        | 150         | 0           | -                        |
| Vert.                                     | 3254.666        | AV       | 46.80          | 28.67           | 6.23      | 41.96     | 2.49                 | 42.23           | 51.4           | 9.1         | 111         | 350         | VBW: 360 Hz              |
| Vert.                                     | 4882.000        | AV       | 41.61          | 31.52           | 7.02      | 42.88     | 2.49                 | 39.76           | 51.4           | 11.6        | 380         | 293         | VBW: 360 Hz              |
| Vert.                                     | 7323.000        | AV       | 39.06          | 37.26           | 8.55      | 43.42     | 2.49                 | 43.94           | 51.4           | 7.4         | 213         | 295         | VBW: 360 Hz              |
| Vert.                                     | 9764.000        | AV       | 36.32          | 39.02           | 9.77      | 43.00     | 2.49                 | 44.60           | 51.4           | 6.8         | 150         | 0           | VBW: 360 Hz, Floor noise |

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

Distance factor : 1 GHz - 10 GHz: 20log (3.995 m / 3.0 m) = 2.49 dB

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

\*These results have sufficient margin without taking account Duty cycle correction factor.

## Radiated Spurious Emission

Test place Shonan EMC Lab.  
Semi Anechoic Chamber SAC 3  
Date December 2, 2023  
Temperature / Humidity 20 deg.C, 39 %RH  
Engineer Takahiro Suzuki  
( 1 GHz - 2.8 GHz )  
Mode Tx Hopping off DH5 2480 MHz With Tx 11ax-40 (OFDM), 5510 MHz

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark     |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|------------|
| Hori.    | 2483.500        | PK       | 48.28          | 27.89           | 14.51     | 41.64     | 2.49                 | 51.53           | 73.9           | 22.3        | 131         | 150         | -          |
| Hori.    | 2483.500        | AV       | 38.14          | 27.89           | 14.51     | 41.64     | 2.49                 | 41.39           | 53.9           | <b>12.5</b> | 131         | 150         | VBW:360 Hz |
| Vert.    | 2483.500        | PK       | 47.67          | 27.89           | 14.51     | 41.64     | 2.49                 | 50.92           | 73.9           | 22.9        | 119         | 157         | -          |
| Vert.    | 2483.500        | AV       | 34.12          | 27.89           | 14.51     | 41.64     | 2.49                 | 37.37           | 53.9           | 16.5        | 119         | 157         | VBW:360 Hz |

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

Distance factor : 1 GHz - 10 GHz :  $20\log(3.995\text{ m} / 3.0\text{ m}) = 2.49\text{ dB}$

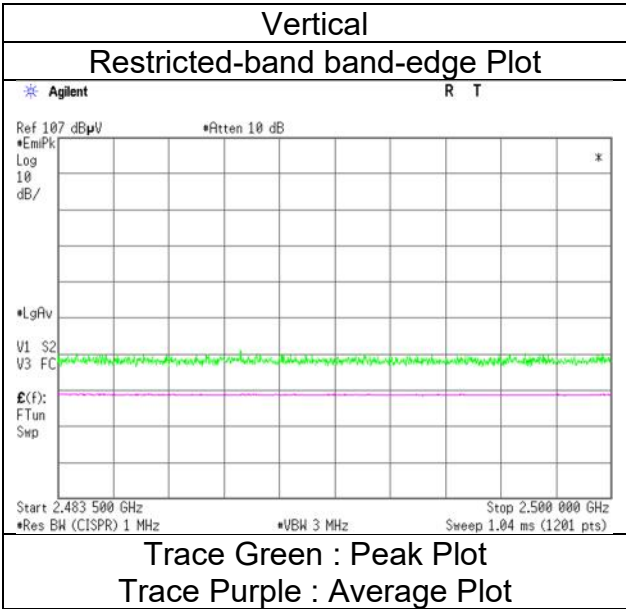
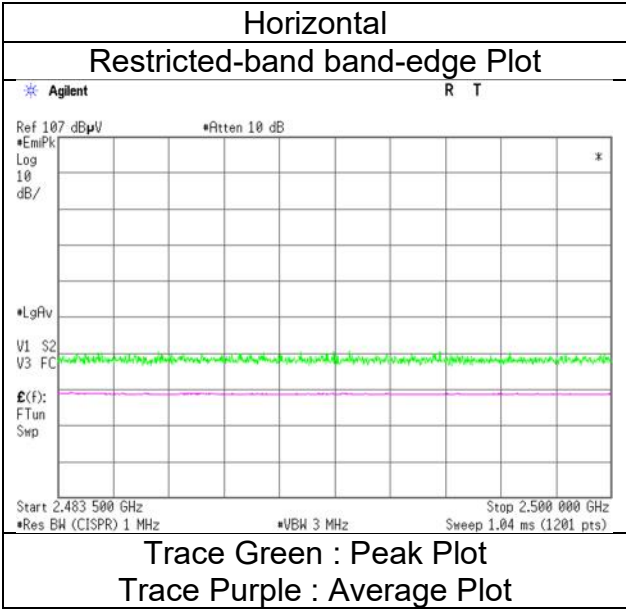
10 GHz - 40 GHz :  $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

\*These results have sufficient margin without taking account Duty cycle correction factor.



**Radiated Spurious Emission**  
**(Reference Plot for bandto edge)**

|                        |                                                              |
|------------------------|--------------------------------------------------------------|
| Test place             | Shonan EMC Lab.                                              |
| Semi Anechoic Chamber  | SAC 3                                                        |
| Date                   | December 2, 2023                                             |
| Temperature / Humidity | 20 deg.C, 39 %RH                                             |
| Engineer               | Takahiro Suzuki                                              |
| Mode                   | Tx Hopping off DH5 2480 MHz With Tx 11ax-40 (OFDM), 5510 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

Test place Shonan EMC Lab.  
Semi Anechoic Chamber SAC 3  
Date December 2, 2023  
Temperature / Humidity 20 deg.C, 39 %RH  
Engineer Takahiro Suzuki  
( 1 GHz - 2.8 GHz )  
Mode Tx Hopping off 3DH5 2402 MHz With Tx 11ax-40 (OFDM), 5510 MHz

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark     |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|------------|
| Hori.    | 2390.000        | PK       | 47.17          | 27.98           | 14.41     | 41.61     | 2.49                 | 50.44           | 73.9           | 23.4        | 131         | 23          | -          |
| Hori.    | 2390.000        | AV       | 37.97          | 27.98           | 14.41     | 41.61     | 2.49                 | 41.24           | 53.9           | 12.6        | 131         | 23          | VBW:360 Hz |
| Vert.    | 2390.000        | PK       | 47.19          | 27.98           | 14.41     | 41.61     | 2.49                 | 50.46           | 73.9           | 23.4        | 116         | 157         | -          |
| Vert.    | 2390.000        | AV       | 34.08          | 27.98           | 14.41     | 41.61     | 2.49                 | 37.35           | 53.9           | 16.5        | 116         | 157         | VBW:360 Hz |

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

Distance factor : 1 GHz - 10 GHz :  $20\log(3.995\text{ m} / 3.0\text{ m}) = 2.49\text{ dB}$

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

\*These results have sufficient margin without taking account Duty cycle correction factor.

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark  |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|---------|
| Hori.    | 2402.000        | PK       | 95.46          | 27.97           | 14.42     | 41.61     | 2.49                 | 98.73           | -              | -           | Carrier |
| Hori.    | 2400.000        | PK       | 39.11          | 27.97           | 14.41     | 41.61     | 2.49                 | 42.37           | 78.7           | 36.3        | -       |
| Vert.    | 2402.000        | PK       | 94.83          | 27.97           | 14.42     | 41.61     | 2.49                 | 98.10           | -              | -           | Carrier |
| Vert.    | 2400.000        | PK       | 39.06          | 27.97           | 14.41     | 41.61     | 2.49                 | 42.32           | 78.1           | 35.7        | -       |

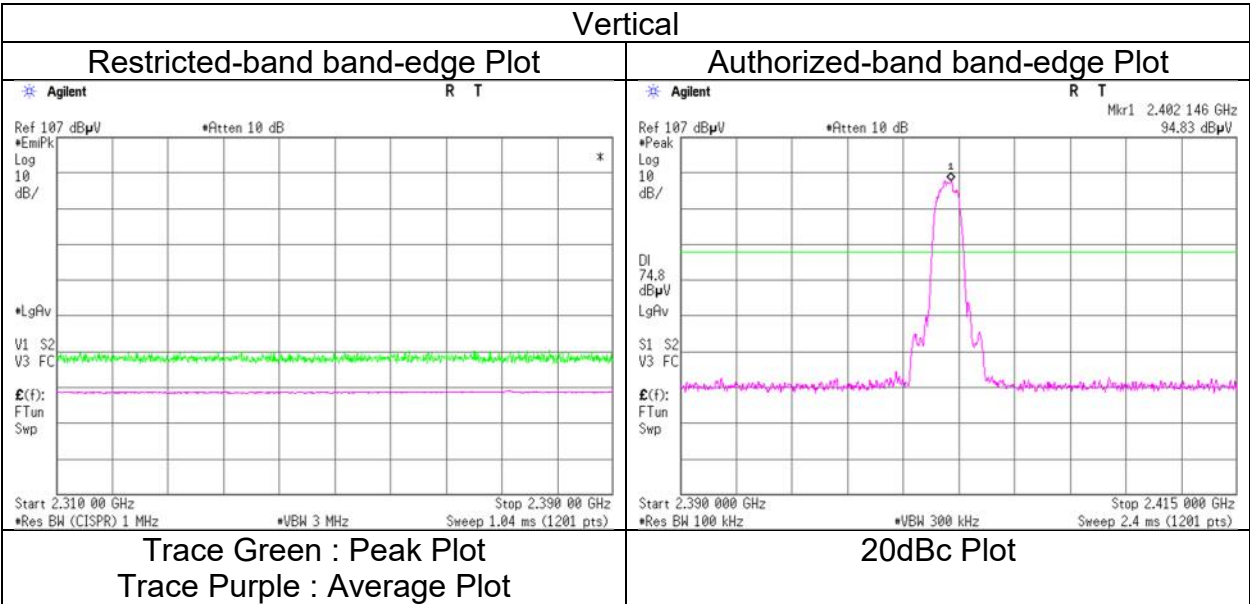
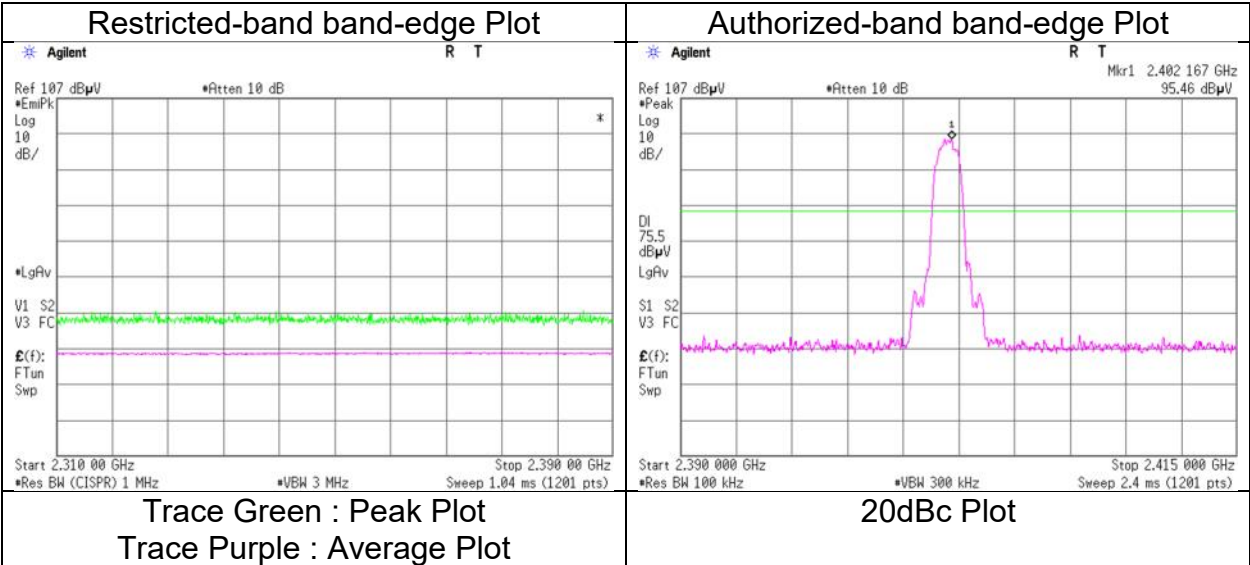
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz :  $20\log(3.995\text{ m} / 3.0\text{ m}) = 2.49\text{ dB}$

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

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

|                        |                                                               |
|------------------------|---------------------------------------------------------------|
| Test place             | Shonan EMC Lab.                                               |
| Semi Anechoic Chamber  | SAC 3                                                         |
| Date                   | December 2, 2023                                              |
| Temperature / Humidity | 20 deg.C, 39 %RH                                              |
| Engineer               | Takahiro Suzuki                                               |
| Mode                   | Tx Hopping off 3DH5 2402 MHz With Tx 11ax-40 (OFDM), 5510 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

Test place Shonan EMC Lab.  
Semi Anechoic Chamber SAC 3  
Date December 2, 2023  
Temperature / Humidity 20 deg.C, 39 %RH  
Engineer Takahiro Suzuki  
( 1 GHz - 2.8 GHz )  
Mode Tx Hopping off 3DH5 2480 MHz With Tx 11ax-40 (OFDM), 5510 MHz

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark     |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|------------|
| Hori.    | 2483.500        | PK       | 48.32          | 27.89           | 14.51     | 41.64     | 2.49                 | 51.57           | 73.9           | 22.3        | 129         | 135         | -          |
| Hori.    | 2483.500        | AV       | 37.95          | 27.89           | 14.51     | 41.64     | 2.49                 | 41.20           | 53.9           | <b>12.7</b> | 129         | 135         | VBW:360 Hz |
| Vert.    | 2483.500        | PK       | 46.54          | 27.89           | 14.51     | 41.64     | 2.49                 | 49.79           | 73.9           | 24.1        | 132         | 158         | -          |
| Vert.    | 2483.500        | AV       | 35.39          | 27.89           | 14.51     | 41.64     | 2.49                 | 38.64           | 53.9           | 15.2        | 132         | 158         | VBW:360 Hz |

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

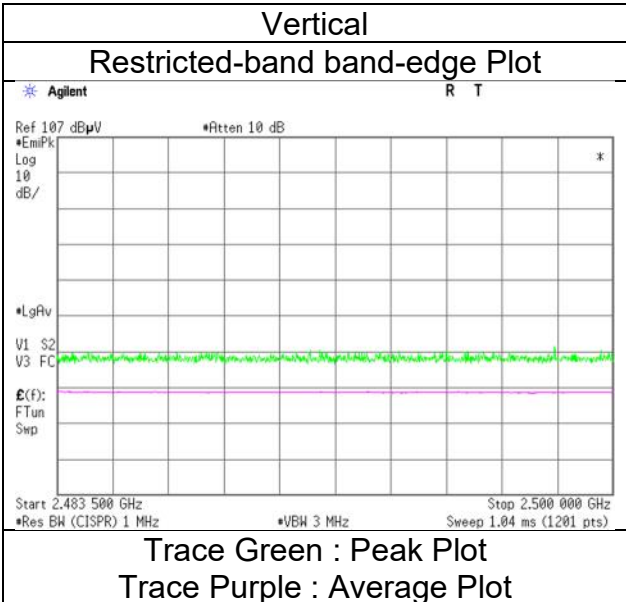
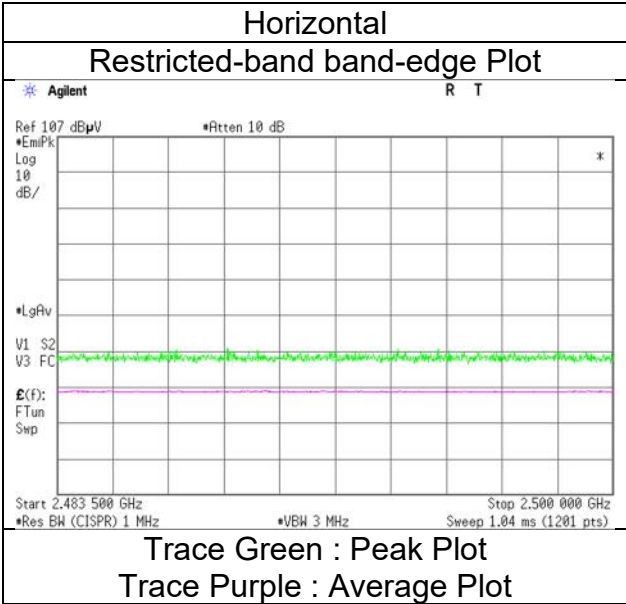
Distance factor : 1 GHz - 10 GHz :  $20\log(3.995\text{ m} / 3.0\text{ m}) = 2.49\text{ dB}$

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

\*These results have sufficient margin without taking account Duty cycle correction factor.

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

|                        |                                                               |
|------------------------|---------------------------------------------------------------|
| Test place             | Shonan EMC Lab.                                               |
| Semi Anechoic Chamber  | SAC 3                                                         |
| Date                   | December 2, 2023                                              |
| Temperature / Humidity | 20 deg.C, 39 %RH                                              |
| Engineer               | Takahiro Suzuki                                               |
| Mode                   | Tx Hopping off 3DH5 2480 MHz With Tx 11ax-40 (OFDM), 5510 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**

Test place                                      Shonan EMC Lab.  
Semi Anechoic Chamber                      SAC 3  
Date                                              January 17, 2024  
Temperature / Humidity                      24 deg.C, 30 %RH  
Engineer                                        Takayuki Kobayashi  
                                                          ( 1 GHz -2.8 GHz )  
Mode                                              Tx Hopping off DH5 2402 MHz With Tx 11ax-40 (OFDM), 6445 MHz

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark      |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|-------------|
| Hori.    | 2390.000        | PK       | 47.17          | 27.98           | 14.32     | 41.61     | 2.49                 | 50.35           | 73.9           | 23.5        | 152         | 242         | -           |
| Hori.    | 2390.000        | AV       | 35.44          | 27.98           | 14.32     | 41.61     | 2.49                 | 38.62           | 53.9           | 15.2        | 152         | 242         | VBW: 360 Hz |
| Vert.    | 2390.000        | PK       | 47.36          | 27.98           | 14.32     | 41.61     | 2.49                 | 50.54           | 73.9           | 23.3        | 187         | 236         | -           |
| Vert.    | 2390.000        | AV       | 36.38          | 27.98           | 14.32     | 41.61     | 2.49                 | 39.56           | 53.9           | 14.3        | 187         | 236         | VBW: 360 Hz |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor  
Distance factor : 1 GHz - 10 GHz : 20log (3.995 m / 3.0 m) = 2.49 dB  
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB  
\*These results have sufficient margin without taking account Duty cycle correction factor.

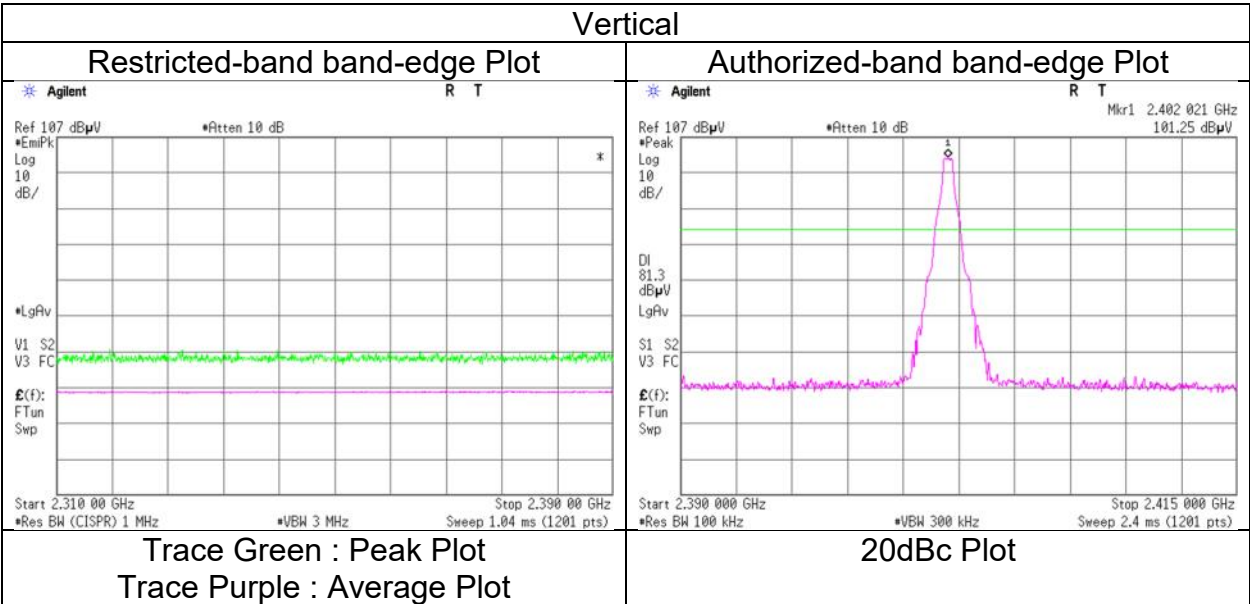
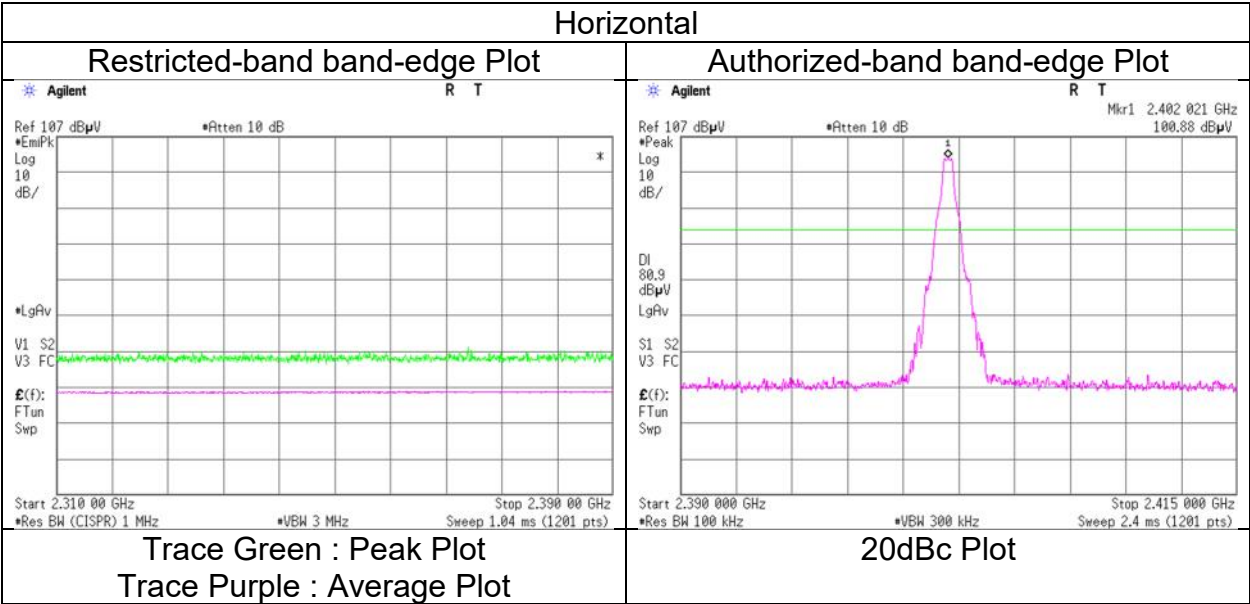
**20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark  |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|---------|
| Hori.    | 2402.000        | PK       | 100.91         | 27.97           | 14.34     | 41.61     | 2.49                 | 104.10          | -              | -           | Carrier |
| Hori.    | 2400.000        | PK       | 39.52          | 27.97           | 14.33     | 41.61     | 2.49                 | 42.70           | 84.1           | 41.4        | -       |
| Vert.    | 2402.000        | PK       | 101.27         | 27.97           | 14.34     | 41.61     | 2.49                 | 104.46          | -              | -           | Carrier |
| Vert.    | 2400.000        | PK       | 40.69          | 27.97           | 14.33     | 41.61     | 2.49                 | 43.87           | 84.4           | 40.5        | -       |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor  
Distance factor : 1 GHz - 10 GHz : 20log (3.995 m / 3.0 m) = 2.49 dB  
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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

|                        |                                                              |
|------------------------|--------------------------------------------------------------|
| Test place             | Shonan EMC Lab.                                              |
| Semi Anechoic Chamber  | SAC 3                                                        |
| Date                   | January 17, 2024                                             |
| Temperature / Humidity | 24 deg.C, 30 %RH                                             |
| Engineer               | Takayuki Kobayashi                                           |
| Mode                   | Tx Hopping off DH5 2402 MHz With Tx 11ax-40 (OFDM), 6445 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**

Test place                      Shonan EMC Lab.  
Semi Anechoic Chamber      SAC 3                      SAC 3                      SAC 3                      SAC 3  
Date                              January 24, 2024      January 17, 2024      January 18, 2024      January 23, 2024  
Temperature / Humidity      21 deg.C, 24 %RH      24 deg.C, 30 %RH      23 deg.C, 27 %RH      23 deg.C, 30 %RH  
Engineer                        Yosuke Murakami      Takayuki Kobayashi      Yosuke Murakami      Kouki Yamada  
                                      ( 30 MHz -1 GHz )      ( 1 GHz -2.8 GHz )      ( 2.8 GHz -10 GHz )      ( 10 GHz -26.5 GHz )  
Mode                              Tx Hopping off DH5 2441 MHz With Tx 11ax-40 (OFDM), 6445 MHz

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

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 31.573             | QP       | 22.40             | 18.43              | 6.51         | 32.20        | 0.00                    | 15.14              | 40.0              | 24.8           | 100            | 0              | -           |
| Hori.    | 848.701            | QP       | 21.20             | 21.53              | 10.80        | 31.37        | 0.00                    | 22.16              | 46.0              | 23.8           | 100            | 0              | -           |
| Hori.    | 872.440            | QP       | 20.90             | 22.00              | 10.87        | 31.23        | 0.00                    | 22.54              | 46.0              | 23.4           | 100            | 0              | -           |
| Hori.    | 911.585            | QP       | 20.70             | 22.00              | 11.00        | 30.98        | 0.00                    | 22.72              | 46.0              | 23.2           | 100            | 0              | -           |
| Hori.    | 3254.666           | PK       | 52.10             | 28.67              | 6.23         | 41.96        | 2.49                    | 47.53              | 73.9              | 26.3           | 123            | 359            | -           |
| Hori.    | 4882.000           | PK       | 50.24             | 31.52              | 7.02         | 42.88        | 2.49                    | 48.39              | 73.9              | 25.5           | 197            | 184            | -           |
| Hori.    | 7323.000           | PK       | 49.00             | 37.26              | 8.55         | 43.42        | 2.49                    | 53.88              | 73.9              | 20.0           | 346            | 257            | -           |
| Hori.    | 9764.000           | PK       | 47.97             | 39.02              | 9.77         | 43.00        | 2.49                    | 56.25              | 73.9              | 17.6           | 150            | 0              | -           |
| Hori.    | 3254.666           | AV       | 44.71             | 28.67              | 6.23         | 41.96        | 2.49                    | 40.14              | 53.9              | 13.7           | 123            | 359            | VBW:360 Hz  |
| Hori.    | 4882.000           | AV       | 37.91             | 31.52              | 7.02         | 42.88        | 2.49                    | 36.06              | 53.9              | 17.8           | 197            | 184            | VBW:360 Hz  |
| Hori.    | 7323.000           | AV       | 37.08             | 37.26              | 8.55         | 43.42        | 2.49                    | 41.96              | 53.9              | 11.9           | 346            | 257            | VBW:360 Hz  |
| Hori.    | 9764.000           | AV       | 36.37             | 39.02              | 9.77         | 43.00        | 2.49                    | 44.65              | 53.9              | 9.2            | 150            | 0              | Floor noise |
| Vert.    | 30.913             | QP       | 22.50             | 18.68              | 6.50         | 32.20        | 0.00                    | 15.48              | 40.0              | 24.5           | 100            | 0              | -           |
| Vert.    | 873.898            | QP       | 20.90             | 22.01              | 10.87        | 31.22        | 0.00                    | 22.56              | 46.0              | 23.4           | 100            | 0              | -           |
| Vert.    | 886.887            | QP       | 20.80             | 22.00              | 10.92        | 31.14        | 0.00                    | 22.58              | 46.0              | 23.4           | 100            | 0              | -           |
| Vert.    | 943.300            | QP       | 20.40             | 22.04              | 11.10        | 30.77        | 0.00                    | 22.77              | 46.0              | 23.2           | 100            | 0              | -           |
| Vert.    | 3254.666           | PK       | 52.22             | 28.67              | 6.23         | 41.96        | 2.49                    | 47.65              | 73.9              | 26.2           | 113            | 355            | -           |
| Vert.    | 4882.000           | PK       | 50.50             | 31.52              | 7.02         | 42.88        | 2.49                    | 48.65              | 73.9              | 25.2           | 383            | 295            | -           |
| Vert.    | 7323.000           | PK       | 49.93             | 37.26              | 8.55         | 43.42        | 2.49                    | 54.81              | 73.9              | 19.0           | 203            | 296            | -           |
| Vert.    | 9764.000           | PK       | 48.10             | 39.02              | 9.77         | 43.00        | 2.49                    | 56.38              | 73.9              | 17.5           | 150            | 0              | -           |
| Vert.    | 3254.666           | AV       | 46.61             | 28.67              | 6.23         | 41.96        | 2.49                    | 42.04              | 53.9              | 11.8           | 113            | 355            | VBW: 360 Hz |
| Vert.    | 4882.000           | AV       | 41.08             | 31.52              | 7.02         | 42.88        | 2.49                    | 39.23              | 53.9              | 14.6           | 383            | 295            | VBW: 360 Hz |
| Vert.    | 7323.000           | AV       | 39.05             | 37.26              | 8.55         | 43.42        | 2.49                    | 43.93              | 53.9              | 9.9            | 203            | 296            | VBW: 360 Hz |
| Vert.    | 9764.000           | AV       | 38.91             | 39.02              | 9.77         | 43.00        | 2.49                    | 47.19              | 53.9              | 6.7            | 150            | 0              | Floor noise |

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

Distance factor : 1 GHz - 10 GHz : 20log (3.995 m / 3.0 m) = 2.49 dB

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

\*These results have sufficient margin without taking account Duty cycle correction factor.



## Radiated Spurious Emission

|                        |                                                              |
|------------------------|--------------------------------------------------------------|
| Test place             | Shonan EMC Lab.                                              |
| Semi Anechoic Chamber  | SAC 3                                                        |
| Date                   | January 17, 2024                                             |
| Temperature / Humidity | 24 deg.C, 30 %RH                                             |
| Engineer               | Takayuki Kobayashi<br>( 1 GHz -2.8 GHz )                     |
| Mode                   | Tx Hopping off DH5 2480 MHz With Tx 11ax-40 (OFDM), 6445 MHz |

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

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dB/m] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|--------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 2483.500           | PK       | 51.16             | 27.89              | 14.42        | 41.64        | 2.49                    | 54.32              | 73.9              | 19.5           | 334            | 359            | -           |
| Hori.    | 2483.500           | AV       | 38.31             | 27.89              | 14.42        | 41.64        | 2.49                    | 41.47              | 53.9              | <b>12.4</b>    | 334            | 359            | VBW: 360 Hz |
| Vert.    | 2483.500           | PK       | 48.51             | 27.89              | 14.42        | 41.64        | 2.49                    | 51.67              | 73.9              | 22.2           | 135            | 236            | -           |
| Vert.    | 2483.500           | AV       | 35.89             | 27.89              | 14.42        | 41.64        | 2.49                    | 39.05              | 53.9              | 14.8           | 135            | 236            | VBW: 360 Hz |

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

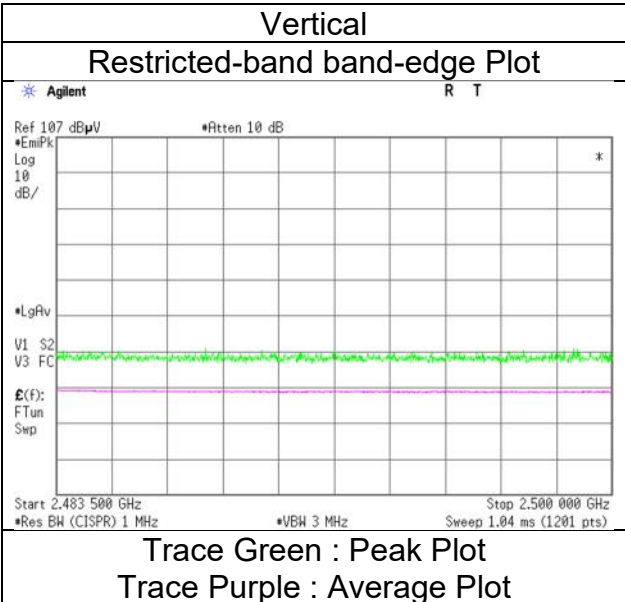
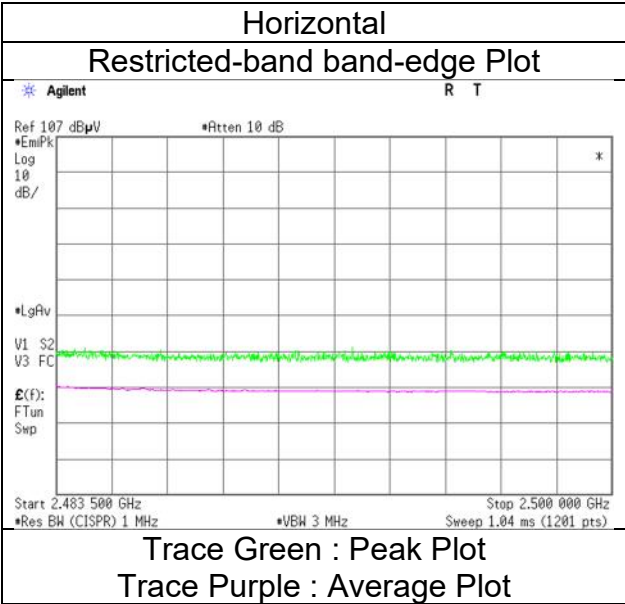
Distance factor : 1 GHz - 10 GHz:  $20\log (3.995 \text{ m} / 3.0 \text{ m}) = 2.49 \text{ dB}$

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

\*These results have sufficient margin without taking account Duty cycle correction factor.

**Radiated Spurious Emission**  
**(Reference Plot for bandto edge)**

|                        |                                                              |
|------------------------|--------------------------------------------------------------|
| Test place             | Shonan EMC Lab.                                              |
| Semi Anechoic Chamber  | SAC 3                                                        |
| Date                   | January 17, 2024                                             |
| Temperature / Humidity | 24 deg.C, 30 %RH                                             |
| Engineer               | Takayuki Kobayashi                                           |
| Mode                   | Tx Hopping off DH5 2480 MHz With Tx 11ax-40 (OFDM), 6445 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

Test place Shonan EMC Lab.  
Semi Anechoic Chamber SAC 3  
Date January 17, 2024  
Temperature / Humidity 24 deg.C, 30 %RH  
Engineer Takayuki Kobayashi  
( 1 GHz -2.8 GHz )  
Mode Tx Hopping off 3DH5 2402 MHz With Tx 11ax-40 (OFDM), 6445 MHz

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Height [cm] | Angle [deg] | Remark      |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|-------------|-------------|-------------|
| Hori.    | 2390.000        | PK       | 48.41          | 27.98           | 14.32     | 41.61     | 2.49                 | 51.59           | 73.9           | 22.3        | 341         | 4           | -           |
| Hori.    | 2390.000        | AV       | 35.60          | 27.98           | 14.32     | 41.61     | 2.49                 | 38.78           | 53.9           | 15.1        | 341         | 4           | VBW: 360 Hz |
| Vert.    | 2390.000        | PK       | 47.50          | 27.98           | 14.32     | 41.61     | 2.49                 | 50.68           | 73.9           | 23.2        | 185         | 237         | -           |
| Vert.    | 2390.000        | AV       | 36.16          | 27.98           | 14.32     | 41.61     | 2.49                 | 39.34           | 53.9           | 14.5        | 185         | 237         | VBW: 360 Hz |

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

Distance factor : 1 GHz - 10 GHz:  $20\log(3.995\text{ m} / 3.0\text{ m}) = 2.49\text{ dB}$

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

\*These results have sufficient margin without taking account Duty cycle correction factor.

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

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark  |
|----------|-----------------|----------|----------------|-----------------|-----------|-----------|----------------------|-----------------|----------------|-------------|---------|
| Hori.    | 2402.000        | PK       | 97.41          | 27.97           | 14.34     | 41.61     | 2.49                 | 100.60          | -              | -           | Carrier |
| Hori.    | 2400.000        | PK       | 39.67          | 27.97           | 14.33     | 41.61     | 2.49                 | 42.85           | 80.6           | 37.7        | -       |
| Vert.    | 2402.000        | PK       | 98.29          | 27.97           | 14.34     | 41.61     | 2.49                 | 101.48          | -              | -           | Carrier |
| Vert.    | 2400.000        | PK       | 40.99          | 27.97           | 14.33     | 41.61     | 2.49                 | 44.17           | 81.4           | 37.2        | -       |

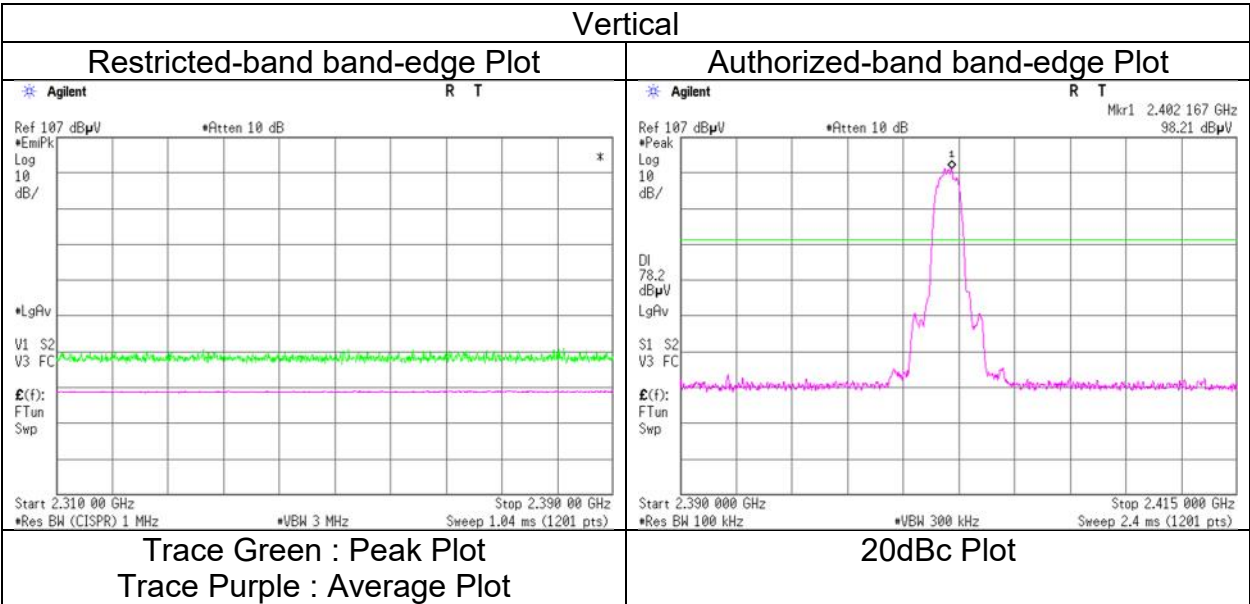
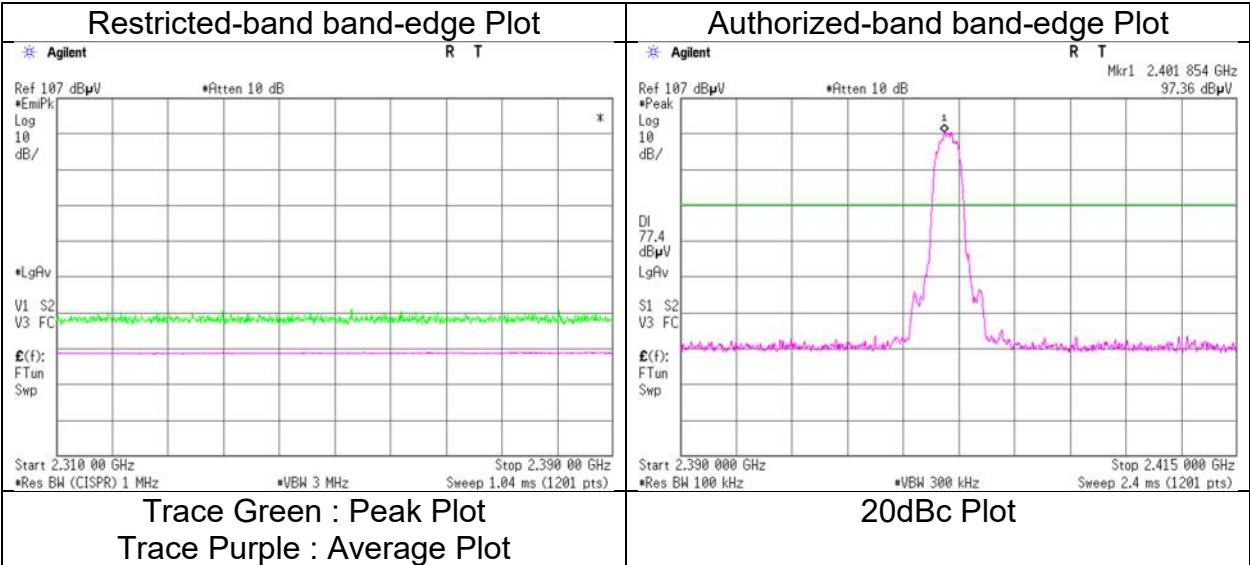
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz:  $20\log(3.995\text{ m} / 3.0\text{ m}) = 2.49\text{ dB}$

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

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

|                        |                                                               |
|------------------------|---------------------------------------------------------------|
| Test place             | Shonan EMC Lab.                                               |
| Semi Anechoic Chamber  | SAC 3                                                         |
| Date                   | January 17, 2024                                              |
| Temperature / Humidity | 24 deg.C, 30 %RH                                              |
| Engineer               | Takayuki Kobayashi                                            |
| Mode                   | Tx Hopping off 3DH5 2402 MHz With Tx 11ax-40 (OFDM), 6445 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

|                        |                                                               |
|------------------------|---------------------------------------------------------------|
| Test place             | Shonan EMC Lab.                                               |
| Semi Anechoic Chamber  | SAC 3                                                         |
| Date                   | January 17, 2024                                              |
| Temperature / Humidity | 24 deg.C, 30 %RH                                              |
| Engineer               | Takayuki Kobayashi<br>( 1 GHz - 2.8 GHz )                     |
| Mode                   | Tx Hopping off 3DH5 2480 MHz With Tx 11ax-40 (OFDM), 6445 MHz |

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

| Polarity | Frequency<br>[MHz] | Detector | Reading<br>[dBuV] | Ant.Fac.<br>[dBm] | Loss<br>[dB] | Gain<br>[dB] | Distance<br>Factor [dB] | Result<br>[dBuV/m] | Limit<br>[dBuV/m] | Margin<br>[dB] | Height<br>[cm] | Angle<br>[deg] | Remark      |
|----------|--------------------|----------|-------------------|-------------------|--------------|--------------|-------------------------|--------------------|-------------------|----------------|----------------|----------------|-------------|
| Hori.    | 2483.500           | PK       | 47.29             | 27.89             | 14.42        | 41.64        | 2.49                    | 50.45              | 73.9              | 23.4           | 340            | 358            | -           |
| Hori.    | 2483.500           | AV       | 36.15             | 27.89             | 14.42        | 41.64        | 2.49                    | 39.31              | 53.9              | <b>14.5</b>    | 340            | 358            | VBW: 360 Hz |
| Vert.    | 2483.500           | PK       | 47.40             | 27.89             | 14.42        | 41.64        | 2.49                    | 50.56              | 73.9              | 23.3           | 180            | 238            | -           |
| Vert.    | 2483.500           | AV       | 35.81             | 27.89             | 14.42        | 41.64        | 2.49                    | 38.97              | 53.9              | 14.9           | 180            | 238            | VBW: 360 Hz |

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

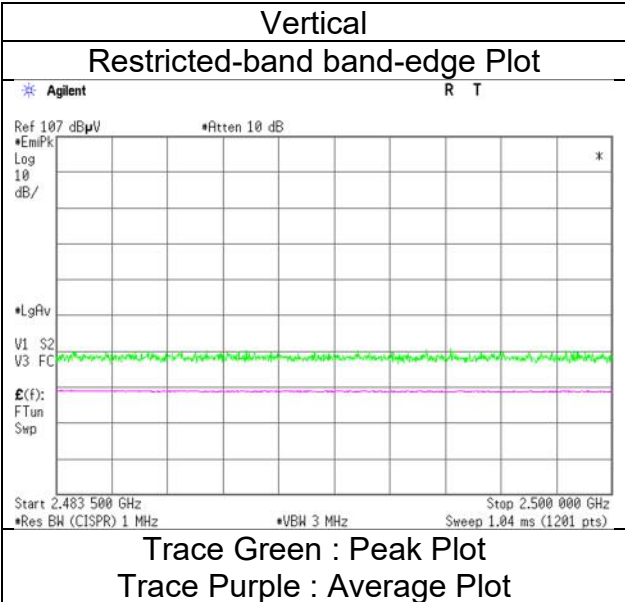
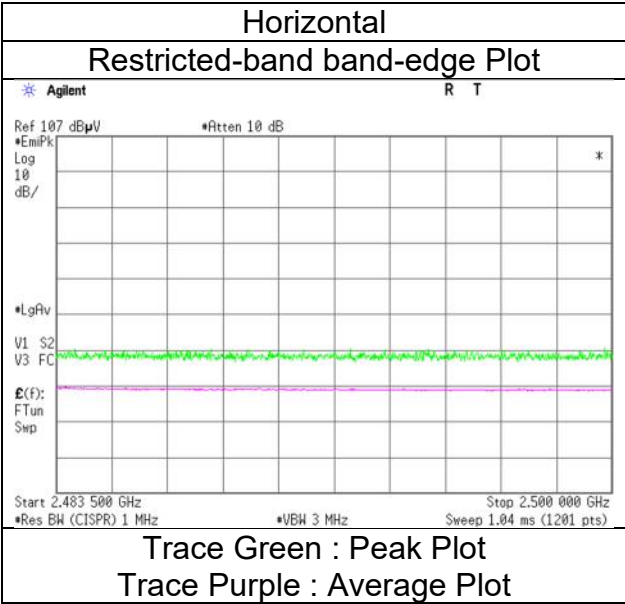
Distance factor : 1 GHz - 10 GHz :  $20\log (3.995 \text{ m} / 3.0 \text{ m}) = 2.49 \text{ dB}$

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

\*These results have sufficient margin without taking account Duty cycle correction factor.

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

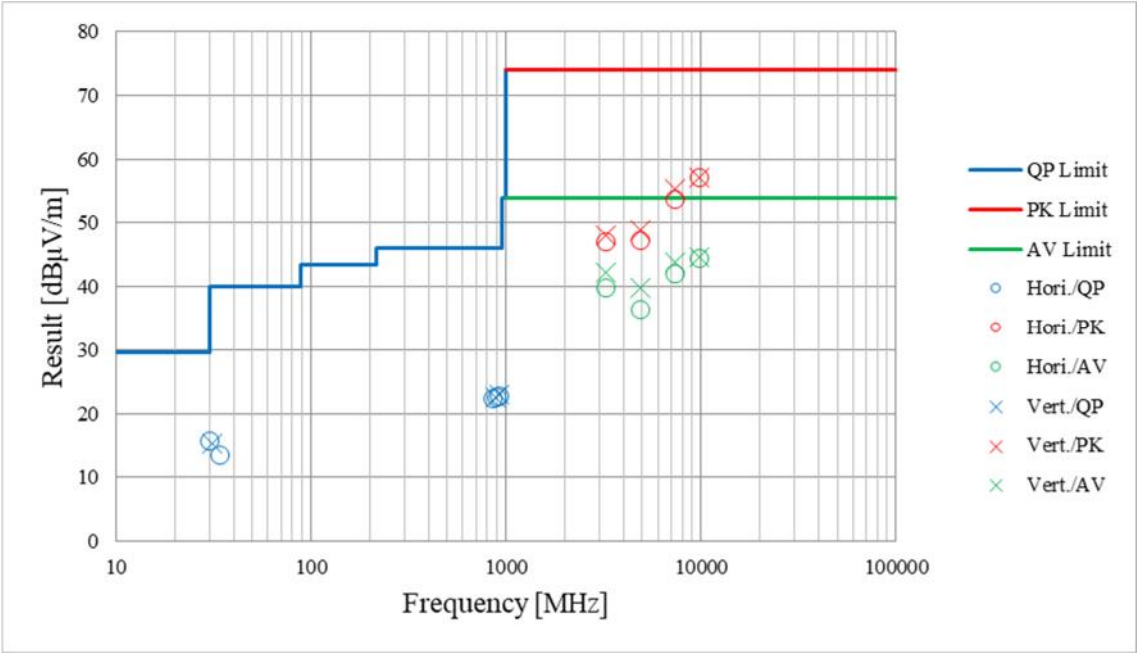
|                        |                                                               |
|------------------------|---------------------------------------------------------------|
| Test place             | Shonan EMC Lab.                                               |
| Semi Anechoic Chamber  | SAC 3                                                         |
| Date                   | January 17, 2024                                              |
| Temperature / Humidity | 24 deg.C, 30 %RH                                              |
| Engineer               | Takayuki Kobayashi                                            |
| Mode                   | Tx Hopping off 3DH5 2480 MHz With Tx 11ax-40 (OFDM), 6445 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)**

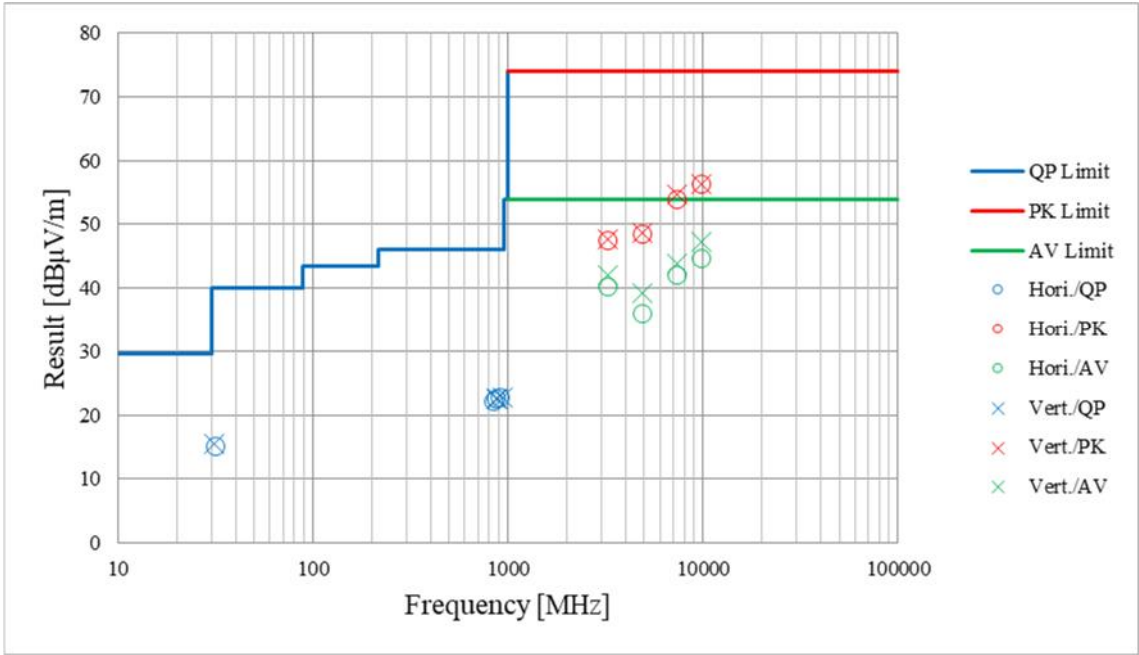
|                        |                                                              |                    |                     |                    |                      |
|------------------------|--------------------------------------------------------------|--------------------|---------------------|--------------------|----------------------|
| Test place             | Shonan EMC Lab.                                              |                    |                     |                    |                      |
| Semi Anechoic Chamber  | SAC 3                                                        | SAC 3              | SAC 3               | SAC 3              | SAC 3                |
| Date                   | January 24, 2024                                             | December 2, 2024   | January 18, 2024    | January 10, 2024   | January 23, 2024     |
| Temperature / Humidity | 21 deg.C, 24 %RH                                             | 20 deg.C, 39 %RH   | 23 deg.C, 27 %RH    | 23 deg.C, 24 %RH   | 23 deg.C, 30 %RH     |
| Engineer               | Yosuke Murakami                                              | Takahiro Suzuki    | Yosuke Murakami     | Takayuki Kobayashi | Kouki Yamada         |
| Mode                   | ( 30 MHz -1 GHz )                                            | ( 1 GHz -2.8 GHz ) | ( 2.8 GHz -10 GHz ) | ( 10 GHz -18 GHz ) | ( 18 GHz -26.5 GHz ) |
|                        | Tx Hopping off DH5 2441 MHz With Tx 11ax-40 (OFDM), 5510 MHz |                    |                     |                    |                      |



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

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

|                        |                                                              |                    |                     |                      |
|------------------------|--------------------------------------------------------------|--------------------|---------------------|----------------------|
| Test place             | Shonan EMC Lab.                                              |                    |                     |                      |
| Semi Anechoic Chamber  | SAC 3                                                        | SAC 3              | SAC 3               | SAC 3                |
| Date                   | January 24, 2024                                             | January 17, 2024   | January 18, 2024    | January 23, 2024     |
| Temperature / Humidity | 21 deg.C, 24 %RH                                             | 24 deg.C, 30 %RH   | 23 deg.C, 27 %RH    | 23 deg.C, 30 %RH     |
| Engineer               | Yosuke Murakami                                              | Takayuki Kobayashi | Yosuke Murakami     | Kouki Yamada         |
|                        | ( 30 MHz -1 GHz )                                            | ( 1 GHz -2.8 GHz ) | ( 2.8 GHz -10 GHz ) | ( 10 GHz -26.5 GHz ) |
| Mode                   | Tx Hopping off DH5 2441 MHz With Tx 11ax-40 (OFDM), 6445 MHz |                    |                     |                      |



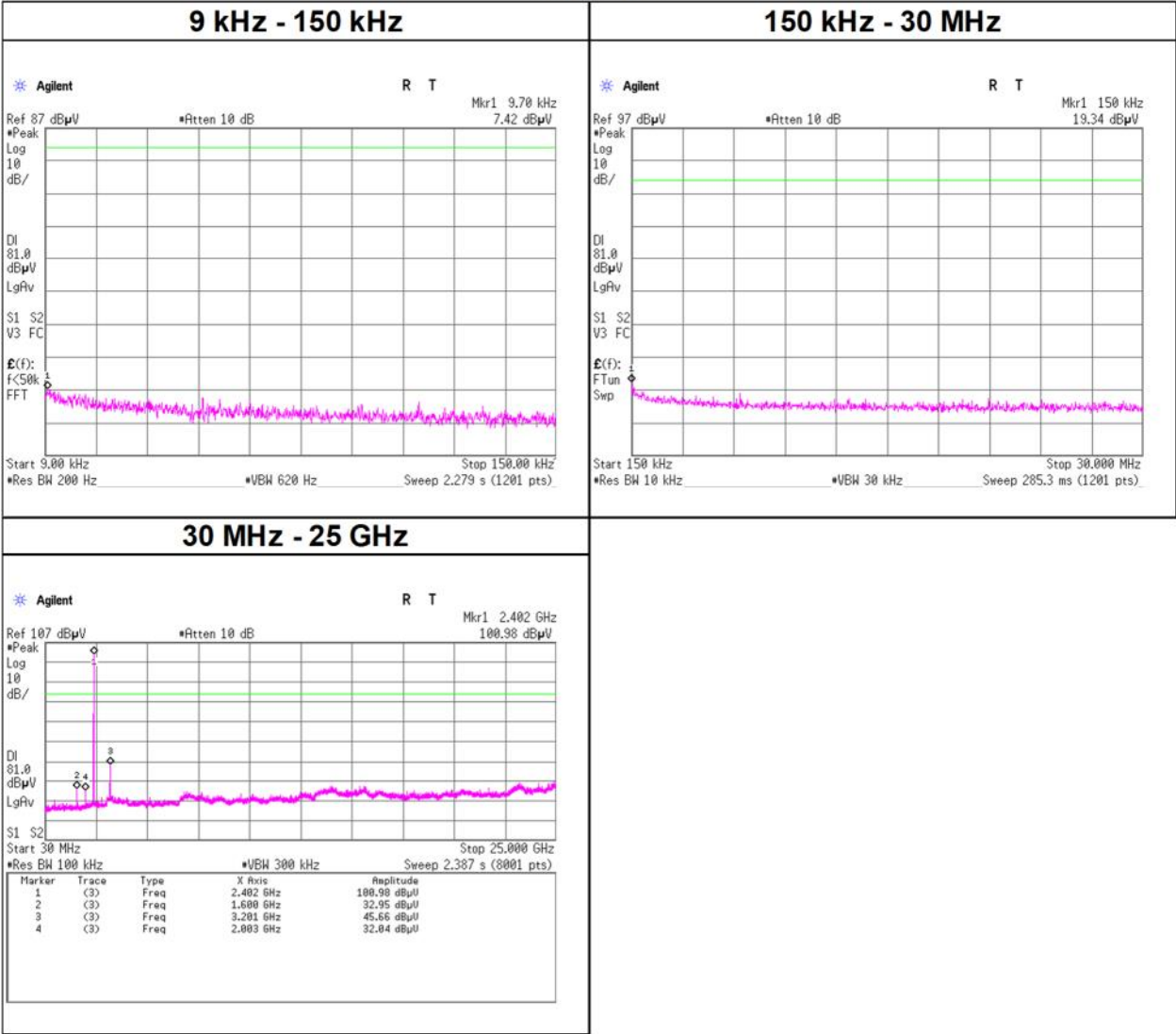
\*These plots data contain sufficient number to show the trend of characteristic features for EUT.



Conducted Spurious Emission

Test place                      Shonan EMC Lab. No.5 Shielded Room  
Date                              June 5, 2023  
Temperature / Humidity      26 deg. C / 46 % RH  
Engineer                        Yosuke Murakami  
Mode                              Tx, Hopping Off, DH5

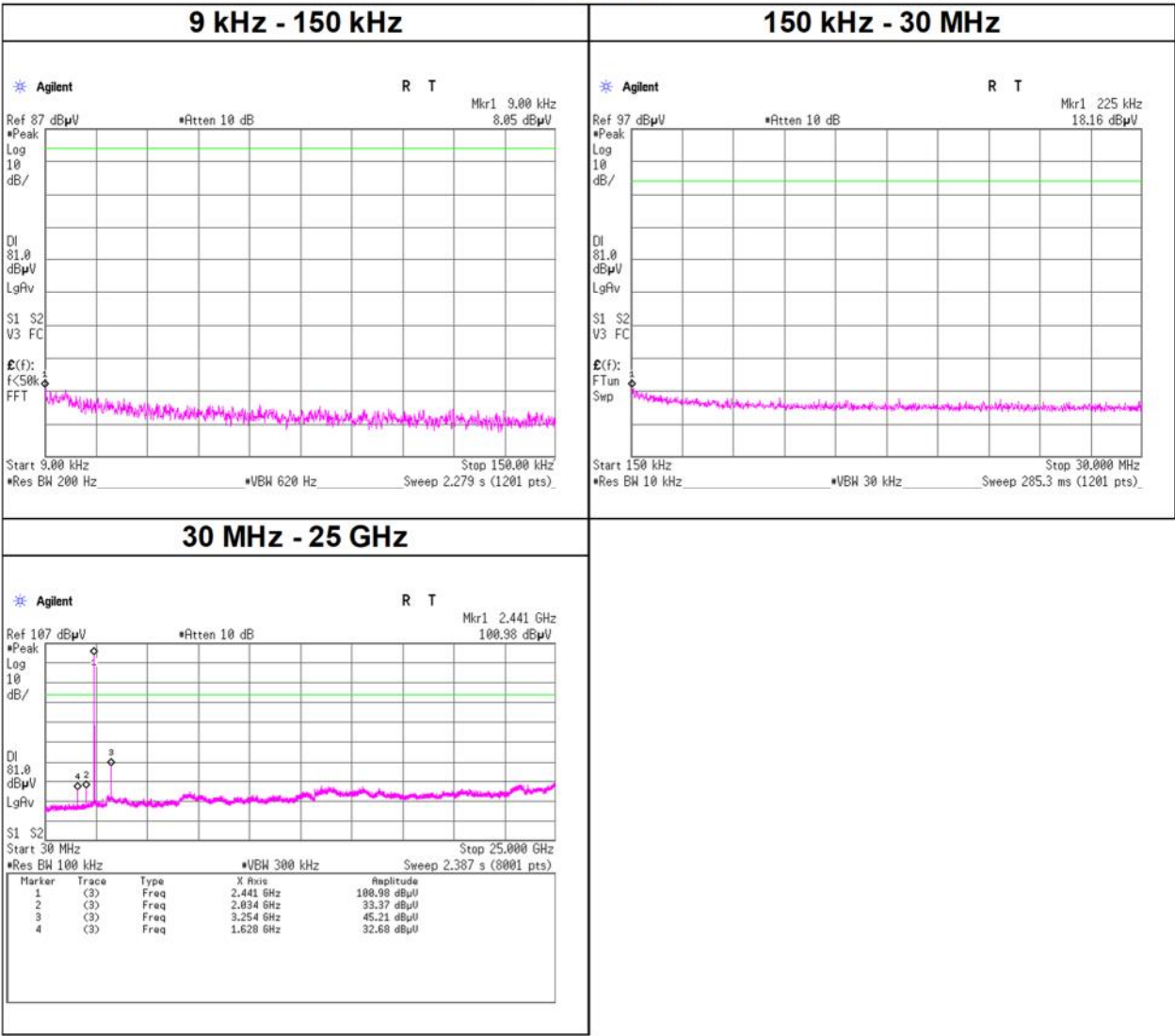
2402 MHz



Conducted Spurious Emission

Test place                      Shonan EMC Lab. No.5 Shielded Room  
Date                              June 5, 2023  
Temperature / Humidity      26 deg. C / 46 % RH  
Engineer                        Yosuke Murakami  
Mode                              Tx, Hopping Off, DH5

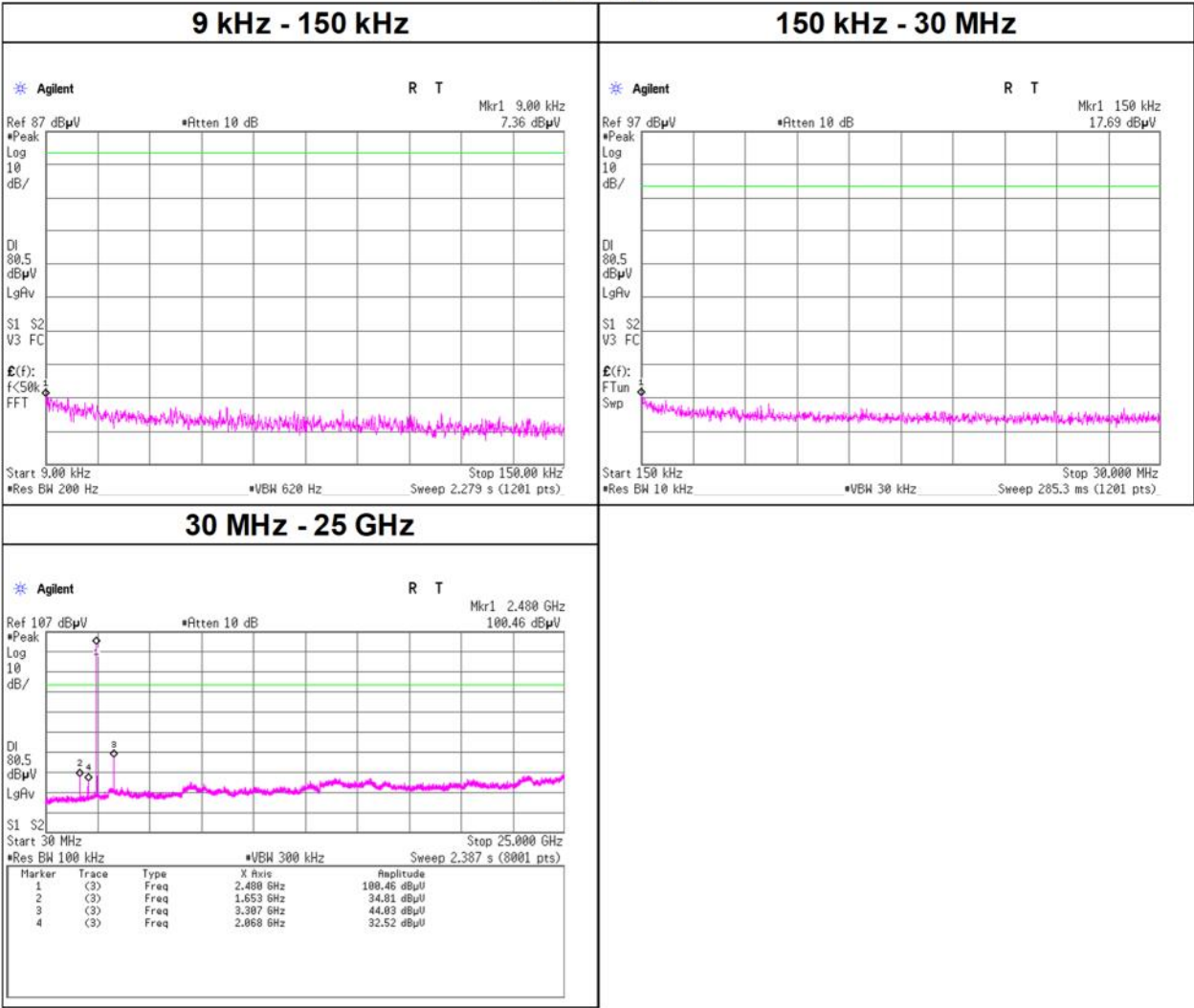
2441 MHz



Conducted Spurious Emission

Test place Shonan EMC Lab. No.5 Shielded Room  
Date June 5, 2023  
Temperature / Humidity 26 deg. C / 46 % RH  
Engineer Yosuke Murakami  
Mode Tx, Hopping Off, DH5

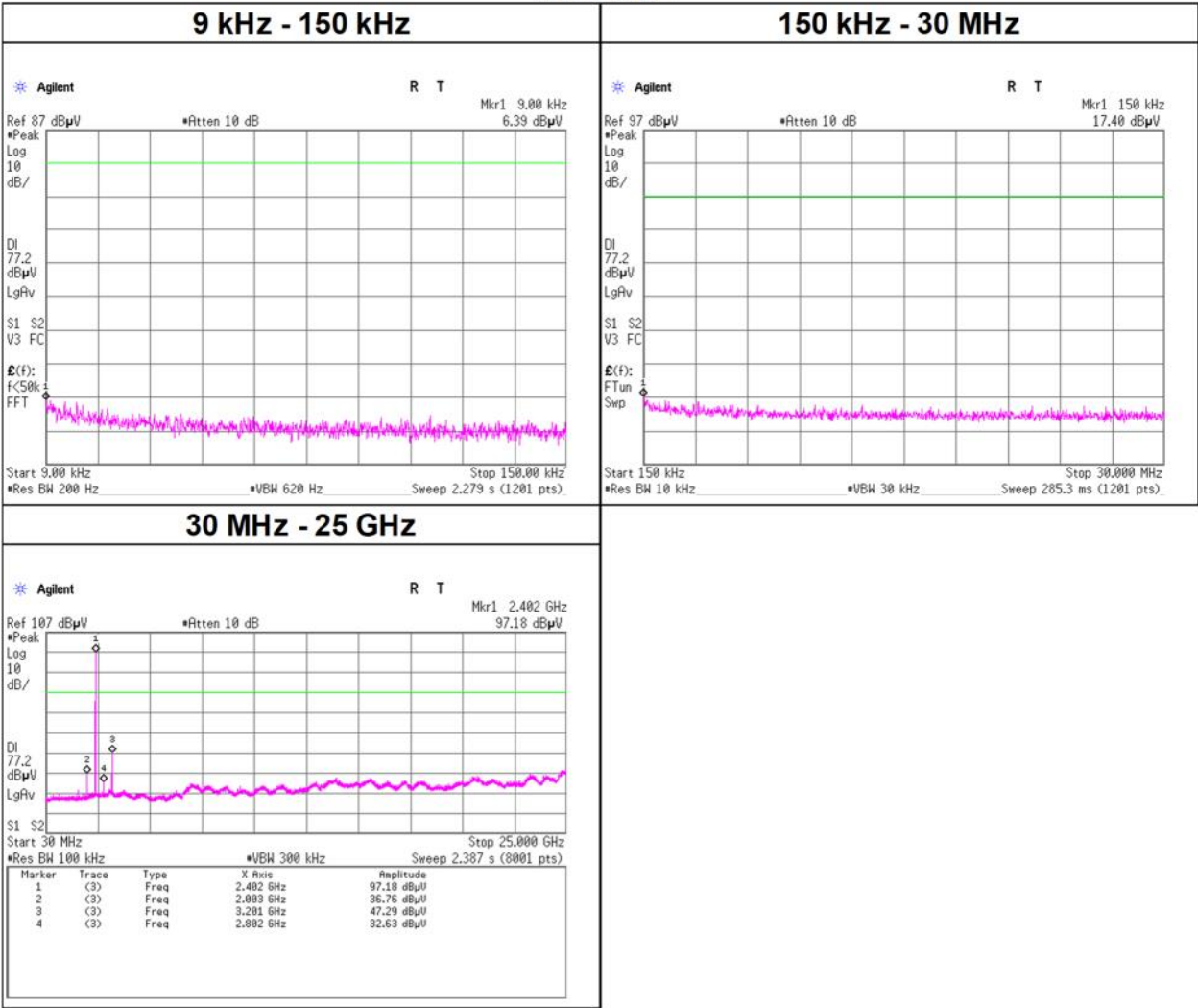
2480 MHz



Conducted Spurious Emission

Test place                      Shonan EMC Lab. No.5 Shielded Room  
Date                              June 6, 2023  
Temperature / Humidity      26 deg. C / 40 % RH  
Engineer                        Yosuke Murakami  
Mode                              Tx, Hopping Off, 3DH5

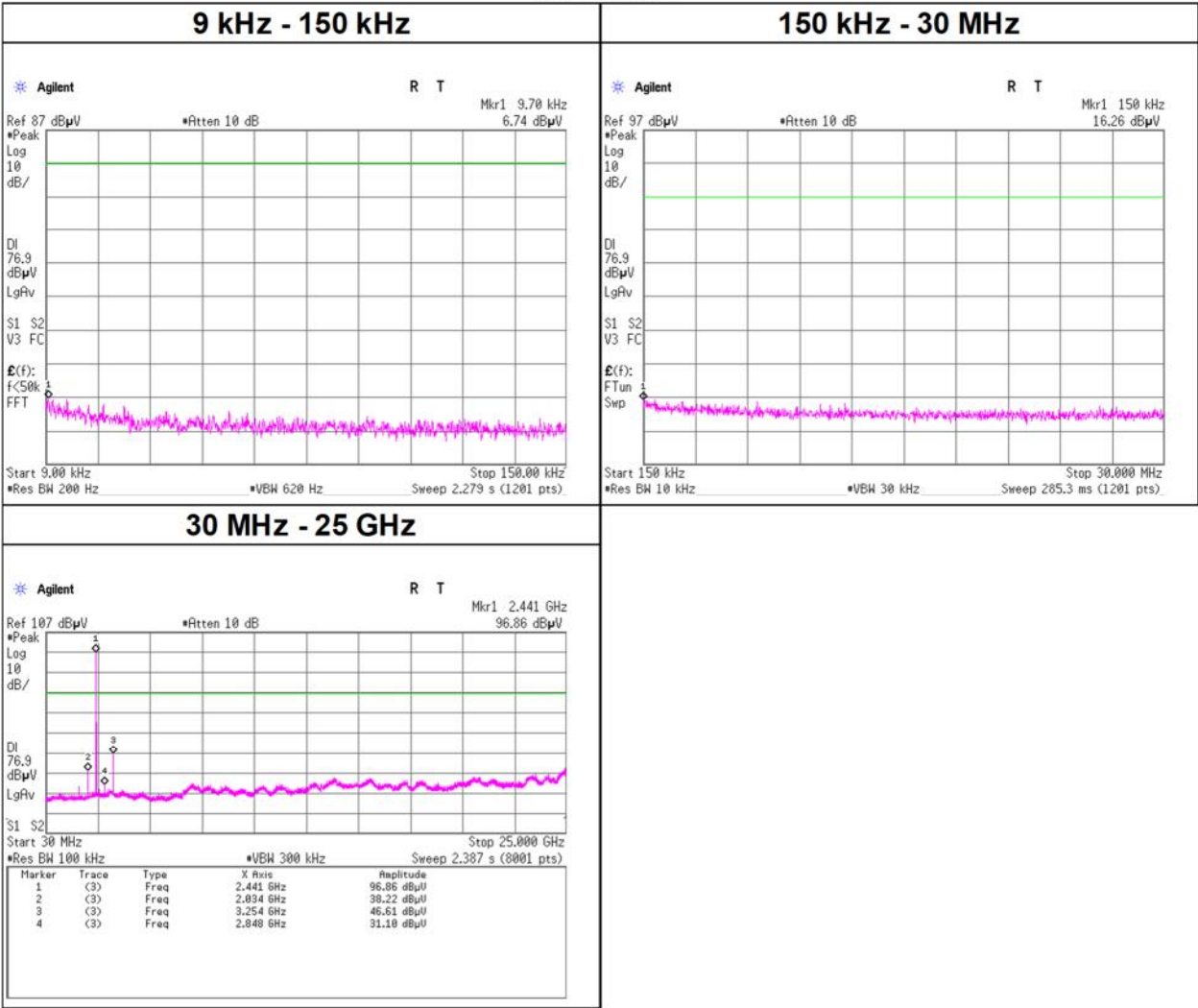
2402 MHz



Conducted Spurious Emission

Test place Shonan EMC Lab. No.5 Shielded Room  
Date June 6, 2023  
Temperature / Humidity 26 deg. C / 40 % RH  
Engineer Yosuke Murakami  
Mode Tx, Hopping Off, 3DH5

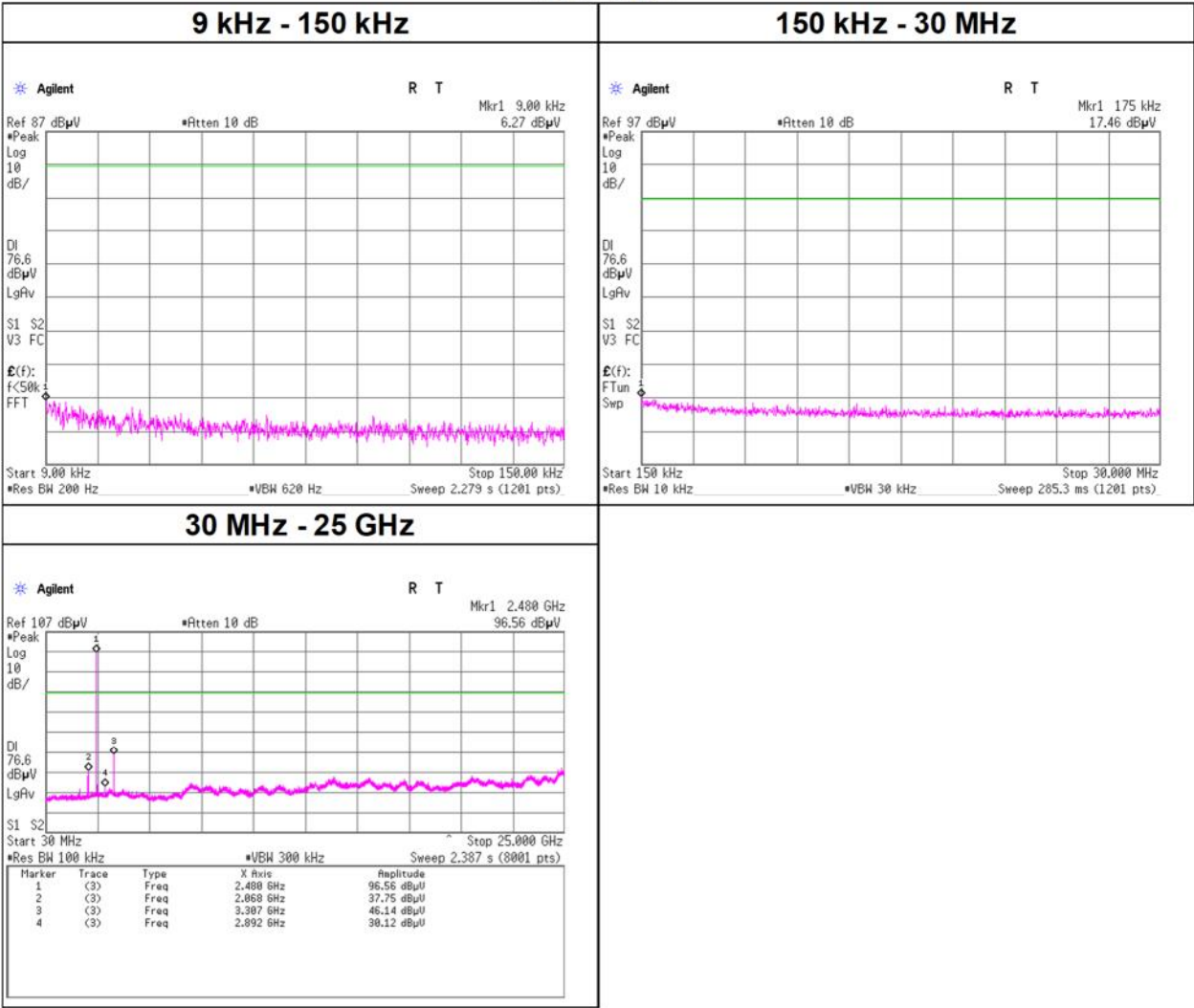
2441 MHz



Conducted Spurious Emission

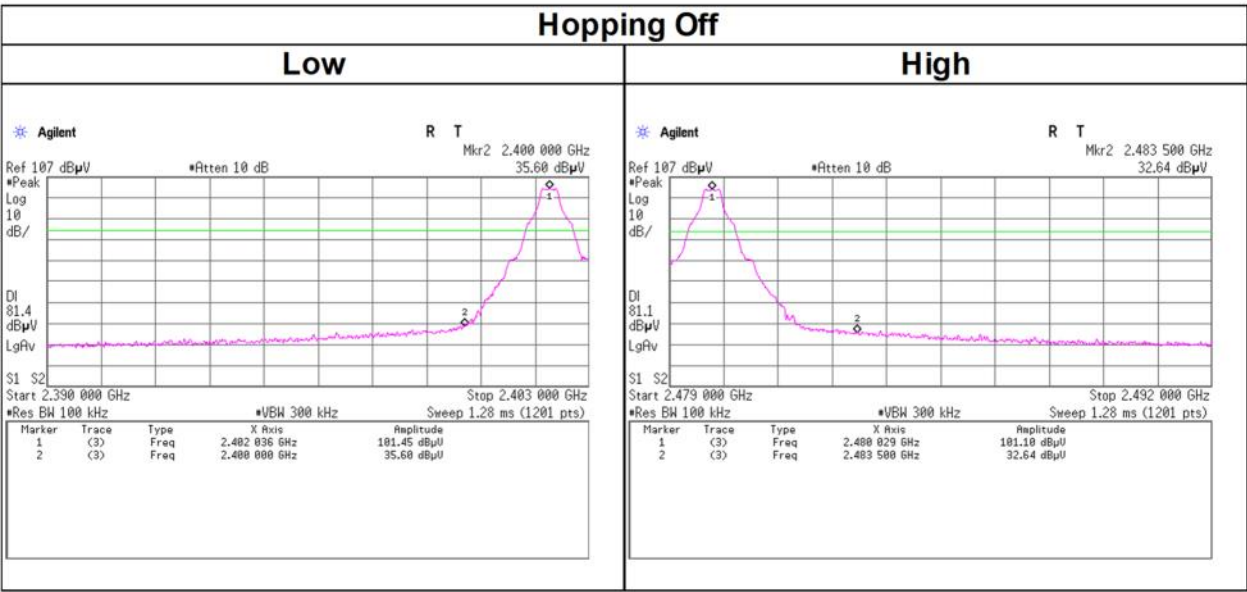
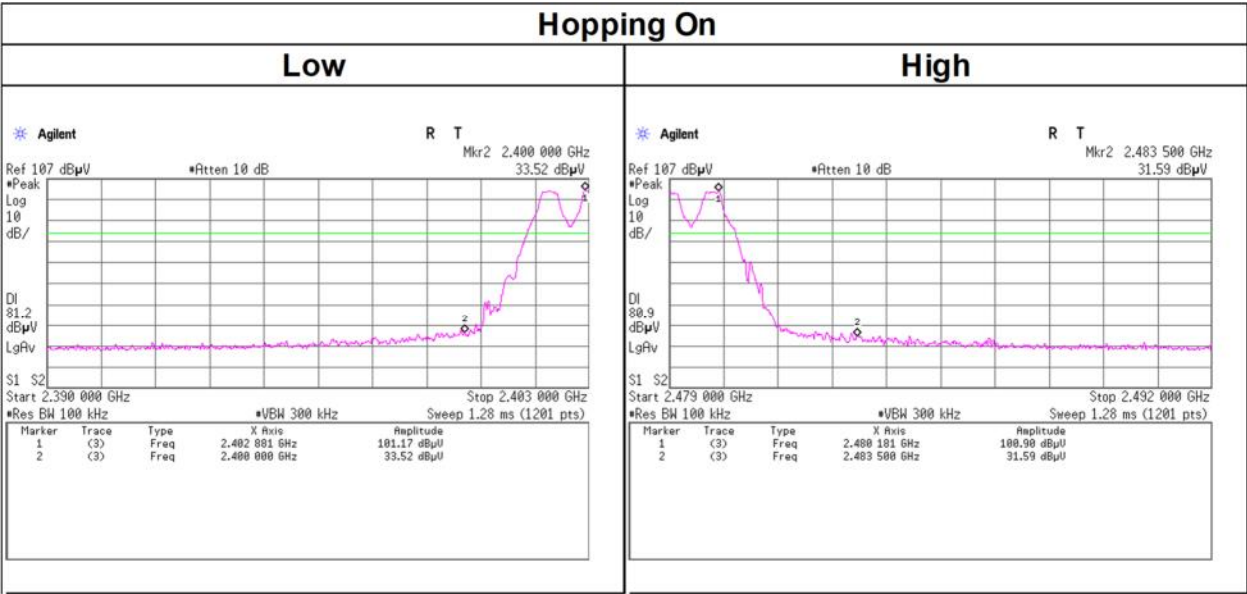
Test place                      Shonan EMC Lab. No.5 Shielded Room  
Date                              June 6, 2023  
Temperature / Humidity      26 deg. C / 40 % RH  
Engineer                        Yosuke Murakami  
Mode                              Tx, Hopping Off, 3DH5

2480 MHz



Conducted Emission Band Edge compliance

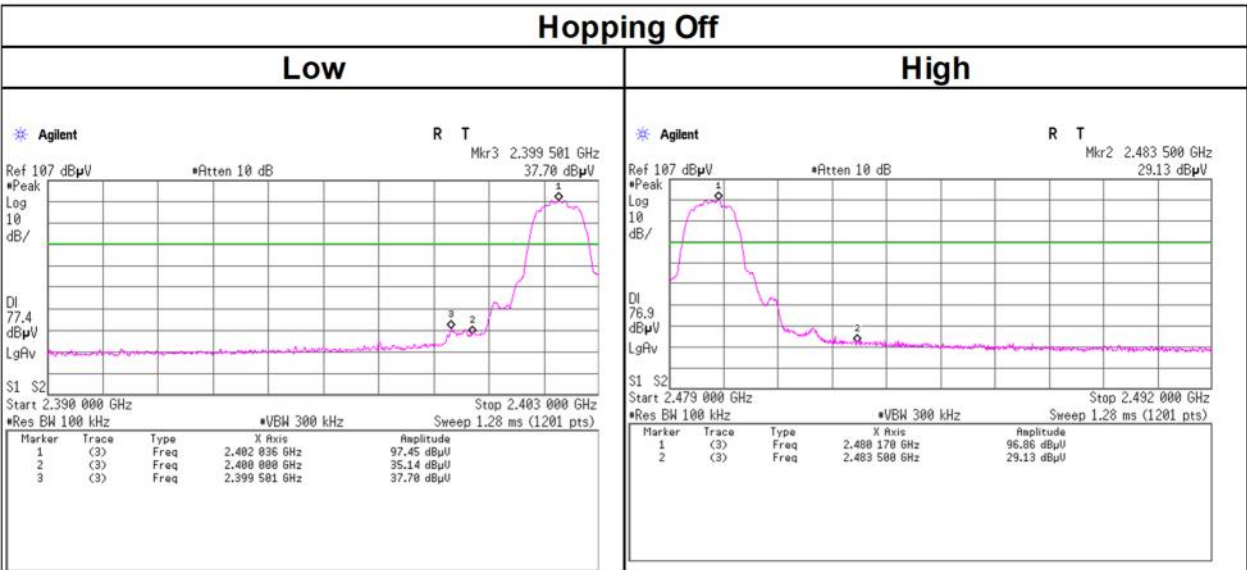
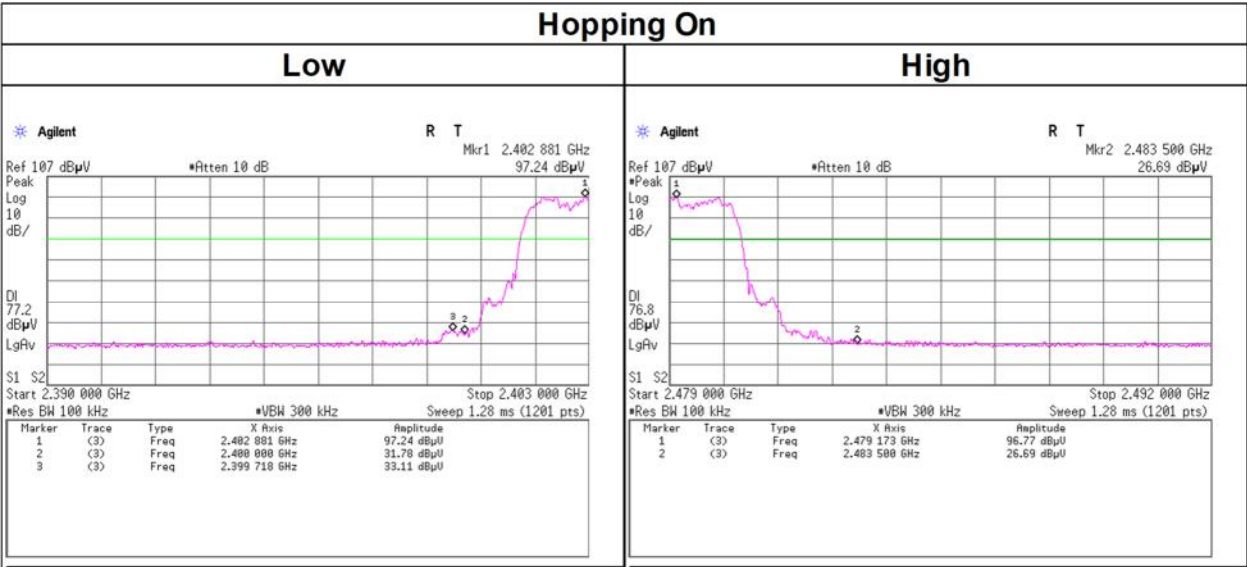
|                        |                                    |                     |
|------------------------|------------------------------------|---------------------|
| Test place             | Shonan EMC Lab. No.5 Shielded Room |                     |
| Date                   | June 5, 2023                       | June 6, 2023        |
| Temperature / Humidity | 26 deg. C / 46 % RH                | 26 deg. C / 40 % RH |
| Engineer               | Yosuke Murakami                    |                     |
| Mode                   | Tx DH5                             |                     |





Conducted Emission Band Edge compliance

Test place                      Shonan EMC Lab. No.5 Shielded Room  
Date                              June 6, 2023  
Temperature / Humidity      26 deg. C / 40 % RH  
Engineer                        Yosuke Murakami  
Mode                              Tx 3DH5





## APPENDIX 2: Test Instruments

### Test Equipment (1/2)

| Test Item | LIMS ID | Description               | Manufacturer                                       | Model                                      | Serial                  | Last Calibration Date | Cal Int |
|-----------|---------|---------------------------|----------------------------------------------------|--------------------------------------------|-------------------------|-----------------------|---------|
| RE        | 145005  | Pre Amplifier             | Toyo Corporation                                   | TPA0118-36                                 | 2046104                 | 2024/02/16            | 12      |
| RE        | 145007  | Pre Amplifier             | Toyo Corporation                                   | HAP18-26W                                  | 19                      | 2024/03/05            | 12      |
| RE        | 145023  | Biconical Antenna         | Schwarzbeck Mess-Elektronik OHG                    | BBA9106                                    | 91032666                | 2023/05/16            | 12      |
| RE        | 145126  | Pre Amplifier             | SONOMA                                             | 310N                                       | 290213                  | 2024/02/07            | 12      |
| RE        | 145136  | Attenuator                | Keysight Technologies Inc                          | 8493C-010                                  | 74864                   | 2023/10/12            | 12      |
| RE        | 145171  | Coaxial Cable&RF Selector | Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO | 8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906 | -/0901-271(RF Selector) | 2024/04/01            | 12      |
| RE        | 145176  | Coaxial Cable             | Suhner                                             | SUCOFLEX 102                               | 32703/2                 | 2023/08/23            | 12      |
| RE        | 145301  | Highpass Filter           | Micro-Tronics                                      | HPM50111                                   | 51                      | 2023/10/13            | 12      |
| RE        | 145377  | Highpass Filter           | Micro-Tronics                                      | HPM50112                                   | 28                      | 2023/10/11            | 12      |
| RE        | 145501  | Horn Antenna              | Schwarzbeck Mess-Elektronik OHG                    | BBHA9120D                                  | 9120D-739               | 2024/03/20            | 12      |
| RE        | 145512  | Horn Antenna              | ETS-Lindgren                                       | 3160-09                                    | 00094868                | 2023/06/12            | 12      |
| RE        | 145514  | Horn Antenna              | ETS-Lindgren                                       | 3160-10                                    | 00092383                | 2023/06/12            | 12      |
| RE        | 145529  | Logperiodic Antenna       | Schwarzbeck Mess-Elektronik OHG                    | VUSLP9111B                                 | 196                     | 2023/05/16            | 12      |
| RE        | 145565  | Semi-Anechoic Chamber     | TDK                                                | SAEC-03(NSA)                               | 3                       | 2024/04/03            | 12      |
| RE        | 145566  | Semi-Anechoic Chamber     | TDK                                                | SAEC-03(SVSWR)                             | 3                       | 2023/05/14            | 12      |
| RE        | 145800  | Spectrum Analyzer         | Keysight Technologies Inc                          | E4448A                                     | MY48250106              | 2024/03/25            | 12      |
| RE        | 150463  | Test Receiver             | Rohde & Schwarz                                    | ESW44                                      | 101581                  | 2023/08/25            | 12      |
| RE        | 156380  | Coaxial Cable             | Huber+Suhner                                       | SUCOFLEX_104_E                             | SN MY 13406/4E          | 2023/05/19            | 12      |
| RE        | 166491  | Coaxial Cable             | Junkosha                                           | MWX221-01000NFSNMS/B                       | 1612S005                | 2024/01/10            | 12      |
| RE        | 167094  | Attenuator                | JFW                                                | 50HF-006N                                  | -                       | 2024/02/13            | 12      |
| RE        | 168300  | Coaxial Cable             | Huber+Suhner                                       | SUCOFLEX 104                               | 800375/4A               | 2022/11/10            | 12 *1)  |
| RE        | 179540  | Coaxial Cable             | Huber+Suhner                                       | SUCOFLEX 102                               | 802815/2                | 2024/03/05            | 12      |
| RE        | 191840  | Thermo-Hygrometer         | CUSTOM. Inc                                        | CTH-201                                    | -                       | 2023/08/03            | 12      |
| RE        | 194685  | Horn Antenna              | Schwarzbeck Mess-Elektronik OHG                    | BBHA 9120 C                                | 711                     | 2024/03/20            | 12      |
| RE        | 196945  | Coaxial Cable             | Huber+Suhner                                       | SUCOFLEX 102                               | 803414/2                | 2024/03/12            | 12      |
| RE        | 200010  | Coaxial Cable             | Huber+Suhner                                       | SUCOFLEX 104                               | 575618/4                | 2023/06/06            | 12      |
| RE        | 202959  | Highpass Filter           | Micro-Tronics                                      | HPM50107                                   | G077                    | 2023/10/11            | 12      |
| RE        | 213530  | Test Receiver             | Rohde & Schwarz                                    | ESW44                                      | 103068                  | 2024/02/22            | 12      |
| RE        | 236869  | Coaxial Cable             | Huber+Suhner                                       | SUCOFLEX 104                               | 200084/4A               | 2023/06/06            | 12      |

## Test Equipment (2/2)

| Test Item | LIMS ID | Description               | Manufacturer                          | Model                  | Serial                  | Last Calibration Date | Cal Int |
|-----------|---------|---------------------------|---------------------------------------|------------------------|-------------------------|-----------------------|---------|
| AT        | 145089  | Spectrum Analyzer         | Keysight Technologies Inc             | E4446A                 | MY46180525              | 2023/12/13            | 12      |
| AT        | 145166  | Coaxial Cable             | Suhner                                | SUCOFLEX 102           | 31599/2                 | 2022/12/01            | 12 *1)  |
| AT        | 146207  | Terminator                | JFW                                   | 50T-128                | -                       | 2023/11/22            | 12      |
| AT        | 146212  | Digital Hitester          | HIOKI E.E. CORPORATION                | 3805-50                | 80997828                | 2023/09/25            | 12      |
| AT        | 146247  | Power Meter               | Keysight Technologies Inc             | 8990B                  | MY51000272              | 2023/05/29            | 12      |
| AT        | 146268  | Power Meter               | Raditeq (Formerly DARE!! Instruments) | RPR3006W               | 15100041SNO73           | 2023/05/30            | 12      |
| AT        | 146310  | Power sensor              | Keysight Technologies Inc             | N1923A                 | MY5326009               | 2023/05/29            | 12      |
| AT        | 154591  | Attenuator                | Weinschel Corp.                       | 54A-10                 | 81595                   | 2024/04/10            | 12      |
| AT        | 171615  | Terminator                | Weinschel - API Technologies Corp     | M1459A                 | 88997                   | 2023/05/11            | 12      |
| AT        | 179108  | Coaxial Cable             | Junkosha                              | MWX241-03000KMSKMS/B   | 1901Q033-R              | 2024/04/09            | 12      |
| AT        | 191845  | Thermo-Hygrometer         | CUSTOM. Inc                           | CTH-201                | -                       | 2023/08/07            | 12      |
| AT        | 204925  | Attenuator                | Weinschel Corp.                       | 54A-10                 | 109970                  | 2024/02/14            | 12      |
| AT,RE     | 145801  | Spectrum Analyzer         | Keysight Technologies Inc             | E4448A                 | MY48250152              | 2024/02/27            | 12      |
| CE        | 144960  | Attenuator                | JFW                                   | 50HF-003N              | -                       | 2023/08/22            | 12      |
| CE        | 145036  | Coaxial Cable&RF Selector | Suhner/Suhner/TOYO                    | RG223U/141PE/NS4906    | -/0901-271(RF Selector) | 2024/04/01            | 12      |
| CE        | 145542  | LISN                      | Rohde & Schwarz                       | ENV216                 | 100516                  | 2024/02/06            | 12      |
| CE,RE     | 146209  | Test Receiver             | Rohde & Schwarz                       | ESU26                  | 100484                  | 2023/09/22            | 12      |
| CE,RE     | 146210  | Digital Hitester          | HIOKI E.E. CORPORATION                | 3805-50                | 80997823                | 2023/09/25            | 12      |
| CE,RE     | 146432  | Tape Measure              | TAJIMA                                | GL19-55                | -                       | -                     | -       |
| CE,RE     | 170932  | EMI Software              | TSJ (Techno Science Japan)            | TEPTO-DV3(RE,CE,ME,PE) | -                       | -                     | -       |

\*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.

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

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

CE: Conducted Emission

RE: Radiated Emission