# RADIO TEST REPORT

## Test Report No. : 13462774S-B-R1

| | | |
|---|---|---|
| **Applicant** | : | **Panasonic Corporation** |
| **Type of EUT** | : | **Car Navigation** |
| **Model Number of EUT** | : | **AT2105** |
| **FCC ID** | : | **ACJ932AT2105** |
| **Test regulation** | : | **FCC Part 15 Subpart C: 2020**<br>***Wireless LAN & Bluetooth Low Energy part** |
| **Test Result** | : | **Complied (Refer to SECTION 3.2)** |

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by the A2LA accreditation body.
6. This test report covers Radio technical requirements.
   It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.
10. This report is a revised version of 13462774S-B. 13462774S-B is replaced with this report.

**Date of test:** August 18 to September 9, 2020

**Representative test engineer:**
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**Approved by:**
S. Takano
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Engineer
Consumer Technology Division

CERTIFICATE 1266.03

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

# REVISION HISTORY

## Original Test Report No.: 13462774S-B

| Revision | Test report No. | Date | Page revised | Contents |
|---|---|---|---|---|
| - (Original) | 13462774S-B | October 22, 2020 | - | - |
| 1 | 13462774S-B-R1 | November 20, 2020 | P.33 | Adding comment:<br>"* The above chart is obtained with the Maximum Packet Size set that can be by test software, and it is different from the maximum duty cycle of the product." |
| | | | P.35 | Correction of comment:<br>from "data communication mode" to "Advertising mode" |
| | | | P.107 | Addition comment: *1) |

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

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

## CONTENTS PAGE

**SECTION 1: Customer information....5**
**SECTION 2: Equipment under test (EUT)....5**
**SECTION 3: Test specification, procedures & results....7**
**SECTION 4: Operation of EUT during testing....10**
**SECTION 5: Radiated Spurious Emission....15**
**SECTION 6: Antenna Terminal Conducted Tests....18**
**APPENDIX 1: Test data....19**
6 dB Bandwidth and 99 % Occupied Bandwidth....19
Maximum Peak Output Power....26
Average Output Power....30
Burst rate confirmation....32
Radiated Spurious Emission....36
Conducted Spurious Emission....93
Power Density....100
**APPENDIX 2: Test instruments....104**
**APPENDIX 3: Photographs of test setup....106**
Radiated Spurious Emission....106
Pre-Check Worst Case Position....107
Antenna Terminal Conducted Tests....108

## SECTION 1: Customer information

| | | |
|---|---|---|
| Company Name | : | Panasonic Corporation |
| Address | : | 4261 Ikonobe-cho, Tsuzuki-ku, Yokohama-shi, Kanagawa-ken, 224-8520, Japan |
| Telephone Number | : | +81-50-3689-7112 |
| Contact Person | : | Takahisa Sakai |

The information provided from the customer is as follows;
- Applicant, Type of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (EUT) other than the Receipt Date
- SECTION 4: Operation of EUT during testing

* The laboratory is exempted from liability of any test results affected from the above information in SECTION 2 and 4.

## SECTION 2: Equipment under test (EUT)

### 2.1 Identification of EUT

| | | |
|---|---|---|
| Type | : | Car Navigation |
| Model Number | : | AT2105 |
| Serial Number | : | Refer to SECTION 4.2 |
| Rating | : | DC 13.2 V |
| Receipt Date | : | July 31, 2020 |
| Country of Mass-production | : | Japan, Mexico, Czech Republic |
| Condition | : | Production prototype<br>(Not for Sale: This sample is equivalent to mass-produced items.) |
| Modification | : | No Modification by the test lab. |

## 2.2 Product Description

Model: AT2105 (referred to as the EUT in this report) is a Car Navigation.

**Radio Specification**

| | **IEEE802.11b** | **IEEE802.11g** | **IEEE802.11n (20 MHz band)** | **IEEE802.11n (40 MHz band)** |
|---|---|---|---|---|
| Frequency of operation | 2412 MHz - 2462 MHz | 2412 MHz - 2462 MHz | 2412 MHz – 2462 MHz, 5180 MHz – 5240 MHz, 5745 MHz – 5825 MHz | 5190 MHz, 5230 MHz, 5755 MHz, 5795 MHz |
| Channel spacing | 5 MHz | | 2.4 GHz band: 5 MHz<br>5 GHz band: 20 MHz | 40 MHz |
| Modulation | DSSS (CCK, DQPSK, DBPSK) | OFDM-CCK (64QAM, 16QAM, QPSK, BPSK) | OFDM (64QAM, 16QAM, QPSK, BPSK) | |
| | **IEEE802.11a** | **IEEE802.11ac (20 MHz band)** | **IEEE802.11ac (40 MHz band)** | **IEEE802.11ac (80 MHz band)** |
| Frequency of operation | 5180 MHz – 5240 MHz, 5745 MHz – 5825 MHz | 5180 MHz – 5240 MHz, 5745 MHz – 5825 MHz | 5190 MHz, 5230 MHz, 5755 MHz, 5795 MHz | 5210 MHz, 5775 MHz |
| Channel spacing | 20 MHz | | 40 MHz | 80 MHz |
| Modulation | OFDM (64QAM, 16QAM, QPSK, BPSK) | OFDM (256QAM,16QAM,QPSK,BPSK) | | |

| | **Bluetooth (BR/EDR)** | **Bluetooth Low Energy** | |
|---|---|---|---|
| Frequency of operation | 2402 MHz – 2480 MHz | 2402 MHz – 2480 MHz | |
| Channel spacing | 1 MHz | 2 MHz | |
| Modulation | FHSS, GFSK, π/4DQPSK, 8DPSK | FHSS, GFSK | |
| Antenna type | Inverted F type antenna | | |
| Antenna Gain | RF0 | 2.4 GHz WLAN | -1.44 dBi |
| | | U-NII-1 | -1.25 dBi |
| | | U-NII-3 | 0.24 dBi |
| | RF1 | BT, BT LE | 0.05 dBi |
| | | U-NII-1 | 0.33 dBi |
| | | U-NII-3 | 0.01 dBi |
| Antenna Connector type | HFC IV Coaxial connector | | |
| Operating Temperature | -30 deg. C to + 65 deg. C | | |

# SECTION 3: Test specification, procedures & results

## 3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on October 13, 2020
* The revision does not affect the test result conducted before its effective date.

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

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

## 3.2 Procedures and results

| Item | Test Procedure | Specification | Worst margin | Results | Remarks |
|---|---|---|---|---|---|
| Conducted Emission | **FCC:** ANSI C63.10-2013 6. Standard test methods<br>**ISED:** RSS-Gen 8.8 | **FCC:** Section 15.207<br>**ISED:** RSS-Gen 8.8 | - | N/A *1) | - |
| 6 dB Bandwidth | **FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02<br>**ISED:** - | **FCC:** Section 15.247(a)(2)<br>**ISED:** RSS-247 5.2(a) | See data. | Complied a) | Conducted |
| Maximum Peak Output Power | **FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02<br>**ISED:** RSS-Gen 6.12 | **FCC:** Section 15.247(b)(3)<br>**ISED:** RSS-247 5.4(d) | | Complied b) | Conducted |
| Power Density | **FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02<br>**ISED:** - | **FCC:** Section 15.247(e)<br>**ISED:** RSS-247 5.2(b) | | Complied c) | Conducted |
| Spurious Emission Restricted Band Edges | **FCC:** KDB 558074 D01 15.247 Meas Guidance v05r02<br>**ISED:** RSS-Gen 6.13 | **FCC:** Section15.247(d)<br>**ISED:** RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10 | 3.6 dB 2390.000 MHz, AV, Hori, Mode: Tx 11g 2417 MHz | Complied# d) ,e) | Conducted (below 30 MHz)/ Radiated (above 30 MHz) *2) |

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.
*1) The test is not applicable since the EUT does not have AC Mains
*2) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02 8.5 and 8.6.

a) Refer to APPENDIX 1 (data of 6 dB Bandwidth and 99 % Occupied Bandwidth)
b) Refer to APPENDIX 1 (data of Maximum Peak Output Power)
c) Refer to APPENDIX 1 (data of Power Density)
d) Refer to APPENDIX 1 (data of Conducted Spurious Emission)
e) Refer to APPENDIX 1 (data of Radiated Spurious Emission)

Symbols:
Complied The data of this test item has enough margin, more than the measurement uncertainty.
Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.

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

**FCC Part 15.31 (e)**

The EUT provides stable voltage constantly to the RF Part regardless of input voltage.
Instead of a new battery, DC power supply was used for the test. That does not affect the test result, therefore the EUT complies with the requirement.

**FCC Part 15.203 Antenna requirement**

The EUT has a unique antenna connector (HFC IV Coaxial connector). 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 | -<br>a) | Conducted |
| a) Refer to APPENDIX 1 (data of 6 dB Bandwidth and 99 % Occupied Bandwidth) | | | | | |

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

## 3.4 Uncertainty

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

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

Shonan EMC Lab.

| Item | Frequency range | Uncertainty (+/-) | | | |
|---|---|---|---|---|---|
| | | No. 1 SAC / SR | No. 2 SAC / SR | No. 3 SAC / SR | No. 4,5,6,8 SR |
| Conducted emission (AC Mains) LISN | 150 kHz-30 MHz | 2.6 dB | 2.6 dB | 2.5 dB | 2.6 dB |
| Radiated emission (Measurement distance: 3 m) | 9 kHz-30 MHz | 3.0 dB | 3.0 dB | 3.0 dB | - |
| | 30 MHz-200 MHz | 4.6 dB | 4.6 dB | 4.6 dB | - |
| | 200 MHz-1 GHz | 6.0 dB | 6.0 dB | 6.0 dB | - |
| | 1 GHz-6 GHz | 4.9 dB | 4.9 dB | 4.9 dB | - |
| | 6 GHz-18 GHz | 5.5 dB | 5.5 dB | 5.5 dB | - |
| | 18 GHz-40 GHz | 5.4 dB | 5.4 dB | 5.4 dB | - |
| Radiated emission (Measurement distance: 1 m) | 1 GHz-18 GHz | 5.8 dB | 5.8 dB | 5.8 dB | - |
| | 18 GHz-40 GHz | 5.7 dB | 5.7 dB | 5.7 dB | - |

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

| Antenna terminal test | Uncertainty (+/-) |
|---|---|
| Power Measurement above 1 GHz (Average Detector)_SPM-06 | 0.98 dB |
| Power Measurement above 1 GHz (Peak Detector)_SPM-06 | 1.75 dB |
| Power Measurement above 1 GHz (Average Detector)_SPM-07 | 0.89 dB |
| Power Measurement above 1 GHz (Peak Detector)_SPM-07 | 1.12 dB |
| Power Measurement above 1 GHz (Average Detector)_SPM-13 | 1.06 dB |
| Power Measurement above 1 GHz (Peak Detector)_SPM-13 | 1.24 dB |
| Spurious emission (Conducted) below 1GHz | 0.9 dB |
| Spurious emission (Conducted) 1 GHz-3 GHz | 0.9 dB |
| Spurious emission (Conducted) 3 GHz-18 GHz | 2.9 dB |
| Spurious emission (Conducted) 18 GHz-26.5 GHz | 2.6 dB |
| Spurious emission (Conducted) 26.5 GHz-40 GHz | 2.0 dB |
| Bandwidth Measurement | 0.07 % |
| Duty cycle and Time Measurement | 0.262 % |
| Temperature | 0.95 deg.C. |
| Voltage | 0.83 % |

## 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, Facsimile: +81 463 50 6401
A2LA Certificate Number: 1266.03 (FCC Test Firm Registration Number: 626366, ISED Lab Company Number: 2973D)

| Test site | IC Registration Number | Width x Depth x Height (m) | Size of reference ground plane (m) / horizontal conducting plane | Maximum measurement distance |
|---|---|---|---|---|
| No.1 Semi-anechoic chamber | 2973D-1 | 20.6 x 11.3 x 7.65 | 20.6 x 11.3 | 10 m |
| No.2 Semi-anechoic chamber | 2973D-2 | 20.6 x 11.3 x 7.65 | 20.6 x 11.3 | 10 m |
| No.3 Semi-anechoic chamber | 2973D-3 | 12.7 x 7.7 x 5.35 | 12.7 x 7.7 | 5 m |
| No.4 Semi-anechoic chamber | - | 8.1 x 5.1 x 3.55 | 8.1 x 5.1 | - |
| 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 | - | - |

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

Refer to APPENDIX.

# SECTION 4: Operation of EUT during testing

## 4.1 Operating Mode(s)

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

| Mode | Remarks* |
|---|---|
| IEEE 802.11b (11b) | 1 Mbps, PN9 |
| IEEE 802.11g (11g) | 54 Mbps, PN9 |
| IEEE 802.11n SISO 20 MHz BW (11n-20) | MCS 7, PN9 |
| Bluetooth (BT) Low Energy (LE) | Uncoded 1 M-PHY, Maximum Packet Size, PRBS9 |
| | Uncoded 2 M-PHY, Maximum Packet Size, PRBS9 |
| *The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel) | |

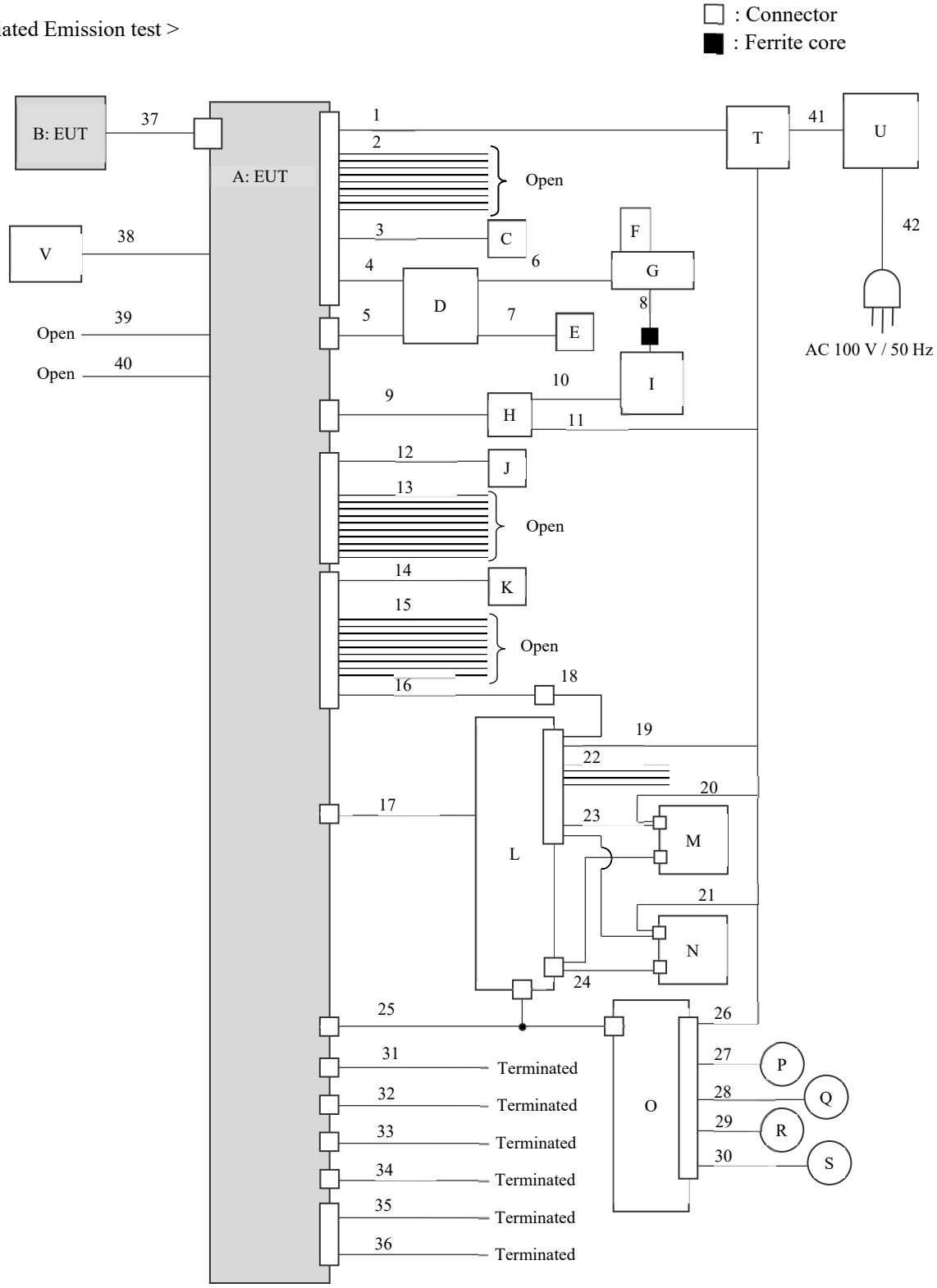
*Power of the EUT was set by the software as follows;
Power settings: 11b : 13 dBm, 11g: 11 dBm (2412 MHz, 2462 MHz), 13 dBm (2417 MHz to 2457 MHz)
11n-20: 10 dBm (2412 MHz, 2462 MHz), 12 dBm (2417 MHz to 2457 MHz)
BT LE 1 M-PHY: Fixed
BT LE 2 M-PHY: Fixed
Software: Labtool Version: 2.0.0.71
(Date: 2020.05.29, Storage location: EUT memory)
*This setting of software is the worst case.
Any conditions under the normal use do not exceed the condition of setting.
In addition, end users cannot change the settings of the output power of the product.

*The details of Operating mode(s)

| Test Item | Operating Mode | Tested frequency |
|---|---|---|
| Conducted Spurious Emission | Tx, 11n-20 | 2437 MHz |
| | Tx BT LE 1 M-PHY,<br>Tx BT LE 2 M-PHY | 2402 MHz<br>2440 MHz<br>2480 MHz |
| Radiated Spurious Emission (Below 1 GHz) | Tx, 11n-20 | 2437 MHz |
| | Tx BT LE 1 M-PHY,<br>Tx BT LE 2 M-PHY | 2402 MHz<br>2440 MHz<br>2480 MHz |
| Radiated Spurious Emission (Above 1 GHz) | Tx, 11b,<br>Tx, 11b with Tx 11ac-20 CDD 5240 MHz | 2412 MHz<br>2437 MHz<br>2462 MHz |
| | Tx, 11g,<br>Tx, 11n-20,<br>Tx, 11g with Tx 11ac-20 CDD 5240 MHz,<br>Tx, 11n-20 with Tx 11ac-20 CDD 5240 MHz | 2412 MHz<br>2417 MHz<br>2437 MHz<br>2457 MHz<br>2462 MHz |
| | Tx BT LE 1 M-PHY,<br>Tx BT LE 2 M-PHY | 2402 MHz<br>2440 MHz<br>2480 MHz |
| 6 dB Bandwidth<br>Maximum Peak Output Power<br>Power Density<br>99 % Occupied Bandwidth | Tx, 11b<br>Tx, 11g<br>Tx, 11n-20 | 2412 MHz<br>2437 MHz<br>2462 MHz |
| | Tx BT LE 1 M-PHY,<br>Tx BT LE 2 M-PHY | 2402 MHz<br>2440 MHz<br>2480 MHz |

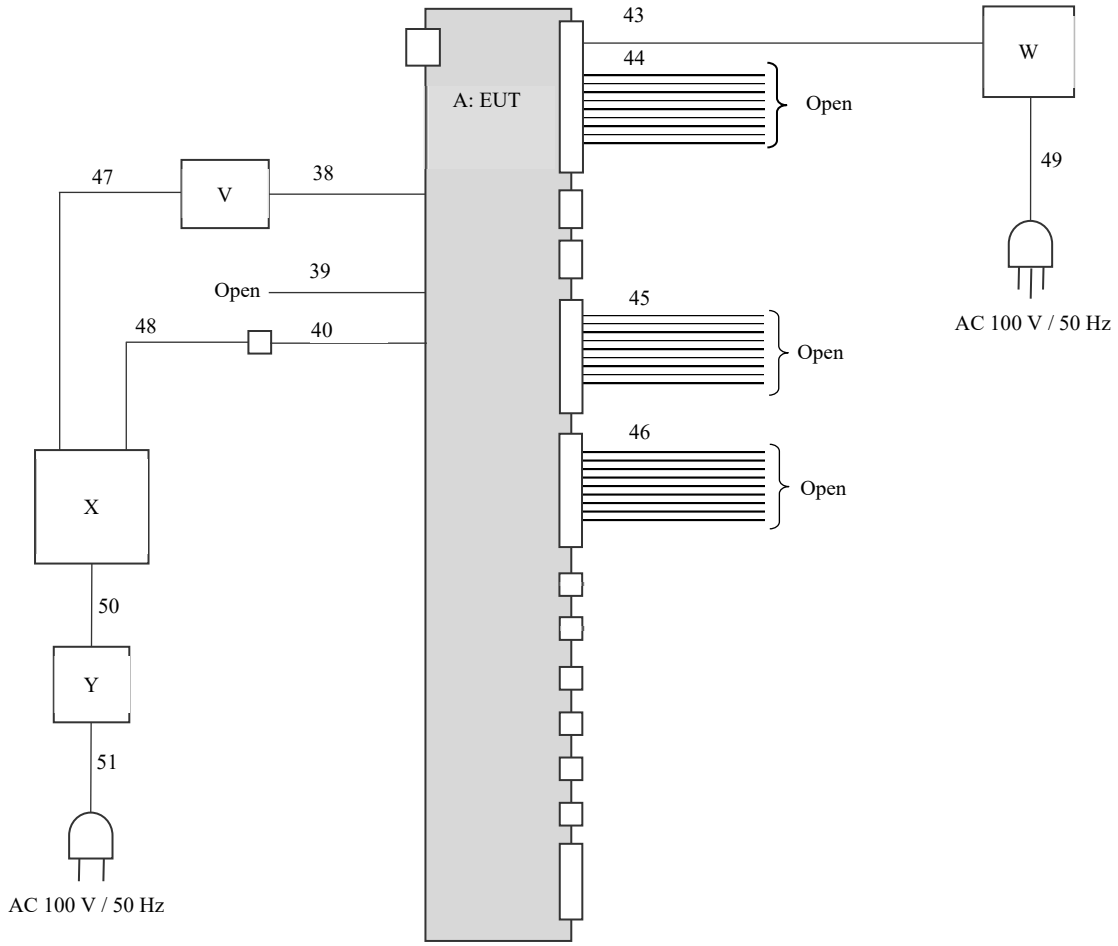
## 4.2 Configuration and peripherals

< Radiated Emission test >




* Cabling and setup(s) were taken into consideration and test data was taken under worse case conditions.
*It was preliminary confirmed that there was no difference in emission level due to a standard ferrite core.

< Antenna Terminal Conducted test >



**Description of EUT and Support equipment**

| No. | Item | Model number | Serial number | Manufacturer | Remarks |
|---|---|---|---|---|---|
| A | Car Navigation | AT2105 | 002 *1)<br>001 *2) | Panasonic Corporation | EUT |
| B | Antenna | CA-AL8BX0AJ | 001 | Panasonic Corporation | EUT |
| C | Steering Switch | - | 1142 | Panasonic Corporation | - |
| D | IF Box | DEP32-10078 | 033 | Panasonic Corporation | - |
| E | Bluetooth Speaker | SRS-X11 | 2154715 | Sony Corporation | - |
| F | USB memory | USM4GU | - | Sony Corporation | - |
| G | USB Hub | U3H-A422BX | 0600341 | ELECOM | - |
| H | JIG Bord | GVIF2HDJIG | 16 | Panasonic Corporation | - |
| I | Separate Display | On-Lap 1102I | 11102100908028 | TEKWIND | - |
| J | Mic | GP-SDA3510A | 0DC062856 | Panasonic Corporation | - |
| K | Mic | GP-SDA3510A | 0DC062519 | Panasonic Corporation | - |
| L | RSE ECU | CR-EL3BX0AJ | 1S-188 | Panasonic Corporation | - |
| M | RSE Display | CR-FL3BJ0AJ | 107 | Panasonic Corporation | - |
| N | RSE Display | CR-FL3BJ0AJ | 108 | Panasonic Corporation | - |
| O | MOST AMP | CL-DL47X2AJ | - | Panasonic Corporation | - |
| P | Speaker | KFC-RS160 | - | KENWOOD | - |
| Q | Speaker | KFC-RS160 | - | KENWOOD | - |
| R | Speaker | KFC-RS160 | - | KENWOOD | - |
| S | Speaker | KFC-RS160 | - | KENWOOD | - |
| T | Terminal Block | - | - | - | - |
| U | Power Supply (DC) | PAN35-10A | DE001677 | KIKUSUI | - |
| V | Jig board | RCarDBG_JTAG2 | WR19-4014 *1)<br>WR12-3224 *2) | WESTEK | - |
| W | Power Supply (DC) | PAN35-10A | ML002085 | KIKUSUI | - |
| X | Laptop Computer | 7666-77J | LV-B8R1X 08/05 | Lenovo | - |
| Y | AC Adapter | 42T4422 | 11S92P1154Z1DXF 1DBFDN | Lenovo | - |

*1) Used for Antenna Terminal conducted test
*2) Used for Radiated Emission test

**List of cables used**

| No. | Name | Length (m) | Shield | | Remarks |
|---|---|---|---|---|---|
| | | | Cable | Connector | |
| 1 | DC | 2.0 | Unshielded | Unshielded | - |
| 2 | Signal | 2.0 | Unshielded | Unshielded | - |
| 3 | Signal | 2.0 + 0.1 | Unshielded | Unshielded | - |
| 4 | IF Box Power | 2.0 + 0.3 | Unshielded | Unshielded | - |
| 5 | Signal | 2.0 | Unshielded | Unshielded | - |
| 6 | USB | 0.07 | Shielded | Shielded | - |
| 7 | USB type C | 0.9 | Shielded | Shielded | - |
| 8 | USB | 2.0 | Shielded | Shielded | - |
| 9 | GVIF(Separate Display) | 2.5 | Shielded | Shielded | - |
| 10 | HDMI | 1.2 | Shielded | Shielded | - |
| 11 | DC | 1.0 | Unshielded | Unshielded | - |
| 12 | Mic | 2.0 + 0.5 | Unshielded | Unshielded | - |
| 13 | Signal | 2.0 | Unshielded | Unshielded | - |
| 14 | Mic | 2.0 + 0.5 | Unshielded | Unshielded | - |
| 15 | Signal | 2.0 | Unshielded | Unshielded | - |
| 16 | Signal | 2.0 | Unshielded | Unshielded | - |
| 17 | RSE | 3.0 | Shielded | Shielded | - |
| 18 | Signal | 1.0 | Unshielded | Unshielded | - |
| 19 | DC | 1.0 | Unshielded | Unshielded | - |
| 20 | DC | 2.0 | Unshielded | Unshielded | - |
| 21 | DC | 2.0 | Unshielded | Unshielded | - |
| 22 | Signal | 1.0 | Unshielded | Unshielded | - |
| 23 | Main(RSE) | 1.0 | Shielded | Shielded | - |
| 24 | RSE DISP-ECU | 2.0 | Unshielded | Unshielded | - |
| 25 | MOST AMP | 2.5 | Unshielded | Unshielded | - |
| 26 | DC | 1.0 | Unshielded | Unshielded | - |
| 27 | Speaker | 1.0 | Unshielded | Unshielded | - |
| 28 | Speaker | 1.0 | Unshielded | Unshielded | - |
| 29 | Speaker | 1.0 | Unshielded | Unshielded | - |
| 30 | Speaker | 1.0 | Unshielded | Unshielded | - |
| 31 | A2B | 3.0 | Unshielded | Unshielded | - |
| 32 | DCM | 3.0 | Shielded | Shielded | - |
| 33 | GPS | 0.12 + 1.5 | Shielded | Shielded | - |
| 34 | Sirius XM | 2.5 | Unshielded | Unshielded | - |
| 35 | FM | 1.5 | Shielded | Shielded | - |
| 36 | FM | 1.5 | Shielded | Shielded | - |
| 37 | BT/WLAN Antenna | 0.3 | Shielded | Shielded | - |
| 38 | Signal | 0.1 | Unshielded | Unshielded | *3) |
| 39 | Signal | 0.2 | Unshielded | Unshielded | *3) |
| 40 | UART | 0.3 | Unshielded | Unshielded | *3) |
| 41 | DC | 2.4 | Unshielded | Unshielded | - |
| 42 | AC | 2.0 | Unshielded | Unshielded | - |
| 43 | DC | 1.0 | Unshielded | Unshielded | - |
| 44 | Signal | 0.2 | Unshielded | Unshielded | - |
| 45 | Signal | 0.2 | Unshielded | Unshielded | - |
| 46 | Signal | 0.2 | Unshielded | Unshielded | - |
| 47 | USB | 1.5 | Shielded | Shielded | - |
| 48 | UART-USB | 1.8 | Shielded | Shielded | - |
| 49 | AC | 2.0 | Unshielded | Unshielded | - |
| 50 | DC | 1.8 | Unshielded | Unshielded | - |
| 51 | AC | 0.9 | Unshielded | Unshielded | - |

*3) This cable is for testing and is not included with products.

# SECTION 5: Radiated Spurious Emission

**Test Procedure**

It was measured based on "8.5 and 8.6 of KDB 558074 D01 15.247 Meas Guidance v05r02".

[For below 1 GHz]
EUT was placed on a urethane platform of nominal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]
EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane.
The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.
The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.
The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).
The test was made with the detector (RBW/VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

**Test Antennas are used as below;**

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

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

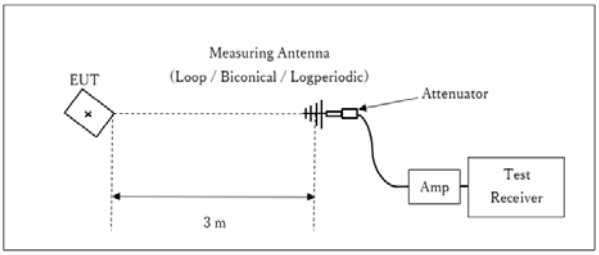
**20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).**

| Frequency | Below 1 GHz | Above 1 GHz | | 20 dBc |
|---|---|---|---|---|
| Instrument used | Test Receiver | Spectrum Analyzer | | Spectrum Analyzer |
| Detector | QP | PK | AV *1), *2) | PK |
| IF Bandwidth | BW 120 kHz | RBW: 1 MHz<br>VBW: 3 MHz | 11.12.2.5.2<br>RBW: 1 MHz<br>VBW: 3 MHz<br>Detector:<br>Power Averaging (Linear voltage)<br>Trace: 100 traces<br>Duty factor was added to the results. | RBW: 100 kHz<br>VBW: 300 kHz |

*1) Average Power Measurement was performed based on ANSI C63.10-2013.
*2) In unwanted emission derived from BT LE carrier, measurement with Average detector was not performed.
The limit for Average detector is applied to the measurement value with Peak detector used Duty cycle correction factor (DCCF).

**Figure 1: Test Setup**

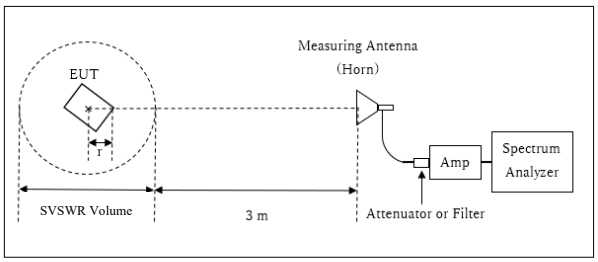
Below 1 GHz




× : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz

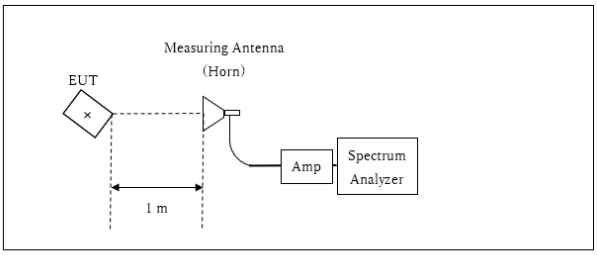



r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: 20 x log (3.82 m / 3.0 m) = 2.10 dB
* Test Distance: (3 + SVSWR Volume /2) - r = 3.82 m

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.18 m

10 GHz – 40 GHz




× : Center of turn table

Distance Factor: 20 x log (1.0 m / 3.0 m) = -9.54 dB
*Test Distance: 1 m

- The carrier level and noise levels were confirmed at each position of 0 deg and 30 deg of EUT and -90 deg, 0 deg and 90 deg of Antenna to see the position of maximum noise, and the test was made at the position that has the maximum noise.

**Worst case:**
<WLAN >
**EUT**

| Antenna polarization | Carrier (Band edge) | Spurious | | | | |
|---|---|---|---|---|---|---|
| | | Below 1 GHz | Above 1 GHz | | | |
| | | | 1 GHz - 2.8 GHz | 2.8 GHz - 10 GHz | 10 GHz - 18 GHz | 18 GHz - 26.5 GHz |
| Horizontal | 0 deg. | 0 deg. | 0 deg. | 0 deg. | 0 deg. | 0 deg. |
| Vertical | 0 deg. | 0 deg. | 0 deg. | 0 deg. | 0 deg. | 0 deg. |

**Antenna**

| Antenna polarization | Carrier (Band edge) | Spurious | | | | |
|---|---|---|---|---|---|---|
| | | Below 1 GHz | Above 1 GHz | | | |
| | | | 1 GHz - 2.8 GHz | 2.8 GHz - 10 GHz | 10 GHz - 18 GHz | 18 GHz - 26.5 GHz |
| Horizontal | 0 deg. | 0 deg. | 0 deg. | 0 deg. | 0 deg. | 0 deg. |
| Vertical | -90 deg. | 0 deg. | -90 deg. | 0 deg. | 0 deg. | 0 deg. |

<BT LE >

**EUT**

| Antenna polarization | Carrier (Band edge) | Spurious | | | | |
|---|---|---|---|---|---|---|
| | | Below 1 GHz | Above 1 GHz | | | |
| | | | 1 GHz - 2.8 GHz | 2.8 GHz - 10 GHz | 10 GHz - 18 GHz | 18 GHz - 26.5 GHz |
| Horizontal | 0 deg. | 0 deg. | 0 deg. | 0 deg. | 0 deg. | 0 deg. |
| Vertical | 0 deg. | 0 deg. | 0 deg. | 0 deg. | 0 deg. | 0 deg. |

**Antenna**

| Antenna polarization | Carrier (Band edge) | Spurious | | | | |
|---|---|---|---|---|---|---|
| | | Below 1 GHz | Above 1 GHz | | | |
| | | | 1 GHz - 2.8 GHz | 2.8 GHz - 10 GHz | 10 GHz - 18 GHz | 18 GHz - 26.5 GHz |
| Horizontal | -90 deg. | 0 deg. | -90 deg. | -90 deg. | 0 deg. | 0 deg. |
| Vertical | -90 deg. | 0 deg. | -90 deg. | -90 deg. | 0 deg. | 0 deg. |

**Measurement range : 30 MHz - 26.5 GHz**
**Test data : APPENDIX**
**Test result : Pass**

# SECTION 6: Antenna Terminal Conducted Tests

**Test Procedure**

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

| Test | Span | RBW | VBW | Sweep time | Detector | Trace | Instrument used |
|---|---|---|---|---|---|---|---|
| 6 dB Bandwidth | 50 MHz, 10 MHz | 100 kHz | 300 kHz | Auto | Peak | Max Hold | Spectrum Analyzer |
| 99 % Occupied Bandwidth *1) | Enough width to display emission skirts | 1 to 5 % of OBW | Three times of RBW | Auto | Peak | Max Hold | Spectrum Analyzer |
| Maximum Peak Output Power | - | - | - | Auto | Peak/ Average *2) | - | Power Meter (Sensor: 160 MHz BW) |
| Peak Power Density | 1.5 times the 6 dB Bandwidth | 3 kHz | 9.1 kHz | Auto | Peak | Max Hold | Spectrum Analyzer *3) |
| Conducted Spurious Emission *4) *5) | 9 kHz to 150 kHz | 200 Hz | 620 Hz | Auto | Peak | Max Hold | Spectrum Analyzer |
| | 150 kHz to 30 MHz | 10 kHz | 30 kHz | | | | |

*1) Peak hold was applied as Worst-case measurement.
*2) Reference data
*3) Section 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013".
*4) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately, however the noise was low enough as shown in the chart.
(9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 kHz).
*5) The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohmes. 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

## 6 dB Bandwidth and 99 % Occupied Bandwidth

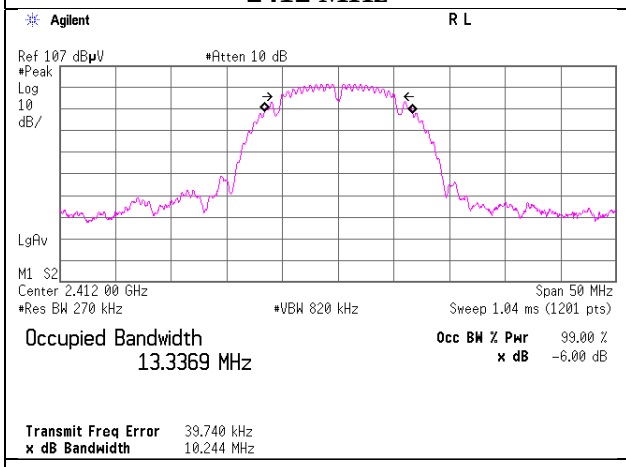
| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | September 4, 2020 |
| Temperature / Humidity | 23 deg. C / 54 % RH |
| Engineer | Toshinori Yamada |
| Mode | Tx |

| Mode | Frequency [MHz] | 99% Occupied Bandwidth [kHz] | 6dB Bandwidth [MHz] | Limit for 6dB Bandwidth [MHz] |
|---|---|---|---|---|
| 11b | 2412 | 13336.9 | 10.095 | > 0.5000 |
| | 2437 | 13317.6 | 10.104 | > 0.5000 |
| | 2462 | 13358.0 | 10.091 | > 0.5000 |
| 11g | 2412 | 16749.2 | 16.490 | > 0.5000 |
| | 2437 | 16739.3 | 16.515 | > 0.5000 |
| | 2462 | 16738.4 | 16.520 | > 0.5000 |
| 11n-20 | 2412 | 17804.4 | 17.709 | > 0.5000 |
| | 2437 | 17828.3 | 17.726 | > 0.5000 |
| | 2462 | 17789.0 | 17.727 | > 0.5000 |
| BT LE 1 M-PHY | 2402 | 1038.8 | 0.712 | > 0.5000 |
| | 2440 | 1039.0 | 0.715 | > 0.5000 |
| | 2480 | 1039.0 | 0.721 | > 0.5000 |
| BT LE 2 M-PHY | 2402 | 2074.5 | 1.256 | > 0.5000 |
| | 2440 | 2073.8 | 1.233 | > 0.5000 |
| | 2480 | 2076.3 | 1.309 | > 0.5000 |

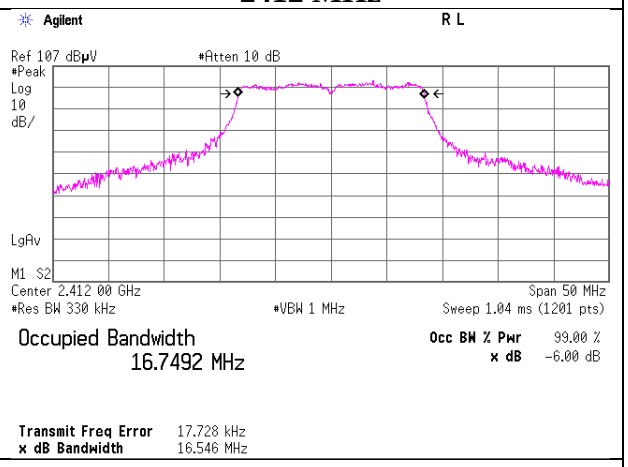
# 99 % Occupied Bandwidth

## 11b

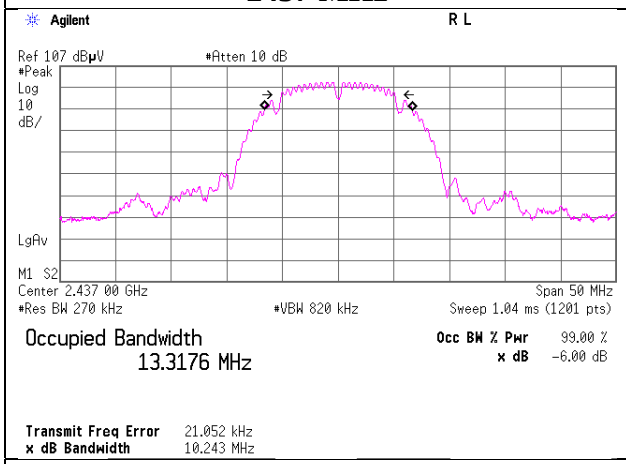
### 2412 MHz



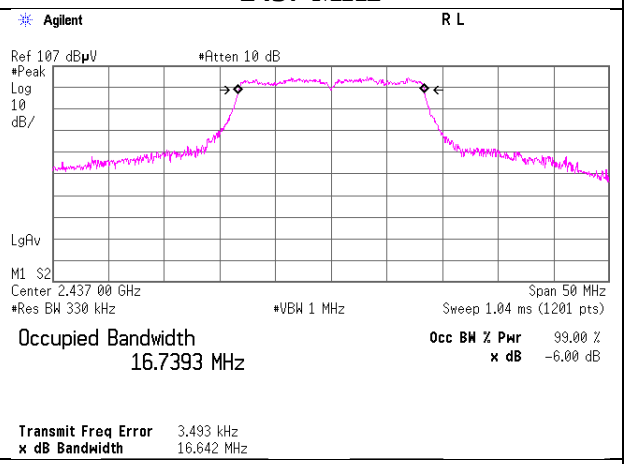

### 2412 MHz



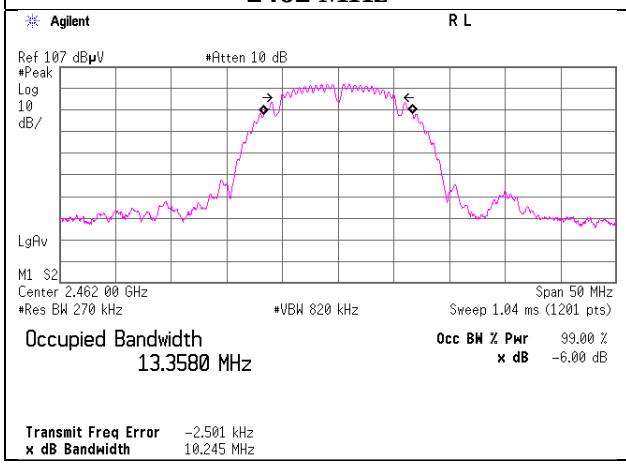

### 2437 MHz



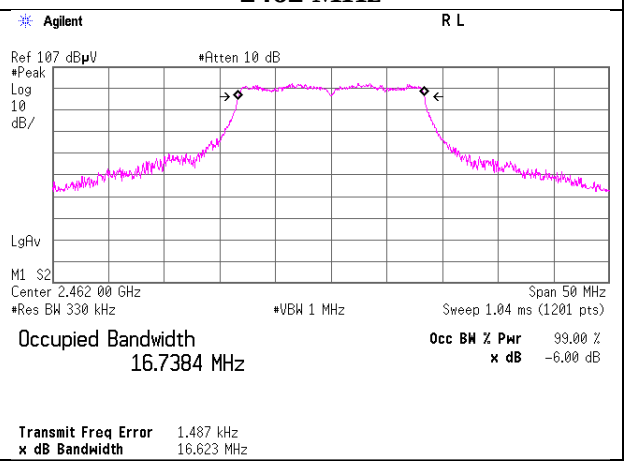

### 2437 MHz




### 2462 MHz



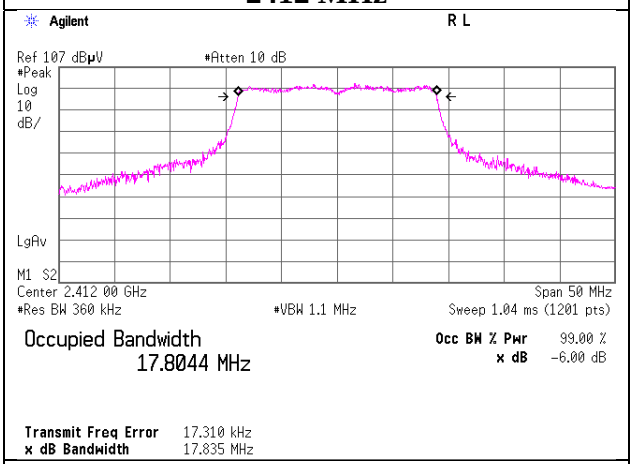

### 2462 MHz



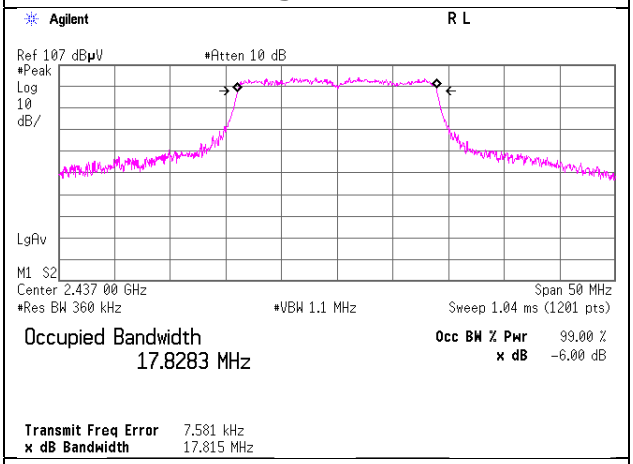
# 99 % Occupied Bandwidth

## 11n-20

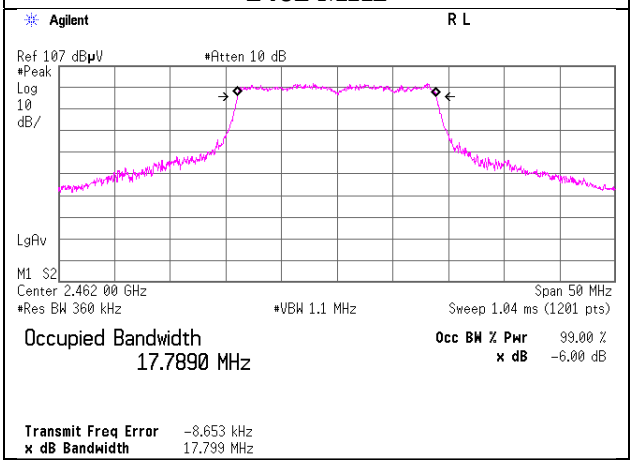
### 2412 MHz




### 2437 MHz



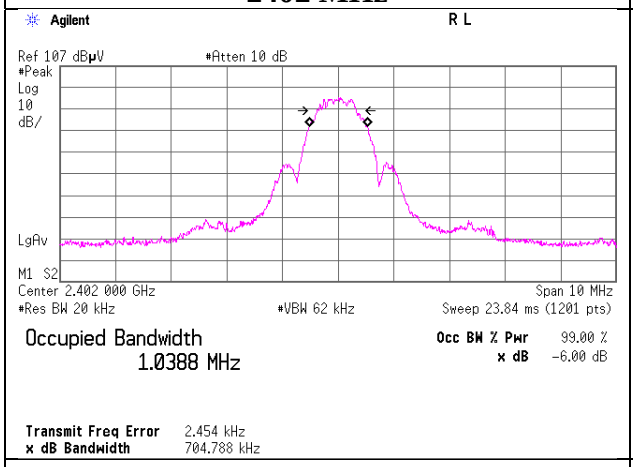

### 2462 MHz



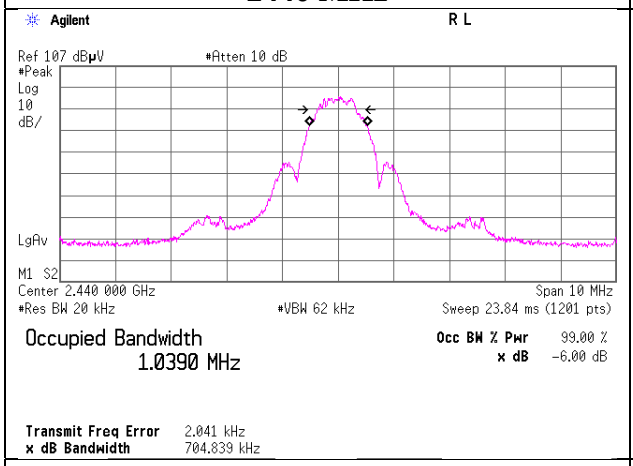
# 99 % Occupied Bandwidth

## BT LE 1 M-PHY

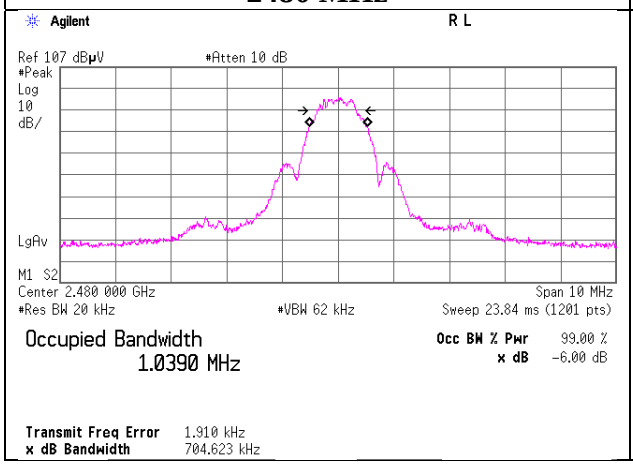
### 2402 MHz




### 2440 MHz

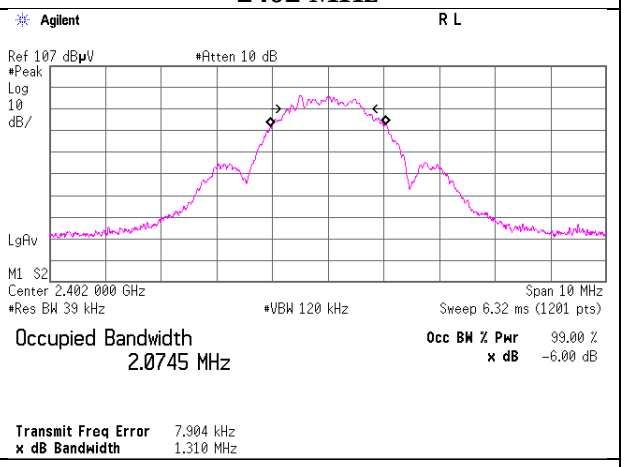



### 2480 MHz

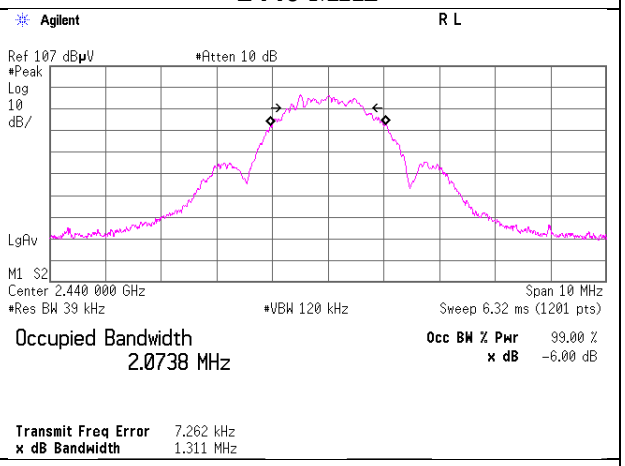



## BT LE 2 M-PHY

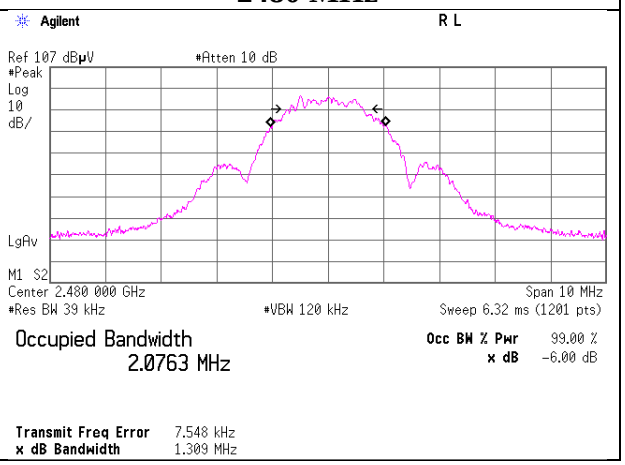
### 2402 MHz




### 2440 MHz



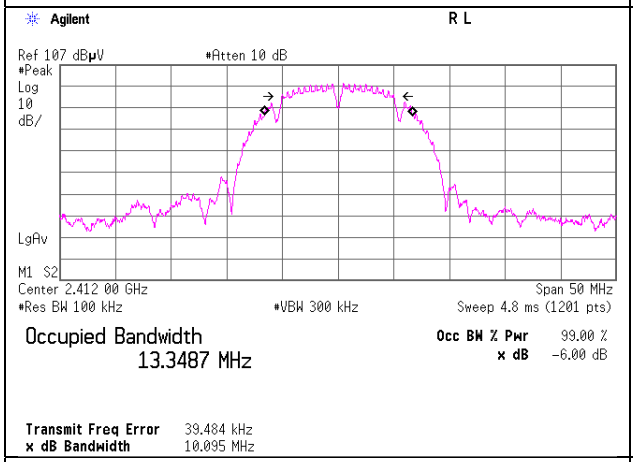

### 2480 MHz



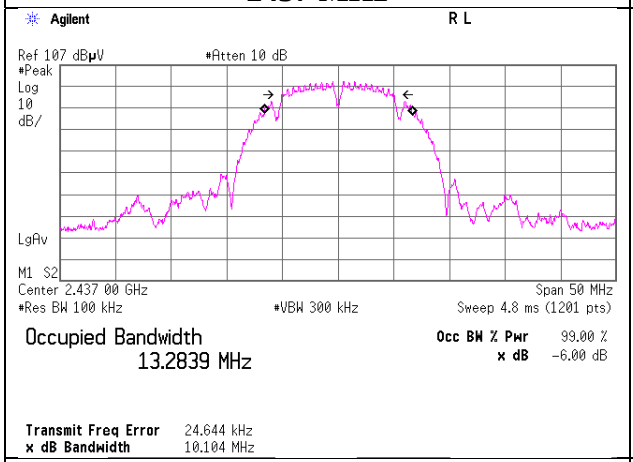
# 6 dB Bandwidth

## 11b

### 2412 MHz




### 2437 MHz

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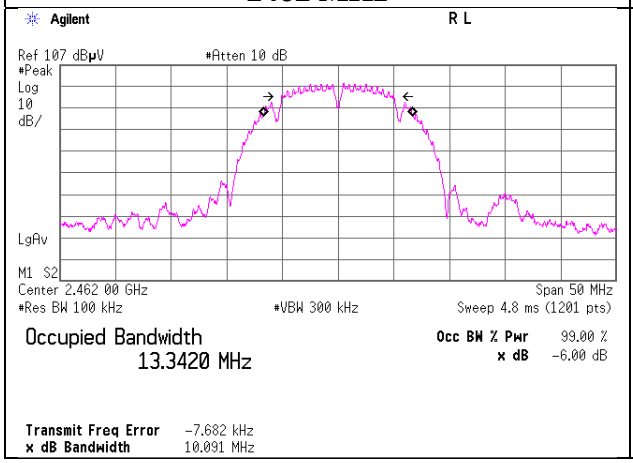
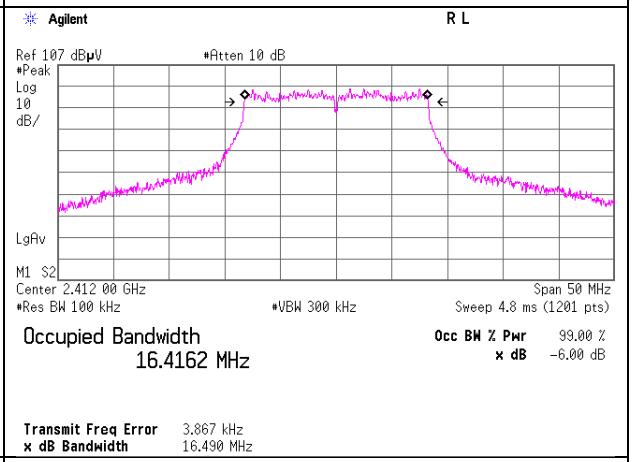



## 11g

### 2412 MHz

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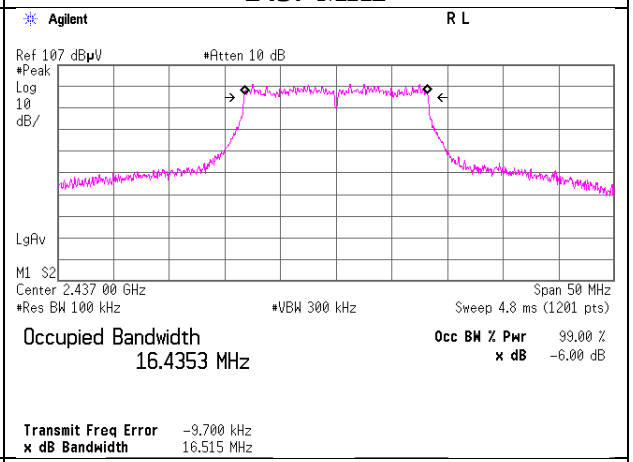


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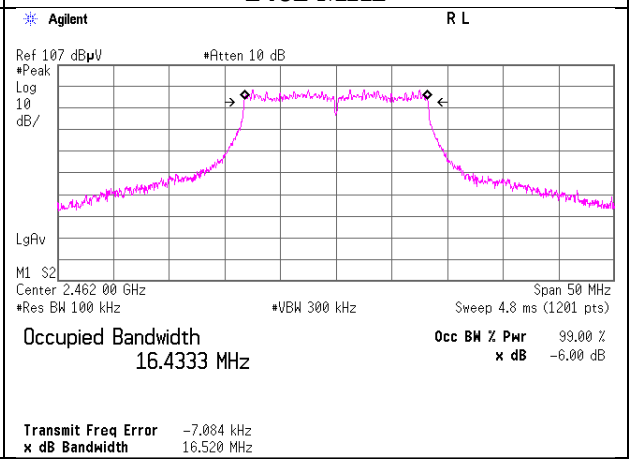
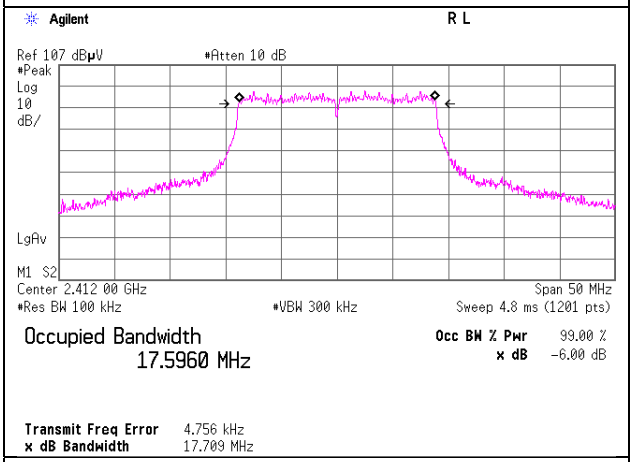


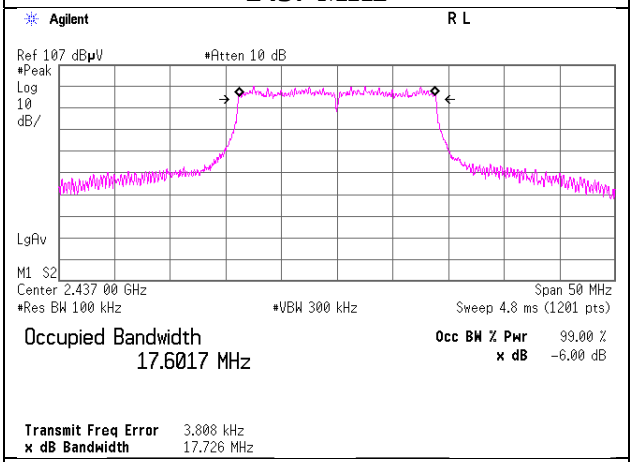
# 6 dB Bandwidth

## 11n-20

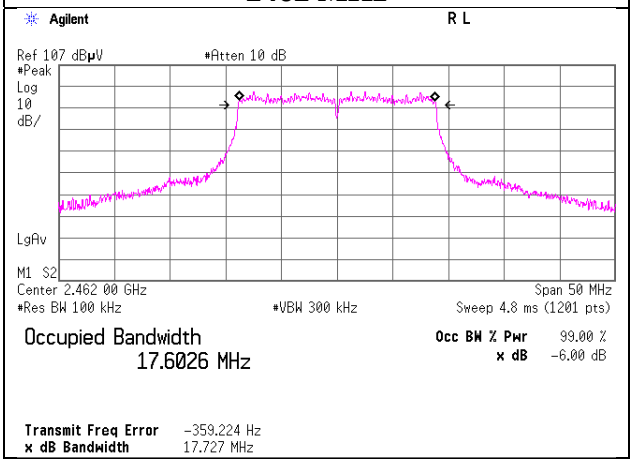
### 2412 MHz




### 2437 MHz



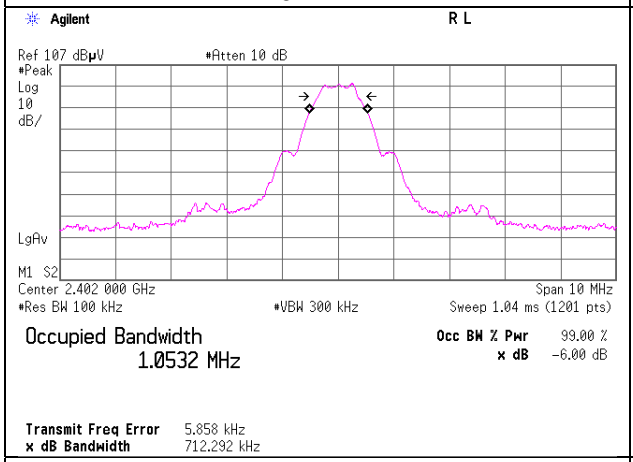

### 2462 MHz



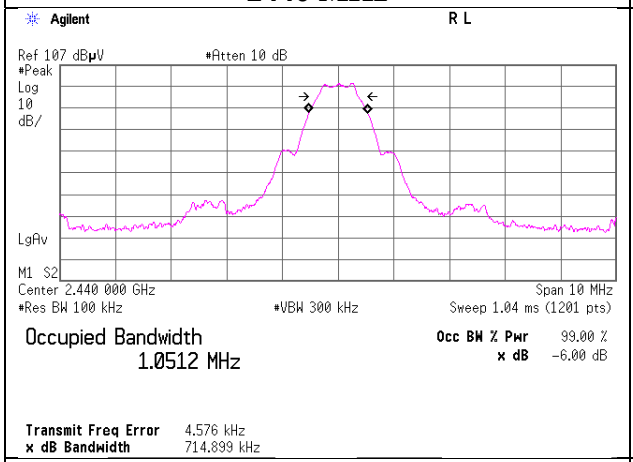
# 6 dB Bandwidth

## BT LE 1 M-PHY

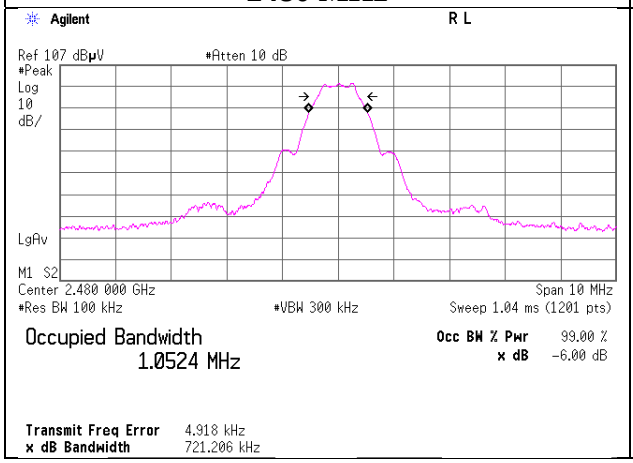
### 2402 MHz




### 2440 MHz

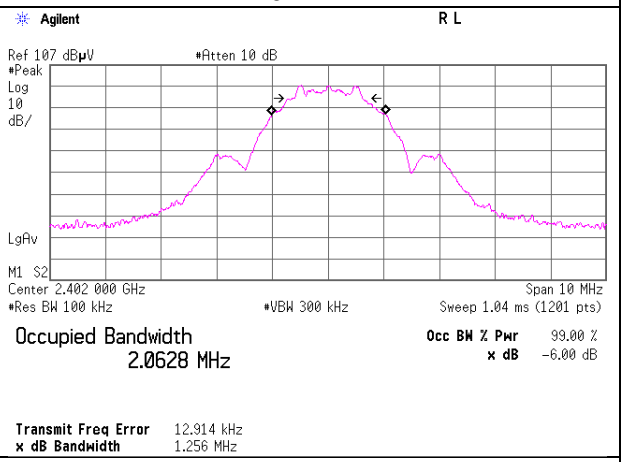



### 2480 MHz

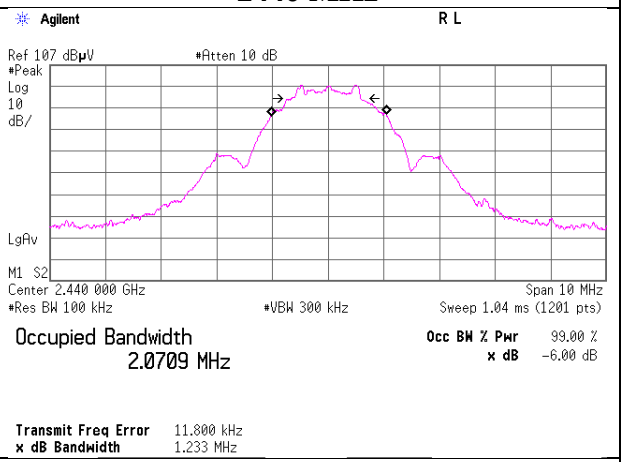



## BT LE 2 M-PHY

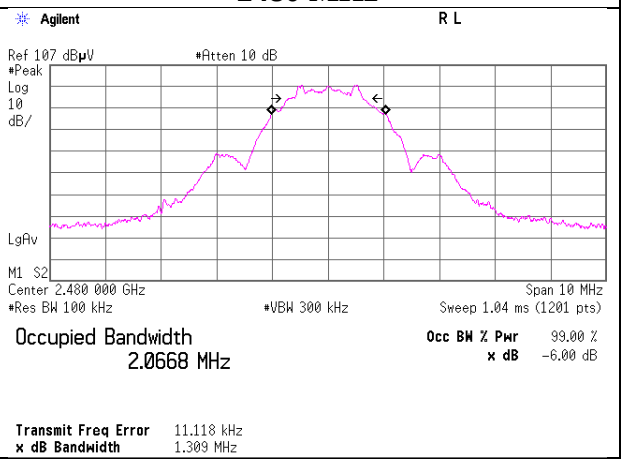
### 2402 MHz




### 2440 MHz




### 2480 MHz



# Maximum Peak Output Power

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | August 18, 2020 |
| Temperature / Humidity | 24 deg. C / 40 % RH |
| Engineer | Shiro Kobayashi |
| Mode | Tx 11b |

| | | | | Conducted Power | | | | | e.i.r.p. for RSS-247 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Freq. | Reading | Cable Loss | Atten. Loss | Result | | Limit | | Margin | Antenna Gain | Result | | Limit | | Margin |
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] | [dBi] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 2412 | 3.98 | 2.10 | 9.81 | 15.89 | 38.82 | 30.00 | 1000 | 14.11 | -1.44 | 14.45 | 27.86 | 36.02 | 4000 | 21.57 |
| 2437 | 4.40 | 2.10 | 9.82 | 16.32 | 42.85 | 30.00 | 1000 | 13.68 | -1.44 | 14.88 | 30.76 | 36.02 | 4000 | 21.14 |
| 2462 | 3.68 | 2.11 | 9.82 | 15.61 | 36.39 | 30.00 | 1000 | 14.39 | -1.44 | 14.17 | 26.12 | 36.02 | 4000 | 21.85 |

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.

2437MHz

| Rate [Mbps] | Reading [dBm] | Remark |
|---|---|---|
| 1 | 4.40 | * |
| 2 | 4.38 | |
| 5.5 | 4.39 | |
| 11 | 4.38 | |

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

# Maximum Peak Output Power

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | August 18, 2020 |
| Temperature / Humidity | 24 deg. C / 40 % RH |
| Engineer | Shiro Kobayashi |
| Mode | Tx 11g |

| | | | | Conducted Power | | | | | e.i.r.p. for RSS-247 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Freq. | Reading | Cable Loss | Atten. Loss | Result | | Limit | | Margin | Antenna Gain | Result | | Limit | | Margin |
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] | [dBi] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 2412 | 10.09 | 2.10 | 9.81 | 22.00 | 158.49 | 30.00 | 1000 | 8.00 | -1.44 | 20.56 | 113.76 | 36.02 | 4000 | 15.46 |
| 2437 | 10.45 | 2.10 | 9.82 | 22.37 | 172.58 | 30.00 | 1000 | 7.63 | -1.44 | 20.93 | 123.88 | 36.02 | 4000 | 15.09 |
| 2462 | 9.85 | 2.11 | 9.82 | 21.78 | 150.66 | 30.00 | 1000 | 8.22 | -1.44 | 20.34 | 108.14 | 36.02 | 4000 | 15.68 |

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.

2437 MHz

| Rate [Mbps] | Reading [dBm] | Remark |
|---|---|---|
| 6 | 10.39 | |
| 9 | 10.40 | |
| 12 | 10.38 | |
| 18 | 10.41 | |
| 24 | 10.39 | |
| 36 | 10.41 | |
| 48 | 10.44 | |
| 54 | 10.45 | * |

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

# Maximum Peak Output Power

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | June 18, 2020 |
| Temperature / Humidity | 25 deg. C / 50 % RH |
| Engineer | Shiro Kobayashi |
| Mode | Tx 11n-20 |

| | | | | Conducted Power | | | | | e.i.r.p. for RSS-247 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Freq. | Reading | Cable Loss | Atten. Loss | Result | | Limit | | Margin | Antenna Gain | Result | | Limit | | Margin |
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] | [dBi] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 2412 | 9.56 | 2.10 | 9.81 | 21.47 | 140.28 | 30.00 | 1000 | 8.53 | -1.44 | 20.03 | 100.69 | 36.02 | 4000 | 15.99 |
| 2437 | 10.46 | 2.10 | 9.82 | 22.38 | 172.98 | 30.00 | 1000 | 7.62 | -1.44 | 20.94 | 124.17 | 36.02 | 4000 | 15.08 |
| 2462 | 9.22 | 2.11 | 9.82 | 21.15 | 130.32 | 30.00 | 1000 | 8.85 | -1.44 | 19.71 | 93.54 | 36.02 | 4000 | 16.31 |

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.

2437 MHz

| MCS Number [MCS] | Reading [dBm] | Remark |
|---|---|---|
| 0 | 10.44 | |
| 1 | 10.45 | |
| 2 | 10.45 | |
| 3 | 10.40 | |
| 4 | 10.44 | |
| 5 | 10.44 | |
| 6 | 10.45 | |
| 7 | 10.46 | * |

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

# Maximum Peak Output Power

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | June 18, 2020 |
| Temperature / Humidity | 25 deg. C / 50 % RH |
| Engineer | Shiro Kobayashi |
| Mode | Tx BT LE |

1 M-PHY

| Freq. | Reading | Cable Loss | Atten. Loss | Conducted Power Result | | Conducted Power Limit | | Conducted Power Margin | e.i.r.p. for RSS-247 Antenna Gain | e.i.r.p. Result | | e.i.r.p. Limit | | e.i.r.p. Margin |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] | [dBi] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 2402 | -8.58 | 2.10 | 9.88 | 3.40 | 2.19 | 30.00 | 1000 | 26.60 | 0.05 | 3.45 | 2.21 | 36.02 | 4000 | 32.57 |
| 2440 | -8.31 | 2.11 | 9.88 | 3.68 | 2.33 | 30.00 | 1000 | 26.32 | 0.05 | 3.73 | 2.36 | 36.02 | 4000 | 32.29 |
| 2480 | -8.32 | 2.12 | 9.88 | 3.68 | 2.33 | 30.00 | 1000 | 26.32 | 0.05 | 3.73 | 2.36 | 36.02 | 4000 | 32.29 |

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain

2440 MHz

| Mode | Data rate [bps] | Reading [dBm] | Remark |
|---|---|---|---|
| 1 M-PHY | 1 M | -8.31 | * |
| Coded-PHY(S=8) | 125 k | -8.33 | |
| Coded-PHY(S=2) | 500 k | -8.32 | |

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

2 M-PHY

| Freq. | Reading | Cable Loss | Atten. Loss | Conducted Power Result | | Conducted Power Limit | | Conducted Power Margin | e.i.r.p. for RSS-247 Antenna Gain | e.i.r.p. Result | | e.i.r.p. Limit | | e.i.r.p. Margin |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dBm] | [mW] | [dB] | [dBi] | [dBm] | [mW] | [dBm] | [mW] | [dB] |
| 2402 | -8.56 | 2.10 | 9.88 | 3.42 | 2.20 | 30.00 | 1000 | 26.58 | 0.05 | 3.47 | 2.22 | 36.02 | 4000 | 32.55 |
| 2440 | -8.31 | 2.11 | 9.88 | 3.68 | 2.33 | 30.00 | 1000 | 26.32 | 0.05 | 3.73 | 2.36 | 36.02 | 4000 | 32.29 |
| 2480 | -8.33 | 2.12 | 9.88 | 3.67 | 2.33 | 30.00 | 1000 | 26.33 | 0.05 | 3.72 | 2.36 | 36.02 | 4000 | 32.30 |

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain
*The equipment and cables were not used for factor 0 dB of the data sheets.

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | August 18, 2020 |
| Temperature / Humidity | 24 deg. C / 40 % RH |
| Engineer | Shiro Kobayashi |
| Mode | Tx |

11b **2 Mbps**

| Freq. | Reading | Cable Loss | Atten. Loss | Result (Time average) | | Duty factor | Result (Burst power average) | |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dB] | [dBm] | [mW] |
| 2412 | 0.94 | 2.10 | 9.81 | 12.85 | 19.28 | 0.11 | 12.96 | 19.77 |
| 2437 | 1.48 | 2.10 | 9.82 | 13.40 | 21.88 | 0.11 | 13.51 | 22.44 |
| 2462 | 0.77 | 2.11 | 9.82 | 12.70 | 18.62 | 0.11 | 12.81 | 19.10 |

11g **54 Mbps**

| Freq. | Reading | Cable Loss | Atten. Loss | Result (Time average) | | Duty factor | Result (Burst power average) | |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dB] | [dBm] | [mW] |
| 2412 | -2.59 | 2.10 | 9.81 | 9.32 | 8.55 | 1.92 | 11.24 | 13.30 |
| 2437 | -0.07 | 2.10 | 9.82 | 11.85 | 15.31 | 1.92 | 13.77 | 23.82 |
| 2462 | -2.45 | 2.11 | 9.82 | 9.48 | 8.87 | 1.92 | 11.40 | 13.80 |

11n-20 **MCS 7**

| Freq. | Reading | Cable Loss | Atten. Loss | Result (Time average) | | Duty factor | Result (Burst power average) | |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dB] | [dBm] | [mW] |
| 2412 | -3.23 | 2.10 | 9.81 | 8.68 | 7.38 | 2.03 | 10.71 | 11.78 |
| 2437 | -1.07 | 2.10 | 9.82 | 10.85 | 12.16 | 2.03 | 12.88 | 19.41 |
| 2462 | -3.49 | 2.11 | 9.82 | 8.44 | 6.98 | 2.03 | 10.47 | 11.14 |

BT LE **1 M-PHY**

| Freq. | Reading | Cable Loss | Atten. Loss | Result (Time average) | | Duty factor | Result (Burst power average) | |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dB] | [dBm] | [mW] |
| 2402 | -9.58 | 2.10 | 9.88 | 2.40 | 1.74 | 0.68 | 3.08 | 2.03 |
| 2440 | -9.29 | 2.11 | 9.88 | 2.70 | 1.86 | 0.68 | 3.38 | 2.18 |
| 2480 | -9.31 | 2.12 | 9.88 | 2.69 | 1.86 | 0.68 | 3.37 | 2.17 |

BT LE **2 M-PHY**

| Freq. | Reading | Cable Loss | Atten. Loss | Result (Time average) | | Duty factor | Result (Burst power average) | |
|---|---|---|---|---|---|---|---|---|
| [MHz] | [dBm] | [dB] | [dB] | [dBm] | [mW] | [dB] | [dBm] | [mW] |
| 2402 | -12.55 | 2.10 | 9.88 | -0.57 | 0.88 | 3.63 | 3.06 | 2.02 |
| 2440 | -12.25 | 2.11 | 9.88 | -0.26 | 0.94 | 3.63 | 3.37 | 2.17 |
| 2480 | -12.29 | 2.12 | 9.88 | -0.29 | 0.94 | 3.63 | 3.34 | 2.16 |

Sample Calculation:
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuat
Result (Burst power average) = Time average + Duty factor

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

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | August 18, 2020 |
| Temperature / Humidity | 24 deg. C / 40 % RH |
| Engineer | Shiro Kobayashi |
| Mode | Tx |

2437 MHz

| Mode | Rate [Mbps] | Reading [dBm] | Duty factor [dB] | Burst power [dBm] | Remarks |
|---|---|---|---|---|---|
| 11b | 1 | 1.52 | 0.05 | 1.57 | |
| | 2 | 1.48 | 0.11 | 1.59 | * |
| | 5.5 | 1.31 | 0.27 | 1.58 | |
| | 11 | 1.09 | 0.49 | 1.58 | |
| 11g | 6 | 1.43 | 0.30 | 1.73 | |
| | 9 | 1.28 | 0.44 | 1.72 | |
| | 12 | 1.15 | 0.57 | 1.72 | |
| | 18 | 0.98 | 0.81 | 1.79 | |
| | 24 | 0.73 | 1.04 | 1.77 | |
| | 36 | 0.41 | 1.43 | 1.84 | |
| | 48 | 0.06 | 1.78 | 1.84 | |
| | 54 | -0.07 | 1.92 | 1.85 | * |

| Mode | MCS Number [MCS] | Reading [dBm] | Duty factor [dB] | Burst power [dBm] | Remarks |
|---|---|---|---|---|---|
| 11n-20 | 0 | 0.50 | 0.32 | 0.82 | |
| | 1 | 0.32 | 0.60 | 0.92 | |
| | 2 | 0.10 | 0.84 | 0.94 | |
| | 3 | -0.20 | 1.07 | 0.87 | |
| | 4 | -0.54 | 1.45 | 0.91 | |
| | 5 | -0.80 | 1.76 | 0.96 | |
| | 6 | -0.92 | 1.88 | 0.96 | |
| | 7 | -1.04 | 2.03 | 0.99 | * |

BT LE, 2440 MHz

| Mode | Data rate [bps] | Reading [dBm] | Duty factor [dB] | Burst power [dBm] | Remarks |
|---|---|---|---|---|---|
| 1 M-PHY | 1 M | -9.27 | 0.68 | -8.59 | * |
| Coded-PHY(S=8) | 125 k | -9.30 | 0.69 | -8.61 | |
| Coded-PHY(S=2) | 500 k | -9.01 | 0.40 | -8.61 | |

* Worst rate

Sample Calculation:

Burst power = Reading (timed average) + Duty factor

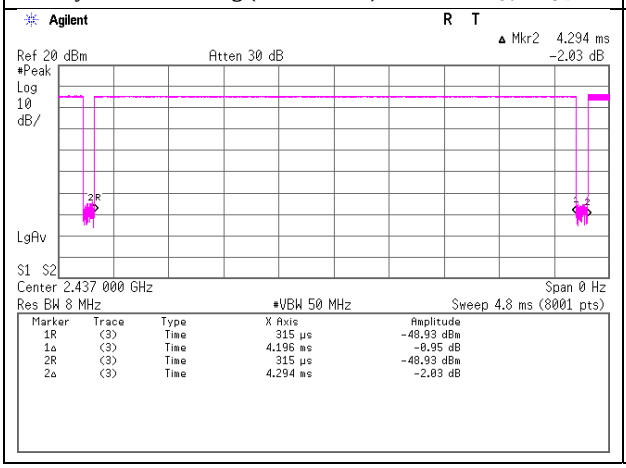
All comparison were carried out on same frequency and measurement factors.

# Burst rate confirmation (for Average Output Power)

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | August 18, 2020 |
| Temperature / Humidity | 24 deg. C / 40 % RH |
| Engineer | Shiro Kobayashi |
| Mode | Tx |

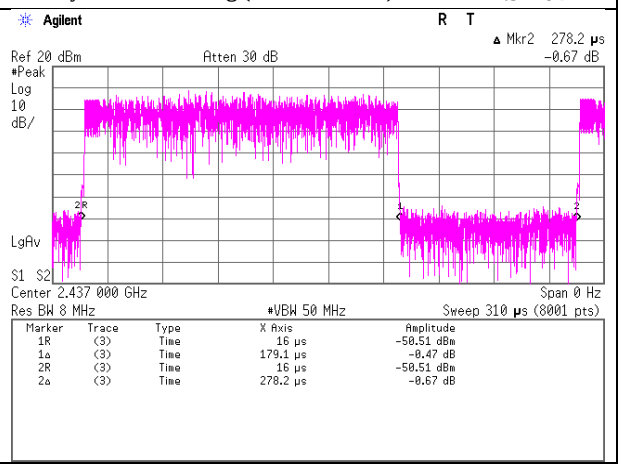
## 11b 2 Mbps

| | |
|---|---|
| **Tx on / (Tx on + Tx off) =** | **0.977** |
| **Tx on / (Tx on + Tx off) * 100 =** | **97.7 %** |
| **Duty factor = 10 * log (4.294 / 4.196) =** | **0.11 dB** |



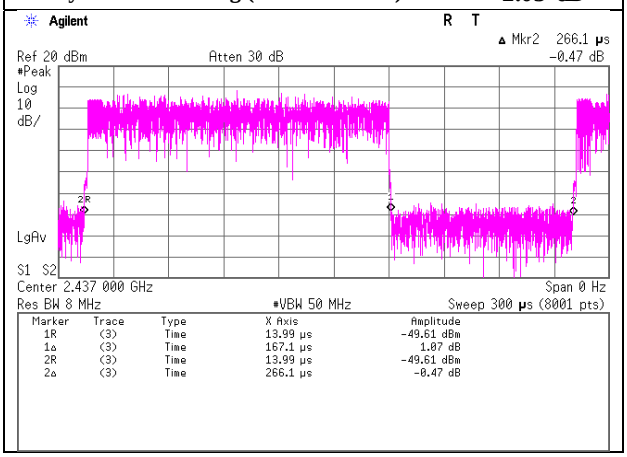

## 11g 54 Mbps

| | |
|---|---|
| **Tx on / (Tx on + Tx off) =** | **0.644** |
| **Tx on / (Tx on + Tx off) * 100 =** | **64.4 %** |
| **Duty factor = 10 * log (0.2782 / 0.1791) =** | **1.92 dB** |




## 11n-20 MCS 7

| | |
|---|---|
| **Tx on / (Tx on + Tx off) =** | **0.628** |
| **Tx on / (Tx on + Tx off) * 100 =** | **62.8 %** |
| **Duty factor = 10 * log (0.2661 / 0.1671) =** | **2.03 dB** |

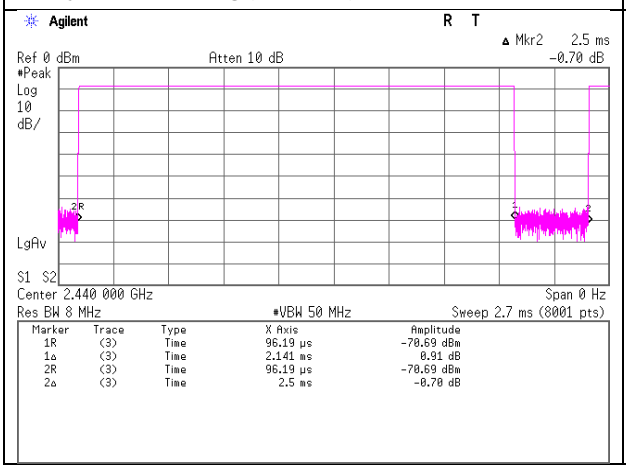


# Burst rate confirmation (for Average Output Power)

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | June 18, 2020 |
| Temperature / Humidity | 25 deg. C / 50 % RH |
| Engineer | Shiro Kobayashi |
| Mode | Tx |

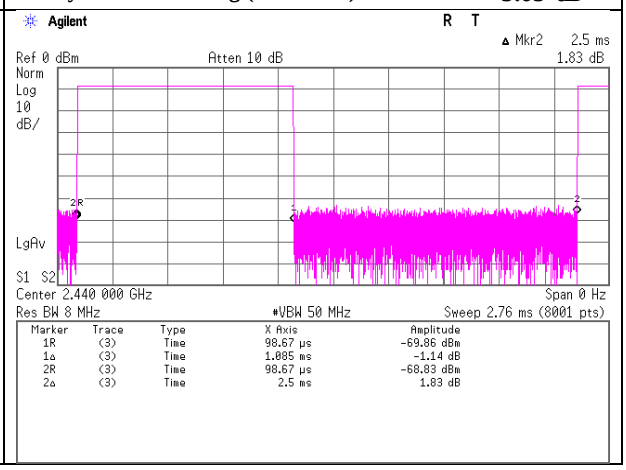
## BT LE 1 M-PHY

| | |
|---|---|
| Tx on / (Tx on + Tx off) = | 0.856 |
| Tx on / (Tx on + Tx off) * 100 = | 85.6 % |
| Duty factor = 10 * log (2.5 / 2.141) = | 0.68 dB |



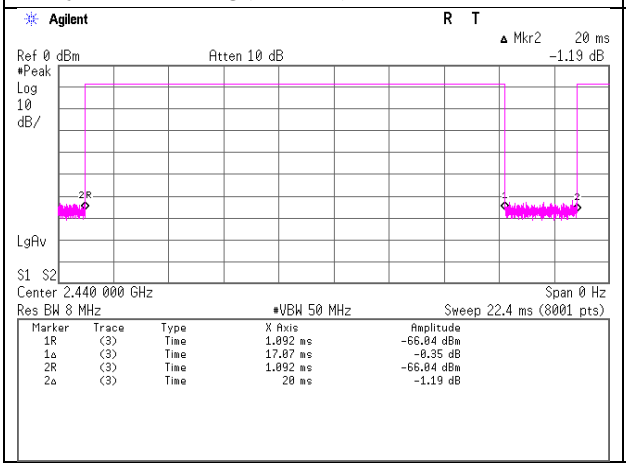

## BT LE 2 M-PHY

| | |
|---|---|
| Tx on / (Tx on + Tx off) = | 0.434 |
| Tx on / (Tx on + Tx off) * 100 = | 43.4 % |
| Duty factor = 10 * log (2.5 / 1.085) = | 3.63 dB |



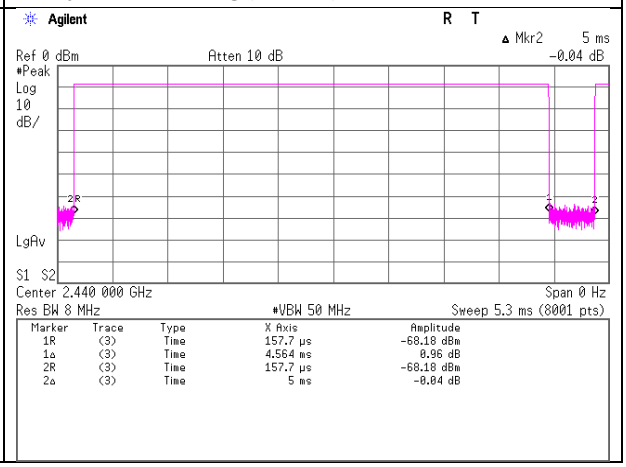

## BT LE Coded-PHY(S=8)

| | |
|---|---|
| Tx on / (Tx on + Tx off) = | 0.854 |
| Tx on / (Tx on + Tx off) * 100 = | 85.4 % |
| Duty factor = 10 * log (20 / 17.07) = | 0.69 dB |




## BT LE Coded-PHY(S=2)

| | |
|---|---|
| Tx on / (Tx on + Tx off) = | 0.913 |
| Tx on / (Tx on + Tx off) * 100 = | 91.3 % |
| Duty factor = 10 * log (5 / 4.564) = | 0.40 dB |



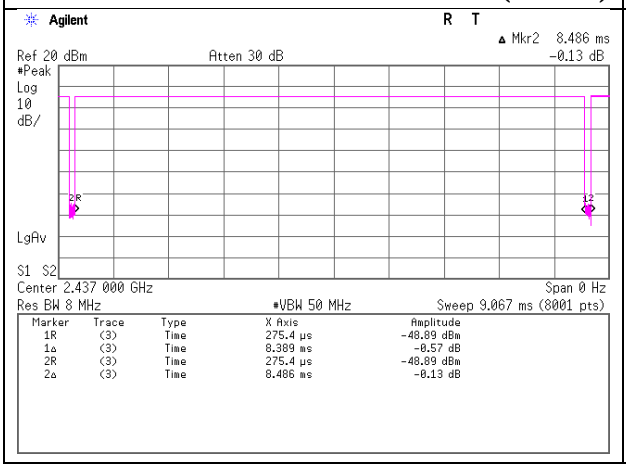

* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.
* The above chart is obtained with the Maximum Packet Size set that can be by test software, and it is different from the maximum duty cycle of the product."

# Burst rate confirmation (for Radiated Spurious Emission)

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | August 18, 2020 |
| Temperature / Humidity | 24 deg. C / 40 % RH |
| Engineer | Shiro Kobayashi |
| Mode | Tx |

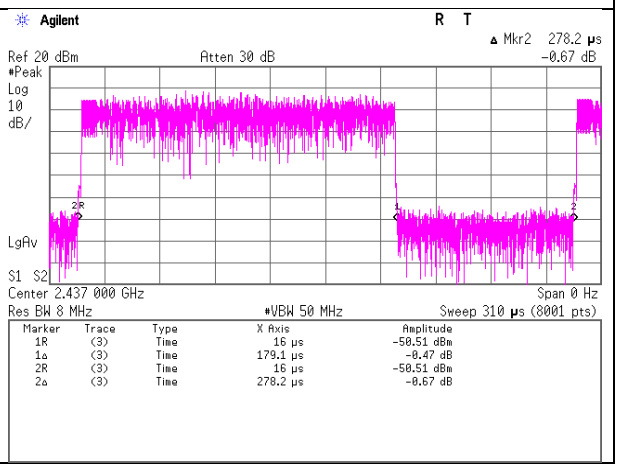
## 11b 1 Mbps

| | |
|---|---|
| Tx on / (Tx on + Tx off) = | 0.989 |
| Tx on / (Tx on + Tx off) * 100 = | 98.9 % |
| Duty factor = 20 * log (8.486 / 8.389) = | 0.10 dB |
| | ( > 98 %) |



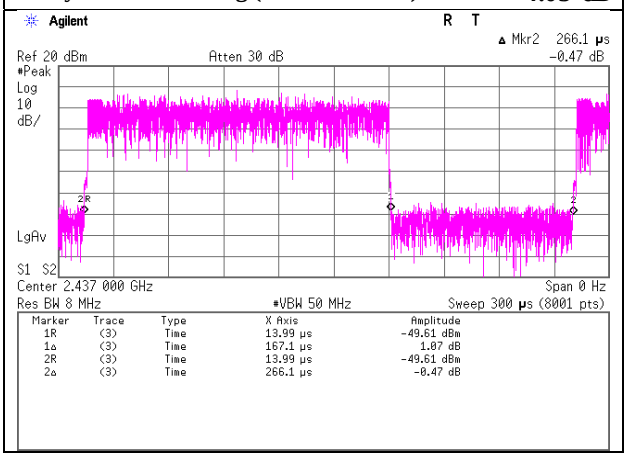

## 11g 54 Mbps

| | |
|---|---|
| Tx on / (Tx on + Tx off) = | 0.644 |
| Tx on / (Tx on + Tx off) * 100 = | 64.4 % |
| Duty factor = 20 * log (0.2782 / 0.1791) = | 3.83 dB |




## 11n-20 MCS 7

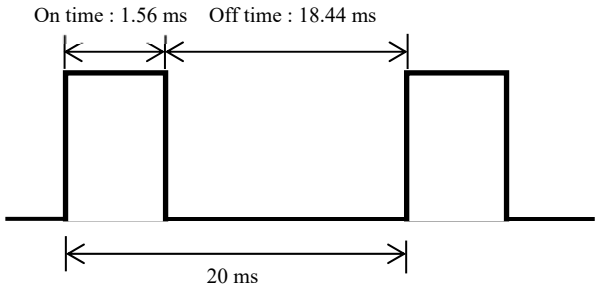
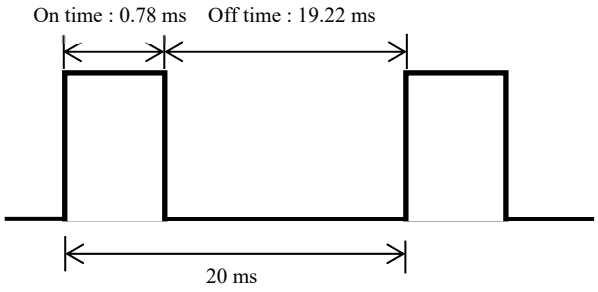
| | |
|---|---|
| Tx on / (Tx on + Tx off) = | 0.628 |
| Tx on / (Tx on + Tx off) * 100 = | 62.8 % |
| Duty factor = 20 * log (0.2661 / 0.1671) = | 4.05 dB |



# Duty cycle correction factor

The information provided from the applicant.

**(Reference chart)**

| 1 M-PHY | 2 M-PHY |
|---|---|
|   |   |

**(for Duty cycle correction factor for Radiated Spurious Emission)**
**Worst 100 ms case**

| 1 M-PHY | 2 M-PHY |
|---|---|
| DCCF = 20 log(1.56 x 5 / 100) = -22.15 dB | DCCF = 20 log(0.78 x 5 / 100) = -28.17 dB |

*Since the burst rate is not different between the channels, the data has been obtained on the representative channel.
*Worst TX Duty cycle BLE is Advertising mode.
The actual measurement value was applied as Duty Cycle Correction factor.

# Radiated Spurious Emission

| | | | |
|---|---|---|---|
| Report No. | 13462774S-B-R1 | | |
| Test place | Shonan EMC Lab. | | |
| Semi Anechoic Chamber | 2 | 2 | 3 |
| Date | August 31, 2020 | August 31, 2020 | August 24, 2020 |
| Temperature / Humidity | 26 deg.C / 62 %RH | 25 deg.C / 66 %RH | 25 deg. C / 60 % RH |
| Engineer | Yosuke Murakami<br>( 1 GHz - 2.8 GHz ) | Kazuya Noda<br>( 2.8 GHz - 10 GHz ) | Yohsuke Matsuzawa<br>( 10 GHz - 26.5 GHz ) |
| Mode | Tx 11b 2412 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. | 2385.607 | PK | 46.56 | 28.57 | 14.03 | 38.68 | 2.10 | 52.58 | 73.9 | 21.3 | 220 | 43 | - |
| Hori. | 2390.000 | PK | 44.82 | 28.56 | 14.03 | 38.68 | 2.10 | 50.83 | 73.9 | 23.0 | 220 | 43 | - |
| Hori. | 4824.000 | PK | 46.15 | 31.60 | 6.44 | 38.54 | 2.10 | 47.75 | 73.9 | 26.1 | 146 | 140 | - |
| Hori. | 7236.000 | PK | 45.55 | 37.65 | 7.93 | 39.17 | 2.10 | 54.06 | 73.9 | 19.8 | 150 | 0 | - |
| Hori. | 2385.607 | AV | 37.75 | 28.57 | 14.03 | 38.68 | 2.10 | 43.77 | 53.9 | 10.1 | 220 | 43 | - |
| Hori. | 2390.000 | AV | 35.81 | 28.56 | 14.03 | 38.68 | 2.10 | 41.82 | 53.9 | 12.0 | 220 | 43 | - |
| Hori. | 4824.000 | AV | 36.88 | 31.60 | 6.44 | 38.54 | 2.10 | 38.48 | 53.9 | 15.4 | 146 | 140 | - |
| Hori. | 7236.000 | AV | 36.50 | 37.65 | 7.93 | 39.17 | 2.10 | 45.01 | 53.9 | **8.8** | 150 | 0 | Floor noise |
| Vert. | 2385.333 | PK | 45.51 | 28.57 | 14.03 | 38.68 | 2.10 | 51.53 | 73.9 | 22.3 | 317 | 99 | - |
| Vert. | 2390.000 | PK | 45.09 | 28.56 | 14.03 | 38.68 | 2.10 | 51.10 | 73.9 | 22.8 | 317 | 99 | - |
| Vert. | 4824.000 | PK | 47.67 | 31.60 | 6.44 | 38.54 | 2.10 | 49.27 | 73.9 | 24.6 | 172 | 350 | - |
| Vert. | 7236.000 | PK | 44.71 | 37.65 | 7.93 | 39.17 | 2.10 | 53.22 | 73.9 | 20.6 | 150 | 0 | - |
| Vert. | 2385.333 | AV | 37.31 | 28.57 | 14.03 | 38.68 | 2.10 | 43.33 | 53.9 | 10.5 | 317 | 99 | - |
| Vert. | 2390.000 | AV | 36.08 | 28.56 | 14.03 | 38.68 | 2.10 | 42.09 | 53.9 | 11.8 | 317 | 99 | - |
| Vert. | 4824.000 | AV | 38.15 | 31.60 | 6.44 | 38.54 | 2.10 | 39.75 | 53.9 | 14.1 | 172 | 350 | - |
| Vert. | 7236.000 | AV | 36.36 | 37.65 | 7.93 | 39.17 | 2.10 | 44.87 | 53.9 | 9.0 | 150 | 0 | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**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. | 2412.000 | PK | 92.05 | 28.52 | 14.04 | 38.66 | 2.10 | 98.05 | - | - | Carrier |
| Hori. | 2398.200 | PK | 45.42 | 28.54 | 14.03 | 38.67 | 2.10 | 51.42 | 78.0 | 26.5 | - |
| Hori. | 2400.000 | PK | 37.98 | 28.54 | 14.04 | 38.67 | 2.10 | 43.99 | 78.0 | 34.0 | - |
| Vert. | 2412.000 | PK | 91.47 | 28.52 | 14.04 | 38.66 | 2.10 | 97.47 | - | - | Carrier |
| Vert. | 2398.267 | PK | 46.08 | 28.54 | 14.03 | 38.67 | 2.10 | 52.08 | 77.4 | 25.3 | - |
| Vert. | 2400.000 | PK | 37.77 | 28.54 | 14.04 | 38.67 | 2.10 | 43.78 | 77.4 | 33.6 | - |

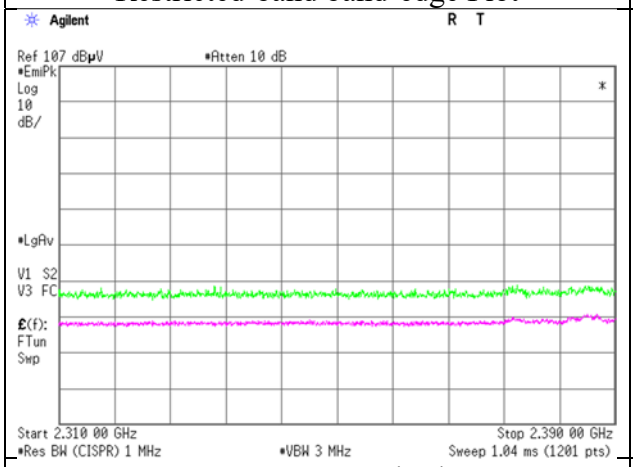
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | August 31, 2020 |
| Temperature / Humidity | 26 deg.C / 62 %RH |
| Engineer | Yosuke Murakami |
| Mode | Tx 11b 2412 MHz |

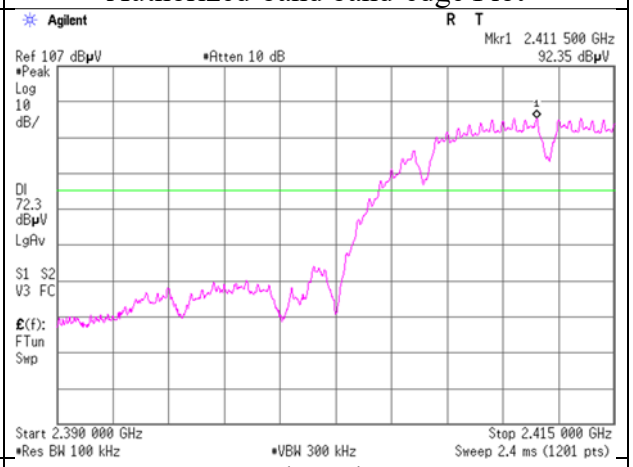
### Horizontal

Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

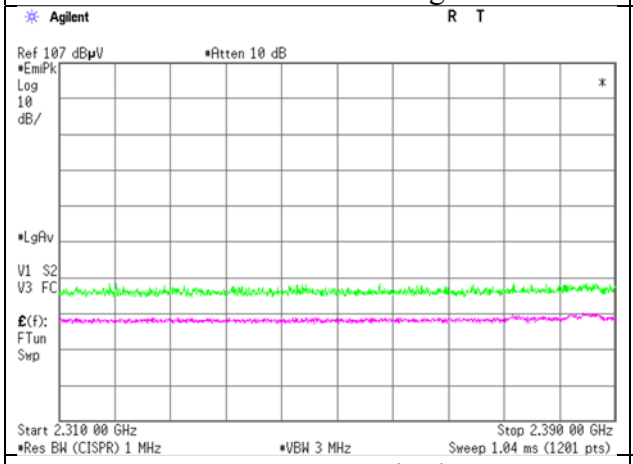
Authorized-band band-edge Plot




20dBc Plot

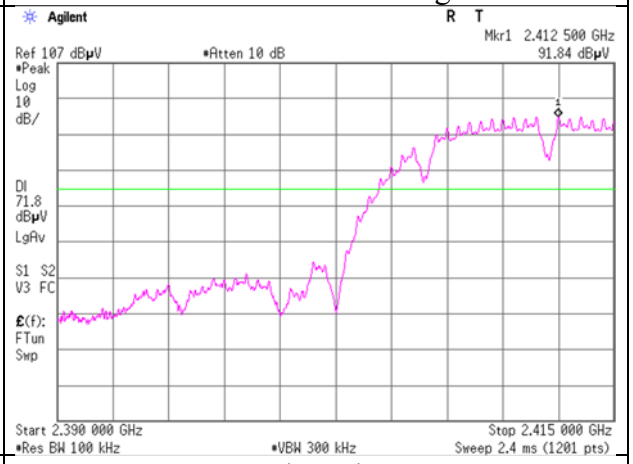
### Vertical

Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

Authorized-band band-edge Plot




20dBc Plot

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

# Radiated Spurious Emission

| | | | |
|---|---|---|---|
| Report No. | 13462774S-B-R1 | | |
| Test place | Shonan EMC Lab. | | |
| Semi Anechoic Chamber | 2 | 2 | 3 |
| Date | August 31, 2020 | August 31, 2020 | August 24, 2020 |
| Temperature / Humidity | 26 deg.C / 62 %RH | 25 deg.C / 66 %RH | 25 deg. C / 60 % RH |
| Engineer | Yosuke Murakami<br>( 1 GHz - 2.8 GHz ) | Kazuya Noda<br>( 2.8 GHz - 10 GHz ) | Yohsuke Matsuzawa<br>( 10 GHz - 26.5 GHz ) |
| Mode | Tx 11b 2437 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. | 4874.000 | PK | 45.91 | 31.58 | 6.47 | 38.54 | 2.10 | 47.52 | 73.9 | 26.3 | 201 | 153 | - |
| Hori. | 7311.000 | PK | 44.99 | 37.71 | 7.96 | 39.27 | 2.10 | 53.49 | 73.9 | 20.4 | 150 | 0 | - |
| Hori. | 4874.000 | AV | 37.92 | 31.58 | 6.47 | 38.54 | 2.10 | 39.53 | 53.9 | 14.3 | 201 | 153 | - |
| Hori. | 7311.000 | AV | 35.08 | 37.71 | 7.96 | 39.27 | 2.10 | 43.58 | 53.9 | 10.3 | 150 | 0 | Floor noise |
| Vert. | 4874.000 | PK | 47.06 | 31.58 | 6.47 | 38.54 | 2.10 | 48.67 | 73.9 | 25.2 | 195 | 3 | - |
| Vert. | 7311.000 | PK | 45.15 | 37.71 | 7.96 | 39.27 | 2.10 | 53.65 | 73.9 | 20.2 | 150 | 0 | - |
| Vert. | 4874.000 | AV | 38.08 | 31.58 | 6.47 | 38.54 | 2.10 | 39.69 | 53.9 | 14.2 | 195 | 3 | - |
| Vert. | 7311.000 | AV | 35.75 | 37.71 | 7.96 | 39.27 | 2.10 | 44.25 | 53.9 | **9.6** | 150 | 0 | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

# Radiated Spurious Emission

| | | | |
|---|---|---|---|
| Report No. | 13462774S-B-R1 | | |
| Test place | Shonan EMC Lab. | | |
| Semi Anechoic Chamber | 2 | 2 | 3 |
| Date | August 31, 2020 | August 31, 2020 | August 24, 2020 |
| Temperature / Humidity | 26 deg.C / 62 %RH | 25 deg.C / 66 %RH | 25 deg. C / 60 % RH |
| Engineer | Yosuke Murakami<br>( 1 GHz - 2.8 GHz ) | Kazuya Noda<br>( 2.8 GHz - 10 GHz ) | Yohsuke Matsuzawa<br>( 10 GHz - 26.5 GHz ) |
| Mode | Tx 11b 2462 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 | 45.09 | 28.40 | 14.12 | 38.62 | 2.10 | 51.09 | 73.9 | 22.8 | 154 | 35 | - |
| Hori. | 4924.000 | PK | 46.95 | 31.63 | 6.50 | 38.54 | 2.10 | 48.64 | 73.9 | 25.2 | 113 | 158 | - |
| Hori. | 7386.000 | PK | 44.42 | 37.79 | 8.02 | 39.36 | 2.10 | 52.97 | 73.9 | 20.9 | 150 | 0 | - |
| Hori. | 2483.500 | AV | 36.02 | 28.40 | 14.12 | 38.62 | 2.10 | 42.02 | 53.9 | 11.8 | 154 | 35 | - |
| Hori. | 4924.000 | AV | 38.38 | 31.63 | 6.50 | 38.54 | 2.10 | 40.07 | 53.9 | 13.8 | 113 | 158 | - |
| Hori. | 7386.000 | AV | 35.25 | 37.79 | 8.02 | 39.36 | 2.10 | 43.80 | 53.9 | 10.1 | 150 | 0 | Floor noise |
| Vert. | 2483.500 | PK | 44.24 | 28.40 | 14.12 | 38.62 | 2.10 | 50.24 | 73.9 | 23.6 | 218 | 180 | - |
| Vert. | 4924.000 | PK | 47.31 | 31.63 | 6.50 | 38.54 | 2.10 | 49.00 | 73.9 | 24.9 | 183 | 8 | - |
| Vert. | 7386.000 | PK | 44.87 | 37.79 | 8.02 | 39.36 | 2.10 | 53.42 | 73.9 | 20.4 | 150 | 0 | - |
| Vert. | 2483.500 | AV | 36.18 | 28.40 | 14.12 | 38.62 | 2.10 | 42.18 | 53.9 | 11.7 | 218 | 180 | - |
| Vert. | 4924.000 | AV | 38.78 | 31.63 | 6.50 | 38.54 | 2.10 | 40.47 | 53.9 | 13.4 | 183 | 8 | - |
| Vert. | 7386.000 | AV | 35.31 | 37.79 | 8.02 | 39.36 | 2.10 | 43.86 | 53.9 | **10.0** | 150 | 0 | Floor noise |

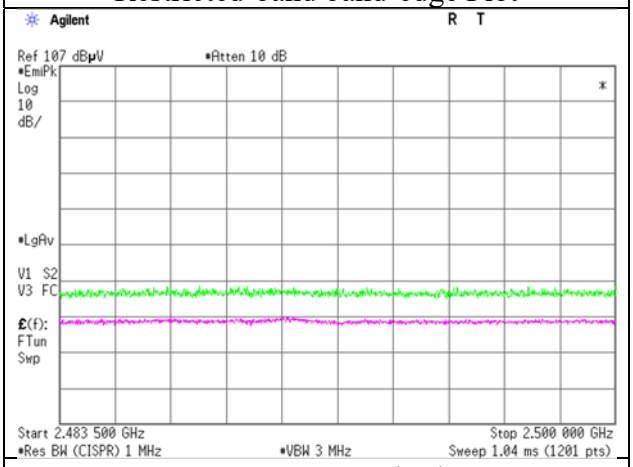
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | August 31, 2020 |
| Temperature / Humidity | 26 deg.C / 62 %RH |
| Engineer | Yosuke Murakami |
| Mode | Tx 11b 2462 MHz |

Horizontal

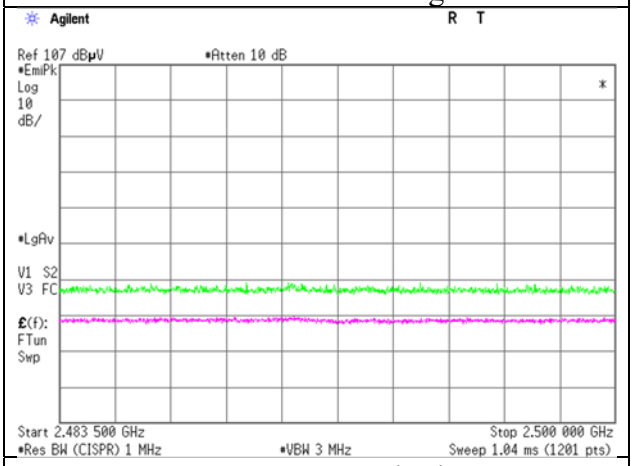
Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

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

# Radiated Spurious Emission

| | | | |
|---|---|---|---|
| Report No. | 13462774S-B-R1 | | |
| Test place | Shonan EMC Lab. | | |
| Semi Anechoic Chamber | 2 | 2 | 3 |
| Date | August 31, 2020 | August 31, 2020 | August 24, 2020 |
| Temperature / Humidity | 26 deg.C / 62 %RH | 25 deg.C / 66 %RH | 25 deg. C / 60 % RH |
| Engineer | Yosuke Murakami | Kazuya Noda | Yohsuke Matsuzawa |
| | ( 1 GHz - 2.8 GHz ) | ( 2.8 GHz - 10 GHz ) | ( 10 GHz - 26.5 GHz ) |
| Mode | Tx 11g 2412 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 | 57.40 | 28.56 | 14.03 | 38.68 | 2.10 | 63.41 | 73.9 | 10.4 | 149 | 16 | - |
| Hori. | 4824.000 | PK | 45.68 | 31.60 | 6.44 | 38.54 | 2.10 | 47.28 | 73.9 | 26.6 | 146 | 143 | - |
| Hori. | 7236.000 | PK | 45.95 | 37.65 | 7.93 | 39.17 | 2.10 | 54.46 | 73.9 | 19.4 | 150 | 0 | - |
| Hori. | 7236.000 | AV | 36.38 | 37.65 | 7.93 | 39.17 | 2.10 | 44.89 | 53.9 | 9.0 | 150 | 0 | Floor noise |
| Vert. | 2390.000 | PK | 56.80 | 28.56 | 14.03 | 38.68 | 2.10 | 62.81 | 73.9 | 11.0 | 154 | 180 | - |
| Vert. | 4824.000 | PK | 46.90 | 31.60 | 6.44 | 38.54 | 2.10 | 48.50 | 73.9 | 25.4 | 177 | 351 | - |
| Vert. | 7236.000 | PK | 45.66 | 37.65 | 7.93 | 39.17 | 2.10 | 54.17 | 73.9 | 19.7 | 150 | 0 | - |
| Vert. | 7236.000 | AV | 36.30 | 37.65 | 7.93 | 39.17 | 2.10 | 44.81 | 53.9 | 9.0 | 150 | 0 | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2390.000 | AV | 39.94 | 28.56 | 14.03 | 38.68 | 3.83 | 2.10 | 49.78 | 53.9 | **4.1** | *1) |
| Hori. | 4824.000 | AV | 36.98 | 31.60 | 6.44 | 38.54 | 3.83 | 2.10 | 42.41 | 53.9 | 11.4 | - |
| Vert. | 2390.000 | AV | 38.87 | 28.56 | 14.03 | 38.68 | 3.83 | 2.10 | 48.71 | 53.9 | 5.1 | *1) |
| Vert. | 4824.000 | AV | 38.18 | 31.60 | 6.44 | 38.54 | 3.83 | 2.10 | 43.61 | 53.9 | 10.2 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

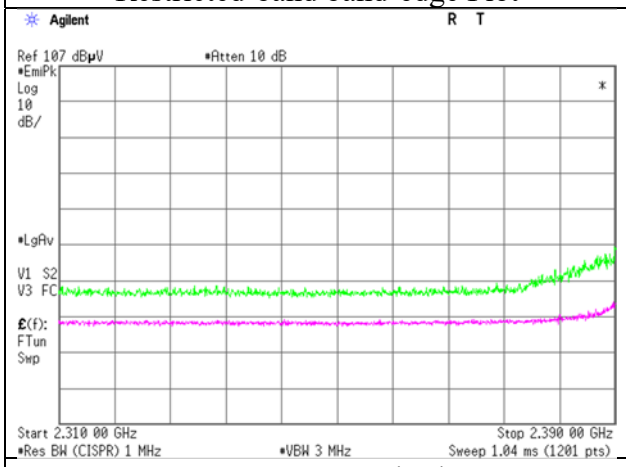
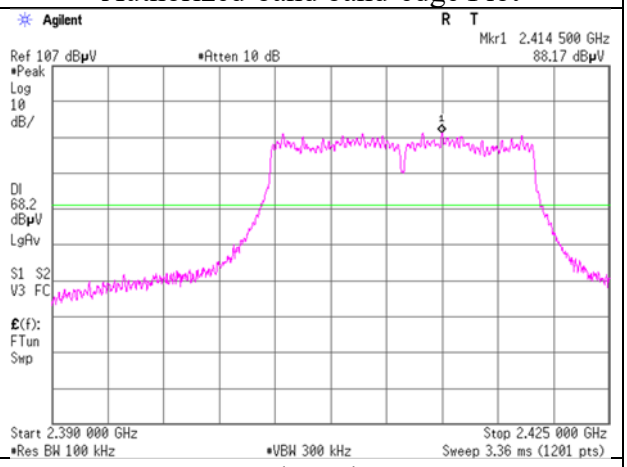
**20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)**

| 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. | 2412.000 | PK | 87.95 | 28.52 | 14.04 | 38.66 | 2.10 | 93.95 | - | - | Carrier |
| Hori. | 2400.000 | PK | 50.20 | 28.54 | 14.04 | 38.67 | 2.10 | 56.21 | 73.9 | 17.6 | - |
| Vert. | 2412.000 | PK | 87.77 | 28.52 | 14.04 | 38.66 | 2.10 | 93.77 | - | - | Carrier |
| Vert. | 2400.000 | PK | 50.29 | 28.54 | 14.04 | 38.67 | 2.10 | 56.30 | 73.7 | 17.4 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

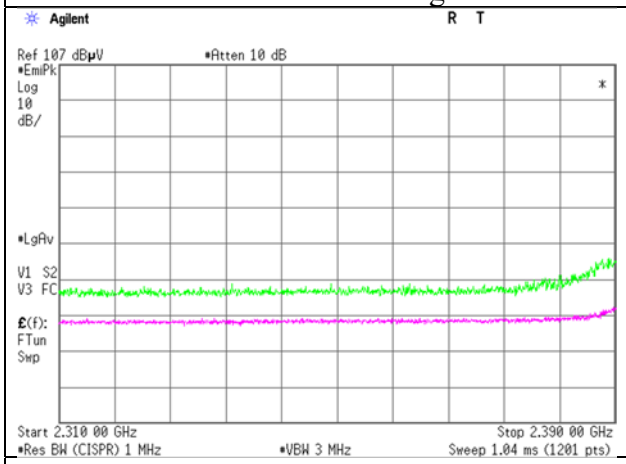
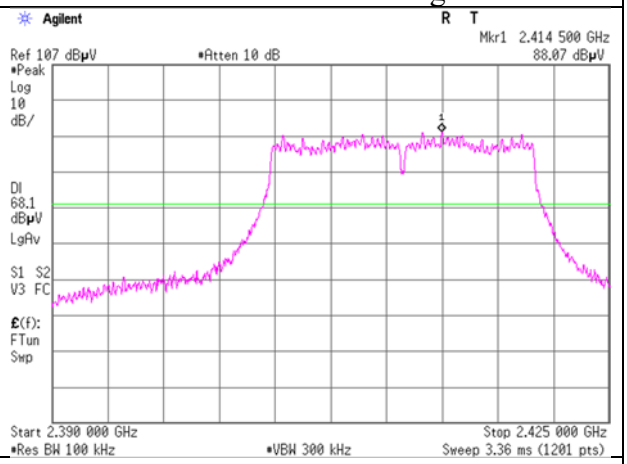
# Radiated Spurious Emission
## (Reference Plot for band-edge)

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | August 31, 2020 |
| Temperature / Humidity | 26 deg.C / 62 %RH |
| Engineer | Yosuke Murakami |
| Mode | Tx 11g 2412 MHz |

| Horizontal | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|  |  |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |





| Vertical | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|  |  |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |





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

# Radiated Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | August 31, 2020 |
| Temperature / Humidity | 26 deg.C / 62 %RH |
| Engineer | Yosuke Murakami |
| | ( 1 GHz - 2.8 GHz ) |
| Mode | Tx 11g 2417 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 | 58.13 | 28.56 | 14.03 | 38.68 | 2.10 | 64.14 | 73.9 | 9.7 | 153 | 14 | - |
| Vert. | 2390.000 | PK | 56.81 | 28.56 | 14.03 | 38.68 | 2.10 | 62.82 | 73.9 | 11.0 | 152 | 181 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2390.000 | AV | 40.37 | 28.56 | 14.03 | 38.68 | 3.83 | 2.10 | 50.21 | 53.9 | **3.6** | *1) |
| Vert. | 2390.000 | AV | 40.06 | 28.56 | 14.03 | 38.68 | 3.83 | 2.10 | 49.90 | 53.9 | 3.9 | *1) |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

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

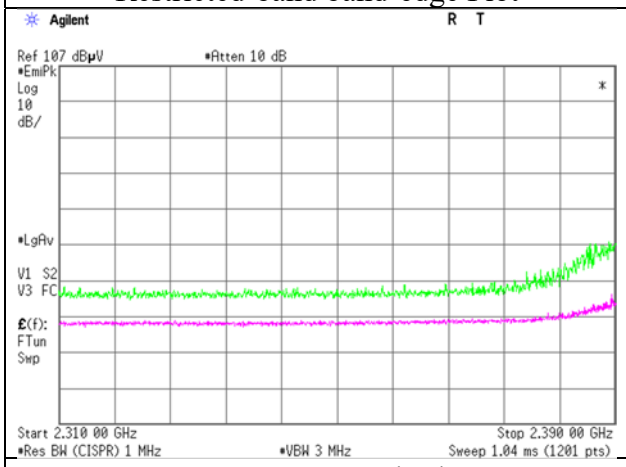
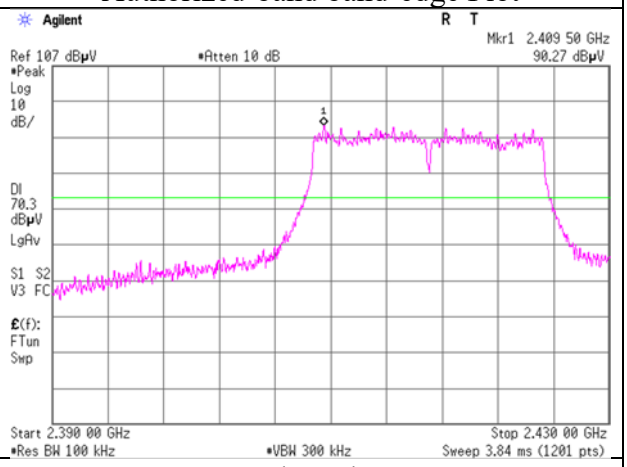
| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2417.000 | PK | 89.95 | 28.51 | 14.06 | 38.66 | 2.10 | 95.96 | - | - | Carrier |
| Hori. | 2400.000 | PK | 49.82 | 28.54 | 14.04 | 38.67 | 2.10 | 55.83 | 75.9 | 20.0 | - |
| Vert. | 2417.000 | PK | 89.38 | 28.51 | 14.06 | 38.66 | 2.10 | 95.39 | - | - | Carrier |
| Vert. | 2400.000 | PK | 48.55 | 28.54 | 14.04 | 38.67 | 2.10 | 54.56 | 75.3 | 20.7 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

-

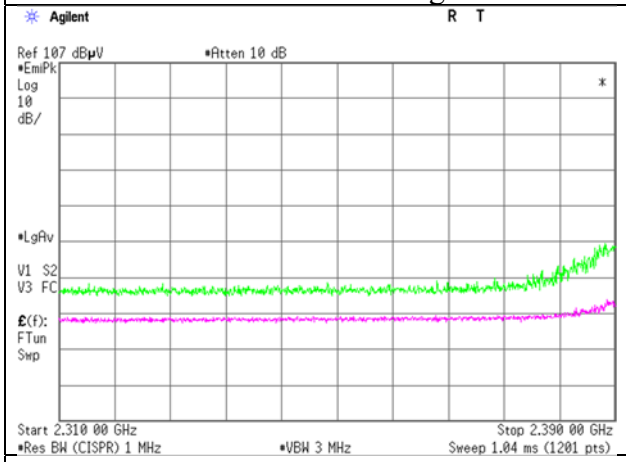
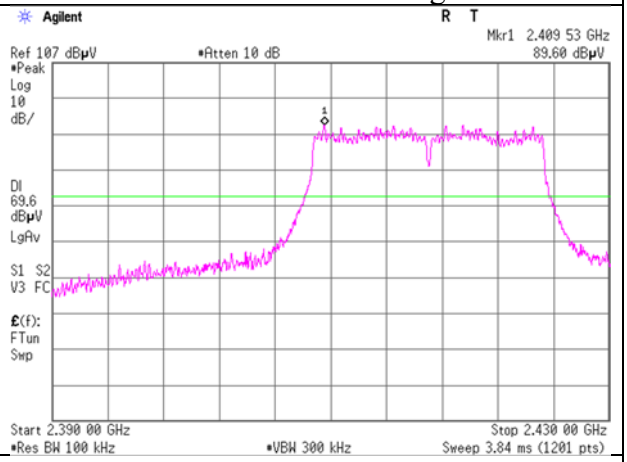
# Radiated Spurious Emission
## (Reference Plot for band-edge)

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | August 31, 2020 |
| Temperature / Humidity | 26 deg.C / 62 %RH |
| Engineer | Yosuke Murakami |
| Mode | Tx 11g 2417 MHz |

| Horizontal | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|  |  |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |





| Vertical | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|  |  |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |





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

# Radiated Spurious Emission

| | | | |
|---|---|---|---|
| Report No. | 13462774S-B-R1 | | |
| Test place | Shonan EMC Lab. | | |
| Semi Anechoic Chamber | 2 | 2 | 3 |
| Date | August 31, 2020 | August 31, 2020 | August 24, 2020 |
| Temperature / Humidity | 26 deg.C / 62 %RH | 25 deg.C / 66 %RH | 25 deg. C / 60 % RH |
| Engineer | Yosuke Murakami<br>( 1 GHz - 2.8 GHz ) | Kazuya Noda<br>( 2.8 GHz - 10 GHz ) | Yohsuke Matsuzawa<br>( 10 GHz - 26.5 GHz ) |
| Mode | Tx 11g 2437 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. | 4874.000 | PK | 45.05 | 31.58 | 6.47 | 38.54 | 2.10 | 46.66 | 73.9 | 27.2 | 232 | 143 | - |
| Hori. | 7311.000 | PK | 44.41 | 37.71 | 7.96 | 39.27 | 2.10 | 52.91 | 73.9 | 20.9 | 150 | 0 | - |
| Hori. | 7311.000 | AV | 35.62 | 37.71 | 7.96 | 39.27 | 2.10 | 44.12 | 53.9 | **9.7** | 150 | 0 | Floor noise |
| Vert. | 4874.000 | PK | 47.34 | 31.58 | 6.47 | 38.54 | 2.10 | 48.95 | 73.9 | 24.9 | 189 | 6 | - |
| Vert. | 7311.000 | PK | 45.46 | 37.71 | 7.96 | 39.27 | 2.10 | 53.96 | 73.9 | 19.9 | 150 | 0 | - |
| Vert. | 7311.000 | AV | 35.60 | 37.71 | 7.96 | 39.27 | 2.10 | 44.10 | 53.9 | 9.8 | 150 | 0 | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 4874.000 | AV | 37.08 | 31.58 | 6.47 | 38.54 | 3.83 | 2.10 | 42.52 | 53.9 | 11.3 | - |
| Vert. | 4874.000 | AV | 38.09 | 31.58 | 6.47 | 38.54 | 3.83 | 2.10 | 43.53 | 53.9 | 10.3 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.

-

# Radiated Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | August 31, 2020 |
| Temperature / Humidity | 25 deg.C / 66 %RH |
| Engineer | Kazuya Noda |
| | ( 1 GHz - 2.8 GHz ) |
| Mode | Tx 11g 2457 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 | 54.53 | 28.40 | 14.12 | 38.62 | 2.10 | 60.53 | 73.9 | 13.3 | 157 | 37 | - |
| Vert. | 2483.500 | PK | 52.02 | 28.40 | 14.12 | 38.62 | 2.10 | 58.02 | 73.9 | 15.8 | 153 | 257 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2483.500 | AV | 38.11 | 28.40 | 14.12 | 38.62 | 3.83 | 2.10 | 47.94 | 53.9 | **5.9** | *1) |
| Vert. | 2483.500 | AV | 37.59 | 28.40 | 14.12 | 38.62 | 3.83 | 2.10 | 47.42 | 53.9 | 6.4 | *1) |

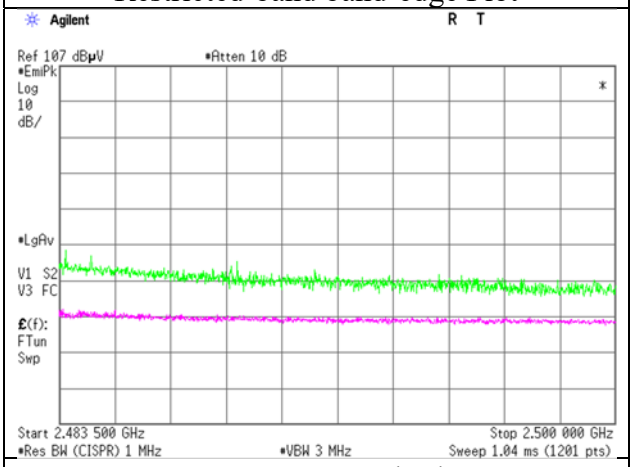
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | August 31, 2020 |
| Temperature / Humidity | 25 deg.C / 66 %RH |
| Engineer | Kazuya Noda |
| Mode | Tx 11g 2457 MHz |

Horizontal

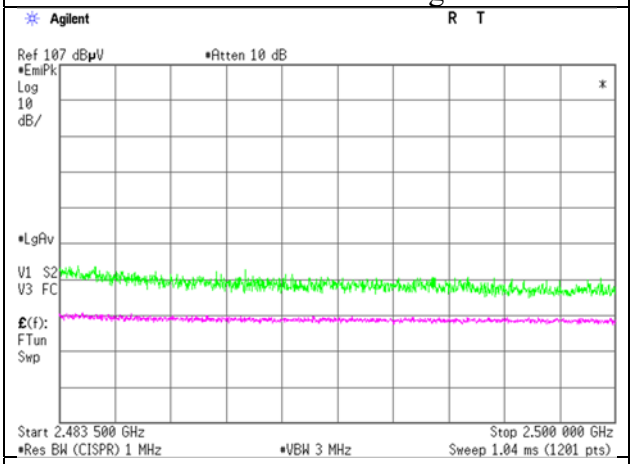
Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

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

# Radiated Spurious Emission

| | | |
|---|---|---|
| Report No. | 13462774S-B-R1 | |
| Test place | Shonan EMC Lab. | |
| Semi Anechoic Chamber | 2 | 3 |
| Date | August 31, 2020 | August 24, 2020 |
| Temperature / Humidity | 25 deg.C / 66 %RH | 25 deg. C / 60 % RH |
| Engineer | Kazuya Noda<br>( 1 GHz - 10 GHz ) | Yohsuke Matsuzawa<br>( 10 GHz - 26.5 GHz ) |
| Mode | Tx 11g 2462 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 | 57.28 | 28.40 | 14.12 | 38.62 | 2.10 | 63.28 | 73.9 | 10.6 | 151 | 34 | - |
| Hori. | 4924.000 | PK | 45.15 | 31.63 | 6.50 | 38.54 | 2.10 | 46.84 | 73.9 | 27.0 | 233 | 150 | - |
| Hori. | 7386.000 | PK | 43.67 | 37.79 | 8.02 | 39.36 | 2.10 | 52.22 | 73.9 | 21.6 | 150 | 0 | - |
| Hori. | 7386.000 | AV | 35.29 | 37.79 | 8.02 | 39.36 | 2.10 | 43.84 | 53.9 | 10.0 | 150 | 0 | Floor noise |
| Vert. | 2483.500 | PK | 53.52 | 28.40 | 14.12 | 38.62 | 2.10 | 59.52 | 73.9 | 14.3 | 152 | 260 | - |
| Vert. | 4924.000 | PK | 48.04 | 31.63 | 6.50 | 38.54 | 2.10 | 49.73 | 73.9 | 24.1 | 185 | 8 | - |
| Vert. | 7386.000 | PK | 44.57 | 37.79 | 8.02 | 39.36 | 2.10 | 53.12 | 73.9 | 20.7 | 150 | 0 | - |
| Vert. | 7386.000 | AV | 35.00 | 37.79 | 8.02 | 39.36 | 2.10 | 43.55 | 53.9 | 10.3 | 150 | 0 | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2483.500 | AV | 37.15 | 28.40 | 14.12 | 38.62 | 3.83 | 2.10 | 46.98 | 53.9 | **6.9** | *1) |
| Hori. | 4924.000 | AV | 37.10 | 31.63 | 6.50 | 38.54 | 3.83 | 2.10 | 42.62 | 53.9 | 11.2 | - |
| Vert. | 2483.500 | AV | 36.71 | 28.40 | 14.12 | 38.62 | 3.83 | 2.10 | 46.54 | 53.9 | 7.3 | *1) |
| Vert. | 4924.000 | AV | 38.75 | 31.63 | 6.50 | 38.54 | 3.83 | 2.10 | 44.27 | 53.9 | 9.6 | - |

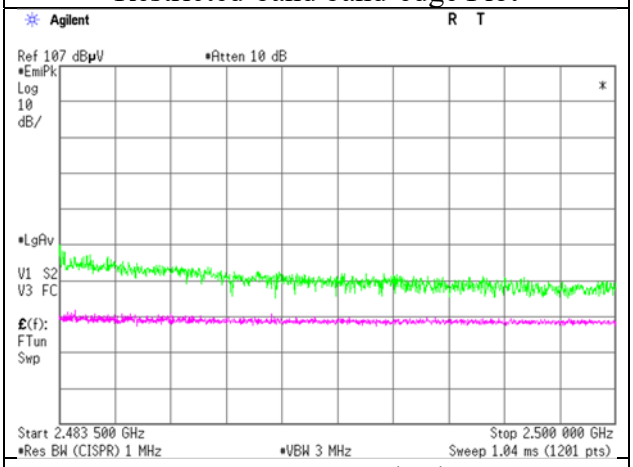
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | August 31, 2020 |
| Temperature / Humidity | 25 deg.C / 66 %RH |
| Engineer | Kazuya Noda |
| Mode | Tx 11g 2462 MHz |

Horizontal

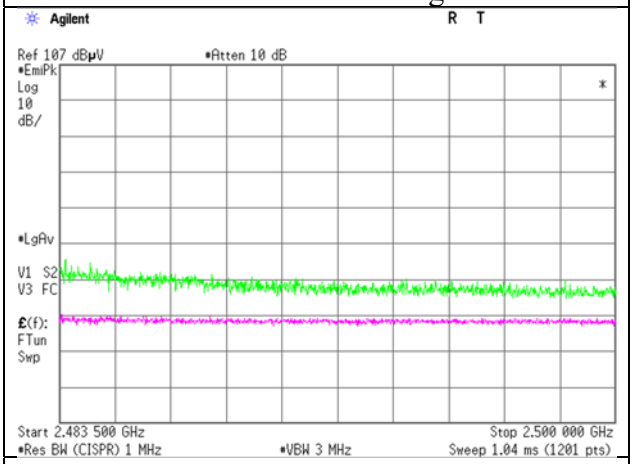
Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

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

# Radiated Spurious Emission

| | | |
|---|---|---|
| Report No. | 13462774S-B-R1 | |
| Test place | Shonan EMC Lab. | |
| Semi Anechoic Chamber | 2 | 3 |
| Date | August 31, 2020 | August 24, 2020 |
| Temperature / Humidity | 25 deg.C / 66 %RH | 25 deg. C / 60 % RH |
| Engineer | Kazuya Noda | Yohsuke Matsuzawa |
| | ( 1 GHz - 10 GHz ) | ( 10 GHz - 26.5 GHz ) |
| Mode | Tx 11n-20 2412 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 | 54.00 | 28.56 | 14.03 | 38.68 | 2.10 | 60.01 | 73.9 | 13.8 | 153 | 14 | - |
| Hori. | 4824.000 | PK | 46.82 | 31.60 | 6.44 | 38.54 | 2.10 | 48.42 | 73.9 | 25.4 | 187 | 139 | - |
| Hori. | 7236.000 | PK | 45.90 | 37.65 | 7.93 | 39.17 | 2.10 | 54.41 | 73.9 | 19.4 | 150 | 0 | - |
| Hori. | 7236.000 | AV | 36.12 | 37.65 | 7.93 | 39.17 | 2.10 | 44.63 | 53.9 | 9.2 | 150 | 0 | Floor noise |
| Vert. | 2390.000 | PK | 52.01 | 28.56 | 14.03 | 38.68 | 2.10 | 58.02 | 73.9 | 15.8 | 152 | 310 | - |
| Vert. | 4824.000 | PK | 47.02 | 31.60 | 6.44 | 38.54 | 2.10 | 48.62 | 73.9 | 25.2 | 167 | 350 | - |
| Vert. | 7236.000 | PK | 45.56 | 37.65 | 7.93 | 39.17 | 2.10 | 54.07 | 73.9 | 19.8 | 150 | 0 | - |
| Vert. | 7236.000 | AV | 36.29 | 37.65 | 7.93 | 39.17 | 2.10 | 44.80 | 53.9 | 9.1 | 150 | 0 | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2390.000 | AV | 39.36 | 28.56 | 14.03 | 38.68 | 4.05 | 2.10 | 49.42 | 53.9 | **4.4** | *1) |
| Hori. | 4824.000 | AV | 36.73 | 31.60 | 6.44 | 38.54 | 4.05 | 2.10 | 42.38 | 53.9 | 11.5 | - |
| Vert. | 2390.000 | AV | 38.76 | 28.56 | 14.03 | 38.68 | 4.05 | 2.10 | 48.82 | 53.9 | 5.0 | *1) |
| Vert. | 4824.000 | AV | 38.26 | 31.60 | 6.44 | 38.54 | 4.05 | 2.10 | 43.91 | 53.9 | 9.9 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

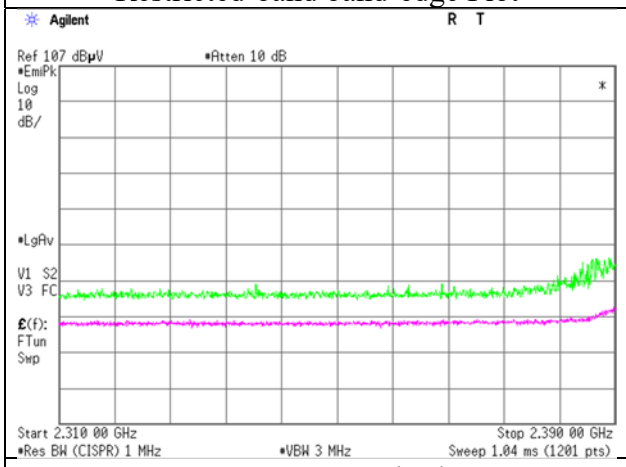
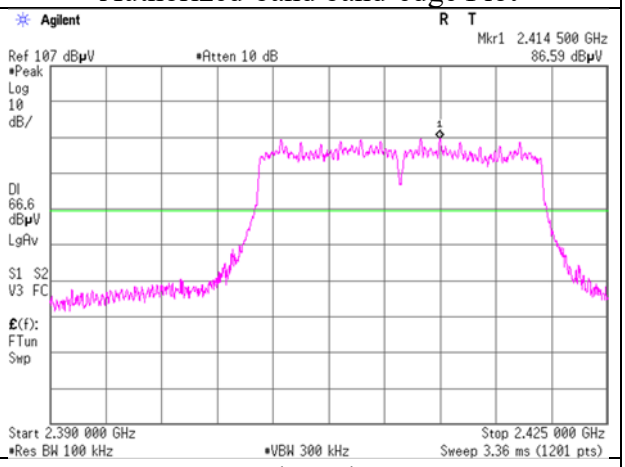
**20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)**

| 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. | 2412.000 | PK | 86.51 | 28.52 | 14.04 | 38.66 | 2.10 | 92.51 | - | - | Carrier |
| Hori. | 2400.000 | PK | 49.50 | 28.54 | 14.04 | 38.67 | 2.10 | 55.51 | 72.5 | 16.9 | - |
| Vert. | 2412.000 | PK | 84.96 | 28.52 | 14.04 | 38.66 | 2.10 | 90.96 | - | - | Carrier |
| Vert. | 2400.000 | PK | 48.61 | 28.54 | 14.04 | 38.67 | 2.10 | 54.62 | 70.9 | 16.2 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

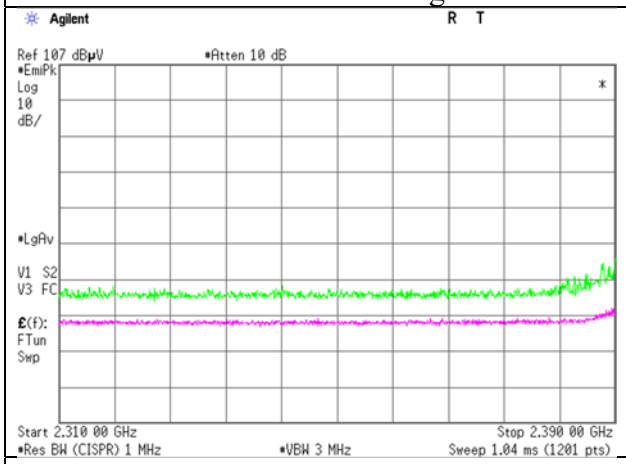
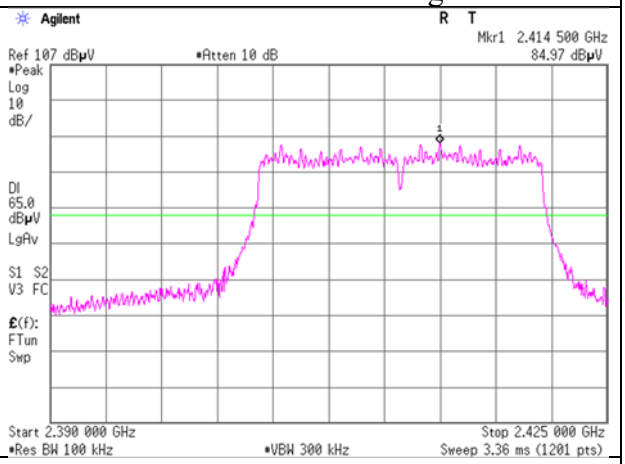
# Radiated Spurious Emission
## (Reference Plot for band-edge)

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | August 31, 2020 |
| Temperature / Humidity | 25 deg.C / 66 %RH |
| Engineer | Kazuya Noda |
| Mode | Tx 11n-20 2412 MHz |

| Horizontal | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|  |  |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |





| Vertical | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|  |  |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |





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

# Radiated Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | August 31, 2020 |
| Temperature / Humidity | 25 deg.C / 66 %RH |
| Engineer | Kazuya Noda |
| | ( 1 GHz - 2.8 GHz ) |
| Mode | Tx 11n-20 2417 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 | 58.19 | 28.56 | 14.03 | 38.68 | 2.10 | 64.20 | 73.9 | 9.7 | 235 | 28 | - |
| Vert. | 2390.000 | PK | 57.59 | 28.56 | 14.03 | 38.68 | 2.10 | 63.60 | 73.9 | 10.3 | 141 | 254 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2390.000 | AV | 39.42 | 28.56 | 14.03 | 38.68 | 4.05 | 2.10 | 49.48 | 53.9 | **4.4** | *1) |
| Vert. | 2390.000 | AV | 38.85 | 28.56 | 14.03 | 38.68 | 4.05 | 2.10 | 48.91 | 53.9 | 4.9 | *1) |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

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

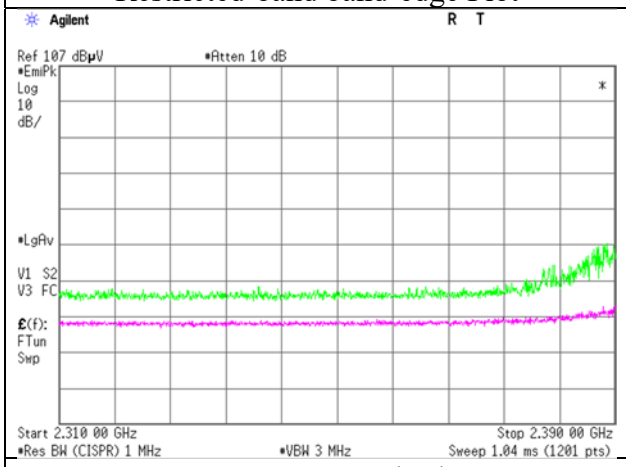
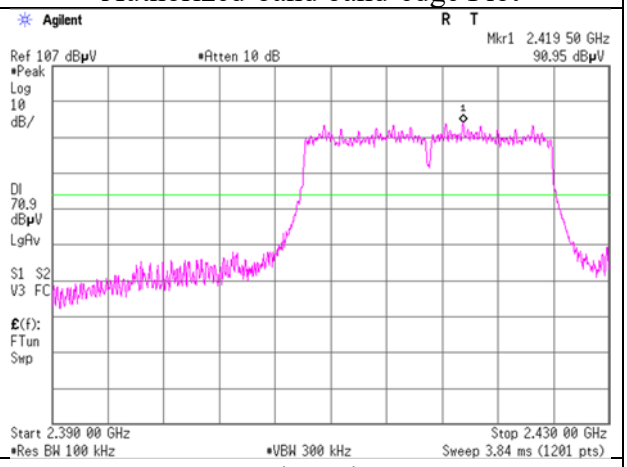
| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2417.000 | PK | 90.93 | 28.51 | 14.06 | 38.66 | 2.10 | 96.94 | - | - | Carrier |
| Hori. | 2400.000 | PK | 54.32 | 28.54 | 14.04 | 38.67 | 2.10 | 60.33 | 76.9 | 16.5 | - |
| Vert. | 2417.000 | PK | 88.53 | 28.51 | 14.06 | 38.66 | 2.10 | 94.54 | - | - | Carrier |
| Vert. | 2400.000 | PK | 48.39 | 28.54 | 14.04 | 38.67 | 2.10 | 54.40 | 74.5 | 20.1 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

-

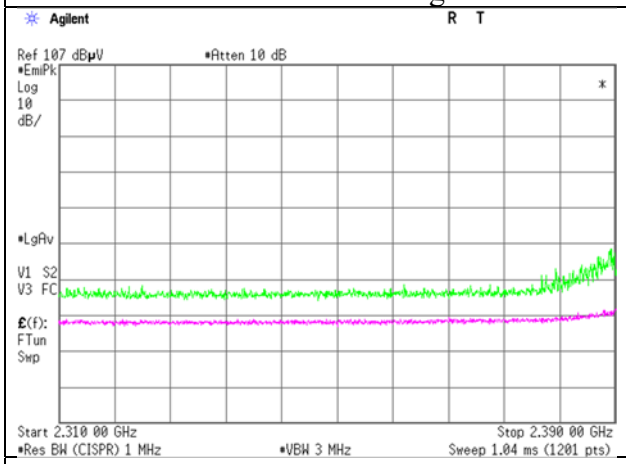
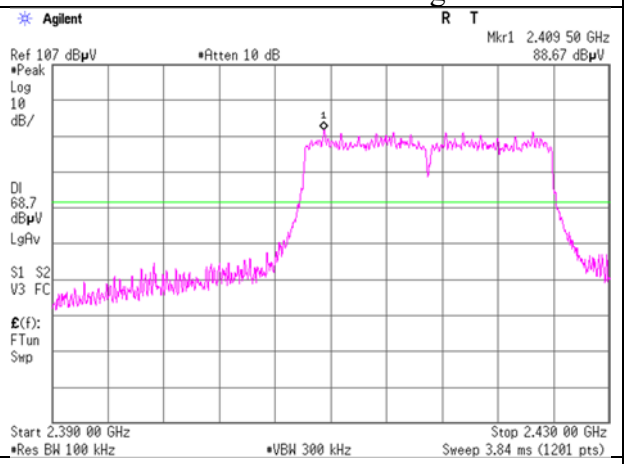
# Radiated Spurious Emission
## (Reference Plot for band-edge)

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | August 31, 2020 |
| Temperature / Humidity | 25 deg.C / 66 %RH |
| Engineer | Kazuya Noda |
| Mode | Tx 11n-20 2417 MHz |

| Horizontal | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|  |  |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |





| Vertical | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|  |  |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |





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

# Radiated Spurious Emission

| | | | | |
|---|---|---|---|---|
| Report No. | 13462774S-B-R1 | | | |
| Test place | Shonan EMC Lab. | | | |
| Semi Anechoic Chamber | 3 | 2 | 2 | 3 |
| Date | August 26, 2020 | August 31, 2020 | September 1, 2020 | August 24, 2020 |
| Temperature / Humidity | 23 deg. C / 60 % RH | 25 deg.C / 66 %RH | 26 deg.C / 65 %RH | 25 deg. C / 60 % RH |
| Engineer | Yohsuke Matsuzawa<br>( 30 MHz - 1 GHz ) | Kazuya Noda<br>( 1 GHz - 2.8 GHz ) | Yosuke Murakami<br>( 2.8 GHz - 10 GHz ) | Yohsuke Matsuzawa<br>( 10 GHz - 26.5 GHz ) |
| Mode | Tx 11n-20 2437 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. | 175.006 | QP | 39.30 | 15.73 | 7.81 | 32.06 | 0.00 | 30.78 | 43.5 | 12.7 | 185 | 223 | - |
| Hori. | 214.737 | QP | 44.60 | 11.23 | 8.06 | 32.03 | 0.00 | 31.86 | 43.5 | 11.6 | 158 | 353 | - |
| Hori. | 240.010 | QP | 48.40 | 11.57 | 8.20 | 32.00 | 0.00 | 36.17 | 46.0 | 9.8 | 131 | 331 | - |
| Hori. | 375.008 | QP | 44.00 | 15.11 | 8.89 | 31.93 | 0.00 | 36.07 | 46.0 | 9.9 | 100 | 42 | - |
| Hori. | 425.013 | QP | 41.30 | 16.06 | 9.12 | 31.94 | 0.00 | 34.54 | 46.0 | 11.4 | 100 | 287 | - |
| Hori. | 519.743 | QP | 41.00 | 17.68 | 9.49 | 31.95 | 0.00 | 36.22 | 46.0 | 9.7 | 100 | 344 | - |
| Hori. | 776.193 | QP | 37.60 | 20.43 | 10.42 | 31.70 | 0.00 | 36.75 | 46.0 | 9.2 | 100 | 8 | - |
| Hori. | 870.348 | QP | 38.40 | 21.99 | 10.73 | 31.21 | 0.00 | 39.91 | 46.0 | **6.0** | 100 | 234 | - |
| Hori. | 4874.000 | PK | 44.93 | 31.58 | 6.61 | 38.54 | 2.10 | 46.68 | 73.9 | 27.2 | 204 | 154 | - |
| Hori. | 7311.000 | PK | 44.39 | 37.71 | 8.19 | 39.27 | 2.10 | 53.12 | 73.9 | 20.7 | 150 | 0 | - |
| Hori. | 7311.000 | AV | 35.34 | 37.71 | 8.19 | 39.27 | 2.10 | 44.07 | 53.9 | 9.8 | 150 | 0 | Floor noise |
| Vert. | 56.533 | QP | 36.90 | 9.06 | 6.67 | 32.16 | 0.00 | 20.47 | 40.0 | 19.5 | 100 | 295 | - |
| Vert. | 782.672 | QP | 35.20 | 20.53 | 10.44 | 31.69 | 0.00 | 34.48 | 46.0 | 11.5 | 100 | 150 | - |
| Vert. | 4874.000 | PK | 47.38 | 31.58 | 6.61 | 38.54 | 2.10 | 49.13 | 73.9 | 24.7 | 190 | 12 | - |
| Vert. | 7311.000 | PK | 44.45 | 37.71 | 8.19 | 39.27 | 2.10 | 53.18 | 73.9 | 20.7 | 150 | 0 | - |
| Vert. | 7311.000 | AV | 35.39 | 37.71 | 8.19 | 39.27 | 2.10 | 44.12 | 53.9 | 9.7 | 150 | 0 | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 4874.000 | AV | 35.87 | 31.58 | 6.61 | 38.54 | 4.05 | 2.10 | 41.67 | 53.9 | 12.2 | - |
| Vert. | 4874.000 | AV | 38.11 | 31.58 | 6.61 | 38.54 | 4.05 | 2.10 | 43.91 | 53.9 | 9.9 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.

# Radiated Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | August 31, 2020 |
| Temperature / Humidity | 25 deg.C / 66 %RH |
| Engineer | Kazuya Noda |
| | ( 1 GHz - 2.8 GHz ) |
| Mode | Tx 11n-20 2457 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 | 50.41 | 28.40 | 14.12 | 38.62 | 2.10 | 56.41 | 73.9 | 17.4 | 154 | 7 | - |
| Vert. | 2483.500 | PK | 50.14 | 28.40 | 14.12 | 38.62 | 2.10 | 56.14 | 73.9 | 17.7 | 139 | 257 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2483.500 | AV | 36.24 | 28.40 | 14.12 | 38.62 | 4.05 | 2.10 | 46.29 | 53.9 | 7.6 | *1) |
| Vert. | 2483.500 | AV | 36.48 | 28.40 | 14.12 | 38.62 | 4.05 | 2.10 | 46.53 | 53.9 | **7.3** | *1) |

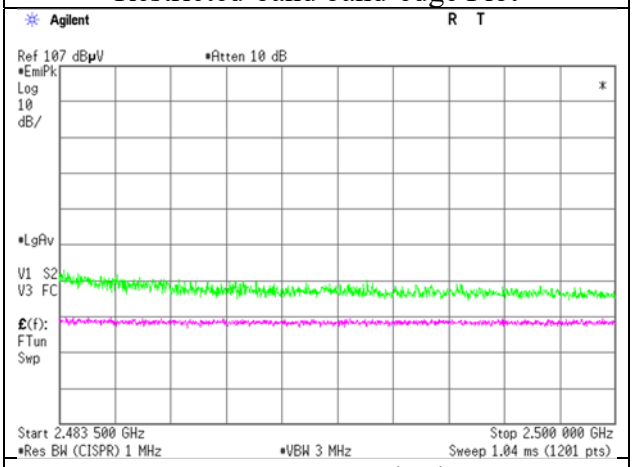
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | August 31, 2020 |
| Temperature / Humidity | 25 deg.C / 66 %RH |
| Engineer | Kazuya Noda |
| Mode | Tx 11n-20 2457 MHz |

Horizontal

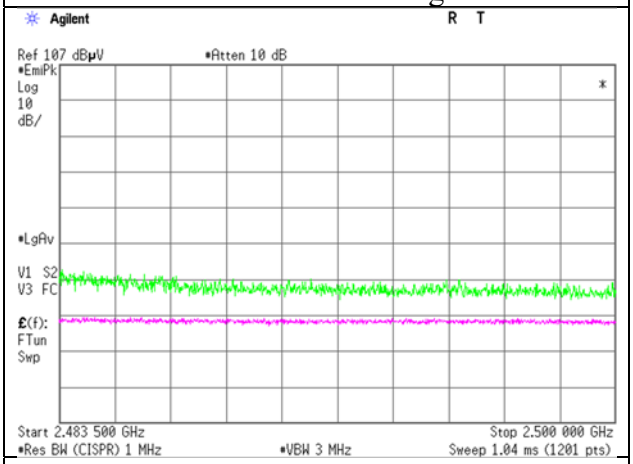
Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

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

# Radiated Spurious Emission

| | | | |
|---|---|---|---|
| Report No. | 13462774S-B-R1 | | |
| Test place | Shonan EMC Lab. | | |
| Semi Anechoic Chamber | 2 | 2 | 3 |
| Date | August 31, 2020 | September 1, 2020 | August 24, 2020 |
| Temperature / Humidity | 25 deg.C / 66 %RH | 26 deg.C / 65 %RH | 25 deg. C / 60 % RH |
| Engineer | Kazuya Noda<br>( 1 GHz - 2.8 GHz ) | Yosuke Murakami<br>( 2.8 GHz - 10 GHz ) | Yohsuke Matsuzawa<br>( 10 GHz - 26.5 GHz ) |
| Mode | Tx 11n-20 2462 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 | 53.98 | 28.40 | 14.12 | 38.62 | 2.10 | 59.98 | 73.9 | 13.9 | 153 | 34 | - |
| Hori. | 4924.000 | PK | 45.13 | 31.63 | 6.65 | 38.54 | 2.10 | 46.97 | 73.9 | 26.9 | 237 | 149 | - |
| Hori. | 7386.000 | PK | 43.21 | 37.79 | 8.26 | 39.36 | 2.10 | 52.00 | 73.9 | 21.9 | 150 | 0 | - |
| Hori. | 7386.000 | AV | 35.01 | 37.79 | 8.26 | 39.36 | 2.10 | 43.80 | 53.9 | 10.1 | 150 | 0 | Floor noise |
| Vert. | 2483.500 | PK | 52.03 | 28.40 | 14.12 | 38.62 | 2.10 | 58.03 | 73.9 | 15.8 | 132 | 258 | - |
| Vert. | 4924.000 | PK | 47.16 | 31.63 | 6.65 | 38.54 | 2.10 | 49.00 | 73.9 | 24.9 | 181 | 13 | - |
| Vert. | 7386.000 | PK | 43.37 | 37.79 | 8.26 | 39.36 | 2.10 | 52.16 | 73.9 | 21.7 | 150 | 0 | - |
| Vert. | 7386.000 | AV | 34.73 | 37.79 | 8.26 | 39.36 | 2.10 | 43.52 | 53.9 | 10.3 | 150 | 0 | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2483.500 | AV | 36.63 | 28.40 | 14.12 | 38.62 | 4.05 | 2.10 | 46.68 | 53.9 | 7.2 | *1) |
| Hori. | 4924.000 | AV | 36.81 | 31.63 | 6.65 | 38.54 | 4.05 | 2.10 | 42.70 | 53.9 | 11.2 | - |
| Vert. | 2483.500 | AV | 36.93 | 28.40 | 14.12 | 38.62 | 4.05 | 2.10 | 46.98 | 53.9 | **6.9** | *1) |
| Vert. | 4924.000 | AV | 38.02 | 31.63 | 6.65 | 38.54 | 4.05 | 2.10 | 43.91 | 53.9 | 9.9 | - |

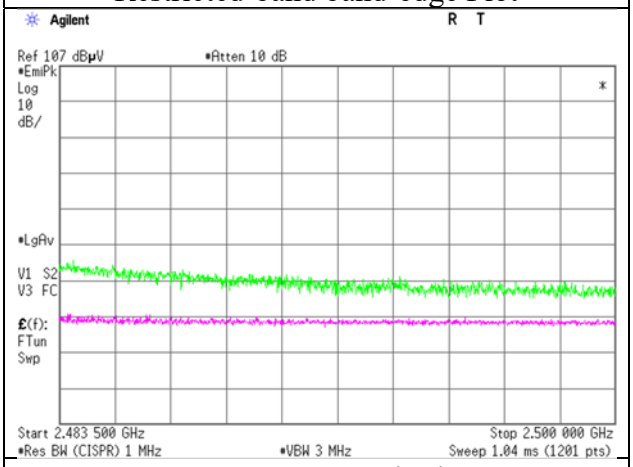
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | August 31, 2020 |
| Temperature / Humidity | 25 deg.C / 66 %RH |
| Engineer | Kazuya Noda |
| Mode | Tx 11n-20 2462 MHz |

Horizontal

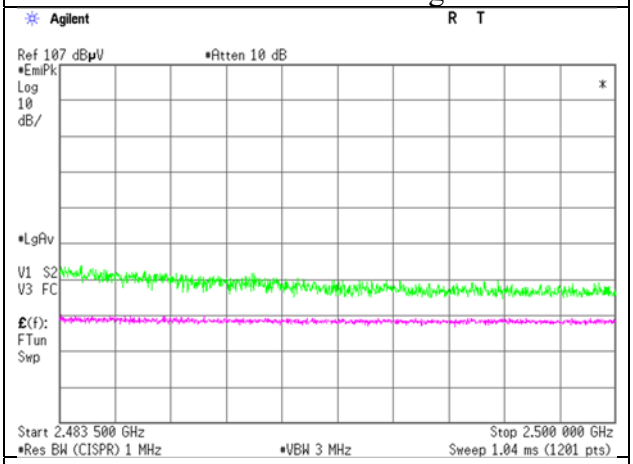
Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

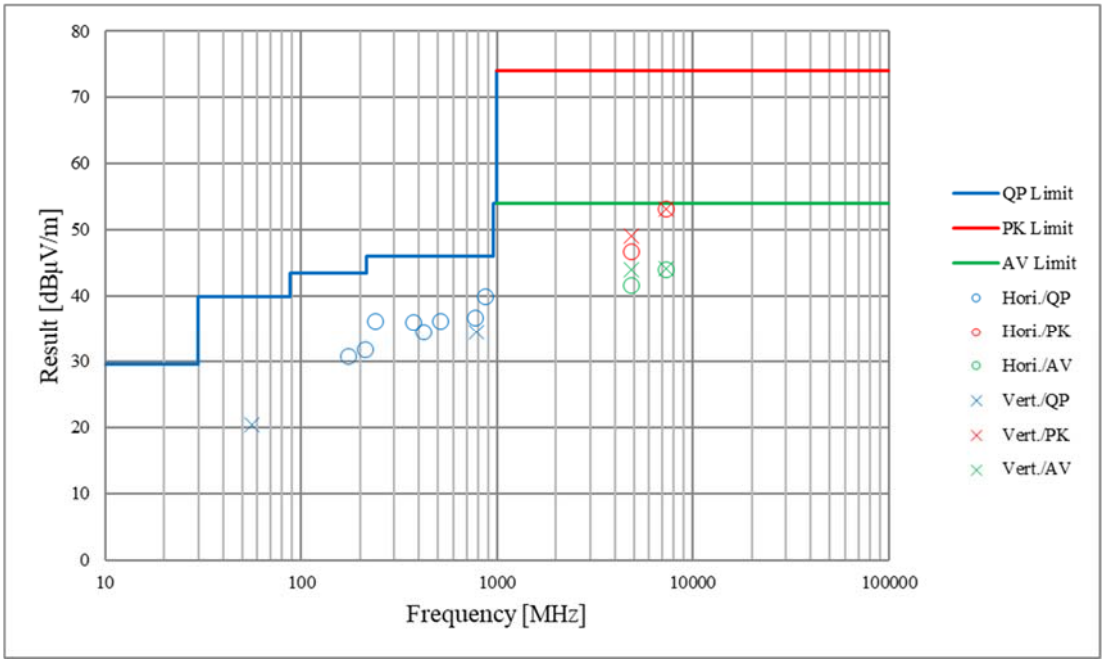



Trace Green : Peak Plot
Trace Purple : Average Plot

* 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)

| | | | | |
|---|---|---|---|---|
| Report No. | 13462774S-B-R1 | | | |
| Test place | Shonan EMC Lab. | | | |
| Semi Anechoic Chamber | 3 | 2 | 2 | 3 |
| Date | August 26, 2020 | August 31, 2020 | September 1, 2020 | August 24, 2020 |
| Temperature / Humidity | 23 deg. C / 60 % RH | 25 deg.C / 66 %RH | 26 deg.C / 65 %RH | 25 deg. C / 60 % RH |
| Engineer | Yohsuke Matsuzawa | Kazuya Noda | Yosuke Murakami | Yohsuke Matsuzawa |
| | ( 30 MHz - 1 GHz ) | ( 1 GHz - 2.8 GHz ) | ( 2.8 GHz - 10 GHz ) | ( 10 GHz - 26.5 GHz ) |
| Mode | Tx 11n-20 2437 MHz | | | |




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

# Radiated Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami |
| | ( 1 GHz - 2.8 GHz ) |
| Mode | Tx 11b 2412 MHz with 11ac-20 CDD 5240 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. | 2385.650 | PK | 47.00 | 28.57 | 14.03 | 38.68 | 2.10 | 53.02 | 73.9 | 20.8 | 159 | 17 | - |
| Hori. | 2390.000 | PK | 46.23 | 28.56 | 14.03 | 38.68 | 2.10 | 52.24 | 73.9 | 21.6 | 159 | 17 | - |
| Hori. | 2385.650 | AV | 38.18 | 28.57 | 14.03 | 38.68 | 2.10 | 44.20 | 53.9 | **9.7** | 159 | 17 | - |
| Hori. | 2390.000 | AV | 36.83 | 28.56 | 14.03 | 38.68 | 2.10 | 42.84 | 53.9 | 11.0 | 159 | 17 | - |
| Vert. | 2385.646 | PK | 46.57 | 28.57 | 14.03 | 38.68 | 2.10 | 52.59 | 73.9 | 21.3 | 142 | 257 | - |
| Vert. | 2390.000 | PK | 45.73 | 28.56 | 14.03 | 38.68 | 2.10 | 51.74 | 73.9 | 22.1 | 142 | 257 | - |
| Vert. | 2385.646 | AV | 38.11 | 28.57 | 14.03 | 38.68 | 2.10 | 44.13 | 53.9 | **9.7** | 142 | 257 | - |
| Vert. | 2390.000 | AV | 36.99 | 28.56 | 14.03 | 38.68 | 2.10 | 43.00 | 53.9 | 10.9 | 142 | 257 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

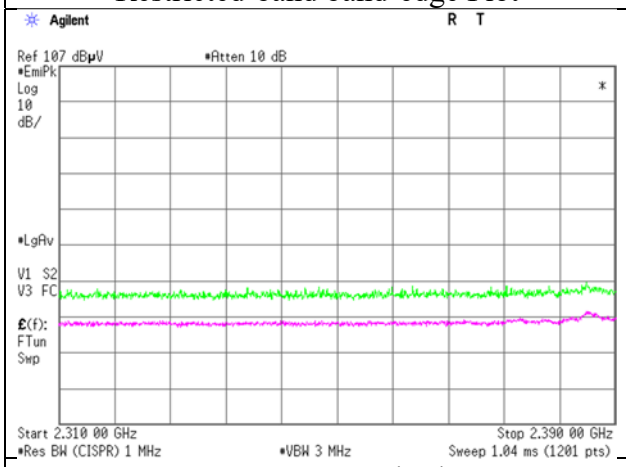
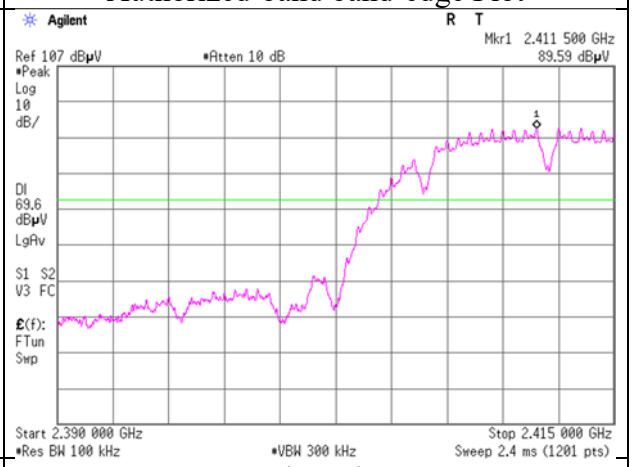
**20 dBc Data Sheet** **(RBW 100 kHz, VBW 300 kHz)**

| 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. | 2412.000 | PK | 89.42 | 28.52 | 14.04 | 38.66 | 2.10 | 95.42 | - | - | Carrier |
| Hori. | 2398.508 | PK | 45.65 | 28.54 | 14.03 | 38.67 | 2.10 | 51.65 | 75.4 | 23.7 | - |
| Hori. | 2400.000 | PK | 37.42 | 28.54 | 14.04 | 38.67 | 2.10 | 43.43 | 75.4 | 31.9 | - |
| Vert. | 2412.000 | PK | 89.11 | 28.52 | 14.04 | 38.66 | 2.10 | 95.11 | - | - | Carrier |
| Vert. | 2398.499 | PK | 44.24 | 28.54 | 14.03 | 38.67 | 2.10 | 50.24 | 75.1 | 24.8 | - |
| Vert. | 2400.000 | PK | 36.63 | 28.54 | 14.04 | 38.67 | 2.10 | 42.64 | 75.1 | 32.4 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

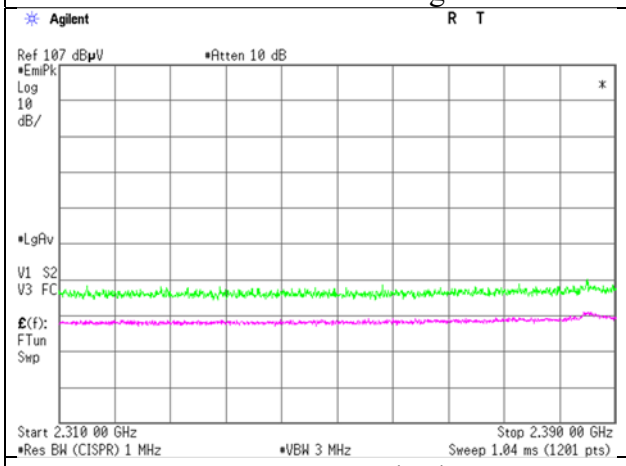
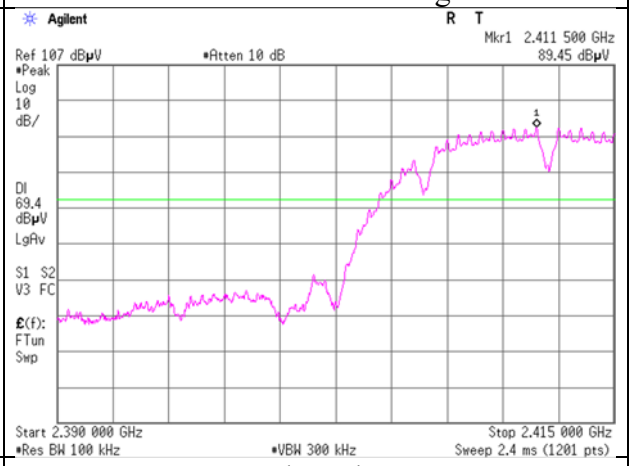
# Radiated Spurious Emission
## (Reference Plot for band-edge)

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami |
| Mode | Tx 11b 2412 MHz with 11ac-20 CDD 5240 MHz |

| Horizontal | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|  |  |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |





| Vertical | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|  |  |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |





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

# Radiated Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami<br>( 1 GHz - 2.8 GHz ) |
| Mode | Tx 11b 2462 MHz with 11ac-20 CDD 5240 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 | 45.04 | 28.40 | 14.12 | 38.62 | 2.10 | 51.04 | 73.9 | 22.8 | 153 | 36 | - |
| Hori. | 2483.500 | AV | 35.61 | 28.40 | 14.12 | 38.62 | 2.10 | 41.61 | 53.9 | 12.2 | 153 | 36 | - |
| Vert. | 2483.500 | PK | 45.67 | 28.40 | 14.12 | 38.62 | 2.10 | 51.67 | 73.9 | 22.2 | 154 | 182 | - |
| Vert. | 2483.500 | AV | 36.40 | 28.40 | 14.12 | 38.62 | 2.10 | 42.40 | 53.9 | **11.5** | 154 | 182 | - |

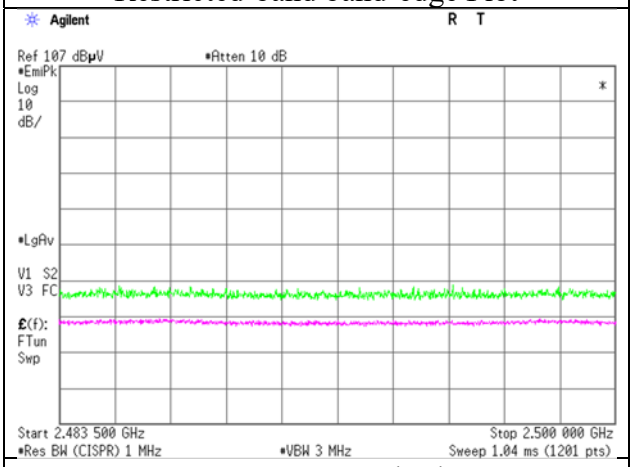
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami |
| Mode | Tx 11b 2462 MHz with 11ac-20 CDD 5240 MHz |

Horizontal

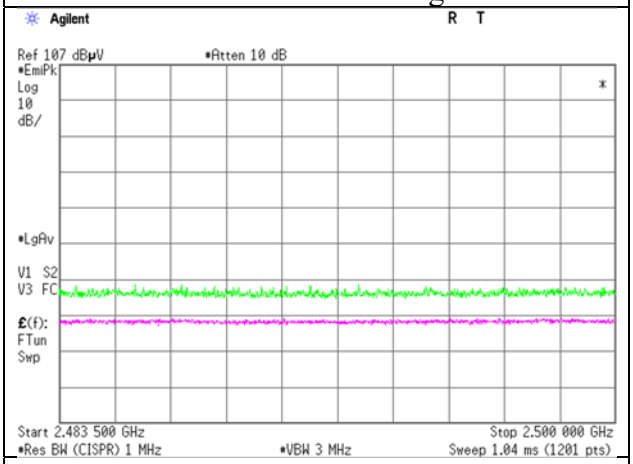
Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

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

# Radiated Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami |
| | ( 1 GHz - 2.8 GHz ) |
| Mode | Tx 11g 2412 MHz with 11ac-20 CDD 5240 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 | 54.94 | 28.56 | 14.03 | 38.68 | 2.10 | 60.95 | 73.9 | 12.9 | 155 | 16 | - |
| Vert. | 2390.000 | PK | 55.08 | 28.56 | 14.03 | 38.68 | 2.10 | 61.09 | 73.9 | 12.8 | 142 | 257 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2390.000 | AV | 38.23 | 28.56 | 14.03 | 38.68 | 3.83 | 2.10 | 48.07 | 53.9 | **5.8** | *1) |
| Vert. | 2390.000 | AV | 37.89 | 28.56 | 14.03 | 38.68 | 3.83 | 2.10 | 47.73 | 53.9 | 6.1 | *1) |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

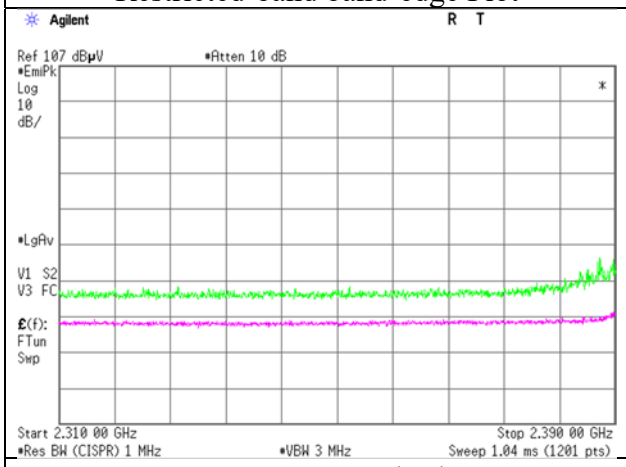
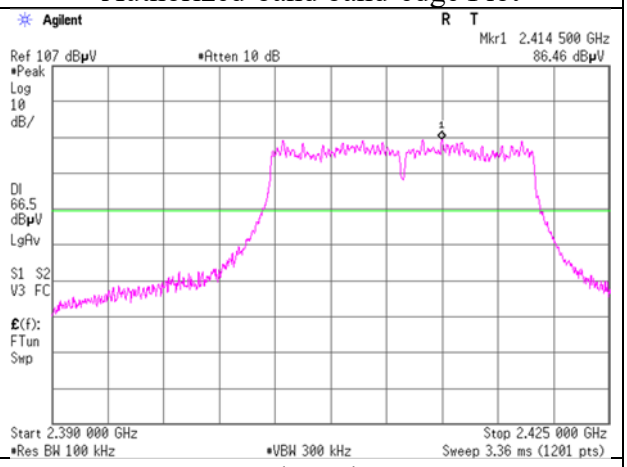
**20 dBc Data Sheet** **(RBW 100 kHz, VBW 300 kHz)**

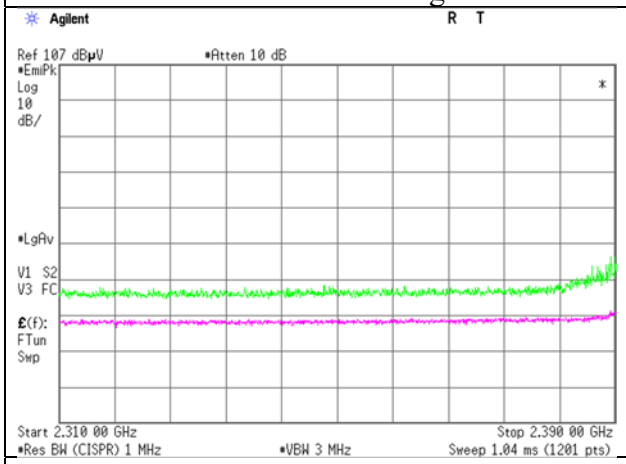
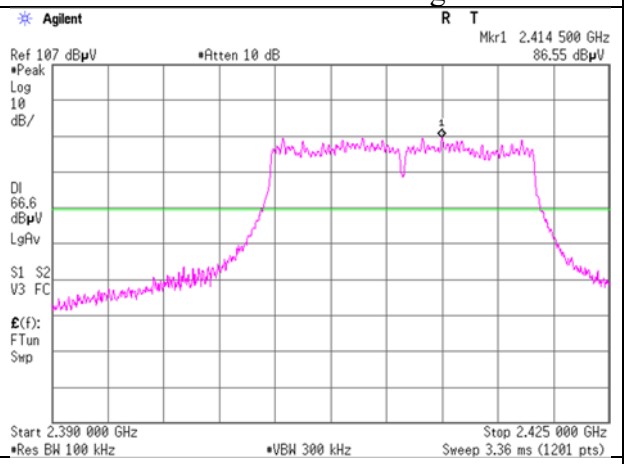
| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2412.000 | PK | 86.07 | 28.52 | 14.04 | 38.66 | 2.10 | 92.07 | - | - | Carrier |
| Hori. | 2400.000 | PK | 50.25 | 28.54 | 14.04 | 38.67 | 2.10 | 56.26 | 72.0 | 15.7 | - |
| Vert. | 2412.000 | PK | 86.15 | 28.52 | 14.04 | 38.66 | 2.10 | 92.15 | - | - | Carrier |
| Vert. | 2400.000 | PK | 49.29 | 28.54 | 14.04 | 38.67 | 2.10 | 55.30 | 72.1 | 16.8 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami |
| Mode | Tx 11g 2412 MHz with 11ac-20 CDD 5240 MHz |

| Horizontal | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|   |   |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |

| Vertical | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|   |   |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |

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

# Radiated Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami |
| | ( 1 GHz - 2.8 GHz ) |
| Mode | Tx 11g 2417 MHz with 11ac-20 CDD 5240 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 | 57.60 | 28.56 | 14.03 | 38.68 | 2.10 | 63.61 | 73.9 | 10.2 | 155 | 15 | - |
| Vert. | 2390.000 | PK | 57.83 | 28.56 | 14.03 | 38.68 | 2.10 | 63.84 | 73.9 | 10.0 | 131 | 180 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2390.000 | AV | 38.25 | 28.56 | 14.03 | 38.68 | 3.83 | 2.10 | 48.09 | 53.9 | **5.8** | *1) |
| Vert. | 2390.000 | AV | 37.92 | 28.56 | 14.03 | 38.68 | 3.83 | 2.10 | 47.76 | 53.9 | 6.1 | *1) |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

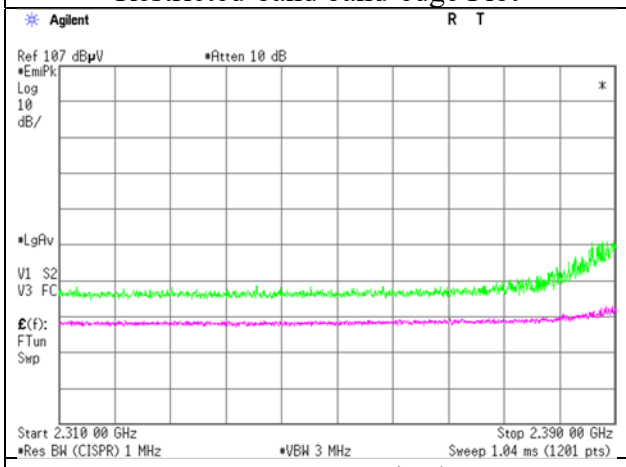
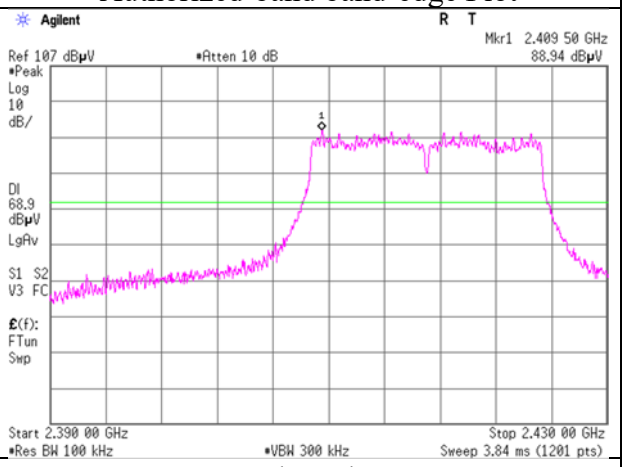
**20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)**

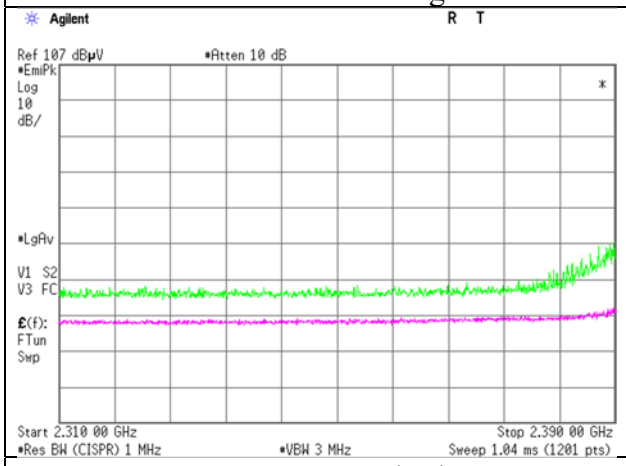
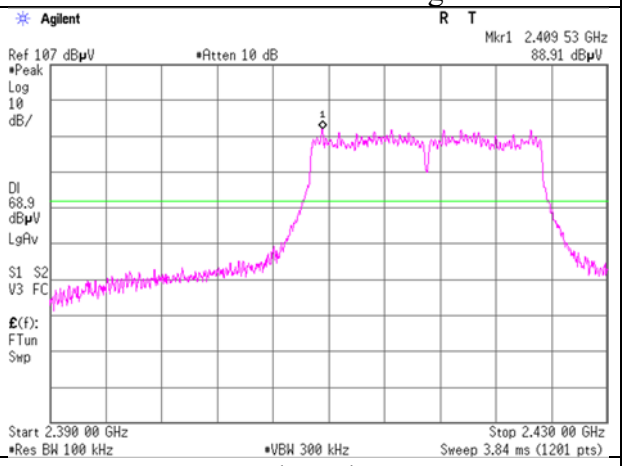
| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2417.000 | PK | 88.54 | 28.51 | 14.06 | 38.66 | 2.10 | 94.55 | - | - | Carrier |
| Hori. | 2400.000 | PK | 48.89 | 28.54 | 14.04 | 38.67 | 2.10 | 54.90 | 74.5 | 19.6 | - |
| Vert. | 2417.000 | PK | 88.52 | 28.51 | 14.06 | 38.66 | 2.10 | 94.53 | - | - | Carrier |
| Vert. | 2400.000 | PK | 48.61 | 28.54 | 14.04 | 38.67 | 2.10 | 54.62 | 74.5 | 19.8 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami |
| Mode | Tx 11g 2417 MHz with 11ac-20 CDD 5240 MHz |

| Horizontal | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|   |   |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |

| Vertical | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|   |   |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |

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

# Radiated Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami<br>( 1 GHz - 2.8 GHz ) |
| Mode | Tx 11g 2457 MHz with 11ac-20 CDD 5240 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 | 55.12 | 28.40 | 14.12 | 38.62 | 2.10 | 61.12 | 73.9 | 12.7 | 151 | 38 | - |
| Vert. | 2483.500 | PK | 50.46 | 28.40 | 14.12 | 38.62 | 2.10 | 56.46 | 73.9 | 17.4 | 154 | 182 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2483.500 | AV | 37.60 | 28.40 | 14.12 | 38.62 | 3.83 | 2.10 | 47.43 | 53.9 | **6.4** | *1) |
| Vert. | 2483.500 | AV | 36.86 | 28.40 | 14.12 | 38.62 | 3.83 | 2.10 | 46.69 | 53.9 | 7.2 | *1) |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

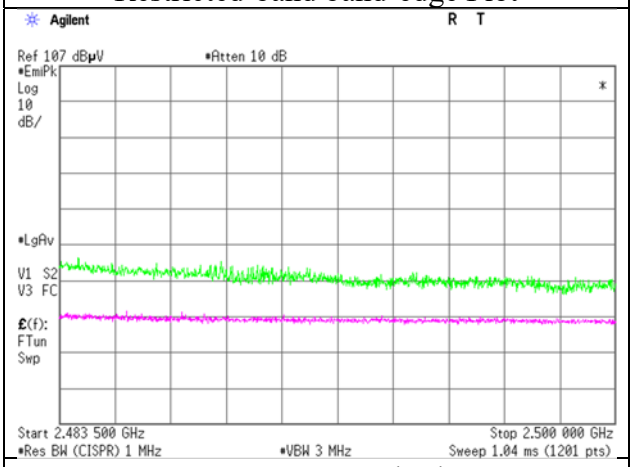
-

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami |
| Mode | Tx 11g 2457 MHz with 11ac-20 CDD 5240 MHz |

Horizontal

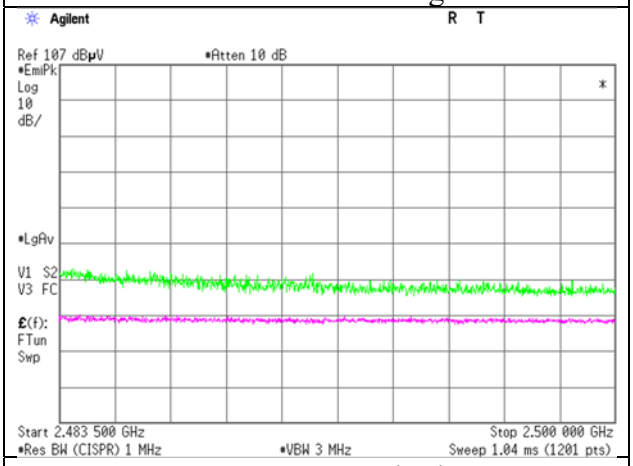
Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

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

# Radiated Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami<br>( 1 GHz - 2.8 GHz ) |
| Mode | Tx 11g 2462 MHz with 11ac-20 CDD 5240 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 | 54.53 | 28.40 | 14.12 | 38.62 | 2.10 | 60.53 | 73.9 | 13.3 | 153 | 37 | - |
| Vert. | 2483.500 | PK | 51.42 | 28.40 | 14.12 | 38.62 | 2.10 | 57.42 | 73.9 | 16.4 | 152 | 182 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2483.500 | AV | 37.04 | 28.40 | 14.12 | 38.62 | 3.83 | 2.10 | 46.87 | 53.9 | **7.0** | *1) |
| Vert. | 2483.500 | AV | 36.33 | 28.40 | 14.12 | 38.62 | 3.83 | 2.10 | 46.16 | 53.9 | 7.7 | *1) |

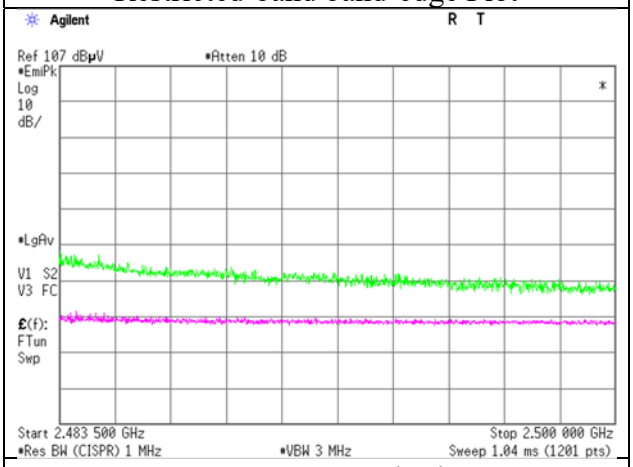
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami |
| Mode | Tx 11g 2462 MHz with 11ac-20 CDD 5240 MHz |

Horizontal

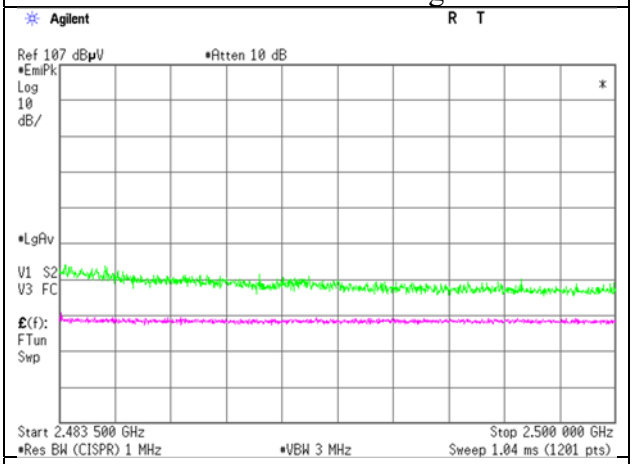
Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

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

# Radiated Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami |
| | ( 1 GHz - 2.8 GHz ) |
| Mode | Tx 11n-20 2412 MHz with 11ac-20 CDD 5240 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 | 53.33 | 28.56 | 14.03 | 38.68 | 2.10 | 59.34 | 73.9 | 14.5 | 189 | 44 | - |
| Vert. | 2390.000 | PK | 52.74 | 28.56 | 14.03 | 38.68 | 2.10 | 58.75 | 73.9 | 15.1 | 145 | 257 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2390.000 | AV | 39.21 | 28.56 | 14.03 | 38.68 | 4.05 | 2.10 | 49.27 | 53.9 | **4.6** | *1) |
| Vert. | 2390.000 | AV | 38.76 | 28.56 | 14.03 | 38.68 | 4.05 | 2.10 | 48.82 | 53.9 | 5.0 | *1) |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

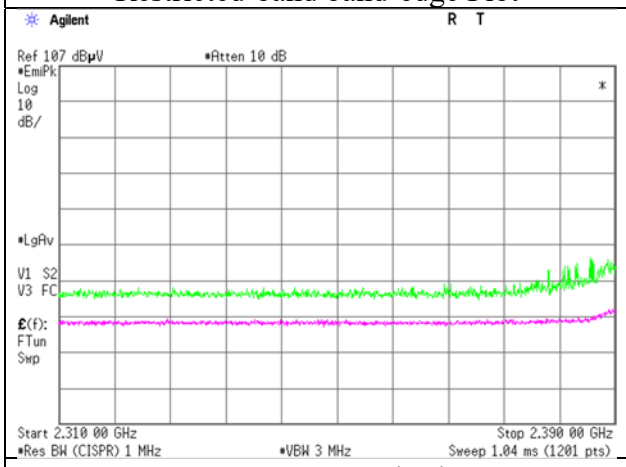
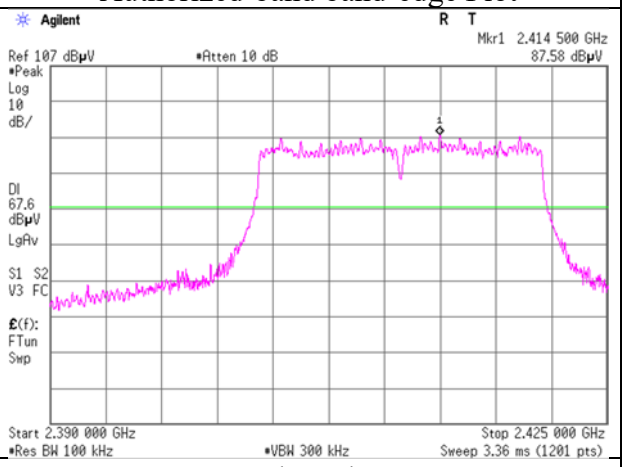
**20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)**

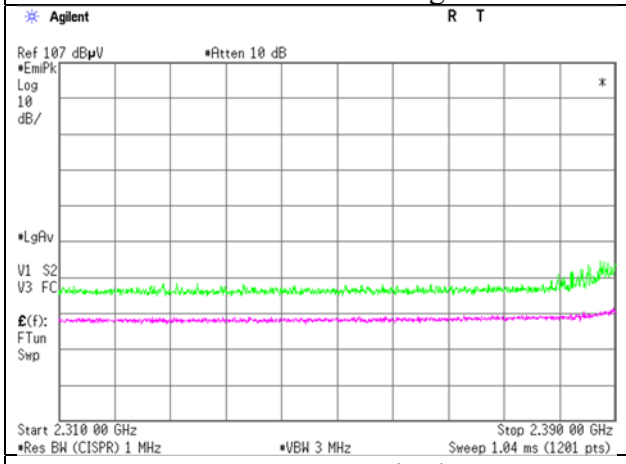
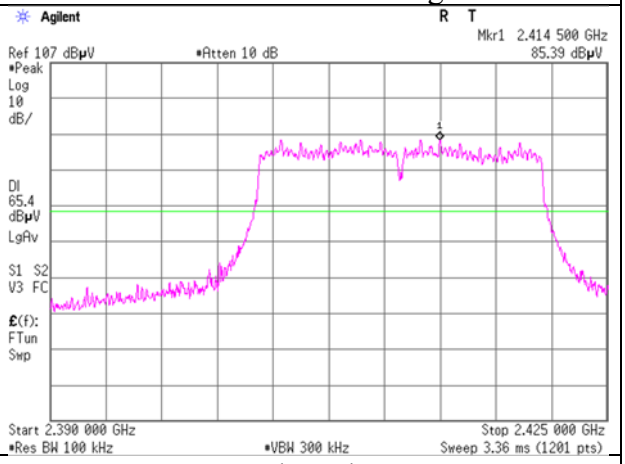
| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2412.000 | PK | 87.21 | 28.52 | 14.04 | 38.66 | 2.10 | 93.21 | - | - | Carrier |
| Hori. | 2400.000 | PK | 50.71 | 28.54 | 14.04 | 38.67 | 2.10 | 56.72 | 73.2 | 16.4 | - |
| Vert. | 2412.000 | PK | 85.04 | 28.52 | 14.04 | 38.66 | 2.10 | 91.04 | - | - | Carrier |
| Vert. | 2400.000 | PK | 46.95 | 28.54 | 14.04 | 38.67 | 2.10 | 52.96 | 71.0 | 18.0 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami |
| Mode | Tx 11n-20 2412 MHz with 11ac-20 CDD 5240 MHz |

| Horizontal | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|   |   |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |

| Vertical | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|   |   |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |

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

# Radiated Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami |
| | ( 1 GHz - 2.8 GHz ) |
| Mode | Tx 11n-20 2417 MHz with 11ac-20 CDD 5240 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 | 57.01 | 28.56 | 14.03 | 38.68 | 2.10 | 63.02 | 73.9 | 10.8 | 159 | 16 | - |
| Vert. | 2390.000 | PK | 56.44 | 28.56 | 14.03 | 38.68 | 2.10 | 62.45 | 73.9 | 11.4 | 184 | 247 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2390.000 | AV | 37.90 | 28.56 | 14.03 | 38.68 | 4.05 | 2.10 | 47.96 | 53.9 | 5.9 | *1) |
| Vert. | 2390.000 | AV | 37.95 | 28.56 | 14.03 | 38.68 | 4.05 | 2.10 | 48.01 | 53.9 | **5.8** | *1) |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

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

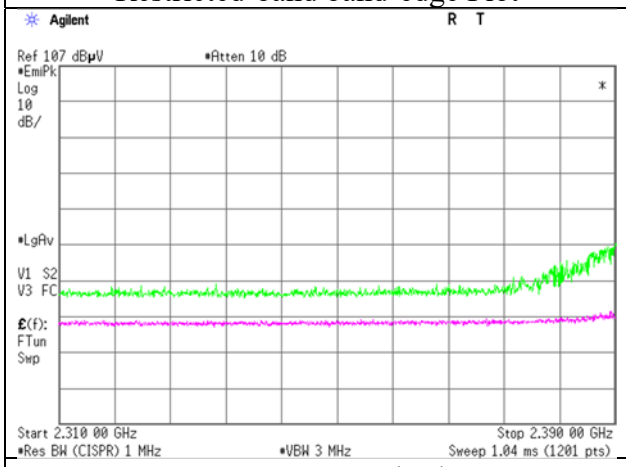
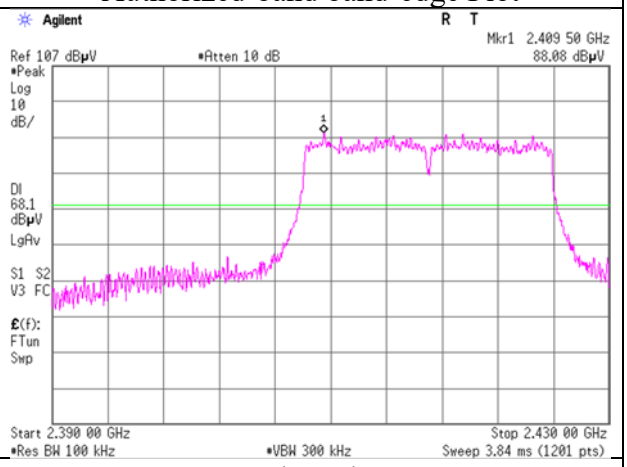
| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2417.000 | PK | 87.69 | 28.51 | 14.06 | 38.66 | 2.10 | 93.70 | - | - | Carrier |
| Hori. | 2400.000 | PK | 45.33 | 28.54 | 14.04 | 38.67 | 2.10 | 51.34 | 73.7 | 22.3 | - |
| Vert. | 2417.000 | PK | 87.39 | 28.51 | 14.06 | 38.66 | 2.10 | 93.40 | - | - | Carrier |
| Vert. | 2400.000 | PK | 45.68 | 28.54 | 14.04 | 38.67 | 2.10 | 51.69 | 73.4 | 21.7 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

-

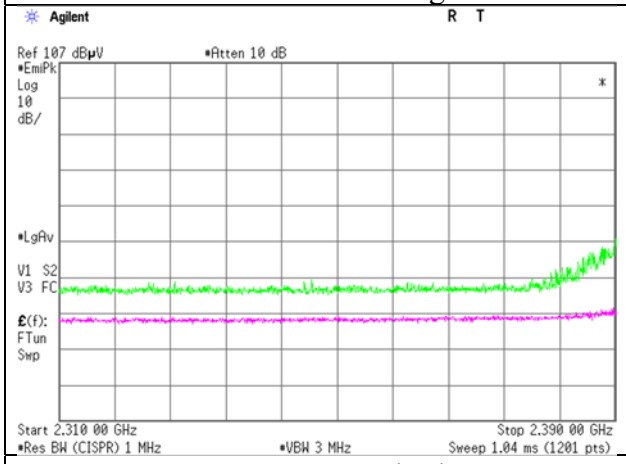
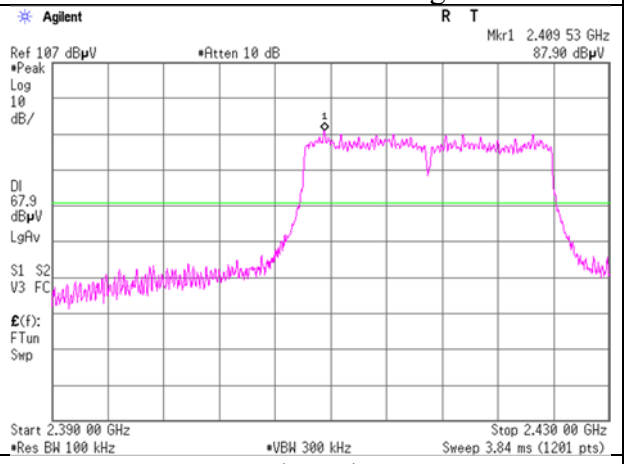
# Radiated Spurious Emission
## (Reference Plot for band-edge)

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami |
| Mode | Tx 11n-20 2417 MHz with 11ac-20 CDD 5240 MHz |

| Horizontal | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|  |  |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |





| Vertical | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|  |  |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |





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

# Radiated Spurious Emission

| | | | | | |
|---|---|---|---|---|---|
| Report No. | 13462774S-B-R1 | | | | |
| Test place | Shonan EMC Lab. | | | | |
| Semi Anechoic Chamber | 3 | 2 | 2 | 2 | 2 |
| Date | August 30, 2020 | September 1, 2020 | September 1, 2020 | September 3, 2020 | September 4, 2020 |
| Temperature / Humidity | 25 deg.C / 64 %RH | 26 deg.C / 65 %RH | 25 deg.C / 63 %RH | 22 deg.C / 65 %RH | 24 deg.C / 67 % RH |
| Engineer | Yosuke Murakami | Yosuke Murakami | Kazuya Noda | Kazuya Noda | Yosuke Murakami |
| | ( 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 11n-20 2437 MHz with 11ac-20 CDD 5240 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. | 175.004 | QP | 40.49 | 15.73 | 7.81 | 32.06 | 0.00 | 31.97 | 43.5 | 11.5 | 189 | 6 | - |
| Hori. | 184.316 | QP | 34.02 | 16.14 | 7.79 | 32.06 | 0.00 | 25.89 | 43.5 | 17.6 | 180 | 350 | - |
| Hori. | 214.685 | QP | 41.56 | 11.23 | 8.06 | 32.03 | 0.00 | 28.82 | 43.5 | 14.6 | 154 | 355 | - |
| Hori. | 240.005 | QP | 48.81 | 11.57 | 8.20 | 32.00 | 0.00 | 36.58 | 46.0 | 9.4 | 140 | 343 | - |
| Hori. | 425.012 | QP | 42.56 | 16.06 | 9.12 | 31.94 | 0.00 | 35.80 | 46.0 | 10.2 | 100 | 349 | - |
| Hori. | 520.114 | QP | 35.88 | 17.67 | 9.49 | 31.95 | 0.00 | 31.09 | 46.0 | 14.9 | 100 | 54 | - |
| Hori. | 747.535 | QP | 36.43 | 20.15 | 10.33 | 31.74 | 0.00 | 35.17 | 46.0 | 10.8 | 100 | 27 | - |
| Hori. | 870.602 | QP | 37.12 | 22.00 | 10.73 | 31.21 | 0.00 | 38.64 | 46.0 | **7.3** | 135 | 275 | - |
| Hori. | 4874.000 | PK | 45.45 | 31.58 | 6.47 | 38.54 | 2.10 | 47.06 | 73.9 | 26.8 | 195 | 158 | - |
| Hori. | 7311.000 | PK | 44.24 | 37.71 | 7.96 | 39.27 | 2.10 | 52.74 | 73.9 | 21.1 | 150 | 0 | - |
| Hori. | 7311.000 | AV | 35.75 | 37.71 | 7.96 | 39.27 | 2.10 | 44.25 | 53.9 | 9.6 | 150 | 0 | Floor noise |
| Vert. | 57.114 | QP | 37.99 | 8.90 | 6.65 | 32.16 | 0.00 | 21.38 | 40.0 | 18.6 | 100 | 275 | - |
| Vert. | 520.085 | QP | 34.12 | 17.67 | 9.49 | 31.95 | 0.00 | 29.33 | 46.0 | 16.6 | 209 | 39 | - |
| Vert. | 745.144 | QP | 35.90 | 20.13 | 10.32 | 31.75 | 0.00 | 34.60 | 46.0 | 11.4 | 157 | 144 | - |
| Vert. | 870.661 | QP | 34.48 | 22.00 | 10.73 | 31.21 | 0.00 | 36.00 | 46.0 | 10.0 | 130 | 10 | - |
| Vert. | 4874.000 | PK | 46.16 | 31.58 | 6.47 | 38.54 | 2.10 | 47.77 | 73.9 | 26.1 | 196 | 5 | - |
| Vert. | 7311.000 | PK | 45.28 | 37.71 | 7.96 | 39.27 | 2.10 | 53.78 | 73.9 | 20.1 | 150 | 0 | - |
| Vert. | 7311.000 | AV | 35.51 | 37.71 | 7.96 | 39.27 | 2.10 | 44.01 | 53.9 | 9.8 | 150 | 0 | Floor noise |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 4874.000 | AV | 35.98 | 31.58 | 6.47 | 38.54 | 4.05 | 2.10 | 41.64 | 53.9 | 12.2 | - |
| Vert. | 4874.000 | AV | 37.74 | 31.58 | 6.47 | 38.54 | 4.05 | 2.10 | 43.40 | 53.9 | 10.5 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.

# Radiated Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami |
| | ( 1 GHz - 2.8 GHz ) |
| Mode | Tx 11n-20 2457 MHz with 11ac-20 CDD 5240 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 | 52.86 | 28.40 | 14.12 | 38.62 | 2.10 | 58.86 | 73.9 | 15.0 | 153 | 36 | - |
| Vert. | 2483.500 | PK | 51.04 | 28.40 | 14.12 | 38.62 | 2.10 | 57.04 | 73.9 | 16.8 | 129 | 258 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2483.500 | AV | 36.80 | 28.40 | 14.12 | 38.62 | 4.05 | 2.10 | 46.85 | 53.9 | **7.0** | *1) |
| Vert. | 2483.500 | AV | 36.44 | 28.40 | 14.12 | 38.62 | 4.05 | 2.10 | 46.49 | 53.9 | 7.4 | *1) |

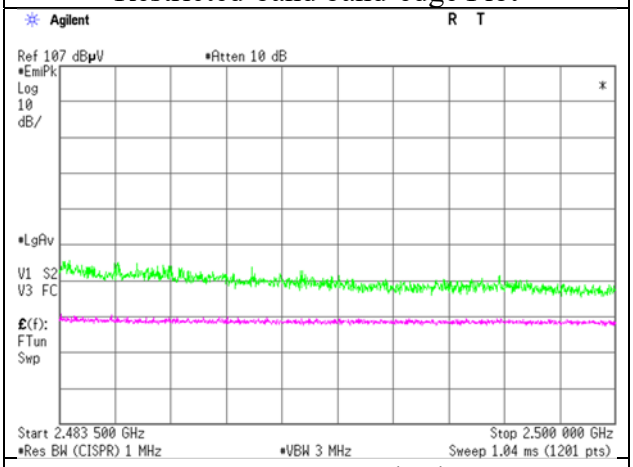
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami |
| Mode | Tx 11n-20 2457 MHz with 11ac-20 CDD 5240 MHz |

Horizontal

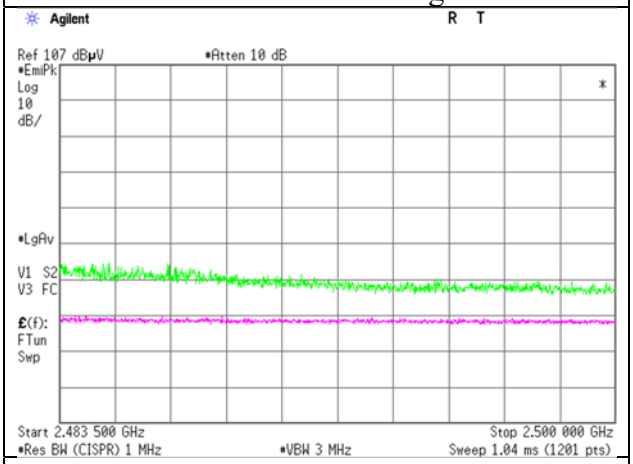
Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

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

# Radiated Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami |
| | ( 1 GHz - 2.8 GHz ) |
| Mode | Tx 11n-20 2462 MHz with 11ac-20 CDD 5240 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 | 52.77 | 28.40 | 14.12 | 38.62 | 2.10 | 58.77 | 73.9 | 15.1 | 153 | 36 | - |
| Vert. | 2483.500 | PK | 50.27 | 28.40 | 14.12 | 38.62 | 2.10 | 56.27 | 73.9 | 17.6 | 155 | 182 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Average measurement value with duty factor**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Duty Factor [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2483.500 | AV | 36.75 | 28.40 | 14.12 | 38.62 | 4.05 | 2.10 | 46.80 | 53.9 | **7.0** | *1) |
| Vert. | 2483.500 | AV | 36.29 | 28.40 | 14.12 | 38.62 | 4.05 | 2.10 | 46.34 | 53.9 | 7.5 | *1) |

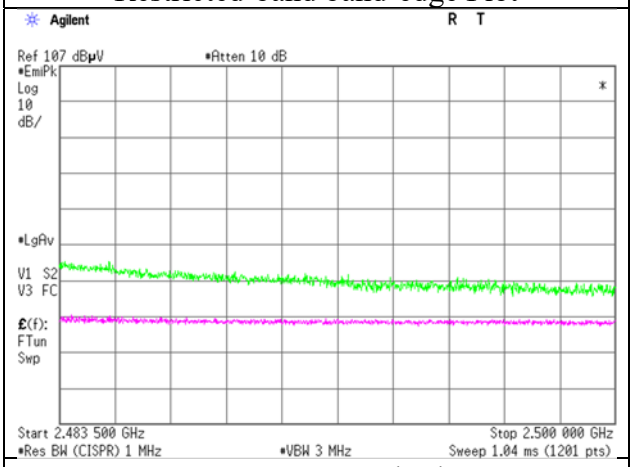
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty factor refer to "Burst rate confirmation" sheet.
*1) Not out of band emission (Leakage Power)

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 2 |
| Date | September 1, 2020 |
| Temperature / Humidity | 26 deg.C / 65 %RH |
| Engineer | Yosuke Murakami |
| Mode | Tx 11n-20 2462 MHz with 11ac-20 CDD 5240 MHz |

Horizontal

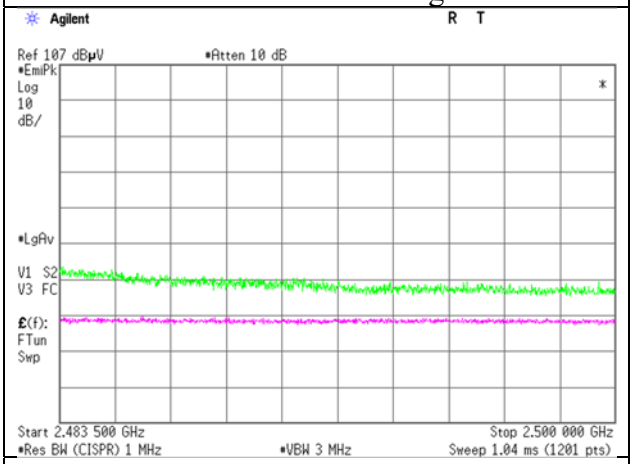
Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

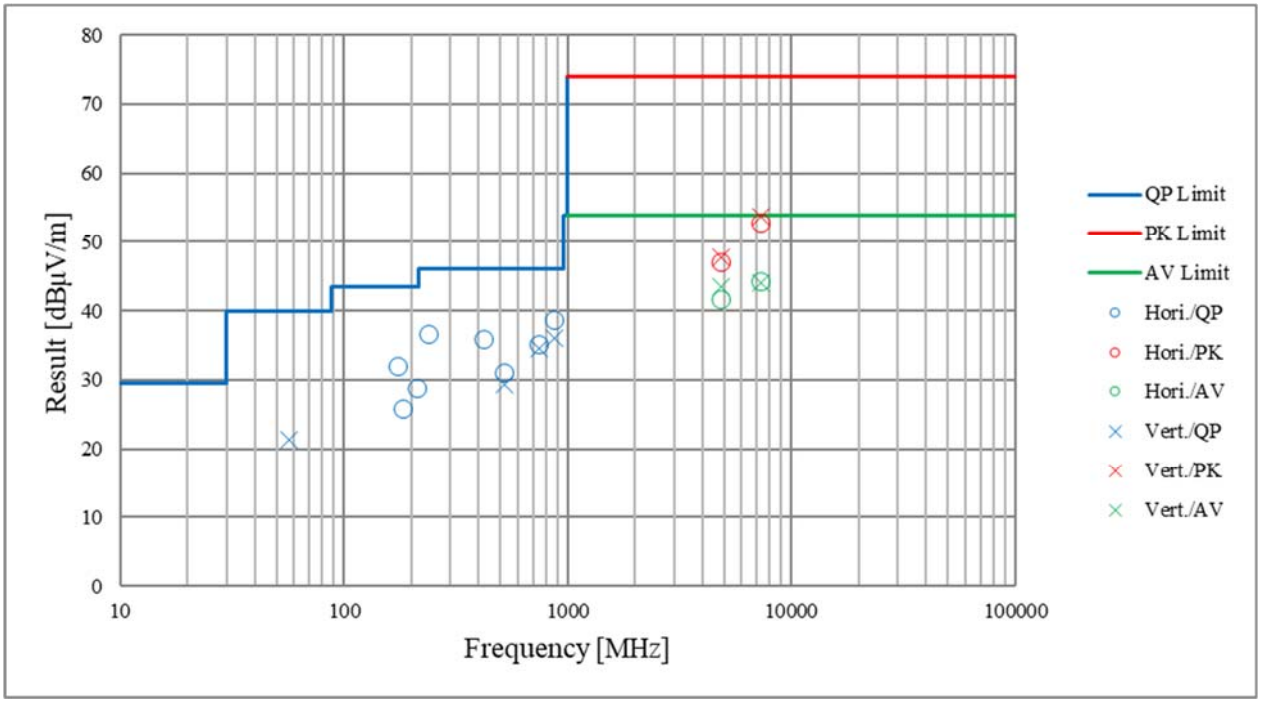



Trace Green : Peak Plot
Trace Purple : Average Plot

* 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)

| | | | | | |
|---|---|---|---|---|---|
| Report No. | 13462774S-B-R1 | | | | |
| Test place | Shonan EMC Lab. | | | | |
| Semi Anechoic Chamber | 3 | 2 | 2 | 2 | 2 |
| Date | August 30, 2020 | September 1, 2020 | September 1, 2020 | September 3, 2020 | September 4, 2020 |
| Temperature / Humidity | 25 deg.C / 64 %RH | 26 deg.C / 65 %RH | 25 deg.C / 63 %RH | 22 deg.C / 65 %RH | 24 deg.C / 67 % RH |
| Engineer | Yosuke Murakami | Yosuke Murakami | Kazuya Noda | Kazuya Noda | Yosuke Murakami |
| | ( 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 11n-20 2437 MHz with 11ac-20 CDD 5240 MHz | | | | |




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

# Radiated Spurious Emission

| | | | | |
|---|---|---|---|---|
| Report No. | 13462774S-B-R1 | | | |
| Test place | Shonan EMC Lab. | | | |
| Semi Anechoic Chamber | 3 | 3 | 3 | 3 |
| Date | August 26, 2020 | August 22, 2020 | August 23, 2020 | August 24, 2020 |
| Temperature / Humidity | 23 deg. C / 60 % RH | 21 deg. C / 60 % RH | 25 deg. C / 61 % RH | 25 deg. C / 60 % RH |
| Engineer | Kazuya Noda | Yohsuke Matsuzawa | Yohsuke Matsuzawa | Yosuke Murakami |
| | ( 30 MHz - 1 GHz ) | ( 1 GHz - 2.8 GHz ) | ( 2.8 GHz - 10 GHz ) | ( 10 GHz - 26.5 GHz ) |
| Mode | Tx BT LE 1 M-PHY 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. | 200.000 | QP | 39.10 | 16.56 | 7.83 | 32.04 | 0.00 | 31.45 | 43.5 | 12.0 | 161 | 316 | - - |
| Hori. | 214.881 | QP | 44.30 | 11.22 | 8.06 | 32.03 | 0.00 | 31.55 | 43.5 | 11.9 | 147 | 352 | - |
| Hori. | 240.010 | QP | 48.60 | 11.57 | 8.20 | 32.00 | 0.00 | 36.37 | 46.0 | 9.6 | 124 | 338 | - |
| Hori. | 375.011 | QP | 43.90 | 15.11 | 8.89 | 31.93 | 0.00 | 35.97 | 46.0 | 10.0 | 100 | 45 | - |
| Hori. | 519.753 | QP | 41.40 | 17.67 | 9.49 | 31.95 | 0.00 | 36.61 | 46.0 | 9.3 | 175 | 121 | - |
| Hori. | 762.804 | QP | 37.10 | 20.34 | 10.39 | 31.71 | 0.00 | 36.12 | 46.0 | 9.8 | 100 | 13 | - |
| Hori. | 870.295 | QP | 35.90 | 21.99 | 10.73 | 31.21 | 0.00 | 37.41 | 46.0 | **8.5** | 100 | 236 | - |
| Hori. | 2390.000 | PK | 49.37 | 28.41 | 14.22 | 41.66 | 2.10 | 52.44 | 73.9 | 21.4 | 105 | 106 | - |
| Hori. | 4804.000 | PK | 50.12 | 31.60 | 6.68 | 42.92 | 2.10 | 47.58 | 73.9 | 26.3 | 120 | 191 | - |
| Hori. | 7206.000 | PK | 52.49 | 37.60 | 8.16 | 43.39 | 2.10 | 56.96 | 73.9 | 16.9 | 127 | 223 | - |
| Vert. | 56.705 | QP | 36.50 | 9.01 | 6.66 | 32.16 | 0.00 | 20.01 | 40.0 | 19.9 | 100 | 252 | - |
| Vert. | 786.426 | QP | 36.20 | 20.60 | 10.45 | 31.68 | 0.00 | 35.57 | 46.0 | 10.4 | 100 | 153 | - |
| Vert. | 2390.000 | PK | 49.28 | 28.41 | 14.22 | 41.66 | 2.10 | 52.35 | 73.9 | 21.5 | 163 | 311 | - |
| Vert. | 4804.000 | PK | 52.92 | 31.60 | 6.68 | 42.92 | 2.10 | 50.38 | 73.9 | 23.5 | 158 | 182 | - |
| Vert. | 7206.000 | PK | 52.38 | 37.60 | 8.16 | 43.39 | 2.10 | 56.85 | 73.9 | 17.0 | 157 | 53 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Peak measurement value with Duty cycle correction factor (DCCF)**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | DCCF [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2390.000 | PK | 49.37 | 28.41 | 14.22 | 41.66 | -22.15 | 2.10 | 30.29 | 53.9 | 23.6 | *1) |
| Hori. | 4804.000 | PK | 50.12 | 31.60 | 6.68 | 42.92 | -22.15 | 2.10 | 25.43 | 53.9 | 28.4 | - |
| Hori. | 7206.000 | PK | 52.49 | 37.60 | 8.16 | 43.39 | -22.15 | 2.10 | 34.81 | 53.9 | 19.0 | - |
| Vert. | 2390.000 | PK | 49.28 | 28.41 | 14.22 | 41.66 | -22.15 | 2.10 | 30.20 | 53.9 | 23.7 | *1) |
| Vert. | 4804.000 | PK | 52.92 | 31.60 | 6.68 | 42.92 | -22.15 | 2.10 | 28.23 | 53.9 | 25.6 | - |
| Vert. | 7206.000 | PK | 52.38 | 37.60 | 8.16 | 43.39 | -22.15 | 2.10 | 34.70 | 53.9 | 19.2 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + DCCF + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.
*1) Not out of band emission (Leakage Power)

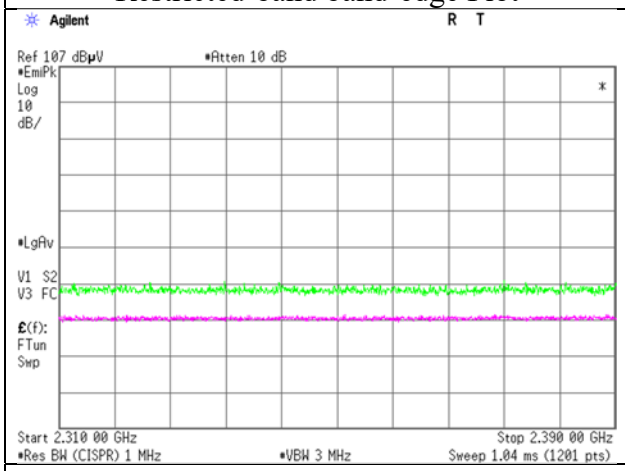
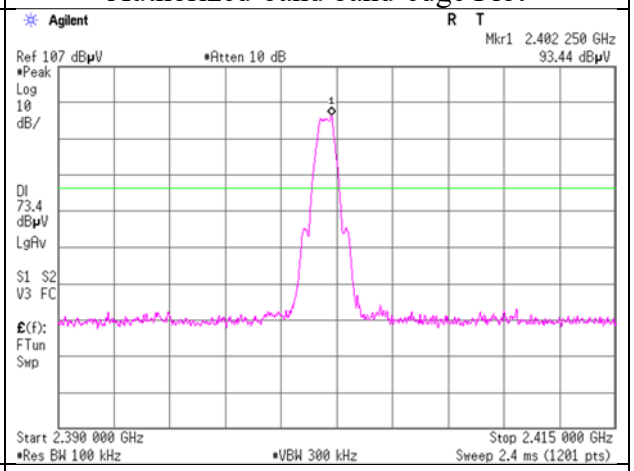
**20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)**

| 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 | 93.50 | 28.38 | 14.23 | 41.67 | 2.10 | 96.54 | - | - | Carrier |
| Hori. | 2400.000 | PK | 39.62 | 28.38 | 14.22 | 41.67 | 2.10 | 42.65 | 76.5 | 33.8 | - |
| Vert. | 2402.000 | PK | 96.00 | 28.38 | 14.23 | 41.67 | 2.10 | 99.04 | - | - | Carrier |
| Vert. | 2400.000 | PK | 41.41 | 28.38 | 14.22 | 41.67 | 2.10 | 44.44 | 79.0 | 34.5 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

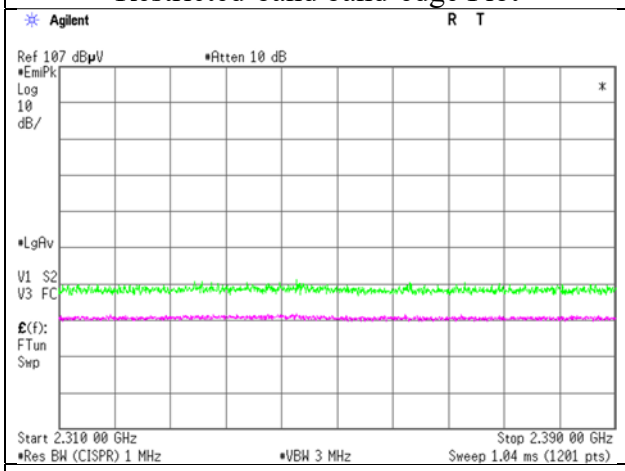
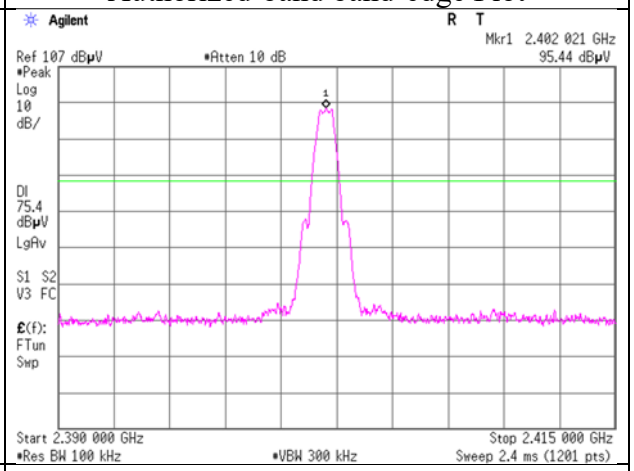
# Radiated Spurious Emission
## (Reference Plot for band-edge)

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 3 |
| Date | August 22, 2020 |
| Temperature / Humidity | 21 deg. C / 60 % RH |
| Engineer | Yohsuke Matsuzawa |
| Mode | Tx BT LE 1 M-PHY 2402 MHz |

| Horizontal | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|  |  |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |





| Vertical | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|  |  |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |





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

# Radiated Spurious Emission

| | | | | |
|---|---|---|---|---|
| Report No. | 13462774S-B-R1 | | | |
| Test place | Shonan EMC Lab. | | | |
| Semi Anechoic Chamber | 3 | 3 | 3 | 3 |
| Date | August 26, 2020 | August 22, 2020 | August 23, 2020 | August 24, 2020 |
| Temperature / Humidity | 23 deg. C / 60 % RH | 21 deg. C / 60 % RH | 25 deg. C / 61 % RH | 25 deg. C / 60 % RH |
| Engineer | Kazuya Noda | Yohsuke Matsuzawa | Yohsuke Matsuzawa | Yosuke Murakami |
| | ( 30 MHz - 1 GHz ) | ( 1 GHz - 2.8 GHz ) | ( 2.8 GHz - 10 GHz ) | ( 10 GHz - 26.5 GHz ) |
| Mode | Tx BT LE 1 M-PHY 2440 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. | 200.000 | QP | 39.20 | 16.56 | 7.83 | 32.04 | 0.00 | 31.55 | 43.5 | 11.9 | 166 | 311 | - |
| Hori. | 214.698 | QP | 44.50 | 11.23 | 8.06 | 32.03 | 0.00 | 31.76 | 43.5 | 11.7 | 157 | 351 | - |
| Hori. | 240.003 | QP | 48.80 | 11.57 | 8.20 | 32.00 | 0.00 | 36.57 | 46.0 | 9.4 | 132 | 337 | - |
| Hori. | 375.013 | QP | 44.60 | 15.11 | 8.89 | 31.93 | 0.00 | 36.67 | 46.0 | 9.3 | 100 | 43 | - |
| Hori. | 520.000 | QP | 41.20 | 17.67 | 9.49 | 31.95 | 0.00 | 36.41 | 46.0 | 9.5 | 178 | 125 | - |
| Hori. | 762.739 | QP | 37.50 | 20.33 | 10.39 | 31.71 | 0.00 | 36.51 | 46.0 | 9.4 | 100 | 11 | - |
| Hori. | 871.020 | QP | 36.10 | 22.01 | 10.73 | 31.20 | 0.00 | 37.64 | 46.0 | **8.3** | 100 | 235 | - |
| Hori. | 4880.000 | PK | 49.58 | 31.63 | 6.72 | 42.93 | 2.10 | 47.10 | 73.9 | 26.8 | 148 | 187 | - |
| Hori. | 7320.000 | PK | 49.67 | 37.71 | 8.21 | 43.49 | 2.10 | 54.20 | 73.9 | 19.7 | 144 | 328 | - |
| Vert. | 56.937 | QP | 35.70 | 8.94 | 6.65 | 32.16 | 0.00 | 19.13 | 40.0 | 20.8 | 100 | 247 | - |
| Vert. | 786.430 | QP | 36.20 | 20.60 | 10.45 | 31.68 | 0.00 | 35.57 | 46.0 | 10.4 | 100 | 152 | - |
| Vert. | 4880.000 | PK | 50.45 | 31.63 | 6.72 | 42.93 | 2.10 | 47.97 | 73.9 | 25.9 | 200 | 184 | - |
| Vert. | 7320.000 | PK | 50.04 | 37.71 | 8.21 | 43.49 | 2.10 | 54.57 | 73.9 | 19.3 | 182 | 127 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Peak measurement value with Duty cycle correction factor (DCCF)**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | DCCF [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 4880.000 | PK | 49.58 | 31.63 | 6.72 | 42.93 | -22.15 | 2.10 | 24.95 | 53.9 | 28.9 | - |
| Hori. | 7320.000 | PK | 49.67 | 37.71 | 8.21 | 43.49 | -22.15 | 2.10 | 32.05 | 53.9 | 21.8 | - |
| Vert. | 4880.000 | PK | 50.45 | 31.63 | 6.72 | 42.93 | -22.15 | 2.10 | 25.82 | 53.9 | 28.0 | - |
| Vert. | 7320.000 | PK | 50.04 | 37.71 | 8.21 | 43.49 | -22.15 | 2.10 | 32.42 | 53.9 | 21.4 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + DCCF + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.

# Radiated Spurious Emission

| | | | | |
|---|---|---|---|---|
| Report No. | 13462774S-B-R1 | | | |
| Test place | Shonan EMC Lab. | | | |
| Semi Anechoic Chamber | 3 | 3 | 3 | 3 |
| Date | August 26, 2020 | August 22, 2020 | August 23, 2020 | August 24, 2020 |
| Temperature / Humidity | 23 deg. C / 60 % RH | 21 deg. C / 60 % RH | 25 deg. C / 61 % RH | 25 deg. C / 60 % RH |
| Engineer | Kazuya Noda | Yohsuke Matsuzawa | Yohsuke Matsuzawa | Yosuke Murakami |
| | ( 30 MHz - 1 GHz ) | ( 1 GHz - 2.8 GHz ) | ( 2.8 GHz - 10 GHz ) | ( 10 GHz - 26.5 GHz ) |
| Mode | Tx BT LE 1 M-PHY 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. | 200.000 | QP | 39.10 | 16.56 | 7.83 | 32.04 | 0.00 | 31.45 | 43.5 | 12.0 | 161 | 312 | - |
| Hori. | 214.916 | QP | 44.40 | 11.22 | 8.06 | 32.03 | 0.00 | 31.65 | 43.5 | 11.8 | 147 | 353 | - |
| Hori. | 240.009 | QP | 48.70 | 11.57 | 8.20 | 32.00 | 0.00 | 36.47 | 46.0 | 9.5 | 170 | 333 | - |
| Hori. | 375.011 | QP | 44.00 | 15.11 | 8.89 | 31.93 | 0.00 | 36.07 | 46.0 | 9.9 | 100 | 40 | - |
| Hori. | 519.938 | QP | 41.10 | 17.67 | 9.49 | 31.95 | 0.00 | 36.31 | 46.0 | 9.6 | 175 | 124 | - |
| Hori. | 765.275 | QP | 37.00 | 20.37 | 10.39 | 31.71 | 0.00 | 36.05 | 46.0 | 9.9 | 100 | 10 | - |
| Hori. | 870.630 | QP | 35.80 | 22.00 | 10.73 | 31.21 | 0.00 | 37.32 | 46.0 | **8.6** | 100 | 231 | - |
| Hori. | 2483.500 | PK | 50.06 | 28.28 | 14.31 | 41.69 | 2.10 | 53.06 | 73.9 | 20.8 | 254 | 139 | - |
| Hori. | 4960.000 | PK | 49.89 | 31.79 | 6.79 | 42.94 | 2.10 | 47.63 | 73.9 | 26.2 | 149 | 73 | - |
| Hori. | 7440.000 | PK | 50.00 | 37.88 | 8.26 | 43.60 | 2.10 | 54.64 | 73.9 | 19.2 | 149 | 106 | - |
| Vert. | 56.697 | QP | 37.10 | 9.01 | 6.66 | 32.16 | 0.00 | 20.61 | 40.0 | 19.3 | 100 | 280 | - |
| Vert. | 84.005 | QP | 40.90 | 7.00 | 7.57 | 32.15 | 0.00 | 23.32 | 40.0 | 16.6 | 100 | 267 | - |
| Vert. | 786.422 | QP | 35.70 | 20.60 | 10.45 | 31.68 | 0.00 | 35.07 | 46.0 | 10.9 | 100 | 151 | - |
| Vert. | 2483.500 | PK | 50.00 | 28.28 | 14.31 | 41.69 | 2.10 | 53.00 | 73.9 | 20.9 | 153 | 312 | - |
| Vert. | 4960.000 | PK | 50.51 | 31.79 | 6.79 | 42.94 | 2.10 | 48.25 | 73.9 | 25.6 | 160 | 47 | - |
| Vert. | 7440.000 | PK | 50.91 | 37.88 | 8.26 | 43.60 | 2.10 | 55.55 | 73.9 | 18.3 | 151 | 8 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Peak measurement value with Duty cycle correction factor (DCCF)**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | DCCF [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2483.500 | PK | 50.06 | 28.28 | 14.31 | 41.69 | -22.15 | 2.10 | 30.91 | 53.9 | 22.9 | *1) |
| Hori. | 4960.000 | PK | 49.89 | 31.79 | 6.79 | 42.94 | -22.15 | 2.10 | 25.48 | 53.9 | 28.4 | - |
| Hori. | 7440.000 | PK | 50.00 | 37.88 | 8.26 | 43.60 | -22.15 | 2.10 | 32.49 | 53.9 | 21.4 | - |
| Vert. | 2483.500 | PK | 50.00 | 28.28 | 14.31 | 41.69 | -22.15 | 2.10 | 30.85 | 53.9 | 23.0 | *1) |
| Vert. | 4960.000 | PK | 50.51 | 31.79 | 6.79 | 42.94 | -22.15 | 2.10 | 26.10 | 53.9 | 27.8 | - |
| Vert. | 7440.000 | PK | 50.91 | 37.88 | 8.26 | 43.60 | -22.15 | 2.10 | 33.40 | 53.9 | 20.5 | - |

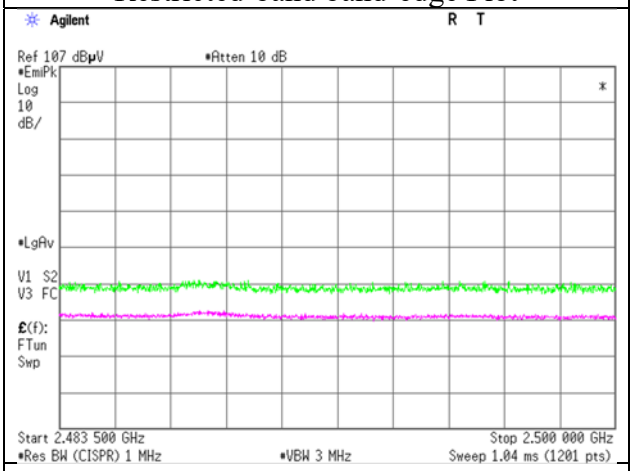
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + DCCF + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.
*1) Not out of band emission (Leakage Power)

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 3 |
| Date | August 22, 2020 |
| Temperature / Humidity | 21 deg. C / 60 % RH |
| Engineer | Yohsuke Matsuzawa |
| Mode | Tx BT LE 1 M-PHY 2480 MHz |

Horizontal

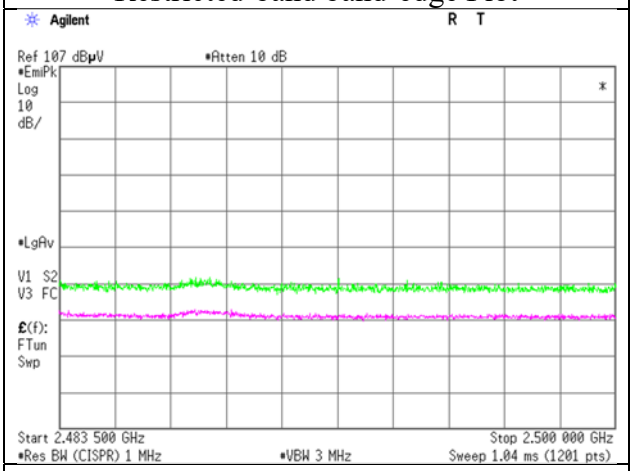
Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

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

# Radiated Spurious Emission

| | | | | |
|---|---|---|---|---|
| Report No. | 13462774S-B-R1 | | | |
| Test place | Shonan EMC Lab. | | | |
| Semi Anechoic Chamber | 3 | 3 | 3 | 3 |
| Date | August 26, 2020 | August 22, 2020 | August 23, 2020 | August 24, 2020 |
| Temperature / Humidity | 23 deg. C / 60 % RH | 21 deg. C / 60 % RH | 25 deg. C / 61 % RH | 25 deg. C / 60 % RH |
| Engineer | Yohsuke Matsuzawa ( 30 MHz - 1 GHz ) | Yohsuke Matsuzawa ( 1 GHz - 2.8 GHz ) | Yohsuke Matsuzawa ( 2.8 GHz - 10 GHz ) | Yosuke Murakami ( 10 GHz - 26.5 GHz ) |
| Mode | Tx BT LE 2 M-PHY 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. | 200.000 | QP | 39.30 | 16.56 | 7.83 | 32.04 | 0.00 | 31.65 | 43.5 | 11.8 | 160 | 315 | - |
| Hori. | 214.899 | QP | 43.80 | 11.22 | 8.06 | 32.03 | 0.00 | 31.05 | 43.5 | 12.4 | 149 | 357 | - |
| Hori. | 240.010 | QP | 49.00 | 11.57 | 8.20 | 32.00 | 0.00 | 36.77 | 46.0 | 9.2 | 134 | 329 | - |
| Hori. | 375.018 | QP | 44.10 | 15.11 | 8.89 | 31.93 | 0.00 | 36.17 | 46.0 | 9.8 | 100 | 41 | - |
| Hori. | 425.017 | QP | 40.60 | 16.06 | 9.12 | 31.94 | 0.00 | 33.84 | 46.0 | 12.1 | 100 | 292 | - |
| Hori. | 520.028 | QP | 40.60 | 17.67 | 9.49 | 31.95 | 0.00 | 35.81 | 46.0 | 10.1 | 100 | 347 | - |
| Hori. | 777.428 | QP | 37.80 | 20.43 | 10.43 | 31.69 | 0.00 | 36.97 | 46.0 | 9.0 | 100 | 9 | - |
| Hori. | 871.083 | QP | 36.60 | 22.01 | 10.73 | 31.20 | 0.00 | 38.14 | 46.0 | **7.8** | 100 | 235 | - |
| Hori. | 2390.000 | PK | 49.53 | 28.41 | 14.22 | 41.66 | 2.10 | 52.60 | 73.9 | 21.3 | 156 | 144 | - |
| Hori. | 4804.000 | PK | 50.23 | 31.60 | 6.68 | 42.92 | 2.10 | 47.69 | 73.9 | 26.2 | 256 | 181 | - |
| Hori. | 7206.000 | PK | 50.35 | 37.60 | 8.16 | 43.39 | 2.10 | 54.82 | 73.9 | 19.0 | 151 | 208 | - |
| Vert. | 55.720 | QP | 36.00 | 9.29 | 6.70 | 32.16 | 0.00 | 19.83 | 40.0 | 20.1 | 100 | 289 | - |
| Vert. | 779.785 | QP | 37.00 | 20.48 | 10.43 | 31.69 | 0.00 | 36.22 | 46.0 | 9.7 | 100 | 156 | - |
| Vert. | 2390.000 | PK | 49.43 | 28.41 | 14.22 | 41.66 | 2.10 | 52.50 | 73.9 | 21.4 | 163 | 313 | - |
| Vert. | 4804.000 | PK | 52.90 | 31.60 | 6.68 | 42.92 | 2.10 | 50.36 | 73.9 | 23.5 | 163 | 183 | - |
| Vert. | 7206.000 | PK | 52.50 | 37.60 | 8.16 | 43.39 | 2.10 | 56.97 | 73.9 | 16.9 | 150 | 116 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Peak measurement value with Duty cycle correction factor (DCCF)**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | DCCF [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2390.000 | PK | 49.53 | 28.41 | 14.22 | 41.66 | -28.17 | 2.10 | 24.43 | 53.9 | 29.4 | *1) |
| Hori. | 4804.000 | PK | 50.23 | 31.60 | 6.68 | 42.92 | -28.17 | 2.10 | 19.52 | 53.9 | 34.3 | - |
| Hori. | 7206.000 | PK | 50.35 | 37.60 | 8.16 | 43.39 | -28.17 | 2.10 | 26.65 | 53.9 | 27.2 | - |
| Vert. | 2390.000 | PK | 49.43 | 28.41 | 14.22 | 41.66 | -28.17 | 2.10 | 24.33 | 53.9 | 29.5 | *1) |
| Vert. | 4804.000 | PK | 52.90 | 31.60 | 6.68 | 42.92 | -28.17 | 2.10 | 22.19 | 53.9 | 31.7 | - |
| Vert. | 7206.000 | PK | 52.50 | 37.60 | 8.16 | 43.39 | -28.17 | 2.10 | 28.80 | 53.9 | 25.1 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + DCCF + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.
*1) Not out of band emission (Leakage Power)

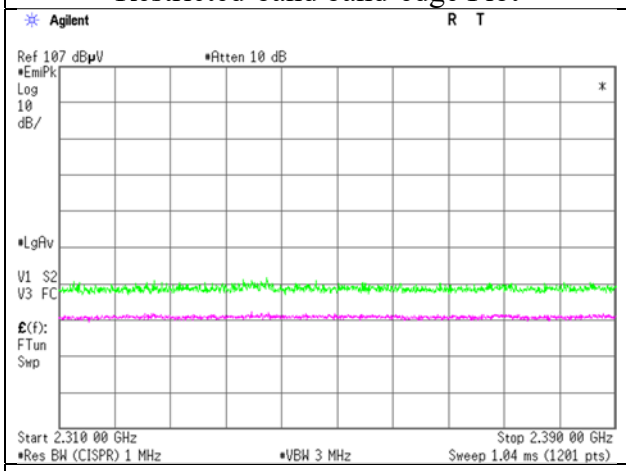
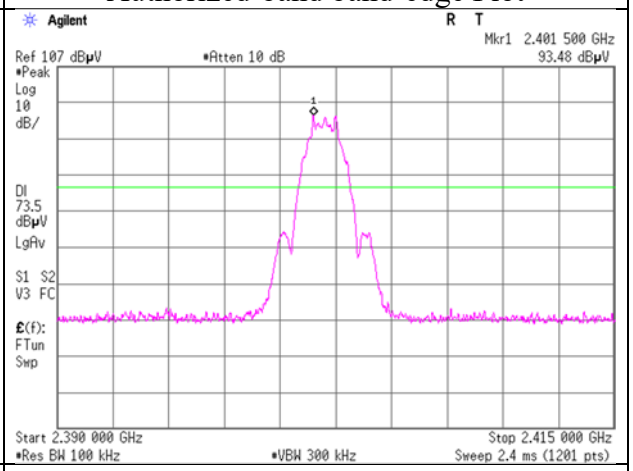
**20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)**

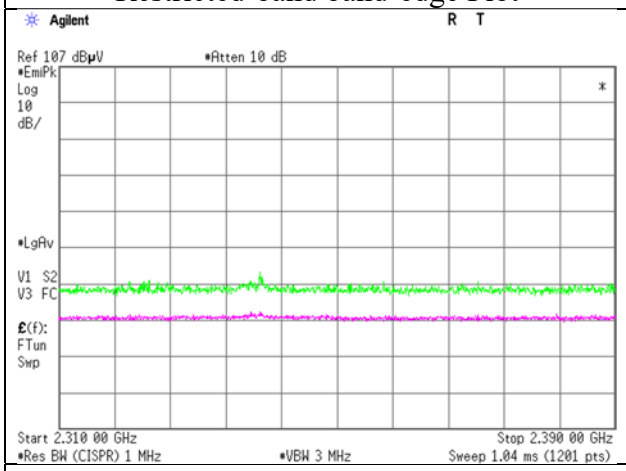
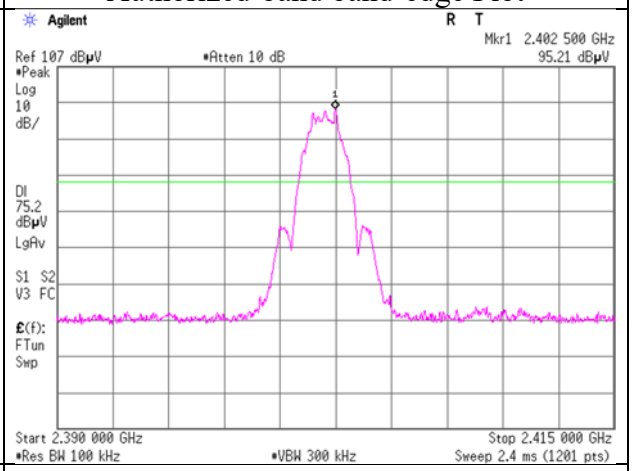
| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2402.000 | PK | 93.37 | 28.38 | 14.23 | 41.67 | 2.10 | 96.41 | - | - | Carrier |
| Hori. | 2400.000 | PK | 61.24 | 28.38 | 14.22 | 41.67 | 2.10 | 64.27 | 76.4 | 12.1 | - |
| Vert. | 2402.000 | PK | 95.00 | 28.38 | 14.23 | 41.67 | 2.10 | 98.04 | - | - | Carrier |
| Vert. | 2400.000 | PK | 63.02 | 28.38 | 14.22 | 41.67 | 2.10 | 66.05 | 78.0 | 11.9 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 3 |
| Date | August 22, 2020 |
| Temperature / Humidity | 21 deg. C / 60 % RH |
| Engineer | Yohsuke Matsuzawa |
| Mode | Tx BT LE 2 M-PHY 2402 MHz |

| Horizontal | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|   |   |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |

| Vertical | |
|---|---|
| Restricted-band band-edge Plot | Authorized-band band-edge Plot |
|   |   |
| Trace Green : Peak Plot<br>Trace Purple : Average Plot | 20dBc Plot |

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

# Radiated Spurious Emission

| | | | | |
|---|---|---|---|---|
| Report No. | 13462774S-B-R1 | | | |
| Test place | Shonan EMC Lab. | | | |
| Semi Anechoic Chamber | 3 | 3 | 3 | 3 |
| Date | August 26, 2020 | August 22, 2020 | August 23, 2020 | August 24, 2020 |
| Temperature / Humidity | 23 deg. C / 60 % RH | 21 deg. C / 60 % RH | 25 deg. C / 61 % RH | 25 deg. C / 60 % RH |
| Engineer | Yohsuke Matsuzawa ( 30 MHz - 1 GHz ) | Yohsuke Matsuzawa ( 1 GHz - 2.8 GHz ) | Yohsuke Matsuzawa ( 2.8 GHz - 10 GHz ) | Yosuke Murakami ( 10 GHz - 26.5 GHz ) |
| Mode | Tx BT LE 2 M-PHY 2440 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. | 175.001 | QP | 38.70 | 15.73 | 7.81 | 32.06 | 0.00 | 30.18 | 43.5 | 13.3 | 183 | 216 | - |
| Hori. | 225.008 | QP | 46.00 | 11.26 | 8.12 | 32.01 | 0.00 | 33.37 | 46.0 | 12.6 | 146 | 359 | - |
| Hori. | 240.008 | QP | 49.20 | 11.57 | 8.20 | 32.00 | 0.00 | 36.97 | 46.0 | 9.0 | 138 | 333 | - |
| Hori. | 375.006 | QP | 44.10 | 15.11 | 8.89 | 31.93 | 0.00 | 36.17 | 46.0 | 9.8 | 100 | 63 | - |
| Hori. | 425.009 | QP | 41.00 | 16.06 | 9.12 | 31.94 | 0.00 | 34.24 | 46.0 | 11.7 | 100 | 288 | - |
| Hori. | 519.745 | QP | 40.30 | 17.68 | 9.49 | 31.95 | 0.00 | 35.52 | 46.0 | 10.4 | 100 | 345 | - |
| Hori. | 762.898 | QP | 37.80 | 20.34 | 10.39 | 31.71 | 0.00 | 36.82 | 46.0 | 9.1 | 100 | 13 | - |
| Hori. | 870.524 | QP | 36.90 | 22.00 | 10.73 | 31.21 | 0.00 | 38.42 | 46.0 | **7.5** | 100 | 230 | - |
| Hori. | 4880.000 | PK | 49.92 | 31.63 | 6.72 | 42.93 | 2.10 | 47.44 | 73.9 | 26.4 | 148 | 185 | - |
| Hori. | 7320.000 | PK | 49.06 | 37.71 | 8.21 | 43.49 | 2.10 | 53.59 | 73.9 | 20.3 | 175 | 91 | - |
| Vert. | 56.456 | QP | 37.60 | 9.08 | 6.67 | 32.16 | 0.00 | 21.19 | 40.0 | 18.8 | 100 | 267 | - |
| Vert. | 781.622 | QP | 34.30 | 20.52 | 10.44 | 31.69 | 0.00 | 33.57 | 46.0 | 12.4 | 100 | 148 | - |
| Vert. | 4880.000 | PK | 51.48 | 31.63 | 6.72 | 42.93 | 2.10 | 49.00 | 73.9 | 24.9 | 159 | 180 | - |
| Vert. | 7320.000 | PK | 49.17 | 37.71 | 8.21 | 43.49 | 2.10 | 53.70 | 73.9 | 20.2 | 184 | 129 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Peak measurement value with Duty cycle correction factor (DCCF)**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | DCCF [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 4880.000 | PK | 49.92 | 31.63 | 6.72 | 42.93 | -28.17 | 2.10 | 19.27 | 53.9 | 34.6 | - |
| Hori. | 7320.000 | PK | 49.06 | 37.71 | 8.21 | 43.49 | -28.17 | 2.10 | 25.42 | 53.9 | 28.4 | - |
| Vert. | 4880.000 | PK | 51.48 | 31.63 | 6.72 | 42.93 | -28.17 | 2.10 | 20.83 | 53.9 | 33.0 | - |
| Vert. | 7320.000 | PK | 49.17 | 37.71 | 8.21 | 43.49 | -28.17 | 2.10 | 25.53 | 53.9 | 28.3 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + DCCF + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.

# Radiated Spurious Emission

| | | | | |
|---|---|---|---|---|
| Report No. | 13462774S-B-R1 | | | |
| Test place | Shonan EMC Lab. | | | |
| Semi Anechoic Chamber | 3 | 3 | 3 | 3 |
| Date | August 26, 2020 | August 22, 2020 | August 23, 2020 | August 24, 2020 |
| Temperature / Humidity | 23 deg. C / 60 % RH | 21 deg. C / 60 % RH | 25 deg. C / 61 % RH | 25 deg. C / 60 % RH |
| Engineer | Yohsuke Matsuzawa | Yohsuke Matsuzawa | Yohsuke Matsuzawa | Yosuke Murakami |
| | ( 30 MHz - 1 GHz ) | ( 1 GHz - 2.8 GHz ) | ( 2.8 GHz - 10 GHz ) | ( 10 GHz - 26.5 GHz ) |
| Mode | Tx BT LE 2 M-PHY 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. | 175.002 | QP | 38.60 | 15.73 | 7.81 | 32.06 | 0.00 | 30.08 | 43.5 | 13.4 | 184 | 215 | - |
| Hori. | 219.507 | QP | 46.20 | 11.21 | 8.09 | 32.02 | 0.00 | 33.48 | 46.0 | 12.5 | 148 | 356 | - |
| Hori. | 240.007 | QP | 49.20 | 11.57 | 8.20 | 32.00 | 0.00 | 36.97 | 46.0 | 9.0 | 138 | 338 | - |
| Hori. | 375.009 | QP | 44.20 | 15.11 | 8.89 | 31.93 | 0.00 | 36.27 | 46.0 | 9.7 | 100 | 59 | - |
| Hori. | 425.010 | QP | 41.00 | 16.06 | 9.12 | 31.94 | 0.00 | 34.24 | 46.0 | 11.7 | 100 | 289 | - |
| Hori. | 520.017 | QP | 40.40 | 17.67 | 9.49 | 31.95 | 0.00 | 35.61 | 46.0 | 10.3 | 200 | 343 | - |
| Hori. | 761.295 | QP | 38.10 | 20.31 | 10.38 | 31.72 | 0.00 | 37.07 | 46.0 | 8.9 | 100 | 19 | - |
| Hori. | 870.200 | QP | 37.30 | 21.99 | 10.73 | 31.21 | 0.00 | 38.81 | 46.0 | **7.1** | 100 | 230 | - |
| Hori. | 2483.500 | PK | 51.16 | 28.28 | 14.31 | 41.69 | 2.10 | 54.16 | 73.9 | 19.7 | 189 | 128 | - |
| Hori. | 4960.000 | PK | 49.90 | 31.79 | 6.79 | 42.94 | 2.10 | 47.64 | 73.9 | 26.2 | 114 | 211 | - |
| Hori. | 7440.000 | PK | 48.87 | 37.88 | 8.26 | 43.60 | 2.10 | 53.51 | 73.9 | 20.3 | 102 | 150 | - |
| Vert. | 56.885 | QP | 36.80 | 8.96 | 6.65 | 32.16 | 0.00 | 20.25 | 40.0 | 19.7 | 100 | 274 | - |
| Vert. | 772.200 | QP | 34.90 | 20.41 | 10.41 | 31.70 | 0.00 | 34.02 | 46.0 | 11.9 | 100 | 150 | - |
| Vert. | 2483.500 | PK | 50.95 | 28.28 | 14.31 | 41.69 | 2.10 | 53.95 | 73.9 | 19.9 | 155 | 311 | - |
| Vert. | 4960.000 | PK | 51.78 | 31.79 | 6.79 | 42.94 | 2.10 | 49.52 | 73.9 | 24.3 | 184 | 182 | - |
| Vert. | 7440.000 | PK | 50.07 | 37.88 | 8.26 | 43.60 | 2.10 | 54.71 | 73.9 | 19.1 | 154 | 7 | - |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

**Peak measurement value with Duty cycle correction factor (DCCF)**

| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | DCCF [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2483.500 | PK | 51.16 | 28.28 | 14.31 | 41.69 | -28.17 | 2.10 | 25.99 | 53.9 | 27.9 | *1) |
| Hori. | 4960.000 | PK | 49.90 | 31.79 | 6.79 | 42.94 | -28.17 | 2.10 | 19.47 | 53.9 | 34.4 | - |
| Hori. | 7440.000 | PK | 48.87 | 37.88 | 8.26 | 43.60 | -28.17 | 2.10 | 25.34 | 53.9 | 28.5 | - |
| Vert. | 2483.500 | PK | 50.95 | 28.28 | 14.31 | 41.69 | -28.17 | 2.10 | 25.78 | 53.9 | 28.1 | *1) |
| Vert. | 4960.000 | PK | 51.78 | 31.79 | 6.79 | 42.94 | -28.17 | 2.10 | 21.35 | 53.9 | 32.5 | - |
| Vert. | 7440.000 | PK | 50.07 | 37.88 | 8.26 | 43.60 | -28.17 | 2.10 | 26.54 | 53.9 | 27.3 | - |

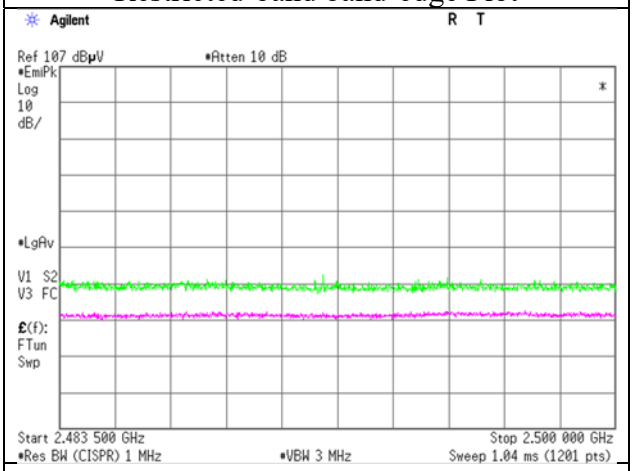
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + DCCF + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (3.82 m / 3.0 m) = 2.10 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB
Duty cycle correction factor (DCCF) refer to "Duty cycle correction factor" sheet.
*1) Not out of band emission (Leakage Power)

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

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. |
| Semi Anechoic Chamber | 3 |
| Date | August 22, 2020 |
| Temperature / Humidity | 21 deg. C / 60 % RH |
| Engineer | Yohsuke Matsuzawa |
| Mode | Tx BT LE 2 M-PHY 2480 MHz |

Horizontal

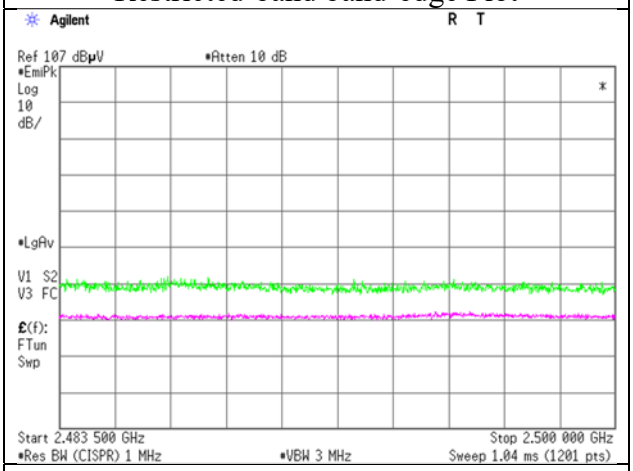
Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

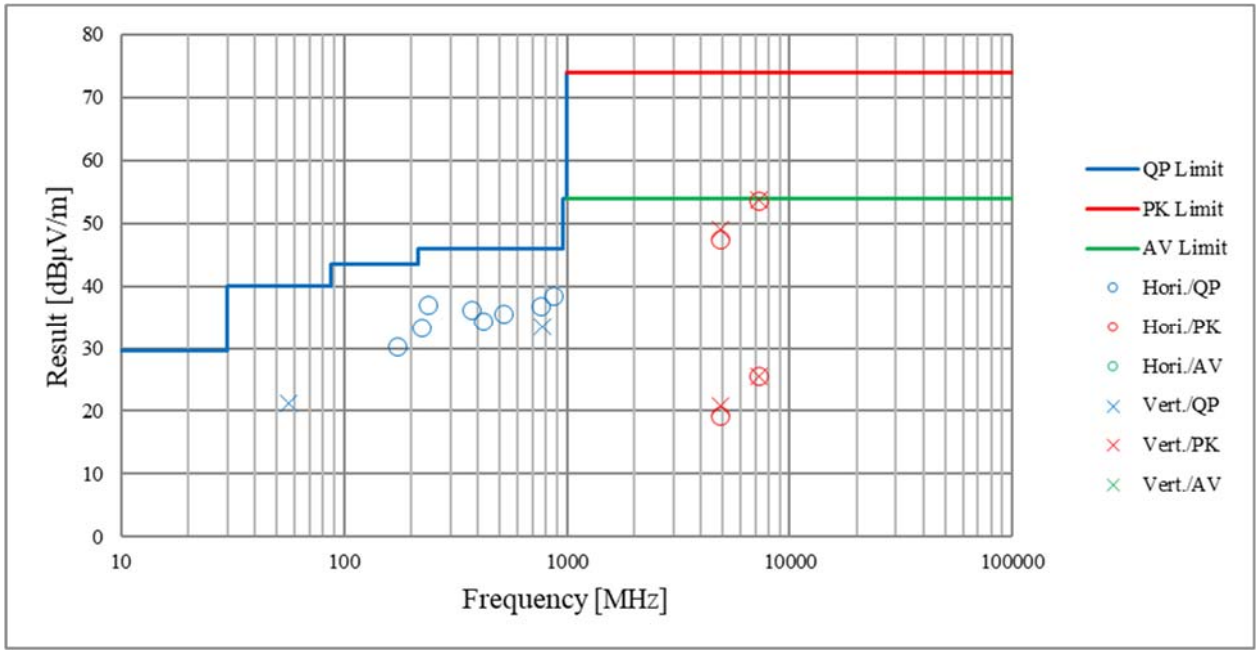



Trace Green : Peak Plot
Trace Purple : Average Plot

* 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)

| | | | | |
|---|---|---|---|---|
| Report No. | 13462774S-B-R1 | | | |
| Test place | Shonan EMC Lab. | | | |
| Semi Anechoic Chamber | 3 | 3 | 3 | 3 |
| Date | August 26, 2020 | August 22, 2020 | August 23, 2020 | August 24, 2020 |
| Temperature / Humidity | 23 deg. C / 60 % RH | 21 deg. C / 60 % RH | 25 deg. C / 61 % RH | 25 deg. C / 60 % RH |
| Engineer | Yohsuke Matsuzawa | Yohsuke Matsuzawa | Yohsuke Matsuzawa | Yosuke Murakami |
| | ( 30 MHz - 1 GHz ) | ( 1 GHz - 2.8 GHz ) | ( 2.8 GHz - 10 GHz ) | ( 10 GHz - 26.5 GHz ) |
| Mode | Tx BT LE 2 M-PHY 2440 MHz | | | |

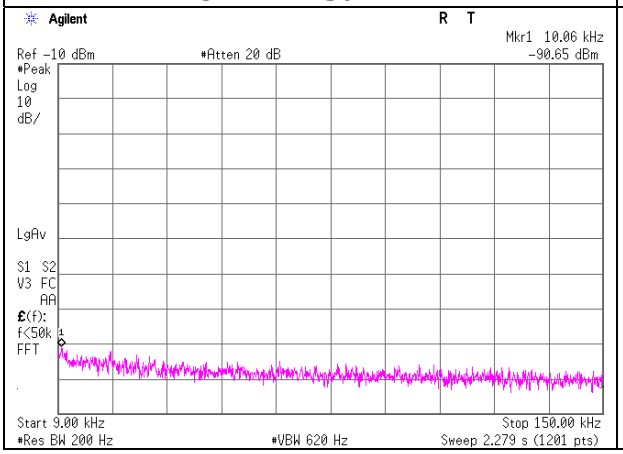



*These plots data contains sufficient number to show the trend of characteristic features for EUT.

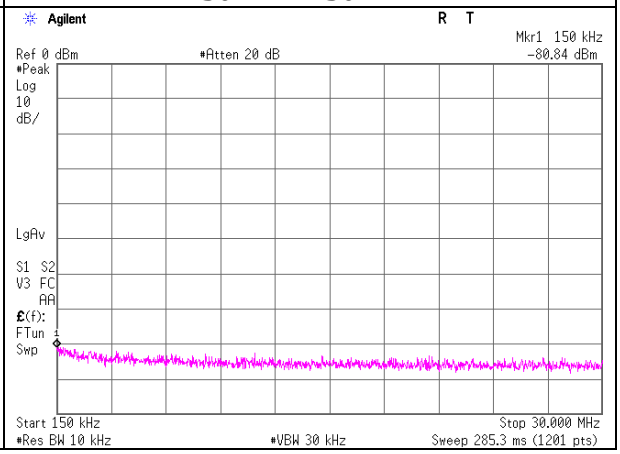
# Conducted Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | September 9, 2020 |
| Temperature / Humidity | 24 deg. C / 57 % RH |
| Engineer | Shiro Kobayashi |
| Mode | Tx 11n-20 2437 MHz |

## 9 kHz - 150 kHz




## 150 kHz - 30 MHz




| Frequency [kHz] | Reading [dBm] | Cable Loss [dB] | Attenuator [dB] | Antenna Gain* [dBi] | N (Number of Output) | EIRP [dBm] | Distance [m] | Ground bounce [dB] | E (field strength) [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10.06 | -90.65 | 0.01 | 9.73 | 2.0 | 1 | -78.9 | 300 | 6.0 | -17.7 | 47.5 | 65.2 | - |
| 150.00 | -80.84 | 0.01 | 9.73 | 2.0 | 1 | -69.1 | 300 | 6.0 | -7.8 | 24.0 | 31.8 | - |

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

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

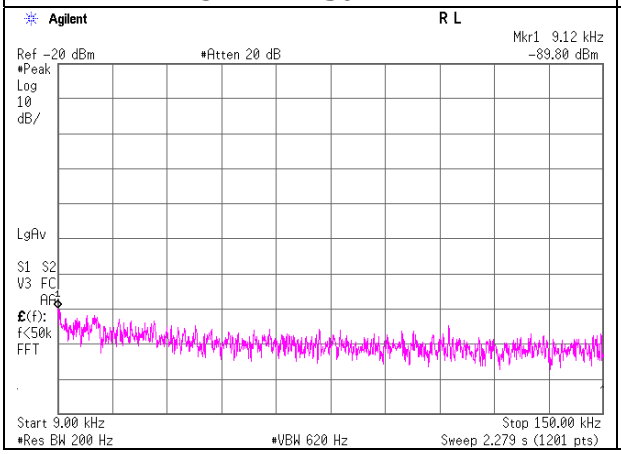
N: Number of output

*2.0 dBi was applied to the test result based on KDB 789033 since antenna gain was less than 2.0 dBi.

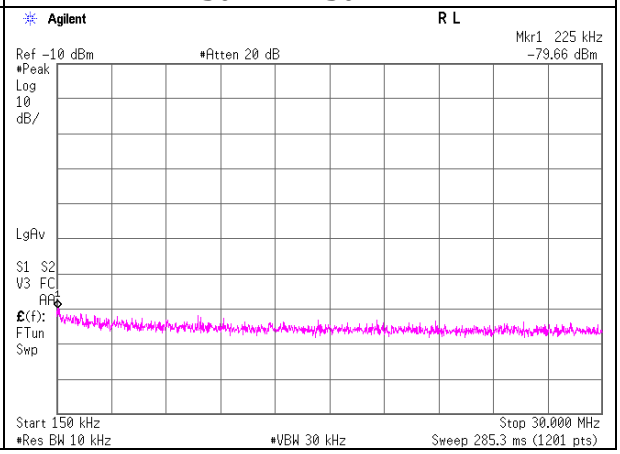
# Conducted Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | September 9, 2020 |
| Temperature / Humidity | 24 deg. C / 57 % RH |
| Engineer | Shiro Kobayashi |
| Mode | Tx BT LE 1 M-PHY 2402 MHz |

## 9 kHz - 150 kHz




## 150 kHz - 30 MHz




| Frequency [kHz] | Reading [dBm] | Cable Loss [dB] | Attenuator [dB] | Antenna Gain* [dBi] | N (Number of Output) | EIRP [dBm] | Distance [m] | Ground bounce [dB] | E (field strength) [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.12 | -89.80 | 0.01 | 9.81 | 2.0 | 1 | -78.0 | 300 | 6.0 | -16.7 | 48.4 | 65.1 | - |
| 225.00 | -79.66 | 0.01 | 9.81 | 2.0 | 1 | -67.8 | 300 | 6.0 | -6.6 | 20.5 | 27.1 | - |

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

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

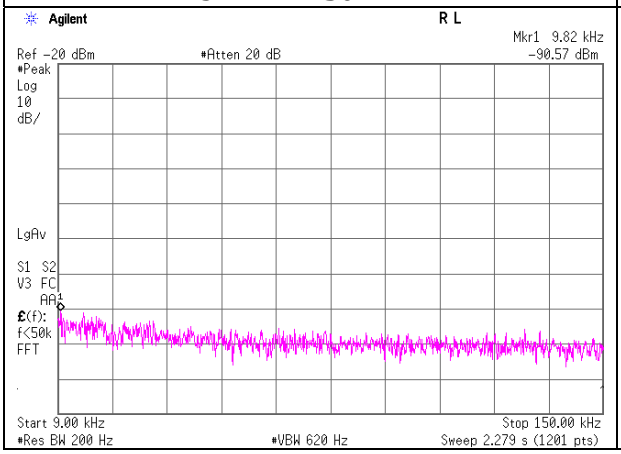
N: Number of output

*2.0 dBi was applied to the test result based on KDB 789033 since antenna gain was less than 2.0 dBi.

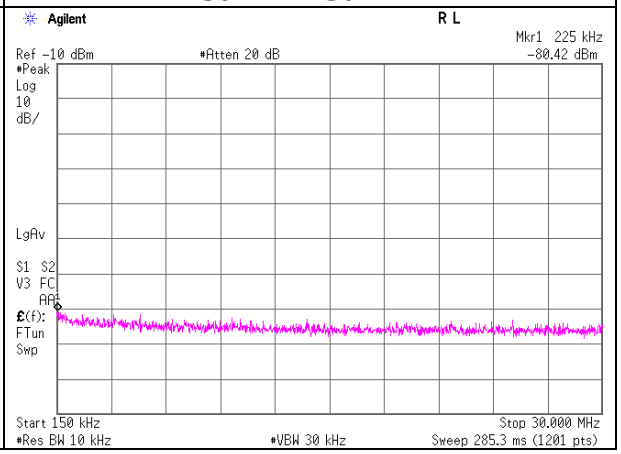
# Conducted Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | September 9, 2020 |
| Temperature / Humidity | 24 deg. C / 57 % RH |
| Engineer | Shiro Kobayashi |
| Mode | Tx BT LE 1 M-PHY 2440 MHz |

## 9 kHz - 150 kHz




## 150 kHz - 30 MHz




| Frequency [kHz] | Reading [dBm] | Cable Loss [dB] | Attenuator [dB] | Antenna Gain* [dBi] | N (Number of Output) | EIRP [dBm] | Distance [m] | Ground bounce [dB] | E (field strength) [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.82 | -90.57 | 0.01 | 9.81 | 2.0 | 1 | -78.8 | 300 | 6.0 | -17.5 | 47.7 | 65.2 | - |
| 225.00 | -80.42 | 0.01 | 9.81 | 2.0 | 1 | -68.6 | 300 | 6.0 | -7.3 | 20.5 | 27.8 | - |

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

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

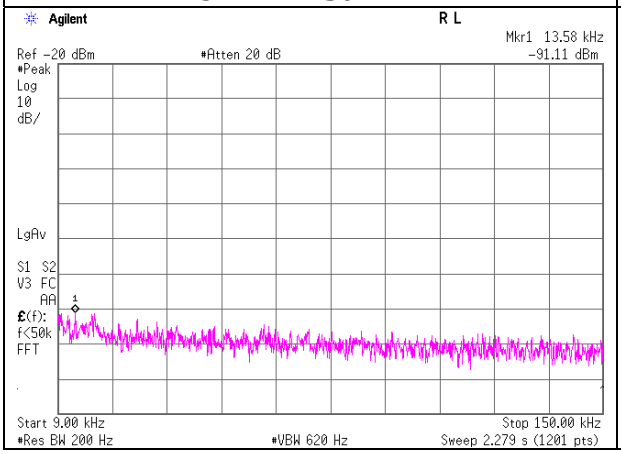
N: Number of output

*2.0 dBi was applied to the test result based on KDB 789033 since antenna gain was less than 2.0 dBi.

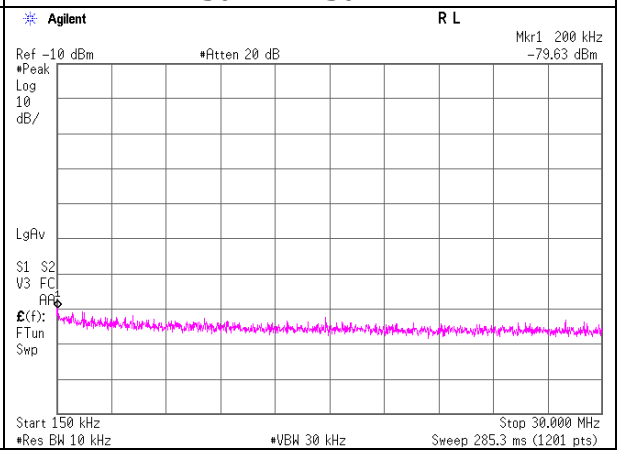
# Conducted Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | September 9, 2020 |
| Temperature / Humidity | 24 deg. C / 57 % RH |
| Engineer | Shiro Kobayashi |
| Mode | Tx BT LE 1 M-PHY 2480 MHz |

## 9 kHz - 150 kHz




## 150 kHz - 30 MHz




| Frequency [kHz] | Reading [dBm] | Cable Loss [dB] | Attenuator [dB] | Antenna Gain* [dBi] | N (Number of Output) | EIRP [dBm] | Distance [m] | Ground bounce [dB] | E (field strength) [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 13.58 | -91.11 | 0.01 | 9.81 | 2.0 | 1 | -79.3 | 300 | 6.0 | -18.0 | 44.9 | 62.9 | - |
| 200.00 | -79.63 | 0.01 | 9.81 | 2.0 | 1 | -67.8 | 300 | 6.0 | -6.6 | 21.5 | 28.1 | - |

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

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

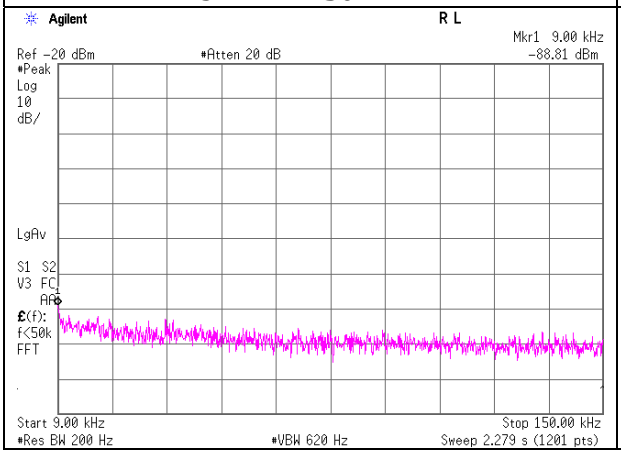
N: Number of output

*2.0 dBi was applied to the test result based on KDB 789033 since antenna gain was less than 2.0 dBi.

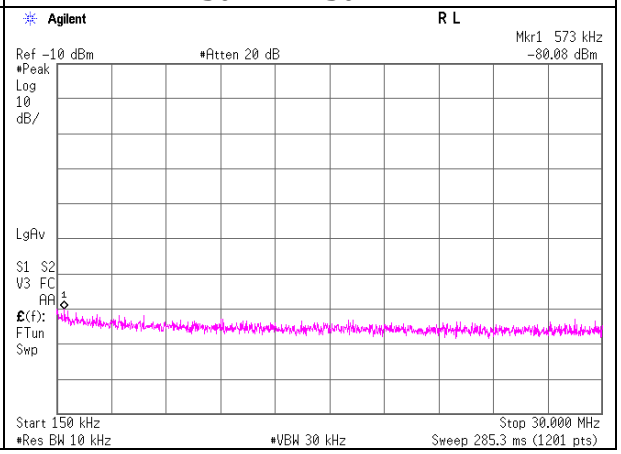
# Conducted Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | September 9, 2020 |
| Temperature / Humidity | 24 deg. C / 57 % RH |
| Engineer | Shiro Kobayashi |
| Mode | Tx BT LE 2 M-PHY 2402 MHz |

## 9 kHz - 150 kHz




## 150 kHz - 30 MHz




| Frequency [kHz] | Reading [dBm] | Cable Loss [dB] | Attenuator [dB] | Antenna Gain* [dBi] | N (Number of Output) | EIRP [dBm] | Distance [m] | Ground bounce [dB] | E (field strength) [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.00 | -88.81 | 0.01 | 9.81 | 2.0 | 1 | -77.0 | 300 | 6.0 | -15.7 | 48.5 | 64.2 | - |
| 573.00 | -80.08 | 0.01 | 9.81 | 2.0 | 1 | -68.3 | 30 | 6.0 | 13.0 | 32.4 | 19.4 | - |

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

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

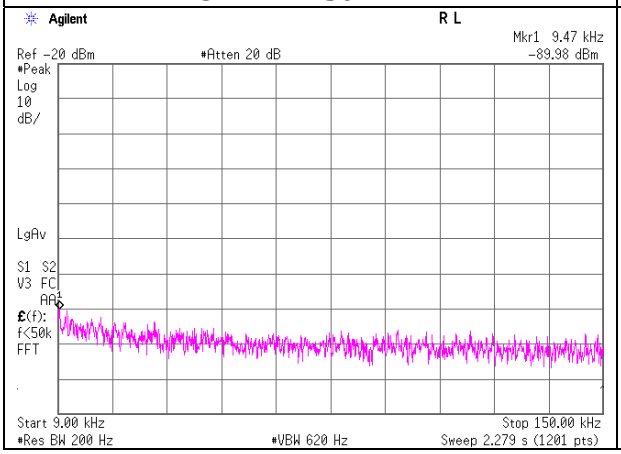
N: Number of output

*2.0 dBi was applied to the test result based on KDB 789033 since antenna gain was less than 2.0 dBi.

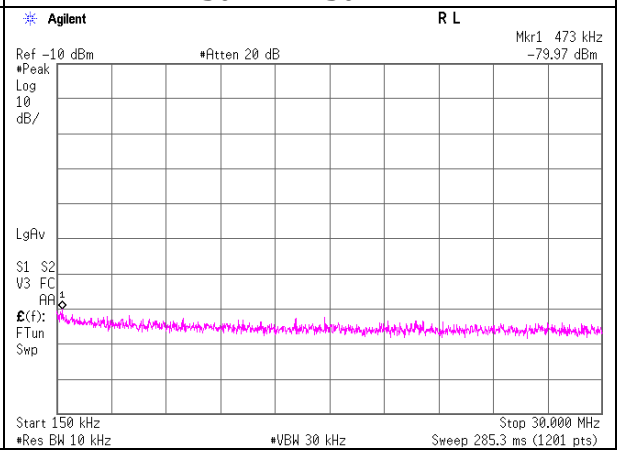
# Conducted Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | September 9, 2020 |
| Temperature / Humidity | 24 deg. C / 57 % RH |
| Engineer | Shiro Kobayashi |
| Mode | Tx BT LE 2 M-PHY 2440 MHz |

## 9 kHz - 150 kHz




## 150 kHz - 30 MHz




| Frequency [kHz] | Reading [dBm] | Cable Loss [dB] | Attenuator [dB] | Antenna Gain* [dBi] | N (Number of Output) | EIRP [dBm] | Distance [m] | Ground bounce [dB] | E (field strength) [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.47 | -89.98 | 0.01 | 9.81 | 2.0 | 1 | -78.2 | 300 | 6.0 | -16.9 | 48.0 | 64.9 | - |
| 473.00 | -79.97 | 0.01 | 9.81 | 2.0 | 1 | -68.2 | 300 | 6.0 | -6.9 | 14.1 | 21.0 | - |

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

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

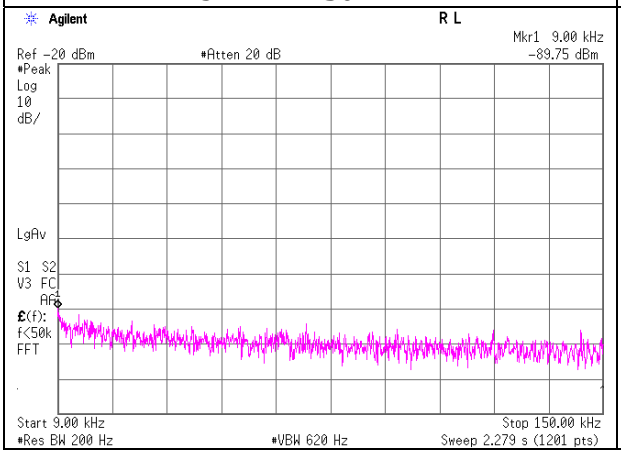
N: Number of output

*2.0 dBi was applied to the test result based on KDB 789033 since antenna gain was less than 2.0 dBi.

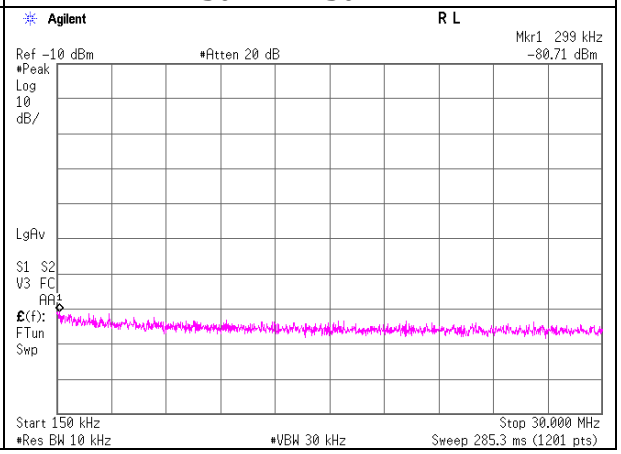
# Conducted Spurious Emission

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | September 9, 2020 |
| Temperature / Humidity | 24 deg. C / 57 % RH |
| Engineer | Shiro Kobayashi |
| Mode | Tx BT LE 2 M-PHY 2480 MHz |

## 9 kHz - 150 kHz




## 150 kHz - 30 MHz




| Frequency [kHz] | Reading [dBm] | Cable Loss [dB] | Attenuator [dB] | Antenna Gain* [dBi] | N (Number of Output) | EIRP [dBm] | Distance [m] | Ground bounce [dB] | E (field strength) [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9.00 | -89.75 | 0.01 | 9.81 | 2.0 | 1 | -77.9 | 300 | 6.0 | -16.7 | 48.5 | 65.2 | - |
| 299.00 | -80.71 | 0.01 | 9.81 | 2.0 | 1 | -68.9 | 300 | 6.0 | -7.6 | 18.0 | 25.6 | - |

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

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

N: Number of output

*2.0 dBi was applied to the test result based on KDB 789033 since antenna gain was less than 2.0 dBi.

# Power Density

| | |
|---|---|
| Report No. | 13462774S-B-R1 |
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Date | September 4, 2020 |
| Temperature / Humidity | 24 deg. C / 54 % RH |
| Engineer | Toshinori Yamada |
| Mode | Tx |

11b

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. Loss [dB] | Result [dBm] | Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|
| 2412 | -17.93 | 2.10 | 9.81 | -6.02 | 8.00 | 14.02 |
| 2437 | -17.30 | 2.10 | 9.82 | -5.38 | 8.00 | 13.38 |
| 2462 | -18.57 | 2.11 | 9.82 | -6.64 | 8.00 | 14.64 |

11g

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. Loss [dB] | Result [dBm] | Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|
| 2412 | -26.35 | 2.10 | 9.81 | -14.44 | 8.00 | 22.44 |
| 2437 | -23.94 | 2.10 | 9.82 | -12.02 | 8.00 | 20.02 |
| 2462 | -26.42 | 2.11 | 9.82 | -14.49 | 8.00 | 22.49 |

11n-20

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. Loss [dB] | Result [dBm] | Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|
| 2412 | -26.81 | 2.10 | 9.81 | -14.90 | 8.00 | 22.90 |
| 2437 | -24.91 | 2.10 | 9.82 | -12.99 | 8.00 | 20.99 |
| 2462 | -27.42 | 2.11 | 9.82 | -15.49 | 8.00 | 23.49 |

BT LE 1 M-PHY

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. Loss [dB] | Result [dBm] | Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|
| 2402 | -23.01 | 2.10 | 9.88 | -11.03 | 8.00 | 19.03 |
| 2440 | -22.71 | 2.11 | 9.88 | -10.72 | 8.00 | 18.72 |
| 2480 | -22.69 | 2.12 | 9.88 | -10.69 | 8.00 | 18.69 |

BT LE 2 M-PHY

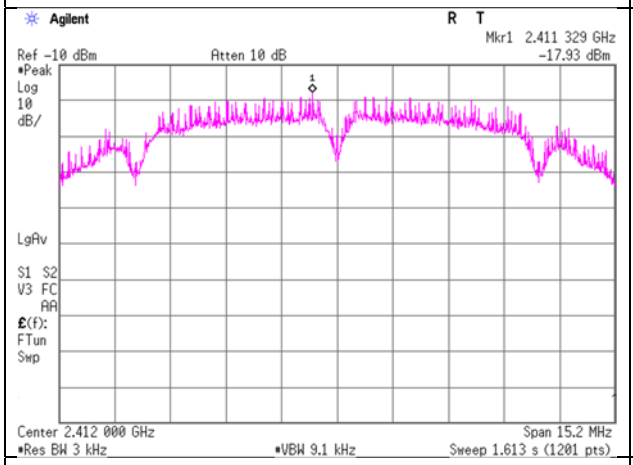
| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. Loss [dB] | Result [dBm] | Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|
| 2402 | -25.03 | 2.10 | 9.88 | -13.05 | 8.00 | 21.05 |
| 2440 | -25.53 | 2.11 | 9.88 | -13.54 | 8.00 | 21.54 |
| 2480 | -25.52 | 2.12 | 9.88 | -13.52 | 8.00 | 21.52 |

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

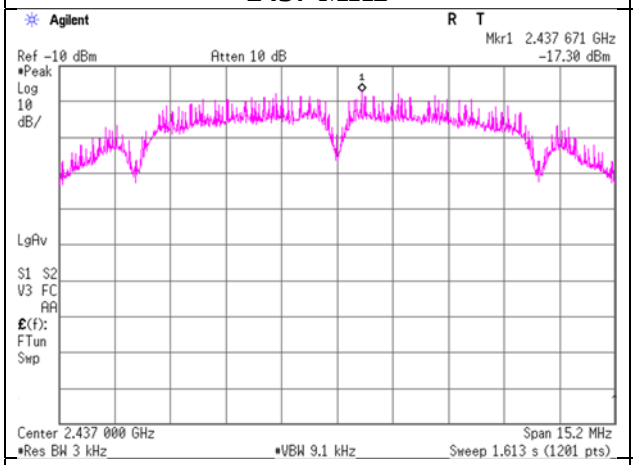
# Power Density

## 11b

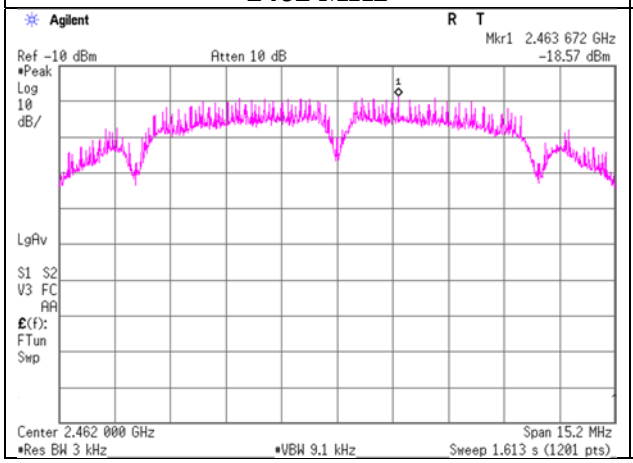
### 2412 MHz




### 2437 MHz

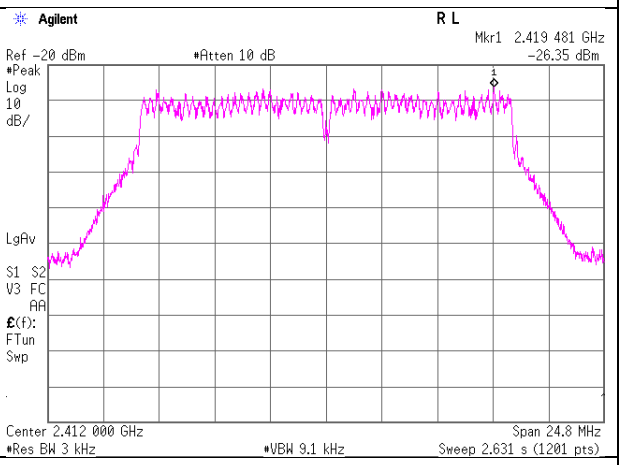



### 2462 MHz

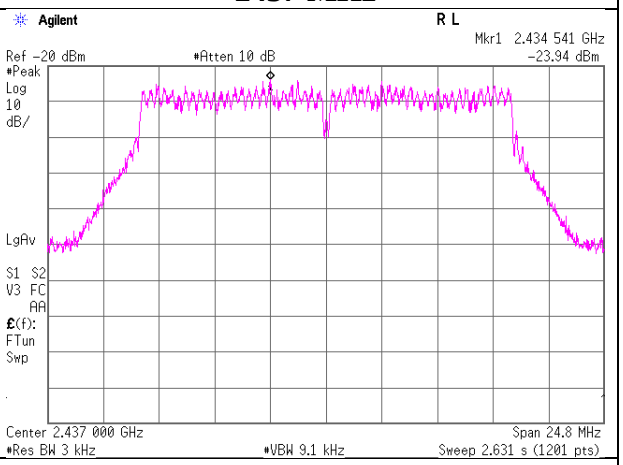



## 11g

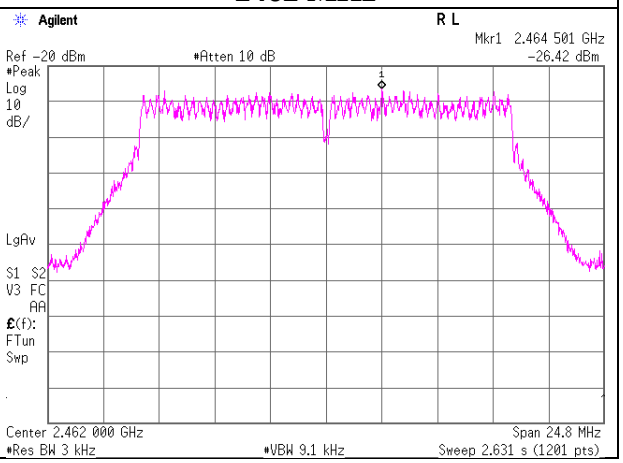
### 2412 MHz




### 2437 MHz



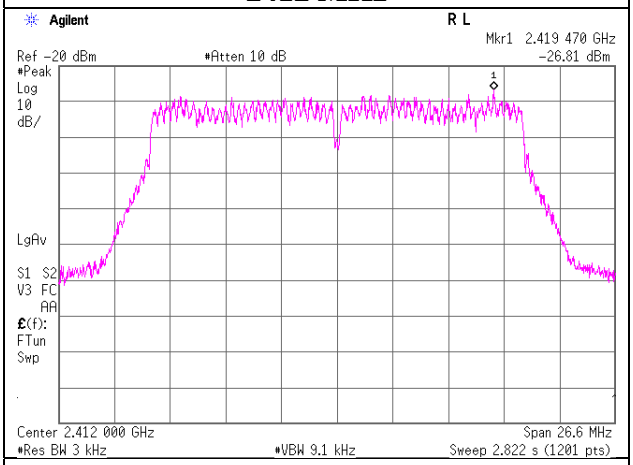

### 2462 MHz



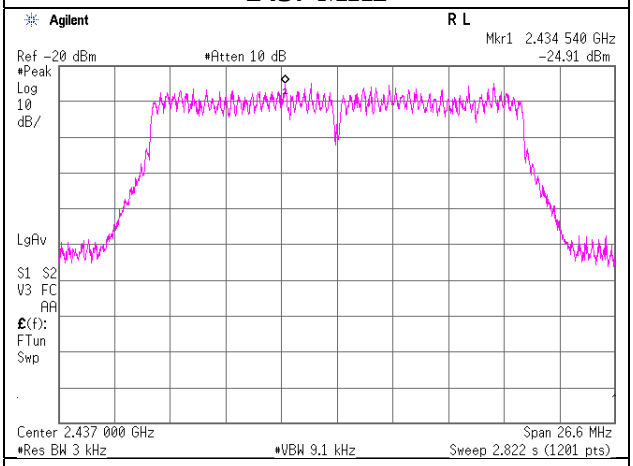
# Power Density

## 11n-20

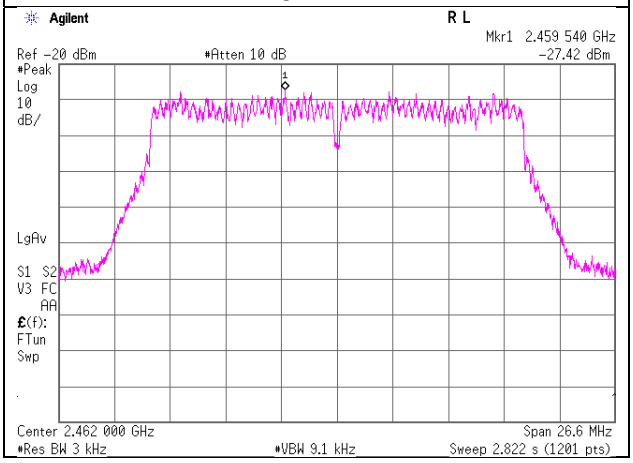
### 2412 MHz




### 2437 MHz



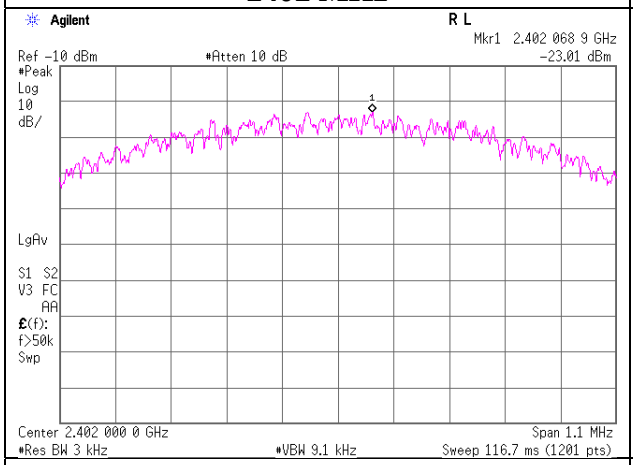

### 2462 MHz



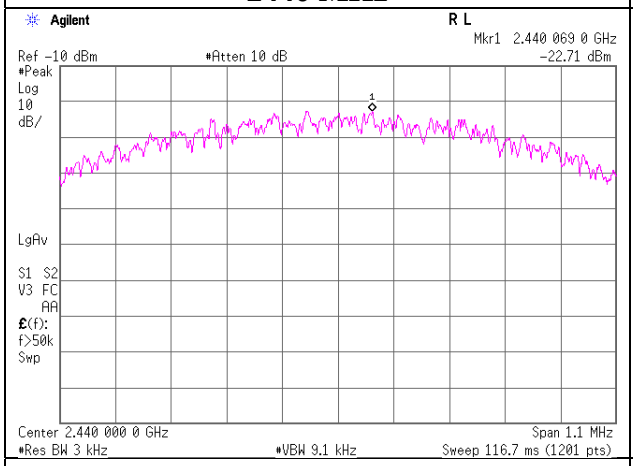
# Power Density

## BT LE 1 M-PHY

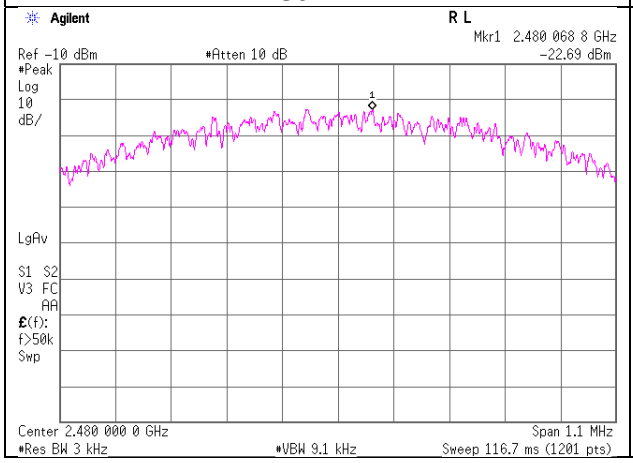
### 2402 MHz




### 2440 MHz

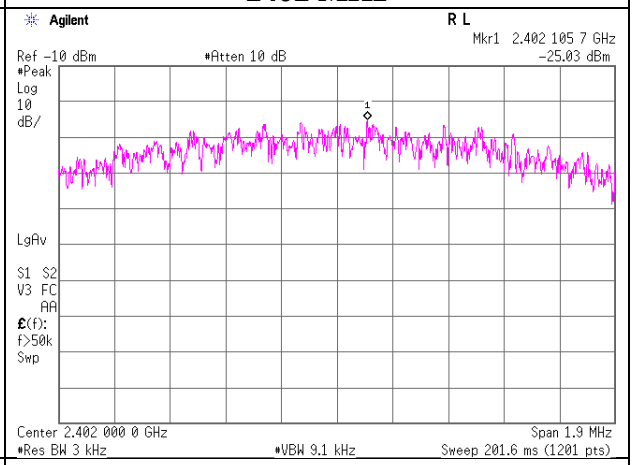



### 2480 MHz

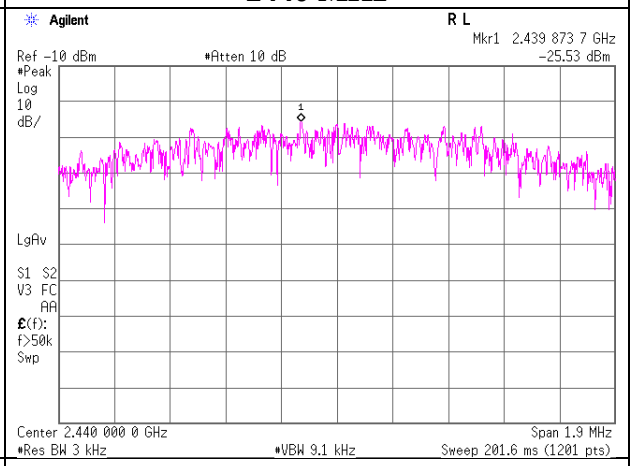



## BT LE 2 M-PHY

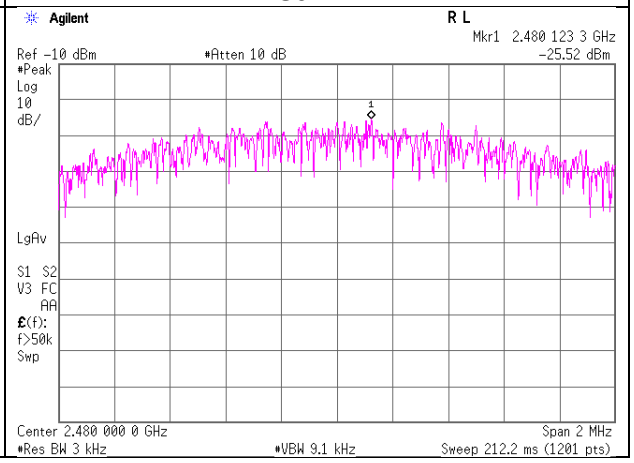
### 2402 MHz




### 2440 MHz




### 2480 MHz



# APPENDIX 2: Test instruments

## Test equipment [1/2]

| Test Name | Local ID | LIMS ID | Description | Manufacturer | Model | Serial | Last Calibration Date | Calibration Interval (Month) |
|---|---|---|---|---|---|---|---|---|
| AT | KSA-08 | 145089 | Spectrum Analyzer | Keysight Technologies Inc | E4446A | MY46180525 | 2019/11/05 | 12 |
| AT | KTS-07 | 145111 | Digital Tester | SANWA | PC500 | 7019232 | 2019/10/01 | 12 |
| AT | SAT10-14 | 154591 | Attenuator | Weinschel Corp. | 54A-10 | 81595 | 2020/04/01 | 12 |
| AT | SAT10-16 | 160494 | Attenuator | Weinschel Corp. | 54A-10 | 83420 | 2019/12/12 | 12 |
| AT | SCC-G66 | 196947 | Coaxial Cable | HUBER+SUNER | SUCOFLEX 102 | 803478/2 | 2020/03/10 | 12 |
| AT | SCC-G67 | 196949 | Coaxial Cable | HUBER+SUNER | SUCOFLEX 102 | 803480/2 | 2020/03/10 | 12 |
| AT | SOS-19 | 175823 | Humidity Indicator | CUSTOM. Inc | CTH-201 | - | 2019/12/19 | 12 |
| AT | SPM-07 | 146247 | Power Meter | Keysight Technologies Inc | 8990B | MY5100272 | 2020/05/27 | 12 |
| AT | SPSS-04 | 146310 | Power sensor | Keysight Technologies Inc | N1923A | MY5326009 | 2020/05/27 | 12 |
| AT | SPSS-05 | 146311 | Power sensor | Keysight Technologies Inc | N1923A | MY5349008 | 2020/05/27 | 12 |
| AT | STM-G6 | 146207 | Terminator | JFW | 50T-128 | - | 2019/11/05 | 12 |
| AT,RE | SSA-02 | 145800 | Spectrum Analyzer | Keysight Technologies Inc | E4448A | MY48250106 | 2020/04/16 | 12 |
| RE | COTS-SEMI-5 | 170932 | EMI Software | TSJ (Techno Science Japan) | TEPTO-DV3(RE,CE,ME,PE) | - | - | - |
| RE | KJM-02 | 146432 | Measure | TAJIMA | GL19-55 | - | - | - |
| RE | SAEC-02(SVSWR) | 145598 | Semi-Anechoic Chamber | TDK | SAEC-02(SVSWR) | 2 | 2020/05/07 | 12 |
| RE | SAEC-03(NSA) | 145565 | Semi-Anechoic Chamber | TDK | SAEC-03(NSA) | 3 | 2020/04/12 | 12 |
| RE | SAEC-03(SVSWR) | 145566 | Semi-Anechoic Chamber | TDK | SAEC-03(SVSWR) | 3 | 2020/05/11 | 12 |
| RE | SAF-03 | 145126 | Pre Amplifier | SONOMA | 310N | 290213 | 2020/02/19 | 12 |
| RE | SAF-05 | 145128 | Pre Amplifier | Toyo Corporation | TPA0118-36 | 1440490 | 2020/06/03 | 12 |
| RE | SAF-06 | 145005 | Pre Amplifier | Toyo Corporation | TPA0118-36 | 1440491 | 2020/02/20 | 12 |
| RE | SAF-08 | 145007 | Pre Amplifier | Toyo Corporation | HAP18-26W | 19 | 2020/03/03 | 12 |
| RE | SAT10-05 | 145136 | Attenuator(above1GHz) | Keysight Technologies Inc | 8493C-010 | 74864 | 2019/11/06 | 12 |
| RE | SAT6-13 | 167094 | Attenuator | JFW | 50HF-006N | - | 2020/02/21 | 12 |
| RE | SBA-03 | 145023 | Biconical Antenna | Schwarzbeck Mess - Elektronik | BBA9106 | 91032666 | 2020/05/17 | 12 |
| RE | SCC-C1/C2/C3/C4/C5/C10/SRSE-03 | 145171 | Coaxial Cable&RF Selector | Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO | 8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906 | -/0901-271(RF Selector) | 2020/04/12 | 12 |
| RE | SCC-G15 | 145176 | Coaxial Cable | Suhner | SUCOFLEX 102 | 32703/2 | 2020/03/04 | 12 |
| RE | SCC-G40 | 166491 | Coaxial Cable | Junkosha | MWX221-01000NFSNMS/B | 1612S005 | 2020/01/08 | 12 |
| RE | SCC-G41 | 151617 | Coaxial Cable | Junkosha | MWX221-01000NFSNMS/B | 1612S006 | 2020/01/08 | 12 |
| RE | SCC-G43 | 156380 | Coaxial Cable | HUBER+SUNER | SUCOFLEX_104_E | SN MY 13406/4E | 2020/06/04 | 12 |
| RE | SCC-G50 | 178573 | Coaxial Cable | HUBER+SUNER | SUCOFLEX_104_E | MY13407/4E | 2020/03/09 | 12 |
| RE | SCC-G51 | 178572 | Coaxial Cable | HUBER+SUNER | SUCOFLEX 104 | 800288 /4A | 2020/03/09 | 12 |
| RE | SCC-G57 | 179540 | Coaxial Cable | HUBER+SUNER | SUCOFLEX 102 | 802815/2 | 2020/05/12 | 12 |

## Test equipment [2/2]

| Test Name | Local ID | LIMS ID | Description | Manufacturer | Model | Serial | Last Calibration Date | Calibration Interval (Month) |
|---|---|---|---|---|---|---|---|---|
| RE | SCC-G58 | 183047 | Coaxial Cable | HUBER+SUNER | SUCOFLEX 104 | 800287/4A | 2020/06/04 | 12 |
| RE | SCC-G69 | 200009 | Coaxial Cable | HUBER+SUNER | SUCOFLEX 104 | 575617/4 | 2020/07/07 | 12 |
| RE | SCC-G70 | 200010 | Coaxial Cable | HUBER+SUNER | SUCOFLEX 104 | 575618/4 | 2020/07/07 | 12 |
| RE | SFL-02 | 145301 | Highpass Filter | MICRO-TRONICS | HPM50111 | 51 | 2019/11/06 | 12 |
| RE | SFL-03 | 145377 | Highpass Filter | MICRO-TRONICS | HPM50112 | 28 | 2019/11/06 | 12 |
| RE | SFL-18 | 145305 | Highpass Filter | MICRO-TRONICS | HPM50111 | 119 | 2020/04/03 | 12 |
| RE | SHA-02 | 145384 | Horn Antenna | Schwarzbeck Mess - Elektronik | BBHA9120D | 9120D-726 | 2020/06/15 | 12 |
| RE | SHA-03 | 145501 | Horn Antenna | Schwarzbeck Mess - Elektronik | BBHA9120D | 9120D-739 | 2020/06/15 | 12 |
| RE | SHA-04 | 145512 | Horn Antenna | ETS LINDGREN | 3160-09 | 00094868 | 2020/06/15 | 12 |
| RE | SHA-06 | 145514 | Horn Antenna | ETS LINDGREN | 3160-10 | 00092383 | 2020/07/16 | 12 |
| RE | SHA-09 | 194684 | Horn Antenna | Schwarzbeck Mess - Elektronik | BBHA 9120 C | 695 | 2020/02/17 | 12 |
| RE | SHA-10 | 194685 | Horn Antenna | Schwarzbeck Mess - Elektronik | BBHA 9120 C | 711 | 2020/02/17 | 12 |
| RE | SJM-09 | 145336 | Measure | PROMART | SEN1935 | - | - | - |
| RE | SLA-07 | 145529 | Logperiodic Antenna | Schwarzbeck Mess - Elektronik | VUSLP9111B | 196 | 2020/05/17 | 12 |
| RE | SOS-21 | 191838 | Humidity Indicator | CUSTOM. Inc | CTH-201 | - | 2019/12/12 | 12 |
| RE | SOS-23 | 191840 | Humidity Indicator | CUSTOM. Inc | CTH-201 | - | 2019/12/12 | 12 |
| RE | STR-08 | 150463 | Test Receiver | Rohde & Schwarz | ESW44 | 101581 | 2019/11/22 | 12 |
| RE | STS-02 | 145793 | Digital Hitester | Hioki | 3805-50 | 80997819 | 2020/04/09 | 12 |
| RE | STS-03 | 146210 | Digital Hitester | Hioki | 3805-50 | 80997823 | 2019/10/01 | 12 |

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

**The expiration date of the calibration is the end of the expired month.**
**As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.**
**All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.**

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