



RADIO TEST REPORT

Test Report No. : 11854935S-A-R2

Applicant : PIONEER CORPORATION
Type of Equipment : MAIN UNIT
Model No. : D172G5
FCC ID : AJDK104
Test regulation : FCC Part 15 Subpart C: 2017
Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
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. This report is a revised version of 11854935S-A-R1.

Date of test: July 26 to 28, 2017

Representative test engineer:

M. Hosaka

Makoto Hosaka
Engineer
Consumer Technology Division

Approved by:

A. Hayashi

Akio Hayashi
Leader
Consumer Technology Division



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

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11854935S-A

| Revision | Test report No. | Date | Page revised | Contents |
|--------------|-----------------|--------------------|--------------|--------------------------------------|
| - (Original) | 11854935S-A | August 28, 2017 | - | - |
| 1 | 11854935S-A-R1 | September 13, 2017 | 4 | Correction of Operating Temperature. |
| 2 | 11854935S-A-R2 | September 19, 2017 | 4 | Correction of Antenna type. |
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SECTION 1: Customer information

Company Name : PIONEER CORPORATION
Address : 25-1, Yamada, Kawagoe-shi, Saitama-ken 350-8555, JAPAN
Telephone Number : +81-49-228-7787
Facsimile Number : +81-49-228-6493
Contact Person : Tomoyuki Tanaka

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment : MAIN UNIT
Model No. : D172G5
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 12.0 V
Receipt Date of Sample : July 22, 2017
Country of Mass-production : Japan
Condition of EUT : Production prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT : No Modification by the test lab

2.2 Product Description

Model: D172G5 (referred to as the EUT in this report) is a MAIN UNIT.

Clock frequency(ies) in the system : Oscillator (Module) 0.032768 MHz
Internal Communication (Module) 195 MHz

Radio Specification

WLAN

Radio Type : Transceiver
Frequency of Operation : 2412 MHz- 2462 MHz
Modulation : DSSS, OFDM
Power Supply (inner) : DC 3.3 V / 1.8 V
Antenna type : inverted F type
Antenna Gain : 2.94 dBi
Operating Temperature : -20 deg. C - +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 June 14, 2017 and effective July 14, 2017

Title : FCC 47CFR Part15 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

3.2 Procedures and results

| Item | Test Procedure | Specification | Worst margin | Results | Remarks |
|---|--|--|--|----------|---|
| Conducted Emission | FCC: ANSI C63.10-2013 6. Standard test methods IC: RSS-Gen 8.8 | FCC: Section 15.207 IC: RSS-Gen 8.8 | N/A | N/A | N/A*1) |
| 6dB Bandwidth | FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: - | FCC: Section 15.247(a)(2) IC: RSS-247 5.2(a) | See data. | Complied | Conducted |
| Maximum Peak Output Power | FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: RSS-Gen 6.12 | FCC: Section 15.247(b)(3) IC: RSS-247 5.4(d) | | Complied | Conducted |
| Power Density | FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: - | FCC: Section 15.247(e) IC: RSS-247 5.2(b) | | Complied | Conducted |
| Spurious Emission Restricted Band Edges | FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: RSS-Gen 6.13 | FCC: Section 15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10 | 5.7 dB 9648.000 MHz, AV, Hori. Tx 11g 2412 MHz | Complied | Conducted (below 30 MHz)/ Radiated (above 30 MHz) *2) |

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

*1) The test is not applicable since the EUT does not have AC ports.

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

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

FCC Part 15.31 (e)

This EUT provides stable voltage (DC 3.3 V / 1.8 V) constantly to the wireless transmitter 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 this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

The EUT has a unique coupling/antenna connector (U.FL). Therefore, the equipment complies with the antenna requirement of Section 15.203.

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3.3 Addition to standard

| Item | Test Procedure | Specification | Worst margin | Results | Remarks |
|------------------------|-----------------|---------------|--------------|---------|-----------|
| 99% Occupied Bandwidth | IC: RSS-Gen 6.6 | IC: - | N/A | - | Conducted |

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

3.4 Uncertainty

EMI

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 SAC / SR | No. 5,6,8 SR |
| Conducted emission (AC Mains) LISN | 150 kHz-30 MHz | 2.6 dB | 2.5 dB | 2.6 dB | 2.5 dB | 2.5 dB |
| Radiated emission (Measurement distance: 3 m) | 9 kHz-30 MHz | 3.1 dB | 3.1 dB | 3.1 dB | - | - |
| | 30 MHz-200 MHz | 4.6 dB | 4.4 dB | 4.6 dB | - | - |
| | 200 MHz-1 GHz | 5.8 dB | 5.7 dB | 5.8 dB | - | - |
| | 1 GHz-13 GHz | 4.9 dB | 4.9 dB | 4.9 dB | - | - |
| Radiated emission (Measurement distance: 1 m) | 13 GHz-18 GHz | 4.6 dB | 4.6 dB | 4.6 dB | - | - |
| | 18 GHz-40 GHz | 4.9 dB | 4.9 dB | 4.9 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 | 0.72 dB |
| Power Measurement above 1 GHz (Peak Detector)_SPM-06 | 0.85 dB |
| Power Measurement above 1 GHz (Average Detector)_SPM-07 | 0.74 dB |
| Power Measurement above 1 GHz (Peak Detector)_SPM-07 | 0.91 dB |
| Spurious emission (Conducted) below 1GHz | 1.6 dB |
| Spurious emission (Conducted) 1 GHz-3 GHz | 1.3 dB |
| Spurious emission (Conducted) 3 GHz-18 GHz | 2.2 dB |
| Spurious emission (Conducted) 18 GHz-26.5 GHz | 2.3 dB |
| Spurious emission (Conducted) 26.5 GHz-40 GHz | 2.4 dB |
| Bandwidth Measurement | 1.01 % |
| Duty cycle and Time Measurement | 0.012 % |

Radiated emission test

The data listed in this test report has enough margin, more than site margin.

3.5 Test Location

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JAB Accreditation No. RTL02610

| 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 E.U.T. during testing

4.1 Operating Mode(s)

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

| Mode | Remarks* |
|---|-------------------------|
| IEEE 802.11b (11b) | 11 Mbps, PN9 |
| IEEE 802.11g (11g) | 48 Mbps, PN9 |
| IEEE 802.11n SISO 20 MHz BW (11n-20) | MCS 3 (GI: 400 ns), PN9 |
| *The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel) | |
| *Power of the EUT was set by the software as follows; Power settings: 3 Software: WLAN A115 *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 |
|---------------------------|-----------------------|-------------------------|
| Spurious Emission | 11b Tx | 2412 MHz |
| 6dB Bandwidth | 11g Tx | 2437 MHz |
| Maximum Peak Output Power | 11n-20 Tx | 2462 MHz |
| Power Density | | |
| 99% Occupied Bandwidth | | |

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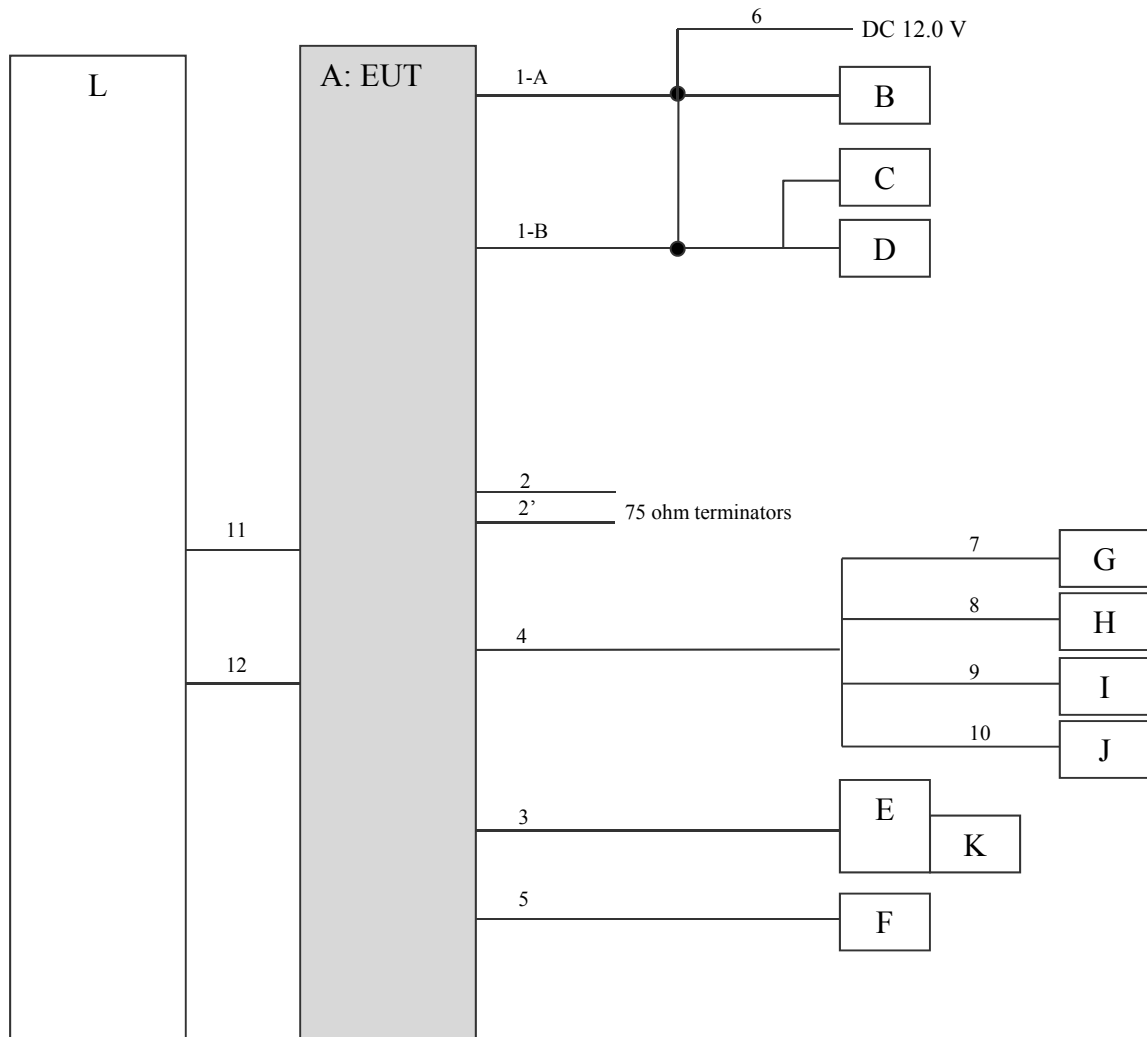
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4.2 Configuration and peripherals



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

Description of EUT and Support equipment

| No. | Item | Model number | Serial number | Manufacturer | Remarks |
|-----|-------------|--------------|--------------------------------------|--------------|---------|
| A | MAIN UNIT | D172G5 | AABB999998CS *1) AABB999999CS *2) | PIONEER | EUT |
| B | Steering SW | - | - | - | - |
| C | Mic | - | - | - | - |
| D | Rear Camera | - | - | - | - |
| E | USB | - | - | - | - |
| F | GPS Antenna | 86860-71011 | - | AISIN | - |
| G | Speaker | TS-F1030 | V44QAH2 | PIONEER | - |
| H | Speaker | TS-F1030 | V44QAH2 | PIONEER | - |
| I | Speaker | TS-F1030 | V44QBA1 | PIONEER | - |
| J | Speaker | TS-F1030 | V44QBA1 | PIONEER | - |
| K | USB Memory | - | - | - | - |
| L | Display | - | - | PIONEER | - |

*1) Used for Radiated Emission test

*2) Used for Antenna Terminal conducted test

List of cables used

| No. | Name | Length (m) | Shield | | Remarks |
|----------|-----------------------|------------|------------|------------|---------|
| | | | Cable | Connector | |
| 1-A | Wire Harness Set | 1.0 | Unshielded | Unshielded | - |
| 1-B | Wire Harness | 1.0 | Unshielded | Unshielded | - |
| 2, 2' | Radio antenna | 1.5 | Shielded | Shielded | - |
| 3 | USB connector | 1.1 | Shielded | Shielded | - |
| 4 | Speaker | 1.1 | Unshielded | Unshielded | - |
| 5 | GPS antenna connector | 1.7 | Shielded | Shielded | - |
| 6 | DC | 1.0 | Shielded | Unshielded | - |
| 7 | Speaker | 2.0 | Unshielded | Unshielded | - |
| 8 | Speaker | 2.0 | Unshielded | Unshielded | - |
| 9 | Speaker | 2.0 | Unshielded | Unshielded | - |
| 10 | Speaker | 2.0 | Unshielded | Unshielded | - |
| 11 | Flat cable | 0.5 | Unshielded | Unshielded | - |
| 12 | Flat cable | 0.5 | Unshielded | Unshielded | - |

SECTION 5: Radiated Spurious Emission

Test Procedure

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "KDB 558074 D01 DTS Meas Guidance v04".

[For below 1 GHz]

EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. 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, 0.25 m by 0.25 m, raised 1.5 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

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

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

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

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

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

Test Antennas are used as below;

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

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

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

| | | | | |
|-----------------|---------------|---|---|---|
| Frequency | Below 1 GHz | Above 1 GHz | | 20 dBc |
| Instrument used | Test Receiver | Spectrum Analyzer | | Spectrum Analyzer |
| Detector | QP | PK | AV *1) | PK |
| IF Bandwidth | BW 120 kHz | RBW: 1 MHz VBW: 3 MHz | Average Power Method: <u>12.2.5.2</u> RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (Linear voltage) Trace: 100 traces Duty factor was added to the results. | RBW: 100 kHz VBW: 300 kHz |
| Test Distance | 3 m | 3.87 m *2) (1 GHz – 13 GHz), 1 m *3) (13 GHz – 26.5 GHz) | | 3.87 m *2) (1 GHz – 13 GHz), 1 m *3) (13 GHz – 26.5 GHz) |

*1) Average Power Measurement was performed based on 6.0 & 12.2.5 of "KDB 558074 D01 DTS Meas Guidance v04".

*2) Distance Factor: $20 \times \log(3.87 \text{ m} / 3.0 \text{ m}) = 2.22 \text{ dB}$

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

Worst case:

The noise levels were confirmed at each position of 0 degree and 30 degree of EUT to see the position of maximum noise, and the test was made at representative 0 degree since no difference was found among each position.

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

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

SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

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

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

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

*2) Reference data

*3) Section 10.2 Method PKPSD (peak PSD) of "KDB 558074 D01 DTS Meas Guidance v04".

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

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

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

Test data : APPENDIX
Test result : Pass

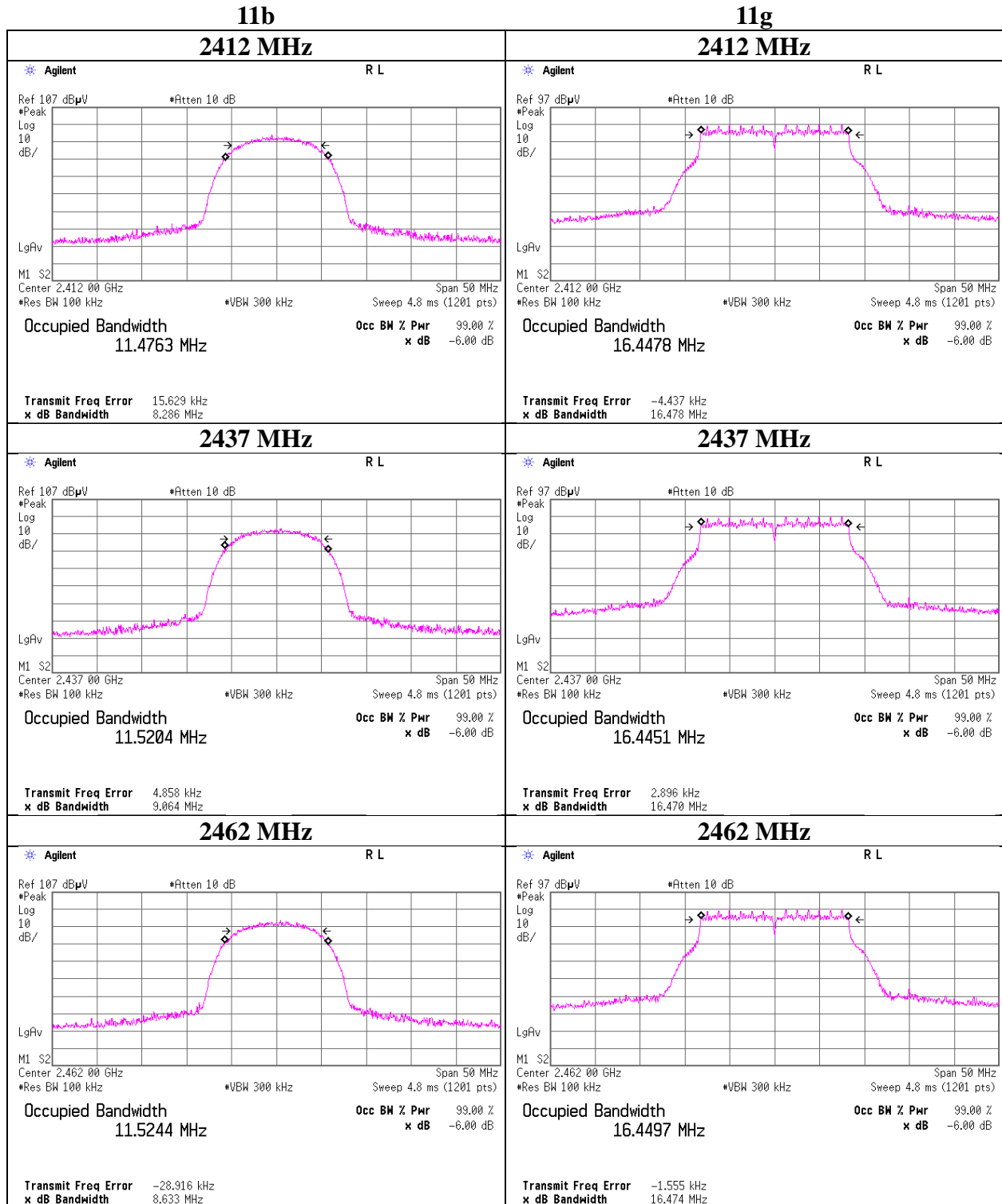
APPENDIX 1: Test data

6dB Bandwidth

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11854935S-A
Date July 28, 2017
Temperature / Humidity 25 deg. C / 55 % RH
Engineer Makoto Hosaka
Mode Tx 11b, Tx 11g, Tx 11n-20

| Mode | Frequency [MHz] | 6dB Bandwidth [MHz] | Limit [kHz] |
|--------|--------------------|------------------------|----------------|
| 11b | 2412 | 8.286 | > 500 |
| | 2437 | 9.064 | > 500 |
| | 2462 | 8.633 | > 500 |
| 11g | 2412 | 16.478 | > 500 |
| | 2437 | 16.470 | > 500 |
| | 2462 | 16.474 | > 500 |
| 11n-20 | 2412 | 17.741 | > 500 |
| | 2437 | 17.746 | > 500 |
| | 2462 | 17.738 | > 500 |

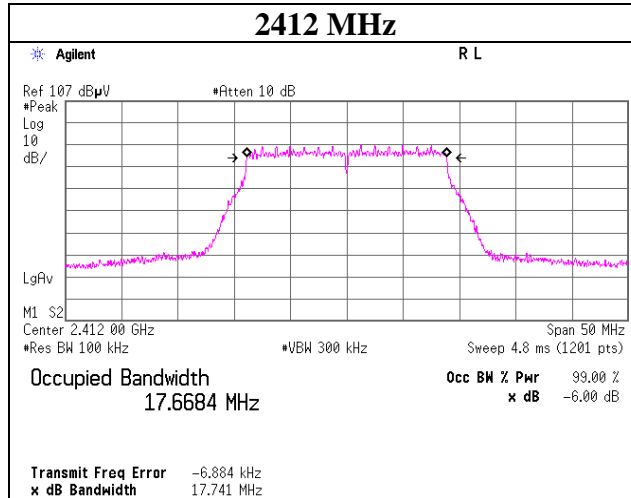
6dB Bandwidth



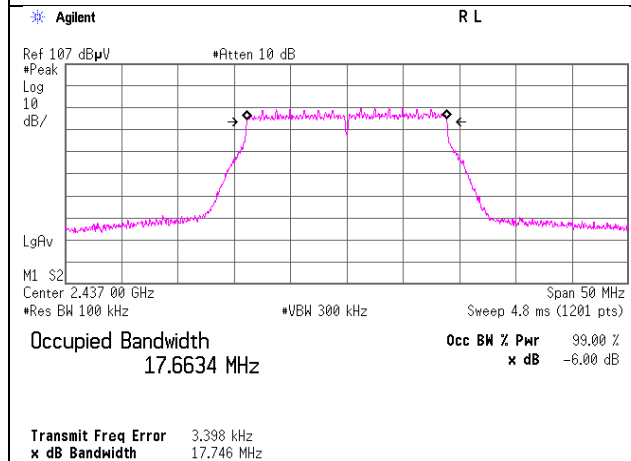
6dB Bandwidth

11n-20

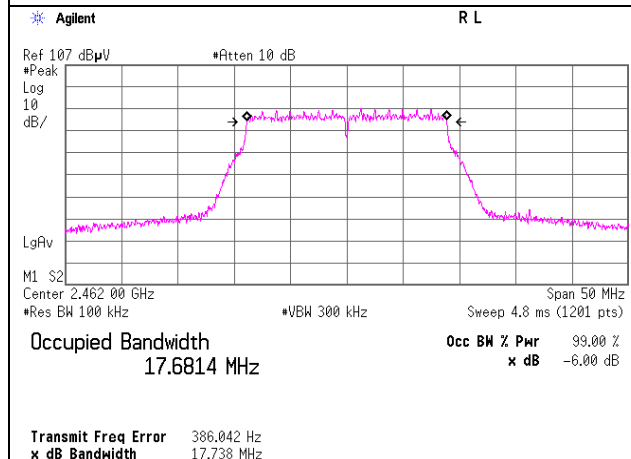
2412 MHz



2437 MHz



2462 MHz



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Maximum Peak Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11854935S-A
Date : July 26, 2017
Temperature / Humidity : 27 deg. C / 54 % RH
Engineer : Makoto Hosaka
Mode : Tx 11b

11b

| Freq. [MHz] | Reading P/M (Peak) [dBm] | Cable Loss [dB] | Atten. Loss [dB] | Result | | Limit | | Margin [dB] |
|----------------|--------------------------------|-----------------------|------------------------|--------|------|-------|------|----------------|
| | | | | [dBm] | [mW] | [dBm] | [mW] | |
| 2412 | -4.03 | 2.02 | 9.96 | 7.95 | 6.24 | 30.00 | 1000 | 22.05 |
| 2437 | -4.02 | 2.03 | 9.96 | 7.97 | 6.27 | 30.00 | 1000 | 22.03 |
| 2462 | -4.15 | 2.04 | 9.97 | 7.86 | 6.11 | 30.00 | 1000 | 22.14 |

Sample Calculation:

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

| Rate [Mbps] | Reading [dBm] | Remark |
|----------------|------------------|--------|
| 1 | -4.56 | |
| 2 | -4.12 | |
| 5.5 | -4.19 | |
| 11 | -4.02 | * |

*: Worst Rate

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

Maximum Peak Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11854935S-A-R2
Date : July 26, 2017
Temperature / Humidity : 27 deg. C / 54 % RH
Engineer : Makoto Hosaka
Mode : Tx 11g

11g

| Freq. [MHz] | Reading P/M (Peak) [dBm] | Cable Loss [dB] | Atten. Loss [dB] | Result | | Limit | | Margin [dB] |
|----------------|--------------------------------|-----------------------|------------------------|--------|-------|-------|------|----------------|
| | | | | [dBm] | [mW] | [dBm] | [mW] | |
| 2412 | 0.94 | 2.02 | 9.96 | 12.92 | 19.59 | 30.00 | 1000 | 17.08 |
| 2437 | 0.90 | 2.03 | 9.96 | 12.89 | 19.45 | 30.00 | 1000 | 17.11 |
| 2462 | 1.15 | 2.04 | 9.97 | 13.16 | 20.70 | 30.00 | 1000 | 16.84 |

Sample Calculation:

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

| Rate [Mbps] | Reading [dBm] | Remark |
|----------------|------------------|--------|
| 6 | -1.82 | |
| 9 | -1.83 | |
| 12 | -1.47 | |
| 18 | -1.46 | |
| 24 | 0.19 | |
| 36 | 0.68 | |
| 48 | 0.90 | * |
| 54 | -0.02 | |

*: Worst Rate

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

Maximum Peak Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11854935S-A-R2
Date : July 26, 2017
Temperature / Humidity : 27 deg. C / 54 % RH
Engineer : Makoto Hosaka
Mode : Tx 11n-20

11n-20

| Freq. [MHz] | Reading P/M (Peak) [dBm] | Cable Loss [dB] | Atten. Loss [dB] | Result | | Limit | | Margin [dB] |
|----------------|--------------------------------|-----------------------|------------------------|--------|-------|-------|------|----------------|
| | | | | [dBm] | [mW] | [dBm] | [mW] | |
| 2412 | 1.44 | 2.02 | 9.96 | 13.42 | 21.98 | 30.00 | 1000 | 16.58 |
| 2437 | 1.42 | 2.03 | 9.96 | 13.41 | 21.93 | 30.00 | 1000 | 16.59 |
| 2462 | 1.31 | 2.04 | 9.97 | 13.32 | 21.48 | 30.00 | 1000 | 16.68 |

Sample Calculation:

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

GI: 800 ns

| MCS Number | Reading [dBm] | Remark |
|---------------|------------------|--------|
| 0 | -1.43 | |
| 1 | -1.04 | |
| 2 | -0.88 | |
| 3 | 1.05 | |
| 4 | 1.35 | |
| 5 | 0.99 | |
| 6 | 1.12 | |
| 7 | 0.90 | |

GI: 400 ns

| MCS Number | Reading [dBm] | Remark |
|---------------|------------------|--------|
| 0 | -1.32 | |
| 1 | -1.11 | |
| 2 | -0.85 | |
| 3 | 1.42 | * |
| 4 | 1.34 | |
| 5 | 0.98 | |
| 6 | 1.14 | |
| 7 | 1.18 | |

* Worst MCS

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

Average Output Power
(Reference data for RF Exposure)

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11854935S-A-R2
Date : July 26, 2017
Temperature / Humidity : 27 deg. C / 54 % RH
Engineer : Makoto Hosaka
Mode : Tx 11b, Tx 11g, Tx 11n-20

11b 1 Mbps

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. Loss [dB] | Result (Time average) | | Duty factor [dB] | Result (Burst power average) | |
|----------------|------------------|-----------------------|------------------------|--------------------------|------|------------------------|---------------------------------|------|
| | | | | [dBm] | [mW] | | [dBm] | [mW] |
| 2412 | -8.31 | 2.02 | 9.96 | 3.67 | 2.33 | 0.04 | 3.71 | 2.35 |
| 2437 | -8.34 | 2.03 | 9.96 | 3.65 | 2.32 | 0.04 | 3.69 | 2.34 |
| 2462 | -8.41 | 2.04 | 9.97 | 3.60 | 2.29 | 0.04 | 3.64 | 2.31 |

11g 6 Mbps

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. Loss [dB] | Result (Time average) | | Duty factor [dB] | Result (Burst power average) | |
|----------------|------------------|-----------------------|------------------------|--------------------------|------|------------------------|---------------------------------|------|
| | | | | [dBm] | [mW] | | [dBm] | [mW] |
| 2412 | -9.20 | 2.02 | 9.96 | 2.78 | 1.90 | 0.29 | 3.07 | 2.03 |
| 2437 | -9.29 | 2.03 | 9.96 | 2.70 | 1.86 | 0.29 | 2.99 | 1.99 |
| 2462 | -9.49 | 2.04 | 9.97 | 2.52 | 1.79 | 0.29 | 2.81 | 1.91 |

11n-20 MCS 0

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. Loss [dB] | Result (Time average) | | Duty factor [dB] | Result (Burst power average) | |
|----------------|------------------|-----------------------|------------------------|--------------------------|------|------------------------|---------------------------------|------|
| | | | | [dBm] | [mW] | | [dBm] | [mW] |
| 2412 | -9.32 | 2.02 | 9.96 | 2.66 | 1.85 | 0.31 | 2.97 | 1.98 |
| 2437 | -9.27 | 2.03 | 9.96 | 2.72 | 1.87 | 0.31 | 3.03 | 2.01 |
| 2462 | -9.35 | 2.04 | 9.97 | 2.66 | 1.85 | 0.31 | 2.97 | 1.98 |

Sample Calculation:

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

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

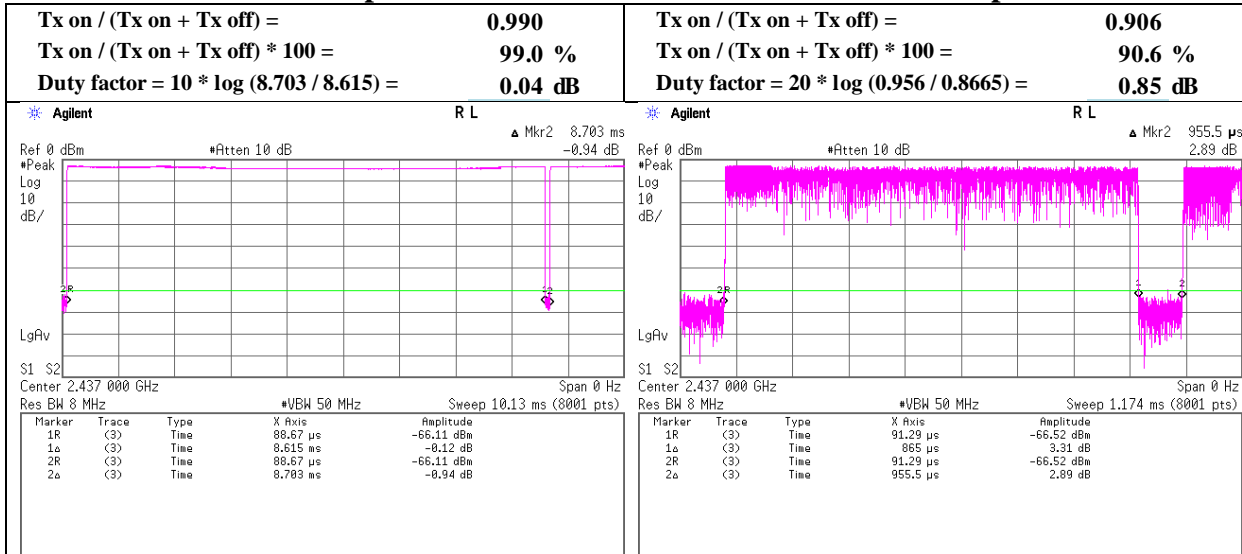
The average output power was measured with the lowest order modulation and lowest data rate configuration in each IEEE 802.11 mode based on KDB 248227 D01.

Burst rate confirmation

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11854935S-A-R2
Date : July 28, 2017
Temperature / Humidity : 25 deg. C / 55 % RH
Engineer : Makoto Hosaka
Mode : Tx 11b, Tx 11g, Tx 11n-20

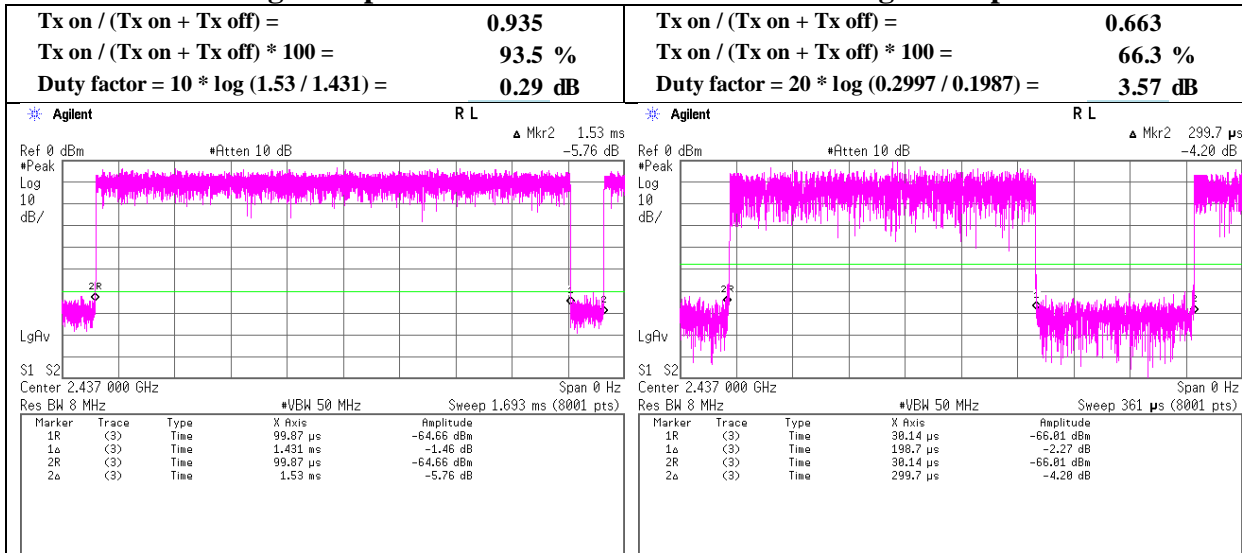
11b 1 Mbps

11b 11 Mbps



11g 6 Mbps

11g 48 Mbps



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

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Shonan EMC Lab.

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Telephone : +81 463 50 6400

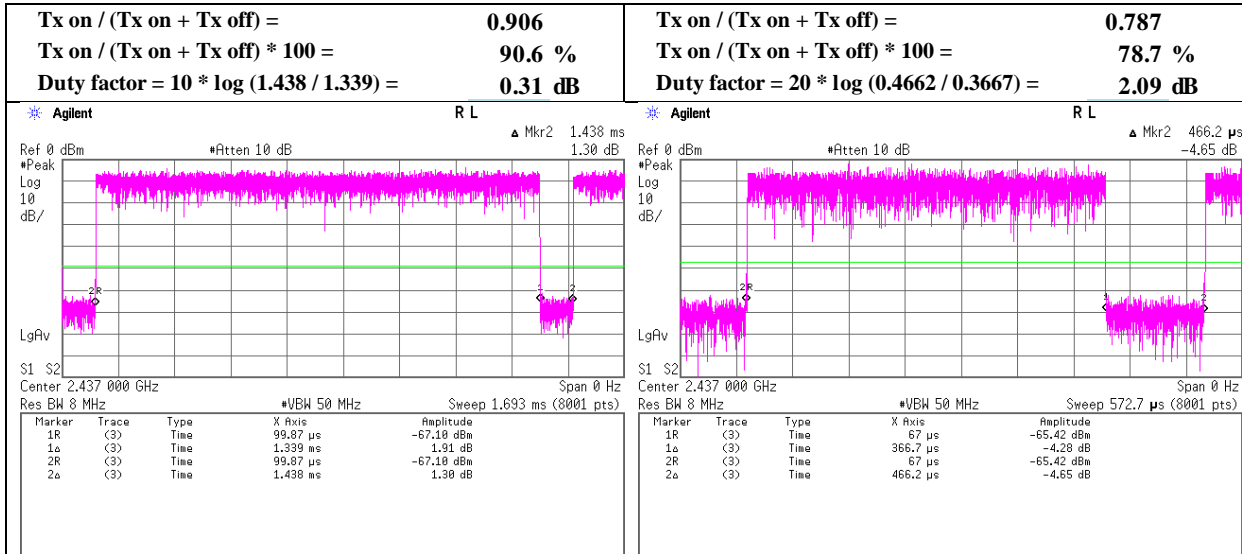
Facsimile : +81 463 50 6401

Burst rate confirmation

| | |
|------------------------|------------------------------------|
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Report No. | 11854935S-A-R2 |
| Date | July 28, 2017 |
| Temperature / Humidity | 25 deg. C / 55 % RH |
| Engineer | Makoto Hosaka |
| Mode | Tx 11b, Tx 11g, Tx 11n-20 |

11n-20 MCS 0

11n-20 MCS 3



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11854935S-A-R2
Date : July 26, 2017 July 27, 2017
Temperature / Humidity : 23 deg. C / 63 % RH 24 deg. C / 62 % RH
Engineer : Yosuke Ishikawa Yosuke Ishikawa
(1 GHz -13 GHz) (13 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. | 1979.901 | PK | 50.12 | 25.78 | 13.17 | 41.02 | 2.22 | 50.27 | 73.90 | 23.6 | 148 | 312 | |
| Hori. | 2390.000 | PK | 46.58 | 27.41 | 13.52 | 40.85 | 2.22 | 48.88 | 73.90 | 25.0 | 171 | 26 | |
| Hori. | 4824.000 | PK | 48.78 | 31.17 | 5.67 | 41.84 | 2.22 | 46.00 | 73.90 | 27.9 | 150 | 0 | |
| Hori. | 7236.000 | PK | 45.86 | 36.52 | 6.85 | 41.20 | 2.22 | 50.25 | 73.90 | 23.6 | 150 | 0 | |
| Hori. | 9648.000 | PK | 45.07 | 38.66 | 7.76 | 40.60 | 2.22 | 53.11 | 73.90 | 20.7 | 150 | 0 | |
| Hori. | 1979.901 | AV | 42.13 | 25.78 | 13.17 | 41.02 | 2.22 | 42.28 | 53.90 | 11.6 | 148 | 312 | *1) |
| Vert. | 1980.114 | PK | 48.73 | 25.78 | 13.17 | 41.02 | 2.22 | 48.88 | 73.90 | 25.0 | 127 | 221 | |
| Vert. | 2390.000 | PK | 46.15 | 27.41 | 13.52 | 40.85 | 2.22 | 48.45 | 73.90 | 25.4 | 154 | 245 | |
| Vert. | 4824.000 | PK | 47.24 | 31.17 | 5.67 | 41.84 | 2.22 | 44.46 | 73.90 | 29.4 | 150 | 0 | |
| Vert. | 7236.000 | PK | 46.48 | 36.52 | 6.85 | 41.20 | 2.22 | 50.87 | 73.90 | 23.0 | 150 | 0 | |
| Vert. | 9648.000 | PK | 44.78 | 38.66 | 7.76 | 40.60 | 2.22 | 52.82 | 73.90 | 21.0 | 150 | 0 | |
| Vert. | 1980.114 | AV | 40.32 | 25.78 | 13.17 | 41.02 | 2.22 | 40.47 | 53.90 | 13.4 | 127 | 221 | *1) |

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

Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.22 dB

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

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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 | 37.56 | 27.41 | 13.52 | 40.85 | 0.85 | 2.22 | 40.71 | 53.90 | 13.2 | *1) |
| Hori. | 4824.000 | AV | 38.62 | 31.17 | 5.67 | 41.84 | 0.85 | 2.22 | 36.69 | 53.90 | 17.2 | |
| Hori. | 7236.000 | AV | 38.31 | 36.52 | 6.85 | 41.20 | 0.85 | 2.22 | 43.55 | 53.90 | 10.3 | |
| Hori. | 9648.000 | AV | 36.55 | 38.66 | 7.76 | 40.60 | 0.85 | 2.22 | 45.44 | 53.90 | 8.5 | |
| Vert. | 2390.000 | AV | 37.58 | 27.41 | 13.52 | 40.85 | 0.85 | 2.22 | 40.73 | 53.90 | 13.2 | *1) |
| Vert. | 4824.000 | AV | 38.55 | 31.17 | 5.67 | 41.84 | 0.85 | 2.22 | 36.62 | 53.90 | 17.3 | |
| Vert. | 7236.000 | AV | 38.16 | 36.52 | 6.85 | 41.20 | 0.85 | 2.22 | 43.40 | 53.90 | 10.5 | |
| Vert. | 9648.000 | AV | 36.44 | 38.66 | 7.76 | 40.60 | 0.85 | 2.22 | 45.33 | 53.90 | 8.6 | |

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

Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.22 dB

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

Duty factor refer to "Duty factor Calculation chart" 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 | 89.14 | 27.50 | 13.54 | 40.84 | 2.22 | 91.56 | - | - | Carrier |
| Hori. | 2400.000 | PK | 38.58 | 27.45 | 13.53 | 40.84 | 2.22 | 40.94 | 71.56 | 30.6 | |
| Vert. | 2412.000 | PK | 88.50 | 27.50 | 13.54 | 40.84 | 2.22 | 90.92 | - | - | Carrier |
| Vert. | 2400.000 | PK | 38.02 | 27.45 | 13.53 | 40.84 | 2.22 | 40.38 | 70.92 | 30.5 | |

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

Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.22 dB

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

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Shonan EMC Lab.

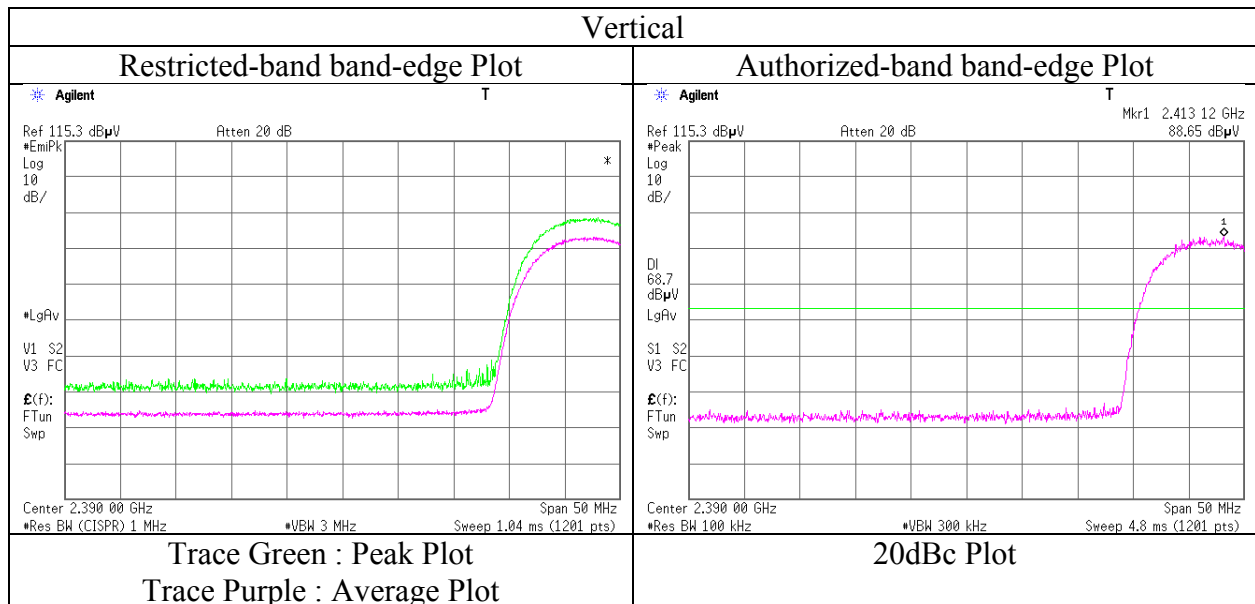
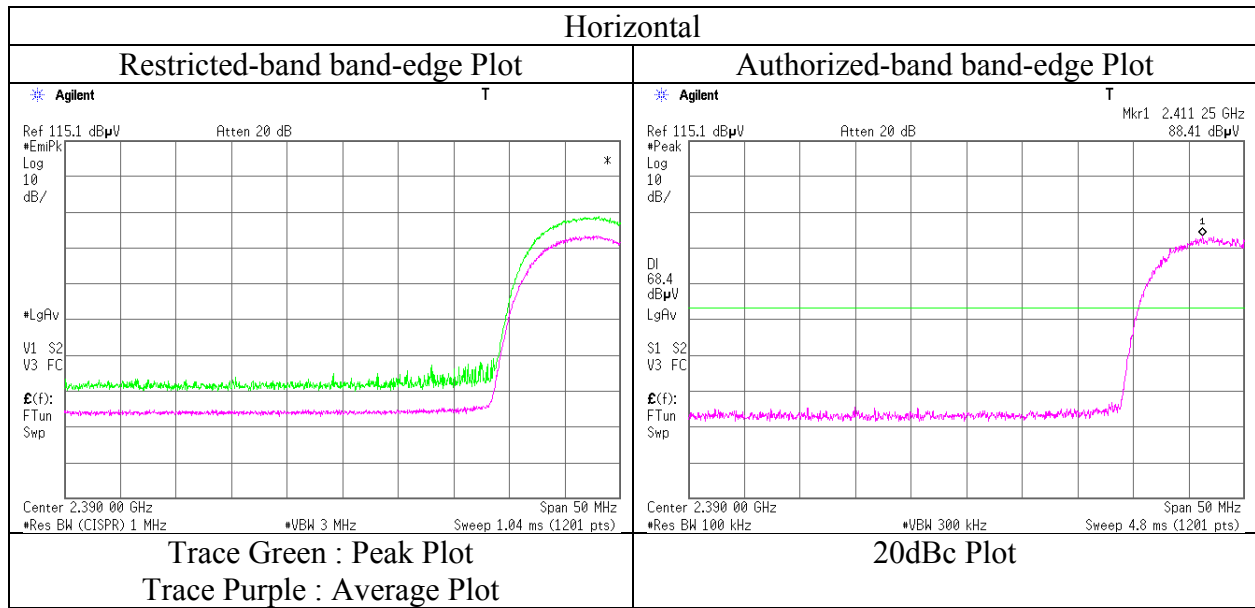
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Facsimile : +81 463 50 6401

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11854935S-A-R2
Date : July 26, 2017
Temperature / Humidity : 23 deg. C / 63 % RH
Engineer : Yosuke Ishikawa
(1 GHz -13 GHz)
Mode : Tx 11b 2412 MHz



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11854935S-A-R2
Date : July 26, 2017 July 27, 2017
Temperature / Humidity : 23 deg. C / 63 % RH 24 deg. C / 62 % RH
Engineer : Yosuke Ishikawa Yosuke Ishikawa
(1 GHz -13 GHz) (13 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. | 1980.026 | PK | 50.11 | 25.78 | 13.17 | 41.02 | 2.22 | 50.26 | 73.90 | 23.6 | 148 | 311 | |
| Hori. | 4874.000 | PK | 46.56 | 31.28 | 5.67 | 41.77 | 2.22 | 43.96 | 73.90 | 29.9 | 150 | 0 | |
| Hori. | 7311.000 | PK | 47.22 | 36.74 | 6.85 | 41.26 | 2.22 | 51.77 | 73.90 | 22.1 | 150 | 0 | |
| Hori. | 9748.000 | PK | 44.53 | 38.74 | 7.78 | 40.62 | 2.22 | 52.65 | 73.90 | 21.2 | 150 | 0 | |
| Hori. | 1980.026 | AV | 42.23 | 25.78 | 13.17 | 41.02 | 2.22 | 42.38 | 53.90 | 11.5 | 148 | 311 | *1) |
| Vert. | 1980.026 | PK | 48.68 | 25.78 | 13.17 | 41.02 | 2.22 | 48.83 | 73.90 | 25.0 | 128 | 222 | |
| Vert. | 4874.000 | PK | 46.58 | 31.28 | 5.67 | 41.77 | 2.22 | 43.98 | 73.90 | 29.9 | 150 | 0 | |
| Vert. | 7311.000 | PK | 46.66 | 36.74 | 6.85 | 41.26 | 2.22 | 51.21 | 73.90 | 22.6 | 150 | 0 | |
| Vert. | 9748.000 | PK | 45.85 | 38.74 | 7.78 | 40.62 | 2.22 | 53.97 | 73.90 | 19.9 | 150 | 0 | |
| Vert. | 1980.026 | AV | 40.33 | 25.78 | 13.17 | 41.02 | 2.22 | 40.48 | 53.90 | 13.4 | 128 | 222 | *1) |

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

Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.22 dB

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

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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 | 38.14 | 31.28 | 5.67 | 41.77 | 0.85 | 2.22 | 36.39 | 53.90 | 17.5 | |
| Hori. | 7311.000 | AV | 38.51 | 36.74 | 6.85 | 41.26 | 0.85 | 2.22 | 43.91 | 53.90 | 10.0 | |
| Hori. | 9748.000 | AV | 36.62 | 38.74 | 7.78 | 40.62 | 0.85 | 2.22 | 45.59 | 53.90 | 8.3 | |
| Vert. | 4874.000 | AV | 38.50 | 31.28 | 5.67 | 41.77 | 0.85 | 2.22 | 36.75 | 53.90 | 17.2 | |
| Vert. | 7311.000 | AV | 38.52 | 36.74 | 6.85 | 41.26 | 0.85 | 2.22 | 43.92 | 53.90 | 10.0 | |
| Vert. | 9748.000 | AV | 36.14 | 38.74 | 7.78 | 40.62 | 0.85 | 2.22 | 45.11 | 53.90 | 8.8 | |

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

Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.22 dB

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

Duty factor refer to "Duty factor Calculation chart" sheet.

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11854935S-A-R2
Date : July 26, 2017 July 27, 2017
Temperature / Humidity : 23 deg. C / 63 % RH 24 deg. C / 62 % RH
Engineer : Yosuke Ishikawa Yosuke Ishikawa
(1 GHz -13 GHz) (13 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. | 1980.126 | PK | 49.39 | 25.78 | 13.17 | 41.02 | 2.22 | 49.54 | 73.90 | 24.3 | 142 | 317 | |
| Hori. | 2483.500 | PK | 49.26 | 27.79 | 13.60 | 40.81 | 2.22 | 52.06 | 73.90 | 21.8 | 137 | 14 | |
| Hori. | 4924.000 | PK | 47.01 | 31.38 | 5.67 | 41.70 | 2.22 | 44.58 | 73.90 | 29.3 | 150 | 0 | |
| Hori. | 7386.000 | PK | 46.35 | 36.95 | 6.86 | 41.32 | 2.22 | 51.06 | 73.90 | 22.8 | 150 | 0 | |
| Hori. | 9848.000 | PK | 45.03 | 38.81 | 7.80 | 40.64 | 2.22 | 53.22 | 73.90 | 20.6 | 150 | 0 | |
| Hori. | 1980.126 | AV | 42.16 | 25.78 | 13.17 | 41.02 | 2.22 | 42.31 | 53.90 | 11.5 | 142 | 317 | *1) |
| Vert. | 1980.043 | PK | 49.22 | 25.78 | 13.17 | 41.02 | 2.22 | 49.37 | 73.90 | 24.5 | 124 | 153 | |
| Vert. | 2483.500 | PK | 47.75 | 27.79 | 13.60 | 40.81 | 2.22 | 50.55 | 73.90 | 23.3 | 126 | 81 | |
| Vert. | 4924.000 | PK | 46.60 | 31.38 | 5.67 | 41.70 | 2.22 | 44.17 | 73.90 | 29.7 | 150 | 0 | |
| Vert. | 7386.000 | PK | 46.46 | 36.95 | 6.86 | 41.32 | 2.22 | 51.17 | 73.90 | 22.7 | 150 | 0 | |
| Vert. | 9848.000 | PK | 44.85 | 38.81 | 7.80 | 40.64 | 2.22 | 53.04 | 73.90 | 20.8 | 150 | 0 | |
| Vert. | 1980.043 | AV | 41.58 | 25.78 | 13.17 | 41.02 | 2.22 | 41.73 | 53.90 | 12.1 | 124 | 153 | *1) |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.22 dB

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

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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 | 27.79 | 13.60 | 40.81 | 0.85 | 2.22 | 40.80 | 53.90 | 13.1 | *1) |
| Hori. | 4924.000 | AV | 38.37 | 31.38 | 5.67 | 41.70 | 0.85 | 2.22 | 36.79 | 53.90 | 17.1 | |
| Hori. | 7386.000 | AV | 38.00 | 36.95 | 6.86 | 41.32 | 0.85 | 2.22 | 43.56 | 53.90 | 10.3 | |
| Hori. | 9848.000 | AV | 36.43 | 38.81 | 7.80 | 40.64 | 0.85 | 2.22 | 45.47 | 53.90 | 8.4 | |
| Vert. | 2483.500 | AV | 37.51 | 27.79 | 13.60 | 40.81 | 0.85 | 2.22 | 41.16 | 53.90 | 12.7 | *1) |
| Vert. | 4924.000 | AV | 38.60 | 31.38 | 5.67 | 41.70 | 0.85 | 2.22 | 37.02 | 53.90 | 16.9 | |
| Vert. | 7386.000 | AV | 38.11 | 36.95 | 6.86 | 41.32 | 0.85 | 2.22 | 43.67 | 53.90 | 10.2 | |
| Vert. | 9848.000 | AV | 36.42 | 38.81 | 7.80 | 40.64 | 0.85 | 2.22 | 45.46 | 53.90 | 8.4 | |

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

Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.22 dB

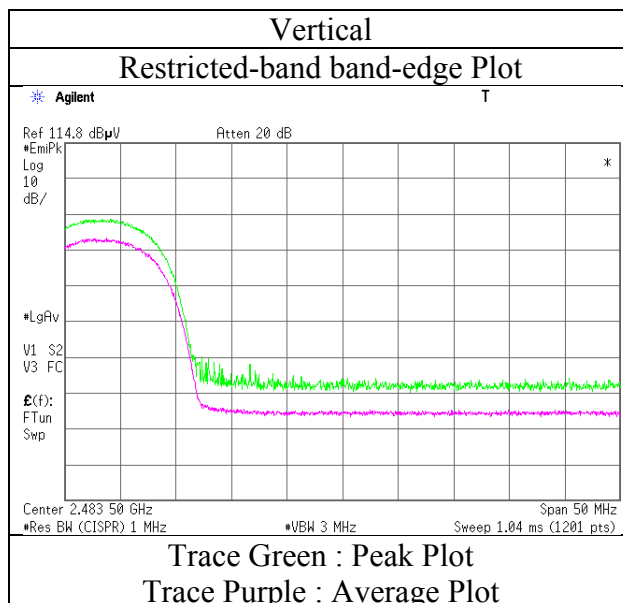
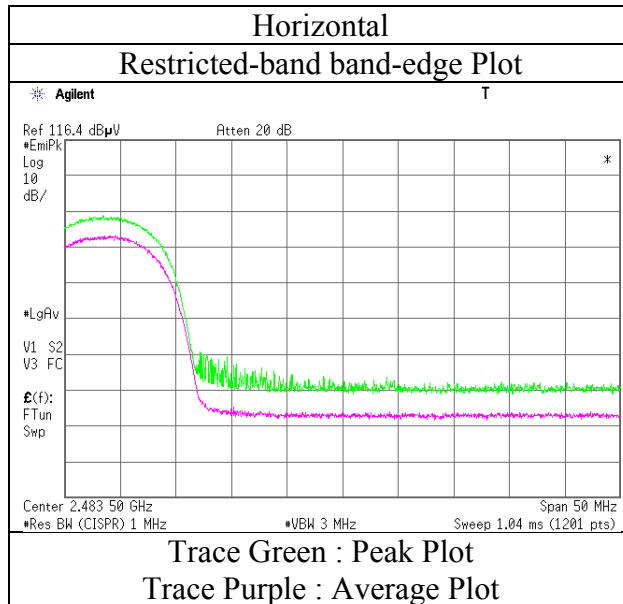
13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

| | |
|------------------------|--|
| Test place | Shonan EMC Lab. No.3 Semi Anechoic Chamber |
| Report No. | 11854935S-A-R2 |
| Date | July 26, 2017 |
| Temperature / Humidity | 23 deg. C / 63 % RH |
| Engineer | Yosuke Ishikawa (1 GHz -13 GHz) |
| Mode | Tx 11b 2462 MHz |



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11854935S-A-R2
Date : July 26, 2017 July 27, 2017
Temperature / Humidity : 23 deg. C / 63 % RH 24 deg. C / 62 % RH
Engineer : Yosuke Ishikawa Yosuke Ishikawa
(1 GHz -13 GHz) (13 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. | 1980.034 | PK | 49.61 | 25.78 | 13.17 | 41.02 | 2.22 | 49.76 | 73.90 | 24.1 | 151 | 40 | |
| Hori. | 2390.000 | PK | 46.81 | 27.41 | 13.52 | 40.85 | 2.22 | 49.11 | 73.90 | 24.7 | 145 | 23 | |
| Hori. | 4824.000 | PK | 47.56 | 31.17 | 5.67 | 41.84 | 2.22 | 44.78 | 73.90 | 29.1 | 150 | 0 | |
| Hori. | 7236.000 | PK | 46.08 | 36.52 | 6.85 | 41.20 | 2.22 | 50.47 | 73.90 | 23.4 | 150 | 0 | |
| Hori. | 9648.000 | PK | 45.63 | 38.66 | 7.76 | 40.60 | 2.22 | 53.67 | 73.90 | 20.2 | 150 | 0 | |
| Hori. | 1980.034 | AV | 41.32 | 25.78 | 13.17 | 41.02 | 2.22 | 41.47 | 53.90 | 12.4 | 151 | 40 | *1) |
| Vert. | 1979.829 | PK | 48.43 | 25.77 | 13.17 | 41.02 | 2.22 | 48.57 | 73.90 | 25.3 | 152 | 2 | |
| Vert. | 2390.000 | PK | 47.20 | 27.41 | 13.52 | 40.85 | 2.22 | 49.50 | 73.90 | 24.4 | 164 | 253 | |
| Vert. | 4824.000 | PK | 47.40 | 31.17 | 5.67 | 41.84 | 2.22 | 44.62 | 73.90 | 29.2 | 150 | 0 | |
| Vert. | 7236.000 | PK | 46.72 | 36.52 | 6.85 | 41.20 | 2.22 | 51.11 | 73.90 | 22.7 | 150 | 0 | |
| Vert. | 9648.000 | PK | 45.21 | 38.66 | 7.76 | 40.60 | 2.22 | 53.25 | 73.90 | 20.6 | 150 | 0 | |
| Vert. | 1979.829 | AV | 40.45 | 25.77 | 13.17 | 41.02 | 2.22 | 40.59 | 53.90 | 13.3 | 152 | 2 | *1) |

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

Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.22 dB

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

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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 | 38.15 | 27.41 | 13.52 | 40.85 | 3.57 | 2.22 | 44.02 | 53.90 | 9.9 | *1) |
| Hori. | 4824.000 | AV | 38.65 | 31.17 | 5.67 | 41.84 | 3.57 | 2.22 | 39.44 | 53.90 | 14.5 | |
| Hori. | 7236.000 | AV | 38.07 | 36.52 | 6.85 | 41.20 | 3.57 | 2.22 | 46.03 | 53.90 | 7.9 | |
| Hori. | 9648.000 | AV | 36.63 | 38.66 | 7.76 | 40.60 | 3.57 | 2.22 | 48.24 | 53.90 | 5.7 | |
| Vert. | 2390.000 | AV | 37.62 | 27.41 | 13.52 | 40.85 | 3.57 | 2.22 | 43.49 | 53.90 | 10.4 | *1) |
| Vert. | 4824.000 | AV | 38.65 | 31.17 | 5.67 | 41.84 | 3.57 | 2.22 | 39.44 | 53.90 | 14.5 | |
| Vert. | 7236.000 | AV | 38.43 | 36.52 | 6.85 | 41.20 | 3.57 | 2.22 | 46.39 | 53.90 | 7.5 | |
| Vert. | 9648.000 | AV | 36.53 | 38.66 | 7.76 | 40.60 | 3.57 | 2.22 | 48.14 | 53.90 | 5.8 | |

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

Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.22 dB

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

Duty factor refer to "Duty factor Calculation chart" 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 | 86.23 | 27.50 | 13.54 | 40.84 | 2.22 | 88.65 | - | - | Carrier |
| Hori. | 2400.000 | PK | 40.53 | 27.45 | 13.53 | 40.84 | 2.22 | 42.89 | 68.65 | 25.8 | |
| Vert. | 2412.000 | PK | 85.65 | 27.50 | 13.54 | 40.84 | 2.22 | 88.07 | - | - | Carrier |
| Vert. | 2400.000 | PK | 39.30 | 27.45 | 13.53 | 40.84 | 2.22 | 41.66 | 68.07 | 26.4 | |

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

Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.22 dB

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

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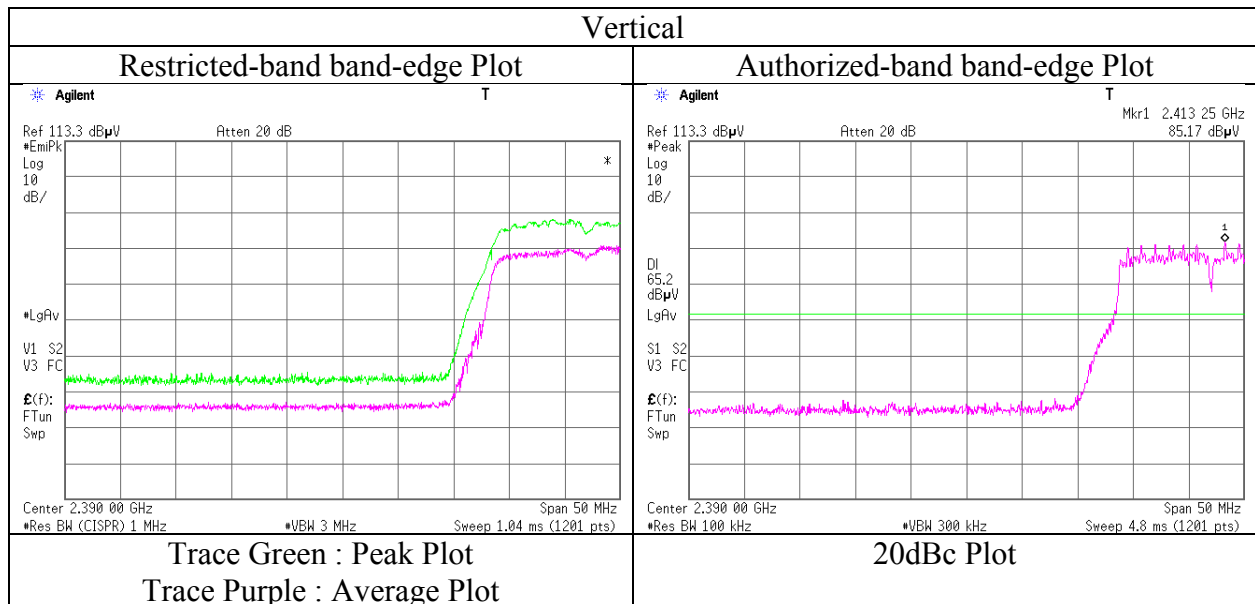
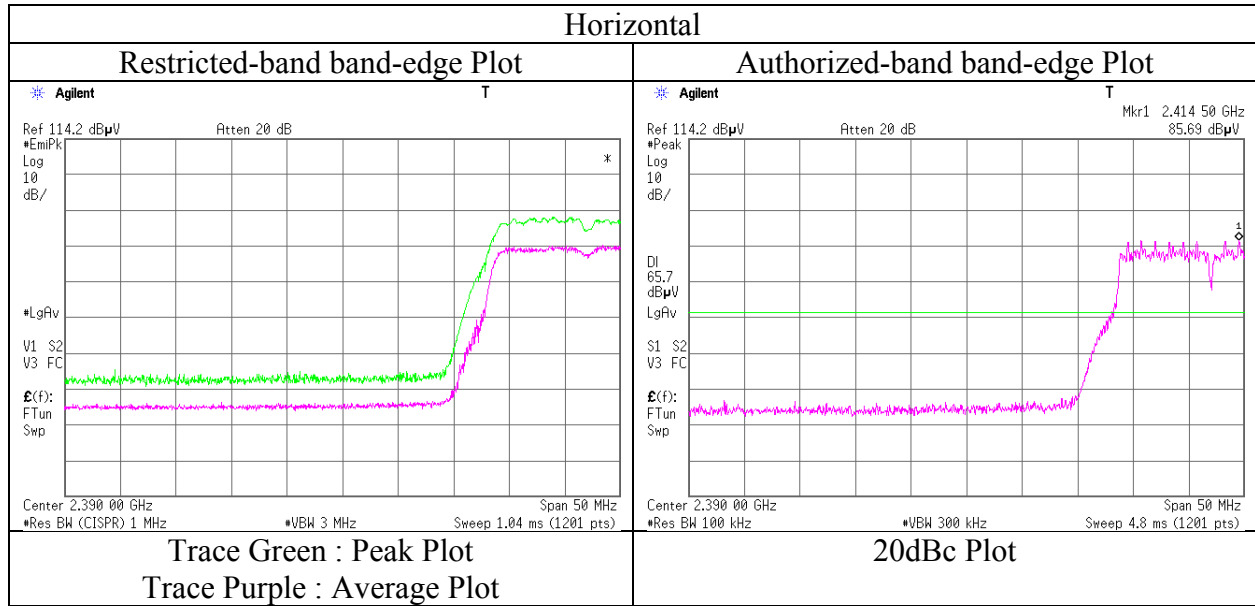
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

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Radiated Spurious Emission
(Reference Plot for band-edge)

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11854935S-A-R2
Date : July 26, 2017
Temperature / Humidity : 23 deg. C / 63 % RH
Engineer : Yosuke Ishikawa
(1 GHz -13 GHz)
Mode : Tx 11g 2412 MHz



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11854935S-A-R2
Date : July 26, 2017 July 27, 2017
Temperature / Humidity : 23 deg. C / 63 % RH 24 deg. C / 62 % RH
Engineer : Yosuke Ishikawa Yosuke Ishikawa
(1 GHz -13 GHz) (13 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. | 1980.146 | PK | 49.68 | 25.78 | 13.17 | 41.02 | 2.22 | 49.83 | 73.90 | 24.0 | 148 | 58 | |
| Hori. | 4874.000 | PK | 47.23 | 31.28 | 5.67 | 41.77 | 2.22 | 44.63 | 73.90 | 29.2 | 150 | 0 | |
| Hori. | 7311.000 | PK | 47.52 | 36.74 | 6.85 | 41.26 | 2.22 | 52.07 | 73.90 | 21.8 | 150 | 0 | |
| Hori. | 9748.000 | PK | 45.43 | 38.74 | 7.78 | 40.62 | 2.22 | 53.55 | 73.90 | 20.3 | 150 | 0 | |
| Hori. | 1980.146 | AV | 42.53 | 25.78 | 13.17 | 41.02 | 2.22 | 42.68 | 53.90 | 11.2 | 148 | 58 | *1) |
| Vert. | 1980.000 | PK | 49.00 | 25.78 | 13.17 | 41.02 | 2.22 | 49.15 | 73.90 | 24.7 | 155 | 313 | |
| Vert. | 4874.000 | PK | 47.25 | 31.28 | 5.67 | 41.77 | 2.22 | 44.65 | 73.90 | 29.2 | 150 | 0 | |
| Vert. | 7311.000 | PK | 47.42 | 36.74 | 6.85 | 41.26 | 2.22 | 51.97 | 73.90 | 21.9 | 150 | 0 | |
| Vert. | 9748.000 | PK | 44.86 | 38.74 | 7.78 | 40.62 | 2.22 | 52.98 | 73.90 | 20.9 | 150 | 0 | |
| Vert. | 1980.000 | AV | 40.18 | 25.78 | 13.17 | 41.02 | 2.22 | 40.33 | 53.90 | 13.5 | 155 | 313 | *1) |

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

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

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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 | 38.46 | 31.28 | 5.67 | 41.77 | 3.57 | 2.22 | 39.43 | 53.90 | 14.5 | |
| Hori. | 7311.000 | AV | 38.39 | 36.74 | 6.85 | 41.26 | 3.57 | 2.22 | 46.51 | 53.90 | 7.4 | |
| Hori. | 9748.000 | AV | 36.18 | 38.74 | 7.78 | 40.62 | 3.57 | 2.22 | 47.87 | 53.90 | 6.0 | |
| Vert. | 4874.000 | AV | 38.38 | 31.28 | 5.67 | 41.77 | 3.57 | 2.22 | 39.35 | 53.90 | 14.5 | |
| Vert. | 7311.000 | AV | 38.26 | 36.74 | 6.85 | 41.26 | 3.57 | 2.22 | 46.38 | 53.90 | 7.5 | |
| Vert. | 9748.000 | AV | 36.24 | 38.74 | 7.78 | 40.62 | 3.57 | 2.22 | 47.93 | 53.90 | 6.0 | |

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

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

Duty factor refer to "Duty factor Calculation chart" sheet.

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11854935S-A-R2
Date : July 26, 2017 July 27, 2017
Temperature / Humidity : 23 deg. C / 63 % RH 24 deg. C / 62 % RH
Engineer : Yosuke Ishikawa Yosuke Ishikawa
 (1 GHz -13 GHz) (13 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. | 1980.041 | PK | 49.06 | 25.78 | 13.17 | 41.02 | 2.22 | 49.21 | 73.90 | 24.6 | 133 | 97 | |
| Hori. | 2483.500 | PK | 47.43 | 27.79 | 13.60 | 40.81 | 2.22 | 50.23 | 73.90 | 23.6 | 165 | 50 | |
| Hori. | 4924.000 | PK | 47.37 | 31.38 | 5.67 | 41.70 | 2.22 | 44.94 | 73.90 | 28.9 | 150 | 0 | |
| Hori. | 7386.000 | PK | 46.11 | 36.95 | 6.86 | 41.32 | 2.22 | 50.82 | 73.90 | 23.0 | 150 | 0 | |
| Hori. | 9848.000 | PK | 45.58 | 38.81 | 7.80 | 40.64 | 2.22 | 53.77 | 73.90 | 20.1 | 150 | 0 | |
| Hori. | 1980.041 | AV | 41.25 | 25.78 | 13.17 | 41.02 | 2.22 | 41.40 | 53.90 | 12.5 | 133 | 97 | *1) |
| Vert. | 1980.062 | PK | 48.40 | 25.78 | 13.17 | 41.02 | 2.22 | 48.55 | 73.90 | 25.3 | 155 | 3 | |
| Vert. | 2483.500 | PK | 47.56 | 27.79 | 13.60 | 40.81 | 2.22 | 50.36 | 73.90 | 23.5 | 125 | 256 | |
| Vert. | 4924.000 | PK | 46.82 | 31.38 | 5.67 | 41.70 | 2.22 | 44.39 | 73.90 | 29.5 | 150 | 0 | |
| Vert. | 7386.000 | PK | 46.37 | 36.95 | 6.86 | 41.32 | 2.22 | 51.08 | 73.90 | 22.8 | 150 | 0 | |
| Vert. | 9848.000 | PK | 46.13 | 38.81 | 7.80 | 40.64 | 2.22 | 54.32 | 73.90 | 19.5 | 150 | 0 | |
| Vert. | 1980.062 | AV | 40.52 | 25.78 | 13.17 | 41.02 | 2.22 | 40.67 | 53.90 | 13.2 | 155 | 3 | *1) |

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

Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.22 dB

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

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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 | 38.00 | 27.79 | 13.60 | 40.81 | 3.57 | 2.22 | 44.37 | 53.90 | 9.5 | *1) |
| Hori. | 4924.000 | AV | 38.57 | 31.38 | 5.67 | 41.70 | 3.57 | 2.22 | 39.71 | 53.90 | 14.2 | |
| Hori. | 7386.000 | AV | 38.01 | 36.95 | 6.86 | 41.32 | 3.57 | 2.22 | 46.29 | 53.90 | 7.6 | |
| Hori. | 9848.000 | AV | 36.38 | 38.81 | 7.80 | 40.64 | 3.57 | 2.22 | 48.14 | 53.90 | 5.8 | |
| Vert. | 2483.500 | AV | 38.08 | 27.79 | 13.60 | 40.81 | 3.57 | 2.22 | 44.45 | 53.90 | 9.4 | *1) |
| Vert. | 4924.000 | AV | 38.55 | 31.38 | 5.67 | 41.70 | 3.57 | 2.22 | 39.69 | 53.90 | 14.2 | |
| Vert. | 7386.000 | AV | 38.21 | 36.95 | 6.86 | 41.32 | 3.57 | 2.22 | 46.49 | 53.90 | 7.4 | |
| Vert. | 9848.000 | AV | 36.24 | 38.81 | 7.80 | 40.64 | 3.57 | 2.22 | 48.00 | 53.90 | 5.9 | |

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

Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.22 dB

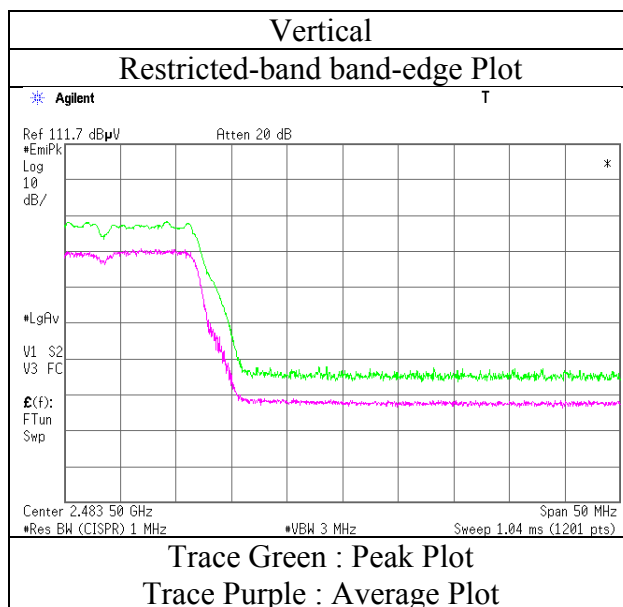
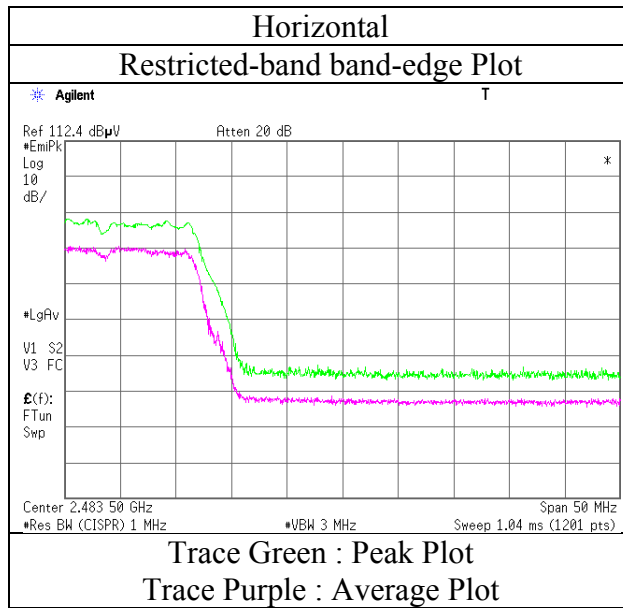
13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

| | |
|------------------------|--|
| Test place | Shonan EMC Lab. No.3 Semi Anechoic Chamber |
| Report No. | 11854935S-A-R2 |
| Date | July 26, 2017 |
| Temperature / Humidity | 23 deg. C / 63 % RH |
| Engineer | Yosuke Ishikawa (1 GHz -13 GHz) |
| Mode | Tx 11g 2462 MHz |



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11854935S-A-R2
Date : July 28, 2017 July 26, 2017 July 27, 2017
Temperature / Humidity : 22 deg. C / 61 % RH 23 deg. C / 63 % RH 24 deg. C / 62 % RH
Engineer : Yosuke Ishikawa Yosuke Ishikawa Yosuke Ishikawa
 (30 MHz -1 GHz) (1 GHz -13 GHz) (13 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. | 70.351 | QP | 38.51 | 6.29 | 6.97 | 32.10 | 0.00 | 19.67 | 40.00 | 20.3 | 257 | 264 | |
| Hori. | 74.016 | QP | 41.56 | 6.25 | 7.28 | 32.10 | 0.00 | 22.99 | 40.00 | 17.0 | 261 | 265 | |
| Hori. | 111.010 | QP | 33.62 | 11.55 | 7.40 | 32.07 | 0.00 | 20.50 | 43.50 | 23.0 | 277 | 285 | |
| Hori. | 148.030 | QP | 31.71 | 14.74 | 7.90 | 32.03 | 0.00 | 22.32 | 43.50 | 21.1 | 219 | 276 | |
| Hori. | 180.332 | QP | 26.43 | 16.28 | 7.97 | 32.01 | 0.00 | 18.67 | 43.50 | 24.8 | 171 | 52 | |
| Hori. | 185.035 | QP | 32.52 | 16.27 | 7.96 | 32.00 | 0.00 | 24.75 | 43.50 | 18.7 | 183 | 301 | |
| Hori. | 259.042 | QP | 32.67 | 11.99 | 8.50 | 31.92 | 0.00 | 21.24 | 46.00 | 24.7 | 126 | 273 | |
| Hori. | 1980.145 | PK | 49.53 | 25.78 | 13.17 | 41.02 | 2.22 | 49.68 | 73.90 | 24.2 | 162 | 48 | |
| Hori. | 2390.000 | PK | 48.41 | 27.41 | 13.52 | 40.85 | 2.22 | 50.71 | 73.90 | 23.1 | 165 | 18 | |
| Hori. | 4824.000 | PK | 47.75 | 31.17 | 5.67 | 41.84 | 2.22 | 44.97 | 73.90 | 28.9 | 150 | 0 | |
| Hori. | 7236.000 | PK | 46.63 | 36.52 | 6.85 | 41.20 | 2.22 | 51.02 | 73.90 | 22.8 | 150 | 0 | |
| Hori. | 9648.000 | PK | 45.89 | 38.66 | 7.76 | 40.60 | 2.22 | 53.93 | 73.90 | 19.9 | 150 | 0 | |
| Hori. | 1980.145 | AV | 42.73 | 25.78 | 13.17 | 41.02 | 2.22 | 42.88 | 53.90 | 11.0 | 162 | 48 | *1) |
| Vert. | 71.155 | QP | 34.44 | 6.28 | 7.03 | 32.10 | 0.00 | 15.65 | 40.00 | 24.3 | 100 | 1 | |
| Vert. | 74.015 | QP | 42.21 | 6.25 | 7.28 | 32.10 | 0.00 | 23.64 | 40.00 | 16.3 | 125 | 102 | |
| Vert. | 592.113 | QP | 32.95 | 18.85 | 9.99 | 31.83 | 0.00 | 29.96 | 46.00 | 16.0 | 100 | 88 | |
| Vert. | 1980.033 | PK | 48.58 | 25.78 | 13.17 | 41.02 | 2.22 | 48.73 | 73.90 | 25.1 | 143 | 2 | |
| Vert. | 2390.000 | PK | 47.27 | 27.41 | 13.52 | 40.85 | 2.22 | 49.57 | 73.90 | 24.3 | 150 | 259 | |
| Vert. | 4824.000 | PK | 47.51 | 31.17 | 5.67 | 41.84 | 2.22 | 44.73 | 73.90 | 29.1 | 150 | 0 | |
| Vert. | 7236.000 | PK | 47.45 | 36.52 | 6.85 | 41.20 | 2.22 | 51.84 | 73.90 | 22.0 | 150 | 0 | |
| Vert. | 9648.000 | PK | 45.98 | 38.66 | 7.76 | 40.60 | 2.22 | 54.02 | 73.90 | 19.8 | 150 | 0 | |
| Vert. | 1980.033 | AV | 39.53 | 25.78 | 13.17 | 41.02 | 2.22 | 39.68 | 53.90 | 14.2 | 143 | 2 | *1) |

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

Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.22 dB

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

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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 | 38.20 | 27.41 | 13.52 | 40.85 | 2.09 | 2.22 | 42.59 | 53.90 | 11.3 | *1) |
| Hori. | 4824.000 | AV | 38.82 | 31.17 | 5.67 | 41.84 | 2.09 | 2.22 | 38.13 | 53.90 | 15.8 | |
| Hori. | 7236.000 | AV | 38.11 | 36.52 | 6.85 | 41.20 | 2.09 | 2.22 | 44.59 | 53.90 | 9.3 | |
| Hori. | 9648.000 | AV | 36.48 | 38.66 | 7.76 | 40.60 | 2.09 | 2.22 | 46.61 | 53.90 | 7.3 | |
| Vert. | 2390.000 | AV | 37.83 | 27.41 | 13.52 | 40.85 | 2.09 | 2.22 | 42.22 | 53.90 | 11.7 | *1) |
| Vert. | 4824.000 | AV | 38.65 | 31.17 | 5.67 | 41.84 | 2.09 | 2.22 | 37.96 | 53.90 | 15.9 | |
| Vert. | 7236.000 | AV | 38.22 | 36.52 | 6.85 | 41.20 | 2.09 | 2.22 | 44.70 | 53.90 | 9.2 | |
| Vert. | 9648.000 | AV | 36.62 | 38.66 | 7.76 | 40.60 | 2.09 | 2.22 | 46.75 | 53.90 | 7.2 | |

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

Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.22 dB

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

Duty factor refer to "Duty factor Calculation chart" 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 | 86.15 | 27.50 | 13.54 | 40.84 | 2.22 | 88.57 | - | - | Carrier |
| Hori. | 2400.000 | PK | 43.81 | 27.45 | 13.53 | 40.84 | 2.22 | 46.17 | 68.57 | 22.4 | |
| Vert. | 2412.000 | PK | 84.84 | 27.50 | 13.54 | 40.84 | 2.22 | 87.26 | - | - | Carrier |
| Vert. | 2400.000 | PK | 40.00 | 27.45 | 13.53 | 40.84 | 2.22 | 42.36 | 67.26 | 24.9 | |

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

Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.22 dB

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

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Shonan EMC Lab.

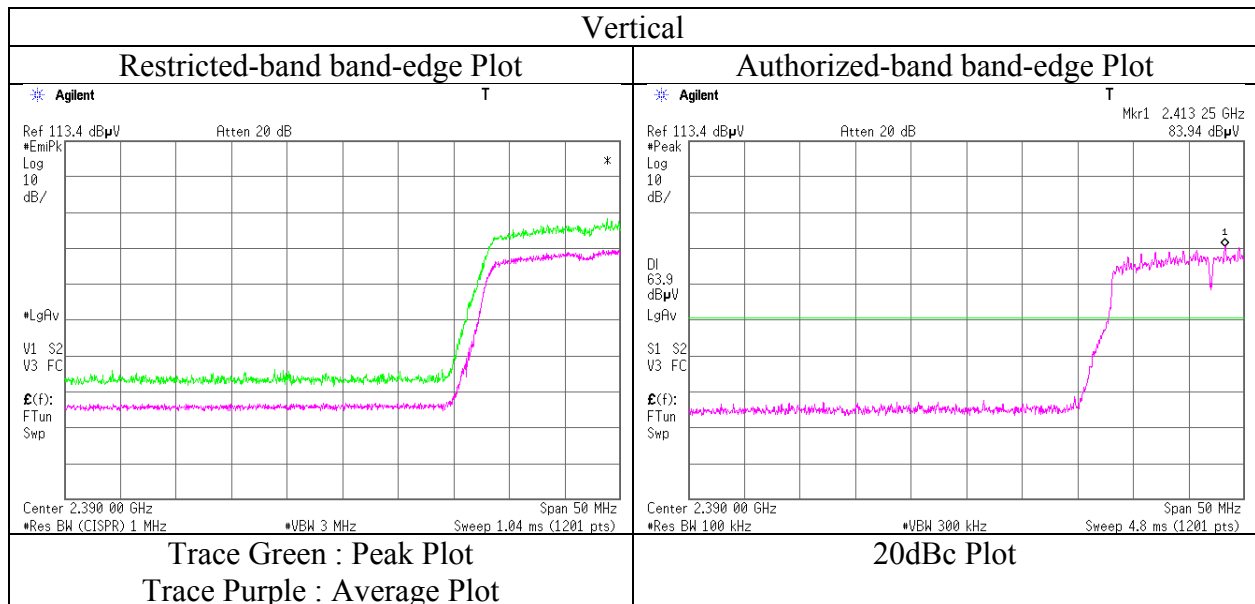
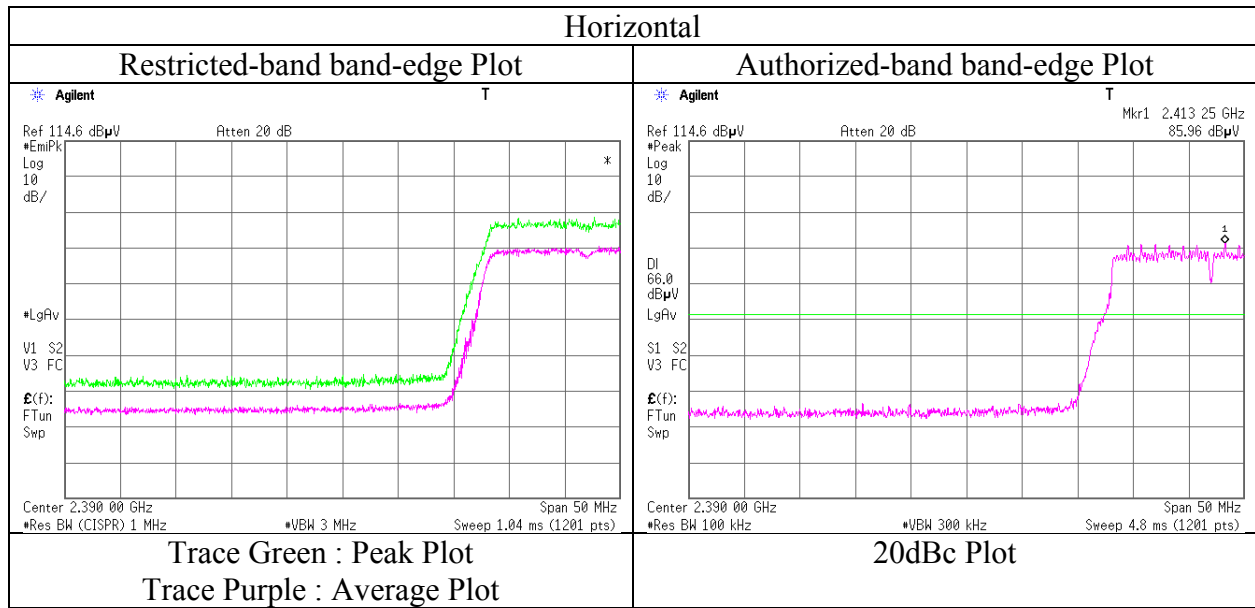
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

| | |
|------------------------|--|
| Test place | Shonan EMC Lab. No.3 Semi Anechoic Chamber |
| Report No. | 11854935S-A-R2 |
| Date | July 26, 2017 |
| Temperature / Humidity | 23 deg. C / 63 % RH |
| Engineer | Yosuke Ishikawa |
| | (1 GHz -13 GHz) |
| Mode | Tx 11n-20 2412 MHz |



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11854935S-A-R2
Date : July 26, 2017 July 27, 2017
Temperature / Humidity : 23 deg. C / 63 % RH 24 deg. C / 62 % RH
Engineer : Yosuke Ishikawa Yosuke Ishikawa
(1 GHz -13 GHz) (13 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. | 1980.080 | PK | 49.37 | 25.78 | 13.17 | 41.02 | 2.22 | 49.52 | 73.90 | 24.3 | 143 | 65 | |
| Hori. | 4874.000 | PK | 47.22 | 31.28 | 5.67 | 41.77 | 2.22 | 44.62 | 73.90 | 29.2 | 150 | 0 | |
| Hori. | 7311.000 | PK | 47.12 | 36.74 | 6.85 | 41.26 | 2.22 | 51.67 | 73.90 | 22.2 | 150 | 0 | |
| Hori. | 9748.000 | PK | 45.03 | 38.74 | 7.78 | 40.62 | 2.22 | 53.15 | 73.90 | 20.7 | 150 | 0 | |
| Hori. | 1980.080 | AV | 42.55 | 25.78 | 13.17 | 41.02 | 2.22 | 42.70 | 53.90 | 11.2 | 143 | 65 | *1) |
| Vert. | 1980.129 | PK | 47.36 | 25.78 | 13.17 | 41.02 | 2.22 | 47.51 | 73.90 | 26.3 | 162 | 19 | |
| Vert. | 4874.000 | PK | 46.87 | 31.28 | 5.67 | 41.77 | 2.22 | 44.27 | 73.90 | 29.6 | 150 | 0 | |
| Vert. | 7311.000 | PK | 47.17 | 36.74 | 6.85 | 41.26 | 2.22 | 51.72 | 73.90 | 22.1 | 150 | 0 | |
| Vert. | 9748.000 | PK | 45.00 | 38.74 | 7.78 | 40.62 | 2.22 | 53.12 | 73.90 | 20.7 | 150 | 0 | |
| Vert. | 1980.129 | AV | 40.63 | 25.78 | 13.17 | 41.02 | 2.22 | 40.78 | 53.90 | 13.1 | 162 | 19 | *1) |

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

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

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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 | 38.43 | 31.28 | 5.67 | 41.77 | 2.09 | 2.22 | 37.92 | 53.90 | 16.0 | |
| Hori. | 7311.000 | AV | 38.47 | 36.74 | 6.85 | 41.26 | 2.09 | 2.22 | 45.11 | 53.90 | 8.8 | |
| Hori. | 9748.000 | AV | 36.36 | 38.74 | 7.78 | 40.62 | 2.09 | 2.22 | 46.57 | 53.90 | 7.3 | |
| Vert. | 4874.000 | AV | 38.37 | 31.28 | 5.67 | 41.77 | 2.09 | 2.22 | 37.86 | 53.90 | 16.0 | |
| Vert. | 7311.000 | AV | 38.40 | 36.74 | 6.85 | 41.26 | 2.09 | 2.22 | 45.04 | 53.90 | 8.9 | |
| Vert. | 9748.000 | AV | 36.48 | 38.74 | 7.78 | 40.62 | 2.09 | 2.22 | 46.69 | 53.90 | 7.2 | |

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

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

Duty factor refer to "Duty factor Calculation chart" sheet.

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11854935S-A-R2
Date : July 26, 2017 July 27, 2017
Temperature / Humidity : 23 deg. C / 63 % RH 24 deg. C / 62 % RH
Engineer : Yosuke Ishikawa Yosuke Ishikawa
(1 GHz -13 GHz) (13 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. | 1980.025 | PK | 49.82 | 25.78 | 13.17 | 41.02 | 2.22 | 49.97 | 73.90 | 23.9 | 198 | 55 | |
| Hori. | 2483.500 | PK | 48.12 | 27.79 | 13.60 | 40.81 | 2.22 | 50.92 | 73.90 | 22.9 | 197 | 52 | |
| Hori. | 4924.000 | PK | 47.57 | 31.38 | 5.67 | 41.70 | 2.22 | 45.14 | 73.90 | 28.7 | 150 | 0 | |
| Hori. | 7386.000 | PK | 46.61 | 36.95 | 6.86 | 41.32 | 2.22 | 51.32 | 73.90 | 22.5 | 150 | 0 | |
| Hori. | 9848.000 | PK | 45.86 | 38.81 | 7.80 | 40.64 | 2.22 | 54.05 | 73.90 | 19.8 | 150 | 0 | |
| Hori. | 1980.025 | AV | 42.57 | 25.78 | 13.17 | 41.02 | 2.22 | 42.72 | 53.90 | 11.1 | 198 | 55 | *1) |
| Vert. | 1980.137 | PK | 49.32 | 25.78 | 13.17 | 41.02 | 2.22 | 49.47 | 73.90 | 24.4 | 167 | 9 | |
| Vert. | 2483.500 | PK | 47.57 | 27.79 | 13.60 | 40.81 | 2.22 | 50.37 | 73.90 | 23.5 | 131 | 251 | |
| Vert. | 4924.000 | PK | 47.46 | 31.38 | 5.67 | 41.70 | 2.22 | 45.03 | 73.90 | 28.8 | 150 | 0 | |
| Vert. | 7386.000 | PK | 47.66 | 36.95 | 6.86 | 41.32 | 2.22 | 52.37 | 73.90 | 21.5 | 150 | 0 | |
| Vert. | 9848.000 | PK | 44.37 | 38.81 | 7.80 | 40.64 | 2.22 | 52.56 | 73.90 | 21.3 | 150 | 0 | |
| Vert. | 1980.137 | AV | 40.13 | 25.78 | 13.17 | 41.02 | 2.22 | 40.28 | 53.90 | 13.6 | 167 | 9 | *1) |

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

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

*1) Not apply duty factor, because duty cycle of this noise was above 98 %.

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 | 38.56 | 27.79 | 13.60 | 40.81 | 2.09 | 2.22 | 43.45 | 53.90 | 10.4 | *1) |
| Hori. | 4924.000 | AV | 38.50 | 31.38 | 5.67 | 41.70 | 2.09 | 2.22 | 38.16 | 53.90 | 15.7 | |
| Hori. | 7386.000 | AV | 38.10 | 36.95 | 6.86 | 41.32 | 2.09 | 2.22 | 44.90 | 53.90 | 9.0 | |
| Hori. | 9848.000 | AV | 36.63 | 38.81 | 7.80 | 40.64 | 2.09 | 2.22 | 46.91 | 53.90 | 7.0 | |
| Vert. | 2483.500 | AV | 38.36 | 27.79 | 13.60 | 40.81 | 2.09 | 2.22 | 43.25 | 53.90 | 10.7 | *1) |
| Vert. | 4924.000 | AV | 38.58 | 31.38 | 5.67 | 41.70 | 2.09 | 2.22 | 38.24 | 53.90 | 15.7 | |
| Vert. | 7386.000 | AV | 37.88 | 36.95 | 6.86 | 41.32 | 2.09 | 2.22 | 44.68 | 53.90 | 9.2 | |
| Vert. | 9848.000 | AV | 36.42 | 38.81 | 7.80 | 40.64 | 2.09 | 2.22 | 46.70 | 53.90 | 7.2 | |

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.22\text{ dB}$

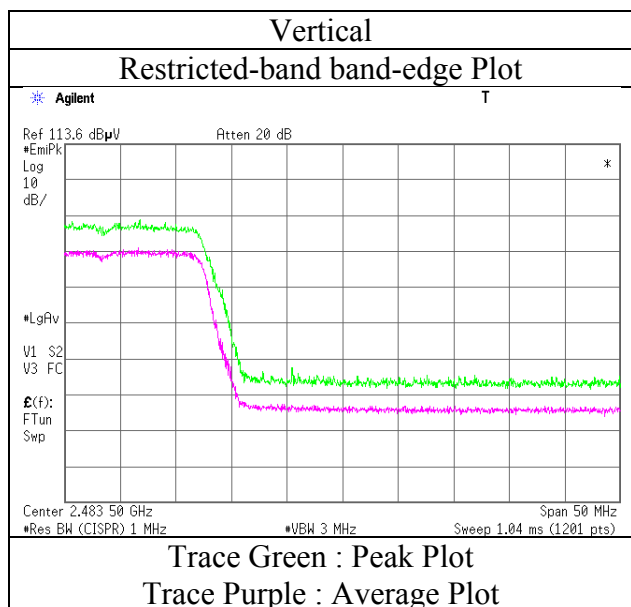
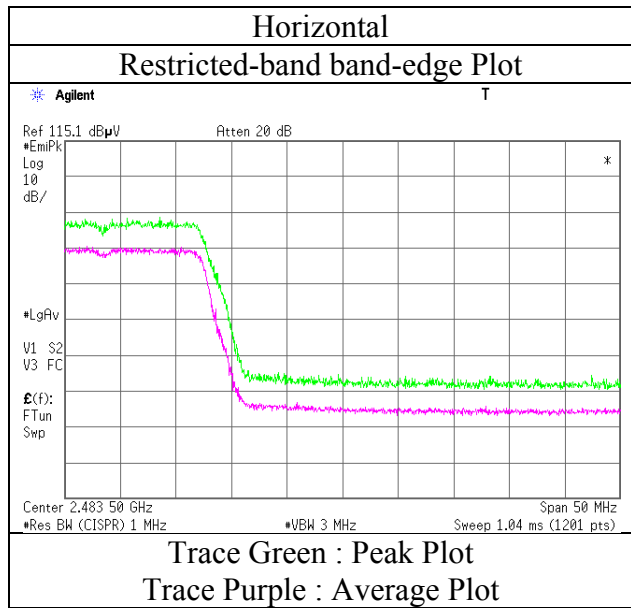
13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

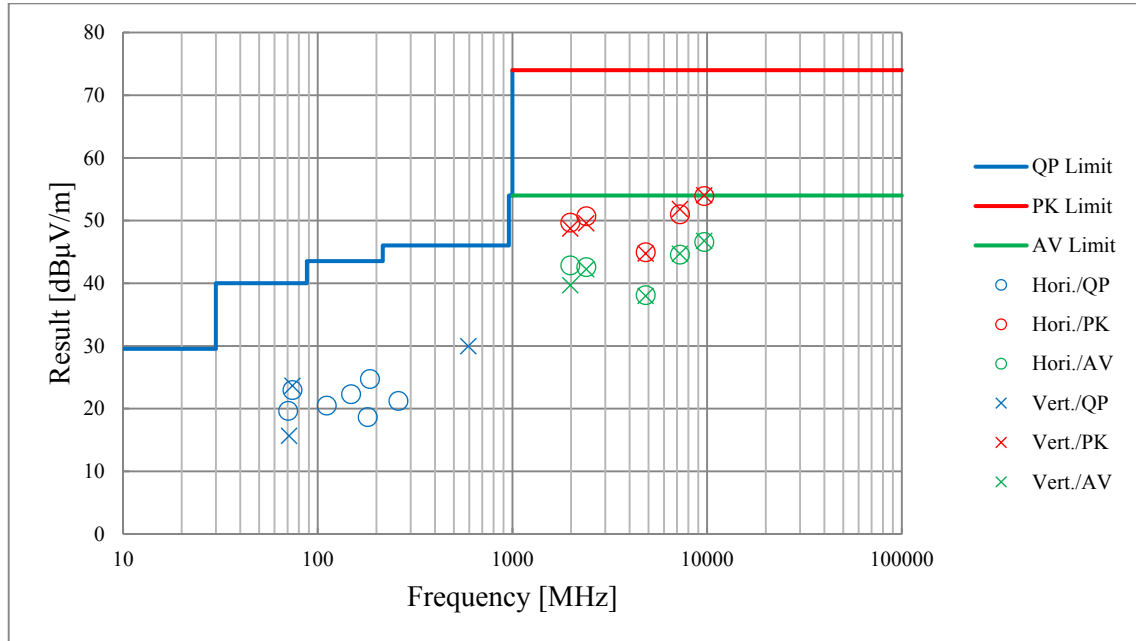
| | |
|------------------------|--|
| Test place | Shonan EMC Lab. No.3 Semi Anechoic Chamber |
| Report No. | 11854935S-A-R2 |
| Date | July 26, 2017 |
| Temperature / Humidity | 23 deg. C / 63 % RH |
| Engineer | Yosuke Ishikawa (1 GHz -13 GHz) |
| Mode | Tx 11n-20 2462 MHz |



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

Radiated Spurious Emission
(Plot data, Worst case)

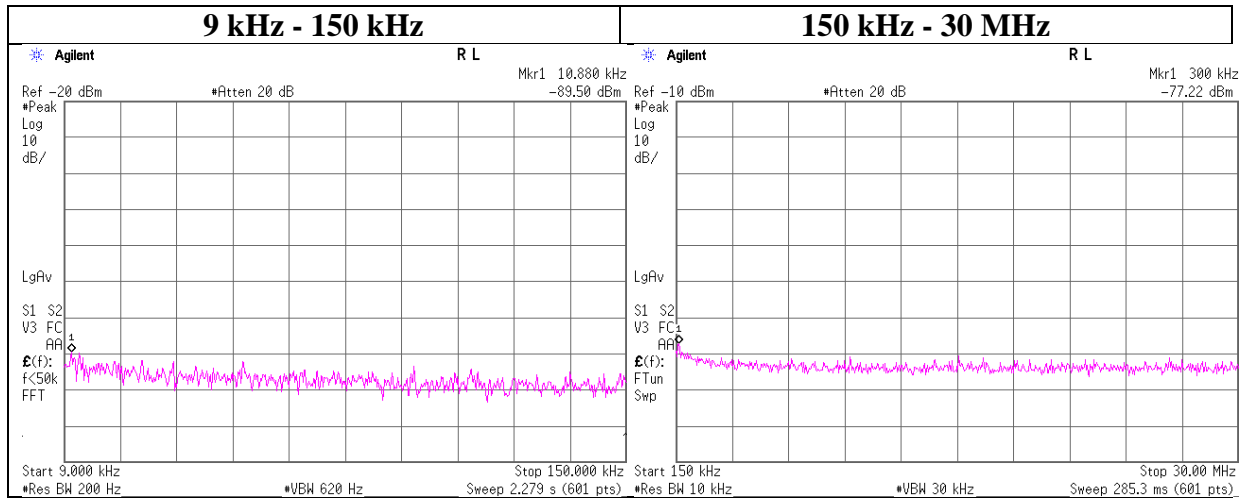
| | | | |
|------------------------|--|---------------------|---------------------|
| Test place | Shonan EMC Lab. No.3 Semi Anechoic Chamber | | |
| Report No. | 11854935S-A-R2 | | |
| Date | July 28, 2017 | July 26, 2017 | July 27, 2017 |
| Temperature / Humidity | 22 deg. C / 61 % RH | 23 deg. C / 63 % RH | 24 deg. C / 62 % RH |
| Engineer | Yosuke Ishikawa | Yosuke Ishikawa | Yosuke Ishikawa |
| | (30 MHz -1 GHz) | (1 GHz -13 GHz) | (13 GHz -26.5 GHz) |
| Mode | Tx 11n-20 2412 MHz | | |



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

Conducted Spurious Emission

| | |
|------------------------|------------------------------------|
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Report No. | 11854935S-A-R2 |
| Date | July 28, 2017 |
| Temperature / Humidity | 25 deg. C / 55 % RH |
| Engineer | Makoto Hosaka |
| Mode | Tx 11n-20 2412 MHz |



| Frequency [kHz] | Reading [dBm] | Cable Loss [dB] | Attenuator Loss [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 |
|-----------------|---------------|-----------------|----------------------|--------------------|----------------------|------------|--------------|--------------------|-----------------------------|----------------|-------------|--------|
| 10.88 | -89.5 | 0.99 | 9.7 | 2.94 | 1 | -75.9 | 300 | 6.0 | -14.6 | 46.8 | 61.4 | |
| 300.00 | -77.2 | 0.99 | 9.7 | 2.94 | 1 | -63.6 | 300 | 6.0 | -2.3 | 18.0 | 20.3 | |

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

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

N: Number of output

Power Density

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11854935S-A-R2
Date July 28, 2017
Temperature / Humidity 25 deg. C / 55 % RH
Engineer Makoto Hosaka
Mode Tx 11b,Tx 11g, Tx 11n-20

11b

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. Loss [dB] | Result [dBm] | Limit [dBm] | Margin [dB] |
|----------------|------------------|-----------------------|------------------------|-----------------|----------------|----------------|
| 2412.00 | -29.78 | 2.02 | 9.96 | -17.80 | 8.00 | 25.80 |
| 2437.00 | -30.41 | 2.03 | 9.96 | -18.42 | 8.00 | 26.42 |
| 2462.00 | -31.17 | 2.04 | 9.97 | -19.16 | 8.00 | 27.16 |

11g

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. Loss [dB] | Result [dBm] | Limit [dBm] | Margin [dB] |
|----------------|------------------|-----------------------|------------------------|-----------------|----------------|----------------|
| 2412.00 | -35.85 | 2.02 | 9.96 | -23.87 | 8.00 | 31.87 |
| 2437.00 | -35.95 | 2.03 | 9.96 | -23.96 | 8.00 | 31.96 |
| 2462.00 | -35.85 | 2.04 | 9.97 | -23.84 | 8.00 | 31.84 |

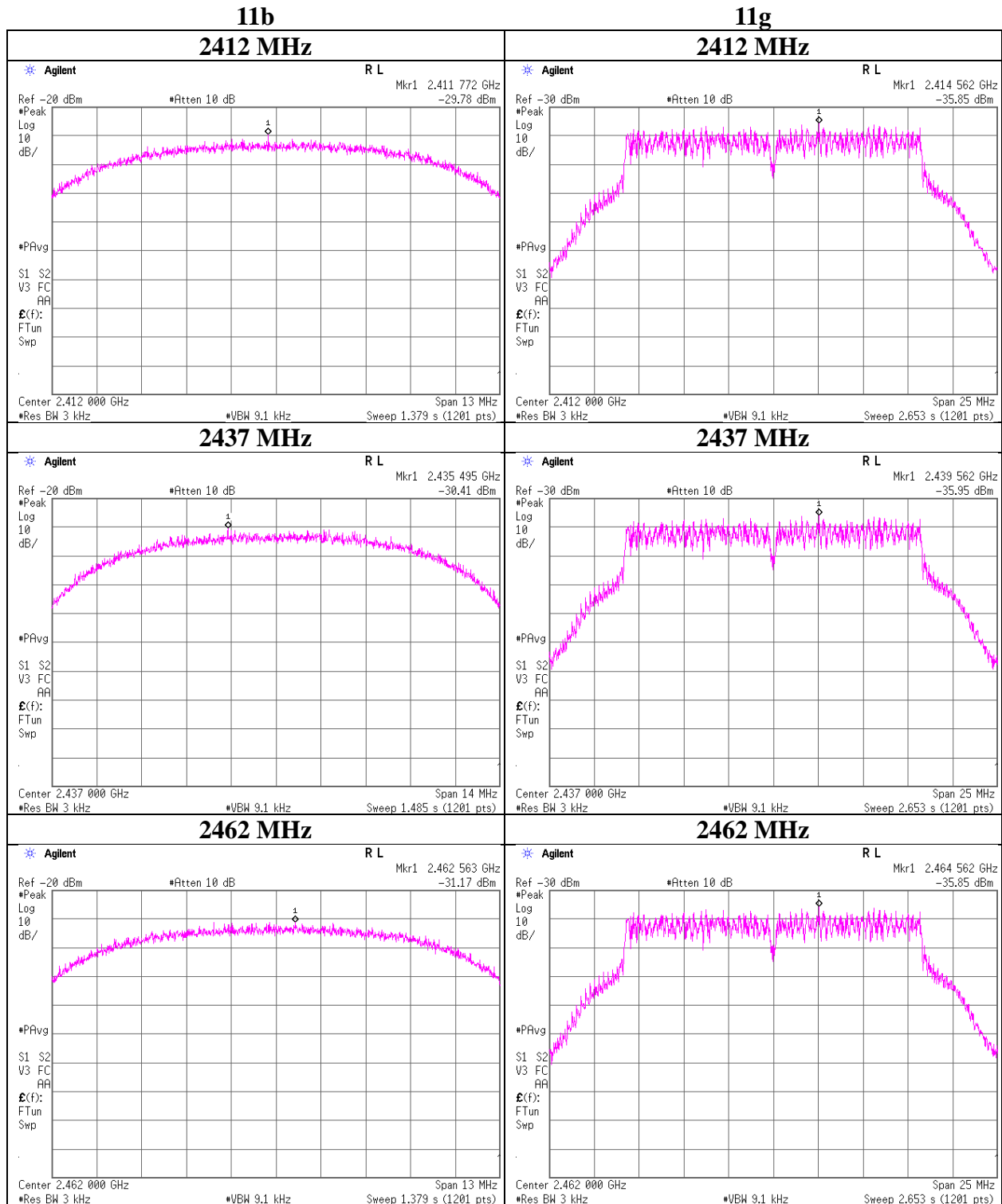
11n-20

| Freq. [MHz] | Reading [dBm] | Cable Loss [dB] | Atten. Loss [dB] | Result [dBm] | Limit [dBm] | Margin [dB] |
|----------------|------------------|-----------------------|------------------------|-----------------|----------------|----------------|
| 2412.00 | -34.80 | 2.02 | 9.96 | -22.82 | 8.00 | 30.82 |
| 2437.00 | -33.62 | 2.03 | 9.96 | -21.63 | 8.00 | 29.63 |
| 2462.00 | -34.73 | 2.04 | 9.97 | -22.72 | 8.00 | 30.72 |

Sample Calculation:

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

Power Density



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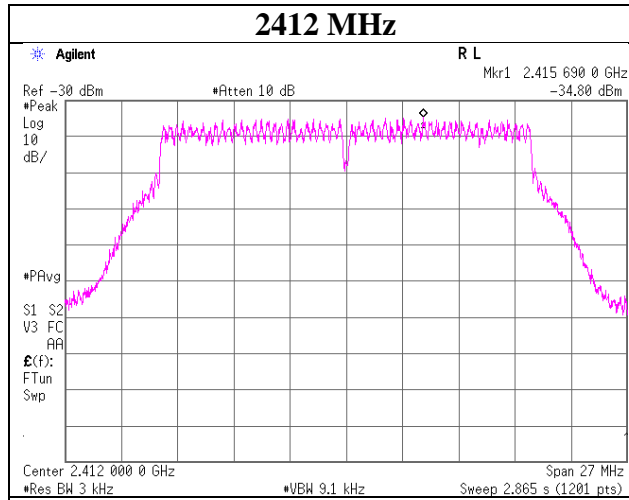
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

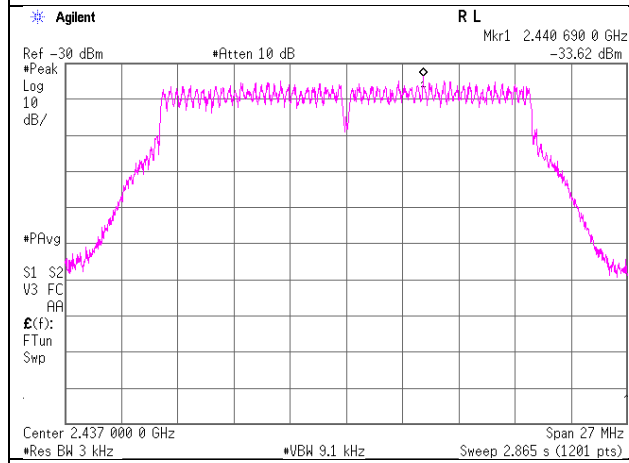
Power Density

11n-20

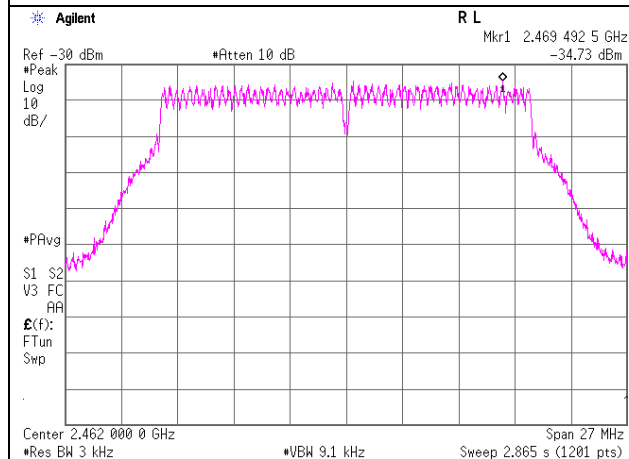
2412 MHz



2437 MHz



2462 MHz



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Shonan EMC Lab.

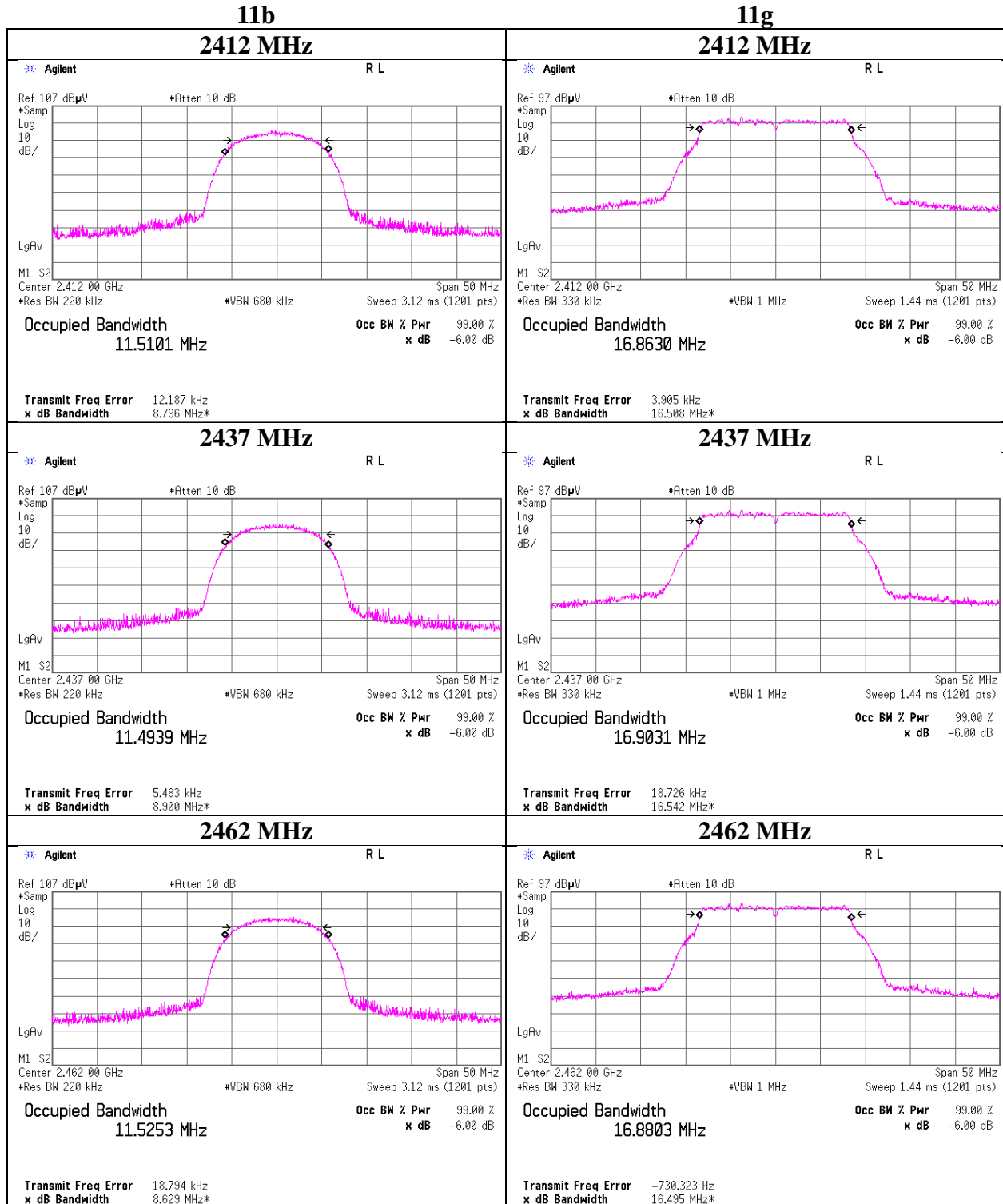
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99% Occupied Bandwidth

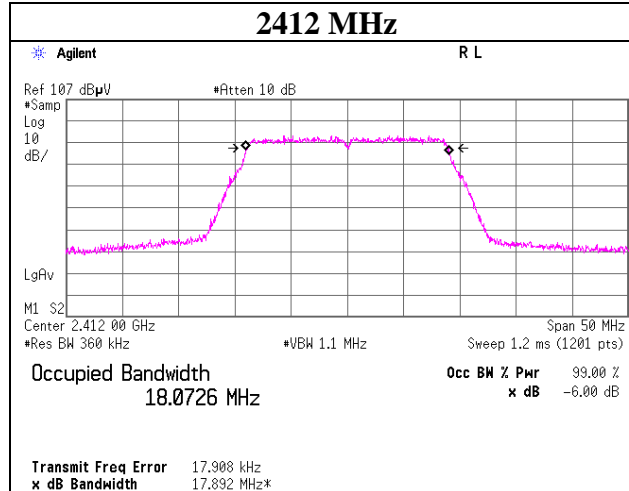
| | |
|------------------------|------------------------------------|
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Report No. | 11854935S-A-R2 |
| Date | July 28, 2017 |
| Temperature / Humidity | 25 deg. C / 55 % RH |
| Engineer | Makoto Hosaka |
| Mode | Tx 11b ,Tx 11g |



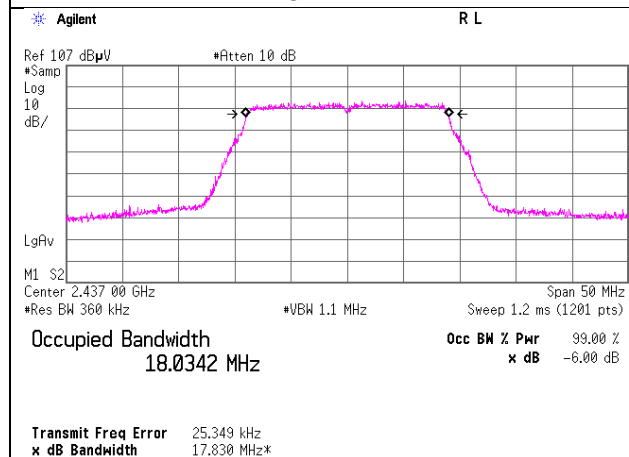
99% Occupied Bandwidth

| | |
|------------------------|------------------------------------|
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Report No. | 11854935S-A-R2 |
| Date | July 28, 2017 |
| Temperature / Humidity | 25 deg. C / 55 % RH |
| Engineer | Makoto Hosaka |
| Mode | Tx 11n-20 |

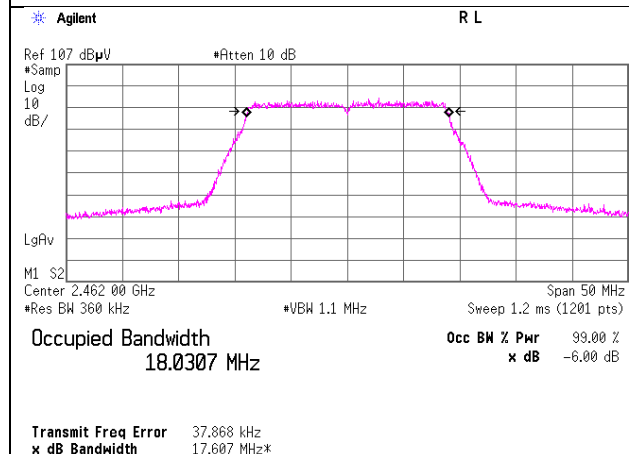
11n-20



2437 MHz



2462 MHz



UL Japan, Inc.

Shonan EMC Lab.

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APPENDIX 2: Test instruments

Test equipment

| Control No. | Instrument | Manufacturer | Model No | Serial No | Test Item | Calibration Date * Interval(month) |
|--------------------------------|------------------------------|--|--|----------------------------|-----------|---------------------------------------|
| SRENT-08 | Spectrum Analyzer | Agilent | E4448A | MY50180019 | AT,RE | 2016/10/24 * 12 |
| SCC-G32 | Coaxial Cable | Junkosha | MWX241-0200 0KMSKMS | OCT-09-13-005 | AT | 2016/11/07 * 12 |
| SAT10-13 | Attenuator | Weinschel Corp. | 54A-10 | 81626 | AT | 2017/03/23 * 12 |
| SOS-09 | Humidity Indicator | A&D | AD-5681 | 4061484 | AT | 2016/12/13 * 12 |
| KTS-07 | Digital Tester | SANWA | PC500 | 7019232 | AT | 2016/10/17 * 12 |
| SPSS-04 | Power sensor | Agilent | N1923A | MY5326009 | AT | 2017/05/01 * 12 |
| SPM-07 | Power Meter | Agilent | 8990B | MY5100272 | AT | 2017/05/01 * 12 |
| SAF-04 | Pre Amplifier | TOYO Corporation | TPA0118-36 | 1440489 | RE | 2017/03/17 * 12 |
| SCC-G07 | Coaxial Cable | Junkosha | J12J103316-00 | MAY-25-17-008 | RE | 2017/06/13 * 12 |
| SCC-G43 | Coaxial Cable | HUBER+SUHNER | SUCOFLEX_1 04 E | SN MY 13406/4E | RE | 2017/07/10 * 12 |
| SHA-03 | Horn Antenna | Schwarzbeck | BBHA9120D | 9120D-739 | RE | 2016/08/22 * 12 |
| SOS-05 | Humidity Indicator | A&D | AD-5681 | 4062518 | RE | 2016/10/12 * 12 |
| KSA-08 | Spectrum Analyzer | Agilent | E4446A | MY46180525 | RE | 2016/10/11 * 12 |
| SJM-02 | Measure | KOMELON | KMC-36 | - | RE | - |
| SAEC-03(SVSWR) | Semi-Anechoic Chamber | TDK | SAEC-03(SVSWR) | 3 | RE | 2017/07/17 * 12 |
| COTS-SEMI-1 | EMI Software | TSJ | TEPTO-DV(RE _CE,RFI,MF) | - | RE | - |
| STS-03 | Digital Hitester | Hioki | 3805-50 | 080997823 | RE | 2016/10/17 * 12 |
| SAT10-05 | Attenuator(above1GHz) | Agilent | 8493C-010 | 74864 | RE | 2016/11/07 * 12 |
| SFL-18 | Highpass Filter | MICRO-TRONICS | HPM50111 | 119 | RE | 2017/04/20 * 12 |
| SHA-05 | Horn Antenna | ETS LINDGREN | 3160-09 | LM4210 | RE | 2017/03/15 * 12 |
| SAF-09 | Pre Amplifier | TOYO Corporation | HAP18-26W | 00000018 | RE | 2016/09/27 * 12 |
| SCC-G19 | Coaxial Cable | Suhner | SUCOFLEX 102A | 1188/2A | RE | 2017/03/23 * 12 |
| SCC-G33 | Coaxial Cable | Junkosha | MWX241-0100 0KMSKMS | - | RE | 2017/04/20 * 12 |
| KAF-02 | Pre Amplifier | Hewlett Packard | 8449B | 3008A01268 | RE | 2017/04/07 * 12 |
| SAEC-03(NSA) | Semi-Anechoic Chamber | TDK | SAEC-03(NSA) | 3 | RE | 2017/06/11 * 12 |
| SBA-03 | Biconical Antenna | Schwarzbeck | BBA9106 | 91032666 | RE | 2016/10/18 * 12 |
| SLA-07 | Logperiodic Antenna | Schwarzbeck | VUSLP9111B | 196 | RE | 2017/01/26 * 12 |
| SAT6-08 | Attenuator | HIROSE ELECTRIC CO.,LTD. | AT-406(40) | - | RE | 2016/08/04 * 12 |
| SCC-C1/C2/C3/C4/C5/C10/SRSE-03 | Coaxial Cable&RF Selector | Fujikura/Fujikura/Suhner /Suhner/Suhner/Suhner/T OYO | 8D2W/12DSFA /141PE/141PE/ 141PE/141PE/ NS4906 | -/0901-271(RF Selector) | RE | 2017/04/07 * 12 |
| SAF-03 | Pre Amplifier | SONOMA | 310N | 290213 | RE | 2017/02/09 * 12 |
| STR-08 | Test Receiver | Rohde & Schwarz | ESW44 | 101581 | RE | 2016/11/08 * 12 |

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

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

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

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

UL Japan, Inc.

Shonan EMC Lab.

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