# RADIO TEST REPORT

## Test Report No. : 11922904M-B-R2

| | | |
|---|---|---|
| **Applicant** | : | **PIONEER CORPORATION** |
| **Type of Equipment** | : | **MULTIMEDIA NAVIGATION RECEIVER** |
| **Model No.** | : | **AVIC-W8400NEX** |
| **FCC ID** | : | **AJDK103** |
| **Test regulation** | : | **FCC Part 15 Subpart C: 2017 (*Wireless LAN part)** |
| **Test items** | : | **Radiated emission tests** |
| **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 11922904M-B-R1. 11922904M-B-R1 is replaced with this report.

**Date of test:** September 2 – 6 , 2017

**Representative test operator:**

Kazuhiro Ando
Engineer
Consumer Technology Division

**Approved by :**

Tomoyuki Yamashita
Engineer
Consumer Technology Division

ilac-MRA

JAB Testing RTL02610

☐ 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.: 1192294M-B

| Revision | Test report No. | Date | Page revised | Contents |
|---|---|---|---|---|
| - (Original) | 11922904M-B | October 6, 2017 | - | - |
| 1 | 11922904M-B-R1 | October 13, 2017 | P.5 | Modification of the frequency of operation |
| 2 | 11922904M-B-R2 | December 4, 2017 | P.4 | Modification of the Clock frequency |
| 2 | 11922904M-B-R2 | December 4, 2017 | P.5 | Update of the Radio specification |
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## SECTION 1: Customer information

| | | |
|---|---|---|
| Company Name | : | PIONEER CORPORATION |
| Address | : | 25-1, Yamada, Kawagoe-shi, Saitama, 350-8555, Japan |
| Telephone Number | : | +81-49-228-7787 |
| Facsimile Number | : | +81-49-228-6493 |
| Contact Person | : | Hiroshi Fuse |

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

### 2.1 Identification of E.U.T.

| | | |
|---|---|---|
| Type of Equipment | : | MULTIMEDIA NAVIGATION RECEIVER |
| Model No. | : | AVIC-W8400NEX |
| Serial No. | : | Refer to Section 4, Clause 4.2 |
| Rating | : | DC 14.4 V |
| Receipt Date of Sample | : | August 23, 2017 |
| Country of Mass-production | : | Thailand |
| Condition of EUT | : | Production prototype<br>(Not for Sale: This sample is equivalent to mass-produced items.) |
| Modification of EUT | : | No Modification by the test lab |

### 2.2 Product Description

**General Specification**

Model: AVIC-W8400NEX (referred to as the EUT in this report) is a MULTIMEDIA NAVIGATION RECEIVER.

| | | |
|---|---|---|
| Clock frequency(ies) in the system | : | Bluetooth Wi-Fi module 37.4 MHz<br>LPO clock for Bluetooth Wi-Fi module 32.768 kHz<br>DC-DCCONVERTER 1000 kHz/ 700.5 kHz, 2.29 MHz, 2.17 MHz, 767.25 kHz/ 699.05 kHz, 767.25 kHz/ 699.05 kHz, 436.907 kHz/ 383.625 kHz, 436.907 kHz/ 383.625 kHz<br>FM/AM TUNER 9.216 MHz (VCO：5.9904 GHz/ 6.2208 GHz)<br>TMC TUNER 9.216 MHz (VCO：5.9904 GHz/ 6.2208 GHz)<br>MAIN PROCESSER 24 MHz, 32.768 kHz, 11.2896 MHz<br>SYSTEM MICRO COMPUTER 3.93216 MHz<br>DVD DRIVER 27 MHz, 121.5 MHz, 36.864 MHz/ 33.8688 MHz<br>LCD BACK LIGHT 436.907 kHz/ 383.625 kHz<br>ELECTORONIC VOLUME 18.432 MHz FPGA 14.7456 MHz<br>ECHO CANCELLER 12.288 MHz<br>HDMI RECEIVER 27 MHz<br>DISPLAY CONTROLLER 32 MHz<br>VIDEO DECORDER 32 MHz<br>MICRO COMPUTER 10 MHz<br>WWR UNIT 24 MHz<br>GPS 26 MHz |

**Radio Specification**

| | | |
|---|---|---|
| Radio Type | : | Transceiver |
| Frequency of Operation | : | 2.4 GHz: 2402 MHz -2480 MHz (Bluetooth BDR/EDR)<br>2412 MHz -2462 MHz (IEEE 802.11b/g/n)<br>W58: 5745MHz - 5825 MHz (IEEE 802.11a/n)<br>5755 MHz - 5795 MHz (IEEE 802.11n/ac)<br>5775 MHz (IEEE 802.11ac) |
| Modulation | : | DSSS (IEEE 802.11b), OFDM (IEEE 802.11g/n/a/ac)<br>FHSS (Bluetooth BDR/EDR) |
| Power Supply (inner) | : | DC 3.3 V/1.8 V |
| Antenna type | : | Monopole Antenna |
| Antenna Gain | : | 2.4 GHz: -8.0 dBi (Bluetooth BDR/EDR)<br>-4.7 dBi (Wireless LAN)<br>5 GHz: -3.0 dBi |
| Operating Temperature | : | -10 deg. C to +60 deg. C |

# SECTION 3: Test specification, procedures & results

## 3.1 Test Specification

| | | |
|---|---|---|
| Test Specification | : | FCC Part 15 Subpart C<br>FCC Part 15 final revised on September 20, 2017 and effective October 20, 2017 |
| Title | : | FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators<br>Section 15.207 Conducted limits<br>Section 15.247 Operation within the bands 902-928MHz,<br>2400-2483.5MHz, and 5725-5850MHz |

* The revision on September 20, 2017, does not affect the test specification applied to the EUT.

## 3.2 Procedures and results

| Item | Test Procedure | Specification | Worst margin | Results | Remarks |
|---|---|---|---|---|---|
| Conducted Emission | **FCC:** ANSI C63.10-2013<br>6. Standard test methods<br>**IC:** RSS-Gen 8.8 | **FCC:** Section 15.207<br>**IC:** RSS-Gen 8.8 | - | N/A<br>*1) | - |
| 6dB Bandwidth | **FCC:** KDB 558074 D01 DTS Meas Guidance v04<br>**IC:** - | **FCC:** Section 15.247(a)(2)<br>**IC:** RSS-247 5.2(a) | - | N/A<br>*2) | Conducted |
| Maximum Peak Output Power | **FCC:** KDB 558074 D01 DTS Meas Guidance v04<br>**IC:** RSS-Gen 6.12 | **FCC:** Section 15.247(b)(3)<br>**IC:** RSS-247 5.4(d) | | N/A<br>*2) | Conducted |
| Power Density | **FCC:** KDB 558074 D01 DTS Meas Guidance v04<br>**IC:** - | **FCC:** Section 15.247(e)<br>**IC:** RSS-247 5.2(b) | | N/A<br>*2) | Conducted |
| Spurious Emission Restricted Band Edges | **FCC:** KDB 558074 D01 DTS Meas Guidance v04<br>**IC:** RSS-Gen 6.13 | **FCC:** Section15.247(d)<br>**IC:** RSS-247 5.5<br>RSS-Gen 8.9<br>RSS-Gen 8.10 | 5.9 dB<br>404.998 MHz, QP, Hori. | Complied | Conducted (below 30 MHz)/ Radiated (above 30 MHz) *3) |

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 power ports.
*2) For other than the Radiated spurious emission tests, refer to test report No 11922902S-B-R2.
*3) 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**
It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

### 3.3 Addition to standard

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.

| Item | Frequency range | Uncertainty (+/-) |
|---|---|---|
| Radiated emission (Measurement distance: 3 m) | 30 MHz - 200 MHz | 4.5 dB |
| | 200 MHz - 1 GHz | 5.8 dB |
| | 1 GHz - 6 GHz | 5.1 dB |
| | 6 GHz - 18 GHz | 5.4 dB |
| Radiated emission (Measurement distance: 1 m) | 18 GHz - 26.5 GHz | 5.4 dB |

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

### 3.5 Test Location

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Telephone: +81 478 88 6500, Facsimile: +81 478 82 3373
JAB Accreditation No. : RTL02610

| Test site | ISED Registration Number | Width x Depth x Height (m) | Size of reference ground plane (m) / horizontal conducting plane | Maximum measurement distance |
|---|---|---|---|---|
| No.1 Open site | 4659A-1 | 6.0 x 5.5 x 2.5 | 20 x 40 | 10 m |
| No.2 Open site | 4659A-2 | 4.4 x 4.4 x 2.15 | 18 x 20 | 10 m |
| No.5 Open site | 4659A-5 | 8.6 x 7.1 x 2.4 | 18 x 23 | 10 m |
| No.1 Shielded room | 4659A-1 | 5.4 x 4.5 x 2.3 | - | - |
| No.2 Shielded room | 4659A-2 | 3.6 x 2.7 x 2.3 | - | - |
| No.3 Shielded room | - | 5.4 x 3.6 x 2.3 | - | - |
| No.4 Shielded Room | - | 6.1 x 6.1 x 3.1 | - | - |
| No.5 Shielded Room | 4659A-5 | 4.2 x 3.1 x 2.5 | - | - |
| No.3 Fully Anechoic Chamber | - | 7.0 x 3.5 x 3.5 | - | - |
| No.6 Semi-anechoic Chamber | 4659A-6 | 8.5 x 5.5 x 5.2 | - | 3 m |
| No.10 Semi-anechoic Chamber | 4659A-10 | 18.4 x 9.9 x 7.7 | - | 10 m |
| No.11 Semi-anechoic Chamber | 4659A-7 | 9.0 x 6.5 x 5.2 | - | 3 m |
| No.1 Measurement room | - | 5.0 x 3.7 x 2.6 | - | - |
| No.2 Measurement room | - | 4.3 x 4.4 x 2.7 | - | - |
| No.3 Measurement room | - | 4.3 x 4.4 x 2.7 | - | - |

### 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)

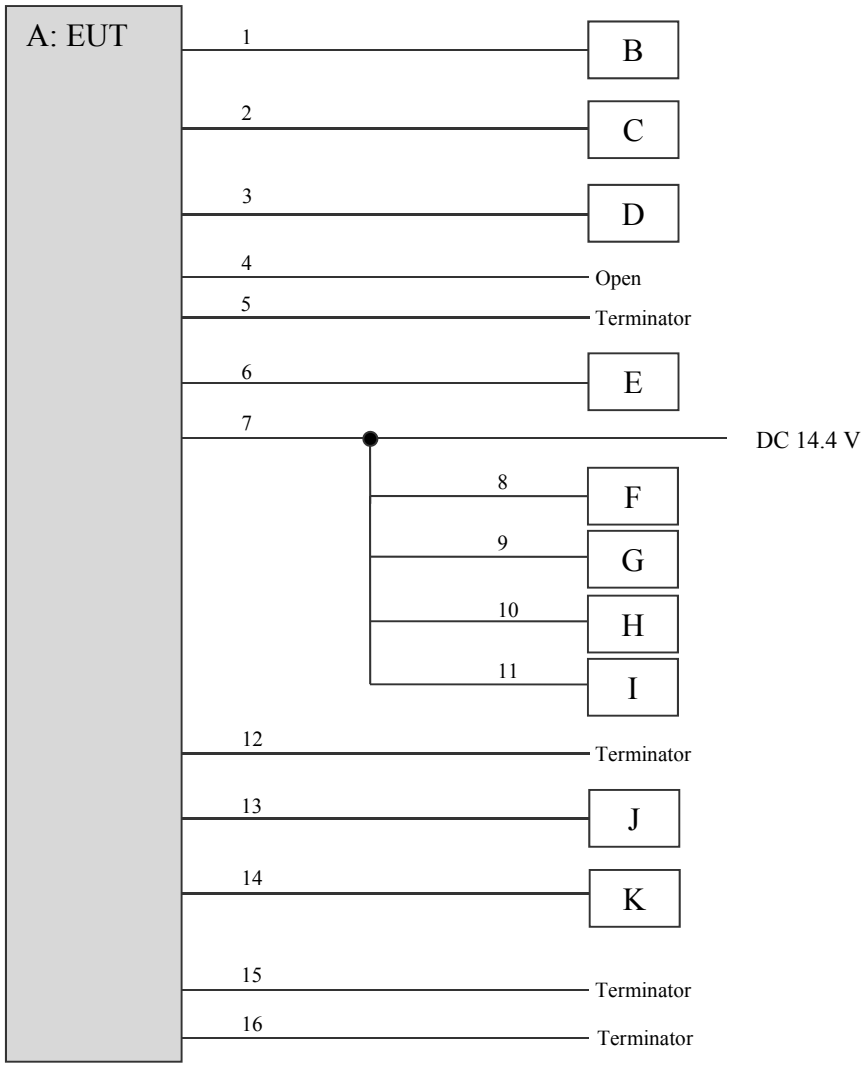
Test operating mode was determined as follows according to "Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals - " of TCB Council Workshop October 2009 also was judged the necessity of 802.11ac mode by the pre-test.

| Mode | Power setting | Remarks* |
|---|---|---|
| IEEE 802.11b (11b) | 14 | 11 Mbps, PN9 |
| IEEE 802.11g (11g) | 12 | 48 Mbps, PN9 |
| IEEE 802.11n 20 MHz BW (11n-20) | 11 | MCS 5, SGI:OFF, PN9 |
| *The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel) | | |
| *Power of the EUT was set by the software as follows;<br>Software: SoC: Ver0.041100<br>System uCom: Ver7.07<br>*This setting of software is the worst case.<br>Any conditions under the normal use do not exceed the condition of setting.<br>In addition, end users cannot change the settings of the output power of the product. | | |

*The details of Operating mode(s)

| Test Item | Operating Mode | Tested frequency |
|---|---|---|
| Spurious Emission (Radiated)<br>(Below 1 GHz) | 11g Tx *1) | 2437 MHz |
| Spurious Emission (Radiated)<br>(Above 1 GHz) | 11b Tx<br>11g Tx<br>11n-20 Tx | 2412 MHz<br>2437 MHz<br>2462 MHz |
| *1) The test was performed with the antenna that had higher power as a representative. | | |

## 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 | MULTIMEDIA NAVIGATION RECEIVER | AVIC-W8400NEX | QFTM000025UC | PIONEER | EUT |
| B | GPS Antenna | CXE5736 | - | QFN | - |
| C | USB Memory | RUF2-HSCLTVA5 | P0000015377 | BUFFALO | - |
| D | USB Memory | RUF2-HSCLTVA5 | P0000015378 | BUFFALO | - |
| E | Mic | - | - | - | - |
| F | Speaker | KFC-RS101 | - | KENWOOD | - |
| G | Speaker | KFC-RS101 | - | KENWOOD | - |
| H | Speaker | KFC-RS101 | - | KENWOOD | - |
| I | Speaker | KFC-RS101 | - | KENWOOD | - |
| J | Smartphone | SO-01C | - | Sony Ericsson | - |
| K | Vehicle Tuner | SXV200 | - | SiriusXM | - |

**List of cables used**

| No. | Name | Length (m) | Shield | | Remarks |
|---|---|---|---|---|---|
| | | | Cable | Connector | |
| 1 | GPS Antenna | 3.5 | Unshielded | Unshielded | - |
| 2 | USB | 1.5 | Shielded | Shielded | - |
| 3 | USB | 1.5 | Shielded | Shielded | - |
| 4 | Steering Wheel Control | 1.0 | Unshielded | Unshielded | - |
| 5 | R. Audio Out | 1.3 | Unshielded | Unshielded | - |
| 6 | Mic | 3.0 | Unshielded | Unshielded | - |
| 7 | Wire Harness Set (DC) | 0.4 + 1.5 | Unshielded | Unshielded | - |
| 8 | Speaker | 0.2 + 1.0 | Unshielded | Unshielded | - |
| 9 | Speaker | 0.2 + 1.0 | Unshielded | Unshielded | - |
| 10 | Speaker | 0.2 + 1.0 | Unshielded | Unshielded | - |
| 11 | Speaker | 0.2 + 1.0 | Unshielded | Unshielded | - |
| 12 | iDATA | 1.6 | Unshielded | Unshielded | - |
| 13 | HDMI | 2.0 | Shielded | Shielded | - |
| 14 | Vehicle Tuner | 0.65 | Shielded | Shielded | - |
| 15 | Wire Harness Set | 0.2 + 1.5 | Unshielded | Unshielded | - |
| 16 | FM Antenna | 2.0 | Shielded | Shielded | - |

## 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 urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

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

The height of the measuring antenna varied between 1 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 1 GHz | Above 1 GHz |
|---|---|---|
| Antenna Type | Hybrid | 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 | Hybrid | Horn | | Spectrum Analyzer |
| Detector | QP | PK | AV *1) | PK |
| IF Bandwidth | BW 120 kHz | RBW: 1 MHz<br>VBW: 3 MHz | Average Power Method:<br>RBW: 1 MHz<br>VBW: 3 MHz<br>Detector:<br>Power Averaging (RMS)<br>Trace: 100 traces<br>If duty cycle was less than 98%, a duty factor was added to the results. | RBW: 100 kHz<br>VBW: 300kHz |
| Test Distance | 3 m | 4.38 m *2) (1 GHz – 10 GHz),<br>1 m *3) (10 GHz – 26 GHz) | | 4.38 m *2) (1 GHz – 10 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 x log (4.38 m / 3.0 m) = 3.3 dB
*3) Distance Factor: 20 x log (1.0 m / 3.0 m) = -9.5 dB

- The carrier level and noise levels were confirmed at angle of 0 deg. to 30 deg. based on the product specification to see the position of maximum noise, and the test was made at the position that has the maximum noise.

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

**Measurement range : 30 MHz - 26 GHz**
**Test data : APPENDIX**
**Test result : Pass**

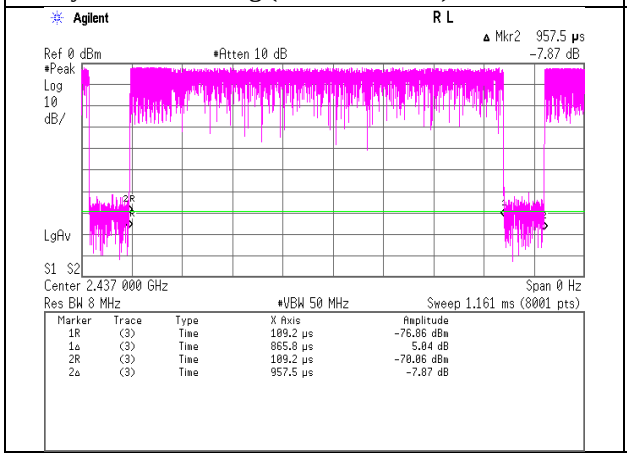
# APPENDIX 1: Test data

## Burst rate confirmation

| | |
|---|---|
| Test place | Shonan EMC Lab. No.5 Shielded Room |
| Report No. | 11922902S-B |
| Date | September 4, 2017 |
| Temperature / Humidity | 26 deg. C / 48 % RH |
| Engineer | Makoto Hosaka |
| Mode | Tx |

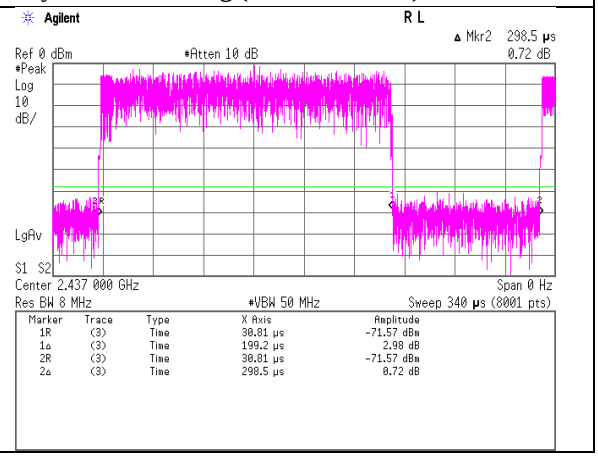
### 11b 11 Mbps

| | |
|---|---|
| **Tx on / (Tx on + Tx off) =** | **0.904** |
| **Tx on / (Tx on + Tx off) * 100 =** | **90.4 %** |
| **Duty factor = 10 * log (0.9575 / 0.8658) =** | **0.44 dB** |



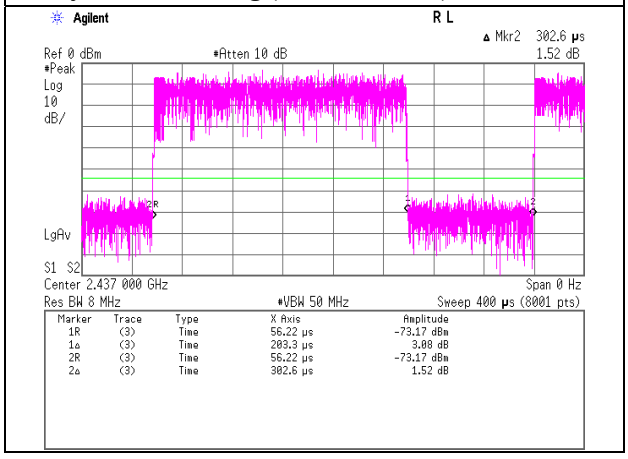

### 11g 48 Mbps

| | |
|---|---|
| **Tx on / (Tx on + Tx off) =** | **0.667** |
| **Tx on / (Tx on + Tx off) * 100 =** | **66.7 %** |
| **Duty factor = 10 * log (0.2985 / 0.1992) =** | **1.76 dB** |




### 11n-20 MCS 5

| | |
|---|---|
| **Tx on / (Tx on + Tx off) =** | **0.672** |
| **Tx on / (Tx on + Tx off) * 100 =** | **67.2 %** |
| **Duty factor = 10 * log (0.3026 / 0.2033) =** | **1.73 dB** |




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

# Radiated Spurious Emission

| | | |
|---|---|---|
| Report No. | 11922904M-B | |
| Test place | Kashima EMC Lab. | |
| Semi Anechoic Chamber | No.10 | No.10 |
| Date | September 2, 2017 | September 5, 2017 |
| Temperature / Humidity | 23 deg. C / 48 % RH | 23 deg. C / 52 % RH |
| Engineer | Hiromitsu Tanabe | Hiromitsu Tanabe |
| | (1 GHz -10 GHz) | (10 GHz -26 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. | 1920.166 | PK | 49.70 | 27.10 | 13.30 | 42.20 | 3.30 | 51.20 | 73.90 | 22.7 | 109 | 189 | |
| Hori. | 2390.000 | PK | 47.70 | 27.60 | 13.60 | 42.10 | 3.30 | 50.10 | 73.90 | 23.8 | 137 | 184 | |
| Hori. | 3168.000 | PK | 51.10 | 29.50 | 5.20 | 42.10 | 3.30 | 47.00 | 73.90 | 26.9 | 144 | 86 | |
| Hori. | 4824.000 | PK | 45.90 | 32.60 | 5.60 | 41.90 | 3.30 | 45.50 | 73.90 | 28.4 | 100 | 0 | Floor noise |
| Hori. | 7236.000 | PK | 45.40 | 37.20 | 7.00 | 40.90 | 3.30 | 52.00 | 73.90 | 21.9 | 100 | 0 | Floor noise |
| Hori. | 1920.166 | AV | 41.70 | 27.10 | 13.30 | 42.20 | 3.30 | 43.20 | 53.90 | **10.7** | 109 | 189 | |
| Hori. | 3168.000 | AV | 45.60 | 29.50 | 5.20 | 42.10 | 3.30 | 41.50 | 53.90 | 12.4 | 144 | 86 | |
| Vert. | 1920.169 | PK | 49.20 | 27.10 | 13.30 | 42.20 | 3.30 | 50.70 | 73.90 | 23.2 | 147 | 184 | |
| Vert. | 2390.000 | PK | 48.80 | 27.60 | 13.60 | 42.10 | 3.30 | 51.20 | 73.90 | 22.7 | 127 | 42 | |
| Vert. | 3168.000 | PK | 49.50 | 29.50 | 5.20 | 42.10 | 3.30 | 45.40 | 73.90 | 28.5 | 241 | 211 | |
| Vert. | 4824.000 | PK | 45.50 | 32.60 | 5.60 | 41.90 | 3.30 | 45.10 | 73.90 | 28.8 | 100 | 0 | Floor noise |
| Vert. | 7236.000 | PK | 45.10 | 37.20 | 7.00 | 40.90 | 3.30 | 51.70 | 73.90 | 22.2 | 100 | 0 | Floor noise |
| Vert. | 1920.169 | AV | 40.90 | 27.10 | 13.30 | 42.20 | 3.30 | 42.40 | 53.90 | 11.5 | 147 | 184 | |
| Vert. | 3168.000 | AV | 42.50 | 29.50 | 5.20 | 42.10 | 3.30 | 38.40 | 53.90 | 15.5 | 241 | 211 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 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 | 38.40 | 27.60 | 13.60 | 42.10 | 0.44 | 3.30 | 41.24 | 53.90 | 12.7 | *1) |
| Hori. | 4824.000 | AV | 37.20 | 32.60 | 5.60 | 41.90 | 0.44 | 3.30 | 37.24 | 53.90 | 16.7 | Floor noise |
| Hori. | 7236.000 | AV | 36.30 | 37.20 | 7.00 | 40.90 | 0.44 | 3.30 | 43.34 | 53.90 | **10.6** | Floor noise |
| Vert. | 2390.000 | AV | 38.90 | 27.60 | 13.60 | 42.10 | 0.44 | 3.30 | 41.74 | 53.90 | 12.2 | *1) |
| Vert. | 4824.000 | AV | 36.80 | 32.60 | 5.60 | 41.90 | 0.44 | 3.30 | 36.84 | 53.90 | 17.1 | Floor noise |
| Vert. | 7236.000 | AV | 36.10 | 37.20 | 7.00 | 40.90 | 0.44 | 3.30 | 43.14 | 53.90 | 10.8 | Floor noise |

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 (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*1) Not out of band emission (Leakage Power)
*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

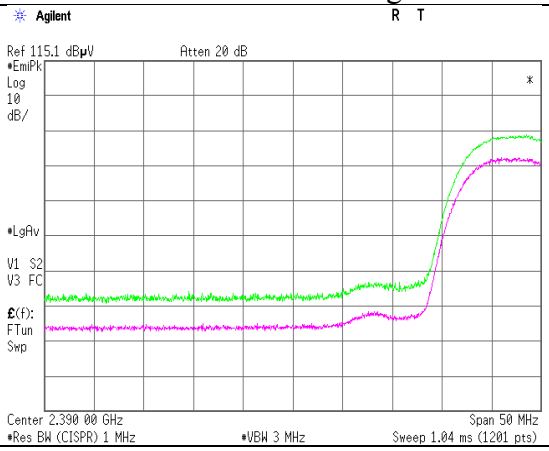
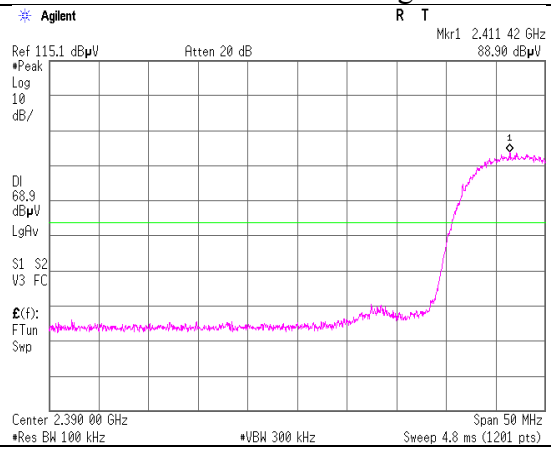
**20 dBc Data Sheet** **(RBW 100 kHz, VBW 300 kHz)**

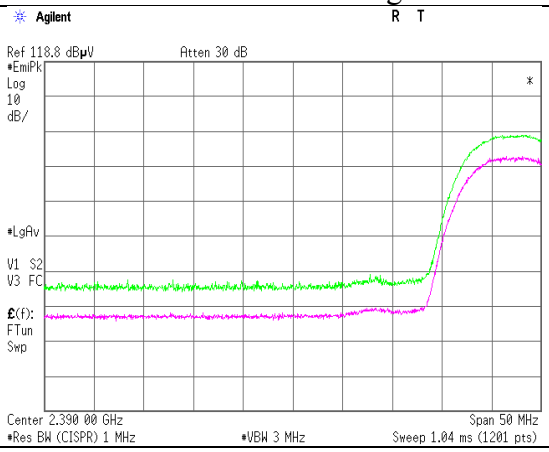
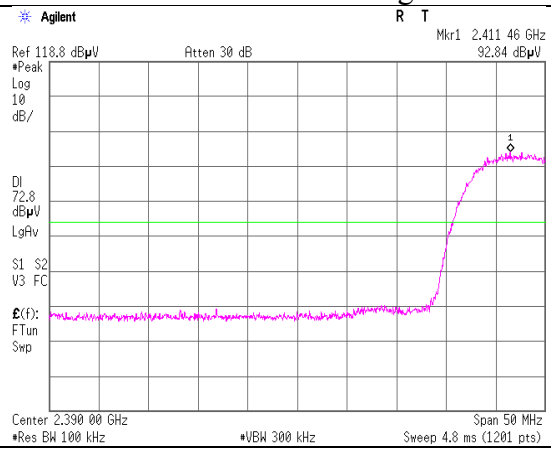
| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2412.000 | PK | 88.90 | 27.60 | 13.60 | 42.10 | 3.30 | 91.30 | - | - | Carrier |
| Hori. | 2398.417 | PK | 44.80 | 27.60 | 13.60 | 42.10 | 3.30 | 47.20 | 71.30 | 24.1 | |
| Hori. | 2400.000 | PK | 41.90 | 27.60 | 13.60 | 42.10 | 3.30 | 44.30 | 71.30 | 27.0 | |
| Vert. | 2412.000 | PK | 92.80 | 27.60 | 13.60 | 42.10 | 3.30 | 95.20 | - | - | Carrier |
| Vert. | 2398.458 | PK | 46.50 | 27.60 | 13.60 | 42.10 | 3.30 | 48.90 | 75.20 | 26.3 | |
| Vert. | 2400.000 | PK | 44.50 | 27.60 | 13.60 | 42.10 | 3.30 | 46.90 | 75.20 | 28.3 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB

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

| | | |
|---|---|---|
| Report No. | 11922904M-B | |
| Test place | Kashima EMC Lab. | |
| Semi Anechoic Chamber | No.10 | No.10 |
| Date | September 2, 2017 | September 5, 2017 |
| Temperature / Humidity | 23 deg. C / 48 % RH | 23 deg. C / 52 % RH |
| Engineer | Hiromitsu Tanabe | Hiromitsu Tanabe |
| | (1 GHz -10 GHz) | (10 GHz -26 GHz) |
| Mode | Tx 11b 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 |

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

# Radiated Spurious Emission

| | | |
|---|---|---|
| Report No. | 11922904M-B | |
| Test place | Kashima EMC Lab. | |
| Semi Anechoic Chamber | No.10 | No.10 |
| Date | September 2, 2017 | September 5, 2017 |
| Temperature / Humidity | 23 deg. C / 48 % RH | 23 deg. C / 52 % RH |
| Engineer | Hiromitsu Tanabe | Hiromitsu Tanabe |
| | (1 GHz -10 GHz) | (10 GHz -26 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. | 1920.166 | PK | 48.80 | 27.10 | 13.30 | 42.20 | 3.30 | 50.30 | 73.90 | 23.6 | 144 | 209 | |
| Hori. | 3168.000 | PK | 50.80 | 29.50 | 5.20 | 42.10 | 3.30 | 46.70 | 73.90 | 27.2 | 149 | 86 | |
| Hori. | 4874.000 | PK | 45.60 | 32.50 | 5.60 | 41.90 | 3.30 | 45.10 | 73.90 | 28.8 | 100 | 0 | Floor noise |
| Hori. | 7311.000 | PK | 44.40 | 37.30 | 7.00 | 40.90 | 3.30 | 51.10 | 73.90 | 22.8 | 100 | 0 | Floor noise |
| Hori. | 1920.166 | AV | 40.80 | 27.10 | 13.30 | 42.20 | 3.30 | 42.30 | 53.90 | **11.6** | 144 | 209 | |
| Hori. | 3168.000 | AV | 45.20 | 29.50 | 5.20 | 42.10 | 3.30 | 41.10 | 53.90 | 12.8 | 149 | 86 | |
| Vert. | 1920.169 | PK | 49.00 | 27.10 | 13.30 | 42.20 | 3.30 | 50.50 | 73.90 | 23.4 | 146 | 182 | |
| Vert. | 3168.000 | PK | 49.80 | 29.50 | 5.20 | 42.10 | 3.30 | 45.70 | 73.90 | 28.2 | 244 | 183 | |
| Vert. | 4874.000 | PK | 46.00 | 32.50 | 5.60 | 41.90 | 3.30 | 45.50 | 73.90 | 28.4 | 100 | 0 | Floor noise |
| Vert. | 7311.000 | PK | 44.70 | 37.30 | 7.00 | 40.90 | 3.30 | 51.40 | 73.90 | 22.5 | 100 | 0 | Floor noise |
| Vert. | 1920.169 | AV | 40.60 | 27.10 | 13.30 | 42.20 | 3.30 | 42.10 | 53.90 | 11.8 | 146 | 182 | |
| Vert. | 3168.000 | AV | 42.50 | 29.50 | 5.20 | 42.10 | 3.30 | 38.40 | 53.90 | 15.5 | 244 | 183 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 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 | 36.70 | 32.50 | 5.60 | 41.90 | 0.44 | 3.30 | 36.64 | 53.90 | 17.3 | Floor noise |
| Hori. | 7311.000 | AV | 35.50 | 37.30 | 7.00 | 40.90 | 0.44 | 3.30 | 42.64 | 53.90 | **11.3** | Floor noise |
| Vert. | 4874.000 | AV | 36.80 | 32.50 | 5.60 | 41.90 | 0.44 | 3.30 | 36.74 | 53.90 | 17.2 | Floor noise |
| Vert. | 7311.000 | AV | 35.40 | 37.30 | 7.00 | 40.90 | 0.44 | 3.30 | 42.54 | 53.90 | 11.4 | Floor noise |

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 (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

# Radiated Spurious Emission

| | | |
|---|---|---|
| Report No. | 11922904M-B | |
| Test place | Kashima EMC Lab. | |
| Semi Anechoic Chamber | No.10 | No.10 |
| Date | September 2, 2017 | September 5, 2017 |
| Temperature / Humidity | 23 deg. C / 48 % RH | 23 deg. C / 52 % RH |
| Engineer | Hiromitsu Tanabe | Hiromitsu Tanabe |
| | (1 GHz -10 GHz) | (10 GHz -26 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. | 1920.170 | PK | 49.00 | 27.10 | 13.30 | 42.20 | 3.30 | 50.50 | 73.90 | 23.4 | 147 | 207 | |
| Hori. | 2483.500 | PK | 47.70 | 27.90 | 13.70 | 42.10 | 3.30 | 50.50 | 73.90 | 23.4 | 160 | 255 | |
| Hori. | 3168.000 | PK | 51.30 | 29.50 | 5.20 | 42.10 | 3.30 | 47.20 | 73.90 | 26.7 | 148 | 86 | |
| Hori. | 4924.000 | PK | 46.10 | 32.60 | 5.60 | 41.90 | 3.30 | 45.70 | 73.90 | 28.2 | 100 | 0 | Floor noise |
| Hori. | 7386.000 | PK | 44.60 | 37.40 | 7.10 | 40.90 | 3.30 | 51.50 | 73.90 | 22.4 | 100 | 0 | Floor noise |
| Hori. | 1920.170 | AV | 40.70 | 27.10 | 13.30 | 42.20 | 3.30 | 42.20 | 53.90 | **11.7** | 147 | 207 | |
| Hori. | 3168.000 | AV | 45.40 | 29.50 | 5.20 | 42.10 | 3.30 | 41.30 | 53.90 | 12.6 | 148 | 86 | |
| Vert. | 1920.167 | PK | 49.30 | 27.10 | 13.30 | 42.20 | 3.30 | 50.80 | 73.90 | 23.1 | 166 | 179 | |
| Vert. | 2483.500 | PK | 49.70 | 27.90 | 13.70 | 42.10 | 3.30 | 52.50 | 73.90 | 21.4 | 130 | 48 | |
| Vert. | 3168.000 | PK | 49.40 | 29.50 | 5.20 | 42.10 | 3.30 | 45.30 | 73.90 | 28.6 | 249 | 179 | |
| Vert. | 4924.000 | PK | 45.70 | 32.60 | 5.60 | 41.90 | 3.30 | 45.30 | 73.90 | 28.6 | 100 | 0 | Floor noise |
| Vert. | 7386.000 | PK | 44.70 | 37.40 | 7.10 | 40.90 | 3.30 | 51.60 | 73.90 | 22.3 | 100 | 0 | Floor noise |
| Vert. | 1920.167 | AV | 40.70 | 27.10 | 13.30 | 42.20 | 3.30 | 42.20 | 53.90 | **11.7** | 166 | 179 | |
| Vert. | 3168.000 | AV | 42.40 | 29.50 | 5.20 | 42.10 | 3.30 | 38.30 | 53.90 | 15.6 | 249 | 179 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 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 | 38.80 | 27.90 | 13.70 | 42.10 | 0.44 | 3.30 | 42.04 | 53.90 | 11.9 | *1) |
| Hori. | 4924.000 | AV | 37.00 | 32.60 | 5.60 | 41.90 | 0.44 | 3.30 | 37.04 | 53.90 | 16.9 | Floor noise |
| Hori. | 7386.000 | AV | 35.70 | 37.40 | 7.10 | 40.90 | 0.44 | 3.30 | 43.04 | 53.90 | 10.9 | Floor noise |
| Vert. | 2483.500 | AV | 40.40 | 27.90 | 13.70 | 42.10 | 0.44 | 3.30 | 43.64 | 53.90 | **10.3** | *1) |
| Vert. | 4924.000 | AV | 37.10 | 32.60 | 5.60 | 41.90 | 0.44 | 3.30 | 37.14 | 53.90 | 16.8 | Floor noise |
| Vert. | 7386.000 | AV | 35.80 | 37.40 | 7.10 | 40.90 | 0.44 | 3.30 | 43.14 | 53.90 | 10.8 | Floor noise |

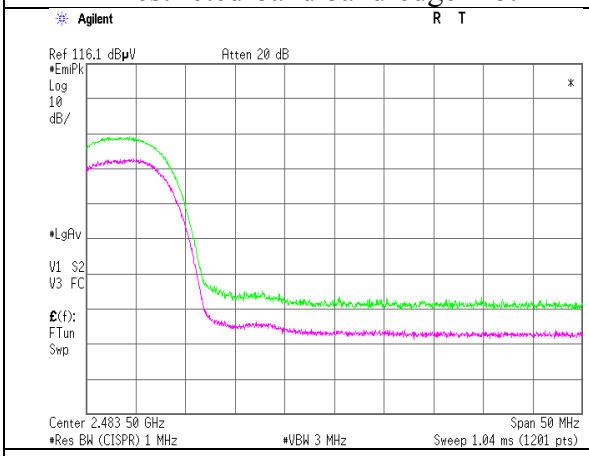
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*1) Not out of band emission (Leakage Power)
*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

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

| | | |
|---|---|---|
| Report No. | 11922904M-B | |
| Test place | Kashima EMC Lab. | |
| Semi Anechoic Chamber | No.10 | No.10 |
| Date | September 2, 2017 | September 5, 2017 |
| Temperature / Humidity | 23 deg. C / 48 % RH | 23 deg. C / 52 % RH |
| Engineer | Hiromitsu Tanabe | Hiromitsu Tanabe |
| | (1 GHz -10 GHz) | (10 GHz -26 GHz) |
| Mode | Tx 11b 2462 MHz | |

Horizontal

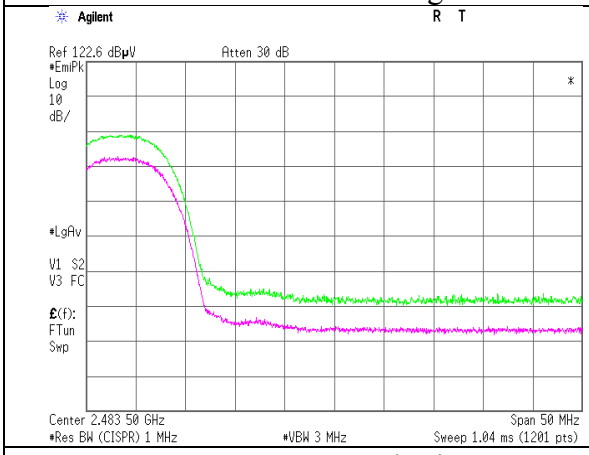
Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

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

# Radiated Spurious Emission

| | | |
|---|---|---|
| Report No. | 11922904M-B | |
| Test place | Kashima EMC Lab. | |
| Semi Anechoic Chamber | No.10 | No.10 |
| Date | September 2, 2017 | September 5, 2017 |
| Temperature / Humidity | 23 deg. C / 48 % RH | 23 deg. C / 52 % RH |
| Engineer | Hiromitsu Tanabe | Hiromitsu Tanabe |
| | (1 GHz -10 GHz) | (10 GHz -26 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. | 1920.166 | PK | 49.30 | 27.10 | 13.30 | 42.20 | 3.30 | 50.80 | 73.90 | 23.1 | 117 | 192 | |
| Hori. | 2390.000 | PK | 50.30 | 27.60 | 13.60 | 42.10 | 3.30 | 52.70 | 73.90 | 21.2 | 132 | 186 | |
| Hori. | 3168.000 | PK | 51.30 | 29.50 | 5.20 | 42.10 | 3.30 | 47.20 | 73.90 | 26.7 | 140 | 85 | |
| Hori. | 4824.000 | PK | 45.80 | 32.60 | 5.60 | 41.90 | 3.30 | 45.40 | 73.90 | 28.5 | 100 | 0 | Floor noise |
| Hori. | 7236.000 | PK | 44.40 | 37.20 | 7.00 | 40.90 | 3.30 | 51.00 | 73.90 | 22.9 | 100 | 0 | Floor noise |
| Hori. | 1920.166 | AV | 41.80 | 27.10 | 13.30 | 42.20 | 3.30 | 43.30 | 53.90 | **10.6** | 117 | 192 | |
| Hori. | 3168.000 | AV | 45.40 | 29.50 | 5.20 | 42.10 | 3.30 | 41.30 | 53.90 | 12.6 | 140 | 85 | |
| Vert. | 1920.169 | PK | 49.30 | 27.10 | 13.30 | 42.20 | 3.30 | 50.80 | 73.90 | 23.1 | 133 | 185 | |
| Vert. | 2390.000 | PK | 51.20 | 27.60 | 13.60 | 42.10 | 3.30 | 53.60 | 73.90 | 20.3 | 127 | 48 | |
| Vert. | 3168.000 | PK | 49.90 | 29.50 | 5.20 | 42.10 | 3.30 | 45.80 | 73.90 | 28.1 | 241 | 183 | |
| Vert. | 4824.000 | PK | 45.70 | 32.60 | 5.60 | 41.90 | 3.30 | 45.30 | 73.90 | 28.6 | 100 | 0 | Floor noise |
| Vert. | 7236.000 | PK | 44.50 | 37.20 | 7.00 | 40.90 | 3.30 | 51.10 | 73.90 | 22.8 | 100 | 0 | Floor noise |
| Vert. | 1920.169 | AV | 41.10 | 27.10 | 13.30 | 42.20 | 3.30 | 42.60 | 53.90 | 11.3 | 133 | 185 | |
| Vert. | 3168.000 | AV | 42.70 | 29.50 | 5.20 | 42.10 | 3.30 | 38.60 | 53.90 | 15.3 | 241 | 183 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 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 | 39.20 | 27.60 | 13.60 | 42.10 | 1.76 | 3.30 | 43.36 | 53.90 | 10.5 | *1) |
| Hori. | 4824.000 | AV | 36.90 | 32.60 | 5.60 | 41.90 | 1.76 | 3.30 | 38.26 | 53.90 | 15.6 | Floor noise |
| Hori. | 7236.000 | AV | 35.40 | 37.20 | 7.00 | 40.90 | 1.76 | 3.30 | 43.76 | 53.90 | 10.1 | Floor noise |
| Vert. | 2390.000 | AV | 40.10 | 27.60 | 13.60 | 42.10 | 1.76 | 3.30 | 44.26 | 53.90 | **9.6** | *1) |
| Vert. | 4824.000 | AV | 37.00 | 32.60 | 5.60 | 41.90 | 1.76 | 3.30 | 38.36 | 53.90 | 15.5 | Floor noise |
| Vert. | 7236.000 | AV | 35.40 | 37.20 | 7.00 | 40.90 | 1.76 | 3.30 | 43.76 | 53.90 | 10.1 | Floor noise |

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 (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*1) Not out of band emission (Leakage Power)
*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

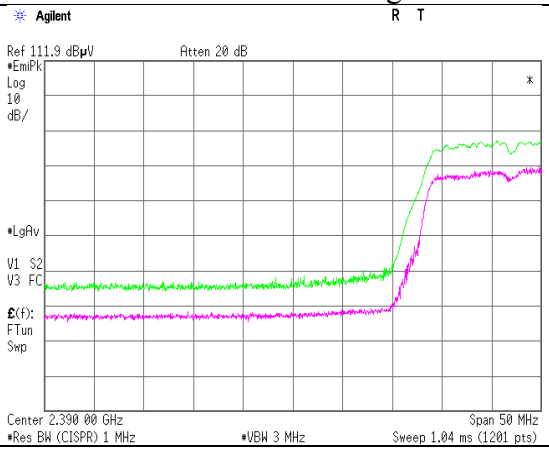
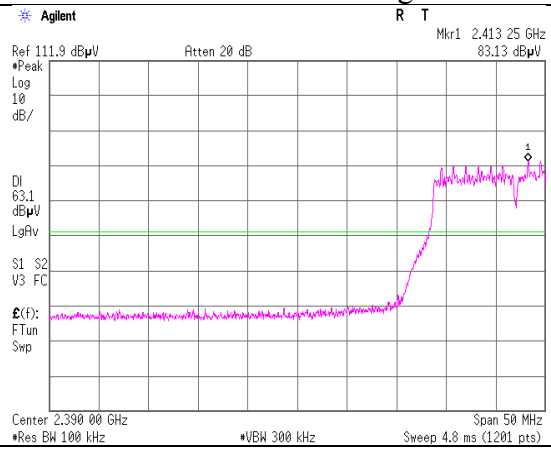
**20 dBc Data Sheet** **(RBW 100 kHz, VBW 300 kHz)**

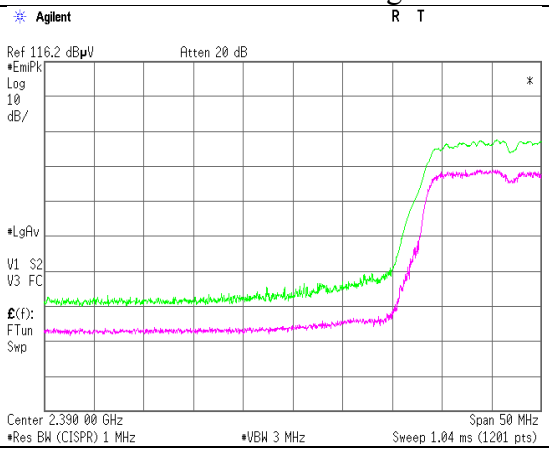
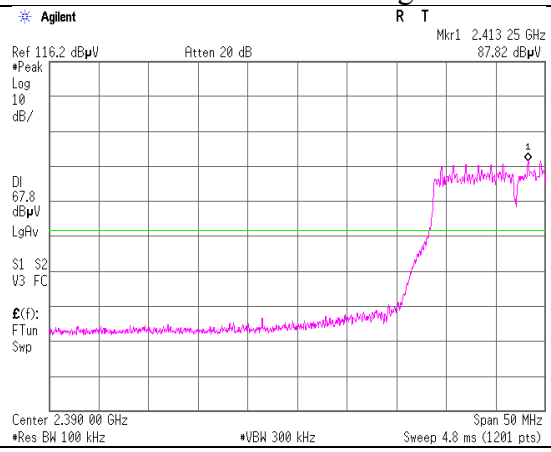
| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2412.000 | PK | 83.10 | 27.60 | 13.60 | 42.10 | 3.30 | 85.50 | - | - | Carrier |
| Hori. | 2397.885 | PK | 41.50 | 27.60 | 13.60 | 42.10 | 3.30 | 43.90 | 65.50 | 21.6 | |
| Hori. | 2400.000 | PK | 42.80 | 27.60 | 13.60 | 42.10 | 3.30 | 45.20 | 65.50 | 20.3 | |
| Vert. | 2412.000 | PK | 87.80 | 27.60 | 13.60 | 42.10 | 3.30 | 90.20 | - | - | Carrier |
| Vert. | 2397.608 | PK | 43.80 | 27.60 | 13.60 | 42.10 | 3.30 | 46.20 | 70.20 | 24.0 | |
| Vert. | 2400.000 | PK | 45.00 | 27.60 | 13.60 | 42.10 | 3.30 | 47.40 | 70.20 | 22.8 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB

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

| | | |
|---|---|---|
| Report No. | 11922904M-B | |
| Test place | Kashima EMC Lab. | |
| Semi Anechoic Chamber | No.10 | No.10 |
| Date | September 2, 2017 | September 5, 2017 |
| Temperature / Humidity | 23 deg. C / 48 % RH | 23 deg. C / 52 % RH |
| Engineer | Hiromitsu Tanabe | Hiromitsu Tanabe |
| | (1 GHz -10 GHz) | (10 GHz -26 GHz) |
| 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 |

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

# Radiated Spurious Emission

| | | | |
|---|---|---|---|
| Report No. | 11922904M-B | | |
| Test place | Kashima EMC Lab. | | |
| Semi Anechoic Chamber | No.10 | No.10 | No.10 |
| Date | September 6, 2017 | September 2, 2017 | September 5, 2017 |
| Temperature / Humidity | 22 deg. C / 52 % RH | 23 deg. C / 48 % RH | 23 deg. C / 52 % RH |
| Engineer | Kazuhiro Ando | Hiromitsu Tanabe | Hiromitsu Tanabe |
| | (30 MHz -1000 MHz) | (1 GHz -10 GHz) | (10 GHz -26 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. | 85.931 | QP | 51.10 | 8.00 | 4.50 | 32.20 | 0.00 | 31.40 | 40.00 | 8.6 | 230 | 195 | |
| Hori. | 95.138 | QP | 54.60 | 8.20 | 4.60 | 32.20 | 0.00 | 35.20 | 43.50 | 8.3 | 230 | 195 | |
| Hori. | 107.416 | QP | 51.40 | 10.00 | 4.70 | 32.20 | 0.00 | 33.90 | 43.50 | 9.6 | 150 | 100 | |
| Hori. | 404.998 | QP | 49.80 | 15.70 | 6.60 | 32.00 | 0.00 | 40.10 | 46.00 | **5.9** | 100 | 150 | |
| Hori. | 458.997 | QP | 44.70 | 17.30 | 6.90 | 32.00 | 0.00 | 36.90 | 46.00 | 9.1 | 100 | 255 | |
| Hori. | 593.996 | QP | 44.80 | 19.80 | 7.40 | 32.10 | 0.00 | 39.90 | 46.00 | 6.1 | 170 | 345 | |
| Hori. | 1920.166 | PK | 48.70 | 27.10 | 13.30 | 42.20 | 3.30 | 50.20 | 73.90 | 23.7 | 146 | 206 | |
| Hori. | 3168.000 | PK | 50.80 | 29.50 | 5.20 | 42.10 | 3.30 | 46.70 | 73.90 | 27.2 | 162 | 89 | |
| Hori. | 4874.000 | PK | 45.90 | 32.50 | 5.60 | 41.90 | 3.30 | 45.40 | 73.90 | 28.5 | 100 | 0 | Floor noise |
| Hori. | 7311.000 | PK | 44.70 | 37.30 | 7.00 | 40.90 | 3.30 | 51.40 | 73.90 | 22.5 | 100 | 0 | Floor noise |
| Hori. | 1920.166 | AV | 40.70 | 27.10 | 13.30 | 42.20 | 3.30 | 42.20 | 53.90 | 11.7 | 146 | 206 | |
| Hori. | 3168.000 | AV | 45.00 | 29.50 | 5.20 | 42.10 | 3.30 | 40.90 | 53.90 | 13.0 | 162 | 89 | |
| Vert. | 105.879 | QP | 48.20 | 9.80 | 4.60 | 32.20 | 0.00 | 30.40 | 43.50 | 13.1 | 100 | 100 | |
| Vert. | 146.544 | QP | 47.90 | 13.40 | 5.00 | 32.20 | 0.00 | 34.10 | 43.50 | 9.4 | 100 | 70 | |
| Vert. | 458.997 | QP | 44.10 | 17.30 | 6.90 | 32.00 | 0.00 | 36.30 | 46.00 | 9.7 | 120 | 165 | |
| Vert. | 593.996 | QP | 43.50 | 19.80 | 7.40 | 32.10 | 0.00 | 38.60 | 46.00 | 7.4 | 200 | 170 | |
| Vert. | 1920.169 | PK | 49.30 | 27.10 | 13.30 | 42.20 | 3.30 | 50.80 | 73.90 | 23.1 | 142 | 185 | |
| Vert. | 3168.000 | PK | 48.90 | 29.50 | 5.20 | 42.10 | 3.30 | 44.80 | 73.90 | 29.1 | 236 | 216 | |
| Vert. | 4874.000 | PK | 45.80 | 32.50 | 5.60 | 41.90 | 3.30 | 45.30 | 73.90 | 28.6 | 100 | 0 | Floor noise |
| Vert. | 7311.000 | PK | 44.40 | 37.30 | 7.00 | 40.90 | 3.30 | 51.10 | 73.90 | 22.8 | 100 | 0 | Floor noise |
| Vert. | 1920.169 | AV | 40.90 | 27.10 | 13.30 | 42.20 | 3.30 | 42.40 | 53.90 | 11.5 | 142 | 185 | |
| Vert. | 3168.000 | AV | 41.50 | 29.50 | 5.20 | 42.10 | 3.30 | 37.40 | 53.90 | 16.5 | 236 | 216 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 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 | 36.70 | 32.50 | 5.60 | 41.90 | 1.76 | 3.30 | 37.96 | 53.90 | 15.9 | Floor noise |
| Hori. | 7311.000 | AV | 35.40 | 37.30 | 7.00 | 40.90 | 1.76 | 3.30 | 43.86 | 53.90 | **10.0** | Floor noise |
| Vert. | 4874.000 | AV | 36.80 | 32.50 | 5.60 | 41.90 | 1.76 | 3.30 | 38.06 | 53.90 | 15.8 | Floor noise |
| Vert. | 7311.000 | AV | 35.40 | 37.30 | 7.00 | 40.90 | 1.76 | 3.30 | 43.86 | 53.90 | **10.0** | Floor noise |

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 (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

# Radiated Spurious Emission

| | | |
|---|---|---|
| Report No. | 11922904M-B | |
| Test place | Kashima EMC Lab. | |
| Semi Anechoic Chamber | No.10 | No.10 |
| Date | September 2, 2017 | September 5, 2017 |
| Temperature / Humidity | 23 deg. C / 48 % RH | 23 deg. C / 52 % RH |
| Engineer | Hiromitsu Tanabe | Hiromitsu Tanabe |
| | (1 GHz -10 GHz) | (10 GHz -26 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. | 1920.170 | PK | 49.10 | 27.10 | 13.30 | 42.20 | 3.30 | 50.60 | 73.90 | 23.3 | 161 | 205 | |
| Hori. | 2483.500 | PK | 48.60 | 27.90 | 13.70 | 42.10 | 3.30 | 51.40 | 73.90 | 22.5 | 162 | 255 | |
| Hori. | 3168.000 | PK | 51.20 | 29.50 | 5.20 | 42.10 | 3.30 | 47.10 | 73.90 | 26.8 | 144 | 85 | |
| Hori. | 4924.000 | PK | 45.70 | 32.60 | 5.60 | 41.90 | 3.30 | 45.30 | 73.90 | 28.6 | 100 | 0 | Floor noise |
| Hori. | 7386.000 | PK | 44.80 | 37.40 | 7.10 | 40.90 | 3.30 | 51.70 | 73.90 | 22.2 | 100 | 0 | Floor noise |
| Hori. | 1920.170 | AV | 40.80 | 27.10 | 13.30 | 42.20 | 3.30 | 42.30 | 53.90 | **11.6** | 161 | 205 | |
| Hori. | 3168.000 | AV | 45.50 | 29.50 | 5.20 | 42.10 | 3.30 | 41.40 | 53.90 | 12.5 | 144 | 85 | |
| Vert. | 1920.167 | PK | 49.50 | 27.10 | 13.30 | 42.20 | 3.30 | 51.00 | 73.90 | 22.9 | 144 | 183 | |
| Vert. | 2483.500 | PK | 52.90 | 27.90 | 13.70 | 42.10 | 3.30 | 55.70 | 73.90 | 18.2 | 121 | 49 | |
| Vert. | 3168.000 | PK | 49.70 | 29.50 | 5.20 | 42.10 | 3.30 | 45.60 | 73.90 | 28.3 | 220 | 0 | |
| Vert. | 4924.000 | PK | 46.00 | 32.60 | 5.60 | 41.90 | 3.30 | 45.60 | 73.90 | 28.3 | 100 | 0 | Floor noise |
| Vert. | 7386.000 | PK | 44.60 | 37.40 | 7.10 | 40.90 | 3.30 | 51.50 | 73.90 | 22.4 | 100 | 0 | Floor noise |
| Vert. | 1920.167 | AV | 40.70 | 27.10 | 13.30 | 42.20 | 3.30 | 42.20 | 53.90 | 11.7 | 144 | 183 | |
| Vert. | 3168.000 | AV | 42.70 | 29.50 | 5.20 | 42.10 | 3.30 | 38.60 | 53.90 | 15.3 | 220 | 0 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 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 | 39.00 | 27.90 | 13.70 | 42.10 | 1.76 | 3.30 | 43.56 | 53.90 | 10.3 | *1) |
| Hori. | 4924.000 | AV | 36.90 | 32.60 | 5.60 | 41.90 | 1.76 | 3.30 | 38.26 | 53.90 | 15.6 | Floor noise |
| Hori. | 7386.000 | AV | 35.70 | 37.40 | 7.10 | 40.90 | 1.76 | 3.30 | 44.36 | 53.90 | 9.5 | Floor noise |
| Vert. | 2483.500 | AV | 40.80 | 27.90 | 13.70 | 42.10 | 1.76 | 3.30 | 45.36 | 53.90 | **8.5** | *1) |
| Vert. | 4924.000 | AV | 37.00 | 32.60 | 5.60 | 41.90 | 1.76 | 3.30 | 38.36 | 53.90 | 15.5 | Floor noise |
| Vert. | 7386.000 | AV | 35.70 | 37.40 | 7.10 | 40.90 | 1.76 | 3.30 | 44.36 | 53.90 | 9.5 | Floor noise |

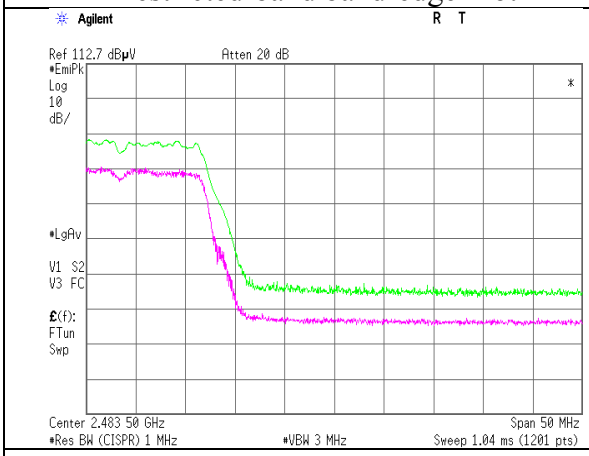
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*1) Not out of band emission (Leakage Power)
*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

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

| | | |
|---|---|---|
| Report No. | 11922904M-B | |
| Test place | Kashima EMC Lab. | |
| Semi Anechoic Chamber | No.10 | No.10 |
| Date | September 2, 2017 | September 5, 2017 |
| Temperature / Humidity | 23 deg. C / 48 % RH | 23 deg. C / 52 % RH |
| Engineer | Hiromitsu Tanabe | Hiromitsu Tanabe |
| | (1 GHz -10 GHz) | (10 GHz -26 GHz) |
| Mode | Tx 11g 2462 MHz | |

Horizontal

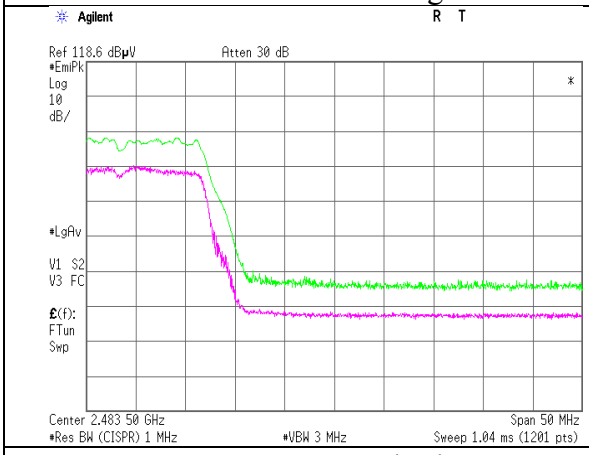
Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

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

# Radiated Spurious Emission

| | | |
|---|---|---|
| Report No. | 11922904M-B | |
| Test place | Kashima EMC Lab. | |
| Semi Anechoic Chamber | No.10 | No.10 |
| Date | September 4, 2017 | September 5, 2017 |
| Temperature / Humidity | 22 deg. C / 52 % RH | 23 deg. C / 52 % RH |
| Engineer | Hiromitsu Tanabe | Hiromitsu Tanabe |
| | (1 GHz -10 GHz) | (10 GHz -26 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. | 1920.173 | PK | 49.50 | 27.10 | 13.30 | 42.20 | 3.30 | 51.00 | 73.90 | 22.9 | 100 | 234 | |
| Hori. | 2390.000 | PK | 49.20 | 27.60 | 13.60 | 42.10 | 3.30 | 51.60 | 73.90 | 22.3 | 113 | 192 | |
| Hori. | 3168.000 | PK | 50.70 | 29.50 | 5.20 | 42.10 | 3.30 | 46.60 | 73.90 | 27.3 | 160 | 87 | |
| Hori. | 4824.000 | PK | 45.20 | 32.60 | 5.60 | 41.90 | 3.30 | 44.80 | 73.90 | 29.1 | 100 | 0 | Floor noise |
| Hori. | 7236.000 | PK | 44.30 | 37.20 | 7.00 | 40.90 | 3.30 | 50.90 | 73.90 | 23.0 | 100 | 0 | Floor noise |
| Hori. | 1920.173 | AV | 41.00 | 27.10 | 13.30 | 42.20 | 3.30 | 42.50 | 53.90 | **11.4** | 100 | 234 | |
| Hori. | 3168.000 | AV | 44.70 | 29.50 | 5.20 | 42.10 | 3.30 | 40.60 | 53.90 | 13.3 | 160 | 87 | |
| Vert. | 1920.161 | PK | 48.60 | 27.10 | 13.30 | 42.20 | 3.30 | 50.10 | 73.90 | 23.8 | 100 | 185 | |
| Vert. | 2390.000 | PK | 51.80 | 27.60 | 13.60 | 42.10 | 3.30 | 54.20 | 73.90 | 19.7 | 128 | 45 | |
| Vert. | 3168.000 | PK | 48.50 | 29.50 | 5.20 | 42.10 | 3.30 | 44.40 | 73.90 | 29.5 | 170 | 212 | |
| Vert. | 4824.000 | PK | 45.50 | 32.60 | 5.60 | 41.90 | 3.30 | 45.10 | 73.90 | 28.8 | 100 | 0 | Floor noise |
| Vert. | 7236.000 | PK | 44.20 | 37.20 | 7.00 | 40.90 | 3.30 | 50.80 | 73.90 | 23.1 | 100 | 0 | Floor noise |
| Vert. | 1920.161 | AV | 39.70 | 27.10 | 13.30 | 42.20 | 3.30 | 41.20 | 53.90 | 12.7 | 100 | 185 | |
| Vert. | 3168.000 | AV | 40.30 | 29.50 | 5.20 | 42.10 | 3.30 | 36.20 | 53.90 | 17.7 | 170 | 212 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 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 | 38.30 | 27.60 | 13.60 | 42.10 | 1.73 | 3.30 | 42.43 | 53.90 | 11.5 | *1) |
| Hori. | 4824.000 | AV | 36.20 | 32.60 | 5.60 | 41.90 | 1.73 | 3.30 | 37.53 | 53.90 | 16.4 | Floor noise |
| Hori. | 7236.000 | AV | 34.80 | 37.20 | 7.00 | 40.90 | 1.73 | 3.30 | 43.13 | 53.90 | 10.8 | Floor noise |
| Vert. | 2390.000 | AV | 39.20 | 27.60 | 13.60 | 42.10 | 1.73 | 3.30 | 43.33 | 53.90 | **10.6** | *1) |
| Vert. | 4824.000 | AV | 36.30 | 32.60 | 5.60 | 41.90 | 1.73 | 3.30 | 37.63 | 53.90 | 16.3 | Floor noise |
| Vert. | 7236.000 | AV | 34.70 | 37.20 | 7.00 | 40.90 | 1.73 | 3.30 | 43.03 | 53.90 | 10.9 | Floor noise |

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 (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*1) Not out of band emission (Leakage Power)
*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

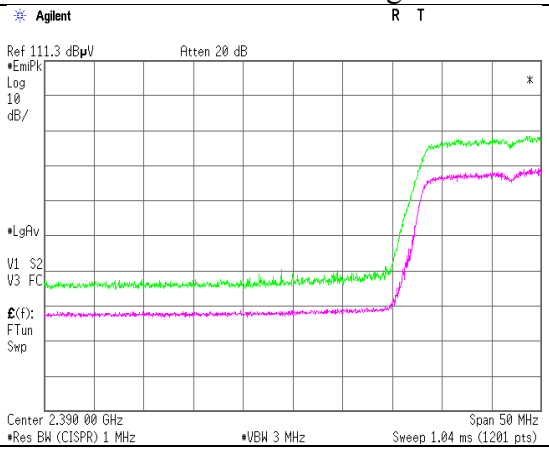
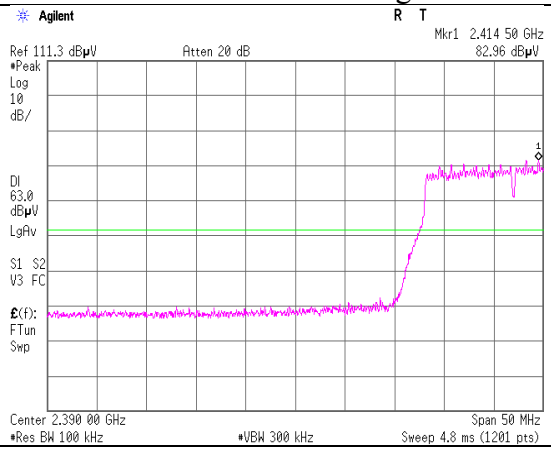
**20 dBc Data Sheet** **(RBW 100 kHz, VBW 300 kHz)**

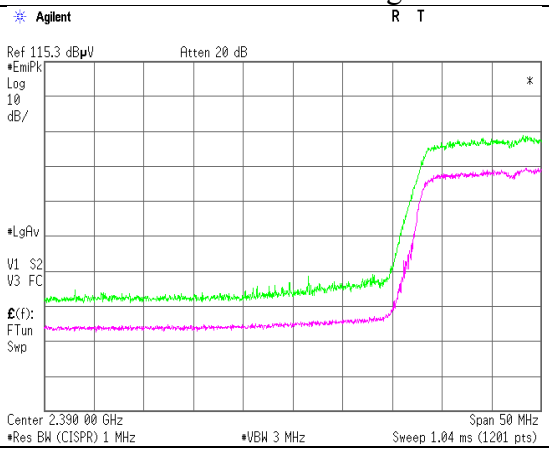
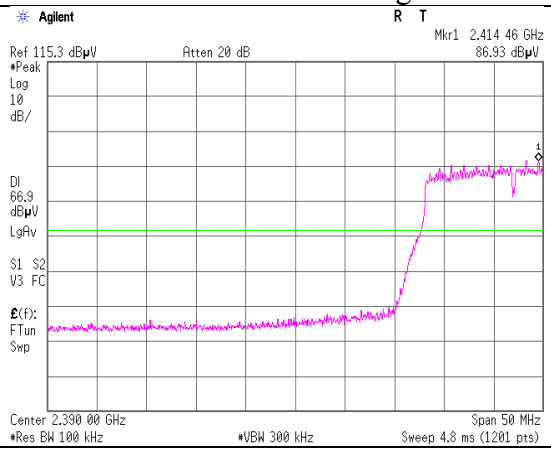
| Polarity | Frequency [MHz] | Detector | Reading [dBuV] | Ant.Fac. [dB/m] | Loss [dB] | Gain [dB] | Distance Factor [dB] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Hori. | 2412.000 | PK | 82.96 | 27.60 | 13.60 | 42.10 | 3.30 | 85.36 | - | - | Carrier |
| Hori. | 2397.909 | PK | 40.40 | 27.60 | 13.60 | 42.10 | 3.30 | 42.80 | 65.36 | 22.6 | |
| Hori. | 2400.000 | PK | 42.50 | 27.60 | 13.60 | 42.10 | 3.30 | 44.90 | 65.36 | 20.5 | |
| Vert. | 2412.000 | PK | 86.90 | 27.60 | 13.60 | 42.10 | 3.30 | 89.30 | - | - | Carrier |
| Vert. | 2398.233 | PK | 42.30 | 27.60 | 13.60 | 42.10 | 3.30 | 44.70 | 69.30 | 24.6 | |
| Vert. | 2400.000 | PK | 44.80 | 27.60 | 13.60 | 42.10 | 3.30 | 47.20 | 69.30 | 22.1 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB

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

| | | |
|---|---|---|
| Report No. | 11922904M-B | |
| Test place | Kashima EMC Lab. | |
| Semi Anechoic Chamber | No.10 | No.10 |
| Date | September 4, 2017 | September 5, 2017 |
| Temperature / Humidity | 22 deg. C / 52 % RH | 23 deg. C / 52 % RH |
| Engineer | Hiromitsu Tanabe | Hiromitsu Tanabe |
| | (1 GHz -10 GHz) | (10 GHz -26 GHz) |
| 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 |

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

# Radiated Spurious Emission

| | | |
|---|---|---|
| Report No. | 11922904M-B | |
| Test place | Kashima EMC Lab. | |
| Semi Anechoic Chamber | No.10 | No.10 |
| Date | September 4, 2017 | September 5, 2017 |
| Temperature / Humidity | 22 deg. C / 52 % RH | 23 deg. C / 52 % RH |
| Engineer | Hiromitsu Tanabe | Hiromitsu Tanabe |
| | (1 GHz -10 GHz) | (10 GHz -26 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. | 1920.164 | PK | 48.50 | 27.10 | 13.30 | 42.20 | 3.30 | 50.00 | 73.90 | 23.9 | 105 | 213 | |
| Hori. | 3168.000 | PK | 50.40 | 29.50 | 5.20 | 42.10 | 3.30 | 46.30 | 73.90 | 27.6 | 218 | 159 | |
| Hori. | 4874.000 | PK | 45.70 | 32.50 | 5.60 | 41.90 | 3.30 | 45.20 | 73.90 | 28.7 | 100 | 0 | Floor noise |
| Hori. | 7311.000 | PK | 44.00 | 37.30 | 7.00 | 40.90 | 3.30 | 50.70 | 73.90 | 23.2 | 100 | 0 | Floor noise |
| Hori. | 1920.164 | AV | 40.00 | 27.10 | 13.30 | 42.20 | 3.30 | 41.50 | 53.90 | **12.4** | 105 | 213 | |
| Hori. | 3168.000 | AV | 44.70 | 29.50 | 5.20 | 42.10 | 3.30 | 40.60 | 53.90 | 13.3 | 218 | 159 | |
| Vert. | 1920.167 | PK | 48.70 | 27.10 | 13.30 | 42.20 | 3.30 | 50.20 | 73.90 | 23.7 | 240 | 182 | |
| Vert. | 3168.000 | PK | 49.80 | 29.50 | 5.20 | 42.10 | 3.30 | 45.70 | 73.90 | 28.2 | 320 | 183 | |
| Vert. | 4874.000 | PK | 45.30 | 32.50 | 5.60 | 41.90 | 3.30 | 44.80 | 73.90 | 29.1 | 100 | 0 | Floor noise |
| Vert. | 7311.000 | PK | 44.10 | 37.30 | 7.00 | 40.90 | 3.30 | 50.80 | 73.90 | 23.1 | 100 | 0 | Floor noise |
| Vert. | 1920.167 | AV | 39.50 | 27.10 | 13.30 | 42.20 | 3.30 | 41.00 | 53.90 | 12.9 | 240 | 182 | |
| Vert. | 3168.000 | AV | 43.00 | 29.50 | 5.20 | 42.10 | 3.30 | 38.90 | 53.90 | 15.0 | 320 | 183 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 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 | 36.00 | 32.50 | 5.60 | 41.90 | 1.73 | 3.30 | 37.23 | 53.90 | 16.7 | Floor noise |
| Hori. | 7311.000 | AV | 34.70 | 37.30 | 7.00 | 40.90 | 1.73 | 3.30 | 43.13 | 53.90 | **10.8** | Floor noise |
| Vert. | 4874.000 | AV | 36.00 | 32.50 | 5.60 | 41.90 | 1.73 | 3.30 | 37.23 | 53.90 | 16.7 | Floor noise |
| Vert. | 7311.000 | AV | 34.70 | 37.30 | 7.00 | 40.90 | 1.73 | 3.30 | 43.13 | 53.90 | **10.8** | Floor noise |

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 (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

# Radiated Spurious Emission

| | | |
|---|---|---|
| Report No. | 11922904M-B | |
| Test place | Kashima EMC Lab. | |
| Semi Anechoic Chamber | No.10 | No.10 |
| Date | September 4, 2017 | September 5, 2017 |
| Temperature / Humidity | 22 deg. C / 52 % RH | 23 deg. C / 52 % RH |
| Engineer | Hiromitsu Tanabe | Hiromitsu Tanabe |
| | (1 GHz -10 GHz) | (10 GHz -26 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. | 1920.162 | PK | 48.70 | 27.10 | 13.30 | 42.20 | 3.30 | 50.20 | 73.90 | 23.7 | 150 | 207 | |
| Hori. | 2483.500 | PK | 49.00 | 27.90 | 13.70 | 42.10 | 3.30 | 51.80 | 73.90 | 22.1 | 155 | 270 | |
| Hori. | 3168.000 | PK | 50.90 | 29.50 | 5.20 | 42.10 | 3.30 | 46.80 | 73.90 | 27.1 | 158 | 88 | |
| Hori. | 4924.000 | PK | 45.30 | 32.60 | 5.60 | 41.90 | 3.30 | 44.90 | 73.90 | 29.0 | 100 | 0 | Floor noise |
| Hori. | 7386.000 | PK | 44.50 | 37.40 | 7.10 | 40.90 | 3.30 | 51.40 | 73.90 | 22.5 | 100 | 0 | Floor noise |
| Hori. | 1920.162 | AV | 40.30 | 27.10 | 13.30 | 42.20 | 3.30 | 41.80 | 53.90 | **12.1** | 150 | 207 | |
| Hori. | 3168.000 | AV | 44.00 | 29.50 | 5.20 | 42.10 | 3.30 | 39.90 | 53.90 | 14.0 | 158 | 88 | |
| Vert. | 1920.169 | PK | 48.30 | 27.10 | 13.30 | 42.20 | 3.30 | 49.80 | 73.90 | 24.1 | 235 | 179 | |
| Vert. | 2483.500 | PK | 50.70 | 27.90 | 13.70 | 42.10 | 3.30 | 53.50 | 73.90 | 20.4 | 122 | 47 | |
| Vert. | 3168.000 | PK | 48.80 | 29.50 | 5.20 | 42.10 | 3.30 | 44.70 | 73.90 | 29.2 | 173 | 212 | |
| Vert. | 4924.000 | PK | 45.10 | 32.60 | 5.60 | 41.90 | 3.30 | 44.70 | 73.90 | 29.2 | 100 | 0 | Floor noise |
| Vert. | 7386.000 | PK | 43.70 | 37.40 | 7.10 | 40.90 | 3.30 | 50.60 | 73.90 | 23.3 | 100 | 0 | Floor noise |
| Vert. | 1920.169 | AV | 39.70 | 27.10 | 13.30 | 42.20 | 3.30 | 41.20 | 53.90 | 12.7 | 235 | 179 | |
| Vert. | 3168.000 | AV | 42.40 | 29.50 | 5.20 | 42.10 | 3.30 | 38.30 | 53.90 | 15.6 | 173 | 212 | |

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 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 | 38.50 | 27.90 | 13.70 | 42.10 | 1.73 | 3.30 | 43.03 | 53.90 | 10.9 | *1) |
| Hori. | 4924.000 | AV | 36.10 | 32.60 | 5.60 | 41.90 | 1.73 | 3.30 | 37.43 | 53.90 | 16.5 | Floor noise |
| Hori. | 7386.000 | AV | 35.00 | 37.40 | 7.10 | 40.90 | 1.73 | 3.30 | 43.63 | 53.90 | 10.3 | Floor noise |
| Vert. | 2483.500 | AV | 40.00 | 27.90 | 13.70 | 42.10 | 1.73 | 3.30 | 44.53 | 53.90 | **9.4** | *1) |
| Vert. | 4924.000 | AV | 36.30 | 32.60 | 5.60 | 41.90 | 1.73 | 3.30 | 37.63 | 53.90 | 16.3 | Floor noise |
| Vert. | 7386.000 | AV | 35.20 | 37.40 | 7.10 | 40.90 | 1.73 | 3.30 | 43.83 | 53.90 | 10.1 | Floor noise |

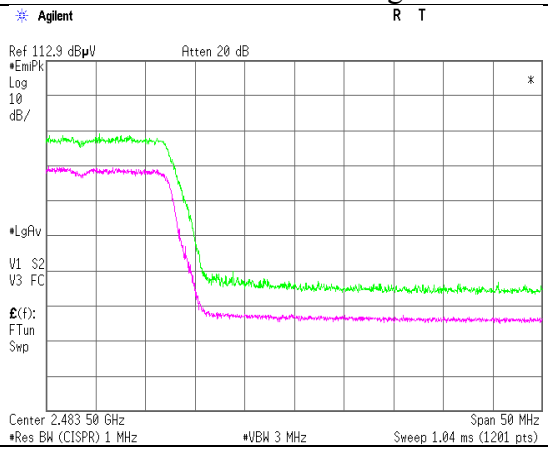
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amprifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 10 GHz : 20log (4.38 m / 3.0 m) = 3.3 dB
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.5 dB
Duty factor refer to "Duty factor Calculation chart" sheet.
*1) Not out of band emission (Leakage Power)
*The noise of duty have not corrected except harmonics since it was confirmed that the duty was 98% or more.

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

| | | |
|---|---|---|
| Report No. | 11922904M-B | |
| Test place | Kashima EMC Lab. | |
| Semi Anechoic Chamber | No.10 | No.10 |
| Date | September 4, 2017 | September 5, 2017 |
| Temperature / Humidity | 22 deg. C / 52 % RH | 23 deg. C / 52 % RH |
| Engineer | Hiromitsu Tanabe | Hiromitsu Tanabe |
| | (1 GHz -10 GHz) | (10 GHz -26 GHz) |
| Mode | Tx 11n-20 2462 MHz | |

Horizontal

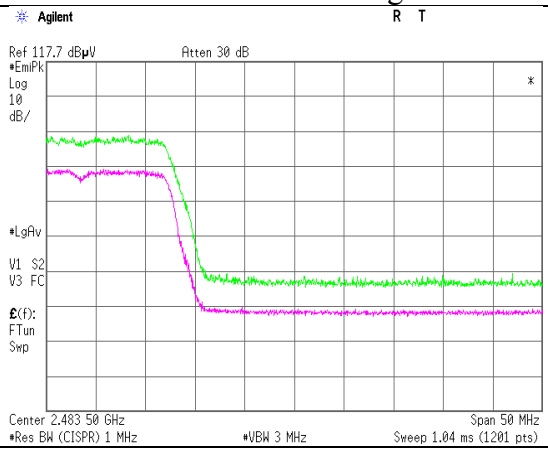
Restricted-band band-edge Plot




Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

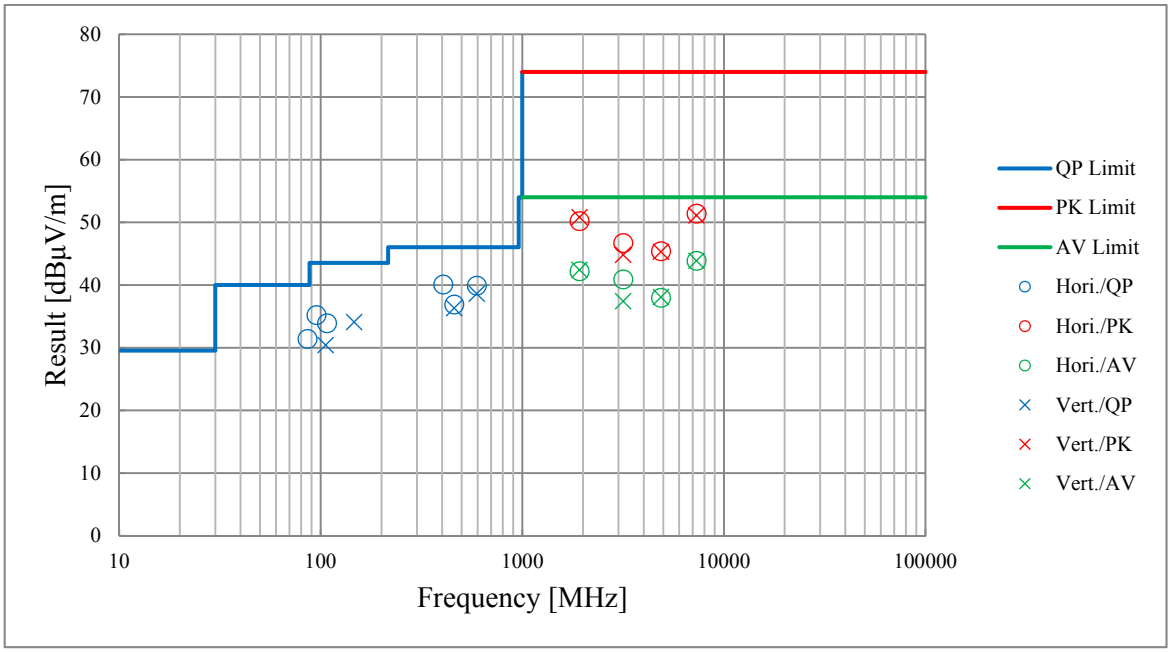



Trace Green : Peak Plot
Trace Purple : Average Plot

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

# Radiated Spurious Emission
## (Plot data, Worst case)

| | | | |
|---|---|---|---|
| Report No. | 11922904M-B | | |
| Test place | Kashima EMC Lab. | | |
| Semi Anechoic Chamber | No.10 | No.10 | No.10 |
| Date | September 6, 2017 | September 2, 2017 | September 5, 2017 |
| Temperature / Humidity | 22 deg. C / 52 % RH | 23 deg. C / 48 % RH | 23 deg. C / 52 % RH |
| Engineer | Kazuhiro Ando | Hiromitsu Tanabe | Hiromitsu Tanabe |
| | (30 MHz -1000 MHz) | (1 GHz -10 GHz) | (10 GHz -26 GHz) |
| Mode | Tx 11g 2437 MHz | | |




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

# APPENDIX 2: Test instruments

**Test equipment**

| Control No. | Instrument | Manufacturer | Model No | Serial No | Test Item | Calibration Date * Interval(month) |
|---|---|---|---|---|---|---|
| CTR-06 | Test Receiver | Rohde & Schwarz | ESCI | 100107 Rev 4.32 | RE | 2016/09/26 * 12 |
| CCC-S11-R (1/4/5/CAT S12-13/6/7/ 8/10) | Coaxial Cable | Fujikura,Suhner,Suhner,Agilent,Suhner,-,Suhner | 5D-2W,SF106,SF104,8496B+8494B,SF106,-,SF106 | MY42143380,US00431042(Step Att) | RE | 2016/11/10 * 12 |
| CAT3-07 | 3dB Fixed Atten. | TAMAGAWA | UFA-01 | none | RE | 2017/04/27 * 12 |
| CBL-09 | LOGBICON | Schwarzbeck | VULB 9168 | 508 | RE | 2017/04/10 * 12 |
| CAF-16 | Pre-Amplifier | Sonoma Instrument | 310N | 325015 | RE | 2017/05/19 * 12 |
| CSCL-16 | Ruler | Tajima | G3 gold | none | RE | - |
| COS-11 | Temperature, Humidity & Atmospheric Logger | T&D | TR-73U | F8060468 | RE | 2017/05/16 * 12 |
| CTS-13 | Digital Multimeter | FLUKE | FLK-83-V | 14610320 | RE | 2017/09/11 * 12 |
| COTS-CEMI-02 | EMI Software | TSJ | TEPTO-DV(RE, CE,MF,PE) | Ver, RE: 2.5.0131, CE: 2.5.0131, ME: 2.5.0129, PE: 2.5.0129 | RE | - |
| CSA-07 | Spectrum Analyzer | Agilent | E4448A | MY52490024 Version A.11.21 | RE | 2017/05/31 * 12 |
| CHA-24 | Double Ridged Wave Guide | ETS-Lindgren | 3115 | 00204569 | RE | 2017/02/01 * 12 |
| CHA-07 | Double Ridged Horn | ETS-Lindgren | 3160-09 | 00166043 | RE | 2017/06/27 * 12 |
| CAF-19 | Pre-Amplifier | TOYO | HAP18-26W | 00000035 | RE | 2017/06/28 * 12 |
| CAF-18 | Pre-Amplifier | TOYO | TPA0118-36 | A-1001 | RE | 2016/11/07 * 12 |
| CAT10-16 | 10dB Fixed Atten. | Weinschel | 54A-10 | 56246 | RE | 2017/05/19 * 12 |
| CHF-03 | HPF | Micro-Tronics | HPM50111-02 | 008 | RE | 2017/05/19 * 12 |
| CCC-G09 | Micro Wave Cable | Junkosha | MWX221 | 1407S222 | RE | 2016/11/25 * 12 |
| CCC-G10 | Micro Wave Cable | Junkosha | MWX221 | J12J102343-00 | RE | 2016/11/25 * 12 |
| CCC-W09 | Micro Wave Cable | SUHNER | SUCOFLEX104 | MY588/4 | RE | 2017/07/18 * 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**