




# RADIO TEST REPORT


**Test Report No. : 10848690H-B-R2**

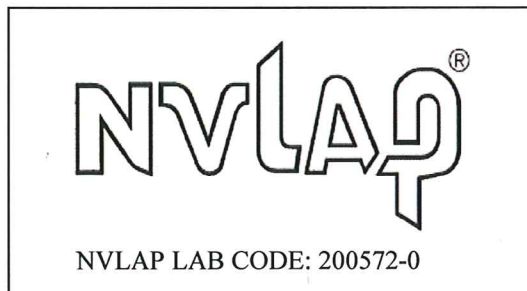
**Applicant** : Yamaha Corporation  
**Type of Equipment** : Network Module  
**Model No.** : NW-01  
**FCC ID** : A6RNW01A  
**Test regulation** : **FCC Part 15 Subpart C: 2015**  
\*Bluetooth part (Radiated Spurious Emission test only)  
\*Class II Permissive change  
**Test Result** : **Complied**

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
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 10848690H-B-R1. 10848690H-B-R1 is replaced with this report.

**Date of test:** June 19 to 21, 2015

**Representative test engineer:**   
Takumi Shimada  
Engineer  
Consumer Technology Division

**Approved by:**   
Takayuki Shimada  
Engineer  
Consumer Technology Division



This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.  
\*As for the range of Accreditation in NVLAP, you may refer to the WEB address,  
<http://www.ul.com/japan/jpn/pages/services/emc/about/mark1/index.jsp#nvlap>



<b>CONTENTS</b>	<b>PAGE</b>
<b>SECTION 1: Customer information.....</b>	<b>4</b>
<b>SECTION 2: Equipment under test (E.U.T.).....</b>	<b>4</b>
<b>SECTION 3: Test specification, procedures &amp; results.....</b>	<b>6</b>
<b>SECTION 4: Operation of E.U.T. during testing.....</b>	<b>8</b>
<b>SECTION 5: Radiated Spurious Emission .....</b>	<b>10</b>
<b>APPENDIX 1: Test data .....</b>	<b>11</b>
Radiated Spurious Emission .....	11
<b>APPENDIX 2: Test instruments .....</b>	<b>23</b>
<b>APPENDIX 3: Photographs of test setup .....</b>	<b>24</b>
Radiated Spurious Emission .....	24
Worst Case Position (Horizontal: X-axis/ Vertical:Y-axis).....	25

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## **SECTION 1: Customer information**

Company Name : Yamaha Corporation  
Address : 10-1 Nakazawa-cho, Naka-ku, Hamamatsu Shizuoka, 430-8650, Japan  
Telephone Number : +81-53-460-3320  
Facsimile Number : +81-53-460-2878  
Contact Person : Koichi Sato, Hideyuki Suzuki

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

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

Type of Equipment : Network Module  
Model No. : NW-01  
Serial No. : Refer to Section 4, Clause 4.2  
Rating : DC 5.0V  
Receipt Date of Sample : Radiated test sample  
Module: June 3, 2015 ( Sample used on June 18 to 21, 2015)  
Antenna: June 18, 2015 ( Sample used on June 18 to 21, 2015)  
Country of Mass-production : Malaysia  
Condition of EUT : Engineering 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**

#### **General Specification**

Clock frequency(ies) in the system : 32.768kHz, 2.25MHz, 6MHz, 22.5792MHz, 24.576MHz, 25MHz,  
26MHz, 50MHz, 400MHz  
Operating temperature : 0deg. C to +67deg. C

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**Radio Specification**

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

Equipment Type	Transceiver	
Frequency of Operation	2412-2462MHz	
Type of Modulation	DSSS, OFDM	
Bandwidth & Channel spacing	20MHz & 5MHz	
Method of frequency generation	Synthesizer	
Power Supply (inner)	DC 3.3V	
Antenna Type	PIFA Antenna	Slot Antenna
Antenna Gain	1.0 dBi including connector and cable	3.5 dBi including connector and cable

**Bluetooth (Ver. 2.1 with EDR function)**

Equipment Type	Transceiver	
Frequency of Operation	2402-2480MHz	
Type of Modulation	FHSS (GFSK, $\pi/4$ DQPSK, 8DPSK)	
Bandwidth & Channel spacing	1MHz & 1MHz	
Method of frequency generation	Synthesizer	
Power Supply (inner)	DC 3.3V	
Antenna Type	PIFA Antenna	Slot Antenna
Antenna Gain	1.0 dBi including connector and cable	3.5 dBi including connector and cable

\*This test report applies to Bluetooth.

<Contents of the change from original model>

Test Report Number of original model is 10646854H-B-R2 (issued by UL Japan, Inc.).

Specification was changed from the original model as follows:

\*Antenna of the EUT was modified.

The radio specification is identical to the original.

Therefore only Conducted emission test and Radiated Spurious Emission test were performed in this report.

Additionally, only the information of modified antenna is described in this report.

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## **SECTION 3: Test specification, procedures & results**

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart C: 2015, final revised on January 21, 2015

Title : FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators  
Section 15.207 Conducted limits  
Section 15.247 Operation within the bands 902-928MHz,  
2400-2483.5MHz, and 5725-5850MHz

### **3.2 Procedures and results**

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Spurious Emission & Band Edge Compliance	FCC: FCC Public Notice DA 00-705 IC: RSS-Gen 6.13	FCC: Section15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	[PIFA Antenna] 6.2dB 7440.000MHz, AV, Vert. [Slot Antenna] 4.4dB 7323.000MHz, AV, Vert.	Complied	Radiated

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

\* In case any questions arise about test procedure, ANSI C63.4: 2009 is also referred.

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

This EUT provides stable voltage (DC 3.3V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

#### **FCC Part 15.203 Antenna requirement**

The EUT has a unique antenna connector (U.FL on the Module). Therefore the equipment complies with the requirement of Section 15.203/212.

### **3.3 Addition to standard**

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

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### 3.4 Uncertainty

#### EMI

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor  $k = 2$ .  
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Test site (semi anechoic chamber)	Radiated emission Uncertainty (+/-)						
	Measurement distance: 3 m				1 m		0.5 m
	9 kHz - 30 MHz	30 MHz - 300 MHz	300 MHz - 1 GHz	1 GHz - 10 GHz	10 GHz - 18 GHz	18 GHz - 26.5 GHz	26.5 GHz - 40 GHz
No. 1	4.3 dB	5.5 dB	6.3 dB	5.5 dB	5.8 dB	5.8 dB	4.3 dB
No. 2	4.2 dB	5.4 dB	6.3 dB	5.4 dB	5.7 dB	5.9 dB	5.6 dB
No. 3	4.4 dB	5.4 dB	6.4 dB	5.2 dB	5.5 dB	5.8 dB	5.5 dB
No. 4	4.7 dB	5.6 dB	6.4 dB	5.3 dB	5.7 dB	5.9 dB	5.5 dB

#### Radiated emission test

The data listed in this report meets the limits unless the uncertainty is taken into consideration.

### 3.5 Test Location

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Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	-	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.6 shielded room	-	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	-	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	-	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	-	3.1 x 5.0 x 2.7	N/A	-	-
No.9 measurement room	-	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.11 measurement room	-	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

\* Size of vertical conducting plane (for Conducted Emission test) : 2.0 m x 2.0 m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

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

Refer to APPENDIX.

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## **SECTION 4: Operation of E.U.T. during testing**

### **4.1 Operating Mode(s)**

Bluetooth (BT): Transmitting (Tx), Payload: PRBS9

Details of Operating Mode(s)

<b>Test Item</b>	<b>Mode</b>	<b>Tested frequency</b>
Radiated Spurious Emission	Tx (Hopping off) DH5, 3DH5	2402MHz 2441MHz 2480MHz
<p>*As a result of preliminary test, the formal test was performed with the above modes, which had the maximum payload length (except Dwell time test)</p> <p>*2DH mode (2Mb/s EDR: pi/4DQPSK) was excluded for other tests than power measurement by using 3DH mode (3 Mb/s EDR: 8DPSK) as a representative.</p> <p>*EUT has the power settings by the software as follows;            Power settings: -1.75dBm            Software: Ver.4.3.1            *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.</p>		

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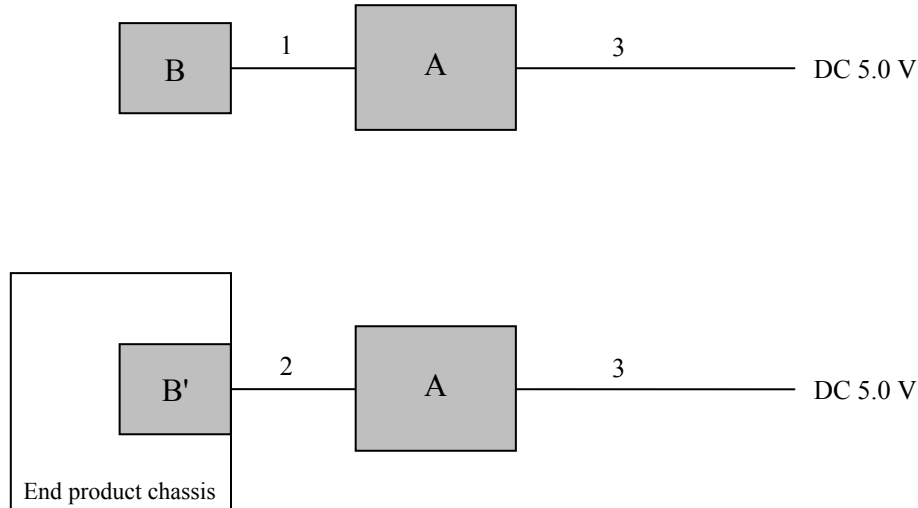
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## 4.2 Configuration and peripherals



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

\* The end product chassis was used for this test in order to ensure the capability of Slot Antenna.

### Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Network Module	NW-01	P21	Yamaha Corporation	EUT
B	PIFA Antenna	L08RF009-CS-R	001	ADVANCED-CONNECTEK INC.	EUT
B'	Slot Antenna	L08RF008-CS-R	001	ADVANCED-CONNECTEK INC.	EUT

### List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	PIFA Antenna Cable	0.4	Shielded	Shielded	-
2	Slot Antenna Cable	0.15	Shielded	Shielded	-
3	DC Cable	2.0	Unshielded	Unshielded	-

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## **SECTION 5: Radiated Spurious Emission**

### **Test Procedure**

EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane.

The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

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

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

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

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

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

### **Test Antennas are used as below;**

Frequency	30 MHz to 300 MHz	300 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	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	RBW: 1 MHz VBW: 10 Hz *1)	RBW: 100 kHz VBW: 300 kHz
Test Distance	3 m	3 m (below 10 GHz), 1 m*2) (above 10 GHz)		3 m (below 10 GHz), 1 m*2) (above 10 GHz)

\*1) Although DA 00-705 accepts VBW = 10 Hz for AV measurements, it was confirmed that superfluous smoothing was not performed.

\*2) Distance Factor:  $20 \times \log(3.0 \text{ m} / 1.0 \text{ m}) = 9.5 \text{ dB}$

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

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

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

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**APPENDIX 1: Test data**

**Radiated Spurious Emission**  
**[PIFA Antenna]**

Test place Ise EMC Lab. No.4 Semi Anechoic Chamber  
Report No. 10848690H  
Date June 19, 2015 June 20, 2015 June 21, 2015  
Temperature/ Humidity 21 deg. C / 47 % RH 24 deg. C / 59 % RH 23 deg. C / 67 % RH  
Engineer Tomoki Matsui Shinya Watanabe Shinya Watanabe  
(1-10GHz) (10-26.5GHz) (30-1000MHz)  
Mode Tx, DH5 2402MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	293.530	QP	31.5	19.4	9.9	31.8	29.0	46.0	17.0	
Hori	325.001	QP	35.3	17.5	10.1	31.8	31.1	46.0	14.9	
Hori	350.001	QP	34.5	17.7	10.2	31.8	30.6	46.0	15.4	
Hori	475.000	QP	34.4	19.1	11.1	31.9	32.7	46.0	13.3	
Hori	525.000	QP	32.0	19.6	11.4	32.0	31.0	46.0	15.0	
Hori	825.003	QP	31.6	23.5	12.9	31.5	36.5	46.0	9.5	
Hori	2390.000	PK	42.6	27.4	3.2	32.3	40.9	73.9	33.0	
Hori	4804.000	PK	40.1	31.5	5.4	31.6	45.4	73.9	28.5	Floor Noise
Hori	7206.000	PK	45.9	36.8	6.6	32.8	56.5	73.9	17.4	
Hori	9608.000	PK	42.5	38.8	7.3	33.2	55.4	73.9	18.5	Floor Noise
Hori	2390.000	AV	32.4	27.4	3.2	32.3	30.7	53.9	23.2	
Hori	4804.000	AV	29.9	31.5	5.4	31.6	35.2	53.9	18.7	Floor Noise
Hori	7206.000	AV	37.0	36.8	6.6	32.8	47.6	53.9	6.3	
Hori	9608.000	AV	31.3	38.8	7.3	33.2	44.2	53.9	9.7	Floor Noise
Vert	293.530	QP	31.2	19.4	9.9	31.8	28.7	46.0	17.3	
Vert	325.001	QP	30.5	17.5	10.1	31.8	26.3	46.0	19.7	
Vert	350.001	QP	31.5	17.7	10.2	31.8	27.6	46.0	18.4	
Vert	475.000	QP	32.9	19.1	11.1	31.9	31.2	46.0	14.8	
Vert	525.000	QP	31.0	19.6	11.4	32.0	30.0	46.0	16.0	
Vert	825.003	QP	29.3	23.5	12.9	31.5	34.2	46.0	11.8	
Vert	2390.000	PK	41.6	27.4	3.2	32.3	39.9	73.9	34.0	
Vert	4804.000	PK	40.2	31.5	5.4	31.6	45.5	73.9	28.4	Floor Noise
Vert	7206.000	PK	44.9	36.8	6.6	32.8	55.5	73.9	18.4	
Vert	9608.000	PK	42.1	38.8	7.3	33.2	55.0	73.9	18.9	Floor Noise
Vert	2390.000	AV	30.3	27.4	3.2	32.3	28.6	53.9	25.3	
Vert	4804.000	AV	28.9	31.5	5.4	31.6	34.2	53.9	19.7	Floor Noise
Vert	7206.000	AV	34.7	36.8	6.6	32.8	45.3	53.9	8.6	
Vert	9608.000	AV	30.7	38.8	7.3	33.2	43.6	53.9	10.3	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

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

**20dBc Data Sheet**

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	95.8	27.4	3.2	32.3	94.1	-	-	Carrier
Hori	2400.000	PK	40.1	27.4	3.2	32.3	38.4	74.1	35.7	
Vert	2402.000	PK	96.9	27.4	3.2	32.3	95.2	-	-	Carrier
Vert	2400.000	PK	37.4	27.4	3.2	32.3	35.7	75.2	39.5	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

**Radiated Spurious Emission**  
**[PIFA Antenna]**

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(1-10GHz) (10-26.5GHz) (30-1000MHz)  
Mode Tx, DH5 2441MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
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Hori	475.000	QP	34.3	19.1	11.1	31.9	32.6	46.0	13.4	
Hori	525.000	QP	32.2	19.6	11.4	32.0	31.2	46.0	14.8	
Hori	825.003	QP	31.4	23.5	12.9	31.5	36.3	46.0	9.7	
Hori	4882.000	PK	41.1	31.8	5.5	31.6	46.8	73.9	27.1	Floor Noise
Hori	7323.000	PK	44.6	37.0	6.5	32.8	55.3	73.9	18.6	
Hori	9764.000	PK	42.4	38.9	7.4	33.3	55.4	73.9	18.5	Floor Noise
Hori	4882.000	AV	28.8	31.8	5.5	31.6	34.5	53.9	19.4	Floor Noise
Hori	7323.000	AV	34.3	37.0	6.5	32.8	45.0	53.9	8.9	
Hori	9764.000	AV	31.0	38.9	7.4	33.3	44.0	53.9	9.9	Floor Noise
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Vert	525.000	QP	30.9	19.6	11.4	32.0	29.9	46.0	16.1	
Vert	825.003	QP	29.3	23.5	12.9	31.5	34.2	46.0	11.8	
Vert	4882.000	PK	41.5	31.8	5.5	31.6	47.2	73.9	26.7	Floor Noise
Vert	7323.000	PK	45.7	37.0	6.5	32.8	56.4	73.9	17.5	
Vert	9764.000	PK	42.6	38.9	7.4	33.3	55.6	73.9	18.3	Floor Noise
Vert	4882.000	AV	29.0	31.8	5.5	31.6	34.7	53.9	19.2	Floor Noise
Vert	7323.000	AV	34.7	37.0	6.5	32.8	45.4	53.9	8.5	
Vert	9764.000	AV	30.9	38.9	7.4	33.3	43.9	53.9	10.0	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

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

**Radiated Spurious Emission**  
**[PIFA Antenna]**

Test place Ise EMC Lab. No.4 Semi Anechoic Chamber  
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Date June 19, 2015 June 20, 2015 June 21, 2015  
Temperature/ Humidity 21 deg. C / 47 % RH 24 deg. C / 59 % RH 23 deg. C / 67 % RH  
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(1-10GHz) (10-26.5GHz) (30-1000MHz)  
Mode Tx, DH5 2480MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	293.530	QP	31.7	19.4	9.9	31.8	29.2	46.0	16.8	
Hori	325.001	QP	35.4	17.5	10.1	31.8	31.2	46.0	14.8	
Hori	350.001	QP	34.4	17.7	10.2	31.8	30.5	46.0	15.5	
Hori	475.000	QP	34.2	19.1	11.1	31.9	32.5	46.0	13.5	
Hori	525.000	QP	32.3	19.6	11.4	32.0	31.3	46.0	14.7	
Hori	825.003	QP	31.5	23.5	12.9	31.5	36.4	46.0	9.6	
Hori	2483.500	PK	43.3	27.6	3.3	32.3	41.9	73.9	32.0	
Hori	4960.000	PK	40.1	32.0	5.5	31.6	46.0	73.9	27.9	Floor Noise
Hori	7440.000	PK	45.8	37.2	6.5	32.9	56.6	73.9	17.3	
Hori	9920.000	PK	42.1	39.0	7.4	33.3	55.2	73.9	18.7	Floor Noise
Hori	2483.500	AV	30.9	27.6	3.3	32.3	29.5	53.9	24.4	
Hori	4960.000	AV	28.5	32.0	5.5	31.6	34.4	53.9	19.5	Floor Noise
Hori	7440.000	AV	36.2	37.2	6.5	32.9	47.0	53.9	6.9	
Hori	9920.000	AV	30.7	39.0	7.4	33.3	43.8	53.9	10.1	Floor Noise
Vert	293.530	QP	31.5	19.4	9.9	31.8	29.0	46.0	17.0	
Vert	325.001	QP	32.1	17.5	10.1	31.8	27.9	46.0	18.1	
Vert	350.001	QP	31.5	17.7	10.2	31.8	27.6	46.0	18.4	
Vert	475.000	QP	32.6	19.1	11.1	31.9	30.9	46.0	15.1	
Vert	525.000	QP	31.1	19.6	11.4	32.0	30.1	46.0	15.9	
Vert	825.003	QP	29.4	23.5	12.9	31.5	34.3	46.0	11.7	
Vert	2483.500	PK	45.5	27.6	3.3	32.3	44.1	73.9	29.8	
Vert	4960.000	PK	39.7	32.0	5.5	31.6	45.6	73.9	28.3	Floor Noise
Vert	7440.000	PK	45.8	37.2	6.5	32.9	56.6	73.9	17.3	
Vert	9920.000	PK	41.7	39.0	7.4	33.3	54.8	73.9	19.1	Floor Noise
Vert	2483.500	AV	32.3	27.6	3.3	32.3	30.9	53.9	23.0	
Vert	4960.000	AV	28.7	32.0	5.5	31.6	34.6	53.9	19.3	Floor Noise
Vert	7440.000	AV	36.9	37.2	6.5	32.9	47.7	53.9	6.2	
Vert	9920.000	AV	30.8	39.0	7.4	33.3	43.9	53.9	10.0	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

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

## Radiated Spurious Emission

### [PIFA Antenna]

Test place Ise EMC Lab. No.4 Semi Anechoic Chamber  
Report No. 10848690H  
Date June 19, 2015                      June 20, 2015                      June 21, 2015  
Temperature/ Humidity 21 deg. C / 47 % RH    24 deg. C / 59 % RH    23 deg. C / 67 % RH  
Engineer Tomoki Matsui                      Shinya Watanabe                      Shinya Watanabe  
(1-10GHz)                      (10-26.5GHz)                      (30-1000MHz)  
Mode Tx, 3DH5 2402MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	293.530	QP	31.6	19.4	9.9	31.8	29.1	46.0	16.9	
Hori	325.001	QP	35.4	17.5	10.1	31.8	31.2	46.0	14.8	
Hori	350.001	QP	34.5	17.7	10.2	31.8	30.6	46.0	15.4	
Hori	475.000	QP	34.6	19.1	11.1	31.9	32.9	46.0	13.1	
Hori	525.000	QP	32.2	19.6	11.4	32.0	31.2	46.0	14.8	
Hori	825.003	QP	31.5	23.5	12.9	31.5	36.4	46.0	9.6	
Hori	2390.000	PK	44.7	27.4	3.2	32.3	43.0	73.9	30.9	
Hori	4804.000	PK	41.1	31.5	5.4	31.6	46.4	73.9	27.5	Floor Noise
Hori	7206.000	PK	42.7	36.8	6.6	32.8	53.3	73.9	20.6	Floor Noise
Hori	9608.000	PK	42.4	38.8	7.3	33.2	55.3	73.9	18.6	Floor Noise
Hori	2390.000	AV	30.9	27.4	3.2	32.3	29.2	53.9	24.7	
Hori	4804.000	AV	28.9	31.5	5.4	31.6	34.2	53.9	19.7	Floor Noise
Hori	7206.000	AV	31.8	36.8	6.6	32.8	42.4	53.9	11.5	Floor Noise
Hori	9608.000	AV	30.6	38.8	7.3	33.2	43.5	53.9	10.4	Floor Noise
Vert	293.530	QP	31.5	19.4	9.9	31.8	29.0	46.0	17.0	
Vert	325.001	QP	31.9	17.5	10.1	31.8	27.7	46.0	18.3	
Vert	350.001	QP	31.5	17.7	10.2	31.8	27.6	46.0	18.4	
Vert	475.000	QP	32.6	19.1	11.1	31.9	30.9	46.0	15.1	
Vert	525.000	QP	31.2	19.6	11.4	32.0	30.2	46.0	15.8	
Vert	825.003	QP	29.3	23.5	12.9	31.5	34.2	46.0	11.8	
Vert	2390.000	PK	46.0	27.4	3.2	32.3	44.3	73.9	29.6	
Vert	4804.000	PK	40.0	31.5	5.4	31.6	45.3	73.9	28.6	Floor Noise
Vert	7206.000	PK	42.9	36.8	6.6	32.8	53.5	73.9	20.4	Floor Noise
Vert	9608.000	PK	42.1	38.8	7.3	33.2	55.0	73.9	18.9	Floor Noise
Vert	2390.000	AV	30.8	27.4	3.2	32.3	29.1	53.9	24.8	
Vert	4804.000	AV	28.8	31.5	5.4	31.6	34.1	53.9	19.8	Floor Noise
Vert	7206.000	AV	31.7	36.8	6.6	32.8	42.3	53.9	11.6	Floor Noise
Vert	9608.000	AV	30.7	38.8	7.3	33.2	43.6	53.9	10.3	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

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

#### 20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	96.9	27.4	3.2	32.3	95.2	-	-	Carrier
Hori	2400.000	PK	43.2	27.4	3.2	32.3	41.5	75.2	33.7	
Vert	2402.000	PK	95.3	27.4	3.2	32.3	93.6	-	-	Carrier
Vert	2400.000	PK	40.9	27.4	3.2	32.3	39.2	73.6	34.4	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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**Radiated Spurious Emission**  
**[PIFA Antenna]**

Test place Ise EMC Lab. No.4 Semi Anechoic Chamber  
Report No. 10848690H  
Date June 19, 2015 June 20, 2015 June 21, 2015  
Temperature/ Humidity 21 deg. C / 47 % RH 24 deg. C / 59 % RH 23 deg. C / 67 % RH  
Engineer Tomoki Matsui Shinya Watanabe Shinya Watanabe  
(1-10GHz) (10-26.5GHz) (30-1000MHz)  
Mode Tx, 3DH5 2441MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	293.530	QP	31.3	19.4	9.9	31.8	28.8	46.0	17.2	
Hori	325.001	QP	35.4	17.5	10.1	31.8	31.2	46.0	14.8	
Hori	350.001	QP	34.5	17.7	10.2	31.8	30.6	46.0	15.4	
Hori	475.000	QP	34.5	19.1	11.1	31.9	32.8	46.0	13.2	
Hori	525.000	QP	32.3	19.6	11.4	32.0	31.3	46.0	14.7	
Hori	825.003	QP	31.4	23.5	12.9	31.5	36.3	46.0	9.7	
Hori	4882.000	PK	40.1	31.8	5.5	31.6	45.8	73.9	28.1	Floor Noise
Hori	7323.000	PK	44.1	37.0	6.5	32.8	54.8	73.9	19.1	Floor Noise
Hori	9764.000	PK	42.6	38.9	7.4	33.3	55.6	73.9	18.3	Floor Noise
Hori	4882.000	AV	28.6	31.8	5.5	31.6	34.3	53.9	19.6	Floor Noise
Hori	7323.000	AV	33.3	37.0	6.5	32.8	44.0	53.9	9.9	Floor Noise
Hori	9764.000	AV	30.9	38.9	7.4	33.3	43.9	53.9	10.0	Floor Noise
Vert	293.530	QP	31.3	19.4	9.9	31.8	28.8	46.0	17.2	
Vert	325.001	QP	31.8	17.5	10.1	31.8	27.6	46.0	18.4	
Vert	350.001	QP	31.5	17.7	10.2	31.8	27.6	46.0	18.4	
Vert	475.000	QP	32.3	19.1	11.1	31.9	30.6	46.0	15.4	
Vert	525.000	QP	31.1	19.6	11.4	32.0	30.1	46.0	15.9	
Vert	825.003	QP	29.4	23.5	12.9	31.5	34.3	46.0	11.7	
Vert	4882.000	PK	40.4	31.8	5.5	31.6	46.1	73.9	27.8	Floor Noise
Vert	7323.000	PK	42.7	37.0	6.5	32.8	53.4	73.9	20.5	Floor Noise
Vert	9764.000	PK	42.5	38.9	7.4	33.3	55.5	73.9	18.4	Floor Noise
Vert	4882.000	AV	29.2	31.8	5.5	31.6	34.9	53.9	19.0	Floor Noise
Vert	7323.000	AV	31.9	37.0	6.5	32.8	42.6	53.9	11.3	Floor Noise
Vert	9764.000	AV	30.9	38.9	7.4	33.3	43.9	53.9	10.0	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

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

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## Radiated Spurious Emission

### [PIFA Antenna]

Test place Ise EMC Lab. No.4 Semi Anechoic Chamber  
Report No. 10848690H  
Date June 19, 2015                      June 20, 2015                      June 21, 2015  
Temperature/ Humidity 21 deg. C / 47 % RH      24 deg. C / 59 % RH      23 deg. C / 67 % RH  
Engineer Tomoki Matsui                      Shinya Watanabe                      Shinya Watanabe  
(1-10GHz)                      (10-26.5GHz)                      (30-1000MHz)  
Mode Tx, 3DH5 2480MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	293.530	QP	31.6	19.4	9.9	31.8	29.1	46.0	16.9	
Hori	325.001	QP	35.1	17.5	10.1	31.8	30.9	46.0	15.1	
Hori	350.001	QP	34.3	17.7	10.2	31.8	30.4	46.0	15.6	
Hori	475.000	QP	34.5	19.1	11.1	31.9	32.8	46.0	13.2	
Hori	525.000	QP	32.3	19.6	11.4	32.0	31.3	46.0	14.7	
Hori	825.003	QP	31.4	23.5	12.9	31.5	36.3	46.0	9.7	
Hori	2483.500	PK	48.5	27.6	3.3	32.3	47.1	73.9	26.8	
Hori	4960.000	PK	40.9	32.0	5.5	31.6	46.8	73.9	27.1	Floor Noise
Hori	7440.000	PK	43.4	37.2	6.5	32.9	54.2	73.9	19.7	Floor Noise
Hori	9920.000	PK	41.5	39.0	7.4	33.3	54.6	73.9	19.3	Floor Noise
Hori	2483.500	AV	33.4	27.6	3.3	32.3	32.0	53.9	21.9	
Hori	4960.000	AV	27.9	32.0	5.5	31.6	33.8	53.9	20.1	Floor Noise
Hori	7440.000	AV	31.7	37.2	6.5	32.9	42.5	53.9	11.4	Floor Noise
Hori	9920.000	AV	30.0	39.0	7.4	33.3	43.1	53.9	10.8	Floor Noise
Vert	293.530	QP	31.3	19.4	9.9	31.8	28.8	46.0	17.2	
Vert	325.001	QP	31.8	17.5	10.1	31.8	27.6	46.0	18.4	
Vert	350.001	QP	31.5	17.7	10.2	31.8	27.6	46.0	18.4	
Vert	475.000	QP	32.3	19.1	11.1	31.9	30.6	46.0	15.4	
Vert	525.000	QP	30.9	19.6	11.4	32.0	29.9	46.0	16.1	
Vert	825.003	QP	29.3	23.5	12.9	31.5	34.2	46.0	11.8	
Vert	2483.500	PK	47.7	27.6	3.3	32.3	46.3	73.9	27.6	
Vert	4960.000	PK	40.3	32.0	5.5	31.6	46.2	73.9	27.7	Floor Noise
Vert	7440.000	PK	43.0	37.2	6.5	32.9	53.8	73.9	20.1	Floor Noise
Vert	9920.000	PK	43.1	39.0	7.4	33.3	56.2	73.9	17.7	Floor Noise
Vert	2483.500	AV	32.1	27.6	3.3	32.3	30.7	53.9	23.2	
Vert	4960.000	AV	29.9	32.0	5.5	31.6	35.8	53.9	18.1	Floor Noise
Vert	7440.000	AV	33.8	37.2	6.5	32.9	44.6	53.9	9.3	Floor Noise
Vert	9920.000	AV	31.7	39.0	7.4	33.3	44.8	53.9	9.1	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

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

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## Radiated Spurious Emission

### [Slot Antenna]

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	10848690H		
Date	June 19, 2015	June 20, 2015	June 21, 2015
Temperature/ Humidity	21 deg. C / 65 % RH	24 deg. C / 59 % RH	23 deg. C / 67 % RH
Engineer	Takumi Shimada	Shinya Watanabe	Shinya Watanabe
	(1-10GHz)	(10-26.5GHz)	(30-1000MHz)
Mode	Tx, DH5 2402MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	248.372	QP	32.4	17.1	9.5	31.8	27.2	46.0	18.8	
Hori	275.000	QP	31.1	18.5	9.7	31.8	27.5	46.0	18.5	
Hori	293.530	QP	34.2	19.4	9.9	31.8	31.7	46.0	14.3	
Hori	350.001	QP	35.5	17.7	10.2	31.8	31.6	46.0	14.4	
Hori	475.000	QP	36.5	19.1	11.1	31.9	34.8	46.0	11.2	
Hori	525.000	QP	32.5	19.6	11.4	32.0	31.5	46.0	14.5	
Hori	2390.000	PK	41.7	27.4	3.2	32.3	40.0	73.9	33.9	
Hori	4804.000	PK	39.9	31.5	5.4	31.6	45.2	73.9	28.7	Floor Noise
Hori	7206.000	PK	45.2	36.8	6.6	32.8	55.8	73.9	18.1	
Hori	9608.000	PK	42.5	38.8	7.3	33.2	55.4	73.9	18.5	Floor Noise
Hori	2390.000	AV	29.6	27.4	3.2	32.3	27.9	53.9	26.0	
Hori	4804.000	AV	28.2	31.5	5.4	31.6	33.5	53.9	20.4	Floor Noise
Hori	7206.000	AV	33.1	36.8	6.6	32.8	43.7	53.9	10.2	
Hori	9608.000	AV	30.0	38.8	7.3	33.2	42.9	53.9	11.0	Floor Noise
Vert	248.372	QP	27.1	17.1	9.5	31.8	21.9	46.0	24.1	
Vert	275.000	QP	27.0	18.5	9.7	31.8	23.4	46.0	22.6	
Vert	293.530	QP	27.8	19.4	9.9	31.8	25.3	46.0	20.7	
Vert	350.001	QP	29.9	17.7	10.2	31.8	26.0	46.0	20.0	
Vert	475.000	QP	34.1	19.1	11.1	31.9	32.4	46.0	13.6	
Vert	525.000	QP	31.3	19.6	11.4	32.0	30.3	46.0	15.7	
Vert	2390.000	PK	41.5	27.4	3.2	32.3	39.8	73.9	34.1	
Vert	4804.000	PK	41.1	31.5	5.4	31.6	46.4	73.9	27.5	Floor Noise
Vert	7206.000	PK	46.2	36.8	6.6	32.8	56.8	73.9	17.1	
Vert	9608.000	PK	42.3	38.8	7.3	33.2	55.2	73.9	18.7	Floor Noise
Vert	2390.000	AV	29.6	27.4	3.2	32.3	27.9	53.9	26.0	
Vert	4804.000	AV	28.4	31.5	5.4	31.6	33.7	53.9	20.2	Floor Noise
Vert	7206.000	AV	36.5	36.8	6.6	32.8	47.1	53.9	6.8	
Vert	9608.000	AV	30.0	38.8	7.3	33.2	42.9	53.9	11.0	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

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

#### 20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	92.7	27.4	3.2	32.3	91.0	-	-	Carrier
Hori	2400.000	PK	36.3	27.4	3.2	32.3	34.6	71.0	36.4	
Vert	2402.000	PK	90.8	27.4	3.2	32.3	89.1	-	-	Carrier
Vert	2400.000	PK	35.3	27.4	3.2	32.3	33.6	69.1	35.5	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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## Radiated Spurious Emission

### [Slot Antenna]

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	10848690H		
Date	June 19, 2015	June 20, 2015	June 21, 2015
Temperature/ Humidity	21 deg. C / 65 % RH	24 deg. C / 59 % RH	23 deg. C / 67 % RH
Engineer	Takumi Shimada (1-10GHz)	Shinya Watanabe (10-26.5GHz)	Shinya Watanabe (30-1000MHz)
Mode	Tx, DH5 2441MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	248.372	QP	32.5	17.1	9.5	31.8	27.3	46.0	18.7	
Hori	275.000	QP	31.2	18.5	9.7	31.8	27.6	46.0	18.4	
Hori	293.530	QP	34.2	19.4	9.9	31.8	31.7	46.0	14.3	
Hori	350.001	QP	35.5	17.7	10.2	31.8	31.6	46.0	14.4	
Hori	475.000	QP	36.2	19.1	11.1	31.9	34.5	46.0	11.5	
Hori	525.000	QP	32.5	19.6	11.4	32.0	31.5	46.0	14.5	
Hori	4882.000	PK	40.4	31.8	5.5	31.6	46.1	73.9	27.8	Floor Noise
Hori	7323.000	PK	47.8	37.0	6.5	32.8	58.5	73.9	15.4	
Hori	9764.000	PK	42.1	38.9	7.4	33.3	55.1	73.9	18.8	Floor Noise
Hori	4882.000	AV	28.1	31.8	5.5	31.6	33.8	53.9	20.1	Floor Noise
Hori	7323.000	AV	38.5	37.0	6.5	32.8	49.2	53.9	4.7	
Hori	9764.000	AV	30.3	38.9	7.4	33.3	43.3	53.9	10.6	Floor Noise
Vert	248.372	QP	27.0	17.1	9.5	31.8	21.8	46.0	24.2	
Vert	275.000	QP	27.0	18.5	9.7	31.8	23.4	46.0	22.6	
Vert	293.530	QP	28.0	19.4	9.9	31.8	25.5	46.0	20.5	
Vert	350.001	QP	29.3	17.7	10.2	31.8	25.4	46.0	20.6	
Vert	475.000	QP	34.1	19.1	11.1	31.9	32.4	46.0	13.6	
Vert	525.000	QP	31.1	19.6	11.4	32.0	30.1	46.0	15.9	
Vert	4882.000	PK	40.2	31.8	5.5	31.6	45.9	73.9	28.0	Floor Noise
Vert	7323.000	PK	47.6	37.0	6.5	32.8	58.3	73.9	15.6	
Vert	9764.000	PK	43.2	38.9	7.4	33.3	56.2	73.9	17.7	Floor Noise
Vert	4882.000	AV	28.2	31.8	5.5	31.6	33.9	53.9	20.0	Floor Noise
Vert	7323.000	AV	38.8	37.0	6.5	32.8	49.5	53.9	4.4	
Vert	9764.000	AV	30.3	38.9	7.4	33.3	43.3	53.9	10.6	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

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

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## Radiated Spurious Emission

### [Slot Antenna]

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	10848690H		
Date	June 19, 2015	June 20, 2015	June 21, 2015
Temperature/ Humidity	21 deg. C / 65 % RH	24 deg. C / 59 % RH	23 deg. C / 67 % RH
Engineer	Takumi Shimada	Shinya Watanabe	Shinya Watanabe
	(1-10GHz)	(10-26.5GHz)	(30-1000MHz)
Mode	Tx, DH5 2480MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	248.372	QP	32.5	17.1	9.5	31.8	27.3	46.0	18.7	
Hori	275.000	QP	31.2	18.5	9.7	31.8	27.6	46.0	18.4	
Hori	293.530	QP	34.2	19.4	9.9	31.8	31.7	46.0	14.3	
Hori	350.001	QP	35.5	17.7	10.2	31.8	31.6	46.0	14.4	
Hori	475.000	QP	36.5	19.1	11.1	31.9	34.8	46.0	11.2	
Hori	525.000	QP	32.4	19.6	11.4	32.0	31.4	46.0	14.6	
Hori	2483.500	PK	49.8	27.6	3.3	32.3	48.4	73.9	25.5	
Hori	4960.000	PK	39.8	32.0	5.5	31.6	45.7	73.9	28.2	Floor Noise
Hori	7440.000	PK	45.6	37.2	6.5	32.9	56.4	73.9	17.5	
Hori	9920.000	PK	42.5	39.0	7.4	33.3	55.6	73.9	18.3	Floor Noise
Hori	2483.500	AV	35.6	27.6	3.3	32.3	34.2	53.9	19.7	
Hori	4960.000	AV	27.9	32.0	5.5	31.6	33.8	53.9	20.1	Floor Noise
Hori	7440.000	AV	34.3	37.2	6.5	32.9	45.1	53.9	8.8	
Hori	9920.000	AV	30.0	39.0	7.4	33.3	43.1	53.9	10.8	Floor Noise
Vert	248.372	QP	27.0	17.1	9.5	31.8	21.8	46.0	24.2	
Vert	275.000	QP	27.0	18.5	9.7	31.8	23.4	46.0	22.6	
Vert	293.530	QP	28.0	19.4	9.9	31.8	25.5	46.0	20.5	
Vert	350.001	QP	29.4	17.7	10.2	31.8	25.5	46.0	20.5	
Vert	475.000	QP	34.1	19.1	11.1	31.9	32.4	46.0	13.6	
Vert	525.000	QP	31.3	19.6	11.4	32.0	30.3	46.0	15.7	
Vert	2483.500	PK	46.9	27.6	3.3	32.3	45.5	73.9	28.4	
Vert	4960.000	PK	39.7	32.0	5.5	31.6	45.6	73.9	28.3	Floor Noise
Vert	7440.000	PK	45.2	37.2	6.5	32.9	56.0	73.9	17.9	
Vert	9920.000	PK	42.1	39.0	7.4	33.3	55.2	73.9	18.7	Floor Noise
Vert	2483.500	AV	33.7	27.6	3.3	32.3	32.3	53.9	21.6	
Vert	4960.000	AV	28.0	32.0	5.5	31.6	33.9	53.9	20.0	Floor Noise
Vert	7440.000	AV	33.6	37.2	6.5	32.9	44.4	53.9	9.5	
Vert	9920.000	AV	30.0	39.0	7.4	33.3	43.1	53.9	10.8	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

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

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## Radiated Spurious Emission

### [Slot Antenna]

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	10848690H		
Date	June 19, 2015	June 20, 2015	June 21, 2015
Temperature/ Humidity	21 deg. C / 65 % RH	24 deg. C / 59 % RH	23 deg. C / 67 % RH
Engineer	Takumi Shimada	Shinya Watanabe	Shinya Watanabe
	(1-10GHz)	(10-26.5GHz)	(30-1000MHz)
Mode	Tx, 3DH5 2402MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	248.372	QP	32.4	17.1	9.5	31.8	27.2	46.0	18.8	
Hori	275.000	QP	31.3	18.5	9.7	31.8	27.7	46.0	18.3	
Hori	293.530	QP	34.2	19.4	9.9	31.8	31.7	46.0	14.3	
Hori	350.001	QP	35.4	17.7	10.2	31.8	31.5	46.0	14.5	
Hori	475.000	QP	36.5	19.1	11.1	31.9	34.8	46.0	11.2	
Hori	525.000	QP	32.4	19.6	11.4	32.0	31.4	46.0	14.6	
Hori	2390.000	PK	44.2	27.4	3.2	32.3	42.5	73.9	31.4	
Hori	4804.000	PK	40.1	31.5	5.4	31.6	45.4	73.9	28.5	Floor Noise
Hori	7206.000	PK	45.5	36.8	6.6	32.8	56.1	73.9	17.8	
Hori	9608.000	PK	42.4	38.8	7.3	33.2	55.3	73.9	18.6	Floor Noise
Hori	2390.000	AV	30.4	27.4	3.2	32.3	28.7	53.9	25.2	
Hori	4804.000	AV	28.2	31.5	5.4	31.6	33.5	53.9	20.4	Floor Noise
Hori	7206.000	AV	35.4	36.8	6.6	32.8	46.0	53.9	7.9	
Hori	9608.000	AV	30.1	38.8	7.3	33.2	43.0	53.9	10.9	Floor Noise
Vert	248.372	QP	27.0	17.1	9.5	31.8	21.8	46.0	24.2	
Vert	275.000	QP	27.1	18.5	9.7	31.8	23.5	46.0	22.5	
Vert	293.530	QP	27.8	19.4	9.9	31.8	25.3	46.0	20.7	
Vert	350.001	QP	29.3	17.7	10.2	31.8	25.4	46.0	20.6	
Vert	475.000	QP	34.1	19.1	11.1	31.9	32.4	46.0	13.6	
Vert	525.000	QP	30.9	19.6	11.4	32.0	29.9	46.0	16.1	
Vert	2390.000	PK	42.9	27.4	3.2	32.3	41.2	73.9	32.7	
Vert	4804.000	PK	41.3	31.5	5.4	31.6	46.6	73.9	27.3	Floor Noise
Vert	7206.000	PK	46.5	36.8	6.6	32.8	57.1	73.9	16.8	
Vert	9608.000	PK	42.2	38.8	7.3	33.2	55.1	73.9	18.8	Floor Noise
Vert	2390.000	AV	30.1	27.4	3.2	32.3	28.4	53.9	25.5	
Vert	4804.000	AV	28.4	31.5	5.4	31.6	33.7	53.9	20.2	Floor Noise
Vert	7206.000	AV	36.4	36.8	6.6	32.8	47.0	53.9	6.9	
Vert	9608.000	AV	30.1	38.8	7.3	33.2	43.0	53.9	10.9	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

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

#### 20dBc Data Sheet

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	92.1	27.4	3.2	32.3	90.4	-	-	Carrier
Hori	2400.000	PK	37.9	27.4	3.2	32.3	36.2	70.4	34.2	
Vert	2402.000	PK	90.4	27.4	3.2	32.3	88.7	-	-	Carrier
Vert	2400.000	PK	36.8	27.4	3.2	32.3	35.1	68.7	33.6	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)

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## Radiated Spurious Emission

### [Slot Antenna]

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber		
Report No.	10848690H		
Date	June 19, 2015	June 20, 2015	June 21, 2015
Temperature/ Humidity	21 deg. C / 65 % RH	24 deg. C / 59 % RH	23 deg. C / 67 % RH
Engineer	Takumi Shimada	Shinya Watanabe	Shinya Watanabe
	(1-10GHz)	(10-26.5GHz)	(30-1000MHz)
Mode	Tx, 3DH5 2441MHz		

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	248.372	QP	32.4	17.1	9.5	31.8	27.2	46.0	18.8	
Hori	275.000	QP	31.2	18.5	9.7	31.8	27.6	46.0	18.4	
Hori	293.530	QP	34.2	19.4	9.9	31.8	31.7	46.0	14.3	
Hori	350.001	QP	35.6	17.7	10.2	31.8	31.7	46.0	14.3	
Hori	475.000	QP	36.4	19.1	11.1	31.9	34.7	46.0	11.3	
Hori	525.000	QP	32.4	19.6	11.4	32.0	31.4	46.0	14.6	
Hori	4882.000	PK	40.3	31.8	5.5	31.6	46.0	73.9	27.9	Floor Noise
Hori	7323.000	PK	47.8	37.0	6.5	32.8	58.5	73.9	15.4	
Hori	9764.000	PK	42.3	38.9	7.4	33.3	55.3	73.9	18.6	Floor Noise
Hori	4882.000	AV	28.2	31.8	5.5	31.6	33.9	53.9	20.0	Floor Noise
Hori	7323.000	AV	37.3	37.0	6.5	32.8	48.0	53.9	5.9	
Hori	9764.000	AV	30.2	38.9	7.4	33.3	43.2	53.9	10.7	Floor Noise
Vert	248.372	QP	27.0	17.1	9.5	31.8	21.8	46.0	24.2	
Vert	275.000	QP	27.1	18.5	9.7	31.8	23.5	46.0	22.5	
Vert	293.530	QP	27.7	19.4	9.9	31.8	25.2	46.0	20.8	
Vert	350.001	QP	29.6	17.7	10.2	31.8	25.7	46.0	20.3	
Vert	475.000	QP	34.0	19.1	11.1	31.9	32.3	46.0	13.7	
Vert	525.000	QP	31.2	19.6	11.4	32.0	30.2	46.0	15.8	
Vert	4882.000	PK	40.1	31.8	5.5	31.6	45.8	73.9	28.1	Floor Noise
Vert	7323.000	PK	48.5	37.0	6.5	32.8	59.2	73.9	14.7	
Vert	9764.000	PK	43.3	38.9	7.4	33.3	56.3	73.9	17.6	Floor Noise
Vert	4882.000	AV	28.1	31.8	5.5	31.6	33.8	53.9	20.1	Floor Noise
Vert	7323.000	AV	37.4	37.0	6.5	32.8	48.1	53.9	5.8	
Vert	9764.000	AV	30.2	38.9	7.4	33.3	43.2	53.9	10.7	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

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

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## Radiated Spurious Emission

### [Slot Antenna]

Test place Ise EMC Lab. No.4 Semi Anechoic Chamber  
Report No. 10848690H  
Date June 19, 2015                      June 20, 2015                      June 21, 2015  
Temperature/ Humidity 21 deg. C / 65 % RH      24 deg. C / 59 % RH      23 deg. C / 67 % RH  
Engineer Takumi Shimada                      Shinya Watanabe                      Shinya Watanabe  
(1-10GHz)                      (10-26.5GHz)                      (30-1000MHz)  
Mode Tx, 3DH5 2480MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	248.372	QP	32.4	17.1	9.5	31.8	27.2	46.0	18.8	
Hori	275.000	QP	31.2	18.5	9.7	31.8	27.6	46.0	18.4	
Hori	293.530	QP	34.1	19.4	9.9	31.8	31.6	46.0	14.4	
Hori	350.001	QP	35.6	17.7	10.2	31.8	31.7	46.0	14.3	
Hori	475.000	QP	36.3	19.1	11.1	31.9	34.6	46.0	11.4	
Hori	525.000	QP	32.4	19.6	11.4	32.0	31.4	46.0	14.6	
Hori	2483.500	PK	50.5	27.6	3.3	32.3	49.1	73.9	24.8	
Hori	4960.000	PK	39.9	32.0	5.5	31.6	45.8	73.9	28.1	Floor Noise
Hori	7440.000	PK	43.2	37.2	6.5	32.9	54.0	73.9	19.9	
Hori	9920.000	PK	42.4	39.0	7.4	33.3	55.5	73.9	18.4	Floor Noise
Hori	2483.500	AV	35.7	27.6	3.3	32.3	34.3	53.9	19.6	
Hori	4960.000	AV	28.0	32.0	5.5	31.6	33.9	53.9	20.0	Floor Noise
Hori	7440.000	AV	33.3	37.2	6.5	32.9	44.1	53.9	9.8	
Hori	9920.000	AV	30.1	39.0	7.4	33.3	43.2	53.9	10.7	Floor Noise
Vert	248.372	QP	27.0	17.1	9.5	31.8	21.8	46.0	24.2	
Vert	275.000	QP	27.0	18.5	9.7	31.8	23.4	46.0	22.6	
Vert	293.530	QP	27.7	19.4	9.9	31.8	25.2	46.0	20.8	
Vert	350.001	QP	29.5	17.7	10.2	31.8	25.6	46.0	20.4	
Vert	475.000	QP	34.1	19.1	11.1	31.9	32.4	46.0	13.6	
Vert	525.000	QP	30.8	19.6	11.4	32.0	29.8	46.0	16.2	
Vert	2483.500	PK	50.3	27.6	3.3	32.3	48.9	73.9	25.0	
Vert	4960.000	PK	39.9	32.0	5.5	31.6	45.8	73.9	28.1	Floor Noise
Vert	7440.000	PK	44.8	37.2	6.5	32.9	55.6	73.9	18.3	
Vert	9920.000	PK	42.1	39.0	7.4	33.3	55.2	73.9	18.7	Floor Noise
Vert	2483.500	AV	35.0	27.6	3.3	32.3	33.6	53.9	20.3	
Vert	4960.000	AV	27.8	32.0	5.5	31.6	33.7	53.9	20.2	Floor Noise
Vert	7440.000	AV	34.3	37.2	6.5	32.9	45.1	53.9	8.8	
Vert	9920.000	AV	30.1	39.0	7.4	33.3	43.2	53.9	10.7	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10 GHz)) - Gain(Amplifier)

\*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

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

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## APPENDIX 2: Test instruments

### EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-04	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2015/02/26 * 12
MOS-15	Thermo-Hygrometer	Custom	CTH-180	1501	RE	2015/01/13 * 12
MJM-23	Measure	ASKUL	-	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-13	Spectrum Analyzer	Agilent	E4440A	MY46185823	RE	2015/06/02 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2014/08/12 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	RE	2014/06/11 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	MY39500780	RE	2015/03/12 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2014/06/11 * 12
MHF-26	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	RE	2014/09/24 * 12
MBA-05	Biconical Antenna	Schwarzbeck	BBA9106	1302	RE	2014/11/22 * 12
MLA-08	Logperiodic Antenna	Schwarzbeck	UKLP9140-A	N/A	RE	2014/11/22 * 12
MAT-68	Attenuator	Anritsu	MP721B	6200961025	RE	2014/11/11 * 12
MCC-50	Coaxial Cable	UL Japan	-	-	RE	2015/06/19 * 12
MPA-14	Pre Amplifier	SONOMA INSTRUMENT	310	260833	RE	2015/03/09 * 12
MTR-01	Test Receiver	Rohde & Schwarz	ESI40	100084	RE	2014/11/10 * 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

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