RADIO TEST REPORT

Test Report No. : 10686939H-A-R1

Applicant	:	**Sony Corporation**
Type of Equipment	:	**Digital Wireless Microphone**
Model No.	:	**DWM-02N**
FCC ID	:	**AK8DWM02N**
Test regulation	:	**FCC Part 15 Subpart C: 2015**
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. 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 10686939H-A. 10686939H-A is replaced with this report.

Date of test: February 20 and 22, 2015

Representative test engineer:
T. Shimada
Takumi Shimada
Engineer
Consumer Technology Division

Approved by:
Takayuki Shimada
Engineer
Consumer Technology Division

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REVISION HISTORY

Original Test Report No.: 10686939H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	10686939H-A	August 21, 2015	-	-
1	10686939H-A-R1	September 30, 2015	P.4	Correction of clock frequency of IC602, 603, 604, 605, 607
1	10686939H-A-R1	September 30, 2015	P.5	Correction of channel spacing of Radio microphone part
1	10686939H-A-R1	September 30, 2015	P.6	Update of FCC15 version

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SECTION 1: Customer information

Company Name	:	Sony EMCS Corporation
Address	:	30 Ibarajima Ohya-cyo, Inazawa-shi, Aichi-ken, 492-8545, JAPAN
Telephone Number	:	+81-50-3807-4243
Facsimile Number	:	+81-50-3807-4306
Contact Person	:	Youhei Hisano

*Remarks
Sony EMCS Corporation (Subsidiary Company Name) is on behalf of the applicant: Sony Corporation.

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

2.1 Identification of E.U.T.

Type of Equipment	:	Digital Wireless Microphone
Model No.	:	DWM-02N
Serial No.	:	Refer to 4.2 in this report.
Rating	:	DC 3.0V (2 x AA batteries)
Receipt Date of Sample	:	February 11, 2015
Country of Manufacture	:	Japan
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

Model: DWM-02N (referred to as the EUT in this report) is a Digital Wireless Microphone.

General Specification

Clock frequency(ies) in the system	:	X401	8MHz
		X202	12.288MHz
		X2001	16MHz
		X801 (TCXO)	19.2MHz
		IC602, 603, 604, 605, 607	1250 - 1500kHz
		IC606	1300kHz
		IC202	600 - 1000kHz
		IC500	250kHz
		X802 (VCO: change by a transmission frequency)	
			(14) 470.125-541.875MHz
			(30) 566.125-607.875MHz, 614.125-637.875MHz
			(42) 638.125-697.875MHz

Radio Specification (Radio microphone part)

Radio type	:	Transmitter
Modulation type	:	π/4 shift QPSK
Emission designator	:	192KG1D, 192KG1E
Necessary bandwidth	:	192kHz, Manufacturer defined
Channel spacing	:	25kHz
Frequency of operation	:	(14) 470.125-541.875MHz (30) 566.125-607.875MHz, 614.125-637.875MHz (42) 638.125-697.875MHz
RF power	:	High: 50mW, Middle: 10mW, Low: 1mW
Antenna type	:	1/4 Lambda Monopole antenna (helical type)
Antenna gain	:	2.14dBi
Power Supply (radio part input)	:	DC 2.8V, DC 3.0V, DC 5.0V
AF Specification	:	40Hz – 18000Hz, Maximum input: -24dBV (MIC level, ATT 0dB)
Operating temperature	:	0 deg. C to 50 deg. C

Radio Specification (RF remote part)

Radio Type	:	Transceiver
Modulation type	:	DSSS
Frequency of Operation	:	2405MHz to 2480MHz
Channel spacing	:	5MHz
Method of frequency generation	:	Synthesizer
Power Supply (radio part input)	:	DC 2.8V
Antenna Type	:	Chip antenna
Antenna Gain	:	-3.0dBi max
Operating temperature	:	0 deg. C to 50 deg. C

*This test report applies for RF remote part.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C: 2015, final revised on September 8, 2015 * The revision on September 8, 2015 does not affect the test specification applied to the EUT.
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

* The EUT complies with FCC Part 15 Subpart B: 2015, final revised on June 12, 2015 and effective July 13, 2015

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.4-2009 7. AC powerline Conducted Emission measurements	**FCC:** Section 15.207	N/A	N/A *1)	-
	IC: RSS-Gen 8.8	**IC:** RSS-Gen 8.8			
6dB Bandwidth	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r03	**FCC:** Section 15.247(a)(2)	See data.	Complied	Conducted
	IC: -	**IC:** RSS-247 5.2(1)			
Maximum Peak Output Power	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r03	**FCC:** Section 15.247(b)(3)		Complied	Conducted
	IC: RSS-Gen 6.12	**IC:** RSS-247 5.4(4)			
Power Density	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r03	**FCC:** Section 15.247(e)		Complied	Conducted
	IC: -	**IC:** RSS-247 5.2(2)			
Spurious Emission Restricted Band Edges	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r03	**FCC:** Section15.247(d)	3.1dB 2483.500MHz, AV, Vert.	Complied	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *2)
	IC: RSS-Gen 6.13	**IC:** RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10			

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.
*1) The test is not applicable since the EUT does not have AC Mains.
*2) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 DTS Meas Guidance v03r03 12.2.7.

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

FCC Part 15.31 (e)
The test was performed with the New Battery (DC 3.0V) and the stable voltage was supplied to the EUT during the tests. Therefore, the 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

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

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

3.4 Uncertainty

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

Test room (semi-anechoic chamber)	Radiated emission						
	(3m*)(±dB)				(1m*)(±dB)		(0.5m*)(±dB)
	9kHz -30MHz	30MHz -300MHz	300MHz -1GHz	1GHz -10GHz	10GHz -18GHz	18GHz -26.5GHz	26.5GHz -40GHz
No.1	4.3dB	5.5dB	6.3dB	5.5dB	5.8dB	5.8dB	4.3dB
No.2	4.2dB	5.4dB	6.3dB	5.4dB	5.7dB	5.9dB	5.6dB
No.3	4.4dB	5.4dB	6.4dB	5.2dB	5.5dB	5.8dB	5.5dB
No.4	4.7dB	5.6dB	6.4dB	5.3dB	5.7dB	5.9dB	5.5dB

*3m/1m/0.5m = Measurement distance

Power meter (±dB)	
Below 1GHz	Above 1GHz
0.7dB	1.5dB

Antenna terminal conducted emission and Power density (±dB)			Antenna terminal conducted emission (±dB)		Channel power (±dB)
Below 1GHz	1GHz-3GHz	3GHz-18GHz	18GHz-26.5GHz	26.5GHz-40GHz	
1.5dB	1.7dB	2.8dB	2.8dB	2.9dB	2.6dB

Radiated emission test(3m)
The data listed in this report meets the limits unless the uncertainty is taken into consideration.

3.5 Test Location

UL Japan, Inc. Ise EMC Lab. *NVLAP Lab. code: 200572-0
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Telephone : +81 596 24 8999 Facsimile : +81 596 24 8124

	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms
No.1 semi-anechoic chamber	2973C-1	19.2 x 11.2 x 7.7m	7.0 x 6.0m	No.1 Power source room
No.2 semi-anechoic chamber	2973C-2	7.5 x 5.8 x 5.2m	4.0 x 4.0m	-
No.3 semi-anechoic chamber	2973C-3	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.3 Preparation room
No.3 shielded room	-	4.0 x 6.0 x 2.7m	N/A	-
No.4 semi-anechoic chamber	2973C-4	12.0 x 8.5 x 5.9m	6.8 x 5.75m	No.4 Preparation room
No.4 shielded room	-	4.0 x 6.0 x 2.7m	N/A	-
No.5 semi-anechoic chamber	-	6.0 x 6.0 x 3.9m	6.0 x 6.0m	-
No.6 shielded room	-	4.0 x 4.5 x 2.7m	4.0 x 4.5 m	-
No.6 measurement room	-	4.75 x 5.4 x 3.0m	4.75 x 4.15 m	-
No.7 shielded room	-	4.7 x 7.5 x 2.7m	4.7 x 7.5m	-
No.8 measurement room	-	3.1 x 5.0 x 2.7m	N/A	-
No.9 measurement room	-	8.0 x 4.6 x 2.8m	2.4 x 2.4m	-
No.11 measurement room	-	6.2 x 4.7 x 3.0m	4.8 x 4.6m	-

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

3.6 Data of EMI, Test instruments, and Test set up

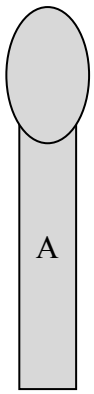
Refer to APPENDIX.

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

4.1 Operating Mode(s)

Mode	Tested frequency
Transmitting (Tx)	2405MHz
	2440MHz
	2480MHz
*Transmitting duty was 100% on all tests.	
*Power of the EUT was set by the software as follows; Power settings: 1mW Software: 1.04 *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.	

4.2 Configuration and peripherals



* Setup was taken into consideration and test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Digital Wireless Microphone	DWM-02N	81412	Sony EMCS Corporation	EUT

SECTION 5: Radiated Spurious Emission

Test Procedure

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "558074 D01 DTS Meas Guidance v03r03".

EUT was placed on a urethane platform of nominal size, 0.5m by 1.0m, raised 0.8m 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 and 4m 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	Below 30MHz	30MHz to 300MHz	300MHz to 1GHz	Above 1GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

In any 100kHz 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 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

20dBc 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 1GHz	Above 1GHz		20dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120kHz	RBW: 1MHz VBW: 3MHz	Average Power Method: 12.2.5.1 RBW: 1MHz VBW: 3MHz Detector: Power Averaging (RMS) Trace: 100 traces Integration Method: 13.3.1 RBW: 100kHz VBW: 300kHz Span: 2MHz Detector: Power Averaging (RMS) Trace: 100 traces	RBW: 100kHz VBW: 300kHz
Test Distance	3m	3m (below 10GHz), 1m *2) (above 10GHz)		3m (below 10GHz), 1m *2) (above 10GHz)

*1) Average Power Measurement was performed based on 6.0 & 12.2.5 of "KDB 558074 D01 DTS Meas Guidance v03r03"
*2) Distance Factor: 20 x log (3.0m/1.0m) = 9.5dB

- 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.

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

SECTION 6: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
6dB Bandwidth	3MHz	100kHz	300kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth	Enough width to display emission skirts	1 to 5% of OBW	Three times of RBW	Auto	Sample	Clear write	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *3)	-	Power Meter (Sensor: 50MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3kHz	10kHz	Auto	Peak	Max Hold	Spectrum Analyzer *1)
Conducted Spurious Emission *2)	9kHz to 150kHz	200Hz	620Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1kHz	27kHz				

*1) Section 10.2 Method PKPSD (peak PSD) of "KDB 558074 D01 DTS Meas Guidance v03r03".
*2) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.(9kHz-150kHz:RBW=200Hz, 150kHz-30MHz:RBW=9.1kHz)
*3) Reference data

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

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Data of EMI test

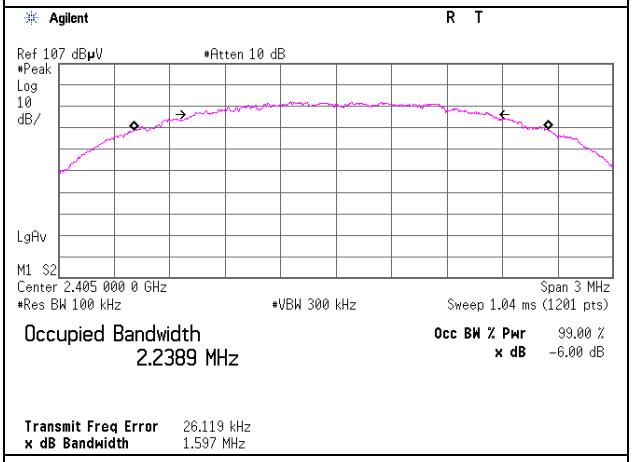
6dB Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10686939H
Date	02/22/2015
Temperature/ Humidity	20deg. C / 56% RH
Engineer	Takumi Shimada
Mode	Tx

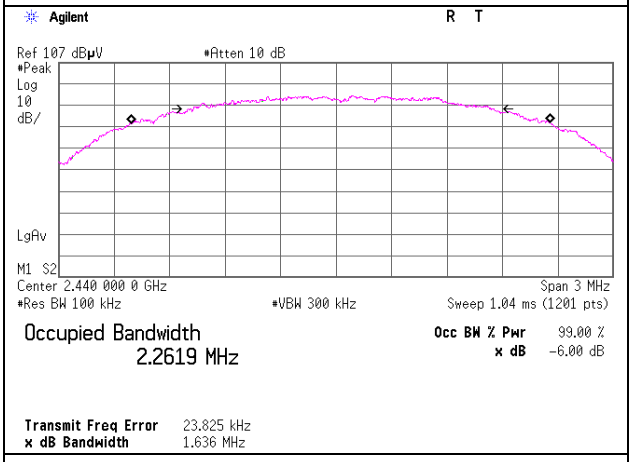
Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2405	1.597	>500
2440	1.636	>500
2480	1.637	>500

6dB Bandwidth

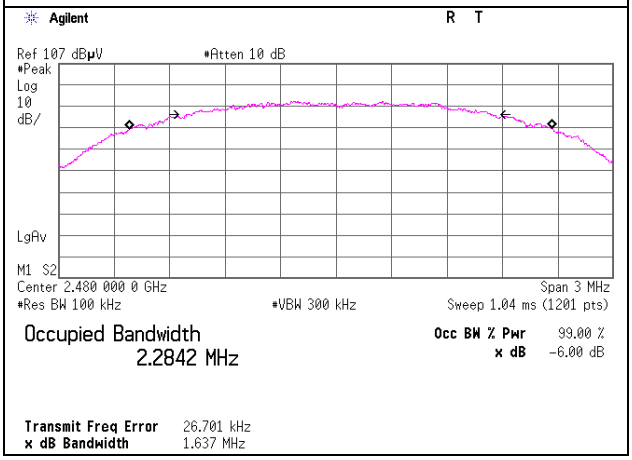
2405MHz



2440MHz



2480MHz



Maximum Peak Output Power

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10686939H
Date	02/22/2015
Temperature/ Humidity	20deg. C / 56% RH
Engineer	Takumi Shimada
Mode	Tx

Freq.	Reading	Cable Loss	Atten.	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2405	-13.79	1.56	10.02	-2.21	0.60	30.00	1000	32.21
2440	-11.44	1.57	10.02	0.15	1.04	30.00	1000	29.85
2480	-13.41	1.58	10.02	-1.81	0.66	30.00	1000	31.81

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

Maximum Average Output Power

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10686939H
Date	02/22/2015
Temperature/ Humidity	20deg. C / 56% RH
Engineer	Takumi Shimada
Mode	Tx

Freq.	Reading	Cable Loss	Atten.	Result	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]
2405	-14.21	1.56	10.02	-2.63	0.55
2440	-11.66	1.57	10.02	-0.07	0.98
2480	-13.81	1.58	10.02	-2.21	0.60

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

Radiated Spurious Emission

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. 10686939H
Date 02/20/2015
Temperature/ Humidity 23deg. C / 39% RH
Engineer Kazuya Yoshioka
Mode Tx 2405MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	80.000	QP	22.4	6.8	7.8	32.1	4.9	40.0	35.1	
Hori	160.000	QP	22.4	15.5	8.7	32.1	14.5	43.5	29.0	
Hori	240.000	QP	22.1	17.0	9.4	32.0	16.5	46.0	29.5	
Hori	320.000	QP	21.9	15.3	10.1	31.9	15.4	46.0	30.6	
Hori	400.000	QP	21.9	17.6	10.5	32.0	18.0	46.0	28.0	
Hori	480.000	QP	22.0	18.1	11.0	32.0	19.1	46.0	26.9	
Hori	2390.000	PK	41.2	26.8	3.2	32.7	38.5	73.9	35.4	
Hori	4810.000	PK	42.1	30.6	5.2	31.8	46.1	73.9	27.8	
Hori	7215.000	PK	41.3	35.9	6.6	32.7	51.1	73.9	22.8	Floor noise
Hori	9620.000	PK	42.4	38.5	7.0	33.3	54.6	73.9	19.3	Floor noise
Hori	2390.000	AV	34.7	26.8	3.2	32.7	32.0	53.9	21.9	
Hori	4810.000	AV	35.8	30.6	5.2	31.8	39.8	53.9	14.1	
Hori	7215.000	AV	33.8	35.9	6.6	32.7	43.6	53.9	10.3	Floor noise
Hori	9620.000	AV	33.9	38.5	7.0	33.3	46.1	53.9	7.8	Floor noise
Vert	80.000	QP	22.4	6.8	7.8	32.1	4.9	40.0	35.1	
Vert	160.000	QP	22.4	15.5	8.7	32.1	14.5	43.5	29.0	
Vert	240.000	QP	22.1	17.0	9.4	32.0	16.5	46.0	29.5	
Vert	320.000	QP	21.9	15.3	10.1	31.9	15.4	46.0	30.6	
Vert	400.000	QP	21.9	17.6	10.5	32.0	18.0	46.0	28.0	
Vert	480.000	QP	22.0	18.1	11.0	32.0	19.1	46.0	26.9	
Vert	2390.000	PK	41.6	26.8	3.2	32.7	38.9	73.9	35.0	
Vert	4810.000	PK	40.7	30.6	5.2	31.8	44.7	73.9	29.2	
Vert	7215.000	PK	41.0	35.9	6.6	32.7	50.8	73.9	23.1	Floor noise
Vert	9620.000	PK	42.2	38.5	7.0	33.3	54.4	73.9	19.5	Floor noise
Vert	2390.000	AV	34.2	26.8	3.2	32.7	31.5	53.9	22.4	
Vert	4810.000	AV	34.2	30.6	5.2	31.8	38.2	53.9	15.7	
Vert	7215.000	AV	33.8	35.9	6.6	32.7	43.6	53.9	10.3	Floor noise
Vert	9620.000	AV	33.9	38.5	7.0	33.3	46.1	53.9	7.8	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

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	2405.000	PK	82.8	26.8	3.2	32.7	80.1	-	-	Carrier
Hori	2400.000	PK	42.8	26.8	3.2	32.7	40.1	60.1	20.0	
Vert	2405.000	PK	82.2	26.8	3.2	32.7	79.5	-	-	Carrier
Vert	2400.000	PK	41.4	26.8	3.2	32.7	38.7	59.5	20.8	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amprifier)
Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Radiated Spurious Emission

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. 10686939H
Date 02/20/2015
Temperature/ Humidity 23deg. C / 39% RH
Engineer Kazuya Yoshioka
Mode Tx 2440MHz

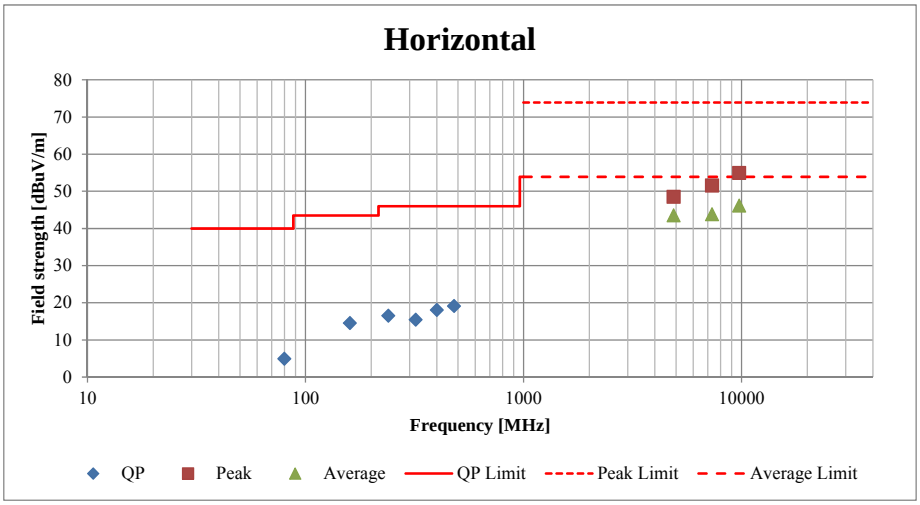
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	80.000	QP	22.4	6.8	7.8	32.1	4.9	40.0	35.1	
Hori	160.000	QP	22.4	15.5	8.7	32.1	14.5	43.5	29.0	
Hori	240.000	QP	22.1	17.0	9.4	32.0	16.5	46.0	29.5	
Hori	320.000	QP	21.9	15.3	10.1	31.9	15.4	46.0	30.6	
Hori	400.000	QP	21.9	17.6	10.5	32.0	18.0	46.0	28.0	
Hori	480.000	QP	22.0	18.1	11.0	32.0	19.1	46.0	26.9	
Hori	4880.000	PK	44.1	30.8	5.3	31.7	48.5	73.9	25.4	
Hori	7320.000	PK	41.8	35.9	6.5	32.7	51.5	73.9	22.4	Floor noise
Hori	9760.000	PK	42.5	38.7	7.1	33.4	54.9	73.9	19.0	Floor noise
Hori	4880.000	AV	39.1	30.8	5.3	31.7	43.5	53.9	10.4	
Hori	7320.000	AV	34.1	35.9	6.5	32.7	43.8	53.9	10.1	Floor noise
Hori	9760.000	AV	33.7	38.7	7.1	33.4	46.1	53.9	7.8	Floor noise
Vert	80.000	QP	22.4	6.8	7.8	32.1	4.9	40.0	35.1	
Vert	160.000	QP	22.4	15.5	8.7	32.1	14.5	43.5	29.0	
Vert	240.000	QP	22.1	17.0	9.4	32.0	16.5	46.0	29.5	
Vert	320.000	QP	21.9	15.3	10.1	31.9	15.4	46.0	30.6	
Vert	400.000	QP	21.9	17.6	10.5	32.0	18.0	46.0	28.0	
Vert	480.000	QP	22.0	18.1	11.0	32.0	19.1	46.0	26.9	
Vert	4880.000	PK	41.0	30.8	5.3	31.7	45.4	73.9	28.5	
Vert	7320.000	PK	42.0	35.9	6.5	32.7	51.7	73.9	22.2	Floor noise
Vert	9760.000	PK	42.2	38.7	7.1	33.4	54.6	73.9	19.3	Floor noise
Vert	4880.000	AV	34.2	30.8	5.3	31.7	38.6	53.9	15.3	
Vert	7320.000	AV	34.1	35.9	6.5	32.7	43.8	53.9	10.1	Floor noise
Vert	9760.000	AV	33.7	38.7	7.1	33.4	46.1	53.9	7.8	Floor noise

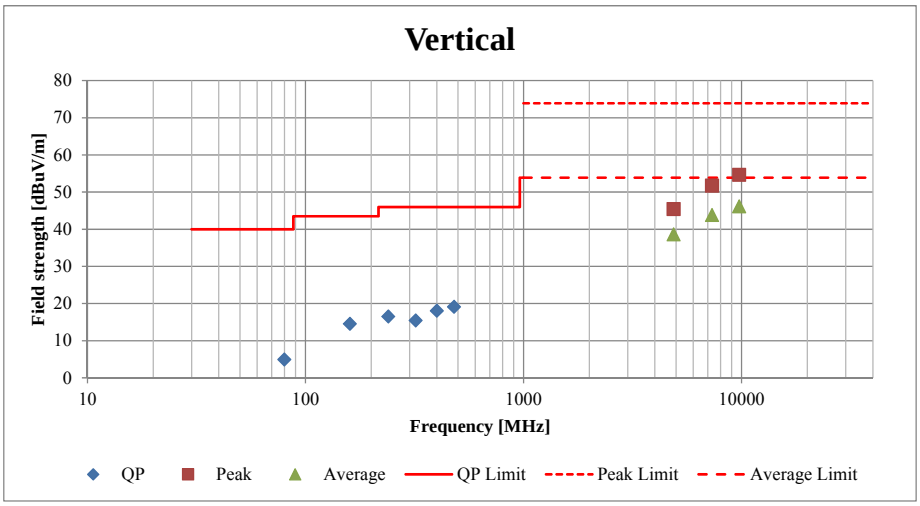
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Radiated Spurious Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10686939H
Date	02/20/2015
Temperature/ Humidity	23deg. C / 39% RH
Engineer	Kazuya Yoshioka
Mode	Tx 2440MHz





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

Radiated Spurious Emission

Test place Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No. 10686939H
Date 02/20/2015
Temperature/ Humidity 23deg. C / 39% RH
Engineer Kazuya Yoshioka
Mode Tx 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	80.000	QP	22.4	6.8	7.8	32.1	4.9	40.0	35.1	
Hori	160.000	QP	22.4	15.5	8.7	32.1	14.5	43.5	29.0	
Hori	240.000	QP	22.1	17.0	9.4	32.0	16.5	46.0	29.5	
Hori	320.000	QP	21.9	15.3	10.1	31.9	15.4	46.0	30.6	
Hori	400.000	QP	21.9	17.6	10.5	32.0	18.0	46.0	28.0	
Hori	480.000	QP	22.0	18.1	11.0	32.0	19.1	46.0	26.9	
Hori	2483.500	PK	60.0	26.9	3.2	32.7	57.4	73.9	16.5	
Hori	4960.000	PK	43.4	30.9	5.2	31.7	47.8	73.9	26.1	
Hori	7440.000	PK	41.6	35.9	6.6	32.7	51.4	73.9	22.5	Floor noise
Hori	9920.000	PK	41.9	38.9	7.1	33.5	54.4	73.9	19.5	Floor noise
Hori	2483.500	AV	52.5	26.9	3.2	32.7	49.9	53.9	4.0	
Hori	4960.000	AV	36.2	30.9	5.2	31.7	40.6	53.9	13.3	
Hori	7440.000	AV	33.7	35.9	6.6	32.7	43.5	53.9	10.4	Floor noise
Hori	9920.000	AV	34.0	38.9	7.1	33.5	46.5	53.9	7.4	Floor noise
Vert	80.000	QP	22.4	6.8	7.8	32.1	4.9	40.0	35.1	
Vert	160.000	QP	22.4	15.5	8.7	32.1	14.5	43.5	29.0	
Vert	240.000	QP	22.1	17.0	9.4	32.0	16.5	46.0	29.5	
Vert	320.000	QP	21.9	15.3	10.1	31.9	15.4	46.0	30.6	
Vert	400.000	QP	21.9	17.6	10.5	32.0	18.0	46.0	28.0	
Vert	480.000	QP	22.0	18.1	11.0	32.0	19.1	46.0	26.9	
Vert	2483.500	PK	58.7	26.9	3.2	32.7	56.1	73.9	17.8	
Vert	4960.000	PK	40.9	30.9	5.2	31.7	45.3	73.9	28.6	
Vert	7440.000	PK	41.8	35.9	6.6	32.7	51.6	73.9	22.3	Floor noise
Vert	9920.000	PK	42.2	38.9	7.1	33.5	54.7	73.9	19.2	Floor noise
Vert	2483.500	AV	53.4	26.9	3.2	32.7	50.8	53.9	3.1	Integration method
Vert	4960.000	AV	34.2	30.9	5.2	31.7	38.6	53.9	15.3	
Vert	7440.000	AV	33.7	35.9	6.6	32.7	43.5	53.9	10.4	Floor noise
Vert	9920.000	AV	34.0	38.9	7.1	33.5	46.5	53.9	7.4	Floor noise

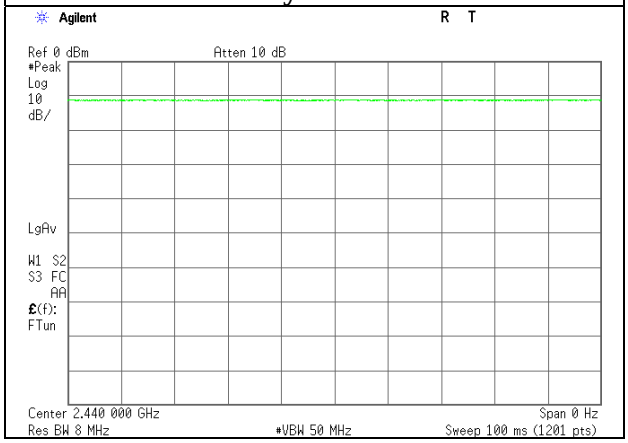
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter-Distance factor(above 10GHz)) - Gain(Amplifier)
*Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).

Distance factor: 10GHz-26.5GHz 20log(3.0m/1.0m)= 9.5dB
26.5GHz-40GHz 20log(3.0m/0.5m)=15.6dB

Burst rate confirmation

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	10686939H
Date	02/20/2015
Temperature/ Humidity	23deg. C / 39% RH
Engineer	Kazuya Yoshioka
Mode	Tx 2480MHz

Duty: 100%



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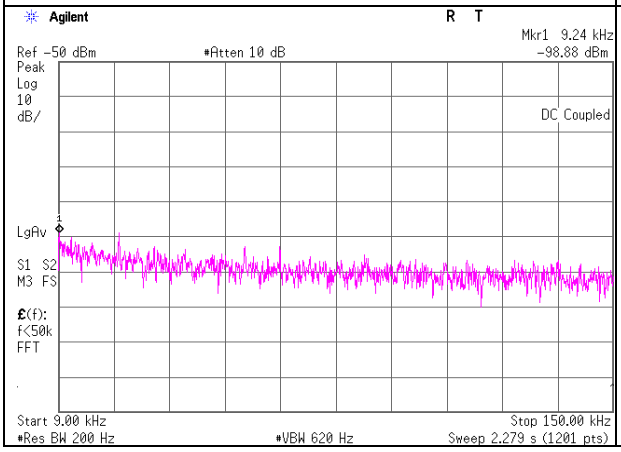
Conducted Spurious Emission

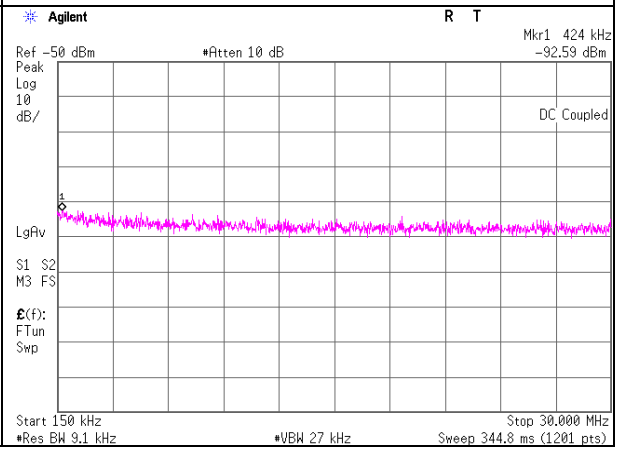
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10686939H
Date	02/22/2015
Temperature/ Humidity	20deg. C / 56% RH
Engineer	Takumi Shimada
Mode	Tx 2405MHz

Tx 2405MHz

9kHz-150kHz



150kHz-30MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenator [dB]	Antenna Gain [dBi]	N (Number of Output	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
9.24	-98.9	0.01	10.0	2.0	1	-86.9	300	6.0	-25.6	48.2	73.8	
424.00	-92.6	0.01	10.0	2.0	1	-80.6	300	6.0	-19.3	15.0	34.3	

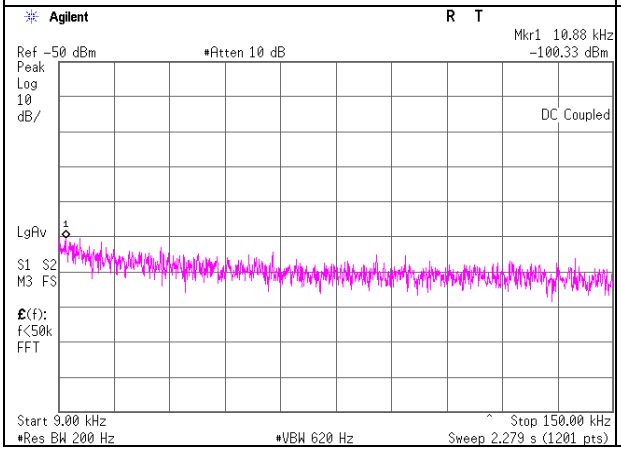
E=EIRP-20log(D)+Ground bounce +104.8[dBuV/m]
EIRP=Reading+Cable Loss+Attenator+Antenna Gain+10*log(N)

Conducted Spurious Emission

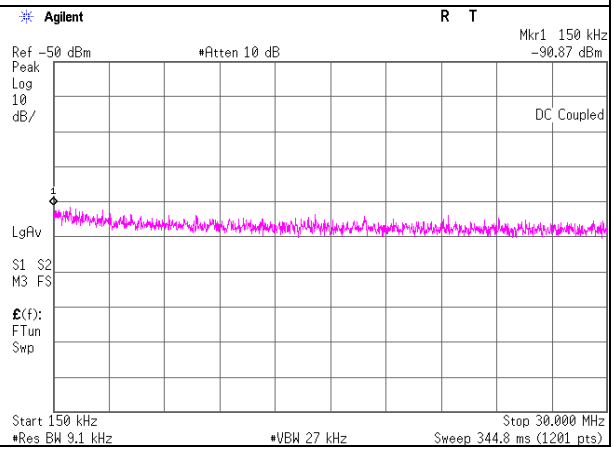
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10686939H
Date	02/22/2015
Temperature/ Humidity	20deg. C / 56% RH
Engineer	Takumi Shimada
Mode	Tx 2440MHz

Tx 2440MHz

9kHz-150kHz



150kHz-30MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenator [dB]	Antenna Gain [dBi]	N (Number of Output	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
10.88	-100.3	0.01	10.0	2.0	1	-88.3	300	6.0	-27.1	46.8	73.9	
150.00	-90.9	0.01	10.0	2.0	1	-78.9	300	6.0	-17.6	24.0	41.6	

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

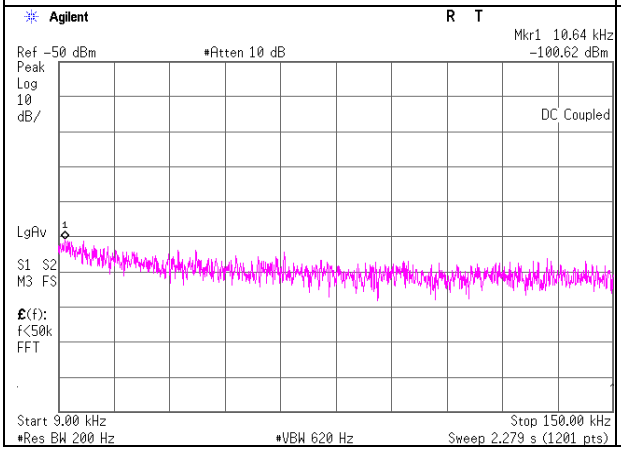
EIRP=Reading+Cable Loss+Attenator+Antenna Gain+10*log(N)

Conducted Spurious Emission

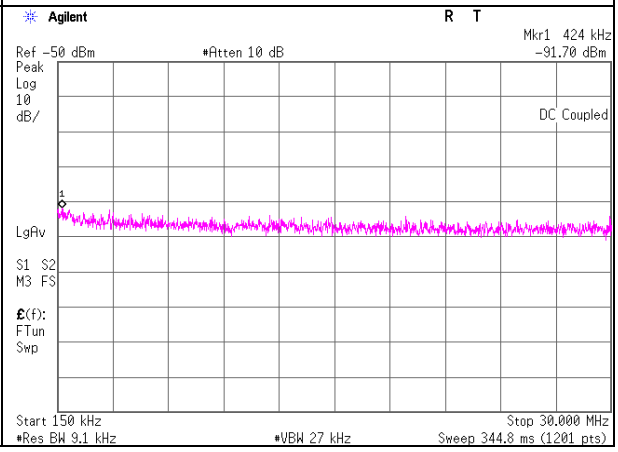
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10686939H
Date	02/22/2015
Temperature/ Humidity	20deg. C / 56% RH
Engineer	Takumi Shimada
Mode	Tx 2480MHz

Tx 2480MHz

9kHz-150kHz



150kHz-30MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenator [dB]	Antenna Gain [dBi]	N (Number of Output	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
10.64	-100.6	0.01	10.0	2.0	1	-88.6	300	6.0	-27.4	47.0	74.4	
424.00	-91.7	0.01	10.0	2.0	1	-79.7	300	6.0	-18.4	15.0	33.4	

E=EIRP-20log(D)+Ground bounce +104.8[dBuV/m]
EIRP=Reading+Cable Loss+Attenator+Antenna Gain+10*log(N)

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Power Density

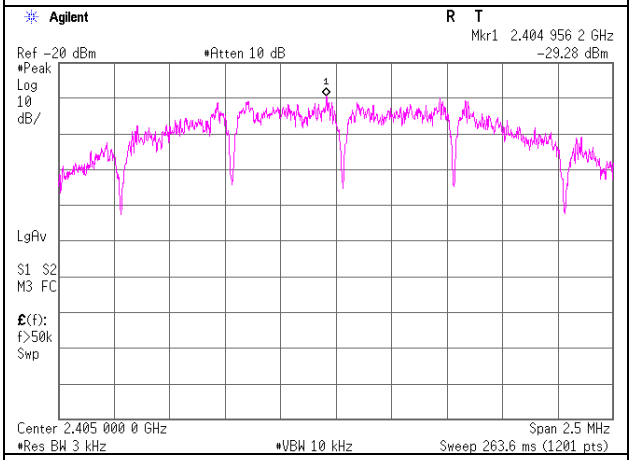
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10686939H
Date	02/22/2015
Temperature/ Humidity	20deg. C / 56% RH
Engineer	Takumi Shimada
Mode	Tx

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2404.96	-29.28	1.56	10.02	-17.70	8.00	25.70
2439.96	-27.08	1.57	10.02	-15.49	8.00	23.49
2479.96	-29.75	1.58	10.02	-18.15	8.00	26.15

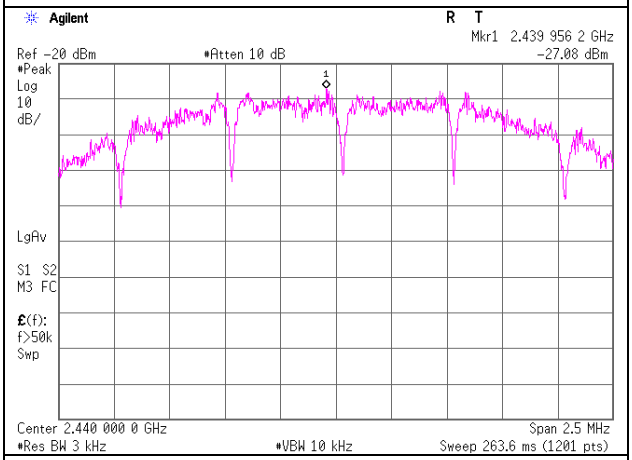
Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator

Power Density

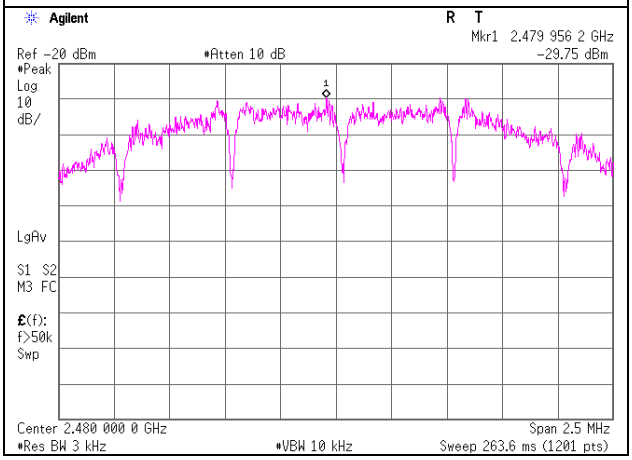
2405MHz



2440MHz



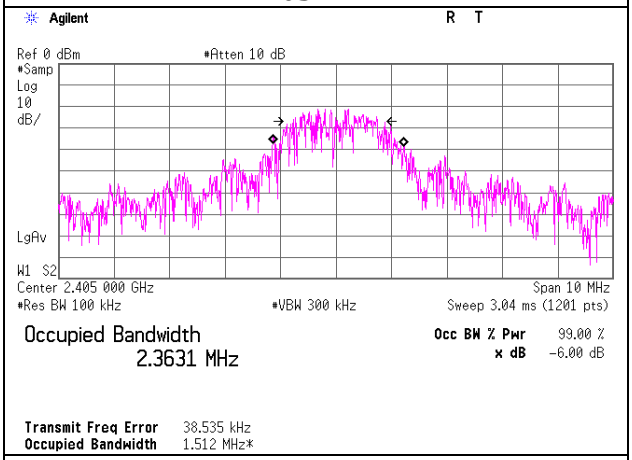
2480MHz



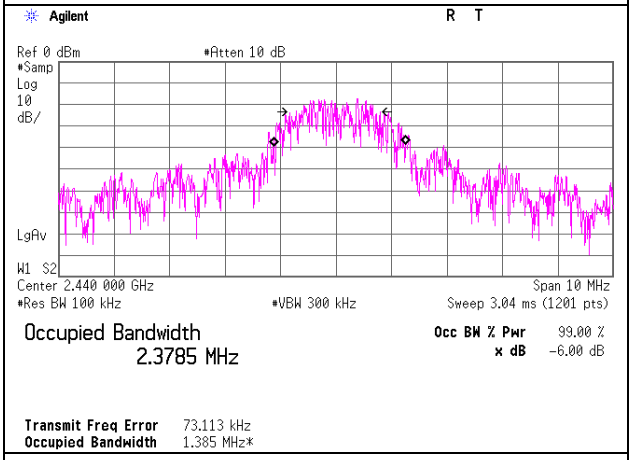
99%Occupied Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	10686939H
Date	02/22/2015
Temperature/ Humidity	20deg. C / 56% RH
Engineer	Takumi Shimada
Mode	Tx

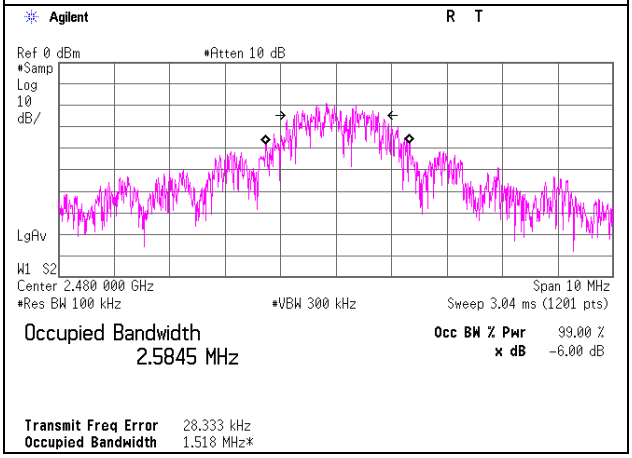
2405MHz



2440MHz



2480MHz



APPENDIX 2: Test instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2014/02/27 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE	2015/01/13 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2014/04/08 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2014/05/26 * 12
MCC-167	Microwave Cable	Junkosha	MWX221	1404S374(1m) / 1405S074(5m)	RE	2014/05/26 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2014/03/24 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2014/05/26 * 12
MHF-25	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	001	RE	2014/09/22 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE	2014/08/19 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2014/10/18 * 12
MLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	174	RE	2014/10/18 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2014/07/14 * 12
MAT-70	Attenuator(6dB)	Agilent	8491A-006	MY52460153	RE	2014/04/14 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2014/03/14 * 12
MSA-16	Spectrum Analyzer	Agilent	E4440A	MY46186390	AT	2015/02/16 * 12
MPM-08	Power Meter	Anritsu	ML2495A	6K00003338	AT	2014/10/16 * 12
MPSE-11	Power sensor	Anritsu	MA2411B	011737	AT	2014/10/15 * 12
MCC-144	Microwave Cable	Junkosha	MWX221	1207S407	AT	2014/08/08 * 12
MAT-25	Attenuator(10dB) (above1GHz)	Agilent	8493C	71642	AT	2014/06/12 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	1401	AT	2015/01/13 * 12
MOTS-MATM	Antenna Terminal Measurement Software	UL Japan	-	-	AT	-

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
AT: Antenna Terminal Conducted test