



RADIO TEST REPORT

Test Report No. : 11013349H

Applicant : MITSUBISHI ELECTRIC CORPORATION SANDA WORKS

Type of Equipment : Car Audio

Model No. : RV-1M

FCC ID : UJHRV1M


Test regulation : FCC Part 15 Subpart C: 2015
* Radiated Spurious Emission test only
* Permissive Change Class II Application

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)

Date of test: October 27 and November 16, 2015

Representative test engineer:


Tsubasa Takayama
Engineer
Consumer Technology Division

Approved by:


Motoya Imura
Engineer
Consumer Technology Division



NVLAP LAB CODE: 200572-0

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.
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13-EM-F0429

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SECTION 1: Customer information

Company Name : MITSUBISHI ELECTRIC CORPORATION SANDA WORKS
Address : 2-3-33, Miwa, Sanda-city, Hyogo, 669-1513, Japan
Telephone Number : +81-79-559-3620
Facsimile Number : +81-79-559-3875
Contact Person : Keiichi Shiode

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

2.1 Identification of E.U.T.

Type of Equipment : Car Audio
Model No. : RV-1M
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 12.0 V
Receipt Date of Sample : October 23, 2015
Country of Mass-production : China
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 : 26MHz

Radio Specification

	Bluetooth Ver.2.1 with EDR function
Frequency of operation	2402-2480MHz
Type of modulation	FHSS (GFSK, $\pi/4$ -DQPSK, 8-DPSK)
Channel spacing	1MHz
Antenna type	Surface mountable chip antenna
Antenna Gain	-19.7 dBi
Antenna Connector type	-

<Contents of the change from original model>

Original test report number of this report is 10762685H-R1.

The EUT is changed the specification form original model as below.

-The antenna was changed.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2015, final revised on November 23, 2015
*Some parts are effective on and after December 17, 2015 or December 23, 2015. The revision 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

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	2.9 dB 200.002 MHz, QP, Horizontal	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 15.31 (e)

The EUT provides stable voltage (DC3.3V) 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 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

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 $k = 2$.
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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	5.1 dB	6.2 dB	5.5 dB	5.8 dB	5.8 dB	4.3 dB
No. 2	4.2 dB	5.1 dB	6.2 dB	5.4 dB	5.7 dB	5.9 dB	5.6 dB
No. 3	4.4 dB	5.1 dB	6.3 dB	5.2 dB	5.5 dB	5.8 dB	5.5 dB
No. 4	4.7 dB	5.3 dB	6.3 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.

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3.5 Test Location

UL Japan, Inc. Ise EMC Lab. *NVLAP Lab. code: 200572-0
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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

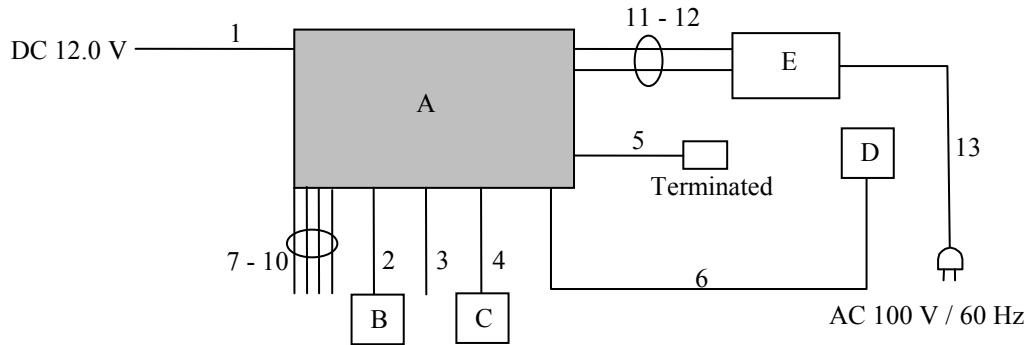
4.1 Operating Mode(s)

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

Details of Operating Mode(s)

Test Item	Mode	Tested frequency
Spurious Emission (Radiated)	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: 255 50 (default) Software: Bluetest 3 *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>		

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	Car Audio	RV-1M	5925K009	MITSUBISHI ELECTRIC CORPORATION SANDA WORKS	EUT
B	Dummy Speaker	-	-	-	-
C	USB Memory	2G	-	imation	-
D	Portable CD Player	SL-CT520	WL7GA002317R	Panasonic	-
E	DVD Player	DV-600AV	HEKD013328LS	Pioneer	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	2.5	Unshielded	Unshielded	-
2	Speaker Cable	1.0	Unshielded	Unshielded	-
3	Signal Cable	1.0	Unshielded	Unshielded	-
4	USB Cable	4.0	Shielded	Shielded	-
5	FM Cable	1.5	Shielded	Shielded	-
6	Audio Cable	1.5	Shielded	Shielded	-
7	Camera in Cable	1.0	Shielded	Shielded	-
8	Signal Cable	1.0	Unshielded	Unshielded	-
9	Signal Cable	1.0	Unshielded	Unshielded	-
10	Main Cable	1.0	Unshielded	Unshielded	-
11	HDMI Cable	4.0	Shielded	Shielded	-
12	Audio Cable	1.5	Shielded	Shielded	-
13	AC Cable	1.5	Unshielded	Unshielded	-

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SECTION 5: Radiated Spurious Emission

Test Procedure

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.

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 test was made on EUT at the normal use position.

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

Test place : Ise EMC Lab.
Semi Anechoic Chamber : No.4 No.2
Report No. : 11013349H
Date : October 27, 2015 November 16, 2015
Temperature / Humidity : 23 deg. C / 41 % RH 24 deg. C / 45 % RH
Engineer : Tsubasa Takayama Tsubasa Takayama
(Above 1 GHz) (Below 1 GHz)
Mode : Tx, Hopping Off, DH5 2402 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	33.332	QP	33.2	16.0	6.8	28.5	27.5	40.0	12.5	
Hori	35.332	QP	32.1	15.5	6.8	28.5	25.9	40.0	14.1	
Hori	38.400	QP	33.9	14.4	6.8	28.5	26.6	40.0	13.4	
Hori	41.474	QP	35.3	13.3	6.9	28.5	27.0	40.0	13.0	
Hori	192.000	QP	39.5	16.4	8.1	27.7	36.3	43.5	7.2	
Hori	200.099	QP	42.0	16.5	8.2	27.7	39.0	43.5	4.5	
Hori	500.005	QP	39.9	17.9	9.8	28.5	39.1	46.0	6.9	
Hori	966.673	QP	28.9	23.1	11.5	27.1	36.4	53.9	17.5	
Hori	1499.497	PK	51.2	25.3	2.8	33.5	45.8	73.9	28.1	
Hori	2390.000	PK	44.8	27.9	3.3	32.1	43.9	73.9	30.0	
Hori	2400.000	PK	-	-	-	-	-	-	-	See 20dBc Data Sheet
Hori	4804.000	PK	47.8	32.8	5.7	31.3	55.0	73.9	18.9	
Hori	7206.000	PK	42.5	36.8	6.9	32.6	53.6	73.9	20.3	NS
Hori	9608.000	PK	42.8	38.1	7.6	32.6	55.9	73.9	18.0	NS
Hori	1499.497	AV	46.4	25.3	2.8	33.5	41.0	53.9	12.9	
Hori	2390.000	AV	31.7	27.9	3.3	32.1	30.8	53.9	23.1	
Hori	4804.000	AV	38.9	32.8	5.7	31.3	46.1	53.9	7.8	
Hori	7206.000	AV	31.3	36.8	6.9	32.6	42.4	53.9	11.5	NS
Hori	9608.000	AV	32.0	38.1	7.6	32.6	45.1	53.9	8.8	NS
Vert	33.332	QP	39.6	16.0	6.8	28.5	33.9	40.0	6.1	
Vert	35.332	QP	38.9	15.5	6.8	28.5	32.7	40.0	7.3	
Vert	38.400	QP	42.2	14.4	6.8	28.5	34.9	40.0	5.1	
Vert	41.474	QP	42.0	13.3	6.9	28.5	33.7	40.0	6.3	
Vert	200.000	QP	31.3	16.5	8.2	27.7	28.3	43.5	15.2	
Vert	500.004	QP	35.8	17.9	9.8	28.5	35.0	46.0	11.0	
Vert	633.331	QP	36.2	19.7	10.3	28.3	37.9	46.0	8.1	
Vert	700.004	QP	31.0	20.3	10.5	28.0	33.8	46.0	12.2	
Vert	966.673	QP	27.9	23.1	11.5	27.1	35.4	53.9	18.5	
Vert	1499.497	PK	48.9	25.3	2.8	33.5	43.5	73.9	30.4	
Vert	2390.000	PK	44.3	27.9	3.3	32.1	43.4	73.9	30.5	
Vert	2400.000	PK	-	-	-	-	-	-	-	See 20dBc Data Sheet
Vert	2566.333	PK	47.8	28.1	3.4	32.1	47.2	73.9	26.8	
Vert	4804.000	PK	50.6	32.8	5.7	31.3	57.8	73.9	16.1	
Vert	7206.000	PK	42.2	36.8	6.9	32.6	53.3	73.9	20.6	NS
Vert	9608.000	PK	42.1	38.1	7.6	32.6	55.2	73.9	18.7	NS
Vert	1499.497	AV	41.2	25.3	2.8	33.5	35.8	53.9	18.1	
Vert	2390.000	AV	31.9	27.9	3.3	32.1	31.0	53.9	22.9	
Vert	2566.333	AV	38.1	28.1	3.4	32.1	37.5	53.9	16.4	
Vert	4804.000	AV	41.6	32.8	5.7	31.3	48.8	53.9	5.1	
Vert	7206.000	AV	31.3	36.8	6.9	32.6	42.4	53.9	11.5	NS
Vert	9608.000	AV	32.0	38.1	7.6	32.6	45.1	53.9	8.8	NS

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).

*The 10th harmonic was not seen so the result was its base noise level.

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

26.5 GHz - 40 GHz 20log (3.0 m / 0.5 m) = 15.6 dB

NS : No signal detected

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	74.5	28.0	3.3	32.1	73.7	-	-	Carrier
Hori	2400.000	PK	39.7	28.0	3.3	32.1	38.9	53.7	14.8	
Vert	2402.000	PK	74.6	28.0	3.3	32.1	73.8	-	-	Carrier
Vert	2400.000	PK	38.9	28.0	3.3	32.1	38.1	53.8	15.7	

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

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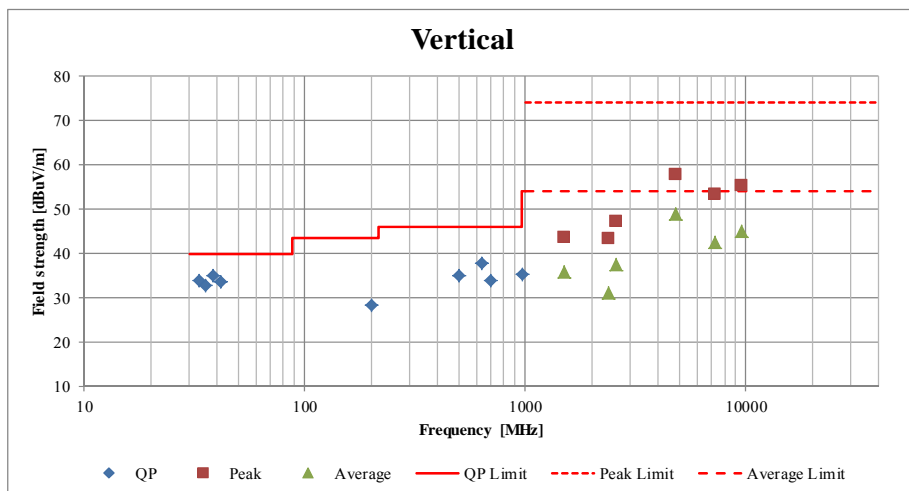
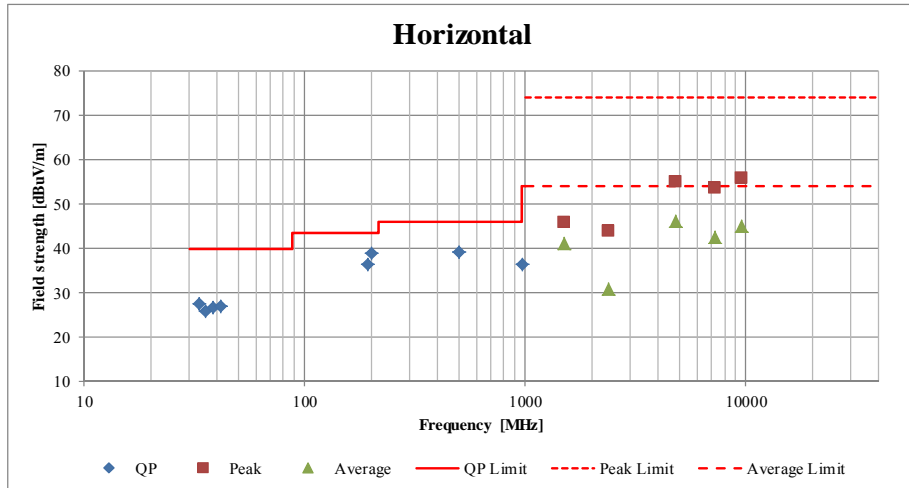
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Radiated Spurious Emission (Plot data, Worst case)

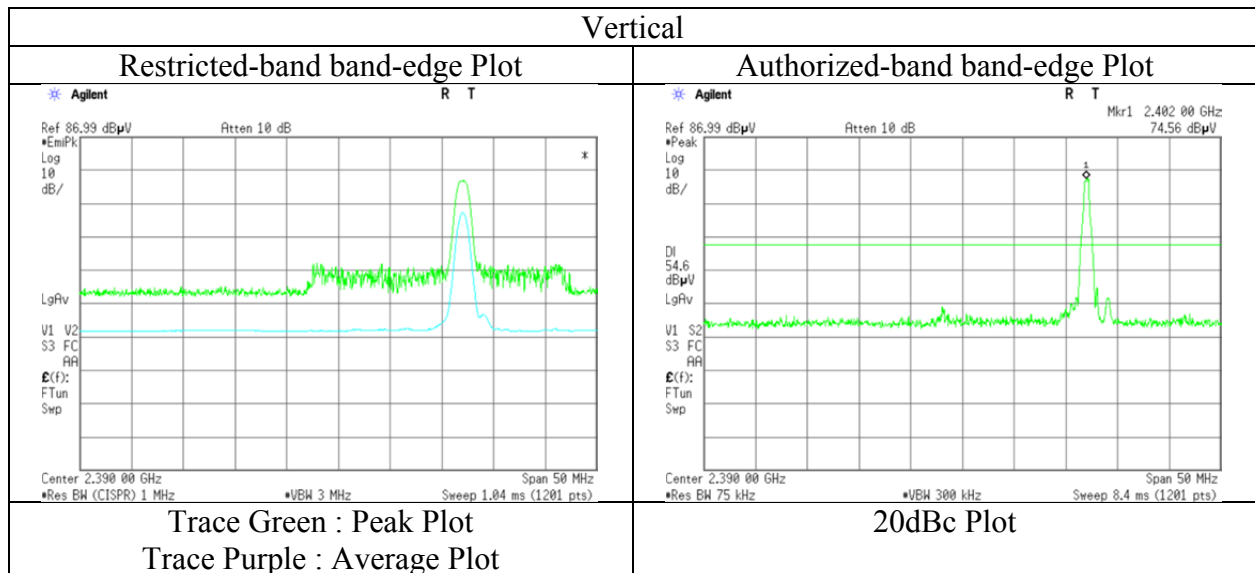
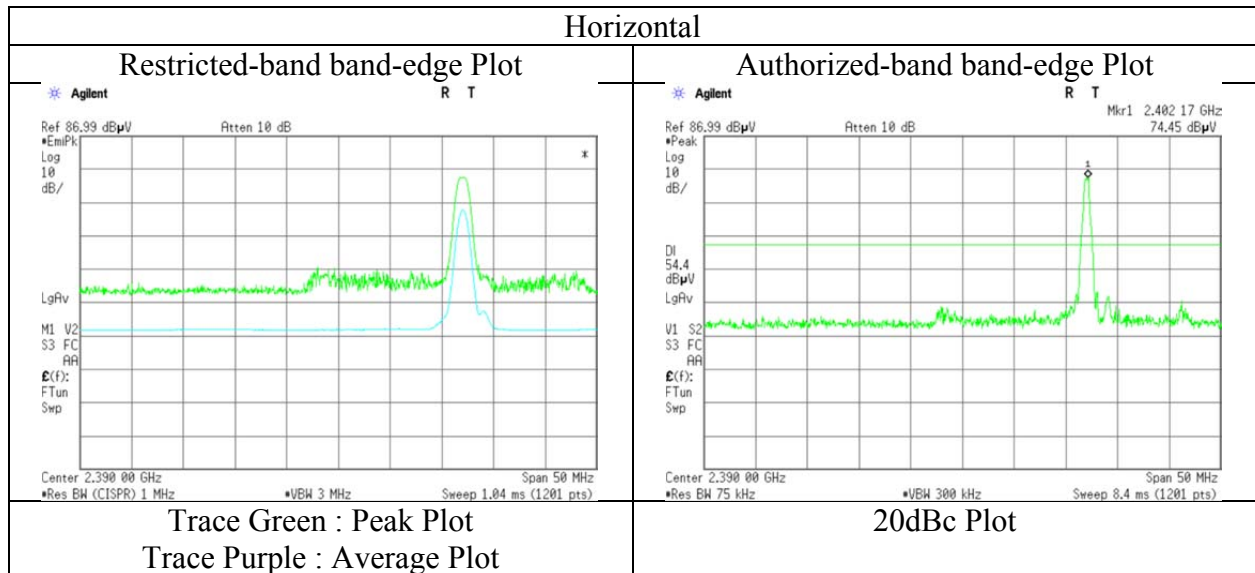
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.2
Report No.	11013349H	
Date	October 27, 2015	November 16, 2015
Temperature / Humidity	23 deg. C / 41 % RH	24 deg. C / 45 % RH
Engineer	Tsubasa Takayama	Tsubasa Takayama
	(Above 1 GHz)	(Below 1 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz	



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

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11013349H
Date	October 27, 2015
Temperature / Humidity	23 deg. C / 41 % RH
Engineer	Tsubasa Takayama
	(Above 1 GHz)
Mode	Tx, Hopping Off, DH5 2402 MHz



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

Radiated Spurious Emission

Test place Ise EMC Lab.
Semi Anechoic Chamber No.4 No.2
Report No. 11013349H
Date October 27, 2015 November 16, 2015
Temperature / Humidity 23 deg. C / 41 % RH 24 deg. C / 45 % RH
Engineer Tsubasa Takayama Tsubasa Takayama
(Above 1 GHz) (Below 1 GHz)
Mode Tx, Hopping Off, DH5 2441 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	33.332	QP	33.1	16.0	6.8	28.5	27.4	40.0	12.6	
Hori	35.332	QP	32.0	15.5	6.8	28.5	25.8	40.0	14.2	
Hori	38.400	QP	34.1	14.4	6.8	28.5	26.8	40.0	13.2	
Hori	41.474	QP	35.2	13.3	6.9	28.5	26.9	40.0	13.1	
Hori	192.000	QP	39.3	16.4	8.1	27.7	36.1	43.5	7.4	
Hori	200.099	QP	42.0	16.5	8.2	27.7	39.0	43.5	4.5	
Hori	500.005	QP	40.4	17.9	9.8	28.5	39.6	46.0	6.4	
Hori	966.673	QP	28.7	23.1	11.5	27.1	36.2	53.9	17.7	
Hori	1629.339	PK	52.7	25.9	2.9	33.1	48.4	73.9	25.5	
Hori	4882.000	PK	48.7	33.1	5.8	31.3	56.3	73.9	17.6	
Hori	7323.000	PK	42.3	36.8	6.9	32.6	53.4	73.9	20.5	NS
Hori	9764.000	PK	42.5	38.2	7.7	32.7	55.7	73.9	18.2	NS
Hori	1629.339	AV	47.5	25.9	2.9	33.1	43.2	53.9	10.7	
Hori	4882.000	AV	42.1	33.1	5.8	31.3	49.7	53.9	4.2	
Hori	7323.000	AV	31.6	36.8	6.9	32.6	42.7	53.9	11.2	NS
Hori	9764.000	AV	32.3	38.2	7.7	32.7	45.5	53.9	8.4	NS
Vert	33.332	QP	40.0	16.0	6.8	28.5	34.3	40.0	5.7	
Vert	35.332	QP	38.9	15.5	6.8	28.5	32.7	40.0	7.3	
Vert	38.400	QP	42.0	14.4	6.8	28.5	34.7	40.0	5.3	
Vert	41.474	QP	42.2	13.3	6.9	28.5	33.9	40.0	6.1	
Vert	200.000	QP	31.5	16.5	8.2	27.7	28.5	43.5	15.0	
Vert	500.004	QP	35.6	17.9	9.8	28.5	34.8	46.0	11.2	
Vert	633.331	QP	36.1	19.7	10.3	28.3	37.8	46.0	8.2	
Vert	700.004	QP	31.1	20.3	10.5	28.0	33.9	46.0	12.1	
Vert	966.673	QP	27.9	23.1	11.5	27.1	35.4	53.9	18.5	
Vert	1629.339	PK	49.9	25.9	2.9	33.1	45.6	73.9	28.3	
Vert	2566.333	PK	47.1	28.1	3.4	32.1	46.5	73.9	27.4	
Vert	4882.000	PK	49.7	33.1	5.8	31.3	57.3	73.9	16.6	
Vert	7323.000	PK	43.1	36.8	6.9	32.6	54.2	73.9	19.7	NS
Vert	9764.000	PK	42.1	38.2	7.7	32.7	55.3	73.9	18.6	NS
Vert	1629.339	AV	43.5	25.9	2.9	33.1	39.2	53.9	14.7	
Vert	2566.333	AV	39.0	28.1	3.4	32.1	38.4	53.9	15.5	
Vert	4882.000	AV	42.0	33.1	5.8	31.3	49.6	53.9	4.4	
Vert	7323.000	AV	31.4	36.8	6.9	32.6	42.5	53.9	11.4	NS
Vert	9764.000	AV	32.0	38.2	7.7	32.7	45.2	53.9	8.7	NS

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).

*The 10th harmonic was not seen so the result was its base noise level.

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

NS : No signal detected

Radiated Spurious Emission

Test place Ise EMC Lab.
Semi Anechoic Chamber No.4 No.2
Report No. 11013349H
Date October 27, 2015 November 16, 2015
Temperature / Humidity 23 deg. C / 41 % RH 24 deg. C / 45 % RH
Engineer Tsubasa Takayama Tsubasa Takayama
(Above 1 GHz) (Below 1 GHz)
Mode Tx, Hopping Off, DH5 2480 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	33.332	QP	33.2	16.0	6.8	28.5	27.5	40.0	12.5	
Hori	35.332	QP	32.4	15.5	6.8	28.5	26.2	40.0	13.8	
Hori	38.400	QP	34.1	14.4	6.8	28.5	26.8	40.0	13.2	
Hori	41.474	QP	35.2	13.3	6.9	28.5	26.9	40.0	13.1	
Hori	200.099	QP	42.0	16.5	8.2	27.7	39.0	43.5	4.5	
Hori	500.005	QP	40.2	17.9	9.8	28.5	39.4	46.0	6.6	
Hori	966.673	QP	29.7	23.1	11.5	27.1	37.2	53.9	16.7	
Hori	1566.485	PK	50.8	25.6	2.8	33.3	45.9	73.9	28.0	
Hori	2483.500	PK	44.7	28.1	3.4	32.1	44.1	73.9	29.8	
Hori	4960.000	PK	49.3	33.4	5.8	31.2	57.3	73.9	16.6	
Hori	7440.000	PK	42.0	36.8	6.9	32.7	53.0	73.9	20.9	NS
Hori	9920.000	PK	42.3	38.3	7.7	32.8	55.5	73.9	18.4	NS
Hori	1566.485	AV	46.7	25.6	2.8	33.3	41.8	53.9	12.1	
Hori	2483.500	AV	31.7	28.1	3.4	32.1	31.1	53.9	22.8	
Hori	4960.000	AV	41.7	33.4	5.8	31.2	49.7	53.9	4.2	
Hori	7440.000	AV	31.3	36.8	6.9	32.7	42.3	53.9	11.6	NS
Hori	9920.000	AV	32.2	38.3	7.7	32.8	45.4	53.9	8.5	NS
Vert	33.332	QP	39.8	16.0	6.8	28.5	34.1	40.0	5.9	
Vert	35.332	QP	38.9	15.5	6.8	28.5	32.7	40.0	7.3	
Vert	38.400	QP	42.1	14.4	6.8	28.5	34.8	40.0	5.2	
Vert	41.474	QP	41.9	13.3	6.9	28.5	33.6	40.0	6.4	
Vert	200.000	QP	32.0	16.5	8.2	27.7	29.0	43.5	14.5	
Vert	500.004	QP	35.5	17.9	9.8	28.5	34.7	46.0	11.3	
Vert	633.331	QP	36.0	19.7	10.3	28.3	37.7	46.0	8.3	
Vert	700.004	QP	32.0	20.3	10.5	28.0	34.8	46.0	11.2	
Vert	966.673	QP	28.0	23.1	11.5	27.1	35.5	53.9	18.4	
Vert	1566.485	PK	51.2	25.6	2.8	33.3	46.3	73.9	27.6	
Vert	2483.500	PK	44.7	28.1	3.4	32.1	44.1	73.9	29.8	
Vert	2566.333	PK	46.8	28.1	3.4	32.1	46.2	73.9	27.7	
Vert	4960.000	PK	49.4	33.4	5.8	31.2	57.4	73.9	16.5	
Vert	7440.000	PK	43.0	36.8	6.9	32.7	54.0	73.9	19.9	NS
Vert	9920.000	PK	41.3	38.3	7.7	32.8	54.5	73.9	19.4	NS
Vert	1566.485	AV	43.2	25.6	2.8	33.3	38.3	53.9	15.6	
Vert	2483.500	AV	32.0	28.1	3.4	32.1	31.4	53.9	22.5	
Vert	2566.333	AV	38.7	28.1	3.4	32.1	38.1	53.9	15.8	
Vert	4960.000	AV	41.1	33.4	5.8	31.2	49.1	53.9	4.8	
Vert	7440.000	AV	31.4	36.8	6.9	32.7	42.4	53.9	11.5	NS
Vert	9920.000	AV	32.0	38.3	7.7	32.8	45.2	53.9	8.7	NS

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).

*The 10th harmonic was not seen so the result was its base noise level.

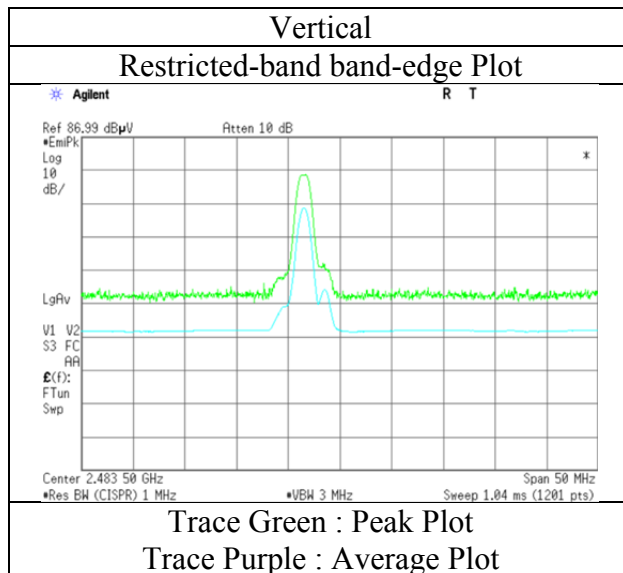
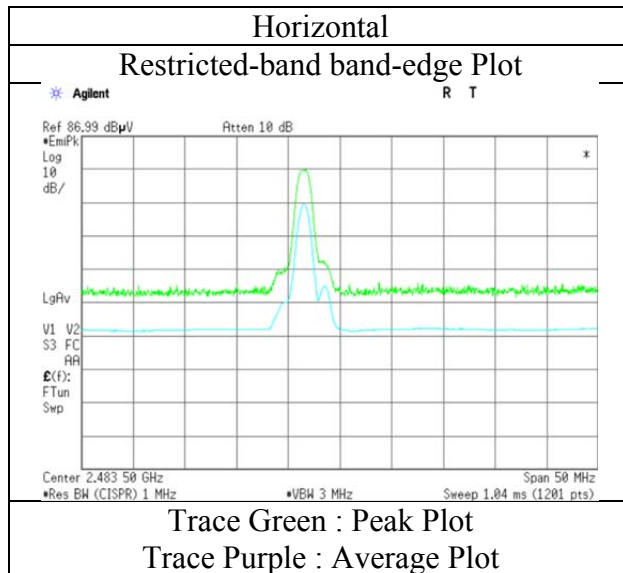
Distance factor: 10 GHz - 26.5 GHz 20log (3.0 m / 1.0 m) = 9.5 dB

26.5 GHz - 40 GHz 20log (3.0 m / 0.5 m) = 15.6 dB

NS : No signal detected

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place : Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. : 11013349H
Date : October 27, 2015
Temperature / Humidity : 23 deg. C / 41 % RH
Engineer : Tsubasa Takayama
(1-10 GHz)
Mode : Tx, Hopping Off, DH5 2480 MHz



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

Radiated Spurious Emission

Test place Ise EMC Lab.
Semi Anechoic Chamber No.4 No.2
Report No. 11013349H
Date October 27, 2015 November 16, 2015
Temperature / Humidity 23 deg. C / 41 % RH 24 deg. C / 45 % RH
Engineer Tsubasa Takayama Tsubasa Takayama
(Above 1 GHz) (Below 1 GHz)
Mode Tx, Hopping Off, 3DH5 2402 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	33.332	QP	33.3	16.0	6.8	28.5	27.6	40.0	12.4	
Hori	35.332	QP	32.0	15.5	6.8	28.5	25.8	40.0	14.2	
Hori	38.400	QP	34.0	14.4	6.8	28.5	26.7	40.0	13.3	
Hori	41.474	QP	34.8	13.3	6.9	28.5	26.5	40.0	13.5	
Hori	200.002	QP	43.2	16.5	8.2	27.7	40.2	43.5	3.3	
Hori	500.005	QP	40.6	17.9	9.8	28.5	39.8	46.0	6.2	
Hori	966.673	QP	30.0	23.1	11.5	27.1	37.5	53.9	16.4	
Hori	1499.497	PK	50.7	25.3	2.8	33.5	45.3	73.9	28.6	
Hori	2390.000	PK	44.5	27.9	3.3	32.1	43.6	73.9	30.3	
Hori	2400.000	PK	-	-	-	-	-	-	-	See 20dBc Data Sheet
Hori	4804.000	PK	42.6	32.8	5.7	31.3	49.8	73.9	24.1	
Hori	7206.000	PK	42.5	36.8	6.9	32.6	53.6	73.9	20.3	NS
Hori	9608.000	PK	42.7	38.1	7.6	32.6	55.8	73.9	18.1	NS
Hori	1499.497	AV	46.5	25.3	2.8	33.5	41.1	53.9	12.8	
Hori	2390.000	AV	31.2	27.9	3.3	32.1	30.3	53.9	23.6	
Hori	4804.000	AV	32.4	32.8	5.7	31.3	39.6	53.9	14.3	
Hori	7206.000	AV	31.2	36.8	6.9	32.6	42.3	53.9	11.6	NS
Hori	9608.000	AV	32.1	38.1	7.6	32.6	45.2	53.9	8.7	NS
Vert	33.332	QP	39.8	16.0	6.8	28.5	34.1	40.0	5.9	
Vert	35.332	QP	39.0	15.5	6.8	28.5	32.8	40.0	7.2	
Vert	38.400	QP	41.5	14.4	6.8	28.5	34.2	40.0	5.8	
Vert	41.474	QP	42.1	13.3	6.9	28.5	33.8	40.0	6.2	
Vert	200.000	QP	32.5	16.5	8.2	27.7	29.5	43.5	14.0	
Vert	500.004	QP	35.3	17.9	9.8	28.5	34.5	46.0	11.5	
Vert	633.331	QP	36.6	19.7	10.3	28.3	38.3	46.0	7.7	
Vert	700.004	QP	32.4	20.3	10.5	28.0	35.2	46.0	10.8	
Vert	966.673	QP	28.9	23.1	11.5	27.1	36.4	53.9	17.5	
Vert	1499.497	PK	48.5	25.3	2.8	33.5	43.1	73.9	30.8	
Vert	2390.000	PK	43.1	27.9	3.3	32.1	42.2	73.9	31.7	
Vert	2400.000	PK	-	-	-	-	-	-	-	See 20dBc Data Sheet
Vert	2566.333	PK	46.9	28.1	3.4	32.1	46.3	73.9	27.6	
Vert	4804.000	PK	42.3	32.8	5.7	31.3	49.5	73.9	24.4	
Vert	7206.000	PK	42.6	36.8	6.9	32.6	53.7	73.9	20.2	NS
Vert	9608.000	PK	42.2	38.1	7.6	32.6	55.3	73.9	18.6	NS
Vert	1499.497	AV	41.7	25.3	2.8	33.5	36.3	53.9	17.6	
Vert	2390.000	AV	30.8	27.9	3.3	32.1	29.9	53.9	24.0	
Vert	2566.333	AV	37.6	28.1	3.4	32.1	37.0	53.9	16.9	
Vert	4804.000	AV	33.3	32.8	5.7	31.3	40.5	53.9	13.5	
Vert	7206.000	AV	31.4	36.8	6.9	32.6	42.5	53.9	11.4	NS
Vert	9608.000	AV	32.5	38.1	7.6	32.6	45.6	53.9	8.3	NS

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).

*The 10th harmonic was not seen so the result was its base noise level.

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

26.5 GHz - 40 GHz 20log (3.0 m / 0.5 m) = 15.6 dB

NS : No signal detected

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	71.9	28.0	3.3	32.1	71.1	-	-	Carrier
Hori	2400.000	PK	34.2	28.0	3.3	32.1	33.4	51.1	17.7	
Vert	2402.000	PK	71.5	28.0	3.3	32.1	70.7	-	-	Carrier
Vert	2400.000	PK	34.6	28.0	3.3	32.1	33.8	50.7	16.9	

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

UL Japan, Inc.

Ise EMC Lab.

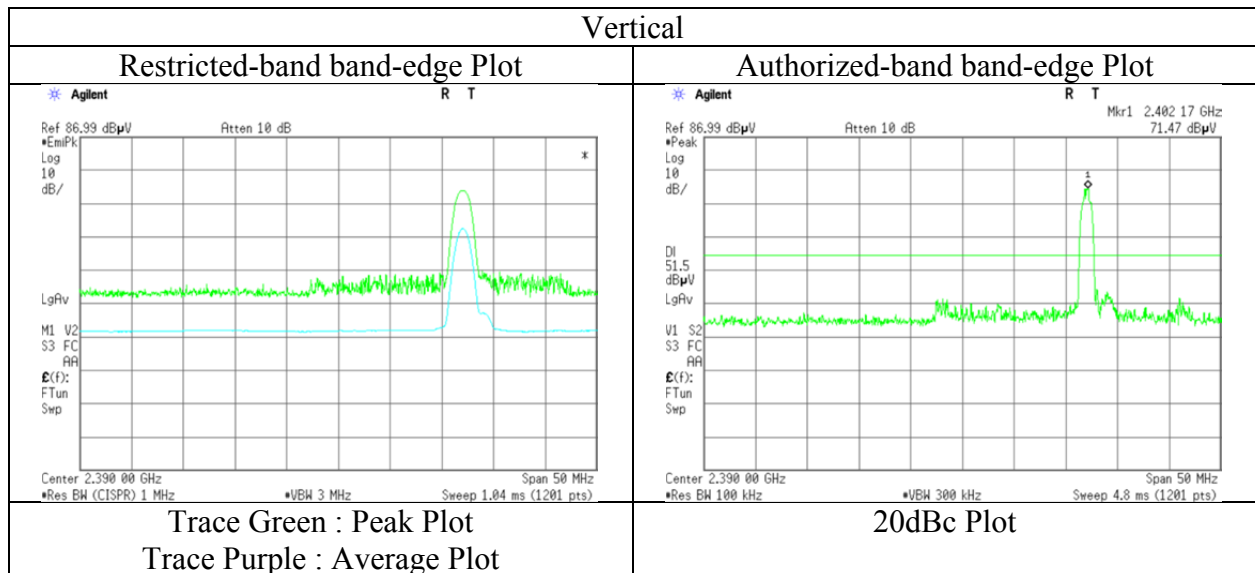
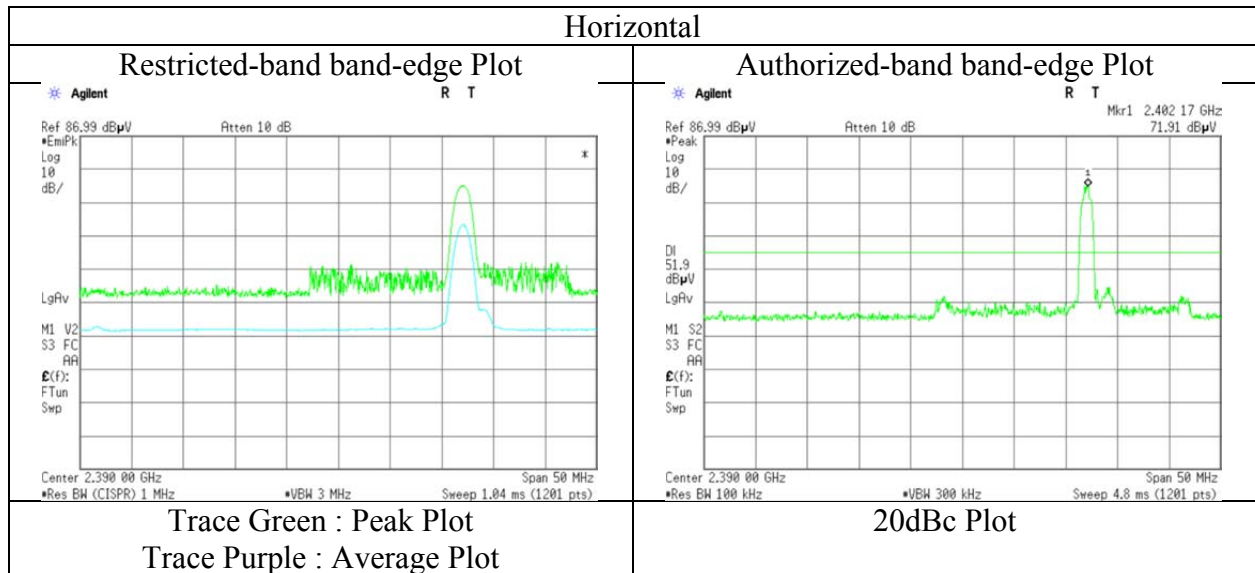
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN

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Facsimile : +81 596 24 8124

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No.	11013349H
Date	October 27, 2015
Temperature / Humidity	23 deg. C / 41 % RH
Engineer	Tsubasa Takayama (1-10GHz)
Mode	Tx, Hopping Off, 3DH5 2402 MHz



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

Radiated Spurious Emission

Test place Ise EMC Lab.
Semi Anechoic Chamber No.4 No.2
Report No. 11013349H
Date October 27, 2015 November 16, 2015
Temperature / Humidity 23 deg. C / 41 % RH 24 deg. C / 45 % RH
Engineer Tsubasa Takayama Tsubasa Takayama
(Above 1 GHz) (Below 1 GHz)
Mode Tx, Hopping Off, 3DH5 2441 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	33.332	QP	33.0	16.0	6.8	28.5	27.3	40.0	12.7	
Hori	35.332	QP	32.1	15.5	6.8	28.5	25.9	40.0	14.1	
Hori	38.400	QP	33.8	14.4	6.8	28.5	26.5	40.0	13.5	
Hori	41.474	QP	35.0	13.3	6.9	28.5	26.7	40.0	13.3	
Hori	200.002	QP	43.2	16.5	8.2	27.7	40.2	43.5	3.3	
Hori	320.000	QP	36.8	15.0	9.0	27.6	33.2	46.0	12.8	
Hori	500.005	QP	40.4	17.9	9.8	28.5	39.6	46.0	6.4	
Hori	966.673	QP	29.7	23.1	11.5	27.1	37.2	53.9	16.7	
Hori	1499.497	PK	51.0	25.3	2.8	33.5	45.6	73.9	28.3	
Hori	4882.000	PK	42.5	33.1	5.8	31.3	50.1	73.9	23.8	
Hori	7323.000	PK	42.5	36.8	6.9	32.6	53.6	73.9	20.3	NS
Hori	9764.000	PK	42.3	38.2	7.7	32.7	55.5	73.9	18.4	NS
Hori	1499.497	AV	46.9	25.3	2.8	33.5	41.5	53.9	12.4	
Hori	4882.000	AV	33.8	33.1	5.8	31.3	41.4	53.9	12.5	
Hori	7323.000	AV	31.6	36.8	6.9	32.6	42.7	53.9	11.2	NS
Hori	9764.000	AV	32.3	38.2	7.7	32.7	45.5	53.9	8.4	NS
Vert	33.332	QP	39.6	16.0	6.8	28.5	33.9	40.0	6.1	
Vert	35.332	QP	38.7	15.5	6.8	28.5	32.5	40.0	7.5	
Vert	38.400	QP	41.6	14.4	6.8	28.5	34.3	40.0	5.7	
Vert	41.474	QP	41.5	13.3	6.9	28.5	33.2	40.0	6.8	
Vert	200.000	QP	32.5	16.5	8.2	27.7	29.5	43.5	14.0	
Vert	500.004	QP	35.0	17.9	9.8	28.5	34.2	46.0	11.8	
Vert	633.331	QP	36.2	19.7	10.3	28.3	37.9	46.0	8.1	
Vert	700.004	QP	32.2	20.3	10.5	28.0	35.0	46.0	11.0	
Vert	966.673	QP	28.9	23.1	11.5	27.1	36.4	53.9	17.5	
Vert	1499.497	PK	49.2	25.3	2.8	33.5	43.8	73.9	30.1	
Vert	2566.333	PK	47.2	28.1	3.4	32.1	46.6	73.9	27.3	
Vert	4882.000	PK	44.8	33.1	5.8	31.3	52.4	73.9	21.5	
Vert	7323.000	PK	43.2	36.8	6.9	32.6	54.3	73.9	19.6	NS
Vert	9764.000	PK	42.2	38.2	7.7	32.7	55.4	73.9	18.5	NS
Vert	1499.497	AV	42.1	25.3	2.8	33.5	36.7	53.9	17.2	
Vert	2566.333	AV	38.9	28.1	3.4	32.1	38.3	53.9	15.6	
Vert	4882.000	AV	32.9	33.1	5.8	31.3	40.5	53.9	13.4	
Vert	7323.000	AV	31.5	36.8	6.9	32.6	42.6	53.9	11.3	NS
Vert	9764.000	AV	32.1	38.2	7.7	32.7	45.3	53.9	8.6	NS

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).

*The 10th harmonic was not seen so the result was its base noise level.

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

26.5 GHz - 40 GHz 20log(3.0 m / 0.5 m) = 15.6 dB

NS : No signal detected

Radiated Spurious Emission

Test place Ise EMC Lab.
Semi Anechoic Chamber No.4 No.2
Report No. 11013349H
Date October 27, 2015 November 16, 2015
Temperature / Humidity 23 deg. C / 41 % RH 24 deg. C / 45 % RH
Engineer Tsubasa Takayama Tsubasa Takayama
(Above 1 GHz) (Below 1 GHz)
Mode Tx, Hopping Off, 3DH5 2480 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	33.332	QP	33.4	16.0	6.8	28.5	27.7	40.0	12.3	
Hori	35.332	QP	32.4	15.5	6.8	28.5	26.2	40.0	13.8	
Hori	38.400	QP	34.0	14.4	6.8	28.5	26.7	40.0	13.3	
Hori	41.474	QP	35.3	13.3	6.9	28.5	27.0	40.0	13.0	
Hori	200.002	QP	43.6	16.5	8.2	27.7	40.6	43.5	2.9	
Hori	500.005	QP	40.5	17.9	9.8	28.5	39.7	46.0	6.3	
Hori	966.673	QP	29.7	23.1	11.5	27.1	37.2	53.9	16.7	
Hori	1499.497	PK	50.8	25.3	2.8	33.5	45.4	73.9	28.5	
Hori	2483.500	PK	44.9	28.1	3.4	32.1	44.3	73.9	29.6	
Hori	4960.000	PK	42.6	33.4	5.8	31.2	50.6	73.9	23.3	
Hori	7440.000	PK	42.1	36.8	6.9	32.7	53.1	73.9	20.8	NS
Hori	9920.000	PK	42.5	38.3	7.7	32.8	55.7	73.9	18.2	NS
Hori	1499.497	AV	46.7	25.3	2.8	33.5	41.3	53.9	12.6	
Hori	2483.500	AV	32.9	28.1	3.4	32.1	32.3	53.9	21.6	
Hori	4960.000	AV	34.0	33.4	5.8	31.2	42.0	53.9	11.9	
Hori	7440.000	AV	31.2	36.8	6.9	32.7	42.2	53.9	11.7	NS
Hori	9920.000	AV	32.3	38.3	7.7	32.8	45.5	53.9	8.4	NS
Vert	33.332	QP	39.6	16.0	6.8	28.5	33.9	40.0	6.1	
Vert	35.332	QP	39.0	15.5	6.8	28.5	32.8	40.0	7.2	
Vert	38.400	QP	41.7	14.4	6.8	28.5	34.4	40.0	5.6	
Vert	41.474	QP	42.0	13.3	6.9	28.5	33.7	40.0	6.3	
Vert	200.000	QP	32.4	16.5	8.2	27.7	29.4	43.5	14.1	
Vert	500.004	QP	35.2	17.9	9.8	28.5	34.4	46.0	11.6	
Vert	633.331	QP	36.2	19.7	10.3	28.3	37.9	46.0	8.1	
Vert	700.004	QP	32.0	20.3	10.5	28.0	34.8	46.0	11.2	
Vert	966.673	QP	28.3	23.1	11.5	27.1	35.8	53.9	18.1	
Vert	1499.497	PK	49.7	25.3	2.8	33.5	44.3	73.9	29.6	
Vert	2483.500	PK	44.5	28.1	3.4	32.1	43.9	73.9	30.0	
Vert	2566.333	PK	47.0	28.1	3.4	32.1	46.4	73.9	27.5	
Vert	4960.000	PK	44.8	33.4	5.8	31.2	52.8	73.9	21.1	
Vert	7440.000	PK	43.1	36.8	6.9	32.7	54.1	73.9	19.8	NS
Vert	9920.000	PK	41.2	38.3	7.7	32.8	54.4	73.9	19.5	NS
Vert	1499.497	AV	42.2	25.3	2.8	33.5	36.8	53.9	17.1	
Vert	2483.500	AV	31.7	28.1	3.4	32.1	31.1	53.9	22.8	
Vert	2566.333	AV	38.6	28.1	3.4	32.1	38.0	53.9	15.9	
Vert	4960.000	AV	32.5	33.4	5.8	31.2	40.5	53.9	13.5	
Vert	7440.000	AV	31.8	36.8	6.9	32.7	42.8	53.9	11.1	NS
Vert	9920.000	AV	32.0	38.3	7.7	32.8	45.2	53.9	8.7	NS

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).

*The 10th harmonic was not seen so the result was its base noise level.

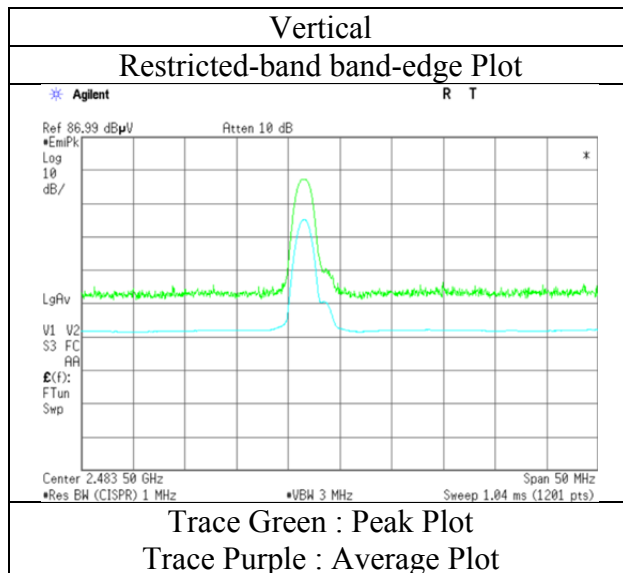
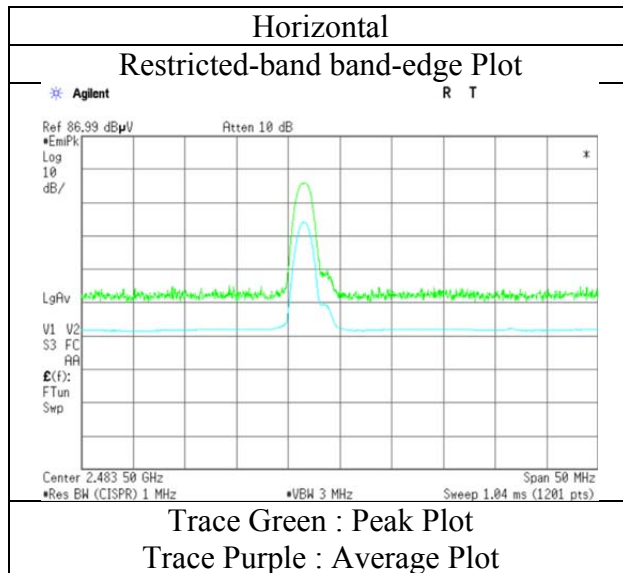
Distance factor: 10 GHz - 26.5 GHz 20log (3.0 m / 1.0 m) = 9.5dB

26.5 GHz - 40 GHz 20log (3.0 m / 0.5 m) = 15.6 dB

NS : No signal detected

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place Ise EMC Lab. No.4 Semi Anechoic Chamber
Report No. 11013349H
Date October 27, 2015
Temperature / Humidity 23 deg. C / 41 % RH
Engineer Tsubasa Takayama
(1-10GHz)
Mode Tx, Hopping Off, 3DH5 2480 MHz



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

APPENDIX 2: Test instruments

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	2015/10/02 * 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-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2015/11/06 * 12
MHA-21	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	RE	2015/08/10 * 12
MCC-141	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	RE	2015/06/22 * 12
MPA-12	MicroWave System Amplifier	Agilent	83017A	00650	RE	2015/10/01 * 12
MHA-17	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	RE	2015/06/06 * 12
MMM-10	DIGITAL HiTESTER	Hioki	3805	051201148	RE	2015/01/16 * 12
MHF-26	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	RE	2015/09/17 * 12
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	RE	2015/07/01 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	RE	2015/01/13 * 12
MJM-14	Measure	KOMELON	KMC-36	-	RE	-
MSA-13	Spectrum Analyzer	Agilent	E4440A	MY46185823	RE	2015/06/02 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100300	RE	2015/06/08 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2015/10/11 * 12
MLA-02	Logperiodic Antenna	Schwarzbeck	USLP9143	201	RE	2015/10/11 * 12
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2015/02/06 * 12
MAT-07	Attenuator(6dB)	Weinschel Corp	2	BK7970	RE	2015/11/10 * 12
MPA-09	Pre Amplifier	Agilent	8447D	2944A10845	RE	2015/09/04 * 12
MMM-01	Digital Tester	Fluke	FLUKE 26-3	78030611	RE	2015/08/19 * 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

UL Japan, Inc.

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