RADIO TEST REPORT

Test Report No. : 11212787H-A-R1

Applicant	:	**Murata Manufacturing Co., Ltd.**
Type of Equipment	:	**Communication Module**
Model No.	:	**Type1JP**
FCC ID	:	**VPYLB1JP**
Test regulation	:	**FCC Part 15 Subpart C: 2016**
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 11212787H-A. 11212787H-A is replaced with this report.

Date of test: March 25 to April 4, 2016

Representative test engineer:
Takumi Shimada
Engineer
Consumer Technology Division

Approved by:
Takayuki Shimada
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.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
http://japan.ul.com/resources/emc_accredited/

REVISION HISTORY

Original Test Report No.: 11212787H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	11212787H-A	May 20, 2016	-	-
1	11212787H-A-R1	September 27, 2016	P 4	Correction of variant model.
1	11212787H-A-R1	September 27, 2016	P 9	Correction of unit configuration of voltage for conducted emission test.
1	11212787H-A-R1	September 27, 2016	P 10, 11	Correction of comment.

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SECTION 1: Customer information

Company Name	:	Murata Manufacturing Co., Ltd.
Address	:	1-10-1 Higashikotari, Nagaokakyo-shi, Kyoto 617-8555 Japan
Telephone Number	:	+81-75-955-6736
Facsimile Number	:	+81-75-955-6634
Contact Person	:	Motoo Hayashi

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

2.1 Identification of E.U.T.

Type of Equipment	:	Communication Module
Model No.	:	Type1JP
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 2.7 - 3.6V (typ. 3.3V)
Receipt Date of Sample	:	March 24, 2016
Country of Mass-production	:	Japan, China
Condition of EUT	:	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification of EUT	:	No Modification by the test lab

2.2 Product Description

Model: Type1JP (referred to as the EUT in this report) is a Communication Module.

General Specification

Clock frequency(ies) in the system	:	40 MHz, 32.768 kHz
Operating temperature	:	-40 deg. C to +85 deg. C

Radio Specification

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

Equipment Type	Transceiver
Frequency of Operation	2412 MHz - 2462 MHz
Type of Modulation	DSSS, OFDM
Bandwidth & Channel spacing	20 MHz & 5 MHz
Method of frequency generation	Synthesizer
Power Supply (inner)	DC 3.3 V *), DC 1.85 V
Antenna Type	Monopole Pattern Antenna
Antenna Gain	0.1 dBi

* It does not affect the radio performance.

Variant model

This model has a variant model: Type1JQ.

	Type1JQ (CC3200)	Type1JP (CC3100)
Microcomputer (ARM)	Presence	Absence

Two models are identical in RF characteristics.
The test was performed with Type1JP as a representative according to the customer's request.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C FCC part 15 final revised on April 6, 2016.
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
Conducted Emission	**FCC:** ANSI C63.10-2013 6. Standard test methods **IC:** RSS-Gen 8.8	**FCC:** Section 15.207 **IC:** RSS-Gen 8.8	**QP** 19.4 dB, 5.49595 MHz, L **AV** 14.4 dB, 5.49595 MHz, L	Complied	-
6dB Bandwidth	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r05 **IC:** -	**FCC:** Section 15.247(a)(2) **IC:** RSS-247 5.2(1)	See data.	Complied	Conducted
Maximum Peak Output Power	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r05 **IC:** RSS-Gen 6.12	**FCC:** Section 15.247(b)(3) **IC:** RSS-247 5.4(4)		Complied	Conducted
Power Density	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r05 **IC:** -	**FCC:** Section 15.247(e) **IC:** RSS-247 5.2(2)		Complied	Conducted
Spurious Emission Restricted Band Edges	**FCC:** KDB 558074 D01 DTS Meas Guidance v03r05 **IC:** RSS-Gen 6.13	**FCC:** Section15.247(d) **IC:** RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	3.5 dB 2390.000 MHz, AV, Hori. 2483.500 MHz, 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 C63.10: 2013 is also referred.

FCC Part 15.31 (e)

This EUT provides stable voltage (DC 1.85 V) constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted on the circuit board. Therefore, the equipment complies with the antenna requirement of Section 15.203/212.

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 $k = 2$.

Ise EMC Lab.

Antenna terminal test Uncertainty (+/-)							
Power meter		Conducted emission and Power density			Conducted emission		Channel power
Below 1 GHz	Above 1 GHz	Below 1 GHz	1 GHz -3 GHz	3 GHz -18 GHz	18 GHz -26.5 GHz	26.5 GHz -40 GHz	
0.9 dB	1.0 dB	1.4 dB	1.7 dB	2.8 dB	2.8 dB	2.9 dB	2.6 dB

Frequency range	Conducted emission using AMN(LISN) (±dB)
0.009 – 0.15MHz	3.5 dB
0.15 – 30MHz	2.9 dB

Test distance	Radiated emission (±dB) 9 kHz - 30 MHz
3m	3.8 dB
10m	3.7 dB

Polarity	Radiated emission (Below 1GHz)			
	(3 m*)(±dB)		(10 m*)(±dB)	
	30 – 300 MHz	300 – 1000MHz	30 – 300 MHz	300 – 1000MHz
Horizontal	4.8 dB	5.2 dB	4.8 dB	5.0 dB
Vertical	4.5 dB	5.9 dB	4.8 dB	5.1 dB

Radiated emission				
(3 m*)(±dB)		(1 m*)(±dB)	(0.5 m*)(±dB)	(10 m*)(±dB)
1 – 6GHz	6 – 18GHz	10 – 26.5 GHz	26.5 – 40GHz	1 -18 GHz
5.1 dB	5.3 dB	5.1 dB	5.1 dB	5.3 dB

*Measurement distance

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

Radiated emission test
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
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone: +81 596 24 8999, Facsimile: +81 596 24 8124

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 2.0m 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.

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

4.1 Operating Mode(s)

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

Mode	Remarks*
IEEE 802.11b (11b)	11 Mbps, PN9
IEEE 802.11g (11g)	6 Mbps, PN9
IEEE 802.11n SISO 20 MHz BW (11n-20)	MCS 5, PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)	
*Power of the EUT was set by the software as follows; Power settings: Same as production model Software: cc3100/cc3200 Radio Tool V1.1.5540.33372 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

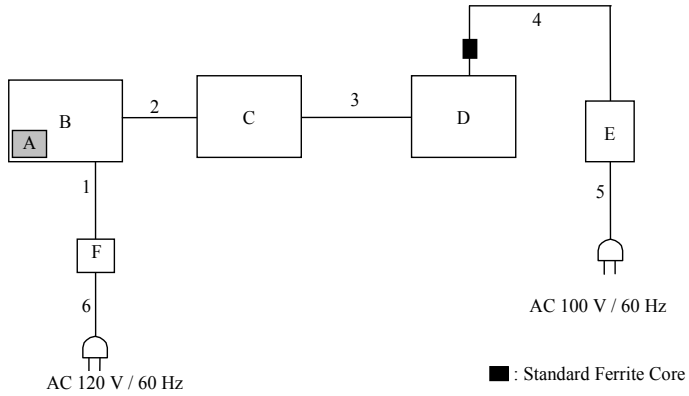
*The details of Operating mode(s)

Test Item	Operating Mode	Tested frequency *3)
Conducted Emission Spurious Emission (Below 1GHz) *1)	11g Tx	2442 MHz
Spurious Emission (Above 1GHz)	11b Tx 11g Tx	2412 MHz 2442 MHz 2462 MHz
	11n-20 Tx *2)	2412 MHz 2462 MHz
6dB Bandwidth Power Density 99% Occupied Bandwidth	11b Tx 11g Tx 11n-20 Tx	2412 MHz 2442 MHz 2462 MHz
Maximum Peak Output Power	11b Tx 11g Tx 11n-20 Tx	2412 MHz 2437 MHz 2442 MHz 2462 MHz

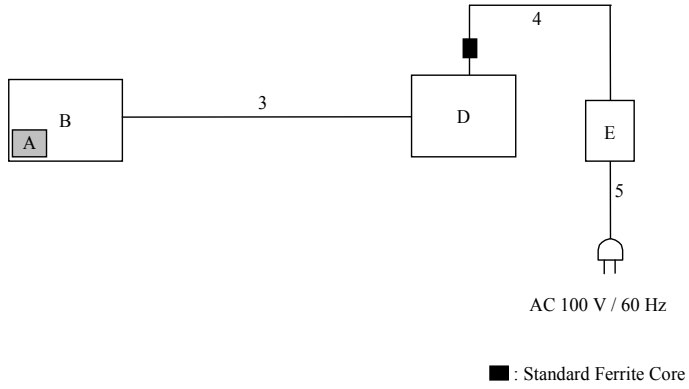
*1) The mode was tested as a representative, because it had the highest power at antenna terminal test.
*2) Since 11g and 11n-20 have the same modulation method and no differences in transmitting specification, test was performed on the representative mode that had the highest peak output power
*3) After the comparison between 2437 MHz and 2442 MHz of the Mid channel, test was performed with 2442 MHz that had higher peak output power as a representative.

4.2 Configuration and peripherals

[Conducted emission test]



[Antenna terminal conducted tests]



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

Description of EUT

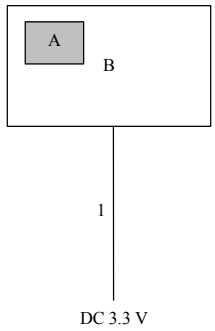
No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Communication Module	Type1JP	6 *1) 2 *2)	Murata Manufacturing Co., Ltd.	EUT
B	Jig Board	-	-	Murata Manufacturing Co., Ltd.	*3)
C	Jig Board	-	-	Murata Manufacturing Co., Ltd.	-
D	Laptop PC	PC-VY25AFZ77	99023431A	NEC	-
E	AC Adapter	PA-1750-07	9605505LB	NEC	-
F	DC Power supply	PMC35-2A	13090501	KIKUSUI	-

*1) Used for conducted emission test
*2) Used for antenna terminal conducted tests
*3) The test was performed with the module that as normal assumed implementation conditions.
(without a solid ground)

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	0.6	Unshielded	Unshielded	-
2	Signal Cable	0.3	Unshielded	Unshielded	-
3	USB Cable	1.5	Shielded	Shielded	-
4	DC Cable	1.8	Unshielded	Unshielded	-
5	AC Cable	1.8	Unshielded	Unshielded	-
6	AC Cable	2.0	Unshielded	Unshielded	-

[Spurious emission test]



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

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Communication Module	Type1JP	11	Murata Manufacturing Co., Ltd.	EUT
B	Jig Board	-	-	Murata Manufacturing Co., Ltd.	*1)

*1) The test was performed with the module that as normal assumed implementation conditions.
(without a solid ground)

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	3.0	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and conditions

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 rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT with other peripherals (as a whole system)
I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber.
The EUT was connected to a LISN (AMN).
An overview sweep with peak detection has been performed.

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

Detector	**: QP and CISPR AV**
Measurement range	**: 0.15 MHz – 30 MHz**
Test data	**: APPENDIX**
Test result	**: Pass**

SECTION 6: Radiated Spurious Emission

Test Procedure

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "558074 D01 DTS Meas Guidance v03r05".

[For below 1GHz]
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.

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

The height of the measuring antenna varied between 1 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
The measurements were performed for both vertical and horizontal antenna polarization with the Test Receiver, or the Spectrum Analyzer.
The measurements were made with the following detector function of the test receiver and the Spectrum analyzer (in linear mode).
The test was made with the detector (RBW/VBW) in the following table.
When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

Test Antennas are used as below;

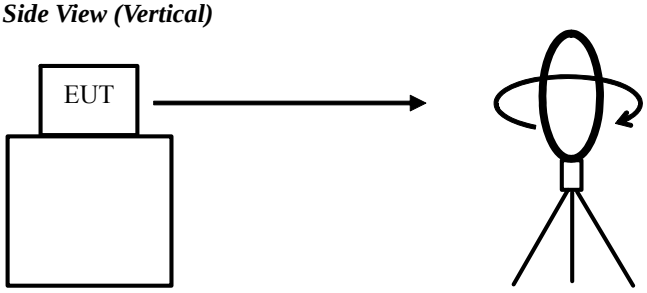
Frequency	Below 30 MHz	30 MHz to 300 MHz	300 MHz to 1 GHz	Above 1 GHz
Antenna Type	Loop	Biconical	Logperiodic	Horn

Frequency: From 9 kHz to 30 MHz at distance 3 m
The EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
The measurements were performed for vertical polarization (antenna angle: 0 deg.).
*Refer to Figure 1 about Direction of the Loop Antenna.

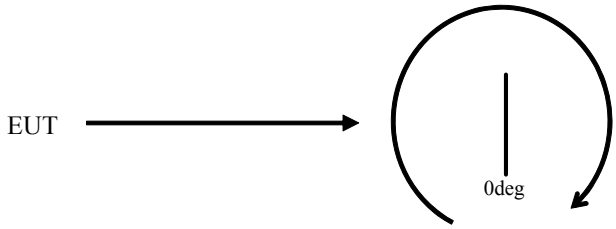
These tests were performed in semi anechoic chamber. Therefore the measured level of emissions may be higher than if measurements were made without a ground plane. However test results were confirmed to pass against standard limit.

Figure 1: Direction of the Loop Antenna

Side View (Vertical)



Top View (Vertical)



Front side: 0 deg.
Forward direction: clockwise

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	From 9 kHz to 90 kHz and From 110 kHz to 150 kHz	From 90 kHz to 110 kHz	From 150 kHz to 490 kHz	From 490 kHz to 30 MHz	From 30 MHz to 1 GHz
Instrument used	Test Receiver				
Detector	PK / AV	QP	PK / AV	QP	QP
IF Bandwidth	BW 200 Hz	BW 200 Hz	BW 9 kHz	BW 9 kHz	BW 120 kHz
Test Distance	3 m *1)	3 m *1)	3 m *1)	3 m *2)	3 m

Frequency	Above 1 GHz		20 dBc
Instrument used	Spectrum Analyzer		Spectrum Analyzer
Detector	PK	AV *5)	PK
IF Bandwidth	RBW: 1 MHz VBW: 3 MHz	Average Power Method: 12.2.5.2 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces Duty factor was added to the results. Integration Method: 13.3.2 RBW: 100kHz VBW: 300kHz Span: 2MHz Band Power: 1MHz Detector: Power Averaging (RMS) Trace: 100 traces Duty factor was added to the results.	RBW: 100 kHz VBW: 300kHz
Test Distance	4.5 m *3) (1 GHz – 10GHz), 1 m *4) (10 GHz – 26.5 GHz)		4.5 m *3) (1 GHz – 10GHz), 1 m *4) (10 GHz – 26.5 GHz)

*1) Distance Factor: 40 x log (3 m / 300 m) = -80 dB
*2) Distance Factor: 40 x log (3 m / 30 m) = -40 dB
*3) Distance Factor: 20 x log (4.5 m / 3.0 m) = 3.5 dB
*4) Distance Factor: 20 x log (1.0 m / 3.0 m) = -9.5 dB
*5) Average Power Measurement was performed based on 6. 0 & 12.2.5 of "KDB 558074 D01 DTS Meas Guidance v03r05"

- 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

SECTION 7: 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	20 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *2)	-	Power Meter (Sensor: 50 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	10 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)

*1) Peak hold was applied as Worst-case measurement.
*2) Reference data
*3) Section 10.2 Method PKPSD (peak PSD) of "KDB 558074 D01 DTS Meas Guidance v03r05".

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

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

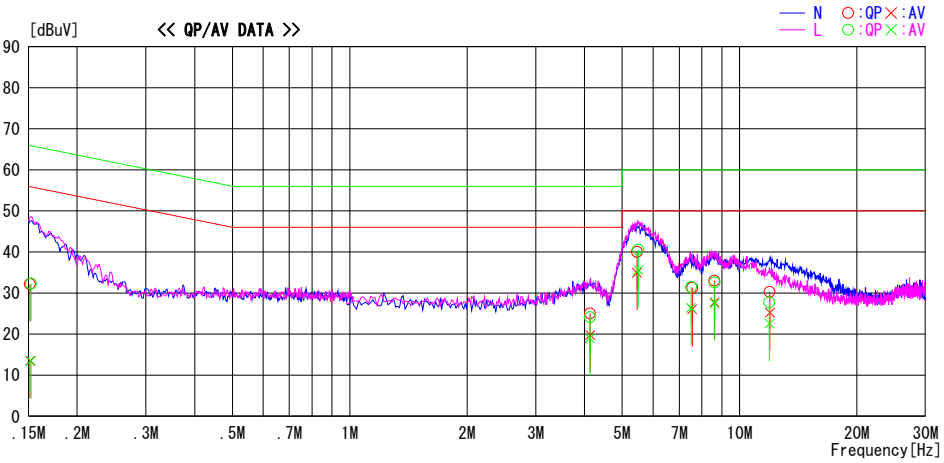
UL Japan, Inc. Ise EMC Lab. No.2 Semi Anechoic Chamber
Date : 2016/03/26

Report No. : 11212787H

Temp./Humi. : 22deg. C / 46% RH
Engineer : Takumi Shimada

Mode / Remarks : Tx 11g 2442MHz

LIMIT : FCC15.207 QP
FCC15.207 AV



Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase	Comment
	QP	AV	Factor	QP	AV	QP	AV	QP	AV		
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
0.15145	19.0	0.3	13.2	32.2	13.5	65.9	55.9	33.7	42.4	N	
4.13530	11.3	6.1	13.7	25.0	19.8	56.0	46.0	31.0	26.2	N	
5.45902	26.1	21.1	13.9	40.0	35.0	60.0	50.0	20.0	15.0	N	
7.56730	17.3	12.1	14.0	31.3	26.1	60.0	50.0	28.7	23.9	N	
8.62931	18.8	13.6	14.2	33.0	27.8	60.0	50.0	27.0	22.2	N	
11.95139	16.0	10.9	14.3	30.3	25.2	60.0	50.0	29.7	24.8	N	
0.15216	19.1	0.3	13.2	32.3	13.5	65.9	55.9	33.6	42.4	L	
4.13297	10.4	5.4	13.7	24.1	19.1	56.0	46.0	31.9	26.9	L	
5.49595	26.7	21.7	13.9	40.6	35.6	60.0	50.0	19.4	14.4	L	
7.51378	17.5	12.4	14.0	31.5	26.4	60.0	50.0	28.5	23.6	L	
8.63778	18.4	13.3	14.2	32.6	27.5	60.0	50.0	27.4	22.5	L	
11.92443	13.4	8.3	14.3	27.7	22.6	60.0	50.0	32.3	27.4	L	

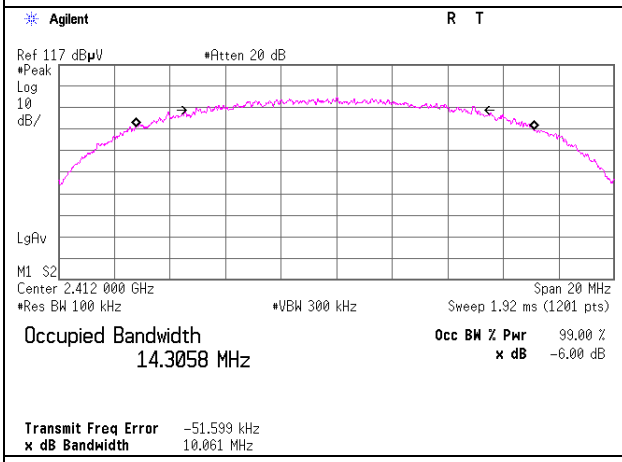
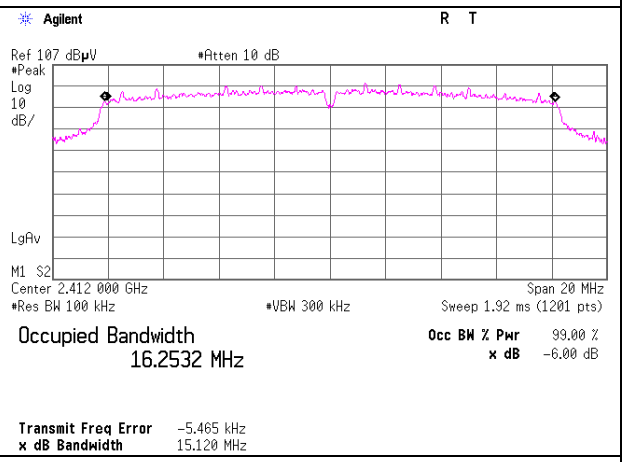
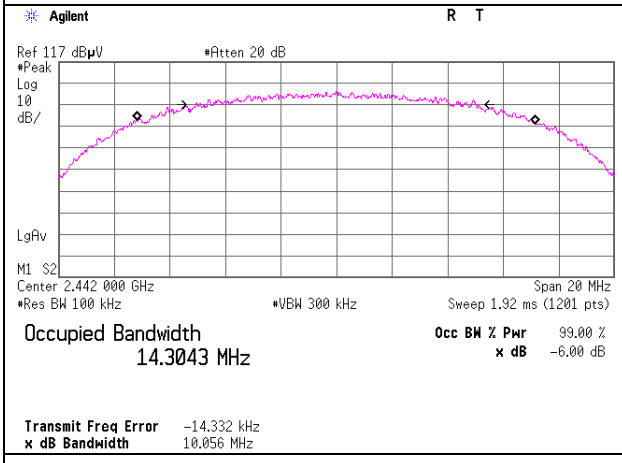
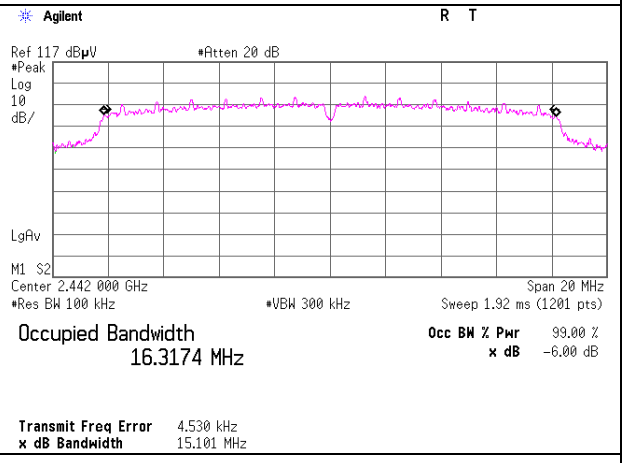
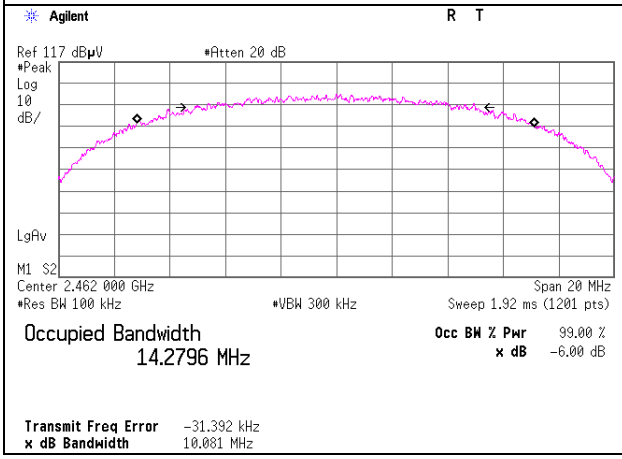
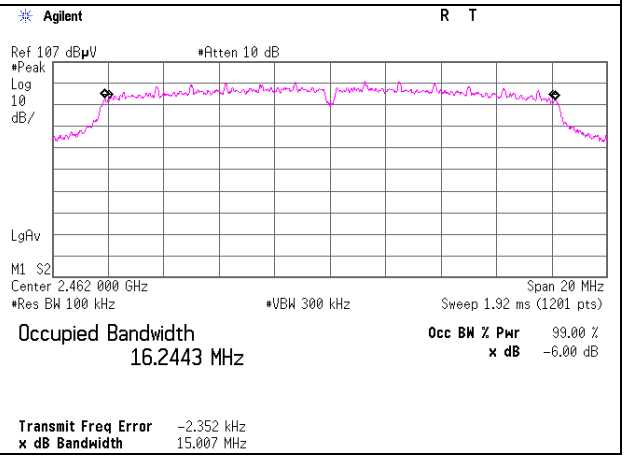
CHART : WITH FACTOR, Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + ATTEN. + CABLE)
Except for the above table : adequate margin data below the limits.

6dB Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11212787H
Date	March 25, 2016
Temperature / Humidity	23 deg. C / 37 % RH
Engineer	Kazuya Yoshioka
Mode	Tx

Mode	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
11b	2412	10.061	> 500
	2442	10.056	> 500
	2462	10.081	> 500
11g	2412	15.120	> 500
	2442	15.101	> 500
	2462	15.007	> 500
11n-20	2412	17.718	> 500
	2442	17.753	> 500
	2462	17.708	> 500

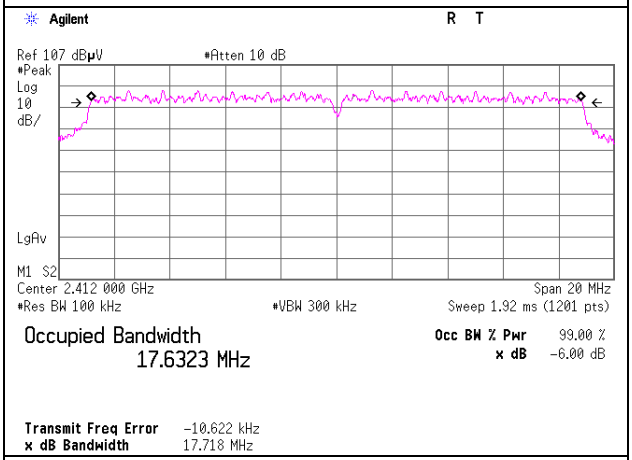
6dB Bandwidth

11b	11g
2412 MHz	**2412 MHz**
	
2442 MHz	**2442 MHz**
	
2462 MHz	**2462 MHz**
	

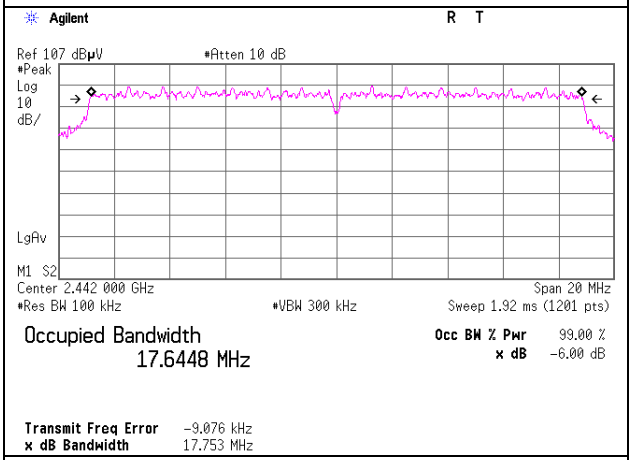
6dB Bandwidth

11n-20

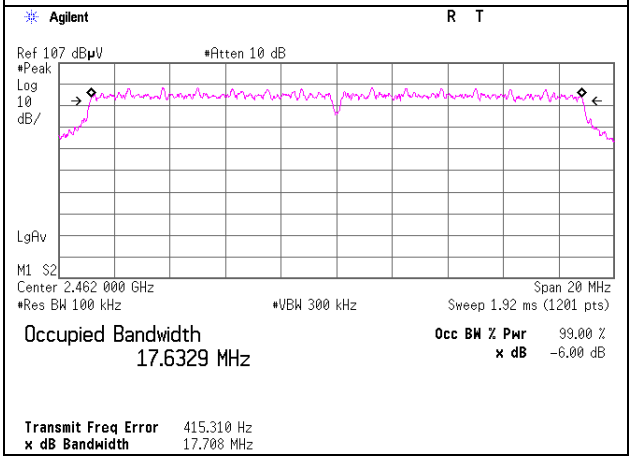
2412 MHz



2442 MHz



2462 MHz



Maximum Peak Output Power

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11212787H
Date	March 25, 2016
Temperature / Humidity	23 deg. C / 37 % RH
Engineer	Kazuya Yoshioka
Mode	Tx 11b

Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	5.88	1.00	10.03	16.91	49.07	30.00	1000	13.09
2437	6.91	1.01	10.03	17.94	62.29	30.00	1000	12.06
2442	7.39	1.01	10.03	18.43	69.67	30.00	1000	11.57
2462	6.16	1.01	10.03	17.20	52.49	30.00	1000	12.80

Sample Calculation:
Result = Reading + Cable Loss + Attenuator Loss

2412MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	5.64	
2	5.71	
5.5	5.86	
11	5.88	*

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11212787H
Date	March 25, 2016
Temperature / Humidity	23 deg. C / 37 % RH
Engineer	Kazuya Yoshioka
Mode	Tx 11g

Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	8.82	1.00	10.03	19.85	96.57	30.00	1000	10.15
2437	8.96	1.01	10.03	19.99	99.87	30.00	1000	10.01
2442	9.00	1.01	10.03	20.04	100.94	30.00	1000	9.96
2462	8.39	1.01	10.03	19.43	87.71	30.00	1000	10.57

Sample Calculation:
Result = Reading + Cable Loss + Attenuator Loss

2412 MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
6	8.82	*
9	8.80	
12	8.61	
18	8.69	
24	8.52	
36	8.56	
48	8.66	
54	8.67	

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

Maximum Peak Output Power

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11212787H
Date	March 25, 2016
Temperature / Humidity	23 deg. C / 37 % RH
Engineer	Kazuya Yoshioka
Mode	Tx 11n-20

Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	8.67	1.00	10.03	19.70	93.29	30.00	1000	10.30
2437	8.68	1.01	10.03	19.71	93.64	30.00	1000	10.29
2442	8.77	1.01	10.03	19.81	95.73	30.00	1000	10.19
2462	8.41	1.01	10.03	19.45	88.11	30.00	1000	10.55

Sample Calculation:
Result = Reading + Cable Loss + Attenuator Loss

2412 MHz

Rate	Reading	Remark
MCS	[dBm]	
0	8.61	
1	8.54	
2	8.63	
3	8.52	
4	8.61	
5	8.67	*
6	8.62	
7	8.21	

*: Worst Rate
All comparison were carried out on same frequency and measurement factors.

Average Output Power
(Reference data)

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11212787H
Date	March 25, 2016
Temperature / Humidity	23 deg. C / 37 % RH
Engineer	Kazuya Yoshioka
Mode	Tx

11b **11 Mbps**

Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2412	2.92	1.00	10.03	13.95	24.82	1.12	15.07	32.12
2437	3.76	1.01	10.03	14.79	30.16	1.12	15.91	39.03
2442	4.35	1.01	10.03	15.39	34.60	1.12	16.51	44.78
2462	3.05	1.01	10.03	14.09	25.65	1.12	15.21	33.19

11g **6 Mbps**

Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2412	1.52	1.00	10.03	12.55	17.98	0.38	12.93	19.63
2437	3.86	1.01	10.03	14.89	30.86	0.38	15.27	33.69
2442	3.87	1.01	10.03	14.91	30.98	0.38	15.29	33.81
2462	1.16	1.01	10.03	12.20	16.60	0.38	12.58	18.12

11n-20 **MCS 2**

Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2412	0.10	1.00	10.03	11.13	12.97	1.14	12.27	16.86
2437	2.67	1.01	10.03	13.70	23.47	1.14	14.84	30.51
2442	2.75	1.01	10.03	13.79	23.94	1.14	14.93	31.12
2462	-0.05	1.01	10.03	10.99	12.56	1.14	12.13	16.33

Sample Calculation:
Result (Time average) = Reading + Cable Loss + Attenuator
Result (Burst power average) = Time average + Duty factor

Average Output Power (Reference data)

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11212787H
Date	March 25, 2016
Temperature / Humidity	23 deg. C / 37 % RH
Engineer	Kazuya Yoshioka
Mode	Tx

2412 MHz

Mode	Rate Mbps	Reading [dBm]	Duty factor [dB]	Burst power average [dBm]	Remarks
11b	1	3.25	0.16	3.41	
	2	3.17	0.28	3.45	
	5.5	3.28	0.64	3.92	
	11	2.92	1.12	4.04	*
11g	6	1.52	0.38	1.90	*
	9	1.22	0.42	1.64	
	12	0.64	0.86	1.50	
	18	0.47	1.04	1.51	
	24	-1.86	2.80	0.94	
	36	-3.41	3.73	0.32	
	48	-5.06	4.82	-0.24	
	54	-5.56	5.30	-0.26	

* Worst rate

Sample Calculation:

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

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

2412 MHz

Mode	Rate MCS	Reading [dBm]	Duty factor [dB]	Burst power average [dBm]	Remarks
11n-20	0	0.81	0.31	1.12	
	1	0.60	0.39	0.99	
	2	0.10	1.14	1.24	*
	3	-1.90	2.24	0.34	
	4	-3.42	3.83	0.41	
	5	-5.22	4.91	-0.31	
	6	-5.58	5.25	-0.33	
	7	-7.67	7.45	-0.22	

* Worst rate

Sample Calculation:

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

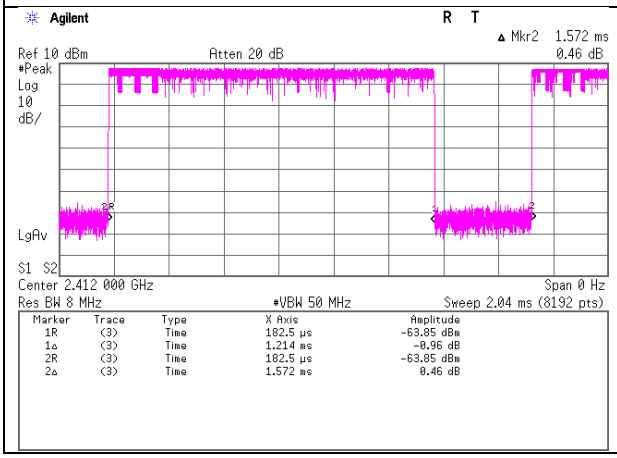
All comparison were carried out on same frequency and measurement factors.

Burst rate confirmation

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11212787H
Date	March 25, 2016
Temperature / Humidity	23 deg. C / 37 % RH
Engineer	Kazuya Yoshioka
Mode	Tx

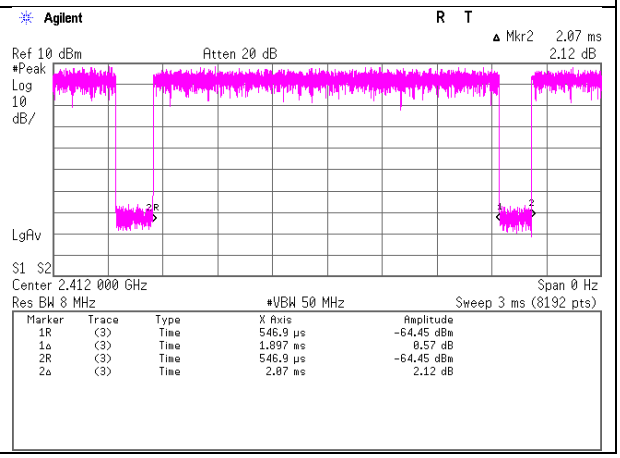
11b 11 Mbps

Tx on / (Tx on + Tx off) = 0.772
Tx on / (Tx on + Tx off) * 100 = 77.2 %
Duty factor = 10 * log (1.572 / 1.214) = 1.12 dB



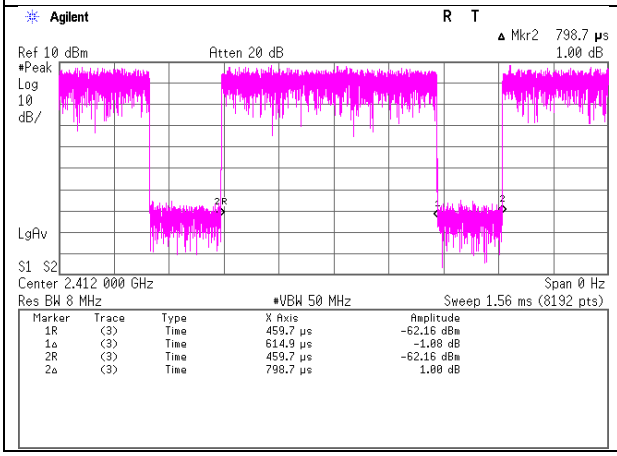
11g 6 Mbps

Tx on / (Tx on + Tx off) = 0.916
Tx on / (Tx on + Tx off) * 100 = 91.6 %
Duty factor = 10 * log (2.07 / 1.897) = 0.38 dB



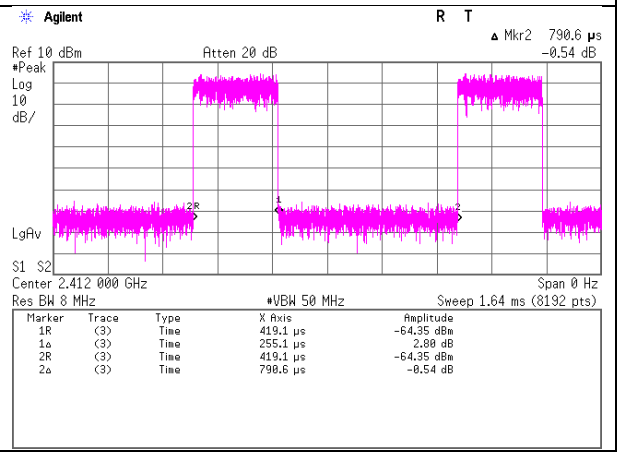
11n-20 MCS 2

Tx on / (Tx on + Tx off) = 0.770
Tx on / (Tx on + Tx off) * 100 = 77.0 %
Duty factor = 10 * log (798.7 / 614.9) = 1.14 dB



11n-20 MCS 5

Tx on / (Tx on + Tx off) = 0.323
Tx on / (Tx on + Tx off) * 100 = 32.3 %
Duty factor = 10 * log (790.6 / 255.1) = 4.91 dB



Radiated Spurious Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11212787H
Date	April 1, 2016
Temperature / Humidity	24 deg. C / 40 % RH
Engineer	Takumi Shimada
	(Above 1GHz)
Mode	Tx 11b 2412 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	51.9	26.9	6.2	32.7	-	52.3	73.9	21.6	
Hori	4018.746	PK	42.5	30.0	7.9	31.9	-	48.5	73.9	25.4	
Hori	4824.000	PK	45.4	31.8	8.1	31.8	-	53.5	73.9	20.4	
Hori	7236.000	PK	40.1	36.0	8.8	32.6	-	52.3	73.9	21.6	Floor Noise
Hori	9648.000	PK	41.5	38.2	9.6	33.3	-	56.0	73.9	17.9	Floor Noise
Hori	2390.000	AV	40.4	26.9	6.2	32.7	1.1	41.9	53.9	12.0	*1)
Hori	4018.746	AV	32.8	30.0	7.9	31.9	1.1	39.9	53.9	14.0	
Hori	4824.000	AV	33.4	31.8	8.1	31.8	1.1	42.6	53.9	11.3	
Hori	7236.000	AV	29.4	36.0	8.8	32.6	-	41.6	53.9	12.3	Floor Noise
Hori	9648.000	AV	30.1	38.2	9.6	33.3	-	44.6	53.9	9.3	Floor Noise
Vert	2390.000	PK	54.2	26.9	6.2	32.7	-	54.6	73.9	19.3	
Vert	4018.746	PK	44.8	30.0	7.9	31.9	-	50.8	73.9	23.1	
Vert	4824.000	PK	46.9	31.8	8.1	31.8	-	55.0	73.9	18.9	
Vert	7236.000	PK	41.4	36.0	8.8	32.6	-	53.6	73.9	20.3	Floor Noise
Vert	9648.000	PK	41.6	38.2	9.6	33.3	-	56.1	73.9	17.8	Floor Noise
Vert	2390.000	AV	44.3	26.9	6.2	32.7	1.1	45.8	53.9	8.1	*1)
Vert	4018.746	AV	35.2	30.0	7.9	31.9	1.1	42.3	53.9	11.6	
Vert	4824.000	AV	34.5	31.8	8.1	31.8	1.1	43.7	53.9	10.2	
Vert	7236.000	AV	29.5	36.0	8.8	32.6	-	41.7	53.9	12.2	Floor Noise
Vert	9648.000	AV	30.4	38.2	9.6	33.3	-	44.9	53.9	9.0	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

*1) Not Out of Band emission(Leakage Power)

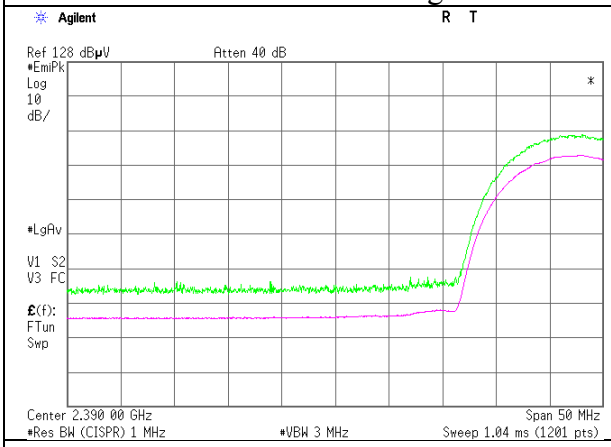
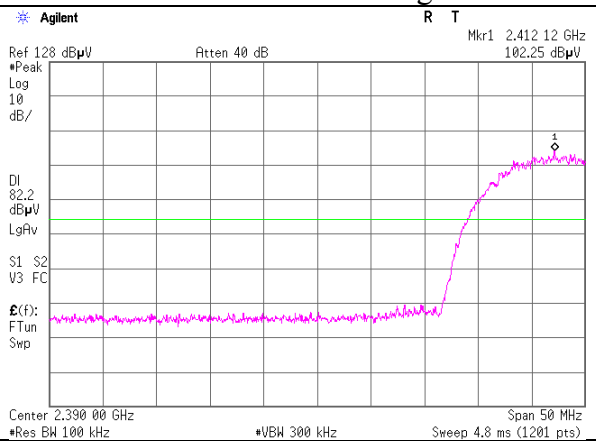
20dBc Data Sheet

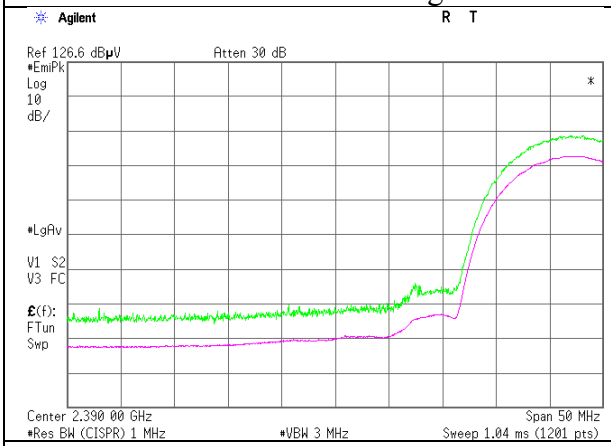
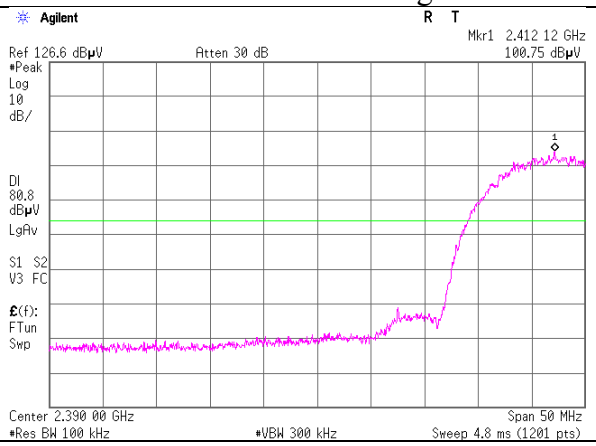
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	102.3	26.9	6.2	32.7	102.7	-	-	Carrier
Hori	2400.000	PK	52.4	26.9	6.2	32.7	52.8	82.7	29.9	
Vert	2412.000	PK	100.8	26.9	6.2	32.7	101.2	-	-	Carrier
Vert	2400.000	PK	52.6	26.9	6.2	32.7	53.0	81.2	28.2	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amprifier)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11212787H
Date	April 1, 2016
Temperature / Humidity	24 deg. C / 40 % RH
Engineer	Takumi Shimada (Above 1GHz)
Mode	Tx 11b 2412 MHz

Horizontal	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11212787H
Date	April 1, 2016
Temperature / Humidity	24 deg. C / 40 % RH
Engineer	Takumi Shimada
	(Above 1GHz)
Mode	Tx 11b 2442 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	4070.319	PK	43.8	30.1	7.9	31.9	-	49.9	73.9	24.0	
Hori	4884.000	PK	46.9	32.0	8.1	31.7	-	55.3	73.9	18.6	
Hori	7326.000	PK	40.4	36.0	8.9	32.6	-	52.7	73.9	21.2	Floor Noise
Hori	9768.000	PK	39.9	38.2	9.6	33.3	-	54.4	73.9	19.5	Floor Noise
Hori	4070.319	AV	36.4	30.1	7.9	31.9	1.1	43.6	53.9	10.3	
Hori	4884.000	AV	38.8	32.0	8.1	31.7	1.1	48.3	53.9	5.6	
Hori	7326.000	AV	32.0	36.0	8.9	32.6	-	44.3	53.9	9.6	Floor Noise
Hori	9768.000	AV	31.5	38.2	9.6	33.3	-	46.0	53.9	7.9	Floor Noise
Vert	4070.319	PK	43.1	30.1	7.9	31.9	-	49.2	73.9	24.7	
Vert	4884.000	PK	45.5	32.0	8.1	31.7	-	53.9	73.9	20.0	
Vert	7326.000	PK	40.3	36.0	8.9	32.6	-	52.6	73.9	21.3	Floor Noise
Vert	9768.000	PK	40.1	38.2	9.6	33.3	-	54.6	73.9	19.3	Floor Noise
Vert	4070.319	AV	35.2	30.1	7.9	31.9	1.1	42.4	53.9	11.5	
Vert	4884.000	AV	37.1	32.0	8.1	31.7	1.1	46.6	53.9	7.3	
Vert	7326.000	AV	32.1	36.0	8.9	32.6	-	44.4	53.9	9.5	Floor Noise
Vert	9768.000	AV	31.6	38.2	9.6	33.3	-	46.1	53.9	7.8	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11212787H
Date	April 1, 2016
Temperature / Humidity	24 deg. C / 40 % RH
Engineer	Takumi Shimada
	(Above 1GHz)
Mode	Tx 11b 2462 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	52.8	26.9	6.2	32.6	-	53.3	73.9	20.6	
Hori	4103.220	PK	44.3	30.2	7.9	31.9	-	50.5	73.9	23.4	
Hori	4924.000	PK	43.8	32.0	8.0	31.7	-	52.1	73.9	21.8	
Hori	7386.000	PK	39.7	36.0	8.9	32.7	-	51.9	73.9	22.0	Floor Noise
Hori	9848.000	PK	41.0	38.2	9.6	33.3	-	55.5	73.9	18.4	Floor Noise
Hori	2483.500	AV	41.1	26.9	6.2	32.6	1.1	42.7	53.9	11.2	*1)
Hori	4103.220	AV	34.1	30.2	7.9	31.9	1.1	41.4	53.9	12.5	
Hori	4924.000	AV	31.9	32.0	8.0	31.7	1.1	41.3	53.9	12.6	
Hori	7386.000	AV	29.8	36.0	8.9	32.7	-	42.0	53.9	11.9	Floor Noise
Hori	9848.000	AV	30.3	38.2	9.6	33.3	-	44.8	53.9	9.1	Floor Noise
Vert	2483.500	PK	51.8	26.9	6.2	32.6	-	52.3	73.9	21.6	
Vert	4103.220	PK	43.5	30.2	7.9	31.9	-	49.7	73.9	24.2	
Vert	4924.000	PK	44.7	32.0	8.0	31.7	-	53.0	73.9	20.9	
Vert	7386.000	PK	40.0	36.0	8.9	32.7	-	52.2	73.9	21.7	Floor Noise
Vert	9848.000	PK	40.7	38.2	9.6	33.3	-	55.2	73.9	18.7	Floor Noise
Vert	2483.500	AV	43.1	26.9	6.2	32.6	1.1	44.7	53.9	9.2	*1)
Vert	4103.220	AV	34.1	30.2	7.9	31.9	1.1	41.4	53.9	12.5	
Vert	4924.000	AV	32.0	32.0	8.0	31.7	1.1	41.4	53.9	12.5	
Vert	7386.000	AV	29.7	36.0	8.9	32.7	-	41.9	53.9	12.0	Floor Noise
Vert	9848.000	AV	30.2	38.2	9.6	33.3	-	44.7	53.9	9.2	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.5 dB

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

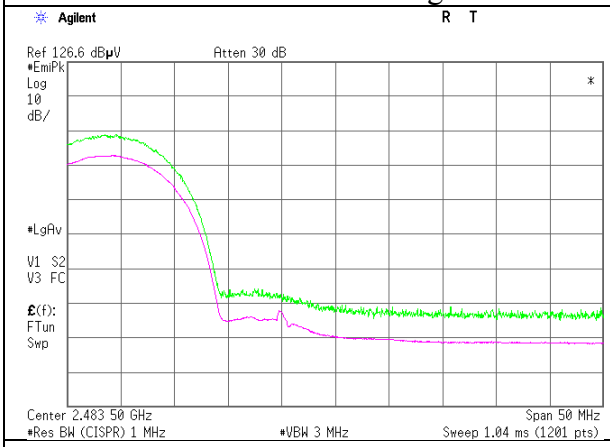
*1) Not Out of Band emission(Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11212787H
Date	April 1, 2016
Temperature / Humidity	24 deg. C / 40 % RH
Engineer	Takumi Shimada (Above 1GHz)
Mode	Tx 11b 2462 MHz

Horizontal

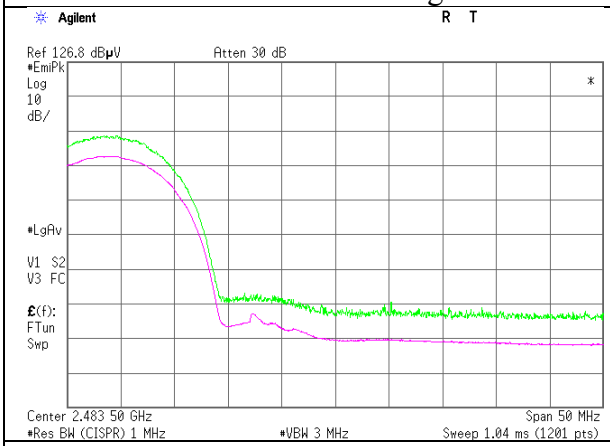
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11212787H
Date	April 1, 2016
Temperature / Humidity	24 deg. C / 40 % RH
Engineer	Takumi Shimada
	(Above 1GHz)
Mode	Tx 11g 2412 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	63.1	26.9	6.2	32.7	-	63.5	73.9	10.4	
Hori	4824.000	PK	40.7	31.8	8.1	31.8	-	48.8	73.9	25.1	Floor Noise
Hori	6432.018	PK	40.5	34.4	8.7	32.2	-	51.4	73.9	22.5	
Hori	7236.000	PK	39.5	36.0	8.8	32.6	-	51.7	73.9	22.2	Floor Noise
Hori	9648.000	PK	41.1	38.2	9.6	33.3	-	55.6	73.9	18.3	Floor Noise
Hori	2390.000	AV	49.6	26.9	6.2	32.7	0.4	50.4	53.9	3.5	*1)
Hori	4824.000	AV	32.0	31.8	8.1	31.8	-	40.1	53.9	13.8	Floor Noise
Hori	6432.018	AV	32.0	34.4	8.7	32.2	0.4	43.3	53.9	10.6	
Hori	7236.000	AV	30.2	36.0	8.8	32.6	-	42.4	53.9	11.5	Floor Noise
Hori	9648.000	AV	31.2	38.2	9.6	33.3	-	45.7	53.9	8.2	Floor Noise
Vert	2390.000	PK	62.1	26.9	6.2	32.7	-	62.5	73.9	11.4	
Vert	4824.000	PK	40.2	31.8	8.1	31.8	-	48.3	73.9	25.6	Floor Noise
Vert	6432.017	PK	42.5	34.4	8.7	32.2	-	53.4	73.9	20.5	
Vert	7236.000	PK	39.7	36.0	8.8	32.6	-	51.9	73.9	22.0	Floor Noise
Vert	9648.000	PK	40.9	38.2	9.6	33.3	-	55.4	73.9	18.5	Floor Noise
Vert	2390.000	AV	48.2	26.9	6.2	32.7	0.4	49.0	53.9	4.9	*1)
Vert	4824.000	AV	29.7	31.8	8.1	31.8	-	37.8	53.9	16.1	Floor Noise
Vert	6432.017	AV	35.8	34.4	8.7	32.2	0.4	47.1	53.9	6.8	
Vert	7236.000	AV	29.7	36.0	8.8	32.6	-	41.9	53.9	12.0	Floor Noise
Vert	9648.000	AV	30.0	38.2	9.6	33.3	-	44.5	53.9	9.4	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.5 dB

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

*1) Not Out of Band emission(Leakage Power)

20dBc Data Sheet

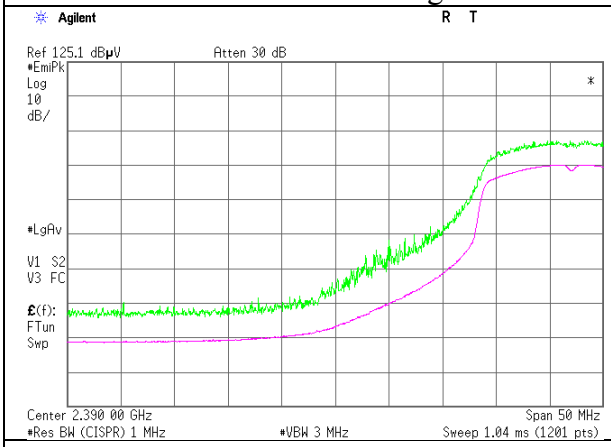
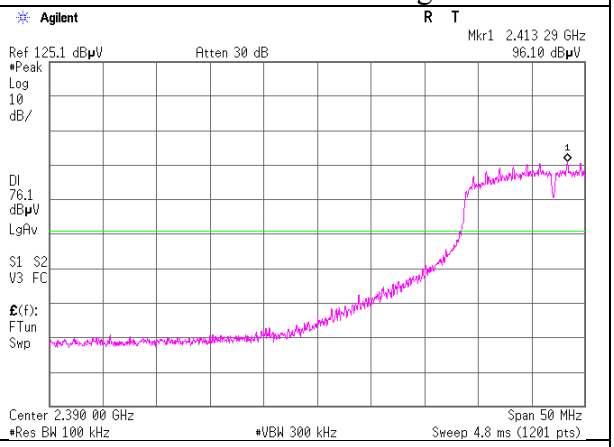
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	96.1	26.9	6.2	32.7	96.5	-	-	Carrier
Hori	2400.000	PK	63.8	26.9	6.2	32.7	64.2	76.5	12.3	
Vert	2412.000	PK	95.9	26.9	6.2	32.7	96.3	-	-	Carrier
Vert	2400.000	PK	64.8	26.9	6.2	32.7	65.2	76.3	11.1	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amprifier)

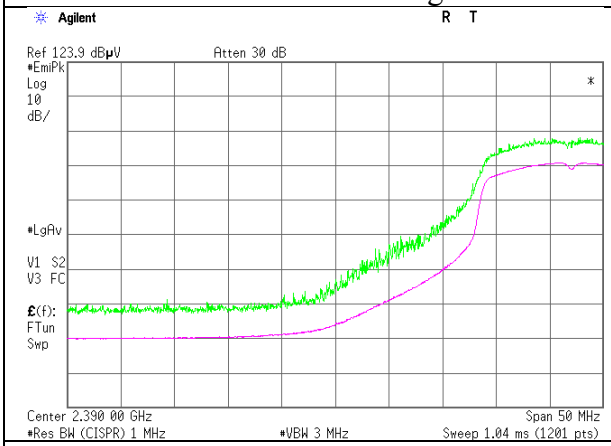
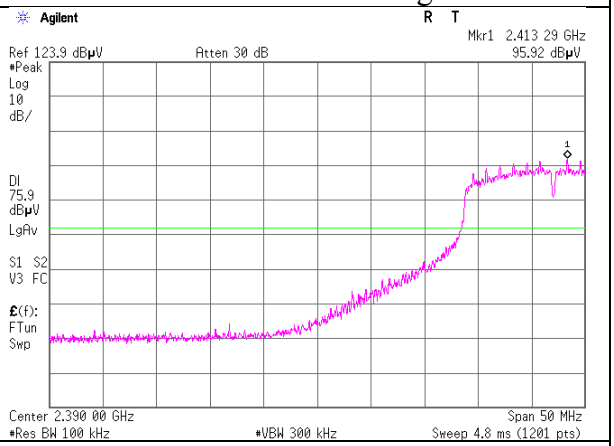
Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11212787H
Date	April 1, 2016
Temperature / Humidity	24 deg. C / 40 % RH
Engineer	Takumi Shimada (Above 1GHz)
Mode	Tx 11g 2412 MHz

Horizontal

Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical

Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

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

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

Test place	Ise EMC Lab.		
Report No.	11212787H		
Semi Anechoic Chamber	No.2	No.3	No.1
Date	March 30, 2016	April 1, 2016	April 4, 2016
Temperature / Humidity	20 deg. C / 34 % RH	24 deg. C / 40 % RH	25 deg. C / 47 % RH
Engineer	Takafumi Noguchi (30 - 1000MHz)	Takumi Shimada (Above 1GHz)	Tomoki Matsui (Below 30MHz)
Mode	Tx 11g 2442 MHz		

Below 30MHz

QP

Ant Deg [deg] or Polarity [Hori/Vert]	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0	3.63200	QP	30.2	19.5	-33.5	32.3	-	-16.1	29.5	45.6	Floor Noise

Result = Reading + Ant Factor + Loss (Cable + Attenuator + Filter + D.Factor) - Gain(Amprifier)

Above 30MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	114.220	QP	29.5	12.1	7.6	28.1	-	21.1	43.5	22.4	
Hori	160.001	QP	31.0	15.3	7.9	27.9	-	26.3	43.5	17.2	
Hori	236.901	QP	33.0	17.6	8.3	27.5	-	31.4	46.0	14.6	
Hori	249.370	QP	31.0	17.9	8.4	27.4	-	29.9	46.0	16.1	
Hori	274.307	QP	30.0	18.9	8.6	27.4	-	30.1	46.0	15.9	
Hori	299.243	QP	32.0	19.7	8.8	27.4	-	33.1	46.0	12.9	
Hori	4884.000	PK	39.3	32.0	8.1	31.7	-	47.7	73.9	26.2	Floor Noise
Hori	6512.027	PK	40.8	34.6	8.8	32.2	-	52.0	73.9	21.9	
Hori	7326.000	PK	40.1	36.0	8.9	32.6	-	52.4	73.9	21.5	Floor Noise
Hori	9768.000	PK	39.8	38.2	9.6	33.3	-	54.3	73.9	19.6	Floor Noise
Hori	4884.000	AV	31.2	32.0	8.1	31.7	-	39.6	53.9	14.3	Floor Noise
Hori	6512.027	AV	32.8	34.6	8.8	32.2	0.4	44.4	53.9	9.5	
Hori	7326.000	AV	32.0	36.0	8.9	32.6	-	44.3	53.9	9.6	Floor Noise
Hori	9768.000	AV	31.9	38.2	9.6	33.3	-	46.4	53.9	7.5	Floor Noise
Vert	113.690	QP	34.2	12.0	7.5	28.1	-	25.6	43.5	17.9	
Vert	160.001	QP	25.9	15.3	7.9	27.9	-	21.2	43.5	22.3	
Vert	236.901	QP	32.8	17.6	8.3	27.5	-	31.2	46.0	14.8	
Vert	249.370	QP	30.5	17.9	8.4	27.4	-	29.4	46.0	16.6	
Vert	274.307	QP	31.6	18.9	8.6	27.4	-	31.7	46.0	14.3	
Vert	299.243	QP	29.6	19.7	8.8	27.4	-	30.7	46.0	15.3	
Vert	4884.000	PK	40.8	32.0	8.1	31.7	-	49.2	73.9	24.7	Floor Noise
Vert	6512.027	PK	41.6	34.6	8.8	32.2	-	52.8	73.9	21.1	
Vert	7326.000	PK	40.1	36.0	8.9	32.6	-	52.4	73.9	21.5	Floor Noise
Vert	9768.000	PK	39.6	38.2	9.6	33.3	-	54.1	73.9	19.8	Floor Noise
Vert	4884.000	AV	32.4	32.0	8.1	31.7	-	40.8	53.9	13.1	Floor Noise
Vert	6512.027	AV	34.7	34.6	8.8	32.2	0.4	46.3	53.9	7.6	
Vert	7326.000	AV	32.3	36.0	8.9	32.6	-	44.6	53.9	9.3	Floor Noise
Vert	9768.000	AV	31.6	38.2	9.6	33.3	-	46.1	53.9	7.8	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11212787H
Date	April 1, 2016
Temperature / Humidity	24 deg. C / 40 % RH
Engineer	Takumi Shimada
	(Above 1GHz)
Mode	Tx 11g 2462 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	65.8	26.9	6.2	32.6	-	66.3	73.9	7.6	
Hori	4924.000	PK	40.7	32.0	8.0	31.7	-	49.0	73.9	24.9	Floor Noise
Hori	6565.370	PK	40.4	34.7	8.8	32.3	-	51.6	73.9	22.3	
Hori	7386.000	PK	40.4	36.0	8.9	32.7	-	52.6	73.9	21.3	Floor Noise
Hori	9848.000	PK	41.1	38.2	9.6	33.3	-	55.6	73.9	18.3	Floor Noise
Hori	2483.500	AV	47.9	26.9	6.2	32.6	0.4	48.8	53.9	5.1	*1)
Hori	4924.000	AV	29.1	32.0	8.0	31.7	-	37.4	53.9	16.5	Floor Noise
Hori	6565.370	AV	30.2	34.7	8.8	32.3	0.4	41.8	53.9	12.1	
Hori	7386.000	AV	29.7	36.0	8.9	32.7	-	41.9	53.9	12.0	Floor Noise
Hori	9848.000	AV	30.3	38.2	9.6	33.3	-	44.8	53.9	9.1	Floor Noise
Vert	2483.500	PK	64.8	26.9	6.2	32.6	-	65.3	73.9	8.6	
Vert	4924.000	PK	40.4	32.0	8.0	31.7	-	48.7	73.9	25.2	Floor Noise
Vert	6565.370	PK	41.9	34.7	8.8	32.3	-	53.1	73.9	20.8	
Vert	7386.000	PK	40.7	36.0	8.9	32.7	-	52.9	73.9	21.0	Floor Noise
Vert	9848.000	PK	40.7	38.2	9.6	33.3	-	55.2	73.9	18.7	Floor Noise
Vert	2483.500	AV	49.5	26.9	6.2	32.6	0.4	50.4	53.9	3.5	*1)
Vert	4924.000	AV	29.4	32.0	8.0	31.7	-	37.7	53.9	16.2	Floor Noise
Vert	6565.370	AV	33.3	34.7	8.8	32.3	0.4	44.9	53.9	9.0	
Vert	7386.000	AV	29.6	36.0	8.9	32.7	-	41.8	53.9	12.1	Floor Noise
Vert	9848.000	AV	30.2	38.2	9.6	33.3	-	44.7	53.9	9.2	Floor Noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.5 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

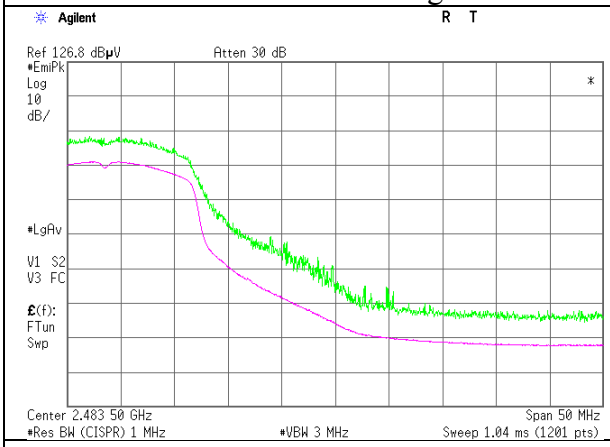
*1) Not Out of Band emission(Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11212787H
Date	April 1, 2016
Temperature / Humidity	24 deg. C / 40 % RH
Engineer	Takumi Shimada (Above 1GHz)
Mode	Tx 11g 2462 MHz

Horizontal

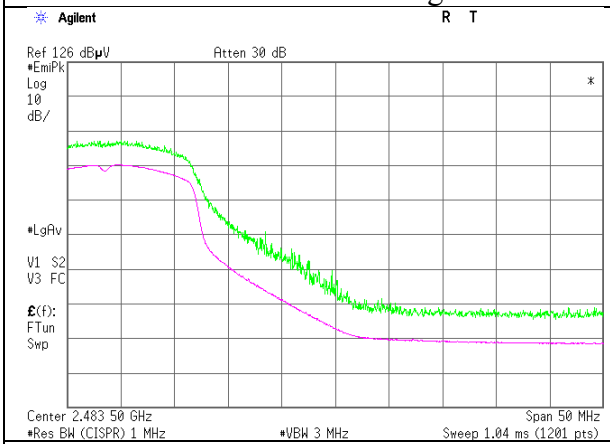
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11212787H
Date	April 1, 2016
Temperature / Humidity	24 deg. C / 40 % RH
Engineer	Takumi Shimada
	(Above 1GHz)
Mode	Tx 11n-20 2412 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2390.000	PK	64.7	26.9	6.2	32.7	-	65.1	73.9	8.8	
Hori	2390.000	AV	40.1	26.9	6.2	32.7	4.9	45.4	53.9	8.5	*1),*2)
Vert	2390.000	PK	66.2	26.9	6.2	32.7	-	66.6	73.9	7.3	
Vert	2390.000	AV	42.2	26.9	6.2	32.7	4.9	47.5	53.9	6.4	*1),*2)

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.5 dB

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

*1) Not Out of Band emission(Leakage Power)

*2) Integration Method

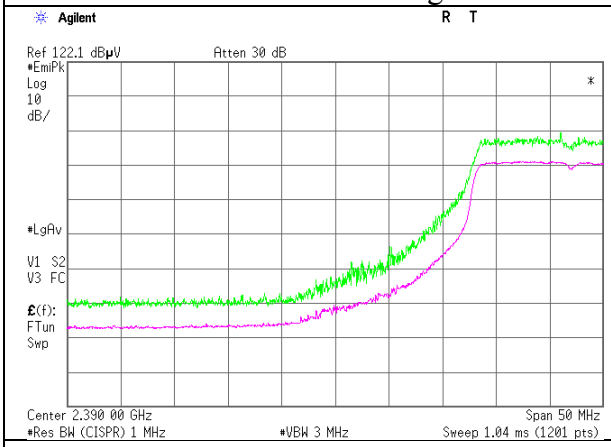
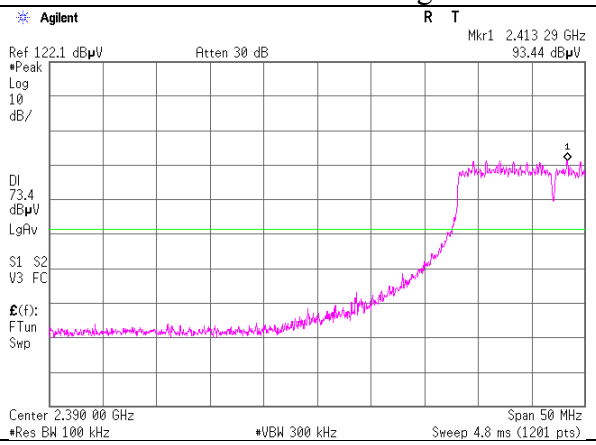
20dBc Data Sheet

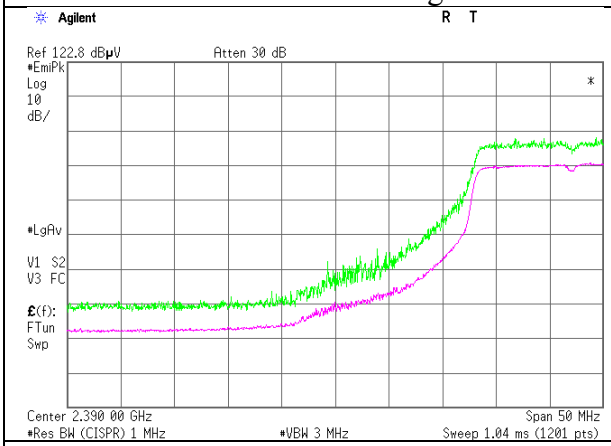
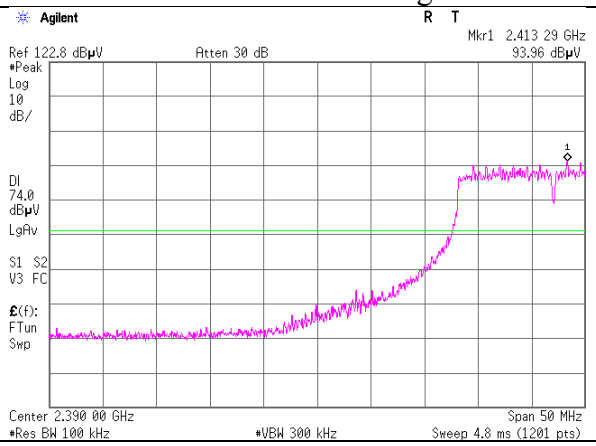
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2412.000	PK	93.4	26.9	6.2	32.7	93.8	-	-	Carrier
Hori	2400.000	PK	63.3	26.9	6.2	32.7	63.7	73.8	10.1	
Vert	2412.000	PK	94.0	26.9	6.2	32.7	94.4	-	-	Carrier
Vert	2400.000	PK	62.5	26.9	6.2	32.7	62.9	74.4	11.5	

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amprifier)

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11212787H
Date	April 1, 2016
Temperature / Humidity	24 deg. C / 40 % RH
Engineer	Takumi Shimada (Above 1GHz)
Mode	Tx 11n-20 2412 MHz

Horizontal	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

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

Radiated Spurious Emission

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11212787H
Date	April 1, 2016
Temperature / Humidity	24 deg. C / 40 % RH
Engineer	Takumi Shimada (Above 1GHz)
Mode	Tx 11n-20 2462 MHz

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2483.500	PK	66.6	26.9	6.2	32.6	-	67.1	73.9	6.8	
Hori	2483.500	AV	43.7	26.9	6.2	32.6	4.9	49.1	53.9	4.8	*1),*2)
Vert	2483.500	PK	67.9	26.9	6.2	32.6	-	68.4	73.9	5.5	
Vert	2483.500	AV	45.0	26.9	6.2	32.6	4.9	50.4	53.9	3.5	*1),*2)

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

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

Distance factor: 1 GHz - 10 GHz 20log (4.5 m / 3.0 m) = 3.5 dB

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

*1) Not Out of Band emission(Leakage Power)

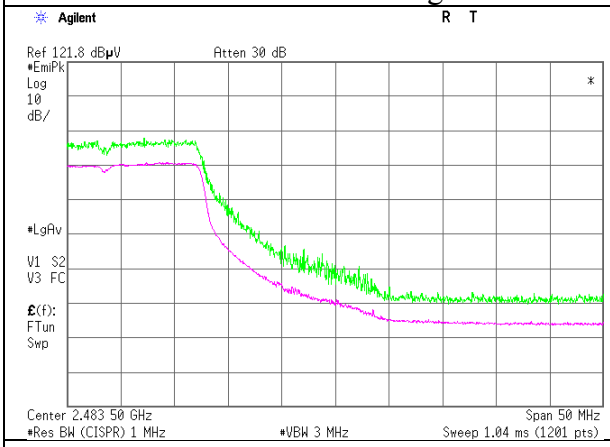
*2) Integration Method

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11212787H
Date	April 1, 2016
Temperature / Humidity	24 deg. C / 40 % RH
Engineer	Takumi Shimada (Above 1GHz)
Mode	Tx 11n-20 2462 MHz

Horizontal

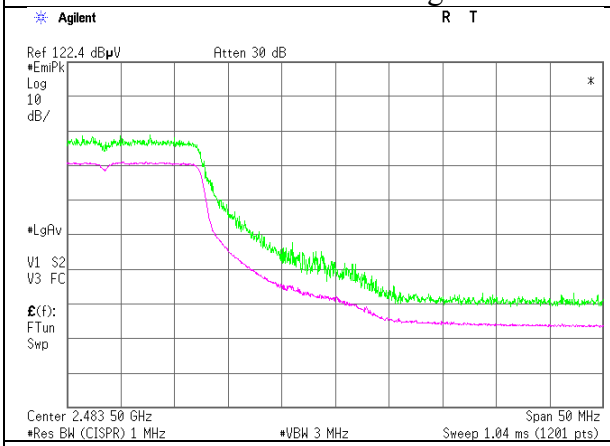
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

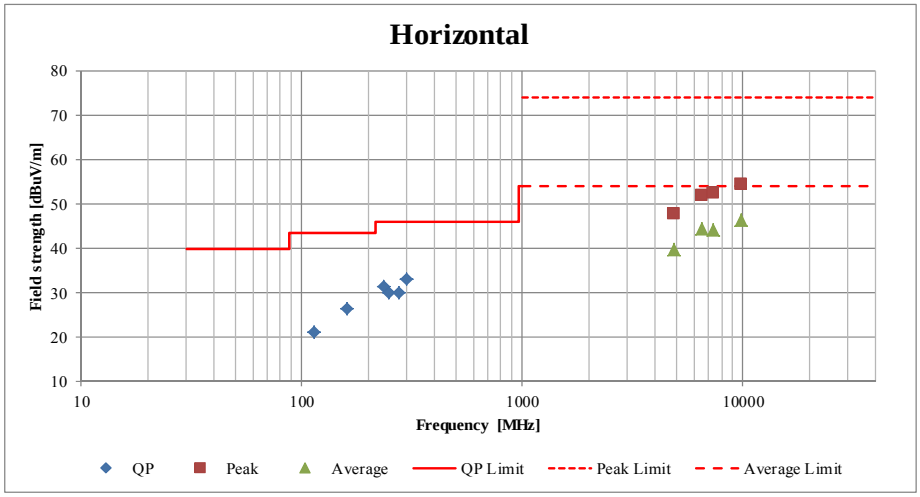


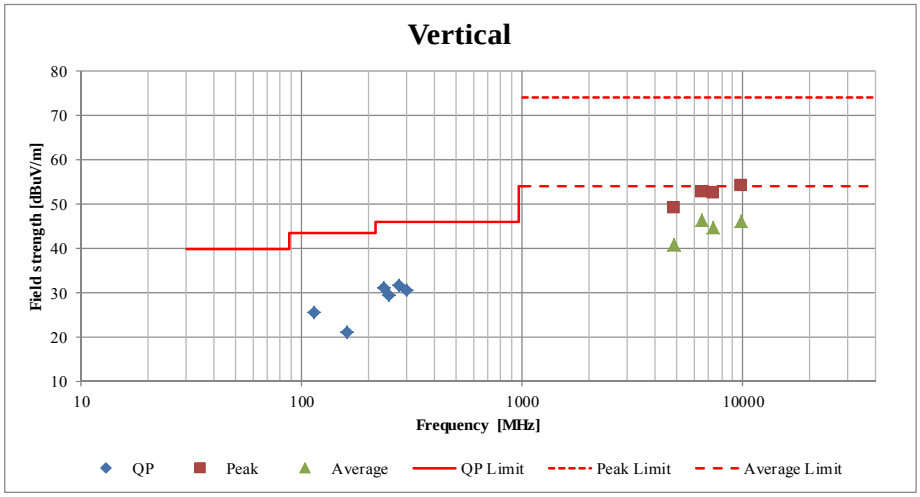
Trace Green : Peak Plot
Trace Purple : Average Plot

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

Radiated Spurious Emission
(Plot data, Worst case)

Test place	Ise EMC Lab.	
Report No.	11212787H	
Semi Anechoic Chamber	No.2	No.3
Date	March 30, 2016	April 1, 2016
Temperature / Humidity	20 deg. C / 34 % RH	24 deg. C / 40 % RH
Engineer	Takafumi Noguchi (Below 1 GHz)	Takumi Shimada (Above 1GHz)
Mode	Tx 11g 2442 MHz	





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

Power Density

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11212787H
Date	March 25, 2016
Temperature / Humidity	23 deg. C / 37 % RH
Engineer	Kazuya Yoshioka
Mode	Tx

11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-20.44	1.00	10.03	-9.41	8.00	17.41
2442.00	-18.90	1.01	10.03	-7.87	8.00	15.87
2462.00	-21.13	1.01	10.03	-10.09	8.00	18.09

11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-23.12	1.00	10.03	-12.09	8.00	20.09
2442.00	-21.01	1.01	10.03	-9.98	8.00	17.98
2462.00	-23.34	1.01	10.03	-12.30	8.00	20.30

11n-20

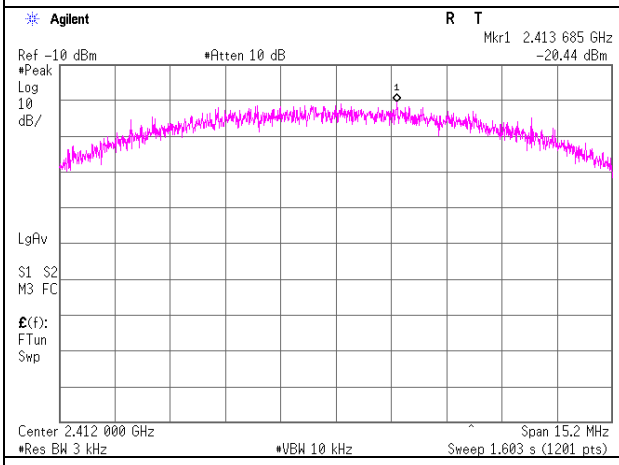
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	-27.00	1.00	10.03	-15.97	8.00	23.97
2442.00	-25.08	1.01	10.03	-14.05	8.00	22.05
2462.00	-26.78	1.01	10.03	-15.74	8.00	23.74

Sample Calculation:
Result = Reading + Cable Loss + Attenuator

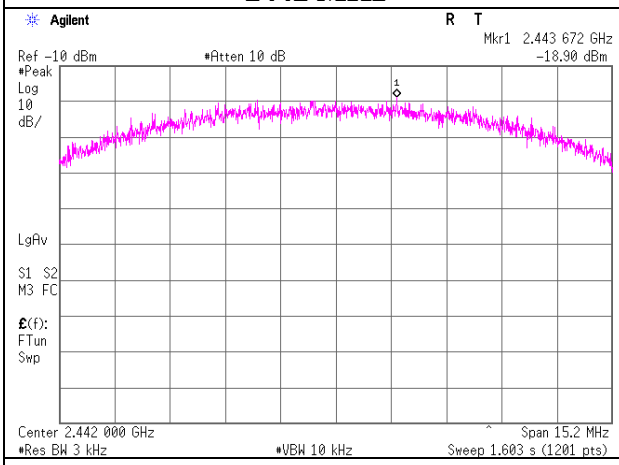
Power Density

11b

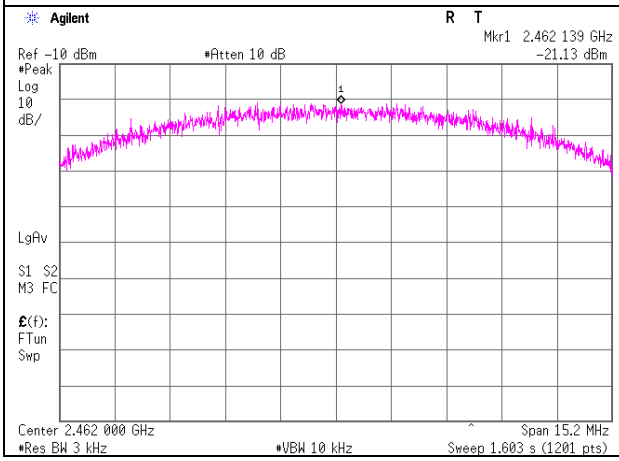
2412 MHz



2442 MHz

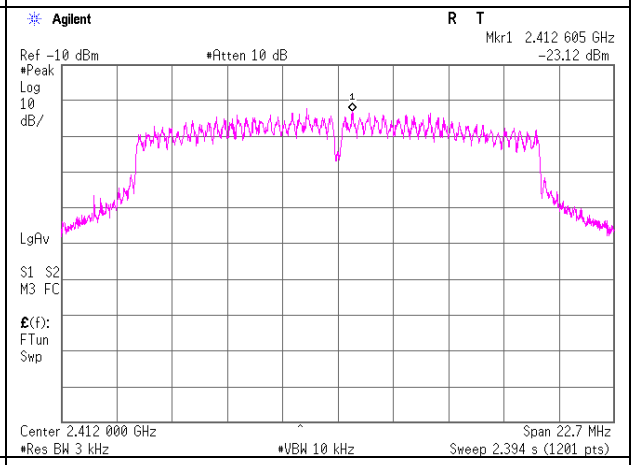


2462 MHz

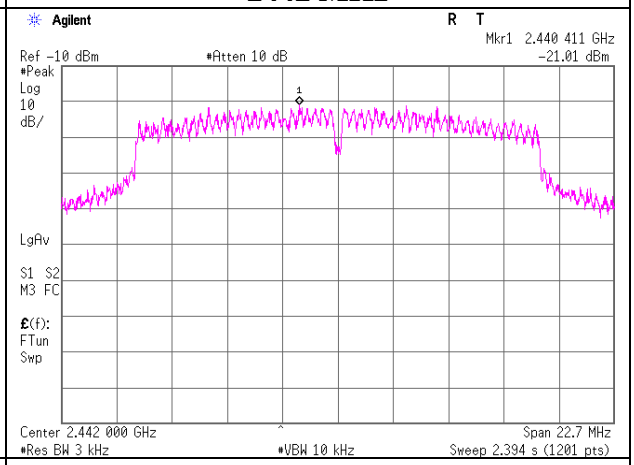


11g

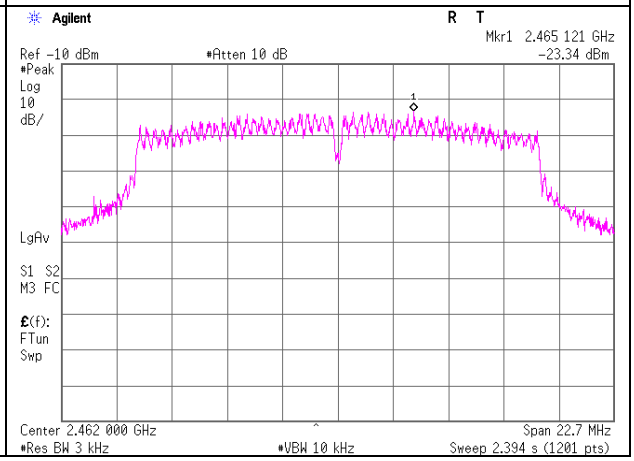
2412 MHz



2442 MHz



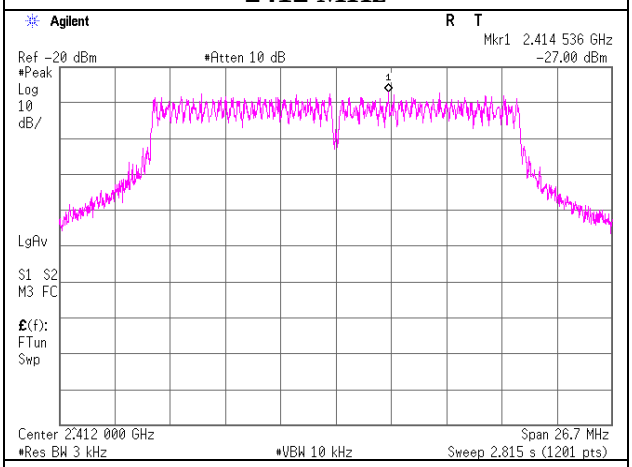
2462 MHz



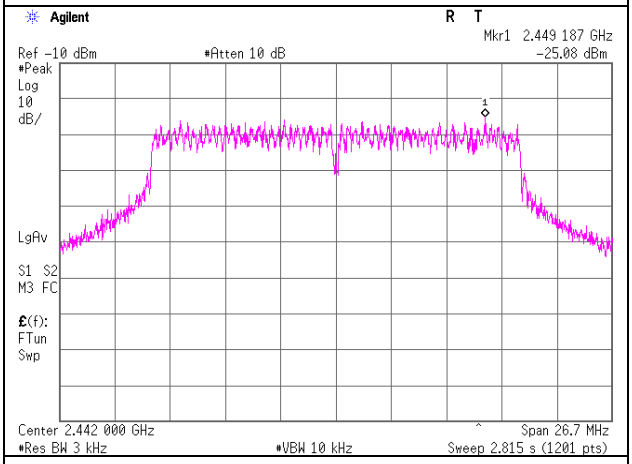
Power Density

11n-20

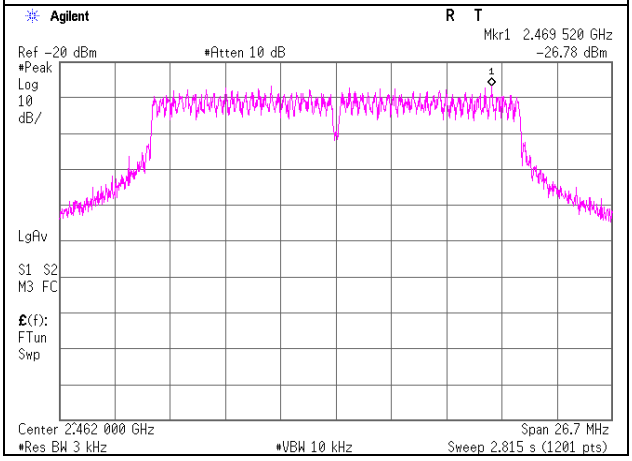
2412 MHz



2442 MHz

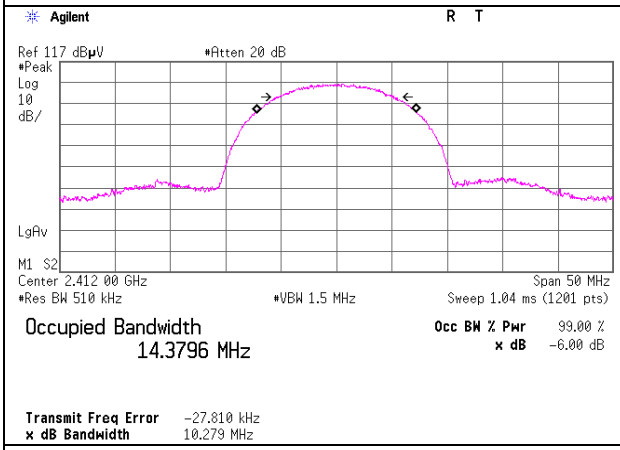
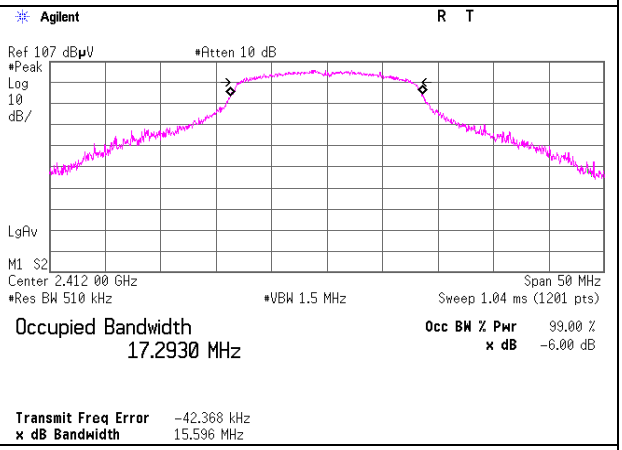
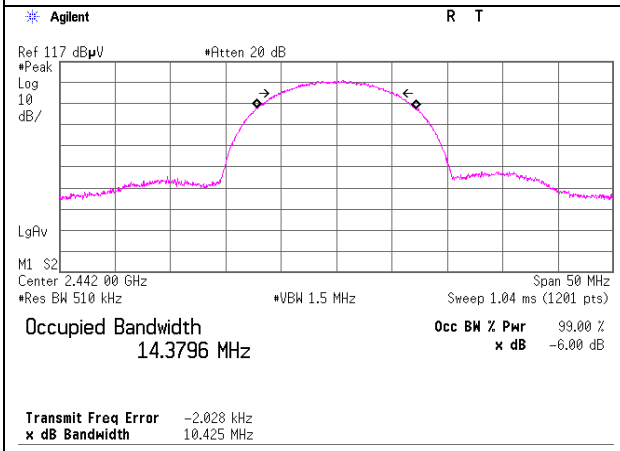
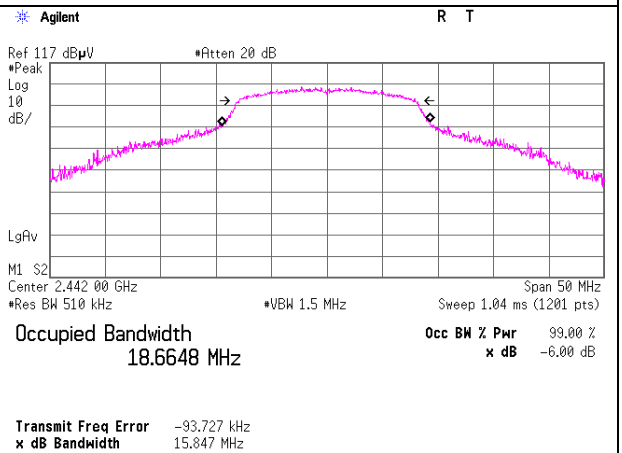
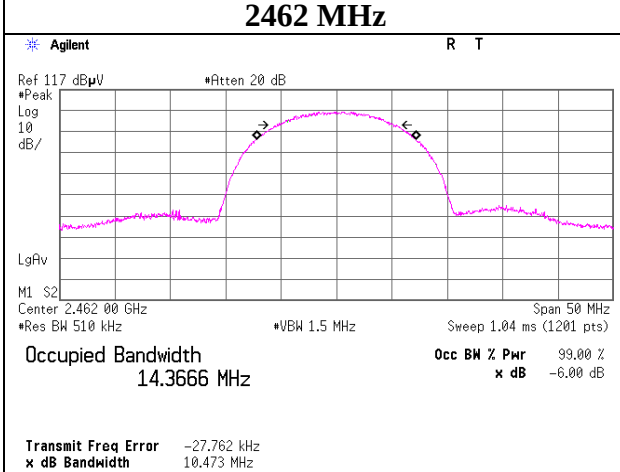
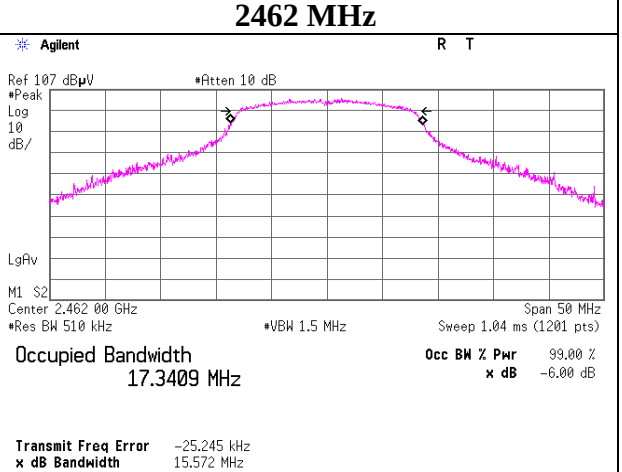


2462 MHz



99% Occupied Bandwidth

Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11212787H
Date	March 25, 2016
Temperature / Humidity	23 deg. C / 37 % RH
Engineer	Kazuya Yoshioka
Mode	Tx

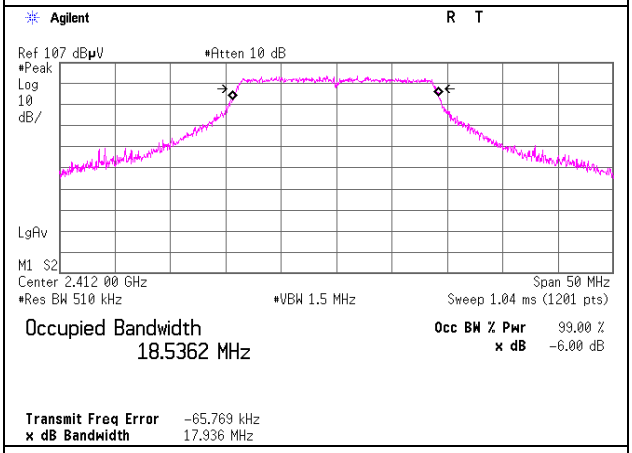
11b	11g
2412 MHz	**2412 MHz**
	
2442 MHz	**2442 MHz**
	
2462 MHz	**2462 MHz**
	

99% Occupied Bandwidth

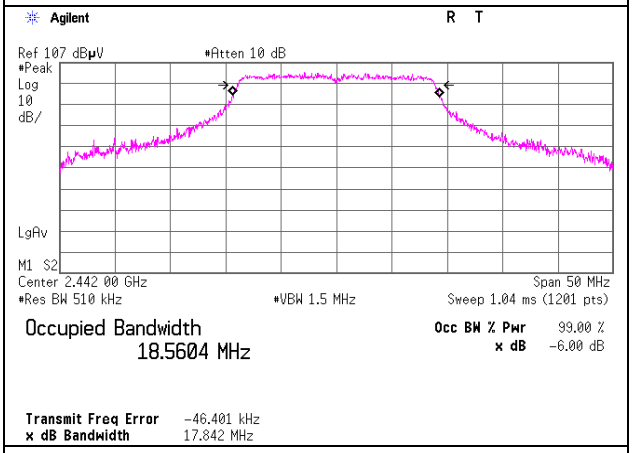
Test place	Ise EMC Lab. No.6 Measurement Room
Report No.	11212787H
Date	March 25, 2016
Temperature / Humidity	23 deg. C / 37 % RH
Engineer	Kazuya Yoshioka
Mode	Tx

11n-20

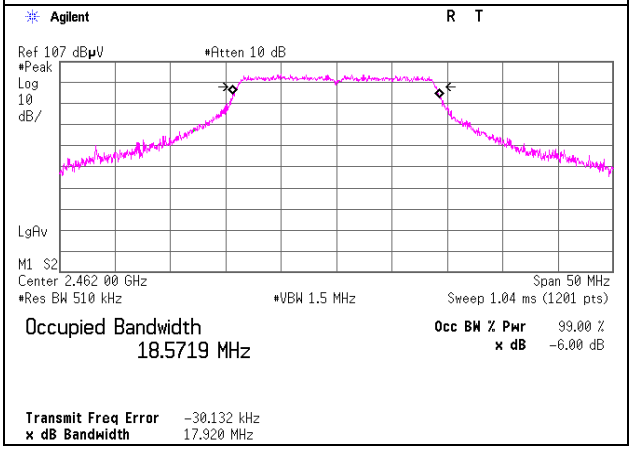
2412 MHz



2442 MHz



2462 MHz



APPENDIX 2: Test instruments

Test equipment (1/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MSA-16	Spectrum Analyzer	Agilent	E4440A	MY46186390	AT	2016/02/08 * 12
MPM-08	Power Meter	Anritsu	ML2495A	6K00003338	AT	2015/10/08 * 12
MPSE-11	Power sensor	Anritsu	MA2411B	011737	AT	2015/10/08 * 12
MAT-22	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	AT	2016/03/18 * 12
MCC-174	Microwave Cable	Junkosha	MWX221	1409S497	AT	2016/03/11 * 12
MCC-38	Coaxial Cable	UL Japan	-	-	AT	2015/12/07 * 12
MAT-10	Attenuator(10dB)	Weinschel Corp	2	BL1173	AT	2015/11/10 * 12
MOS-14	Thermo-Hygrometer	Custom	CTH-201	1401	AT	2016/01/21 * 12
MMM-12	DIGITAL HiTESTER	Hioki	3805	060500120	AT	2016/02/23 * 12
MAEC-02	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	CE/RE	2015/07/01 * 12
MOS-22	Thermo-Hygrometer	Custom	CTH-201	0003	CE/RE	2016/01/21 * 12
MJM-14	Measure	KOMELON	KMC-36	-	CE/RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	CE/RE	-
MSA-10	Spectrum Analyzer	Agilent	E4448A	MY46180655	CE	2016/02/24 * 12
MTR-03	Test Receiver	Rohde & Schwarz	ESCI	100300	CE/RE	2015/10/11 * 12
MLS-23	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	CE(EUT)	2015/07/10 * 12
MLS-24	LISN(AMN)	Schwarzbeck	NSLK8127	8127-730	CE(AE)	2015/07/10 * 12
MTA-31	Terminator	TME	CT-01	-	CE	2016/01/12 * 12
MCC-13	Coaxial Cable	Fujikura	3D-2W(12m)/5D-2W(5m)/5D-2W(0.8m)/5D-2W(1m)	-	CE	2016/02/08 * 12
MAT-65	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	CE	2016/01/14 * 12
MMM-01	Digital Tester	Fluke	FLUKE 26-3	78030611	CE/RE	2015/08/19 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2015/10/01 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE	2016/01/21 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2015/05/18 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2015/05/18 * 12
MHF-25	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	001	RE	2015/09/16 * 12
MCC-167	Microwave Cable	Junkosha	MWX221	1404S374(1m) / 1405S074(5m)	RE	2015/05/21 * 12
MPA-11	MicroWave System Amplifier	Agilent	83017A	MY39500779	RE	2016/03/24 * 12
MMM-08	DIGITAL HiTESTER	Hioki	3805	051201197	RE	2016/01/13 * 12
MBA-02	Biconical Antenna	Schwarzbeck	BBA9106	VHA91032008	RE	2015/10/11 * 12
MLA-05	Logperiodic Antenna	Rohde & Schwarz	ESLP9145	2	RE	Pre Check
MCC-12	Coaxial Cable	Fujikura/Agilent	-	-	RE	2016/02/08 * 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
MAEC-01	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	RE	2015/09/19 * 12
MOS-27	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	RE	2016/01/21 * 12
MJM-25	Measure	KOMELON	KMC-36	-	RE	-
MTR-09	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	RE	2015/06/08 * 12
MLPA-01	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100017	RE	2015/10/24 * 12
MCC-143	Coaxial Cable	UL Japan	-	-	RE	2015/06/24 * 12

Test equipment (2/2)

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MCC-03	Coaxial Cable	Fujikura/Suhner/TSJ	5D-2W(20m)/3D-2W(7.5m)/RG400u(1.5m)/RFM-E421(Switcher)	-/01068(Switcher)	RE	2015/09/29 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2016/03/24 * 12
MAT-08	Attenuator(6dB)	Weinschel Corp	2	BK7971	RE	2015/11/10 * 12
MMM-03	Digital Tester	Fluke	FLUKE 26-3	78030621	RE	2015/08/19 * 12
MSA-15	Spectrum Analyzer	Agilent	E4440A	MY46187105	RE	2015/11/11 * 12
MHA-16	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170306	RE	2015/05/19 * 12
MHF-06	High Pass Filter 3.5-24GHz	TOKIMEC	TF323DCA	601	RE	2015/05/15 * 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: **CE: Conducted Emission test**
RE: Radiated Emission test
AT: Antenna Terminal Conducted test