




RADIO TEST REPORT


Test Report No. : 11656716S-C-R2

Applicant : Nintendo Co., Ltd.
Type of Equipment : Portable Game Machine
Model No. : JAN-001
FCC ID : BKEJAN001
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. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. This report is a revised version of 11656716S-C-R1. 11656716S-C-R1 is replaced with this report.

Date of test: March 15 to 23, 2017

Representative test engineer: 
Hiroyuki Morikawa
Engineer
Consumer Technology Division

Approved by: 
Akio Hayashi
Leader
Consumer Technology Division



- The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
 There is no testing item of "Non-accreditation".

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11656716S-C

Revision	Test report No.	Date	Page revised	Contents
- (Original)	11656716S-C	May 10, 2017	-	-
1	11656716S-C-R1	May 22, 2017	4	Correction of specification
2	11656716S-C-R2	May 30, 2017	4-5	Correction

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SECTION 1: Customer information

Company Name : Nintendo Co., Ltd.
Address : 11-1 Hokotate-cho, Kamitoba, Minami-ku, Kyoto 601-8501, Japan
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Facsimile Number : +81-75-662-9624
Contact Person : Kazuya Kuramoto

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

2.1 Identification of E.U.T.

Type of Equipment : Portable Game Machine
Model No. : JAN-001
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 3.7 V (battery)
AC 100 V – 120 V, 50 Hz / 60 Hz (AC Adapter)
Receipt Date of Sample : February 28, 2017
Country of Mass-production : 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: JAN-001 (referred to as the EUT in this report) is a Portable Game Machine .

General Specification

Clock frequency(ies) in the system : Wireless LAN: 40 MHz, NFC: 13 MHz

Radio Specification

WLAN (IEEE802.11b/g, IEEE802.11)

Radio Type : Transceiver
Frequency of Operation : 2412 MHz - 2472 MHz
Modulation : DSSS
Antenna type : Dipole Antenna
Antenna Gain : 1.28 dBi
Operating Temperature : +5 deg. C - +35 deg. C

NFC

Radio Type : Transceiver
Frequency of Operation : 13.56 MHz
Modulation : ASK
Antenna type : Loop
Operating Temperature : +5 deg.C to +35 deg C.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on November 14, 2016 and effective December 14, 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	5.4 dB, 0.40190 MHz, N AV, Tx IEEE 802.11g 2412 MHz	Complied	-
6dB Bandwidth	FCC: KDB 558074 D01 DTS Meas Guidance v03r05 IC: -	FCC: Section 15.247(a)(2) IC: RSS-247 5.2(a)	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(d)		Complied	Conducted
Power Density	FCC: KDB 558074 D01 DTS Meas Guidance v03r05 IC: -	FCC: Section 15.247(e) IC: RSS-247 5.2(b)		Complied	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 DTS Meas Guidance v03r05 IC: RSS-Gen 6.13	FCC: Section 15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	5.9 dB 12310.00 MHz, AV, Horizontal, Tx IEEE 802.11g 2462 MHz	Complied	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *1)
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422. *1) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 DTS Meas Guidance v03r05 12.2.7.					

* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.

FCC Part 15.31 (e)

The EUT is supplied the power from battery and the test was performed with the full-charged battery. 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 EUT complies with the requirement.

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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

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

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Item	Frequency range	Uncertainty (+/-)				
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR	No. 5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.6 dB	2.5 dB	2.6 dB	2.5 dB	2.5 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.1 dB	3.1 dB	3.1 dB	-	-
	30 MHz-200 MHz	4.6 dB	4.4 dB	4.6 dB	-	-
	200 MHz-1 GHz	5.8 dB	5.7 dB	5.8 dB	-	-
	1 GHz-13 GHz	4.9 dB	4.9 dB	4.9 dB	-	-
Radiated emission (Measurement distance: 1 m)	13 GHz-18 GHz	4.6 dB	4.6 dB	4.6 dB	-	-
	18 GHz-40 GHz	4.9 dB	4.9 dB	4.9 dB	-	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.72 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.85 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.74 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	0.91 dB
Spurious emission (Conducted) below 1GHz	1.6 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.3 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.2 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.3 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.4 dB
Bandwidth Measurement	1.01 %
Duty cycle and Time Measurement	0.012 %

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 test report has enough margin, more than the site margin.

3.5 Test Location

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JAB Accreditation No. RTL02610

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	-	2.55 x 4.1 x 2.5	-	-

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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

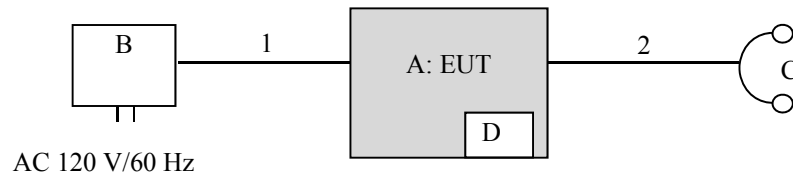
4.1 Operating Mode(s)

Test item	Mode	Tested frequency	Worst data mode *2)
Conducted emission Radiated emission (below 1 GHz) *1)	Transmitting (Tx) IEEE 802.11g (11g)	2412 MHz	PN9, 12 Mbps
6 dB bandwidth, Occupied Bandwidth (99 %), Maximum output power, Power density	Transmitting (Tx) IEEE 802.11b (11b)	2412 MHz, 2442 MHz, 2462 MHz, 2467 MHz, 2472 MHz *3)	PN9, 1 Mbps
	Transmitting (Tx) IEEE 802.11g (11g)	2412 MHz, 2437 MHz, 2462 MHz	PN9, 12 Mbps
	Transmitting (Tx) IEEE 802.11 (11)	2412 MHz, 2442 MHz, 2472 MHz	PN9, 2 Mbps
Radiated emission (above 1 GHz)	Transmitting (Tx) IEEE 802.11b (11b)	2412 MHz, 2442 MHz, 2462 MHz, 2472 MHz	PN9, 1 Mbps
	Transmitting (Tx) IEEE 802.11g (11g)	2412 MHz, 2437 MHz, 2462 MHz	PN9, 12 Mbps
	Transmitting (Tx) IEEE 802.11 (11)	2412 MHz, 2442 MHz, 2472 MHz	PN9, 2 Mbps
<p>*Power of the EUT was set by the software as follows; Power settings: Refer to Power setting (target power) table. (setting "Typical" value) Software: Art_Remote ver.1.0.0.0</p> <p>*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> <p>*1) 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 and also was judged the necessity of OFDM VHT mode by the pre-test.</p> <p>*2) The worst condition was determined based on the test result of Maximum Peak Output Power.</p> <p>*3) The channel on 2462 MHz and 2467 MHz were measured, since the power setting of the channel on 2462 MHz were higher than the channel on 2467 MHz and 2472 MHz.</p>			

(Power setting (target power) table)

			Min [dBm]	Typical [dBm]	Max [dBm]
802.11b	1-11ch	1-11 Mbps	3.5	5.5	7
	12-13ch	1-11 Mbps	-2	0	1.5
802.11g	1-11ch	6-24 Mbps	3	5	6.5
		36-48 Mbps	2	4	5.5
		54 Mbps	1.5	3.5	5
802.11	1-11ch	1 – 2 Mbps	-2	0	1.5

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

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Portable Game Machine	JAN-001	NJG000017190 *1) NJG000016155 *2)	NINTENDO	EUT
B	AC Adaptor	WAP-002	-	Mitsumi	-
C	Headphones	-	-	-	-
D	Micro SD card	-	-	Transcend	-

*1) Used for Antenna Terminal conducted test

*2) Used for Conducted Emission test and Radiated Emission test

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	1.9	Unshielded	Unshielded	-
2	Headphones	0.8	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. 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.

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.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT via AC adapter in a shielded room. The EUT via AC adapter 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 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m, raised 1.5 m above the conducting ground plane.

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

The height of the measuring antenna varied between 1 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 200 MHz	200 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 *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	Average Power Method: RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces If duty cycle was less than 98%, a duty factor was added to the results.	RBW: 100 kHz VBW: 300kHz
Test Distance	3 m	3.9 m *2) (1 GHz – 13 GHz), 1 m *3) (13 GHz – 26.5 GHz)		3.9 m *2) (1 GHz – 13 GHz), 1 m *3) (13 GHz – 26.5 GHz)

*1) Average Power Measurement was performed based on 6.0 & 12.2.5 of "KDB 558074 D01 DTS Meas Guidance v03r05".

*2) Distance Factor: $20 \times \log(3.9 \text{ m} / 3.0 \text{ m}) = 2.28 \text{ dB}$

*3) Distance Factor: $20 \times \log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

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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.

Antenna polarization	Carrier	Spurious (Below 1 GHz)	Spurious (1 GHz -13 GHz)	Spurious (13 GHz -26.5 GHz)
Horizontal	X	X	X	X
Vertical	Y	Y	Z	Z

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

Measurement range : 30 MHz - 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	9.1 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4)	9kHz to 150kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1 kHz	27 kHz				
*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". *4) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart. (9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 9.1 kHz)							

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

Test data : **APPENDIX**
Test result : **Pass**

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APPENDIX 1: Test data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

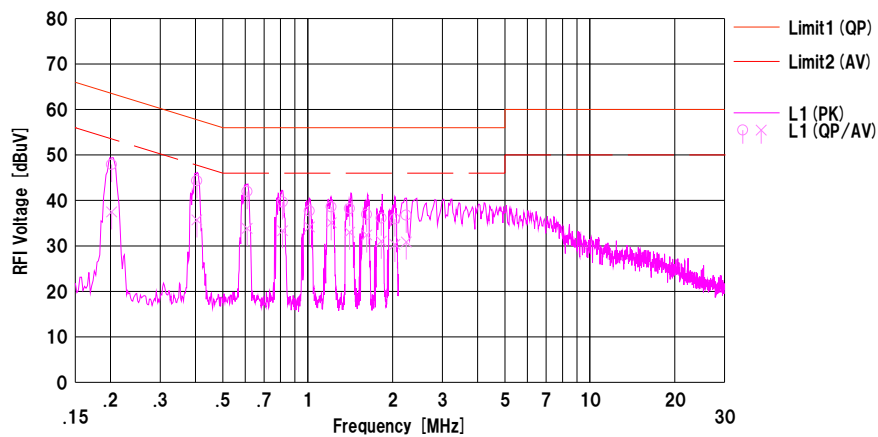
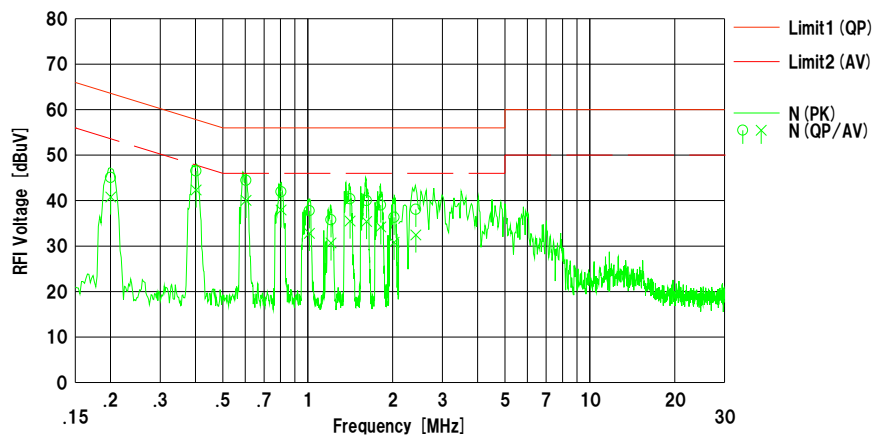
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
 Date : 2017/03/16

Mode : Tx, IEEE802.11g, 2412MHz
 Power : AC 120V / 60Hz
 Temp./Humi. : 22 deg.C / 28 %RH

Remarks : -

Limit1 : FCC 15C (15.207) QP
 Limit2 : FCC 15C (15.207) AV

Engineer : Hiroyuki Morikawa



Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
 LISN: SLS-05

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2017/03/16

Mode : Tx, IEEE802.11g, 2412MHz

Power : AC 120V / 60Hz
Temp./Humi. : 22 deg.C / 28 %RH

Remarks : -

Limit1 : FCC 15C (15.207) QP
Limit2 : FCC 15C (15.207) AV

Engineer : Hiroyuki Morikawa

<< QP/AV DATA >>

No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.20031	32.70	28.40	12.39	45.09	40.79	63.60	53.60	18.5	12.8	N	
2	0.40190	34.10	29.90	12.42	46.52	42.32	57.81	47.81	11.2	5.4	N	
3	0.80480	32.00	27.60	12.45	44.45	40.05	56.00	46.00	11.5	5.9	N	
4	0.80484	29.50	25.50	12.45	41.95	37.95	56.00	46.00	14.0	8.0	N	
5	1.01394	25.30	20.30	12.48	37.78	32.78	56.00	46.00	18.2	13.2	N	
6	1.20910	23.30	18.20	12.49	35.79	30.69	56.00	46.00	20.2	15.3	N	
7	1.41186	27.90	23.00	12.51	40.41	35.51	56.00	46.00	15.5	10.4	N	
8	1.61632	27.50	22.90	12.51	40.01	35.41	56.00	46.00	15.9	10.5	N	
9	1.81578	26.50	21.70	12.52	39.02	34.22	56.00	46.00	16.9	11.7	N	
10	2.02418	23.80	18.30	12.53	36.33	30.83	56.00	46.00	19.6	15.1	N	
11	2.41677	25.50	19.90	12.56	38.06	32.46	56.00	46.00	17.9	13.5	N	
12	0.20168	35.50	25.10	12.39	47.89	37.49	63.54	53.54	15.6	16.0	L1	
13	0.40456	31.90	23.30	12.42	44.32	35.72	57.76	47.76	13.4	12.0	L1	
14	0.61010	29.50	21.40	12.45	41.95	33.85	56.00	46.00	14.0	12.1	L1	
15	0.81420	27.20	20.90	12.45	39.65	33.35	56.00	46.00	16.3	12.6	L1	
16	1.01422	25.20	21.70	12.48	37.68	34.18	56.00	46.00	18.3	11.8	L1	
17	1.21185	26.10	22.60	12.49	38.59	35.09	56.00	46.00	17.4	10.9	L1	
18	1.40721	25.70	20.50	12.51	38.21	33.01	56.00	46.00	17.7	12.9	L1	
19	1.61852	24.40	19.90	12.51	36.81	32.41	56.00	46.00	19.0	13.5	L1	
20	1.82259	23.60	18.50	12.52	36.12	31.02	56.00	46.00	19.8	14.9	L1	
21	2.03547	23.40	17.80	12.53	35.93	30.33	56.00	46.00	20.0	15.6	L1	
22	2.23618	24.20	18.30	12.55	36.75	30.85	56.00	46.00	19.2	15.1	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
LISN: SLS-05

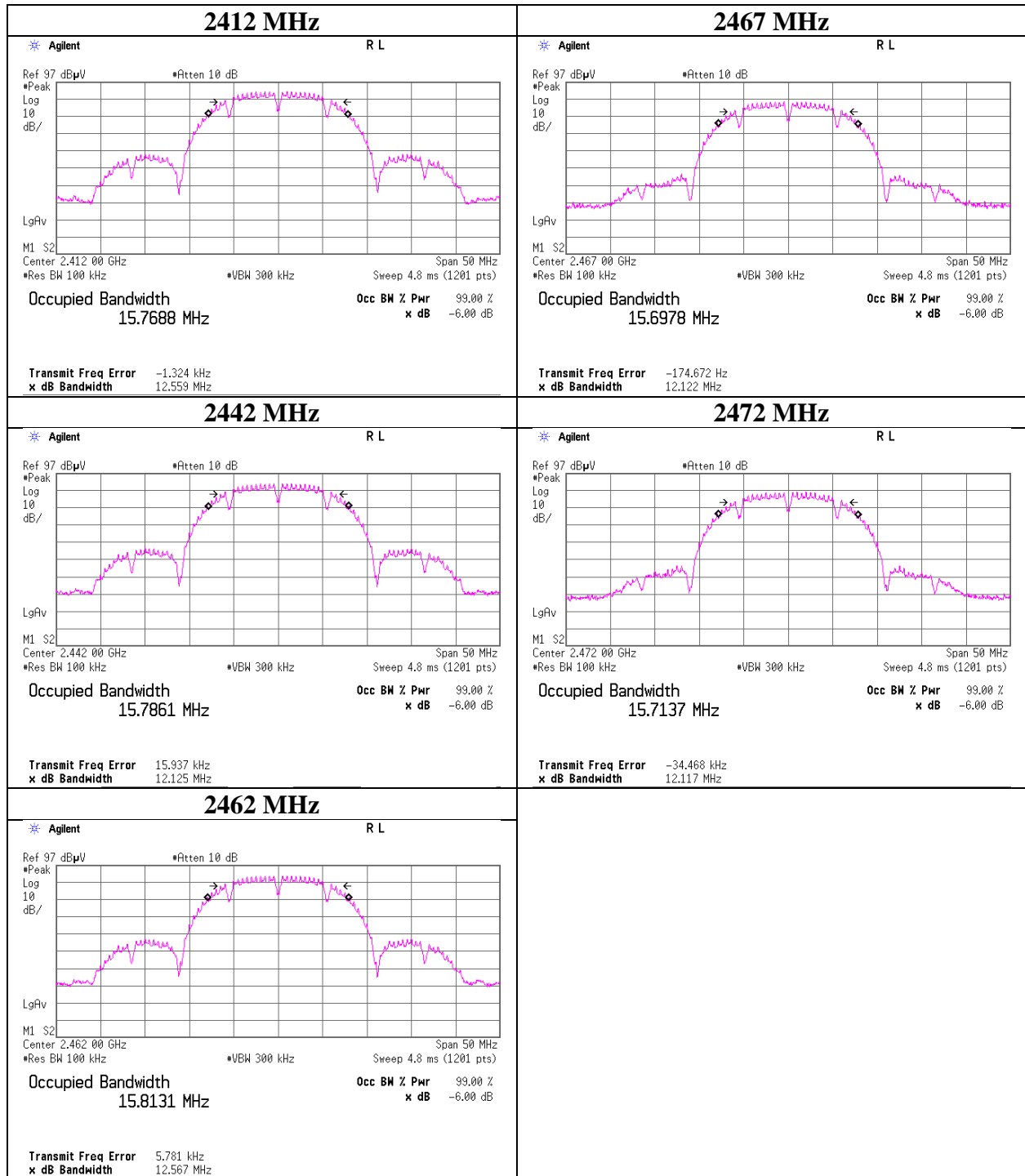
6 dB Bandwidth

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11656716S-C-R2
Date March 22, 2017 March 23, 2017
Temperature / Humidity 23 deg.C / 35 %RH 24 deg. C / 49 % RH
Engineer Kenichi Adachi Makoto Hosaka
Mode Tx

Mode	Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [kHz]
11b	2412	12.559	> 500
	2442	12.125	> 500
	2462	12.567	> 500
	2467	12.122	> 500
	2472	12.117	> 500
11g	2412	16.502	> 500
	2437	16.463	> 500
	2462	16.480	> 500
11	2412	12.131	> 500
	2442	12.432	> 500
	2472	12.756	> 500

6dB Bandwidth

11b



UL Japan, Inc.

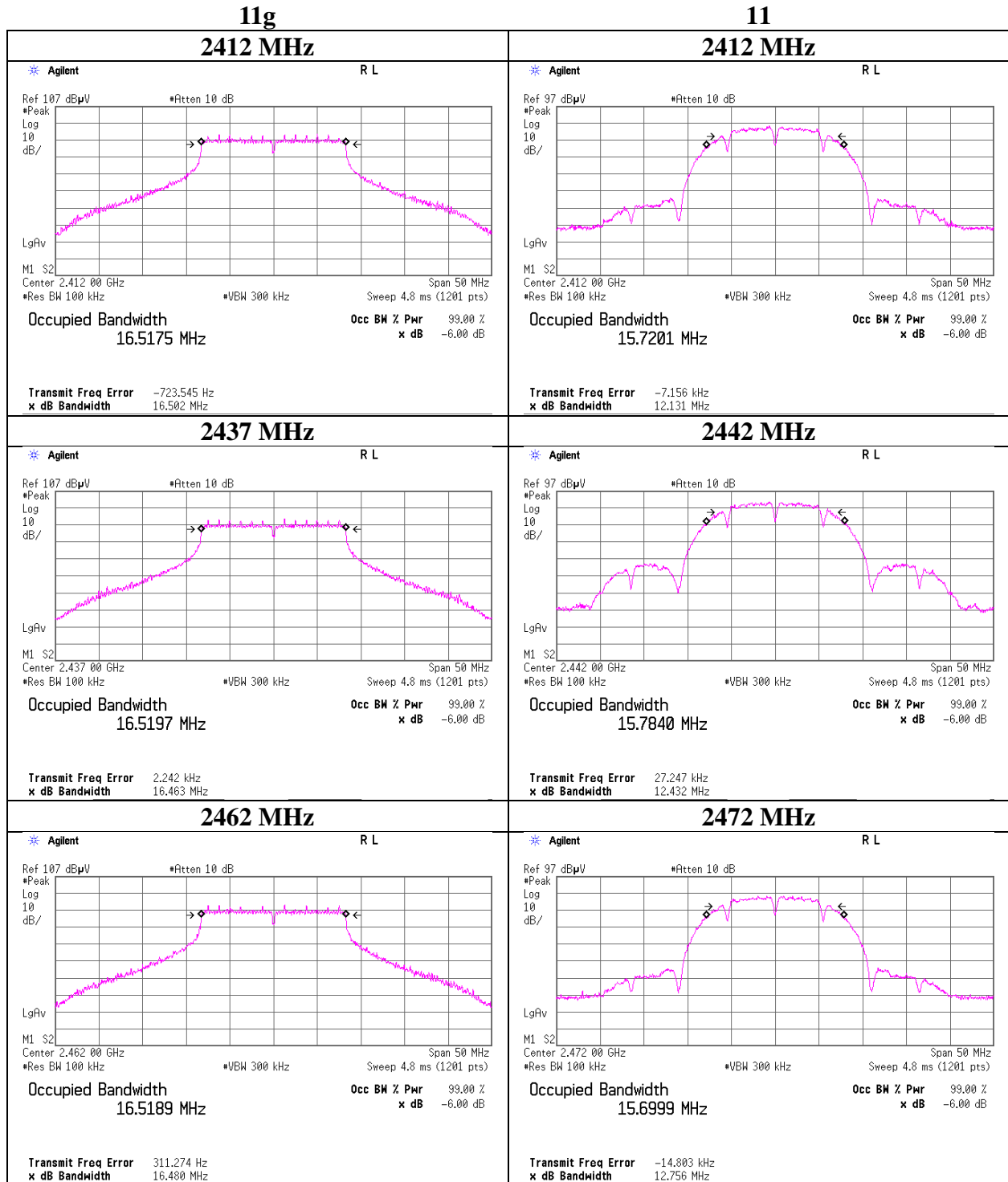
Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

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6dB Bandwidth



Maximum Peak Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11656716S-C-R2
Date	March 22, 2017
Temperature / Humidity	23 deg.C / 35 %RH
Engineer	Kenichi Adachi
Mode	Tx 11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	-3.00	1.16	9.97	8.13	6.50	30.00	1000	21.87
2442	-3.24	1.15	9.96	7.87	6.12	30.00	1000	22.13
2462	-3.68	1.15	9.96	7.43	5.53	30.00	1000	22.57
2467	-8.87	1.15	9.96	2.24	1.67	30.00	1000	27.76
2472	-8.57	1.16	9.96	2.55	1.80	30.00	1000	27.45

Sample Calculation:

Result = Reading + Cable Loss + Atten. Loss

*The equipment and cables were not used for factor 0 dB of the data sheets.

2442 MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	-3.24	*
2	-3.27	
5.5	-3.26	
11	-3.25	

*: Worst Rate

Maximum Peak Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11656716S-C-R2
Date	March 22, 2017
Temperature / Humidity	23 deg.C / 35 %RH
Engineer	Kenichi Adachi
Mode	Tx 11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	2.98	1.16	9.97	14.11	25.76	30.00	1000	15.89
2437	2.70	1.16	9.96	13.82	24.10	30.00	1000	16.18
2462	2.54	1.15	9.96	13.65	23.17	30.00	1000	16.35

Sample Calculation:

Result = Reading + Cable Loss + Atten. Loss

*The equipment and cables were not used for factor 0 dB of the data sheets.

2437 MHz

Rate [Mbps]	Reading [dBm]	Remark
6	2.35	
9	2.18	
12	2.70	*
18	2.48	
24	2.66	
36	1.23	
48	1.39	
54	1.34	

*: Worst Rate

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

Maximum Peak Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11656716S-C-R2
Date	March 15, 2017
Temperature / Humidity	23 deg.C / 28 %RH
Engineer	Hiroyuki Morikawa
Mode	Tx 11

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	-7.95	1.16	9.64	2.85	1.93	30.00	1000	27.15
2442	-8.28	1.15	9.64	2.51	1.78	30.00	1000	27.49
2472	-8.18	1.16	9.65	2.63	1.83	30.00	1000	27.37

Sample Calculation:

Result = Reading + Cable Loss + Atten. Loss

*The equipment and cables were not used for factor 0 dB of the data sheets.

2412 MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	-8.06	
2	-7.95	*

*: Worst Rate

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

Average Output Power
(Reference data for SAR testing)

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11656716S-C-R2
Date : March 22, 2017
Temperature / Humidity : 23 deg.C / 35 %RH
Engineer : Kenichi Adachi
Mode : Tx

11b 1 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-5.17	1.16	9.97	5.96	3.94	0.00	5.96	3.95
2442	-6.11	1.15	9.96	5.00	3.16	0.00	5.00	3.16
2462	-6.12	1.15	9.96	4.99	3.16	0.00	4.99	3.16
2467	-11.67	1.15	9.96	-0.56	0.88	0.00	-0.56	0.88
2472	-11.54	1.16	9.96	-0.42	0.91	0.00	-0.42	0.91

11g 12 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-5.71	1.16	9.97	5.42	3.48	0.01	5.43	3.49
2437	-6.26	1.16	9.96	4.86	3.06	0.01	4.87	3.07
2462	-6.27	1.15	9.96	4.84	3.05	0.01	4.85	3.06

11 2 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-11.24	1.16	9.64	-0.44	0.90	0.00	-0.44	0.90
2442	-11.22	1.15	9.64	-0.43	0.91	0.00	-0.43	0.91
2472	-11.26	1.16	9.65	-0.45	0.90	0.00	-0.45	0.90

Sample Calculation:

Result (Time average) = Reading + Cable Loss + Attenuator Loss

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

Average Output Power
(Reference data for SAR testing)

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11656716S-C-R2
Date : March 22, 2017
Temperature / Humidity : 23 deg.C / 35 %RH
Engineer : Kenichi Adachi
Mode : Tx

11b: 2442 MHz, 11g: 2437 MHz, 11: 2412 MHz

Mode	Rate Mbps	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11b	1	-6.11	0.00	-6.11	*
	2	-6.27	0.00	-6.27	
	5.5	-6.24	0.00	-6.24	
	11	-6.26	0.00	-6.26	
11g	6	-6.32	0.01	-6.31	
	9	-6.27	0.01	-6.26	
	12	-6.26	0.01	-6.25	*
	18	-6.30	0.01	-6.29	
	24	-6.36	0.02	-6.34	
	36	-7.62	0.03	-7.59	
	48	-7.58	0.03	-7.55	
11	1	-11.33	0.00	-11.33	
	2	-11.24	0.00	-11.24	*

* Worst rate

Sample Calculation:

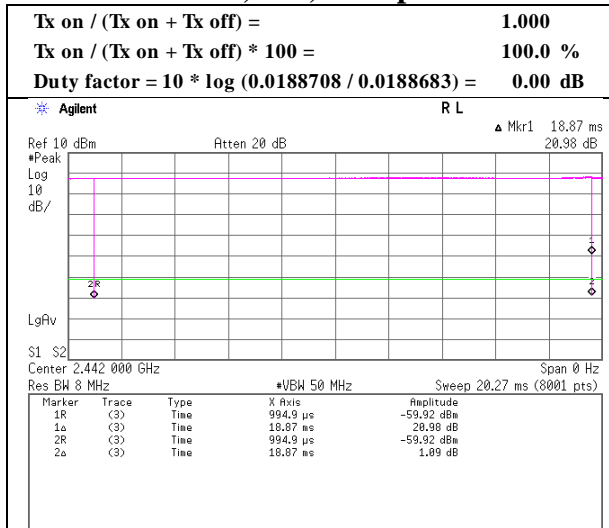
$$\text{Burst power} = \text{Reading (timed average)} + \text{Duty factor}$$

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

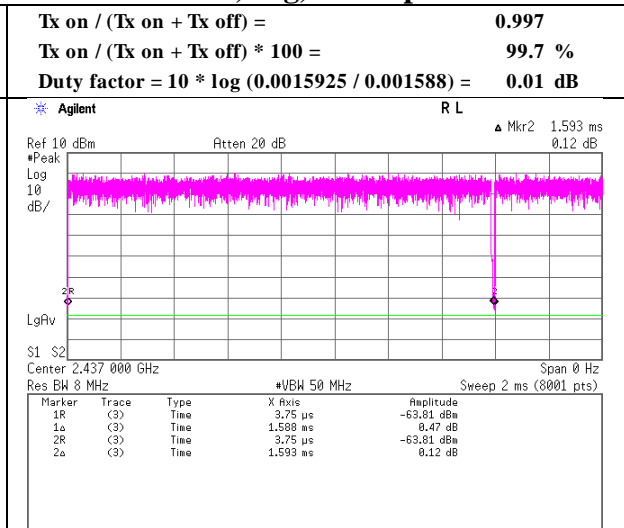
Burst rate confirmation
(for Average output power)

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11656716S-C-R2
Date : March 23, 2017
Temperature / Humidity : 24 deg. C / 49 % RH
Engineer : Makoto Hosaka
Mode : Tx

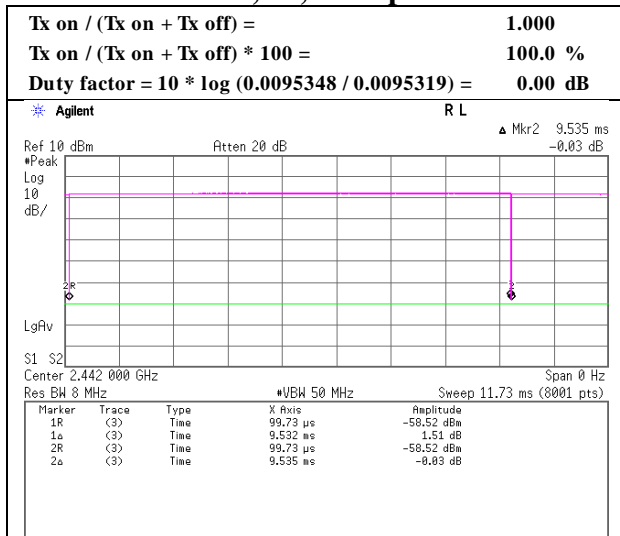
Tx, 11b, 1 Mbps



Tx, 11g, 12 Mbps



Tx, 11, 2 Mbps



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

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	11656716S-C-R2		
Date	March 15, 2017	March 15, 2017	March 17, 2017
Temperature / Humidity	21 deg. C / 30 % RH	22 deg. C / 28 % RH	22 deg. C / 28 % RH
Engineer	Hikaru Shirasawa (1-2.8GHz, 3SAC)	Hiroyuki Morikawa (2.8-13GHz, 3SAC)	Kazutaka Takeyama (13-26.5GHz, 3SAC)
Mode	Tx 11b 2412 MHz		

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	44.97	27.41	14.21	39.77	2.28	49.10	73.90	24.8	127	336	
Hori.	3216.018	PK	47.17	28.57	6.00	39.96	2.28	44.06	73.90	29.8	102	290	
Hori.	4824.000	PK	46.90	31.17	6.66	40.17	2.28	46.84	73.90	27.0	115	337	
Hori.	7236.000	PK	45.30	36.52	8.17	41.55	2.28	50.72	73.90	23.1	150	0	
Hori.	9648.000	PK	44.38	38.66	9.11	39.81	2.28	54.62	73.90	19.2	150	0	
Hori.	12060.000	PK	44.07	39.29	10.35	40.18	2.28	55.81	73.90	18.0	150	0	
Hori.	2390.000	AV	35.21	27.41	14.21	39.77	2.28	39.34	53.90	14.5	127	336	
Hori.	3216.018	AV	40.97	28.57	6.00	39.96	2.28	37.86	53.90	16.0	102	290	
Hori.	4824.000	AV	41.28	31.17	6.66	40.17	2.28	41.22	53.90	12.6	115	337	
Hori.	7236.000	AV	36.57	36.52	8.17	41.55	2.28	41.99	53.90	11.9	150	0	
Hori.	9648.000	AV	35.35	38.66	9.11	39.81	2.28	45.59	53.90	8.3	150	0	
Hori.	12060.000	AV	35.54	39.29	10.35	40.18	2.28	47.28	53.90	6.6	150	0	
Vert.	2390.000	PK	44.32	27.41	14.21	39.77	2.28	48.45	73.90	25.4	201	71	
Vert.	3216.070	PK	46.33	28.57	6.00	39.96	2.28	43.22	73.90	30.6	100	266	
Vert.	4824.000	PK	45.35	31.17	6.66	40.17	2.28	45.29	73.90	28.6	124	226	
Vert.	7236.000	PK	44.96	36.52	8.17	41.55	2.28	50.38	73.90	23.5	150	0	
Vert.	9648.000	PK	43.57	38.66	9.11	39.81	2.28	53.81	73.90	20.0	150	0	
Vert.	12060.000	PK	44.20	39.29	10.35	40.18	2.28	55.94	73.90	17.9	150	0	
Vert.	2390.000	AV	35.11	27.41	14.21	39.77	2.28	39.24	53.90	14.6	201	71	
Vert.	3216.070	AV	40.05	28.57	6.00	39.96	2.28	36.94	53.90	16.9	100	266	
Vert.	4824.000	AV	38.73	31.17	6.66	40.17	2.28	38.67	53.90	15.2	124	226	
Vert.	7236.000	AV	37.02	36.52	8.17	41.55	2.28	42.44	53.90	11.4	150	0	
Vert.	9648.000	AV	35.37	38.66	9.11	39.81	2.28	45.61	53.90	8.3	150	0	
Vert.	12060.000	AV	35.55	39.29	10.35	40.18	2.28	47.29	53.90	6.6	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.9 m / 3.0 m) = 2.28 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	84.22	27.50	14.24	39.77	2.28	88.47	-	-	Carrier
Hori.	2397.001	PK	45.98	27.44	14.21	39.77	2.28	50.14	68.47	18.3	
Hori.	2400.000	PK	43.25	27.45	14.22	39.77	2.28	47.43	68.47	21.0	
Vert.	2412.000	PK	81.76	27.50	14.24	39.77	2.28	86.01	-	-	Carrier
Vert.	2396.998	PK	43.26	27.44	14.21	39.77	2.28	47.42	66.01	18.6	
Vert.	2400.000	PK	40.45	27.45	14.22	39.77	2.28	44.63	66.01	21.4	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.9 m / 3.0 m) = 2.28 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

UL Japan, Inc.

Shonan EMC Lab.

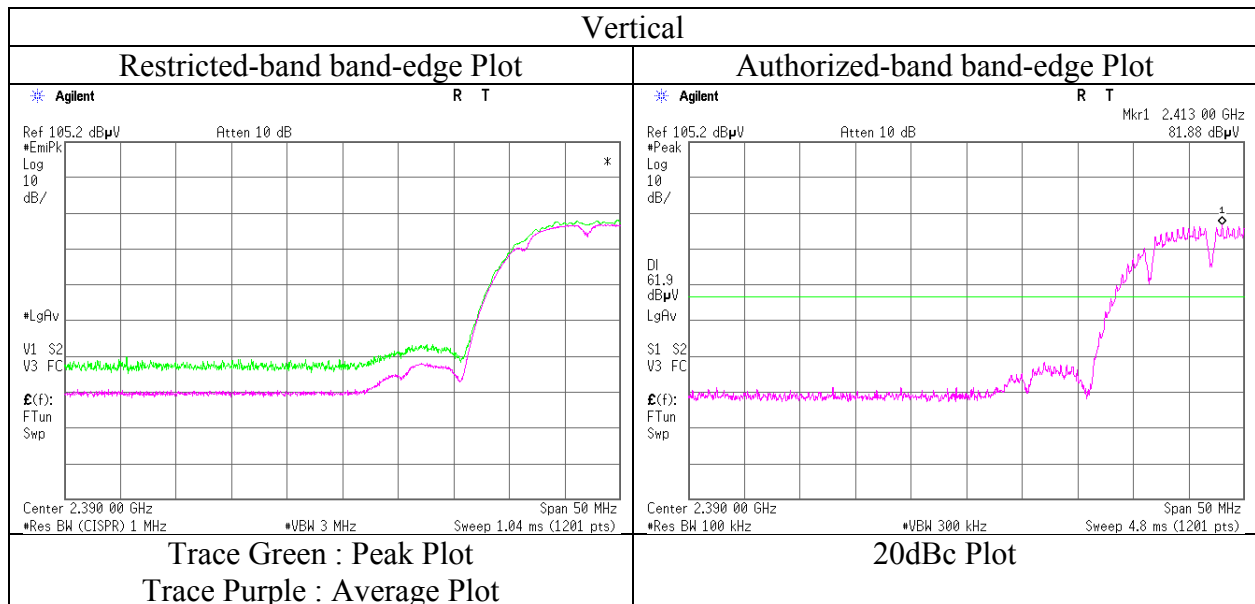
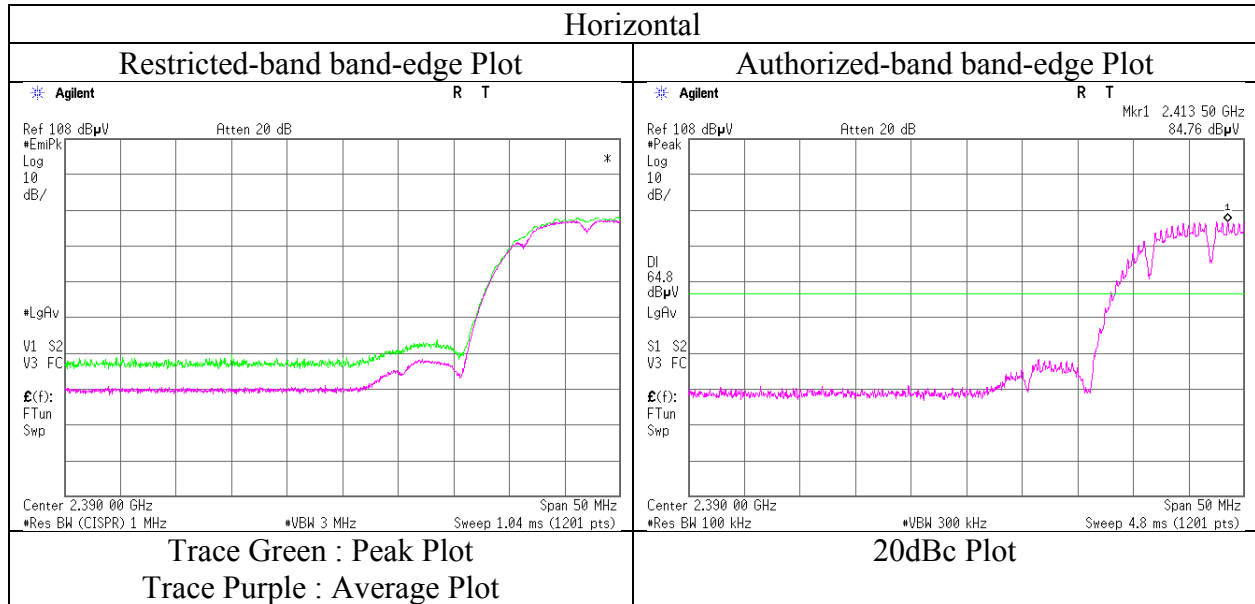
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Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11656716S-C-R2
Date	March 15, 2017
Temperature / Humidity	21 deg. C / 30 % RH
Engineer	Hikaru Shirasawa
Mode	Tx 11b 2412 MHz



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

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	11656716S-C-R2		
Date	March 15, 2017	March 15, 2017	March 17, 2017
Temperature / Humidity	21 deg. C / 30 % RH	22 deg. C / 28 % RH	22 deg. C / 28 % RH
Engineer	Hikaru Shirasawa (1-2.8GHz, 3SAC)	Hiroyuki Morikawa (2.8-13GHz, 3SAC)	Kazutaka Takeyama (13-26.5GHz, 3SAC)
Mode	Tx 11b 2442 MHz		

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	3256.016	PK	46.09	28.59	6.03	39.97	2.28	43.02	73.90	30.8	102	293	
Hori.	4884.000	PK	43.92	31.30	6.68	40.20	2.28	43.98	73.90	29.9	148	324	
Hori.	7326.000	PK	44.92	36.78	8.26	41.51	2.28	50.73	73.90	23.1	150	0	
Hori.	9768.000	PK	44.03	38.75	9.21	39.82	2.28	54.45	73.90	19.4	150	0	
Hori.	12210.000	PK	44.40	39.30	10.56	40.43	2.28	56.11	73.90	17.7	150	0	
Hori.	3256.016	AV	39.69	28.59	6.03	39.97	2.28	36.62	53.90	17.2	102	293	
Hori.	4884.000	AV	36.69	31.30	6.68	40.20	2.28	36.75	53.90	17.1	148	324	
Hori.	7326.000	AV	36.86	36.78	8.26	41.51	2.28	42.67	53.90	11.2	150	0	
Hori.	9768.000	AV	35.99	38.75	9.21	39.82	2.28	46.41	53.90	7.4	150	0	
Hori.	12210.000	AV	35.61	39.30	10.56	40.43	2.28	47.32	53.90	6.5	150	0	
Vert.	3256.015	PK	46.70	28.59	6.03	39.97	2.28	43.63	73.90	30.2	100	302	
Vert.	4884.000	PK	44.05	31.30	6.68	40.20	2.28	44.11	73.90	29.7	120	222	
Vert.	7326.000	PK	45.79	36.78	8.26	41.51	2.28	51.60	73.90	22.3	150	0	
Vert.	9768.000	PK	44.87	38.75	9.21	39.82	2.28	55.29	73.90	18.6	150	0	
Vert.	12210.000	PK	44.42	39.30	10.56	40.43	2.28	56.13	73.90	17.7	150	0	
Vert.	3256.015	AV	38.38	28.59	6.03	39.97	2.28	35.31	53.90	18.5	100	302	
Vert.	4884.000	AV	36.10	31.30	6.68	40.20	2.28	36.16	53.90	17.7	120	222	
Vert.	7326.000	AV	36.89	36.78	8.26	41.51	2.28	42.70	53.90	11.2	150	0	
Vert.	9768.000	AV	36.06	38.75	9.21	39.82	2.28	46.48	53.90	7.4	150	0	
Vert.	12210.000	AV	35.73	39.30	10.56	40.43	2.28	47.44	53.90	6.4	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.9 m / 3.0 m) = 2.28 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	11656716S-C-R2		
Date	March 15, 2017	March 15, 2017	March 17, 2017
Temperature / Humidity	21 deg. C / 30 % RH	22 deg. C / 28 % RH	22 deg. C / 28 % RH
Engineer	Hikaru Shirasawa (1-2.8GHz, 3SAC)	Hiroyuki Morikawa (2.8-13GHz, 3SAC)	Kazutaka Takeyama (13-26.5GHz, 3SAC)
Mode	Tx 11b 2462 MHz		

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	46.05	27.79	14.32	39.79	2.28	50.65	73.90	23.2	132	333	
Hori.	3282.700	PK	48.05	28.61	6.04	39.97	2.28	45.01	73.90	28.8	120	290	
Hori.	4924.000	PK	45.56	31.38	6.70	40.22	2.28	45.70	73.90	28.2	117	323	
Hori.	7386.000	PK	44.67	36.95	8.33	41.49	2.28	50.74	73.90	23.1	150	0	
Hori.	9848.000	PK	43.96	38.81	9.28	39.82	2.28	54.51	73.90	19.3	150	0	
Hori.	12310.000	PK	44.52	39.31	10.69	40.60	2.28	56.20	73.90	17.7	150	0	
Hori.	2483.500	AV	36.10	27.79	14.32	39.79	2.28	40.70	53.90	13.2	132	333	
Hori.	3282.700	AV	42.96	28.61	6.04	39.97	2.28	39.92	53.90	13.9	120	290	
Hori.	4924.000	AV	37.15	31.38	6.70	40.22	2.28	37.29	53.90	16.6	117	323	
Hori.	7386.000	AV	36.67	36.95	8.33	41.49	2.28	42.74	53.90	11.1	150	0	
Hori.	9848.000	AV	35.28	38.81	9.28	39.82	2.28	45.83	53.90	8.0	150	0	
Hori.	12310.000	AV	36.18	39.31	10.69	40.60	2.28	47.86	53.90	6.0	150	0	
Vert.	2483.500	PK	45.13	27.79	14.32	39.79	2.28	49.73	73.90	24.1	290	75	
Vert.	3282.659	PK	46.71	28.61	6.04	39.97	2.28	43.67	73.90	30.2	100	155	
Vert.	4924.000	PK	45.31	31.38	6.70	40.22	2.28	45.45	73.90	28.4	148	274	
Vert.	7386.000	PK	44.37	36.95	8.33	41.49	2.28	50.44	73.90	23.4	150	0	
Vert.	9848.000	PK	43.13	38.81	9.28	39.82	2.28	53.68	73.90	20.2	150	0	
Vert.	12310.000	PK	44.56	39.31	10.69	40.60	2.28	56.24	73.90	17.6	150	0	
Vert.	2483.500	AV	36.15	27.79	14.32	39.79	2.28	40.75	53.90	13.1	290	75	
Vert.	3282.659	AV	40.37	28.61	6.04	39.97	2.28	37.33	53.90	16.5	100	155	
Vert.	4924.000	AV	36.26	31.38	6.70	40.22	2.28	36.40	53.90	17.5	148	274	
Vert.	7386.000	AV	36.57	36.95	8.33	41.49	2.28	42.64	53.90	11.2	150	0	
Vert.	9848.000	AV	35.41	38.81	9.28	39.82	2.28	45.96	53.90	7.9	150	0	
Vert.	12310.000	AV	35.92	39.31	10.69	40.60	2.28	47.60	53.90	6.3	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.9 m / 3.0 m) = 2.28 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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Shonan EMC Lab.

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Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	11656716S-C-R2		
Date	March 15, 2017	March 15, 2017	March 17, 2017
Temperature / Humidity	21 deg. C / 30 % RH	22 deg. C / 28 % RH	22 deg. C / 28 % RH
Engineer	Hikaru Shirasawa (1-2.8GHz, 3SAC)	Hiroyuki Morikawa (2.8-13GHz, 3SAC)	Kazutaka Takeyama (13-26.5GHz, 3SAC)
Mode	Tx 11b 2472 MHz		

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	47.80	27.79	14.32	39.79	2.28	52.40	73.90	21.5	127	337	
Hori.	3295.986	PK	45.84	28.62	6.04	39.97	2.28	42.81	73.90	31.0	112	291	
Hori.	4944.000	PK	43.78	31.42	6.72	40.22	2.28	43.98	73.90	29.9	150	0	
Hori.	7416.000	PK	45.68	37.04	8.38	41.47	2.28	51.91	73.90	21.9	150	0	
Hori.	9888.000	PK	43.92	38.84	9.31	39.82	2.28	54.53	73.90	19.3	150	0	
Hori.	12360.000	PK	44.64	39.32	10.77	40.68	2.28	56.33	73.90	17.5	150	0	
Hori.	2483.500	AV	40.65	27.79	14.32	39.79	2.28	45.25	53.90	8.6	127	337	
Hori.	3295.986	AV	39.59	28.62	6.04	39.97	2.28	36.56	53.90	17.3	112	291	
Hori.	4944.000	AV	35.47	31.42	6.72	40.22	2.28	35.67	53.90	18.2	150	0	
Hori.	7416.000	AV	36.73	37.04	8.38	41.47	2.28	42.96	53.90	10.9	150	0	
Hori.	9888.000	AV	35.67	38.84	9.31	39.82	2.28	46.28	53.90	7.6	150	0	
Hori.	12360.000	AV	36.14	39.32	10.77	40.68	2.28	47.83	53.90	6.0	150	0	
Vert.	2483.500	PK	46.36	27.79	14.32	39.79	2.28	50.96	73.90	22.9	198	73	
Vert.	3296.030	PK	45.96	28.62	6.04	39.97	2.28	42.93	73.90	30.9	117	158	
Vert.	4944.000	PK	43.93	31.42	6.72	40.22	2.28	44.13	73.90	29.7	150	0	
Vert.	7416.000	PK	45.21	37.04	8.38	41.47	2.28	51.44	73.90	22.4	150	0	
Vert.	9888.000	PK	44.12	38.84	9.31	39.82	2.28	54.73	73.90	19.1	150	0	
Vert.	12360.000	PK	44.12	39.32	10.77	40.68	2.28	55.81	73.90	18.0	150	0	
Vert.	2483.500	AV	38.63	27.79	14.32	39.79	2.28	43.23	53.90	10.6	198	73	
Vert.	3296.030	AV	38.75	28.62	6.04	39.97	2.28	35.72	53.90	18.1	117	158	
Vert.	4944.000	AV	35.56	31.42	6.72	40.22	2.28	35.76	53.90	18.1	150	0	
Vert.	7416.000	AV	36.55	37.04	8.38	41.47	2.28	42.78	53.90	11.1	150	0	
Vert.	9888.000	AV	35.52	38.84	9.31	39.82	2.28	46.13	53.90	7.7	150	0	
Vert.	12360.000	AV	35.88	39.32	10.77	40.68	2.28	47.57	53.90	6.3	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.9 m / 3.0 m) = 2.28 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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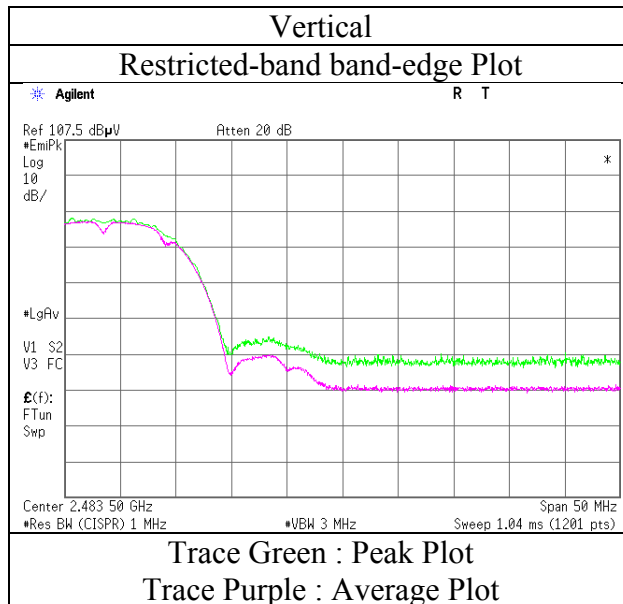
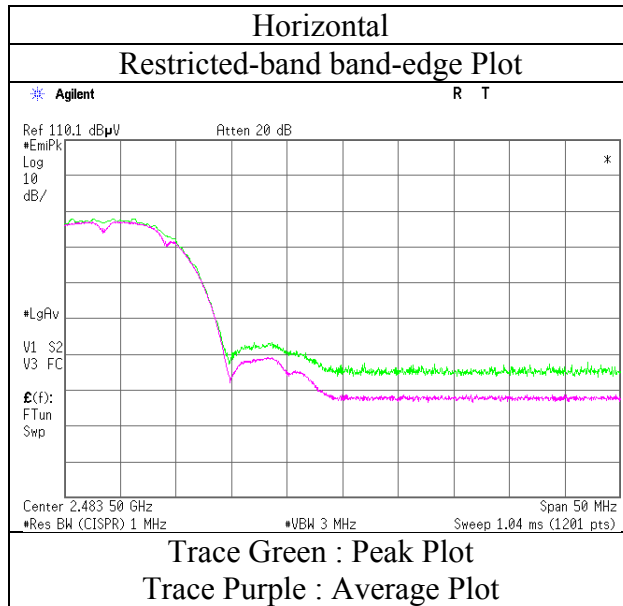
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Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11656716S-C-R2
Date	March 15, 2017
Temperature / Humidity	21 deg. C / 30 % RH
Engineer	Hikaru Shirasawa
Mode	Tx 11b 2472 MHz



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11656716S-C-R2
Date : March 16, 2017 March 15, 2017 March 17, 2017
Temperature / Humidity : 22 deg. C / 28 % RH 21 deg. C / 30 % RH 22 deg. C / 28 % RH
Engineer : Hiroyuki Morikawa Hikaru Shirasawa Kazutaka Takeyama
 (30-1000MHz, 3SAC) (1-13GHz, 3SAC) (13-26.5GHz, 3SAC)
Mode : Tx 11g 2412 MHz

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	247.535	QP	24.10	11.67	8.40	31.93	0.00	12.24	46.00	33.7	100	92	
Hori.	268.112	QP	33.60	12.30	8.52	31.92	0.00	22.50	46.00	23.5	111	0	
Hori.	938.390	QP	32.00	22.06	11.15	30.58	0.00	34.63	46.00	11.3	100	345	
Hori.	2390.000	PK	48.96	27.41	14.21	39.77	2.28	53.09	73.90	20.8	125	333	
Hori.	3215.985	PK	50.39	28.57	6.00	39.96	2.28	47.28	73.90	26.6	100	290	
Hori.	4824.000	PK	45.71	31.17	6.66	40.17	2.28	45.65	73.90	28.2	124	324	
Hori.	7236.000	PK	45.10	36.52	8.17	41.55	2.28	50.52	73.90	23.3	150	0	
Hori.	9648.000	PK	44.42	38.66	9.11	39.81	2.28	54.66	73.90	19.2	150	0	
Hori.	12060.000	PK	44.92	39.29	10.35	40.18	2.28	56.66	73.90	17.2	150	0	
Hori.	2390.000	AV	38.64	27.41	14.21	39.77	2.28	42.77	53.90	11.1	125	333	
Hori.	3215.985	AV	46.14	28.57	6.00	39.96	2.28	43.03	53.90	10.8	100	290	
Hori.	4824.000	AV	36.45	31.17	6.66	40.17	2.28	36.39	53.90	17.5	124	324	
Hori.	7236.000	AV	36.62	36.52	8.17	41.55	2.28	42.04	53.90	11.8	150	0	
Hori.	9648.000	AV	35.25	38.66	9.11	39.81	2.28	45.49	53.90	8.4	150	0	
Hori.	12060.000	AV	35.51	39.29	10.35	40.18	2.28	47.25	53.90	6.6	150	0	
Vert.	51.818	QP	33.30	10.19	6.93	32.12	0.00	18.30	40.00	21.7	100	245	
Vert.	78.650	QP	34.50	6.20	7.62	32.10	0.00	16.22	40.00	23.7	100	223	
Vert.	114.726	QP	27.60	12.09	7.36	32.07	0.00	14.98	43.50	28.5	100	110	
Vert.	260.202	QP	21.60	12.03	8.48	31.92	0.00	10.19	46.00	35.8	100	0	
Vert.	268.111	QP	32.10	12.30	8.52	31.92	0.00	21.00	46.00	25.0	151	0	
Vert.	938.393	QP	31.00	22.06	11.15	30.58	0.00	33.63	46.00	12.3	110	61	
Vert.	2390.000	PK	47.57	27.41	14.21	39.77	2.28	51.70	73.90	22.2	204	71	
Vert.	3216.013	PK	49.38	28.57	6.00	39.96	2.28	46.27	73.90	27.6	111	231	
Vert.	4824.000	PK	45.90	31.17	6.66	40.17	2.28	45.84	73.90	28.0	152	310	
Vert.	7236.000	PK	46.01	36.52	8.17	41.55	2.28	51.43	73.90	22.4	150	0	
Vert.	9648.000	PK	44.06	38.66	9.11	39.81	2.28	54.30	73.90	19.6	150	0	
Vert.	12060.000	PK	45.02	39.29	10.35	40.18	2.28	56.76	73.90	17.1	150	0	
Vert.	2390.000	AV	38.48	27.41	14.21	39.77	2.28	42.61	53.90	11.2	204	71	
Vert.	3216.013	AV	45.19	28.57	6.00	39.96	2.28	42.08	53.90	11.8	111	231	
Vert.	4824.000	AV	35.99	31.17	6.66	40.17	2.28	35.93	53.90	17.9	152	310	
Vert.	7236.000	AV	36.97	36.52	8.17	41.55	2.28	42.39	53.90	11.5	150	0	
Vert.	9648.000	AV	35.61	38.66	9.11	39.81	2.28	45.85	53.90	8.0	150	0	
Vert.	12060.000	AV	35.77	39.29	10.35	40.18	2.28	47.51	53.90	6.4	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.9 m / 3.0 m) = 2.28 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	82.15	27.50	14.24	39.77	2.28	86.40	-	-	Carrier
Hori.	2400.000	PK	53.98	27.45	14.22	39.77	2.28	58.16	66.40	8.2	
Vert.	2412.000	PK	81.02	27.50	14.24	39.77	2.28	85.27	-	-	Carrier
Vert.	2400.000	PK	50.65	27.45	14.22	39.77	2.28	54.83	65.27	10.4	

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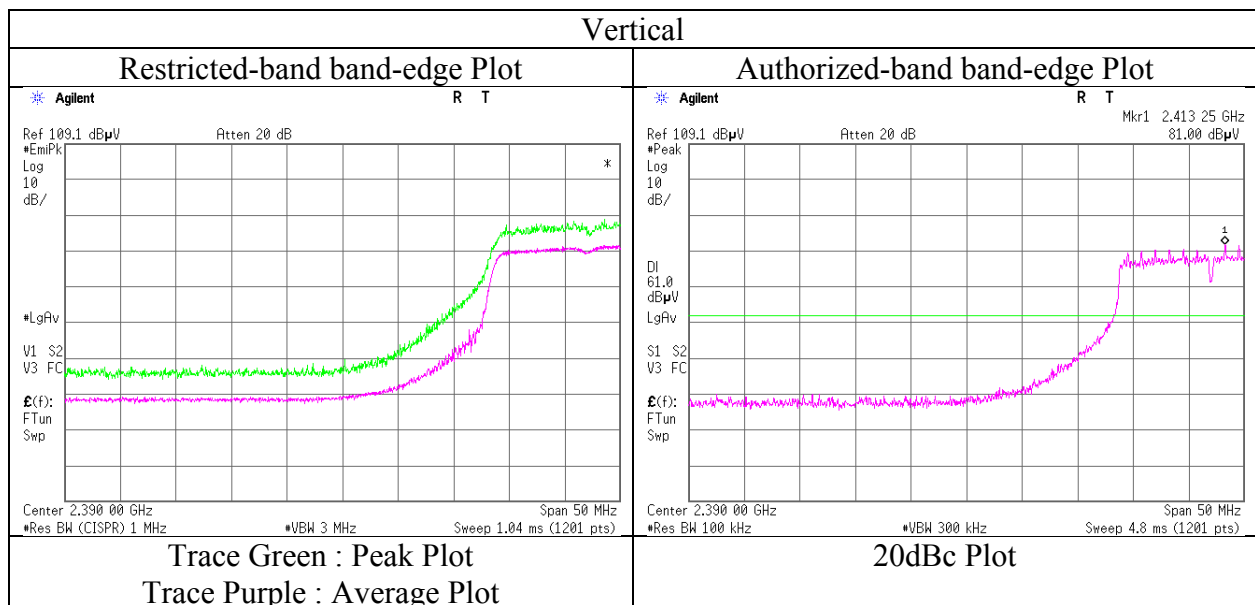
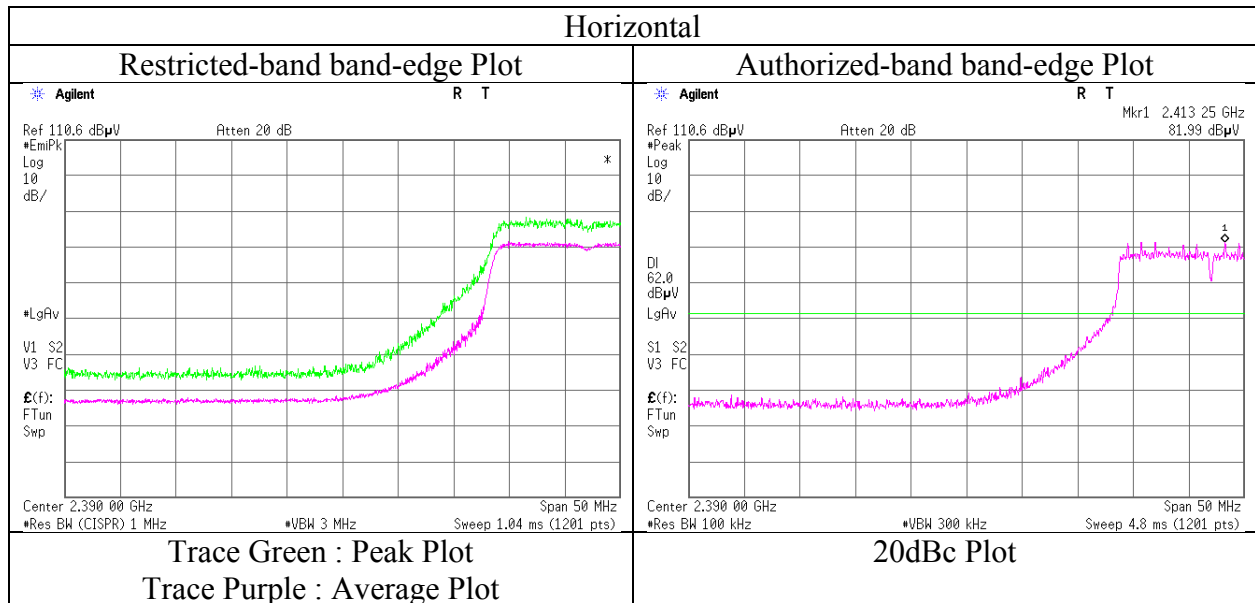
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Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11656716S-C-R2
Date	March 15, 2017
Temperature / Humidity	21 deg. C / 30 % RH
Engineer	Hikaru Shirasawa
Mode	Tx 11g 2412 MHz



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

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	11656716S-C-R2		
Date	March 15, 2017	March 15, 2017	March 17, 2017
Temperature / Humidity	21 deg. C / 30 % RH	22 deg. C / 28 % RH	22 deg. C / 28 % RH
Engineer	Hikaru Shirasawa (1-2.8GHz, 3SAC)	Hiroyuki Morikawa (2.8-13GHz, 3SAC)	Kazutaka Takeyama (13-26.5GHz, 3SAC)
Mode	Tx 11g 2437 MHz		

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	3249.358	PK	49.60	28.59	6.01	39.96	2.28	46.52	73.90	27.3	100	290	
Hori.	4874.000	PK	44.78	31.28	6.67	40.19	2.28	44.82	73.90	29.0	129	321	
Hori.	7311.000	PK	46.46	36.74	8.25	41.52	2.28	52.21	73.90	21.6	150	0	
Hori.	9748.000	PK	43.73	38.74	9.18	39.81	2.28	54.12	73.90	19.7	150	0	
Hori.	12185.000	PK	44.37	39.30	10.52	40.39	2.28	56.08	73.90	17.8	150	0	
Hori.	3249.358	AV	45.05	28.59	6.01	39.96	2.28	41.97	53.90	11.9	100	290	
Hori.	4874.000	AV	35.89	31.28	6.67	40.19	2.28	35.93	53.90	17.9	129	321	
Hori.	7311.000	AV	36.66	36.74	8.25	41.52	2.28	42.41	53.90	11.4	150	0	
Hori.	9748.000	AV	35.85	38.74	9.18	39.81	2.28	46.24	53.90	7.6	150	0	
Hori.	12185.000	AV	36.00	39.30	10.52	40.39	2.28	47.71	53.90	6.1	150	0	
Vert.	3249.367	PK	47.65	28.59	6.01	39.96	2.28	44.57	73.90	29.3	107	321	
Vert.	4874.000	PK	43.21	31.28	6.67	40.19	2.28	43.25	73.90	30.6	100	204	
Vert.	7311.000	PK	45.43	36.74	8.25	41.52	2.28	51.18	73.90	22.7	150	0	
Vert.	9748.000	PK	44.73	38.74	9.18	39.81	2.28	55.12	73.90	18.7	150	0	
Vert.	12185.000	PK	44.09	39.30	10.52	40.39	2.28	55.80	73.90	18.1	150	0	
Vert.	3249.367	AV	42.13	28.59	6.01	39.96	2.28	39.05	53.90	14.8	107	321	
Vert.	4874.000	AV	35.42	31.28	6.67	40.19	2.28	35.46	53.90	18.4	100	204	
Vert.	7311.000	AV	36.46	36.74	8.25	41.52	2.28	42.21	53.90	11.6	150	0	
Vert.	9748.000	AV	35.88	38.74	9.18	39.81	2.28	46.27	53.90	7.6	150	0	
Vert.	12185.000	AV	35.77	39.30	10.52	40.39	2.28	47.48	53.90	6.4	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.9 m / 3.0 m) = 2.28 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	11656716S-C-R2		
Date	March 15, 2017	March 15, 2017	March 17, 2017
Temperature / Humidity	21 deg. C / 30 % RH	22 deg. C / 28 % RH	22 deg. C / 28 % RH
Engineer	Hikaru Shirasawa (1-2.8GHz, 3SAC)	Hiroyuki Morikawa (2.8-13GHz, 3SAC)	Kazutaka Takeyama (13-26.5GHz, 3SAC)
Mode	Tx 11g 2462 MHz		

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	53.23	27.79	14.32	39.79	2.28	57.83	73.90	16.0	123	336	
Hori.	3282.701	PK	47.09	28.61	6.04	39.97	2.28	44.05	73.90	29.8	119	293	
Hori.	4924.000	PK	44.33	31.38	6.70	40.22	2.28	44.47	73.90	29.4	150	0	
Hori.	7386.000	PK	45.32	36.95	8.33	41.49	2.28	51.39	73.90	22.5	150	0	
Hori.	9848.000	PK	43.95	38.81	9.28	39.82	2.28	54.50	73.90	19.4	150	0	
Hori.	12310.000	PK	45.12	39.31	10.69	40.60	2.28	56.80	73.90	17.1	150	0	
Hori.	2483.500	AV	40.99	27.79	14.32	39.79	2.28	45.59	53.90	8.3	123	336	
Hori.	3282.701	AV	42.10	28.61	6.04	39.97	2.28	39.06	53.90	14.8	119	293	
Hori.	4924.000	AV	35.65	31.38	6.70	40.22	2.28	35.79	53.90	18.1	150	0	
Hori.	7386.000	AV	36.61	36.95	8.33	41.49	2.28	42.68	53.90	11.2	150	0	
Hori.	9848.000	AV	35.44	38.81	9.28	39.82	2.28	45.99	53.90	7.9	150	0	
Hori.	12310.000	AV	36.28	39.31	10.69	40.60	2.28	47.96	53.90	5.9	150	0	
Vert.	2483.500	PK	52.01	27.79	14.32	39.79	2.28	56.61	73.90	17.2	201	74	
Vert.	3282.684	PK	46.01	28.61	6.04	39.97	2.28	42.97	73.90	30.9	115	319	
Vert.	4924.000	PK	43.15	31.38	6.70	40.22	2.28	43.29	73.90	30.6	150	0	
Vert.	7386.000	PK	44.53	36.95	8.33	41.49	2.28	50.60	73.90	23.3	150	0	
Vert.	9848.000	PK	43.64	38.81	9.28	39.82	2.28	54.19	73.90	19.7	150	0	
Vert.	12310.000	PK	44.26	39.31	10.69	40.60	2.28	55.94	73.90	17.9	150	0	
Vert.	2483.500	AV	40.09	27.79	14.32	39.79	2.28	44.69	53.90	9.2	201	74	
Vert.	3282.684	AV	39.24	28.61	6.04	39.97	2.28	36.20	53.90	17.7	115	319	
Vert.	4924.000	AV	35.30	31.38	6.70	40.22	2.28	35.44	53.90	18.4	150	0	
Vert.	7386.000	AV	36.42	36.95	8.33	41.49	2.28	42.49	53.90	11.4	150	0	
Vert.	9848.000	AV	35.61	38.81	9.28	39.82	2.28	46.16	53.90	7.7	150	0	
Vert.	12310.000	AV	36.04	39.31	10.69	40.60	2.28	47.72	53.90	6.1	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.9 m / 3.0 m) = 2.28 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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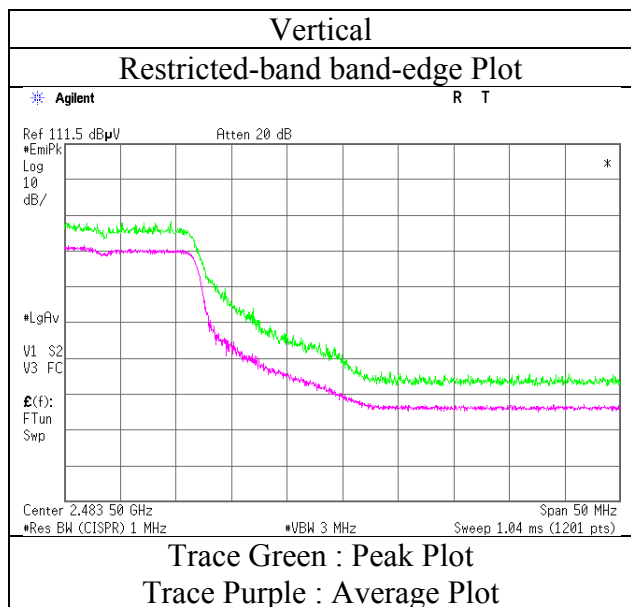
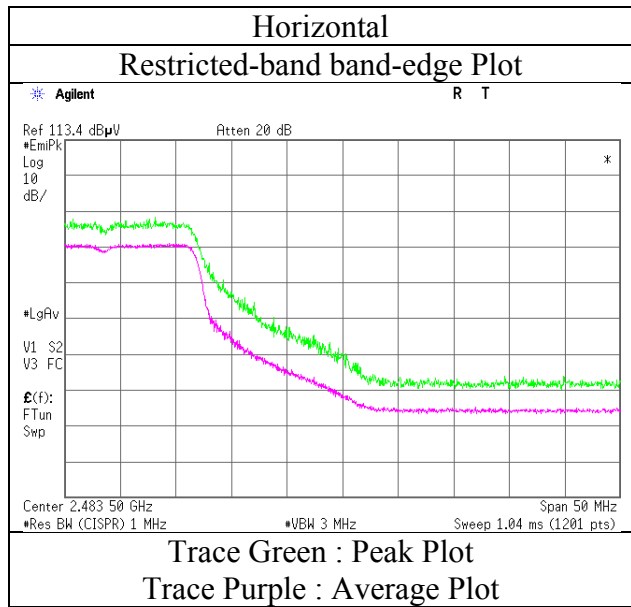
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Radiated Spurious Emission
(Reference Plot for band-edge)

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11656716S-C-R2
Date : March 15, 2017
Temperature / Humidity : 21 deg. C / 30 % RH
Engineer : Hikaru Shirasawa
Mode : Tx 11g 2462 MHz



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11656716S-C-R2
Date : March 16, 2017 March 17, 2017
Temperature / Humidity : 22 deg. C / 28 % RH 22 deg. C / 28 % RH
Engineer : Kazutaka Takeyama Kazutaka Takeyama
 (1-13GHz, 3SAC) (13-26.5GHz, 3SAC)
Mode : Tx 11, 2412 MHz

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	45.02	27.41	14.21	39.77	2.28	49.15	73.90	24.7	145	326	
Hori.	3215.986	PK	47.58	28.57	6.00	39.96	2.28	44.47	73.90	29.4	193	290	
Hori.	4824.000	PK	46.81	31.17	6.66	40.17	2.28	46.75	73.90	27.1	117	343	
Hori.	7236.000	PK	45.48	36.52	8.17	41.55	2.28	50.90	73.90	23.0	150	0	
Hori.	9648.000	PK	44.29	38.66	9.11	39.81	2.28	54.53	73.90	19.3	150	0	
Hori.	12060.000	PK	44.90	39.29	10.35	40.18	2.28	56.64	73.90	17.2	150	0	
Hori.	2390.000	AV	36.15	27.41	14.21	39.77	2.28	40.28	53.90	13.6	145	326	
Hori.	3215.986	AV	39.74	28.57	6.00	39.96	2.28	36.63	53.90	17.2	193	290	
Hori.	4824.000	AV	36.07	31.17	6.66	40.17	2.28	36.01	53.90	17.8	117	343	
Hori.	7236.000	AV	36.67	36.52	8.17	41.55	2.28	42.09	53.90	11.8	150	0	
Hori.	9648.000	AV	35.13	38.66	9.11	39.81	2.28	45.37	53.90	8.5	150	0	
Hori.	12060.000	AV	35.59	39.29	10.35	40.18	2.28	47.33	53.90	6.5	150	0	
Vert.	2390.000	PK	44.88	27.41	14.21	39.77	2.28	49.01	73.90	24.8	149	73	
Vert.	3216.002	PK	48.35	28.57	6.00	39.96	2.28	45.24	73.90	28.6	102	261	
Vert.	4824.000	PK	46.57	31.17	6.66	40.17	2.28	46.51	73.90	27.3	156	219	
Vert.	7236.000	PK	44.25	36.52	8.17	41.55	2.28	49.67	73.90	24.2	150	0	
Vert.	9648.000	PK	43.72	38.66	9.11	39.81	2.28	53.96	73.90	19.9	150	0	
Vert.	12060.000	PK	43.82	39.29	10.35	40.18	2.28	55.56	73.90	18.3	150	0	
Vert.	2390.000	AV	36.26	27.41	14.21	39.77	2.28	40.39	53.90	13.5	149	73	
Vert.	3216.002	AV	42.09	28.57	6.00	39.96	2.28	38.98	53.90	14.9	102	261	
Vert.	4824.000	AV	36.10	31.17	6.66	40.17	2.28	36.04	53.90	17.8	156	219	
Vert.	7236.000	AV	36.64	36.52	8.17	41.55	2.28	42.06	53.90	11.8	150	0	
Vert.	9648.000	AV	35.06	38.66	9.11	39.81	2.28	45.30	53.90	8.6	150	0	
Vert.	12060.000	AV	35.83	39.29	10.35	40.18	2.28	47.57	53.90	6.3	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.25 m / 3.0 m) = 2.28 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	79.12	27.50	14.24	39.77	2.28	83.37	-	-	Carrier
Hori.	2397.384	PK	40.96	27.44	14.21	39.77	2.28	45.12	63.37	18.3	
Hori.	2400.000	PK	39.85	27.45	14.22	39.77	2.28	44.03	63.37	19.3	
Vert.	2412.000	PK	77.65	27.50	14.24	39.77	2.28	81.90	-	-	Carrier
Vert.	2397.221	PK	39.93	27.44	14.21	39.77	2.28	44.09	61.90	17.8	
Vert.	2400.000	PK	38.74	27.45	14.22	39.77	2.28	42.92	61.90	19.0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.25 m / 3.0 m) = 2.28 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

UL Japan, Inc.

Shonan EMC Lab.

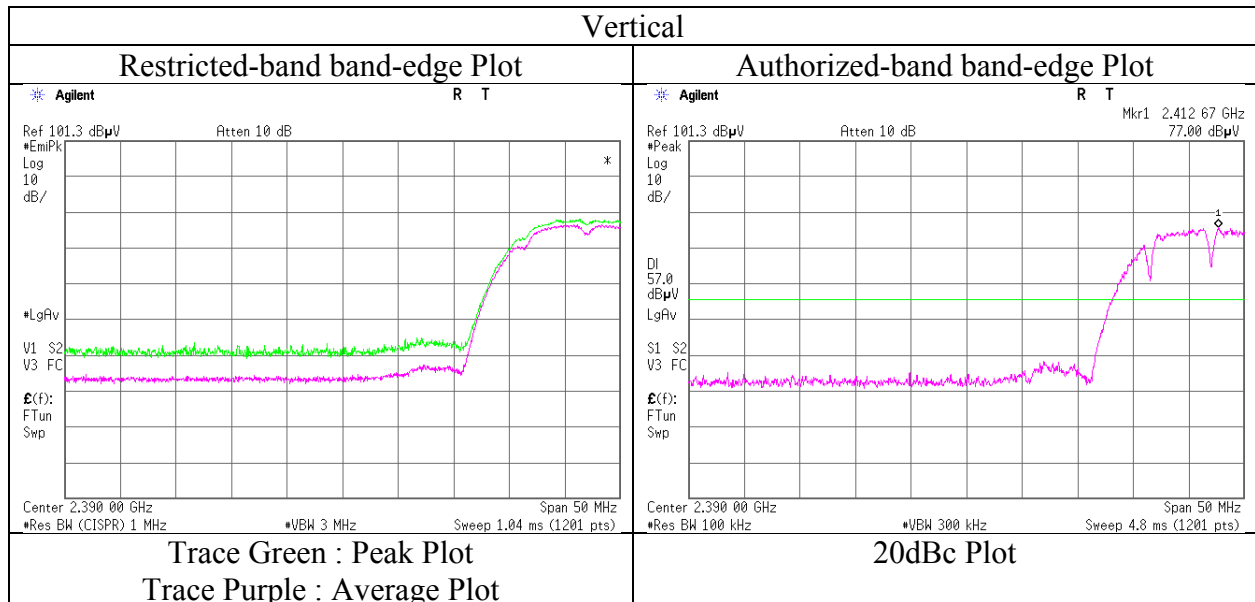
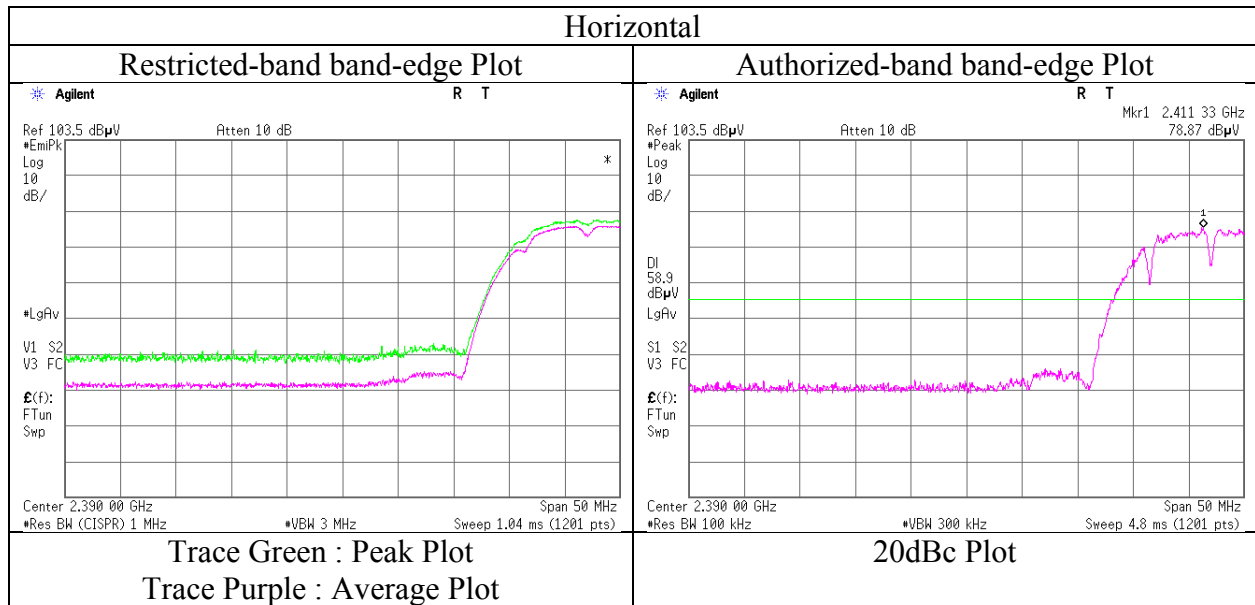
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11656716S-C-R2
Date	March 16, 2017
Temperature / Humidity	22 deg. C / 28 % RH
Engineer	Kazutaka Takeyama
Mode	Tx 11, 2412 MHz



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11656716S-C-R2
Date : March 16, 2017 March 17, 2017
Temperature / Humidity : 22 deg. C / 28 % RH 22 deg. C / 28 % RH
Engineer : Kazutaka Takeyama Kazutaka Takeyama
 (1-13GHz, 3SAC) (13-26.5GHz, 3SAC)
Mode : Tx 11, 2442 MHz

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	3255.987	PK	49.26	28.59	6.03	39.97	2.28	46.19	73.90	27.7	102	288	
Hori.	4884.000	PK	44.73	31.30	6.68	40.20	2.28	44.79	73.90	29.1	150	0	
Hori.	7326.000	PK	46.13	36.78	8.26	41.51	2.28	51.94	73.90	21.9	150	0	
Hori.	9768.000	PK	45.84	38.75	9.21	39.82	2.28	56.26	73.90	17.6	150	0	
Hori.	12210.000	PK	45.15	39.30	10.56	40.43	2.28	56.86	73.90	17.0	150	0	
Hori.	3255.987	AV	41.53	28.59	6.03	39.97	2.28	38.46	53.90	15.4	102	288	
Hori.	4884.000	AV	35.23	31.30	6.68	40.20	2.28	35.29	53.90	18.6	150	0	
Hori.	7326.000	AV	37.08	36.78	8.26	41.51	2.28	42.89	53.90	11.0	150	0	
Hori.	9768.000	AV	35.96	38.75	9.21	39.82	2.28	46.38	53.90	7.5	150	0	
Hori.	12210.000	AV	35.62	39.30	10.56	40.43	2.28	47.33	53.90	6.5	150	0	
Vert.	3255.934	PK	47.60	28.59	6.03	39.97	2.28	44.53	73.90	29.3	119	99	
Vert.	4884.000	PK	44.72	31.30	6.68	40.20	2.28	44.78	73.90	29.1	150	0	
Vert.	7326.000	PK	46.53	36.78	8.26	41.51	2.28	52.34	73.90	21.5	150	0	
Vert.	9768.000	PK	44.26	38.75	9.21	39.82	2.28	54.68	73.90	19.2	150	0	
Vert.	12210.000	PK	46.43	39.30	10.56	40.43	2.28	58.14	73.90	15.7	150	0	
Vert.	3255.934	AV	38.14	28.59	6.03	39.97	2.28	35.07	53.90	18.8	119	99	
Vert.	4884.000	AV	35.27	31.30	6.68	40.20	2.28	35.33	53.90	18.5	150	0	
Vert.	7326.000	AV	36.95	36.78	8.26	41.51	2.28	42.76	53.90	11.1	150	0	
Vert.	9768.000	AV	36.45	38.75	9.21	39.82	2.28	46.87	53.90	7.0	150	0	
Vert.	12210.000	AV	36.04	39.30	10.56	40.43	2.28	47.75	53.90	6.1	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.9 m / 3.0 m) = 2.28 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11656716S-C-R2
Date : March 16, 2017 March 17, 2017
Temperature / Humidity : 22 deg. C / 28 % RH 22 deg. C / 28 % RH
Engineer : Kazutaka Takeyama Kazutaka Takeyama
 (1-13GHz, 3SAC) (13-26.5GHz, 3SAC)
Mode : Tx 11, 2472 MHz

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	47.64	27.79	14.32	39.79	2.28	52.24	73.90	21.6	125	330	
Hori.	3295.901	PK	47.48	28.62	6.04	39.97	2.28	44.45	73.90	29.4	113	288	
Hori.	4944.000	PK	44.78	31.42	6.72	40.22	2.28	44.98	73.90	28.9	150	0	
Hori.	7416.000	PK	45.64	37.04	8.38	41.47	2.28	51.87	73.90	22.0	150	0	
Hori.	9888.000	PK	44.92	38.84	9.31	39.82	2.28	55.53	73.90	18.3	150	0	
Hori.	12360.000	PK	45.79	39.32	10.77	40.68	2.28	57.48	73.90	16.4	150	0	
Hori.	2483.500	AV	40.89	27.79	14.32	39.79	2.28	45.49	53.90	8.4	125	330	
Hori.	3295.901	AV	38.42	28.62	6.04	39.97	2.28	35.39	53.90	18.5	113	288	
Hori.	4944.000	AV	35.06	31.42	6.72	40.22	2.28	35.26	53.90	18.6	150	0	
Hori.	7416.000	AV	36.84	37.04	8.38	41.47	2.28	43.07	53.90	10.8	150	0	
Hori.	9888.000	AV	35.24	38.84	9.31	39.82	2.28	45.85	53.90	8.0	150	0	
Hori.	12360.000	AV	35.91	39.32	10.77	40.68	2.28	47.60	53.90	6.3	150	0	
Vert.	2483.500	PK	46.59	27.79	14.32	39.79	2.28	51.19	73.90	22.7	141	79	
Vert.	3295.947	PK	47.03	28.62	6.04	39.97	2.28	44.00	73.90	29.9	126	101	
Vert.	4944.000	PK	45.78	31.42	6.72	40.22	2.28	45.98	73.90	27.9	150	0	
Vert.	7416.000	PK	46.30	37.04	8.38	41.47	2.28	52.53	73.90	21.3	150	0	
Vert.	9888.000	PK	43.85	38.84	9.31	39.82	2.28	54.46	73.90	19.4	150	0	
Vert.	12360.000	PK	45.20	39.32	10.77	40.68	2.28	56.89	73.90	17.0	150	0	
Vert.	2483.500	AV	38.46	27.79	14.32	39.79	2.28	43.06	53.90	10.8	141	79	
Vert.	3295.947	AV	36.83	28.62	6.04	39.97	2.28	33.80	53.90	20.1	126	101	
Vert.	4944.000	AV	34.98	31.42	6.72	40.22	2.28	35.18	53.90	18.7	150	0	
Vert.	7416.000	AV	36.61	37.04	8.38	41.47	2.28	42.84	53.90	11.0	150	0	
Vert.	9888.000	AV	35.47	38.84	9.31	39.82	2.28	46.08	53.90	7.8	150	0	
Vert.	12360.000	AV	36.11	39.32	10.77	40.68	2.28	47.80	53.90	6.1	150	0	

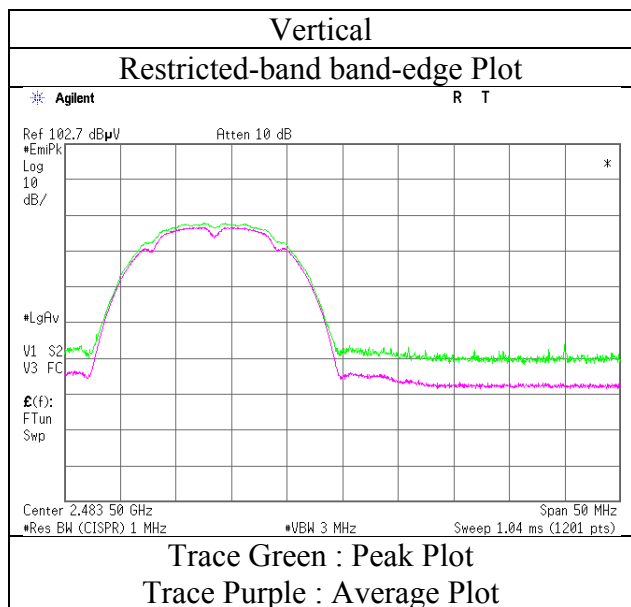
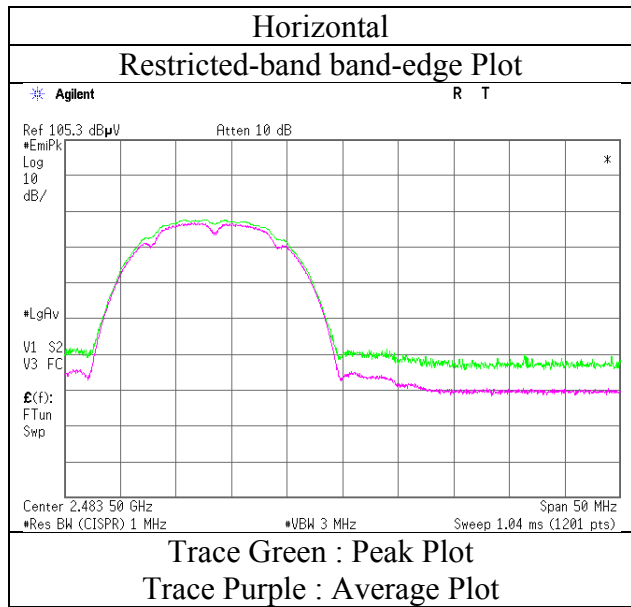
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log(3.9 m / 3.0 m) = 2.28 dB

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

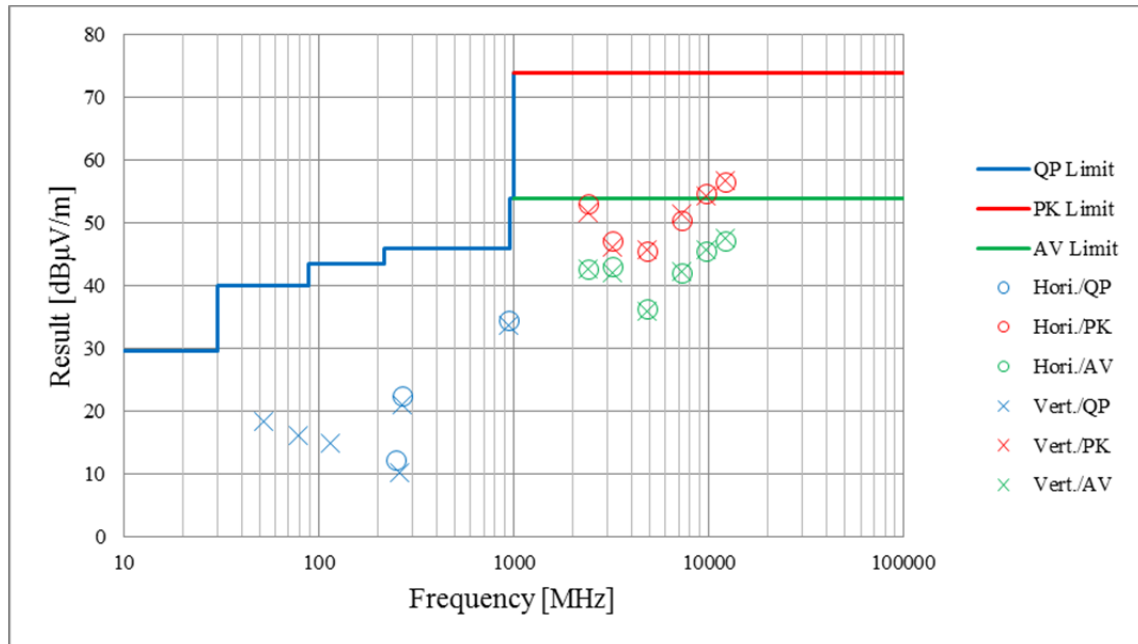
Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11656716S-C-R2
Date	March 16, 2017
Temperature / Humidity	22 deg. C / 28 % RH
Engineer	Kazutaka Takeyama
Mode	Tx 11, 2472 MHz



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

Radiated Spurious Emission
(Plot data, Worst case)

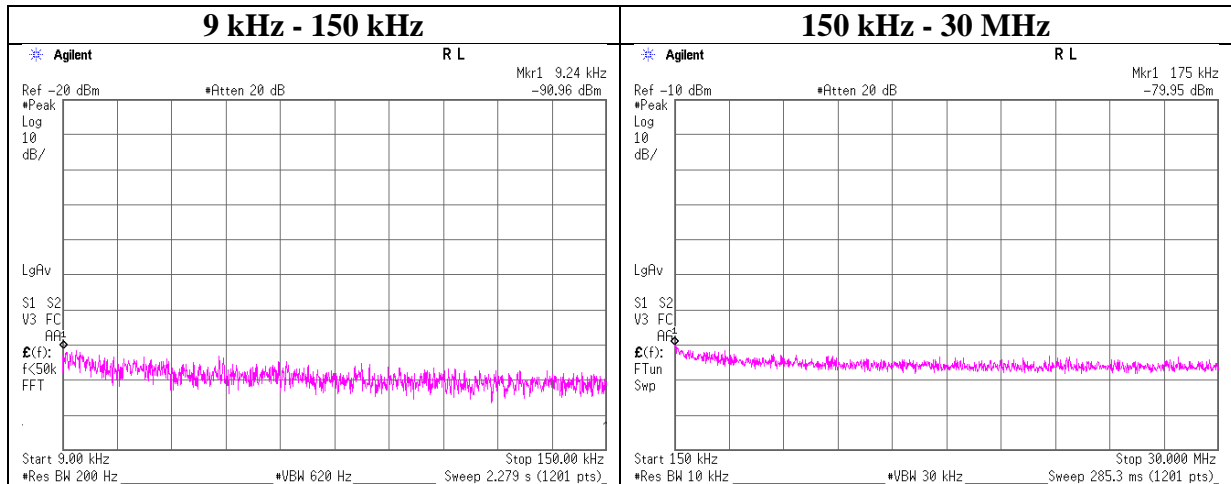
Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber		
Report No.	11656716S-C-R2		
Date	March 16, 2017	March 15, 2017	March 17, 2017
Temperature / Humidity	22 deg. C / 28 % RH	21 deg. C / 30 % RH	22 deg. C / 28 % RH
Engineer	Hiroyuki Morikawa (30-1000MHz, 3SAC)	Hikaru Shirasawa (1-13GHz, 3SAC)	Kazutaka Takeyama (13-26.5GHz, 3SAC)
Mode	Tx 11g 2412 MHz		



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

Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11656716S-C-R2
Date	March 23, 2017
Temperature / Humidity	24 deg.C / 49 %RH
Engineer	Makoto Hosaka
Mode	Tx 11g 2412 MHz



Frequency [MHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain* [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
0.00924	-90.96	0.01	9.5	2.0	1	-79.4	300	6.0	-18.2	108.2	126.4	
0.17500	-79.95	0.01	9.5	2.0	1	-68.4	300	6.0	-7.1	82.7	89.8	

$$E \text{ [dBuV/m]} = \text{EIRP [dBm]} - 20 \log(\text{Distance [m]}) + \text{Ground bounce [dB]} + 104.8 \text{ [dBuV/m]}$$

$$\text{EIRP [dBm]} = \text{Reading [dBm]} + \text{Cable loss [dB]} + \text{Attenuator Loss [dB]} + \text{Antenna gain [dBi]} + 10 * \log(N)$$

N: Number of output

- *) No detect noise signal was in frequency range from 9 kHz to 30 MHz.
- *) The antenna gain applied 2 dBi of section 12.2.6 of FCC KDB 558074 D01.

Power Density

Test place	Shonan EMC Lab. No.5 Shielded Room	
Report No.	11656716S-C-R2	
Date	March 22, 2017	March 23, 2017
Temperature / Humidity	23 deg.C / 35 %RH	24 deg.C / 49 %RH
Engineer	Kenichi Adachi	Makoto Hosaka
Mode	Tx	

11b

Ch. Freq. [MHz]	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	2410.51	-28.59	1.16	9.92	-17.51	8.00	25.51
2442.00	2442.67	-30.09	1.15	9.92	-19.02	8.00	27.02
2462.00	2462.51	-29.34	1.15	9.92	-18.27	8.00	26.27
2467.00	2463.50	-34.81	1.15	9.65	-24.01	8.00	32.01
2472.00	2471.51	-34.10	1.16	9.65	-23.29	8.00	31.29

11g

Ch. Freq. [MHz]	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	2407.00	-30.16	1.16	9.64	-19.36	8.00	27.36
2437.00	2443.27	-31.02	1.16	9.64	-20.22	8.00	28.22
2462.00	2467.35	-30.64	1.15	9.65	-19.84	8.00	27.84

11

Ch. Freq. [MHz]	Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2412.00	2411.21	-34.26	1.16	9.97	-23.13	8.00	31.13
2442.00	2444.47	-29.33	1.15	9.96	-18.22	8.00	26.22
2472.00	2470.13	-33.93	1.16	9.96	-22.81	8.00	30.81

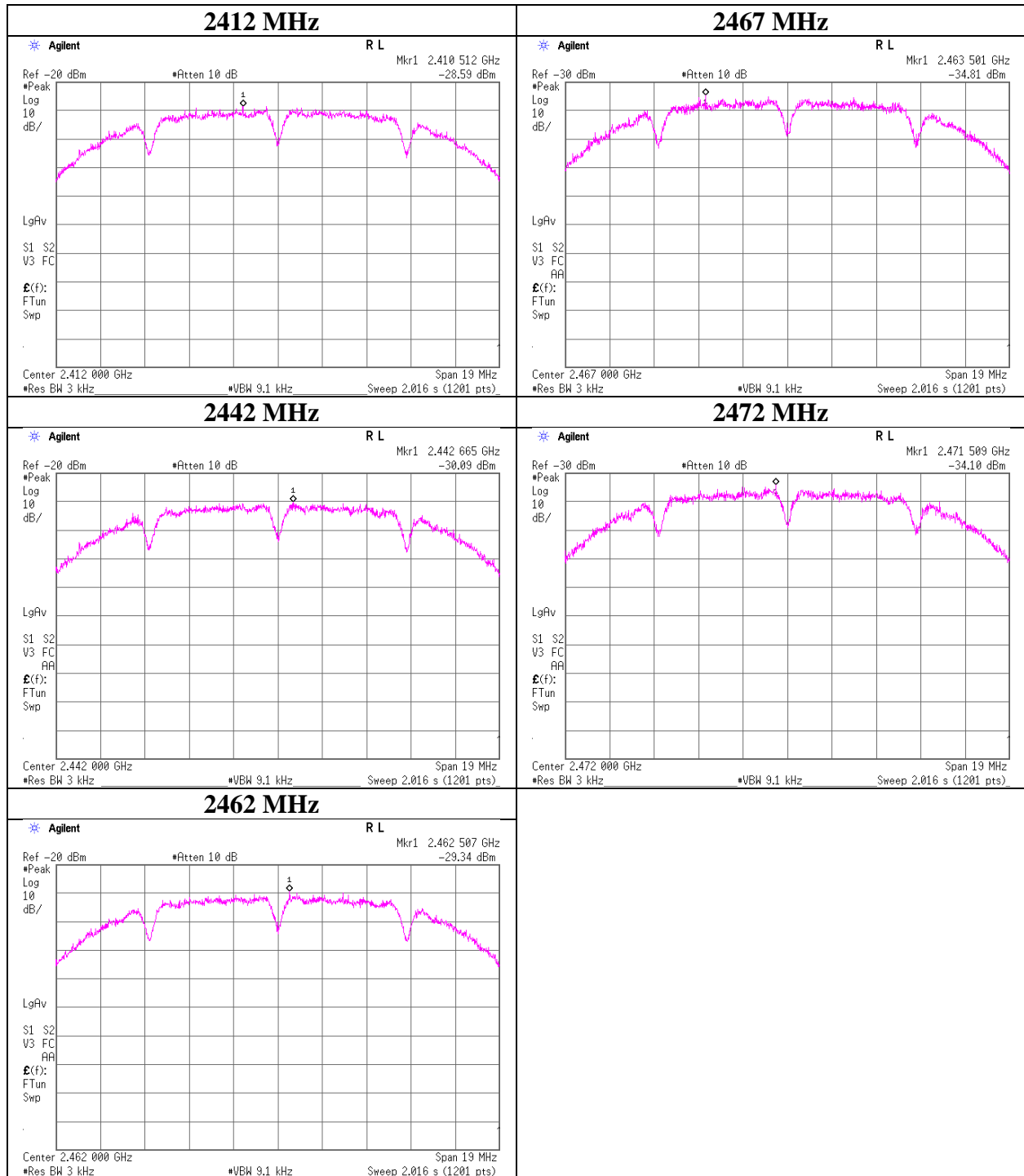
Sample Calculation:

$$\text{Result} = \text{Reading} + \text{Cable Loss} + \text{Attenuator Loss}$$

*The equipment and cables were not used for factor 0 dB of the data sheets.

Power Density

11b



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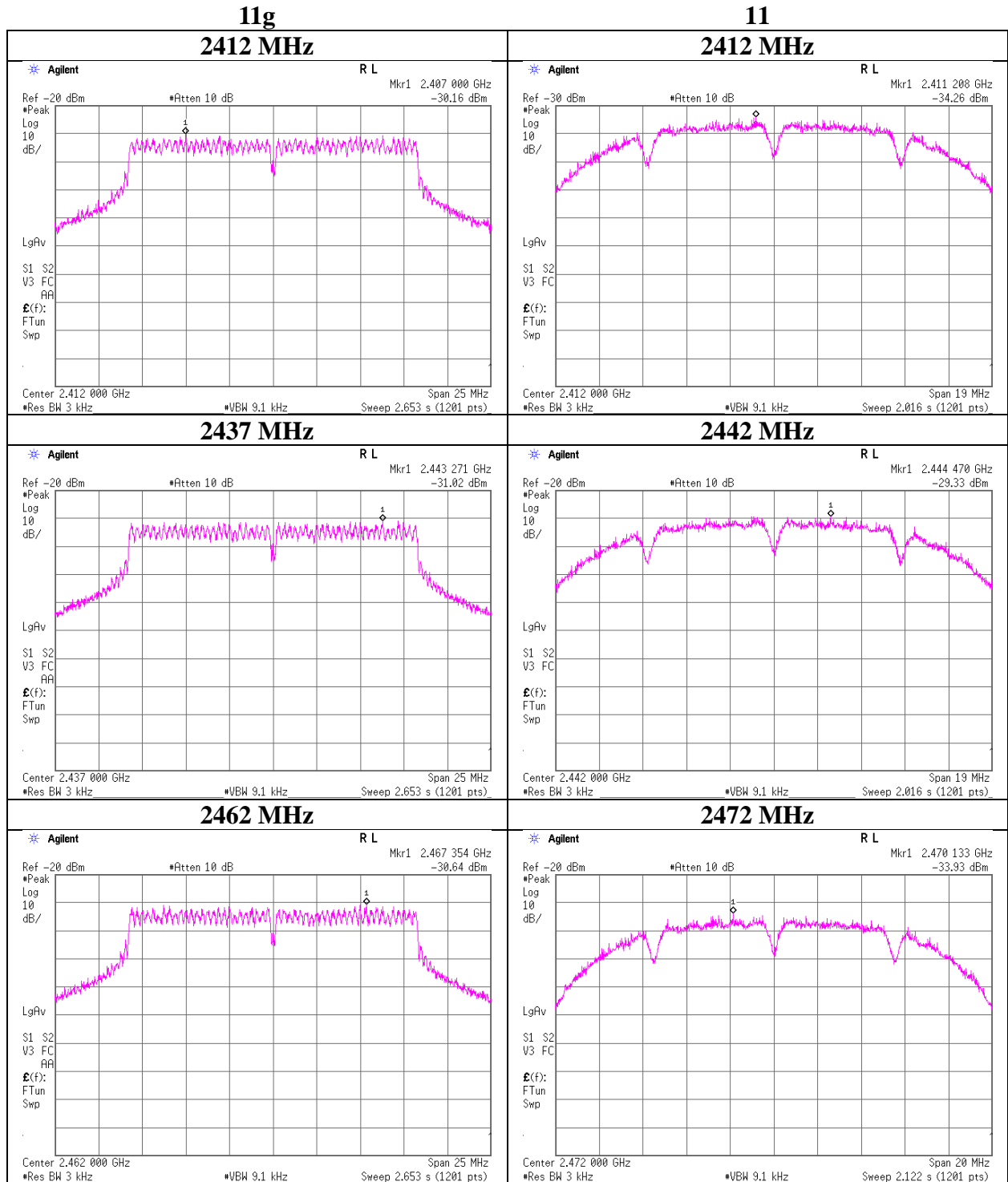
Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Power Density



UL Japan, Inc.

Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

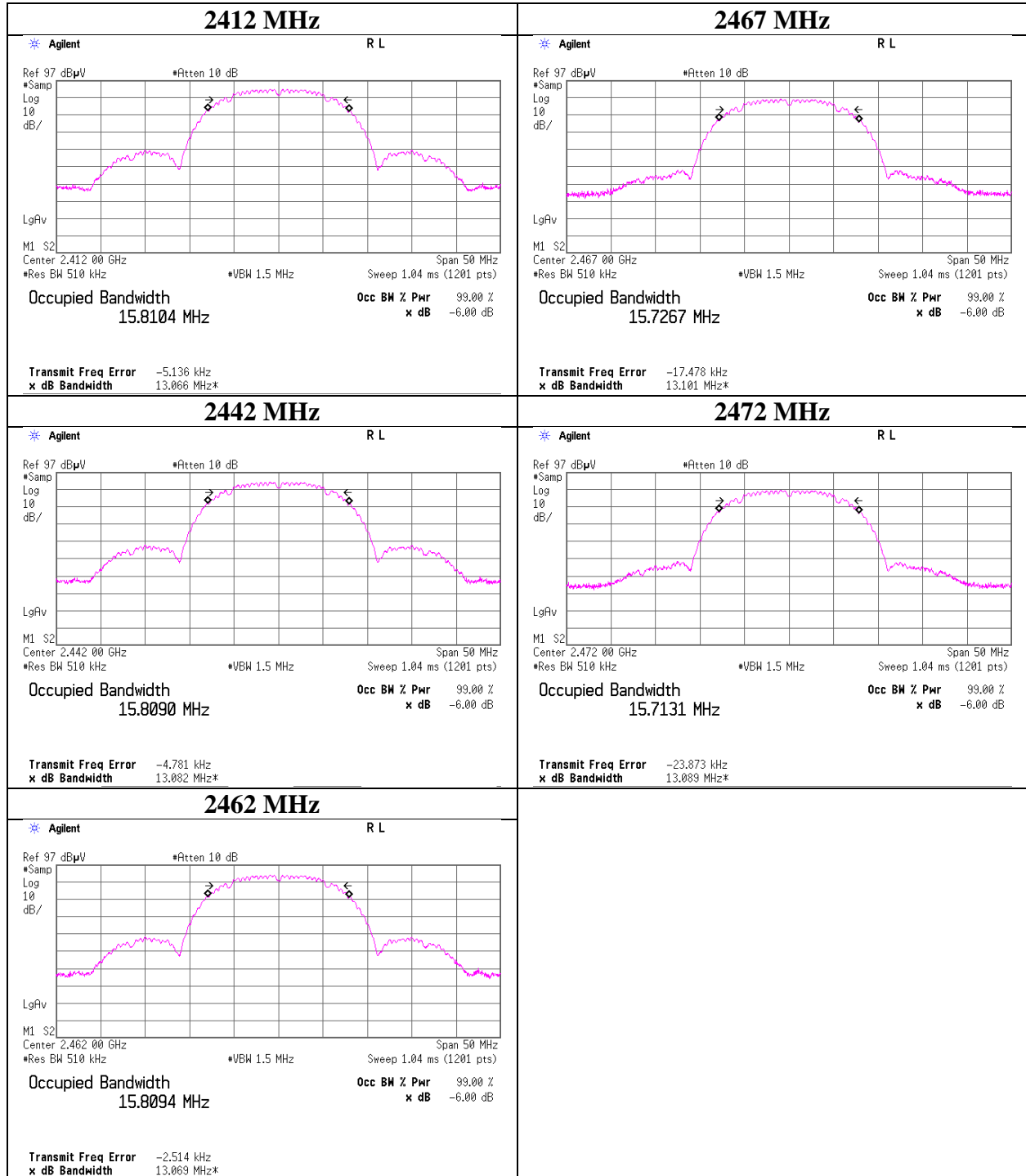
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99 % Occupied Bandwidth

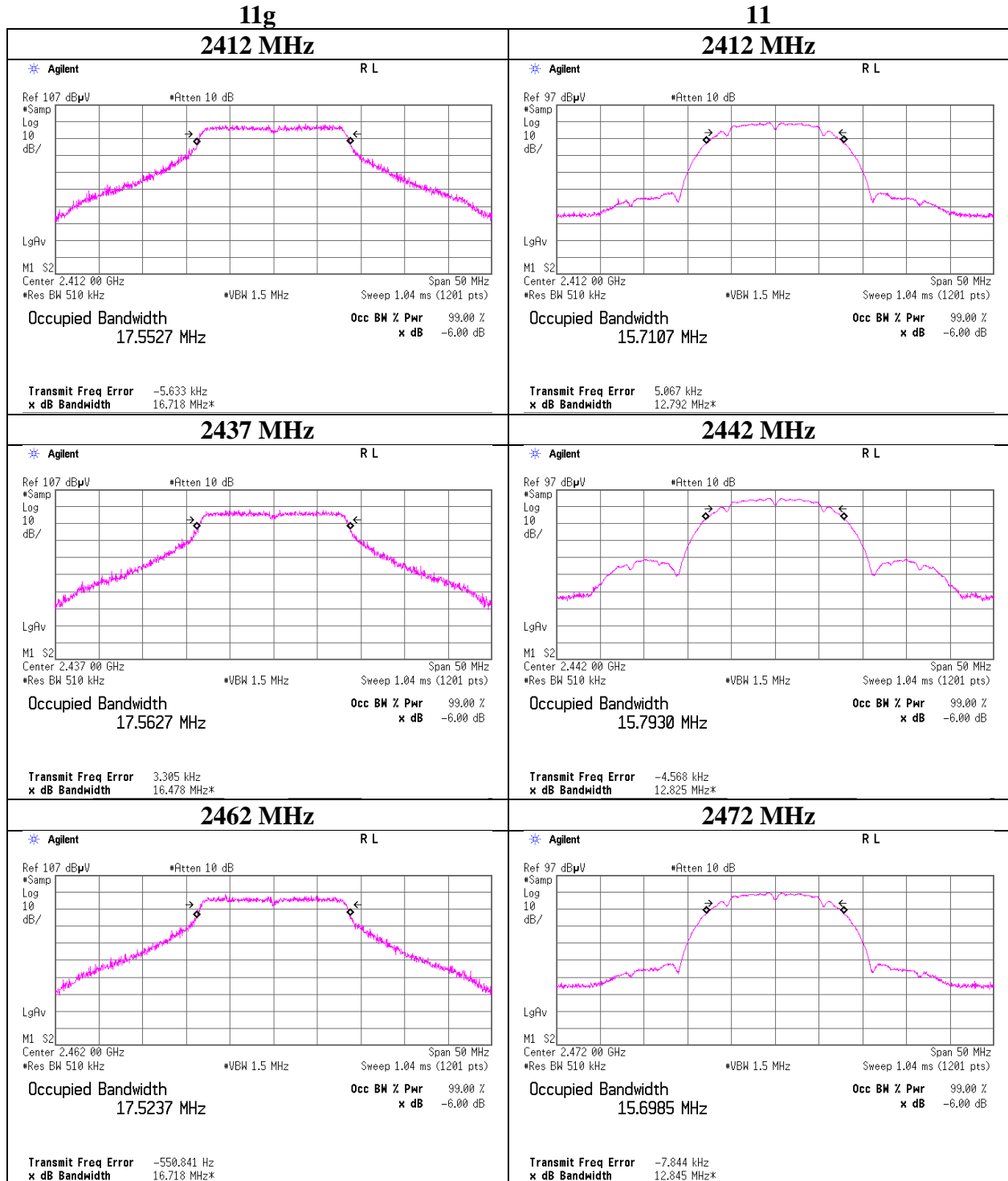
Test place	Shonan EMC Lab. No.5 Shielded Room	
Report No.	11656716S-C-R2	
Date	March 22, 2017	March 23, 2017
Temperature / Humidity	23 deg.C / 35 %RH	24 deg.C / 49 %RH
Engineer	Kenichi Adachi	Makoto Hosaka
Mode	Tx	

11b



99 % Occupied Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room	
Report No.	11656716S-C-R2	
Date	March 22, 2017	March 23, 2017
Temperature / Humidity	23 deg.C / 35 %RH	24 deg.C / 49 %RH
Engineer	Kenichi Adachi	Makoto Hosaka
Mode	Tx	



APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2016/04/04 * 12
SPSS-05	Power sensor	Agilent	N1923A	MY5326008	AT	2016/04/04 * 12
SAT10-09	Attenuator	Weinschel Corp.	54A-10	W5692	AT	2016/11/07 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2016/03/23 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	AT	2016/12/13 * 12
STS-05	Digital Hitester	Hioki	3805-50	080997828	AT	2016/10/17 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2016/09/26 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2016/12/13 * 12
KTS-07	Digital Tester	SANWA	PC500	7019232	AT	2016/10/17 * 12
SPM-06	Power Meter	Anritsu	ML2495A	0850009	AT	2016/04/01 * 12
SPSS-03	Power sensor	Anritsu	MA2411B	0917063	AT	2016/04/01 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT	2017/03/07 * 12
KAT10-S2	Attenuator	Agilent	8490D 010	06036	AT	2016/11/07 * 12
SCC-H13	Microwave cable	RS Pro	R-132G7210 100CO	-	AT	2016/04/18 * 12
SAEC-03(SVS WR)	Semi-Anechoic Chamber	TDK	SAEC-03(SVS WR)	3	RE	2016/07/25 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2016/08/22 * 12
SAJ-01	Antenna Tilt Jig	Intelligent System Engineering Co., Ltd	Antenna Tilt Jig	T-S001	RE	Pre Check
SCC-G40	Coaxial Cable	Junkosha	MWX221-01000 NFSNMS/B	1612S005	RE	2017/01/08 * 12
SCC-G06	Coaxial Cable	Junkosha	J12J102207-00	MAY-23-16-091	RE	2016/06/14 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	RE	2016/11/07 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2016/11/29 * 12
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2017/02/17 * 12
SCC-G21	Coaxial Cable	Suhner	SUCOFLEX 104	296169/4	RE	2016/05/11 * 12
SRENT-08	Spectrum Analyzer	Agilent	E4448A	MY50180019	RE, AT	2016/10/24 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE, CE,RFI,MF)	-	RE, CE	-

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

UL Japan, Inc.

Shonan EMC Lab.

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Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SJM-02	Measure	KOMELON	KMC-36	-	RE, CE	-
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2016/10/12 * 12
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE, CE	2016/10/17 * 12
SCC-G19	Coaxial Cable	Suhner	SUCOFLEX 102A	1188/2A	RE	2016/03/08 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-0100 0KMSKMS	-	RE	2016/04/18 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2016/03/24 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2016/09/27 * 12
SCC-C6/C7/ C8/C10/SRS E-03	Coaxial Cable&RF Selector	Suhner/Fujikura/Su hner/Suhner/TOYO	141PE/12DSFA /141PE/141PE/ NS4906	-/0901-271(RF Selector)	CE	2016/04/22 * 12
SLS-05	LISN	Rohde & Schwarz	ENV216	100516	CE	2017/02/27 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	CE	2016/12/13 * 12
STM-05	Terminator	TME	CT-01 BP	-	CE	2016/12/15 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	CE	2016/03/28 * 12
SAEC-03(NS A)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2016/07/15 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2016/10/18 * 12
SLA-07	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	196	RE	2017/01/26 * 12
SAT6-08	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	RE	2016/08/04 * 12
SCC-C1/C2/ C3/C4/C5/C1 0/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/S uhner/Suhner/Suhn er/Suhner/TOYO	8D2W/12DSFA /141PE/141PE/ 141PE/141PE/N S4906	-/0901-271(RF Selector)	RE	2016/04/22 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2017/02/09 * 12
SSA-01	Spectrum Analyzer	Agilent	N9010A-526	MY48031482	RE	2016/04/28 * 12
KAF-06	Pre Amplifier	TSJ	MLA-1840B02- 35	-	RE	2017/02/17 * 12
KHA-04	Horn Antenna	EMCO	3160-09	1278	RE	2016/06/24 * 12
SCC-G19	Coaxial Cable	Suhner	SUCOFLEX 102A	1188/2A	RE	2016/03/08 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-0100 0KMSKMS	-	RE	2016/04/18 * 12

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