



RADIO TEST REPORT

Test Report No. : 11355752S-N-R1

Applicant : Canon Inc.
Type of Equipment : Wireless LAN Module
Model No. : BM72065
FCC ID : AZDBM72065
Test regulation : FCC Part 15 Subpart C: 2016
Test Result : Complied

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. 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 11355752S-N. 11355752S-N is replaced with this report.

Date of test: September 20 to October 13, 2016

Representative test engineer:

Yosuke Ishikawa
Engineer
Consumer Technology Division

Approved by:

Toyokazu Imamura
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".

UL Japan, Inc.

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11355752S-N

[illegible]

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SECTION 1: Customer information

Company Name : Canon Inc.
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 Telephone Number : +81-3-3758-2111
 Facsimile Number : +81-44-739-5495
 Contact Person : Yasuhiko Minakawa

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

2.1 Identification of E.U.T.

Type of Equipment : Wireless LAN Module
 Model No. : BM72065
 Serial No. : Refer to Section 4, Clause 4.2
 Rating : DC 3.3 V
 Receipt Date of Sample : September 20, 2016
 Country of Mass-production : Japan
 Condition of EUT : Engineering prototype
 (Not for Sale: This sample is equivalent to mass-produced items.)
 Modification of EUT : No Modification by the test lab.

2.2 Product Description

Model: BM72065 (referred to as the EUT in this report) is a Wireless LAN Module.

General Specification

Clock frequency(ies) in the system : 38.4 MHz

Radio Specification

Equipment type : Transceiver

WLAN (IEEE802.11b/g/a/n-20/n-40)

Type of radio	IEEE802.11b	IEEE802.11g	IEEE802.11a	IEEE802.11n (20 M band)	IEEE802.11n (40 M band)
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	5180 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	2412 MHz - 2462 MHz 5180 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	2422 MHz - 2452 MHz 5190 MHz - 5310 MHz 5510 MHz - 5670 MHz 5755 MHz - 5795 MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)		
Channel spacing	5 MHz		20 MHz	<u>2.4 GHz band</u> 5 MHz <u>5 GHz band</u> 20 MHz	40 MHz
Antenna type	Balance Antenna				
Antenna gain	2.4 GHz ~ 2.5 GHz : 3.0 dBi, 5.15 GHz ~ 5.85 GHz: 4.5 dBi				
Antenna connector type	U.FL connector				
Operating temperature	0 deg. C - +50 deg. C				

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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

* The revision on November 14, 2016, does not affect the test specification applied to the EUT.

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	19.3 dB, 0.40375 MHz, L1 QP, Tx 2412 MHz, 11g	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: Section 15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	4.9 dB 2390.00 MHz, AV, Vertical Tx 2422 MHz, 11n-40	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 RF Module has its own regulator. The RF Module is constantly provided voltage (DC 1.8 V and DC 3.0 V) through the regulator regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

The EUT has a unique coupling/antenna connector (U.FL). Therefore the equipment 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 $k = 2$.

Shonan EMC Lab.

Item	Frequency range	Uncertainty (+/-)			
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.1 dB	2.1 dB	2.6 dB	2.2 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	2.7 dB	2.7 dB	3.1 dB	-
	30 MHz-300 MHz	4.4 dB	4.4 dB	4.6 dB	-
	300 MHz-1 GHz	5.6 dB	5.5 dB	5.3 dB	-
	1 GHz-13 GHz	5.2 dB	5.2 dB	5.2 dB	-
Radiated emission (Measurement distance: 1 m)	13 GHz-18 GHz	4.9 dB	4.9 dB	4.9 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	0.76 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.79 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.74 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	1.08 dB
Spurious emission (Conducted) below 1GHz	1.5 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.7 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.4 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.5 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.5 dB
Bandwidth Measurement	0.66 %
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 report meets the limits unless the uncertainty is taken into consideration.

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 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.

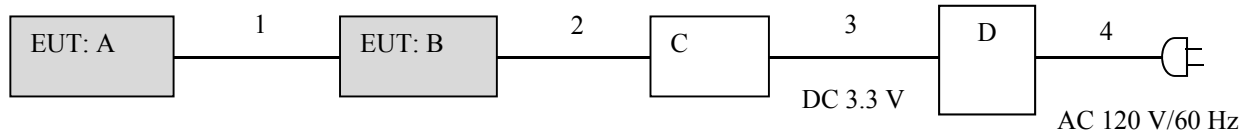
Mode	Remarks*
IEEE 802.11b (11b)	11 Mbps, PN9
IEEE 802.11g (11g)	6 Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	MCS 7, PN9
IEEE 802.11n 40 MHz BW (11n-40)	MCS 5, PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)	
Power settings: 11b = 12 dBm, 11g = 12 dBm, 11n-20 = 12 dBm, 11n-40 = 11 dBm	
Software: DUT Labtool ver 1.0.7.13	

*Transmitting duty was 100 % on all tests.

*The details of Operating mode(s)

Test Item	Operating Mode	Tested frequency
Conducted Emission Spurious Emission (below 1 GHz)	11g Tx	2412 MHz
Spurious Emission (above 1 GHz) 6dB Bandwidth Maximum Peak Output Power Power Density 99% Occupied Bandwidth	11b Tx 11g Tx 11n-20 Tx 11n-40 Tx	2412 MHz, 2437 MHz, 2462 MHz 2422 MHz, 2437 MHz, 2452 MHz

4.2 Configuration and peripherals



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

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	2.4-5G dual band antenna	146153-100	-	MOLEX	EUT
B	Wireless LAN Module	BM72065	60128BCC1E18	Canon	EUT
C	Jig	-	-	-	-
D	DC Power Supply	PAN35-10A	NA000955	Kikusui	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Antenna	0.1	Unshielded	Unshielded	-
2	Flat	0.07	Unshielded	Unshielded	-
3	DC	1.5	Unshielded	Unshielded	-
4	DC	1.8	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.

Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN / (AMN) to the input power source.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a shielded room. 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 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 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

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

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

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

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

Test Antennas are used as below;

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

In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(IC) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (IC).

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *3)	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: 300 kHz
Test Distance	3 m	3.94 m *1) (1 GHz – 13 GHz), 1 m *2) (13 GHz – 26 GHz)		3.94 m *1) (1 GHz – 13 GHz), 1 m *2) (13 GHz – 26 GHz)

*1) Distance Factor: $20 \times \log(3.94 \text{ m} / 3.0 \text{ m}) = 2.37 \text{ dB}$

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

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

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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.

EUT	Antenna polarization	Carrier (Band edge)	Spurious				
			Below 1 GHz	Above 1 GHz			
				1 GHz - 2.8 GHz	2.8 GHz - 13 GHz	13 GHz - 18 GHz	18 GHz - 26.5 GHz
Module	Horizontal	Y	X	Y	X	X	X
	Vertical	Y	X	Y	X	X	X
Antenna	Horizontal	X	X	X	X	X	X
	Vertical	Y	X	Y	X	X	X

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

Measurement range : 30 MHz - 26 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	Enough width to display emission skirts	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	Sample	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	10 kHz	30 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 = 1.0 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

APPENDIX 1: Test data

Conducted Emission

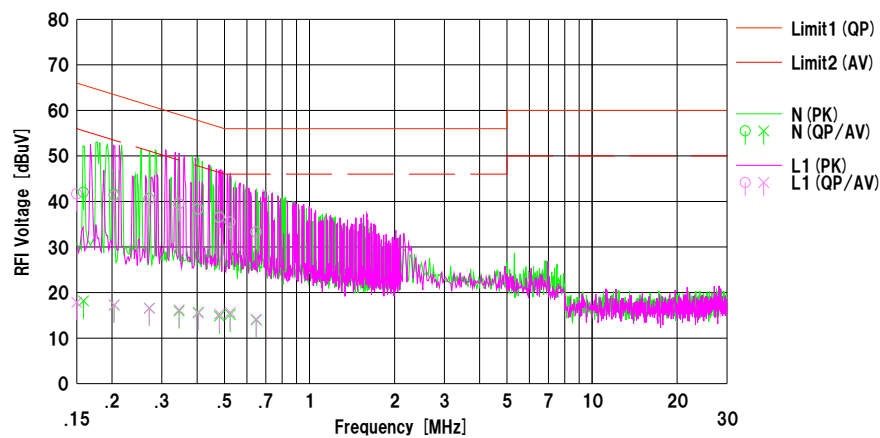
DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.1 Shielded Room
Date : 2016/10/13

Mode : Tx_11g_2412 MHz
Order No. : 11355752S
Temp./Humi. : 22 deg.C / 54 %RH

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

Engineer : Takahiro Suzuki



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15849	29.58	5.72	12.43	42.01	18.15	65.54	55.54	23.5	37.3	N	
2	0.20340	29.14	4.82	12.43	41.57	17.25	63.47	53.47	21.9	36.2	N	
3	0.27109	28.17	4.15	12.44	40.61	16.59	61.08	51.08	20.4	34.4	N	
4	0.34538	27.08	3.52	12.45	39.53	15.97	59.07	49.07	19.5	33.1	N	
5	0.40375	25.69	3.19	12.47	38.16	15.66	57.78	47.78	19.6	32.1	N	
6	0.47943	24.26	2.38	12.46	36.72	14.84	56.35	46.35	19.6	31.5	N	
7	0.52365	23.00	2.71	12.47	35.47	15.18	56.00	46.00	20.5	30.8	N	
8	0.64752	20.73	1.47	12.50	33.23	13.97	56.00	46.00	22.7	32.0	N	
9	0.15000	29.22	5.43	12.43	41.65	17.86	66.00	56.00	24.3	38.1	L1	
10	0.20340	28.77	4.86	12.43	41.20	17.29	63.47	53.47	22.2	36.1	L1	
11	0.27109	28.05	4.12	12.44	40.49	16.56	61.08	51.08	20.5	34.5	L1	
12	0.34538	26.98	3.75	12.45	39.43	16.20	59.07	49.07	19.6	32.8	L1	
13	0.40375	25.92	3.01	12.47	38.39	15.46	57.78	47.78	19.3	32.3	L1	
14	0.47943	23.99	2.84	12.46	36.45	15.30	56.35	46.35	19.9	31.0	L1	
15	0.52365	23.00	3.18	12.47	35.47	15.65	56.00	46.00	20.5	30.3	L1	
16	0.64752	20.83	1.65	12.50	33.33	14.15	56.00	46.00	22.6	31.8	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
LISN: SLS-01

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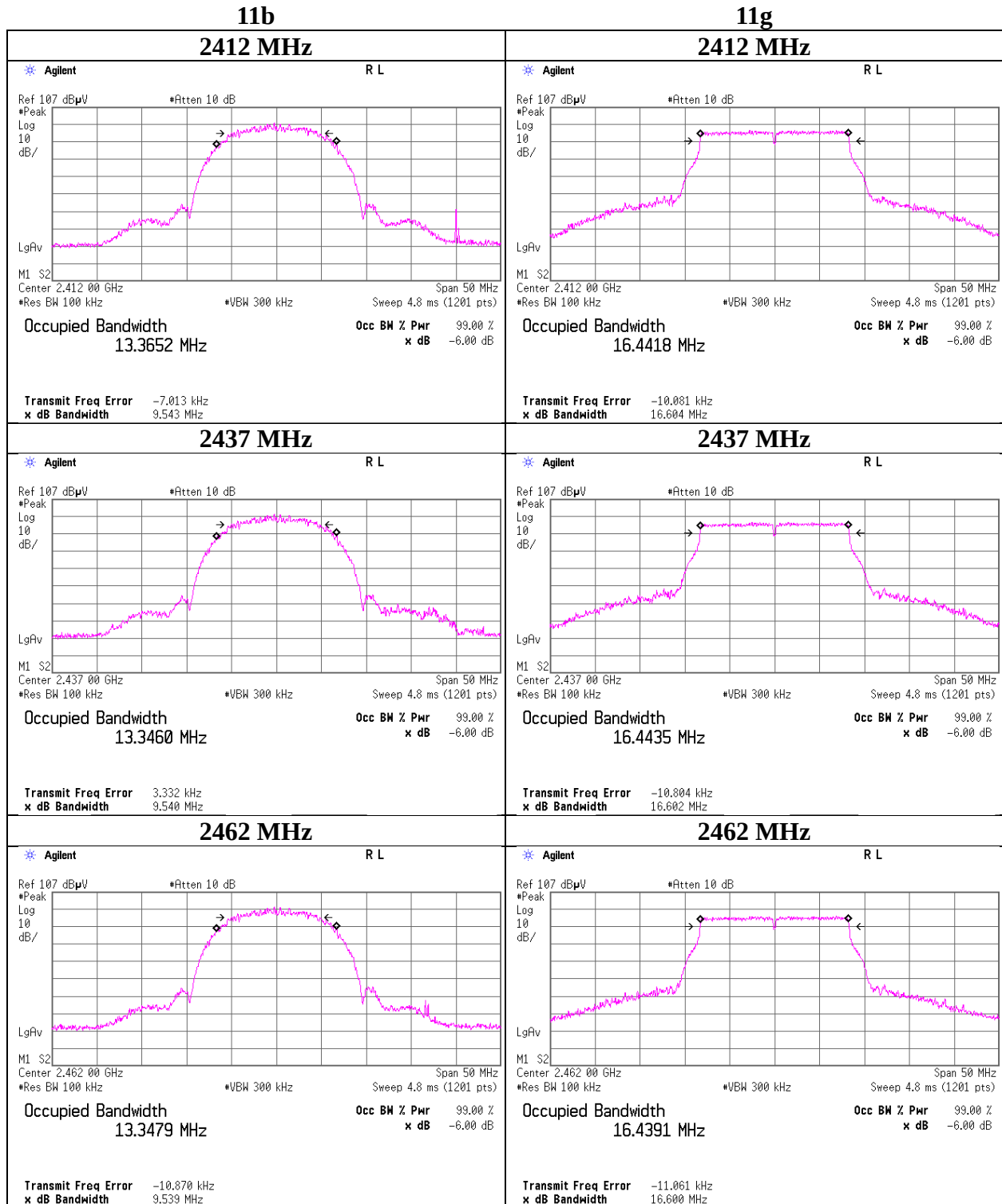
Facsimile : +81 463 50 6401

6dB Bandwidth

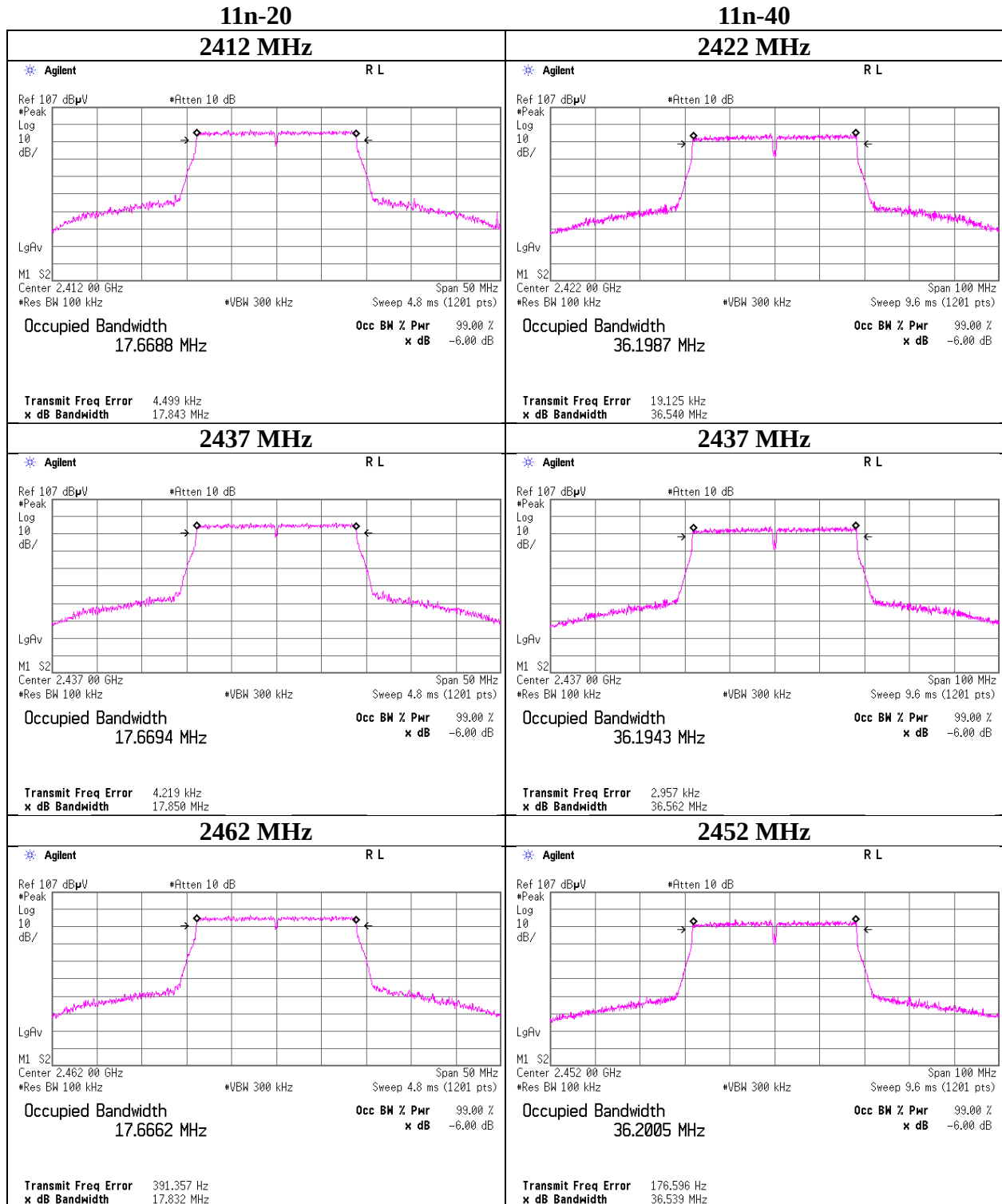
Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11355752S-N-R1
Date	September 21, 2016
Temperature / Humidity	24 deg. C / 52 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

Mode	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
11b	2412	9.543	> 500
	2437	9.540	> 500
	2462	9.539	> 500
11g	2412	16.604	> 500
	2437	16.602	> 500
	2462	16.600	> 500
11n-20	2412	17.843	> 500
	2437	17.850	> 500
	2462	17.832	> 500
11n-40	2422	36.540	> 500
	2437	36.562	> 500
	2452	36.539	> 500

6dB Bandwidth



6dB Bandwidth



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Maximum Peak Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11355752S-N-R1
Date : September 20, 2016
Temperature / Humidity : 24 deg. C / 54 % RH
Engineer : Shinichi Takano
Mode : Tx 11b

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	3.82	1.71	9.67	15.20	33.11	30.00	1000	14.80
2437	3.69	1.70	9.67	15.06	32.06	30.00	1000	14.94
2462	3.62	1.70	9.67	14.99	31.55	30.00	1000	15.01

Sample Calculation:

Result = Reading + Cable Loss + Attenuator Loss

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

2437MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	3.48	
2	3.47	
5.5	3.49	
11	3.69	*

*: 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.	11355752S-N-R1
Date	September 20, 2016
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Shinichi Takano
Mode	Tx 11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	11.20	1.71	9.67	22.58	181.13	30.00	1000	7.42
2437	11.15	1.70	9.67	22.52	178.65	30.00	1000	7.48
2462	10.94	1.70	9.67	22.31	170.22	30.00	1000	7.69

Sample Calculation:

Result = Reading + Cable Loss + Attenuator Loss

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

2437 MHz

Rate [Mbps]	Reading [dBm]	Remark
6	11.15	*
9	10.23	
12	10.82	
18	10.30	
24	11.12	
36	10.79	
48	10.59	
54	10.69	

*: 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.	11355752S-N-R1
Date	September 20, 2016
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Shinichi Takano
Mode	Tx 11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	10.32	1.71	9.67	21.70	147.91	30.00	1000	8.30
2437	10.28	1.70	9.67	21.65	146.22	30.00	1000	8.35
2462	10.20	1.70	9.67	21.57	143.55	30.00	1000	8.43

Sample Calculation:

Result = Reading + Cable Loss + Attenuator Loss

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

2437 MHz

Mode	Reading	Remark
MCS	[dBm]	
0	10.11	
1	10.17	
2	10.27	
3	10.23	
4	10.21	
5	10.22	
6	10.22	
7	10.28	*

*: 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.	11355752S-N-R1
Date	September 20, 2016
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Shinichi Takano
Mode	Tx 11n-40

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2422	10.91	1.71	9.67	22.29	169.43	30.00	1000	7.71
2437	11.10	1.70	9.67	22.47	176.60	30.00	1000	7.53
2452	10.67	1.70	9.67	22.04	159.96	30.00	1000	7.96

Sample Calculation:

Result = Reading + Cable Loss + Attenuator Loss

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

2437 MHz

Mode	Reading	Remark
MCS	[dBm]	
0	10.77	
1	10.26	
2	10.72	
3	11.06	
4	10.97	
5	11.10	*
6	10.41	
7	10.31	

*: Worst Rate

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

Average Output Power **(Reference data for RF Exposure)**

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11355752S-N-R1
Date : September 20, 2016
Temperature / Humidity : 24 deg. C / 54 % RH
Engineer : Shinichi Takano
Mode : Tx

11b 11 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	1.07	1.71	9.67	12.45	17.58	0.00	12.45	17.58
2437	0.89	1.70	9.67	12.26	16.83	0.00	12.26	16.83
2462	0.83	1.70	9.67	12.20	16.60	0.00	12.20	16.60

11g 6 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	1.10	1.71	9.67	12.48	17.70	0.00	12.48	17.70
2437	1.11	1.70	9.67	12.48	17.70	0.00	12.48	17.70
2462	0.72	1.70	9.67	12.09	16.18	0.00	12.09	16.18

11n-20 MCS 2

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	1.03	1.71	9.67	12.41	17.42	0.00	12.41	17.42
2437	0.96	1.70	9.67	12.33	17.10	0.00	12.33	17.10
2462	0.73	1.70	9.67	12.10	16.22	0.00	12.10	16.22

11n-40 MCS 0

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2422	0.33	1.71	9.67	11.71	14.83	0.00	11.71	14.83
2437	0.62	1.70	9.67	11.99	15.81	0.00	11.99	15.81
2452	0.02	1.70	9.67	11.39	13.77	0.00	11.39	13.77

Sample Calculation:

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

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

The test was performed with condition that obtained the maximum frame power in pre-check.

Average Output Power (Reference data for RF Exposure)

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11355752S-N-R1
Date	September 20, 2016
Temperature / Humidity	24 deg. C / 54 % RH
Engineer	Shinichi Takano
Mode	Tx

2437 MHz

Mode	Rate Mbps	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11b	1	0.64	0.00	0.64	
	2	0.69	0.00	0.69	
	5.5	0.76	0.00	0.76	
	11	0.89	0.00	0.89	*
11g	6	1.11	0.00	1.11	*
	9	0.85	0.00	0.85	
	12	0.94	0.00	0.94	
	18	1.05	0.00	1.05	
	24	1.01	0.00	1.01	
	36	0.79	0.00	0.79	
	48	0.84	0.00	0.84	
	54	0.75	0.00	0.75	

* Worst rate

Sample Calculation:

Burst power = Reading (timed average) + Duty factor

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

2437 MHz

Mode	Rate MCS	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11n-20	0	0.84	0.00	0.84	
	1	0.83	0.00	0.83	
	2	0.96	0.00	0.96	*
	3	0.94	0.00	0.94	
	4	0.94	0.00	0.94	
	5	0.95	0.00	0.95	
	6	0.91	0.00	0.91	
11n-40	0	0.62	0.00	0.62	*
	1	0.61	0.00	0.61	
	2	0.61	0.00	0.61	
	3	0.56	0.00	0.56	
	4	0.56	0.00	0.56	
	5	0.53	0.00	0.53	
	6	0.61	0.00	0.61	
	7	0.56	0.00	0.56	

* Worst rate

Sample Calculation:

Burst power = Reading (timed average) + Duty factor

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

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Shonan EMC Lab.

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Telephone : +81 463 50 6400

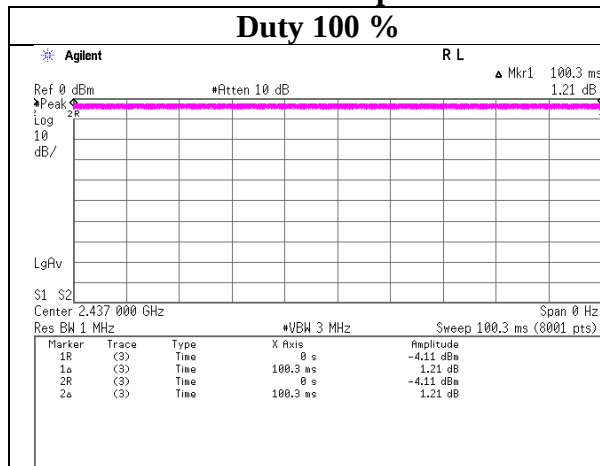
Facsimile : +81 463 50 6401

Burst rate confirmation

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11355752S-N-R1
Date : September 20, 2016
Temperature / Humidity : 24 deg. C / 54 % RH
Engineer : Shinichi Takano
Mode : Tx

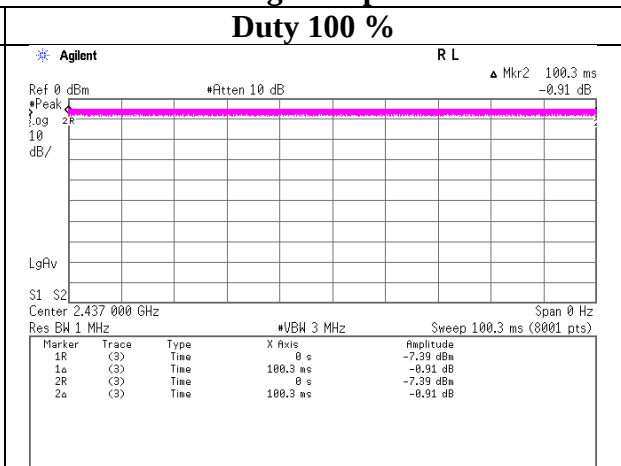
11b 11 Mbps

Duty 100 %



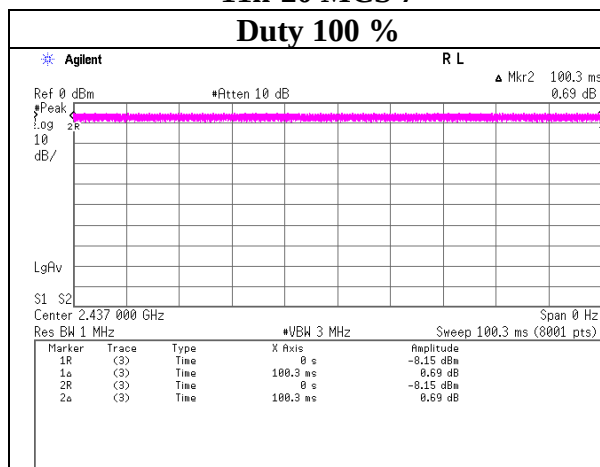
11g 6 Mbps

Duty 100 %



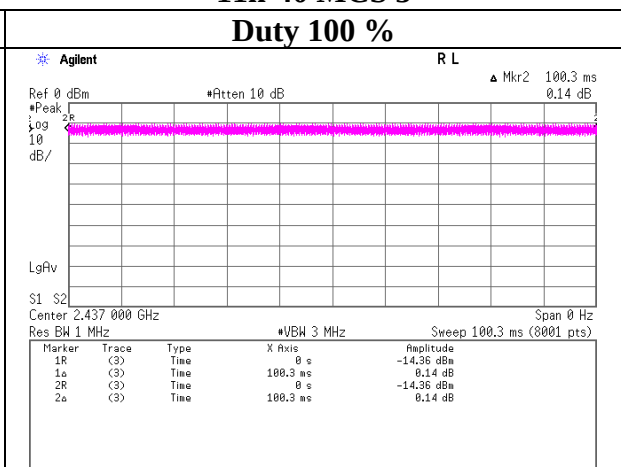
11n-20 MCS 7

Duty 100 %



11n-40 MCS 5

Duty 100 %



Radiated Spurious Emission

Report No. 11355752S-N-R1
Anechoic Chamber No. 1 2 2
Date September 26, 2016 September 28, 2016 October 5, 2016
Temperature / Humidity 22 deg. C / 67 % RH 22 deg. C / 64 % RH 24 deg. C / 61 % RH
Engineer Yosuke Ishikawa Yasumasa Owaki Hiroyuki Morikawa
(1-2.8GHz) (13-26GHz) (2.8-13GHz)
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	46.30	27.21	13.77	40.70	2.37	48.95	73.90	24.9	248	278	
Hori.	4824.000	PK	41.61	31.17	5.93	37.13	2.37	43.95	73.90	30.0	150	0	
Hori.	7236.000	PK	42.87	36.49	7.26	37.86	2.37	51.13	73.90	22.8	150	0	
Hori.	9648.000	PK	44.11	38.34	7.89	39.15	2.37	53.56	73.90	20.3	150	0	
Hori.	2390.000	AV	36.04	27.21	13.77	40.70	2.37	38.69	53.90	15.2	248	278	
Hori.	4824.000	AV	33.68	31.17	5.93	37.13	2.37	36.02	53.90	17.9	150	0	
Hori.	7236.000	AV	35.09	36.49	7.26	37.86	2.37	43.35	53.90	10.6	150	0	
Hori.	9648.000	AV	36.20	38.34	7.89	39.15	2.37	45.65	53.90	8.2	150	0	
Vert.	2390.000	PK	45.26	27.21	13.77	40.70	2.37	47.91	73.90	25.9	160	268	
Vert.	4824.000	PK	41.72	31.17	5.93	37.13	2.37	44.06	73.90	29.8	150	0	
Vert.	7236.000	PK	43.16	36.49	7.26	37.86	2.37	51.42	73.90	22.5	150	0	
Vert.	9648.000	PK	44.08	38.34	7.89	39.15	2.37	53.53	73.90	20.4	150	0	
Vert.	2390.000	AV	37.24	27.21	13.77	40.70	2.37	39.89	53.90	14.0	160	268	
Vert.	4824.000	AV	33.63	31.17	5.93	37.13	2.37	35.97	53.90	17.9	150	0	
Vert.	7236.000	AV	34.93	36.49	7.26	37.86	2.37	43.19	53.90	10.7	150	0	
Vert.	9648.000	AV	36.29	38.34	7.89	39.15	2.37	45.74	53.90	8.2	150	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.94\text{ m} / 3.0\text{ m}) = 2.37\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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	96.36	27.29	13.79	40.70	2.37	99.11	-	-	Carrier
Hori.	2400.000	PK	42.71	27.25	13.78	40.70	2.37	45.41	79.11	33.7	
Vert.	2412.000	PK	96.90	27.29	13.79	40.70	2.37	99.65	-	-	Carrier
Vert.	2400.000	PK	43.27	27.25	13.78	40.70	2.37	45.97	79.65	33.7	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.94\text{ m} / 3.0\text{ m}) = 2.37\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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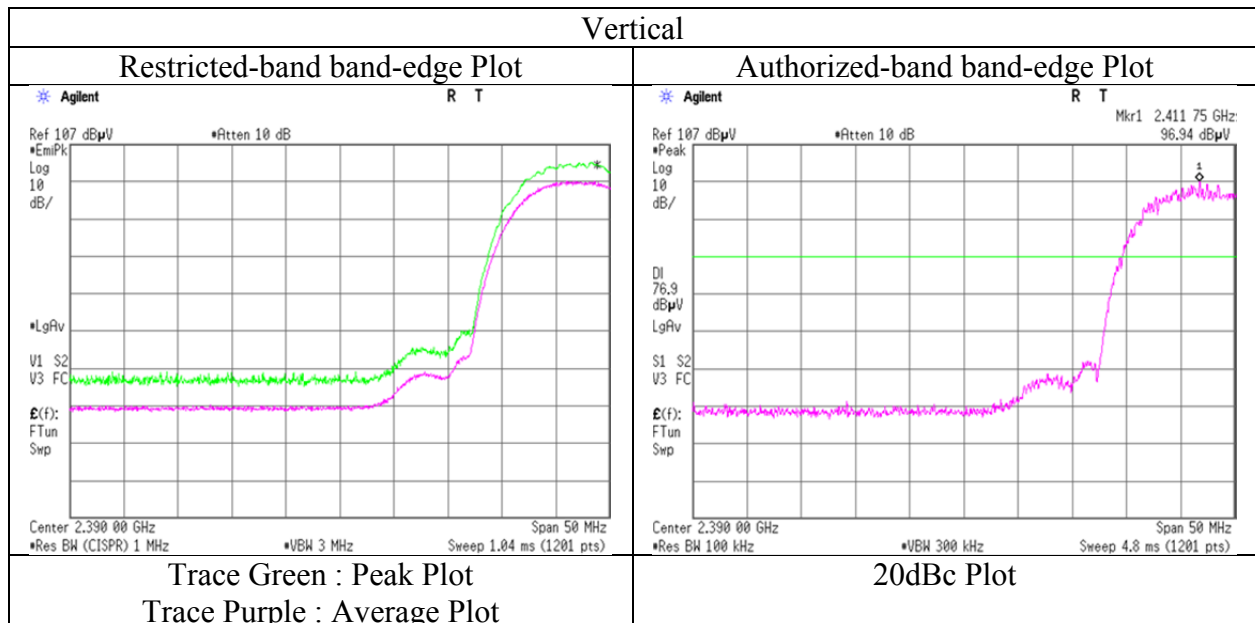
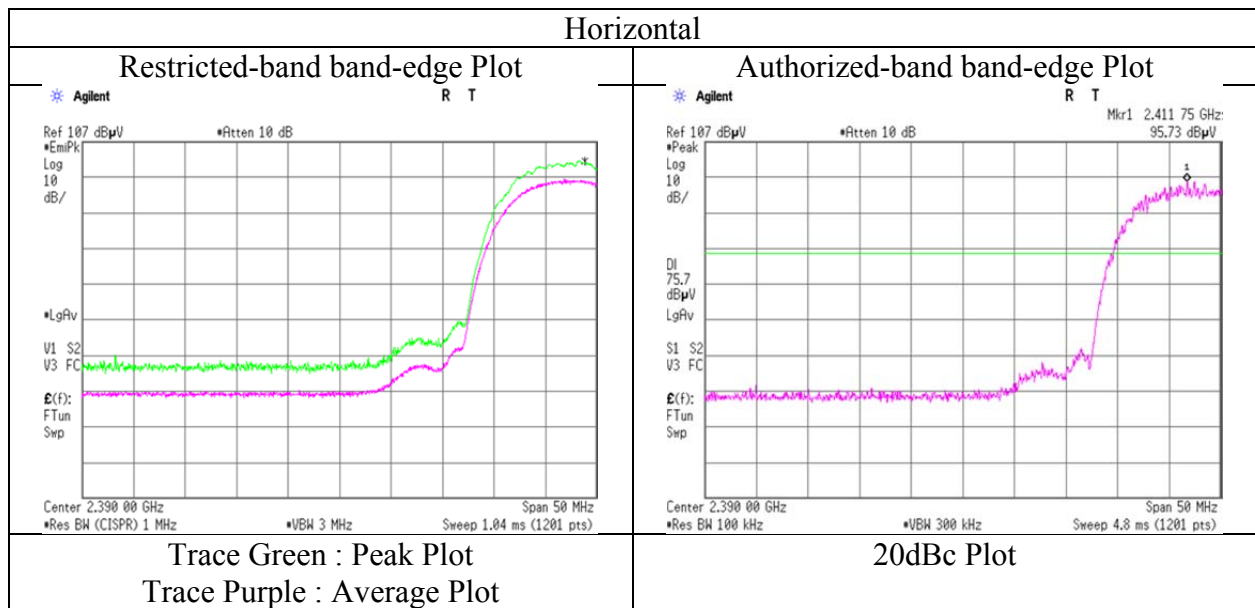
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

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Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11355752S-N-R1
Anechoic Chamber No.	1
Date	September 26, 2016
Temperature / Humidity	22 deg. C / 67 % RH
Engineer	Yosuke Ishikawa
	(1-2.8GHz)
Mode	Tx 11b 2412 MHz



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

Radiated Spurious Emission

Report No. 11355752S-N-R1
Anechoic Chamber No. 1 2 2
Date September 26, 2016 September 28, 2016 October 5, 2016
Temperature / Humidity 22 deg. C / 67 % RH 22 deg. C / 64 % RH 24 deg. C / 61 % RH
Engineer Yosuke Ishikawa Yasumasa Owaki Hiroyuki Morikawa
(1-2.8GHz) (13-26GHz) (2.8-13GHz)
Mode Tx 11b 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.	4874.000	PK	41.36	31.28	5.96	37.15	2.37	43.82	73.90	30.1	150	0	
Hori.	7311.000	PK	43.45	36.62	7.31	37.91	2.37	51.84	73.90	22.1	150	0	
Hori.	9748.000	PK	44.05	38.50	7.97	39.19	2.37	53.70	73.90	20.2	150	0	
Hori.	4874.000	AV	33.56	31.28	5.96	37.15	2.37	36.02	53.90	17.9	150	0	
Hori.	7311.000	AV	34.36	36.62	7.31	37.91	2.37	42.75	53.90	11.2	150	0	
Hori.	9748.000	AV	35.75	38.50	7.97	39.19	2.37	45.40	53.90	8.5	150	0	
Vert.	4874.000	PK	42.30	31.28	5.96	37.15	2.37	44.76	73.90	29.1	150	0	
Vert.	7311.000	PK	42.91	36.62	7.31	37.91	2.37	51.30	73.90	22.6	150	0	
Vert.	9748.000	PK	44.57	38.50	7.97	39.19	2.37	54.22	73.90	19.7	150	0	
Vert.	4874.000	AV	33.88	31.28	5.96	37.15	2.37	36.34	53.90	17.6	150	0	
Vert.	7311.000	AV	34.69	36.62	7.31	37.91	2.37	43.08	53.90	10.8	150	0	
Vert.	9748.000	AV	35.93	38.50	7.97	39.19	2.37	45.58	53.90	8.3	150	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.94\text{ m} / 3.0\text{ m}) = 2.37\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

UL Japan, Inc.

Shonan EMC Lab.

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Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No. 11355752S-N-R1
Anechoic Chamber No. 1 2 2
Date September 26, 2016 September 28, 2016 October 5, 2016
Temperature / Humidity 22 deg. C / 67 % RH 22 deg. C / 64 % RH 24 deg. C / 61 % RH
Engineer Yosuke Ishikawa Yasumasa Owaki Hiroyuki Morikawa
(1-2.8GHz) (13-26GHz) (2.8-13GHz)
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	46.46	27.52	13.86	40.69	2.37	49.52	73.90	24.3	146	280	
Hori.	4924.000	PK	42.06	31.38	5.99	37.18	2.37	44.62	73.90	29.3	150	0	
Hori.	7386.000	PK	42.80	36.75	7.37	37.96	2.37	51.33	73.90	22.6	150	0	
Hori.	9848.000	PK	43.19	38.65	8.06	39.23	2.37	53.04	73.90	20.9	150	0	
Hori.	2483.500	AV	37.47	27.52	13.86	40.69	2.37	40.53	53.90	13.3	146	280	
Hori.	4924.000	AV	33.58	31.38	5.99	37.18	2.37	36.14	53.90	17.8	150	0	
Hori.	7386.000	AV	34.51	36.75	7.37	37.96	2.37	43.04	53.90	10.9	150	0	
Hori.	9848.000	AV	35.42	38.65	8.06	39.23	2.37	45.27	53.90	8.6	150	0	
Vert.	2483.500	PK	46.06	27.52	13.86	40.69	2.37	49.12	73.90	24.7	139	233	
Vert.	4924.000	PK	41.85	31.38	5.99	37.18	2.37	44.41	73.90	29.5	150	0	
Vert.	7386.000	PK	42.27	36.75	7.37	37.96	2.37	50.80	73.90	23.1	150	0	
Vert.	9848.000	PK	43.63	38.65	8.06	39.23	2.37	53.48	73.90	20.4	150	0	
Vert.	2483.500	AV	37.18	27.52	13.86	40.69	2.37	40.24	53.90	13.6	139	233	
Vert.	4924.000	AV	34.00	31.38	5.99	37.18	2.37	36.56	53.90	17.3	150	0	
Vert.	7386.000	AV	34.30	36.75	7.37	37.96	2.37	42.83	53.90	11.1	150	0	
Vert.	9848.000	AV	35.47	38.65	8.06	39.23	2.37	45.32	53.90	8.6	150	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.94\text{ m} / 3.0\text{ m}) = 2.37\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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Shonan EMC Lab.

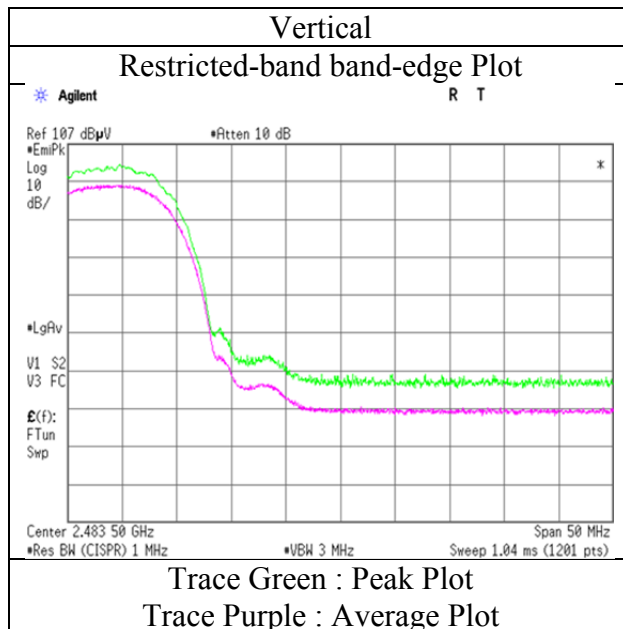
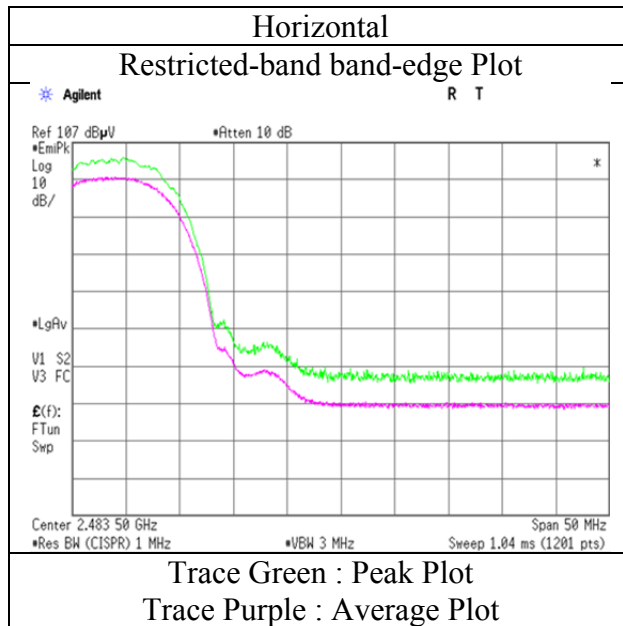
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11355752S-N-R1
Anechoic Chamber No.	1
Date	September 26, 2016
Temperature / Humidity	22 deg. C / 67 % RH
Engineer	Yosuke Ishikawa (1-2.8GHz)
Mode	Tx 11b 2462 MHz



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

Radiated Spurious Emission

Report No.	11355752S-N-R1			
Anechoic Chamber No.	1	2	2	1
Date	September 26, 2016	September 28, 2016	October 5, 2016	October 13, 2016
Temperature / Humidity	22 deg. C / 67 % RH	22 deg. C / 64 % RH	24 deg. C / 61 % RH	22 deg. C / 54 % RH
Engineer	Yosuke Ishikawa (1-2.8GHz)	Yasumasa Owaki (13-26GHz)	Hiroyuki Morikawa (2.8-13GHz)	Takahiro Suzuki (30-1000MHz)
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.	150.914	QP	22.35	14.87	8.68	31.78	0.00	14.12	43.50	29.3	207	268	
Hori.	187.619	QP	22.19	16.30	9.03	31.76	0.00	15.76	43.50	27.7	186	5	
Hori.	214.417	QP	21.94	16.98	9.27	31.75	0.00	16.44	43.50	27.0	246	200	
Hori.	271.100	QP	22.47	18.71	9.75	31.74	0.00	19.19	46.00	26.8	142	318	
Hori.	733.970	QP	22.23	21.22	9.00	31.95	0.00	20.50	46.00	25.5	124	358	
Hori.	2390.000	PK	52.91	27.21	13.77	40.70	2.37	55.56	73.90	18.3	230	267	
Hori.	4824.000	PK	42.13	31.17	5.93	37.13	2.37	44.47	73.90	29.4	150	0	
Hori.	7236.000	PK	42.87	36.49	7.26	37.86	2.37	51.13	73.90	22.8	150	0	
Hori.	9648.000	PK	43.92	38.34	7.89	39.15	2.37	53.37	73.90	20.5	150	0	
Hori.	2390.000	AV	40.67	27.21	13.77	40.70	2.37	43.32	53.90	10.5	230	267	
Hori.	4824.000	AV	33.75	31.17	5.93	37.13	2.37	36.09	53.90	17.8	150	0	
Hori.	7236.000	AV	35.00	36.49	7.26	37.86	2.37	43.26	53.90	10.6	150	0	
Hori.	9648.000	AV	36.43	38.34	7.89	39.15	2.37	45.88	53.90	8.0	150	0	
Vert.	114.826	QP	22.73	12.33	8.30	31.79	0.00	11.57	43.50	31.9	100	3	
Vert.	170.024	QP	22.32	15.67	8.86	31.77	0.00	15.08	43.50	28.4	100	179	
Vert.	214.871	QP	22.19	17.00	9.28	31.75	0.00	16.72	43.50	26.7	100	269	
Vert.	260.582	QP	22.51	18.36	9.67	31.74	0.00	18.80	46.00	27.2	100	2	
Vert.	442.819	QP	22.16	17.93	7.48	31.87	0.00	15.70	46.00	30.3	100	10	
Vert.	2390.000	PK	55.16	27.21	13.77	40.70	2.37	57.81	73.90	16.0	149	235	
Vert.	4824.000	PK	41.84	31.17	5.93	37.13	2.37	44.18	73.90	29.7	150	0	
Vert.	7236.000	PK	43.14	36.49	7.26	37.86	2.37	51.40	73.90	22.5	150	0	
Vert.	9648.000	PK	44.73	38.34	7.89	39.15	2.37	54.18	73.90	19.7	150	0	
Vert.	2390.000	AV	42.97	27.21	13.77	40.70	2.37	45.62	53.90	8.2	149	235	
Vert.	4824.000	AV	33.81	31.17	5.93	37.13	2.37	36.15	53.90	17.8	150	0	
Vert.	7236.000	AV	35.05	36.49	7.26	37.86	2.37	43.31	53.90	10.6	150	0	
Vert.	9648.000	AV	36.54	38.34	7.89	39.15	2.37	45.99	53.90	7.9	150	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.94\text{ m} / 3.0\text{ m}) = 2.37\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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	89.92	27.29	13.79	40.70	2.37	92.67	-	-	Carrier
Hori.	2400.000	PK	52.22	27.25	13.78	40.70	2.37	54.92	72.67	17.8	
Vert.	2412.000	PK	91.01	27.29	13.79	40.70	2.37	93.76	-	-	Carrier
Vert.	2400.000	PK	53.31	27.25	13.78	40.70	2.37	56.01	73.76	17.8	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.94\text{ m} / 3.0\text{ m}) = 2.37\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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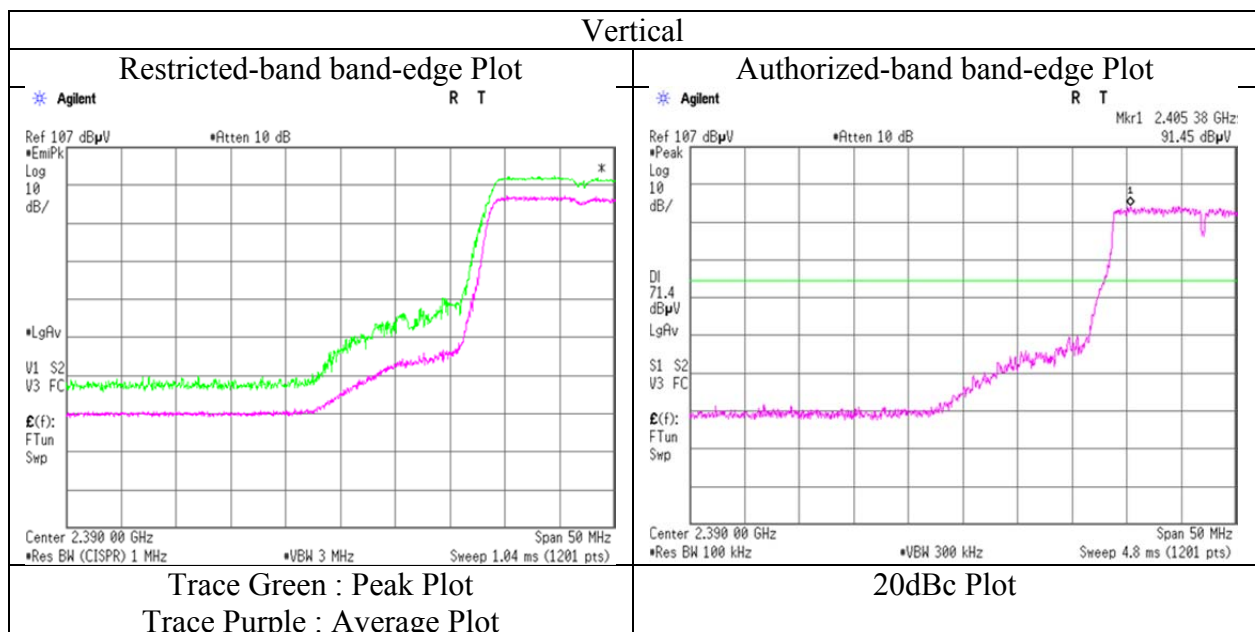
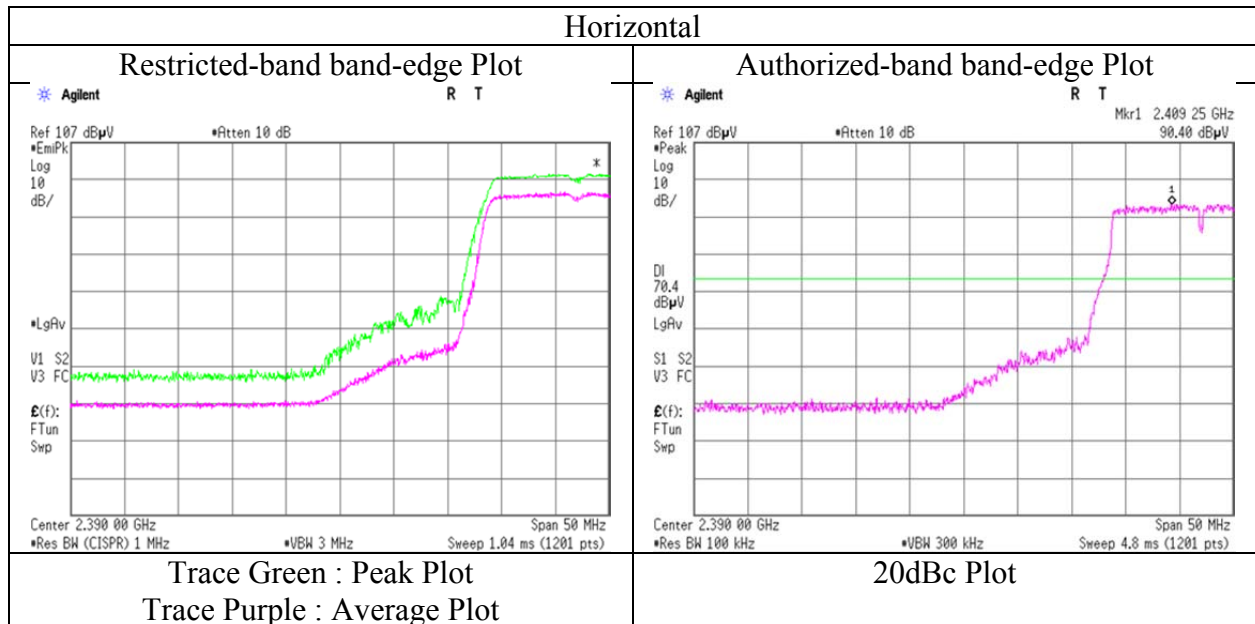
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Radiated Spurious Emission (Reference Plot for band-edge)

Report No. 11355752S-N-R1
Anechoic Chamber No. 1
Date September 26, 2016
Temperature / Humidity 22 deg. C / 67 % RH
Engineer Yosuke Ishikawa
(1-2.8GHz)
Mode Tx 11g 2412 MHz



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

Radiated Spurious Emission

Report No. 11355752S-N-R1
Anechoic Chamber No. 1 2 2
Date September 26, 2016 September 28, 2016 October 5, 2016
Temperature / Humidity 22 deg. C / 67 % RH 22 deg. C / 64 % RH 24 deg. C / 61 % RH
Engineer Yosuke Ishikawa Yasumasa Owaki Hiroyuki Morikawa
(1-2.8GHz) (13-26GHz) (2.8-13GHz)
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.	4874.000	PK	41.99	31.28	5.96	37.15	2.37	44.45	73.90	29.5	150	0	
Hori.	7311.000	PK	42.99	36.62	7.31	37.91	2.37	51.38	73.90	22.5	150	0	
Hori.	9748.000	PK	44.11	38.50	7.97	39.19	2.37	53.76	73.90	20.1	150	0	
Hori.	4874.000	AV	33.76	31.28	5.96	37.15	2.37	36.22	53.90	17.7	150	0	
Hori.	7311.000	AV	34.61	36.62	7.31	37.91	2.37	43.00	53.90	10.9	150	0	
Hori.	9748.000	AV	36.05	38.50	7.97	39.19	2.37	45.70	53.90	8.2	150	0	
Vert.	4874.000	PK	42.97	31.28	5.96	37.15	2.37	45.43	73.90	28.5	150	0	
Vert.	7311.000	PK	43.41	36.62	7.31	37.91	2.37	51.80	73.90	22.1	150	0	
Vert.	9748.000	PK	43.97	38.50	7.97	39.19	2.37	53.62	73.90	20.3	150	0	
Vert.	4874.000	AV	34.26	31.28	5.96	37.15	2.37	36.72	53.90	17.2	150	0	
Vert.	7311.000	AV	34.56	36.62	7.31	37.91	2.37	42.95	53.90	11.0	150	0	
Vert.	9748.000	AV	35.79	38.50	7.97	39.19	2.37	45.44	53.90	8.5	150	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.94\text{ m} / 3.0\text{ m}) = 2.37\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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Radiated Spurious Emission

Report No. 11355752S-N-R1
Anechoic Chamber No. 1 2 2
Date September 26, 2016 September 28, 2016 October 5, 2016
Temperature / Humidity 22 deg. C / 67 % RH 22 deg. C / 64 % RH 24 deg. C / 61 % RH
Engineer Yosuke Ishikawa Yasumasa Owaki Hiroyuki Morikawa
(1-2.8GHz) (13-26GHz) (2.8-13GHz)
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	55.03	27.52	13.86	40.69	2.37	58.09	73.90	15.8	145	277	
Hori.	4924.000	PK	42.19	31.38	5.99	37.18	2.37	44.75	73.90	29.2	150	0	
Hori.	7386.000	PK	43.43	36.75	7.37	37.96	2.37	51.96	73.90	21.9	150	0	
Hori.	9848.000	PK	44.03	38.65	8.06	39.23	2.37	53.88	73.90	20.0	150	0	
Hori.	2483.500	AV	42.53	27.52	13.86	40.69	2.37	45.59	53.90	8.3	145	277	
Hori.	4924.000	AV	33.82	31.38	5.99	37.18	2.37	36.38	53.90	17.5	150	0	
Hori.	7386.000	AV	34.36	36.75	7.37	37.96	2.37	42.89	53.90	11.0	150	0	
Hori.	9848.000	AV	35.60	38.65	8.06	39.23	2.37	45.45	53.90	8.5	150	0	
Vert.	2483.500	PK	56.16	27.52	13.86	40.69	2.37	59.22	73.90	14.6	154	239	
Vert.	4924.000	PK	42.08	31.38	5.99	37.18	2.37	44.64	73.90	29.3	150	0	
Vert.	7386.000	PK	43.08	36.75	7.37	37.96	2.37	51.61	73.90	22.3	150	0	
Vert.	9848.000	PK	43.72	38.65	8.06	39.23	2.37	53.57	73.90	20.3	150	0	
Vert.	2483.500	AV	41.20	27.52	13.86	40.69	2.37	44.26	53.90	9.6	154	239	
Vert.	4924.000	AV	34.48	31.38	5.99	37.18	2.37	37.04	53.90	16.9	150	0	
Vert.	7386.000	AV	34.34	36.75	7.37	37.96	2.37	42.87	53.90	11.0	150	0	
Vert.	9848.000	AV	35.57	38.65	8.06	39.23	2.37	45.42	53.90	8.5	150	0	

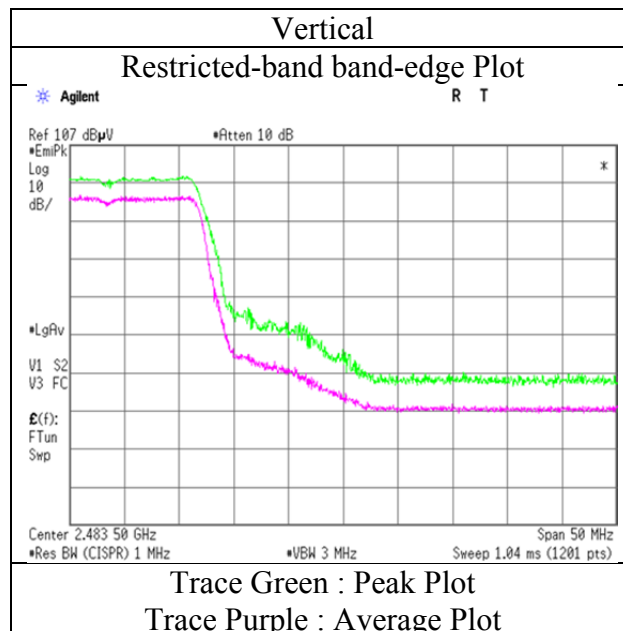
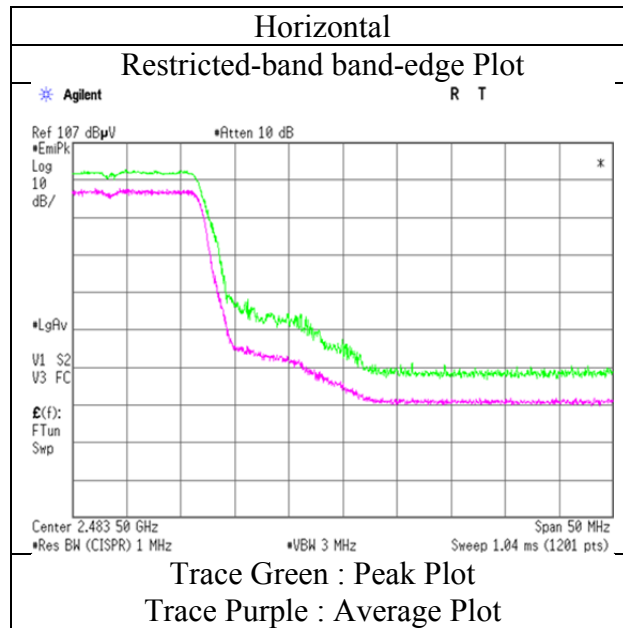
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.94\text{ m} / 3.0\text{ m}) = 2.37\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11355752S-N-R1
Anechoic Chamber No.	1
Date	September 26, 2016
Temperature / Humidity	22 deg. C / 67 % RH
Engineer	Yosuke Ishikawa (1-2.8GHz)
Mode	Tx 11g 2462 MHz



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

Radiated Spurious Emission

Report No. 11355752S-N-R1
Anechoic Chamber No. 1 2 2
Date September 26, 2016 September 28, 2016 October 5, 2016
Temperature / Humidity 22 deg. C / 67 % RH 22 deg. C / 64 % RH 24 deg. C / 61 % RH
Engineer Yosuke Ishikawa Yasumasa Owaki Hiroyuki Morikawa
(1-2.8GHz) (13-26GHz) (2.8-13GHz)
Mode Tx 11n-20 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	57.96	27.21	13.77	40.70	2.37	60.61	73.90	13.2	189	296	
Hori.	4824.000	PK	42.05	31.17	5.93	37.13	2.37	44.39	73.90	29.5	150	0	
Hori.	7236.000	PK	43.24	36.49	7.26	37.86	2.37	51.50	73.90	22.4	150	0	
Hori.	9648.000	PK	44.04	38.34	7.89	39.15	2.37	53.49	73.90	20.4	150	0	
Hori.	2390.000	AV	41.76	27.21	13.77	40.70	2.37	44.41	53.90	9.4	189	296	
Hori.	4824.000	AV	33.52	31.17	5.93	37.13	2.37	35.86	53.90	18.0	150	0	
Hori.	7236.000	AV	34.84	36.49	7.26	37.86	2.37	43.10	53.90	10.8	150	0	
Hori.	9648.000	AV	36.05	38.34	7.89	39.15	2.37	45.50	53.90	8.4	150	0	
Vert.	2390.000	PK	59.48	27.21	13.77	40.70	2.37	62.13	73.90	11.7	148	278	
Vert.	4824.000	PK	41.01	31.17	5.93	37.13	2.37	43.35	73.90	30.6	150	0	
Vert.	7236.000	PK	43.31	36.49	7.26	37.86	2.37	51.57	73.90	22.3	150	0	
Vert.	9648.000	PK	44.69	38.34	7.89	39.15	2.37	54.14	73.90	19.8	150	0	
Vert.	2390.000	AV	43.18	27.21	13.77	40.70	2.37	45.83	53.90	8.0	148	278	
Vert.	4824.000	AV	33.85	31.17	5.93	37.13	2.37	36.19	53.90	17.7	150	0	
Vert.	7236.000	AV	34.92	36.49	7.26	37.86	2.37	43.18	53.90	10.7	150	0	
Vert.	9648.000	AV	36.10	38.34	7.89	39.15	2.37	45.55	53.90	8.4	150	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.94\text{ m} / 3.0\text{ m}) = 2.37\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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	89.51	27.29	13.79	40.70	2.37	92.26	-	-	Carrier
Hori.	2400.000	PK	49.77	27.25	13.78	40.70	2.37	52.47	72.26	19.8	
Vert.	2412.000	PK	91.12	27.29	13.79	40.70	2.37	93.87	-	-	Carrier
Vert.	2400.000	PK	51.30	27.25	13.78	40.70	2.37	54.00	73.87	19.9	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.94\text{ m} / 3.0\text{ m}) = 2.37\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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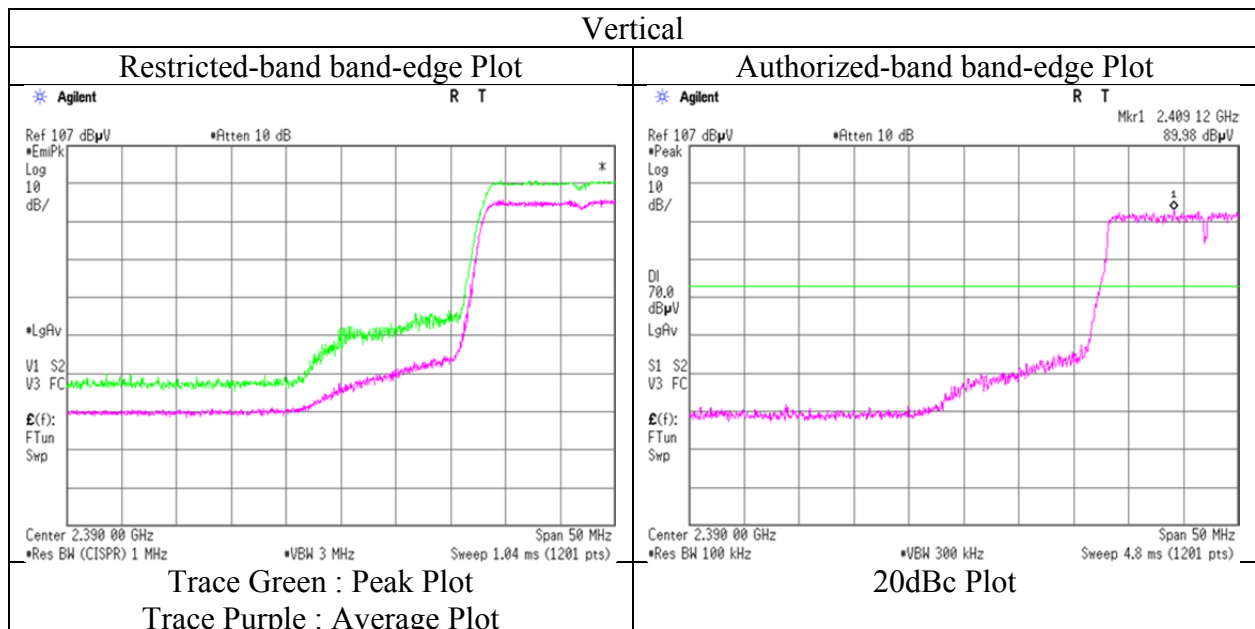
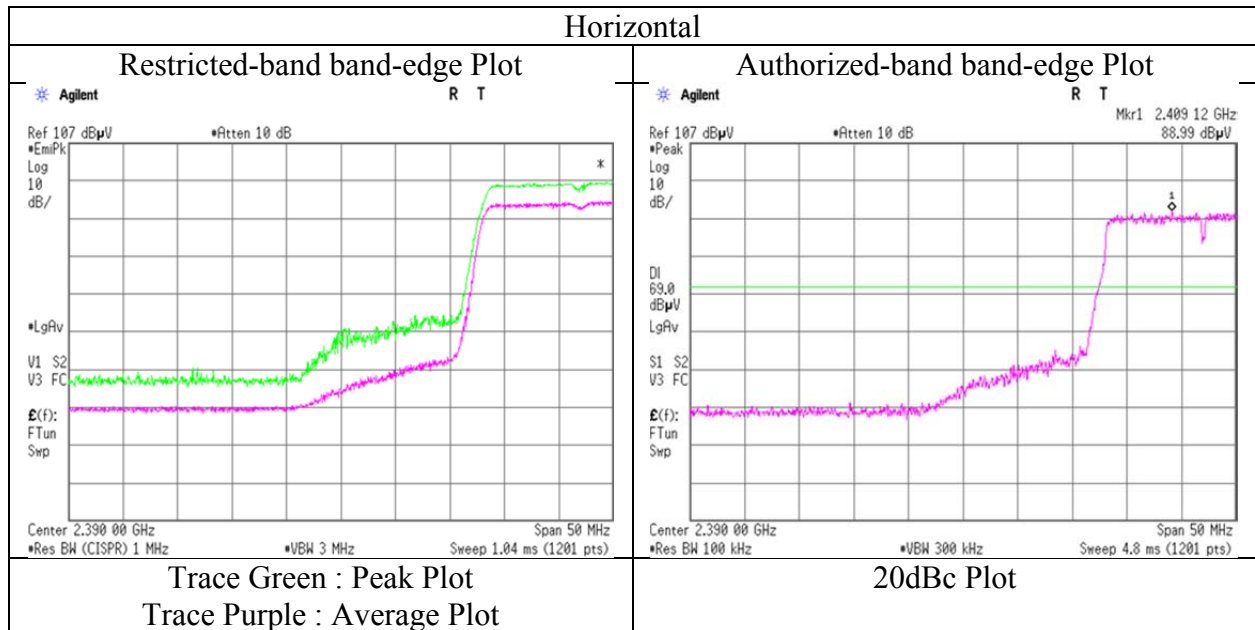
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission (Reference Plot for band-edge)

Report No. 11355752S-N-R1
Anechoic Chamber No. 1
Date September 26, 2016
Temperature / Humidity 22 deg. C / 67 % RH
Engineer Yosuke Ishikawa
(1-2.8GHz)
Mode Tx 11n-20 2412 MHz



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

Radiated Spurious Emission

Report No.	11355752S-N-R1	
Anechoic Chamber No.	1	2
Date	September 26, 2016	September 28, 2016
Temperature / Humidity	22 deg. C / 67 % RH	22 deg. C / 64 % RH
Engineer	Yosuke Ishikawa (1-2.8GHz)	Yasumasa Owaki (13-26GHz)
Mode	Tx 11n-20 2437 MHz	
		October 5, 2016 24 deg. C / 61 % RH Hiroyuki Morikawa (2.8-13GHz)

(* 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.	4874.000	PK	41.80	31.28	5.96	37.15	2.37	44.26	73.90	29.6	150	0	
Hori.	7311.000	PK	42.36	36.62	7.31	37.91	2.37	50.75	73.90	23.2	150	0	
Hori.	9748.000	PK	44.14	38.50	7.97	39.19	2.37	53.79	73.90	20.1	150	0	
Hori.	4874.000	AV	33.92	31.28	5.96	37.15	2.37	36.38	53.90	17.5	150	0	
Hori.	7311.000	AV	34.67	36.62	7.31	37.91	2.37	43.06	53.90	10.8	150	0	
Hori.	9748.000	AV	35.78	38.50	7.97	39.19	2.37	45.43	53.90	8.5	150	0	
Vert.	4874.000	PK	42.80	31.28	5.96	37.15	2.37	45.26	73.90	28.6	150	0	
Vert.	7311.000	PK	42.90	36.62	7.31	37.91	2.37	51.29	73.90	22.6	150	0	
Vert.	9748.000	PK	43.69	38.50	7.97	39.19	2.37	53.34	73.90	20.6	150	0	
Vert.	4874.000	AV	34.17	31.28	5.96	37.15	2.37	36.63	53.90	17.3	150	0	
Vert.	7311.000	AV	34.43	36.62	7.31	37.91	2.37	42.82	53.90	11.1	150	0	
Vert.	9748.000	AV	35.93	38.50	7.97	39.19	2.37	45.58	53.90	8.3	150	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.94\text{ m} / 3.0\text{ m}) = 2.37\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission

Report No. 11355752S-N-R1
Anechoic Chamber No. 1 2 2
Date September 26, 2016 September 28, 2016 October 5, 2016
Temperature / Humidity 22 deg. C / 67 % RH 22 deg. C / 64 % RH 24 deg. C / 61 % RH
Engineer Yosuke Ishikawa Yasumasa Owaki Hiroyuki Morikawa
(1-2.8GHz) (13-26GHz) (2.8-13GHz)
Mode Tx 11n-20 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	57.63	27.52	13.86	40.69	2.37	60.69	73.90	13.2	251	289	
Hori.	4924.000	PK	41.77	31.38	5.99	37.18	2.37	44.33	73.90	29.6	150	0	
Hori.	7386.000	PK	42.47	36.75	7.37	37.96	2.37	51.00	73.90	22.9	150	0	
Hori.	9848.000	PK	43.82	38.65	8.06	39.23	2.37	53.67	73.90	20.2	150	0	
Hori.	2483.500	AV	43.23	27.52	13.86	40.69	2.37	46.29	53.90	7.6	251	289	
Hori.	4924.000	AV	34.13	31.38	5.99	37.18	2.37	36.69	53.90	17.2	150	0	
Hori.	7386.000	AV	34.15	36.75	7.37	37.96	2.37	42.68	53.90	11.2	150	0	
Hori.	9848.000	AV	35.77	38.65	8.06	39.23	2.37	45.62	53.90	8.3	150	0	
Vert.	2483.500	PK	57.01	27.52	13.86	40.69	2.37	60.07	73.90	13.8	182	346	
Vert.	4924.000	PK	42.28	31.38	5.99	37.18	2.37	44.84	73.90	29.1	150	0	
Vert.	7386.000	PK	43.64	36.75	7.37	37.96	2.37	52.17	73.90	21.7	150	0	
Vert.	9848.000	PK	43.76	38.65	8.06	39.23	2.37	53.61	73.90	20.3	150	0	
Vert.	2483.500	AV	42.84	27.52	13.86	40.69	2.37	45.90	53.90	8.0	182	346	
Vert.	4924.000	AV	34.17	31.38	5.99	37.18	2.37	36.73	53.90	17.2	150	0	
Vert.	7386.000	AV	34.33	36.75	7.37	37.96	2.37	42.86	53.90	11.0	150	0	
Vert.	9848.000	AV	35.47	38.65	8.06	39.23	2.37	45.32	53.90	8.6	150	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.94\text{ m} / 3.0\text{ m}) = 2.37\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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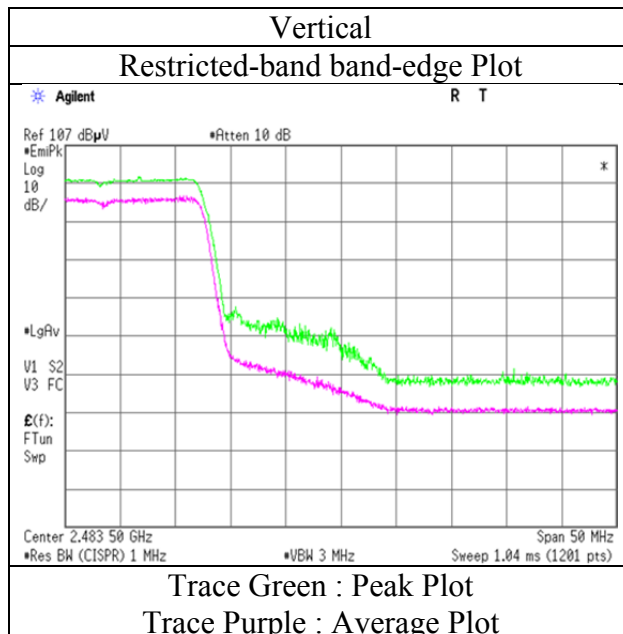
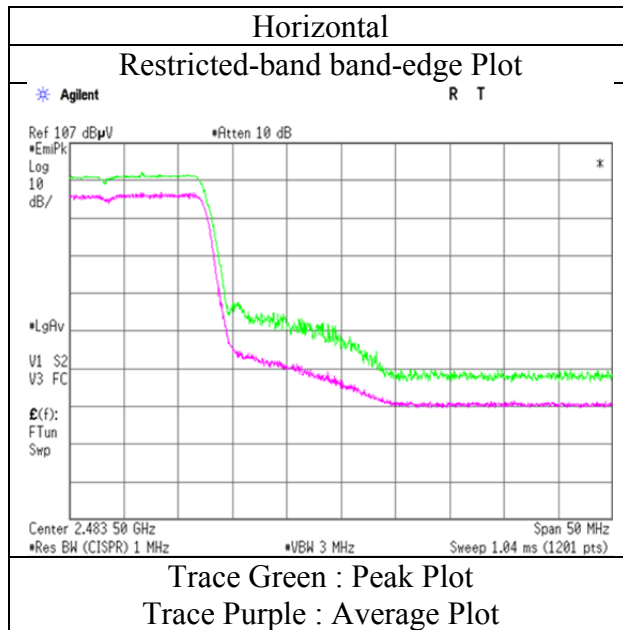
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	11355752S-N-R1
Anechoic Chamber No.	1
Date	September 26, 2016
Temperature / Humidity	22 deg. C / 67 % RH
Engineer	Yosuke Ishikawa (1-2.8GHz)
Mode	Tx 11n-20 2462 MHz



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

Radiated Spurious Emission

Report No. 11355752S-N-R1
Anechoic Chamber No. 1 2 2
Date September 26, 2016 September 28, 2016 October 5, 2016
Temperature / Humidity 22 deg. C / 67 % RH 22 deg. C / 64 % RH 24 deg. C / 61 % RH
Engineer Yosuke Ishikawa Yasumasa Owaki Hiroyuki Morikawa
(1-2.8GHz) (13-26GHz) (2.8-13GHz)
Mode Tx 11n-40 2422 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	55.28	27.21	13.77	40.70	2.37	57.93	73.90	15.9	152	265	
Hori.	4844.000	PK	41.98	31.22	5.95	37.14	2.37	44.38	73.90	29.5	150	0	
Hori.	7266.000	PK	42.50	36.54	7.27	37.88	2.37	50.80	73.90	23.1	150	0	
Hori.	9688.000	PK	43.98	38.41	7.92	39.16	2.37	53.52	73.90	20.4	150	0	
Hori.	2390.000	AV	44.45	27.21	13.77	40.70	2.37	47.10	53.90	6.8	152	265	
Hori.	4844.000	AV	33.70	31.22	5.95	37.14	2.37	36.10	53.90	17.8	150	0	
Hori.	7266.000	AV	34.76	36.54	7.27	37.88	2.37	43.06	53.90	10.8	150	0	
Hori.	9688.000	AV	36.21	38.41	7.92	39.16	2.37	45.75	53.90	8.1	150	0	
Vert.	2390.000	PK	57.48	27.21	13.77	40.70	2.37	60.13	73.90	13.7	143	220	
Vert.	4844.000	PK	42.14	31.22	5.95	37.14	2.37	44.54	73.90	29.4	150	0	
Vert.	7266.000	PK	43.10	36.54	7.27	37.88	2.37	51.40	73.90	22.5	150	0	
Vert.	9688.000	PK	43.51	38.41	7.92	39.16	2.37	53.05	73.90	20.9	150	0	
Vert.	2390.000	AV	46.31	27.21	13.77	40.70	2.37	48.96	53.90	4.9	143	220	
Vert.	4844.000	AV	33.53	31.22	5.95	37.14	2.37	35.93	53.90	18.0	150	0	
Vert.	7266.000	AV	34.75	36.54	7.27	37.88	2.37	43.05	53.90	10.9	150	0	
Vert.	9688.000	AV	36.03	38.41	7.92	39.16	2.37	45.57	53.90	8.3	150	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.94\text{ m} / 3.0\text{ m}) = 2.37\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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.	2422.000	PK	88.50	27.32	13.80	40.70	2.37	91.29	-	-	Carrier
Hori.	2400.000	PK	47.51	27.25	13.78	40.70	2.37	50.21	71.29	21.1	
Vert.	2422.000	PK	89.18	27.32	13.80	40.70	2.37	91.97	-	-	Carrier
Vert.	2400.000	PK	46.91	27.25	13.78	40.70	2.37	49.61	71.97	22.4	

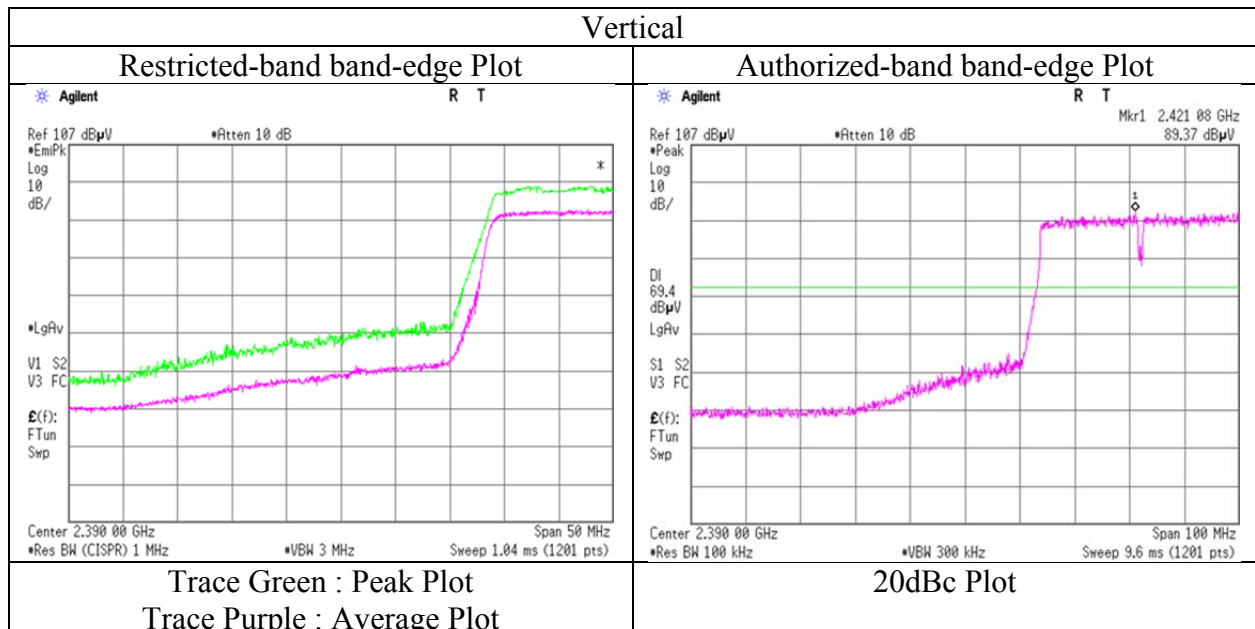
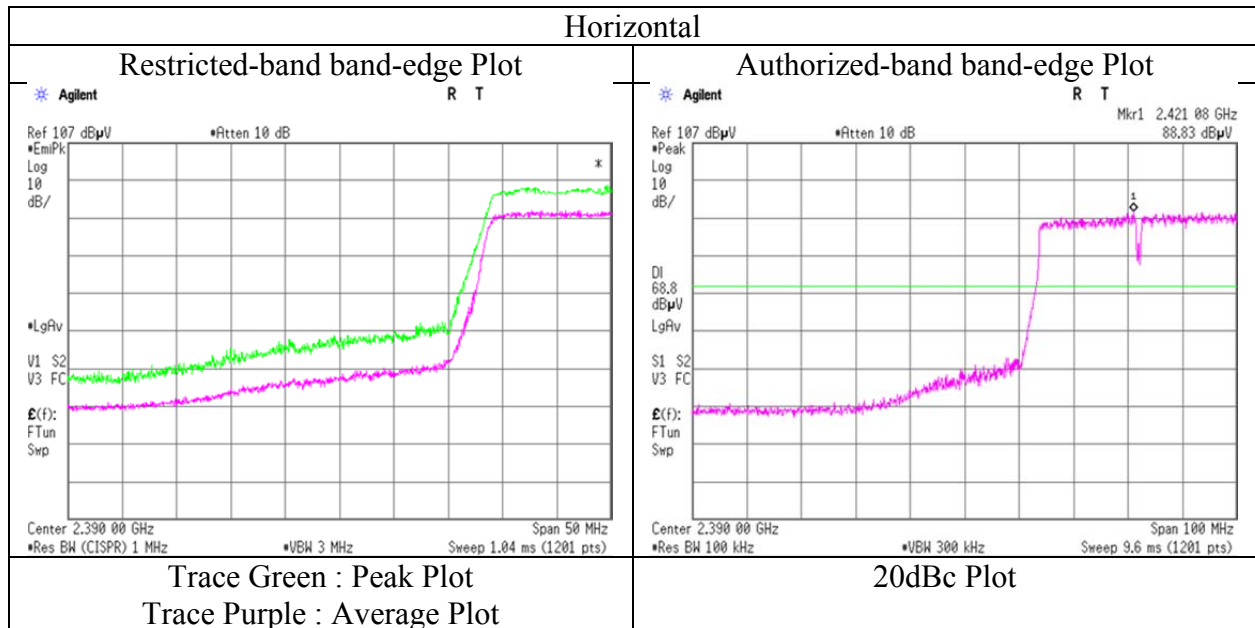
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.94\text{ m} / 3.0\text{ m}) = 2.37\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Report No. 11355752S-N-R1
Anechoic Chamber No. 1
Date September 26, 2016
Temperature / Humidity 22 deg. C / 67 % RH
Engineer Yosuke Ishikawa
(1-2.8GHz)
Mode Tx 11n-40 2422 MHz



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

Radiated Spurious Emission

Report No. 11355752S-N-R1
Anechoic Chamber No. 1 2 2
Date September 26, 2016 September 28, 2016 October 5, 2016
Temperature / Humidity 22 deg. C / 67 % RH 22 deg. C / 64 % RH 24 deg. C / 61 % RH
Engineer Yosuke Ishikawa Yasumasa Owaki Hiroyuki Morikawa
(1-2.8GHz) (13-26GHz) (2.8-13GHz)
Mode Tx 11n-40 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.	4874.000	PK	41.09	31.28	5.96	37.15	2.37	43.55	73.90	30.4	150	0	
Hori.	7311.000	PK	42.25	36.62	7.31	37.91	2.37	50.64	73.90	23.3	150	0	
Hori.	9748.000	PK	44.62	38.50	7.97	39.19	2.37	54.27	73.90	19.6	150	0	
Hori.	4874.000	AV	33.50	31.28	5.96	37.15	2.37	35.96	53.90	17.9	150	0	
Hori.	7311.000	AV	34.51	36.62	7.31	37.91	2.37	42.90	53.90	11.0	150	0	
Hori.	9748.000	AV	35.62	38.50	7.97	39.19	2.37	45.27	53.90	8.6	150	0	
Vert.	4874.000	PK	41.59	31.28	5.96	37.15	2.37	44.05	73.90	29.9	150	0	
Vert.	7311.000	PK	43.02	36.62	7.31	37.91	2.37	51.41	73.90	22.5	150	0	
Vert.	9748.000	PK	43.50	38.50	7.97	39.19	2.37	53.15	73.90	20.8	150	0	
Vert.	4874.000	AV	33.47	31.28	5.96	37.15	2.37	35.93	53.90	18.0	150	0	
Vert.	7311.000	AV	34.49	36.62	7.31	37.91	2.37	42.88	53.90	11.0	150	0	
Vert.	9748.000	AV	35.55	38.50	7.97	39.19	2.37	45.20	53.90	8.7	150	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.94\text{ m} / 3.0\text{ m}) = 2.37\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission

Report No. 11355752S-N-R1
Anechoic Chamber No. 1 2 2
Date September 26, 2016 September 28, 2016 October 5, 2016
Temperature / Humidity 22 deg. C / 67 % RH 22 deg. C / 64 % RH 24 deg. C / 61 % RH
Engineer Yosuke Ishikawa Yasumasa Owaki Hiroyuki Morikawa
(1-2.8GHz) (13-26GHz) (2.8-13GHz)
Mode Tx 11n-40 2452 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	54.77	27.52	13.86	40.69	2.37	57.83	73.90	16.0	229	269	
Hori.	4904.000	PK	41.90	31.34	5.98	37.17	2.37	44.42	73.90	29.5	150	0	
Hori.	7356.000	PK	42.48	36.70	7.34	37.94	2.37	50.95	73.90	23.0	150	0	
Hori.	9808.000	PK	44.27	38.59	8.02	39.22	2.37	54.03	73.90	19.9	150	0	
Hori.	2483.500	AV	43.06	27.52	13.86	40.69	2.37	46.12	53.90	7.7	229	269	
Hori.	4904.000	AV	33.80	31.34	5.98	37.17	2.37	36.32	53.90	17.6	150	0	
Hori.	7356.000	AV	34.27	36.70	7.34	37.94	2.37	42.74	53.90	11.2	150	0	
Hori.	9808.000	AV	35.31	38.59	8.02	39.22	2.37	45.07	53.90	8.8	150	0	
Vert.	2483.500	PK	56.01	27.52	13.86	40.69	2.37	59.07	73.90	14.8	163	41	
Vert.	4904.000	PK	42.03	31.34	5.98	37.17	2.37	44.55	73.90	29.4	150	0	
Vert.	7356.000	PK	42.52	36.70	7.34	37.94	2.37	50.99	73.90	22.9	150	0	
Vert.	9808.000	PK	44.77	38.59	8.02	39.22	2.37	54.53	73.90	19.4	150	0	
Vert.	2483.500	AV	44.14	27.52	13.86	40.69	2.37	47.20	53.90	6.7	163	41	
Vert.	4904.000	AV	33.71	31.34	5.98	37.17	2.37	36.23	53.90	17.7	150	0	
Vert.	7356.000	AV	34.43	36.70	7.34	37.94	2.37	42.90	53.90	11.0	150	0	
Vert.	9808.000	AV	35.25	38.59	8.02	39.22	2.37	45.01	53.90	8.9	150	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.94\text{ m} / 3.0\text{ m}) = 2.37\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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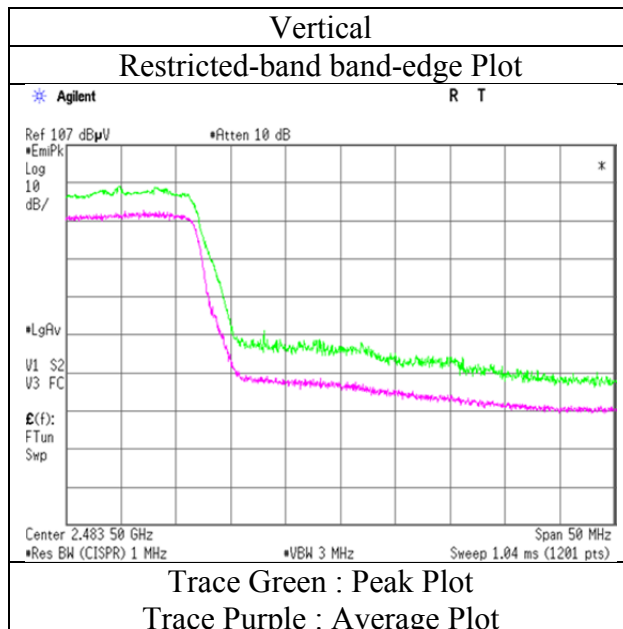
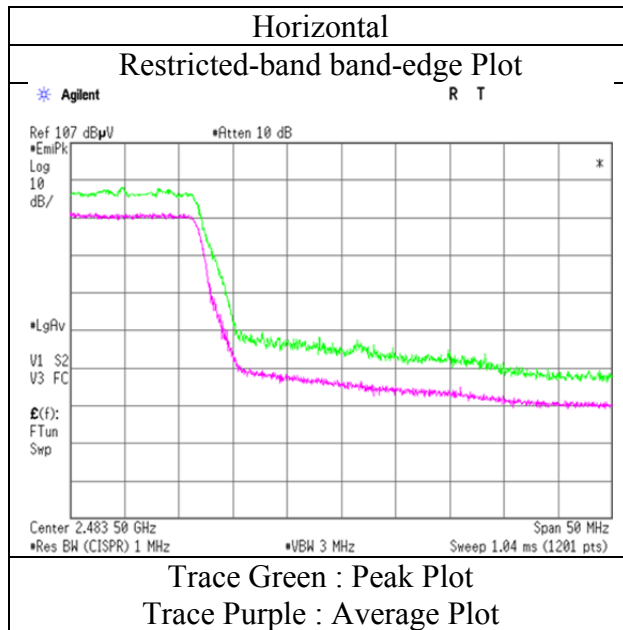
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

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Radiated Spurious Emission (Reference Plot for band-edge)

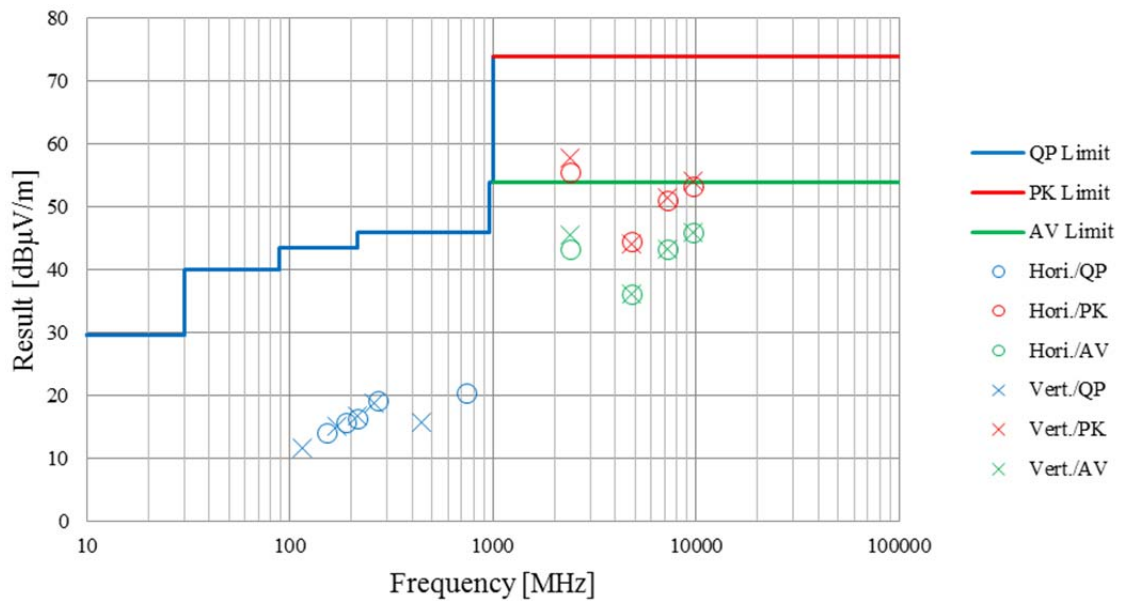
Report No.	11355752S-N-R1
Anechoic Chamber No.	1
Date	September 26, 2016
Temperature / Humidity	22 deg. C / 67 % RH
Engineer	Yosuke Ishikawa (1-2.8GHz)
Mode	Tx 11n-40 2452 MHz



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

Radiated Spurious Emission **(Plot data, Worst case)**

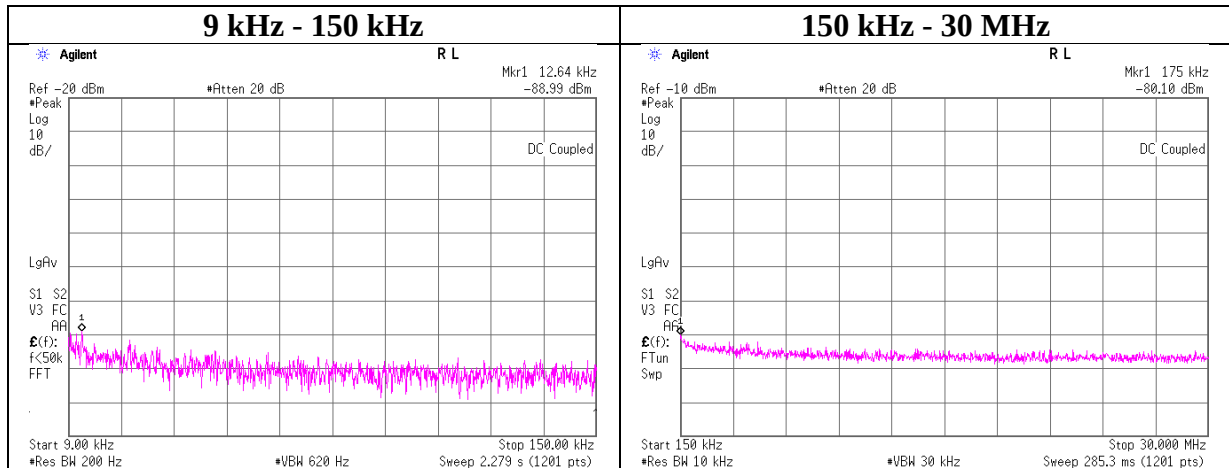
Report No.	11355752S-N-R1	2	2	1
Anechoic Chamber No.	1	2	2	1
Date	September 26, 2016	September 28, 2016	October 5, 2016	October 13, 2016
Temperature / Humidity	22 deg. C / 67 % RH	22 deg. C / 64 % RH	24 deg. C / 61 % RH	22 deg. C / 54 % RH
Engineer	Yosuke Ishikawa (1-2.8GHz)	Yasumasa Owaki (13-26GHz)	Hiroyuki Morikawa (2.8-13GHz)	Takahiro Suzuki (30-1000MHz)
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.	11355752S-N-R1
Date	September 21, 2016
Temperature / Humidity	24 deg. C / 52 % RH
Engineer	Yosuke Ishikawa
Mode	Tx 11g 2412 MHz



Frequency	Reading	Cable Loss	Attenuator Loss	Antenna Gain	N (Number of Output	EIRP	Distance	Ground bounce	E (field strength)	Limit	Margin	Remark
[kHz]	[dBm]	[dB]	[dB]	[dBi]		[dBm]	[m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
12.64	-89.0	0.02	9.5	3.0	1	-76.4	300	6.0	-15.2	45.5	60.7	
175.00	-80.1	0.02	9.5	3.0	1	-67.5	300	6.0	-6.3	22.7	29.0	

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

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

Power Density

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11355752S-N-R1
Date	September 21, 2016
Temperature / Humidity	24 deg. C / 52 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

11b

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412	-23.77	1.71	9.67	-12.39	8.00	20.39
2437	-23.33	1.70	9.67	-11.96	8.00	19.96
2462	-22.69	1.70	9.67	-11.32	8.00	19.32

11g

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412	-27.31	1.71	9.67	-15.93	8.00	23.93
2437	-27.35	1.70	9.67	-15.98	8.00	23.98
2462	-27.44	1.70	9.67	-16.07	8.00	24.07

11n-20

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412	-26.50	1.71	9.67	-15.12	8.00	23.12
2437	-26.63	1.70	9.67	-15.26	8.00	23.26
2462	-27.12	1.70	9.67	-15.75	8.00	23.75

11n-40

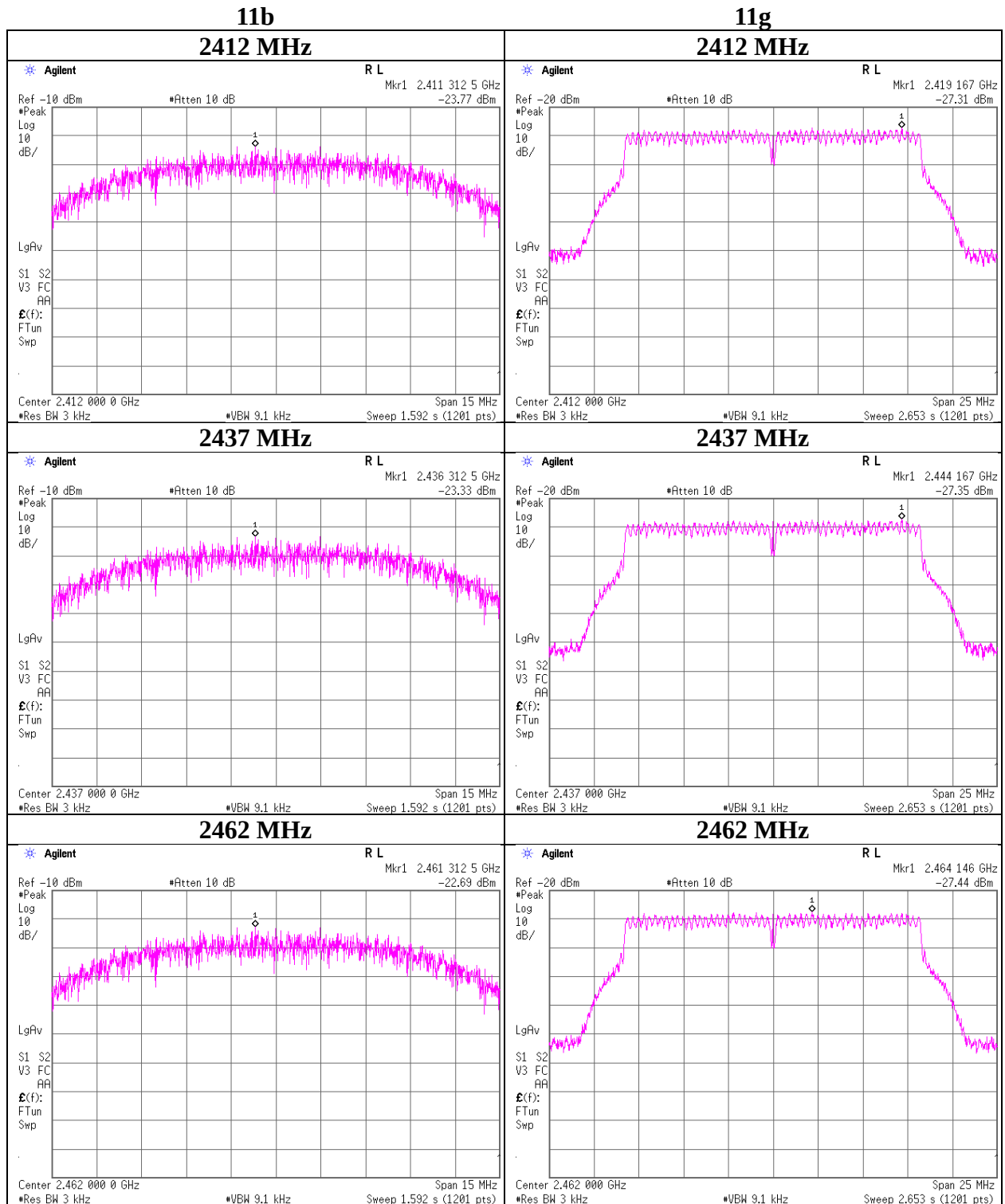
Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2422	-29.00	1.71	9.67	-17.62	8.00	25.62
2437	-28.75	1.70	9.67	-17.38	8.00	25.38
2452	-27.12	1.70	9.67	-15.75	8.00	23.75

Sample Calculation:

Result = Reading + Cable Loss + Attenuator

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

Power Density



UL Japan, Inc.

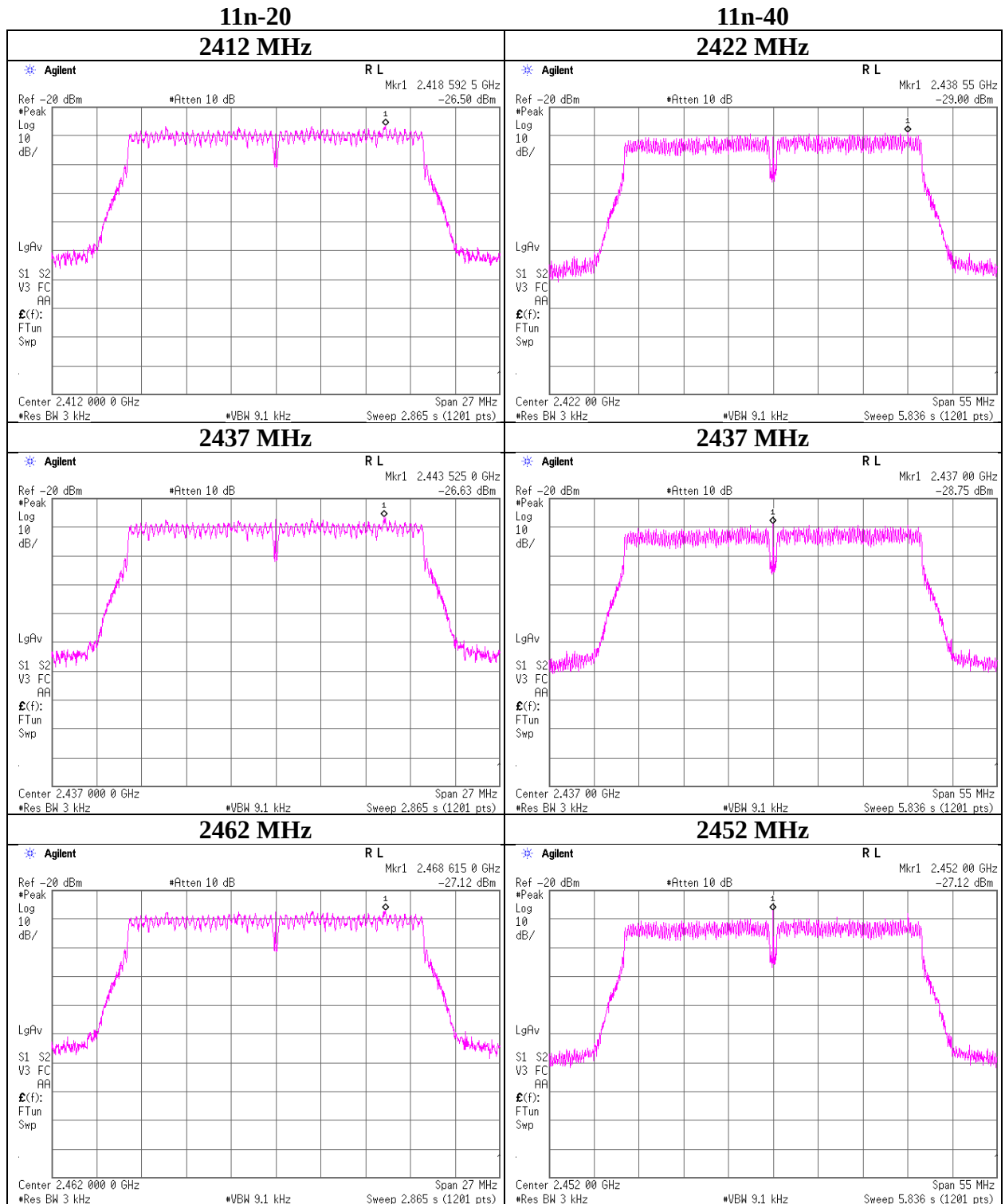
Shonan EMC Lab.

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

Telephone : +81 463 50 6400

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Power Density



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Shonan EMC Lab.

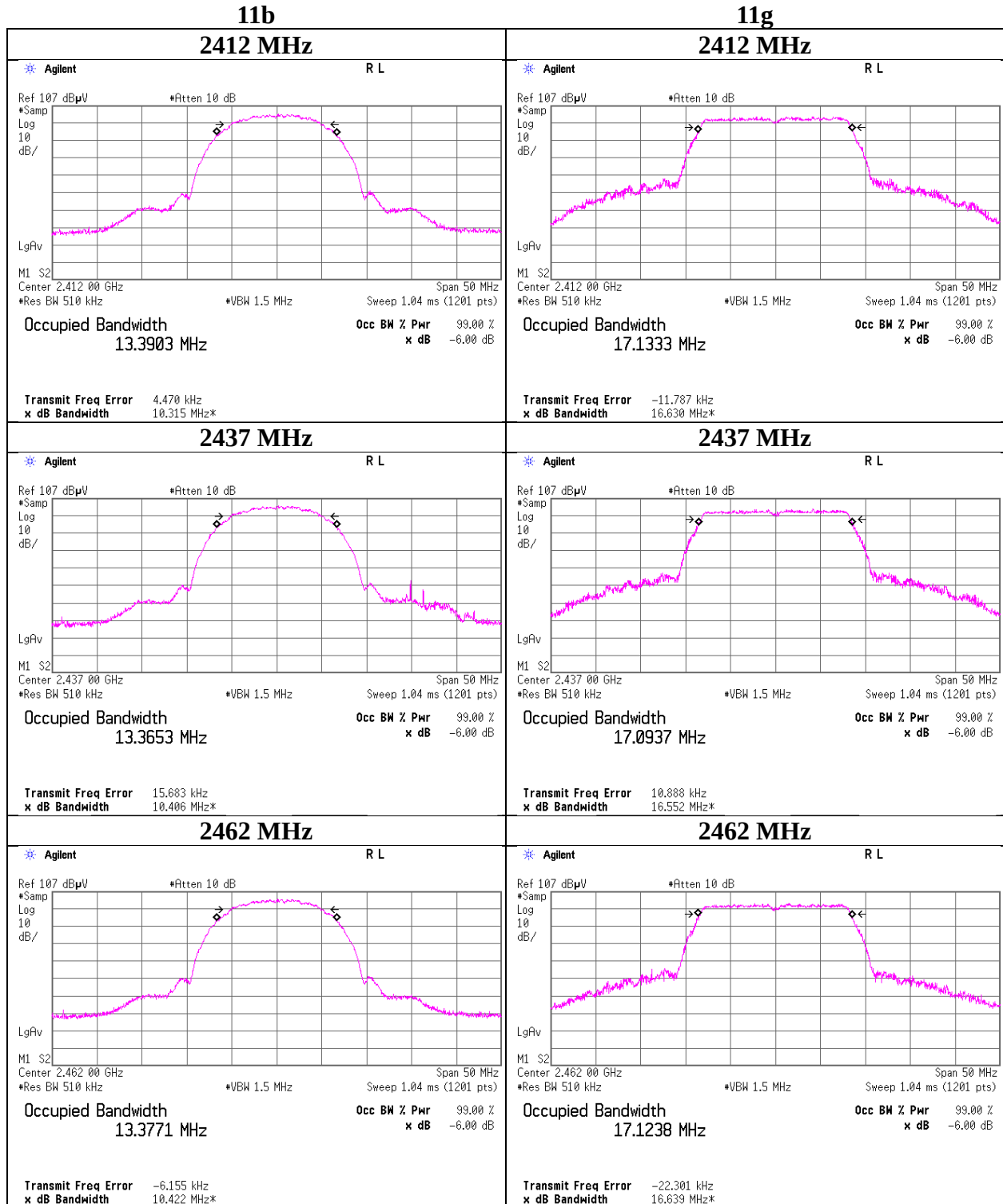
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

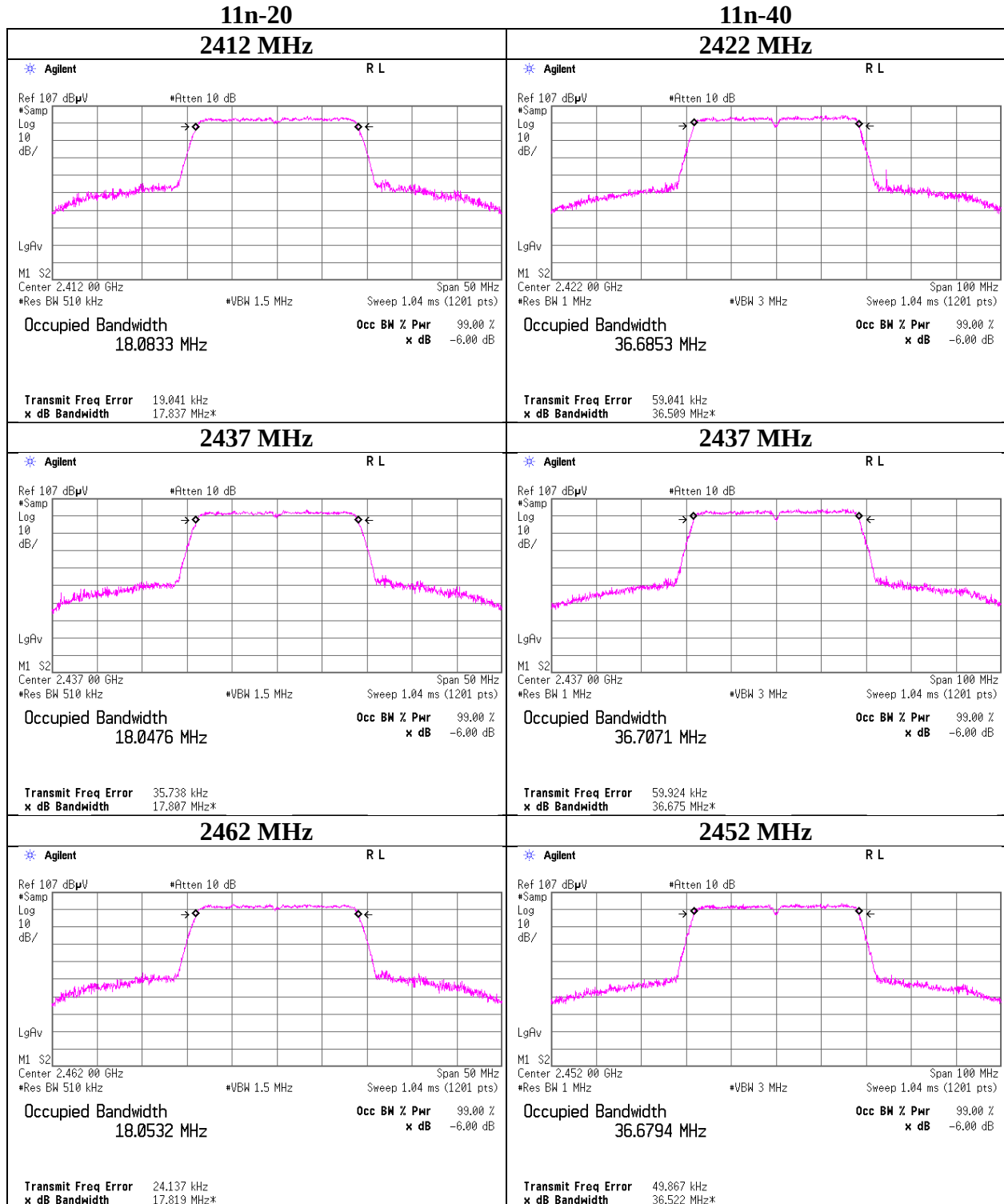
99% Occupied Bandwidth

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11355752S-N-R1
Date : September 21, 2016
Temperature / Humidity : 24 deg. C / 52 % RH
Engineer : Yosuke Ishikawa
Mode : Tx



99% Occupied Bandwidth

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11355752S-N-R1
Date : April 1, 2015
Temperature / Humidity : 23 deg. C / 68 % RH
Engineer : Takayuki Shimada
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-04	Power sensor	Agilent	N1923A	MY5326009	AT	2016/04/04 * 12
SCC-G14	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	AT	2016/03/23 * 12
SAT10-09	Attenuator	Weinschel Corp.	54A-10	W5692	AT	2015/11/04 * 12
SCC-H11	Microwave cable	RS Pro	R-132G7210 100CO	-	AT	2016/04/18 * 12
STS-06	Digital Hitester	Hioki	3805-50	080997830	AT	2016/03/22 * 12
SOS-10	Humidity Indicator	A&D	AD-5681	4064561	AT	2015/10/22 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT, RE	2016/03/23 * 12
SRENT-06	Spectrum Analyzer	KEYSIGHT	E4440A	MY48250921	AT	2016/08/07 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2015/12/07 * 12
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2016/03/22 * 12
SCC-G06	Coaxial Cable	Junkosha	J12J102207-00	MAY-23-16-091	RE	2016/06/14 * 12
SCC-G21	Coaxial Cable	Suhner	SUCOFLEX 104	296169/4	RE	2016/05/11 * 12
SHA-01	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	RE	2016/08/09 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2015/10/22 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE	2015/11/06 * 12
KJM-09	Measure	KOMELON	KMC-36	-	RE	-
SAEC-01(SV SWR)	Semi-Anechoic Chamber	TDK	SAEC-01(SV SWR)	1	RE	2016/07/24 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV (RE,CE,RFI, MF)	-	RE	-
STS-01	Digital Hitester	Hioki	3805-50	080997812	RE	2015/11/18 * 12
SAT10-05	Attenuator(above1G Hz)	Agilent	8493C-010	74864	RE	2015/11/04 * 12
SFL-18	Highpass Filter	MICRO-TRONICS	HPM50111	119	RE	2016/04/18 * 12
SAF-05	Pre Amplifier	TOYO Corporation	TPA0118-36	1440490	RE	2016/02/10 * 12

The expiration date of the calibration is the end of the expired month.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test Item:
CE: Conducted Emission test
RE: Radiated Emission test
AT: Antenna Terminal Conducted test

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

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SCC-G05	Coaxial Cable	Junkosha	J12J102207-00	APR-30-15-037	RE	2016/05/24 * 12
SCC-G22	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	RE	2016/05/11 * 12
SHA-02	Horn Antenna	Schwarzbeck	BBHA9120 D	9120D-726	RE	2016/08/09 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2015/10/22 * 12
SSA-01	Spectrum Analyzer	Agilent	N9010A-526	MY48031482	RE	2016/04/28 * 12
SJM-09	Measure	PROMART	SEN1935	-	RE	-
SAEC-02(SV SWR)	Semi-Anechoic Chamber	TDK	SAEC-02(S VSWR)	2	RE	2016/07/22 * 12
STS-02	Digital Hitester	Hioki	3805-50	080997819	RE	2016/03/22 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2016/03/24 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26 W	00000018	RE	2016/09/27 * 12
SCC-G19	Coaxial Cable	Suhner	SUCOFLEX 102A	1188/2A	RE	2016/03/08 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2015/11/16 * 12
SFL-03	Highpass Filter	MICRO-TRONICS	HPM50112	028	RE	2015/11/16 * 12
SAF-01	Pre Amplifier	SONOMA	310N	290211	RE	2016/02/19 * 12
KAT6-04	Attenuator	INMET	18N-6dB	-	RE	2015/12/18 * 12
SAT3-09	Attenuator	JFW	50HF-003N	-	RE	2016/08/04 * 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

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Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
KBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1926	RE	2015/11/02 * 12
SCC-A1/A3/ A5/A7/A8/A1 3/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/S uhner/Suhner/Suhne r/Suhner/TOYO	8D2W/12D SFA/141PE/ 141PE/141P E/141PE/NS 4906	-/0901-269 (RF Selector)	RE	2016/04/22 * 12
SCC-A2/A4/ A6/A7/A8/A1 3/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/S uhner/Suhner/Suhne r/Suhner/TOYO	8D2W/12D SFA/141PE/ 141PE/141P E/141PE/NS 4906	-/0901-269 (RF Selector)	RE	2016/04/22 * 12
KLA-03	Logperiodic Antenna	Schwarzbeck	USLP9143	170	RE	2015/10/17 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2016/10/12 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	RE,CE	2015/11/06 * 12
KJM-09	Measure	KOMELON	KMC-36	-	RE,CE	-
SAEC-01(NS A)	Semi-Anechoic Chamber	TDK	SAEC-01(N SA)	1	RE	2016/07/14 * 12
COTS-SEMI- 1	EMI Software	TSJ	TEPTO-DV (RE,CE,RFI, MF)	-	RE,CE	-
STS-01	Digital Hitester	Hioki	3805-50	080997812	RE,CE	2015/11/18 * 12
SCC-A12/A1 3/SRSE-01	Coaxial Cable&RF Selector	Suhner/Suhner/TOY O	RG223U/14 1PE/NS490 6	-/0901-269 (RF Selector)	CE	2016/04/22 * 12
SLS-01	LISN	Rohde & Schwarz	ENV216	100511	CE	2016/02/08 * 12
SAT3-10	Attenuator	JFW	50HF-003N	-	CE	2016/08/04 * 12
SOS-02	Humidity Indicator	A&D	AD-5681	4063343	CE	2015/12/07 * 12

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