



RADIO TEST REPORT

Test Report No. : 11014760S-A-R2

Applicant : Sony Corporation
Type of Equipment : Wireless Transceiver Module
Model No. : BNSY25
FCC ID : AK8BNSY25
Test regulation : FCC Part 15 Subpart C: 2015
Test Result : Complied

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above regulation.
4. The test results in this report are traceable to the national or international standards.
5. 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 11014760S-A-R1. 11014760S-A-R1 is replaced with this report.

Date of test: October 31 to November 17, 2015

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".

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13-EM-F0429

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SECTION 1: Customer information

Company Name : Sony EMCS Corporation
Address : 8-4 Shiomi Kisarazu-shi, Chiba, 292-0834 Japan
Telephone Number : +81-438-37-3982
Contact Person : Kazuhiko Nagano

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

2.1 Identification of E.U.T.

Type of Equipment : Wireless Transceiver Module
Model No. : BNSY25
Serial No. : Refer to Section 4, Clause 4.2
Rating : DC 3.3 V, DC 2.8 V, DC 1.8 V
Receipt Date of Sample : October 7, 2015
Country of Mass-production : China, Taiwan
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: BNSY25 (referred to as the EUT in this report) is a Wireless Transceiver Module.
* BNSY25 is Controller IC (MT8591, etc.) and RF front-end part (DHSR-SY25).

General Specification

Clock frequency(ies) in the system : 26 MHz

Radio Specification

Radio Type : Transceiver
Frequency of Operation : Wireless LAN part:
2412-2462 MHz,
5180-5320 MHz, 5500-5700 MHz, 5745-5825 MHz
Bluetooth part:
2402-2480 MHz
Modulation : Wireless LAN part:
2.4 GHz bands: DBPSK, DQPSK, CCK, OFDM
5 GHz bands: OFDM
Bluetooth part:
BDR (Basic Data Rate): GFSK
EDR (Enhanced Data Rate): $\pi/4$ -DQPSK, 8DPSK
LE (Low Energy mode): GFSK
Antenna type : Dipole
Antenna connector : MHF4
Antenna Gain : 2400 - 2483.5 MHz: +0.21 dBi max (include antenna cable 199 mm)
5150 - 5250 MHz: -2.06 dBi max (include antenna cable 199 mm)
5250 - 5350 MHz: -0.99 dBi max (include antenna cable 199 mm)
5470 - 5725 MHz: -0.01 dBi max (include antenna cable 199 mm)
5725 - 5850 MHz: -0.95 dBi max (include antenna cable 199 mm)

Remarks: This Wireless Module consists of 1 chip each of 5 GHz band and 2.4 GHz band.

*1) Refer to the test reports: 11014760S-B-R1 for FCC 15.247 (Bluetooth part).

*2) Refer to the test reports: 11014760S-C-R2 and 11014760S-D for FCC 15.407.

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SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C: 2015, final revised on November 23, 2015
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

*Some parts are effective on and after December 17, 2015 or December 23, 2015. The revision does not affect the test specification applied to the EUT.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10- 2013 IC: RSS-Gen 8.8	FCC: Section 15.207 IC: RSS-Gen 8.8	16.7 dB, QP, 0.15844 MHz, N (Tx, BT LE, 2402 MHz)	Complied	-
6 dB Bandwidth	FCC: KDB 558074 D01 DTS Meas Guidance v03r04 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 v03r04 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 v03r04 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 v03r04 IC: RSS-Gen 6.13	FCC: Section15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	1.7 dB 2483.500 MHz, AV, Vertical (Tx, 11n-20, 2462 MHz, antenna cable 199 mm)	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 v03r04 12.2.7.

* In case any questions arise about test procedure, ANSI C 63.10:2013 is also referred.

However, there is one deviation from ANSI C 63.10:2013. (ANSI C63.10:2013 is Non-accreditation)

Measurement height is not 1.5 m, but 0.8 m.

FCC Part 15.31 (e)

This EUT is provided the stable voltage (DC 3.3 V, DC 2.8 V, DC 1.8 V) constantly to RF unit regardless of input voltage from PMIC. Therefore, the equipment complies with the requirement.

FCC Part 15.203 / 212

The EUT has a unique coupling/antenna connector. Therefore, the equipment complies with the antenna 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
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	3.6 dB	3.4 dB	3.4 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.7 dB	3.5 dB	3.5 dB
	30 MHz-300 MHz	4.9 dB	4.9 dB	4.7 dB
	300 MHz-1 GHz	5.0 dB	5.0 dB	4.8 dB
	1 GHz-13 GHz	4.9 dB	4.9 dB	4.9 dB
Radiated emission (Measurement distance: 1 m)	13 GHz-18 GHz	5.7 dB	5.7 dB	5.7 dB
	18 GHz-40 GHz	4.5 dB	4.3 dB	4.3 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)

*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.

Mode	Remarks *2)
Transmitting (Tx), IEEE 802.11b (11b)	1 Mbps, PN9
Transmitting (Tx), IEEE 802.11g (11g)	48 Mbps, PN9
Transmitting (Tx), IEEE 802.11n SISO 20 MHz BW (11n-20)	MCS 7, PN9
Transmitting (Tx), Bluetooth Low Energy mode (BT LE)	PRBS9
*Transmitting duty was refer to APEENDIX.	
*The worst condition was determined based on the test result of Maximum Conducted Output Power.	
*2) Power of the EUT was set by the software as follows; (IEEE802.11b / 11g / 11n): Power settings: Fixed Software: MT6625 RF Test Version 0.3 (Bluetooth LE): Power settings: Fixed Software: MT6625 BT Test Version 0.2 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

*The details of operation mode(s)

Test Item	Operating Mode	Tested Antenna cable (length) *4)	Tested Frequency
Conducted emission	Tx, 11n-20 *3)	400 mm	2412 MHz
	Tx, BT LE	400 mm	2402 MHz 2440 MHz 2480 MHz
Spurious Emission (below 1 GHz)	Tx, 11n-20 *3)	400 mm	2412 MHz
	Tx, BT LE	400 mm	2402 MHz 2440 MHz 2480 MHz
Spurious Emission (above 1 GHz)	Tx, 11b, Tx, 11g, Tx, 11n-20	worst: 400 mm, (bandedge was measured by each cable)	2412 MHz 2437 MHz 2462 MHz
	Tx, BT LE	worst: 400 mm, (bandedge was measured by each cable)	2402 MHz 2440 MHz 2480 MHz
6 dB Bandwidth Maximum Peak Output Power Power Density 99 % Occupied Bandwidth	Tx, 11b, Tx, 11g, Tx, 11n-20	-	2412 MHz 2437 MHz 2462 MHz
	Tx, BT LE	-	2402 MHz 2440 MHz 2480 MHz
*3) The mode was tested as a representative, because it had the highest power at antenna terminal test.			
*4) The test was performed with the representative antenna cable that was worst measured value by pre-check test.			

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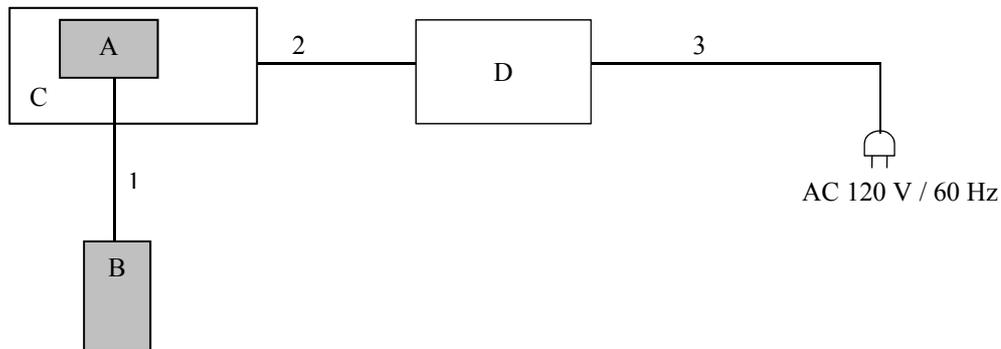
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4.2 Configuration and peripherals



* 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	Wireless Transceiver Module	BNSY25	0F081530001703	Front-end: Wistron NeWeb Corporation Control IC: MediaTek	EUT
B	PWB Antenna	1-980-877-02	-	Sony	EUT
C	Jig board	-	-	Sony	-
D	AC Adaptor	AC-M1208WW	M1521540404	Sony	-

List of cables used

No.	Cable name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Cable (Antenna)	0.4 or 0.199	Shielded	Shielded	-
2	Output cord (AC Adaptor)	1.0	Unshielded	Unshielded	-
3	Power Supply Cord	0.7	Unshielded	Unshielded	-

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SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a platform of nominal size, 1.0 m by 2.0 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 40cm 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 80cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT via AC adaptor in a Shielded room.

The EUT via AC adaptor 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 v03r04".

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.

The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

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

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

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

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

Test Antennas are used as below;

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

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

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

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	Average Power Method: (for Bluetooth LE): <u>12.2.5.2</u> RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (Linear voltage) Trace: 100 traces Duty factor was added to the results. (for wireless LAN): <u>12.2.5.3</u> Method VB *1) RBW: 1 MHz VBW: 1/T (*T = transmission duration)	RBW: 100 kHz VBW: 300kHz
Test Distance	3 m	3.87 m *2) (below 13 GHz, SVSWR, 2AC), 4.37 m *2) (below 13 GHz, SVSWR, 3AC), 1 m *3) (above 13 GHz)		3.87 m *2) (below 13 GHz, SVSWR, 2AC), 4.37 m *2) (below 13 GHz, SVSWR, 3AC), 1 m *3) (above 13 GHz)

*1) Average Power Measurement was performed based on 6.0 & 12.2.5 of "KDB 558074 D01 DTS Meas Guidance v03r04"

*2) Distance Factor: $20 \times \log(3.87 \text{ m}/3 \text{ m}) = 2.3 \text{ dB}$ (for 1AC)

Distance Factor: $20 \times \log(4.37 \text{ m}/3 \text{ m}) = 3.3 \text{ dB}$ (for 3AC)

*3) Distance Factor: $20 \times \log(1.0 \text{ m}/3.0 \text{ m}) = -9.5 \text{ dB}$

- 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.

	Test Antenna	Carrier	Spurious			
			30 MHz-1 GHz	1-13 GHz	13-18 GHz	18-26 GHz
Module	Horizontal	Z	X	Z	Y	Z
	Vertical	Z	Z	Z	X	Z
Antenna	Horizontal	X	Y	X	Y	X
	Vertical	Y	Z	Y	Y	X

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

Measurement range : 30 M - 26 GHz

Test data : APPENDIX

Test result : Pass

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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
6 dB 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: 160 MHz BW)
Peak Power Density	1.5 times the 6 dB Bandwidth	3 kHz	9.1 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	10 kHz	30 kHz				

*1) The measurement was performed with Max Hold since the duty cycle was not 100 %.

*2) Reference data

*3) Section 10.2 Method PKPSD (peak PSD) of "KDB 558074 D01 DTS Meas Guidance v03r04".

*4) In the frequency range below 30 MHz, 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 = 10 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 Semi-Anechoic Chamber
Date : 2015/11/14

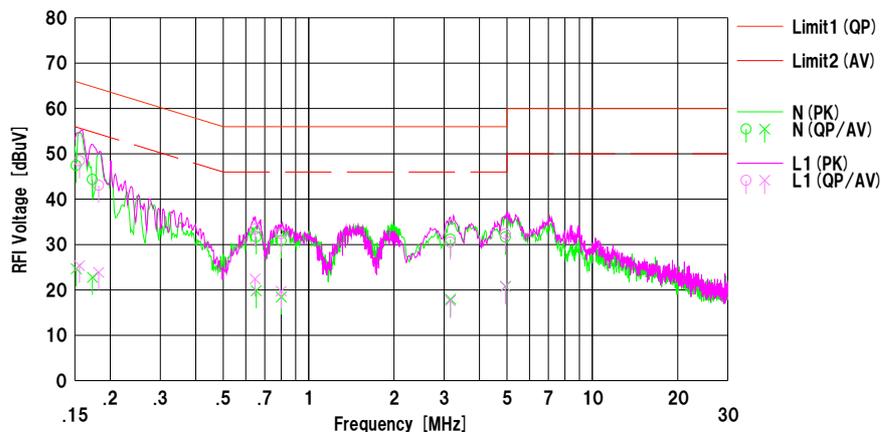
Mode : Tx, 11n HT20, 2412 MHz

Power : AC 120 V / 60 Hz
Temp./Humi. : 25 deg.C / 40 %RH

Remarks : Ant.cable: 400mm

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

Engineer : Hikaru Shirasawa



No.	Freq. [MHz]	Reading		C.Fac [dB]	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]				
1	0.15170	35.10	12.30	12.35	47.45	24.65	65.91	55.91	18.4	31.2	N	
2	0.17300	32.00	10.40	12.36	44.36	22.76	64.82	54.82	20.4	32.0	N	
3	0.65340	19.30	7.40	12.40	31.70	19.80	56.00	46.00	24.3	26.2	N	
4	0.80130	18.40	6.00	12.42	30.82	18.42	56.00	46.00	25.1	27.5	N	
5	3.16380	18.60	5.40	12.54	31.14	17.94	56.00	46.00	24.8	28.0	N	
6	4.94320	19.00	8.10	12.65	31.65	20.75	56.00	46.00	24.3	25.2	N	
7	0.15580	36.10	13.00	12.35	48.45	25.35	65.68	55.68	17.2	30.3	L1	
8	0.18200	30.70	11.50	12.35	43.05	23.85	64.39	54.39	21.3	30.5	L1	
9	0.64730	21.00	10.00	12.41	33.41	22.41	56.00	46.00	22.5	23.5	L1	
10	0.80040	20.00	7.30	12.42	32.42	19.72	56.00	46.00	23.5	26.2	L1	
11	3.15770	18.00	5.10	12.54	30.54	17.64	56.00	46.00	25.4	28.3	L1	
12	4.94030	19.70	8.20	12.65	32.35	20.85	56.00	46.00	23.6	25.1	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
LISN-SLS-07

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

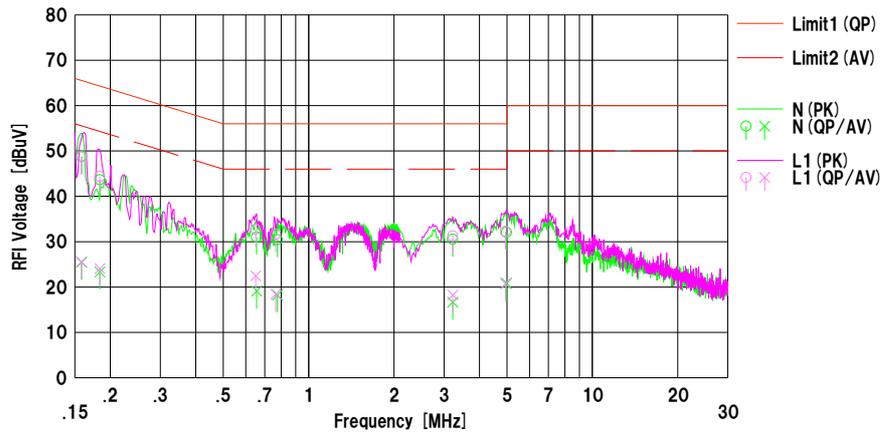
UL Japan, Inc. Shonan EMC Lab. No.3 Semi-Anechoic Chamber
Date : 2015/11/14

Mode : Tx, LE, 2402 MHz
Power : AC 120 V / 60 Hz
Temp./Humi. : 25 deg.C / 40 %RH

Remarks : Ant.cable: 400mm

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

Engineer : Hikaru Shirasawa

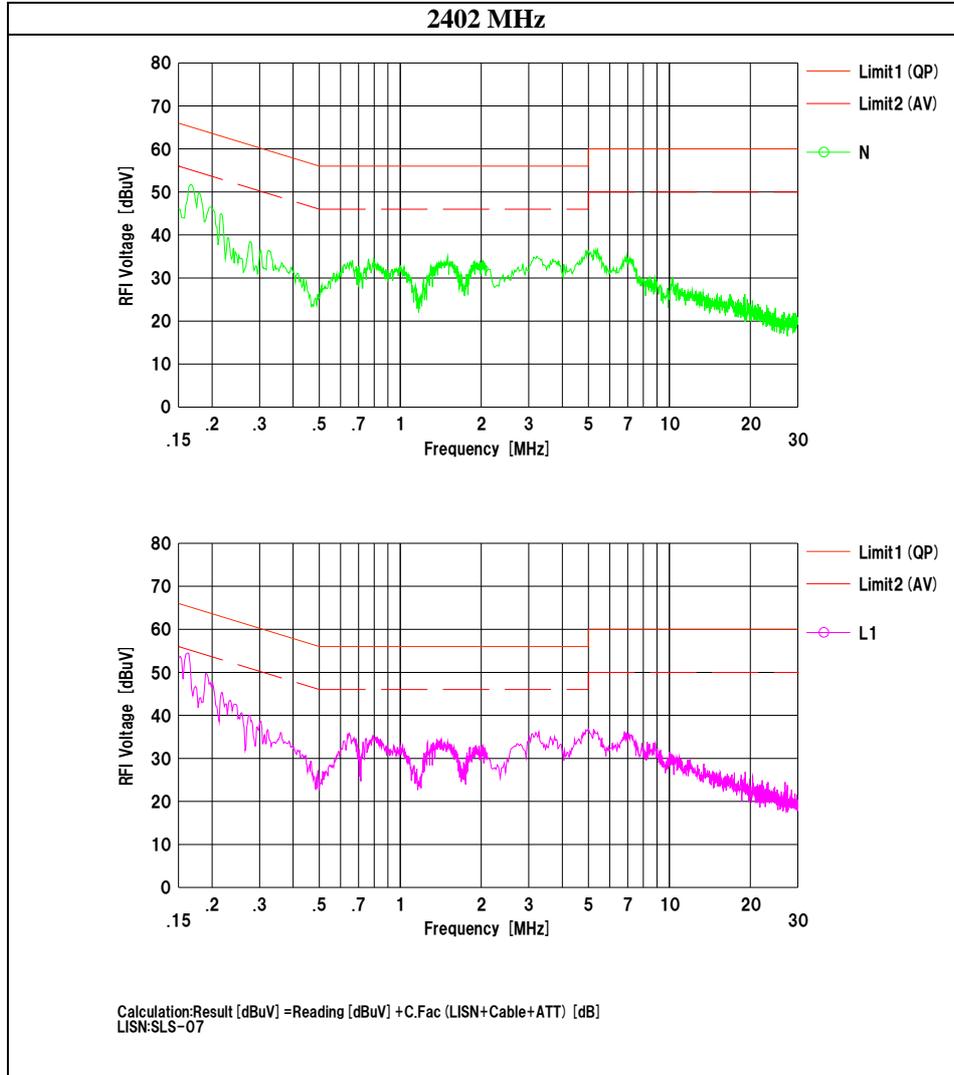


No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15844	36.50	13.10	12.35	48.85	25.45	65.55	55.55	16.7	30.1	N	
2	0.18378	31.30	11.00	12.35	43.65	23.35	64.31	54.31	20.6	30.9	N	
3	0.65550	18.60	6.70	12.40	31.00	19.10	56.00	46.00	25.0	26.9	N	
4	0.77650	18.00	5.80	12.42	30.42	18.22	56.00	46.00	25.5	27.7	N	
5	3.22050	18.00	4.10	12.54	30.54	16.64	56.00	46.00	25.4	29.3	N	
6	4.98780	19.40	8.20	12.65	32.05	20.85	56.00	46.00	23.9	25.1	N	
7	0.15834	36.30	13.20	12.35	48.65	25.55	65.55	55.55	16.9	30.0	L1	
8	0.18374	32.00	11.70	12.35	44.35	24.05	64.31	54.31	19.9	30.2	L1	
9	0.65090	20.30	10.10	12.40	32.70	22.50	56.00	46.00	23.3	23.5	L1	
10	0.76590	19.20	6.00	12.42	31.62	18.42	56.00	46.00	24.3	27.5	L1	
11	3.22190	18.70	5.70	12.54	31.24	18.24	56.00	46.00	24.7	27.7	L1	
12	4.94410	19.60	8.10	12.65	32.25	20.75	56.00	46.00	23.7	25.2	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
LISN:SLS-07

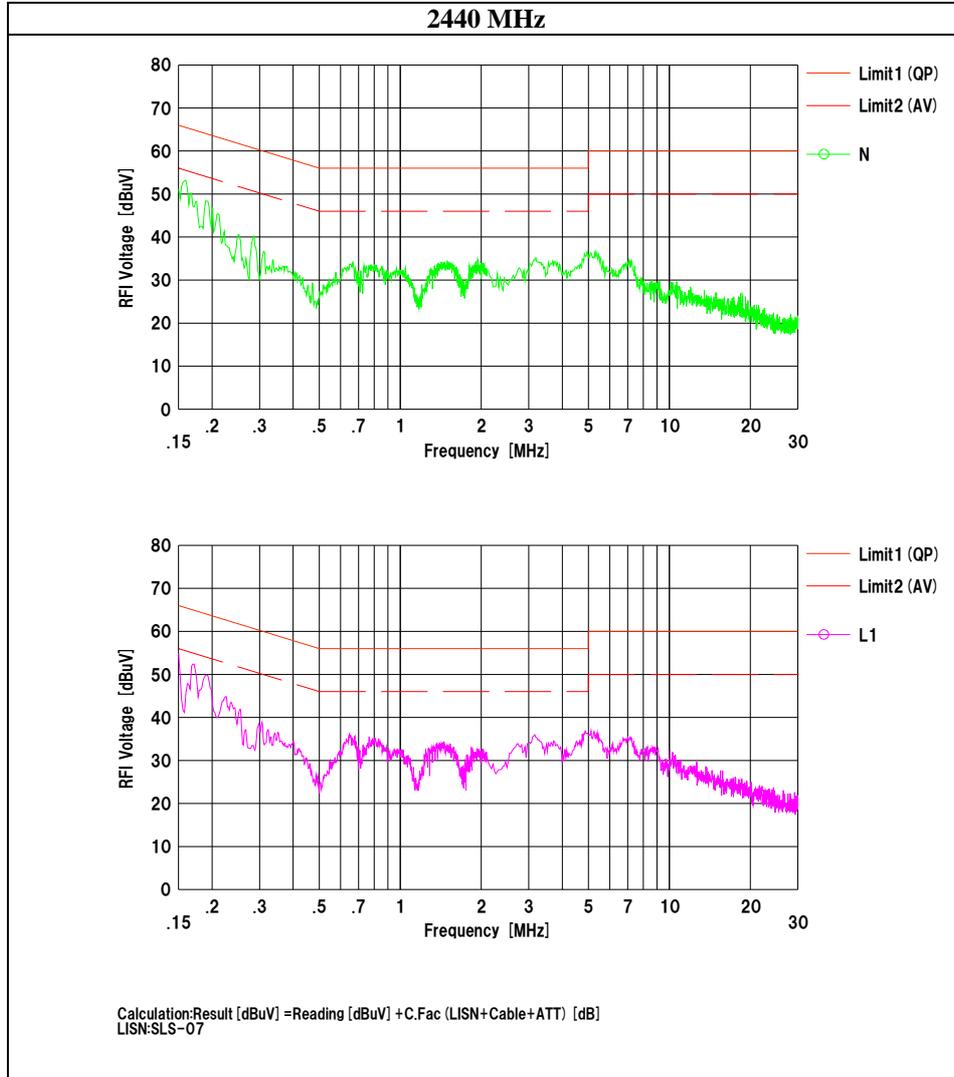
Conducted Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11014760S-A-R2
Date	November 14, 2015
Temperature / Humidity	25 deg. C / 40 % RH
Engineer	Hikaru Shirasawa
Mode	Tx BT LE



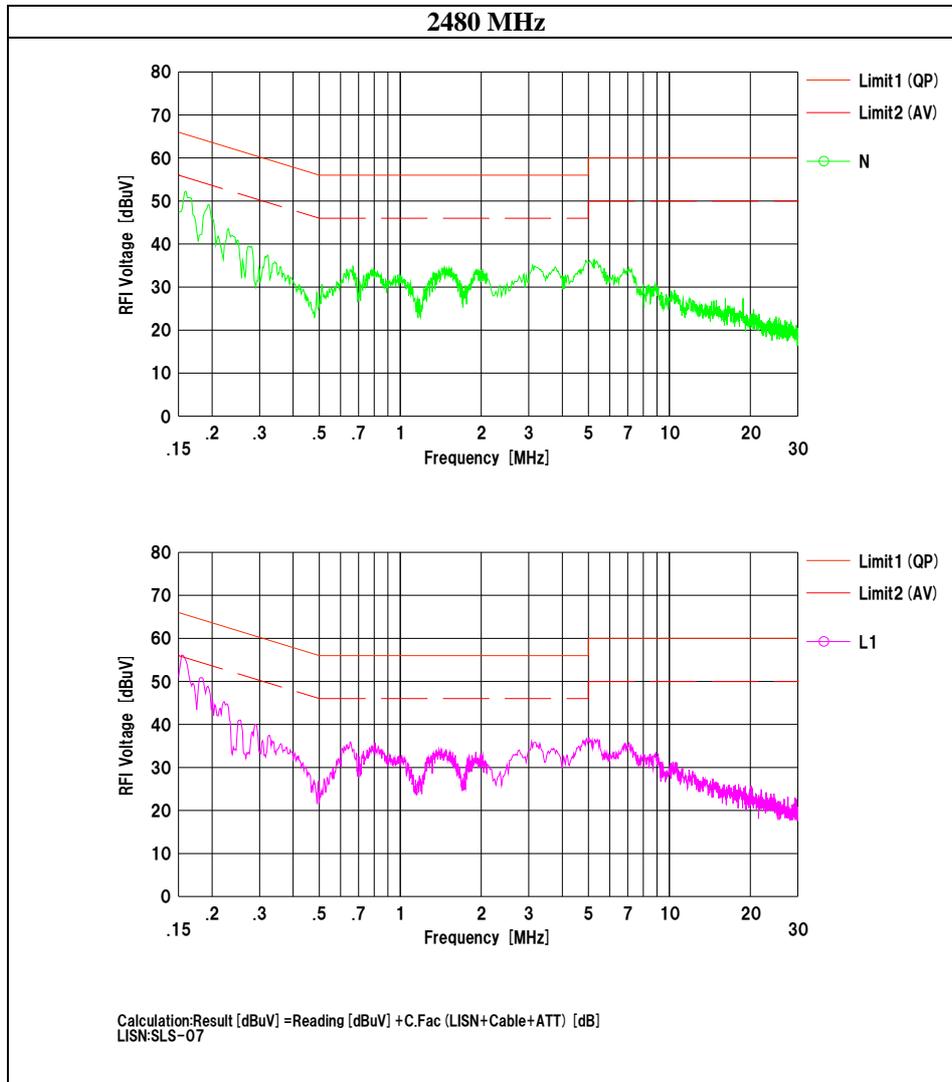
Conducted Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11014760S-A-R2
Date	November 14, 2015
Temperature / Humidity	25 deg. C / 40 % RH
Engineer	Hikaru Shirasawa
Mode	Tx BT LE



Conducted Emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11014760S-A-R2
Date	November 14, 2015
Temperature / Humidity	25 deg. C / 40 % RH
Engineer	Hikaru Shirasawa
Mode	Tx BT LE

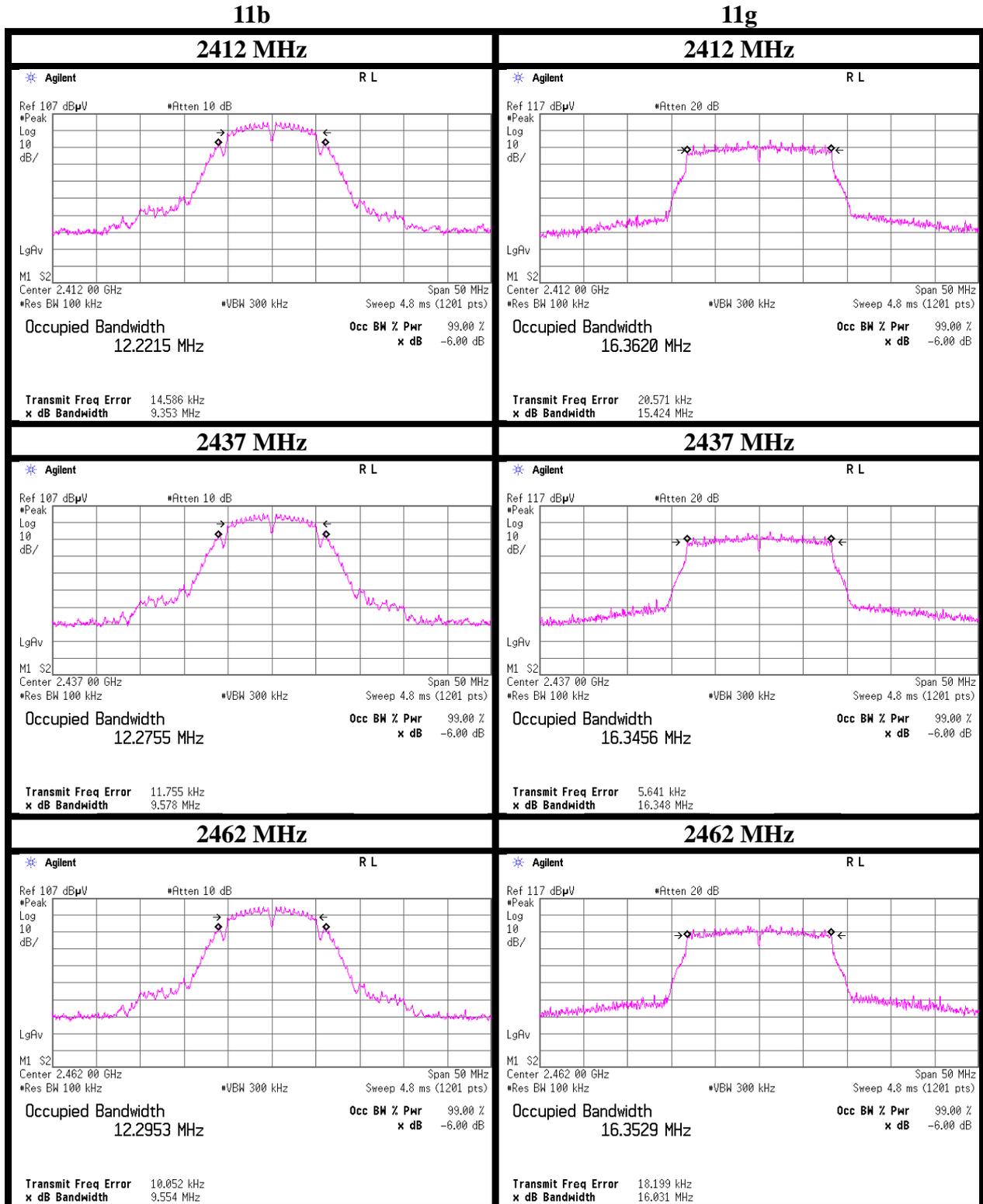


6 dB Bandwidth

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11014760S-A-R2
Date November 1, 2015
Temperature / Humidity 23 deg. C / 39 % RH
Engineer Yosuke Ishikawa
Mode Tx

Mode	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
11b	2412	9.353	> 500
	2437	9.578	> 500
	2462	9.554	> 500
11g	2412	15.424	> 500
	2437	16.348	> 500
	2462	16.031	> 500
11n-20	2412	16.018	> 500
	2437	16.913	> 500
	2462	16.301	> 500

6 dB Bandwidth



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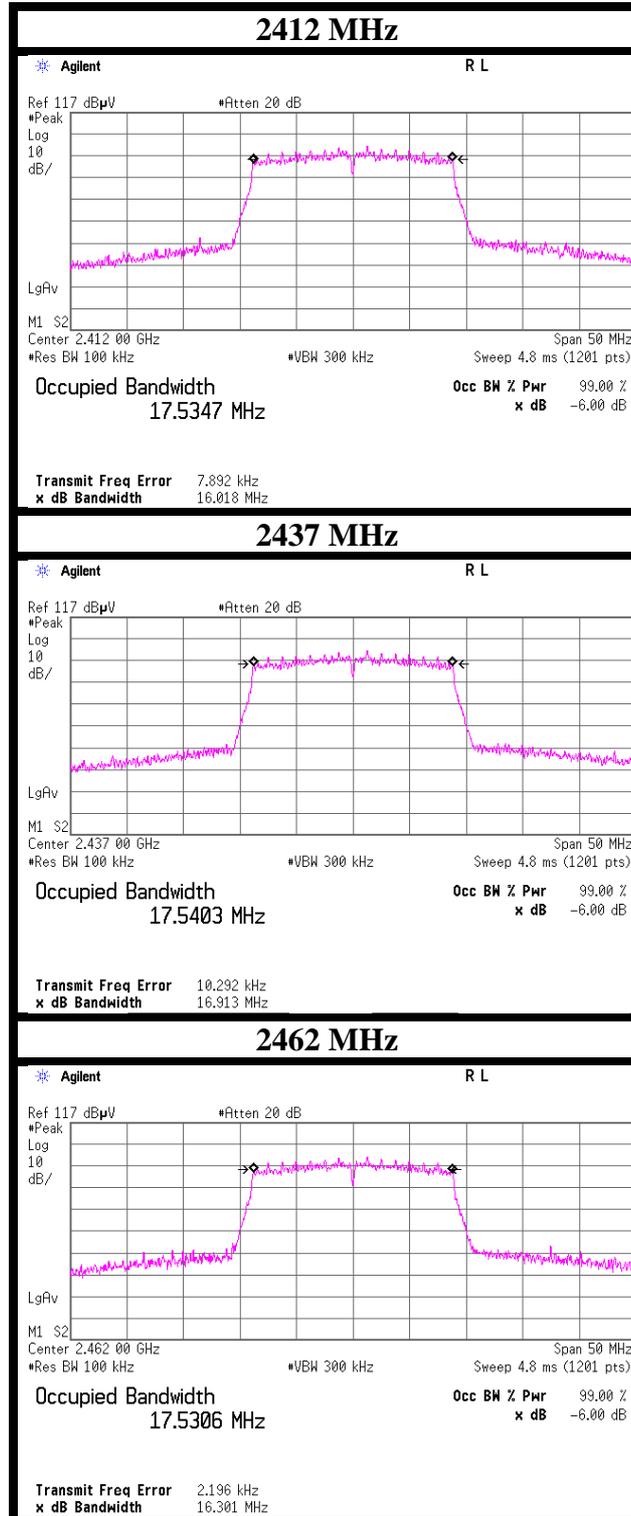
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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6 dB Bandwidth

11n-20



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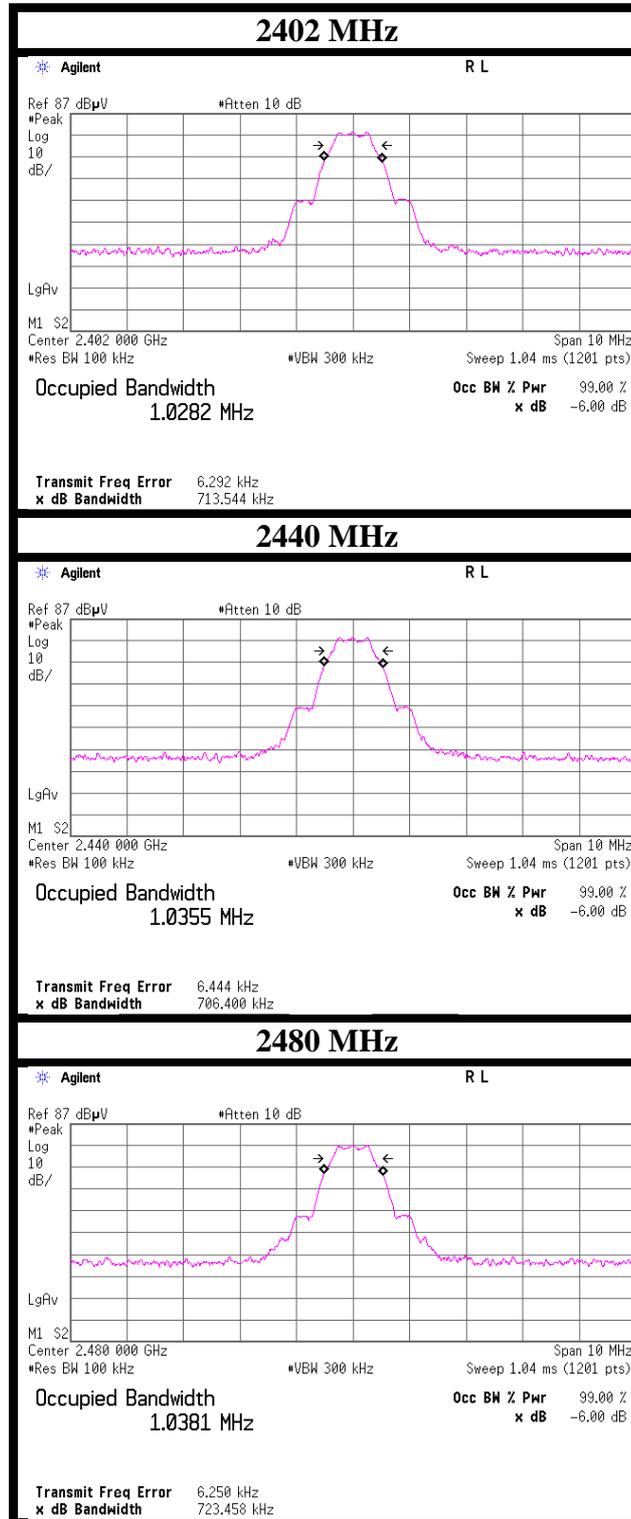
Facsimile : +81 463 50 6401

6 dB Bandwidth

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11014760S-A-R2
Date November 17, 2015
Temperature / Humidity 20 deg. C / 45 % RH
Engineer Hiroyuki Morikawa
Mode Tx BT LE

Mode	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
Tx BT LE	2402	0.714	> 500
	2440	0.706	> 500
	2480	0.723	> 500

6 dB Bandwidth



Maximum Peak Conducted Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11014760S-A-R2
Date	November 1, 2015
Temperature / Humidity	23 deg. C / 39 % RH
Engineer	Yosuke Ishikawa
Mode	Tx 11g

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	14.30	1.62	9.93	25.85	384.59	30.00	1000	4.15
2437	14.22	1.62	9.93	25.77	377.57	30.00	1000	4.23
2462	14.16	1.63	9.93	25.72	373.25	30.00	1000	4.28

Sample Calculation:

Result = Reading + Cable Loss (including the cable(s) customer supplied) + 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	12.85	
9	13.02	
12	14.02	
18	14.14	
24	13.01	
36	12.86	
48	14.22	*
54	14.15	

*: Worst Rate

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

Maximum Peak Conducted Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11014760S-A-R2
Date : November 1, 2015
Temperature / Humidity : 23 deg. C / 39 % RH
Engineer : Yosuke Ishikawa
Mode : Tx 11n-20

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2412	14.32	1.62	9.93	25.87	386.37	30.00	1000	4.13
2437	14.30	1.62	9.93	25.85	384.59	30.00	1000	4.15
2462	13.99	1.63	9.93	25.55	358.92	30.00	1000	4.45

Sample Calculation:

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

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

2437 MHz

MCS	Reading [dBm]	Remark
0	12.94	
1	12.92	
2	12.93	
3	13.03	
4	13.16	
5	14.25	
6	14.29	
7	14.30	*

*: Worst Rate

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

Maximum Peak Conducted Output Power

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11014760S-A-R2
Date : November 1, 2015
Temperature / Humidity : 20 deg. C / 45 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx BT LE

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2402	-3.66	1.62	9.67	7.63	5.79	30.00	1000	22.37
2440	-3.59	1.62	9.67	7.70	5.89	30.00	1000	22.30
2480	-3.78	1.64	9.67	7.53	5.66	30.00	1000	22.47

Sample Calculation:

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

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

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Average Output Power
(Reference data for RF Exposure)

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11014760S-A-R2
Date : November 1, 2015
Temperature / Humidity : 23 deg. C / 39 % RH
Engineer : Yosuke Ishikawa
Mode : Tx

11b 1 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	4.00	1.62	9.93	15.55	35.89	0.08	15.63	36.56
2437	3.84	1.62	9.93	15.39	34.59	0.08	15.47	35.24
2462	3.84	1.63	9.93	15.40	34.67	0.08	15.48	35.32

11g 48 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	1.17	1.62	9.93	12.72	18.71	2.73	15.45	35.08
2437	1.19	1.62	9.93	12.74	18.79	2.73	15.47	35.24
2462	1.29	1.63	9.93	12.85	19.28	2.73	15.58	36.14

11n-20 MCS 7

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Frame power)		Duty factor [dB]	Result (Burst power)	
				[dBm]	[mW]		[dBm]	[mW]
2412	0.84	1.62	9.93	12.39	17.34	3.06	15.45	35.08
2437	0.85	1.62	9.93	12.40	17.38	3.06	15.46	35.16
2462	1.01	1.63	9.93	12.57	18.07	3.06	15.63	36.56

Sample Calculation:

Result (Frame power) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuat
Result (Burst power) = Frame power + Duty factor

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

Average Output Power
(Reference data for RF Exposure)

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11014760S-A-R2
Date : November 1, 2015
Temperature / Humidity : 23 deg. C / 39 % RH
Engineer : Yosuke Ishikawa
Mode : Tx

2437 MHz

Mode	Rate Mbps	Reading [dBm]	Duty factor [dB]	Burst power [dBm]	Remarks
11b	1	3.84	0.08	3.92	*
	2	3.70	0.16	3.86	
	5.5	3.50	0.40	3.90	
	11	3.21	0.70	3.91	
11g	6	3.19	0.50	3.69	
	9	3.01	0.72	3.73	
	12	2.86	0.93	3.79	
	18	2.52	1.31	3.83	
	24	1.98	1.65	3.63	
	36	1.43	2.25	3.68	
	48	1.19	2.73	3.92	*
	54	0.77	2.95	3.72	
11n-20	0	3.31	0.53	3.84	
	1	2.92	0.98	3.90	
	2	2.41	1.35	3.76	
	3	2.10	1.70	3.80	
	4	1.61	2.24	3.85	
	5	1.17	2.68	3.85	
	6	1.03	2.87	3.90	
	7	0.85	3.06	3.91	*

* Worst rate

Sample Calculation:

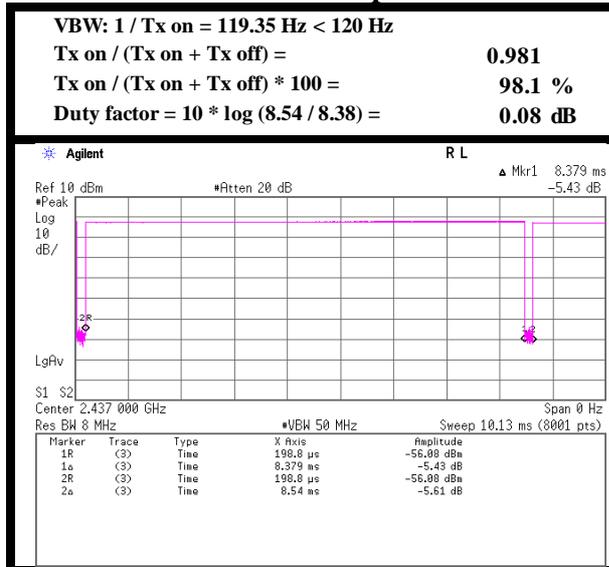
$$\text{Burst power} = \text{Reading (timed average)} + \text{Duty factor}$$

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

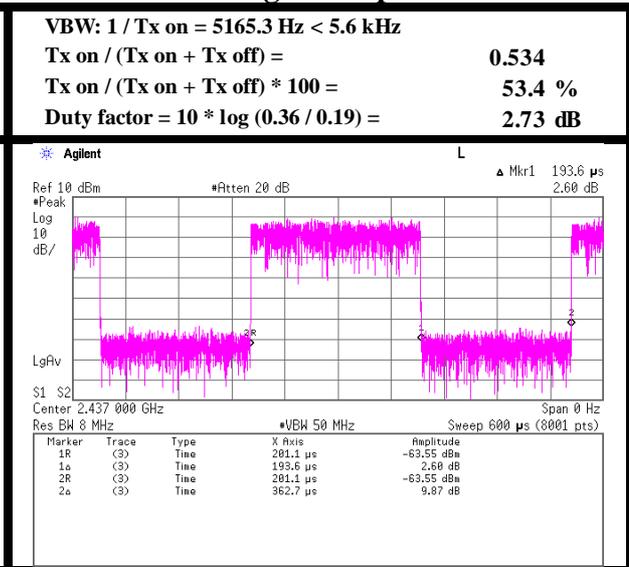
Burst rate confirmation

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11014760S-A-R2
Date : November 1, 2015
Temperature / Humidity : 23 deg. C / 39 % RH
Engineer : Yosuke Ishikawa
Mode : Tx

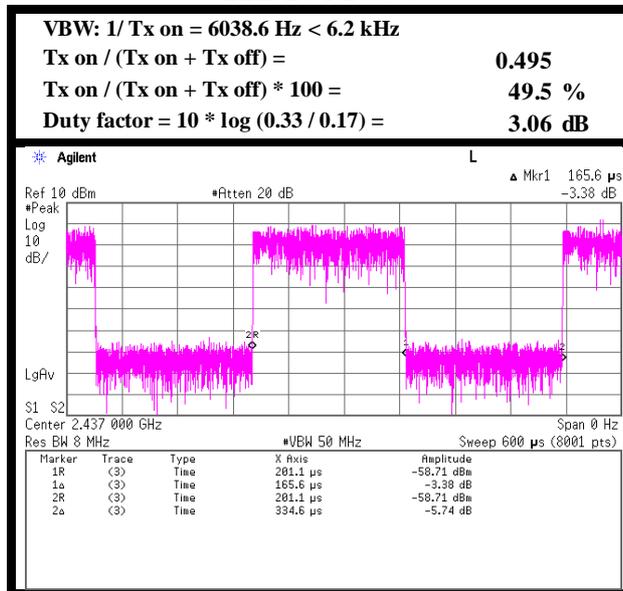
11b 1 Mbps



11g 48 Mbps



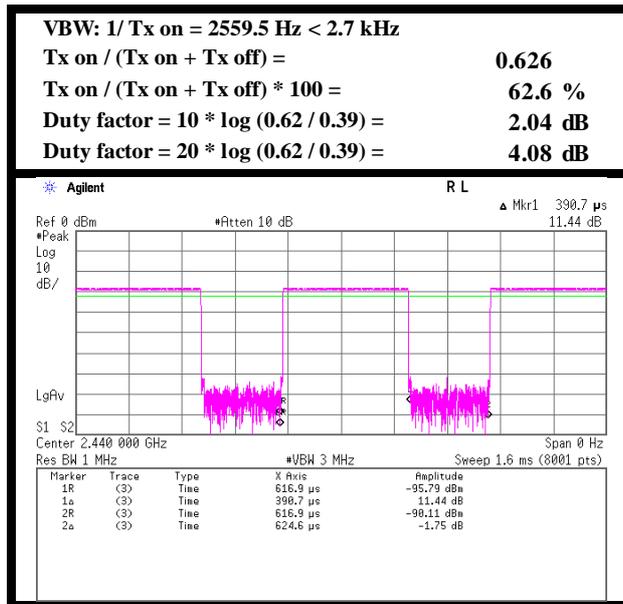
11n-20 MCS 7



* Duty factor was used for average output power.

Burst rate confirmation

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11014760S-A-R2
Date	November 17, 2015
Temperature / Humidity	20 deg. C / 45 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx BT LE



- * Duty factor 2.04 dB was used for average output power.
- * Duty factor 4.08 dB was used for spurious emissions.

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.1 Semi Anechoic Chamber	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11014760S-A-R2	
Date	November 7, 2015	November 12, 2015
Temperature / Humidity	23 deg. C / 43 % RH	25 deg. C / 34 % RH
Engineer	Kenichi Adachi (1-13 GHz)	Tomohiro Hara (13-26 GHz)
Mode	Tx 11b 2412 MHz with antenna cable 400 mm	

(* 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	43.3	27.7	14.8	40.7	2.3	47.4	73.9	26.5	100	12	
Hori.	4824.000	PK	52.0	31.4	7.3	41.6	2.3	51.4	73.9	22.5	111	228	
Hori.	7236.000	PK	46.3	36.6	8.7	41.2	2.3	52.7	73.9	21.2	100	0	
Hori.	9648.000	PK	46.7	38.0	9.8	40.1	2.3	56.7	73.9	17.2	100	0	
Hori.	12060.000	PK	46.8	39.6	10.7	39.4	2.3	60.0	73.9	13.9	100	0	
Hori.	2390.000	AV	33.9	27.7	14.8	40.7	2.3	38.0	53.9	15.9	100	12	
Hori.	4824.000	AV	47.6	31.4	7.3	41.6	2.3	47.0	53.9	6.9	111	228	
Hori.	7236.000	AV	35.7	36.6	8.7	41.2	2.3	42.1	53.9	11.8	100	0	
Hori.	9648.000	AV	35.2	38.0	9.8	40.1	2.3	45.2	53.9	8.7	100	0	
Hori.	12060.000	AV	34.2	39.6	10.7	39.4	2.3	47.4	53.9	6.5	100	0	
Vert.	2390.000	PK	43.3	27.7	14.8	40.7	2.3	47.4	73.9	26.5	100	194	
Vert.	4824.000	PK	53.0	31.4	7.3	41.6	2.3	52.4	73.9	21.5	131	301	
Vert.	7236.000	PK	46.4	36.6	8.7	41.2	2.3	52.8	73.9	21.1	100	0	
Vert.	9648.000	PK	46.6	38.0	9.8	40.1	2.3	56.6	73.9	17.3	100	0	
Vert.	12060.000	PK	46.9	39.6	10.7	39.4	2.3	60.1	73.9	13.8	100	0	
Vert.	2390.000	AV	34.0	27.7	14.8	40.7	2.3	38.1	53.9	15.8	100	194	
Vert.	4824.000	AV	48.7	31.4	7.3	41.6	2.3	48.1	53.9	5.8	131	301	
Vert.	7236.000	AV	35.2	36.6	8.7	41.2	2.3	41.6	53.9	12.3	100	0	
Vert.	9648.000	AV	35.1	38.0	9.8	40.1	2.3	45.1	53.9	8.8	100	0	
Vert.	12060.000	AV	34.3	39.6	10.7	39.4	2.3	47.5	53.9	6.4	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)} / 20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$
13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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	92.4	27.7	14.9	40.7	2.3	96.6	-	-	Carrier
Hori.	2398.202	PK	43.3	27.7	14.8	40.7	2.3	47.4	76.5	29.1	
Hori.	2400.000	PK	37.8	27.7	14.9	40.7	2.3	42.0	76.5	34.5	
Vert.	2412.000	PK	93.6	27.7	14.9	40.7	2.3	97.8	-	-	Carrier
Vert.	2398.202	PK	43.4	27.7	14.8	40.7	2.3	47.5	77.7	30.2	
Vert.	2400.000	PK	39.9	27.7	14.9	40.7	2.3	44.1	77.7	33.6	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)} / 20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$
13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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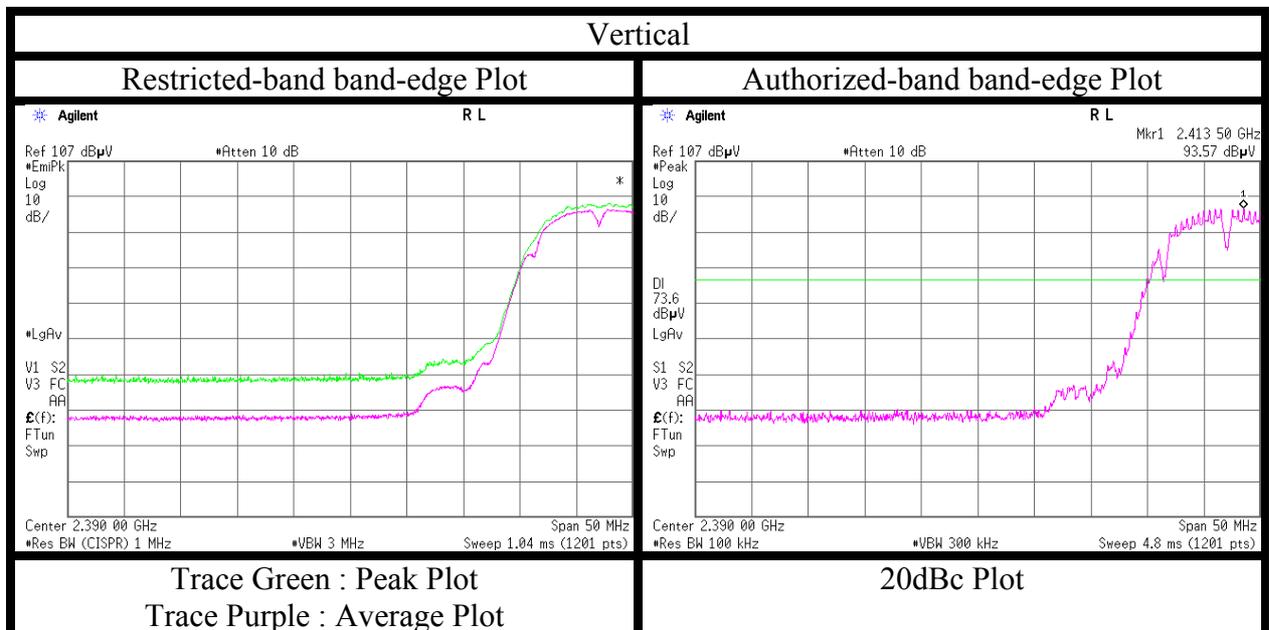
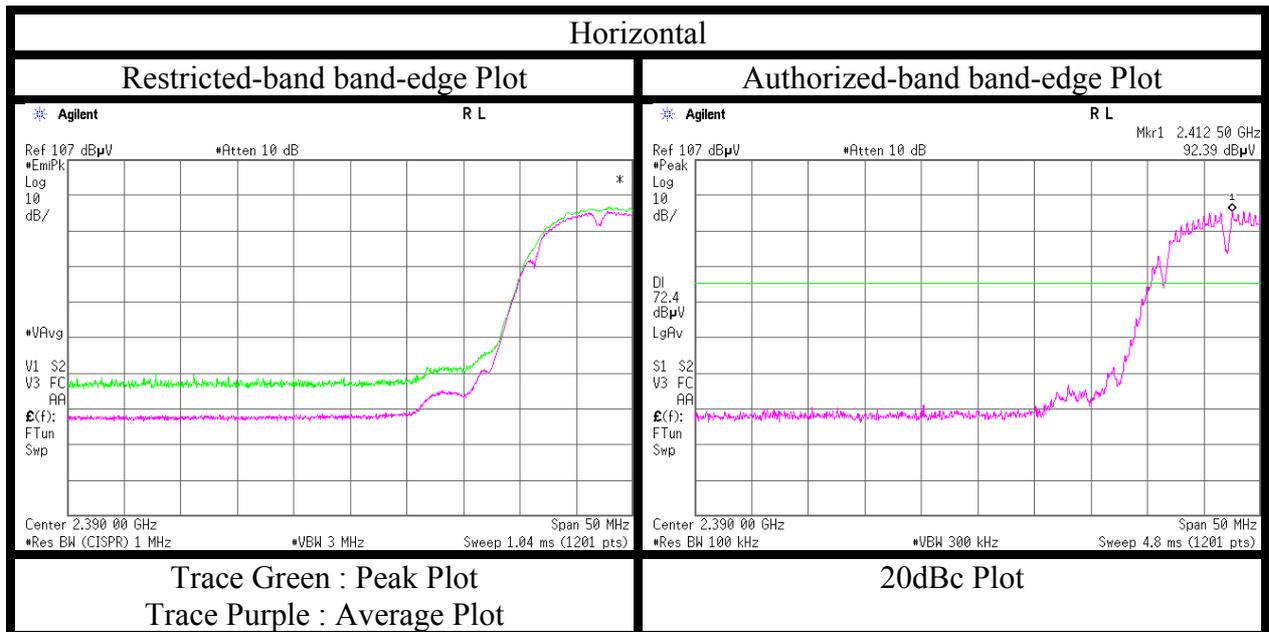
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Radiated Spurious Emission
(Reference Plot for band-edge)

Test place : Shonan EMC Lab. No.1 Semi Anechoic Chamber
Report No. : 11014760S-A-R2
Date : November 7, 2015
Temperature / Humidity : 23 deg. C / 43 % RH
Engineer : Kenichi Adachi
(1-13 GHz)
Mode : Tx 11b 2412 MHz with antenna cable 400 mm



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

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.1 Semi Anechoic Chamber	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11014760S-A-R2	
Date	November 7, 2015	November 12, 2015
Temperature / Humidity	23 deg. C / 43 % RH	25 deg. C / 34 % RH
Engineer	Kenichi Adachi (1-13 GHz)	Tomohiro Hara (13-26 GHz)
Mode	Tx 11b 2437 MHz with antenna cable 400 mm	

(* 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	48.5	31.6	7.3	41.6	2.3	48.1	73.9	25.8	113	232	
Hori.	7311.000	PK	46.2	36.7	8.7	41.3	2.3	52.6	73.9	21.3	100	0	
Hori.	9748.000	PK	44.8	38.0	9.8	40.1	2.3	54.8	73.9	19.1	100	0	
Hori.	12185.000	PK	45.1	39.6	10.7	39.3	2.3	58.4	73.9	15.5	100	0	
Hori.	4874.000	AV	42.9	31.6	7.3	41.6	2.3	42.5	53.9	11.4	113	232	
Hori.	7311.000	AV	35.2	36.7	8.7	41.3	2.3	41.6	53.9	12.3	100	0	
Hori.	9748.000	AV	33.9	38.0	9.8	40.1	2.3	43.9	53.9	10.0	100	0	
Hori.	12185.000	AV	33.7	39.6	10.7	39.3	2.3	47.0	53.9	6.9	100	0	
Vert.	4874.000	PK	49.2	31.6	7.3	41.6	2.3	48.8	73.9	25.1	131	297	
Vert.	7311.000	PK	46.1	36.7	8.7	41.3	2.3	52.5	73.9	21.4	100	0	
Vert.	9748.000	PK	44.9	38.0	9.8	40.1	2.3	54.9	73.9	19.0	100	0	
Vert.	12185.000	PK	45.0	39.6	10.7	39.3	2.3	58.3	73.9	15.6	100	0	
Vert.	4874.000	AV	43.8	31.6	7.3	41.6	2.3	43.4	53.9	10.5	131	297	
Vert.	7311.000	AV	35.1	36.7	8.7	41.3	2.3	41.5	53.9	12.4	100	0	
Vert.	9748.000	AV	34.0	38.0	9.8	40.1	2.3	44.0	53.9	9.9	100	0	
Vert.	12185.000	AV	33.6	39.6	10.7	39.3	2.3	46.9	53.9	7.0	100	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)} / 20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

UL Japan, Inc.

Shonan EMC Lab.

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Radiated Spurious Emission

Test place	Shonan EMC Lab. No.1 Semi Anechoic Chamber	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11014760S-A-R2	
Date	November 7, 2015	November 12, 2015
Temperature / Humidity	23 deg. C / 43 % RH	25 deg. C / 34 % RH
Engineer	Kenichi Adachi (1-13 GHz)	Tomohiro Hara (13-26 GHz)
Mode	Tx 11b 2462 MHz with antenna cable 400 mm	

(* 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	45.4	27.8	15.0	40.7	2.3	49.8	73.9	24.1	100	14	
Hori.	4924.000	PK	47.9	31.7	7.4	41.6	2.3	47.7	73.9	26.2	114	225	
Hori.	7386.000	PK	46.1	36.7	8.8	41.3	2.3	52.6	73.9	21.3	100	0	
Hori.	9848.000	PK	45.0	38.1	9.9	40.0	2.3	55.3	73.9	18.6	100	0	
Hori.	12310.000	PK	43.8	39.6	10.7	39.1	2.3	57.3	73.9	16.6	100	0	
Hori.	2483.500	AV	34.0	27.8	15.0	40.7	2.3	38.4	53.9	15.5	100	14	
Hori.	4924.000	AV	40.0	31.7	7.4	41.6	2.3	39.8	53.9	14.1	114	225	
Hori.	7386.000	AV	35.3	36.7	8.8	41.3	2.3	41.8	53.9	12.1	100	0	
Hori.	9848.000	AV	34.1	38.1	9.9	40.0	2.3	44.4	53.9	9.5	100	0	
Hori.	12310.000	AV	33.0	39.6	10.7	39.1	2.3	46.5	53.9	7.4	100	0	
Vert.	2483.500	PK	45.5	27.8	15.0	40.7	2.3	49.9	73.9	24.0	100	209	
Vert.	4924.000	PK	48.9	31.7	7.4	41.6	2.3	48.7	73.9	25.2	134	299	
Vert.	7386.000	PK	46.0	36.7	8.8	41.3	2.3	52.5	73.9	21.4	100	0	
Vert.	9848.000	PK	45.1	38.1	9.9	40.0	2.3	55.4	73.9	18.5	100	0	
Vert.	12310.000	PK	43.9	39.6	10.7	39.1	2.3	57.4	73.9	16.5	100	0	
Vert.	2483.500	AV	34.0	27.8	15.0	40.7	2.3	38.4	53.9	15.5	100	209	
Vert.	4924.000	AV	40.8	31.7	7.4	41.6	2.3	40.6	53.9	13.3	134	299	
Vert.	7386.000	AV	35.2	36.7	8.8	41.3	2.3	41.7	53.9	12.2	100	0	
Vert.	9848.000	AV	34.2	38.1	9.9	40.0	2.3	44.5	53.9	9.4	100	0	
Vert.	12310.000	AV	33.1	39.6	10.7	39.1	2.3	46.6	53.9	7.3	100	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)} / 20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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Shonan EMC Lab.

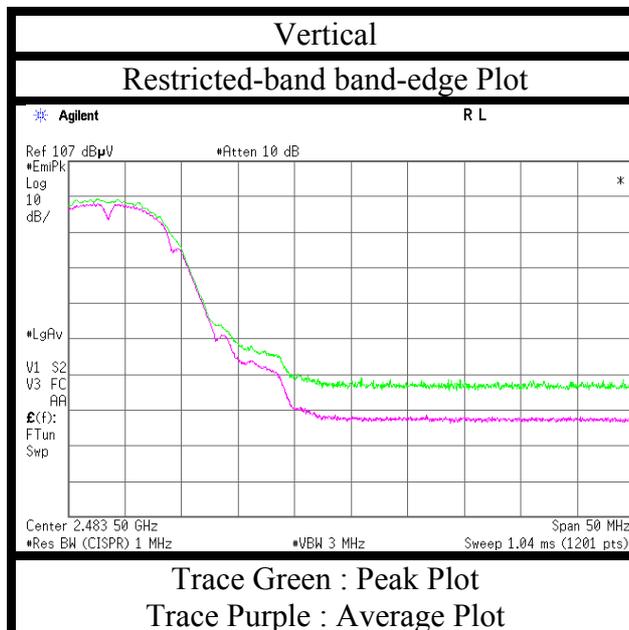
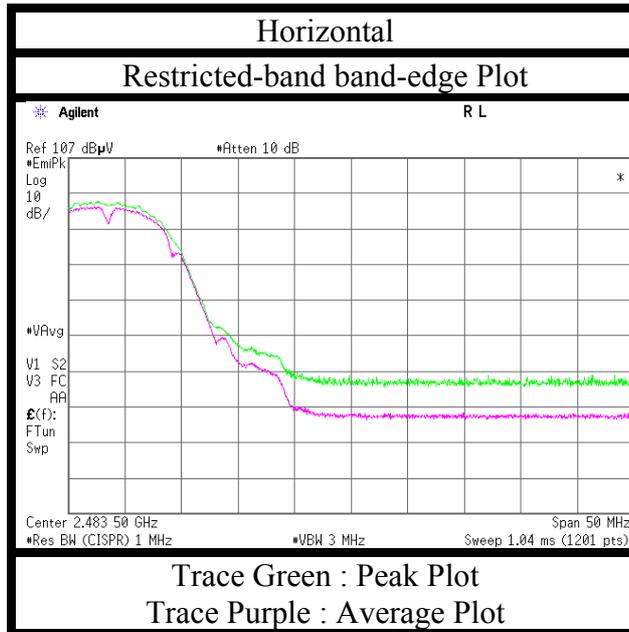
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Radiated Spurious Emission
(Reference Plot for band-edge)

Test place : Shonan EMC Lab. No.1 Semi Anechoic Chamber
Report No. : 11014760S-A-R2
Date : November 7, 2015
Temperature / Humidity : 23 deg. C / 43 % RH
Engineer : Kenichi Adachi
(1-13 GHz)
Mode : Tx 11b 2462 MHz with antenna cable 400 mm



* 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. : 11014760S-A-R2
Date : November 10, 2015
Temperature / Humidity : 24 deg. C / 55 % RH
Engineer : Hikaru Shirasawa
(1-2.8 GHz)
Mode : Tx 11g 2412 MHz with antenna cable 199 mm

(* 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	61.8	27.8	13.7	41.0	3.3	65.6	73.9	8.3	160	328	
Hori.	2390.000	AV	44.0	27.8	13.7	41.0	3.3	47.8	53.9	6.1	160	328	
Vert.	2390.000	PK	61.7	27.8	13.7	41.0	3.3	65.5	73.9	8.4	100	8	
Vert.	2390.000	AV	42.9	27.8	13.7	41.0	3.3	46.7	53.9	7.2	100	8	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)} / 20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$
13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

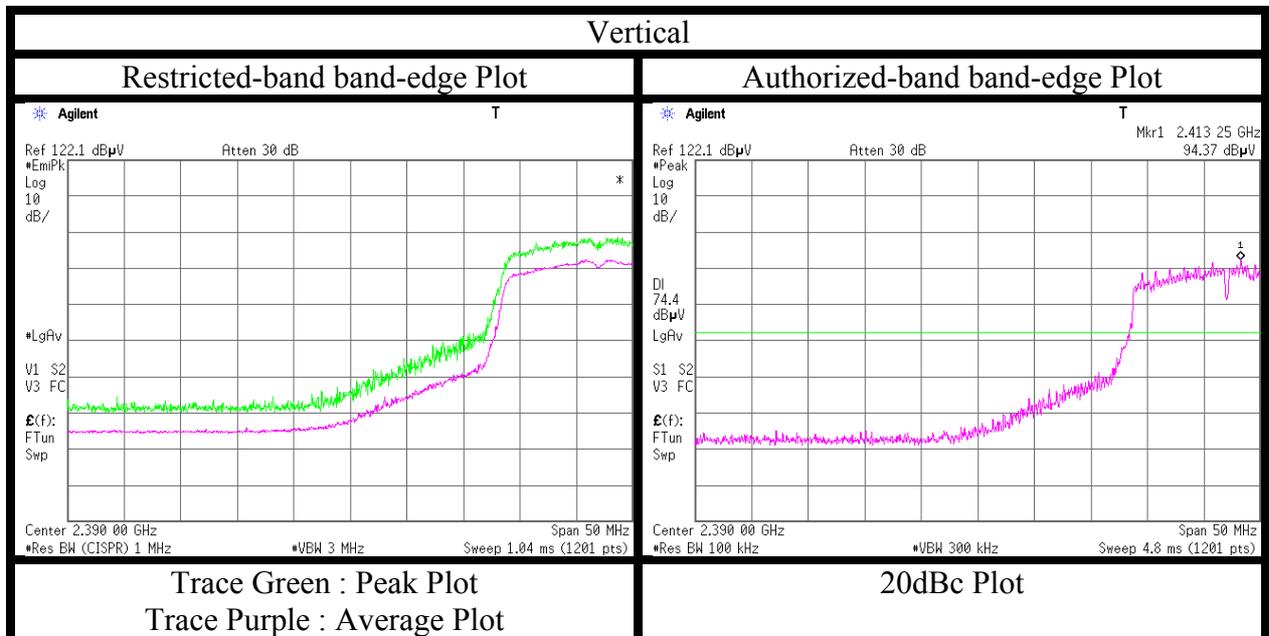
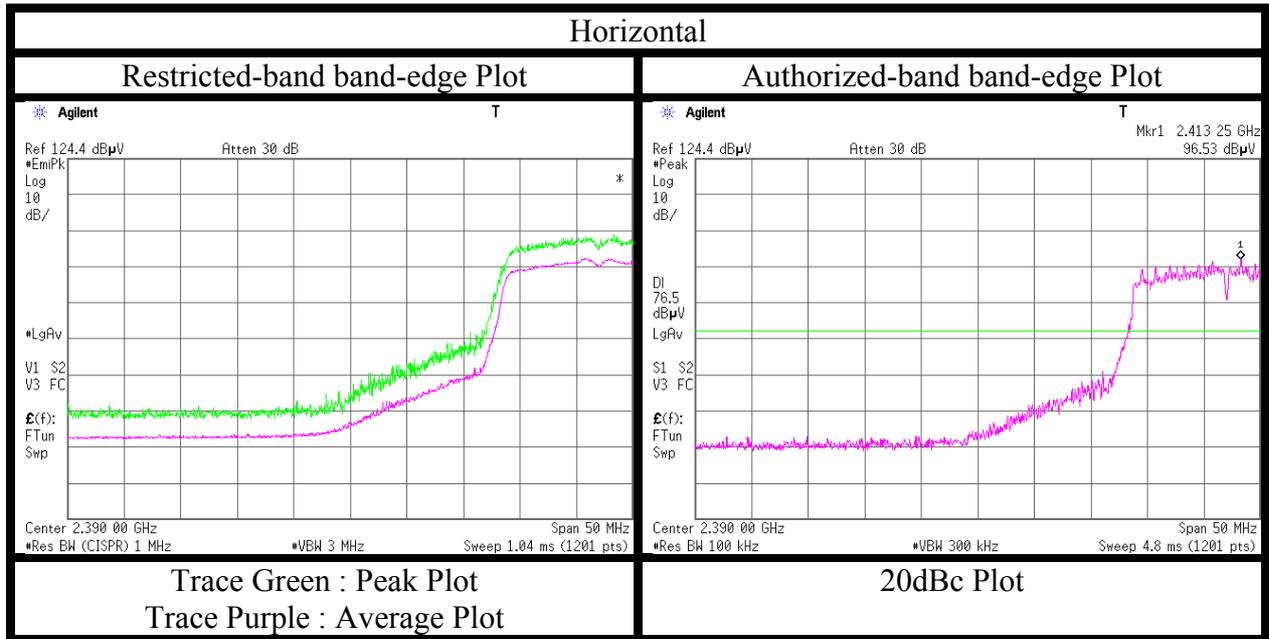
20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

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	96.6	27.8	13.7	41.0	3.3	100.4	-	-	Carrier
Hori.	2400.000	PK	61.5	27.8	13.7	41.0	3.3	65.3	80.4	15.1	
Vert.	2412.000	PK	94.4	27.8	13.7	41.0	3.3	98.2	-	-	Carrier
Vert.	2400.000	PK	61.0	27.8	13.7	41.0	3.3	64.8	78.2	13.4	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)} / 20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$
13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11014760S-A-R2
Date	November 10, 2015
Temperature / Humidity	24 deg. C / 55 % RH
Engineer	Hikaru Shirasawa (1-2.8 GHz)
Mode	Tx 11g 2412 MHz with antenna cable 199 mm



* 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. : 11014760S-A-R2
Date : November 10, 2015
Temperature / Humidity : 24 deg. C / 55 % RH
Engineer : Hikaru Shirasawa
(1-2.8 GHz)
Mode : Tx 11g 2412 MHz with antenna cable 400 mm

(* 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	63.4	27.8	13.7	41.0	3.3	67.2	73.9	6.7	103	39	
Hori.	2390.000	AV	43.0	27.8	13.7	41.0	3.3	46.8	53.9	7.1	103	39	
Vert.	2390.000	PK	56.8	27.8	13.7	41.0	3.3	60.6	73.9	13.3	100	342	
Vert.	2390.000	AV	41.2	27.8	13.7	41.0	3.3	45.0	53.9	8.9	100	342	

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

Distance factor : 1 GHz - 13 GHz : $20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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	94.6	27.8	13.7	41.0	3.3	98.4	-	-	Carrier
Hori.	2400.000	PK	61.8	27.8	13.7	41.0	3.3	65.6	78.4	12.8	
Vert.	2412.000	PK	94.8	27.8	13.7	41.0	3.3	98.6	-	-	Carrier
Vert.	2400.000	PK	52.7	27.8	13.7	41.0	3.3	56.5	78.6	22.1	

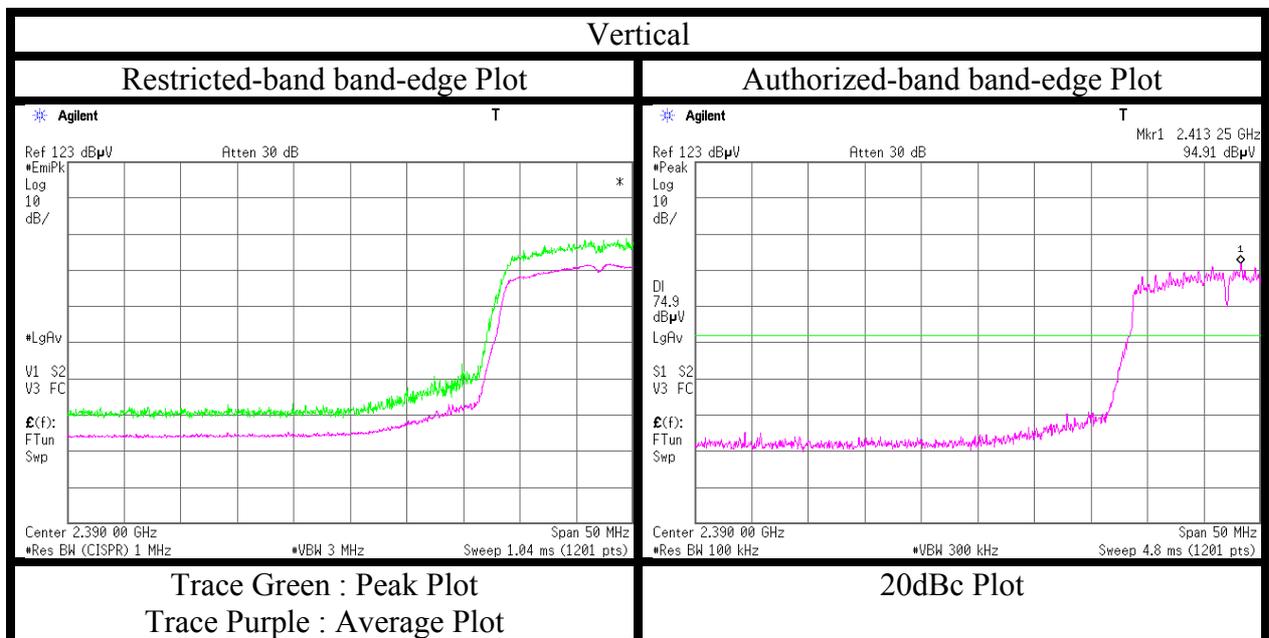
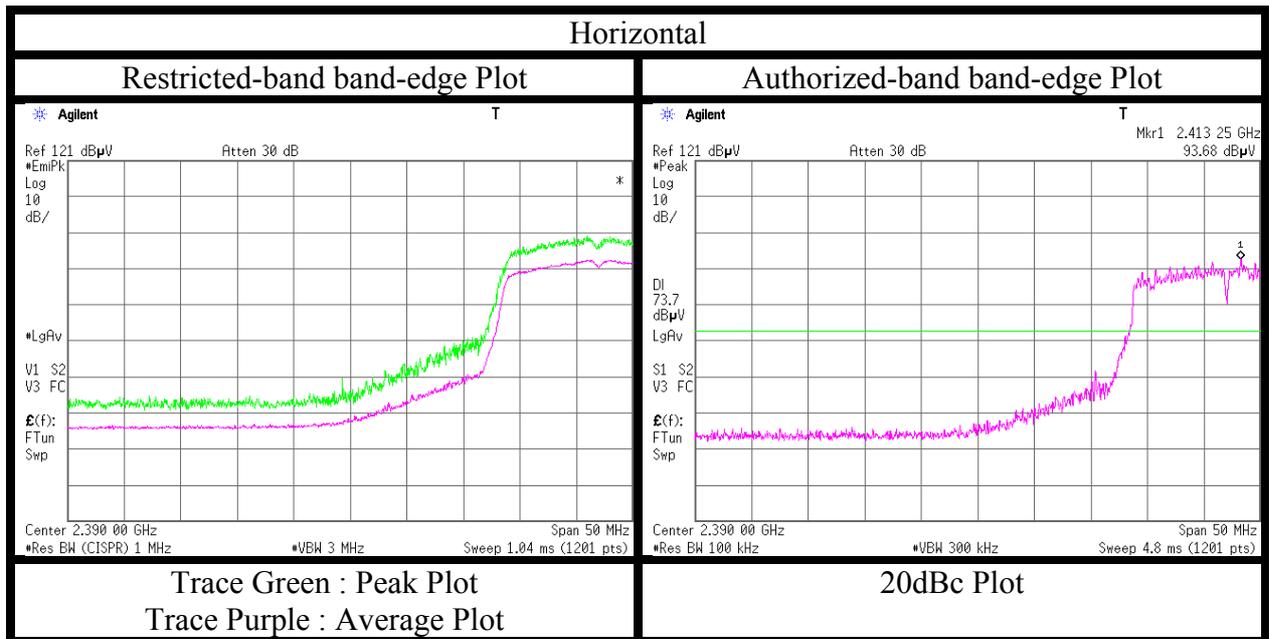
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11014760S-A-R2
Date : November 10, 2015
Temperature / Humidity : 24 deg. C / 55 % RH
Engineer : Hikaru Shirasawa
(1-2.8 GHz)
Mode : Tx 11g 2412 MHz with antenna cable 400 mm



* 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. : 11014760S-A-R2
Date : November 10, 2015
Temperature / Humidity : 24 deg. C / 55 % RH
Engineer : Hikaru Shirasawa
(1-2.8 GHz)
Mode : Tx 11g 2462 MHz with antenna cable 400 mm

(* 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	56.6	27.9	13.8	41.0	3.3	60.6	73.9	13.3	100	76	
Hori.	2483.500	AV	42.4	27.9	13.8	41.0	3.3	46.4	53.9	7.5	100	76	
Vert.	2483.500	PK	53.8	27.9	13.8	41.0	3.3	57.8	73.9	16.1	128	210	
Vert.	2483.500	AV	40.0	27.9	13.8	41.0	3.3	44.0	53.9	9.9	128	210	

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

Distance factor : 1 GHz - 13 GHz : $20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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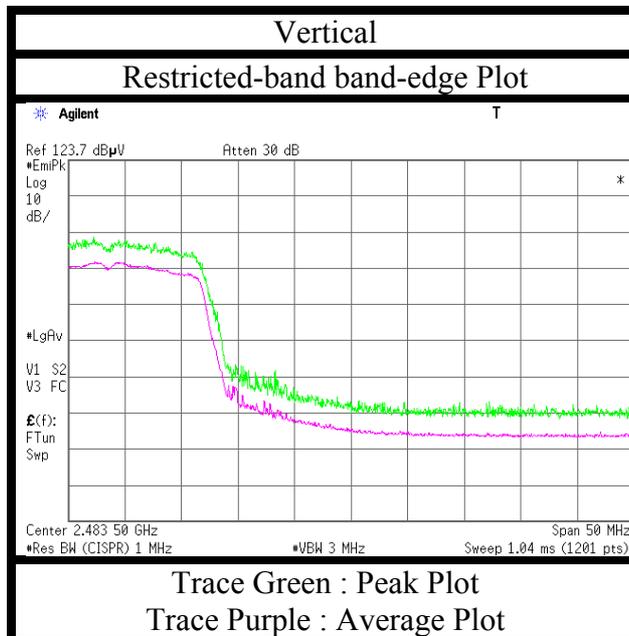
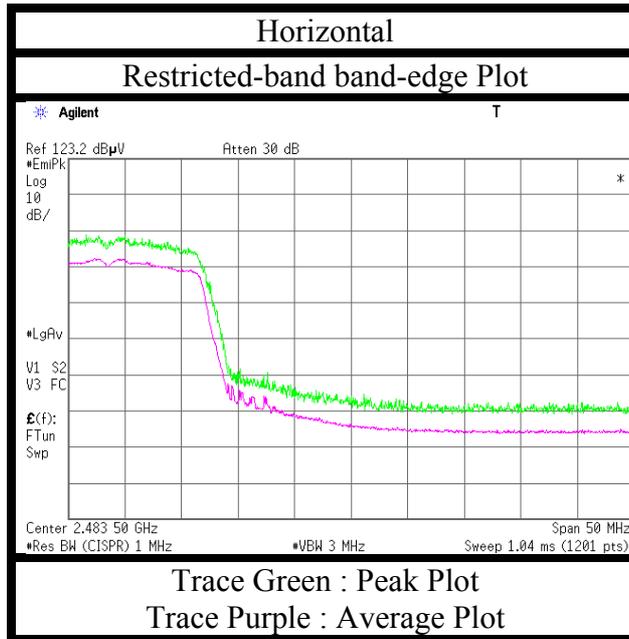
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Radiated Spurious Emission
(Reference Plot for band-edge)

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11014760S-A-R2
Date : November 10, 2015
Temperature / Humidity : 24 deg. C / 55 % RH
Engineer : Hikaru Shirasawa
(1-2.8 GHz)
Mode : Tx 11g 2462 MHz with antenna cable 400 mm



* 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. : 11014760S-A-R2
Date : November 10, 2015
Temperature / Humidity : 24 deg. C / 55 % RH
Engineer : Hikaru Shirasawa
(1-2.8 GHz)
Mode : Tx 11g 2462 MHz with antenna cable 199 mm

(* 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	55.1	27.9	13.8	41.0	3.3	59.1	73.9	14.8	100	321	
Hori.	2483.500	AV	41.4	27.9	13.8	41.0	3.3	45.4	53.9	8.5	100	321	
Vert.	2483.500	PK	57.3	27.9	13.8	41.0	3.3	61.3	73.9	12.6	100	36	
Vert.	2483.500	AV	42.3	27.9	13.8	41.0	3.3	46.3	53.9	7.6	100	36	

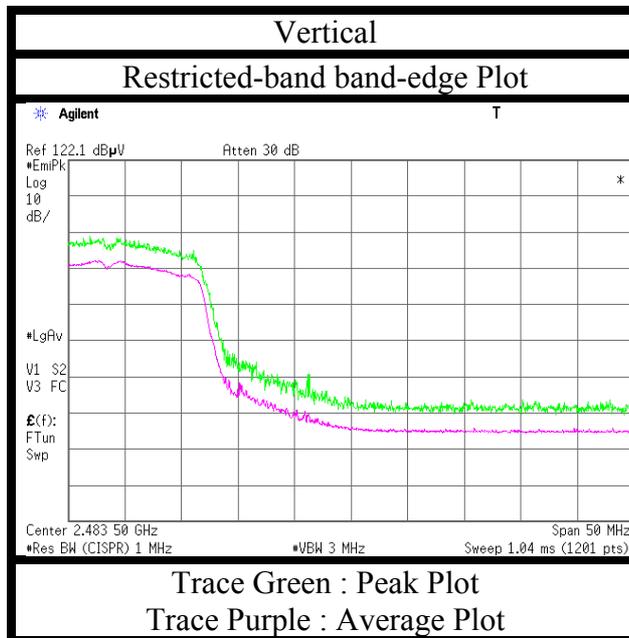
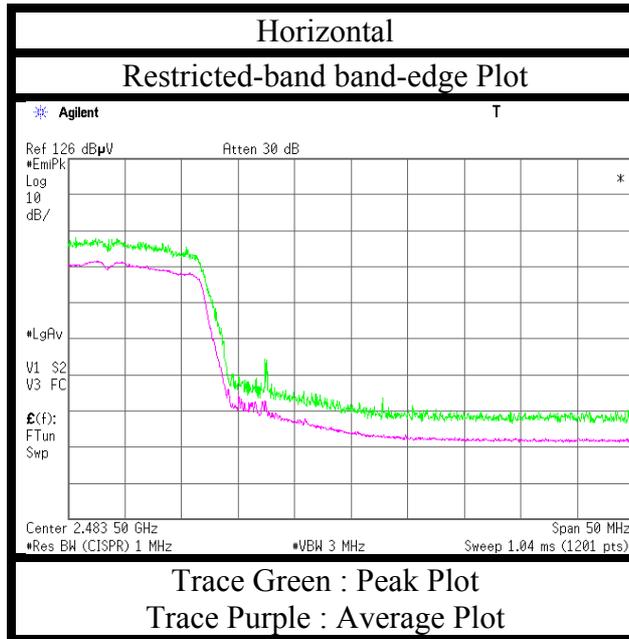
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)}$ / $20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11014760S-A-R2
Date : November 10, 2015
Temperature / Humidity : 24 deg. C / 55 % RH
Engineer : Hikaru Shirasawa
(1-2.8 GHz)
Mode : Tx 11g 2462 MHz with antenna cable 199 mm



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

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.1 Semi Anechoic Chamber	Shonan EMC Lab. No.3 Semi Anechoic Chamber	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11014760S-A-R2		
Date	November 7, 2015	November 12, 2015	November 13, 2015
Temperature / Humidity	23 deg. C / 43 % RH	25 deg. C / 34 % RH	25 deg. C / 40 % RH
Engineer	Kenichi Adachi	Tomohiro Hara	Hikaru Shirasawa
Mode	Tx 11n-20 2412 MHz with antenna cable 199 mm (for band-edge emissions), Tx 11n-20 2412 MHz with antenna cable 400 mm (for except band-edge emissions)		

(* 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.	316.113	QP	36.2	14.2	8.8	31.9	0.0	27.3	46.0	18.7	100	179	
Hori.	638.981	QP	31.2	19.5	10.1	31.9	0.0	28.9	46.0	17.1	129	198	
Hori.	835.592	QP	29.3	21.5	10.8	31.3	0.0	30.3	46.0	15.7	100	160	
Hori.	2390.000	PK	59.1	27.7	14.8	40.7	2.3	63.2	73.9	10.7	100	302	
Hori.	4824.000	PK	48.9	31.4	7.3	41.6	2.3	48.3	73.9	25.6	110	226	
Hori.	7236.000	PK	46.3	36.6	8.7	41.2	2.3	52.7	73.9	21.2	100	0	
Hori.	9648.000	PK	46.7	38.0	9.8	40.1	2.3	56.7	73.9	17.2	100	0	
Hori.	12060.000	PK	46.9	39.6	10.7	39.4	2.3	60.1	73.9	13.8	100	0	
Hori.	2390.000	AV	46.9	27.7	14.8	40.7	2.3	51.0	53.9	2.9	100	302	
Hori.	4824.000	AV	39.9	31.4	7.3	41.6	2.3	39.3	53.9	14.6	110	226	
Hori.	7236.000	AV	37.5	36.6	8.7	41.2	2.3	43.9	53.9	10.0	100	0	
Hori.	9648.000	AV	36.6	38.0	9.8	40.1	2.3	46.6	53.9	7.3	100	0	
Hori.	12060.000	AV	36.7	39.6	10.7	39.4	2.3	49.9	53.9	4.0	100	0	
Vert.	66.523	QP	49.2	6.4	6.7	32.1	0.0	30.2	40.0	9.8	100	185	
Vert.	70.633	QP	51.8	5.9	7.0	32.1	0.0	32.6	40.0	7.4	100	143	
Vert.	86.027	QP	45.4	7.0	7.7	32.1	0.0	28.0	40.0	12.0	100	282	
Vert.	172.070	QP	34.2	15.6	8.0	32.0	0.0	25.8	43.5	17.7	100	72	
Vert.	2390.000	PK	62.3	27.7	14.8	40.7	2.3	66.4	73.9	7.5	133	281	
Vert.	4824.000	PK	49.7	31.4	7.3	41.6	2.3	49.1	73.9	24.8	130	297	
Vert.	7236.000	PK	46.4	36.6	8.7	41.2	2.3	52.8	73.9	21.1	100	0	
Vert.	9648.000	PK	46.6	38.0	9.8	40.1	2.3	56.6	73.9	17.3	100	0	
Vert.	12060.000	PK	46.8	39.6	10.7	39.4	2.3	60.0	73.9	13.9	100	0	
Vert.	2390.000	AV	47.8	27.7	14.8	40.7	2.3	51.9	53.9	2.0	133	281	
Vert.	4824.000	AV	40.1	31.4	7.3	41.6	2.3	39.5	53.9	14.4	130	297	
Vert.	7236.000	AV	37.6	36.6	8.7	41.2	2.3	44.0	53.9	9.9	100	0	
Vert.	9648.000	AV	36.6	38.0	9.8	40.1	2.3	46.6	53.9	7.3	100	0	
Vert.	12060.000	AV	36.6	39.6	10.7	39.4	2.3	49.8	53.9	4.1	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.3 dB (1AC) / 20log(4.37 m / 3.0 m) = 3.3 dB (3AC)
13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 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	94.7	27.7	14.9	40.7	2.3	98.9	-	-	Carrier
Hori.	2400.000	PK	61.0	27.7	14.9	40.7	2.3	65.2	78.8	13.6	
Vert.	2412.000	PK	96.9	27.7	14.9	40.7	2.3	101.1	-	-	Carrier
Vert.	2400.000	PK	62.8	27.7	14.9	40.7	2.3	67.0	81.0	14.0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.3 dB (1AC) / 20log(4.37 m / 3.0 m) = 3.3 dB (3AC)
13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

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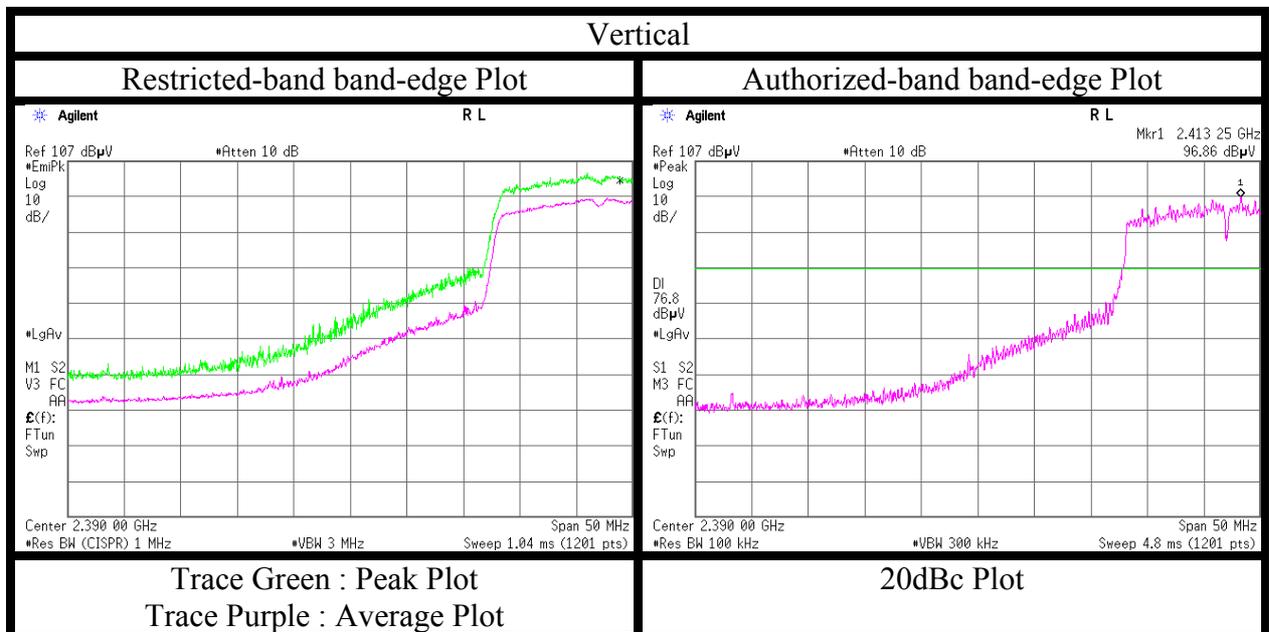
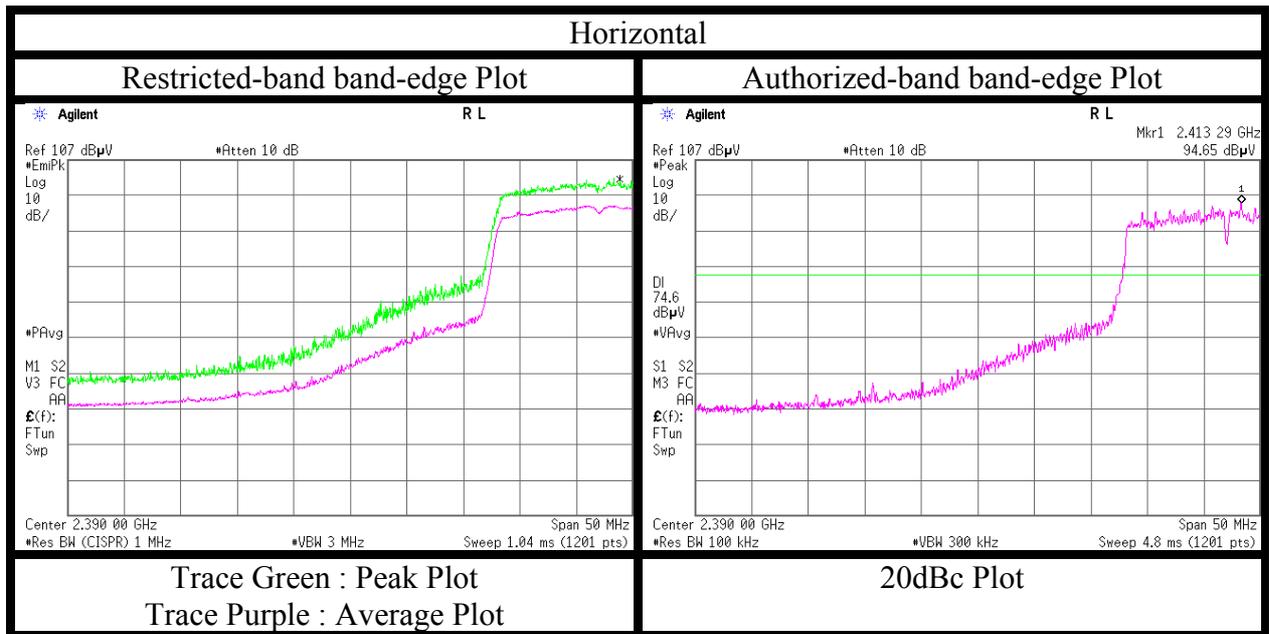
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Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.1 Semi Anechoic Chamber
Report No.	11014760S-A-R2
Date	November 7, 2015
Temperature / Humidity	23 deg. C / 43 % RH
Engineer	Kenichi Adachi (1-13 GHz)
Mode	Tx 11n-20 2412 MHz with antenna cable 199 mm



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.1 Semi Anechoic Chamber
Report No. : 11014760S-A-R2
Date : November 7, 2015
Temperature / Humidity : 23 deg. C / 43 % RH
Engineer : Kenichi Adachi
(1-2.8 GHz)
Mode : Tx 11n-20 2412 MHz with antenna cable 400 mm

(* 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	51.2	27.7	14.8	40.7	2.3	55.3	73.9	18.6	100	11	
Hori.	2390.000	AV	41.0	27.7	14.8	40.7	2.3	45.1	53.9	8.8	100	11	
Vert.	2390.000	PK	51.3	27.7	14.8	40.7	2.3	55.4	73.9	18.5	100	213	
Vert.	2390.000	AV	41.2	27.7	14.8	40.7	2.3	45.3	53.9	8.6	100	213	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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	91.9	27.7	14.9	40.7	2.3	96.1	-	-	Carrier
Hori.	2400.000	PK	51.8	27.7	14.9	40.7	2.3	56.0	76.0	20.0	
Vert.	2412.000	PK	93.1	27.7	14.9	40.7	2.3	97.3	-	-	Carrier
Vert.	2400.000	PK	52.4	27.7	14.9	40.7	2.3	56.6	77.3	20.7	

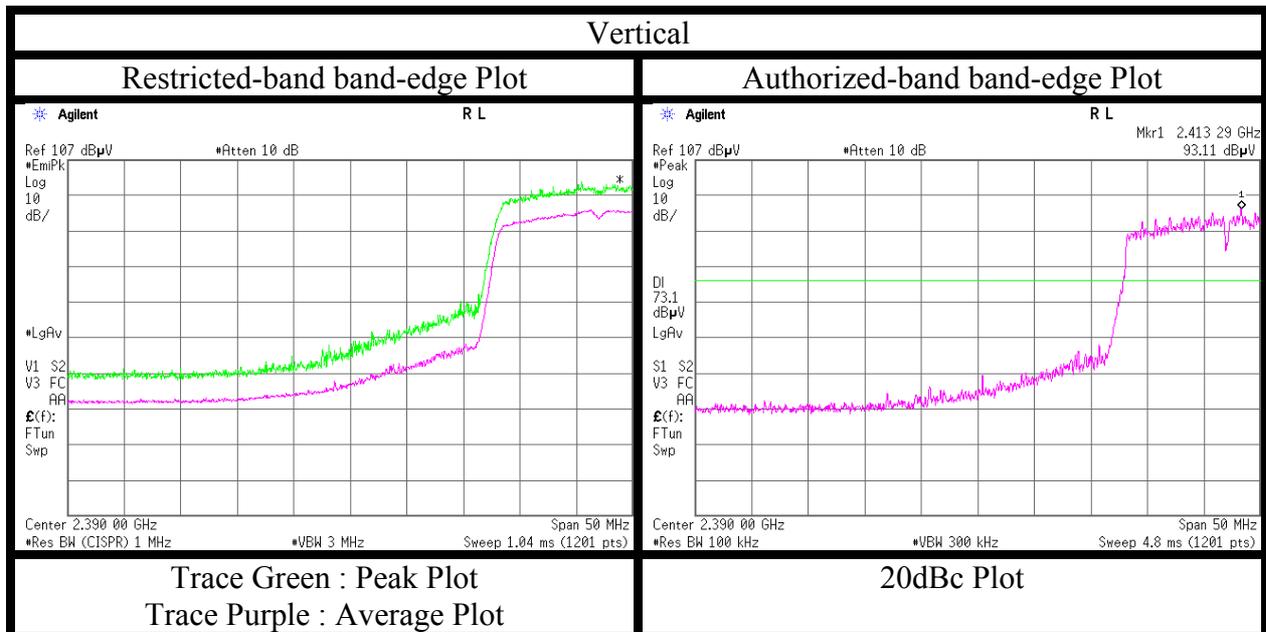
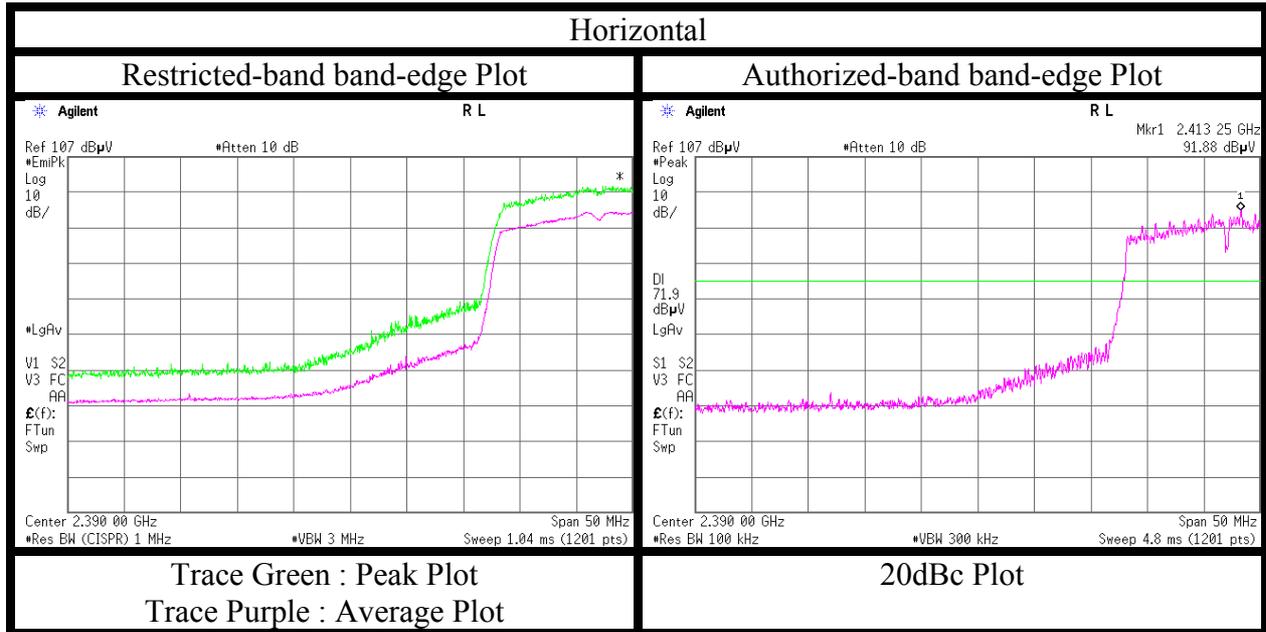
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.1 Semi Anechoic Chamber
Report No.	11014760S-A-R2
Date	November 7, 2015
Temperature / Humidity	23 deg. C / 43 % RH
Engineer	Kenichi Adachi (1-2.8 GHz)
Mode	Tx 11b 2412 MHz with antenna cable 400 mm



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

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.1 Semi Anechoic Chamber	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11014760S-A-R2	
Date	November 7, 2015	November 12, 2015
Temperature / Humidity	23 deg. C / 43 % RH	25 deg. C / 34 % RH
Engineer	Kenichi Adachi (1-13 GHz)	Tomohiro Hara (13-26 GHz)
Mode	Tx 11n-20 2437 MHz with antenna cable 400 mm	

(* 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	47.5	31.6	7.3	41.6	2.3	47.1	73.9	26.8	114	227	
Hori.	7311.000	PK	46.1	36.7	8.7	41.3	2.3	52.5	73.9	21.4	100	0	
Hori.	9748.000	PK	44.9	38.0	9.8	40.1	2.3	54.9	73.9	19.0	100	0	
Hori.	12185.000	PK	45.0	39.6	10.7	39.3	2.3	58.3	73.9	15.6	100	0	
Hori.	4874.000	AV	39.8	31.6	7.3	41.6	2.3	39.4	53.9	14.5	114	227	
Hori.	7311.000	AV	37.8	36.7	8.7	41.3	2.3	44.2	53.9	9.7	100	0	
Hori.	9748.000	AV	36.1	38.0	9.8	40.1	2.3	46.1	53.9	7.8	100	0	
Hori.	12185.000	AV	35.6	39.6	10.7	39.3	2.3	48.9	53.9	5.0	100	0	
Vert.	4874.000	PK	48.0	31.6	7.3	41.6	2.3	47.6	73.9	26.3	129	299	
Vert.	7311.000	PK	46.2	36.7	8.7	41.3	2.3	52.6	73.9	21.3	100	0	
Vert.	9748.000	PK	45.0	38.0	9.8	40.1	2.3	55.0	73.9	18.9	100	0	
Vert.	12185.000	PK	45.2	39.6	10.7	39.3	2.3	58.5	73.9	15.4	100	0	
Vert.	4874.000	AV	40.1	31.6	7.3	41.6	2.3	39.7	53.9	14.2	129	299	
Vert.	7311.000	AV	38.0	36.7	8.7	41.3	2.3	44.4	53.9	9.5	100	0	
Vert.	9748.000	AV	36.3	38.0	9.8	40.1	2.3	46.3	53.9	7.6	100	0	
Vert.	12185.000	AV	35.7	39.6	10.7	39.3	2.3	49.0	53.9	4.9	100	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)} / 20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$
13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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Radiated Spurious Emission

Test place	Shonan EMC Lab. No.1 Semi Anechoic Chamber	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11014760S-A-R2	
Date	November 7, 2015	November 12, 2015
Temperature / Humidity	23 deg. C / 43 % RH	25 deg. C / 34 % RH
Engineer	Kenichi Adachi	Tomohiro Hara
Mode	(1-13 GHz) (13-26 GHz)	
	Tx 11n-20 2462 MHz with antenna cable 199 mm (for band-edge emissions), Tx 11n-20 2462 MHz with antenna cable 400 mm (for except band-edge emissions)	

(* 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	57.9	27.8	15.0	40.7	2.3	62.3	73.9	11.6	100	307	
Hori.	4924.000	PK	47.3	31.7	7.4	41.6	2.3	47.1	73.9	26.8	113	231	
Hori.	7386.000	PK	46.1	36.7	8.8	41.3	2.3	52.6	73.9	21.3	100	0	
Hori.	9848.000	PK	45.1	38.1	9.9	40.0	2.3	55.4	73.9	18.5	100	0	
Hori.	12310.000	PK	43.9	39.6	10.7	39.1	2.3	57.4	73.9	16.5	100	0	
Hori.	2483.500	AV	43.1	27.8	15.0	40.7	2.3	47.5	53.9	6.4	100	307	
Hori.	4924.000	AV	38.8	31.7	7.4	41.6	2.3	38.6	53.9	15.3	113	231	
Hori.	7386.000	AV	37.7	36.7	8.8	41.3	2.3	44.2	53.9	9.7	100	0	
Hori.	9848.000	AV	36.6	38.1	9.9	40.0	2.3	46.9	53.9	7.0	100	0	
Hori.	12310.000	AV	35.6	39.6	10.7	39.1	2.3	49.1	53.9	4.8	100	0	
Vert.	2483.500	PK	62.0	27.8	15.0	40.7	2.3	66.4	73.9	7.5	132	297	
Vert.	4924.000	PK	47.6	31.7	7.4	41.6	2.3	47.4	73.9	26.5	132	303	
Vert.	7386.000	PK	46.2	36.7	8.8	41.3	2.3	52.7	73.9	21.2	100	0	
Vert.	9848.000	PK	45.2	38.1	9.9	40.0	2.3	55.5	73.9	18.4	100	0	
Vert.	12310.000	PK	43.8	39.6	10.7	39.1	2.3	57.3	73.9	16.6	100	0	
Vert.	2483.500	AV	47.8	27.8	15.0	40.7	2.3	52.2	53.9	1.7	132	297	
Vert.	4924.000	AV	39.1	31.7	7.4	41.6	2.3	38.9	53.9	15.0	132	303	
Vert.	7386.000	AV	37.8	36.7	8.8	41.3	2.3	44.3	53.9	9.6	100	0	
Vert.	9848.000	AV	36.7	38.1	9.9	40.0	2.3	47.0	53.9	6.9	100	0	
Vert.	12310.000	AV	35.5	39.6	10.7	39.1	2.3	49.0	53.9	4.9	100	0	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)} / 20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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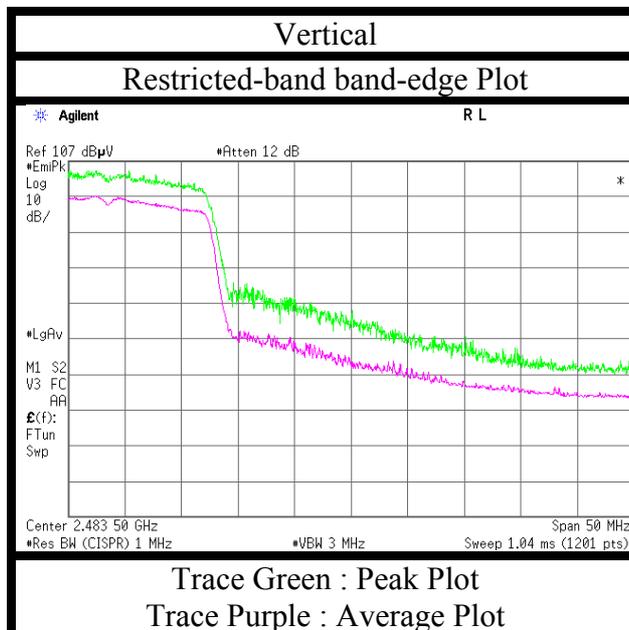
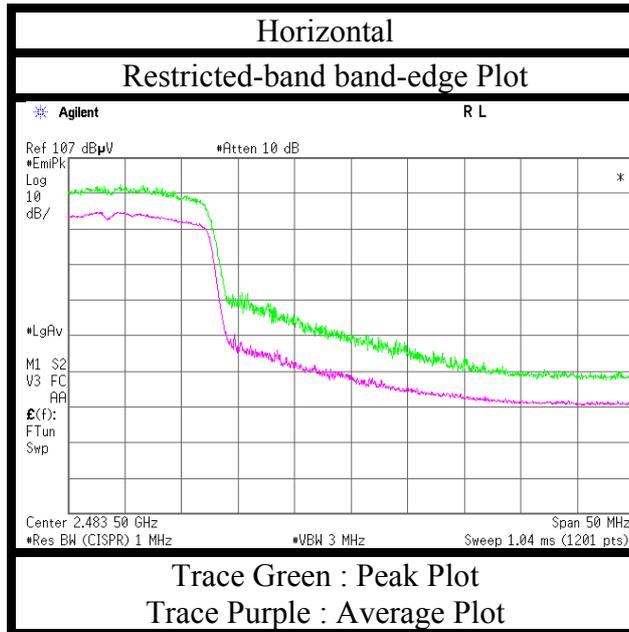
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Radiated Spurious Emission
(Reference Plot for band-edge)

Test place : Shonan EMC Lab. No.1 Semi Anechoic Chamber
Report No. : 11014760S-A-R2
Date : November 7, 2015
Temperature / Humidity : 23 deg. C / 43 % RH
Engineer : Kenichi Adachi
(1-13 GHz)
Mode : Tx 11n-20 2462 MHz with antenna cable 199 mm



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.1 Semi Anechoic Chamber
Report No. : 11014760S-A-R2
Date : November 7, 2015
Temperature / Humidity : 23 deg. C / 43 % RH
Engineer : Kenichi Adachi
(1-2.8 GHz)
Mode : Tx 11n-20 2462 MHz with antenna cable 400 mm

(* 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	52.9	27.8	15.0	40.7	2.3	57.3	73.9	16.6	100	14	
Hori.	2483.500	AV	41.1	27.8	15.0	40.7	2.3	45.5	53.9	8.4	100	14	
Vert.	2483.500	PK	53.6	27.8	15.0	40.7	2.3	58.0	73.9	15.9	100	211	
Vert.	2483.500	AV	41.4	27.8	15.0	40.7	2.3	45.8	53.9	8.1	100	211	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

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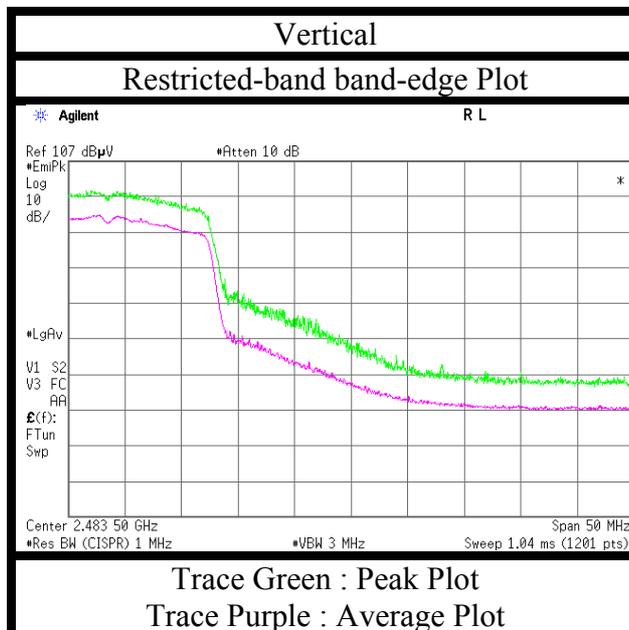
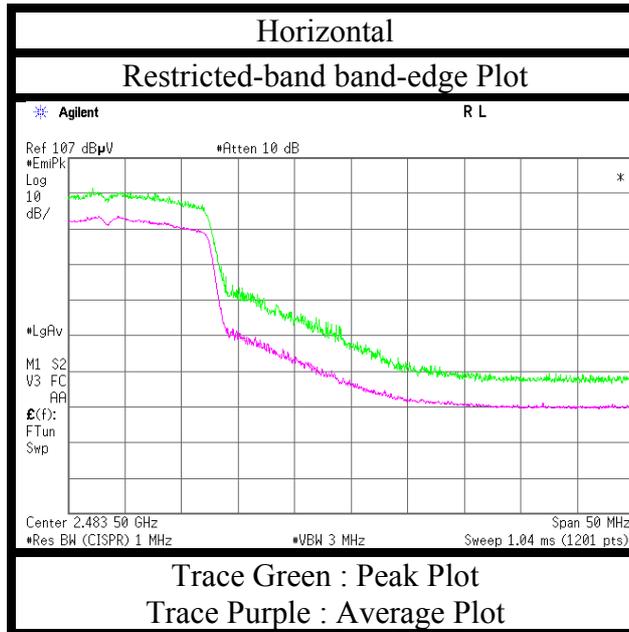
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Radiated Spurious Emission
(Reference Plot for band-edge)

Test place : Shonan EMC Lab. No.1 Semi Anechoic Chamber
Report No. : 11014760S-A-R2
Date : November 7, 2015
Temperature / Humidity : 23 deg. C / 43 % RH
Engineer : Kenichi Adachi
(1-2.8 GHz)
Mode : Tx 11n-20 2462 MHz with antenna cable 400 mm



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

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.1 Semi Anechoic Chamber	Shonan EMC Lab. No.1 Semi Anechoic Chamber	Shonan EMC Lab. No.3 Semi Anechoic Chamber	Shonan EMC Lab. No.1 Semi Anechoic Chamber
Report No.	11014760S-A-R2			
Date	October 31, 2015	November 4, 2015	November 11, 2015	November 14, 2015
Temperature / Humidity	23 deg. C / 40 % RH	23 deg. C / 39 % RH	23 deg. C / 35 % RH	23 deg. C / 36 % RH
Engineer	Shinichi Takano (30-1000 MHz)	Hiroyuki Morikawa (13-26 GHz)	Hikaru Shirasawa (1-2.8 GHz)	Yosuke Ishikawa (2.8-13 GHz)
Mode	Tx BT LE 2402 MHz with antenna cable 199 mm (for band-edge emissions), Tx BT LE 2402 MHz with antenna cable 400 mm (for except band-edge emissions)			

(* 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.	225.793	QP	36.7	16.7	9.4	31.7	0.0	31.1	46.0	14.9	148	89	
Hori.	638.980	QP	33.2	19.5	8.4	32.0	0.0	29.1	46.0	16.9	139	177	
Hori.	835.589	QP	32.3	21.5	9.3	31.6	0.0	31.5	46.0	14.5	107	115	
Hori.	2390.000	PK	46.6	27.8	13.7	41.0	3.3	50.4	73.9	23.5	167	7	
Hori.	4804.000	PK	49.4	31.3	7.4	41.7	2.3	48.7	73.9	25.2	100	319	
Hori.	7206.000	PK	45.9	36.6	9.0	41.2	2.3	52.6	73.9	21.3	100	0	
Hori.	9608.000	PK	45.3	37.9	9.9	40.1	2.3	55.3	73.9	18.6	100	0	
Vert.	67.506	QP	49.0	6.3	7.7	31.8	0.0	31.2	40.0	8.8	100	196	
Vert.	70.797	QP	50.6	6.0	7.7	31.8	0.0	32.5	40.0	7.5	100	204	
Vert.	344.066	QP	34.9	14.8	6.8	31.8	0.0	24.7	46.0	21.3	100	118	
Vert.	2390.000	PK	46.3	27.8	13.7	41.0	3.3	50.1	73.9	23.8	100	4	
Vert.	2999.982	PK	48.4	28.2	6.8	40.7	2.3	45.0	73.9	28.9	100	265	
Vert.	4804.000	PK	46.3	31.3	7.4	41.7	2.3	45.6	73.9	28.3	100	0	
Vert.	7206.000	PK	46.5	36.6	9.0	41.2	2.3	53.2	73.9	20.7	100	0	
Vert.	9608.000	PK	46.4	37.9	9.9	40.1	2.3	56.4	73.9	17.5	100	0	

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

Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.3 dB (1AC) / 20log(4.37 m / 3.0 m) = 3.3 dB (3AC)

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	37.3	27.8	13.7	41.0	4.0	3.3	45.1	53.9	8.8	
Hori.	4804.000	AV	37.7	31.3	7.4	41.7	4.0	2.3	41.0	53.9	12.9	
Hori.	7206.000	AV	35.0	36.6	9.0	41.2	4.0	2.3	45.7	53.9	8.2	
Hori.	9608.000	AV	34.1	37.9	9.9	40.1	4.0	2.3	48.1	53.9	5.8	
Vert.	2390.000	AV	37.4	27.8	13.7	41.0	4.0	3.3	45.2	53.9	8.7	
Vert.	2999.982	AV	40.4	28.2	6.8	40.7	4.0	2.3	41.0	53.9	12.9	
Vert.	4804.000	AV	35.3	31.3	7.4	41.7	4.0	2.3	38.6	53.9	15.3	
Vert.	7206.000	AV	35.0	36.6	9.0	41.2	4.0	2.3	45.7	53.9	8.2	
Vert.	9608.000	AV	34.1	37.9	9.9	40.1	4.0	2.3	48.1	53.9	5.8	

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

Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.3 dB (1AC) / 20log(4.37 m / 3.0 m) = 3.3 dB (3AC)

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

Duty factor refer to "Duty factor Calculation chart" sheet.

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.	2402.000	PK	101.0	27.8	13.7	41.0	3.3	104.8	-	-	Carrier
Hori.	2400.000	PK	42.1	27.8	13.7	41.0	3.3	45.9	84.8	38.9	
Vert.	2402.000	PK	101.5	27.8	13.7	41.0	3.3	105.3	-	-	Carrier
Vert.	2400.000	PK	43.0	27.8	13.7	41.0	3.3	46.8	85.2	38.4	

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

Distance factor : 1 GHz - 13 GHz : 20log(3.87 m / 3.0 m) = 2.3 dB (1AC) / 20log(4.37 m / 3.0 m) = 3.3 dB (3AC)

13 GHz - 40 GHz : 20log(1.0 m / 3.0 m) = -9.5 dB

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Shonan EMC Lab.

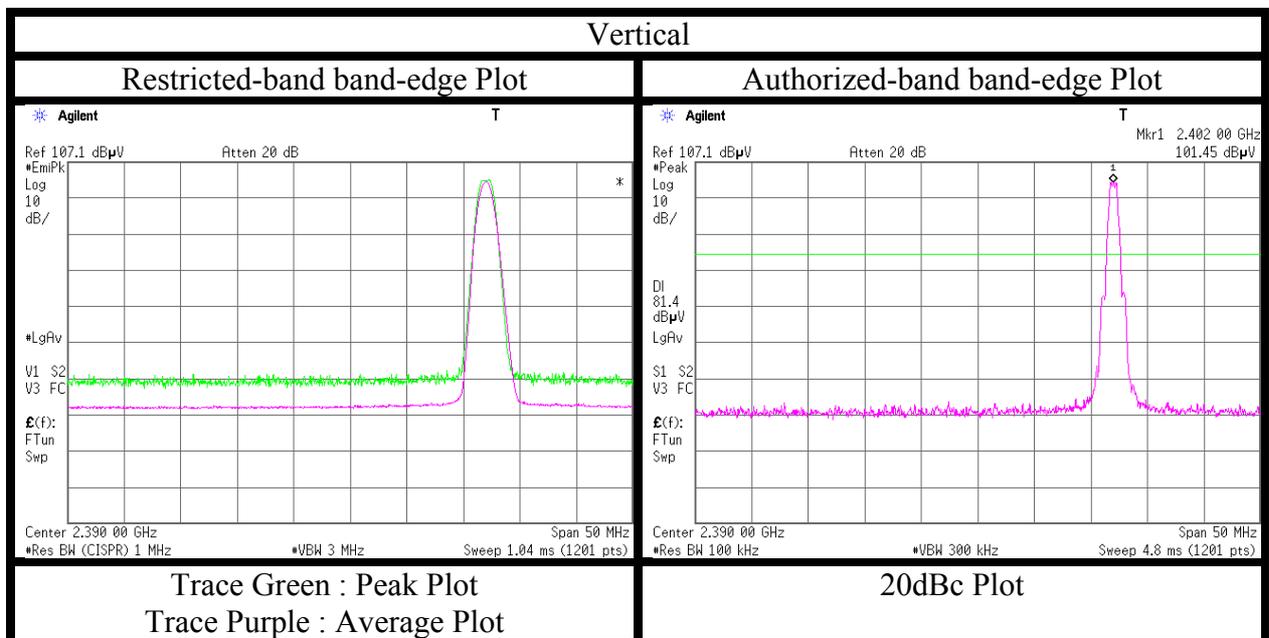
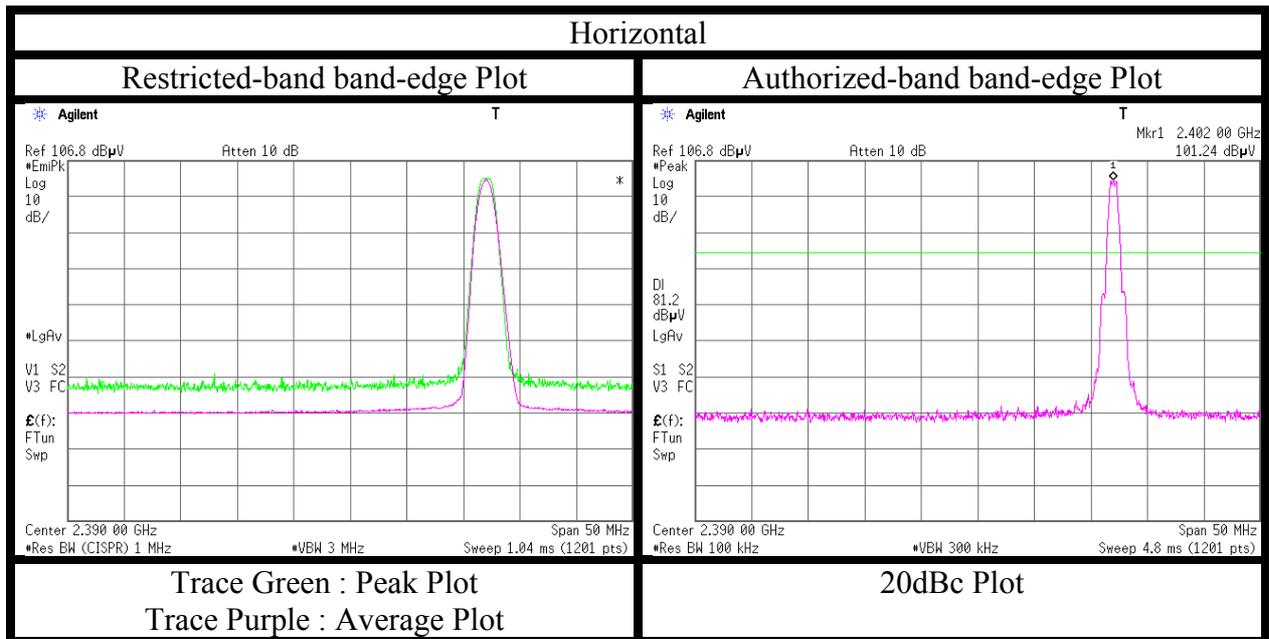
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

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Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11014760S-A-R2
Date	November 11, 2015
Temperature / Humidity	23 deg. C / 35 % RH
Engineer	Hikaru Shirasawa (1-2.8 GHz)
Mode	Tx BT LE 2402 MHz with antenna cable 199 mm



* 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. : 11014760S-A-R2
Date : November 11, 2015
Temperature / Humidity : 23 deg. C / 35 % RH
Engineer : Hikaru Shirasawa
(1-2.8 GHz)
Mode : Tx BT LE 2402 MHz with antenna cable 400 mm

(* 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	46.1	27.8	13.7	41.0	3.3	49.9	73.9	24.0	100	186	
Vert.	2390.000	PK	46.3	27.8	13.7	41.0	3.3	50.1	73.9	23.8	100	212	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)} / 20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$
13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	36.9	27.8	13.7	41.0	4.0	3.3	44.7	53.9	9.2	
Vert.	2390.000	AV	37.3	27.8	13.7	41.0	4.0	2.3	44.1	53.9	9.8	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)} / 20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$
13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

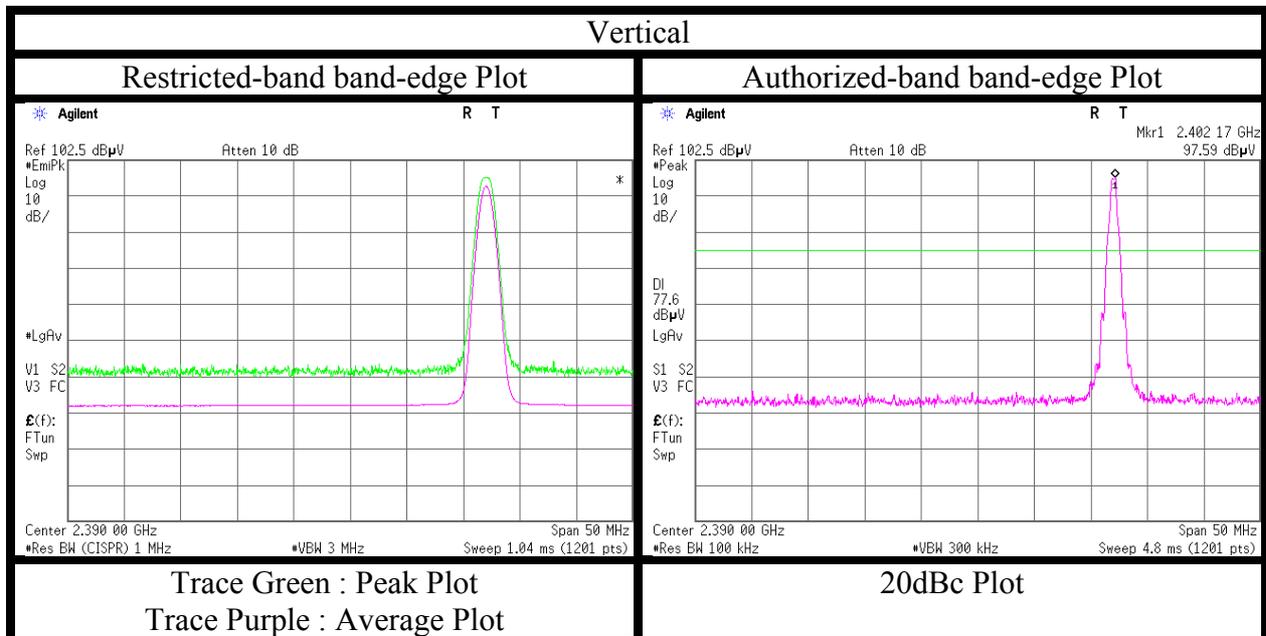
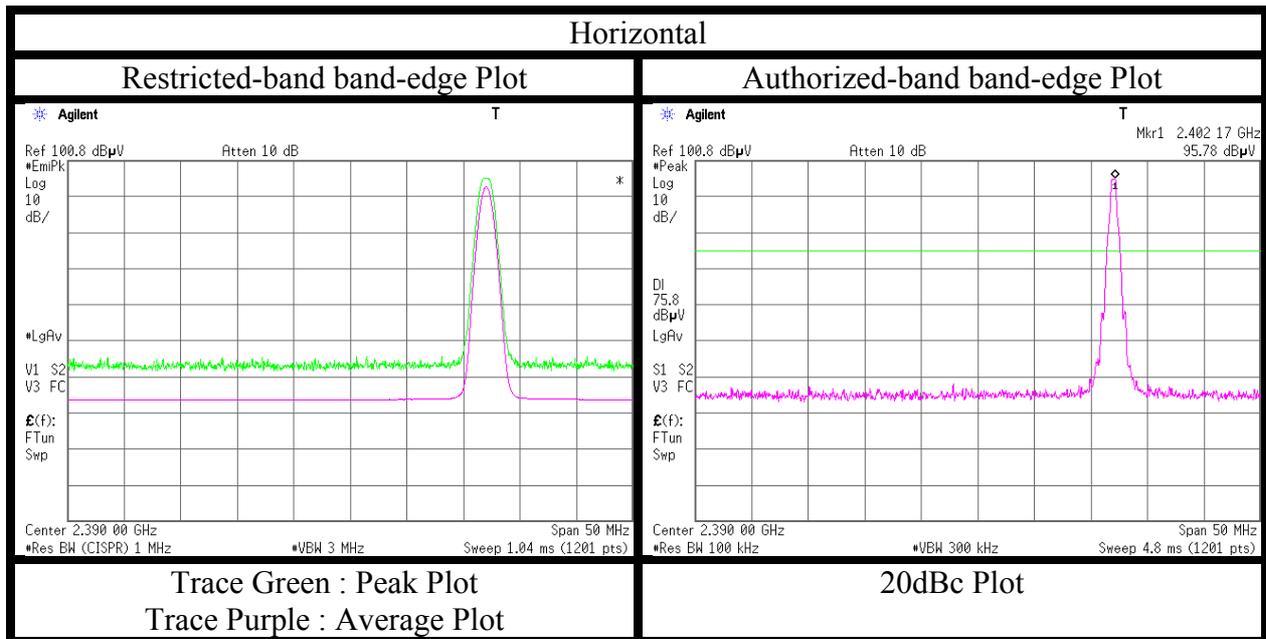
20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

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.	2402.000	PK	95.0	27.8	13.7	41.0	3.3	98.8	-	-	Carrier
Hori.	2400.000	PK	39.7	27.8	13.7	41.0	3.3	43.5	78.8	35.3	
Vert.	2402.000	PK	97.2	27.8	13.7	41.0	3.3	101.0	-	-	Carrier
Vert.	2400.000	PK	40.3	27.8	13.7	41.0	3.3	44.1	81.0	36.9	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)} / 20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$
13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11014760S-A-R2
Date	November 11, 2015
Temperature / Humidity	23 deg. C / 35 % RH
Engineer	Hikaru Shirasawa (1-2.8 GHz)
Mode	Tx BT LE 2412 MHz with antenna cable 400 mm



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

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.1 Semi Anechoic Chamber	Shonan EMC Lab. No.1 Semi Anechoic Chamber	Shonan EMC Lab. No.3 Semi Anechoic Chamber	Shonan EMC Lab. No.1 Semi Anechoic Chamber
Report No.	11014760S-A-R2			
Date	October 31, 2015	November 4, 2015	November 11, 2015	November 14, 2015
Temperature / Humidity	23 deg. C / 40 % RH	23 deg. C / 39 % RH	23 deg. C / 35 % RH	23 deg. C / 36 % RH
Engineer	Shinichi Takano (30-1000 MHz)	Hiroyuki Morikawa (13-26 GHz)	Hikaru Shirasawa (1-2.8 GHz)	Yosuke Ishikawa (2.8-13 GHz)
Mode	Tx BT LE 2440 MHz with antenna cable 400 mm			

(* 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.	225.792	QP	36.8	16.7	9.4	31.7	0.0	31.2	46.0	14.8	147	98	
Hori.	638.980	QP	33.6	19.5	8.4	32.0	0.0	29.5	46.0	16.5	139	179	
Hori.	835.589	QP	32.1	21.5	9.3	31.6	0.0	31.3	46.0	14.7	108	111	
Hori.	4880.000	PK	46.9	31.6	7.4	41.6	2.3	46.6	73.9	27.3	100	269	
Hori.	7320.000	PK	46.1	36.7	9.0	41.3	2.3	52.8	73.9	21.1	100	0	
Hori.	9760.000	PK	43.9	38.0	9.9	40.1	2.3	54.0	73.9	19.9	100	0	
Vert.	67.507	QP	49.1	6.3	7.7	31.8	0.0	31.3	40.0	8.7	100	164	
Vert.	70.865	QP	50.6	6.0	7.7	31.8	0.0	32.5	40.0	7.5	100	239	
Vert.	344.066	QP	34.8	14.8	6.8	31.8	0.0	24.6	46.0	21.4	100	120	
Vert.	3000.000	PK	48.8	28.2	6.8	40.7	2.3	45.4	73.9	28.5	100	263	
Vert.	4880.000	PK	46.3	31.6	7.4	41.6	2.3	46.0	73.9	27.9	100	0	
Vert.	7320.000	PK	46.2	36.7	9.0	41.3	2.3	52.9	73.9	21.0	100	0	
Vert.	9760.000	PK	44.9	38.0	9.9	40.1	2.3	55.0	73.9	18.9	100	0	
Vert.	3000.000	AV	39.9	28.2	6.8	40.7	2.3	36.5	53.9	17.4	100	263	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor
Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)} / 20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$
13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4880.000	AV	36.3	31.6	7.4	41.6	4.0	2.3	40.0	53.9	13.9	
Hori.	7320.000	AV	34.7	36.7	9.0	41.3	4.0	2.3	45.4	53.9	8.5	
Hori.	9760.000	AV	33.6	38.0	9.9	40.1	4.0	2.3	47.7	53.9	6.2	
Vert.	4880.000	AV	35.2	31.6	7.4	41.6	4.0	2.3	38.9	53.9	15.0	
Vert.	7320.000	AV	34.6	36.7	9.0	41.3	4.0	2.3	45.3	53.9	8.6	
Vert.	9760.000	AV	33.6	38.0	9.9	40.1	4.0	2.3	47.7	53.9	6.2	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Duty factor + Distance factor
Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)} / 20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$
13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

Radiated Spurious Emission

Test place	Shonan EMC Lab. No.1 Semi Anechoic Chamber	Shonan EMC Lab. No.1 Semi Anechoic Chamber	Shonan EMC Lab. No.3 Semi Anechoic Chamber	Shonan EMC Lab. No.1 Semi Anechoic Chamber
Report No.	11014760S-A-R2			
Date	October 31, 2015	November 4, 2015	November 11, 2015	November 14, 2015
Temperature / Humidity	23 deg. C / 40 % RH	23 deg. C / 39 % RH	23 deg. C / 35 % RH	23 deg. C / 36 % RH
Engineer	Shinichi Takano (30-1000 MHz)	Hiroyuki Morikawa (13-26 GHz)	Hikaru Shirasawa (1-2.8 GHz)	Yosuke Ishikawa (2.8-13 GHz)
Mode	Tx BT LE 2480 MHz with antenna cable 199 mm (for band-edge emissions) Tx BT LE 2480 MHz with antenna cable 400 mm (for except band-edge emissions)			

(* 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.	225.793	QP	36.8	16.7	9.4	31.7	0.0	31.2	46.0	14.8	148	93	
Hori.	638.980	QP	33.6	19.5	8.4	32.0	0.0	29.5	46.0	16.5	145	177	
Hori.	835.589	QP	32.1	21.5	9.3	31.6	0.0	31.3	46.0	14.7	107	111	
Hori.	2483.500	PK	49.4	27.9	13.8	41.0	3.3	53.4	73.9	20.5	158	4	
Hori.	4960.000	PK	46.3	31.9	7.5	41.6	2.3	46.4	73.9	27.5	100	242	
Hori.	7440.000	PK	46.1	36.7	8.9	41.3	2.3	52.7	73.9	21.2	100	0	
Hori.	9920.000	PK	44.6	38.1	10.0	40.0	2.3	55.0	73.9	18.9	100	0	
Vert.	67.503	QP	49.2	6.3	7.7	31.8	0.0	31.4	40.0	8.6	100	193	
Vert.	70.794	QP	50.6	6.0	7.7	31.8	0.0	32.5	40.0	7.5	100	252	
Vert.	344.066	QP	34.7	14.8	6.8	31.8	0.0	24.5	46.0	21.5	100	125	
Vert.	2483.500	PK	47.5	27.9	13.8	41.0	3.3	51.5	73.9	22.4	131	4	
Vert.	3000.012	PK	48.6	28.2	6.8	40.7	2.3	45.2	73.9	28.7	100	262	
Vert.	4960.000	PK	46.2	31.9	7.5	41.6	2.3	46.3	73.9	27.6	100	0	
Vert.	7440.000	PK	46.0	36.7	8.9	41.3	2.3	52.6	73.9	21.3	100	0	
Vert.	9920.000	PK	44.6	38.1	10.0	40.0	2.3	55.0	73.9	18.9	100	0	
Vert.	3000.012	AV	40.6	28.2	6.8	40.7	2.3	37.2	53.9	16.7	100	262	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)} / 20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant. Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	38.6	27.9	13.8	41.0	4.0	3.3	46.6	53.9	7.3	
Hori.	4960.000	AV	35.5	31.9	7.5	41.6	4.0	2.3	39.6	53.9	14.3	
Hori.	7440.000	AV	34.3	36.7	8.9	41.3	4.0	2.3	44.9	53.9	9.0	
Hori.	9920.000	AV	32.7	38.1	10.0	40.0	4.0	2.3	47.1	53.9	6.8	
Vert.	2483.500	AV	38.2	27.9	13.8	41.0	4.0	3.3	46.2	53.9	7.7	
Vert.	4960.000	AV	35.2	31.9	7.5	41.6	4.0	2.3	39.3	53.9	14.6	
Vert.	7440.000	AV	34.3	36.7	8.9	41.3	4.0	2.3	44.9	53.9	9.0	
Vert.	9920.000	AV	32.8	38.1	10.0	40.0	4.0	2.3	47.2	53.9	6.7	

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

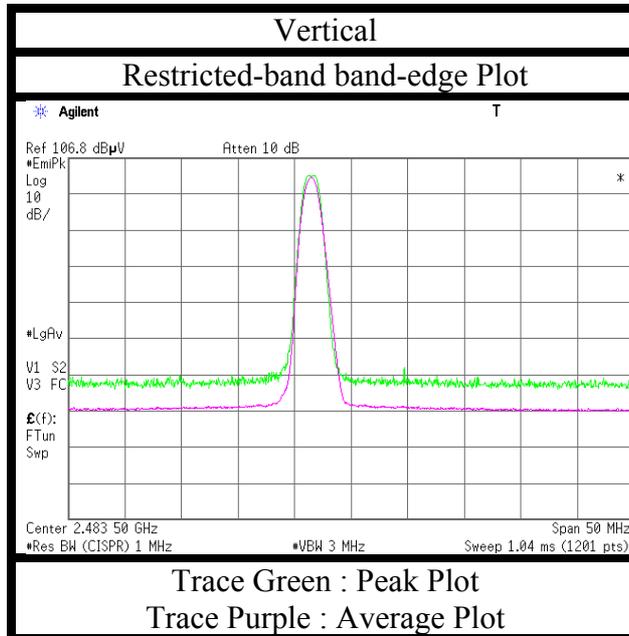
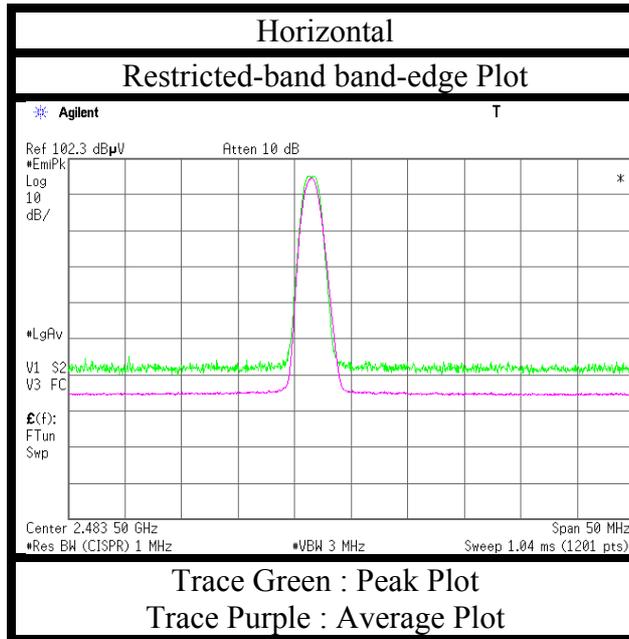
Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)} / 20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11014760S-A-R2
Date : November 11, 2015
Temperature / Humidity : 23 deg. C / 35 % RH
Engineer : Hikaru Shirasawa
(1-2.8 GHz)
Mode : Tx BT LE 2480 MHz with antenna cable 199 mm



* 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. : 11014760S-A-R2
Date : November 11, 2015
Temperature / Humidity : 23 deg. C / 35 % RH
Engineer : Hikaru Shirasawa
(1-2.8 GHz)
Mode : Tx BT LE 2480 MHz with antenna cable 400 mm

(* 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	46.9	27.9	13.8	41.0	3.3	50.9	73.9	23.0	100	197	
Vert.	2483.500	PK	46.8	27.9	13.8	41.0	3.3	50.8	73.9	23.1	182	13	

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

Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)}$ / $20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	37.9	27.9	13.8	41.0	4.0	3.3	45.9	53.9	8.0	
Vert.	2483.500	AV	37.3	27.9	13.8	41.0	4.0	3.3	45.3	53.9	8.6	

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

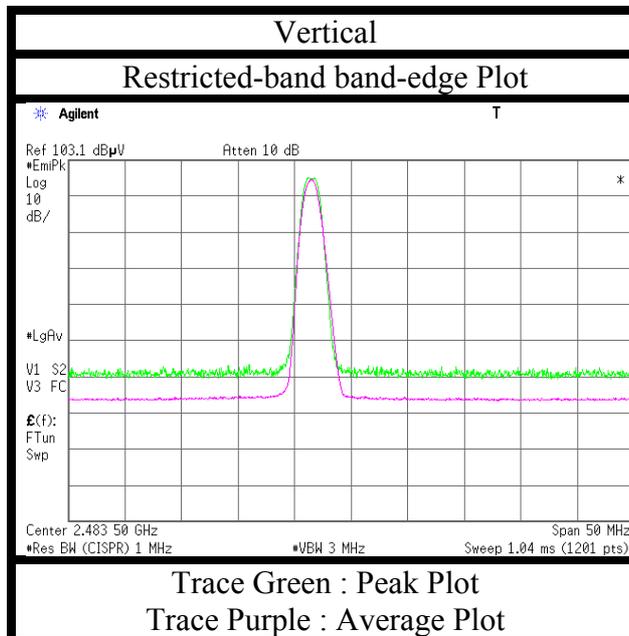
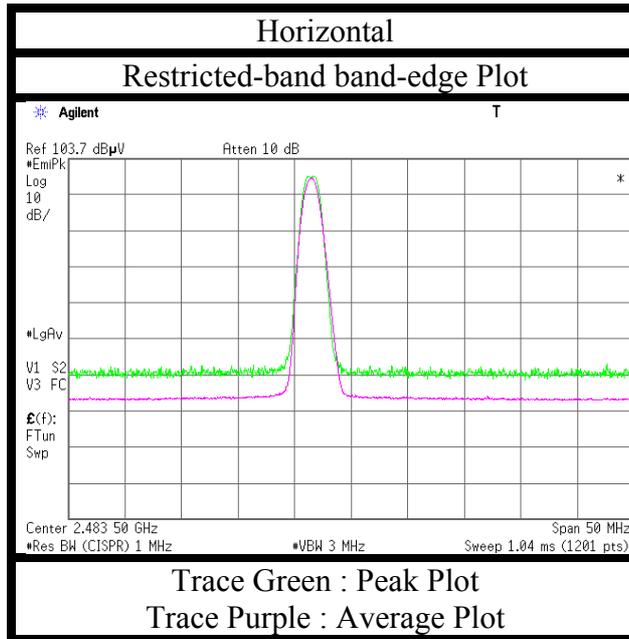
Distance factor : 1 GHz - 13 GHz : $20\log(3.87\text{ m} / 3.0\text{ m}) = 2.3\text{ dB (1AC)}$ / $20\log(4.37\text{ m} / 3.0\text{ m}) = 3.3\text{ dB (3AC)}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Duty factor refer to "Duty factor Calculation chart" sheet.

Radiated Spurious Emission
(Reference Plot for band-edge)

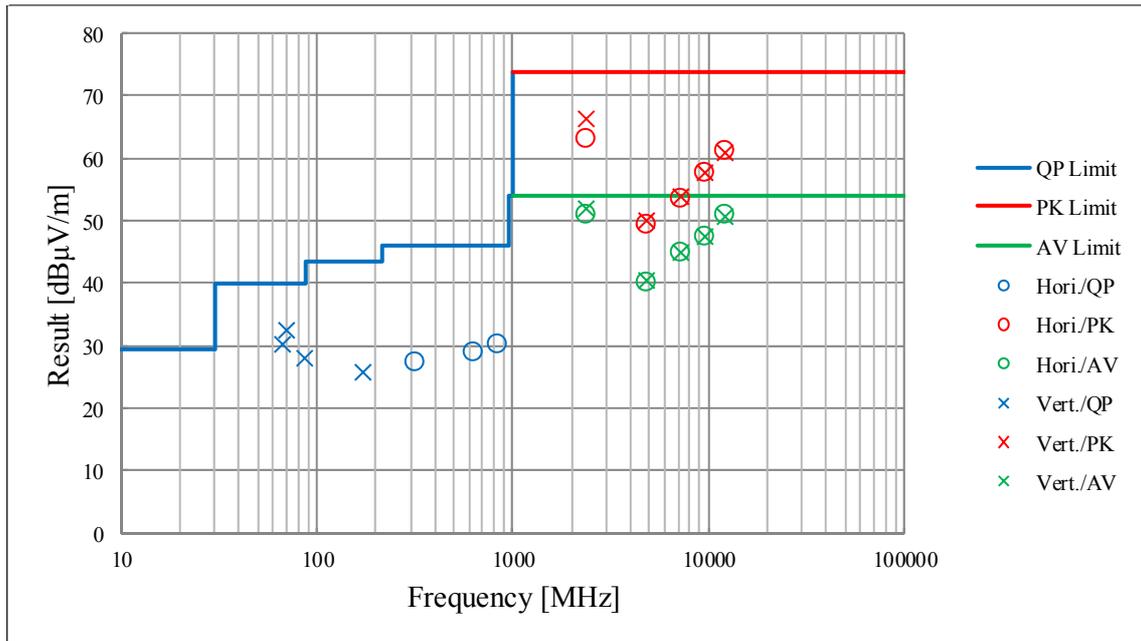
Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11014760S-A-R2
Date : November 11, 2015
Temperature / Humidity : 23 deg. C / 35 % RH
Engineer : Hikaru Shirasawa
(1-2.8 GHz)
Mode : Tx BT LE 2480 MHz with antenna cable 400 mm



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

Radiated Spurious Emission
(Plot data, Worst case)

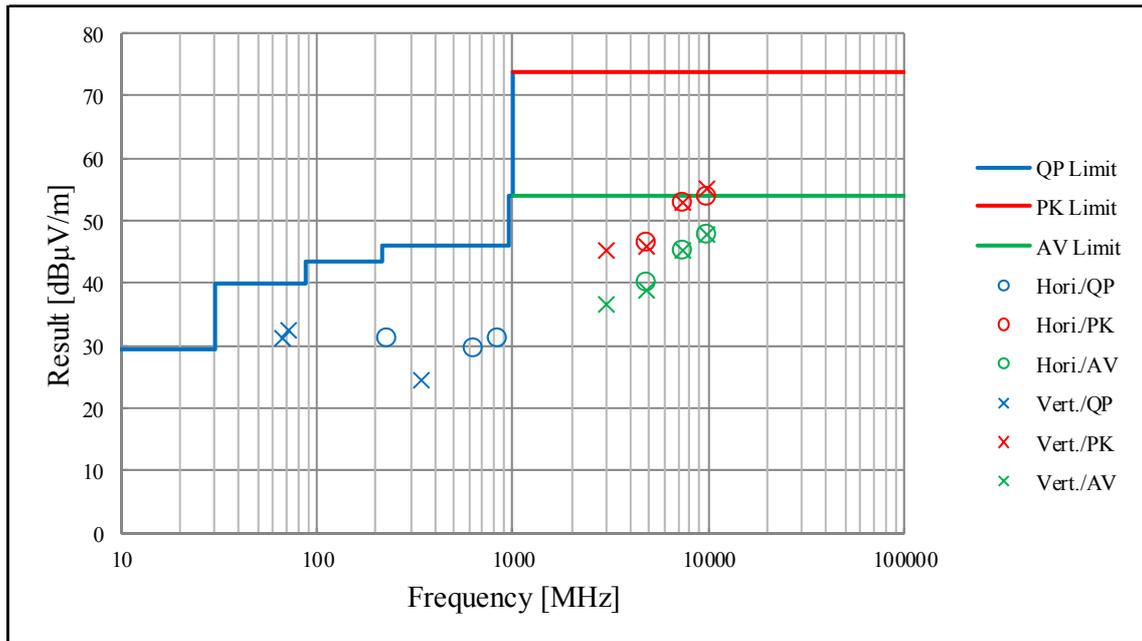
Test place	Shonan EMC Lab. No.1 Semi Anechoic Chamber	Shonan EMC Lab. No.3 Semi Anechoic Chamber	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11014760S-A-R2		
Date	November 7, 2015	November 12, 2015	November 13, 2015
Temperature / Humidity	23 deg. C / 43 % RH	25 deg. C / 34 % RH	25 deg. C / 40 % RH
Engineer	Kenichi Adachi (1-13 GHz)	Tomohiro Hara (13-26 GHz)	Hikaru Shirasawa (30-1000 MHz)
Mode	Tx 11n-20 2412 MHz with antenna cable 400 mm		



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

Radiated Spurious Emission (Plot data, Worst case)

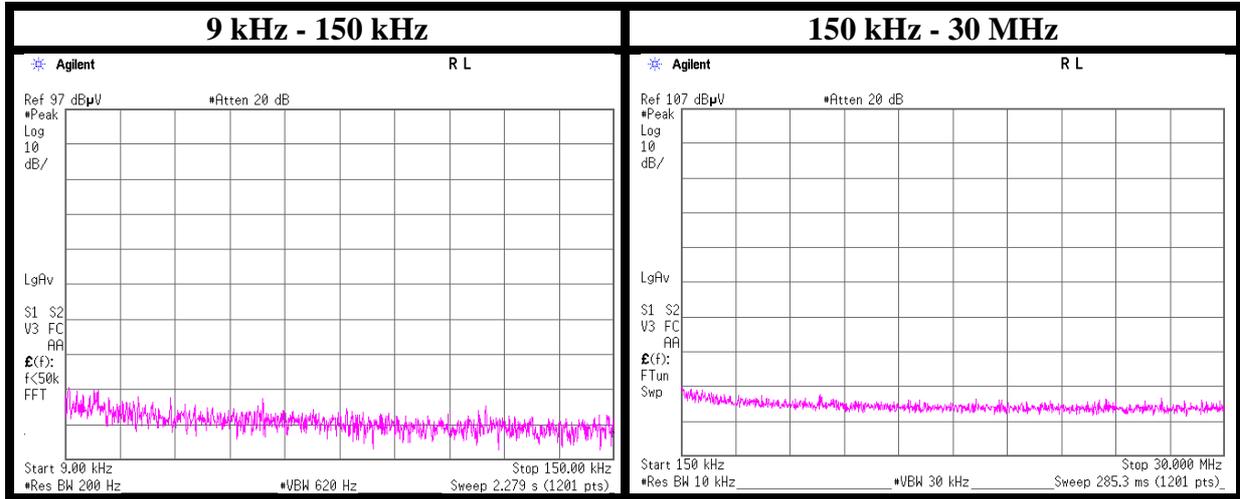
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Report No.	11014760S-A-R2			
Date	October 31, 2015	November 4, 2015	November 11, 2015	November 14, 2015
Temperature / Humidity	23 deg. C / 40 % RH	23 deg. C / 39 % RH	23 deg. C / 35 % RH	23 deg. C / 36 % RH
Engineer	Shinichi Takano (30-1000 MHz)	Hiroyuki Morikawa (13-26 GHz)	Hikaru Shirasawa (1-2.8 GHz)	Yosuke Ishikawa (2.8-13 GHz)
Mode	Tx BT LE 2440 MHz with antenna cable 400 mm			



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

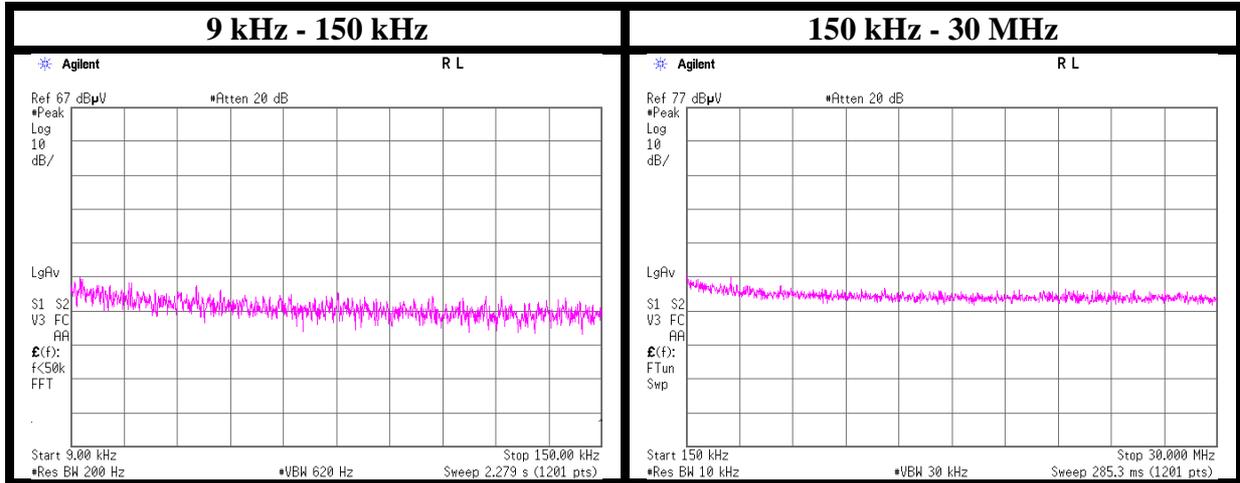
Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11014760S-A-R2
Date : November 1, 2015
Temperature / Humidity : 23 deg. C / 39 % RH
Engineer : Yosuke Ishikawa
Mode : Tx 11n-20 2412 MHz



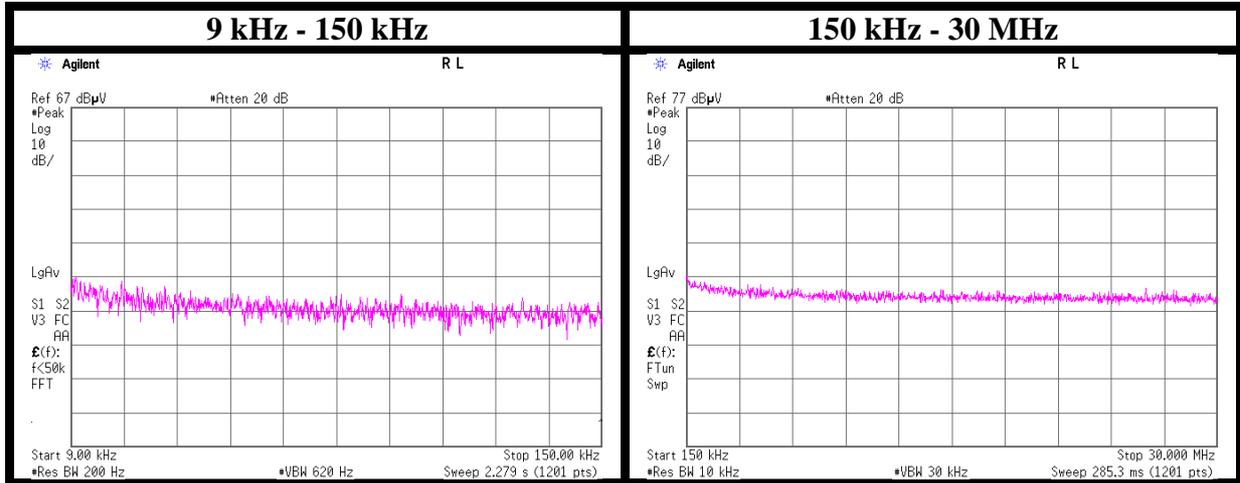
Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11014760S-A-R2
Date : November 17, 2015
Temperature / Humidity : 20 deg. C / 45 % RH
Engineer : Hiroyuki Morikawa
Mode : Tx BT LE 2402MHz



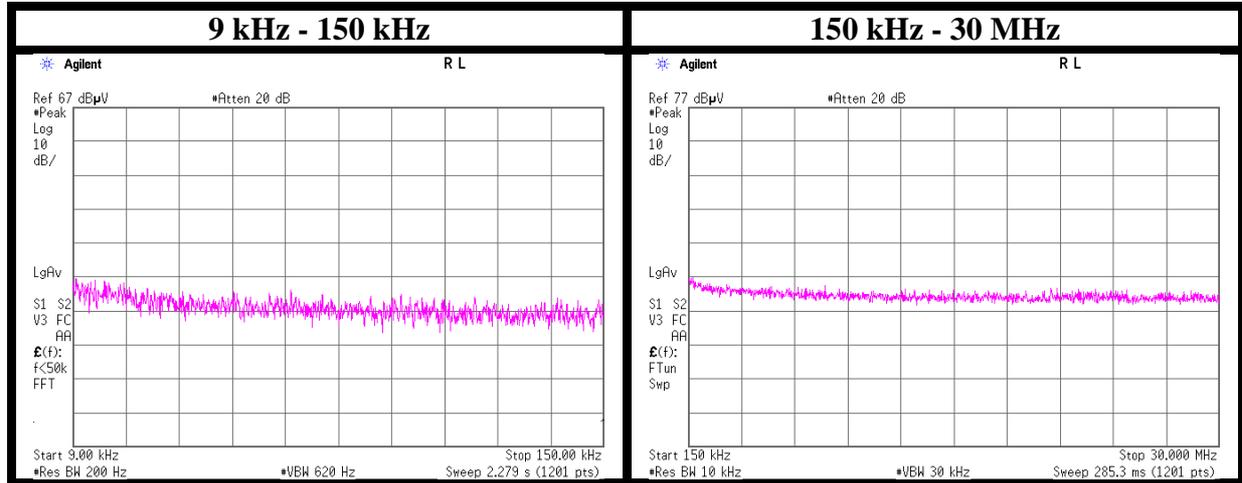
Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11014760S-A-R2
Date	November 17, 2015
Temperature / Humidity	20 deg. C / 45 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx BT LE 2440MHz



Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11014760S-A-R2
Date	November 17, 2015
Temperature / Humidity	20 deg. C / 45 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx BT LE 2480MHz



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Power Density

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11014760S-A-R2
Date November 1, 2015
Temperature / Humidity 23 deg. C / 39 % RH
Engineer Yosuke Ishikawa
Mode Tx

11b

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-17.67	1.62	9.93	-6.12	8.00	14.12
2437.00	-17.55	1.62	9.93	-6.00	8.00	14.00
2462.00	-18.74	1.63	9.93	-7.18	8.00	15.18

11g

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-21.77	1.62	9.93	-10.22	8.00	18.22
2437.00	-21.65	1.62	9.93	-10.10	8.00	18.10
2462.00	-21.11	1.63	9.93	-9.55	8.00	17.55

11n-20

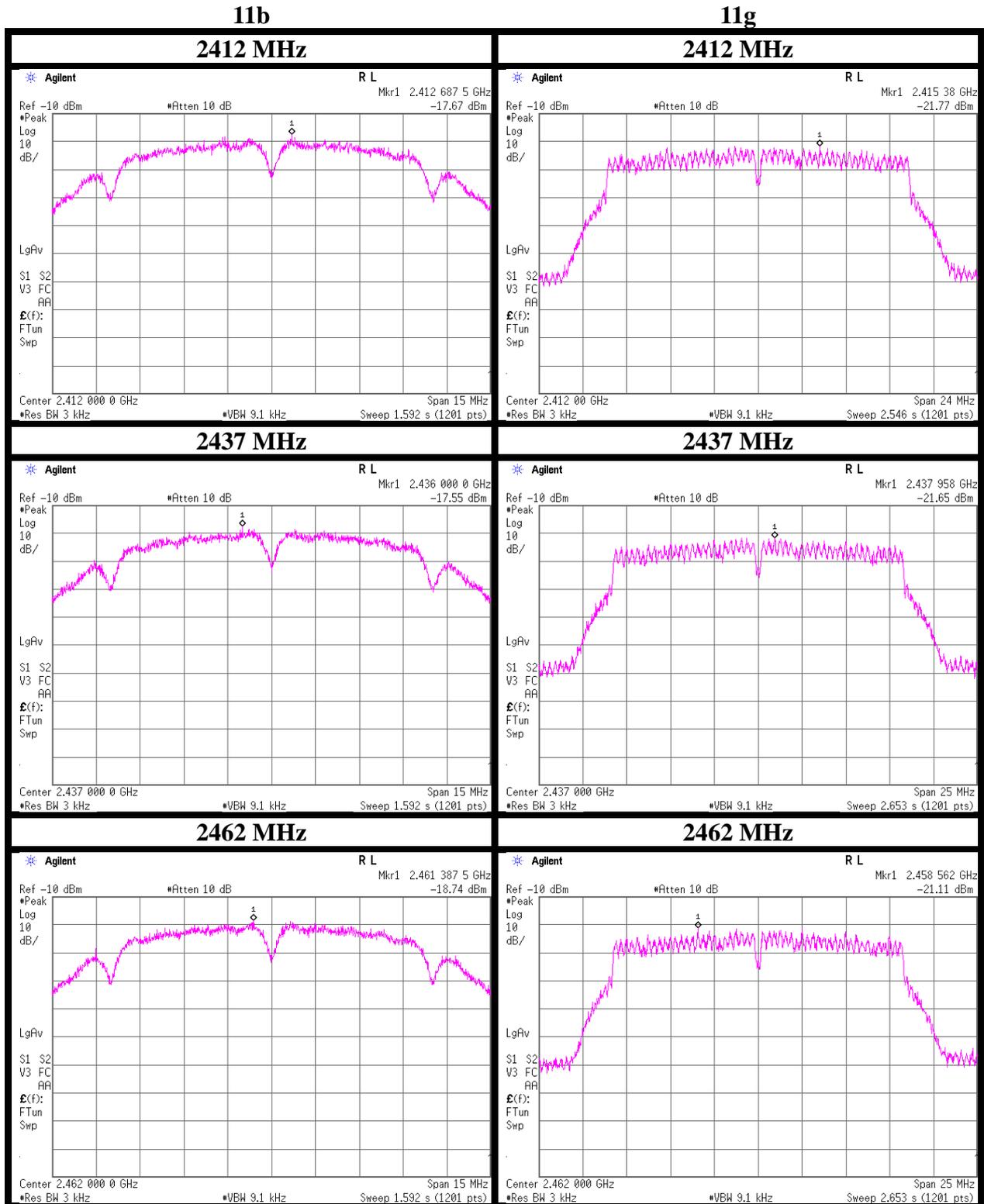
Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2412.00	-19.29	1.62	9.93	-7.74	8.00	15.74
2437.00	-21.20	1.62	9.93	-9.65	8.00	17.65
2462.00	-20.21	1.63	9.93	-8.65	8.00	16.65

Sample Calculation:

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

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

Power Density



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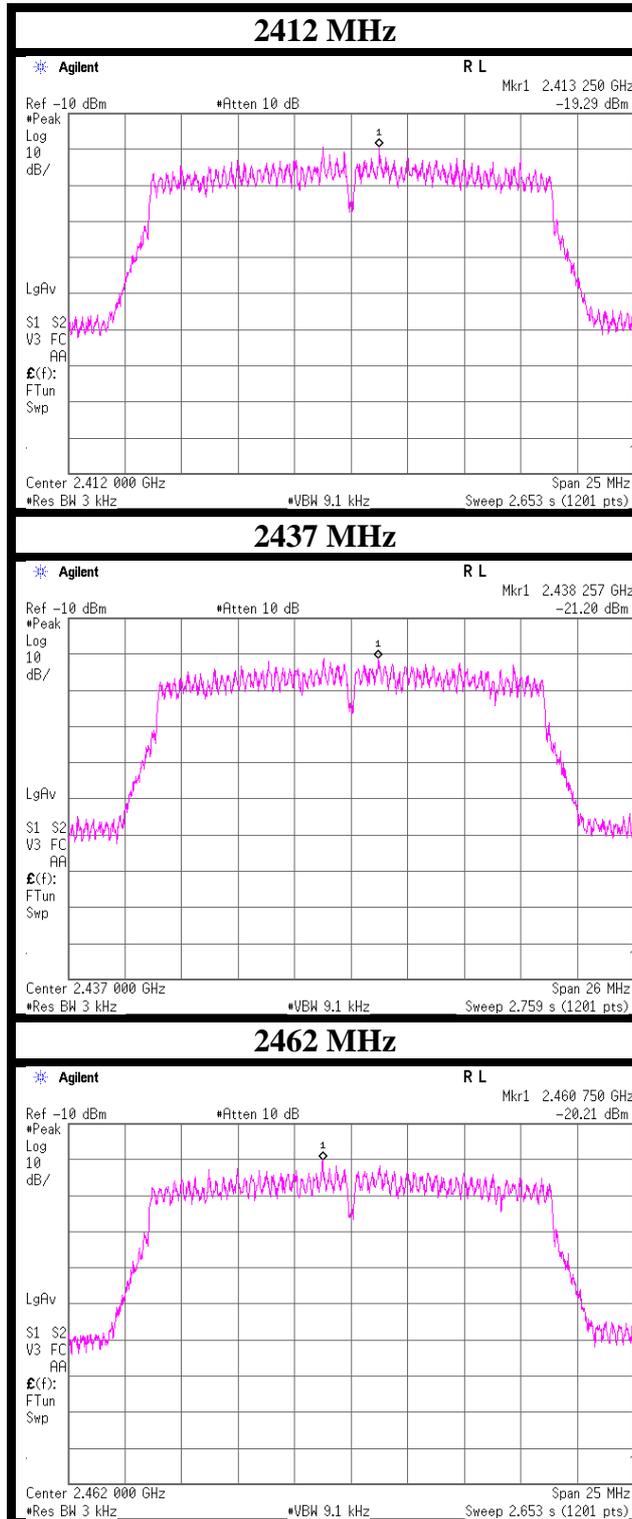
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Power Density

11n-20



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Power Density

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11014760S-A-R2
Date November 17, 2015
Temperature / Humidity 20 deg. C / 45 % RH
Engineer Hiroyuki Morikawa
Mode Tx BT LE

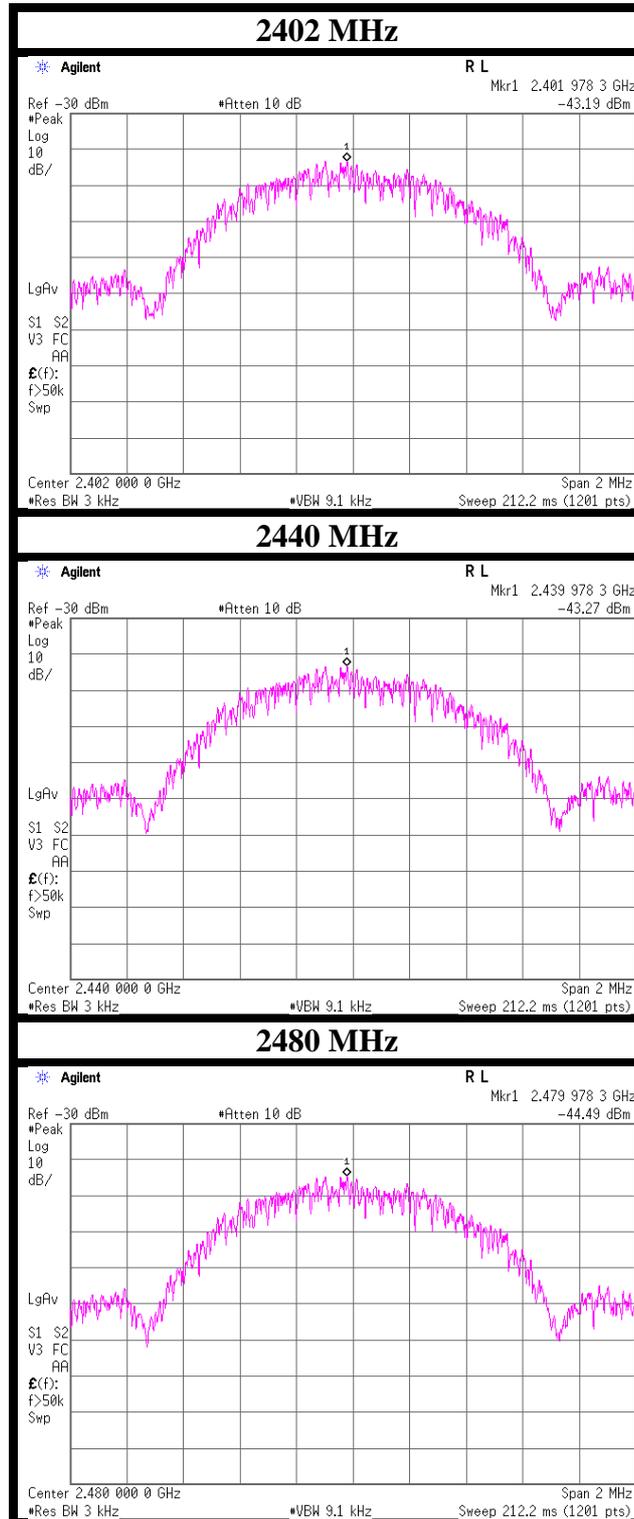
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2402.00	-43.19	1.62	9.67	-31.90	8.00	39.90
2440.00	-43.27	1.62	9.67	-31.98	8.00	39.98
2480.00	-44.49	1.64	9.67	-33.18	8.00	41.18

Sample Calculation:

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

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

Power Density



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Shonan EMC Lab.

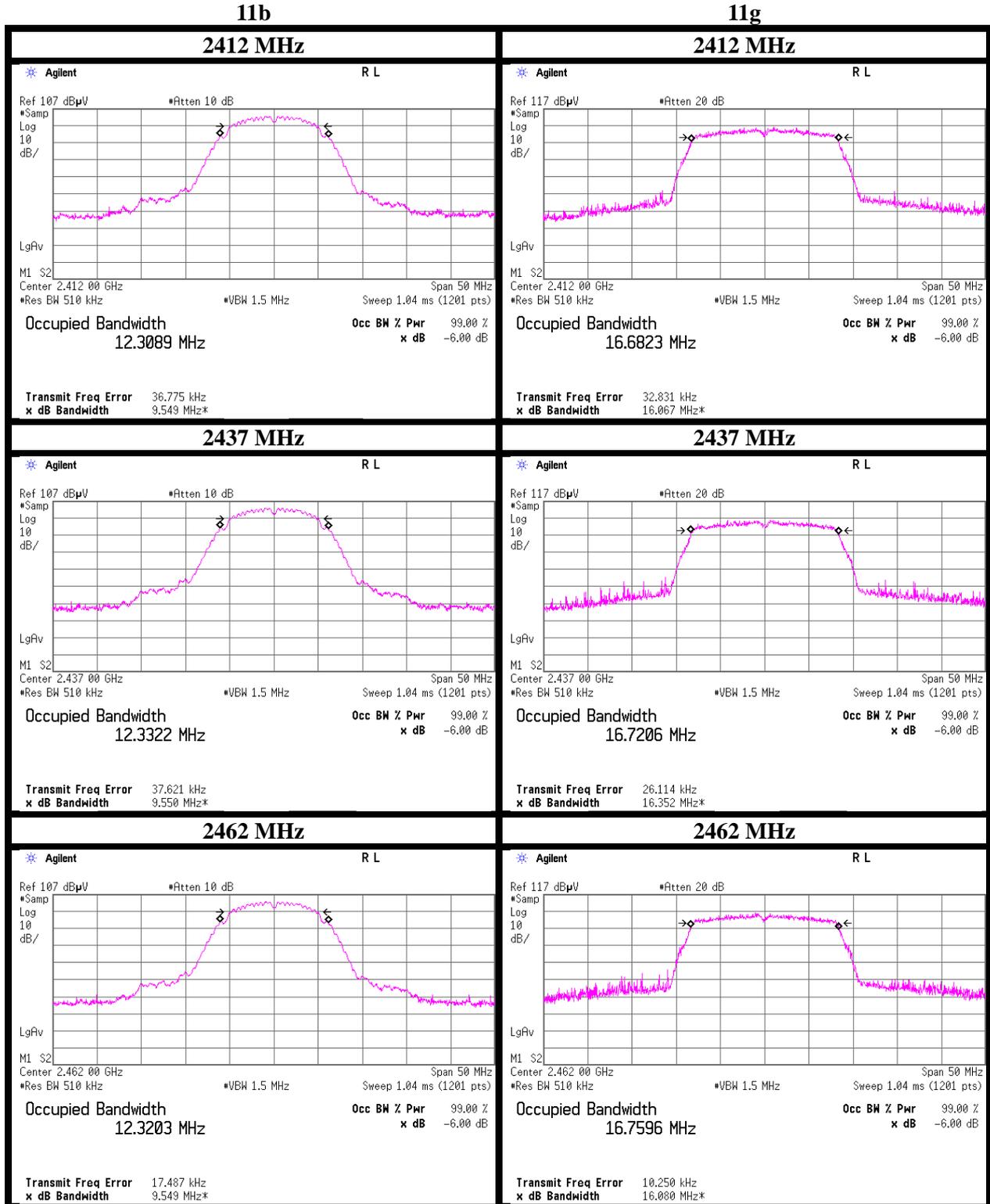
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

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99 % Occupied Bandwidth

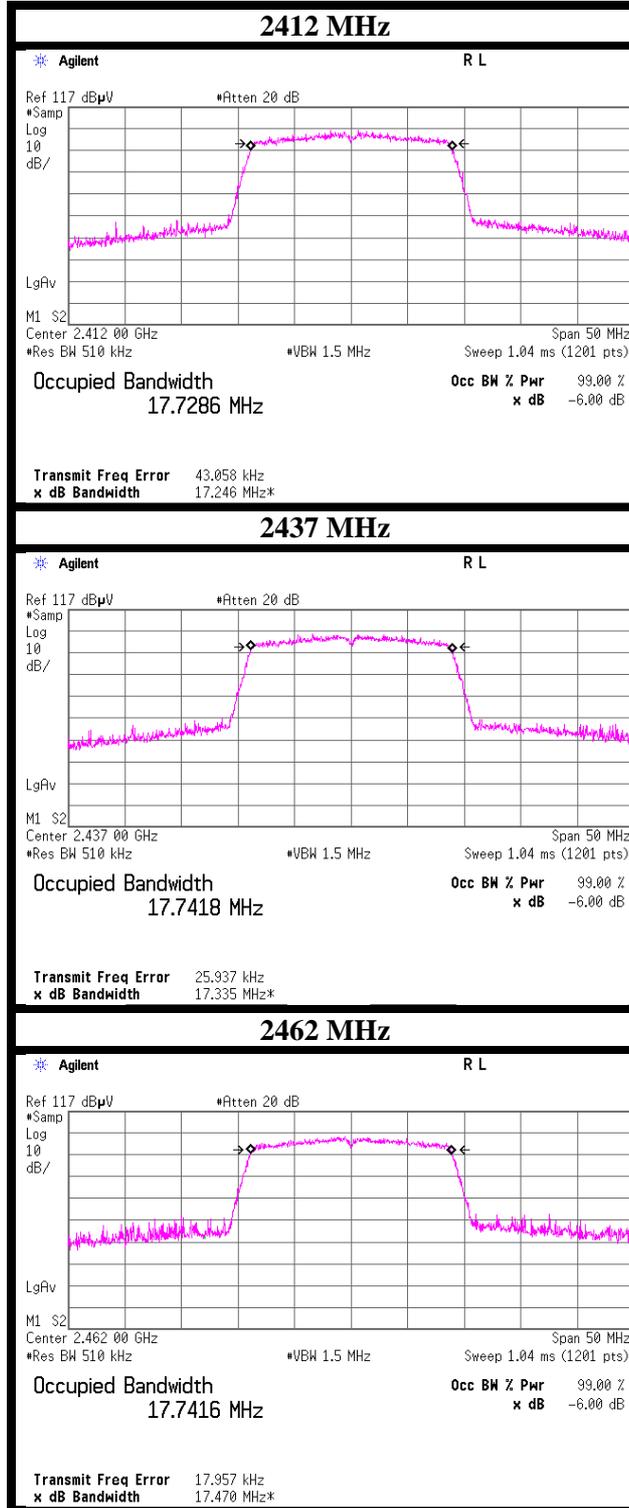
Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11014760S-A-R2
Date	November 1, 2015
Temperature / Humidity	23 deg. C / 39 % RH
Engineer	Yosuke Ishikawa
Mode	Tx



99 % Occupied Bandwidth

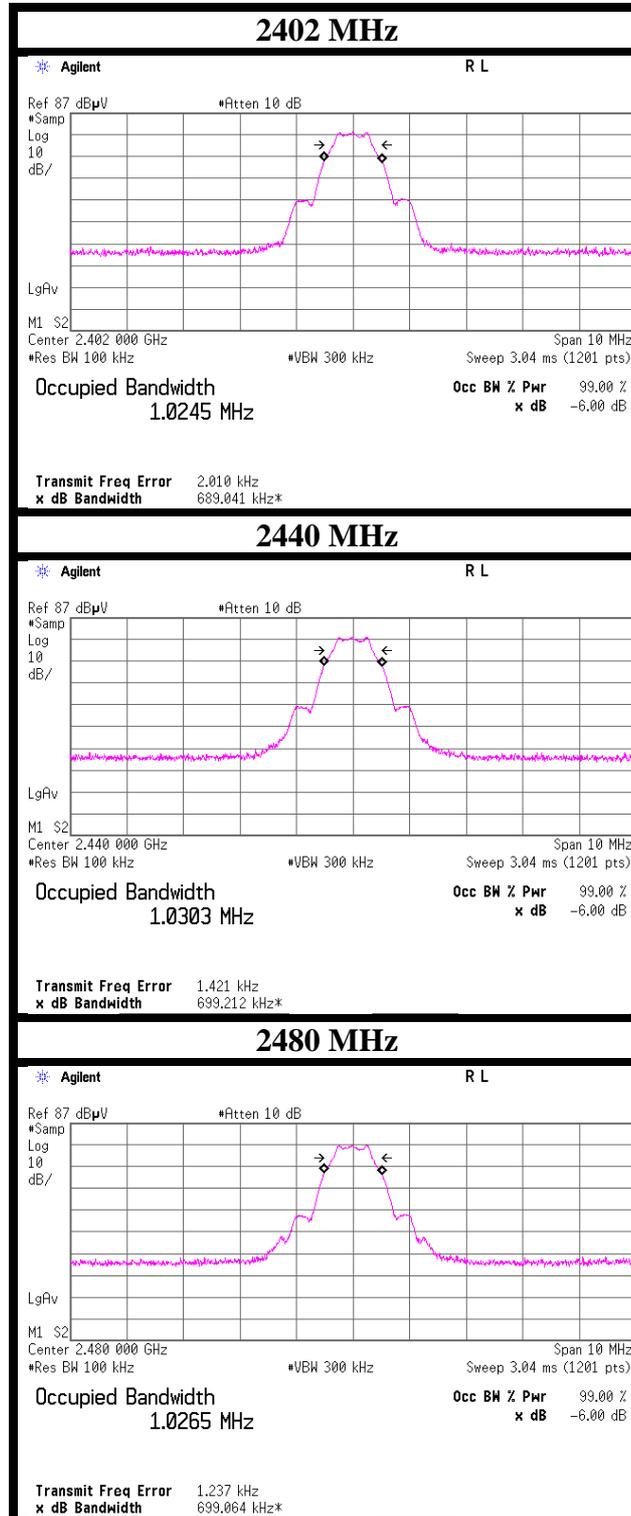
Test place : Shonan EMC Lab. No.5 Shielded Room
 Report No. : 11014760S-A-R2
 Date : November 1, 2015
 Temperature / Humidity : 23 deg. C / 39 % RH
 Engineer : Yosuke Ishikawa
 Mode : Tx

11n-20



99 % Occupied Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11014760S-A-R2
Date	November 17, 2015
Temperature / Humidity	20 deg. C / 45 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx BT LE



APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAF-01	Pre Amplifier	SONOMA	310N	290211	RE	2015/02/18 * 12
KAT6-04	Attenuator	INMET	18N-6dB	-	RE	2014/12/19 * 12
SAT3-09	Attenuator	JFW	50HF-003N	-	RE	2015/08/31 * 12
SBA-01	Biconical Antenna	Schwarzbeck	BBA9106	91032664	RE	2015/10/11 * 12
SCC-A1/A3/A5/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2015/04/17 * 12
SCC-A2/A4/A6/A7/A8/A13/SRSE-01	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	RE	2015/04/17 * 12
SLA-01	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP9108-A0888	RE	2015/10/11 * 12
SOS-01	Humidity Indicator	A&D	AD-5681	4062555	RE	2015/10/22 * 12
STR-02	Test Receiver	Rohde & Schwarz	ESCI	100575	RE	2015/09/11 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
SAEC-01(NSA)	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	RE	2015/07/13 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFI,MF)	-	RE, CE	-
STS-01	Digital Hitester	Hioki	3805-50	080997812	RE	2014/11/11 * 12
SSA-03	Spectrum Analyzer	Agilent	E4448A	MY48250152	AT	2015/09/16 * 12
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2015/04/02 * 12
SPSS-04	Power sensor	Agilent	N1923A	MY5326009	AT	2015/04/02 * 12
SAT10-10	Attenuator	Weinschel Corp.	54A-10	37584	AT	2015/04/09 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX102	30790/2	AT	2015/03/11 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2014/12/24 * 12
STS-05	Digital Hitester	Hioki	3805-50	080997828	AT	2014/11/11 * 12
SAEC-01(SVSWR)	Semi-Anechoic Chamber	TDK	SAEC-01(SVSWR)	1	RE	2015/07/08 * 12
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2015/03/23 * 12
SCC-G01	Coaxial Cable	Suhner	SUCOFLEX104A	46497/4A	RE	2015/04/17 * 12
SCC-G21	Coaxial Cable	Suhner	SUCOFLEX104	296169/4	RE	2015/05/19 * 12
SHA-01	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-725	RE	2015/08/10 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2015/03/23 * 12
SHA-04	Horn Antenna	ETS LINDGREN	3160-09	LM3640	RE	2015/03/17 * 12
SAF-08	Pre Amplifier	TOYO Corporation	HAP18-26W	00000019	RE	2015/03/23 * 12
SCC-G15	Coaxial Cable	Suhner	SUCOFLEX102	32703/2	RE	2015/03/11 * 12
SFL-03	Highpass Filter	MICRO-TRONICS	HPM50112	028	RE	2014/11/21 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2015/03/26 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	RE	2015/11/04 * 12
SFL-18	Highpass Filter	MICRO-TRONICS	HPM50111	119	RE	2015/04/09 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2014/11/21 * 12

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Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2015/05/27 * 12
SCC-G04	Coaxial Cable	Junkosha	J12J102207-00	JUN-12-14-018	RE	2015/06/08 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2015/05/19 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2015/08/11 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2015/10/22 * 12
SJM-15	Measure	ASKUL	-	-	RE,CE	-
SAEC-03(SVS WR)	Semi-Anechoic Chamber	TDK	SAEC-03(SV SWR)	3	RE	2015/08/28 * 12
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE,CE	2014/11/11 * 12
SFL-01	Highpass Filter	MICRO-TRONICS	HPM50115	001	RE	2014/11/21 * 12
SCC-G19	Coaxial Cable	Suhner	SUCOFLEX 102A	1188/2A	RE	2015/03/11 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2015/03/17 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2015/09/07 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2015/07/16 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2015/10/11 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2015/10/11 * 12
SAT6-08	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	RE	2015/08/31 * 12
SCC-C1/C2/C3 /C4/C5/C10/SR SE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	RE	2015/04/17 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2015/02/18 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE,CE	2015/03/24 * 12
SCC-C9/C10/SR SE-03	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	CE	2015/04/17 * 12
SLS-05	LISN	Rohde & Schwarz	ENV216	100516	CE(EUT)	2015/02/24 * 12
SAT3-07	Attenuator	JFW	50HF-003N	-	CE	2015/09/18 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	CE	2014/12/24 * 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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