



RADIO TEST REPORT

Test Report No. : 14026147S-A

Applicant : Canon Inc.
Type of EUT : Wireless LAN Module
Model Number of EUT : K30387
FCC ID : AZDK30387
Test regulation : FCC Part 15 Subpart C: 2021
Test Result : Complied (Refer to SECTION 3)

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by the A2LA accreditation body.
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. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.

Date of test: June 7 to November 20, 2021

Representative test engineer:

Shiro Kobayashi
Engineer

Approved by:

Shinichi Takano
Engineer



CERTIFICATE 1266.03

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

UL Japan, Inc.
Shonan EMC Lab.

1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN
Telephone : +81 463 50 6400
Facsimile : +81 463 50 6401

REVISION HISTORY

Original Test Report No.: 14026147S-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	14026147S-A	December 16, 2021	-	-

Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	MCS	Modulation and Coding Scheme
AC	Alternating Current	MRA	Mutual Recognition Arrangement
AFH	Adaptive Frequency Hopping	N/A	Not Applicable
AM	Amplitude Modulation	NIST	National Institute of Standards and Technology
Amp, AMP	Amplifier	NS	No signal detect.
ANSI	American National Standards Institute	NSA	Normalized Site Attenuation
Ant, ANT	Antenna	NVLAP	National Voluntary Laboratory Accreditation Program
AP	Access Point	OBW	Occupied Band Width
ASK	Amplitude Shift Keying	OFDM	Orthogonal Frequency Division Multiplexing
Atten., ATT	Attenuator	P/M	Power meter
AV	Average	PCB	Printed Circuit Board
BPSK	Binary Phase-Shift Keying	PER	Packet Error Rate
BR	Bluetooth Basic Rate	PHY	Physical Layer
BT	Bluetooth	PK	Peak
BT LE	Bluetooth Low Energy	PN	Pseudo random Noise
BW	BandWidth	PRBS	Pseudo-Random Bit Sequence
Cal Int	Calibration Interval	PSD	Power Spectral Density
CCK	Complementary Code Keying	QAM	Quadrature Amplitude Modulation
Ch., CH	Channel	QP	Quasi-Peak
CISPR	Comite International Special des Perturbations Radioelectriques	QPSK	Quadri-Phase Shift Keying
CW	Continuous Wave	RBW	Resolution Band Width
DBPSK	Differential BPSK	RDS	Radio Data System
DC	Direct Current	RE	Radio Equipment
D-factor	Distance factor	RF	Radio Frequency
DFS	Dynamic Frequency Selection	RMS	Root Mean Square
DQPSK	Differential QPSK	RSS	Radio Standards Specifications
DSSS	Direct Sequence Spread Spectrum	Rx	Receiving
EDR	Enhanced Data Rate	SA, S/A	Spectrum Analyzer
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power	SG	Signal Generator
EMC	ElectroMagnetic Compatibility	SVSWR	Site-Voltage Standing Wave Ratio
EMI	ElectroMagnetic Interference	TR	Test Receiver
EN	European Norm	Tx	Transmitting
ERP, e.r.p.	Effective Radiated Power	VBW	Video BandWidth
EU	European Union	Vert.	Vertical
EUT	Equipment Under Test	WLAN	Wireless LAN
Fac.	Factor		
FCC	Federal Communications Commission		
FHSS	Frequency Hopping Spread Spectrum		
FM	Frequency Modulation		
Freq.	Frequency		
FSK	Frequency Shift Keying		
GFSK	Gaussian Frequency-Shift Keying		
GNSS	Global Navigation Satellite System		
GPS	Global Positioning System		
Hori.	Horizontal		
ICES	Interference-Causing Equipment Standard		
IEC	International Electrotechnical Commission		
IEEE	Institute of Electrical and Electronics Engineers		
IF	Intermediate Frequency		
ILAC	International Laboratory Accreditation Conference		
ISED	Innovation, Science and Economic Development Canada		
ISO	International Organization for Standardization		
JAB	Japan Accreditation Board		
LAN	Local Area Network		
LIMS	Laboratory Information Management System		

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

CONTENTS	PAGE
SECTION 1: Customer information.....	5
SECTION 2: Equipment under test (EUT).....	5
SECTION 3: Test specification, procedures & results.....	7
SECTION 4: Operation of EUT during testing	10
SECTION 5: Conducted Emission.....	13
SECTION 6: Radiated Spurious Emission	14
SECTION 7: Antenna Terminal Conducted Tests.....	16
APPENDIX 1: Test data	17
Conducted Emission	17
99 % Occupied Bandwidth and 6 dB Bandwidth.....	18
Maximum Peak Output Power	23
Average Output Power	27
Radiated Spurious Emission	30
Conducted Spurious Emission	62
Power Density	63
APPENDIX 2: Test instruments	66
APPENDIX 3: Photographs of test setup	68
Conducted Emission	68
Radiated Spurious Emission	69
Worst Case Position of Pre-check.....	70
Antenna Terminal Conducted Tests.....	71

SECTION 1: Customer information

Company Name	:	Canon Inc.
Address	:	451, Tsukagoshi 3-chome, Saiwai-ku, Kawasaki-shi, Kanagawa 212-8530, Japan
Telephone Number	:	+81-3-3758-2111
Contact Person	:	Hiroyuki Saito

The information provided from the customer is as follows;

- Applicant, Type of EUT, Model Number of EUT, FCC ID on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (EUT) other than the Receipt Date
- SECTION 4: Operation of EUT during testing

* The laboratory is exempted from liability of any test results affected from the above information in SECTION 2 and 4.

SECTION 2: Equipment under test (EUT)

2.1 Identification of EUT

Type	:	Wireless LAN Module
Model Number	:	K30387
Serial Number	:	Refer to SECTION 4.2
Rating	:	DC 3.3 V
Receipt Date	:	June 7, 2021(used for other than 1-2.8 GHz radiated emission) November 10, 2021(used for 1-2.8 GHz radiated emission)
Country of Mass-production	:	Thailand, Vietnam
Condition	:	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	:	No Modification by the test lab.

2.2 Product Description

Model: K30387 (referred to as the EUT in this report) is a Wireless LAN Module.

Radio Specification

	IEEE802.11b	IEEE802.11g	IEEE802.11n (20 MHz band)	IEEE802.11n (40 MHz band)
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz, 5180 MHz - 5240 MHz, 5260 MHz - 5320 MHz, 5500 MHz - 5700 MHz, 5745 MHz - 5825 MHz	2422 MHz - 2452 MHz, 5190 MHz - 5230 MHz, 5270 MHz - 5310 MHz, 5510 MHz - 5670 MHz, 5755 MHz - 5795 MHz
Channel spacing	5 MHz		2.4 GHz band: 5 MHz 5 GHz band: 20 MHz	2.4 GHz band: 5 MHz 5 GHz band: 40 MHz
Modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)	
	IEEE802.11a	IEEE802.11ac (20 MHz band)	IEEE802.11ac (40 MHz band)	IEEE802.11ac (80 MHz band)
Frequency of operation	5180 MHz - 5240 MHz, 5260 MHz - 5320 MHz, 5500 MHz - 5700 MHz, 5745 MHz - 5825 MHz	5180 MHz - 5240 MHz, 5260 MHz - 5320 MHz, 5500 MHz - 5700 MHz, 5745 MHz - 5825 MHz	5190 MHz - 5230 MHz, 5270 MHz - 5310 MHz, 5510 MHz - 5670 MHz, 5755 MHz - 5795 MHz	5210 MHz, 5290 MHz, 5530 MHz, 5610 MHz, 5775 MHz
Channel spacing	20 MHz		40 MHz	80 MHz
Modulation	OFDM (64QAM, 16QAM, QPSK, BPSK)	OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)		
Antenna type	Inverted-L antenna			
Antenna Gain	2.4 GHz	1.8 dBi		
	U-NII-1, U-NII-2A	2.1 dBi		
	U-NII-2C	2.1 dBi		
	U-NII-3	2.1 dBi		
Master / Slave	2.4 GHz	Master and Slave		
	U-NII-1	Master and Slave		
	U-NII-2A	Slave		
	U-NII-2C	Slave		
	U-NII-3	Master and Slave		
Operating Temperature	0 deg. C to + 45 deg. C			

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on May 3, 2021 and effective July 2, 2021

Title : FCC 47 CFR Part 15 Radio Frequency Device Subpart C Intentional Radiators
Section 15.207 Conducted limits
Section 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz,
and 5725-5850 MHz

* The revision does not affect the test result conducted before its effective date.

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods ISED: RSS-Gen 8.8	FCC: Section 15.207 ISED: RSS-Gen 8.8	10.8 dB 0.38646 MHz, AV, L1 Mode: Tx 11n-20 2437 MHz	Complied a)	-
6 dB Bandwidth	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section 15.247(a)(2) ISED: RSS-247 5.2(a)	See data.	Complied b)	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: RSS-Gen 6.12	FCC: Section 15.247(b)(3) ISED: RSS-247 5.4(d)		Complied c)	Conducted
Power Density	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section 15.247(e) ISED: RSS-247 5.2(b)		Complied d)	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: RSS-Gen 6.13	FCC: Section 15.247(d) ISED: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	3.2 dB 2390.000 MHz, AV, Vert. Mode: Tx 11n-40 2427 MHz	Complied# e), f)	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 15.247 Meas Guidance v05r02 8.5 and 8.6.

- a) Refer to APPENDIX 1 (data of Conducted Emission)
- b) Refer to APPENDIX 1 (data of 6 dB Bandwidth and 99 % Occupied Bandwidth)
- c) Refer to APPENDIX 1 (data of Maximum Peak Output Power)
- d) Refer to APPENDIX 1 (data of Power Density)
- e) Refer to APPENDIX 1 (data of Conducted Spurious Emission)
- f) Refer to APPENDIX 1 (data of Radiated Spurious Emission)

Symbols:

Complied The data of this test item has enough margin, more than the measurement uncertainty.

Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.

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

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

FCC Part 15.31 (e)

The host device provides stable voltage constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement

FCC Part 15.203 Antenna requirement

The antenna is not removable from the EUT. Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99 % Occupied Bandwidth	ISED: RSS-Gen 6.7	ISED: -	N/A	Complied a)	Conducted
a) Refer to APPENDIX 1 (data of 6 dB Bandwidth and 99 % Occupied Bandwidth)					

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

There is no applicable rule of uncertainty in this applied standard. Therefore, the results are derived depending on whether or not laboratory uncertainty is applied.

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

Shonan EMC Lab.

Item	Frequency range	Uncertainty (+/-)			
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4,5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.6 dB	2.6 dB	2.6 dB	2.9 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.0 dB	2.7 dB	2.7 dB	-
	30 MHz-200 MHz	4.6 dB	4.6 dB	4.6 dB	-
	200 MHz-1 GHz	6.0 dB	6.0 dB	6.0 dB	-
	1 GHz-6 GHz	4.8 dB	4.8 dB	4.8 dB	-
	6 GHz-18 GHz	5.4 dB	5.4 dB	5.4 dB	-
	18 GHz-40 GHz	5.3 dB	5.3 dB	5.3 dB	-
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.7 dB	5.7 dB	5.7 dB	-
	18 GHz-40 GHz	5.6 dB	5.6 dB	5.6 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	1.4 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	1.6 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.89 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	1.2 dB
Power Measurement above 1 GHz (Average Detector)_SPM-13	0.91 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-13	1.2 dB
Spurious emission (Conducted) below 1GHz	0.87 dB
Spurious emission (Conducted) 1 GHz-3 GHz	0.96 dB
Spurious emission (Conducted) 3 GHz-18 GHz	3.0 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.6 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.2 dB
Bandwidth Measurement	0.012 %
Duty cycle and Time Measurement	0.27 %
Temperature_SCH-01	0.87 deg.C.
Humidity_SCH-01	4.3 %
Temperature_SCH-02	2.0 deg.C.
Humidity_SCH-02	6.6 %
Voltage	0.86 %

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

3.5 Test Location

UL Japan, Inc. Shonan EMC Lab.
 1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 JAPAN
 Telephone: +81 463 50 6400, Facsimile: +81 463 50 6401
 A2LA Certificate Number: 1266.03
 (FCC test firm registration number: 626366, ISED lab company number: 2973D / CAB identifier: JP0001)

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 EUT during testing

4.1 Operating Mode(s)

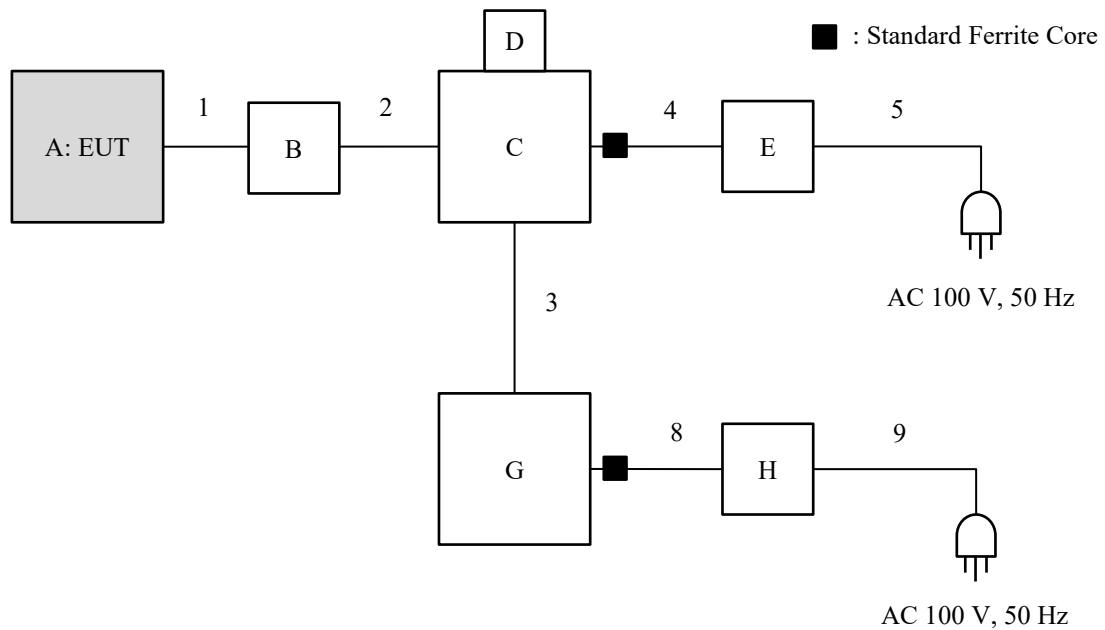
Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals - ” of TCB Council Workshop October 2009.

Mode	Remarks*
IEEE 802.11b (11b)	1 Mbps, PN9
IEEE 802.11g (11g)	6 Mbps, PN9
IEEE 802.11n MIMO 20 MHz BW (11n-20)	MCS 5, PN9
IEEE 802.11n MIMO 40 MHz BW (11n-40)	MCS 7, PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)	
*Power of the EUT was set by the software as follows; Power settings: 11b: 11 dBm 11g, 11n-20: 10 dBm (2417 MHz to 2457 MHz), 8 dBm (2412 MHz, 2462 MHz) 11n-40: 7 dBm (2427 MHz to 2447 MHz), 5 dBm (2422 MHz, 2452 MHz) Software: 11b: wl0 Version 13.10.246.225 (Date: 2020.3.17, Storage location: Driven by connected Smart Devices Board) Except 11b RF Testing Tool for CYW4373SUSB Version FW_13_10_246_225 (Date: 2020.3.17, Storage location: Driven by connected Smart Devices Board) *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.	

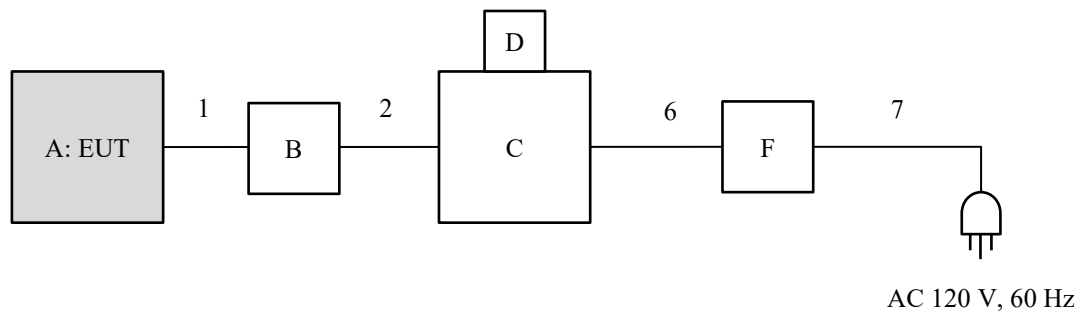
Test Item	Operating Mode	Tested frequency
Conducted Spurious Emission	Tx, 11n-20	2437 MHz
Radiated Spurious Emission (Below 1 GHz)	Tx, 11n-20	2437 MHz
Radiated Spurious Emission (Above 1 GHz)	Tx, 11b	2412 MHz, 2437 MHz, 2462 MHz
	Tx, 11g	2412 MHz, 2417 MHz 2452 MHz, 2462 MHz
	Tx, 11n-20	2412 MHz, 2417 MHz, 2437 MHz, 2452 MHz, 2462 MHz
	Tx, 11n-40	2422 MHz, 2427 MHz, 2437 MHz, 2447 MHz, 2452 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, 11n-40	2422 MHz, 2437 MHz, 2452 MHz

4.2 Configuration and peripherals

<For Antenna Terminal Conducted test>



<For Radiated Emission test and Conducted emission test>



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

*As a result of comparing AC 120 V and AC 240 V at pre-check, conducted emission test was performed with AC 120 V of the worst voltage as representative.

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	WLAN Module	K30387	A42	Canon	EUT
B	WLAN JOINT PCB	-	-	Canon	-
C	Smart Devices Board	MCIMX6SX-SDB	TR19451175	NXP	-
D	SD Card	SDS/16GB	-	Kingston	-
E	AC Adaptor	GST40A05	EB93405832	MEAN WELL	-
F	AC Adapter	ATS036T-A050	400-75956	SCEPTRE	-
G	Laptop Computer	E1Q57PA#ABJ	5CB3310KHW	HP	-
H	AC Adapter	PPP009L-E	3453442403	HP	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	FLAT	0.1	Unshielded	Unshielded	-
2	USB	1.0	Shielded	Shielded	-
3	LAN	1.5	Unshielded	Unshielded	-
4	DC	1.0	Unshielded	Unshielded	-
5	AC	1.8	Unshielded	Unshielded	-
6	DC	1.0	Unshielded	Unshielded	-
7	AC	1.8	Unshielded	Unshielded	-
8	DC	1.7	Unshielded	Unshielded	-
9	AC	1.7	Unshielded	Unshielded	-

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80 cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

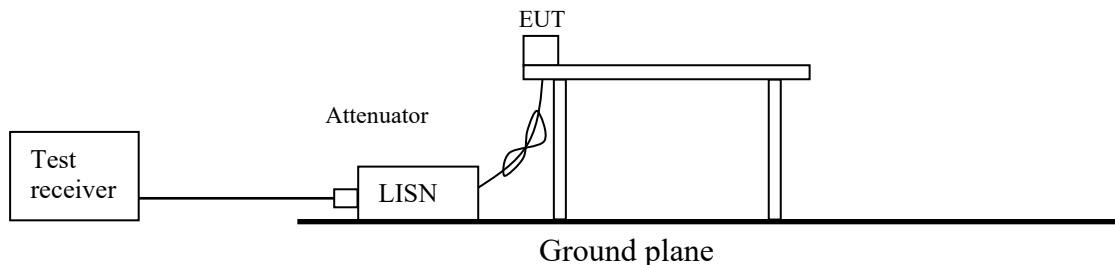
All unused 50 ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected to the measuring equipment.

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

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

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

Figure 1: Test Setup



SECTION 6: Radiated Spurious Emission

Test Procedure

It was measured based on "8.5 and 8.6 of KDB 558074 D01 15.247 Meas Guidance v05r02".

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

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

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

Test antenna was aimed at the EUT for receiving the maximum signal and always kept within the illumination area of the 3 dB beamwidth of the antenna.

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

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

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

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

Test Antennas are used as below;

Frequency	30 MHz to 200 MHz	200 MHz to 1 GHz	Above 1 GHz
Antenna Type	Biconical	Logperiodic	Horn

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

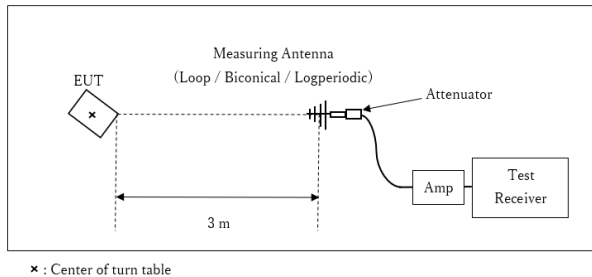
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

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	11.12.2.5.2 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (Linear voltage) Trace: 100 traces Duty factor was added to the results.	RBW: 100 kHz VBW: 300 kHz

*1) Average Power Measurement was performed based on ANSI C63.10-2013.

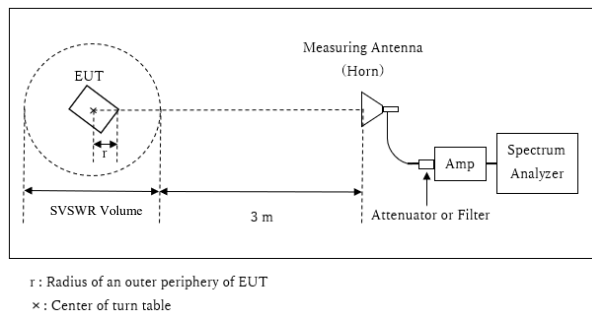
Figure 2: Test Setup

Below 1 GHz



Test Distance: 3 m

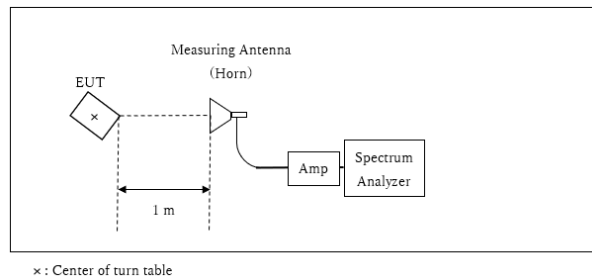
1 GHz - 10 GHz



Distance Factor: $20 \times \log (3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$
* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.98 \text{ m}$

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
r = 0.02 m

10 GHz - 26.5 GHz



Distance Factor: $20 \times \log (1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$
*Test Distance: 1 m

- The carrier level and noise levels were confirmed at each position of X, Y and Z axes of EUT to see the position of maximum noise, and the test was made at the position that has the maximum noise.

Antenna polarization	Carrier	Spurious (30 MHz - 1 GHz)	Spurious (1 GHz - 2.8 GHz)	Spurious (2.8 GHz - 13 GHz)	Spurious (13 GHz - 18 GHz)	Spurious (18 GHz - 26.5 GHz)
Horizontal	Y	X	Y	Y	X	X
Vertical	Z	X	Z	Z	X	X

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

Measurement range : 30 MHz - 26.5 GHz
Test data : APPENDIX
Test result : Pass

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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	50 MHz / 100 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99 % Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak / Average *2)	-	Power Meter (Sensor: 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) *5)	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) Peak hold was applied as Worst-case measurement.
 *2) Reference data
 *3) Section 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013".
 *4) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
 Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.
 (9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 kHz)
 *5) The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohms. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to 45.5 - 51.5 = -6.0 dBuA/m, which has the same margin, 3 dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

The test results and limit are rounded off to two decimals place, so some differences might be observed.
 The equipment and cables were not used for factor 0 dB of the data sheets.

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

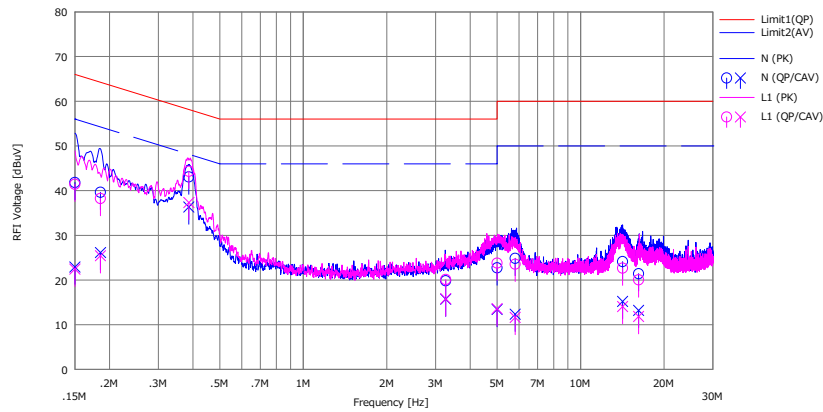
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2021/06/26

Mode : Tx 11n-20 2437 MHz
Power : DC 3.3 V, AC 120 V / 60 Hz (AC adaptor)
Temp./Humi. : 25 deg.C / 40 %RH

Remarks : -

Limit : FCC_Part 15 Subpart C(15.207)

Engineer : Yusuke Tanikawara



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		(QP) [dBuV]	(CAV) [dBuV]		(QP) [dBuV]	(CAV) [dBuV]	(QP) [dBuV]	(AV) [dBuV]	(QP) [dB]	(AV) [dB]		
1	0.15000	29.40	10.50	12.42	41.82	22.92	66.00	56.00	24.1	33.0	N	
2	0.18558	27.20	13.70	12.44	39.64	26.14	64.23	54.23	24.5	28.0	N	
3	0.38619	30.60	23.90	12.45	43.05	36.35	58.15	48.15	15.1	11.8	N	
4	3.26291	7.20	3.10	12.62	19.82	15.72	56.00	46.00	36.1	30.2	N	
5	5.00000	10.00	0.70	12.72	22.72	13.42	56.00	46.00	33.2	32.5	N	
6	5.80763	12.10	-0.40	12.76	24.86	12.36	60.00	50.00	35.1	37.6	N	
7	14.17450	11.00	2.10	13.11	24.11	15.21	60.00	50.00	35.8	34.7	N	
8	16.19861	8.20	0.00	13.20	21.40	13.20	60.00	50.00	38.6	36.8	N	
9	0.15000	29.00	10.00	12.43	41.43	22.43	66.00	56.00	24.5	33.5	L1	
10	0.18551	25.80	13.00	12.44	38.24	25.44	64.24	54.24	26.0	28.8	L1	
11	0.38646	31.90	24.90	12.44	44.34	37.34	58.14	48.14	13.8	10.8	L1	
12	3.26199	7.50	3.20	12.61	20.11	15.81	56.00	46.00	35.8	30.1	L1	
13	5.00000	11.10	0.90	12.69	23.79	13.59	56.00	46.00	32.2	32.4	L1	
14	5.80698	10.80	-1.10	12.73	23.53	11.63	60.00	50.00	36.4	38.3	L1	
15	14.17450	9.70	1.10	12.97	22.67	14.07	60.00	50.00	37.3	35.9	L1	
16	16.19486	7.00	-1.20	13.03	20.03	11.83	60.00	50.00	39.9	38.1	L1	

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

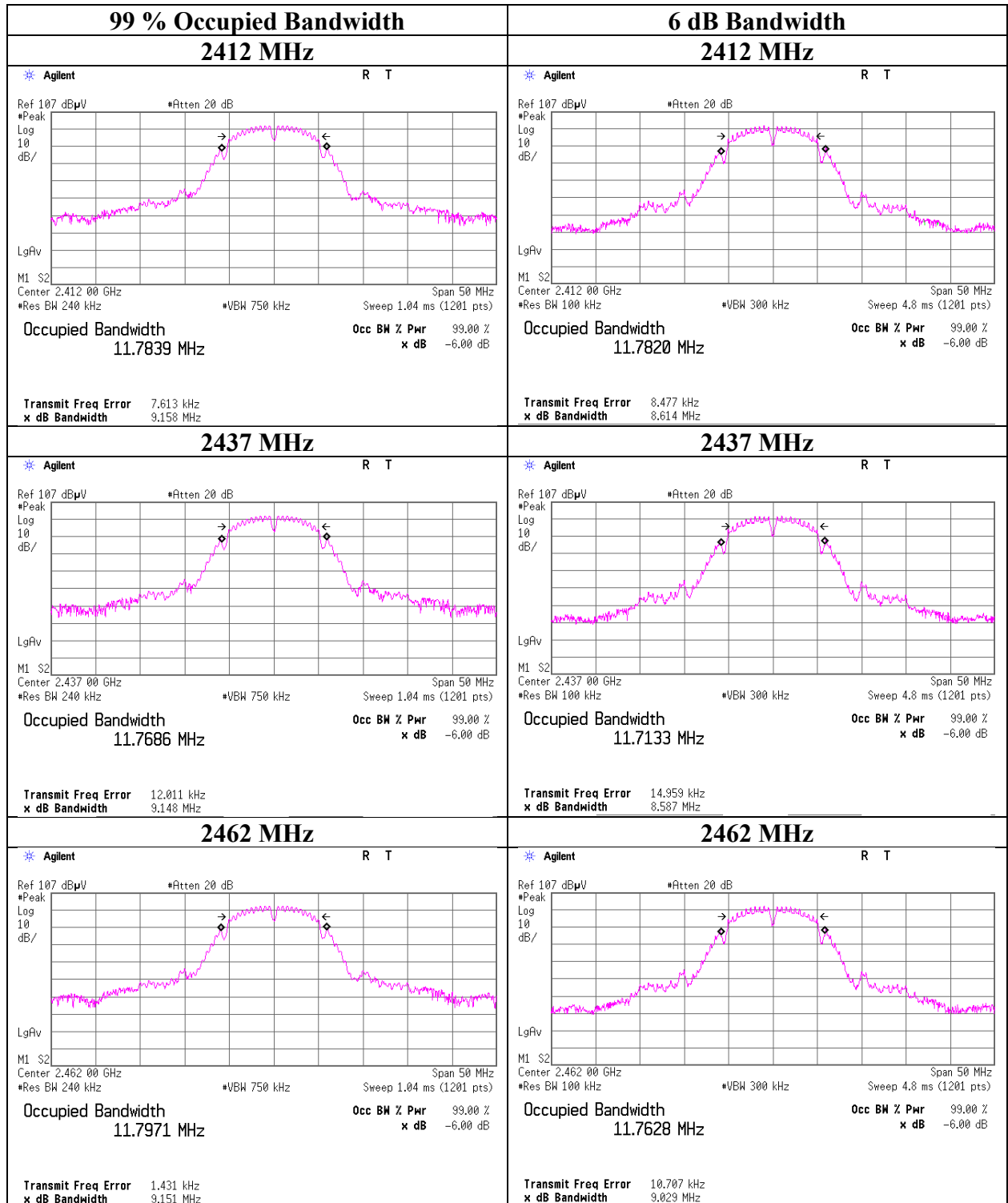
99 % Occupied Bandwidth and 6 dB Bandwidth

Report No. 14026147S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date June 7, 2021
Temperature / Humidity 23 deg. C / 60 % RH
Engineer Shiro Kobayashi
Mode Tx

Mode	Frequency [MHz]	99 % Occupied Bandwidth [kHz]	6 dB Bandwidth [MHz]	Limit for 6 dB Bandwidth [MHz]
11b	2412	11783.9	8.614	> 0.5000
	2437	11768.6	8.587	> 0.5000
	2462	11797.1	9.029	> 0.5000
11g	2412	17140.2	16.403	> 0.5000
	2437	17140.7	16.380	> 0.5000
	2462	17122.0	16.423	> 0.5000
11n-20	2412	18122.8	17.776	> 0.5000
	2437	18122.4	17.780	> 0.5000
	2462	18092.7	17.772	> 0.5000
11n-40	2422	36494.6	36.557	> 0.5000
	2437	36517.6	36.549	> 0.5000
	2452	36501.8	36.549	> 0.5000

99 % Occupied Bandwidth and 6 dB Bandwidth

11b



UL Japan, Inc.

Shonan EMC Lab.

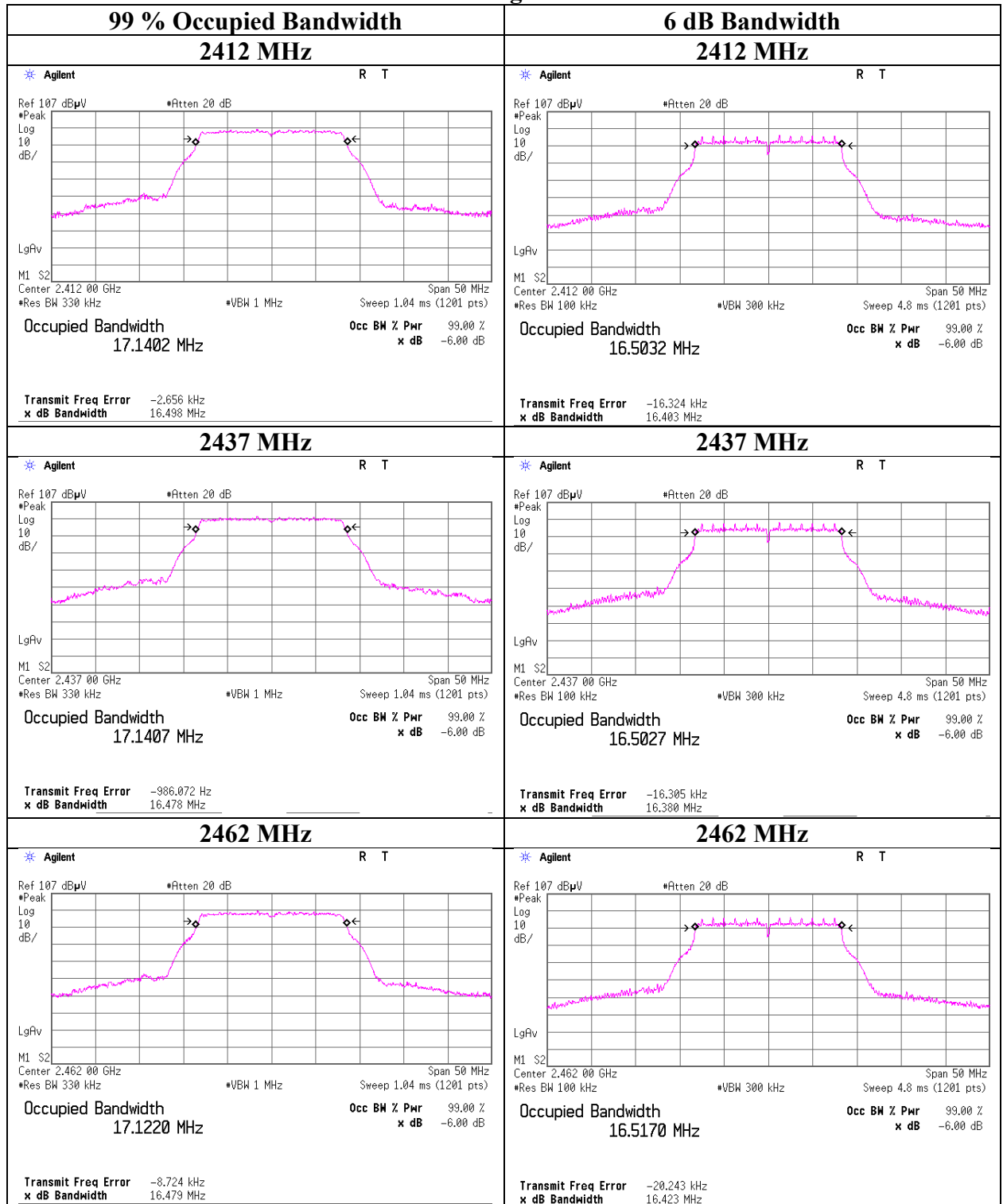
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99 % Occupied Bandwidth and 6 dB Bandwidth

11g



UL Japan, Inc.

Shonan EMC Lab.

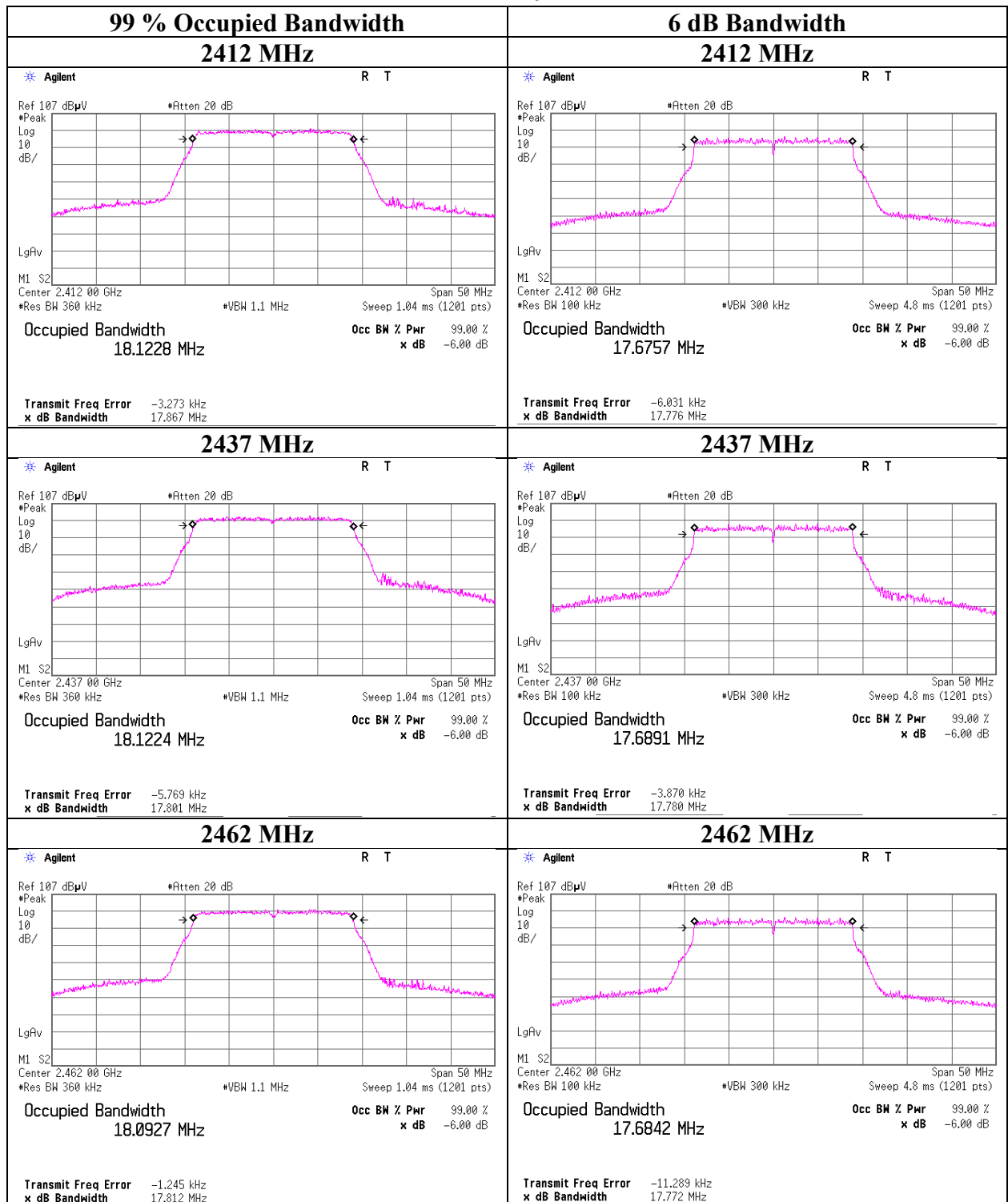
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99 % Occupied Bandwidth and 6 dB Bandwidth

11n-20



UL Japan, Inc.

Shonan EMC Lab.

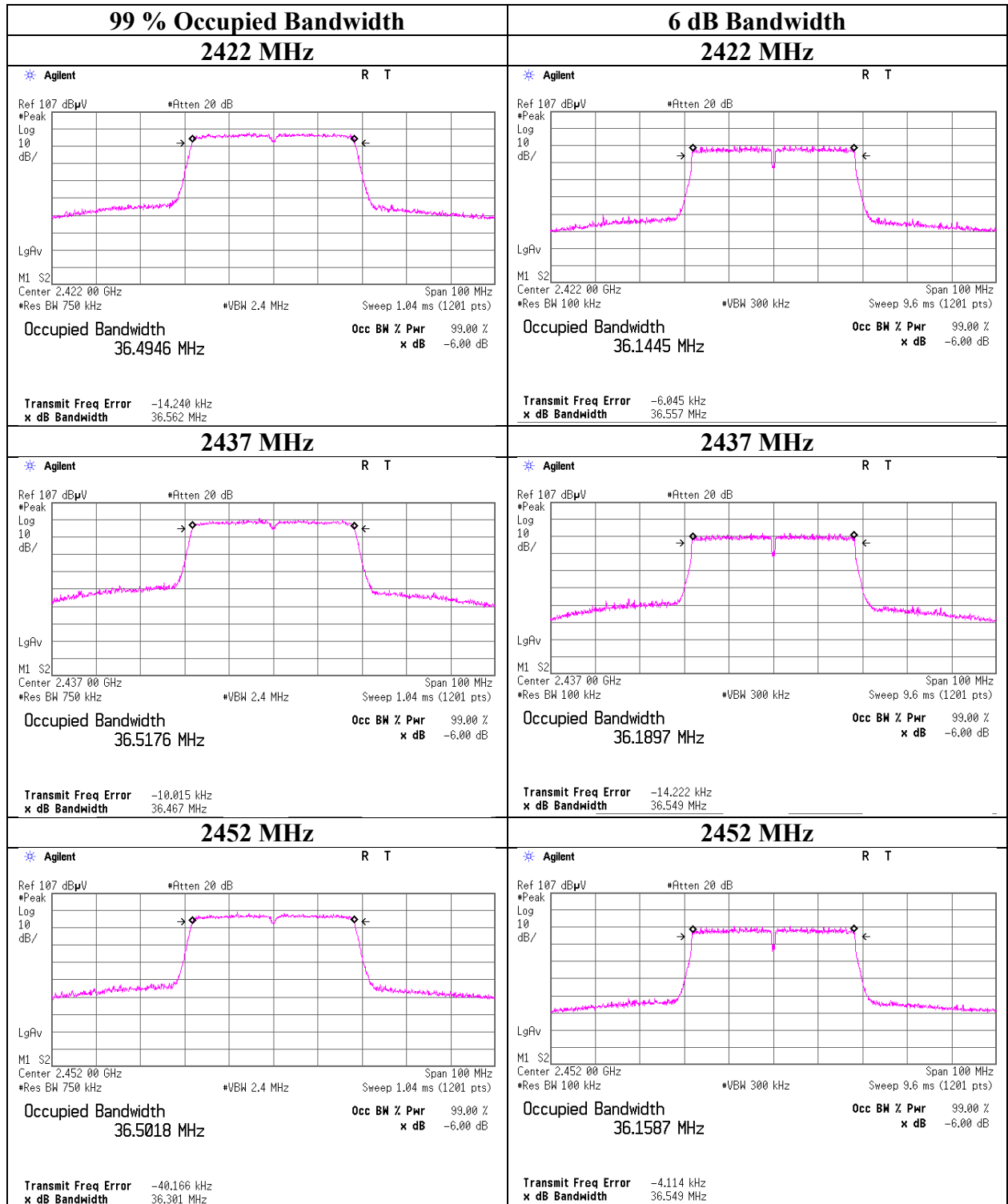
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99 % Occupied Bandwidth and 6 dB Bandwidth

11n-40



UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Maximum Peak Output Power

Report No. 14026147S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date June 7, 2021
Temperature / Humidity 23 deg. C / 60 % RH
Engineer Shiro Kobayashi
Mode Tx 11b

Freq.	Reading	Cable Loss	Atten. Loss	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]	[dB]		[dBm]	[mW]	[dBm]	[mW]	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	3.28	1.49	9.97	14.74	29.79	30.00	1000	15.26	1.80	16.54	45.08	36.02	4000	19.48
2437	3.34	1.49	9.98	14.81	30.27	30.00	1000	15.19	1.80	16.61	45.81	36.02	4000	19.41
2462	3.50	1.50	9.98	14.98	31.48	30.00	1000	15.02	1.80	16.78	47.64	36.02	4000	19.24

Sample Calculation:

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

e.i.r.p. Result = Conducted Power Result + Antenna Gain

2437 MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
1	3.34	*
2	3.21	-
5.5	3.22	-
11	3.32	-

*: Worst Rate

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

Maximum Peak Output Power

Report No. 14026147S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date June 7, 2021
Temperature / Humidity 23 deg. C / 60 % RH
Engineer Shiro Kobayashi
Mode Tx 11g

Freq.	Reading	Cable Loss	Atten. Loss	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]			[dB]	[dBm]	[mW]	[dBm]	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2412	9.27	1.49	9.97	20.73	118.30	30.00	1000	9.27	1.80	22.53	179.06	36.02	4000	13.49
2437	9.35	1.49	9.98	20.82	120.78	30.00	1000	9.18	1.80	22.62	182.81	36.02	4000	13.40
2462	9.27	1.50	9.98	20.75	118.85	30.00	1000	9.25	1.80	22.55	179.89	36.02	4000	13.47

Sample Calculation:

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

e.i.r.p. Result = Conducted Power Result + Antenna Gain

2437 MHz

Rate	Reading	Remark
[Mbps]	[dBm]	
6	9.35	*
9	9.00	-
12	9.23	-
18	8.86	-
24	8.77	-
36	8.35	-
48	9.32	-
54	8.20	-

*: Worst Rate

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

Maximum Peak Output Power

Report No. 14026147S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date June 7, 2021
Temperature / Humidity 23 deg. C / 60 % RH
Engineer Shiro Kobayashi
Mode Tx 11n-20

Freq.	Reading	Cable Loss	Atten. Loss	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]	[dB]		[dBm]	[mW]	[dBm]	[mW]	
[MHz]	[dBm]	[dB]	[dB]						[dBi]					
2412	8.55	1.49	9.97	20.01	100.23	30.00	1000	9.99	1.80	21.81	151.71	36.02	4000	14.21
2437	9.99	1.49	9.98	21.46	139.96	30.00	1000	8.54	1.80	23.26	211.84	36.02	4000	12.76
2462	9.17	1.50	9.98	20.65	116.14	30.00	1000	9.35	1.80	22.45	175.79	36.02	4000	13.57

Sample Calculation:

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

e.i.r.p. Result = Conducted Power Result + Antenna Gain

2437 MHz

MCS Index	Reading [dBm]	Remark
0	9.83	-
1	9.70	-
2	9.56	-
3	9.38	-
4	9.50	-
5	9.99	*
6	9.50	-
7	9.67	-

*: Worst Rate

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

Maximum Peak Output Power

Report No. 14026147S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date June 7, 2021
Temperature / Humidity 23 deg. C / 60 % RH
Engineer Shiro Kobayashi
Mode Tx 11n-40

Freq.	Reading	Cable Loss	Atten. Loss	Conducted Power					e.i.r.p. for RSS-247					
				Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
				[dBm]	[mW]	[dBm]	[mW]	[dB]		[dBm]	[mW]	[dBm]	[mW]	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2422	6.26	1.49	9.98	17.73	59.29	30.00	1000	12.27	1.80	19.53	89.74	36.02	4000	16.49
2437	7.79	1.49	9.98	19.26	84.33	30.00	1000	10.74	1.80	21.06	127.64	36.02	4000	14.96
2452	6.24	1.50	9.98	17.72	59.16	30.00	1000	12.28	1.80	19.52	89.54	36.02	4000	16.50

Sample Calculation:

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

e.i.r.p. Result = Conducted Power Result + Antenna Gain

2437 MHz

MCS Index	Reading [dBm]	Remark
0	7.58	-
1	7.26	-
2	7.40	-
3	7.39	-
4	7.43	-
5	7.29	-
6	7.43	-
7	7.79	*

*: Worst Rate

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

Average Output Power (Reference data for RF Exposure)

Report No. 14026147S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date June 7, 2021
Temperature / Humidity 23 deg. C / 60 % RH
Engineer Shiro Kobayashi
Mode Tx

11b 5.5 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor *1) [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	0.07	1.49	9.97	11.53	14.22	0.00	11.53	14.22
2437	0.10	1.49	9.98	11.57	14.35	0.00	11.57	14.35
2462	0.42	1.50	9.98	11.90	15.49	0.00	11.90	15.49

11g 48 Mbps

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor *1) [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-2.82	1.49	9.97	8.64	7.31	0.00	8.64	7.31
2437	-0.75	1.49	9.98	10.72	11.80	0.00	10.72	11.80
2462	-2.61	1.50	9.98	8.87	7.71	0.00	8.87	7.71

11n-20 MCS 3

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor *1) [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2412	-2.81	1.49	9.97	8.65	7.33	0.00	8.65	7.33
2437	-0.84	1.49	9.98	10.63	11.56	0.00	10.63	11.56
2462	-2.54	1.50	9.98	8.94	7.83	0.00	8.94	7.83

11n-40 MCS 7

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor *1) [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2422	-5.55	1.49	9.98	5.92	3.91	0.00	5.92	3.91
2437	-3.73	1.49	9.98	7.74	5.94	0.00	7.74	5.94
2452	-5.50	1.50	9.98	5.98	3.96	0.00	5.98	3.96

*1) Duty Factor is not required because the measurement using a gated RF average power meter.

Sample Calculation:

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

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

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

Report No.	14026147S-A
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	June 7, 2021
Temperature / Humidity	23 deg. C / 60 % RH
Engineer	Shiro Kobayashi
Mode	Tx

2437 MHz

Mode	Rate Mbps	Reading [dBm]	Remarks
11b	1	-0.04	-
	2	-0.04	-
	5.5	0.10	*
	11	0.03	-
11g	6	-0.97	-
	9	-0.98	-
	12	-0.93	-
	18	-0.94	-
	24	-0.93	-
	36	-0.93	-
	48	-0.75	*
	54	-0.87	-

* Worst rate

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

2437 MHz

Mode	MCS Index	Reading [dBm]	Remarks
11n-20	0	-0.96	-
	1	-0.95	-
	2	-0.94	-
	3	-0.84	*
	4	-0.86	-
	5	-0.97	-
	6	-1.10	-
	7	-1.03	-
11n-40	0	-3.98	-
	1	-3.84	-
	2	-3.87	-
	3	-3.79	-
	4	-3.81	-
	5	-3.76	-
	6	-3.94	-
	7	-3.73	*

* Worst rate

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

UL Japan, Inc.

Shonan EMC Lab.

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

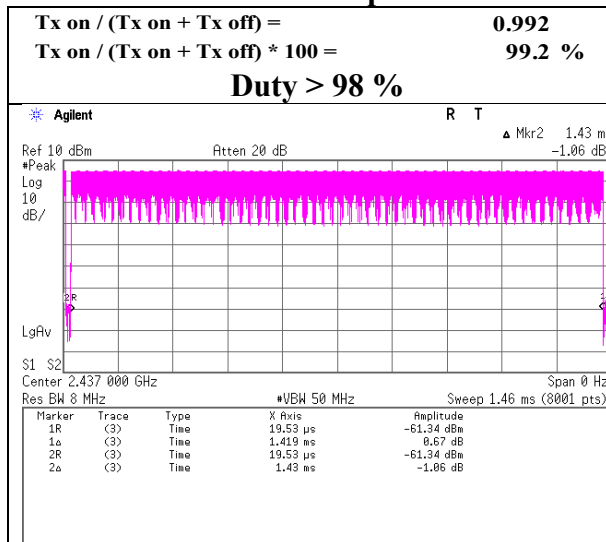
Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

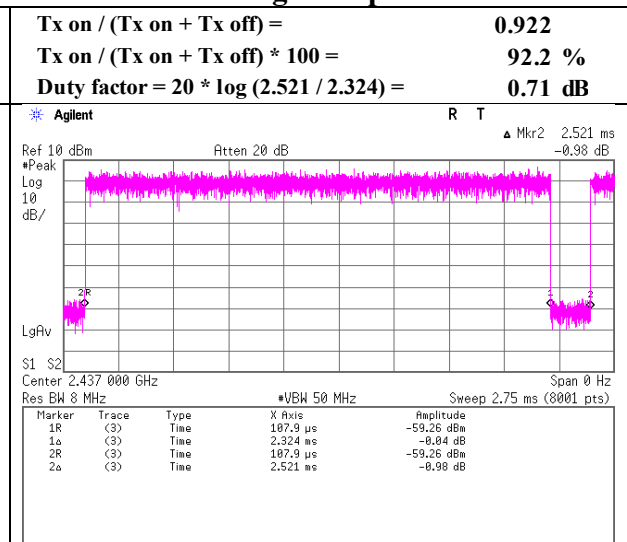
Burst rate confirmation

Report No. 14026147S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date June 7, 2021
Temperature / Humidity 23 deg. C / 60 % RH
Engineer Shiro Kobayashi
Mode Tx

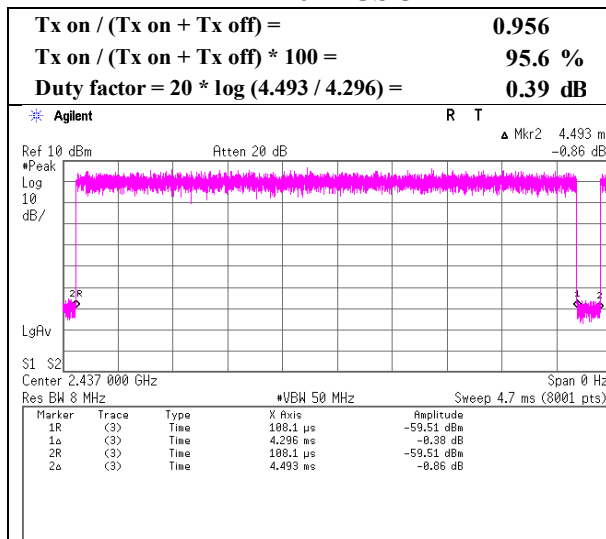
11b 1 Mbps



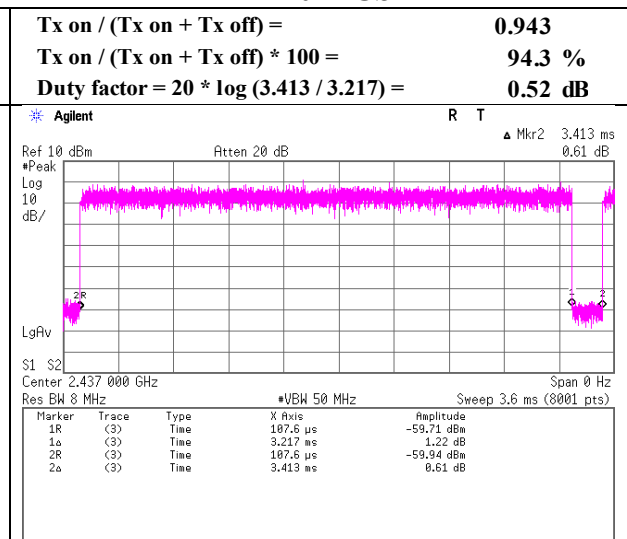
11g 6 Mbps



11n-20 MCS 5



11n-40 MCS 7



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

Radiated Spurious Emission

Report No. 14026147S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3 3 3
Date November 20, 2021 June 22, 2021 June 24, 2021
Temperature / Humidity 22 deg.C, 32 %RH 22 deg.C, 55 %RH 24 deg.C, 56 %RH
Engineer Takahiro Kawakami Hiromasa Sato Hiromasa Sato
(1 GHz -2.8 GHz) (2.8 GHz -18 GHz) (18 GHz -26.5 GHz)
Mode Tx 11b 2412 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	55.46	28.33	14.42	41.62	2.46	59.05	73.9	14.8	142	69	-
Hori.	3618.000	PK	51.48	29.02	6.35	42.18	2.46	47.13	73.9	26.7	275	228	-
Hori.	4824.000	PK	54.95	31.47	6.85	42.89	2.46	52.84	73.9	21.0	188	107	-
Hori.	7236.000	PK	51.83	36.07	8.27	43.42	2.46	55.21	73.9	18.6	150	0	-
Hori.	9648.000	PK	52.24	38.77	9.52	43.12	2.46	59.87	73.9	14.0	150	0	-
Hori.	2390.000	AV	40.03	28.33	14.42	41.62	2.46	43.62	53.9	10.2	142	69	-
Hori.	3618.000	AV	43.75	29.02	6.35	42.18	2.46	39.40	53.9	14.5	275	228	-
Hori.	4824.000	AV	48.65	31.47	6.85	42.89	2.46	46.54	53.9	7.3	188	107	-
Hori.	7236.000	AV	38.81	36.07	8.27	43.42	2.46	42.19	53.9	11.7	150	0	floor noise
Hori.	9648.000	AV	39.22	38.77	9.52	43.12	2.46	46.85	53.9	7.0	150	0	floor noise
Vert.	2390.000	PK	57.40	28.33	14.42	41.62	2.46	60.99	73.9	12.9	158	91	-
Vert.	3618.000	PK	51.34	29.02	6.35	42.18	2.46	46.99	73.9	26.9	202	247	-
Vert.	4824.000	PK	55.33	31.47	6.85	42.89	2.46	53.22	73.9	20.6	105	128	-
Vert.	7236.000	PK	50.71	36.07	8.27	43.42	2.46	54.09	73.9	19.8	150	0	-
Vert.	9648.000	PK	52.04	38.77	9.52	43.12	2.46	59.67	73.9	14.2	150	0	-
Vert.	2390.000	AV	40.88	28.33	14.42	41.62	2.46	44.47	53.9	9.4	158	91	-
Vert.	3618.000	AV	43.28	29.02	6.35	42.18	2.46	38.93	53.9	14.9	202	247	-
Vert.	4824.000	AV	49.31	31.47	6.85	42.89	2.46	47.20	53.9	6.7	105	128	-
Vert.	7236.000	AV	38.52	36.07	8.27	43.42	2.46	41.90	53.9	12.0	150	0	floor noise
Vert.	9648.000	AV	39.29	38.77	9.52	43.12	2.46	46.92	53.9	6.9	150	0	floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98\text{ m} / 3.0\text{ m}) = 2.46\text{ dB}$

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	98.39	28.29	14.44	41.63	2.46	101.95	-	-	Carrier
Hori.	2400.000	PK	51.44	28.31	14.44	41.63	2.46	55.02	81.9	26.8	-
Vert.	2412.000	PK	100.33	28.29	14.44	41.63	2.46	103.89	-	-	Carrier
Vert.	2400.000	PK	53.88	28.31	14.44	41.63	2.46	57.46	83.8	26.3	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98\text{ m} / 3.0\text{ m}) = 2.46\text{ dB}$

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

UL Japan, Inc.

Shonan EMC Lab.

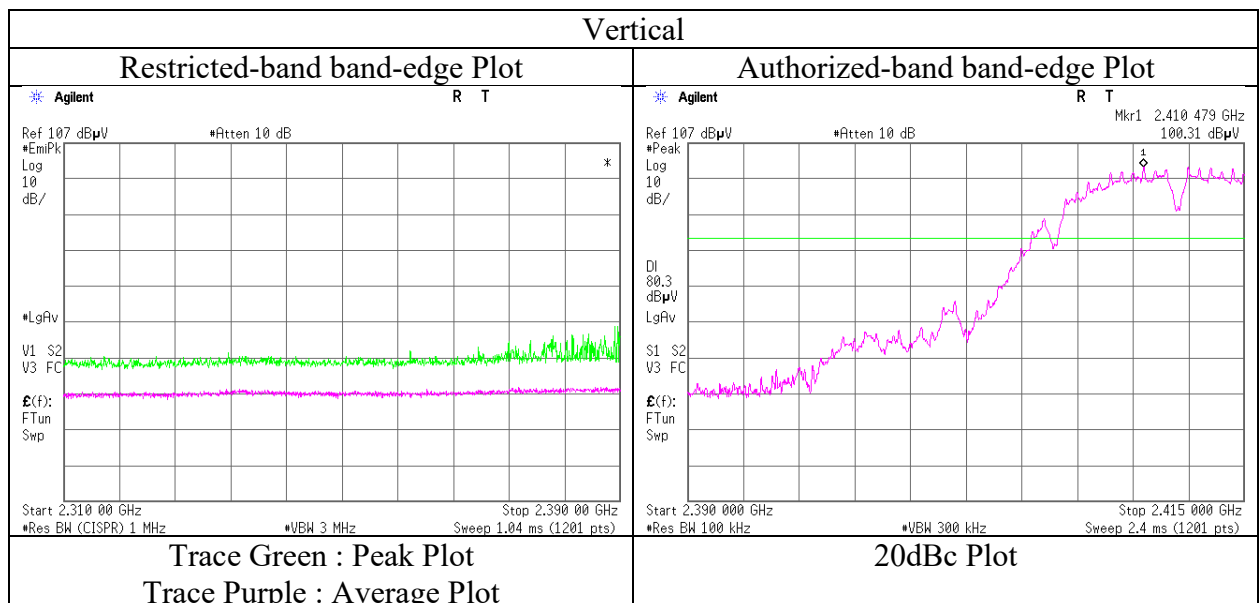
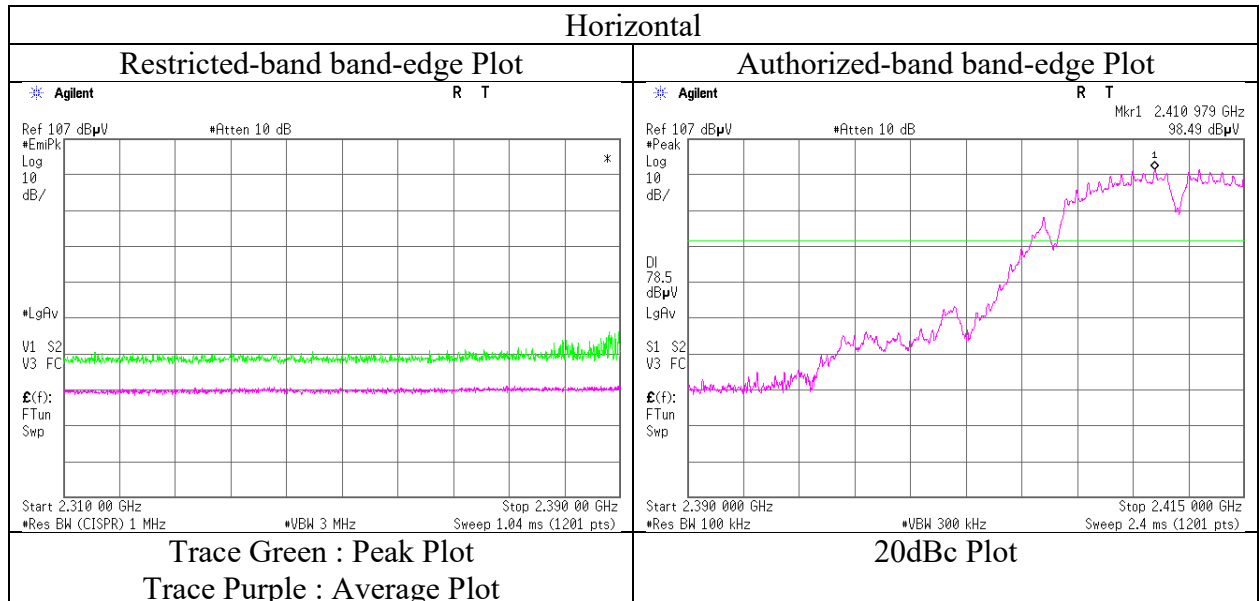
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	14026147S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 20, 2021
Temperature / Humidity	22 deg.C, 32 %RH
Engineer	Takahiro Kawakami
	(1 GHz -2.8 GHz)
Mode	Tx 11b 2412 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No. 14026147S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3 3 3 3
Date November 20, 2021 June 20, 2021 June 22, 2021 June 24, 2021
Temperature / Humidity 22 deg.C, 32 %RH 24 deg.C, 58 %RH 22 deg.C, 55 %RH 24 deg.C, 56 %RH
Engineer Takahiro Kawakami Toshinori Yamada Hiromasa Sato Hiromasa Sato
(1 GHz -2.8 GHz) (2.8 GHz -10 GHz) (10 GHz -18 GHz) (18 GHz -26.5 GHz)
Mode Tx 11b 2437 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	3655.500	PK	50.91	29.68	6.36	42.19	2.46	47.22	73.9	26.6	256	278	-
Hori.	4874.000	PK	50.73	31.63	6.88	42.89	2.46	48.81	73.9	25.0	108	258	-
Hori.	7311.000	PK	49.29	37.69	8.32	43.51	2.46	54.25	73.9	19.6	150	0	-
Hori.	9748.000	PK	49.36	39.17	9.56	42.99	2.46	57.56	73.9	16.3	150	0	-
Hori.	3655.500	AV	42.78	29.68	6.36	42.19	2.46	39.09	53.9	14.8	256	278	-
Hori.	4874.000	AV	43.44	31.63	6.88	42.89	2.46	41.52	53.9	12.3	108	258	-
Hori.	7311.000	AV	39.37	37.69	8.32	43.51	2.46	44.33	53.9	9.5	150	0	floor noise
Hori.	9748.000	AV	39.15	39.17	9.56	42.99	2.46	47.35	53.9	6.5	150	0	floor noise
Vert.	3655.500	PK	51.40	29.68	6.36	42.19	2.46	47.71	73.9	26.1	242	246	-
Vert.	4874.000	PK	52.92	31.63	6.88	42.89	2.46	51.00	73.9	22.9	105	126	-
Vert.	7311.000	PK	49.14	37.69	8.32	43.51	2.46	54.10	73.9	19.8	150	0	-
Vert.	9748.000	PK	49.16	39.17	9.56	42.99	2.46	57.36	73.9	16.5	150	0	-
Vert.	3655.500	AV	43.78	29.68	6.36	42.19	2.46	40.09	53.9	13.8	242	246	-
Vert.	4874.000	AV	46.31	31.63	6.88	42.89	2.46	44.39	53.9	9.5	105	126	-
Vert.	7311.000	AV	39.22	37.69	8.32	43.51	2.46	44.18	53.9	9.7	150	0	floor noise
Vert.	9748.000	AV	39.10	39.17	9.56	42.99	2.46	47.30	53.9	6.6	150	0	floor noise

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

Distance factor : 1 GHz - 10 GHz : 20log (3.98 m / 3.0 m) = 2.46 dB

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

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No. 14026147S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3 3 3
Date November 20, 2021 June 22, 2021 June 24, 2021
Temperature / Humidity 22 deg.C, 32 %RH 22 deg.C, 55 %RH 24 deg.C, 56 %RH
Engineer Takahiro Kawakami Hiromasa Sato Hiromasa Sato
(1 GHz -2.8 GHz) (2.8 GHz -18 GHz) (18 GHz -26.5 GHz)
Mode Tx 11b 2462 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	56.08	28.24	14.52	41.65	2.46	59.65	73.9	14.2	109	65	-
Hori.	2485.377	PK	57.76	28.24	14.52	41.66	2.46	61.32	73.9	12.5	109	65	-
Hori.	3693.000	PK	51.92	29.17	6.36	42.20	2.46	47.71	73.9	26.1	184	271	-
Hori.	4924.000	PK	53.13	31.53	6.92	42.89	2.46	51.15	73.9	22.7	222	103	-
Hori.	7386.000	PK	50.71	36.29	8.35	43.59	2.46	54.22	73.9	19.6	150	0	-
Hori.	9848.000	PK	50.57	38.99	9.59	42.86	2.46	58.75	73.9	15.1	150	0	-
Hori.	2483.500	AV	40.50	28.24	14.52	41.65	2.46	44.07	53.9	9.8	109	65	-
Hori.	2485.377	AV	39.86	28.24	14.52	41.66	2.46	43.42	53.9	10.4	109	65	-
Hori.	3693.000	AV	46.08	29.17	6.36	42.20	2.46	41.87	53.9	12.0	184	271	-
Hori.	4924.000	AV	43.76	31.53	6.92	42.89	2.46	41.78	53.9	12.1	222	103	-
Hori.	7386.000	AV	38.34	36.29	8.35	43.59	2.46	41.85	53.9	12.0	150	0	floor noise
Hori.	9848.000	AV	37.92	38.99	9.59	42.86	2.46	46.10	53.9	7.8	150	0	floor noise
Vert.	2483.500	PK	57.65	28.24	14.52	41.65	2.46	61.22	73.9	12.6	140	89	-
Vert.	2485.614	PK	58.70	28.24	14.52	41.66	2.46	62.26	73.9	11.6	140	89	-
Vert.	3693.000	PK	51.30	29.17	6.36	42.20	2.46	47.09	73.9	26.8	154	249	-
Vert.	4924.000	PK	52.83	31.53	6.92	42.89	2.46	50.85	73.9	23.0	132	121	-
Vert.	7386.000	PK	50.83	36.29	8.35	43.59	2.46	54.34	73.9	19.5	150	0	-
Vert.	9848.000	PK	49.95	38.99	9.59	42.86	2.46	58.13	73.9	15.7	150	0	-
Vert.	2483.500	AV	41.65	28.24	14.52	41.65	2.46	45.22	53.9	8.6	140	89	-
Vert.	2485.614	AV	40.84	28.24	14.52	41.66	2.46	44.40	53.9	9.5	140	89	-
Vert.	3693.000	AV	45.05	29.17	6.36	42.20	2.46	40.84	53.9	13.0	154	249	-
Vert.	4924.000	AV	44.09	31.53	6.92	42.89	2.46	42.11	53.9	11.7	132	121	-
Vert.	7386.000	AV	38.19	36.29	8.35	43.59	2.46	41.70	53.9	12.2	150	0	floor noise
Vert.	9848.000	AV	38.67	38.99	9.59	42.86	2.46	46.85	53.9	7.0	150	0	floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

UL Japan, Inc.

Shonan EMC Lab.

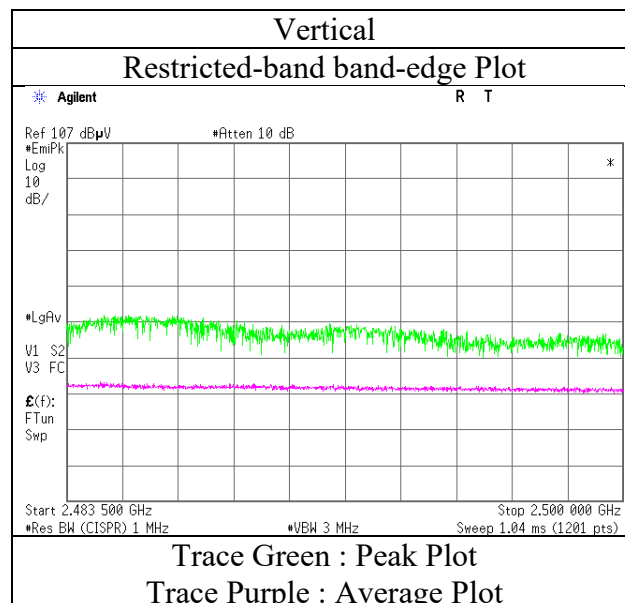
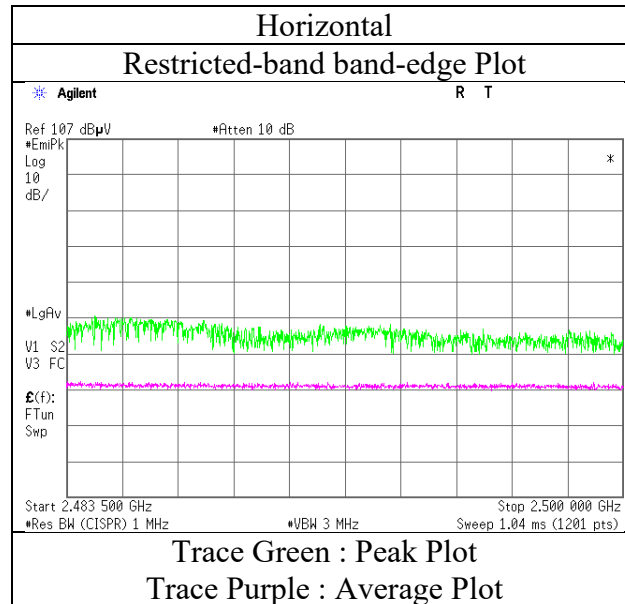
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission **(Reference Plot for band-edge)**

Report No. 14026147S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date November 20, 2021
Temperature / Humidity 22 deg.C, 32 %RH
Engineer Takahiro Kawakami
(1 GHz -2.8 GHz)
Mode Tx 11b 2462 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No. 14026147S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date November 20, 2021
Temperature / Humidity 22 deg.C, 32 %RH
Engineer Takahiro Kawakami
(1 GHz -2.8 GHz)
Mode Tx 11g 2412 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	53.34	28.33	14.42	41.62	2.46	56.93	73.9	16.9	139	64	-
Vert.	2390.000	PK	58.29	28.33	14.42	41.62	2.46	61.88	73.9	12.0	158	90	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

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	41.81	28.33	14.42	41.62	0.71	2.46	46.11	53.9	7.7	*1)
Vert.	2390.000	AV	44.45	28.33	14.42	41.62	0.71	2.46	48.75	53.9	5.1	*1)

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

Duty factor refer to "Burst rate confirmation" sheet.

*1) Not out of band emission (Leakage Power)

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	92.96	28.29	14.44	41.63	2.46	96.52	-	-	Carrier
Hori.	2400.000	PK	48.90	28.31	14.44	41.63	2.46	52.48	76.5	24.0	-
Vert.	2412.000	PK	94.22	28.29	14.44	41.63	2.46	97.78	-	-	Carrier
Vert.	2400.000	PK	51.47	28.31	14.44	41.63	2.46	55.05	77.7	22.6	-

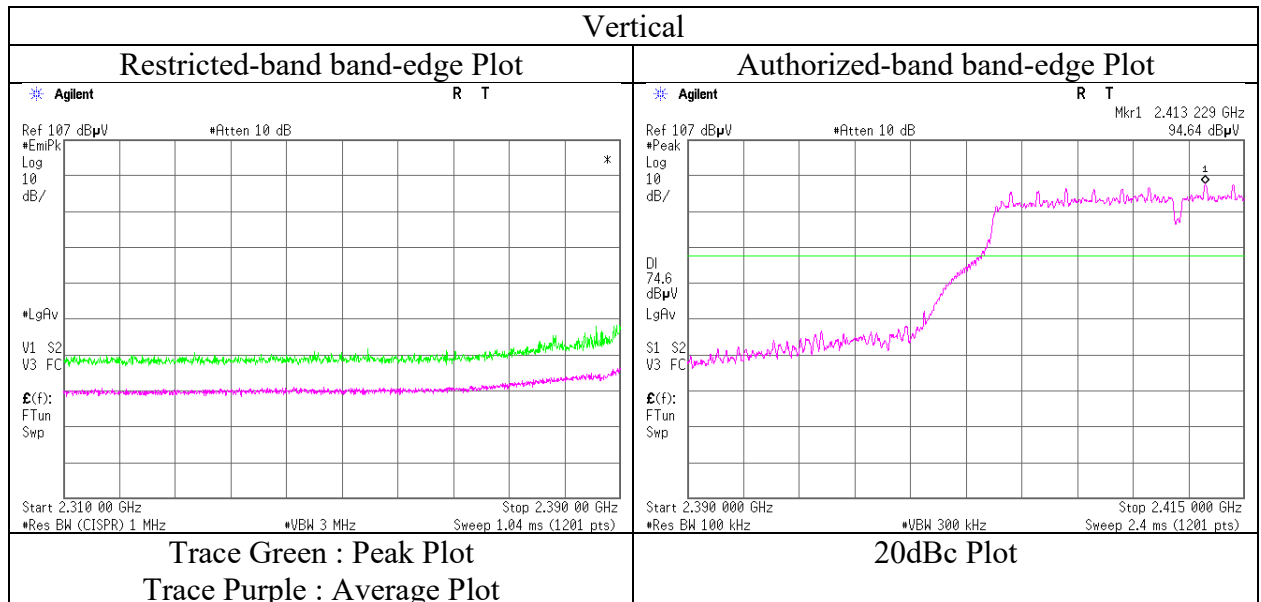
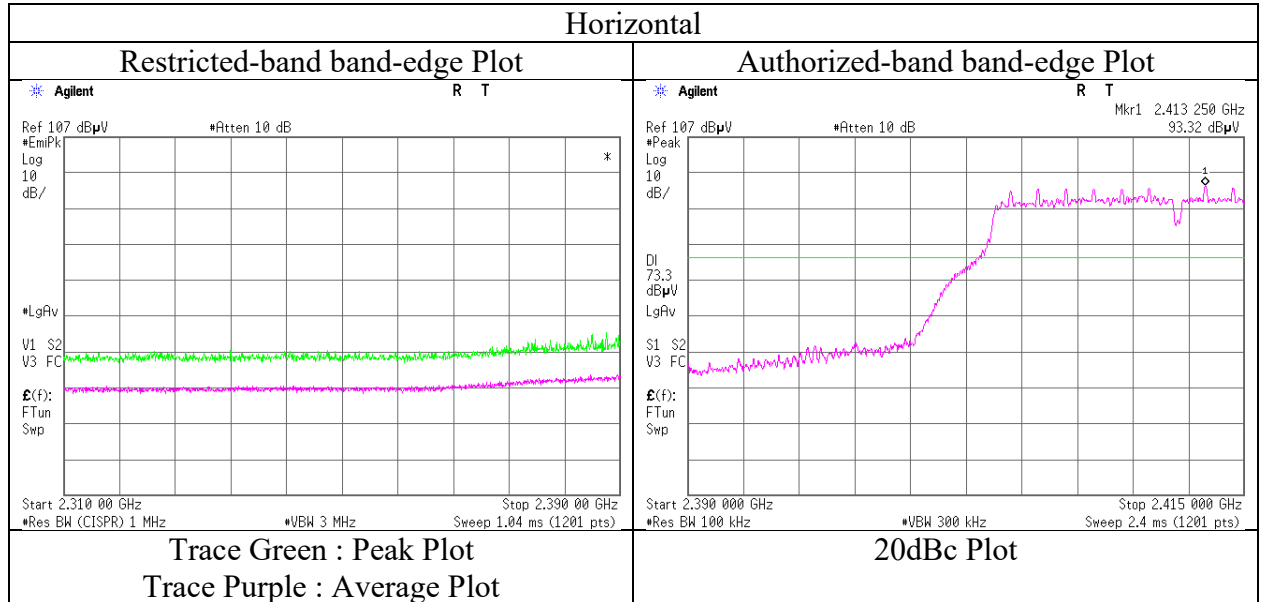
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	14026147S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 20, 2021
Temperature / Humidity	22 deg.C, 32 %RH
Engineer	Takahiro Kawakami
	(1 GHz -2.8 GHz)
Mode	Tx 11g 2412 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No. 14026147S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date November 20, 2021
Temperature / Humidity 22 deg.C, 32 %RH
Engineer Takahiro Kawakami
(1 GHz – 2.8 GHz)
Mode Tx 11g 2417 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	52.31	28.33	14.42	41.62	2.46	55.90	73.9	18.0	124	63	-
Vert.	2390.000	PK	54.40	28.33	14.42	41.62	2.46	57.99	73.9	15.9	158	87	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

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	43.24	28.33	14.42	41.62	0.71	2.46	47.54	53.9	6.3	*1)
Vert.	2390.000	AV	44.94	28.33	14.42	41.62	0.71	2.46	49.24	53.9	4.6	*1)

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

Duty factor refer to "Burst rate confirmation" sheet.

*1) Not out of band emission (Leakage Power)

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.	2417.000	PK	94.73	28.28	14.45	41.63	2.46	98.29	-	-	Carrier
Hori.	2400.000	PK	50.44	28.31	14.44	41.63	2.46	54.02	78.2	24.1	-
Vert.	2417.000	PK	96.22	28.28	14.45	41.63	2.46	99.78	-	-	Carrier
Vert.	2400.000	PK	53.09	28.31	14.44	41.63	2.46	56.67	79.7	23.0	-

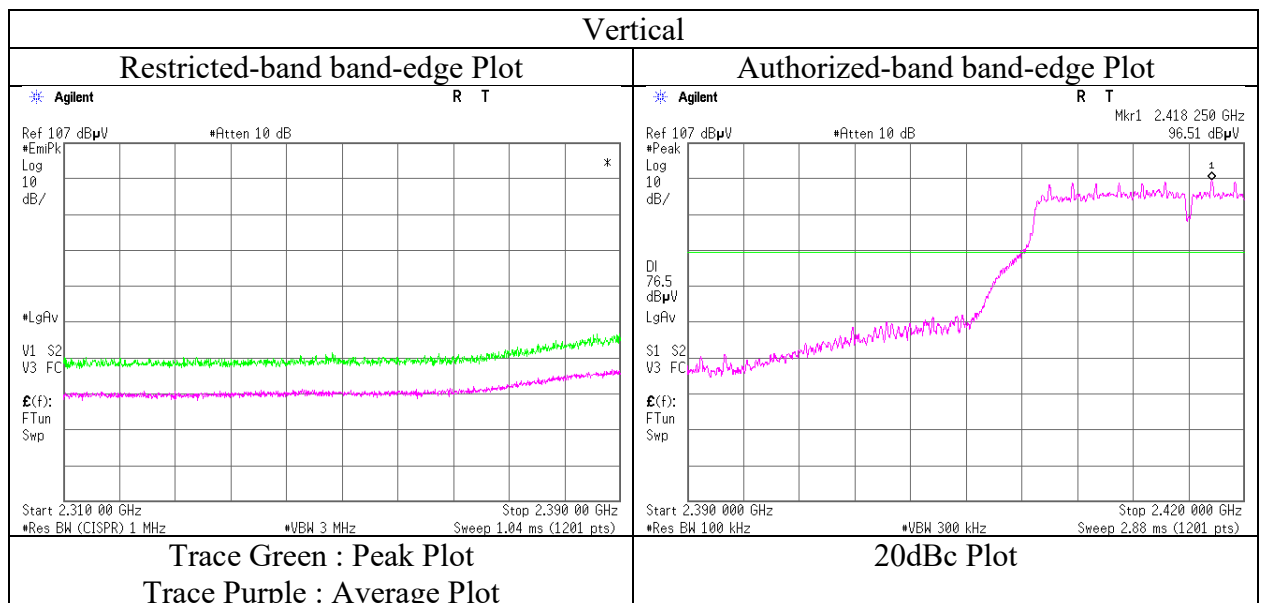
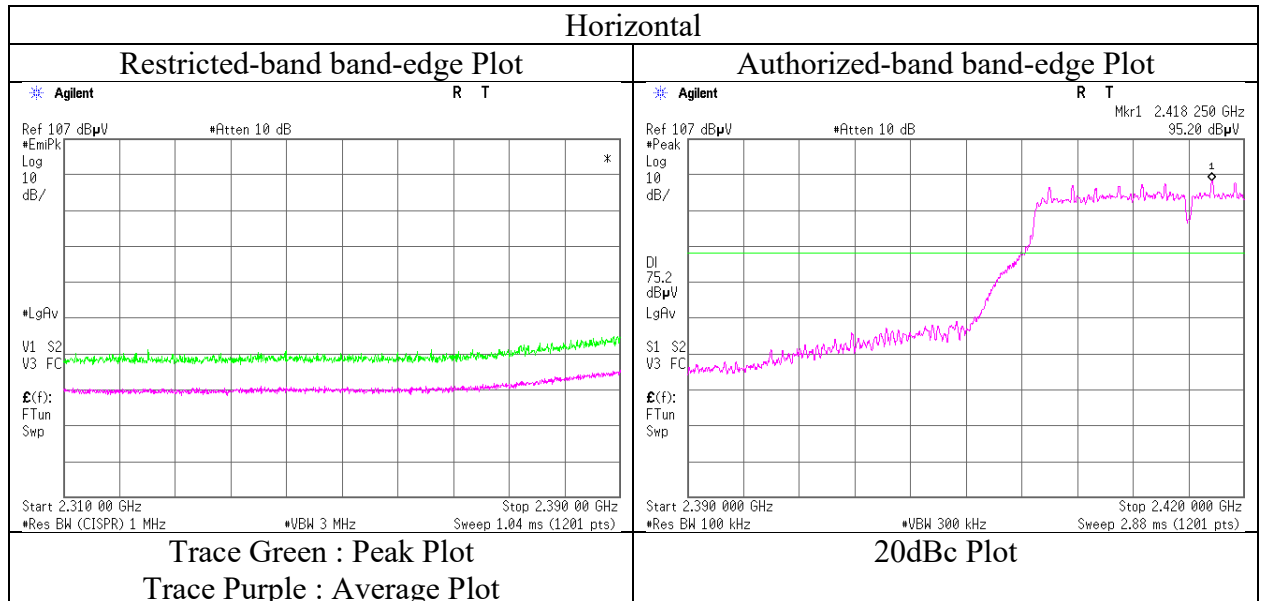
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	14026147S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 20, 2021
Temperature / Humidity	22 deg.C, 32 %RH
Engineer	Takahiro Kawakami
	(1 GHz – 2.8 GHz)
Mode	Tx 11g 2417 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No. 14026147S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date November 20, 2021
Temperature / Humidity 22 deg.C, 32 %RH
Engineer Takahiro Kawakami
(1 GHz – 2.8 GHz)
Mode Tx 11g 2457 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	55.97	28.24	14.52	41.65	2.46	59.54	73.9	14.3	135	67	-
Vert.	2483.500	PK	56.59	28.24	14.52	41.65	2.46	60.16	73.9	13.7	143	92	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

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	44.74	28.24	14.52	41.65	0.71	2.46	49.02	53.9	4.8	*1)
Vert.	2483.500	AV	46.20	28.24	14.52	41.65	0.71	2.46	50.48	53.9	3.4	*1)

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

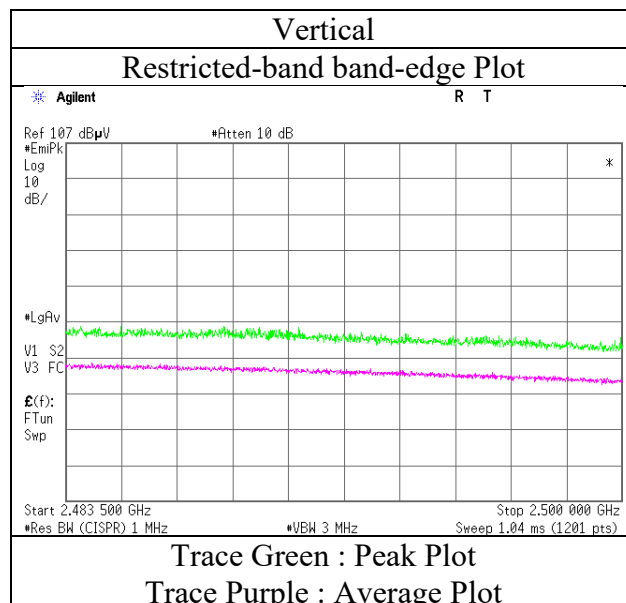
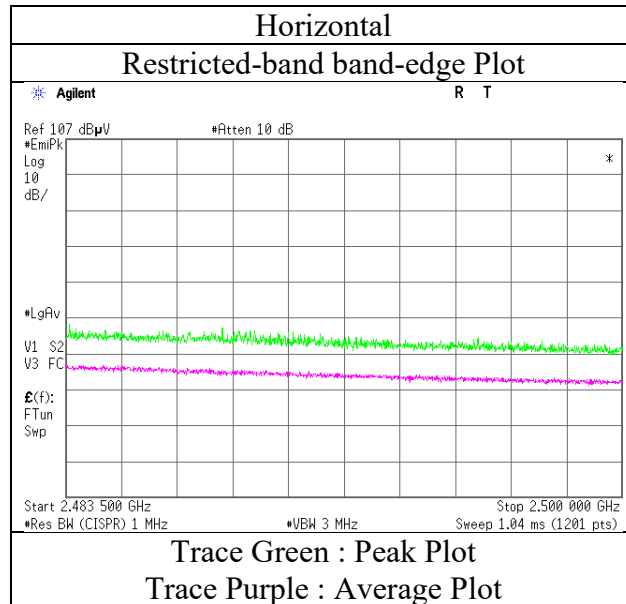
10 GHz - 40 GHz : $20\log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

Duty factor refer to "Burst rate confirmation" sheet.

*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	14026147S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 20, 2021
Temperature / Humidity	22 deg.C, 32 %RH
Engineer	Takahiro Kawakami
	(1 GHz – 2.8 GHz)
Mode	Tx 11g 2457 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions. Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No. 14026147S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date November 20, 2021
Temperature / Humidity 22 deg.C, 32 %RH
Engineer Takahiro Kawakami
(1 GHz -2.8 GHz)
Mode Tx 11g 2462 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	57.35	28.24	14.52	41.65	2.46	60.92	73.9	12.9	199	61	-
Vert.	2483.500	PK	60.03	28.24	14.52	41.65	2.46	63.60	73.9	10.3	145	89	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98\text{ m} / 3.0\text{ m}) = 2.46\text{ dB}$

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

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	44.75	28.24	14.52	41.65	0.71	2.46	49.03	53.9	4.8	*1)
Vert.	2483.500	AV	46.23	28.24	14.52	41.65	0.71	2.46	50.51	53.9	3.3	*1)

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98\text{ m} / 3.0\text{ m}) = 2.46\text{ dB}$

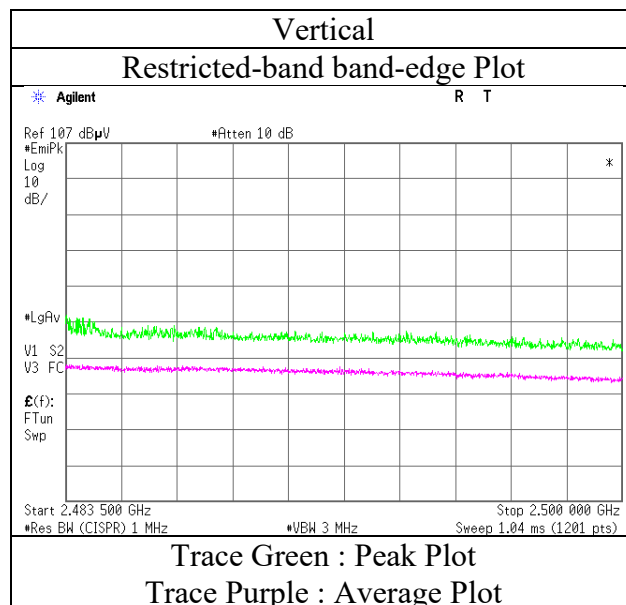
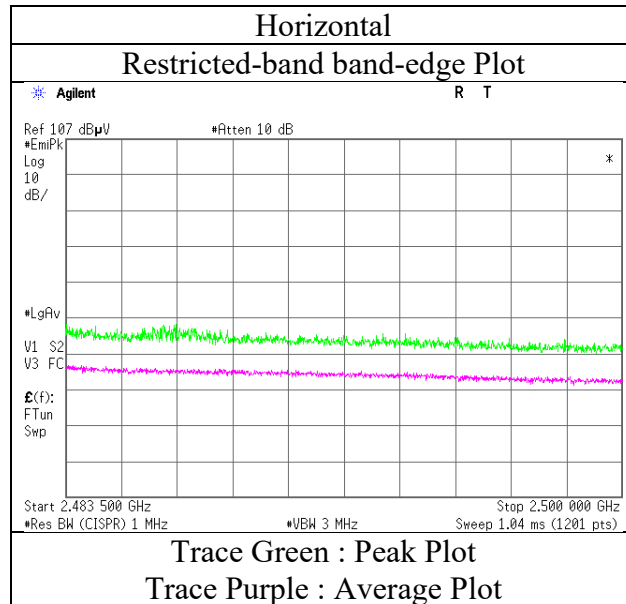
10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Burst rate confirmation" sheet.

*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	14026147S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 20, 2021
Temperature / Humidity	22 deg.C, 32 %RH
Engineer	Takahiro Kawakami
	(1 GHz -2.8 GHz)
Mode	Tx 11g 2462 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions. Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No. 14026147S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3 3 3
Date November 20, 2021 June 22, 2021 June 24, 2021
Temperature / Humidity 22 deg.C, 32 %RH 22 deg.C, 55 %RH 24 deg.C, 56 %RH
Engineer Takahiro Kawakami Hiromasa Sato Hiromasa Sato
(1 GHz -2.8 GHz) (2.8 GHz -18 GHz) (18 GHz -26.5 GHz)
Mode Tx 11n-20 2412 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	58.22	28.33	14.42	41.62	2.46	61.81	73.9	12.0	139	65	-
Hori.	3618.000	PK	50.74	29.02	6.35	42.18	2.46	46.39	73.9	27.5	265	220	-
Hori.	4824.000	PK	50.47	31.47	6.85	42.89	2.46	48.36	73.9	25.5	249	109	-
Hori.	7236.000	PK	50.87	36.07	8.27	43.42	2.46	54.25	73.9	19.6	150	0	-
Hori.	9648.000	PK	51.66	38.77	9.52	43.12	2.46	59.29	73.9	14.6	150	0	-
Hori.	7236.000	AV	40.35	36.07	8.27	43.42	2.46	43.73	53.9	10.1	150	0	floor noise
Hori.	9648.000	AV	39.87	38.77	9.52	43.12	2.46	47.50	53.9	6.4	150	0	floor noise
Vert.	2390.000	PK	61.09	28.33	14.42	41.62	2.46	64.68	73.9	9.2	157	92	-
Vert.	3618.000	PK	50.83	29.02	6.35	42.18	2.46	46.48	73.9	27.4	167	249	-
Vert.	4824.000	PK	51.62	31.47	6.85	42.89	2.46	49.51	73.9	24.3	126	126	-
Vert.	7236.000	PK	50.75	36.07	8.27	43.42	2.46	54.13	73.9	19.7	150	0	-
Vert.	9648.000	PK	50.94	38.77	9.52	43.12	2.46	58.57	73.9	15.3	150	0	-
Vert.	7236.000	AV	39.02	36.07	8.27	43.42	2.46	42.40	53.9	11.5	150	0	floor noise
Vert.	9648.000	AV	38.89	38.77	9.52	43.12	2.46	46.52	53.9	7.3	150	0	floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

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	43.66	28.33	14.42	41.62	0.39	2.46	47.64	53.9	6.2	*1)
Hori.	3618.000	AV	43.63	29.02	6.35	42.18	0.39	2.46	39.67	53.9	14.2	-
Hori.	4824.000	AV	40.62	31.47	6.85	42.89	0.39	2.46	38.90	53.9	15.0	-
Vert.	2390.000	AV	45.85	28.33	14.42	41.62	0.39	2.46	49.83	53.9	4.0	*1)
Vert.	3618.000	AV	43.55	29.02	6.35	42.18	0.39	2.46	39.59	53.9	14.3	-
Vert.	4824.000	AV	40.49	31.47	6.85	42.89	0.39	2.46	38.77	53.9	15.1	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

Duty factor refer to "Burst rate confirmation" sheet.

*1) Not out of band emission (Leakage Power)

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	92.43	28.29	14.44	41.63	2.46	95.99	-	-	Carrier
Hori.	2400.000	PK	50.54	28.31	14.44	41.63	2.46	54.12	75.9	21.7	-
Vert.	2412.000	PK	94.52	28.29	14.44	41.63	2.46	98.08	-	-	Carrier
Vert.	2400.000	PK	54.41	28.31	14.44	41.63	2.46	57.99	78.0	20.0	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

UL Japan, Inc.

Shonan EMC Lab.

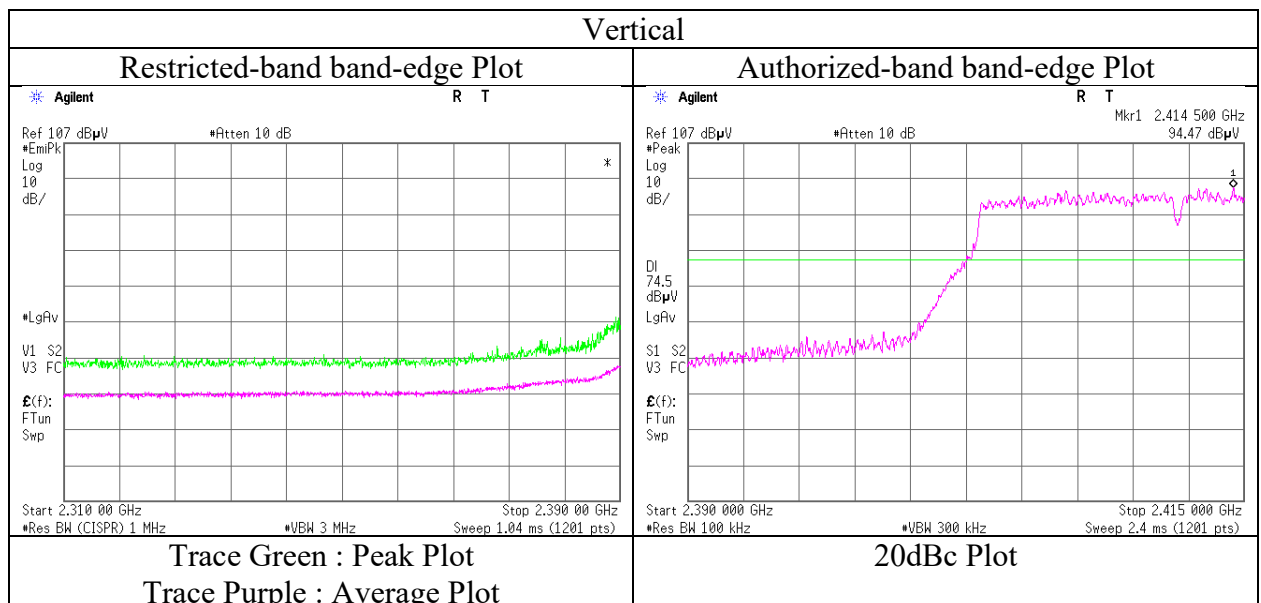
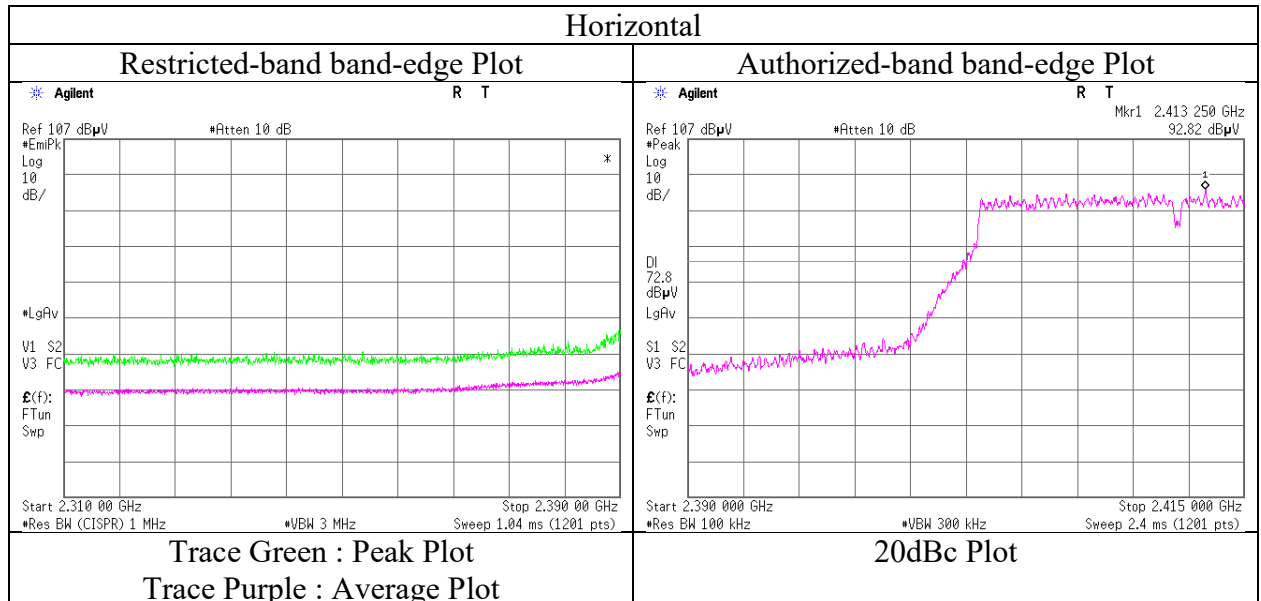
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	14026147S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 20, 2021
Temperature / Humidity	22 deg.C, 32 %RH
Engineer	Takahiro Kawakami (1 GHz -2.8 GHz)
Mode	Tx 11n-20 2412 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No. 14026147S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date November 20, 2021
Temperature / Humidity 22 deg.C, 32 %RH
Engineer Takahiro Kawakami
(1 GHz – 2.8 GHz)
Mode Tx 11n-20 2417 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	52.12	28.33	14.42	41.62	2.46	55.71	73.9	18.1	139	66	-
Vert.	2390.000	PK	56.25	28.33	14.42	41.62	2.46	59.84	73.9	14.0	156	89	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

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	41.97	28.33	14.42	41.62	0.39	2.46	45.95	53.9	7.9	*1)
Vert.	2390.000	AV	45.01	28.33	14.42	41.62	0.39	2.46	48.99	53.9	4.9	*1)

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

Duty factor refer to "Burst rate confirmation" sheet.

*1) Not out of band emission (Leakage Power)

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.	2417.000	PK	93.63	28.28	14.45	41.63	2.46	97.19	-	-	Carrier
Hori.	2400.000	PK	51.59	28.31	14.44	41.63	2.46	55.17	77.1	21.9	-
Vert.	2417.000	PK	96.77	28.28	14.45	41.63	2.46	100.33	-	-	Carrier
Vert.	2400.000	PK	55.41	28.31	14.44	41.63	2.46	58.99	80.3	21.3	-

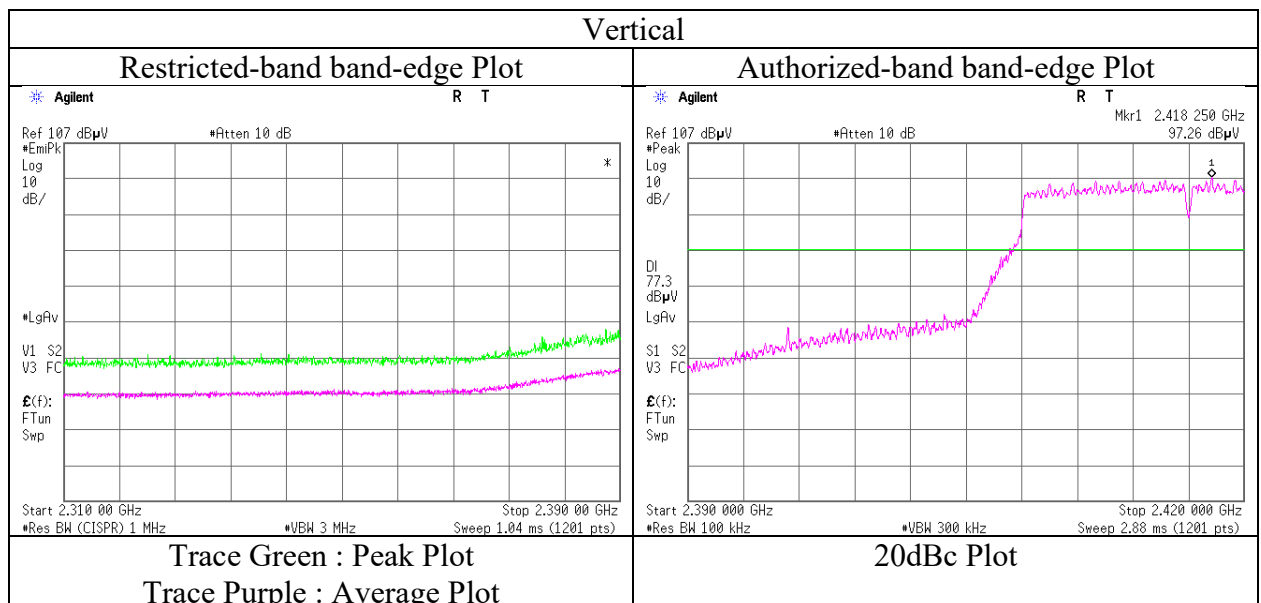
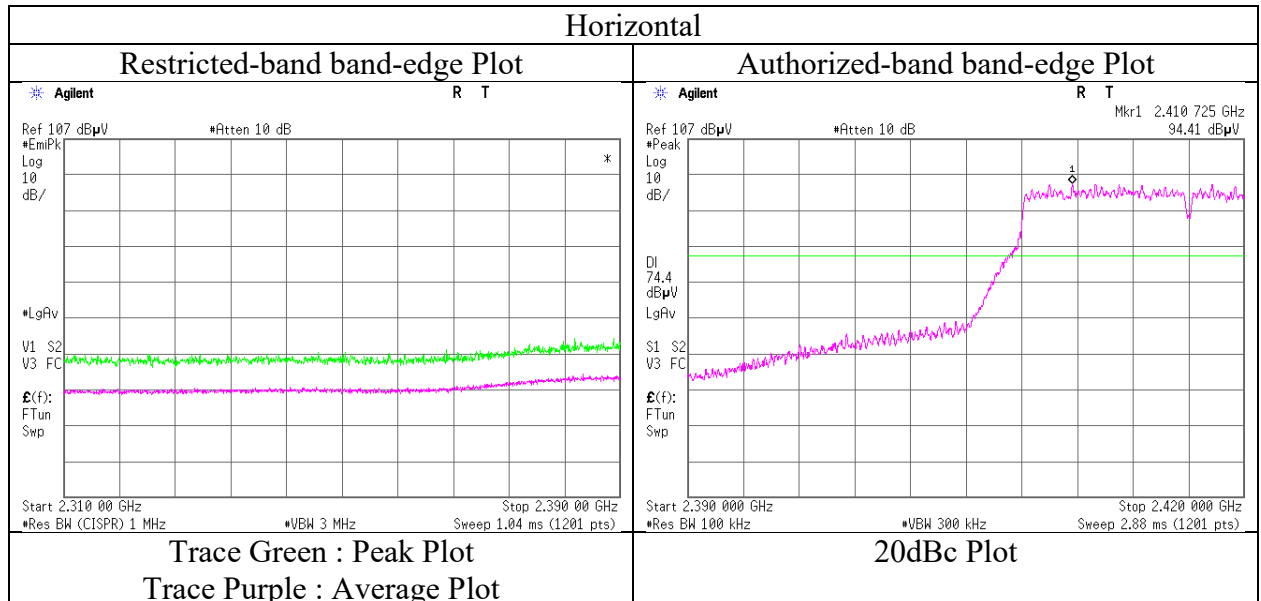
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	14026147S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 20, 2021
Temperature / Humidity	22 deg.C, 32 %RH
Engineer	Takahiro Kawakami
	(1 GHz – 2.8 GHz)
Mode	Tx 11n-20 2417 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No. 14026147S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3 3 3 3
Date June 26, 2021 November 20, 2021 June 22, 2021 June 24, 2021
Temperature / Humidity 24 deg.C, 50 %RH 22 deg.C, 32 %RH 22 deg.C, 55 %RH 24 deg.C, 56 %RH
Engineer Yusuke Tanikawara Takahiro Kawakami Hiromasa Sato Hiromasa Sato
(30 MHz -1 GHz) (1 GHz -2.8 GHz) (2.8 GHz -18 GHz) (18 GHz -26.5 GHz)
Mode Tx 11n-20 2437 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	198.138	QP	32.90	16.46	7.84	32.05	0.00	25.15	43.5	18.3	100	294	-
Hori.	209.781	QP	41.90	11.33	8.07	32.04	0.00	29.26	43.5	14.2	149	304	-
Hori.	324.520	QP	49.40	14.45	8.70	31.95	0.00	40.60	46.0	5.4	100	276	-
Hori.	393.320	QP	42.60	15.69	9.02	31.94	0.00	35.37	46.0	10.6	100	258	-
Hori.	402.582	QP	42.00	15.98	9.07	31.94	0.00	35.11	46.0	10.8	100	265	-
Hori.	571.798	QP	37.30	18.45	9.79	31.93	0.00	33.61	46.0	12.3	170	98	-
Hori.	3655.500	PK	51.67	29.10	6.36	42.19	2.46	47.40	73.9	26.5	188	277	-
Hori.	4874.000	PK	51.07	31.50	6.88	42.89	2.46	49.02	73.9	24.8	204	110	-
Hori.	7311.000	PK	51.32	36.14	8.32	43.51	2.46	54.73	73.9	19.1	150	0	-
Hori.	9748.000	PK	51.17	38.97	9.56	42.99	2.46	59.17	73.9	14.7	150	0	-
Hori.	7311.000	AV	37.74	36.14	8.32	43.51	2.46	41.15	53.9	12.7	150	0	floor noise
Hori.	9748.000	AV	38.00	38.97	9.56	42.99	2.46	46.00	53.9	7.9	150	0	floor noise
Vert.	50.053	QP	39.60	11.19	6.79	32.17	0.00	25.41	40.0	14.5	100	180	-
Vert.	198.131	QP	37.50	16.46	7.84	32.05	0.00	29.75	43.5	13.7	100	157	-
Vert.	209.528	QP	43.30	11.34	8.07	32.04	0.00	30.67	43.5	12.8	100	179	-
Vert.	482.862	QP	34.10	17.52	9.42	31.92	0.00	29.12	46.0	16.8	133	188	-
Vert.	3655.500	PK	51.12	29.10	6.36	42.19	2.46	46.85	73.9	27.0	217	243	-
Vert.	4874.000	PK	50.72	31.50	6.88	42.89	2.46	48.67	73.9	25.2	192	129	-
Vert.	7311.000	PK	50.27	36.14	8.32	43.51	2.46	53.68	73.9	20.2	150	0	-
Vert.	9748.000	PK	50.51	38.97	9.56	42.99	2.46	58.51	73.9	15.3	150	0	-
Vert.	7311.000	AV	38.75	36.14	8.32	43.51	2.46	42.16	53.9	11.7	150	0	floor noise
Vert.	9748.000	AV	39.21	38.97	9.56	42.99	2.46	47.21	53.9	6.6	150	0	floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98\text{ m} / 3.0\text{ m}) = 2.46\text{ dB}$

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

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.	3655.500	AV	45.08	29.10	6.36	42.19	0.39	2.46	41.20	53.9	12.7	-
Hori.	4874.000	AV	40.39	31.50	6.88	42.89	0.39	2.46	38.73	53.9	15.1	-
Vert.	3655.500	AV	44.08	29.10	6.36	42.19	0.39	2.46	40.20	53.9	13.7	-
Vert.	4874.000	AV	40.48	31.50	6.88	42.89	0.39	2.46	38.82	53.9	15.0	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98\text{ m} / 3.0\text{ m}) = 2.46\text{ dB}$

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

Duty factor refer to "Burst rate confirmation" sheet.

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Report No. 14026147S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date November 20, 2021
Temperature / Humidity 22 deg.C, 32 %RH
Engineer Takahiro Kawakami
(1 GHz – 2.8 GHz)
Mode Tx 11n-20 2457 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	57.12	28.24	14.52	41.65	2.46	60.69	73.9	13.2	199	57	-
Vert.	2483.500	PK	59.07	28.24	14.52	41.65	2.46	62.64	73.9	11.2	144	93	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98\text{ m} / 3.0\text{ m}) = 2.46\text{ dB}$

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

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	44.45	28.24	14.52	41.65	0.39	2.46	48.41	53.9	5.4	*1)
Vert.	2483.500	AV	46.05	28.24	14.52	41.65	0.39	2.46	50.01	53.9	3.8	*1)

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98\text{ m} / 3.0\text{ m}) = 2.46\text{ dB}$

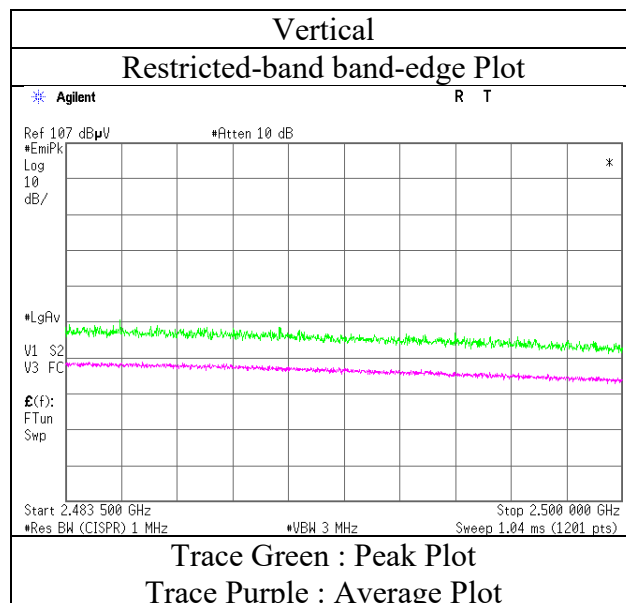
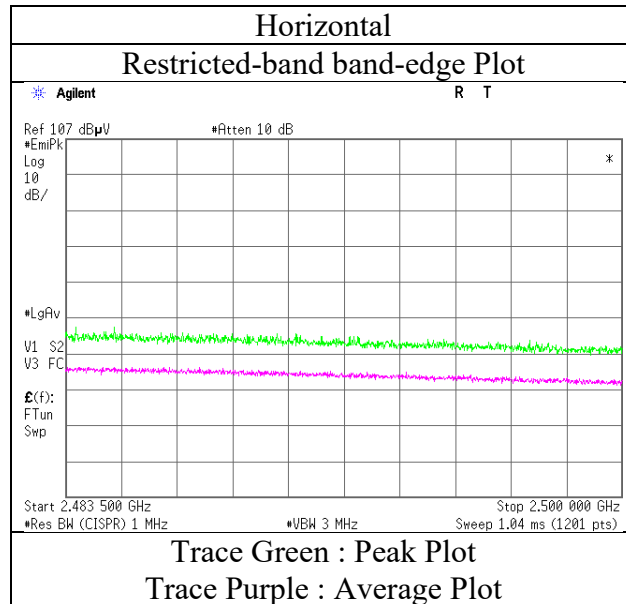
10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Burst rate confirmation" sheet.

*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	14026147S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 20, 2021
Temperature / Humidity	22 deg.C, 32 %RH
Engineer	Takahiro Kawakami
	(1 GHz – 2.8 GHz)
Mode	Tx 11n-20 2457 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions. Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	14026147S-A			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	3	3	3	3
Date	November 11, 2021	June 20, 2021	June 22, 2021	June 24, 2021
Temperature / Humidity	22 deg.C, 40 %RH	24 deg.C, 58 %RH	22 deg.C, 55 %RH	24 deg.C, 56 %RH
Engineer	Takahiro Kawakami	Toshinori Yamada	Hiromasa Sato	Hiromasa Sato
	(1 GHz -2.8 GHz)	(2.8 GHz -10 GHz)	(10 GHz -18 GHz)	(18 GHz -26.5 GHz)
Mode	Tx 11n-20 2462 MHz			

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	56.95	28.47	14.28	38.67	2.46	63.49	73.9	10.4	115	62	-
Hori.	3693.000	PK	50.44	29.75	6.36	42.20	2.46	46.81	73.9	27.0	103	83	-
Hori.	4924.000	PK	49.44	31.68	6.92	42.89	2.46	47.61	73.9	26.2	163	244	-
Hori.	7386.000	PK	49.16	37.81	8.35	43.59	2.46	54.19	73.9	19.7	150	0	-
Hori.	9848.000	PK	48.54	39.16	9.59	42.86	2.46	56.89	73.9	17.0	150	0	-
Hori.	7386.000	AV	38.90	37.81	8.35	43.59	2.46	43.93	53.9	9.9	150	0	floor noise
Hori.	9848.000	AV	38.52	39.16	9.59	42.86	2.46	46.87	53.9	7.0	150	0	floor noise
Vert.	2483.500	PK	56.28	28.47	14.28	38.67	2.46	62.82	73.9	11.0	158	74	-
Vert.	3693.000	PK	50.12	29.75	6.36	42.20	2.46	46.49	73.9	27.4	125	234	-
Vert.	4924.000	PK	49.92	31.68	6.92	42.89	2.46	48.09	73.9	25.8	100	88	-
Vert.	7386.000	PK	49.59	37.81	8.35	43.59	2.46	54.62	73.9	19.2	150	0	-
Vert.	9848.000	PK	49.71	39.16	9.59	42.86	2.46	58.06	73.9	15.8	150	0	-
Vert.	7386.000	AV	38.87	37.81	8.35	43.59	2.46	43.90	53.9	10.0	150	0	floor noise
Vert.	9848.000	AV	38.49	39.16	9.59	42.86	2.46	46.84	53.9	7.0	150	0	floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

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	42.39	28.47	14.28	38.67	0.39	2.46	49.32	53.9	4.5	*1)
Hori.	3693.000	AV	42.44	29.75	6.36	42.20	0.39	2.46	39.20	53.9	14.7	-
Hori.	4924.000	AV	39.69	31.68	6.92	42.89	0.39	2.46	38.25	53.9	15.6	-
Vert.	2483.500	AV	42.29	28.47	14.28	38.67	0.39	2.46	49.22	53.9	4.6	*1)
Vert.	3693.000	AV	41.14	29.75	6.36	42.20	0.39	2.46	37.90	53.9	16.0	-
Vert.	4924.000	AV	40.18	31.68	6.92	42.89	0.39	2.46	38.74	53.9	15.1	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

Duty factor refer to "Burst rate confirmation" sheet.

*1) Not out of band emission (Leakage Power)

UL Japan, Inc.

Shonan EMC Lab.

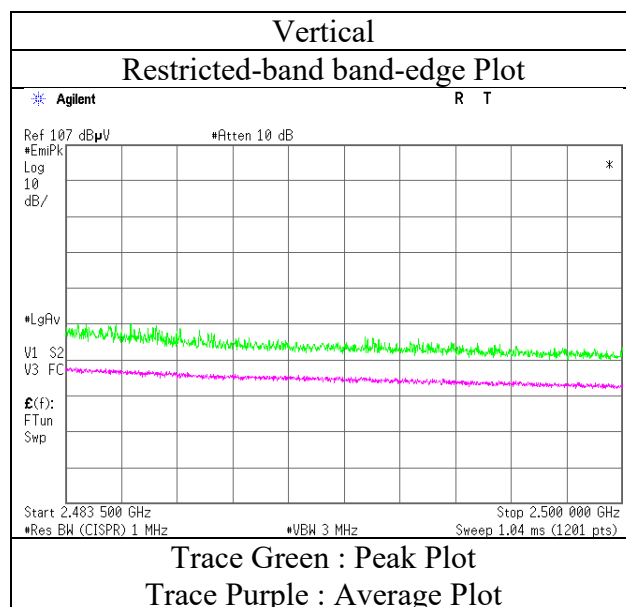
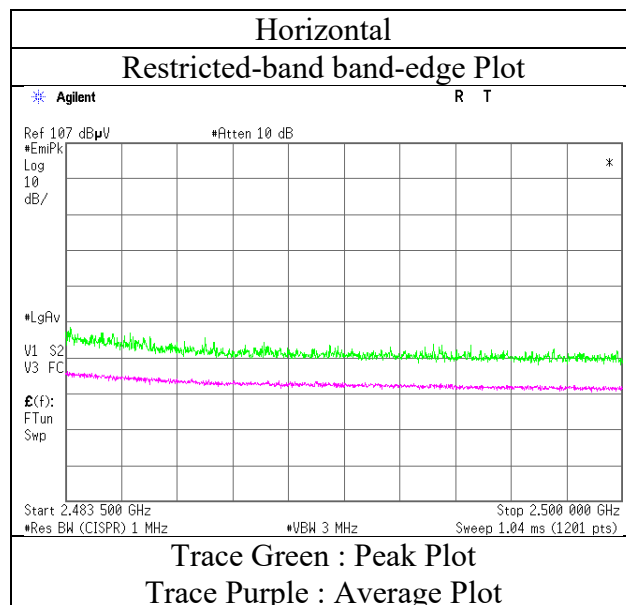
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	14026147S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 11, 2021
Temperature / Humidity	22 deg.C, 40 %RH
Engineer	Takahiro Kawakami (1 GHz -2.8 GHz)
Mode	Tx 11n-20 2462 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions. Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No. 14026147S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3 3 3 3
Date November 20, 2021 June 20, 2021 June 22, 2021 June 24, 2021
Temperature / Humidity 22 deg.C, 32 %RH 24 deg.C, 58 %RH 22 deg.C, 55 %RH 24 deg.C, 56 %RH
Engineer Takahiro Kawakami Toshinori Yamada Hiromasa Sato Hiromasa Sato
(1 GHz -2.8 GHz) (2.8 GHz -10 GHz) (10 GHz -18 GHz) (18 GHz -26.5 GHz)
Mode Tx 11n-40 2422 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	52.85	28.33	14.42	41.62	2.46	56.44	73.9	17.4	124	65	-
Hori.	3633.000	PK	51.11	29.64	6.36	42.18	2.46	47.39	73.9	26.5	122	82	-
Hori.	4844.000	PK	49.47	31.61	6.86	42.89	2.46	47.51	73.9	26.3	252	113	-
Hori.	7266.000	PK	49.08	37.62	8.30	43.46	2.46	54.00	73.9	19.9	150	0	-
Hori.	9688.000	PK	49.98	39.09	9.54	43.07	2.46	58.00	73.9	15.9	150	0	-
Hori.	7266.000	AV	38.90	37.62	8.30	43.46	2.46	43.82	53.9	10.0	150	0	floor noise
Hori.	9688.000	AV	39.21	39.09	9.54	43.07	2.46	47.23	53.9	6.6	150	0	floor noise
Vert.	2390.000	PK	57.23	28.33	14.42	41.62	2.46	60.82	73.9	13.0	144	88	-
Vert.	3633.000	PK	50.19	29.64	6.36	42.18	2.46	46.47	73.9	27.4	100	237	-
Vert.	4844.000	PK	49.63	31.61	6.86	42.89	2.46	47.67	73.9	26.2	234	251	-
Vert.	7266.000	PK	49.56	37.62	8.30	43.46	2.46	54.48	73.9	19.4	150	0	-
Vert.	9688.000	PK	49.80	39.09	9.54	43.07	2.46	57.82	73.9	16.0	150	0	-
Vert.	7266.000	AV	39.15	37.62	8.30	43.46	2.46	44.07	53.9	9.8	150	0	floor noise
Vert.	9688.000	AV	39.39	39.09	9.54	43.07	2.46	47.41	53.9	6.4	150	0	floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

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	42.39	28.33	14.42	41.62	0.52	2.46	46.50	53.9	7.3	*1)
Hori.	3633.000	AV	42.37	29.64	6.36	42.18	0.52	2.46	39.17	53.9	14.7	-
Hori.	4844.000	AV	40.00	31.61	6.86	42.89	0.52	2.46	38.56	53.9	15.3	-
Vert.	2390.000	AV	44.52	28.33	14.42	41.62	0.52	2.46	48.63	53.9	5.2	*1)
Vert.	3633.000	AV	41.23	29.64	6.36	42.18	0.52	2.46	38.03	53.9	15.8	-
Vert.	4844.000	AV	39.83	31.61	6.86	42.89	0.52	2.46	38.39	53.9	15.5	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

Duty factor refer to "Burst rate confirmation" sheet.

*1) Not out of band emission (Leakage Power)

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2422.000	PK	86.76	28.28	14.45	41.63	2.46	90.32	-	-	Carrier
Hori.	2400.000	PK	44.26	28.31	14.44	41.63	2.46	47.84	70.3	22.4	-
Vert.	2422.000	PK	88.23	28.28	14.45	41.63	2.46	91.79	-	-	Carrier
Vert.	2400.000	PK	45.93	28.31	14.44	41.63	2.46	49.51	71.7	22.1	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

UL Japan, Inc.

Shonan EMC Lab.

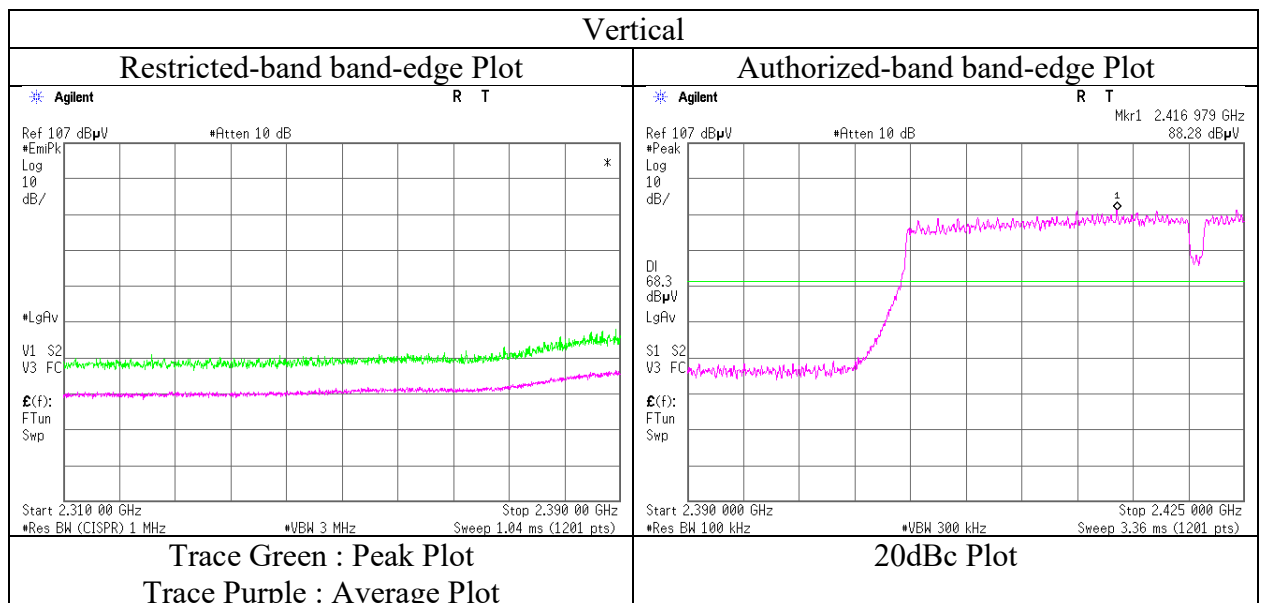
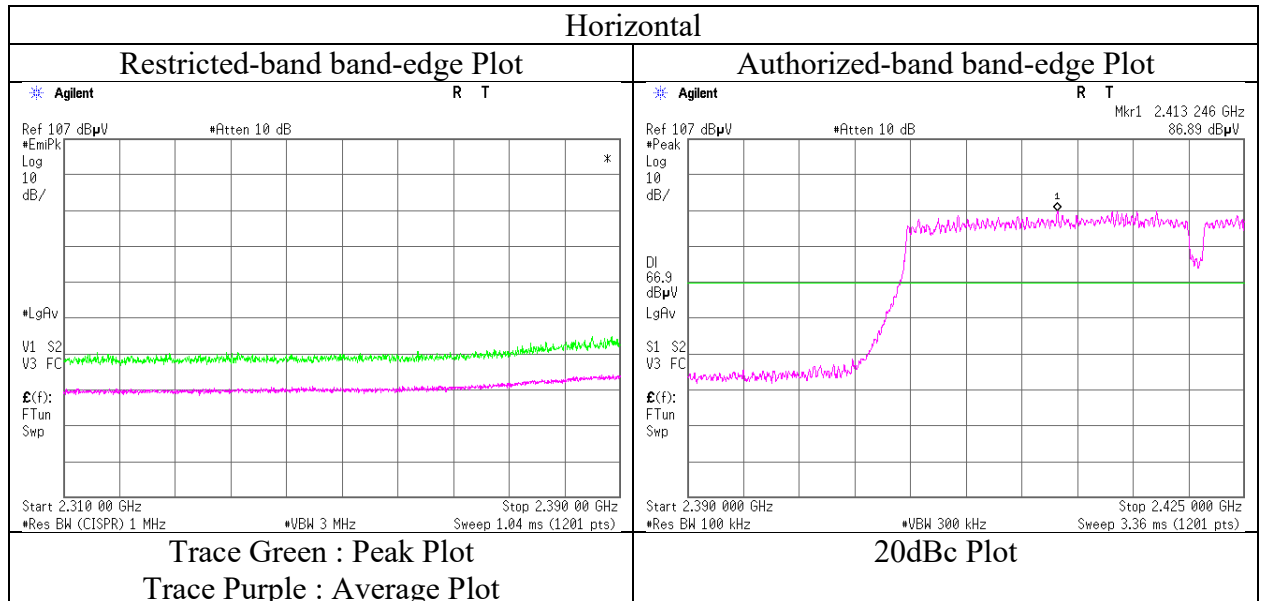
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	14026147S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 20, 2021
Temperature / Humidity	22 deg.C, 32 %RH
Engineer	Takahiro Kawakami (1 GHz -2.8 GHz)
Mode	Tx 11n-40 2422 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No. 14026147S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date November 20, 2021
Temperature / Humidity 22 deg.C, 32 %RH
Engineer Takahiro Kawakami
(1 GHz – 2.8 GHz)
Mode Tx 11n-40 2427 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	53.82	28.33	14.42	41.62	2.46	57.41	73.9	16.4	142	68	-
Vert.	2390.000	PK	59.17	28.33	14.42	41.62	2.46	62.76	73.9	11.1	136	91	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

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	43.26	28.33	14.42	41.62	0.52	2.46	47.37	53.9	6.5	*1)
Vert.	2390.000	AV	46.57	28.33	14.42	41.62	0.52	2.46	50.68	53.9	3.2	*1)

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

Duty factor refer to "Burst rate confirmation" sheet.

*1) Not out of band emission (Leakage Power)

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.	2427.000	PK	88.38	28.27	14.46	41.64	2.46	91.93	-	-	Carrier
Hori.	2400.000	PK	46.28	28.31	14.44	41.63	2.46	49.86	71.9	22.0	-
Vert.	2427.000	PK	89.65	28.27	14.46	41.64	2.46	93.20	-	-	Carrier
Vert.	2400.000	PK	49.68	28.31	14.44	41.63	2.46	53.26	73.2	19.9	-

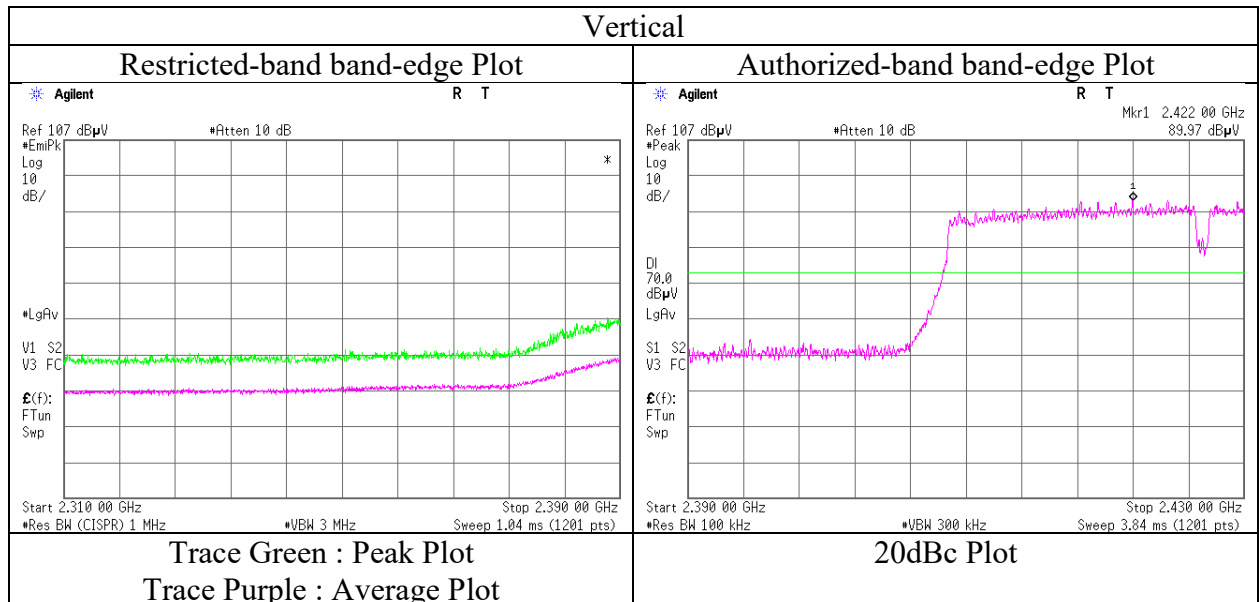
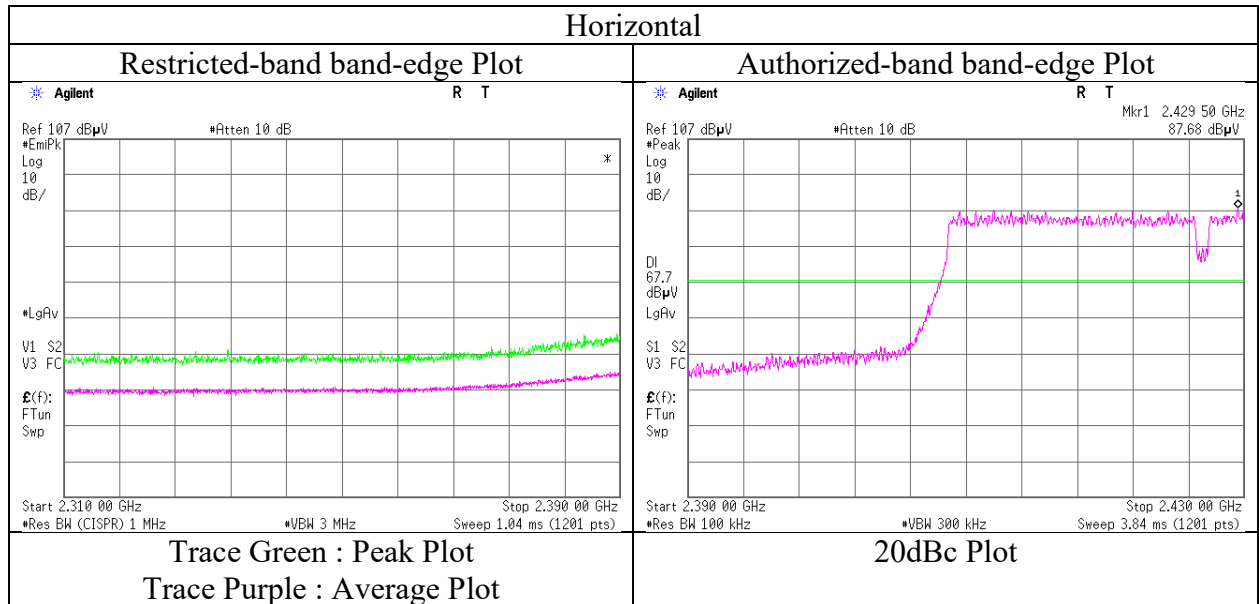
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	14026147S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 20, 2021
Temperature / Humidity	22 deg.C, 32 %RH
Engineer	Takahiro Kawakami
	(1 GHz – 2.8 GHz)
Mode	Tx 11n-40 2427 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No. 14026147S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3 3 3
Date November 20, 2021 June 22, 2021 June 24, 2021
Temperature / Humidity 22 deg.C, 32 %RH 22 deg.C, 55 %RH 24 deg.C, 56 %RH
Engineer Takahiro Kawakami Hiromasa Sato Hiromasa Sato
(1 GHz -2.8 GHz) (2.8 GHz -18 GHz) (18 GHz -26.5 GHz)
Mode Tx 11n-40 2437 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	3655.500	PK	51.96	29.10	6.36	42.19	2.46	47.69	73.9	26.2	184	274	-
Hori.	4874.000	PK	49.21	31.50	6.88	42.89	2.46	47.16	73.9	26.7	172	121	-
Hori.	7311.000	PK	51.67	36.14	8.32	43.51	2.46	55.08	73.9	18.8	150	0	-
Hori.	9748.000	PK	51.29	38.97	9.56	42.99	2.46	59.29	73.9	14.6	150	0	-
Hori.	7311.000	AV	39.00	36.14	8.32	43.51	2.46	42.41	53.9	11.4	150	0	floor noise
Hori.	9748.000	AV	39.56	38.97	9.56	42.99	2.46	47.56	53.9	6.3	150	0	floor noise
Vert.	3655.500	PK	50.52	29.10	6.36	42.19	2.46	46.25	73.9	27.6	217	245	-
Vert.	4874.000	PK	50.13	31.50	6.88	42.89	2.46	48.08	73.9	25.8	245	243	-
Vert.	7311.000	PK	50.96	36.14	8.32	43.51	2.46	54.37	73.9	19.5	150	0	-
Vert.	9748.000	PK	50.43	38.97	9.56	42.99	2.46	58.43	73.9	15.4	150	0	-
Vert.	7311.000	AV	39.56	36.14	8.32	43.51	2.46	42.97	53.9	10.9	150	0	floor noise
Vert.	9748.000	AV	39.55	38.97	9.56	42.99	2.46	47.55	53.9	6.3	150	0	floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98\text{ m} / 3.0\text{ m}) = 2.46\text{ dB}$

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

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.	3655.500	AV	45.14	29.10	6.36	42.19	0.52	2.46	41.39	53.9	12.5	-
Hori.	4874.000	AV	39.22	31.50	6.88	42.89	0.52	2.46	37.69	53.9	16.2	-
Vert.	3655.500	AV	44.41	29.10	6.36	42.19	0.52	2.46	40.66	53.9	13.2	-
Vert.	4874.000	AV	38.63	31.50	6.88	42.89	0.52	2.46	37.10	53.9	16.8	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98\text{ m} / 3.0\text{ m}) = 2.46\text{ dB}$

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

Duty factor refer to "Burst rate confirmation" sheet.

Radiated Spurious Emission

Report No. 14026147S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date November 20, 2021
Temperature / Humidity 22 deg.C, 32 %RH
Engineer Takahiro Kawakami
(1 GHz – 2.8 GHz)
Mode Tx 11n-40 2447 MHz

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	55.07	28.24	14.52	41.65	2.46	58.64	73.9	15.2	135	66	-
Vert.	2483.500	PK	57.83	28.24	14.52	41.65	2.46	61.40	73.9	12.5	155	94	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98\text{ m} / 3.0\text{ m}) = 2.46\text{ dB}$

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

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	43.84	28.24	14.52	41.65	0.52	2.46	47.93	53.9	5.9	*1)
Vert.	2483.500	AV	45.43	28.24	14.52	41.65	0.52	2.46	49.52	53.9	4.3	*1)

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98\text{ m} / 3.0\text{ m}) = 2.46\text{ dB}$

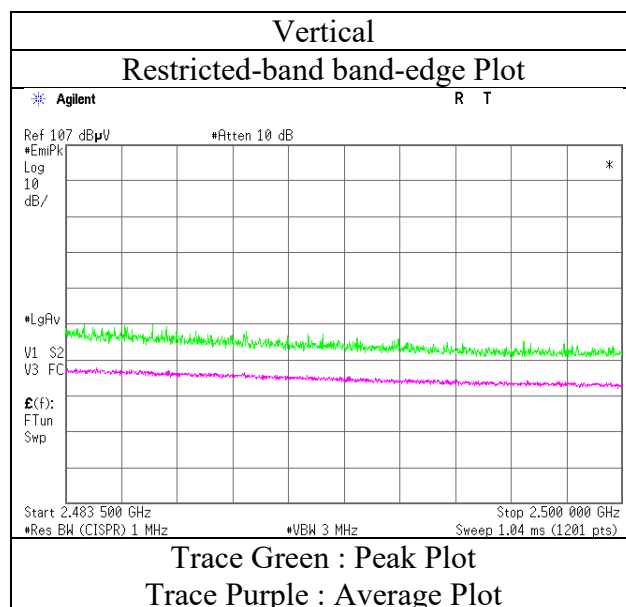
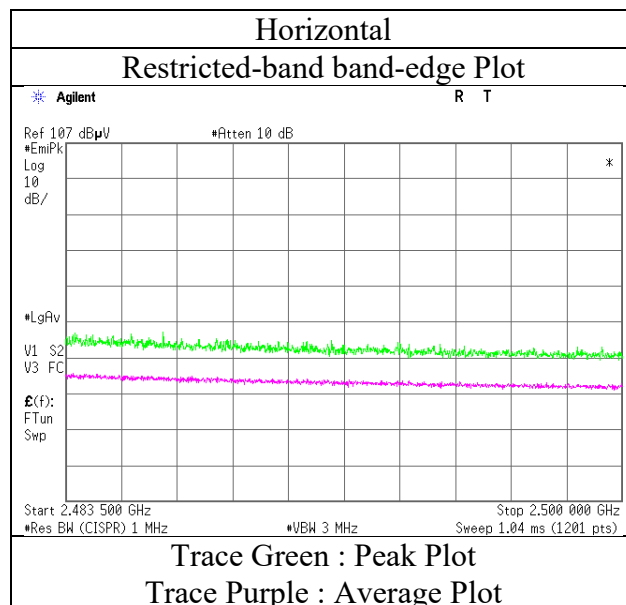
10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Burst rate confirmation" sheet.

*1) Not out of band emission (Leakage Power)

Radiated Spurious Emission (Reference Plot for band-edge)

Report No.	14026147S-A
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	3
Date	November 20, 2021
Temperature / Humidity	22 deg.C, 32 %RH
Engineer	Takahiro Kawakami
	(1 GHz – 2.8 GHz)
Mode	Tx 11n-40 2447 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions. Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	14026147S-A			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	3	3	3	3
Date	November 11, 2021	June 20, 2021	June 22, 2021	June 24, 2021
Temperature / Humidity	22 deg.C, 40 %RH	24 deg.C, 58 %RH	22 deg.C, 55 %RH	24 deg.C, 56 %RH
Engineer	Takahiro Kawakami	Toshinori Yamada	Hiromasa Sato	Hiromasa Sato
	(1 GHz -2.8 GHz)	(2.8 GHz -10 GHz)	(10 GHz -18 GHz)	(18 GHz -26.5 GHz)
Mode	Tx 11n-40 2452 MHz			

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	49.97	28.47	14.28	38.67	2.46	56.51	73.9	17.3	118	62	-
Hori.	3678.000	PK	50.66	29.73	6.36	42.19	2.46	47.02	73.9	26.8	103	86	-
Hori.	4904.000	PK	49.01	31.65	6.91	42.89	2.46	47.14	73.9	26.7	316	111	-
Hori.	7356.000	PK	48.85	37.76	8.35	43.56	2.46	53.86	73.9	20.0	150	0	-
Hori.	9808.000	PK	48.47	39.19	9.57	42.91	2.46	56.78	73.9	17.1	150	0	-
Hori.	7356.000	AV	38.76	37.76	8.35	43.56	2.46	43.77	53.9	10.1	150	0	floor noise
Hori.	9808.000	AV	38.70	39.19	9.57	42.91	2.46	47.01	53.9	6.8	150	0	floor noise
Vert.	2483.500	PK	51.61	28.47	14.28	38.67	2.46	58.15	73.9	15.7	162	90	-
Vert.	3678.000	PK	51.43	29.73	6.36	42.19	2.46	47.79	73.9	26.1	147	245	-
Vert.	4904.000	PK	49.45	31.65	6.91	42.89	2.46	47.58	73.9	26.3	116	47	-
Vert.	7356.000	PK	49.09	37.76	8.35	43.56	2.46	54.10	73.9	19.8	150	0	-
Vert.	9808.000	PK	49.48	39.19	9.57	42.91	2.46	57.79	73.9	16.1	150	0	-
Vert.	7356.000	AV	39.02	37.76	8.35	43.56	2.46	44.03	53.9	9.8	150	0	floor noise
Vert.	9808.000	AV	39.26	39.19	9.57	42.91	2.46	47.57	53.9	6.3	150	0	floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

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	39.77	28.47	14.28	38.67	0.52	2.46	46.83	53.9	7.0	*1)
Hori.	3678.000	AV	42.05	29.73	6.36	42.19	0.52	2.46	38.93	53.9	14.9	-
Hori.	4904.000	AV	39.61	31.65	6.91	42.89	0.52	2.46	38.26	53.9	15.6	-
Vert.	2483.500	AV	40.64	28.47	14.28	38.67	0.52	2.46	47.70	53.9	6.2	*1)
Vert.	3678.000	AV	43.86	29.73	6.36	42.19	0.52	2.46	40.74	53.9	13.1	-
Vert.	4904.000	AV	39.17	31.65	6.91	42.89	0.52	2.46	37.82	53.9	16.0	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.98 \text{ m} / 3.0 \text{ m}) = 2.46 \text{ dB}$

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

Duty factor refer to "Burst rate confirmation" sheet.

*1) Not out of band emission (Leakage Power)

UL Japan, Inc.

Shonan EMC Lab.

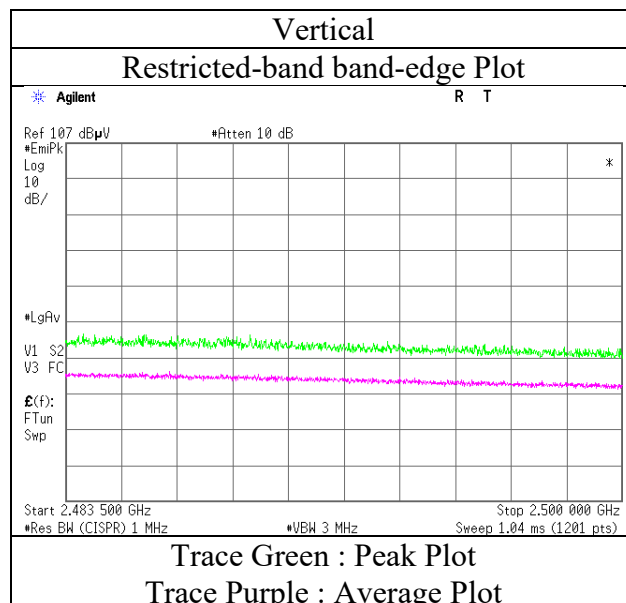
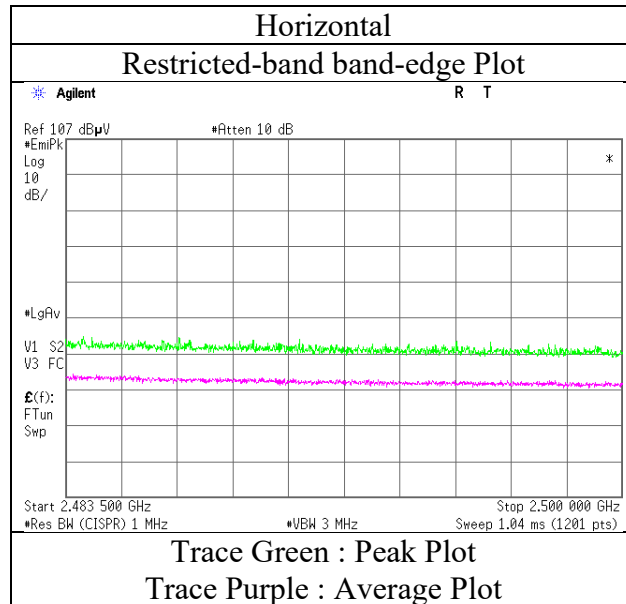
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

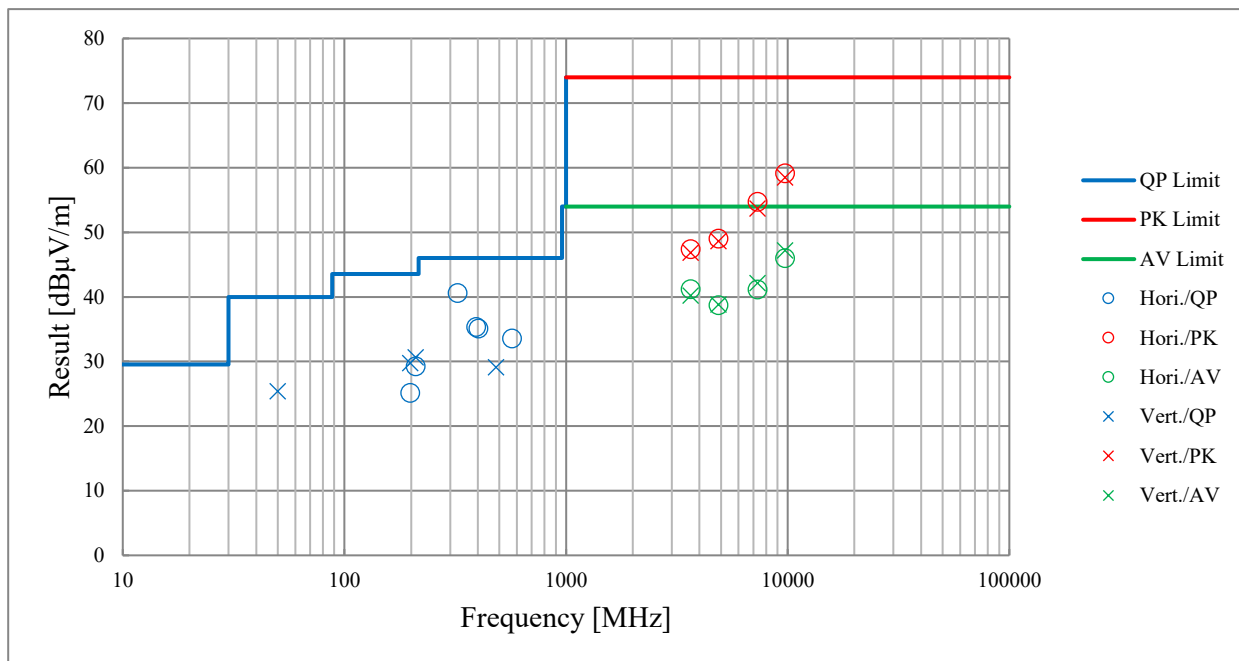
Report No. 14026147S-A
Test place Shonan EMC Lab.
Semi Anechoic Chamber 3
Date November 11, 2021
Temperature / Humidity 22 deg.C, 40 %RH
Engineer Takahiro Kawakami
(1 GHz -2.8 GHz)
Mode Tx 11n-40 2452 MHz



* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission (Plot data, Worst case)

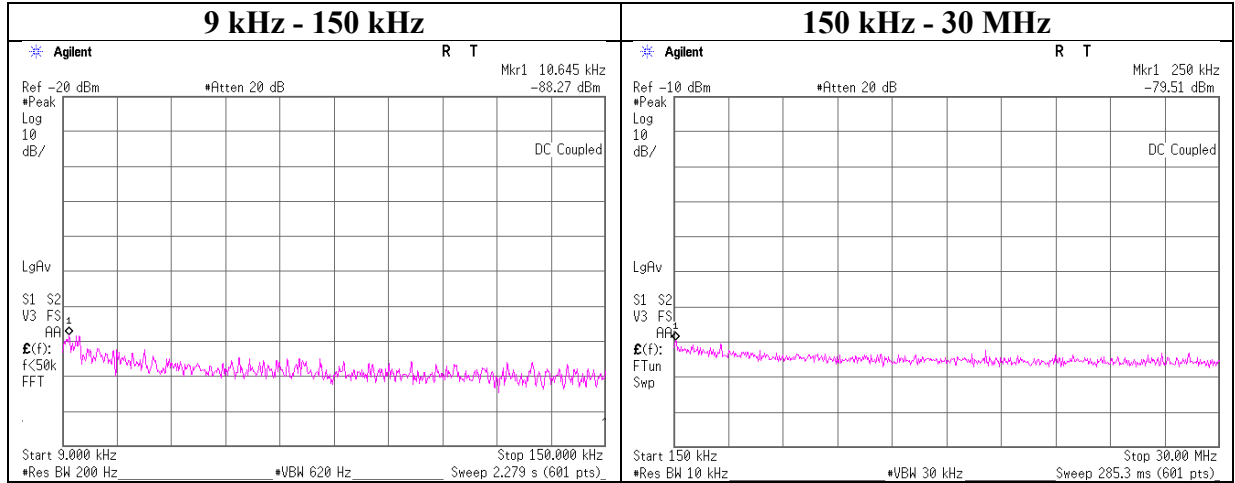
Report No.	14026147S-A			
Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	3	3	3	3
Date	June 26, 2021	November 20, 2021	June 22, 2021	June 24, 2021
Temperature / Humidity	24 deg.C, 50 %RH	22 deg.C, 32 %RH	22 deg.C, 55 %RH	24 deg.C, 56 %RH
Engineer	Yusuke Tanikawara (30 MHz -1 GHz)	Takahiro Kawakami (1 GHz -2.8 GHz)	Hiromasa Sato (2.8 GHz -18 GHz)	Hiromasa Sato (18 GHz -26.5 GHz)
Mode	Tx 11n-20 2437 MHz			



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

Conducted Spurious Emission

Report No.	14026147S-A
Test place	Shonan EMC Lab. No.5 Shielded Room
Date	June 7, 2021
Temperature / Humidity	23 deg. C / 60 % RH
Engineer	Shiro Kobayashi
Mode	Tx 11n-20 2437 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain* [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
10.645	-88.27	0.01	9.91	2.00	1	-76.4	300	6.0	-15.1	47.0	62.1	-
250.000	-79.51	0.01	9.91	2.00	1	-67.6	300	6.0	-6.3	19.6	25.9	-

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

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

N: Number of output

*2.0 dBi was applied to the test result based on ANSI C63.10 since antenna gain was less than 2.0 dBi.

Power Density

Report No. 14026147S-A
Test place Shonan EMC Lab. No.5 Shielded Room
Date June 7, 2021
Temperature / Humidity 23 deg. C / 60 % RH
Engineer Shiro Kobayashi
Mode Tx

11b

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm / 3 kHz]	[dB]	[dB]	[dBm / 3 kHz]	[dBm / 3 kHz]	[dB]
2412	-21.45	1.49	9.97	-9.99	8.00	17.99
2437	-22.00	1.49	9.98	-10.53	8.00	18.53
2462	-21.09	1.50	9.98	-9.61	8.00	17.61

11g

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm / 3 kHz]	[dB]	[dB]	[dBm / 3 kHz]	[dBm / 3 kHz]	[dB]
2412	-27.52	1.49	9.97	-16.06	8.00	24.06
2437	-25.31	1.49	9.98	-13.84	8.00	21.84
2462	-27.50	1.50	9.98	-16.02	8.00	24.02

11n-20

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm / 3 kHz]	[dB]	[dB]	[dBm / 3 kHz]	[dBm / 3 kHz]	[dB]
2412	-27.85	1.49	9.97	-16.39	8.00	24.39
2437	-25.63	1.49	9.98	-14.16	8.00	22.16
2462	-27.62	1.50	9.98	-16.14	8.00	24.14

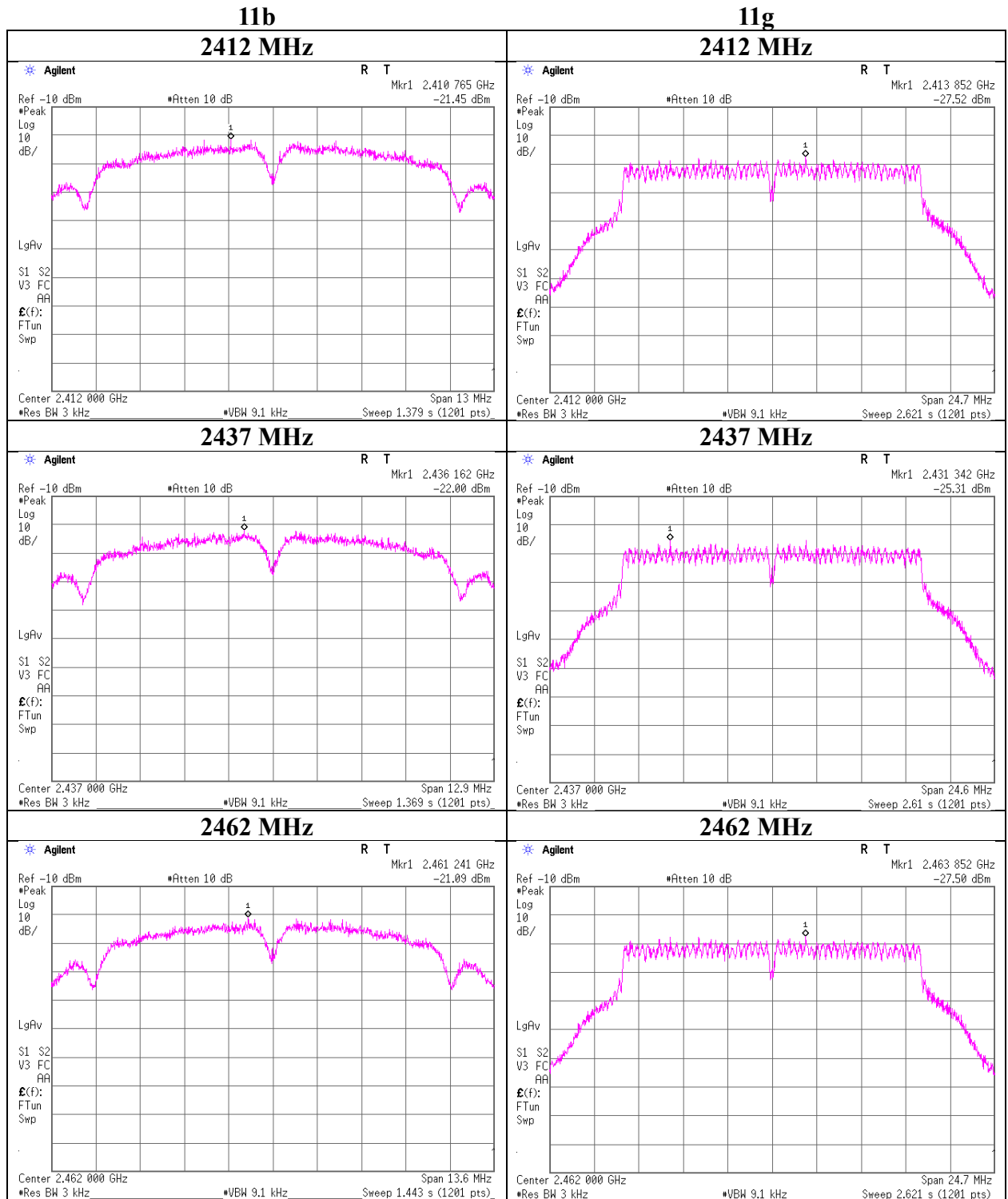
11n-40

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm / 3 kHz]	[dB]	[dB]	[dBm / 3 kHz]	[dBm / 3 kHz]	[dB]
2422	-33.74	1.49	9.98	-22.27	8.00	30.27
2437	-31.66	1.49	9.98	-20.19	8.00	28.19
2452	-33.58	1.50	9.98	-22.10	8.00	30.10

Sample Calculation:

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

Power Density



UL Japan, Inc.

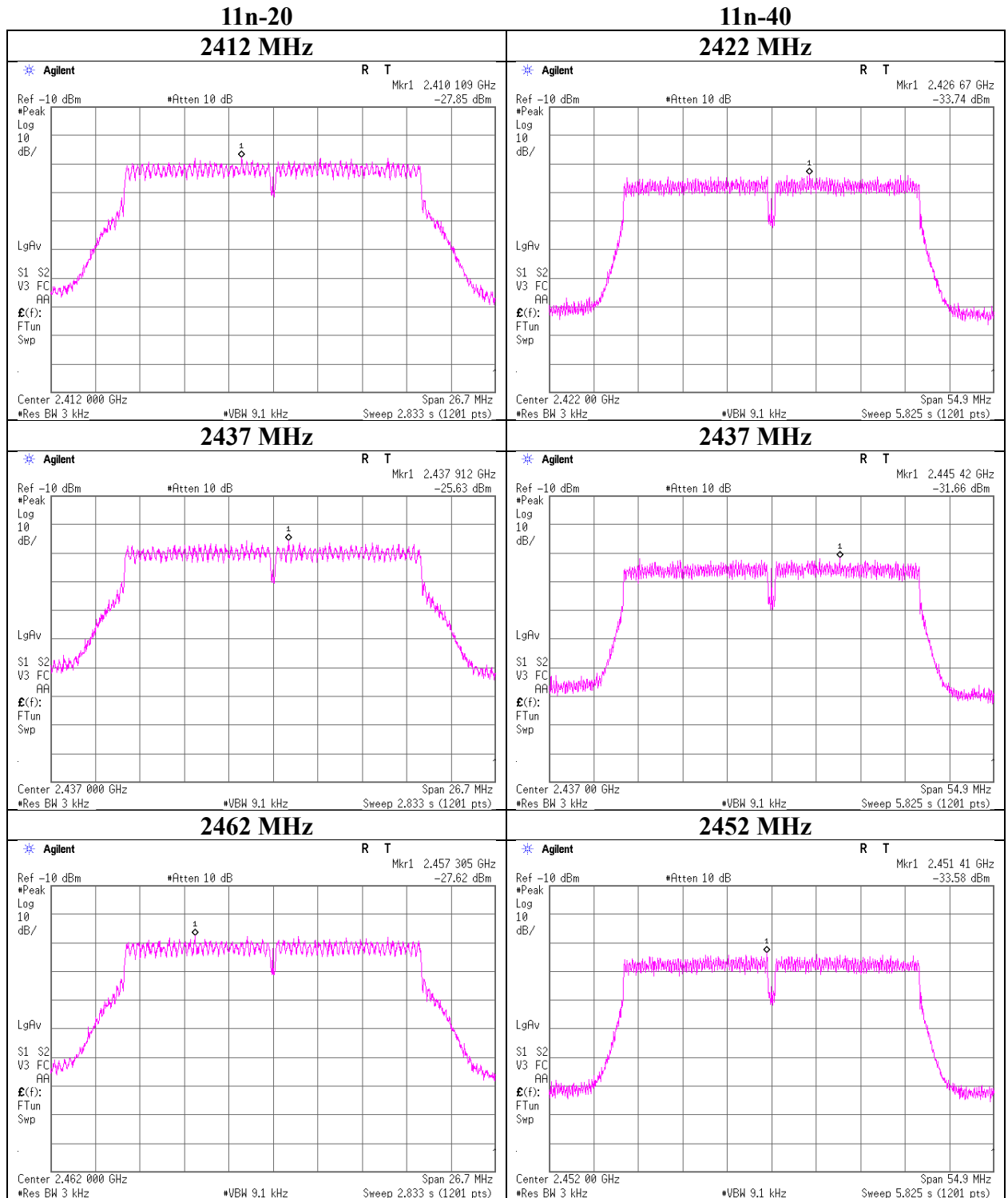
Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Power Density



UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

APPENDIX 2: Test instruments

Test equipment (1/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	KTS-07	145111	Digital Tester	SANWA	PC500	7019232	2020/10/21	12 *1)
AT	SAT10-23	204927	Attenuator	Weinschel Corp.	54A-10	-	2021/02/09	12
AT	SCC-G67	196949	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803480/2	2021/03/01	12
AT	SOS-27	191845	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2020/09/29	12 *1)
AT	SPM-13	169910	Power Meter	Keysight Technologies Inc	8990B	MY51000448	2021/01/25	12
AT	SPSS-06	169911	Power sensor	Keysight Technologies Inc	N1923A	MY57270004	2021/01/25	12
AT	SRENT-15	160899	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY46185516	2021/01/26	12
CE	SAT3-10	144960	Attenuator	JFW	50HF-003N	-	2020/08/18	12 *1)
CE	SCC-C9/C10/SR SE-03	145036	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS 4906	-/0901-271(RF Selector)	2021/04/12	12
CE	SLS-05	145542	LISN	Rohde & Schwarz	ENV216	100516	2021/02/12	12
CE	SOS-24	191841	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2020/10/01	12 *1)
CE,RE	COTS-SEMI-5	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,PE)	-	-	-
CE,RE	KJM-02	146432	Measure	TAJIMA	GL19-55	-	-	-
CE,RE	STR-08	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2020/12/02	12
CE,RE	STS-03	146210	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997823	2021/09/14	12
RE	KHA-02	144941	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	230	2021/05/10	12
RE	KHA-04	146351	Horn Antenna	EMCO	3160-09	1278	2021/05/20	12
RE	KSA-08	145089	Spectrum Analyzer	Keysight Technologies Inc	E4446A	MY46180525	2020/11/24	12
RE	SAEC-03(NSA)	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2021/04/27	12
RE	SAEC-03(SVSWR)	145566	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	2021/05/21	12
RE	SAF-03	145126	Pre Amplifier	SONOMA	310N	290213	2021/02/10	12
RE	SAF-06	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	1440491	2021/02/08	12
RE	SAF-08	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2021/03/01	12
RE	SAT10-06	145137	Attenuator	Keysight Technologies Inc	8493C-010	74865	2021/10/05	12

Test equipment (2/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	SAT6-13	167094	Attenuator	JFW	50HF-006N	-	2021/02/10	12
RE	SBA-03	145023	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	91032666	2021/05/15	12
RE	SCC-C1/C2/C3/C4/C5/C10/SRSE-03	145171	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	2021/04/12	12
RE	SCC-G15	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2021/03/01	12
RE	SCC-G41	151617	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S006	2021/01/19	12
RE	SCC-G43	156380	Coaxial Cable	Huber+Suhner	SUCOFLEX 104 E	SN MY 13406/4E	2021/05/17	12
RE	SCC-G57	179540	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	802815/2	2021/05/18	12
RE	SCC-G58	183047	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	800287/4A	2021/05/17	12
RE	SCC-G70	200010	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	575618/4	2021/07/06	12
RE	SFL-18	145305	Highpass Filter	MICRO-TRONICS	HPM50111	119	2021/04/08	12
RE	SHA-03	145501	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-739	2021/06/14	12
RE	SHA-10	194685	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	711	2021/03/03	12
RE	SLA-07	145529	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	196	2021/05/15	12
RE	SOS-23	191840	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2021/08/02	12
RE	SSA-03	145801	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250152	2021/08/09	12

*Hyphens for Last Calibration Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.

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

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

The expiration*1) This test equipment was used for the tests before the expiration date of the calibration. All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

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

UL Japan, Inc.

Shonan EMC Lab.

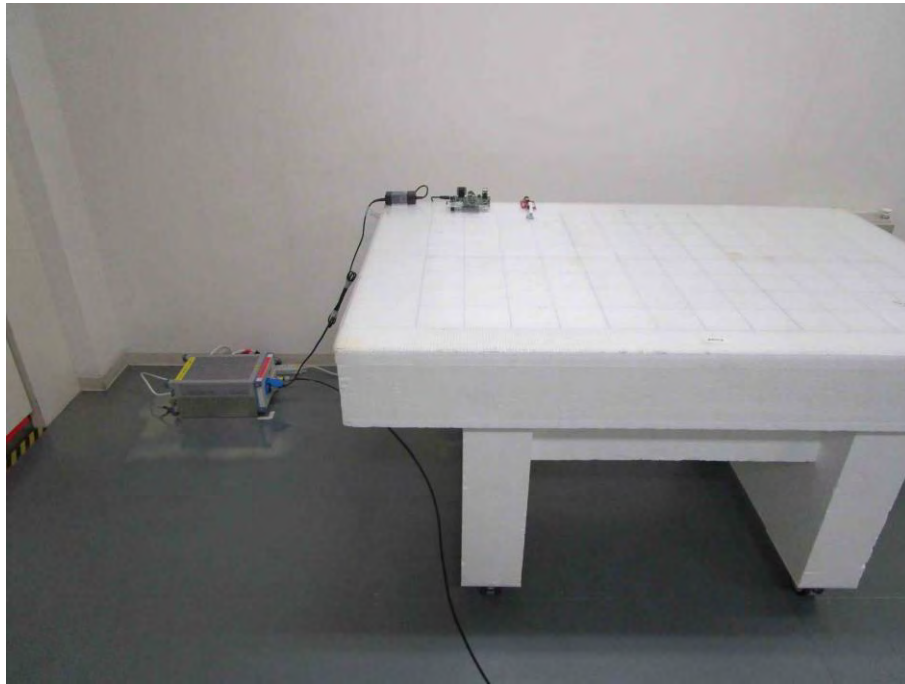
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

APPENDIX 3: Photographs of test setup

Conducted Emission



Front



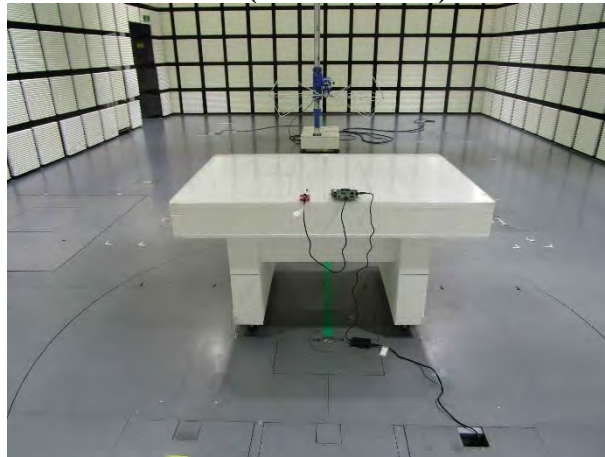
Side

Radiated Spurious Emission

Front



Rear (Below 1 GHz)

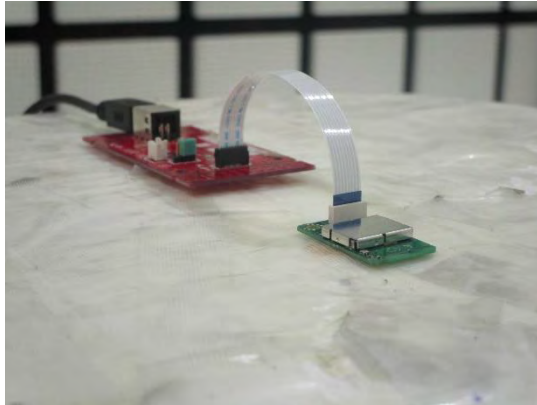


Rear (Above 1 GHz)

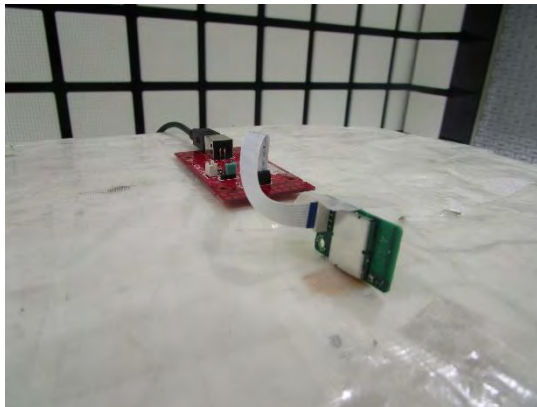


Worst Case Position of Pre-check

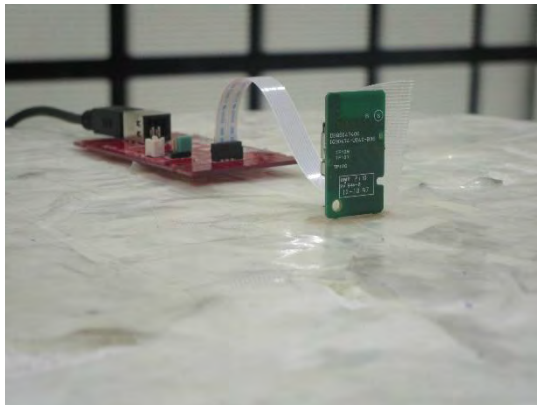
X-axis



Y-axis



Z-axis



Antenna Terminal Conducted Tests

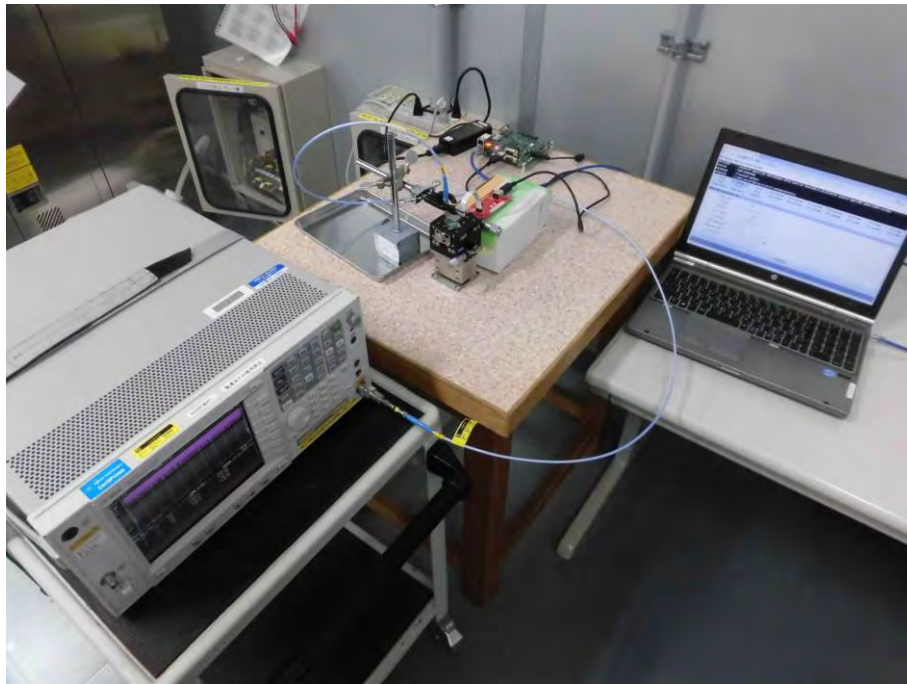


Photo 1

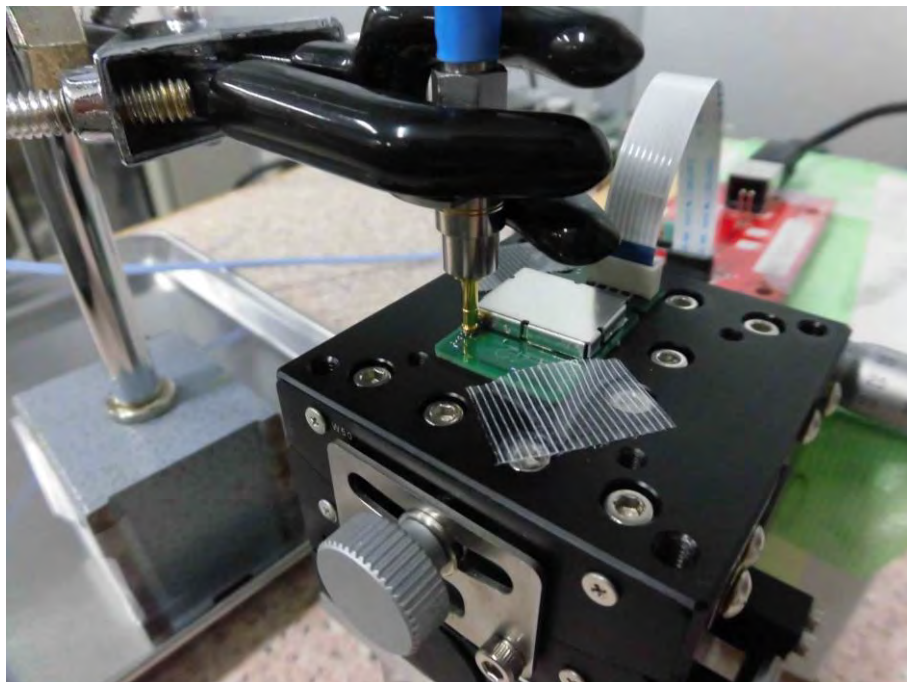


Photo 2

End of Report