

RADIO TEST REPORT

Test Report No. 14758269H-A-R1

Customer	silex technology, Inc.
Description of EUT	SDIO Wireless Module
Model Number of EUT	SX-SDMAC
FCC ID	N6C-SDMAC
Test Regulation	FCC Part 15 Subpart C
Test Result	Complied
Issue Date	August 7, 2023
Remarks	*For Permissive Change *Radiated Spurious Emission only

Representative Test EngineerTakumi Nishida
Engineer**Approved By**Satofumi Matsuyama
Engineer

CERTIFICATE 5107.02

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

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- The information provided from the customer for this report is identified in Section 1.
- For test report(s) referred in this report, the latest version (including any revisions) is always referred.

REVISION HISTORY

Original Test Report No.: 14758269H-A

This report is a revised version of 14758269H-A. 14758269H-A is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	14758269H-A	July 4, 2023	-
1	14758269H-A-R1	August 7, 2023	<u>Section 2.2: Product Description</u> <u>General Specification</u> -Correction of Rating 48 MHz → DC 3.3 V <u>Section 2.2: Product Description</u> <u>Radio Specification</u> -Deletion of Radio Specification for WLAN 5GHz and Bluetooth (BR/EDR/Low Energy). <u>Section 2.3: Contents of modification</u> -Deletion of Section 2.3: Contents of modification.

Reference: Abbreviations (Including words undescribed in this report)

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

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SECTION 1: Customer Information

Company Name	silex technology, Inc.
Address	2-3-1 Hikaridai, Seika-cho, Soraku-gun, Kyoto 619-0237, Japan
Telephone Number	+81-774-98-3878
Contact Person	Yoshinori Nakai

The information provided from the customer is as follows;

- Customer, Description 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 and Test 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

Description	SDIO Wireless Module
Model Number	SX-SDMAC
Serial Number	Refer to SECTION 4.2
Condition	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	May 16, 2023
Test Date	May 30 and 31, 2023

2.2 Product Description

General Specification

Rating	DC 3.3 V
Operating temperature	-40 deg. C - +85 deg. C

Radio Specification

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

Equipment Type	Transceiver	
Frequency of Operation	20 MHz Band:	2412 MHz to 2462 MHz
	40 MHz Band:	2422 MHz to 2452 MHz
Type of Modulation	DSSS, OFDM	
Antenna Gain:	-0.51 dBi	

SECTION 3: Test Specification, Procedures & Results

3.1 Test Specification

Test Specification	FCC Part 15 Subpart C The latest version on the first day of the testing period
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

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
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	8.7 dB 2483.5 MHz, AV, Horizontal	Complied	Radiated (above 30 MHz) *1)
<p>Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593. * In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.</p> <p>*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.</p>					

FCC Part 15.31 (e)

This EUT 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 EUT has a unique coupling/antenna connector.
Therefore the equipment complies with the requirement of 15.203.

3.3 Addition to Standard

No addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

Measurement uncertainty is not taken into account when stating conformity with a specified requirement.
Note: When margins obtained from test results are less than the measurement uncertainty, the test results may exceed the limit.

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

Radiated emission

Measurement distance	Frequency Range		Unit	Calculated Uncertainty (+/-)
3 m	9 kHz to 30 MHz		dB	3.3
10 m			dB	3.1
3 m	30 MHz to 200 MHz	Horizontal	dB	4.8
		Vertical	dB	5.0
	200 MHz to 1000 MHz	Horizontal	dB	5.1
		Vertical	dB	6.2
10 m	30 MHz to 200 MHz	Horizontal	dB	4.8
		Vertical	dB	4.8
	200 MHz to 1000 MHz	Horizontal	dB	4.9
		Vertical	dB	5.0
3 m	1 GHz to 6 GHz		dB	4.9
	6 GHz to 18 GHz		dB	5.2
1 m	10 GHz to 26.5 GHz		dB	5.5
	26.5 GHz to 40 GHz		dB	5.4
10 m	1 GHz to 18 GHz		dB	5.3

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 Japan

Telephone: +81-596-24-8999

A2LA Certificate Number: 5107.02 / FCC Test Firm Registration Number: 884919

ISED Lab Company Number: 2973C / CAB identifier: JP0002

Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.5 measurement room	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
No.6 shielded room	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	3.1 x 5.0 x 2.7	3.1 x 5.0	-	-
No.9 measurement room	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.10 shielded room	3.8 x 2.8 x 2.8	3.8 x 2.8	-	-
No.11 measurement room	4.0 x 3.4 x 2.5	N/A	-	-
No.12 measurement room	2.6 x 3.4 x 2.5	N/A	-	-
Large Chamber	16.9 x 22.1 x 10.17	16.9 x 22.1	-	10 m
Small Chamber	5.3 x 6.69 x 3.59	5.3 x 6.69	-	-

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

Mode	Remarks*
IEEE 802.11b (11b)	2 Mbps, PN9
IEEE 802.11g (11g)	24 Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	MCS 4 (Long GI, 3 Streams), PN9
IEEE 802.11n 40 MHz BW (11n-40)	MCS 3 (Short GI, 3 Streams), PN9
*The worst condition was determined based on the test result of Maximum Peak Output Power of original test report (Mid Channel).	
*Power of the EUT was set by the software as follows; Power Setting: Refer to the following table Software: QRCT Version 4.0209.0 (Date: 2022.8.17, Storage location: Driven by connected PC)	
*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 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.	

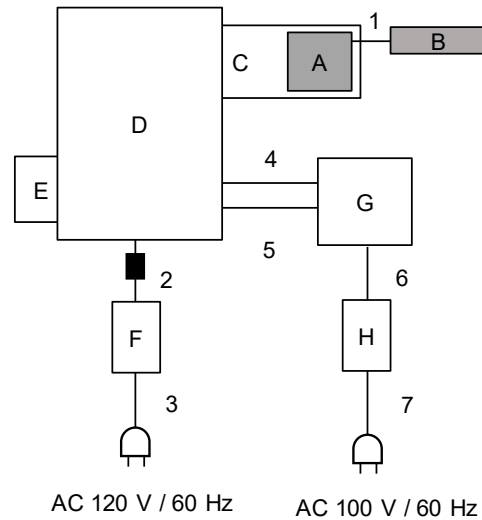
[Power setting]

	Rate		Power Setting
11b	2 Mbps (Short GI)	2412 MHz	12.5
		2417 MHz	
		2437 MHz	
		2457 MHz	
		2462 MHz	
11g	24Mbps	2412 MHz	13
		2417 MHz	15
		2437 MHz	15
		2457 MHz	15
		2462 MHz	12
11n20	MCS4	2412 MHz	12
		2417 MHz	15
		2437 MHz	15
		2457 MHz	15
		2462 MHz	11.5
11n40	MCS3	2422 MHz	9
		2427 MHz	9
		2437 MHz	10.5
		2447 MHz	10.5
		2452 MHz	9.5

*The Details of Operating Mode(s)

Test Item	Operating Mode	Tested Antenna *4)	Tested frequency
Spurious Emission above 1GHz (Radiated) *2)	11b Tx 11g Tx	1	2412 MHz 2437 MHz 2462 MHz
	11n-20 Tx *3)		2412 MHz 2462 MHz
	11n-40 Tx		2422 MHz 2437 MHz 2452 MHz
Spurious Emission below 1GHz (Radiated) *1)	11g Tx	1	2437 MHz
<p>*1) The operating mode and tested frequency were tested as a representative, because it had the highest power at antenna terminal test.</p> <p>*2) Since 11g and 11n-20 have the same modulation method and no differences in transmitting specification, test was performed on the representative mode that had the highest peak output power.</p> <p>*3) The test was performed only band-edge.</p> <p>*4) The EUT has two antenna ports, ANT1 and ANT2. The test was performed with ANT1 which was worst case in preliminary check.</p>			

4.2 Configuration and Peripherals



■ : Standard Ferrite Core

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

Description of EUT and Support Equipment

No.	Item	Model Number	Serial Number	Manufacturer	Remarks
A	SDIO Wireless Module	SX-SDMAC	001	silex technology, Inc.	EUT
B	Antenna	1007695-01	001	TOPCON CORPORATION	EUT
C	Jig	PW102660CX	No.9	silex technology, Inc.	-
D	Jig	MCIMX6Q-SDB	SX04415	NXP	-
E	SD Card	SD-K08D	CDMD003	TOSHIBA	-
F	AC Adapter	ATS030-A050	PS2D-5050APL05	SCEPTRE POWER	-
G	Laptop PC	Latitude5590	CU03567	Dell	-
H	AC Adapter	LA90PM130	CU03567	Dell	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Antenna Cable	0.05	Shielded	Shielded	-
2	DC Cable	1.00	Unshielded	Unshielded	-
3	AC Cable	1.90	Unshielded	Unshielded	-
4	USB Cable	1.50	Shielded	Shielded	-
5	LAN Cable	1.50	Unshielded	Unshielded	-
6	DC Cable	1.80	Unshielded	Unshielded	-
7	AC Cable	0.90	Unshielded	Unshielded	-

SECTION 5: 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. 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 height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.

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

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

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

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

Test Antennas are used as below;

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

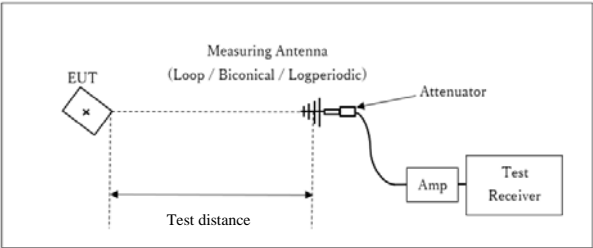
In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired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

20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(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	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	11.12.2.5.1 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces 11.12.2.5.2 The duty cycle was less than 98% for detected noise, a duty factor was added to the 11.12.2.5.1 results.	RBW: 100 kHz VBW: 300 kHz

Figure 2: Test Setup

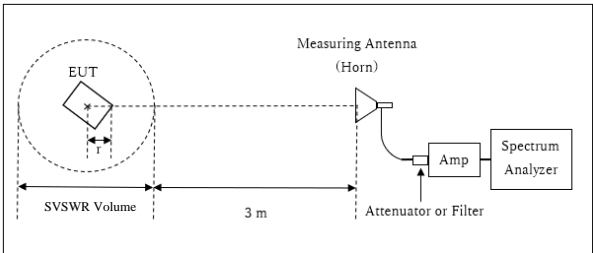
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz to 10 GHz

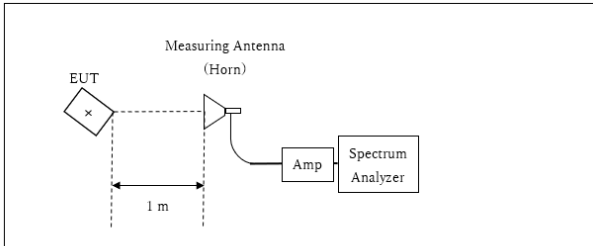


r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: $20 \times \log (3.9 \text{ m} / 3.0 \text{ m}) = 2.28 \text{ dB}$
* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.9 \text{ m}$

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
 $r = 0.1 \text{ m}$

10 GHz to 26.5 GHz



× : Center of turn table

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

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

Measurement Range	: 30 MHz to 26.5 GHz
Test Data	: APPENDIX
Test Result	: Pass

APPENDIX 1: Test Data

Radiated Spurious Emission

Test place	Ise EMC Lab.	No.4
Semi Anechoic Chamber	No.4	No.4
Date	May 30, 2023	May 31, 2023
Temperature / Humidity	23 deg. C / 59 % RH	24 deg. C / 55 % RH
Engineer	Takumi Nishida	Takumi Nishida
Mode	(1 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
	Tx 11b 2412 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	2390.0	46.8	37.3	27.6	5.5	32.0	-	47.8	38.4	73.9	53.9	26.1	15.5	
Hori.	4824.0	42.6	35.3	31.6	7.8	31.1	-	50.9	43.6	73.9	53.9	23.1	10.3	
Hori.	7236.0	42.0	32.3	35.9	9.0	32.4	-	54.6	44.8	73.9	53.9	19.3	9.1	Floor noise
Hori.	9648.0	42.8	31.4	38.9	9.9	32.5	-	59.0	47.7	73.9	53.9	14.9	6.2	Floor noise
Vert.	2390.0	46.0	37.2	27.6	5.5	32.0	-	47.1	38.3	73.9	53.9	26.8	15.6	
Vert.	4824.0	42.3	35.8	31.6	7.8	31.1	-	50.6	44.1	73.9	53.9	23.3	9.8	
Vert.	7236.0	42.0	32.2	35.9	9.0	32.4	-	54.6	44.8	73.9	53.9	19.4	9.1	Floor noise
Vert.	9648.0	42.8	31.5	38.9	9.9	32.5	-	59.1	47.8	73.9	53.9	14.8	6.1	Floor noise

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

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

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

*QP detector was used up to 1GHz

20dBc Data Sheet

Polarity	Frequency	Reading (PK)	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	2412.0	94.4	27.5	5.5	32.0	95.4	-	-	Carrier
Hori.	2400.0	38.4	27.6	5.5	32.0	39.4	75.4	36.0	
Vert.	2412.0	93.7	27.5	5.5	32.0	94.8	-	-	Carrier
Vert.	2400.0	37.8	27.6	5.5	32.0	38.8	74.8	35.9	

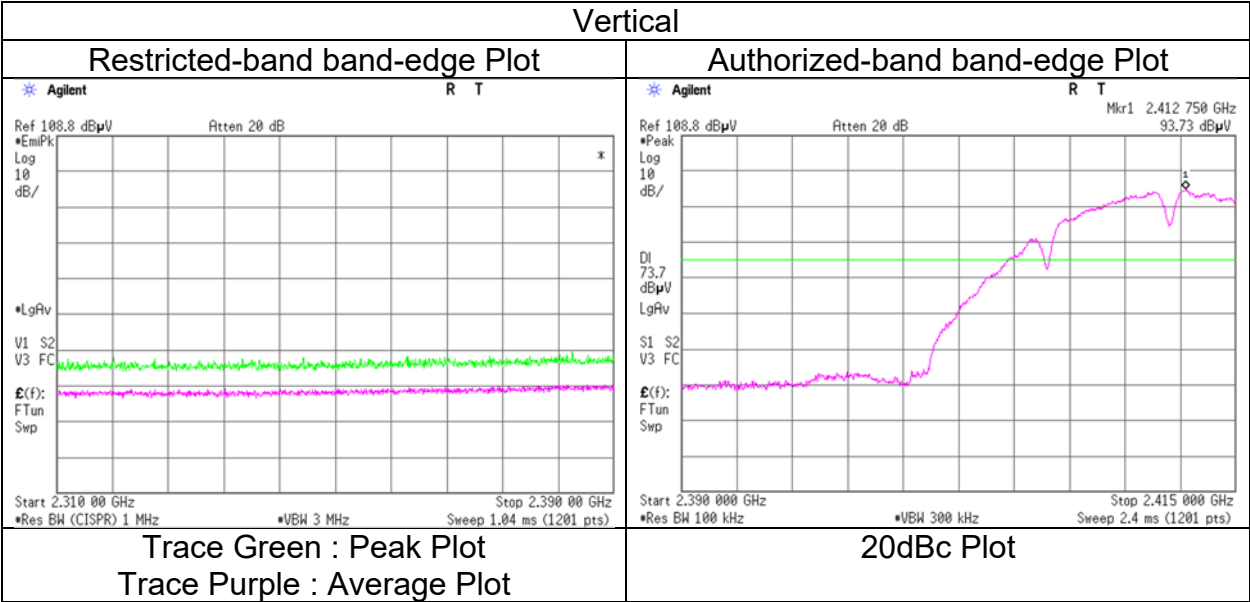
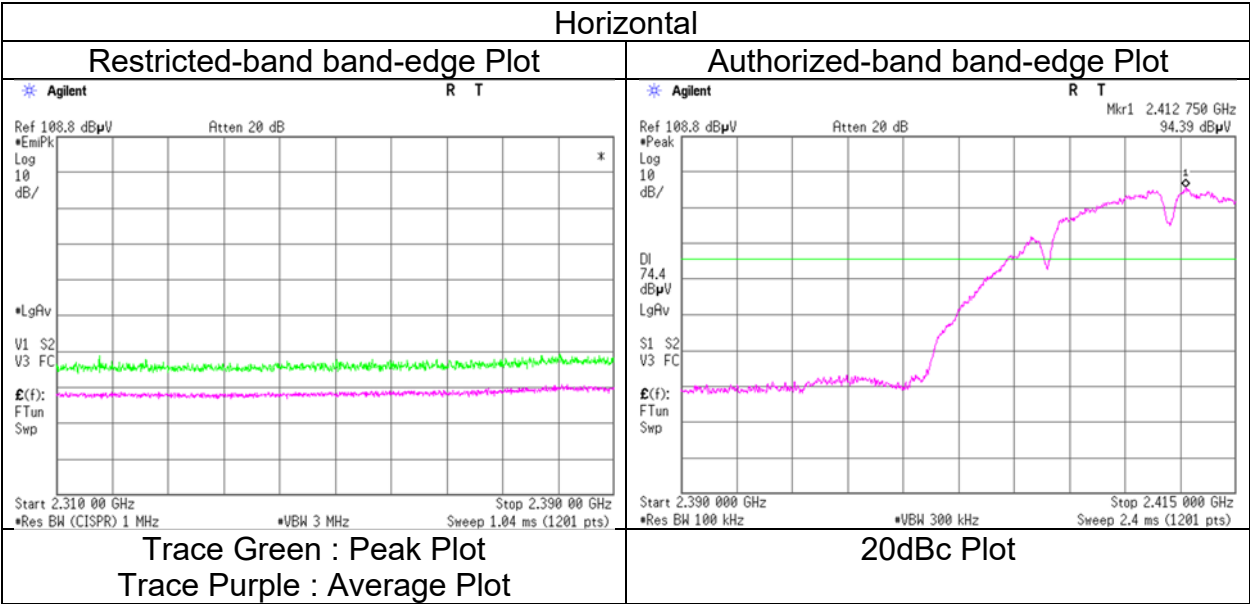
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz 20log (3.9 m / 3.0 m) = 2.28 dB

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

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	May 30, 2023
Temperature / Humidity	23 deg. C / 59 % RH
Engineer	Takumi Nishida
	(1 GHz to 10 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

Test place	Ise EMC Lab.	No.4
Semi Anechoic Chamber	No.4	No.4
Date	May 30, 2023	May 31, 2023
Temperature / Humidity	23 deg. C / 59 % RH	24 deg. C / 55 % RH
Engineer	Takumi Nishida	Takumi Nishida
	(1 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
Mode	Tx 11b 2437 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	4874.0	42.6	35.6	31.7	7.8	31.1	-	51.0	44.0	73.9	53.9	23.0	9.9	
Hori.	7311.0	42.2	32.0	36.0	9.0	32.4	-	54.9	44.6	73.9	53.9	19.0	9.3	Floor noise
Hori.	9748.0	42.9	31.0	39.2	9.9	32.6	-	59.4	47.6	73.9	53.9	14.5	6.3	Floor noise
Vert.	4874.0	42.5	35.9	31.7	7.8	31.1	-	50.8	44.3	73.9	53.9	23.1	9.7	
Vert.	7311.0	42.3	32.0	36.0	9.0	32.4	-	55.0	44.7	73.9	53.9	18.9	9.3	Floor noise
Vert.	9748.0	43.0	31.1	39.2	9.9	32.6	-	59.5	47.6	73.9	53.9	14.4	6.3	Floor noise

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

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

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

*QP detector was used up to 1GHz.

Distance factor:

1 GHz - 10 GHz	20log (3.9 m / 3.0 m) = 2.28 dB	
10 GHz - 26.5 GHz	20log (1.0 m / 3.0 m) = -9.5 dB	

Radiated Spurious Emission

Test place	Ise EMC Lab.	No.4
Semi Anechoic Chamber	No.4	No.4
Date	May 30, 2023	May 31, 2023
Temperature / Humidity	23 deg. C / 59 % RH	24 deg. C / 55 % RH
Engineer	Takumi Nishida	Takumi Nishida
	(1 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
Mode	Tx 11b 2462 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	2483.5	48.1	40.0	27.5	5.6	32.0	-	49.2	41.1	73.9	53.9	24.7	12.8	
Hori.	4924.0	42.8	35.6	31.8	7.8	31.1	-	51.2	44.0	73.9	53.9	22.7	9.9	
Hori.	7386.0	42.4	31.8	36.2	9.0	32.4	-	55.1	44.5	73.9	53.9	18.8	9.4	Floor noise
Hori.	9848.0	43.2	31.1	39.3	9.9	32.6	-	59.8	47.7	73.9	53.9	14.1	6.2	Floor noise
Vert.	2483.5	49.1	40.6	27.5	5.6	32.0	-	50.1	41.7	73.9	53.9	23.8	12.2	
Vert.	4924.0	42.7	35.9	31.8	7.8	31.1	-	51.1	44.3	73.9	53.9	22.8	9.6	
Vert.	7386.0	42.4	31.9	36.2	9.0	32.4	-	55.2	44.6	73.9	53.9	18.7	9.3	Floor noise
Vert.	9848.0	43.2	31.2	39.3	9.9	32.6	-	59.8	47.8	73.9	53.9	14.1	6.1	Floor noise

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

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

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

*QP detector was used up to 1GHz.

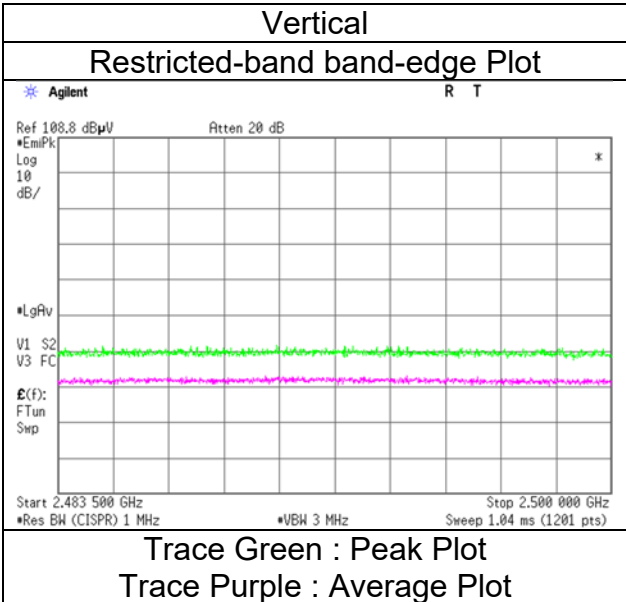
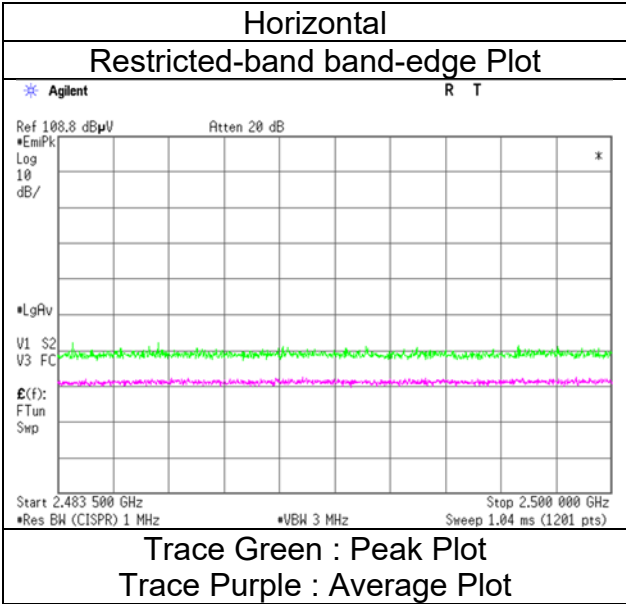
Distance factor:	1 GHz - 10 GHz	20log (3.9 m / 3.0 m) = 2.28 dB
	10 GHz - 26.5 GHz	20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer

Mode

Ise EMC Lab.
No.4
May 30, 2023
23 deg. C / 59 % RH
Takumi Nishida
(1 GHz to 10 GHz)
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

Test place	Ise EMC Lab.	No.4
Semi Anechoic Chamber	No.4	No.4
Date	May 30, 2023	May 31, 2023
Temperature / Humidity	23 deg. C / 59 % RH	24 deg. C / 55 % RH
Engineer	Takumi Nishida	Takumi Nishida
	(1 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
Mode	Tx 11g 2412 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	2390.0	56.1	43.1	27.6	5.5	32.0	0.7	57.1	44.9	73.9	53.9	16.8	9.0	*1)
Hori.	4824.0	41.9	32.4	31.6	7.8	31.1	-	50.1	40.7	73.9	53.9	23.8	13.2	Floor noise
Hori.	7236.0	42.5	31.8	35.9	9.0	32.4	-	55.1	44.4	73.9	53.9	18.8	9.6	Floor noise
Hori.	9648.0	43.4	31.4	38.9	9.9	32.5	-	59.7	47.7	73.9	53.9	14.2	6.2	Floor noise
Vert.	2390.0	53.6	41.7	27.6	5.5	32.0	0.7	54.6	43.4	73.9	53.9	19.3	10.5	*1)
Vert.	4824.0	42.0	32.3	31.6	7.8	31.1	-	50.3	40.6	73.9	53.9	23.6	13.3	Floor noise
Vert.	7236.0	42.4	31.9	35.9	9.0	32.4	-	55.0	44.4	73.9	53.9	18.9	9.5	Floor noise
Vert.	9648.0	43.5	31.5	38.9	9.9	32.5	-	59.8	47.8	73.9	53.9	14.1	6.1	Floor noise

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

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

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

*QP detector was used up to 1GHz.

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

20dBc Data Sheet

Polarity	Frequency	Reading (PK)	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	2412.0	89.2	27.5	5.5	32.0	90.2	-	-	Carrier
Hori.	2400.0	57.2	27.6	5.5	32.0	58.2	70.2	12.0	
Vert.	2412.0	87.9	27.5	5.5	32.0	88.9	-	-	Carrier
Vert.	2400.0	54.3	27.6	5.5	32.0	55.4	68.9	13.6	

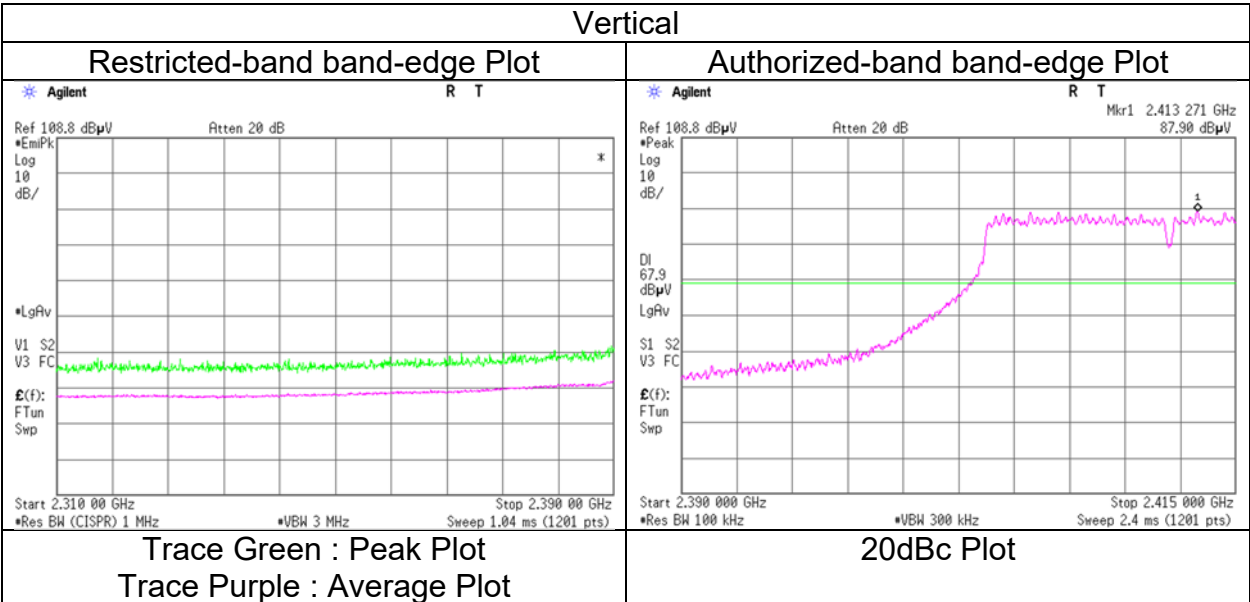
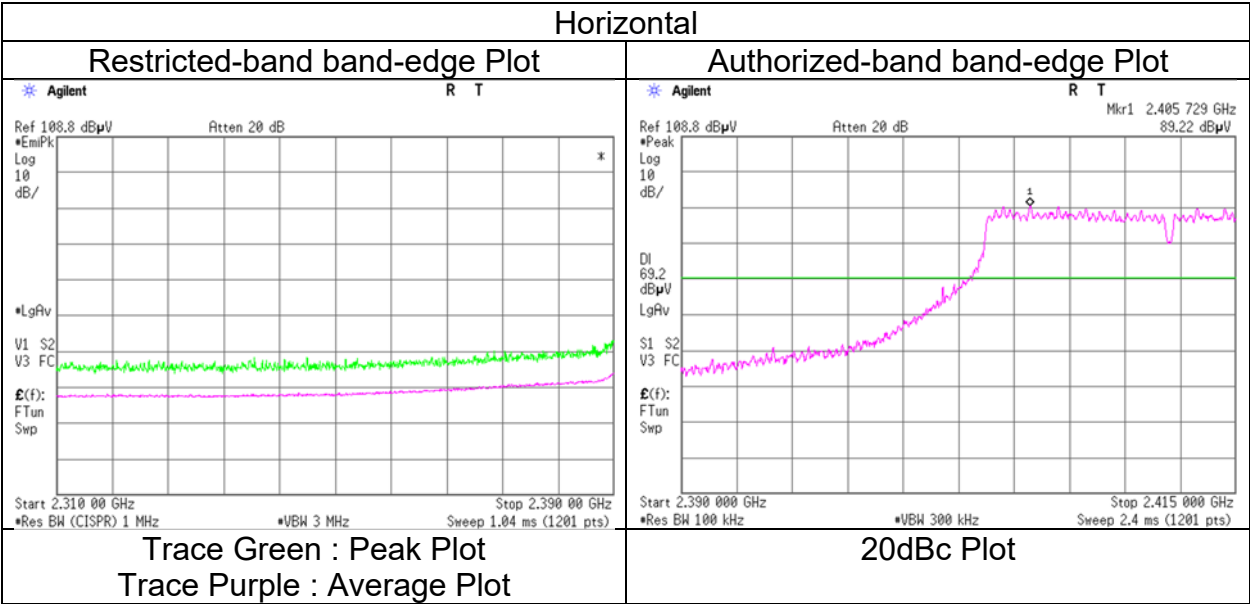
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz 20log (3.9 m / 3.0 m) = 2.28 dB

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

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	May 30, 2023
Temperature / Humidity	23 deg. C / 59 % RH
Engineer	Takumi Nishida
	(1 GHz to 10 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

Test place	Ise EMC Lab.	No.4	No.4
Semi Anechoic Chamber	No.4	May 31, 2023	May 31, 2023
Date	May 30, 2023	May 31, 2023	May 31, 2023
Temperature / Humidity	23 deg. C / 59 % RH	24 deg. C / 55 % RH	24 deg. C / 55 % RH
Engineer	Takumi Nishida	Takumi Nishida	Takumi Nishida
	(1 GHz to 10 GHz)	(10 GHz to 26.5 GHz)	(Below GHz)
Mode	Tx 11g 2437 MHz		

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	30.2	22.9	-	18.7	6.6	28.6	-	19.7	-	40.0	-	20.3	-	
Hori.	175.3	21.7	-	16.0	7.9	28.1	-	17.4	-	43.5	-	26.1	-	
Hori.	271.8	21.7	-	13.6	8.5	27.8	-	16.0	-	46.0	-	30.0	-	
Hori.	320.5	21.6	-	14.7	8.8	27.9	-	17.2	-	46.0	-	28.8	-	
Hori.	396.0	35.9	-	16.0	9.2	28.5	-	32.7	-	46.0	-	13.3	-	
Hori.	430.6	24.3	-	16.4	9.4	28.7	-	21.4	-	46.0	-	24.6	-	
Hori.	4874.0	42.2	32.5	31.7	7.8	31.1	-	50.6	40.9	73.9	53.9	23.4	13.0	Floor noise
Hori.	7311.0	42.6	31.9	36.0	9.0	32.4	-	55.3	44.6	73.9	53.9	18.7	9.3	Floor noise
Hori.	9748.0	43.6	31.1	39.2	9.9	32.6	-	60.1	47.7	73.9	53.9	13.8	6.2	Floor noise
Vert.	30.2	22.8	-	18.7	6.6	28.6	-	19.6	-	40.0	-	20.4	-	
Vert.	175.3	21.5	-	16.0	7.9	28.1	-	17.3	-	43.5	-	26.2	-	
Vert.	271.8	21.9	-	13.6	8.5	27.8	-	16.3	-	46.0	-	29.7	-	
Vert.	320.5	21.6	-	14.7	8.8	27.9	-	17.2	-	46.0	-	28.8	-	
Vert.	396.0	32.7	-	16.0	9.2	28.5	-	29.5	-	46.0	-	16.5	-	
Vert.	430.6	26.0	-	16.4	9.4	28.7	-	23.1	-	46.0	-	22.9	-	
Vert.	4874.0	42.1	32.5	31.7	7.8	31.1	-	50.4	40.8	73.9	53.9	23.5	13.1	Floor noise
Vert.	7311.0	42.6	32.0	36.0	9.0	32.4	-	55.3	44.7	73.9	53.9	18.6	9.3	Floor noise
Vert.	9748.0	43.7	31.2	39.2	9.9	32.6	-	60.2	47.8	73.9	53.9	13.7	6.1	Floor noise

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

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

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

*QP detector was used up to 1GHz.

Distance factor: 1 GHz - 10 GHz $20\log(3.9\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission

Test place	Ise EMC Lab.	No.4
Semi Anechoic Chamber	No.4	No.4
Date	May 30, 2023	May 31, 2023
Temperature / Humidity	23 deg. C / 59 % RH	24 deg. C / 55 % RH
Engineer	Takumi Nishida	Takumi Nishida
	(1 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
Mode	Tx 11g 2462 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	2483.5	53.5	42.5	27.5	5.6	32.0	0.7	54.6	44.2	73.9	53.9	19.3	9.7	*1)
Hori.	4924.0	42.3	32.6	31.8	7.8	31.1	-	50.8	41.0	73.9	53.9	23.1	12.9	Floor noise
Hori.	7386.0	42.5	32.0	36.2	9.0	32.4	-	55.3	44.7	73.9	53.9	18.6	9.2	Floor noise
Hori.	9848.0	43.6	31.0	39.3	9.9	32.6	-	60.2	47.6	73.9	53.9	13.7	6.3	Floor noise
Vert.	2483.5	52.9	42.0	27.5	5.6	32.0	0.7	53.9	43.7	73.9	53.9	20.0	10.2	*1)
Vert.	4924.0	42.3	32.6	31.8	7.8	31.1	-	50.8	41.0	73.9	53.9	23.2	12.9	Floor noise
Vert.	7386.0	42.5	32.2	36.2	9.0	32.4	-	55.2	45.0	73.9	53.9	18.7	8.9	Floor noise
Vert.	9848.0	43.7	31.2	39.3	9.9	32.6	-	60.3	47.8	73.9	53.9	13.6	6.2	Floor noise

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

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

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

*QP detector was used up to 1GHz.

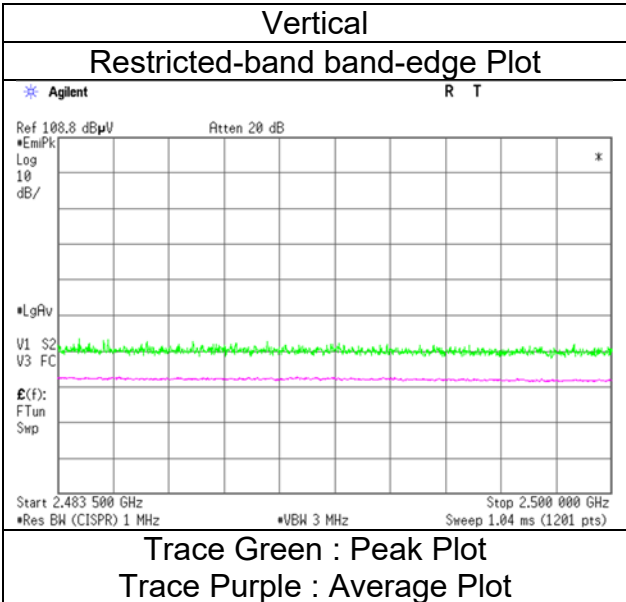
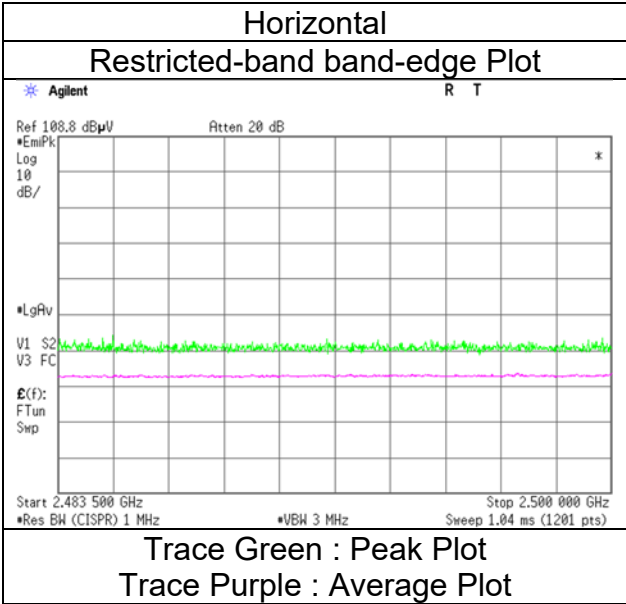
*1) Not Out of Band emission(Leakage Power)

Distance factor:	1 GHz - 10 GHz	20log (3.9 m / 3.0 m) = 2.28 dB
	10 GHz - 26.5 GHz	20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer
Mode

Ise EMC Lab.
No.4
May 30, 2023
23 deg. C / 59 % RH
Takumi Nishida
(1 GHz to 10 GHz)
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

Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date May 30, 2023
Temperature / Humidity 23 deg. C / 59 % RH
Engineer Takumi Nishida
 (1 GHz to 10 GHz)
Mode Tx 11n-20 2412 MHz

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	2390.0	55.2	41.4	27.6	5.5	32.0	0.7	56.3	43.1	73.9	53.9	17.6	10.8	*1)
Vert.	2390.0	54.0	40.6	27.6	5.5	32.0	0.7	55.1	42.4	73.9	53.9	18.8	11.5	*1)

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

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

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

*QP detector was used up to 1GHz.

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

20dBc Data Sheet

Polarity	Frequency	Reading (PK)	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	2412.0	88.5	27.5	5.5	32.0	89.6	-	-	Carrier
Hori.	2400.0	55.6	27.6	5.5	32.0	56.7	69.6	12.9	
Vert.	2412.0	87.1	27.5	5.5	32.0	88.1	-	-	Carrier
Vert.	2400.0	53.1	27.6	5.5	32.0	54.1	68.1	14.0	

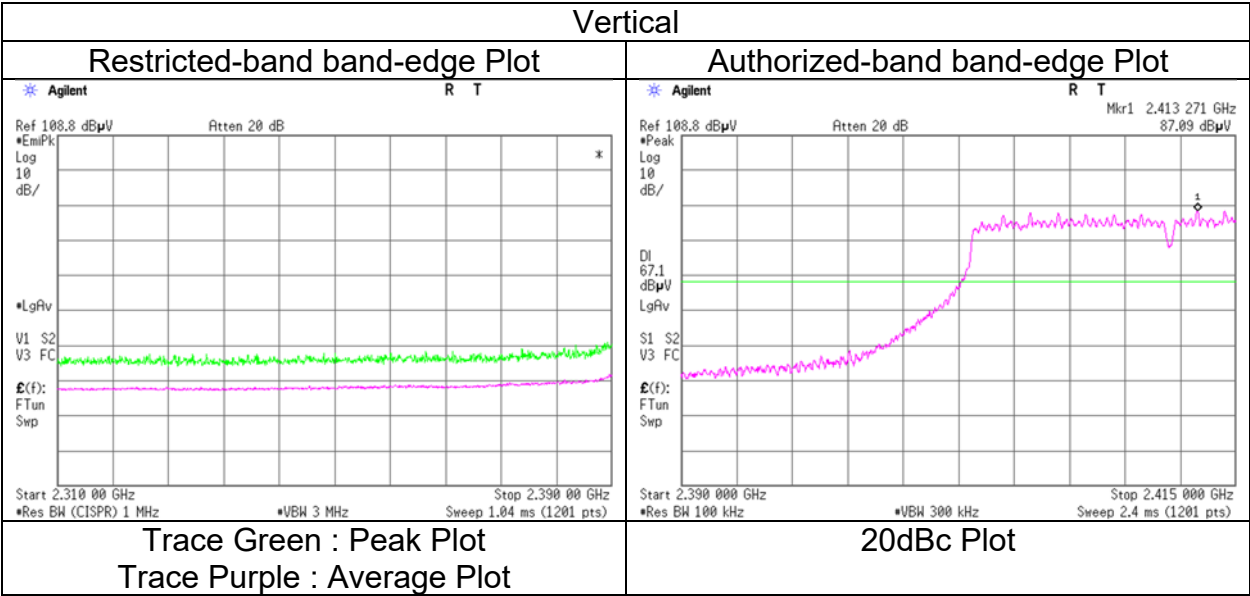
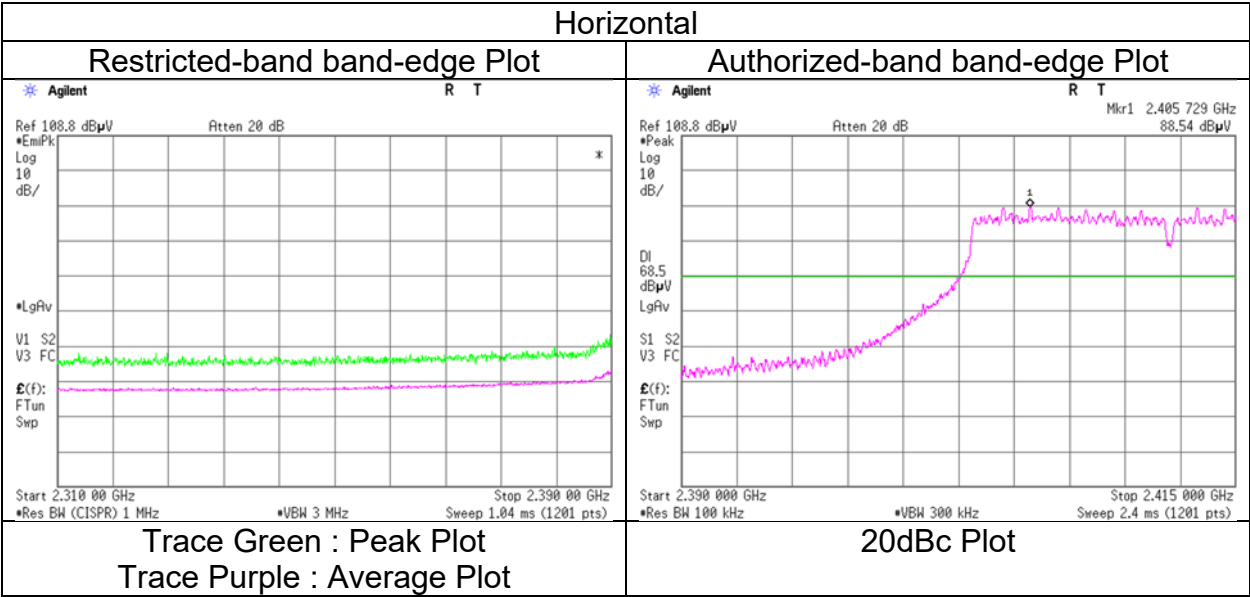
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz 20log (3.9 m / 3.0 m) = 2.28 dB

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

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	May 30, 2023
Temperature / Humidity	23 deg. C / 59 % RH
Engineer	Takumi Nishida
	(1 GHz to 10 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

Test place Ise EMC Lab.
Semi Anechoic Chamber No.4
Date May 30, 2023
Temperature / Humidity 23 deg. C / 59 % RH
Engineer Takumi Nishida
(1 GHz to 10 GHz)
Mode Tx 11n-20 2462 MHz

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	2483.5	53.1	42.2	27.5	5.6	32.0	0.7	54.2	43.9	73.9	53.9	19.7	10.0	*1)
Vert.	2483.5	52.6	41.9	27.5	5.6	32.0	0.7	53.6	43.6	73.9	53.9	20.3	10.3	*1)

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

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

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

*QP detector was used up to 1GHz

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

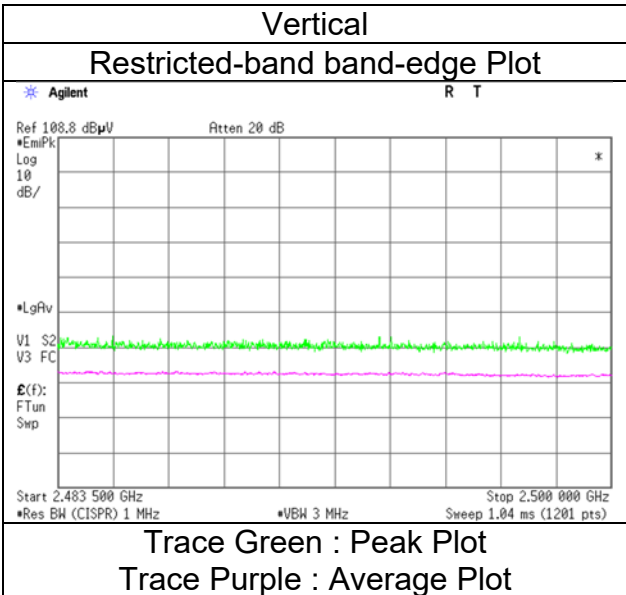
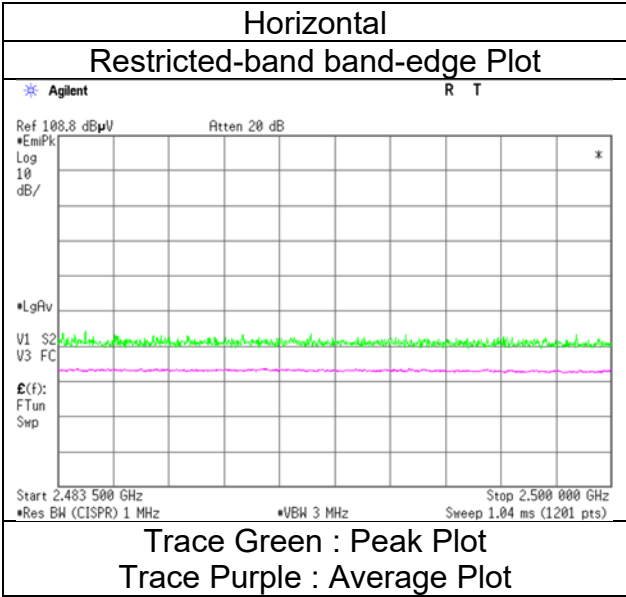
Distance factor: 1 GHz - 10 GHz 20log (3.9 m / 3.0 m) = 2.28 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer

Mode

Ise EMC Lab.
No.4
May 30, 2023
23 deg. C / 59 % RH
Takumi Nishida
(1 GHz to 10 GHz)
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

Test place	Ise EMC Lab.	No.4
Semi Anechoic Chamber	No.4	No.4
Date	May 30, 2023	May 31, 2023
Temperature / Humidity	23 deg. C / 59 % RH	24 deg. C / 55 % RH
Engineer	Takumi Nishida	Takumi Nishida
	(1 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
Mode	Tx 11n-40 2422 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	2390.0	50.9	39.8	27.6	5.5	32.0	1.3	51.9	42.2	73.9	53.9	22.0	11.8	*1)
Hori.	4844.0	42.5	32.3	31.7	7.8	31.1	-	50.8	40.6	73.9	53.9	23.1	13.3	Floor noise
Hori.	7266.0	42.6	32.5	36.0	9.0	32.4	-	55.2	45.1	73.9	53.9	18.7	8.8	Floor noise
Hori.	9688.0	43.1	31.3	39.1	9.9	32.5	-	59.5	47.7	73.9	53.9	14.4	6.2	Floor noise
Vert.	2390.0	50.3	38.9	27.6	5.5	32.0	1.3	51.4	41.2	73.9	53.9	22.5	12.7	*1)
Vert.	4844.0	42.4	32.4	31.7	7.8	31.1	-	50.7	40.7	73.9	53.9	23.2	13.2	Floor noise
Vert.	7266.0	42.7	32.7	36.0	9.0	32.4	-	55.3	45.2	73.9	53.9	18.6	8.7	Floor noise
Vert.	9688.0	43.4	31.4	39.1	9.9	32.5	-	59.8	47.8	73.9	53.9	14.1	6.1	Floor noise

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

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

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

*QP detector was used up to 1GHz.

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

20dBc Data Sheet

Polarity	Frequency	Reading (PK)	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	2422.0	81.9	27.5	5.5	32.0	82.9	-	-	Carrier
Hori.	2400.0	51.6	27.6	5.5	32.0	52.7	62.9	10.3	
Vert.	2422.0	81.6	27.5	5.5	32.0	82.6	-	-	Carrier
Vert.	2400.0	50.7	27.6	5.5	32.0	51.8	62.6	10.9	

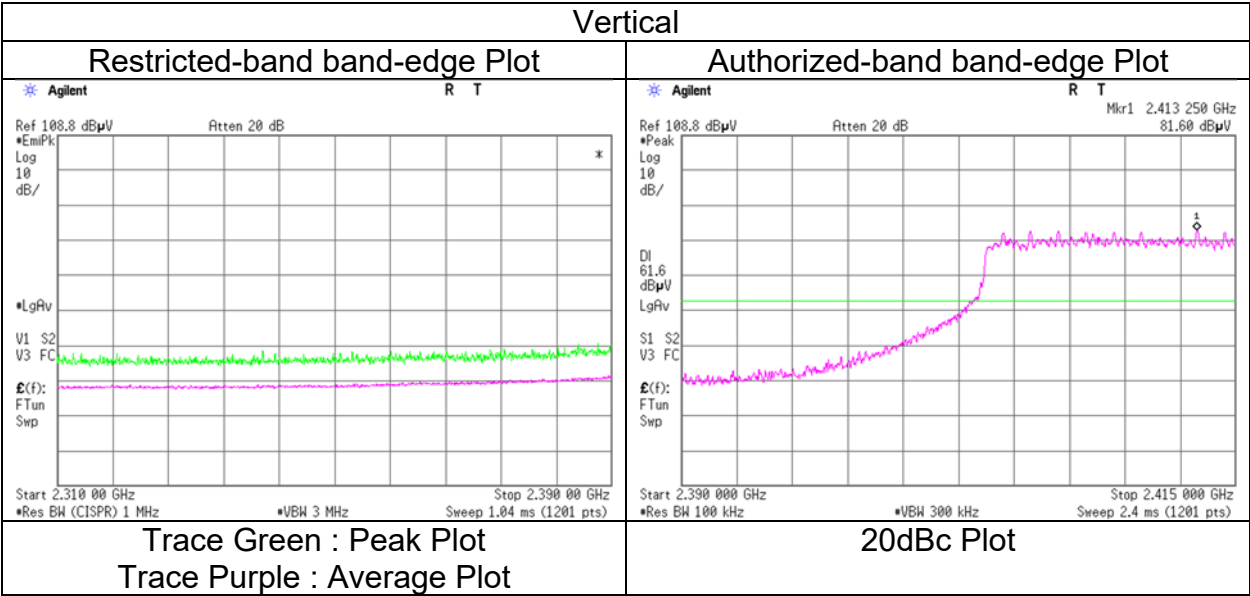
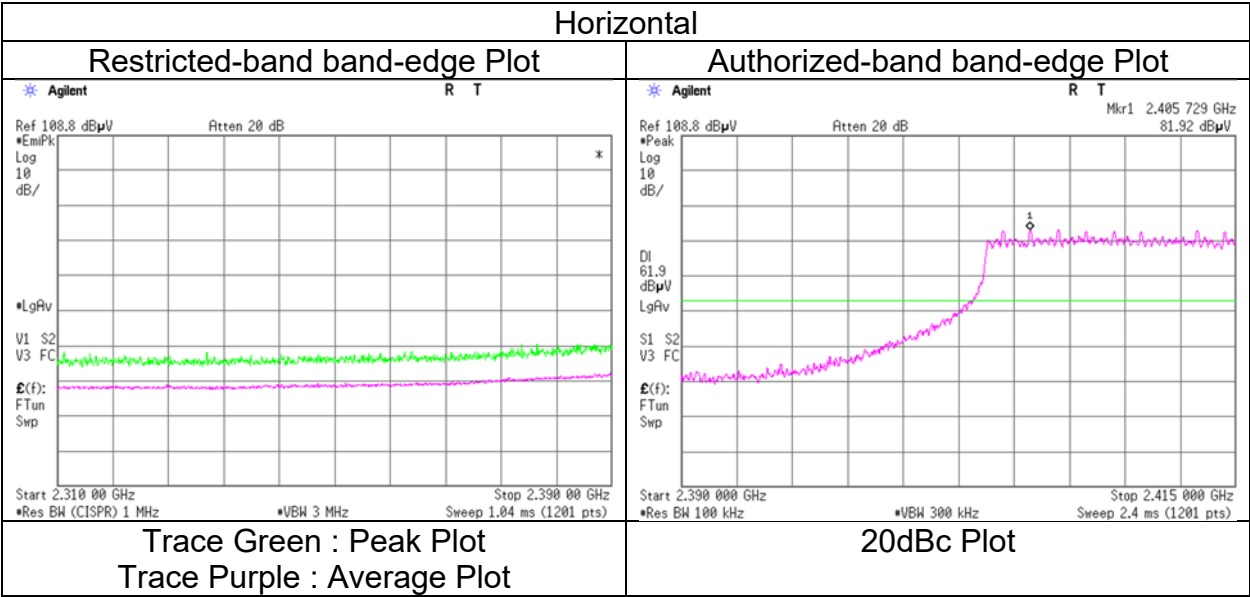
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier)

Distance factor: 1 GHz - 10 GHz 20log (3.9 m / 3.0 m) = 2.28 dB

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

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	May 30, 2023
Temperature / Humidity	23 deg. C / 59 % RH
Engineer	Takumi Nishida
	(1 GHz to 10 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

Test place	Ise EMC Lab.	No.4
Semi Anechoic Chamber	No.4	No.4
Date	May 30, 2023	May 31, 2023
Temperature / Humidity	23 deg. C / 59 % RH	24 deg. C / 55 % RH
Engineer	Takumi Nishida	Takumi Nishida
	(1 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
Mode	Tx 11n-40 2437 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	4874.0	42.8	32.7	31.7	7.8	31.1	-	51.2	41.0	73.9	53.9	22.7	12.9	Floor noise
Hori.	7311.0	42.9	31.5	36.0	9.0	32.4	-	55.6	44.2	73.9	53.9	18.3	9.7	Floor noise
Hori.	9748.0	43.3	31.2	39.2	9.9	32.6	-	59.9	47.8	73.9	53.9	14.0	6.2	Floor noise
Vert.	4874.0	42.7	32.4	31.7	7.8	31.1	-	51.0	40.7	73.9	53.9	22.9	13.2	Floor noise
Vert.	7311.0	42.8	32.3	36.0	9.0	32.4	-	55.5	45.0	73.9	53.9	18.4	9.0	Floor noise
Vert.	9748.0	43.1	31.3	39.2	9.9	32.6	-	59.7	47.9	73.9	53.9	14.3	6.0	Floor noise

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

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

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

*QP detector was used up to 1GHz

Distance factor:	1 GHz - 10 GHz	20log (3.9 m / 3.0 m) = 2.28 dB
	10 GHz - 26.5 GHz	20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab.	No.4
Semi Anechoic Chamber	No.4	No.4
Date	May 30, 2023	May 31, 2023
Temperature / Humidity	23 deg. C / 59 % RH	24 deg. C / 55 % RH
Engineer	Takumi Nishida	Takumi Nishida
	(1 GHz to 10 GHz)	(10 GHz to 26.5 GHz)
Mode	Tx 11n-40 2452 MHz	

Polarity	Frequency	Reading (QP / PK)	Reading (AV)	Ant. Factor	Loss	Gain	Duty Factor	Result (QP / PK)	Result (AV)	Limit (QP / PK)	Limit (AV)	Margin (QP / PK)	Margin (AV)	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	
Hori.	2483.5	57.4	42.9	27.5	5.6	32.0	1.3	58.5	45.2	73.9	53.9	15.4	8.7	*1)
Hori.	4904.0	43.0	32.7	31.7	7.8	31.1	-	51.4	41.1	73.9	53.9	22.5	12.8	Floor noise
Hori.	7356.0	43.2	31.8	36.1	9.0	32.4	-	55.9	44.5	73.9	53.9	18.0	9.5	Floor noise
Hori.	9808.0	43.3	31.2	39.3	9.9	32.6	-	59.9	47.8	73.9	53.9	14.0	6.1	Floor noise
Vert.	2483.5	57.3	42.7	27.5	5.6	32.0	1.3	58.4	45.0	73.9	53.9	15.5	8.9	*1)
Vert.	4904.0	42.7	33.0	31.7	7.8	31.1	-	51.1	41.4	73.9	53.9	22.8	12.5	Floor noise
Vert.	7356.0	43.3	31.7	36.1	9.0	32.4	-	56.0	44.4	73.9	53.9	17.9	9.5	Floor noise
Vert.	9808.0	43.5	31.2	39.3	9.9	32.6	-	60.1	47.8	73.9	53.9	13.8	6.1	Floor noise

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

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

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

*QP detector was used up to 1GHz.

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

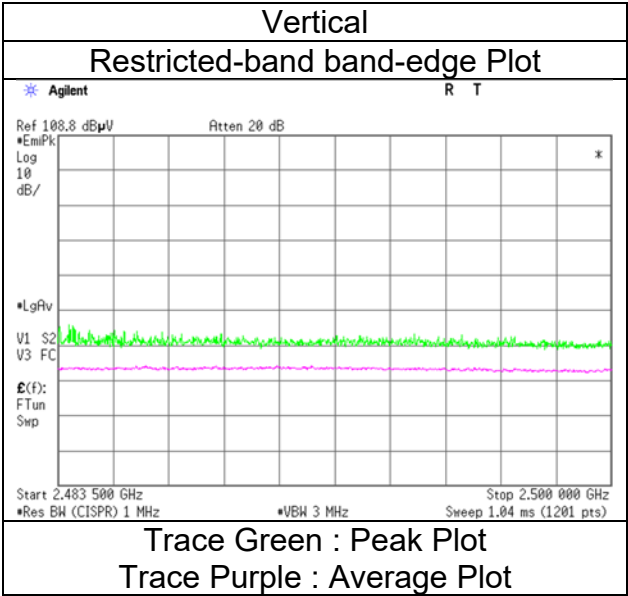
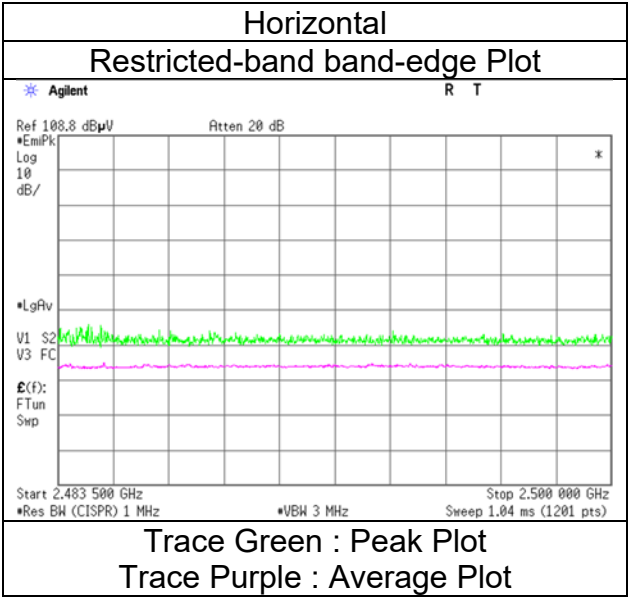
Distance factor:	1 GHz - 10 GHz	20log (3.9 m / 3.0 m) = 2.28 dB
	10 GHz - 26.5 GHz	20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer

Mode

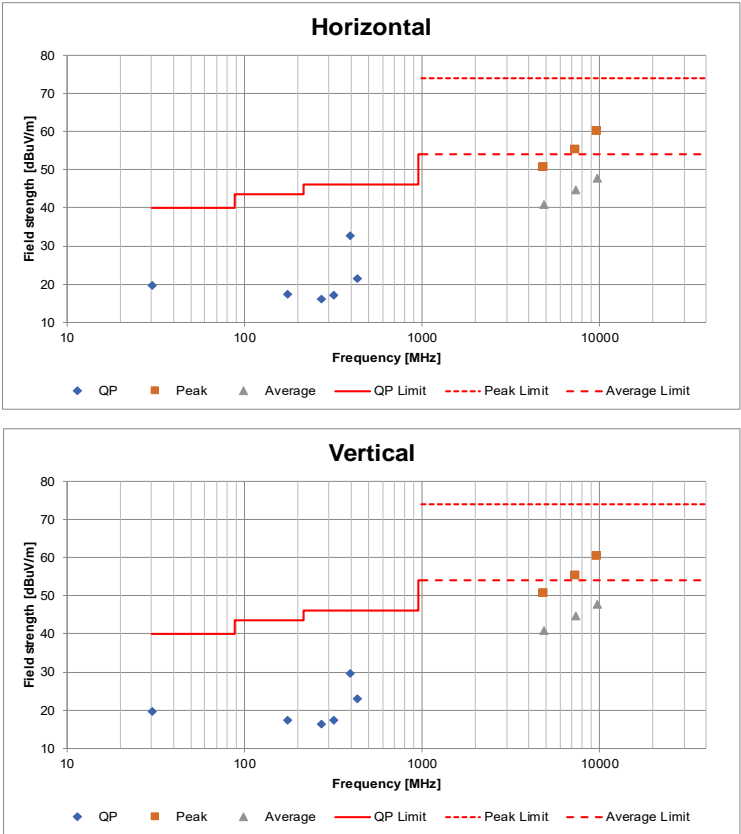
Ise EMC Lab.
No.4
May 30, 2023
23 deg. C / 59 % RH
Takumi Nishida
(1 GHz to 10 GHz)
Tx 11n-40 2452 MHz



* 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 mode for Maximum Peak Output Power)

Test place	Ise EMC Lab.	No.4	No.4
Semi Anechoic Chamber	No.4	May 31, 2023	May 31, 2023
Date	May 30, 2023	May 31, 2023	May 31, 2023
Temperature / Humidity	23 deg. C / 59 % RH	24 deg. C / 55 % RH	24 deg. C / 55 % RH
Engineer	Takumi Nishida	Takumi Nishida	Takumi Nishida
Mode	(1 GHz to 10 GHz)	(10 GHz to 26.5 GHz)	(Below 1 GHz)
	Tx 11g 2437 MHz		



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

APPENDIX 2: Test Instruments

Test Equipment

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	COTS-MEMI-02	178648	EMI measurement program	TSJ (Techno Science Japan)	TEPTO-DV	-	-	-
RE	MAEC-02	142004	AC2_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-06902	05/30/2022	24
RE	MAEC-04	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/22/2022	24
RE	MAEC-04-SVSWR	142017	AC4_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	04/14/2023	24
RE	MAT-112	220646	Attenuator	Huber+Suhner	6806_N-50-1	-	03/17/2023	12
RE	MBA-08	141427	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103B+B BA9106	08031	07/30/2022	12
RE	MCC-12	141317	Coaxial Cable	UL Japan	-	-	09/27/2022	12
RE	MCC-218	141394	Microwave Cable	Junkosha	MWX221	1607S141(1 m) / 1608S264(5 m)	09/12/2022	12
RE	MHA-06	141512	Horn Antenna 1-18GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	254	10/20/2022	12
RE	MHA-16	141513	Horn Antenna 15-40GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9170	BBHA9170306	07/05/2022	12
RE	MHF-26	141296	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	09/08/2022	12
RE	MJM-27	142228	Measure, Tape, Steel	KOMELON	KMC-36	-	-	-
RE	MJM-29	142230	Measure, Tape, Steel	KOMELON	KMC-36	-	-	-
RE	MLA-21	141265	Logperiodic Antenna(200-1000MHz)	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	9111B-190	07/30/2022	12
RE	MMM-01	141542	Digital Tester	Fluke Corporation	FLUKE 26-3	78030611	08/12/2022	12
RE	MMM-10	141545	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201148	01/18/2023	12
RE	MOS-15	141562	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0010	01/13/2023	12
RE	MOS-41	192300	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	0013	12/17/2022	12
RE	MPA-10	141579	Pre Amplifier	Keysight Technologies Inc	8449B	3008A02142	02/14/2023	12
RE	MPA-12	141581	MicroWave System Amplifier	Keysight Technologies Inc	83017A	00650	10/05/2022	12
RE	MSA-10	141899	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY46180655	02/20/2023	12
RE	MTR-03	141942	Test Receiver	Rohde & Schwarz	ESCI	100300	05/24/2023	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.

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

Test item:

RE: Radiated Emission