







RADIO TEST REPORT

Test Report No.: 14654490H-C-R1

Customer	Silex Technology, Inc
Description of EUT	PCI Express Half mini card WLAN module
Model Number of EUT	SX-PCEAN2
FCC ID	N6C-SXPCEAN2
Test Regulation	FCC Part 15 Subpart C
Test Result	Complied (Refer to SECTION 3)
Issue Date	April 13, 2023
Remarks	* Wireless LAN (2.4 GHz band) part * For Permissive Change * Radiated Spurious Emission only

Representative Test Engineer	Approved By
	
Daiki Matsui Engineer	Satofumi Matsuyama Engineer
 	
CERTIFICATE 5107.02	
<input type="checkbox"/> The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan, Inc.	
<input checked="" type="checkbox"/> 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.: 14654490H-C

This report is a revised version of 14654490H-C. 14654490H-C is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	14654490H-C	March 15, 2023	-
1	14654490H-C-R1	April 13, 2023	Section 2.2: Product Description Radio Specification Correction of Antenna Gain WLAN 2.4 GHz: 2.14 dBi → 1.44 dBi WLAN 5 GHz: 4 dBi → 3.9 dBi
1	14654490H-C-R1	April 13, 2023	APPENDIX 1: Test Data Radiated Spurious Emission -11b: 2412 MHz Correction of Limit for 2288.0 MHz (and relevant value). -All test frequency except for 11b: 2412 MHz. Addition of 2288.0 MHz (and relevant value).

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	PCI Express Half mini card WLAN module
Model Number	SX-PCEAN2
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	January 23, 2023
Test Date	February 22 to 24, 2023

2.2 Product Description

General Specification

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

Radio Specification

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

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	1.44 dBi	

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

Equipment Type	Transceiver	
Frequency of Operation	20 MHz Band	5180 MHz to 5240 MHz 5260 MHz to 5320 MHz 5500 MHz to 5700 MHz 5745 MHz to 5825 MHz
	40 MHz Band	5190 MHz to 5230 MHz 5270 MHz to 5310 MHz 5510 MHz to 5670 MHz 5755 MHz to 5795 MHz
Type of Modulation	OFDM	
Antenna Gain	3.9 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

* Also the EUT complies with FCC Part 15 Subpart B.

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: Section15.247(d) ISED: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	1.3 dB 2390.0 MHz, AV, Horizontal	Complied a)	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. *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 Radiated Spurious Emission)</p>					

FCC Part 15.31 (e)

The RF Module has own regulator.

The RF Module is constantly provided voltage through own regulator regardless of input voltage.

Therefore, this EUT complies with the requirement.

FCC Part 15.203/212 Antenna requirement

The EUT has a unique antenna connector.

Therefore, the equipment complies with the requirement of 15.203/212.

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		Uncertainty (+/-)
3 m	9 kHz to 30 MHz		3.2 dB
10 m			3.0 dB
3 m	30 MHz to 200 MHz	Horizontal	4.8 dB
		Vertical	5.0 dB
	200 MHz to 1000 MHz	Horizontal	5.1 dB
		Vertical	6.2 dB
10 m	30 MHz to 200 MHz	Horizontal	4.8 dB
		Vertical	4.8 dB
	200 MHz to 1000 MHz	Horizontal	5.0 dB
		Vertical	5.0 dB
3 m	1 GHz to 6 GHz		4.9 dB
	6 GHz to 18 GHz		5.2 dB
1 m	10 GHz to 26.5 GHz		5.4 dB
	26.5 GHz to 40 GHz		5.4 dB
10 m	1 GHz to 18 GHz		5.4 dB

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.

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

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

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

Telephone: +81-596-24-8999

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	-	-

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)

Mode	Remarks*
IEEE 802.11b (11b)	11Mbps (Short GI), PN9
IEEE 802.11g (11g)	12Mbps, PN9
IEEE 802.11n 20 MHz BW (11n-20)	MCS 9 (Short GI), PN9
IEEE 802.11n 40 MHz BW (11n-40)	MCS 9 (Short GI), 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 setting value might be different from product specification value)	
Power Setting: Refer to the following table. Software: art2 ver4.4 (Date: February 22, 2023, 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.	

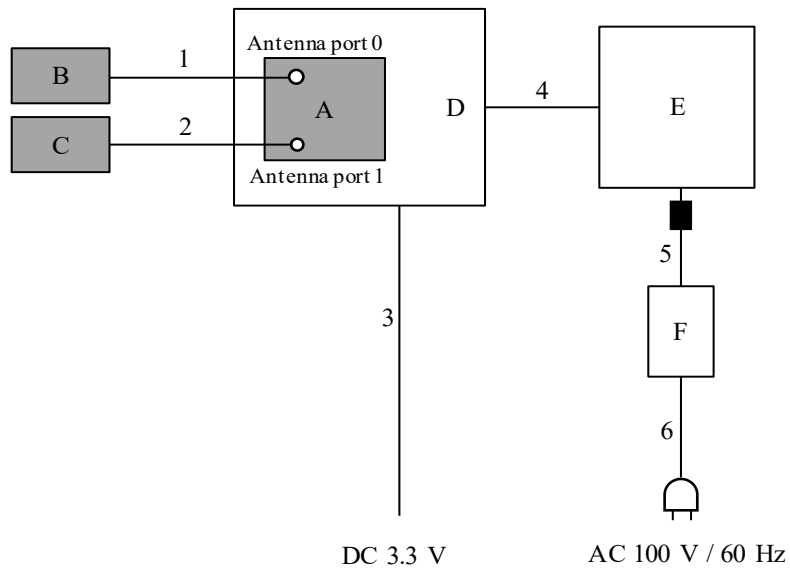
[Power setting]

Operation	Rate	Frequency	Power Setting [dBm]
11b	11 Mbps(Short GI)	2412 MHz	14.5
		2437 MHz	16.5
		2462 MHz	13.0
11g	12 Mbps	2412 MHz	15.5
		2437 MHz	18.5
		2462 MHz	13.5
11n-20 MHz	MCS 9 (Short GI)	2412 MHz	13.5
		2437 MHz	17.5
		2462 MHz	12.0
11n-40 MHz	MCS 9 (Short GI)	2422 MHz	7.50
		2437 MHz	16.5
		2452 MHz	5.50

*The Details of Operating Mode(s)

Test Item	Operating Mode	Tested Antenna port	Tested frequency
Radiated Spurious Emission (Below 1 GHz)	11n-20 Tx *1)	0+1	2437 MHz *1)
Radiated Spurious Emission (Above 1 GHz)	11b Tx	0	2412 MHz
	11n-20 Tx *2)	0+1	2437 MHz
			2462 MHz
	11g Tx *3)	0	2412 MHz
11n-40 Tx	0+1	2422 MHz	2437 MHz
		2437 MHz	2452 MHz
		2452 MHz	
*1) The operating mode and tested frequency were tested as a representative, because it had the highest power at antenna terminal test. *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. *3) Only band-edge test was performed.			

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	PCI Express Half Mini Card WLAN Module	SX-PCEAN2	M7000030	Silex Technology, Inc	EUT
B	Antenna	1019-013A	023	STAF Corporation	EUT
C	Antenna	1019-013A	024	STAF Corporation	EUT
D	Jig board	-	-	-	-
E	Laptop PC	Probook 6570b	EA/2017/80039	HP	-
F	AC Adapter	PPP009C	F220881331036649	HP	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Antenna Cable	0.1	Shielded	Shielded	-
2	Antenna Cable	0.1	Shielded	Shielded	-
3	DC Cable	2.4	Unshielded	Unshielded	-
4	Mini PCI Cable	0.6	Unshielded	Unshielded	-
5	DC Cable	1.8	Unshielded	Unshielded	-
6	AC Cable	1.8	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, 0.5 m by 1.0 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

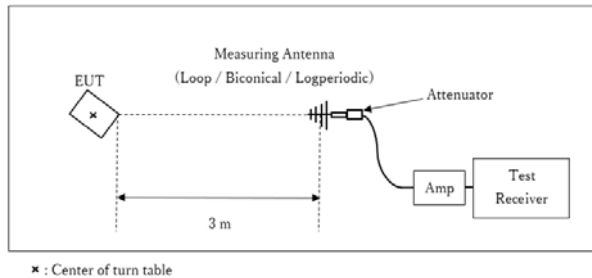
In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired 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	<u>11.12.2.5.1</u> RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces <u>11.12.2.5.2</u> 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

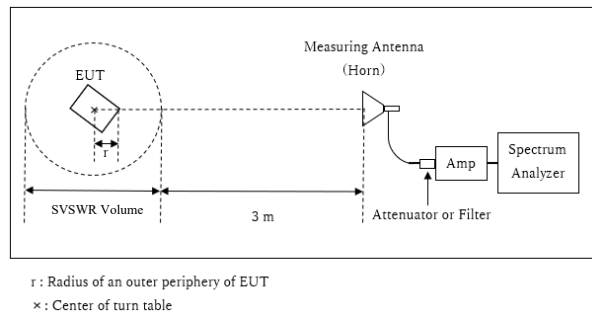
Figure 2: Test Setup

Below 1 GHz



Test Distance: 3 m

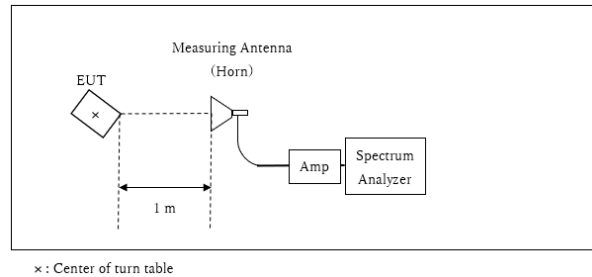
1 GHz to 10 GHz



Distance Factor: $20 \times \log(3.8 \text{ m} / 3.0 \text{ m}) = 2.06 \text{ dB}$
* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.8 \text{ m}$

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
 $r = 0.2$

10 GHz to 26.5 GHz



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.	
Semi Anechoic Chamber	No.3	No.3
Date	February 22, 2023	February 24, 2023
Temperature / Humidity	22 deg. C / 30 % RH	20 deg. C / 30 % RH
Engineer	Daiki Matsui	Tetsuro Yoshida
	(1 GHz - 10 GHz)	(10 GHz - 26.5 GHz)
Mode	Tx 11b 2412 MHz	

Polarity [Hori/Vert]	Frequency [MHz]	Reading (QP / PK) [dBuV]	Reading (AV) [dBuV]	Ant. Factor [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result (QP / PK) [dBuV/m]	Result (AV) [dBuV/m]	Limit (QP / PK) [dBuV/m]	Limit (AV) [dBuV/m]	Margin (QP / PK) [dB]	Margin (AV) [dB]	Remark
Hori.	2288.0	49.3	37.4	28.2	5.3	33.0	-	49.8	38.0	73.9	53.9	24.1	16.0	
Hori.	2390.0	55.6	46.2	27.7	5.4	32.9	0.2	55.7	46.6	73.9	53.9	18.2	7.3	*1)
Hori.	4824.0	44.1	33.3	31.5	7.7	32.0	-	51.3	40.5	73.9	53.9	22.6	13.4	
Hori.	7236.0	41.7	31.8	35.9	9.1	32.8	-	53.9	43.9	73.9	53.9	20.0	10.0	Floor noise
Hori.	9648.0	41.9	31.4	38.9	9.8	33.5	-	57.0	46.6	73.9	53.9	16.9	7.3	Floor noise
Vert.	2288.0	51.1	38.8	28.2	5.3	33.0	-	51.7	39.3	73.9	53.9	22.3	14.6	
Vert.	2390.0	54.7	43.9	27.7	5.4	32.9	0.2	54.9	44.2	73.9	53.9	19.1	9.7	*1)
Vert.	4824.0	46.5	35.3	31.5	7.7	32.0	-	53.7	42.5	73.9	53.9	20.2	11.4	
Vert.	7236.0	41.8	31.9	35.9	9.1	32.8	-	53.9	44.1	73.9	53.9	20.0	9.8	Floor noise
Vert.	9648.0	42.0	32.2	38.9	9.8	33.5	-	57.1	47.3	73.9	53.9	16.8	6.6	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

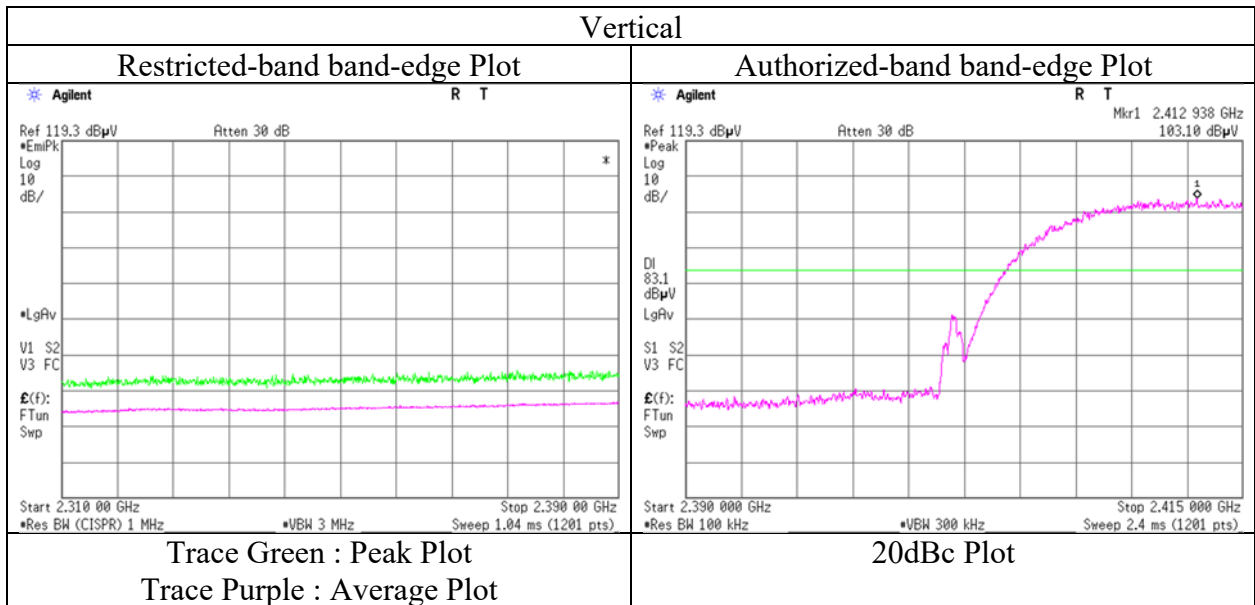
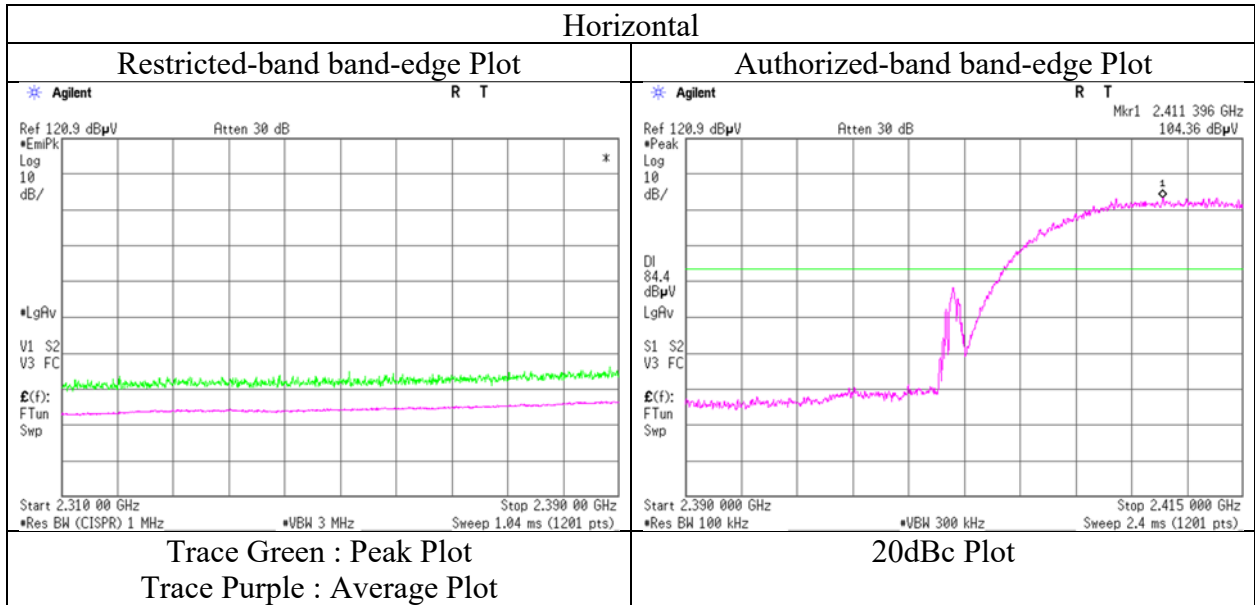
Polarity [Hori/Vert]	Frequency [MHz]	Reading (PK) [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.0	104.4	27.6	5.4	32.9	104.5	-	-	Carrier
Hori.	2400.0	51.4	27.6	5.4	32.9	51.5	84.5	33.0	
Hori.	2464.0	49.9	27.5	5.4	32.9	50.0	84.5	34.4	
Vert.	2412.0	103.1	27.6	5.4	32.9	103.2	-	-	Carrier
Vert.	2400.0	49.4	27.6	5.4	32.9	49.6	83.2	33.7	
Vert.	2464.0	51.8	27.5	5.4	32.9	51.9	83.2	31.3	

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

Distance factor: 1 GHz - 10 GHz 20log(3.8 m / 3.0 m) = 2.06 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.3
Date	February 22, 2023
Temperature / Humidity	22 deg. C / 30 % RH
Engineer	Daiki Matsui
	(1 GHz - 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.	
Semi Anechoic Chamber	No.3	No.3
Date	February 22, 2023	February 24, 2023
Temperature / Humidity	22 deg. C / 30 % RH	20 deg. C / 30 % RH
Engineer	Daiki Matsui	Tetsuro Yoshida
	(1 GHz - 10 GHz)	(10 GHz - 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.	2288.0	48.8	37.4	28.2	5.3	33.0	-	49.3	37.9	73.9	53.9	24.6	16.0	
Hori.	4874.0	48.2	37.0	31.5	7.7	32.0	0.2	55.4	44.5	73.9	53.9	18.5	9.4	
Hori.	7311.0	43.6	33.5	36.0	9.1	32.8	0.2	55.8	45.9	73.9	53.9	18.1	8.0	
Hori.	9748.0	42.0	31.7	39.1	9.8	33.6	-	57.3	47.0	73.9	53.9	16.6	6.9	Floor noise
Vert.	2288.0	50.8	38.7	28.2	5.3	33.0	-	51.3	39.2	73.9	53.9	22.6	14.7	
Vert.	4874.0	45.4	34.6	31.5	7.7	32.0	0.2	52.6	42.1	73.9	53.9	21.3	11.8	
Vert.	7311.0	41.8	31.9	36.0	9.1	32.8	-	54.0	44.1	73.9	53.9	19.9	9.8	Floor noise
Vert.	9748.0	41.9	31.9	39.1	9.8	33.6	-	57.3	47.3	73.9	53.9	16.6	6.6	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 $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$
 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.	
Semi Anechoic Chamber	No.3	No.3
Date	February 22, 2023	February 24, 2023
Temperature / Humidity	22 deg. C / 30 % RH	20 deg. C / 30 % RH
Engineer	Daiki Matsui	Tetsuro Yoshida
	(1 GHz - 10 GHz)	(10 GHz - 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.	2288.0	48.9	37.5	28.2	5.3	33.0	-	49.5	38.1	73.9	53.9	24.4	15.9	
Hori.	2483.5	55.4	45.3	27.5	5.4	32.9	0.2	55.5	45.6	73.9	53.9	18.4	8.3	*1)
Hori.	4924.0	47.1	34.2	31.6	7.7	31.9	0.2	54.5	41.7	73.9	53.9	19.5	12.2	
Hori.	7386.0	42.1	31.7	36.1	9.1	32.8	-	54.4	44.0	73.9	53.9	19.5	9.9	Floor noise
Hori.	9848.0	42.7	32.0	39.2	9.9	33.6	-	58.1	47.4	73.9	53.9	15.8	6.5	Floor noise
Vert.	2288.0	50.2	38.7	28.2	5.3	33.0	-	50.8	39.2	73.9	53.9	23.2	14.7	
Vert.	2483.5	53.6	43.1	27.5	5.4	32.9	0.2	53.7	43.5	73.9	53.9	20.2	10.4	*1)
Vert.	4924.0	46.6	36.2	31.6	7.7	31.9	0.2	53.9	43.7	73.9	53.9	20.0	10.2	
Vert.	7386.0	42.4	31.5	36.1	9.1	32.8	-	54.7	43.9	73.9	53.9	19.2	10.0	Floor noise
Vert.	9848.0	42.8	32.2	39.2	9.9	33.6	-	58.3	47.6	73.9	53.9	15.6	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).

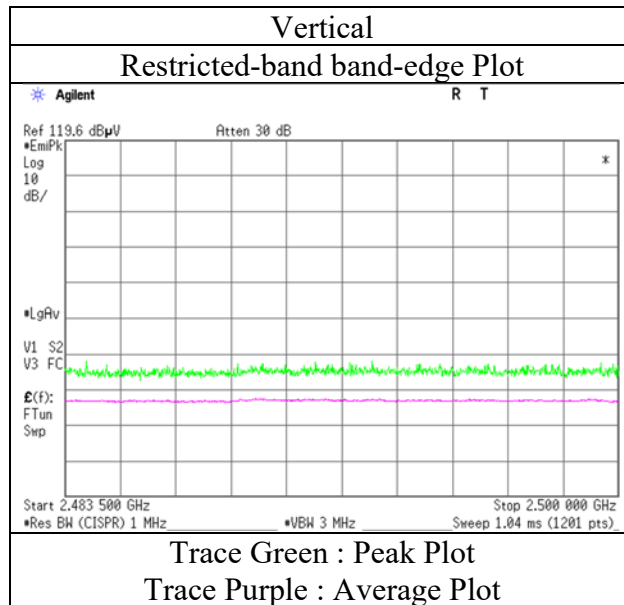
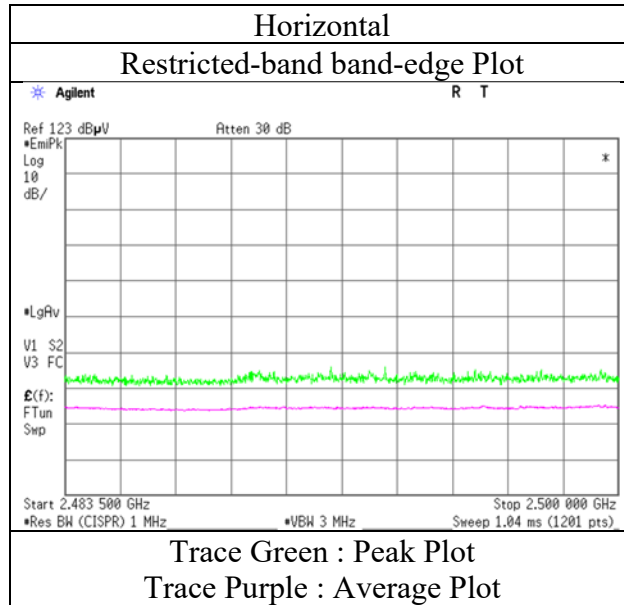
*QP detector was used up to 1GHz.

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

Distance factor: 1 GHz - 10 GHz $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	February 22, 2023
Temperature / Humidity	22 deg. C / 30 % RH
Engineer	Daiki Matsui
	(1 GHz - 10 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

Test place	Ise EMC Lab.	No.3
Semi Anechoic Chamber	No.3	No.3
Date	February 23, 2023	February 24, 2023
Temperature / Humidity	22 deg. C / 32 % RH	20 deg. C / 30 % RH
Engineer	Daiki Matsui	Tetsuro Yoshida
	(1 GHz - 10 GHz)	(10 GHz - 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.	2288.0	47.0	35.7	28.2	5.3	33.0	-	47.6	36.2	73.9	53.9	26.4	17.7	
Hori.	2390.0	69.5	52.2	27.7	5.4	32.9	0.3	69.7	52.6	73.9	53.9	4.2	1.3	*1)
Hori.	4824.0	41.6	31.5	31.5	7.7	32.0	-	48.8	38.7	73.9	53.9	25.1	15.2	Floor noise
Hori.	7236.0	42.2	31.5	35.9	9.1	32.8	-	54.3	43.7	73.9	53.9	19.6	10.2	Floor noise
Hori.	9648.0	42.1	31.5	38.9	9.8	33.5	-	57.2	46.6	73.9	53.9	16.7	7.3	Floor noise
Vert.	2288.0	48.0	36.8	28.2	5.3	33.0	-	48.5	37.3	73.9	53.9	25.4	16.6	
Vert.	2390.0	66.7	50.6	27.7	5.4	32.9	0.3	66.8	51.0	73.9	53.9	7.1	2.9	*1)
Vert.	4824.0	41.5	30.8	31.5	7.7	32.0	-	48.7	38.0	73.9	53.9	25.2	15.9	Floor noise
Vert.	7236.0	42.3	31.7	35.9	9.1	32.8	-	54.4	43.9	73.9	53.9	19.5	10.0	Floor noise
Vert.	9648.0	42.2	31.5	38.9	9.8	33.5	-	57.3	46.6	73.9	53.9	16.6	7.3	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.

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

20dBc Data Sheet

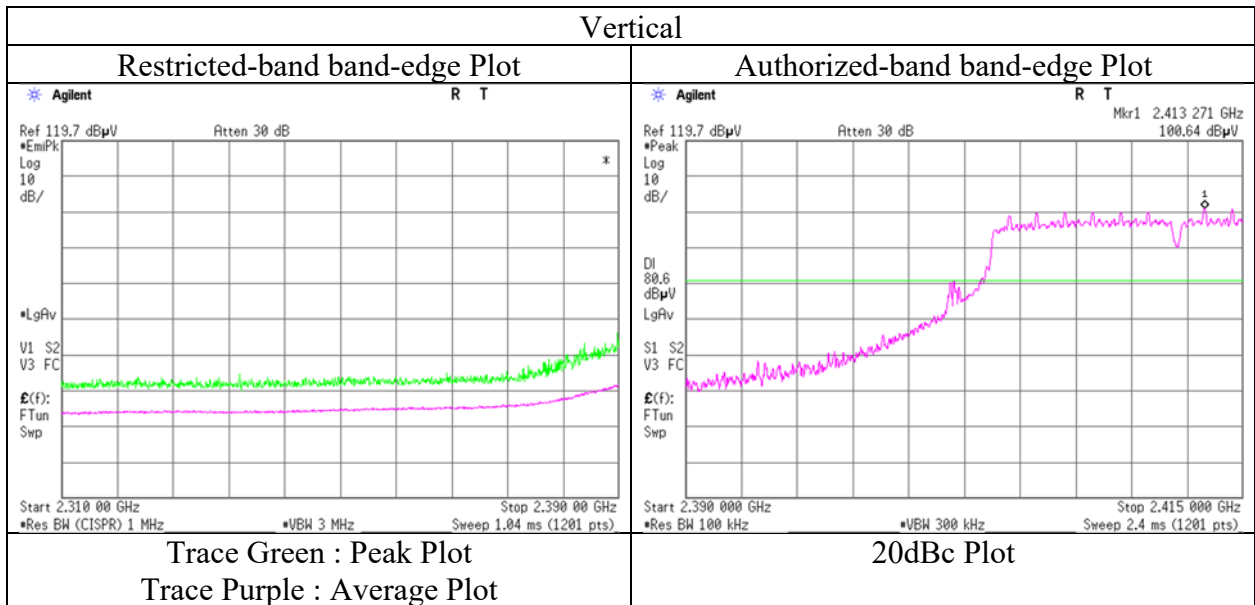
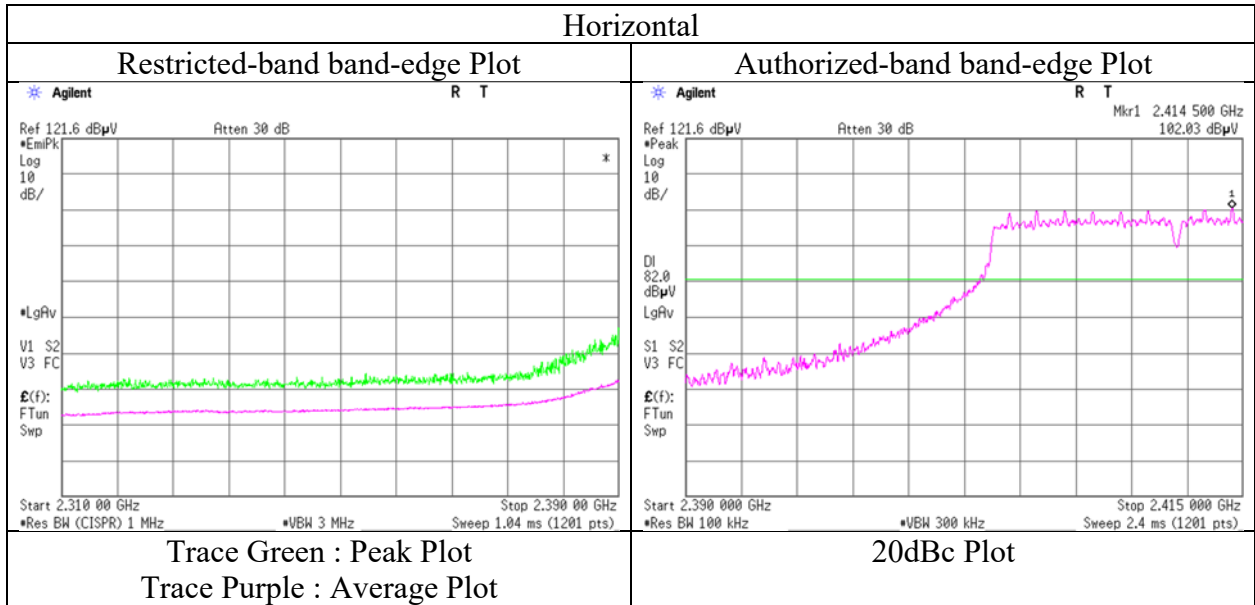
Polarity	Frequency	Reading (PK)	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	2412.0	102.0	27.6	5.4	32.9	102.1	-	-	Carrier
Hori.	2400.0	69.2	27.6	5.4	32.9	69.4	82.1	12.8	
Vert.	2412.0	100.6	27.6	5.4	32.9	100.7	-	-	Carrier
Vert.	2400.0	66.3	27.6	5.4	32.9	66.4	80.7	14.4	

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

Distance factor: 1 GHz - 10 GHz 20log(3.8 m / 3.0 m) = 2.06 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.3
Date	February 23, 2023
Temperature / Humidity	22 deg. C / 32 % RH
Engineer	Daiki Matsui
	(1 GHz - 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.	
Semi Anechoic Chamber	No.3	No.3
Date	February 22, 2023	February 24, 2023
Temperature / Humidity	22 deg. C / 30 % RH	20 deg. C / 30 % RH
Engineer	Daiki Matsui	Tetsuro Yoshida
	(1 GHz - 10 GHz)	(10 GHz - 26.5 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.	2288.0	47.0	35.5	28.2	5.3	33.0	-	47.5	36.0	73.9	53.9	26.4	17.9	
Hori.	4874.0	42.2	31.3	31.5	7.7	32.0	0.2	49.4	38.8	73.9	53.9	24.5	15.1	
Hori.	7311.0	41.9	31.8	36.0	9.1	32.8	-	54.1	44.0	73.9	53.9	19.8	9.9	Floor noise
Hori.	9748.0	42.4	31.6	39.1	9.8	33.6	-	57.7	47.0	73.9	53.9	16.2	7.0	Floor noise
Vert.	2288.0	47.9	36.7	28.2	5.3	33.0	-	48.4	37.2	73.9	53.9	25.5	16.7	
Vert.	4874.0	43.6	33.1	31.5	7.7	32.0	0.2	50.8	40.6	73.9	53.9	23.1	13.3	
Vert.	7311.0	42.1	31.7	36.0	9.1	32.8	-	54.3	43.9	73.9	53.9	19.6	10.0	Floor noise
Vert.	9748.0	41.8	31.6	39.1	9.8	33.6	-	57.1	46.9	73.9	53.9	16.8	7.0	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(3.8 m / 3.0 m) = 2.06 dB
 10 GHz - 26.5 GHz 20log(1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	February 23, 2023	February 24, 2023
Temperature / Humidity	22 deg. C / 32 % RH	20 deg. C / 30 % RH
Engineer	Daiki Matsui	Tetsuro Yoshida
	(1 GHz - 10 GHz)	(10 GHz - 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.	2288.0	47.0	35.6	28.2	5.3	33.0	-	47.6	36.1	73.9	53.9	26.3	17.8	
Hori.	2483.5	65.5	48.4	27.5	5.4	32.9	0.3	65.6	48.8	73.9	53.9	8.3	5.1	*1)
Hori.	4924.0	41.6	31.1	31.6	7.7	31.9	-	48.9	38.4	73.9	53.9	25.0	15.5	Floor noise
Hori.	7386.0	41.9	31.5	36.1	9.1	32.8	-	54.2	43.9	73.9	53.9	19.7	10.0	Floor noise
Hori.	9848.0	42.2	32.3	39.2	9.9	33.6	-	57.7	47.7	73.9	53.9	16.3	6.2	Floor noise
Vert.	2288.0	47.8	36.3	28.2	5.3	33.0	-	48.3	36.9	73.9	53.9	25.6	17.0	
Vert.	2483.5	65.5	49.7	27.5	5.4	32.9	0.3	65.6	50.1	73.9	53.9	8.3	3.8	*1)
Vert.	4924.0	41.3	31.5	31.6	7.7	31.9	-	48.7	38.8	73.9	53.9	25.2	15.1	Floor noise
Vert.	7386.0	42.3	31.8	36.1	9.1	32.8	-	54.7	44.2	73.9	53.9	19.2	9.7	Floor noise
Vert.	9848.0	42.7	32.9	39.2	9.9	33.6	-	58.1	48.3	73.9	53.9	15.8	5.6	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).

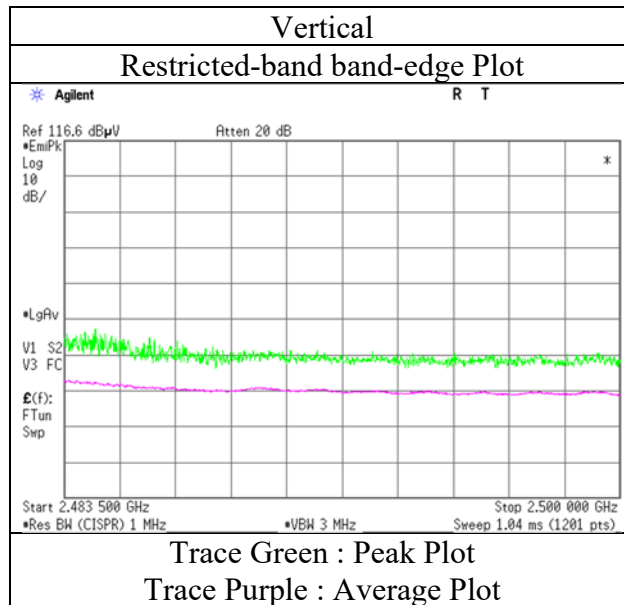
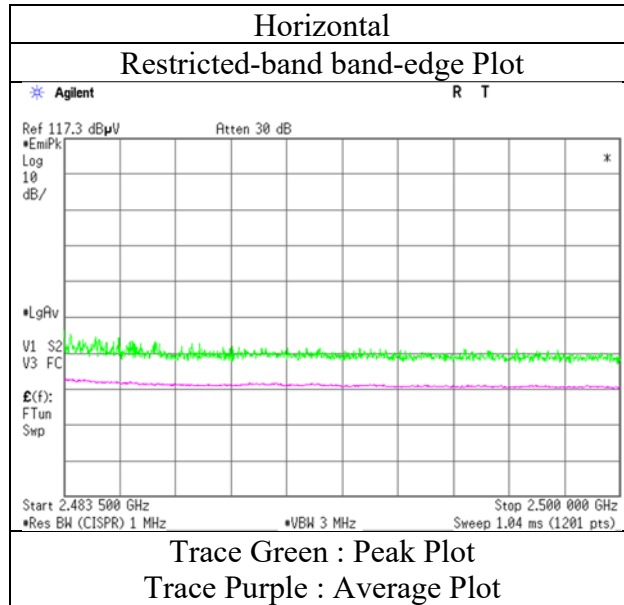
*QP detector was used up to 1GHz.

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

Distance factor: 1 GHz - 10 GHz $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place Ise EMC Lab.
Semi Anechoic Chamber No.3
Date February 23, 2023
Temperature / Humidity 22 deg. C / 32 % RH
Engineer Daiki Matsui
 (1 GHz - 10 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

Test place	Ise EMC Lab.	No.3
Semi Anechoic Chamber	No.3	No.3
Date	February 23, 2023	February 24, 2023
Temperature / Humidity	22 deg. C / 32 % RH	20 deg. C / 30 % RH
Engineer	Daiki Matsui	Tetsuro Yoshida
	(1 GHz - 10 GHz)	(10 GHz - 26.5 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.	2288.0	47.1	35.7	28.2	5.3	33.0	-	47.6	36.2	73.9	53.9	26.3	17.7	
Hori.	2390.0	67.7	48.3	27.7	5.4	32.9	0.6	67.8	49.0	73.9	53.9	6.1	4.9	*1)
Hori.	4824.0	41.2	31.2	31.5	7.7	32.0	-	48.5	38.4	73.9	53.9	25.4	15.5	Floor noise
Hori.	7236.0	42.1	31.9	35.9	9.1	32.8	-	54.3	44.1	73.9	53.9	19.6	9.8	Floor noise
Hori.	9648.0	41.6	31.7	38.9	9.8	33.5	-	56.7	46.8	73.9	53.9	17.2	7.1	Floor noise
Vert.	2288.0	47.9	36.6	28.2	5.3	33.0	-	48.4	37.1	73.9	53.9	25.5	16.8	
Vert.	2390.0	62.4	46.0	27.7	5.4	32.9	0.6	62.5	46.8	73.9	53.9	11.4	7.1	*1)
Vert.	4824.0	41.2	31.3	31.5	7.7	32.0	-	48.5	38.6	73.9	53.9	25.4	15.3	Floor noise
Vert.	7236.0	42.6	32.0	35.9	9.1	32.8	-	54.8	44.1	73.9	53.9	19.1	9.8	Floor noise
Vert.	9648.0	41.8	31.7	38.9	9.8	33.5	-	57.0	46.8	73.9	53.9	17.0	7.1	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

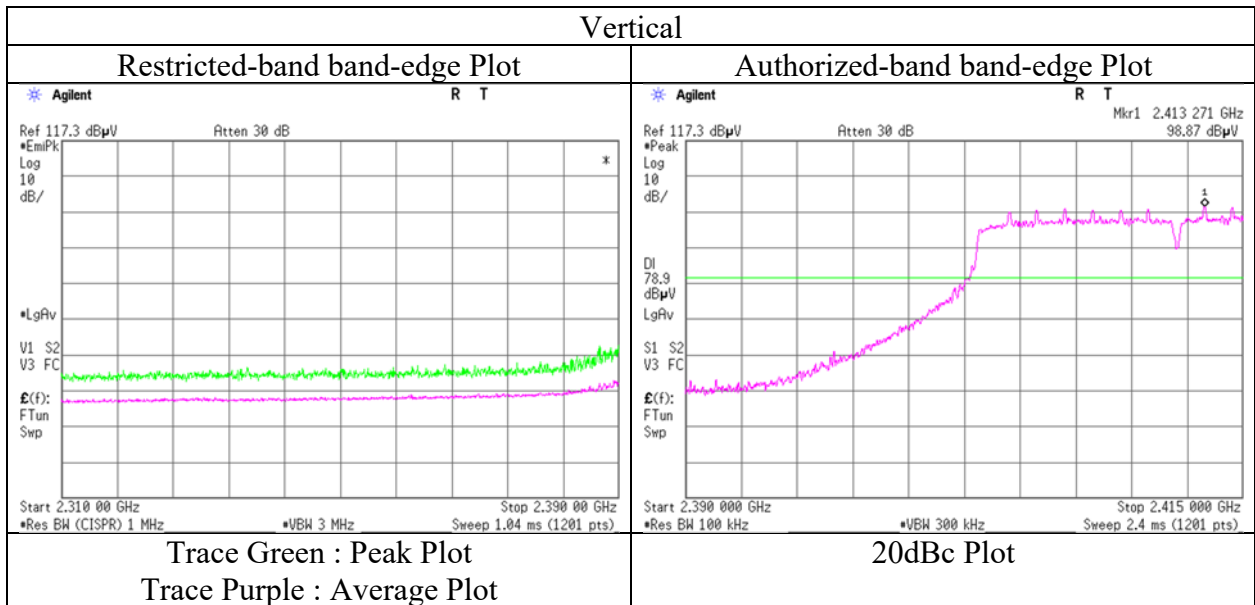
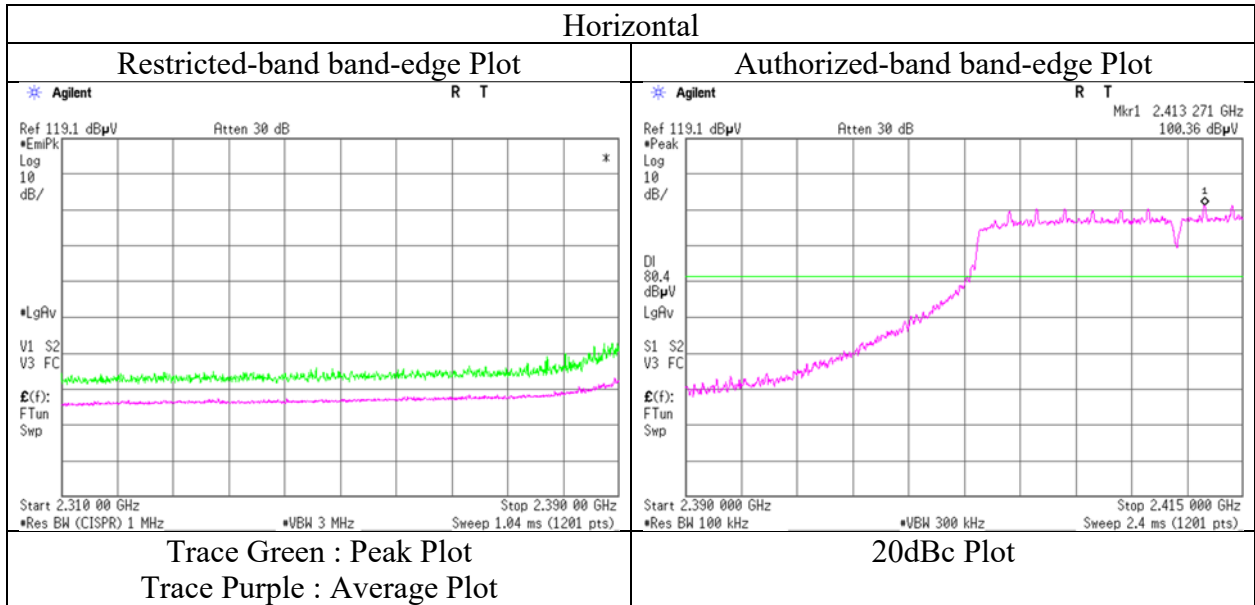
Polarity	Frequency	Reading (PK)	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	2412.0	100.4	27.6	5.4	32.9	100.5	-	-	Carrier
Hori.	2400.0	67.9	27.6	5.4	32.9	68.0	80.5	12.5	
Vert.	2412.0	98.9	27.6	5.4	32.9	99.0	-	-	Carrier
Vert.	2400.0	65.7	27.6	5.4	32.9	65.9	79.0	13.1	

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

Distance factor: 1 GHz - 10 GHz 20log(3.8 m / 3.0 m) = 2.06 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.3
Date	February 23, 2023
Temperature / Humidity	22 deg. C / 32 % RH
Engineer	Daiki Matsui
	(1 GHz - 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.3	No.3	No.3
Date	February 22, 2023	February 23, 2023	February 24, 2023
Temperature / Humidity	22 deg. C / 30 % RH	22 deg. C / 32 % RH	20 deg. C / 30 % RH
Engineer	Daiki Matsui	Daiki Matsui	Tetsuro Yoshida
Mode	(Below 1 GHz)	(1 GHz - 10 GHz)	(10 GHz - 26.5 GHz)
	Tx 11n-20 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.	235.0	40.9	-	12.0	9.5	32.0	-	30.3	-	46.0	-	15.7	-	
Hori.	335.0	40.9	-	14.9	10.3	32.0	-	34.1	-	46.0	-	11.9	-	
Hori.	637.5	34.6	-	19.4	12.2	31.9	-	34.3	-	46.0	-	11.7	-	
Hori.	749.3	38.5	-	20.6	12.9	31.7	-	40.3	-	46.0	-	5.7	-	
Hori.	815.9	38.7	-	21.1	13.2	31.3	-	41.7	-	46.0	-	4.3	-	
Hori.	957.4	33.2	-	22.2	14.0	30.5	-	38.8	-	46.0	-	7.2	-	
Hori.	2288.0	45.7	32.8	28.2	5.3	33.0	-	46.2	33.3	73.9	53.9	27.7	20.6	
Hori.	4874.0	41.4	31.2	31.5	7.7	32.0	-	48.7	38.5	73.9	53.9	25.2	15.4	Floor noise
Hori.	7311.0	42.2	32.1	36.0	9.1	32.8	-	54.4	44.3	73.9	53.9	19.5	9.6	Floor noise
Hori.	9748.0	41.6	31.6	39.1	9.8	33.6	-	57.0	46.9	73.9	53.9	16.9	7.0	Floor noise
Vert.	235.0	32.3	-	12.0	9.5	32.0	-	21.7	-	46.0	-	24.3	-	
Vert.	330.0	34.9	-	14.7	10.2	32.0	-	27.9	-	46.0	-	18.1	-	
Vert.	637.5	31.1	-	19.4	12.2	31.9	-	30.8	-	46.0	-	15.2	-	
Vert.	749.3	34.6	-	20.6	12.9	31.7	-	36.4	-	46.0	-	9.6	-	
Vert.	815.9	33.5	-	21.1	13.2	31.3	-	36.5	-	46.0	-	9.5	-	
Vert.	957.4	30.5	-	22.2	14.0	30.5	-	36.1	-	46.0	-	9.9	-	
Vert.	2288.0	46.1	33.2	28.2	5.3	33.0	-	46.6	33.7	73.9	53.9	27.3	20.2	
Vert.	4874.0	41.3	31.3	31.5	7.7	32.0	-	48.6	38.5	73.9	53.9	25.3	15.4	Floor noise
Vert.	7311.0	42.8	31.9	36.0	9.1	32.8	-	55.0	44.1	73.9	53.9	18.9	9.8	Floor noise
Vert.	9748.0	41.7	31.8	39.1	9.8	33.6	-	57.0	47.2	73.9	53.9	16.9	6.7	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(3.8 m / 3.0 m) = 2.06 dB
 10 GHz - 26.5 GHz 20log(1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.3	No.3
Date	February 23, 2023	February 24, 2023
Temperature / Humidity	22 deg. C / 32 % RH	20 deg. C / 30 % RH
Engineer	Daiki Matsui	Tetsuro Yoshida
	(1 GHz - 10 GHz)	(10 GHz - 26.5 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.	2288.0	45.6	32.7	28.2	5.3	33.0	-	46.1	33.2	73.9	53.9	27.8	20.7	
Hori.	2483.5	60.7	46.6	27.5	5.4	32.9	0.6	60.8	47.3	73.9	53.9	13.1	6.6	*1)
Hori.	4924.0	41.3	32.0	31.6	7.7	31.9	-	48.7	39.3	73.9	53.9	25.2	14.6	Floor noise
Hori.	7386.0	42.1	32.1	36.1	9.1	32.8	-	54.5	44.5	73.9	53.9	19.4	9.4	Floor noise
Hori.	9848.0	41.6	31.8	39.2	9.3	33.6	-	56.4	46.6	73.9	53.9	17.6	7.4	Floor noise
Vert.	2288.0	46.0	33.2	28.2	5.3	33.0	-	46.5	33.7	73.9	53.9	27.4	20.2	
Vert.	2483.5	59.2	45.4	27.5	5.4	32.9	0.6	59.3	46.1	73.9	53.9	14.6	7.8	*1)
Vert.	4924.0	41.4	31.3	31.6	7.7	31.9	-	48.8	38.7	73.9	53.9	25.1	15.2	Floor noise
Vert.	7386.0	42.7	31.7	36.1	9.1	32.8	-	55.0	44.0	73.9	53.9	18.9	9.9	Floor noise
Vert.	9848.0	41.5	31.8	39.2	9.9	33.6	-	56.9	47.2	73.9	53.9	17.0	6.7	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).

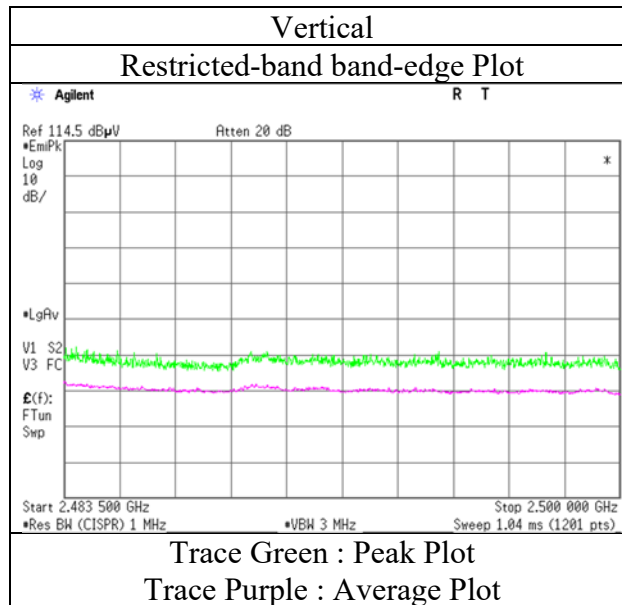
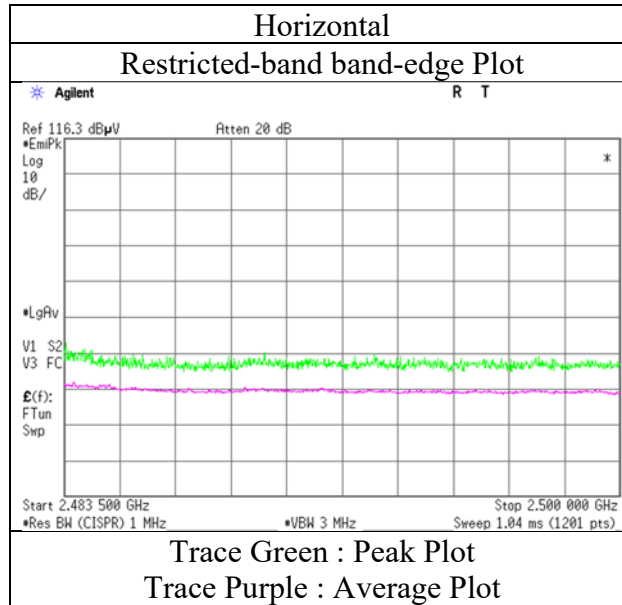
*QP detector was used up to 1GHz.

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

Distance factor: 1 GHz - 10 GHz $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	February 23, 2023
Temperature / Humidity	22 deg. C / 32 % RH
Engineer	Daiki Matsui
Mode	(1 GHz - 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.
Semi Anechoic Chamber	No.3
Date	February 24, 2023
Temperature / Humidity	20 deg. C / 30 % RH
Engineer	Tetsuro Yoshida
	(1 GHz - 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.	2288.0	49.4	37.6	28.2	5.3	33.0	-	49.9	38.1	73.9	53.9	24.0	15.8	
Hori.	2390.0	60.4	45.6	27.7	5.4	32.9	0.8	60.5	46.6	73.9	53.9	13.4	7.3	*1)
Hori.	4844.0	42.9	32.3	31.5	7.7	32.0	-	50.1	39.6	73.9	53.9	23.8	14.4	Floor noise
Hori.	7266.0	42.5	32.9	35.9	9.1	32.8	-	54.7	45.1	73.9	53.9	19.3	8.8	Floor noise
Hori.	9688.0	43.9	33.2	39.0	9.8	33.6	-	59.1	48.4	73.9	53.9	14.8	5.5	Floor noise
Vert.	2288.0	51.0	38.7	28.2	5.3	33.0	-	51.6	39.2	73.9	53.9	22.4	14.7	
Vert.	2390.0	62.4	48.6	27.7	5.4	32.9	0.8	62.6	49.5	73.9	53.9	11.3	4.4	*1)
Vert.	4844.0	41.7	32.7	31.5	7.7	32.0	-	49.0	40.0	73.9	53.9	24.9	14.0	Floor noise
Vert.	7266.0	41.9	32.2	35.9	9.1	32.8	-	54.0	44.3	73.9	53.9	19.9	9.6	Floor noise
Vert.	9688.0	41.8	32.6	39.0	9.8	33.6	-	57.1	47.8	73.9	53.9	16.8	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)

20dBc Data Sheet

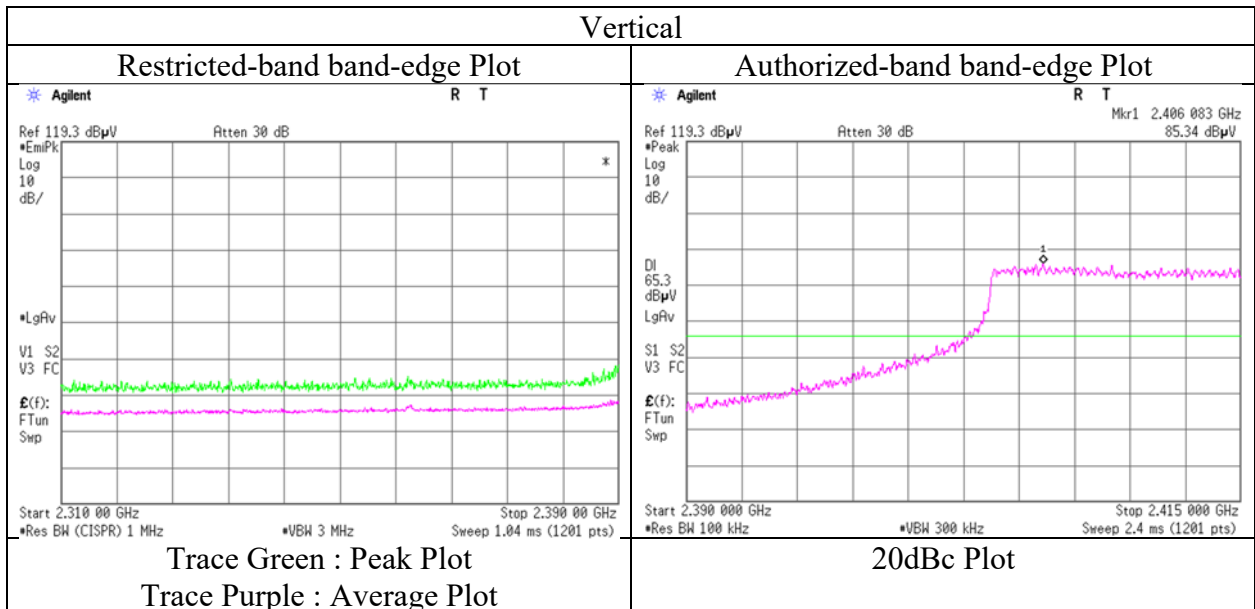
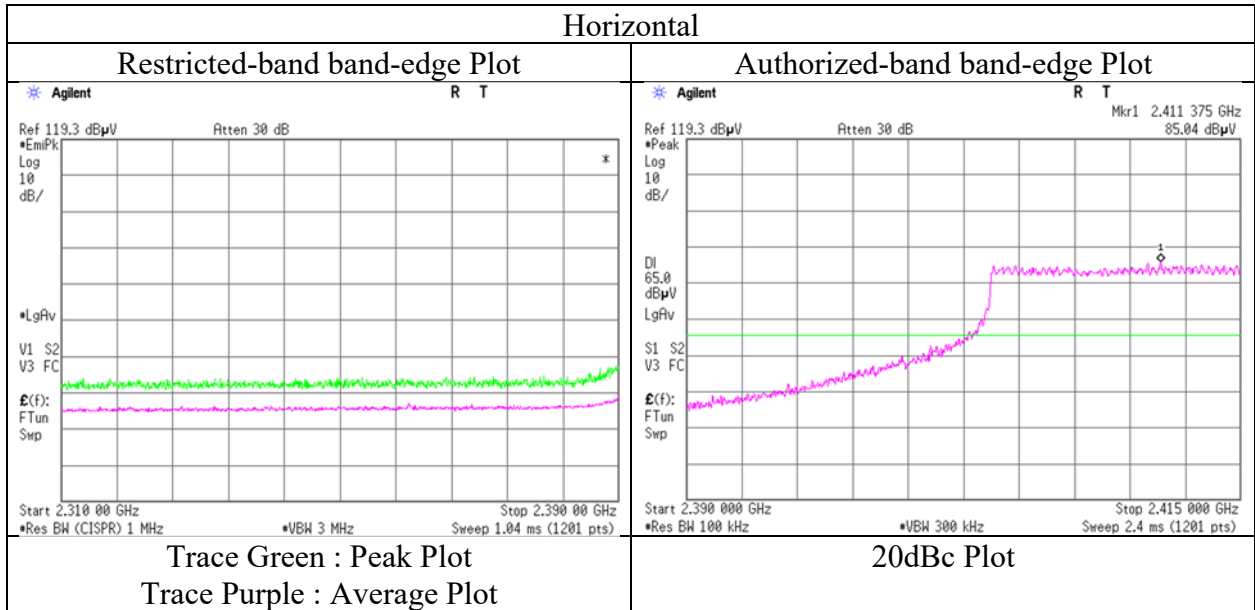
Polarity	Frequency	Reading (PK)	Ant Factor	Loss	Gain	Result	Limit	Margin	Remark
[Hori/Vert]	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
Hori.	2422.0	85.0	27.6	5.4	32.9	85.1	-	-	Carrier
Hori.	2400.0	61.3	27.6	5.4	32.9	61.4	65.1	3.8	
Vert.	2422.0	85.3	27.6	5.4	32.9	85.4	-	-	Carrier
Vert.	2400.0	63.5	27.6	5.4	32.9	63.6	65.4	1.9	

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

Distance factor: 1 GHz - 10 GHz $20\log(3.8\text{ m} / 3.0\text{ m}) = 2.06\text{ dB}$
 10 GHz - 26.5 GHz $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.5\text{ dB}$

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	February 24, 2023
Temperature / Humidity	20 deg. C / 30 % RH
Engineer	Tetsuro Yoshida
	(1 GHz - 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.
Semi Anechoic Chamber	No.3
Date	February 24, 2023
Temperature / Humidity	20 deg. C / 30 % RH
Engineer	Tetsuro Yoshida
	(1 GHz - 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.	2288.0	49.2	37.3	28.2	5.3	33.0	-	49.7	37.8	73.9	53.9	24.2	16.1	
Hori.	4874.0	40.1	32.2	31.5	7.7	32.0	-	47.3	39.5	73.9	53.9	26.6	14.5	Floor noise
Hori.	7311.0	41.7	33.4	36.0	9.1	32.8	-	53.9	45.6	73.9	53.9	20.0	8.3	Floor noise
Hori.	9748.0	41.5	32.0	39.1	9.8	33.6	-	56.8	47.4	73.9	53.9	17.1	6.5	Floor noise
Vert.	2288.0	49.9	38.5	28.2	5.3	33.0	-	50.4	39.0	73.9	53.9	23.5	14.9	
Vert.	4874.0	41.2	32.2	31.5	7.7	32.0	-	48.5	39.5	73.9	53.9	25.4	14.4	Floor noise
Vert.	7311.0	40.8	32.2	36.0	9.1	32.8	-	53.0	44.4	73.9	53.9	20.9	9.5	Floor noise
Vert.	9748.0	41.0	31.7	39.1	9.8	33.6	-	56.4	47.0	73.9	53.9	17.5	6.9	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(3.8 m / 3.0 m) = 2.06 dB
 10 GHz - 26.5 GHz 20log(1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	February 24, 2023
Temperature / Humidity	20 deg. C / 30 % RH
Engineer	Tetsuro Yoshida
	(1 GHz - 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.	2288.0	49.3	37.3	28.2	5.3	33.0	-	49.8	37.9	73.9	53.9	24.1	16.1	
Hori.	2483.5	63.7	48.4	27.5	5.4	32.9	0.8	63.8	49.3	73.9	53.9	10.1	4.6	*1)
Hori.	4904.0	41.2	31.2	31.6	7.7	31.9	-	48.5	38.5	73.9	53.9	25.4	15.4	Floor noise
Hori.	7356.0	41.6	31.9	36.1	9.1	32.8	-	53.9	44.2	73.9	53.9	20.0	9.7	Floor noise
Hori.	9808.0	42.6	32.2	39.2	9.9	33.6	-	58.0	47.7	73.9	53.9	15.9	6.2	Floor noise
Vert.	2288.0	49.9	38.5	28.2	5.3	33.0	-	50.4	39.0	73.9	53.9	23.5	14.9	
Vert.	2483.5	62.0	47.0	27.5	5.4	32.9	0.8	62.1	47.9	73.9	53.9	11.8	6.0	*1)
Vert.	4904.0	40.8	31.1	31.6	7.7	31.9	-	48.2	38.4	73.9	53.9	25.8	15.5	Floor noise
Vert.	7356.0	42.1	31.9	36.1	9.1	32.8	-	54.4	44.2	73.9	53.9	19.5	9.7	Floor noise
Vert.	9808.0	42.5	32.3	39.2	9.9	33.6	-	57.9	47.7	73.9	53.9	16.0	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).

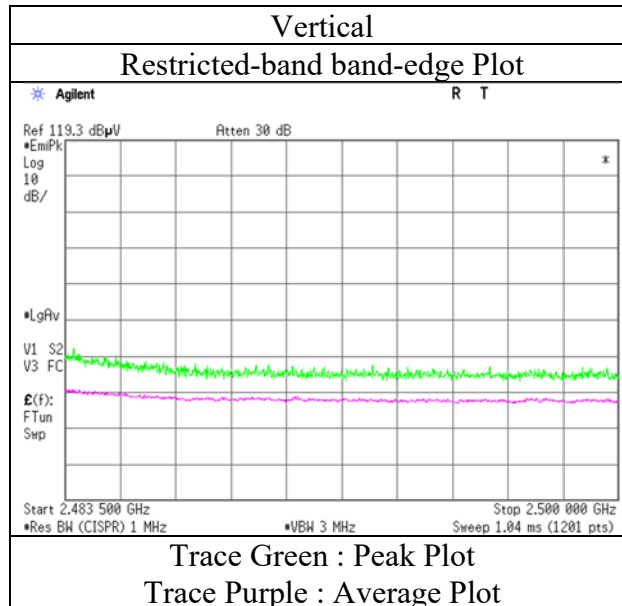
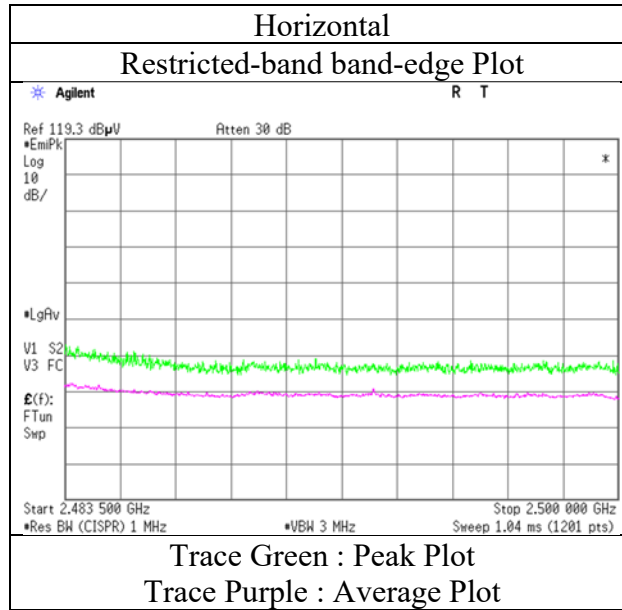
*QP detector was used up to 1GHz.

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

Distance factor:	1 GHz - 10 GHz	20log (3.8 m / 3.0 m) = 2.06 dB
	10 GHz - 26.5 GHz	20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission (Reference Plot for band-edge)

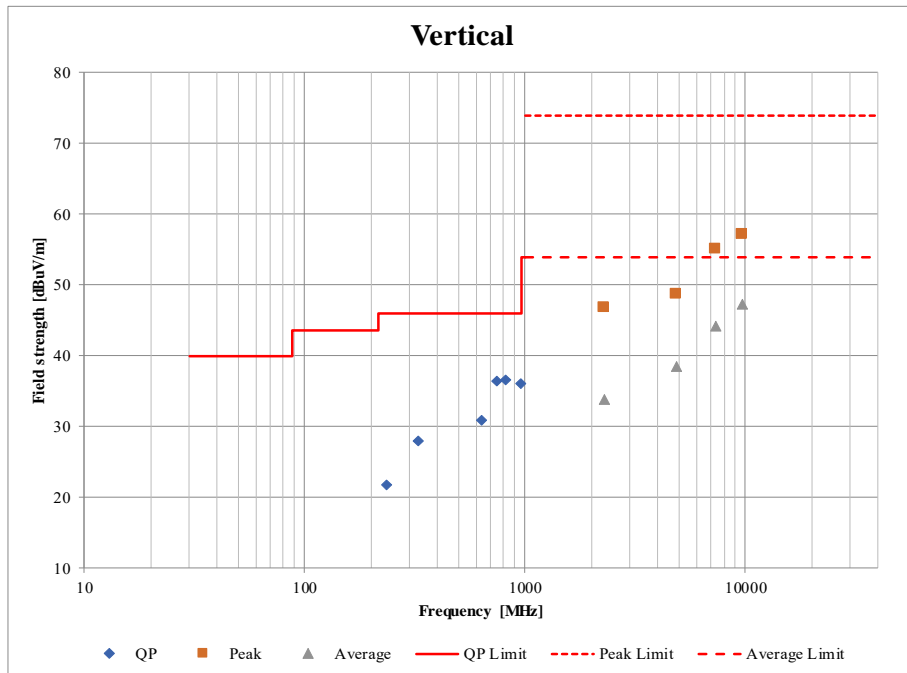
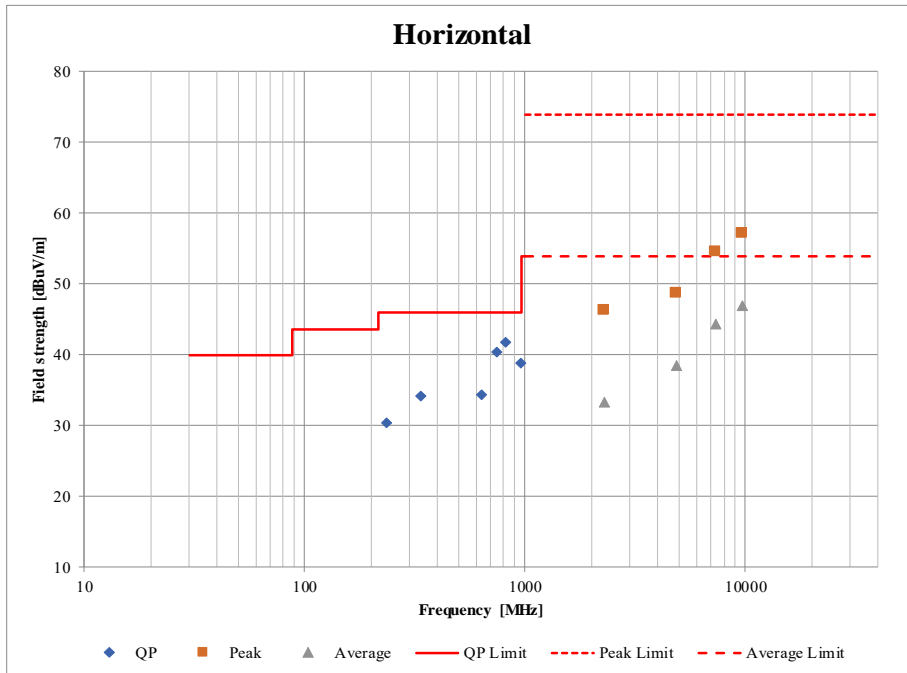
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.3
Date	February 24, 2023
Temperature / Humidity	20 deg. C / 30 % RH
Engineer	Tetsuro Yoshida
Mode	(1 GHz - 10 GHz) Tx 11n-40 2452 MHz



* 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.		
Semi Anechoic Chamber	No.3	No.3	No.3
Date	February 22, 2023	February 23, 2023	February 24, 2023
Temperature / Humidity	22 deg. C / 30 % RH	22 deg. C / 32 % RH	20 deg. C / 30 % RH
Engineer	Daiki Matsui (Below 1 GHz)	Daiki Matsui (1 GHz - 10 GHz)	Tetsuro Yoshida (10 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.

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-03	142008	AC3_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	05/23/2022	24
RE	MAEC-03-SVSWR	142013	AC3_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	04/01/2021	24
RE	MAT-95	142314	Attenuator	Pasternack Enterprises	PE7390-6	D/C 1504	06/13/2022	12
RE	MBA-05	141425	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	VHA9103+ BBA9106	VHA 91031302	08/26/2022	12
RE	MCC-231	177964	Microwave Cable	Junkosha INC.	MMX221	1901S329(1m)/1902S579(5m)	03/15/2022	12
RE	MCC-51	141323	Coaxial cable	UL Japan	-	-	09/27/2022	12
RE	MHA-16	141513	Horn Antenna 15-40GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9170	BBHA9170306	07/05/2022	12
RE	MHA-20	141507	Horn Antenna 1-18GHz	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	258	11/14/2022	12
RE	MHF-25	141232	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	001	09/07/2022	12
RE	MJM-16	142183	Measure	KOMELON	KMC-36	-	10/03/2022	12
RE	MLA-22	141266	Logperiodic Antenna (200-1000MHz)	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	9111B-191	08/26/2022	12
RE	MMM-08	141532	DIGITAL HiTESTER	HIOKI E.E. CORPORATION	3805	51201197	01/17/2023	12
RE	MOS-13	141554	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	1301	01/13/2023	12
RE	MPA-11	141580	MicroWave System Amplifier	Keysight Technologies Inc	83017A	MY39500779	03/17/2022	12
RE	MPA-13	141582	Pre Amplifier	SONOMA INSTRUMENT	310	260834	02/07/2023	12
RE	MSA-14	141901	Spectrum Analyzer	Keysight Technologies Inc	E4440A	MY48250080	01/16/2023	12
RE	MTR-08	141949	Test Receiver	Rohde & Schwarz	ESCI	100767	07/29/2022	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