



RADIO TEST REPORT

Test Report No. 14202031S-A-R1

Customer	KONICA MINOLTA, INC.
Description of EUT	SKR 3000
Model Number of EUT	P-95
FCC ID	YR7SKR3000P8
Test Regulation	FCC Part 15 Subpart C: 2022
Test Result	Complied (Refer to SECTION 3)
Issue Date	July 28, 2022
Remarks	Radiated Spurious Emission only

Representative Test Engineer

Shiro Kobayashi
Engineer

Approved By

Toyokazu Imamura
Leader



CERTIFICATE 1266.03

- ☐ 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".

Report Cover Page - Form-ULID-003532 (DCS:13-EM-F0429) Issue# 20.0

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- The information provided from the applicant 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.: 14202031S-A

This report is a revised version of 14202031S-A. 14202031S-A is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	14202031S-A	May 10, 2022	-
1	14202031S-A-R1	July 28, 2022	P.5 Correction of Antenna Connector type: From "ULF" To "U.FL" P.8 Correction of Wlan Auth Tool's Released Date: From "2022/2/24" To "2017/4/18" P.10 Addition of comment: "*1): r applied the diagonal length that maximizes the Distance Factor."

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	KONICA MINOLTA, INC.
Address	1, Sakura-machi, Hino-shi, Tokyo, 191-8511 Japan
Telephone Number	+81-42-589-8429
Contact Person	Yukihiro Niekawa

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	SKR 3000
Model Number	P-95
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	February 8, 2022
Test Date	February 8 to 23, 2022

2.2 Product Description

General Specification

Rating	DC 15 V
Operating temperature	+10 deg. C to +35 deg. C

Radio Specification

	IEEE802.11b	IEEE802.11g	IEEE802.11a	IEEE802.11n (20 M band)	IEEE802.11n (40 M band)
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	2412 MHz - 2462 MHz 5180 MHz - 5240 MHz 5260 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	5190 MHz - 5230 MHz 5270 MHz - 5310 MHz 5510 MHz - 5670 MHz 5755 MHz - 5795 MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM,QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)		OFDM (BPSK, QPSK, 16QAM, 64QAM)
Channel spacing	5 MHz		20 MHz	5 MHz (2.4 GHz band) 20 MHz (5 GHz band)	40 MHz
Antenna Type	[Main Antenna (chain 0)/Sub Antenna(chain 1)]PIFA (Planar Inverted F Antenna)				
Antenna gain	[Main Antenna (chain 0)] -1.95 dBi (2.4 GHz Band), -0.98 dBi (5 GHz Band)				
	[Sub Antenna (chain 1)] -2.21 dBi (2.4 GHz Band), -1.54 dBi (5 GHz Band)				
Antenna Connector type	[Main Antenna (chain0)/Sub Antenna(chain 1)] Connector PCB side: U.FL, Antenna side: Soldered				

SECTION 3: Test Specification, Procedures & Results

3.1 Test Specification

Test Specification	FCC Part 15 Subpart C FCC Part 15 final revised on April 1, 2022 and effective May 2, 2022
Title	FCC 47 CFR Part 15 Radio Frequency Device Subpart C Intentional Radiators Section 15.207 Conducted limits Section 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

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

The customer has declared that the EUT has complies with FCC Part 15 Subpart B as SDoC.

Following test items were performed in this report (See clause 3.2). The rest of the test items required were conducted with wireless module SX-SDMAN2. Refer to the test report 13568152S-K.

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	FCC: ANSI C63.10-2013 6. Standard test methods ISED: RSS-Gen 8.8	FCC: Section 15.207 ----- ISED: RSS-Gen 8.8	-	N/A	*1)
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	7.5 dB 2390.000 MHz, AV, Vertical Tx 11g 2412 MHz, Tx 11n-20 2412 MHz	Complied a)	Radiated (above 30 MHz) *1)
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) The test is not applicable since the EUT has no AC mains. Wireless LAN does not operate during charging.					
*2) 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)					
Symbols:					
Complied The data of this test item has enough margin, more than the measurement uncertainty.					
Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration					

FCC Part 15.31 (e)

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

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT. Therefore, the equipment complies with the antenna requirement.

3.3 Addition to Standard

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

3.4 Uncertainty

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

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

Shonan EMC Lab.

Item	Frequency range	Uncertainty (+/-)			
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4,5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.6 dB	2.6 dB	2.7 dB	2.7 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	2.9 dB	2.9 dB	2.9 dB	-
	30 MHz-200 MHz	4.6 dB	4.6 dB	4.6 dB	-
	200 MHz-1 GHz	6.0 dB	6.0 dB	6.0 dB	-
	1 GHz-6 GHz	4.8 dB	4.8 dB	4.8 dB	-
	6 GHz-18 GHz	5.4 dB	5.4 dB	5.4 dB	-
	18 GHz-40 GHz	5.6 dB	5.6 dB	5.7 dB	-
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.7 dB	5.7 dB	5.7 dB	-
	18 GHz-40 GHz	5.9 dB	5.9 dB	5.9 dB	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

3.5 Test Location

UL Japan, Inc. Shonan EMC Lab.

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

Telephone: +81 463 50 6400, Facsimile: +81 463 50 6401

A2LA Certificate Number: 1266.03

(FCC test firm registration number: 626366, ISED lab company number: 2973D / CAB identifier: JP0001)

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
No.1 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 Shielded room	-	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	-	2.55 x 4.1 x 2.5	-	-

3.6 Test Data, Test Instruments, and Test Set Up

Refer to APPENDIX.

SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

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

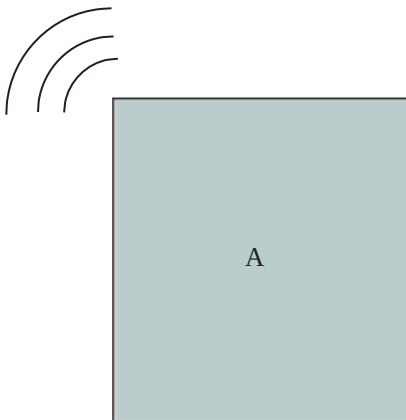
Mode	Remarks*	Power Setting (dBm)
IEEE 802.11b (11b)	11 Mbps, PN9	14
IEEE 802.11g (11g)	36 Mbps, PN9	8, 15, 11
IEEE 802.11n MIMO 20 MHz BW (11n-20)	MCS 12 (Long GI), PN9	6, 14, 7
*The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel) (Reference test report No.: Refer to 3.1)		
*Power of the EUT was set by the software as follows; Software: Refer to the below table.		
*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.		

Software name	Version	Released Date	Storage location
Panel Firmware	V4.20R00.000	2022/2/8	EUT memory (*. operated by connected host PC)
Wlan Auth Tool	1.3.0.2	2017/4/18	Connected host PC

*The details of Operating mode(s)

Test Item	Operating Mode	Tested Antenna	Tested frequency
Spurious Emission	11b Tx 11g Tx	Sub	2412 MHz 2437 MHz 2462 MHz
	11n-20 (MIMO) Tx	Main + Sub	2412 MHz 2437 MHz 2462 MHz

4.2 Configuration and Peripherals



Description of EUT and Support Equipment

No.	Item	Model Number	Serial Number	Manufacturer	Remarks
A	SKR 3000	P-95	ADU1-S0001	KONICA MINOLTA Inc.	EUT

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 0.5 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]

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

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

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

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

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

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

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

Test Antennas are used as below;

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

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

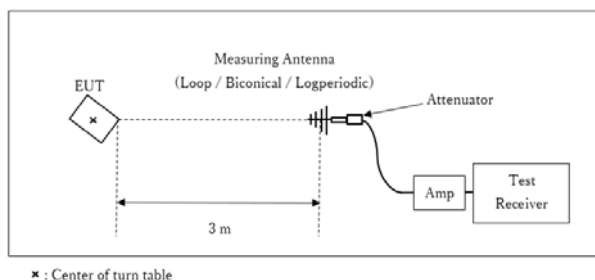
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	11.12.2.5.2 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (Linear voltage) Trace: 100 traces Duty factor was added to the results.	RBW: 100 kHz VBW: 300 kHz

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

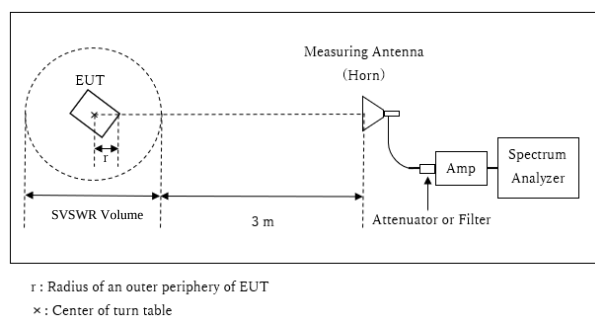
Figure 1: Test Setup

Below 1 GHz



Test Distance: 3 m

1 GHz to 10 GHz

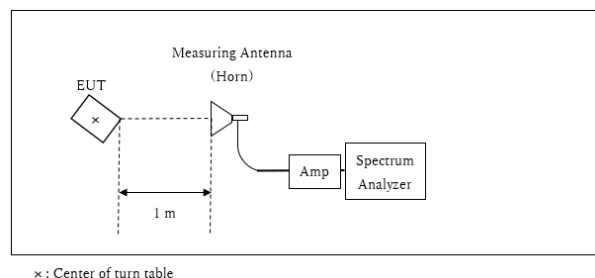


Distance Factor: $20 \times \log (3.77 \text{ m} / 3.0 \text{ m}) = 1.99 \text{ dB}$
* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.77 \text{ m}$

SVSWR Volume : 2.0 m
(SVSWR Volume has been calibrated based on CISPR 16-1-4.)
 $r = 0.23 \text{ m} * 1)$

*1): r applied the diagonal length that maximizes the Distance Factor.

10 GHz to 26.5 GHz



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

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

Module SISO

Antenna polarization	Carrier	Spurious (30 MHz - 1 GHz)	Spurious (1 GHz - 2.8 GHz)	Spurious (2.8 GHz - 10 GHz)	Spurious (10 GHz - 18 GHz)	Spurious (18 GHz - 26.5 GHz)
Horizontal	Z	-	Z	Z	X	X
Vertical	X	-	X	X	X	X

Module MIMO

Antenna polarization	Carrier	Spurious (30 MHz - 1 GHz)	Spurious (1 GHz - 2.8 GHz)	Spurious (2.8 GHz - 10 GHz)	Spurious (10 GHz - 18 GHz)	Spurious (18 GHz - 26.5 GHz)
Horizontal	Z	X	Z	Z	X	X
Vertical	X	X	X	X	X	X

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

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

APPENDIX 1: Test Data**Radiated Spurious Emission**

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.3
Date	February 8, 2022	February 12, 2022	February 21, 2022
Temperature / Humidity	22 deg. C / 32 % RH	20 deg. C / 36 % RH	22 deg. C / 32 % RH
Engineer	Shiro Kobayashi	Miku Ikudome	Takahiro Kawakami
	(1 GHz - 10 GHz)	(10 GHz -18 GHz)	(18 GHz -26.5 GHz)
Mode	Tx 11b 2412 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	46.71	27.73	14.85	39.61	1.99	51.67	73.9	22.2	127	106	-
Hori.	4824.000	PK	48.82	31.23	7.51	39.69	1.99	49.86	73.9	24.0	207	81	-
Hori.	7236.000	PK	43.94	36.60	9.25	39.48	1.99	52.30	73.9	21.6	150	0	-
Hori.	9648.000	PK	44.45	38.27	10.86	39.66	1.99	55.91	73.9	17.9	150	0	-
Hori.	7236.000	AV	34.78	36.60	9.25	39.48	1.99	43.14	53.9	10.7	150	0	Floor noise
Hori.	9648.000	AV	34.95	38.27	10.86	39.66	1.99	46.41	53.9	7.4	150	0	Floor noise
Vert.	2390.000	PK	47.19	27.73	14.85	39.61	1.99	52.15	73.9	21.7	111	354	-
Vert.	4824.000	PK	49.46	31.23	7.51	39.69	1.99	50.50	73.9	23.4	153	20	-
Vert.	7236.000	PK	43.75	36.60	9.25	39.48	1.99	52.11	73.9	21.7	150	0	-
Vert.	9648.000	PK	44.33	38.27	10.86	39.66	1.99	55.79	73.9	18.1	150	0	-
Vert.	7236.000	AV	34.77	36.60	9.25	39.48	1.99	43.13	53.9	10.7	150	0	Floor noise
Vert.	9648.000	AV	35.28	38.27	10.86	39.66	1.99	46.74	53.9	7.1	150	0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : 20log(3.77 m / 3.0 m) = 1.99 dB

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	37.13	27.73	14.85	39.61	0.33	1.99	42.42	53.9	11.4	*1)
Hori.	4824.000	AV	39.24	31.23	7.51	39.69	0.33	1.99	40.61	53.9	13.2	-
Vert.	2390.000	AV	36.15	27.73	14.85	39.61	0.33	1.99	41.44	53.9	12.4	*1)
Vert.	4824.000	AV	39.68	31.23	7.51	39.69	0.33	1.99	41.05	53.9	12.8	-

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

Distance factor : 1 GHz - 10 GHz : 20log(3.77 m / 3.0 m) = 1.99 dB

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

Duty factor refer to "Burst rate confirmation" sheet (20log(1.334 / 1.285) = 0.33 dB : Test report 13568152S-K).

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	88.33	27.69	14.88	39.62	1.99	93.27	-	-	Carrier
Hori.	2398.986	PK	49.10	27.71	14.87	39.62	1.99	54.05	73.2	19.1	-
Hori.	2400.000	PK	47.15	27.71	14.87	39.62	1.99	52.10	73.2	21.1	-
Vert.	2412.000	PK	88.97	27.69	14.88	39.62	1.99	93.91	-	-	Carrier
Vert.	2397.500	PK	48.20	27.72	14.87	39.62	1.99	53.16	73.9	20.7	-
Vert.	2400.000	PK	46.28	27.71	14.87	39.62	1.99	51.23	73.9	22.6	-

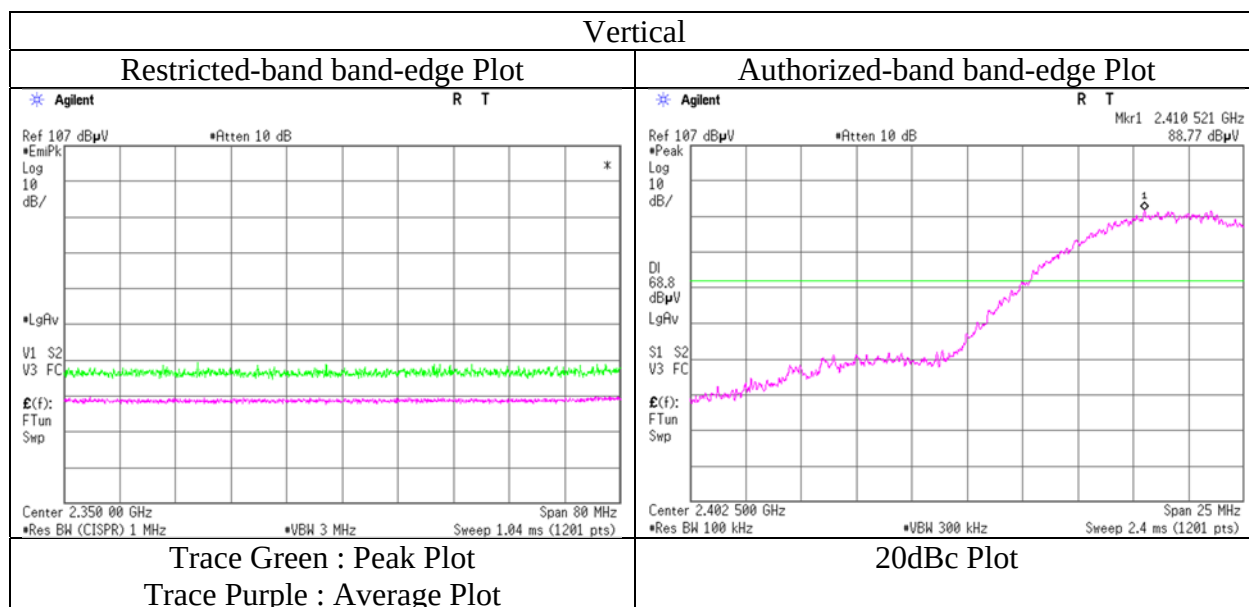
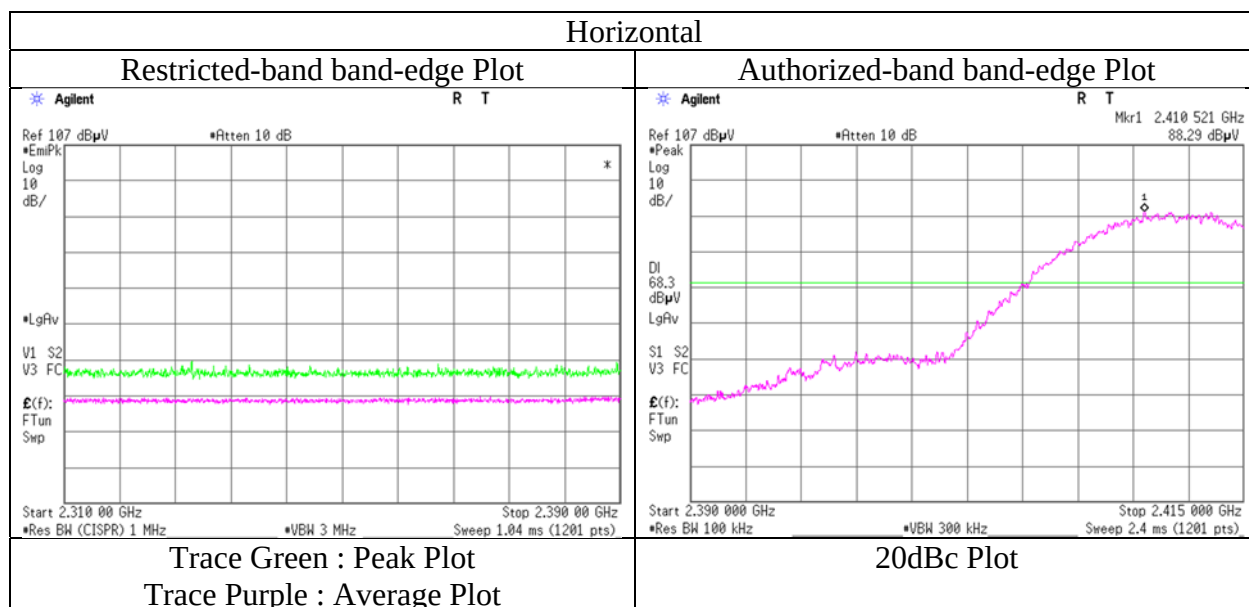
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log(3.77 m / 3.0 m) = 1.99 dB

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

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	February 8, 2022
Temperature / Humidity	22 deg. C / 32 % RH
Engineer	Shiro Kobayashi
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	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.3
Date	February 8, 2022	February 12, 2022	February 21, 2022
Temperature / Humidity	22 deg. C / 32 % RH	20 deg. C / 36 % RH	22 deg. C / 32 % RH
Engineer	Shiro Kobayashi (1 GHz - 10 GHz)	Miku Ikudome (10 GHz -18 GHz)	Takahiro Kawakami (18 GHz -26.5 GHz)
Mode	Tx 11b 2437 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	4874.000	PK	48.41	31.25	7.54	39.70	1.99	49.49	73.9	24.4	193	72	-
Hori.	7311.000	PK	43.24	36.66	9.29	39.46	1.99	51.72	73.9	22.1	150	0	-
Hori.	9748.000	PK	44.02	38.59	10.86	39.61	1.99	55.85	73.9	18.0	150	0	-
Hori.	7311.000	AV	34.85	36.66	9.29	39.46	1.99	43.33	53.9	10.5	150	0	Floor noise
Hori.	9748.000	AV	35.10	38.59	10.86	39.61	1.99	46.93	53.9	6.9	150	0	Floor noise
Vert.	4874.000	PK	47.07	31.25	7.54	39.70	1.99	48.15	73.9	25.7	155	28	-
Vert.	7311.000	PK	43.45	36.66	9.29	39.46	1.99	51.93	73.9	21.9	150	0	-
Vert.	9748.000	PK	43.82	38.59	10.86	39.61	1.99	55.65	73.9	18.2	150	0	-
Vert.	7311.000	AV	35.07	36.66	9.29	39.46	1.99	43.55	53.9	10.3	150	0	Floor noise
Vert.	9748.000	AV	34.84	38.59	10.86	39.61	1.99	46.67	53.9	7.2	150	0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$ 10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	38.76	31.25	7.54	39.70	0.33	1.99	40.17	53.9	13.7	-
Vert.	4874.000	AV	38.27	31.25	7.54	39.70	0.33	1.99	39.68	53.9	14.2	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$ 10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$ Duty factor refer to "Burst rate confirmation" sheet ($20\log(1.334 / 1.285) = 0.33\text{ dB}$: Test report 13568152S-K).

Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.3
Date	February 8, 2022	February 12, 2022	February 21, 2022
Temperature / Humidity	22 deg. C / 32 % RH	20 deg. C / 36 % RH	22 deg. C / 32 % RH
Engineer	Shiro Kobayashi (1 GHz - 10 GHz)	Miku Ikudome (10 GHz -18 GHz)	Takahiro Kawakami (18 GHz -26.5 GHz)
Mode	Tx 11b 2462 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	45.71	27.61	14.97	39.64	1.99	50.64	73.9	23.2	177	68	-
Hori.	4924.000	PK	48.48	31.31	7.57	39.71	1.99	49.64	73.9	24.2	201	76	-
Hori.	7386.000	PK	44.75	36.78	9.34	39.44	1.99	53.42	73.9	20.4	150	0	-
Hori.	9848.000	PK	44.36	38.75	10.84	39.56	1.99	56.38	73.9	17.5	150	0	-
Hori.	7386.000	AV	35.48	36.78	9.34	39.44	1.99	44.15	53.9	9.7	150	0	Floor noise
Hori.	9848.000	AV	34.96	38.75	10.84	39.56	1.99	46.98	53.9	6.9	150	0	Floor noise
Vert.	2483.500	PK	45.35	27.61	14.97	39.64	1.99	50.28	73.9	23.6	134	359	-
Vert.	4924.000	PK	47.56	31.31	7.57	39.71	1.99	48.72	73.9	25.1	152	27	-
Vert.	7386.000	PK	44.41	36.78	9.34	39.44	1.99	53.08	73.9	20.8	150	0	-
Vert.	9848.000	PK	43.68	38.75	10.84	39.56	1.99	55.70	73.9	18.2	150	0	-
Vert.	7386.000	AV	35.30	36.78	9.34	39.44	1.99	43.97	53.9	9.9	150	0	Floor noise
Vert.	9848.000	AV	35.09	38.75	10.84	39.56	1.99	47.11	53.9	6.7	150	0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	36.32	27.61	14.97	39.64	0.33	1.99	41.58	53.9	12.3	*1)
Hori.	4924.000	AV	38.04	31.31	7.57	39.71	0.33	1.99	39.53	53.9	14.3	-
Vert.	2483.500	AV	36.43	27.61	14.97	39.64	0.33	1.99	41.69	53.9	12.2	*1)
Vert.	4924.000	AV	38.08	31.31	7.57	39.71	0.33	1.99	39.57	53.9	14.3	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$

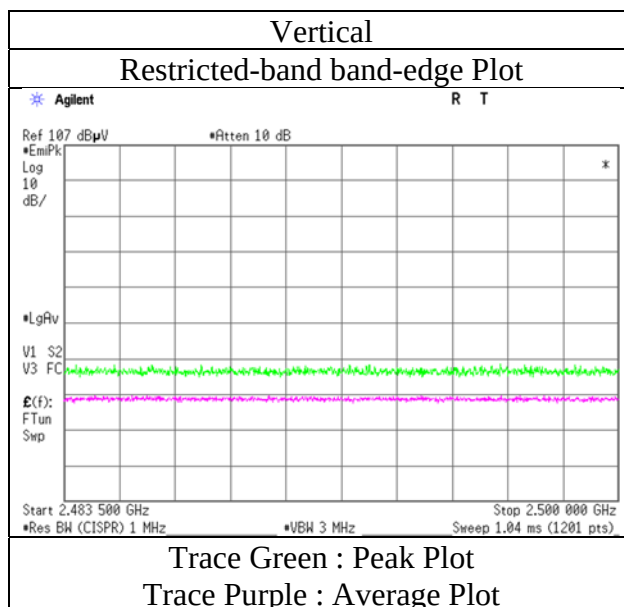
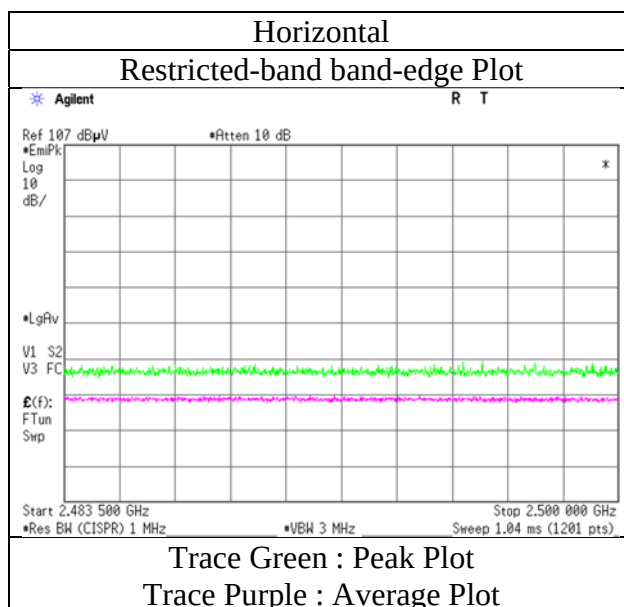
10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Burst rate confirmation" sheet ($20\log(1.334 / 1.285) = 0.33\text{ dB}$: Test report 13568152S-K).

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

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	February 8, 2022
Temperature / Humidity	22 deg. C / 32 % RH
Engineer	Shiro Kobayashi
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	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.3
Date	February 8, 2022	February 12, 2022	February 21, 2022
Temperature / Humidity	22 deg. C / 32 % RH	20 deg. C / 36 % RH	22 deg. C / 32 % RH
Engineer	Shiro Kobayashi (1 GHz - 10 GHz)	Miku Ikudome (10 GHz -18 GHz)	Takahiro Kawakami (18 GHz -26.5 GHz)
Mode	Tx 11g 2412 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	52.17	27.73	14.85	39.61	1.99	57.13	73.9	16.7	125	104	-
Hori.	4824.000	PK	44.77	31.23	7.51	39.69	1.99	45.81	73.9	28.0	194	83	-
Hori.	7236.000	PK	43.95	36.60	9.25	39.48	1.99	52.31	73.9	21.5	150	0	-
Hori.	9648.000	PK	44.19	38.27	10.86	39.66	1.99	55.65	73.9	18.2	150	0	-
Hori.	7236.000	AV	34.90	36.60	9.25	39.48	1.99	43.26	53.9	10.6	150	0	Floor noise
Hori.	9648.000	AV	35.23	38.27	10.86	39.66	1.99	46.69	53.9	7.2	150	0	Floor noise
Vert.	2390.000	PK	52.56	27.73	14.85	39.61	1.99	57.52	73.9	16.3	106	352	-
Vert.	4824.000	PK	44.97	31.23	7.51	39.69	1.99	46.01	73.9	27.8	154	19	-
Vert.	7236.000	PK	43.67	36.60	9.25	39.48	1.99	52.03	73.9	21.8	150	0	-
Vert.	9648.000	PK	44.63	38.27	10.86	39.66	1.99	56.09	73.9	17.8	150	0	-
Vert.	7236.000	AV	35.00	36.60	9.25	39.48	1.99	43.36	53.9	10.5	150	0	Floor noise
Vert.	9648.000	AV	35.15	38.27	10.86	39.66	1.99	46.61	53.9	7.2	150	0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	39.88	27.73	14.85	39.61	1.25	1.99	46.09	53.9	7.8	*1)
Hori.	4824.000	AV	35.83	31.23	7.51	39.69	1.25	1.99	38.12	53.9	15.7	-
Vert.	2390.000	AV	40.15	27.73	14.85	39.61	1.25	1.99	46.36	53.9	7.5	*1)
Vert.	4824.000	AV	35.79	31.23	7.51	39.69	1.25	1.99	38.08	53.9	15.8	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$

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

Duty factor refer to "Burst rate confirmation" sheet ($20\log(0.414 / 0.358) = 1.25\text{ dB}$: Test report 13568152S-K).

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	79.88	27.69	14.88	39.62	1.99	84.82	-	-	Carrier
Hori.	2400.000	PK	51.35	27.71	14.87	39.62	1.99	56.30	64.8	8.4	-
Vert.	2412.000	PK	80.10	27.69	14.88	39.62	1.99	85.04	-	-	Carrier
Vert.	2400.000	PK	52.21	27.71	14.87	39.62	1.99	57.16	65.0	7.8	-

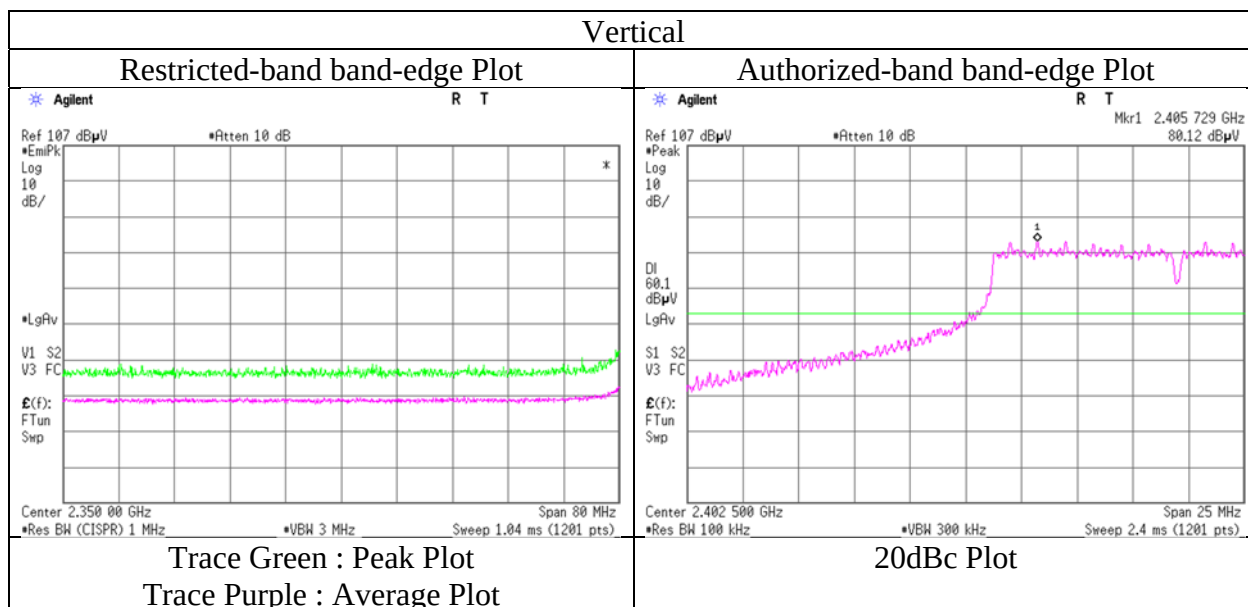
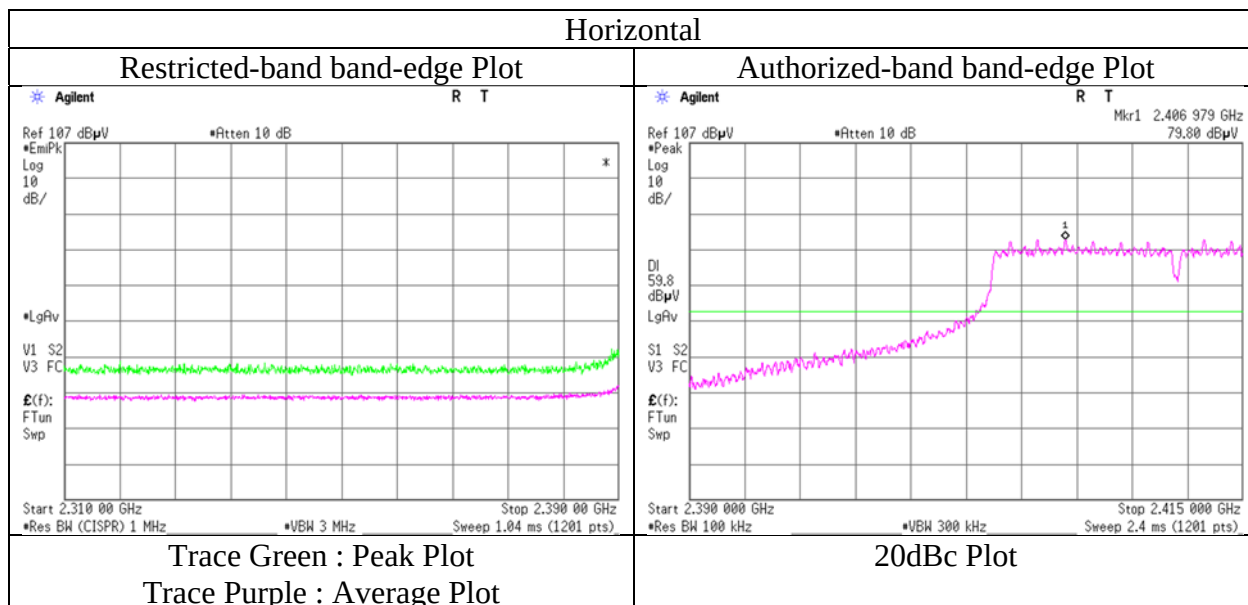
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$

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

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	February 8, 2022
Temperature / Humidity	22 deg. C / 32 % RH
Engineer	Shiro Kobayashi
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	Shonan EMC Lab.	No.1	No.3
Semi Anechoic Chamber	No.1	No.1	No.3
Date	February 8, 2022	February 12, 2022	February 21, 2022
Temperature / Humidity	22 deg. C / 32 % RH	20 deg. C / 36 % RH	22 deg. C / 32 % RH
Engineer	Shiro Kobayashi (1 GHz - 10 GHz)	Miku Ikudome (10 GHz -18 GHz)	Takahiro Kawakami (18 GHz -26.5 GHz)
Mode	Tx 11g 2437 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	4874.000	PK	45.94	31.25	7.54	39.70	1.99	47.02	73.9	26.8	199	82	-
Hori.	7311.000	PK	43.96	36.66	9.29	39.46	1.99	52.44	73.9	21.4	150	0	-
Hori.	9748.000	PK	44.16	38.59	10.86	39.61	1.99	55.99	73.9	17.9	150	0	-
Hori.	7311.000	AV	34.91	36.66	9.29	39.46	1.99	43.39	53.9	10.5	150	0	Floor noise
Hori.	9748.000	AV	35.37	38.59	10.86	39.61	1.99	47.20	53.9	6.7	150	0	Floor noise
Vert.	4874.000	PK	45.66	31.25	7.54	39.70	1.99	46.74	73.9	27.1	134	17	-
Vert.	7311.000	PK	44.22	36.66	9.29	39.46	1.99	52.70	73.9	21.2	150	0	-
Vert.	9748.000	PK	44.23	38.59	10.86	39.61	1.99	56.06	73.9	17.8	150	0	-
Vert.	7311.000	AV	34.96	36.66	9.29	39.46	1.99	43.44	53.9	10.4	150	0	Floor noise
Vert.	9748.000	AV	34.99	38.59	10.86	39.61	1.99	46.82	53.9	7.0	150	0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	37.12	31.25	7.54	39.70	1.25	1.99	39.45	53.9	14.4	-
Vert.	4874.000	AV	37.16	31.25	7.54	39.70	1.25	1.99	39.49	53.9	14.4	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$

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

Duty factor refer to "Burst rate confirmation" sheet ($20\log(0.414 / 0.358) = 1.25\text{ dB}$: Test report 13568152S-K).

Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.3
Date	February 8, 2022	February 12, 2022	February 21, 2022
Temperature / Humidity	22 deg. C / 32 % RH	20 deg. C / 36 % RH	22 deg. C / 32 % RH
Engineer	Shiro Kobayashi (1 GHz - 10 GHz)	Miku Ikudome (10 GHz -18 GHz)	Takahiro Kawakami (18 GHz -26.5 GHz)
Mode	Tx 11g 2462 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	45.87	27.61	14.97	39.64	1.99	50.80	73.9	23.1	115	88	-
Hori.	4924.000	PK	45.07	31.31	7.57	39.71	1.99	46.23	73.9	27.6	231	92	-
Hori.	7386.000	PK	43.72	36.78	9.34	39.44	1.99	52.39	73.9	21.5	150	0	-
Hori.	9848.000	PK	43.53	38.75	10.84	39.56	1.99	55.55	73.9	18.3	150	0	-
Hori.	7386.000	AV	34.26	36.78	9.34	39.44	1.99	42.93	53.9	10.9	150	0	Floor noise
Hori.	9848.000	AV	34.95	38.75	10.84	39.56	1.99	46.97	53.9	6.9	150	0	Floor noise
Vert.	2483.500	PK	50.44	27.61	14.97	39.64	1.99	55.37	73.9	18.5	127	351	-
Vert.	4924.000	PK	44.67	31.31	7.57	39.71	1.99	45.83	73.9	28.0	138	3	-
Vert.	7386.000	PK	43.48	36.78	9.34	39.44	1.99	52.15	73.9	21.7	150	0	-
Vert.	9848.000	PK	43.54	38.75	10.84	39.56	1.99	55.56	73.9	18.3	150	0	-
Vert.	7386.000	AV	34.54	36.78	9.34	39.44	1.99	43.21	53.9	10.6	150	0	Floor noise
Vert.	9848.000	AV	34.71	38.75	10.84	39.56	1.99	46.73	53.9	7.1	150	0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	36.81	27.61	14.97	39.64	1.25	1.99	42.99	53.9	10.9	*1)
Hori.	4924.000	AV	35.90	31.31	7.57	39.71	1.25	1.99	38.31	53.9	15.5	-
Vert.	2483.500	AV	39.55	27.61	14.97	39.64	1.25	1.99	45.73	53.9	8.1	*1)
Vert.	4924.000	AV	35.83	31.31	7.57	39.71	1.25	1.99	38.24	53.9	15.6	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$

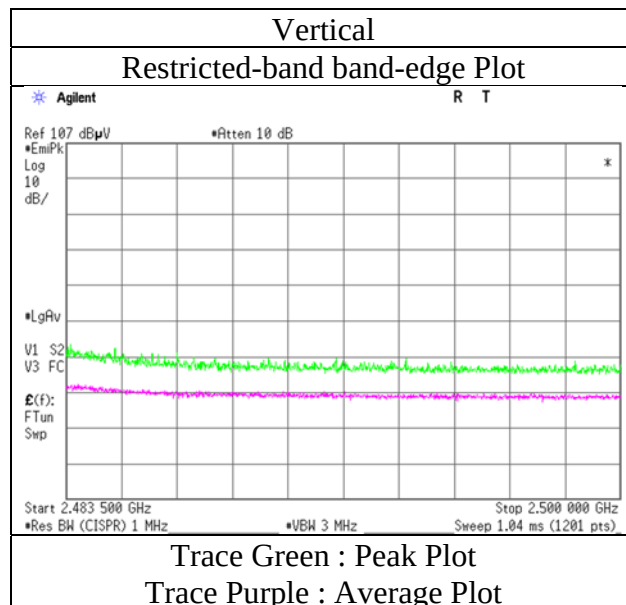
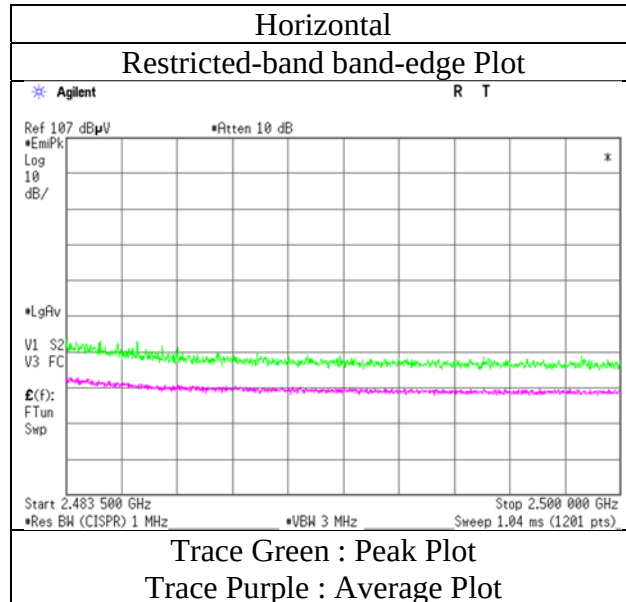
10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Burst rate confirmation" sheet ($20\log(0.414 / 0.358) = 1.25\text{ dB}$: Test report 13568152S-K).

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

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	February 8, 2022
Temperature / Humidity	22 deg. C / 32 % RH
Engineer	Shiro Kobayashi
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	Shonan EMC Lab.			
Semi Anechoic Chamber	No.1	No.1	No.1	No.3
Date	February 8, 2022	February 9, 2022	February 12, 2022	February 21, 2022
Temperature / Humidity	22 deg. C / 32 % RH	23 deg. C / 38 % RH	20 deg. C / 36 % RH	22 deg. C / 32 % RH
Engineer	Shiro Kobayashi (1 GHz – 2.8 GHz)	Yosuke Murakami (2.8 GHz -10 GHz)	Miku Ikudome (10 GHz -18 GHz)	Takahiro Kawakami (18 GHz -26.5 GHz)
Mode	Tx 11n-20 2412 MHz			

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2390.000	PK	50.70	27.73	14.85	39.61	1.99	55.66	73.9	18.2	123	109	-
Hori.	4824.000	PK	45.72	31.23	7.51	39.69	1.99	46.76	73.9	27.1	299	240	-
Hori.	7236.000	PK	44.06	36.60	9.25	39.48	1.99	52.42	73.9	21.4	150	0	-
Hori.	9648.000	PK	43.42	38.27	10.86	39.66	1.99	54.88	73.9	19.0	150	0	-
Hori.	7236.000	AV	34.87	36.60	9.25	39.48	1.99	43.23	53.9	10.6	150	0	Floor noise
Hori.	9648.000	AV	34.58	38.27	10.86	39.66	1.99	46.04	53.9	7.8	150	0	Floor noise
Vert.	2390.000	PK	51.34	27.73	14.85	39.61	1.99	56.30	73.9	17.6	267	354	-
Vert.	4824.000	PK	45.87	31.23	7.51	39.69	1.99	46.91	73.9	26.9	181	90	-
Vert.	7236.000	PK	44.71	36.60	9.25	39.48	1.99	53.07	73.9	20.8	150	0	-
Vert.	9648.000	PK	44.84	38.27	10.86	39.66	1.99	56.30	73.9	17.6	150	0	-
Vert.	7236.000	AV	34.66	36.60	9.25	39.48	1.99	43.02	53.9	10.8	150	0	Floor noise
Vert.	9648.000	AV	34.37	38.27	10.86	39.66	1.99	45.83	53.9	8.0	150	0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$ 10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$ **Average measurement value with duty factor**

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	39.12	27.73	14.85	39.61	2.17	1.99	46.25	53.9	7.6	*1)
Hori.	4824.000	AV	36.21	31.23	7.51	39.69	2.17	1.99	39.42	53.9	14.4	-
Vert.	2390.000	AV	39.26	27.73	14.85	39.61	2.17	1.99	46.39	53.9	7.5	*1)
Vert.	4824.000	AV	35.85	31.23	7.51	39.69	2.17	1.99	39.06	53.9	14.8	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$ 10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$ Duty factor refer to "Burst rate confirmation" sheet ($20\log(0.253 / 0.1972) = 2.17\text{ dB}$: Test report 13568152S-K).

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

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

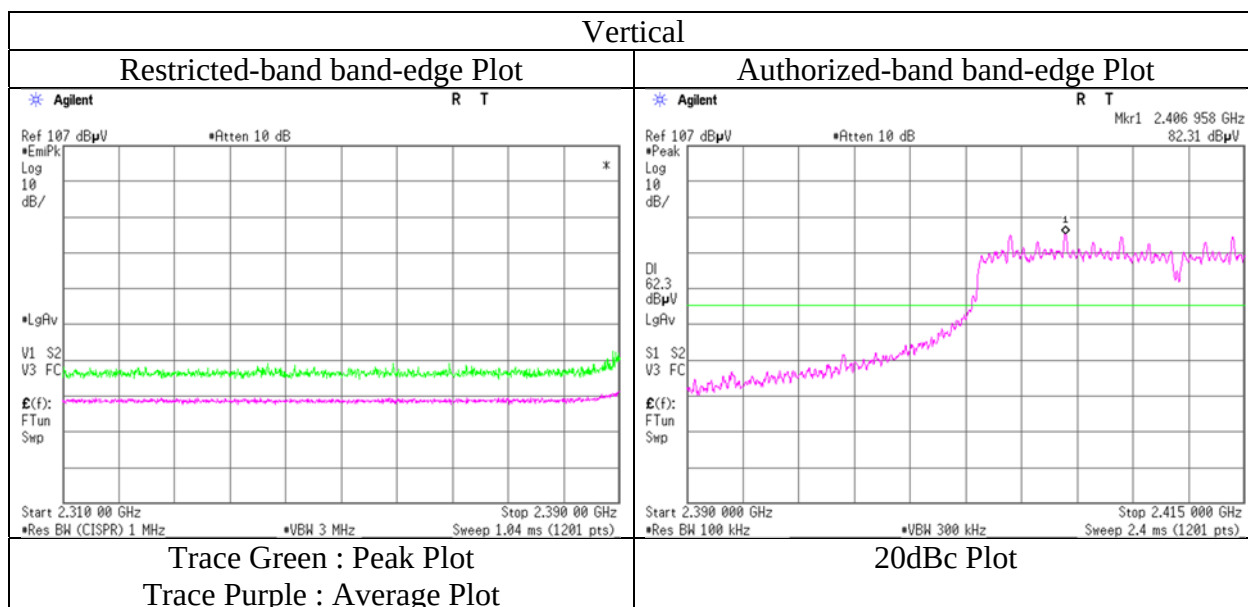
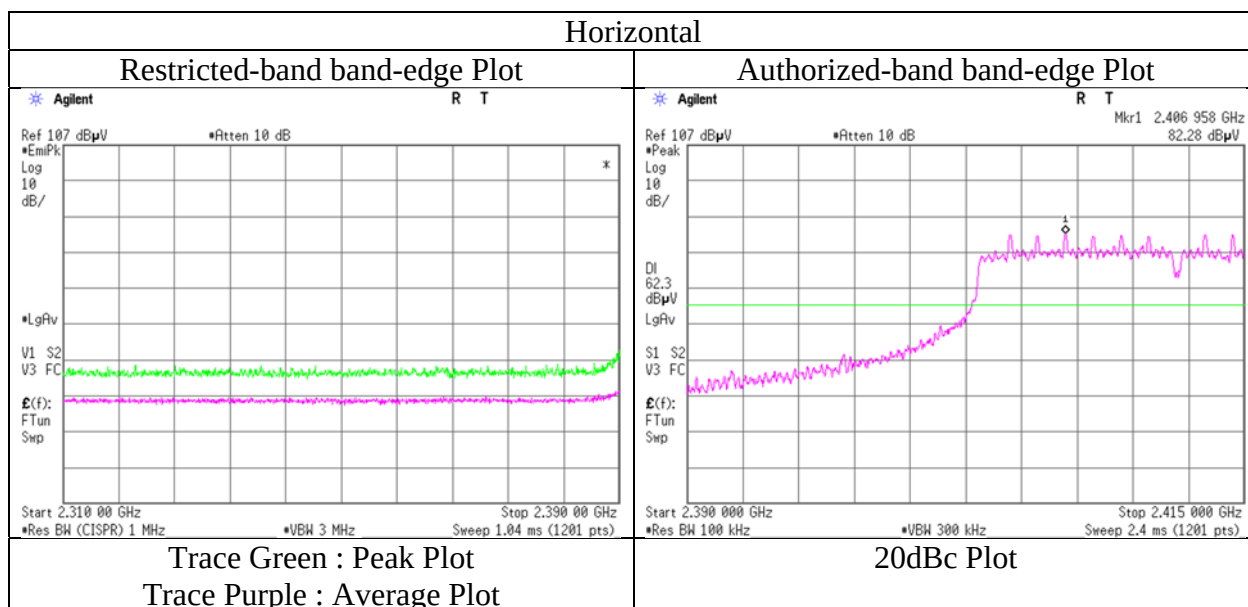
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2412.000	PK	82.34	27.69	14.88	39.62	1.99	87.28	-	-	Carrier
Hori.	2400.000	PK	49.34	27.71	14.87	39.62	1.99	54.29	67.2	12.9	-
Vert.	2412.000	PK	82.26	27.69	14.88	39.62	1.99	87.20	-	-	Carrier
Vert.	2400.000	PK	50.51	27.71	14.87	39.62	1.99	55.46	67.2	11.7	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$ 10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	February 8, 2022
Temperature / Humidity	22 deg. C / 32 % RH
Engineer	Shiro Kobayashi
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	Shonan EMC Lab.	No.1	No.1	No.1	No.3
Semi Anechoic Chamber	No.3	No.1	No.1	No.1	No.3
Date	February 23, 2022	February 8, 2022	February 9, 2022	February 12, 2022	February 21, 2022
Temperature / Humidity	22 deg. C / 29 % RH	22 deg. C / 32 % RH	23 deg. C / 38 % RH	20 deg. C / 36 % RH	22 deg. C / 32 % RH
Engineer	Miku Ikudome (30 MHz – 1 GHz)	Shiro Kobayashi (1 GHz – 2.8 GHz)	Yosuke Murakami (2.8 GHz -10 GHz)	Miku Ikudome (10 GHz -18 GHz)	Takahiro Kawakami (18 GHz -26.5 GHz)
Mode	Tx 11n-20 2437 MHz				

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	349.998	QP	28.37	15.23	8.83	31.92	0.00	20.51	46.0	25.4	100	187	-
Hori.	450.001	QP	31.20	16.59	9.30	31.93	0.00	25.16	46.0	20.8	100	286	-
Hori.	850.010	QP	26.01	21.48	10.79	31.33	0.00	26.95	46.0	19.0	101	44	-
Hori.	949.999	QP	27.52	22.07	11.11	30.59	0.00	30.11	46.0	15.8	100	45	-
Hori.	4874.000	PK	46.31	31.25	7.54	39.70	1.99	47.39	73.9	26.5	310	260	-
Hori.	7311.000	PK	44.48	36.66	9.29	39.46	1.99	52.96	73.9	20.9	150	0	-
Hori.	9748.000	PK	44.69	38.59	10.86	39.61	1.99	56.52	73.9	17.3	150	0	-
Hori.	7311.000	AV	35.24	36.66	9.29	39.46	1.99	43.72	53.9	10.1	150	0	Floor noise
Hori.	9748.000	AV	35.00	38.59	10.86	39.61	1.99	46.83	53.9	7.0	150	0	Floor noise
Vert.	350.002	QP	26.98	15.23	8.83	31.92	0.00	19.12	46.0	26.8	154	177	-
Vert.	449.998	QP	37.01	16.59	9.30	31.93	0.00	30.97	46.0	15.0	128	196	-
Vert.	850.003	QP	23.62	21.48	10.79	31.33	0.00	24.56	46.0	21.4	179	336	-
Vert.	950.002	QP	25.21	22.07	11.11	30.59	0.00	27.80	46.0	18.2	105	349	-
Vert.	4874.000	PK	48.91	31.25	7.54	39.70	1.99	49.99	73.9	23.9	176	83	-
Vert.	7311.000	PK	44.32	36.66	9.29	39.46	1.99	52.80	73.9	21.1	150	0	-
Vert.	9748.000	PK	43.83	38.59	10.86	39.61	1.99	55.66	73.9	18.2	150	0	-
Vert.	7311.000	AV	34.99	36.66	9.29	39.46	1.99	43.47	53.9	10.4	150	0	Floor noise
Vert.	9748.000	AV	34.65	38.59	10.86	39.61	1.99	46.48	53.9	7.4	150	0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$ 10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$ **Average measurement value with duty factor**

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4874.000	AV	35.82	31.25	7.54	39.70	2.17	1.99	39.07	53.9	14.8	-
Vert.	4874.000	AV	37.22	31.25	7.54	39.70	2.17	1.99	40.47	53.9	13.4	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$ 10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$ Duty factor refer to "Burst rate confirmation" sheet ($20\log(0.253 / 0.1972) = 2.17\text{ dB}$: Test report 13568152S-K).

Radiated Spurious Emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	No.1	No.1	No.1
Date	February 8, 2022	February 9, 2022	February 12, 2022
Temperature / Humidity	22 deg. C / 32 % RH	23 deg. C / 38 % RH	20 deg. C / 36 % RH
Engineer	Shiro Kobayashi (1 GHz – 2.8 GHz)	Yosuke Murakami (2.8 GHz -10 GHz)	Miku Ikudome (10 GHz -18 GHz)
Mode	Tx 11n-20 2462 MHz		

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	48.25	27.61	14.97	39.64	1.99	53.18	73.9	20.7	114	115	-
Hori.	4924.000	PK	44.79	31.31	7.57	39.71	1.99	45.95	73.9	27.9	301	258	-
Hori.	7386.000	PK	44.80	36.78	9.34	39.44	1.99	53.47	73.9	20.4	150	0	-
Hori.	9848.000	PK	44.04	38.75	10.84	39.56	1.99	56.06	73.9	17.8	150	0	-
Hori.	7386.000	AV	35.55	36.78	9.34	39.44	1.99	44.22	53.9	9.6	150	0	Floor noise
Hori.	9848.000	AV	34.85	38.75	10.84	39.56	1.99	46.87	53.9	7.0	150	0	Floor noise
Vert.	2483.500	PK	47.70	27.61	14.97	39.64	1.99	52.63	73.9	21.2	296	348	-
Vert.	4924.000	PK	44.90	31.31	7.57	39.71	1.99	46.06	73.9	27.8	180	91	-
Vert.	7386.000	PK	44.97	36.78	9.34	39.44	1.99	53.64	73.9	20.2	150	0	-
Vert.	9848.000	PK	43.89	38.75	10.84	39.56	1.99	55.91	73.9	17.9	150	0	-
Vert.	7386.000	AV	35.24	36.78	9.34	39.44	1.99	43.91	53.9	9.9	150	0	Floor noise
Vert.	9848.000	AV	35.08	38.75	10.84	39.56	1.99	47.10	53.9	6.8	150	0	Floor noise

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	37.94	27.61	14.97	39.64	2.17	1.99	45.04	53.9	8.8	*1)
Hori.	4924.000	AV	35.81	31.31	7.57	39.71	2.17	1.99	39.14	53.9	14.7	-
Vert.	2483.500	AV	37.50	27.61	14.97	39.64	2.17	1.99	44.60	53.9	9.3	*1)
Vert.	4924.000	AV	36.11	31.31	7.57	39.71	2.17	1.99	39.44	53.9	14.4	-

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.77\text{ m} / 3.0\text{ m}) = 1.99\text{ dB}$

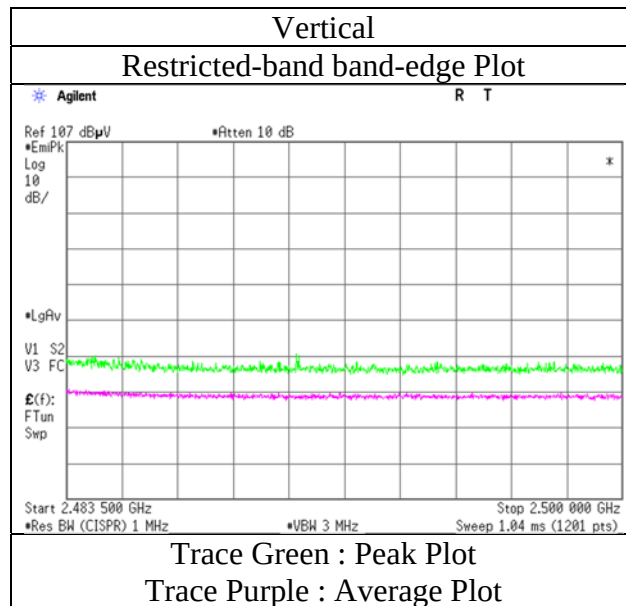
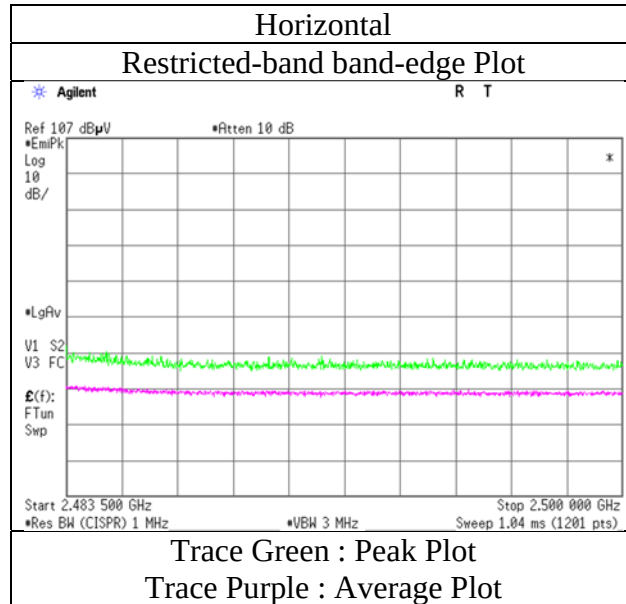
10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Duty factor refer to "Burst rate confirmation" sheet ($20\log(0.253 / 0.1972) = 2.17\text{ dB}$: Test report 13568152S-K).

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

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	No.1
Date	February 8, 2022
Temperature / Humidity	22 deg. C / 32 % RH
Engineer	Shiro Kobayashi
Mode	Tx 11n-20 2462 MHz

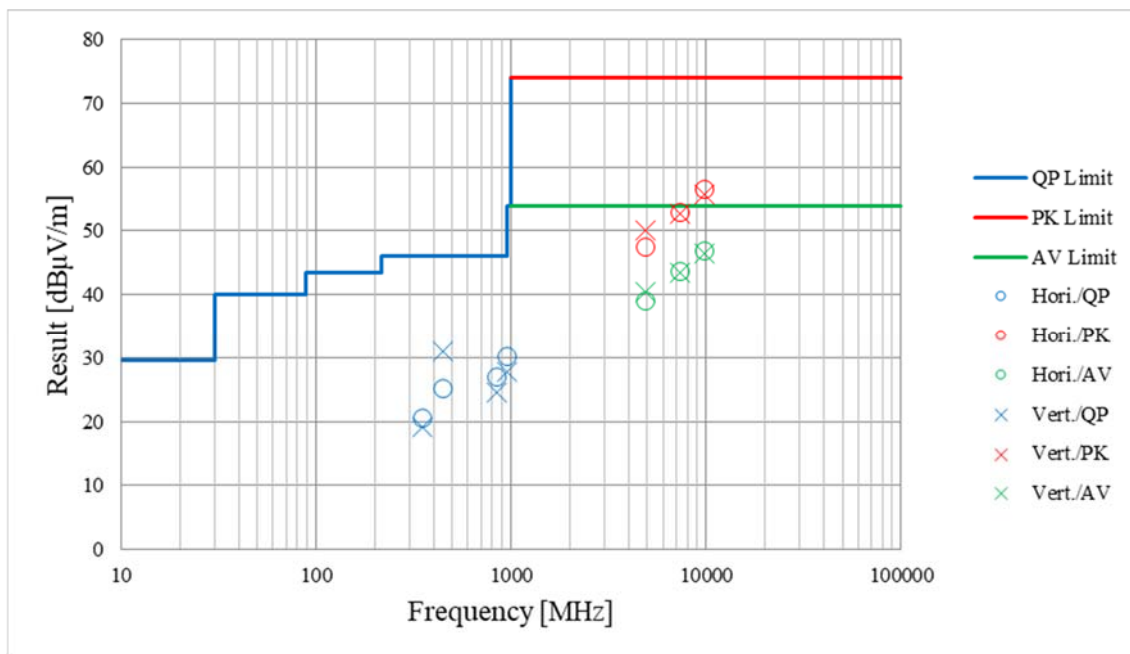


* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions.
Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

(Plot data, Worst case mode for Maximum Conducted Output Power of the test report mentioned in 3.1)

Test place	Shonan EMC Lab.	No.1	No.1	No.1	No.3
Semi Anechoic Chamber	No.3	No.1	No.1	No.1	No.3
Date	February 23, 2022	February 8, 2022	February 9, 2022	February 12, 2022	February 21, 2022
Temperature / Humidity	22 deg. C / 29 % RH	22 deg. C / 32 % RH	23 deg. C / 38 % RH	20 deg. C / 36 % RH	22 deg. C / 32 % RH
Engineer	Miku Ikudome	Shiro Kobayashi	Yosuke Murakami	Miku Ikudome	Takahiro Kawakami
	(30 MHz - 1 GHz)	(1 GHz - 2.8 GHz)	(2.8 GHz - 10 GHz)	(10 GHz - 18 GHz)	(18 GHz - 26.5 GHz)
Mode	Tx 11n-20 2437 MHz				



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

APPENDIX 2: Test Instruments

Test Equipment(1/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	COTS-SEMI-5	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3 (RE,CE,ME,PE)	-	-	-
RE	KJM-02	146432	Measure	TAJIMA	GL19-55	-	-	-
RE	KSA-08	145089	Spectrum Analyzer	Keysight Technologies Inc	E4446A	MY46180525	2021/10/13	12
RE	SAEC-01 (NSA)	145597	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	2021/04/30	12
RE	SAEC-01 (SVSWR)	145561	Semi-Anechoic Chamber	TDK	SAEC-01(SVSWR)	1	2021/05/09	12
RE	SAEC-03 (NSA)	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2021/04/27	12
RE	SAEC-03 (SVSWR)	145566	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	2021/05/21	12
RE	SAF-03	145126	Pre Amplifier	SONOMA	310N	290213	2021/02/10	12
RE	SAF-04	145127	Pre Amplifier	Toyo Corporation	TPA0118-36	2072554	2021/05/17	12
RE	SAF-06	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	1440491	2022/02/04	12
RE	SAF-08	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2021/03/01	12
RE	SAJ-02	146104	Antenna Tilt Jig	Intelligent System Engineering Co., Ltd	Antenna Tilt Jig	T-S002	-	-
RE	SAT10-06	145137	Attenuator	Keysight Technologies Inc	8493C-010	74865	2021/10/05	12
RE	SAT6-13	167094	Attenuator	JFW	50HF-006N	-	2022/02/21	12
RE	SBA-03	145023	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	91032666	2021/05/15	12
RE	SCC-C1/C2/C3/C4/C5/C10/SRS E-03	145171	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	2021/04/12	12
RE	SCC-G05	145039	Coaxial Cable	Junkosha	J12J102207-00	APR-30-15-037	2022/01/06	12
RE	SCC-G15	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2021/03/01	12
RE	SCC-G41	151617	Coaxial Cable	Junkosha	MWX221-01000NFSNMS/B	1612S006	2022/01/06	12
RE	SCC-G43	156380	Coaxial Cable	Huber+Suhner	SUCOFLEX_104_E	SN MY 13406/4E	2021/05/17	12

Test Equipment(2/2)

Test Item	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
RE	SCC-G57	179540	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	802815/2	2021/05/18	12
RE	SCC-G58	183047	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	800287/4A	2021/05/17	12
RE	SCC-G62	196985	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803650/2	2021/03/01	12
RE	SCC-G68	200008	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	575616/4	2021/07/06	12
RE	SCC-G70	200010	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	575618/4	2021/07/06	12
RE	SFL-03	145377	Highpass Filter	MICRO-TRONICS	HPM50112	28	2021/10/05	12
RE	SFL-18	145305	Highpass Filter	MICRO-TRONICS	HPM50111	119	2021/04/08	12
RE	SHA-01	145383	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-725	2021/05/20	12
RE	SHA-03	145501	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-739	2021/06/14	12
RE	SHA-04	145512	Horn Antenna	ETS-Lindgren	3160-09	00094868	2021/06/14	12
RE	SHA-08	194683	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	694	2021/03/03	12
RE	SJM-21	207278	Measuring Tool, Tape Measure	ASKUL	-	-	-	-
RE	SLA-07	145529	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	196	2021/05/15	12
RE	SOS-20	191837	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2021/08/02	12
RE	SOS-23	191840	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2021/08/02	12
RE	SSA-02	145800	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250106	2021/04/13	12
RE	STR-01	145790	Test Receiver	Rohde & Schwarz	ESU40	100093	2021/04/27	12
RE	STR-09	213530	Test Receiver	Rohde & Schwarz	ESW44	103068	2022/01/17	12
RE	STS-01	145792	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997812	2021/09/14	12
RE	STS-03	146210	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997823	2021/09/14	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