

RADIO TEST REPORT

Test Report No. 14908125M-A-R1

Customer	Circuit Design, Inc.
Description of EUT	2.4 GHz DSSS low power radio transceiver
Model Number of EUT	STD-504
FCC ID	V9X-STD504
Test Regulation	FCC Part 15 Subpart C
Test Result	Complied
Issue Date	March 25, 2024
Remarks	-

Representative Test EngineerKazuhiro Ando
Engineer**Approved By**Kenichi Suda
Manager

CERTIFICATE 1266.01

- ☐ 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# 23.0

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- The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan, Inc. has been accredited.
- The information provided by the customer for this report is identified in SECTION 1.
- The laboratory is not responsible for information provided by the customer which can impact the validity of the results.
- For test report(s) referred in this report, the latest version (including any revisions) is always referred.

REVISION HISTORY

Original Test Report No.: 14908125M-A

This report is a revised version of 14908125M-A. 14908125M-A is replaced with this report.

Revision	Test Report No.	Date	Page Revised Contents																																				
- (Original)	14908125M-A	March 4, 2024	-																																				
1	14908125M-A-R1	March 25, 2024	P.5, Change of Operating temperature From: -20 deg. C to +65 deg. C To: -30 deg. C to +70 deg. C																																				
1	14908125M-A-R1	March 25, 2024	P.5, Correction of antenna description of *1) From: connector shape To: antenna shape																																				
1	14908125M-A-R1	March 25, 2024	P.5, Correction of antenna description of *2) From : ANT-2G4W1R-R and ANT-2400-SFW To: ANT-2400-SFW and ANT-2G4W1R-R																																				
1	14908125M-A-R1	March 25, 2024	P.6, Change of worst margin From: 3.4 dB 4953.00 MHz, AV, Vertical To: 2.0 dB 4953.00 MHz, AV, Horizontal																																				
1	14908125M-A-R1	March 25, 2024	P.16, Change of Worst case position of ANT-2G4S3 antenna																																				
1	14908125M-A-R1	March 25, 2024	P.28, Correction of typo of TRX2 port <table><tr><th>[MHz]</th><th>[dBm]</th><th>[dB]</th><th>[dB]</th><th>[dBm]</th><th>[mW]</th><th>[dB]</th><th>[dBm]</th><th>[mW]</th></tr><tr><td>2471.5</td><td>-6.61</td><td>0.92</td><td>10.05</td><td>4.36</td><td>2.73</td><td>0.00</td><td>4.36</td><td>2.73</td></tr></table> ↓ <table><tr><th>[MHz]</th><th>[dBm]</th><th>[dB]</th><th>[dB]</th><th>[dBm]</th><th>[mW]</th><th>[dB]</th><th>[dBm]</th><th>[mW]</th></tr><tr><td>2471.5</td><td>-6.82</td><td>0.92</td><td>10.05</td><td>4.15</td><td>2.60</td><td>0.00</td><td>4.15</td><td>2.60</td></tr></table>	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]	2471.5	-6.61	0.92	10.05	4.36	2.73	0.00	4.36	2.73	[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]	2471.5	-6.82	0.92	10.05	4.15	2.60	0.00	4.15	2.60
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1	14908125M-A-R1	March 25, 2024	P.18, P.30 – P.36, Replaced with the corrected data.																																				
1	14908125M-A-R1	March 25, 2024	P.58, Added the notes.																																				
1	14908125M-A-R1	March 25, 2024	P.64, Added horn antenna (LIMS ID: 143456) to the list of Test Instruments.																																				

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	Circuit Design, Inc.
Address	7557-1, Hotaka, Azumino, Nagano 399-8303 Japan
Telephone Number	+81-263-82-1011
Contact Person	Yukinaga Koike

The information provided by 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

SECTION 2: Equipment Under Test (EUT)

2.1 Identification of EUT

Description	2.4 GHz DSSS low power radio transceiver
Model Number	STD-504
Serial Number	Refer to SECTION 4.2
Condition	Engineering prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	January 18, 2024
Test Date	January 22 to March 21, 2024

2.2 Product Description

General Specification

Rating	DC 3.3 V to 5.0 V (Absolute max. voltage 5.5 V)
Operating temperature	-30 deg. C to +70 deg. C

Radio Specification

This report contains data provided by the customer which can impact the validity of results. UL Japan, Inc. is only responsible for the validity of results after the integration of the data provided by the customer. The data provided by the customer is marked "a)" in the table below.

Direct sequence spread spectrum

Equipment Type	Transceiver
Frequency of Operation	2402.5 MHz to 2476.5 MHz
Type of Modulation	FSK
Antenna Type / Antenna Gain ^{a)}	Whip antenna / 0 dBi (ANT-2G4S3) Sleeve antenna / 2 dBi (ANT-2G4S2) *1) Waterproof swivel type / 2 dBi (ANT-2400-SFW) *2) PCB antenna / 2.5 +/- 1 dBi (W5I-BO-07)

*1) The only difference between ANT-2G4S2-L and ANT-2G4S2 is the antenna shape. The tests were performed only using ANT-2G4S2 as a representative of the antennas.

*2) The only difference between ANT-2400-SFW and ANT-2G4W1R-R is whether it is waterproof or not. The tests were performed only using ANT-2400-SFW as a representative of the antennas.

SECTION 3: Test Specification, Procedures & Results

3.1 Test Specification

Test Specification	FCC Part 15 Subpart C The latest version on the first day of the testing period
Title	FCC 47 CFR Part 15 Radio Frequency Device Subpart C Intentional Radiators Section 15.207 Conducted limits Section 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
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	21.7 dB, 0.15000 MHz, N	Complied	-
6dB Bandwidth	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section 15.247(a)(2) ISED: RSS-247 5.2(a)	See data.	Complied	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: RSS-Gen 6.12	FCC: Section 15.247(b)(3) ISED: RSS-247 5.4(d)		Complied	Conducted
Power Density	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: -	FCC: Section 15.247(e) ISED: RSS-247 5.2(b)		Complied	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 15.247 Meas Guidance v05r02 ISED: RSS-Gen 6.13	FCC: Section 15.247(d) ISED: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	2.0 dB 4953.00 MHz, AV, Horizontal	Complied	Conducted (below 30 MHz)/ 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) 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.

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 15.203/212 Antenna requirement

The EUT has a unique coupling/antenna connector (MHF). Therefore the equipment complies with the requirement of 15.203/212.

3.3 Addition to Standard

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
99% Occupied Bandwidth	ISED: RSS-Gen 6.7	ISED: -	N/A	-	Conducted

Other than above, 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 $k = 2$.

Conducted emission

Frequency range	Uncertainty (+/-)
0.15 MHz to 30 MHz	3.3 dB

Radiated emission

Measurement distance	Frequency range	Uncertainty (+/-)
3 m	9 kHz to 30 MHz	3.2 dB
	30 MHz to 200 MHz	6.2 dB
	200 MHz to 1000 MHz	6.3 dB
	1 GHz to 6 GHz	4.7 dB
	6 GHz to 18 GHz	5.1 dB
	18 GHz to 40 GHz	5.5 dB
1 m	1 GHz to 18 GHz	5.2 dB
	18 GHz to 40 GHz	5.6 dB
0.5 m	26.5 GHz to 40 GHz	5.8 dB

Antenna Terminal test

Test Item	Uncertainty (+/-)
6 dB Bandwidth / 99 % Occupied Bandwidth	1.2 %
Maximum Output Power	0.58 dB
Burst Rate	0.20 %
Power Density	2.0 dB
Conducted Spurious Emission (9 kHz to 30 MHz)	2.2 dB

3.5 Test Location

UL Japan, Inc. Kashima EMC Lab.

1614 Mushihata, Katori-shi, Chiba-ken, 289-0341 Japan

Telephone: +81-478-88-6500

A2LA Certificate Number: 1266.01 / FCC Test Firm Registration Number: 910230

ISED Lab Company Number: 4659A / CAB identifier: JP0006

Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Open site	6.0 x 5.5 x 2.5	20 x 40	10 m
No.5 Open site	8.6 x 7.1 x 2.4	18 x 23	10 m
No.1 Shielded room	5.4 x 4.5 x 2.3	-	-
No.5 Shielded Room	4.2 x 3.1 x 2.5	-	-
No.9 Shielded Room	6.1 x 3.6 x 2.8	-	-
No.6 Semi-anechoic Chamber	8.5 x 5.5 x 5.2	-	3 m
No.10 Semi-anechoic Chamber	18.4 x 9.9 x 7.7	-	10 m
No.11 Semi-anechoic Chamber	9.0 x 6.5 x 5.2	-	3 m
No.1 Measurement room	5.0 x 3.7 x 2.6	-	-
No.2 Measurement room	4.3 x 4.4 x 2.7	-	-

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*
Tx	Antenna Type 1. ANT-2G4S3 2. ANT-2G4S2 3. ANT-2400-SFW: ANT-2400-SFW + Connection Cable(CBL-RPSMARD-MH) 4. W5I-BO-07
*Power of the EUT was set by the software as follows; Power Setting: Fixed Software: STD 504 Version: V1 (Date: 2024.1.18, Storage location: EUT memory) *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.	

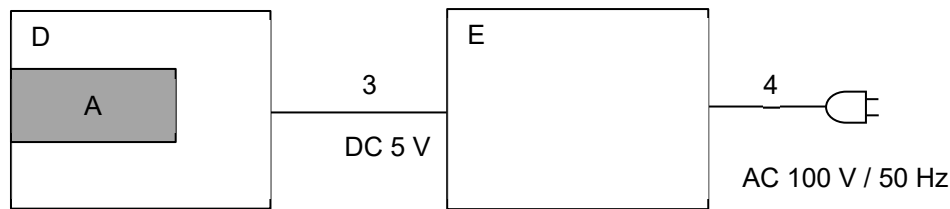
*The Details of Operating Mode(s)

Test Item	Operating Mode	Tested Antenna Port	Tested Frequency
Conducted Emission, Radiated Spurious Emission (Below 1 GHz)	Tx	TRX1 *2)	2402.5 MHz *1)
Radiated Spurious Emission (Above 1 GHz)	Tx	TRX1 *2)	2402.5 MHz 2439.5 MHz 2471.5 MHz *3) 2476.5 MHz
Maximum Peak Output Power, Power Density, 6dB Bandwidth, 99% Occupied Bandwidth	Tx	TRX1, TRX2	2402.5 MHz 2439.5 MHz 2471.5 MHz 2476.5 MHz
Conducted Spurious Emission	Tx	TRX1	2402.5 MHz *1)
		TRX2	2439.5 MHz *1)
*1) Conducted emissions, Radiated Spurious emissions for frequencies below 1 GHz, and Conducted Spurious Emission were limited to the channel that had the highest power during the antenna terminal test, as preliminary testing indicated that changing the operating frequency had no significant impact on the emissions in those frequency bands. *2) The test was performed with the antenna that had higher power as a representative. *3) Band Edge Only			

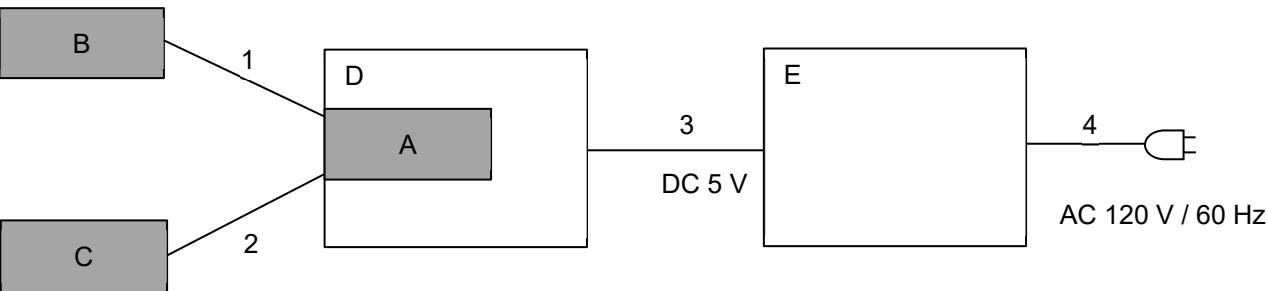
* TRX1 antenna port and TRX2 antenna port do not transmit simultaneously.

4.2 Configuration and Peripherals

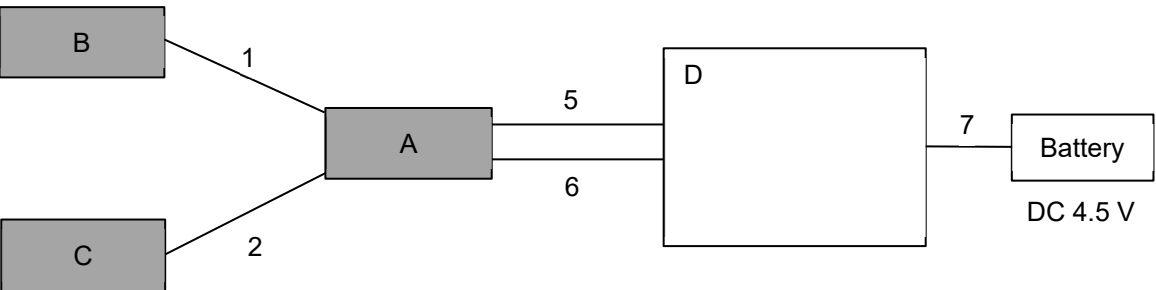
Antenna Terminal Conducted Tests



Conducted Emission Test



Radiated Spurious Emission Tests



* 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	2.4 GHz DSSS low power radio transceiver	STD-504	2	Circuit Design, Inc.	EUT
B-1	Whip antenna	ANT-2G4S3	-	Circuit Design, Inc.	EUT
B-2	Sleeve antenna	ANT-2G4S2	-	Circuit Design, Inc.	EUT
B-3	Whip antenna swivel type	ANT-2400-SFW	-	Circuit Design, Inc.	EUT
B-4	PCB antenna	W5I-BO-07	-	Circuit Design, Inc.	EUT
C-1	Whip antenna	ANT-2G4S3	-	Circuit Design, Inc.	EUT
C-2	Sleeve antenna	ANT-2G4S2	-	Circuit Design, Inc.	EUT
C-3	Whip antenna swivel type	ANT-2400-SFW	-	Circuit Design, Inc.	EUT
C-4	PCB antenna	W5I-BO-07	-	Circuit Design, Inc.	EUT
D	Jig	TB-STD504	-	Circuit Design, Inc.	-
E	DC Power Supply	GSV3000	1708192900	DIAMOND ANTENNA	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	Antenna Cable	0.03	Shielded	Shielded	ANT-2G4S3
		0.10	Shielded	Shielded	ANT-2G4S2
		0.15	Shielded	Shielded	ANT-2400-SFW + CBL-RPSMARD-MH
		0.12	Shielded	Shielded	W5I-BO-07
2	Antenna Cable	0.03	Shielded	Shielded	ANT-2G4S3
		0.10	Shielded	Shielded	ANT-2G4S2
		0.15	Shielded	Shielded	ANT-2400-SFW + CBL-RPSMARD-MH
		0.12	Shielded	Shielded	W5I-BO-07
3	DC Cable	1.0	Unshielded	Unshielded	-
4	AC Cable	1.7	Unshielded	Unshielded	-
5	Extension Cable	0.35	Unshielded	Unshielded	-
6	Extension Cable	0.35	Unshielded	Unshielded	-
7	DC Cable	0.12	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and Conditions

EUT was placed on a wooden table of nominal size, 1.0 m by 2.0 m, raised 0.8 m above the conducting ground plane.

The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals was aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

For the tests on EUT itself (as a standalone equipment)

Each EUT current-carrying power lead, except the ground (safety) lead, was individually connected through a LISN / (AMN) to the input power source.

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

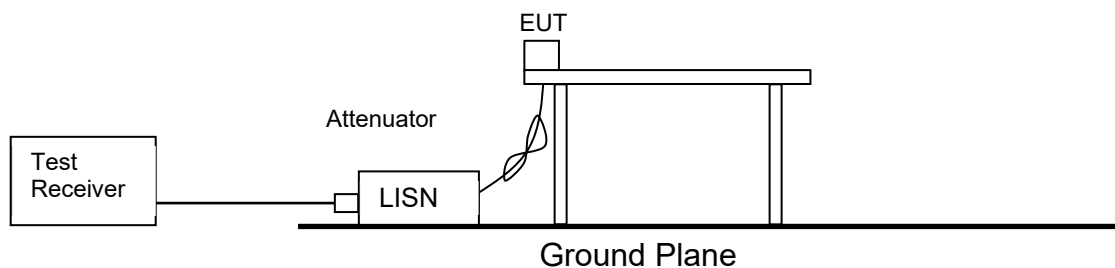
The EUT was connected to a LISN (AMN).

An overview sweep with peak detection has been performed.

Test results are rounded off and limit are rounded down, so some differences might be observed.

Detector	: QP and CISPR AV
Measurement Range	: 0.15 MHz to 30 MHz
Test Data	: APPENDIX
Test Result	: Pass

Figure 1: Test Setup



SECTION 6: Radiated Spurious Emission

Test Procedure

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

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 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. 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 1 GHz	Above 1 GHz
Antenna Type	Hybrid	Horn

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

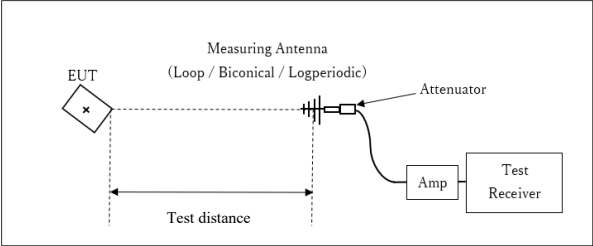
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(ISED) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (ISED).

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument Used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	11.12.2.5.1 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces	RBW: 100 kHz VBW: 300 kHz

Figure 2: Test Setup

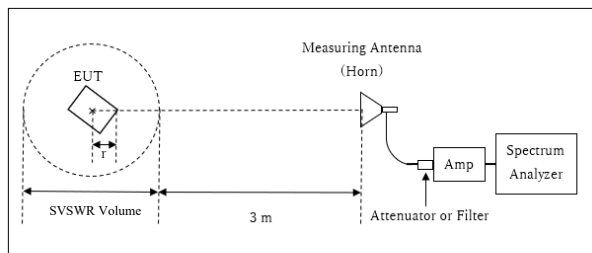
Below 1 GHz

Test Distance: 3 m



x : Center of turn table

1 GHz to 10 GHz



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

(ANT-2G4S3)

Distance Factor: $20 \times \log (3.96 \text{ m} / 3.0 \text{ m}) = 2.4 \text{ dB}$

* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.96 \text{ m}$

SVSWR Volume : 2.0 m

(SVSWR Volume has been calibrated based on CISPR 16-1-4.)

r = 0.04 m

(ANT-2G4S2)

Distance Factor: $20 \times \log (3.9 \text{ m} / 3.0 \text{ m}) = 2.28 \text{ dB}$

* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.9 \text{ m}$

SVSWR Volume : 2.0 m

(SVSWR Volume has been calibrated based on CISPR 16-1-4.)

r = 0.1 m

(ANT-2400-SFW)

Distance Factor: $20 \times \log (3.86 \text{ m} / 3.0 \text{ m}) = 2.19 \text{ dB}$

* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.86 \text{ m}$

SVSWR Volume : 2.0 m

(SVSWR Volume has been calibrated based on CISPR 16-1-4.)

r = 0.14 m

(W5I-BO-07)

Distance Factor: $20 \times \log (3.89 \text{ m} / 3.0 \text{ m}) = 2.26 \text{ dB}$

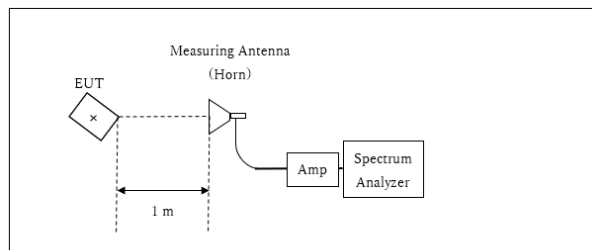
* Test Distance: $(3 + \text{SVSWR Volume} / 2) - r = 3.89 \text{ m}$

SVSWR Volume : 2.0 m

(SVSWR Volume has been calibrated based on CISPR 16-1-4.)

r = 0.11 m

10 GHz to 26.5 GHz



× : Center of turn table

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

* Test Distance: 1 m

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

Antenna: ANT-2G4S3

		Carrier	30 MHz - 1 GHz	1 GHz - 2.8 GHz	2.8 GHz -10 GHz	10 GHz - 18 GHz	18 GHz - 26.5 GHz
Module	Hor.	X	Y	X	Y	Z	X
	Ver.	Y	Y	Y	Z	Z	Y
Antenna	Hor.	Y	X	Y	Y	X	Y
	Ver.	Y	X	Y	Y	X	Y

Antenna: ANT-2G4S2

		Carrier	30 MHz - 1 GHz	1 GHz - 2.8 GHz	2.8 GHz -10 GHz	10 GHz - 18 GHz	18 GHz - 26.5 GHz
Module	Hor.	Z	X	Z	Z	Z	Z
	Ver.	Z	Z	Z	Z	Z	Z
Antenna	Hor.	X	X	X	X	X	X
	Ver.	Y	X	Y	Y	Y	Y

Antenna: ANT-2400-SFW

		Carrier	30 MHz - 1 GHz	1 GHz - 2.8 GHz	2.8 GHz -10 GHz	10 GHz - 18 GHz	18 GHz - 26.5 GHz
Module	Hor.	Z	X	Z	Z	Z	Z
	Ver.	Z	Z	Z	Z	Z	Z
Antenna	Hor.	X	X	X	X	X	X
	Ver.	Y	X	Y	Y	X	Y

Antenna: W5I-B0-07

		Carrier	30 MHz - 1 GHz	1 GHz - 2.8 GHz	2.8 GHz -10 GHz	10 GHz - 18 GHz	18 GHz - 26.5 GHz
Module	Hor.	Z	X	Z	Z	Z	Z
	Ver.	Z	Z	Z	Z	Z	Z
Antenna	Hor.	X	X	X	X	X	X
	Ver.	Y	X	Y	Y	X	Y

Test results are rounded off and limit are rounded down, so some differences might be observed.

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

SECTION 7: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument Used
6dB Bandwidth	2 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *2)	-	Power Meter (Sensor: 160 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	9.1 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4) *5)	9 kHz to 150 kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150 kHz to 30 MHz	10 kHz	30 kHz				

*1) Peak hold was applied as Worst-case measurement.

*2) Reference data

*3) Section 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013".

*4) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents.
Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.
(9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 10 kHz)

*5) The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377 Ohms. For example, the measurement at frequency 9 kHz resulted in a level of 45.5 dBuV/m, which is equivalent to $45.5 - 51.5 = -6.0$ dBuA/m, which has the same margin, 3 dB, to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

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

Test Data : APPENDIX
Test Result : Pass

APPENDIX 1: Test Data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

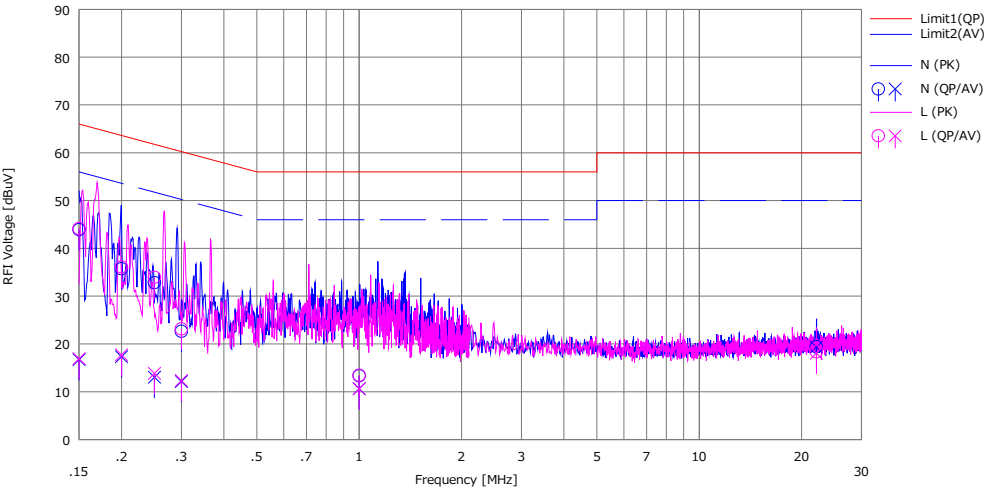
UL Japan, Inc. Kashima EMC Lab. No.5 Shielded Room
Date : 2024/03/21

Company : Circuit Design, Inc.
Kind of EUT : 2.4 GHz DSSS low power radio transceiver
Model No. : STD-504
Serial No. : 2
Remarks : ANT-2G4S3

Mode : Transmitting mode 2402.5 MHz
Order No. : 14908125
Power : DC 5 V (AC 120 V / 60 Hz)
Temp./Humi. : 20 deg.C / 42 %RH

Limit : FCC_Part 15 Subpart C(15.207)

Tested by : Kazuhiro Ando



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15000	33.80	6.60	10.12	43.92	16.72	66.00	56.00	22.0	39.2	N	
2	0.20000	25.60	7.20	10.13	35.73	17.33	63.61	53.61	27.8	36.2	N	
3	0.25000	22.70	2.90	10.14	32.84	13.04	61.76	51.76	28.9	38.7	N	
4	0.30000	12.50	2.00	10.14	22.64	12.14	60.24	50.24	37.6	38.1	N	
5	1.00000	3.10	0.40	10.23	13.33	10.63	56.00	46.00	42.6	35.3	N	
6	22.12000	7.80	7.70	11.63	19.43	19.33	60.00	50.00	40.5	30.6	N	
7	0.15000	34.00	6.80	10.12	44.12	16.92	66.00	56.00	21.8	39.0	L	
8	0.20000	26.00	7.60	10.13	36.13	17.73	63.61	53.61	27.4	35.8	L	
9	0.25000	13.80	3.70	10.14	33.94	13.84	61.76	51.76	27.8	37.9	L	
10	0.30000	13.00	2.20	10.14	23.14	12.34	60.24	50.24	37.1	37.9	L	
11	1.00000	3.20	0.40	10.24	13.44	10.64	56.00	46.00	42.5	35.3	L	
12	22.12000	6.50	6.20	11.85	18.35	18.05	60.00	50.00	41.6	31.9	L	

Calculation:Result[dBuV]=Reading[dBuV]+C.Fac(AMN+Cable)[dB]
AMN:143508

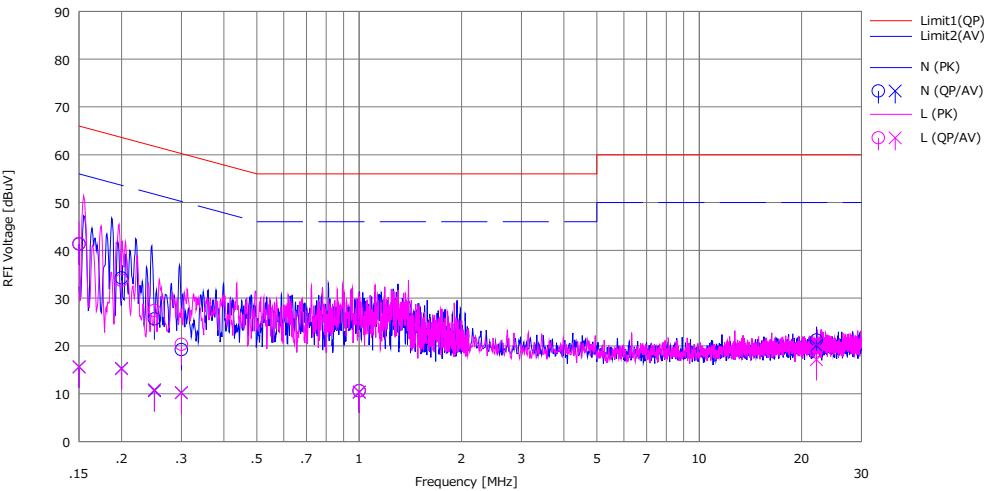
Conducted Emission

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Kashima EMC Lab. No.5 Shielded Room
Date : 2024/01/28

Company : Circuit Design, Inc. Mode : Transmitting mode 2402.5 MHz
Kind of EUT : 2.4 GHz DSSS low power radio transceiver Order No. : 14908125
Model No. : STD-504 Power : DC 5 V (AC 120 V / 60 Hz)
Serial No. : 2 Temp./Humi. : 21 deg.C / 40 %RH
Remarks : ANT-2G4S2

Limit : FCC_Part 15 Subpart C(15.207) Tested by : Kazuhiro Ando



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		[dBuV]	[dBuV]		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	31.20	5.50	10.12	41.32	15.62	66.00	56.00	24.6	40.3	N	
2	0.20000	24.10	5.20	10.13	34.23	15.33	63.61	53.61	29.3	38.2	N	
3	0.25000	15.50	0.50	10.14	25.64	10.64	61.76	51.76	36.1	41.1	N	
4	0.30000	9.10	0.10	10.14	19.24	10.24	60.24	50.24	41.0	40.0	N	
5	1.00000	0.40	0.10	10.23	10.63	10.33	56.00	46.00	45.3	35.6	N	
6	22.12000	9.60	8.50	11.63	21.23	20.13	60.00	50.00	38.7	29.8	N	
7	0.15000	31.30	5.50	10.12	41.42	15.62	66.00	56.00	24.5	40.3	L	
8	0.20000	23.60	5.10	10.13	33.73	15.23	63.61	53.61	29.8	38.3	L	
9	0.25000	17.30	0.70	10.14	27.44	10.84	61.76	51.76	34.3	40.9	L	
10	0.30000	10.20	0.10	10.14	20.34	10.24	60.24	50.24	39.9	40.0	L	
11	1.00000	0.40	0.10	10.24	10.64	10.34	56.00	46.00	45.3	35.6	L	
12	22.12000	7.10	5.30	11.85	18.95	17.15	60.00	50.00	41.0	32.8	L	

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac(LISN+Cable)[dB]
LISN: 143505

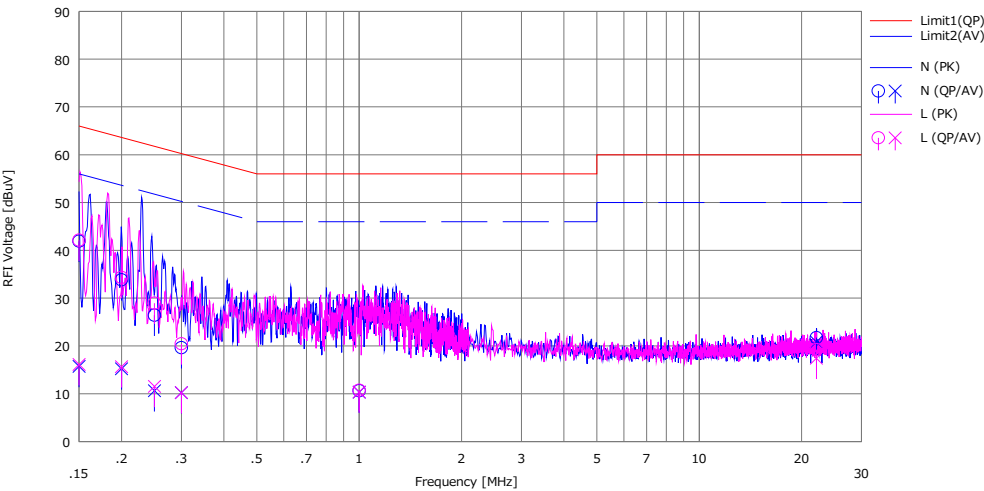
Conducted Emission

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Kashima EMC Lab. No.5 Shielded Room
Date : 2024/01/28

Company : Circuit Design, Inc. Mode : Transmitting mode 2402.5 MHz
Kind of EUT : 2.4 GHz DSSS low power radio transceiver Order No. : 14908125
Model No. : STD-504 Power : DC 5 V (AC 120 V / 60 Hz)
Serial No. : 2 Temp./Humi. : 21 deg.C / 40 %RH
Remarks : ANT-2400-SFW

Limit : FCC_Part 15 Subpart C(15.207) Tested by : Kazuhiro Ando



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		[dBuV]	[dBuV]		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	31.80	5.60	10.12	41.92	15.72	66.00	56.00	24.0	40.2	N	
2	0.20000	23.70	5.10	10.13	33.83	15.23	63.61	53.61	29.7	38.3	N	
3	0.25000	16.30	0.50	10.14	26.44	10.64	61.76	51.76	35.3	41.1	N	
4	0.30000	9.50	0.10	10.14	19.64	10.24	60.24	50.24	40.6	40.0	N	
5	1.00000	0.40	0.10	10.23	10.63	10.33	56.00	46.00	45.3	35.6	N	
6	22.12000	10.10	9.20	11.63	21.73	20.83	60.00	50.00	38.2	29.1	N	
7	0.15000	32.00	6.00	10.12	42.12	16.12	66.00	56.00	23.8	39.8	L	
8	0.20000	24.20	5.50	10.13	34.33	15.63	63.61	53.61	29.2	37.9	L	
9	0.25000	18.80	1.40	10.14	28.94	11.54	61.76	51.76	32.8	40.2	L	
10	0.30000	10.30	0.10	10.14	20.44	10.24	60.24	50.24	39.8	40.0	L	
11	1.00000	0.50	0.10	10.24	10.74	10.34	56.00	46.00	45.2	35.6	L	
12	22.12000	7.40	5.60	11.85	19.25	17.45	60.00	50.00	40.7	32.5	L	

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac(LISN+Cable)[dB]
LISN: 143505

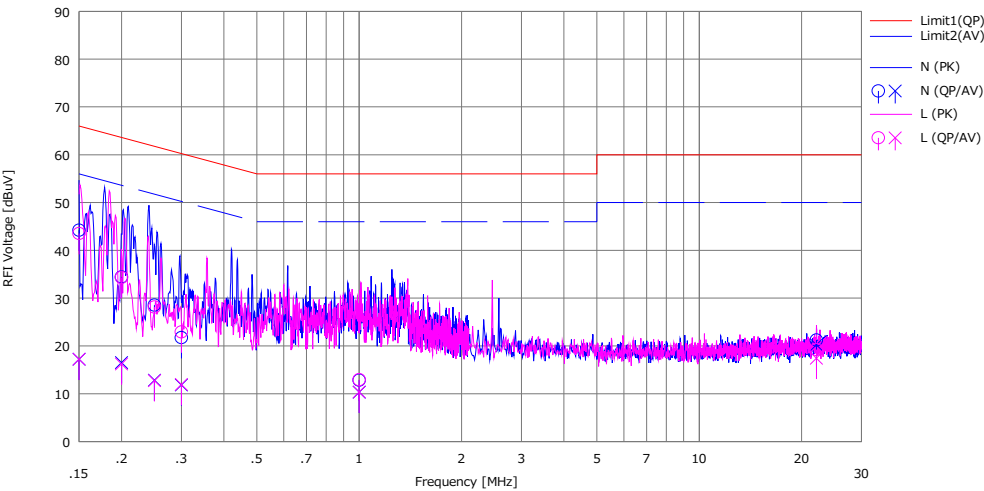
Conducted Emission

DATA OF CONDUCTED EMISSION TEST

UL Japan, Inc. Kashima EMC Lab. No.5 Shielded Room
Date : 2024/01/28

Company : Circuit Design, Inc. Mode : Transmitting mode 2402.5 MHz
Kind of EUT : 2.4 GHz DSSS low power radio transceiver Order No. : 14908125
Model No. : STD-504 Power : DC 5 V (AC 120 V / 60 Hz)
Serial No. : 2 Temp./Humi. : 21 deg.C / 40 %RH
Remarks : W5I-BO-07

Limit : FCC_Part 15 Subpart C(15.207) Tested by : Kazuhiro Ando



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		[dBuV]	[dBuV]		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]		
1	0.15000	34.10	7.10	10.12	44.22	17.22	66.00	56.00	21.7	38.7	N	
2	0.20000	24.30	6.40	10.13	34.43	16.53	63.61	53.61	29.1	37.0	N	
3	0.25000	18.40	2.70	10.14	28.54	12.84	61.76	51.76	33.2	38.9	N	
4	0.30000	11.60	1.70	10.14	21.74	11.84	60.24	50.24	38.5	38.4	N	
5	1.00000	2.60	0.10	10.23	12.83	10.33	56.00	46.00	43.1	35.6	N	
6	22.12000	9.60	8.60	11.63	21.23	20.23	60.00	50.00	38.7	29.7	N	
7	0.15000	33.40	7.10	10.12	43.52	17.22	66.00	56.00	22.4	38.7	L	
8	0.20000	24.20	6.10	10.13	34.33	16.23	63.61	53.61	29.2	37.3	L	
9	0.25000	18.00	2.60	10.14	28.14	12.74	61.76	51.76	33.6	39.0	L	
10	0.30000	12.80	1.80	10.14	22.94	11.94	60.24	50.24	37.3	38.3	L	
11	1.00000	2.70	0.10	10.24	12.94	10.34	56.00	46.00	43.0	35.6	L	
12	22.12000	7.40	5.60	11.85	19.25	17.45	60.00	50.00	40.7	32.5	L	

Calculation: Result[dBuV]=Reading[dBuV]+C.Fac(LISN+Cable)[dB]
LISN: 143505

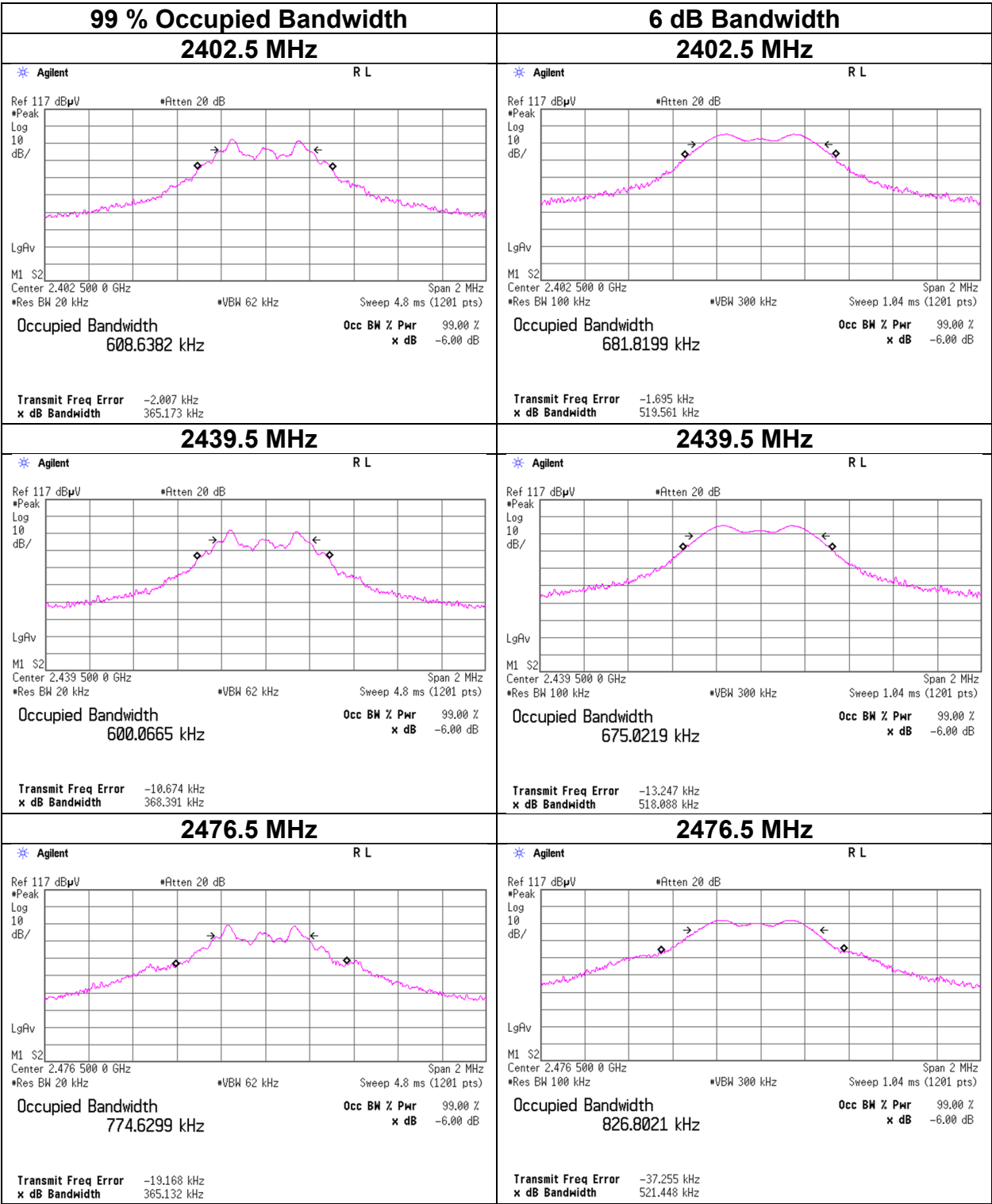
99 % Occupied Bandwidth and 6 dB Bandwidth

Test place Kashima EMC Lab. No.2 Measurement Room
Date January 31, 2024
Temperature / Humidity 20 deg. C / 48 % RH
Engineer Kazuhiro Ando
Mode Tx

Antenna	Frequency [MHz]	99% Occupied Bandwidth [kHz]	6dB Bandwidth [MHz]	Limit for 6dB Bandwidth [MHz]
TRX1	2402.5	608.6	0.520	> 0.5000
	2439.5	600.1	0.518	> 0.5000
	2471.5	608.8	0.520	> 0.5000
	2476.5	774.6	0.521	> 0.5000
TRX2	2402.5	596.5	0.513	> 0.5000
	2439.5	601.0	0.510	> 0.5000
	2471.5	594.0	0.506	> 0.5000
	2476.5	752.1	0.515	> 0.5000

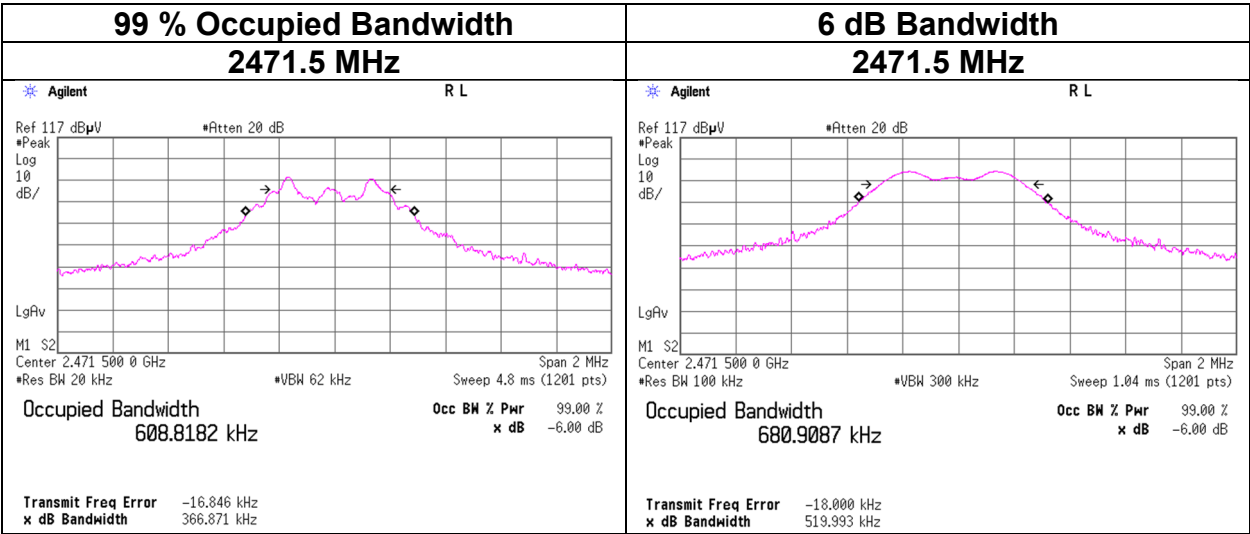
99 % Occupied Bandwidth and 6 dB Bandwidth

TRX1



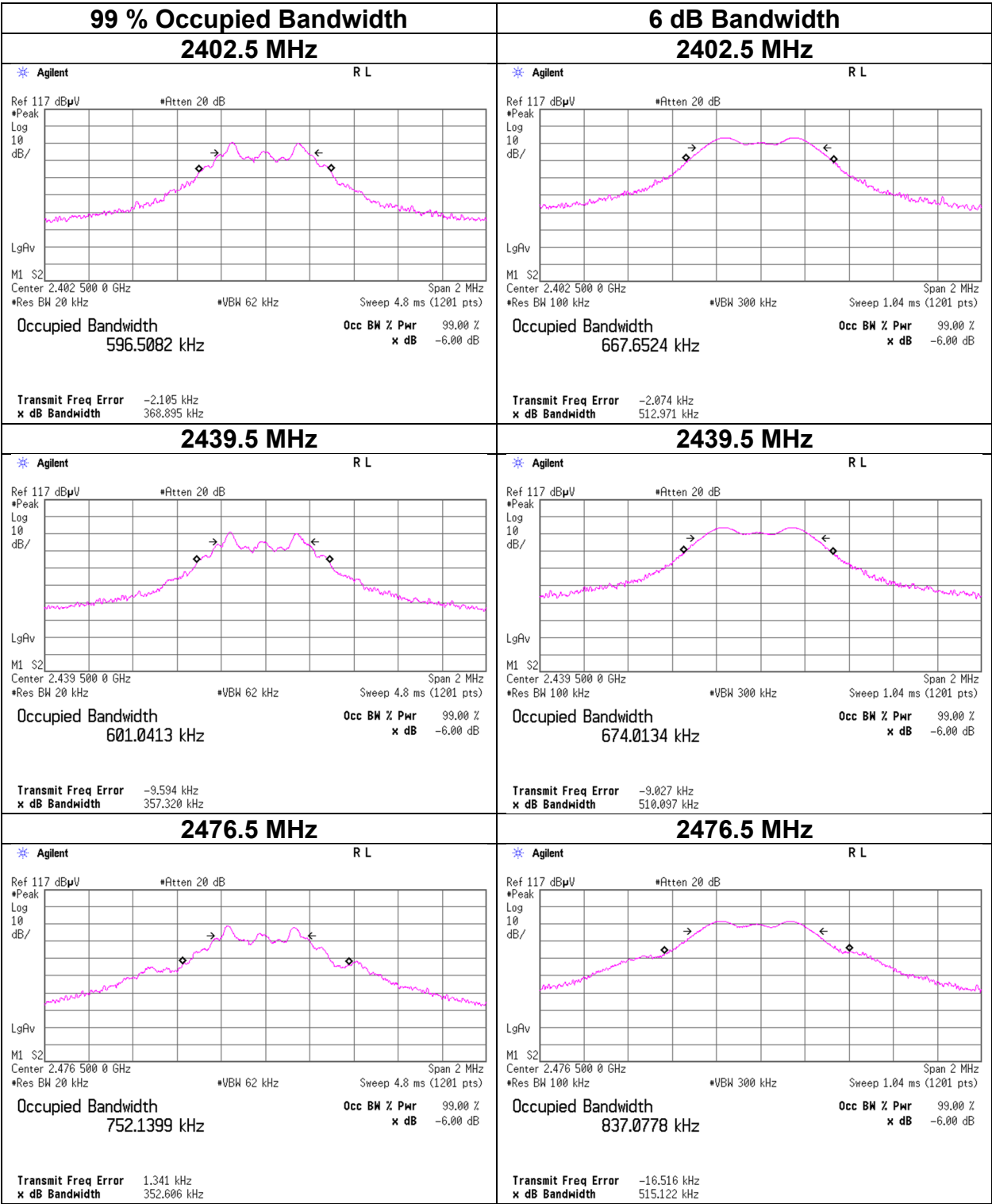
99 % Occupied Bandwidth and 6 dB Bandwidth

TRX1



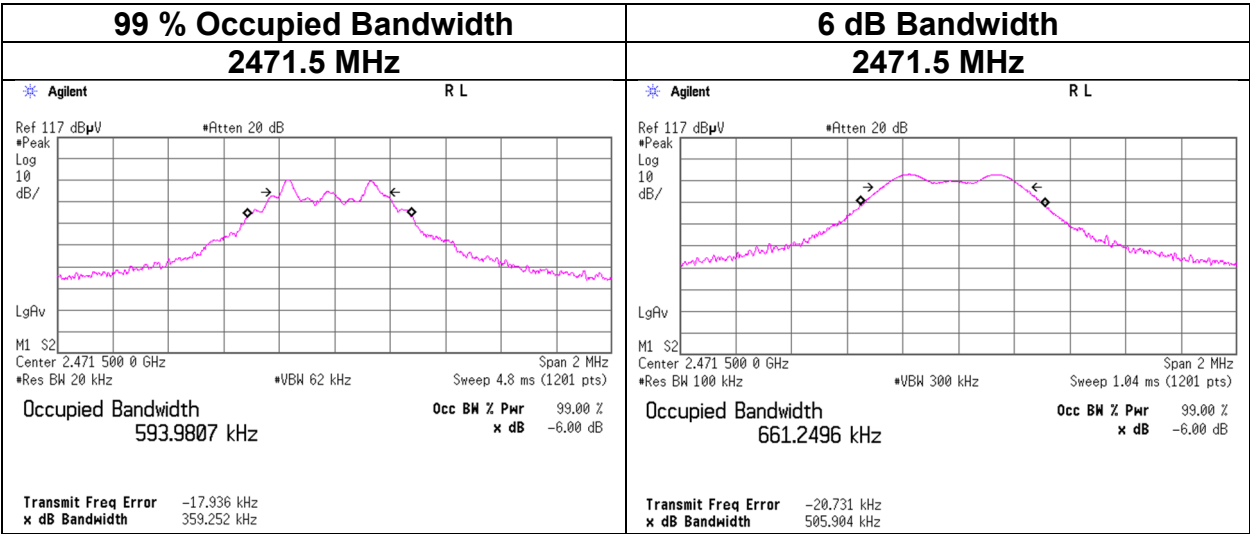
99 % Occupied Bandwidth and 6 dB Bandwidth

TRX2



99 % Occupied Bandwidth and 6 dB Bandwidth

TRX2



Maximum Peak Output Power

Test place Kashima EMC Lab. No.2 Measurement Room
Date January 24, 2024
Temperature / Humidity 20 deg. C / 40 % RH
Engineer Kazuhiro Ando
Mode Tx

TRX1				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2402.5	-4.53	0.91	10.05	6.43	4.40	30.00	1000	23.57	3.5	9.93	9.84	36.02	4000	26.09
2439.5	-5.02	0.92	10.05	5.95	3.94	30.00	1000	24.05	3.5	9.45	8.81	36.02	4000	26.57
2471.5	-5.57	0.92	10.05	5.40	3.47	30.00	1000	24.60	3.5	8.90	7.76	36.02	4000	27.12
2476.5	-7.56	0.92	10.05	3.41	2.19	30.00	1000	26.59	3.5	6.91	4.91	36.02	4000	29.11

TRX2				Conducted Power					e.i.r.p. for RSS-247					
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin	Antenna Gain	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2402.5	-6.21	0.91	10.05	4.75	2.99	30.00	1000	25.25	3.5	8.25	6.68	36.02	4000	27.77
2439.5	-5.96	0.92	10.05	5.01	3.17	30.00	1000	24.99	3.5	8.51	7.10	36.02	4000	27.51
2471.5	-6.61	0.92	10.05	4.36	2.73	30.00	1000	25.64	3.5	7.86	6.11	36.02	4000	28.16
2476.5	-7.79	0.92	10.05	3.18	2.08	30.00	1000	26.82	3.5	6.68	4.66	36.02	4000	29.34

Sample Calculation:

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

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

Average Output Power (Reference data for RF Exposure)

Test place	Kashima EMC Lab. No.2 Measurement Room
Date	January 24, 2024
Temperature / Humidity	20 deg. C / 40 % RH
Engineer	Kazuhiro Ando
Mode	Tx

TRX1

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2402.5	-4.66	0.91	10.05	6.30	4.27	0.00	6.30	4.27
2439.5	-5.17	0.92	10.05	5.80	3.80	0.00	5.80	3.80
2471.5	-5.74	0.92	10.05	5.23	3.33	0.00	5.23	3.33
2476.5	-7.82	0.92	10.05	3.15	2.07	0.00	3.15	2.07

TRX2

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2402.5	-6.39	0.91	10.05	4.57	2.86	0.00	4.57	2.86
2439.5	-6.15	0.92	10.05	4.82	3.03	0.00	4.82	3.03
2471.5	-6.82	0.92	10.05	4.15	2.60	0.00	4.15	2.60
2476.5	-8.09	0.92	10.05	2.88	1.94	0.00	2.88	1.94

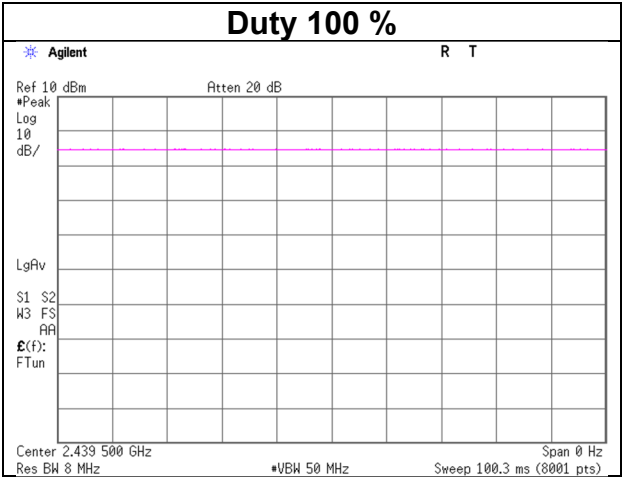
Sample Calculation:

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

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

Burst rate confirmation

Test place Kashima EMC Lab. No.2 Measurement Room
Date January 31, 2024
Temperature / Humidity 20 deg. C / 48 % RH
Engineer Kazuhiro Ando
Mode Tx



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

Radiated Spurious Emission

Test place	Kashima EMC Lab.				
Semi Anechoic Chamber	No.11	No.11	No.11	No.11	No.11
Date	March 13, 2024	March 11, 2024	March 8, 2024	March 11, 2024	March 13, 2024
Temperature / Humidity	20 deg. C / 38 % RH	21 deg. C / 40 % RH	23 deg. C / 38 % RH	21 deg. C / 40 % RH	20 deg. C / 38 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(30 MHz to 1 GHz)	(1 GHz to 2.8 GHz)	(2.8 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx 2402.5 MHz, ANT-2G4S3				

(* 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.	133.192	QP	33.80	12.70	6.64	32.09	0.00	21.05	43.5	22.4	225	113	
Hori.	153.616	QP	28.10	13.60	6.78	32.08	0.00	16.40	43.5	27.1	196	117	
Hori.	182.000	QP	35.20	11.51	6.96	32.05	0.00	21.62	43.5	21.8	189	115	
Hori.	199.081	QP	34.80	10.01	7.06	32.03	0.00	19.84	43.5	23.6	131	129	
Hori.	208.000	QP	34.90	9.86	7.12	32.02	0.00	19.86	43.5	23.6	166	128	
Hori.	2246.500	PK	56.50	27.69	13.41	46.32	2.41	53.69	73.9	20.2	160	90	
Hori.	2325.000	PK	57.74	27.54	13.48	46.29	2.41	54.88	73.9	19.0	160	90	
Hori.	2390.000	PK	55.76	27.46	13.52	46.26	2.41	52.89	73.9	21.0	100	90	
Hori.	4805.000	PK	57.52	32.57	5.63	45.77	2.41	52.36	73.9	21.5	100	228	
Hori.	7207.500	PK	51.01	37.05	6.98	44.83	2.41	52.62	73.9	21.2	237	310	
Hori.	14415.000	PK	50.10	40.40	9.88	43.03	-9.54	47.81	73.9	26.0	148	224	
Hori.	2246.500	AV	50.09	27.69	13.41	46.32	2.41	47.28	53.9	6.6	160	90	
Hori.	2325.000	AV	48.67	27.54	13.48	46.29	2.41	45.81	53.9	8.0	160	90	
Hori.	2390.000	AV	47.99	27.46	13.52	46.26	2.41	45.12	53.9	8.7	100	90	
Hori.	4805.000	AV	51.74	32.57	5.63	45.77	2.41	46.58	53.9	7.3	100	228	
Hori.	7207.500	AV	43.33	37.05	6.98	44.83	2.41	44.94	53.9	8.9	237	310	
Hori.	14415.000	AV	41.63	40.40	9.88	43.03	-9.54	39.34	53.9	14.5	148	224	
Vert.	132.951	QP	27.30	12.67	6.64	32.09	0.00	14.52	43.5	28.9	100	26	
Vert.	153.616	QP	23.50	13.60	6.78	32.08	0.00	11.80	43.5	31.7	100	0	
Vert.	182.000	QP	26.90	11.51	6.96	32.05	0.00	13.32	43.5	30.1	100	0	
Vert.	2246.500	PK	54.70	27.69	13.41	46.32	2.41	51.89	73.9	22.0	168	13	
Vert.	2325.000	PK	55.99	27.54	13.48	46.29	2.41	53.13	73.9	20.7	160	31	
Vert.	2390.000	PK	54.63	27.46	13.52	46.26	2.41	51.76	73.9	22.1	134	39	
Vert.	4805.000	PK	57.35	32.57	5.63	45.77	2.41	52.19	73.9	21.7	379	191	
Vert.	7207.500	PK	50.82	37.05	6.98	44.83	2.41	52.43	73.9	21.4	170	0	
Vert.	14415.000	PK	50.34	40.40	9.88	43.03	-9.54	48.05	73.9	25.8	133	0	
Vert.	2246.500	AV	47.76	27.69	13.41	46.32	2.41	44.95	53.9	8.9	168	13	
Vert.	2325.000	AV	47.08	27.54	13.48	46.29	2.41	44.22	53.9	9.6	160	31	
Vert.	2390.000	AV	45.93	27.46	13.52	46.26	2.41	43.06	53.9	10.8	134	39	
Vert.	4805.000	AV	51.52	32.57	5.63	45.77	2.41	46.36	53.9	7.5	379	191	
Vert.	7207.500	AV	43.35	37.05	6.98	44.83	2.41	44.96	53.9	8.9	170	0	
Vert.	14415.000	AV	42.35	40.40	9.88	43.03	-9.54	40.06	53.9	13.8	133	0	

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

Distance factor : 1 GHz - 10 GHz : 20log (3.96 m / 3.0 m) = 2.41 dB

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.500	PK	106.96	27.45	13.53	46.25	2.41	104.10	-	-	Carrier
Hori.	2400.000	PK	60.88	27.44	13.53	46.25	2.41	58.01	84.1	26.0	
Vert.	2402.500	PK	105.08	27.45	13.53	46.25	2.41	102.22	-	-	Carrier
Vert.	2400.000	PK	59.52	27.44	13.53	46.25	2.41	56.65	82.2	25.5	

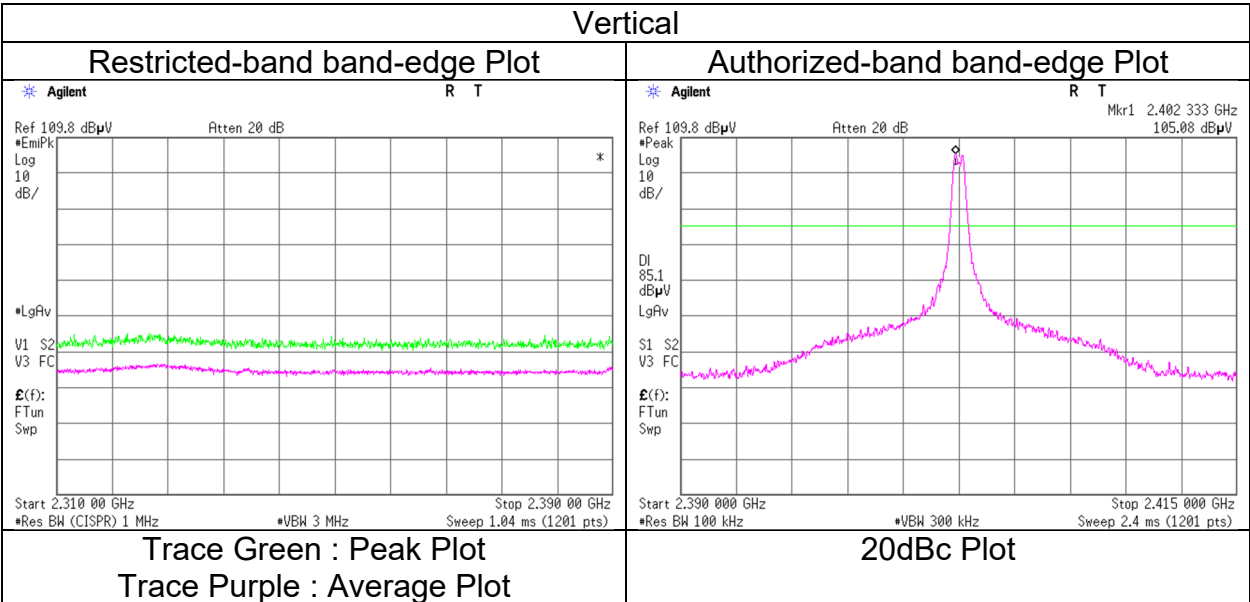
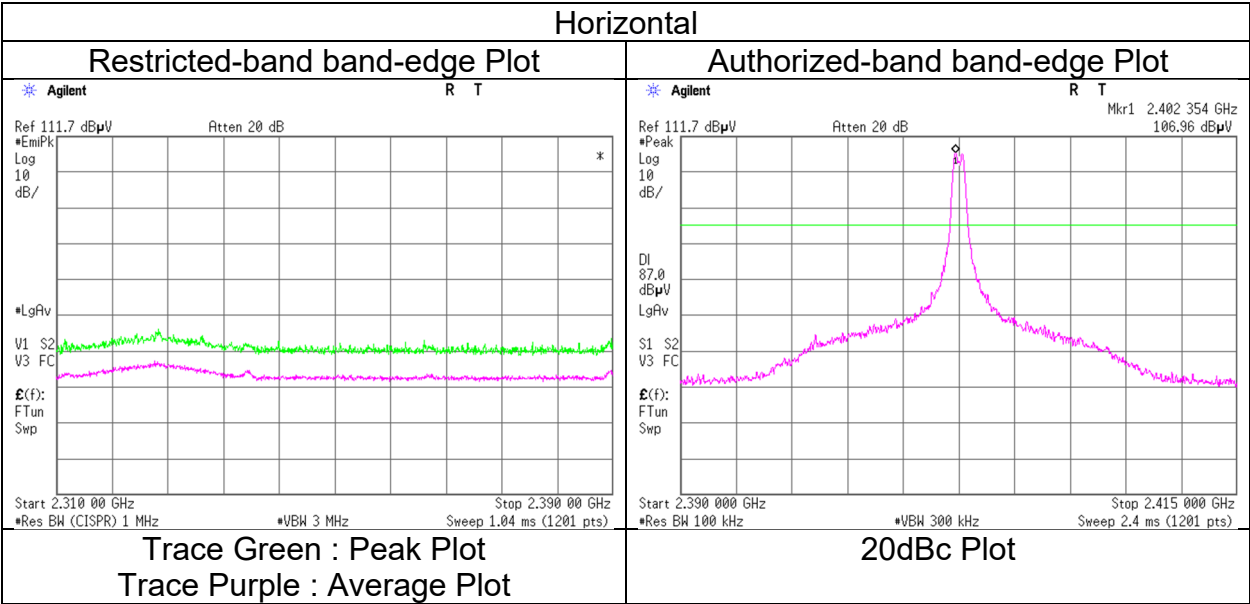
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.96 m / 3.0 m) = 2.41 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	Kashima EMC Lab.
Semi Anechoic Chamber	No.11
Date	March 11, 2024
Temperature / Humidity	21 deg. C / 40 % RH
Engineer	Hiromitsu Tanabe
	(1 GHz to 10 GHz)
Mode	Tx 2402.5 MHz, ANT-2G4S3



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

Radiated Spurious Emission

Test place Kashima EMC Lab.
Semi Anechoic Chamber No.11 No.11 No.11 No.11
Date March 11, 2024 March 8, 2024 March 11, 2024 March 13, 2024
Temperature / Humidity 21 deg. C / 40 % RH 23 deg. C / 38 % RH 21 deg. C / 40 % RH 20 deg. C / 38 % RH
Engineer Hiromitsu Tanabe Hiromitsu Tanabe Hiromitsu Tanabe Hiromitsu Tanabe
 (1 GHz to 2.8 GHz) (2.8 GHz to 10 GHz) (10 GHz to 18 GHz) (18 GHz to 26.5 GHz)
Mode Tx 2439.5 MHz, ANT-2G4S3

(* 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.	2283.500	PK	55.88	27.56	13.44	46.31	2.41	52.98	73.9	20.9	154	87	
Hori.	2361.350	PK	55.52	27.53	13.50	46.27	2.41	52.69	73.9	21.2	156	89	
Hori.	4879.000	PK	58.51	32.58	5.68	45.76	2.41	53.42	73.9	20.4	180	196	
Hori.	7318.500	PK	51.65	37.39	7.01	44.65	2.41	53.81	73.9	20.0	130	329	
Hori.	14637.000	PK	48.27	39.92	9.91	42.61	-9.54	45.95	73.9	27.9	168	190	
Hori.	2283.500	AV	47.68	27.56	13.44	46.31	2.41	44.78	53.9	9.1	154	87	
Hori.	2361.350	AV	46.77	27.53	13.50	46.27	2.41	43.94	53.9	9.9	156	89	
Hori.	4879.000	AV	53.64	32.58	5.68	45.76	2.41	48.55	53.9	5.3	180	196	
Hori.	7318.500	AV	42.71	37.39	7.01	44.65	2.41	44.87	53.9	9.0	130	329	
Hori.	14637.000	AV	39.10	39.92	9.91	42.61	-9.54	36.78	53.9	17.1	168	190	
Vert.	2283.500	PK	54.58	27.56	13.44	46.31	2.41	51.68	73.9	22.2	150	11	
Vert.	2361.350	PK	55.31	27.53	13.50	46.27	2.41	52.48	73.9	21.4	150	33	
Vert.	4879.000	PK	57.32	32.58	5.68	45.76	2.41	52.23	73.9	21.6	351	189	
Vert.	7318.500	PK	50.42	37.39	7.01	44.65	2.41	52.58	73.9	21.3	171	332	
Vert.	14637.000	PK	48.39	39.92	9.91	42.61	-9.54	46.07	73.9	27.8	137	215	
Vert.	2283.500	AV	46.16	27.56	13.44	46.31	2.41	43.26	53.9	10.6	150	11	
Vert.	2361.350	AV	46.26	27.53	13.50	46.27	2.41	43.43	53.9	10.4	150	33	
Vert.	4879.000	AV	52.14	32.58	5.68	45.76	2.41	47.05	53.9	6.8	351	189	
Vert.	7318.500	AV	42.04	37.39	7.01	44.65	2.41	44.20	53.9	9.7	171	332	
Vert.	14637.000	AV	39.53	39.92	9.91	42.61	-9.54	37.21	53.9	16.6	137	215	

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

Distance factor : 1 GHz - 10 GHz : 20log (3.96 m / 3.0 m) = 2.41 dB

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

Radiated Spurious Emission

Test place Kashima EMC Lab.
Semi Anechoic Chamber No.11
Date March 11, 2024
Temperature / Humidity 21 deg. C / 40 % RH
Engineer Hiromitsu Tanabe
 (1 GHz to 2.8 GHz)
Mode Tx 2471.5 MHz, ANT-2G4S3

(* 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	54.17	27.94	13.60	46.16	2.41	51.96	73.9	21.9	253	238	
Hori.	2497.500	PK	54.96	28.05	13.61	46.14	2.41	52.89	73.9	21.0	253	238	
Hori.	2483.500	AV	45.12	27.94	13.60	46.16	2.41	42.91	53.9	10.9	253	238	
Hori.	2497.500	AV	46.86	28.05	13.61	46.14	2.41	44.79	53.9	9.1	253	238	
Vert.	2483.500	PK	54.21	27.94	13.60	46.16	2.41	52.00	73.9	21.9	135	37	
Vert.	2497.500	PK	55.11	28.05	13.61	46.14	2.41	53.04	73.9	20.8	135	37	
Vert.	2483.500	AV	45.24	27.94	13.60	46.16	2.41	43.03	53.9	10.8	135	37	
Vert.	2497.500	AV	46.89	28.05	13.61	46.14	2.41	44.82	53.9	9.0	135	37	

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

Distance factor : 1 GHz - 10 GHz : 20log (3.96 m / 3.0 m) = 2.41 dB

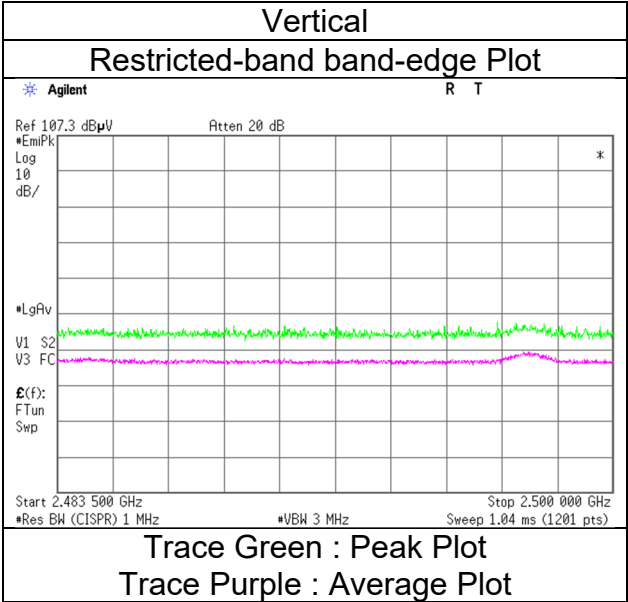
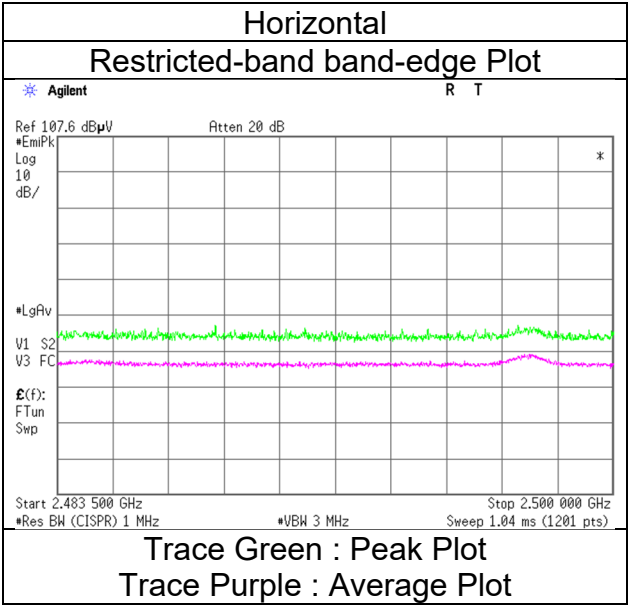
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer

Mode

Kashima EMC Lab.
No.11
March 11, 2024
21 deg. C / 40 % RH
Hiromitsu Tanabe
(1 GHz to 2.8 GHz)
Tx 2471.5 MHz, ANT-2G4S3



* 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	Kashima EMC Lab.			
Semi Anechoic Chamber	No.11	No.11	No.11	No.11
Date	March 11, 2024	March 8, 2024	March 11, 2024	March 13, 2024
Temperature / Humidity	21 deg. C / 40 % RH	23 deg. C / 38 % RH	21 deg. C / 40 % RH	20 deg. C / 38 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz to 2.8 GHz)	(2.8 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx 2476.5 MHz, ANT-2G4S3			

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	57.64	27.94	13.60	46.16	2.41	55.43	73.9	18.4	191	49	
Hori.	2502.500	PK	53.89	28.08	13.61	46.14	2.41	51.85	73.9	22.0	191	49	
Hori.	2554.500	PK	54.03	28.27	13.66	46.05	2.41	52.32	73.9	21.5	191	49	
Hori.	4953.000	PK	60.44	32.76	5.72	45.75	2.41	55.58	73.9	18.3	179	198	
Hori.	7429.500	PK	51.05	37.35	7.05	44.58	2.41	53.28	73.9	20.6	154	308	
Hori.	14859.000	PK	48.20	39.07	9.94	42.69	-9.54	44.98	73.9	28.9	159	203	
Hori.	2483.500	AV	48.35	27.94	13.60	46.16	2.41	46.14	53.9	7.7	191	49	
Hori.	2502.500	AV	45.91	28.08	13.61	46.14	2.41	43.87	53.9	10.0	191	49	
Hori.	2554.500	AV	45.13	28.27	13.66	46.05	2.41	43.42	53.9	10.4	191	49	
Hori.	4953.000	AV	56.70	32.76	5.72	45.75	2.41	51.84	53.9	2.0	179	198	
Hori.	7429.500	AV	42.24	37.35	7.05	44.58	2.41	44.47	53.9	9.4	154	308	
Hori.	14859.000	AV	38.72	39.07	9.94	42.69	-9.54	35.50	53.9	18.4	159	203	
Vert.	2483.500	PK	58.93	27.94	13.60	46.16	2.41	56.72	73.9	17.1	161	44	
Vert.	2502.500	PK	53.92	28.08	13.61	46.14	2.41	51.88	73.9	22.0	150	33	
Vert.	2554.500	PK	53.68	28.27	13.66	46.05	2.41	51.97	73.9	21.9	150	33	
Vert.	4953.000	PK	58.65	32.76	5.72	45.75	2.41	53.79	73.9	20.1	359	191	
Vert.	7429.500	PK	50.35	37.35	7.05	44.58	2.41	52.58	73.9	21.3	150	349	
Vert.	14859.000	PK	47.56	39.07	9.94	42.69	-9.54	44.34	73.9	29.5	152	134	
Vert.	2483.500	AV	47.91	27.94	13.60	46.16	2.41	45.70	53.9	8.2	161	44	
Vert.	2502.500	AV	45.76	28.08	13.61	46.14	2.41	43.72	53.9	10.1	150	33	
Vert.	2554.500	AV	45.19	28.27	13.66	46.05	2.41	43.48	53.9	10.4	150	33	
Vert.	4953.000	AV	54.42	32.76	5.72	45.75	2.41	49.56	53.9	4.3	359	191	
Vert.	7429.500	AV	42.21	37.35	7.05	44.58	2.41	44.44	53.9	9.4	150	349	
Vert.	14859.000	AV	38.96	39.07	9.94	42.69	-9.54	35.74	53.9	18.1	152	134	

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

Distance factor : 1 GHz - 10 GHz : $20\log (3.96 \text{ m} / 3.0 \text{ m}) = 2.41 \text{ dB}$

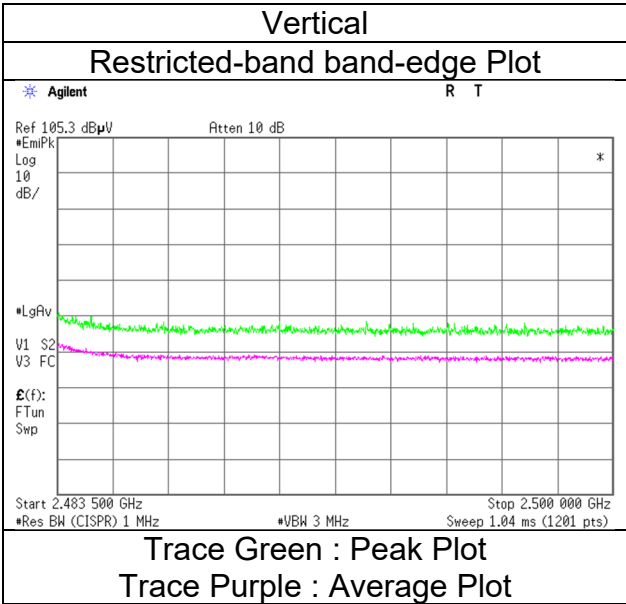
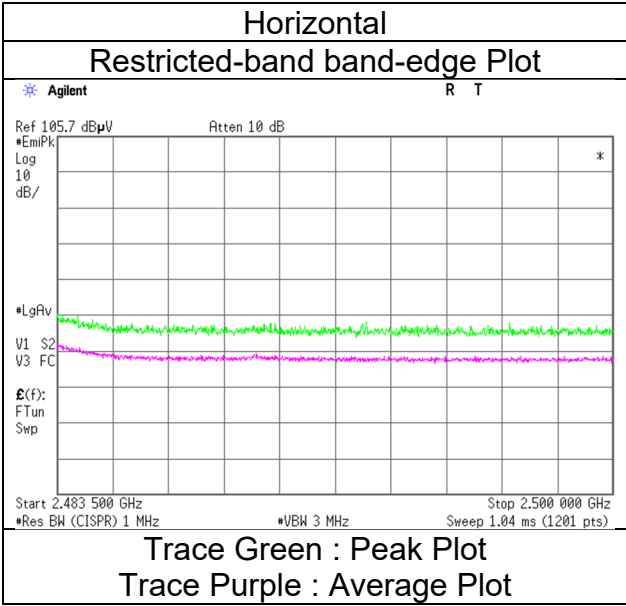
$$10 \text{ GHz} - 40 \text{ GHz} : 20 \log (1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$$

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer

Mode

Kashima EMC Lab.
No.11
March 11, 2024
21 deg. C / 40 % RH
Hiromitsu Tanabe
(1 GHz to 2.8 GHz)
Tx 2476.5 MHz, ANT-2G4S3



* 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	Kashima EMC Lab.			
Semi Anechoic Chamber	No.11	No.11	No.11	No.11
Date	January 26, 2024	January 22, 2024	January 24, 2024	January 25, 2024
Temperature / Humidity	21 deg. C / 41 % RH	23 deg. C / 40 % RH	22 deg. C / 38 % RH	20 deg. C / 39 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(30 MHz to 1 GHz)	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx 2402.5 MHz, ANT-2G4S2			

(* 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.	160.000	QP	33.17	13.53	6.82	32.07	0.00	21.45	43.5	22.0	180	101	
Hori.	182.000	QP	38.91	11.51	6.96	32.05	0.00	25.33	43.5	18.1	194	112	
Hori.	208.000	QP	30.61	9.86	7.12	32.02	0.00	15.57	43.5	27.9	177	118	
Hori.	234.000	QP	30.54	11.03	7.28	32.00	0.00	16.85	46.0	29.1	145	140	
Hori.	312.000	QP	31.42	13.82	7.68	31.94	0.00	20.98	46.0	25.0	100	225	
Hori.	774.050	QP	27.46	22.26	9.50	31.88	0.00	27.34	46.0	18.6	100	143	
Hori.	2246.500	PK	54.81	27.70	13.40	46.32	2.28	51.87	73.9	22.0	152	81	
Hori.	2325.000	PK	55.65	27.57	13.47	46.29	2.28	52.68	73.9	21.2	146	301	
Hori.	2390.000	PK	55.33	27.57	13.51	46.26	2.28	52.43	73.9	21.4	187	144	
Hori.	4805.000	PK	57.99	32.62	5.62	45.77	2.28	52.74	73.9	21.1	143	155	
Hori.	7207.500	PK	51.97	37.18	6.96	44.83	2.28	53.56	73.9	20.3	189	140	
Hori.	2246.500	AV	45.82	27.70	13.40	46.32	2.28	42.88	53.9	11.0	152	81	
Hori.	2325.000	AV	46.09	27.57	13.47	46.29	2.28	43.12	53.9	10.7	146	301	
Hori.	2390.000	AV	46.55	27.57	13.51	46.26	2.28	43.65	53.9	10.2	187	144	
Hori.	4805.000	AV	52.90	32.62	5.62	45.77	2.28	47.65	53.9	6.2	143	155	
Hori.	7207.500	AV	43.41	37.18	6.96	44.83	2.28	45.00	53.9	8.9	189	140	
Vert.	160.000	QP	27.38	13.53	6.82	32.07	0.00	15.66	43.5	27.8	210	205	
Vert.	182.000	QP	33.36	11.51	6.96	32.05	0.00	19.78	43.5	23.7	217	216	
Vert.	208.000	QP	25.61	9.86	7.12	32.02	0.00	10.57	43.5	32.9	160	205	
Vert.	773.663	QP	25.60	22.27	9.50	31.88	0.00	25.49	46.0	20.5	100	142	
Vert.	2246.500	PK	54.80	27.70	13.40	46.32	2.28	51.86	73.9	22.0	213	336	
Vert.	2325.000	PK	55.38	27.57	13.47	46.29	2.28	52.41	73.9	21.4	116	161	
Vert.	2390.000	PK	55.00	27.57	13.51	46.26	2.28	52.10	73.9	21.8	119	332	
Vert.	4805.000	PK	58.00	32.62	5.62	45.77	2.28	52.75	73.9	21.1	278	197	
Vert.	7207.500	PK	51.50	37.18	6.96	44.83	2.28	53.09	73.9	20.8	139	344	
Vert.	2246.500	AV	45.62	27.70	13.40	46.32	2.28	42.68	53.9	11.2	213	336	
Vert.	2325.000	AV	46.91	27.57	13.47	46.29	2.28	43.94	53.9	9.9	116	161	
Vert.	2390.000	AV	46.51	27.57	13.51	46.26	2.28	43.61	53.9	10.2	119	332	
Vert.	4805.000	AV	52.28	32.62	5.62	45.77	2.28	47.03	53.9	6.8	278	197	
Vert.	7207.500	AV	43.59	37.18	6.96	44.83	2.28	45.18	53.9	8.7	139	344	

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

Distance factor : 1 GHz - 10 GHz : 20log (3.90 m / 3.0 m) = 2.28 dB

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.500	PK	107.44	27.59	13.52	46.25	2.28	104.58	-	-	Carrier
Hori.	2400.000	PK	61.66	27.58	13.52	46.25	2.28	58.79	84.6	25.7	
Vert.	2402.500	PK	106.20	27.59	13.52	46.25	2.28	103.34	-	-	Carrier
Vert.	2400.000	PK	61.77	27.58	13.52	46.25	2.28	58.90	83.3	24.4	

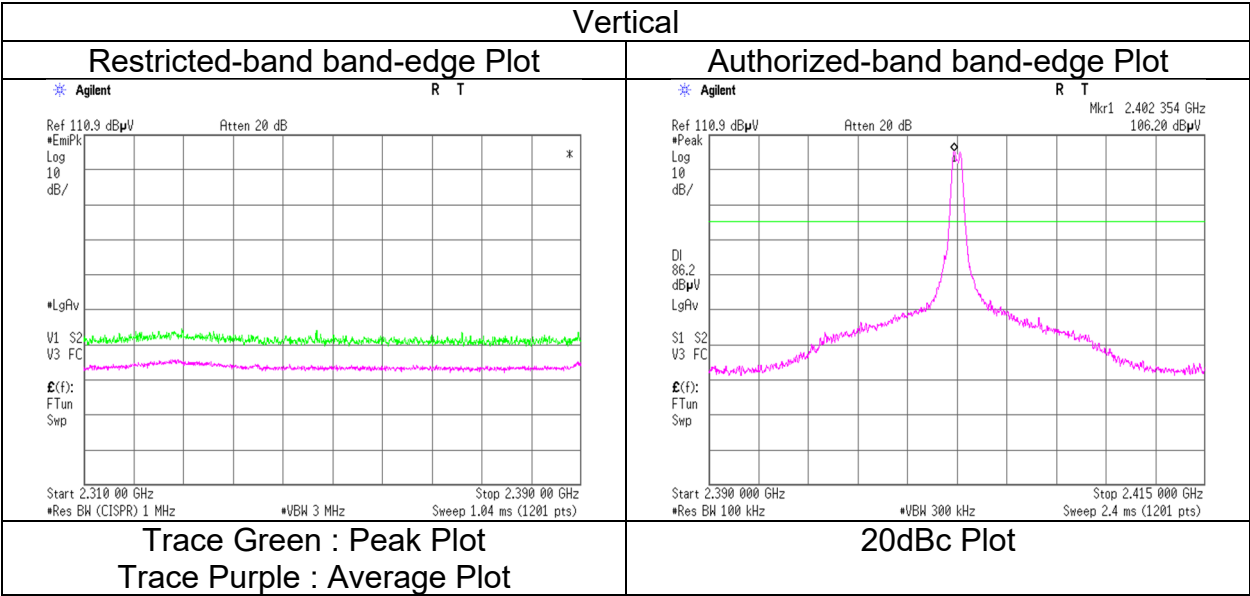
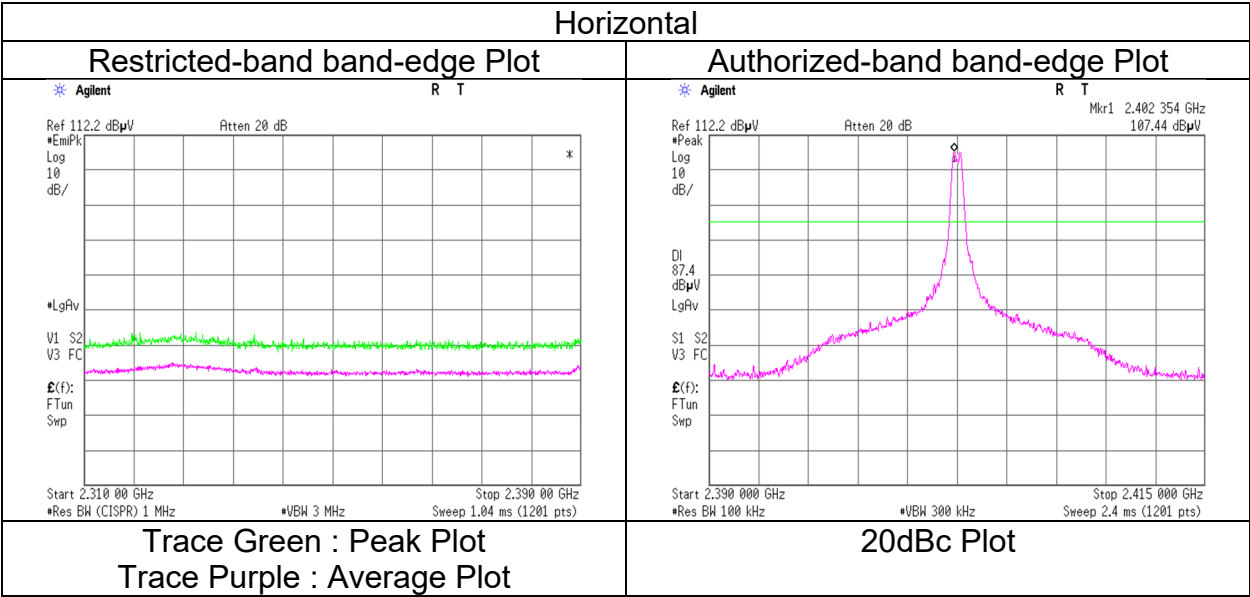
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.90 m / 3.0 m) = 2.28 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	Kashima EMC Lab.
Semi Anechoic Chamber	No.11
Date	January 22, 2024
Temperature / Humidity	23 deg. C / 40 % RH
Engineer	Hiromitsu Tanabe
	(1 GHz to 10 GHz)
Mode	Tx 2402.5 MHz, ANT-2G4S2



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

Radiated Spurious Emission

Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.11	No.11	No.11
Date	January 23, 2024	January 24, 2024	January 25, 2024
Temperature / Humidity	23 deg. C / 39 % RH	22 deg. C / 38 % RH	20 deg. C / 39 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx 2439.5 MHz, ANT-2G4S2		

(* 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.	2283.500	PK	54.24	27.63	13.43	46.31	2.28	51.27	73.9	22.6	153	320	
Hori.	2361.350	PK	55.07	27.53	13.49	46.27	2.28	52.10	73.9	21.8	150	136	
Hori.	4879.000	PK	55.10	32.66	5.66	45.76	2.28	49.94	73.9	23.9	145	153	
Hori.	7318.500	PK	51.42	37.25	6.99	44.65	2.28	53.29	73.9	20.6	133	199	
Hori.	2283.500	AV	45.57	27.63	13.43	46.31	2.28	42.60	53.9	11.3	153	320	
Hori.	2361.350	AV	46.10	27.53	13.49	46.27	2.28	43.13	53.9	10.7	150	136	
Hori.	4879.000	AV	48.61	32.66	5.66	45.76	2.28	43.45	53.9	10.4	145	153	
Hori.	7318.500	AV	42.50	37.25	6.99	44.65	2.28	44.37	53.9	9.5	133	199	
Vert.	2283.500	PK	54.53	27.63	13.43	46.31	2.28	51.56	73.9	22.3	166	348	
Vert.	2361.350	PK	51.10	27.53	13.49	46.27	2.28	48.13	73.9	25.7	173	72	
Vert.	4879.000	PK	55.85	32.66	5.66	45.76	2.28	50.69	73.9	23.2	156	192	
Vert.	7318.500	PK	51.15	37.25	6.99	44.65	2.28	53.02	73.9	20.8	167	0	
Vert.	2283.500	AV	45.39	27.63	13.43	46.31	2.28	42.42	53.9	11.4	166	348	
Vert.	2361.350	AV	45.86	27.53	13.49	46.27	2.28	42.89	53.9	11.0	173	72	
Vert.	4879.000	AV	50.62	32.66	5.66	45.76	2.28	45.46	53.9	8.4	156	192	
Vert.	7318.500	AV	42.57	37.25	6.99	44.65	2.28	44.44	53.9	9.4	167	0	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

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

Radiated Spurious Emission

Test place Kashima EMC Lab.
Semi Anechoic Chamber No.11
Date January 24, 2024
Temperature / Humidity 22 deg. C / 38 % RH
Engineer Hiromitsu Tanabe
 (1 GHz to 2.8 GHz)
Mode Tx 2471.5 MHz, ANT-2G4S2

(* 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	54.80	27.99	13.59	46.16	2.28	52.50	73.9	21.4	148	152	
Hori.	2497.500	PK	55.33	28.09	13.60	46.14	2.28	53.16	73.9	20.7	148	152	
Hori.	2483.500	AV	45.76	27.99	13.59	46.16	2.28	43.46	53.9	10.4	148	152	
Hori.	2497.500	AV	48.40	28.09	13.60	46.14	2.28	46.23	53.9	7.6	148	152	
Vert.	2483.500	PK	54.20	27.99	13.59	46.16	2.28	51.90	73.9	22.0	232	178	
Vert.	2497.500	PK	55.32	28.09	13.60	46.14	2.28	53.15	73.9	20.7	232	178	
Vert.	2483.500	AV	45.97	27.99	13.59	46.16	2.28	43.67	53.9	10.2	232	178	
Vert.	2497.500	AV	48.32	28.09	13.60	46.14	2.28	46.15	53.9	7.7	232	178	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

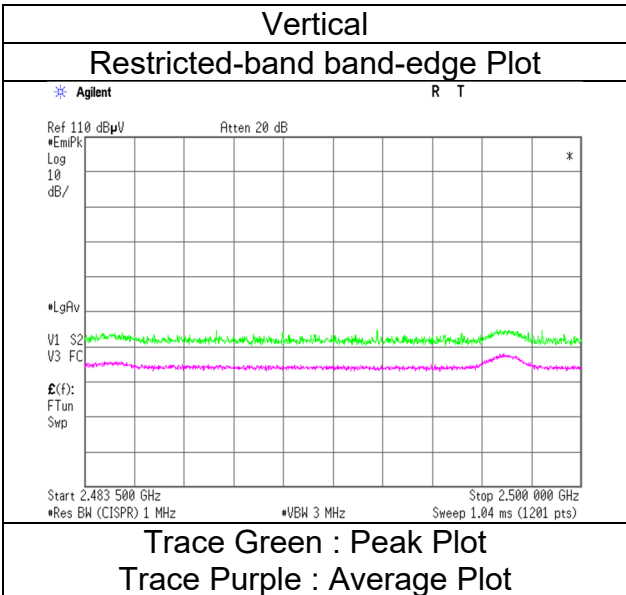
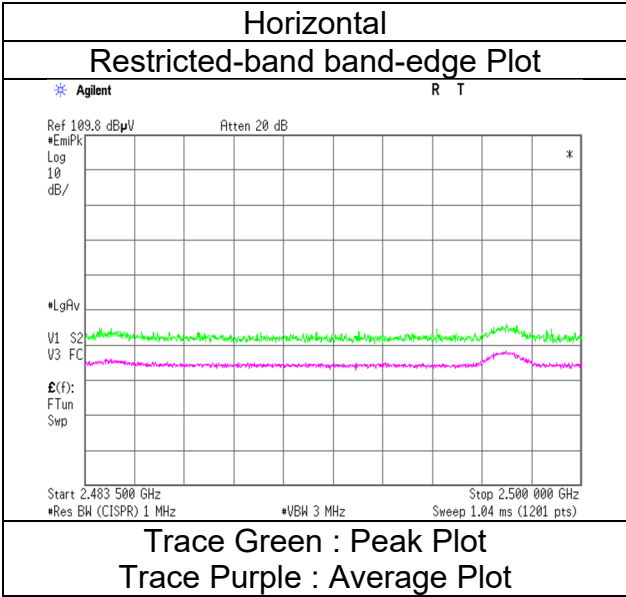
10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer

Mode

Kashima EMC Lab.
No.11
January 24, 2024
22 deg. C / 38 % RH
Hiromitsu Tanabe
(1 GHz to 2.8 GHz)
Tx 2471.5 MHz, ANT-2G4S2



* 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	Kashima EMC Lab.		
Semi Anechoic Chamber	No.11	No.11	No.11
Date	January 23, 2024	January 24, 2024	January 25, 2024
Temperature / Humidity	23 deg. C / 39 % RH	22 deg. C / 38 % RH	20 deg. C / 39 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx 2476.5 MHz, ANT-2G4S2		

(* 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	60.17	27.99	13.59	46.16	2.28	57.87	73.9	16.0	213	145	
Hori.	2502.500	PK	54.73	28.12	13.60	46.14	2.28	52.59	73.9	21.3	213	145	
Hori.	2554.500	PK	54.70	28.26	13.65	46.05	2.28	52.84	73.9	21.0	213	145	
Hori.	4953.000	PK	58.40	32.59	5.70	45.75	2.28	53.22	73.9	20.6	129	156	
Hori.	7429.500	PK	50.04	37.42	7.03	44.58	2.28	52.19	73.9	21.7	151	145	
Hori.	2483.500	AV	51.01	27.99	13.59	46.16	2.28	48.71	53.9	5.1	213	145	
Hori.	2502.500	AV	47.10	28.12	13.60	46.14	2.28	44.96	53.9	8.9	213	145	
Hori.	2554.500	AV	46.27	28.26	13.65	46.05	2.28	44.41	53.9	9.4	213	145	
Hori.	4953.000	AV	53.42	32.59	5.70	45.75	2.28	48.24	53.9	5.6	129	156	
Hori.	7429.500	AV	41.62	37.42	7.03	44.58	2.28	43.77	53.9	10.1	151	145	
Vert.	2483.500	PK	58.99	27.99	13.59	46.16	2.28	56.69	73.9	17.2	110	326	
Vert.	2502.500	PK	54.31	28.12	13.60	46.14	2.28	52.17	73.9	21.7	110	326	
Vert.	2554.500	PK	54.00	28.26	13.65	46.05	2.28	52.14	73.9	21.7	110	326	
Vert.	4953.000	PK	59.88	32.59	5.70	45.75	2.28	54.70	73.9	19.2	179	194	
Vert.	7429.500	PK	50.28	37.42	7.03	44.58	2.28	52.43	73.9	21.4	171	331	
Vert.	2483.500	AV	50.21	27.99	13.59	46.16	2.28	47.91	53.9	5.9	110	326	
Vert.	2502.500	AV	46.35	28.12	13.60	46.14	2.28	44.21	53.9	9.6	110	326	
Vert.	2554.500	AV	45.70	28.26	13.65	46.05	2.28	43.84	53.9	10.0	110	326	
Vert.	4953.000	AV	55.65	32.59	5.70	45.75	2.28	50.47	53.9	3.4	179	194	
Vert.	7429.500	AV	41.85	37.42	7.03	44.58	2.28	44.00	53.9	9.9	171	331	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.90\text{ m} / 3.0\text{ m}) = 2.28\text{ dB}$

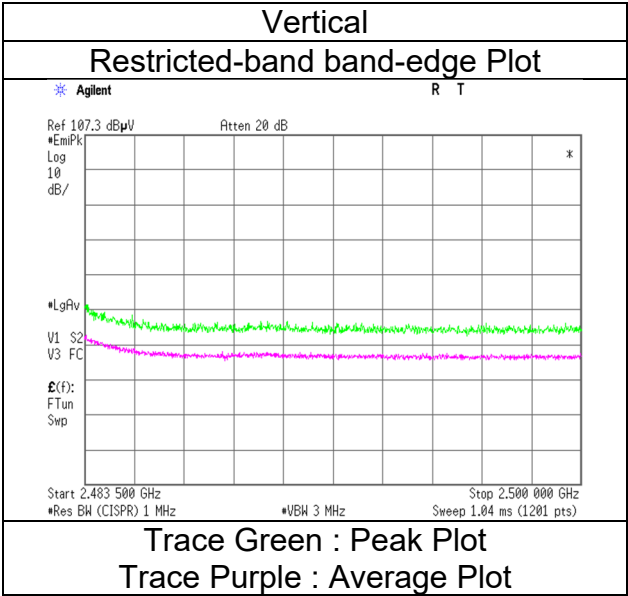
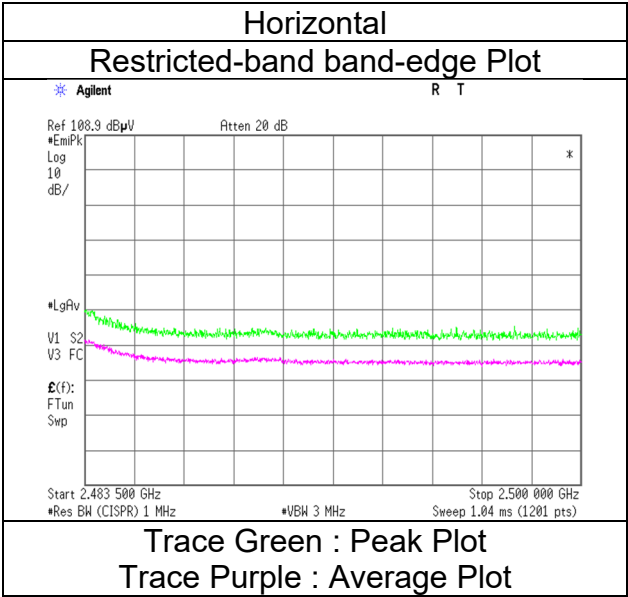
10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer

Mode

Kashima EMC Lab.
No.11
January 23, 2024
23 deg. C / 39 % RH
Hiromitsu Tanabe
(1 GHz to 10 GHz)
Tx 2476.5 MHz, ANT-2G4S2



* 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	Kashima EMC Lab.			
Semi Anechoic Chamber	No.11	No.11	No.11	No.11
Date	January 26, 2024	January 22, 2024	January 25, 2024	January 25, 2024
Temperature / Humidity	21 deg. C / 41 % RH	23 deg. C / 40 % RH	20 deg. C / 39 % RH	20 deg. C / 39 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(30 MHz to 1 GHz)	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx 2402.5 MHz, ANT-2400-SFW			

(* 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.	138.425	QP	38.34	13.16	6.68	32.09	0.00	26.09	43.5	17.4	226	114	
Hori.	182.000	QP	36.22	11.51	6.96	32.05	0.00	22.64	43.5	20.8	172	105	
Hori.	208.000	QP	29.87	9.86	7.12	32.02	0.00	14.83	43.5	28.6	170	113	
Hori.	234.000	QP	28.33	11.03	7.28	32.00	0.00	14.64	46.0	31.3	144	290	
Hori.	260.000	QP	29.44	12.13	7.43	31.98	0.00	17.02	46.0	28.9	109	157	
Hori.	774.141	QP	27.28	22.26	9.50	31.88	0.00	27.16	46.0	18.8	100	314	
Hori.	2246.500	PK	56.22	27.70	13.40	46.32	2.19	53.19	73.9	20.7	167	50	
Hori.	2325.000	PK	55.86	27.57	13.47	46.29	2.19	52.80	73.9	21.1	158	300	
Hori.	2390.000	PK	55.16	27.57	13.51	46.26	2.19	52.17	73.9	21.7	100	301	
Hori.	4805.000	PK	58.03	32.62	5.62	45.77	2.19	52.69	73.9	21.2	134	156	
Hori.	7207.500	PK	50.31	37.18	6.96	44.83	2.19	51.81	73.9	22.0	196	145	
Hori.	14415.000	PK	49.42	40.35	9.85	43.03	-9.54	47.05	73.9	26.8	121	237	
Hori.	2246.500	AV	48.71	27.70	13.40	46.32	2.19	45.68	53.9	8.2	167	50	
Hori.	2325.000	AV	47.58	27.57	13.47	46.29	2.19	44.52	53.9	9.3	158	300	
Hori.	2390.000	AV	46.49	27.57	13.51	46.26	2.19	43.50	53.9	10.4	100	301	
Hori.	4805.000	AV	52.44	32.62	5.62	45.77	2.19	47.10	53.9	6.8	134	156	
Hori.	7207.500	AV	42.62	37.18	6.96	44.83	2.19	44.12	53.9	9.7	196	145	
Hori.	14415.000	AV	40.93	40.35	9.85	43.03	-9.54	38.56	53.9	15.3	121	237	
Vert.	143.321	QP	27.82	13.49	6.71	32.09	0.00	15.93	43.5	27.5	100	166	
Vert.	182.000	QP	26.72	11.51	6.96	32.05	0.00	13.14	43.5	30.3	100	3	
Vert.	312.000	QP	22.97	13.82	7.68	31.94	0.00	12.53	46.0	33.4	100	13	
Vert.	774.285	QP	26.22	22.26	9.50	31.88	0.00	26.10	46.0	19.9	100	142	
Vert.	2246.500	PK	55.13	27.70	13.40	46.32	2.19	52.10	73.9	21.8	163	0	
Vert.	2325.000	PK	55.76	27.57	13.47	46.29	2.19	52.70	73.9	21.2	171	95	
Vert.	2390.000	PK	55.08	27.57	13.51	46.26	2.19	52.09	73.9	21.8	151	38	
Vert.	4805.000	PK	57.72	32.62	5.62	45.77	2.19	52.38	73.9	21.5	278	197	
Vert.	7207.500	PK	51.34	37.18	6.96	44.83	2.19	52.84	73.9	21.0	132	355	
Vert.	14415.000	PK	49.03	40.35	9.85	43.03	-9.54	46.66	73.9	27.2	189	342	
Vert.	2246.500	AV	46.97	27.70	13.40	46.32	2.19	43.94	53.9	9.9	163	0	
Vert.	2325.000	AV	47.04	27.57	13.47	46.29	2.19	43.98	53.9	9.9	171	95	
Vert.	2390.000	AV	46.31	27.57	13.51	46.26	2.19	43.32	53.9	10.5	151	38	
Vert.	4805.000	AV	51.96	32.62	5.62	45.77	2.19	46.62	53.9	7.2	278	197	
Vert.	7207.500	AV	43.57	37.18	6.96	44.83	2.19	45.07	53.9	8.8	132	355	
Vert.	14415.000	AV	41.38	40.35	9.85	43.03	-9.54	39.01	53.9	14.8	189	342	

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

Distance factor : 1 GHz - 10 GHz : 20log (3.86 m / 3.0 m) = 2.19 dB

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.500	PK	106.96	27.59	13.52	46.25	2.19	104.01	-	-	Carrier
Hori.	2400.000	PK	61.95	27.58	13.52	46.25	2.19	58.99	84.0	25.0	
Vert.	2402.500	PK	106.47	27.59	13.52	46.25	2.19	103.52	-	-	Carrier
Vert.	2400.000	PK	61.51	27.58	13.52	46.25	2.19	58.55	83.5	24.9	

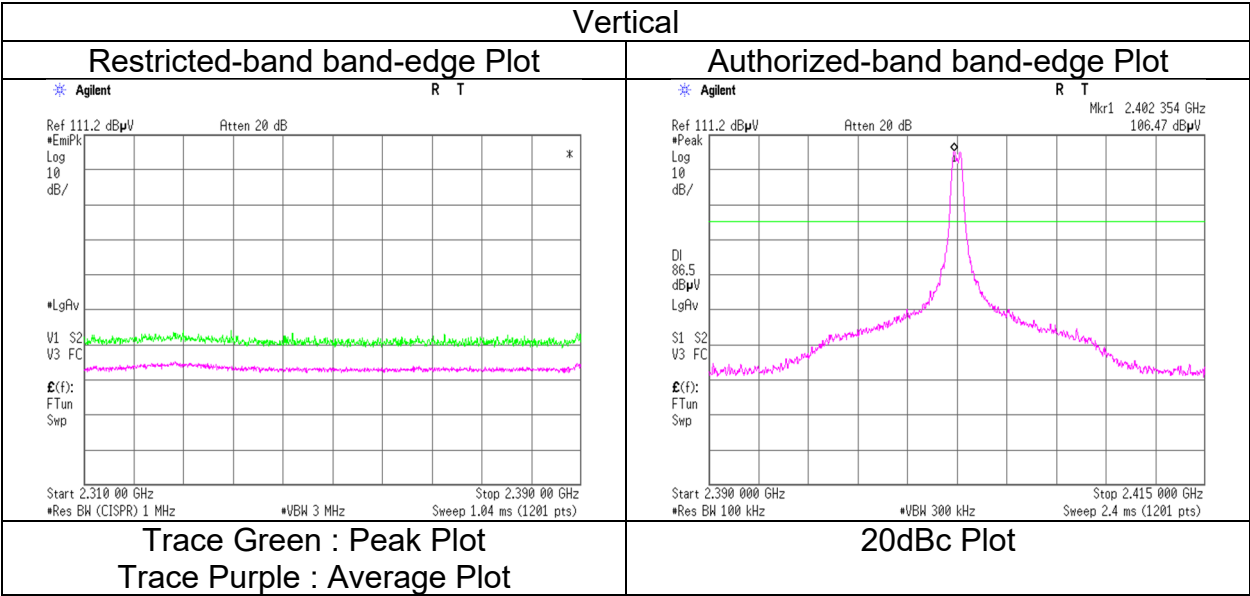
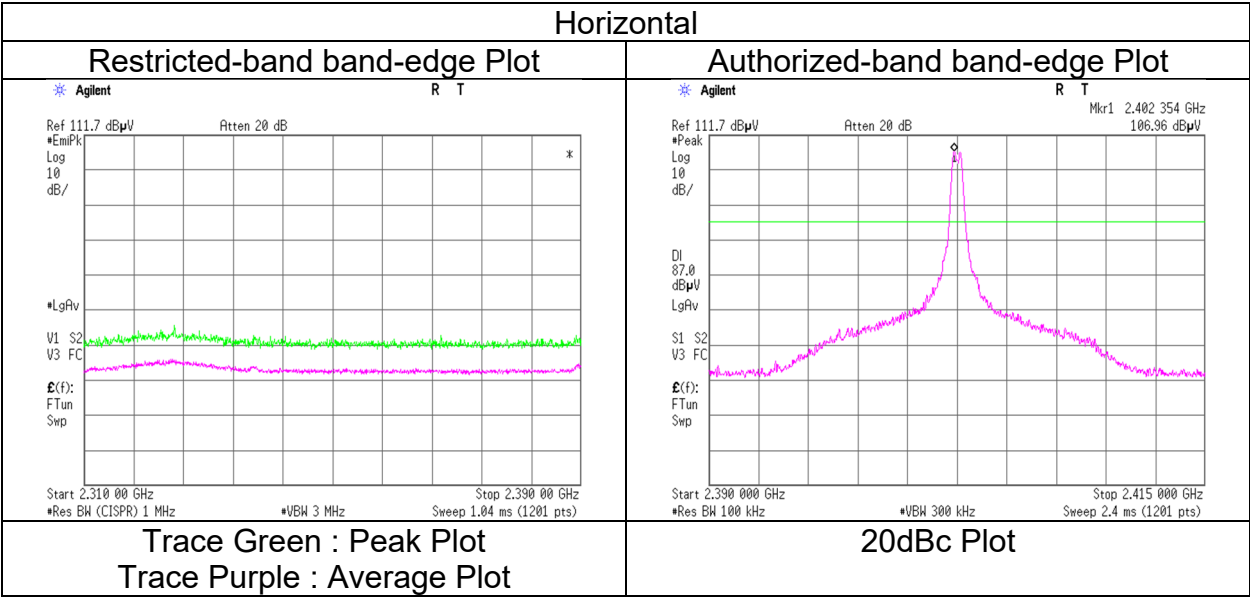
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.86 m / 3.0 m) = 2.19 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	Kashima EMC Lab.
Semi Anechoic Chamber	No.11
Date	January 22, 2024
Temperature / Humidity	23 deg. C / 40 % RH
Engineer	Hiromitsu Tanabe
	(1 GHz to 10 GHz)
Mode	Tx 2402.5 MHz, ANT-2400-SFW



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

Radiated Spurious Emission

Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.11	No.11	No.11
Date	January 23, 2024	January 25, 2024	January 25, 2024
Temperature / Humidity	23 deg. C / 40 % RH	20 deg. C / 39 % RH	20 deg. C / 39 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx 2439.5 MHz, ANT-2400-SFW		

(* 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.	2283.500	PK	54.50	27.63	13.43	46.31	2.19	51.44	73.9	22.4	157	303	
Hori.	2361.350	PK	55.04	27.53	13.49	46.27	2.19	51.98	73.9	21.9	150	51	
Hori.	4879.000	PK	54.75	32.66	5.66	45.76	2.19	49.50	73.9	24.4	158	124	
Hori.	7318.500	PK	51.24	37.25	6.99	44.65	2.19	53.02	73.9	20.8	144	274	
Hori.	14637.000	PK	47.81	39.94	9.87	42.61	-9.54	45.47	73.9	28.4	123	243	
Hori.	2283.500	AV	46.78	27.63	13.43	46.31	2.19	43.72	53.9	10.1	157	303	
Hori.	2361.350	AV	46.27	27.53	13.49	46.27	2.19	43.21	53.9	10.6	150	51	
Hori.	4879.000	AV	48.20	32.66	5.66	45.76	2.19	42.95	53.9	10.9	158	124	
Hori.	7318.500	AV	42.74	37.25	6.99	44.65	2.19	44.52	53.9	9.3	144	274	
Hori.	14637.000	AV	38.91	39.94	9.87	42.61	-9.54	36.57	53.9	17.3	123	243	
Vert.	2283.500	PK	54.65	27.63	13.43	46.31	2.19	51.59	73.9	22.3	154	354	
Vert.	2361.350	PK	54.57	27.53	13.49	46.27	2.19	51.51	73.9	22.3	151	0	
Vert.	4879.000	PK	55.58	32.66	5.66	45.76	2.19	50.33	73.9	23.5	165	198	
Vert.	7318.500	PK	50.96	37.25	6.99	44.65	2.19	52.74	73.9	21.1	187	21	
Vert.	14637.000	PK	47.87	39.94	9.87	42.61	-9.54	45.53	73.9	28.3	186	217	
Vert.	2283.500	AV	46.39	27.63	13.43	46.31	2.19	43.33	53.9	10.5	154	354	
Vert.	2361.350	AV	45.66	27.53	13.49	46.27	2.19	42.60	53.9	11.3	151	0	
Vert.	4879.000	AV	49.95	32.66	5.66	45.76	2.19	44.70	53.9	9.2	165	198	
Vert.	7318.500	AV	42.45	37.25	6.99	44.65	2.19	44.23	53.9	9.6	187	21	
Vert.	14637.000	AV	38.63	39.94	9.87	42.61	-9.54	36.29	53.9	17.6	186	217	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.86\text{ m} / 3.0\text{ m}) = 2.19\text{ dB}$

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

Radiated Spurious Emission

Test place Kashima EMC Lab.
Semi Anechoic Chamber No.11
Date January 24, 2024
Temperature / Humidity 22 deg. C / 38 % RH
Engineer Hiromitsu Tanabe
 (1 GHz to 2.8 GHz)
Mode Tx 2471.5 MHz, ANT-2400-SFW

(* 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	54.32	27.99	13.59	46.16	2.19	51.93	73.9	21.9	138	63	
Hori.	2497.500	PK	55.35	28.09	13.60	46.14	2.19	53.09	73.9	20.8	138	63	
Hori.	2483.500	AV	45.74	27.99	13.59	46.16	2.19	43.35	53.9	10.5	138	63	
Hori.	2497.500	AV	48.33	28.09	13.60	46.14	2.19	46.07	53.9	7.8	138	63	
Vert.	2483.500	PK	54.31	27.99	13.59	46.16	2.19	51.92	73.9	21.9	117	124	
Vert.	2497.500	PK	55.90	28.09	13.60	46.14	2.19	53.64	73.9	20.2	117	124	
Vert.	2483.500	AV	46.53	27.99	13.59	46.16	2.19	44.14	53.9	9.7	117	124	
Vert.	2497.500	AV	48.68	28.09	13.60	46.14	2.19	46.42	53.9	7.4	117	124	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.86\text{ m} / 3.0\text{ m}) = 2.19\text{ dB}$

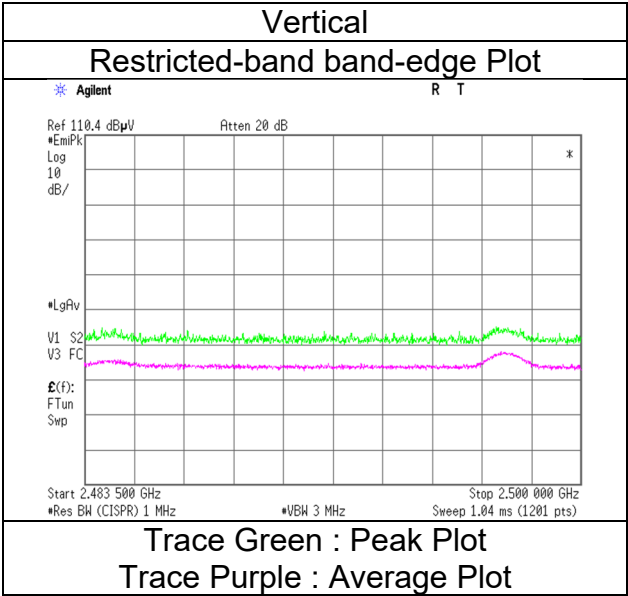
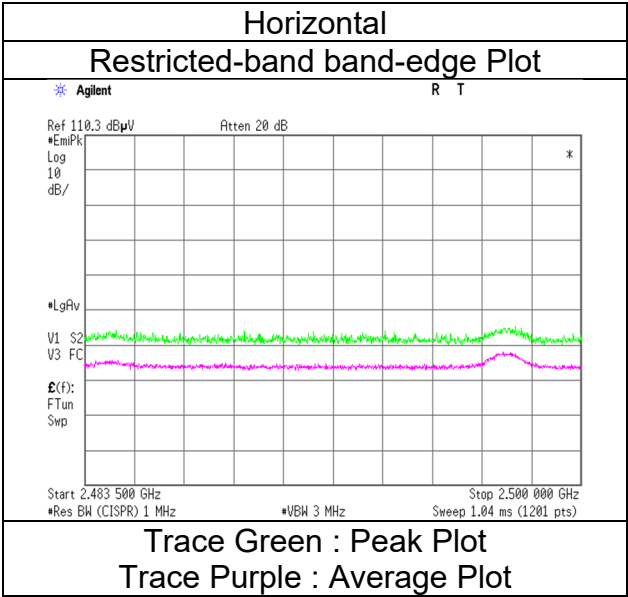
10 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer

Mode

Kashima EMC Lab.
No.11
January 24, 2024
22 deg. C / 38 % RH
Hiromitsu Tanabe
(1 GHz to 2.8 GHz)
Tx 2471.5 MHz, ANT-2400-SFW



* 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	Kashima EMC Lab.		
Semi Anechoic Chamber	No.11	No.11	No.11
Date	January 23, 2024	January 25, 2024	January 25, 2024
Temperature / Humidity	23 deg. C / 40 % RH	20 deg. C / 39 % RH	20 deg. C / 39 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx 2476.5 MHz, ANT-2400-SFW		

(* 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	60.18	27.99	13.59	46.16	2.19	57.79	73.9	16.1	136	58	
Hori.	2502.500	PK	54.76	28.12	13.60	46.14	2.19	52.53	73.9	21.3	136	58	
Hori.	2554.500	PK	54.26	28.26	13.65	46.05	2.19	52.31	73.9	21.5	136	58	
Hori.	4953.000	PK	58.17	32.59	5.70	45.75	2.19	52.90	73.9	21.0	133	157	
Hori.	7429.500	PK	50.42	37.42	7.03	44.58	2.19	52.48	73.9	21.4	155	0	
Hori.	14859.000	PK	47.72	39.29	9.90	42.69	-9.54	44.68	73.9	29.2	125	245	
Hori.	2483.500	AV	50.59	27.99	13.59	46.16	2.19	48.20	53.9	5.7	136	58	
Hori.	2502.500	AV	46.90	28.12	13.60	46.14	2.19	44.67	53.9	9.2	136	58	
Hori.	2554.500	AV	46.11	28.26	13.65	46.05	2.19	44.16	53.9	9.7	136	58	
Hori.	4953.000	AV	53.33	32.59	5.70	45.75	2.19	48.06	53.9	5.8	133	157	
Hori.	7429.500	AV	41.74	37.42	7.03	44.58	2.19	43.80	53.9	10.1	155	0	
Hori.	14859.000	AV	38.89	39.29	9.90	42.69	-9.54	35.85	53.9	18.0	125	245	
Vert.	2483.500	PK	59.53	27.99	13.59	46.16	2.19	57.14	73.9	16.7	212	117	
Vert.	2502.500	PK	54.56	28.12	13.60	46.14	2.19	52.33	73.9	21.5	212	117	
Vert.	2554.500	PK	54.11	28.26	13.65	46.05	2.19	52.16	73.9	21.7	212	117	
Vert.	4953.000	PK	59.41	32.59	5.70	45.75	2.19	54.14	73.9	19.7	301	199	
Vert.	7429.500	PK	50.67	37.42	7.03	44.58	2.19	52.73	73.9	21.1	154	339	
Vert.	14859.000	PK	47.66	39.29	9.90	42.69	-9.54	44.62	73.9	29.2	184	250	
Vert.	2483.500	AV	49.96	27.99	13.59	46.16	2.19	47.57	53.9	6.3	212	117	
Vert.	2502.500	AV	46.51	28.12	13.60	46.14	2.19	44.28	53.9	9.6	212	117	
Vert.	2554.500	AV	45.71	28.26	13.65	46.05	2.19	43.76	53.9	10.1	212	117	
Vert.	4953.000	AV	54.79	32.59	5.70	45.75	2.19	49.52	53.9	4.3	301	199	
Vert.	7429.500	AV	42.00	37.42	7.03	44.58	2.19	44.06	53.9	9.8	154	339	
Vert.	14859.000	AV	38.78	39.29	9.90	42.69	-9.54	35.74	53.9	18.1	184	250	

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

Distance factor : 1 GHz - 10 GHz : 20log (3.86 m / 3.0 m) = 2.19 dB

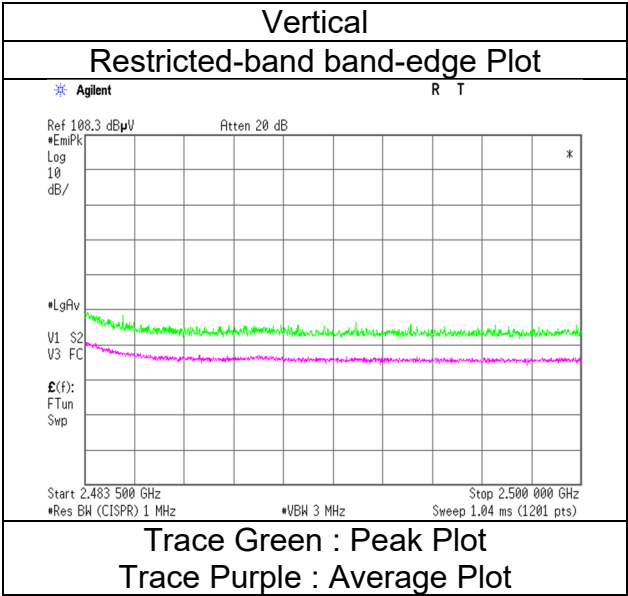
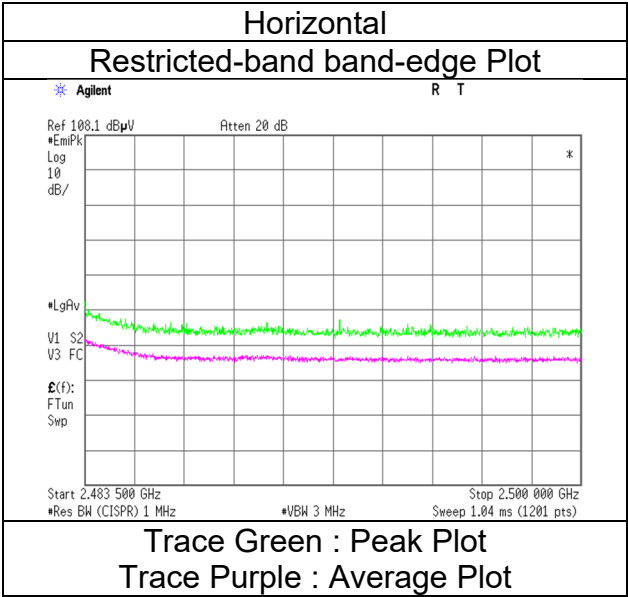
10 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Test place
Semi Anechoic Chamber
Date
Temperature / Humidity
Engineer

Mode

Kashima EMC Lab.
No.11
January 23, 2024
23 deg. C / 40 % RH
Hiromitsu Tanabe
(1 GHz to 10 GHz)
Tx 2476.5 MHz, ANT-2400-SFW



* 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	Kashima EMC Lab.			
Semi Anechoic Chamber	No.11	No.11	No.11	No.11
Date	January 25, 2024	January 22, 2024	January 25, 2024	January 25, 2024
Temperature / Humidity	20 deg. C / 39 % RH	23 deg. C / 40 % RH	20 deg. C / 39 % RH	20 deg. C / 39 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(30 MHz to 1 GHz)	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx 2402.5 MHz, W5I-BO-07			

(* 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.	130.000	QP	31.43	12.49	6.62	32.10	0.00	18.44	43.5	25.0	223	294	
Hori.	160.000	QP	34.81	13.53	6.82	32.07	0.00	23.09	43.5	20.4	171	100	
Hori.	182.000	QP	41.87	11.51	6.96	32.05	0.00	28.29	43.5	15.2	180	114	
Hori.	184.331	QP	35.20	11.20	6.98	32.05	0.00	21.33	43.5	22.1	184	115	
Hori.	208.000	QP	34.15	9.86	7.12	32.02	0.00	19.11	43.5	24.3	163	122	
Hori.	773.581	QP	25.24	22.28	9.50	31.88	0.00	25.14	46.0	20.8	100	34	
Hori.	2246.500	PK	55.35	27.70	13.40	46.32	2.26	52.39	73.9	21.5	149	88	
Hori.	2324.500	PK	56.29	27.57	13.45	46.29	2.26	53.28	73.9	20.6	145	87	
Hori.	2390.000	PK	54.75	27.57	13.51	46.26	2.26	51.83	73.9	22.0	100	98	
Hori.	4805.000	PK	57.51	32.62	5.62	45.77	2.26	52.24	73.9	21.6	326	161	
Hori.	7207.500	PK	50.31	37.18	6.96	44.83	2.26	51.88	73.9	22.0	234	153	
Hori.	14415.000	PK	49.45	40.35	9.85	43.03	-9.54	47.08	73.9	26.8	116	232	
Hori.	2246.500	AV	46.61	27.70	13.40	46.32	2.26	43.65	53.9	10.2	149	88	
Hori.	2324.500	AV	47.00	27.57	13.45	46.29	2.26	43.99	53.9	9.9	145	87	
Hori.	2390.000	AV	46.23	27.57	13.51	46.26	2.26	43.31	53.9	10.5	100	98	
Hori.	4805.000	AV	52.38	32.62	5.62	45.77	2.26	47.11	53.9	6.7	326	161	
Hori.	7207.500	AV	43.14	37.18	6.96	44.83	2.26	44.71	53.9	9.1	234	153	
Hori.	14415.000	AV	40.96	40.35	9.85	43.03	-9.54	38.59	53.9	15.3	116	232	
Vert.	160.000	QP	30.10	13.53	6.82	32.07	0.00	18.38	43.5	25.1	165	210	
Vert.	182.000	QP	34.23	11.51	6.96	32.05	0.00	20.65	43.5	22.8	215	201	
Vert.	773.954	QP	25.75	22.26	9.50	31.88	0.00	25.63	46.0	20.3	100	80	
Vert.	2246.500	PK	53.92	27.70	13.40	46.32	2.26	50.96	73.9	22.9	139	0	
Vert.	2324.500	PK	57.44	27.57	13.45	46.29	2.26	54.43	73.9	19.4	153	341	
Vert.	2390.000	PK	55.17	27.57	13.51	46.26	2.26	52.25	73.9	21.6	137	341	
Vert.	4805.000	PK	58.38	32.62	5.62	45.77	2.26	53.11	73.9	20.7	193	186	
Vert.	7207.500	PK	50.97	37.18	6.96	44.83	2.26	52.54	73.9	21.3	300	0	
Vert.	14415.000	PK	49.44	40.35	9.85	43.03	-9.54	47.07	73.9	26.8	174	332	
Vert.	2246.500	AV	46.04	27.70	13.40	46.32	2.26	43.08	53.9	10.8	139	0	
Vert.	2324.500	AV	48.17	27.57	13.45	46.29	2.26	45.16	53.9	8.7	153	341	
Vert.	2390.000	AV	46.59	27.57	13.51	46.26	2.26	43.67	53.9	10.2	137	341	
Vert.	4805.000	AV	52.85	32.62	5.62	45.77	2.26	47.58	53.9	6.3	193	186	
Vert.	7207.500	AV	42.97	37.18	6.96	44.83	2.26	44.54	53.9	9.3	300	0	
Vert.	14415.000	AV	41.06	40.35	9.85	43.03	-9.54	38.69	53.9	15.2	174	332	

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

Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB

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

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.500	PK	106.69	27.59	13.52	46.25	2.26	103.81	-	-	Carrier
Hori.	2400.000	PK	60.44	27.58	13.52	46.25	2.26	57.55	83.8	26.2	
Vert.	2402.500	PK	107.75	27.59	13.52	46.25	2.26	104.87	-	-	Carrier
Vert.	2400.000	PK	62.05	27.58	13.52	46.25	2.26	59.16	84.9	25.7	

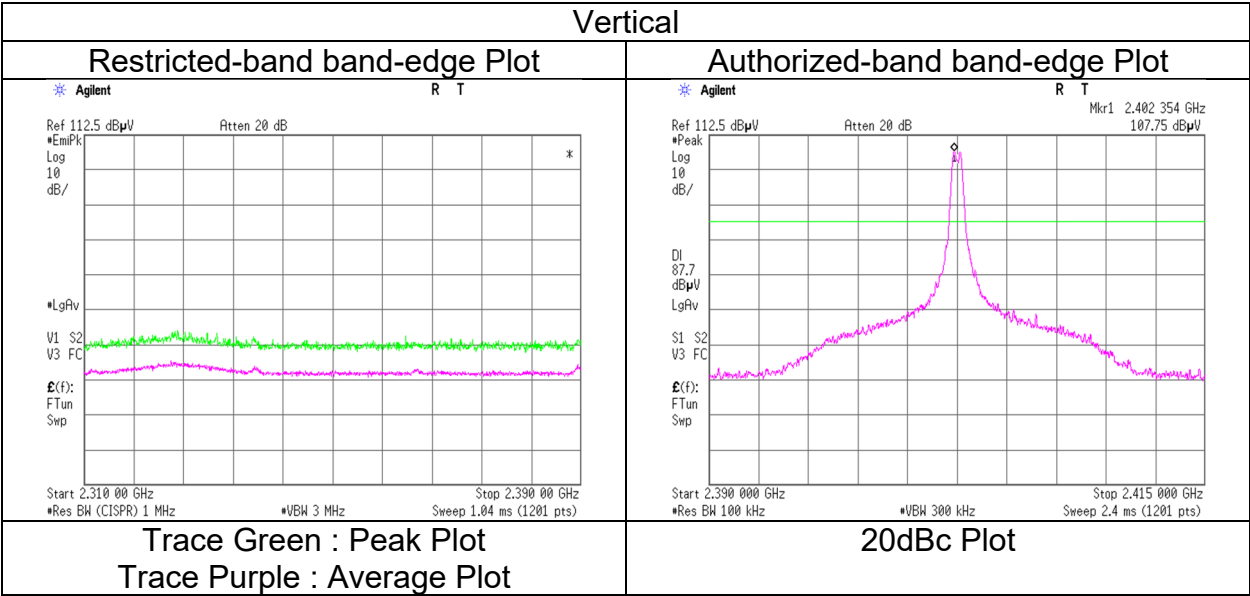
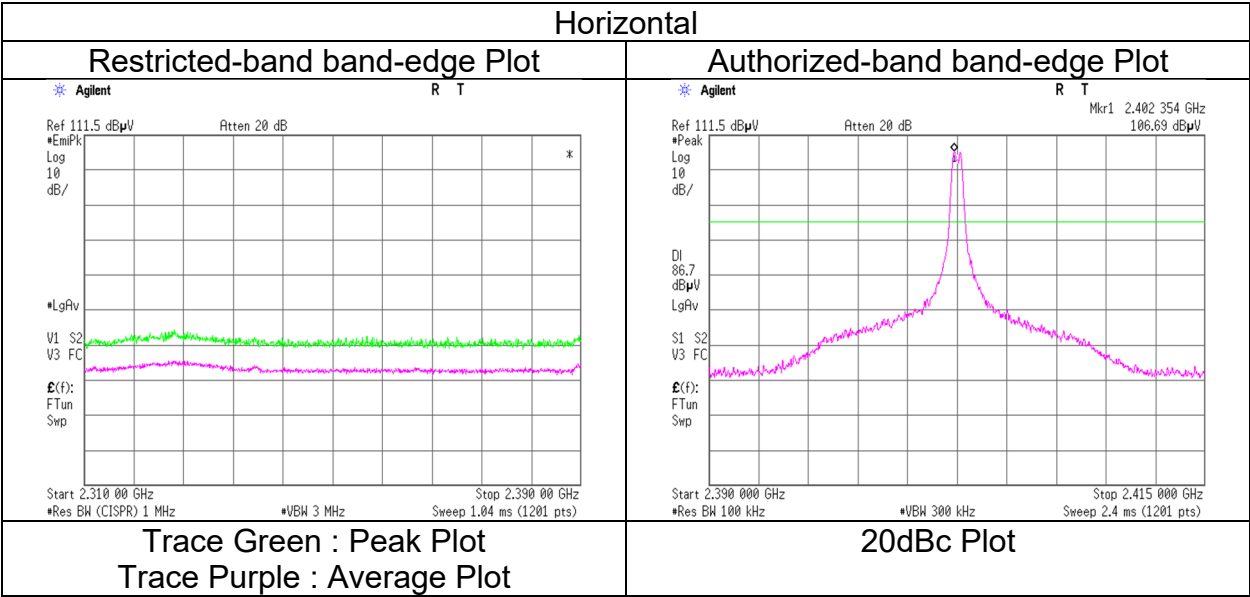
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 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	Kashima EMC Lab.
Semi Anechoic Chamber	No.11
Date	January 22, 2024
Temperature / Humidity	23 deg. C / 40 % RH
Engineer	Hiromitsu Tanabe
	(1 GHz to 10 GHz)
Mode	Tx 2402.5 MHz, W5I-BO-07



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

Radiated Spurious Emission

Test place	Kashima EMC Lab.		
Semi Anechoic Chamber	No.11	No.11	No.11
Date	January 23, 2024	January 25, 2024	January 25, 2024
Temperature / Humidity	23 deg. C / 39 % RH	20 deg. C / 39 % RH	20 deg. C / 39 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx 2439.5 MHz, W5I-BO-07		

(* 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.	2283.500	PK	54.49	27.63	13.43	46.31	2.26	51.50	73.9	22.4	152	79	
Hori.	4879.000	PK	54.43	32.66	5.66	45.76	2.26	49.25	73.9	24.6	147	157	
Hori.	7318.500	PK	51.62	37.25	6.99	44.65	2.26	53.47	73.9	20.4	150	200	
Hori.	14637.000	PK	48.00	39.94	9.87	42.61	-9.54	45.66	73.9	28.2	133	211	
Hori.	2283.500	AV	46.04	27.63	13.43	46.31	2.26	43.05	53.9	10.8	152	79	
Hori.	4879.000	AV	48.26	32.66	5.66	45.76	2.26	43.08	53.9	10.8	147	157	
Hori.	7318.500	AV	42.68	37.25	6.99	44.65	2.26	44.53	53.9	9.3	150	200	
Hori.	14637.000	AV	38.89	39.94	9.87	42.61	-9.54	36.55	53.9	17.3	133	211	
Vert.	2283.500	PK	55.63	27.63	13.43	46.31	2.26	52.64	73.9	21.2	148	338	
Vert.	4879.000	PK	55.61	32.66	5.66	45.76	2.26	50.43	73.9	23.4	180	191	
Vert.	7318.500	PK	51.62	37.25	6.99	44.65	2.26	53.47	73.9	20.4	197	0	
Vert.	14637.000	PK	47.95	39.94	9.87	42.61	-9.54	45.61	73.9	28.2	152	214	
Vert.	2283.500	AV	46.49	27.63	13.43	46.31	2.26	43.50	53.9	10.4	148	338	
Vert.	4879.000	AV	50.28	32.66	5.66	45.76	2.26	45.10	53.9	8.8	180	191	
Vert.	7318.500	AV	43.81	37.25	6.99	44.65	2.26	45.66	53.9	8.2	197	0	
Vert.	14637.000	AV	39.20	39.94	9.87	42.61	-9.54	36.86	53.9	17.0	152	214	

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

Distance factor : 1 GHz - 10 GHz : $20\log(3.89\text{ m} / 3.0\text{ m}) = 2.26\text{ dB}$

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

Radiated Spurious Emission

Test place Kashima EMC Lab.
Semi Anechoic Chamber No.11
Date January 24, 2024
Temperature / Humidity 22 deg. C / 38 % RH
Engineer Hiromitsu Tanabe
 (1 GHz to 2.8 GHz)
Mode Tx 2471.5 MHz, W5I-BO-07

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

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	2483.500	PK	55.06	27.99	13.59	46.16	2.26	52.74	73.9	21.1	145	94	
Hori.	2497.500	PK	55.77	28.09	13.60	46.14	2.26	53.58	73.9	20.3	145	94	
Hori.	2483.500	AV	45.90	27.99	13.59	46.16	2.26	43.58	53.9	10.3	145	94	
Hori.	2497.500	AV	48.34	28.09	13.60	46.14	2.26	46.15	53.9	7.7	145	94	
Vert.	2483.500	PK	54.65	27.99	13.59	46.16	2.26	52.33	73.9	21.5	130	342	
Vert.	2497.500	PK	56.14	28.09	13.60	46.14	2.26	53.95	73.9	19.9	130	342	
Vert.	2483.500	AV	46.06	27.99	13.59	46.16	2.26	43.74	53.9	10.1	130	342	
Vert.	2497.500	AV	49.38	28.09	13.60	46.14	2.26	47.19	53.9	6.7	130	342	

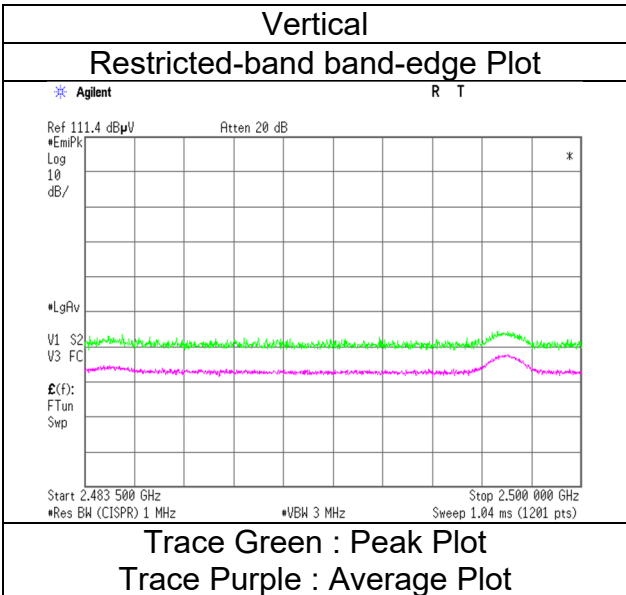
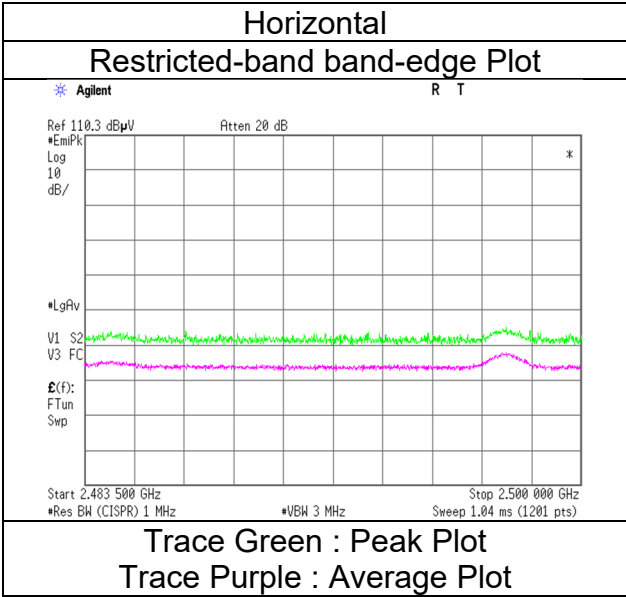
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : $20\log(3.89\text{ m} / 3.0\text{ m}) = 2.26\text{ dB}$

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	Kashima EMC Lab.
Semi Anechoic Chamber	No.11
Date	January 24, 2024
Temperature / Humidity	22 deg. C / 38 % RH
Engineer	Hiromitsu Tanabe
	(1 GHz to 2.8 GHz)
Mode	Tx 2471.5 MHz, W5I-BO-07



* 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	Kashima EMC Lab.		
Semi Anechoic Chamber	No.11	No.11	No.11
Date	January 23, 2024	January 25, 2024	January 25, 2024
Temperature / Humidity	23 deg. C / 39 % RH	20 deg. C / 39 % RH	20 deg. C / 39 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx 2476.5 MHz, W5I-BO-07		

(* 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	59.97	27.99	13.59	46.16	2.26	57.65	73.9	16.2	150	98	
Hori.	2502.500	PK	55.05	28.12	13.60	46.14	2.26	52.89	73.9	21.0	150	98	
Hori.	2554.500	PK	54.51	28.26	13.65	46.05	2.26	52.63	73.9	21.2	150	98	
Hori.	4953.000	PK	58.50	32.59	5.70	45.75	2.26	53.30	73.9	20.6	140	157	
Hori.	7429.500	PK	50.77	37.42	7.03	44.58	2.26	52.90	73.9	21.0	170	180	
Hori.	14859.000	PK	47.82	39.29	9.90	42.69	-9.54	44.78	73.9	29.1	125	235	
Hori.	2483.500	AV	50.12	27.99	13.59	46.16	2.26	47.80	53.9	6.1	150	98	
Hori.	2502.500	AV	46.80	28.12	13.60	46.14	2.26	44.64	53.9	9.2	150	98	
Hori.	2554.500	AV	45.93	28.26	13.65	46.05	2.26	44.05	53.9	9.8	150	98	
Hori.	4953.000	AV	54.40	32.59	5.70	45.75	2.26	49.20	53.9	4.7	140	157	
Hori.	7429.500	AV	41.53	37.42	7.03	44.58	2.26	43.66	53.9	10.2	170	180	
Hori.	14859.000	AV	38.92	39.29	9.90	42.69	-9.54	35.88	53.9	18.0	125	235	
Vert.	2483.500	PK	61.59	27.99	13.59	46.16	2.26	59.27	73.9	14.6	113	329	
Vert.	2502.500	PK	55.28	28.12	13.60	46.14	2.26	53.12	73.9	20.7	113	329	
Vert.	2554.500	PK	55.60	28.26	13.65	46.05	2.26	53.72	73.9	20.1	113	329	
Vert.	4953.000	PK	59.05	32.59	5.70	45.75	2.26	53.85	73.9	20.0	174	198	
Vert.	7429.500	PK	51.49	37.42	7.03	44.58	2.26	53.62	73.9	20.2	155	0	
Vert.	14859.000	PK	48.16	39.29	9.90	42.69	-9.54	45.12	73.9	28.7	169	246	
Vert.	2483.500	AV	51.89	27.99	13.59	46.16	2.26	49.57	53.9	4.3	113	329	
Vert.	2502.500	AV	47.85	28.12	13.60	46.14	2.26	45.69	53.9	8.2	113	329	
Vert.	2554.500	AV	46.96	28.26	13.65	46.05	2.26	45.08	53.9	8.8	113	329	
Vert.	4953.000	AV	55.24	32.59	5.70	45.75	2.26	50.04	53.9	3.8	174	198	
Vert.	7429.500	AV	42.37	37.42	7.03	44.58	2.26	44.50	53.9	9.4	155	0	
Vert.	14859.000	AV	39.03	39.29	9.90	42.69	-9.54	35.99	53.9	17.9	169	246	

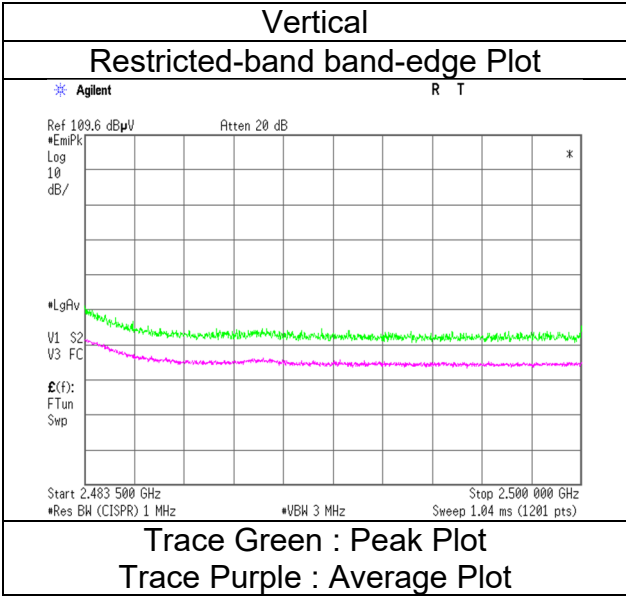
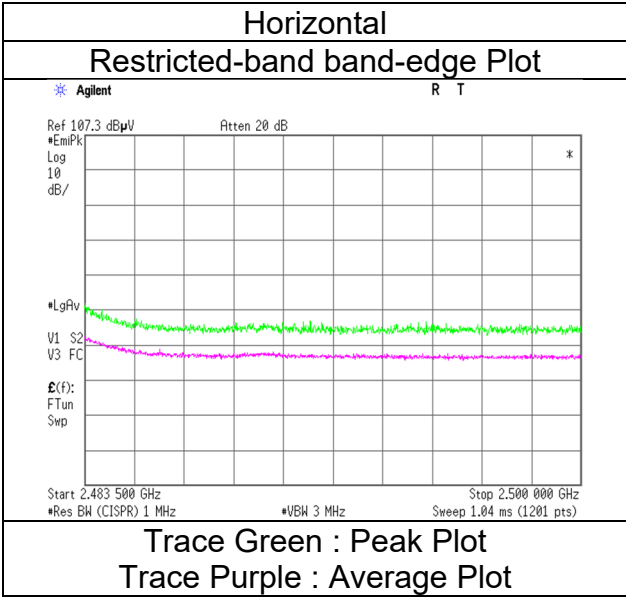
Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 10 GHz : 20log (3.89 m / 3.0 m) = 2.26 dB

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

Radiated Spurious Emission
(Reference Plot for band-edge)

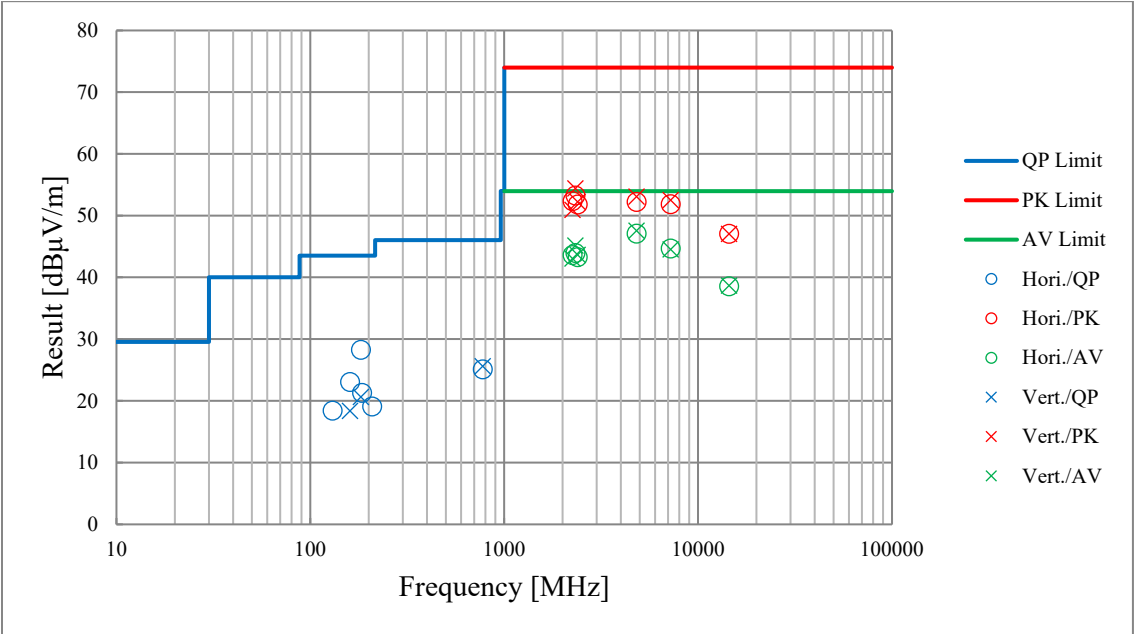
Test place	Kashima EMC Lab.
Semi Anechoic Chamber	No.11
Date	January 23, 2024
Temperature / Humidity	23 deg. C / 39 % RH
Engineer	Hiromitsu Tanabe
	(1 GHz to 10 GHz)
Mode	Tx 2476.5 MHz, W5I-BO-07



* 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	Kashima EMC Lab.			
Semi Anechoic Chamber	No.11	No.11	No.11	No.11
Date	January 25, 2024	January 22, 2024	January 25, 2024	January 25, 2024
Temperature / Humidity	20 deg. C / 39 % RH	23 deg. C / 40 % RH	20 deg. C / 39 % RH	20 deg. C / 39 % RH
Engineer	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe	Hiromitsu Tanabe
	(30 MHz to 1 GHz)	(1 GHz to 10 GHz)	(10 GHz to 18 GHz)	(18 GHz to 26.5 GHz)
Mode	Tx 2402.5 MHz, W5I-BO-07			



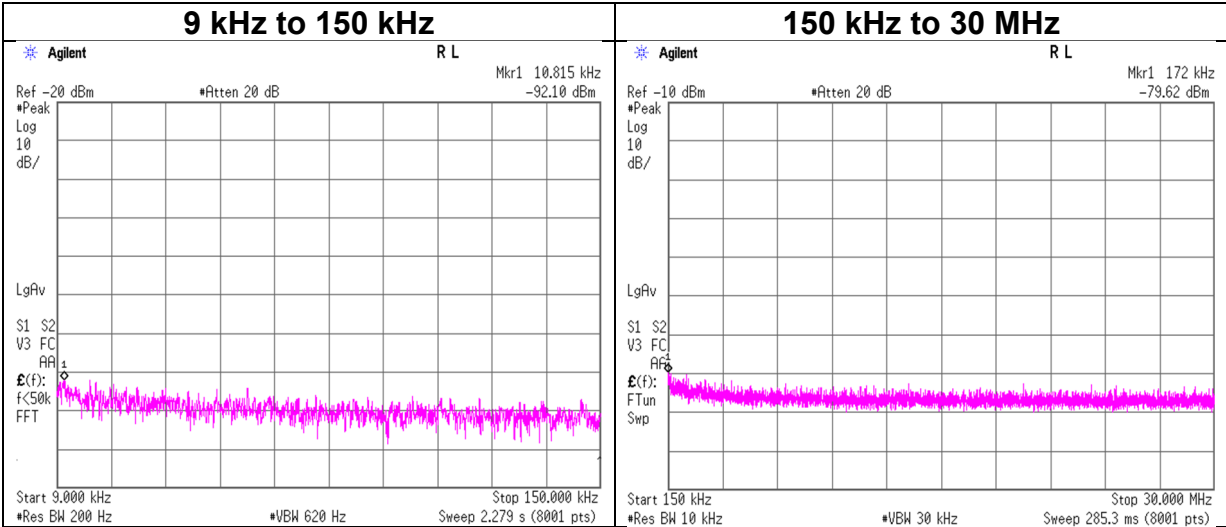
*These plots data contain sufficient number to show the trend of characteristic features for EUT.

Note: Plot data was set to the maximum EIRP.

Conducted Spurious Emission

Test place
Date
Temperature / Humidity
Engineer
Mode

Kashima EMC Lab. No.2 Measurement Room
January 31, 2024
20 deg. C / 48 % RH
Kazuhiro Ando
Tx 2402.5 MHz, TRX1



Frequency	Reading	Cable Loss	Attenuator Loss	Antenna Gain	N	EIRP	Distance	Ground bounce	E	Limit	Margin	Remark
[kHz]	[dBm]	[dB]	[dB]	[dBi]	(Number of Output)	[dBm]	[m]	[dB]	(field strength) [dBuV/m]	[dBuV/m]	[dB]	
10.82	-92.10	0.00	9.95	3.5	1	-78.7	300	6.0	-17.4	46.9	64.3	
172.00	-79.62	0.01	9.95	3.5	1	-66.2	300	6.0	-4.9	22.8	27.7	

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

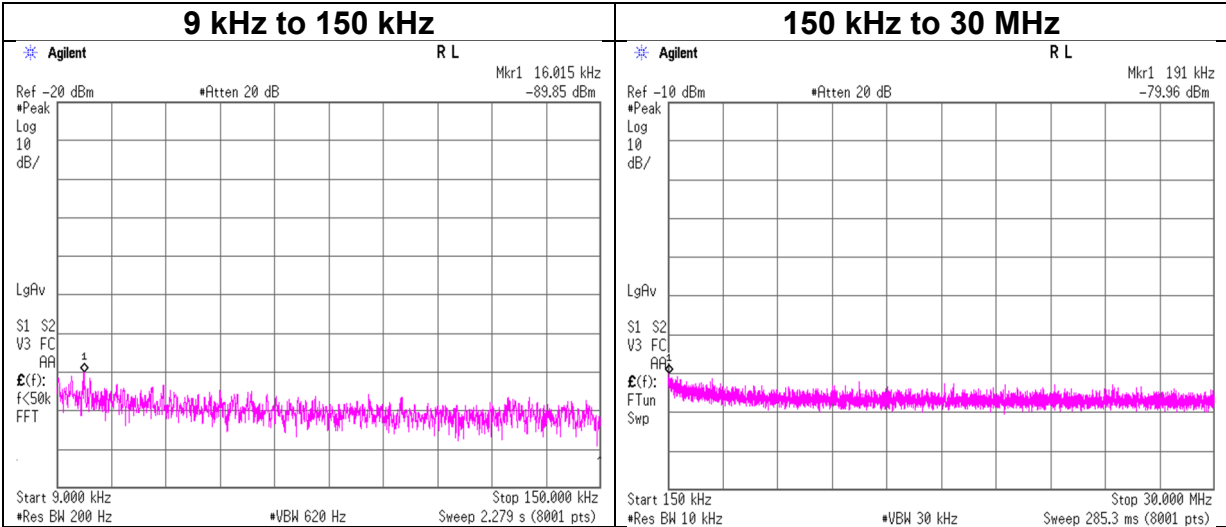
EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * log (N)

N: Number of output

Conducted Spurious Emission

Test place
Date
Temperature / Humidity
Engineer
Mode

Kashima EMC Lab. No.2 Measurement Room
January 31, 2024
20 deg. C / 48 % RH
Kazuhiro Ando
Tx 2439.5 MHz, TRX2



Frequency	Reading	Cable Loss	Attenuator Loss	Antenna Gain	N	EIRP	Distance	Ground bounce	E	Limit	Margin	Remark
[kHz]	[dBm]	[dB]	[dB]	[dBi]	(Number of Output)	[dBm]	[m]	[dB]	(field strength) [dBuV/m]	[dBuV/m]	[dB]	
16.02	-89.85	0.00	9.95	3.5	1	-76.4	300	6.0	-15.1	43.5	58.6	
191.00	-79.96	0.01	9.95	3.5	1	-66.5	300	6.0	-5.2	21.9	27.1	

E [dBuV/m] = EIRP [dBm] - 20 log (Distance [m]) + Ground bounce [dB] + 104.8 [dBuV/m]
EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * log (N)
N: Number of output

Power Density

Test place	Kashima EMC Lab. No.2 Measurement Room
Date	January 31, 2024
Temperature / Humidity	20 deg. C / 48 % RH
Engineer	Kazuhiro Ando
Mode	Tx

TRX1

Freq. [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2402.5	-10.72	0.91	10.05	0.24	8.00	7.76
2439.5	-11.02	0.92	10.05	-0.05	8.00	8.05
2471.5	-11.44	0.92	10.05	-0.47	8.00	8.47
2476.5	-13.65	0.92	10.05	-2.68	8.00	10.68

TRX2

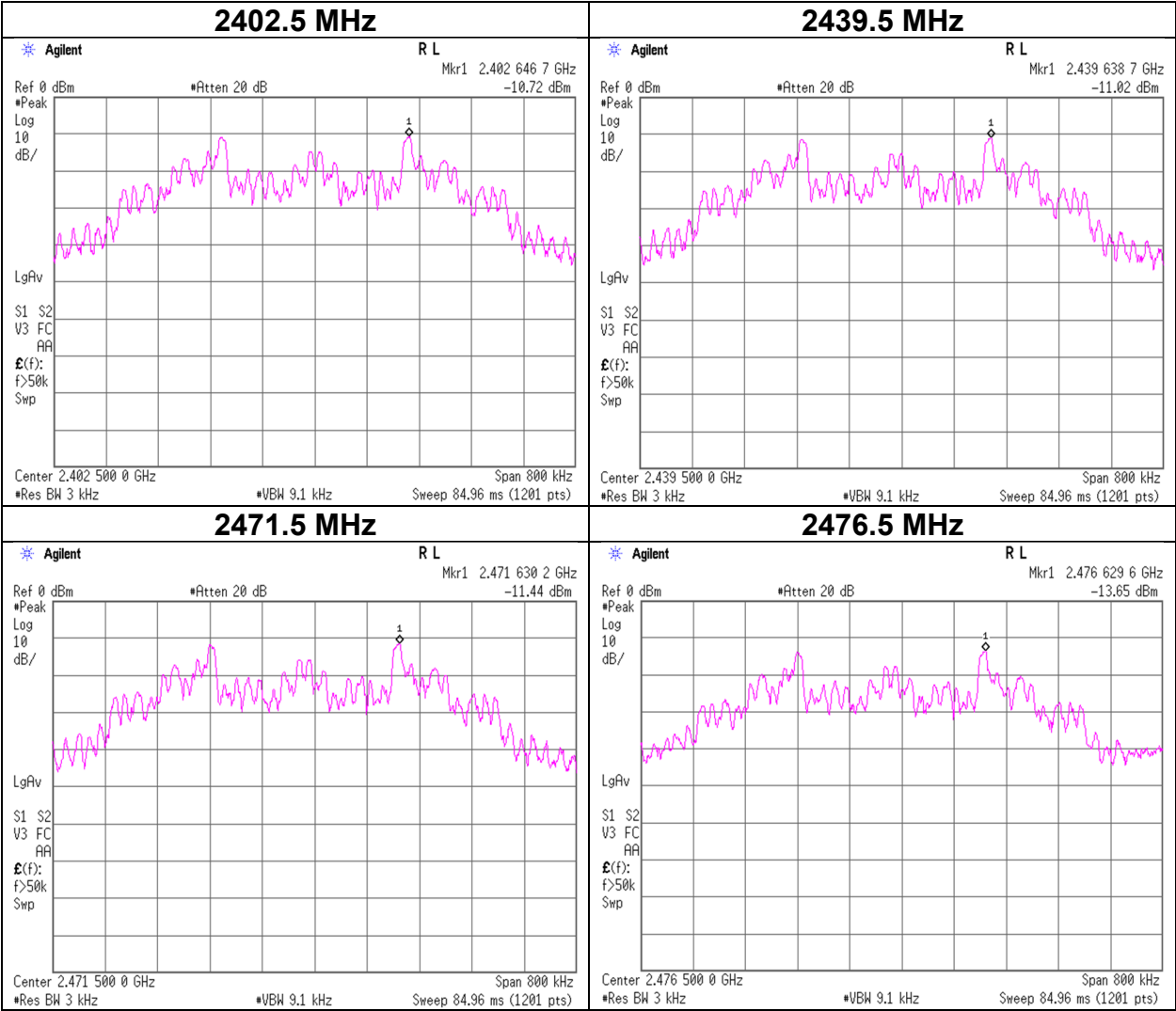
Freq. [MHz]	Reading [dBm / 3 kHz]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm / 3 kHz]	Limit [dBm / 3 kHz]	Margin [dB]
2402.5	-12.46	0.91	10.05	-1.50	8.00	9.50
2439.5	-11.95	0.92	10.05	-0.98	8.00	8.98
2471.5	-12.56	0.92	10.05	-1.59	8.00	9.59
2476.5	-14.10	0.92	10.05	-3.13	8.00	11.13

Sample Calculation:

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

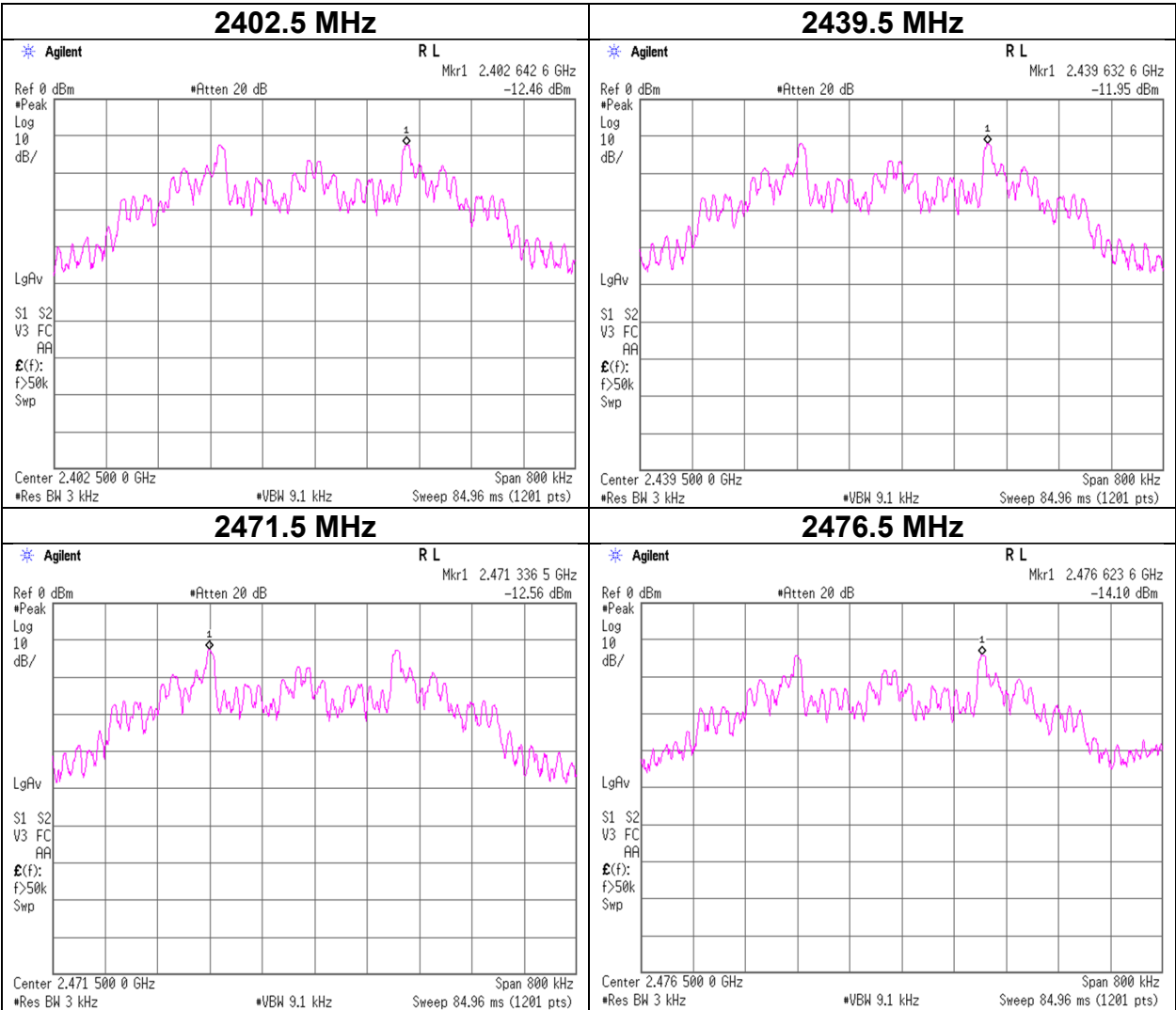
Power Density

TRX1



Power Density

TRX2



APPENDIX 2: Test Instruments

Test Equipment

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
CE	143505	A.M.N.	Rohde & Schwarz	ESH3-Z5	835239/022	2023/07/04	12
CE	143167	5 Site CE (SR) System	N/A	none(No.5 CE SR)	-	2023/07/13	12
CE	144195	Test Receiver	Rohde & Schwarz	ESCI	100053	2023/09/09	12
CE	222614	Measure	SHINWA RULES CO., LTD.	80862	none	-	-
CE	222854	Temperature & Humidity Logger	HIOKI E.E. CORPORATION	LR5001/LR9504	220820033/220899853	2023/09/19	12
CE	143133	Barometer	Sanoh Co., Ltd	SBR-151	001439	2023/03/10	36
CE	144211	Digital Multimeter	Fluke Corporation	112	89790194	2023/10/24	12
CE	178804	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3 (RE,CE,ME,PE)	Ver 3.1.0484	-	-
RE	143642	Spectrum Analyzer	Keysight Technologies Inc	N9030A	MY53310670 Version A.13.12	2023/05/23	12
RE	143643	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY52490024	2023/06/21	12
RE	192242	Microwave Cable	Huber+Suhner	AnySF104/PC35m/P C35m/1000mm	805419/4	2024/01/19	12
RE	231902	Micro Wave Cable	Junkosha	MWX221	FEB-20-23-021	2023/03/10	12
RE	143023	10dB Fixed Atten.	Weinschel - API Technologies Corp	54A-10	56251	2023/05/25	12
RE	143442	HPF	Micro-Tronics	HPM50111-02	009	2023/05/24	12
RE	144644	Semi Anechoic Chamber	TDK	SVSWR (No.11)	11	2023/05/15	12
RE	175395	Pre Amplifier	Erzia Technologies S.L.	ERZ-LNA-0100-2700-45-4	16A2001702002	2023/12/07	12
RE	143438	Double Ridged Horn	ETS-Lindgren (Cedar Park, Texas)	3160-09	00166043	2023/06/19	12
RE	142937	Pre-Amplifier	TOYO	HAP18-26W	00000035	2023/06/19	12
RE	142992	Micro Wave Cable	Suhner	SUCOFLEX102	MY010/2A	2023/06/04	12
RE	222746	Measure	SHINWA RULES CO., LTD.	80862	none	-	-
RE	200033	Temperature & Humidity Logger	HIOKI E.E. CORPORATION	LR5001/LR9504	200636447/200699543	2023/07/18	12
RE	143133	Barometer	Sanoh Co., Ltd	SBR-151	001439	2023/03/10	36
RE	144215	Digital Multimeter	Fluke Corporation	FLK-83-V	14610320	2023/10/24	12
RE	178804	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3 (RE,CE,ME,PE)	Ver 3.1.0484	-	-
RE	143169	11Site RE 3m System	N/A	none(No.11 RE)	none	2023/11/15	12
RE	143122	LOGBICON	Schwarzbeck Mess-Elektronik OHG	VULB 9168	508	2023/04/18	12
RE	178807	5dB Fixed Atten.	Pasternack Enterprises	PE7047-5	none	2023/04/18	12
RE	142936	Pre-Amplifier	SONOMA INSTRUMENT	310N	325015	2023/05/23	12
RE	144193	Test Receiver	Rohde & Schwarz	ESU40	100426	2023/04/20	12
RE	144648	Semi Anechoic Chamber	TDK	NSA (No.11)	11	2023/05/11	12
RE	143456	Double Ridged Wave Guide	ETS-Lindgren (Cedar Park, Texas)	3115	00204573	2024/02/09	12
AT	143643	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY52490024	2023/06/21	12
AT	143023	10dB Fixed Atten.	Weinschel - API Technologies Corp	54A-10	56251	2023/05/25	12
AT	143109	Micro Wave Cable	Suhner	SUCOFLEX102	MY3662/2	2023/05/25	12
AT	143588	Peak Power Analyzer	Keysight Technologies Inc	8990B	MY51000276	2023/06/20	12
AT	143606	Power Sensor	Keysight Technologies Inc	N1923A	MY54070024	2023/06/20	12
AT	222747	Measure	SHINWA RULES CO., LTD.	80862	none	-	-
AT	144210	Digital Multimeter	Fluke Corporation	112	89790193	2023/10/24	12
AT	200034	Temperature & Humidity Logger	HIOKI E.E. CORPORATION	LR5001/LR9504	200636456/200699552	2023/07/18	12
AT	143133	Barometer	Sanoh Co., Ltd	SBR-151	001439	2023/03/10	36

*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:

AT: Antenna Terminal Conducted test

CE: Conducted Emission

RE: Radiated Emission