RADIO TEST REPORT

Test Report No. 15492690S-A-R2

Customer	**TOKAI RIKA CO., LTD.**
Description of EUT	**UWB ANTENNA**
Model Number of EUT	**TRUS24E1**
FCC ID	**MOZTRUS24E1**
Test Regulation	**FCC Part 15 Subpart F**
Test Result	**Complied**
Issue Date	**March 19, 2025**
Remarks	**UWB part(s)**

Representative Test Engineer	Approved By
Hiromasa Sato Engineer	Toyokazu Imamura Engineer

CERTIFICATE 1266.03

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan, Inc.

☒ There is no testing item of "Non-accreditation".

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

REVISION HISTORY

Original Test Report No. 15492690S-A

This report is a revised version of 15492690S-A-R1. 15492690S-A-R1 is replaced with this report.

Revision	Test Report No.	Date	Revised Contents
- (Original)	15492690S-A	December 2, 2024	-
1	15492690S-A-R1	March 7, 2025	4.2 P.11 Correction of Cables name. No.3: AC -> DC
			APPENDIX 4 Deletion of remarks P.15: " *For RF Exposure evaluation Maximum RMS power measured: -45.33 dBm/MHz (refer to upper table value) / 10 ^ (-45.33 [dBm/MHz]/ 10) = 0.00002931 mW/MHz The bandwidth of this equipment was 587.156 MHz (99 % occupied bandwidth, refer to the data of bandwidth sheet) Total RMS output power was 0.01720954 mW = 0.00002931 mW/MHz x 587.156 MHz *There were no detect UWB emissions in the range that below 5000 MHz." P.16: "*For RF Exposure evaluation Maximum RMS power measured: -45.26 dBm/MHz (refer to upper table value) / 10 ^ (-45.26 [dBm/MHz]/ 10) = 0.00002979 mW/MHz The bandwidth of this equipment was 602.962 MHz (99 % occupied bandwidth, refer to the data of bandwidth sheet) Total RMS output power was 0.01796224 mW = 0.00002979 mW/MHz x 602.962 MHz *There were no detect UWB emissions in the range that below 5000 MHz." P.33: "* For RSP-100 Annex B Maximum peak power measured: -13.39 dBm/50 MHz (refer to upper table value) / 10 ^ (-13.39 [dBm/50 MHz]/ 10) = 0.045814 mW/50 MHz The bandwidth of this equipment was 587.156 MHz (99 % occupied bandwidth, refer to the data of bandwidth sheet) Total peak output power was 0.537999 mW = 0.045814 [mW/50 MHz] x 587.156 [MHz] / 50 [MHz]" P.34: "*For RSP-100 Annex B Maximum peak power measured: -13.83 dBm/50 MHz (refer to upper table value) / 10 ^ (-13.83 [dBm/50 MHz]/ 10) = 0.0414 mW/50 MHz The bandwidth of this equipment was 602.962 MHz (99 % occupied bandwidth, refer to the data of bandwidth sheet) Total peak output power was 0.499253 mW = 0.0414 [mW/50 MHz] x 602.962 [MHz] / 50 [MHz]"
			p.21, p.28, Correction of chart (correction limit line).
			p.37, p.38 Correction of Transmitter Timeout. (22.22 ms -> less than 1.5 s) Deletion of remarks "* Although no transmission signal was seen after the companion device was turned off, the transmitter timeout result was assumed to be the time for one sequence transmission, assuming that the time for one sequence transmission that EUT may transmit. "and table" (Reference data) 1 sequence chart"

Revision	Test Report No.	Date	Revised Contents
2	15492690S-A-R2	March 19, 2025	p.7 Correction of results of Conducted Emission (Complied -> N/A)
			p.7 Correction of remarks of Transmitter timeout (Conducted -> Radiated)
			p.10, P.11 Deletion of Serial No. of No. A “6.5 GHz Continuous” and “8 GHz Continuous”
			p.11 Addition of *1) and *2) of No. A
			p.37, p.38 Correction of Transmitter Timeout. (less than 1.5 s -> less than 10 s)

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
APD	Absorbed Power Density	LAN	Local Area Network
ASK	Amplitude Shift Keying	LIMS	Laboratory Information Management System
Atten., ATT	Attenuator	MCS	Modulation and Coding Scheme
AV	Average	MRA	Mutual Recognition Arrangement
BPSK	Binary Phase-Shift Keying	N/A	Not Applicable
BR	Bluetooth Basic Rate	NIST	National Institute of Standards and Technology
BT	Bluetooth	NS	No signal detect.
BT LE	Bluetooth Low Energy	NSA	Normalized Site Attenuation
BW	BandWidth	NVLAP	National Voluntary Laboratory Accreditation Program
Cal Int	Calibration Interval	OBW	Occupied Band Width
CCK	Complementary Code Keying	OFDM	Orthogonal Frequency Division Multiplexing
Ch., CH	Channel	P/M	Power meter
CISPR	Comite International Special des Perturbations Radioelectriques	PCB	Printed Circuit Board
CW	Continuous Wave	PER	Packet Error Rate
DBPSK	Differential BPSK	PHY	Physical Layer
DC	Direct Current	PK	Peak
D-factor	Distance factor	PN	Pseudo random Noise
DFS	Dynamic Frequency Selection	PRBS	Pseudo-Random Bit Sequence
DQPSK	Differential QPSK	PSD	Power Spectral Density
DSSS	Direct Sequence Spread Spectrum	QAM	Quadrature Amplitude Modulation
EDR	Enhanced Data Rate	QP	Quasi-Peak
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power	QPSK	Quadri-Phase Shift Keying
EMC	ElectroMagnetic Compatibility	RBW	Resolution Band Width
EMI	ElectroMagnetic Interference	RDS	Radio Data System
EN	European Norm	RE	Radio Equipment
ERP, e.r.p.	Effective Radiated Power	RF	Radio Frequency
EU	European Union	RMS	Root Mean Square
EUT	Equipment Under Test	RSS	Radio Standards Specifications
Fac.	Factor	Rx	Receiving
FCC	Federal Communications Commission	SA, S/A	Spectrum Analyzer
FHSS	Frequency Hopping Spread Spectrum	SAR	Specific Absorption Rate
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
HPF	High-Pass Filter	WPT	Wireless Power Transmit

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SECTION 1: Customer Information

Company Name	TOKAI RIKA CO., LTD.
Address	3-260 Toyota, Oguchi-cho, Niwa-gun, Aichi 480-0195, Japan
Telephone Number	+81-70-2244-4738
Contact Person	Tetsuhiro Okuoka

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	UWB ANTENNA
Model Number	TRUS24E1
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	September 25, 2024
Test Date	September 26 to November 6, 2024

2.2 Product Description

General Specification

Rating	DC 12 V (DC 9.5 V to 16 V)
Operating temperature	-40 deg.C to +105 deg.C

Radio Specification

[UWB]

Equipment Type	Transmitter
Frequency of Operation	6489.6 MHz (CH5), 7987.2MHz (CH9)
Type of Modulation	Burst Position Modulation and Binary Phase-Shift Keying
Antenna Gain	0.0028 dBi

SECTION 3: Test specification, Procedures & Results

3.1 Test Specification

Test Specification	FCC Part 15 Subpart F The latest version on the first day of the testing period
Title	FCC 47 CFR Part 15 Radio Frequency Device Subpart F Ultra-Wideband Operation Section 15.207 Conducted limits Section 15.503 Definitions Section 15.505 Cross reference Section 15.519 Technical requirements for hand held UWB systems Section 15.521 Technical requirements applicable to all UWB devices

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.10-2013 6. Standard test methods	**FCC:** Section 15.207 Section 15.505(a) Section 15.521(j)	-	N/A	*1)
	ISED: RSS-Gen 8.8	**ISED:** RSS-220 5.2.1(b)			
UWB Bandwidth	**FCC:** Section 15.503(a) ANSI C63.10: 2013 6 Standard test methods, 10 Procedures for measuring ultra-wideband devices	**FCC:** Section 15.503(d) Section 15.519 (b)	See data.	Complied	Radiated
	ISED: RSS-220 Annex 2	**ISED:** RSS-220 2, RSS-220 5.1			
Radiated emission	**FCC:** Section 15.503(a) ANSI C63.10: 2013 6 Standard test methods, 10 Procedures for measuring ultra-wideband devices	**FCC:** Section 15.209, Section 15.505, Section 15.519 (c) (d),Section 521(c)	3.96 dB 7864.510MHz AV, Horizontal Mode: Transmitting ch9	Complied	Radiated
	ISED: RSS-Gen 6.5 RSS-220 Annex 4	**ISED:** RSS-220 5.3.1(c)(d)(e)			
Peak level of the Emission	**FCC:** Section 15.521(e)(g) ANSI C63.10: 2013 6 Standard test methods, 10 Procedures for measuring ultra-wideband devices	**FCC:** Section 15.519 (e)	-	Complied	Radiated
	ISED: RSS-220 Annex 4	**ISED:** RSS-220 5.3.1(g)			
Transmitter timeout	**FCC:** Section 15.519(a)(1) ANSI C63.10: 2013 6 Standard test methods, 10 Procedures for measuring ultra-wideband devices	**FCC:** Section 15.519 (a)(1)	-	Complied	Radiated
	ISED: RSS-220 Annex 4	**ISED:** RSS-220 5.3.1(b)			
Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593. *1) This test not applicable since the EUT does not have AC Mains.					

FCC Part 15.31 (e)

The EUT provides stable voltage constantly to the wireless transmitter regardless of input voltage. Instead of a new battery, DC power supply was used for the test. That does not affect the test result.
Therefore, this EUT complies with the requirement.

FCC Part 15.203 Antenna requirement

It is impossible for end users to replace the antenna, because the antenna is mounted inside of the EUT.
Therefore, the equipment complies with the antenna requirement of Section 15.203.

3.3 Addition to Standard

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

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.

Item	Frequency range	Uncertainty (+/-)
Conducted Emission (AC Mains) LISN	150 kHz-30 MHz	3.0 dB
Radiated Emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.3 dB
	30 MHz-200 MHz	4.8 dB
	200 MHz-1 GHz	6.1 dB
	1 GHz-6 GHz	4.7 dB
	6 GHz-18 GHz	5.3 dB
	18 GHz-40 GHz	5.5 dB
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.6 dB
	18 GHz-40 GHz	5.8 dB

Radiated Emission (Substitution measurement)

Substitution measurement (EUT height: 1.5 m, Distance: 3 m)	
Frequency range	Uncertainty (+/-)
30 MHz - 200 MHz	4.3 dB
200 MHz - 1000 MHz	3.5 dB
1 GHz - 13 GHz	3.9 dB

Substitution measurement (EUT height: 1.5 m, Distance: 1 m)	
Frequency range	Uncertainty (+/-)
1 GHz - 13 GHz	4.6 dB
13 GHz - 18 GHz	5.2 dB
18 GHz - 26.5 GHz	3.7 dB
26.5 GHz - 40 GHz	3.7 dB

Substitution measurement (EUT height: 1.5 m, Distance: 0.5 m)	
Frequency range	Uncertainty (+/-)
1 GHz - 13 GHz	4.5 dB
13 GHz - 18 GHz	5.2 dB
18 GHz - 26.5 GHz	3.6 dB
26.5 GHz - 40 GHz	3.6 dB

Substitution measurement (EUT height: 1.5 m, Distance: 0.3 m)	
Frequency range	Uncertainty (+/-)
1 GHz - 13 GHz	4.7 dB
13 GHz - 18 GHz	5.2 dB
18 GHz - 26.5 GHz	3.6 dB
26.5 GHz - 40 GHz	3.6 dB

Substitution measurement (EUT height: 1.5 m, Distance: 0.1 m)	
Frequency range	Uncertainty (+/-)
13 GHz - 18 GHz	5.5 dB
18 GHz - 26.5 GHz	4.0 dB
26.5 GHz - 40 GHz	4.0 dB

3.5 Test Location

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

Test room	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber (SAC1)	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber (SAC2)	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber (SAC3)	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber (SAC4)	8.1 x 5.1 x 3.55	8.1 x 5.1	-
Wireless anechoic chamber 1 (WAC1)	9.5 x 6.0 x 5.4	9.5 x 6.0	3 m
Wireless anechoic chamber 2 (WAC2)	9.5 x 6.0 x 5.4	9.5 x 6.0	3 m
No.1 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 Shielded room	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	2.55 x 4.1 x 2.5	-	-
No.2 Measurement room	4.5 x 3.5 x 2.5	-	-
Wireless shielded room 1	3.0 x 4.5 x 2.7	3.0 x 4.5	-
Wireless shielded room 2	3.0 x 4.5 x 2.7	3.0 x 4.5	-

3.6 Test Data, Test Instruments, and Test Set Up

Refer to APPENDIX.

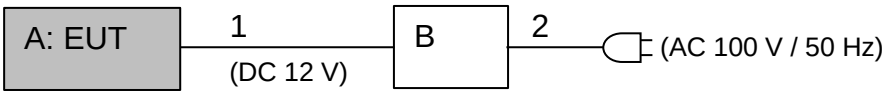
SECTION 4: Operation of EUT during testing

4.1 Operating Mode(s)

Test Item	Operating Mode	Tested frequency
Other than Transmitter timeout test	Transmitting (Tx) ch5 (6489.6 MHz), Transmitting (Tx) ch9 (7987.2 MHz)	6489.6 MHz, 7987.2 MHz
Transmitter timeout test	Normal transmitting (Tx) ch5 (6489.6 MHz), Normal transmitting (Tx) ch9 (7987.2 MHz)	6489.6 MHz, 7987.2 MHz
*Power of the EUT was set by the software as follows; Power Setting: Fixed Software: Software:TY_070D_UWBCTRL_SUB_310.hex Version:0310 (Date: 2024.06.20, Storage location: Driven by connected PC) *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.		

4.2 Configuration and Peripherals

[Other than Transmitter timeout test]



*Test data was taken under worse case conditions.

Description of EUT and support equipment

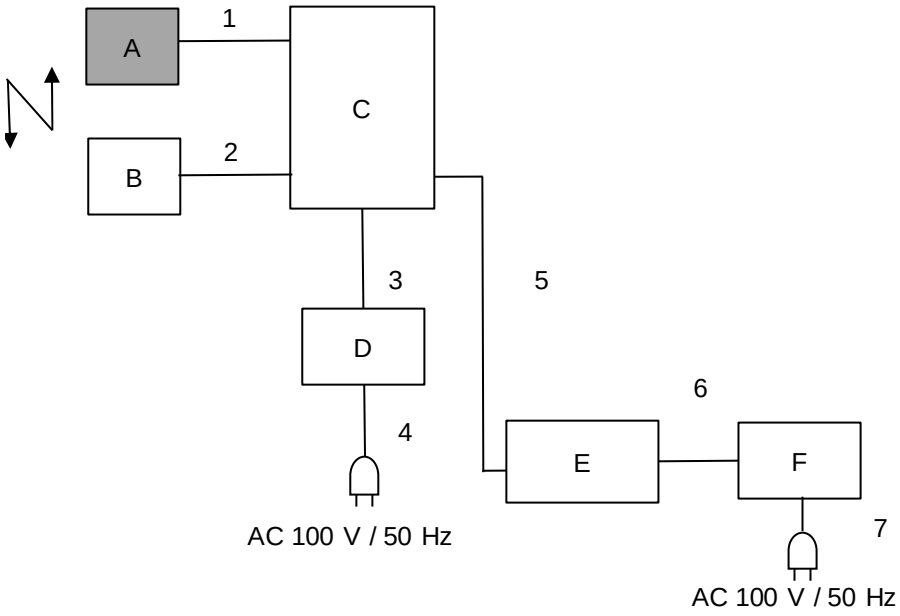
No.	Item	Model number	Serial number	Manufacturer	Remarks
A	UWB ANTENNA	TRUS24E1	No.37 *1) No.38 *2)	TOKAI RIKA CO., LTD.	EUT
B	Power Supply(DC)	PAN35-10A	BP002287	Kikusui Electronics Corp.	-

*1) Used for Transmitting ch5.
*2) Used for Transmitting ch9.

List of cables used

No.	Cable	Length (m)	Shield-Cable	Shield-Connector	Remarks
1	DC	2.0	Unshielded	Unshielded	-
2	AC	2.0	Unshielded	Unshielded	-

[Transmitter timeout test]



Description of EUT and Support Equipment

No.	Item	Model number	Serial Number	Manufacturer	Remarks
A	UWB ANTENNA	TRUS24E1	No.39 *1) No.40 *2)	TOKAI RIKA CO., LTD.	EUT
B	UWB ANTENNA	INITIATOR	No.3	TOKAI RIKA CO., LTD.	Companion device
C	UWB checker	UWB CHECKER	SS2-494	TOKAI RIKA CO., LTD.	-
D	AC adapter	AD-A120P300	2109	Xiamen UME Electronics Co., Ltd.	-
E	Laptop computer	Dell Precision M2800	27KM3 A01	Dell	-
F	AC adapter	LA130PM121	0VJJCH5	Dell	-

*1) Used for Normal transmitting ch5.
*2) Used for Normal transmitting ch9.

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC & signal cable	2.1	Unshielded	Unshielded	-
2	DC & signal cable	2.1	Unshielded	Unshielded	-
3	DC	1.5	Unshielded	Unshielded	-
4	AC	1.8	Unshielded	Unshielded	-
5	USB	1.5	Shielded	Shielded	-
6	DC	1.7	Unshielded	Unshielded	-
7	AC	0.9	Unshielded	Unshielded	-

SECTION 5: Radiated Emission

Test Procedure

[For below 30 MHz]
EUT was placed on a platform of nominal size, 0.15 m by 0.05 m, raised 0.8 m above the conducting ground plane. The table is made of expanded polystyrol and expanded polypropylene. That has very low permittivity.
The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.
The measurements were performed for vertical polarization (antenna angle: 0 deg., 45 deg., 90 deg., and 135 deg.) and horizontal polarization.
*Refer to Figure 1 about Direction of the Loop Antenna.

[For 30 MHz to 960 MHz]
EUT was placed on a platform of nominal size, 0.15 m by 0.05 m, raised 0.8 m above the conducting ground plane. The table is made of expanded polystyrol and expanded polypropylene. That has very low permittivity.

[For 960 MHz to 1000 MHz]
EUT was placed on a urethane platform of nominal size, 0.15 m by 0.05 m, raised 1.5 m above the conducting ground plane.

[For above 1000 MHz]
EUT was placed on a urethane platform of nominal size, 0.15 m by 0.05 m, raised 1.5 m above the conducting ground plane.

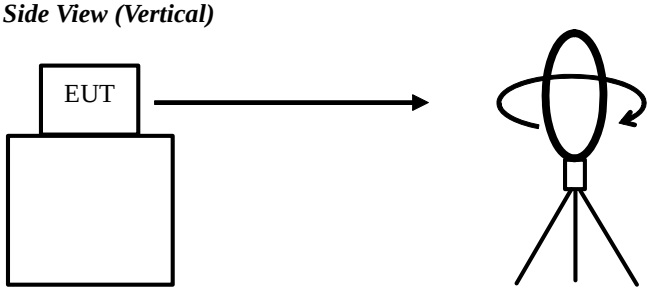
UWB emissions and other emissions:
1) The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
The measurements were performed for both vertical and horizontal antenna polarization with the 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.

(UWB emissions only) (refer to ANSI C63.10 (reference ANSI C63.26))
2) Exchanged the EUT to the Substitution Antenna, the measurement was set for the same height 1.5 m as the EUT. The frequency below 1 GHz of the Substitution Antenna was used the Half wave dipole Antenna, which was tuned the measured frequency in 1).
The frequency above 1 GHz of the Substitution Antenna was used Horn Antenna.
The Substitution Antenna was connected to the Signal Generator, and the polarized electromagnetic radiation of the Substitution Antenna was matched with the one of the measuring Antenna, which was set with the Signal Generator to the measured frequency in 1). Then, we set with the Output power (CW) of the Signal Generator where the measuring electromagnetic field strength is equal to the measured value in 1) by means of varying the measuring antenna height between 1 to 4 m to obtain maximum receiving level.
Its Output power of Signal Generator was recorded.

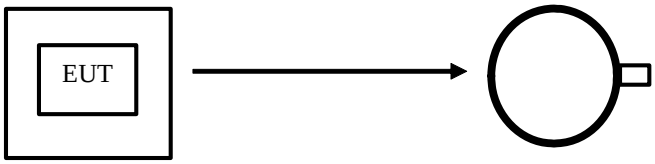
3) Equivalent isotropic radiated power was calculated by subtracting the cable loss and the attenuator loss connected between the signal generator and the substitution antenna from the output power of the signal generator recorded in 2).
For the usage of the antenna (horn antenna) for the substitution antenna, the equivalent isotropic radiated power was calculated by compensating the finite substitution antenna.

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

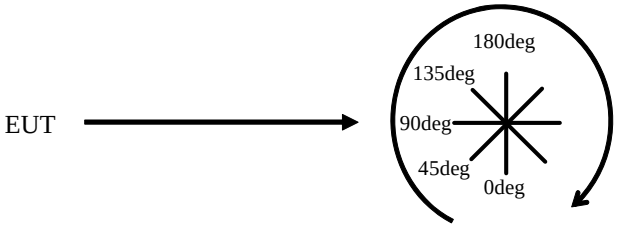


Top View (Horizontal)



Antenna was not rotated.

Top View (Vertical)



Front side: 0 deg.
Forward direction: clockwise

Test Antennas are used as below;

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

Frequency	Below 30 MHz	30 to 960 MHz	Above 960 MHz	
Instrument used	Test Receiver	Test Receiver	Spectrum Analyzer	
Detector	Quasi-Peak	Quasi-Peak	Peak	RMS (AV) *2)
IF Bandwidth	BW 9 kHz	BW 120 kHz	UWB spurious emission: RBW: 1 MHz, VBW: 3 MHz Carrier emission: RBW: 50 MHz, VBW: 80 MHz	UWB spurious emission: RBW: 1 MHz, VBW: 3 MHz GPS band emission: RBW: 1 kHz, VBW: 3 kHz
Test Distance	3 m	3 m	3.0 m (960 MHz to 1 GHz) 0.5 m (1 GHz to 10.6 GHz) *1) 0.3 m (10.6 GHz to 18 GHz) *1) 0.1 m (above 18 GHz) *1)	

*1) For section 10.3.2 of ANSI C63.10: 2013. This measurement was performed at less than 3 m due to the small radiation emission of EUT. In addition, this measurement was performed by the substitution measurement.
Since there are frequencies that are the distance of the near field condition with respect to the measurement distance, we have verified the measurement results in the near field condition and the far field condition and confirmed that there was no difference in the test results.

*2) For section 10.3.7 of ANSI C63.10: 2013. This measurement was set the sweep time so that there is no more than a 1 ms integration period over each measurement bin.

- 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.

Polarity	Frequency [GHz]							
	Below 0.030	0.030 to 0.96	0.96 to 1	1 to 2	2 to 10.6	10.6 to 18	18 to 26.5	26.5 to 40
Horizontal	X	X	X	X	Z	Y	Z	Z
Vertical	X	X	X	X	X	Y	Z	Z

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

Measurement range : 9 kHz to 40 GHz
Test data : APPENDIX
Test result : Pass

SECTION 6: UWB bandwidth and 99 % occupied bandwidth

Test Procedure

The tests were made with below setting by a radiated electric field in semi-anechoic chamber.

Test	Span	RBW	VBW	Sweep	Detector	Trace	Instrument used
UWB Bandwidth, 99 % Occupied Bandwidth	1 GHz	1 MHz or 10 MHz	3 MHz or 30 MHz	Auto	Peak	Max Hold	Spectrum Analyzer

Test data : APPENDIX
Test result : Pass

SECTION 7: Transmitter timeout

Test Procedure

The test was made with spectrum analyzer.

Test Data : APPENDIX
Test Result : Pass

APPENDIX 1: Test Data

Radiated emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC3
Date	October 30, 2024
Temperature / Humidity	24 deg. C / 42 % RH
Engineer	Kouki Yamada
Mode	Transmitting ch5

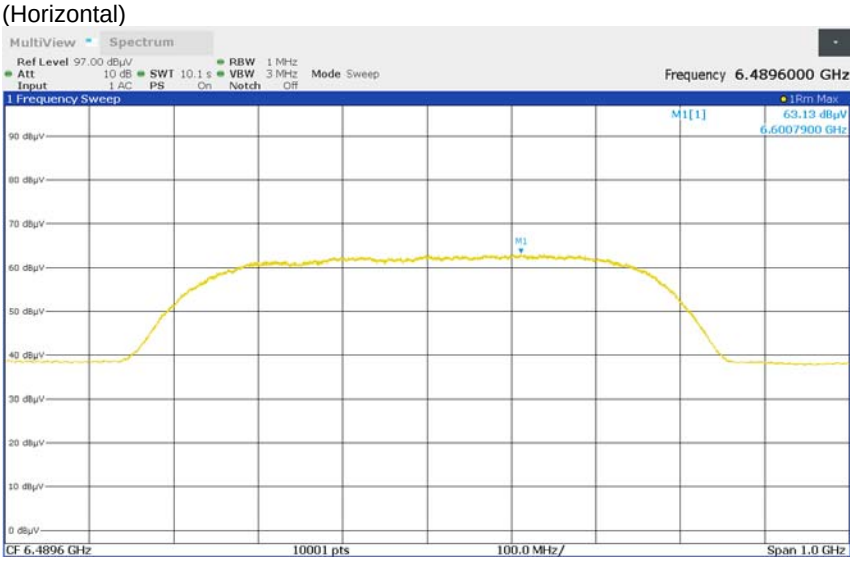
(UWB emission, carrier emission)

(*SA: Spectrum analyzer, SG: Signal generator, Ant.: substitution antenna)

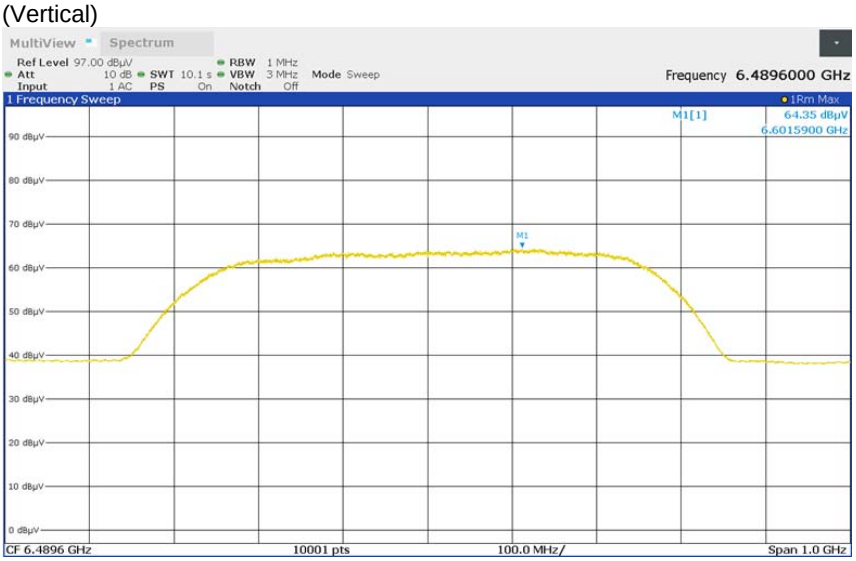
Band	Pol.	Frequency [MHz]	SA Reading [dBuV/MHz]	SG level [dBm]	Tx Ant.Gain [dBi]	Tx Loss [dB]	-	EIRP Result [dBm/MHz]	EIRP Limit [dBm/MHz]	Margin [dB]	Remarks	Height [cm]	Angle [deg.]
3.1 GHz - 10.6 GHz	Hor.	6600.790	63.13	-46.49	10.55	10.35	-	-46.29	-41.30	4.99	carrier	156	64
3.1 GHz - 10.6 GHz	Ver.	6601.590	64.35	-45.54	10.56	10.35	-	-45.33	-41.30	4.03	carrier	155	340

Sample Calculation :
EIRP Result [dBm/MHz] = SG level [dBm] + Tx Ant.Gain [dBi] - Tx Loss [dB]

(Horizontal)



(Vertical)



Radiated emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC3
Date	October 30, 2024
Temperature / Humidity	24 deg. C / 42 % RH
Engineer	Kouki Yamada
Mode	Transmitting ch9

(UWB emission, carrier emission)

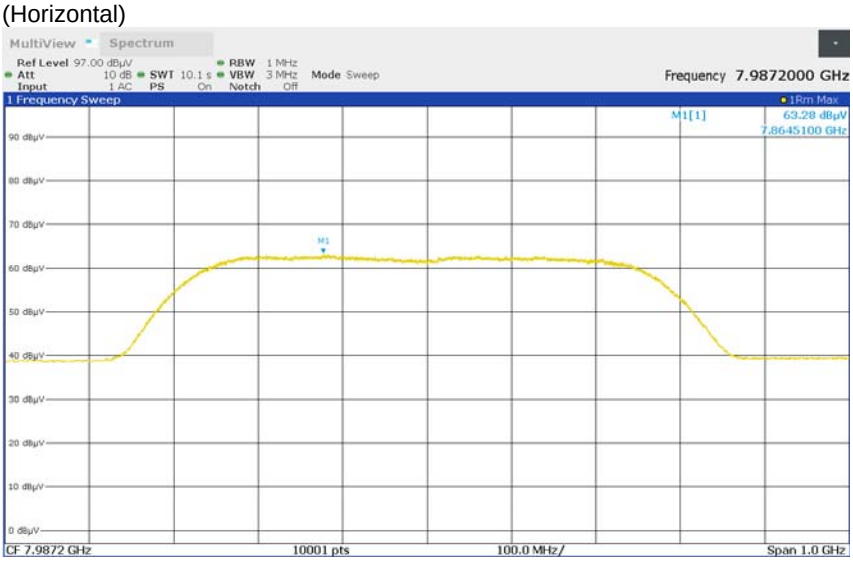
(*SA: Spectrum analyzer, SG: Signal generator, Ant.: substitution antenna)

Band	Pol.	Frequency [MHz]	SA Reading [dBuV/MHz]	SG level [dBm]	Tx Ant.Gain [dBi]	Tx Loss [dB]	-	EIRP Result [dBm/MHz]	EIRP Limit [dBm/MHz]	Margin [dB]	Remarks	Height [cm]	Angle [deg.]
3.1 GHz - 10.6 GHz	Hor.	7864.510	63.28	-46.45	12.45	11.26	-	-45.26	-41.30	3.96	carrier	155	61
3.1 GHz - 10.6 GHz	Ver.	8111.990	62.80	-47.16	12.85	11.43	-	-45.74	-41.30	4.44	carrier	153	17

Sample Calculation :

EIRP Result [dBm/MHz] = SG level [dBm] + Tx Ant.Gain [dBi] - Tx Loss [dB]

(Horizontal)



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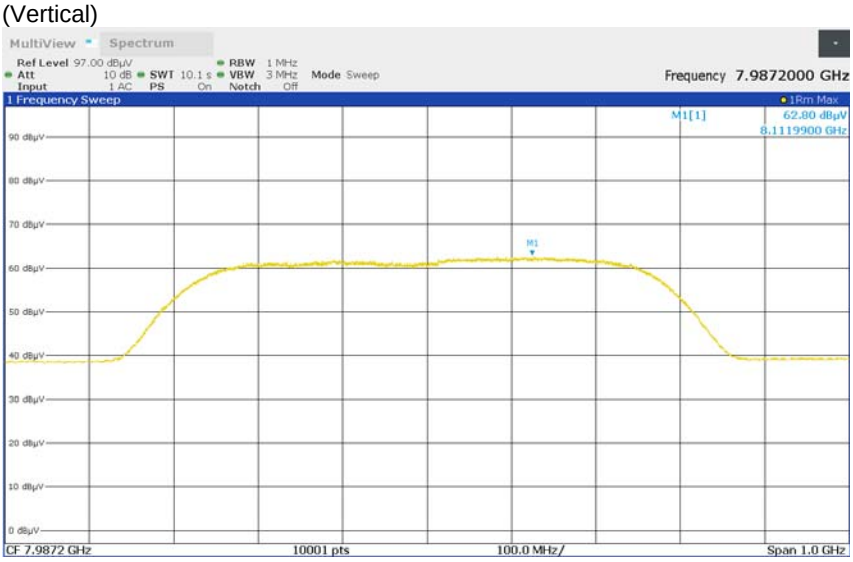


Radiated emission

Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	SAC2	SAC2	SAC2	SAC3
Date	October 9, 2024	October 8, 2024	October 7, 2024	October 30, 2024
Temperature / Humidity	21 deg. C / 68 % RH	24 deg. C / 66 % RH	24 deg. C / 69 % RH	24 deg. C / 42 % RH
Engineer	Hiromasa Sato (9 kHz to 30 MHz)	Hiromasa Sato (30 MHz to 1 GHz)	Kouki Yamada (1 GHz to 2 GHz, 10.6 GHz to 18 GHz)	Kouki Yamada (2 GHz to 10.6 GHz)
Mode	Transmitting ch5			

(UWB emission except carrier emission)

9 kHz to 18 GHz

No.	Freq.	Reading (PK)	SG Level	TX Ant.Gain	TX Loss	ERP		Margin	Pola.	Height	Angle	TX Ant.Type	Comment
						Result	Limit						
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	12979.200	36.38	-72.78	13.23	14.62	-74.17	-61.30	12.8	Hori.	158	232	Horn	RMS
2	12979.200	36.61	-75.89	13.23	14.62	-77.28	-61.30	15.9	Vert.	157	204	Horn	RMS

Calculation:Result [dBm] = SG level [dBm] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

* For below 960 MHz, RBW was set according to FCC 15.209 / RSS-Gen, Above 960 MHz was set to 1 MHz .
(* There were no detect UWB emissions in the range that below 960 MHz)

Radiated emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC2	SAC2
Date	September 26, 2024	October 7, 2024
Temperature / Humidity	24 deg. C / 38 % RH	24 deg. C / 63 % RH
Engineer	Hiromasa Sato (18 GHz to 26.5 GHz)	Makoto Hosaka (26.5 GHz to 40 GHz)
Mode	Transmitting ch5	

(UWB emission except carrier emission)

18 GHz to 26.5 GHz

No.	Freq.	Reading (PK)	SG Level	TX Ant.Gain	TX Loss	EIRP		Margin	Pola.	Height	Angle	TX Ant.Type	Comment
						Result	Limit						
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	19468.801	32.88	-81.15	10.47	18.24	-88.92	-61.30	27.6	Hori.	150	0	Horn	RMS Floor noise
2	25958.400	46.54	-59.39	12.47	21.08	-68.00	-61.30	6.7	Hori.	160	342	Horn	RMS
3	19468.801	32.67	-83.17	10.47	18.24	-90.94	-61.30	29.6	Vert.	150	0	Horn	RMS Floor noise
4	25958.400	45.33	-59.88	12.47	21.08	-68.49	-61.30	7.1	Vert.	152	304	Horn	RMS

Calculation:Result [dBm] = SG level [dBm] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

26.5 GHz to 40 GHz

No.	Freq.	Reading (PK)	SG Level	TX Ant.Gain	TX Loss	EIRP		Margin	Pola.	Height	Angle	TX Ant.Type	Comment
						Result	Limit						
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	32448.000	39.53	-82.19	12.53	24.18	-93.84	-61.30	32.5	Hori.	150	0	Horn	Floor noise
2	38937.602	45.15	-70.66	15.57	26.88	-81.97	-61.30	20.6	Hori.	156	0	Horn	RMS
3	32448.000	39.53	-82.53	12.53	24.18	-94.18	-61.30	32.8	Vert.	150	0	Horn	Floor noise
4	38937.602	42.72	-79.10	15.57	26.88	-90.41	-61.30	29.1	Vert.	156	322	Horn	RMS

Calculation:Result [dBm] = SG level [dBm] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

Radiated emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC2
Date	October 8, 2024
Temperature / Humidity	24 deg. C / 66 % RH
Engineer	Hiromasa Sato (30 MHz to 1 GHz)
Mode	Transmitting ch5

(Other emission)

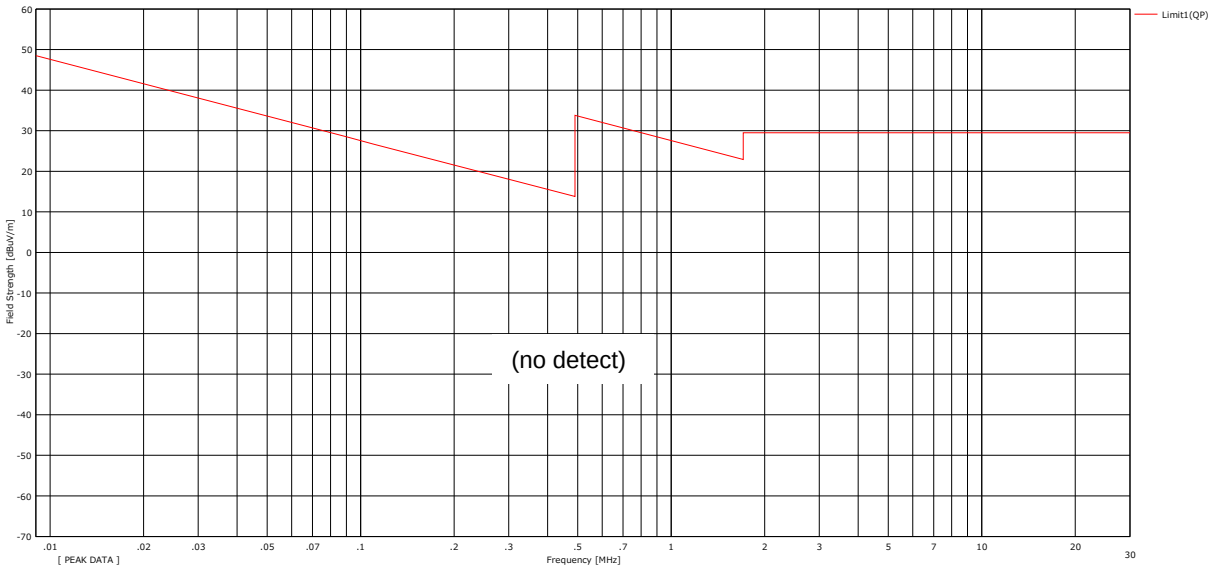
No.	Freq.	Reading (QP)	Ant.Fac	Loss	Gain	Result (QP)	Limit (QP)	Margin (QP)	Pola.	Height	Angle	Ant. Type	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]		
1	35.909	21.35	16.34	7.01	31.94	12.76	40.00	27.2	Hori.	211	316	BC	
2	62.736	20.41	7.59	7.07	31.92	3.15	40.00	36.8	Hori.	287	359	BC	
3	219.130	21.26	10.55	5.93	31.79	5.95	46.00	40.0	Hori.	115	160	LP	
4	664.845	20.11	20.22	8.87	31.63	17.57	46.00	28.4	Hori.	168	41	LP	
5	85.145	21.39	7.24	8.27	31.91	4.99	40.00	35.0	Vert.	100	259	BC	
6	94.047	22.17	9.09	8.18	31.90	7.54	43.50	35.9	Vert.	100	223	BC	
7	182.872	20.42	16.17	8.88	31.82	13.65	43.50	29.8	Vert.	100	250	BC	

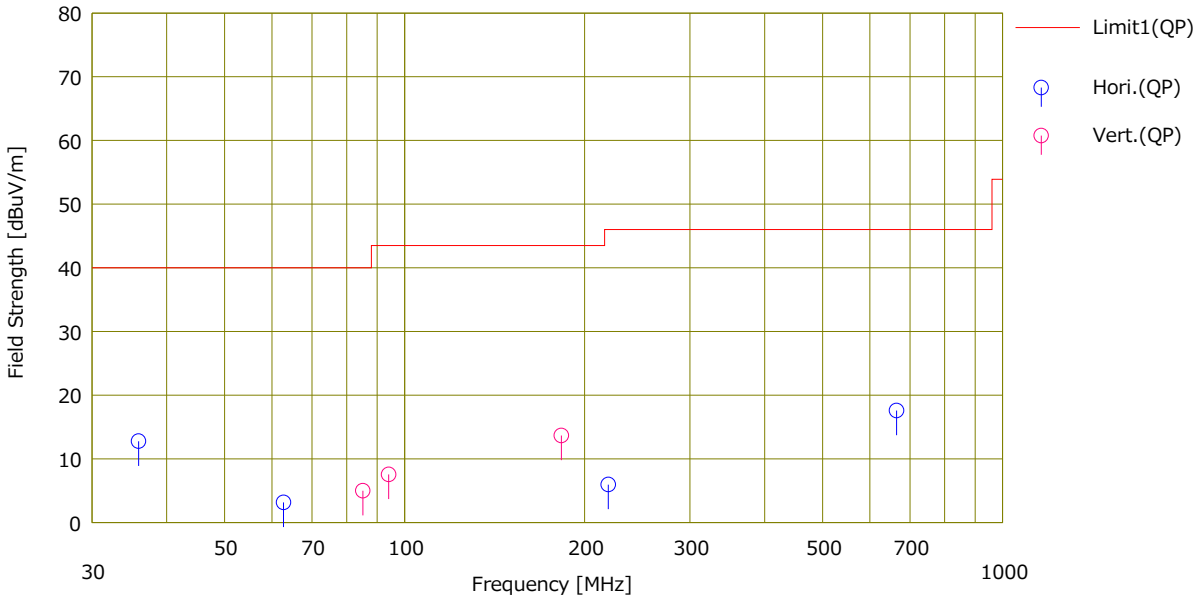
Calculation Result [dBuV/m] = Reading [dBuV/m] + Ant.Fac [dB/m] + Loss (Cable + ATT + Δ AF)[dB] - Gain (AMP)[dB]
Ant.Type = BC: Biconical antenna, LP: Logperiodic antenna, **SH*: Horn antenna

(* There were no detect other emissions in the range that below 30 MHz and above 960 MHz)

Radiated emission

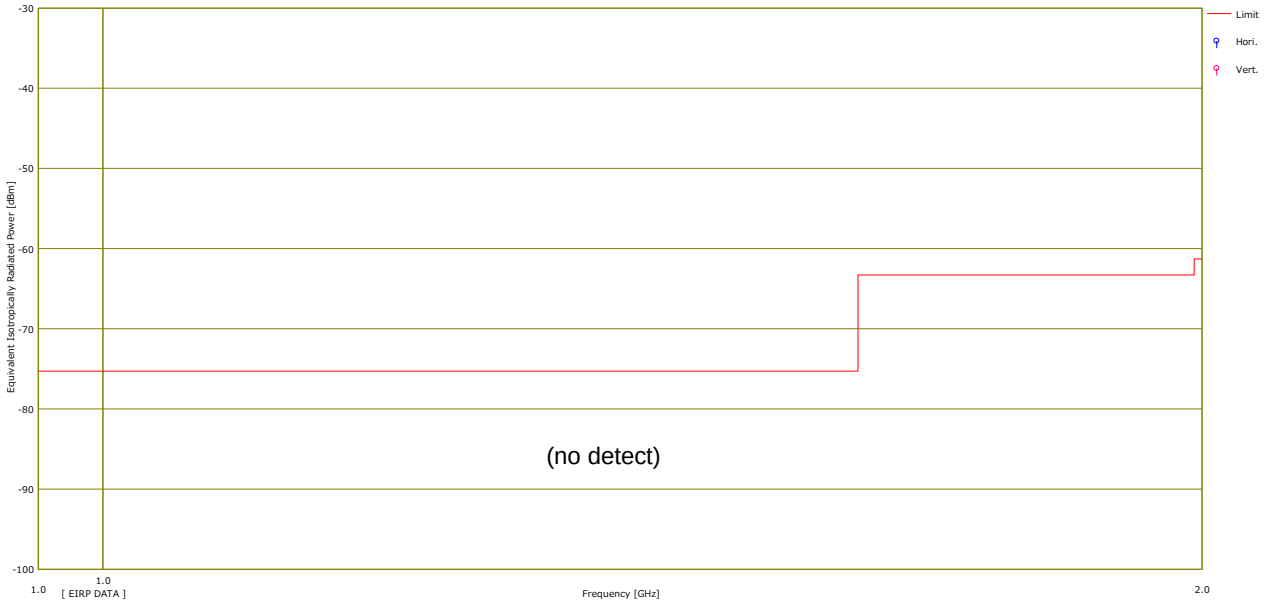
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC2	SAC2
Date	October 9, 2024	October 8, 2024
Temperature / Humidity	21 deg. C / 68 % RH	24 deg. C / 66 % RH
Engineer	Hiromasa Sato (9 kHz to 30 MHz)	Hiromasa Sato (30 MHz to 1 GHz)
Mode	Transmitting ch5	

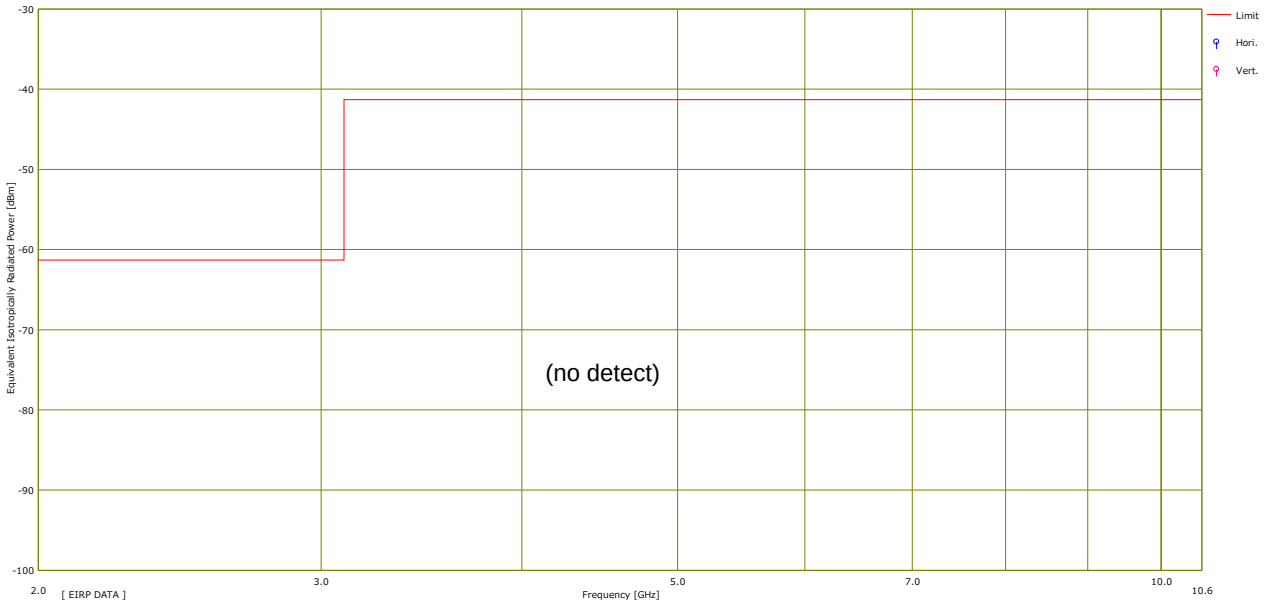




Radiated emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	SAC2	SAC3	SAC2
Date	October 7, 2024	October 30, 2024	October 7, 2024
Temperature / Humidity	24 deg. C / 69 % RH	24 deg. C / 42 % RH	24 deg. C / 69 % RH
Engineer	Kouki Yamada (1 GHz to 2 GHz)	Kouki Yamada (2 GHz to 10.6 GHz)	Kouki Yamada (10.6 GHz to 18 GHz)
Mode	Transmitting ch5		

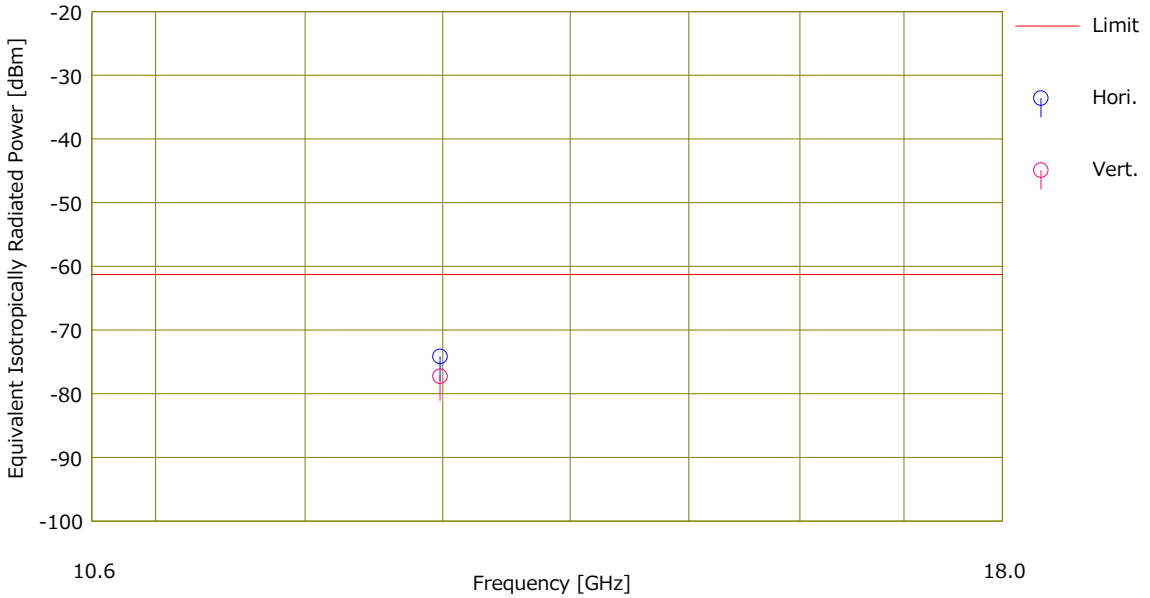


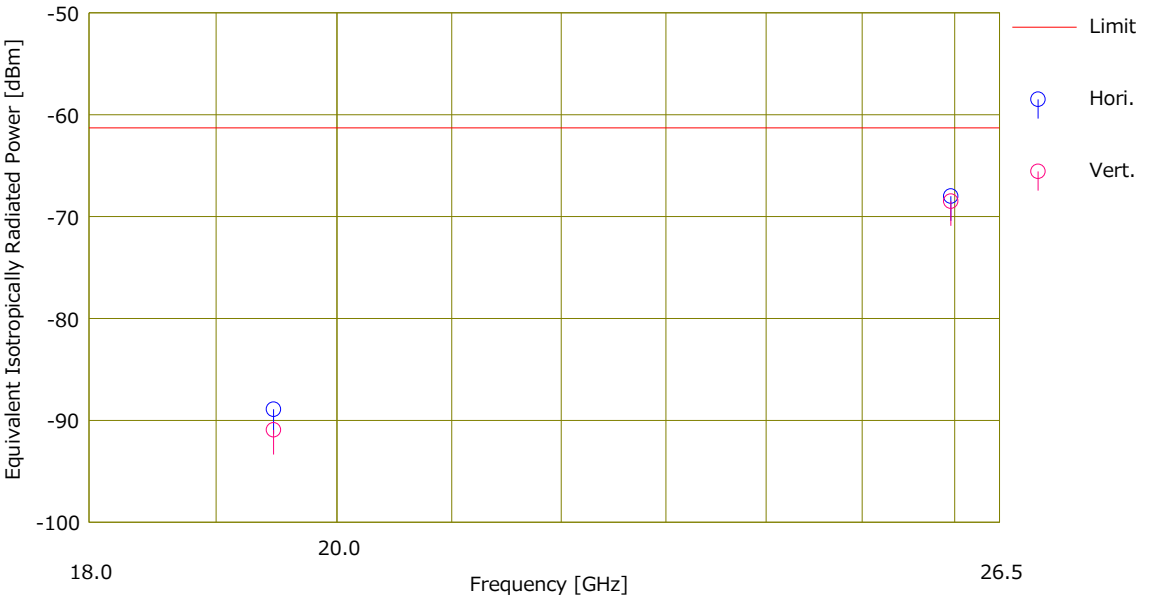


(* except GPS band and carrier emissions)

Radiated emission

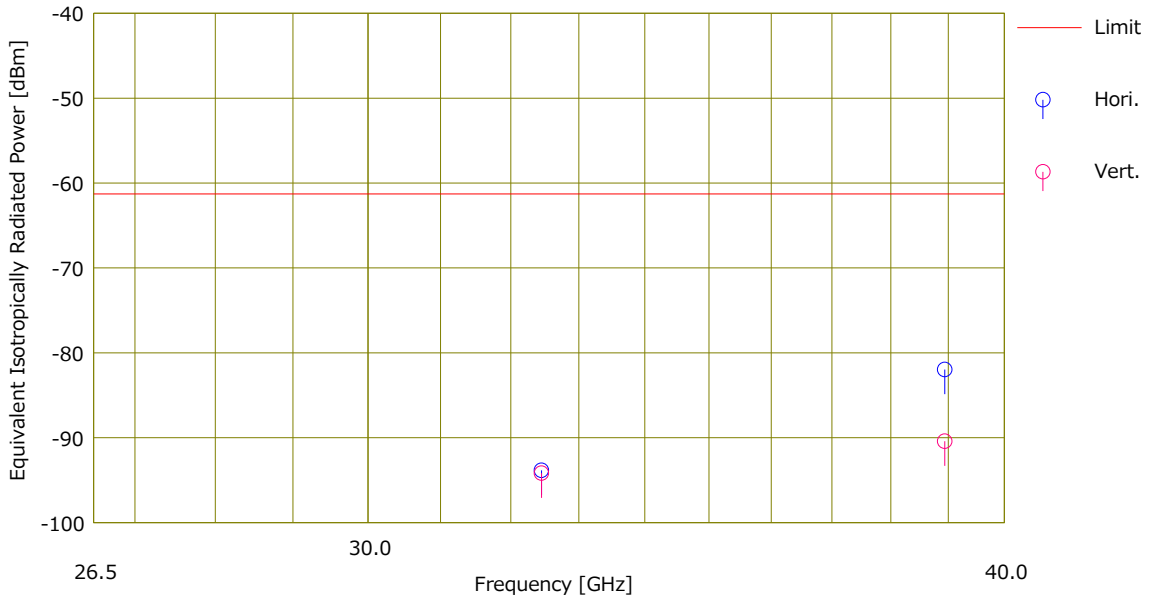
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC2	SAC3
Date	October 7, 2024	September 26, 2024
Temperature / Humidity	24 deg. C / 69 % RH	24 deg. C / 38 % RH
Engineer	Kouki Yamada (10.6 GHz to 18 GHz)	Hiromasa Sato (18 GHz to 26.5 GHz)
Mode	Transmitting ch5	





Radiated emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC2
Date	October 7, 2024
Temperature / Humidity	24 deg. C / 63 % RH
Engineer	Makoto Hosaka (26.5 GHz to 40 GHz)
Mode	Transmitting ch5



Radiated emission

Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	SAC2	SAC2	SAC2	SAC3
Date	October 9, 2024	October 8, 2024	October 7, 2024	October 30, 2024
Temperature / Humidity	21 deg. C / 68 % RH	24 deg. C / 66 % RH	24 deg. C / 69 % RH	24 deg. C / 42 % RH
Engineer	Hiromasa Sato (9 kHz to 30 MHz)	Hiromasa Sato (30 MHz to 1 GHz)	Kouki Yamada (1 GHz to 2 GHz, 10.6 GHz to 18 GHz)	Kouki Yamada (2 GHz to 10.6 GHz)
Mode	Transmitting ch9			

(UWB emission except carrier emission)

9 kHz to 18 GHz

No.	Freq.	Reading (PK)	SG Level	TX Ant.Gain	TX Loss	ERP		Margin	Pola.	Height	Angle	TX Ant.Type	Comment
						Result	Limit						
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	15974.400	36.13	-66.71	13.48	16.21	-69.44	-61.30	8.1	Hori.	153	12	Horn	RMS
2	15974.400	35.43	-68.35	13.48	16.21	-71.08	-61.30	9.7	Vert.	158	34	Horn	RMS

Calculation:Result [dBm] = SG level [dBm] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

* For below 960 MHz, RBW was set according to FCC 15.209 / RSS-Gen, Above 960 MHz was set to 1 MHz .
(* There were no detect UWB emissions in the range that below 960 MHz)

Radiated emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC2	SAC3
Date	October 7, 2024	September 26, 2024
Temperature / Humidity	24 deg. C / 63 % RH	24 deg. C / 38 % RH
Engineer	Makoto Hosaka (18 GHz to 26.5 GHz)	Hiromasa Sato (26.5 GHz to 40 GHz)
Mode	Transmitting ch9	

(UWB emission except carrier emission)

18 GHz to 26.5 GHz

No.	Freq.	Reading (PK)	SG Level	TX Ant.Gain	TX Loss	EIRP Result	EIRP Limit	Margin	Pola.	Height	Angle	TX Ant.Type	Comment
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	23961.600	33.05	-80.02	12.57	20.20	-87.65	-61.30	26.3	Hori.	150	0	Horn	Floor noise
2	23961.600	33.06	-80.36	12.57	20.20	-87.99	-61.30	26.6	Vert.	150	0	Horn	Floor noise

Calculation:Result [dBm] = SG level [dBm] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

26.5 GHz to 40 GHz

No.	Freq.	Reading (PK)	SG Level	TX Ant.Gain	TX Loss	EIRP Result	EIRP Limit	Margin	Pola.	Height	Angle	TX Ant.Type	Comment
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	31948.801	54.46	-55.47	13.01	23.61	-66.07	-61.30	4.7	Hori.	150	11	Horn	RMS
2	39936.000	44.09	-72.40	14.02	26.88	-85.26	-61.30	23.9	Hori.	159	0	Horn	RMS Floor noise
3	31948.801	53.86	-56.49	13.01	23.61	-67.09	-61.30	5.7	Vert.	151	274	Horn	RMS
4	39936.000	44.23	-73.06	14.02	26.88	-85.92	-61.30	24.6	Vert.	150	0	Horn	RMS Floor noise

Calculation:Result [dBm] = SG level [dBm] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

Radiated emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC2
Date	October 8, 2024
Temperature / Humidity	24 deg. C / 66 % RH
Engineer	Hiromasa Sato (30 MHz to 1 GHz)
Mode	Transmitting ch9

(Other emission)

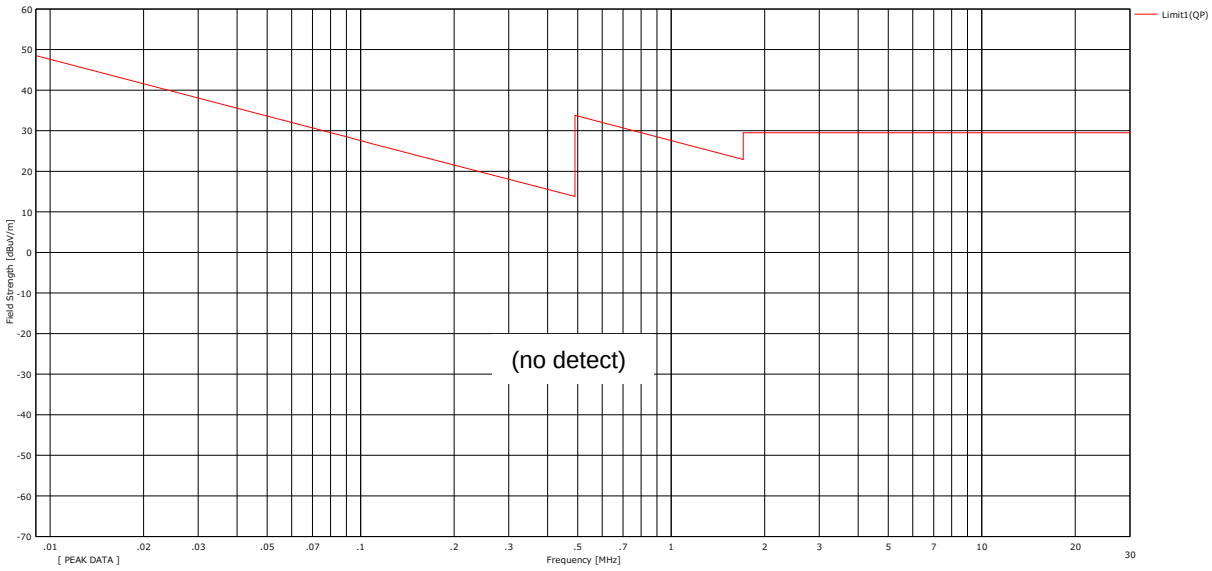
No.	Freq.	Reading (QP)	Ant.Fac	Loss	Gain	Result (QP)	Limit (QP)	Margin (QP)	Pola.	Height	Angle	Ant. Type	Comment
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]		
1	35.979	21.19	16.32	7.01	31.94	12.58	40.00	27.4	Hori.	213	232	BC	
2	62.735	20.58	7.60	7.07	31.92	3.33	40.00	36.6	Hori.	284	358	BC	
3	219.070	21.30	10.54	5.93	31.79	5.98	46.00	40.0	Hori.	101	165	LP	
4	664.801	20.24	20.22	8.87	31.63	17.70	46.00	28.3	Hori.	175	31	LP	
5	85.211	21.28	7.25	8.27	31.91	4.89	40.00	35.1	Vert.	100	267	BC	
6	93.701	22.13	9.02	8.18	31.90	7.43	43.50	36.0	Vert.	100	222	BC	
7	182.843	20.38	16.17	8.88	31.82	13.61	43.50	29.8	Vert.	100	253	BC	

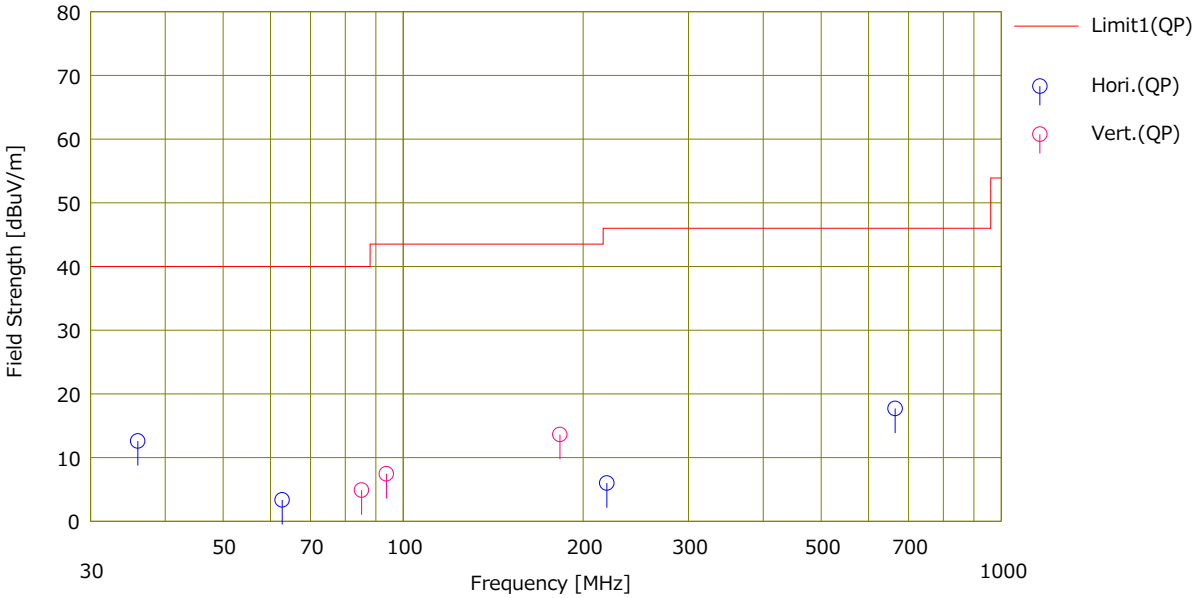
Calculation Result [dBuV/m] = Reading [dBuV/m] + Ant.Fac [dB/m] + Loss (Cable + ATT + Δ AF)[dB] - Gain (AMP)[dB]
Ant.Type = BC: Biconical antenna, LP: Logperiodic antenna, **SH*: Horn antenna

(* There were no detect other emissions in the range that below 30 MHz and above 960 MHz)

Radiated emission

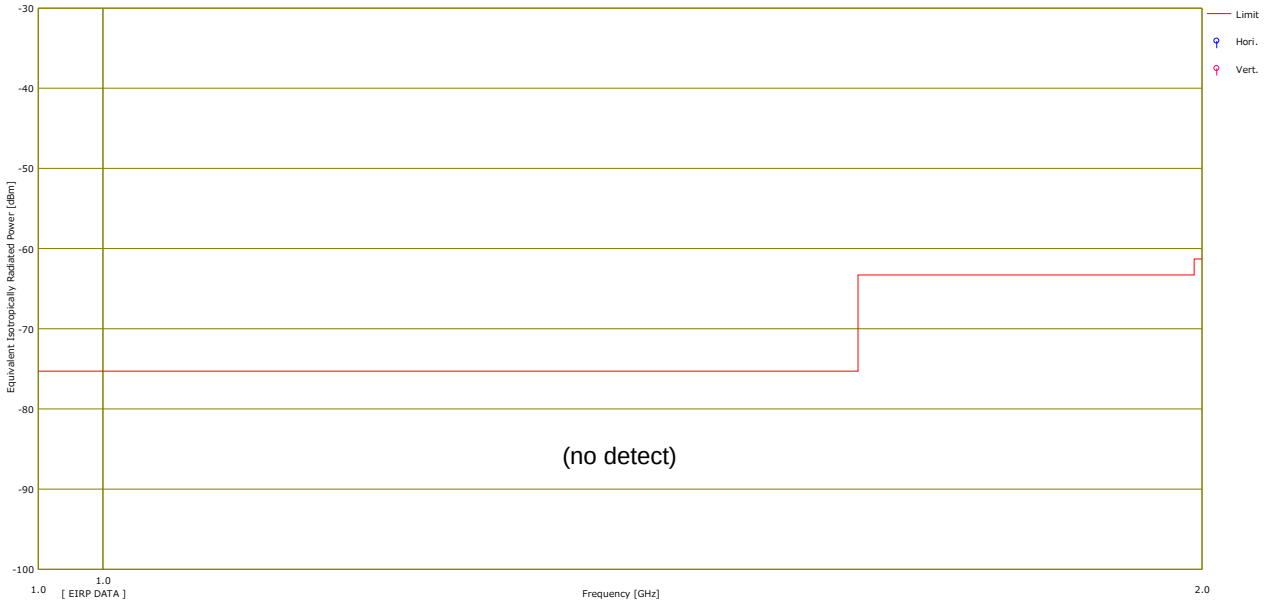
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC2	SAC2
Date	October 9, 2024	October 8, 2024
Temperature / Humidity	21 deg. C / 68 % RH	24 deg. C / 66 % RH
Engineer	Hiromasa Sato (9 kHz to 30 MHz)	Hiromasa Sato (30 MHz to 1 GHz)
Mode	Transmitting ch9	

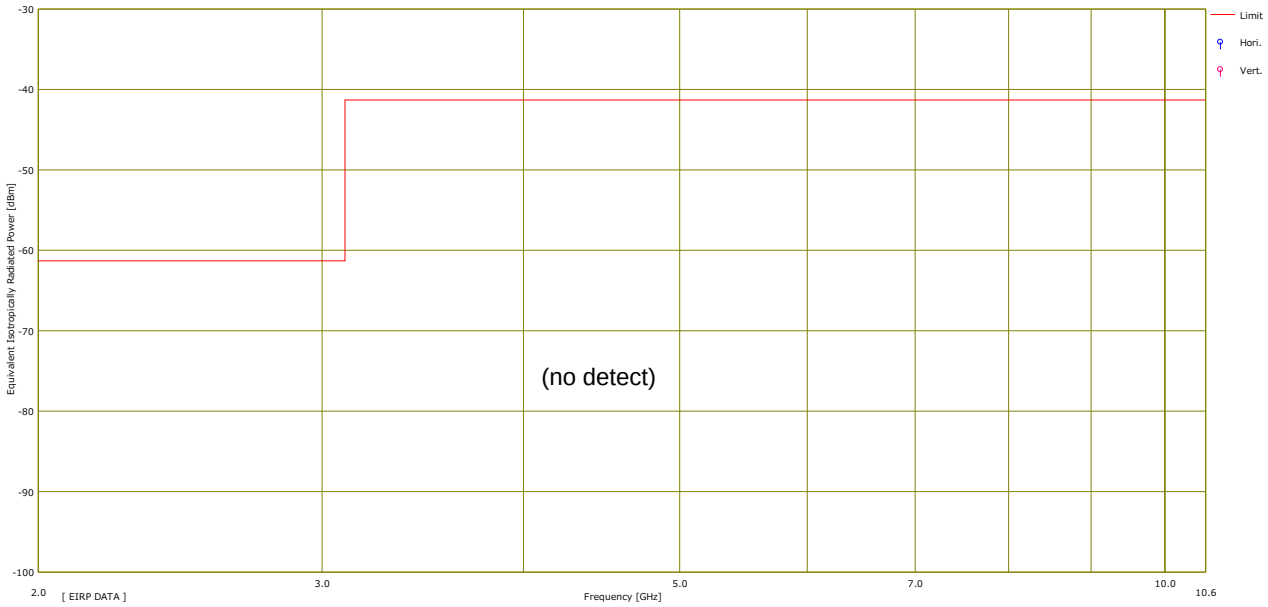




Radiated emission

Test place	Shonan EMC Lab.		
Semi Anechoic Chamber	SAC2	SAC3	SAC2
Date	October 7, 2024	October 30, 2024	October 7, 2024
Temperature / Humidity	24 deg. C / 69 % RH	24 deg. C / 42 % RH	24 deg. C / 69 % RH
Engineer	Kouki Yamada (1 GHz to 2 GHz)	Kouki Yamada (2 GHz to 10.6 GHz)	Kouki Yamada (10.6 GHz to 18 GHz)
Mode	Transmitting ch9		

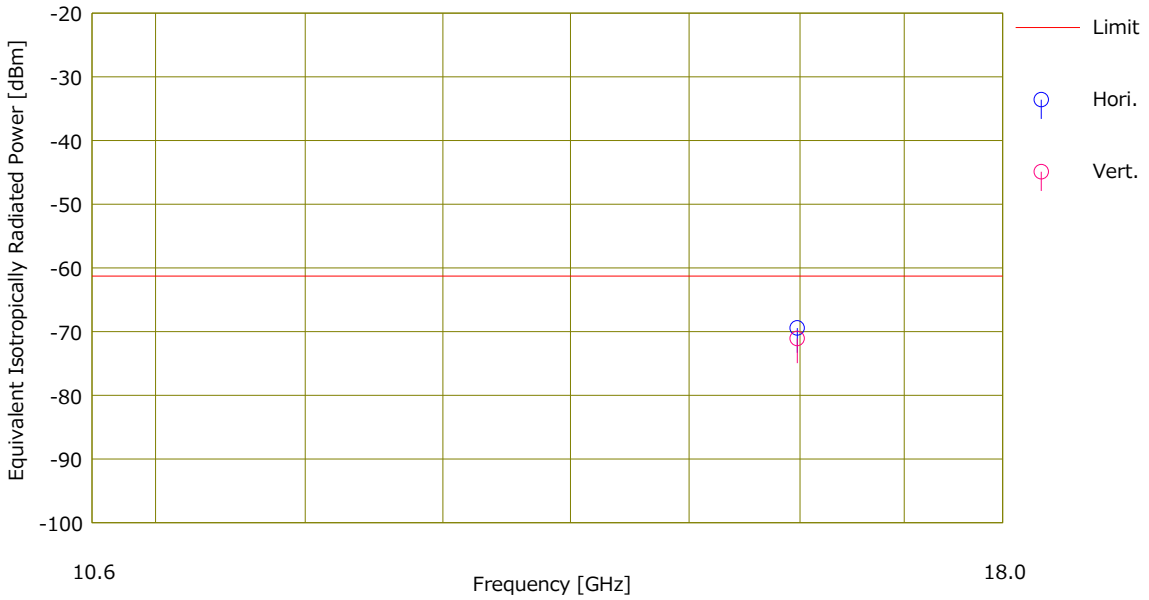


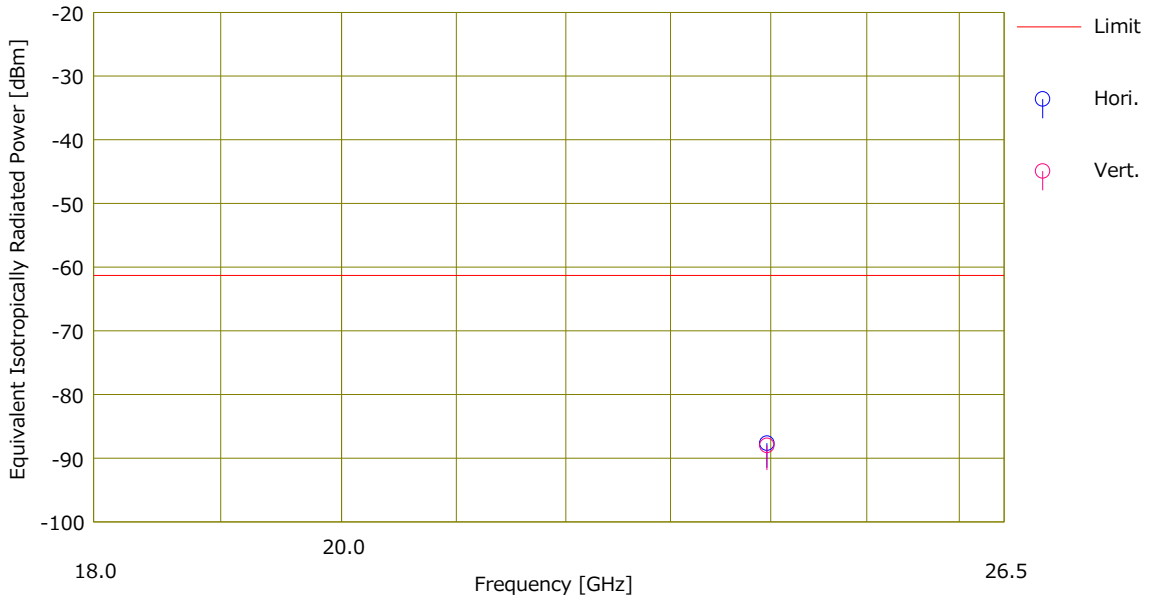


(* except GPS band and carrier emissions)

Radiated emission

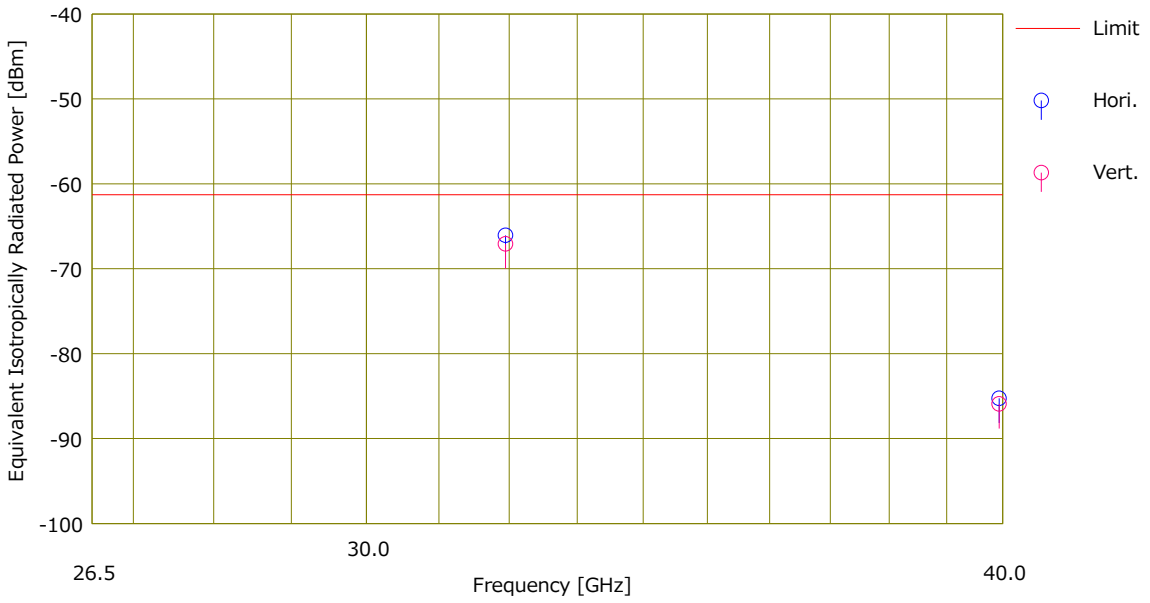
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC2	SAC2
Date	October 7, 2024	October 7, 2024
Temperature / Humidity	24 deg. C / 69 % RH	24 deg. C / 63 % RH
Engineer	Kouki Yamada (10.6 GHz to 18 GHz)	Makoto Hosaka (18 GHz to 26.5 GHz)
Mode	Transmitting ch9	





Radiated emission

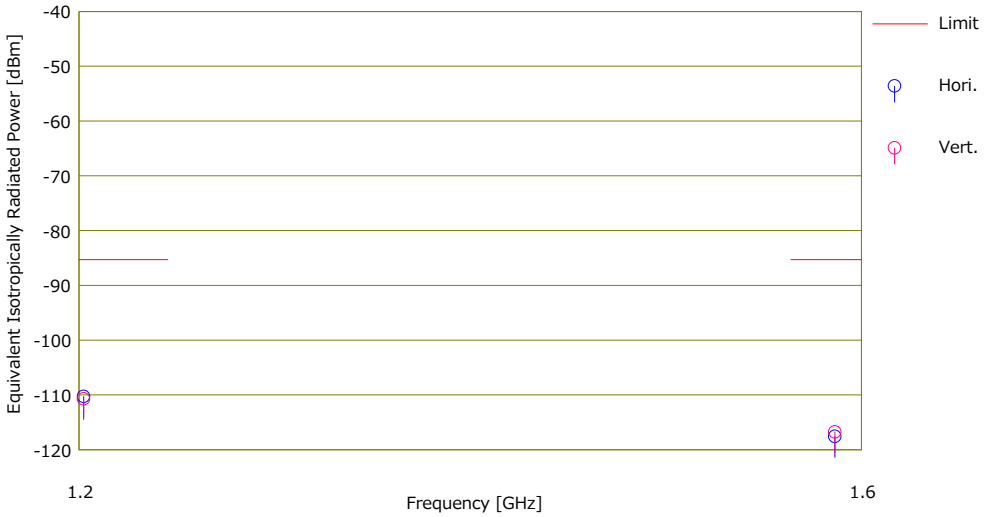
Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC3
Date	September 26, 2024
Temperature / Humidity	24 deg. C / 38 % RH
Engineer	Hiromasa Sato (26.5 GHz to 40 GHz)
Mode	Transmitting ch9



Radiated emission (GPS band)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC2
Date	October 7, 2024
Temperature / Humidity	24 deg. C / 69 % RH
Engineer	Kouki Yamada
Mode	Transmitting ch5

(GPS bands emission)



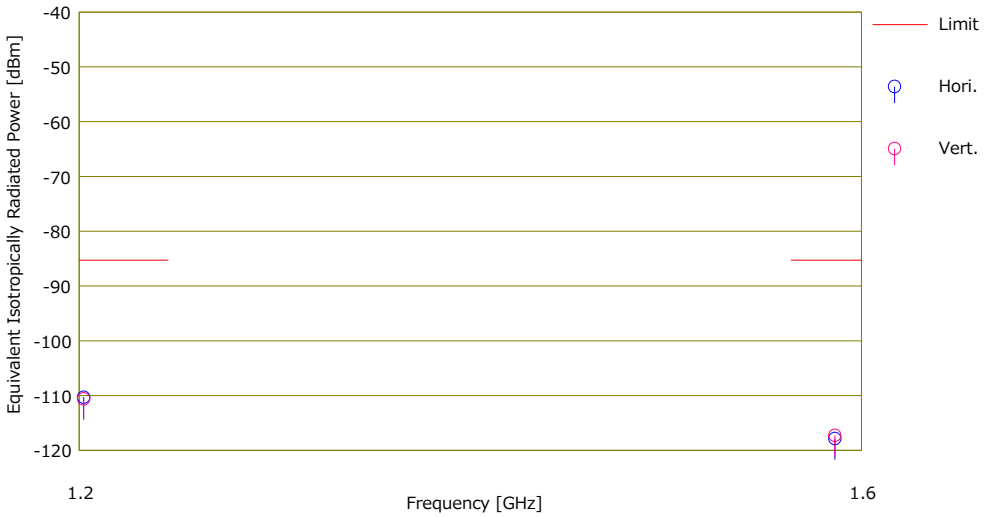
No.	Freq. [MHz]	Reading <PK> [dBuV]	SG Level [dBm]	TX Ant.Gain [dBi]	TX Loss [dB]	EIRP Result [dBm]	EIRP Limit [dBm]	Margin [dB]	Pola.	Height [cm]	Angle [deg]	TX Ant.Type	Comment
1	1202.000	16.72	-112.34	6.34	4.27	-110.27	-85.30	24.9	Hori.	150	0	Horn	RBW:1 kHz, Floor noise
2	1584.500	15.68	-121.71	9.08	4.94	-117.57	-85.30	32.2	Hori.	150	0	Horn	RBW:1 kHz, Floor noise
3	1202.000	16.64	-112.79	6.34	4.27	-110.72	-85.30	25.4	Vert.	150	0	Horn	RBW:1 kHz, Floor noise
4	1584.500	15.87	-120.89	9.08	4.94	-116.75	-85.30	31.4	Vert.	150	0	Horn	RBW:1 kHz, Floor noise

Calculation:Result [dBm] = SG level [dBm] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

Radiated emission (GPS band)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC2
Date	October 7, 2024
Temperature / Humidity	24 deg. C / 69 % RH
Engineer	Kouki Yamada
Mode	Transmitting ch9

(GPS bands emission)



No.	Freq. [MHz]	Reading <PK> [dBuV]	SG Level [dBm]	TX Ant.Gain [dBi]	TX Loss [dB]	EIRP Result [dBm]	EIRP Limit [dBm]	Margin [dB]	Pola.	Height [cm]	Angle [deg]	TX Ant.Type	Comment
1	1202.000	16.68	-112.38	6.34	4.27	-110.31	-85.30	25.0	Hori.	150	0	Horn	RBW:1 kHz, Floor noise
2	1584.500	15.38	-122.01	9.08	4.94	-117.87	-85.30	32.5	Hori.	150	0	Horn	RBW:1 kHz, Floor noise
3	1202.000	16.74	-112.69	6.34	4.27	-110.62	-85.30	25.3	Vert.	150	0	Horn	RBW:1 kHz, Floor noise
4	1584.500	15.34	-121.42	9.08	4.94	-117.28	-85.30	31.9	Vert.	150	0	Horn	RBW:1 kHz, Floor noise

Calculation:Result [dBm] = SG level [dBm] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

Peak level of the emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC3
Date	October 30, 2024
Temperature / Humidity	24 deg. C / 42 % RH
Engineer	Kouki Yamada
Mode	Transmitting ch5

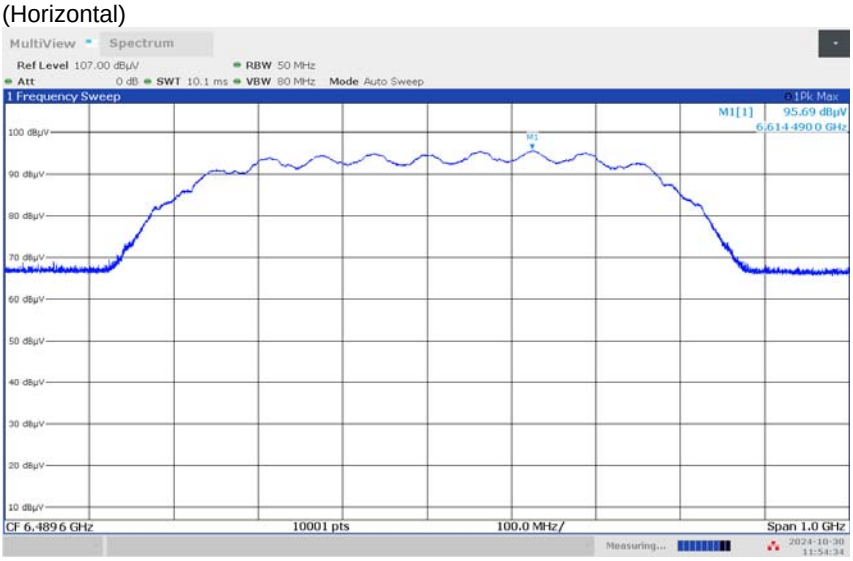
(Peak level of the emission)

(*SA: Spectrum analyzer, SG: Signal generator, Ant.: substitution antenna)

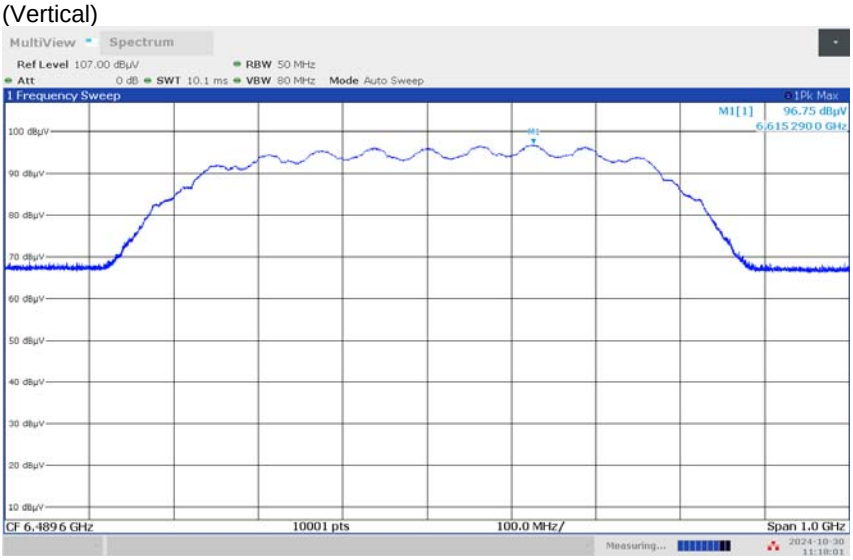
Band	Pol.	Frequency [MHz]	SA Reading [dBuV/50 MHz]	SG level [dBm]	Tx Ant.Gain [dBi]	Tx Loss [dB]	RBW converted factor [dB]	EIRP Result [dBm/50 MHz]	EIRP Limit [dBm/50 MHz]	Margin [dB]	Remarks	Height [cm]	Angle [deg.]
3.1 GHz - 10.6 GHz	Hor.	6614.490	95.69	-14.77	10.62	10.36	0.14	-14.37	0.00	14.37	carrier	156	64
3.1 GHz - 10.6 GHz	Ver.	6615.290	96.75	-13.79	10.62	10.36	0.14	-13.39	0.00	13.39	carrier	155	340

Sample Calculation :
EIRP Result [dBm/MHz] = SG level [dBm] + Tx Ant.Gain [dBi] - Tx Loss [dB] + RBW converted factor [dB]
RBW converted factor [dB] = 20 x log (50 / (3 dB measured bandwidth = 49.1784 [MHz]))

(Horizontal)



(Vertical)



Peak level of the emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC3
Date	October 30, 2024
Temperature / Humidity	24 deg. C / 42 % RH
Engineer	Kouki Yamada
Mode	Transmitting ch9

(Peak level of the emission)

(*SA: Spectrum analyzer, SG: Signal generator, Ant.: substitution antenna)

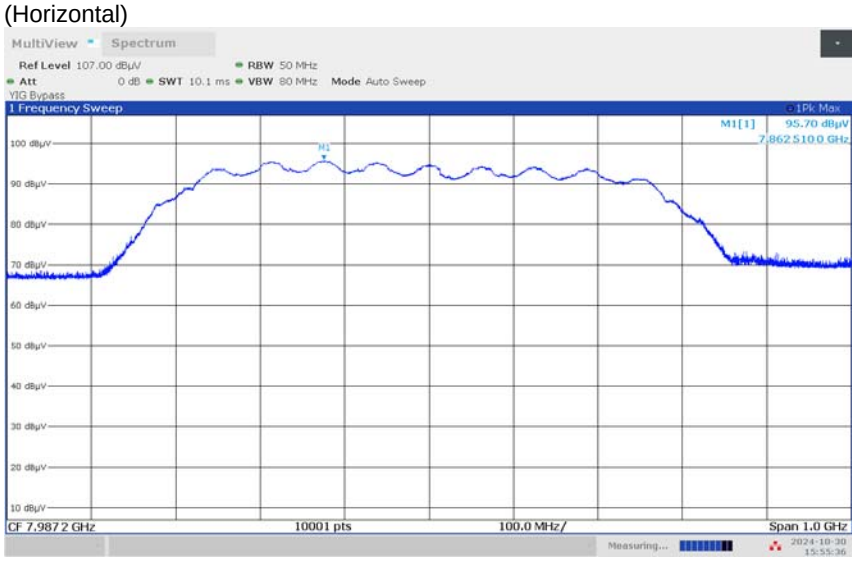
Band	Pol.	Frequency [MHz]	SA Reading [dBuV/50 MHz]	SG level [dBm]	Tx Ant.Gain [dBi]	Tx Loss [dB]	RBW converted factor [dB]	EIRP Result [dBm/50 MHz]	EIRP Limit [dBm/50 MHz]	Margin [dB]	Remarks	Height [cm]	Angle [deg.]
3.1 GHz - 10.6 GHz	Hor.	7862.510	95.70	-15.16	12.45	11.26	0.14	-13.83	0.00	13.83	carrier	155	61
3.1 GHz - 10.6 GHz	Ver.	7864.410	94.60	-16.24	12.45	11.26	0.14	-14.91	0.00	14.91	carrier	153	17

Sample Calculation :

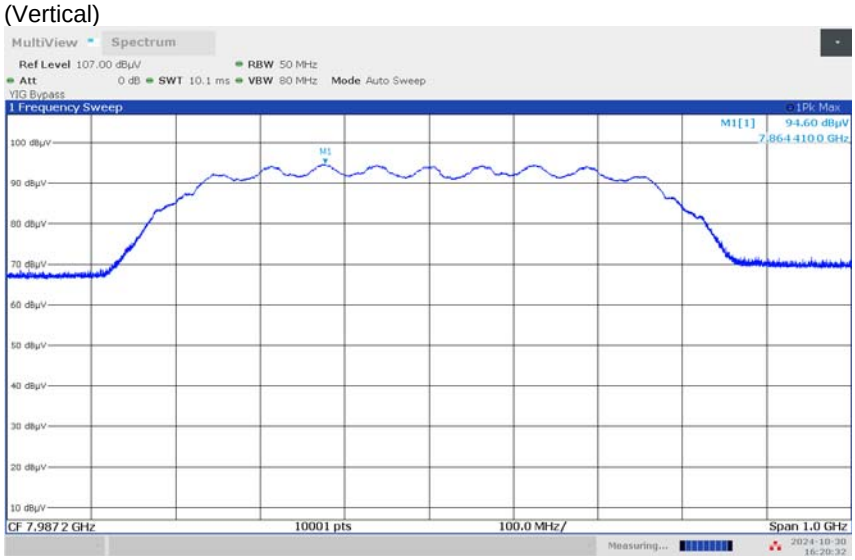
EIRP Result [dBm/MHz] = SG level [dBm] + Tx Ant.Gain [dBi] - Tx Loss [dB] + RBW converted factor [dB]

RBW converted factor [dB] = 20 x log (50 / (3 dB measured bandwidth = 49.1784 [MHz]))

(Horizontal)



(Vertical)

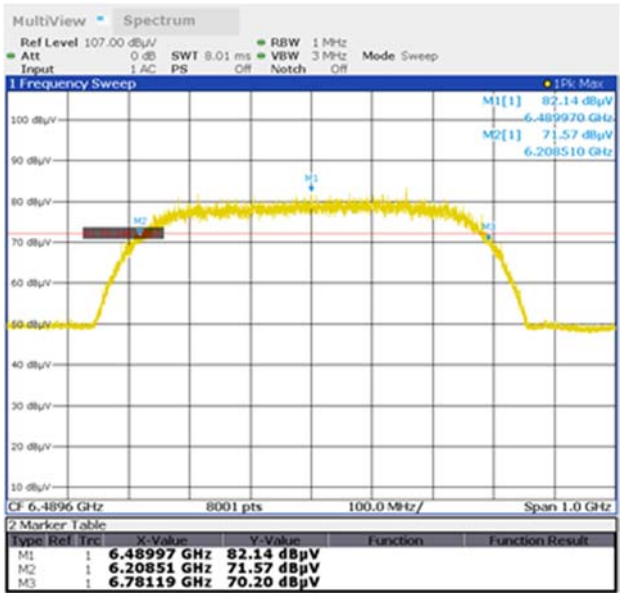


UWB Bandwidth

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC3
Date	October 23, 2024
Temperature / Humidity	24 deg. C / 31 % RH
Engineer	Kenichi Adachi
Mode	Transmitting ch5

10 dB Bandwidth: 572.680 MHz (Limit: >= 500 MHz)
Center Frequency 6494.850 MHz (= (fH + fL) / 2)

(worst: Horizontal)



Start Frequency: 5989.600 **MHz** **f L:** 6208.510 **MHz**
Stop Frequency: 6989.600 **MHz** **f H:** 6781.190 **MHz**

99 % Occupied Bandwidth 587.156 MHz

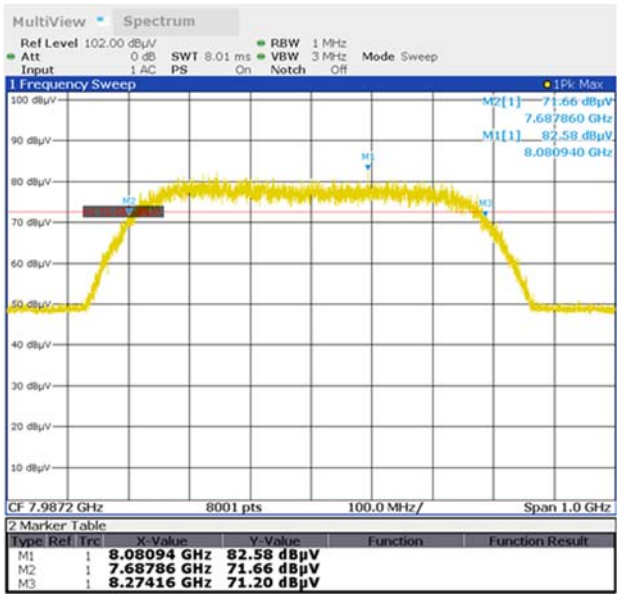
UWB Bandwidth

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC3
Date	October 23, 2024
Temperature / Humidity	24 deg. C / 31 % RH
Engineer	Kenichi Adachi
Mode	Transmitting ch9

10 dB Bandwidth: 586.300 MHz (Limit: >= 500 MHz)

Center Frequency 7981.010 MHz (= (fH + fL) / 2)

(worst: Horizontal)



Start Frequency: 7487.200 **MHz** **f L:** 7687.860 **MHz**

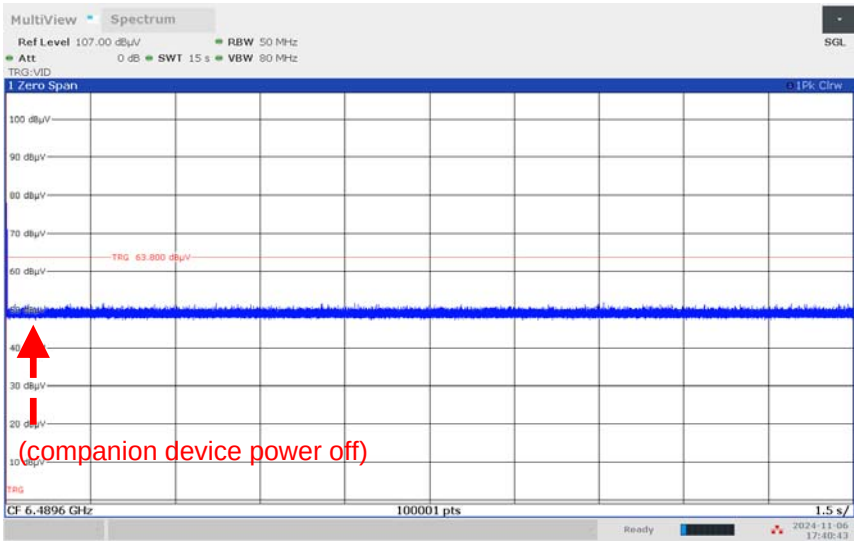
Stop Frequency: 8487.200 **MHz** **f H:** 8274.160 **MHz**

99 % Occupied Bandwidth 602.962 MHz

Transmitter timeout

Test place	Shonan EMC Lab. No.5 Shielded room
Date	November 6, 2024
Temperature / Humidity	24 deg. C / 39 % RH
Engineer	Hiromasa Sato
Mode	Normal Transmitting ch5

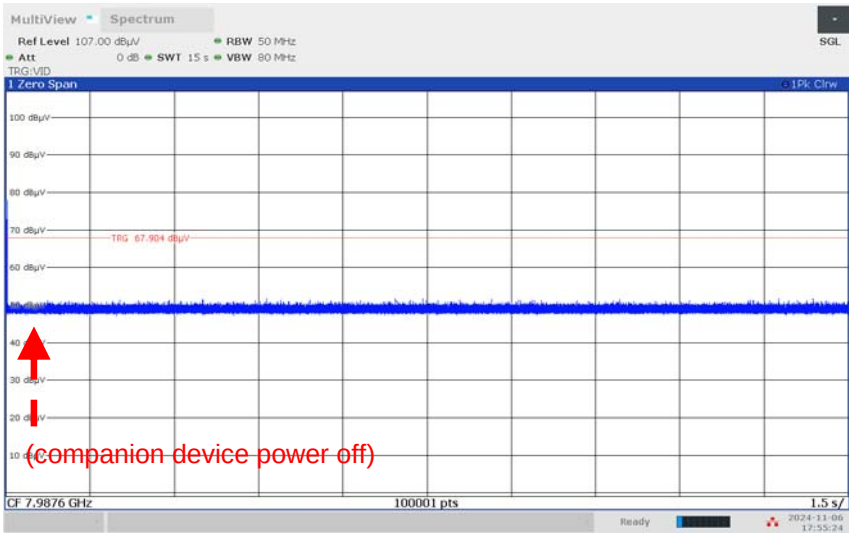
Transmitter Timeout: less than 10 s (Limit: < 10 s)



Transmitter timeout

Test place	Shonan EMC Lab. No.5 Shielded room
Date	November 6, 2024
Temperature / Humidity	24 deg. C / 39 % RH
Engineer	Hiromasa Sato
Mode	Normal Transmitting ch9

Transmitter Timeout: less than 10 s (Limit: < 10 s)



APPENDIX 2: Test instruments

Test Instruments (1/2)

Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int (Month)
RE	144941	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	230	2024/05/13	12
RE	144975	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	2024/04/10	12
RE	144976	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-270(RF Selector)	2024/04/10	12
RE	145004	Pre Amplifier	SONOMA	310N	290212	2024/02/13	12
RE	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	2046104	2024/02/16	12
RE	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2024/08/21	12
RE	145022	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	91032665	2024/04/10	12
RE	145128	Pre Amplifier	Toyo Corporation	TPA0118-36	1440490	2024/05/08	12
RE	145129	Pre Amplifier	Toyo Corporation	HAP26-40W	B3208602403-176	2024/05/09	12
RE	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2024/08/21	12
RE	145384	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-726	2024/03/11	12
RE	145501	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-739	2024/03/20	12
RE	145512	Horn Antenna	ETS-Lindgren	3160-09	00094868	2024/06/20	12
RE	145514	Horn Antenna	ETS-Lindgren	3160-10	00092383	2024/06/20	12
RE	145515	Horn Antenna	ETS-Lindgren (Cedar Park, Texas)	3116	108256	2024/05/13	12
RE	145536	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100218	2024/04/10	12
RE	145563	Semi-Anechoic Chamber	TDK	SAEC-02(NSA)	2	2024/03/22	12
RE	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2024/04/03	12
RE	145568	Semi Anechoic Chamber(ME)	TDK	Semi Anechoic Chamber 3m/10m	1, 2, 3	2022/12/24	24
RE	145790	Test Receiver	Rohde & Schwarz	ESU40	100093	2024/04/19	12
RE	145793	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997819	2024/05/29	12
RE	146210	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997823	2024/09/24	12
RE	146226	Signal Generator	Keysight Technologies Inc	E8257D-540	MY48051404	2024/01/10	12
RE	146432	Tape Measure	TAJIMA	GL19-55	-	-	-
RE	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2024/08/06	12
RE	150921	Attenuator	JFW	50HF-003N	-	2024/02/13	12
RE	156380	Coaxial Cable	Huber+Suhner	SUCOFLEX_104_E	SN MY 13406/4E	2024/05/09	12
RE	167095	Attenuator	JFW	50HF-006N	-	2024/02/13	12
RE	167096	Attenuator	JFW	50HF-006N	-	2024/02/13	12
RE	168301	Coaxial Cable	Huber+Suhner	SUCOFLEX 102 E	800137/2EA	2024/08/20	12
RE	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,PE)	Ver 3.1.0546	-	-
RE	175822	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2024/08/11	12
RE	178573	Coaxial Cable	Huber+Suhner	SUCOFLEX_104_E	MY13407/4E	2024/03/05	12
RE	179540	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	802815/2	2024/03/05	12
RE	191840	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2024/08/12	12

Test Instruments (2/2)

Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int (Month)
RE	191840	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2024/08/12	12
RE	194601	Coaxial Cable	Fjikura	5D-2W	-	2023/12/08	12
RE	194683	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	694	2024/03/04	12
RE	194684	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	695	2024/03/11	12
RE	194685	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	711	2024/03/20	12
RE	196945	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803414/2	2024/03/12	12
RE	200009	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	575617/4	2024/06/05	12
RE	200010	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	575618/4	2024/06/05	12
RE	202959	Highpass Filter	Micro-Tronics	HPM50107	G077	2024/10/10	12
RE	206229	Bandpass Filter	Micro-Tronics	BPC50411	086	2024/03/05	12
RE	207277	Tape Measure	ASKUL	-	-	-	-
RE	213530	Test Receiver	Rohde & Schwarz	ESW44	103068	2024/02/22	12
RE	221966	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	2000703/2	2024/06/05	12
RE	235269	Spectrum Analyzer	Rohde & Schwarz	FSW43	102488	2024/10/17	12
RE	235697	Coaxial Cable	Hayashi-Repic co., Ltd.	KMS020B-GL140sE-KMS020B-2.0m	47456-01-01	2024/04/09	12
RE	235739	Thermo-Hygrometer	CUSTOM. Inc	CTH-230	-	2024/04/28	12
RE	236418	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VULP 9118 B	00975	2024/07/03	12
RE	243215	Coaxial Cable	Hayashi-Repic co., Ltd.	SMS13-13A26-NMS13-9.0m	49306-01-03	2024/06/12	12
RE	243217	Coaxial Cable	Hayashi-Repic co., Ltd.	SMS13-13A26-NMS13-9.0m	49306-01-04	2023/12/20	12
RE	253422	Spectrum Analyzer	Rohde & Schwarz	FSW43	101849	2024/10/21	12

***1) This test equipment was used for the tests before the expiration date of the calibration.**

***Hyphens for Last Calibration Date, Calibration Due 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.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

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

Test item: RE: Radiated Emission test