RADIO TEST REPORT

Test Report No. 15636656S-A-R3

Customer	**AISIN CORPORATION**
Description of EUT	**UWB Module**
Model Number of EUT	**AQ10**
FCC ID	**PENAQ10**
Test Regulation	**FCC Part 15 Subpart F**
Test Result	**Complied**
Issue Date	**May 7, 2025**
Remarks	**-**

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. 15636656S-A

This report is a revised version of 15636656S-A-R2. 15636656S-A-R2 is replaced with this report.

Revision	Test Report No.	Date	Revised Contents
- (Original)	15636656S-A	February 27, 2025	-
1	15636656S-A-R1	March 25, 2025	p18, 22 Corrected comments. From "* For RBW less than 960 MHz was set according to FCC 15.209, Above 960 MHz was set to 1 MHz." to "* For below 960 MHz, RBW was set according to FCC 15.209 / RSS-Gen, above 960 MHz, RBW was set to 1 MHz."
			p19, 23 Changed limit unit from “dBuV/m” to “dBm” of the chart in the 960 – 1000 MHz
			p36, 37 Added comments and the sequence diagram for description.
2	15636656S-A-R2	April 17, 2025	p.6, Correction error ("The stable voltage was supplied by the ECU which was required to have a power supply regulator." to "The RF part has its own regulator. The RF part is constantly provided voltage through the regulator regards of input voltage.").
			p.28, p.29, Correction frequency value (correction unit [GHz] to [MHz])
			p.36, p.37, Deleted the confidentiality timing chart.
3	15636656S-A-R3	May 7, 2025	p.2, Correction of an error in the numbering of the previous version. ((before): This report is a revised version of 15636656S-A. 15636656S-A is …-> (after): This report is a revised version of 15636656S-A-R2. 15636656S-A-R2 is …)

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	AISIN CORPORATION
Address	2-1, Asahi-machi, Kariya, Aichi, 448-8650 JAPAN
Telephone Number	+81-50-3151-4983
Contact Person	Koji NOMURA

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 Module
Model Number	AQ10
Serial Number	Refer to SECTION 4.2
Condition	Production prototype (Not for Sale: This sample is equivalent to mass-produced items.)
Modification	No Modification by the test lab
Receipt Date	December 16, 2024
Test Date	December 19, 2024 to February 12, 2025

2.2 Product Description

General Specification

Rating	DC 7.1 V (DC 6.0 V to 8.2 V)
Operating temperature	-40 deg. C to +85 deg. C

Radio Specification

UWB

Equipment Type	Transceiver
Frequency of Operation	6489.6 MHz (6240.0 MHz to 6739.2 MHz) (CH5), 7987.2 MHz (7737.6 MHz to 8236.8 MHz) (CH9)
Type of Modulation	BPM-BPSK
Antenna Gain	4.32 dBi (max)

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)	1.7 dB 31948.801 MHz AV, Vertical (Transmitting ch9, Normal power mode)	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 RF part has its own regulator. The RF part is constantly provided voltage through the regulator regards of input voltage."
Therefore, the 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 to 30 MHz	3.0 dB
Radiated Emission (Measurement distance: 3 m)	9 kHz to 30 MHz	3.3 dB
	30 MHz to 200 MHz	4.8 dB
	200 MHz to 1 GHz	6.1 dB
	1 GHz to 6 GHz	4.7 dB
	6 GHz to 18 GHz	5.3 dB
	18 GHz to 40 GHz	5.5 dB
Radiated Emission (Measurement distance: 1 m)	1 GHz to 18 GHz	5.6 dB
	18 GHz to 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	4.7 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: 0.3 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

Antenna terminal test	Uncertainty (+/-)
Spurious Emission (Conducted) below 1 GHz	0.93 dB
Conducted Emissions Power Density Measurement 1 GHz-3 GHz	0.93 dB
Conducted Emissions Power Density Measurement 3 GHz-18 GHz	3.0 dB
Spurious Emission (Conducted) 18 GHz-26.5 GHz	2.8 dB
Spurious Emission (Conducted) 26.5 GHz-40 GHz	2.3 dB
Bandwidth Measurement	0.012 %
Duty Cycle and Time Measurement	0.27 %
Voltage	0.92 %

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

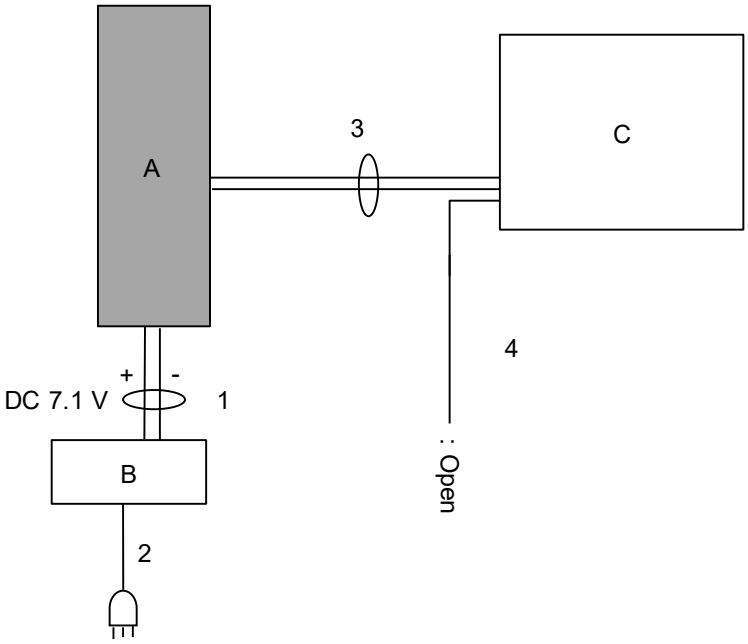
Refer to APPENDIX.

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: Normal power mode : Fixed Low power mode : Fixed Software: UWB: SOFTWARE, ELECTRICAL KEY, N Version: 00001 (Date: 2024.12.10, 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.		

4.2 Configuration and Peripherals



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

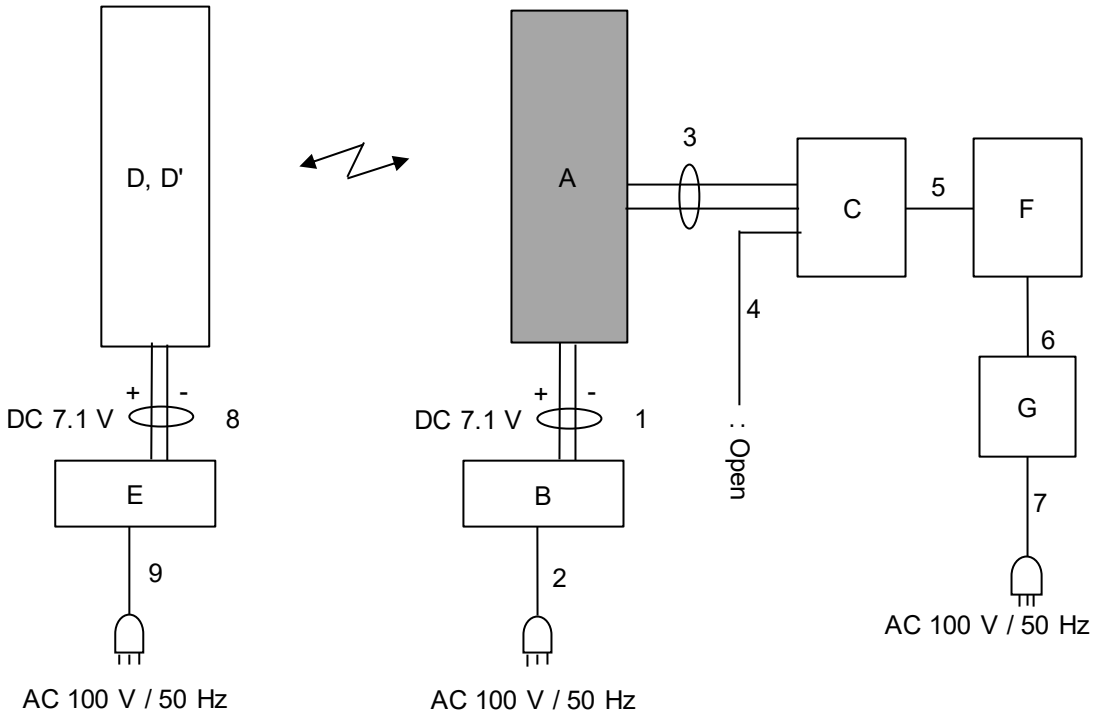
Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	UWB Module	AQ10	SH2PU24111	AISIN	EUT
B	Power Supply (DC)	PAN35-10A	NA000955	KIKUSUI	-
C	MLT advan	5CF1L1	SER 6148(UWB2)	PRISM Co., Ltd	Control tool

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	-
3	Signal	2.0 + 0.4	Unshielded	Unshielded	-
4	Signal	0.4	Shielded	Shielded	-

[Transmitter timeout test]



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C	MLT advan	5CF1L1	SER 6148(UWB2)	PRISM Co., Ltd	Control tool
D	UWB Module	AE10	SH1TU24151	AISIN	AE (for ch 5)
D'	UWB Module	AE10	SH1TU24161	AISIN	AE (for ch 9)
E	Power Supply (DC)	PAN35-10A	BP002287	Kikusui Electronics Corp.	-
F	Personal computer	A6SJKWDA231B	24017884E	Toshiba	-
G	AC adapter	PA517U-1ACA	G71C000MPC20 O109Q05WPWCC	Toshiba	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	2.0	Unshielded	Unshielded	-
2	AC	2.0	Unshielded	Unshielded	-
3	Signal	2.0 + 0.4	Unshielded	Unshielded	-
4	Signal	0.4	Unshielded	Unshielded	-
5	USB	1.0	Shielded	Shielded	-
6	DC	1.7	Unshielded	Unshielded	-
7	AC	0.5	Unshielded	Unshielded	-
8	DC	2.0	Unshielded	Unshielded	-
9	AC	2.0	Unshielded	Unshielded	-

SECTION 5: Radiated Emission

Test Procedure

[For below 30 MHz]
EUT was placed on a platform of nominal size, 0.5 m by 0.5 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, 0.5 m by 0.5 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.

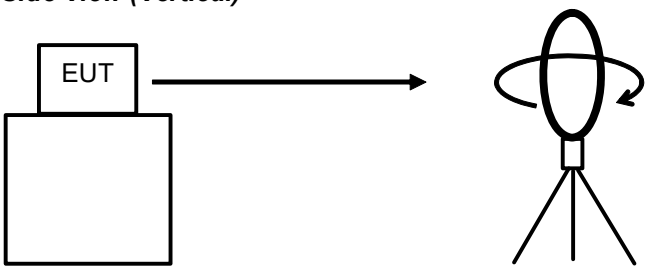
UWB emissions and other emissions:
1) The height of the measuring antenna varied between 1 m and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field strength.
The measurements were performed for both vertical and horizontal antenna polarization with the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

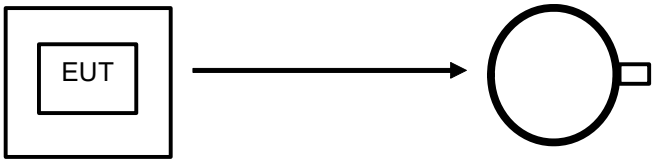
3) Equivalent isotropic radiated power was calculated by subtracting the cable loss and the attenuator loss connected between the signal generator and the substitution antenna from the output power of the signal generator recorded in 2).
For the usage of the antenna (horn antenna) for the substitution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

Figure 1: Direction of the Loop Antenna

Side View (Vertical)

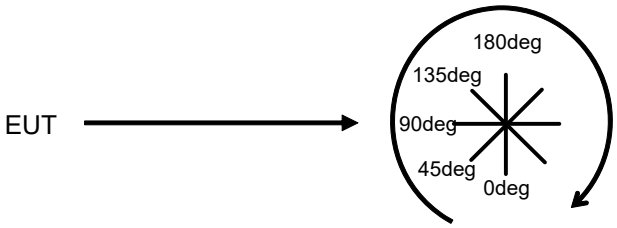


Top View (Horizontal)



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.

Radiated Emission Test was performed in the highest mode of Power.

- The carrier level and noise levels were confirmed at each position of X, Y and Z, Top or Bottom 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	X	X	Y	Z
Vertical	X	X	X	X	Z	Z	Y	X

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 40 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.

The test was performed in the typical sequence cycle mode.

Test Data : APPENDIX
Test Result : Pass

APPENDIX 1: Test Data

Radiated emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date	December 19, 2024
Temperature / Humidity	23 deg. C / 29 % RH
Engineer	Yuta Shiba
Mode	Transmitting ch5, Normal power mode

(UWB emission, carrier emission)

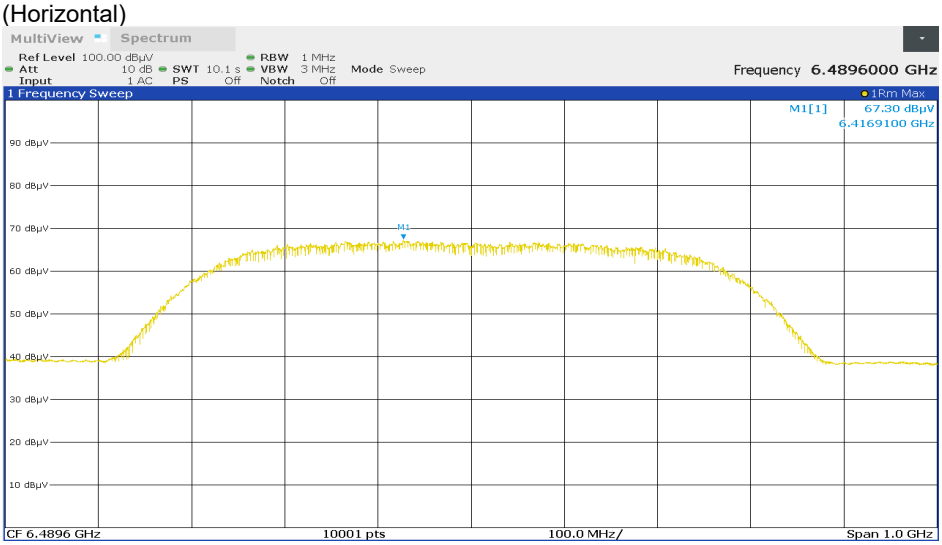
(*SA: Spectrum analyzer, SG: Signal generator, Ant.: substitution antenna)

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.	6416.910	67.30	-43.56	10.23	10.20	-	-43.53	-41.30	2.23	carrier	157	192
3.1 GHz - 10.6 GHz	Ver.	6406.210	66.16	-44.85	10.27	10.19	-	-44.77	-41.30	3.47	carrier	156	187

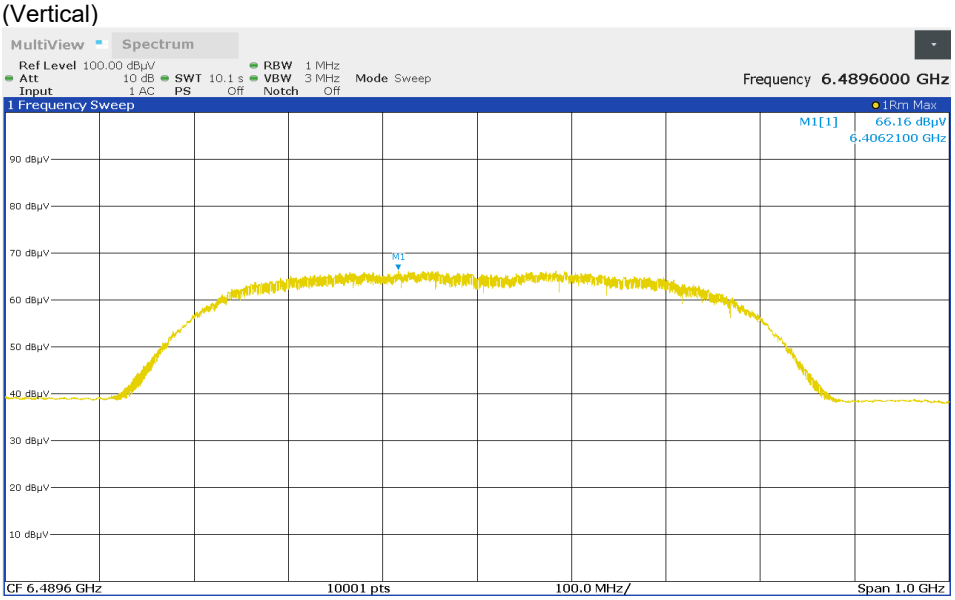
Sample Calculation :

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

(Horizontal)



(Vertical)



Radiated emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date	January 6, 2025
Temperature / Humidity	21 deg. C / 29 % RH
Engineer	Hiromasa Sato
Mode	Transmitting ch9, Normal power mode

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

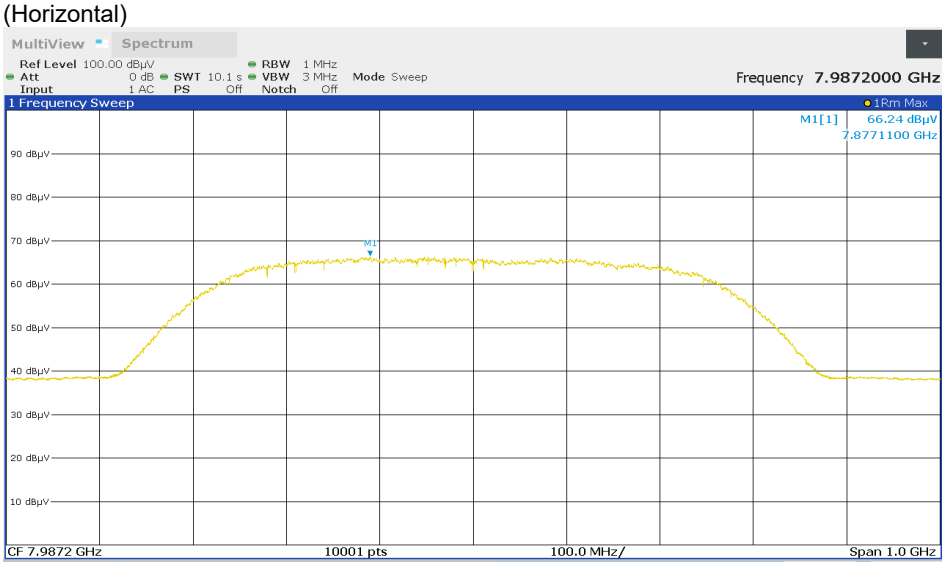
Band	Pol.	Frequency [MHz]	SA Reading [dBuV/MHz]	SG level [dBm]	Tx Ant.Gain [dBi]	Tx Loss [dB]	-	EIRP Result [dBm/MHz]	EIRP Limit [dBm/MHz]	Margin [dB]	Remarks	Height [cm]	Angle [deg.]
3.1 GHz - 10.6 GHz	Hor.	7877.110	66.24	-44.81	12.47	11.27	-	-43.61	-41.30	2.31	carrier	149	189
3.1 GHz - 10.6 GHz	Ver.	7945.800	64.93	-45.95	12.61	11.31	-	-44.65	-41.30	3.35	carrier	157	183

Sample Calculation :

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

(UWB emission, carrier emission)

(Horizontal)



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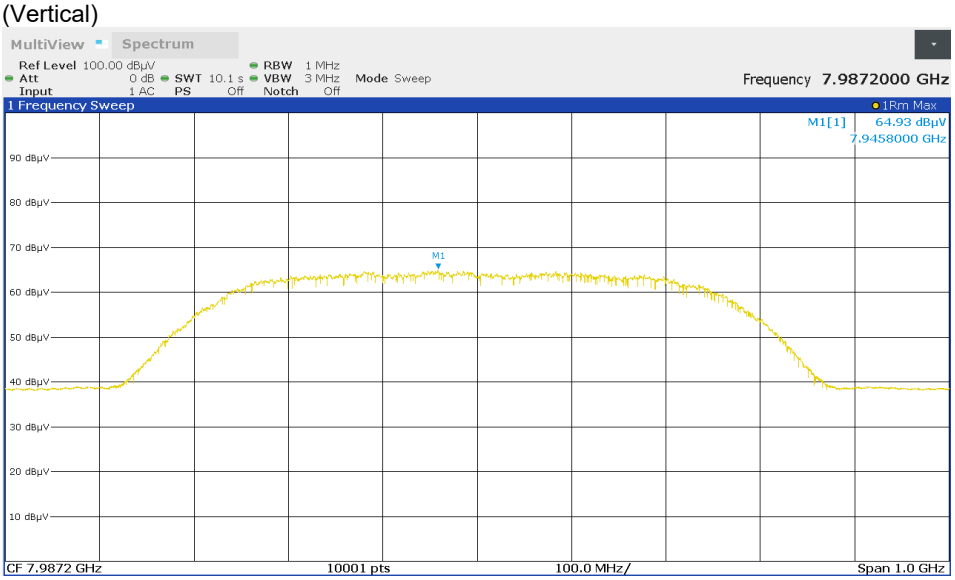


Radiated emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date	December 19, 2024
Temperature / Humidity	23 deg. C / 29 % RH
Engineer	Yuta Shiba
Mode	Transmitting ch5, Low power mode

(UWB emission, carrier emission)

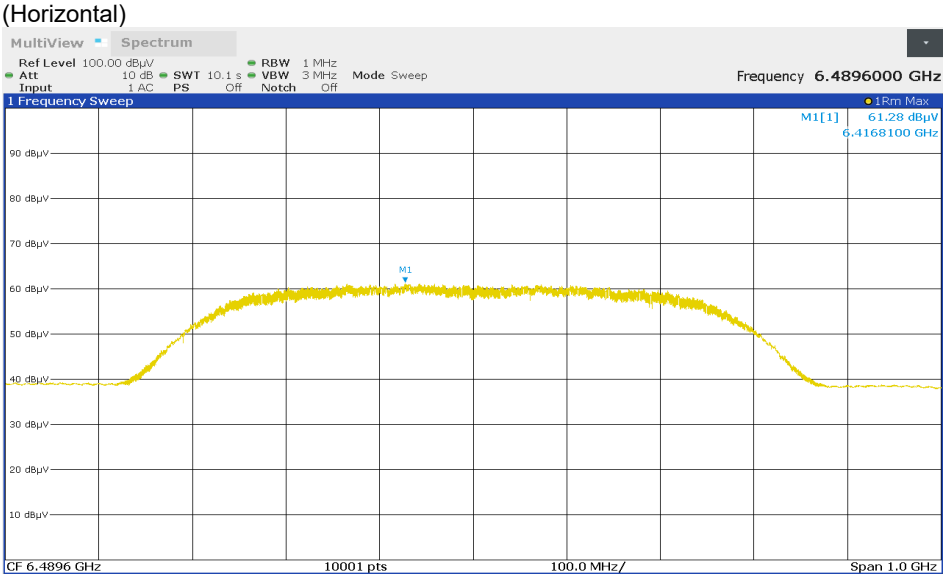
(*SA: Spectrum analyzer, SG: Signal generator, Ant.: substitution antenna)

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.	6416.810	61.28	-49.62	10.23	10.20	-	-49.59	-41.30	8.29	carrier	156	190
3.1 GHz - 10.6 GHz	Ver.	6416.910	60.16	-50.57	10.23	10.20	-	-50.54	-41.30	9.24	carrier	156	188

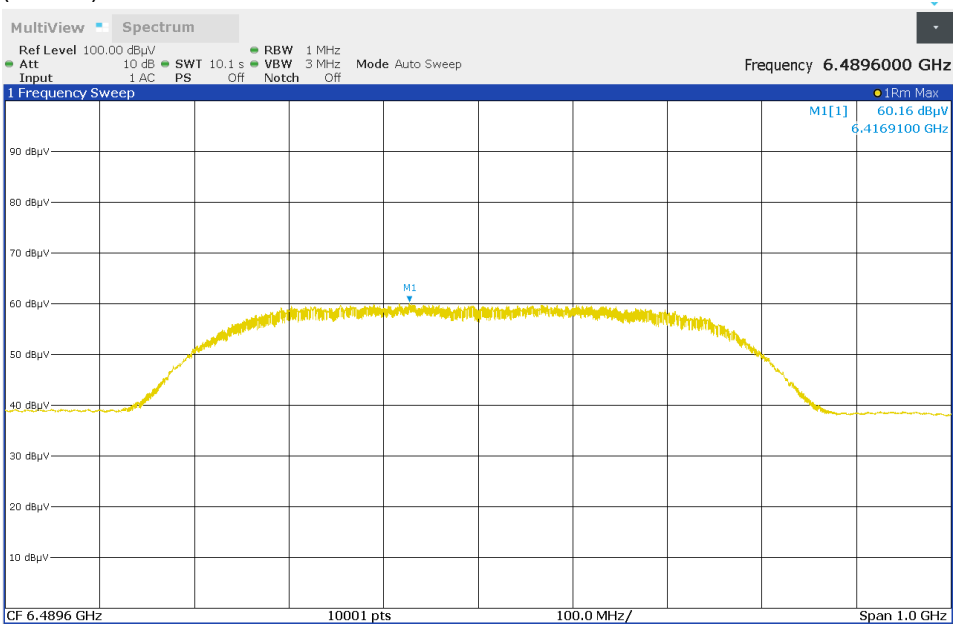
Sample Calculation :

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

(Horizontal)



(Vertical)



Radiated emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date	January 6, 2025
Temperature / Humidity	26 deg. C / 28 % RH
Engineer	Shiro Kobayashi
Mode	Transmitting ch9, Lowl power mode

(UWB emission, carrier emission)

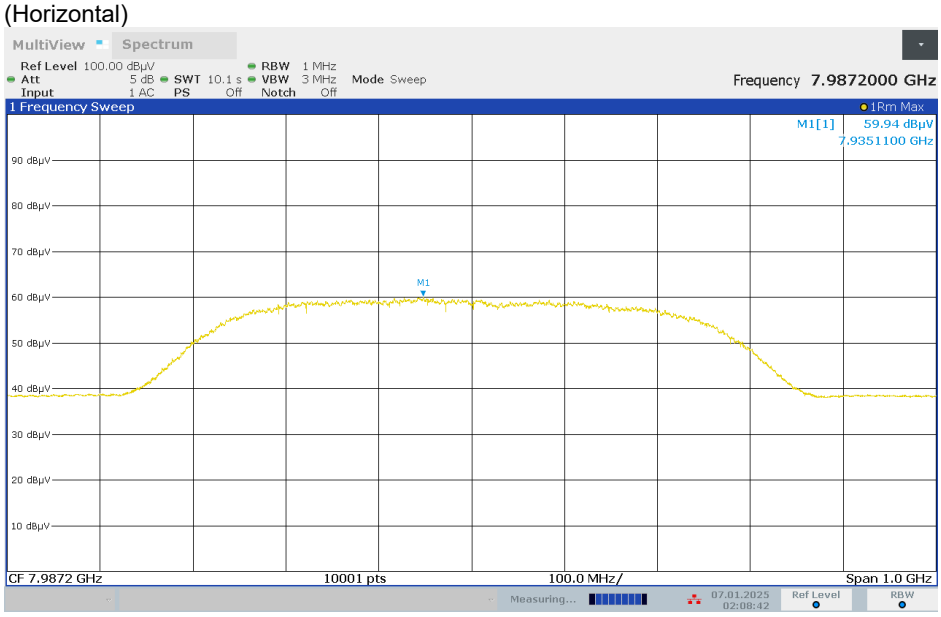
(*SA: Spectrum analyzer, SG: Signal generator, Ant.: substitution antenna)

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.	7935.110	59.94	-50.78	12.58	11.31	-	-49.51	-41.30	8.21	carrier	150	192
3.1 GHz - 10.6 GHz	Ver.	7945.800	59.07	-51.84	12.61	11.31	-	-50.54	-41.30	9.24	carrier	153	1

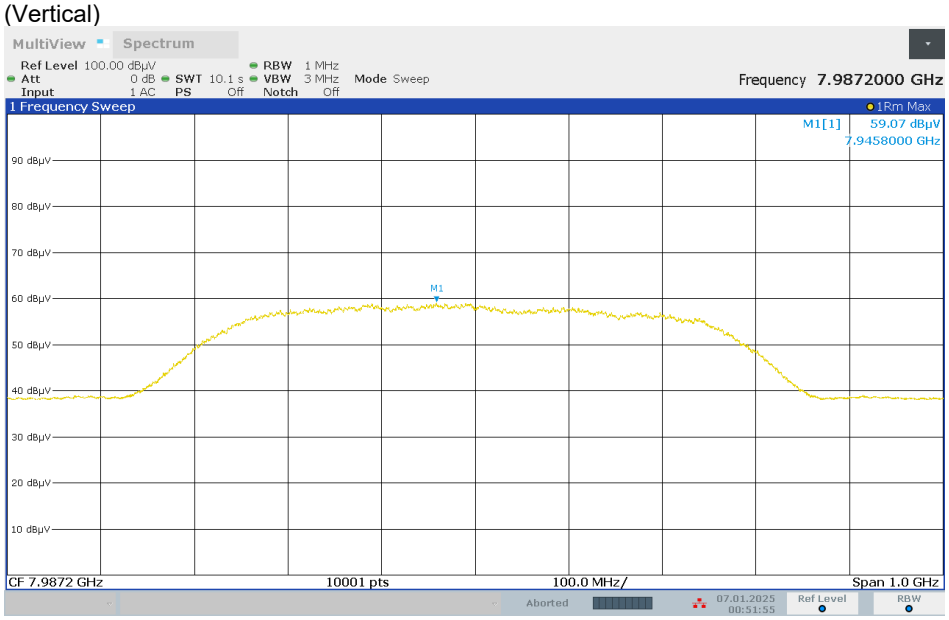
Sample Calculation :

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

(Horizontal)



(Vertical)

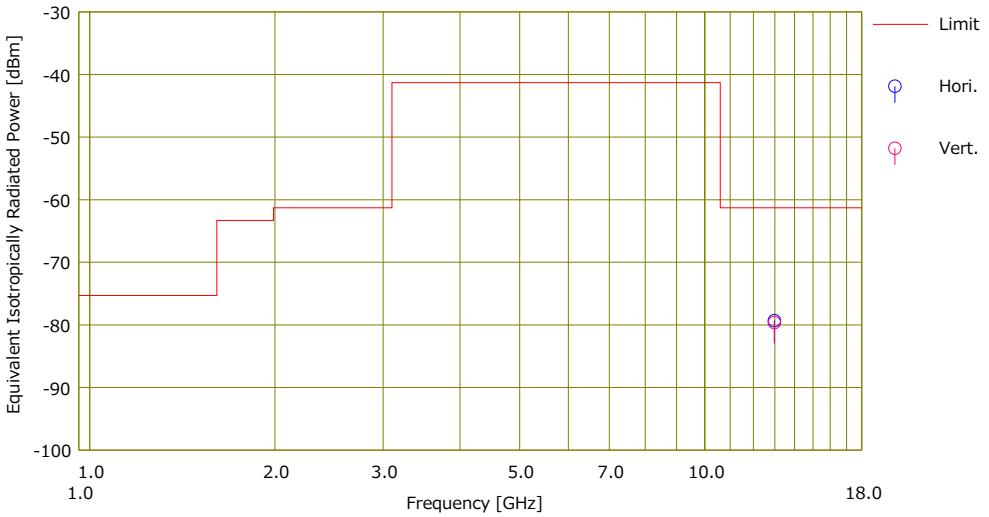


Radiated emission

Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	SAC 1	SAC 3	SAC 3	SAC 3
Date	January 26, 2025	January 10, 2025	January 8, 2025	January 9, 2025
Temperature / Humidity	20 deg. C / 26 % RH	21 deg. C / 29 % RH	22 deg. C / 25 % RH	25 deg. C / 22 % RH
Engineer	Hiromasa Sato (9 kHz to 30 MHz)	Yusuke Tanikawara (30 MHz to 1 GHz)	Kenichi Adachi (1 GHz – 10.6 GHz)	Hiromasa Sato (10.6 GHz - 18 GHz)
Mode	Transmitting ch5, Normal power mode			

(UWB emission except carrier emission)

9 kHz - 18 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	12979.200	37.61	-77.94	13.23	14.62	-79.33	-61.30	18.0	Hori.	152	195	Horn	
2	12979.200	37.54	-78.26	13.23	14.62	-79.65	-61.30	18.3	Vert.	155	8	Horn	

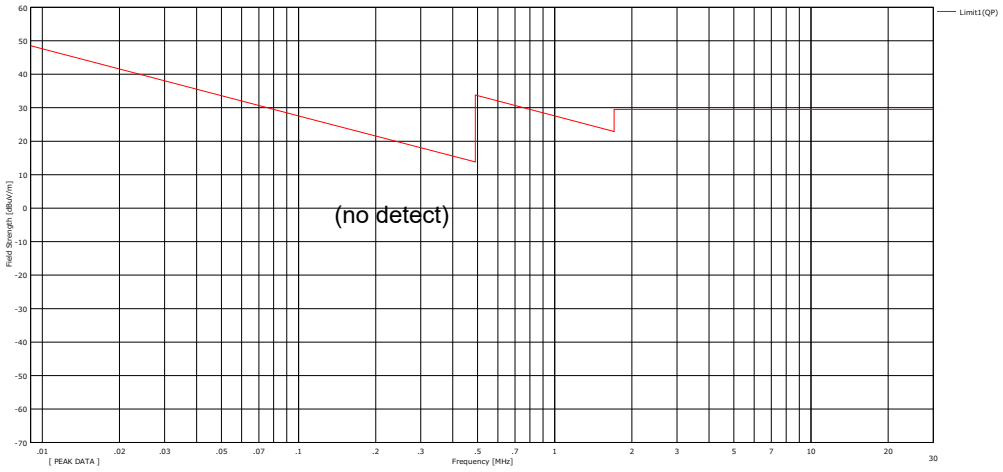
Calculation:Result [dBm] = SG level [dBm] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

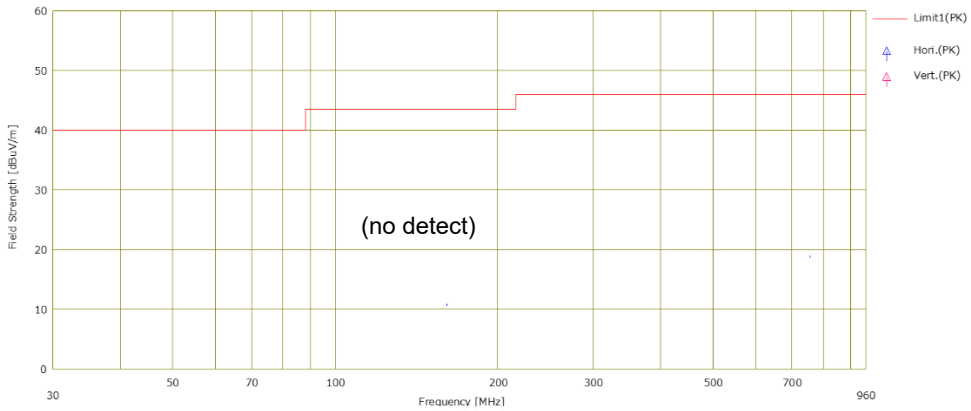
* For below 960 MHz, RBW was set according to FCC 15.209 / RSS-Gen, above 960 MHz, RBW was set to 1 MHz.
(* There were no detect UWB emissions in the range that below 960 MHz)

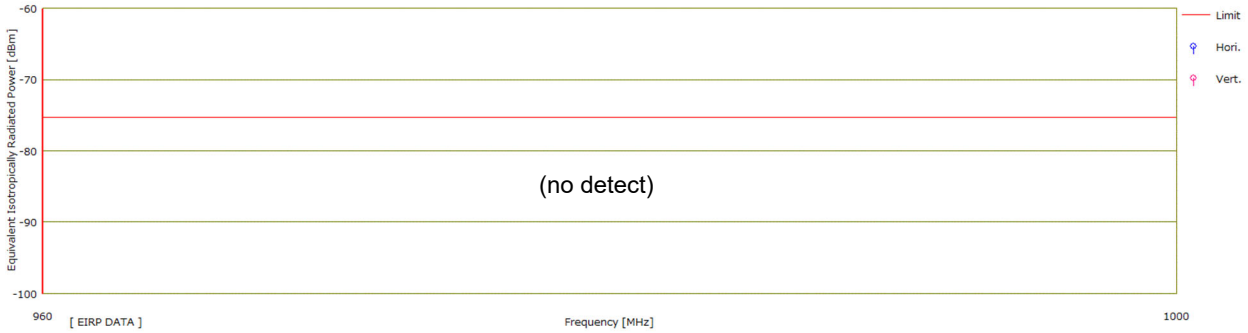
Radiated emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC 1	SAC 3
Date	January 26, 2025	January 10, 2025
Temperature / Humidity	20 deg. C / 26 % RH	21 deg. C / 29 % RH
Engineer	Hiromasa Sato (9 kHz to 30 MHz)	Yusuke Tanikawara (30 MHz to 1 GHz)
Mode	Transmitting ch5, Normal power mode	

(UWB emission except carrier emission)





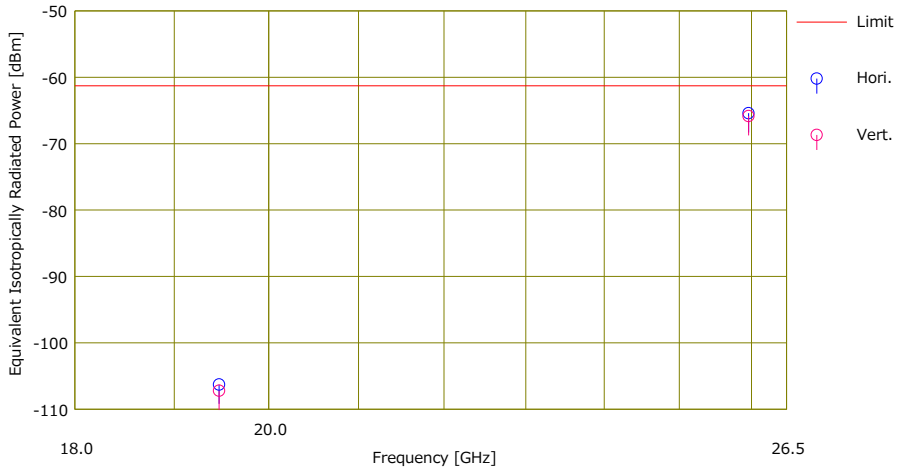


Radiated emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 3
Date	January 9, 2025
Temperature / Humidity	23 deg. C / 25 % RH
Engineer	Shiro Kobayashi (18 GHz – 26.5 GHz)
Mode	Transmitting ch5, Normal power mode

(UWB emission except carrier emission)

18 GHz – 26.5 GHz



No.	Freq.	Reading (PK)	SG Level	TX Ant.Gain	TX Loss	ERP Result	ERP Limit	Margin	Pola.	Height	Angle	TX Ant.Type	Comment
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	19468.801	29.75	-98.51	10.47	18.24	-106.28	-61.30	44.9	Hori.	150	0	Horn	RMS, Floor noise
2	25958.400	46.16	-56.81	12.47	21.08	-65.42	-61.30	4.1	Hori.	158	26	Horn	RMS
3	19468.801	29.83	-99.43	10.47	18.24	-107.20	-61.30	45.9	Vert.	150	0	Horn	RMS, Floor noise
4	25958.400	44.84	-57.24	12.47	21.08	-65.85	-61.30	4.5	Vert.	158	5	Horn	RMS

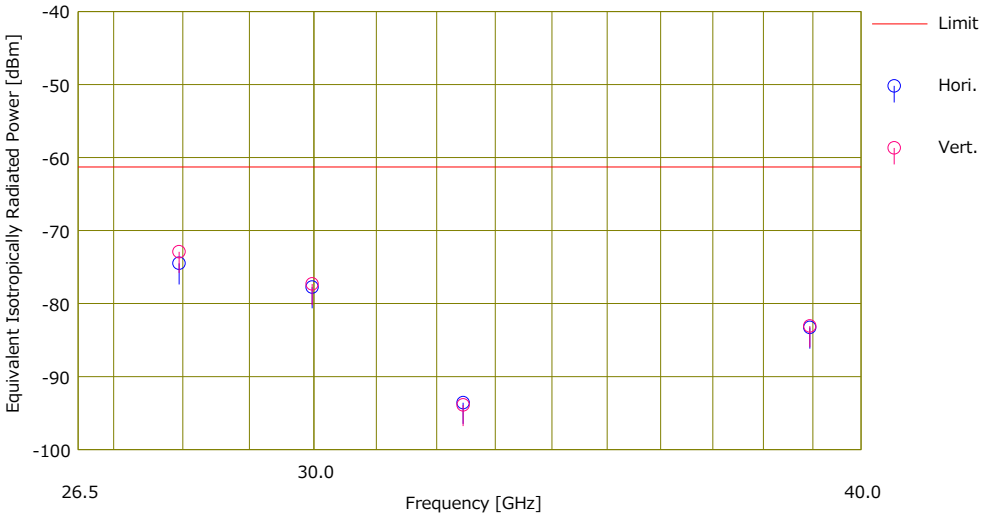
Calculation:Result [dBm] = SG level [dBm] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

Radiated emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 3
Date	January 10, 2025
Temperature / Humidity	21 deg. C / 29 % RH
Engineer	Yusuke Tanikawara (26.5 GHz – 40 GHz)
Mode	Transmitting ch5, Normal power mode

(UWB emission except carrier emission)

26.5 GHz - 40 GHz



No.	Freq.	Reading (PK)	SG Level	TX Ant.Gain	TX Loss	ERP Result	ERP Limit	Margin	Pola.	Height	Angle	TX Ant.Type	Comment
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	27945.221	48.67	-64.02	11.94	22.41	-74.49	-61.30	13.1	Hori.	152	326	Horn	RMS
2	29972.080	47.86	-68.18	13.67	23.24	-77.75	-61.30	16.4	Hori.	153	47	Horn	RMS
3	32448.000	40.53	-81.93	12.53	24.18	-93.58	-61.30	32.2	Hori.	151	34	Horn	RMS
4	38937.602	45.11	-71.97	15.57	26.88	-83.28	-61.30	21.9	Hori.	152	210	Horn	RMS
5	27945.221	50.19	-62.43	11.94	22.41	-72.90	-61.30	11.6	Vert.	154	229	Horn	RMS
6	29972.080	47.11	-67.74	13.67	23.24	-77.31	-61.30	16.0	Vert.	152	225	Horn	RMS
7	32448.000	40.29	-82.23	12.53	24.18	-93.88	-61.30	32.5	Vert.	153	2	Horn	RMS
8	38937.602	44.95	-71.76	15.57	26.88	-83.07	-61.30	21.7	Vert.	153	131	Horn	RMS

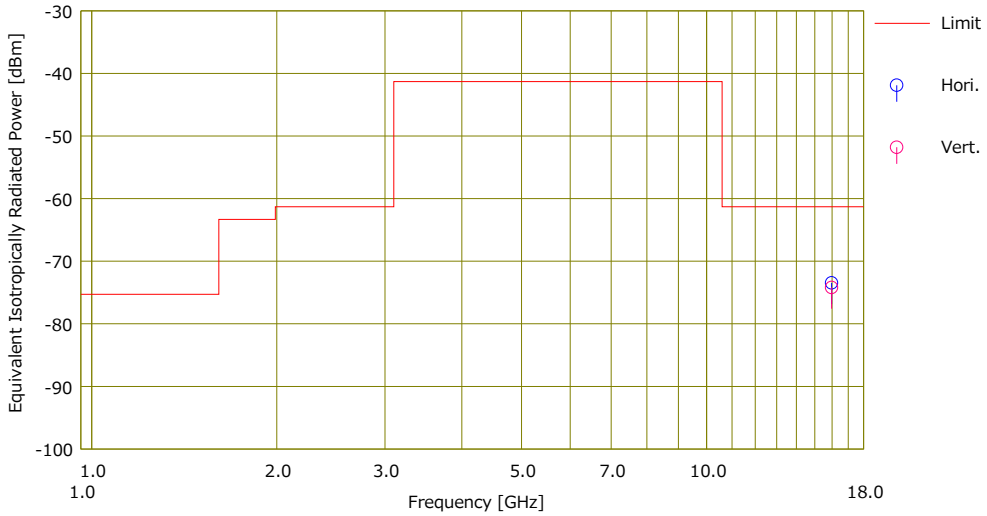
Calculation:Result [dBm] = SG level [dBm] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

Radiated emission

Test place	Shonan EMC Lab.			
Semi Anechoic Chamber	SAC 1	SAC 3	SAC 3	SAC 3
Date	January 26, 2025	January 10, 2025	January 8, 2025	January 9, 2025
Temperature / Humidity	20 deg. C / 26 % RH	21 deg. C / 29 % RH	22 deg. C / 25 % RH	25 deg. C / 22 % RH
Engineer	Hiromasa Sato (9 kHz to 30 MHz)	Yusuke Tanikawara (30 MHz to 1 GHz)	Kenichi Adachi (1 GHz – 10.6 GHz)	Hiromasa Sato (10.6 GHz - 18 GHz)
Mode	Transmitting ch9, Normal power mode			

(UWB emission except carrier emission)

9 kHz - 18 GHz



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	15974.400	37.32	-70.73	13.48	16.21	-73.46	-61.30	12.1	Hori.	154	190	Horn	
2	15974.400	37.51	-71.47	13.48	16.21	-74.20	-61.30	12.9	Vert.	152	4	Horn	

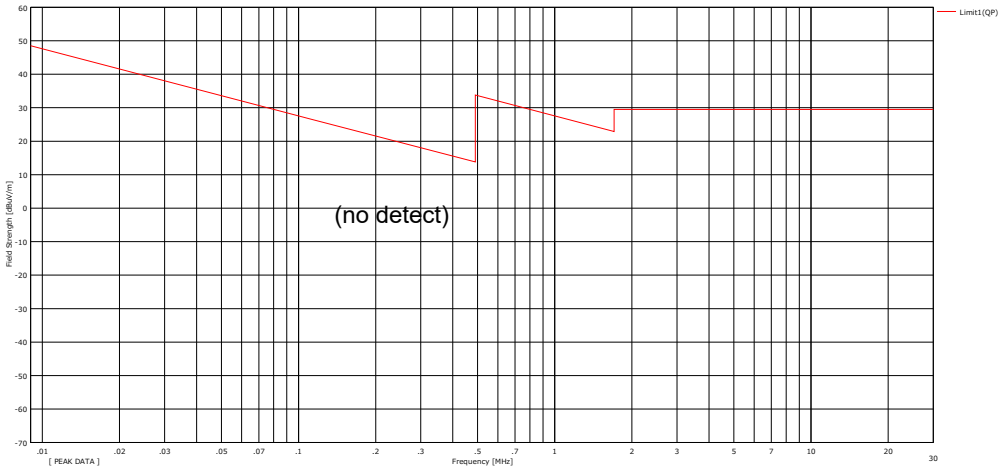
Calculation:Result [dBm] = SG level [dBm] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

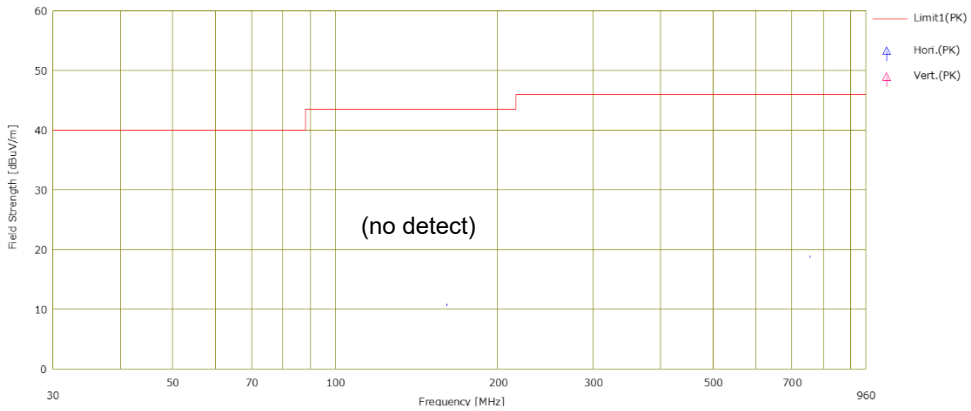
* For below 960 MHz, RBW was set according to FCC 15.209 / RSS-Gen, above 960 MHz, RBW was set to 1 MHz.
(* There were no detect UWB emissions in the range that below 960 MHz)

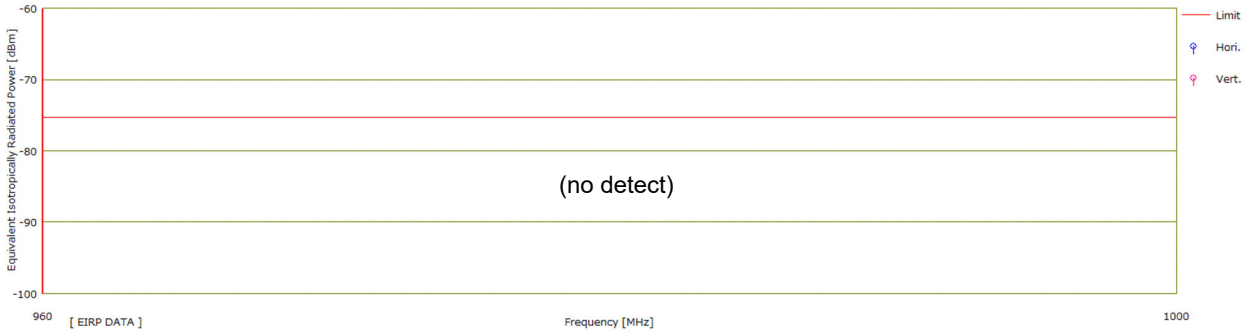
Radiated emission

Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	SAC 1	SAC 3
Date	January 26, 2025	January 10, 2025
Temperature / Humidity	20 deg. C / 26 % RH	21 deg. C / 29 % RH
Engineer	Hiromasa Sato (9 kHz to 30 MHz)	Yusuke Tanikawara (30 MHz to 1 GHz)
Mode	Transmitting ch9, Normal power mode	

(UWB emission except carrier emission)





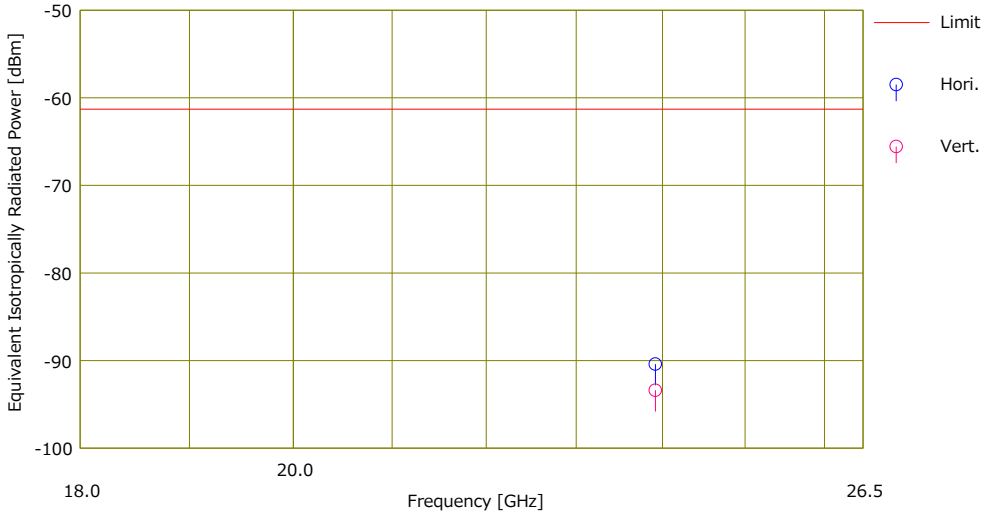


Radiated emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 3
Date	January 9, 2025
Temperature / Humidity	23 deg. C / 25 % RH
Engineer	Shiro Kobayashi (18 GHz – 26.5 GHz)
Mode	Transmitting ch9, Normal power mode

(UWB emission except carrier emission)

18 GHz – 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	23916.600	31.66	-82.71	12.52	20.21	-90.40	-61.30	29.1	Hori.	159	302	Horn	RMS
2	23916.600	31.25	-85.70	12.52	20.21	-93.39	-61.30	32.0	Vert.	157	290	Horn	RMS

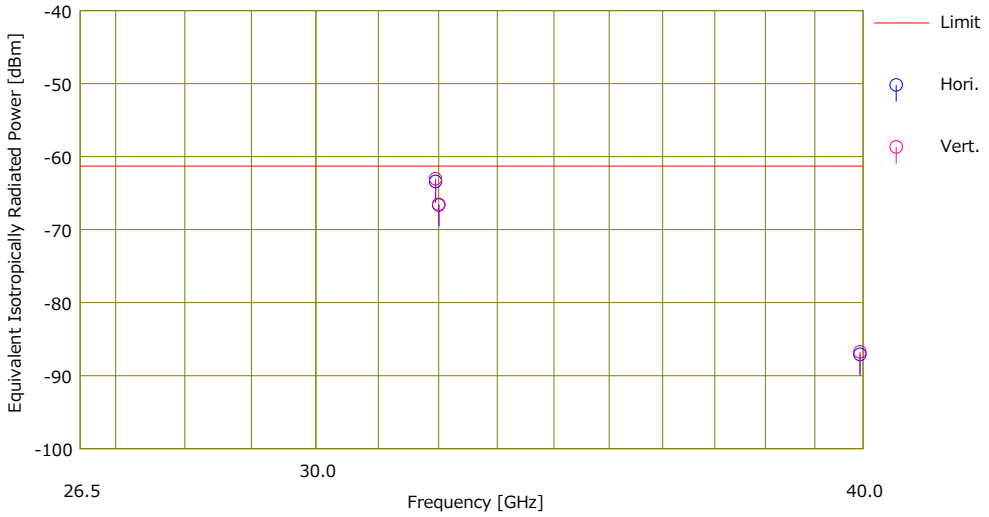
Calculation:Result [dBm] = SG level [dBm] + Tx Ant Gain [dBi] - Tx Loss (Cable)[dB]
Tx Antenna: Horn(1 GHz-40 GHz) / Rx-Antenna: Horn(1 GHz-40 GHz)

Radiated emission

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 3
Date	January 10, 2025
Temperature / Humidity	21 deg. C / 29 % RH
Engineer	Yusuke Tanikawara (26.5 GHz – 40 GHz)
Mode	Transmitting ch9, Normal power mode

(UWB emission except carrier emission)

26.5 GHz - 40 GHz



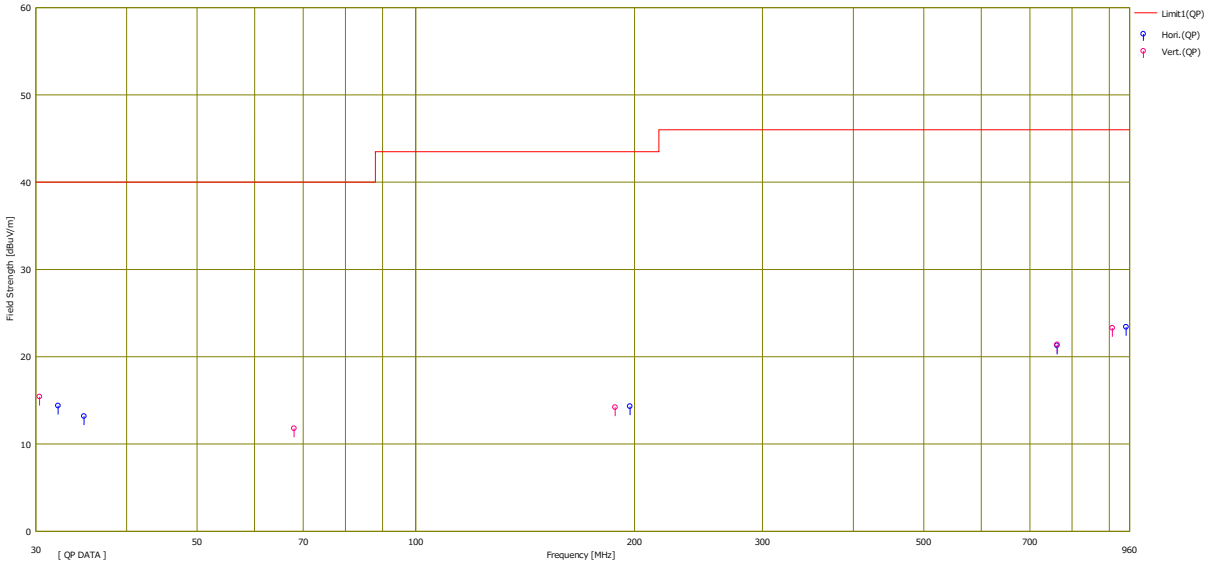
No.	Freq.	Reading (PK)	SG Level	TX Ant.Gain	TX Loss	EIRP		Margin	Pola.	Height	Angle	TX Ant.Type	Comment
						Result	Limit						
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	31948.801	58.42	-52.81	13.01	23.61	-63.41	-61.30	2.1	Hori.	153	20	Horn	RMS
2	32002.990	55.01	-55.98	12.98	23.64	-66.64	-61.30	5.3	Hori.	154	15	Horn	RMS
3	39936.000	40.84	-74.24	14.02	26.88	-87.10	-61.30	25.8	Hori.	150	0	Horn	RMS_Floor noise
4	31948.801	58.11	-52.43	13.01	23.61	-63.03	-61.30	1.7	Vert.	149	10	Horn	RMS
5	32002.990	55.02	-55.88	12.98	23.64	-66.54	-61.30	5.2	Vert.	149	7	Horn	RMS
6	39936.000	40.88	-73.89	14.02	26.88	-86.75	-61.30	25.4	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	SAC 3
Date	January 10, 2025
Temperature / Humidity	21 deg. C / 29 % RH
Engineer	Yusuke Tanikawara
Mode	Transmitting ch5, Normal power mode

(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	32.193	22.30	17.79	6.46	32.16	14.39	40.00	25.6	Hori.	148	355	BC	
2	34.953	22.10	16.72	6.52	32.16	13.18	40.00	26.8	Hori.	151	7	BC	
3	197.130	21.90	16.46	7.97	32.02	14.31	43.50	29.1	Hori.	203	3	BC	
4	762.920	21.40	20.63	10.90	31.65	21.28	46.00	24.7	Hori.	100	357	LP	
5	949.586	20.20	22.28	11.55	30.62	23.41	46.00	22.5	Hori.	100	1	LP	
6	30.362	22.70	18.47	6.41	32.16	15.42	40.00	24.5	Vert.	100	2	BC	
7	68.003	30.50	6.77	6.65	32.14	11.78	40.00	28.2	Vert.	100	169	BC	
8	188.097	22.10	16.21	7.93	32.03	14.21	43.50	29.2	Vert.	100	347	BC	
9	763.225	21.50	20.63	10.90	31.65	21.38	46.00	24.6	Vert.	100	356	LP	
10	908.998	20.60	22.21	11.39	30.91	23.29	46.00	22.7	Vert.	100	0	LP	

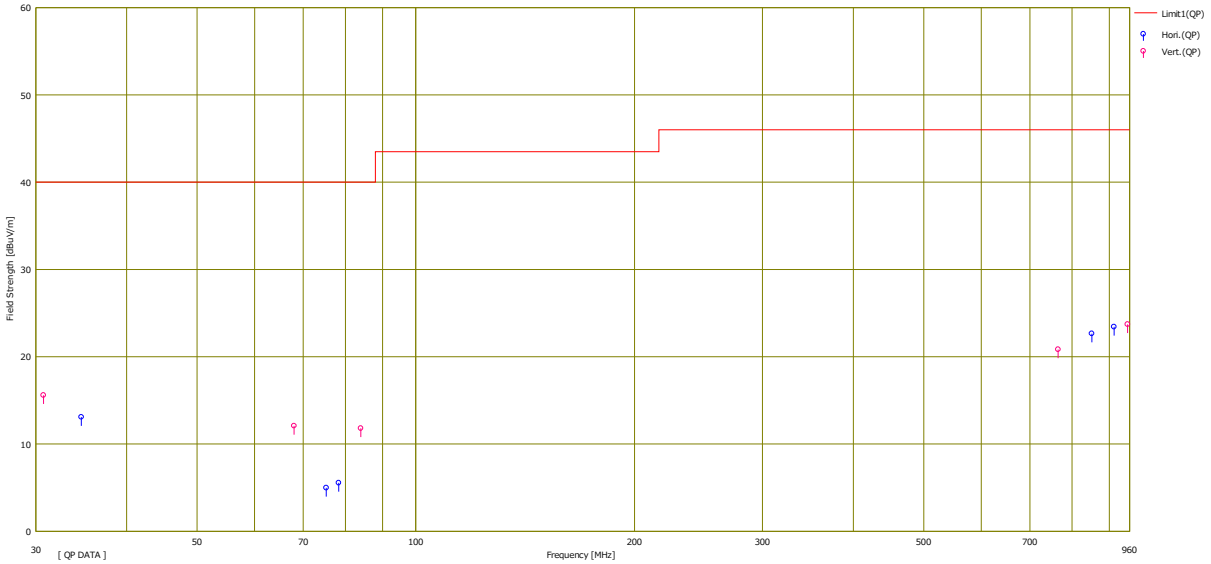
Calculation Result [dBuV/m] = Reading [dBuV/m] + Ant.Fac [dB/m] + Loss (Cable + ATT + ΔAF)[dB] - Gain (AMP)[dB]
Ant.Type = BC: Biconical antenna, LP: Logperiodic antenna, **SH*: Horn antenna

(* 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	SAC 3
Date	January 10, 2025
Temperature / Humidity	21 deg. C / 29 % RH
Engineer	Yusuke Tanikawara
Mode	Transmitting ch9, Normal power mode

(Other emission)



No.	Freq. [MHz]	Reading (QP) [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result (QP) [dBuV/m]	Limit (QP) [dBuV/m]	Margin (QP) [dB]	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
1	34.652	21.90	16.84	6.51	32.16	13.09	40.00	26.9	Hori.	300	343	BC	
2	75.303	23.60	6.27	7.24	32.13	4.98	40.00	35.0	Hori.	298	4	BC	
3	78.327	23.90	6.32	7.46	32.13	5.55	40.00	34.4	Hori.	300	1	BC	
4	851.705	21.00	21.69	11.22	31.26	22.65	46.00	23.3	Hori.	100	358	LP	
5	913.895	20.70	22.19	11.41	30.87	23.43	46.00	22.5	Hori.	100	353	LP	
6	30.739	23.00	18.32	6.43	32.16	15.59	40.00	24.4	Vert.	100	2	BC	
7	68.000	30.80	6.77	6.65	32.14	12.08	40.00	27.9	Vert.	100	198	BC	
8	84.009	29.30	7.02	7.61	32.13	11.80	40.00	28.2	Vert.	100	191	BC	
9	765.548	20.90	20.66	10.91	31.64	20.83	46.00	25.1	Vert.	100	2	LP	
10	953.971	20.30	22.43	11.56	30.58	23.71	46.00	22.2	Vert.	100	357	LP	

Calculation Result [dBuV/m] = Reading [dBuV/m] + Ant.Fac [dB/m] + Loss (Cable + ATT + ΔAF)[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 (GPS band)

Test place	Shonan EMC Lab.
Semi Anechoic Chamber	SAC 3
Date	January 8, 2025
Temperature / Humidity	22 deg. C / 25 % RH
Engineer	Shiro Kobayashi
Mode	Transmitting ch5, Normal power mode

(GPS bands emission)

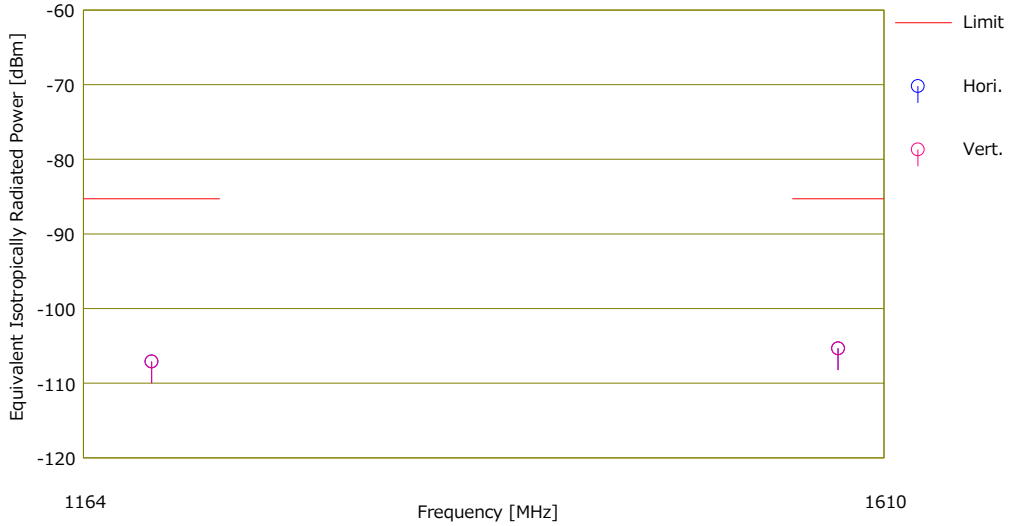
No.	Freq.	Reading <PK>	SG Level	TX Ant.Gain	TX Loss	EIRP Result	EIRP Limit	Margin	Pola.	Height	Angle	TX Ant.Type	Comment
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	1202.000	18.54	-110.00	7.17	4.27	-107.10	-85.30	21.8	Hori.	150	0	Horn	RMS,RBW 1 kHz,noise floor level.
2	1584.500	18.61	-110.00	9.61	4.94	-105.33	-85.30	20.0	Hori.	150	0	Horn	RMS,RBW 1 kHz,noise floor level.
3	1202.000	18.66	-110.00	7.17	4.27	-107.10	-85.30	21.8	Vert.	150	0	Horn	RMS,RBW 1 kHz,noise floor level.
4	1584.500	18.77	-110.00	9.61	4.94	-105.33	-85.30	20.0	Vert.	150	0	Horn	RMS,RBW 1 kHz,noise floor level.

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	SAC 3
Date	January 8, 2025
Temperature / Humidity	22 deg. C / 25 % RH
Engineer	Shiro Kobayashi
Mode	Transmitting ch9, Normal power mode

(GPS bands emission)



No.	Freq.	Reading (PK)	SG Level	TX Ant.Gain	TX Loss	ERP Result	ERP Limit	Margin	Pola.	Height	Angle	TX Ant.Type	Comment
	[MHz]	[dBuV]	[dBm]	[dBi]	[dB]	[dBm]	[dBm]	[dB]		[cm]	[deg]		
1	1202.000	18.55	-110.00	7.17	4.27	-107.10	-85.30	21.8	Hori.	150	0	Horn	RMS,RBW 1 kHz,noise floor level.
2	1584.500	18.66	-110.00	9.61	4.94	-105.33	-85.30	20.0	Hori.	150	0	Horn	RMS,RBW 1 kHz,noise floor level.
3	1202.000	18.63	-110.00	7.17	4.27	-107.10	-85.30	21.8	Vert.	150	0	Horn	RMS,RBW 1 kHz,noise floor level.
4	1584.500	18.79	-110.00	9.61	4.94	-105.33	-85.30	20.0	Vert.	150	0	Horn	RMS,RBW 1 kHz,noise floor level.

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. No.3 Semi Anechoic Chamber
Date	January 7, 2025
Temperature / Humidity	23 deg. C / 25 % RH
Engineer	Hiromasa Sato
Mode	Transmitting ch5, Normal power mode

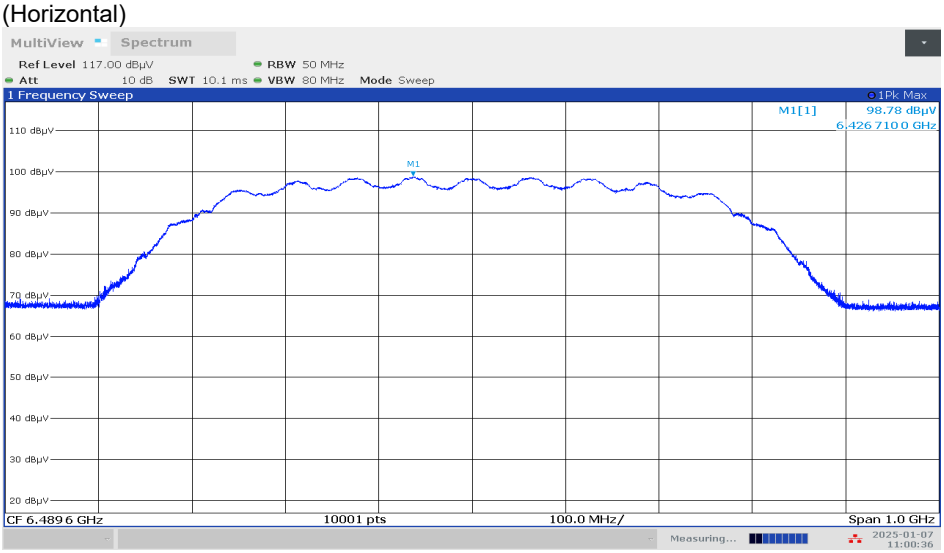
(Peak level of the emission)

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

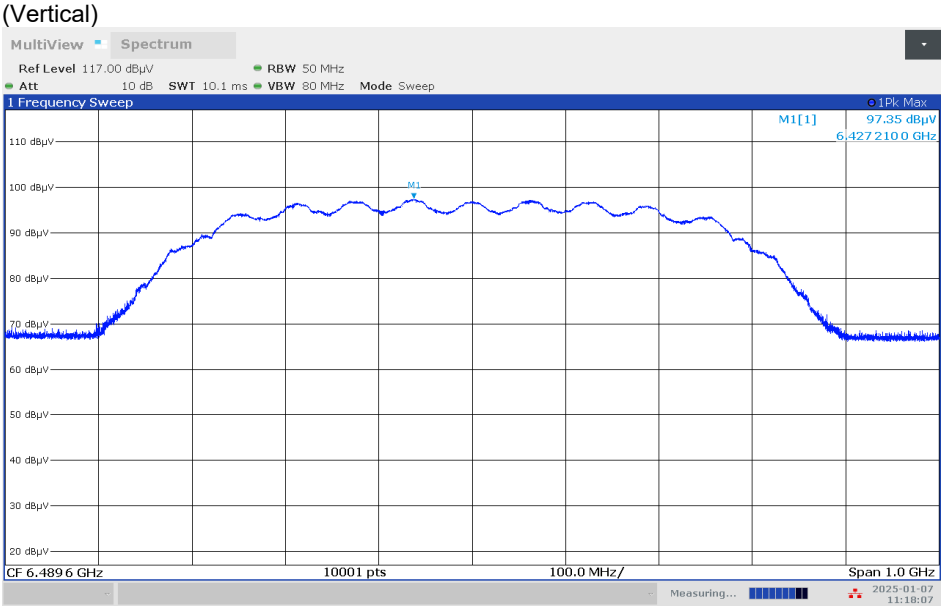
Band	Pol.	Frequency [MHz]	SA Reading [dBuV/50 MHz]	SG level [dBm]	Tx Ant.Gain [dBi]	Tx Loss [dB]	RBW converted factor [dB]	EIRP Result [dBm/50 MHz]	EIRP Limit [dBm/50 MHz]	Margin [dB]	Remarks	Height [cm]	Angle [deg.]
3.1 GHz - 10.6 GHz	Hor.	6426.710	98.78	-13.22	10.20	10.21	0.50	-12.73	0.00	12.73	carrier	148	193
3.1 GHz - 10.6 GHz	Ver.	6427.210	97.35	-13.89	10.20	10.21	0.50	-13.40	0.00	13.40	carrier	156	182

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 = 47.1834 [MHz]))

(Horizontal)



(Vertical)



Peak level of the emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date	January 6, 2025
Temperature / Humidity	26 deg. C / 28 % RH
Engineer	Shiro Kobayashi
Mode	Transmitting ch9, Normal power mode

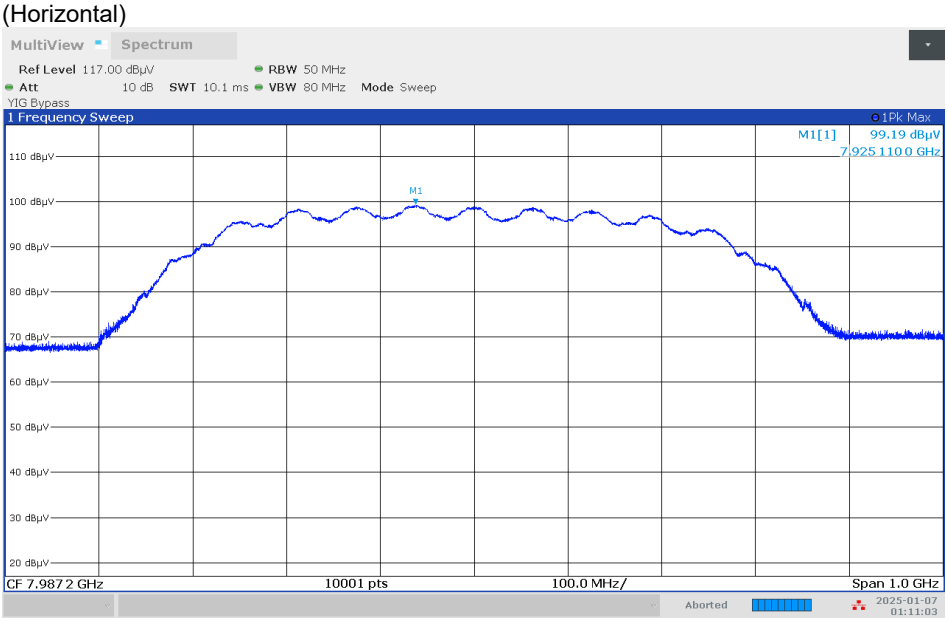
(Peak level of the emission)

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

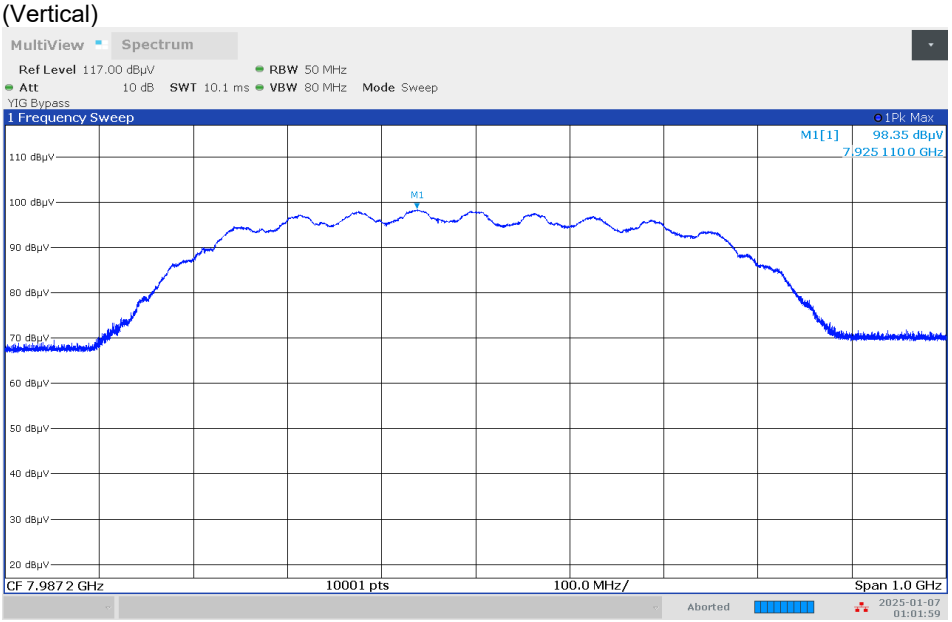
Band	Pol.	Frequency [MHz]	SA Reading [dBuV/50 MHz]	SG level [dBm]	Tx Ant.Gain [dBi]	Tx Loss [dB]	RBW converted factor [dB]	EIRP Result [dBm/50 MHz]	EIRP Limit [dBm/50 MHz]	Margin [dB]	Remarks	Height [cm]	Angle [deg.]
3.1 GHz - 10.6 GHz	Hor.	7925.110	99.19	-12.49	12.55	11.30	0.50	-10.74	0.00	10.74	carrier	150	192
3.1 GHz - 10.6 GHz	Ver.	7925.110	98.35	-13.28	12.55	11.30	0.50	-11.53	0.00	11.53	carrier	153	1

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 = 47.1834 [MHz]))

(Horizontal)



(Vertical)



Peak level of the emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date	January 7, 2025
Temperature / Humidity	23 deg. C / 25 % RH
Engineer	Hiromasa Sato
Mode	Transmitting ch5, Low power mode

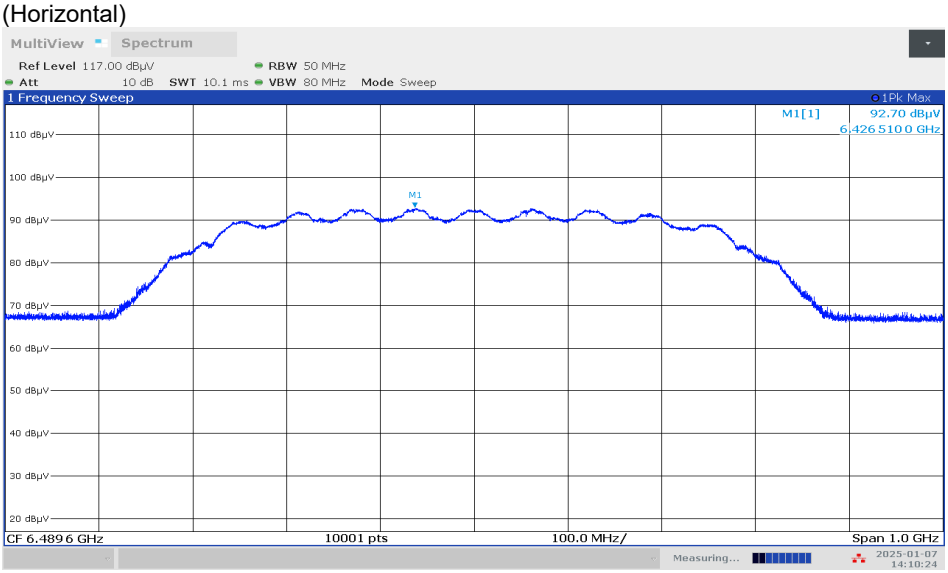
(Peak level of the emission)

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

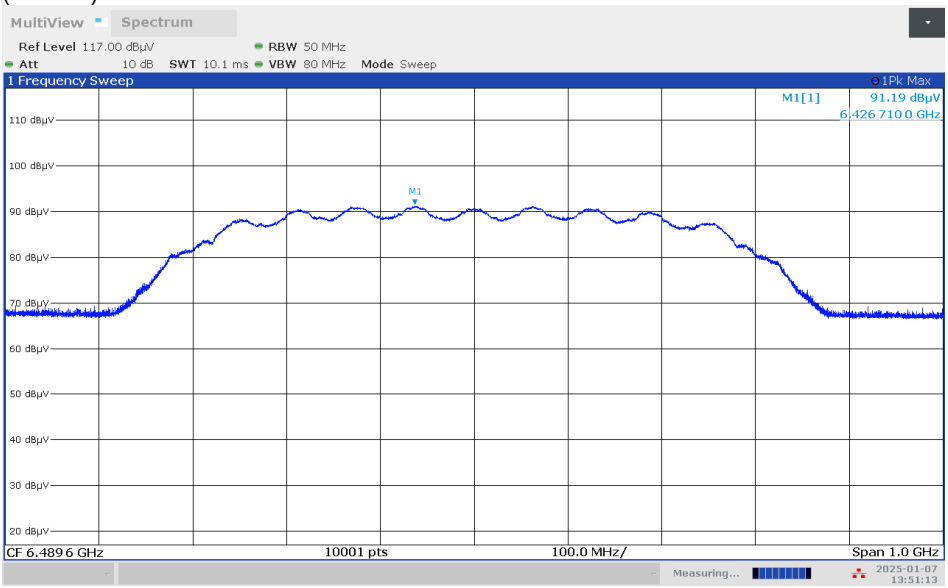
Band	Pol.	Frequency [MHz]	SA Reading [dBuV/50 MHz]	SG level [dBm]	Tx Ant.Gain [dBi]	Tx Loss [dB]	RBW converted factor [dB]	EIRP Result [dBm/50 MHz]	EIRP Limit [dBm/50 MHz]	Margin [dB]	Remarks	Height [cm]	Angle [deg.]
3.1 GHz - 10.6 GHz	Hor.	6426.510	92.70	-19.62	10.20	10.21	0.50	-19.13	0.00	19.13	carrier	148	179
3.1 GHz - 10.6 GHz	Ver.	6426.710	91.19	-20.45	10.20	10.21	0.50	-19.96	0.00	19.96	carrier	149	357

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 = 47.1834 [MHz]))

(Horizontal)



(Vertical)



Peak level of the emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Date	January 6, 2025
Temperature / Humidity	26 deg. C / 28 % RH
Engineer	Shiro Kobayashi
Mode	Transmitting ch9, Low power mode

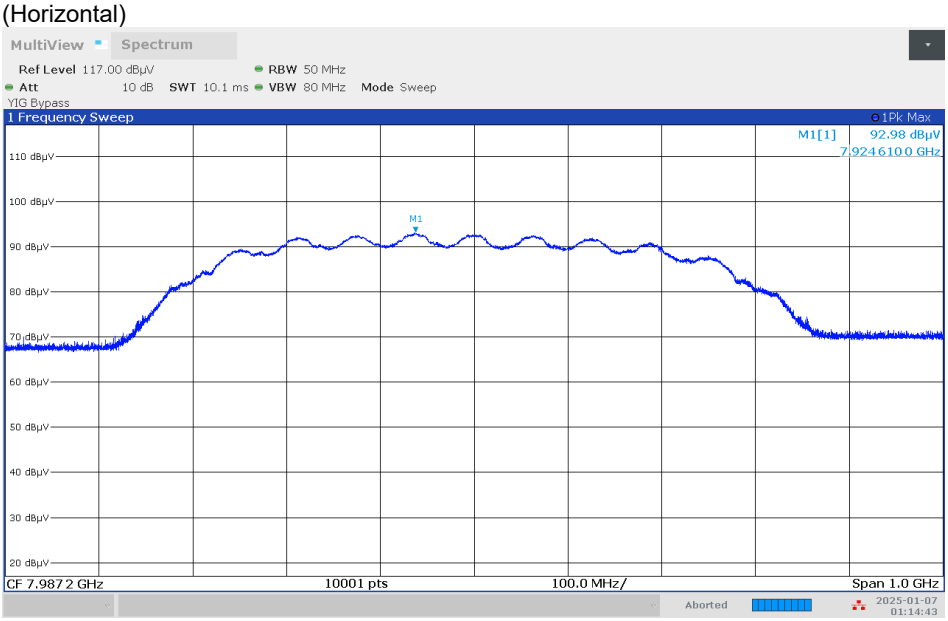
(Peak level of the emission)

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

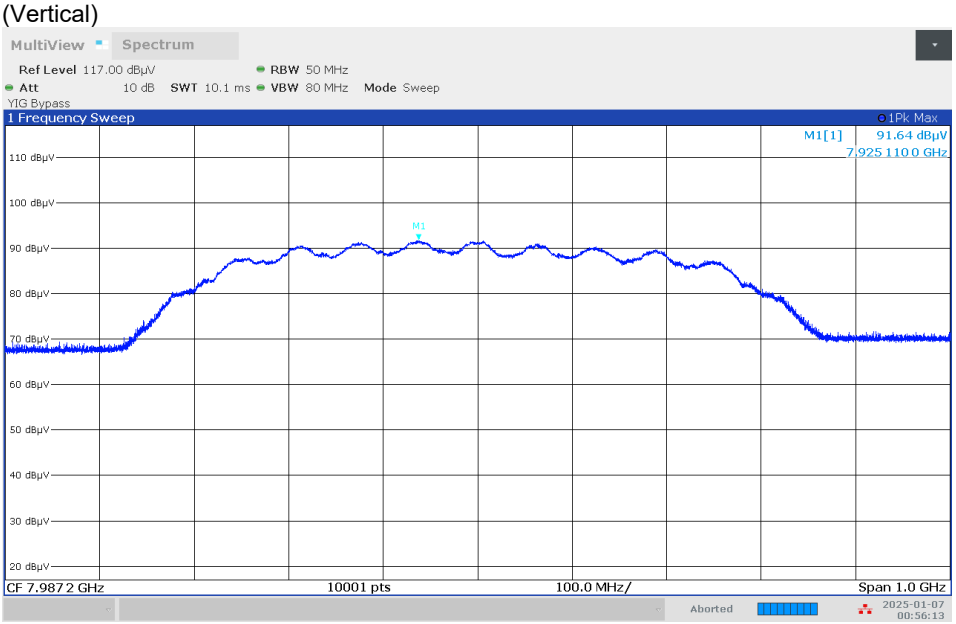
Band	Pol.	Frequency [MHz]	SA Reading [dBuV/50 MHz]	SG level [dBm]	Tx Ant.Gain [dBi]	Tx Loss [dB]	RBW converted factor [dB]	EIRP Result [dBm/50 MHz]	EIRP Limit [dBm/50 MHz]	Margin [dB]	Remarks	Height [cm]	Angle [deg.]
3.1 GHz - 10.6 GHz	Hor.	7924.610	92.98	-18.85	12.54	11.30	0.50	-17.11	0.00	17.11	carrier	150	192
3.1 GHz - 10.6 GHz	Ver.	7925.110	91.64	-19.67	12.55	11.30	0.50	-17.92	0.00	17.92	carrier	153	1

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 = 47.1834 [MHz]))

(Horizontal)



(Vertical)



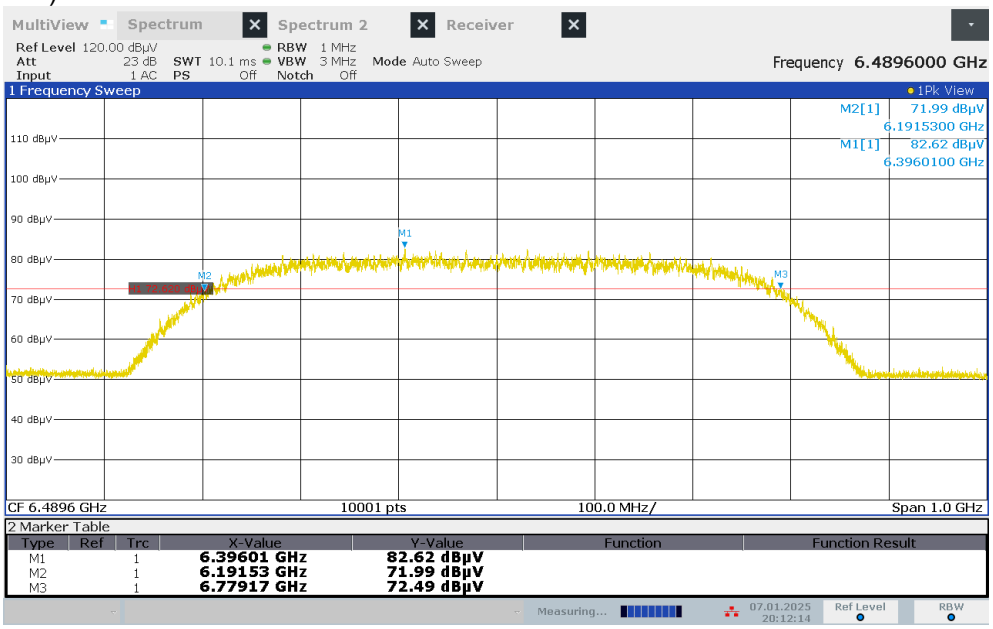
UWB Bandwidth

Test place	Shonan EMC Lab. SAC 3
Date	January 7, 2025
Temperature / Humidity	23 deg. C / 26 % RH
Engineer	Shiro Kobayashi
Mode	Transmitting ch5, Normal power mode

10 dB Bandwidth: **587.640 MHz (Limit: >= 500 MHz)**

Center Frequency **6485.350 MHz (= (fH + fL) / 2)**

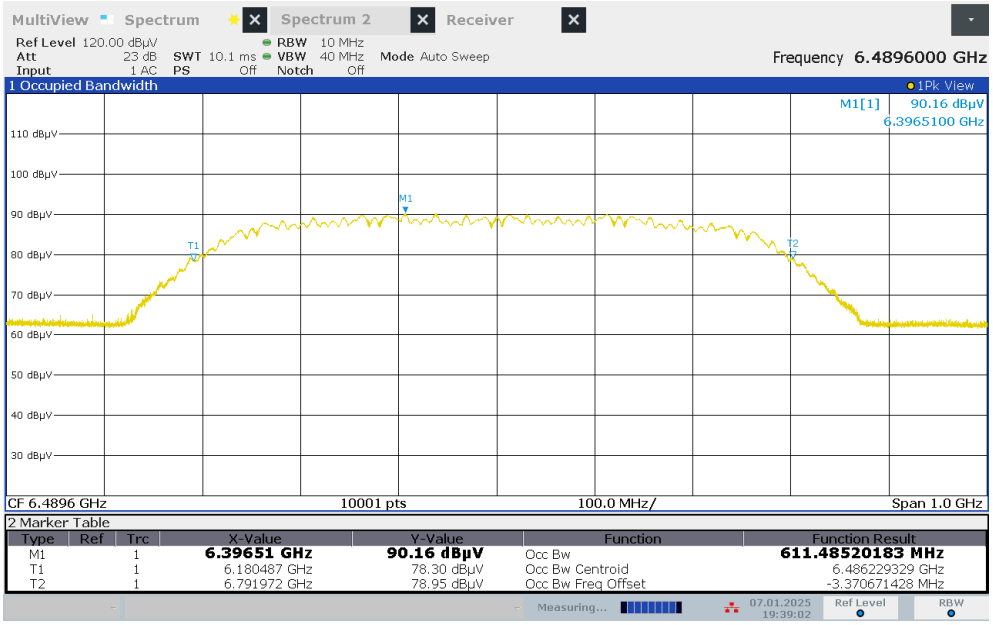
(worst: Vertical)



Start Frequency: 5989.600 **MHz** **f L:** 6191.530 **MHz**

Stop Frequency: 6989.600 **MHz** **f H:** 6779.170 **MHz**

99 % Occupied BW: 611.485 **MHz**



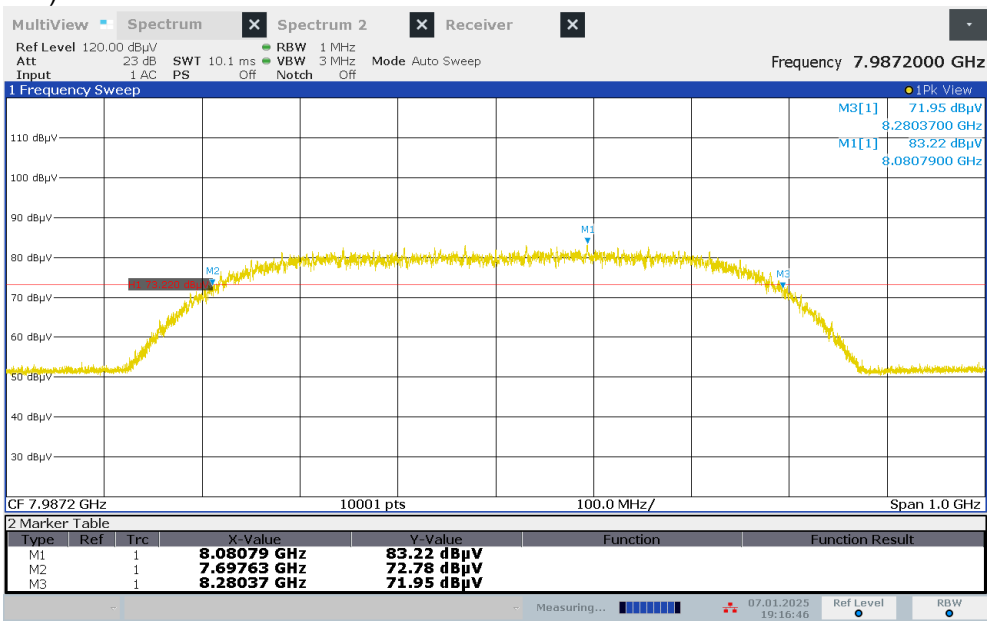
UWB Bandwidth

Test place	Shonan EMC Lab. SAC 3
Date	January 7, 2025
Temperature / Humidity	23 deg. C / 26 % RH
Engineer	Shiro Kobayashi
Mode	Transmitting ch9, Normal power mode

10 dB Bandwidth: 582.740 MHz (Limit: >= 500 MHz)

Center Frequency 7989.000 MHz (= (fH + fL) / 2)

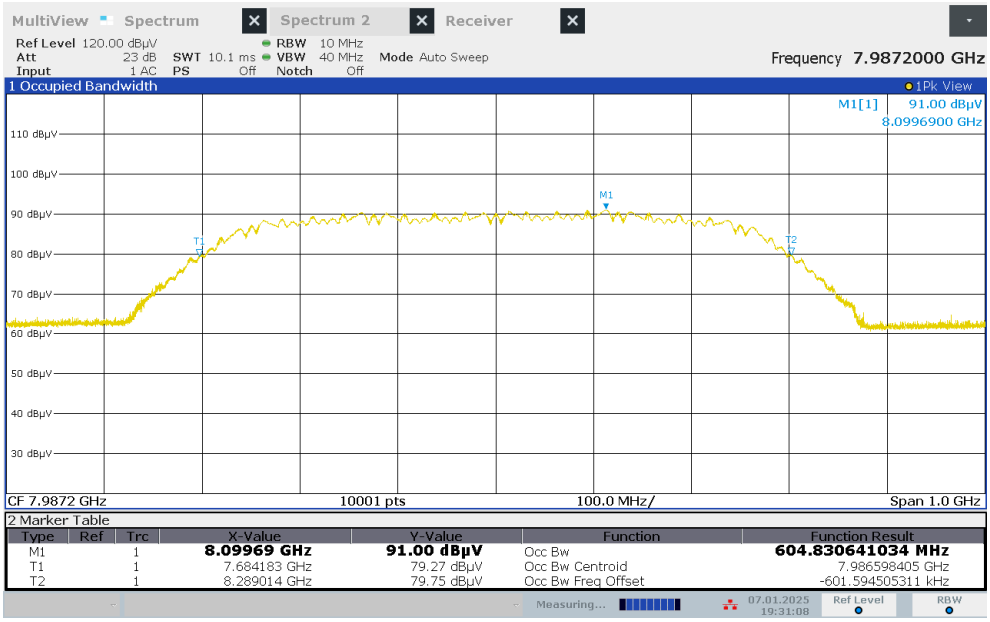
(worst: Vertical)



Start Frequency: 7487.200 **MHz** **f L:** 7697.630 **MHz**

Stop Frequency: 8487.200 **MHz** **f H:** 8280.370 **MHz**

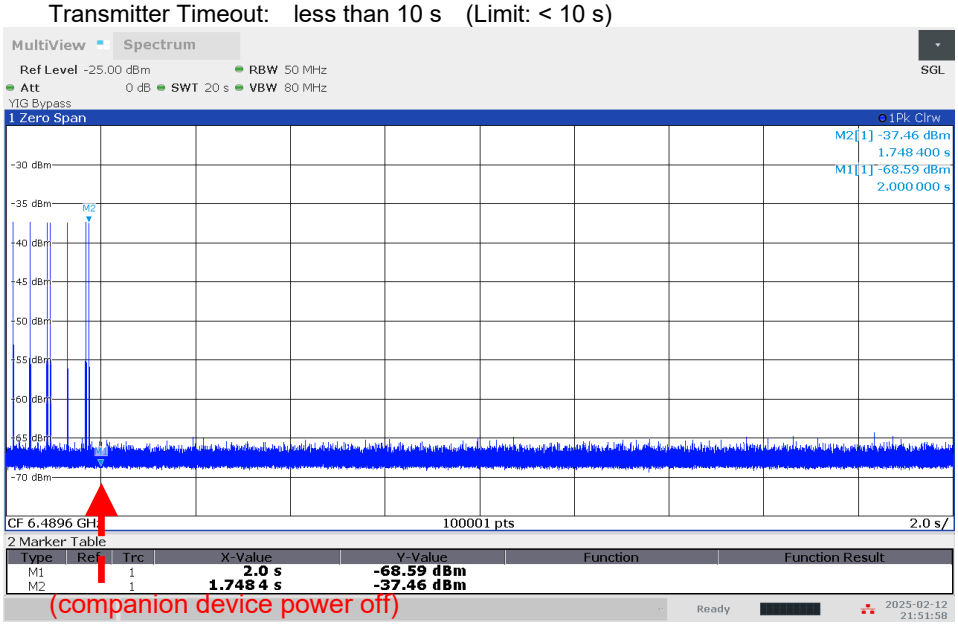
99 % Occupied BW: 604.831 **MHz**



Transmitter timeout

Test place	Shonan EMC Lab. No.6 Shielded Room
Date	February 12, 2025
Temperature / Humidity	25 deg. C / 39 % RH
Engineer	Kenichi Adachi
Mode	Normal Transmitting ch5, Normal power mode

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



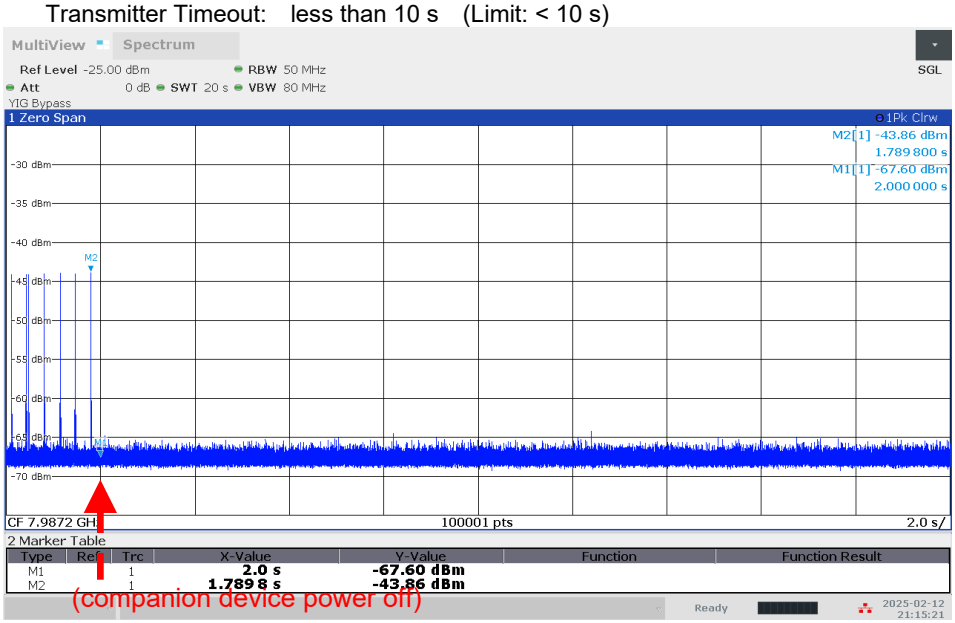
M1: power off of companion device
M2: end of EUT's transmission

* After turning off the signal of the companion device, there was no transmission signal from the EUT at all signal.
This EUT was keeping stopped transmit unless there is a second trigger at the Transmitter timeout of the UWB after the Trigger.
Therefore, it was written in the test results of the transmitter timeout was less than 10 s.

Transmitter timeout

Test place	Shonan EMC Lab. No.6 Shielded Room
Date	February 12, 2025
Temperature / Humidity	25 deg. C / 39 % RH
Engineer	Kenichi Adachi
Mode	Normal Transmitting ch9, Normal power mode

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



M1: power off of companion device
M2: end of EUT's transmission

* After turning off the signal of the companion device, there was no transmission signal from the EUT at all signal.
This EUT was keeping stopped transmit unless there is a second trigger at the Transmitter timeout of the UWB after the Trigger.
Therefore, it was written in the test results of the transmitter timeout was less than 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	144959	Attenuator	JFW	50HF-003N	-	2024/08/22	12
RE	167096	Attenuator	JFW	50HF-006N	-	2024/02/13	12
RE	248303	Attenuator	JFW	50HFFA-006-2/18N	-	2024/05/06	12
RE	206229	Bandpass Filter	Micro-Tronics	BPC50411	086	2024/03/05	12
RE	145023	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	91032666	2024/05/10	12
RE	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2024/08/21	12
RE	194601	Coaxial Cable	Fjikura	5D-2W	-	2024/11/21	12
RE	196941	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803093/2	2024/03/07	12
RE	196945	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803414/2	2024/03/12	12
RE	221966	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	2000703/2	2024/06/05	12
RE	236869	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	200084/4A	2024/12/05	12
RE	249679	Coaxial Cable	Hayashi-Repic co., Ltd.	SMS13-13A26-NMS13-0.5m	50736-01-01	2024/06/12	12
RE	255496	Coaxial Cable	Hayashi-Repic co., Ltd.	SFS13-13A26-SMS13-1.0m	51221-01-01	2024/12/05	12
RE	144968	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-269(RF Selector)	2024/04/01	12
RE	253628	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	5D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	2024/10/16	12
RE	145792	Digital Hitester	HIOKI E. E. CORPORATION	3805-50	80997812	2024/09/24	12
RE	146210	Digital Hitester	HIOKI E. E. CORPORATION	3805-50	80997823	2024/09/24	12
RE	145110	Digital Tester	SANWA	PC500	7019240	2024/05/29	12
RE	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,PE)	Ver 3.1.0546	-	-
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	194683	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	694	2024/03/04	12
RE	194685	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	711	2024/03/20	12
RE	145529	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	196	2024/05/10	12
RE	245074	Loop(Active) Antenna	ETS-Lindgren	6502	00262458	2024/04/02	12
RE	145003	Pre Amplifier	SONOMA	310N	290211	2025/02/19	12
RE	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	2046104	2024/02/16	12
RE	145126	Pre Amplifier	SONOMA	310N	290213	2025/02/19	12
RE	145129	Pre Amplifier	Toyo Corporation	HAP26-40W	B3208602403-176	2024/05/09	12
RE	145568	Semi Anechoic Chamber(ME)	TDK	Semi Anechoic Chamber 3m/10m	1, 2, 3	2024/10/12	24
RE	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2024/04/03	12
RE	145597	Semi-Anechoic Chamber	TDK	SAEC-01(NSA)	1	2024/04/16	12
RE	146226	Signal Generator	Keysight Technologies Inc	E8257D-540	MY48051404	2025/01/15	12
RE	235269	Spectrum Analyzer	Rohde & Schwarz	FSW43	102488	2024/10/17	12
RE	146432	Tape Measure	TAJIMA	GL19-55	-	-	-

Test Instruments (2/2)

Test Name	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int (Month)
RE	207279	Tape Measure	ASKUL	-	-	-	-
RE	145790	Test Receiver	Rohde & Schwarz	ESU40	100093	2024/04/19	12
RE	213530	Test Receiver	Rohde & Schwarz	ESW44	103068	2025/02/12	12
RE	146293	Thermo-Hygrometer	A&D Company	AD-5681	4062518	2024/08/12	12
RE	191840	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2024/08/12	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