



# RADIO TEST REPORT

**Test Report No. : 14082148S-A-R2**

**Applicant** : DENSO CORPORATION  
**Type of EUT** : Radio Frequency Key (RFK)  
**Model Number of EUT** : YBN00  
**FCC ID** : HYQYBN00  
**Test regulation** : FCC Part 15 Subpart F: 2021  
**Test Result** : Complied (Refer to Section 3)

1. This test report shall not be reproduced in full or partial, without the written approval of UL Japan, Inc.
2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by the A2LA accreditation body.
6. This test report covers Radio technical requirements.  
It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan, Inc. has been accredited.
9. The information provided from the customer for this report is identified in SECTION 1.
10. This report is a revised version of 14082148S-A-R1. 14082148S-A-R1 is replaced with this report.

**Date of test:** November 16 to 24, 2021

**Representative test engineer:** *K. Adachi*  
Kenichi Adachi  
Engineer

**Approved by:** *T. Imamura*  
Toyokazu Imamura  
Leader



CERTIFICATE 1266.03

The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan, Inc.  
 There is no testing item of "Non-accreditation".

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Report Cover Page - 13-EM-F0429 Issue # 19.0

## **REVISION HISTORY**

### **Original Test Report No.: 14082148S-A**

Revision	Test report No.	Date	Page revised	Contents
- (Original)	14082148S-A	February 28, 2022	-	-
1	14082148S-A-R1	March 11, 2022	P.1, 4, 10	Correction of Radio "Type of Equipment" From: Electrical Key To: Radio Frequency Key (RFK)
			P.4	Deletion of Operating temperature from Radio Specification and addition to General Specification Deletion of UWB "part" Addition of Frequency of operation of UWB: (CH5): 6489.6 MHz (6240.0 to 6739.2 MHz), (CH9): 7987.2 MHz (7737.6 to 8236.8 MHz)
				Correction of Antenna gain "UWB" From: (CH 5): 6.78 dBi max, (CH 9): 2.83 dBi max To: (CH5): 6.78 dBi (max), (CH9): 2.83 dBi (max)
			P.4, 5	Deletion of Antenna type and Antenna Connector Type from Radio Specification
			P.5	Modification of Frequency of Operation [Bluetooth Low Energy] From: 2402 MHz - 2480 MHz To: 2402 MHz to 2480 MHz Modification of Antenna Gain of [Bluetooth Low Energy] From: "-1.69 dBi (for 2402 MHz), -2.10 dBi (for 2426 MHz), -3.09 dBi (for 2480 MHz)" To: -1.69 dBi (max) Deletion from Radio Specification "WPC1.2 (5W BPP)" "(Passive)"and Coil system
			p.7	Correction of "FCC Part 15.31 (e)" From: The EUT provides stable voltage constantly to the RF Module regardless of input voltage. To: The EUT provides stable voltage constantly to the RF Part regardless of input voltage.
			p.12, p.13	Correction of Section No. (7 -> 6, 8 -> 7, 9 -> 8)
			p.12	Added the setting of instrument of Below 30 MHz
			p.10	Correction of the style of fonts.
			p.12, p.13, p.24, p.25	Correction of number/fonts clarification has been implemented.
2	14082148S-A-R2	May 20, 2022		

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## **SECTION 1: Customer information**

Company Name : DENSO CORPORATION  
Address : 1-1 Showa-cho, Kariya-shi, Aichi ken, 448-8661 Japan  
Telephone Number : +81-566-61-5789  
Contact Person : Toshiaki Saito

The information provided from the customer is as follows;

- Applicant, Type 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
- SECTION 4: Operation of EUT during testing

\* The laboratory is exempted from liability of any test results affected from the above information in SECTION 2 and 4.

## **SECTION 2: Equipment under test (E.U.T.)**

### **2.1 Identification of E.U.T.**

Type of Equipment : Radio Frequency Key (RFK)  
Model No. : YBN00  
Serial No. : Refer to Section 4, Clause 4.2  
Receipt Date of Sample : October 28, 2021  
Condition of EUT : Engineering prototype  
(Not for Sale: This sample is equivalent to mass-produced items.)  
Modification of EUT : No Modification by the test lab

### **2.2 Product Description**

Model: YBN00 (referred to as the EUT in this report) is a Radio Frequency Key (RFK).

#### **General Specification**

Rating : DC 3.7 V typical (DC 3.0 V to 4.2 V)  
Operating temperature : -30 deg. C to +60 deg. C

#### **Radio Specification**

##### **UWB \*1)**

Equipment type : Transceiver  
Frequency of operation : (CH5): 6489.6 MHz (6240.0 to 6739.2 MHz),  
(CH9): 7987.2 MHz (7737.6 to 8236.8 MHz)  
Type of modulation : BPM-BPSK  
Antenna gain : (CH5): 6.78 dBi (max),  
(CH9): 2.83 dBi (max)

\*1) This test report applies to UWB part.

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**[Bluetooth Low Energy]**

Radio Type : Transceiver  
Frequency of Operation : 2402 MHz to 2480 MHz  
Modulation : GFSK  
Antenna Gain : -1.69 dBi (max)

**[NFC (Passive)]**

Equipment Type : Transceiver  
Frequency of Operation : 13.56 MHz  
Modulation : ASK

**[WPC1.2 (5W BPP)]**

Equipment Type : Receiver  
Frequency Band : 110 kHz to 205 kHz  
Rated Receive Output Power : 5 W (BPP)  
Charging distance : Contact

## **SECTION 3: Test specification, procedures & results**

### **3.1 Test Specification**

Test Specification : FCC Part 15 Subpart F  
FCC Part 15 final revised on May 3, 2021 and effective July 2, 2021

Title : FCC 47CFR Part15 Radio Frequency Device  
Section 15.207 Conducted limits  
Subpart F Ultra-Wideband Operation  
Section 15.519 Technical requirements for hand held UWB systems.

### 3.2 Procedures and results

#### < Requirements for indoor UWB systems >

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)
	IC: RSS-Gen 8.8	IC: 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)	-	Complied a)	Radiated
	IC: RSS-220 Annex 2	IC: RSS-220 2 RSS-220 5.1			
Radiated emission	FCC: Section 15.521(d) 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)	5.77 dB 6403.203 MHz AV, Vertical Mode: Transmitting CH 5	Complied b)	Radiated (above 30 MHz) / Conducted (below 30 MHz) *2)
	IC: RSS-Gen 6.5 RSS-220 Annex 4	IC: 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)	13.43 dB 6437.469 MHz PK, Vertical Mode Transmitting CH 5	Complied c)	Radiated
	IC: RSS-220 Annex 4	IC: 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 d)	Conducted
	IC: RSS-220 Annex 4	IC: RSS-220 5.3.1(b)			

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.

\*1) This test was not applicable since the EUT does not have AC Mains.

\*2) Radiated test was selected over 30 MHz based on section 15.519 (c).

a) Refer to APPENDIX 1 (Data of UWB Bandwidth)

b) Refer to APPENDIX 1 (Data of Radiated emission)

c) Refer to APPENDIX 1 (Data of Peak level of the Emission)

d) Refer to APPENDIX 1 (Data of Transmitter timeout)

Symbols:

Complied The data of this test item has enough margin, more than the measurement uncertainty.

Complied# The data of this test item meets the limits unless the measurement uncertainty is taken into consideration.

\* In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.

#### FCC Part 15.31 (e)

The EUT provides stable voltage constantly to the RF Part 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 the EUT complies with the requirement.

#### FCC Part 15.203 Antenna requirement

The antenna is not removable from the EUT.

Therefore, the equipment complies with the antenna requirement of Section 15.203.

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### 3.3 Addition to standard

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

### 3.4 Uncertainty

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

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

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Item	Frequency range	Uncertainty (+/-)			
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4,5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.9 dB	2.9 dB	3.0 dB	2.9 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.2 dB	3.1 dB	3.1 dB	-
	30 MHz-200 MHz	4.6 dB	4.6 dB	4.6 dB	-
	200 MHz-1 GHz	6.0 dB	6.1 dB	6.1 dB	-
Radiated emission (Measurement distance: 1 m)	1 GHz-18 GHz	5.6 dB	5.6 dB	5.6 dB	-
	18 GHz-40 GHz	5.8 dB	5.8 dB	5.8 dB	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Substitution measurement (EUT height: 1.5 m, Distance: 3 m)	
Frequency range	Uncertainty (+/-)
30 MHz - 200 MHz	4.7 dB
200 MHz - 1000 MHz	3.5 dB
1 GHz - 13 GHz	4.3 dB

Substitution measurement (EUT height: 1.5 m, Distance: 1 m)	
Frequency range	Uncertainty (+/-)
1 GHz - 13 GHz	4.9 dB
13 GHz - 18 GHz	5.5 dB

Substitution measurement (EUT height: 1.5 m, Distance: 0.5 m)	
Frequency range	Uncertainty (+/-)
1 GHz - 13 GHz	4.9 dB
13 GHz - 18 GHz	5.5 dB
18 GHz - 26.5 GHz	4.1 dB
26.5 GHz - 40 GHz	4.1 dB

Substitution measurement (EUT height: 1.5 m, Distance: 0.3 m)	
Frequency range	Uncertainty (+/-)
1 GHz - 13 GHz	5.0 dB
13 GHz - 18 GHz	5.5 dB
18 GHz - 26.5 GHz	4.1 dB
26.5 GHz - 40 GHz	4.1 dB

Substitution measurement (EUT height: 1.5 m, Distance: 0.1 m)	
Frequency range	Uncertainty (+/-)
13 GHz - 18 GHz	5.8 dB
18 GHz - 26.5 GHz	4.4 dB
26.5 GHz - 40 GHz	4.5 dB

Antenna terminal test	Uncertainty (+/-)
Spurious emission (Conducted) below 1GHz	0.93 dB
Spurious emission (Conducted) 1 GHz-3 GHz	0.92 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.3 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.3 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.3 dB
Bandwidth Measurement	0.012 %
Duty cycle and Time Measurement	0.27 %
Voltage	0.97 %

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### 3.5 Test Location

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A2LA Certificate Number: 1266.03

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

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

### 3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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## SECTION 4: Operation of E.U.T. during testing

### 4.1 Operating Mode(s)

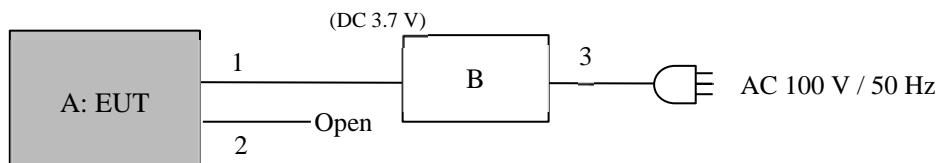
The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Test Item	Mode
Other than Transmitter timeout test	Transmitting (Tx) CH 5 (6489.6 MHz), Transmitting (Tx) CH 9 (7987.2 MHz)
Transmitter timeout test	Normal transmitting CH 5 (6489.6 MHz), Normal transmitting CH 9 (7987.2 MHz)
-	Software (Firmware): RFK software for certification Ver.1.1 (Date: 2021.10.14, Storage location: EUT memory) Power setting: Fixed (CH5: -3 dBm, CH 9: -3 dBm)

\*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.

Justification: The system was configured in typical fashion (as customer would normally use it) for testing.

### 4.2 Configuration and peripherals



\*Test data was taken under worse case conditions.

#### Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Radio Frequency Key (RFK)	YBN00	1 *1) 2 *2)	DENSO CORPORATION	EUT
B	Power Supply (DC)	PAN35-10A	DE001677	KIKUSUI	-

\*1) Used for Radiated emission tests

\*2) Used for Antenna terminal conducted tests

#### List of cables used

No.	Cable	Length (m)	Shield-Cable	Shield-Connector	Remarks
1	DC	0.2+2.0	Unshielded	Unshielded	*3)
2	UART	0.15	Unshielded	Unshielded	*3)
3	AC	2.0	Unshielded	Unshielded	-

\*3) This cable is used only test.

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## **SECTION 5: Radiated Spurious Emission**

### **Test Procedure**

[For below 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 and the table top is covered with polycarbonate. That has very low permittivity.

[For above 960 MHz]

EUT was placed on a platform of nominal size, 0.15 m by 0.05 m, raised 1.5 m above the conducting ground plane. The table is made of expanded polystyrol and expanded polypropylene and the table top is covered with polycarbonate. That has very low permittivity.

(UWB emissions and other emissions)

1) The height of the measuring antenna varied between 1 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.

**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 - 960 MHz	Above 960 MHz
Instrument used	Test Receiver	Test Receiver	Spectrum Analyzer
Detector	Quasi-Peak (QP)	Quasi-Peak (QP)	Peak (PK)
IF Bandwidth	BW 9 kHz	BW 120 kHz	(for UWB spurious emission): RBW: 1 MHz VBW: 3 MHz (for carrier's emission): RBW: 50 MHz VBW: 80 MHz (for UWB spurious emission): RBW: 1 kHz VBW: 3 kHz
Test Distance	3 m	3 m	3.0 m (960 MHz – 1 GHz) 0.5 m *1) (1 GHz – 10.6 GHz), 0.3 m *1) (10.6 GHz – 18 GHz), 0.1 m *1) (above 18 GHz)

\*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.

- 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	0.030-0.96	0.96-1	1-2	2-10.6	10.6-18	18-26.5	26.5-40
Hor.	X	X	X	X	X	Z	Z	Y
Ver.	X	X	X	X	Y	Z	X	X

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

**Measurement range : 9 kHz - 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	3 MHz	Auto	Peak	Max Hold	Spectrum Analyzer

**Test data : APPENDIX**  
**Test result : Pass**

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## **SECTION 7: Antenna terminal conducted tests**

### **Test Procedure**

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

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument used
Conducted Spurious Emission *1)	9 kHz to 150 kHz 150 kHz to 30 MHz	200 Hz 10 kHz	620 Hz 30 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
*1) In the frequency range below 30MHz, RBW was narrowed to separate the noise contents. Then, wide-band noise near the limit was checked separately, however the noise was not detected as shown in the chart.							

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

**Test data** : APPENDIX  
**Test result** : Pass

## **SECTION 8: Transmitter timeout**

### **Test Procedure**

The test was made with spectrum analyzer.

**Test data** : APPENDIX  
**Test result** : Pass

## APPENDIX 1: Test data

### Data of Radiated emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	14082148S-A-R2
Date	November 16, 2021
Temperature / Humidity	23 deg. C / 30 % RH
Engineer	Kenichi Adachi
Mode	Transmitting CH 5

(UWB emission, RBW 1 MHz)

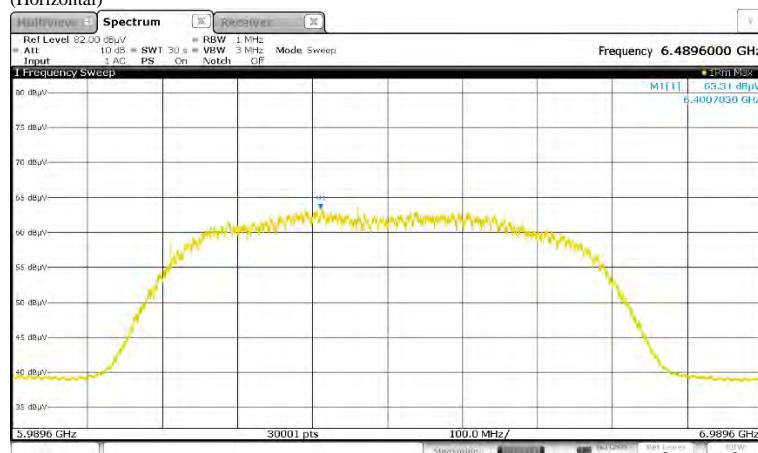
(\*SA: Spectrum analyzer, SG: Signal generator, Ant.: substitution antenna)

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.	6400.703	63.31	-48.43	10.77	9.97	-47.63	-41.30	6.33	carrier	154	0
3.1 GHz - 10.6 GHz	Ver.	6403.203	63.90	-47.87	10.77	9.97	-47.07	-41.30	5.77	carrier	151	11

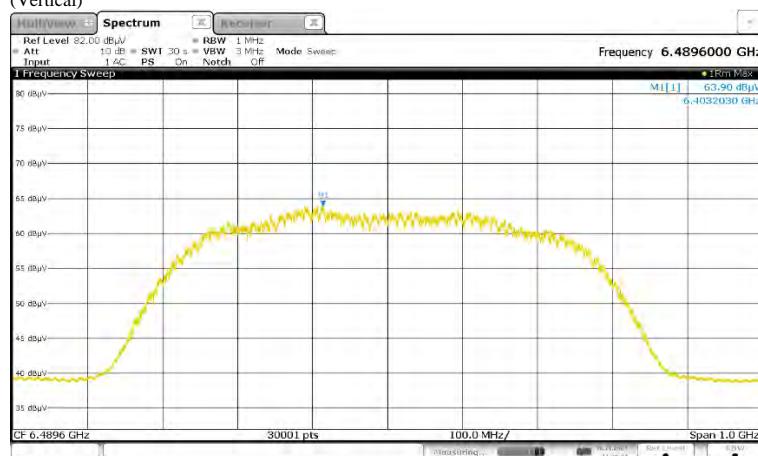
Sample Calculation :

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

(Horizontal)



(Vertical)



\* For RF Exposure evaluation

Maximum RMS power measured: -47.07 dBm/MHz (refer to upper table value) / 10 ^ (-47.07 [dBm/MHz] / 10) = 0.00001963 mW/MHz

The bandwidth of this equipment was 609.012 MHz (99 % occupied bandwidth, refer to the data of bandwidth sheet)

Total RMS output power was 0.01195491 mW = 0.00001963 mW/MHz x 609.012 MHz

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## Data of Radiated emission

Test place Shonan EMC Lab. No.3 Semi Anechoic Chamber  
 Report No. 14082148S-A-R2  
 Date November 16, 2021  
 Temperature / Humidity 23 deg. C / 30 % RH  
 Engineer Kenichi Adachi  
 Mode Transmitting CH 9

(UWB emission, RBW 1 MHz)

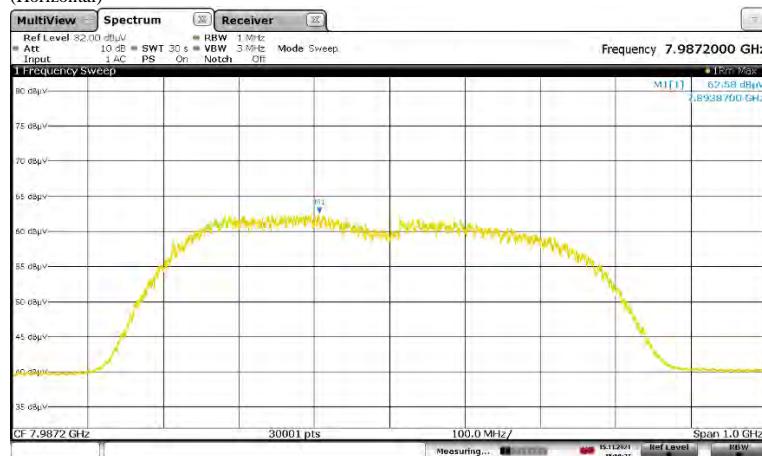
(\*SA: Spectrum analyzer, SG: Signal generator, Ant.: substitution antenna)

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.	7893.870	62.58	-49.40	9.67	11.11	-50.84	-41.30	9.54	carrier	153	32
3.1 GHz - 10.6 GHz	Ver.	7893.903	62.45	-49.55	9.67	11.11	-50.99	-41.30	9.69	carrier	150	17

Sample Calculation :

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

(Horizontal)



(Vertical)



\* For RF Exposure evaluation

Maximum RMS power measured: -50.84 dBm/MHz (refer to upper table value) /  $10^{-(-50.84 \text{ [dBm/MHz]}/10)} = 0.00000824 \text{ mW/MHz}$

The bandwidth of this equipment was 620.49 MHz (99 % occupied bandwidth, refer to the data of bandwidth sheet)

Total RMS output power was  $0.00511284 \text{ mW} = 0.00000824 \text{ mW/MHz} \times 620.49 \text{ MHz}$

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## Data of Radiated emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber									
Report No.	14082148S-A-R2									
Date	November 18, 2021		November 19, 2021		November 16, 2021		November 17, 2021			
Temperature / Humidity	23 deg. C / 31 % RH		23 deg. C / 31 % RH		23 deg. C / 30 % RH		23 deg. C / 32 % RH			
Engineer	Yusuke Tanikawara (9 kHz – 30 MHz)		Takahiro Kawakami (30 MHz - 1000 MHz)		Kenichi Adachi (1 GHz – 10.6 GHz)		Shunsaku Yumi (10.6 GHz – 26.5 GHz)			
Mode	Transmitting CH 5									

(UWB emission, For RBW less than 960 MHz was set according to FCC 15.209, Above 960 MHz was set to 1 MHz)

### 9 kHz – 18 GHz

No.	Freq. [MHz]	Reading (AV)		SG Level [dBm]	TX Ant.Gain [dB]	TX Loss [dB]	ERP			Margin [dB]	Pola.	Height [cm]	Angle [deg]	TX Ant.Type	Comment
		[dBmV]	[dBm]				Result [dBm]	Limit [dBm]	Result [dBm]						
1	12979.200	37.82	-75.03	13.34	14.57		-76.26	-61.30	14.9	Hori.	161	49	Horn	RMS	
2	12979.200	37.54	-75.94	13.34	14.57		-77.17	-61.30	15.8	Vert.	157	42	Horn	RMS	

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

### 18 GHz – 26.5 GHz

No.	Freq. [MHz]	Reading (AV)		SG Level [dBm]	TX Ant.Gain [dB]	TX Loss [dB]	ERP			Margin [dB]	Pola.	Height [cm]	Angle [deg]	TX Ant.Type	Comment
		[dBmV]	[dBm]				Result [dBm]	Limit [dBm]	Result [dBm]						
1	19468.801	32.22	-92.87	9.57	18.30		-101.60	-61.30	40.3	Hori.	156	2	Horn	RMS	
2	25958.400	42.57	-60.97	11.07	21.15		-71.05	-61.30	9.7	Hori.	157	295	Horn	RMS	
3	19468.801	32.56	-92.25	9.57	18.30		-100.98	-61.30	39.6	Vert.	152	355	Horn	RMS	
4	25958.400	45.12	-58.56	11.07	21.15		-68.64	-61.30	7.3	Vert.	151	316	Horn	RMS	

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

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### Data of Radiated emission

Test place Shonan EMC Lab. No.3 Semi Anechoic Chamber  
 Report No. 14082148S-A-R2  
 Date November 18, 2021  
 Temperature / Humidity 23 deg. C / 31 % RH  
 Engineer Yusuke Tanikawara  
 (26.5 GHz - 40 GHz)  
 Mode Transmitting CH 5

(UWB emission, RBW 1 MHz)

#### 26.5 GHz - 40 GHz

No.	Freq. [MHz]	Reading [dBuV]	SG Level [dBm]	TX		ERP		Margin [dB]	Pola.	Height [cm]	Angle [deg]	TX Ant.Type	Comment
				Ant.Gain [dB]	Loss [dB]	Result [dBm]	Limit [dBm]						
1	32448.000	46.01	-75.64	11.79	24.42	<b>-88.27</b>	-61.30	26.9	Hori.	153	151	Horn	RMS
2	38937.602	49.68	-70.73	15.07	27.13	<b>-82.79</b>	-61.30	21.4	Hori.	154	152	Horn	RMS
3	32448.000	46.22	-78.33	11.79	24.42	<b>-90.96</b>	-61.30	29.6	Vert.	153	39	Horn	RMS
4	38937.602	50.21	-70.04	15.07	27.13	<b>-82.10</b>	-61.30	20.8	Vert.	154	62	Horn	RMS

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

## Data of Radiated emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber											
Report No.	14082148S-A-R2											
Date	November 18, 2021			November 19, 2021			November 16, 2021			November 17, 2021		
Temperature / Humidity	23 deg. C / 31 % RH			23 deg. C / 31 % RH			23 deg. C / 30 % RH			23 deg. C / 32 % RH		
Engineer	Yusuke Tanikawara (9 kHz – 30 MHz)			Takahiro Kawakami (30 MHz - 1000 MHz)			Kenichi Adachi (1 GHz – 18 GHz)			Shunsaku Yumi (18 GHz – 26.5 GHz)		
Mode	Transmitting CH 9											

(UWB emission, For RBW less than 960 MHz was set according to FCC 15.209, Above 960 MHz was set to 1 MHz)

### 9 kHz – 18 GHz

No.	Freq. [MHz]	Reading (AV) [dBuV]	SG Level [dBm]	TX Ant.Gain [dB]	TX Loss [dB]	ERP			Margin [dB]	Pola.	Height [cm]	Angle [deg]	TX Ant.Type	Comment
						Result [dBm]	Limit [dBm]	Margin [dB]						
1	15974.400	38.42	-67.68	13.68	16.19	-70.19	-61.30	8.8	Hori.	157	61	Horn	RMS	
2	15974.400	38.26	-67.85	13.68	16.19	-70.36	-61.30	9.0	Vert.	149	32	Horn	RMS	

Calculation:Result[dBm]=SG level[dBm]+Tx Ant Gain[dBi]-Tx Loss (Cable)[dB]

Tx Antenna: Horn(1G-40G) / Rx-Antenna: Horn(1G-40G)

### 18 GHz – 26.5 GHz

No.	Freq. [MHz]	Reading (AV) [dBuV]	SG Level [dBm]	TX Ant.Gain [dB]	TX Loss [dB]	ERP			Margin [dB]	Pola.	Height [cm]	Angle [deg]	TX Ant.Type	Comment
						Result [dBm]	Limit [dBm]	Margin [dB]						
1	23961.600	31.63	-91.36	11.68	20.23	-99.91	-61.30	38.6	Hori.	150	0	Horn	RMS, Noise Floor Level	
2	23961.600	32.10	-83.26	11.68	20.23	-91.81	-61.30	30.5	Vert.	151	8	Horn	RMS	

Calculation:Result[dBm]=SG level[dBm]+Tx Ant Gain[dBi]-Tx Loss (Cable)[dB]

Tx Antenna: Horn(1G-40G) / Rx-Antenna: Horn(1G-40G)

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## Data of Radiated emission

Test place Shonan EMC Lab. No.3 Semi Anechoic Chamber  
 Report No. 14082148S-A-R2  
 Date November 18, 2021  
 Temperature / Humidity 23 deg. C / 31 % RH  
 Engineer Yusuke Tanikawa  
 (26.5 GHz - 40 GHz)  
 Mode Transmitting CH 9

(UWB emission, RBW 1 MHz)

### 26.5 GHz - 40 GHz

No.	Freq. [MHz]	Reading [dBUV]	SG Level [dBm]	TX		ERP		Margin [dBm]	Pola.	Height [cm]	Angle [deg]	TX Ant.Type	Comment
				Ant.Gain [dB]	Loss [dB]	Result [dBm]	Limit [dBm]						
1	31948.801	56.98	-56.68	12.00	23.74	<b>-68.42</b>	-61.30	7.1	Hori.	154	342	Horn	RMS
2	39936.000	45.51	-72.63	13.83	27.15	<b>-85.95</b>	-61.30	24.6	Hori.	151	140	Horn	RMS
3	31948.801	58.39	<b>-56.35</b>	12.00	<b>23.74</b>	<b>-68.09</b>	-61.30	6.7	Vert.	152	25	Horn	RMS
4	39936.000	45.86	-73.22	13.83	27.15	<b>-86.54</b>	-61.30	25.2	Vert.	148	50	Horn	RMS

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

## Data of Radiated emission

Test place Shonan EMC Lab. No.3 Semi Anechoic Chamber  
 Report No. 14082148S-A-R2  
 Date November 19, 2021  
 Temperature / Humidity 23 deg. C / 31 % RH  
 Engineer Takahiro Kawakami  
 Mode Transmitting CH 5

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

Nb.	Freq. [MHz]	Reading	Ant.Fac	Loss	Gain	Result (GP)	Limit (GP)	Margin (GP)	Pola.	Height [cm]	Angle [deg]	Ant. Type	Comment
		[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dB]	[H/V]					
1	152,994	22,03	14,89	7,81	32,09	12,64	43,50	30,8	Hori.	100	0	BC	
2	286,906	21,36	13,54	8,51	31,98	11,43	46,00	34,5	Hori.	100	0	LP	
3	343,601	21,63	15,10	8,80	31,93	13,60	46,00	32,4	Hori.	100	0	LP	
4	952,206	20,81	22,07	11,12	30,57	23,43	46,00	22,5	Hori.	100	0	LP	
5	94,194	22,35	9,05	7,47	32,13	6,74	43,50	36,7	Vert.	100	0	BC	
6	126,396	22,31	13,67	7,33	32,11	11,20	43,50	32,3	Vert.	100	0	BC	
7	280,198	21,42	13,43	8,47	31,98	11,34	46,00	34,6	Vert.	100	0	LP	

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

## Data of Radiated emission

Test place Shonan EMC Lab. No.3 Semi Anechoic Chamber  
 Report No. 14082148S-A-R2  
 Date November 19, 2021  
 Temperature / Humidity 23 deg. C / 31 % RH  
 Engineer Takahiro Kawakami  
 Mode Transmitting CH 9

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

No.	Freq. [MHz]	Reading [dBuV]	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result [QP]	Limit [QP]	Margin [QP]	Pola	Height [cm]	Angle [deg]	Ant. Type	Comment
1	154,461	22.05	14.95	7.83	32.09	12.74	43.50	30.7	Hori.	100	0	BC	
2	282,301	21.60	13.47	8.48	31.98	11.57	46.00	34.4	Hori.	100	0	LP	
3	356,398	21.76	15.26	8.86	31.92	13.96	46.00	32.0	Hori.	100	0	LP	
4	916,800	21.10	22.09	10.99	30.88	23.30	46.00	22.7	Hori.	100	0	LP	
5	100,613	22.26	10.30	7.34	32.13	7.77	43.50	35.7	Vert.	100	0	BC	
6	142,096	21.88	14.47	7.64	32.10	11.89	43.50	31.6	Vert.	100	0	BC	
7	279,903	21.45	13.42	8.47	31.98	11.36	46.00	34.6	Vert.	100	0	LP	

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

## Data of Radiated emission (GPS band)

Test place Shonan EMC Lab. No.3 Semi Anechoic Chamber  
 Report No. 14082148S-A-R2  
 Date November 17, 2021  
 Temperature / Humidity 23 deg. C / 32 % RH  
 Engineer Shunsaku Yumi  
 Mode Transmitting CH 5

(GPS bands emission)

No.	Freq. [MHz]	Reading (AV) [dBuV]	SG Level [dBm]	TX Ant.Gain [dB]	TX Loss [dB]	ERP		Margin	Pola.	Height [cm]	Angle [deg]	TX Ant.Type	Comment
						Result [dBm]	Limit [dBm]						
1	1202.000	15.66	-135.00	6.33	4.17	<b>-132.84</b>	-85.30	47.5	Hori.	150	0	Horn	RBW 1 kHz, Noise Floor Level
2	1584.500	15.70	-135.00	9.02	4.82	<b>-130.80</b>	-85.30	45.5	Hori.	150	0	Horn	RBW 1 kHz, Noise Floor Level
3	1202.000	15.71	-135.00	6.33	4.17	<b>-132.84</b>	-85.30	47.5	Vert.	150	0	Horn	RBW 1 kHz, Noise Floor Level
4	1584.500	15.31	-135.00	9.02	4.82	<b>-130.80</b>	-85.30	45.5	Vert.	150	0	Horn	RBW 1 kHz, Noise Floor Level

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

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### Data of Radiated emission (GPS band)

Test place Shonan EMC Lab. No.3 Semi Anechoic Chamber  
 Report No. 14082148S-A-R2  
 Date November 17, 2021  
 Temperature / Humidity 23 deg. C / 32 % RH  
 Engineer Shunsaku Yumi  
 Mode Transmitting CH 9

(GPS bands emission)

No.	Freq. [MHz]	Reading (AV) [dBuV]	SG Level [dBm]	TX Ant.Gain [dB]	TX Loss [dB]	ERP		Margin	Pola.	Height [cm]	Angle [deg]	TX Ant.Type	Comment
						Result [dBm]	Limit [dBm]						
1	1202.000	15.11	-135.00	6.33	4.17	<b>-132.84</b>	-85.30	47.5	Hori.	150	0	Horn	RBW 1 kHz, Noise Floor Level
2	1584.500	15.69	-135.00	9.02	4.82	<b>-130.80</b>	-85.30	45.5	Hori.	150	0	Horn	RBW 1 kHz, Noise Floor Level
3	1202.000	15.40	-135.00	6.33	4.17	<b>-132.84</b>	-85.30	47.5	Vert.	150	0	Horn	RBW 1 kHz, Noise Floor Level
4	1584.500	15.19	-135.00	9.02	4.82	<b>-130.80</b>	-85.30	45.5	Vert.	150	0	Horn	RBW 1 kHz, Noise Floor Level

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

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## Data of Peak level of the emission

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	14082148S-A-R2
Date	November 16, 2021
Temperature / Humidity	23 deg. C / 30 % RH
Engineer	Kenichi Adachi
Mode	Transmitting CH 5

(Peak level of the emission)

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

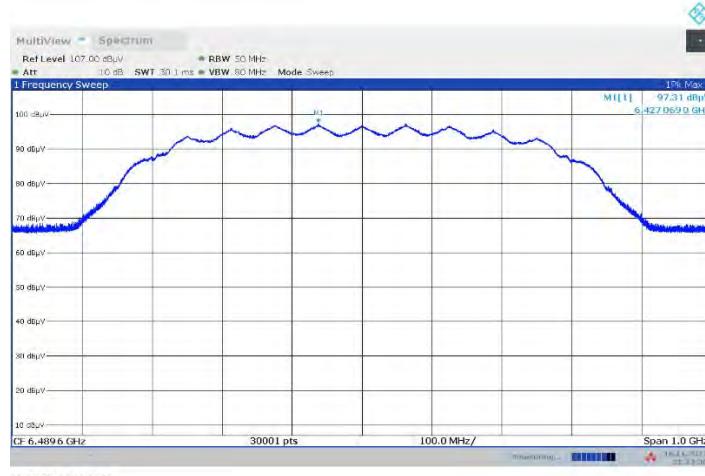
Band	Pol.	Frequency [MHz]	SA Reading [dBuV/50 MHz]	SG level [dBm]	Tx Ant.Gain [dBi]	Tx Loss [dB]	RBW converted factor [dB]	EIRP Result [dBm/50 MHz]	EIRP Limit [dBm/50 MHz]	Margin [dB]	Remarks	Height [cm]	Angle [deg.]
3.1 GHz - 10.6 GHz	Hor.	6427.069	97.31	-14.89	10.72	9.99	0.29	-13.87	0.00	13.87	carrier	154	0
3.1 GHz - 10.6 GHz	Ver.	6427.469	97.76	-14.45	10.72	9.99	0.29	-13.43	0.00	13.43	carrier	151	11

Sample Calculation :

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

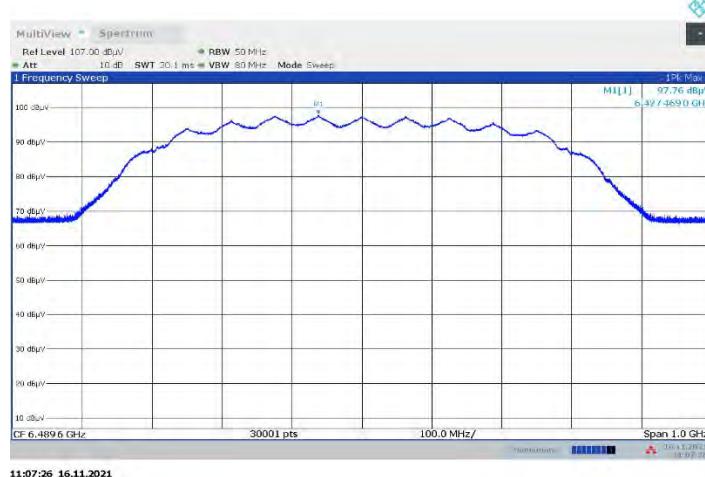
RBW converted factor [dB] =  $20 \times \log (50 / (3 \text{ dB measured bandwidth} = 48.3384 \text{ [MHz]}))$

(Horizontal)



11:53:37 16.11.2021

(Vertical)



11:07:26 16.11.2021

\* For RSP-100 Annex B

Maximum peak power measured: -13.43 dBm/50 MHz (refer to upper table value) / 10 ^ (-13.43 [dBm/50 MHz] / 10) = 0.045394 mW/50 MHz

The bandwidth of this equipment was 609.012 MHz (99 % occupied bandwidth, refer to the data of bandwidth sheet)

Total peak output power was 0.55290982 mW = 0.045394 [mW/50 MHz] x 609.012 [MHz] / 50 [MHz]

## Data of Peak level of the emission

Test place Shonan EMC Lab. No.3 Semi Anechoic Chamber  
 Report No. 14082148S-A-R2  
 Date November 16, 2021  
 Temperature / Humidity 23 deg. C / 30 % RH  
 Engineer Kenichi Adachi  
 Mode Transmitting CH 9

(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.	7862.437	96.68	-15.62	9.77	11.09	0.29	-16.65	0.00	16.65	carrier	153	32
3.1 GHz - 10.6 GHz	Ver.	7862.004	96.23	-16.29	9.77	11.09	0.29	-17.32	0.00	17.32	carrier	150	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] =  $20 \times \log (50 / (3 \text{ dB measured bandwidth} = 48.3384 \text{ [MHz]}))$

(Horizontal)



15:58:06 15.11.2021

(Vertical)



15:17:06 15.11.2021

\* For RSP-100 Annex B

Maximum peak power measured: -16.65 dBm/50 MHz (refer to upper table value) /  $10^{\lceil -16.65 \text{ [dBm/50 MHz]} / 10 \rceil} = 0.021627 \text{ mW/50 MHz}$

The bandwidth of this equipment was 620.49 MHz (99 % occupied bandwidth, refer to the data of bandwidth sheet)

Total peak output power was  $0.26838674 \text{ mW} = 0.021627 \text{ [mW/50 MHz]} \times 620.49 \text{ [MHz]} / 50 \text{ [MHz]}$

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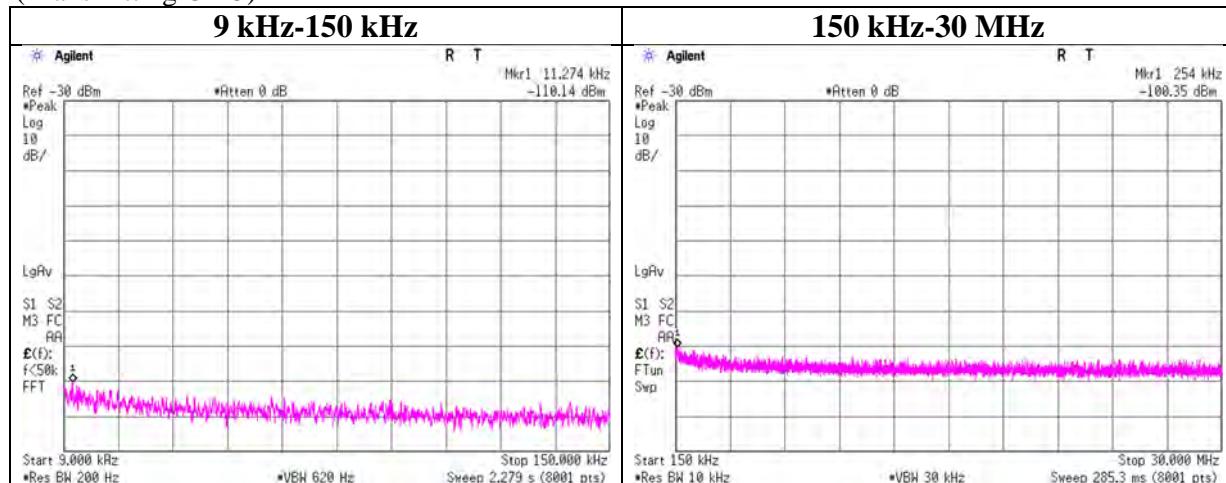
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**(Reference) Data of Antenna terminal conducted Test**

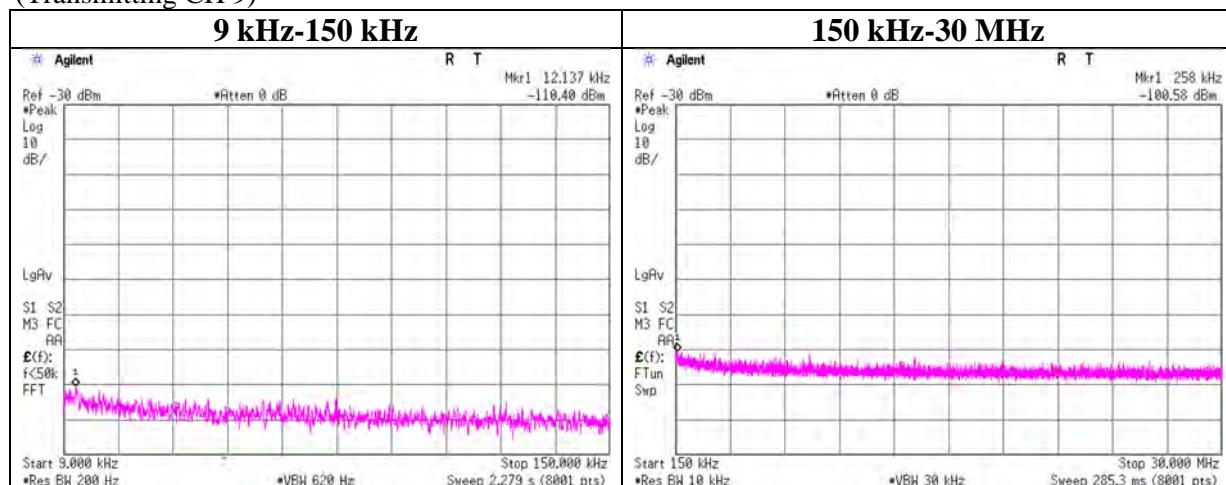
Test place Shonan EMC Lab. No.5 Shielded Room  
 Report No. 14082148S-A-R2  
 Date November 24, 2021  
 Temperature / Humidity 23 deg. C / 33 % RH  
 Engineer Kenichi Adachi  
 Mode Transmitting

(Transmitting CH 5)



\*\* No detect signal.

(Transmitting CH 9)



\*\* No detect signal.

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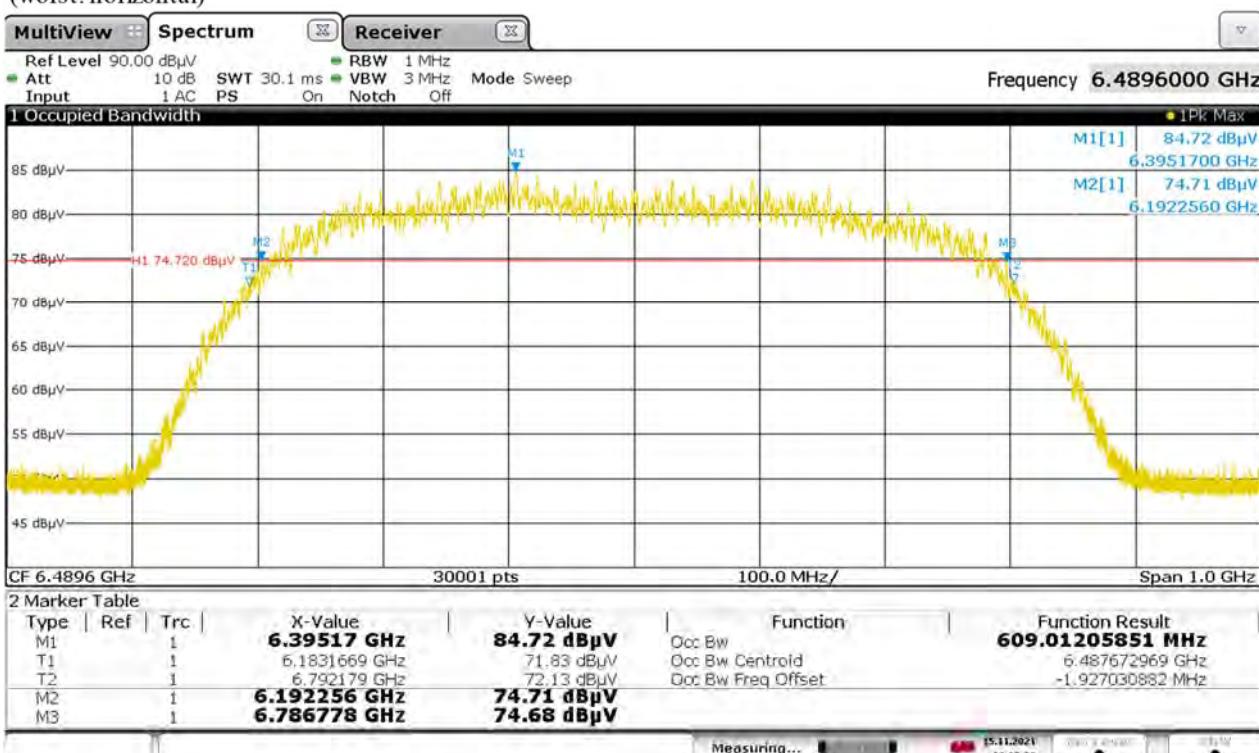
Facsimile : +81 463 50 6401

## Data of UWB Bandwidth

Test place Shonan EMC Lab. No.3 Semi Anechoic Chamber  
 Report No. 14082148S-A-R2  
 Date November 16, 2021  
 Temperature / Humidity 23 deg. C / 30 % RH  
 Engineer Kenichi Adachi  
 Mode Transmitting CH 5

**10 dB Bandwidth:** 594.522 MHz (Limit: >= 500 MHz)  
**99 % Occupied Bandwidth:** 609.012 MHz  
**Center Frequency** 6489.517 MHz ( = (fH + fL) / 2 )

(worst: horizontal)



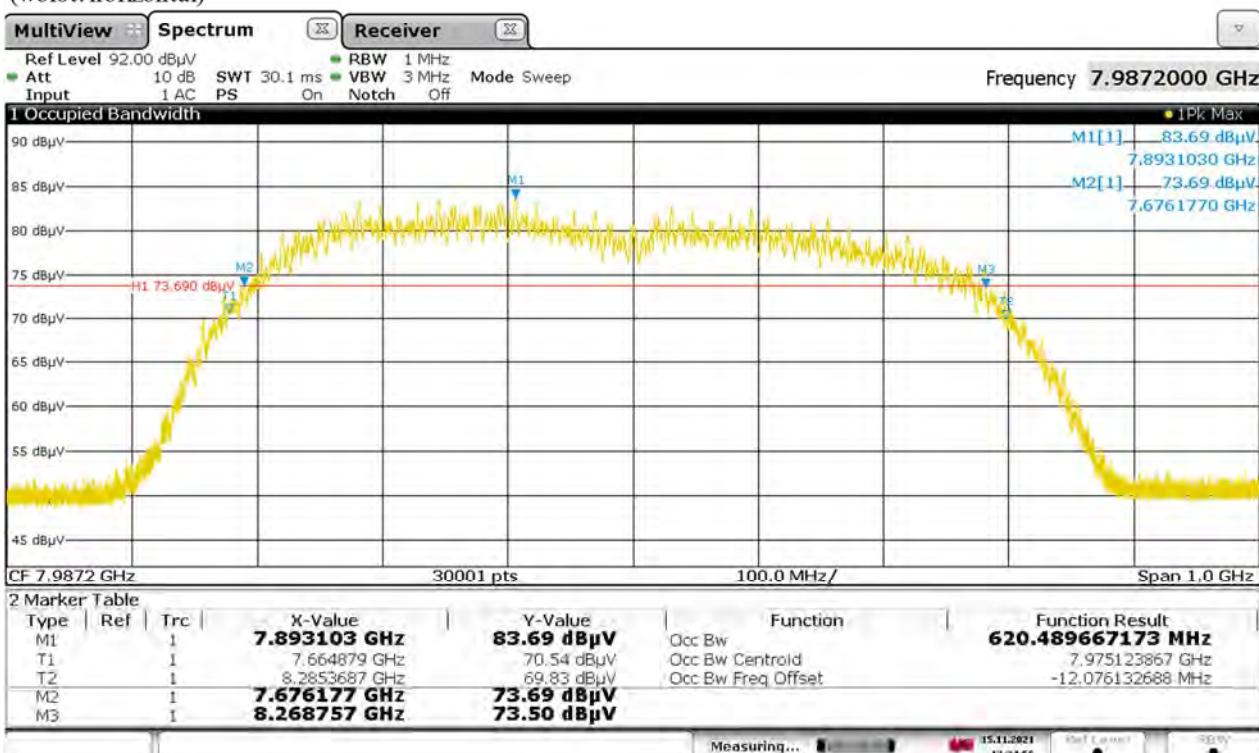
**Start Frequency:** 5989.600 MHz **fL:** 6192.256 MHz  
**Stop Frequency:** 6989.600 MHz **fH:** 6786.778 MHz

## Data of UWB Bandwidth

Test place Shonan EMC Lab. No.3 Semi Anechoic Chamber  
 Report No. 14082148S-A-R2  
 Date November 16, 2021  
 Temperature / Humidity 23 deg. C / 30 % RH  
 Engineer Kenichi Adachi  
 Mode Transmitting CH 9

**10 dB Bandwidth:** 592.580 MHz (Limit: >= 500 MHz)  
**99 % Occupied Bandwidth:** 620.490 MHz  
**Center Frequency** 7972.467 MHz ( = (fH + fL) / 2 )

(worst: horizontal)



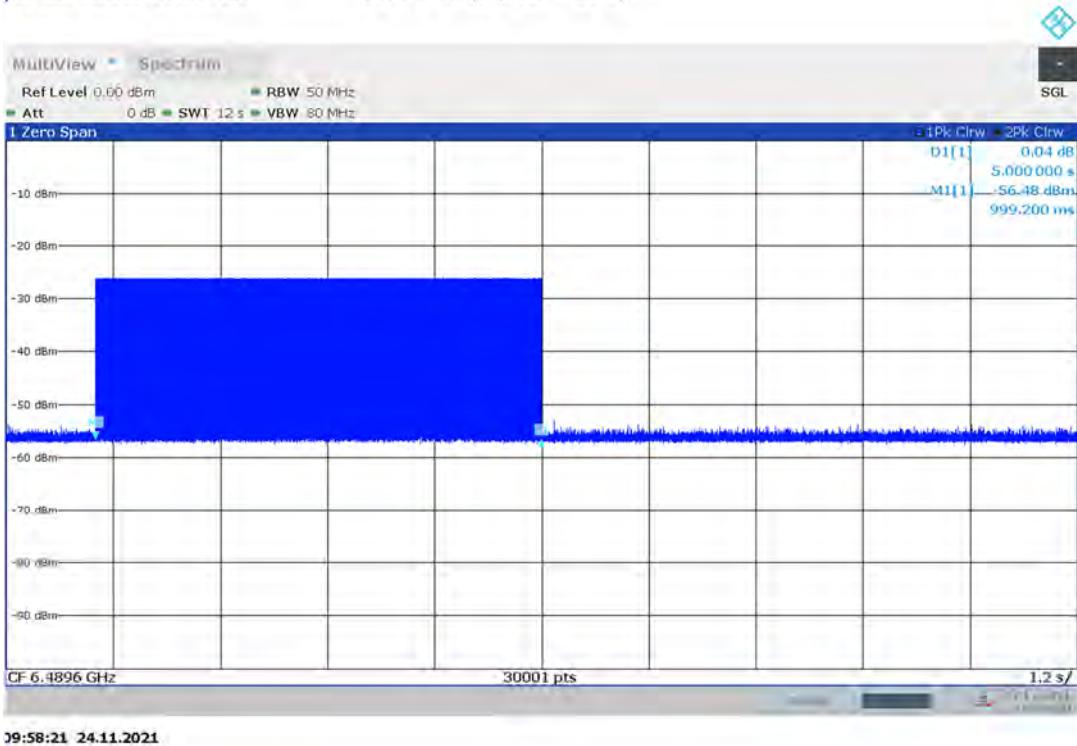
**Start Frequency:** 7487.200 MHz  
**Stop Frequency:** 8487.200 MHz

**fL:** 7676.177 MHz  
**fH:** 8268.757 MHz

## Data of Transmitter timeout

Test place Shonan EMC Lab. No.5 Shielded Room  
Report No. 14082148S-A-R2  
Date November 24, 2021  
Temperature / Humidity 23 deg. C / 33 % RH  
Engineer Kenichi Adachi  
Mode Transmitting CH5

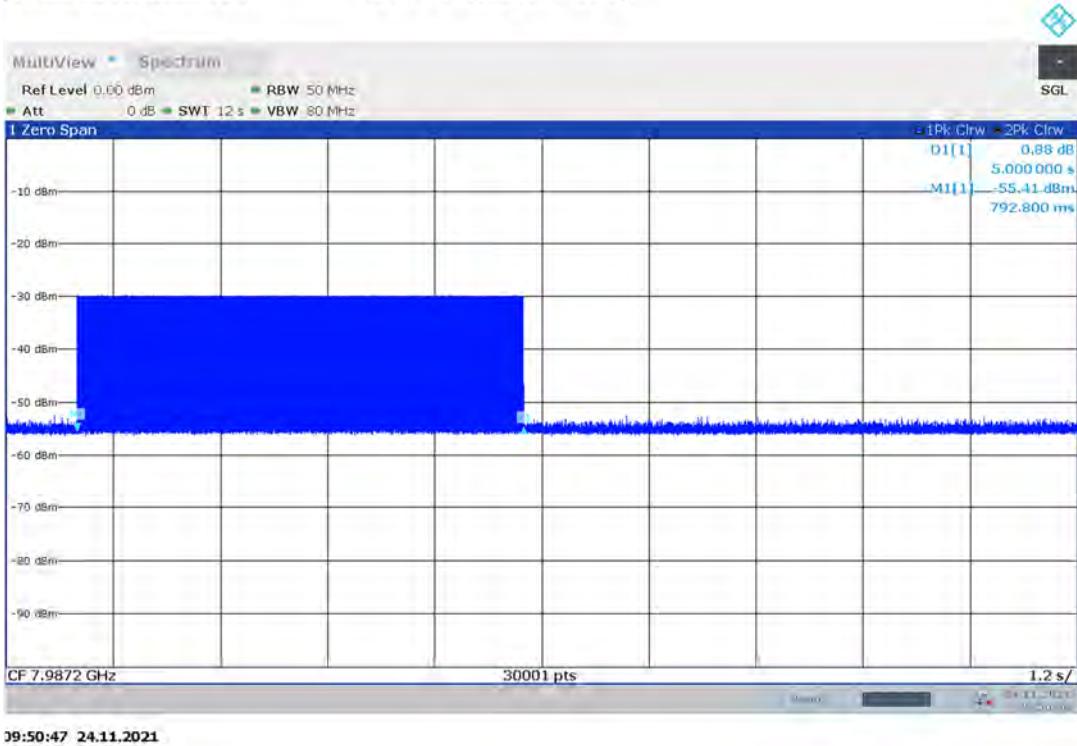
**Transmitter Timeout:** 5.000 s (Limit: <10 s)



## Data of Transmitter timeout

Test place Shonan EMC Lab. No.5 Shielded Room  
Report No. 14082148S-A-R2  
Date November 24, 2021  
Temperature / Humidity 23 deg. C / 33 % RH  
Engineer Kenichi Adachi  
Mode Transmitting CH9

**Transmitter Timeout:** 5.000 s (Limit: <10 s)



## **APPENDIX 2: Test instruments**

### **Test Instruments (1/2)**

Test Name	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Interval (Month)
AT	COTS-SUWB-01	144924	UWB CONFORMANCE TEST	Keysight Technologies Inc	-	-	-	-
AT	SCC-G60	196941	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	803093/2	2021/03/01	12
AT	SOS-27	191845	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2021/08/02	12
AT	SSA-03	145801	Spectrum Analyzer	Keysight Technologies Inc	E4448A	MY48250152	2021/08/09	12
AT	STS-05	146212	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997828	2021/09/14	12
AT	SUWB-01	145797	UWB RF TEST INTERFACE	Keysight Technologies Inc	MT-479	12039	2021/07/06	12
RE	SRENT-23	206472	Spectrum Analyzer	Rohde & Schwarz	FSW43	104056	2021/04/27	12
RE	COTS-SEMI-5	170932	EMI Software	TSJ (Techno Science Japan)	TEPTO-DV3(RE,CE,ME,PE)	-	-	-
RE	KHA-02	144941	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	230	2021/05/10	12
RE	KJM-02	146432	Measure	TAJIMA	GL19-55	-	-	-
RE	SAEC-03(NSA)	145565	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	2021/04/27	12
RE	SAEC-ALL	145568	Semi Anechoic Chamber(ME)	TDK	Semi Anechoic Chamber 3m/10m	1, 2, 3	2020/12/25	24
RE	SAF-03	145126	Pre Amplifier	SONOMA	310N	290213	2021/02/10	12
RE	SAF-06	145005	Pre Amplifier	Toyo Corporation	TPA0118-36	1440491	2021/02/08	12
RE	SAF-08	145007	Pre Amplifier	Toyo Corporation	HAP18-26W	19	2021/03/01	12
RE	SAF-10	145129	Pre Amplifier	Toyo Corporation	HAP26-40W	10	2021/03/01	12
RE	SAT10-05	145136	Attenuator	Keysight Technologies Inc	8493C-010	74864	2021/10/07	12
RE	SAT6-13	167094	Attenuator	JFW	50HF-006N	-	2021/02/10	12
RE	SAT6-15	167096	Attenuator	JFW	50HF-006N	-	2021/02/10	12
RE	SBA-03	145023	Biconical Antenna	Schwarzbeck Mess-Elektronik OHG	BBA9106	91032666	2021/05/15	12
RE	SCC-C1/C2/C3/C4/C5/C10/SRSE-03	145171	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TYO	8D2W/12DSFA /141PE/141PE/141PE/141PE/NS 4906	-/0901-271(RF Selector)	2021/04/12	12
RE	SCC-G15	145176	Coaxial Cable	Suhner	SUCOFLEX 102	32703/2	2021/03/01	12
RE	SCC-G42	151618	Coaxial Cable	Junkosha	J12J103275-00	FEB-28-17-017	2021/03/01	12
RE	SCC-G43	156380	Coaxial Cable	Huber+Suhner	SUCOFLEX_104_E	SN MY 13406/4E	2021/05/17	12
RE	SCC-G57	179540	Coaxial Cable	Huber+Suhner	SUCOFLEX 102	802815/2	2021/05/18	12
RE	SCC-G58	183047	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	800287/4A	2021/05/17	12
RE	SCC-G70	200010	Coaxial Cable	Huber+Suhner	SUCOFLEX 104	575618/4	2021/07/06	12

**UL Japan, Inc.**

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**Test Instruments (2/2)**

Test Name	Local ID	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Interval (Month)
RE	SCC-M1	194601	Coaxial Cable	Fjikura	5D-2W	-	2020/12/10	12
RE	SFL-26	206229	Bandpass Filter	MICRO-TRONICS	BPC50411	086	2021/03/08	12
RE	SHA-03	145501	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA9120D	9120D-739	2021/06/14	12
RE	SHA-04	145512	Horn Antenna	ETS-Lindgren	3160-09	00094868	2021/06/14	12
RE	SHA-06	145514	Horn Antenna	ETS-Lindgren	3160-10	00092383	2021/06/14	12
RE	SHA-07	145515	Horn Antenna	ETS-Lindgren (Cedar Park, Texas)	3116	108256	2021/05/10	12
RE	SHA-09	194684	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	695	2021/03/03	12
RE	SHA-10	194685	Horn Antenna	Schwarzbeck Mess-Elektronik OHG	BBHA 9120 C	711	2021/03/03	12
RE	SLA-07	145529	Logperiodic Antenna	Schwarzbeck Mess-Elektronik OHG	VUSLP9111B	196	2021/05/15	12
RE	SLP-02	145536	Loop Antenna	Rohde & Schwarz	HFH2-Z2	100218	2021/04/06	12
RE	SOS-23	191840	Humidity Indicator	CUSTOM. Inc	CTH-201	-	2021/08/02	12
RE	SSG-02	146226	Signal Generator	Keysight Technologies Inc	E8257D-540	MY48051404	2021/02/01	12
RE	STR-08	150463	Test Receiver	Rohde & Schwarz	ESW44	101581	2020/12/02	12
RE	STS-03	146210	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997823	2021/09/14	12

**\*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  
 AT: Antenna Terminal Conducted test

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