RADIO TEST REPORT

Test Report No. : 12903635H-A

Applicant	:	**OMRON HEALTHCARE Co., Ltd.**
Type of Equipment	:	**BLOOD PRESSURE MONITOR**
Model No.	:	**HEM-7361T**
Test standard	:	**EN 300 328 V2.1.1**
Test Result	:	**Complied (Refer to SECTION 3.2)**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the above standard(s).
4. The test results in this report are traceable to the national or international standards.
5. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
6. The all test items in this test report are conducted by UL Japan, Inc. Ise EMC Lab.
7. This test report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
8. The information provided from the customer for this report is identified in SECTION 1.

Date of test: June 13 to 17, 2019

Representative test engineer: T Noguchi
Takafumi Noguchi
Engineer
Consumer Technology Division

Approved by : Takayuki.S
Takayuki Shimada
Leader
Consumer Technology Division

NVLAP® TESTING NVLAP LAB CODE 200572-0 ilac-MRA

This laboratory is accredited by the NVLAP LAB CODE 200572-0, U.S.A. The tests reported herein have been performed in accordance with its terms of accreditation.
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http://japan.ul.com/resources/emc_accredited/

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

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

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REVISION HISTORY

Original Test Report No.: 12903635H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12903635H-A	June 26, 2019	-	-

UL Japan, Inc.
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SECTION 1: Customer information

Company Name	:	OMRON HEALTHCARE Co., Ltd.
Address	:	53, Kunotsubo, Terado-cho, Muko, Kyoto, 617-0002 JAPAN
Address	:	53, Kunotsubo, Terado-cho, Muko, KYOTO, 617-0002 Japan
Telephone Number	:	+81-75-925-2045
Facsimile Number	:	+81-75-925-2046

The information provided from the customer is as follows;
- Applicant, Type of Equipment, Model No. on the cover and other relevant pages
- SECTION 1: Customer information
- SECTION 2: Equipment under test (E.U.T.)
- SECTION 4: Operation of E.U.T. 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	:	BLOOD PRESSURE MONITOR
Model No.	:	HEM-7361T
Serial No.	:	Refer to SECTION 4, SECTION 4.2
Rating	:	DC 6.0 V (Battery) AC 100 V to 240 V / 50 Hz (AC Adapter)
Receipt Date of Sample (Information from test lab.)	:	June 12, 2019
Country of Mass-production	:	China, Vietnam, and Japan
Condition of EUT	:	Production 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: HEM-7361T (referred to as the EUT in this report) is a BLOOD PRESSURE MONITOR.

Variant models: HEM-7361T-E, HEM-7361T-D, HEM-7361T-ALRU, JPN717T, JPN710T
The differences among these models are as follow;
- the place of destination
- the existence or non-existence of backlight on the LCD

Radio Specification

Bluetooth Low Energy

Equipment Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Type of Modulation	:	GFSK
Antenna Type	:	Chip Antenna
Antenna Gain	:	5.05 dBi
Operating Temperature	:	+10 deg. C to +40 deg. C
Receiver Category	:	Category 2

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Radio	:	EN 300 328 V2.1.1
Title	:	Wideband transmission systems; Data transmission equipment operating in the 2.4GHz ISM band and using wide band modulation techniques; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU
Purpose of test	:	Compliance with the harmonized RE directive 2014/53/EU.

3.2 Procedures and results

Item	Test Procedure	Limit	Test method	Worst margin	Results	Remarks
RF output power	Clause 5.4.2	Clause 4.3.2.2	Conducted	-	Complied a)	-
Power Spectral Density	Clause 5.4.3	Clause 4.3.2.3	Conducted	-	Complied b)	-
Duty cycle, Tx-sequence, Tx-gap	Clause 5.4.2	Clause 4.3.2.4	Conducted	-	N/A	*1)
Medium Utilisation (MU) factor	Clause 5.4.2	Clause 4.3.2.5	Conducted	-	N/A	*1)
Adaptivity (adaptive equipment using modulations other than FHSS)	Clause 5.4.6	Clause 4.3.2.6	Conducted	-	N/A	*2)
Occupied Channel Bandwidth	Clause 5.4.7	Clause 4.3.2.7	Conducted	-	Complied c)	-
Transmitter unwanted emissions in the out-of-band domain	Clause 5.4.8	Clause 4.3.2.8	Conducted	-	Complied d)	-
Transmitter unwanted emissions in the spurious domain	Clause 5.4.9	Clause 4.3.2.9	Radiated	12.7 dB 4804.00 MHz, Vertical	Complied e)	-
Receiver Spurious emissions	Clause 5.4.10	Clause 4.3.2.10	Radiated	10.0 dB 52.98 MHz Vertical	Complied f)	-
Transmitter unwanted emissions in the spurious domain	Clause 5.4.9	Clause 4.3.2.9	Conducted	-	N/A	*3)
Receiver Spurious emissions	Clause 5.4.10	Clause 4.3.2.10	Conducted	-	N/A	*3)
Receiver Blocking	Clause 5.4.11	Clause 4.3.2.11	Conducted	-	Complied g)	-
Geo-location capability	-	Clause 4.3.2.12	-	-	N/A	*4)

Note: UL Japan, Inc.'s EMI Work Procedure 13-EM-W0420.
*1) The test is not applicable since the EUT is an adaptive equipment and does not operate in a non-adaptive mode.
*2) The test is not applicable since the RF output power of the EUT is less than 10 dBm (e.i.r.p.).
*3) The EUT does not have antenna connector.
*4) The EUT does not have Geo-location capability.

a) Refer to APPENDIX 1 (data of RF Output Power)
b) Refer to APPENDIX 1 (data of Power Spectral Density)
c) Refer to APPENDIX 1 (data of Occupied Channel Bandwidth)
d) Refer to APPENDIX 1 (data of Transmitter unwanted emissions in the out-of-band domain)
e) Refer to APPENDIX 1 (data of Transmitter unwanted emissions in the spurious domain (Radiated))
f) Refer to APPENDIX 1 (data of Receiver spurious emissions (Radiated))
g) Refer to APPENDIX 1 (data of Receiver Blocking)

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.

3.3 Additions or deviations to standards

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

3.4 Uncertainty

Although this standard determines only the limit value of uncertainty, there is no applicable rule of uncertainty in this. 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 $k = 2$.

Ise EMC Lab.

Item	Unit	Required Uncertainty (+/-)	Calculated Uncertainty (+/-)
Occupied Channel Bandwidth	%	5	0.96
RF output power, conducted	dB	1.5	1.3
Power Spectral Density, conducted	dB	3	1.9
Unwanted Emissions, conducted	dB	3	2.3
All emissions, radiated	dB	6	5.6
Temperature	deg. C	3	0.975
Supply voltages	%	3	1.6
Time	%	5	0.10
Receiver Blocking	dB	Not Defined *1)	1.1

*1) Not Defined: Although this test item is not defined in the standard, it is listed as reference.

*Measurement uncertainties of UL Japan, Inc. do not exceed the uncertainties required in the standard.

3.5 Test Location

UL Japan, Inc. Ise EMC Lab.
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Telephone: +81 596 24 8999, Facsimile: +81 596 24 8124
NVLAP Lab. code: 200572-0

Test site	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Other rooms	Maximum measurement distance
No.1 semi-anechoic chamber	19.2 x 11.2 x 7.7	7.0 x 6.0	No.1 Power source room	10 m
No.2 semi-anechoic chamber	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.3 Preparation room	3 m
No.3 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.4 semi-anechoic chamber	12.0 x 8.5 x 5.9	6.8 x 5.75	No.4 Preparation room	3 m
No.4 shielded room	4.0 x 6.0 x 2.7	N/A	-	-
No.5 semi-anechoic chamber	6.0 x 6.0 x 3.9	6.0 x 6.0	-	-
No.5 measurement room	6.4 x 6.4 x 3.0	6.4 x 6.4	-	-
No.6 shielded room	4.0 x 4.5 x 2.7	4.0 x 4.5	-	-
No.6 measurement room	4.75 x 5.4 x 3.0	4.75 x 4.15	-	-
No.7 shielded room	4.7 x 7.5 x 2.7	4.7 x 7.5	-	-
No.8 measurement room	3.1 x 5.0 x 2.7	3.1 x 5.0	-	-
No.9 measurement room	8.8 x 4.6 x 2.8	2.4 x 2.4	-	-
No.11 measurement room	6.2 x 4.7 x 3.0	4.8 x 4.6	-	-

* Size of vertical conducting plane (for Conducted Emission test) : 2.0 m x 2.0 m for No.1, No.2, No.3, and No.4 semi-anechoic chambers and No.3 and No.4 shielded rooms.

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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

4.1 Operating Mode(s)

Mode	Remarks*
Bluetooth (BT) Low Energy (LE)	Continuous Tx (Tx), PN9 Continuous Rx (Rx)
*Transmitting duty was 100 % on all tests. *The worst condition was determined based on the test result of RF Output power. *EUT has the power settings by the software as follows; - Power Setting: 0dBm - Software: Serial Command Explorer 2 Ver.2.3.4.9 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.	

Details of Operating Mode(s)

Bluetooth Low Energy [DSSS and other forms of modulation]

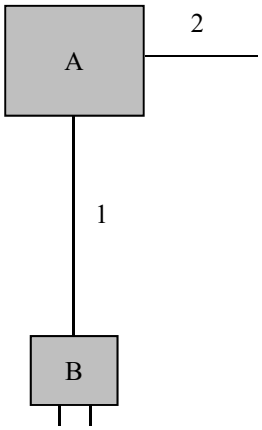
Test item	Operating mode	Tested frequency
RF output power, Power Spectral Density	BT LE Tx	2402 MHz 2440 MHz 2480 MHz
Occupied channel bandwidth, Transmitter unwanted emissions in the out-of-band domain, Transmitter unwanted emissions in the spurious domain (Radiated)	BT LE Tx	2402 MHz 2480 MHz
Receiver spurious emissions (Radiated)	BT LE Rx	2402 MHz 2480 MHz
Receiver blocking	Communication Bluetooth Low Energy (Direct test mode)	2402 MHz 2480 MHz

Extreme test condition	
Temperature	+10 deg. C to +40 deg. C
Voltage	Vnom: DC 6.0 V: operating voltage range of EUT *

*The RF module is constantly provided with the stable voltage regardless of input voltage, so the testing was performed with DC 6.0 V only.

4.2 Configuration and peripherals

[Radiated emission test]



AC 230 V / 50 Hz

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

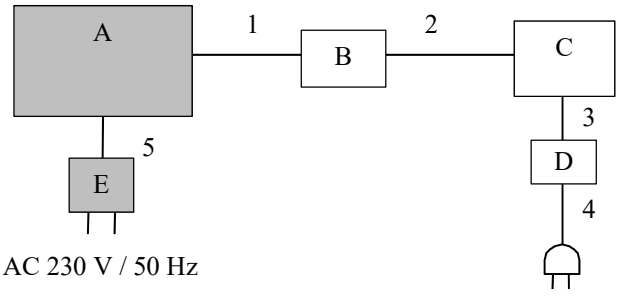
Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	BLOOD PRESSURE MONITOR	HEM-7361T	ES1812000079V	OMRON HEALTHCARE Co., Ltd.	EUT
B	AC Adapter	HHP-AM01	852A	OMRON HEALTHCARE Co., Ltd.	EUT

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	DC Cable	1.5	Unshielded	Unshielded	-
2	Signal Cable	0.2	Unshielded	Unshielded	-

[Antenna Terminal Conducted test]



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

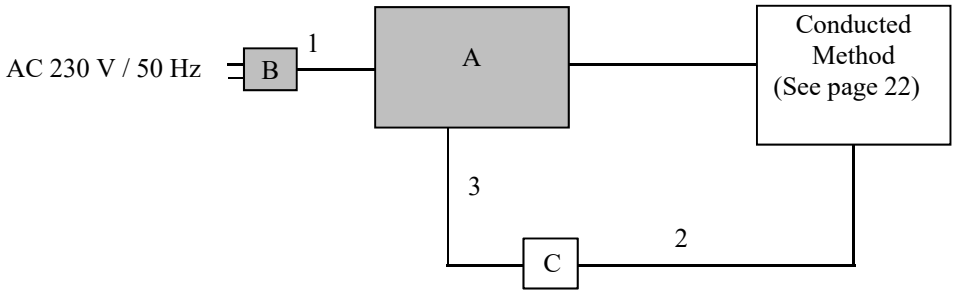
Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	BLOOD PRESSURE MONITOR	HEM-7361T	ES1812000080V	OMRON HEALTHCARE Co., Ltd.	EUT
B	Jig	-	-	-	-
C	Laptop PC	PC-BL530VH6B	99185918A	NEC	-
D	AC Adapter	ADP-60NH	9903033DD	NEC	-
E	AC Adapter	HHP-AM01	852A	OMRON HEALTHCARE Co., Ltd.	EUT

List of cables used

No.	Name	Length (m)	Shield		Remark
			Cable	Connector	
1	Signal Cable	1.0	Unshielded	Unshielded	-
2	USB Cable	0.3	Shielded	Shielded	-
3	DC Cable	1.8	Unshielded	Unshielded	-
4	AC Cable	1.0	Unshielded	Unshielded	-
5	DC Cable	1.5	Unshielded	Unshielded	-

[Receiver Blocking tests]



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remark
A	BLOOD PRESSURE MONITOR	HEM-7361T	ES1812000080V	OMRON HEALTHCARE Co., Ltd.	EUT
B	AC Adapter	HHP-AM01	852A	OMRON HEALTHCARE Co., Ltd.	EUT
C	Jig	-	-	-	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.5	Unshielded	Unshielded	-
2	USB Cable	1.0	Shielded	Shielded	-
3	Signal Cable	0.2	Unshielded	Unshielded	-

SECTION 5: Antenna Terminal Conducted Tests

Test Procedure

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

Test	Instrument used	Remark
RF Output Power	Power Meter	Normal and Extreme conditions
Power Spectral Density	Spectrum Analyzer	Option 1 Normal condition
Occupied Channel Bandwidth	Spectrum Analyzer	Normal condition
Transmitter unwanted emissions in the out-of band domain	Spectrum Analyzer	Normal conditions - Detector mode: RMS - Trace: Max Hold - Band power was used on behalf of the time domain power function. - Filter mode: Gaussian Filter Since the data in this test report has enough margin
Receiver Blocking	Spectrum Analyzer	Normal condition

The test results are rounded off to two decimals place, so some differences might be observed.
The equipment and cables were not used for factor 0.0 dB of the data sheets.

Test data : APPENDIX
Test result : Pass

SECTION 6: Transmitter unwanted emissions in the spurious domain and Receiver spurious emissions (Radiated)

Test Procedure

1) EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 m raised 1.5 m above the conducting ground plane.
The Radiated Electric Field Strength intensity has been measured in semi anechoic chamber at a distance of 3 m.
The measuring antenna height was varied between 1 m to 4 m and the turn table 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.

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 m to 4 m to obtain maximum receiving level.
Its Output power of Signal Generator was recorded.

3) Below 1 GHz:
Effective 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 except for the Half wave dipole Antenna for the Substitution Antenna, the Effective radiated power was calculated by compensating the finite difference in the Antenna gain of the Half wave dipole Antenna, and Substitution Antenna.
Above 1 GHz:
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.

Pre-check scan setting

Frequency	Below 1 GHz	Above 1 GHz
Instrument used	Spectrum Analyzer	Spectrum Analyzer
IF Bandwidth	Peak, RBW: 100 kHz / VBW: 300 kHz	Peak, RBW: 1 MHz / VBW: 3 MHz
Trace mode	Max hold	Max hold

Measured setting

Frequency	Below 1 GHz	Above 1 GHz
Instrument used	Spectrum Analyzer	Spectrum Analyzer
IF Bandwidth	RMS, RBW: 100 kHz / VBW: 300 kHz	RMS, RBW: 1 MHz / VBW: 3 MHz
Span / Sweep time	Zero / 120 % of detected burst	Zero / 120 % of detected burst
Trace mode	Clear Write (band power)	Clear Write (band power)

- 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.

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

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

RF Output Power

Report No.	12903635H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	June 13, 2019
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Takumi Shimada
Mode	Tx BT LE

BT LE

Test Condition		Freq.	P/M (AV) Reading	Cable Loss	Atten. Loss	Antenna Gain	Result	Limit	Margin
Temp.	Volt.	[MHz]	[dBm]	[dB]	[dB]	[dBi]	[dBm]	[dBm]	[dB]
nom	nom	2402.0	-11.67	1.03	9.99	5.05	4.40	20.00	15.60
		2440.0	-11.59	1.04	9.99	5.05	4.49	20.00	15.51
		2480.0	-11.47	1.05	9.99	5.05	4.62	20.00	15.38
min	nom	2402.0	-11.42	1.03	9.99	5.05	4.65	20.00	15.35
		2440.0	-11.35	1.04	9.99	5.05	4.73	20.00	15.27
		2480.0	-11.19	1.05	9.99	5.05	4.90	20.00	15.10
max	nom	2402.0	-11.88	1.03	9.99	5.05	4.19	20.00	15.81
		2440.0	-11.82	1.04	9.99	5.05	4.26	20.00	15.74
		2480.0	-11.77	1.05	9.99	5.05	4.32	20.00	15.68

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

Power Spectral Density

Report No.	12903635H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	June 13, 2019
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Takumi Shimada
Mode	Tx BT LE

BT LE

Test Condition		Ch	S/A	S/A	RF Output	Result	Limit	Margin
Temp.	Volt.	Freq.	Maximum Reading	Total Power Reading	Power			
		[MHz]	[dBm/MHz]	[dBm]	[dBm]	[dBm/MHz]	[dBm/MHz]	[dB]
nom	nom	2402.00	-10.91	-10.85	4.40	4.34	10.00	5.66
		2440.00	-11.18	-11.12	4.49	4.43	10.00	5.57
		2480.00	-11.05	-10.99	4.62	4.56	10.00	5.44

Result [dBm/MHz] = S/A Maximum Reading [dBm/MHz] - S/A Total Power Reading [dBm] (*1) + RF Output Power [dBm] (*2)

(*1) Integrated value of 2400 MHz to 2483.5 MHz

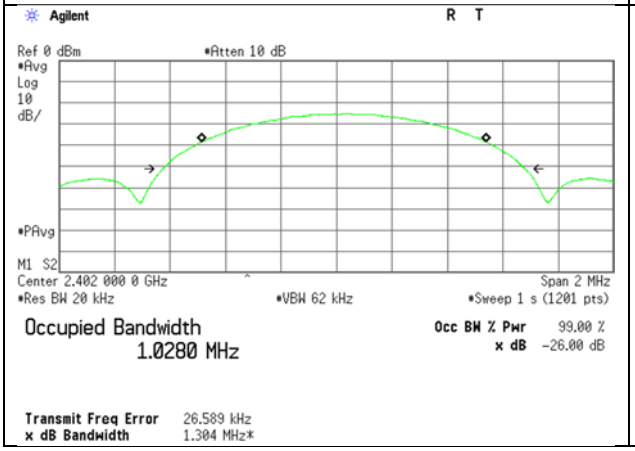
(*2) Refer to RF Output Power

Occupied Channel Bandwidth

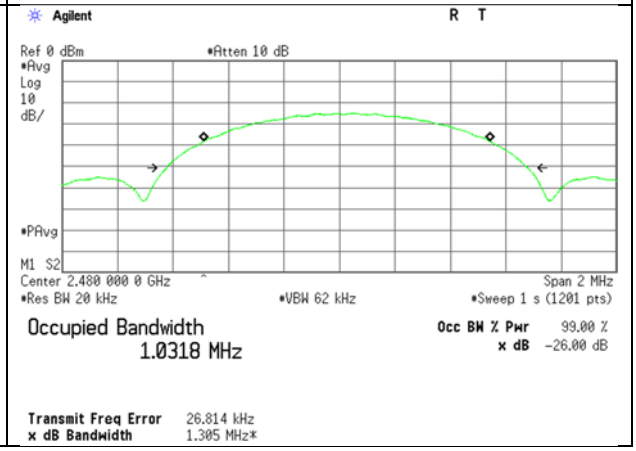
Report No.	12903635H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	June 13, 2019
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Takumi Shimada
Mode	Tx BT LE

Frequency [MHz]	Bandwidth [MHz]	Result [MHz]	Limit [MHz]
2402	1.0280	2401.4860	> 2400
2480	1.0318	2480.5159	< 2483.5

Tx 2402 MHz



Tx 2480 MHz



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Transmitter unwanted emissions in the out-of-band domain

Report No.	12903635H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	June 13, 2019
Temperature / Humidity	23 deg. C / 45 % RH
Engineer	Takumi Shimada
Mode	Tx BT LE

BT LE

Frequency [MHz]	S/A (AV) Reading [dBm/MHz]	Cable Loss [dB]	Atten. Loss [dB]	Antenna Gain [dBi]	Result [dBm/MHz]	Limit [dBm/MHz]	Margin [dB]	Remarks
2398.5	-70.85	1.03	9.99	5.05	-54.78	-20.00	34.78	Lowest ch 2400 MHz - 2 BW
2399.5	-68.30	1.03	9.99	5.05	-52.23	-10.00	42.23	Lowest ch 2400 MHz - BW
2484.0	-72.24	1.05	9.99	5.05	-56.15	-10.00	46.15	Highest ch 2483.5 MHz + BW
2485.1	-72.81	1.05	9.99	5.05	-56.72	-20.00	36.72	Highest ch 2483.5 MHz + 2 BW

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

*Above test result was maximum value on each 1 BW.

Transmitter unwanted emissions in the spurious domain (Radiated)

Report No.	12903635H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	June 14, 2019
Temperature / Humidity	24 deg. C / 67 % RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE

2402 MHz

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Result (ERP) <=1GHz, (EIRP) >1GHz [dBm]		Limit (ERP) <=1GHz, (EIRP) >1GHz [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
												Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
4804.00	50.4	51.2	-49.2	-48.6	6.0	11.9	-43.3	-42.7	-30.0	13.3	12.7	205	175	143	288	
7206.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
9608.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
12010.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	

Below 1GHz: Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15,
Above 1GHz: Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain
Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)
Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
NS : No signal detect.
Detector : Below 1 GHz: Spectrum Analyzer RMS Average (RBW: 100 kHz / VBW: 300 kHz)
Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

2480 MHz

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Result (ERP) <=1GHz, (EIRP) >1GHz [dBm]		Limit (ERP) <=1GHz, (EIRP) >1GHz [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
												Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
4960.00	47.2	46.1	-52.6	-54.1	6.1	12.3	-46.4	-47.9	-30.0	16.4	17.9	197	169	173	294	
7440.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
9920.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
12400.00	NS	NS	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	

Below 1GHz: Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15,
Above 1GHz: Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain
Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)
Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
NS : No signal detect.
Detector : Below 1 GHz: Spectrum Analyzer RMS Average (RBW: 100 kHz / VBW: 300 kHz)
Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

Receiver spurious emissions (Radiated)

Report No.	12903635H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.1
Date	June 14, 2019
Temperature / Humidity	24 deg. C / 67 % RH
Engineer	Takafumi Noguchi
Mode	BT LE Rx

2402 MHz

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Result (ERP) <=1GHz, (EIRP) >1GHz [dBm]		Limit (ERP) <=1GHz, (EIRP) >1GHz [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
												Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
52.98	-	50.1	-	-34.0	2.0	-28.8	-	-67.0	-57.0	-	10.0	-	-	100	67	
80.29	-	49.8	-	-46.7	2.5	-19.0	-	-70.4	-57.0	-	13.4	-	-	100	199	
2402.00	NS	NS	-	-	-	-	-	-	-47.0	-	-	-	-	-	-	

Below 1GHz: Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15,
Above 1GHz: Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain
Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)
Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
NS : No signal detect.
Detector : Below 1 GHz: Spectrum Analyzer RMS Average (RBW: 100 kHz / VBW: 300 kHz)
Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

2480 MHz

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Result (ERP) <=1GHz, (EIRP) >1GHz [dBm]		Limit (ERP) <=1GHz, (EIRP) >1GHz [dBm]	Margin [dB]		Horizontal		Vertical		Remarks
												Rx Ant. Height	Turn Table	Rx Ant. Height	Turn Table	
[MHz]	HOR	VER	HOR	VER	[dB]	[dBi]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
52.98	-	50.0	-	-34.1	2.0	-28.8	-	-67.1	-57.0	-	10.1	-	-	100	64	
80.29	-	49.8	-	-46.7	2.5	-19.0	-	-70.4	-57.0	-	13.4	-	-	100	195	
2480.00	NS	NS	-	-	-	-	-	-	-47.0	-	-	-	-	-	-	

Below 1GHz: Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - 2.15,
Above 1GHz: Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain
Rx-ANTENNA : Biconical Antenna(25 MHz - 200 MHz), Logperiodic Antenna(200 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)
Tx-ANTENNA : 120 MHz tuned Dipole Antenna(30 MHz - 120 MHz), Dipole Antenna(120 MHz - 1000 MHz), Horn Antenna(1 GHz - 12.75 GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).
NS : No signal detect.
Detector : Below 1 GHz: Spectrum Analyzer RMS Average (RBW: 100 kHz / VBW: 300 kHz)
Above 1 GHz: Spectrum Analyzer RMS Average (RBW: 1 MHz / VBW: 3 MHz)

Receiver Blocking

Report No.	12903635H
Test place	Ise EMC Lab. No.4 Measurement Room
Date	June 17, 2019
Temperature / Humidity	23 deg. C / 39 % RH
Engineer	Yuta Moriya
Mode	Tx BT LE

Wanted signal mean power from companion device (dBm)	Measured Receiver Sensitivity (dBm)	
	Lowest Channel	Highest Channel
Pmin	-97.75	-97.75
Pmin + 6 dB	-91.75	-91.75

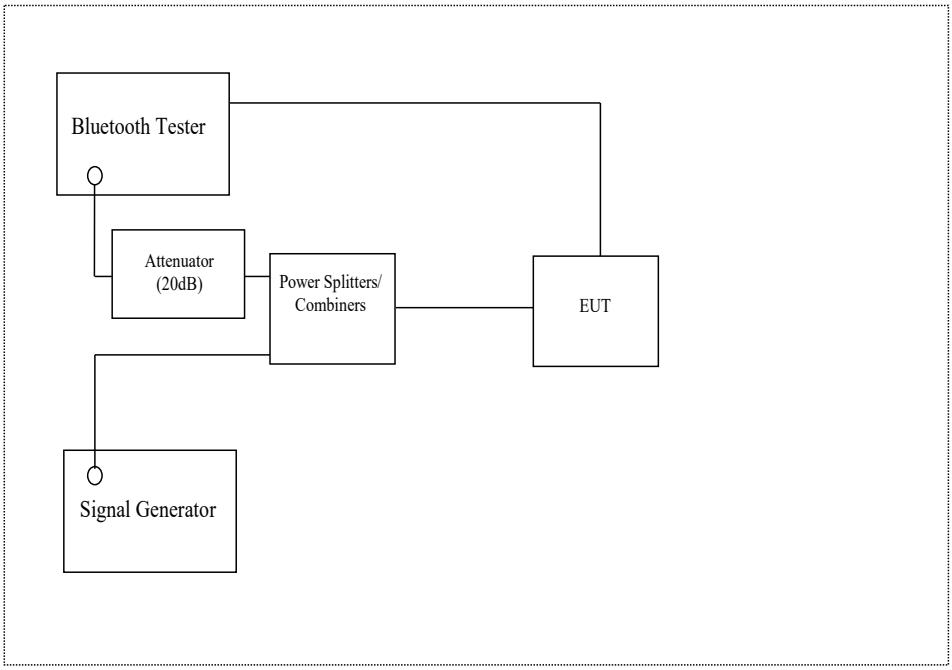
Receiver Category 2 equipment

Operating Channel	Wanted signal mean power from companion device (dBm)	Blocking signal frequency (MHz)	Blocking signal power (dBm)*1)	Result PER (%)	Limit PER (%)
Lowest Channel	P_{min} + 6 dB	2380	-49	0.87	≦10
		2503.5		1.07	
	P_{min} + 6 dB	2300	-39	0.87	
		2583.5		1.01	
Highest Channel	P_{min} + 6 dB	2380	-49	0.99	≦10
		2503.5		0.91	
	P_{min} + 6 dB	2300	-39	0.86	
		2583.5		0.98	

*Pmin is the minimum level of wanted signal (in dBm) required to meet the minimum performance criterion a PER less than or equal to 10 % in the absence of any blocking signal.

*1) Blocking signal power was adjusted by assumed antenna gain 8.05 dBi (Product antenna gain +3 dB margin) since it was more severe condition.

CONDUCTED METHODS SYSTEM BLOCK DIAGRAM of Receiver Blocking



APPENDIX 2: Test instruments

Test Instruments

Test item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
RE	141950	EMI Test Receiver	Rohde & Schwarz	ESU26	100412	06/15/2018	06/30/2019	12
RE	178648	EMI measurement program	TSJ	TEPTO-DV	-	-	-	-
RE	141350	Coaxial Cable	Suhner/storm/Agilent/TSJ	-	-	06/04/2018	06/30/2019	12
RE	141213	Attenuator(6dB)	Weinschel Corp	2	BK7971	11/05/2018	11/30/2019	12
RE	141576	Pre Amplifier	AGILENT	8449B	3008A01671	02/08/2019	02/29/2020	12
RE	141393	Microwave Cable	Junkosha	MWX221	1604S254(1 m) / 1608S088(5 m)	08/08/2018	08/31/2019	12
RE	141511	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	253	04/12/2019	04/30/2020	12
RE	141268	Logbicon	Schwarzbeck	VULB 9168	727	09/13/2018	09/30/2019	12
RE	142226	Measure	KOMELON	KMC-36	-	-	-	-
RE	141585	Pre Amplifier	MITEQ	MLA-10K01-B01-35	1237616	02/08/2019	02/29/2020	12
RE	141998	AC1_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	06/18/2018	06/30/2020	24
RE	141566	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	01/11/2019	01/31/2020	12
RE	141296	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	09/19/2018	09/30/2019	12
RE	141218	Coaxial Cable	UL Japan	-	-	07/19/2018	07/31/2019	12
RE	141464	Dipole Antenna	Schwarzbeck	VHAP	1018	10/23/2018	10/31/2019	12
RE	141967	Signal Generator	Rohde & Schwarz	SMT02	51400043	08/07/2018	08/31/2019	12
RE	141409	Microwave Cable(1-30GHz)	Huber+Suhner	SF103/11PC3.5-31/ 11PC3.5-31/8.0m	54308/3	01/10/2019	01/31/2020	12
RE	141514	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	1611	05/16/2019	05/31/2020	12
RE	141896	Signal Generator	Rohde & Schwarz	SMR40	100137	06/04/2019	06/30/2020	12
RE	141530	Digital Tester	Fluke Corporation	FLUKE 26-3	78030621	08/21/2018	08/31/2019	12
RB	155908	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	140481	-	-	-
RB	141321	Microwave Cable	Junkosha	MWX221	1409S493	03/26/2019	03/31/2020	12
RB	141326	Microwave Cable	Suhner	SUCOFLEX101	2874(1m) / 2877(5m)	03/04/2019	03/31/2020	12
RB	141821	Power Splitters/Combiners	Mini-Circuit	ZFSC-2-10G	326	09/18/2018	09/30/2019	12
RB	141903	Spectrum Analyzer	AGILENT	E4440A	MY46186390	09/20/2018	09/30/2019	12
RB	141905	Signal Generator	Rohde & Schwarz	SML03	100332	09/13/2018	09/30/2019	12
RB	141174	Attenuator(20dB)(above1 GHz)	HIROSE ELECTRIC CO.,LTD.	AT-120	901247	01/10/2019	01/31/2020	12
AT/RB	141224	Microwave Cable	Junkosha	MWX221	1409S496	03/05/2019	03/31/2020	12
AT	141902	Spectrum Analyzer	AGILENT	E4440A	MY46187105	10/04/2018	10/31/2019	12
AT	141809	Power Meter	ANRITSU	ML2495A	825002	05/16/2019	05/31/2020	12
AT	141830	Power sensor	ANRITSU	MA2411B	738285	05/16/2019	05/31/2020	12
AT	141429	Temperature and Humidity Chamber	TABAI ESPEC	PL-2KP	14015723	08/08/2018	08/31/2019	12
AT	141561	Thermo-Hygrometer	CUSTOM	CTH-201	1401	01/11/2019	01/31/2020	12
AT	141420	Attenuator	Weinschel Associates	WA56-10	56100307	05/17/2019	05/31/2020	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:

AT: Antenna Terminal Conducted test (other than Receiver Blocking test)
RE: Radiated emission test
RB: Receiver Blocking test

APPENDIX 3: Photographs of test setup

Radiated emission

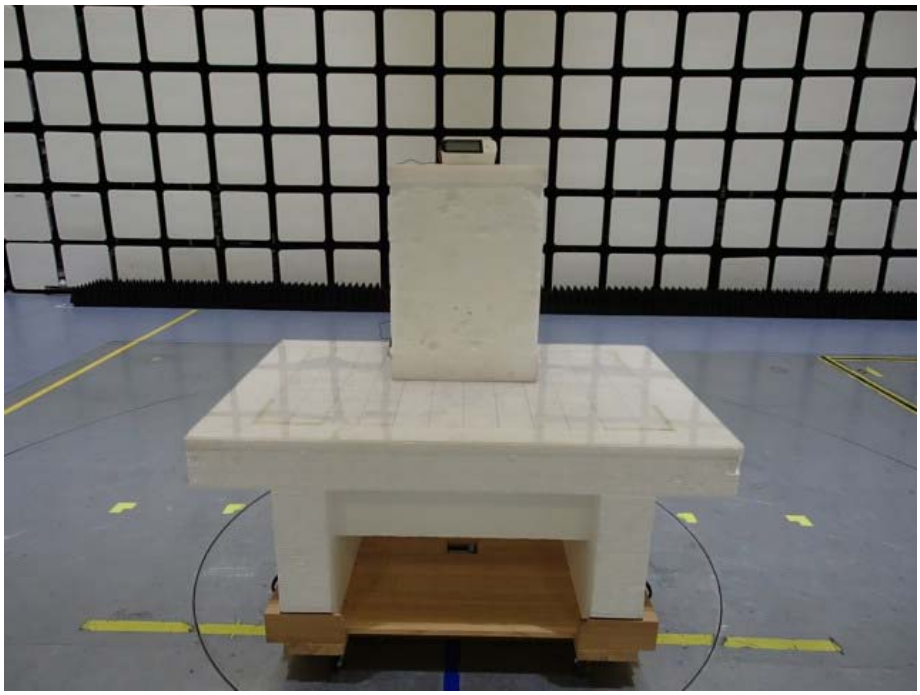


Photo 1

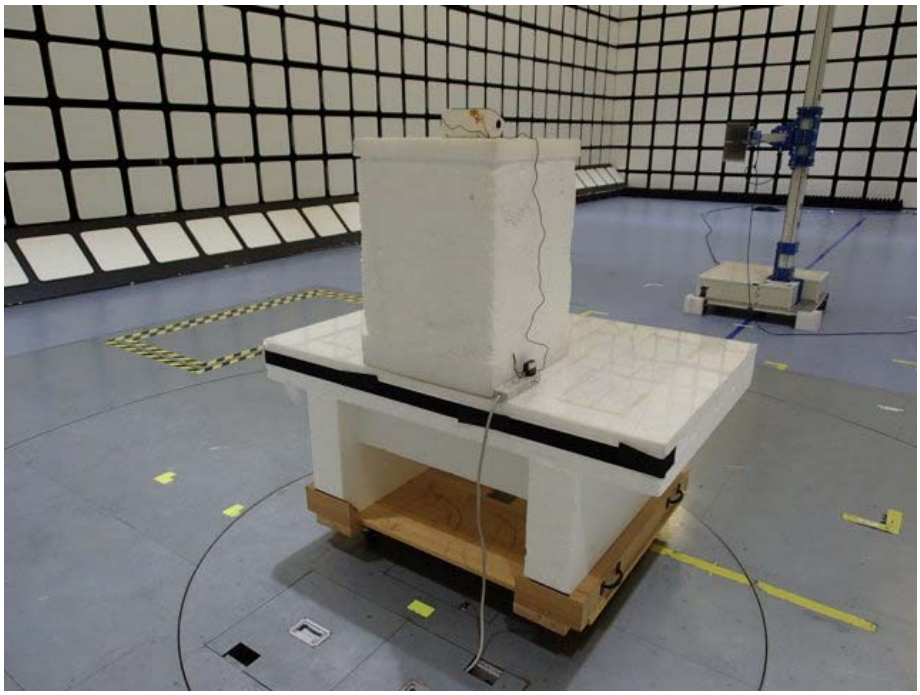


Photo 2

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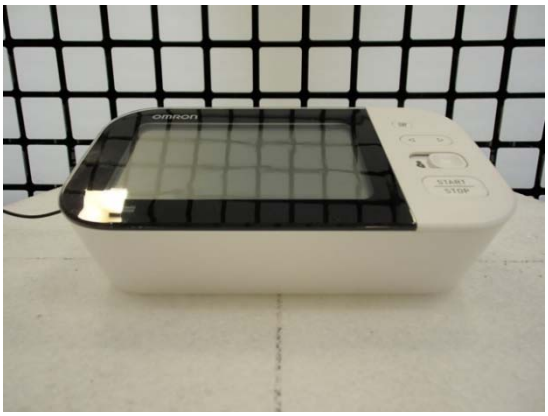
Facsimile : +81 596 24 8124

Worst Case Position

Below 1 GHz(Horizontal: X-axis / Vertical: X-axis)
Above 1 GHz(Horizontal: X-axis / Vertical: Y-axis)

X-axis



Y-axis

Z-axis

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Receiver Blocking

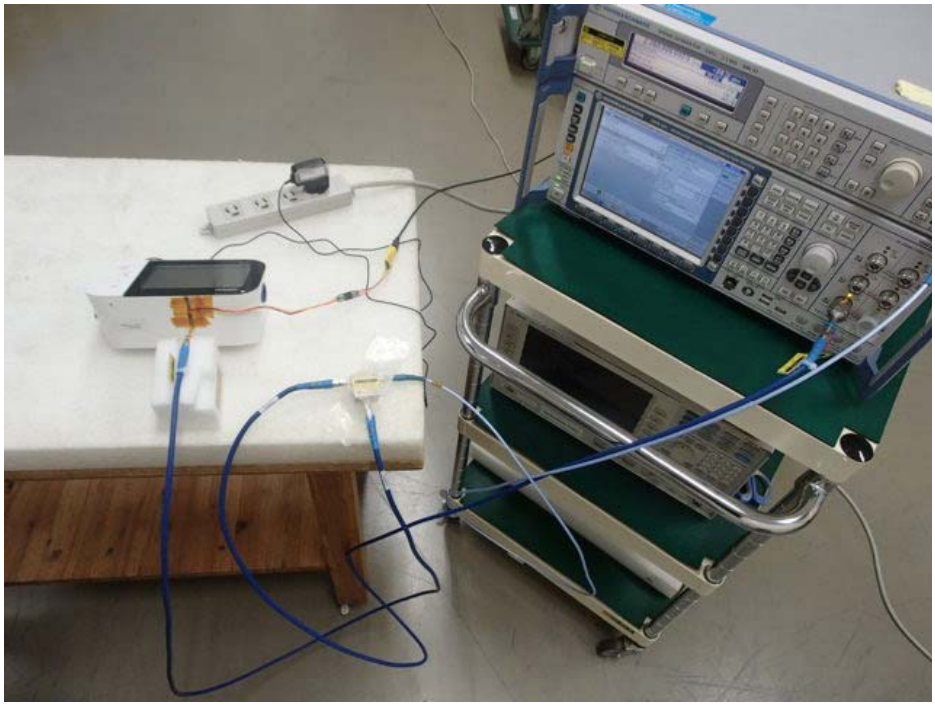

Photo 1

End of Report

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