RADIO TEST REPORT

Test Report No. : 11858088H

Applicant	:	**OMRON HEALTHCARE Co., Ltd.**
Type of Equipment	:	**Blood Pressure Monitor**
Model No.	:	**HEM-7600T**
Test standard	:	**EN 300 328 V1.9.1**
Test Result	:	**Complied**

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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 must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.
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)

Date of test: July 15 to 19, 2016

Representative test engineer:
Ken Fujita
Engineer
Consumer Technology Division

Approved by :
Takayuki Shimada
Engineer
Consumer Technology Division

NVLAP TESTING
NVLAP LAB CODE: 200572-0

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.
*As for the range of Accreditation in NVLAP, you may refer to the WEB address,
http://japan.ul.com/resources/emc_accredited/

REVISION HISTORY

Original Test Report No.: 11858088H

Revision	Test report No.	Date	Page revised	Contents
- (Original)	11858088H	July 13, 2017	-	-

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Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
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SECTION 1: Customer information

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

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

2.1 Identification of E.U.T.

Type of Equipment	:	Blood Pressure Monitor
Model No.	:	HEM-7600T
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 6.0 V
Receipt Date of Sample	:	July 14, 2016
Country of Mass-production	:	Japan
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

General Specification

Clock frequency(ies) in the system	:	26 MHz

Radio Specification

Bluetooth Low Energy

Equipment Type	:	Transceiver
Frequency of Operation	:	2402 - 2480MHz
Type of Modulation	:	GFSK
Power Supply (inner)	:	1.2 V
Antenna Type	:	Inverted F-type antenna
Antenna Gain	:	-1.3 dBi
Operating Temperature	:	10 deg. C - +40 deg. C

*Original Model: HEM-7600T has variant model: HEM-7600T-E.
The difference of these models is only destination.

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Radio : EN 300 328 V1.9.1

Title : Electromagnetic compatibility and Radio spectrum Matters (ERM);
Wideband transmission systems; Data transmission equipment operating in the 2.4GHz ISM band and using wide band modulation techniques;
Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive

Purpose of test Compliance with the R&TTE directive 1999/5/EC.

3.2 Procedures and results

No.	Item	Test Procedure	Limit	Remarks	Worst margin	Exclusions	Results
1	RF output power	Clause 5.3.2	Clause 4.3.2.2	Conducted	-	N/A	Complied
2	Power Spectral Density	Clause 5.3.3	Clause 4.3.2.3	Conducted	-	N/A	Complied
3	Duty cycle, Tx-sequence, Tx-gap	Clause 5.3.2	Clause 4.3.2.4	Conducted	-	N/A	N/A *1)
4	Medium Utilisation (MU) factor	Clause 5.3.2	Clause 4.3.2.5	Conducted	-	N/A	N/A *1)
5	Adaptivity (adaptive equipment using modulations other than FHSS)	Clause 5.3.7	Clause 4.3.2.6	Conducted	-	N/A	N/A *2)
6	Occupied Channel Bandwidth	Clause 5.3.8	Clause 4.3.2.7	Conducted	-	N/A	Complied
7	Transmitter unwanted emissions in the out-of-band domain	Clause 5.3.9	Clause 4.3.2.8	Conducted	-	N/A	Complied
8	Transmitter unwanted emissions in the spurious domain	Clause 5.3.10	Clause 4.3.2.9	Radiated	11.4 dB 7206.00 MHz, Horizontal	N/A	Complied
9	Receiver Spurious emissions	Clause 5.3.11	Clause 4.3.2.10	Radiated	No signal detected	N/A	Complied
10	Transmitter unwanted emissions in the spurious domain	Clause 5.3.10	Clause 4.3.2.9	Conducted	3.6 dB 2398.00 MHz	N/A	Complied
11	Receiver Spurious emissions	Clause 5.3.11	Clause 4.3.2.10	Conducted	9.4 dB 286.00 MHZ	N/A	Complied
12	Receiver Blocking	Clause 5.3.7	Clause 4.3.2.11	Conducted	-	N/A	N/A *2)
13	Geo-location capability	-	Clause 4.3.2.12	-	-	N/A	N/A *3)

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 Geo-location capability.

3.3 Additions or deviations to standards

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

3.4 Uncertainty

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

Substitution measurement (EUT height: 1.5 m, Distance: 3 m)	
Frequency range	Uncertainty (+/-)
25 MHz - 200 MHz	5.6 dB
200 MHz - 1000 MHz	4.1 dB
1 GHz - 12.75 GHz	4.6 dB

Antenna terminal test	Uncertainty (+/-)
RF output power	1.0 dB
Power Spectral Density and Unwanted Emissions	1.7 dB
Time and Duty Cycle	0.012%
Conducted Spurious Emission	2.7 dB

[Transmitter unwanted emissions in the spurious domain]
The data listed in this test report has enough margin, more than the site margin.
[Receiver spurious emissions]
The data listed in this test report has enough margin, more than the site margin.

3.5 Test Location

UL Japan, Inc. Ise EMC Lab. *NVLAP Lab. code: 200572-0
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone: +81 596 24 8999, Facsimile: +81 596 24 8124

Test site	IC Registration Number	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	2973C-1	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	2973C-2	7.5 x 5.8 x 5.2	4.0 x 4.0	-	3 m
No.3 semi-anechoic chamber	2973C-3	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	2973C-4	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.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	N/A	-	-
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 Low Energy (BT LE)	Continuous Tx (Tx)
	Continuous Rx (Rx)
*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: 0 dBm - Software: Serial Command Explorer 2 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.	

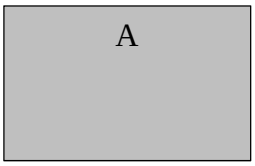
Bluetooth Low Energy [DSSS and other forms of modulation]

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 (Conducted / Radiated)	BT LE Tx	2402 MHz 2480 MHz
Receiver spurious emissions (Conducted / Radiated)	BT LE Rx	2402 MHz 2480 MHz

Extreme test condition	
Temperature	0 deg. C to +40 deg. C
Voltage	Vnom: DC 6 V: operating voltage range of EUT *

*The RF module is constantly provided with voltage (DC 3.3 V) regardless of input voltage, so the testing was performed with DC 6 V only.

4.2 Configuration and peripherals



*Setup was taken into consideration and test data was taken under worse case conditions.

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remark
A	Blood Pressure Monitor	HEM-7600T	ES2-083 *1) 9545448-2A *2)	OMRON HEALTHCARE Co., Ltd.	EUT

*1) Used for Transmitter unwanted emissions in the spurious domain and Receiver spurious emissions (Radiated) tests
*2) Used for Antenna Terminal Conducted Tests

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	Normal condition
Occupied Channel Bandwidth	Spectrum Analyzer	Normal condition
Transmitter unwanted emissions in the out-of band domain	Spectrum Analyzer	Normal and Extreme 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
Transmitter unwanted emissions in the spurious domain (Conducted)	Spectrum Analyzer	Normal condition
Receiver Spurious emissions (Conducted)	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 (Horn Antenna) except for the Half wave dipole Antenna (2.15 dBi) 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

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11858088H
Date	July 15, 2016
Temperature / Humidity	24 deg. C / 45 % RH
Engineer	Ken Fujita
Mode	Tx BT LE

Tx 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	-11.69	1.37	10.09	-1.30	-1.53	20.00	21.53
		2440.0	-11.71	1.38	10.09	-1.30	-1.54	20.00	21.54
		2480.0	-11.86	1.39	10.09	-1.30	-1.68	20.00	21.68
min	nom	2402.0	-11.18	1.37	10.09	-1.30	-1.02	20.00	21.02
		2440.0	-11.23	1.38	10.09	-1.30	-1.06	20.00	21.06
		2480.0	-11.32	1.39	10.09	-1.30	-1.14	20.00	21.14
max	nom	2402.0	-11.95	1.37	10.09	-1.30	-1.79	20.00	21.79
		2440.0	-11.98	1.38	10.09	-1.30	-1.81	20.00	21.81
		2480.0	-12.18	1.39	10.09	-1.30	-2.00	20.00	22.00

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

Power Spectral Density

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11858088H
Date	July 15, 2016
Temperature / Humidity	24 deg. C / 45 % RH
Engineer	Ken Fujita
Mode	Tx 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	2440.00	-16.11	-16.08	-1.53	-1.56	10.00	11.56
		2402.00	-15.99	-15.96	-1.54	-1.57	10.00	11.57
		2480.00	-16.08	-16.05	-1.68	-1.71	10.00	11.71

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

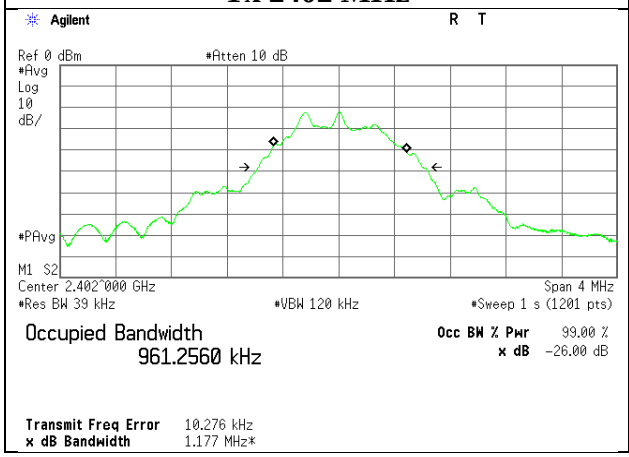
(*2) Refer to RF Output Power

Occupied Channel Bandwidth

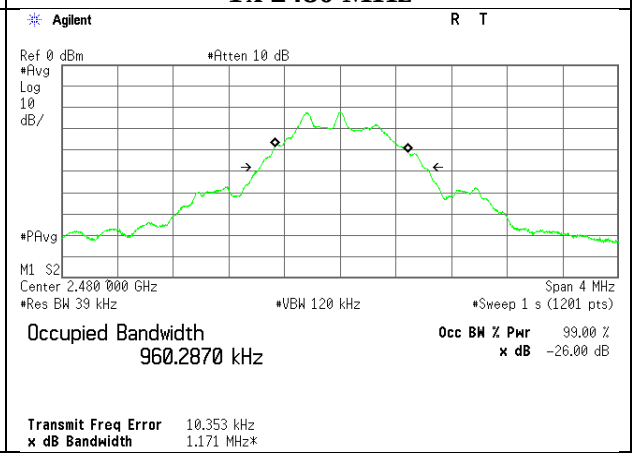
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11858088H
Date	July 15, 2016
Temperature / Humidity	24 deg. C / 45 % RH
Engineer	Ken Fujita
Mode	Tx BT LE

Frequency [MHz]	Bandwidth [MHz]	Result [MHz]	Limit [MHz]
2402	0.9613	2401.5194	> 2400
2480	0.9603	2480.4801	< 2483.5

Tx 2402 MHz



Tx 2480 MHz



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Transmitter unwanted emissions in the out-of-band domain

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11858088H
Date	July 15, 2016
Temperature / Humidity	24 deg. C / 45 % RH
Engineer	Ken Fujita
Mode	Tx BT LE

Test Condition		Frequency	S/A (AV) Reading	Cable Loss	Atten. Loss	Antenna Gain	Result	Limit	Margin	Remarks
Temp.	Volt.	[MHz]	[dBm/MHz]	[dB]	[dB]	[dBi]	[dBm/MHz]	[dBm/MHz]	[dB]	
nom	nom	2398.5	-66.18	1.37	10.09	-1.30	-56.02	-20.00	36.02	Lowest ch 2400 MHz - 2 BW
		2399.5	-63.67	1.38	10.09	-1.30	-53.50	-10.00	43.50	Lowest ch 2400 MHz - BW
		2484.0	-67.34	1.39	10.09	-1.30	-57.16	-10.00	47.16	Highest ch 2483.5 MHz + BW
		2485.0	-68.87	1.39	10.09	-1.30	-58.69	-20.00	38.69	Highest ch 2483.5 MHz + 2 BW
min	nom	2398.5	-66.79	1.37	10.09	-1.30	-56.63	-20.00	36.63	Lowest ch 2400 MHz - 2 BW
		2399.5	-63.82	1.38	10.09	-1.30	-53.65	-10.00	43.65	Lowest ch 2400 MHz - BW
		2484.0	-67.77	1.39	10.09	-1.30	-57.59	-10.00	47.59	Highest ch 2483.5 MHz + BW
		2485.0	-69.27	1.39	10.09	-1.30	-59.09	-20.00	39.09	Highest ch 2483.5 MHz + 2 BW
max	nom	2398.5	-67.21	1.37	10.09	-1.30	-57.05	-20.00	37.05	Lowest ch 2400 MHz - 2 BW
		2399.5	-64.28	1.38	10.09	-1.30	-54.11	-10.00	44.11	Lowest ch 2400 MHz - BW
		2484.0	-68.32	1.39	10.09	-1.30	-58.14	-10.00	48.14	Highest ch 2483.5 MHz + BW
		2485.0	-70.22	1.39	10.09	-1.30	-60.04	-20.00	40.04	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.	11858088H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.1	No.3
Date	July 18, 2016	July 19, 2016
Temperature / Humidity	22 deg. C / 33% RH	24 deg. C / 65% RH
Engineer	Koji Yamamoto (Above 1GHz)	Tomohisa Nakagawa (Below 1GHz)
Mode	Tx BT LE	

2402 MHz

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Tx Ant. Atten. Loss	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]	[dB]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
4804.00	43.3	44.9	-57.6	-56.4	6.2	12.5	0.0	-51.3	-50.1	-30.0	21.3	20.1	118	47	123	329	
7206.00	48.1	40.7	-46.3	-54.1	7.4	12.3	0.0	-41.4	-49.2	-30.0	11.4	19.2	120	186	104	229	
9608.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	
12010.00	NS	NS	-	-	-	-	-	-	-	-30.0	-	-	-	-	-	-	

2480 MHz

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Tx Ant. Atten. Loss	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]	[dB]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
4960.00	37.6	39.9	-64.9	-61.3	6.3	12.5	0.0	-58.7	-55.1	-30.0	28.7	25.1	144	111	110	335	
7440.00	45.6	39.5	-47.2	-54.2	7.5	11.9	0.0	-42.8	-49.8	-30.0	12.8	19.8	116	174	105	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 - Tx Antenna Attenuator Loss -2.15,
Above 1GHz: Calculation Result = SG Reading - Tx Cable Loss + Tx Antenna Gain - Tx Antenna Attenuator Loss
Rx-ANTENNA : Biconical Antenna(25M-200MHz), Logperiodic Antenna(200M-1000MHz), Horn Antenna(1G-12.75GHz)
Tx-ANTENNA : 120MHz tuned Dipole Antenna(25M-120MHz), Dipole Antenna(120M-1000MHz), Horn Antenna(1G-12.75GHz)
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
NS : No signal detect.
Detector : Below 1GHz: Spectrum Analyzer RMS Average(RBW:100kHz/VBW:300kHz)
Above 1GHz: Spectrum Analyzer RMS Average(RBW:1MHz/VBW:3MHz)

Transmitter unwanted emissions in the spurious domain (Conducted)

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11858088H
Date	July 15, 2016
Temperature / Humidity	24 deg. C / 45 % RH
Engineer	Ken Fujita
Mode	Tx BT LE

2402 MHz

Frequency [MHz]	S/A Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]	Remarks
182.00	-69.8	0.1	9.9	-59.8	-54.0	5.8	
286.00	-70.0	0.4	9.9	-59.7	-36.0	23.7	
875.30	-81.4	0.4	10.1	-70.9	-36.0	34.9	
2398.00	-45.4	1.7	10.1	-33.6	-30.0	3.6	
2493.00	-65.3	1.9	10.1	-53.3	-30.0	23.3	
4803.50	-59.3	2.2	10.1	-46.9	-30.0	16.9	
7206.00	-68.1	2.5	10.2	-55.4	-30.0	25.4	
9608.00	-71.2	2.9	10.3	-57.9	-30.0	27.9	
12010.00	-69.1	6.2	10.3	-52.5	-30.0	22.5	

Result = S/A Reading + Cable Loss + Attenuator Loss
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
NS : No signal detect.
Detector : Below 1GHz: Spectrum Analyzer Peak(RBW:100kHz/VBW:300kHz)
Above 1GHz: Spectrum Analyzer Peak(RBW:1MHz/VBW:3MHz)

2480 MHz

Frequency [MHz]	S/A Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]	Remarks
182.00	-69.9	0.2	10.0	-59.8	-54.0	5.7	
338.00	-70.3	0.4	9.9	-60.0	-36.0	24.0	
637.30	-81.4	0.4	9.9	-71.1	-54.0	17.1	
2388.50	-65.7	1.7	10.1	-54.0	-30.0	24.0	
2492.50	-50.0	1.9	10.1	-38.0	-30.0	8.0	
4960.00	-63.4	2.2	10.1	-51.1	-30.0	21.1	
7440.00	-69.7	2.7	10.2	-56.8	-30.0	26.8	
9920.00	-72.0	2.9	10.3	-58.8	-30.0	28.8	
12400.00	-69.6	6.2	10.3	-53.1	-30.0	23.1	

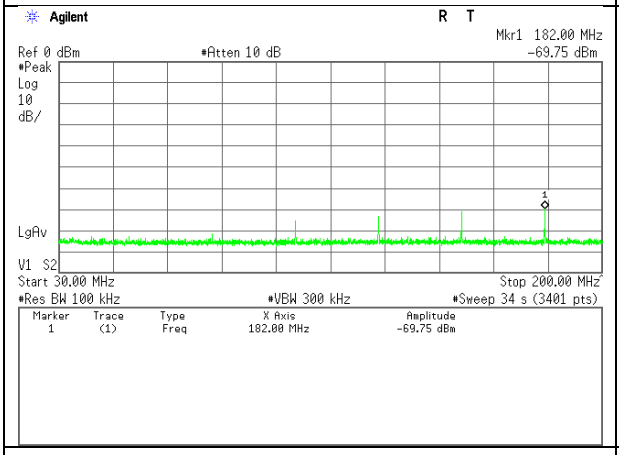
Result = S/A Reading + Cable Loss + Attenuator Loss
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
NS : No signal detect.
Detector : Below 1GHz: Spectrum Analyzer Peak(RBW:100kHz/VBW:300kHz)
Above 1GHz: Spectrum Analyzer Peak(RBW:1MHz/VBW:3MHz)

Transmitter unwanted emissions in the spurious domain (Conducted)

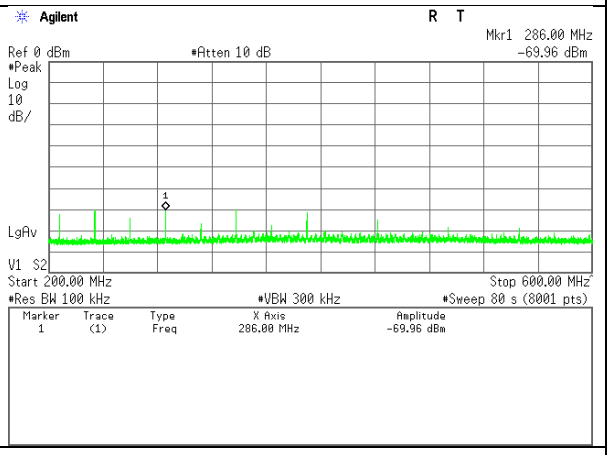
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11858088H
Date	July 15, 2016
Temperature / Humidity	24 deg. C / 45 % RH
Engineer	Ken Fujita
Mode	Tx BT LE

2402 MHz

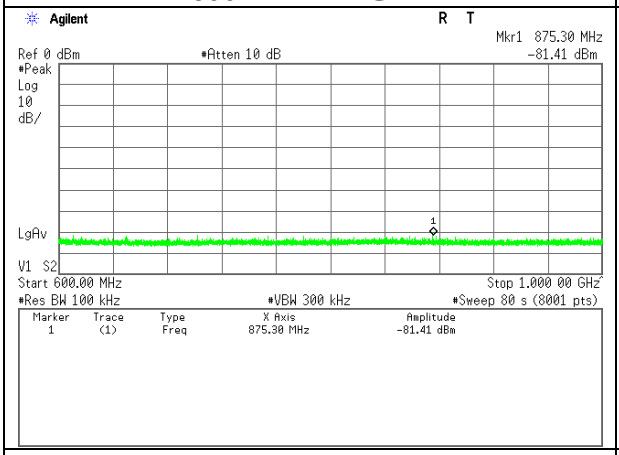
30 MHz - 200 MHz



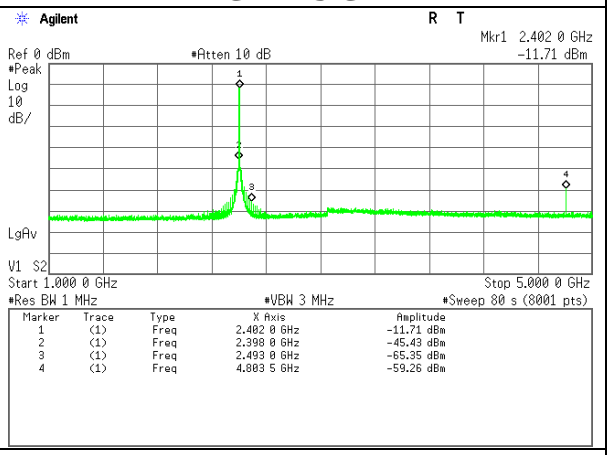
200 MHz - 600 MHz



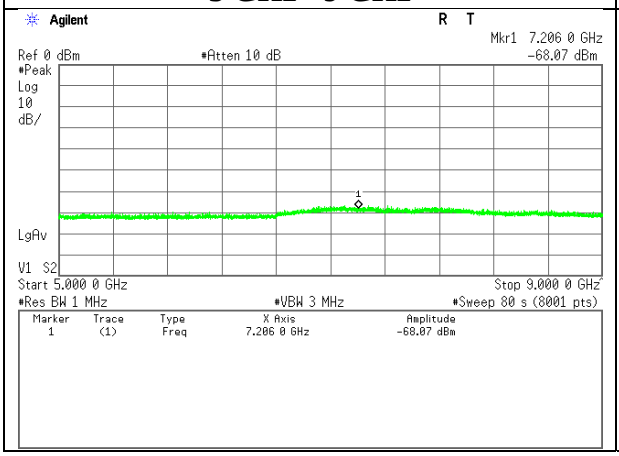
600 MHz - 1 GHz



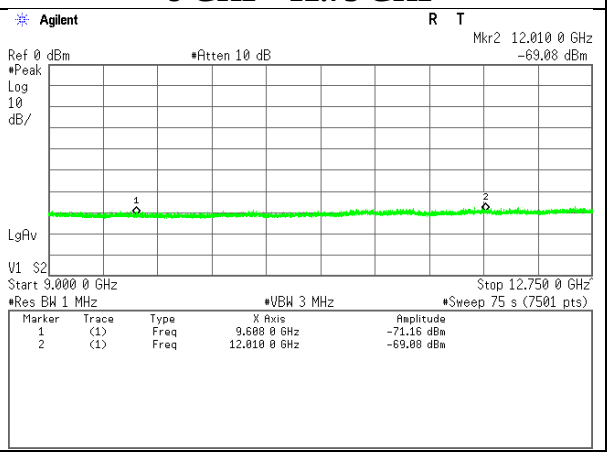
1 GHz - 5 GHz



5 GHz - 9 GHz



9 GHz – 12.75 GHz

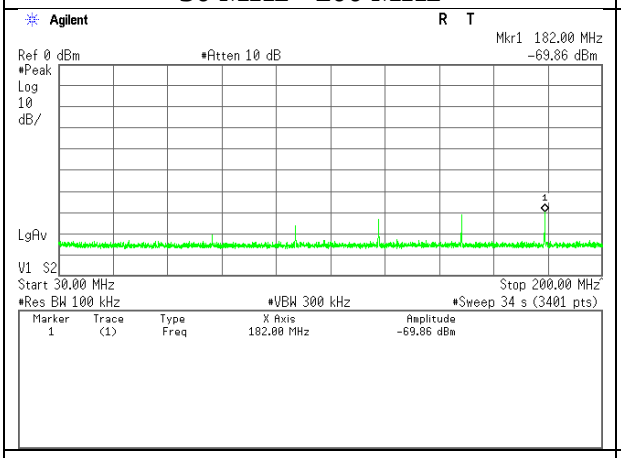


Transmitter unwanted emissions in the spurious domain (Conducted)

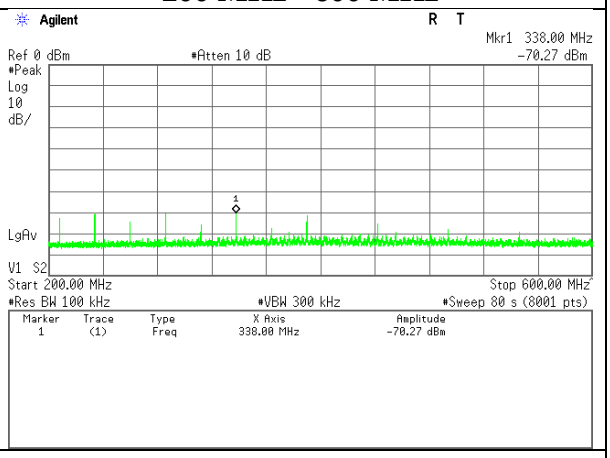
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11858088H
Date	July 15, 2016
Temperature / Humidity	24 deg. C / 45 % RH
Engineer	Ken Fujita
Mode	Tx BT LE

2480 MHz

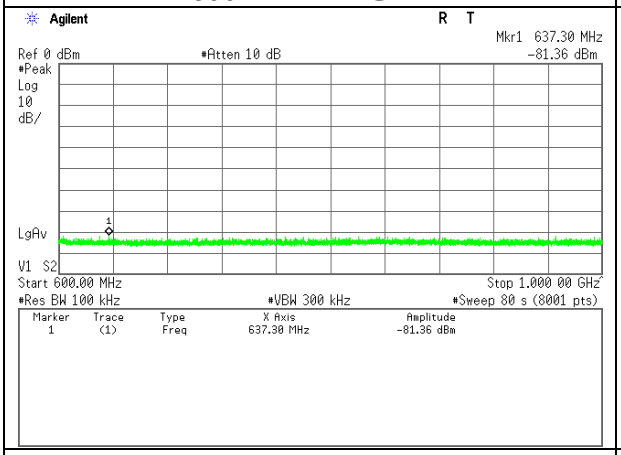
30 MHz - 200 MHz



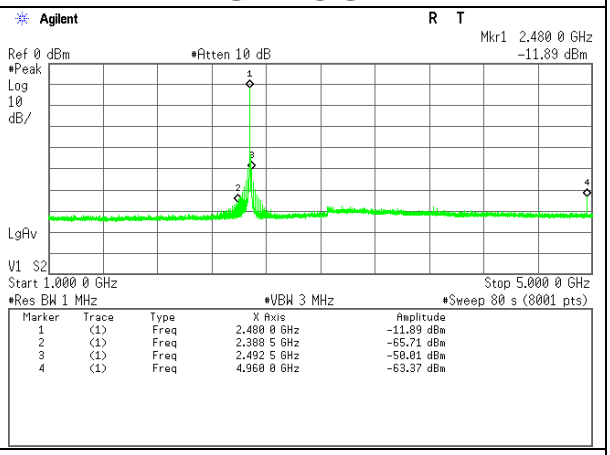
200 MHz - 600 MHz



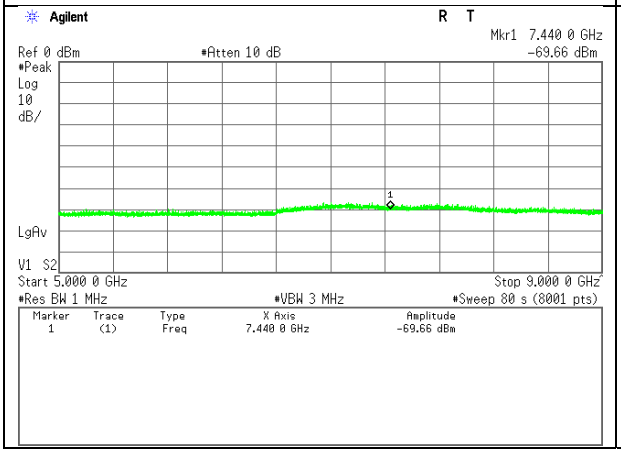
600 MHz - 1 GHz



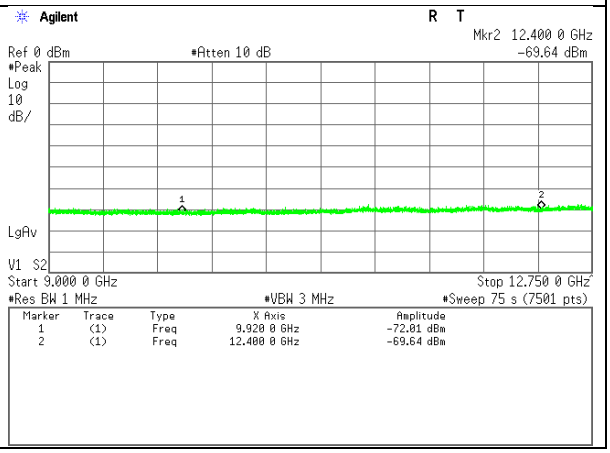
1 GHz - 5 GHz



5 GHz - 9 GHz



9 GHz – 12.75 GHz



Receiver spurious emissions (Radiated)

Report No.	11858088H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.1	No.3
Date	July 18, 2016	July 19, 2016
Temperature / Humidity	22 deg. C / 33% RH	24 deg. C / 65% RH
Engineer	Koji Yamamoto (Above 1GHz)	Tomohisa Nakagawa (Below 1GHz)
Mode	Rx BT LE	

2402 MHz

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Tx Ant. Atten. Loss	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]	[dB]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
2402.00	NS	NS	-	-	-	-	-	-	-	-47.0	-	-	-	-	-	-	

2480 MHz

Frequency	Rx SA/TR Reading [dBuV]		Tx SG Reading [dBm]		Tx Cable Loss	Tx Ant. Gain	Tx Ant. Atten. Loss	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]	[dB]	HOR	VER		HOR	VER	[cm]	[deg.]	[cm]	[deg.]	
2480.00	NS	NS	-	-	-	-	-	-	-	-47.0	-	-	-	-	-	-	

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

Receiver spurious emissions (Conducted)

Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11858088H
Date	July 15, 2016
Temperature / Humidity	24 deg. C / 45 % RH
Engineer	Ken Fujita
Mode	Rx BT LE

2402 MHz

Frequency [MHz]	S/A Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]	Remarks
156.00	-70.2	0.1	0.0	-70.0	-57.0	13.0	
286.00	-66.7	0.3	0.0	-66.4	-57.0	9.4	
623.95	-81.7	0.4	0.0	-81.3	-57.0	24.3	
3261.00	-68.9	1.7	0.0	-67.3	-47.0	20.3	
7046.50	-68.0	2.6	0.0	-65.5	-47.0	18.5	
11956.50	-68.1	2.9	0.0	-65.2	-47.0	18.2	

Result = S/A Reading + Cable Loss + Attenuator Loss
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
NS : No signal detect.
Detector : Below 1GHz: Spectrum Analyzer Peak(RBW:100kHz/VBW:300kHz)
Above 1GHz: Spectrum Analyzer Peak(RBW:1MHz/VBW:3MHz)

2480 MHz

Frequency [MHz]	S/A Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]	Remarks
159.30	-83.35	0.2	0.0	-83.2	-57.0	26.2	
260.05	-81.28	0.3	0.0	-81.0	-57.0	24.0	
734.35	-82.35	0.4	0.0	-82.0	-57.0	25.0	
3124.00	-69.16	1.7	0.0	-67.5	-47.0	20.5	
6946.00	-68.34	2.6	0.0	-65.7	-47.0	18.7	
12408.00	-68.54	2.9	0.0	-65.6	-47.0	18.6	

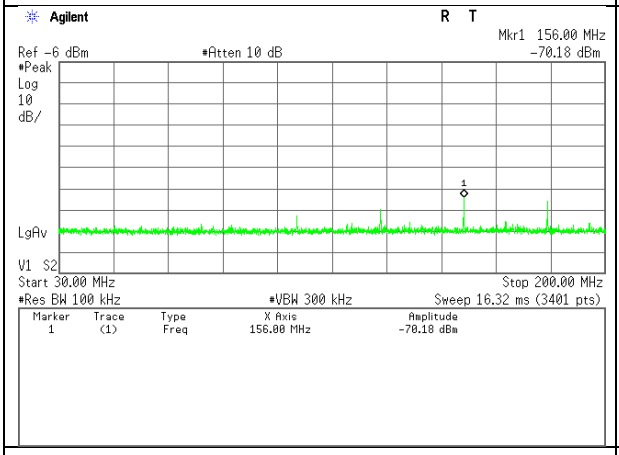
Result = S/A Reading + Cable Loss + Attenuator Loss
Other frequency noises omitted in this report were not seen or had enough margin (more than 20dB).
NS : No signal detect.
Detector : Below 1GHz: Spectrum Analyzer Peak(RBW:100kHz/VBW:300kHz)
Above 1GHz: Spectrum Analyzer Peak(RBW:1MHz/VBW:3MHz)

Receiver spurious emissions (Conducted)

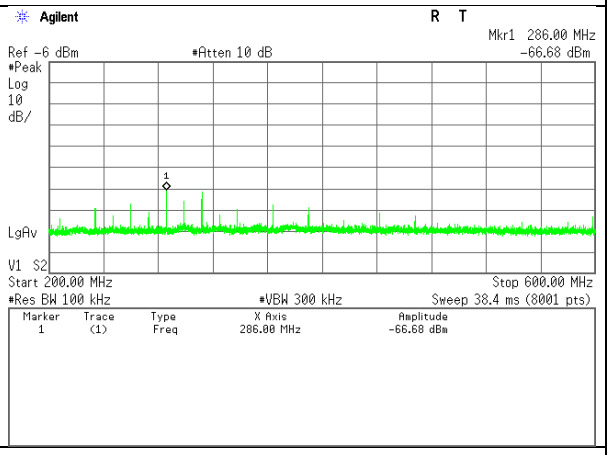
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11858088H
Date	July 15, 2016
Temperature / Humidity	24 deg. C / 45 % RH
Engineer	Ken Fujita
Mode	Rx BT LE

2402 MHz

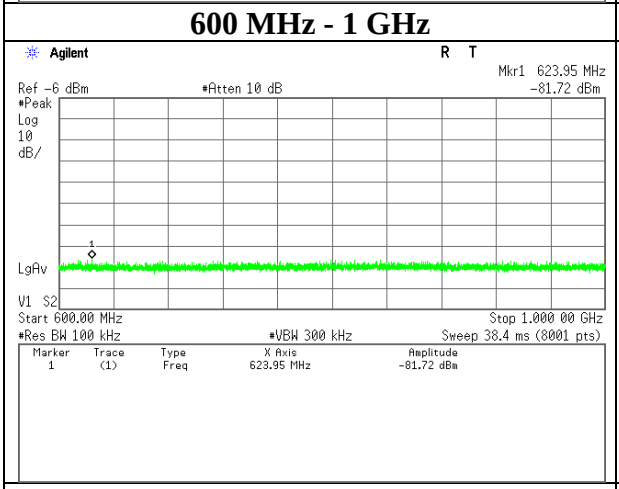
30 MHz - 200 MHz



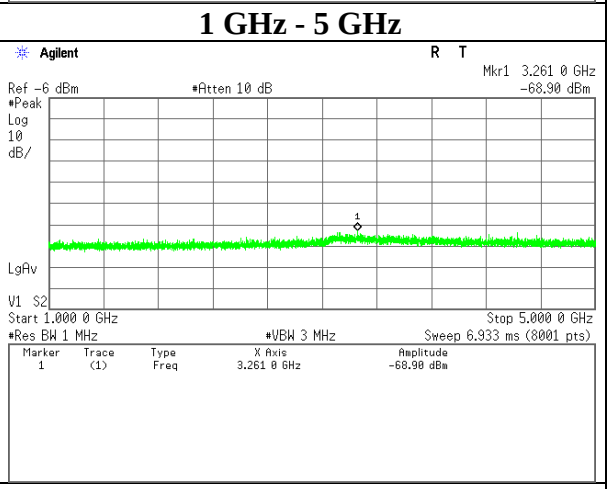
200 MHz - 600 MHz



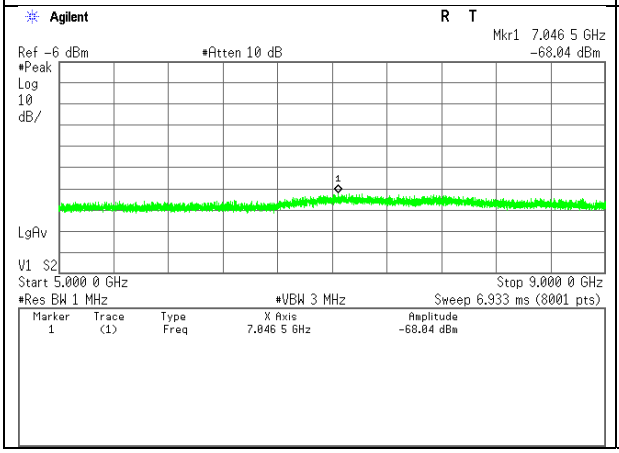
600 MHz - 1 GHz



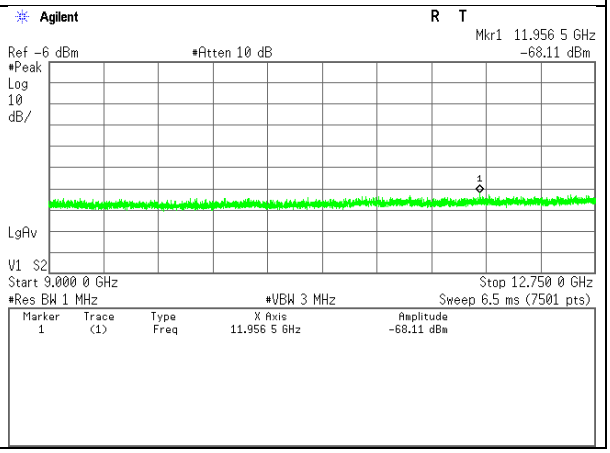
1 GHz - 5 GHz



5 GHz - 9 GHz



9 GHz – 12.75 GHz

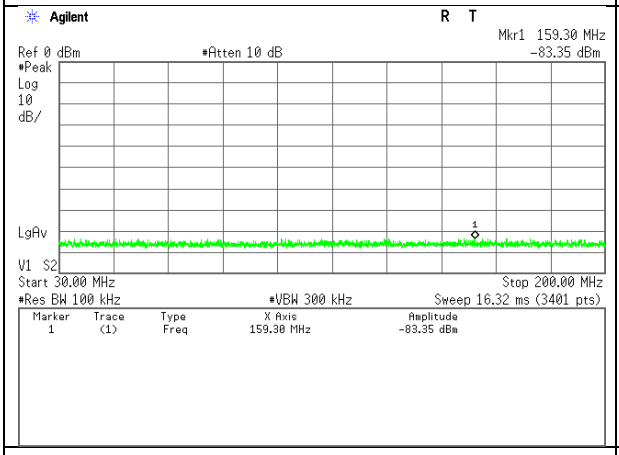


Receiver spurious emissions (Conducted)

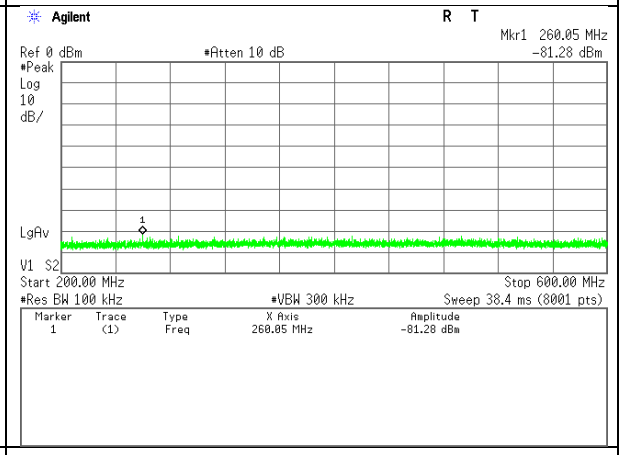
Test place	Ise EMC Lab. No.11 Measurement Room
Report No.	11858088H
Date	June 15, 2016
Temperature / Humidity	24 deg. C / 45 % RH
Engineer	Ken Fujita
Mode	Rx BT LE

2480 MHz

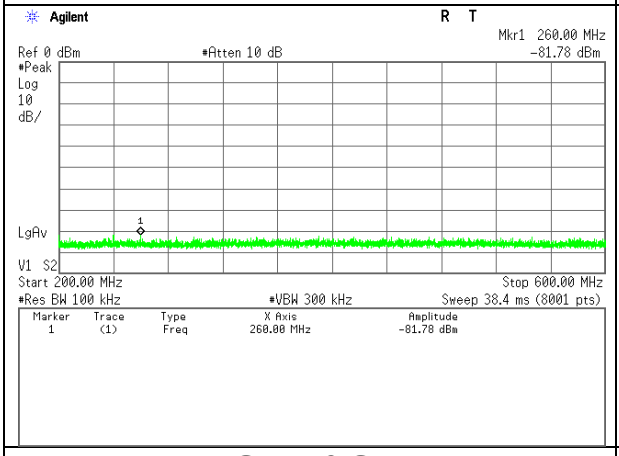
30 MHz - 200 MHz



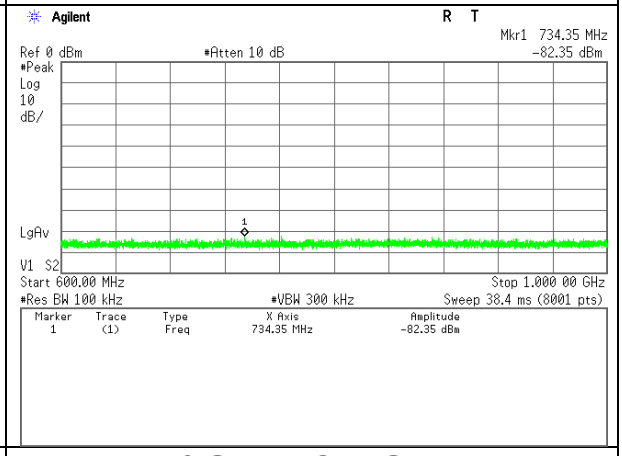
200 MHz - 600 MHz



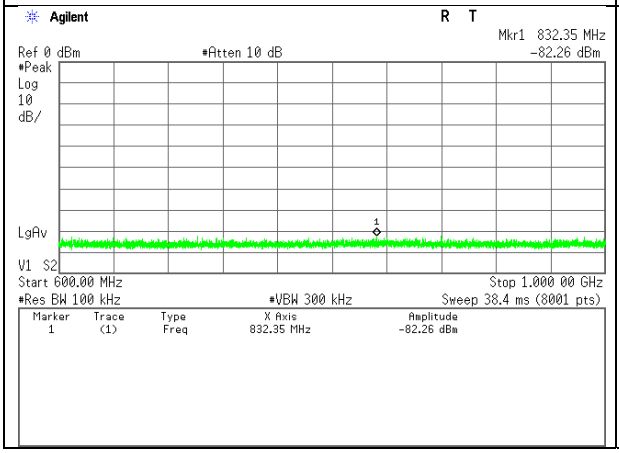
600 MHz - 1 GHz



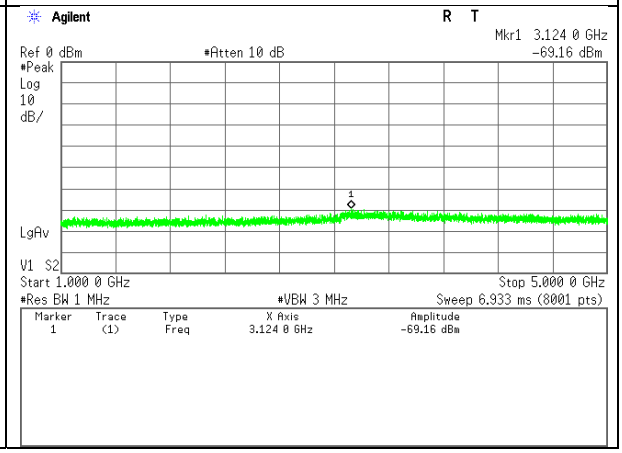
1 GHz - 5 GHz



5 GHz - 9 GHz



9 GHz – 12.75 GHz



APPENDIX 2: Test instruments

EMI Test Equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
MAEC-01	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 10m	DA-06881	RE	2015/09/19 * 12
MOS-27	Thermo-Hygrometer	CUSTOM	CTH-201	A08Q26	RE	2016/01/21 * 12
MJM-25	Measure	KOMELON	KMC-36	-	RE	-
COTS-MEMI	EMI measurement program	TSJ	TEPTO-DV	-	RE	-
MHA-05	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	253	RE	2016/05/29 * 12
MPA-01	Pre Amplifier	Agilent	8449B	3008A01671	RE	2016/02/26 * 12
MCC-165	Microwave Cable	Junkosha	MWX221	1203S213(1m) / 1311S166(5m)	RE	2015/11/10 * 12
MMM-03	Digital Tester	Fluke	FLUKE 26-3	78030621	RE	2015/08/19 * 12
MSA-04	Spectrum Analyzer	Agilent	E4448A	US44300523	RE	2015/11/06 * 12
MHF-25	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	001	RE	2015/09/16 * 12
MSG-16	Signal Generator	Rohde & Schwarz	SMR40	100137	RE	2016/06/29 * 12
MHA-20	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	258	RE	2016/05/29 * 12
MCC-130	Microwave Cable(1-30GHz)	HUBER+SUHNER	SF103/11PC3.5-31/ 11PC3.5-31/8.0m	54308/3	RE	2016/01/19 * 12
MAEC-03	Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	RE	2015/10/01 * 12
MOS-13	Thermo-Hygrometer	Custom	CTH-180	1301	RE	2016/01/21 * 12
MJM-16	Measure	KOMELON	KMC-36	-	RE	-
MSA-03	Spectrum Analyzer	Agilent	E4448A	MY44020357	RE	2016/05/19 * 12
MTR-08	Test Receiver	Rohde & Schwarz	ESCI	100767	RE	2015/09/02 * 12
MBA-03	Biconical Antenna	Schwarzbeck	BBA9106	1915	RE	2015/10/11 * 12
MLA-22	Logperiodic Antenna(200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-191	RE	2016/01/30 * 12
MCC-51	Coaxial cable	UL Japan	-	-	RE	2015/07/13 * 12
MAT-70	Attenuator(6dB)	Agilent	8491A-006	MY52460153	RE	2016/04/05 * 12
MPA-13	Pre Amplifier	SONOMA INSTRUMENT	310	260834	RE	2016/03/24 * 12
MMM-08	DIGITAL HiTESTER	Hioki	3805	051201197	RE	2016/01/13 * 12
MOS-19	Thermo-Hygrometer	Custom	CTH-201	0001	AT	2015/12/08 * 12
MCC-138	Microwave cable	HUBER+SUHNER	SUCOFLEX 102	37953/2	AT	2015/10/08 * 12
MAT-23	Attenuator(10dB)	Orient Microwave	BX10-0476-00	-	AT	2016/03/18 * 12
MPM-12	Power Meter	Anritsu	ML2495A	0825002	AT	2016/06/06 * 12
MSA-16	Spectrum Analyzer	Agilent	E4440A	MY46186390	AT	2016/02/08 * 12
MPSE-17	Power sensor	Anritsu	MA2411B	0738285	AT	2016/06/06 * 12

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
RE: Radiated emission test

APPENDIX 3: Photographs of test setup

Radiated emission

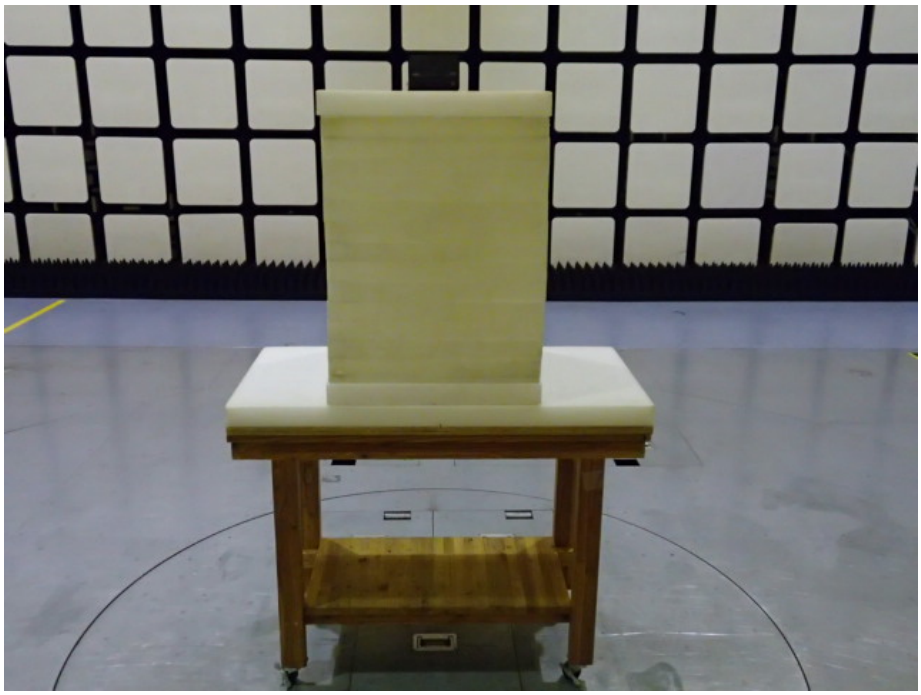


Photo 1

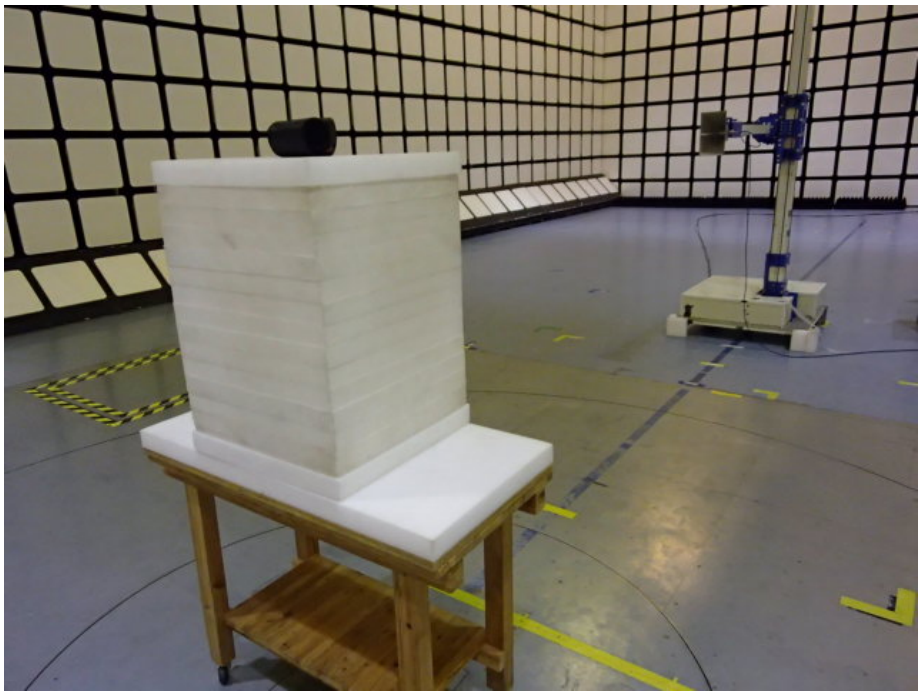


Photo 2

UL Japan, Inc.
Ise EMC Lab.
4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021 JAPAN
Telephone : +81 596 24 8999
Facsimile : +81 596 24 8124

Worst Case Position
(Horizontal: Z-axis / Vertical: Z-axis)

X-axis

Y-axis

Z-axis

End of Report

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Facsimile : +81 596 24 8124