RADIO TEST REPORT

Test Report No. : 12661897H-A-R1

Applicant	:	**OMRON HEALTHCARE Co., Ltd.**
Type of Equipment	:	**Blood Pressure Monitor**
Model No.	:	**HEM-7150T**
FCC ID	:	**Q6ZHEM7150T**
Test regulation	:	**FCC Part 15 Subpart C: 2018**
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 regulation.
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.
9. This report is a revised version of 12661897H-A. 12661897H-A is replaced with this report.

Date of test: January 15 to 19, 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

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/

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

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REVISION HISTORY

Original Test Report No.: 12661897H-A

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12661897H-A	January 30, 2019	-	-
1	12661897H-A-R1	March 4, 2019	P.9	Correction of Cable No. 3 of List of cables used table in Clause 4.2
1	12661897H-A-R1	March 4, 2019	P.33	Addition of LIMS ID: 141949 (Test Receiver) in the Test Instruments

CONTENTS **PAGE**

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	:	Yoshinori Tsurumi

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 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-7150T
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	AC 120 V / 60 Hz
Receipt Date of Sample (Information from test lab.)	:	January 15, 2019
Country of Mass-production	:	Japan, China, and Vietnam
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: HEM-7150T (referred to as the EUT in this report) is a Blood Pressure Monitor.

Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	GFSK
Antenna type	:	Chip Antenna
Antenna Gain	:	5.05 dBi (max)
Clock frequency (Maximum)	:	26 MHz

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification	:	FCC Part 15 Subpart C FCC Part 15 final revised on March 12, 2018 and effective April 11, 2018
Title	:	FCC 47CFR Part15 Radio Frequency Device Subpart C Intentional Radiators Section 15.207 Conducted limits Section 15.247 Operation within the bands 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz

3.2 Procedures and results

Item	Test Procedure	Specification	Worst margin	Results	Remarks
Conducted Emission	**FCC:** ANSI C63.10-2013 6. Standard test methods **IC:** RSS-Gen 8.8	**FCC:** Section 15.207 **IC:** RSS-Gen 8.8	**QP** 26.9 dB, 0.40563 MHz, N **AV** 30.9 dB, 0.40563 MHz, N / 0.40795 MHz, L	Complied a)	-
6dB Bandwidth	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05 **IC:** -	**FCC:** Section 15.247(a)(2) **IC:** RSS-247 5.2(a)	See data.	Complied b)	Conducted
Maximum Peak Output Power	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05 **IC:** RSS-Gen 6.12	**FCC:** Section 15.247(b)(3) **IC:** RSS-247 5.4(d)		Complied c)	Conducted
Power Density	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05 **IC:** -	**FCC:** Section 15.247(e) **IC:** RSS-247 5.2(b)		Complied d)	Conducted
Spurious Emission Restricted Band Edges	**FCC:** KDB 558074 D01 15.247 Meas Guidance v05 **IC:** RSS-Gen 6.13	**FCC:** Section15.247(d) **IC:** RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	2.7 dB 4880.00 MHz, AV, Horizontal	Complied# e), f)	Conducted (below 30 MHz)/ Radiated (above 30 MHz) *1)

Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422.
*1) Radiated test was selected over 30 MHz based on section 15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05 8.5 and 8.6.

a) Refer to APPENDIX 1 (data of Conducted Emission)
b) Refer to APPENDIX 1 (data of 6 dB Bandwidth and 99 % Occupied Bandwidth)
c) Refer to APPENDIX 1 (data of Maximum Peak Output Power)
d) Refer to APPENDIX 1 (data of Power Density)
e) Refer to APPENDIX 1 (data of Conducted Spurious Emission)
f) Refer to APPENDIX 1 (data of Radiated Spurious Emission)

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)
This EUT provides stable voltage constantly to RF Module regardless of input voltage. Therefore, this EUT complies with the requirement.

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

3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	RSS-Gen 6.7	**IC:** -	N/A	Complied a)	Conducted
Note: UL Japan, Inc.'s EMI Work Procedures No. 13-EM-W0420 and 13-EM-W0422. a) Refer to APPENDIX 1 (data of 6 dB Bandwidth and 99 % Occupied Bandwidth)					
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.					

Other than above, no addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

EMI

There is no applicable rule of uncertainty in this applied standard. Therefore, the following 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.

Antenna Terminal test

Test Item	Uncertainty (+/-)
6 dB Bandwidth / 99 % Occupied Bandwidth	0.96 %
Maximum Peak Output Power / Average Output Power	1.3 dB
Burst Rate	0.10 %
Power Density	2.7 dB
Conducted Spurious Emission	2.7 dB

Conducted emission

using Item	Frequency range	Uncertainty (+/-)
AMN (LISN)	0.009 MHz to 0.15 MHz	3.8 dB
	0.15 MHz to 30 MHz	3.4 dB

Radiated emission

Measurement distance	Frequency range	Uncertainty (+/-)
3 m	9 kHz to 30 MHz	3.3 dB
10 m		3.2 dB
3 m	30 MHz to 200 MHz (Horizontal)	4.8 dB
	(Vertical)	5.0 dB
	200 MHz to 1000 MHz (Horizontal)	5.2 dB
	(Vertical)	6.3 dB
10 m	30 MHz to 200 MHz (Horizontal)	4.8 dB
	(Vertical)	4.9 dB
	200 MHz to 1000 MHz (Horizontal)	5.0 dB
	(Vertical)	5.0 dB
3 m	1 GHz to 6 GHz	5.0 dB
	6 GHz to 18 GHz	5.3 dB
1 m	10 GHz to 26.5 GHz	5.8 dB
	26.5 GHz to 40 GHz	5.8 dB
10 m	1 GHz to 18 GHz	5.2 dB

3.5 Test Location

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
NVLAP Lab. code: 200572-0 / FCC Test Firm Registration Number: 199967

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	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 2.0m 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

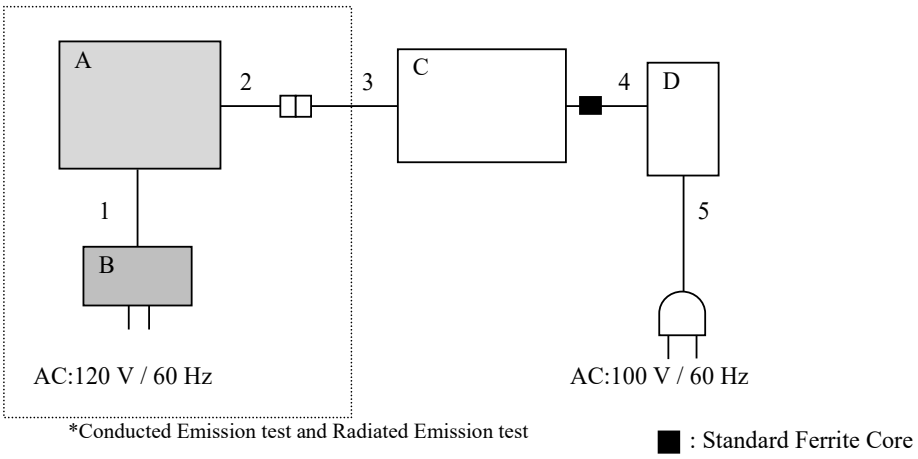
4.1 Operating Mode(s)

Mode	Remarks*
Bluetooth Low Energy (BT LE)	Payload: PRBS9 Uncoded 1M-PHY
*Power of the EUT was set by the software as follows; Power settings: 0dBm Software: Serial Command Explorer2 VER1.00 *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.	

*The details of Operating mode(s)

Test Item	Operating Mode	Tested frequency
Conducted Emission 6dB Bandwidth Maximum Peak Output Power Power Density 99% Occupied Bandwidth Spurious Emission(Radiated / Conducted)	Tx BT LE	2402 MHz 2440 MHz 2480 MHz

4.2 Configuration and peripherals



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

Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	Blood Pressure Monitor	HEM-7150T	ES1812000042V *1) ES1812000041V *2)	OMRON HEALTHCARE Co., Ltd.	EUT
B	AC Adapter	HEM-ADPTW5	852A	OMRON HEALTHCARE Co., Ltd.	EUT
C	Laptop PC	PC-BL530VH6B	999185918A	NEC	-
D	AC Adapter	ADP-60NH	9903033DD	NEC	-

*1) Used for Antenna Terminal conducted test
*2) Used for Conducted Emission test and Radiated Emission test

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC Cable	1.5	Unshielded	Unshielded	-
2	Signal Cable	0.2	Unshielded	Unshielded	-
3	USB Cable	1.0	Shielded	Shielded	-
4	DC Cable	1.7	Unshielded	Unshielded	-
5	AC Cable	0.8	Unshielded	Unshielded	-

SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a urethane platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane.
The rear of tabletop was located 40 cm to the vertical conducting plane. The rear of EUT, including peripherals aligned and flushed with rear of tabletop. All other surfaces of tabletop were at least 80cm from any other grounded conducting surface. EUT was located 80 cm from a Line Impedance Stabilization Network (LISN) / Artificial mains Network (AMN) and excess AC cable was bundled in center.

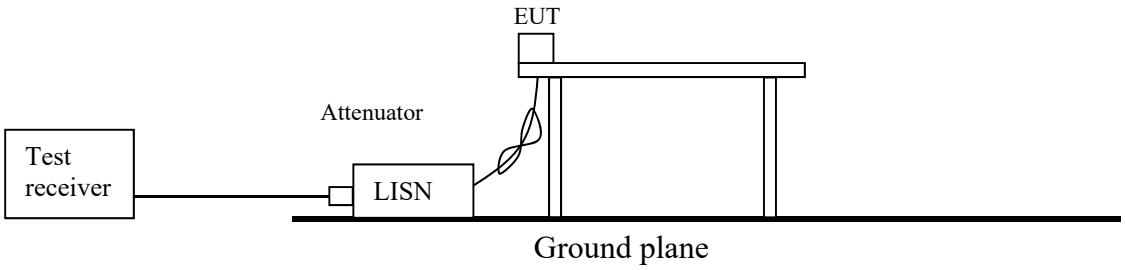
For the tests on EUT with other peripherals (as a whole system)
I/O cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30 cm to 40 cm long and were hanged at a 40 cm height to the ground plane. All unused 50ohm connectors of the LISN (AMN) were resistivity terminated in 50 ohm when not connected to the measuring equipment.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a Semi Anechoic Chamber.
The EUT was connected to a LISN (AMN).
An overview sweep with peak detection has been performed.

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

Detector : QP and CISPR AV
Measurement range : 0.15 MHz - 30 MHz
Test data : APPENDIX
Test result : Pass

Figure 1: Test Setup



SECTION 6: Radiated Spurious Emission

Test Procedure

It was measured based on "8.5 and 8.6 of KDB 558074 D01 15.247 Meas Guidance v05".

[For below 1 GHz]
EUT was placed on a urethane platform of nominal size, 0.5 m by 1.0 m, raised 0.8 m above the conducting ground plane. The Radiated Electric Field Strength has been measured in a Semi Anechoic Chamber with a ground plane.

[For above 1 GHz]
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 has been measured in a Semi Anechoic Chamber with absorbent materials lined on a ground plane.

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.

Test Antennas are used as below;

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

In any 100 kHz bandwidth outside the restricted band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator confirmed 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on a radiated measurement.

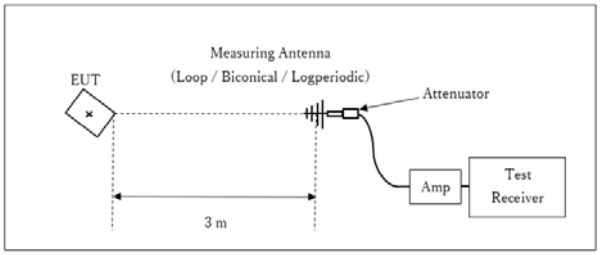
20 dBc was applied to the frequency over the limit of FCC 15.209 / Table 4 of RSS-Gen 8.9(IC) and outside the restricted band of FCC15.205 / Table 6 of RSS-Gen 8.10 (IC).

Frequency	Below 1 GHz	Above 1 GHz		20 dBc
Instrument used	Test Receiver	Spectrum Analyzer		Spectrum Analyzer
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	11.12.2.5.1 RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (RMS) Trace: 100 traces 11.12.2.5.2 The duty cycle was less than 98% for detected noise, a duty factor was added to the 11.12.2.5.1 results.	RBW: 100 kHz VBW: 300 kHz

*1) Average Power Measurement was performed based on ANSI C63.10-2013.

Figure 2: Test Setup

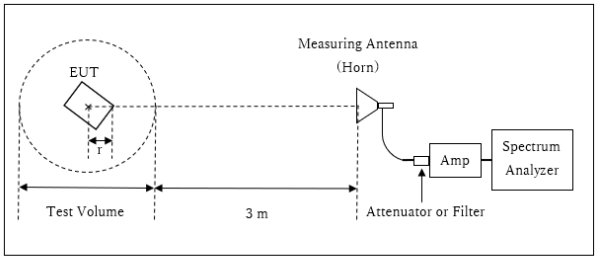
Below 1 GHz



× : Center of turn table

Test Distance: 3 m

1 GHz - 10 GHz

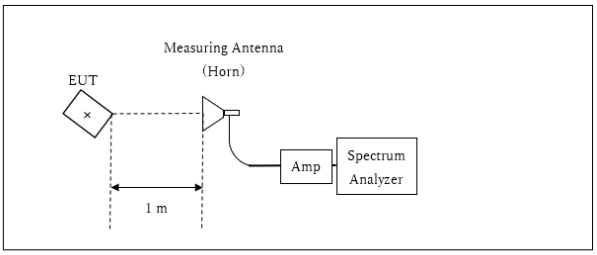


r : Radius of an outer periphery of EUT
× : Center of turn table

Distance Factor: 20 x log (3.95 m / 3.0 m) = 2.39 dB
* Test Distance: (3 + Test Volume /2) - r = 3.95 m

Test Volume : 2.0 m
(Test Volume has been calibrated based on CISPR 16-1-4.)
r = 0.05 m

10 GHz - 26.5 GHz



× : Center of turn table

Distance Factor: 20 x log (1.0 m / 3.0 m) = -9.5 dB
*Test Distance: 1 m

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

Measurement range : 30 MHz - 26.5 GHz
Test data : APPENDIX
Test result : Pass

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
6dB Bandwidth	3 MHz	100 kHz	300 kHz	Auto	Peak	Max Hold	Spectrum Analyzer
99% Occupied Bandwidth *1)	Enough width to display emission skirts	1 to 5 % of OBW	Three times of RBW	Auto	Peak	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *2)	-	Power Meter (Sensor: 50 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	10 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *4)	9kHz to 150kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	9.1 kHz	27 kHz				

*1) Peak hold was applied as Worst-case measurement.
*2) Reference data
*3) Section 11.10.2 Method PKPSD (peak PSD) of "ANSI C63.10-2013".
*4) 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.
(9 kHz - 150 kHz: RBW = 200 Hz, 150 kHz - 30 MHz: RBW = 9.1 kHz)

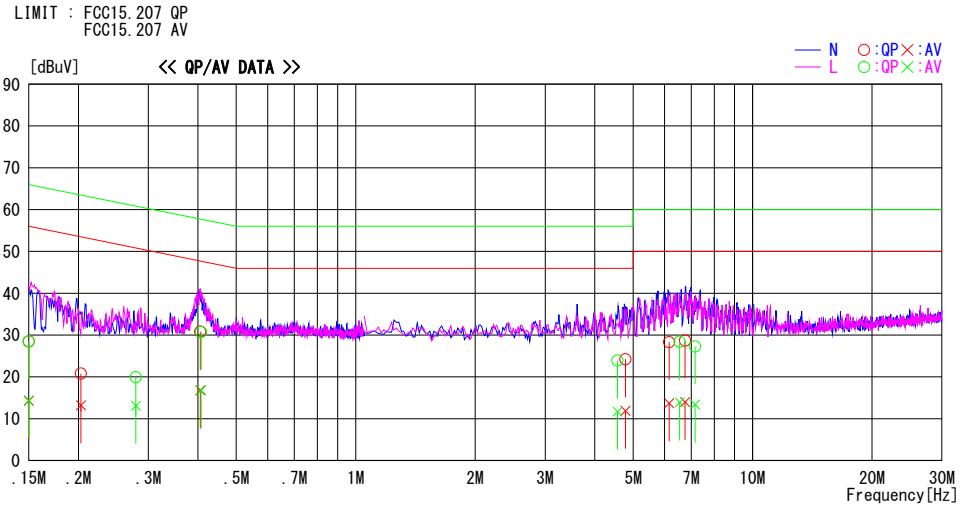
The test results and limit are rounded off to two decimals place, so some differences might be observed.
The equipment and cables were not used for factor 0 dB of the data sheets.

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Conducted Emission

Report No.	12661897H
Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Date	January 19, 2019
Temperature / Humidity	21 deg. C / 31 % RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE 2480 MHz



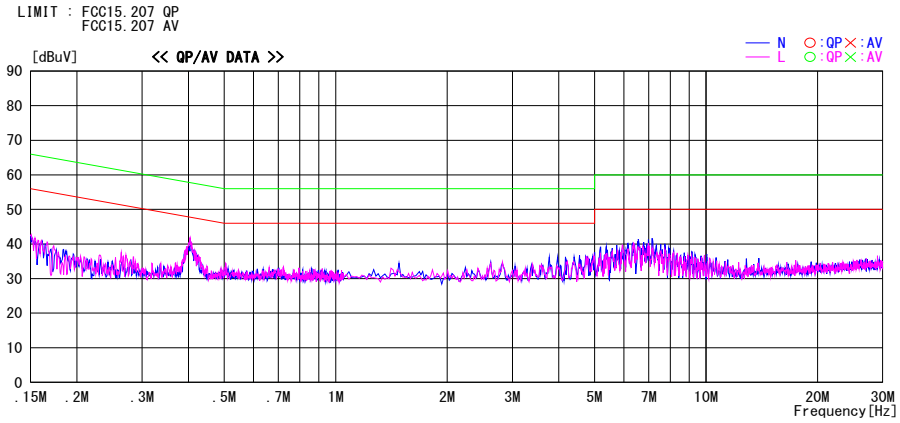
Frequency	Reading Level		Corr.	Results		Limit		Margin		Phase
	QP	AV	Factor	QP	AV	QP	AV	QP	AV	
[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dB]	[dB]	
0.15000	15.1	0.9	13.4	28.5	14.3	66.0	56.0	37.5	41.7	N
0.20304	7.4	-0.2	13.4	20.8	13.2	63.5	53.5	42.7	40.3	N
0.40563	17.4	3.4	13.4	30.8	16.8	57.7	47.7	26.9	30.9	N
4.78027	10.3	-2.0	13.9	24.2	11.9	56.0	46.0	31.8	34.1	N
6.16038	14.2	-0.4	14.1	28.3	13.7	60.0	50.0	31.7	36.3	N
6.75540	14.6	-0.1	14.1	28.7	14.0	60.0	50.0	31.3	36.0	N
0.15000	15.1	1.0	13.4	28.5	14.4	66.0	56.0	37.5	41.6	L
0.27920	6.5	-0.3	13.4	19.9	13.1	60.8	50.8	40.9	37.7	L
0.40795	17.3	3.4	13.4	30.7	16.8	57.7	47.7	27.0	30.9	L
4.56680	10.1	-2.1	13.8	23.9	11.7	56.0	46.0	32.1	34.3	L
6.55040	14.3	-0.2	14.1	28.4	13.9	60.0	50.0	31.6	36.1	L
7.16402	13.2	-0.7	14.1	27.3	13.4	60.0	50.0	32.7	36.6	L

CHART: WITH FACTOR Peak hold data. CALCULATION : RESULT = READING + C.F (LISN + CABLE + ATT)
Except for the above table: adequate margin data below the limits.

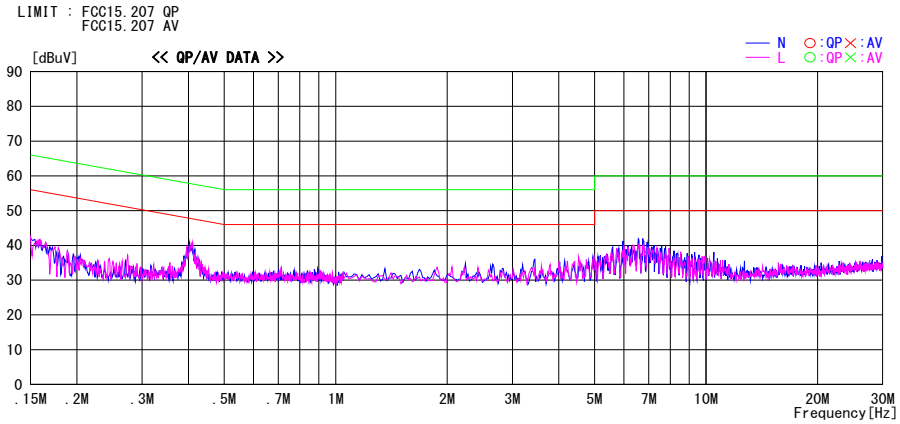
Conducted Emission

Report No.	12661897H
Test place	Ise EMC Lab. No.3 Semi Anechoic Chamber
Date	January 19, 2019
Temperature / Humidity	21 deg. C / 31 % RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE

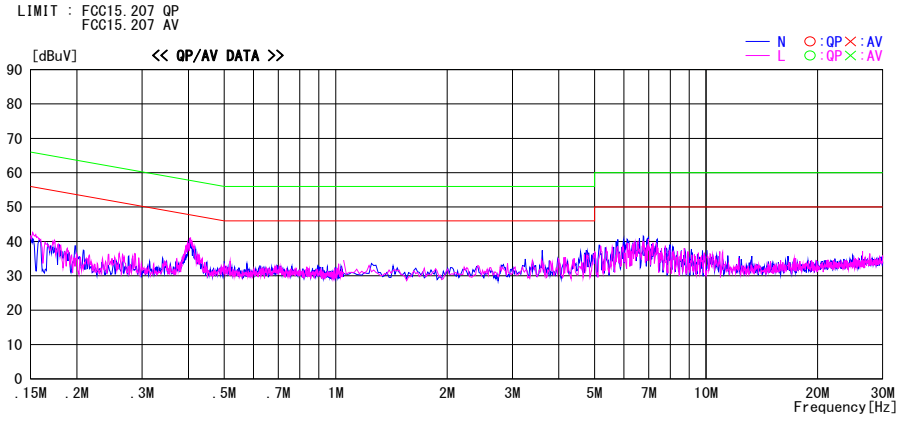
2402 MHz



2440 MHz



2480 MHz



Y scale [dBuV] Chart — N — L

6 dB Bandwidth and 99 % Occupied Bandwidth

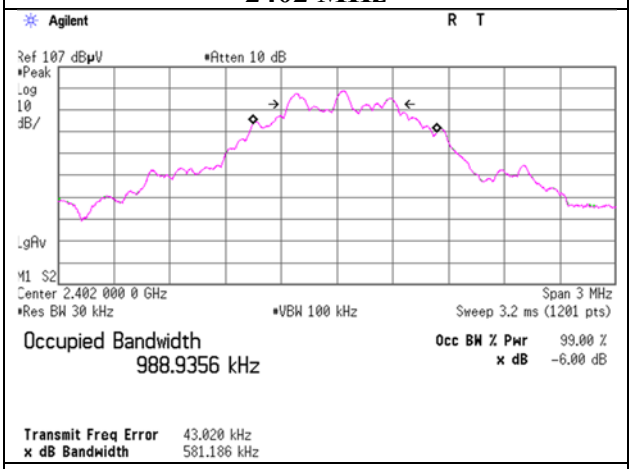
Report No.	12661897H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	January 16, 2019
Temperature / Humidity	23 deg. C / 38 % RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE

Mode	Frequency [MHz]	99% Occupied Bandwidth [kHz]	6dB Bandwidth [MHz]	Limit for 6dB Bandwidth [MHz]
BT LE	2402	988.936	0.679	> 0.5000
	2440	984.777	0.667	> 0.5000
	2480	990.043	0.676	> 0.5000

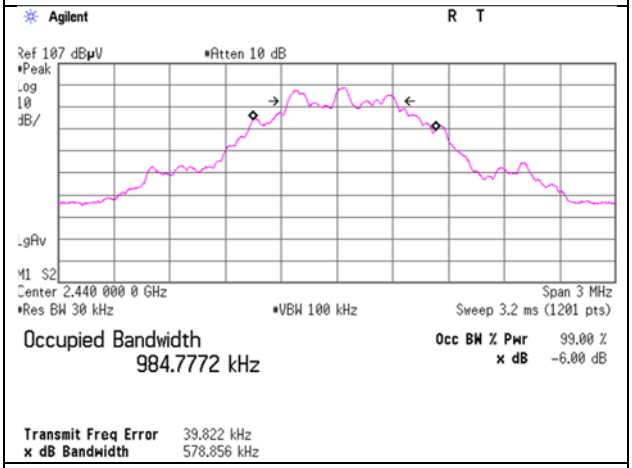
99%Occupied Bandwidth

BT LE

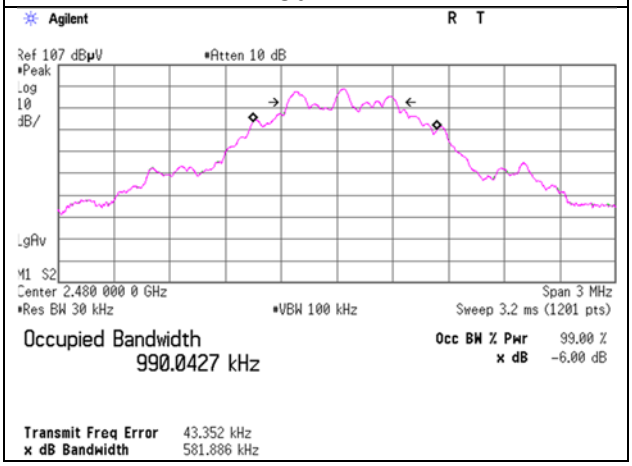
2402 MHz



2440 MHz



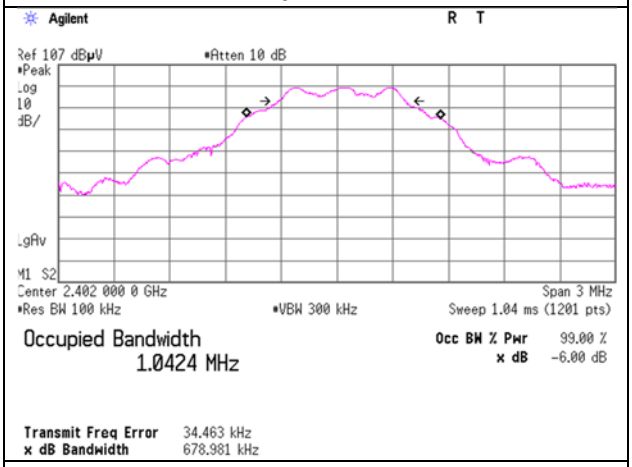
2480 MHz



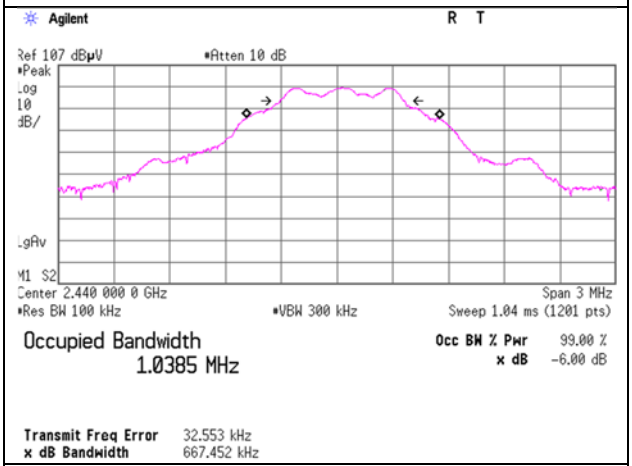
6dB Bandwidth

BT LE

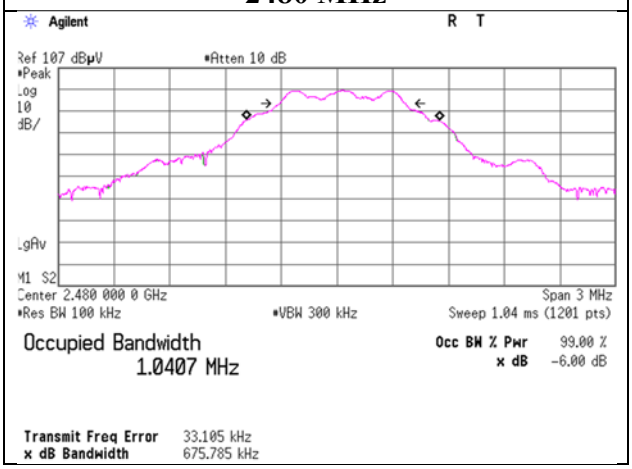
2402 MHz



2440 MHz



2480 MHz



Maximum Peak Output Power

Report No.	12661897H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	January 15, 2019
Temperature / Humidity	26 deg. C / 35 % RH
Engineer	Ryota Yamanaka
Mode	Tx BT LE

				Conducted Power				
Freq.	Reading	Cable Loss	Atten. Loss	Result		Limit		Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dBm]	[mW]	[dB]
2402	-10.40	0.10	10.04	-0.26	0.94	30.00	1000	30.26
2440	-10.28	0.10	10.04	-0.14	0.97	30.00	1000	30.14
2480	-10.24	0.10	10.04	-0.10	0.98	30.00	1000	30.10

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain

Average Output Power
(Reference data for RF Exposure)

Report No.	12661897H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	January 15, 2019
Temperature / Humidity	26 deg. C / 35 % RH
Engineer	Ryota Yamanaka
Mode	Tx BT LE

BT LE

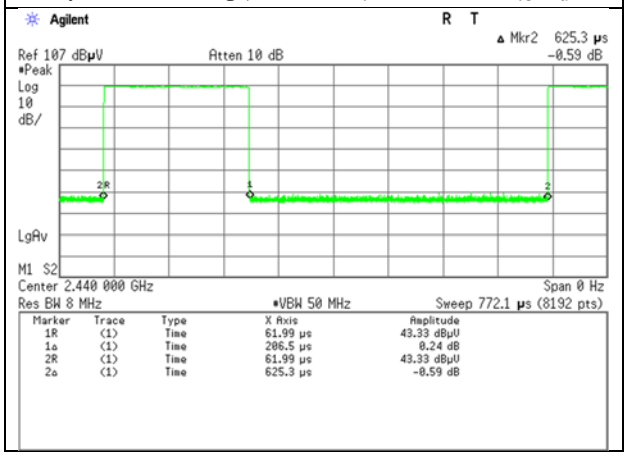
Freq.	Reading	Cable Loss	Atten. Loss	Result (Time average)		Duty factor	Result (Burst power average)	
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[mW]	[dB]	[dBm]	[mW]
2402	-15.25	0.10	10.04	-5.11	0.31	4.81	-0.30	0.93
2440	-15.14	0.10	10.04	-5.00	0.32	4.81	-0.19	0.96
2480	-15.06	0.10	10.04	-4.92	0.32	4.81	-0.11	0.97

Sample Calculation:
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss
Result (Burst power average) = Time average + Duty factor

Burst rate confirmation

Report No.	12661897H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	January 15, 2019
Temperature / Humidity	26 deg. C / 35 % RH
Engineer	Ryota Yamanaka
Mode	Tx BT LE

Tx on / (Tx on + Tx off) =	**0.330**
Tx on / (Tx on + Tx off) * 100 =	**33.0 %**
Duty factor = 10 * log (625.3 / 206.5) =	**4.81 dB**



* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

Radiated Spurious Emission

Report No.	12661897H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.3
Date	January 17, 2019	January 18, 2019
Temperature / Humidity	20 deg. C / 34 % RH	19 deg. C / 35 % RH
Engineer	Yuichiro Yamazaki (Above 1 GHz)	Takafumi Noguchi (Below 1 GHz)
Mode	Tx BT LE 2402 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	38.020	QP	21.8	15.7	7.3	32.3	-	12.5	40.0	27.5	
Hori	57.515	QP	28.9	8.9	7.6	32.2	-	13.2	40.0	26.8	
Hori	156.249	QP	21.5	15.2	8.8	32.2	-	13.3	43.5	30.2	
Hori	275.303	QP	21.5	13.1	9.9	32.1	-	12.4	46.0	33.6	
Hori	568.067	QP	21.5	18.3	11.8	32.1	-	19.5	46.0	26.5	
Hori	878.266	QP	21.0	22.1	13.6	31.2	-	25.5	46.0	20.5	
Hori	2388.745	PK	48.7	27.6	5.8	31.3	-	50.8	73.9	23.1	
Hori	2390.000	PK	46.3	27.6	5.8	31.3	-	48.4	73.9	25.5	
Hori	4804.000	PK	41.7	31.4	8.0	30.6	-	50.5	73.9	23.4	
Hori	7206.000	PK	42.0	36.2	9.0	31.8	-	55.4	73.9	18.5	Floor noise
Hori	9608.000	PK	42.1	37.9	10.2	32.1	-	58.1	73.9	15.8	Floor noise
Hori	2388.745	AV	31.2	27.6	5.8	31.3	4.8	38.1	53.9	15.8	
Hori	2390.000	AV	31.3	27.6	5.8	31.3	4.8	38.2	53.9	15.7	*1)
Hori	4804.000	AV	33.8	31.4	8.0	30.6	4.8	47.4	53.9	6.5	
Hori	7206.000	AV	33.9	36.2	8.5	31.8	-	46.8	53.9	7.1	Floor noise
Hori	9608.000	AV	31.8	37.9	10.2	32.1	-	47.8	53.9	6.1	Floor noise
Vert	43.211	QP	27.4	13.7	7.4	32.2	-	16.3	40.0	23.7	
Vert	58.362	QP	40.2	8.7	7.6	32.2	-	24.3	40.0	15.7	
Vert	166.348	QP	21.6	15.6	8.9	32.2	-	13.9	43.5	29.6	
Vert	221.410	QP	22.4	11.3	9.4	32.1	-	11.0	46.0	35.0	
Vert	283.674	QP	21.8	13.4	9.9	32.1	-	13.0	46.0	33.0	
Vert	751.994	QP	21.2	20.4	13.0	31.8	-	22.8	46.0	23.2	
Vert	2388.745	PK	48.1	27.6	5.8	31.3	-	50.2	73.9	23.7	
Vert	2390.000	PK	44.4	27.6	5.8	31.3	-	46.5	73.9	27.4	
Vert	4804.000	PK	43.9	31.4	8.0	30.6	-	52.7	73.9	21.2	
Vert	7206.000	PK	42.1	36.2	9.0	31.8	-	55.5	73.9	18.4	Floor noise
Vert	9608.000	PK	42.4	37.9	10.2	32.1	-	58.4	73.9	15.5	Floor noise
Vert	2388.745	AV	31.0	27.6	5.8	31.3	4.8	37.9	53.9	16.0	
Vert	2390.000	AV	31.1	27.6	5.8	31.3	4.8	38.0	53.9	15.9	*1)
Vert	4804.000	AV	32.1	31.4	8.0	30.6	4.8	45.7	53.9	8.2	
Vert	7206.000	AV	33.2	36.2	9.0	31.8	-	46.6	53.9	7.3	Floor noise
Vert	9608.000	AV	31.7	37.9	10.2	32.1	-	47.7	53.9	6.2	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (3.95 m / 3.0 m) = 2.39 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

*1) Not Out of Band emission(Leakage Power)

20dBc Data Sheet

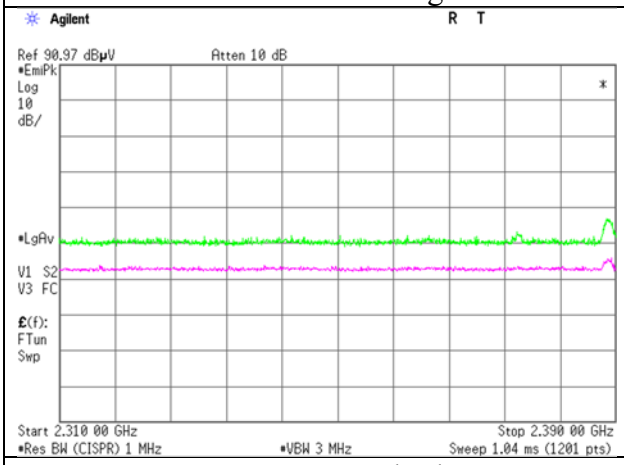
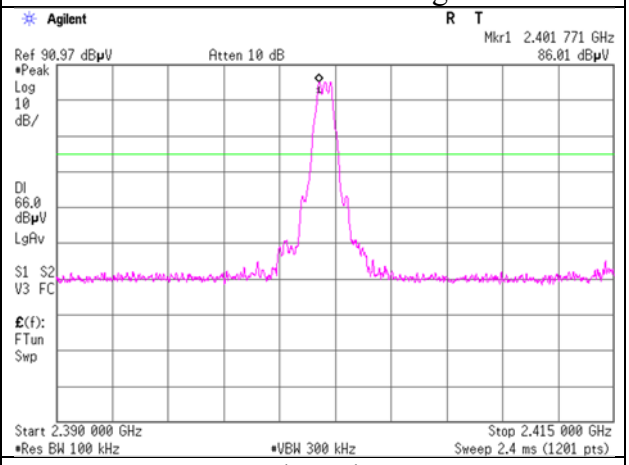
Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant Factor [dB/m]	Loss [dB]	Gain [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	2402.000	PK	86.0	27.6	5.8	31.3	88.1	-	-	Carrier
Hori	2400.000	PK	41.9	27.6	5.8	31.3	44.0	68.1	24.1	
Vert	2402.000	PK	84.8	27.6	5.8	31.3	86.9	-	-	Carrier
Vert	2400.000	PK	41.0	27.6	5.8	31.3	43.1	66.9	23.8	

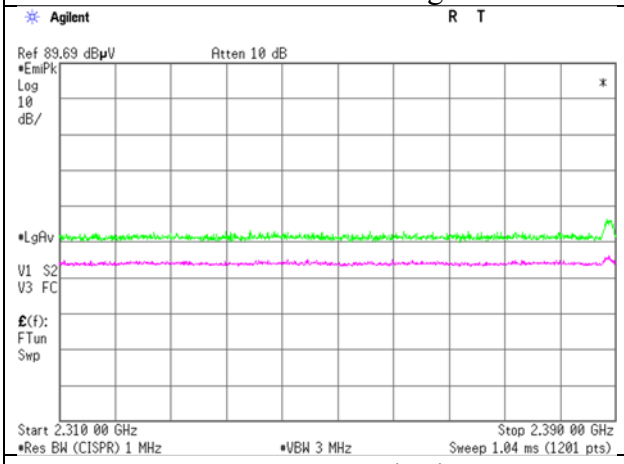
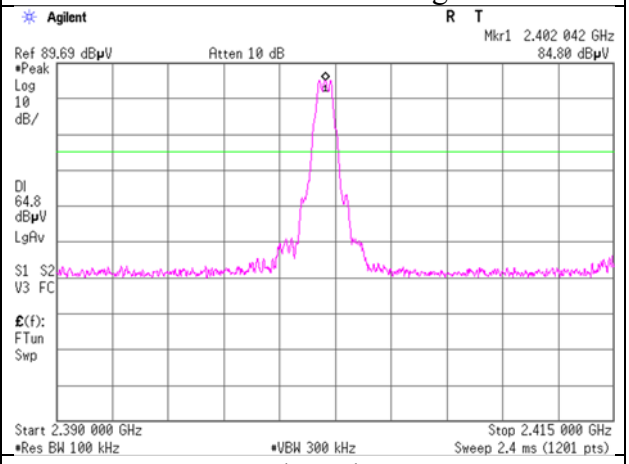
Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amprifier)

Distance factor: 1 GHz - 10 GHz 20log (3.95 m / 3.0 m) = 2.39 dB

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12661897H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	January 17, 2019
Temperature / Humidity	20 deg. C / 34 % RH
Engineer	Yuichiro Yamazaki (1 GHz - 10 GHz)
Mode	Tx BT LE 2402 MHz

Horizontal	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

Vertical	
Restricted-band band-edge Plot	Authorized-band band-edge Plot
	
Trace Green : Peak Plot Trace Purple : Average Plot	20dBc Plot

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions. Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	12661897H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.3
Date	January 17, 2019	January 18, 2019
Temperature / Humidity	20 deg. C / 34 % RH	19 deg. C / 35 % RH
Engineer	Yuichiro Yamazaki (Above 1 GHz)	Takafumi Noguchi (Below 1 GHz)
Mode	Tx BT LE 2440 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	38.228	QP	21.6	15.7	7.3	32.3	-	12.3	40.0	27.7	
Hori	57.047	QP	27.7	9.0	7.6	32.2	-	12.1	40.0	27.9	
Hori	164.546	QP	21.4	15.7	8.9	32.2	-	13.8	43.5	29.7	
Hori	272.322	QP	21.2	13.0	9.8	32.1	-	11.9	46.0	34.1	
Hori	540.894	QP	21.3	17.6	11.7	32.1	-	18.5	46.0	27.5	
Hori	852.348	QP	21.1	21.7	13.5	31.3	-	25.0	46.0	21.0	
Hori	4880.000	PK	46.1	31.5	8.0	30.6	-	55.0	73.9	18.9	
Hori	7320.000	PK	42.2	36.3	9.0	31.9	-	55.6	73.9	18.3	Floor noise
Hori	9760.000	PK	42.3	38.3	10.3	32.1	-	58.8	73.9	15.1	Floor noise
Hori	4880.000	AV	37.5	31.5	8.0	30.6	4.8	51.2	53.9	2.7	
Hori	7320.000	AV	33.1	36.3	9.0	31.9	-	46.5	53.9	7.4	Floor noise
Hori	9760.000	AV	31.1	38.3	10.3	32.1	-	47.6	53.9	6.3	Floor noise
Vert	43.094	QP	26.7	13.7	7.4	32.2	-	15.6	40.0	24.4	
Vert	58.560	QP	40.3	8.7	7.6	32.2	-	24.4	40.0	15.6	
Vert	168.172	QP	21.4	15.8	8.9	32.2	-	13.9	43.5	29.6	
Vert	219.012	QP	22.5	11.2	9.4	32.1	-	11.0	46.0	35.0	
Vert	286.000	QP	21.7	13.4	10.0	32.1	-	13.0	46.0	33.0	
Vert	754.045	QP	21.3	20.4	13.0	31.8	-	22.9	46.0	23.1	
Vert	4880.000	PK	45.7	31.5	8.0	30.6	-	54.6	73.9	19.3	
Vert	7320.000	PK	42.3	36.3	9.0	31.9	-	55.7	73.9	18.2	Floor noise
Vert	9760.000	PK	42.1	38.3	10.3	32.1	-	58.6	73.9	15.3	Floor noise
Vert	4880.000	AV	37.1	31.5	8.0	30.6	4.8	50.8	53.9	3.1	
Vert	7320.000	AV	33.0	36.3	9.0	31.9	-	46.4	53.9	7.5	Floor noise
Vert	9760.000	AV	31.0	38.3	10.3	32.1	-	47.5	53.9	6.4	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (3.95 m / 3.0 m) = 2.39 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

Radiated Spurious Emission

Report No.	12661897H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.3
Date	January 17, 2019	January 18, 2019
Temperature / Humidity	20 deg. C / 34 % RH	19 deg. C / 35 % RH
Engineer	Yuichiro Yamazaki (Above 1 GHz)	Takafumi Noguchi (Below 1 GHz)
Mode	Tx BT LE 2480 MHz	

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori	38.541	QP	21.6	15.5	7.3	32.3	-	12.1	40.0	27.9	
Hori	57.986	QP	28.6	8.8	7.6	32.2	-	12.8	40.0	27.2	
Hori	165.445	QP	21.4	15.6	8.9	32.2	-	13.7	43.5	29.8	
Hori	267.179	QP	21.4	12.7	9.8	32.1	-	11.8	46.0	34.2	
Hori	554.314	QP	21.7	18.0	11.8	32.1	-	19.4	46.0	26.6	
Hori	875.878	QP	21.1	22.1	13.6	31.2	-	25.6	46.0	20.4	
Hori	2483.500	PK	44.8	27.5	5.8	31.3	-	46.8	73.9	27.1	
Hori	2492.855	PK	48.7	27.6	5.8	31.3	-	50.8	73.9	23.1	
Hori	4960.000	PK	44.0	31.7	8.0	30.6	-	53.1	73.9	20.8	
Hori	7440.000	PK	42.9	36.4	9.0	31.9	-	56.4	73.9	17.5	Floor noise
Hori	9920.000	PK	41.3	38.4	10.4	32.2	-	57.9	73.9	16.0	Floor noise
Hori	2483.500	AV	33.4	27.5	5.8	31.3	4.8	40.2	53.9	13.7	*1)
Hori	2492.855	AV	30.4	27.6	5.8	31.3	4.8	37.3	53.9	16.6	
Hori	4960.000	AV	31.4	31.7	8.0	30.6	4.8	45.3	53.9	8.6	
Hori	7440.000	AV	31.5	36.4	9.0	31.9	-	45.0	53.9	8.9	Floor noise
Hori	9920.000	AV	30.9	38.4	10.4	32.2	-	47.5	53.9	6.4	Floor noise
Vert	42.395	QP	27.8	14.0	7.4	32.2	-	17.0	40.0	23.0	
Vert	58.260	QP	40.5	8.7	7.6	32.2	-	24.6	40.0	15.4	
Vert	159.690	QP	21.2	15.5	8.8	32.2	-	13.3	43.5	30.2	
Vert	222.619	QP	22.2	11.3	9.4	32.1	-	10.8	46.0	35.2	
Vert	283.906	QP	21.7	13.4	9.9	32.1	-	12.9	46.0	33.1	
Vert	760.233	QP	21.2	20.4	13.0	31.8	-	22.8	46.0	23.2	
Vert	2483.500	PK	45.0	27.5	5.8	31.3	-	47.0	73.9	26.9	
Vert	2492.855	PK	48.0	27.6	5.8	31.3	-	50.1	73.9	23.8	
Vert	4960.000	PK	44.3	31.7	8.0	30.6	-	53.4	73.9	20.5	
Vert	7440.000	PK	42.4	36.4	9.0	31.9	-	55.9	73.9	18.0	Floor noise
Vert	9920.000	PK	41.6	38.4	10.4	32.2	-	58.2	73.9	15.7	Floor noise
Vert	2483.500	AV	32.1	27.5	5.8	31.3	4.8	38.9	53.9	15.0	*1)
Vert	2492.855	AV	30.1	27.6	5.8	31.3	4.8	37.0	53.9	16.9	
Vert	4880.000	AV	35.0	31.5	8.0	30.6	4.8	48.7	53.9	5.2	
Vert	7440.000	AV	31.6	36.4	9.0	31.9	-	45.1	53.9	8.8	Floor noise
Vert	9920.000	AV	31.1	38.4	10.4	32.2	-	47.7	53.9	6.2	Floor noise

Result = Reading + Ant Factor + Loss (Cable+Attenuator+Filter+Distance factor(above 1 GHz)) - Gain(Amplifier) + Duty factor

*Other frequency noises omitted in this report were not seen or had enough margin (more than 20 dB).

Distance factor: 1 GHz - 10 GHz 20log (3.95 m / 3.0 m) = 2.39 dB
10 GHz - 26.5 GHz 20log (1.0 m / 3.0 m) = -9.5 dB

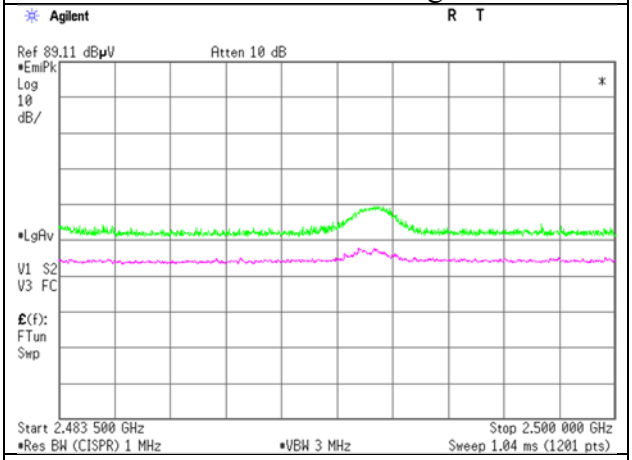
*1) Not Out of Band emission(Leakage Power)

Radiated Spurious Emission
(Reference Plot for band-edge)

Report No.	12661897H
Test place	Ise EMC Lab.
Semi Anechoic Chamber	No.4
Date	January 17, 2019
Temperature / Humidity	20 deg. C / 34 % RH
Engineer	Yuichiro Yamazaki (Above 1 GHz)
Mode	Tx BT LE 2480 MHz

Horizontal

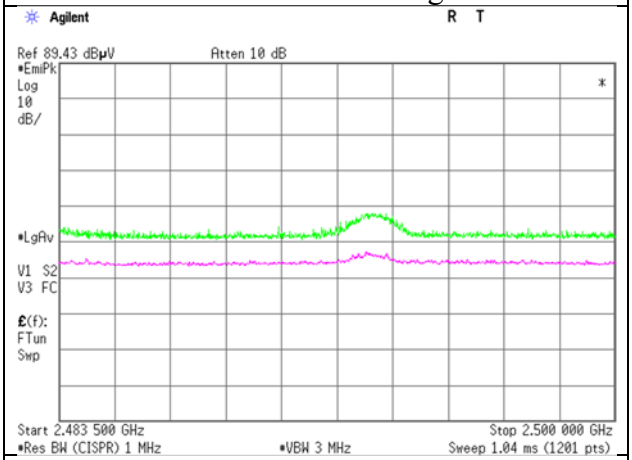
Restricted-band band-edge Plot



Trace Green : Peak Plot
Trace Purple : Average Plot

Vertical

Restricted-band band-edge Plot

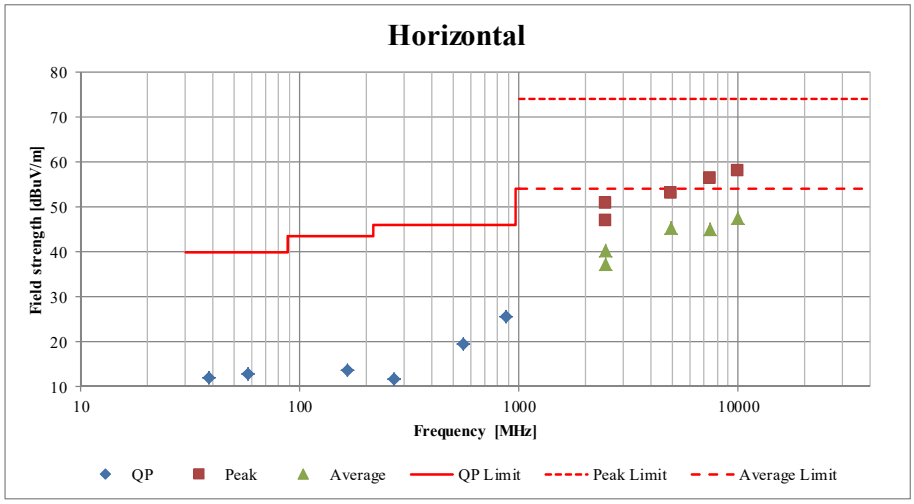


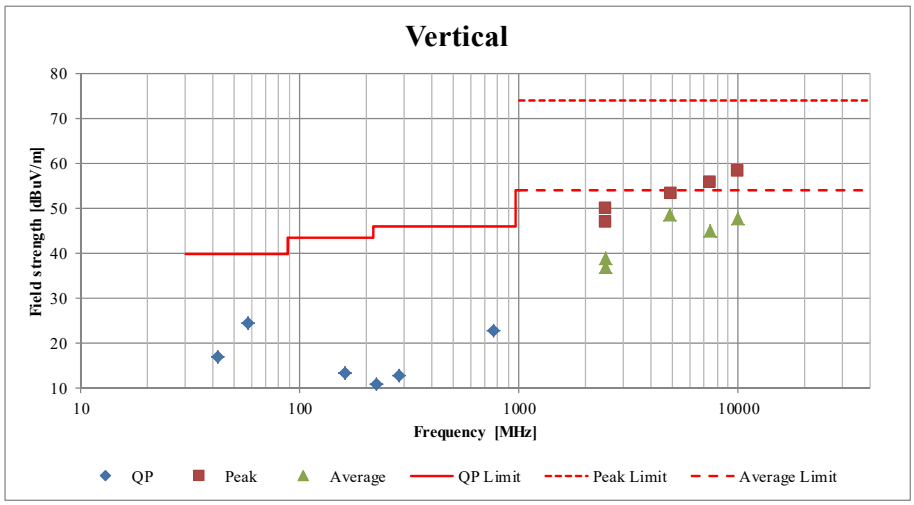
Trace Green : Peak Plot
Trace Purple : Average Plot

* The measurement was conducted for a sufficiently long enough time to detect any possible spurious emissions. Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission
(Plot data, Worst case)

Report No.	12661897H	
Test place	Ise EMC Lab.	
Semi Anechoic Chamber	No.4	No.3
Date	January 17, 2019	January 18, 2019
Temperature / Humidity	20 deg. C / 34 % RH	19 deg. C / 35 % RH
Engineer	Yuichiro Yamazaki (Above 1 GHz)	Takafumi Noguchi (Below 1 GHz)
Mode	Tx BT LE 2480 MHz	



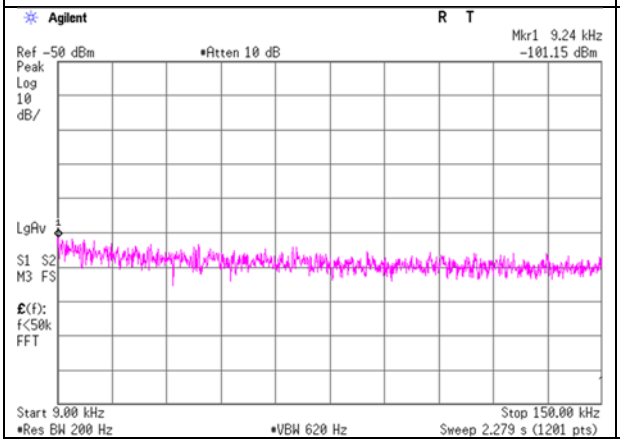


*These plots data contains sufficient number to show the trend of characteristic features for EUT.

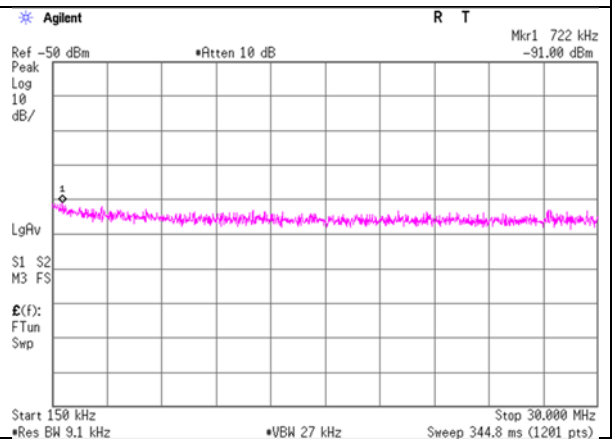
Conducted Spurious Emission

Report No.	12661897H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	January 16, 2019
Temperature / Humidity	23 deg. C / 38 % RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE 2402 MHz

9 kHz - 150 kHz



150 kHz - 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
9.24	-101.2	0.10	10.2	5.05	1	-85.8	300	6.0	-24.6	48.2	72.8	
722.00	-91.0	0.12	10.2	5.05	1	-75.7	30	6.0	5.6	30.4	24.8	

E [dBuV/m] = EIRP [dBm] - 20 log (Distance [m]) + Ground bounce [dB] + 104.8 [dBuV/m]

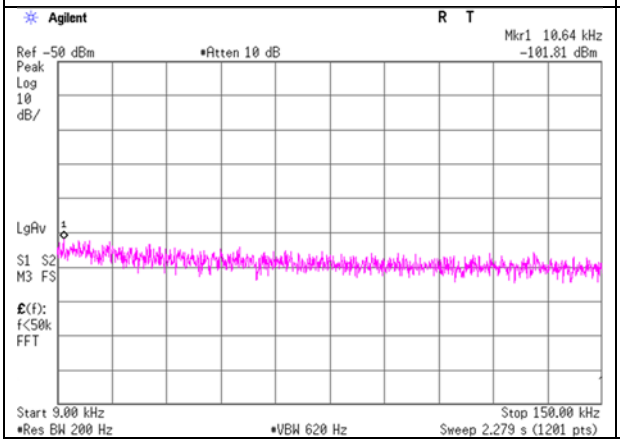
EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * log (N)

N: Number of output

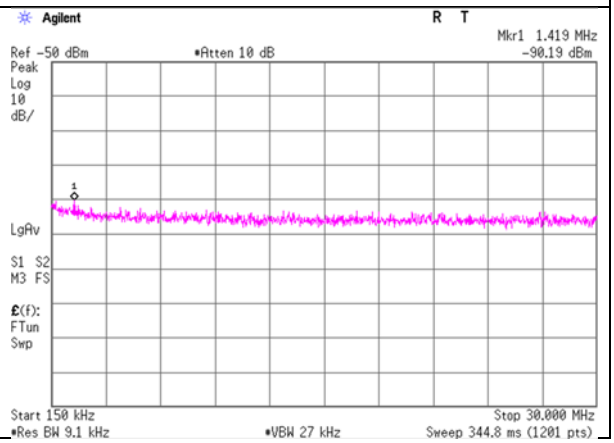
Conducted Spurious Emission

Report No.	12661897H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	January 16, 2019
Temperature / Humidity	23 deg. C / 38 % RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE 2440 MHz

9 kHz - 150 kHz



150 kHz - 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
10.64	-101.8	0.10	10.2	5.05	1	-86.5	300	6.0	-25.2	47.0	72.2	
1419.00	-90.2	0.12	10.2	5.05	1	-74.9	30	6.0	6.4	24.5	18.1	

E [dBuV/m] = EIRP [dBm] - 20 log (Distance [m]) + Ground bounce [dB] + 104.8 [dBuV/m]

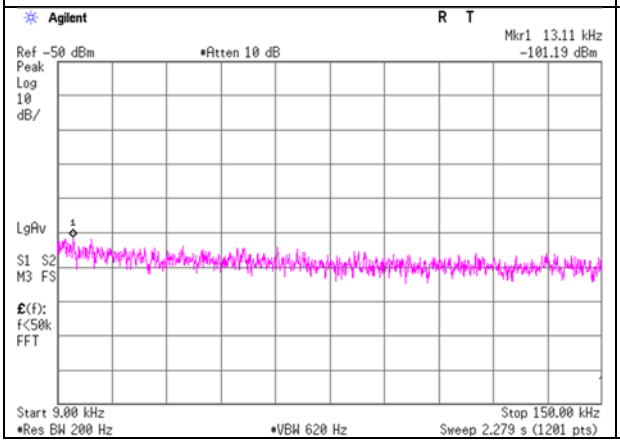
EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * log (N)

N: Number of output

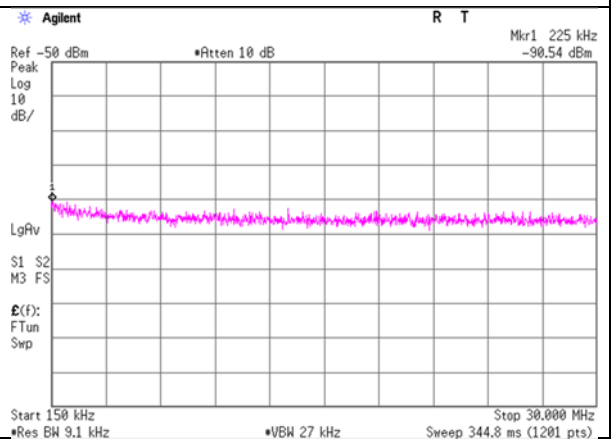
Conducted Spurious Emission

Report No.	12661897H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	January 16, 2019
Temperature / Humidity	23 deg. C / 38 % RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE 2480 MHz

9 kHz - 150 kHz



150 kHz - 30 MHz



Frequency [kHz]	Reading [dBm]	Cable Loss [dB]	Attenuator Loss [dB]	Antenna Gain [dBi]	N (Number of Output)	EIRP [dBm]	Distance [m]	Ground bounce [dB]	E (field strength) [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
13.11	-101.2	0.10	10.2	5.05	1	-85.9	300	6.0	-24.6	45.2	69.8	
225.00	-90.5	0.11	10.2	5.05	1	-75.2	300	6.0	-14.0	20.5	34.5	

E [dBuV/m] = EIRP [dBm] - 20 log (Distance [m]) + Ground bounce [dB] + 104.8 [dBuV/m]

EIRP[dBm] = Reading [dBm] + Cable loss [dB] + Attenuator Loss [dB] + Antenna gain [dBi] + 10 * log (N)

N: Number of output

Power Density

Report No.	12661897H
Test place	Ise EMC Lab. No.6 Measurement Room
Date	January 16, 2019
Temperature / Humidity	23 deg. C / 38 % RH
Engineer	Takafumi Noguchi
Mode	Tx BT LE

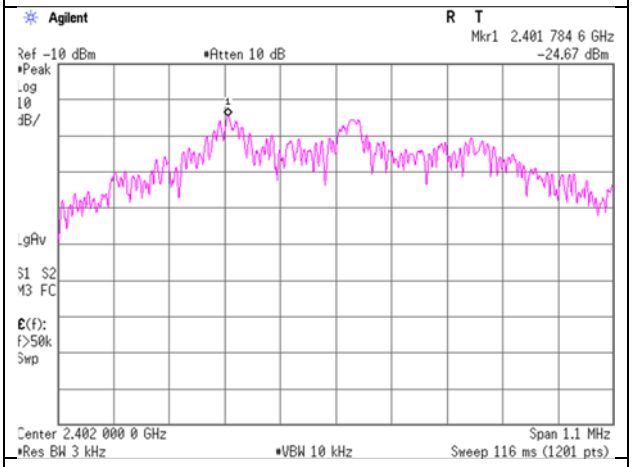
Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result [dBm]	Limit [dBm]	Margin [dB]
2402.00	-24.67	0.38	10.04	-14.25	8.00	22.25
2440.00	-24.49	0.38	10.04	-14.07	8.00	22.07
2480.00	-24.61	0.38	10.04	-14.19	8.00	22.19

Sample Calculation:
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

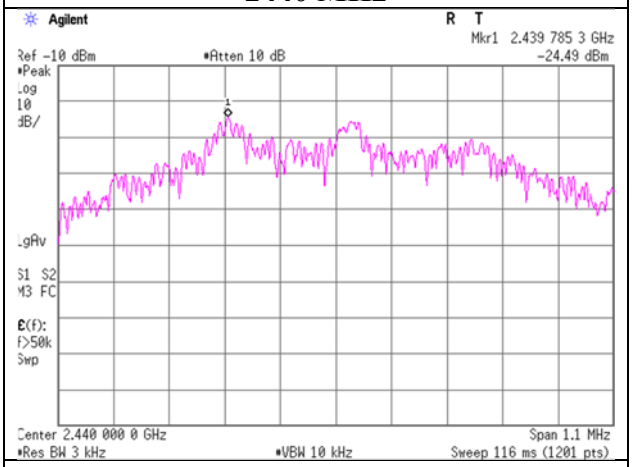
*The equipment and cables were not used for factor 0 dB of the data sheets.

Power Density

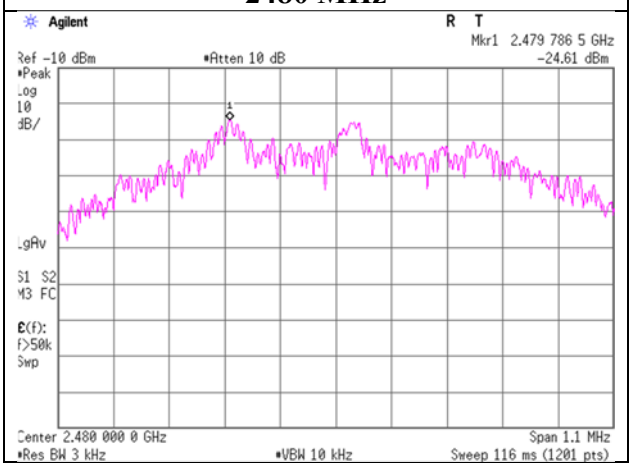
2402 MHz



2440 MHz



2480 MHz



APPENDIX 2: Test instruments

Test Instruments

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
CE	141247	Attenuator(13dB)	JFW Industries, Inc.	50FP-013H2 N	-	12/6/2018	12/31/2019	12
CE	141357	LISN(AMN)	Schwarzbeck	NSLK8127	8127-729	7/24/2018	7/31/2019	12
CE	141216	Coaxial cable	Fujikura/Suhner/ TSJ	5D-2W/SFM14/ sucoform141-P E/421-010	-/00640	7/3/2018	7/31/2019	12
RE/CE	141949	Test Receiver	Rohde & Schwarz	ESCI	100767	8/6/2018	8/31/2019	12
RE/CE	141554	Thermo-Hygrometer	CUSTOM	CTH-180	1301	1/24/2018	1/31/2019	12
RE/CE	141532	DIGITAL HiTESTER	HIOKI	3805	51201197	1/9/2018	1/31/2019	12
RE	141545	DIGITAL HiTESTER	HIOKI	3805	51201148	1/9/2018	1/31/2019	12
RE	141296	High Pass Filter 3.5-18.0GHz	UL Japan	HPF SELECTOR	002	9/19/2018	9/30/2019	12
RE	142227	Measure	KOMELON	KMC-36	-	-	-	-
RE	141562	Thermo-Hygrometer	CUSTOM	CTH-180	1501	1/24/2018	1/31/2019	12
RE	141506	Horn Antenna 15-40GHz	Schwarzbeck	BBHA9170	BBHA9170307	6/8/2018	6/30/2019	12
RE	141581	MicroWave System Amplifier	AGILENT	83017A	650	10/4/2018	10/31/2019	12
RE	142011	AC4_Semi Anechoic Chamber(NSA)	TDK	Semi Anechoic Chamber 3m	DA-10005	6/28/2018	6/30/2020	24
RE	142017	AC4_Semi Anechoic Chamber(SVSWR)	TDK	Semi Anechoic Chamber 3m	DA-10005	4/7/2018	4/30/2019	12
RE	141412	Microwave Cable	Junkosha	MWX221	1305S002R(1m) / 1405S146(5m)	6/14/2018	6/30/2019	12
RE	141884	Spectrum Analyzer	AGILENT	E4448A	MY44020357	11/2/2018	11/30/2019	12
RE	141508	Horn Antenna 1-18GHz	Schwarzbeck	BBHA9120D	9120D-557	6/8/2018	6/30/2019	12
RE	142285	Antenna Tilt Jig	Intelligent System Engineering Co., Ltd	Antenna Tilt Jig	T-0003	-	-	-
RE	141424	Biconical Antenna	Schwarzbeck	BBA9106	1915	6/4/2018	6/30/2019	12
RE	148897	Attenuator	KEYSIGHT	8491A	MY52462349	12/20/2018	12/31/2019	12
RE	141582	Pre Amplifier	SONOMA INSTRUMENT	310	260834	2/27/2018	2/28/2019	12
RE	141266	Logperiodic Antenna (200-1000MHz)	Schwarzbeck	VUSLP9111B	911B-191	6/4/2018	6/30/2019	12
RE	141323	Coaxial cable	UL Japan	-	-	7/3/2018	7/31/2019	12
AT	141269	Attenuator(10dB) 1-18GHz	Orient Microwave	BX10-0476-00	-	3/12/2018	3/31/2019	12
AT	141832	Power sensor	ANRITSU	MA2411B	738174	10/9/2018	10/31/2019	12
AT	141810	Power Meter	ANRITSU	ML2495A	824014	10/9/2018	10/31/2019	12
AT	141279	Microwave Cable	Junkosha	MMX221-0050 0DMSDMS	1502S303	3/20/2018	3/31/2019	12
AT	142180	Measure	KOMELON	KMC-36	-	-	-	-
AT	141547	DIGITAL HiTESTER	HIOKI	3805	60500120	2/7/2018	2/28/2019	12
AT	141363	Attenuator(10dB)	JFW	50FP-010-H2	43608 46-202-1	2/28/2018	2/28/2019	12
AT	141413	Coaxial Cable	UL Japan	-	-	6/12/2018	6/30/2019	12
AT	141561	Thermo-Hygrometer	CUSTOM	CTH-201	1401	1/11/2019	1/31/2020	12
AT	141899	Spectrum Analyzer	AGILENT	E4448A	MY46180655	8/10/2018	8/31/2019	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: **CE: Conducted Emission test**
RE: Radiated Emission test
AT: Antenna Terminal Conducted test