



RADIO TEST REPORT

Test Report No. : 11765856S-A

Applicant : SEIKO EPSON CORPORATION
Type of Equipment : GPS Sports Monitor
Model No. : J-57
FCC ID : BKMAP010
Test regulation : FCC Part 15 Subpart C: 2017
Test Result : Complied

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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.
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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 5 to 8, 2017

Representative test engineer:


Hikaru Shirasawa
Engineer
Consumer Technology Division

Approved by:


Shinichi Takano
Engineer
Consumer Technology Division



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

UL Japan, Inc.

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 11765856S-A

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SECTION 1: Customer information

Company Name	:	SEIKO EPSON CORPORATION
Address	:	3-3-5 Owa, Suwa-shi, Nagano-ken, 392-8502, Japan
Telephone Number	:	+81-263-52-4335
Facsimile Number	:	+81-263-53-3702
Contact Person	:	Yoshinobu Murakami

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

2.1 Identification of E.U.T.

Type of Equipment	:	GPS Sports Monitor
Model No.	:	J-57
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 3.7 V
Receipt Date of Sample	:	June 30, 2017
Country of Mass-production	:	China
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: J-57 (referred to as the EUT in this report) is a GPS Sports Monitor.

Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	GFSK
Power Supply (radio part input)	:	DC 3.1 V
Antenna type	:	Chip
Antenna Gain	:	0.1 dBi
Clock frequency (Maximum)	:	32 kHz, 26 MHz, 32 MHz, 48 MHz

SECTION 3: Test specification, procedures & results

3.1 Test Specification

Test Specification : FCC Part 15 Subpart C
FCC Part 15 final revised on June 14, 2017 and effective July 14, 2017

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

* The revision on June 14, 2017, does not affect the test specification applied to the EUT.

* Also the EUT complies with FCC Part 15 Subpart B.

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	21.6 dB, 0.51129 MHz, L1, AV, Tx 2402 MHz	Complied	-
6dB Bandwidth	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: -	FCC: Section 15.247(a)(2) IC: RSS-247 5.2(a)	See data.	Complied	Conducted
Maximum Peak Output Power	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: RSS-Gen 6.12	FCC: Section 15.247(b)(3) IC: RSS-247 5.4(d)		Complied	Conducted
Power Density	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: -	FCC: Section 15.247(e) IC: RSS-247 5.2(b)		Complied	Conducted
Spurious Emission Restricted Band Edges	FCC: KDB 558074 D01 DTS Meas Guidance v04 IC: RSS-Gen 6.13	FCC: Section 15.247(d) IC: RSS-247 5.5 RSS-Gen 8.9 RSS-Gen 8.10	6.6 dB 2483.500 MHz, AV, Horizontal Tx 2480 MHz	Complied	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 DTS Meas Guidance v04 12.2.7.

* 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 (DC 3.1 V) constantly to RF Part 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.

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3.3 Addition to standard

Item	Test Procedure	Specification	Worst margin	Results	Remarks
99% Occupied Bandwidth	IC: RSS-Gen 6.6	IC: -	N/A	-	Conducted

Other than above, 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 $k = 2$.
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Item	Frequency range	Uncertainty (+/-)				
		No. 1 SAC / SR	No. 2 SAC / SR	No. 3 SAC / SR	No. 4 SAC / SR	No. 5,6,8 SR
Conducted emission (AC Mains) LISN	150 kHz-30 MHz	2.6 dB	2.5 dB	2.6 dB	2.5 dB	2.5 dB
Radiated emission (Measurement distance: 3 m)	9 kHz-30 MHz	3.1 dB	3.1 dB	3.1 dB	-	-
	30 MHz-200 MHz	4.6 dB	4.4 dB	4.6 dB	-	-
	200 MHz-1 GHz	5.8 dB	5.7 dB	5.8 dB	-	-
	1 GHz-13 GHz	4.9 dB	4.9 dB	4.9 dB	-	-
Radiated emission (Measurement distance: 1 m)	13 GHz-18 GHz	4.6 dB	4.6 dB	4.6 dB	-	-
	18 GHz-40 GHz	4.9 dB	4.9 dB	4.9 dB	-	-

SAC=Semi-Anechoic Chamber

SR= Shielded Room is applied besides radiated emission

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)_SPM-06	0.72 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.85 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.74 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	0.91 dB
Spurious emission (Conducted) below 1GHz	1.6 dB
Spurious emission (Conducted) 1 GHz-3 GHz	1.3 dB
Spurious emission (Conducted) 3 GHz-18 GHz	2.2 dB
Spurious emission (Conducted) 18 GHz-26.5 GHz	2.3 dB
Spurious emission (Conducted) 26.5 GHz-40 GHz	2.4 dB
Bandwidth Measurement	1.01 %
Duty cycle and Time Measurement	0.012 %

Conducted Emission test

The data listed in this test report has enough margin, more than the site margin.

Radiated emission test

The data listed in this test report has enough margin, more than the site margin.

3.5 Test Location

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JAB Accreditation No. RTL02610

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

3.6 Test data, Test instruments, and Test set up

Refer to APPENDIX.

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

4.1 Operating Mode(s)

Mode	Operating Mode	Tested frequency
All items	Bluetooth Low Energy	2402 MHz, 2440 MHz 2480 MHz
*Transmitting duty was 100 % on all tests. *The worst condition was determined based on the test result of Maximum Peak Output Power (Mid Channel)		
*Power of the EUT was set by the software as follows; Power settings: Fixed Software (Firmware): version 0.82 *This setting of software is the worst case. Any conditions under the normal use do not exceed the condition of setting. In addition, end users cannot change the settings of the output power of the product.		

4.2 Configuration and peripherals



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

Description of EUT

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	GPS Sports Monitor	J-57	ES003 00051 *1) ES003 00052 *2)	SEIKO EPSON	EUT
B	Clip	-	ES002 00110	SEIKO EPSON	-
C	SWITCH-MODE POWER SUPPLY	6A-052WU05B	-	TOKI Trading	-

*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	USB	0.5	Shielded	Shielded	-

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SECTION 5: Conducted Emission

Test Procedure and conditions

EUT was placed on a platform of nominal size, 1.0 m by 1.5 m, raised 0.8 m above the conducting ground plane. The table is made of Styrofoam and covered with polyvinyl chloride. That has very low permittivity. 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.

The AC Mains Terminal Continuous disturbance Voltage has been measured with the EUT in a shielded room. 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

SECTION 6: Radiated Spurious Emission

Test Procedure

It was measured based on "11.0 Emissions in non-restricted frequency bands" of "KDB 558074 D01 DTS Meas Guidance v04".

[For below 1 GHz]

EUT was placed on a urethane platform of nominal size, 0.5 m by 0.5 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 *a)		Spectrum Analyzer *a)
Detector	QP	PK	AV *1)	PK
IF Bandwidth	BW 120 kHz	RBW: 1 MHz VBW: 3 MHz	Average Power Method: <u>12.2.5.2</u> RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (Linear voltage) Trace: 100 traces	RBW: 100 kHz VBW: 300kHz
Test Distance	3 m	3.97 m *2) (1 GHz – 13 GHz), 1 m *3) (13 GHz – 26.5 GHz)		3.97 m *2) (1 GHz – 13 GHz), 1 m *3) (13 GHz – 26.5 GHz)

*1) Average Power Measurement was performed based on 6.0 & 12.2.5 of "KDB 558074 D01 DTS Meas Guidance v04".

*2) Distance Factor: $20 \times \log(3.97 \text{ m} / 3.0 \text{ m}) = 2.44 \text{ dB}$

*3) Distance Factor: $20 \times \log(1.0 \text{ m} / 3.0 \text{ m}) = -9.54 \text{ dB}$

The carrier levels and noise levels were confirmed with and without clip (power supply) / at each position of X, Y and Z axes to see the position of maximum noise, and the test was made under the condition that has the maximum noise.

Antenna polarization	Carrier	Spurious (Below 1 GHz)	Spurious (1 GHz -13 GHz)	Spurious (13 GHz -26.5 GHz)
Horizontal	Y (Without clip)	X (With clip)	Y (Without clip)	X (Without clip)
Vertical	X (Without clip)	X (With clip)	X (Without clip)	X (Without clip)

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	10 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	Sample	Max Hold	Spectrum Analyzer
Maximum Peak Output Power	-	-	-	Auto	Peak/ Average *2)	-	Power Meter (Sensor: 160 MHz BW)
Peak Power Density	1.5 times the 6dB Bandwidth	3 kHz	9.1 kHz	Auto	Peak	Max Hold	Spectrum Analyzer *3)
Conducted Spurious Emission *5)	9kHz to 150kHz	200 Hz	620 Hz	Auto	Peak	Max Hold	Spectrum Analyzer
	150kHz to 30MHz	10 kHz	30 kHz				
*1) Peak hold was applied as Worst-case measurement. *2) Reference data *3) Section 10.2 Method PKPSD (peak PSD) of "KDB 558074 D01 DTS Meas Guidance v04". *5) 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 = 10 kHz)							

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

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

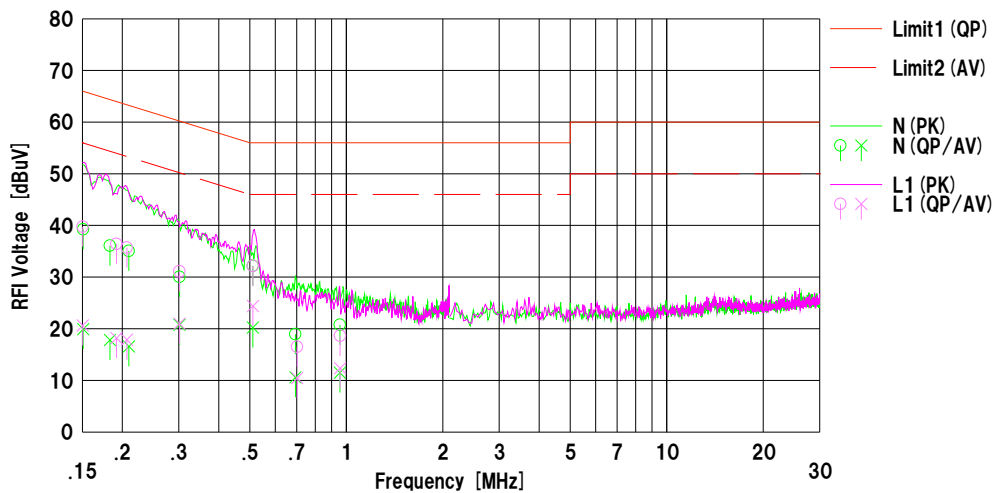
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2017/07/08

Mode : BLE Tx 2402 MHz
Power : AC 120 V / 60 Hz
Temp./Humi. : 23 deg.C / 54 %RH

Remarks :

Limit1 : FCC 15C (15.207) QP
Limit2 : FCC 15C (15.207) AV

Engineer : Hikaru Shirasawa



No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dB]	<AV> [dB]		
1	0.15097	26.69	7.38	12.54	39.23	19.92	65.95	55.95	26.7	36.0	N	
2	0.18295	23.54	5.27	12.53	36.07	17.80	64.35	54.35	28.2	36.5	N	
3	0.20959	22.51	4.04	12.54	35.05	16.58	63.22	53.22	28.1	36.6	N	
4	0.30161	17.50	8.22	12.54	30.04	20.76	60.20	50.20	30.1	29.4	N	
5	0.51077	19.58	7.65	12.58	32.16	20.23	56.00	46.00	23.8	25.7	N	
6	0.69346	6.34	-2.01	12.61	18.95	10.60	56.00	46.00	37.0	35.4	N	
7	0.95558	8.11	-1.14	12.64	20.75	11.50	56.00	46.00	35.2	34.5	N	
8	0.15044	27.21	8.09	12.54	39.75	20.63	65.98	55.98	26.2	35.3	L1	
9	0.19178	23.89	5.67	12.53	36.42	18.20	63.96	53.96	27.5	35.7	L1	
10	0.20662	23.18	5.34	12.53	35.71	17.87	63.34	53.34	27.6	35.4	L1	
11	0.30154	18.57	8.44	12.54	31.11	20.98	60.20	50.20	29.0	29.2	L1	
12	0.51129	19.57	11.78	12.58	32.15	24.35	56.00	46.00	23.8	21.6	L1	
13	0.70249	3.89	-2.17	12.61	16.50	10.44	56.00	46.00	39.5	35.5	L1	
14	0.95689	6.01	-0.29	12.64	18.65	12.35	56.00	46.00	37.3	33.6	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
LISN:SLS-02

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Conducted Emission

DATA OF CONDUCTED EMISSION TEST

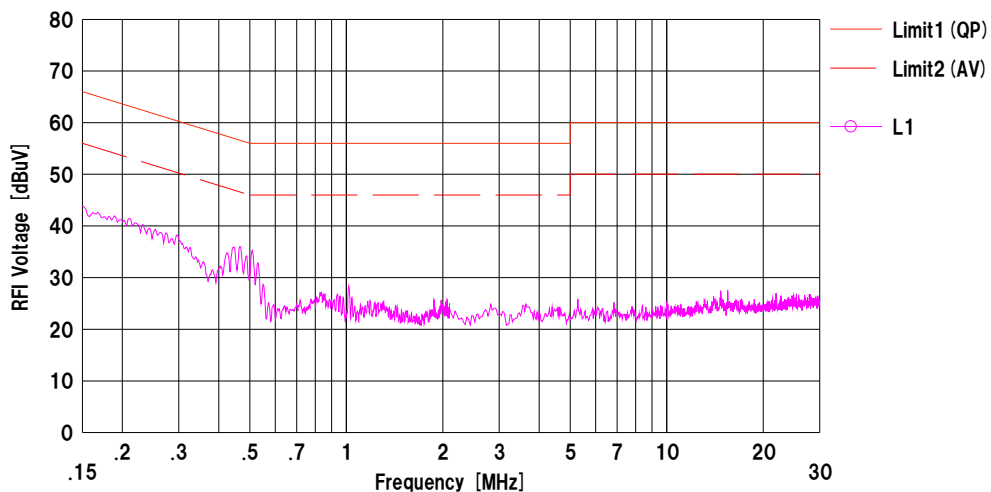
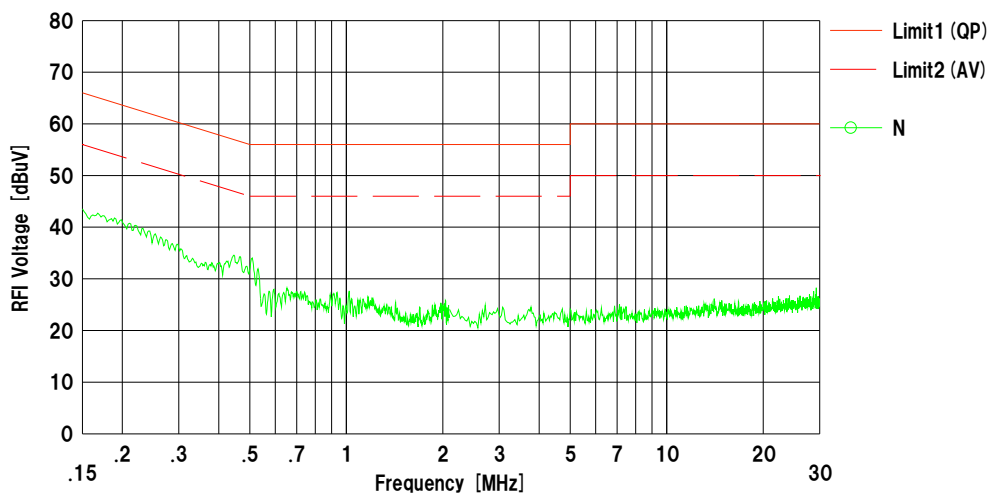
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2017/07/08

Mode : BLE Tx 2440 MHz
Power : AC 120 V / 60 Hz
Temp./Humi. : 23 deg.C / 54 %RH

Remarks :

Limit1 : FCC 15C (15.207) QP
Limit2 : FCC 15C (15.207) AV

Engineer : Hikaru Shirasawa



Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
LISN:SLS-02

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Conducted Emission

DATA OF CONDUCTED EMISSION TEST

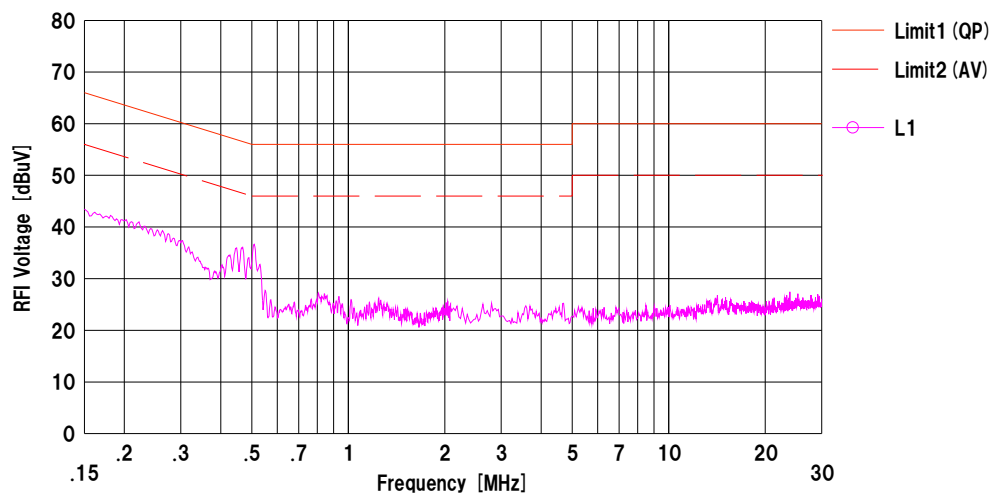
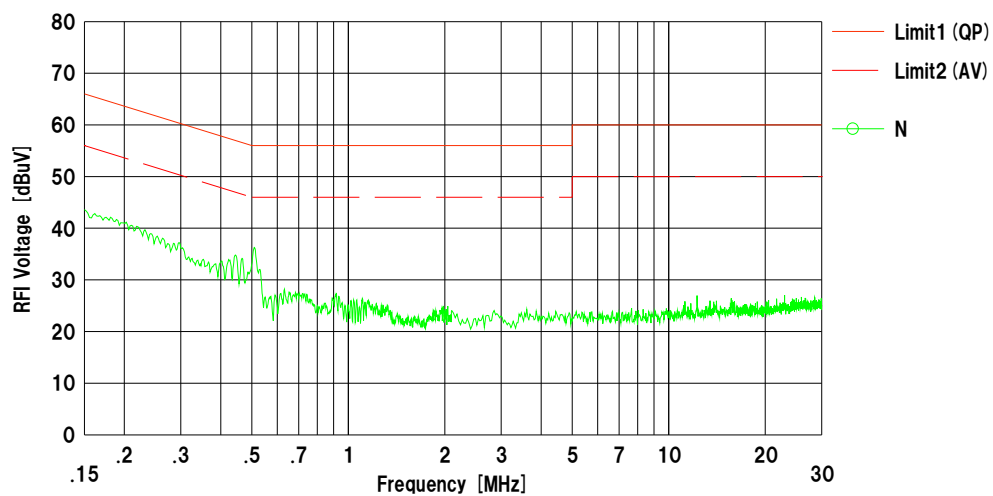
UL Japan, Inc. Shonan EMC Lab. No.3 Shielded Room
Date : 2017/07/08

Mode : BLE Tx 2480 MHz
Power : AC 120 V / 60 Hz
Temp./Humi. : 23 deg.C / 54 %RH

Remarks :

Limit1 : FCC 15C (15.207) QP
Limit2 : FCC 15C (15.207) AV

Engineer : Hikaru Shirasawa



Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
LISN:SLS-02

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6dB Bandwidth

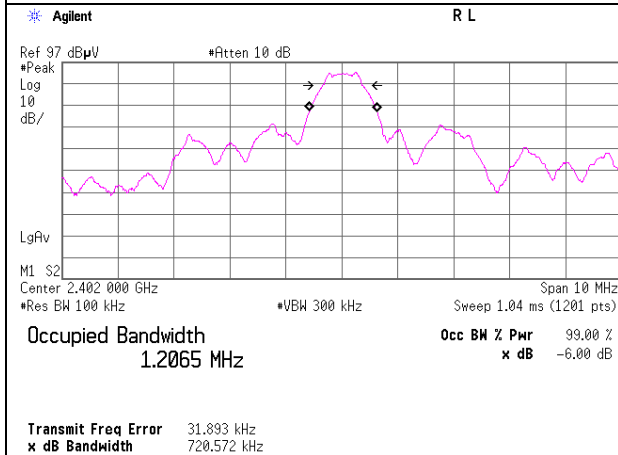
Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11765856S-A
Date July 6, 2017
Temperature / Humidity 26 deg. C / 49 % RH
Engineer Hikaru Shirasawa
Mode Tx BT LE

Mode	Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
BT LE	2402	0.721	> 500
	2440	0.699	> 500
	2480	0.712	> 500

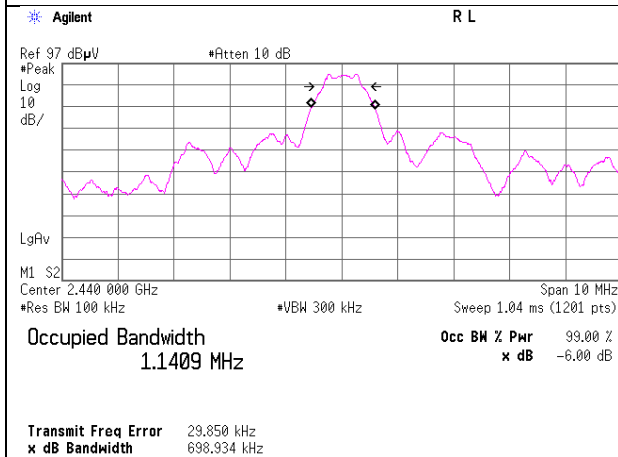
6dB Bandwidth

BT LE

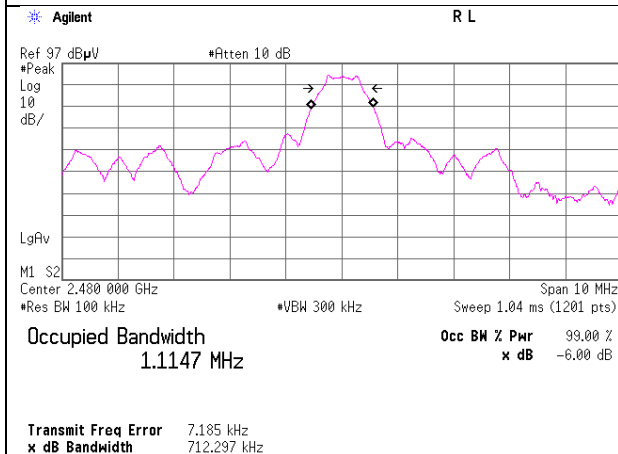
2402 MHz



2440 MHz



2480 MHz



Maximum Peak Output Power

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11765856S-A
Date July 6, 2017
Temperature / Humidity 26 deg. C / 49 % RH
Engineer Hikaru Shirasawa
Mode Tx BT LE

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2402	-13.20	1.20	9.80	-2.20	0.60	30.00	1000	32.20
2440	-13.55	1.20	9.80	-2.55	0.56	30.00	1000	32.55
2480	-14.05	1.21	9.80	-3.04	0.50	30.00	1000	33.04

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.

Average Output Power
(Reference data for RF Exposure)

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11765856S-A
Date	July 6, 2017
Temperature / Humidity	26 deg. C / 49 % RH
Engineer	Hikaru Shirasawa
Mode	Tx BT LE

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result (Time average)		Duty factor [dB]	Result (Burst power average)	
				[dBm]	[mW]		[dBm]	[mW]
2402	-14.36	1.20	9.80	-3.36	0.46	0.00	-3.36	0.46
2440	-14.84	1.20	9.80	-3.84	0.41	0.00	-3.84	0.41
2480	-15.47	1.21	9.80	-4.46	0.36	0.00	-4.46	0.36

Sample Calculation:

Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

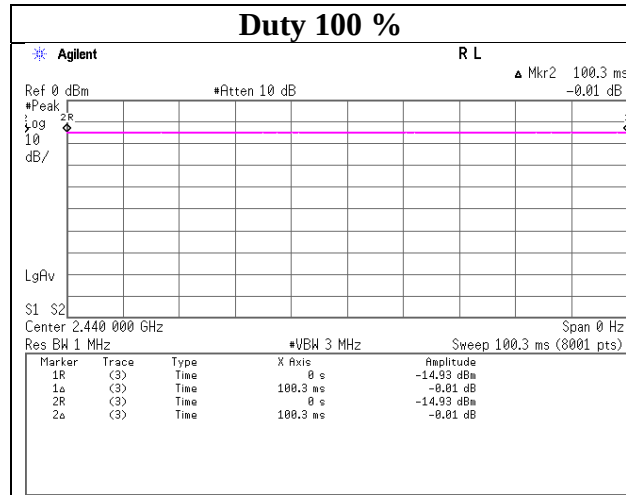
Result (Burst power average) = Time average + Duty factor

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

**The average output power was measured with the lowest order modulation and
lowest data rate configuration in each IEEE 802.11 mode based on KDB 248227 D01.**

Burst rate confirmation

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11765856S-A
Date July 6, 2017
Temperature / Humidity 26 deg. C / 49 % RH
Engineer Hikaru Shirasawa
Mode Tx BT LE



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

Radiated Spurious Emission

Report No.	11765856S-A	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.2
Date	July 8, 2017	July 5, 2017
Temperature / Humidity	25 deg. C / 60 % RH	24 deg. C / 62 % RH
Engineer	Hikaru Shirasawa (30 MHz – 1 GHz)	Hiroyuki Morikawa (Above 1 GHz)
Mode	Tx BT LE 2402 MHz	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	192.002	QP	34.96	16.25	7.97	32.00	0.00	27.18	43.50	16.3	170	332	
Hori.	288.006	QP	27.29	12.98	8.66	31.92	0.00	17.01	46.00	28.9	100	248	
Hori.	336.002	QP	27.83	14.19	8.91	31.86	0.00	19.07	46.00	26.9	100	70	
Hori.	2390.000	PK	47.18	27.17	14.20	40.85	2.44	50.14	73.90	23.8	137	8	
Hori.	4804.000	PK	48.87	31.13	6.61	41.86	2.44	47.19	73.90	26.7	163	75	
Hori.	4806.012	PK	48.89	31.14	6.60	41.86	2.44	47.21	73.90	26.7	163	75	
Hori.	7206.000	PK	46.36	36.43	8.15	41.18	2.44	52.20	73.90	21.7	150	0	
Hori.	9608.000	PK	45.60	38.28	9.14	40.59	2.44	54.87	73.90	19.0	150	0	
Hori.	2390.000	AV	39.04	27.17	14.20	40.85	2.44	42.00	53.90	11.9	137	8	
Hori.	4804.000	AV	40.77	31.13	6.61	41.86	2.44	39.09	53.90	14.8	163	75	
Hori.	4806.012	AV	40.64	31.14	6.60	41.86	2.44	38.96	53.90	14.9	163	75	
Hori.	7206.000	AV	39.06	36.43	8.15	41.18	2.44	44.90	53.90	9.0	150	0	
Hori.	9608.000	AV	37.55	38.28	9.14	40.59	2.44	46.82	53.90	7.1	150	0	
Vert.	101.602	QP	24.52	10.21	7.49	32.08	0.00	10.14	43.50	33.3	100	43	
Vert.	135.569	QP	25.83	13.98	7.66	32.04	0.00	15.43	43.50	28.0	100	196	
Vert.	168.344	QP	25.41	15.76	8.02	32.02	0.00	17.17	43.50	26.3	100	15	
Vert.	192.002	QP	37.01	16.25	7.97	32.00	0.00	29.23	43.50	14.2	100	198	
Vert.	432.003	QP	32.42	16.27	9.35	31.86	0.00	26.18	46.00	19.8	100	179	
Vert.	2390.000	PK	47.50	27.17	14.20	40.85	2.44	50.46	73.90	23.4	143	7	
Vert.	4804.000	PK	49.09	31.13	6.61	41.86	2.44	47.41	73.90	26.5	142	130	
Vert.	4806.014	PK	49.34	31.14	6.60	41.86	2.44	47.66	73.90	26.2	142	130	
Vert.	7206.000	PK	46.99	36.43	8.15	41.18	2.44	52.83	73.90	21.1	150	0	
Vert.	9608.000	PK	46.22	38.28	9.14	40.59	2.44	55.49	73.90	18.4	150	0	
Vert.	2390.000	AV	38.87	27.17	14.20	40.85	2.44	41.83	53.90	12.1	143	7	
Vert.	4804.000	AV	42.78	31.13	6.61	41.86	2.44	41.10	53.90	12.8	142	130	
Vert.	4806.014	AV	40.93	31.14	6.60	41.86	2.44	39.25	53.90	14.7	142	130	
Vert.	7206.000	AV	38.98	36.43	8.15	41.18	2.44	44.82	53.90	9.1	150	0	
Vert.	9608.000	AV	37.63	38.28	9.14	40.59	2.44	46.90	53.90	7.0	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.97\text{ m} / 3.0\text{ m}) = 2.44\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

20 dBc Data Sheet (RBW 100 kHz, VBW 300 kHz)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2402.000	PK	83.10	27.21	14.21	40.84	2.44	86.12	-	-	Carrier
Hori.	2399.267	PK	53.40	27.20	14.20	40.84	2.44	56.40	66.12	9.7	
Hori.	2400.000	PK	50.95	27.20	14.20	40.84	2.44	53.95	66.12	12.2	
Vert.	2402.000	PK	82.58	27.21	14.21	40.84	2.44	85.60	-	-	Carrier
Vert.	2399.277	PK	52.47	27.20	14.20	40.84	2.44	55.47	65.60	10.1	
Vert.	2400.000	PK	50.28	27.20	14.20	40.84	2.44	53.28	65.60	12.3	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.97\text{ m} / 3.0\text{ m}) = 2.44\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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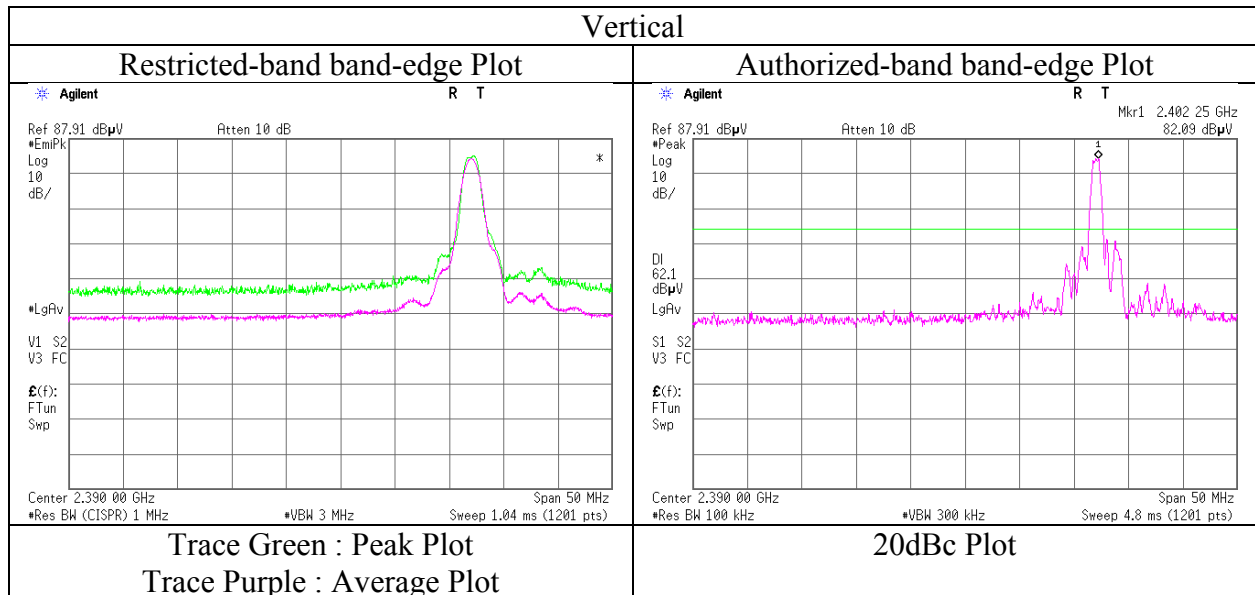
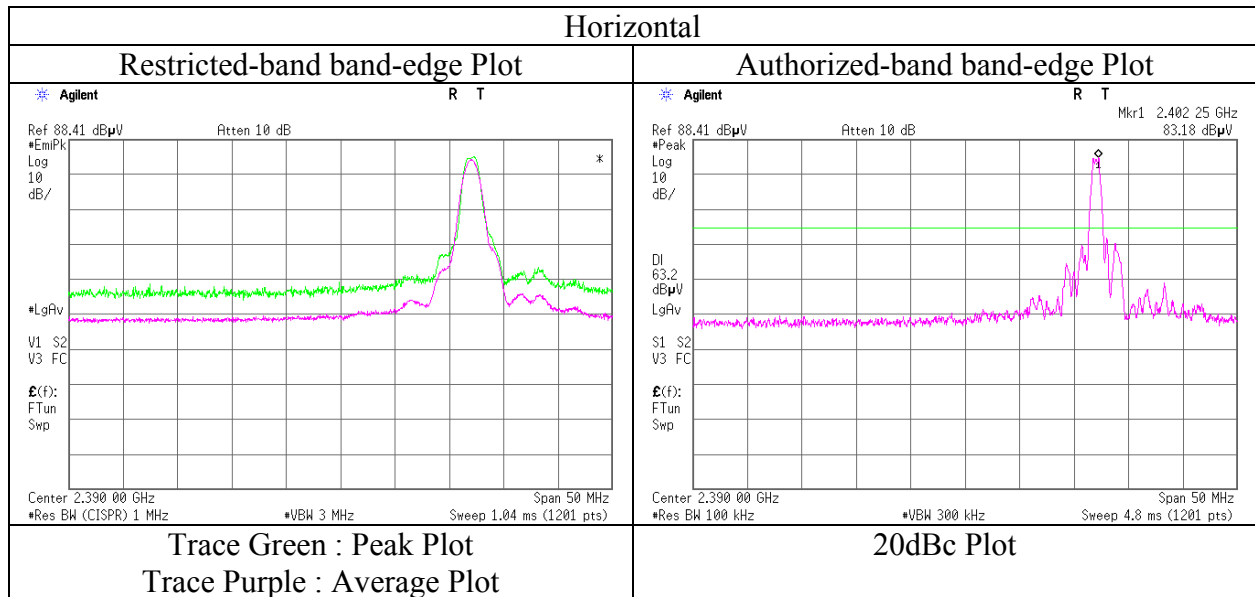
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

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Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber
Report No.	11765856S-A
Date	July 5, 2017
Temperature / Humidity	24 deg. C / 62 % RH
Engineer	Hiroyuki Morikawa (Above 1 GHz)
Mode	Tx BT LE 2402 MHz



* Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission

Report No.	11765856S-A	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.2
Date	July 8, 2017	July 5, 2017
Temperature / Humidity	25 deg. C / 60 % RH	24 deg. C / 62 % RH
Engineer	Hikaru Shirasawa (30 MHz – 1 GHz)	Hiroyuki Morikawa (Above 1 GHz)
Mode	Tx BT LE 2440 MHz	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	192.001	QP	34.85	16.25	7.97	32.00	0.00	27.07	43.50	16.4	173	317	
Hori.	288.002	QP	27.33	12.98	8.66	31.92	0.00	17.05	46.00	28.9	100	247	
Hori.	336.001	QP	27.75	14.19	8.91	31.86	0.00	18.99	46.00	27.0	100	71	
Hori.	4880.000	PK	49.65	31.29	6.64	41.76	2.44	48.26	73.90	25.6	185	188	
Hori.	4882.013	PK	48.51	31.29	6.64	41.76	2.44	47.12	73.90	26.8	185	188	
Hori.	7320.000	PK	46.82	36.63	8.18	41.27	2.44	52.80	73.90	21.1	150	0	
Hori.	9760.000	PK	45.44	38.52	9.18	40.62	2.44	54.96	73.90	18.9	150	0	
Hori.	4880.000	AV	41.62	31.29	6.64	41.76	2.44	40.23	53.90	13.7	185	188	
Hori.	4882.013	AV	40.99	31.29	6.64	41.76	2.44	39.60	53.90	14.3	185	188	
Hori.	7320.000	AV	38.76	36.63	8.18	41.27	2.44	44.74	53.90	9.2	150	0	
Hori.	9760.000	AV	37.37	38.52	9.18	40.62	2.44	46.89	53.90	7.0	150	0	
Vert.	101.613	QP	24.53	10.21	7.49	32.08	0.00	10.15	43.50	33.3	100	53	
Vert.	135.581	QP	25.94	13.98	7.66	32.04	0.00	15.54	43.50	27.9	100	207	
Vert.	168.342	QP	25.55	15.76	8.02	32.02	0.00	17.31	43.50	26.1	100	15	
Vert.	192.004	QP	36.64	16.25	7.97	32.00	0.00	28.86	43.50	14.6	100	204	
Vert.	432.002	QP	32.37	16.27	9.35	31.86	0.00	26.13	46.00	19.8	100	182	
Vert.	4880.000	PK	49.47	31.29	6.64	41.76	2.44	48.08	73.90	25.8	184	136	
Vert.	4882.013	PK	48.48	31.29	6.64	41.76	2.44	47.09	73.90	26.8	184	136	
Vert.	7320.000	PK	46.99	36.63	8.18	41.27	2.44	52.97	73.90	20.9	150	0	
Vert.	9760.000	PK	45.18	38.52	9.18	40.62	2.44	54.70	73.90	19.2	150	0	
Vert.	4880.000	AV	42.86	31.29	6.64	41.76	2.44	41.47	53.90	12.4	184	136	
Vert.	4882.013	AV	41.23	31.29	6.64	41.76	2.44	39.84	53.90	14.1	184	136	
Vert.	7320.000	AV	39.05	36.63	8.18	41.27	2.44	45.03	53.90	8.9	150	0	
Vert.	9760.000	AV	37.29	38.52	9.18	40.62	2.44	46.81	53.90	7.1	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : $20\log(3.97\text{ m} / 3.0\text{ m}) = 2.44\text{ dB}$

13 GHz - 40 GHz : $20\log(1.0\text{ m} / 3.0\text{ m}) = -9.54\text{ dB}$

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Shonan EMC Lab.

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Radiated Spurious Emission

Report No.	11765856S-A	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.2
Date	July 8, 2017	July 5, 2017
Temperature / Humidity	25 deg. C / 60 % RH	24 deg. C / 62 % RH
Engineer	Hikaru Shirasawa (30 MHz – 1 GHz)	Hiroyuki Morikawa (Above 1 GHz)
Mode	Tx BT LE 2480 MHz	

(* PK: Peak, AV: Average, QP: Quasi-Peak)

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Height [cm]	Angle [deg]	Remark
Hori.	192.001	QP	34.59	16.25	7.97	32.00	0.00	26.81	43.50	16.6	167	311	
Hori.	288.003	QP	27.48	12.98	8.66	31.92	0.00	17.20	46.00	28.8	100	258	
Hori.	336.000	QP	27.93	14.19	8.91	31.86	0.00	19.17	46.00	26.8	100	71	
Hori.	2483.500	PK	49.85	27.49	14.32	40.81	2.44	53.29	73.90	20.6	149	17	
Hori.	2485.720	PK	49.44	27.50	14.32	40.81	2.44	52.89	73.90	21.0	149	17	
Hori.	4958.013	PK	47.83	31.45	6.67	41.65	2.44	46.74	73.90	27.2	176	52	
Hori.	4960.000	PK	47.30	31.46	6.67	41.65	2.44	46.22	73.90	27.7	176	52	
Hori.	7440.000	PK	46.83	36.84	8.20	41.36	2.44	52.95	73.90	21.0	150	0	
Hori.	9920.000	PK	44.70	38.76	9.21	40.66	2.44	54.45	73.90	19.5	150	0	
Hori.	2483.500	AV	43.89	27.49	14.32	40.81	2.44	47.33	53.90	6.6	149	17	
Hori.	2485.720	AV	41.76	27.50	14.32	40.81	2.44	45.21	53.90	8.7	149	17	
Hori.	4960.000	AV	39.94	31.46	6.67	41.65	2.44	38.86	53.90	15.0	176	52	
Hori.	7440.000	AV	38.85	36.84	8.20	41.36	2.44	44.97	53.90	8.9	150	0	
Hori.	9920.000	AV	37.28	38.76	9.21	40.66	2.44	47.03	53.90	6.9	150	0	
Vert.	99.570	QP	26.25	9.90	7.53	32.08	0.00	11.60	43.50	31.9	100	44	
Vert.	135.597	QP	25.79	13.98	7.66	32.04	0.00	15.39	43.50	28.1	100	210	
Vert.	168.356	QP	25.49	15.76	8.02	32.02	0.00	17.25	43.50	26.2	100	9	
Vert.	192.000	QP	36.61	16.25	7.97	32.00	0.00	28.83	43.50	14.6	100	199	
Vert.	432.001	QP	32.40	16.27	9.35	31.86	0.00	26.16	46.00	19.8	100	183	
Vert.	2483.500	PK	49.80	27.49	14.32	40.81	2.44	53.24	73.90	20.7	198	11	
Vert.	2485.643	PK	49.96	27.50	14.32	40.81	2.44	53.41	73.90	20.5	198	11	
Vert.	4958.014	PK	48.83	31.45	6.67	41.65	2.44	47.74	73.90	26.2	151	324	
Vert.	4960.000	PK	48.13	31.46	6.67	41.65	2.44	47.05	73.90	26.9	151	324	
Vert.	7440.000	PK	47.06	36.84	8.20	41.36	2.44	53.18	73.90	20.7	150	0	
Vert.	9920.000	PK	45.01	38.76	9.21	40.66	2.44	54.76	73.90	19.1	150	0	
Vert.	2483.500	AV	42.26	27.49	14.32	40.81	2.44	45.70	53.90	8.2	198	11	
Vert.	2485.643	AV	41.90	27.50	14.32	40.81	2.44	45.35	53.90	8.6	198	11	
Vert.	4958.014	AV	41.72	31.45	6.67	41.65	2.44	40.63	53.90	13.3	151	324	
Vert.	4960.000	AV	41.48	31.46	6.67	41.65	2.44	40.40	53.90	13.5	151	324	
Vert.	7440.000	AV	38.72	36.84	8.20	41.36	2.44	44.84	53.90	9.1	150	0	
Vert.	9920.000	AV	37.23	38.76	9.21	40.66	2.44	46.98	53.90	6.9	150	0	

Result = Reading + Ant.Fac. + Loss (Cable+(Attenuator or Filter)(below 18 GHz)) - Gain(Amplifier) + Distance factor

Distance factor : 1 GHz - 13 GHz : 20log (3.97 m / 3.0 m) = 2.44 dB

13 GHz - 40 GHz : 20log (1.0 m / 3.0 m) = -9.54 dB

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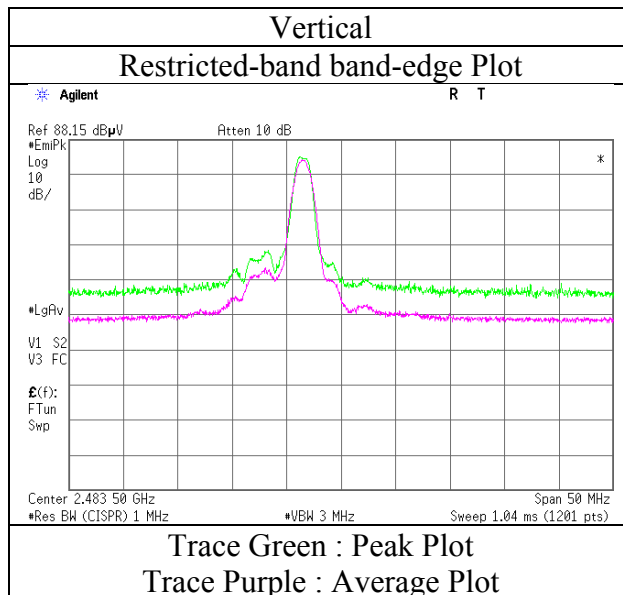
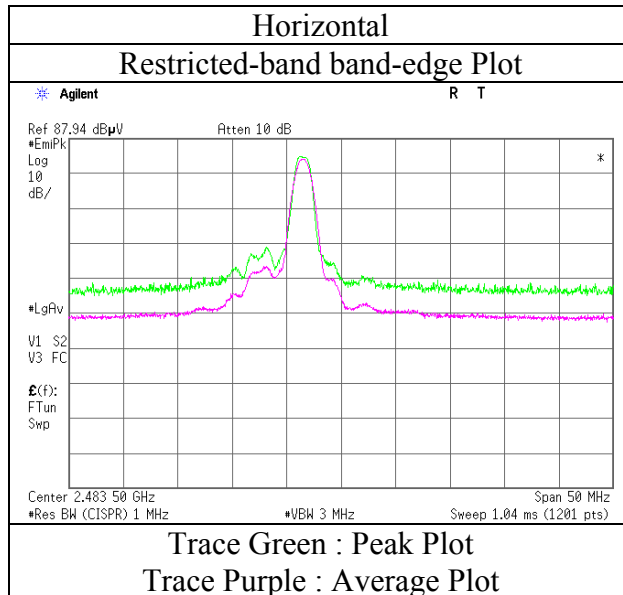
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Radiated Spurious Emission (Reference Plot for band-edge)

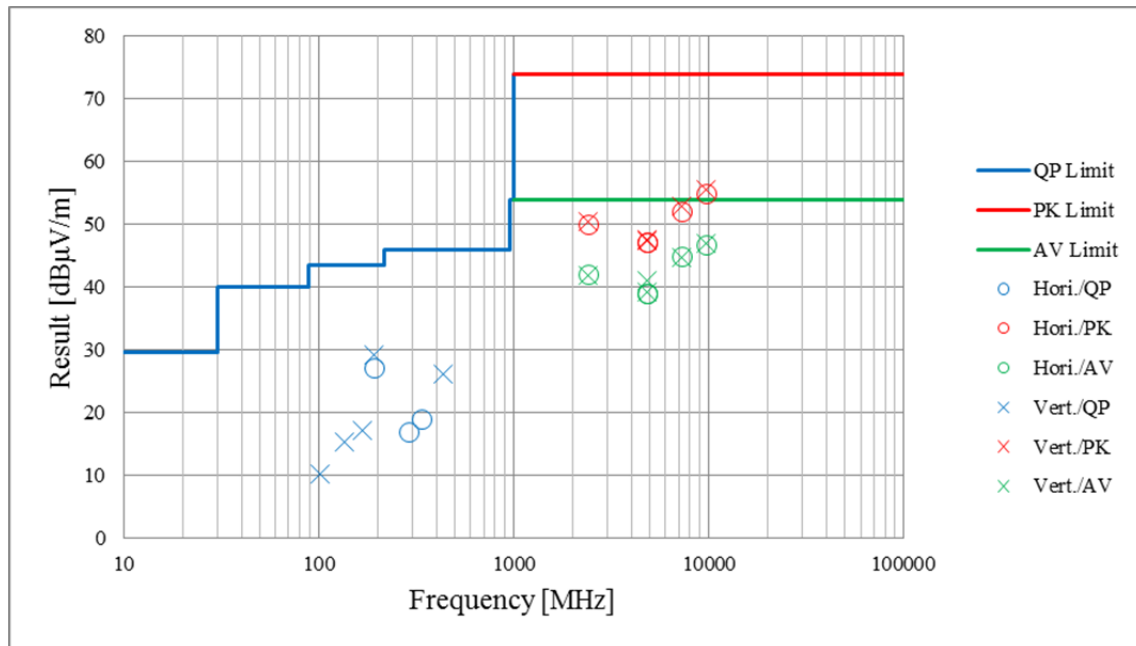
Test place	Shonan EMC Lab. No.2 Semi Anechoic Chamber
Report No.	11765856S-A
Date	July 5, 2017
Temperature / Humidity	24 deg. C / 62 % RH
Engineer	Hiroyuki Morikawa (Above 1 GHz)
Mode	Tx BT LE 2480 MHz



* Final result of restricted band edge was shown in tabular data.

Radiated Spurious Emission **(Plot data, Worst case)**

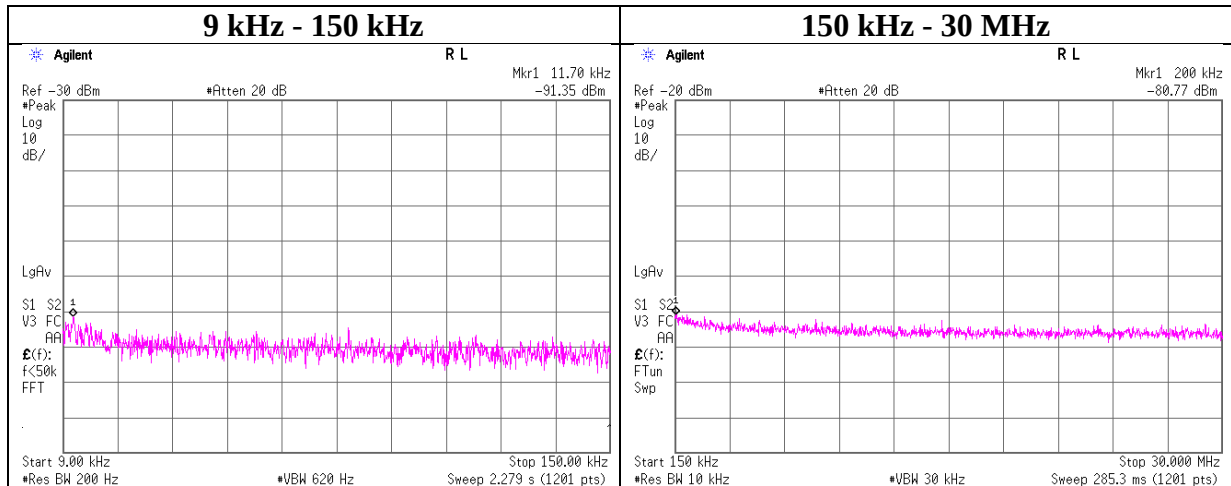
Report No.	11765856S-A	
Test place	Shonan EMC Lab.	
Semi Anechoic Chamber	No.3	No.2
Date	July 8, 2017	July 5, 2017
Temperature / Humidity	25 deg. C / 60 % RH	24 deg. C / 62 % RH
Engineer	Hikaru Shirasawa (30 MHz – 1 GHz)	Hiroyuki Morikawa (Above 1 GHz)
Mode	Tx BT LE 2402 MHz	



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

Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11765856S-A
Date : July 6, 2017
Temperature / Humidity : 26 deg. C / 49 % RH
Engineer : Hikaru Shirasawa
Mode : Tx BT LE 2402 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
11.70	-91.4	0.01	9.7	2.0	1	-79.6	300	6.0	-18.4	46.2	64.6	
200.00	-80.8	0.01	9.7	2.0	1	-69.0	300	6.0	-7.8	21.5	29.3	

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

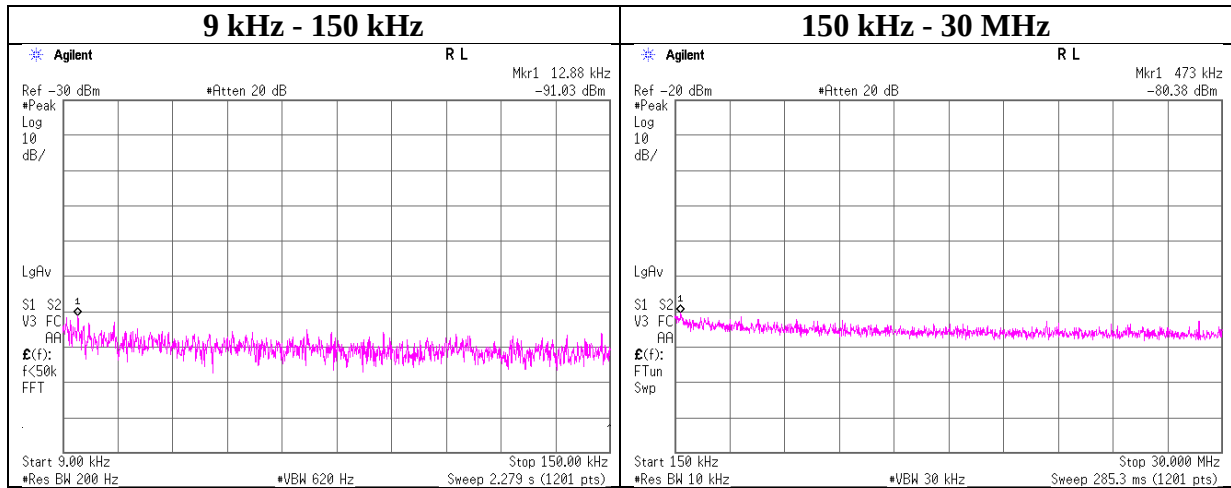
$$\text{EIRP [dBm]} = \text{Reading [dBm]} + \text{Cable loss [dB]} + \text{Attenuator Loss [dB]} + \text{Antenna gain [dBi]} + 10 * \log (N)$$

N: Number of output

*2.0 dBi was applied to the test result based on KDB 558074 since antenna gain was less than 2.0 dBi.

Conducted Spurious Emission

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11765856S-A
Date	July 6, 2017
Temperature / Humidity	26 deg. C / 49 % RH
Engineer	Hikaru Shirasawa
Mode	Tx BT LE 2440 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
12.88	-91.0	0.01	9.7	2.0	1	-79.3	300	6.0	-18.0	45.4	63.4	
473.00	-80.4	0.01	9.7	2.0	1	-68.6	300	6.0	-7.4	14.1	21.5	

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

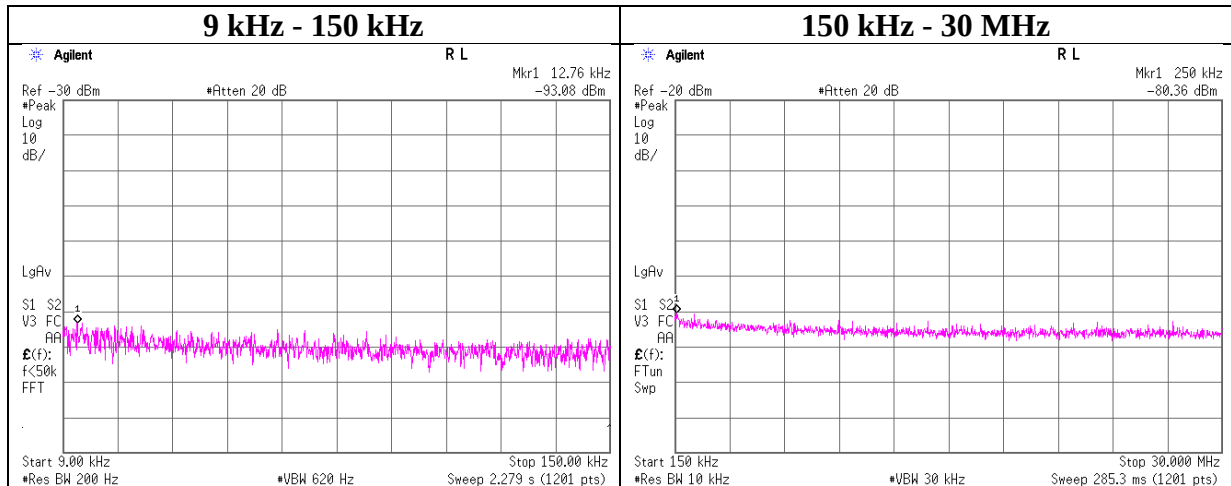
$EIRP[dBm] = Reading [dBm] + Cable\ loss [dB] + Attenuator\ Loss [dB] + Antenna\ gain [dBi] + 10 * \log (N)$

N: Number of output

*2.0 dBi was applied to the test result based on KDB 558074 since antenna gain was less than 2.0 dBi.

Conducted Spurious Emission

Test place : Shonan EMC Lab. No.5 Shielded Room
Report No. : 11765856S-A
Date : July 6, 2017
Temperature / Humidity : 26 deg. C / 49 % RH
Engineer : Hikaru Shirasawa
Mode : Tx BT LE 2480 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
12.76	-93.1	0.01	9.7	2.0	1	-81.3	300	6.0	-20.1	45.4	65.5	
250.00	-80.4	0.01	9.7	2.0	1	-68.6	300	6.0	-7.4	19.6	27.0	

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

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

N: Number of output

*2.0 dBi was applied to the test result based on KDB 558074 since antenna gain was less than 2.0 dBi.

Power Density

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11765856S-A
Date July 6, 2017
Temperature / Humidity 26 deg. C / 49 % RH
Engineer Hikaru Shirasawa
Mode Tx BT LE

Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2402.00	-26.33	1.20	9.80	-15.33	8.00	23.33
2440.00	-26.26	1.20	9.80	-15.26	8.00	23.26
2480.00	-27.30	1.21	9.80	-16.29	8.00	24.29

Sample Calculation:

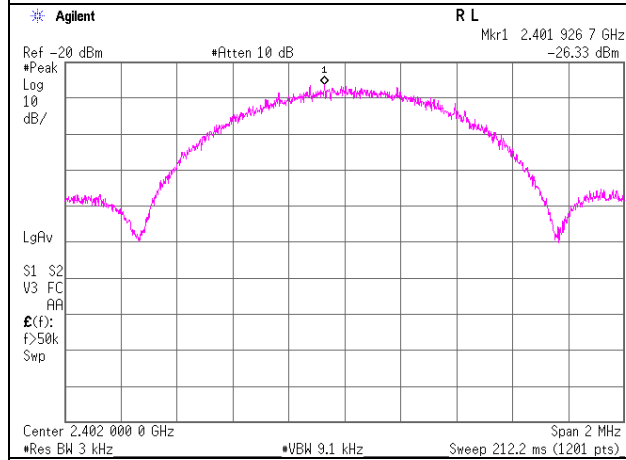
Result = Reading + Cable Loss (including the cable(s) customer supplied) + Attenuator Loss

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

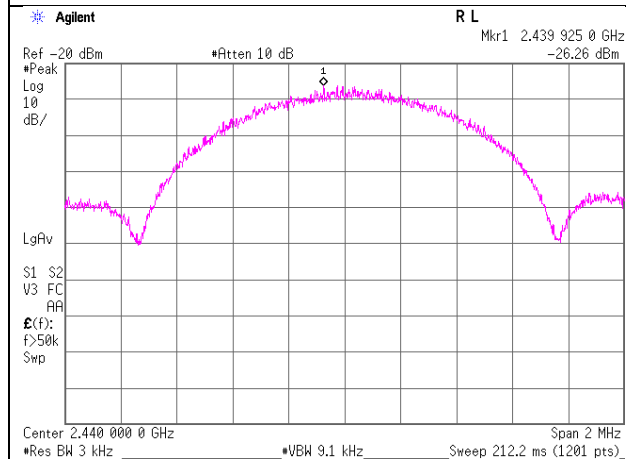
Power Density

BT LE

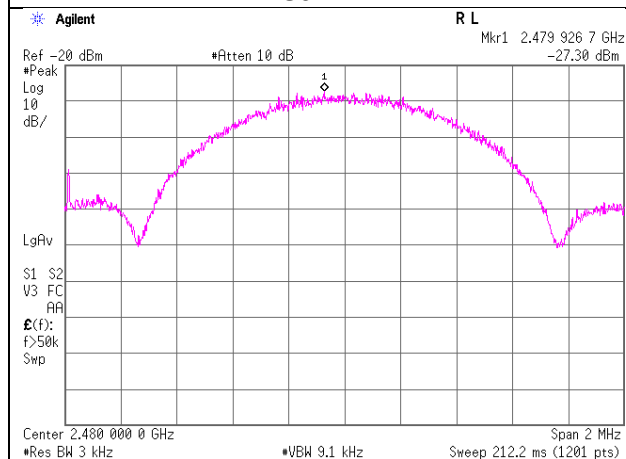
2402 MHz



2440 MHz



2480 MHz

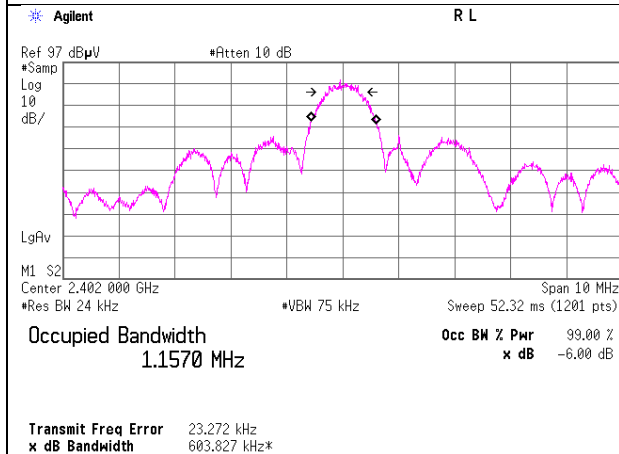


99%Occupied Bandwidth

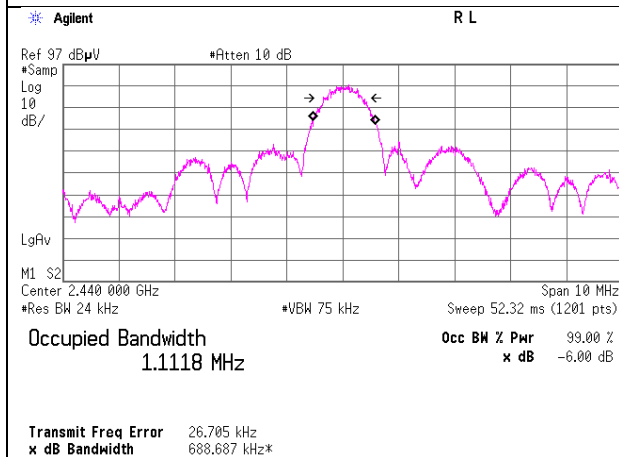
Test place Shonan EMC Lab. No.5 Shielded Room
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Date July 6, 2017
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Engineer Hikaru Shirasawa
Mode Tx BT LE

BT LE

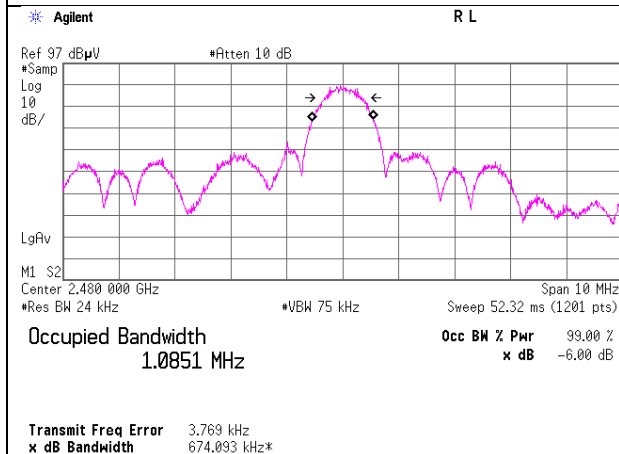
2402 MHz



2440 MHz



2480 MHz



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APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	AT	2017/03/07 * 12
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2017/05/01 * 12
SPSS-05	Power sensor	Agilent	N1923A	MY5349008	AT	2017/05/01 * 12
SAT10-14	Attenuator	Weinschel Corp.	54A-10	81595	AT	2017/04/20 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2017/03/23 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2016/12/13 * 12
KTS-07	Digital Tester	SANWA	PC500	7019232	AT	2016/10/17 * 12
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2017/03/17 * 12
SCC-G06	Coaxial Cable	Junkosha	J12J102207-00	MAY-23-16-091	RE	2017/06/13 * 12
SCC-G23	Coaxial Cable	Suhner	SUCOFLEX 104	297342/4	RE	2017/05/08 * 12
SCC-G40	Coaxial Cable	Junkosha	MWX221-0100 0NFSNMS/B	1612S005	RE	2017/01/08 * 12
SHA-02	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-726	RE	2016/08/09 * 12
SOS-03	Humidity Indicator	A&D	AD-5681	4063325	RE	2016/10/12 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2016/10/11 * 12
SJM-09	Measure	PROMART	SEN1935	-	RE	-
SAEC-02(SVSWR)	Semi-Anechoic Chamber	TDK	SAEC-02(SVSWR)	2	RE	2016/07/22 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFL,MF)	-	RE, CE	-
STS-02	Digital Hitester	Hioki	3805-50	080997819	RE	2017/03/08 * 12
SAT10-05	Attenuator(above1GHz)	Agilent	8493C-010	74864	RE	2016/11/07 * 12
SFL-18	Highpass Filter	MICRO-TRONICS	HPM50111	119	RE	2017/04/20 * 12
SHA-05	Horn Antenna	ETS LINDGREN	3160-09	LM4210	RE	2017/03/15 * 12
SAF-09	Pre Amplifier	TOYO Corporation	HAP18-26W	00000018	RE	2016/09/27 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-0100 0KMSKMS	-	RE	2017/04/20 * 12
SCC-G20	Coaxial Cable	Junkosha	J12J102518-00	APR-15-15-003	RE	2017/04/20 * 12
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2017/06/11 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2016/10/18 * 12
SLA-07	Logperiodic Antenna	Schwarzbeck	VUSLP9111B	196	RE	2017/01/26 * 12
SAT6-08	Attenuator	HIROSE ELECTRIC CO.,LTD.	AT-406(40)	-	RE	2016/08/04 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271(RF Selector)	RE	2017/04/07 * 12
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2017/02/09 * 12
STR-08	Test Receiver	Rohde & Schwarz	ESW44	101581	RE, CE	2016/11/08 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2016/10/12 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE, CE	-
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE, CE	2016/10/17 * 12
SCC-C9/C10/SRSE-03	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS4906	-/0901-271(RF Selector)	CE	2017/04/07 * 12
SOS-06	Humidity Indicator	A&D	AD-5681	4062118	CE	2016/12/13 * 12
SLS-02	LISN	Rohde & Schwarz	ENV216	100512	CE	2017/02/10 * 12
SAT3-10	Attenuator	JFW	50HF-003N	-	CE	2016/08/04 * 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: CE: Conducted Emission test
RE: Radiated Emission test
AT: Antenna Terminal Conducted test

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