



RADIO TEST REPORT

Test Report No. : 11822950S-D-R1

Applicant : Sony Corporation
Type of Equipment : IC Recorder
Model No. : ICD-TX800
FCC ID : AK8ICDTX800
Test regulation : FCC Part 15 Subpart C: 2017
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 regulation.
4. The test results in this report are traceable to the national or international standards.
5. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
6. This test report covers Radio technical requirements. It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. This report is a revised version of 11822950S-D.

Date of test: June 22 to 31, 2017

Representative test engineer:


Kazutaka Takayama
Engineer
Consumer Technology Division

Approved by:


Toyokazu Imamura
Leader
Consumer Technology Division



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

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

13-EM-F0429

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SECTION 1: Customer information

Company Name	:	Sony Corporation
Brand Name	:	SONY
Address	:	1-7-1 Konan, Minato-ku, Tokyo 108-0075, Japan

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

2.1 Identification of E.U.T.

Type of Equipment	:	IC Recorder
Model No.	:	ICD-TX800
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 3.7 V (rechargeable battery) DC 5 V (USB)
Receipt Date of Sample	:	June 12, 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: ICD-TX800 (referred to as the EUT in this report) is an IC Recorder.

General Specification

Clock frequency(ies) in the system	:	32.768 kHz (RTC), 24 MHz (CPU), 26 MHz (Bluetooth)
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Radio Specification

Radio Type	:	Transceiver
Frequency of Operation	:	2402 MHz - 2480 MHz
Modulation	:	GFSK, π /4DQPSK, 8DPSK (Classic Bluetooth), GFSK (Bluetooth Low Energy)
Power Supply (radio part input)	:	DC 1.8 V
Antenna type	:	Chip
Antenna Gain	:	-1.5 dBi

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.

The EUT has been tested for compliance 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	10.1 dB, 0.27900 MHz, N QP, 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	4.9 dB 9608.000 MHz, AV, Vertical, Tx 2402 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 1.8 V) constantly to RF part regardless of input voltage. Therefore, this EUT complies with the requirement.

FCC Part 15.203

It is impossible for end users to replace the antenna, because it is mounted inside of the EUT. Therefore the equipment complies with the requirement.

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.

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

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	-	-
Radiated emission (Measurement distance: 1 m)	1 GHz-13 GHz	4.9 dB	4.9 dB	4.9 dB	-	-
	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 %

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

UL Japan, Inc. Shonan EMC Lab.

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

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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.

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Telephone : +81 463 50 6400

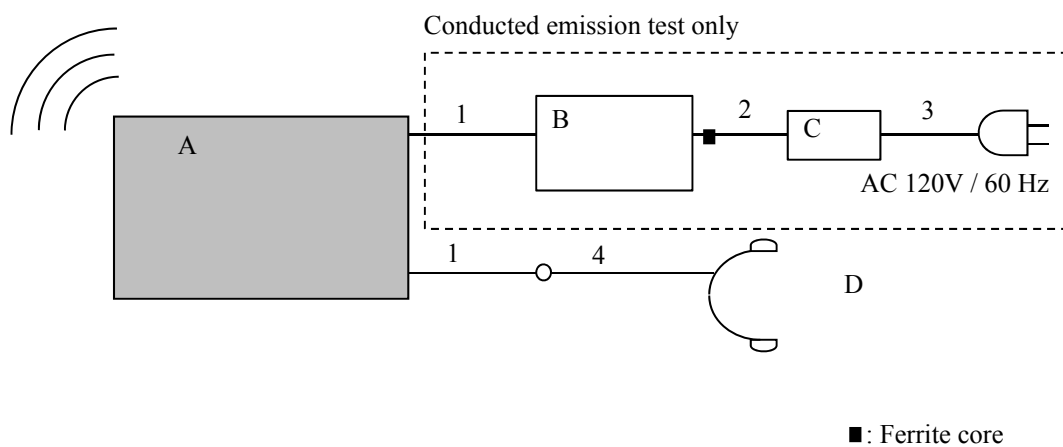
Facsimile : +81 463 50 6401

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

4.1 Operating Mode(s)

Mode	Frequency	Remarks*
Bluetooth Low Energy	2402 MHz, 2440 MHz, 2480 MHz	PN9
*Power of the EUT was set by the software as follows; - Power Setting: Fixed - Software: N/A *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 and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	IC Recorder	ICD-TX800	235 *1) 238 *2)	Sony Corporation	EUT
B	Laptop Computer	7666-77J	LV-B8PZ8 08/05	Lenovo	-
C	AC Adaptor	92P1213	11S92P1213Z1ZDDZ92C2B0	Lenovo	-
D	Headphones	MDR-E804Y	-	Sony Corporation	-

*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	-
2	DC power	1.8	Unshielded	Unshielded	-
3	AC power	1.0	Unshielded	Unshielded	-
4	Headphone	1.1	Unshielded	Unshielded	-

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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.

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 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 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 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 m 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	Average Power Method: <u>12.2.5.2</u> RBW: 1 MHz VBW: 3 MHz Detector: Power Averaging (Linear voltage) Trace: 100 traces Duty factor was added to the results.	RBW: 100 kHz VBW: 300kHz
Test Distance	3 m	3.99 m *2) (1 GHz – 13 GHz), 1 m *3) (13 GHz – 26.5 GHz)		3.99 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: $20 \times \log(3.99 \text{ m} / 3.0 \text{ m}) = 2.48 \text{ dB}$

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

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Shonan EMC Lab.

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

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Facsimile : +81 463 50 6401

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.

Antenna polarization	Frequency			
	Below 1 GHz	1 GHz - 2.8 GHz	2.8 GHz - 18 GHz	18 GHz - 26.5 GHz
Horizontal	X	Y	Y	Z
Vertical	X	Z	Z	X

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: 50 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 *4)	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".
 *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.

Test data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Conducted Emission

DATA OF CONDUCTED EMISSION TEST

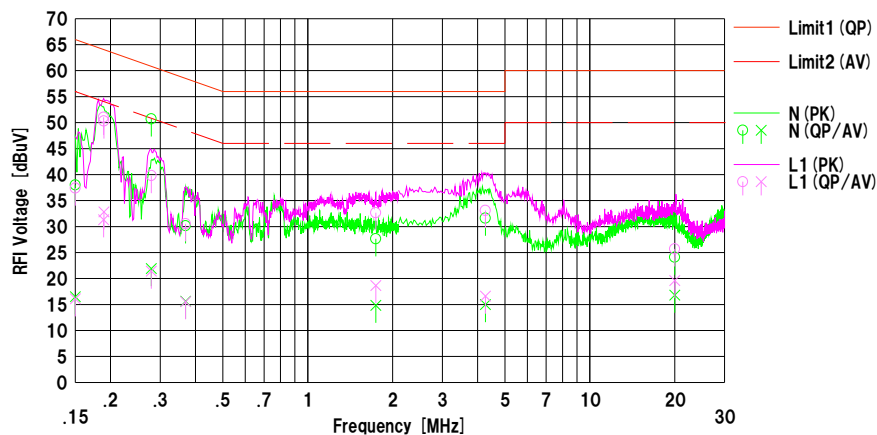
UL Japan, Inc. Shonan EMC Lab. No.1 Shielded Room
Date : 2017/06/25

Mode : BLE Tx 2402MHz
Power : AC 120 V / 60 Hz
Temp./Humi. : 25 deg.C. / 55 %RH

Remarks : -

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

Engineer : Kazutaka Takeyama

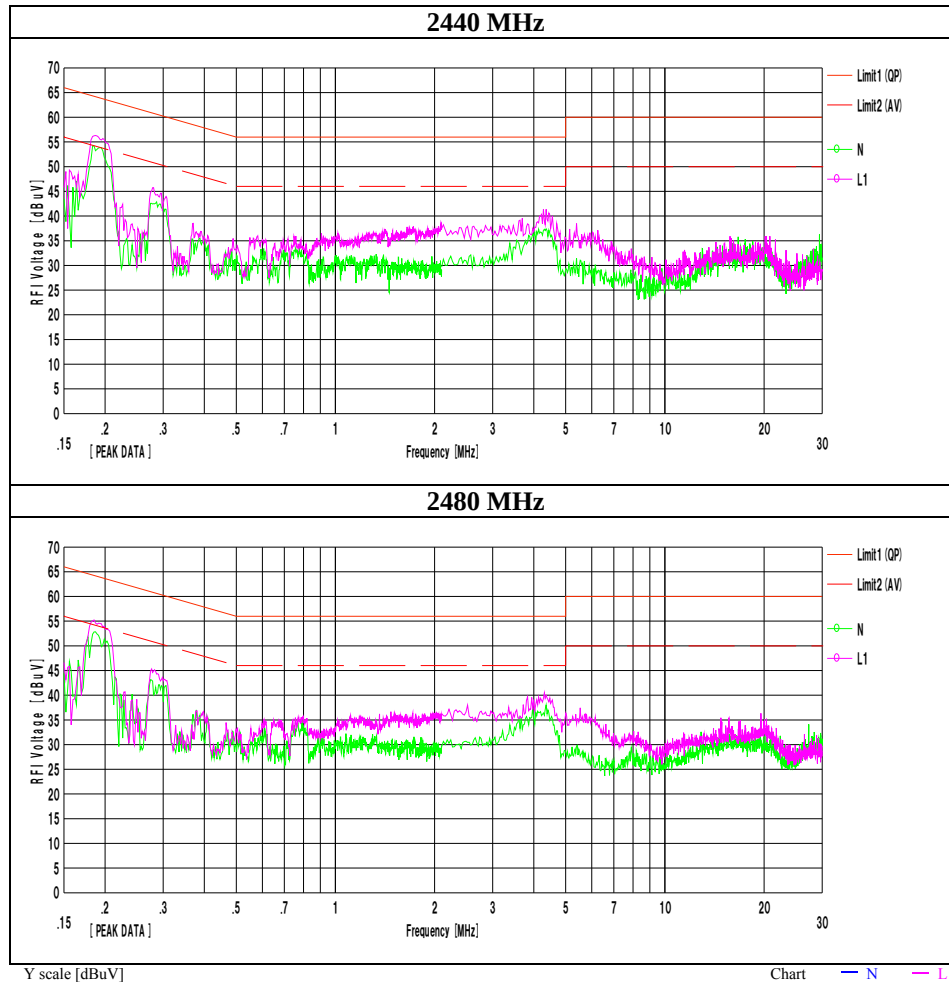


No.	Freq. [MHz]	Reading		C.Fac	Results		Limit		Margin		Phase	Comment
		<QP> [dBuV]	<AV> [dBuV]		<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]	<QP> [dBuV]	<AV> [dBuV]		
1	0.15000	25.60	4.10	12.41	38.01	16.51	66.00	56.00	27.9	39.4	N	
2	0.27900	38.30	9.50	12.42	50.72	21.92	60.85	50.85	10.1	28.9	N	
3	0.36900	17.70	3.20	12.45	30.15	15.65	58.52	48.52	28.3	32.8	N	
4	1.74300	15.10	2.30	12.56	27.66	14.86	56.00	46.00	28.3	31.1	N	
5	4.26400	18.90	2.30	12.71	31.61	15.01	56.00	46.00	24.3	30.9	N	
6	20.00100	10.70	3.40	13.41	24.11	16.81	60.00	50.00	35.8	33.1	N	
7	0.15000	25.00	3.70	12.41	37.41	16.11	66.00	56.00	28.5	39.8	L1	
8	0.18900	38.60	18.90	12.41	51.01	31.31	64.08	54.08	13.0	22.7	L1	
9	0.18943	37.90	20.40	12.41	50.31	32.81	64.06	54.06	13.7	21.2	L1	
10	0.27900	27.40	9.00	12.42	39.82	21.42	60.85	50.85	21.0	29.4	L1	
11	0.36900	18.10	3.10	12.45	30.55	15.55	58.52	48.52	27.9	32.9	L1	
12	1.74300	20.10	6.10	12.56	32.66	18.66	56.00	46.00	23.3	27.3	L1	
13	4.26400	20.40	3.90	12.71	33.11	16.61	56.00	46.00	22.8	29.3	L1	
14	20.00120	12.30	6.20	13.41	25.71	19.61	60.00	50.00	34.2	30.3	L1	

Calculation: Result [dBuV] = Reading [dBuV] + C.Fac (LISN+Cable+ATT) [dB]
LISN: SLS-01

Conducted Emission

Test place : Shonan EMC Lab. No.1 Shielded room
Report No. : 11822950S-D-R1
Date : June 25, 2017
Temperature / Humidity : 22 deg. C / 55 % RH
Engineer : Kazutaka Takeyama
Mode : Tx BT LE

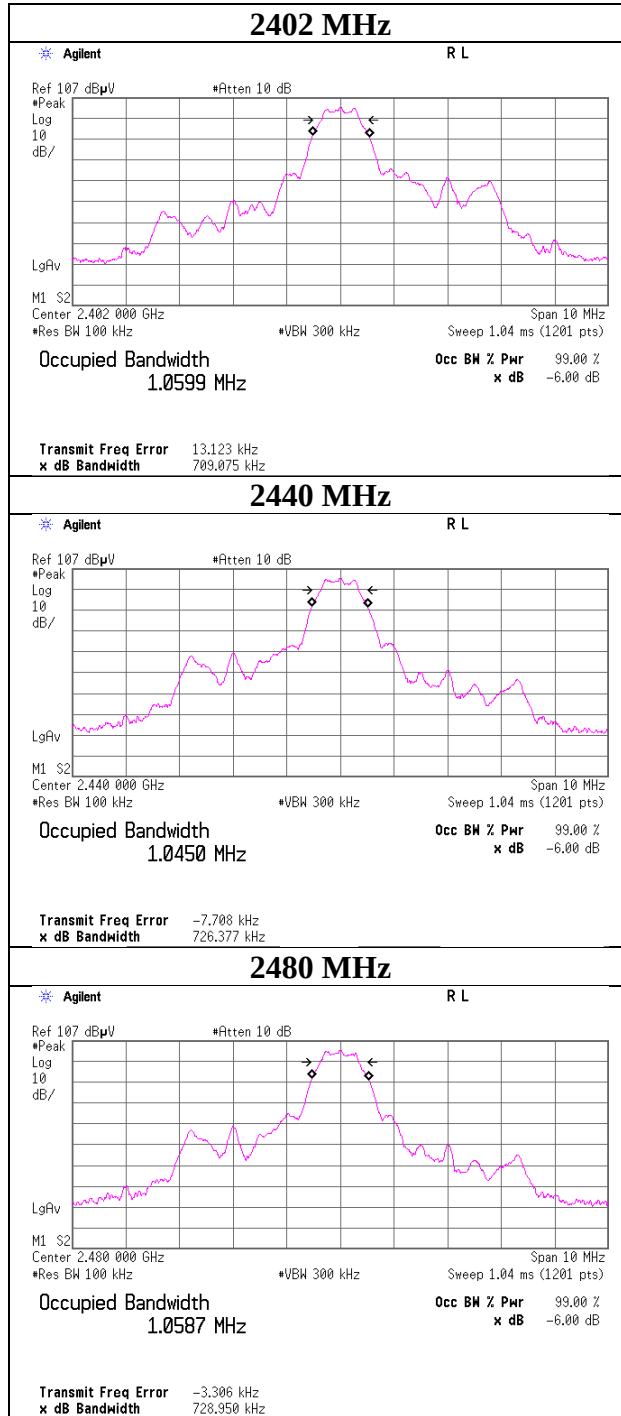


6dB Bandwidth

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11822950S-D-R1
Date June 23, 2017
Temperature / Humidity 25 deg. C / 52 % RH
Engineer Hiroyuki Morikawa
Mode Tx BT LE

Frequency [MHz]	6dB Bandwidth [MHz]	Limit [kHz]
2402	0.709	> 500
2440	0.726	> 500
2480	0.729	> 500

6dB Bandwidth



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

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Facsimile : +81 463 50 6401

Maximum Peak Output Power

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11822950S-D-R1
Date July 31, 2017
Temperature / Humidity 24 deg. C / 57 % RH
Engineer Hiroyuki Morikawa
Mode Tx BT LE

Freq. [MHz]	Reading [dBm]	Cable Loss [dB]	Atten. Loss [dB]	Result		Limit		Margin [dB]
				[dBm]	[mW]	[dBm]	[mW]	
2402	-4.28	1.00	9.96	6.68	4.66	30.00	1000	23.32
2440	-4.21	1.00	9.97	6.76	4.74	30.00	1000	23.24
2480	-4.25	1.01	9.97	6.73	4.71	30.00	1000	23.27

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. : 11822950S-D-R1
Date : July 31, 2017
Temperature / Humidity : 24 deg. C / 57 % RH
Engineer : Hiroyuki Morikawa
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	-6.82	1.00	9.96	4.14	2.59	1.88	6.02	4.00
2440	-6.77	1.00	9.97	4.20	2.63	1.88	6.08	4.06
2480	-6.80	1.01	9.97	4.18	2.62	1.88	6.06	4.04

Sample Calculation:

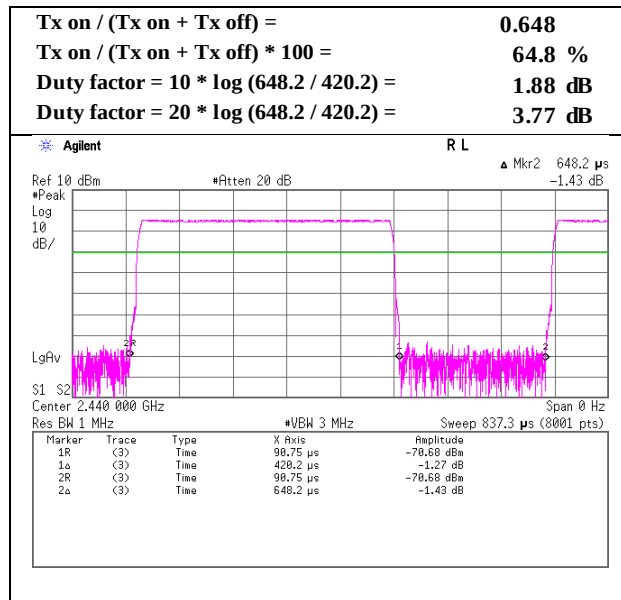
Result (Time average) = Reading + Cable Loss (including the cable(s) customer supplied) + Atten

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

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

Burst rate confirmation

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11822950S-D-R1
Date	June 23, 2017
Temperature / Humidity	25 deg. C / 52 % RH
Engineer	Hiroyuki Morikawa
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

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11822950S-D-R1
Date : June 22, 2017 June 23, 2017
Temperature / Humidity : 24 deg. C / 66 % RH 25 deg. C / 55 % RH
Engineer : Hiroyuki Morikawa Kazutaka Takeyama
(1 GHz -26.5 GHz) (30 MHz – 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.	163.787	QP	22.80	15.56	8.02	32.02	0.00	14.36	43.50	29.1	300	351	
Hori.	765.788	QP	22.80	20.23	10.60	31.60	0.00	22.03	46.00	23.9	150	101	
Hori.	876.884	QP	22.70	21.63	10.97	31.07	0.00	24.23	46.00	21.7	100	59	
Hori.	2390.000	PK	45.20	27.41	14.02	40.85	2.48	48.26	73.90	25.6	135	1	
Hori.	4804.000	PK	50.30	31.13	6.41	41.86	2.48	48.46	73.90	25.4	272	327	
Hori.	7206.000	PK	44.00	36.44	8.09	41.18	2.48	49.83	73.90	24.0	100	0	
Hori.	9608.000	PK	42.00	38.63	9.30	40.59	2.48	51.82	73.90	22.0	100	0	
Hori.	19216.000	PK	48.00	40.44	8.30	45.06	-9.54	42.14	73.90	31.7	138	290	
Vert.	105.810	QP	22.90	10.81	7.44	32.07	0.00	9.08	43.50	34.4	100	232	
Vert.	137.242	QP	23.10	14.10	7.70	32.04	0.00	12.86	43.50	30.6	100	292	
Vert.	376.004	QP	22.60	15.08	9.10	31.86	0.00	14.92	46.00	31.0	100	2	
Vert.	643.243	QP	22.90	19.22	10.18	31.85	0.00	20.45	46.00	25.5	100	354	
Vert.	2390.000	PK	46.00	27.41	14.02	40.85	2.48	49.06	73.90	24.8	144	350	
Vert.	4804.000	PK	51.10	31.13	6.41	41.86	2.48	49.26	73.90	24.6	153	267	
Vert.	7206.000	PK	47.40	36.44	8.09	41.18	2.48	53.23	73.90	20.6	100	0	
Vert.	9608.000	PK	47.00	38.63	9.30	40.59	2.48	56.82	73.90	17.0	100	0	
Vert.	19216.000	PK	48.40	40.44	8.30	45.06	-9.54	42.54	73.90	31.3	160	6	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2390.000	AV	37.40	27.41	14.02	40.85	3.72	2.48	44.18	53.90	9.7	*1)
Hori.	4804.000	AV	42.00	31.13	6.41	41.86	3.72	2.48	43.88	53.90	10.0	
Hori.	7206.000	AV	35.50	36.44	8.09	41.18	3.72	2.48	45.05	53.90	8.9	
Hori.	9608.000	AV	34.30	38.63	9.30	40.59	3.72	2.48	47.84	53.90	6.1	
Hori.	19216.000	AV	41.20	40.44	8.30	45.06	3.72	-9.54	39.06	53.90	14.8	
Vert.	2390.000	AV	37.00	27.41	14.02	40.85	3.72	2.48	43.78	53.90	10.1	*1)
Vert.	4804.000	AV	43.40	31.13	6.41	41.86	3.72	2.48	45.28	53.90	8.6	
Vert.	7206.000	AV	36.60	36.44	8.09	41.18	3.72	2.48	46.15	53.90	7.8	
Vert.	9608.000	AV	35.50	38.63	9.30	40.59	3.72	2.48	49.04	53.90	4.9	
Vert.	19216.000	AV	41.70	40.44	8.30	45.06	3.72	-9.54	39.56	53.90	14.3	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB

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

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

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	99.32	27.46	14.03	40.84	2.48	102.45	-	-	Carrier
Hori.	2400.000	PK	55.00	27.45	14.03	40.84	2.48	58.12	82.45	24.3	
Hori.	2558.000	PK	44.52	27.93	14.19	40.87	2.48	48.25	82.45	34.2	
Hori.	2584.000	PK	42.11	27.96	14.21	40.90	2.48	45.86	82.45	36.6	
Vert.	2402.000	PK	98.20	27.46	14.03	40.84	2.48	101.33	-	-	Carrier
Vert.	2400.000	PK	54.00	27.45	14.03	40.84	2.48	57.12	81.33	24.2	
Vert.	2558.000	PK	42.12	27.93	14.19	40.87	2.48	45.85	81.33	35.5	
Vert.	2584.000	PK	43.14	27.96	14.21	40.90	2.48	46.89	81.33	34.4	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB

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

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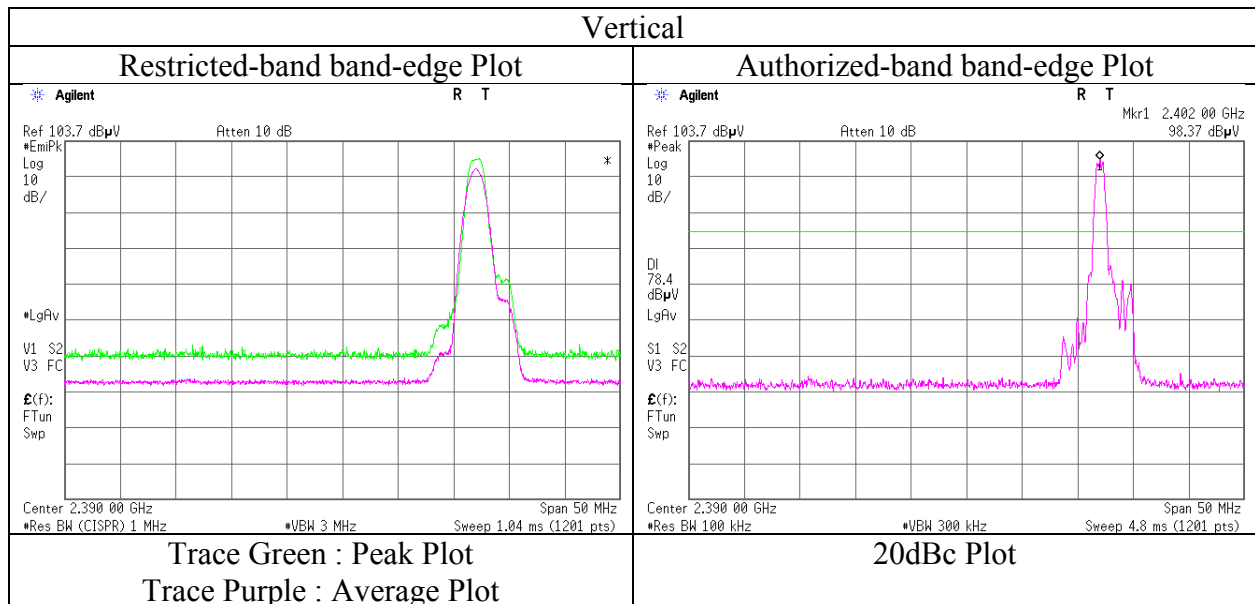
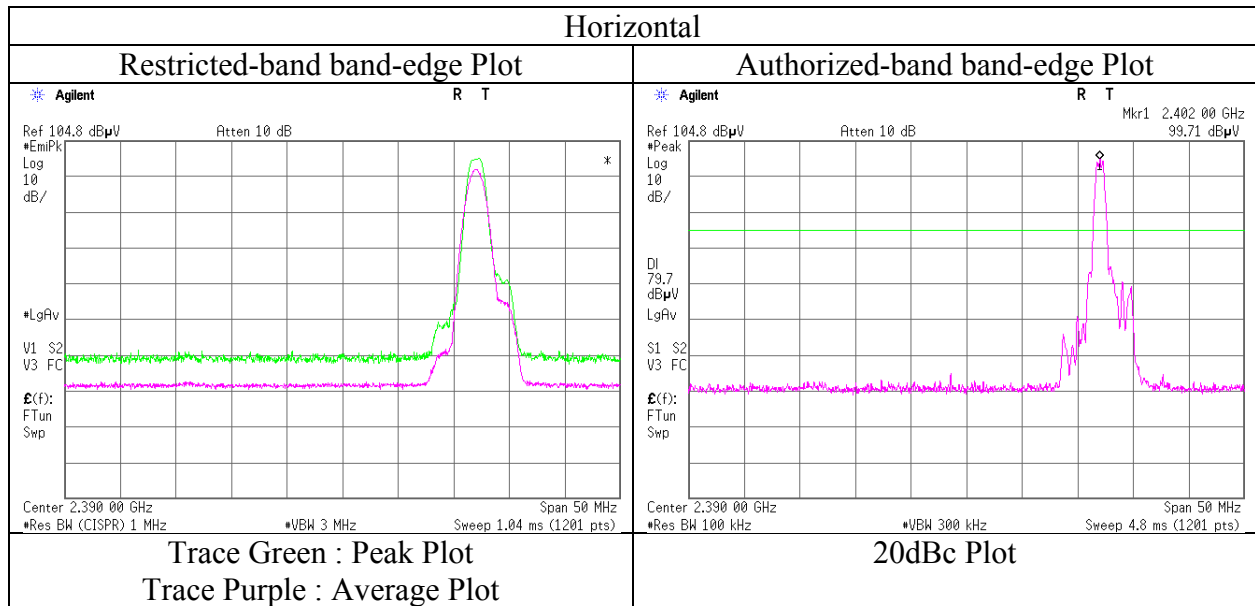
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11822950S-D-R1
Date	June 22, 2017
Temperature / Humidity	24 deg. C / 66 % RH
Engineer	Hiroyuki Morikawa (1 GHz -13 GHz)
Mode	Tx BT LE 2402 MHz



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

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11822950S-D-R1
Date : June 22, 2017 June 23, 2017
Temperature / Humidity : 24 deg. C / 66 % RH 25 deg. C / 55 % RH
Engineer : Hiroyuki Morikawa Kazutaka Takeyama
(1 GHz -26.5 GHz) (30 MHz – 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.	32.721	QP	22.40	16.60	6.68	32.13	0.00	13.55	40.00	26.4	300	124	
Hori.	105.310	QP	22.90	10.74	7.45	32.07	0.00	9.02	43.50	34.4	150	205	
Hori.	177.909	QP	23.10	16.19	7.98	32.01	0.00	15.26	43.50	28.2	150	79	
Hori.	941.736	QP	22.70	22.07	11.18	30.55	0.00	25.40	46.00	20.6	150	171	
Hori.	4880.000	PK	51.80	31.29	6.47	41.76	2.48	50.28	73.90	23.6	256	333	
Hori.	7320.000	PK	46.00	36.77	8.25	41.27	2.48	52.23	73.90	21.6	100	0	
Hori.	9760.000	PK	42.60	38.75	9.40	40.62	2.48	52.61	73.90	21.2	100	0	
Hori.	19520.000	PK	50.50	40.34	8.39	45.01	-9.54	44.68	73.90	29.2	134	281	
Vert.	160.909	QP	23.10	15.43	8.02	32.02	0.00	14.53	43.50	28.9	100	1	
Vert.	387.201	QP	22.60	15.33	9.15	31.86	0.00	15.22	46.00	30.7	100	358	
Vert.	894.380	QP	22.60	21.87	11.03	30.96	0.00	24.54	46.00	21.4	100	2	
Vert.	4880.000	PK	53.80	31.29	6.47	41.76	2.48	52.28	73.90	21.6	166	260	
Vert.	7320.000	PK	45.50	36.77	8.25	41.27	2.48	51.73	73.90	22.1	100	0	
Vert.	9760.000	PK	43.60	38.75	9.40	40.62	2.48	53.61	73.90	20.2	100	0	
Vert.	19520.000	PK	49.50	40.34	8.39	45.01	-9.54	43.68	73.90	30.2	152	182	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	4880.000	AV	42.90	31.29	6.47	41.76	3.72	2.48	45.10	53.90	8.8	
Hori.	7320.000	AV	36.40	36.77	8.25	41.27	3.72	2.48	46.35	53.90	7.6	
Hori.	9760.000	AV	34.70	38.75	9.40	40.62	3.72	2.48	48.43	53.90	5.5	
Hori.	19520.000	AV	43.30	40.34	8.39	45.01	3.72	-9.54	41.20	53.90	12.7	
Vert.	4880.000	AV	43.70	31.29	6.47	41.76	3.72	2.48	45.90	53.90	8.0	
Vert.	7320.000	AV	35.80	36.77	8.25	41.27	3.72	2.48	45.75	53.90	8.2	
Vert.	9760.000	AV	34.80	38.75	9.40	40.62	3.72	2.48	48.53	53.90	5.4	
Vert.	19520.000	AV	43.80	40.34	8.39	45.01	3.72	-9.54	41.70	53.90	12.2	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB

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

Duty factor refer to "Duty factor Calculation chart" sheet.

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.	2440.000	PK	98.00	27.61	14.08	40.83	2.48	101.34	-	-	Carrier
Hori.	2570.000	PK	42.69	27.94	14.19	40.89	2.48	46.41	81.34	34.9	
Hori.	2596.000	PK	43.83	27.97	14.22	40.92	2.48	47.58	81.34	33.8	
Vert.	2440.000	PK	97.30	27.61	14.08	40.83	2.48	100.64	-	-	Carrier
Vert.	2570.000	PK	42.92	27.94	14.19	40.89	2.48	46.64	80.64	34.0	
Vert.	2596.000	PK	44.03	27.97	14.22	40.92	2.48	47.78	80.64	32.9	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB

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

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission

Test place : Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No. : 11822950S-D-R1
Date : June 22, 2017 June 23, 2017
Temperature / Humidity : 24 deg. C / 66 % RH 25 deg. C / 55 % RH
Engineer : Hiroyuki Morikawa Kazutaka Takeyama
(1 GHz -26.5 GHz) (30 MHz – 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.	138.462	QP	22.90	14.19	7.73	32.04	0.00	12.78	43.50	30.7	300	169	
Hori.	170.769	QP	23.00	15.87	8.01	32.01	0.00	14.87	43.50	28.6	150	150	
Hori.	600.000	QP	22.89	18.95	10.02	31.82	0.00	20.04	46.00	25.9	100	177	
Hori.	2483.500	PK	51.00	27.79	14.12	40.81	2.48	54.58	73.90	19.3	277	356	
Hori.	4960.000	PK	50.10	31.45	6.52	41.65	2.48	48.90	73.90	25.0	255	338	
Hori.	7440.000	PK	47.00	37.11	8.40	41.36	2.48	53.63	73.90	20.2	100	0	
Hori.	9920.000	PK	45.10	38.87	9.49	40.66	2.48	55.28	73.90	18.6	100	0	
Hori.	19840.000	PK	49.60	40.24	8.45	45.11	-9.54	43.64	73.90	30.2	135	275	
Vert.	194.070	QP	23.00	16.24	7.97	32.00	0.00	15.21	43.50	28.2	100	114	
Vert.	636.633	QP	22.80	19.18	10.15	31.84	0.00	20.29	46.00	25.7	100	169	
Vert.	788.972	QP	22.90	20.46	10.67	31.51	0.00	22.52	46.00	23.4	100	224	
Vert.	941.665	QP	22.70	22.07	11.18	30.55	0.00	25.40	46.00	20.6	100	354	
Vert.	2483.500	PK	52.50	27.79	14.12	40.81	2.48	56.08	73.90	17.8	152	11	
Vert.	4960.000	PK	53.40	31.45	6.52	41.65	2.48	52.20	73.90	21.7	100	256	
Vert.	7440.000	PK	47.00	37.11	8.40	41.36	2.48	53.63	73.90	20.2	100	0	
Vert.	9920.000	PK	44.90	38.87	9.49	40.66	2.48	55.08	73.90	18.8	100	0	
Vert.	19840.000	PK	48.40	40.24	8.45	45.11	-9.54	42.44	73.90	31.4	140	182	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB

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

Average measurement value with duty factor

Polarity	Frequency [MHz]	Detector	Reading [dBuV]	Ant.Fac. [dB/m]	Loss [dB]	Gain [dB]	Duty Factor [dB]	Distance Factor [dB]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Remark
Hori.	2483.500	AV	39.20	27.79	14.12	40.81	3.72	2.48	46.50	53.90	7.4	*1)
Hori.	4960.000	AV	41.10	31.45	6.52	41.65	3.72	2.48	43.62	53.90	10.3	
Hori.	7440.000	AV	36.80	37.11	8.40	41.36	3.72	2.48	47.15	53.90	6.8	
Hori.	9920.000	AV	35.00	38.87	9.49	40.66	3.72	2.48	48.90	53.90	5.0	
Hori.	19840.000	AV	42.60	40.24	8.45	45.11	3.72	-9.54	40.36	53.90	13.6	
Vert.	2483.500	AV	38.70	27.79	14.12	40.81	3.72	2.48	46.00	53.90	7.9	*1)
Vert.	4960.000	AV	42.40	31.45	6.52	41.65	3.72	2.48	44.92	53.90	9.0	
Vert.	7440.000	AV	36.30	37.11	8.40	41.36	3.72	2.48	46.65	53.90	7.3	
Vert.	9920.000	AV	34.50	38.87	9.49	40.66	3.72	2.48	48.40	53.90	5.5	
Vert.	19840.000	AV	42.00	40.24	8.45	45.11	3.72	-9.54	39.76	53.90	14.2	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB

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

Duty factor refer to "Duty factor Calculation chart" sheet.

*1) Not out of band emission (Leakage Power)

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.	2480.000	PK	95.80	27.78	14.12	40.81	2.48	99.37	-	-	Carrier
Hori.	2636.000	PK	41.07	28.02	14.26	40.97	2.48	44.86	79.37	34.5	
Vert.	2480.000	PK	96.00	27.78	14.12	40.81	2.48	99.57	-	-	Carrier
Vert.	2636.220	PK	42.15	28.02	14.26	40.97	2.48	45.94	79.57	33.6	

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

Distance factor : 1 GHz - 13 GHz : 20log (3.99 m / 3.0 m) = 2.48 dB

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

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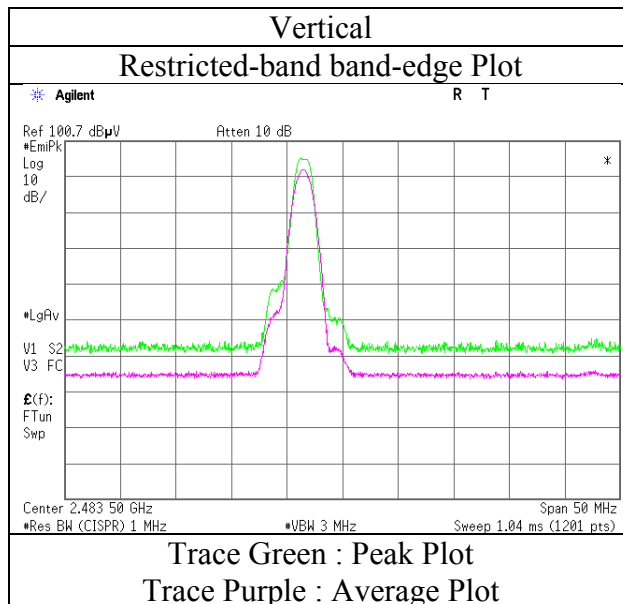
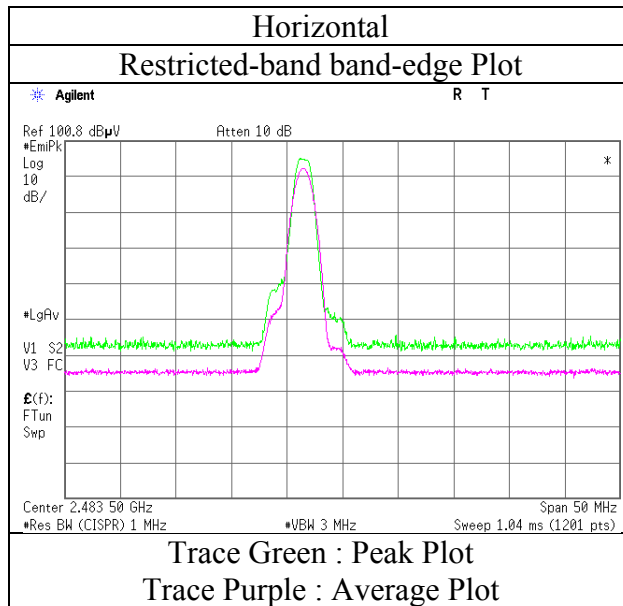
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

Radiated Spurious Emission (Reference Plot for band-edge)

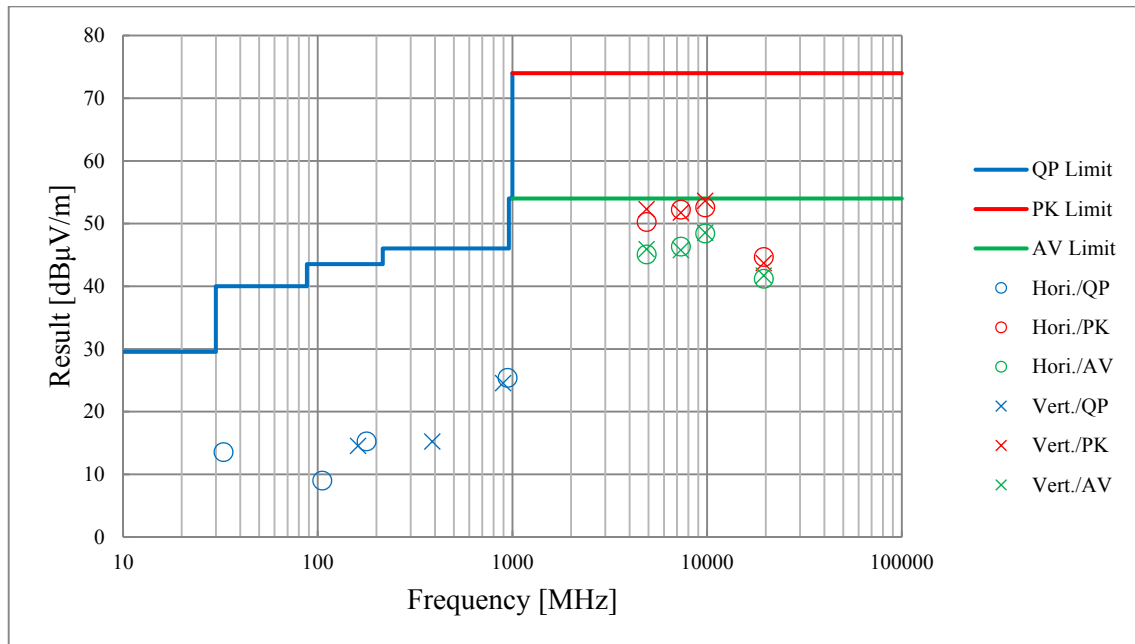
Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber
Report No.	11822950S-D-R1
Date	June 22, 2017
Temperature / Humidity	24 deg. C / 66 % RH
Engineer	Hiroyuki Morikawa (1 GHz -13 GHz)
Mode	Tx BT LE 2480 MHz



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

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

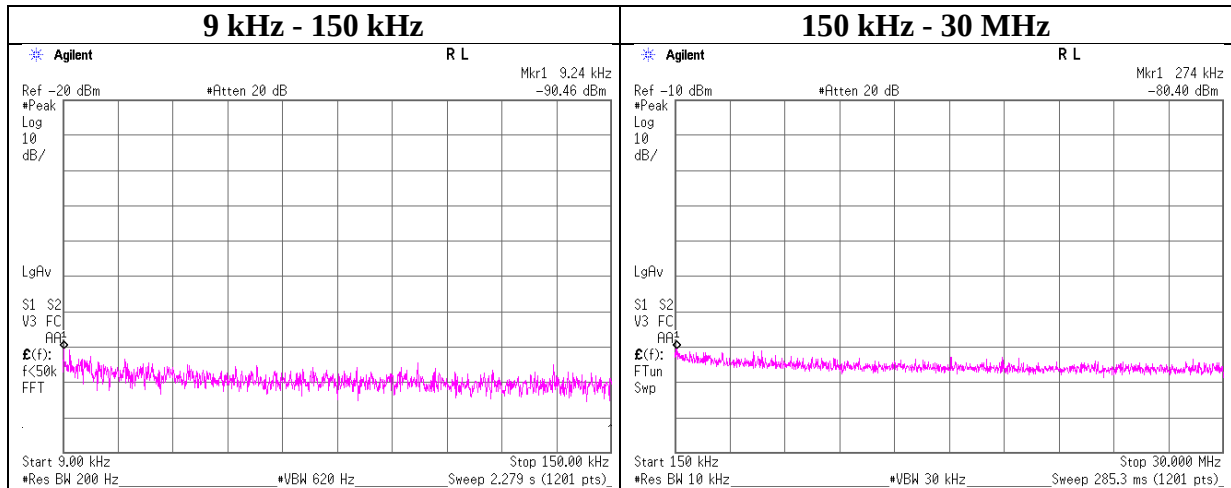
Test place	Shonan EMC Lab. No.3 Semi Anechoic Chamber	
Report No.	11822950S-D-R1	
Date	June 22, 2017	June 23, 2017
Temperature / Humidity	24 deg. C / 66 % RH	25 deg. C / 55 % RH
Engineer	Hiroyuki Morikawa (1 GHz -26.5 GHz)	Kazutaka Takeyama (30 MHz – 1 GHz)
Mode	Tx BT LE 2440 MHz	



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

Conducted Spurious Emission

Test place : Shonan EMC Lab. No.6 Shielded Room
Report No. : 11822950S-D-R1
Date : June 23, 2017
Temperature / Humidity : 25 deg. C / 52 % RH
Engineer : Hiroyuki Morikawa
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
9.24	-90.5	0.29	9.8	2.0	1	-78.3	300	6.0	-17.1	48.2	65.3	
274.00	-80.4	0.29	9.8	2.0	1	-68.3	300	6.0	-7.0	18.8	25.8	

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

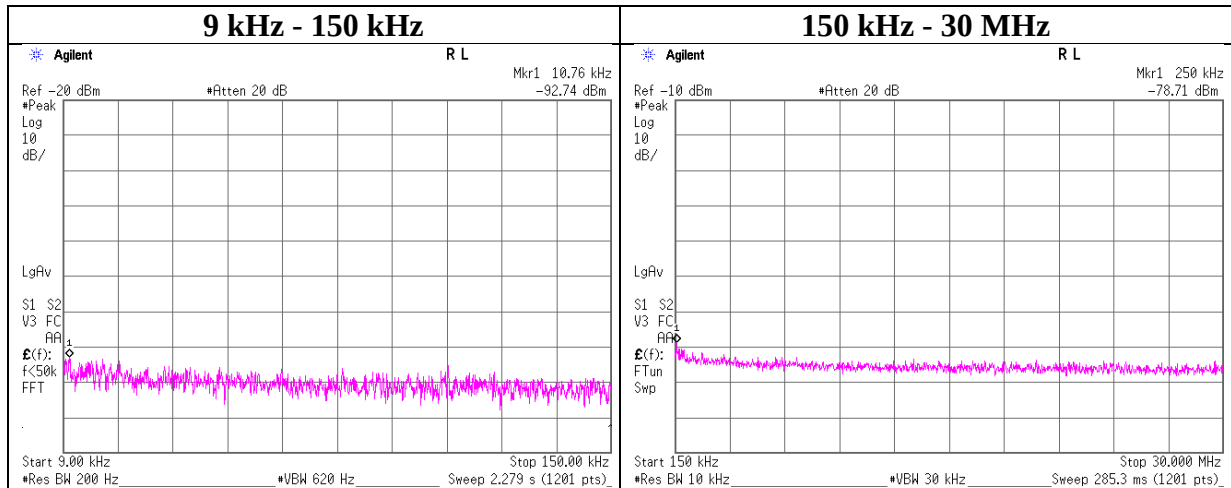
$EIRP[dBm] = Reading [dBm] + Cable\ loss [dB] + Attenuator\ Loss [dB] + Antenna\ gain [dBi] + 10 * \log (N)$

N: Number of output

*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.6 Shielded Room
Report No. : 11822950S-D-R1
Date : June 23, 2017
Temperature / Humidity : 25 deg. C / 52 % RH
Engineer : Hiroyuki Morikawa
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
10.76	-92.7	0.29	9.8	2.0	1	-80.6	300	6.0	-19.4	46.9	66.3	
250.00	-78.7	0.29	9.8	2.0	1	-66.6	300	6.0	-5.3	19.6	24.9	

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

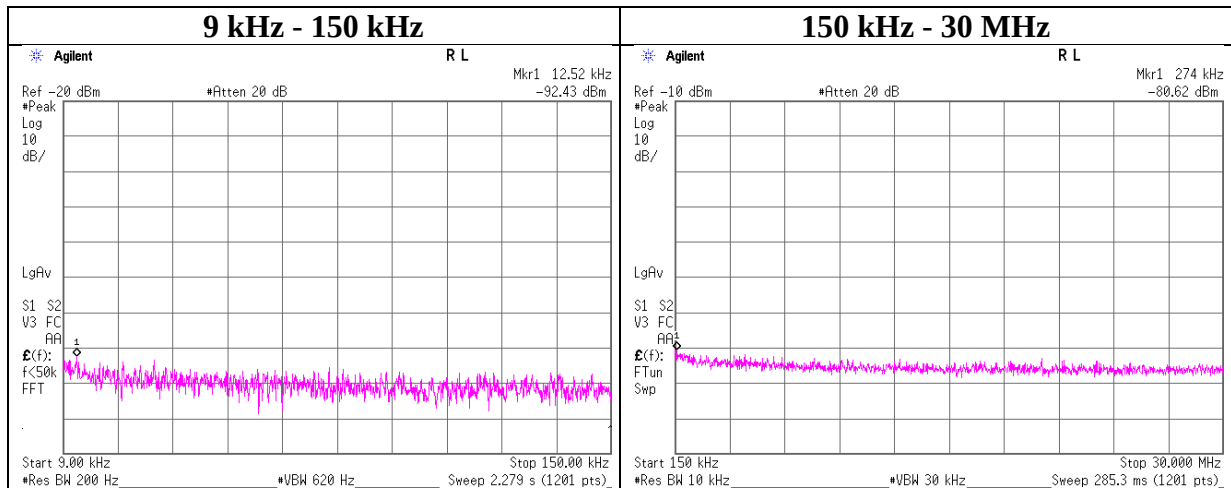
$EIRP[dBm] = Reading [dBm] + Cable\ loss [dB] + Attenuator\ Loss [dB] + Antenna\ gain [dBi] + 10 * \log (N)$

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.6 Shielded Room
Report No.	11822950S-D-R1
Date	June 23, 2017
Temperature / Humidity	25 deg. C / 52 % RH
Engineer	Hiroyuki Morikawa
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
12.52	-92.4	0.29	9.8	2.0	1	-80.3	300	6.0	-19.1	45.6	64.7	
274.00	-78.9	0.29	9.8	2.0	1	-66.7	300	6.0	-5.5	18.8	24.3	

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

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

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.

Power Density

Test place Shonan EMC Lab. No.5 Shielded Room
Report No. 11822950S-D-R1
Date June 23, 2017
Temperature / Humidity 25 deg. C / 52 % RH
Engineer Hiroyuki Morikawa
Mode Tx BT LE

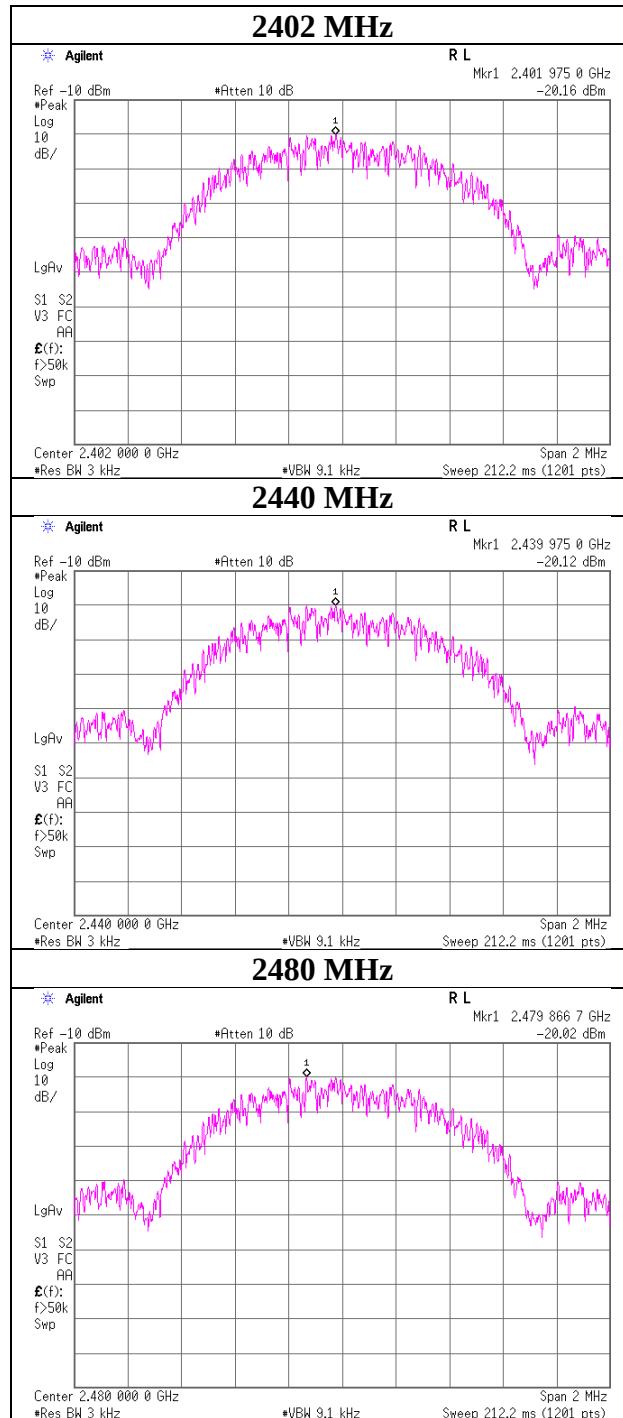
Freq.	Reading	Cable Loss	Atten. Loss	Result	Limit	Margin
[MHz]	[dBm]	[dB]	[dB]	[dBm]	[dBm]	[dB]
2402.00	-20.16	1.00	9.96	-9.20	8.00	17.20
2440.00	-20.12	1.00	9.97	-9.15	8.00	17.15
2480.00	-20.02	1.01	9.97	-9.04	8.00	17.04

Sample Calculation:

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

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

Power Density



UL Japan, Inc.

Shonan EMC Lab.

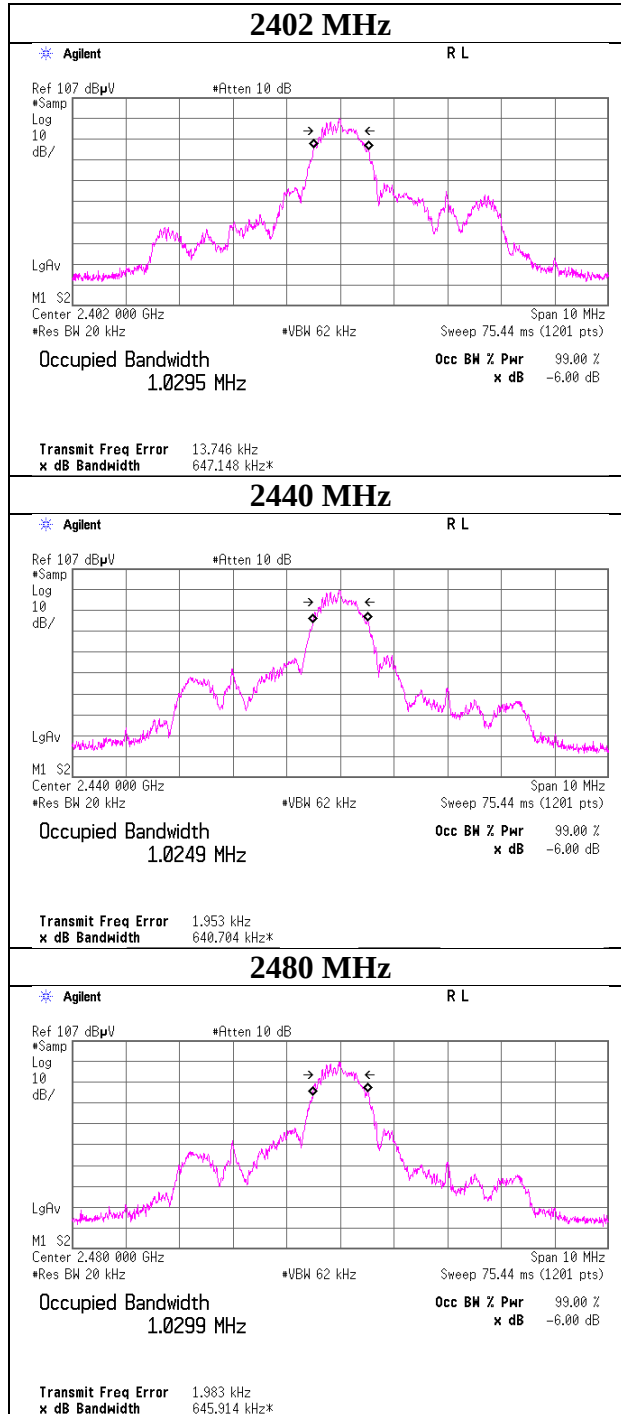
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401

99% Occupied Bandwidth

Test place	Shonan EMC Lab. No.5 Shielded Room
Report No.	11822950S-D-R1
Date	June 23, 2017
Temperature / Humidity	25 deg. C / 52 % RH
Engineer	Hiroyuki Morikawa
Mode	Tx BT LE



APPENDIX 2: Test instruments

Test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2017/06/11 * 12
SAF-04	Pre Amplifier	TOYO Corporation	TPA0118-36	1440489	RE	2017/03/17 * 12
SCC-G05	Coaxial Cable	Junkosha	J12J102207-00	APR-30-15-037	RE	2017/01/08 * 12
SCC-G22	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	RE	2017/05/08 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2016/08/22 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2016/10/12 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2017/03/07 * 12
SJM-02	Measure	KOMELON	KMC-36	-	RE	-
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFI,MF)	-	RE,CE	-
STS-03	Digital Hitester	Hioki	3805-50	080997823	RE	2016/10/17 * 12
SFL-02	Highpass Filter	MICRO-TRONICS	HPM50111	051	RE	2016/11/29 * 12
SCC-G40	Coaxial Cable	Junkosha	MWX221-01000NF SNMS/B	1612S005	RE	2017/01/08 * 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-G20	Coaxial Cable	Junkosha	J12J102518-00	APR-15-15-003	RE	2017/04/20 * 12
SCC-G33	Coaxial Cable	Junkosha	MWX241-01000K MSKMS	-	RE	2017/04/20 * 12
SAT10-06	Attenuator	Agilent	8493C-010	74865	RE	2016/11/07 * 12
SAEC-03(SVS WR)	Semi-Anechoic Chamber	TDK	SAEC-03(SVSWR)	3	RE	2016/07/25 * 12
SCC-A12/A13/ SRSE-01	Coaxial Cable&RF Selector	Suhner/Suhner/TOYO	RG223U/141PE/NS 4906	-/0901-269(RF Selector)	CE	2017/04/07 * 12
SLS-01	LISN	Rohde & Schwarz	ENV216	100511	CE	2017/02/10 * 12
SAT3-10	Attenuator	JFW	50HF-003N	-	CE	2016/08/04 * 12
SOS-15	Humidity Indicator	A&D	AD-5681	7478311	CE	2017/02/21 * 12
STR-01	Test Receiver	Rohde & Schwarz	ESU40	100093	CE	2017/04/12 * 12
KJM-09	Measure	KOMELON	KMC-36	-	CE	-
STS-01	Digital Hitester	Hioki	3805-50	080997812	CE	2016/10/17 * 12
SCC-G12	Coaxial Cable	Suhner	SUCOFLEX 102	30790/2	AT	2017/03/23 * 12
SAT10-13	Attenuator	Weinschel Corp.	54A-10	81626	AT	2017/03/23 * 12
SPM-07	Power Meter	Agilent	8990B	MY5100272	AT	2017/04/17 * 12
SPSS-05	Power sensor	Agilent	N1923A	MY5349008	AT	2017/05/01 * 12
SOS-09	Humidity Indicator	A&D	AD-5681	4061484	AT	2016/12/13 * 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

UL Japan, Inc.

Shonan EMC Lab.

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

Telephone : +81 463 50 6400

Facsimile : +81 463 50 6401