



Test report No. : 10368504S
Page : 1 of 19
Issued date : June 17, 2014
FCC ID : 2AADJFFS-L

EMI TEST REPORT

Test Report No.: 10368504S

Applicant : Sony Engineering Corporation
Type of Equipment : RF Glow-Wristband receiver
Model No. : FFS-W4
FCC ID : 2AADJFFS-L
Test regulation : FCC Part15 Subpart B: 2014
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 limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
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6. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.

Date of test:

June 12, 2014

Representative test engineer:

Akio Hayashi
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.

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13-EM-F0429

REVISION HISTORY

Original Test Report No.: 10368504S

[illegible]

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SECTION 1: Customer information

Company Name : Sony Engineering Corporation
Address : 3-3-1 Tsujido-Shinmachi Fujisawa-shi, Kanagawa, 251-0042 Japan
Telephone Number : +81-466-38-3428
Facsimile Number : +81-466-38-3771
Contact Person : Masayuki Okada

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

2.1 Identification of E.U.T.

Type of Equipment : RF Glow-Wristband receiver
Model Number : FFS-W4
Serial Number : 20/24/25
Rating : DC1.5V
Country of Mass-production : Vietnam
Condition of EUT : Engineering prototype
(Not for Sale: This sample is equivalent to mass-produced items.)
Receipt Date of Sample : June 10, 2014
Modification of EUT : No modification by the test lab.

2.2 Product description

Model: FFS-W4 (referred to as the EUT in this report) is an RF Glow-Wristband receiver.

Clock frequency(ies) in the system : 30MHz(RF IC), 24MHz(MCU)

<Radio part>

Equipment type : Receiver
Frequency of operation : 922.4-926.4MHz
Antenna type : Pattern antenna (internal)
Antenna connector type : None

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SECTION 3: Test specification, procedures & results

3.1 Test specification

Test specification : FCC Part 15 Subpart B: 2014,
final revised on May 1, 2014 and effective June 2, 2014
Title : FCC 47CFR Part 15 Radio Frequency Device
Subpart B Unintentional Radiators

3.2 Procedures & Results

Item	Test Procedure	Limits	Deviation	Worst margin	Result
Conducted emission	ANSI C63.4: 2009 7. AC powerline conducted emission measurements	FCC 15.107 (a)	N/A *1)	N/A	N/A
Radiated emission	ANSI C63.4: 2009 8. Radiated emission measurements	FCC 15.109 (a)	N/A	22.4dB Serial No.: 20 Freq.: 1843.165MHz Polarization: Horizontal Detection: Average Mode: Receiving 922.4MHz	Complied
Antenna power conduction for receivers	ANSI C63.4: 2009 12.2.5 Antenna- conducted power measurements	FCC 15.111 (a)	N/A *2)	N/A	N/A

*1) The test is not applicable since the EUT does not have AC Mains ports.

*2) The test is not applicable since the EUT does not have antenna ports.

Note: UL Japan's EMI Work Procedures No.13-EM-W0420

3.3 Additions to standards

No addition, deviation or exclusion has been made from standards.

3.4 Confirmation

UL Japan, Inc. hereby confirms the E.U.T., in the configuration tested, complies with the specifications
FCC Part 15 Subpart B: 2014.

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3.5 Uncertainty

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

Item	Frequency range	No.1 SAC ^{*1} /SR ^{*2} (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
Radiated emission (Measurement distance: 3m)	30MHz-300MHz	4.8 dB	5.0 dB	4.8 dB
	300MHz-1GHz	5.0 dB	5.0 dB	4.8 dB
	1GHz-18GHz	4.9 dB	4.9 dB	4.9 dB

*1: SAC=Semi-Anechoic Chamber

*2: SR= Shielded Room is applied besides radiated emission

Radiated emission

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

3.6 Test location

UL Japan, Inc. Shonan EMC Lab.

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

Telephone number : +81 463 50 6400

Facsimile number : +81 463 50 6401

JAB Accreditation No. : RTL02610

	IC Registration No.	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	10m
☐ No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
☒ No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
☐ 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	-

3.7 Test Setup, Data of EMI & Test instruments

Refer to Appendix 1 to 3.

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

4.1 Operating mode

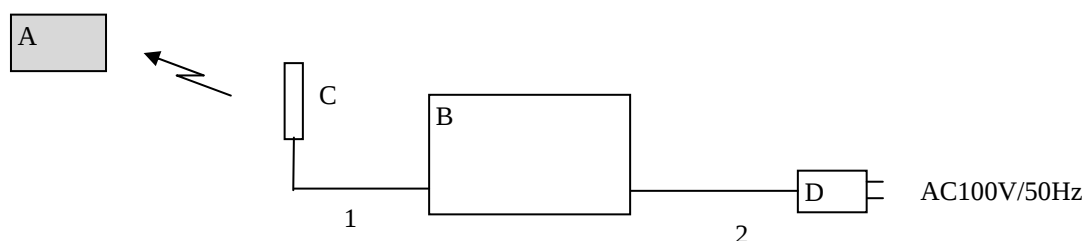
The EUT exercise program used during testing was designed to exercise the various system components in a manner similar to typical use.

Test item	Operating mode	Tested frequency
All items	Receiving	922.4MHz, 924.4MHz, 926.4MHz

Software: NODE1_v1005

Justification: The system was configured in typical fashion (as customer would normally use it) for testing.

4.2 Configuration and peripherals



* Test data was taken under worse case conditions.

Description of EUT and support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	RF Glow-Wristband receiver	FFS-W4	20/24/25	Sony Engineering	EUT
B	RF transmitter	FFS-T1	No.0021	Sony Engineering	-
C	Antenna	-	-	-	-
D	AC Adaptor	SU10-102	08459031 1329	Sinpro Electronics	-

List of cables used

No.	Cable	Length (m)	Shield-Cable	Shield-Connector	Remarks
1	Coaxial	3.0	Shielded	Shielded	-
2	DC	0.8	Unshielded	Unshielded	-

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SECTION 5: Radiated emission

5.1 Operating environment

The test was carried out in No.3 semi-anechoic chamber.

Temperature : See test data
Humidity : See test data

5.2 Test configuration

EUT was placed on a polyethylene platform of nominal size, 0.5m by 0.5m, raised 0.8m above the conducting ground plane. Photographs of the set up are shown in Appendix 1.

5.3 Test conditions

Frequency range : 30MHz - 5GHz
Test distance : 3m
EUT position : Table top

5.4 Test procedure

The Radiated Electric Field Strength intensity has been measured on an anechoic chamber with a ground plane and at a distance of 3m. Measurements were performed with quasi-peak, peak and average detector. The measuring antenna height was varied between 1 and 4m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity. The measurements were performed for both vertical and horizontal antenna polarization. The radiated emission measurements were made with the following detector function of the test receiver.

Frequency	:	30-1000MHz	1-5GHz
Detector Type	:	Quasi-Peak	Peak * Average
IF Bandwidth	:	120kHz	RBW:1MHz/VBW:3MHz RBW:1MHz/VBW:10Hz

* When using Spectrum analyzer, the test was made with adjusting span to zero by using peak hold.

The 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.
Worst position: Refer to the data.

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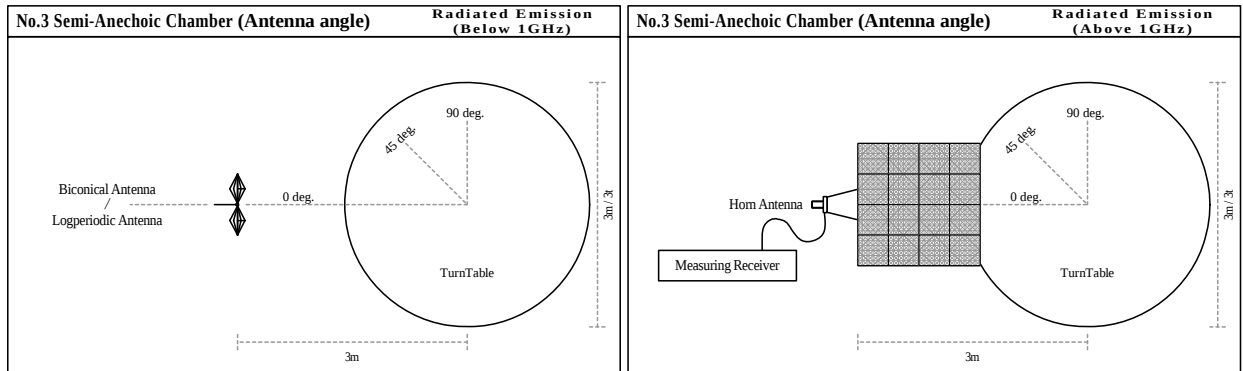


Figure 1. Antenna angle

5.5 Results

Summary of the test results : Pass
Refer to APPENDIX 1

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Contents of appendixes

APPENDIX 1: Data of EMI test

Radiated emission

APPENDIX 2: Test instruments

Test instruments

APPENDIX 3: Photographs of test setup

Radiated emission

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DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.3 Semi - Anechoic Chamber
Date : 2014/06/12

Company : Sony Engineering Corporation

Kind of EUT : RF Glow - Wristband receiver

Model No. : FFS - W4

Serial No. : 20

Remarks : EUT_axis Hor:Z Ver:Z

Mode : Receiving 922.4MHz

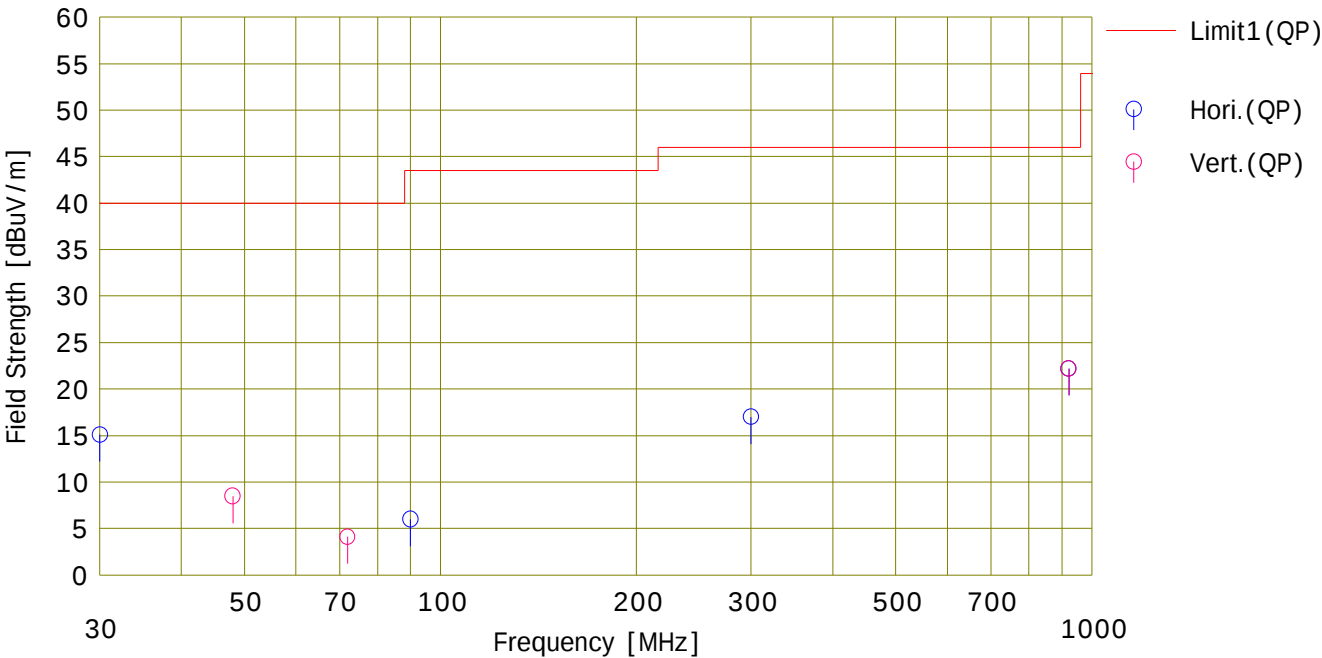
Order No. : 10368504S

Power : DC 1.5V

Temp./Humi. : 25deg.C. / 61%RH

Limit1 : FCC 15B Class B (3m)

Engineer : Akio Hayashi



No.	Freq.	Reading	Ant.Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant. Type	Comment
	[MHz]	[dBuV]				[dBuV/m]	[dBuV/m]	[dB]					
1	30.000	22.8	18.1	6.4	32.2	15.1	40.0	24.9	Hori.	400	327	BC	
2	90.000	22.6	8.1	7.4	32.1	6.0	43.5	37.5	Hori.	400	276	BC	
3	300.000	26.8	13.8	8.4	32.0	17.0	46.0	29.0	Hori.	400	162	LP	
4	922.400	20.6	21.8	10.7	30.9	22.2	46.0	23.8	Hori.	100	0	LP	
5	48.000	22.5	11.5	6.7	32.2	8.5	40.0	31.5	Vert.	100	214	BC	
6	72.000	23.1	6.3	6.9	32.2	4.1	40.0	35.9	Vert.	100	293	BC	
7	922.400	20.6	21.8	10.7	30.9	22.2	46.0	23.8	Vert.	100	0	LP	

DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.3 Semi - Anechoic Chamber
Date : 2014/06/12

Company : Sony Engineering Corporation

Kind of EUT : RF Glow - Wristband receiver

Model No. : FFS - W4

Serial No. : 24

Remarks : EUT_axis Hor:Z Ver:Z

Mode : Receiving 924.4MHz

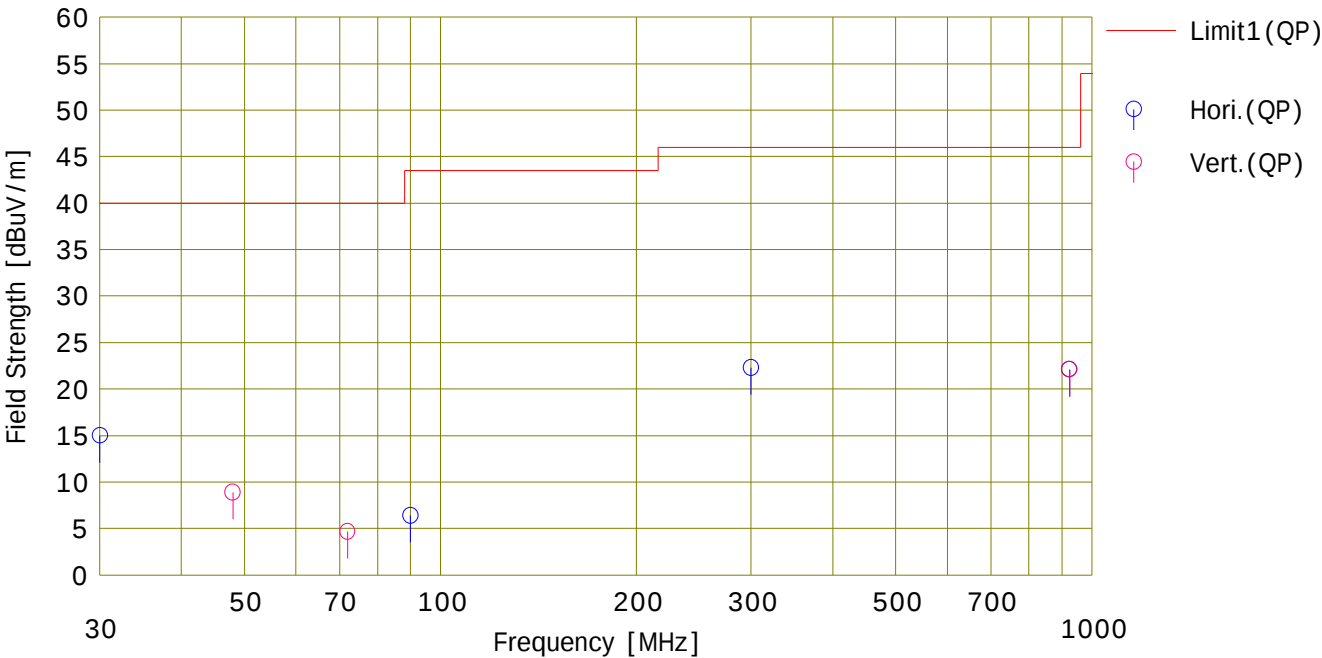
Order No. : 10368504S

Power : DC 1.5V

Temp./Humi. : 25deg.C. / 61%RH

Limit1 : FCC 15B Class B (3m)

Engineer : Akio Hayashi



No.	Freq. [MHz]	Reading	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result	Limit	Margin	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
		<QP> [dBuV]				<QP> [dBuV/m]	<QP> [dBuV/m]	<QP> [dB]					
1	30.000	22.7	18.1	6.4	32.2	15.0	40.0	25.0	Hori.	315	240	BC	
2	90.000	23.0	8.1	7.4	32.1	6.4	43.5	37.1	Hori.	372	15	BC	
3	300.000	27.0	18.9	8.4	32.0	22.3	46.0	23.7	Hori.	400	340	BC	
4	924.400	20.4	21.8	10.7	30.8	22.1	46.0	23.9	Hori.	100	0	LP	
5	48.000	22.9	11.5	6.7	32.2	8.9	40.0	31.1	Vert.	100	250	BC	
6	72.000	23.7	6.3	6.9	32.2	4.7	40.0	35.3	Vert.	100	241	BC	
7	924.400	20.4	21.8	10.7	30.8	22.1	46.0	23.9	Vert.	100	0	LP	

DATA OF RADIATED EMISSION TEST

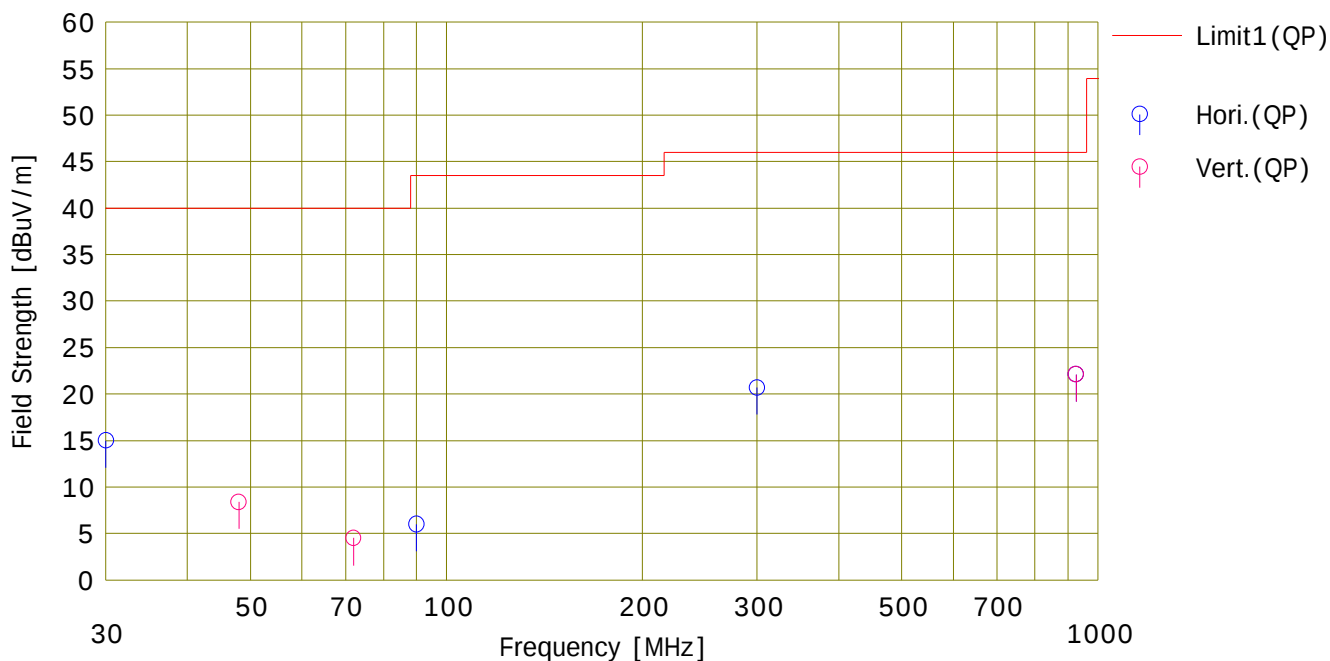
UL Japan, Inc. Shonan EMC Lab. No.3 Semi-Anechoic Chamber
Date : 2014/06/12

Company : Sony Engineering Corporation
Kind of EUT : RF Glow-Wristband receiver
Model No. : FFS-W4
Serial No. : 25
Remarks : EUT_axis Hor:Z Ver:Z

Mode : Receiving 926.4MHz
Order No. : 10368504S
Power : DC 1.5V
Temp./Humi. : 25deg.C. / 61%RH

Limit1 : FCC 15B Class B (3m)

Engineer : Akio Hayashi



No.	Freq. [MHz]	Reading <QP>	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	Result <QP>	Limit <QP>	Margin <QP>	Pola. [H/V]	Height [cm]	Angle [deg]	Ant. Type	Comment
		[dBuV]				[dBuV/m]	[dBuV/m]	[dB]					
1	30.000	22.7	18.1	6.4	32.2	15.0	40.0	25.0	Hori.	397	196	BC	
2	90.000	22.6	8.1	7.4	32.1	6.0	43.5	37.5	Hori.	356	302	BC	
3	300.000	30.5	13.8	8.4	32.0	20.7	46.0	25.3	Hori.	100	289	LP	
4	926.400	20.4	21.8	10.7	30.8	22.1	46.0	23.9	Hori.	359	291	LP	
5	48.000	22.4	11.5	6.7	32.2	8.4	40.0	31.6	Vert.	100	265	BC	
6	72.000	23.5	6.3	6.9	32.2	4.5	40.0	35.5	Vert.	100	153	BC	
7	926.400	20.4	21.8	10.7	30.8	22.1	46.0	23.9	Vert.	100	247	LP	

DATA OF RADIATED EMISSION TEST

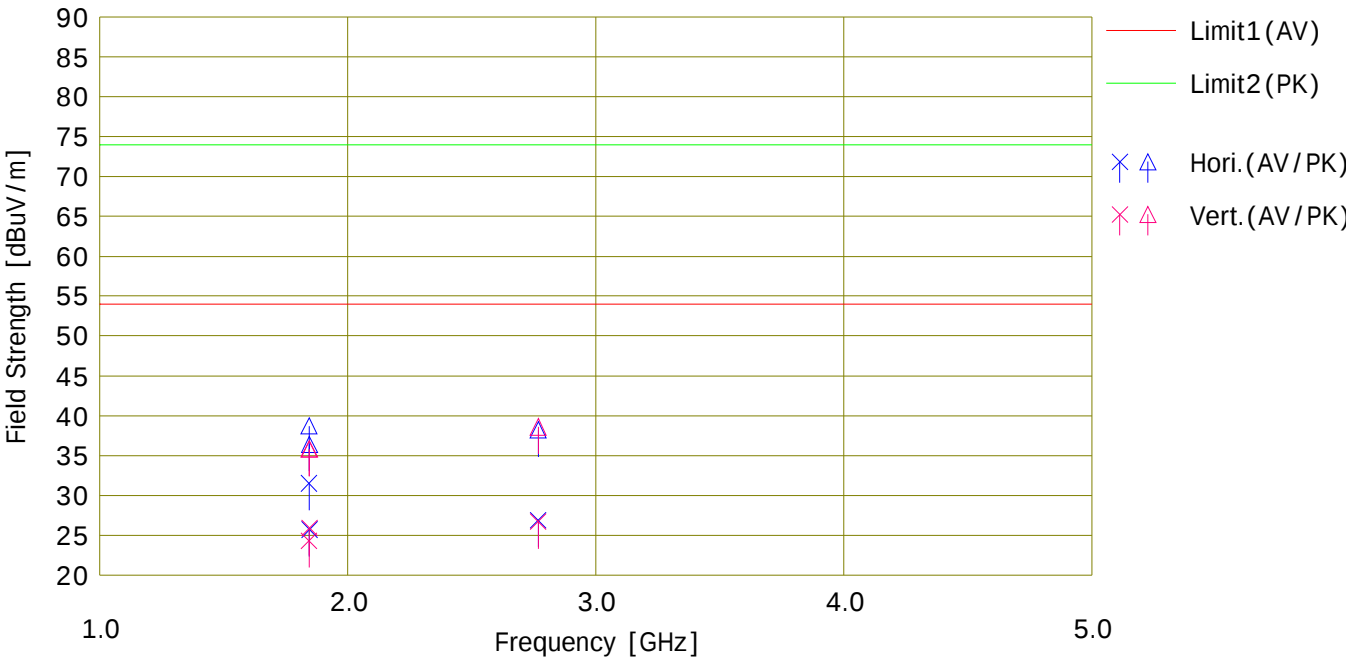
UL Japan, Inc. Shonan EMC Lab. No.3 Semi- Anechoic Chamber
Date : 2014/06/12

Company : Sony Engineering Corporation
Kind of EUT : RF Glow - Wristband receiver
Model No. : FFS - W4
Serial No. : 20
Remarks : EUT_axis Hor:Z Ver:Z

Mode : Receiving 922.4MHz
Order No. : 10368504S
Power : DC 1.5V
Temp. /Humi. : 25deg.C. / 61%RH

Limit1 : FCC 15B Class B (3m) AV
Limit2 : FCC 15B Class B (3m) Peak

Engineer : Akio Hayashi



No.	Freq.	Reading		Ant.Fac	Loss	Gain	Result		Limit		Margin		Pola.	Height	Angle	Ant. Type	Comment
		<AV>	<PK>				<AV>	<PK>	<AV>	<PK>	<AV>	<PK>					
	[MHz]	[dBuV]	[dBuV]		[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]		[cm]	[deg]		
1	1843.165	42.0	49.2	26.3	4.4	41.2	31.5	38.7	53.9	73.9	22.4	35.2	Hori.	110	0	SHA03	
2	1844.800	36.2	46.9	26.3	4.4	41.2	25.7	36.4	53.9	73.9	28.2	37.5	Hori.	100	243	SHA03	
3	2767.200	34.4	45.7	27.6	5.8	40.9	26.9	38.2	53.9	73.9	27.0	35.7	Hori.	100	289	SHA03	
4	1842.945	34.8	46.3	26.3	4.4	41.2	24.3	35.8	53.9	73.9	29.6	38.1	Vert.	100	0	SHA03	
5	1844.800	36.4	46.3	26.3	4.4	41.2	25.9	35.8	53.9	73.9	28.0	38.1	Vert.	100	265	SHA03	
6	2767.200	34.2	46.1	27.6	5.8	40.9	26.7	38.6	53.9	73.9	27.2	35.3	Vert.	100	188	SHA03	

DATA OF RADIATED EMISSION TEST

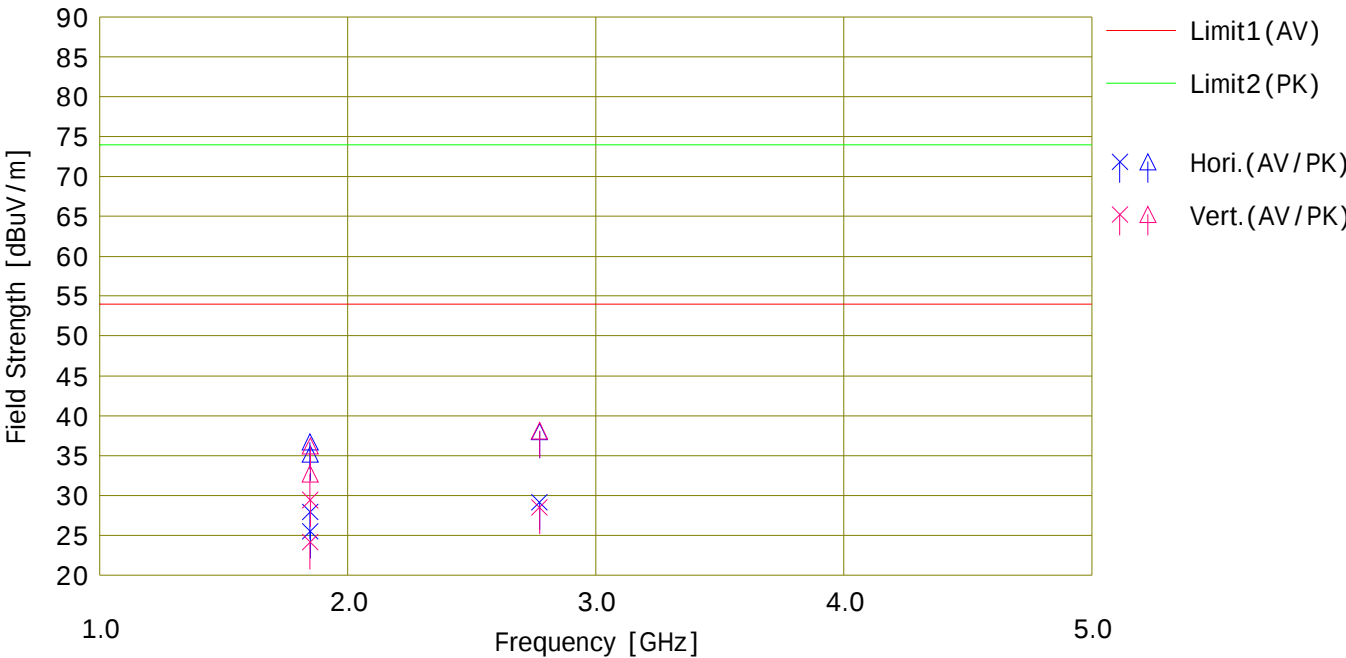
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Serial No. : 24
Remarks : EUT_axis Hor:Z Ver:Z

Mode : Receiving 924.4MHz
Order No. : 10368504S
Power : DC 1.5V
Temp./Humi. : 25deg.C. / 61%RH

Limit1 : FCC 15B Class B (3m) AV
Limit2 : FCC 15B Class B (3m) Peak

Engineer : Akio Hayashi



No.	Freq.	Reading		Ant.Fac	Loss	Gain	Result		Limit		Margin		Pola.	Height	Angle	Ant. Type	Comment
		<AV>	<PK>				<AV>	<PK>	<AV>	<PK>	<AV>	<PK>					
	[MHz]	[dBuV]	[dBuV]				[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]		[cm]	[deg]		
1	1846.980	38.4	47.2	26.3	4.4	41.2	27.9	36.7	53.9	73.9	26.0	37.2	Hori.	100	182	SHA03	
2	1848.800	36.0	45.7	26.3	4.4	41.2	25.5	35.2	53.9	73.9	28.4	38.7	Hori.	100	227	SHA03	
3	2773.200	36.6	45.5	27.6	5.8	40.9	29.1	38.0	53.9	73.9	24.8	35.9	Hori.	100	199	SHA03	
4	1846.905	34.6	43.2	26.3	4.4	41.2	24.1	32.7	53.9	73.9	29.8	41.2	Vert.	100	194	SHA03	
5	1848.800	39.9	46.7	26.3	4.4	41.2	29.4	36.2	53.9	73.9	24.5	37.7	Vert.	100	257	SHA03	
6	2773.200	36.0	45.6	27.6	5.8	40.9	28.5	38.1	53.9	73.9	25.4	35.8	Vert.	100	207	SHA03	

DATA OF RADIATED EMISSION TEST

UL Japan, Inc. Shonan EMC Lab. No.3 Semi - Anechoic Chamber
Date : 2014/06/12

Company : Sony Engineering Corporation

Kind of EUT : RF Glow - Wristband receiver

Model No. : FFS - W4

Serial No. : 25

Remarks : EUT_axis Hor:Z Ver:Z

Mode : Receiving 926.4MHz

Order No. : 10368504S

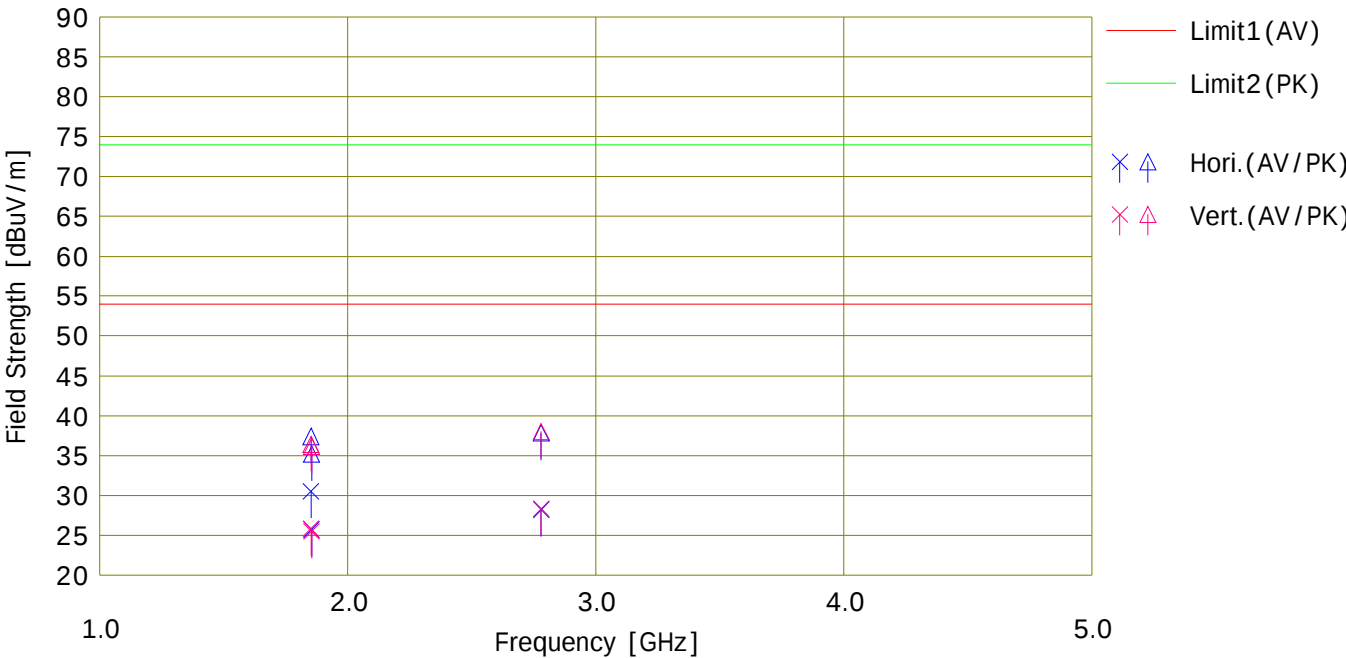
Power : DC 1.5V

Temp./Humi. : 25deg.C. / 61%RH

Limit1 : FCC 15B Class B (3m) AV

Limit2 : FCC 15B Class B (3m) Peak

Engineer : Akio Hayashi



No.	Freq.	Reading		Ant.Fac	Loss	Gain	Result		Limit		Margin		Pola.	Height	Angle	Ant. Type	Comment
		<AV>	<PK>				<AV>	<PK>	<AV>	<PK>	<AV>	<PK>					
	[MHz]	[dBuV]	[dBuV]		[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]		[cm]	[deg]		
1	1850.919	41.0	47.9	26.3	4.4	41.2	30.5	37.4	53.9	73.9	23.4	36.5	Hori.	104	0	SHA03	
2	1852.800	36.2	45.7	26.3	4.4	41.2	25.7	35.2	53.9	73.9	28.2	38.7	Hori.	100	284	SHA03	
3	2779.200	35.7	45.3	27.6	5.8	40.9	28.2	37.8	53.9	73.9	25.7	36.1	Hori.	100	201	SHA03	
4	1850.932	36.3	46.9	26.3	4.4	41.2	25.8	36.4	53.9	73.9	28.1	37.5	Vert.	100	0	SHA03	
5	1852.800	36.0	46.6	26.3	4.4	41.2	25.5	36.1	53.9	73.9	28.4	37.8	Vert.	100	0	SHA03	
6	2779.200	35.8	45.5	27.6	5.8	40.9	28.3	38.0	53.9	73.9	25.6	35.9	Vert.	100	0	SHA03	

APPENDIX 2

Test Instruments

EMI test equipment

Control No.	Instrument	Manufacturer	Model No	Serial No	Test Item	Calibration Date * Interval(month)
SAF-03	Pre Amplifier	SONOMA	310N	290213	RE	2014/02/14 * 12
SAT6-06	Attenuator	JFW	50HF-006N	-	RE	2014/02/17 * 12
SBA-03	Biconical Antenna	Schwarzbeck	BBA9106	91032666	RE	2013/10/26 * 12
SCC-C1/C2/C3/C4/C5/C10/SRSE-03	Coaxial Cable&RF Selector	Fujikura/Fujikura/Suhner/Suhner/Suhner/Suhner/TOYO	8D2W/12DSFA/141PE/141PE/141PE/141PE/NS4906	-/0901-271 (RF Selector)	RE	2014/04/25 * 12
SLA-03	Logperiodic Antenna	Schwarzbeck	UHALP9108A	UHALP 9108-A 0901	RE	2013/10/26 * 12
SOS-05	Humidity Indicator	A&D	AD-5681	4062518	RE	2014/02/21 * 12
STR-06	Test Receiver	Rohde & Schwarz	ESCI	101259	RE	2014/03/04 * 12
SJM-15	Measure	ASKUL	-	-	RE	-
SAEC-03(NSA)	Semi-Anechoic Chamber	TDK	SAEC-03(NSA)	3	RE	2013/07/09 * 12
COTS-SEMI-1	EMI Software	TSJ	TEPTO-DV(RE,CE,RFI,MF)	-	RE	-
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2014/05/23 * 12
SFL-01	Highpass Filter	MICRO-TRONICS	HPM50115	001	RE	2013/11/22 * 12
SCC-G02	Coaxial Cable	Suhner	SUCOFLEX 104A	46498/4A	RE	2014/04/22 * 12
SCC-G22	Coaxial Cable	Suhner	SUCOFLEX 104	296199/4	RE	2014/05/15 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2013/08/19 * 12
KSA-08	Spectrum Analyzer	Agilent	E4446A	MY46180525	RE	2014/03/04 * 12

The expiration date of the calibration is the end of the expired month .
 As for some calibrations performed after the tested dates , those test equipment have been controlled by means of an unbroken chains of calibrations .

All equipment is calibrated with valid calibrations . Each measurement data is traceable to the national or international standards .

Test Item :

RE: Radiated emission