



Test report No. : 10354314S  
Page : 1 of 20  
Issued date : June 2, 2014  
FCC ID : 2AADJFFS-U

# **EMI TEST REPORT**

**Test Report No.: 10354314S**

**Applicant** : Sony Engineering Corporation  
**Type of Equipment** : RF Glow-Stick receiver  
**Model No.** : FFS-R9  
**FCC ID** : 2AADJFFS-U  
**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.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government.
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:**

May 26, 2014

**Representative test engineer:**

Tomochika Sato

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

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13-EM-F0429

## REVISION HISTORY

**Original Test Report No.: 10354314S**

[illegible]

**UL Japan, Inc.**

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## **CONTENTS**

	<b>PAGE</b>
<b>SECTION 1 : Customer information</b>	<b>4</b>
<b>SECTION 2 : Equipment under test (E.U.T.)</b>	<b>4</b>
<b>SECTION 3 : Test specification, procedures &amp; results</b>	<b>5</b>
<b>SECTION 4 : Operation of E.U.T. during testing</b>	<b>7</b>
<b>SECTION 5 : Radiated emission</b>	<b>8</b>
 <b><u>Contents of appendixes</u></b>	 <b>10</b>
<b>APPENDIX 1: Data of EMI test</b>	<b>11</b>
<b>APPENDIX 2: Test instruments</b>	<b>17</b>
<b>APPENDIX 3: Photographs of test setup</b>	<b>18</b>
<b>APPENDIX 4: Configuration and peripherals</b>	<b>20</b>

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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-Stick receiver
Model Number	: FFS-R9
Serial Number	: No.1 (Receiving 922.4MHz) No.2 (Receiving 924.4MHz) No.3 (Receiving 926.4MHz)
Rating	: DC3V
Country of Mass-production	: Vietnam
Condition of EUT	: Production model
Receipt Date of Sample	: May 23, 2014
Modification of EUT	: No modification by the test lab.

## 2.2 Product description

Model: FFS-R9 (referred to as the EUT in this report) is an RF Glow-Stick receiver.

Clock frequency(ies) in the system : 30MHz (RFIC), 16MHz (MCU)

<Radio part>

Equipment type : Receiver  
Frequency of operation : 922.4-926.4MHz  
Antenna type : Chip (internal)

### **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

\* The revision on May 1, 2014 does not affect the test specification applied to the EUT.

#### **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	22.5dB Freq.: 4891.379MHz Polarization: Horizontal Detection: Average Mode: Receiving 926.4MHz	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 <sup>*1</sup> /SR <sup>*2</sup> (±)	No.2 SAC/SR (±)	No.3 SAC/SR (±)
<b>Radiated emission</b> (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
<input type="checkbox"/> No.1 semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input type="checkbox"/> No.2 semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10m
<input checked="" type="checkbox"/> No.3 semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5m
<input type="checkbox"/> No.4 semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
<input type="checkbox"/> No.1 shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input type="checkbox"/> No.2 shielded room	-	6.8 x 4.1 x 2.7	6.8 x 4.1	-
<input type="checkbox"/> No.3 shielded room	-	6.3 x 4.7 x 2.7	6.3 x 4.7	-
<input type="checkbox"/> No.4 shielded room	-	4.4 x 4.7 x 2.7	4.4 x 4.7	-
<input type="checkbox"/> No.5 shielded room	-	7.8 x 6.4 x 2.7	7.8 x 6.4	-
<input type="checkbox"/> 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 sequence is used : 1) Receiving 922.4MHz  
2) Receiving 924.4MHz  
3) Receiving 926.4MHz  
Software : N/A

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

### **4.2 Configuration and peripherals**

**This clause has been submitted for separate exhibit. Refer to APPENDIX 4.**

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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 and Y 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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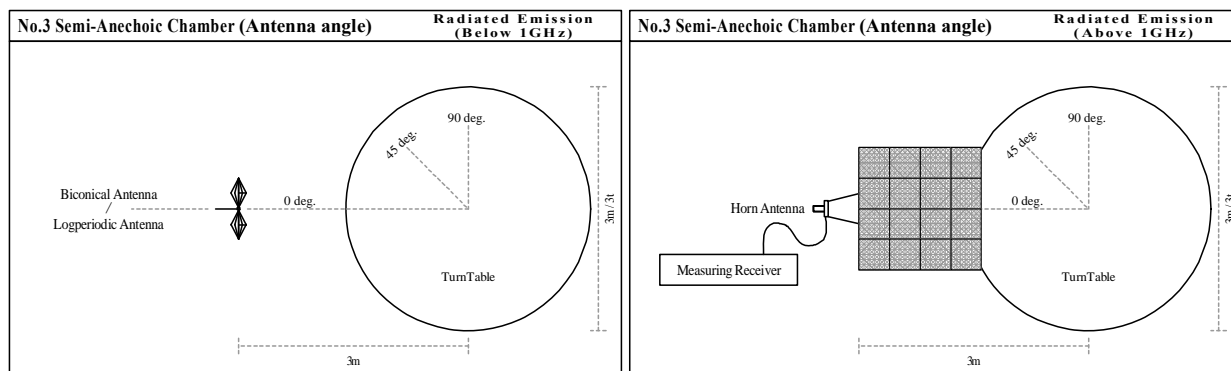


Figure 1. Antenna angle

## 5.5 Results

Summary of the test results : Pass  
Refer to APPENDIX 2

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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

### **APPENDIX 4: Configuration and peripherals**

Configuration and peripherals

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DATA OF RADIATED EMISSION TEST

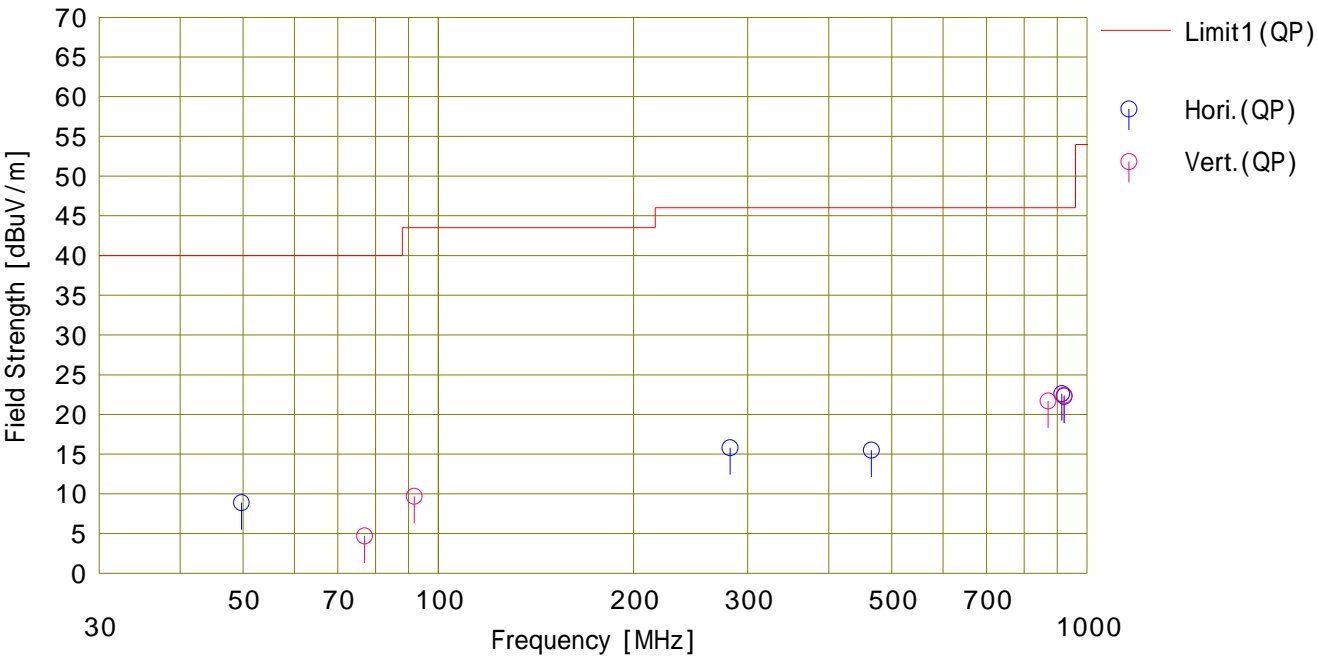
UL Japan, Inc. Shonan EMC Lab. No.3 Semi-Anechoic Chamber  
Date : 2014/05/26

Company : Sony Engineering Corporation  
Kind of EUT : RF glow-stick receiver  
Model No. : FFS-R9  
Serial No. : No.1  
Remarks : EUT:Y

Mode : Receiving 922.4MHz  
Order No. : 10354314S  
Power : DC 3V  
Temp./Humi. : 21deg.C. / 42%RH

Limit1 : FCC 15B Class B (3m)

Engineer : Tomochika Sato



No.	Freq. [MHz]	Reading	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	S.Fac [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	49.724	23.4	10.9	6.8	32.2	0.0	8.9	40.0	31.1	Hori.	150	1	BC	
2	281.651	21.3	18.2	8.3	32.0	0.0	15.8	46.0	30.2	Hori.	300	332	BC	
3	465.185	21.5	16.9	9.1	32.0	0.0	15.5	46.0	30.5	Hori.	100	208	LP	
4	914.553	21.1	21.7	10.7	30.9	0.0	22.6	46.0	23.4	Hori.	150	215	LP	
5	922.400	20.7	21.8	10.7	30.9	0.0	22.3	46.0	23.7	Hori.	100	0	LP	
6	76.987	23.3	6.3	7.0	32.2	0.3	4.7	40.0	35.3	Vert.	100	1	BC	
7	91.819	25.9	8.5	7.1	32.1	0.3	9.7	43.5	33.8	Vert.	100	139	BC	
8	871.054	21.0	21.3	10.6	31.2	0.0	21.7	46.0	24.3	Vert.	100	249	LP	
9	922.400	20.8	21.8	10.7	30.9	0.0	22.4	46.0	23.6	Vert.	100	0	LP	

# DATA OF RADIATED EMISSION TEST

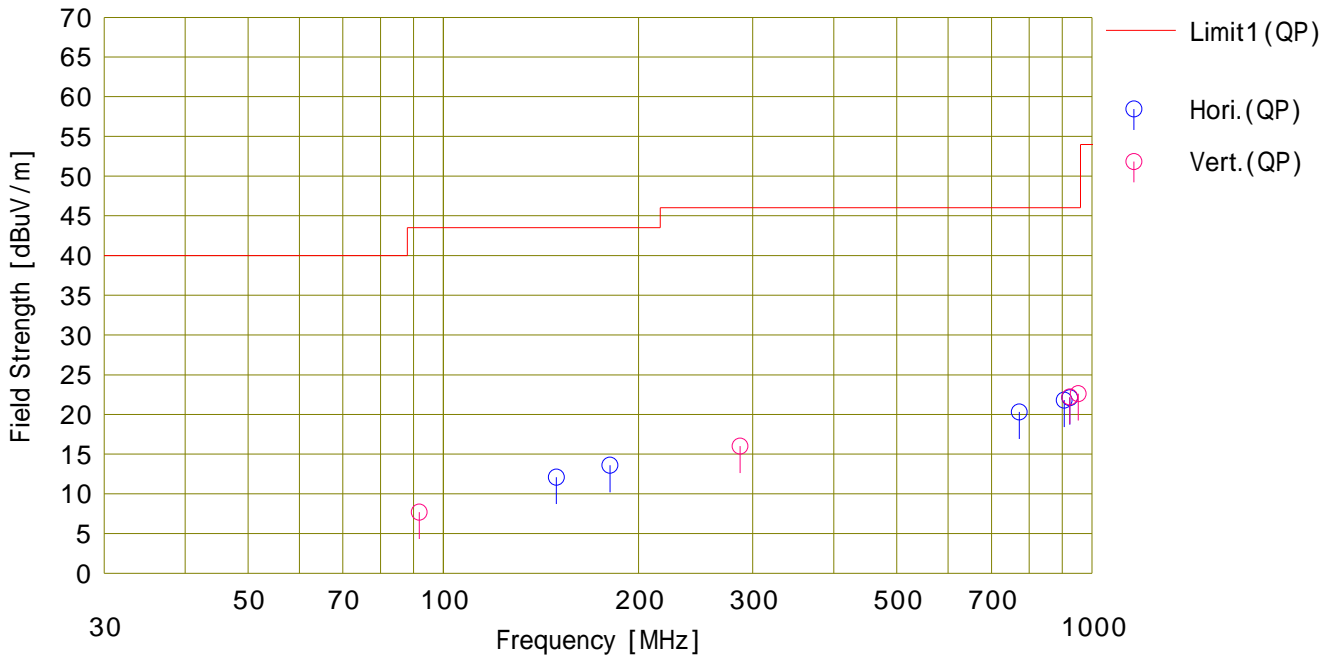
UL Japan, Inc. Shonan EMC Lab. No.3 Semi-Anechoic Chamber  
Date : 2014/05/26

Company : Sony Engineering Corporation  
Kind of EUT : RF glow-stick receiver  
Model No. : FFS-R9  
Serial No. : No.2  
Remarks : EUT:Y

Mode : Receiving 924.4MHz  
Order No. : 10354314S  
Power : DC 3V  
Temp./Humi. : 21deg.C. / 42%RH

Limit1 : FCC 15B Class B (3m)

Engineer : Tomochika Sato



No.	Freq. [MHz]	Reading	Ant.Fac [dB/m]	Loss [dB]	Gain [dB]	S.Fac [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	149.381	21.9	14.6	7.6	32.1	0.1	12.1	43.5	31.4	Hori.	300	30	BC	
2	180.671	22.0	16.0	7.8	32.1	-0.1	13.6	43.5	29.9	Hori.	150	4	BC	
3	772.510	21.4	20.3	10.3	31.7	0.0	20.3	46.0	25.7	Hori.	150	72	LP	
4	906.159	20.4	21.7	10.7	31.0	0.0	21.8	46.0	24.2	Hori.	100	193	LP	
5	924.400	20.4	21.8	10.7	30.8	0.0	22.1	46.0	23.9	Hori.	100	0	LP	
6	91.826	23.9	8.5	7.1	32.1	0.3	7.7	43.5	35.8	Vert.	100	277	BC	
7	286.780	21.3	18.4	8.3	32.0	0.0	16.0	46.0	30.0	Vert.	100	142	BC	
8	924.400	20.5	21.8	10.7	30.8	0.0	22.2	46.0	23.8	Vert.	100	0	LP	
9	952.479	20.3	22.1	10.8	30.6	0.0	22.6	46.0	23.4	Vert.	100	335	LP	

# DATA OF RADIATED EMISSION TEST

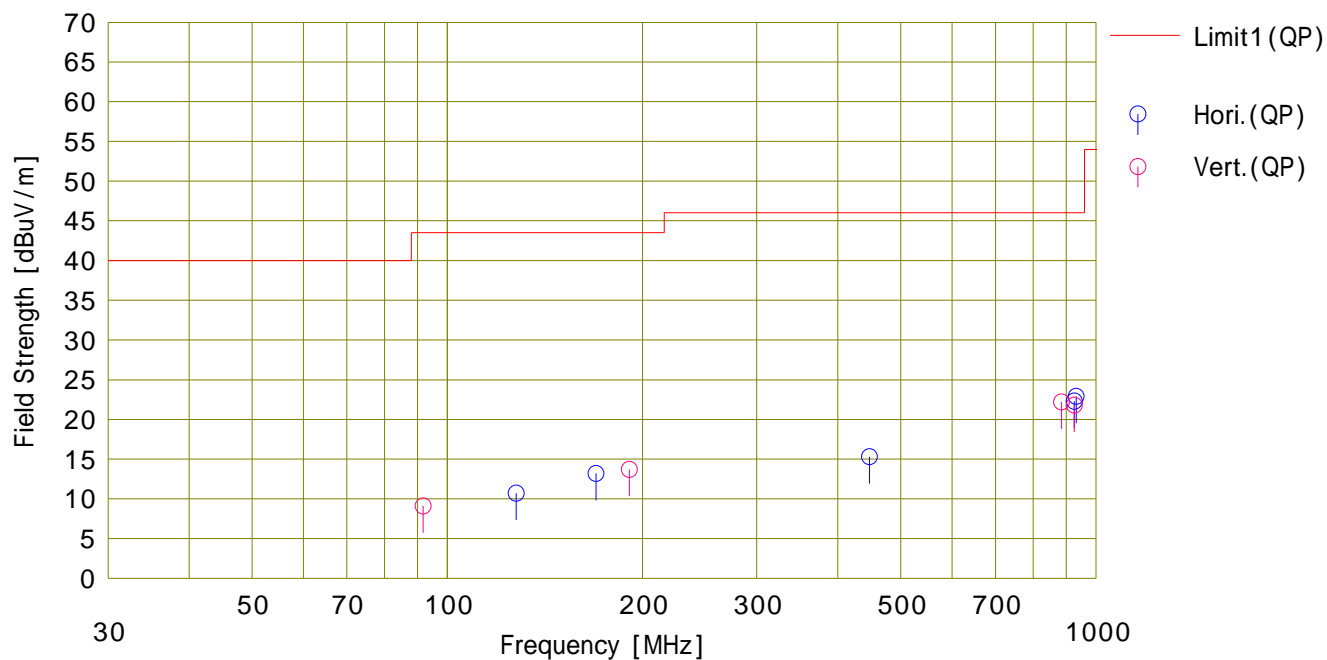
UL Japan, Inc. Shonan EMC Lab. No.3 Semi-Anechoic Chamber  
Date : 2014/05/26

Company : Sony Engineering Corporation  
Kind of EUT : RF glow-stick receiver  
Model No. : FFS-R9  
Serial No. : No.3  
Remarks : EUT:Y

Mode : Receiving 926.4MHz  
Order No. : 10354314S  
Power : DC 3V  
Temp./Humi. : 21deg.C. / 42%RH

Limit1 : FCC 15B Class B (3m)

Engineer : Tomochika Sato



No.	Freq.	Reading	Ant.Fac	Loss	Gain	S.Fac	Result	Limit	Margin	Pola.	Height	Angle	Ant. Type	Comment
		<QP>					<QP>	<QP>	<QP>					
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]		
1	127.725	21.9	13.6	7.4	32.1	-0.1	10.7	43.5	32.8	Hori.	300	239	BC	
2	169.522	22.1	15.4	7.7	32.1	0.1	13.2	43.5	30.3	Hori.	150	358	BC	
3	447.582	21.5	16.8	9.0	32.0	0.0	15.3	46.0	30.7	Hori.	100	352	LP	
4	926.400	20.6	21.8	10.7	30.8	0.0	22.3	46.0	23.7	Hori.	100	0	LP	
5	932.378	21.1	21.9	10.7	30.8	0.0	22.9	46.0	23.1	Hori.	100	357	LP	
6	91.807	25.3	8.5	7.1	32.1	0.3	9.1	43.5	34.4	Vert.	100	353	BC	
7	190.854	21.9	16.2	7.8	32.1	-0.1	13.7	43.5	29.8	Vert.	100	247	BC	
8	884.572	21.3	21.4	10.6	31.1	0.0	22.2	46.0	23.8	Vert.	100	1	LP	
9	926.400	20.1	21.8	10.7	30.8	0.0	21.8	46.0	24.2	Vert.	100	0	LP	

# DATA OF RADIATED EMISSION TEST

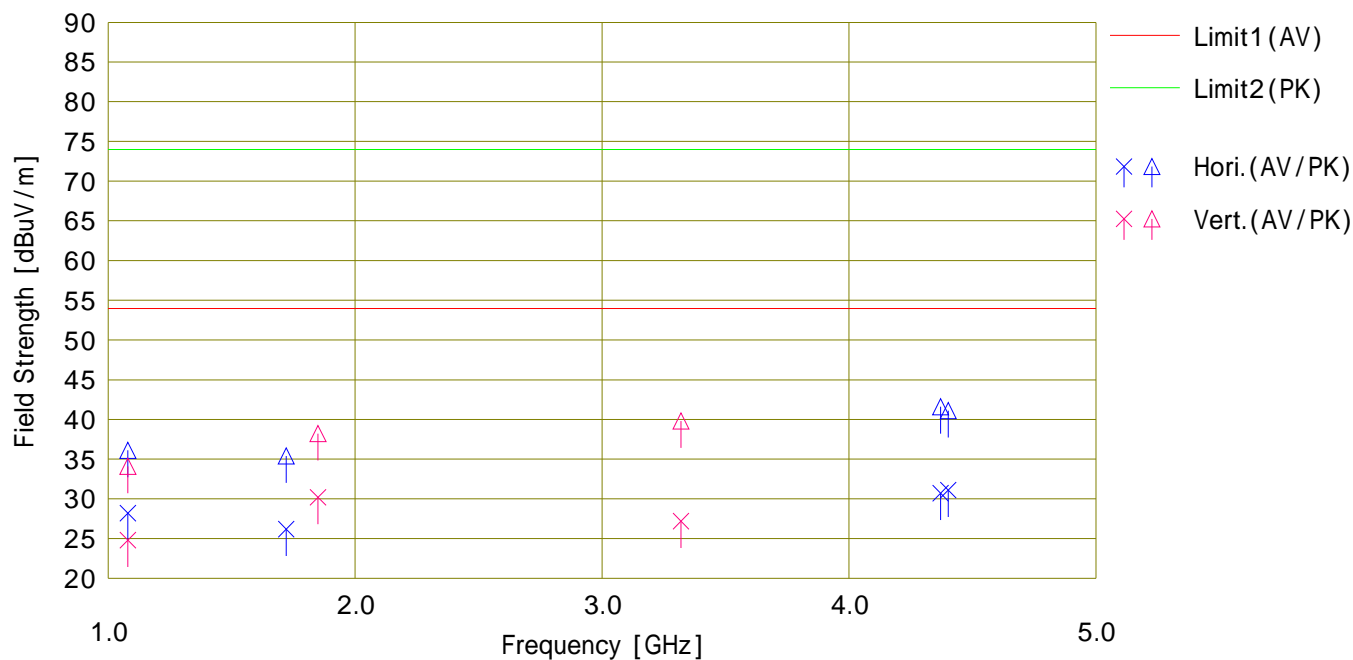
UL Japan, Inc. Shonan EMC Lab. No.3 Semi-Anechoic Chamber  
Date : 2014/05/26

Company : Sony Engineering Corporation  
Kind of EUT : RF glow-stick receiver  
Model No. : FFS-R9  
Serial No. : No.1  
Remarks : EUT:X

Mode : Receiving 922.4MHz  
Order No. : 10354314S  
Power : DC 3V  
Temp./Humi. : 21deg.C. / 42%RH

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

Engineer : Tomochika Sato



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
		<AV> [dBuV]	<PK> [dBuV]				<AV> [dBuV/m]	<PK> [dBuV/m]	<AV> [dBuV/m]	<PK> [dBuV/m]	<AV> [dB]	<PK> [dB]					
1	1079.890	42.3	50.2	23.9	2.8	40.8	28.2	36.1	53.9	73.9	25.7	37.8	Hori.	100	181	SHA03	
2	1721.037	37.5	46.7	26.1	3.7	41.1	26.2	35.4	53.9	73.9	27.7	38.5	Hori.	100	17	SHA03	
3	4370.729	35.6	46.5	29.1	6.2	40.2	30.7	41.6	53.9	73.9	23.2	32.3	Hori.	100	0	SHA03	
4	4401.575	35.9	45.9	29.2	6.2	40.2	31.1	41.1	53.9	73.9	22.8	32.8	Hori.	100	0	SHA03	
5	1080.035	38.9	48.2	23.9	2.8	40.8	24.8	34.1	53.9	73.9	29.1	39.8	Vert.	100	82	SHA03	
6	1849.965	41.2	49.2	26.3	3.9	41.2	30.2	38.2	53.9	73.9	23.7	35.7	Vert.	100	19	SHA03	
7	3319.376	34.6	47.2	28.1	5.4	40.9	27.2	39.8	53.9	73.9	26.7	34.1	Vert.	100	0	SHA03	

DATA OF RADIATED EMISSION TEST

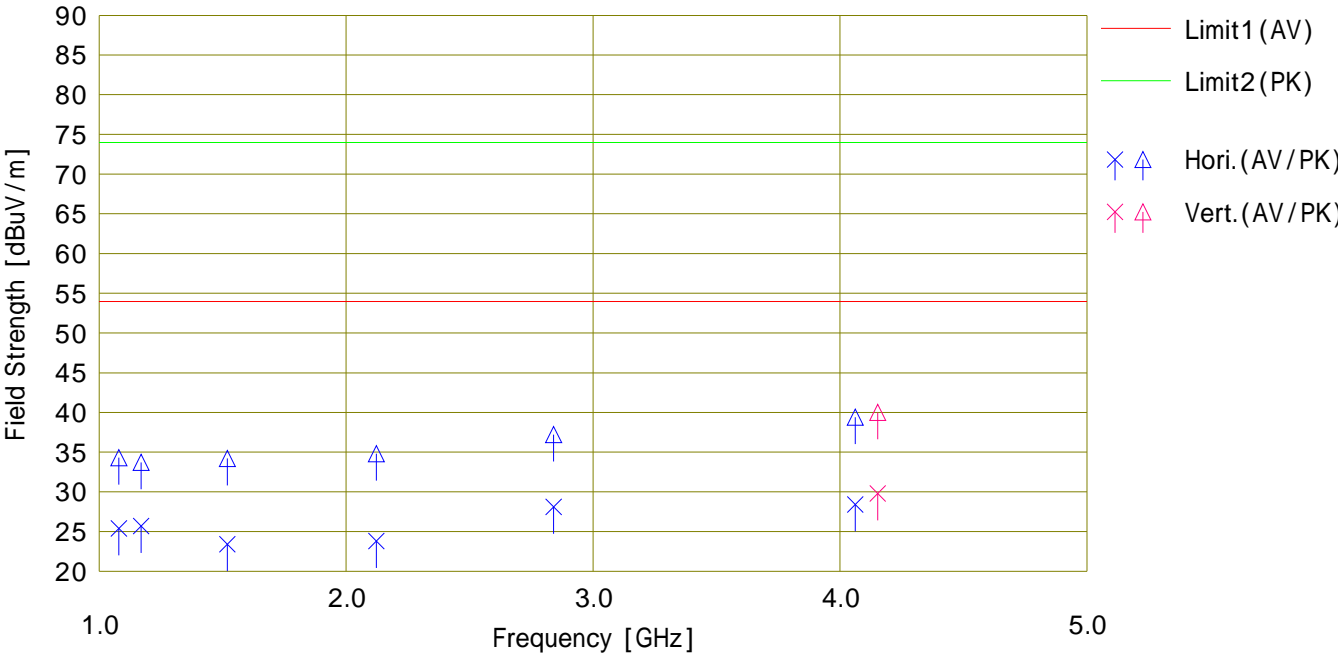
UL Japan, Inc. Shonan EMC Lab. No.3 Semi - Anechoic Chamber  
Date : 2014/05/26

Company : Sony Engineering Corporation  
Kind of EUT : RF glow - stick receiver  
Model No. : FFS - R9  
Serial No. : No.2  
Remarks : EUT:X

Mode : Receiving 924.4MHz  
Order No. : 10354314S  
Power : DC 3V  
Temp./Humi. : 21deg.C. / 42%RH

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

Engineer : Tomochika Sato



No.	Freq.	Reading		Ant.Fac	Loss	Gain	Result		Limit		Margin		Pola.	Height	Angle	Ant. Type	Comment
		<AV>	<PK>				<AV>	<PK>	<AV>	<PK>	<AV>	<PK>					
		[dBuV]	[dBuV]				[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]					
1	1079.678	39.5	48.4	23.9	2.8	40.8	25.4	34.3	53.9	73.9	28.5	39.6	Hori.	100	327	SHA03	
2	1169.986	39.2	47.2	24.3	3.0	40.8	25.7	33.7	53.9	73.9	28.2	40.2	Hori.	100	126	SHA03	
3	1519.162	35.1	45.9	25.7	3.5	40.9	23.4	34.2	53.9	73.9	30.5	39.7	Hori.	100	0	SHA03	
4	2122.416	34.2	45.2	26.7	4.2	41.3	23.8	34.8	53.9	73.9	30.1	39.1	Hori.	100	0	SHA03	
5	2840.441	36.1	45.2	27.8	5.0	40.8	28.1	37.2	53.9	73.9	25.8	36.7	Hori.	100	0	SHA03	
6	4061.305	34.2	45.2	28.7	6.0	40.5	28.4	39.4	53.9	73.9	25.5	34.5	Hori.	100	0	SHA03	
7	4152.686	35.4	45.6	28.8	6.0	40.4	29.8	40.0	53.9	73.9	24.1	33.9	Vert.	100	0	SHA03	

# DATA OF RADIATED EMISSION TEST

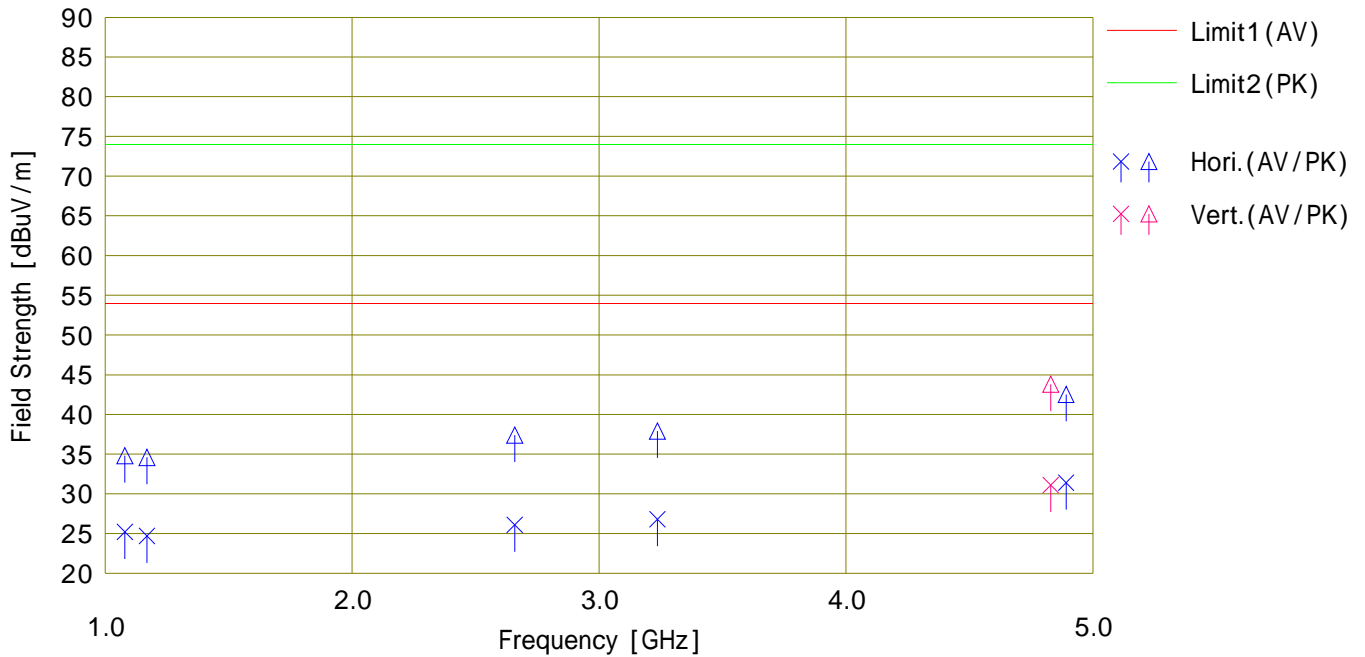
UL Japan, Inc. Shonan EMC Lab. No.3 Semi-Anechoic Chamber  
Date : 2014/05/26

Company : Sony Engineering Corporation  
Kind of EUT : RF glow-stick receiver  
Model No. : FFS-R9  
Serial No. : No.3  
Remarks : EUT:X

Mode : Receiving 926.4MHz  
Order No. : 10354314S  
Power : DC 3V  
Temp./Humi. : 21deg.C. / 42%RH

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

Engineer : Tomochika Sato



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
		<AV> [dBuV]	<PK> [dBuV]				<AV> [dBuV/m]	<PK> [dBuV/m]	<AV> [dBuV/m]	<PK> [dBuV/m]	<AV> [dB]	<PK> [dB]					
1	1079.874	39.3	48.9	23.9	2.8	40.8	25.2	34.8	53.9	73.9	28.7	39.1	Hori.	100	51	SHA03	
2	1169.552	38.2	48.1	24.3	3.0	40.8	24.7	34.6	53.9	73.9	29.2	39.3	Hori.	100	15	SHA03	
3	2658.632	34.9	46.2	27.3	4.8	40.9	26.1	37.4	53.9	73.9	27.8	36.5	Hori.	100	81	SHA03	
4	3235.958	34.2	45.3	28.1	5.4	40.9	26.8	37.9	53.9	73.9	27.1	36.0	Hori.	100	1	SHA03	
5	4891.379	33.2	44.3	31.4	6.5	39.7	31.4	42.5	53.9	73.9	22.5	31.4	Hori.	100	0	SHA03	
6	4828.880	33.2	45.9	31.1	6.5	39.7	31.1	43.8	53.9	73.9	22.8	30.1	Vert.	100	10	SHA03	



## APPENDIX

### 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,RFL,MF)	-	RE	-
SAF-06	Pre Amplifier	TOYO Corporation	TPA0118-36	1440491	RE	2014/05/23 * 12
SCC-G01	Coaxial Cable	Suhner	SUCOFLEX 104A	46497/4A	RE	2014/04/22 * 12
SCC-G21	Coaxial Cable	Suhner	SUCOFLEX 104	296169/4	RE	2014/05/15 * 12
SHA-03	Horn Antenna	Schwarzbeck	BBHA9120D	9120D-739	RE	2013/08/19 * 12
SSA-02	Spectrum Analyzer	Agilent	E4448A	MY48250106	RE	2014/03/17 * 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