

## ***FCC EVALUATION REPORT FOR CERTIFICATION***

**Applicant : OHSUNG ELECTRONICS CO., LTD.**

**#181 Gongdan-dong, Gumi-si, Gyeongbuk,**

**Republic of Korea**

**Attn: Mr. Hak-Ki Kim / General Manager**

**Date of Issue : February 22, 2011**

**Order Number: GETEC-C1-11-035**

**Test Report Number: GETEC-E3-11-011**

**Test Site: Gumi College EMC Center**

**FCC Registration Number: (100749, 443957)**

**FCC ID. : OZ5URCSNP1**

**Applicant : OHSUNG ELECTRONICS CO., LTD.**

**Rule Part(s) : FCC Part 15 Subpart B**  
**Equipment Class : Class B computing device peripheral (JBP)**  
**EUT Type : Streaming Network Player**  
**Type of Authority : Certification**  
**Model Name : SNP-1**  
**Trade Name : UNIVERSAL Remote Control**

**This equipment has been shown to be in compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003**

**I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.**

**Tested by,**

**Reviewed by,**

*Soon Hoon*

**Soon-Hoon Jeong, Engineer**  
**GUMI College EMC center**



**Jae-Hoon Jeong, Senior Engineer**  
**GUMI College EMC center**



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*Scope: Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and / or unintentional radiators for compliance with technical rules and regulations of the Federal Communications Commission.*

## 1. General Information

**Applicant: OHSUNG ELECTRONICS CO., LTD.**

**Applicant Address: #181 Gongdan-dong, Gumi-si, Gyeongbuk, Republic of Korea**

**Manufacturer: OHSUNG ELECTRONICS CO., LTD.**

**Manufacturer Address: #181 Gongdan-dong, Gumi-si, Gyeongbuk, Republic of Korea**

**Contact Person: Mr. Hak-Ki Kim / General Manager**

**Tel. Number: +82-54-468-7281 Fax Number: +82-54-461-8368**

- **FCC ID.** OZ5URCSNP1
- **EUT Type** Streaming Network Player
- **Model Name** SNP-1
- **Trade Name** UNIVERSAL Remote Control
- **Serial Number** Prototype
- **Rule Part(s)** FCC Part 15 Subpart B
- **Type of Authority** Certification
- **Test Procedure(s)** ANSI C63.4 (2003)
- **Dates of Test** February 9~ 18, 2011
- **Place of Test** **Gumi College EMC Center** ( FCC Registration Number: 100749, 443957)  
407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.
- **Test Report Number** GETEC-E3-11-011
- **Dates of Issue** February 22, 2011

**EUT Type: Streaming Network Player**

**FCC ID.: OZ5URCSNP1**



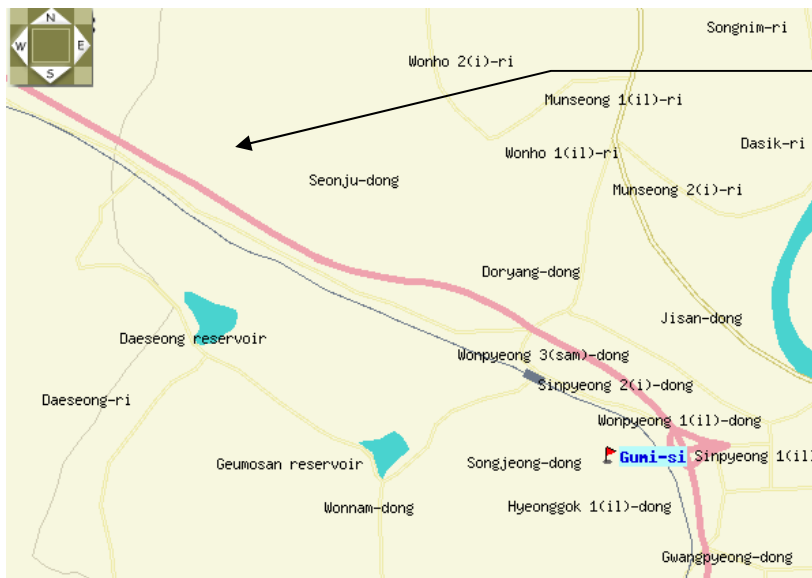
## 2. Introduction

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Nose Emissions From Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ASNI C63.4-2003) was used in determining radiated and conducted emissions emanating from **OHSUNG ELECTRONICS CO., LTD. Streaming Network Player (Model Name: SNP-1)**

These measurement tests were conducted at **Gumi College EMC Center**.

The site address is 407, Bugok-dong, Gumi-si, Gyeongbuk, Korea.

This test site is one of the highest point of Gumi 1 college at about 200 km away from Seoul city and 40 km away from Daegu city. It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures. The detailed description of the measurement facility was found to be in compliance with the requirements of §2.948 according to ANSI C63.4 (2003)



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Fig 1. The map above shows the Gumi College in vicinity area.



### 3. Product Information

#### 3.1 Description of EUT

The Equipment under Test (EUT) is the **OHSUNG ELECTRONICS CO., LTD. Streaming Network Player (Model Name: SNP-1) FCC ID.: OZ5URCSNP1**

**Mood Lamp (White):** 4 Station Dimming (Off . Min . Mid . Max)

**Power LED (Blue):** Power Status

**Network LED (Blue):** Network Status

**Reset Button:** System Reset

**Power:** 12V/3.5A (Do Not USE 48V for MFSPOE-8)

**Ethernet:** One 10/100 RJ45 port (Indicator 2 LED)

**Control:** One IR Emitter Input (For RF 1way System)

**Coaxial:** One SPDIF(Coaxial) Out

**Audio:** One Audio Line Out

**Component:** One Component Video Out

- . Clock Frequency : 24 MHz



### 3.2 Support Equipment / Cables used

#### 3.2.1 Used Support Equipment

Description	Manufacturer	Model Name	S/N & FCC ID.
Base station	OHSUNG ELECTRONICS CO., LTD.	MRX-10	S/N: N/A FCC ID.: JNZ211443
LCD monitor	LG Electronics Inc.	22LV2500-UA	S/N: N/A FCC ID.: BEJ22LV2500UA

See “Appendix D – Test Setup Photographs” for actual system test set-up

#### 3.2.2 System configuration

Description	Manufacturer	Model Name	S/N & FCC ID.
AC/DC adapter	SPS INC.	EA1050E-120	S/N: N/A FCC ID.: N/A

#### 3.2.3 Used Cable(s)

Cable Name	Condition	Description
Power cable	Connected to the AC/DC adapter	1.80 m unshielded
Adapter cable	Connected to the EUT and AC/DC adapter	1.00 m shielded with a ferrite core
Component cable	Connected to the EUT and LCD monitor	3.00 m shielded
Component sound cable	Connected to the EUT and LCD monitor	3.00 m shielded
Digital audio out cable	Connected to the EUT and LCD monitor	1.50 m shielded
IR in cable	Connected to the EUT and base station	3.00 m shielded
LAN cable	Connected to the EUT and Network	10.00 m unshielded

### 3.3 Modification Item(s)

- None.



## 4. Description of tests

### 4.1 Test Condition

The EUT was installed, arranged and operated in a manner that is most representative of equipment as typically used. The measurements were carried out while varying operating modes and cable positions within typically arrangement to determine maximum emission level.

The representative and worst test mode(s) were noted in the test report.

- Test Voltage / Frequency : AC 120 V / 60 Hz
- Test Mode(s): Continuous play with audio files via Network



## 4.2 Conducted Emission

The Line conducted emission test facility is inside a 4 m × 8 m × 2.5 m shielded enclosure. (FCC Registration No.: 100749)

The EUT was placed on a non-conducting 1.0 m by 1.5 m table, which is 0.8 m in height and 0.4 m away from the vertical wall of the shielded enclosure.

The EUT is powered from the Rohde & Schwarz LISN (ESH2-Z5) and the support equipment is powered from the Rohde & Schwarz LISN (ESH3-Z5). Powers to the LISN are filtered by high-current high insertion loss power line filter.

Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

The RF output of the LISN was connected to the EMI test receiver (Rohde & Schwarz, ESCS30).

The EMI test receiver was scanned from 150 kHz to 30 MHz with 20 ms sweep time to determine the frequency producing the maximum EME from the EUT. The frequency producing the maximum level was re-examined using Quasi-Peak mode of the EMI test receiver.

The bandwidth of Quasi-peak mode was set to 9 kHz. Each emission was maximized consistent with typical applications by varying the configuration of the test sample. Interface cables were connected to the available interface ports of the test unit. The effect of varying the position of cables was investigated to find the configuration that produces maximum diagram emission. Excess cable lengths were bundled at center with 30 cm ~ 40 cm.

Each EME reported was calibrated using the R/S signal generator

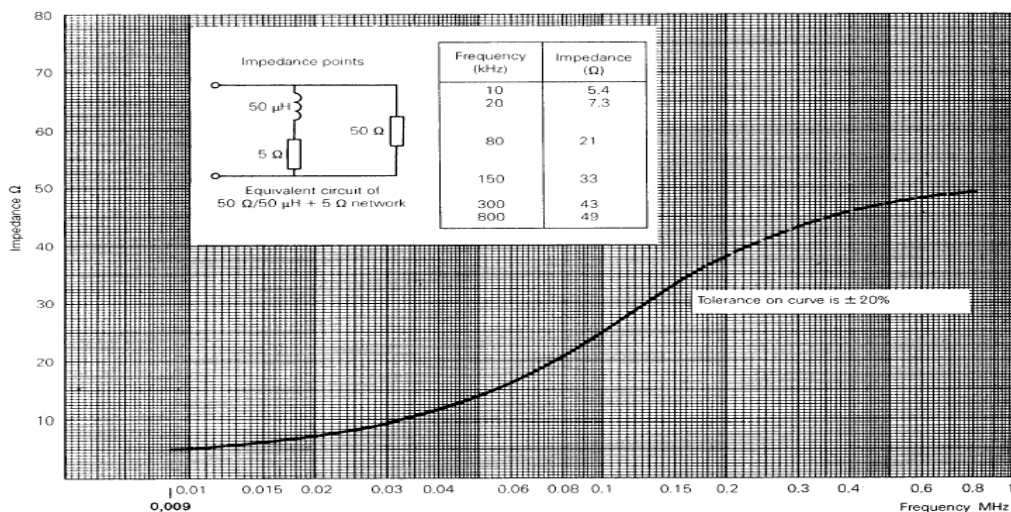


Fig 2. Impedance of LISN





### 4.3 Radiated Emission

Preliminary measurements were conducted 3 m semi anechoic chamber using broadband antennas to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The technology configuration, mode of operation and turntable azimuth with respect to antenna was note for each frequency found.

Final measurements were made 3 m chamber (FCC registration No.: 443957) and/or 10 m OATS (FCC registration No.: 100749).

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

Each frequency found during pre-scan measurements was re-examined and investigated using EMI test receiver. The detector function was set to CISPR quasi-peak mode average mode and the bandwidth of the receiver was set to 120 kHz or 1 MHz depending on the frequency or type of signal.

The EUT, support equipment and interconnecting cables were reconfigured to the setup producing the maximum emission for the frequency and were placed on top of a 0.8 m high non-metallic 1.0 m × 1.5 m table.

The turntable containing the test sample was rotated; the antenna height was varied 1 to 4 meter and stopped at the azimuth or height producing the maximum emission.

Each EME reported was calibrated using the R/S signal generator

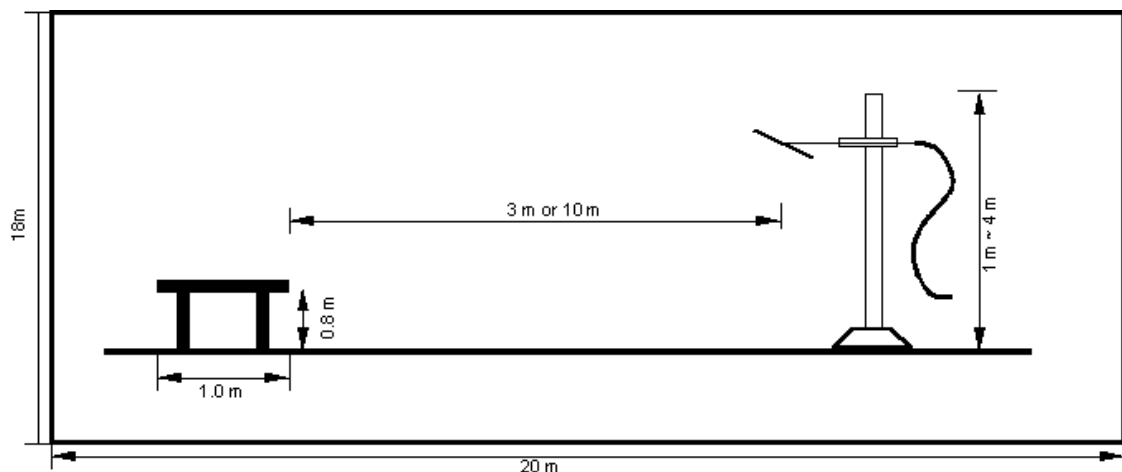


Fig 3. Dimensions of test site.



## 5. Conducted Emission

### 5.1 Operating Environment

Temperature : 24 °C  
Relative Humidity : 40 % R.H.

### 5.2 Test Set-up

The conducted emission measurements were performed in the shielded room.

The EUT was placed on wooden table, 0.8 m heights above the floor, 0.4 m from the reference ground plane (GRP) wall and 0.8 m from AMN & ISN.

AMN is bonded on horizontal reference ground plane.

The ground plane, which was electrically bonded to the shield room, ground system and all power lines entering the shield room, were filtered.

### 5.3 Measurement Uncertainty

The measurement uncertainty was calculated in accordance with ISO “Guide to the expression of uncertainty in measurement.”

The measurement uncertainty was given with a confidence of 95 %.

Test Items	Uncertainty	Remark
Conducted emission (9 kHz ~ 150 kHz)	± 2.71 dB	Confidence levels of 95 % ( $k = 2$ )
Conducted emission (150 kHz ~ 30 MHz)	± 3.34 dB	Confidence levels of 95 % ( $k = 2$ )



#### 5.4 Limit

RFI Conducted	FCC Limit(dB $\mu$ V/m) Class B	
	Quasi-Peak	Average
150 kHz ~ 0.5 MHz	66 ~ 56*	56 ~ 46*
0.5 MHz ~ 5 MHz	56	46
5 MHz ~ 30 MHz	60	50

\*Limits decreases linearly with the logarithm of frequency.

#### 5.5 Test Equipment used

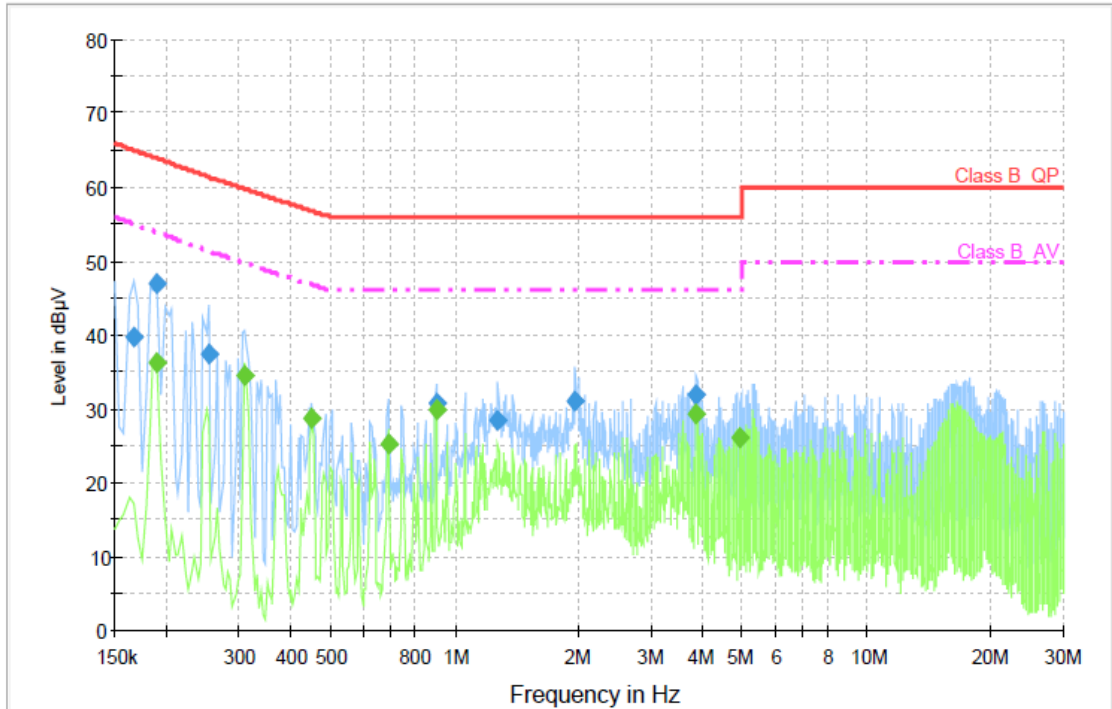
Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESCS30	Rohde & Schwarz	EMI Test Receiver	839809/003	12. 10. 2011
■ - ESH3-Z5	Rohde & Schwarz	LISN	838979/020	12. 10. 2011
■ - ESH2-Z5	Rohde & Schwarz	LISN	829991/009	12. 10. 2011
■ - ISN T8	TESEQ. GmbH	Impedance Network	24568	11. 09. 2011

#### 5.6 Test data for Conducted Emission

- Test Date : February 18, 2011
- Resolution Bandwidth : 9 kHz
- Frequency Range : 0.15 MHz ~ 30 MHz



### Voltage with 4-Line-LISN\_L1



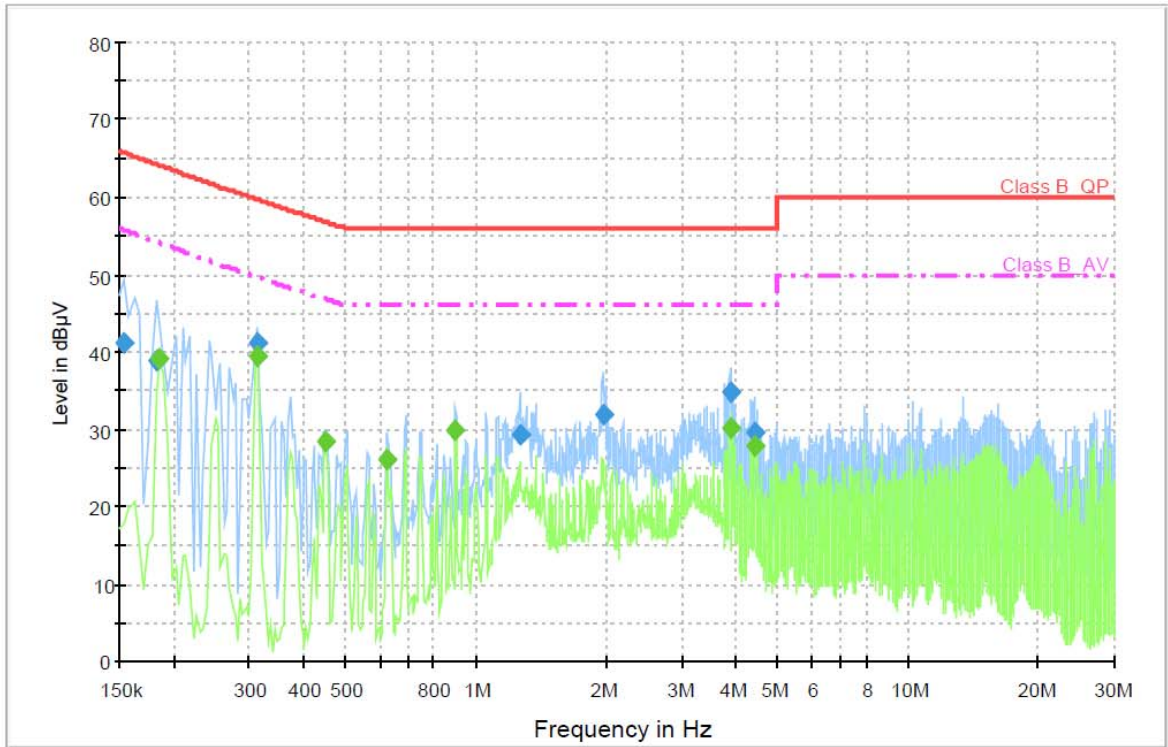
#### Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.166000	39.6	1000.000	9.000	GND	L1	10.1	25.5	65.1	
0.190000	47.0	1000.000	9.000	GND	L1	10.1	16.9	63.9	
0.254000	37.5	1000.000	9.000	GND	L1	10.1	23.9	61.4	
0.902000	30.8	1000.000	9.000	GND	L1	10.1	25.2	56.0	
1.274000	28.3	1000.000	9.000	GND	L1	10.1	27.7	56.0	
1.966000	31.0	1000.000	9.000	GND	L1	10.2	25.0	56.0	
3.866000	31.9	1000.000	9.000	GND	L1	10.3	24.1	56.0	

#### Final Measurement Detector 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.190000	36.3	1000.000	9.000	GND	L1	10.1	17.6	53.9	
0.310000	34.6	1000.000	9.000	GND	L1	10.1	15.1	49.7	
0.450000	28.7	1000.000	9.000	GND	L1	10.1	18.1	46.8	
0.690000	25.1	1000.000	9.000	GND	L1	10.1	20.9	46.0	
0.902000	29.8	1000.000	9.000	GND	L1	10.1	16.2	46.0	
3.866000	29.2	1000.000	9.000	GND	L1	10.3	16.8	46.0	
4.942000	26.1	1000.000	9.000	GND	L1	10.3	19.9	46.0	

< Fig 4. Conducted emission result (Live line) >



### Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.154000	41.3	1000.000	9.000	GND	N	10.1	24.5	65.8	
0.182000	38.9	1000.000	9.000	GND	N	10.1	25.4	64.3	
0.314000	41.2	1000.000	9.000	GND	N	10.1	18.5	59.7	
1.266000	29.3	1000.000	9.000	GND	N	10.1	26.7	56.0	
1.970000	31.8	1000.000	9.000	GND	N	10.2	24.2	56.0	
3.870000	34.6	1000.000	9.000	GND	N	10.3	21.4	56.0	
4.434000	29.6	1000.000	9.000	GND	N	10.3	26.4	56.0	

### Final Measurement Detector 2

Frequency (MHz)	CAverage (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.186000	39.1	1000.000	9.000	GND	N	10.1	15.0	54.1	
0.314000	39.3	1000.000	9.000	GND	N	10.1	10.3	49.6	
0.450000	28.4	1000.000	9.000	GND	N	10.1	18.4	46.8	
0.626000	26.0	1000.000	9.000	GND	N	10.1	20.0	46.0	
0.898000	29.9	1000.000	9.000	GND	N	10.1	16.1	46.0	
3.870000	30.1	1000.000	9.000	GND	N	10.3	15.9	46.0	
4.434000	27.7	1000.000	9.000	GND	N	10.3	18.3	46.0	

< Fig 5. Conducted emission result (Neutral line) >



## 6. Radiated Emission

### 6.1 Operating Environment

Temperature : 24 °C  
Relative Humidity : 40 % R.H.

### 6.2 Test Set-up

A preliminary and final measurement was at 3 m anechoic chamber.

The EUT was placed on a non-conductive turntable approximately 0.8 m above the ground plane.

The turntable with EUT was rotated 360°, and the antenna was varied in height between 1.0 m and 4.0 m in order to determine the maximum emission levels.

This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

### 6.3 Measurement Uncertainty

The measurement uncertainty was calculated in accordance with ISO “Guide to the expression of uncertainty in measurement”.

The measurement uncertainty was given with a confidence of 95 %.

Test Items(Anechoic Chamber)	Uncertainty	Remark
Radiated emission (30 MHz ~ 300 MHz, 3 m, Vertical)	± 4.32 dB	Confidence levels of 95 % ( $k = 2$ )
Radiated emission (30 MHz ~ 300 MHz, 3 m, Horizontal)	± 4.21 dB	Confidence levels of 95 % ( $k = 2$ )
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Vertical)	± 3.96 dB	Confidence levels of 95 % ( $k = 2$ )
Radiated emission (300 MHz ~ 1 000 MHz, 3 m, Horizontal)	± 3.97 dB	Confidence levels of 95 % ( $k = 2$ )



#### 6.4 Limit

Frequency (MHz)	FCC Limit @ 3 m. dB $\mu$ V/m	CISPR Limit @ 10 m. dB $\mu$ V/m
30 ~ 88	40.0	30.0
88 ~ 216	43.5	30.0
216 ~ 230	46.0	30.0
230 ~ 960	46.0	37.0
960 ~ 1 000	54.0	37.0
> 1 000	54.0	No Specified limit

#### 6.5 Test Equipment used

Model Name	Manufacturer	Description	Serial Number	Due to Calibration
■ - ESIB26	Rohde & Schwarz	EMI Test Receiver	830482/010	12. 11. 2010
■ - VULB9160	Schwarzbeck	Broadband Test Antenna	3193	03. 15. 2012
□ - BBHA9120D	Schwarzbeck	Horn Antenna	207	12. 22. 2011
■ - MCU066	matur0 GmbH	Position Controller	1390306	N/A
■ - TT2.5SI	matur0 GmbH	Turntable	1390307	N/A
■ - AM 4.0	matur0 GmbH	Antenna Mast	1390308	N/A
□ - AFS 44 00101800-25-10P-44	MITEQ	Preamplifier	1258943	11. 12. 2010

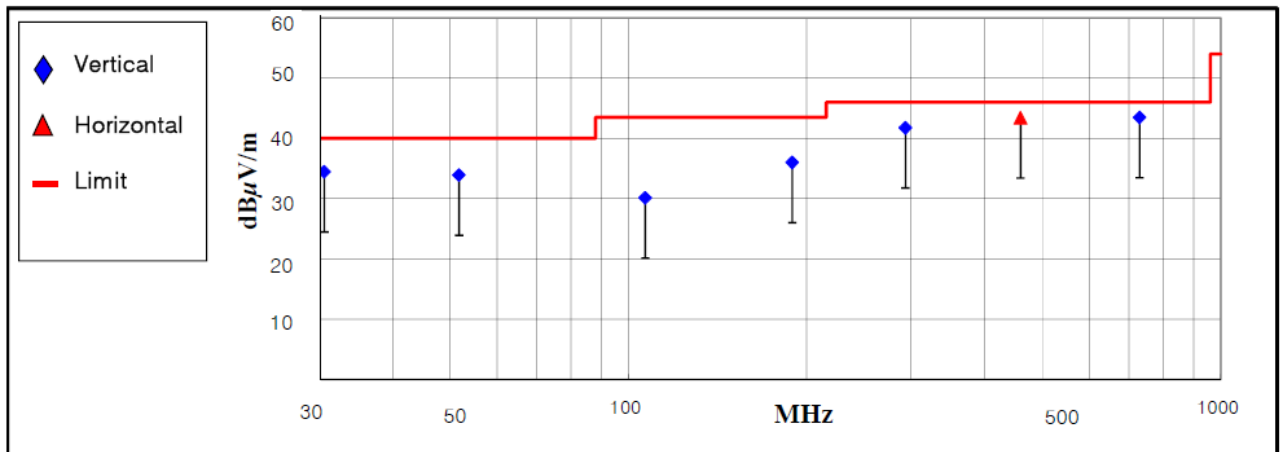


### 6.6 Test data for Radiated Emission

- Test Date : February 9, 2011
- Resolution Bandwidth : 120 kHz
- Frequency Range : 30 MHz ~ 1 000 MHz
- Measurement Distance : 3 m
- Note : The highest frequency of the internal source of the EUT is less than 108 MHz  
 The measurement was made up to 1 000 MHz

◆ Detector mode: Quasi-peak detector mode

Frequency (MHz)	Measurement Level				Limit (dBμ V/m)	Margin (dB)	Positioning System		
	Reading	Antenna	Cable	Test Result			Pol. (H/V)	Height (cm)	Angle (°)
	Value(dBμ V)	Factor(dB/m)	Loss(dB)	(dBμ V/m)					
30.66	23.14	10.34	1.02	34.50	40.00	5.50	V	102	263
51.76	20.75	11.90	1.31	33.96	40.00	6.04	V	100	298
106.74	18.17	10.12	1.88	30.17	43.50	13.33	V	100	112
189.00	23.73	9.79	2.52	36.04	43.50	7.46	V	100	276
293.51	25.43	13.20	3.16	41.79	46.00	4.21	V	115	301
459.00	22.66	16.78	4.01	43.45	46.00	2.55	H	100	224
729.00	17.41	21.04	5.05	43.50	46.00	2.50	V	100	218



< Fig 6. Radiated emission result (30 MHz ~ 1 000 MHz) >





## 7. Sample Calculations

$$\begin{aligned} \text{dB}\mu\text{V} &= 20 \text{ Log}_{10}(\mu\text{V}/\text{m}) \\ \text{dB}\mu\text{V} &= \text{dBm} + 107 \\ \mu\text{V} &= 10^{(\text{dB}\mu\text{V}/20)} \end{aligned}$$

### 7.1 Example 1 :

#### ■ 20.3 MHz

<b>Class B Limit</b>	<b>= 250 <math>\mu\text{V}</math> = 48 dB<math>\mu\text{V}</math></b>
<b>Reading</b>	<b>= 39.2 dB<math>\mu\text{V}</math></b>
<b>10<sup>(39.2dB<math>\mu\text{V}/20</math>)</sup></b>	<b>= 91.2 <math>\mu\text{V}</math></b>
<b>Margin</b>	<b>= 48 dB<math>\mu\text{V}</math> - 39.2 dB<math>\mu\text{V}</math></b>
	<b>= 8.8 dB</b>

### 7.2 Example 2 :

#### ■ 66.7 MHz

<b>Class B Limit</b>	<b>= 100 <math>\mu\text{V}/\text{m}</math> = 40.0 dB<math>\mu\text{V}/\text{m}</math></b>
<b>Reading</b>	<b>= 31.0 dB<math>\mu\text{V}</math></b>
<b>Antenna Factor + Cable Loss</b>	<b>= 5.8 dB</b>
<b>Total</b>	<b>= 36.8 dB<math>\mu\text{V}/\text{m}</math></b>
<b>Margin</b>	<b>= 40.0 dB<math>\mu\text{V}/\text{m}</math> - 36.8 dB<math>\mu\text{V}/\text{m}</math></b>
	<b>= 3.2 dB</b>



## 8. Recommendation & Conclusion

The data collected shows that the **OHSUNG ELECTRONICS CO., LTD. Streaming Network Player (Model Name: SNP-1)** was complies with §15.107 and 15.109 of the FCC Rules.