

Certification of Compliance

CFR 47 Part 15 Subpart B

Test Report File No. : 06-IST-0265

Date of Issue : June 8, 2006

Model(s) : DAH-2100
Kind of Product : Digital Audio Player
FCC ID : PCMDAH-2100
Applicant : HYUN WON INC.
Address : 4th Floor, e-Venture Center, 74-2 Shinchon3-dong,
Dong Gu, Daegu City, South Korea
Manufacturer : HYUN WON INC.
Address : 4th Floor, e-Venture Center, 74-2 Shinchon3-dong,
Dong Gu, Daegu City, South Korea

Test Result

☒ Positive

☐ Negative

Reviewed By

Approved By



S.J.CHO / EMC Group Manager



J.H.LEE / Chief

Comment(s)

- Investigations requested : Measurement to the relevant clauses of FCC rules and regulations Part 15 Subpart B - Unintentional Radiators, Class B.
- The test report with appendix consists of 25 pages.
- The test result only responds to the tested sample.
- It is not allowed to copy this report even partly without the allowance of IST EMC Laboratory.
- This equipment as for has been shown to be capable of continued 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 2004.



TABLE OF CONTENTS

Table of contents	2
Information of test laboratory, Environmental conditions, Power used, Product information	3
Descriptions of test	
Conducted Emission	4
Radiated Emission	5
Measurement Uncertainty Calculations	6
Equipment Under Test	7
Test Set-Up (Figure)	8
Summary	9

■ Test Conditions and Data - Emissions

◆ Conducted Emissions	0.15MHz - 30MHz	Applicable	
Test Conditions / Data and Plots			10-12
◆ Radiated Emissions	30MHz - 1GHz	Applicable	
Test Conditions / Data and Plots			13-19

Appendix	A. The Photos of Test Setup	20-23
	B. The Photos of Equipment Under Test	24-25

Note:

INFORMATIONS OF TEST LABORATORY

EMC LABORATORY of IST Co., Ltd. (*FCC Filing Lab.*)

80, Jeil-Ri, Yangji-Myun, Yongin-City

Kyonggi-Do, 449-860, Korea

TEL : +82 31 333 9018

FAX : +82 31 333 9019

ENVIRONMENTAL CONDITIONS

Temperature 11 °C

Humidity 43 %

Atmospheric pressure 1013 mbar

POWER SUPPLY SYSTEM USED

Power supply system AC 120Vac, 60Hz

(Refer to the product information)

PRODUCT INFORMATION

The Equipment Under Test(EUT) is MP3 PLAYER of HYUN WON INC.

(FCC ID : PCMDAH-2001)

VIDEO: LCD Display: 3.5-inch TFT LCD, 320x240 pixels. 16.7Milion Colors

File Formats: Divx3.11/4/5. XviD, MPEG1(VCD), MPEG2(DVD), MPEG4(WMV and ASF: transcoding software) up to 720x576 pixels, 30 f/s, 8Mbps Bit rate

Bookmark/resume/Video Subtitles

AUDIO: File Formats: MP3(8~320Kbps), WMA, Ogg Vorbis(Up to Q10), AC3, AAC

ID3 Tag Support/Sound Spectrometer

RECORD: Recording (Direct Encoding): MP3

Recording Source: Voice(Built-in Mic.), FM Radio(Direct)

FM RADIO: FM Frequency Range: 76MHz-108MHz(Global/International FM Ready)

POWER: Built-in Rechargeable Lithium Ion Battery

Adaptor: Input-AC 100V to 240V, Output-DC 5V 2A

SYSTEM REQUIREMENT Microsoft Windows XP/2000, Mac OS, Linux

SIZE & Dimensions: 92.6mm X 81mm X 24.6mm

WEIGHT Weight: approx. 259g(8.8 oz.)

- EMC suppression device is not used during the test.
- Please refer to user's manual.

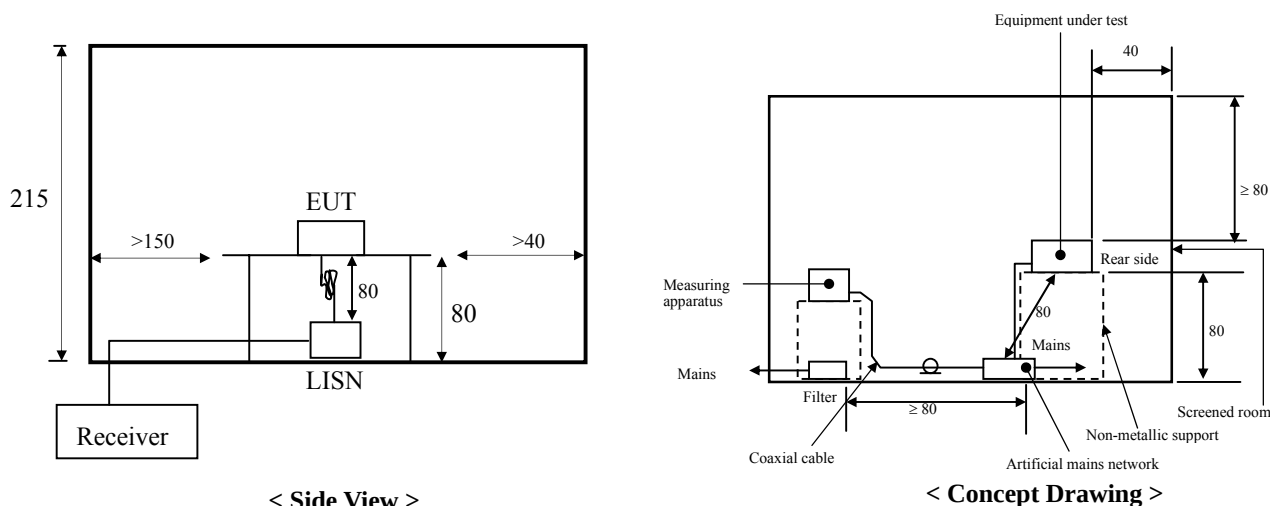
DESCRIPTIONS OF TEST

Conducted Emissions:

The measurement were performed over the frequency range of 0.15MHz to 30MHz using a ESH2-Z5 LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10KHz or for "quasi-peak" & "Average" within a bandwidth of 9KHz.

-Procedure of Test

The line-conducted facility is located inside a shielded room No.1. A 1m X 1.5m wooden table 80cm height is placed 40cm away from the vertical wall and 1.5m away from the other wall of the shielded room. The ESCS30 and ESH2-Z5 LISN are bonded to bottom of the shielded room. The EUT is located on the wooden table with distance more than 80cm from the LISN and powered from the ESH2-Z5 LISN .The peripheral equipment is powered from the other LISN. Power to the LISNs are filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ϕ 1.2cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the ESH2-Z5 LISN. All interconnecting cables more than 1m were shortened by non-inductive bundling to a 1m length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating conditions. The RF output of the LISN was connected to the ESCS30 receiver to determine the frequency producing the maximum emission from the EUT. The frequency producing the maximum level was reexamined using Quasi-Peak mode by manual measurement, after scanned by automatic Peak mode for frequency range from 0.15 to 30MHz. The bandwidth of the receiver was set to 10KHz. The EUT, peripheral equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.



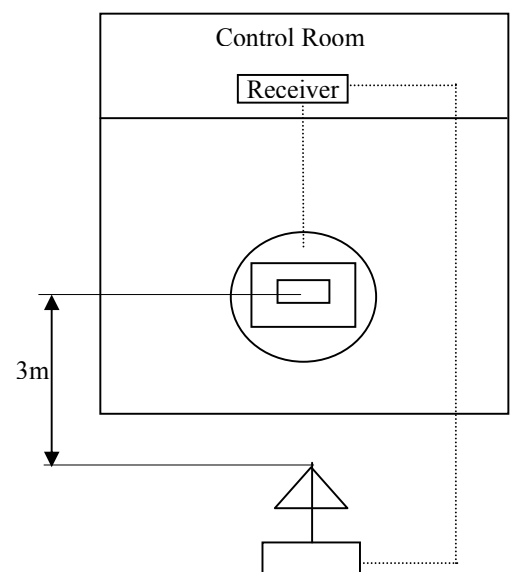
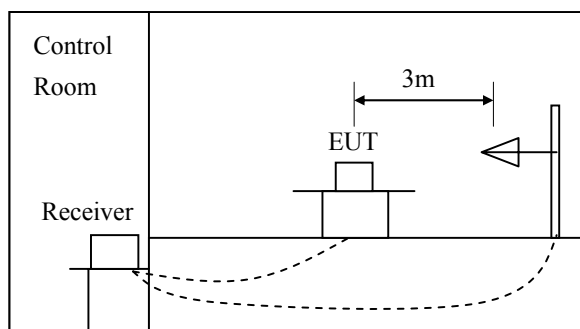
DESCRIPTION OF TEST

Radiated Emissions:

The measurement was performed over the frequency range of 30MHz to 1GHz using antenna as the input transducer to a Spectrum analyzer or a Field Intensity Meter. The measurement was made with the detector set for "quasi-peak" within a bandwidth of 120KHz.

-Procedure of Test

Preliminary measurements were made at 3 meter using bi-log antennas, and spectrum analyzer to determine the frequency producing the max. emission in anechoic chamber. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turn-table azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30MHz to 1000MHz using bi-log antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3-meters test distance using bi-log antenna or horn antenna. The OATS have been verified in regular for its normalized site attenuation. The test equipment was placed on a wooden table. Sufficient time for the EUT, peripheral 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 by manual. The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120kHz or 1MHz depending on the frequency of type of signal. The EUT, peripheral equipment and interconnecting cables were re-configured to the set-up producing the max. emission for the frequency and were placed on top of a 0.8-meter high nonmetallic 1 x 1.5 meter table. The EUT, peripheral equipment, and interconnecting cables were re-arranged and manipulated to maximize each emission. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Each emission was maximized by: varying the mode of operation to the EUT and/or peripheral equipment and changing the polarity of the antenna, whichever determined the worst-case emission.



Measurement Uncertainty Calculations

The measurement uncertainties stated were calculated in accordance with the requirements of NIST Technical Note 1297 and NIS 81 (1994).

Contribution (Conducted Emissions)	Probability Distribution	Uncertainty ($\pm$ dB)
		0.15-30MHz
Receiver Specification	Rectangular	1.5
LISN Coupling Specification	Rectangular	1.5
Cable and Input Attenuator Calibration	Normal (k=2)	0.5
Mismatch to Reciver	U-Shaped	-0.8 / +0.7
System Repeatability	Normal (k=1)	0.2
Combined Standard Uncertainty	Normal (k=2)	-1.85 / +1.71
Expanded Uncertainty U	Normal (k=2)	-3.7 / +3.42

$$U_{c,minus} = -1.85, U_{c,plus} = 1.71$$

$$U = -3.70 / +3.42 \text{ (k=2, 95.45\% confidence level)}$$

Contribution (Radiated Emissions)	Probability Distribution	Uncertainties($\pm$ dB)
		3 m
Antenna		
Factor	Normal (k=2)	0.9968
Frequency Interpolation	Rectangular	0.1039
Height Variation	Rectangular	-2.6 / +1.5
Directivity Difference	Rectangular	-1.0 / +0
Phase Center Location	Rectangular	1.0
Cable Loss	Normal (k=2)	0.5
Receiver		
Voltage Accuracy	Normal (k=2)	2.0
Pulse Response	Rectangular	1.5
Absolute Repetition Rate	Rectangular	1.5
Mismatch to Receiver		
$ \Gamma_{\text{antenna}} = 0.33$	U-Shaped	-1.0 / +0.9
$ \Gamma_{\text{receiver}} = 0.33$		
System Repeatability	Std Deviation	0.5
Combined Standard Uncertainty	Normal	-2.6048 / 2.2775
Expanded Uncertainty U	Normal (k=2)	-5.21 / +4.55

$$U_{c,minus} = -2.6048, U_{c,plus} = 2.2775$$

$$U = -5.21 / +4.55 \text{ (k=2, 95.45\% confidence level)}$$

Equipment Under Test

EUT Type :

- ☒ Table-Top. ☐ Floor-Standing.
☐ Table-Top and Floor-Standing(Combination).

Operation - mode of the E.U.T. :

The equipment under test was operated during the measurement under following conditions :

- ☐ Standby Mode
☒ Operational Condition : ☒ File up/download mode
 ☒ FM receiving mode
 ☒ Playback mode
 ☒ Voice recording mode

Configuration of the equipment under test :

Following peripheral devices and interface cables were connected during the measurement :

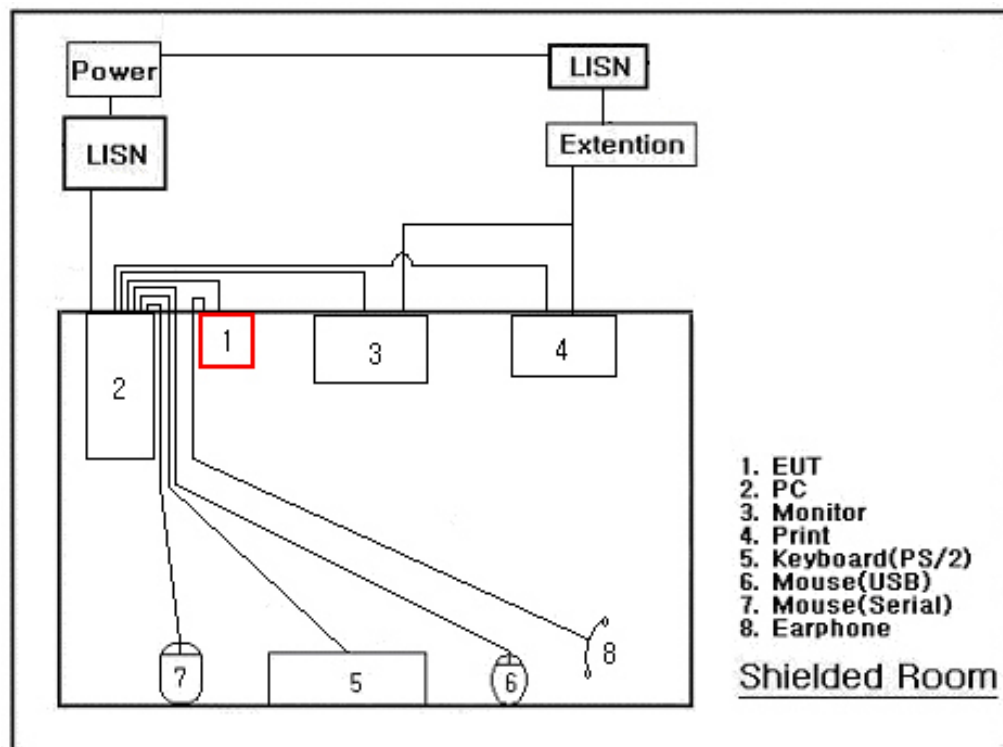
Equipment	Type	Brand	Serial No.
dx6120MT	Desktop Computer	HP	CNG52000QL
SK-2880	Keyboard(PS/2)	HP	N/A
M-UV69a	Mouse(USB)	HP	N/A
1704FPTt	Monitor	DELL	N/A
M-M28	Mouse(Serial)	Logitech	N/A
A0302380	Printer	Northern Telecom	2633S60168

Connecting Interface Cables :

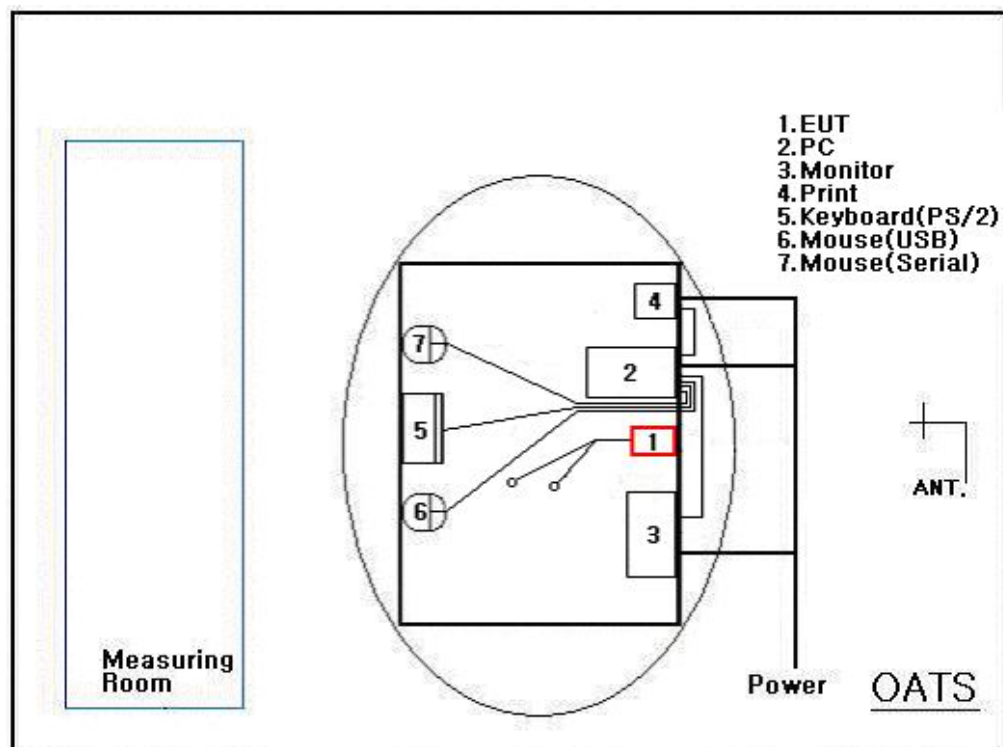
Shielded monitor's signal cable(with two ferrite core) : 1.5 m
Shielded Printer's signal cable(with one ferrite core) : 1.8 m
Unshielded Keyboard(PS/2) cable(without ferrite core) : 1.8 m
Unshielded Mouse(USB) cable(without ferrite core) : 1.8 m
Unshielded Mouse(Serial) cable(without ferrite core) : 1.8 m
Unshielded USB cable(with two ferrite core) : 0.7 m
Unshielded Earphone cable(without ferrite core) : 1.5 m

Note :

Test Set-Up



Conducted Emissions



Radiated Emissions

SUMMARY

Emissions

■ Conducted Emission

The requirements are ☒ MET ☐ Not MET
Minimum limit margin 5.5 dB at 1.55 MHz
Maximum limit exceeding

**Remarks : With Neutral phase, for average detect mode.
(File up/download mode)**

Find the test data in following pages 11 to 12.

■ Radiated Emission

The requirements are ☒ MET ☐ Not MET
Minimum limit margin 4.2 dB at 594.2 MHz
Maximum limit exceeding

Remarks : File up/download mode.

Find the test data in following page 13 to 19.

Test Date

Begin of Testing : June 01, 2006

End of Testing : June 08, 2006

Prepared By

Note :

- ■ means the test is applicable,
- □ is not applicable.



C.W.Kim / Project Engineer

TEST CONDITIONS AND DATA

Conducted Emissions

[Applicable]

◆ Test Equipment Used

Model Name	Description	Manufacture	Calibration Date	Serial Number
ESCS30	Test Receiver	Rohde & Schwarz	Jan. 12, 2006	828985/023
ESH2-Z5	LISN	Rohde & Schwarz	Aug. 12, 2005	861714/012
ESH3-Z2	Pulse Limiter	Rohde & Schwarz	Jul. 12, 2005	357.8810.52

◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Test Program File up/download mode

◆ Test Date June 05, 2006

◆ Test Area Conducted room

Note : The equipment used is calibrated in regular for every year.

Conducted Emissions

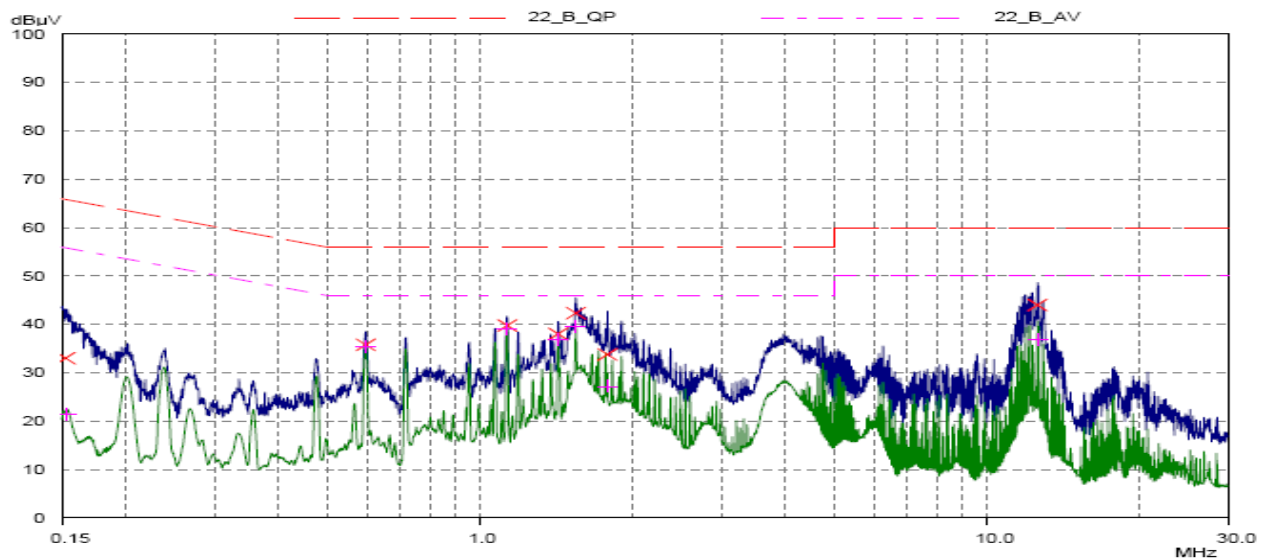
Live Phase

ISTCo.,Ltd.

Conducted Emission

EUT: DAH-2100
Manuf: HYUNWON INC.
Op Cond: 120Vac 60Hz
Operator: C.W. KIM
Test Spec: FILE UP/DOWNLOADMODE
Comment: LIVE
PK : BLUE AV : GREEN
Result File: LIVE(FCC).dat : New Measurement

Scan Settings (1 Range)
Start 150kHz Stop 30MHz Step 0.2% IF BW 9kHz Detector PK+AV M-Time 20msec Atten Auto Preamp OFF OpRge 60dB
Final Measurement: Detectors: X QP / + AV Meas Time: 2sec Peaks: 8 Acc Margin: 25 dB



Freq. [MHz]	Measurement [dB μ V]		Limit [dB μ V]		Insertion Loss [dB]	Cable Loss [dB μ V]	Result [dB μ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.597	35.8	35.5	56.0	46.0	0.2	0.6	36.6	36.3	19.4	9.7
1.135	39.8	39.1	56.0	46.0	0.2	0.6	40.6	39.9	15.4	6.1
1.431	38.1	36.8	56.0	46.0	0.2	0.7	39.0	37.7	17.0	8.3
1.550	42.3	39.6	56.0	46.0	0.2	0.7	43.2	40.5	12.8	5.5
1.790	33.8	27.2	56.0	46.0	0.3	0.7	34.8	28.1	21.2	17.9
12.635	44.0	37.0	60.0	50.0	0.5	0.8	45.3	38.3	14.7	11.7

Note : PC power line

Conducted Emissions

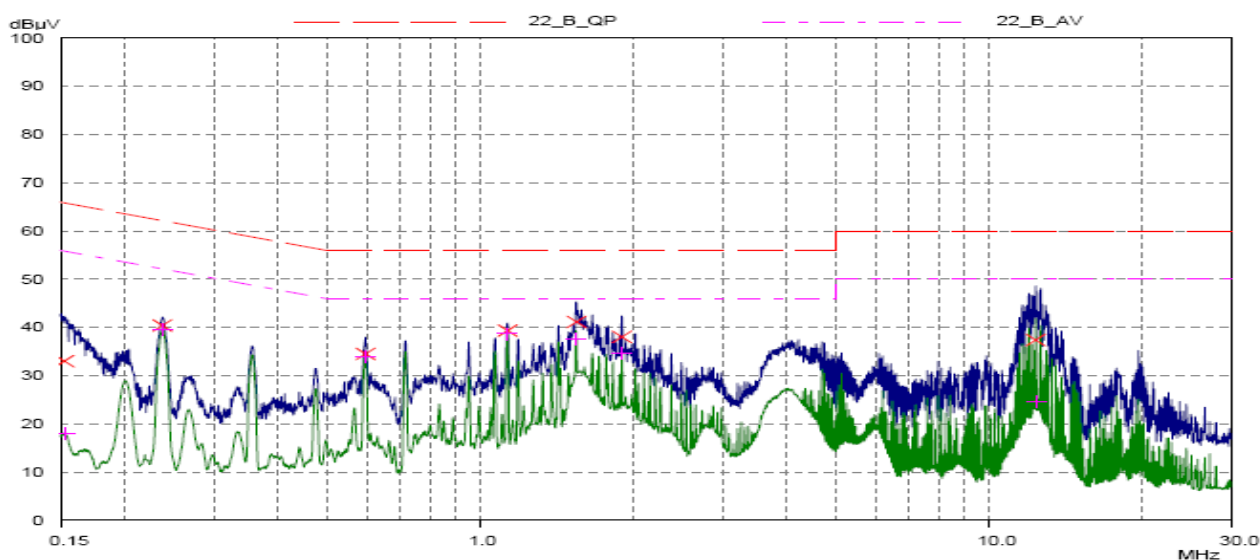
Neutral Phase

ISTCo.,Ltd.

Conducted Emission

EUT: DAH-2100
Manuf: HYUNWON INC.
Op Cond: 120Vac 60Hz
Operator: C.W. KIM
Test Spec: FILE UP/DOWNLOADMODE
Comment: NEUTRAL
PK : BLUE AV : GREEN
Result File: N(FCC).dat : New Measurement

Scan Settings (1 Range)
Start 150kHz Stop 30MHz Step 0.2% IF BW 9kHz Detector PK+AV Receiver Settings M-Time 20msec Atten Auto Preamp OFF OpRge 60dB
Final Measurement: Detectors: X QP / + AV
Meas Time: 2sec
Peaks: 8
Acc Margin: 25 dB



Freq. [MHz]	Measurement [dB μ V]		Limit [dB μ V]		Insertion Loss [dB]	Cable Loss [dB μ V]	Result [dB μ V]		Margin [dB]	
	Q-peak	Average	Q-peak	Average			Q-peak	Average	Q-peak	Average
0.238	40.4	39.6	62.2	52.2	0.3	0.3	41.0	40.2	21.1	11.9
0.597	34.6	34.0	56.0	46.0	0.2	0.6	35.4	34.8	20.6	11.2
1.135	39.4	38.7	56.0	46.0	0.2	0.6	40.2	39.5	15.8	6.5
1.550	41.2	37.6	56.0	46.0	0.3	0.7	42.2	38.6	13.8	7.5
1.905	38.1	34.7	56.0	46.0	0.3	0.7	39.1	35.7	16.9	10.3
12.410	37.4	24.7	60.0	50.0	0.5	0.8	38.7	26.0	21.3	24.0

Note : PC power line

TEST CONDITIONS AND DATA

Radiated Emission

[Applicable]

◆ Test Equipment Used

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESCS30	Test Receiver	Rohde & Schwarz	Jan. 12, 2006	828985/023
VULB 9160	Antenna	Schwarzbeck	Sep. 28, 2005	3071

◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Test Program File up/download mode
 FM receiving mode
 Playback mode
 Voice recording mode

◆ Test Date June 06~07, 2006

◆ Test Area Open site

Note : The equipment used is calibrated in regular for every year.

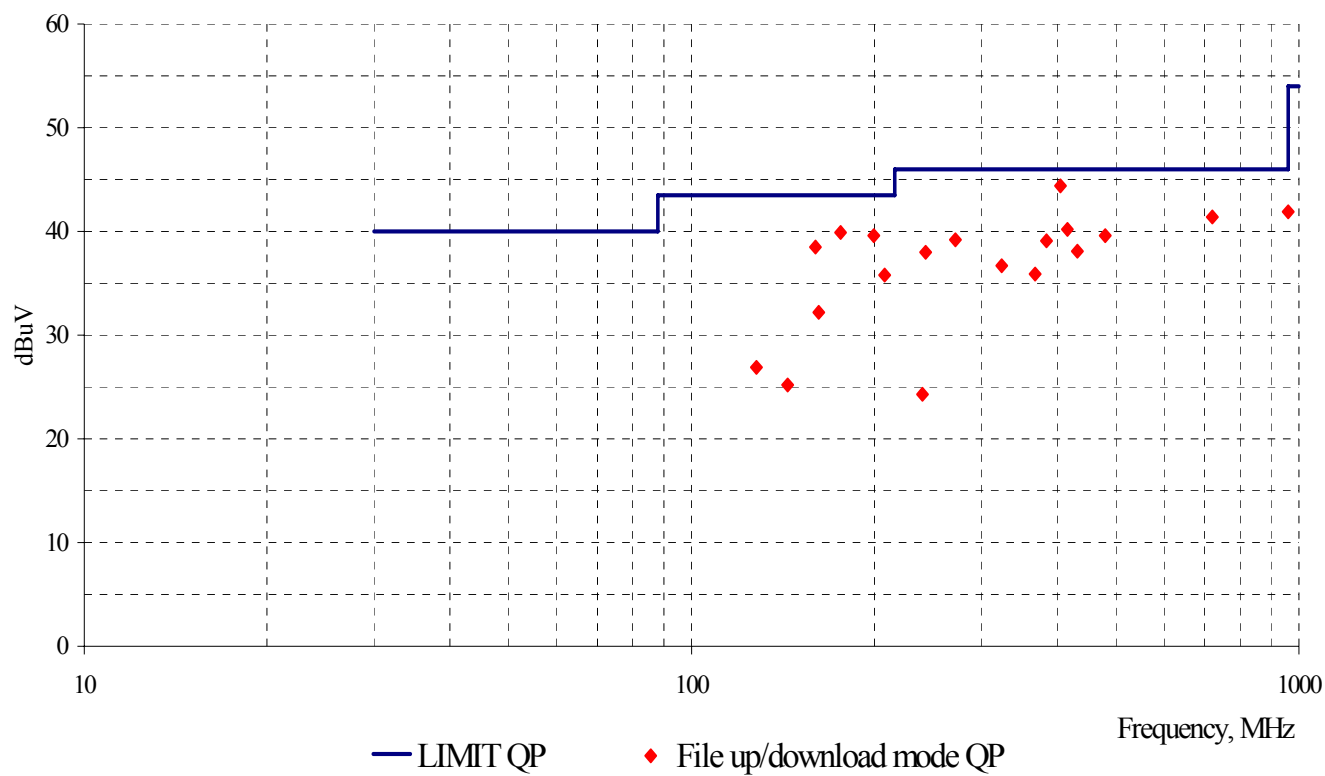
Radiated Emissions
 (Disturbance Radiation)

[Applicable]

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
127.9	14.0	10.4	2.5	H	26.9	43.5	16.6
143.9	10.0	12.5	2.7	H	25.2	43.5	18.3
159.9	22.2	13.3	3.0	H	38.5	43.5	5.0
176.0	25.3	11.4	3.2	H	39.9	43.5	3.6
199.6	27.2	9.0	3.4	H	39.6	43.5	3.9
207.9	24.2	8.4	3.2	H	35.8	43.5	7.7
240.0	10.3	10.2	3.8	H	24.3	46.0	21.7
271.9	23.6	11.6	4.0	H	39.2	46.0	6.8
367.9	17.2	13.8	4.9	H	35.9	46.0	10.1
383.9	20.0	14.2	4.9	H	39.1	46.0	6.9
415.9	19.6	15.3	5.3	H	40.2	46.0	5.8
479.9	19.3	14.5	5.8	H	39.6	46.0	6.4
719.9	13.2	20.3	7.9	H	41.4	46.0	4.6
959.9	9.0	23.0	9.9	H	41.9	46.0	4.1

Note: File up/download mode

MEASUREMENT OF DISTURBANCE RADIATION



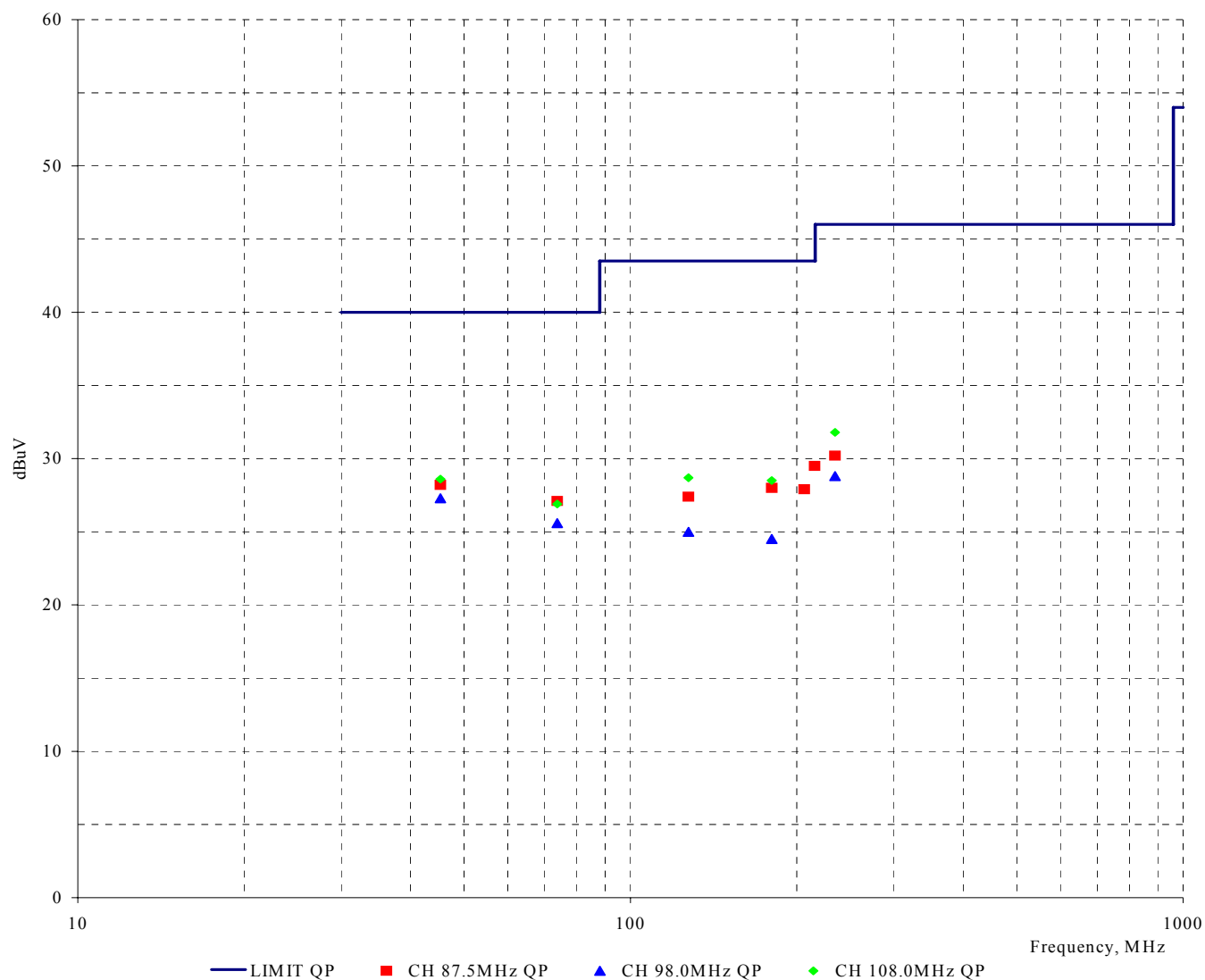
[Applicable]

CH Freq. [MHz]	Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
87.5	45.3	15.3	11.9	1.0	H	28.2	40.0	11.8
	73.7	16.7	8.8	1.6	H	27.1	40.0	12.9
	127.3	14.5	10.4	2.5	H	27.4	43.5	16.1
	180.1	14.1	10.7	3.2	H	28.0	43.5	15.5
	206.3	16.0	8.6	3.3	H	27.9	43.5	15.6
	215.4	17.9	8.4	3.2	H	29.5	43.5	14.0
	234.6	16.7	9.7	3.8	V	30.2	46.0	15.8
98.0	45.3	14.4	11.9	1.0	H	27.3	40.0	12.7
	73.7	15.2	8.8	1.6	H	25.6	40.0	14.4
	127.3	12.1	10.4	2.5	H	25.0	43.5	18.5
	180.1	10.6	10.7	3.2	H	24.5	43.5	19.0
	234.6	15.3	9.7	3.8	V	28.8	46.0	17.2
108.0	45.3	15.7	11.9	1.0	H	28.6	40.0	11.4
	73.7	16.5	8.8	1.6	H	26.9	40.0	13.1
	127.3	15.8	10.4	2.5	H	28.7	43.5	14.8
	180.1	14.6	10.7	3.2	H	28.5	43.5	15.0
	234.6	18.3	9.7	3.8	V	31.8	46.0	14.2

Note :FM receiving mode

Z axis plane was the worst test result than Y axis plane and X axis plane.

MEASUREMENT OF DISTURBANCE RADIATION



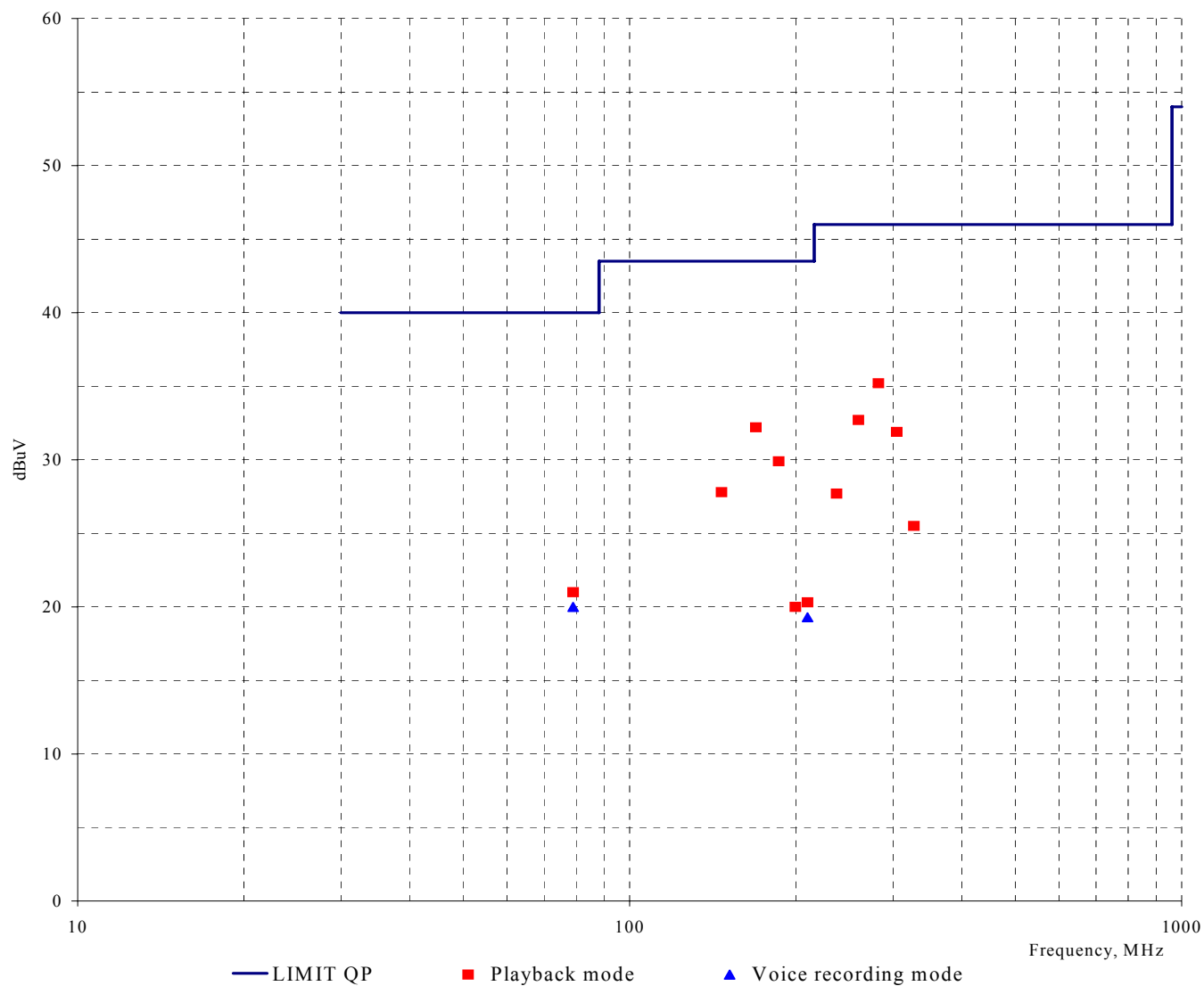
[Applicable]

Mode	Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
Playback	79.0	11.3	8.0	1.7	H	21.0	40.0	19.0
	146.7	12.6	12.4	2.8	H	27.8	43.5	15.7
	169.3	17.1	12.4	2.7	H	32.2	43.5	11.3
	186.2	16.9	9.9	3.1	H	29.9	43.5	13.6
	199.6	7.6	9.0	3.4	H	20.0	43.5	23.5
	210.0	8.9	8.3	3.1	H	20.3	43.5	23.2
	237.0	14.0	9.9	3.8	H	27.7	46.0	18.3
	259.6	17.6	11.1	4.0	H	32.7	46.0	13.3
	282.2	19.3	11.8	4.1	H	35.2	46.0	10.8
	304.8	15.1	12.4	4.4	H	31.9	46.0	14.1
	327.3	8.0	13.0	4.5	H	25.5	46.0	20.5
Voice recording	79.0	10.3	8.0	1.7	H	20.0	40.0	20.0
	210.0	7.9	8.3	3.1	H	19.3	43.5	24.2

Note :Playback, Voice recording mode

Z axis plane was the worst test result than Y axis plane and X axis plane.

MEASUREMENT OF DISTURBANCE RADIATION



Appendix A. The Photos of Test Setup



Conducted Emissions(PC power line) - Front View



Conducted Emissions(PC power line) - Rear View

Appendix A. The Photos of Test Setup



Radiated Emissions(File up/download mode)-Front View



Radiated Emissions(File up/download mode)-Front View

Appendix A. The Photos of Test Setup



Radiated Emissions(FM receiving/Voice record/Playback mode)X-axis View



Radiated Emissions(FM receiving/Voice record/Playback mode)-Y-axis View



Radiated Emissions(FM receiving/Voice record/Playback mode)-Z-axis View

Appendix B. The Photos of Equipment Under Test



Front View



Rear View

Appendix B. The Photos of Equipment Under Test



USB cable



Earphone