

Certification of Compliance

CFR 47 Part 15 Subpart B

Test Report File No. : 05-IST-0339

Date of Issue : October 26, 2005

Model(s) : DAH-1800
Kind of Product : MP3 PLAYER
FCC ID : PCMDAH-1800
Applicant : Hyun Won Inc.
Address : 333-1, Shindae-Ri, Kumho-Eup, Youngcheon-City,
Kyoungbuk, South Korea
Manufacturer : Hyun Won Inc.
Address : 333-1, Shindae-Ri, Kumho-Eup, Youngcheon-City,
Kyoungbuk, 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 24 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 2003.



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 | 20-22 |
| | B. The Photos of Equipment Under Test | 23-24 |

Note:

INFORMATIONS OF TEST LABORATORY

EMC LABORATORY of IST Co., Ltd. (*FCC Filing Lab.*)
San 21-8, Goan-Ri, Baekam-Myun, Yongin-City
Kyonggi-Do, 449-860, Korea
TEL : +82 31 333 4093 FAX : +82 31 333 4094

ENVIRONMENTAL CONDITIONS

| | |
|----------------------|-----------|
| Temperature | 22 °C |
| Humidity | 54 % |
| Atmospheric pressure | 1014 mbar |

POWER SUPPLY SYSTEM USED

Power supply system AC 120Vac, 60Hz(PC Power)
(Refer to the product information)

PRODUCT INFORMATION

The Equipment Under Test(EUT) is MP3 PLAYER of Hyun Won Inc.
(FCC ID : PCMDAH-1800)

| | |
|----------------------------|---|
| FM Frequency Range : | 76MHz ~ 108.0MHz |
| Headset Output(FM Tuner) : | Left 7mW + Right 7mW(16Ω) Max.Volume |
| S/N ratio(FM Tuner) : | 50dB |
| Antenna : | Headset/Earphone code antenna |
| Frequency Characteristic : | 20Hz ~ 20KHz |
| Headset Output(Audio) : | Left 20mW + Right 20mW(16Ω) Max.Volume |
| S/N ratio(Audio) : | 90dB |
| File Type : | MP3, WMA, OGG, WAV, ASF, JPEG, MPEG4 |
| Bit Rate : | MP3(8Kbps ~ 320Kbps, VBR), WMA(32 ~ 192Kbps) OGG(Q-1 ~ Q10), WAV(MS-ADPCM) |
| USB Download Speed : | 40Mbps |
| Recording hours : | 1040 minutes for voice recording (with 256MB and based on 32Kbps) |
| Max. Playback hours : | Audio(approx. 12hours) Video(approx. 3hours) |
| Operational Temperature : | -5°C ~ 70°C |
| Display : | 65000 Color OLED |
| Size(W x H x D mm) : | 58 x 28 x 22 |
| Weight(g) : | 35(Battery inclusive) |
| Battery : | Lithium Polymer(built - in type) |

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

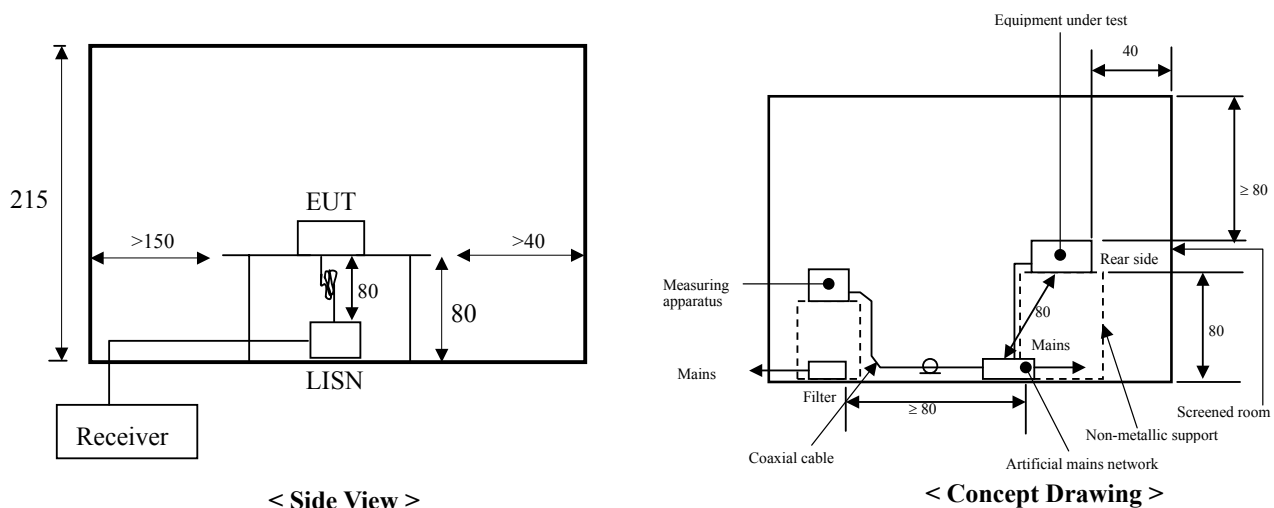
DESCRIPTIONS OF TEST

Conducted Emissions:

The measurement were performed over the frequency range of 0.15MHz to 30MHz using a 50 Ω /50uH 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 R/S ESH3 and Hyup-Rip KNW-407 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 EMCO 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 EMCO 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 R/S 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.



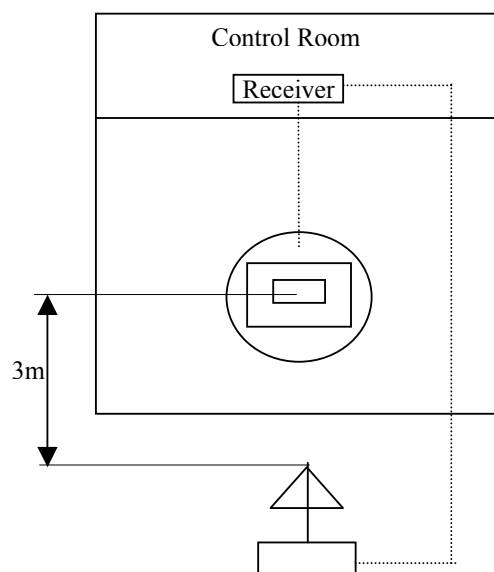
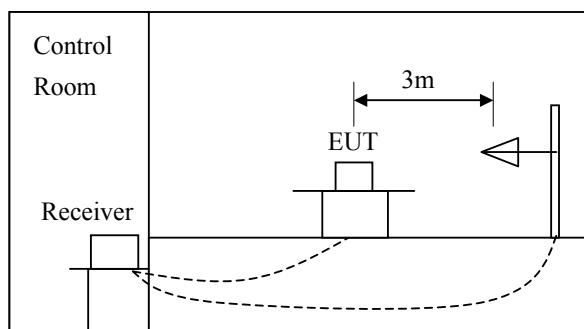
DESCRIPTION OF TEST

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-conical and log-periodic 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 300MHz using S/B bi-conical antenna and 300 to 1000MHz using S/B log-periodic antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made at open site with 3-meters test distance using S/B 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 :

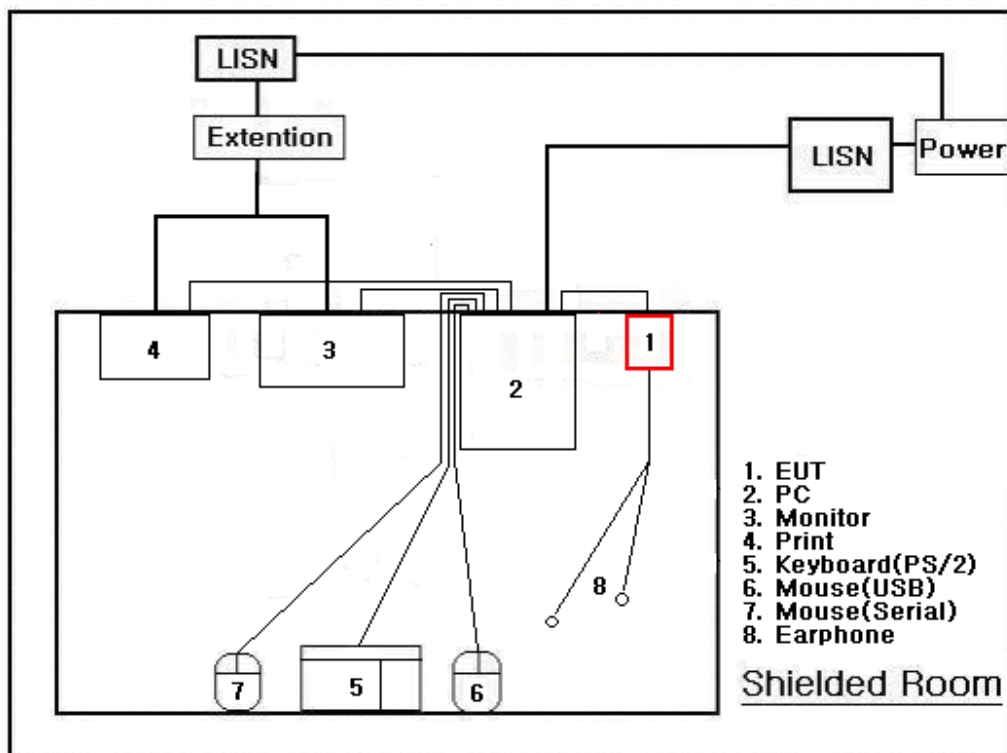
| Equipment | Type | Brand | Serial No. |
|------------------|-----------|------------------|------------|
| Desktop Computer | dx6120 MT | HP | CNG5210N2R |
| Keyboard (PS/2) | SK-2880 | HP | - |
| Mouse (USB) | M-UV69a | HP | - |
| Monitor | SL703C | Daewoo Lucoms | N/A |
| Mouse (Serial) | SMB-400 | Logitech | N/A |
| Printer | A0302380 | Northern Telecom | N/A |

Connecting Interface Cables :

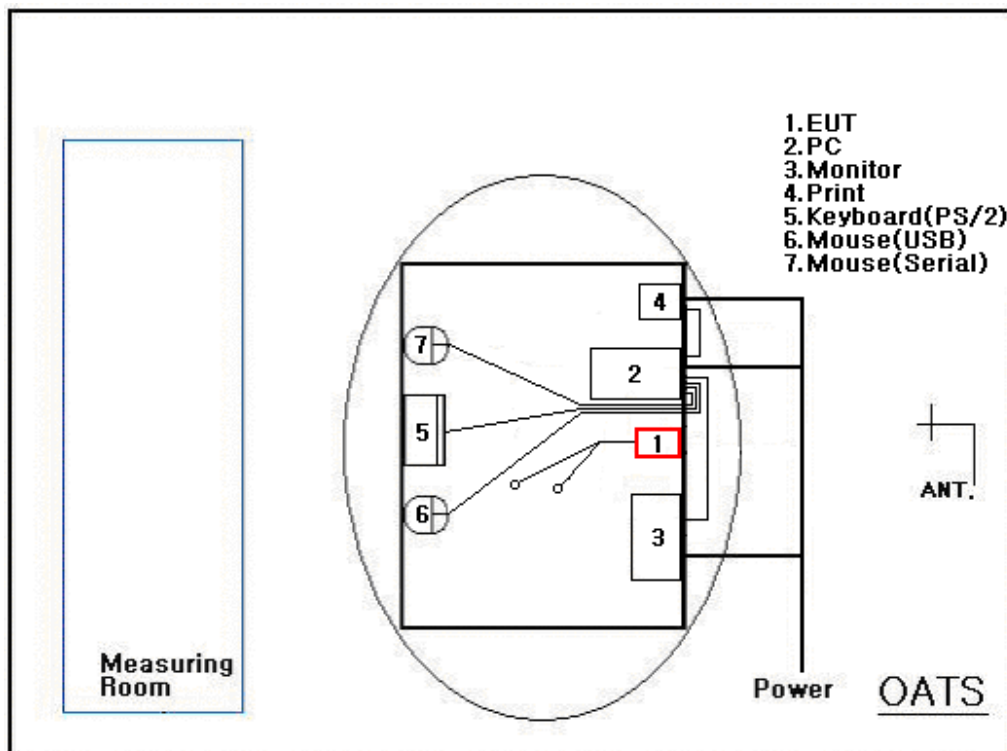
Shielded monitor's signal cable (with two ferrite core) : 1.5 m
 Shielded Printer's signal cable (with two ferrite core) : 1.8 m
 Unshielded Keyboard (PS/2) cable (without ferrite core) : 1.8 m
 Unshielded Mouse (USB) cable (without ferrite core) : 1.8 m
 Unshielded Mouse (Serial) cable (without ferrite core) : 1.8 m
 Unshielded USB cable (with two ferrite core) : 1.2 m
 Unshielded Earphone cable (without ferrite core) : 1.4 m

Note :

Test Set-Up



Conducted Emissions



Radiated Emissions

SUMMARY

Emissions

■ Conducted Emission

The requirements are

● MET

○ Not MET

Minimum limit margin

5.7 dB at 0.692 MHz

Maximum limit exceeding

Remarks : With Neutral phase, for average detect mode.

(File up/download mode)

Find the test data in following pages 10 to 12.

■ Radiated Emission

The requirements are

● MET

○ Not MET

Minimum limit margin

6.6 dB at 543.3 MHz

Maximum limit exceeding

Remarks : FM receiving mode.

Find the test data in following page 13 to 19.

Test Date

Begin of Testing : October 24, 2005

End of Testing : October 25, 2005

Note :

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

Prepared By



S.J.OH / Senior Engineer

TEST CONDITIONS AND DATA

Conducted Emissions

[Applicable]

◆ Test Equipment Used

| Model Name | Description | Manufacture | Calibration Date | Serial Number |
|------------|---------------|-----------------|------------------|---------------|
| ESH3 | Test Receiver | Rohde & Schwarz | Jul. 12, 2005 | 892108/018 |
| 3725/2 | LISN | EMCO | Jul. 12, 2005 | 9101-2068 |
| KNW-407 | LISN | Hyup-Rip | Jul. 12, 2005 | 8-883-10 |
| 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

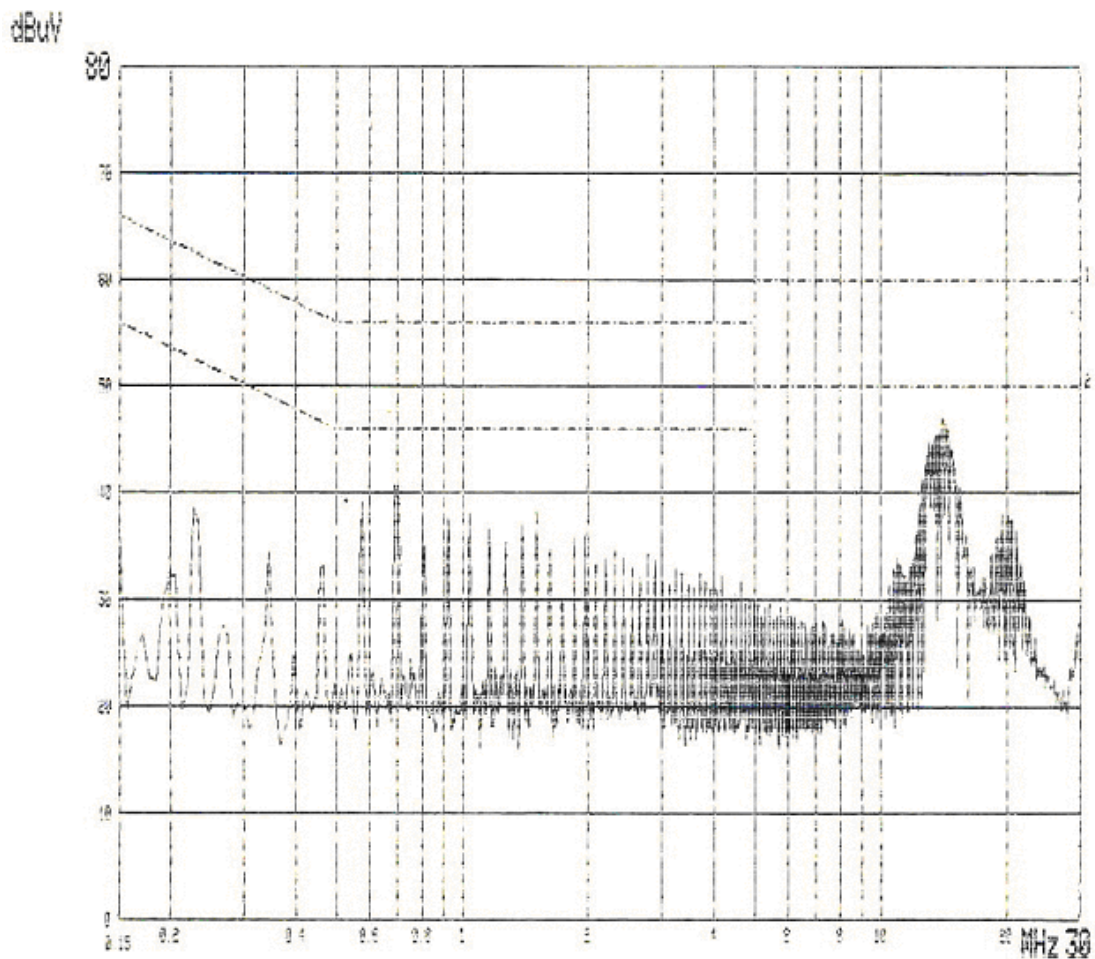
◆ Test Date October 25, 2005

◆ Test Area Conducted room No.1

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

Conducted Emissions

Live Phase



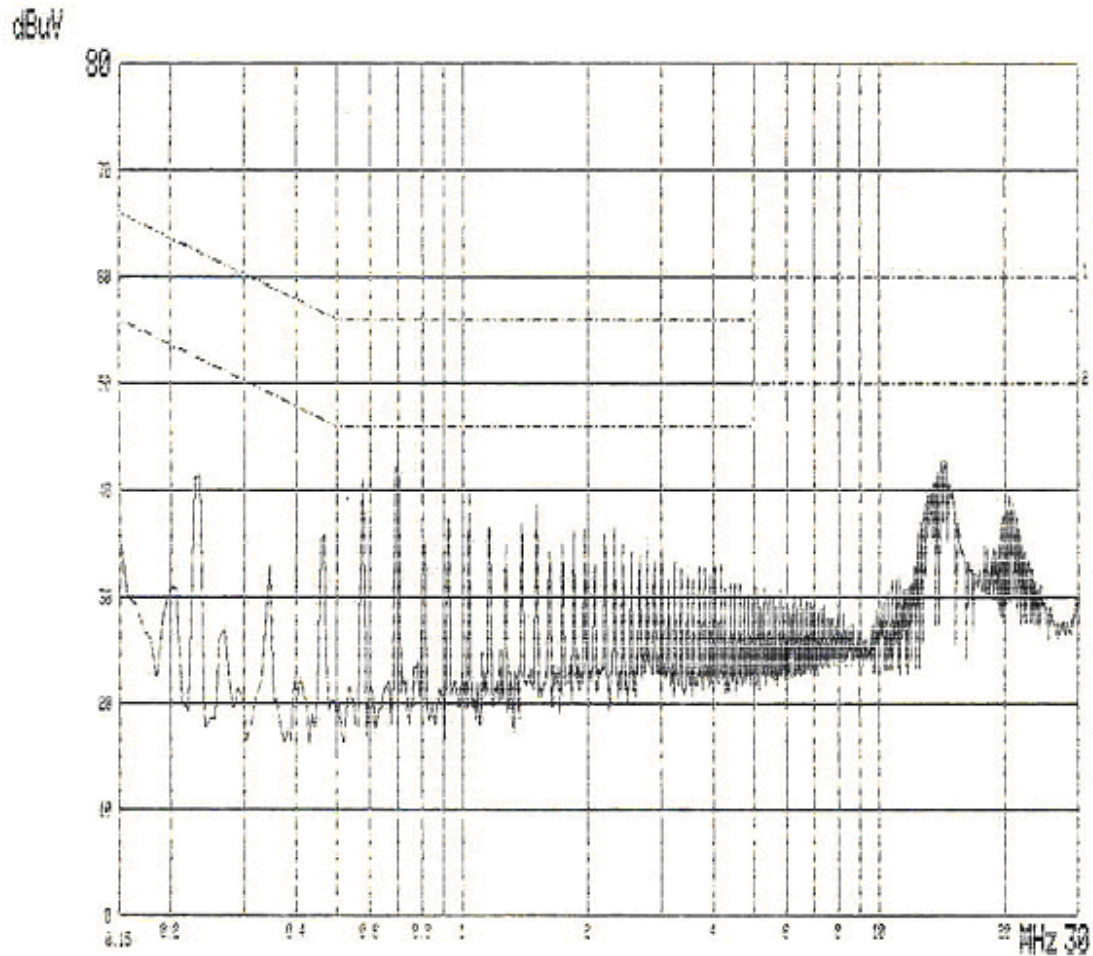
MODEL NAME : DAH-1800
120Vac 60Hz PHASE : LIVE

| 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 |
| 0.150 | 28.1 | 10.4 | 66.0 | 56.0 | 0.3 | 0.5 | 28.9 | 11.2 | 37.1 | 44.8 |
| 0.231 | 37.5 | 37.0 | 62.4 | 52.4 | 0.4 | 0.4 | 38.3 | 37.8 | 24.1 | 14.6 |
| 0.692 | 40.8 | 39.2 | 56.0 | 46.0 | 0.4 | 0.4 | 41.6 | 40.0 | 14.4 | 6.0 |
| 1.500 | 36.7 | 35.8 | 56.0 | 46.0 | 0.3 | 0.5 | 37.5 | 36.6 | 18.5 | 9.4 |
| 14.196 | 47.1 | 37.5 | 60.0 | 50.0 | 0.3 | 0.6 | 48.0 | 38.4 | 12.0 | 11.6 |
| 20.080 | 37.6 | 22.4 | 60.0 | 50.0 | 0.3 | 0.7 | 38.6 | 23.4 | 21.4 | 26.6 |

Note :

Conducted Emissions

Neutral Phase



MODEL NAME : DAH-1800
120Vac 60Hz PHASE : NEUTRAL

| 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 |
| 0.150 | 28.0 | 16.2 | 66.0 | 56.0 | 0.3 | 0.5 | 28.8 | 17.0 | 37.2 | 39.0 |
| 0.230 | 41.5 | 39.7 | 62.4 | 52.4 | 0.4 | 0.4 | 42.3 | 40.5 | 20.1 | 11.9 |
| 0.692 | 40.9 | 39.5 | 56.0 | 46.0 | 0.4 | 0.4 | 41.7 | 40.3 | 14.3 | 5.7 |
| 1.500 | 37.2 | 36.6 | 56.0 | 46.0 | 0.3 | 0.5 | 38.0 | 37.4 | 18.0 | 8.6 |
| 14.197 | 41.6 | 30.7 | 60.0 | 50.0 | 0.3 | 0.6 | 42.5 | 31.6 | 17.5 | 18.4 |
| 20.083 | 36.7 | 25.5 | 60.0 | 50.0 | 0.3 | 0.7 | 37.7 | 26.5 | 22.3 | 23.5 |

Note :

TEST CONDITIONS AND DATA

Radiated Emission

[Applicable]

◆ Test Equipment Used

| Name | Type | Manufacturer | Calibration. Date | Serial Number |
|-----------|---------------|-----------------|-------------------|---------------|
| ESVS10 | Test Receiver | Rohde & Schwarz | Aug. 16, 2005 | 839049/004 |
| VULB 9160 | Antenna | Schwarzbeck | Aug. 23, 2005 | 3048 |

◆ 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 October 24, 2005

◆ Test Area Open site No.2

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

Radiated Emissions

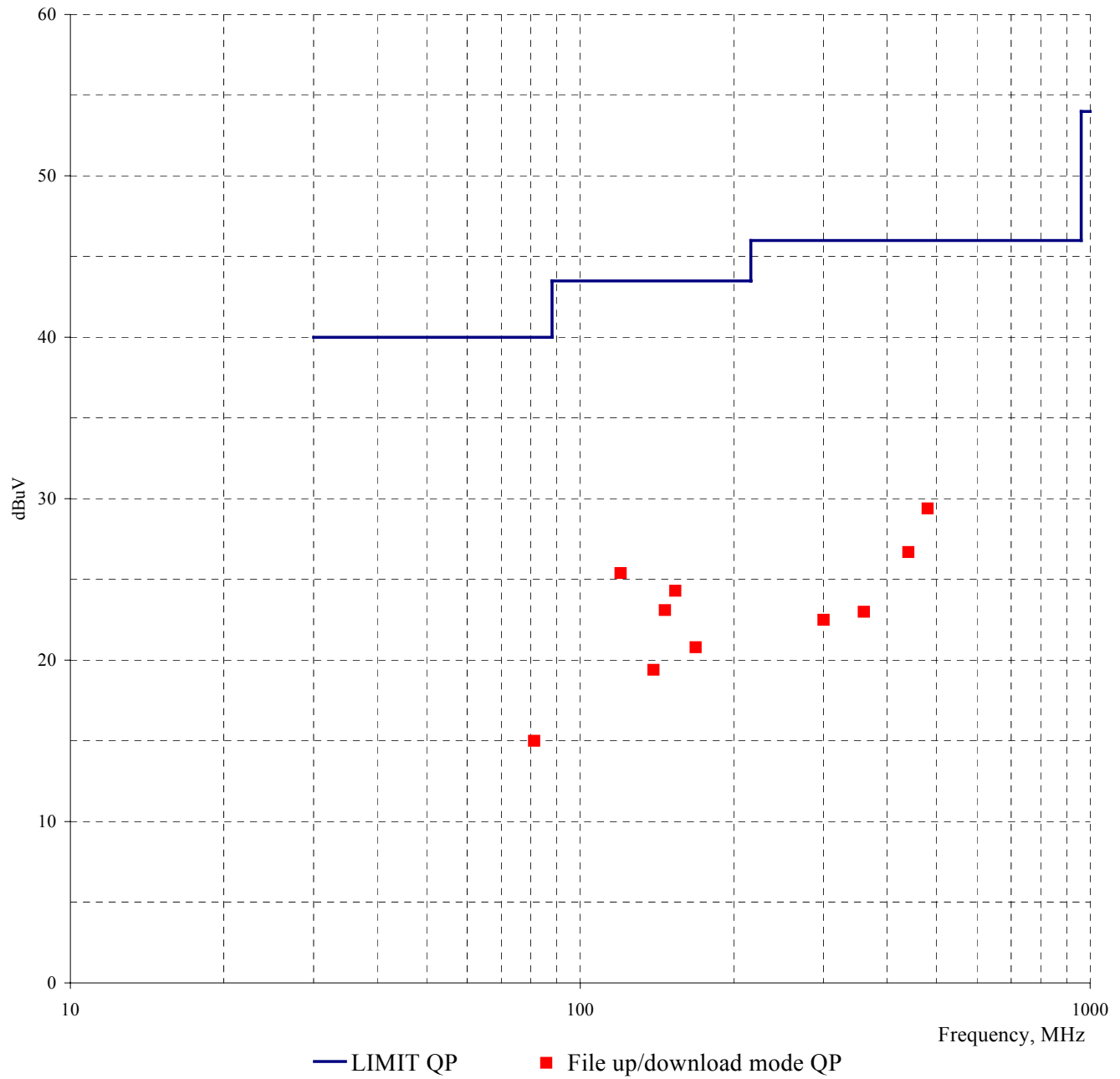
(Disturbance Radiation)

[Applicable]

| Freq. [MHz] | Reading [dBuV] | Antenna Factor [dB/m] | Cable Loss [dB] | Polar. [H/V] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] |
|----------------|-------------------|-----------------------------|-----------------------|-----------------|--------------------|-------------------|----------------|
| 81.2 | 5.0 | 8.0 | 2.0 | V | 15.0 | 40.0 | 25.0 |
| 120.0 | 11.4 | 11.4 | 2.6 | V | 25.4 | 43.5 | 18.1 |
| 139.2 | 4.0 | 12.6 | 2.8 | V | 19.4 | 43.5 | 24.1 |
| 146.6 | 7.5 | 12.8 | 2.8 | V | 23.1 | 43.5 | 20.4 |
| 153.6 | 8.4 | 13.0 | 2.9 | V | 24.3 | 43.5 | 19.2 |
| 168.4 | 5.5 | 12.3 | 3.0 | V | 20.8 | 43.5 | 22.7 |
| 300.1 | 5.6 | 12.5 | 4.4 | V | 22.5 | 46.0 | 23.5 |
| 360.0 | 4.3 | 13.9 | 4.8 | H | 23.0 | 46.0 | 23.0 |
| 440.0 | 5.5 | 15.7 | 5.5 | H | 26.7 | 46.0 | 19.3 |
| 480.0 | 7.0 | 16.5 | 5.9 | H | 29.4 | 46.0 | 16.6 |

Note: **File up/download mode**

MEASUREMENT OF DISTURBANCE RADIATION

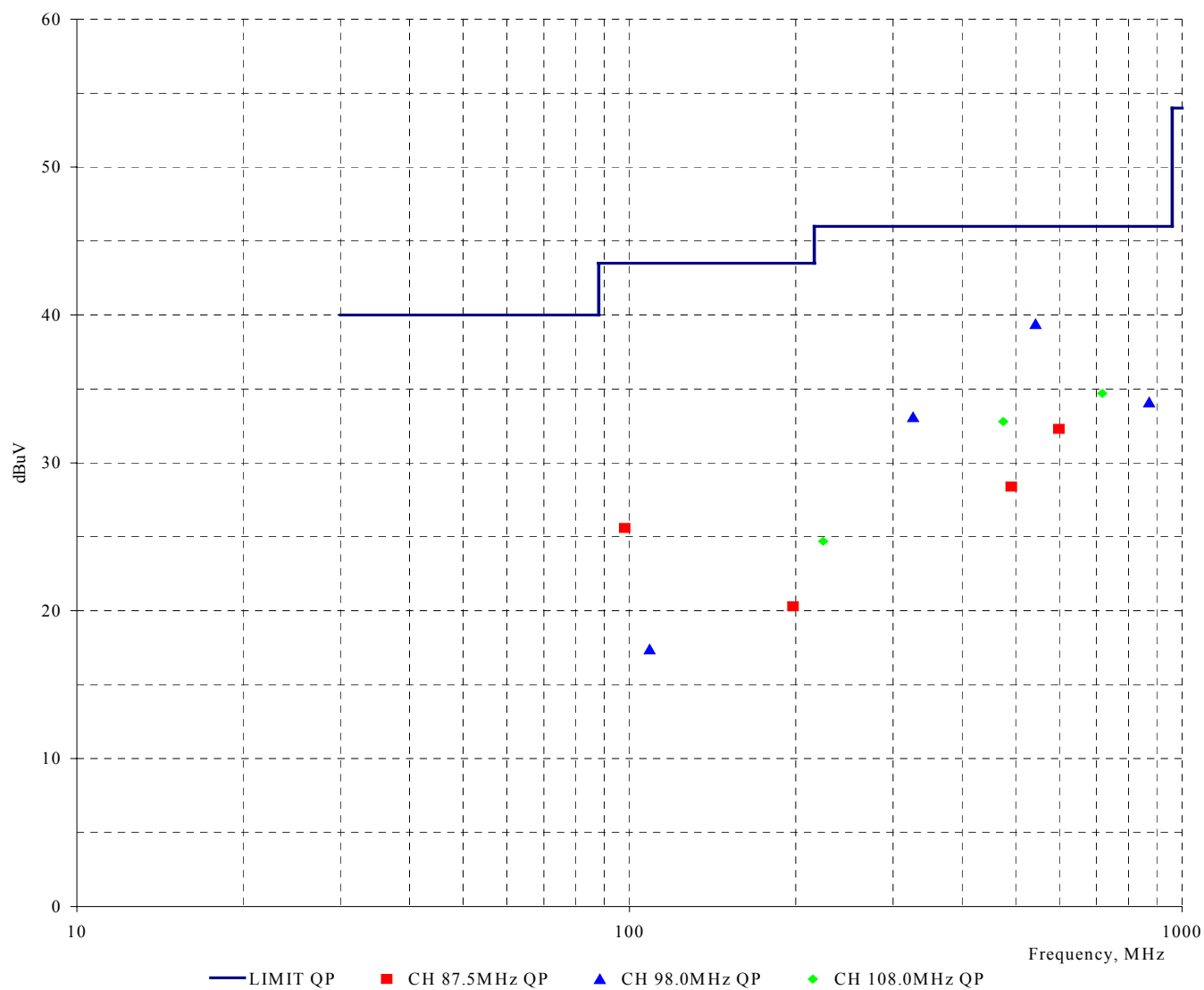


[Applicable]

| 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 | 98.1 | 14.4 | 9.0 | 2.2 | H | 25.6 | 43.5 | 17.9 |
| | 197.7 | 7.6 | 9.4 | 3.3 | H | 20.3 | 43.5 | 23.2 |
| | 491.0 | 5.8 | 16.7 | 5.9 | H | 28.4 | 46.0 | 17.6 |
| | 598.8 | 7.1 | 18.6 | 6.6 | H | 32.3 | 46.0 | 13.7 |
| 98.0 | 108.8 | 4.8 | 10.3 | 2.3 | H | 17.4 | 43.5 | 26.1 |
| | 326.1 | 15.3 | 13.2 | 4.6 | H | 33.1 | 46.0 | 12.9 |
| | 543.3 | 17.2 | 16.0 | 6.2 | H | 39.4 | 46.0 | 6.6 |
| | 872.1 | 3.7 | 21.9 | 8.5 | H | 34.1 | 46.0 | 11.9 |
| 108.0 | 224.2 | 11.4 | 9.7 | 3.6 | H | 24.7 | 46.0 | 21.3 |
| | 474.7 | 10.5 | 16.5 | 5.8 | H | 32.8 | 46.0 | 13.2 |
| | 717.3 | 6.6 | 20.7 | 7.4 | H | 34.7 | 46.0 | 11.3 |

Note : **FM receiving mode**

MEASUREMENT OF DISTURBANCE RADIATION

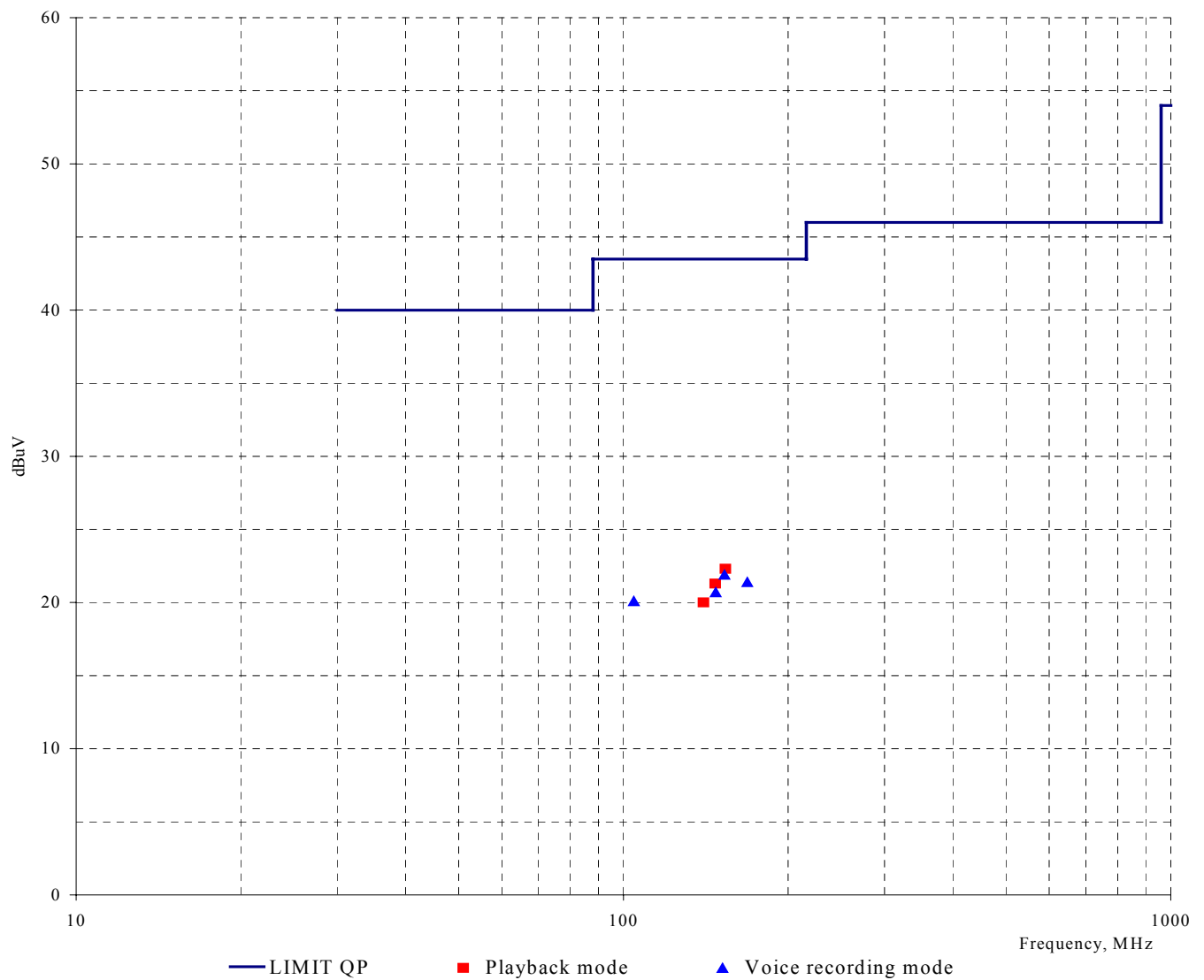


[Applicable]

| Mode | Freq. [MHz] | Reading [dBuV] | Antenna Factor [dB/m] | Cable Loss [dB] | Polar. [H/V] | Result [dBuV/m] | Limit [dBuV/m] | Margin [dB] |
|--------------------|----------------|-------------------|-----------------------------|-----------------------|-----------------|--------------------|-------------------|----------------|
| Playback | 140.0 | 4.5 | 12.7 | 2.8 | V | 20.0 | 43.5 | 23.5 |
| | 147.2 | 5.7 | 12.8 | 2.8 | H | 21.3 | 43.5 | 22.2 |
| | 153.6 | 6.4 | 13.0 | 2.9 | H | 22.3 | 43.5 | 21.2 |
| Voice recording | 140.5 | 4.6 | 12.7 | 2.8 | V | 20.1 | 43.5 | 23.4 |
| | 147.5 | 5.0 | 12.9 | 2.8 | H | 20.7 | 43.5 | 22.8 |
| | 153.0 | 6.0 | 13.0 | 2.9 | H | 21.9 | 43.5 | 21.6 |
| | 168.4 | 6.1 | 12.3 | 3.0 | H | 21.4 | 43.5 | 22.1 |

Note : **Playback, Voice recording mode**

MEASUREMENT OF DISTURBANCE RADIATION



Appendix A. The Photos of Test Setup



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



Conducted Emissions (File up/download mode) - Rear View

Appendix A. The Photos of Test Setup



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



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

Appendix A. The Photos of Test Setup



Radiated Emissions(FM receiving, Playback, Voice recording mode)-Front View



Radiated Emissions(FM receiving, Playback, Voice recording mode)-Rear View

Appendix B. The Photos of Equipment Under Test



Front View



Rear View

Appendix B. The Photos of Equipment Under Test



USB Cable



Earphone