Certification of Compliance

CFR 47 Part 15 Subpart B

Test Report File No. : 05-IST-0389 **Date of Issue** : December 26, 2005

FCC ID : TTQEZAV-PEBBLE

Model(s) : EZAV-PEBBLE ■ Basic ☐ Alternate

Kind of Product : Digital Audio Player

Applicant : EZAV Co., Ltd.

Address : KyungBin Bldg 2F, #517-18, Dogok-dong, Kangnam-ku, Seoul, Korea

Manufacturer : EZAV Co., Ltd.

Address : KyungBin Bldg 2F, #517-18, Dogok-dong, Kangnam-ku, Seoul, Korea

Test Result ■ **Positive** ☐ **Negative**

Reviewed By

S.J.Cho / EMC Group Manager

Approved By

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.

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■ **Test Conditions and Data – Emissions**

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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	18.1 ℃
Humidity	39 %
Atmospheric pressure	1012 mbar

POWER SUPPLY SYSTEM USED

Power supply system	Li-ION battery (Refer to the product information)

PRODUCT INFORMATION

AUDIO	File Support	MPEG 1/2/2.5/3 Layer3, WMA, ASF
	Channel	Stereo
	Frequency Range	20Hz~20KHz
	Earphone Output	20mW(L)+20mW:16Ω, Maximum Volume
	S/N Ratio	Over 90dB(With 20KHz LPF)
FM Radio	Frequency Range	87.5MHz~108MHz(Korea/USA/Europe) 76MHz~108MHz(Japan)
	Earphone Output	20mW(L)+20mW:16Ω, Maximum Volume
	S/N Ratio	Over 55dB(With 20KHz LPF)
	Receiver Type	Earphone Cord Antenna
Record	Voice recording time	256MB(Up to 36hours(16kbps))
		512MB(Up to 72hours(16kbps)
Format	Decode Format	MP3, WMA, ASF
	Encode Format	MP3
PC Interface	System OS	Windows98/ME/2000/XP/MAC OS(Over 9.0)
Power Supply	Rechargeable Li-ION Battery	
Dimension	35 x 68 x 16(mm)	
Weights	about 24g(battery included)	

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

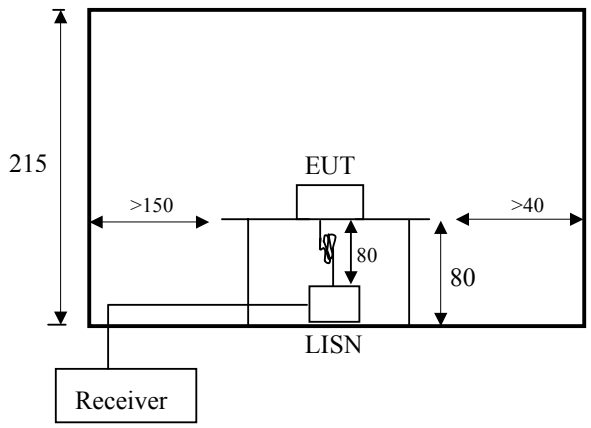
DESCRIPTIONS OF TEST

Conducted Emissions:

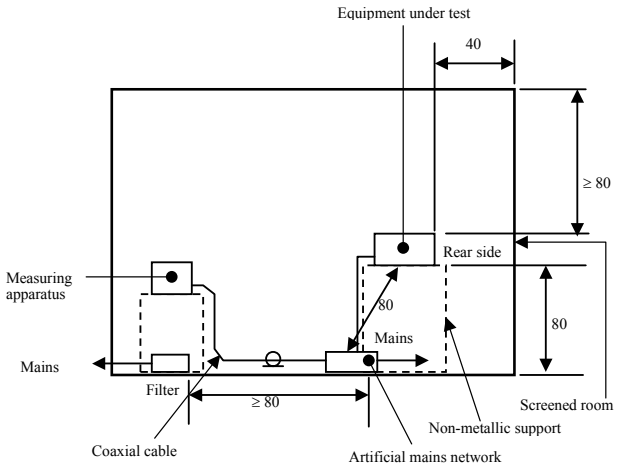
The measurement were performed over the frequency range of 0.15MHz to 30MHz using a 50Ω/50uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10KHz or for "quasi-peak" & "Average" 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 3725/2 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 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.



< Side View >



< Concept Drawing >

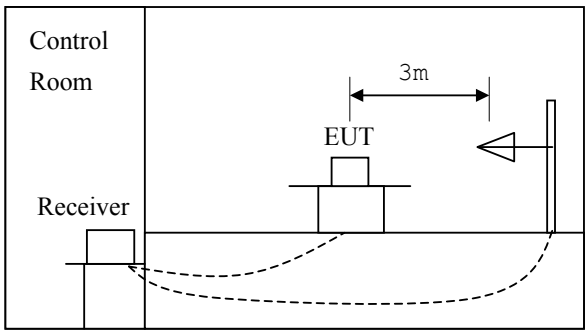
DESCRIPTION OF TEST

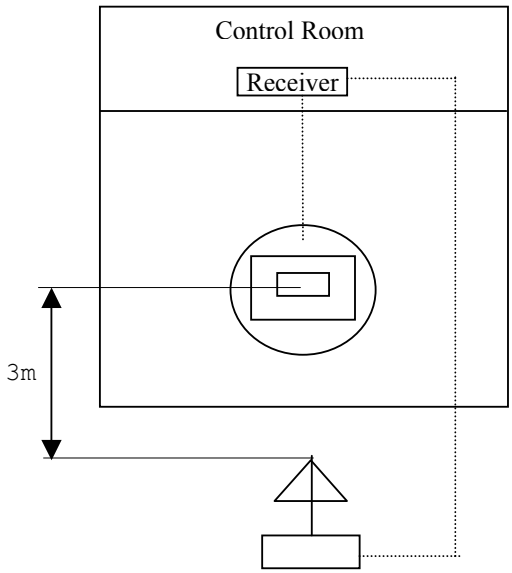
Radiated Emissions:

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 1000MHz using S/B LogBicon antenna VL9160. Under 30MHz, magnetic loop antenna were used. Final measurements were made at open site with 3-meters test distance using the same 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 (±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 (k=2, 95.45% confidence level)

Contribution (Radiated Emissions)	Probability Distribution	Uncertainties(±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 $\lvert \Gamma_{antenna} \rvert = 0.33$ $\lvert \Gamma_{receiver} \rvert = 0.33$	U-Shaped	-1.0 / +0.9
System Repeatibility	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 (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 : ■ Files read/write mode

■ Playback mode

■ FM receiving mode

Configuration of the equipment under test :

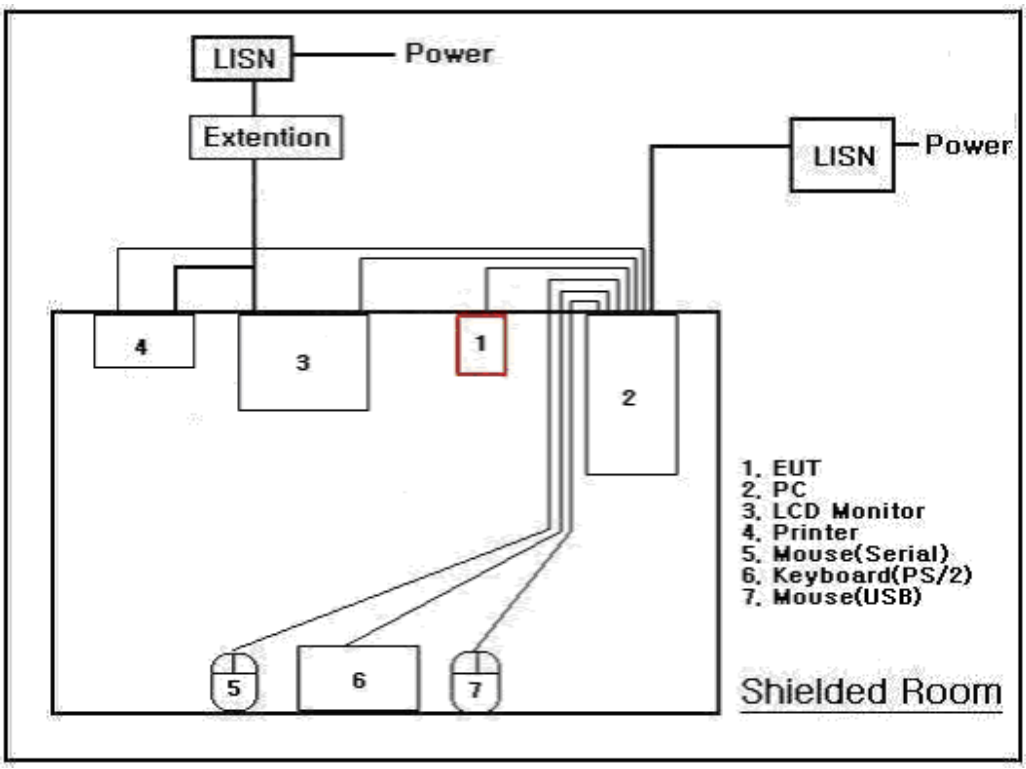
Following peripheral devices and interface cables were connected during the measurement :

Equipment	Type	Brand	Serial No.	FCC Compliance Info.
PC	dx6120 MT	HP	CNG52000QL	DOC
LCD Monitor	1704FPTt	DELL	N/A	
Keyboard(PS/2)	SDL4000	HP	N/A	DOC
Mouse(PS/2)	M-UV69a	HP	N/A	DOC
Mouse(Serial)	M-M28	Logitech	N/A	DZL210365
Printer	A0302380	Northern Telecom	2633S60168	DSI6XU2225C-L

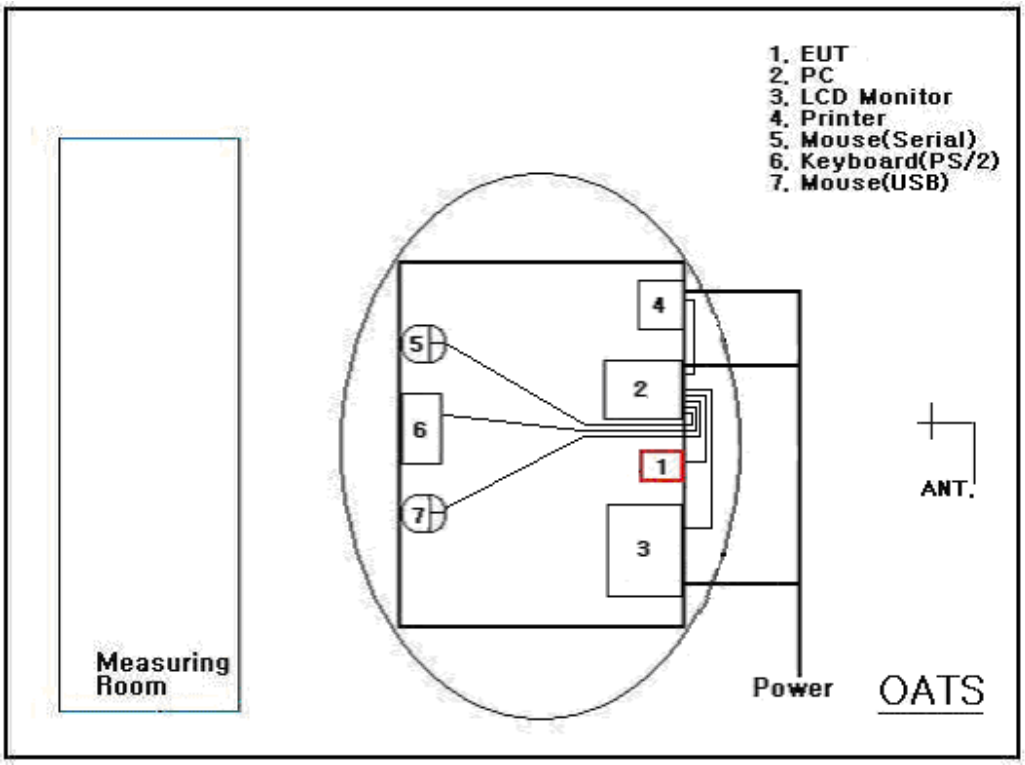
Connecting Interface Cables :
- Unshielded AC power cable : 1.8 m
- Shielded monitor's signal cable (with two ferrite core) : 1.8 m
- Shielded Printer's signal cable (without ferrite core) : 1.8 m
- Unshielded Keyboard's signal cable (without ferrite core) : 1.8 m
- Unshielded Mouse's signal cable (without ferrite core) : 1.8 m
- Unshielded USB cable (with two ferrite core) : 1.0 m
- Unshielded Earphone cable(without ferrite core) : 1.6 m

Note :

Test Set-Up



Conducted Emissions



Radiated Emissions

SUMMARY

Emissions

■ Conducted Emission

Test Rule Part 15.107(c)

The requirements are ● MET ○ Not MET

Minimum limit margin 6.01dB at 0.698MHz

Maximum limit exceeding

Remarks : Limits are kept with more 3dB margin.

Find the test data in following pages 11 to 12.

■ Radiated Emission

Test Rule Part 15.109(a)(e)

The requirements are ● MET ○ Not MET

Minimum limit margin 4.41dB at 492MHz

Maximum limit exceeding

Remarks : Limits are kept with more 3dB margin.

Find the test data in following page 14 to 19.

test Date

Begin of testing : Dec. 12, 2005

End of testing : Dec. 14, 2005

Note :

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

Prepared By

J.H. Park / EMC Engineer

TEST CONDITIONS AND DATA

Conducted Emissions

[Applicable]

◆ Test Equipment Used

Model Name	Description	Manufacture	Calibration Date	Serial Number
ESH 3	Test Receiver	Rohde & Schwarz	Jul. 12, 2005	892108/018
3725/2	LISN	Rohde & Schwarz	Jul. 12, 2005	9101-2068
KNW-407	LISN	Hyup-Rip	Jul. 12, 2005	9101-2068
ESH 3-Z2	Pulse limiter	Rohde & Schwarz	Jul. 12, 2005	357.8810.52

◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

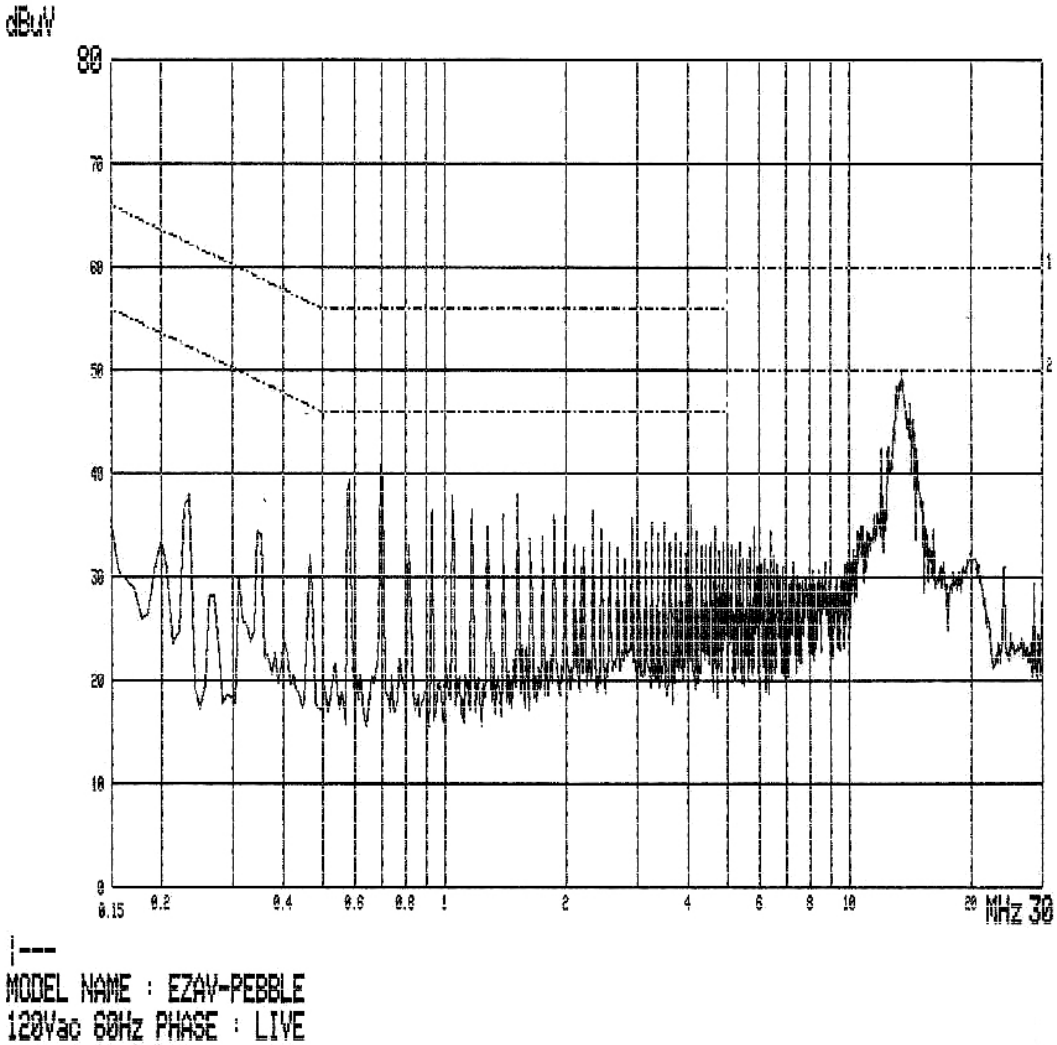
◆ Test Program Files read/write mode

◆ Test Date Dec. 12, 2005

◆ Test Area Shielded Room (for Conducted Emission test)

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

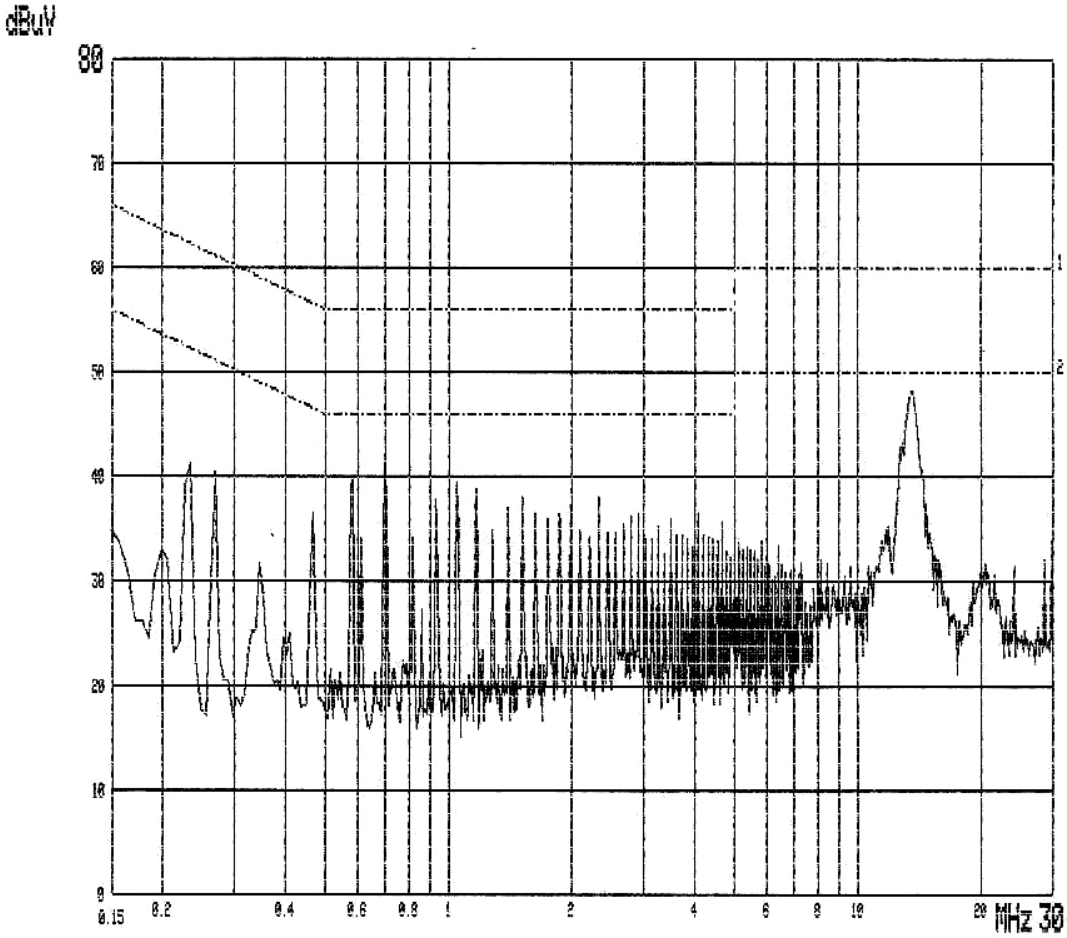
Conducted Emissions



Freq. [MHz]	Measurement [dB μV]		Limit [dB μV]		Insertion Loss	Cable Loss	Result [dB μV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	[dB]	[dB μV]	Q-peak	Average	Q-peak	Average
0.233	38.30	35.90	62.34	52.34	0.29	0.33	38.92	36.52	23.42	15.82
0.582	37.90	38.00	56.00	46.00	0.19	0.58	38.67	38.77	17.33	7.23
0.698	39.40	38.90	56.00	46.00	0.19	0.60	40.19	39.69	15.81	6.31
1.047	37.10	36.00	56.00	46.00	0.22	0.60	37.92	36.82	18.08	9.18
1.512	36.80	36.40	56.00	46.00	0.24	0.65	37.69	37.29	18.31	8.71
13.262	46.40	38.30	60.00	50.00	0.51	0.80	47.71	39.61	12.29	10.39

Note :

Conducted Emissions



Freq. [MHz]	Measurement [dB μV]		Limit [dB μV]		Insertion Loss	Cable Loss	Result [dB μV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	[dB]	[dB μV]	Q-peak	Average	Q-peak	Average
0.233	39.80	39.50	62.34	52.34	0.29	0.33	40.42	40.12	21.92	12.22
0.582	38.90	38.90	56.00	46.00	0.19	0.58	39.67	39.67	16.33	6.33
0.698	39.50	39.20	56.00	46.00	0.19	0.60	40.29	39.99	15.71	6.01
1.047	38.40	37.70	56.00	46.00	0.22	0.60	39.22	38.52	16.78	7.48
1.163	37.50	34.80	56.00	46.00	0.22	0.62	38.34	35.64	17.66	10.36
13.530	45.30	38.80	60.00	50.00	0.51	0.80	46.61	40.11	13.39	9.89

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	LogBicon Ant.	Schwarzbeck	Aug. 23, 2005	3048

◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Test Program Files read/write mode
Playback mode
FM receiving mode

◆ Test Date Dec. 13, 2005
Dec. 14, 2005

◆ Test Area Open Area Test Site No.2

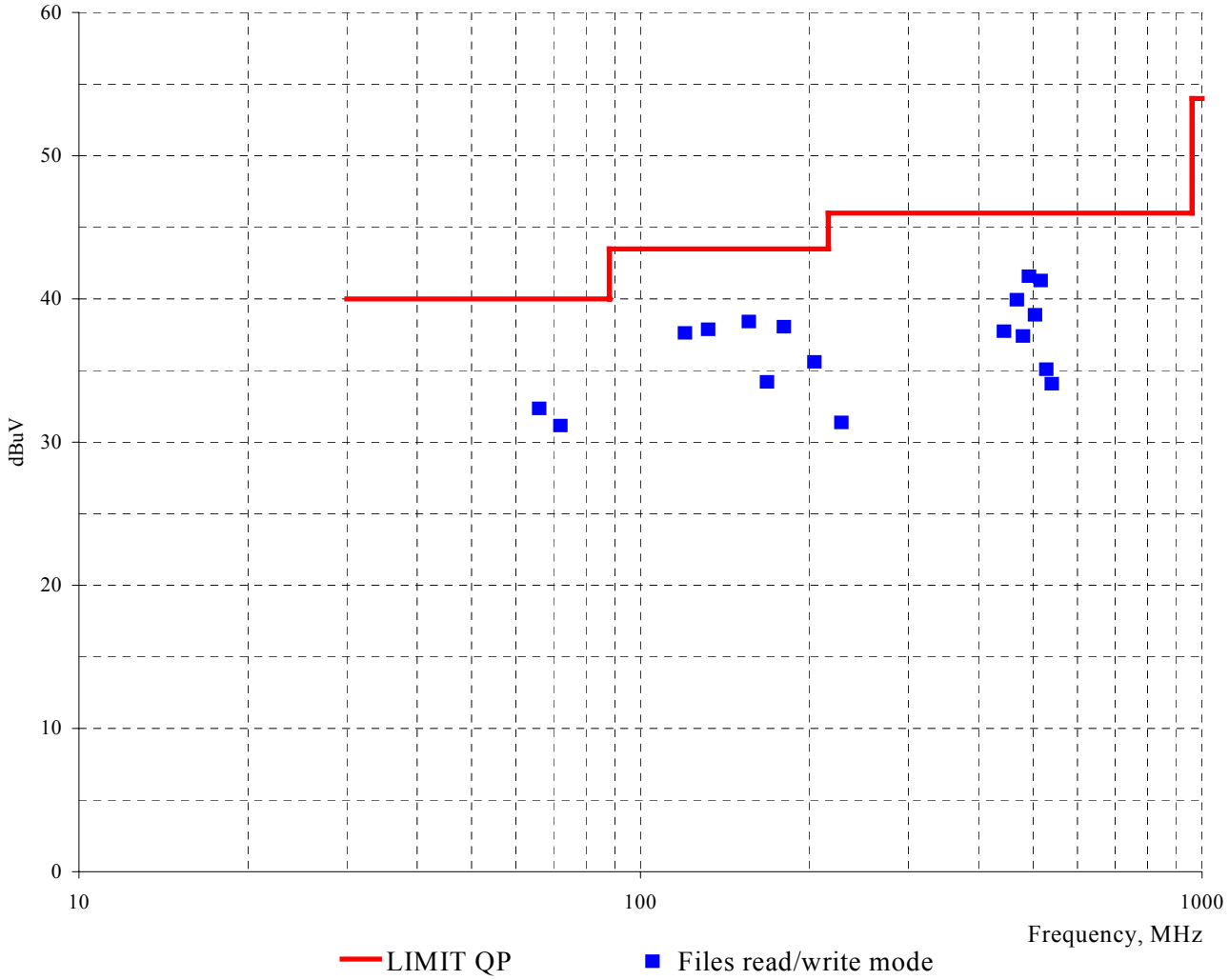
Note : The equipment used is calibrated in regular for every year.

Radiated Emissions

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]
66.00	20.90	9.93	1.52	V	40.00	32.35	7.65
72.00	20.70	8.83	1.62	V	40.00	31.15	8.85
120.00	23.20	11.93	2.50	V	43.50	37.63	5.87
132.00	22.70	12.44	2.74	V	43.50	37.88	5.62
156.00	22.10	13.27	3.06	V	43.50	38.43	5.07
168.00	18.60	12.38	3.22	H	43.50	34.20	9.30
180.00	23.80	10.86	3.40	H	43.50	38.06	5.44
204.00	22.90	9.15	3.56	H	43.50	35.61	7.89
228.00	17.30	10.14	3.94	H	46.00	31.38	14.62
444.00	15.60	16.21	5.94	H	46.00	37.75	8.25
468.00	17.30	16.61	6.03	H	46.00	39.94	6.06
480.00	14.60	16.76	6.06	H	46.00	37.42	8.58
492.00	18.60	16.91	6.08	H	46.00	41.59	4.41
504.00	15.70	17.09	6.10	H	46.00	38.89	7.11
516.00	17.80	17.36	6.13	H	46.00	41.29	4.71
528.00	11.30	17.63	6.15	H	46.00	35.08	10.92
540.00	10.00	17.89	6.18	H	46.00	34.07	11.93

Note : ***Files read/write mode***

MEASUREMENT OF DISTURBANCE RADIATION

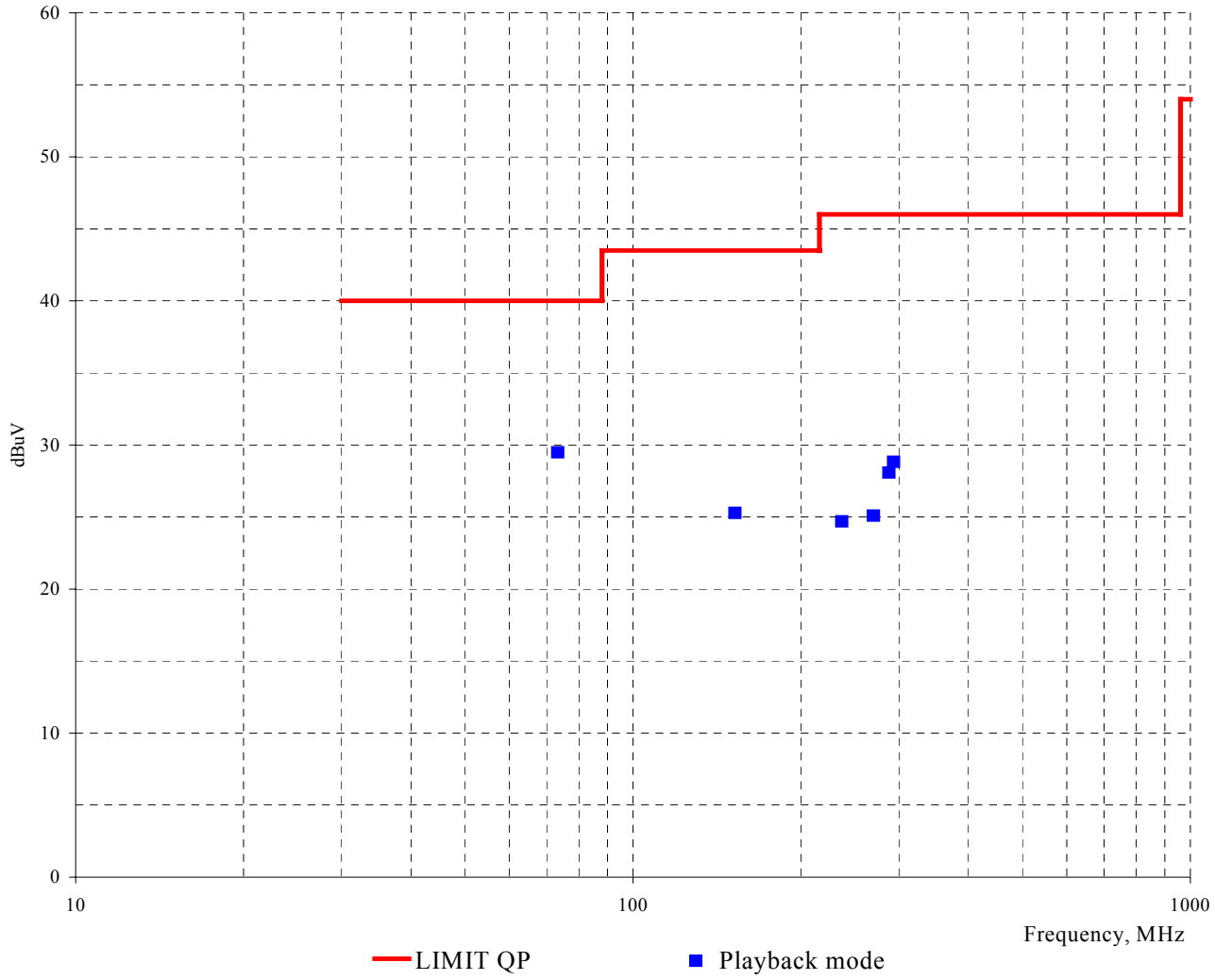


Radiated Emissions

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]
73.30	19.20	8.66	1.63	H	40.00	29.49	10.51
152.40	9.10	13.16	3.02	H	43.50	25.28	18.22
237.00	10.10	10.51	4.09	H	46.00	24.70	21.30
270.90	8.90	11.70	4.50	H	46.00	25.10	20.90
287.80	11.20	12.22	4.67	H	46.00	28.09	17.91
293.40	11.70	12.40	4.73	H	46.00	28.83	17.17

Note : ***Playback mode***

MEASUREMENT OF DISTURBANCE RADIATION



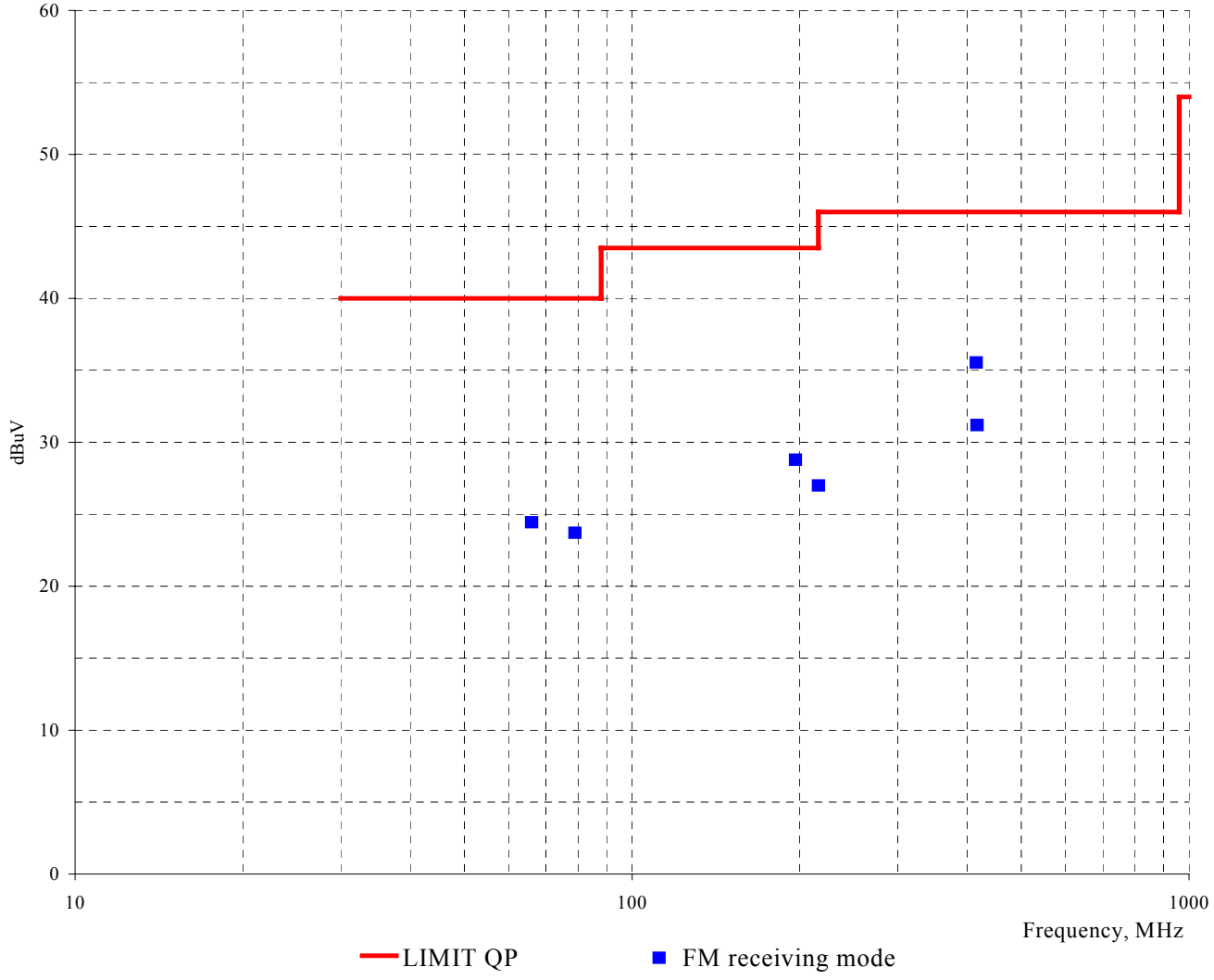
Radiated Emissions

Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]
66.00	13.00	9.93	1.52	H	40.00	24.45	15.55
79.00	14.10	7.92	1.69	H	40.00	23.71	16.29
196.50	16.00	9.31	3.48	H	43.50	28.79	14.71
216.20	13.60	9.65	3.75	H	46.00	27.00	19.00
415.00	14.60	15.29	5.65	H	46.00	35.54	10.46
416.50	10.20	15.34	5.66	H	46.00	31.20	14.80

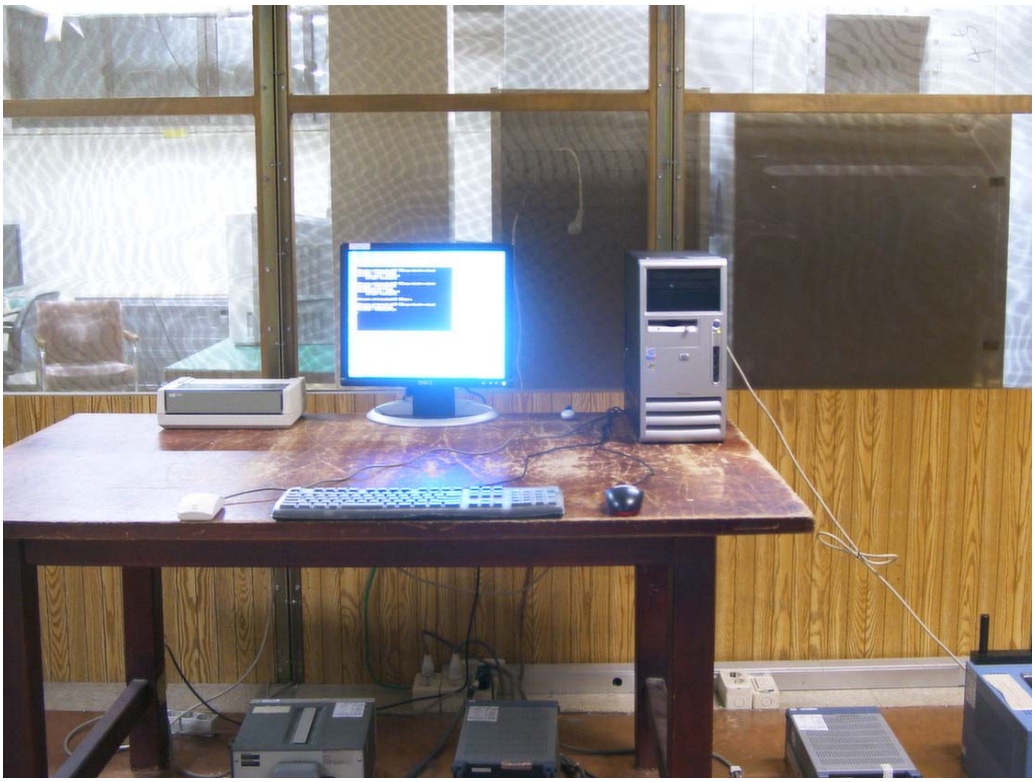
*Note : **FM receiving mode***

End of Data

MEASUREMENT OF DISTURBANCE RADIATION



Appendix A. The Photos of Test Setup



Conducted Emissions-Front View(Files read/write mode)

Conducted Emissions-Rear View(Files read/write mode)

Appendix A. The Photos of Test Setup

Radiated Emissions(30MHz-1GHz)-Front View(Files read/write mode)

Radiated Emissions(30MHz-1GHz)-Rear View(Files read/write mode)

Appendix A. The Photos of Test Setup

Radiated Emissions(30MHz-1GHz)-Front View(Playback, FM receaving mode)

Radiated Emissions(30MHz-1GHz)-Rear View(Playback, FM receaving mode)

Appendix B. The Photos of EUT

Front View

Rear View

Appendix B. The Photos of EUT

Earphone

USB Cable