Certification of Compliance

CFR 47 Part 15 Subpart B

Test Report File No.	: 04-IST-0359	Date of Issue	: November 26, 2004
Model(s)	: SP-2000		
Brand Name	: polka		
Kind of Product	: Digital Audio Player		
Applicant	: SM ELECTRONICS CO., LTD.		
Address	: 4F, Cheongsan Plaza., 115-3, image-Dong, Bundang-gu, Seongnam-Si, Gyunggi-Do, 463-829, Korea.		
Manufacturer	: SM ELECTRONICS CO., LTD.		
Address	: 4F, Cheongsan Plaza., 115-3, image-Dong, Bundang-gu, Seongnam-Si, Gyunggi-Do, 463-829, Korea.		

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

Reviewed By

J. H. Lee / EMC Group Manager

Approved By

G. Chung / Chief

-Investigations requested : Measurement to the relevant clauses of FCC rules and regulations Part 15 Subpart B (Class B PC Peripherals / FM Broadcast receivers)
-The test report with appendix consists of 21 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 2001.

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TEST REGULATIONS

The tests were performed according to the following regulations ;

FCC Part 15, Subpart B (Unintentional Radiators, Class B)

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	20 ℃
Humidity	45 %
Atmospheric pressure	1012 mbar

MEASUREMENT UNCERTAINTY

The measurement uncertainty was evaluated for all test items listed in this report. Also it, " The evaluation and treatment of uncertainty ", is described in IST Quality Manual according to ISO17025 Guide. The data and results described in this report are true and include evaluated uncertainty. It may cause some deviation of uncertainty by change component or process of the test for similar products.

POWER SUPPLY SYSTEM USED

Power supply system

(Refer to the product information)

PRODUCT INFORMATION

Memory Capacity	512MB
Interface	USB 1.1(with two ferrite core)
Rated power	3.7Vdc(Internal)
Size	37.5 x 77.5 x 17 (WxHxD)
FM Frequency	76.0 ~ 108.0MHz
File Format	MP3/WMA/OGG

- EMC suppression device is not used during the test.

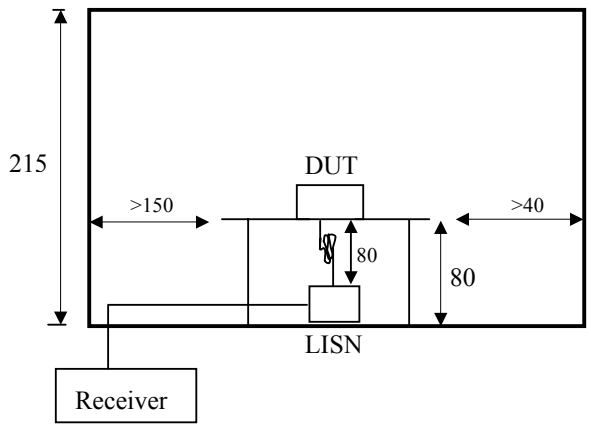
DESCRIPTIONS OF TEST

Conducted Emissions:

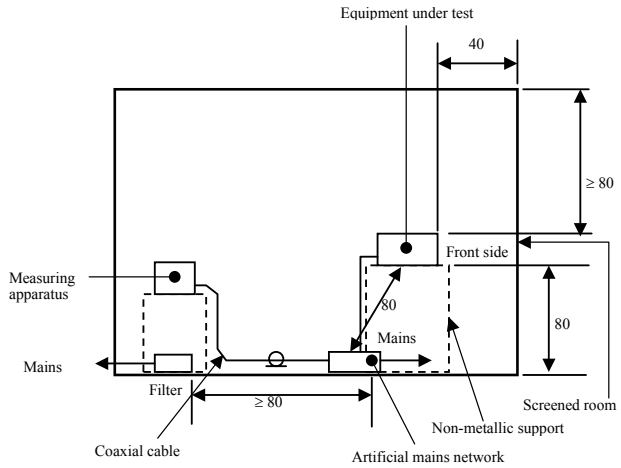
The measurement were performed over the frequency range of 0.15MHz to 30MHz using a 50Ω/50uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10KHz or for "quasi-peak" & "Average" 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 ESH3-Z5 and EMCO 3825/2 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.



< Side View >



< Concept Drawing >

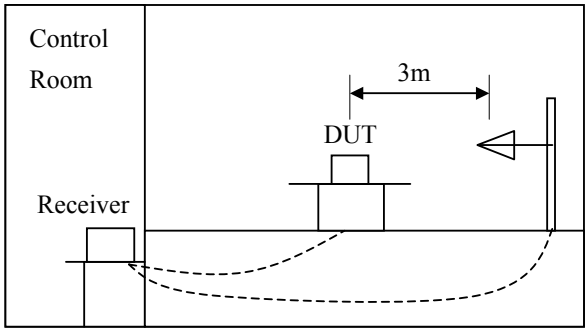
DESCRIPTION OF TEST

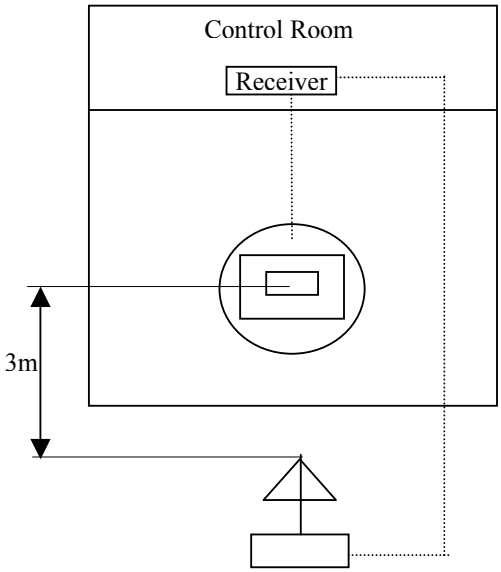
Radiated Emissions:

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 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.





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 : 1) File Up/Download
2) Play Back Mode
3) Recording Mode
4) FM Receiver Mode

The test results of followings are the representative of worst case emissions for the available resolution can be adjusted

Configuration of the equipment under test :

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

Equipment	Type	Brand	FCC Compliance info.
PC	Vectra VL420MT	HP	DoC
Monitor	LXC-540X	Zhejiang Xingxing Daewoo Lucoms Technology Co., Ltd.	R95LXC540X
Keyboard	SK-2502C	HP	DoC
PS/2 Mouse	M-S48a	HP	JNZ201213
Printer	A0302384	Northern Telecom	BS46XU225C-L
Serial Mouse	M-M28	Logitech	DZL210365

Connecting Interface Cables :
- Unshielded AC power cable : 1.5 m
- Shielded monitor's signal cable (with two ferrite core) : 1.8 m
- Shielded Printer's signal cable (with two ferrite core) : 1.8 m
- Unshielded USB cable(with two ferrite core) : 1.2 m

Note :

SUMMARY

Emissions

■ Conducted Emission

The requirements are	(●) MET	( ) Not MET
Minimum limit margin	12.0 dB	0.265 MHz
Maximum limit exceeding		

Remarks : **Limits are kept with more than 3dB margin**
Find the test data in following pages 10 to 11

■ Radiated Emission

The requirements are	(●) MET	( ) Not MET
Minimum limit margin	7.8 dB	130.4 MHz
Maximum limit exceeding		

Remarks : **Limits are kept with more than 3dB margin**
Find the test data in following page 15

Test Date

Begin of Testing : November 17, 2004.
End of Testing : November 23, 2004.

Prepared By

S.J.Oh / Research Engineer

Note :

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

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. 15, 2004	892108/018
3725/2	LISN	EMCO	Jul. 15, 2004	9101-2068
KNW-407	LISN	Hyup-Rip	Jul. 15, 2004	8-883-10
ESH 3-Z2	Pulse Limiter	Rohde & Schwarz	Jul. 15, 2004	357.8810.52

◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Test Program 1) File Up/Download

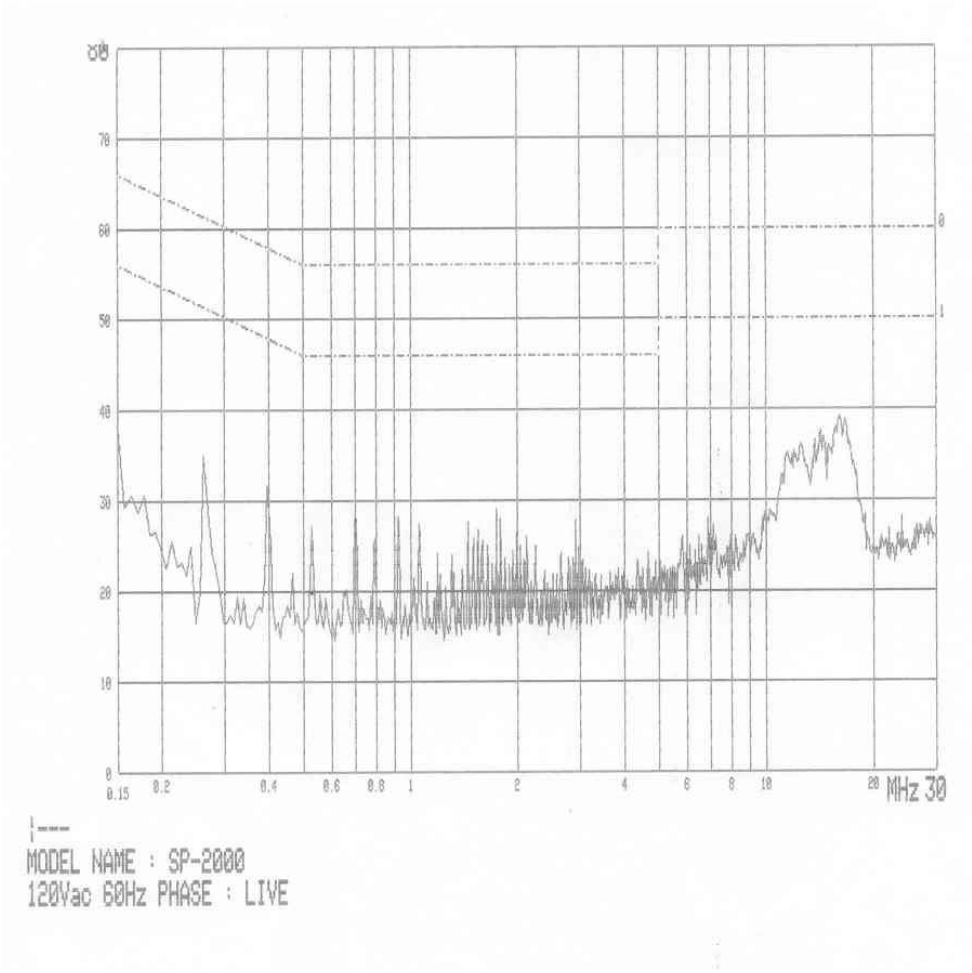
◆ Test Date November 18, 2004

◆ Test Area Shielded room No.1

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

Conducted Emissions

Connecting to PC with LIVE Line

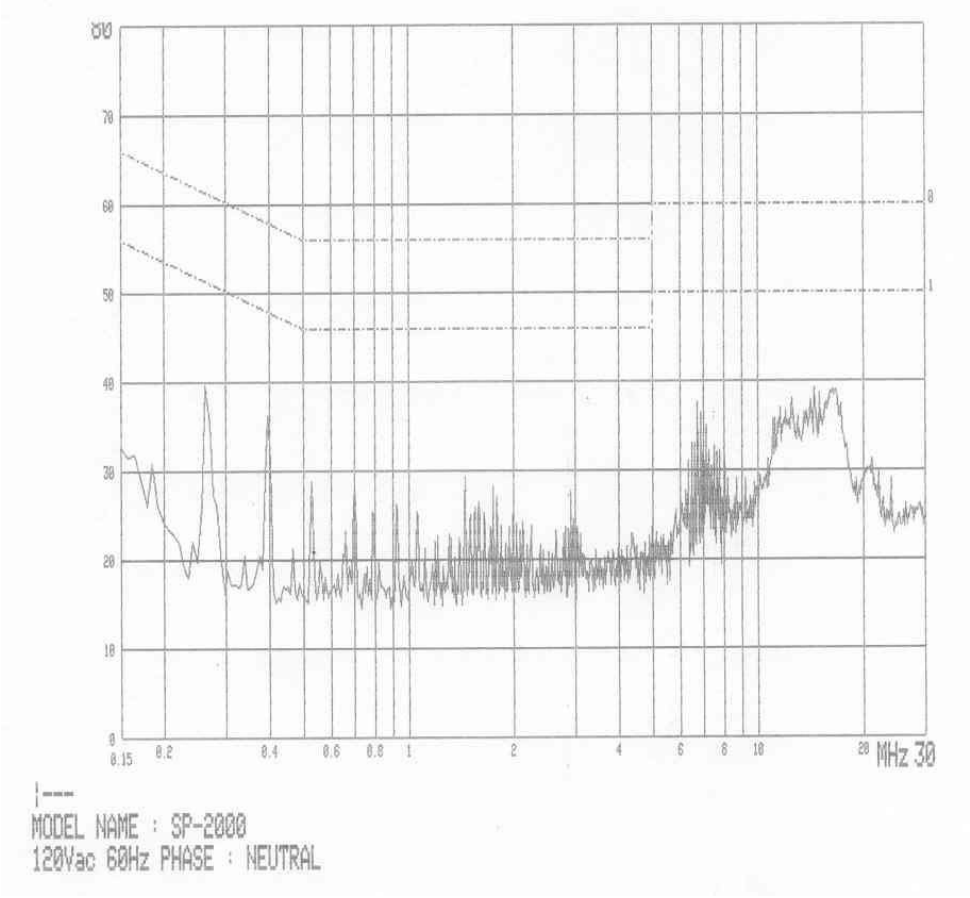


Freq. [MHz]	Measurement [dB μV]		Limit [dB μV]		Insertion Loss	Cable Loss	Result [dB μV]		Margin [dB]	
	Q-peak	Average	Q-peak	Average	[dB]	[dB μV]	Q-peak	Average	Q-peak	Average
0.264	33.6	32.3	61.3	51.3	0.2	0.5	34.3	33.0	27.0	18.3
0.396	30.4	26.9	57.9	47.9	0.2	0.4	31.0	27.5	26.9	20.4
0.923	27.6	25.7	56.0	46.0	0.1	0.4	28.1	26.2	27.9	19.8
1.741	25.8	23.8	56.0	46.0	0.1	0.5	26.4	24.4	29.6	21.6
7.061	20.3	13.4	60.0	50.0	0.1	0.7	21.1	14.2	38.9	35.8
16.104	37.1	30.8	60.0	50.0	0.2	0.7	38.0	31.7	22.0	18.3

Note :

Conducted Emissions

Connecting to PC with NEUTRAL Line



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
0.265	39.9	38.7	61.3	51.3	0.1	0.5	40.5	39.3	20.8	12.0
0.395	35.3	35.3	58.0	48.0	0.1	0.4	35.8	35.8	22.1	12.1
1.396	17.5	14.4	56.0	46.0	0.1	0.4	18.1	15.0	37.9	31.0
2.902	25.1	21.2	56.0	46.0	0.1	0.5	25.7	21.8	30.3	24.2
6.992	35.9	15.5	60.0	50.0	0.1	0.7	36.7	16.3	23.3	33.7
14.460	34.5	30.6	60.0	50.0	0.2	0.7	35.4	31.5	24.6	18.5

Note :

TEST CONDITIONS AND DATA

Radiated Emission

[Applicable]

◆ Test Equipment Used

Name	Type	Manufacturer	Calibration. Date	Serial Number
ESVP	Test Receiver	Rohde & Schwarz	Jul. 15, 2004	861744/004
VULB 9160	Antenna	Schwarzbeck	Jun. 10, 2004	3047

◆ Test Accessories Used

Type	Manufacturer
Aneroid Barometer	Sato
Hygrometer	Sato

◆ Test Program
1) File Up/Download
2) Play Back Mode
3) Recording Mode
4) FM Receiver Mode

◆ Test Date November 22, 2004

◆ Test Area Open site No.1

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

Radiated Emissions

Mode	Freq. [MHz]	Reading [dBuV]	Antenna Factor [dB/m]	Cable Loss [dB]	Polar. [H/V]	Result [dBuV/m]	Limit [dBuV/m]	Margin [dB]
File Up/Download	36.2	15.4	13.4	1.0	V	29.8	40.0	10.2
	78.2	18.2	8.1	1.6	V	27.9	40.0	12.1
	130.4	23.1	10.5	2.1	V	35.7	43.5	7.8
	162.1	19.4	12.3	2.3	V	34.0	43.5	9.5
	192.2	20.0	9.0	2.5	V	31.5	43.5	12.0
	239.4	20.4	10.1	2.8	H	33.3	46.0	12.7
	383.5	21.7	12.5	3.8	H	38.0	46.0	8.0
	500.5	18.3	15.1	4.8	H	38.2	46.0	7.8
Play Back	79.2	20.3	7.9	1.6	V	29.8	40.0	10.2
	130.3	19.4	10.5	2.1	V	32.0	43.5	11.5
	479.3	16.4	14.5	4.8	H	35.7	46.0	10.3
Recording	79.2	18.1	7.9	1.6	V	27.6	40.0	12.4
	383.2	12.7	12.5	3.8	H	29.0	46.0	17.0
FM Receiver	72.1	15.2	9.4	1.6	V	26.2	40.0	13.8
	162.3	12.4	12.3	2.3	V	27.0	43.5	16.5

Note:

Appendix A. The EUT Photos

Front View

Rear View

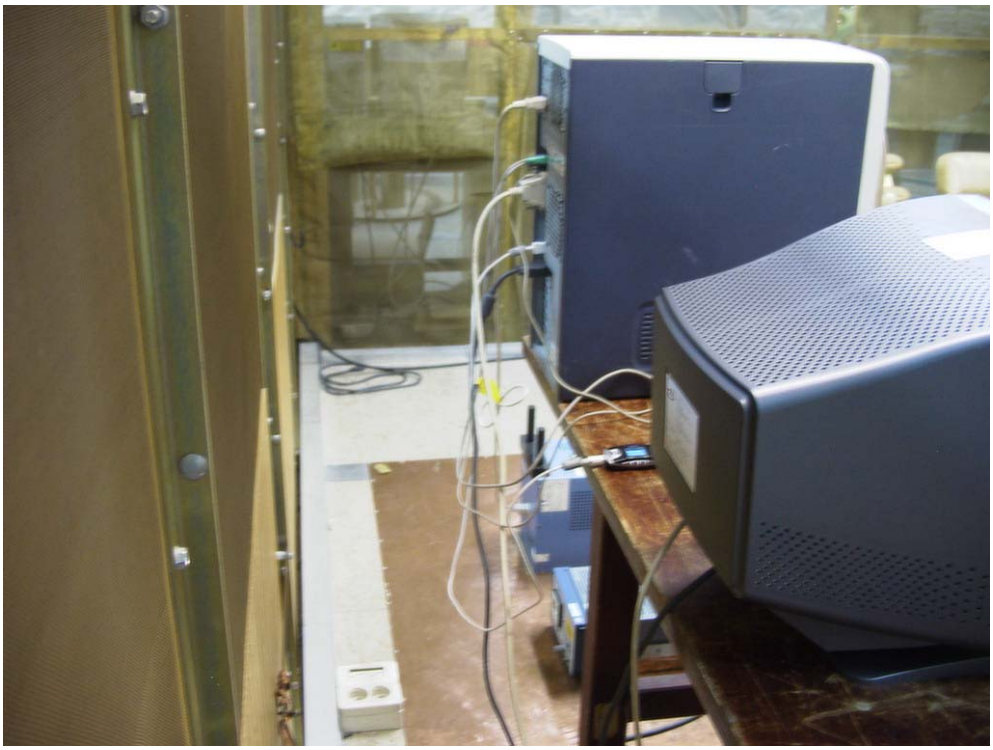
Appendix A. The EUT Photos

USB Cable

Earphone

Appendix B. The Test Setup Photos

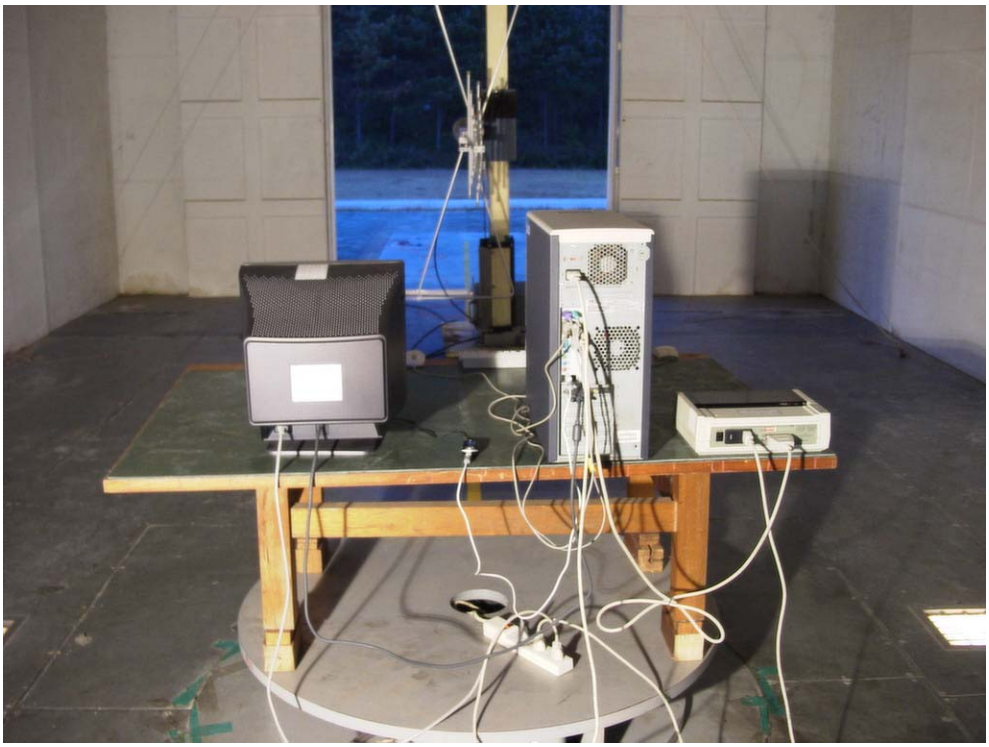
Conducted Emissions - Front View



Conducted Emissions - Rear View

Appendix B. The Test Setup Photos

Radiated Emissions – Front View



Radiated Emissions – Rear View