Electromagnetic Emission

F C C M E A S U R E M E N T R E P O R T

CERTIFICATION OF COMPLIANCE

FCC Part 15 Certification Measurement

PRODUCT	:	Thermal Printer
MODEL/TYPE NO	:	PORTI-S40
FCC ID	:	QDDPORTI-S40
APPLICANT	:	WOOSIM SYSTEM Inc. #501, Daerung Technotown 3th, 448, Gasan-dong, Seoul, Korea Attn. : Yong Suk, In / Engineer
FCC CLASSIFICATION	:	JBP - Computer peripheral Devices
FCC RULE PART(S)	:	FCC Part 15 Subpart B Class B
FCC PROCEDURE	:	Certification
TRADE NAME	:	WOOSIM SYSTEM
TEST REPORT No.	:	E02.0316.FCC.163N
DATES OF TEST	:	March 14, 2002
DATES OF ISSUE	:	March 16, 2002
TEST LABORATORY	:	ETL Inc (FCC Registration Number : 95422) #584 Sangwhal-ri, Kanam-myun, Youju-kun, 469-880 Kyounggi-do, Korea Tel : (031) 885-0072 Fax : (031) 885-0074

This Thermal Printer, Model PORI-S40 has been tested in accordance with the measurement procedures specified in ANSI C63.4-1992 at the ETL EMC Test Laboratory and has been show to be complied with the electromagnetic radiated emission limits specified in FCC Rule Part 15, Computer peripheral Devices.
I attest to the accuracy of data. All measurement herein are 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.
The results of testing in this report apply to the product / system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Yo han, Park

Name : Yo Han, Park

Title : Chief Engineer of EMC Team

Table of Contents

FCC MEASUREMENT REPORT

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

General Information

Applicant Name : WOOSIM SYSTEM Inc.

Address : #501, Daerung Technotown 3th, 448, Gasan-dong,Seoul, Korea

Attention : Yong Suk, In / Engineer

- **EUT Type :** Thermal Printer
- **Model Number :** PORTI-S40
- **FCC Identifier :** QDDPORTI-S40
- **S/N :** WSPS000614
- **Modulation :** NONE
- **FCC Rule Part(s) :** FCC Part 15 Subpart B
- **Test Procedure :** ANSI C63.4-1992
- **FCC Classification :** Computer peripheral Devices
- **Dates of Tests :** March 14, 2002
- **Place of Tests :** ETL Inc
  EMC Testing Lab (FCC Registration Number : 95422)
  584, Sangwhal-Ri, Kanam-Myun, Youju-Kun,469-880
  Kyounggi-Do, Korea
  Tel : (031) 885-0072 Fax : (031) 885-0074
- **Test Report No. :** E02.0316.FCC,163N

1. INTRODUCTION

The measurement test for radiated and conducted emission test were conducted at the open area test site of E-RAE Testing Laboratory Inc. facility located at 584, Sangwhal-ri, Ganam-myun, Youju-kun, Kyoungki-do, Korea. The site is constructed in conformance with the requirements of the ANSI C63.4-1992 and CISPR Publication 22. The ETL has site descriptions on file with the FCC for 3 and 10 meters site configurations. Detailed description of test facility was found to be in compliance with the requirements of Section 2.948 FCC Rules according to the ANSI C63.4-1992 and registered to the Federal Communications Commission (Registration Number : 95422).

The measurement procedure described in American National Standard for Method of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C.63.4-1992) was used in determining radiated and conducted emissions from the . Model : PORTI-S40

2. PRODUCT INFORMATION

2.1 General Remark

PORTI-S40 and PORTI-S30 are same models.
Only difference is model name and top covers.

2.2 Equipment Description

The Equipment Under Test (EUT) is the WOOSIM SYSTEM Inc.PORTI-S40
Please refer to Users manual

2.3 General Specification

● Item	: PORTI-S40
● Chassis Type	: Plastic
● List of Each OSC. Or X-Tal. Freq. (>=1MHz)	: X-TAL – 25.800MHz, 3.68640 MHz
● Printing width	: 57 – 58 mm
● Printing speed	: 50mm / sec
● Receive buffer size	: 10K bytes
● Note	: Printing speed may be slower, depending on the data transmission speed and the combination of control commands.
● Supply voltage	: 7.2 DCV / 1.8 A
● Environment conditions	: Temperature : 0C – 40C(operating) -10C – 50(storage) : Humidity : 30% - 80% (operating) 10% - 90% (storage)
● MCBF	: Mechanical : 37,000,000 lines : Head : Approximately 100Km

3. DESCRIPTION OF TESTS

3.1 Conducted Emission Measurement

Conducted emissions measurements were made in accordance with § 12.2 in ANSI C63.4-1992 "Measurement of Information Technology Equipment ". 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" within a bandwidth of 9KHz.

- Procedure of Test

The line-conducted facility is located inside a shielded room 1m X 1.5m wooden table 80cm high is placed 40cm away from the vertical wall and 1.5m away from the side wall of the shielded room. Two EMCO 3825/2 LISN are bonded to the shielded room. The EUT is powered from the EMCO LISN and the support equipment is powered from another EMCO LISN. Power to the LISN is 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 these supply lines will be connected to the EMCO LISN. Non-inductive bundling to a 1m length shortened all interconnecting cables more than 1m. Sufficient time for the 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 R3261A Spectrum Analyzer to determine the frequency producing the max. emission from the EUT. The frequency producing the max. level was reexamined using to set Quasi-Peak mode by manual, after scanned by automatic Peak mode from 0.15 to 30MHz. The bandwidth of the Spectrum Analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission.

3. DESCRIPTION OF TESTS

3.2 Radiated Emission Measurement

Radiated emission measurements were in accordance with ANSI C63.4-1992. The measurements were 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 measurements were made with the detector set for "Quasi-peak" within a bandwidth of 120KHz.

- **Procedure of Test**

Preliminary measurements were made at 3 meter using broadband antennas, and spectrum analyzer to determined the frequency producing the max. emission in shielded room. Appropriate precaution was taken to ensure that all emission from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth and height with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 1000MHz using SchwarzBeck Log-Bicon antenna. Above 1GHz, linearly polarized double ridge horn antennas were used. Final measurements were made open site at 10-meters. The test equipment was placed on a wooden turn-table. 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 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, support 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, support 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 max. emission. Each emission was maximized by: varying the mode of operation to the EUT and/or support equipment and changing the polarity of the antenna, whichever determined the worst-case emission. Photographs of the worst-case emission can be seen in Test Setup photos.

4. TEST CONDITION

4.1 Test Configuration

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the following conditions and configurations were used.

4.2 EUT operation

Operating Mode	The worst operating condition
Stand-by Mode	
Printing Mode	O
Communication Mode	

O : Worst case investigated during the Test

4.3 Support Equipment Used

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

EUT – Thermal Printer (WOOSIM SYSTEM)

FCC ID	**: QDDPORTI-S40**
Model Name	**: PORTI-S40**
Serial No.	**: WSPS000614**
Manufacturer	**: WOOSIM SYSTEM Inc.**
Power Supply Type	**: DC7.2V From Adaptor**
Power Cord	**: Non-shielded, Undetachable: 1.5m**
Data Cable	**: Shielded, 1.5m**

Support Unit 1-Persnal computer (DELL)

FCC ID	**: N/A(N/A)**
Model Name	**: MMP**
Serial No.	**: 2LL11S**
Manufacturer	**: DELL**
Power Supply Type	**: Switching**
Power Cord	**: Non-shielded, Detachable: 1.2m**
Data Cable	**: Shielded, Detachable:1.5m**

Support Unit 2-Keyboard (DELL)

FCC ID	**: N/A(DoC)**
Model Name	**: SK-8000**
Serial No.	**: N/A**
Manufacturer	**: DELL**
Power Supply Type	**: N/A**
Power Cord	**: N/A**
Data Cable	**: Shielded, 1.5m**

Support Unit 3- Printer (H.P)

FCC ID	**: B94C2164X**
Model Name	**: C4562B**
Serial No.	**: TH9411434G**
Manufacturer	**: H.P**
Power Supply Type	**: DC 24V From Adaptor**
Power Cord	**: Non-Shield, 1.5m**
Data Cable	**: Shielded, 1.5m**

Support Unit 4-Mouse (LOGITECH)

FCC ID	**: DZL211029**
Model Name	**: M-S34**
Serial No.	**: LZC01002314**
Manufacturer	**: LOGITECH**
Power Supply Type	**: N/A**
Power Cord	**: N/A**
Data Cable	**: Shielded, 1.2m**

Support Unit 5- Monitor (E-RAE)

FCC ID	**: OIOELM-150**
Model Name	**: ELM-150B**
Serial No.	**: N/A**
Manufacturer	**: E-RAE Electronics Industry Co., Ltd.**
Power Supply Type	**: DC12V From Adaptor**
Power Cord	**: Non-shielded, Detachable: 1.2m**
Data Cable	**: Shielded 15pin D-sub, 1.5m**

Support Unit 6- USB Mouse (N/A)

FCC ID	**: N/A**
Model Name	**: HL898W**
Serial No.	**: HL08011837**
Manufacturer	**: N/A**
Power Supply Type	**: N/A**
Power Cord	**: N/A**
Data Cable	**: Shielded, 1.2m**

Support Unit 7- EAR MIC (JETECH)

FCC ID	**: N/A**
Model Name	**: JE101**
Serial No.	**: N/A**
Manufacturer	**: JETECH**
Power Supply Type	**: N/A**
Power Cord	**: N/A**
Data Cable	**: Shielded, 1.5m**

5. TEST RESULTS

5.1 Summary of Test Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum emission of the EUT are reported.

The at collected shows that the WOOSIM SYSTEM Inc., PORTI-S40 complies with technical requirements of the FCC PART 15 Subpart B, Computer peripheral Devices

Test Rule Parts	Measurement Required	Result
Part 15.107(e)	Conducted Emissions Measurement	Passed by –12.55dB
Part 15.109(e)	Radiated Emissions Measurement	Passed by –3.13dB

The equipment is not modified anything, mechanical or circuits to improve EMI status during a measurement. No EMI suppression device(s) was added and/or modified during testing.

5. TEST RESULTS

5.2 Conducted Emissions Measurement

EUT	Thermal Printer / PORTI-S40 (SN: WSPS000614)
Limit apply to	CISPR22
Test Date	March 14, 2002
Operating Condition	Printing Mode
Environment Condition	Humidity Level : 36 %RH, Temperature : 22℃
Result	Passed by –12.55dB

Conducted Emission Test Data

The following table shows the highest levels of conducted emissions on both polarization of live and neutral line.

Detector mode : CISPR22 Quasi-Peak mode (6dB Bandwidth : 9 KHz)

Frequency (MHz)	Reading [dBuV]		Phase H / N]	Limit		Margin	
	Q.Peak	Average		Q.Peak	Average	Q.Peak	Average
0.157	53.45		H	66.0 ~ 56.0	-	12.55	-
0.194	52.12	-	H		-	13.88	-
0.214	45.57	-	H		-	20.43	-
0.299	43.82	-	H		-	22.18	-
0.598	40.70		H	56.0	-	15.30	-
1.99	35.10	-	N		-	20.90	-
2.98	34.50	-	N		-	21.50	-
6.51	34.55	-	H	60.0	-	25.45	-
18.11	29.52	-	H		-	30.48	-
20.02	33.85	-	H		-	26.15	-
The other frequencies have 12.55dB margin at least							

NOTES :

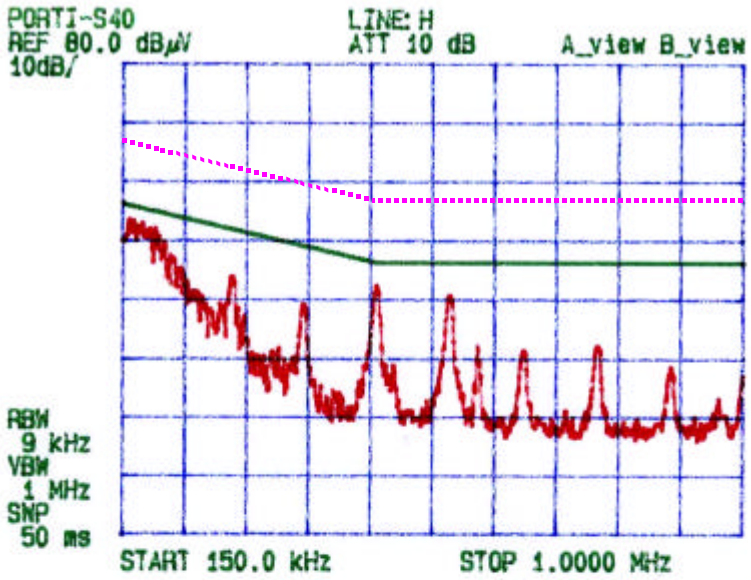
1. *** H : HOT Line , **N : Neutral Line**
2. **Margin value = Limit – Reading**
3. **Measurement were performed at the DC Power Supply Inlet in the frequency band of 0.150MHz ~ 30MHz according to the CISPR22**

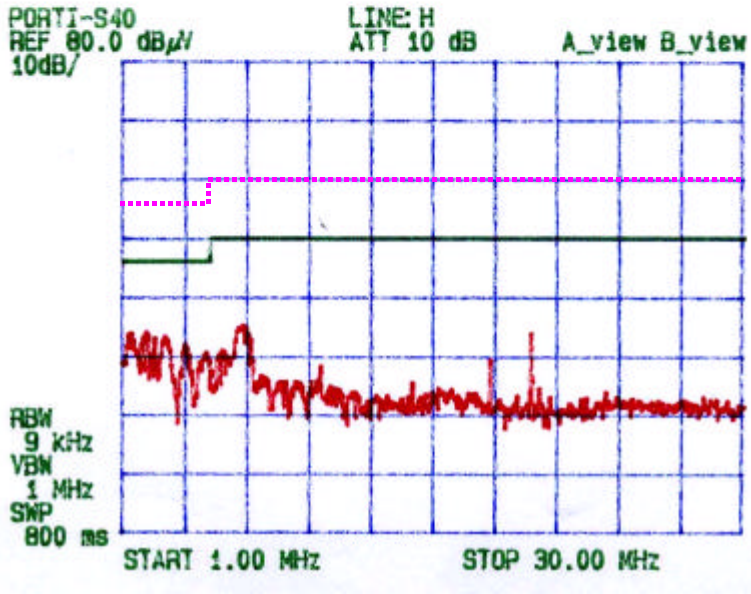
Ho Jin, Kim

Test Engineer : H. J. Kim

5. TEST RESULTS

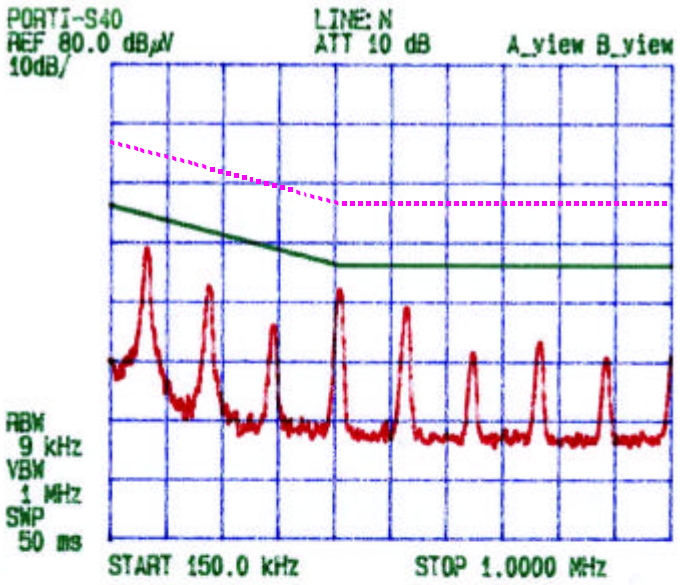
Line: HOT Line

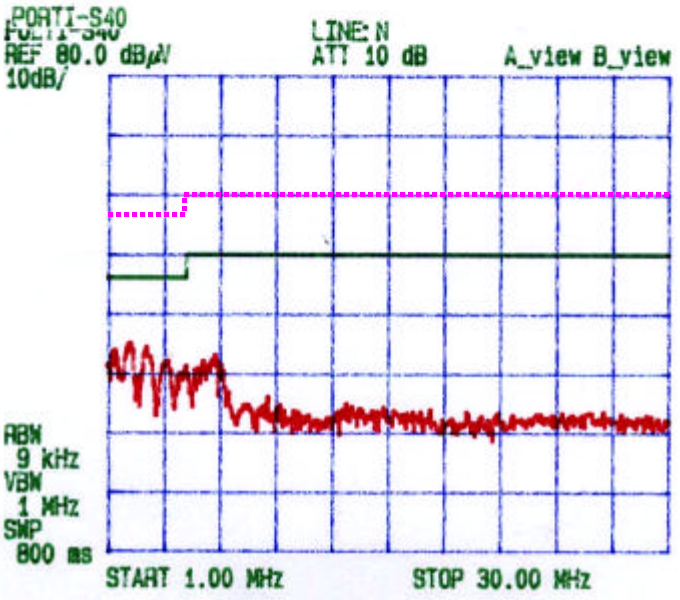




5.TEST RESULTS

Line: Neutral Line





5. TEST RESULTS

5.3 Radiated Emissions Measurement

EUT	Thermal Printer / PORTI-S40 (SN: WSPS000614)
Limit apply to	CISPR22
Test Date	March 14, 2002
Operating Condition	Printing Mode
Environment Condition	Humidity Level : 36 %RH, Temperature : 22℃
Result	Passed by –3.13dB

Radiated Emission Test Data

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.
Detector mode : CISPR22 Quasi-Peak mode (6dB Bandwidth : 120 kHz)

Measurement Distance : 10 meters

Frequency [MHz]	Reading [dBμV]	Polarization (*H/**V)	Ant. Factor [dB]	Cable Loss [dB]	Result [dBμV/m]	Limit [dB]	Margin [dB]
73.90	15.76	V	8.91	2.20	26.87	30.00	3.13
222.62	9.03	H	10.37	4.00	23.40		6.60
245.11	9.06	H	10.64	4.10	23.80		6.20
253.25	9.97	H	11.00	4.20	25.17		4.83
258.01	9.41	H	11.00	4.20	24.61		5.39
288.36	5.95	H	12.19	4.50	22.64	37.00	14.36
296.75	8.14	H	12.35	4.50	24.99		12.01
305.09	9.41	H	12.68	4.60	26.69		10.31
335.40	7.91	H	13.18	4.70	23.36		13.64
378.63	3.28	H	14.32	5.30	22.90		14.1
The other frequencies have 3.13 dB margin at least							

NOTE : **1. * H : Horizontal polarization , ** V : Vertical polarization**
2. Emission Level = Reading + Antenna factor + Cable loss
3. Margin value = Limit - Emission Level
4.The measurement was performed for the frequency range 30MHz ~1000MHz according to the CISPR22

Ho Jin, Kim

Test Engineer : H. J. Kim

6. SAMPLE CALCULATION

Sample Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor.
The basic equation with a sample calculation is as follows:

FS = RA + AF + CF

where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor

$dB(\mu V/m) = 20 \log_{10} (\mu V /m)$: Equation 1
$dB\mu V = dBm + 107$: Equation 2

Example 1 : @ 0.150 MHz

Class B Limit = 1995.3 uV = 66.0 dBuV

Reading = 53.45 dBuV

Convert to uV = 470.4 uV

Margin = 53.45 – 66.00 = - 12.55

= - 12.55 dB below Limit

Example 2 : @73.90MHz

Class B Limit = 100 uV = 40.0 dBuV/m

Reading = 15.76 dBuV

Antenna Factor + Cable Loss = 11.11dB

Total = 26.87 dBuV/m

Margin = 26.87 – 30.0 = - 3.13 dBuV/m

= - 3.13dB below Limit

7. TEST EQUIPMENT LIST

List of Test Equipments Used for Measurements

Test Equipment		Mo	Mfg.	Serial No.	Cal. Due Date
☒	Spectrum Analyzer	R3261A	Advantest	21720033	02-10-26
☐	Spectrum Analyzer	ESA-L1500A	H.P	US37360920	02-10-20
☒	Receiver	ESVS 10	R & S	835165/001	03-04-06
☒	Preamplifier	HP8447D	HP	2944A07626	03-01-10
☐	Preamplifier	HP 8347A	HP	2834A00544	02-05-23
☒	LISN	3825/2	EMCO	9006-1669	02.12.27
☒	LISN	3825/2	EMCO	9208-1995	02.12.27
☒	TriLog Antenna	VULB9160	Schwarz Beck	3082	02-05-08
☐	LogBicon	VULB9165	Schwarz Beck	2023	02-05-08
☒	Dipole Antenna	VHAP	Schwarz Beck	964	02-05-03
☒	Dipole Antenna	VHAP	Schwarz Beck	965	02-05-03
☒	Dipole Antenna	UHAP	Schwarz Beck	949	02-05-03
☒	Dipole Antenna	UHAP	Schwarz Beck	950	02-05-03
☒	Broad band Horn Antenna	BBHA 9120 D	Schwarz Beck	277	02-11-03
☒	Turn-Table	DETT-03	Daeil EMC	-	N/A
☒	Antenna Master	DEAM-03	Daeil EMC	-	N/A
☐	Plotter	7440A	H.P	2725A 75722	N/A
☒	Chamber	DTEC01	DAETONG	-	N/A
☒	Impedance Matching Pad	6001.01.A	SUNNER	3252	02-09-22
☐	Thermo Hygrograph	3-3122	ISUZU	3312201	02-12-20
☐	BaroMeter	-	Regulus	-	-