

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-WP40
FCC ID	: QDDPORTI-WP40
APPLICANT	: Woosim System Inc. #501, Daerung Technotown 3th, 448, Gasan-dong, Geumcheon-gu, Seoul, Korea Attn.: Lee, Mi-gyeong / Assistant manager
MANUFACTURER	: Woosim System Inc. #501, Daerung Technotown 3th, 448, Gasan-dong, Geumcheon-gu, Seoul, Korea
FCC CLASSIFICATION	: Class B personal computers and peripherals
FCC RULE PART(S)	: FCC Part 15 Subpart B
FCC PROCEDURE	: Certification
TEST REPORT No.	: ETLE070323.177
DATES OF TEST	: March 24, 2007
REPORT ISSUE DATE	: April 05, 2007
TEST LABORATORY	: ETL Inc. (FCC Registration Number : 95422)

This Thermal Printer, Model PORTI-WP40 has been tested in accordance with the measurement procedures specified in ANSI C63.4-2003 at the ETL Test Laboratory and has been shown to be complied with the electromagnetic radiated emission limits specified in FCC Rule Part15 Subpart B:

I attest to the accuracy of data. All measurement herein was performed by me or was made under my supervision and is 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.

✓

Chon Sik, Kim / Chief Engineer

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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,
Geumcheon-gu, Seoul, Korea

Attention : Lee, Mi-gyeong / Assistant manager

- **EUT Type :** Thermal Printer
- **Model Number :** PORTI-WP40
- **FCC ID :** QDDPORTI-WP40
- **S/N :** N/A
- **FCC Rule Part(s) :** FCC Part 15 Subpart B
- **Test Procedure :** ANSI C63.4-2003
- **FCC Classification :** Class B personal computers and peripherals
- **Dates of Tests :** March 24, 2007
- **Place of Tests :** ETL Inc. Testing Lab. (FCC Registration Number : 95422)

Radiated Emission test;
#584, Sangwhal-ri, Ganam-myeon, Yoju-gun,
Gyeonggi-do, 469-885, Korea
- **Conducted Emission test;**
ETL Inc. Testing Lab. (FCC Registration Number : 95422)
371-51, Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea
- **Test Report No. :** ETLE070323.177



1. INTRODUCTION

The measurement test for radiated and conducted emission test were conducted at the ETL Inc. The site is constructed in conformance with the requirements of the ANSI C63.4-2003 and CISPR Publication 16. The ETL has site descriptions on file with the FCC for 3 m and 10 m 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 C63.4-2003 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 9 kHz to 40 GHz (ANSI C63.4-2003) was used in determining radiated and conducted emissions from the Woosim System Inc., Model: PORTI-WP40.

2. PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the Woosim System Inc., Model: PORTI-WP40.

2.2 General Specification

Item	Specification	
Print method	Direct thermal line printing	
Characters per line	92 cpl(MAX.)	
Character size	Eng. : 9 x 24 dots. 12 x 24 dots Kor. : 16 x 24 dots. [24 x 24 dots]	
Resolution	203 dpi, 8 dots/mm	
Print width	4 inch (104 mm, 832 dots)	
Print speed	40 mm/s	
Dimension	(143 x 77,7 x 46,7) mm	
Weight	340 g (including paper roll)	
Interface	RS-232C or TTL	
Paper roll	Thermal paper roll (113 mm wide, 40 Ø)	
Barcodes	PDF417(2-dimension), Code128, Code39, I2/5, Code93 UPC, EAN(KAN, JAN), CODABAR	
Receive buffer size	10 Kbytes	
Note	Printing speed may be slower, depending on the data Transmission speed and the combination of control commands.	
Input Power	9 VDC, Standby 60 mA and Max 3 A (Standard model)	
Environment Conditions	Temperature	-10 °C ~ 40 °C (operating) -10 °C ~ 70 °C (storage)
	Humidity	30 % ~ 80 % (operating) 10 % ~ 90 % (storage)
MCBF (Mean Cycle Between failure)	Mechanical	37,000,000 lines
	Head	Approximately 50 Km

3. DESCRIPTION OF TESTS

3.1 Conducted Emission Measurement

Conducted emissions measurements were made in accordance with section 11, "Measurement of Information Technology Equipment" of ANSI C63.4-2003. The measurements were performed over the frequency range of 0,15 MHz to 30 MHz using a 50Ω / 50uH LISN as the input transducer to a Spectrum Analyzer or a Test Receiver. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 9 kHz or for "quasi-peak" within a bandwidth of 9 kHz.

The line-conducted emission test is conducted inside a shielded anechoic chamber room with 1 m x 1,5 m x 0,8 m wooden table which is placed 40 cm away from the vertical wall and 1,5 m away from the side wall of the chamber room. Two LISN are bonded to the shielded room. The EUT is powered from the LISN and the support 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 1,2 cm. 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 LISN. Non-inductive bundling to a 1 m length shortened all interconnecting cables more than 1 m. 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 EMI Test Receiver to determine the frequency producing the maximum emission from the EUT. The frequency producing the maximum level was reexamined using to set Quasi-Peak mode by manual, after scanned by automatic Peak mode from 0,15 MHz to 30 MHz. The bandwidth of the spectrum analyzer was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission.

Photographs of the worst-case emission can be seen in photographs of conducted emission test setup in Appendix B.

3.2 Radiated Emission Measurement

Radiated emission measurements were made in accordance with section 11, "Measurement of Information Technology Equipment" of ANSI C63.4-2003. The measurements were performed over the frequency range of 30 MHz to 1 GHz 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 120 kHz.

Preliminary measurements were made at 3 m using broadband antennas, and spectrum analyzer to determined the frequency producing the maximum 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 MHz to 1 000 MHz using Log-Bicon antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used. Final measurements were made open site at 10 m. 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 120 kHz 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 maximum emission for the frequency and were placed on top of a 0,8 m high nonmetallic 1 m x 1,5 m 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 m to 4 m 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 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 Photographs of the worst-case emission test setup can be seen in Appendix B.

4. TEST CONDITION

4.1 Test Configuration

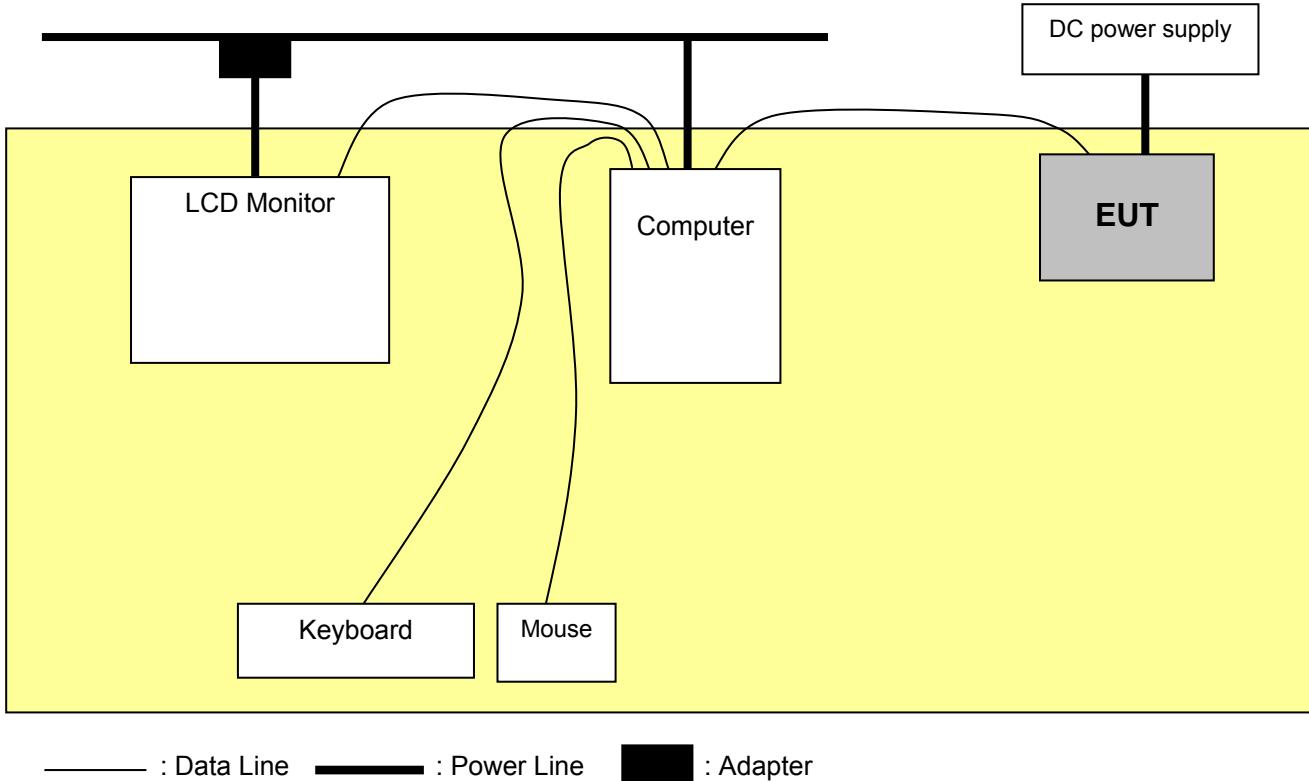
The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the EUT and the supported equipments were installed to meet FCC requirement and operated in a manner and which tends to maximize its emission level in a typical application.

4.2 EUT operation

Worst operating condition : The state of continuous printing

4.3 Support Equipment Used

Description	Model Name	Serial No.	Manufacturer	FCC ID
PC	DHM	FNTGBIS	DELL INC.	-
LCD Monitor	ELM-150B	NONE	Erae Electronics Industrial Co., Ltd.	-
Keyboard	KB-9963	B26960GBUK O13F	Chicony Electronics	-
Mouse	M-S34	LNA1021277 9	Logitech	-

4.4 The setup drawing(s)**4.5 Type of Cables Used**

Device from	Device to	Type of Cable	Length(m)	Type of shield
PC	Keyboard	PS/2	1,2	Shielded
PC	Mouse	PS/2	1,2	Shielded
PC	LCD Monitor	VIDEO	1,5	Shielded
PC	Power socket	INLET	1,5	Unshielded
EUT	PC	RS-232	0,25	Shielded
EUT	DC power supply	DC IN	0,8	-
LCD Monitor	Adapter	DC In	1,5	Shielded

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.

FCC Rule	Measurement Required	Result
15.107	Conducted Emission Measurement	N/A*
15.109	Radiated Emission Measurement	Passed by 3,2 dB

N/A* : Conducted Emission test was not applied. Because, EUT power supplies from a DC 9 V.

The data collected shows that the **Woosim System Inc. / Thermal Printer / PORTI-WP40** complied with technical requirements of above rules part 15.107 and 15.109 Class B Limits and CISPR Publication 22.

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.

5.2. Radiated Emissions Measurement

EUT	Thermal Printer / PORTI-WP40 (SN :N/A)
Limit apply to	FCC Part 15. 109(CISPR Pub.22 Class B)
Test Date	March 24, 2007
Operating Condition	Continuous printing mode
Result	Passed by 3,4 dB

Radiated Emission Test Data

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Detector mode: CISPR Quasi-Peak mode (6 dB Bandwidth: 120 kHz)

Frequency [MHz]	Reading [dB μ V]	Polarization (*H/**V)	Ant. Factor [dB/m]	Cable Loss [dB μ V]	Emission Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]
56,32	5,92	V	11,58	2,10	19,60	30,0	10,40
154,87	3,89	V	12,78	3,62	20,30	30,0	9,70
167,70	8,44	H	12,08	3,78	24,30	30,0	5,70
180,52	8,91	H	10,79	3,90	23,60	30,0	6,40
219,00	10,71	H	9,62	4,48	24,80	30,0	5,20
349,00	13,99	H	13,52	6,09	33,60	37,0	3,40
336,75	14,11	H	13,25	5,94	33,30	37,0	3,70
399,75	12,17	H	14,54	6,60	33,30	37,0	3,70
387,50	12,54	H	14,29	6,48	33,30	37,0	3,70

NOTES : 1. * H : Horizontal polarization , ** V : Vertical polarization

2. Result = Reading + Antenna factor + Cable loss

3. Margin value = Limit - Result

4. The measurement was performed for the frequency range 30 MHz ~ 1 000 MHz according to the CISPR 22 Class B.



Test Engineer: Ju-Hee, Jeong

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

$$dB(\mu V) = 20 \log_{10} (\mu V)$$

$$dB\mu V = dBm + 107$$

Example : @ 349,00 MHz

$$\text{Class B Limit} = 37 \text{ dB } \mu V/m$$

$$\text{Reading} = 13,99 \text{ dB } \mu V$$

$$\text{Antenna Factor + Cable Loss} = 13,52 + 6,09 = 19,61 \text{ dB } \mu V/m$$

$$\text{Total} = 33,60 \text{ dB } \mu V/m$$

$$\text{Margin} = 37 - 33,6 = 3,4 \text{ dB}$$

$$= 3,4 \text{ dB below Limit}$$

7. List of test equipments used for measurements

Test Equipment		Model	Mfg.	Serial No.	Cal. Due Date
<input checked="" type="checkbox"/>	EMI TEST Receiver	ESVS 10	R & S	835165/001	07-04-25
<input type="checkbox"/>	EMI TEST Receiver	ESPI3	R & S	100478	07-10-17
<input type="checkbox"/>	LISN	3816-2	EMCO	1002	07-10-17
<input type="checkbox"/>	LISN	3825/2	EMCO	9208-1995	07-04-06
<input checked="" type="checkbox"/>	LogBicon Antenna	VULB9160	Schwarz Beck	3082	07-08-11
<input checked="" type="checkbox"/>	Turn-Table	DETT-03	Daeil EMC	-	N/A
<input checked="" type="checkbox"/>	Antenna Master	DEAM-03	Daeil EMC	-	N/A