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/Serial No.	:	PORTI-P340 / NONE
FCC ID	:	QDDPORTI-P340
APPLICANT	:	Woosim System Inc. #501, Daerung Technotown 3th, 448, Gasan-dong, Geumcheon-gu, Seoul, Korea Attn. : Moo-Seoung Lim / 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
RULE PART(S)	:	FCC Part 15 Subpart B
FCC PROCEDURE	:	Certification
TEST REPORT No.	:	ETLE070911.631
DATES OF TEST	:	October 05, 2007 ~ October 08, 2007
REPORT ISSUE DATE	:	October 12, 2007
TEST LABORATORY	:	ETL Inc. (FCC Registration Number : 95422)

This THERMAL PRINTER, Model PORTI-P340 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

ETL Inc.
#371-51, Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea
Tel: 82-2-858-0786 Fax: 82-2-858-0788

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EMC Lab : #584 Sangwhal-ri, Ganam-myeon, Yoju-gun, Gyounggi-do, 469-885, Korea

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	**: Moo-Seoung Lim / Assistant Manager**

- **EUT Type :** THERMAL PRINTER
- **Model Number :** PORTI-P340
- **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 :** October 05, 2007 ~ October 08, 2007
- **Place of Tests :** ETL Inc. Testing Lab.

  Radiated Emission test;
  #584, Sangwhal-ri, Ganam-myeon, Yoju-gun,
  Gyeonggi-do, 469-885, Korea

  Conducted Emission test;
  ETL Inc. Testing Lab.
  371-51, Gasan-dong, Geumcheon-gu, Seoul, 153-803, Korea
- **Test Report No. :** ETLE070911.631

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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 FCC Rules according to the ANSI C63.4-2003 and registered to the Federal Communications Commission (FCC 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-P340

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2. PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the Woosim System Inc., Model: PORTI-P340.

2.2 General Specification

Item	Specification	
Print method	Direct thermal line printing	
Characters per line	64cpl (MAX)	
Character size	Eng. : 9×24dots, 12×24dots Kor. : 16×24dots, [24×24dots]	
Resolution	203dpi, 8dots/mm	
Print width	3-inch (72mm, 576dots)	
Print speed	40mm/sec	
Dimension	110 × 77.7 × 48 mm	
Weight	300g (including paper roll)	
Interface	UART	
Paper roll	Thermal paper roll (80mm wide, 38ø)	
Barcodes	PDF417(2-dimension), Code128, Code39, I2/5, Code93 UPC, EAN(KAN, JAN), CODABAR	
Receive buffer size	10K bytes	
Note	Printing speed may be slower, depending on the data transmission speed and the combination of control commands.	
Input Power	9VDC, Standby 60mA and Max 3A	
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

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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 50 Ω / 50 uH 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 0,4 m 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.

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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 – 10 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 1000 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 laced 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 1 MHz 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 1m 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.

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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	X
Continuous printing mode	O

O: Worst case investigated during the Test

4.3 Support Equipment Used

Description	Model Name	Serial No.	Manufacturer
Notebook computer	SV10	958291CT300126	SAMSUNG
Adapter (for Notebook computer)	AD-6019	CNBA4400238AD2V H77G8142	Li Shin International Electronic Co., Ltd.
DC POWER SUPPLY	E3616A	H.P	KR64301658

4.4 Type of Cables Used

Device from	Device to	Type of I/O port	Length(m)	Type of shield
EUT	Notebook computer	RS-232	0,4	Shielded
EUT	DC power supply	DC Input	0,8	Shielded
Notebook computer	Adapter	DC Input	1,0	Shielded
DC power supply	Power socket	AC Input	1,2	Unshielded

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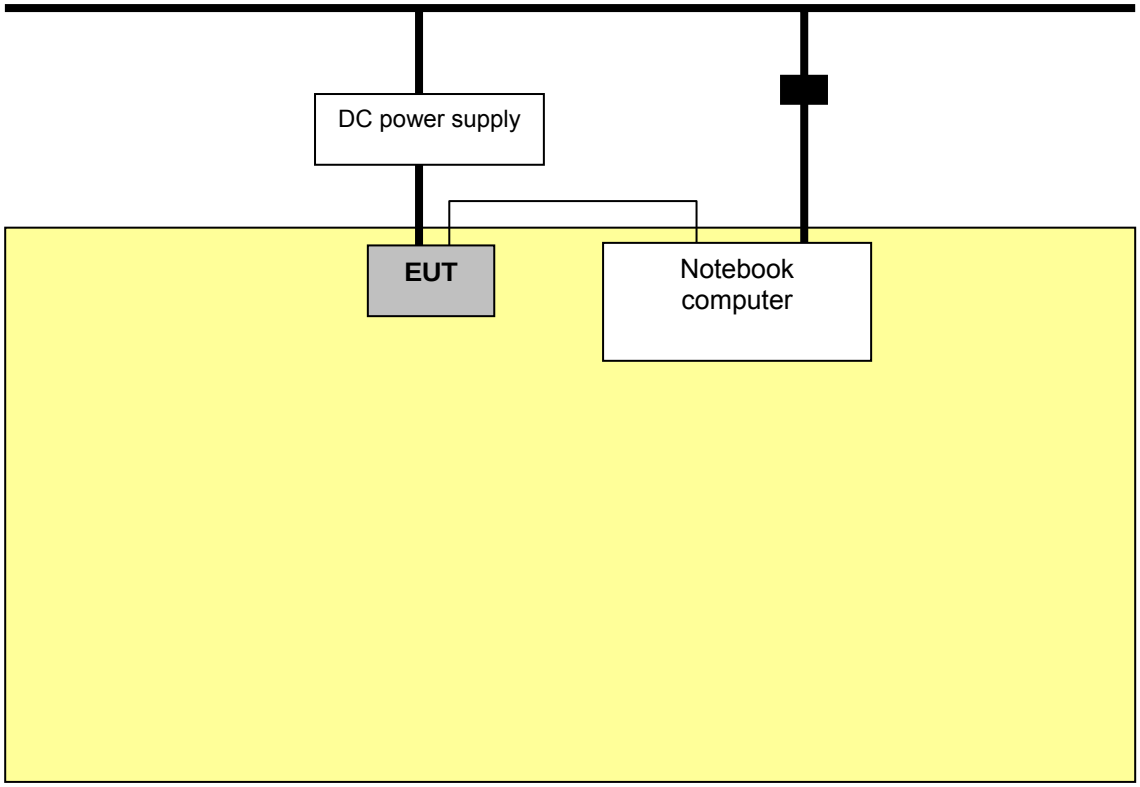
4.5 The setup drawing(s)



: Data Line

: Power Line

: Adapter

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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	**Passed by 3,50 dB**
15.109(g)	Radiated Emission Measurement	**Passed by 3,00 dB**

The data collected shows that the **Woosim System Inc. / THERMAL PRINTER / PORTI-P340** complied with technical requirements of above rules part 15.107 and 15.109(g) 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.

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5.2 Conducted Emissions Measurement

EUT	THERMAL PRINTER / PORTI-P340 (SN: N/A)
Limit apply to	FCC Part 15.107
Test Date	October 08, 2007
Operating Condition	Continuous printing mode
Result	Passed by 3,50 dB

Conducted Emission Test Data

The following table shows the highest levels of conducted emissions on both polarizations of hot and neutral line.
Detector mode: CISPR Quasi-Peak mode (6 dB Bandwidth: 9 kHz)

Frequency [MHz]	Result [dBμV]		Phase (*H/**N)	Limit [dBμV]		Margin [dB]	
	Quasi-peak	Average		Quasi-peak	Average	Quasi-peak	Average
0,492	37,7	27,7	H	56,1	46,1	18,4	18,9
0,591	44,6	42,5	H	56,0	46,0	11,4	3,5
0,790	41,2	38,4	H	56,0	46,0	14,8	7,6
2,075	42,3	37,9	H	56,0	46,0	13,7	8,1
2,175	43,3	39,2	H	56,0	46,0	12,7	6,8
2,276	42,4	38,9	H	56,0	46,0	13,6	7,1

NOTES :

1. *** H : HOT Line , **N : Neutral Line**
2. **Margin value = Limit – Result**
3. **All conditions were investigated and the worst-case emissions are reported.**
4. **If the reading Quasi-peak value is below the average limit, do not test average mode.**

Test Engineer : **Kug Kyoung, Yoon**

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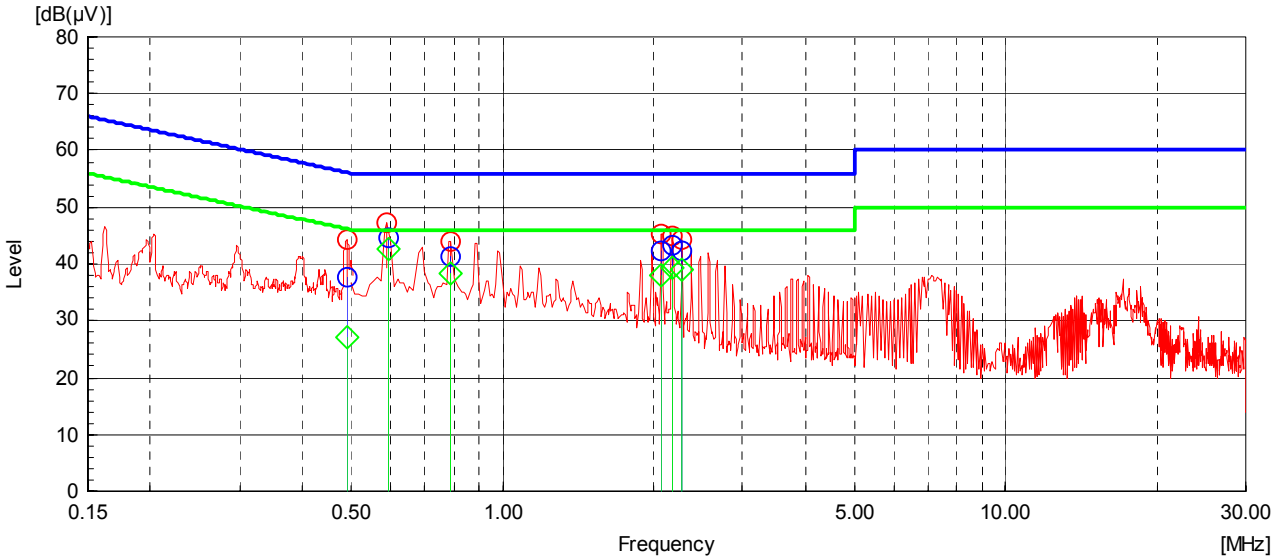
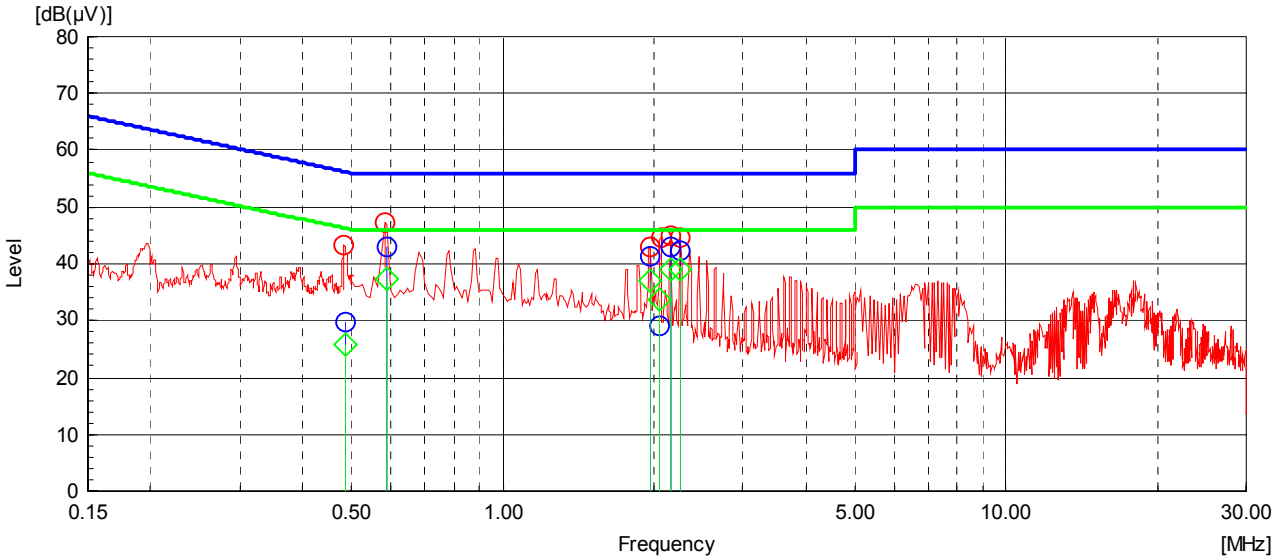
Line Polarity : Hot

Limit : Quasi-Peak
Average



Line Polarity : Neutral



Quasi-peak Average

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5.3 Radiated Emissions Measurement

EUT	THERMAL PRINTER / PORTI-P340 (SN: N/A)
Limit apply to	FCC Part 15.109(g)
Test Date	October 08, 2007
Operating Condition	Continuous printing mode
Result	Passed by 3,00 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 [dBμN]	Polarization (*H/**V)	Ant. Factor [dB/m]	Cable Loss [dB]	Result [dBμN/m]	Limit [dBμN/m]	Margin [dB]
60,77	15,14	V	8,55	2,11	25,80	30,0	4,20
72,85	9,71	V	8,06	2,23	20,00	30,0	10,00
120,77	9,39	V	10,49	3,11	23,00	30,0	7,00
128,17	10,45	V	10,83	3,22	24,50	30,0	5,50
144,92	6,37	H	11,36	3,47	21,20	30,0	8,80
227,90	11,79	H	10,63	4,58	27,00	30,0	3,00
364,64	8,37	H	13,78	6,25	28,40	37,0	8,60

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 FCC Part 15.109(g) and CISPR Publication 22. Class B.**

Test Engineer : **Kug Kyoung, Yoon**

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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

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

Example : @ 227,90 MHz

Class B Limit = 30,00 dBuV/m

Reading = 11,79 dBuV

Antenna Factor + Cable Loss = 10,63 + 4,58 = 15,21 dBuV/m

Total = 27,00 dBuV/m

Margin = 30,00 – 27,00 = 3,00 dB

= 3,00dB below Limit

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7. List of test equipments used for measurements

Test Equipment		Model	Mfg.	Serial No.	Cal. Due Date
☒	EMI TEST Receiver	ESVS10	R & S	835165/001	08.05.03
☒	EMI TEST Receiver	ESPI3	R & S	100478	08.10.17
☒	LogBicon Antenna	VULB9165	Schwarz Beck	2023	08.08.28
☒	LISN	3816-2	EMCO	1001	08.10.17
☒	LISN	3816-2	EMCO	1002	08.10.17
☒	Turn-Table	DETT-03	Daeil EMC	-	N/A
☒	Antenna Master	DEAM-03	Daeil EMC	-	N/A

End of test report

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