ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CLASS B CERTIFICATION

Test report file number	**: E034R-070**
Applicant	**: Seoul Standard Co., Ltd.**
Address	**: 4th F1., Yujin B/D, 47-31, Samsung-Dong, Gangnam-Gu, Seoul, Korea**
Manufacturer	**: Seoul Standard Co., Ltd.**
Address	**: 4th F1., Yujin B/D, 47-31, Samsung-Dong, Gangnam-Gu, Seoul, Korea**
Type of Equipment	**: Rugged Notebook Personal Computer**
FCC ID.	**: Q4USTD-50K**
Model Name	**: STD-50K**
Serial Number	**: N/A**
Total page of Report	**: 13 pages (including this page)**
Date of Incoming	**: January 30, 2003**
Date of Issuing	**: April 23, 2003**

SUMMARY

The equipment complies with the regulation; ***FCC PART 15 CFR 47 SUBPART B, Class B.***

This test report contains only the result of a single test of the sample supplied for the examination.

It is not a general valid assessment of the features of the respective products of the mass-production.

Prepared by: G. W. Lee/ Chief Engineer
EMC Div.
ONETECH Corp.

Reviewed by: Y. K. Kwon/ Director
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ONETECH Corp.

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1. VERIFICATION OF COMPLIANCE

APPLICANT	: Seoul Standard Co., Ltd.
ADDRESS	: 4th F1., Yujin B/D, 47-31, Samsung-Dong, Gangnam-Gu, Seoul, Korea
CONTACT PERSON	: Mr. Jin-Gyu, Shim / Manager
TELEPHONE NO.	: +82-2-518-4414
FCC ID	: Q4USTD-50K
MODEL NAME	: STD-50K
SERIAL NUMBER	: N/A
DATE	: April 23, 2003

DEVICE TYPE	Class B Personal Computer -UNINTENTIONAL RADIATOR
E.U.T. DESCRIPTION	Rugged Notebook Personal Computer
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4/1992
TYPE OF EQUIPMENT TESTED	PRE-PRODUCTION
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	CERTIFICATION
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SECTION 15.101(CLASS B)
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	YES
FINAL TEST WAS CONDUCTED ON	3 METER OPEN AREA TEST SITE

-. This device has shown compliance with the conducted emissions limits in 15.107 adopted under FCC 02-107 (ET Docket 98-80). The device may be marketed after July 11, 2005 and is not affected by the 15.37(j) transition provisions.

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

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2. GENERAL INFORMATION

2.1 Product Description

The Seoul Standard Co., Ltd., Model STD-50K (referred to as the EUT in this report) is a Rugged Notebook Personal Computer. It is toughly constructed Pentium-III grade high performance, multi-functional portable computer withstanding harsh environment and designed & certified for testing high & low temperature, humidity, vibration, shock, water proof per military specification test procedure of MIL-STD-810E.

The Product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Metal
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	2 MHz, 4.194304 MHz and 49.152 MHz on the main B/D, 25MHz on the LAN B/D 4.19430MHz on the LED B/D, 4 MHz on the Touch Screen B/D,
CPU	Pentium III 700
MEMORY	256MB
MAX. RESOLUTION	LCD: 1024 X 768, 75Hz, External Monitor: 1280 X 1024, 75Hz
POWER REQUIREMENT	DC 19V, 3.68A, 70W(Max) from the AC/DC Adaptor
USED AC/DC ADAPTERS	LSE9901B1970 manufactured by Li Shin International Enterprise Corp
NUMBER OF LAYERS	Main B/D: 8 Layers, Modem B/D: 4 Layers, Key B/D: 2 Layers, Inverter B/D: 2 Layers LED B/D: 2 Layers, Touch Screen B/D: 2Layers, Power LED B/D: 2 Layers
EXTERNAL CONNECTORS	DC In Port, USB Port, LAN Port, Modem Port, External Audio Port, PS/2 Port, Serial Port, Parallel Port, External Monitor Port, Docking Port, IrDA Port, PCMCIA

Model Differences:

-. None

2.2 Related Submittal(s) / Grant(s)

-. Original submittal only

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2.3 Test System Details

The model numbers for all the equipments, which were used in the tested system, is:

Model	Manufacturer	Description	FCC ID	Connected to
STD-50K	Seoul Standard Co., Ltd.	LCD Monitor (EUT)	Q4USTD-50K	-
NF-1500MAEP	BTC KOREA CO., LTD.	LCD MONITOR	LAKNF-1500MAT	EUT
OK-720	Microsoft Corp.	MOUSE	DoC	EUT
2225C	HP	PRINTER	DSI6XU2225	PC
020-0470	CARDINAL	MODEM	GDE0196	PC
LSE9901B1970	Li Shin International Enterprise Corp	AC/DC ADAPTER	N/A	EUT
SP202	FENG SHIN Cable Co., Ltd.	SPEAKER	N/A	EUT
PCA-3100	Prochips	USB Camera	MY8PCA3100	EUT

The product for docking port was not developed and specially shall be manufactured by the applicant. So, the connector was terminated with several serial cables.

2.4 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4/1992.
Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

2.5 Test Facility

The open area test site and conducted measurement facilities are located on at 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-City, Kyounggi-Do, 464-080, Korea. Description details of test facilities were submitted to the Commission on January 18, 2002. (Registration Number: 92819)

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3. SYSTEM TEST CONFIGURATION

3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main B/D	Seoul Standard Co., Ltd.	STD-50K	N/A
LCD Panel	LG. PHILIPS LCD	LP141XB (A2)	N/A
Modem B/D	Top Circuit	STD-50K	N/A
LED B/D	Top Circuit	Rev: 03.3	N/A
KEY B/D	Top Circuit	STD-KEYBOARD-01219	N/A
LAN B/D	Top Circuit	STD-50K	N/A
TOUCH SCREEN B/D	Top Circuit	STD-50K	N/A
INVERTER B/D	Top Circuit	STD-50K	N/A

3.2 EUT exercise Software

The windows program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. This program was included into HOST. Once loaded, this program sequentially exercises each system component in turn. The sequence used is: (1) series of "H" characters are printed on the monitor until the screen is completely full, (2) copy series of "H" characters to mass storage device (if one is used), (3) print series of "H" characters to printer. The complete cycle is repeated continuously.

The test was performed about each resolution from minimum resolution to maximum resolution for getting maximum noise level and the investigated worst resolution mode of the EUT was 1024 x 768, 75Hz under the display condition of external monitor and LCD on the EUT simultaneously.

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3.3 Cable Description

	Power Cord Shielded (Y/N)	I/O cable Shielded (Y/N)	Length (M)
Rugged Notebook Personal Computer (EUT)	N	Y	1.8(P), 1.2(D)
AC/DC ADAPTER	N	N	1.5(P)
MOUSE	N/A	Y	1.5(D)
PRINTER	N	Y	1.8(P), 1.2(D)
MODEM	N	Y	1.8(P), 1.2(D)
SPEAKER	N/A	N	1.2(D)
USB CAMERA	N/A	Y	1.2(D)
LCD MONITOR	N	Y	1.5(P), 1.2(D)

* The marked "(D)" means the Data Cable and "(P)" means the Power Cable.

3.4 Noise Suppression Parts on Cable

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
Rugged Notebook Personal Computer (EUT)	N	N/A	Y	BOTH END
AC/DC ADAPTER	Y	EUT END	Y	EUT END
MOUSE	N	N/A	Y	EUT END
PRINTER	N	N/A	Y	EUT END
MODEM	N	N/A	Y	EUT END
SPEAKER	N	N/A	Y	EUT END
USB CAMERA	N	N/A	Y	EUT END
LCD MONITOR	Y	BOTH END	Y	BOTH END

3.5 Equipment Modifications

To achieve compliance to CLASS B levels, the following change(s) was made by ONETECH Corp. during compliance testing:

1. Added a Ferrite Core between Main board and Modem board at the nearest connector on the main board.
2. Added EMI Tape Between Metal Housing and CPU board.
3. Added Gaskets Between Metal Housing and LCD Panel.
4. Added Gaskets Between Metal Housing and Rear/Left/Right External ports

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3.6 Configuration of Test System

Line Conducted Test: AC/DC adapter supplied the power of the EUT and the adapter was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4/1992 7.2.3 to determine the worse operating conditions.

Radiated Emission Test: Preliminary radiated emission test was conducted using the procedure in ANSI C63.4:1992 8.3.1.1 to determine the worse operating conditions. Final radiated emission test was conducted at 3 meters open area test site.

4. PRELIMINARY TEST

4.1 AC Power line Conducted Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Resolution: 640 x 480 for External Monitor and LCD on the EUT	
Resolution: 800 x 600 for External Monitor and LCD on the EUT	
Resolution: 1024 x 768 for External Monitor and LCD on the EUT	X
Resolution: 1280 x 1024 for External Monitor	

4.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Resolution: 640 x 480 for External Monitor and LCD on the EUT	
Resolution: 800 x 600 for External Monitor and LCD on the EUT	
Resolution: 1024 x 768 for External Monitor and LCD on the EUT	X
Resolution: 1280 x 1024 for External Monitor	

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5. FINAL RESULT OF MEASURMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level.

5.1 Conducted Emission Test

Humidity Level : 48% Temperature : 21°C

Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.107

Type of Test : Class B Personal Computer

Result : PASSED BY –4.08 dB at 19.49 MHz when used Average detector mode

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EUT : Rugged Notebook Personal Computer Date : February 27, 2003

Operating Condition : Read/Write, Ping, "H" Pattern, Sound On

Detector : CISPR Quasi-Peak and Average(6 dB Bandwidth: 9 kHz)

Frequency (MHz)	Line	Quasi-Peak (dBuV)			Margin (dB)	Average (dBuV)		Margin (dB)
		Emission Level	Detector Mode	Limits*		Emission level	Limits	
3.09	N	46.30	P	56.00	-9.70	36.23	46.00	-9.77
3.45	N	47.05	P	56.00	-8.95	36.35	46.00	-9.65
3.57	N	48.09	P	56.00	-7.91	33.97	46.00	-12.03
3.99	N	48.34	P	56.00	-7.66	35.04	46.00	-10.96
4.36	N	47.88	P	56.00	-8.12	34.95	46.00	-11.05
19.49	N	53.11	P	60.00	-6.89	45.92	50.00	-4.08

Line Conducted Emission Tabulated Data

Remark : "H": Hot Line, "N": Neutral line, "P": Peak detector, "Q.P.": Quasi-Peak Detector Mode.

See next page for an overview sweep performed with peak detector and average.

Tested by : Dan-Gi, Lee / Project Engineer

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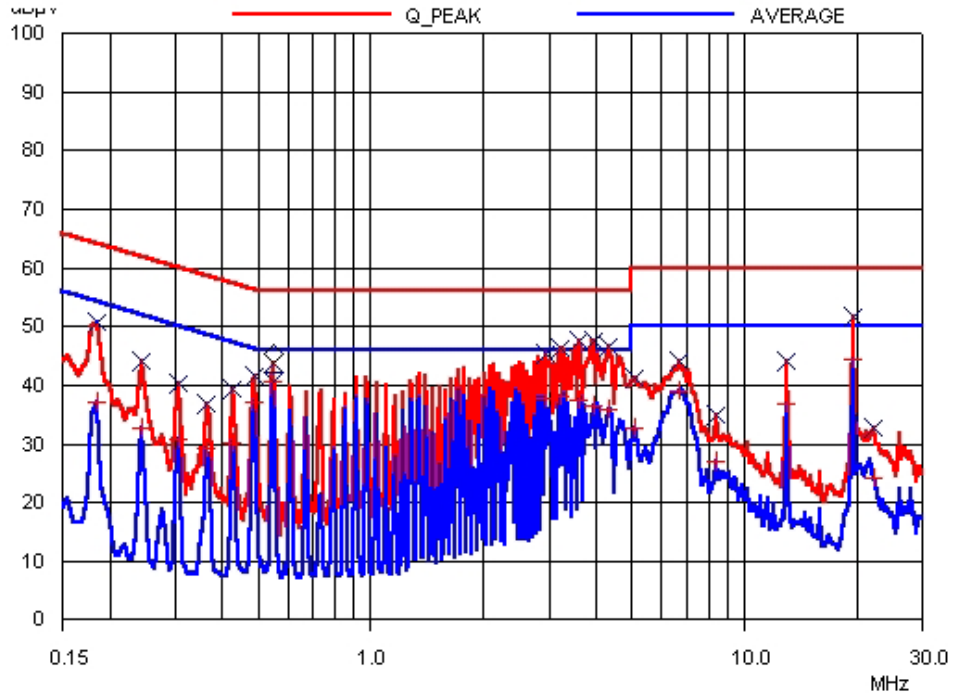
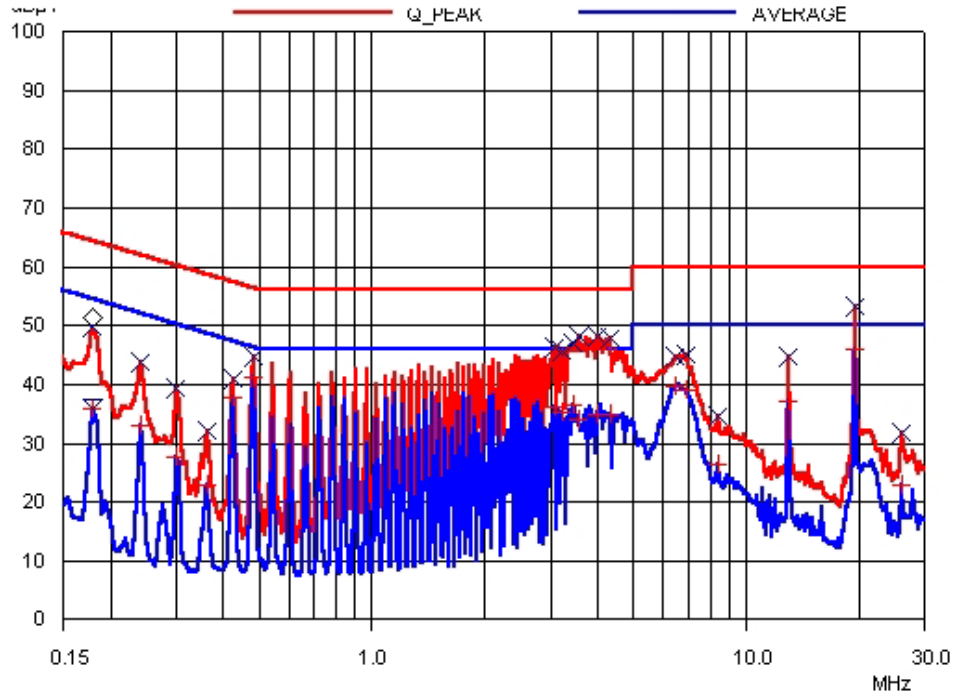


HOT LINE



NEUTRAL LINE

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5.2 Radiated Emission Test

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

Humidity Level : 49 % Temperature : 19°C

Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.109

Type of Test : Class B Personal Computer

Result : PASSED BY –3.60 dB at 240.00 MHz

EUT : Rugged Notebook Personal Computer Date : April 01, 2003

Operating Condition : Continuously displayed "H" characters on the screen of the EUT

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

Distance : 3 Meter

Radiated Emission		Ant	Correction Factors		Total	FCC CLASS B	
Freq. (MHz)	Amp. (dBuV)	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
66.12	23.70	V	8.31	1.00	33.01	40.00	-6.99
75.76	26.20	H	6.99	1.00	34.19	40.00	-5.81
100.13	21.20	V	12.28	1.15	34.63	43.50	-8.87
142.96	18.20	V	12.83	1.32	32.35	43.50	-11.15
207.92	19.48	H	10.93	1.61	32.02	43.50	-11.48
214.44	21.56	H	10.93	1.65	34.14	43.50	-9.36
240.00	29.00	V	11.62	1.78	42.40	46.00	-3.60
246.60	27.20	H	11.92	1.81	40.93	46.00	-5.07
253.10	20.40	H	12.18	1.84	34.42	46.00	-11.58
259.70	17.10	H	12.40	1.85	31.35	46.00	-14.65
496.05	15.20	H	17.43	2.67	35.30	46.00	-10.70
Other frequencies up to 5 GHz were not found.							

Radiated Emission Tabulated Data

Tested by : Dan-Gi, Lee / Project Engineer

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6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+	Meter reading	(dBuV)
+	Cable Loss	(dB)
+	Antenna Factor (Loss)	(dB/meter)
=	Corrected Reading	(dBuV/meter)
-	Specification Limit	(dBuV/meter)
=	dB Relative to Spec	(+/- dB)

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7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS 10	827864/005	OCT/02	12MONTH	■
2.	Test receiver	R/S	ESHS10	834467/007	APR/03	12MONTH	■
3.	Spectrum analyzer	HP	8568B	3026A0226	APR/03	12MONTH	■
4.	RF preselector	HP	85685A	3107A01264	APR/03	12MONTH	■
5.	Quasi-Peak Adapter	HP	85650A	3107A01542	APR/03	12MONTH	■
6.	Spectrum analyzer	HP	8564E	3650A00756	OCT/02	12MONTH	■
7.	Horn Antenna	Schwarzbeck	BBHA9170	BBHA9170178	JULY/02	12MONTH	■
8.	Dipole Antenna	EMCO	3121C	9107-745	JUN/02	12MONTH	
9.	Biconical antenna	EMCO	3104C	9109-4441 9109-4443 9109-4444	APR/03	12MONTH	■
10.	Log Periodic antenna	EMCO	3146	9109-3213 9109-3214 9109-3217	JUN/02	12MONTH	■
11.	LISN	EMCO	3825/2	9109-1867 9109-1869	JUN/02	12MONTH	■
12.	RF Amplifier	HP	8447F	3113A04554	JUN/02	N/A	
13.	Spectrum Analyzer	HP	8591A	3131A02312	APR/02	12MONTH	
14.	Computer System Hard disk drive	HP	98581C 9153C	98543A CMC762Z9153	N/A N/A	N/A N/A	
15.	Plotter	HP	7475A	30052 22986	N/A	N/A	
16.	Position Controller	EMCO	1090	9107-1038	N/A	N/A	■
17.	Turn Table	EMCO	1080-1.21	9109-1576	N/A	N/A	■
18.	Antenna Master	EMCO	1070-1	9109-1624	N/A	N/A	■

-. Mark "■" means used equipment.

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