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ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

Test report file number : E00NR-008

Applicant : OPENERS Co., LTD.

Address : 3F Sungji BD., 499 Wolpyung 1-Dong, Seo-Ku, Taejon, 302-281, Korea

Manufacturer : OPENERS Co., LTD.

Address : 3F Sungji BD., 499 Wolpyung 1-Dong, Seo-Ku, Taejon, 302-281, Korea

Type of Equipment : MMC WRITER

FCC ID : OZXMRW-6030

Model / Type No. : MRW-6030

Serial number : N/A

Total page of Report : 13 pages (including this page)

Date of Incoming : October 13, 2000

Date of issuing : November 10, 2000

SUMMARY

The equipment complies with the regulation; FCC PART 15 CFR 47 SUBPART B Section 15.101.

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:

Y. K. Nam / Asst. Chief Engineer

Reviewed by:

S. S. Hong / Managing Director



ONETECH

Testing & Evaluation Lab.

Page 2 of 13

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CONTENTS

	Page
1. VERIFICATION OF COMPLIANCE.....	4
2. GENERAL INFORMATION.....	5
2.1 PRODUCT DESCRIPTION.....	5
2.2 RELATED SUBMITTAL(S) / GRANT(S)	5
2.3 TEST SYSTEM DETAILS.....	6
2.4 TEST METHODOLOGY	6
2.5 TEST FACILITY	6
3. SYSTEM TEST CONFIGURATION.....	7
3.1 JUSTIFICATION.....	7
3.2 EUT EXERCISE SOFTWARE	7
3.3 CABLE DESCRIPTION	7
3.4 NOISE SUPPRESSION PARTS ON CABLE	8
3.5 EQUIPMENT MODIFICATIONS	8
3.6 CONFIGURATION OF TEST SYSTEM.....	8
4. PRELIMINARY TEST.....	9
4.1 AC POWER LINE CONDUCTED EMISSION TEST	9
4.2 RADIATED EMISSION TEST	9
5. FINAL RESULT OF MEASUREMENT.....	10
5.1 CONDUCTED EMISSION TEST	10
5.2 RADIATED EMISSION TEST	14
6. FIELD STRENGTH CALCULATION	16
7. LIST OF TEST EQUIPMENT	18



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1. VERIFICATION OF COMPLIANCE

APPLICANT : OPENERS Co., LTD.
 ADDRESS : 3F Sungji BD., 499 Wolpyung 1-Dong, Seo-Ku, Taejon, 302-281, Korea
 CONTACT PERSON : B. H. Yoon
 TELEPHONE NO : 82-42-487-1117
 FCC ID : OZXMRW-6030
 MODEL NO/NAME : MRW-6030
 SERIAL NUMBER : N/A
 DATE : November 10, 2000

DEVICE TYPE	Peripheral Device for Class B Computing Device -Unintentional Radiator
E.U.T. DESCRIPTION	MMC WRITER
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
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
FINAL TEST WAS CONDUCTED ON	3 METER OPEN AREA TEST SITE

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 OPENERS Co., LTD., Model MRW-6030 (referred to as the EUT in this report) is an MMC WRITER. Product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	PLASTIC
USB CONTROLLER	GDS30C6001
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1MHz)	48MHz
POWER REQUIREMENTS	DC 5V supplied from a PC
NUMBER OF LAYERS	2 LAYER (MAIN BOARD)
FILE DOWNLOADING SPEED	130Kbytes/sec
DIMENSION	68.9mm(W) X 37.1mm(H) X 15.3mm(D)

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	FCC ID	Description	Connected to
MRW-6030	OPENERS Co., LTD.	OZXMRW-6030	MMC WRITER (EUT)	PC
TC-PA1000	TAEIL	LIZ-TCPA1000	PC	-
AV-5T	KDS	EVOKD-1510T	MONITOR	PC
SKR-1032	SEJIN Elec	GJJKR-1032B	KEYBOARD	PC
9532	ARTEC.	ITEUECMN9532	MOUSE	PC
2225C	HP	DSI6XU2225	PRINTER	PC
020-0470	CARDINAL	GDE0196	MODEM	PC

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-Kun, Kyunggi-Do 464-080 Korea. Description details of test facilities were submitted to the Commission on January 12, 1999. (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, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
MAIN B/D	OPENERS Co., LTD.	20001018	N/A

3.2 EUT exercise Software

After EUT was connected at USB port of the PC, the data was transferred continuously between PC and EUT during the testing.

3.3 Cable Description

	Power Cord Shielded (Y/N)	I/O cable Shielded (Y/N)	Length (M)
MMC WRITER (EUT)	N/A	Y	1.2(D)
PC	N	Y	1.5(P), 1.2(D)
MONITOR	N	Y	1.5(P), 1.8(D)
KEYBOARD	N/A	Y	1.2 (D)
MOUSE	N/A	Y	1.2(D)
MODEM	N	Y	1.5(D)
PRINTER	N	Y	1.5(P), 1.2 (D)

* The marked “(P)” means the Power Cable, “(D)” means the Data Cable.

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3.4 Noise Suppression Parts on Cable

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
MMC WRITER (EUT)	N	N/A	Y	BOTH END
PC	-	-	-	-
MONITOR	Y	BOTH END	Y	PC END
KEYBOARD	N	N/A	Y	PC END
MOUSE	N	N/A	Y	PC END
MODEM	N	N/A	Y	BOTH END
PRINTER	N	N/A	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:

“There was no Modified items during EMI test”

3.6 Configuration of Test System

Line Conducted Test: EUT was connected to the PC and PC was connected to LISN, all supporting equipment 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 worst operating conditions. Final radiated emission test was conducted at 3 meters open area test site.

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4. PRELIMINARY TEST

4.1 Conducted Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Continuous transfer of data between PC and EUT	X

4.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Continuous transfer of data between PC and EUT	X



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5. FINAL RESULT OF MEASUREMENT

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 : 42 % Temperature : 21 •
Limits apply to : FCC CFR 47, PART 15, SUBPART B
Type of Test : CLASS B
Result : PASSED BY -10.88 dB at 29.83 MHz

EUT : MMC WRITER Date: October 11, 2000
Operating Condition : Continuous transfer of data between PC and EUT
Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

Power Line Conducted Emission			FCC CLASS B	
Frequency (MHz)	Amplitude (dBuV)	Conductor	Limit (dBuV)	Margin (dB)
0.47	24.74	NEUTRAL	48.00	-23.26
0.60	22.28	NEUTRAL	48.00	-25.72
2.64	19.65	HOT	48.00	-28.35
3.18	22.02	HOT	48.00	-25.98
6.48	34.99	NEUTRAL	48.00	-13.01
10.57	31.44	NEUTRAL	48.00	-16.56
23.17	35.35	NEUTRAL	48.00	-12.65
29.83	37.12	NEUTRAL	48.00	-10.88

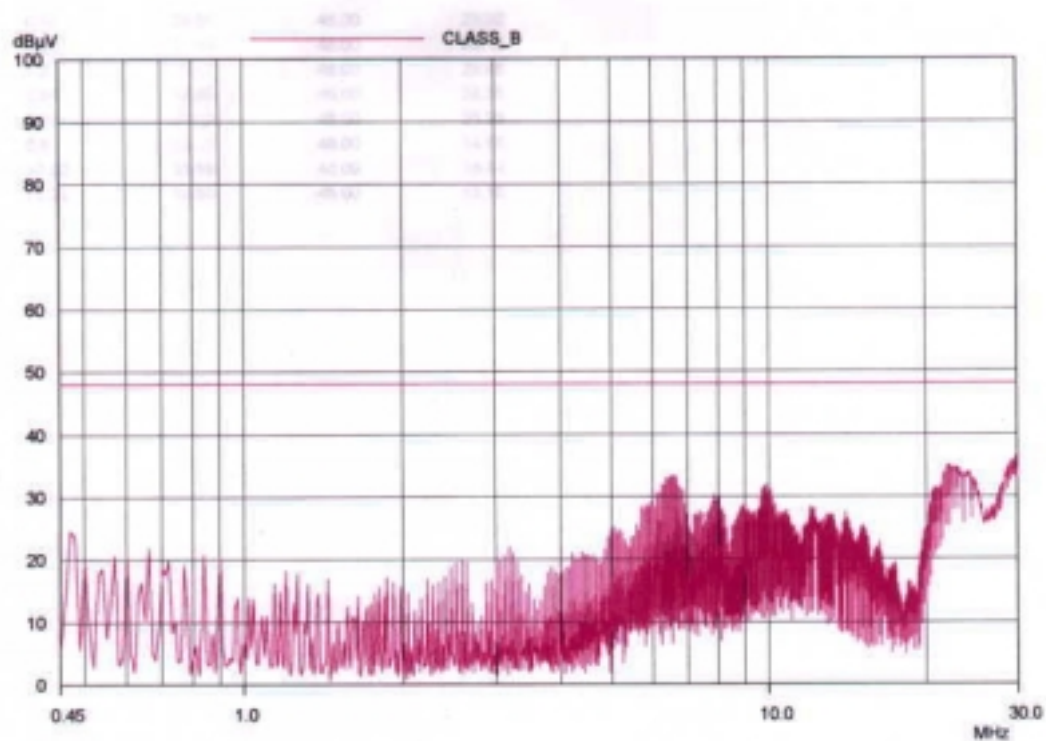
Line Conducted Emission Tabulated Data

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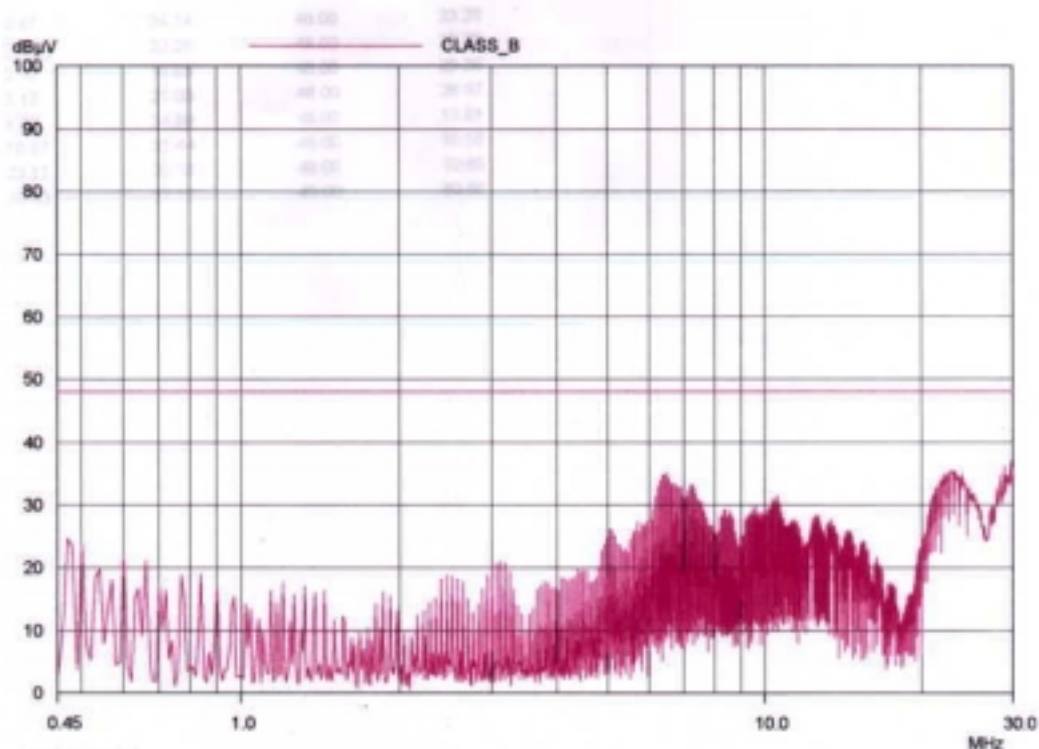
Measuring by: Young Min, Choi / Project Engineer



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HOT LINE



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(TEL: 82-31-746-8500 FAX: 82-31-746-8700)

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Page 13 of 13

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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 : 56 % Temperature : 24 •
Limits apply to : FCC CFR 47, PART 15, SUBPART B
Type of Test : CLASS B
Result : PASSED BY -5.64 dB at 48.00 MHz

EUT : MMC WRITER Date: October 20, 2000
Operating Condition : Continuous transfer of data between PC and 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)
48.00	22.20	V	11.25	0.91	34.36	40.00	-5.64
96.10	24.60	V	10.47	1.13	36.20	43.50	-7.30
144.15	21.60	H	12.97	1.33	35.90	43.50	-7.60
186.50	12.30	V	16.28	1.49	30.07	43.50	-13.43
233.60	21.90	H	12.09	1.74	35.73	46.00	-10.27
240.00	24.30	H	12.20	1.78	38.28	46.00	-7.72
264.00	20.80	H	13.36	1.86	36.02	46.00	-9.98
306.20	14.90	H	15.22	2.04	32.16	46.00	-13.84
480.00	15.10	H	17.75	2.62	35.47	46.00	-10.53

Radiated Emission Tabulated Data

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Measuring by: Young Min, Choi / Project Engineer

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6. FIELD STRENGTH CALCULATION

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

$$\begin{aligned}
 &+ \text{ Meter reading} && (\text{dBuV}) \\
 &+ \text{ Cable Loss} && (\text{dB}) \\
 &+ \text{ Antenna Factor (Loss)} && (\text{dB/meter}) \\
 &= \text{ Corrected Reading} && (\text{dBuV/meter}) \\
 &- \text{ Specification Limit} && (\text{dBuV/meter}) \\
 &= \text{ dB Relative to Spec} && (+/- \text{ dB})
 \end{aligned}$$

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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	SEP/00	12MONTH	■
2.	Test receiver	R/S	ESHS10	834467/007	APRIL/00	12MONTH	■
3.	Spectrum analyzer	HP	8568B	3026A0226	SEP/00	12MONTH	■
4.	RF preselector	HP	85685A	3107A01264	SEP/00	12MONTH	■
5.	Quasi-Peak Adapter	HP	85650A	3107A01542	SEP/00	12MONTH	■
6.	Dipole Antenna	EMCO	3121C	9107-745	JUN/00	12MONTH	
7.	Biconical antenna	EMCO	3104C	9109-4441 9109-4443 9109-4444	MAR/00	12MONTH	■
8.	Log Periodic antenna	EMCO	3146	9109-3213 9109-3214 9109-3217	MAR/00	12MONTH	■
9.	LISN	EMCO	3825/2	9109-1867 9109-1869	FEB/00	12MONTH	■
10.	RF Amplifier	HP	8447F	3113A04554	JUN/00	N/A	
11.	Spectrum Analyzer	HP	8591A	3131A02312	APR/00	12MONTH	
12.	Computer System	HP	98581C	98543A	N/A	N/A	■
	Hard disk drive		9153C	CMC762Z9153	N/A	N/A	■
13.	Plotter	HP	7475A	30052 22986	N/A	N/A	■
14.	Position Controller	EMCO	1090	9107-1038	N/A	N/A	■
15.	Turn Table	EMCO	1080-1.21	9109-1576	N/A	N/A	■
16.	Antenna Master	EMCO	1070-1	9109-1624	N/A	N/A	■