

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CLASS B CERTIFICATION

Test Report No. : E061R-025
AGR No. : A05DA-008
Applicant : SAROTECH CO., LTD.
Address : Sarotech Bldg. 320-15, Sungnae-Dong, Gangdong-Gu, Seoul, 134-851, Korea
Manufacturer : SAROTECH CO., LTD.
Address : Hanlim Venture Town #204, 689-6, Gumjeong-Dong, Gunpo-City, Kyungki-Do, Korea
Type of Equipment : PHOTO STORAGE (Peripheral Device for Class B Computing Device)
FCC ID : PBCDSR281
Model Name : DSR-281
Serial number : N/A
Total page of Report : 15 pages (including this page)
Date of Incoming : October 18, 2005
Date of Issuing : January 13, 2006

SUMMARY

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

This test report contains only the results 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.

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1. VERIFICATION OF COMPLIANCE

- APPLICANT : SAROTECH CO., LTD.
- ADDRESS : Sarotech Bldg. 320-15, Sungnae-Dong, Gangdong-Gu, Seoul, 134-851, Korea
- CONTACT PERSON : Mr. Ken-Ho, Jung / Associate
- TELEPHONE NO : +82-2-480-5146
- FCC ID : PBCDSR281
- MODEL NAME : DSR-281
- SERIAL NUMBER : N/A
- DATE : January 13, 2006

EQUIPMENT CLASS	JBP - Peripheral Device for Class B Computing Device
E.U.T. DESCRIPTION	PHOTO STORAGE - Unintentional Radiator
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4: 2003
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	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 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.

2. GENERAL INFORMATION

2.1 Product Description

The SAROTECH CO., LTD., Model DSR-281 (referred to as the EUT in this report) is a PHOTO STORAGE. 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)	12 MHz and 24 MHz on the Main Board
NUMBER OF LAYERS	4 Layers: Main Board, 2 Layers: Panel Board
EXTERNAL CONNECTOR	CF, SD, MS, SM Socket, DC In, USB

2.2 Model Differences

-. None

2.3 Related Submittal(s) / Grant(s)

-. Original submittal only

2.4 Test System Details

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

Model	Manufacturer	FCC ID	Description	Connected to
DSR-281	SAROTECH CO., LTD.	PBCDSR281	PHOTO STORAGE (EUT)	Notebook PC
TSA11-050240WV	TPI	N/A	AC/DC Adaptor	EUT
PP05LC	DELL COMPUTER CORP.	DoC	Notebook PC	-
2225C	HP	DSI6XU2225	PRINTER	Notebook PC
020-0470	CARDINAL	GDE0196	MODEM	Notebook PC
N/A	ZYURS	N/A	SD Memory	EUT
N/A	HITACHI	N/A	CF Memory	EUT

2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4: 2003. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

2.6 Test Facility

The open area test site and conducted measurement facilities are located on at 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-080, Korea. Description details of test facilities were submitted to the Commission on

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

EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

April 04, 2003. (Registration Number: 340658)

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 BOARD	SAROTECH CO., LTD.	EVO Main Rev 0.3	N/A
HDD	HITACHI	DK23CA-20F	N/A
PANEL BOARD	SAROTECH CO., LTD.	Panel Rev 0.3	N/A

3.2 EUT exercise Software

The EUT was operated as following 2 modes, but the worst mode data were recorded in this report.

1. The data of the HDD in the EUT were continuously read and written to the notebook PC via USB port during the test.
2. The data of the memory stick were continuously read and written to the EUT during the test.

3.3 Cable Description

	Power Cord Shielded (Y/N)	I/O cable Shielded (Y/N)	Length (M)
PHOTO STORAGE (EUT)	N	Y	1.2(P), 3.0(D)
AC/DC Adaptor	N	N	1.2(D)
Notebook PC	N	-	1.5(P)
Printer	N	Y	1.5(P), 1.2(D)
Modem	N	Y	1.5(P), 1.2(D)
SD Memory	N/A	N/A	-
CF Memory	N/A	N/A	-

* The marked "(P)" means the Power Cable and "D" means the I/O Cable.

3.4 Noise Suppression Parts on Cable

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
PHOTO STORAGE (EUT)	N	N/A	Y	BOTH END
AC/DC Adaptor	Y	EUT END	Y	EUT END
Notebook PC	-	-	-	-
Printer	N	N/A	Y	BOTH END
Modem	N	N/A	Y	BOTH END
SD Memory	N	N/A	N	EUT END
CF Memory	N	N/A	N	EUT END

3.5 Equipment Modifications

- The L2, 3, 5, 6, 7, 11 and 12 were changed to the bead(1000 ohm).
- The resistor(0 ohm) of USB D+/- line was changed to the CMF(Common Mode Filter – 90 ohm)
- The ground of digital and analog were connected in the main board.
- The EMI gasket was added to the ground of main board and rear metal enclosure.
- The ferrite core was added to the USB cable.
- The L8, 9, 10 of U11 VSS line were changed to bead(1000 ohm).
- The R79, 81, 85(0 ohm) was changed to bead(1000 ohm).
- The bead(300 ohm) was added to the pin 38(MS_CLK) and 49(SD_CLK) of J8 socket.
- The bead(300 ohm) was added to the pin 7(DEOC) of J5 line.
- The two bead(1000 ohm) were added to the pin 4(VIN) of DC jack J2 line.
- The bypass capacitor(0.1uF) was added to the pin 4(VIN) of DC jack J2 line.
- The bypass capacitor(0.1uF) was added to the pin 5(NC_G) of DC jack J2 line.

3.6 Configuration of Test System

Line Conducted Test : The EUT was connected to adaptor or notebook PC and the power line of adaptor or notebook PC 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: 2003 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: 2003 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)
The data of the HDD in the EUT were continuously read and written to the notebook PC via USB port during the test. ☐ The power of EUT was supplied by USB port. ☐ The power of EUT was supplied by AC/DC Adaptor.	X
The data of the memory stick were continuously read and written to EUT during the test.	-

4.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
The data of the HDD in the EUT were continuously read and written to the notebook PC via USB port during the test. ☐ The power of EUT was supplied by USB port. ☐ The power of EUT was supplied by AC/DC Adaptor.	X
The data of the memory stick were continuously read and written to EUT during the test.	-

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

5.1.1 The power of the EUT: USB Port

Humidity Level : 41 % Temperature : 21°C
 Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.107(a)
 Type of Test : CLASS B
 Result : PASSED BY -9.85 dB at 3.76 MHz under USB power mode

EUT : PHOTO STORAGE Date: December 16, 2005
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)
 Operating Condition : The data of the HDD in the EUT were continuously read and written to the notebook PC via USB.
 Remark : Used by USB power

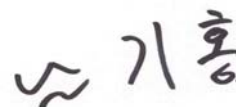
Frequency (MHz)	Line	Peak (dBuV)		Margin (dB)
		Emission level	Q.P Limits	
0.16	H	54.02	65.46	-11.44
0.18	N	54.48	64.49	-10.01
0.24	N	46.56	62.10	-15.54
0.30	N	44.72	60.11	-15.39
3.46	N	42.68	56.00	-13.32
3.76	H	46.15	56.00	-9.85
Frequency (MHz)	Line	Average (dBuV)		Margin (dB)
		Emission level	Limits	
0.16	H	22.30	55.46	-33.16
0.18	N	39.14	54.49	-15.35
3.46	N	29.63	46.00	-16.37
3.76	H	29.72	46.00	-16.28

Line Conducted Emissions Tabulated Data

5.1.2 The power of the EUT: AC/DC Adaptor

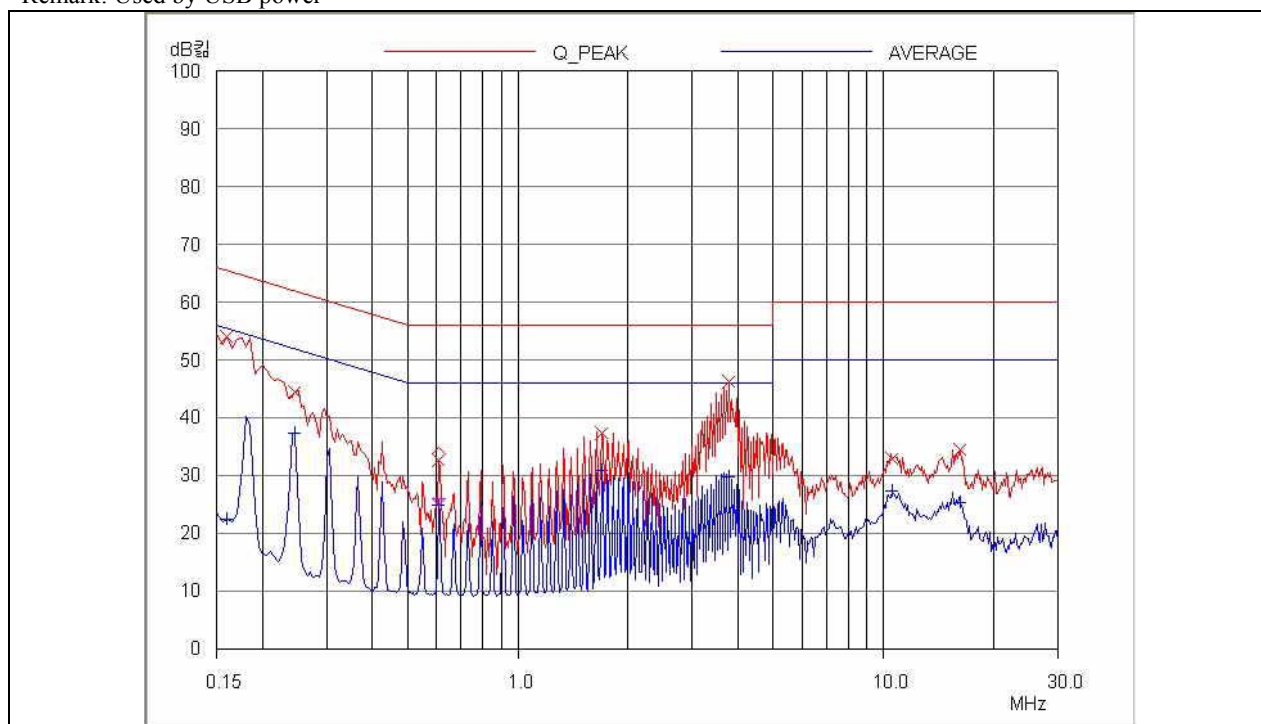
Frequency (MHz)	Line	Peak (dBuV)		Margin (dB)
		Emission level	Q.P Limits	
0.21	H	51.01	63.01	-12.00
0.23	N	46.80	62.27	-15.47
0.54	H	39.61	56.00	-16.39
1.37	H	39.67	56.00	-16.33
2.05	H	41.78	56.00	-14.22
2.16	N	39.67	56.00	-16.33
Frequency (MHz)	Line	Average (dBuV)		Margin (dB)
		Emission level	Limits	
0.21	H	26.01	53.01	-27.00
0.23	N	30.68	52.27	-21.59
2.05	H	24.66	46.00	-21.34
2.16	N	22.59	46.00	-23.41

Line Conducted Emissions Tabulated Data

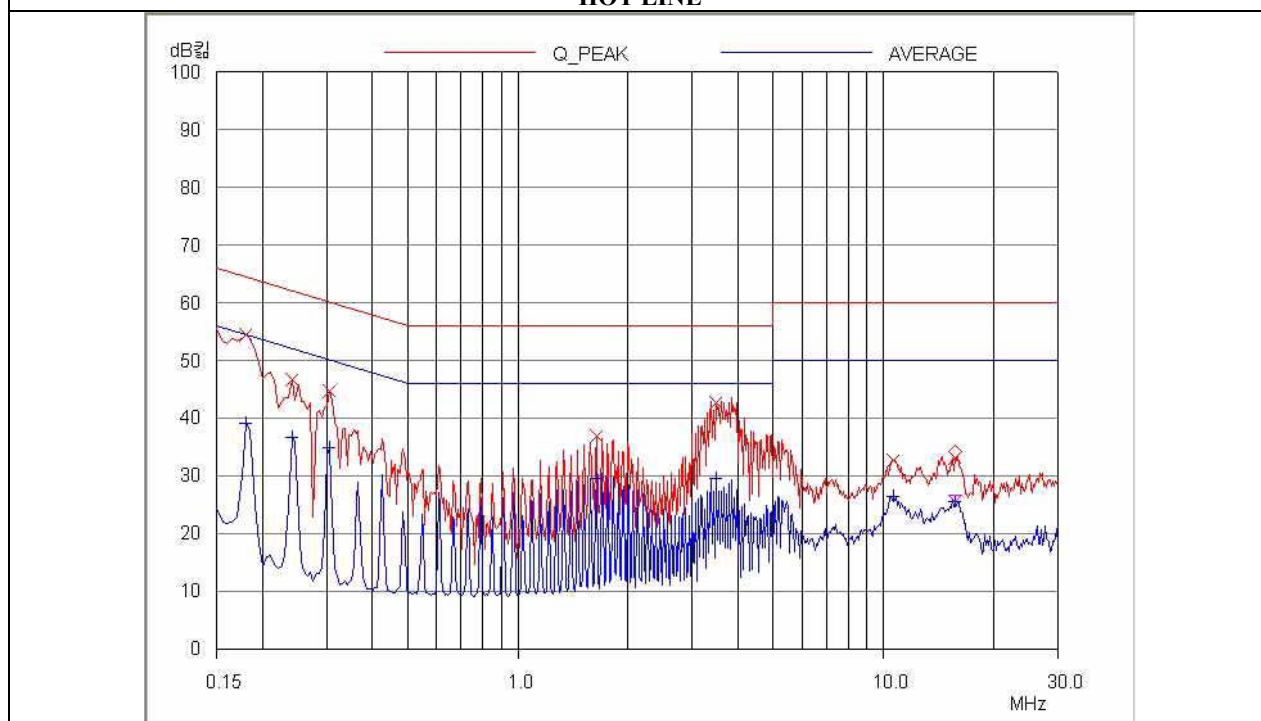


Tested by: Ki-Hong, Nam / Test Engineer

Remark: Used by USB power



HOT LINE



NEUTRAL LINE

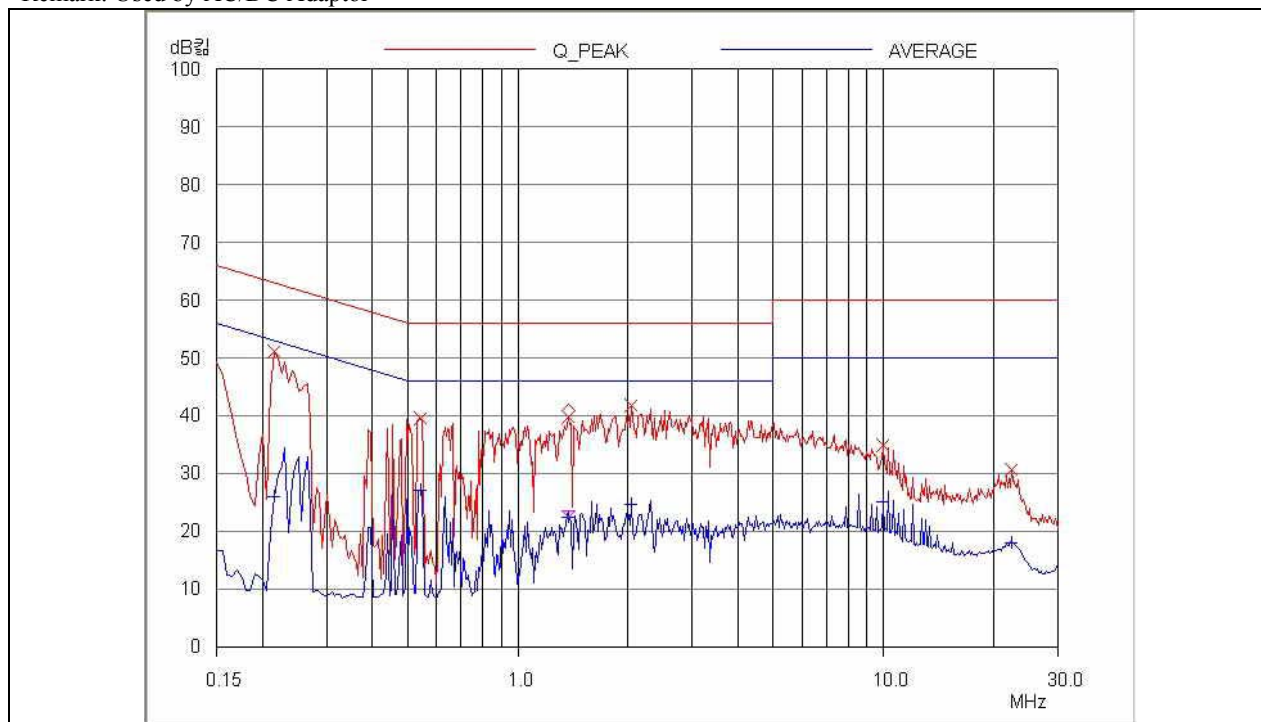
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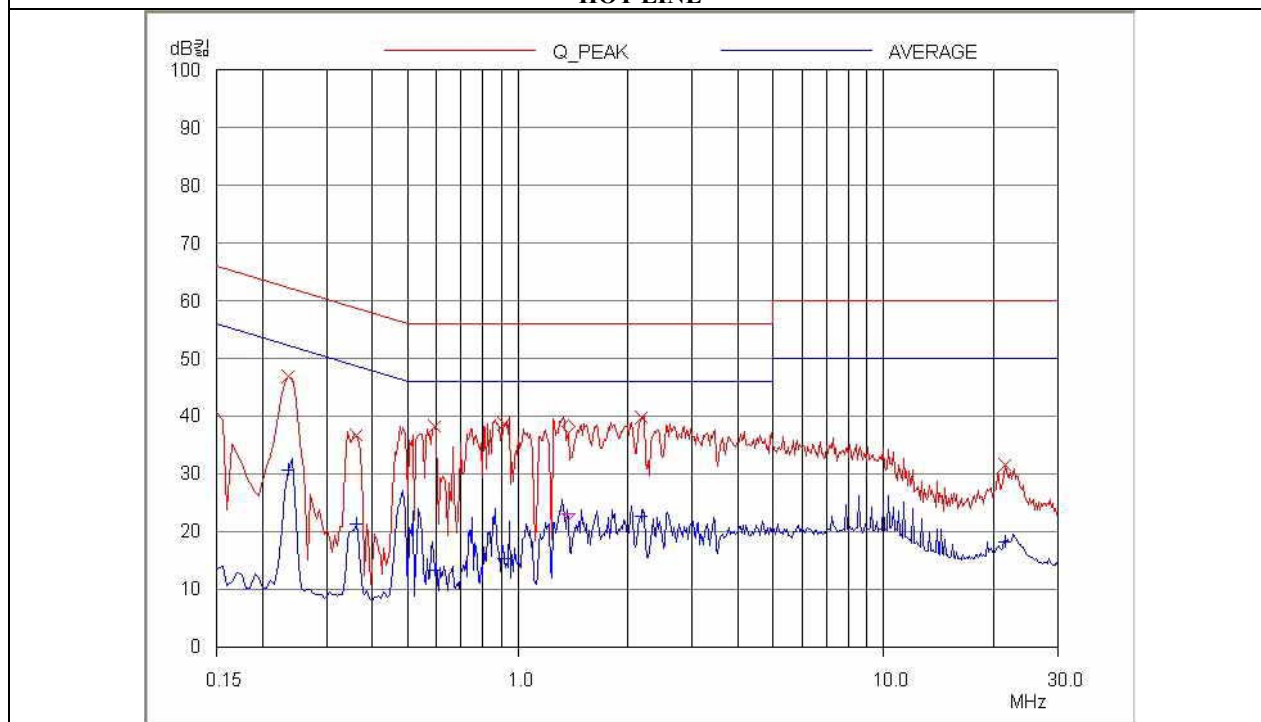
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Remark: Used by AC/DC Adaptor



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.

5.2.1 The power of the EUT: USB Port

Humidity Level : 41 %

Temperature: 17 °C

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

Type of Test : CLASS B

Result : PASSED BY -5.26 dB at 839.94 MHz

EUT : PHOTO STORAGE Date: December 16, 2005

Frequency Range : 30MHz – 1000MHz

Operating Condition : The data of the HDD in the EUT were continuously read and written to the notebook PC via USB.

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)
56.13	18.46	H	8.65	1.40	28.51	40.00	-11.49
116.40	15.46	V	12.46	1.96	29.88	43.52	-13.64
133.69	11.36	H	14.19	2.27	27.82	43.52	-15.70
240.12	15.48	V	16.78	3.24	35.50	46.02	-10.52
265.11	16.60	H	17.55	3.46	37.61	46.02	-8.41
360.10	18.44	V	14.57	4.24	37.25	46.02	-8.77
839.94	11.52	V	22.12	7.12	40.76	46.02	-5.26

Radiated Emissions Tabulated Data

5.2.1 The power of the EUT: AC/DC Adaptor

Humidity Level : 41 %
 Temperature: 17 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.109 (a)
 Type of Test : CLASS B
 Result : PASSED BY -4.68 dB at 840.02 MHz

EUT : PHOTO STORAGE Date: December 16, 2005
 Frequency Range : 30MHz – 1000MHz
 Operating Condition : The data of the HDD in the EUT were continuously read and written to the notebook PC via USB.
 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)
116.26	17.64	H	12.44	1.96	32.04	43.52	-11.48
134.36	15.43	V	14.25	2.29	31.97	43.52	-11.55
239.98	14.60	H	16.78	3.24	34.62	46.02	-11.40
265.46	11.20	V	17.56	3.46	32.22	46.02	-13.80
359.98	10.40	V	14.56	4.24	29.20	46.02	-16.82
840.02	12.10	H	22.12	7.12	41.34	46.02	-4.68

Radiated Emissions Tabulated Data

기홍

Tested by: Ki-Hong, Nam / Test Engineer

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)

7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESVS10	827864/005	DEC/05	12MONTH	■
2.	Test receiver	R/S	ESHS 10	834467/007	MAY/05	12MONTH	■
3.	Spectrum analyzer	HP	8566B	3407A08547	JUL/05	12MONTH	
4.	Spectrum analyzer	HP	8568B	3109A05456	APR/05	12MONTH	■
5.	RF preselector	HP	85685A	3107A01264	APR/05	12MONTH	■
6.	Quasi-Peak Adapter	HP	8574B	2811A01432	APR/05	12MONTH	■
7.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	VULB9163 166	APR/05	12MONTH	
8.	Biconical antenna	EMCO	3110	9003-1121	FEB/05	12MONTH	
		Schwarzbeck	VHA9103	91031852	JAN/05		■
9.	Log Periodic antenna	EMCO	3146	9001-2614	FEB/05	12MONTH	
		Schwarzbeck	9108-A(494)	62281001	FEB/05		■
10.	LISN	EMCO	3825/2	9109-1867	JUL/05	12MONTH	■
				9109-1869	JUL/05		
		Schwarzbeck	NSLK 8126	8126-404	AUG/05		■
11.	Position Controller	HD GmbH	HD100	N/A	N/A	N/A	■
12.	Turn Table	HD GmbH	DS420S	N/A	N/A	N/A	■
13.	Antenna Master	HD GmbH	MA240	N/A	N/A	N/A	■