



# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CLASS B CERTIFICATION

**Test Report No.** : E059R-024  
**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** : Network Storage (Peripheral Device for Class B Computing Device)  
**FCC ID** : PBCNHD-355  
**Model Name** : NHD-355  
**Serial number** : N/A  
**Total page of Report** : 12 pages (including this page)  
**Date of Incoming** : July 14, 2005  
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## 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.

Prepared by:

Young-Min, Choi / Project Engineer  
EMC Div.  
ONETECH Corp.

Reviewed by:

Y. K. Kwon / Director  
EMC Div.  
ONETECH Corp



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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. Cheol-Young, Cho / Manager  
- . TELEPHONE NO : +82-2-480-5140  
- . FCC ID : PBCNHD-355  
- . MODEL NAME : NHD-355  
- . SERIAL NUMBER : N/A  
- . DATE : September 09, 2005

EQUIPMENT CLASS	JBP - Peripheral Device for Class B Computing Device
E.U.T. DESCRIPTION	Network 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 NHD-355 (referred to as the EUT in this report) is a Network 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)	24 MHz, 25 MHz and 33 MHz
NUMBER OF LAYERS	4 Layers: Main Board
EXTERNAL CONNECTOR	WAN Connector, LAN Connector, USB Connector

### 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
NHD-355	SAROTECH CO., LTD.	PBCNHD-355	Network Storage (EUT)	Notebook PC
PP01L	DELL COMPUTER CORP.	DoC	Notebook PC	-
JPC-2057	HYUNDAI-JPC INC	DoC	Mouse	Notebook PC
2225C	HP	DSI6XU2225	PRINTER	Notebook PC
020-0470	CARDINAL	GDE0196	MODEM	Notebook PC
N/A	SAROTECH CO., LTD.	N/A	USB Memory Stick (1)	EUT
N/A	HANA Micron	N/A	USB Memory Stick (2)	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 426-1 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-080, Korea. Description details of test facilities were submitted to the Commission on 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.	NHD-355 (Marvell) Rev 1.0	N/A
POWER BOARD	Seyangtech	SY0103	N/A
SUB BOARD	N/A	NHD-255 LED Rev 1.1	N/A
HDD	Samsung	SP1203N/D0M	N/A

#### 3.2 EUT exercise Software

The configuration of the test setup is as following,

The WAN port of the EUT was connected to the HUB which was installed in the outside of test area and LAN port of the EUT was connected to the notebook PC and other LAN port were terminated. The USB ports on the EUT were connected to USB memory sticks.

#### 3.3 Cable Description

	Power Cord Shielded (Y/N)	I/O cable Shielded (Y/N)	Length (M)
Network Storage (EUT)	N	Y	1.2(P), 3.0(D)
Notebook PC	N	-	1.5(P)
Mouse	N/A	N	1.2(D)
Printer	N	Y	1.5(P), 1.2(D)
Modem	N	Y	1.5(P), 1.2(D)
Memory Stick (1)	N/A	N/A	-
Memory Stick (2)	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
Network Storage (EUT)	N	N/A	Y	BOTH END
Notebook PC	-	-	-	-
Mouse	N	N/A	Y	Notebook PC END
Printer	N	N/A	Y	BOTH END
Modem	N	N/A	Y	BOTH END
Memory Stick (1)	N	N/A	N	Notebook PC END
Memory Stick (2)	N	N/A	N	Notebook PC END

### 3.5 Equipment Modifications

- The rating of R1, 2 were changed from 22 ohm to 75 ohm.
- The R60(22 ohm) was changed to bead(300 ohm) in the line of OSC1.
- The R58, 59, 61, 62, 63(22 ohm) were changed to bead(300 ohm) in the line of U2.
- The R75(22 ohm) was changed to bead(300 ohm) in the line of Y4.
- The R112, 113(0 ohm) was changed to bead(220 ohm).
- The R54, 55, 56, 57(22 ohm) were changed to bead(300 ohm).
- The R140(0 ohm) was changed to bead(220 ohm) in the line of U8.
- The bypass capacitor(0.01uF) was added to the connector J2(Pin 1, 2, 5, 6, 7, 8, 9, 10, 11, 12, 13)
- The L1, 2, 5, 14, 16, 17, 18 were changed to resistor(0 ohm).(Analog VCC and Digital VCC were shorted.)
- The L11, 15 were changed to resistor(0 ohm).(Analog GND and Digital GND were shorted.)
- The L6, 7, 8, 9 were changed to bead(300 ohm) in the line of USB.
- The bypass capacitor(0.1uF) was added to the USB connector(Pin 1, 8)
- The L3, 4 were changed to bead(1000 ohm) in the line of USB VBUS.
- The bypass capacitor(0.1uF) was added to the connector J10(Pin 1, 4)
- The bypass capacitor(0.1uF) was added to the connector J6(Pin 1)
- The ground of main board was connected to the ground of front board by wire.

### 3.6 Configuration of Test System

**Line Conducted Test** : The EUT 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: 2001 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: 2001 8.3.1.1 to determine the worse operating conditions. Final radiated emission test



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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 using LAN port.	-
The data of the memory stick were continuously read and written to the notebook PC through the EUT using LAN port.	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)
The data of the HDD in the EUT were continuously read and written to the notebook PC using LAN port.	-
The data of the memory stick were continuously read and written to the notebook PC through the EUT using LAN port.	X



## 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	: <u>43 %</u>	Temperature : <u>21°C</u>
Limits apply to	: <u>FCC CFR 47, PART 15, SUBPART B, SECTION 15.107(a)</u>	
Type of Test	: <u>CLASS B</u>	
Result	: <u>PASSED BY -10.49 dB at 3.29 MHz</u>	

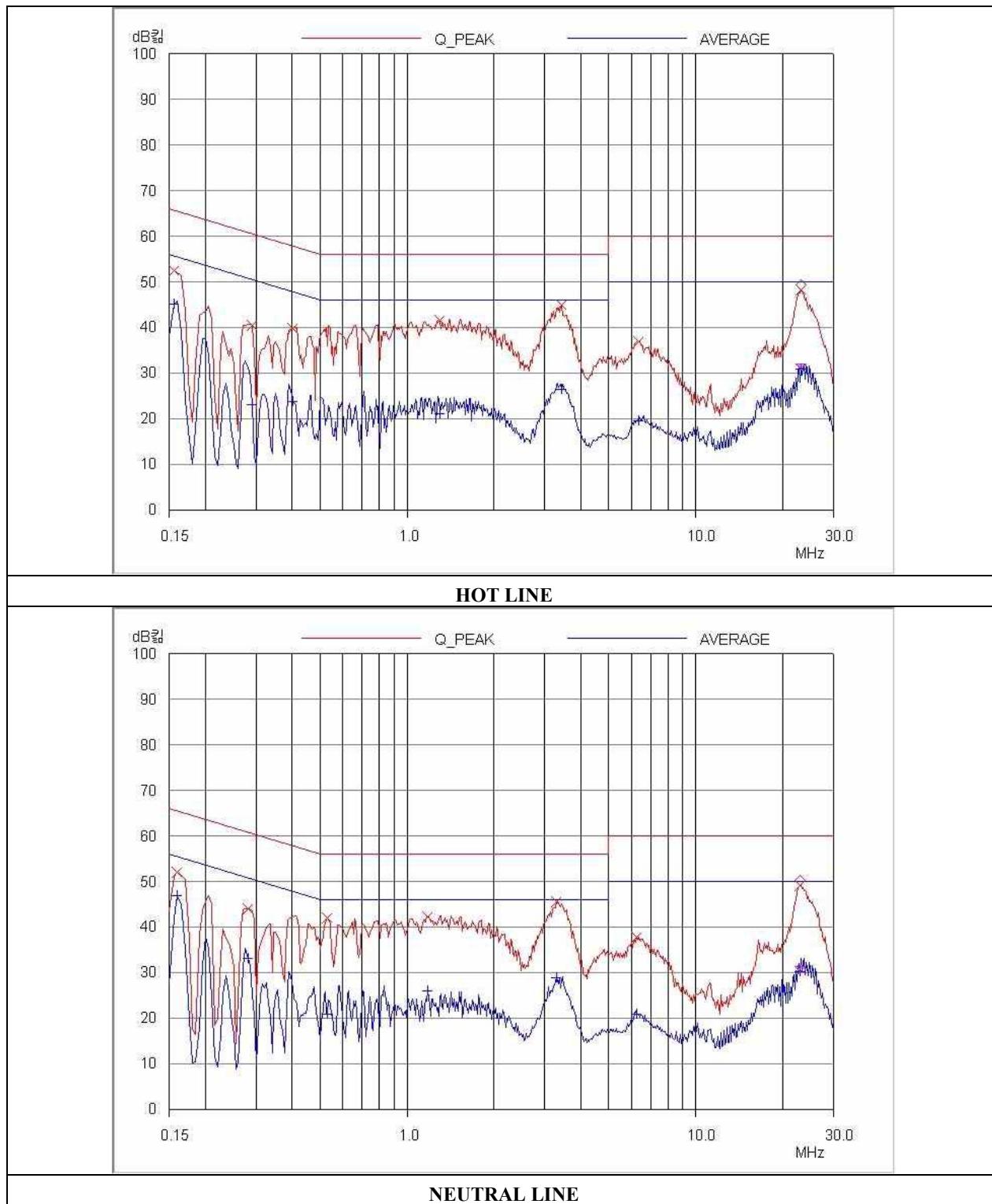
EUT	: Network Storage	Date: September 01, 2005
Detector	: CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)	
Operating Condition	: The data of the memory stick were continuously read and written to the notebook PC through the EUT.	

Frequency (MHz)	Line	Peak (dBuV)		Margin (dB)
		Emission level	Q.P Limits	
0.16	H	52.48	65.73	-13.25
1.18	N	42.27	56.00	-13.73
3.29	N	45.51	56.00	-10.49
3.41	H	44.83	56.00	-11.17
22.80	N	49.06	60.00	-10.94
23.05	H	48.14	60.00	-11.86
Frequency (MHz)	Line	Average (dBuV)		Margin (dB)
		Emission level	Limits	
3.29	N	28.88	46.00	-17.12
3.41	H	26.40	46.00	-19.60
22.80	N	30.11	50.00	-19.89
23.05	H	30.92	50.00	-19.08

Line Conducted Emissions Tabulated Data

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Tested by: Ki-Hong, Nam / Test Engineer





## 5.2 Radiated Emission Test

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

Humidity Level : 45 %  
 Temperature: 24 °C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.109 (a)  
 Type of Test : CLASS B  
 Result : PASSED BY -4.28 dB at 527.11 MHz

EUT : Network Storage Date: August  
 31, 2005  
 Frequency Range : 30MHz – 1000MHz  
 Operating Condition : The data of the memory stick were continuously read and written to the notebook PC through 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)		Ant.	Cable (dB)		Amp. (dBuV/m)	Limit (dBuV/m)
97.83	23.30	V	9.73	1.90	34.93	43.52	-8.59
148.22	17.56	V	14.99	2.32	34.87	43.52	-8.65
299.39	17.46	H	20.04	3.79	41.29	46.02	-4.73
399.20	21.64	H	15.44	4.40	41.48	46.02	-4.54
527.11	18.46	H	17.89	5.39	41.74	46.02	-4.28
599.79	17.64	V	18.65	5.30	41.59	46.02	-4.43
631.77	16.74	H	19.04	5.55	41.33	46.02	-4.69
749.98	13.23	H	21.27	6.90	41.40	46.02	-4.62
900.18	10.70	H	22.94	7.10	40.74	46.02	-5.28

Radiated Emissions Tabulated Data



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**HEAD OFFICE** : #505 SK APT. Factory 223-28, Sangdaewon 1 Dong, Jungwon-Gu, Seongnam-City, Kyunggi-Do, 462-705, Korea  
(TEL: +82-31-746-8500, FAX: +82-31-746-8700)  
**EMC Testing Dept** : 426-1 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)



## 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/04	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	■