ELECTROMAGNETIC EMISSION COMPLIANCE REPORT
FOR FCC CLASS B CERTIFICATION

Test report file number : E043R-067

Applicant : SAROTECH CO., LTD.

Address : Hangang Bldg. 1549-7, Seocho-Dong, Seocho-Ku, Seoul, 137-070, Korea

Manufacturer : SAROTECH CO., LTD.

Address : Hanlim venture town #204, Gumjeong-Dong 689-6, Gunpo-City, Kyungki-Do, Korea

Type of Equipment : External HDD Enclosure (Peripheral Device for Class B Computing Device)

FCC ID : PBCFHD-354

Model Name : FHD-354

Multiple Model Name : N/A

Serial Number : N/A

Total page of Report : 15 pages (including this page)

Date of Incoming : March 2, 2004

Date of Issuing : March 23, 2004

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: 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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EMC Testing Dept : 426-1 Daessangryung-Ri, Chowol-Myun, Kwangju-City, Gyunggi-Do 464-860 Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)

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1. VERIFICATION OF COMPLIANCE

-. APPLICANT : SAROTECH CO., LTD.
-. ADDRESS : Hangang Bldg. 1549-7, Seocho-Dong, Seocho-Ku, Seoul, 137-070, Korea
-. CONTACT PERSON : Mr. Cheol-Young, Cho / Manager
-. TELEPHONE NO : +82-2-3471-4501
-. FCC ID : PBCFHD-354
-. MODEL NO/NAME : FHD-354
-. SERIAL NUMBER : N/A
-. DATE : March 23, 2004

DEVICE TYPE	Peripheral Device for Class B Computing Device - Unintentional Radiator
E.U.T. DESCRIPTION	External HDD Enclosure
THIS REPORT CONCERNS	ORIGINAL GRANT
MEASUREMENT PROCEDURES	ANSI C63.4/2002
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

-. 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 SAROTECH CO., LTD., Model FHD-354 (referred to as the EUT in this report) is an External HDD Enclosure that is interfaced to personal computer via USB or IEEE 1394 port. 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, 24.576 MHz
USED POWER SUPPLY	Model No: SY0084 Manufacturer: Seyang Electronics Model No: AST353 Manufacturer A Storage Limited
NUMBER OF LAYERS	4 Layers
EXTERNAL CONNECTOR	2 USB ports and 1 IEEE1394 port

Model Differences:

The difference(s) compared to the EUT is as follows: None.

2.2 Related Submittal(s) / Grant(s)

Original submittal only

2.3 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
FHD-354	SAROTECH CO., LTD.	PBCFHD-354	External HDD Enclosure (EUT)	PC
GX240	DELL Computer Corp.	DOC	PC	-
SK-8110	Silitek	DOC	Keyboard	PC
X06-08477	MICROSOFT CORP.	DOC	Mouse	PC
2225C	HP	DSI6XU2225	Printer	PC
020-0470	Cardinal	GDE0196	Modem	PC
D540X-4K	Maxtor	DOC	HDD	EUT
E551	DELL Computer Corp.	DOC	Monitor	PC

2.4 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4/2002. Radiated testing was performed at a distance of 3 meters from EUT to the antenna.

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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 18, 2002. (Registration Number: 92819)

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	SAROTECH CO., LTD.	FHD-353UF2 (PL) Rev 1.2	N/A
HDD	Maxtor	D540X-4K	N/A
Power B'D(1)	Seyang Electronic	SY0084	N/A
Power B'D(2)	A Storage Limited	AST353	N/A

3.2 EUT exercise Software

-. After connecting the EUT to a personal computer using USB or IEEE1394 cable, data were continuously read and written from the HDD of the personal computer to the EUT.

The test was performed about each operation mode, USB and IEEE1394 for getting maximum noise level, but worst emission levels were recorded in this test report. Also the EUT has 2 kinds of power supply, so the test was performed at each power.

3.3 Cable Description

	Power Cord Shielded (Y/N)	I/O cable Shielded (Y/N)	Length (M)
External HDD Enclosure (EUT)	N/A	N/A	1.8(P), 1.2(D)
PC	N	-	1.8 (P)
Keyboard	N/A	N	1.0 (D)
Mouse	N/A	N	1.2 (D)
Printer	N	Y	1.8 (P), 1.5 (D)
Modem	N	Y	1.8 (P), 1.5 (D)
Monitor	N	Y	1.8 (P), 1.0 (D)

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

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3.4 Noise Suppression Parts on Cable

	Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
External HDD Enclosure (EUT)	N	N/A	Y	BOTH END
PC	N	N/A	-	-
Keyboard	N	N/A	Y	PC END
Mouse	N	N/A	Y	PC END
Printer	N	N/A	Y	BOTH END
Modem	N	N/A	Y	BOTH END
Monitor	Y	PC END	Y	PC END

3.5 Equipment Modifications

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

"Not Applicable"

3.6 Configuration of Test System

Line Conducted Test : The EUT was connected to USB port of PC and the power line of the EUT was connected to LISN. All supporting equipments were connected to another LISN. Using the procedure in ANSI C63.4/2001 7.2.3 to determine the worse operating conditions performed preliminary Power line Conducted Emission test.

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 was conducted at 3 meters open area test site.

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4. PRELIMINARY TEST

4.1 AC Power line Conducted Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	Used Power Supply	The Worse operating condition (Please check one only)
Data were continuously read and written via USB port	Seyang Electronics Model: SY0084	X
Data were continuously read and written via IEEE 1394 port	A Storage Limited Model: AST353	-
Data were continuously read and written via USB port	Seyang Electronics Model: SY0084	X
Data were continuously read and written via IEEE 1394 port	A Storage Limited Model: AST353	-

4.2 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated

Operation Mode	Used Power Supply	The Worse operating condition (Please check one only)
Data were continuously read and written via USB port		X
Data were continuously read and written via IEEE 1394 port		-
Data were continuously read and written via USB port		X
Data were continuously read and written via IEEE 1394 port		-

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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 : 50 % Temperature: 19 °C

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

Type of Test : CLASS B

Result : PASSED BY –4.47 dB at 0.18 MHz with Average mode

EUT : External HDD Enclosure Date: March 9, 2004

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

Used Power Supply : Seyang Electronics, Model: SY0084

Operating Condition : Data were continuously read and written via USB port between a PC and the EUT.

Frequency (MHz)	Line	Quasi-Peak (dBuV)			Margin (dB)	Average (dBuV)		Margin (dB)
		Emission Level	Detector Mode	Limits		Emission level	Limits	
0.18	H	55.73	P	64.26	-8.53	49.79	54.26	-4.47
0.21	H	53.39	P	63.01	-9.62	42.56	53.01	-10.45
0.63	H	48.88	P	56.00	-7.12	29.70	46.00	-16.30
0.86	H	51.24	P	56.00	-4.76	30.93	46.00	-15.07
1.04	N	48.41	P	56.00	-7.59	36.62	46.00	-9.38
2.10	N	47.34	P	56.00	-8.66	31.71	46.00	-14.29
8.65	N	41.68	P	56.00	-18.32	32.30	50.00	-17.70

Line Conducted Emission Tabulated Data

Remark : "H": Hot Line, "N": Neutral line, "P": Peak detector

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

Tested by: Gi-Hong, Nam / Test Engineer

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5.2 Conducted Emission Test

Humidity Level : 50 % Temperature: 19 °C

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

Type of Test : CLASS B

Result : PASSED BY –3.66 dB at 0.16 MHz with Peak mode

EUT : External HDD Enclosure Date: March 9, 2004

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

Used Power Supply : A Storage Limited, Model: AST353

Operating Condition : Data were continuously read and written via USB port between PC and the EUT.

Frequency (MHz)	Line	Quasi-Peak (dBuV)			Margin (dB)	Average (dBuV)		Margin (dB)
		Emission Level	Detector Mode	Limits		Emission level	Limits	
0.16	H	61.55	P	65.21	-3.66	48.71	55.21	-6.50
0.22	H	52.90	P	65.20	-9.92	38.61	55.20	-14.21
3.18	H	36.22	P	56.00	-19.78	18.53	46.00	-27.47
5.56	N	41.22	P	60.00	-18.78	19.36	50.00	-30.64
9.33	N	40.57	P	60.00	-19.43	22.34	50.00	-27.66
24.00	H	35.45	P	60.00	-24.55	33.37	50.00	-16.63

Line Conducted Emission Tabulated Data

Remark : "H": Hot Line, "N": Neutral line, "P": Peak detect

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

남기홍

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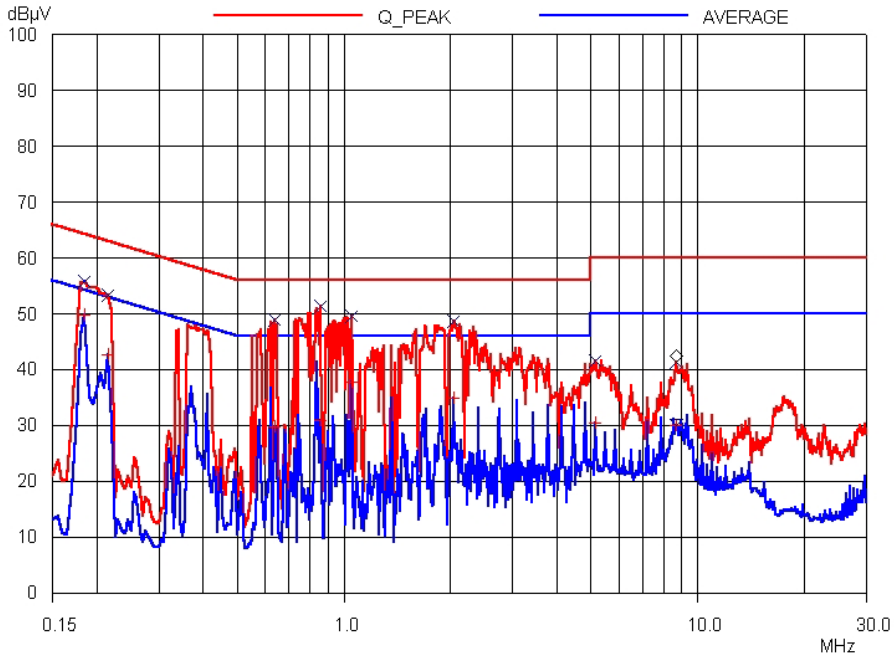
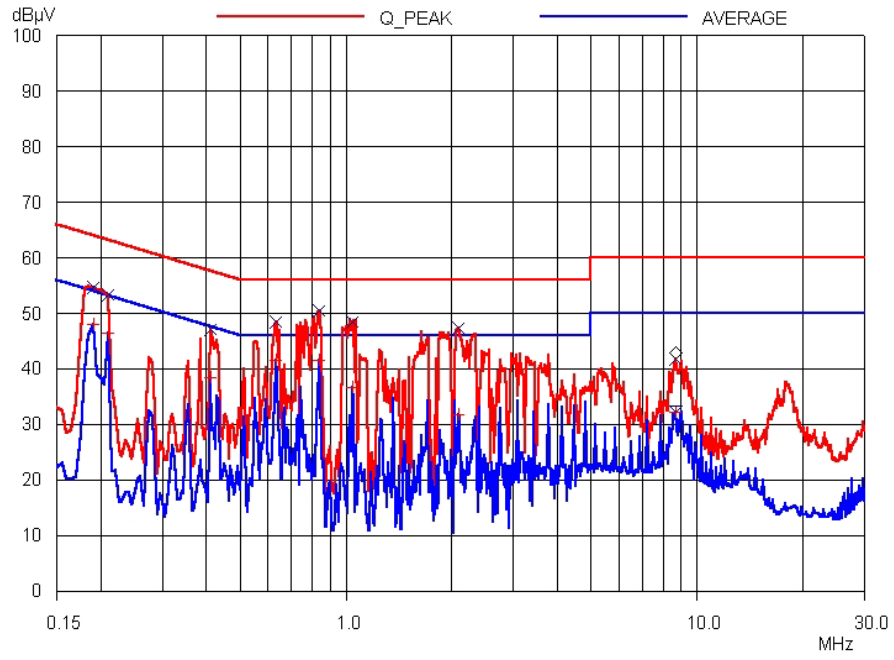
Test data for Seyang Electronics, Model: SY0084



HOT LINE



NEUTRAL LINE

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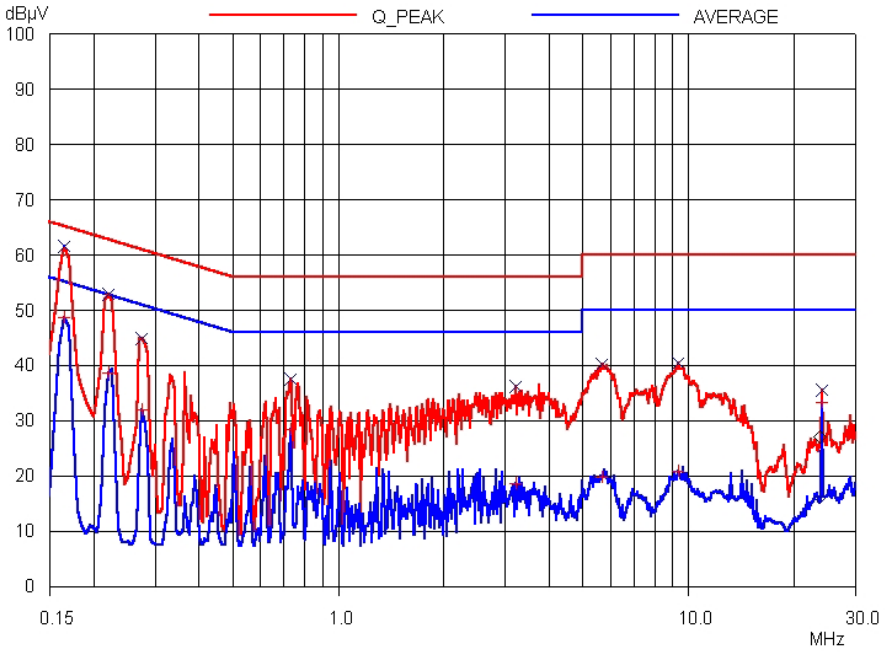
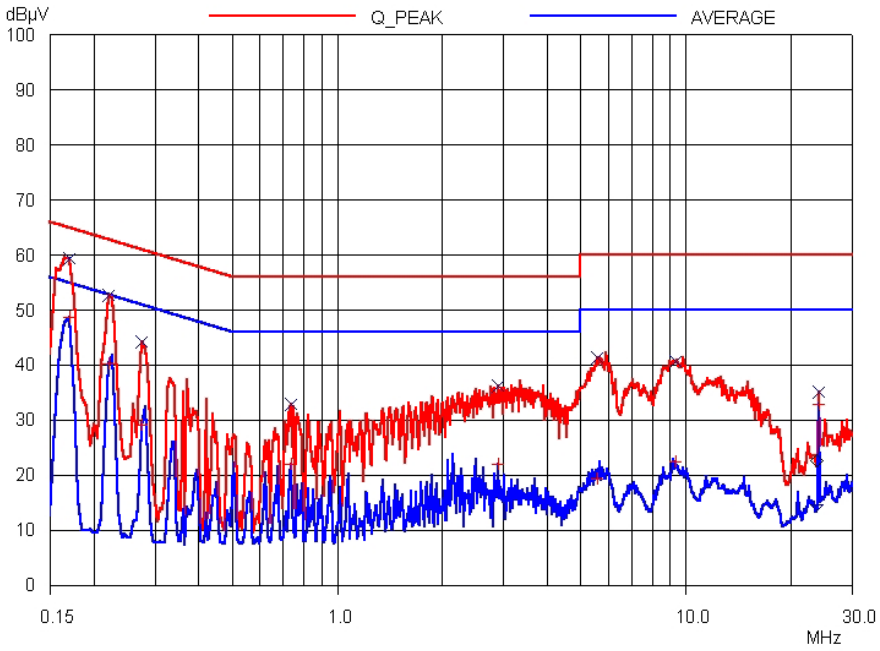
Test data for A Storage Limited, Model: AST353



HOT LINE



NEUTRAL LINE

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5.3 Radiated Emission Test

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

Humidity Level : 50 % Temperature: 19 °C

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

Type of Test : CLASS B

Result : PASSED BY -4.46 dB at 480.00 MHz

EUT : External HDD Enclosure Date: March 3, 2004

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

Distance : 3 Meter

Used Power Supply : Seyang Electronics, Model: SY0084

Operating Condition : Data were continuously read and written via USB port between PC and the EUT.

Frequency (MHz)	Reading (dBuV)	Detect Mode	Ant. Pol. (H/V)	Ant. Factor(dB/m)	Cable Loss	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
50.60	21.30	P	V	11.21	1.20	33.71	40.00	-6.29
80.28	23.90	P	V	6.67	1.41	31.98	40.00	-8.02
137.09	19.20	P	V	12.55	2.00	33.75	40.00	-6.25
150.00	15.13	P	V	14.07	2.00	31.20	40.00	-8.80
180.00	15.21	P	V	16.38	2.40	33.99	40.00	-6.01
480.00	21.20	P	H	17.24	4.10	42.54	47.00	-4.46
720.00	14.54	P	H	21.12	5.26	40.92	47.00	-6.08
797.40	14.21	P	V	21.46	5.59	41.26	47.00	-5.74

Tested by: Gi-Hong, Nam / Test Engineer

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5.4 Radiated Emission Test

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

Humidity Level : 50 % Temperature: 19 °C

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

Type of Test : CLASS B

Result : PASSED BY -5.30 dB at 449.90 MHz

EUT : External HDD Enclosure Date: March 3, 2003

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

Distance : 3 Meter

Used Power Supply : A Storage Limited, Model: AST353

Operating Condition : Data were continuously read and written via USB port between PC and the EUT.

Frequency (MHz)	Reading (dBuV)	Detect Mode	Ant. Pol. (H/V)	Ant. Factor(dB/m)	Cable Loss	Emission Level(dBuV/m)	Limits (dBuV/m)	Margin (dB)
50.00	20.10	P	V	11.31	1.20	32.61	40.00	-7.39
81.00	24.00	P	V	6.81	1.44	32.25	40.00	-7.75
150.00	17.30	P	V	14.07	2.00	33.37	40.00	-6.63
180.00	15.10	P	V	16.38	2.40	33.88	40.00	-6.12
221.40	21.00	P	H	10.94	2.66	34.60	40.00	-5.40
360.00	20.10	P	H	14.52	3.42	38.04	47.00	-8.96
420.00	18.40	P	H	15.64	3.88	37.92	47.00	-9.08
449.90	21.30	P	H	16.30	4.10	41.70	47.00	-5.30

Radiated Emissions Tabulated Data

Tested by: Gi-Hong, Nam / Test 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/03	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.	Dipole Antenna	EMCO	3121C	9107-745	JUN/03	12MONTH	
7.	Biconical antenna	EMCO	3104C	9109-4441 9109-4443 9109-4444	APR/03	12MONTH	■
8.	Log Periodic antenna	EMCO	3146	9109-3213 9109-3214 9109-3217	APR/03	12MONTH	■
9.	LISN	EMCO	3825/2	9109-1867 9109-1869	AUG/03	12MONTH	
10.	Position Controller	EMCO	1090	9107-1038	N/A	N/A	■
11.	Turn Table	EMCO	1080-1.21	9109-1576	N/A	N/A	■
12.	Antenna Master	EMCO	1070-1	9109-1624	N/A	N/A	■

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