

EMI TEST REPORT

According to FCC Part 15 Subpart B/Class B

Product : Notebook PC

Model No. : 200STM

FCC ID : A3LSQ10

1. This test reports shall not be reproduced except in full, without the written approval of SEC EMC Testing laboratory.
2. This test reports does not constitute an endorsement by NIST/NVLAP or U.S Government.
3. This test report is to certify that the tested device properly complies with the requirements of FCC Rules and Regulations Part 15 Subpart B Unintentional Radiators.
All tests necessary to show compliance to the requirements were and these results met the specifications requirement.

Date of test : December 11, 2001 ~ December 12, 2001

Issued Date : December 13, 2001

Tested by:

C. K. Park
Chun Kyu, PARK / Test Engineer

Reviewed by:

S. K. cha
Seung Kyu, CHA / Manager of EMC Lab

Authorised by:

K. B. Chung
Kyu Baek, CHUNG / Chief of EMC Lab.

This laboratory is registered by the NIST/NVLAP, U.S.A.
The test reported herein have been performed in accordance with its terms of registration.



NVLAP Code: 200447

Table of Contents

1. General Information

- 1.1 Product Description
- 1.2 Configuration of EUT and peripherals
- 1.3 Used Cable Description
- 1.4 System Block Diagram of Test Configuration
- 1.5 Test Facility

2. System Test Configuration

- 2.1 Configuration of Radiated and Conducted Interference Measurement
- 2.2 Operation Environment
- 2.3 Test Procedure

3. Conducted Emission Test Data

4. Radiated Emission Test Data

5. Label Configuration and Location

6. Test Equipment Used

Distribution

This test report has been made available as follows:

CS Management Center, EMC Laboratory	1 original
Computer Division	1 copy

1. General Information

Applicant : Samsung Electronics Co., Ltd.
CS Management Center EMC Test Laboratory
Tel.: +81-(0)31-200-2135 Fax.: +81-(0)31-200-2189

Full Address : 416 Maetan 3 Dong, Paldal-Ku,
Suwon City, Kyungki Do, Korea, 442-742

Kind of Product : **Notebook PC**

FCC ID : **A3LSQ10**

Project Name : **Storm**

Model & Variant Names : **200STM** (Brand Name: Gateway)
Gateway 200 (Brand Name: Gateway)
SQ10 (Brand Name: SAMSUNG)

Test Report Produced by : Chun Kyu, PARK / Test Eng.

1.1 Product Description

1) Justification

The system was configured for testing in typical fashion use. Cable were attached to each of the available I/O Ports. Where applicable, peripherals were attached to the I/O cables. The mode of operation utilized for testing was selected to best simulate typical EUT use.

The system was pre-tested using the below additional components, and we found worst emission level for the components, were selected as the final components for the test.

Component	Brand and Model Name	Remark
FDD	- Samsung, SFD-321S/PC5	Worst case
CD-ROM	- Samsung, SN-124Q.	
CD-RW	- Toshiba, SR-C8002, 5502159	Worst case
DVD	- Toshiba, SD-C2502, 5502157	
DVD_CDRW_Combo	- Toshiba, SD-R2102, 5502160	
CD-ROM(IEEE1394)	- Samsung, SN-124Q.	
CD-RW(IEEE1394)	- Toshiba, SR-C8002, 5502159	
DVD(IEEE1394)	- Toshiba, SD-C2502, 5502157	
DVD_CDRW_Combo (IEEE1394)	- Toshiba, SD-R2102, 5502160	Worst case
Slice Dock	- Samsung, MD-200	Worst case

And then the system was tested with the configuration of (A), (B) below

(A) CPU PIII LV 866MHz, LCD 12.1"

(B) CPU PIII LV 733MHz, LCD 12.1"

In each test mode, Finally we found worst case emission that is above (A) configuration with the Worst case components(in the above table). So, the DATA of the maximum(worst case) EUT operation was reported.

2) Operating Frequency :

866MHz(CPU CORE CLOCK), 165MHz(DV01_CLK), 133MHz(HOST CLOCK)
66MHz(GB CLOCK), 48MHz(DREF CLK), 65MHz(LCD CLOCK), 33MHz(PCI CLOCK)
133MHz(MEMORY CLOCK), 14.318(REF CLOCK), 25MHz(LOM LO)
24.576MHz(R5C511 LO), 14.318MHz(REF LO), 42.152MHz(ESS1988 LO)

3) Description of Testing operating mode

Operating Mode	Operating section of EUT
"H" Pattern display & Read / Write	LCD Screen
	Ext. CRT Monitor
	Hard disk drive(drive C), CD-RW(drive D)
	Floppy disk drive(drive A)
	Network (drive N)
	Flash Memory(drive P)
	COM2 to Internal Modem COM4 to Speedup USB Modem LPT1 to Printer
File Reading & Audio Output	Audio out to Speaker, digital speaker DVD(drive E) Play out to speaker and digital speaker

4) Tested Resolution :

Tested Video mode	Resolutions	Refresh rates	Colors
LCD(12.1")	1024 X 768	60Hz	32bits
Ext. Monitor	1024 X 768	85Hz	32bits

5) Assemble Parts

Item	Specification	Remark
CPU	Intel Pentium III LV 866 MHz uFCPGA2, Cache 512KB	Intel Mobile PentiumIII LV 866Mhz 495 pin, BGA2
Main Chipset (RAM)	Intel 830M -133 MHz CPU/Memory Bus -128MB On Board/ Maximum 640MB With 1 SODIMM Slot	Intel 82830M
Graphic Controller	Intel, Integrated In the 830M 8MB Video Buffer (UMA), DVMT	Intel 82830M-GMCH-M
Video Display	Samsung, LTN121XF-L01 12.1" XGA TFT LCD	SN : 2BI9081602
FDD	Samsung, SFD-321S/PC5	SN :D1BM2003974
HDD	Toshiba, 30GB, MK3017GAP(ATA100)	
Swap Device	Toshiba, CD-RW, SR-C8002, 8/8/24X	
Cardbus & IEEE1394 Cont.	Ricoh R5C551 CSP 208pin, 1 CardBus, 2 IEEE1394 Port	
Network	3Com, 920-STT06 Agere Mini-PCI WLAN Card	
Communication Device	PCTEL, SENS PT56ADW MDC modem Speedup USB modem	Samsung SQ10 only (CDMA 2000 1X)
External Device (IEEE1394)	-Toshiba, SD-R2102 DVD/RW Combo drive	SN :1X6T102202
AC Adapter	Samsung, 42W , AD-4212B, 100V~240V Free Voltage	50Hz/60Hz
Battery	Toshiba, Removable 8-cell Li-Ion Smart, 26W	
Slice dock	IEEE1394 Signal for IDE Slot on Slice Dock -Fully Support Hot Dock/Undock -Left Bay: CD-ROM, DVD-ROM, CD-R/W, Combo Drive, 2nd HDD -Right Bay: FDD -Ports : SIO, PIO, 2 USB, PS/2, NETWORK, DC IN, SPDIF, IEEE1394, CRT	MD-200

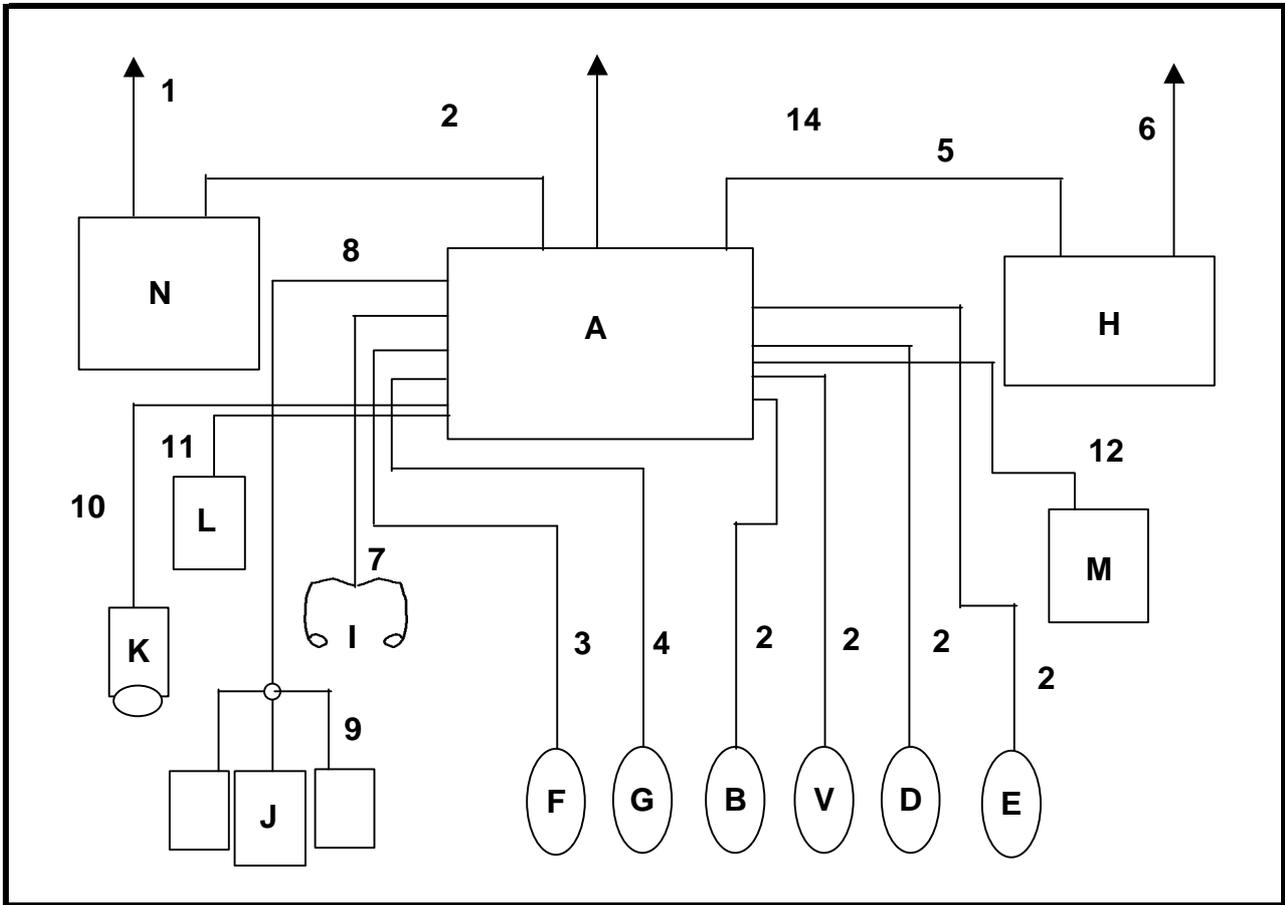
1.2 Configuration of EUT and peripherals

Mark	Item	Model No.	Serial No.	Manufacturer	FCC ID
A	Notebook PC	200STM	-	Samsung	A3LSQ10
B	USB Mouse	M-U48a	LZP12500067	LOGITECH	JNZ211360
C	USB Mouse	M-U48a	LZK13405696	LOGITECH	JNZ211360
D	USB Mouse	M-U48a	LZE94654030	LOGITECH	JNZ211360
E	USB Mouse	M-U48a	LZO10703970	LOGITECH	JNZ211360
F	PS/2 Mouse	NICHE Mouse	-	KYE SYSTEMS	DOC
G	Searial Mouse	M-M35	LZA71155447	LOGITECH	DOC
H	Printer	LQ-580H	CG2Y014508	EPSON	DOC
I	Earphone	-	-	-	-
J	Digital Speaker	BA735	-	Boston	-
K	Digital Camcorder	DCR-PC110	1091827	Sony	-
L	DVD-ROM	-	-	Samsung	-
M	Telephone	SSP-2300	-	Samsung	-
N	Monitor	TFT7010	BN68-0005721-00	-	DOC

1.3 Used Cable Description

No.	Item	Length[m]	Shielded (Y/N)	Remark
1	Power cable for EUT	3.52	N	
2	USB Mouse cable	1.5	N	
3	PS/2 Mouse cable	1.8	N	
4	Serial Mouse	1.82	N	
5	Printer cable	1.6	Y	
6	Power cable for printer	1.85	N	
7	Headphone cable	2	N	
8	Digital speaker cable 1	2.35	N	
9	Digital speaker cable 2	2.5	N	
10	Digital camcorder cable	1.8	N	
11	DVD-ROM cable	1.6	N	
12	Telephone cable	1.9	N	
13	Monitor cable	1.85	Y	
14	Power cable for monitor	1.82	N	

1.4 System Block Diagram of Test Configuration



1.5 Test Facility

All test described in this report were performed by :
SAMSUNG ELECTRONICS CO., LTD.
EMC TESTING LABORATORY
416 Maetan 3 Dong, Paldal-Ku, Suwon City, Kyungki Do, Korea, 442-742
Semi Anechoic Chamber #1(Registration Number:98856) and Shielded Room.

This test facility has been filed in FCC under the criteria in ANSI C63.4-1992.

2. System Test Configuration

2.1 Configuration of Radiated and Conducted Interference Measurement

* Cabling was taken into consideration and test data was taken under worst case conditions.

1)Conduction(Front View)



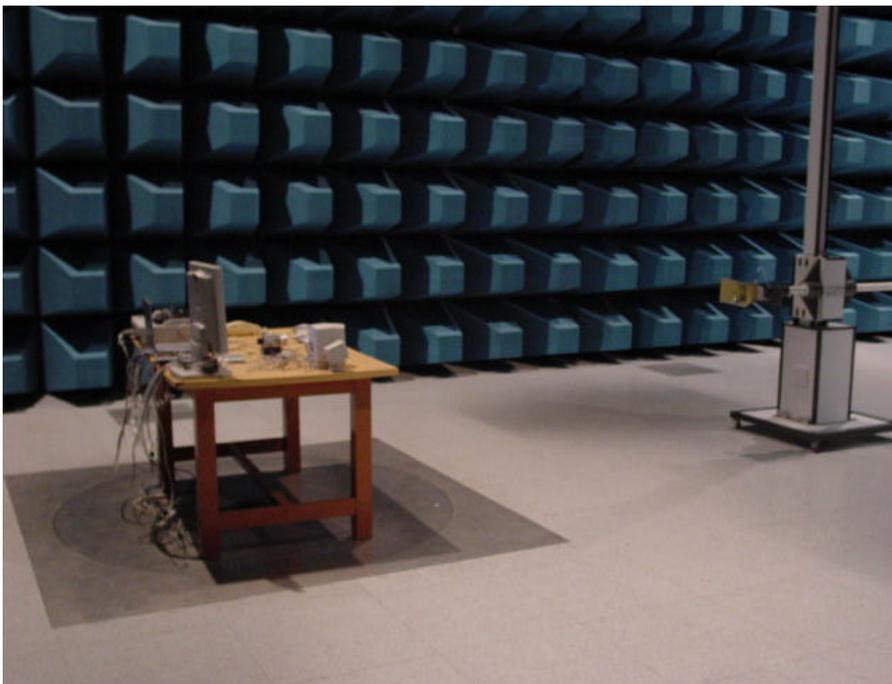
2)Conduction(Rear View)



3) Radiation(Front View)



4) Radiation(Rear View)



2.2 Operation Enviroment

	Conduction	Radiation
Temperature [C] :	23	23
Humidity [%] :	63	63
Power supply	: AC120V/60Hz	AC120V/60Hz

2.3 Test Procedure

2.3.1 Conducted Emissions

Eut was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane. The rear of tabletop was located 40cm to the vertical conducting ground plane.

The rear of EUT, including peripherals was aligned and flush with rear of tabletop. All other surfaces of tabletop was at least 80cm from any other grounded conducting surface. I/O cables and AC cables that were connected to the peripherals were bundled in center. They were folded back and forth forming a bundle 30cm to 40cm long and were hanged at a 40cm height to the ground plane.

Each EUT current-carrying power lead, except the ground(safety) lead, were individually connected through a LISN to the input power source.

All unused 50 ohm connectors of the LISN were resistively terminated in 50 ohm when not connected to the measuring equipment.

The EUT was switched on and allowed to warm up to its normal operating condition. A quick scan, from 150kHz to 30MHz, was made on the L1 & L2 line by LISN. High peaks, relative to the limit line, over the frequency range were then selected. The EMI TEST RECEIVER was then tuned to the selected frequencies. CISPR quasi-peak measurements with a receiver bandwidth setting of 9kHz, were taken.

2.3.2 Radiated Emissions

Eut was placed on a platform of nominal size, 1m by 1.5m, raised 80cm above the conducting ground plane.

The rear of EUT, including peripherals was aligned and flush with rear of tabletop. I/O cables that were connected to the peripherals were bundle in center.

They were folded back and forth forming a bundle 30cm to 40cm long and were hanged 40cm height to the ground plane.

The system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 2000 MHz using biconiLog antenna. Also, the EMI TEST RECEIVER was scanned from 1000 to 18000MHz using linearly polarized double ridge horn antennas were used.

Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and/or support equipment; powering the monitor from the floor mounted outlet box and the computer aux AC outlet if applicable, and changing the polarity of the antenna; whichever determined the worst-case emission.

The explanation of measuring instrument setup when respective function is used in any frequency band is as following:

Frequency Band [MHz]	Instrument	Detector fuction	resolution Bandwidth	Video Bandwidth
30 to 1000	Spectrum analyzer	Peak	1MHz	1MHz
	EMI Test receiver	Quasi-Peak	120kHz	-
Above 1000	EMI Test receiver	Average	1MHz	-

3. Conducted Emission Test Data

+ Test Data Sheet

Frequency [MHz]	Meter reading (a)		Total Loss (b) [dB]	Results (a) + (b)		Limits		Margin (Limits-Result)	
	QP	AV		QP	AV	QP	AV	QP	AV
	[dBuV]			[dBuV]		[dBuV]		[dB]	
0.185	49.2	40.6	0.1	49.3	40.7	64.3	54.3	15.0	13.6
0.192	47.0	29.0	0.1	47.1	29.1	63.9	53.9	16.9	24.9
0.248	46.8	39.2	0.1	46.9	39.3	61.8	51.8	14.9	12.5
0.304	40.0	35.8	0.1	40.1	35.9	60.1	50.1	20.0	14.2
0.367	36.3	32.9	0.1	36.4	33.0	58.6	48.6	22.2	15.6
0.493	31.1	27.9	0.2	31.3	28.1	56.1	46.1	24.8	18.0
0.556	29.0	26.4	0.2	29.2	26.6	56.0	46.0	26.8	19.4
0.675	26.7	23.3	0.2	26.9	23.5	56.0	46.0	29.1	22.5
1.844	31.5	27.1	0.1	31.6	27.2	56.0	46.0	24.4	18.8
2.831	40.1	36.3	0.1	40.2	36.4	56.0	46.0	15.8	9.6
3.454	40.4	20.5	0.1	40.5	20.6	56.0	46.0	15.5	25.4
4.126	41.7	33.3	0.1	41.8	33.4	56.0	46.0	14.2	12.6
5.421	45.4	37.0	0.1	45.5	37.1	60.0	50.0	14.5	12.9
8.571	41.2	26.9	0.1	41.3	27.0	60.0	50.0	18.7	23.0
10.601	41.4	32.9	0.4	41.8	33.3	60.0	50.0	18.2	16.7
14.108	39.9	33.4	0.8	40.7	34.2	60.0	50.0	19.3	15.8
19.218	41.5	35.9	1.5	43.0	37.4	60.0	50.0	17.0	12.6
24.300	29.7	24.2	1.0	30.7	25.2	60.0	50.0	29.3	24.8

* Results = Meter Reading(QP) + Total Loss(LISN Insertion loss + Cable loss)

* Measurement detector function and bandwidth

Detector function : CISPR quasi-peak

Bandwidth : 9kHz

4. Radiated Emission Test Data

Frequency Range [MHz]	Tested Frequency [MHz]	ANT Pol.	Meter Reading [A] [dBuV/m]	Total Loss [B] [dB]	Antenna Height [Cm]	Turn table Degree [Deg]	Results [A+B] [dBuV/m]	Limits at 10m [dBuV/m]	Margin (Limit-Result) [dB]
30 - 230	41.80	V	11.3	13.2	116	48	24.5	30.0	5.5
	59.94	V	14.9	7.0	200	45	21.9		8.1
	80.80	V	10.6	9.1	400	162	19.7		10.3
	101.40	V	12.6	12.9	112	347	25.5		4.5
	191.20	V	14.8	11.5	300	100	26.3		3.7
	222.30	H	10.7	12.3	400	214	23.0		7.0
230 - 1000	232.60	V	14.9	13.4	100	30	28.3	37.0	8.7
	278.60	H	15.1	15.8	108	50	30.9		6.1
	300.10	H	13.7	16.5	206	220	30.2		6.8
	310.60	H	13.3	16.9	200	180	30.2		6.8
	590.50	H	6.1	23.8	185	110	29.9		7.1
	741.00	V	4.8	25.6	150	180	30.4		6.6

Frequency Range [MHz]	Tested Frequency [MHz]	ANT Pol.	Meter Reading [A] [dBuV/m]	Total Loss [B] [dB]	Antenna Height [Cm]	Turn table Degree [Deg]	Results [A+B] [dBuV/m]	Limits at 3m [dBuV/m]	Margin (Limit-Result) [dB]
1000 ~ 5000	1520	H	9.80	29.61	150	70	39.41	54.00	14.59
	2046	H	7.32	32.30	110	60	39.62	54.00	14.38
	3601	H	9.00	41.20	120	65	50.20	54.00	3.80
	4290	H	6.28	43.20	117	57	49.48	54.00	4.52
	1190	V	11.92	20.10	115	55	32.02	54.00	21.98
	1240	V	9.15	18.45	113	54	27.60	54.00	26.40

* "<" Means equal or less then 5dB

* Receiving Antenna Mode : **Horizontal, Vertical**

* Results = Meter Reading + Total Loss(Antenna factor + Cable loss)

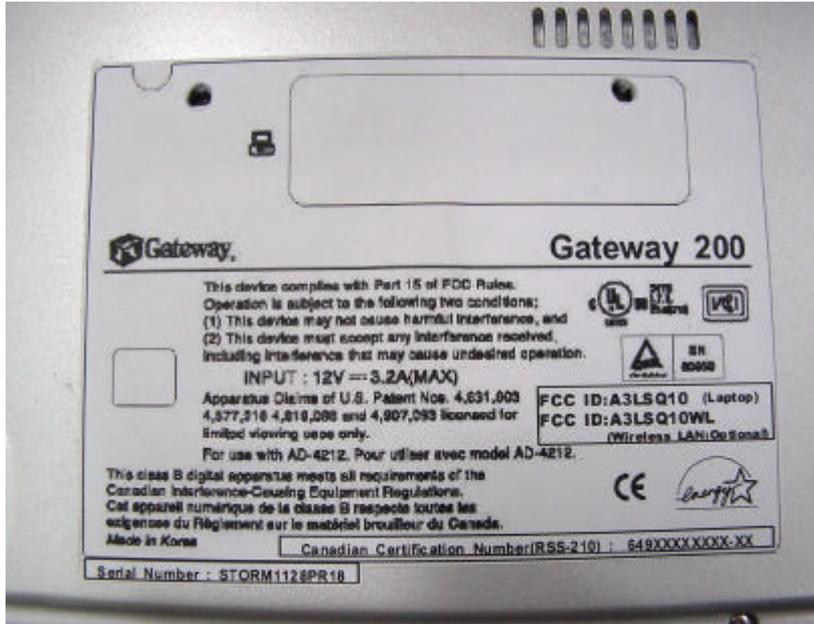
* Measurement detector function and bandwidth

Detector function : CISPR quasi-peak(Above 1000MHz: Average)

Resolution Bandwidth : 120kHz(Above 1000MHz: 1MHz)

5. FCC Label Configuration and Location

5.1 Label Configuration



5.2 Location of Label



6. Test Equipment Used

Equipment	Model No.	Serial No.	Makers	Calibration Last calibration and Interval
Spectrum analyzer	8566B	3340A21744	H.P	01/ 03/ 20, 12Months
	Firmware versions : Rev.29.9.86			
Quasi-peak adapter	85650A	2521A00687	H.P	01/ 10/ 10, 12Months
RF Preselector	85685A	2602A00224	H.P	01/ 10/ 10, 12Months
Field strength meter	ESCS30	839809/022	R & S	01/ 06/ 18, 12Months
	Firmware versions : Main 1.08, OTP 02.01, GRA 02.03			
Field strength meter	ESI 26	832692/002	R & S	01/ 06/ 18, 12Months
	Firmware versions : BIOS 3.3, Analyzer 2.09.2			
L.I.S.N	3825-2	9208-1981	EMCO	01/ 03/ 23, 12Months
Double Ridged Guide Antenna	3115	9505-4441	EMCO	01/ 06/ 03, 12Months
Bi-Log Antenna	CBL6112B	2767	SCHAFFNER	01/ 01/ 02, 12Months