

EMI TEST REPORT

According to FCC Part 15 Subpart B/Class B

Product : Notebook PC

Model No. : X05

FCC ID : A3LSX10

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All tests necessary to show compliance to the requirements were and these results met the specifications requirement.

Date of test : February 6, 2003 ~ February 7, 2003`

Issued Date : March 13, 2003

Tested by:

Jong Ho, LEE / Test Engineer

Reviewed by:

No Cheon, PARK / Manager of EMC Lab.

Authorized by:

Kyu Baek, CHUNG / Chief of EMC Lab.

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NVLAP Code: 200447

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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.

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

Kind of Product : **Notebook PC**

FCC ID : **A3LSX10**

Project Name : **Aquula, Aquila-C
Arcade**

Model & Variant Names : **X05, X10** (Brand Name: Samsung)
SX05, SX10 (Brand Name: Samsung)
200ARC (Brand Name: Gateway)

Test Report Produced by : Jong Ho, LEE / Test Engineer

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
CD-ROM Drive	Samsung, SN-124P	
CD-RW	Teac, CD-W224E	
DVD-ROM	Teac, DV-28EB	
DVD-ROM	Toshiba, SD-C2612	
CD-RW Combo	Samsung, SN-324B/MMC	Worst Case
CD-RW Combo	Toshiba, SD-R2312	

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

(A) Banias CPU 1600MHz with Samsung chassis

(B) Banias CPU 1600MHz with Gateway chassis

This report is for above (A) configuration with the worst case component.

So the data of the maximum EUT operation was reported.

Further details of cabling and configuration are shown in the test system configuration.

2) Operating Frequency :

1600MHz(CPU speed), 100MHz(CPU clock), 66MHz for the MCH, AGP, 33MHz for all PCI clocks,
48 MHz for ICH4-M, 32.768 kHz XTAL for ICH4-M real time clock
14.318MHz, 24.576MHz XTAL for STA9752 Audio Codec. 25MHz XTAL for 82562EZ LAN Controller.
24.576MHz XTAL for R5C593 1394/PCMCIA/Memory stick Controller
10MHz XTAL for MICOM

3) Description of Testing operating mode

Operating Mode	Operating section of EUT
EMI Excerciser Version 3.10	LCD Screen
	external Monitor
	television(S-VHS)
	floppy disk drive a:
	hard disk drive c:
	network map drive z:
	memory stick e:
	CD Reading(Internal)
	CD Reading(USB CDRW)
	LPT 1
Hyperterminal	H's pattern trasnfer from remote computer

4) Tested Resolution :

Tested Video mode	Resolutions	Refresh rates	Colors
LCD(14.1")	1024 X 768	60Hz	32bits
Ext. Monitor	1024 X 768	60Hz	32bits
TV Monitor	1024 X 768	60Hz	32bits

6) Assemble Parts

Item	Specification	Remark
CPU	Intel Banias CPU 1600MHz 479pin uFCBGA 400 MHz system bus On-die 1MB L2 cache	
Main Memory	Samsung, M470L3224BT0-CB0 direct DDR channel 64bit 256 MB memory	Samsung & Infinition Max 2GB
Graphic Contoller	Intel Montara-GM UMA solution Supports 4x AGP, CRT, S-VHS TV Port(CH7011A)	
Flat Panel Dispay	SEC. 14.1", LTN141XJ-L01 Upto 1024x768 Pixels; 18-bit 262k colors	
HDD	IBM, IC25N030ATCS04-0, 30GB, 2.5"	
PCMCIA	Samsung, SCF-48M, 48MB	SN : CEB201ASM9947
ODD Drive	Samsung, SN-324B/MMC, DVD-CDRW Combo CD 24X, DVD 8X, CDRW 4X Speed	
AC Adapter	SEC, AD-6019A, 60-Watts, 2 pin	
MODEM	SEC, SFM-3200LW, 56KBPS	
LAN	Integrated PHY 10BASE-T, 100BASE-TX , LOM(82562EZ)	
Wireless LAN	Intel, Callexico 802.11b, WM3B2100, 11MBPS	FCC ID:PD9WM3B2100
Input Devices	Keyboard, 19mm pitch, 2.4mmH travel length Pointing Device, PS/2 Touchpad w/ 2 button, 1 wheel	
Memory Stick	Sony, MSA-32A(32MB) for X05	
Battery	SEC, SSB-X10LS6, Removable 6-cell Li-Ion	
Ports	2 USB, PS/2, RJ-11, RJ-45, DC IN,EXT. MONITOR, S-VHS TV-out,MIC-IN,HEADPHONE-OUT, SPDIF, Card bus slot. USB Docking, Etc	

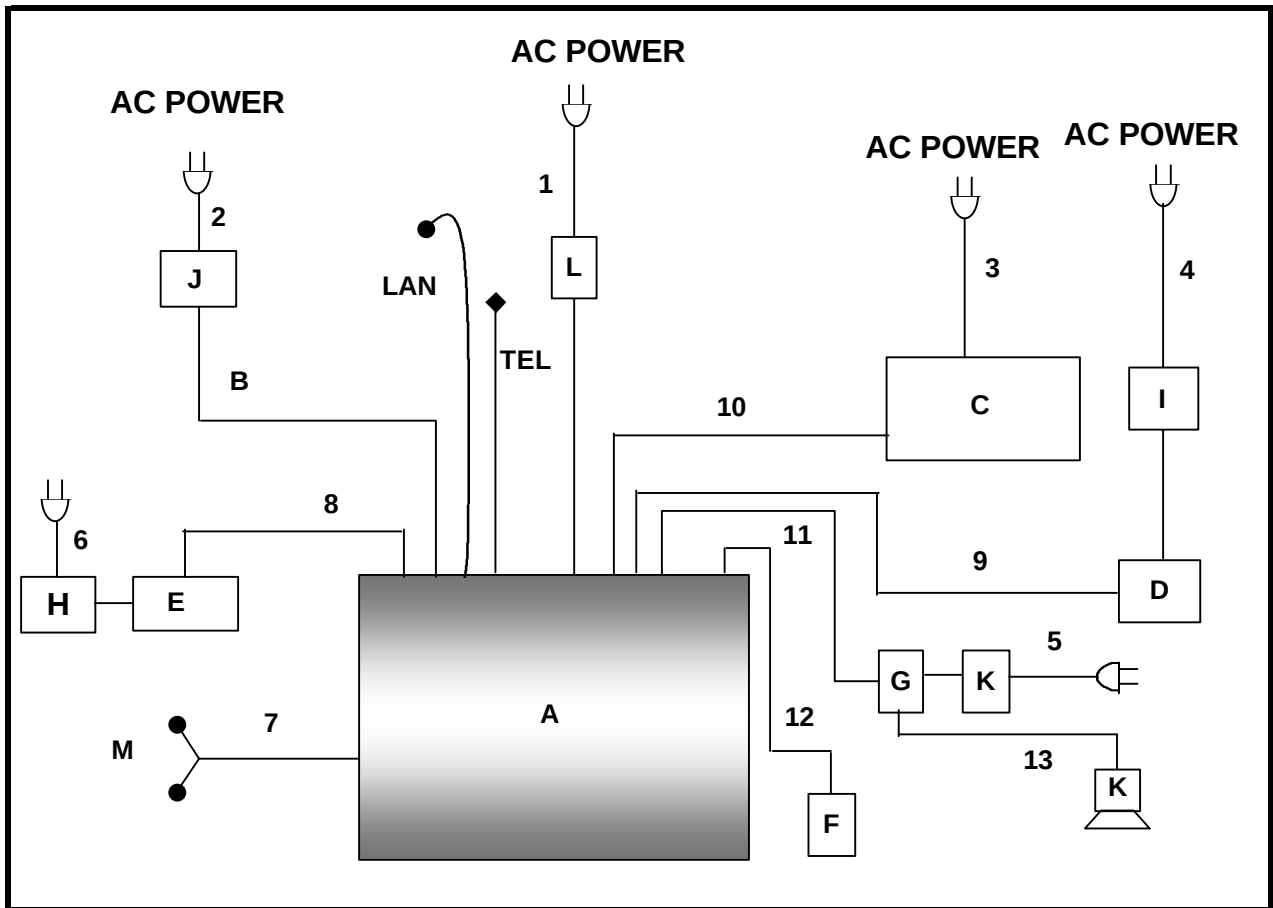
1.2 Configuration of EUT and peripherals

Mark	Item	Model No.	Serial No.	Manufacturer	FCC ID
A	Notebook PC	200ARC	-	SAMSUNG	A3LSX10
B	Monitor	M17D-AN	N106H4JT100839	SAMSUNG	DOC
C	TV	TM-2100PN	8604011	JVC	-
D	External HDD	SEV08UP	HV08J1AT600477	SAMSUNG	DOC
E	External HDD	SEV08UP	HV08J1AT600351	SAMSUNG	DOC
F	USB Mouse	M-U48a	LZE010703970	Logitech	JNZ211360
G	Optical Speaker	CSW2020	SM20202041003323	CAMBRIDGE	-
H	Adapter	PSCV360104A	C020381562B	SAMSUNG	For HDD
I	Adapter	PSCV360104A	C020381934B	SAMSUNG	For HDD
J	Adapter	AD-4214N	C011108523	SAMSUNG	For Monitor
K	Adapter	KD-1540	AD20000001290	CREATIVE	For Speaker
L	Adapter	AD-6019A	CNBA4400123ASE382CD0418	SAMSUNG	For EUT
M	Earphone	-	-	-	

1.3 Used Cable Description

No.	Item	Length[m]	Shielded (Y/N)	Remark
1	AC Power Cable	1.5	N	PC
2	AC Power Cable	1.5	N	Monitor
3	AC Power Cable	1.5	N	TV
4	AC Power Cable	1.5	N	HDD
5	AC Power Cable	1.5	N	Optical Speaker
6	AC Power Cable	1.5	N	HDD
7	Earphone Cable	1.0	N	
8	USB Cable	1.7	Y	
9	1394 Cable	1.7	Y	
10	TV Cable	1.2	N	
11	Fiber Optic Cable	2.0	N	
12	USB Cable	1.7	Y	

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:873282) 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 worse case conditions.

1)Conduction(Front View)



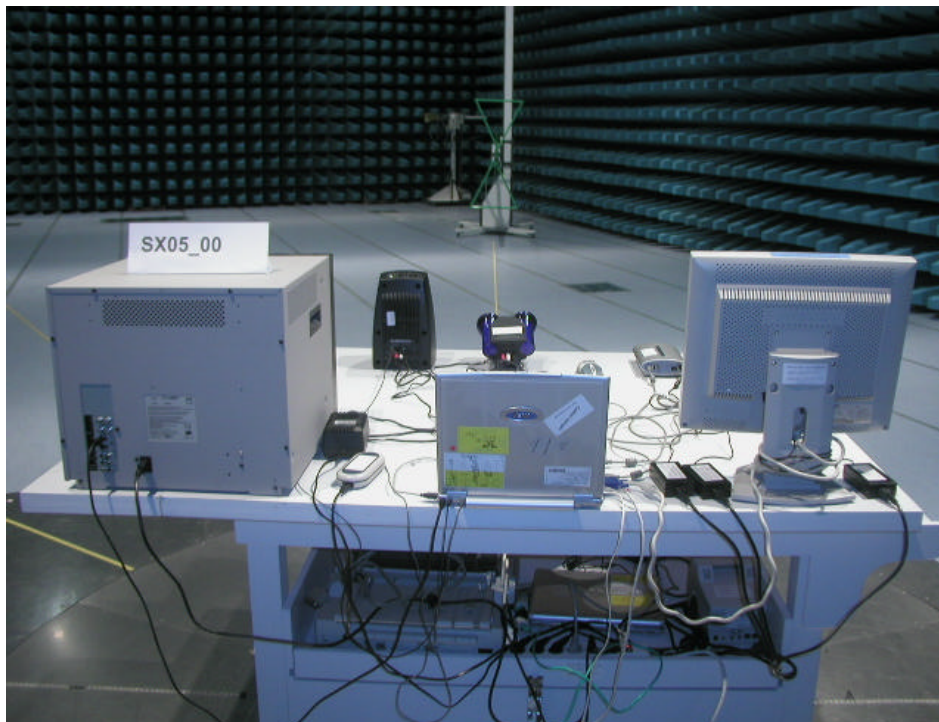
2)Conduction(Rear View)



3) Radiation(Front View)



4) Radiation(Rear View)



2.2 Operation Environment

	Conduction	Radiation
Temperature [C] :	24.4	20
Humidity [%] :	43	44
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 10kHz, 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 1000 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	Peak	1MHz	-

3. Conducted Emission Test Data

O 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]	
0.158	23.6	4.6	0.6	24.2	5.2	65.6	55.6	41.4	50.4
0.197	50.6	42.0	0.6	51.2	42.6	63.7	53.7	12.5	11.1
0.263	42.6	36.2	0.5	43.1	36.7	61.3	51.3	18.2	14.6
0.330	36.9	30.9	0.5	37.4	31.4	59.5	49.5	22.1	18.1
0.392	36.2	31.9	0.5	36.7	32.4	58.0	48.0	21.3	15.6
0.459	36.5	30.7	0.6	37.1	31.3	56.7	46.7	19.6	15.4
0.658	31.0	26.8	0.6	31.6	27.4	56.0	46.0	24.4	18.6
1.248	33.2	31.6	0.6	33.8	32.2	56.0	46.0	22.2	13.8
2.037	36.9	33.1	0.5	37.4	33.6	56.0	46.0	18.6	12.4
2.295	35.4	33.0	0.5	35.9	33.5	56.0	46.0	20.1	12.5
3.580	35.2	19.7	0.6	35.8	20.3	56.0	46.0	20.2	25.7
4.002	40.0	36.6	0.8	40.8	37.4	56.0	46.0	15.2	8.6
6.142	42.5	42.8	0.8	43.3	43.6	60.0	50.0	16.7	6.4
8.002	38.2	34.4	1.0	39.2	35.4	60.0	50.0	20.8	14.6
10.240	50.0	45.1	0.9	50.9	46.0	60.0	50.0	9.1	4.0
14.335	40.0	38.6	1.5	41.5	40.1	60.0	50.0	18.5	9.9
17.787	34.2	29.7	1.4	35.6	31.1	60.0	50.0	24.4	18.9
20.814	31.4	30.0	1.7	33.1	31.7	60.0	50.0	26.9	18.3

* QP : Quasi-peak, AV: Average

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

*"-":The Quasi-peak reading value also meets average limit so it is not necessary to measure with Average detector

* Measurement detector function and bandwidth

Detector function : CISPR quasi-peak

Bandwidth : 10kHz

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 [dBuV/m]	Margin (Limit-Result) [dB]
30 - 230								30.0	
	37.50	V	7.7	15.0	119	31	22.7		7.3
	72.20	V	13.2	7.0	197	128	20.2		9.8
	80.50	V	13.0	8.3	177	330	21.3		8.7
	154.70	V	9.1	11.9	100	209	21.0		9
	162.00	V	9.5	11.6	100	228	21.1		8.9
	189.50	V	6.6	10.5	112	0	17.1		12.9
	196.60	H	15.2	10.8	400	89	26.0		4
230 - 1000								37.0	
	325.10	V	9.9	16.6	400	30	26.5		10.5
	379.30	V	15.0	18.2	350	14	33.2		3.8
	467.20	H	12.1	20.4	213	296	32.5		4.5
	596.50	V	4.7	22.5	192	57	27.2		9.8
	761.80	H	4.0	24.3	126	238	28.3		8.7
	959.50	H	-0.6	25.6	170	89	25.0		12.0
1000- 8000								74.0	
	1002.5	V	17.7	24.2	100	30	41.9		32.1
	2434.0	V	7.3	20.0	100	210	27.3		46.7
	5768.5	V	-0.6	29.8	100	20	29.2		44.8

* "<" 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: Peak)

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

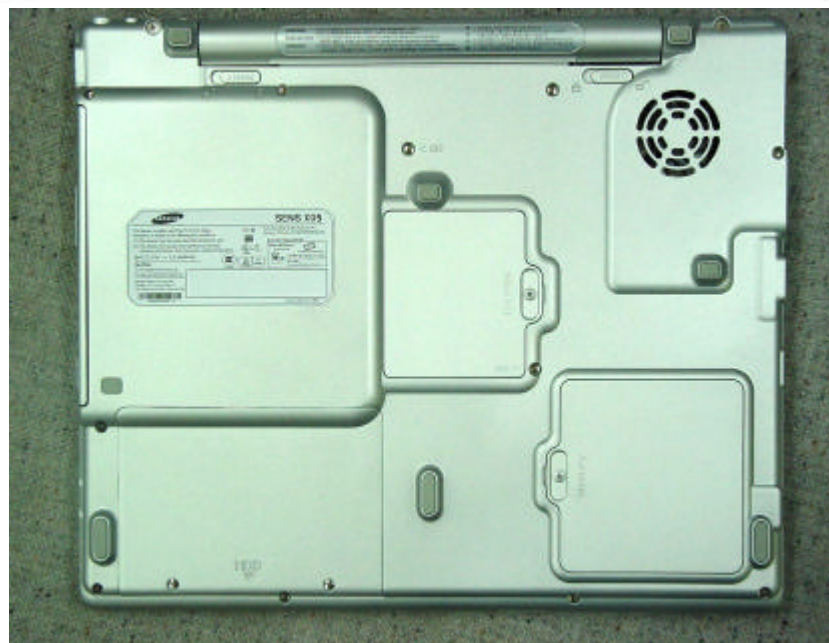
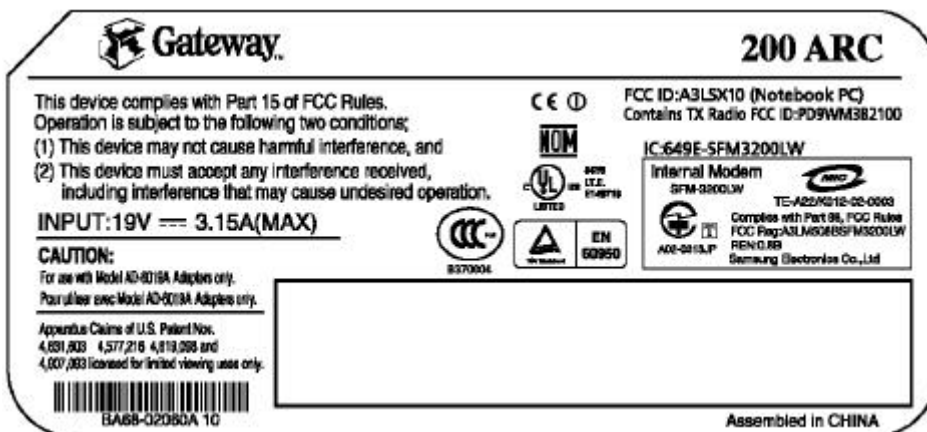
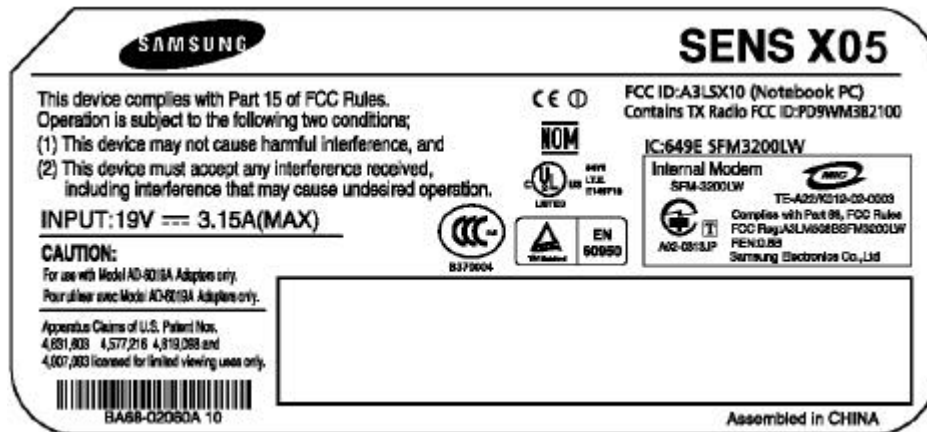
* Test distance

- Below 1000MHz: 10m(Quasi-peak)

- Above 1000MHz: 3m(Peak)

5. FCC Label Configuration and Location

5.1, 5.2 Label and Label Location



6. Test Equipment Used

Equipment	Model No.	Serial No	Makers.	Next Calibration date
Field strength meter	ESCS30	100104	R & S	2004-01-17
	Firmware versions : Main 2.22, OTP 02.01, GRA 02.36			
Test Receiver	ESI26	100010	R&S	2003-05-04
L.I.S.N	3810/2NM	2251	EMCO	2003-05-07
L.I.S.N	ESH3-Z5	831887/0004	R&S	2003-11-18
Bi-Log Antenna	CBL6112B	2804	SCHAFFNER	2003-04-19
Double Ridged Guide Antenna	HF906	100027	R & S	2003-07-26