

EMI TEST REPORT

According to FCC Part 15 Subpart B/Class B

Product : Notebook PC

Model No. : P25

FCC ID : A3LSP10

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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 7, 2003 ~ February 12, 2003

Issued Date : February 21, 2003

Tested by:

Jong Ho, LEE / Test Engineer

Reviewed by:

Yang Soo, KIM / Manager of EMC Lab.

Authorized by:

Kyu Baek, CHUNG / Chief of EMC Lab.

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The test reported herein have been performed in accordance with its terms of registration.



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 : **A3LSP10**

Project Name : **Taurus II**

Model & Variant Names : **P25, P20** (Brand Name: Samsung)
Transport T2000 (Brand Name: Micron)

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 tested using the below configurations of (A) and (B).

(A) LCD 15.0" and CPU Pentium IV 2400MHz without Port Replicator.

(B) LCD 14.1" and CPU Pentium IV 2400MHz with Port Replicator(SPR-P20).

Finally we reported with above (A) configuration. 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 :

2.4GHz(CPU Speed), 100MHz(Host Clock), 133MHz(SDRAM Clock), 8M(Finger print)
33.3MHz(PCI Clock), 14.318MHz(Ref), 49.512MHz(Audio Clock), 25M(Network)
183MHz(Video Memory Clock), 12.288MHz(Audio Bit Clock), 24.576MHz(Audio C24)
10MHz(Micom Clock), 48MHz(USB Clock), 66.6(Hub), 65MHz(15" LCD Clock)

3) Description of Testing operating mode

Operating Mode	Operating section of EUT
"H" Pattern display & Read / Write	LCD Screen
	External Monitor
	TV monitor
	Floppy Disk Drive A:
	Hard Disk Drive C:
	Flash memory drive D:
	LPT1 to printer
Data access	Telecommunications (LAN, Modem)

4) Tested Resolution :

Tested Video mode	Resolutions	Refresh rates	Colors
LCD(15")	1280 X 1024	60Hz	32bits
Ext. Monitor	1280 X 1024	85Hz	32bits
TV Monitor	640 X 480	60Hz	32bits

5) Manufacturer : SAMSUNG Electronics Co., Ltd.

6) Assemble Parts

Item	Specification	Remark
CPU	Intel Pentium IV Northwood 2.4GHz	512KB Cache, 400MHz PSB
Memory	Samsung, 512MB, 2 SODIMM, Max 1GB	
Video	Samsung, LCD 15" TFT SXGA, LTN150P4-L02	ATI Mobillity M7P
Display	Upto 1024 X 768 Pixels:32-bit colors(LCD)	
Modem	Samsung, SFM-3200LW, 56Kbps	V.90 compliant/V92 ready
Swap Device	Toshiba, SD-R2312, CD-RW/DVD Combo	
Wireless LAN	Agere, MPC13A-20/R, MiniPCI type, 11Mbps	Ruby
HDD	IBM, 40GB, IC25N040ATCS04-0, 2.5"	
LAN	10/100 Base-T Ethernet support, Intel Kinnereth	
Adapter	Astec, AD-9019M, AC 100~240V FREE-VOLTAGE	50/60Hz, 90W, 3pin
Input Device	Keyboard, 19mm pitch, 3mmH travel length, Pointing Device, PS/2 Touchpad w/2 button, Memory Stick	
Battery	65Wh, Removable 8-Cell Li-Ion Smart	
Port Replicator	DC-in, SVHS, SPDIF out, VGA, SIO, DVI, RJ-45, PS/2, 1394, USB, Headphone, Mic, Dock conn. Etc.	

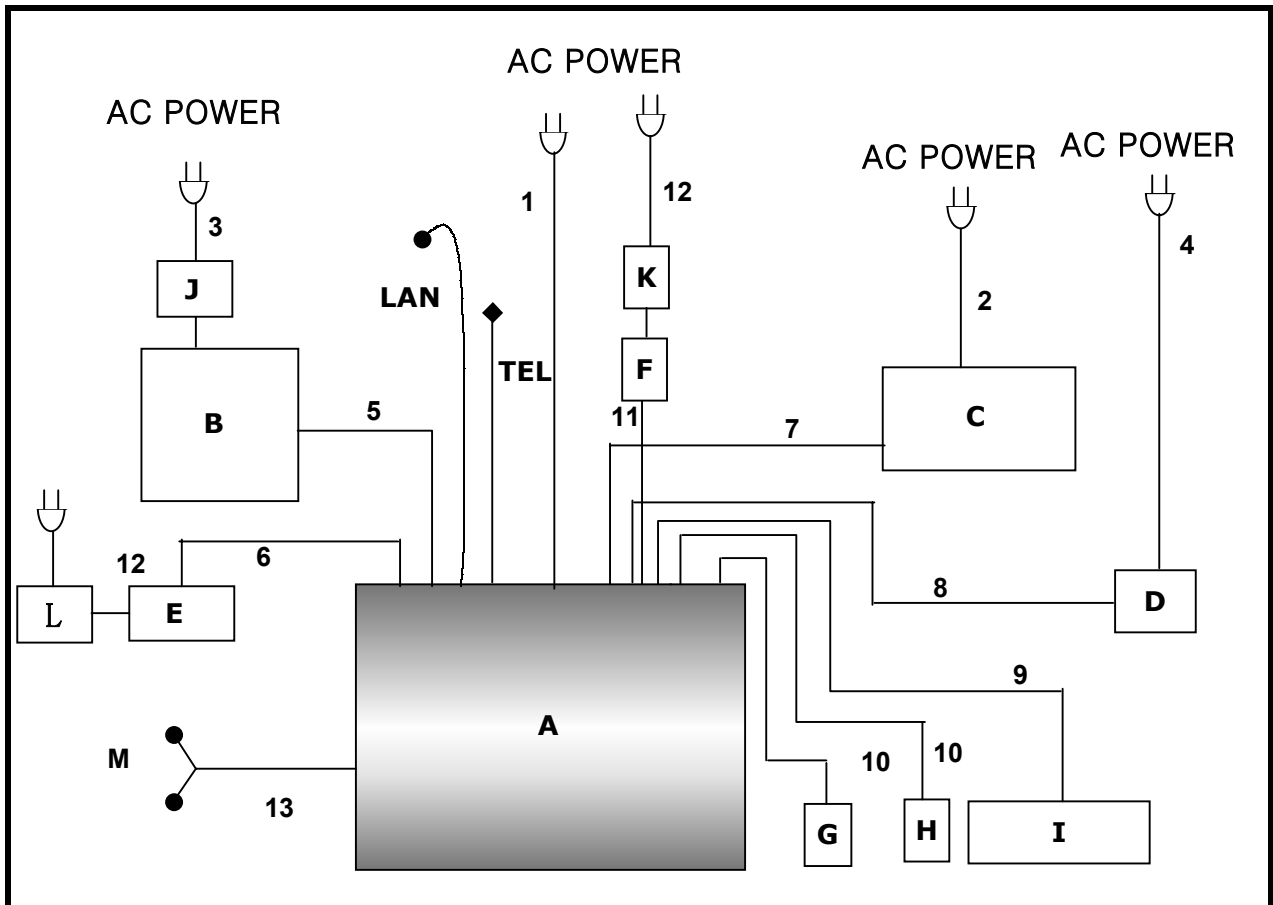
1.2 Configuration of EUT and peripherals

Mark	Item	Model No.	Serial No.	Manufacturer	FCC ID
A	Notebook PC	P25	-	SAMSUNG	A3LSP10
B	Monitor	M17D-AN	N106H4JT100839	SAMSUNG	Doc
C	Printer	LQ-580H	CG2Y014532	EPSON	Doc
D	TV	TM-2100PN	8604011	JVC	-
E	External HDD	SEV08UP	HV08J1AT600477	SAMSUNG	Doc
F	External HDD	SEV08UP	HV08J1AT600351	SAMSUNG	Doc
G	USB Mouse	M-U48a	LZE010703970	Logitech	JNZ211360
H	Serial Mouse	SMB-400	9GHF00178	SEJIN	Doc
I	PS/2 Keyboard	7801	K1C100662	SAMSUNG	Doc
J	Adapter	AD-4214N	C011108523	SAMSUNG	For Monitor
K	Adapter	PSCV360104A	C020381562B	SAMSUNG	For HDD
L	Adapter	PSCV360104A	C020381934B	SAMSUNG	For HDD
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	Printer
3	AC Power Cable	1.5	N	Monitor
4	AC Power Cable	1.5	N	TV
5	Monitor Cable	1.5	Y	
6	1394 Cable	1.5	Y	
7	Printer Cable	1.6	Y	
8	TV Cable	1.6	Y	
9	PS/2 Keyboard Cable	1.6	N	
10	Mouse Cable	1.7	N	
11	USB Cable	1.5	N	
12	AC Power Cable	1.5	N	HDD
13	Earphone Cable	1.0	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:873282) and Shielded Room.

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

2. System Test Configuration

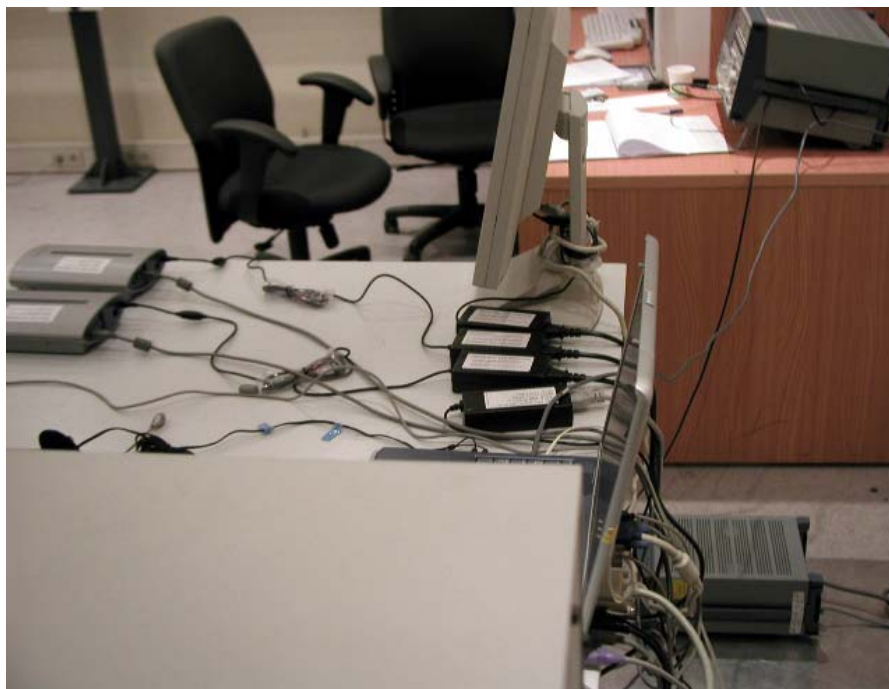
2.1 Configuration of Radiated and Conducted Interference Measurement

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

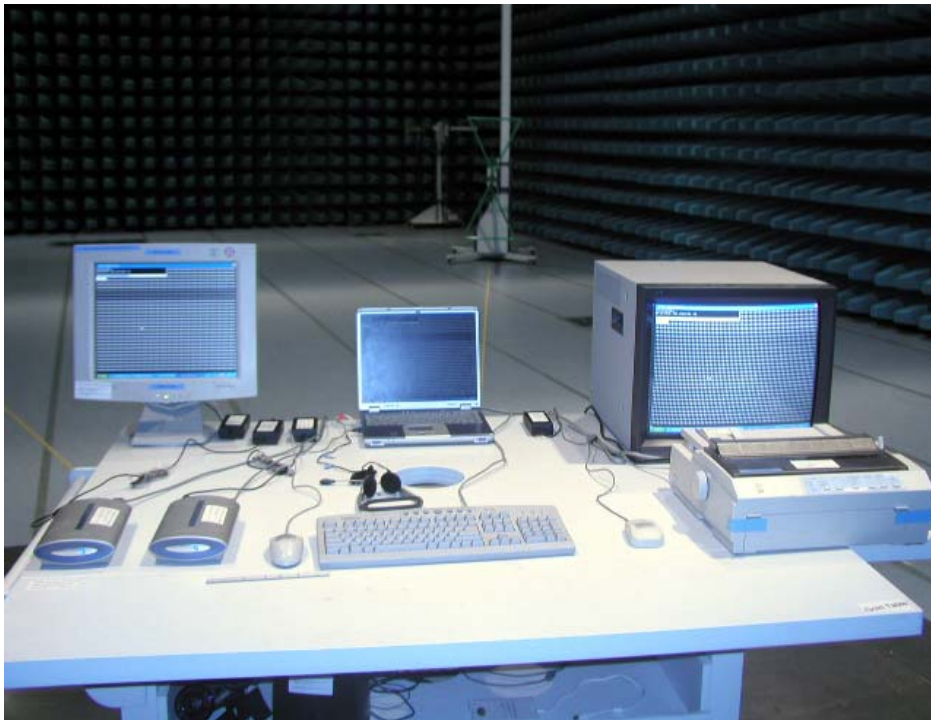
1)Conduction(Front View)



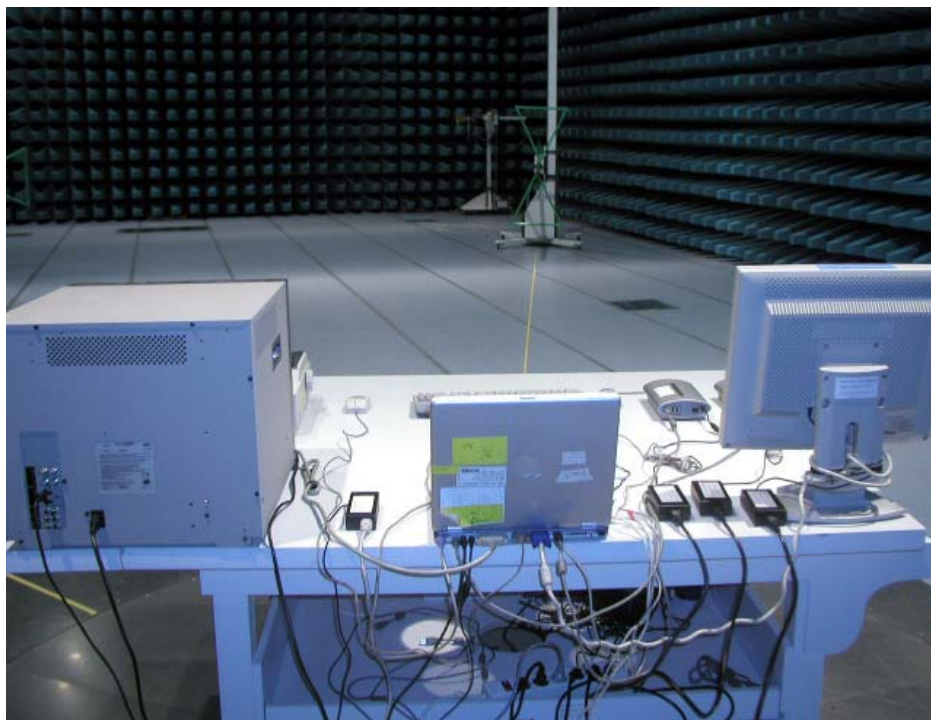
2)Conduction(Rear View)



3) Radiation(Front View)



4) Radiation(Rear View)



2.2 Operation Environment

	Conduction	Radiation
Temperature [C] :	25	21
Humidity [%]	31	42
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]	
0.150	55.0	35.9	0.6	55.6	36.5	66.0	56.0	10.4	19.5
0.162	53.6	33.5	0.6	54.2	34.1	65.4	55.4	11.2	21.3
0.185	50.2	29.9	0.6	50.8	30.5	64.3	54.3	13.5	23.8
0.209	46.9	41.9	0.6	47.5	42.5	63.3	53.3	15.8	10.8
0.216	43.1	25.0	0.6	43.7	25.6	63.0	53.0	19.3	27.4
0.396	36.6	19.1	0.5	37.1	19.6	57.9	47.9	20.8	28.3
0.568	32.1	15.5	0.6	32.7	16.1	56.0	46.0	23.3	29.9
0.779	29.6	14.2	0.5	30.1	14.7	56.0	46.0	25.9	31.3
1.150	26.9	16.9	0.6	27.5	17.5	56.0	46.0	28.5	28.5
1.213	28.3	22.6	0.6	28.9	23.2	56.0	46.0	27.1	22.8
2.791	23.8	16.1	0.5	24.3	16.6	56.0	46.0	31.7	29.4
3.580	33.2	20.4	0.6	33.8	21.0	56.0	46.0	22.2	25.0
6.795	26.1	20.9	0.8	26.9	21.7	60.0	50.0	33.1	28.3
7.990	25.4	20.4	1.0	26.4	21.4	60.0	50.0	33.6	28.6
18.127	31.6	22.5	1.5	33.1	24.0	60.0	50.0	26.9	26.0
20.259	39.2	38.3	1.5	40.7	39.8	60.0	50.0	19.3	10.2
21.662	39.6	39.0	1.6	41.2	40.6	60.0	50.0	18.8	9.4
27.810	24.5	17.1	1.8	26.3	18.9	60.0	50.0	33.7	31.1

* 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	30.5	V	5.2	18.5	235	105	23.7	30.0	10.2
	47.8	V	11.3	9.8	238	261	21.1		8.7
	51.1	V	10.1	8.5	100	275	18.6		7.0
	75.1	V	18.9	7.3	195	149	26.2		3.6
	88.1	V	10.8	9.9	100	70	20.7		5.6
	100.0	V	12.5	11.9	105	134	24.4		12.3
	138.4	V	6.2	12.6	100	89	18.8		10.9
	197.1	V	3.6	10.9	150	89	14.5		12
	217.7	V	10.9	10.4	100	209	21.3		7.9
	219.5	V	7.8	10.6	104	213	18.4		7.4
230 - 1000	379.2	V	14.4	18.2	369	16	32.6	37.0	4.4
	433.3	V	10.6	19.7	310	30	30.3		10.3
1000- 12000	1193.0	V	18.0	24.2	100	240	42.2	74.0	31.8
	2927.0	H	11.4	29.3	100	90	40.7		33.3
	9726.0	H	12.6	37.6	100	150	50.2		23.9

* "<" 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)

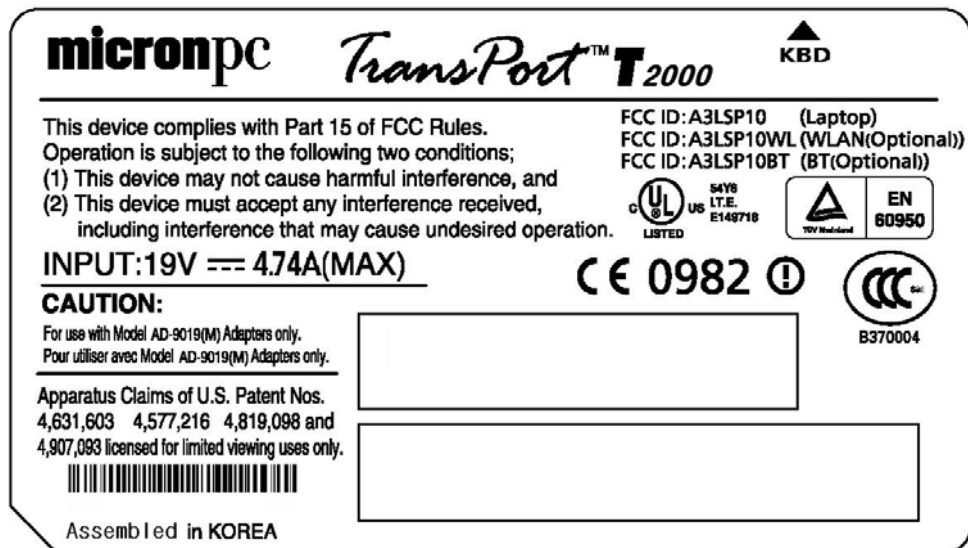
* Test distance

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

- Above 1000MHz: 3m(Peak)

5. FCC Label Configuration and Location

5.1 Label Configuration



5.2 Location of Label



6. Test Equipment Used

Equipment	Model No.	Serial No	Makers.	Next Calibration date
Field strength meter	ESCS30	830986/004	R & S	2003-02-15
	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