

EMI TEST REPORT

Samsung Electronics Co., Ltd.

416 Maetan 3-Dong, Yeongtong-Gu,
Suwon-Si, Gyeonggi-Do, 443-742 Korea
(Tel: 031 277 7752, Fax: 031 277 7753)

Project No. : LBE064062

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**1. Applicant**

- Name of organization : **Samsung Electronics Co., Ltd.**
- Address : 416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do
443-742 Korea
- Date of application : 2006.12.12

2. Purpose for the report : Approval for EMI

3. Kind of product : Notebook PC (Model name : NP-Q40)

4. Date of test : 2006.12.12 ~ 2006.12.14

5. Applied standard : FCC Part 15:2006 Subpart B

6. Test result : Complied

The equipment under test has found to be compliant with the applied standards.
(Refer to the attached test result for more detail.)

Tested by

Name : Young Hun, Cheong

J.Y.H

Reviewed by

Name : No Cheon, Park

N. C. Park

This report is the test result about the sphere accredited by KOLAS which signed the
Mutual Recognition Arrangement of International Laboratory Accreditation Cooperation.

2006. 12. 28

Samsung Electronics Co., Ltd.
Chief of CS Management Center

TEST RESULT

Test Report No. : LBE064062

Applicant / Address : Samsung Electronics Co., Ltd.
416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do
443-742 Korea

Manufacture / Address : Samsung Electronics Co., Ltd.
416 Maetan 3-Dong, Yeongtong-Gu, Suwon-Si, Gyeonggi-Do
443-742 Korea

EUT : 1. Product name : Notebook PC
2. Model name : NP-Q40
3. FCC ID : **A3L-NP-Q40**
4. Brand name : Samsung
5. Variant model : None

Basic Standards : ANSI C63.4:2006

Test Result : **COMPLIED**
The equipment under test has found to be compliant with the applied standards

Test Lab. : CS Management Center, Samsung Electronics Co., Ltd.



Tested by : Young Hun, CheongChoi

Reviewed by : No Cheon, Park

Date of Issue : 2006. 12. 28

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1. General information

1.1 Basic information related product

Applicant	Samsung Electronics Co., Ltd.
Model name	NP-Q40
Applicant address	416 Maetan 3-Dong, Yeongtong-Gu,Suwon-Si,Gyeonggi-Do 443-742 Korea
Contact person	Hyeja jin
Kind of product	Notebook PC
Variant model	-
Manufacturer	Samsung Electronics Co., Ltd. 416 Maetan 3-Dong, Yeongtong-Gu,Suwon-Si,Gyeonggi-Do 443-742 Korea
Rated power	AC 120 V, 60 Hz
New / Alternative / Permissive change information	New

1.2 Detail Information related product

1.2.1 Specification

Item	Specification	Remark
CPU	Intel Yonah ULV Processor single-core 1.2GHz	-
Chipset	Intel 945GMS+ ICH7M	-
Main Memory	On B'D 256MB (SAMSUNG)	-
Graphic controller	Internal GMA 950 Graphic	-
Inverter Board	Delta, DAC-09N016 REV:AF	-
LCD DISPLAY	Toshiba; LTD121EX1R , 12.1" WXGA (1280 x 768, 16:9)	-
Modem	Agere systems, Athens(AM2) S/W Modem, 56KBPS, Fax/Data Azalia MDC 1456VQL-T1(INT-LF), MIC No.:TE-A22/K012-04-0410	-
HDD	Hitachi, HTC426060G8CE00, 60G,1.8"	-
ODD	None	-
LAN	BROADCOM, BCM5751MKFBG , Gigabit Ethernet	-
Wireless LAN	Intel, WM3945ABG KR, 802.11abg, 54Mbps, Mini-card MIC No.:INT-WM3945ABGKR FCC ID : PD9WM3945ABG	-
Bluetooth	Broadcom, BCM92045NMD, USB 2.0 type, Bluetooth Ver 2.0 MIC No.:R-LARN-05-0240, FCC ID:QDS-BRCM1018	-
DMB	MBridge, SDM-2000, Korea only	-
ADAPTER	Lishin, 0455A1990, AD-9019S, 90W, 3 pin	-
Battery	SANYO[6Cell]: Q30LS6	-
Input Devices	Keyboard, 18.05mm pitch, 2.6mmH travel length PS/2 Touchpad	-
Ports	LAN & Modem Combo, 1 1394, 2 USB, 1 VGA, DC IN, 1 MIC-IN, CF Card Socket, 4 in 1 socket, Docking	-
X-dock	SEC, X-DOCK(AA- RD2NX25), 1 PS/2, 4 USB, 1 LAN, 1 1394, 1 TV- OUT, 1 DVI, 1 VGA, DC-IN, 1 Parallel, 1 Serial, 1 MIC- IN, 1 SPDIF/1HP-OUT	-

Operating Frequency

1.2GHz(CPU Speed), 667MHz(Host Clock), 533MHz(DDR2),
33MHz(PCI Clock), 96MHz (PCIE Clock), 14.318MHz(Ref), 33MHz(MICOM Clock),
33Mhz(Cardbus controller), 25Mhz(LAN controller)

1.3 Operating mode and condition

Although the actual EUT was a Peripheral Device, the whole system was looked upon as a EUT. The EUT exercise program used during radiated and conducted emissions testing was the Samsung Standardized Emission Test Program for Windows. During the certification test, the LCD panel was open and video signals were simultaneously active on the LCD panel, and the VGA port. The system was configured for testing in a typical fashion that a customer would normally use, and was tested while in an automated non-attendant mode. The program repetitively sends a screen of 'H' to the display, reads and writes to the hard drive, and writes to all serial, parallel ports and modem. Music is played from the Audio player to the Line-In jack and ported out to the earphones. A hard drive from the remote PC was mapped to the EUT and a data file was read and written over the network connection to provide continuous activity. The EUT was connected to a remote PC through the Ethernet port with Unshielded Twisted Pair Ethernet cable and Modem port by using hyper terminal program. Ethernet testing was performed at 1Gbps operation. Cables were attached to each of the available I/O Ports. Where applicable, peripherals were attached to the I/O cables.

The EUT was tested with the WLAN communicating during the radiated immunity testing. The hopping Channels of the Bluetooth hopped and operated in the 2400-2483.5 MHz band, with 79 channels.

- Test Voltage : AC 120 V, 60 Hz

1.4 Equipment modifications

No equipment modifications were required.

1.5 Test procedure

1.5.1 Conducted emission

EUT was placed on a platform nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The rear of tabletop was located 40 cm 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 80 cm 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 bindle 30 cm to 40 cm long and were handed at a 40 cm 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.

Frequency Band [MHz]	Equipment	Detector	Resolution Bandwidth	Video Bandwidth
0.15 to 30	EMI Receiver	Quasi-Peak	9 kHz	-
		Average	9 kHz	-

1.5.2 Radiated emission

EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The rear of EUT, including peripherals was aligned and flush with rear of tabletop.

The I/O cables that were connected to the peripherals were bundle in center.

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

Test was made with the antenna positioned in both the horizontal and vertical planes of polarization.

The measurement antenna was varied in height above the conducting ground plane and the turn table azimuth was varied to obtain the maximum signal strength

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 1 000 MHz using biconiLog antenna.

Frequency Band [MHz]	Equipment	Detector	Resolution Bandwidth	Video Bandwidth
30 to 1 000	EMI Receiver	Quasi-Peak	120 kHz	-
Above 1 000	EMI Receiver	Peak	1MHz	1MHz

1.6 Test configuration

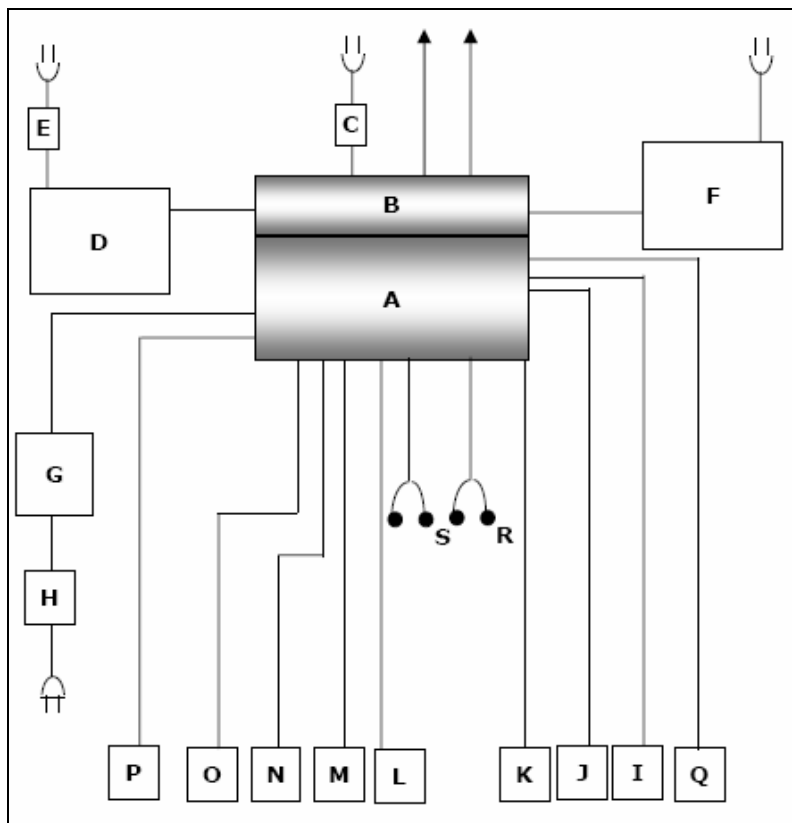
1.6.1 Used EUT and peripherals

Mark	Item	Model No.	Serial No.	Manufacturer	FCC ID
A	Notebook PC	NP-Q40	-	Samsung	A3L-NP-Q40
B	X-Dock	AA-RD2NX25AD-6019	-	Samsung	Doc-
C	AC Adaptor	AD-9019S	CNBA4400215AD2VH6A S1914	Li shin	-
D	Monitor	CX712MP	-	Samsung	Doc
E	AC Adaptor	PSCV36010A4	C020381825B	Samsung	-
F	Printer	LQ-580H	CG2Y014534	EPSON	Doc
G	Digital Cam.	DCR-PC110	1148606	SONY	Doc
H	AC Adaptor	AC-L10A	21042337	SONY	-
I	PS/2 Mouse	P801	02590934	Samsung	Doc
J	Serial Mouse	-	1020764	Microsoft	Doc
K	USB Mouse	MS201U	69G1107	Samsung	Doc
L	USB Mouse	MS201U	69G0556	Samsung	Doc
M	USB Mouse	MS201U	69G1173	Samsung	Doc
N	USB Mouse	MS201U	69G0511	Samsung	Doc
O	USB Mouse	MS201U	69G1102	Samsung	Doc
P	USB Mouse	MS201U	69G1458	Samsung	Doc
Q	USB Mouse	MS201U	69G1494	Samsung	Doc
R	Headset	Axis-202	-	Labtec	
S	Headset	MH21	-	-	

1.6.2 Used cable description

Mark	Connect Cable	Length [m]	Shielded [Y/N]	Remark
1	Power	1.8	No	For n/pc
2	Power	1.8	No	For monitor
3	LCD Monitor	1.8	No	From pc to monitor
4	USB Mouse	1.8	No	From pc to camcorder
5	USB Mouse	1.8	No	From pc to mouse
6	Headset	1.6	No	From pc to headset
7	LAN	2.0	No	From pc to lan

1.6.3 Block Diagram



1.7 Applied Standards

Test standard	Basic standard
FCC Part 15:2006 Subpart B	ANSI C63.4:2003

1.8 Test Facility

1.8.1 General information

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR 22, 16-1, 16-2.

This EMC Testing Lab. is accredited by Korea Laboratory Accreditation Scheme(KOLAS) which signed the International Laboratory Accreditation Cooperation (ILAC) Mutual Recognition Arrangement (MRA) for the above test item(s) and test method(s).

This Lab. is operated as testing laboratory in accordance with the requirements of ISO/IEC 17025:1998.

1.8.2 Accreditation and listing



1.8.3 Measurement uncertainty

(According to CISPR 16-4 and Lab. 34)

Test item	Measurement uncertainty
Conducted emission	± 2.8 dB
Radiated emission Horizontal	± 5.1 dB
Vertical	± 5.09 dB

2. Summary of test results

Result : COMPLIED

The equipment under test (EUT) has been found to comply with the applied standards.

Section of the Product Standard		Applied Standard	Result
Electromagnetic Emission Test			
3.1	Conducted Emission	FCC Part 15:2006 Subpart B	Complied
3.2	Radiated Emission	FCC Part 15:2006 Subpart B	Complied

3. Description of individual tests

3.1 Conducted emission

3.1.1 Test information

Test engineer	Young Hun, Cheong
Test date	November 14, 2006
Climate condition	Ambient temperature : 24.0 °C, Relative humidity : 28 % Atmospheric pressure : 101.6 kPa
Test place	Shielded room #1

3.1.2 Test equipment

Equipment	Model Name	Manufacturer	Serial No.	Calibration	
				Date	Interval (Month)
EMI TEST RECEIVER	ESCI	R&S	100369	2006-05-01	12
LISN	ENV216	R&S	100116	2006-09-01	12
LISN	ESH3-Z5	R&S	100261	2006-07-21	12
Test Software	EMC 32	R&S	Ver 4.40.0	N/A	N/A

3.1.3 Test result : **Complied**

The Measured emissions of the EUT have found to be below the specified limits.

3.1.4 Test data and graph

The Initial step in collecting conducted data was to perform a peak and average scan over the measurement range using a receiver. The find data represents worst-case emissions.

3.1.4.1 Test graph

Test Information

EUT Name: NP-Q40
Serial Number:
Test Description:
Operating Conditions:
Operator Name: yh.cheong
Comment:

Hardware Setup: Voltage with ENV 2-Line-LISN - [EMI conducted]

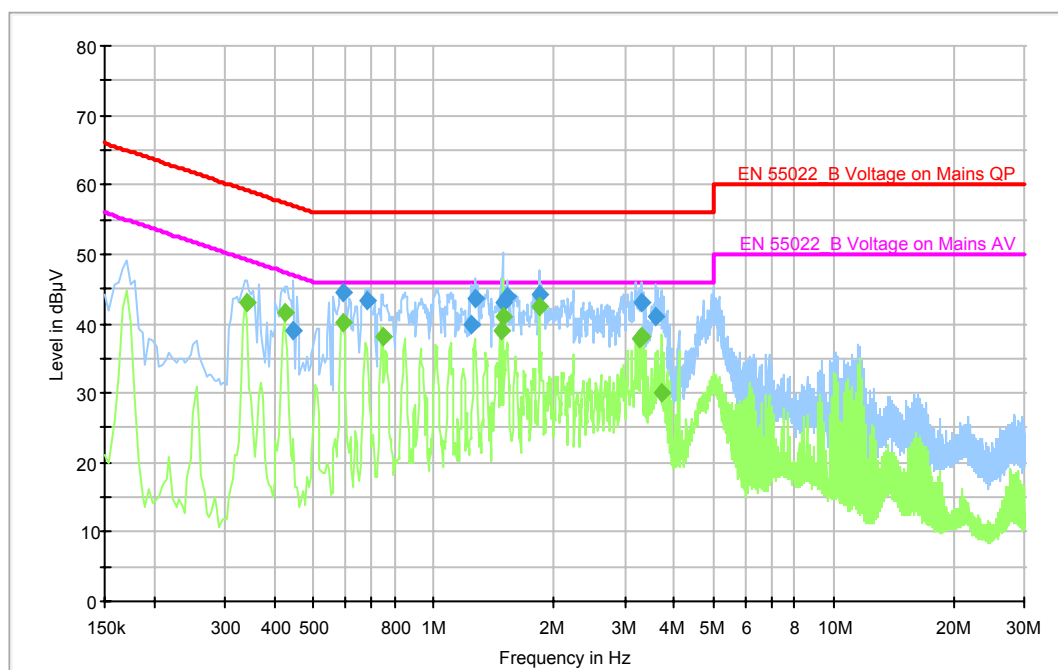
Subrange 1
Frequency Range: 150kHz - 30MHz
Receiver: ESCI 3
Transducer: ENV216 / Receiver-2-Line-LISN ENV216

Scan Setup: EN55022_B_ENV 2-Line-LISN fin [EMI conducted]

Hardware Setup: Voltage with ENV 2-Line-LISN
Level Unit: dBμV

Subrange	Detectors	IF Bandwidth	Meas. Time	Receiver
150kHz - 30MHz	QuasiPeak; Average	9kHz	15s	ESCI 3

EN55022_B with ENV 2-Line-LISN



Final Measurement Detector 1

Frequency (MHz)	QuasiPeak (dBμV)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.442 500	39.0	L1	9.6	18.0	57.0
0.590 500	44.3	L1	9.6	11.7	56.0
0.678 500	43.3	L1	9.6	12.7	56.0
1.243 500	39.8	N	9.6	16.2	56.0
1.272 500	43.7	L1	9.7	12.3	56.0
1.484 500	43.0	N	9.7	13.0	56.0
1.528 500	43.8	L1	9.7	12.2	56.0
1.832 500	44.2	L1	9.7	11.8	56.0
3.316 500	43.1	L1	9.7	12.9	56.0
3.568 500	40.9	L1	9.7	15.1	56.0

Final Measurement Detector 2

Frequency (MHz)	Average (dBμV)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.338 500	43.1	L1	9.6	6.2	49.2
0.422 500	41.6	L1	9.6	5.8	47.4
0.590 500	40.2	L1	9.6	5.8	46.0
0.742 500	38.0	N	9.6	8.0	46.0
1.468 500	38.9	L1	9.7	7.1	46.0
1.484 500	41.1	N	9.7	4.9	46.0
1.832 500	42.5	L1	9.7	3.5	46.0
3.252 500	37.9	L1	9.7	8.1	46.0
3.316 500	38.2	L1	9.7	7.8	46.0
3.708 500	29.9	L1	9.7	16.1	46.0

* QP : Quasi-peak, AV: Average

* Level (QuasiPeak or Average) = Meter Reading(QP or AV) + Corr. (LISN Insertion loss + Cable loss)

* Margin = Limit – Result

3.2 Radiated Emission

3.2.1 Test information

Test engineer	Young Hun, Cheong
Test date	November 12, 2006
Climate condition	Ambient temperature : 24.6 °C , Relative humidity : 33 % Atmospheric pressure : 101.9 kPa
Test place	10m Semi Anechoic Chamber #1

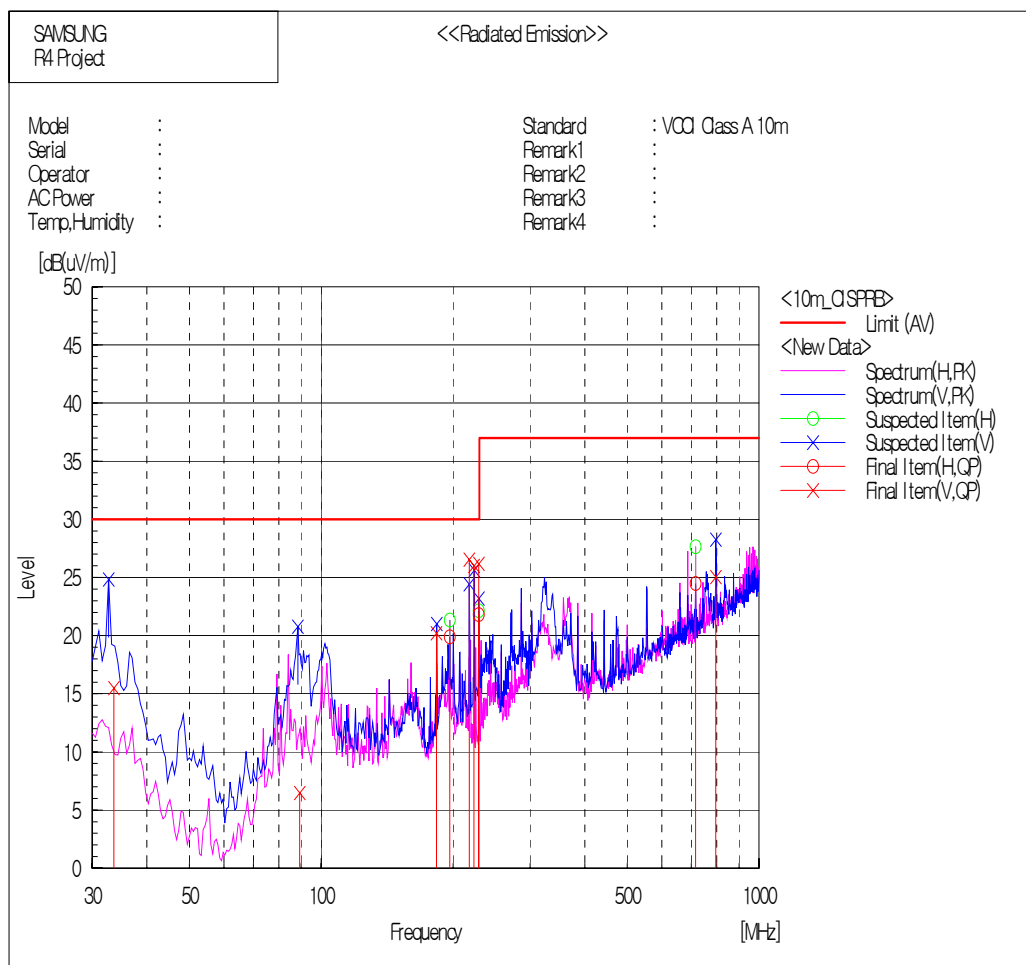
3.2.2 Test equipment

Equipment	Model name	Manufacturer	Serial no.	Calibration	
				Date	Interval (Month)
Bi-con Antenna	CBL6112D	SCHAFFNER	22601	2006-06-26	12
Bi-con Antenna	CBL6112D	SCHAFFNER	22602	2006-06-26	12
EMI Receiver	ESI26	R&S	100287	2006-03-05	12
EMI Receiver	ESI26	R&S	100288	2006-04-04	12
AMPLIFIER	310N	SONOMA	251674	2006-03-14	12
AMPLIFIER	310N	SONOMA	251677	2006-03-06	12
Ant Mast	MA4000	Inn-co	-	N/A	N/A
Ant Mast	MA4000	Inn-co	-	N/A	N/A
Mast Controller	CO2000	Inn-co	-	N/A	N/A

3.2.3 Test result : **Complied**

The Measured emissions of the EUT have found to be below the specified limits.

3.2.4 Test data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(uV)]	c.f [dB(1/m)]	Result QP [dB(uV/m)]	Limit [dB(uV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]	System
1	33.595	V	30.0	-14.5	15.5	30.0	14.5	101.0	230.6	2
2	89.300	V	27.6	-21.1	6.5	30.0	23.5	146.0	0.3	2
3	183.383	V	40.5	-20.3	20.2	30.0	9.8	100.0	199.1	2
4	196.580	H	39.9	-20.0	19.9	30.0	10.1	400.0	245.0	1
5	217.731	V	46.5	-20.0	26.5	30.0	3.5	106.0	172.9	2
6	223.477	V	45.6	-19.6	26.0	30.0	4.0	100.0	176.3	2
7	229.067	H	40.6	-18.8	21.8	30.0	8.2	400.0	310.1	1
8	229.072	V	44.8	-18.6	26.2	30.0	3.8	111.0	174.4	2
9	715.855	H	30.6	-6.1	24.5	37.0	12.5	128.0	343.7	1
10	796.769	V	30.2	-5.2	25.0	37.0	12.0	200.0	325.4	2

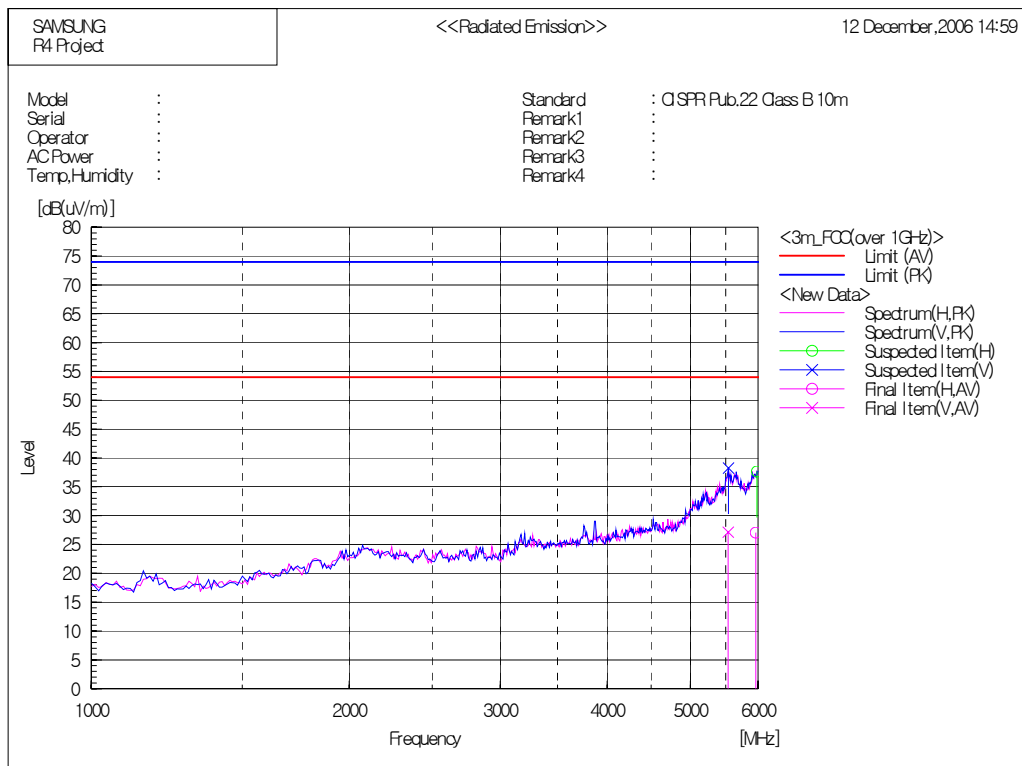
* Receiving antenna mode : Horizontal, Vertical

* Test distance : 10 m (RF Semi Anechoic Chamber)

* Result = Reading + c.f (Antenna factor + Cable loss- Amp Gain)

* Margin = Limit – Result

2. Test Data (1GHz ~ 6GHz)



Spectrum Selection

No.	Frequency [MHz]	(P)	Reading [dB(μV)]	c.f [dB(1/m)]	Result PK [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Height [cm]	Angle [deg]
1	5539.078	V	30.4	7.9	38.3	54.0	15.7	200.0	347.5
2	5979.960	H	28.9	8.8	37.7	54.0	16.3	200.0	338.6

- * Measurement detector function and bandwidth
 - Detector function : peak
 - Bandwidth : 1MHz
- * Receiving Antenna Mode : Horizontal, Vertical
- * Test distance : 3m (Semi-Anechoic Chamber)
- * Result = Meter Reading + c.f(Antenna factor + Cable loss-Amp. Gain)
- * Margin = Limit – Result

4. Appendix

4.1 Test photography



Picture 1. Conducted emission (Front)



Picture 2. Conducted emission (Rear)



Picture 3. Radiated emission (Front)



Picture 4. Radiated emission (Rear)

4.2 EUT photography



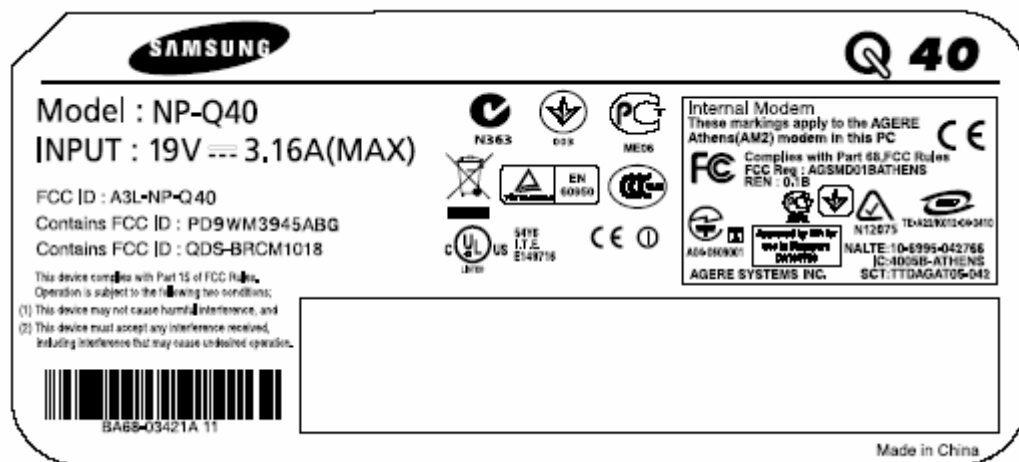
Picture 5. EUT (Top)



Picture 6. EUT (Bottom)



Picture 7. ID Label Location



Picture 8. Label