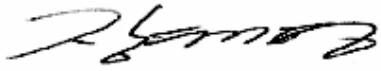
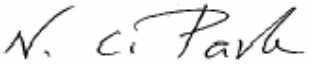
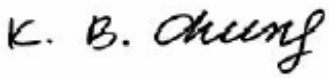
EMC Test Report

According to FCC Part 15 Subpart B

Project No.		LBE041846
Equipment under Test		
	Applicant	Samsung Electronics Co. Ltd; 416 Maetan-3 Dong, Paldal-Ku, Suwon City, Kyungki-Do, Korea, 442-742
	FCC ID	A3LAT56L5
	Product Name	DLP PROJECTION TV
	Model Name	AT56L5
	Manufacturer	Samsung Electronics Co. Ltd
Date of Test		September 17 ~ 21, 2004
Issued Date		September 21, 2004

	Name/Position	Signature
Tested by	Jang Tae Young Test Engineer	
Reviewed by	No Cheon, Park Manager of EMC Lab.	
Authorized by	Kyu Baek, Chung Chief of EMC Lab.	

1. This test reports does not constitute an endorsement by NIST/NVLAP or U.S Government.
2. 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.

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 LAB CODE 200447

Table of Contents

1. General Information

1.1 Basic Information related Product

Applicant	Samsung Electronics Co. Ltd;
Model name	AT56L5
Applicant Address	Samsung Electronics Co. Ltd; 416 Maetan3- Dong, Yeoung tong-Ku, Suwon City, Gyeonggi-Do, Korea, 443-742
Contact Person	Changyoung Choi
Kind of product	DLP PROJECTION TV
Valiant list	None
Manufacturer	Samsung Electronics Co. Ltd;

1.2 Detail Information related Product

Specification

Resolution	1280 * 720
Horizontal Frequency	60kHz
Vertical Frequency	75Hz

1.3 Operating Mode and Condition

The system was configured for testing in typical fashion use.

The mode of operation utilized for testing was selected to best simulate typical EUT use.

- PC Video Input
- PC DVI Input

The EUT Exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to typical use.

1.4 Equipment Modifications

No equipment modifications were required.

1.5 Test Procedure

1.5.1 Disturbance Voltage at Mains

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

1.5.2 Radiated disturbance

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.

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 run 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 1000 MHz using biconiLog antenna.

1.6 Test Configuration

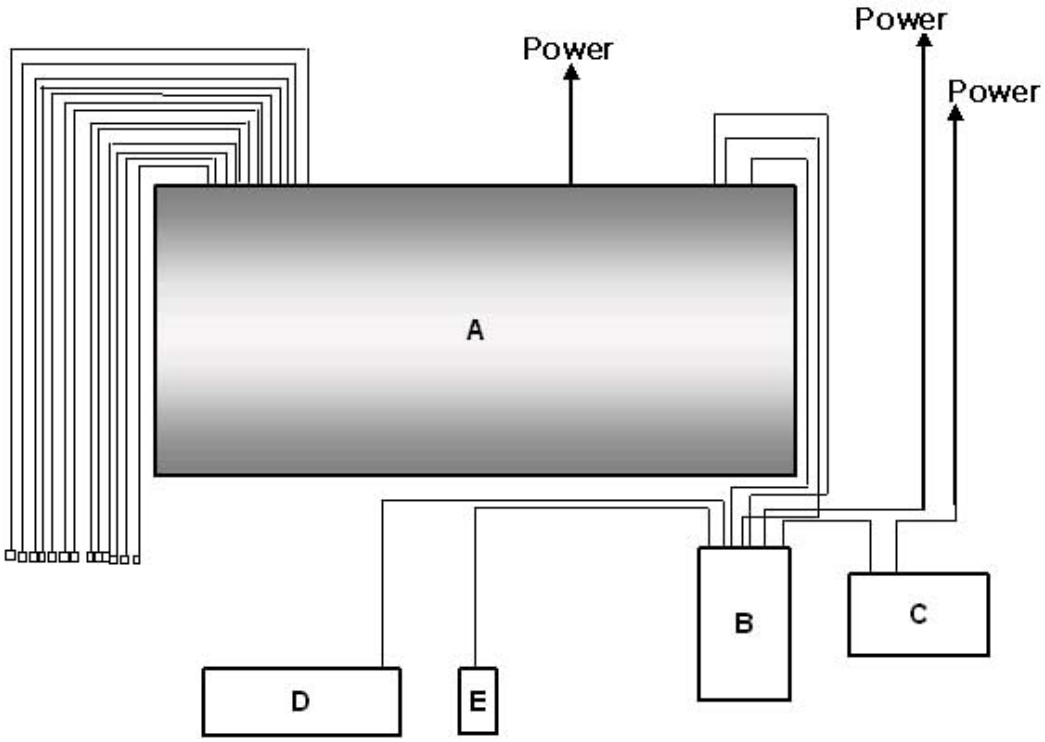
Used EUT and Peripherals

Seq	Device	Model Name	Serial #	Maker	FCC ID/DoC
A	DLP Projection TV	AT56L5	-	SAMSUNG	
B	PC	M6050	812092FRC2822	SAMSUNG	DoC
C	Printer	ML-1750	-	SAMSUNG	A3LML1750
D	PS/2 Keyboard	7800	K22115077	BTC Telecom	DoC
E	PS/2 Mouse	Scroll Mouse P801	01032707	SYE Systems	FSUGMZFT

Used Cable Description

	Connect Cable	Length [m]	Shielded [Y/N]	Remark
1	Parallel (Printer)	1.7	Yes	
2	Monitor	1.5	Yes	
3	DVI	1.5	Yes	
4	USB	1.5	Yes	
5	PS/2	1.5	Yes	
6	Component Video Out	1.5	No	
7	AV front IN	1.5	No	
8	Audio Out	1.5	No	
9	S -Video Out	1.5	Yes	
10	Audio Out	1.5	No	

Block Diagram



1.7 Applied Standards

List

Applied Standards	Test Procedure
FCC Part15	ANSI C63.4 : 2000

Performance Criteria

A. normal performance within the specification limits

B. temporary degradation or less of function or performance which is self-recoverable

C. temporary degradation or less of function or performance which require operator intervention or system reset

1.6 Test Facility

General Information

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR 22, 16-1, 16-2, 11.

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.

Accreditation and Listing

Uncertainty (According to NAMAS Pub.NIS81)

Test Item	Expanded Uncertainty
Radiated Disturbance	5.09
Disturbance voltage at the mains terminals	1.64

2. Summary of Test Results

Result : PASS

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 Part15	Complied
3.2	Radiated Emission	FCC Part15	Complied

3. Description of Individual Tests

3.1 Conducted Emission

Test Information	
Test Engineer	Jang Tae Young
Test Date	September 21, 2004
Climate Condition	Ambient Temperature :24 ℃ Relative Humidity : 37% Atmospheric Pressure 1013mbar
Test Place	Shield Room

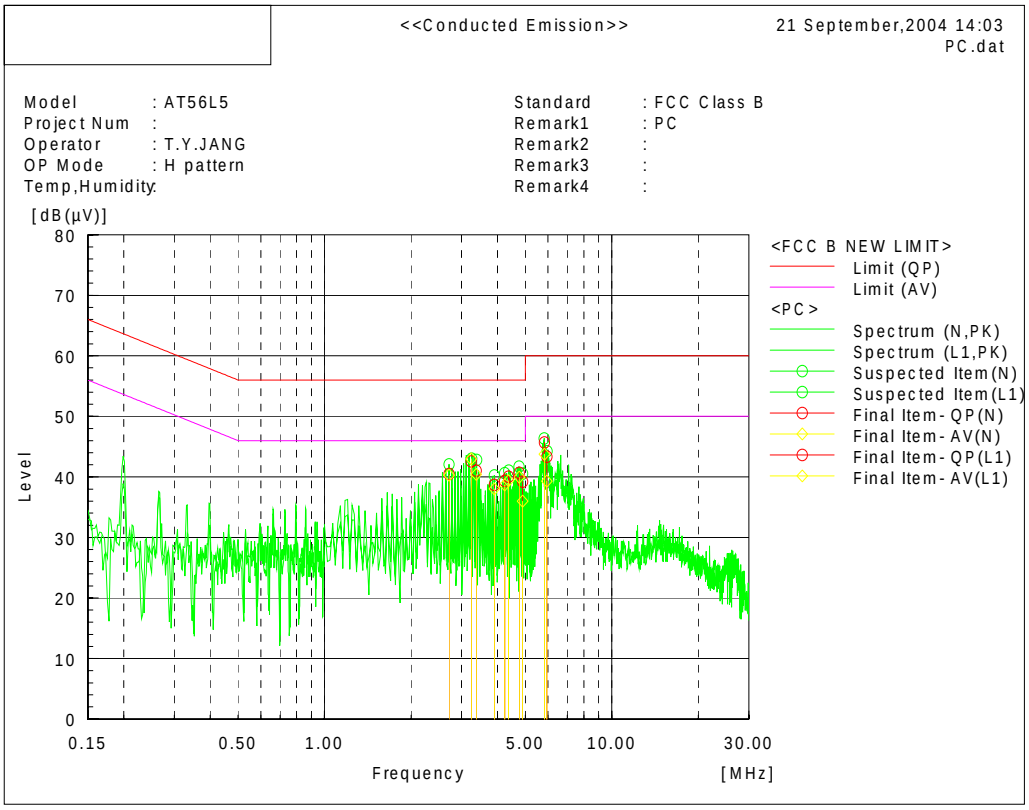
Test Equipments

Equipment	Modal Name	Manufacturer	Serial No.	Calibration	
				Next Date	Interval
Field strength meter	ESI	R&S	832692/002	2005-05-24	12
TV Signal Generator	PM5418-TDSI	PHILIPS	LO612437	2004-09-20	12
L.I.S.N	ESH3-Z5	R&S	100262	2005-02-11	12
Field strength meter	ESS	R&S	844661	2005-01-05	12
RF Relais Matrix	PSU	R&S	861206/024	N/A	12
Test Software	EP5CE	TOYO	None	N/A	N/A

Measurement Results	**Passed** The Measured emissions of the EUT have found to be below the specified limits.

Test Data & Graph

1. Analog - TEST DATA & GRAPH



Final Result

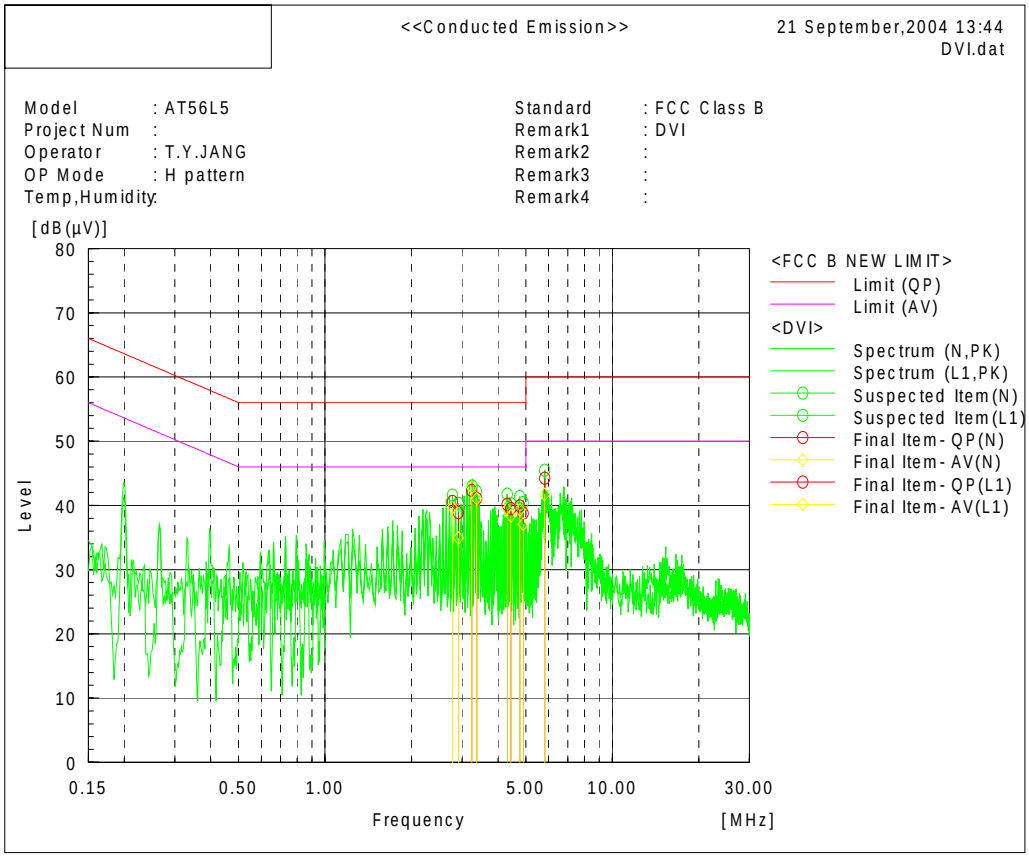
--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f [dB]	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)]	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB]
1	4.2342	39.2	38.5	0.2	39.4	38.7	56.0	46.0	16.7	7.3
2	4.7638	40.5	39.8	0.2	40.7	40.0	56.0	46.0	15.3	6.1
3	4.8957	39.0	35.8	0.2	39.2	36.0	56.0	46.0	16.8	10.0
4	5.9401	43.1	39.1	0.2	43.3	39.3	60.0	50.0	16.7	10.7

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f [dB]	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)]	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB]
1	2.7125	40.3	40.1	0.2	40.5	40.3	56.0	46.0	15.5	5.7
2	3.2417	42.3	42.8	0.2	42.5	43.0	56.0	46.0	13.5	3.0
3	3.374	40.8	40.2	0.2	41.0	40.4	56.0	46.0	15.0	5.6
4	3.9025	38.5	37.8	0.2	38.7	38.0	56.0	46.0	17.3	8.0
5	4.366	39.8	39.2	0.2	40.0	39.4	56.0	46.0	16.0	6.6
6	5.8218	45.6	43.7	0.1	45.7	43.8	60.0	50.0	14.3	6.2

2. DVI - TEST DATA & GRAPH



Final Result

--- N Phase ---

No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f [dB]	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)]	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB]
1	4.2987	40.0	39.2	0.2	40.2	39.4	56.0	46.0	15.9	6.6
2	4.762	39.7	39.1	0.2	39.9	39.3	56.0	46.0	16.1	6.7
3	4.8948	38.6	36.9	0.2	38.8	37.1	56.0	46.0	17.2	8.9

--- L1 Phase ---

No.	Frequency [MHz]	Reading QP [dB(µV)]	Reading AV [dB(µV)]	c.f [dB]	Result QP [dB(µV)]	Result AV [dB(µV)]	Limit QP [dB(µV)]	Limit AV [dB(µV)]	Margin QP [dB]	Margin AV [dB]
1	2.7773	40.4	39.5	0.2	40.6	39.7	56.0	46.0	15.4	6.3
2	2.9096	38.7	34.7	0.2	38.9	34.9	56.0	46.0	17.1	11.1
3	3.2412	42.2	42.7	0.2	42.4	42.9	56.0	46.0	13.6	3.2
4	3.3731	40.9	40.8	0.2	41.1	41.0	56.0	46.0	14.9	5.0
5	4.4317	39.3	38.2	0.2	39.5	38.4	56.0	46.0	16.5	7.6
6	5.820	44.2	41.6	0.1	44.3	41.7	60.0	50.0	15.7	8.3

3.2 Radiated Emission

Test Information	
Test Engineer	Jang Tae Young
Test Date	September 17, 2004
Climate Condition	Ambient Temperature : 24℃ Relative Humidity : 37% Atmospheric Pressure 1013mbar
Test Place	10m RF Semi Anechoic Chamber

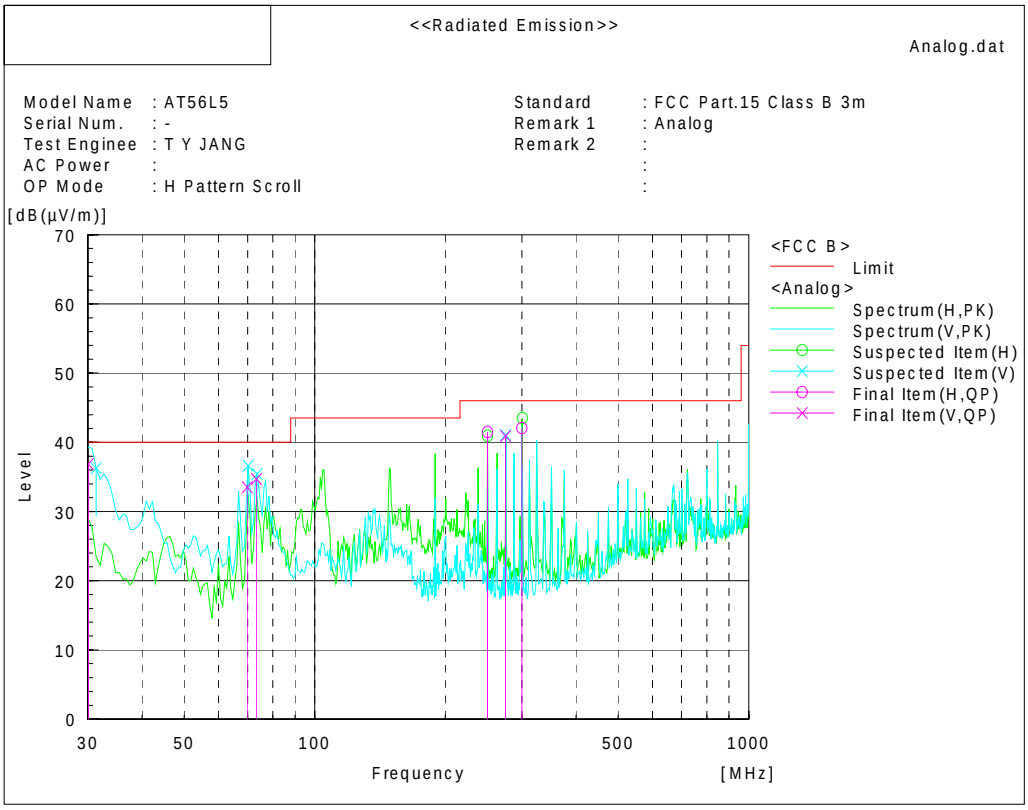
Test Equipments

Equipment	Modal Name	Manufacturer	Serial No.	Calibration	
				Next Date	Next Date
Field strength meter	ESCS	R&S	100104	2004-10-17	12
RF Selector	NS4900	TOYO	0303-015	N/A	N/A
Biconilog Antenna	6112B	SCHAFFNER	2767	2006-05-22	12
Mast Controller	HD2000	HD	HD20000902027	N/A	N/A
Test Software	EP5RE	TOYO	None	N/A	12
TV Signal Generator	PM5418-TDSI	PHILIPS	LO612437	2004-09-20	12
Spectrum Analyzer	E7405A	Agilent	MY42000109	2004-11-27	12

Measurement Results	Pass No Operation errors were detected during or after the applied test.

Test Data & Graph

1. Analog - TEST DATA & GRAPH



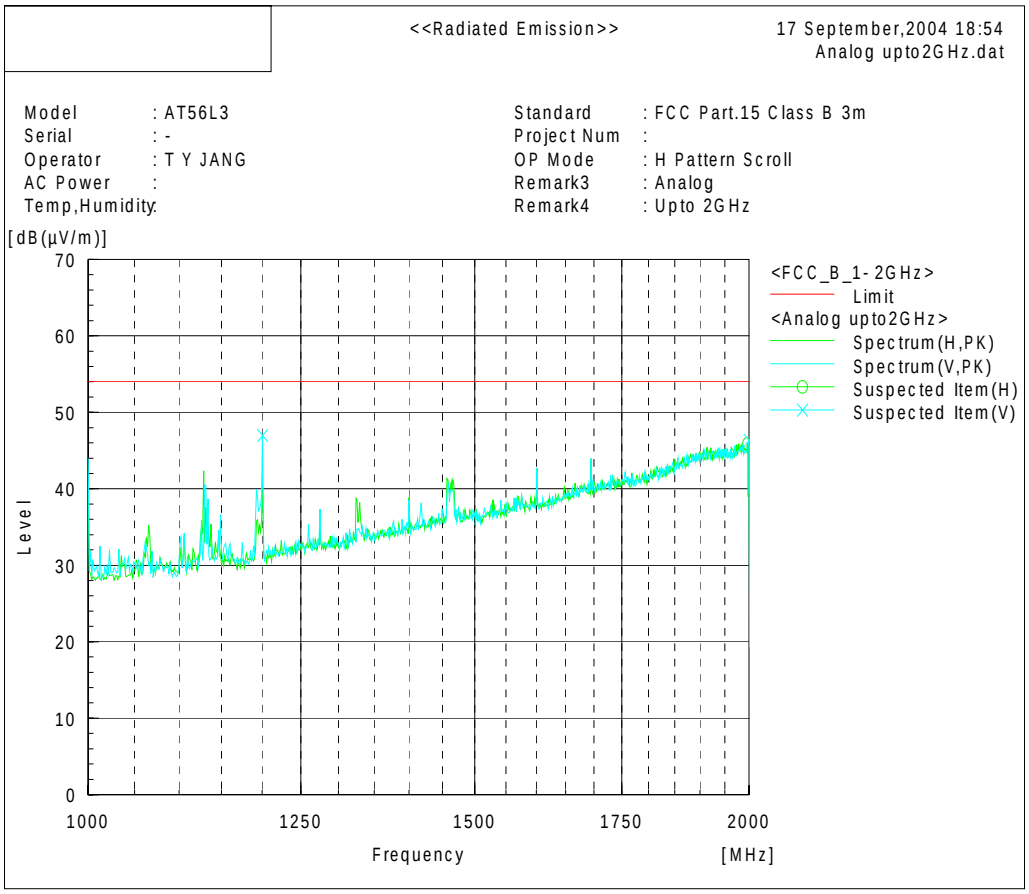
Final Result

--- Horizontal Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(µV)]	c.f [dB(1/m)]	Result [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]	Remark
1	249.996	57.7	-16.2	41.5	46.0	4.5	
2	299.990	56.0	-13.9	42.1	46.0	3.9	

--- Vertical Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(µV)]	c.f [dB(1/m)]	Result [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]	Remark
1	69.899	58.6	-25.1	33.5	40.0	6.5	
2	73.396	59.2	-24.5	34.7	40.0	5.3	
3	274.998	55.6	-14.7	40.9	46.0	5.1	
4	30.054	49.9	-13.0	36.9	40.0	3.1	



Spectrum Selection

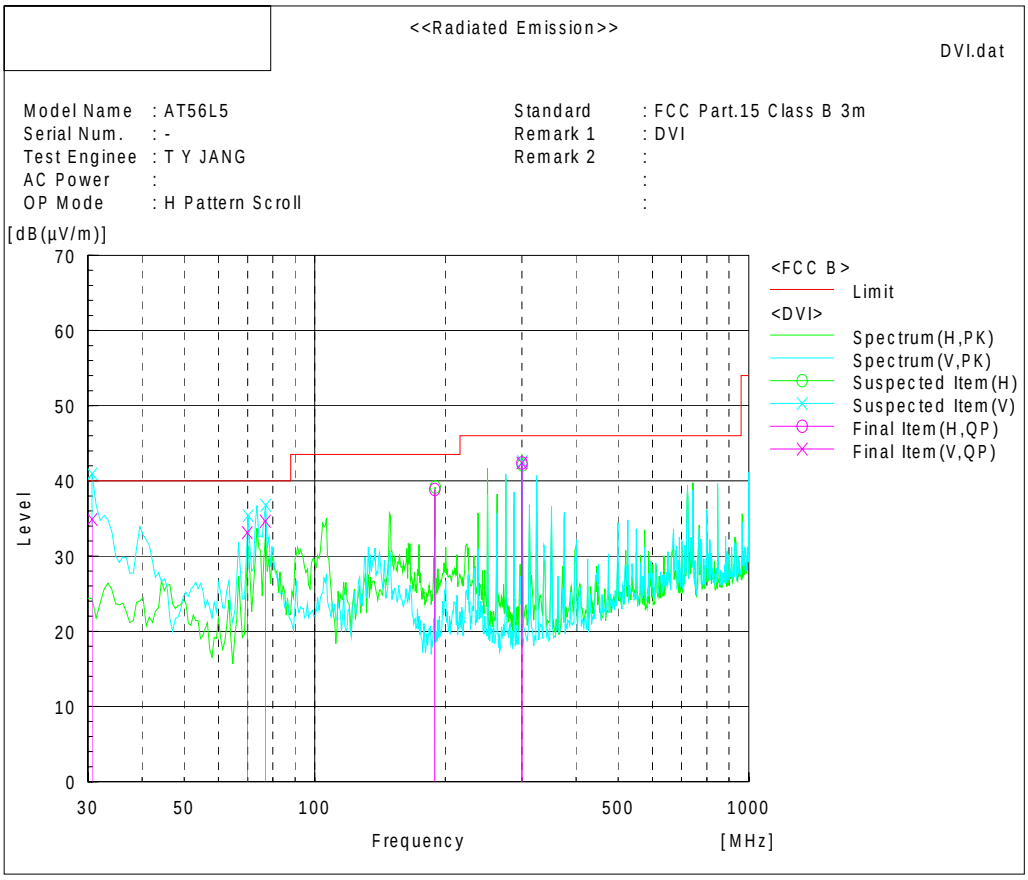
--- Horizontal Polarization ---

No.	Frequency	Reading	c.f	Result PK	Limit	Margin	Remark
	[MHz]	[dB(µV)]	[dB(1/m)]	[dB(µV/m)]	[dB(µV/m)]	[dB]	
1	1997.425	20.5	25.4	45.9	54.0	8.1	

--- Vertical Polarization ---

No.	Frequency	Reading	c.f	Result PK	Limit	Margin	Remark
	[MHz]	[dB(µV)]	[dB(1/m)]	[dB(µV/m)]	[dB(µV/m)]	[dB]	
1	1200.738	40.7	6.3	47.0	54.0	7.0	
2	1999.950	21.0	25.4	46.4	54.0	7.6	

2. DVI - TEST DATA & GRAPH



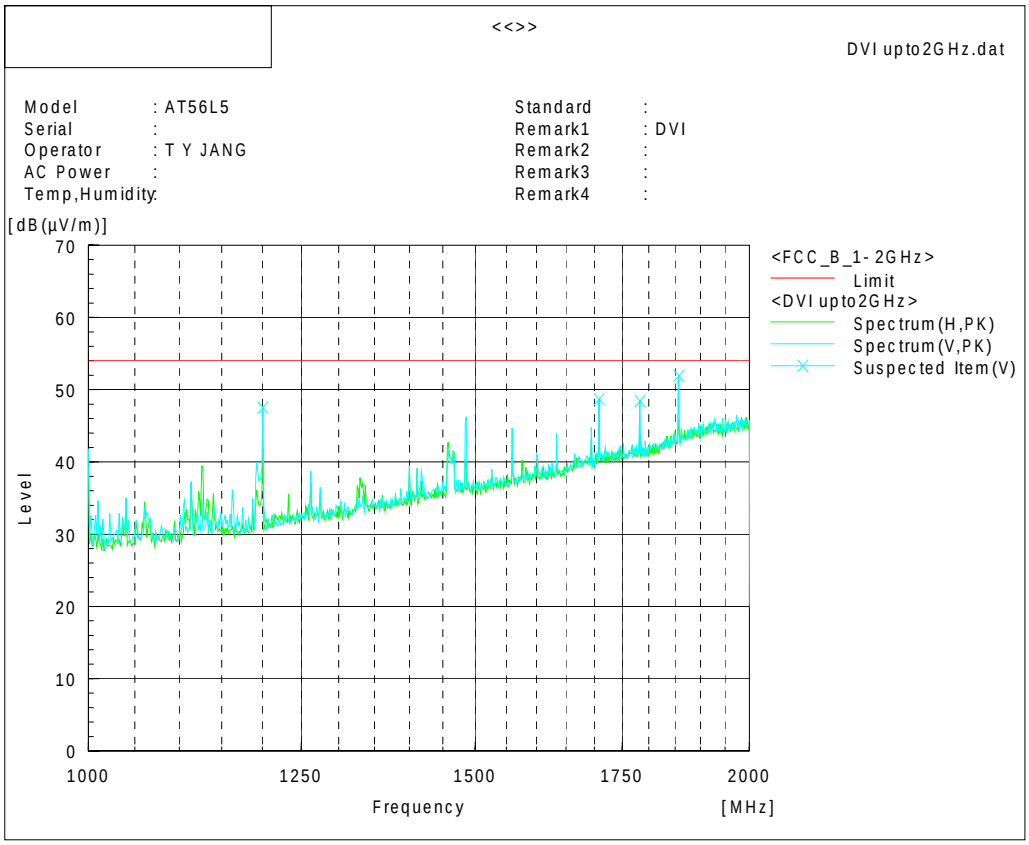
Final Result

--- Horizontal Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(µV)]	c.f [dB(1/m)]	Result [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]	Remark
1	188.976	58.7	-19.8	38.9	43.5	4.7	
2	299.990	56.3	-13.9	42.4	46.0	3.6	

--- Vertical Polarization (QP)---

No.	Frequency [MHz]	Reading [dB(µV)]	c.f [dB(1/m)]	Result [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]	Remark
1	30.682	48.2	-13.3	34.9	40.0	5.1	
2	69.899	58.2	-25.1	33.1	40.0	6.9	
3	76.892	58.3	-23.7	34.6	40.0	5.4	
4	299.990	56.3	-13.9	42.4	46.0	3.6	



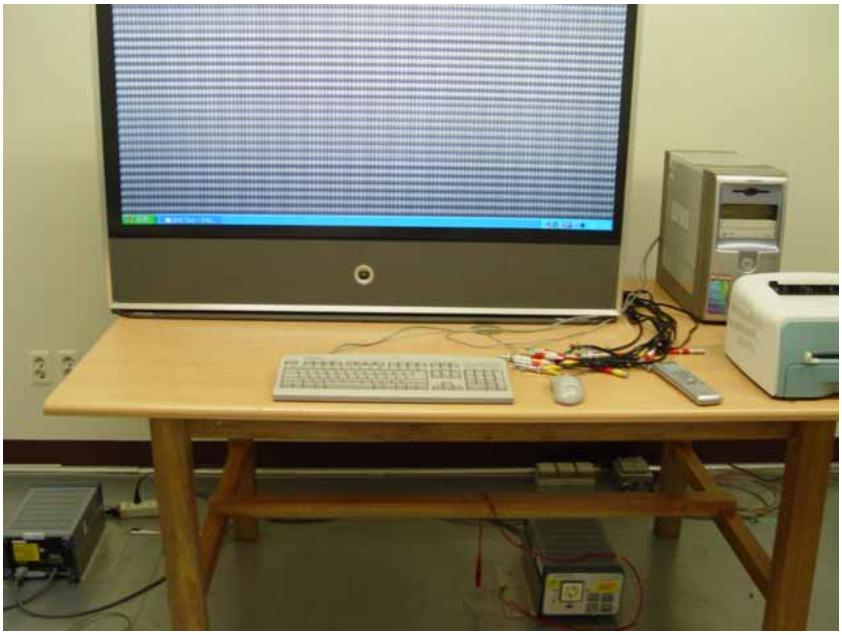
Spectrum Selection

--- Vertical Polarization ---

No.	Frequency [MHz]	Reading [dB(µV)]	c.f [dB(1/m)]	Result PK [dB(µV/m)]	Limit [dB(µV/m)]	Margin [dB]	Remark
1	1200.738	41.3	6.3	47.6	54.0	6.4	
2	1708.313	29.0	19.7	48.7	54.0	5.3	
3	1782.800	27.7	20.8	48.5	54.0	5.5	
4	1857.287	29.0	22.9	51.9	54.0	2.1	

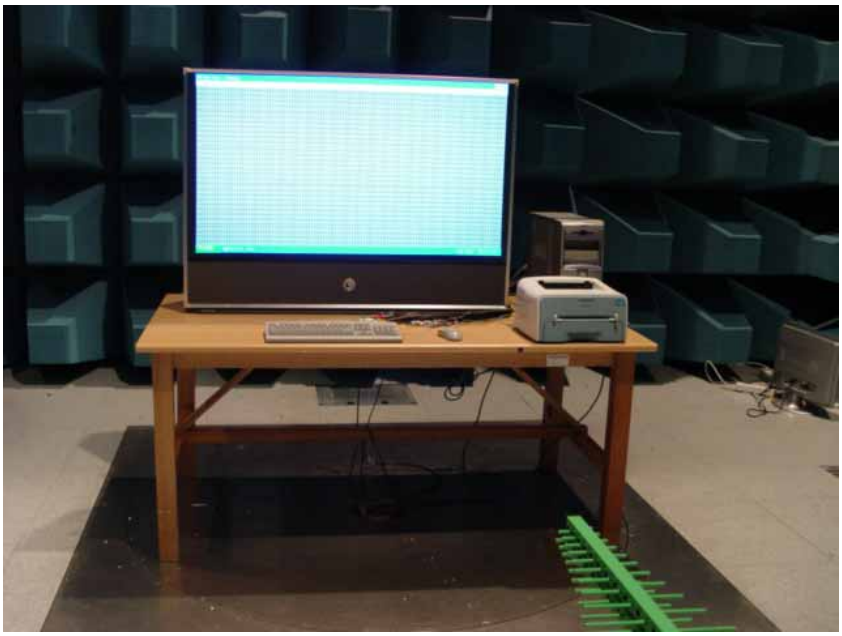
4. Appendix

4.1 Test Photography

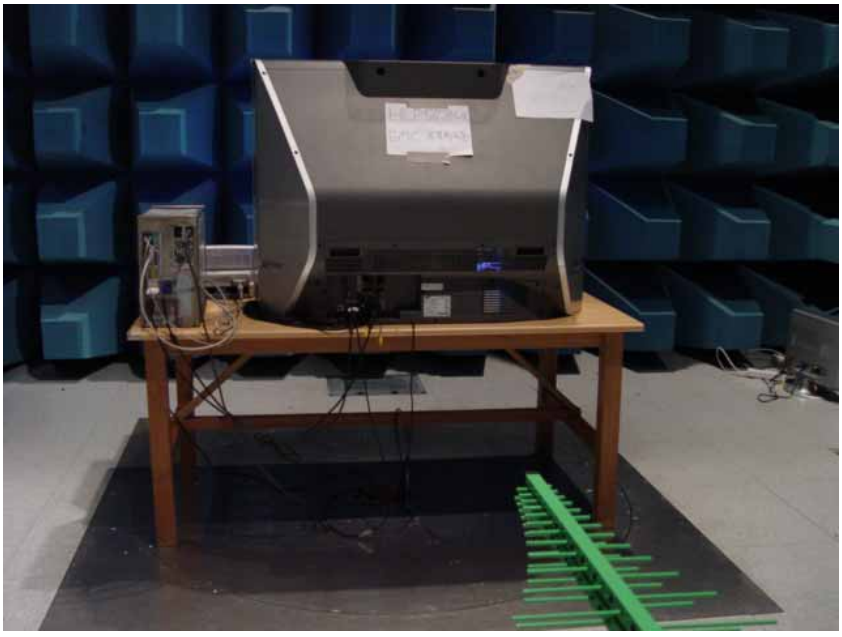


Pic. 1 Conducted Emission (Front)

Pic. 2 Conducted Emission (Rear)



Pic. 3 Radiated Emission (Front)



Pic. 4 Radiated Emission (Rear)

4.2 EUT Photography

Pic. 5 EUT (Front)

Pic. 6 EUT (Rear)

Pic. 7 EUT(Inside)

Pic. 7 EUT (Label)