EMI TEST REPORT

Test report No.: **EMC- FCC- 0239**

Type of equipment: **DLP TV MONITOR**

Model Name: **AT56L7**

FCC ID.: **A3LAT56L7X**

Applicant: **SAMSUNG ELECTRONICS CO., LTD.**

Test standards: **FCC part 15 subpart B, Class B**

Test Procedure and Items :
AC Power Line Conducted Emissions Measurement: ANSI C63.4-2001
Radiated Emissions Measurement : ANSI C63.4-2001

Test result : Complied

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.
The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of test: 2005. 03. 10 **Date of Issue: 2005. 03. 10**

Tested by: KIM, CHANG-MIN **Reviewed by:** CHUNG, MIN-SEOK

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1. Client information

Applicant: **SAMSUNG ELECTRONICS CO., LTD.**
Address: 416, Maetan-3Dong, Yeongtong-Gu, Suwon City, Gyeonggi-Do, Korea 442-742
Telephone number: + 82-31-200-5419
Facsimile number: + 82-31-200-5402
Contact Person: Chang-young, Choi

Manufacturer: **SAMSUNG ELECTRONICS CO., LTD.**
Address: 416, Maetan-3Dong, Yeongtong-gu, Suwon City, Gyeonggi-Do, Korea 442-742

2. Laboratory information

Address

EMC compliance Ltd.

82-1, JEIL-RI, YANGJI-MYUN, YOUNGIN-CITY, KYUNGGI-DO, KOREA

Telephone Number : 82 31 336 9919

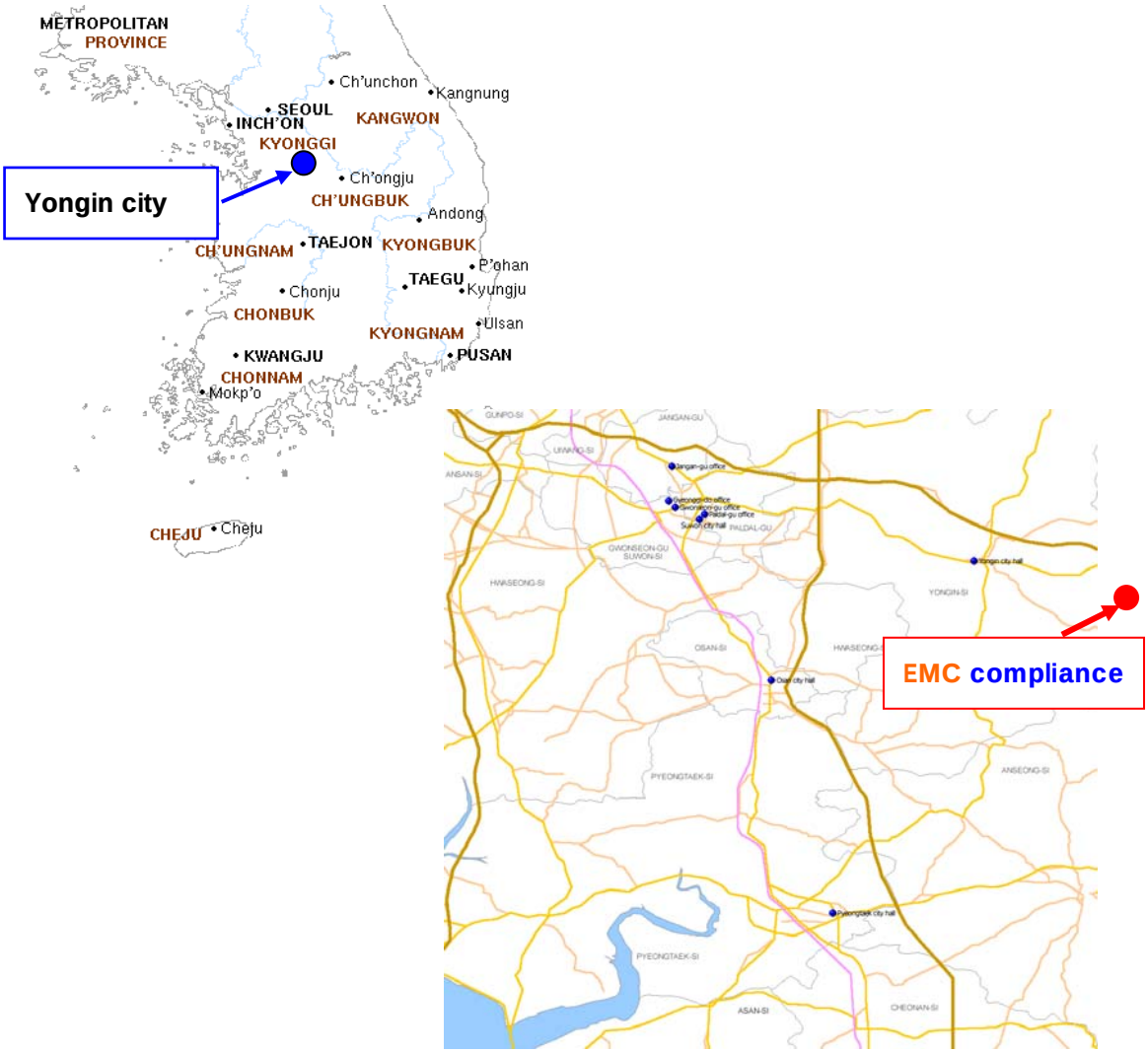
Facsimile Number : 82 31 336 4767

FCC Filing No. : 793334

VCCI Registration No. : C-1713, R-1606

KOLAS NO.: 231

SITE MAP



3. Test system configuration

3.1 Operation Environment

	Temperature	Humidity	Pressure
OATS :	2 °C	39 %	1008 hPa
Shielded room :	24 °C	40 %	1006 hPa

Test site

These testing were performed following locations;

Shielded room: Conducted emission
OATS (3m) : Radiated emission

3.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMI. The factors contributing to uncertainties are test receiver, Cable Loss, antenna factor calibration, Antenna directivity, antenna factor Variation with height, antenna phase center variation, antenna Frequency interpolation, measurement distance variation, Site imperfection, mismatching, and system repeatability.

Based on NIS 80, 81, the measurement uncertainty level with a 95% confidence level was applied.

3.3 Sample calculation

Conducted emission

The field strength is calculated by adding the LISN factor, cable loss from the measured reading.
The sample calculation is as follows :

FS = MR + LF + CL

MR = Meter Reading
LF = LISN Factor
CL = Cable Loss

If MR is 30dB, LISN Factor 1dB, CL 1dB
The result (MR) is
30 + 1 + 1 = 32dBuV

Radiated emission

The field strength is calculated adding the antenna Factor, cable loss and, Antenna pad adding, subtracting the amplifier gain from the measured reading.
The sample calculation is as follows :

FS = MR + AF + CL + AT -AG
MR = Meter Reading
AF = Antenna Factor
CL = Cable Loss
AP = Antenna Pad
AG=Amplifier Gain

If MR is 30dB, AF 12dB, CL 5dB, AP 10dB, AG 35dB
The result (MR) is
30 + 12 + 5 + 10 –35 = 22dBuV/m

4. Description of EUT

4.1 Product description

Applicant/ Manufacturer:	SAMSUNG ELECTRONICS CO., LTD
Address of Applicant:	416, Maetan-3Dong, Paldal-Gu, Suwon City, Gyeonggi, Korea.
Type of equipment:	DLP TV MONITOR
Basic Model:	AT56L7
Serial number:	HLR5688WX/XAA
Tuner Type No. :	DNVD355BV401A
Tuner manufacturer :	SAMSUNG ELECTRO-MECHANIC
Sub-Tuner Type No. :	TMQH2-502A
Sub-Tuner manufacturer :	ALPS
Power Rating:	120V, 60Hz

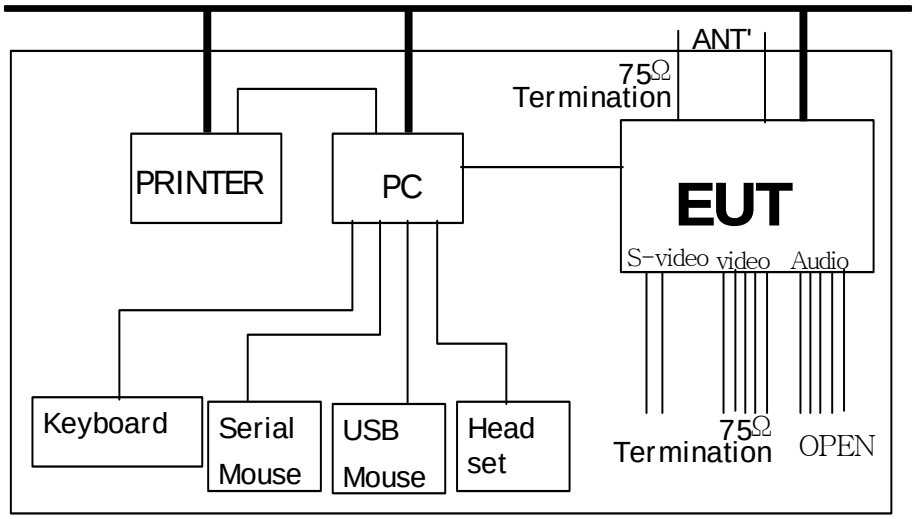
4.2 Peripherals

Description	Model / Part #	Serial number	Manufacture
TV pattern generator	PM5515	L04831	PHILIPS
PC	MP11	A24692GT300039	SAMSUNG
Printer	EPSON STYLUS C60	DR5K014977	EPSON
Keyboard	KU-9978	B35760KGAKJ02B	COMPAQ
Serial Mouse	SWW-23	N/A	A4Tech
USB Mouse	M-UV69a	HCA40800279	SAMSUNG

4.3 Used cables

Start		END		Cable Spec.	
Name	**I/O Port**	**Name**	**I/O Port**	**Length**	**Shield**
EUT	BNC	ANT'	BNC	3.0	Shield
	BNC	-	OPEN	3.0	Shield
	D-SUB	PC	D-SUB	1.8	Shield
	RCA	-	OPEN	2.0	Shield
	RCA	-	c	2.0	Shield

4.4 E.U.T. test configuration



4.5 Operating conditions

Operating : “H” pattern, Scrolling mode.

5. Summary of test results

5.1 Modification to the E.U.T.

- None

5.2 Standards & results

FCC Part 15 Subpart B (Class B)
ANSI C63.4 – 2001

Test items	Test methods	Result
Conducted emission	ANSI C63.4-2001	Pass
Radiated emission	ANSI C63.4-2001	Pass

6. Test results

6.1 Conducted emission

6.1.1 Measurement procedure

Mains

The measurements were performed in a shielded room.
EUT was placed on a non-metallic table height of 0.1m above the reference ground plane.
The rear of tabletop was located 0.4m to the vertical conducted plane.
All other surfaces of tabletop were at least 0.8m away from any other grounded conducting surface.
Cables were folded back and forth forming a bundle 0.3m to 0.4m long and were hanged at a 0.4m height to the ground plane.
Each EUT power lead, except ground (safety) lead, was individually connected through a LISN to input power source.
Both lines of power cord, hot and neutral were measured.

6.1.2 Used equipments

Equipment	Model	Serial no.	Makers	Next Cal. date	Used
Test receiver	ESHS10	843276/003	R&S	05.05.13	☒
L.I.S.N.	ESH3-Z5	100267	R&S	05.06.14	☒
	L3-32A	0120J20305	PMM	05.04.03	☒
Test site	Shield room	-	-	-	☒

6.1.3 Measurement uncertainty

Conducted emission measurement : (K=2)
9kHz-150 kHz : ±3.48
150kHz-300 MHz : ±3.05

6.1.4 Test data

Frequency	Correction Factor		Line	Quasi-peak			Average		
				Limit	Reading	Result	Limit	Reading	Result
[MHz]	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
0.396	0.08	0.2	H	57.94	34.77	35.05	47.94	29.02	29.30
0.399	0.10	0.2	N	57.87	35.01	35.31	47.87	30.53	30.83
0.465	0.08	0.2	H	56.60	40.61	40.89	46.60	38.01	38.29
0.468	0.10	0.2	N	56.55	39.88	40.18	46.55	36.91	37.21
0.597	0.09	0.2	H	56.00	39.51	39.80	46.00	35.49	35.78
0.600	0.10	0.2	N		40.63	40.93		36.02	36.32
0.669	0.10	0.2	N		37.17	37.47		34.34	34.64
3.070	0.14	0.4	H		37.35	37.89		34.20	34.74
20.040	0.86	0.5	N	60.00	37.11	38.47	50.00	33.10	34.46
21.510	0.89	0.5	N		38.81	40.20		34.38	35.77
21.910	0.89	0.5	N		39.01	40.40		33.62	35.01
22.039	0.94	0.5	H		38.00	39.44		35.15	36.59

- Note. QP = Quasi-Peak, AV= Average / LINE(N) : NEUTRAL, LINE(H) : HOT
- Loss = LISN Loss + Cable Loss
- Measurement time : 1 s

6.1.5 Result

Complied

6.2 Radiated emission

6.2.1 Measurement procedure

A pretest was performed at 3m distance in a semi-anechoic chamber for searching correct frequency. The final test was done at a 10m open area test site with a quasi-peak detector.
EUT was placed on a non-metallic table height of 0.1m above the reference ground plane.
Cables were folded back and forth forming a bundle 0.3m to 0.4m long and were hanged at a 0.4m height to the ground plane.
Cables connected to EUT were fixed to cause maximum emission.
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 to obtain the maximum signal strength.

6.2.2 Used equipments

Equipment	Model no.	Serial no.	Makers	Next cal. date	Used
Test receiver	ESVS10	82786/006	R&S	05.05.14	☒
TRILOG Broadband Antenna	VULB 9160	3138	SCHWARZBECK	05.04.10	☒
Antenna Mast	A109	N/A	DEAIL	-	☒
Turn Table	TS14	N/A	DEAIL	-	☒
10m OATS	-	-	EMC Compliance	-	☒

6.2.3 Measurement uncertainty

Radiated Emission measurement : (K=2)
30-300 MHz ; 3 m: ±3.56, 10 m: ±3.50
300-1000 MHz ; 3 m: ±4.47, 10 m: ±2.64

6.2.4 Test data

* 3 m OATS
* *Note : Reading = Test Receiver meter,*
P= Polarization → POL H = Horizontal, POL V = Vertical
* *Result = Field Strength (Antenna factor + Cable factor + Reading)*

Frequency	Reading	Pol.	Height	angle	Correction Factor		Limits	Result	Margin
[MHz]	[dBuV/m]		[m]		Antenna	Cable	[dBuV/m]	[dBuV/m]	[dB]
32.00	15.3	V	1.0	285	12.30	0.54	40.0	28.14	11.86
133.54	19.8	V	1.0	103	12.85	1.36	43.5	34.01	9.49
399.67	8.7	V	1.0	3	15.30	2.89	46.0	26.89	19.11
400.00	9.5	H	1.0	282	15.32	2.90	46.0	27.72	18.28
899.99	10.1	H	1.2	30	22.56	5.59	46.0	38.25	7.75

6.2.5. Result

Complied

7. Test Graphs

Conducted Emission test graph

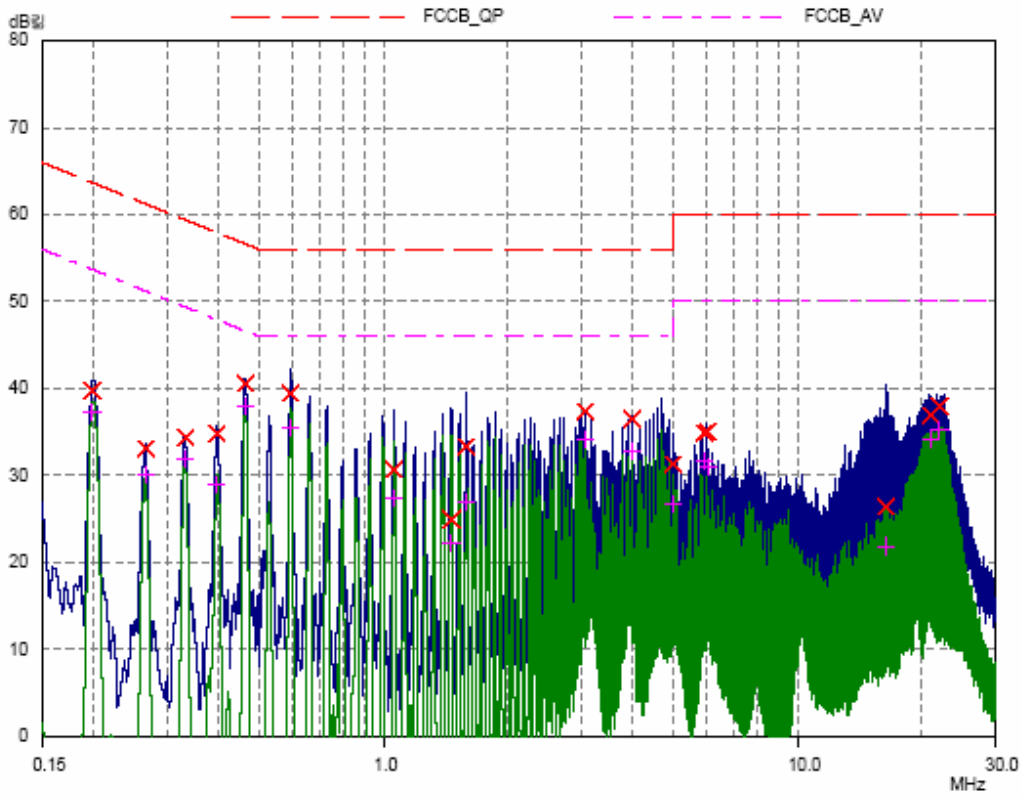
EUT:
Manuf: SEC
Op Cond: H
Operator:
Test Spec: FCC Class B Conducted Emission
Comment: VGA MODE

Result File: sectv_vh.dat : SEC TV VGA

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 25 dB



EUT:
Manuf: SEC
Op Cond: N
Operator:
Test Spec: FCC Class B Conducted Emission
Comment: VGA MODE

Result File: sectv_vn.dat : SEC TV VGA

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 25 dB