

# EMI TEST REPORT

**Test report No.:** EMC- FCC- 0297

**Type of equipment:** DLP TV

**Model Name:** AT71L6

**FCC ID.:** A3LAT71L6D

**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. 06. 16**

**Date of Issue: 2005. 06. 17**

**Tested by:** \_\_\_\_\_



SEO, JUNG-HUN

**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, YONGIN-CITY, KYUNGGI-DO, KOREA

Telephone Number : 82 31 336 9919

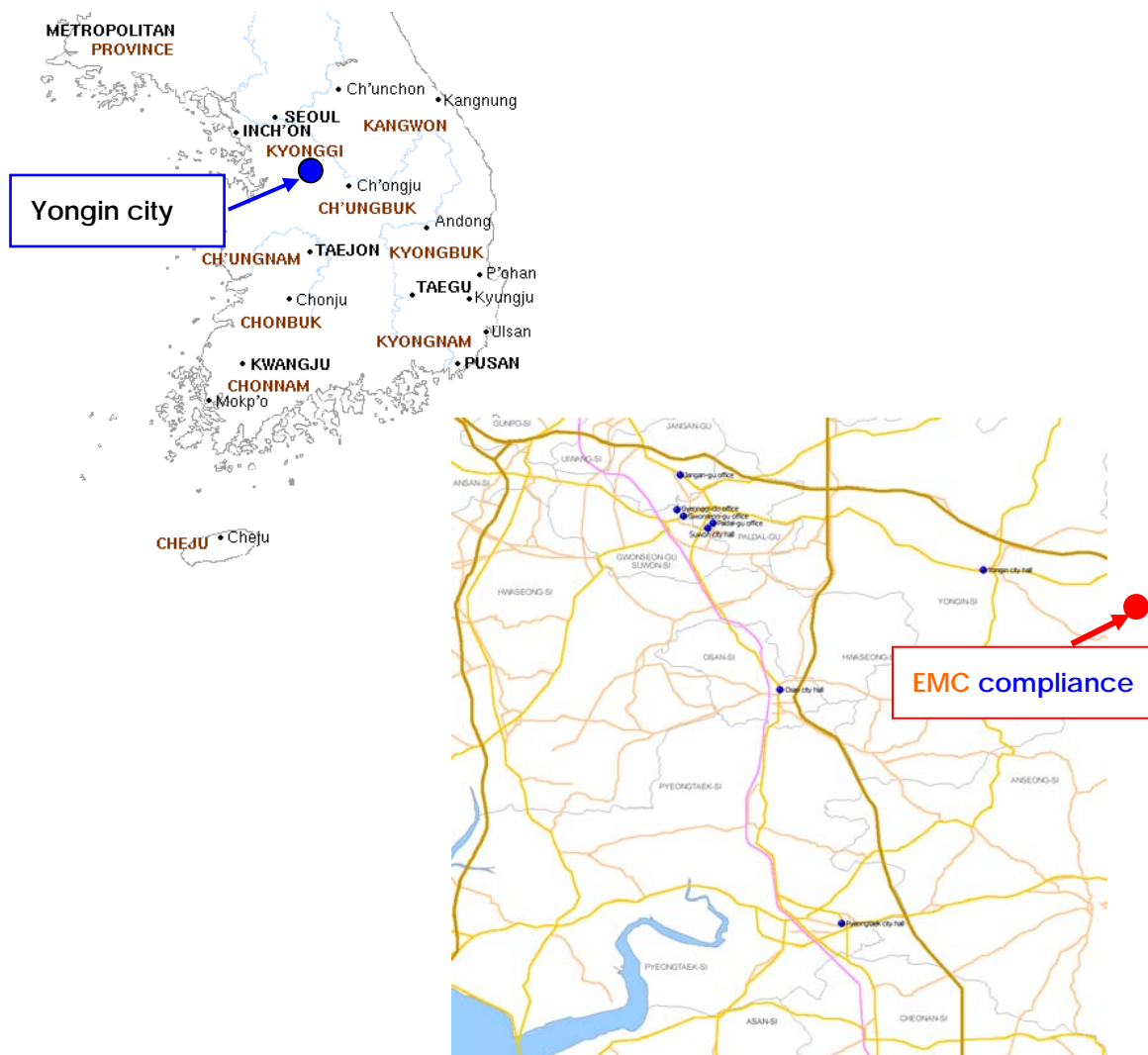
Facsimile Number : 82 31 336 4767

FCC Filing No. : 793334

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

KOLAS NO.: 231

### SITE MAP



**EMC Compliance Ltd.**

82-1, JEIL-RI, YANGJI-MYUN, YONGIN-CITY, KYUNGGI-DO, 449-825 KOREA  
TEL: 82 31 336 9919 FAX : 82 31 336 4767

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### 3. Test system configuration

#### 3.1 Operation Environment

	Temperature	Humidity	Pressure
OATS :	25 °C	38 %	1004 hPa
Shielded room :	26 °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 :

$$\text{FS} = \text{MR} + \text{LF} + \text{CL}$$

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

If MR is 30dB, LISN Factor 1dB, CL 1dB

The result (MR) is

$$30 + 1 + 1 = 32\text{dBuV}$$

#### 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 :

$$\text{FS} = \text{MR} + \text{AF} + \text{CL} + \text{AT} - \text{AG}$$

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

$$30 + 12 + 5 + 10 - 35 = 22\text{dBuV/m}$$

## 4. Description of EUT

### 4.1 Product description

Applicant/ Manufacturer:	SAMSUNG ELECTRONICS CO., LTD
Address of Applicant:	416, Maetan-3Dong, Yeongtong-Gu, Suwon City, Gyeonggi-Do, Korea 442-742
Kind of product:	DLP TV MONITOR
Basic Model:	AT71L6
Rating:	AC 110-120V, 60Hz
Maximum Resolution:	1920 × 1080, 60Hz

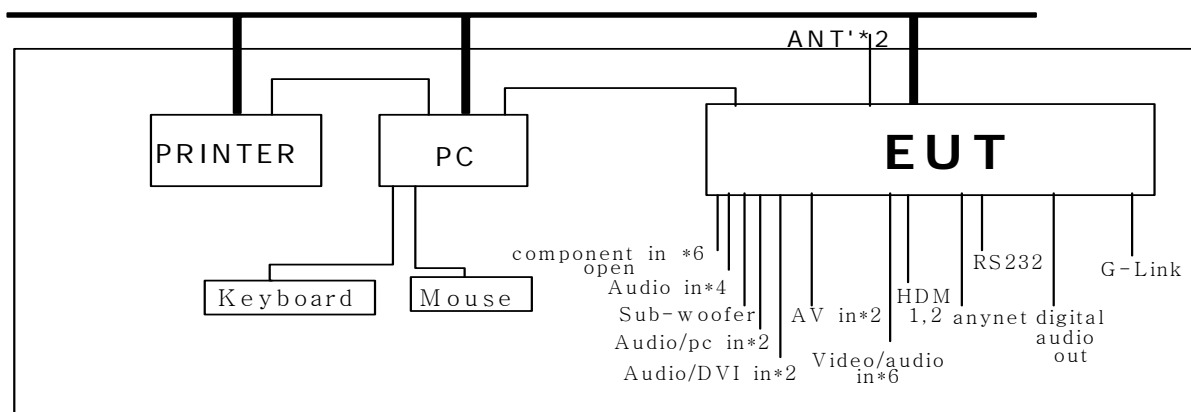
### 4.2 Peripherals

Description	Model / Part #	Serial number	Manufacturer	FCC
PC	M5330	490092EN50337	SAMSUNG	DOC
PRINTER	EPSON STYLUS C60	DR5K015097	EPSON	DOC
KEYBOARD	SK-8110	MY-04N729- 71619-53E- 0680	DELL	DOC
MOUSE	OF2854	501039651	DELL	DOC

### 4.3 Used cables

Start		END		Cable Spec.	
Name	I/O Port	Name	I/O Port	Length	Shield
<b>EUT</b>	D-SUB	PC	D-SUB	2.0	Shield
	Component in	OPEN	-	3.0	Shield
	Audio in	OPEN	-	3.0	Shield
	SUB-WOOFER	OPEN	-	3.0	Shield
	Audio/PC in	OPEN	-	3.0	Shield
	Audio/DVI in	OPEN	-	3.0	Shield
	AV out	OPEN	-	3.0	Shield
	Video/Audio in	OPEN	-	3.0	Shield
	HDM 1,2	OPEN	-	3.0	Shield
	Anynet	OPEN	-	3.0	Shield
	RS232	OPEN	-	3.0	Shield
	Digital Audio out	OPEN	-	3.0	Shield
	ANT1,2	OPEN	-	3.0	Shield
	G-Link	OPEN	-	3.0	Shield

### 4.4 E.U.T. test configuration



### 4.5 Operating conditions

Operating : "H" pattern scrolling test mode. (1920X1080, 60Hz)

## 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	06.05.13	<input checked="" type="checkbox"/>
L.I.S.N.	ESH3-Z5	100267	R&S	06.06.14	<input checked="" type="checkbox"/>
	L3-32A	0120J20305	PMM	06.04.03	<input checked="" type="checkbox"/>
Test site	Shield room	-	-	-	<input checked="" type="checkbox"/>

### 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 [MHz]	Correction Factor		Line	Quasi-peak			Average		
	LISN	Cable		Limit	Reading	Result	Limit	Reading	Result
				[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]
0.198	0.03	0.2	N	63.69	44.63	44.86	53.69	41.19	41.42
0.261	0.03	0.2	H	61.40	34.21	34.44	51.40	28.04	28.27
0.264	0.03	0.2	N	61.30	38.28	38.51	51.30	32.38	32.61
0.327	0.08	0.2	H	59.53	37.46	37.74	49.53	32.61	32.89
0.330	0.09	0.2	N	59.45	36.98	37.27	49.45	32.50	32.79
0.405	0.10	0.2	N	57.75	32.33	32.63	47.75	28.28	28.58
0.591	0.09	0.2	H	56.00	25.95	26.24	46.00	23.44	23.73
0.984	0.10	0.4	H		18.57	19.07		16.64	17.14
6.050	0.20	0.5	N	60.00	26.54	27.24	50.00	22.30	23.00
6.100	0.19	0.5	H		16.55	17.24		6.74	7.43
14.360	0.60	0.5	N		25.36	26.46		11.46	12.56
18.810	0.84	0.5	N		23.79	25.13		16.42	17.76
18.940	0.91	0.5	H		18.55	19.96		13.43	14.84

- 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	06.05.14	<input checked="" type="checkbox"/>
TRILOG Broadband Antenna	VULB 9160	3138	SCHWARZBECK	06.04.10	<input checked="" type="checkbox"/>
Antenna Mast	A109	N/A	DEAIL	-	<input checked="" type="checkbox"/>
Turn Table	TS14	N/A	DEAIL	-	<input checked="" type="checkbox"/>
10m OATS	-	-	EMC Compliance	-	<input checked="" type="checkbox"/>

### 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 [MHz]	Reading [dBuV/m]	Pol.	Height [m]	angle	Correction Factor		Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
					Antenna	Cable			
41.49	18.3	V	1.0	125	11.99	0.60	40.0	30.89	9.11
133.70	14.8	H	2.0	234	12.12	1.80	43.5	28.72	14.78
134.76	16.0	H	2.0	67	12.19	1.80	43.5	29.99	13.51
400.00	16.7	V	1.0	11	15.45	3.80	46.0	35.95	10.05
487.50	15.3	V	1.0	292	17.22	4.30	46.0	36.82	9.18
732.52	13.7	V	1.0	202	21.30	6.10	46.0	41.10	4.90
862.49	11.4	H	1.9	186	22.62	7.00	46.0	41.02	4.98
943.58	10.7	V	1.2	281	23.89	7.40	46.0	41.99	4.01
964.27	12.4	V	1.0	261	24.03	7.50	54.0	43.93	10.07

#### 6.2.5. Result

Complied

## 7. Test photographs

### Conducted emission



Radiated Emission



## 8. Test Graphs

### Conducted Emission test graph

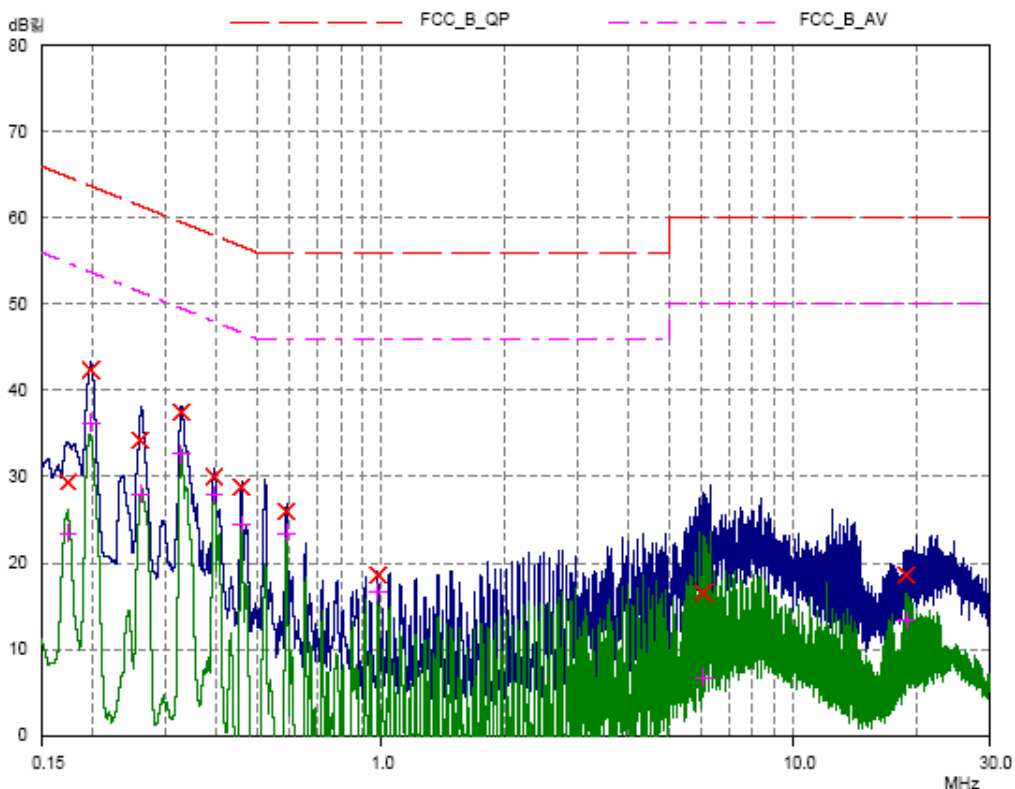
EUT: HLR7178WX/XAA  
 Manuf: SAMSUNG  
 Op Cond: HOT  
 Operator:  
 Test Spec: FCC Class B Conducted Emission  
 Comment:

Result File: hlr7178h.dat : SAMSUNG DLP TV

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: HLR7178WX/XAA  
 Manuf: SAMSUNG  
 Op Cond: NEUTRAL  
 Operator:  
 Test Spec: FCC Class B Conducted Emission  
 Comment:

Result File: hlr7178n.dat : SAMSUNG DLP TV

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

