

HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

Product Compliance Division, EMC Team
SAN 136-1, AMI-RI , BUBAL-EUP, ICHEON-SI, KYOUNKI-DO, 467-701, KOREA
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TEST REPORT

Manufacture;
HYUNDAI IT CORP.

SAN 136-1, AMI-RI , BUBAL-EUP, ICHEON-SI,
KYOUNKI-DO, 467-701, KOREA

HYUNDAI IMAGEQUEST FRN : 0005-8664-39

Date of Issue : Apr. 16. 2007

Test Report No.: HCT-F07-0404

Test Site: HYUNDAI CALIBRATION & CERTIFICATION
TECHNOLOGIES CO., LTD.

HCT FRN : 0005-8664-21

FCC ID :

PJILT46DW000

MODEL / TYPE:

LT46DW000

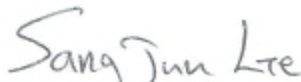
Rule Part(s): Part 15 & 2
Equipment Class: FCC Class B Peripheral Device (JBP)
Standard(s): FCC Class B: (CISPR 22)
EUT Type: LCD TV
Max. Resolution(s): 1920 X 1080 (@/60Hz)
Port/Connector(s): AV 1 In, AV 2 Out, Component Audio In 1, Component Audio In 1,
Component Audio In 2, Component Audio In 2, AV 3 In, S-Video In,
ANT. In, HDMI Out, AC In, USB, Serial, AC In, D-Sub In
LCD Panel: LTA460HS-LH4/ SAMSUNG

This equipment has been shown to be in compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.4-2003

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.



Report prepared by
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Approved by
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MEASUREMENT REPORT

1.Scope

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission.

Applicant Name:	HYUNDAI IT Corp.
Address:	SAN 136-1, AMI-RI , BUBAL-EUP, ICHEON-SI, KYOUNKI-DO, 467-701,KOREA

- FCC ID : PJILT46DW000
- Equipment Class: FCC Class B Peripheral Device (JBP)
- EUT Type: LCD TV
- Max. Resolution: 1920 X 1080 (@60Hz)
- Panel: LTA460HS-LH4/ SAMSUNG
- Rule Part(s): FCC Part 15 Subpart B
- Test Procedure(s): ANSI C63.4 (2003)
- Dates of Tests: Apr 10. 2007 ~ Apr. 12. 2007
- Place of Tests: 254-1,MAEKOK-RI,HOBUP-MYUN,ICHON-SI,KYOUNGKI-DO,467-701,KOREA

2.1 INTRODUCTION

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz (ANSI C63.4-2003) was used in determining radiated and conducted emissions emanating from **HYUNDAI IT CORP. LCD TV FCC ID: PJILT46DW000**

The open area test site and conducted measurement facility used to collect the radiated data are located at the 254-1, MAEKOK-RI, HOBUP-MYUN, ICHON-SI, KYOUNGKI-DO, 467-701, KOREA. The site is constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated July 23, 2003 (Confirmation Number: EA90661)

3.1 PRODUCT INFORMATION

3.2 Equipment Description

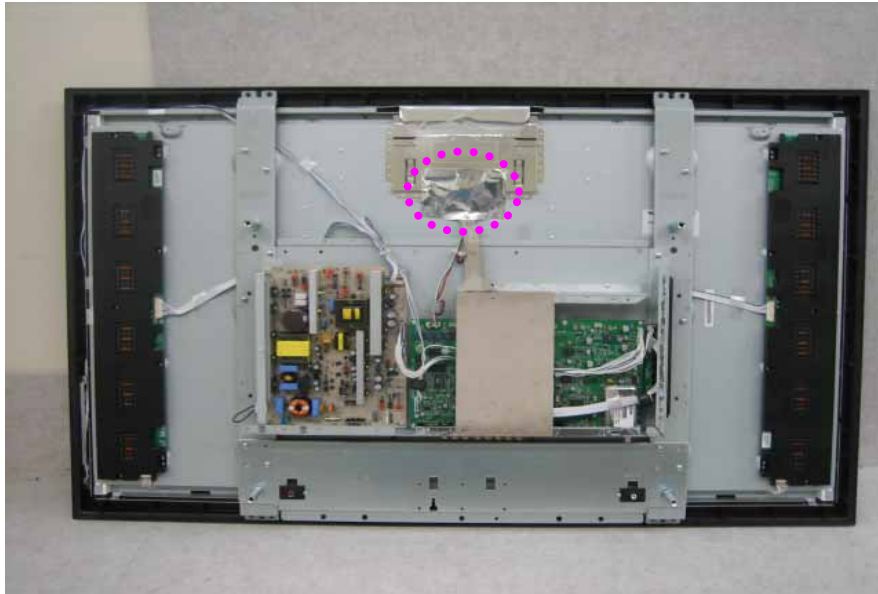
Equipment Under Test (EUT) is the **HYUNDAI IT CORP.** (Model : **LT46DW000**) LCD TV

FCC ID: **PJILT46DW000**

Model		LT46DW000
Input	S-Video	1(A/V audio common)
	Video (RCA)	2(Audio included)
	Component(Y/Cb/Cr)	2(Audio included)
	Antenna	1
	PC Connection jack	D-SUB
	Max. resolution	1920 X 1080 @ 60 Hz
	Audio	L/R
	HDMI	2
	Memory Slot	No
Output	Video	1
	Audio	2(L/R, SPDIF)
TV/Video	Analog	NTSC M / FM
	Digital	ATSC
	Video system	Component, S-Video, Composite, PC, HDMI
Power	Supply	AC 100 - 240 V, 50/60 Hz
	Consumption power	260W (Typical)
	Stand-by power	< 1W
Dimension (W x D x H mm - Stand included)	1323 x310 x 757	
Weigh (Stand included)	31.5 Kg	
Control type	Remote control, Key control	

3.3 EMI Suppression Devices

Attached the Aluminum tape



Attached the Core



4.1 Description of Tests(Conducted)

4.2 Powerline Conducted RFI (150kHz- 30MHz)

The power line conducted RFI measurements were performed according to ANSI C63.4 (2003). The EUT was placed on a non-conducting 1.0 by 1.5 meter table which is 0.8 meters in height and 0.40 meters away from the vertical wall of the shielded enclosure. Power to the EUT is provided through a Rohde & Schwarz 50 Ω / 50 uH Line Impedance Stabilization Network (LISN) and the support equipment through a separate Solar 50 Ω / 50 uH Line- Conducted Test Facility LISN. Sufficient time for the EUT, support equipment, and test equipment were allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME. The spectrum was scanned from 150kHz to 30 MHz. Each maximum EME was remeasured using an EMI receiver. The detector function of the receiver was set to CISPR quasi- peak and average mode with the bandwidth set to 9 kHz. Each emission was maximized consistent with the typical applications by varying the configuration of the test sample. Interface cables were connected to the available interface ports of the test unit. The effect of varying the position of cables was investigated to find the configuration that produces maximum Diagram emission. Excess cable lengths were bundled at the center with 30- 40cm. in length. The worst-case configuration is noted in the test report and the photographs are attached. Each EME reported was calibrated using the Rohde & Schwarz SMT signal generator and are listed on Table 1. RFI Conducted FCC Class B.

RFI CONDUCTED	FCC CLASS B Limits dB(uV)	
Freq. Range	Quasi-Peak	Average
150kHz - 0.5MHz	66-56**	56-46**
0.5MHz – 5MHz	56	46
5MHz - 30MHz	60	50
**Limits decreases linearly with the logarithm of frequency		

Table 1. RFI Conducted Limits

4.3 Description of Tests(Radiated)

Radiated Emissions

Preliminary measurements were made indoors at 3 meter using broadband antennas, broadband amplifier, and spectrum analyzer to determine the frequency producing the maximum EME. Appropriate precaution was taken to ensure that all EME from the EUT were maximized and investigated. The spectrum was scanned from 30 to 1000 MHz using Tri-log antenna, and above 1 GHz using linearly polarized horn antennas. For frequencies above 1 GHz, horn antennas were used. Sufficient time for the EUT, support equipment, and test equipment were allowed in order for them to warm up to their normal operating condition. The EMI receiver detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 120 kHz. The EUT, support equipment, and interconnecting cables were arranged to the configuration that produces the maximum EME emission found during preliminary scan. The turntable containing the system was rotated; the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission. Horizontal and vertical antenna polarizations were checked. 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, and powering the monitor the computer aux AC outlet, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission.

ITE Radiated Limits			
Frequency (MHz)	FCC Limit @ 3m. Quasi-Peak dB[μV / m]	FCC Limit @ 10m.* Quasi – Peak dB [μV / m]	CISPR Limit @ 10m. Quasi-Peak dB [μV / m]
30-88	40.0	29.5	30.0
88-216	43.5	33.0	30.0
216-230	46.0	35.6	30.0
230-960	46.0	35.6	37.0
960-1000	54.0	43.5	37.0
> 1000	54.0	43.5	No Specified Limit
* Limit extrapolated 20 dB/decade			

Table 2. Radiated Class B limits @ 10-meters

5.1 Support Equipment Used

DEVICE TYPE	MANUFACTURER	TYPE NUMBER	FCC ID / DoC	CONNECTED TO
LCD TV (EUT)	HYUNDAI IT CORP.	LT46DW000	DoC	EUT
P.C	DELL	OPTIPLEXGX620	DoC	EUT END
Mouse	DELL	MO56U0	DoC	P.C END
Key Board	DELL	SK-8115	DoC	P.C END
MPEG-Recorder	Tektronix	MTX 100	DoC	-
MPEG-Recorder	Tektronix	MTX 100	DoC	-
All Channel Converter	EIDEN	4200C-006	DoC	-
8vsb Modulator	EIDEN	3313b-002	DoC	-
TV PATTEN GENERATOR	PROMAX	GV698	DoC	-

5.2 Cable Description

		Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (M)
LCD TV	AV 1 In	N/A	Y	D(1.6)
	AV 2 Out	N/A	Y	D(1.6)
	Component Audio In 1	N/A	Y	D(1.6)
	Component Video In 1	N/A	Y	D(1.6)
	Component Audio In 2	N/A	Y	D(1.6)
	Component Video In 2	N/A	Y	D(1.6)
	AV 3 In	N/A	Y	D(1.6)
	S-Video In	N/A	Y	D(1.6)
	ANT. In	N/A	Y	D(3.0)
	HDMI Out	N/A	Y	D(1.8)
	D-Sub In	N/A	Y	D(1.8)
	Audio In	N/A	Y	D(1.5)
	Serial	N/A	Y	D(1.5)
	AC In	N	N/A	P(1.8)
PC	USB	N/A	Y	D(1.8)
	USB	N/A	Y	D(1.8)
	Serial	N/A	Y	D(1.5)
	Audio Out	N/A	Y	D(1.5)
	Parallel	N/A	Y	D(1.5)
	AC In	N	N/A	P(1.8)
Print	AC In	N	N/A	P(1.8)

The marked "(D)" means the Data Cable and "(P)" means the Power Cable.

5.3 Noise Suppression Parts on Cable. (I/O CABLE)

		Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
LCD TV	AV 1 In	N	N/A	Y	BOTH END
	AV 2 Out	N	N/A	Y	BOTH END
	Component Audio In 1	N	N/A	Y	BOTH END
	Component Video In 1	N	N/A	Y	BOTH END
	Component Audio In 2	N	N/A	Y	BOTH END
	Component Video In 2	N	N/A	Y	BOTH END
	AV 3 In	N	N/A	Y	BOTH END
	S-Video In	N	N/A	Y	BOTH END
	ANT. In	N	N/A	Y	BOTH END
	HDMI Out	N	N/A	Y	BOTH END
	D-Sub In	Y	Both end	Y	BOTH END
	Audio In	N	N/A	Y	BOTH END
Serial	Y	Both end	Y	BOTH END	
PC	USB	N	N/A	Y	PC END
	USB	N	N/A	Y	PC END
	Serial	Y	Both end	Y	BOTH END
	Audio Out	N	N/A	Y	BOTH END
	Parallel	N	N/A	Y	BOTH END

6.1 LINE-CONDUCTED TEST DATA

[D-SUB]

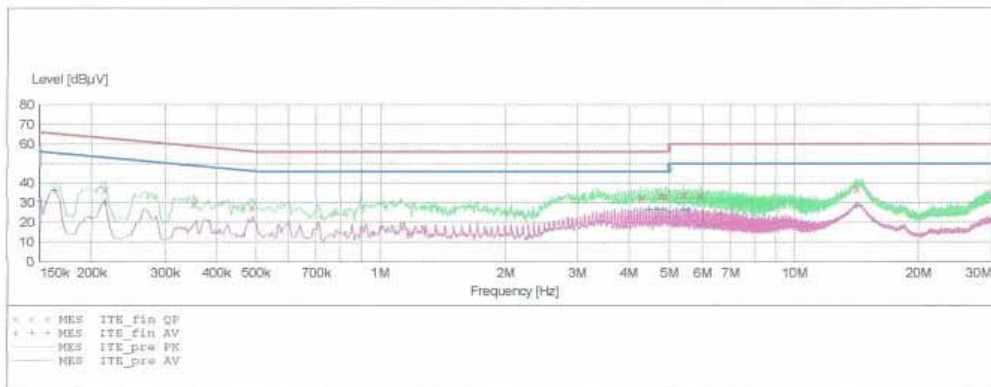
HCT

EMC TEST LAB.

EUT: LT46DW000
 Manufacturer: HYUNDAI IT CORP.
 Operating Condition: 1920 X 1080 60Hz
 Test Site: SHIELD ROOM
 Operator: KH-SEO
 Test Specification: CISPR 22 CLASS B
 Comment: N

SCAN TABLE: "CISPR 22 Voltage"

Short Description:			CISPR 22 Voltage			
Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.1 kHz	500.0 kHz	2.5 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			
5.0 MHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None
			Average			



MEASUREMENT RESULT: "ITE_fin OP"

4/10/2007 1:42PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Line	PE
0.215100	36.80	10.0	63	26.2	---	---
0.352600	29.40	10.0	59	29.5	---	---
0.487600	27.70	10.1	56	28.5	---	---
4.270000	32.70	10.5	56	23.3	---	---
4.765000	33.70	10.6	56	22.3	---	---
4.900000	33.60	10.6	56	22.4	---	---
5.400000	34.40	10.7	60	25.6	---	---
5.905000	33.50	10.7	60	26.5	---	---
14.165000	37.10	11.8	60	22.9	---	---

MEASUREMENT RESULT: "ITE_fin AV"

4/10/2007 1:42PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.150100	30.90	10.0	56	25.0	---	---
0.162600	36.60	10.0	55	18.7	---	---
0.215100	30.00	10.0	53	23.0	---	---
4.475000	26.80	10.6	46	19.2	---	---
4.690000	26.90	10.6	46	19.1	---	---
4.835000	26.80	10.6	46	19.2	---	---
5.400000	26.80	10.7	50	23.2	---	---
5.545000	26.50	10.7	50	23.5	---	---
14.150000	28.60	11.8	50	21.4	---	---

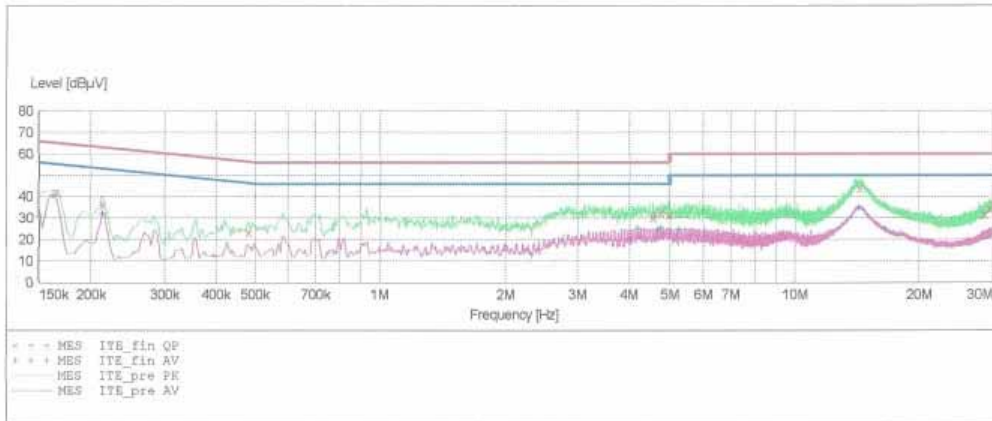
HCT

EMC TEST LAB.

EUT: LT46DW000
 Manufacturer: HYUNDAI IT CORP.
 Operating Condition: 1920 X 1080 60Hz
 Test Site: SHIELD ROOM
 Operator: KH-SEO
 Test Specification: CISPR 22 CLASS B
 Comment: H

SCAN TABLE: "CISPR 22 Voltage"

Short Description:		CISPR 22 Voltage					
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer	
150.1 kHz	500.0 kHz	2.5 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				
500.0 kHz	5.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				
5.0 MHz	30.0 MHz	5.0 kHz	MaxPeak	10.0 ms	9 kHz	None	
			Average				


MEASUREMENT RESULT: "ITE_fin QP"

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Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.165100	41.80	10.0	65	23.4	---	---
0.212600	36.50	10.0	63	26.6	---	---
0.480100	23.70	10.1	56	32.6	---	---
4.555000	30.30	10.6	56	25.7	---	---
4.760000	32.60	10.6	56	23.4	---	---
4.975000	31.50	10.6	56	24.5	---	---
14.385000	43.90	11.8	60	16.1	---	---
28.515000	31.60	12.8	60	28.4	---	---
29.440000	34.30	12.8	60	25.7	---	---

MEASUREMENT RESULT: "ITE_fin AV"

4/10/2007 1:45PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.150100	30.80	10.0	56	25.2	---	---
0.162600	40.80	10.0	55	14.6	---	---
0.212600	32.40	10.0	53	20.7	---	---
4.190000	25.30	10.5	46	20.7	---	---
4.690000	24.80	10.6	46	21.2	---	---
4.760000	25.40	10.6	46	20.6	---	---
5.255000	24.80	10.7	50	25.2	---	---
14.275000	35.00	11.8	50	15.0	---	---
16.570000	25.00	12.1	50	25.0	---	---

NOTES:

- 1. All modes of operation were investigated, and the worst-case emissions are reported.**
- 2. The conducted limits are listed on Table 1 (Page 7).**
- 3. Line H = Hot Line N = Neutral**

** Measurements using CISPR quasi-peak mode.

7.1 RADIATED TEST DATA

[D-Sub]

Frequency MHz	Reading dBuV	Ant. Factor dB/m	Cable Loss Db	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
78.9	15.9	8.5	2.1	V	26.5	30.0	3.5
134.0	11.2	12.0	2.7	V	25.9	30.0	4.1
339.0	12.1	13.6	4.4	V	30.1	37.0	6.9
800.0	5.6	21.4	6.7	H	33.7	37.0	3.3

Radiated Measurements at 10-meters.

1920 X 1080 (@60Hz)

NOTES:

1. All modes of operation were investigated, and the worst-case emissions are reported.
2. The radiated limits are listed on Table 2 (Page 8).

*** Measurements using CISPR quasi-peak mode. Above 1GHz, peak detector function mode is used using a resolution bandwidth of 1MHz and a video bandwidth of 1MHz. The peak level complies with the average limit. Peak mode is used with linearly polarized horn antenna and low-loss microwave cable.

8.1 Sample Calculations

$$\text{dB } \mu\text{V} = 20 \log_{10} (\mu\text{V}/\text{m})$$

8.2 Example 1:

@ 0.1626 KHz

Class B limit = 55.0 dB μV
Reading = 40.8 dB μV (calibrated level)

Margin = 40.8 – 55.0 = - 14.2 dB μV
= **14.2 dB below limit**

8.3 Example 2:

@ 800.0 MHz

Class B limit = 37.0 dB $\mu\text{V}/\text{m}$
Reading = 5.6 dB $\mu\text{V}/\text{m}$ (calibrated level)
Antenna Factor + Cable Loss = 28.1 dB
Total = 33.7 dB $\mu\text{V}/\text{m}$

Margin = 33.7 - 37.0 = - 3.3 dB $\mu\text{V}/\text{m}$
= **3.3 dB below limit**

9.1 Test Equipment

<u>Type</u>	<u>Manufacture</u>	<u>Model Number</u>	<u>CAL Due Date</u>
Conducted Emission			
EMI Test Receiver	Rohde & Schwarz	ESCI	2007.08.24
LISN	Rohde & Schwarz	ESH2-Z5	2007.04.26
LISN	EMCO	703125	2007.04.26
PULSE LIMITER	Rohde & Schwarz	ESH3-Z2	2007.10.30
Radiated Emission			
EMI Test Receiver	Rohde & Schwarz	ESCI40	2007.11.06
TRILOG Antenna	Schwarzbeck	9168	2008.03.19
Antenna Position Tower	HD	MA240	N/A
Turn Table	EMCO	1050	N/A
Controller	HD GmbH	HD 100	N/A
Slide Bar	HD GmbH	KMS 560	N/A

10.1 Test Software Used

The EUT was acted standby mode during radiated and conducted testing.

NOTE: This is a sample of the basic program used during the test. However, during testing, a different software program may be used; whichever determines the worst-case condition. In addition, the program used also depends on the number and type of devices being tested.

11.1 Conclusion

The data collected shows that the **HYUNDAI IT CORP.** LCD TV
FCC ID: PJILT46DW000 complies with §15.107 and §15.109 of the FCC Rules.