

HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

Product Compliance Division, EMC Team
SAN 136-1, AMI-RI, BUBAL-EUP, ICHEON-SI, KYOUNGKI-DO, 467-701, KOREA
TEL : +82 31 639 8517 FAX : +82 31 639 8525

CERTIFICATION

Manufacture;
HARSPER CO.,LTD.

**546-4. Ami-Ri Bubai-Eub, Ichon-City, Kyoungki-Do
Korea**

HARSPER FRN : 0007-9131-06

Date of Issue : February 17, 2005

Test Report No.: HCT-F05-0201

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

HCT FRN : 0005-8664-21

FCC ID :

O5XHL-401B

MODEL :

HL-4010B

Rule Part(s):	Part 15 & 2
Equipment Class:	FCC Class B Peripheral Device (JBP)
Standard(s):	FCC Class B: 2003
EUT Type:	LCD TV MONITOR
Max. Resolution(s):	1280×1024(@60Hz)
Model(s):	HL-4010B
Port/Connector(s)	POWER, COMPOSITE, RS-232C, COMPONENT, SPEAKER, DSUB DVI, S-VIDEO, ANTENNA

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 C63.4-2001.

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 : Ki-Soo Kim
Manager of EMC Tech. Part



HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

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ATTACHMENT A:	FCC ID LABEL & LOCATION
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MEASUREMENT REPORT

1.1 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:	HARSPER CO., LTD.
Address:	546-4. Ami-Ri, Bubai-Eub, Ichon-City, Kyoungki-Do Korea

- **FCC ID : O5XHL-401B**
- **Equipment Class: FCC Class B Peripheral Device (JBP)**
- **EUT Type: LCD TV MONITOR**
- **Model(s): HL-4010B**
- **Max. Resolution: 1280×1024(@60Hz)**
- **Power Cord: Unshielded**
- **Rule Part(s): FCC Part 15 Subpart B**
- **Test Procedure(s): ANSI C63.4 (2001)**
- **Dates of Tests: February 11, 2005 ~ February 15, 2005**
- **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 C63.4-2001) was used in determining radiated and conducted emissions emanating from **HARSPER CO., LTD. LCD TV MONITOR FCC ID: O5XHL-401B**

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 HARSPER CO.,LTD. (Model : HL-4010B) LCD TV MONITOR

FCC ID: **O5XHL-401B**

Maximum Resolution(s): **1280×1024(@60Hz)**

Dimensions: **1185mm(W) x 666mm(H) x 270mm(D)**

Power Supply: **AC 100-240V, 50/ 60Hz 250W**

Connectivity: **TV Input: RF / CATV (NTSC)**

Composite Input/Output: RCA ×4 Port (AV INPUT 1/2/3, AV OUTPUT)

Component 1, 2 Input: (Y, Pb/Cb, Pr/Cr: 480i, 480p, 576i, 576p, 720p, 1080i)

S-video Input: Mini DIN 4Pin × 1 Port

RGB Input: Mini D-sub 15Pin × 1Port (480p/576p, 720p, 1080i)

DVI Input: Mini D-sub 29Pin ×1Port (480p/576p, 720p, 1080i)

Audio In/Output: RCA × 5Port: Full support separated audio input

Speaker output: Cinch Type × 4Port (Stereo L/R)

Control ports: RS-232 D-sub 9Pin × 1Port

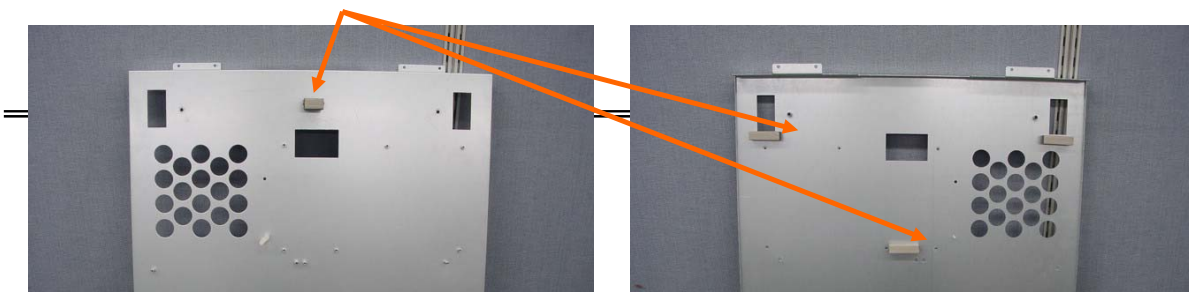
Power Consumption: **250Watts**

Weight (Net): **34.8Kg**

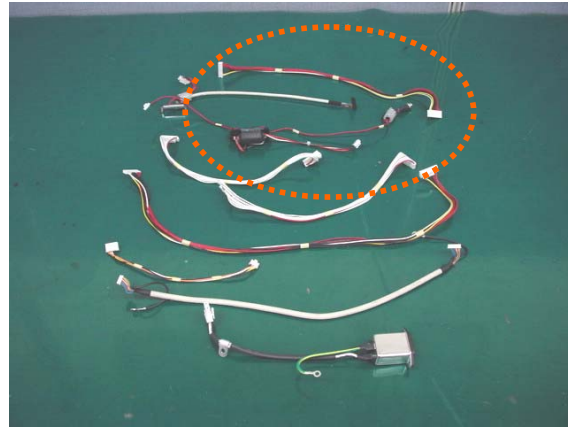
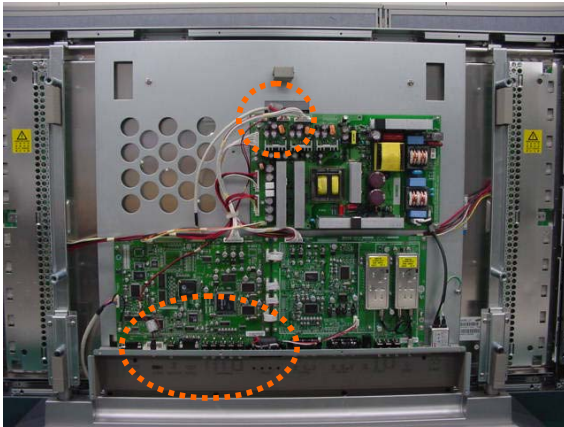
EMI Suppression Devices:

Modifications were made to the device. Please refer to the next page.

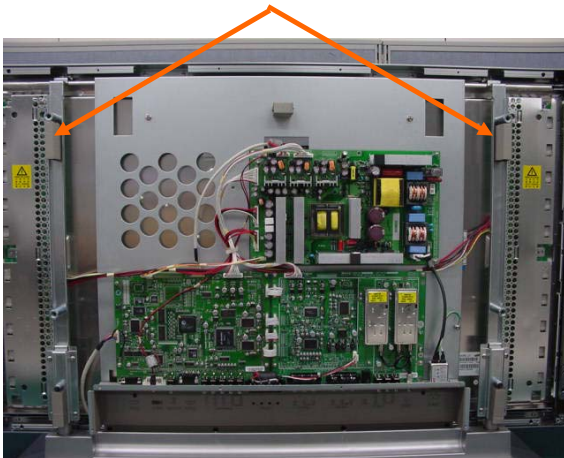
1. **Attach a gasket on LCD panel back case**



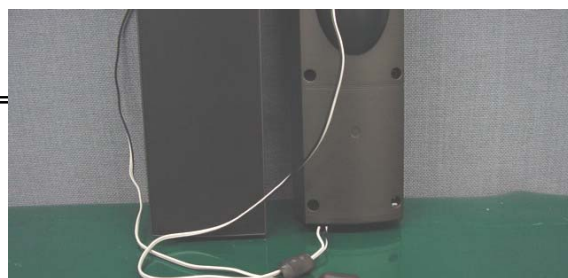
2. Apply a ferrite Core to the Speaker Cable and LVDS Cable



3. Attach a gasket on Panel Frame



4. Apply a ferrite Core to the External Speaker Cable



4.1 Description of Tests(Conducted & Radiated)

4.2 Powerline Conducted Emission (150kHz- 30MHz)

The power line conducted RFI measurements were performed according to CISPR 22.

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 measured 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 centre 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 SMX signal generator and are listed on Table 1. RFI Conducted FCC Class B

RFI CONDUCTED	FCC CLASS B	
	Limits	dB(uV/m)
Freq. Range	CISPR 22 Quasi-Peak	CISPR 22 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. FCC CLASS B Conducted Emission Limits

4.3 Description of Tests(Radiated)

Radiated Emissions

Preliminary measurements were made indoors at 1 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 300 MHz using biconical antenna, 300 to 1000 MHz using log- periodic antenna, and above 1 GHz using linearly polarized horn antennas. Final measurements were made outdoors at 10-meter test range using Dipole antennas and EMI receiver. 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	

* Limit extrapolated 20 dB/decade			

Table 2. Radiated Class B limits @ 10-meters

5.1 Support Equipment Used

DEVICE TYPE	MANUFACTURER	MODEL NUMBER	FCC ID / DoC	CONNECTED TO
MONITOR (EUT)	HARSPER CO., LTD.	HL-4010B	O5XHL-401B	P.C
P.C	H.P	HP Pavilion 700	DoC	EUT
KEY BOARD	H.P	5181	DoC	P.C
MOUSE	Microsoft	IntelliMouse optical USB and PS/2 compatible	DoC	P.C
PRINTER	H/P	C4569A	DoC	P.C

Cable Termination	Component port 75Ω S-Video Port 75Ω Composite Video Port 75Ω Composite Audio Port 30 KΩ
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5.2 Cable Description

		Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (M)
PDP TV Monitor (EUT)	Power	N	N/A	1.8(P),
	Video	N/A	Y	1.6(D)
	Audio	N/A	Y	1.6(D)
	RS-232C	N/A	Y	1.7(D)
	Component	N/A	Y	1.6(D)
	Speaker	N/A	N	3.0(D)
	Dsub	N/A	Y	1.8(D)
	DVI	N/A	Y	1.8(D)
	S-video	N/A	Y	1.6(D)
	ANT	N/A	N	3.0(D)
PC		N	N/A	1.8(P)
KEY BOARD		N/A	N/A	1.8(D)
MOUSE		N/A	Y	1.8(D)
PRINTER		N	Y	1.8(P),1.8(D)

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
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LCD TV MONITOR (EUT)	Video	N	N/A	Y	BOTH END
	Audio	N	N/A	Y	BOTH END
	RS-232C	N	N/A	Y	BOTH END
	Component	N	N/A	Y	BOTH END
	Speaker	Y	EUT END	N	N/A
	Dsub	Y	BOTH END	Y	BOTH END
	DVI	Y	BOTH END	Y	BOTH END
	S-video	N	N/A	Y	BOTH END
	ANT	N	N/A	Y	BOTH END
PC		N	N/A	N/A	N/A
KEYBOARD		N	N/A	Y	PC END
MOUSE		N	N/A	Y	PC END
PRINTER		Y	BOTH END	Y	BOTH END

6.1 CONDUCTED TEST DATA

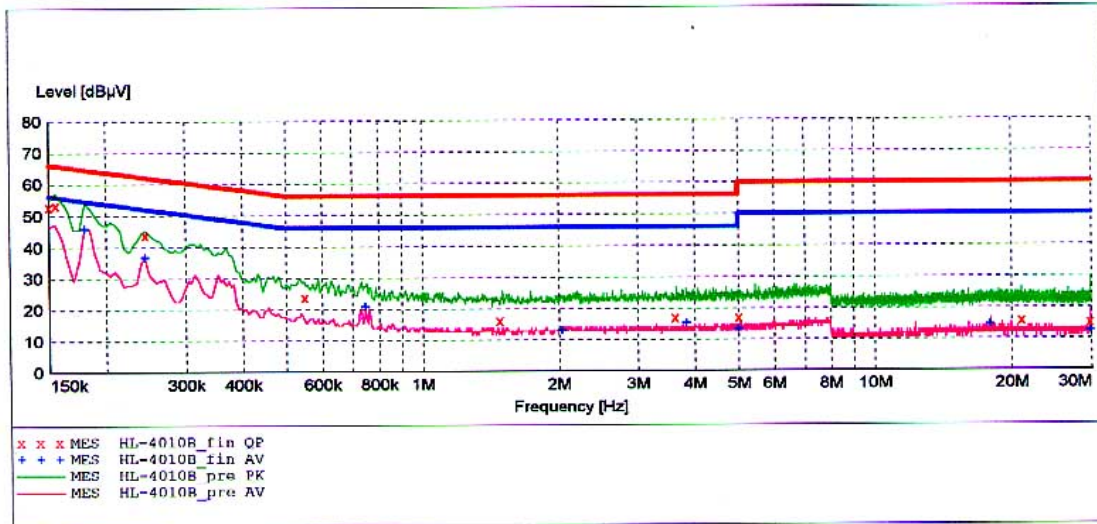
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EMC TESTING Laboratory

EUT: HL-4010B
Manufacturer: HARSPER
Operating Condition: 1280 X 1024 60Hz (A)
Test Site: SHIELD ROOM
Operator: BK, HAM
Test Specification: CISPR 22 CLASS B
Comment: H(110)

SCAN TABLE: "CISPR 22 Voltage"

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



MEASUREMENT RESULT: "HL-4010B_fin QP"

2/12/05 1:53PM						
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.150000	52.80	10.1	66	13.2	1	---
0.155000	53.40	10.1	66	12.3	1	---
0.245000	43.90	10.1	62	18.0	1	---
0.550000	23.80	10.1	56	32.2	1	---
1.485000	16.20	10.2	56	39.8	1	---
3.625000	17.00	10.2	56	39.0	1	---
5.000000	17.00	10.3	56	39.0	1	---
21.060000	15.80	10.6	60	44.2	1	---
29.865000	15.10	10.6	60	44.9	1	---

MEASUREMENT RESULT: "HL-4010B_fin AV"

2/12/05 1:53PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.180000	45.90	10.1	55	8.6	1	---
0.245000	36.80	10.1	52	15.1	1	---
0.750000	21.00	10.2	46	25.0	1	---
2.035000	12.80	10.3	46	33.2	1	---
3.835000	15.40	10.3	46	30.6	1	---
5.000000	13.30	10.3	46	32.7	1	---
18.005000	14.50	10.5	50	35.5	1	---
29.905000	12.50	10.6	50	37.5	1	---

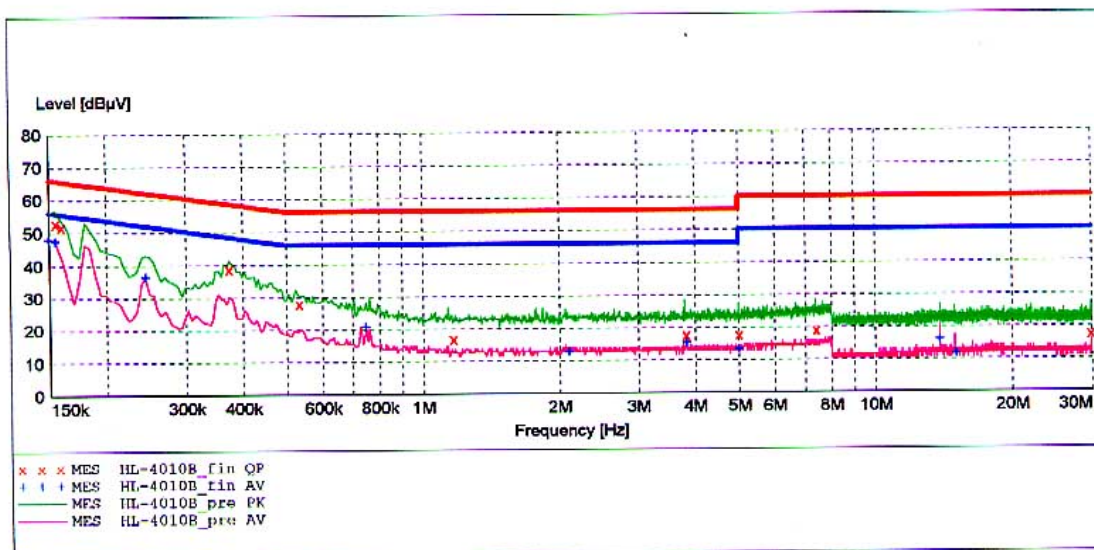
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EMC TESTING Laboratory

EUT: HL-4010B
Manufacturer: HARSEPER
Operating Condition: 1280 X 1024 60Hz (A)
Test Site: SHIELD ROOM
Operator: BK, HAM
Test Specification: CISPR 22 CLASS B
Comment: N(110)

SCAN TABLE: "CISPR 22 Voltage"

Short Description: CISPR 22 voltage
Start Stop Step Detector Meas. IF Transducer
Frequency Width Time Bandw.
150.0 kHz 500.0 kHz 5.0 kHz MaxPeak 10.0 ms 9 kHz None
Average



MEASUREMENT RESULT: "HL-4010B_fin QP"

2/12/05 1:57PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.155000	52.80	10.1	66	12.9	1	---
0.160000	51.90	10.1	66	13.6	1	---
0.375000	38.70	10.1	58	19.7	1	---
0.535000	28.00	10.1	56	28.0	1	---
1.170000	16.90	10.1	56	39.1	1	---
3.830000	17.60	10.3	56	38.4	1	---
5.000000	17.60	10.3	56	38.4	1	---
7.420000	18.90	10.3	60	41.1	1	---
29.930000	17.40	10.6	60	42.6	1	---

MEASUREMENT RESULT: "HL-4010B_fin AV"

2/12/05 1:57PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.150000	48.00	10.1	56	8.0	1	---
0.155000	47.50	10.1	56	8.3	1	---
0.245000	36.40	10.1	52	15.5	1	---
0.750000	20.70	10.2	46	25.3	1	---
2.110000	12.70	10.3	46	33.3	1	---
3.835000	15.40	10.3	46	30.6	1	---
5.000000	13.20	10.3	46	32.8	1	---
13.900000	16.10	10.5	50	33.9	1	---
15.140000	11.60	10.5	50	38.4	1	---

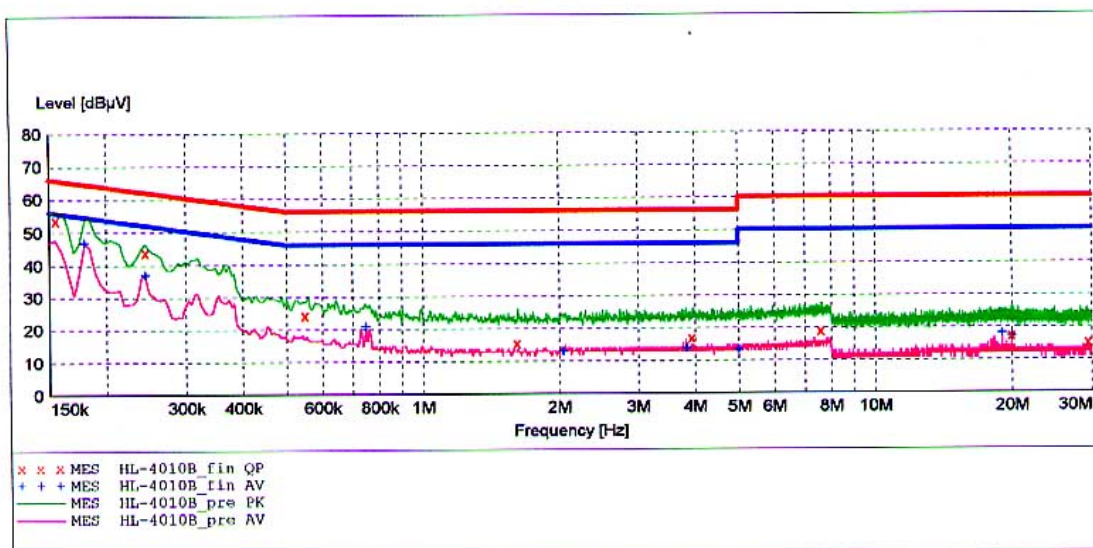
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EMC TESTING Laboratory

EUT: HL-4010B
Manufacturer: HARSPEP
Operating Condition: 1280 X 1024 60Hz (D)
Test Site: SHIELD ROOM
Operator: BK, HAM
Test Specification: CISPR 22 CLASS B
Comment: H(110)

SCAN TABLE: "CISPR 22 Voltage"

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



MEASUREMENT RESULT: "HL-4010B_fin QP"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.155000	53.80	10.1	66	11.9	1	---
0.245000	43.80	10.1	62	18.1	1	---
0.550000	24.40	10.1	56	31.6	1	---
1.615000	15.50	10.2	56	40.5	1	---
3.940000	17.00	10.3	56	39.0	1	---
7.605000	18.90	10.3	60	41.1	1	---
19.995000	17.30	10.5	60	42.7	1	---
29.460000	15.10	10.6	60	44.9	1	---

MEASUREMENT RESULT: "HL-4010B_fin AV"

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.180000	46.90	10.1	55	7.6	1	---
0.245000	36.90	10.1	52	15.0	1	---

MEASUREMENT RESULT: "HL-4010B_fin AV"

(continued)

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.750000	20.90	10.2	46	25.1	1	---
2.045000	12.80	10.3	46	33.2	1	---
3.840000	13.80	10.3	46	32.2	1	---
5.000000	13.30	10.3	46	32.7	1	---
19.120000	18.10	10.5	50	31.9	1	---
20.000000	17.10	10.5	50	32.9	1	---

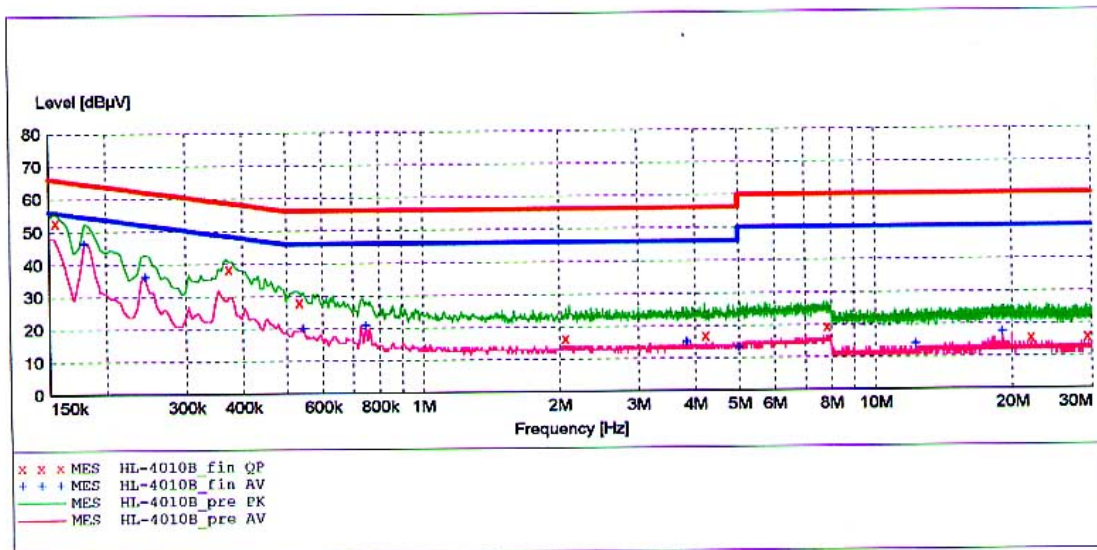
HCT

EMC TESTING Laboratory

EUT: HL-4010B
Manufacturer: HARSPEC
Operating Condition: 1280 X 1024 60Hz (D)
Test Site: SHIELD ROOM
Operator: BK, HAM
Test Specification: CISPR 22 CLASS B
Comment: N(110)

SCAN TABLE: "CISPR 22 Voltage"

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



MEASUREMENT RESULT: "HL-4010B_fin_QP"

2/12/05 2:06PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.155000	52.80	10.1	66	12.9	1	---
0.375000	38.50	10.1	58	19.9	1	---
0.535000	28.20	10.1	56	27.8	1	---
2.070000	16.30	10.3	56	39.7	1	---
4.225000	17.00	10.3	56	39.0	1	---
7.835000	19.40	10.4	60	40.6	1	---
22.025000	15.80	10.6	60	44.2	1	---
29.355000	15.90	10.6	60	44.1	1	---

MEASUREMENT RESULT: "HL-4010B_fin_AV"

2/12/05 2:06PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.180000	46.40	10.1	55	8.1	1	---
0.245000	36.20	10.1	52	15.7	1	---

MEASUREMENT RESULT: "HL-4010B_fin AV"

(continued)

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.545000	20.00	10.1	46	26.0	1	---
0.750000	21.00	10.2	46	25.0	1	---
3.835000	15.30	10.3	46	30.7	1	---
5.000000	13.30	10.3	46	32.7	1	---
12.290000	14.10	10.4	50	35.9	1	---
19.120000	17.70	10.5	50	32.3	1	---

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

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
35.9	5.4	16.9	1.3	V	23.6	30	6.4
79.7	13.4	7.0	2.0	V	22.4	30	7.6
120.7	8.1	12.8	2.4	V	23.3	30	6.7
241.7	8.5	17.3	3.5	H	29.3	37	7.7
259.1	9.0	17.7	3.7	H	30.4	37	6.6
286.5	8.5	18.8	3.9	V	31.2	37	5.8
402.8	8.9	17.0	4.6	H	30.5	37	6.5
563.8	5.5	20.5	5.4	V	31.4	37	5.6
725.0	3.5	22.7	6.2	V	32.4	37	4.6

1280 X 1024, 60Hz DSUB Mode

Frequency MHz	Reading dBuV	Ant. Factor dB	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
36.3	6.3	16.5	1.3	V	24.1	30	5.9
82.6	15.0	7.5	2.0	V	24.5	30	5.5
212.1	3.2	16.6	3.3	V	23.1	30	6.9
242.6	8.1	17.3	3.5	H	28.9	37	8.1
287.0	8.0	18.9	3.9	H	30.8	37	6.2
402.8	9.6	17.0	4.6	V	31.2	37	5.8
563.9	4.9	20.5	5.4	V	30.8	37	6.2
725.3	4.0	22.7	6.2	H	32.9	37	4.1

1280 X 1024, 60Hz DVI Mode

Radiated Measurements at 10-meters.

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).**
- 3. We performed the test up to 2GHz, but not found noise above 1GHz.**

**** AFCL = Antenna Factor (Roberts dipole) and Cable Loss .**

***** 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

$$\text{dB} = 20 \log_{10} ()$$

$$\text{dB} = \text{dBm} + 107$$

8.2 Example 1:

@ 155.00 KHz

Class B limit	=	65.7 dB	
Reading	=	53.8 dB	(calibrated level)

Margin	=	53.8 - 65.7 = - 11.9 dB
	=	11.9 dB below limit

8.3 Example 2:

@ 725.3 MHz

Class B limit	=	37 dB /m
Reading	=	4.0 dB /m (calibrated level)
Antenna Factor + Cable Loss	=	28.9 dB
Total	=	32.9 dB /m

Margin	=	32.9 - 37 = - 4.1 dB /m
	=	4.1 dB below

limit

9.1 Test Equipment

<u>Type</u>	<u>Manufacture</u>	<u>Model Number</u>	<u>CAL Due Date</u>
EMI Test Receiver	Rohde & Schwarz	ESI40	2005.11.16
EMI Test Receiver	Rohde & Schwarz	ESVS30	2005.07.15
EMI Test Receiver	Rohde & Schwarz	ESCI	2005.09.13
LISN	Rohde & Schwarz	ESH2-Z5	2005.07.28
LISN	EMCO	3825/2SH	2005.11.29
Tri-Log Antennas	Schwarzbeck	VULB9160	2005.04.06
Antenna Position Tower	HD	MA240	N/A
Turn Table	EMCO	1050	N/A
Reference Network Impedance	Voltech	IEC 555	N/A
AC Power Source	PACIFIC	Magnetic Module	N/A
AC Power Source	PACIFIC	360AMX	2005.11.25
Controller	HD GmbH	HD 100	N/A
Slide Bar	HD GmbH	KMS 560	N/A

10.1 Test Software Used

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The software, contained on a 3-1/2 inch disc, was inserted into drive A and is auto starting on power-up. Once loaded, the program sequentially exercises each system component in turn. The sequence used is : (1) Display test, (2) RS 232 test (3) Key board test, (4) Printer test, (5) FDD test, (6) HDD test. The complete cycle takes about 20 seconds and is repeated continuously. As the keyboard and mouse are strictly input devices, no data is transmitted to them during test. They are however, continuously scanned for data input activity. The video resolution modes setup and change program was used during the radiated and conducted emission 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 HARSPER CO., LTD. LCD TV MONITOR **FCC ID: O5XHL-401B** complies with §15.107 and §15.109 of the FCC Rules.