



HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

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CERTIFICATION

Manufacture;
HARSPER CO.,LTD.

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

HARSPER FRN : 00007-9131-06

Date of Issue : September 10, 2004

Test Report No.: HCT-F04-0905

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

HCT FRN : 0005-8664-21

FCC ID :

O5XHL-400B

MODEL :

HL-4000B

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-4000B
Port/Connector(s)	POWER, VIDEO, AUDIO, 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-400B**
- **Equipment Class: FCC Class B Peripheral Device (JBP)**
- **EUT Type: LCD TV MONITOR**
- **Model(s): HL-4000B**
- **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: August 12, 2004~September 10, 2004**
- **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 **HARPER CO., LTD. LCD TV Monitor FCC ID: O5XHL-400B**

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-4000B) LCD TV Monitor

FCC ID: **O5XHL-400B**

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

Dimensions: **1166mm(W) x 675.1mm(H) x 305mm(D)**

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

Connectivity: **Composite : RCA-pin x 1,**

Component video signal : YpbPr x 1(480i/576i)

S-video : Mini DIN 4-pin x 1

RGB input : D-sub 15-pin x 1(480p/576p, 720p, 1080i)

Audio input : RCA-pin Type(L/R) x 5 : Full support separated audio input

Speaker output : Cinch Conn Type(L/R) x 1(4cinch connectors type)

Audio system : Stereo

Control ports : RS-232 D-sub 9-pin x 1

DVI Input and DVI Cable

Power Consumption : **300Watts**

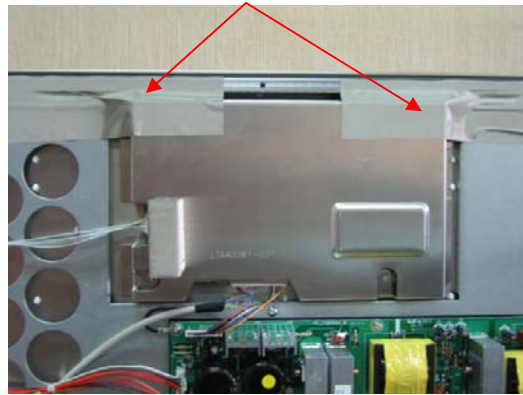
Weight (Net):**34.8Kg**

EMI Suppression Devices:

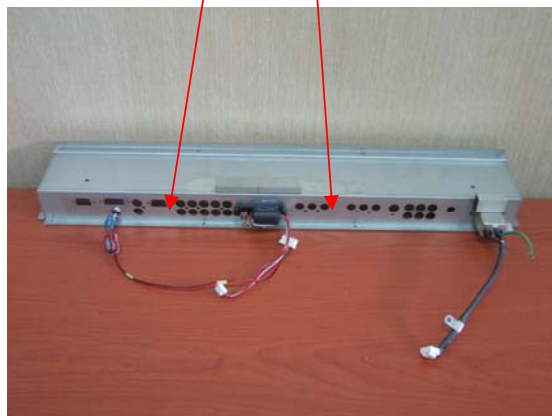
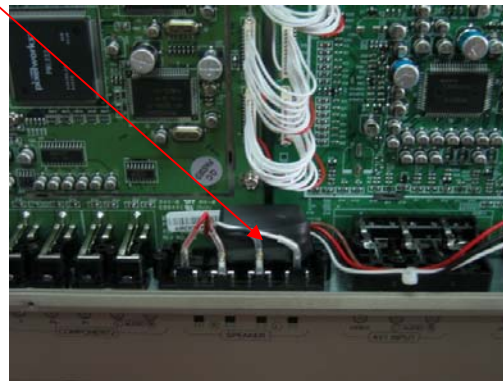
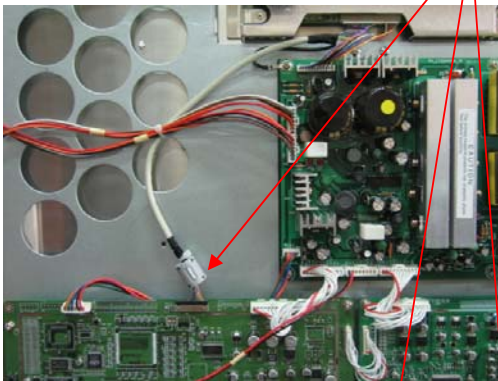
Modifications were made to the device.

1. Attach a gasket on the panel

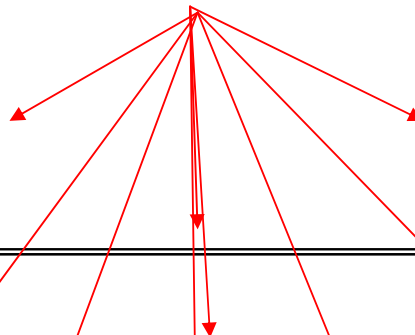
**2. Apply a strip of aluminum tape on the
conductive strip to the frame.**



3. Apply a ferrite Core to the Interface cable



4 . Attach a gasket on the panel





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	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-4000B	O5XHL-400B	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	C6410A	DoC	P.C
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Cable Termination	Component port 75Ω S-Video Port 75Ω Video Port 75Ω 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)
LCD 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
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

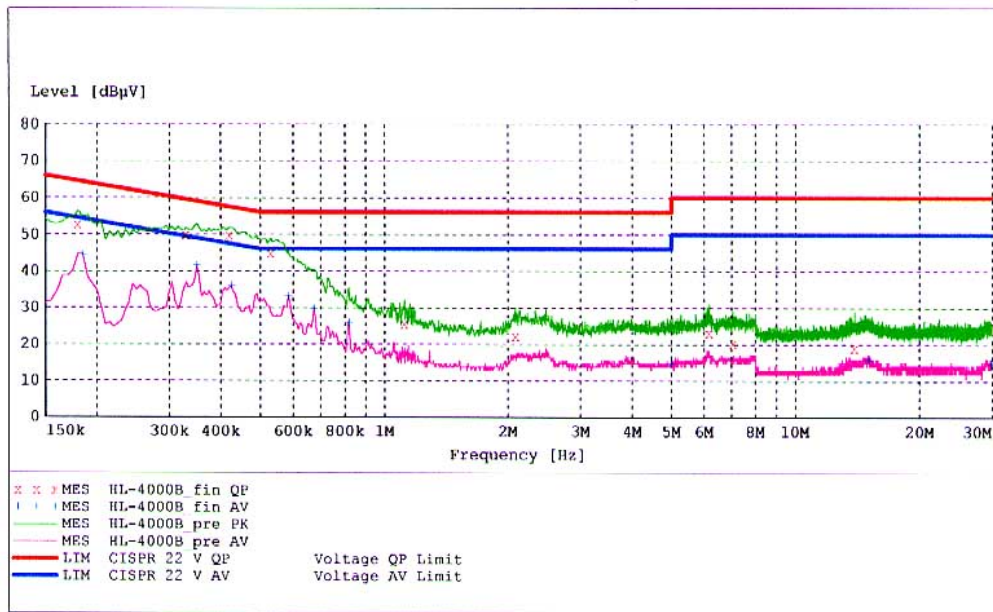
6.1 CONDUCTED TEST DATA

HCT
EMC TESTING Laboratory

EUT: HL-4000B
Manufacturer: HARSPEP
Operating Condition: 1024 X 768 75 Hz
Test Site: SHIELD ROOM
Operator: BK, HAM
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
Frequency	Frequency	Width				
150.0 kHz	500.0 kHz	5.0 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: "HL-4000B_fin QP"

8/13/04 7:07PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.180000	52.70	10.1	65	11.7	1	---
0.330000	49.80	10.1	60	9.7	1	---
0.420000	49.70	10.1	57	7.8	1	---
0.530000	44.80	10.1	56	11.2	1	---
1.120000	25.40	10.1	56	30.6	1	---
2.090000	22.00	10.3	56	34.0	1	---
6.190000	23.10	10.3	60	36.9	1	---
7.070000	20.30	10.3	60	39.7	1	---
13.940000	19.00	10.5	60	41.0	1	---

MEASUREMENT RESULT: "HL-4000B fin AV"

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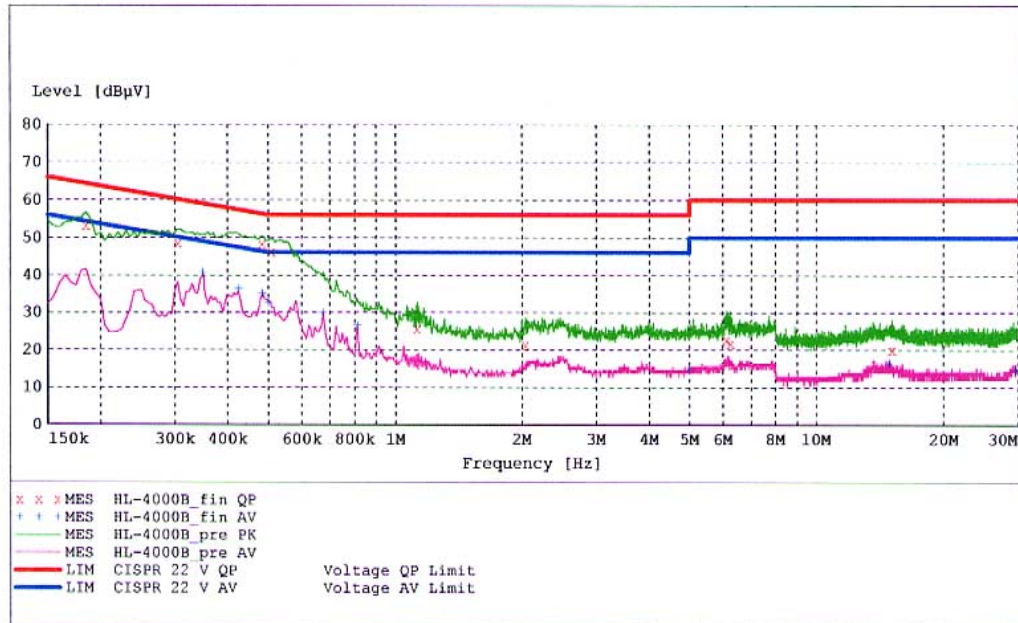
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.185000	44.70	10.1	54	9.6	1	---
0.350000	41.70	10.1	49	7.3	1	---
0.425000	36.00	10.1	47	11.4	1	---
0.585000	33.10	10.2	46	12.9	1	---
0.675000	29.80	10.2	46	16.2	1	---
0.820000	25.90	10.2	46	20.1	1	---
5.000000	14.80	10.3	46	31.2	1	---
15.115000	15.90	10.5	50	34.1	1	---
29.880000	14.80	10.6	50	35.2	1	---

HCT
EMC TESTING Laboratory

EUT: HL-4000B
Manufacturer: HARSPER
Operating Condition: 1024 X 768 75 Hz
Test Site: SHIELD ROOM
Operator: BK, HAM
Test Specification: CISPR 22 CLASS B
Comment: N

SCAN TABLE: "CISPR 22 Voltage"

Short Description:			CISPR 22 Voltage			
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
Frequency	Frequency	Width				
150.0 kHz	500.0 kHz	5.0 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: "HL-4000B_fin QP"

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Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.185000	53.20	10.1	64	11.1	1	---
0.305000	48.50	10.1	60	11.6	1	---
0.485000	48.30	10.1	56	8.0	1	---
0.510000	46.10	10.1	56	9.9	1	---
1.130000	25.50	10.1	56	30.5	1	---
2.045000	21.20	10.3	56	34.8	1	---
6.140000	22.70	10.3	60	37.3	1	---
6.270000	21.60	10.3	60	38.4	1	---
15.140000	20.00	10.5	60	40.0	1	---

MEASUREMENT RESULT: "HL-4000B_fin AV"

8/13/04 7:03PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
0.350000	40.80	10.1	49	8.1	1	---
0.425000	36.50	10.1	47	10.9	1	---
0.485000	35.00	10.1	46	11.3	1	---
0.500000	32.40	10.1	46	13.6	1	---
0.675000	30.00	10.2	46	16.0	1	---
0.815000	26.60	10.2	46	19.4	1	---
5.000000	14.80	10.3	46	31.2	1	---
14.915000	16.60	10.5	50	33.4	1	---
29.690000	14.70	10.6	50	35.3	1	---

NOTES:

1. All modes of operation were investigated, and the worst-case emissions are reported.

7.1 RADIATED TEST DATA

Frequency MHz	Reading dBuV	Ant. Factor dB/m	Cable Loss dB/m	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB/m
36.7	5.3	16.5	1.3	V	23.1	30	-6.9
71.6	16.0	6.2	1.8	V	24.0	30	-6.0
140.2	6.1	14.5	2.6	H	23.2	30	-6.8
143.3	6.9	14.6	2.6	V	24.1	30	-5.9
195.4	5.0	16.2	3.2	H	24.4	30	-5.6
214.8	3.8	16.7	3.3	V	23.8	30	-6.2
239.2	8.2	17.2	3.5	H	28.9	37	-8.1
492.8	7.0	19.0	5.1	V	31.1	37	-5.9
530.6	5.7	19.8	5.3	V	30.8	37	-6.2
716.1	3.3	22.6	6.1	V	32.0	37	-5.0

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

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

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

8.2 Example 1:

@ 0.51 MHz

Class B limit = 56 dB $\square$
Reading = 46.1 dB $\square$ (calibrated level)

Margin = 46.1 - 56 = - 9.9 dB $\square$
= **9.9 dB below limit**

8.3 Example 2:

@ 716.1 MHz

Class B limit = 37 dB $\square$
Reading = 3.3 dB $\square$ (calibrated level)
Antenna Factor + Cable Loss = 28.7 dB $\square$
Total = 32 dB $\square$

Margin = 32 - 37 = - 6.2 dB $\square$
= **6.2 dB below**

limit

9.1 Test Equipment

<u>Type</u>	<u>Manufacture</u>	<u>Model Number</u>	<u>CAL Date</u>
EMI Test Receiver	Rohde & Schwarz	ESI40	2003.11.16
EMI Test Receiver	Rohde & Schwarz	ESVS30	2004.07.16
LISN	Rohde & Schwarz	ESH2-Z5	2004.07.28
LISN	EMCO	ESH3-Z5	2004.07.28
Attenuator	Rohde & Schwarz	ESH3-Z2	2003.11.16
Amplifier	Hewlett-Packard	8447E	2004.08.23
TRILOG Antenna	Schwarzbeck	9160	2004.04.06
Antenna Position Tower	EMCO	1051-12	N/A
Turn Table	EMCO	1060-06	N/A
Power Analyzer	Voltech	PM 3300	2004.02.15
Reference Network Impedance	Voltech	IEC 555	N/A
AC Power Source	PACIFIC	Magnetic Module	N/A
AC Power Source	PACIFIC	360-AMX	2003.11.25
Controller	HD GmbH	HD 100	N/A
SlideBar	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. PDP Monitor **FCC ID: O5XHL-400B** complies with §15.107 and §15.109 of the FCC Rules.

