

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 TEL: +82 31 639 8517 FAX: +82 31 639 8525

TEST REPORT

Manufacture:

HARSPER CO.,LTD.

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

Korea

HARSPER FRN: 00007-9131-06

Date of Issue: June 28, 2005

Test Report No.: HCT-F06-0604

Test Site: HYUNDAI CALIBRATION & CERTIFICATION

TECHNOLOGIES CO., LTD.

HCT FRN: 0005-8664-21

FCC ID:

O5XHP-500VP

HP-5000VP

MODEL:

Rule Part(s): Part 15 & 2

Equipment Class: FCC Class B Peripheral Device (JBP)

Standard(s): FCC Class B EUT Type: PDP TV

Max. Resolution(s): $1280 \times 1024 (@60Hz)$

Model(s): HP-5000VP

Port/Connector(s): DVI&D-Sub(PC)Sound,DVI,HDMI,RS-232C,D-Sub(PC),Component1,2,

Component Sound1,2,VIDEO 1,VIDEO OUTPUT2,VIDEO 2,AV,

SPDIF(optical), Phone Jack, S-VIDEO, S-VIEDO/AC Sound, D-TV Antenna,

A-TV Antenna, Speak Cable, AC Power

PDP Panel SAMSUNG(42AX-YD01)

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

: Kun-Hyoung Kim **Test engineer of EMC Tech.Part**

Approved by : Sang Jun LEE

Manager of EMC Tech.Part



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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: O5XHP-500VP

• Equipment Class: FCC Class B Peripheral Device (JBP)

• EUT Type: **PDP TV**

• Model(s): **HP-5000VP**

• Max. Resolution: 1280 x 1024(@60Hz)

• Power Cord: Unshielded

• Rule Part(s): FCC Part 15 Subpart B

• Test Procedure(s): **ANSI C63.4 (2003)**

Report No.: HCT-FO6-0604

• Dates of Tests: June 23 2006 ~ June 26 2006

• Place of Tests: 254-1,MAEKOK-RI,HOBUP-MYUN,ICHON-SI,KYOUNGKI-DO,467-701,KOREA

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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 (ANSIC63.4-2001) was used in determining radiated and conducted emissions emanating from **HARSPER CO., LTD. PDP TV FCC ID: O5XHP-500VP**

The open area test site and conducted measurement facility used to collect the radiateddata 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 C63.4and CISPR Publication 22. Detailed description of test facility was submitted to the Commissionand accepted dated July 23,2003 (Confirmation Number: EA90661)

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3.1 PRODUCT INFORMATION

3.2 Equipment Description

Equipment Under Test (EUT) is the HARSPER CO.,LTD. (Model: HP-5000VP) PDP TV

FCC ID: O5XHP-500VP

Maximum Resolution(s): $1280 \times 1024(@60Hz)$

Dimensions: 1390mm(W) x 737.8mm(H) x82mm(D)

Power Supply: AC 100-240V, 50/60Hz, 400W

Connectivity: TV 1,2Input: RF / CATV (ATSC)

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

Component 1, 2 Input: RCA × 2 Port (Y, Pb/Cb, Pr/Cr: 480i, 480p, 576i, 576p, 720p,

1080i)

S-video Input: Mini Din 4Pin × 1 Port

PC Input: Mini D-Sub 15pin × 1Port/HDTV

Input(480p,576p,720p(50/60Hz),1080i(50/60Hz))

DVI Input: Mini D-sub 29Pin × 1Port /HDTV

Input(480p,576p,720p(50/60Hz),1080i(50/60Hz)),HDCP(Factory Option)

Audio In/Output: RCA × 6Port

Speaker output : Cinch Type × 4Port(Stereo L/R), Head Phone Jack × 1Port

External Control ports: Mini D-Sub 9Pin × 1Port

HDMI Port : HDMI × 1Port

SPDIF Port : SPDIF(Optical) × 1Port(5.1Channel)

Power Consumption: 520Watts

Weight (Net):45.5Kg

EMI Suppression Devices:

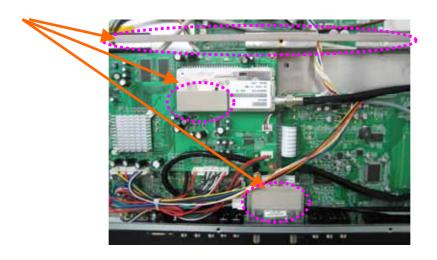
Modifications were made to the device. Please refer to the next page.

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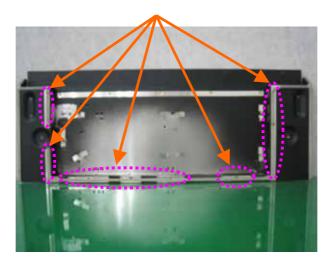




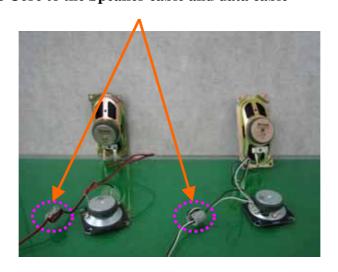
1. Attach fabrictape on rear LCD panel.



2. Attach a gasket on TV Case



3. Apply a ferrite Core to the Speaker cable and data cable



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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

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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. 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 extrapola	ated 20 dB/decade	I				

Table 2. Radiated Class B limits @ 10-meters

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5.1 Support Equipment Used

DEVICE TYPE	MANUFACTURER	MODEL NUMBER	FCC ID / DoC	CONNECTED TO
PDP TV(EUT)	HARSPER CO., LTD.	HP-5000VP	O5XHP-500VP	EUT
P.C	DELL	OPTIPLEXGX620	DoC	EUT END
MOUSE	DELL	MO56U0	DoC	PC END
SERIAL MOUSE	LOGITECH	IntelliMouse optical USB and PS/2 compatible	DoC	PC END
KEY BOARD	DELL	SK-8115	DoC	PC END
PRINTER	Н.Р	C4569A	DoC	PC END
HEAD-SET	HYUNDAI	JPC-914MV	DoC	PC END
MPEG-Recoder	Tektronix	MTX 100	DoC	-
MPEG-Recoder	Tektronix	MTX 100	DoC	-
All Channel Converter	EIDEN	4200C-006	DoC	-
8VSB Modulator	EIDEN	3313b-002	DoC	-
TV PATTERN GENERATOR	GV698AEU119	GV-698	DoC	EUT END

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5.2 Cable Description

		Power Cord Shielded (Y/N)	I/O Cable Shielded (Y/N)	Length (M)
	AC In	N	N/A	1.8(P)
	DVI	N/A	Y	1.8(D)
	D-Sub	N/A	Y	1.6(D)
	Audio In	N/A	Y	1.6(D)
	HDMI	N/A	Y	1.8(D)
	RS-232C	N/A	Y	1.8(D)
	Component 1	N/A	Y	1.6(D)
	Component Audio1	N/A	N	1.6(D)
	Component 2	N/A	Y	1.6(D)
	Component Audio2	N/A	Y	1.6(D)
PDP TV (EUT)	Air ANT	N/A	Y	3.0(D)
	Cable ANT	N/A	Y	3.0(D)
	Video Out	N/A	Y	1.6(D)
	Audio Out	N/A	Y	1.6(D)
	Video In1	N/A	Y	1.6(D)
	Audio In1	N/A	Y	1.6(D)
	Video In2	N/A	Y	1.6(D)
	Audio In2	N/A	Y	1.6(D)
	Line Out	N/A	N	1.6(D)
	S-Video In	N/A	Y	1.6(D)
	Video In3	N/A	Y	1.6(D)
	Audio In3	N/A	Y	1.6(D)
	AC In	N	N/A	1.8(P)
	USB(Mouse)	N	N/A	1.8(D)
PC	USB(Keyboard)	N	N/A	1.8(D)
	Parallel(Printer)	N	N/A	1.8(D)
	Serial(Mouse)	N	N/A	1.6(D)
Printer	AC In	N	N/A	1.8(P)

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

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

		Ferrite Bead (Y/N)	Location	Metal Hood (Y/N)	Location
	AC In	N	N/A	N	N/A
	DVI	Y	BOTH END	Y	BOTH END
	D-Sub	Y	BOTH END	Y	BOTH END
	Audio In	Y	EUTD END	Y	BOTH END
	HDMI	N	N/A	Y	BOTH END
	RS-232C	N	N/A	Y	BOTH END
	Component1	N	N/A	Y	BOTH END
	Component Audio 1	N	N/A	Y	BOTH END
	Component2	N	N/A	Y	BOTH END
PDP TV (EUT)	Component Audio2	N	N/A	Y	BOTH END
	Air ANT	N	N/A	Y	BOTH END
	Cable ANT	N	N/A	Y	BOTH END
	Video Out	N	N/A	Y	BOTH END
	Audio Out	N	N/A	Y	BOTH END
	Video In1	N	N/A	Y	BOTH END
	Audio In1	N	N/A	Y	BOTH END
	Video In1	N	N/A	Y	BOTH END
	Line Out	N	N/A	Y	BOTH END
	S-Video In	N	N/A	Y	BOTH END
	Video In	N	N/A	Y	BOTH END
	Audio In3	N	N/A	Y	BOTH END
	AC In	N	N/A	N	N/A
τ	USB(Mouse)	N	N/A	Y	PC END
τ	JBS(Mouse)	N	N/A	Y	PC END
	Parallel	N	N/A	Y	PC END
Se	erial(Mouse)	N	N/A	Y	PC END

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6.1 CONDUCTED TEST DATA

D-Sub [1280X1024 60 Hz]

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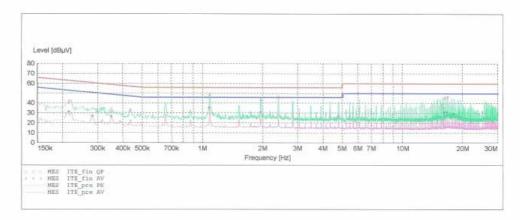
EMC TEST LAB

EUT: HP-5000V

Manufacturer: HARSPER
Operating Condition: 1280 X 1024 60Hz (DSUB)
Test Site: SHIELD ROOM

Operator: KH-KIM
Test Specification: CISPR 22 CLASS B

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



MEASUREMENT RESULT: "ITE_fin QP"

6/23/2006 5:	53PM					
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.215100	41.30	10.1	63	21.7		
0.350100	31.70	10.1	59	27.2		
0.435100	32.70	10.1	57	24.4		
1.085000	49.80	10.1	56	6.2		
1.955000	44.80	10.3	56	11.2		
2.390000	46.60	10.3	56	9.4	200,000,000	
15.870000	38.60	10.5	60	21.4		mr 100 to
16.305000	45.70	10.5	60	14.3	3.717	
16.740000	46.50	10.5	60	13.5		

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MEASUREMENT	RESULT	: "ITE_	fin A	7"		
6/23/2006 5:	53PM					
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.215100	31.20	10.1	53	21.8	-	****
0.282600	27.00	10.1	51	23.8		
0.350100	26.70	10.1	49	22.2		
1.085000	35.20	10.1	46	10.8	-	000 000 000
1.955000	30.90	10.3	46	15.1		
4.780000	27.30	10.3	46	18.7		
16.305000	31.00	10.5	50	19.0		
16.740000	31.50	10.5	50	18.5		
18.045000	29.70	10.5	50	20.3		44.44.40

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HP-5000V EUT:

Manufacturer: HARSPER

Operating Condition: 1280 X 1024 60Hz (DSUB)

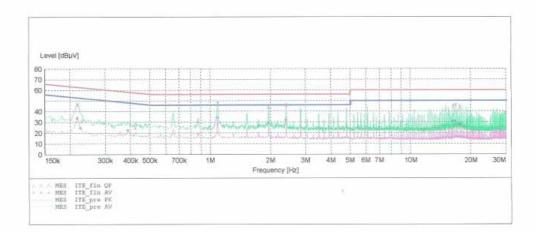
Test Site: SHIELD ROOM

Operator: KH-KIM Test Specification: CISPR 22 CLASS B

Comment: H

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

Average



MEASUREMENT RESULT: "ITE fin QP"

6/23/2006	5:50	PM					
Frequen M	cy Hz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.2176	00	46.90	10.1	63	16.0		
0.2276	0.0	31.20	10.1	63	31.3		-
0.4226	0.0	25.40	10.1	57	32.0	40.00.00	
1.0900	00	48.00	10.1	56	8.0	-00 00 00	
1.9550	00	44.80	10.3	56	11.2		
2.3900	00	46.30	10.3	56	9.7		
16.3050	00	45.20	10.5	60	14.8		
16.7400	00	46.30	10.5	60	13.7		
17,6100	00	44.20	10.5	60	15.8		

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MEASUREMENT	RESULT	: "ITE_	fin A	7"		
6/23/2006 5:5	0PM					
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.217600	33.70	10.1	53	19.2	1000	
0.225100	24.80	10.1	53	27.8		
0.390100	22.70	10.1	48	25.3		
1.090000	33.90	10.1	46	12.1		
1.960000	28.80	10.3	46	17.2		-
2.390000	31.90	10.3	46	14.1		
16.305000	30.50	10.5	50	19.5		
16.740000	31.30	10.5	50	18.7		****
17.605000	27.80	10.5	50	22.2		44.30.00

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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

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^{**} Measurements using CISPR quasi-peak mode.



7.1 RADIATED TEST DATA

Frequency	Reading	Ant. Factor	Cable Loss	ANT POL	Total	Limit	Margin
MHz	dBuV	dB/m	Db	(H/V)	dBuV/m	dBuV/m	dB
139.8	8.6	12.6	2.6	٧	23.8	30.0	6.2
160.0	8.4	12.8	2.9	Н	24.1	30.0	5.9
180.0	11.8	11.1	3.0	٧	25.9	30.0	4.1
200.0	10.8	9.1	3.2	V	23.1	30.0	6.9
259.7	14.0	11.4	3.7	Н	29.1	37.0	7.9
280.0	16.9	12.1	3.8	٧	32.8	37.0	4.2
659.0	5.3	19.8	5.9	٧	31.0	37.0	6.0

1280 X 1024, 60Hz DSUB 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).

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^{**} 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

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

$$dB \mu V = dBm + 107$$

8.2 Example 1:

@ 1.085 MHz

Class B limit = $56.0 \text{ dB } \mu\text{V}$

Reading = $49.8 \text{ dB } \mu\text{V}$ (calibrated level)

Margin = $49.8 - 56.0 = -6.2 \text{ dB } \mu\text{V}$

= 6.2 dB below limit

8.3 Example 2:

@ 140.0 MHz

Class B limit = $40.0 \text{ dB } \mu\text{V/m}$

Reading = $19.8 \text{ dB } \mu\text{V/m}$ (calibrated level)

Antenna Factor + Cable Loss = 15.3 dBTotal = $35.1 \text{ dB } \mu\text{V/m}$

Margin = $35.1 - 40.0 = -4.9 \text{ dB } \mu\text{V/m}$

= 4.9 dB below limit

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9.1 Test Equipment

<u>Type</u>	<u>Manufacture</u>	Model Number	CAL Due Date
EMI Test Receiver	Rohde & Schwarz	ESI40	2006.11.16
EMI Test Receiver	Rohde & Schwarz	ESCI	2006.09.13
LISN	Rohde & Schwarz	ESH2-Z5	2007.04.26
LISN	EMCO	703125	2007.04.26
TRILOG Antenna	Schwarzbeck	VULB 9160	2007.04.17
Antenna Position Tower	HD	MA240	N/A
Turn Table	EMCO	1050	N/A
Power Analyzer	Voltech	PM 3300	2007.03.22
Reference Network Impedance	Voltech	IEC 555	N/A
AC Power Source	PACIFIC	Magnetic Module	N/A
AC Power Source	PACIFIC	360-AMX	2006.11.25
Controller	HD GmbH	HD 100	N/A
SlideBar	HD GmbH	KMS 560	N/A
PULSE LIMITER	Rohde & Schwarz	ESH3-Z2	2006.11.16

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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.

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11.1 Conclusion

The data collected shows that the HARSPER CO., LTD. LCD TV MONITOR FCC ID: O5XHP-500VP complies with §15.107 and §15.109 of the FCC Rules.

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