



HYUNDAI CALIBRATION & CERTIFICATION TECH. CO., LTD.

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CERTIFICATION

Manufacture;
HASPER CO.,LTD.

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

HASPER FRN : 00007-9131-06

Date of Issue : DECEMBER 17, 2003

Test Report No.: HCT-F03-1202

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

HCT FRN : 0005-8664-21

FCC ID :

O5XHP-520W

MODEL / TYPE :

HP-5000W

| | |
|----------------------------|---|
| Rule Part(s): | Part 15 & 2; ET Docket 95-19 |
| Equipment Class: | FCC Class B Peripheral Device (JBP) |
| Standard(s): | FCC Class B: 1998 (CISPR 22) |
| EUT Type: | PDP MONITOR |
| Max. Resolution(s): | 1280x1024(@64KHz/ 60Hz) |
| Model(s): | HP-5000W |
| Port/Connector(s) | RS-232C INPUT, DVI INPUT, RGB PC INPUT, PC/DVI AUDIO INPUT, COMPONENT INPUT 1/2, AV INPYUT, OPICAL(SPDIF) DIGITAL AUDIO OUT JAK, S-VIDEO INPUT, ANT. IN, AC(POWER) INPUT |

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 C63.4-1992 (Grant Notes: #19, #28).

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

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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-520W**
- **Equipment Class: FCC Class B Peripheral Device (JBP)**
- **EUT Type: PDP MONITOR**
- **Model(s): HP-5000W**
- **Max. Resolution: 1280x1024(@64KHz/ 60Hz)**
- **Power Cord: Unshielded**
- **Rule Part(s): FCC Part 15 Subpart B**
- **Test Procedure(s): ANSI C63.4 (1992)**
- **Dates of Tests: DECEMBER 10, 2003~DECEMBER 11,2003**
- **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 C63.4-1992) was used in determining radiated and conducted emissions emanating from **HARSPER CO., LTD PDP MONITOR FCC ID: O5XHP-520W**

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 : HP-5000W) PDP MONITOR**
FCC ID: **O5XHP-520W**

Maximum Resolution(s): **1280 X 1024 (@64KHz/ 60Hz)**

Dimensions: **1416mm(W) x 798mm(H) x 299mm(D)**

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

Connectivity: **Composite : RCA-pin × 2, Component video signal : YpbPr × 2**

S-video : Mini DIN 4-pin × 1, RGB input : D-sub 15-pin × 1(480i/p, 720p, 1080i)

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

Speaker output : Cinch Conn Type(L/R) × 1(4cinch connectirs type)

Audio system : Stereo, Control Ports : RS-232 D-sub 9-pin × 1

DVI input : DVI Cable

Power Consumption : **540Watts**

Weight (Net):**55.5Kg**

EMI Suppression Devices:

Modifications were made to the device.

Refer to cover letter.

4.1 Description of Tests(Conducted)

4.2 Powerline Conducted RFI (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 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 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) | CISPR 22 CLASS B Limits dB(uV/m) | |
|---|--------------------------------|-------------------------------------|---------------------|
| Freq. Range | FCC Class B Quasi-Peak | CISPR 22 Quasi-Peak | CISPR 22 Average |
| 150kHz - 0.5MHz | 48* | 66-56** | 56-46** |
| 0.5MHz - 5MHz | 48 | 56 | 46 |
| 5MHz - 30MHz | 48 | 60 | 50 |
| *FCC Class B limits starts from 450kHz | | | |
| **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 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 | No Specified Limit |
| | | | |
| | | | |
| | | | |
| * 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) | HASPER CO., LTD. | HP-5000W | O5XHP-520W | 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 |

| | |
|----------------------|--|
| Cable Termination | Component port 75Ω S-Video Port 75Ω Video Port 75Ω Audio Port 30 KΩ |
|----------------------|--|

5.2 Cable Description

| | | Power Cord Shielded (Y/N) | I/O Cable Shielded (Y/N) | Length (M) |
|-------------------|-----------|---------------------------|--------------------------|---------------|
| PDP 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) |
| | D-sub | N/A | Y | 1.8(D) |
| | DVI | N/A | Y | 1.8(D) |
| | S-video | N/A | Y | 1.6(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 |
|-------------------|-----------|--------------------|----------|------------------|----------|
| PDP 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 |
| | D-sub | Y | BOTH END | Y | BOTH END |
| | DVI | Y | BOTH END | Y | BOTH END |
| | S-video | 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 |

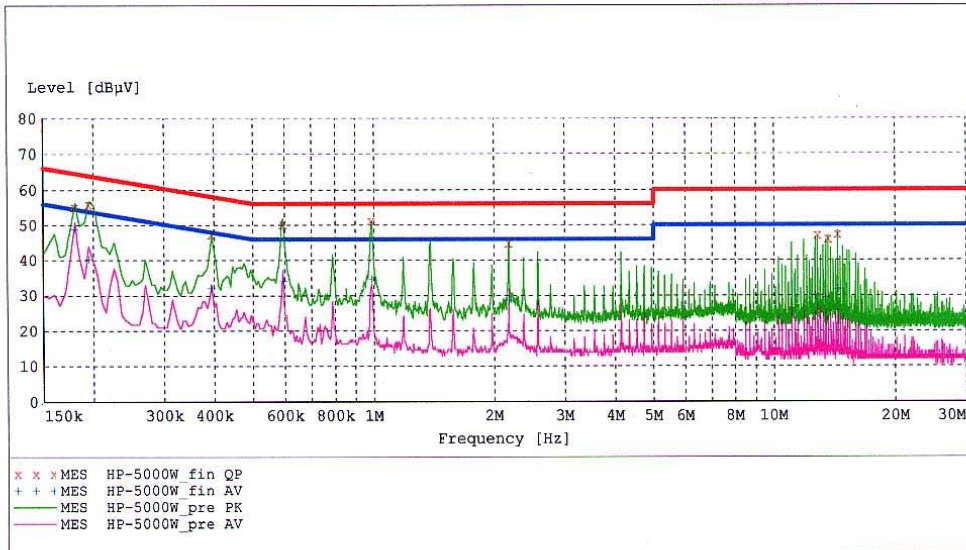
6.1 CONDUCTED TEST DATA

HYUNDAI C-TECH.
EMC TESTING Laboratory

EUT: HP-5000W
Manufacturer: HARSPER
Operating Condition: NORMAL
Test Site: SHIELD ROOM
Operator: JP-HONG
Test Specification: CISPR 22 CLASS B
Comment: N
Start of Test: 12/10/03 / 3:37:13PM

SCAN TABLE: "CISPR 22 Voltage"

| Short Description: | | CISPR 22 Voltage | | | | | Transducer |
|---------------------|-----------|------------------|----------|------------|-----------|------|------------|
| Start | Stop | Step | Detector | Meas. Time | IF Bandw. | | |
| Frequency 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 | | | | |



MEASUREMENT RESULT: "HP-5000W_fin QP"

12/10/03 3:40PM

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Line | PE |
|---------------|------------|-----------|------------|-----------|------|-----|
| 0.180000 | 55.10 | 10.1 | 65 | 9.4 | 1 | --- |
| 0.195000 | 55.90 | 10.1 | 64 | 7.9 | 1 | --- |
| 0.395000 | 47.30 | 10.1 | 58 | 10.7 | 1 | --- |
| 0.595000 | 50.20 | 10.2 | 56 | 5.8 | 1 | --- |
| 0.990000 | 51.20 | 10.1 | 56 | 4.8 | 1 | --- |
| 2.175000 | 44.70 | 10.3 | 56 | 11.3 | 1 | --- |
| 12.850000 | 47.10 | 10.5 | 60 | 12.9 | 1 | --- |
| 13.640000 | 46.10 | 10.5 | 60 | 13.9 | 1 | --- |
| 14.430000 | 47.30 | 10.5 | 60 | 12.7 | 1 | --- |

MEASUREMENT RESULT: "HP-5000W_fin AV"

12/10/03 3:40PM

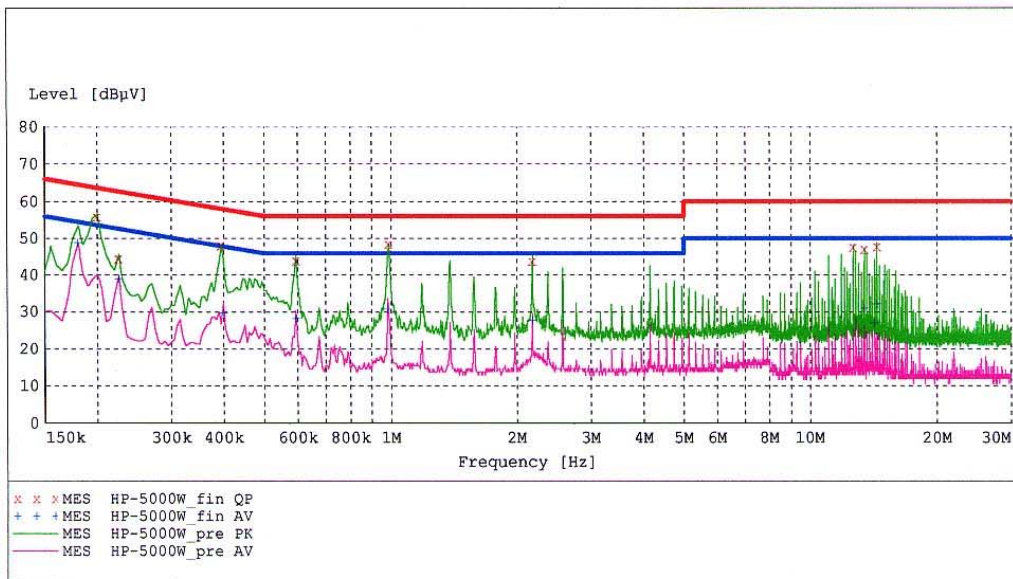
| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Line | PE |
|------------------|---------------|--------------|---------------|--------------|------|-----|
| 0.180000 | 48.80 | 10.1 | 55 | 5.6 | 1 | --- |
| 0.195000 | 40.40 | 10.1 | 54 | 13.4 | 1 | --- |
| 0.395000 | 32.10 | 10.1 | 48 | 15.8 | 1 | --- |
| 0.595000 | 34.00 | 10.2 | 46 | 12.0 | 1 | --- |
| 0.990000 | 34.70 | 10.1 | 46 | 11.3 | 1 | --- |
| 2.175000 | 28.70 | 10.3 | 46 | 17.3 | 1 | --- |
| 12.650000 | 30.10 | 10.4 | 50 | 19.9 | 1 | --- |
| 13.440000 | 29.50 | 10.5 | 50 | 20.5 | 1 | --- |
| 14.430000 | 31.80 | 10.5 | 50 | 18.2 | 1 | --- |

HYUNDAI C-TECH.
EMC TESTING Laboratory

EUT: HP-5000W
 Manufacturer: HARSPER
 Operating Condition: NORMAL
 Test Site: SHIELD ROOM
 Operator: JP-HONG
 Test Specification: CISPR 22 CLASS B
 Comment: H
 Start of Test: 12/10/03 / 3:32:46PM

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 | | | |



MEASUREMENT RESULT: "HP-5000W_fin QP"

12/10/03 3:35PM

| Frequency MHz | Level dBuV | Transd dB | Limit dBuV | Margin dB | Line | PE |
|---------------|------------|-----------|------------|-----------|------|-----|
| 0.200000 | 55.80 | 10.1 | 64 | 7.8 | 1 | --- |
| 0.225000 | 44.40 | 10.1 | 63 | 18.2 | 1 | --- |
| 0.395000 | 48.00 | 10.1 | 58 | 10.0 | 1 | --- |
| 0.595000 | 43.90 | 10.2 | 56 | 12.1 | 1 | --- |
| 0.990000 | 48.40 | 10.1 | 56 | 7.6 | 1 | --- |
| 2.175000 | 43.70 | 10.3 | 56 | 12.3 | 1 | --- |
| 12.650000 | 47.60 | 10.4 | 60 | 12.4 | 1 | --- |
| 13.440000 | 47.00 | 10.5 | 60 | 13.0 | 1 | --- |
| 14.430000 | 47.80 | 10.5 | 60 | 12.2 | 1 | --- |

MEASUREMENT RESULT: "HP-5000W_fin AV"

12/10/03 3:35PM

| Frequency MHz | Level dBμV | Transd dB | Limit dBμV | Margin dB | Line | PE |
|------------------|---------------|--------------|---------------|--------------|------|-----|
| 0.180000 | 48.80 | 10.1 | 55 | 5.7 | 1 | --- |
| 0.225000 | 39.10 | 10.1 | 53 | 13.6 | 1 | --- |
| 0.400000 | 29.80 | 10.1 | 48 | 18.0 | 1 | --- |
| 0.595000 | 28.30 | 10.2 | 46 | 17.7 | 1 | --- |
| 0.985000 | 30.90 | 10.1 | 46 | 15.1 | 1 | --- |
| 2.175000 | 27.90 | 10.3 | 46 | 18.1 | 1 | --- |
| 13.440000 | 31.10 | 10.5 | 50 | 18.9 | 1 | --- |
| 14.230000 | 27.20 | 10.5 | 50 | 22.8 | 1 | --- |
| 14.430000 | 32.20 | 10.5 | 50 | 17.8 | 1 | --- |

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 |
|------------------|-----------------|-------------------|------------------|------------------|-----------------|-----------------|--------------|
| 36.90 | 18.3 | 16.5 | 1.3 | V | 36.1 | 40 | -3.9 |
| 60.30 | 23.4 | 7.7 | 1.8 | V | 32.9 | 40 | -7.1 |
| 68.00 | 25.1 | 6.4 | 1.8 | V | 33.3 | 40 | -6.7 |
| 120.60 | 20.0 | 12.8 | 2.4 | H | 35.2 | 43.5 | -8.3 |
| 120.60 | 18.0 | 12.8 | 2.4 | V | 33.2 | 43.5 | -10.3 |
| 333.10 | 11.2 | 16.4 | 4.2 | H | 31.8 | 46 | -14.2 |
| 362.00 | 12.8 | 16.6 | 4.4 | H | 33.7 | 46 | -12.3 |
| 374.00 | 16.6 | 16.7 | 4.4 | H | 37.7 | 46 | -8.3 |
| 408.00 | 14.1 | 17.2 | 4.6 | H | 35.9 | 46 | -10.1 |
| 561.00 | 12.1 | 20.4 | 5.4 | H | 37.9 | 46 | -8.1 |
| 561.00 | 13.8 | 20.4 | 5.4 | V | 39.6 | 46 | -6.4 |
| 768.00 | 12.1 | 23.1 | 6.3 | H | 41.5 | 46 | -4.5 |

Radiated Measurements at 3-meters.

NOTES:

1. All modes(PC, Video, S-Vide, DVI, TV mode) of operation were investigated, and the worst-case emissions are reported.
2. The radiated limits are listed on Table 2 (Page 7).

** 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

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

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

8.2 Example 1:

@ 20.3 MHz

| | |
|-----------------------------|--|
| Class B limit | = 250 μV = 47.96 dB μV |
| Reading | = - 67.8 dBm (calibrated level) |
| Convert to dB μV | = - 67.8 + 107 = 39.2 dB μV |
| $10^{(39.2/20)}$ | = 91.2 μV |

| | |
|---------------|-----------------------------|
| Margin | = 39.2 - 47.96 = - 8.76 |
| | = 8.8 dB below limit |

8.3 Example 2:

@ 66.7 MHz

| | |
|-------------------------------|---|
| Class B limit | = 100 $\mu\text{V/m}$ = 40.0 dB $\mu\text{V/m}$ |
| Reading | = - 76.0 dBm (calibrated level) |
| Convert to dB $\mu\text{V/m}$ | = - 76.0 + 107 = 31.0 dB $\mu\text{V/m}$ |
| Antenna Factor + Cable Loss | = 5.8 dB |
| Total | = 36.8 dB $\mu\text{V/m}$ |

| | |
|---------------|-----------------------------|
| Margin | = 36.8 - 40.0 = - 3.2 |
| | = 3.2 dB below limit |

9.1 Test Equipment

| <u>Type</u> | <u>Manufacture</u> | <u>Model Number</u> | <u>CAL Date</u> |
|-----------------------------|--------------------|---------------------|-----------------|
| EMI Test Receiver | Rohed & Schwarz | ESI40 | 2003.11.16 |
| EMI Test Receiver | Rohed & Schwarz | ESVS30 | 2003.07.16 |
| LISN | Rohed & Schwarz | ESH2-Z5 | 2004.08.21 |
| LISN | EMCO | 3825/2 | 2004.02.24 |
| Amplifier | Hewlett-Packard | 8447E | 2003.08.23 |
| Aborbing Clamp | Rohed & Schwarz | MDS-21 | 2003.04.24 |
| Dipole Antennas | Schwarzbeck | VHAP | 2003.07.24 |
| Dipole Antennas | Schwarzbeck | UHAP | 2003.07.24 |
| Biconical Antenna | Schwarzbeck | VHA9103 | 2003.07.23 |
| Log-Periodic Antenna | Schwarzbeck | UHALP9107 | 2003.07.23 |
| Antenna Position Tower | HD | MA240 | N/A |
| Turn Table | EMCO | 1050 | N/A |
| Power Analyzer | Voltech | PM 3300 | 2003.02.15 |
| Reference Network Impedance | Voltech | IEC 555 | N/A |
| AC Power Source | PACIFIC | Magnetic Module | N/A |
| AC Power Source | PACIFIC | 360AMX | 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.

Actual program used is the Display “ H “ Pattern , White Pattern , 100/0/75/0 Colour bars, 1000 Hz Audio signal. All resolution modes were investigated and tested

11.1 Conclusion

The data collected shows that the **HARSPER CO., LTD. PDP Monitor** **FCC ID: O5XHP-520W**. complies with §15.107 and §15.109 of the FCC Rules.

