



SK TECH CO., LTD.

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## FCC-Certificate of Compliance

<b>Test Report No.:</b>	SKTFCE-070104-002		
<b>NVLAP CODE :</b>	200220-0		
<b>Applicant:</b>	Woo Young Telecom Co., Ltd.		
<b>Applicant Address:</b>	222-6, Suwolam-ri, Seotan-myeon, Pyeongtaek-si, Gyeonggi-do, 451-852, Rep. of Korea.		
<b>Manufacturer :</b>	Woo Young Telecom Co., Ltd.		
<b>Manufacturer Address:</b>	222-6, Suwolam-ri, Seotan-myeon, Pyeongtaek-si, Gyeonggi-do, 451-852, Rep. of Korea.		
<b>Product:</b>	LCD Monitor		
<b>FCC ID:</b>	PXWHL920WA	<b>Model No.:</b>	HL920WA, HL920WD, HL921WA, HL921WD
<b>Receipt No.:</b>	SKTEU06-0780	<b>Date of receipt:</b>	Dec. 19, 2006
<b>Date of Issue:</b>	Jan. 04, 2006		
<b>Testing location:</b>	SK TECH CO., LTD. 820-2, Wolmoon-Ri, Wabu-Up, Namyangju-Si, Kyunggi-Do, Korea		
<b>Test Standards:</b>	ANSI C63.4 / 2003		
<b>Rule Parts:</b>	FCC part 15 Subpart B, CISPR 22		
<b>Equipment Class :</b>	Class B Digital Device Peripheral		
<b>Test Result:</b>	The above mentioned product has been tested and passed.		

Prepared by: S.Y.Ye

Tested by: H.P.Kim/Engineer

Approved by: D.H.Kang  
/Manager & Chief Engineer

Signature	Date	Signature	Date	Signature	Date
Other Aspects :					
Abbreviations :	· OK, Pass = passed · Fail = failed · N/A = not applicable				

- ☒ • This test report is not permitted to copy partly without our permission.
- This test result is dependent on only equipment to be used.
- This test result is based on a single evaluation of one sample of the above mentioned.
- This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S Government.
- We certify that this test report has been based on the measurement standards that is traceable to the national or International standards.

NVLAP Lab. Code: 200220-0



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## 1. General

This equipment has been shown to be capable of compliance with the applicable technical standards and was tested in accordance with the measurement procedures as indicated in this report.

We attest to the accuracy of data. All measurements reported herein were performed by SK TECH Co., Ltd. and were made under Chief Engineer's supervision.

We assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

## 2. Test Site

SK TECH Co., Ltd.

### 2.1 Location

820-2, Wolmoon Ri, Wabu-Up, Namyangju-Si, Kyunggi-Do, Korea

The test site is in compliance with ISO/IEC 17025 for general requirements for the competence of testing and calibration laboratories.

This laboratory is recognized as a Conformity Assessment Body(CAB) for CAB's, Designation Number: **KR0007** by FCC, is accredited by NVLAP for NVLAP Lab. Code : **200220-0** and DATech for DAR-Registration No.:**DAT-P-076/97-01**.



## 2.2 List of Test and Measurement Instruments

Table 1 : List of Test and Measurement Equipment

- **Conducted Disturbance**

Kind of Equipment	Type	S/N	Calibrated until
EMI Receiver	ESHS10	835871/002	09.2007
Artificial Mains Network	ESH2-Z5	834549/011	07.2007

- **Radiated Disturbance**

Kind of Equipment	Type	S/N	Calibrated until
EMI Receiver	ESIB40	100277	02.2007
Amplifier	8447F	3113A05153	07.2007
Trilog-Broadband Antenna	VULB9168	9168-230	07.2007
Antenna Turntable Driver	5907	91X518	N/A
Antenna Turntable controller	5906	91X519	N/A

## 2.3 Test Date

Date of Application : Dec. 19, 2006

Date of Test : Dec. 21, 2006 ~ Dec. 22, 2006

## 2.4 Test Environment

See each test item's description.



### 3. Description of the tested samples

The EUT is a LCD Monitor.

HL921WA and HL921WD are different from HL920WA and HL920WD in looking of stand base and front cover.

HL921WA and HL921WD's stand base is rectangular, HL920WA and HL920WD's stand base is oval.

HL921WA and HL920WD's front cover is a little bit different from HL920WA and HL920WD in looking as the attached photo. (See External Photographs of EUT page 3)

#### 3.1 Rating and Physical Characteristics

MODE		Analog	Digital
Panel	Type	TFT active matrix	
	Size	19 inch wide	
		408.24 x 255.15(mm)	
	Pixel Pitch	0.2835 x 0.2835(mm)	
	Display Color	16.2M	
Display Resolution	Basic	1440 x 900@60Hz	
	Maximum	1440x900 @ 75Hz	1440 x900 @ 60Hz
Frequency	Horizontal	31.5 ~ 80KHz	31 ~ 64KHz
	Vertical	56 ~ 75Hz	59 ~ 61Hz
Connectors		15pin D-Sub Connector	24pin DVI-D Connector
		Speaker Input/ Headphone Output(Audio Cable) <sup>1</sup>	
Tilting Degree(U/D)		-5°~20° Degree	
Plug & Play		VESA DDC 1/2B	
Power	Input	Internal type: 100~240V AC, 50/60Hz, 0.5A	
	Consumption	Under 40W (Speaker Max 4W <sup>1</sup> )	
	Standby mode	2W less	
Power Management		Power Save	
Environmental Consideration	Temperature	0~25°C (32°F ~ 77°F)	
	Humidity	90% less	
Dimensions	Outside	445mm(W)x350mm(H)x190mm(D)	
Weight		4.3Kg	



## 3.2 Submitted Documents

N/A

## 4. Measurement Conditions

Operating voltage of the EUT is supplied from AC Line.

The rating is AC 120V/ 60Hz at input.

## 4.1 Modes of Operation

The EUT was in the following operating mode during all testing.

The EUT is connected to PC by VGA interface cable.

The EUT is tested in the mode of "H" on the screen and played windows media player.

## 4.2 List of Peripherals

Equipment	Manufacturer	Model Name	Serial No.
Mini keyboard	SEJIN ELECTRON INC.	SPR-8695TV	6ATFZ011380
PC	DELL	DCSM	HJD4J1S

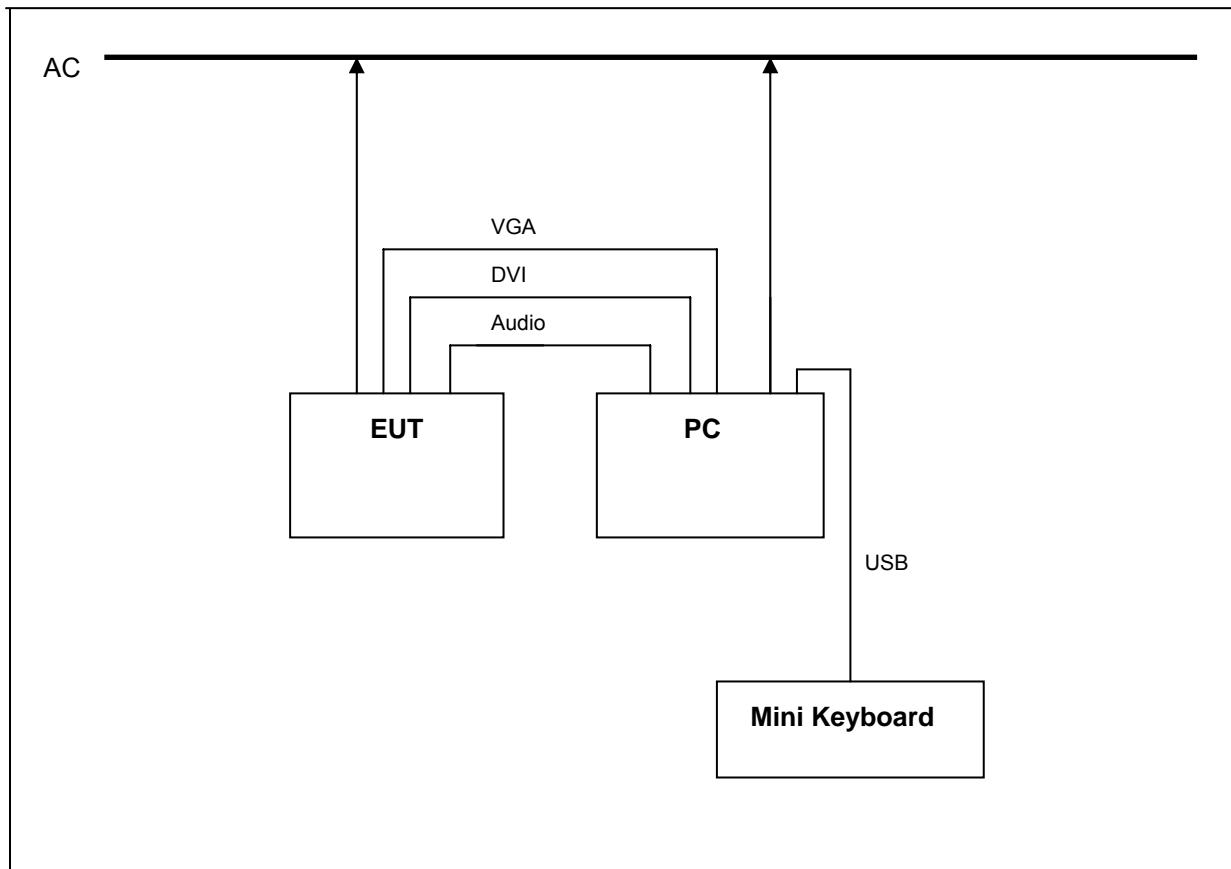
## 4.3 Type of Used Cables

Equipment	Manufacturer	M/N	S/N	Cables &connectors
EUT (DVI cable for PC)	N/A	N/A	N/A	1.2m shielded DVI cable
EUT (VGA cable for PC)	N/A	N/A	N/A	1.2m shielded VGA cable
EUT (Audio Cable for PC)	N/A	N/A	N/A	1.0m shielded Audio cable
PC(USB Cable for Mini keyboard)	N/A	N/A	N/A	2.0m shielded USB cable



## 4.4 Test Setup

The test setup photographs showed the external supply connections and interfaces.



**[ System Block Diagram of Test Configuration ]**



## 4.5 Uncertainty

### 1) Radiated disturbances from 30 MHz to 1000 MHz at a distance of 3m and 10 m

Input quantity	Xi	Probability distribution function
Receiver reading	Vr	Rectangular $\sqrt{3}$
Attenuation: antenna-receiver	Lc	k=1
Amplifier Error	Ae	k=2
antenna factor	Lac	k=2
<b>Receiver corrections:</b>		
Sine wave voltage	dVsw	Rectangular $\sqrt{3}$
Pulse amplitude response	dVpa	Rectangular $\sqrt{3}$
Pulse repetition rate response	dVpr	Rectangular $\sqrt{3}$
Mismatch: antenna-receiver	dM	k=1
<b>Antenna corrections:</b>		
AF frequency interpolation	dAFF	Rectangular $\sqrt{3}$
AF height deviations	dAFh	Rectangular $\sqrt{3}$
Directivity difference	dAdir	3 m: Rectangular $\sqrt{3}$ , 10 m: Rectangular $\sqrt{3}$
Phase centre location	dAph	3 m: Rectangular $\sqrt{3}$ , 10 m: Rectangular $\sqrt{3}$
Cross-polarisation	dAcp	Rectangular $\sqrt{3}$
Balance	dAbal	Rectangular $\sqrt{3}$
<b>Site corrections:</b>		
Site imperfections	dSA	Rectangular $\sqrt{6}$
Separation distance	dd	3 m: Rectangular $\sqrt{3}$ , 10 m: Rectangular $\sqrt{3}$
Table height	dh	3 m: k=2, 10 m: k=2
Expanded Uncertainty		4.60(Vertical)/4.59(Horizontal) k=2 (Level of confidence)

Expanded Uncertainty

$$U = k * U_c(x_i) = 2 * 2.3 = 4.60 \text{dB}$$

The coverage factor k =2 yields approximately a 95% level of confidence.

### 2) Conducted disturbance from 150 KHz to 30 MHz using a 50 Ω/50 uH AMN

Input quantity	Xi	Probability distribution function
Receiver reading	Vr	Rectangular $\sqrt{3}$
Attenuation: AMN-receiver	Lc	k=1
AMN voltage division factor	Lamn	k=2
<b>Receiver corrections:</b>		
Sine wave voltage	dVsw	Rectangular $\sqrt{3}$
Pulse amplitude response	dVpa	Rectangular $\sqrt{3}$
Pulse repetition rate response	dVpr	Rectangular $\sqrt{3}$
Mismatch: AMN-receiver	dM	U-shape $\sqrt{2}$
AMN impedance	dZ	Triangular $\sqrt{6}$
Expanded Uncertainty		3.99 k=2 (Level of confidence)

Expanded uncertainty

$$U = k * U_c(x_i) = 2 * 1.96 = 3.92 \text{dB}$$

The coverage factor k =2 yields approximately a 95% level of confidence.



## 5. EMISSION Test

### 5.1 Conducted Emissions

**Result:****PASS**

The line-conducted facility is located inside a 2.6M x 3.6M x 7.0M shielded enclosure.

The shielding effectiveness of the shielded room is in accordance with MIL-Std-285 or NSA 604-05. A 1 m x 1.5 m wooden table 80 cm high is placed 40 cm. away from the vertical wall and 1.5 m away from the side wall of the shielded room. ROHDE & SCHWARZ Model ESH3-Z5 (10 kHz-30 MHz) 50 ohm/50 uH Line-Impedance Stabilization Networks(LISNs) are bonded to the shielded room.

The EUT is powered from the ROHDE & SCHWARZ LISN and the support equipment is powered from the ROHDE & SCHWARZ LISN. Power to the LISNs are filtered by a high-current high-insertion loss Lindgren enclosures power line filters (100dB 14 kHz-10 GHz).

The purpose of the filter is to attenuate ambient signal interference and this filter is also bonded to the shielded enclosure.

All electrical cables are shielded by braided tinned copper zipper tubing with inner diameter of 1/2". If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the ROHDE & SCHWARZ LISN.

All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1-meter length.

Sufficient time for the EUT, support equipment, and test equipment was 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 from the EUT.

The spectrum was scanned from 150 kHz to 30 MHz with 100msec. sweep time.

The frequency producing the maximum level was reexamined using EMI/field Intensity Meter (ESHS 10) and Quasi-Peak adapter. The detector function was set to CISPR quasi-peak mode.

The bandwidth of the receiver was set to 10 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission.

Each emission was maximized by: switching power lines; varying the mode of operation or resolution;clock or data exchange speed; if applicable; whichever determined the worst-case emission.

Photographs of the worst-case emission can be seen in photograph of conducted test.

Each EME reported was calibrated using self-calibrating mode.



Table 2: Test Data, Conducted Disturbance

## &lt;Quasi-Peak&gt;

Frequency (MHz)	Reading (dBuV)	Line	C/F (dB)	C/L (dB)	Actual (dBuV)	Limit (dBuV)	Margin (dB)
11.635	47.47	N	0.39	0.25	48.11	60.00	11.89
11.960	47.09	N	0.39	0.25	47.73	60.00	12.27
12.100	47.23	L	0.66	0.27	48.16	60.00	11.84
12.725	46.41	L	0.66	0.27	47.34	60.00	12.66
18.105	42.67	N	0.71	0.35	43.73	60.00	16.27
24.145	47.24	L	1.18	0.41	48.83	60.00	11.17

## &lt;Average&gt;

Frequency (MHz)	Reading (dBuV)	Line	C/F (dB)	C/L (dB)	Actual (dBuV)	Limit (dBuV)	Margin (dB)
11.635	40.96	N	0.39	0.25	41.60	50.00	8.40
11.960	40.59	N	0.39	0.25	41.23	50.00	8.77
12.100	37.65	L	0.66	0.27	38.58	50.00	11.42
18.105	40.63	N	0.71	0.35	41.69	50.00	8.31
24.145	44.70	L	1.18	0.41	46.29	50.00	3.71
27.160	40.63	L	1.18	0.43	42.24	50.00	7.76

## ► NOTE

\* C/F = Correction Factor

\* C/L = Cable Loss

\* LINE : L = Line-PE, N = Neutral-PE

\* Margin Calculation

Margin(Q.P) = Limit - Actual

[Actual(Q.P)= Reading(Q.P) + C/F + C/L]



Figure 1: Spectral Diagram, LINE – PE

SK TECH Co., Ltd.  
CONDUCTED DISTURBANCE

22 Dec 2006 11:15

EUT: HL920WA  
Manuf:  
Op Cond: AC 120 V / 60 Hz  
Operator:  
Test Spec: FCC Part 15 Subpart B  
Comment: LINE-PE  
Result File: 920wa\_l1.dat : HL920WA (Lien Chang)

Scan Settings (1 Range)  
Frequencies Receiver Settings  
Start Stop Step IF BW Detector M-Time Atten Preamp OpRge  
150kHz 30MHz 5kHz 10kHz PK+AV 20msec Auto OFF 60dB

Final Measurement: Detectors: X QP / + AV  
Meas Time: 1sec  
Peaks: 8  
Acc Margin: 35 dB

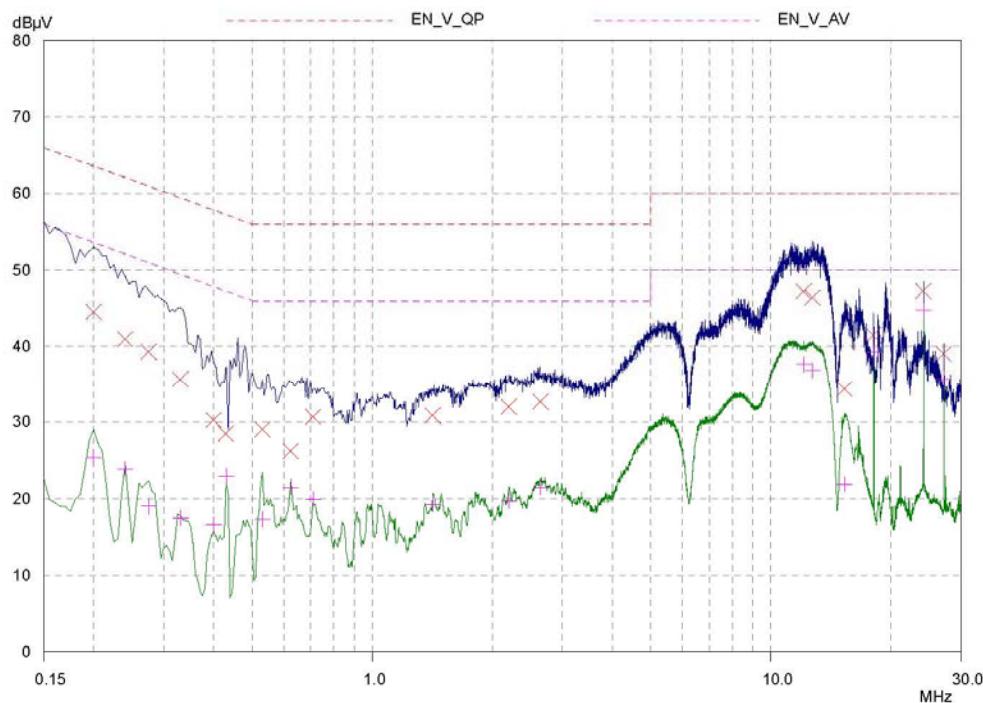




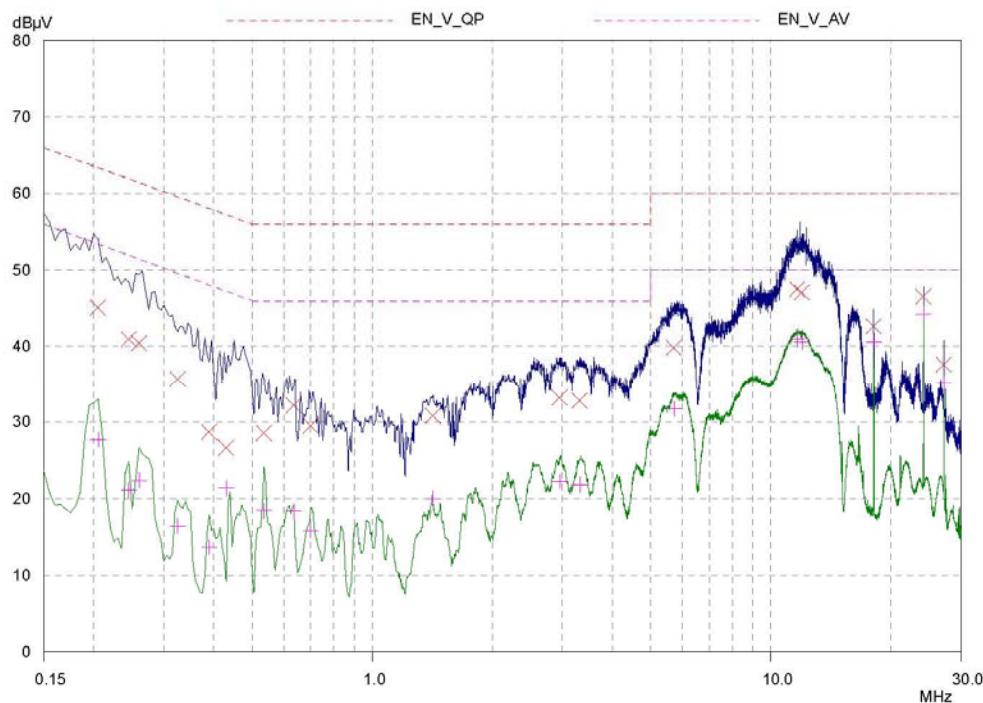
Figure 2: Spectral Diagram, NEUTRAL – PE

SK TECH Co., Ltd.  
CONDUCTED DISTURBANCE  
EUT: HL920WA  
Manuf:  
Op Cond: AC 120 V / 60 Hz  
Operator:  
Test Spec: FCC Part 15 Subpart B  
Comment: NEUTRAL-PE  
Lien Chang Power  
Result File: 920wa\_n1.dat :HL920WA (Lien Chang)

22 Dec 2006 10:54

Scan Settings (1 Range)		Receiver Settings							
Frequencies		Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge	
Start	Stop	5kHz	10kHz	PK+AV	20msec	Auto	OFF	60dB	
150kHz	30MHz								

Final Measurement: Detectors: X QP / + AV  
Meas Time: 1sec  
Peaks: 8  
Acc Margin: 35 dB





## 5.2 Radiated Emissions

**Result :****PASS**

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 system configuration, clock speed, mode of operation or video resolution, turntable azimuth with respect to the antenna were noted for each frequency found.

The spectrum was scanned from 30 to 300 MHz using biconical antenna and from 300 to 1000 MHz using log-periodic antenna. Above 1 GHz, linearly polarized double ridge horn antennas were used.

Final measurements were made outdoors at 3-meter test range using SCHWARZBECK dipole antennas.

The test equipment was placed on a wooden table situated on a 4x4 meter area adjacent to the measurement area. Turntable was to protect from weather in the dome that made with FRP.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. Each frequency found during pre-scan measurements was re-examined and investigated using EMI/Field Intensity Meter(ESVS 10) and Quasi-Peak Adapter.

The detector function was set to CISPR quasi-peak mode and the bandwidth of the receiver was set to 100 kHz or 1 MHz depending on the frequency or type of signal.

The half-wave dipole antenna was tuned to the frequency found during preliminary radiated measurements. The EUT, support equipment and interconnecting cables were re-configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1 x 1.5 meter table.

The EUT, support equipment, and interconnecting cables were re-arranged and manipulated to maximize each EME emission. 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.

Each emission was maximized by: varying the mode of operation or resolution; clock or data exchange speed, and/or support equipment, if applicable; and changing the polarity of the antenna, whichever determined the worst-case emission.

Photographs of the worst-case emission can be seen in photograph of radiated emission test.

Each EME reported was calibrated using self-calibrating mode.

**Table 3 : Test Data, Radiated Emissions**

&lt;RGB&gt;

Frequency [MHz]	Pol.	Height [m]	Real Reading	Correction Factor		T-Fact [dB]	Data [dBuV/m]	Limits [dBuV/m]	Margin [dB]
				Antenna	Cable				
173.53	V	1.0	21.6	12.8	1.4	14.2	35.8	43.5	7.7
301.80	V	1.0	25.3	12.9	1.6	14.5	39.8	46.0	6.2
575.39	V	1.2	9.4	18.3	2.1	20.4	29.8	46.0	16.2
597.31	V	1.2	17.8	18.3	2.1	20.4	38.2	46.0	7.8
995.52	V	1.1	17.7	24.1	2.7	26.8	44.5	54.0	9.5

Table. Radiated Measurements at 3-meters

&lt; DVI &gt;

Frequency [MHz]	Pol.	Height [m]	Real Reading	Correction Factor		T-Fact [dB]	Data [dBuV/m]	Limits [dBuV/m]	Margin [dB]
				Antenna	Cable				
169.29	V	1.0	23.4	12.8	1.3	14.1	37.5	43.5	6.0
597.66	V	1.0	12.4	18.3	2.1	20.4	32.8	46.0	13.2

Table. Radiated Measurements at 3-meters

**NOTES:**

1. All modes of operation were investigated and the worst-case emission are reported.
2. All other emission are non-significant.
3. All readings are calibrated by self-mode in receiver.
4. Measurements using CISPR Quasi-Peak mode.
5. H = Horizontal, V = Vertical Polarization
6. Data = Real Reading + T – Fact (Antenna+Cable)
7. Margin = Limits – Data