

**Landmark Technology Inc.**

# Uni700 LCD Controller

For

TFT LCDs with Resolution up to 1,920 x 1,200

(Version A)

January 27, 2009

## 1. Introduction

The Uni700 controller board is designed for LCD panels of 800x480, 1024x768, 1280x768, 1366x768, 1280x1024, 1600x1200 and 1920 x 1200 resolutions. It provides an auto-input synchronization and easy to use interface.

Currently, the Uni700 controller has VGA and DVI input connectors. The controller automatically detects and logs onto the input video whether it is VGA or DVI.

### To Proceed:

- A. Make sure to use the correct parts and refer to the Connection diagram in Fig. 4.
- B. Check the controller jumper J8 settings to select the LCD voltage (having a wrong setting may damage the LCD panel).
- C. Please read this user guide to understand the operation & the functions of the card
- D. Static electricity may damage the chips on the card. Make sure to ground everything before handling the card.

**Important Notes** – This product is designed for system developers and integrators. The manufacturer accepts no liability for damage or injury caused by the use of this product. It is the responsibility of the system developers, integrators, and other users to ensure:

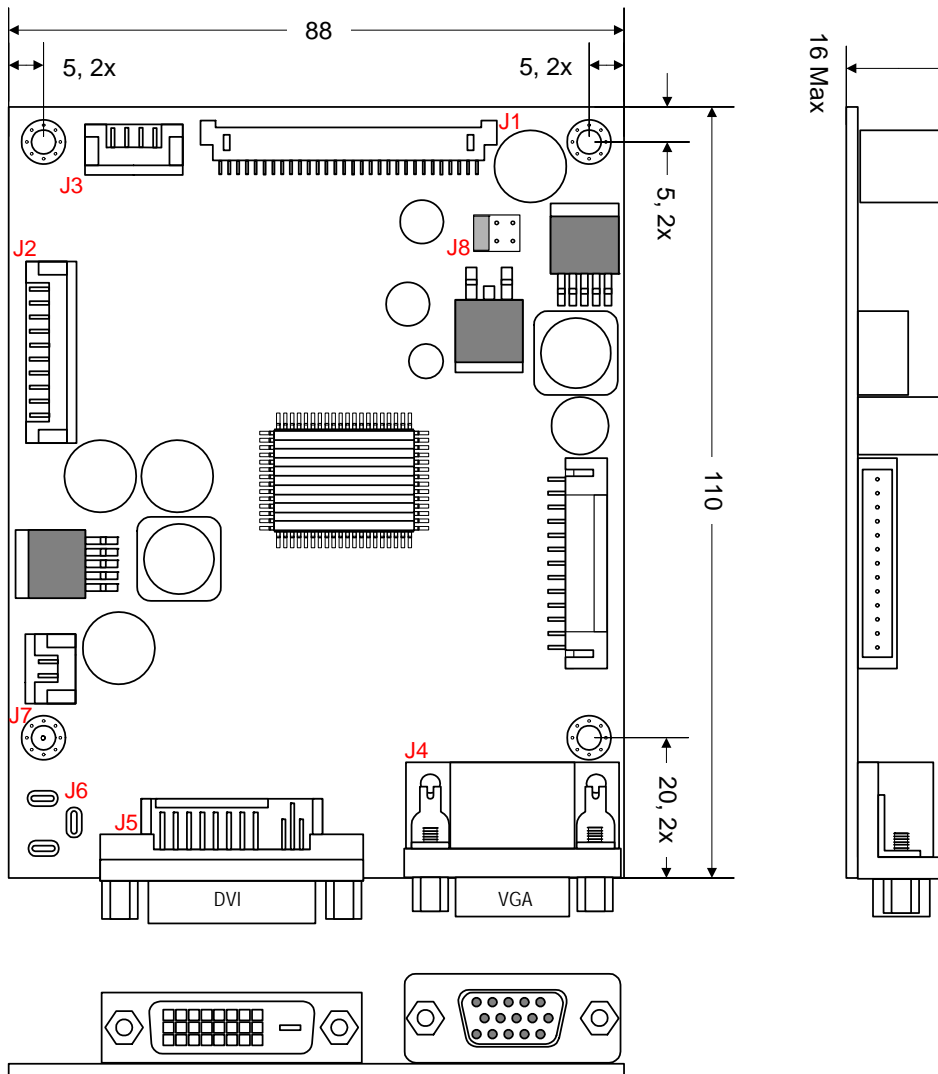
- A. All required and appropriate safety measures are properly implemented.
- B. Obtain regulatory approvals as needed.
- C. Check power specifications and connections before turning on the power

## 2. Features:

Input Video Signal	Analog RGB (VGA), Digital TMDS (DVI)
Supported Resolution	DOS, VGA, SVGA, XGA, SXGA, WXGA, UXGA, WUXGA
Color Depth	24 bits (16.8 million) colors
LCD Interface	LVDS
LCD Voltage Supported	3.3V / 5V / 12V
Plug & Play	VESA DDC 2B Ver. 1.3
Controller Dimensions	110 mm x 88 mm x 16 mm ( H max)
OSD Board Dimensions	104 mm x 22 mm
Operating Temp. Range	0 to 60 degree C
Humidity	90% R.H. Max.

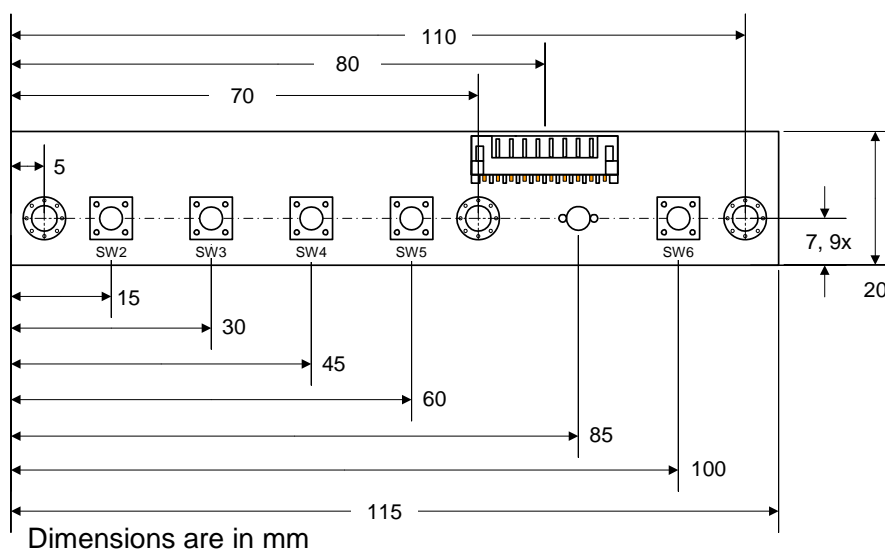
## 3. Uni700 Mechanical Dimensions

The dimensions (in mm) of the main controller board and its connectors are shown in Fig. 2:



**Fig. 2**

The dimensions (in mm) of the OSD board and its connectors are show in Fig. 3.



**Fig. 3 OSD Board Dimensions**

There are 5 push button keys for various display adjustments. Please refer to the OSD Menu section for details.

#### 4. System Connection

The typical connection diagram of the UNI700 LCD controller to Landmark VHB LCD modules is illustrated in Fig. 4 below.

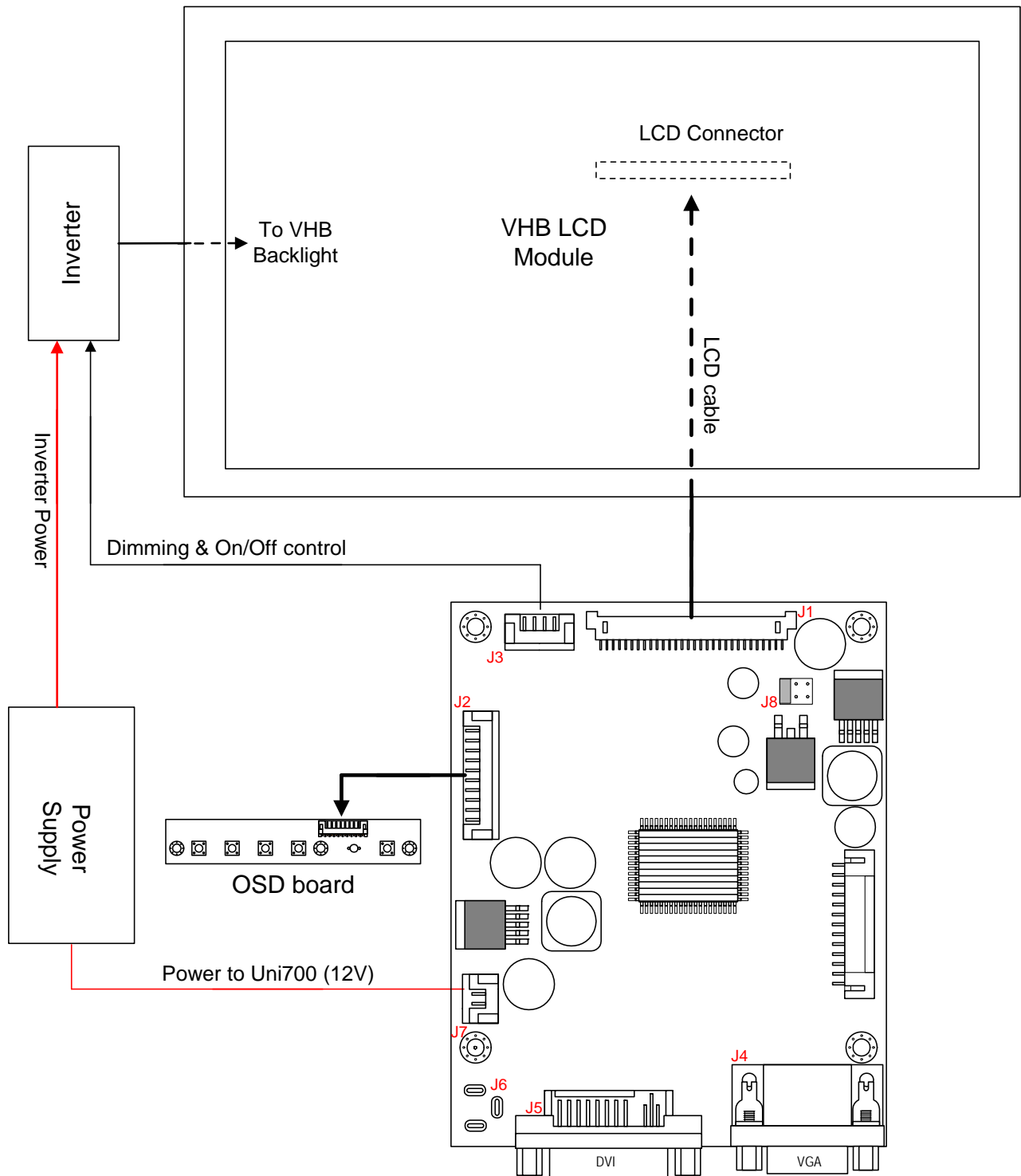


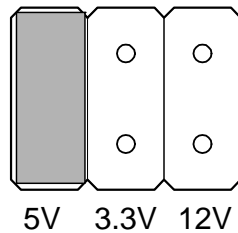
Fig. 4 - Typical Connection Diagram from the Uni700 to a Landmark VHB LCD and the Inverter

**Cautions:**

- A. The inverter power should connect directly from the power supply as shown in Fig. 4. The 12V from connector J3 cannot carry the heavy inverter current load to run the VHB backlight.
- B. Never connect or disconnect any parts of the system while the power is turned on as doing so may cause serious damage to the Uni700 controller and other parts.

**5. Set LCD Voltage**

There is a jumper J8 near the LVDS connector J1. This jumper has 3 positions, 5V, 3.3V, and 12V. This jumper must be set correctly to match the LCD voltage specified in the LCD data sheet. Mis-setting this voltage may damage the LCD. The setting shown below is for an LCD that operates on 5V.



**6. Video Modes Supported**

Mode	Resolution	f <sub>H</sub> (KHz)	f <sub>V</sub> (Hz)	Mode	Resolution	f <sub>H</sub> (KHz)	f <sub>V</sub> (Hz)
VGA	640 x 480	31.339	60	WXGA	1280 x 768	47.663	60
		35.156	70			55.968	70
		37.861	72			57.709	72
		37.500	75			60.495	75
VGA	720 x 400	31.430	70	SXGA	1280 x 960	60.000	60
	720 x 480	29.175	60			69.661	70
SVGA	800 x 600	37.713	60			72.266	72
		43.810	70			75.000	75
		48.029	72	63.981	60		
XGA	1024 x 768	46.875	75	74.777	70		
		48.549	60	76.563	72		
		56.637	70	79.976	75		
		57.574	72	47.712	60		
	1152 x 864	60.023	75	WXGA	1360 x 768	56.001	70
		53.924	60			57.868	72
		63.281	70			60.413	75
		65.039	72			55.710	60
	1280 x 720	67.500	75	UXGA	1440 x 900	55.710	60
		44.621	60		1600 x 1200	75.000	60
		52.535	70	HDTV	1650 x 1050	65.089	60
		54.127	72	WUXGA	1920 x 1080		
		56.604	75		1920 x 1200	74.405	60

## 6. Electric Specifications

### Input Spec

Description	Unit	Min	Typical	Max	Remarks
Power input					
Voltage	V DC	11.4	12	12.6	
Consumption	Watt		TBD		
Video Input - RGB					
Analog RGB	Vpp	0	0.7		
Sync	Vdc	0	5	5.5	
H Frequency	KHz	31		80	Depends on mode
V Frequency	Hz	55	75	77	Depends on mode
Video Input - DVI	mVpp	450	500	900	

### Output Spec

Description	Unit	Min	Typical	Max	Remarks
LCD Power					
12V	V DC	11.4	12	12.6	
5V	V DC	4.5	5	5.5	
3.3V	V DC	3.16	3.3	3.5	
LVDS Interface	mVpp	250	350	450	Differential +/-
Inverter Interface					
Vcc	V DC	11.4	12	12.6	
On/Off Ctrl	Von	0		3.3	0V off, 3.3V on
Dimming	Vd	0		3.3	3.3V max brightness

## 7. Connectors and Pin Assignments

The connectors on the UNI700 card and their functions are listed below:

J1	LVDS Interface Connector
J2	OSD Connector
J3	Invertor Connection
J4	VGA, 15-pin D-sub Connector
J5	DVI Input Connector
J6	Input Power Connector (not used)
J7	Input Power Connector
J9	Video Signal Input (reserved)

The pin Assignments of the connectors besides the standard ones (such as VGA and DVI) are listed below:

**J1 (30 Pins) – LVDS Interface YEONHO 12507WR-30**

Pin #	Symbol	Description
1	VCC	Power to LCD
2	VCC	Power to LCD
3	VCC	Power to LCD
4	VCC	Power to LCD
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	RxE3+	Positive LVDS differential data, Ch-3 (Even data)
9	RxE3-	Negative LVDS differential data, Ch-3 (Even data)
10	RxEC+	Positive LVDS differential clock (Even clock)
11	RxEC-	Negative LVDS differential clock (Even clock)
12	RxE2+	Positive LVDS differential data, Ch-2 (Even data)
13	RxE2-	Negative LVDS differential data, Ch-2 (Even data)
14	GND	Ground
15	RxE1+	Positive LVDS differential data, Ch-1 (Even data)
16	RxE1-	Negative LVDS differential data, Ch-1 (Even data)
17	GND	Ground
18	RxE0+	Positive LVDS differential data, Ch-0 (Even data)
19	RxE0-	Negative LVDS differential data, Ch-0 (Even data)
20	RxO3+	Positive LVDS differential data, Ch-3 (Odd data)
21	RxO3-	Negative LVDS differential data, Ch-3 (Odd data)
22	RxOC+	Positive LVDS differential clock (Odd clock)
23	RxOC-	Negative LVDS differential clock (Odd clock)
24	GND	Ground
25	RxO2+	Positive LVDS differential data, Ch-2 (Odd data)
26	RxO2-	Negative LVDS differential data, Ch-2 (Odd data)
27	RxO1+	Positive LVDS differential data, Ch-1 (Odd data)
28	RxO1-	Negative LVDS differential data, Ch-1 (Odd data)
29	RxO0+	Positive LVDS differential data, Ch-0 (Odd data)
30	RxO0-	Negative LVDS differential data, Ch-0 (Odd data)

**J2 – OSD Connector YEONHO 20010WR-12**

Pin #	Function	Pin #	Function
1	IR	7	Up
2	+5V	8	LED R
3	GND	9	LED G
4	Select	10	Power
5	Menu	11	Left
6	Down	12	Right

**J3 – Inverter Connector YEONHO 20010WR-06**

Pin #	Symbol	Description
1	12V	12V DC power output
2	12V	12V DC power output
3	On/Off	Inverter On/Off control
4	Dimming	Inverter brightness control
5	GND	Ground
6	GND	Ground

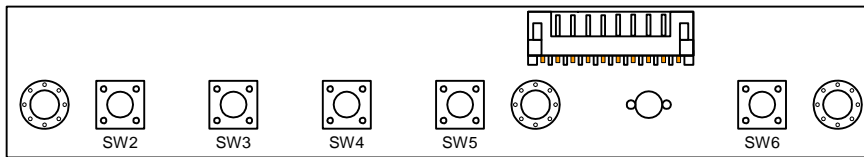
**Cautions** – The 12V power on J3 can run inverters for small size regular brightness LCDs. It does not have the current capability to run Landmark inverters for VHB backlights. Please follow Fig. 4 on page 4 for the proper connections to run very high brightness LCDs. In addition, for large size TV LCDs and PID (public information display) LCDs, the inverter input voltage is usually 24V. A 24V power supply with adequate power rating shall be used.

**J7 – for Power Input YEONHO 20010WR-04**

Pin #	Symbol	Description
1	12V	12 Volt DC power input
2	12V	12 Volt DC power input
3	GND	Ground
4	GND	Ground

**8. OSD Board**

The OSD board and its push button keys are shown in the following figure:



There are five push button keys on the OSD board. The functions of the keys are summarized below:

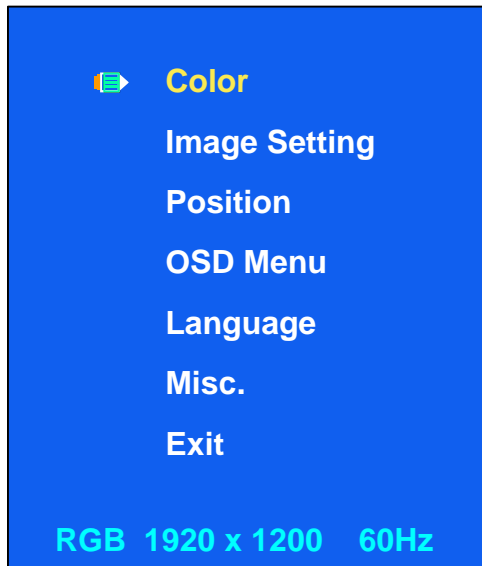
- SW2 - Menu, Select, Activate    Brings up the OSD Main Menu, select the item on the Menu. Press it again to activate the selected adjustment.
- SW3 – Back, Exit                    Go back to the previous menu.
- SW4 – Down, “-“                    Move the OSD cursor down. After activating the selected item with SW2, use SW4 key to adjust the setting or move the screen image downward.
- SW5 – Up, “+”                        Move the OSD cursor up. After activating the selected item with SW2, use SW5 key to adjust the setting or move the screen image upward.
- SW6 – Power                          Turn the LCD On and Off.

## The SW6 (POWER) Key

Pressing the SW6 (POWER) key turns the LCD On or Off. When the LCD is turned on, the LED on the OSD board turns green. When the LCD is turned off, the LED turns red. If the inverter On/Off control is connected to Pin #3 of J3, then the inverter and the backlight will be turned off also.

## 9. The OSD Menu

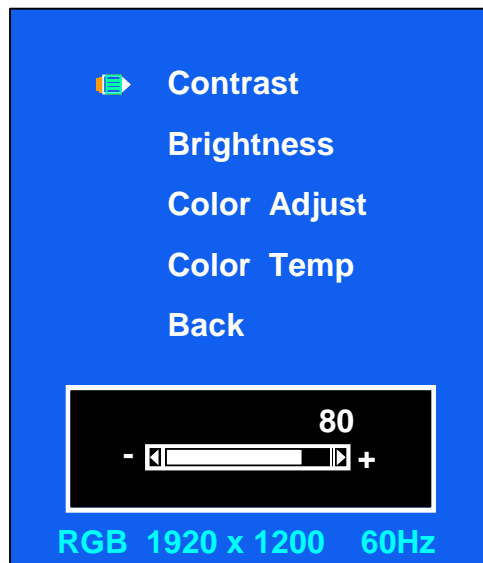
When the SW2 (Menu) key on the OSD board is pressed, the Main Menu appears on the screen:



There are 7 items on the MAIN MENU. At the bottom of the MAIN MENU, the current video input mode (RGB), the resolution (1920x1200), and the vertical sync frequencies (60Hz) are displayed.

### The Color Submenu and Making Adjustments

When the MAIN MENU is turned on, the OSD cursor is at “Color” which is also highlighted. Press the SW2 key again to activate the Color adjustment. The following Color Submenu shows up:



The Color Submenu has 4 adjustment items plus the item “Back”. The Contrast adjustment is highlighted. Press the SW2 key to activate the Contrast adjustment. Then push the SW4 key or the SW5 key to make adjustments down or up respectively. In the meantime, a setting bar at the lower side of the Sub Menu shows the level of adjustment both graphically and numerically.

After finishing the adjustment, press the SW2 or SW3 key to exit the adjustment mode. To make another adjustment in the Color Submenu, press the SW4 key to move the cursor down and the SW5 key to move the cursor up to select the adjustment needed. Then press the SW2 key to activate the selected adjustment. Again, use the SW4 or SW5 key to make the adjustment. After completing the setting, press the SW2 key to exit.

Now, if no more adjustments are needed, then press SW3 key to move back to the MAIN MENU. Alternatively, press the SW4 key to move the OSD cursor down to “Back”. Then press the SW2 key to go back to the Main Menu.

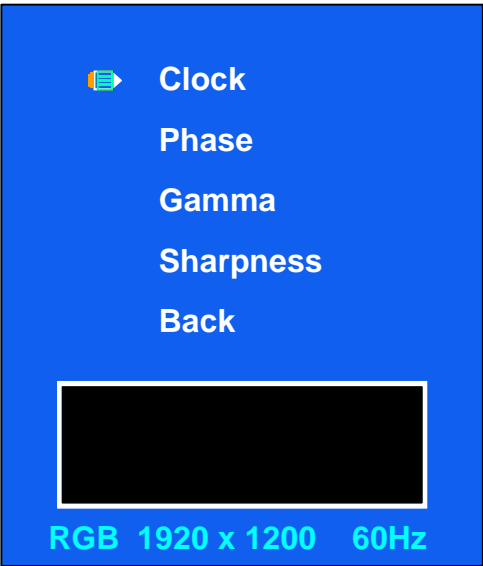
**Note** – The Uni700 BIOS for Landmark VHB LCD modules uses the Brightness adjustment (in Color Submenu) to control the backlight brightness. That is, the Brightness adjustment changes the dimming voltage output at pin #4 of the inverter connector J3. The following are the output dimming voltage vs. the setting levels:

Setting level	0	25*	100
Vd output (V)	0	0.6	5

\* **Caution:** For Landmark inverters, please make sure that the setting does not go below 25. Going below this level creates a Vd voltage less than 0.6V, which will turn off the backlight and make the screen totally black. As a result, you will not be able to see the OSD menu and make adjustments to bring up the screen.

### The Image Setting Submenu

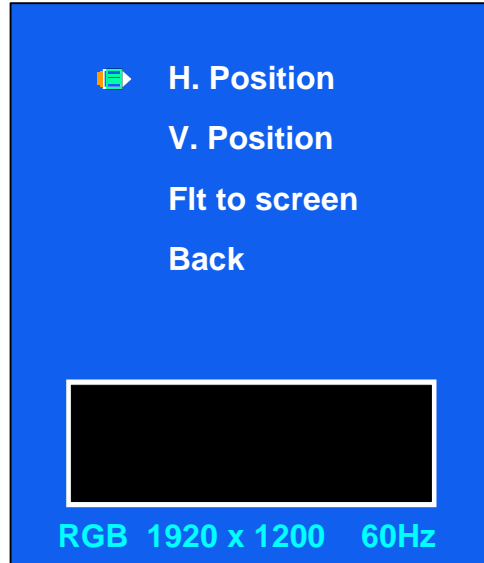
Press the SW3 key to go back to the Main Menu. Then press the SW4 key once to move the OSD cursor down one step to the Image Setting adjustment. Then press the SW2 key to activate the following Image Setting Submenu.



Then follow the same procedure as described above to make various adjustments.

### The Position Submenu

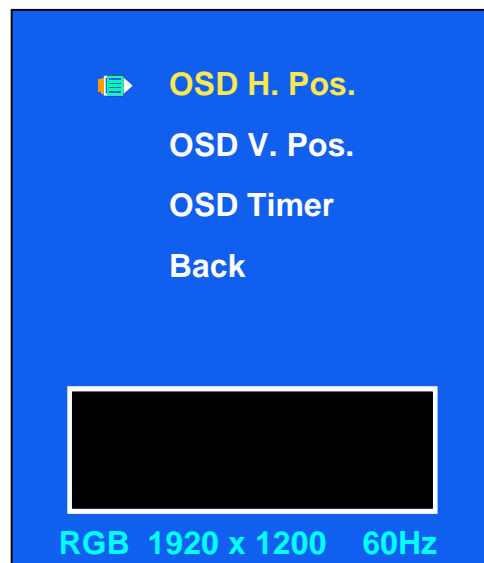
In the Position Sub Menu, there are 3 adjustments, the H. Position, V. Position, and Fit to Screen as shown below:



The H. Position and the V. Position adjustments move the display image on the LCD horizontally and vertically. For the Fit to Screen adjustment, please refer to “Section 7, Resolution Scaling” for details.

### The OSD Menu

In the OSD Menu, The OSD H. Pos. and the OSD V. Pos. allow the user to position the OSD Menus at the desirable horizontal and vertical locations on the screen. The next item, the OSD Timer sets the time period in seconds that the OSD menus and adjustments stay on the screen before they disappear automatically. Setting the time too short is very inconvenient for performing various adjustments.



**The Language Submenu** - this submenu allows the user to set the OSD language. In general, English is set as the default language.

## The Misc. Submenu

The Misc. Submenu has two adjustments.

For the Signal Source, the present Uni700 BIOS will automatically detect and decode the input video signal. Therefore, activating the Signal Source just provides a display of the video signal (RGB or DVI) currently used.



The Reset adjustment is to set various adjustments to their default values programmed in the factory. If possible, please do not activate the Reset adjustment since the default settings, in general, may not provide the best display image on the screen.

## Saving the Settings

After the adjustments are done, press SW3 to go back to the Main Menu, then move the OSD cursor to Exit. The Main Menu disappears and the current settings of the adjustments made are saved in memory. When the LCD and the Uni700 controller is powered on again, the saved settings are used to drive the display.

## 7. Resolution Scaling

When the resolution of the video source is different from the native resolution of the LCD, the Uni700 controller will scale the input video resolution such that the displayed image fills the entire screen (or nearly the entire screen).

### Downscale

If the resolution setting of the video input is higher than the native resolution of the LCD, the UNI700 will downscale the video image to the native resolution of the LCD. For example, if the LCD native resolution is SXGA (1280 x 1024) and the video signal is UXGA at 1600 x 1200, the

Uni700 will downscale the 1600 x 1200 resolution and display the image on the LCD with 1280 x 1024 resolution.

## Upscale

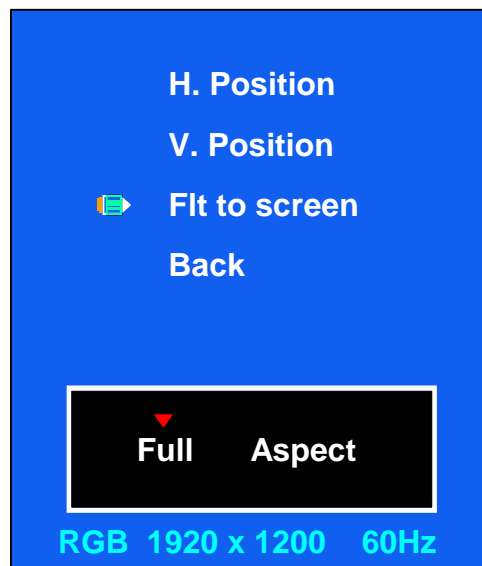
If the resolution setting of the video source is lower than the native resolution of the LCD, the input video image will be upscaled to fill the screen. For example, if the LCD native resolution is WUXGA (1920 x 1200) and the video input signal is at SXGA (1280 x 1024), the UNI700 will upscale the input video resolution and displays the image to the entire screen. However, in doing so, the aspect ratio issue occurs.

## Aspect Ratio

In the above example, since the aspect ratio (horizontal to vertical ratio) of the LCD is 16:10 (that is, 1920:1200), and the SXGA video signal has an aspect ratio of 5:4 (1280:1024), the scaled image will not fit the screen perfectly.

If the image is scaled to fill the entire screen, the horizontal resolution of the video signal (1280) is scaled to 1920 with a factor of 150%. On the other hand, the vertical resolution of the video signal (1024) is only subject to a scaling factor of 117.2% (1024 to 1200). The image will fill the entire LCD screen but with significant distortion. For example, a circle is displayed in the shape of a tomato. This is not good for certain critical applications, such as medical imaging.

To resolve this issue, the Uni700 provides a choice of maintaining the aspect ratio of the original video image. This choice is in the Position Submenu as shown below:



Press the SW4 key twice to move the OSD cursor to “Fit to screen”. Pressing the SW2 key brings up the two choices, “Full” and “Aspect”, in the window below. The small red triangle shows that the current setting is “Full”. So the scaled image fills the entire screen with significant distortion. Press the SW5 key to move the setting to “Aspect”. The SXGA video image will be scaled to the LCD resolution with the original aspect ratio of 5:4. So the image fills the screen vertically but with black strips at the left side and the right side of the screen. In this way, the image on the screen has no distortion.

## **8. Disclaimer**

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