

Landmark Technology Inc.

MG21 LCD Controller

For

TFT LCDs with Resolution up to 1,280 x 1,024

(Version A)

August 8, 2008

1. Introduction

MG21 is a compact size LCD controller with analog RGB (VGA) and DVI inputs. It uses the Genesis gm5621 chip and supports TFT LCD modules up to SXGA (1,280 x 1,024) native resolutions (1.31 MPixels) with 16,777,216 colors.

For video inputs beyond the SXGA (1280 x 1024) resolution, the MG21 down scales the input video to the native resolution of the LCD, and then displays the image over the screen. It supports video input all the way to WUXGA (1920 x 1200).

To Proceed:

- A. Make sure to use the correct parts and refer to Fig. 4 - the system connection diagram, to connect the MG21 card to the LCD correctly.
- B. Refer to this User's Guide for operating procedures and cautions

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 (0.7 Vp-p), Digital RGB (DVI)
Supported Resolution	DOS, VGA, SVGA, XGA, SXGA, WXGA, UXGA, WUXGA
Color Depth	24 bits (16.8 million) colors
H-Sync Range	30 - 80 KHz
V-Sync Range	60 - 75 Hz
LCD Interface	LVDS
LCD Voltage Supported	3.3V / 5V / 12V
Audio Output Power	2 Watts x 2 Channels
Plug & Play	Supported
Power Input	12V (\pm 0.6V) DC
Power Mode	Normal & Power Saving
Power Consumption	Normal, 3 Watts typ. w/o load. Power Saving, < 1 Watt
Controller Dimensions	110 mm x 82 mm x 14 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. MG21 Mechanical Dimensions

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

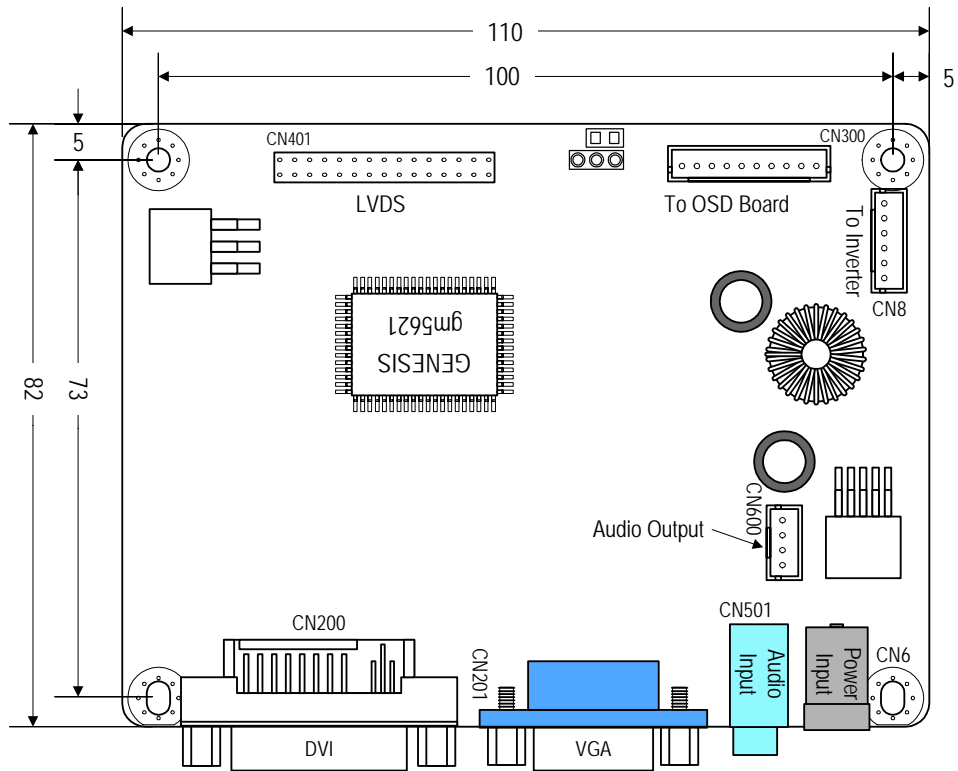
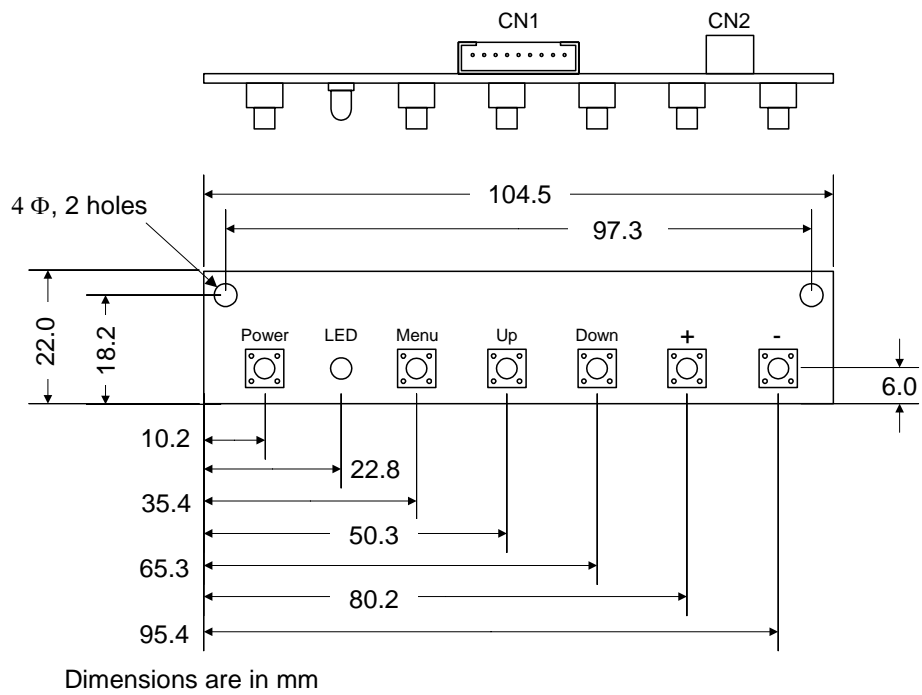


Fig. 2

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

Fig. 3 OSD Board Dimensions



There are two connectors on the OSD board. CN1 is for the cable connecting the OSD board to the main controller board. The 3-pin connector CN2 is for a IR sensor board for OSD adjustment with a remote control. This feature is not implemented in Version A MG21 controller.

4. System Connection

The typical connection diagram of the MG21 LCD controller to Landmark VHB LCD modules is illustrated in Fig. 4.

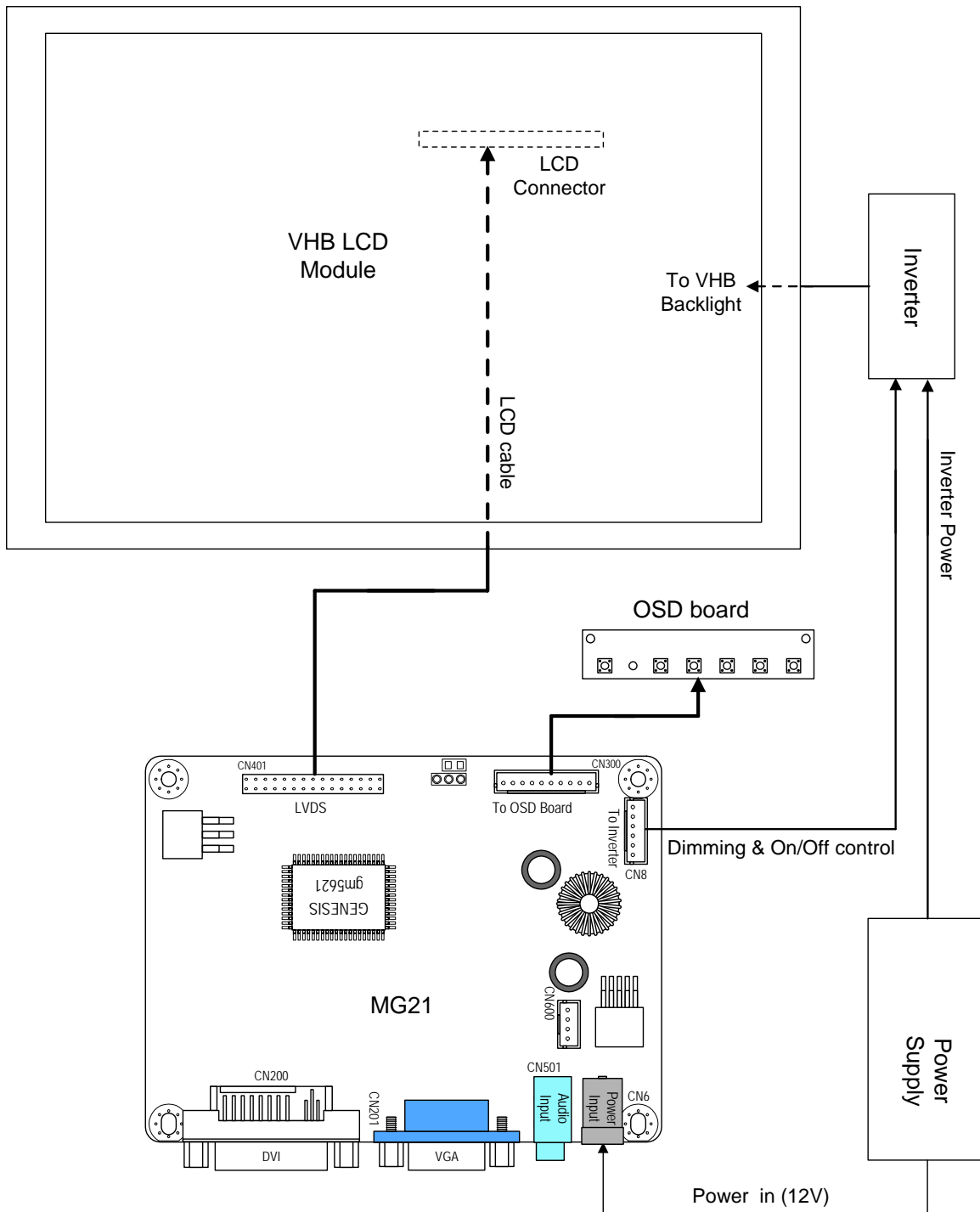


Fig. 4 - Typical Connection Diagram from the MG22 to a Landmark VHB LCD and the Inverter

Cautions:

- A. The inverter power should go directly from the power supply as shown in Fig. 4. The 12V from the connector CN5 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 damages to the MG21 controller and other parts.

5. Video Modes Supported

Mode	Resolution	f _H (KHz)	f _V (Hz)
VGA	640 x 480	31.5	60
		37.9	72
		37.5	75
VGA	640 x 400	31.5	70
VGA	720 x 400	31.5	70
SVGA	800 x 600	37.9	60
		48.1	72
		46.9	75
XGA	1024 x 768	48.4	60
		56.5	70
		60.0	75
SXGA	1280 x 1024	64.0	60
		80.0	75

6. Connectors and Pin Assignments

The connectors on the MG21 card and their functions are listed below:

CN6	12V power input
CN8	Inverter interface
CN300	OSD connection
CN401	LVDS Interface
CN200	DVI input
CN201	VGA, 15-pin D-sub connector
CN501	Audio input (Reserved for Version B)
CN600	Audio output (Reserved for Version B)

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

CN6 – for Power Input

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

CN8 – Inverter Connector

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

Cautions – The 12V power on CN8 can run inverters for 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 connections to run very high brightness LCDs.

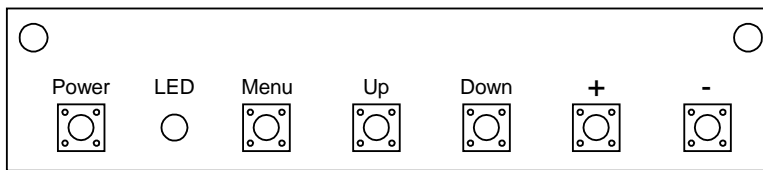
CN401 (30 Pins/2.0 mm) – LVDS Interface

Pin No	Symbol	Description
1	VCC	Power
2	VCC	Power
3	VCC	Power
4	VCC	Power
5	GND	Ground
6	GND	Ground
7	RxO0-	Negative LVDS differential data, CH0 (Odd data)
8	RxO0+	Positive LVDS differential data, CH0 (Odd data)
9	RxO1-	Negative LVDS differential data, CH1 (Odd data)
10	RxO1+	Positive LVDS differential data, CH1 (Odd data)
11	RxO2-	Negative LVDS differential data, CH2 (Odd data)
12	RxO2+	Positive LVDS differential data, CH2 (Odd data)
13	GND	Ground
14	GND	Ground
15	RxOC-	Negative LVDS differential clock, (Odd clock)
16	RxOC+	Positive LVDS differential clock, (Odd clock)
17	RxO3-	Negative LVDS differential data, CH3 (Odd data)
18	RxO3+	Positive LVDS differential data, CH3 (Odd data)
19	RxE0-	Negative LVDS differential data, CH0 (Even data)
20	RxE0+	Positive LVDS differential data, CH0 (Even data)
21	RxE1-	Negative LVDS differential data, CH1 (Even data)
22	RxE1+	Positive LVDS differential data, CH1 (Even data)
23	RxE2-	Negative LVDS differential data, CH2 (Even data)
24	RxE2+	Positive LVDS differential data, CH2 (Even data)

25	GND	Ground
26	GND	Ground
27	RxEC-	Negative LVDS differential clock, (Even clock)
28	RxEC+	Positive LVDS differential clock, (Even clock)
29	RxE3-	Negative LVDS differential data, CH3 (Even data)
30	RxE3+	Positive LVDS differential data, CH3 (Even data)

6. OSD

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



There are six push buttons on the OSD board. The functions of the buttons are summarized below:

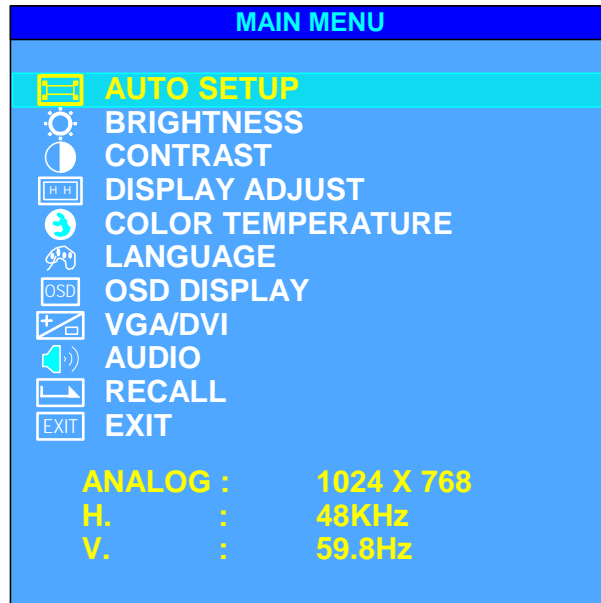
- POWER** Turns the LCD power on and off.
- MENU** Brings up the OSD menu and activate the selected item to enter the next Menu.
- UP & DOWN** Moves through various adjustments in each OSD Menu. Also after the selected adjustment is activated, use Up & Down buttons to increase & decrease the setting.
- +** Hot key to active the AUTO SETUP function in the OSD Main Menu.
- Reserved for future use. For the current Version A, this button has no function.

The POWER button

When the POWER button is pushed on, the LED turns to green and the LCD screen is turned on. Push the POWER button off turns off the LED and the video connection. If the inverter On/Off control is connected to Pin #3 of CN8, then the inverter/backlight will be turned off.

The OSD Menu

When the MENU button on the OSD board is pressed, the Main Menu appears on the screen:



There are 11 items to be selected on the MAIN MENU. At the lower side of the MAIN MENU, The current video input mode (ANALOG), the resolution (1024x768), the horizontal and the vertical sync frequencies (48KHz and 69.8Hz) are displayed.

Note - Some of the items on the Main Menu and the Sub Menus are reserved for the MG21, Version B. Their functionality may not be implemented in the current Version A BIOS.

Making Adjustment

When the OSD MENU is turned on, the AUTO SETUP is highlighted. Push the UP & DOWM buttons to move the selection up and down.

For example, pushing the DOWN button once will highlight the BRIGHTNESS selection. Then, push the MENU button to activate it. The following BRIGHTNESS Sub Menu shows up on the screen:



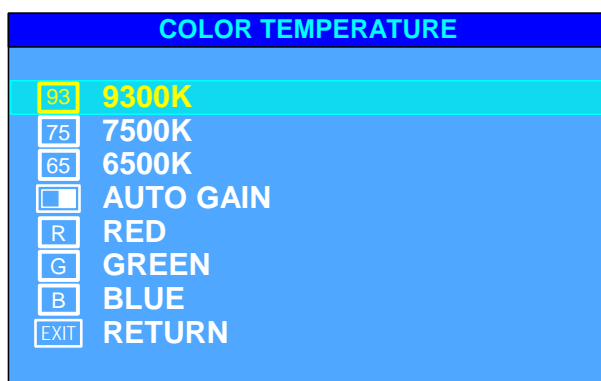
This Sub Menu has the BRIGHTNESS adjustment highlighted. Push the MENU button again to activate it and the following BRIGHTNESS adjustment box shows up on the screen.



To make adjustments, use the UP or DOWN button to increase or decrease the setting. In the meantime, the setting level is display numerically as well as by the white bar. After completing the adjustment, push the MENU button to return to the previous BRIGHTNESS menu.

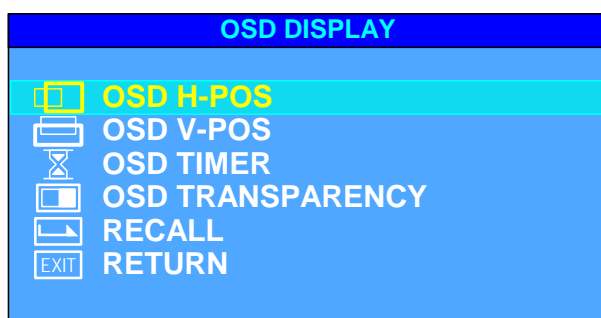
Follow the similar procedure to adjust the CONTRAST. The BRIGHTNESS and CONTRAST are the two main adjustments needed to get a good display on the screen.

In the Main Menu, pushing the DOWN button to highlight the COLOR TEMPERTURE selection. Push the MENU button to activate it. The following COLOR TEMPERATURE Sub Menu shows up on the screen .In the present Version A BIOS, the color temperature sets 9300K, 7500K, 6500K have been de-activated as the current code does not reproduce the color temperature selected (for example, 9300K) with the acceptable accuracy.



If it is necessary to adjust the color tone, please use the RED, GREEN, and BLUE adjustments. Use the UP & DOWN button to highlight the selected color to be adjusted and push the MENU button to activate it. Then use the UP & DOWN buttons to adjust the setting in a similar way as illustrated in the BRIGHTNESS adjustment.

Back to the Main Menu, push the DOWN button to highlight the OSD DISPLAY. Then push the MENU button to activate the following OSD DISPLAY Sub 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 will stay on the screen before automatically disappear. Setting the time too short is very inconvenient in performing various adjustments.

So, from the OSD DISPLAY Menu, push the DOWN button twice to highlight the OSD TIMER and then push the MENU button to activate the following adjustment box.



The number displayed on the right side of the white bar is the time period in seconds that the OSD Menus will stay on the screen. Use the UP and DOWN buttons to increase or decrease the time period as needed to complete various adjustments.

The item RECALL appears in the MAIN MENU and in the Sub Menus of BRIGHTNESS, CONTRAST, DISPLAY ADJUSTMENT, and OSD DISPLAY. The function of the RECALL is to reset various adjustments to a pre-defined (default) setting or settings.

Note – in the present Version A BIOS, the pre-defined or default settings activated by the RECALL may not provide the best image quality on the screen.

7. Resolution Scaling

Upscale

When 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 entire screen (or near the entire screen). The MG21 performs the upscale function well.

Downscale

When the resolution setting of the video input is higher than the native resolution of the LCD, the MG21 will down scale the image to the native resolution of the LCD. For example, if the LCD resolution is XGA (1024 x 768) and if the video input resolution is set at SXGA (1280 x 1024), the MG21 will down scale the 1280 x 1024 image to 1024 x 768 and display it to fill the entire area of the screen. However, since the aspect ratio of SXGA resolution is 5:4 (that is, 1280 : 1024), and the LCD screen aspect ratio is 4:3 (1024 : 768), there will be a little bit image distortion. For example, a square object in the image will be stretched in the horizontal direction by about 6.4% and becomes slightly rectangular.

8. Disclaimer

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