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User's Manual for

GAI-LCD Series A 2007598, 2007600, 2007602, 2007604, 2007606, 2007608, 2007610.

6.5" to 19" TFT-LCD Monitors

Version 1.11, May 2007

REVISION HISTORY

Title	GAI-LCD Series A Monitor User Manual	
Revision Number	Description	Date of Issue
1.0	Initial release	November 2006
1.10	- Updated Figure 1-4 and Section 4.4 for DVI/VGA AD Board V2.0	April 2007
1.11	- DVI/VGA AD Board CN25 connector pin 3 voltage changed to +9V~+36V input	May 2007

ABOUT THIS MANUAL

This document covers the description and installation instructions for the GAI-LCD Series A Monitors. The monitors in this series include the 2007610, 2007608, 2007606, 2007604, 2007602, 2007600 and 2007598.

SAFETY PRECAUTIONS

- Prior to installing, moving, and modifying the monitor, make sure the power is turned off and the power cord is disconnected.
- Do not apply voltage levels that exceed the specified voltage range. Doing so will cause fire or an electrical shock.
- Electric shocks can occur if the panel is opened. Do not drop or insert any objects into the ventilation openings of the monitor.
- Only qualified engineers from certified system integrators or VARs are allowed to make necessary functional modifications to the monitor, e.g., adding a touch panel. GAI offers the customization service on a pre-order basis.
- Designs with stand-alone and fault-tolerant hardware considerations should be implemented using the series models as a critical alarm or production line control.
- If considerable amount of dust, water, or fluids entered the monitor, turn off the power supply immediately, unplug the power cord, and contact the monitor vendor.
- Explosions may occur with installations in environments where flammable gases are present.
- Fault-tolerant and failsafe designs should be implemented with the use of the series models on transportation vehicles, ships, safety/security devices, or medical devices not related to life-support functionalities. Users/integrators should take the responsibility for implementations with adequate levels of reliability and safety.

FURTHER PRECAUTIONS

- Do not drop the monitor against a hard surface. Doing so will damage the display.
- Do not strike or exert excessive force onto the LCD panel.
- Touching the LCD panel using a sharp object will damage the LCD panel.
- Avoid environments exposed to direct sunlight, dust, or chemical vapors.
- The ambient temperature of the installation site should be observed and controlled to avoid overheating the monitor.

- Condensation might form inside the monitor chassis if exposed to sudden changes in temperature.
- Carefully route the power cord so that people cannot step on it. Do not place anything over the power cord.
- If the equipment should be left unused for an extended period of time, disconnect it from the power source to avoid damage by transient over-voltage.
- If any of the following situations arise, have the equipment checked by qualified service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated into the equipment.
    - The equipment has been exposed to moisture.
    - The equipment does not work properly, or cannot be made to work according to the user manual.
    - The equipment has been dropped and damaged.
    - The equipment shows obvious signs of damage.

WARNING!

Any changes or modifications made to the equipment that are not expressly approved by the relevant standards could void the authority to operate the equipment.

ADDITIONAL INFORMATION AND ASSISTANCE

MAINTENANCE AND CLEANING

Prior to cleaning any part or component of the monitor, please read the details below.

- Except for the properly installed front LCD panel, never spray or squirt liquids directly onto any other component. To clean the LCD panel, please rub it with a piece of soft dry cloth or a slightly moistened cloth.
- The interior of the LCD monitor does not require cleaning. Keep fluids away from the LCD monitor interior.

- Be cautious of all small removable components when vacuuming the monitor.
- Turn the system off before cleaning the LCD monitor.
- Never drop any objects or liquids through the openings of the LCD monitor.
- Be cautious of any possible allergic reactions to solvents or chemicals used when cleaning the monitor.
- Avoid eating, drinking and smoking within vicinity of the monitor.

CLEANING TOOLS

Some components in the monitor may only be cleaned using a product specifically designed for the purpose. In such case, the product will be explicitly mentioned in the cleaning tips. Below is a list of items to use when cleaning the computer or computer peripherals.

- ***Cloth*** – Although paper towels or tissues can be used, a soft, clean piece of cloth is recommended when cleaning the monitor.
- ***Water or rubbing alcohol*** – A cloth moistened with water or rubbing alcohol can be used to clean the monitor.
- ***Using solvents*** – The use of solvents is not recommended when cleaning the monitor as they may damage the plastic parts.
- ***Vacuum cleaner*** – Using a vacuum specifically designed for computers is one of the best methods of cleaning the monitor. Over dust and dirt can restrict the airflow in a computer and cause circuitry to corrode.
- ***Cotton swabs*** - Cotton swaps moistened with rubbing alcohol or water are excellent tools for wiping hard to reach areas.
- ***Foam swabs*** - Whenever possible, it is best to use lint free swabs such as foam swabs for cleaning.

ESD PRECAUTIONS

Observe all conventional anti-ESD methods while handling the components contained within the LCD should the need arise for adding a function. The use of a grounded wrist strap and an anti-static work pad is recommended. Avoid dust and debris or other static-accumulating materials in the work area.

CONVENTIONS USED IN THIS MANUAL

WARNING!

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously. Warnings are easy to recognize. The word “warning” is written as “**WARNING**,” both capitalized and bold and is followed by text in italics. The italicized text is the warning message.

CAUTION!

Cautionary messages should also be heeded to helps reduce the chance of losing data or damaging the system. Cautions are easy to recognize. The word “caution” is written as “**CAUTION**,” both capitalized and bold and is followed by text in italics. The italicized text is the cautionary message.

NOTE:

These messages inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can helps avoid making mistakes. Notes are easy to recognize. The word “note” is written as “**NOTE**,” both capitalized and bold and is followed by text in italics. The italicized text is the cautionary message.

Lists

Bulleted Lists: Bulleted lists are statements of non-sequential facts that can be read in any order. Each statement is preceded by a round black dot “•” or bullets in other shapes.

Numbered Lists: Numbered lists describe sequential steps should be followed in order.

Table of Contents

List of Figures

List of Tables

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Chapter

1

Introduction

1.1 GAI-LCD Series A Monitor Overview

The GAI-LCD Series A monitor is the latest member of GAI's line of sophisticated LCD designs, and it has been improved to be RoHS compliant. It is designed to fit industrial automation, or any other applications that require minimum installation space and flexible configuration. Flexible analog or digital interfaces are provided for ease of connection with a management computer. If remote/non-attentive control is preferred, RS-232 or USB interfaces can be used with customized adapter cables.

1.1.1 Standard Features

All the base models listed in **Section 1.2.1** have the following standard features

- LCD monitor
- OSD controls
- VGA
- Robust metal chassis
- RoHS compliant

1.1.2 Model Variations

The GAI-LCD Series A offers the following model variations.

- 2007598A: 6.5" LCD screen
- 2007598B: 6.5" LCD screen + high luminance
- 2007600A: 8.4" LCD screen
- 2007600B: 8.4" LCD screen + high luminance
- 2007602A: 10.4" LCD screen
- 2007602B: 10.4" LCD screen + high luminance
- 2007604: 12.1" LCD screen
- 2007606: 15" LCD screen
- 2007608: 17" LCD screen
- 2007610: 19" LCD screen

1.2 Applications and Features

1.2.1 GAI-LCD Series A Monitor Applications

GAI's series of LCD monitors are designed for system manufacturers, integrators, or value-added resellers that want to provide all the performance, quality and reliability of an LCD display solution at a cost effective price. GAI's LCD series offer additional components such as cables, an inverter and power supply with controller interfaces that include VGA and DVI.

1.2.2 GAI-LCD Series A Monitor Features

Some of the features of the GAI-LCD series A monitor include:

- Analog VGA interface supports most general system boards
- Over 300 cd/m2 high brightness and 50,000 hrs MTFB long lifetime panel
- Advanced thermal and air-flow design
- Supports panel mounting
- 12V DC power input via adapter
- Long product life support
- RoHS compliant

1.3 External Overview

The following sections describe the physical layout of the GAI-LCD series A monitors.

1.3.1 Front View

The front of the GAI-LCD series A monitor is a flat panel TFT LCD screen attached to a metal chassis. **Figure 1-1** shows a typical GAI-LCD Series A front view.

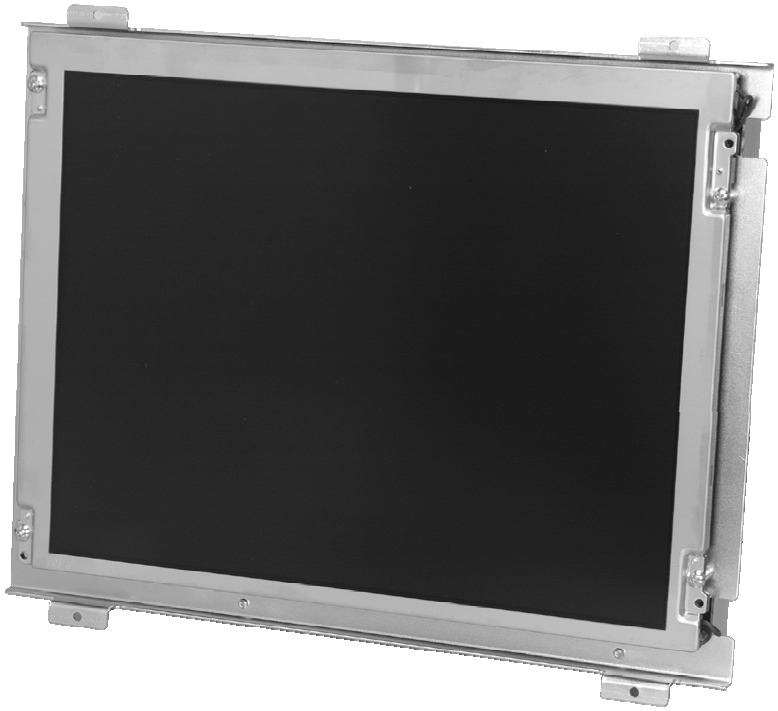

Figure 1-1: Typical GAI-LCD Series A Front View

1.3.2 Rear View

The rear of the GAI-LCD series A monitor is a metal chassis. An on screen display (OSD) control button panel, if present, is located vertically on the left side of the chassis with the following control buttons:

- LCD On/Off
- Auto
- Left
- Right
- Menu

The OSD panel also has one power LED.

Figure 1-2 shows a typical GAI-LCD Series A rear panel.

Figure 1-2: Typical GAI-LCD Series A Rear View

1.3.3 Connectors

Each GAI-LCD Series A monitor has a number of interface connectors on either the top or right panel of the chassis (when viewing the rear panel). Figure 1-3 shows a typical GAI-LCD Series A connector panel. Each model may include or exclude additional connectors. Refer to **Section 2.3** for listings of GAI-LCD Series A's and their connectors. All connectors are fully described in **Section 5.4**.

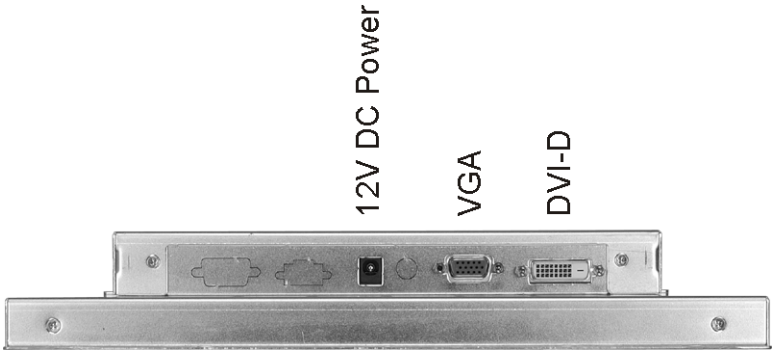

Figure 1-3: Typical GAI-LCD Series A Connectors

1.3.4 AD Board

The GAI-LCD Series A monitor AD boards provide a wide variety of control interfaces, receiving and managing signals from a CPU card through cabling. **Figure 1-4** shows the DVI/VGA AD board as a sample of a typical AD board for the GAI-LCD Series A monitor. Refer to **Chapter 4** for a complete description of AD boards and their connectors.

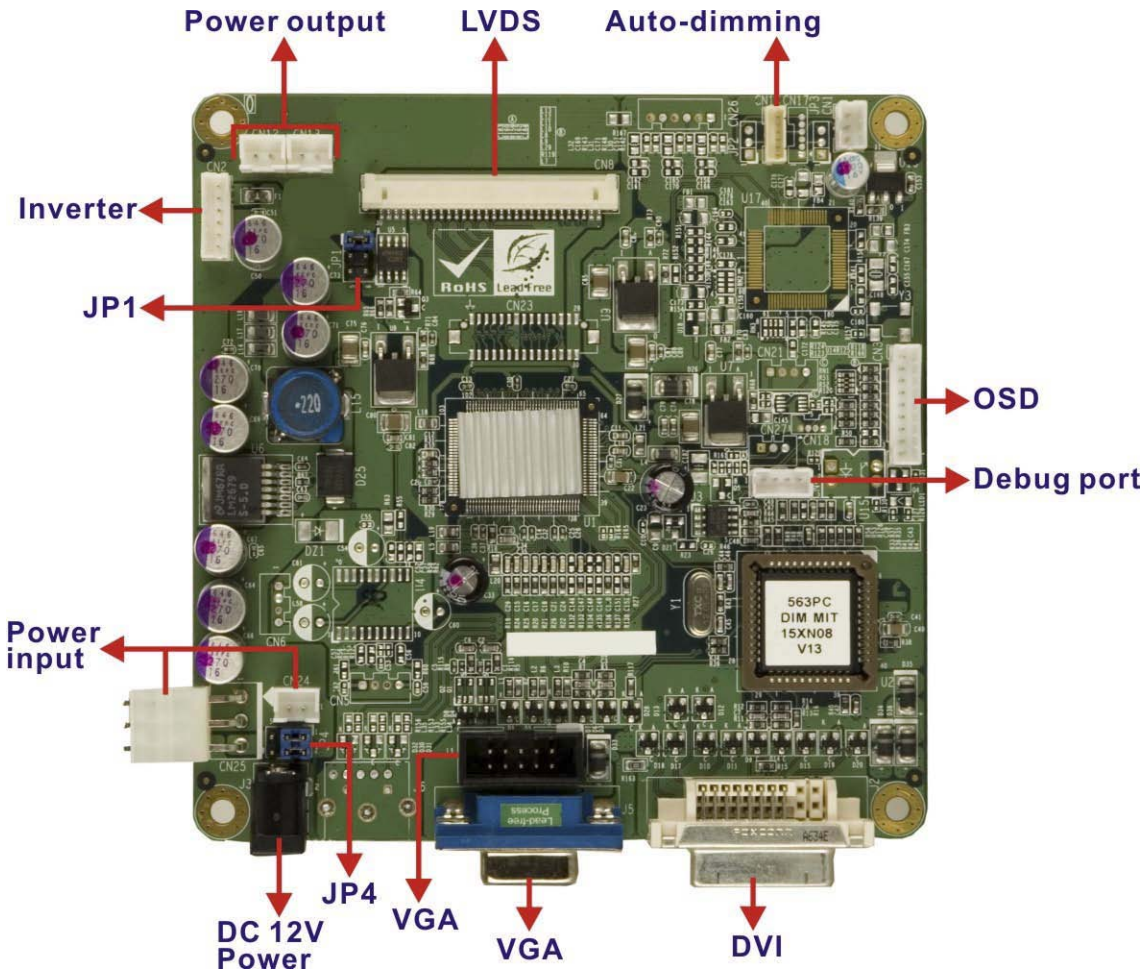

Figure 1-4: DVI/VGA AD Board

1.4 Series Specifications

Table 1-1 shows the GAI-LCD Series A specifications.

GAI-LCD	2007598A	2007600A	2007602A	2007604	2007606	2007608	2007610
LCD Type	6.5" TFT	8.4" TFT	10.4" TFT	12.1" TFT	15" TFT	17" TFT	19" TFT
Input Interface	VGA			VGA + DVI-D			
Max. Resolution	640x480	800x600			1024x768	1280x1024	
Backlight MTBF	50,000 Hrs						
Contrast	500:1				400:1	500:1	700:1
LCD Color	262K					16.2M	
Brightness (cd/m2)	400/500	220/450	230/400	400	350	300	
Inverter	7F700-LV12ETG-RS (400 cd/m^2) or 7F700-LV12EAG-RS (500 cd/m^2)	7F700-LV1401TG-RS (220 cd/m^2) or 7F700-LCD19062C-RS (450 cd/m^2)	7F700-PLCD0312101AG-RS (230 cd/m^2) or 7F700-PLCD02102G-RS (400 cd/m^2)	7F700-QF82V4-RS	7F700-QF117V116-RS	7F700-PLCD2817418-RS	
AD Board	VGA640	VGA800		VGA-DVI			
Power Adapter	25W 63000-UP0251E12PL02-RS			45W 63000-UP0451E12P81L-RS			
Chassis	Heavy-duty steel						
View Angle (H / V)	140/120	130/110 or 120/100	120/100	140/110	120/100	140/130	
OSD function	Yes						
Mounting	Panel						
Dimension (WxHxD) (mm)	203 x 121 x 34	234 x 147 x 35.3	242.2 x 209 x 33.6	294 x 240.7 x 42	364.1 x 262.5 x 41.9	390.4 x 300 x 46.9	427.9 x 327.4 x 48.4
Operation Temperature	0~50°C						

Table 1-1: GAI-LCD Series A Specifications

1.5 Certifications

All GAI-LCD Series A monitor models comply with the following international standards:

- RoHS

For a more detailed description of these standards, please refer to **Appendix A**.

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Chapter

2

Mechanical Overview

2.1 Introduction

This chapter describes the general mechanical overview of the GAI-LCD Series A monitors including rear panel variations, available interfaces and overall dimensions.

2.2 Rear Panel

The rear panel of the GAI-LCD Series A monitor is comprised of a metal chassis with an OSD control panel.

2.2.1 Rear Panel Variants

Table 2-1 shows the rear panel variants for the GAI-LCD Series A monitor.

Model	OSD Control Panel Location	Variant Number
2007610 2007608 2007606 2007604 2007602 2007600	Vertically along the left side of the rear panel.	1
2007598	In line along the bottom of the rear panel.	2

Table 2-1: Rear Panel Variants

2.2.2 Rear Panel Variant 1

The following models of the GAI-LCD Series A monitor have an OSD control panel located vertically along the left side of the rear panel:

- 2007610
- 2007608
- 2007606
- 2007604
- 2007602
- 2007600

Figure 2-1 shows the location of the rear panel variant 1 OSD controls.

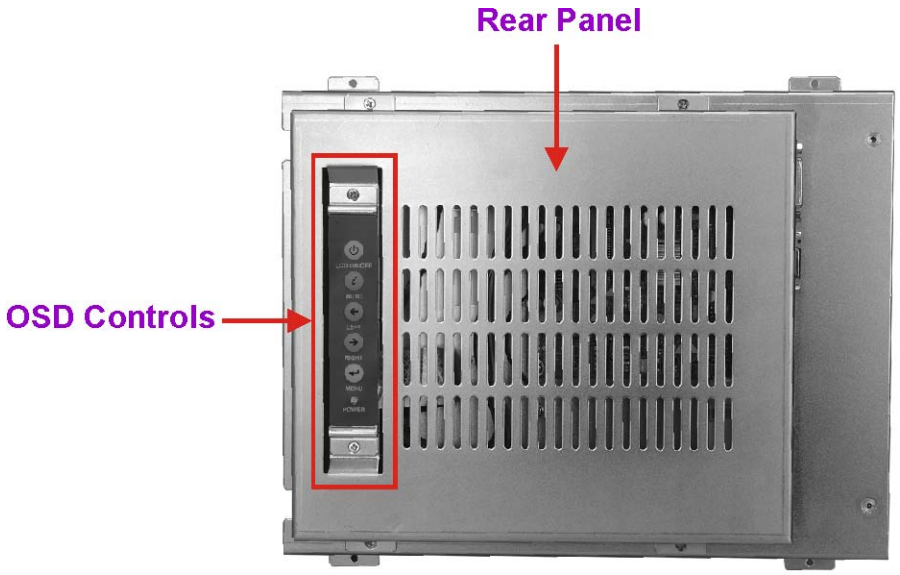

Figure 2-1: Rear Panel Variant 1

2.2.3 Rear Panel Variant 2

The following model of the GAI-LCD Series A monitor has OSD control buttons located on the bottom of the rear panel:

- 2007598

Figure 2-2 shows the location of the rear panel variant 2 OSD controls.

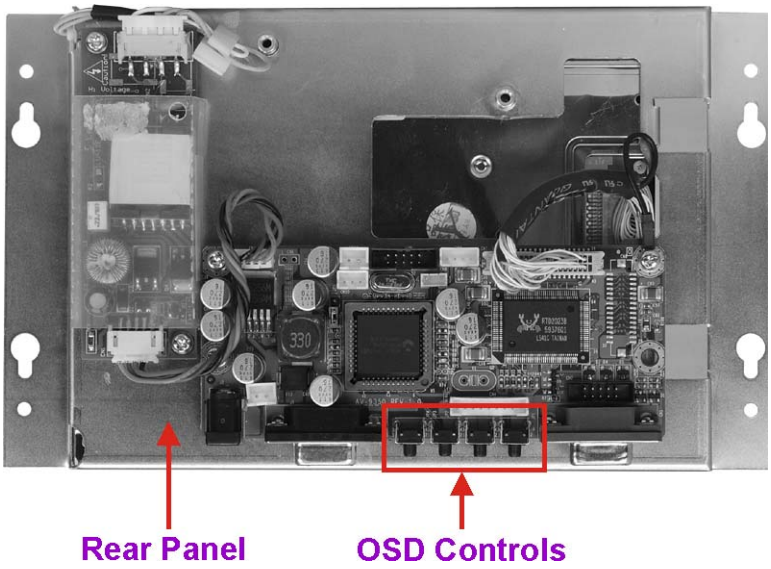

Figure 2-2: Rear Panel Variant 2

2.3 Connector Panel

All external peripheral interface connectors are located on the rear panel of the GAI-LCD Series A monitor. The following sections describe the rear panel variants and their associated connectors.

2.3.1 Available Connectors

There are a number of rear panel peripheral device connectors available for the GAI-LCD Series A monitor.

- VGA connector
- DVI-D connector
- 12V power connector

2.3.2 Variant 1 Connectors

The following is a list of the bottom panel peripheral device connectors used on the 2007598, 2007600 and 2007602 series monitor.

- VGA connector
- 12V power connector

2.3.3 Variant 2 Connectors

The following is a list of the bottom panel peripheral device connectors used on the 2007604, 2007606, 2007608 and 2007610 series monitor.

- VGA connector
- DVI-D connector
- 12V power connector

2.4 Physical Dimensions

The following sections describe the physical dimensions for each model of the GAI-LCD Series A monitor.

2.4.1 General Physical Dimensions

General physical dimensions for the GAI-LCD Series A monitors are shown in **Table 2-2**.

Model	Width (mm)	Height (mm)	Depth (mm)
2007610	427.9	327.4	48.4
2007608	390.4	330	46.9
2007606	364.1	262.5	41.9
2007604	294	240.7	42
2007602	242.2	209	33.6
2007600	234	147	35.3
2007598	203	121	34

Table 2-2: General Physical Dimensions

2.4.2 2007610 Physical Dimensions

The physical dimensions of the 2007610 are shown in **Figure 2-3**.

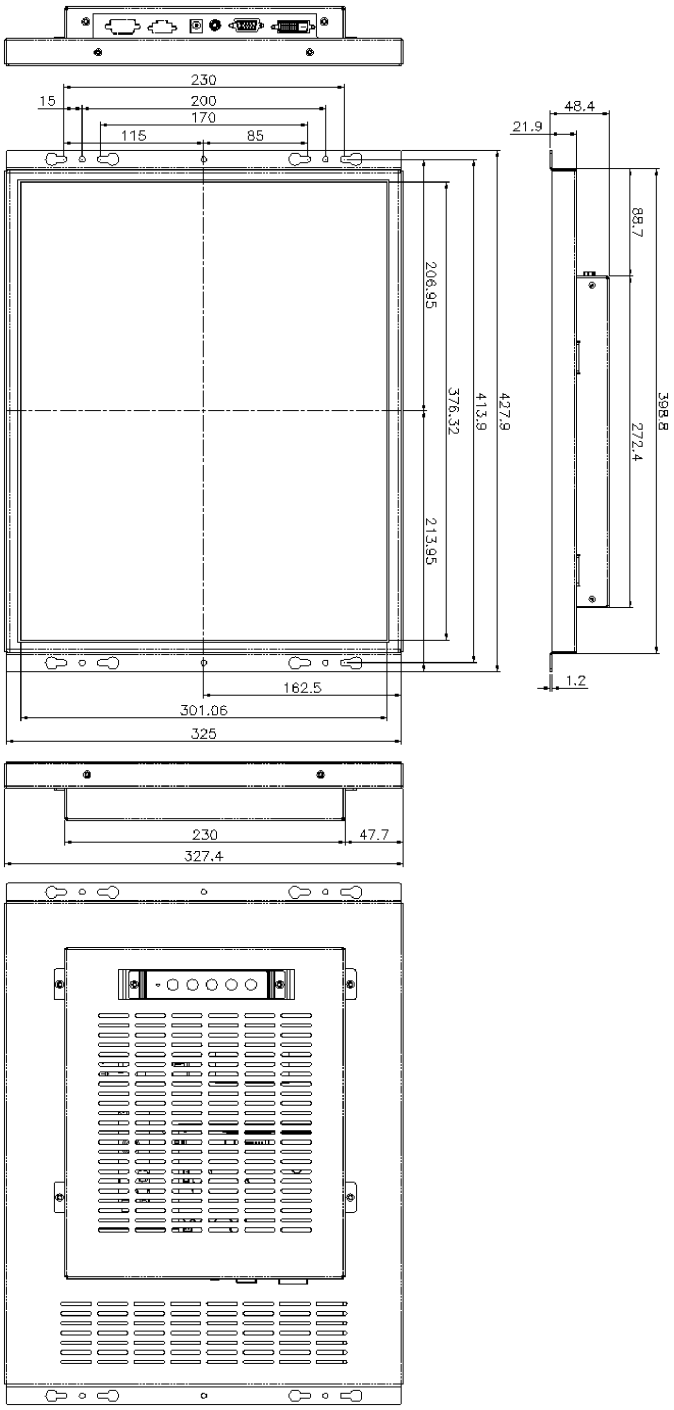

Figure 2-3: 2007610 Physical Dimensions (millimeters)

2.4.3 2007608 Physical Dimensions

The physical dimensions of the 2007608 are shown in **Figure 2-4**.

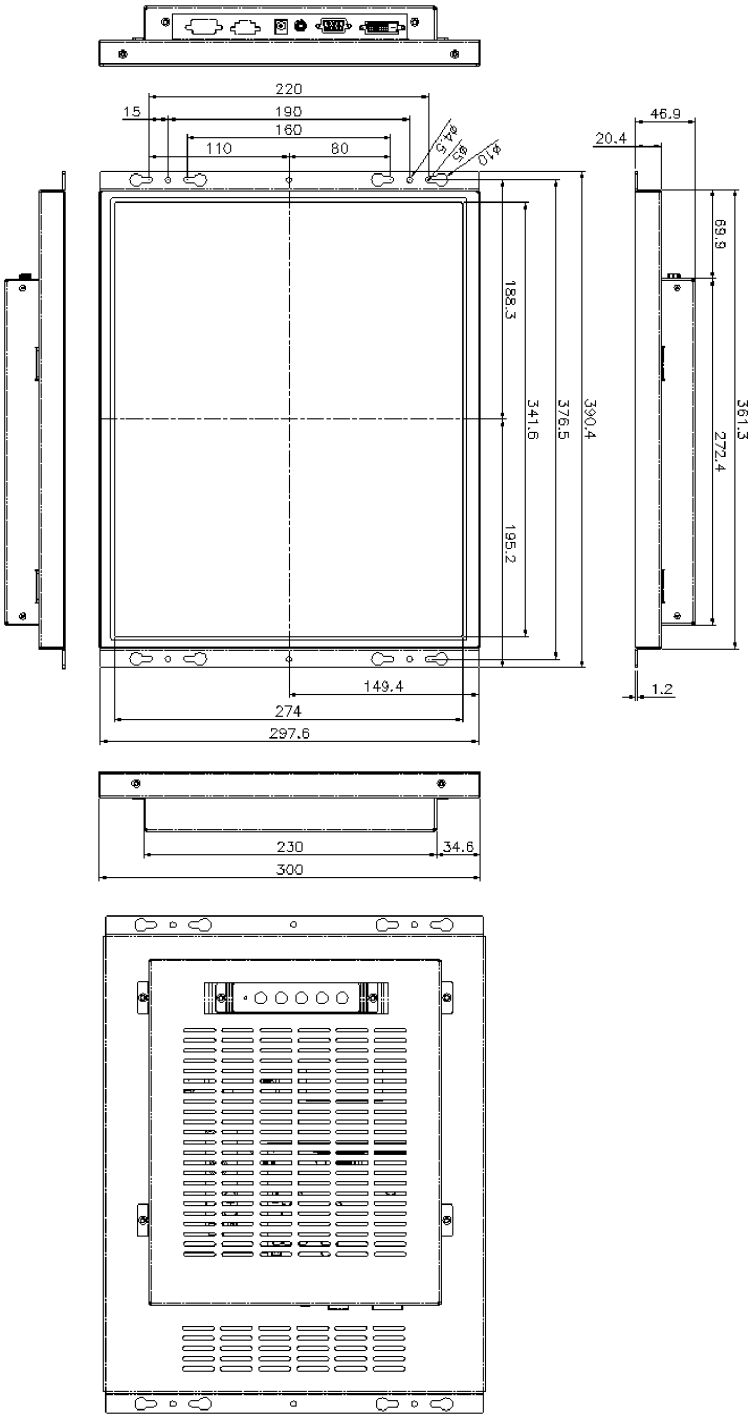

Figure 2-4: 2007608 Physical Dimensions (millimeters)

2.4.4 2007606 Physical Dimensions

The physical dimensions of the 2007606 are shown in **Figure 2-5**.

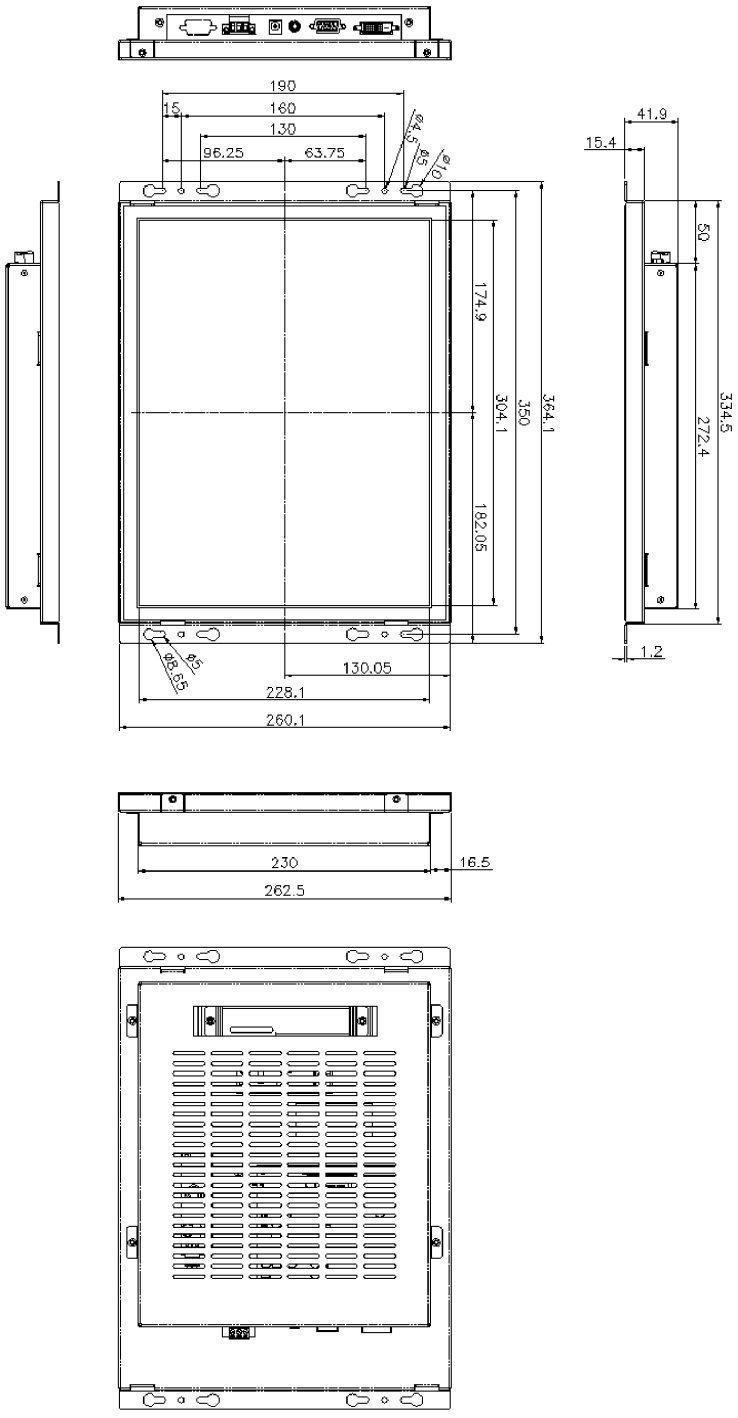

Figure 2-5: 2007606 Physical Dimensions (millimeters)

2.4.5 2007604 Physical Dimensions

The physical dimensions of the 2007604 are shown in **Figure 2-6**.

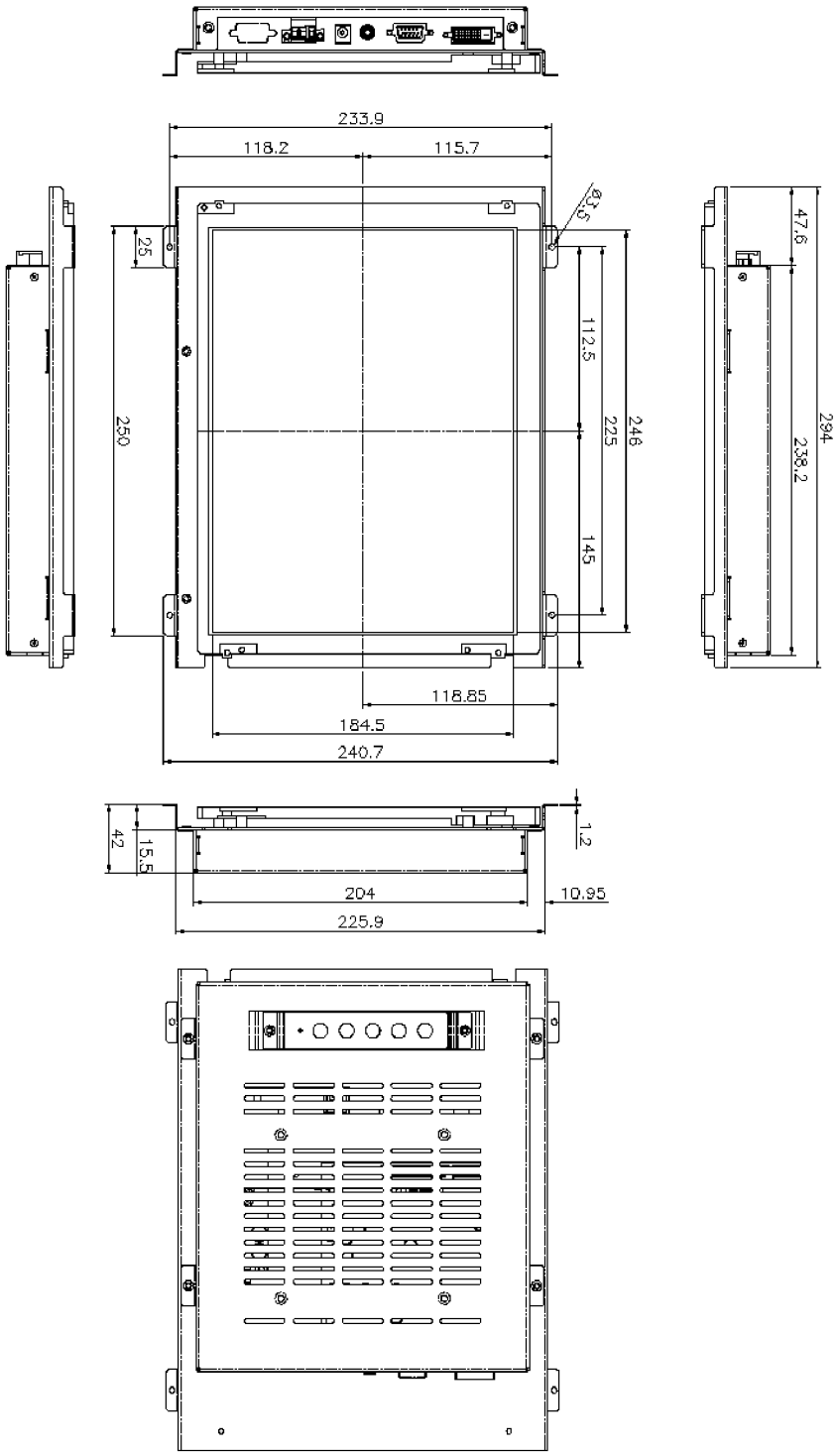

Figure 2-6: 2007604 Physical Dimensions (millimeters)

2.4.6 2007602 Physical Dimensions

The physical dimensions of the 2007602 are shown in **Figure 2-7**.

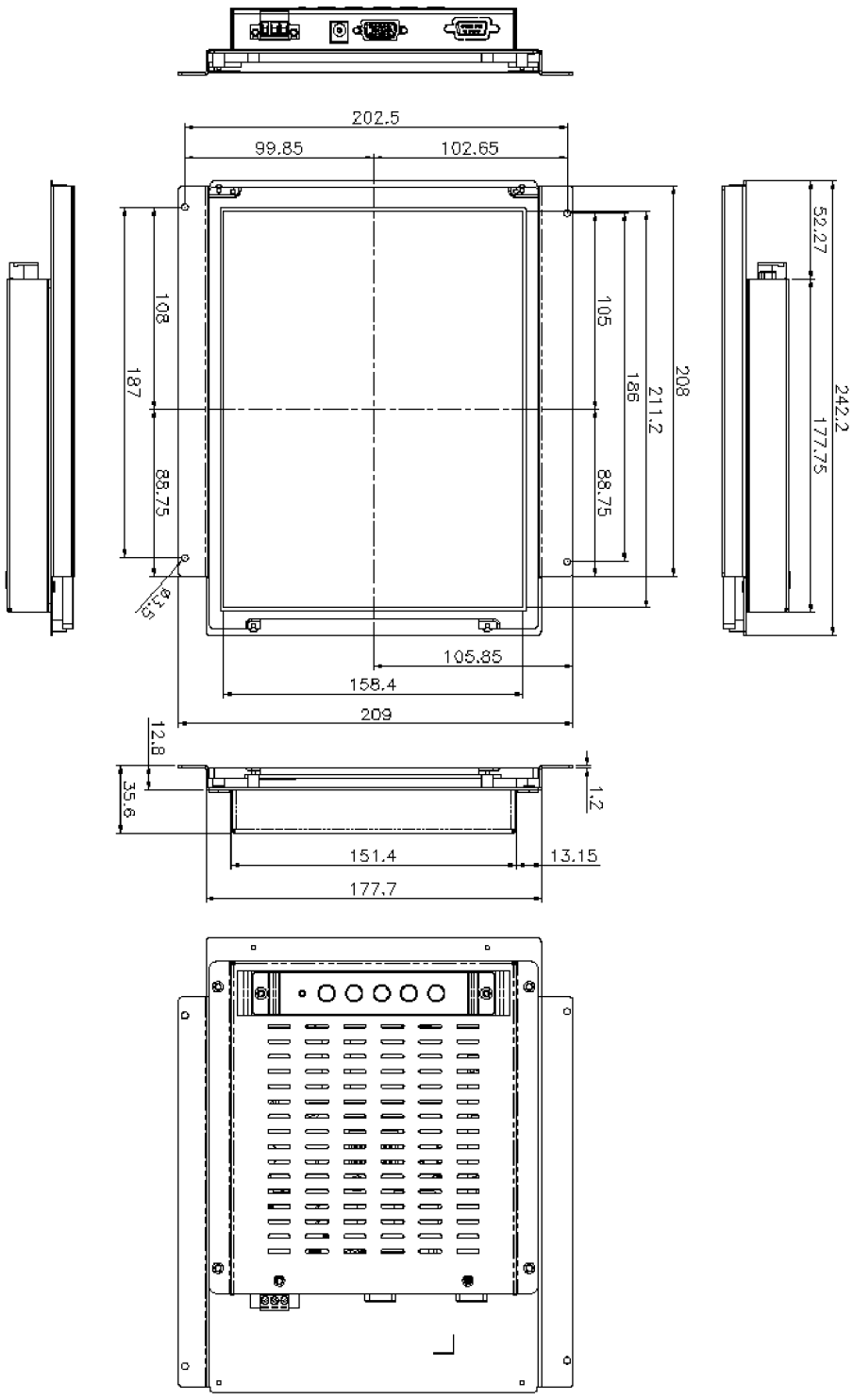

Figure 2-7: 2007602 Physical Dimensions (millimeters)

2.4.7 2007600 Physical Dimensions

The physical dimensions of the 2007600 are shown in **Figure 2-8**.

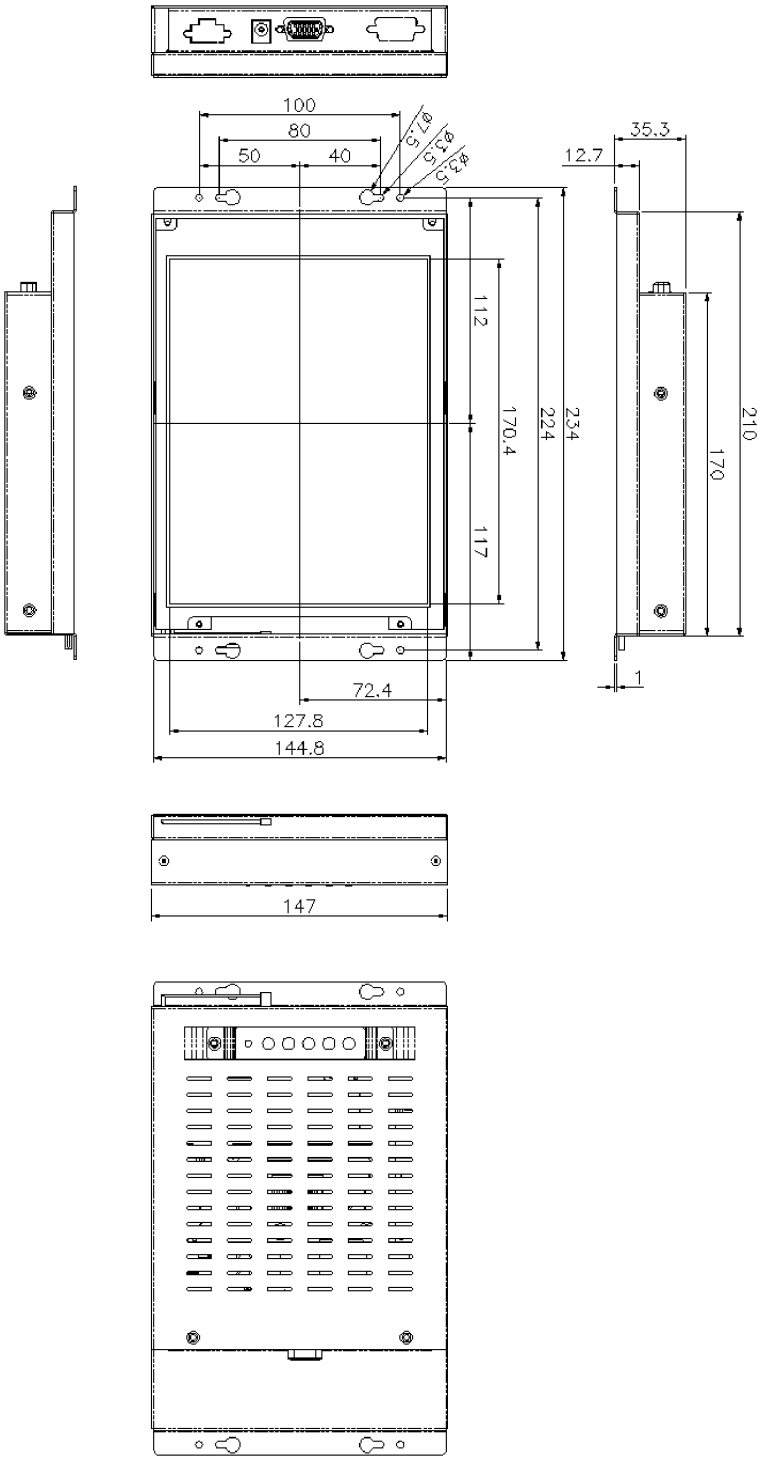

Figure 2-8: 2007600 Physical Dimensions (millimeters)

2.4.8 2007598 Physical Dimensions

The physical dimensions of the 2007598 are shown in **Figure 2-9**.

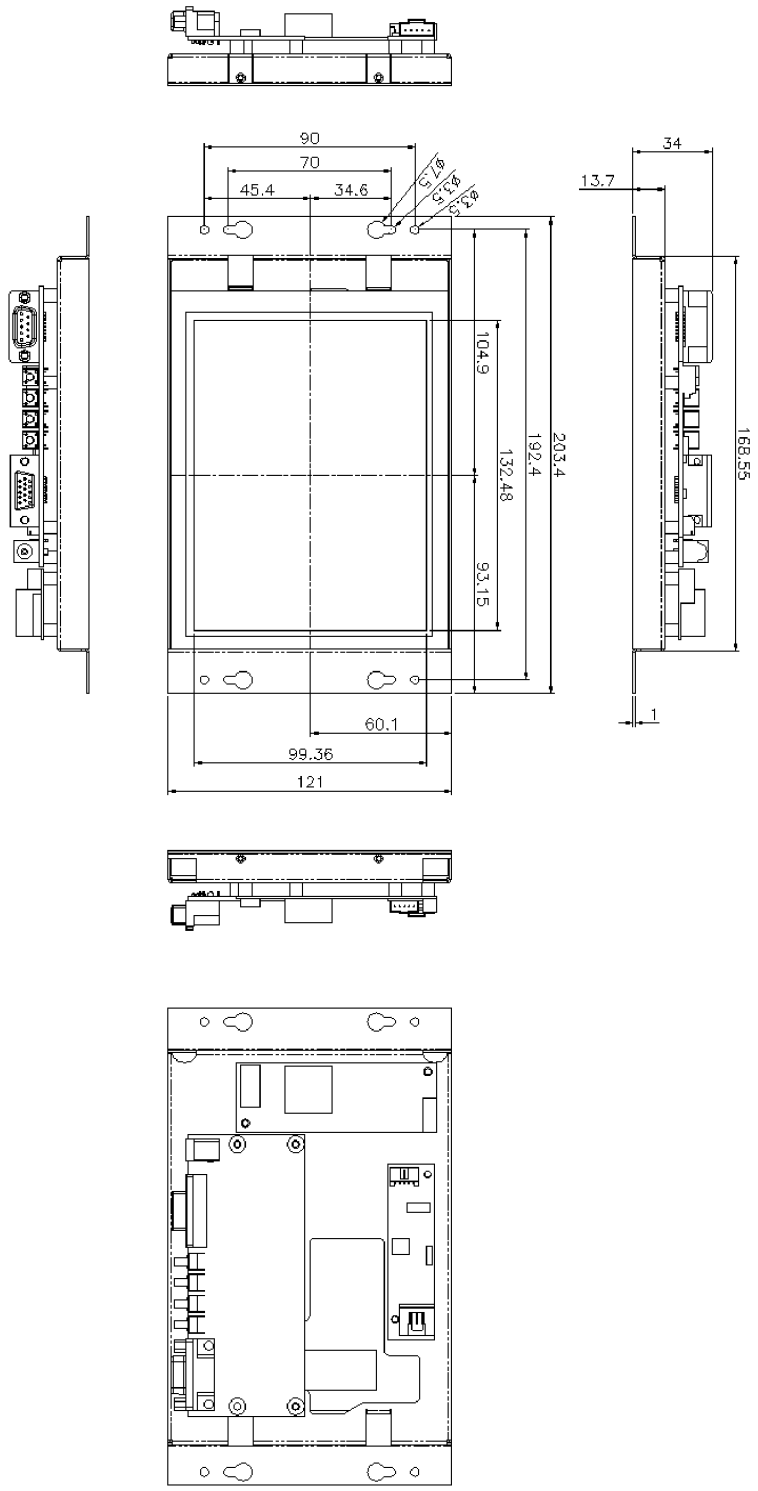

Figure 2-9: 2007598 Physical Dimensions (millimeters)

2.5 Mounting Options

Each GAI-LCD Series A monitor has mounting holes located on the mounting bracket. **Table 2-3** details the number of mounting holes for each model of the GAI-LCD Series A monitor. Refer to **Section 2.4** for more information.

Model	No. of Round Holes - Size	No. of Slotted Holes
2007610	6 – 4mm dia.	8
2007608	6 – 4.5mm dia.	8
2007606	6 – 4.5mm dia.	8
2007604	4 – 3.5mm dia.	-
2007602	4 – 3.5mm dia.	-
2007600	4 – 3.5mm dia.	4
2007598	4 – 3.5mm dia.	4

Table 2-3: Mounting Holes

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Chapter

3

LCD Specifications

3.1 LCD Specifications

3.1.1 LCD Overview

The GAI-LCD Series A monitors use the following LCD panels.

- **2007610:** AUO M190EG02
- **2007608:** AUO M170EG01
- **2007606:** AUO G150XG01
- **2007604:** AUO G121SN01
- **2007602B:** AUO G104SN02
- **2007602A:** AUO G104SN03
- **2007600B:** AUO G084SN05
- **2007600A:** AUO G084SN03
- **2007598B:** AUO G065VN01
- **2007598A**: Toshiba LTA065A043F

Detailed specifications for the LCD screens are listed in the following sections.

3.1.2 2007610 LCD Specifications

Table 3-1 lists the 2007610 LCD specifications.

Model	2007610
Size	19”
MFR / Model	AUO/M190EG02
Resolution	SXGA (1280 x 1024)
Active Area (mm)	376.3 x 301.1
Pixel Pitch (mm)	0.294
Mode	TN
Number of Colors	16.2M
Color Saturation (NTSC%)	72
View Angle (H/V)	160 / 160
Brightness (cd/m2)	300
Contrast Ratio	700:1
Response Time (ms) (at 25C)	6
Power Consumption (W)	28
Interface	2ch LVDS
Supply Voltage (V)	5
Backlight	4 CCFL
Lamp Life (hrs)	50,000

Table 3-1: 2007610 LCD Specifications

3.1.3 2007608 LCD Specifications

Table 3-2 lists the 2007608 LCD specifications.

Model	2007608
Size	17"
MFR/Model	AUO/M170EG01
Resolution	SXGA (1280 x 1024)
Active Area (mm)	337.9 x 270.3
Pixel Pitch (mm)	0.264
Mode	TN
Number of Colors	16.2M
Color Saturation (NTSC%)	72
View Angle (H/V)	140/130
Brightness (cd/m2)	300
Contrast Ratio	500:1
Response Time (ms) (at 25C)	8
Power Consumption (W)	25.8
Interface	2ch LVDS
Supply Voltage (V)	5
Backlight	4 CCFL
Lamp Life (hrs)	50,000

Table 3-2: 2007608 LCD Specifications

3.1.4 2007606 LCD Specifications

Table 3-3 lists the 2007606 LCD specifications.

Model	2007606
Size	15"
MFR / Model	AUO/G150XG01
Resolution	XGA (1024 x 768)
Active Area (mm)	304.1 x 228.1
Pixel Pitch (mm)	0.297
Mode	TN
Number of Colors	262K
Color Saturation (NTSC%)	60
View Angle (H/V)	130/120
Brightness (cd/m2)	350
Contrast Ratio	500:1
Response Time (ms) (at 25C)	12
Power Consumption (W)	11.5
Interface	1ch LVDS
Supply Voltage (V)	3.3
Backlight	2 CCFL
Lamp Life (hrs)	50000

Table 3-3: 2007606 LCD Specifications

3.1.5 2007604 LCD Specifications

Table 3-4 lists the 2007604 LCD specifications.

Model	2007604
Size	12.1”
MFR/Model	AUO/G121SN01
Resolution	SVGA (800 x 600)
Active Area (mm)	246.0 x 184.5
Pixel Pitch (mm)	0.307
Mode	TN
Number of Colors	62K
Color Saturation (NTSC%)	55
View Angle (H/V)	150/110
Brightness (cd/m2)	400
Contrast Ratio	500:1
Response Time (ms) (at 25C)	35
Power Consumption (W)	7.3
Interface	1ch LVDS
Supply Voltage (V)	3.3
Backlight	2 CCFL
Lamp Life (hrs)	50000

Table 3-4: 2007604 LCD Specifications

3.1.6 2007602B LCD Specifications

Table 3-5 lists the 2007602B LCD specifications.

Model	2007602B
Size	10.4”
MFR / Model	AUO/G104SN02
Resolution	SVGA (800 x 600)
Active Area (mm)	211.2 x 158.4
Pixel Pitch (mm)	0.264
Mode	TN
Number of Colors	262K
Color Saturation (NTSC%)	45
View Angle (H/V)	120 / 110
Brightness (cd/m2)	400
Contrast Ratio	500:1
Response Time (ms) (at 25C)	35
Power Consumption (W)	8.3
Interface	1ch LVDS
Supply Voltage (V)	3.3
Backlight	2 CCFL
Lamp Life (hrs)	50000

Table 3-5: 2007602B LCD Specifications

3.1.7 2007602A LCD Specifications

Table 3-5 lists the 2007602A LCD specifications.

Model	2007602A
Size	10.4”
MFR/Model	AUO/G104SN03
Resolution	SVGA (800 x 600)
Active Area (mm)	211.2 x 158.4
Pixel Pitch (mm)	0.264
Mode	TN
Number of Colors	262K
Color Saturation (NTSC%)	45
View Angle (H/V)	140 / 110
Brightness (cd/m2)	230
Contrast Ratio	500:1
Response Time (ms) (at 25C)	35
Power Consumption (W)	2.52
Interface	1ch LVDS
Supply Voltage (V)	3.3
Backlight	1 CCFL
Lamp Life (hrs)	20000

Table 3-6: 2007602A LCD Specifications

3.1.8 2007600B LCD Specifications

Table 3-7 lists the 2007600B LCD specifications.

Model	2007600B
Size	8.4”
MFR / Model	AUO/G084SN05
Resolution	SVGA (800 x 600)
Active Area (mm)	170.4 x 127.8
Pixel Pitch (mm)	0.213
Mode	TN
Number of Colors	262K
Color Saturation (NTSC%)	45
View Angle (H/V)	120 / 100
Brightness (cd/m2)	450
Contrast Ratio	500:1
Response Time (ms) (at 25C)	35
Power Consumption (W)	5.8
Interface	1ch LVDS
Supply Voltage (V)	3.3
Backlight	2 CCFL
Lamp Life (hrs)	50000

Table 3-7: 2007600B LCD Specifications

3.1.9 2007600A LCD Specifications

Table 3-7 lists the 2007600A LCD specifications.

Model	2007600A
Size	8.4"
MFR/Model	AUO/G084SN03
Resolution	SVGA (800 x 600)
Active Area (mm)	170.4 x 127.8
Pixel Pitch (mm)	0.213
Mode	TN
Number of Colors	262K
Color Saturation (NTSC%)	45
View Angle (H/V)	130 / 110
Brightness (cd/m2)	220
Contrast Ratio	500:1
Response Time (ms) (at 25C)	35
Power Consumption (W)	3.3
Interface	1ch LVDS
Supply Voltage (V)	3.3
Backlight	1 CCFL
Lamp Life (hrs)	20000

Table 3-8: 2007600A LCD Specifications

3.1.10 2007598B LCD Specifications

Table 3-9 lists the 2007598B LCD specifications.

Model	2007598B
Size	6.5”
MFR / Model	AUO/G065VN01
Resolution	SVGA (640 x 480)
Active Area (mm)	132.5 x 99.4
Pixel Pitch (mm)	0.207
Mode	TN
Number of Colors	262K / 16.2M
Color Saturation (NTSC%)	55
View Angle (H/V)	140 / 120
Brightness (cd/m2)	500
Contrast Ratio	500:1
Response Time (ms) (at 25C)	25
Power Consumption (W)	4.26
Interface	1ch LVDS
Supply Voltage (V)	3.3
Backlight	2 CCFL
Lamp Life (hrs)	50000

Table 3-9: 2007598B LCD Specifications

3.1.11 2007598A LCD Specifications

Table 3-9 lists the 2007598A LCD specifications.

Model	2007598A
Size	6.5”
MFR/Model	Toshiba/LTA065A043F
Resolution	VGA (640 x 480)
Active Area (mm)	132.52 x 98.64
Pixel Pitch (mm)	0.207
Number of Colors	262K
View Angle (H/V)	140 / 120
Brightness (cd/m2)	400
Contrast Ratio	500:1
Response Time (ms) (at 25C)	30
Power Consumption (W)	4.2
Interface	TTL
Supply Voltage (V)	3.3
Backlight	CCFL side light (L-type)
Lamp Life (hrs)	50000

Table 3-10: 2007598A LCD Specifications

3.2 Power Adapters

Table 3-11 lists the AC/DC power adapter specifications.

GAI-LCD	2007610, 2007608, 2007606, 2007604	2007602, 2007600, 2007598
Power	45 Watt AC/DC Adapter	25 Watt AC/DC Adapter
General Description	Universal Input 90 to 264 VAC EMI Meets FCC/CISPR 22 Class B MTBF 165Khrs Limited Power Source	Universal Input 90 to 264 VAC EMI Meets FCC/CISPR 22 Class B MTBF 300Khrs Limited Power Source
Input Voltage Range	90-264VAC	90-264VAC
Input Frequency	47-63 Hz	47-63 Hz
Inrush Current	40A max. (Cold Start)	30A max. (Cold Start)
Hold-up Time	10mS typical	10mS typical
Leakage Current	0.5mA max.	3.5mA max.
Short Circuit Protection	Continuous	Continuous
Over-voltage Protection	Yes	Yes
Continuous Output Power	45W max.	25W max.
Hi-pot Isolation: Input / Output	4242VDC	4242VDC

Table 3-11: Power Adapter Specifications

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Chapter

4

AD Boards

4.1 AD Board Overview

The GAI-LCD Series A monitor AD board provides a wide variety of control interfaces, receiving and managing interface signals from a CPU card through cabling. There are three AD boards used for the GAI-LCD Series A monitors: VGA640, VGA800 and DVI/VGA. Refer to **Table 1-1** for a listing of GAI-LCD Series A monitors and their associated AD board. The following sections describe each AD board in detail.

4.2 VGA640 AD Board

The following sections describe the VGA640 AD board in detail.

4.2.1 VGA640 AD Board Overview

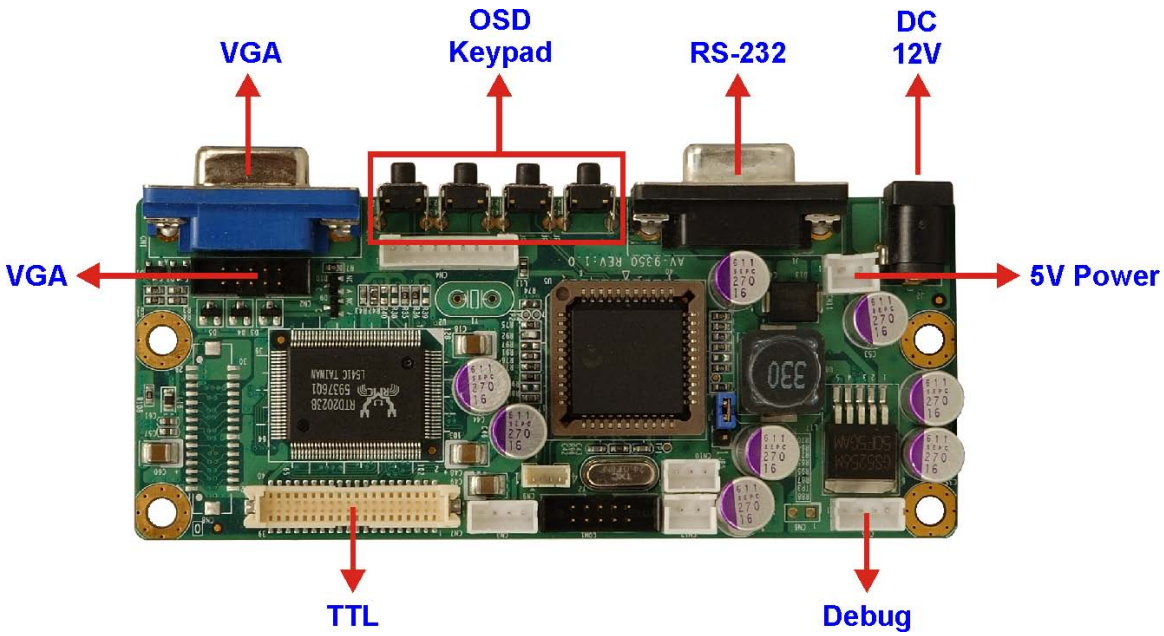

Figure 4-1: VGA640 AD Board Overview

4.2.2 VGA640 AD Board Connectors

The VGA640 AD board has the following connectors onboard:

- 1 x VGA connector
- 2 x Debugged port
- 1 x External OSD and LED Indication connector

- 1 x TTL output connector
- 2 x 5V power connector
- 1 x RS-232 connector

The VGA640 AD board has the following connectors on the board rear panel:

- 1 x RS-232 connector
- 1 x VGA connector
- 1 x 12V DC power connector

The locations of the peripheral interface connectors for the VGA640 AD board are shown in **Section 4.2.3**. A complete list of all the peripheral interface connectors can be seen in **Section 4.2.4**.

4.2.3 VGA640 AD Board Layout

Figure 4-2 shows the onboard peripheral connectors and onboard jumpers.

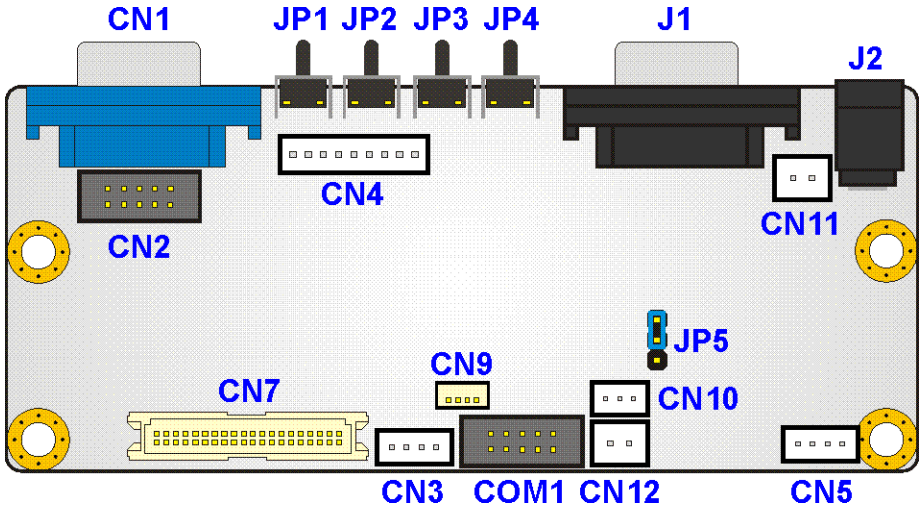

Figure 4-2: Connector and Jumper Locations

4.2.4 VGA640 Peripheral Interface Connectors

Table 4-1 shows a list of the peripheral interface connectors on the VGA640 AD board. Detailed descriptions of these connectors can be found in **Section 0**.

Connector	Type	Label
5V Power connector	2-pin header	CN11, CN12
Debugged Port connector	4-pin header	CN3, CN5
External OSD and LED Indication connector	9-pin header	CN4
Serial Communications connector	10-pin header	COM1
TTL Output connector	40-pin header	CN7
VGA connector	10-pin header	CN2

Table 4-1: VGA640 Peripheral Interface Connectors

4.2.5 VGA640 Rear Panel Connectors

Table 4-2 lists the rear panel connectors and buttons on the VGA640 AD board. Detailed descriptions of these connectors and buttons can be found in **Section 4.2.14**.

Connector	Type	Label
DC 12V Power connector	DC Power Jack	J2
Serial connector	RS232 connector	J1
OSD Function Button	Pushbutton	JP1
OSD Function Button	Pushbutton	JP2
OSD Function Button	Pushbutton	JP3
OSD Function Button	Pushbutton	JP4
VGA Connector	15-pin VGA connector	CN1

Table 4-2: VGA640 Rear Panel Connectors

4.2.6 VGA640 Onboard Jumper

Table 4-3 lists the onboard jumper. A detailed description of the jumper can be found in **Section 4.2.19**.

Jumper	Type	Label
LCD Panel Voltage Select	3-pin header	JP5

Table 4-3: VGA640 Onboard Jumper

4.2.7 VGA640 Internal Peripheral Connectors

Internal peripheral connectors on the VGA640 AD board are only accessible when the board is outside of the monitor. This section has complete descriptions of all the internal, peripheral connectors on the VGA640 AD board.

4.2.8 5V Power Connector

CN Label: CN11, CN12

CN Type: 2-pin header

CN Pinouts: See **Table 4-4**

CN Location: See **Figure 4-3**

The 5V power connector is a general-purpose power connector.

Pin	Description	Pin	Description
1	+5V	2	GND

Table 4-4: 5V Power Connector Pinouts

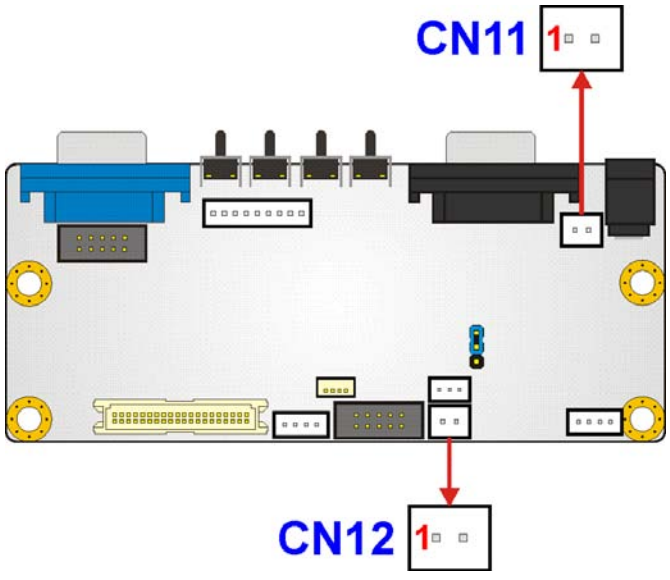

Figure 4-3: 5V Power Connector Location

4.2.9 Debugged Port Connector

CN Label: CN3, CN5

CN Type: 4-pin header

CN Pinouts: See **Table 4-5**

CN Location: See **Figure 4-4**

Use the debugged port connector to update the AD board BIOS.

Pin	Description
1	+5V
2	TX
3	RX
4	GND

Table 4-5: Debugged Port Connector Pinouts

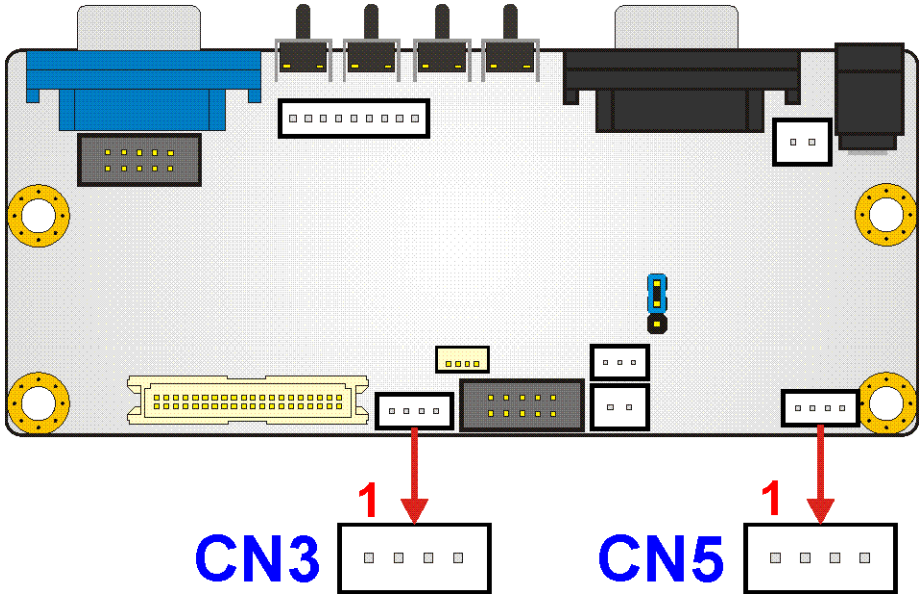

Figure 4-4: Debugged Port Connector Location

4.2.10 External OSD and LED Indication Connector

CN Label: CN4

CN Type: 9-pin header

CN Pinouts: See **Table 4-6**

CN Location: See **Figure 4-5**

The External OSD and LED Indication connector connects to an external OSD controller.

Pin	Description
1	LED_ORANGE
2	+5V
3	LED_GREEN
4	MENU/ENTER
5	RIGHT
6	LEFT
7	AUTO
8	LCD ON/OFF
9	GND

Table 4-6: External OSD and LED Indication Connector Pinouts

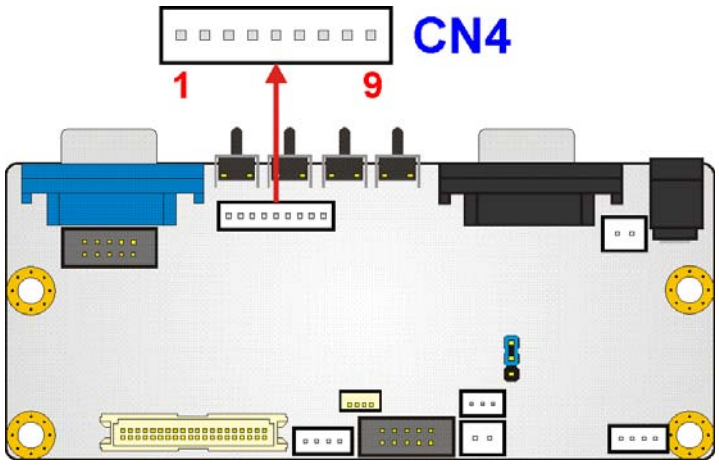

Figure 4-5: External OSD and LED Indication Connector Location

4.2.11 Serial Communications Connector

CN Label: COM1

CN Type: 10-pin header

CN Pinouts: See **Table 4-7**

CN Location: See **Figure 4-6**

The VGA640 has a 10-pin serial communications connector.

Pin	Description	Pin	Description
1	DCD	6	CTS
2	DSR	7	DTR
3	RXD	8	RI
4	RTS	9	GND
5	TXD	10	GND

Table 4-7: Serial Communications Connector Pinouts

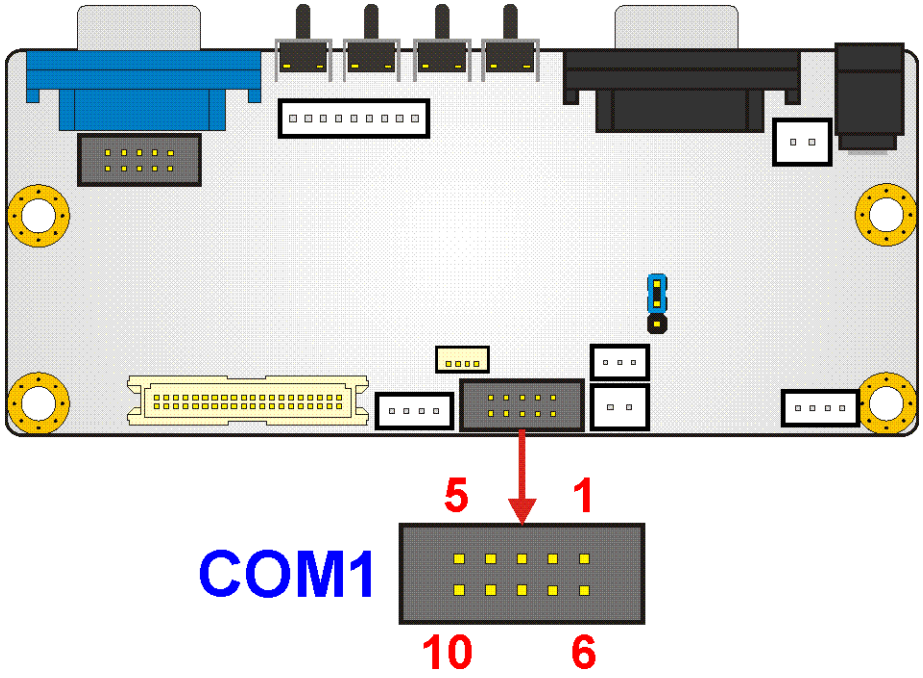

Figure 4-6: Serial Communications Connector Location

4.2.12 TTL Output Connector

CN Label: CN7

CN Type: 40-pin header

CN Pinouts: See **Table 4-8**

CN Location: See **Figure 4-7**

The TTL output connector connects the LCD panel to the system.

Pin	Description	Pin	Description
2	LCD5V	1	LCD5V
4	GROUND	3	GROUND
6	LCD3V	5	LCD3V
8	GROUND	7	N/C
10	B1	9	B0
12	B3	11	B2
14	B5	13	B4
16	B7	15	B6
18	G1	17	G0
20	G3	19	G2
22	G5	21	G4
24	G7	23	G6
26	R1	25	R0
28	R3	27	R2
30	R5	29	R4
32	R7	31	R6
34	GROUND	33	GROUND
36	FPVS	35	FPCLK
38	FPHS	37	FPDEN
40	ENVEE	39	N/C

Table 4-8: TTL Output Connector Pinouts

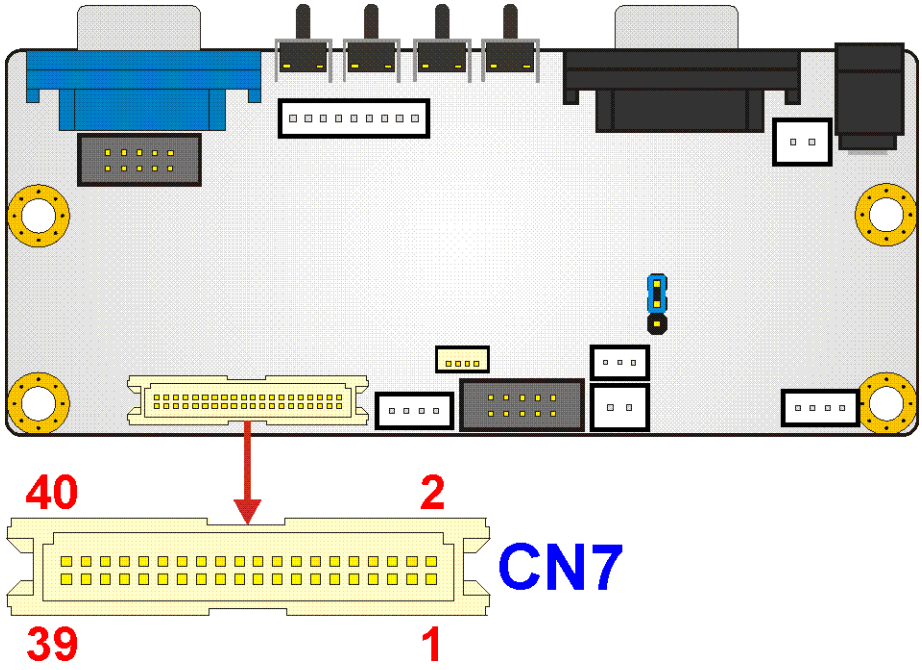

Figure 4-7: TTL Output Connector Location

NOTE:

The supply voltage (3.3V and 5V) can be selected via JP5.

4.2.13 VGA Connector

CN Label: CN2

CN Type: 10-pin header

CN Pinouts: See **Table 4-9**

CN Location: See **Figure 4-8**

In addition to the standard DB-15 female VGA connector (CN1), a VGA connection can also be made through the onboard CN2 10-pin header.

Pin	Description	Pin	Description
1	RED	2	DDCCLK
3	GREEN	4	DDCDAT
5	BLUE	6	GROUND
7	HSYNC	8	GROUND
9	VSYNC	10	GROUND

Table 4-9: VGA Connector Pinouts

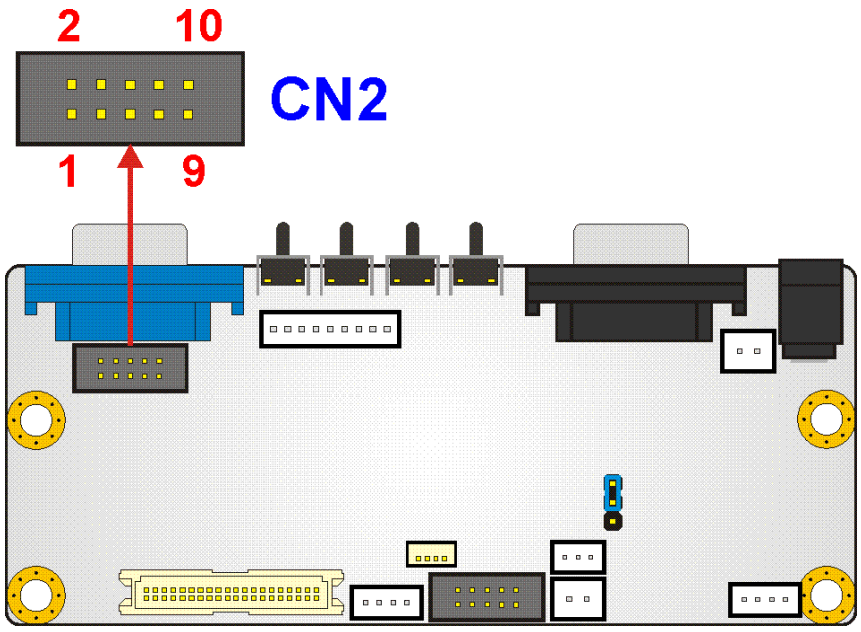

Figure 4-8: VGA Connector Location

4.2.14 VGA640 External (Rear Panel) Connectors

Figure 4-9 shows the VGA640 external (rear panel) connectors. The peripheral connectors on the back panel of the monitor can connect to external devices. The peripheral connectors on the rear panel are:

- 1 x DC 12V connector
- 1 x Serial Communications connector
- 4 x OSD Function Button
- 1 x VGA conector

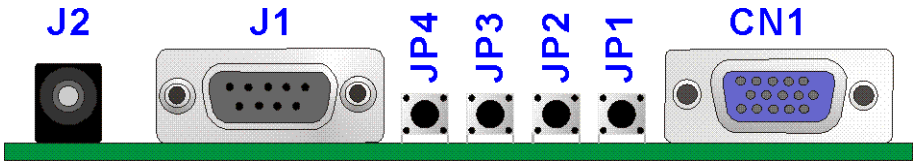

Figure 4-9: VGA640 External (Rear Panel) Connectors

4.2.15 DC 12V Connector

CN Label: J2

CN Type: DC 12V Jack

CN Pinouts: See **Table 4-10**

CN Location: See **Figure 4-9**

Use the DC 12V connector to power the monitor.

PIN	DESCRIPTION
1	GND
2	GND
3	DC 12V

Table 4-10: DC 12V Connector Pinouts

4.2.16 RS232 Serial Connector

CN Label: J1

CN Type: D-Sub 9 female connector

CN Pinouts: See **Table 4-11** and **Figure 4-10**

CN Location: See **Figure 4-9**

Use the RS-232 serial connector to connect the touch panel.

PIN	DESCRIPTION	PIN	DESCRIPTION
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI/Vout
5	GND		

Table 4-11: RS232 Serial Connector Pinouts

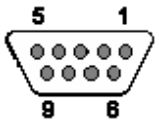

Figure 4-10: RS232 Serial Connector Pinout Locations

4.2.17 OSD Control Buttons

CN Label: JP1, JP2, JP3, JP4

CN Type: Pushbutton

CN Pinouts: See **Table 4-12**, **Table 4-13**, **Table 4-14**, **Table 4-15**

CN Location: See **Figure 4-9**

Use these buttons to control the OSD functions. The following tables list each button's function and pinouts.

PIN	DESCRIPTION	PIN	DESCRIPTION
1	MENU/SELECT	3	No Connect
2	Ground	4	No Connect

Table 4-12: OSD Control Button JP1 Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	UP/COLOR ADJUST	3	No Connect
2	Ground	4	No Connect

Table 4-13: OSD Control Button JP2 Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	DOWN/AUTO ADJUST	3	No Connect
2	Ground	4	No Connect

Table 4-14: OSD Control Button JP3 Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	LCD ON/OFF	3	No Connect
2	Ground	4	No Connect

Table 4-15: OSD Control Button JP4 Pinouts

4.2.18 VGA Connector

CN Label: CN1

CN Type: HD-D-sub 15 female connector

CN Pinouts: See **Table 4-16** and **Figure 4-11**

CN Location: See **Figure 4-9**

Use the standard HD-D-sub 15-pin VGA connector to connect the monitor to a system.

PIN	DESCRIPTION	PIN	DESCRIPTION
1	Red	9	No Connect
2	Green	10	Ground
3	Blue	11	No Connect
4	No Connect	12	DDC DAT
5	Ground	13	Horizontal Synchronization
6	Ground	14	Vertical Synchronization
7	Ground	15	DDC Clock
8	Ground		

Table 4-16: VGA Connector Pinouts

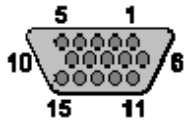

Figure 4-11: VGA Connector Pinout Locations

4.2.19 VGA640 Onboard Jumper

NOTE:

A jumper is a metal bridge used to close an electrical circuit. It consists of two or three metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To CLOSE/SHORT a jumper means connecting the pins of the jumper with the plastic clip and to OPEN a jumper means removing the plastic clip from a jumper.

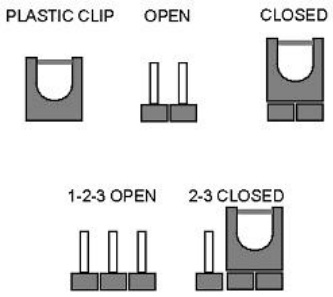

Figure 4-12: Jumpers

The VGA640 has one onboard jumper (**Table 4-3**).

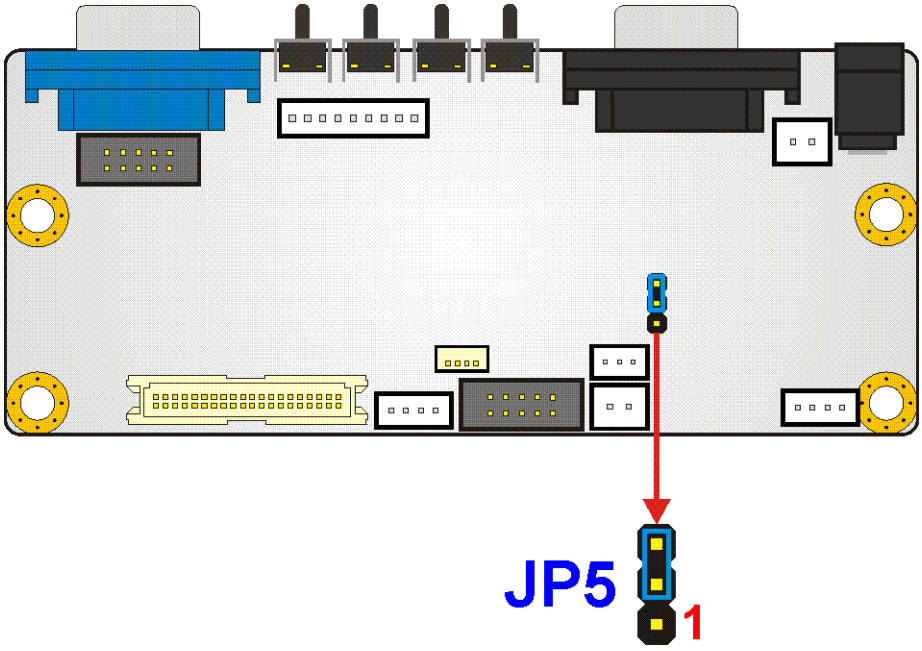

Figure 4-13: Jumper Location

4.2.20 LCD Panel (TTL) Voltage Select Jumper

Jumper Label: JP5

Jumper Type: 3-pin header

Jumper Location: See **Figure 4-13**

Jumper Settings: See **Table 4-17**

The JP5 jumper sets the voltage to the LCD panel.

JP5	Description
1-2	Panel Voltage select 5V
2-3	Panel Voltage select 3.3V (Default)

Table 4-17: LCD Panel (TTL) Voltage Select Jumper Settings

4.3 VGA800 AD Board

The following sections describe the VGA800 AD board in detail.

4.3.1 VGA800 AD Board Overview

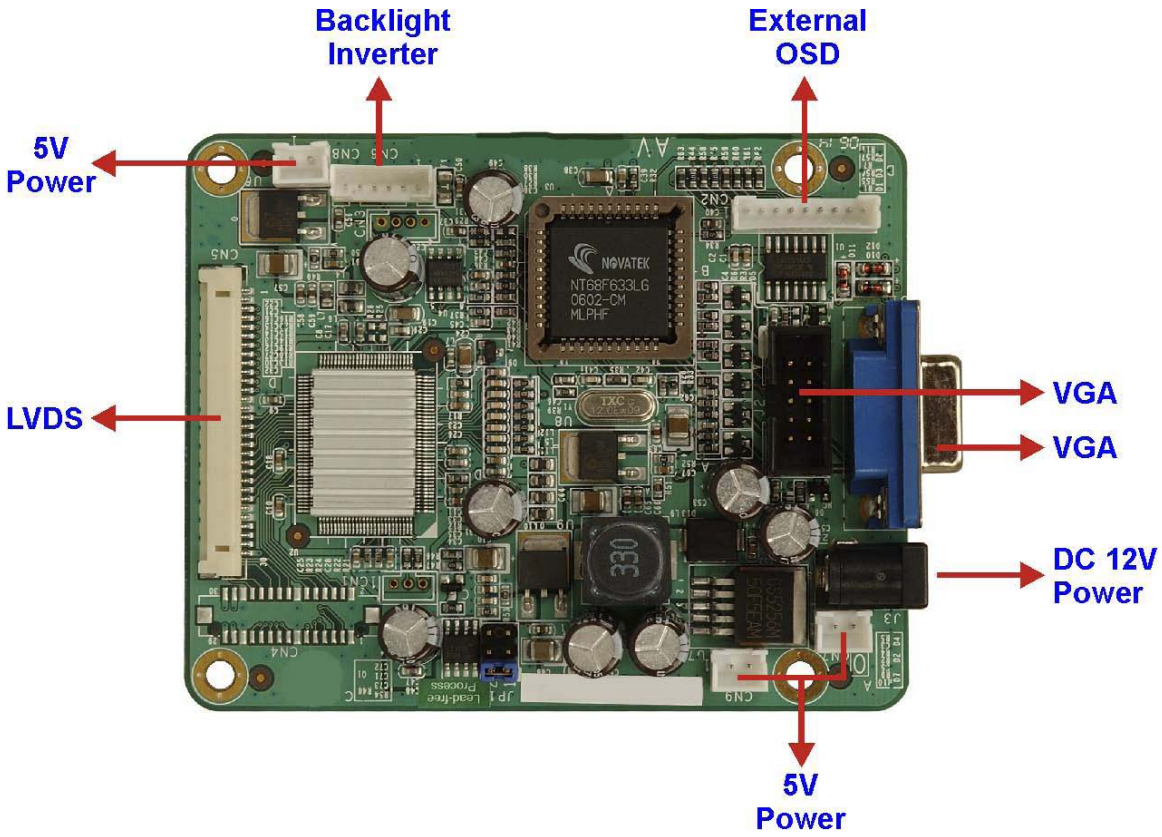

Figure 4-14: VGA800 AD Board Overview

4.3.2 VGA800 AD Board Connectors

The VGA800 AD board has the following connectors onboard:

- 1 x VGA connector
- 1 x External OSD and LED Indication connector
- 1 x LVDS connector
- 3 x 5V power connector
- 1 x Backlight Inverter connector

The VGA800 AD board has the following connectors on the board rear panel:

- 1 x VGA connector
- 1 x 12V DC power connector

The locations of the peripheral interface connectors for the VGA800 AD board are shown in **Section 4.3.3**. A complete list of all the peripheral interface connectors can be seen in **Section 0**.

4.3.3 VGA800 AD Board Layout

Figure 4-15 shows the onboard peripheral connectors and onboard jumpers.

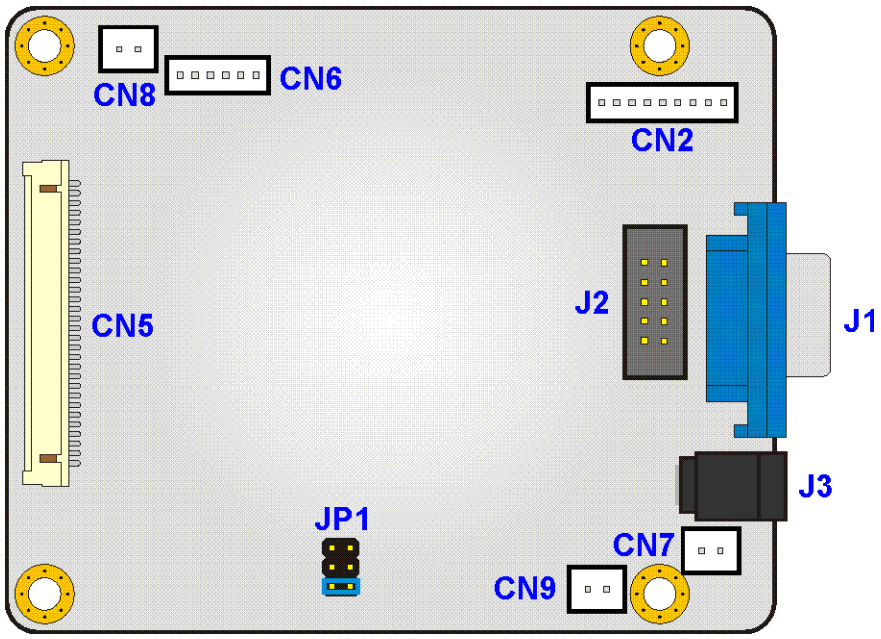

Figure 4-15: Connector and Jumper Locations

4.3.4 VGA800 Peripheral Interface Connectors

Table 4-18 shows a list of the peripheral interface connectors on the VGA800 AD board. Detailed descriptions of these connectors can be found in **Section 0**.

Connector	Type	Label
5V Power connector	2-pin header	CN7, CN8, CN9
Backlight Inverter connector	6-pin header	CN6
External OSD and LED Indication connector	9-pin header	CN2
LVDS Output connector	30-pin header	CN5
VGA connector	10-pin header	J2

Table 4-18: VGA800 Peripheral Interface Connectors

4.3.5 VGA800 Rear Panel Connectors

Table 4-19 lists the rear panel connectors and jumpers on the VGA800 AD board. Detailed descriptions of these connectors and jumpers can be found in **Section 0**.

Connector	Type	Label
DC 12V Power connector	DC Power Jack	J3
VGA Connector	15-pin VGA connector	J1

Table 4-19: VGA800 Rear Panel Connectors

4.3.6 VGA800 Onboard Jumper

Table 4-20 lists the onboard jumper. A detailed description of the jumper can be found in **Section 0**.

Jumper	Type	Label
LCD Panel Voltage Select	3-pin header	JP1

Table 4-20: VGA800 Onboard Jumper

4.3.7 VGA800 Internal Peripheral Connectors

Internal peripheral connectors on the VGA800 AD board are only accessible when the board is outside of the monitor. This section has complete descriptions of all the internal, peripheral connectors on the VGA800 AD board.

4.3.8 5V Power Connector

CN Label: CN7, CN8, CN9

CN Type: 2-pin header

CN Pinouts: See **Table 4-21**

CN Location: See **Figure 4-16**

The 5V power connector is a general-purpose power connector.

Pin	Description	Pin	Description
1	+5V	2	GND

Table 4-21: 5V Power Connector Pinouts

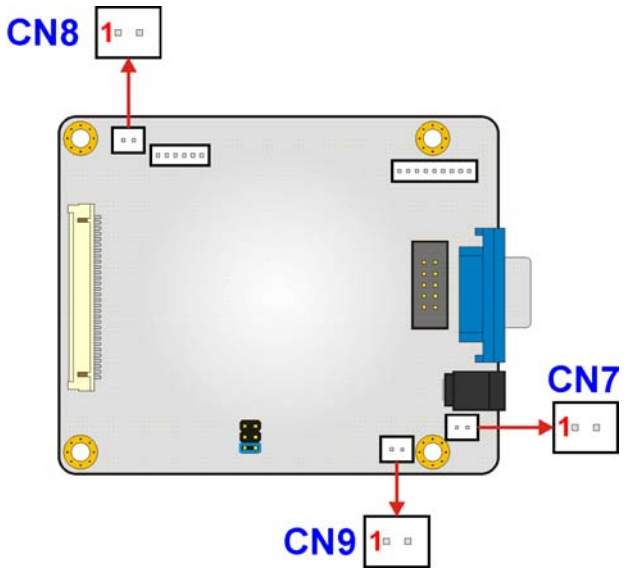

Figure 4-16: 5V Power Connector Location

4.3.9 Backlight Inverter Connector

CN Label: CN6

CN Type: 6-pin header

CN Pinouts: See **Table 4-22**

CN Location: See **Figure 4-17**

The Inverter connector connects to the LCD backlight.

Pin	Description
1	+12V
2	+12V
3	On/Off
4	BKLT_ADJ
5	GND
6	GND

Table 4-22: Backlight Inverter Connector Pinouts

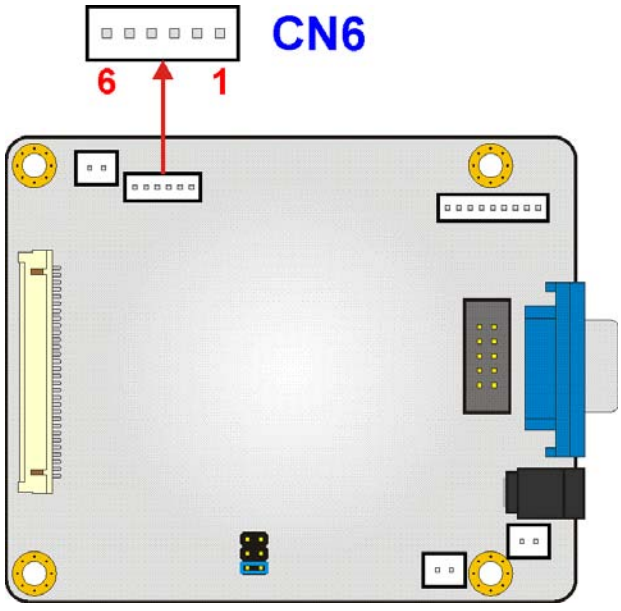

Figure 4-17: Backlight Inverter Connector Location

4.3.10 External OSD and LED Indication Connector

CN Label: CN2

CN Type: 9-pin header

CN Pinouts: See **Table 4-23**

CN Location: See **Figure 4-18**

The External OSD and LED Indication connector connects to an external OSD controller.

Pin	Description
1	LED_ORANGE
2	+5V
3	LED_GREEN
4	MENU/ENTER
5	RIGHT
6	LEFT
7	AUTO
8	LCD ON/OFF
9	GND

Table 4-23: External OSD and LED Indication Connector Pinouts

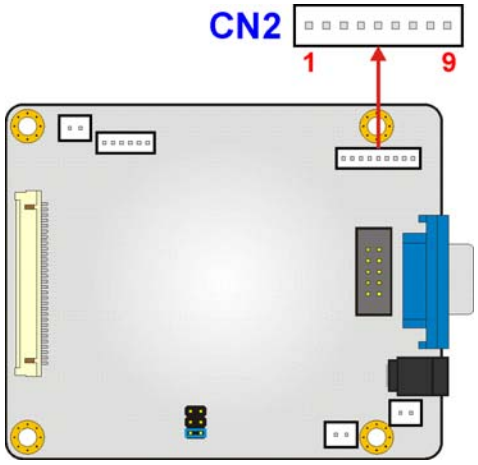

Figure 4-18: External OSD and LED Indication Connector Location

4.3.11 LVDS Output Connector

CN Label: CN7

CN Type: 30-pin header

CN Pinouts: See **Table 4-24**

CN Location: See **Figure 4-19**

Use the LVDS output connector to connect the LCD panel to a system.

Pin	Description	Pin	Description
1	GND	2	GND
3	TXO3+	4	TXO3-
5	TXOC+	6	TXOC-
7	TXO2+	8	TXO2-
9	TXO1+	10	TXO1-
11	TXO0+	12	TXO0-
13	GND	14	GND
15	TXE3+	16	TXE3-
17	TXEC+	18	TXEC-
19	TXE2+	20	TXE2-
21	TXE1+	22	TXE1-
23	TXE0+	24	TXE0-
25	GND	26	GND
27	VDD	28	VDD
29	VDD	30	VDD

Table 4-24: LVDS Output Connector Pinouts

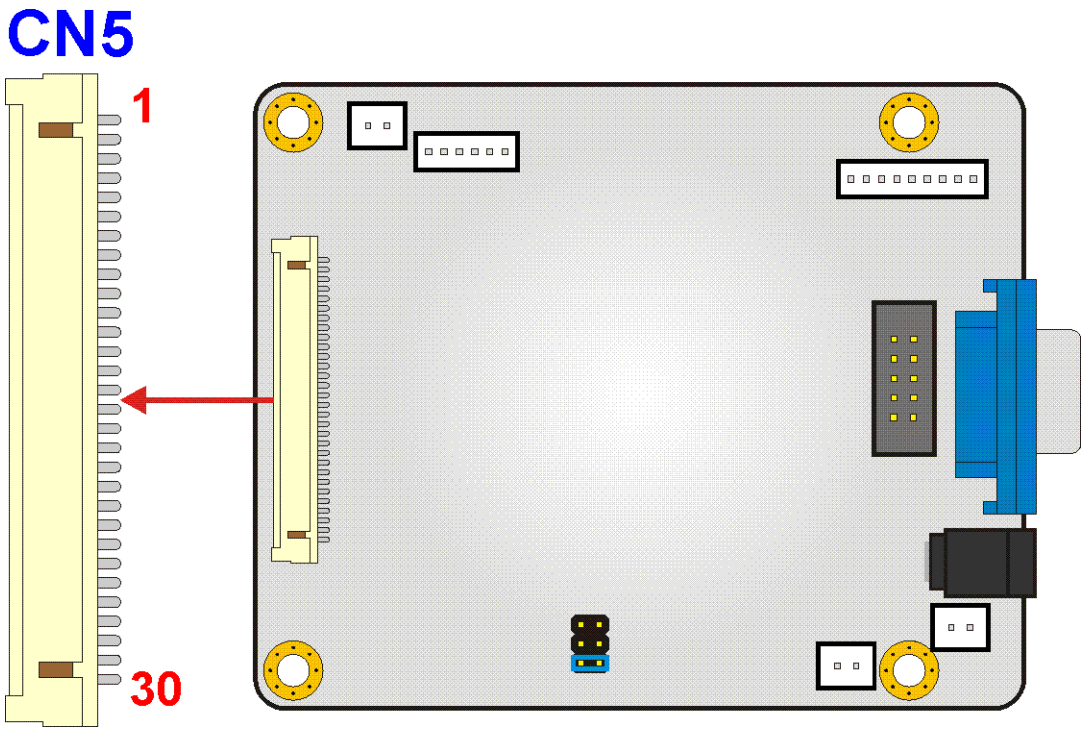

Figure 4-19: LVDS Output Connector Location

NOTE:

The supply voltage (3.3V (Default), 5V or 12V) can be selected via JP1.

4.3.12 VGA Connector

CN Label: J2

CN Type: 10-pin header

CN Pinouts: See **Table 4-25**

CN Location: See **Figure 4-20**

In addition to the standard DB-15 female VGA connector (J1), a VGA connection can also be made through the onboard CN2 10-pin header.

Pin	Description	Pin	Description
1	RED	2	DDCCLK
3	GREEN	4	DDCDAT
5	BLUE	6	GROUND
7	HSYNC	8	GROUND
9	VSYNC	10	GROUND

Table 4-25: VGA Connector Pinouts

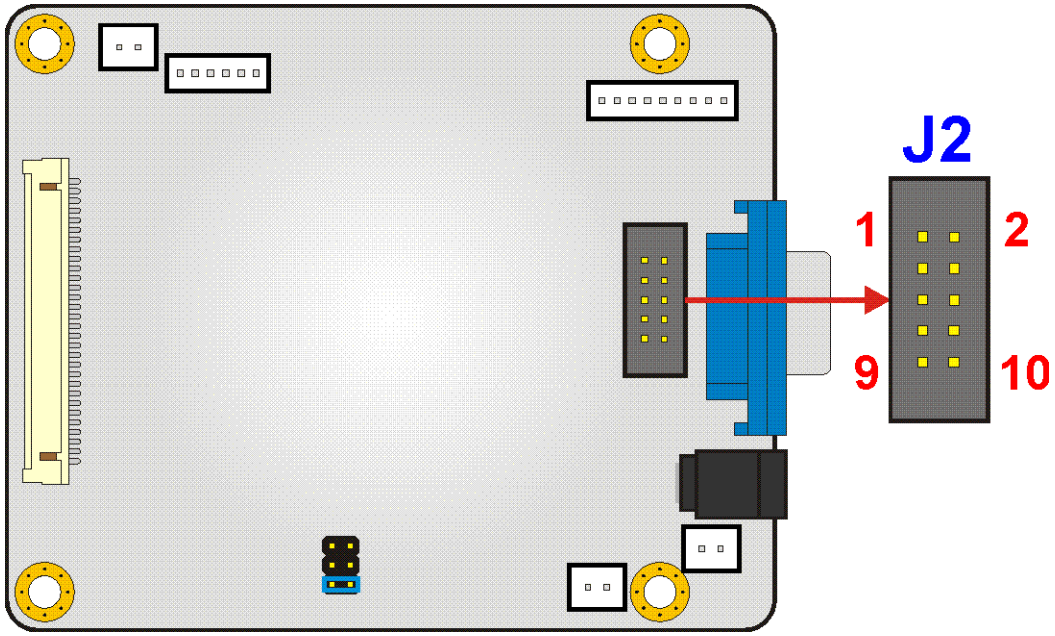

Figure 4-20: VGA Connector Location

4.3.13 VGA800 External (Rear Panel) Connectors

Figure 4-21 shows the VGA800 external (rear panel) connectors. The peripheral connectors on the back panel of the monitor can connect to external devices. The peripheral connectors on the rear panel are:

- 1 x DC 12V connector
- 1 x VGA connector

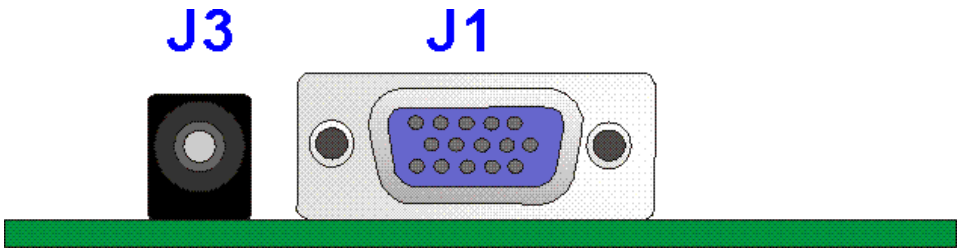

Figure 4-21: VGA800 External (Rear Panel) Connectors

4.3.14 DC 12V Connector

CN Label: J3

CN Type: DC 12V Jack

CN Pinouts: See **Table 4-26**

CN Location: See **Figure 4-21**

Use the DC 12V connector to power the monitor.

PIN	DESCRIPTION
1	GND
2	GND
3	DC 12V

Table 4-26: DC 12V Connector Pinouts

4.3.15 VGA Connector

CN Label: J1

CN Type: HD-D-sub 15 female connector

CN Pinouts: See **Table 4-27** and **Figure 4-22**

CN Location: **Figure 4-21**

Use the standard HD-D-sub 15-pin VGA connector to connect the monitor to a system.

PIN	DESCRIPTION	PIN	DESCRIPTION
1	Red	9	No Connect
2	Green	10	Ground
3	Blue	11	No Connect
4	No Connect	12	DDC DAT
5	Ground	13	Horizontal Synchronization
6	Ground	14	Vertical Synchronization
7	Ground	15	DDC Clock
8	Ground		

Table 4-27: VGA Connector Pinouts

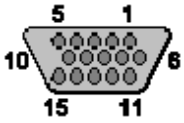

Figure 4-22: VGA Connector Pinout Locations

4.3.16 VGA800 Onboard Jumper

NOTE:

A jumper is a metal bridge used to close an electrical circuit. It consists of two or three metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To CLOSE/SHORT a jumper means connecting the pins of the jumper with the plastic clip and to OPEN a jumper means removing the plastic clip from a jumper.

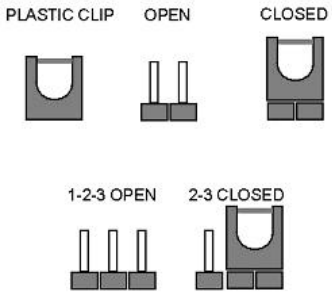

Figure 4-23: Jumpers

The VGA800 has one onboard jumper (**Table 4-20**).

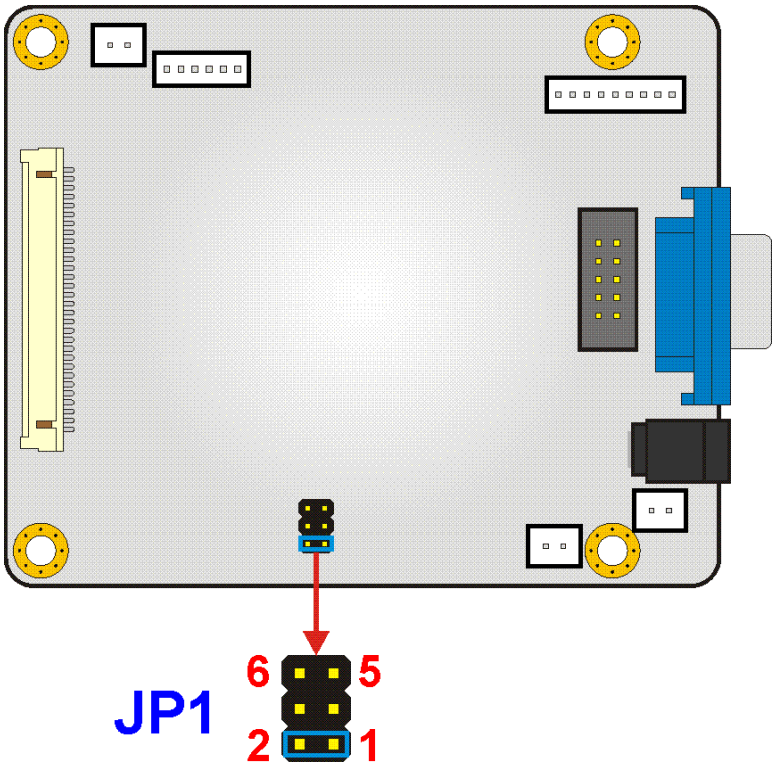

Figure 4-24: Jumper Location

4.3.17 LCD Panel Voltage Select Jumper

Jumper Label: JP5

Jumper Type: 6-pin header

Jumper Location: See **Figure 4-24**

Jumper Settings: See **Table 4-28**

The JP1 jumper sets the voltage to the LCD panel.

JP1	Description
1-2	Panel Voltage select 3.3V (Default)
3-4	Panel Voltage select 5V
5-6	Panel Voltage select 12V

Table 4-28: LCD Panel Voltage Select Jumper Settings

4.4 DVI/VGA AD Board Overview

The DVI/VGA AD board provides a wide variety of control interfaces, receiving and managing interface signals from a CPU card through cabling. The following sections describe the DVI/VGA AD board in detail.

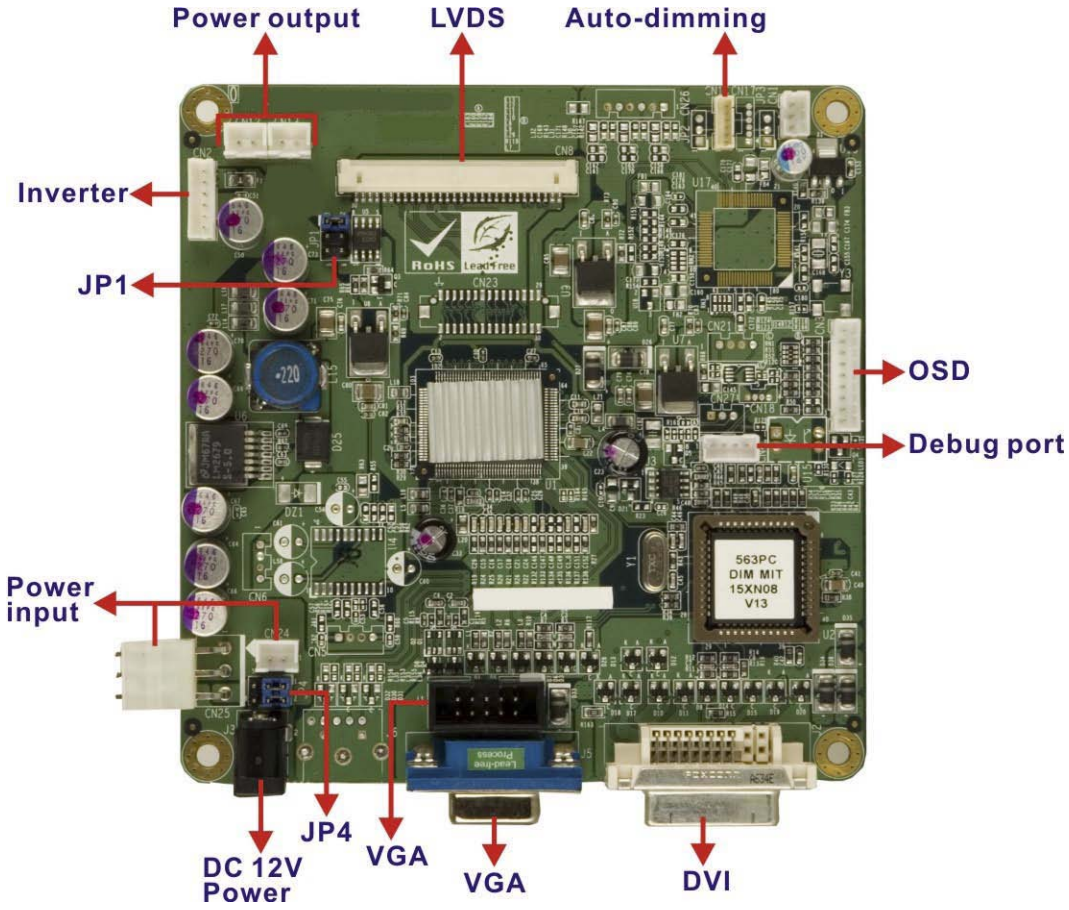

Figure 4-25: DVI/VGA AD Board Overview

4.4.1 DVI/VGA AD Board Connectors

The DVI/VGA AD board has the following connectors on-board:

- 1 x Auto-dimming connector
- 1 x Debug connector
- 1 x External OSD and LED Indication connector
- 1 x Inverter interface connector
- 1 x LVDS connector
- 2 x Power output connector
- 2 x Power input connector
- 1 x VGA connector

The DVI/VGA AD board has the following connectors on the board rear panel:

- 1 x 12V DC power connector
- 1 x DVI connector
- 1 x VGA connector

The locations of the peripheral interface connectors for the DVI/VGA AD board are shown in **Section 4.4.2**. A complete list of all the peripheral interface connectors can be seen in **Section 4.4.3**.

4.4.2 DVI/VGA AD Board Layout

Figure 4-26 shows the on-board peripheral connectors and on-board jumpers.

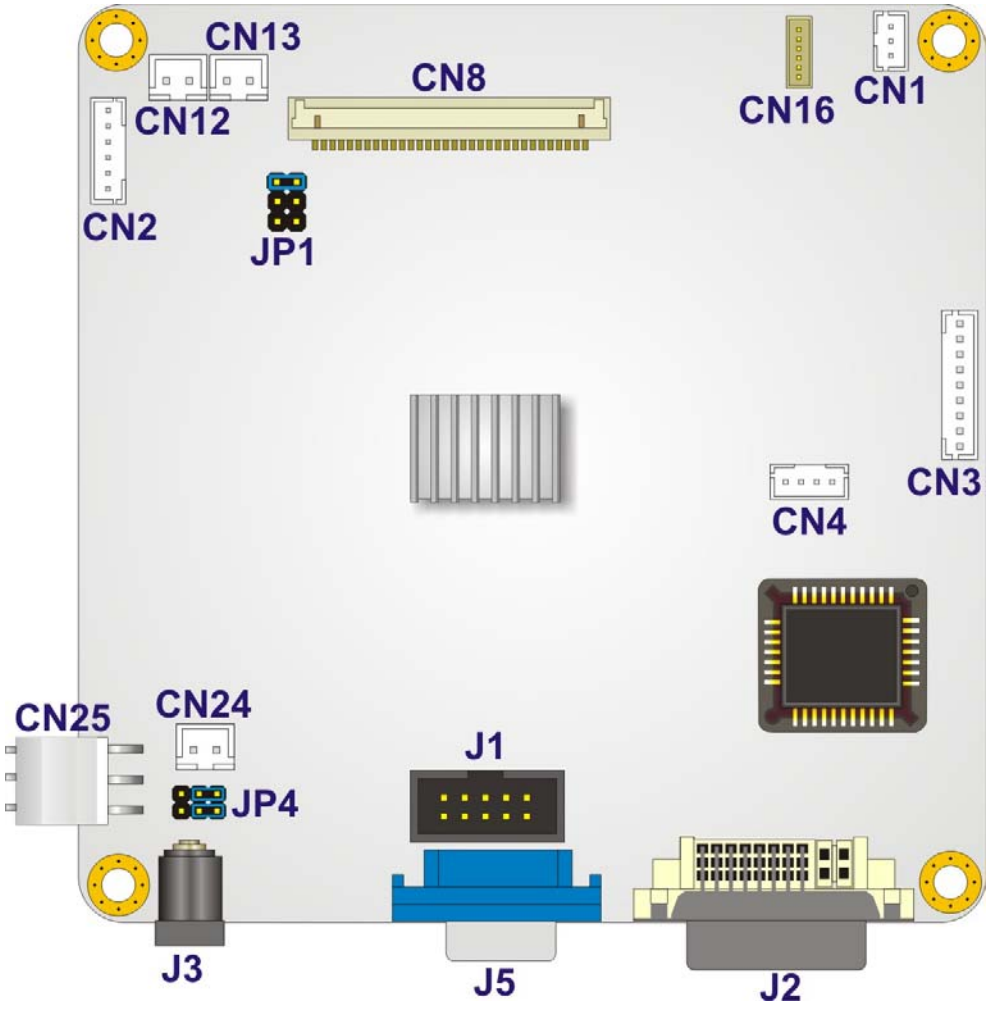

Figure 4-26: Connector and Jumper Locations

4.4.3 DVI/VGA Peripheral Interface Connectors

Table 4-29 shows a list of the peripheral interface connectors on the DVI/VGA AD board. Detailed descriptions of these connectors can be found in **Section 4.4.6**.

Connector	Type	Label
Auto-dimming connector	6-pin wafer connector	CN16
Debug connector	4-pin wafer connector	CN4
External OSD and LED Indication connector	9-pin wafer connector	CN3
Inverter interface connector	6-pin wafer connector	CN2
LVDS connector	30-pin connector	CN8
Power output connectors	2-pin wafer connector	CN12, CN13
Power input connectors	3-pin wafer connector	CN24. CN25
VGA connector	10-pin box header	J1

Table 4-29: DVI/VGA Peripheral Interface Connectors

4.4.4 DVI/VGA Rear Panel Connectors

Table 4-30 lists the rear panel connectors on the DVI/VGA AD board. Detailed descriptions of these connectors can be found in **Section 4.4.18**.

Connector	Type	Label
12V DC power connector	**DC Power Jack**	**J3**
DVI connector	**24-pin DVI-D connector**	**J2**
VGA connector	**15-pin VGA connector**	**J5**

Table 4-30: DVI/VGA Rear Panel Connectors

4.4.5 DVI/VGA On-board Jumpers

Table 4-31 lists the on-board jumpers. A detailed description of these jumpers can be found in **Section 4.4.15.**

Jumper	Type	Label
LCD Panel Power Input Select	**6-pin header**	**JP4**
LCD Panel Voltage Select	**6-pin header**	**JP1**

Table 4-31: DVI/VGA On-board Jumpers

4.4.6 DVI/VGA Internal Peripheral Connectors

Internal peripheral connectors on the DVI/VGA AD board are only accessible when the board is outside of the monitor. This section has complete descriptions of all the internal, peripheral connectors on the DVI/VGA AD board.

4.4.7 Auto-Dimming Connector

CN Label: CN16

CN Type: 6-pin wafer connector

CN Pinouts: See Table 4-32

CN Location: See Figure 4-27

The auto-dimming connector connects to an external auto-dimming sensor.

PIN	DESCRIPTION
1	+3.3V
2	NC
3	GND
4	SCL
5	NC
6	SDA

Table 4-32: Auto-dimming Connector Pinouts

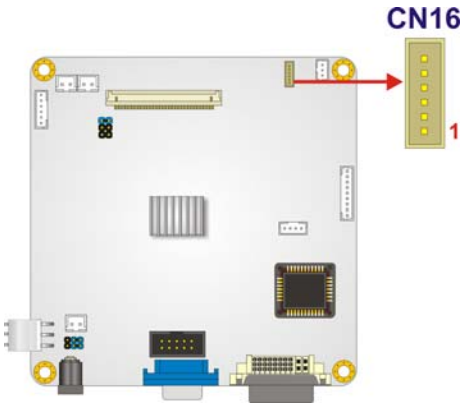

Figure 4-27: Auto-dimming Connector Location

4.4.8 Debug Port Connector

CN Label: CN4

CN Type: 4-pin wafer connector

CN Pinouts: See Table 4-33

CN Location: See Figure 4-28

Use the debug port connector to update the AD board BIOS.

PIN	DESCRIPTION
1	+5V
2	TX
3	RX
4	GND

Table 4-33: Debug Port Connector Pinouts

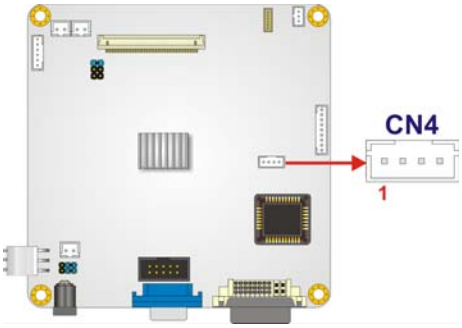

Figure 4-28: Debug Port Connector Location

4.4.9 External OSD and LED Indication Connector

CN Label: CN3

CN Type: 9-pin wafer connector

CN Pinouts: See Table 4-34

CN Location: See Figure 4-29

The External OSD and LED Indication connector connects to an external OSD controller.

PIN	DESCRIPTION
1	LED_ORANGE
2	LED_SENSOR
3	LED_GREEN
4	MENU/ENTER
5	RIGHT
6	LEFT
7	AUTO/EXIT
8	LCD ON/OFF
9	GND

Table 4-34: External OSD and LED Indication Connector Pinouts

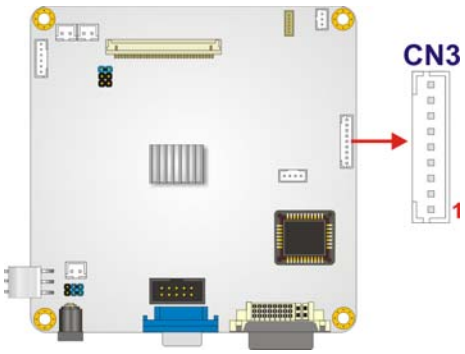

Figure 4-29: External OSD and LED Indication Connector Location

4.4.10 Backlight Inverter Connector

CN Label: CN2

CN Type: 6-pin wafer connector

CN Pinouts: See Table 4-35

CN Location: See Figure 4-30

The Inverter connector connects to the LCD backlight. Using the BKLT_EN signal to control the inverter status (ON/OFF) and the BKLT_ADJ signal to adjust brightness of inverter by OSD brightness function. The OSD brightness function can control a PWM input and variable DC voltage to minimize flickering (due to the interference between panel timing and inverter's AC timing), and adjust LCD back light brightness.

PIN	DESCRIPTION
1	+12V
2	+12V
3	BKLT_EN
4	BKLT_ADJ
5	GND
6	GND

Table 4-35: Backlight Inverter Connector Pinouts

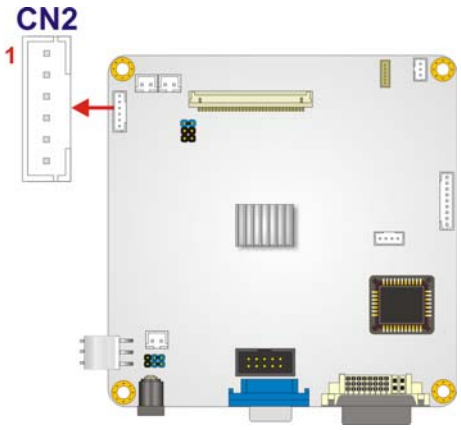

Figure 4-30: Backlight Inverter Connector Location

4.4.11 LVDS Output Connector

CN Label: CN8

CN Type: 30-pin connector

CN Pinouts: See Table 4-36

CN Location: See Figure 4-31

Use either LVDS output connector to connect the LCD panel to a system.

PIN	DESCRIPTION	PIN	DESCRIPTION
1	GND	2	GND
3	TXO3+	4	TXO3-
5	TXOC+	6	TXOC-
7	TXO2+	8	TXO2-
9	TXO1+	10	TXO1-
11	TXO0+	12	TXO0-
13	GND	14	GND
15	TXE3+	16	TXE3-
17	TXEC+	18	TXEC-
19	TXE2+	20	TXE2-
21	TXE1+	22	TXE1-

PIN	DESCRIPTION	PIN	DESCRIPTION
23	TXE0+	24	TXE0-
25	GND	26	GND
27	VDD	28	VDD
29	VDD	30	VDD

Table 4-36: LVDS Output Connector Pinouts

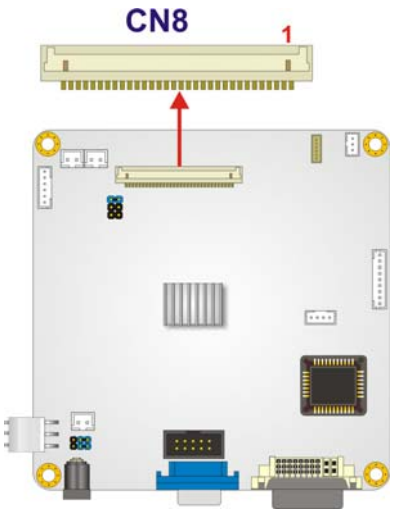

Figure 4-31: LVDS Output Connector Location

NOTE:

The supply voltage (3.3V (Default), 5V or 12V) can be selected via JP1.

4.4.12 Power Output Connector

CN Label: CN12, CN13

CN Type: 2-pin wafer connector

CN Pinouts: See Table 4-37 and Table 4-38

CN Location: See Figure 4-32

The DVI/VGA supports two power output connectors, one for 12V and the other for 5V.

PIN	DESCRIPTION
1	+12V
2	GND

Table 4-37: Power Output Connector Pinouts (CN12)

PIN	DESCRIPTION
1	+5V
2	GND

Table 4-38: Power Output Connector Pinouts (CN13)

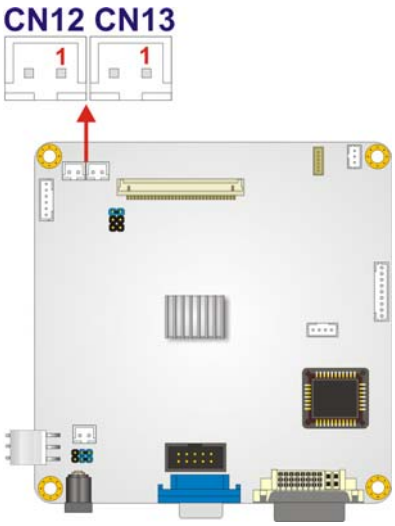

Figure 4-32: Power Output Connector Locations

4.4.13 Power Input Connector

CN Label: CN24, CN25

CN Type: 2-pin wafer connector, 3-pin wafer connector

CN Pinouts: See Table 4-39 and Table 4-40

CN Location: See Figure 4-33

The DVI/VGA supports two internal power input connectors.

PIN	DESCRIPTION
1	+12V
2	GND

Table 4-39: Power Input Connector Pinouts (CN24)

PIN	DESCRIPTION
1	+12V Input
2	GND
3	+9V~36V to external power module

Table 4-40: Power Input Connector Pinouts (CN25)

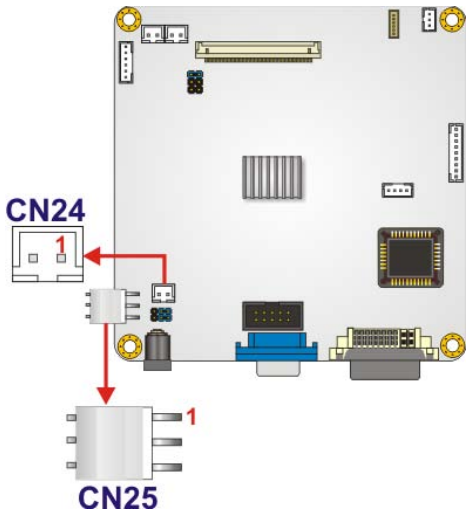

Figure 4-33: Power Input Connector Locations

4.4.14 VGA Connector

CN Label: J1

CN Type: 10-pin box header

CN Pinouts: See Table 4-41

CN Location: See Figure 4-34

In addition to the standard DB-15 female VGA connector (J1), a VGA connection can also be made through the on-board CN2 10-pin header.

PIN	DESCRIPTION	PIN	DESCRIPTION
1	RED	2	SMCLK
3	GREEN	4	SMDATA
5	BLUE	6	GROUND
7	HSYNC	8	GROUND
9	VSYNC	10	GROUND

Table 4-41: VGA Connector Pinouts

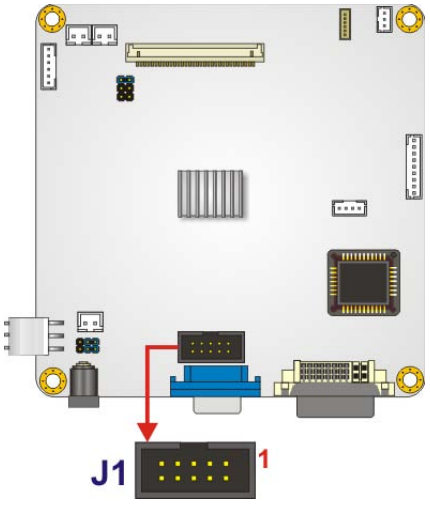

Figure 4-34: VGA Connector Location

4.4.15 DVI/VGA On-board Jumpers

NOTE:

A jumper is a metal bridge used to close an electrical circuit. It consists of two or three metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To CLOSE/SHORT a jumper means connecting the pins of the jumper with the plastic clip and to OPEN a jumper means removing the plastic clip from a jumper.

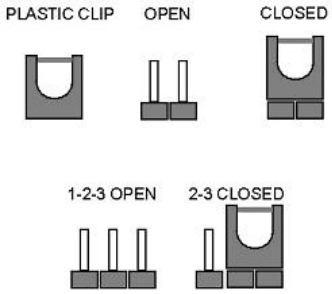

Figure 4-35: Jumpers

The DVI/VGA has two on-board jumpers (**Table 4-31**).

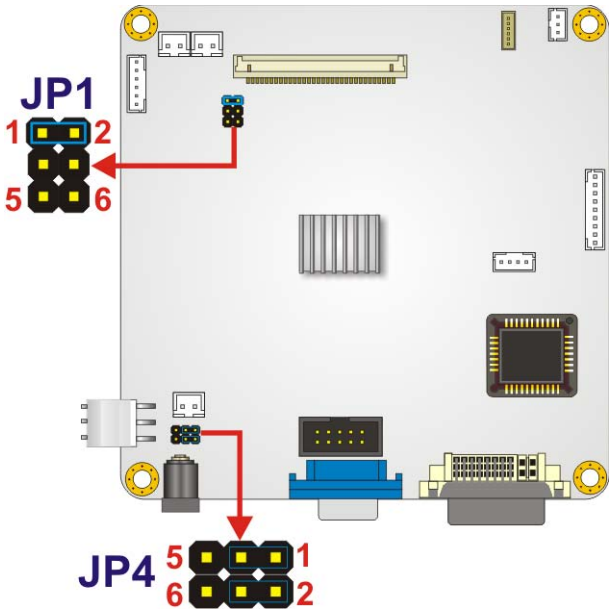

Figure 4-36: Jumper Locations

4.4.16 LCD Panel Power Input Jumper

Jumper Label: JP4

Jumper Type: 6-pin header

Jumper Location: See **Figure 4-36**

Jumper Settings: See **Table 4-42**

The JP4 jumper sets the input source from either the 12V power connector (J3) or the external terminal block.

JP4	Description
1-3, 2-4	+12V from power connector (J3) (Default)
3-5, 4-6	Input with external connector (Need external power module)

Table 4-42: LCD Panel Power Input Jumper Settings

4.4.17 LCD Panel Voltage Select Jumper

Jumper Label: JP1

Jumper Type: 6-pin header

Jumper Location: See **Figure 4-36**

Jumper Settings: See **Table 4-43**

The JP1 jumper sets the voltage to the LCD panel.

JP1	Description
1-2	Panel Voltage select 3.3V (Default)
3-4	Panel Voltage select 5V
5-6	Panel Voltage select 12V

Table 4-43: LCD Panel Voltage Select Jumper Settings

4.4.18 DVI/VGA External (Rear Panel) Connectors

Figure 4-37 shows the DVI/VGA external (rear panel) connectors. The peripheral connectors on the back panel of the monitor can connect to external devices. The peripheral connectors on the rear panel are:

- 1 x DC 12V connector
- 1 x DVI-D connector
- 1 x VGA connector

Figure 4-37: DVI/VGA External (Rear Panel) Connectors

4.4.19 DC 12V Connector

CN Label: J3

CN Type: DC 12V Jack

CN Pinouts: See Table 4-44

CN Location: See **Figure 4-37**

Use the DC 12V connector to power the monitor.

PIN	DESCRIPTION
1	GND
2	GND
3	DC 12V

Table 4-44: DC 12V Connector Pinouts

4.4.20 VGA Connector

CN Label: J5

CN Type: D-sub 15 female connector

CN Pinouts: See Table 4-45 and Figure 4-38

CN Location: See **Figure 4-37**

Use the standard D-sub 15-pin VGA connector to connect the monitor to a system.

PIN	DESCRIPTION	PIN	DESCRIPTION
1	Red	9	No Connect
2	Green	10	Ground
3	Blue	11	No Connect
4	No Connect	12	DDC DAT
5	Ground	13	Horizontal Synchronization
6	Ground	14	Vertical Synchronization
7	Ground	15	DDC Clock
8	Ground		

Table 4-45: VGA Connector Pinouts

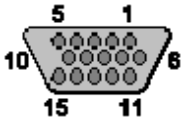

Figure 4-38: VGA Connector Pinout Locations

4.4.21 DVI-D Connector

CN Label: J2

CN Type: D-sub DVI female connector

CN Pinouts: See Table 4-46 and Figure 4-39

CN Location: See **Figure 4-37**

The 24-pin female dual link digital only DVI [Digital Visual Interface] connector is a standard for high-speed, high-resolution digital displays. Use the DVI-D connector to connect the LCD to a system.

PIN	DESCRIPTION	PIN	DESCRIPTION
1	RX2-	2	RX2+
3	GND	4	NC
5	NC	6	DVI-SCL
7	DVI-SDA	8	NC
9	RX1-	10	RX1+
11	GND	12	NC
13	NC	14	DVI-5V
15	GND	16	HOT-PLUG
17	RX0-	18	RX0+
19	GND	20	NC
21	NC	22	GND
23	RXC+	24	RXC-

Table 4-46: DVI-D Connector Pinouts

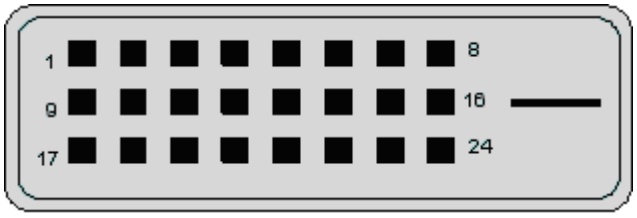

Figure 4-39: DVI-D Connector Pinout Locations

Chapter

5

Installation

5.1 Installation Precautions

When installing the GAI-LCD Series A monitor, please follow the precautions listed below:

- **Read the user manual**: The user manual provides a complete description of the GAI-LCD Series A monitor, installation instructions and configuration options.
- **DANGER! Disconnect Power**: Power to the monitor must be disconnected when installing the GAI-LCD Series A monitor, or before any attempt is made to access the rear panel. Electric shock and personal injury might occur if the rear panel of the monitor is opened while the power cord is still connected to an electrical outlet.
- **Qualified Personnel**: The GAI-LCD Series A monitor must be installed and operated only by trained and qualified personnel. Maintenance, upgrades, or repairs may only be carried out by qualified personnel who are familiar with the associated dangers.
- **Mounting**: Since the monitor may weigh up to 10 kg (not including a swing arm or other accessories), please ensure at least two people assist with mounting the monitor.
- **Air Circulation**: Make sure there is sufficient air circulation when installing the monitor. The monitor's cooling vents must not be obstructed by any objects. Blocking the vents can cause overheating of the monitor. Leave at least 5 cm of clearance around the monitor to prevent overheating.
- **Grounding**: The monitor should be properly grounded. The voltage feeds must not be overloaded. Adjust the cabling and provide external overcharge protection per the electrical values indicated on the label attached to the back of the monitor.
- **Anti-static Discharge**: The rear panel of the monitor must to be removed to configure the monitor's AD board voltage select jumper. When doing so, be sure the monitor is disconnected from its power source and take all necessary safety precautions to avoid electrocution and static discharge to the AD board. The use of a grounded wrist strap and an anti-static work pad is recommended.

5.2 Unpacking

5.2.1 Packaging

When shipped, the GAI-LCD Series A monitor is wrapped in a plastic bag. Two polystyrene ends are placed on either side of the monitor. The monitor is then placed into a first (internal) cardboard box. This box is then sealed and placed into a second (external) cardboard box. The second box is also sealed. A bag containing accessory items is placed with the monitor in the internal (first) box.

5.2.2 Unpacking Procedure

To unpack the GAI-LCD Series A monitor, follow the steps below:

WARNING:

The front side LCD screen has a protective plastic cover stuck to the screen. Only remove the plastic cover after the GAI-LCD Series A monitor has been properly installed. This ensures the screen is protected during the installation process.

Step 1: Use box cutters, a knife or a sharp pair of scissors that seals the top side of the external (second) box.

Step 2: Open the external (second) box.

Step 3: Use box cutters, a knife or a sharp pair of scissors that seals the top side of the internal (first) box.

Step 4: Lift the monitor out of the boxes.

Step 5: Remove both polystyrene ends, one from each side.

Step 6: Pull the plastic cover off the GAI-LCD Series A monitor.

Step 7: Make sure all the components listed in the packing list are present.

5.2.3 Packing List

All the monitors in the GAI-LCD Series A are shipped with the following components:

- 1 x GAI-LCD Series A monitor.
- 1 x AC Power cable
- 1 x VGA Cable
- 1 x 45W AC Power Adapter (2007610 / 7608 / 7606 / 7604)
- 1 x 25W AC Power Adapter (2007602 / 7600 / 7598)
- 5 x Replacement Round Head Screw
- 5 x Replacement Flat Head Screw
- 5 x Replacement Wire Strain Band
- 1 x User Manual on CDROM

If any of these items are missing or damaged, contact the distributor or sales representative immediately.

5.3 Pre-installation Preparation

5.3.1 Tools

Before installing the GAI-LCD Series A monitor, make sure the following tools are on hand:

- **Philips (crosshead) screwdriver**: All the retention screws on the system are Philips screws.
- **Soft working mat**: When the GAI-LCD Series A monitor is installed, the screen is placed on the working surface. It is therefore important to rest the MPC indutrial workstation on a soft at that cannot damage the LCD screen on the front of the GAI-LCD Series A monitor.

5.4 Connectors

Table 5-1 lists the rear panel connectors for the GAI-LCD Series A monitors.

GAI-LCD	6.5"	8.4"	10.4"	12.1"	15"	17"	19"
DVI-D	-			Yes			
VGA	Yes						
Power (12V Jack)	Yes						

Table 5-1: Rear Panel Connectors

5.4.1 VGA Connector

Use the rear panel standard 15-pin female VGA connector to connect the monitor to the system graphics interface.

PIN	DESCRIPTION	PIN	DESCRIPTION	PIN	DESCRIPTION
1	RED	6	GROUND	11	NC
2	GREEN	7	GROUND	12	DDCDAT
3	BLUE	8	GROUND	13	HSYNC
4	NC	9	NC	14	VSYNC
5	GROUND	10	GROUND	15	DDCCLK

Table 5-2: VGA Connector Pinouts

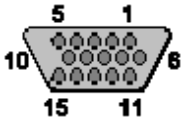

Figure 5-1: VGA Connector

5.4.2 DVI-D Connector

Use the rear panel standard 24-pin female DVI-D connector to connect the monitor to the system graphics interface.

PIN	DESCRIPTION	PIN	DESCRIPTION	PIN	DESCRIPTION
1	TMDS Data2-	9	TMDS Data1-	17	TMDS Data0-
2	TMDS Data2+	10	TMDS Data1+	18	TMDSData0+

PIN	DESCRIPTION	PIN	DESCRIPTION	PIN	DESCRIPTION
3	TMDS Data2/4 Shield	11	TMDS Data1/3 Shield	19	TMDS Data0/5 Shield
4	TMDS Data4-	12	TMDS Data3-	20	TMDS Data5-
5	TMDS Data4+	13	TMDS Data3+	21	TMDS Data5+
6	DDC Clock [SCL]	14	+5 V Power	22	TMDS Clock Shield
7	DDC Data [SDA]	15	Ground (for +5 V)	23	TMDS Clock +
8	Analog vertical sync	16	Hot Plug Detect	24	TMDS Clock -

Table 5-3: DVI-D Connector Pinouts

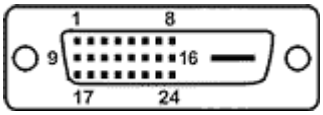

Figure 5-2: DVI-D Connector

5.4.3 12V Power Connector

Use the rear panel +12V DC jack to connect the monitor to a power source.

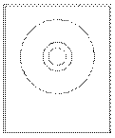

Figure 5-3: 12V Power Connector

5.5 Mounting the GAI-LCD Series A Monitor

Each GAI-LCD Series A monitor comes with a preinstalled mounting bracket with a number of holes available for mounting purposes that system integrators will find especially useful. Refer to **Sections 2.4** and **2.5** for further details on the number and location of mounting holes for each model of the GAI-LCD Series A monitor.

Chapter

6

On-Screen-Display (OSD) Controls

6.1 User Mode OSD Structure

6.1.1 OSD Buttons

There are several on-screen-display (OSD) control buttons oriented either vertically along the right hand side or horizontally along the bottom of the monitor front panel. Refer to **Section 2.2** for availability and orientation of the OSD controls on specific GAI-LCD Series A monitors.

Figure 6-1 shows a typical arrangement of OSD controls for all models of the GAI-LCD Series A monitor except the 2007598.

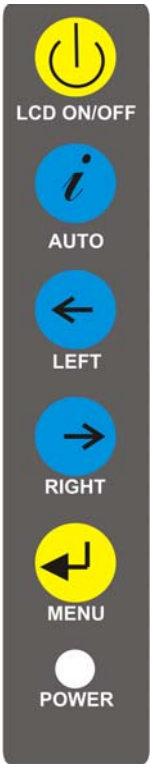

Figure 6-1: OSD Control Buttons for All Models Except 2007598

Figure 6-2 shows the OSD controls for the 2007598.

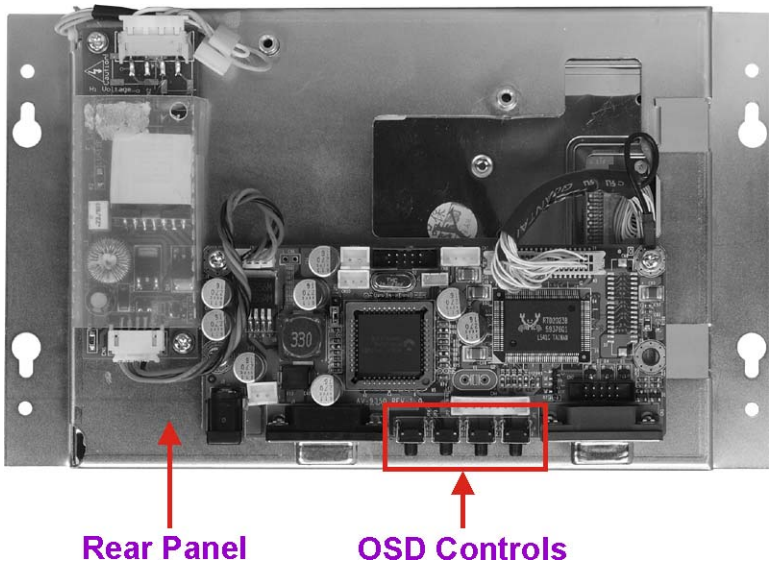

Figure 6-2: 2007598 OSD Control Buttons

NOTE:

Pressing the direction keys (LEFT or RIGHT) can bring out a simple menu which adjusts the LCD screen brightness and contrast values.

6.1.2 OSD Menu Structure – All Models Except 2007598

Table 6-1 shows the OSD menu structure for all models of the DN series monitor except the 2007598.

Level 0	Level 1	Value
Main Display Features Menu	Brightness	0 to 100
	Contrast	0 to 100
	Horizontal Size	0 to 100
	Phase	0 to 100
	H. Position	0 to 100
	V. Position	0 to 100
	Sharpness	1 to 5

Level 0	Level 1	Value
Speaker	Volume	This menu is currently disabled, and will be implemented with models equipped with speakers.
	Mute	
Color Menu	9300	- Preset NTSC value
	7500	- Preset NTSC value
	User	RGB values from 0 to 100
Language Menu	English	Select
	French	
	German	
	Spanish	
	Italian	
	Japanese	
	Russian	
	Traditional Chinese	
	Simplified Chinese	
OSD Menu	OSD Time Out	0 to 60 sec
	OSD Position	1 to 5
	OSD Transparency	0 to 100
	Auto Setting	On or Off
	Recall	No or Yes
	Aspect Ratio	4:3 or 5:4
Signal Menu	Digital	Select
	Analog	
Backlight Menu	Light Enable	On or Off
	Light Contrast	0 to 100
	Light Brightness	0 to 100
	Light H Start	0 to 100
	Light H Width	0 to 100
	Light V Start	0 to 100
	Light V Height	0 to 100

Table 6-1: OSD Menus – All Models Except 2007598

6.1.3 2007598 OSD Menu Structure

Table 6-2 shows the OSD menu structure for the 2007598.

Level 0	Level 1	Level 2
Color	Contrast	0 to 100
	Brightness	0 to 255
	Color Adjust	Red Green Blue
	Color Temp	9300 6500 5800 sRGB USER
	Back	
Image Seeting	Clock	0 to 100
	Phase	0 to 63
	Gamma	0 1 2 3
	Sharpness	0 1 2 3 4
	Back	
Position	H Position	0 to 200
	V Position	0 to 23
	Back	
OSD Menu	OSD H.POS	0 to 200
	OSD H.POS	0 to 200
	OSD Timer	0 to 27
	Back	
Language Menu	English	Select
	French	
	German	
	Spanish	
	Traditional Chinese	
	Simplified Chinese	
	Japanese	

Level 0	Level 1	Level 2
Misc.	Signal source	D-SUB
	Reset	
	Factory Mode	
	Info.	
	Back	
Exit		

Table 6-2: 2007598 OSD Menus

6.2 Using the OSD

OSD menu options are described below.

NOTE:

The 2007598 OSD display features differ from those described below. Use the following display features as reference for the 2007598 monitor.

6.2.1 Main Display Features

Main display features are shown in **Figure 6-3**.

Figure 6-3: Main Display Features

- **Brightness**:

  The brightness option adjusts the brightness of screen. This function adjusts the offset value of ADC. Setting this value too high or too low will affect the quality of image.

- **Contrast:**

  This function adjusts the gain value of ADC. Adjusting this value too high or too low will worsen the quality of image.

- **Horizontal Size:**

  This item adjusts the screen size in the horizontal direction.

- **Phase:**

  This option adjusts the input signal and dot clock position (Analog only).

- **H. Position:**

  Adjusts the horizontal position of the display screen.

- **V. Position:**

  Adjusts the vertical position of the display screen.

- **Sharpness:**

  Adjusts the sharpness level to one of the 5 preset values. This option may help reducing the softening edges around displayed objects.

6.2.2 Color

Color options are shown in **Figure 6-4**.

Figure 6-4: Color Options

The Color menu fine-tunes the palette of color hues for the LCD.

- **9300**:

  NTSC standard Kelvin

- **7500**:

  NTSC standard Kelvin

- **User**:

  This item allows fine-tuning the balance among Red, Green, and Blue color hues if images look garish or unrealistic.

6.2.3 Language

The Languages are shown in **Figure 6-5**.

Figure 6-5: Language Menu

This menu provides options for selecting ODS screen legends in a preferred language.

6.2.4 OSD Configurations

The OSD configurations are shown in **Figure 6-6**.

Figure 6-6: OSD Configurations Menu

OSD Configurations are described below.

- **OSD Time Out:**

  Determines how many seconds the OSD screen stays on screen before it disappears when OSD is left unattended.

- **OSD Position:**

  Adjusts the OSD position on the screen. Position 1 is in the upper left of the screen, position 2 in the upper right and position 3 in the center.

- **OSD Transparency**

  Determines the opacity of OSD background.

- **Auto Setting**

  This function automatically adjusts the LCD screen position in situations such as connecting the LCD to a different host computer.

- **Recall**

  Restores the default OSD settings. Note that this will restore all default display settings.

- **Aspect Ratio**

  Adjusts the display ratio referring to the width of the screen and then to the height of the screen.

6.2.5 Signal

The Signal menu in **Figure 6-7** enables manual selection of the type of graphic source input, i.e., analog (15-pin VGA) or digital (DVI-D).

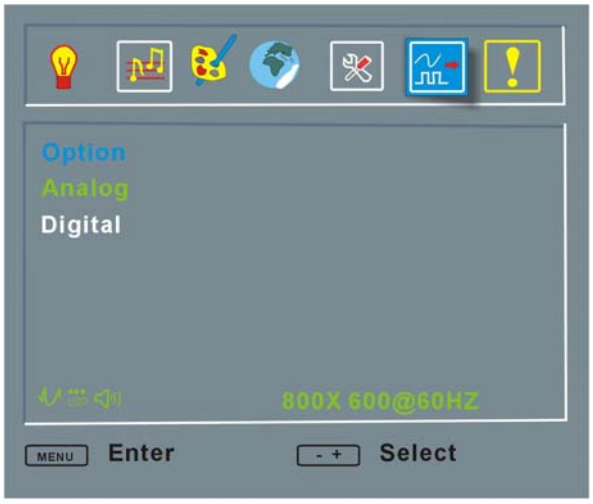

Figure 6-7: Signal Menu

6.2.6 Backlight

The Backlight menu in **Figure 6-8** enables users to configure the LCD backlight.

Figure 6-8: Backlight Menu

Backlight Menu options are described below.

- **Light Enabled:**

  Turns backlight on or off.

- **Light Contrast:**

  Adjusts the backlight contrast.

- **Light Brightness:**

  Adjusts the backlight brightness.

- **Light H Start:**

  Adjusts the backlight projection area in the horizontal direction.

- **Light H Width:**

  Adjusts the width of the backlight projection area.

- **Light V Start:**

  Adjusts the backlight projection area in the vertical direction.

- **Light V Height:**

  Adjusts the height of the backlight projection area.

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Appendix

A

Certifications

A.1 RoHS Compliant

All models in the GAI-LCD Series A comply with the Restriction of Hazardous Materials (RoHS) Directive. This means that all components used to build the industrial workstations and the workstation itself are RoHS compliant.

The RoHS Directive bans the placing on the EU market of new electrical and electronic equipment containing more than agreed levels of lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants.

Any advice or comments about our products and service, or anything we can help you with please don't hesitate to contact with us. We will do our best to support your products, projects and business.

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