

LCD Controller Selection Guide for Hantronix Graphics LCDs

General:

The larger Hantronix displays, such as the 320 x 240 and 640 x 480pixel sizes, are shipped without built-in controllers. This is done because displays in this size range are typically used with a wide range of microprocessors and full sized computers. The choice of controller depends on which type or class of processor is being used. The possibilities range from a simple 8-bit micro-controller to a Pentium PC driving the display under the Windows operating system.

This application note will give the designer an overview of the controllers that are available to drive any of the Hantronix LCD panels that do not have built-in controllers.

Types of available interfaces:

Embedded or desktop PC:

When an LCD panel is to be driven by a computer such as an embedded PC or a desktop PC the LCD display is usually driven from a plug-in video card, either ISA or PCI bus. These cards are readily available and, with one exception are the primary display card in the computer. Most of these will drive a conventional CRT monitor and the LCD panel simultaneously. The LCD panel can then be used as the primary display for the computer or in conjunction with it.

In theory the 320 x 240 (quarter VGA or QVGA) panels can be driven from these cards but the operating system, usually Windows or DOS, requires a BIOS (Basic Input Output System) that is programmed to cover the size of panel used. Very few of these are available for the QVGA size so only 640 x 480 (VGA) size panels are used in this configuration. If a QVGA panel is to be driven from a PC a secondary display card is usually used in addition to the primary display. The secondary display card does not display the operating system screens but is instead programmed separately by the designer.

Hantronix P/N	Resolution	Description
HDM160GS16	160 x 160	Single Scan 4-bit monochrome STN
HDM240GS16	240 x 160	Single Scan 4-bit monochrome STN
HDM240192	240 x 192	Single Scan 4-bit monochrome STN
HDM240200	240 x 200	Single Scan 4-bit monochrome STN
HDM2432	240 x 320	Single Scan 4-bit monochrome STN
HDM3224 (All mono)	320 x 240	Single Scan 4-bit monochrome STN
HDM3224C	320 x 240	Single Scan 8-bit color STN
HDM4832L	480 x 320	Single Scan 8-bit color STN
HDM6448 (All mono)	640 x 480	Dual Scan 4-bit monochrome STN
HDM6448C	640 x 480	Dual Scan 8-bit color STN

Table #1 Hantronix part numbers and descriptions

A number of display board manufacturers are given below. These are only suggestions and there are other manufacturers which are not listed here. If you are in doubt as to the suitability of a given controller for a Hantronix panel you should contact the vendor of the controller and ask them. They will ask for the type of panel you are planning to use. This information is supplied in Table #1. This description is enough for them to assess the suitability of their controller with this display.

PC104:

PC104 embedded computers are commonly used with LCD displays and either DOS or Windows operating systems. All of the considerations detailed above also apply to the PC104 environment.

The following are makers of plug-in VGA LCD controller cards.

- ▶ *Digital View* - www.digitalview.com - ISA & PCI Bus VGA controllers
- ▶ *Earth Computer Technologies* - www.flat-panel.com - ISA & PCI Bus VGA controllers.
- ▶ *AVED Display Technologies* - www.aveddisplay.com - ISA & PCI Bus VGA controllers.
- ▶ *Gounder Technologies, Inc.* - www1.math.luc.edu/~rmb/temp/specs.html - ISA Bus VGA controllers.

The following are makers of single board computers with built-in or add-on VGA LCD controllers.

- ▶ *Adastra Systems* - www.adastra.com - 486 & Pentium Processors
- ▶ *Protech Systems* - www.protech.com.tw - 386, 486 and Pentium Processors.
- ▶ *Ampro Computers, Inc.* - www.ampro.com - 386, 486 and Pentium Processor, PC104
- ▶ *Tern, Inc.* - www.tern.com - 386EX Processor, PC104

8 or 16-bit Micro-Controllers:

LCD panels used with small micro-controllers require the designer to implement the LCD controller "from scratch". Table #2 compares some of the available controller ICs and their suitability for use with various Hantronix flat panel displays. Two options are given for each display from each vendor where available. The minimum version is the lowest priced controller that will drive the display. The full featured controllers cost more but provide extra features such as gray scale on the monochrome panels and many colors on the color panels. They may also operate on a wide range of voltages and have sleep or low power modes.

All of these controllers are downward compatible. For instance, a color capable controller will also drive a monochrome panel. This may be desirable if a product needs to handle both monochrome and color displays.

Hantronix P/N	Controller IC P/N & Mfr.(Min)	Controller IC P/N & Mfr.(Full)	Comments
HDM160GS16 HDM240GS16 HDM240192 HDM240200 HDM3224 (All mono)	Epson S1D13700	Epson SED1376/ S1D13706 ----- Amulet AGB64LV01-QC (GUI Controller)	The controllers in the minimum (Min) column provide basic display functions and are the minimum controller that can be used. Controllers in the Full column provide extra functions such as gray scale or more colors, wider range of V_{DD} voltages, built-in video RAM, low power modes, image inversion and rotation, etc.
HDM2432 (1/320 duty) HDM4832L	Epson SED1353/ S1D13503		
HDM3224C	Epson SED1375/ S1D13705	Epson SED1354/ S1D13504	
HDM6448 (All mono)	Epson SED1375/ S1D13705	Epson SED1386/ S1D13806	
HDM6448C	Epson SED1354/ S1D13504	Epson SED1386/ S1D13806	

Table #2 Controllers for 8, 16 & 32-bit Processors