



Powerful Display Controller for X Windows

Datacube's innovative XI Display Controller was developed to complement the display capabilities of the MaxVideo 250 and MaxVideo 200 pipeline image processing systems. XI stands for "X Windows" and "imaging." Its unique ability to merge large numbers of image pixels with X Windows is unsurpassed.

Utilized in systems with a MaxVideo image processor and host computer, the XI Display Controller delivers a complete X11R5 windows solution. XI links the image processor with the display, moving images at frame rates. It displays live, true color, pseudo-color, and 8-, 10-, and 12-bit grey-scale windows simultaneously. Windows may be double-buffered, have graphical overlays, and contain stereo data.

XI solves the single monitor dilemma, eliminating the need for dumb terminals, host computer graphics controllers, and extra monitors to display image processing results. In all supported environments, XI can boot the host computer and provide a high performance X Windows system with real-time imagery.

A powerful X Windows system, XI features an onboard graphics processor to accelerate graphics rendering functions within windows. Display resolution is programmable up to 1600x1280 @ 76 Hz or 1Kx1K stereo @ 120 Hz. To achieve a multiple monitor X Windows system, XI can operate with a host computer's graphics controller or other XI boards, all controlled by a single keyboard and mouse.

Datacube offers three XI models for system flexibility, in a compact 2-slot, 6U VME format. All models are full featured and engineered for reliability and performance. The 8+8 Low Cost model, 8-bit plus 8-bit overlay (1280x1024 @ 76 Hz), is used for grey-scale or pseudo-color image display.



The 24+8 True Color model, 24-bit plus 8-bit overlay (1280x1024 @ 76 Hz), is used for true color display or double- or triple-buffered grey-scale image display. The top of the line 24+8 Turbo True Color model, 24-bit plus 8-bit overlay (1600x1280 @ 76 Hz), also offers two simultaneous 120 MB/second inputs from the image processor.

The high quality XI Display Controller offers sophisticated features and supports a full range of display types and environments. It delivers Datacube solution performance, maximum flexibility, and multiple configurations to meet all of your image processing display needs.

- Real-time images from MaxVideo 250 or 200 displayed in the X Windows environment
- Programmable display resolution up to 1600x1280 @ 76 Hz or 1Kx1K stereo @ 120 Hz
- 240 MB/second MAXbus image input into live windows
- Simultaneous live true color, pseudo-color, grey-scale, and double-buffered windows
- X Windows server software with extensions linking it to Datacube's ImageFlow software
- XI is the only monitor or terminal required in any supported environment



Specifications

Features

Software Control

Datacube's ImageFlow and Xdq server software control the XI Display Controller. An application program creates a window under X, then via an X server extension acquires an ImageFlow handle for that window. It then attaches the handle to the end of an image processing pipeline and the result of the image processing appears in the window.

Display Memory

High level display memory is composed of two parts: overlay memory and image memory. The *overlay memory* performs two functions. Graphics are drawn into it by the 34020 display processor and displayed from it by the RAMDAC, and it is used to control the visibility and display type of the image memory. The overlay memory is 8 bits deep on all models. The *image memory* is either 8 or 24 bits deep, depending on the XI model. For grey-scale or pseudo-color image display, 8 bits is sufficient. For true color, multiple-buffered grey-scale images, or 12-bit grey-scale display, 24 bits is required.

MAXbus

The MAXbus connection to the image processor can operate at 10, 20, 40, or 80 Megapixels/second. Pixel depth can range from 8 bits to 24 bits. Two independent MAXbus inputs provide simultaneous updating of two windows or stereo windows, or may be time sliced to update multiple windows. 30 frames per second updating of 1Kx1K windows, waterfall windows, and windows roaming over arbitrarily large images are all easily achieved.

Display Video Timing

The XI Display Controller's video timing is programmable from X Windows configuration files. Horizontal and vertical timing are done by the video timing logic within the 34020 display processor. The pixel clock is created by a frequency synthesizer which can generate any display pixel clock rate from 10 MHz up to 220 MHz. The vertical rate of the display may be locked to an external reference.

Supported Display Types

The XI Display Controller supports the following types of windows:

- **Graphics** – From 2 to 256 colors, display colors are requested individually by asking the X server for an 8-bit index to display the requested color. The X server controls the LUT and shares colors between the graphics windows.
- **Pseudo8** – 256 colors out of a possible 16 million via a LUT
- **Grey8** – 256 levels of grey with no LUT
- **Grey10** – 1024 levels of grey with a 10x8 LUT
- **Grey12** – 4096 levels of grey with a 12x8 LUT
- **True24** – 24-bit color image with no LUT
- **ColorLut24** – 24-bit color image with three 8x8 LUTS

Supported Environments

The XI Display Controller is supported under ImageFlow environments that have X Windows support.

Feature	8+8	24+8	24+8 Turbo
Bits of Image Memory	8	24	24
Maximum Pixel Rate in MHz	135	135	220
Maximum Horizontal Resolution @ 76 Hz	1280	1280	1600
Maximum Vertical Resolution @ 76 Hz	1024	1024	1280
Maximum Horizontal Resolution @ 120 Hz	900	900	1024
Maximum Vertical Stereo Resolution @ 120 Hz	720	720	124
10, 20, or 40 MHz, 8-bit Grey-scale MAXbus Input	Yes	Yes	Yes
80 MHz, 8-bit MAXbus Input (2Hx2V)	—	—	Yes
2 Simultaneous 20 or 40 MHz, 8-bit MAXbus Inputs	—	—	Yes
10, 20, or 40 MHz, 24-bit Color MAXbus Input	—	Yes	Yes
80 MHz, 24-bit Color MAXbus Input	—	—	Yes
20 MHz, 8- or 24-bit MAXbus Input with 4 Pixel Bloom	—	—	Yes
10- and 12-bit Grey-scale MAXbus Input and Display	—	—	Yes

Electrical Specifications

Power Requirements (All voltages are +/-5%)

- +5 Volts 9.0 Amps
- +12 Volts 0.25 Amps
- -12 Volts 0.25 Amps

Environmental Specifications

- Operating Temperature: 0° to 55° C (32° to 131° F)
- Storage Temperature: -40° to 100° C (-40° to 212° F)
- Humidity: 10% to 90% Relative Humidity (non-condensing)
- Air Flow Requirement: 50 CFPM (minimum)

Physical Specifications

The XI Display Controller is a double dual height VMEbus compatible (Eurocard) device.

- Height: 6.30 inches (160 mm)
- Length: 9.19 inches (233 mm)
- Width: 1.60 inches (40.6 mm)

Additional Information

For related product information, refer to the following Datacube literature:

- [MaxVideo 250 Data Sheet](#)
- [ImageFlow Data Sheet](#)
- [ImageFlow Technical Description](#)

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