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PRODUCT DATASHEET



SVME/DMV-712

Graphics Imaging Platform

Features

- Dual independent graphics channels using Permedia®3 graphics accelerators
- Dual Digital video capture inputs
- Dual Digital and Analog video outputs
- Dual LVDS / TMDS digital interfaces
- Dual External syncs
- Optimized X11™ Window System Server, OpenGL® & Motif software
- 500 Mhz PowerPC™ 7410 CPU
- Dual independent 64 bit 33/66 MHz PCI buses
- Two 64 bit 33/66 Mhz sites
- VxWorks® Tornado™ BSP and Driver Suite
- Available in a full range of ruggedization levels, both air and conduction cooled

Overview

The SVME/DMV-712 is a high performance VME graphics imaging platform combining the leading edge features and performance of the Permedia3 graphics accelerator, PowerPC 7410 CPU, 64 bit 33/66 MHz capable PMC sites, and commercial software standards and programming interfaces such as X11 / OpenGL and Motif. The 712 is a COTS product providing the capabilities of a graphics controller with the functionality of a Single Board Computer and the flexibility of PMC expansion.



SVME/DMV-712 provides high performance synthetic graphical output capabilities for applications requiring medium to complex visual Human Machine Interfaces, digital video capture, extensive digital output features, and video synchronization. The 712 is targeted at applications requiring the high-speed presentation of synthetic graphics generated programmatically on a Single Board Computer (SBC) where these must be fused with such sensor data as live video, or where a variety of video output formats are needed, or where it is desired to synchronize the output of the card with other video sources. We provide the only complete solution for digital video signal integrity at high resolutions and refresh rates through controlled signal tracking to ensure the optimal digital signal performance for both digital video capture and digital image output.

The SVME/DMV-712 architecture uses a PowerPC 7410 CPU driving two Permedia3 graphics accelerators over two independent local 64 bit 66 MHz PCI buses. The card supports two IEEE P1386/1386.1 64 bit PMC sites. Functionally equivalent versions of the 712 are available for a variety of situations from air-cooled laboratories, to challenging ground, naval, or avionics environments. SVME/DMV-712 utilizes common hardware and software interfaces to the PMC-700, the PMC-702, and PMC-724 FrameGrabber graphics products to ensure a seamless transition of application code during target upgrades and technology insertion.



Graphics Features

- Dual independent graphics channels using Permedia3 graphics accelerators featuring hardware anti-aliasing and OpenGL acceleration
- 32 Mbytes of graphics memory for each Permedia3
- Various digital capture formats (including OpenLDI and FlatLink™) supported through independent LVDS interfaces
- Independent RGBHV non-interlaced analog outputs
- Independent RGBHV interlaced analog outputs
- Optional sync on green capability for Interlaced and Non-interlaced video outputs for each graphics channel
- Various digital video output formats (including OpenLDI and FlatLink) supported through independent LVDS interfaces
- Independent DVI digital video outputs employing TMDS technology
- Independent External sync inputs

CPU and I/O Features

- 500 Mhz PowerPC™ 7410 CPU
- 256Mbytes or 512Mbytes of synchronous DRAM with ECC
- 2 Mbytes of L2 cache memory
- Cache may be configured as direct-mapped SRAM
- Up to 32 Mbytes of contiguous 64-bit wide direct memory-mapped Flash memory (write protection provided)
- Permanent Alternate Boot Site (PABS) provides backup boot capability
- 512 bytes of Serial EEPROM
- 10/100BaseTX (twisted pair) Ethernet™ port
- Two RS-232 serial ports and four RS-422 ports
- Two USB 1.1 interfaces. (keyboard, mouse and hub support)
- 8 bits of bi-directional digital discrete I/O, with interrupt on inputs
- Eight 32-bit general purpose timers
- Three 16-bit system timers
- Watchdog timer
- Four general-purpose PCI DMA controllers
- Tundra Universe II™ VME64 master/slave interface with VME DMA

Software Features

- Optimized X11 window System Server, OpenGL and Motif software
- VxWorks/Tornado 2 BSP and Driver Suite
- Diagnostic software support
- Comprehensive Foundation Firmware with: debug monitor and non-volatile memory programmer, suite of card support service routines, BIT (Built-in-Test) firmware and Ethernet connection option

Physical Features

- Air-cooled modules conform to the dimensions defined in ANSI/VITA 1-1994, American National Standard for VME64. Front panel hardware on air-cooled modules includes: injector/extractor handles, EMC strip, alignment pin, and keying provisions in accordance with ANSI/VITA 1.1, American National Standards for VME64 Extensions (and IEEE 1101.10)
- Conduction-cooled modules conform to the dimensions defined in IEEE 1101.2-1992, Standard for Mechanical Core Specifications for Conduction-Cooled Eurocards
- Two IEEE P1386/1386.1 64-bit PMC sites for high-performance I/O expansion 33/66 MHz capable
- Optimum conduction-cooling with TherMax™ thermal frame
- Available in a full range of ruggedization levels, both air-cooled and conduction-cooled

BUS Architecture

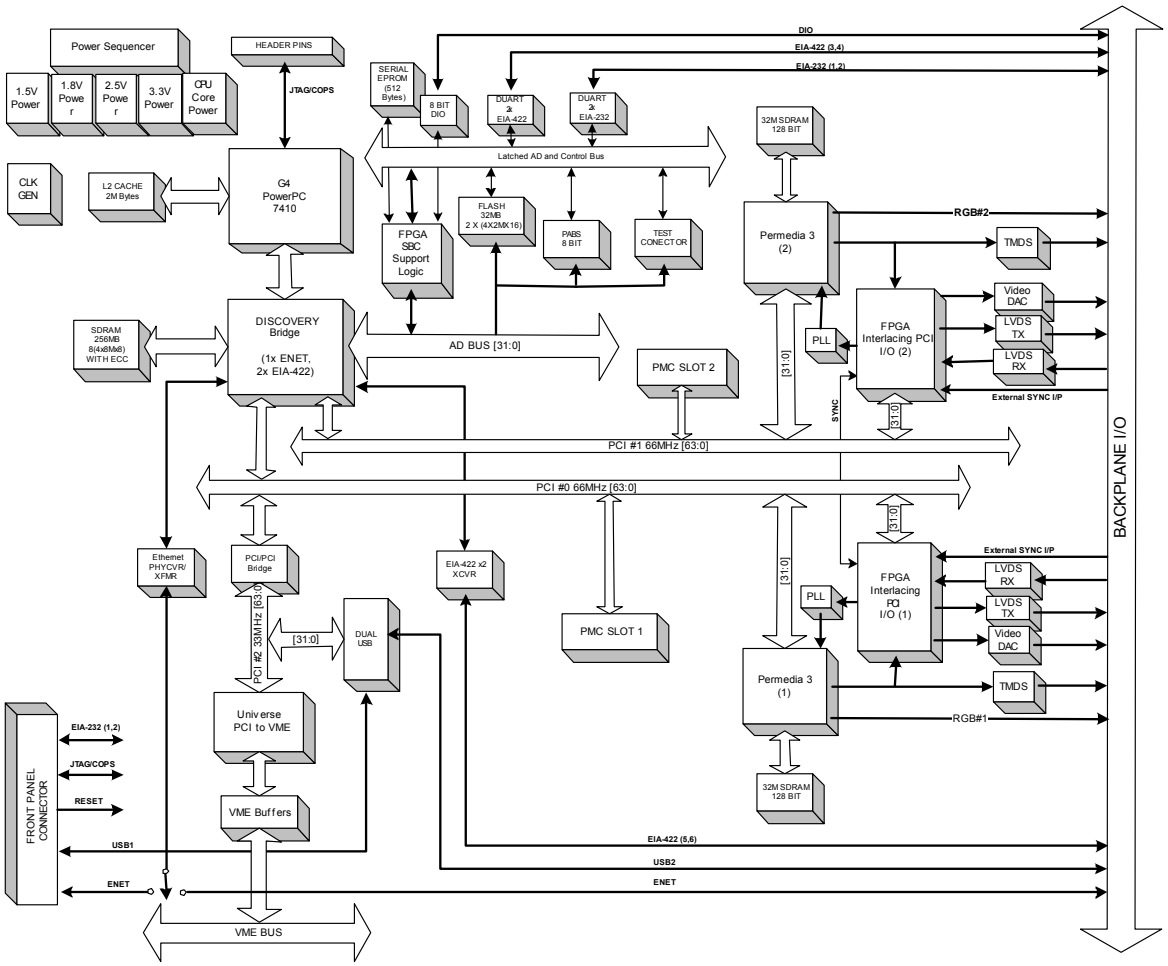
A powerful GT-64260 Discovery™ system controller bridges the processor MPX bus to the SDRAM bus, two 64-bit 66 MHz PCI busses, and a high-performance device bus on which the Flash memory and non-PCI peripherals are found. The powerful crossbar fabric internal to the Discovery device allows for concurrent data transfers to take place on the various busses. Examples of data transfers that can occur concurrently on the 712include:

- processor accesses to Flash concurrent with PCI-SDRAM transfers on either PCI bus

- processor accesses one PCI bus concurrent with PCI-SDRAM transfers on the other PCI bus
- processor accesses on-chip peripherals (Ethernet and serial ports) concurrent with PCI-SDRAM transfers on either PCI bus.

SVME/DMV-712 provides hardware-enforced cache coherency with respect to accesses to SDRAM from PCI and bus-mastering peripherals. The Discovery system controller provides a separate device bus for Flash and peripherals, thus the SDRAM bus is reserved expressly for SDRAM devices. This results in reduced bus loading on the SDRAM bus, allowing for higher speed operation.

Figure 1: 712 Block Diagram





Video Output Capabilities

PMC-702 provides a variety of video output capabilities. Both analog (non-interlaced or interlaced) and digital (DVI or LVDS) can be presented simultaneously in real-time.

Non-Interlaced Analog Video Output

Each 712 graphics channel provides a single non-interlaced RGB analog video output with separate horizontal and vertical syncs. This output supports non-interlaced video standards from 640 x 480 to 1600 x 1200 at various refresh rates. Our X11/OpenGL software allows the user to easily select the desired resolution and refresh rate from an extensive list of supported modes. Each graphics channel can be configured to provide a composite sync on green channel.

Interlaced Analog Video Output

Each 712 graphics channel provides a single interlaced RGB analog video output with separate horizontal and vertical syncs. Each channel can be individually configured to provide a composite sync on green channel and supports the following output formats:

> PAL
> RS-170
> STANAG 3350, classes A, B, and C; and
> RS-343

Interlaced analog video output capabilities are implemented in a Field Programmable Gate Array (FPGA) device. This design feature provides the flexibility to expand or tailor the list of interlaced analog video output formats supported by the SVME/DMV-712. Contact your local sales representative directly should you require this service.

DVI Compatible Digital Output

Each 712 graphics channel provides a single high speed Industry standard Digital Visual Interface (DVI) digital output supporting display resolutions up to 1280 x 1024. The DVI interface is compatible with many commercially available digital monitors. DVI is also known by the trade name PanelLink which incorporates Transition Minimized Differential Signalling (TMDS) technology. Displays or other receiving electronics such as video mixers can be readily constructed using off-the-shelf support devices, saving the time and expense of designing proprietary solutions.

LVDS Digital Output

Each 712 graphics channel employs a Low-Voltage Differential Signaling (LVDS) interface supporting various digital video formats including OpenLDI and FlatLink. The 712 digital video output formats are implemented in channel specific Field Programmable Gate Array (FPGA) devices. This design feature provides us the flexibility to expand or tailor the list of video formats supported by each channel on the LVDS interfaces. Contact us directly should you require this service.

Video Output Modes

Table 1: Video Output Modes

Resolution	Refresh Frequency (Hz)	Color Depth (bits)*
Analog Video Modes		
Non-interlaced		
640 x 480	60, 75, 85, 100	8, 16, 32
800 x 600	60, 75, 85, 100	8, 16, 32
1024 x 768	60, 75, 85, 100, 118	8, 16, 32
1152 x 864	60, 75, 85, 100, 118	8, 16, 32
1280 x 1024	60, 75, 85, 100	8, 16, 32
1600 x 1200	60, 75	8, 16, 32
1600 x 1200	85, 100	8, 16
Interlaced		
RS-170 640 x 480	30	8, 16, 32
RS-343 875 Line	30	8, 16, 32
PAL 768 x 575	25	8, 16, 32
Digital Video Mode:		
TMDS PanelLink®		
up to 1280 x 1024	60	8, 16, 32
LVDS OpenLDI/FlatLink™		
up to 1024 x 768**	60	8, 16, 32

* all video is output at 24bits of RGB color depth
** maximum pixel clock rate of 65hz

Video Input Capabilities

SVME/DMV-712 provides a variety of real-time digital video capture capabilities. Each 712 graphics channel employs an LVDS interface supporting a variety of digital video formats including OpenLDI and FlatLink. The SVME/DMV-712 digital video input formats are implemented in channel specific FPGA devices. This design feature provides us with the flexibility to expand or tailor the list of video formats (such as CameraLink and our defined Interlaced protocol) supported by each channel on the LVDS interfaces. Contact us directly should you require this service.

The Xv extension to X11 provides programmatic control over the video input functions. Captured digital video images can be overlaid with dynamic graphical images programmed using our X11/OpenGL software. The output is the fused graphical image required by many modern applications.



Synchronization

Sync On Green
Each 712 graphics channel supports the insertion of a composite sync signal on both the non-interlaced (progressive scan) and interlaced analog video outputs. For both outputs, the signal can be inserted on either the green channel, or in the case of certain video standards, the Red, Green and Blue channels. The sync on green feature is commonly required for interlaced displays, removing the need for separate horizontal and vertical syncs.

External Sync
Each 712 graphics channel supports an external sync input to allow the synchronization of the graphics output to a system master sync or to another graphics generating module. Each channel supports both separate horizontal and vertical syncs or a single composite sync. This feature is typically required in systems supporting multiple displays where visual artifacts will be evident if adjacent displays are not refreshed at the same time.

Power Management

SVME/DMV-712 features extensive power management control in order to minimize system power requirements regardless of the application. Through the our OpenGL/X11 software driver, it is possible to shut down many of the board functions that are not required within a specific application such as specific digital and analog video interfaces.

Built-In-Test (BIT)

BIT for SVME/DMV-712 is provided by firmware routines within our Card Level Diagnostics (CLD) package. CLD is part of the Foundation Firmware suite of firmware components delivered in the Flash memory of the our processor cards.

Software Support

Software support for the 712 is provided through a Graphics Software Suite (GSS) and a Board Support Package (BSP).

Board Support Package
We have developed a Tornado/VxWorks BSP and Driver Suite that allows users to run the VxWorks real-time operating system on SVME/DMV-712 and tie seamlessly into the powerful Tornado development environment. The BSP and Driver Suite provide the drivers and libraries to fully support the 712's wide array of onboard I/O and connectivity options.

Graphics Software Suite
Graphics support for SVME/DMV-712 is provided by a Graphics Software Suite which includes an optimized implementation of the X11 Server, OpenGL and Motif. These provide a comprehensive suite of industry standard software APIs to allow for maximum flexibility in Human Machine Interface (HMI) design. See the Graphics Software Suite datasheet for details.

Supported development hosts for the BSP and Graphics Software Suite include VxWorks Tornado 2 for MS Windows and Solaris. Runtime SVME/DMV-712 software support is available for VxWorks Tornado 2 for PowerPC. The development software, runtime licenses and maintenance are sold separately from the PMC-702 hardware.

OpenGL and X11 Software interface

OpenGL is a standard graphics Application Programming Interface (API) which provides both 2D and 3D rendering capabilities. Widely adopted, the OpenGL standard is currently implemented on more computers and operating systems than any competing graphics standard. We provide the X Window System server (the X11 server) and the Silicon Graphics® Inc.-defined GLX extension for use with the 712. The GLX extension provides a windowing environment in which OpenGL applications can be rendered. While this package can be used with such window managers as Motif, OpenGL applications running on SVME/DMV-712 are typically rendered in such a way as to use the full screen.

The SVME/DMV-712 X11 server supports the display of X11 applications on the 712, as well as PMC-700 and PMC-702 boards. The X11/OpenGL library can support up to four displays allowing for any combination of PMC-700 or PMC-702 on the 712.

Motif

The Motif window manager is an industry standard Window Manager which facilitates the development of applications requiring desktop PC-like look and feel and functionality under the X Windows System. Our Motif window manager has been ported and is fully integrated with the X11/OpenGL graphics software.

Table 2: Development Software

Product Number	Description
DSW-DEV-712-010	Graphics Software Suite and Board Support pacakge for use with SVME/DMV-712 Includes X11 server, OpenGL, Motif and driver suite for VxWorks (Tornado 2).
DSW-RTL-712-xxx	Runtime License for DSW-DEV-712-xxx

xxx - Contact your local sales representative for specific ordering information



Flexibility

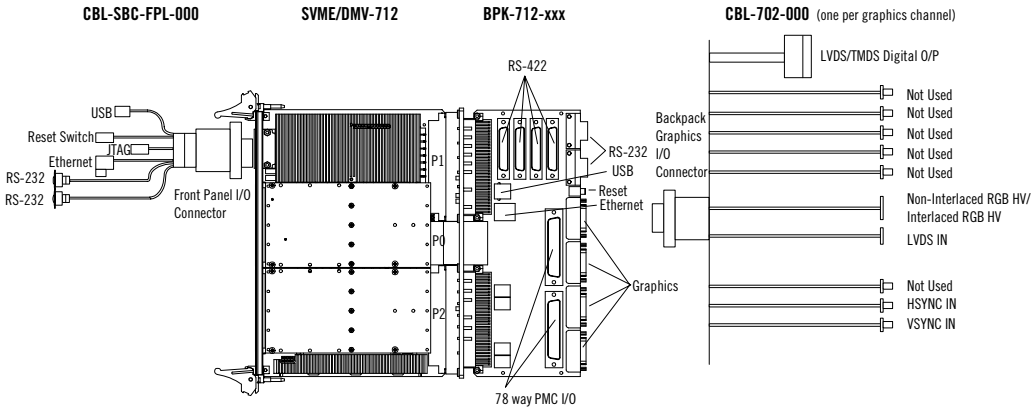
SVME/DMV-712 is available in various configurations to match the features, performance and ruggedization required for the target application. The 712 utilizes common hardware and software interfaces standards to the PMC-700 and PMC-702 graphics products to ensure a seamless transition of application code during target upgrades or technology insertion.

Support Equipment

The SVME/DMV-712 is designed to use 4 standard SBC and graphics cabling.

All video I/O is accessible through the VME P2 and P0 backplane connectors. The developer also has the ability to interface directly to the I/O through the 712 Backpack (rear transition module). This module uses the standard CBL-702-000 cable for video I/O and is the preferred method of accessing the SVME/DMV-712 I/O..

Figure 2: Support Equipment



Support Cables

Two types of support cables are used with the 712. One is a front panel cable for SBC I/O and the other is a graphics I/O cable.

Graphics Cable.

Product Number	Card Style	Connector
CBL-702-000	SVME Only	Backpack

This is a high integrity front panel cable for SPMC-702 development. Digital video output: 1x TMDS/LVDS (using DVI connector). Analog video output: 1x R,G,B,H,V non-interlaced (VGA connector), 1x RGBHV interlaced (BNC connectors). Digital video input: 1x LVDS (15W D-type connector). Analog video input: 2x analog (BNC connectors). Sync input: 1x external sync (BNC connector).

Front Panel Cable

Product Number	Card Style	Connector
CBL-SBC-FPL-000	SVME Only	Front Panel

The front panel break-out cable provides the following I/O: 1x ethernet (using RJ-45 connector), 2x RS-232 connectors, 1x USB connector, 1x JTAG/COP connector, 1x reset (using push-button switch). This cable is compatible with the VME-712 and VME-181 cards.



Table 3: Specifications

RUGGEDIZATION LEVELS*		
SMVE card	Available in levels 0 and 100 (inlet 8cfm air flow)	
DMV card	Available in levels 100** and 200**	
POWER REQUIREMENTS		
3.3 V	2.6 A (typical), 3.5 A (maximum)	
5 V	4.5 A (typical), 5.3 A (maximum)	
+12 V	74m A (typical), 100mA (maximum)	
-12 V	74m A (typical), 100m A (maximum)	
DIMENSIONS		
	Size	**Weight**
SVME card	Per IEEE 1101.1., ANSI/VITA 1 and ANSI/VITA 1.1	<800 g (<1.76 lb.)
DMV card	Per IEEE 1101.2	<850 g (<1.87 lb.)

* Refer to Ruggedization Guidelines for more details.

** Some restrictions apply to the combinations of PMC modules that can be supported. Selective power management and choice of PMC site may be necessary. Contact your local representative for further information and analysis of your specific requirements.

Contact Information

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Curtiss-Wright Controls, Embedded Computing Sales Offices

North America

Alabama T: +1 256 830 0149 F: +1 256 830 4295	**Mid-West** T: +1 314 983 0800 F: +1 314 872 1706	**New Jersey** T: +1 201 251 2630 F: +1 201 251 2640
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Europe T: +44 (0) 29 20 747 927 F: +44 (0) 29 20 762 060	***Asia Pacific*** T: +1 613 254 5121 F: +1 613 599 7777

Support and Technical Resources

North America support@dy4.com T: +1 613 254 5150	**Europe** uksupport@dy4.com T: +44 (0) 870 351 3672	**Internet** www.cwcembedded.com info@cwcembedded.com



Contact Information

To find your appropriate sales representative, please visit:

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