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THE POWER OF VISION

ATC342 – ATCA "Mongoose 1" Video Mixer (Windowing), 5 Video Inputs

ATCA Video Mixer

AdvancedTCA®

KEY FEATURES

- AdvancedTCA Video Mixer (Windowing)
- External Input: 4 Analog and 1 DVI-I (Analog or 24-bit Digital)
  - RS-170, RS-343, NTSC, PAL, SECAM, STANAG
  - Composite TV (CVBS), S-Video, RGB, YPbPr
  - Resolutions up to 1920x1200@60Hz (WUXGA)
  - 21.5MHz to 166MHz Pixel Clock Range
  - Composite Sync, Separate Sync, or Sync on Green/Y
  - Four video scalers for Window Zoom/Shrink/Crop/Pan/Position
- External Output: Analog daisy-chain and 1 DVI-I (Analog and 24-bit Digital)
- Z-Ordering, Alpha Blending, Chroma Keying on all 5 inputs
- High-quality 30-bit Digital Video Processing Paths
- Screen/Window Capture to file
- Additional Graphics Layer w/ per-pixel Alpha Blending
- Four GbE ports (2 to the base channels, 2 to the front panel)
- RS-232 to the front panel
- IPMI Management Controller

Benefits of Choosing VadaTech

- High performance video mixer blade
- Low latency solution
- 30-bit digital video processing instead of typical 24-bit
- Native ATCA form factor
- Instant PC-to-Monitor DVI connection in 'bypass' mode, no need to wait for board boot to use display
- ATCA manageability
- Electrical, mechanical, software, and system-level expertise in house
- Full ecosystem of front and rear boards, enclosures, specialty modules, and test/dev products from one source
- AS9100 and ISO9001 certified company

The Mongoose 1 is a high performance ATCA Video Mixer that takes in DVI-I graphics and outputs DVI-I graphics while simultaneously mixing in up to four additional analog video windowed or full-screen sources. The analog video sources come in on up to twelve analog signal lines which are arbitrarily structured into up to four composite (1 signal line), S-Video (2 signal lines), and/or component (3 signal lines) source groups by way of an on-board video cross-point switch. The analog video signals come in on two HD-15 connectors and either one of them can be dynamically selected to also daisy-chain out to another HD-15 connector for use by a second blade if desired.

The video mixer uses high-quality 3D comb filtering, motion-adaptive de-interlacing, and frame-rate conversion to match the analog video to the DVI-I input video. The analog sources can be scaled/cropped/panned/positioned arbitrarily with respect to the DVI-I graphics. The four analog inputs, DVI-I input, and internal graphics layer can then be z-ordered to determine which ones are on top of the others and then alpha blended or Chroma keyed for advanced video effects. The resulting full-screen/window can be still-frame captured to a file without interrupting the on-screen video. The video mixer is controlled via Ethernet (using a C API library or CLI) or Serial (using a CLI). With the Mongoose 1, important input sources like charts, maps, and surveillance cameras can be overlaid onto your PC desktop seamlessly to provide an integrated view of video and data sources.

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ANALOG VIDEO SOURCES

The Mongoose 1 provides the ability to input a combination of following on its analog video inputs:

- SD Composite (color/monochrome) or HD Composite (monochrome)
- SD S-Video
- HD/SD RGB or YPbPr Component with Sync On Green (SOG)/Sync on Y
- HD/SD RGB with separate H/V Sync (i.e. VGA)

The overall combination can support up to four simultaneous sources of which up to two sources can have separate syncs and up to three sources can require more than one video signal line (i.e. non-composite). The Analog video inputs are on HD-15 connectors which are routed to a video cross point switch. This cross point switch allows for flexible assignment of video signals on the connectors to video input channels on the board. All inputs are digitized to 30-bit digital video immediately after the cross point switch to ensure optimal video quality through the entire video processing pipeline. These inputs may be interlaced scan in which case they will be converted to progressive scan using a high-quality motion-adaptive de-interlacer or they may be progressive scan. Color composite signals are processed with a high-quality 3D comb filter for Y/C separation.

ANALOG VIDEO DAISY-CHAINING

The Analog video output port includes a selector input that allows for selection of either of the two Analog video input connectors. The selected connector's signals will be re-driven to the analog video output port for use in a daisy-chaining type of application with multiple video blades.

DVI-I INPUT SOURCE AND OUTPUT

The Mongoose 1 accepts DVI Analog (RGB + H/V Sync) which can be sourced from a DVI-A or DVI-I source natively or from a VGA source with a simple VGA-to-DVI adapter (not included) or it accepts DVI 24-bit Digital (TMDS) which can be sourced from a DVI-D or DVI-I source. The DVI Input is digitized (for analog) or expanded (for digital) to 30-bit digital video immediately at the input to ensure optimal video quality through the entire video processing pipeline. The DVI-I input must be progressive scan. The same format that comes in on the input is passed through to the output which outputs DVI Analog (RGB + H/V Sync) and DVI 24-bit Digital (TMDS) simultaneously. The DVI Analog can be converted to VGA with a simple DVI-to-VGA adapter (not included). The board also features a bypass mode where the DVI-I input can be routed directly to the DVI-I output to bypass the video pipeline of the board. This feature is enabled by default during start-up of the board to ensure that the PC can display its graphics to the monitor without interruption. Once the board is booted, the full mixer functionality is enabled.

WINDOW ADJUSTMENTS

Each window can be adjusted for digitization clock phase, hue, saturation, brightness, contrast, gamma, and flesh tone. The adjustments can be saved and used automatically as the defaults or manual adjustments can be made to override the defaults.

WINDOW ZOOM / SHRINK

The Mongoose 1 provides the capability to use scalers to zoom in or shrink the analog video sources arbitrarily in both the horizontal and vertical directions. Aspect ratio may be maintained if desired or it may be manipulated according to the desired application such as when displaying non-square NTSC pixels onto a square pixel PC display to make the resulting video appear correct.

WINDOW CLIPPING / CROPPING

Windows will be automatically clipped if they overlap the screen boundary to ensure that they do not wrap around. Additional clipping can be performed to crop off unwanted video portions of the window around the edges of the source for purposes such as removing the legacy over scan area, etc.

WINDOW PANNING

During scaling the scaler can manipulate the starting point within the input video to facilitate a panning effect on the resulting output video. This allows for zooming in on a feature and then panning around within the source video at the zoomed in magnification for example.

WINDOW POSITIONING / FRAMING / FREEZE / Z-ORDER

Windows can be arbitrarily positioned on the screen. Windows can have an optional window frame added with a desired color, alpha value, and thickness. Windows can be frozen such that they are no longer updated and remain displaying the last frame of video presented at the time of the freeze. They can also be z-ordered relative to each other to create a layer stack which determines which windows are on top of the others.

DVI-I INPUT, INTERNAL GRAPHICS, AND BACKGROUND LAYERS

In addition to the four scalable Analog video input layers there are three additional non-scalable layers. The full-screen DVI Input and internal graphics layers can be z-ordered/alpha blended/Chroma keyed just like the Analog video input layers. The internal graphics layer allows the customer to upload graphics to the board for display. The internal graphics layer is the only layer that allows continuously variable per-pixel alpha values to be specified. This enables advanced graphics overlays that wouldn't be possible with the DVI/video inputs alone. Such internal graphics overlays can make use of sophisticated alpha gradients or multiple regions of several different alpha values, etc. compared to the other layers which allow either per-window alpha or two Chroma-keyed alpha values. A background layer is always at the back of the layer stack and allows the customer to specify an RGB value which will be seen for any pixel that is not completely obscured by the other layers.

ALPHA BLENDING / CHROMA KEYING

The analog video input windows, DVI-I input, and internal graphics layer can all be assigned an alpha blending value which determines how transparent they should appear. The alpha value is used to recursively mix each layer onto the layers behind it so that each window is completely transparent, some percentage of translucent, or completely opaque as they are mixed back to front. Each layer may also be Chroma keyed such that a specific RGB color range is selected to be keyed. Each pixel of the layer can either fall inside of the key range or outside of the key range and have one of two alpha values assigned to it as a result. Chroma keying can be used to create the typical "weatherman in front of a green screen" effect or to create transparent portions of graphics for overlay onto video, etc. When the alpha values are reversed an inverse Chroma key effect is also supported where everything that is keyed becomes solid and everything else is transparent for instance. Controls are V-sync synchronized to enable seamless cross-fades, cuts, etc.

FULLSCREEN / WINDOW CAPTURE

The full screen/window capture feature is able to capture a still-frame of the screen or a window into a file. This file can then be transferred to another device for viewing/permanent storage. The capture is made in real-time from one single frame of the DVI-I output video and therefore no interruption of the output video is necessary to make the capture. The capture is a 1-to-1 pixel perfect representation of what was actually sent to the display at the time of capture.

LOW LATENCY

The DVI-I input to DVI-I output path is extremely low latency (less than two video lines of delay), which is critical for interaction between the PC operator's input and the visual feedback at the display. The analog video inputs are also presented with as low latency as possible while still preserving high image quality without tearing or other similar artefacts. The analog video input latency necessarily varies by a frame or so due to the frame rate conversion necessary to present the disparate inputs in sync with the DVI-I output. Only the absolute minimum buffering that is required to present artefact-free video is used at any time by the video processing pipeline.

MONITORING

A variety of sensors and other data for the physical board are exposed via the IPMI management scheme of ATCA. These include temperature, voltage, serial number, etc. Additional sensors are provided via this mechanism to allow for monitoring of the state of the video mixer inputs, etc.

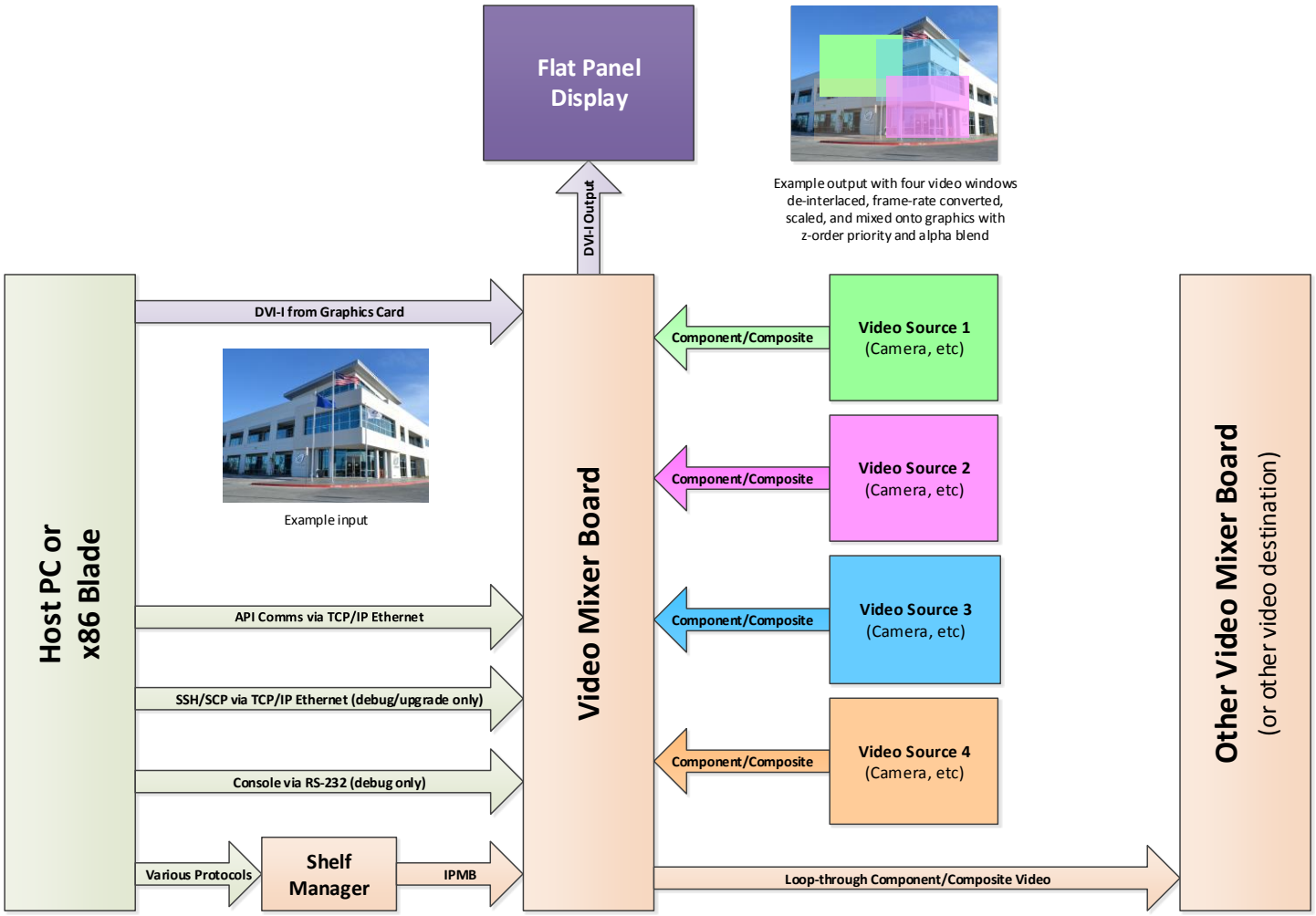
CONTROL API / DECLASSIFICATION

C API library code is provided for integration with the customer's own application for controlling the video mixer via TCP/IP Ethernet. The board can also be controlled via an RS-232 or SSH (Ethernet) console Command Line Interface (CLI). An example application is available to ease development start-up. The Mongoose 1 is designed with information security-sensitive applications in mind and can be run with all non-volatile memories write-protected. Temporary data relating to video content such as screen/window captures are stored in volatile memory so that they are automatically lost upon power-off.

INTEGRATION SERVICES AND APPLICATION-READY PLATFORMS

VadaTech has a full ecosystem of ATCA and µTCA products including chassis platforms, shelf managers, AMC modules, Switch and Payload Boards, Rear Transition Modules (RTM), Power Modules, and more. The company also offers integration services as well as pre-configured Application-Ready Platforms. Please contact VadaTech Sales for more information.

A TYPICAL USE CASE



BLOCK DIAGRAM

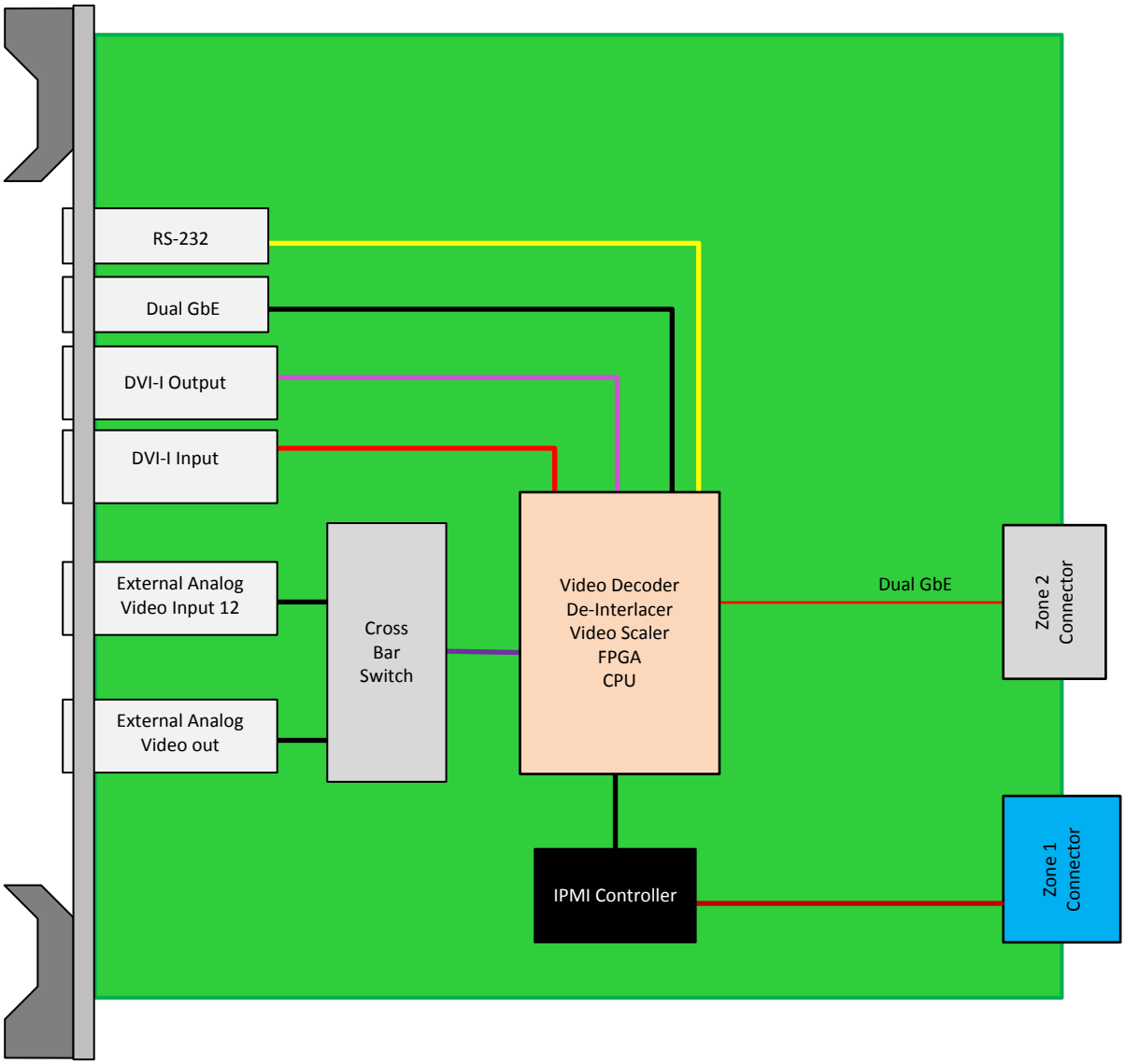


Figure 1: ATC342 Block Diagram

SPECIFICATIONS

Architecture		
Physical	Dimensions	Width: 12.68" (322.25 mm)
		Depth: 11.02" (280 mm)
Type	ATCA Video Processing	FPGA
Standards		
Module Management	IPMI	IPMI version 2.0 and PICMG 3.0
Video Type	Analog/Digital	RS-170, RS-343, S-Video, RGB / YPbPr, computer video up to 1920x1200, 60 Hz
PICMG	ATCA	PICMG 3.0 R3.0
Configuration		
Power	Power consumption	20W
Environmental	Temperature	Operating Temperature: 0° to 55°C
		Storage Temperature: –40° to +70°C
	Vibration	0.5 G, 5 to 500 Hz on each axis
	Shock	20 Gs peak, 11 ms duration, non-operational
	Relative Humidity	5 to 95 per cent, non-condensing
Front Panel	Interface Connectors	RJ-45 Dual GbE
		Micro USB RS-232 port for IPMC, RJ-45 RS-232 port for CPU
		Dual DVI-I
		Triple HD-15 for Video input/output
	LEDs	IPMI management control
		Activity / Link / User LEDs
	Ejector Handles	Hot swap with micro-switch
Software Support	Operating System	Linux
Other		
MTBF	MIL Handbook 217-F@TBD Hrs	
Certifications	Designed to meet FCC, CE and UL certifications where applicable	
Compliance	PICMG 3.0 Rev 3.0, RoHS 2.	
Standards	VadaTech is certified to both the ISO9001:2000 and AS9100B:2004 standards	
Warranty	Two (2) years	
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ORDERING OPTIONS

ATC342 – A00 – 000 – 0HJ

A = Back up for RTC (Real Time Clock)
0 = Supercap
1 = Lithium Battery

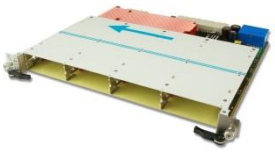
H = Temperature Range
0 = Commercial
1 = Industrial

J = Conformal Coating
0 = None
1 = Humiseal 1A33 Polyurethane
2 = Humiseal 1B31 Acrylic

RELATED PRODUCTS

VT830 – 6U ATCA Shelf

AMC735 – 10GbE Network Interface card



ATC133 – 10G Switch/Carrier + FPGA

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