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Find the *Aitech Defense Systems M596* at our website: *Click HERE*

M596

Radeon™ E8860 (Adelaar) Video & Graphics XMC

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Embedded Computing *without* Compromise



- **6 Simultaneous Video Outputs**
  - 5 x DVI
  - RGBHV
  - 4 x DisplayPort
  - 2 x Composite
  - S-Video
  - 2 x STANAG 3350
- **Multiple Video Inputs**
  - 2 x HD-SDI
  - 7 x Composite
  - STANAG 3350
  - 3 x S-Video
- **AMD Radeon E8860 (Adelaar) GPU**
  - 6 Independent Graphics Heads
  - 2 GB GDDR5
- **PCIe x8 Gen2 Host Interface**
- **Full Video Switching Capabilities**
- **Video Capture and Overlay**
- **Video Resize and Customized Formats**
- **Full 2D/3D Processing Capabilities**
- **Universal VPWR 5V/12V**
- **DirectX® 11, Shader 5.0, OpenGL 4.2, OpenCL 1.2**
- **Windows®, VxWorks® Support**



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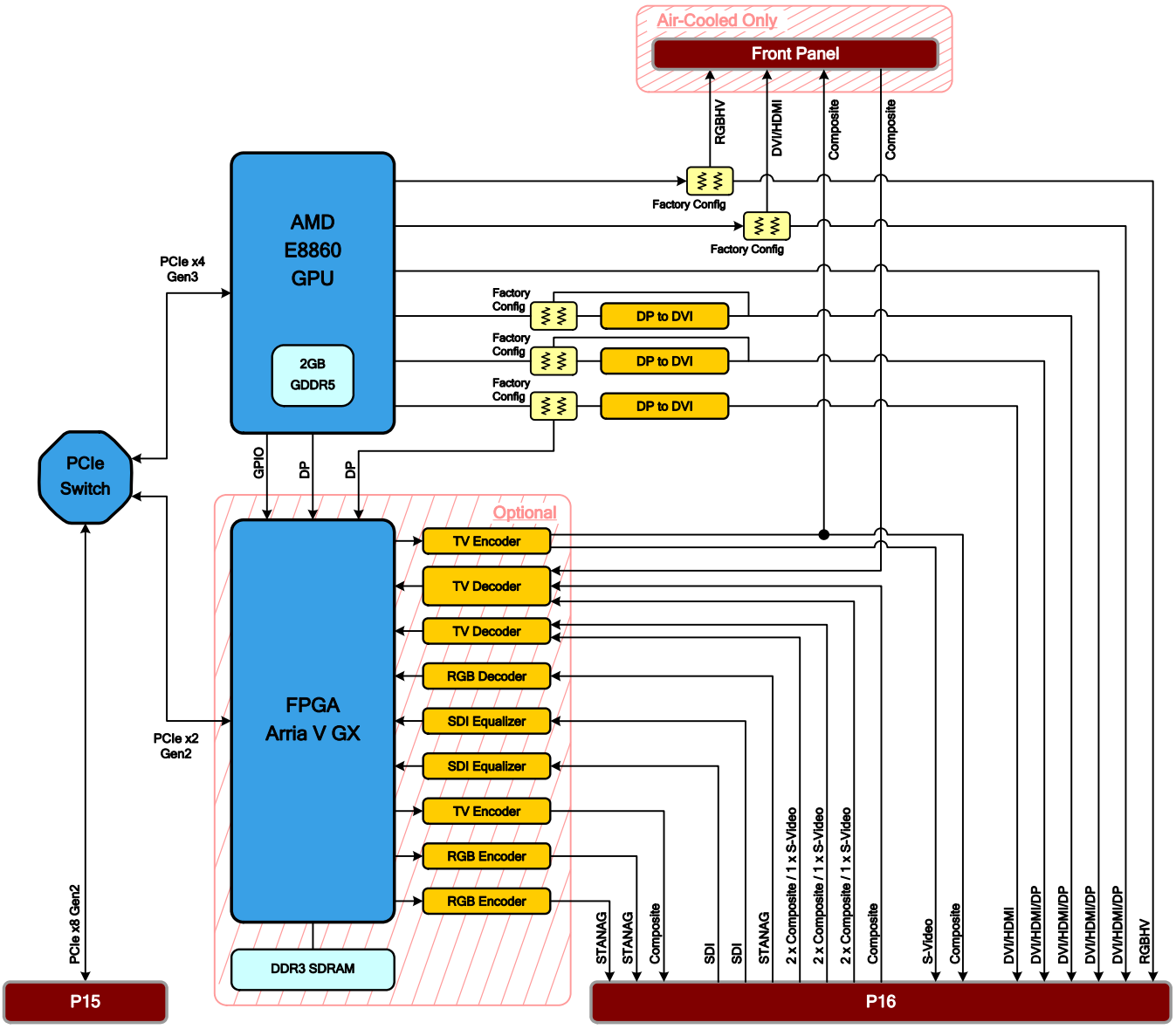
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Aitech's M596 6-Head Multiple Output Graphics XMC provides a high-performance, highly versatile embedded video and graphics solution for harsh environment applications. Designed around the AMD E8860 Six Head Graphics Processing Unit with its 2 GB of GDDR5, the M596 can simultaneously drive up to 6 independent video streams in a wide variety of output formats.

The M596 supports the most advanced graphics and video standards including DirectX, OpenGL, and H.264, as well as multiple and versatile graphics and video input/output protocols. A number of the standard M596 output video channels are provided through E8860 native integrated video ports. Additional video protocols/formats and signal conditioning are provided by an optional sophisticated FPGA residing alongside the E8860 GPU, to complement the GPU's capabilities.

In addition, the M596 provides advanced video overlay functionality. The E8860 processor generates the graphics images, superimposes an input from one of the various video formats, and drives the result to a monitor. Additional overlay processes can be implemented simultaneously via additional independent video streams, using a different video input. This process can be routed to the FPGA for output on an interface not supported natively by the GPU.

To ensure high-speed transfer of graphics and video, the M596 interconnects with the host system via an 8-lane PCIe link.



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Board Architecture

GPU	AMD Radeon E8860 (Adelaar) • 6 Independent Graphics Heads • Embedded GPU Operating @ up to 625 MHz • 2 GB GDDR5 @ up to 1125 MHz • 640 shader processors • UVD 4th generation supports the decoding of H.264, VC-1, MPEG4, and MPEG2 • DirectX®11, Shader 5.0, OpenGL 4.2, OpenCL 1.2 • 768/480 GFLOPs single/double precision peak (600e/4.5 Gbps) • ~3x 3D performance of AMD Radeon™ E4690 GPU • Overlay Support
Video FPGA	Video and graphics capabilities can be enhanced by the optional video FPGA with its own DDR3 RAM array, which provides video input interfaces and additional output interfaces that are not natively supported by the GPU (see the *I/O* section below).
PCIe	• The PCIe switch manages connections between the GPU, FPGA, and host • PCIe x8 host interface supporting Gen2/Gen1 speeds and x8/x4/x2/x1 link widths
Board Resources	• On-board Temperature Sensor • On-board Status Indicator LEDs

I/O

		I/O Variant				
		1	**2**	**3**	**4**	**5**
Video Outputs	HDMI/DVI (1)	2 (2)	2 (2)	5 (2)	5 (2)	0
	RGBHV	1 (3)	1 (3)	1 (3)	1 (3)	1 (3)
	DisplayPort	0	0	0	0	4
	S-Video	1 (4)	0	1 (4)	0	0
	Composite	2 (4) (5)	0	2 (4) (5)	0	0
	STANAG 3350	1	0	2 (8)	0	0
Max # Outputs Available Simultaneously (9)		4	2	6	5	5
Video Inputs	SDI	2	0	2	0	0
	Composite	7 (6) (7)	0	7 (6) (7)	0	0
	S-Video	3 (7)	0	3 (7)	0	0
	STANAG 3350	1	0	0	0	0

Notes:
(1) In variants 1 and 2, only one channel can be used as HDMI at a time
In variants 3 and 4, up to 3 channels can be used as HDMI at a time
(2) In air-cooled boards one of these channels is available only at the front panel (not at P16)
(3) In air-cooled boards the RGBHV output is available only at the front panel (not at P16)
(4) Composite Output 0 and S-Video Output 0 are clones that are generated by the same video encoder
(5) A clone of P16 Composite Output 0 is routed to the front panel of air-cooled boards, the channel cannot be used simultaneously at both locations
(6) One additional composite input is available at the front panel of air-cooled boards
(7) Because ports are routed to shared pins, each S-Video input is available at the expense of two Composite inputs. Due to shared decoders, a maximum of two Composite/S-Video inputs can be used simultaneously.
(8) One channel RGsB, one channel RsGsBs
(9) Maximum numbers of independent outputs available simultaneously for the different variants are as follows:
Variant 1: 4 outputs = 2 x DVI/RGBHV from GPU + 2 x Composite/S-Video/STANAG 3350 from FPGA
Variant 2: 2 outputs = 2 x DVI/RGBHV from GPU
Variant 3: 6 outputs = 2 x DVI/RGBHV from GPU + 3 x DVI from DP to DVI converters + 1 x Composite/S-Video/STANAG 3350 from FPGA
Variant 4: 5 outputs = 2 x DVI/RGBHV from GPU + 3 x DVI from DP to DVI converters
Variant 5: 5 outputs = 4 x DisplayPort from GPU + 1 x RGBHV from GPU
(10) Pinout compatibility with Aitech M595 XMC configuration 3 is available by special order.

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Supported Resolutions

Video Standard	Video Signal Format	Resolution Specification					Input Interface			Output Interface					
		Total Lines	Active Lines	Aspect Ratio	Frame Rate	Interlaced/ Progressive	STANAG 3350	Composite/ S-Video	SDI	DVI	HDMI	RGBHV	DisplayPort	STANAG 3350	Composite/ S-Video
Analog TV	RS-170A (NTSC)	525	483	4:3	60	I		●							●
	PAL	625	576	4:3	50	I		●							●
VESA	VGA (640 x 480)	525	480	4:3	60	P				●		●	●		
	SVGA (800 x 600)	628	600	4:3	60	P				●		●	●		
	XGA (1024 x 768)	806	768	4:3	60	P				●		●	●		
	SXGA (1280 x 1024)	1066	1024	5:4	60	P				●		●	●		
	UXGA (1600 x 1200)	1250	1200	4:3	60	P				●		●	●		
	WUXGA (1920 x 1200)	1235	1200	16:10	60	P						●	●		
	WQXGA (2560 x 1600)	1658	1600	16:10	60	P				● (1)			●		
SMPTE/ HDTV	480/60i	525	483	4:3	60	I			●						
	576/50i	625	576	4:3	50	I			●						
	720/60p	750	720	16:9	60	P			●		●				
	1080/60i	1125	1080	16:9	60	I			●		●				
	1080/30p	1125	1080	16:9	30	P			●		●				
	1080/60p	1125	1080	16:9	60	P					●				
STANAG 3350	Class B (PAL)	625	575	4:3	50	I	●							●	
	Class C (NTSC)	525	485	4:3	60	I	●							●	

Notes: (1) WQXGA is supported only by dual-link DVI channels
(2) Support for additional video resolutions may be available per customer request (contact your Aitech representative for more information)

Software

Operating System (1)	DirectX 11	Shader 5.0	OpenGL 4.2	OpenGL ES 2.0	OpenGL SC	OpenCL 1.2	Video Outputs	Video Inputs
Windows®	AMD Drivers							Aitech Drivers
	●	●	●			●	● (5)	●
VxWorks® (2) (3)	CoreAVI Drivers (4)							
				●	●		●	●

Notes: (1) The M596 is available with different GPU options (Windows version or VxWorks version), this hardware option determines OS support and is specified when ordering the board, see *Ordering Information* below
(2) CoreAVI VxWorks drivers are available for both PowerPC and x86 platforms
(3) For systems requiring DO-178B certification, a CoreAVI DO-178B package is also available
(4) Aitech CSL is required by the CoreAVI driver to support video inputs in VxWorks
(5) In Windows, STANAG and Composite/S-Video outputs are supported only in Variant 1

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Power

	+3.3 V	VPWR (Universal +5V/+12V)			Total (1) (3) (4)
Typ. (5)	0.9 A	+5 V @ 6.5 A	or	+12 V @ 2.7 A	35.4 W
Max. (6)	1.4 A	+5 V @ 9.1 A (2)	or	+12 V @ 3.8 A	50.3 W

Notes:
(1) Total power consumption of the full featured board configuration (including FPGA and associated resources – RAM array, video encoders and decoders, etc.)
(2) Full performance not assured under these conditions; +12V VPWR is recommended.
(3) +12V, +3.3V_AUX of the XMC standard not required
(4) -12V (with consumption of ~20 mA) is required only if the STANAG output is used
(5) GPU clock @ 400 MHz, GPU memory clock @ 550 MHz, running 3DMark 11 Benchmark @ 1280 x 720
(6) GPU clock @ 625 MHz, GPU memory clock @ 1125 MHz, running 3DMark 11 Benchmark @ 1280 x 720

GPU Performance/Power

Clocks [MHz]		Power [W] (1)		3DMark 11 (4) Score
GPU	**Memory**	**Idle** (2)	**Max** (3)	
300	150	7.2	14.4	969
400	550	12.6	24.2	1925
500	950	14.9	29.6	2471
625	1125	15.7	33.8	3023
Power Play Configuration (5)		7.2	33.5	2968

Notes:
(1) GPU power consumption (not overall board power consumption)
(2) Idle Power measured in Windows 7 idle mode
(3) Max Power measured during 3DMark11 Benchmark
(4) 3DMark 11 Benchmark @ 1280 x 720
(5) Power Play can be used with AMD driver only

Test Platform: Gigabyte Technology Co. Ltd. H77-DS3H Motherboard with Intel Core i7 3770K Quad Core @ 3.9 GHz and 8 GB DDR3 @ 667 MHz, Windows 7 32-bit OS with AMD VENUS PRO MCM(6822) Ver. 13.251.0.0 Driver

Mechanical

	Form Factor & Dimensions	Weight
Air-Cooled	Single-Width XMC per ANSI/VITA 42.0-2008	<270 g [0.60 lbs]
Conduction-Cooled	Single-Width XMC per ANSI/VITA 42.0-2008	<200 g [0.45 lbs]

Environmental

Specs per VITA 47	Air-Cooled			Conduction-Cooled	
	Commercial	**Rugged**	**Military**	**Rugged**	**Military**
Operating Temp.	AC1 (0 to +55 ºC) (2)	AC3 (-40 to +70 ºC) (2)	AC4 (-40 to +85 ºC) (1,2)	CC3 (-40 to +70 ºC) (3)	CC4 (-40 to +85 ºC) (1,3)
Non-Operating Temp.	C1 (-40 to +85 ºC)	C3 (-50 to +100 ºC)	C4 (-55 to +125 ºC)	C3 (-50 to +100 ºC)	C4 (-55 to +125 ºC)
Vibration	V1	V2	V2	V3	V3
Operating Shock	OS1	OS1	OS1	OS2	OS2
Altitude	15,000 ft.	35,000 ft.	70,000 ft.	35,000 ft.	70,000 ft.
Relative Humidity (4)	0 - 90%	0 - 95% with Acrylic (Standard),			
Conformal Coating	N/A	0 - 100% with Urethane (Optional)			

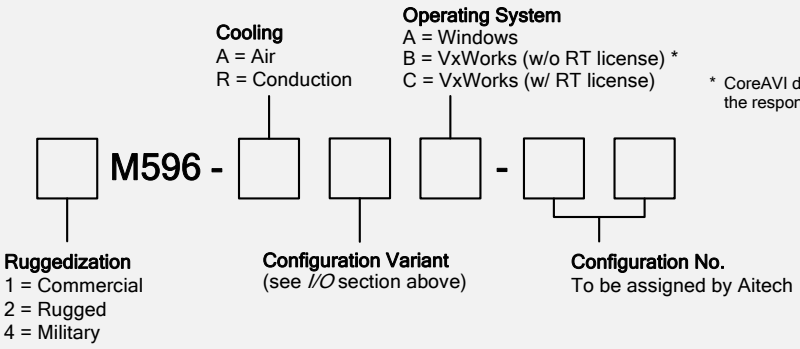
Notes:
(1) -55 ºC available, contact an Aitech representative for more information
(2) Operating ambient air temperature (with sufficient airflow)
(3) Operating card edge temperature
(4) Non-condensing

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Ordering Information



* CoreAVI driver and RT license are required for each board. It is the responsibility of the customer to procure them from CoreAVI.

Example: 4M596-R1C-00

Optional Accessories

TM596	6U Transition Module providing convenient access to M596 I/O interfaces via standard connectors. The TM596 is a plug-in extension to Rear Transition Modules (RTM) for Aitech 6U SBCs and is used to access M596 I/O when the M596 is mounted on an Aitech SBC. Supports both air and conduction-cooled M596 when mounted in a compatible system. See the TM596 datasheet for more information.
TM530	Rear Transition Module (RTM) providing convenient access to M596 I/O interfaces via standard connectors when the M596 is mounted on a CM870 XMC Carrier. Supports both air and conduction-cooled M596 when mounted in a compatible system. See the TM530 and CM870 datasheets for more information.

Contact Aitech

Contact your Aitech sales representative for additional product information, and for inquiries regarding customized configurations of the M596 and additional software support.



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