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Find the *Aitech Defense Systems M598* at our website: *Click HERE*

M598

Radeon™ E8860 (Adelaar) Video & Graphics PMC

Aitech
Embedded Computing *without* Compromise



- **Multiple Video Outputs**
  - 2 x DVI/HDMI
  - 2 x Composite
  - RGBHV
  - S-Video
- **Multiple Video Inputs**
  - 6 x Composite
  - STANAG 3350
  - 3 x S-Video
- **AMD Radeon E8860 (Adelaar) GPU**
  - 6 Independent Graphics Heads
  - 2 GB GDDR5
- **PCI-X 64-bit @ 133 MHz Host Interface**
- **Full Video Switching Capabilities**
- **Video Capture and Overlay**
- **Video Resize and Customized Formats**
- **Full 2D/3D Processing Capabilities**
- **DirectX® 11, Shader 5.0, OpenGL 4.2, OpenCL 1.2**
- **Windows®, VxWorks® Support**



M598

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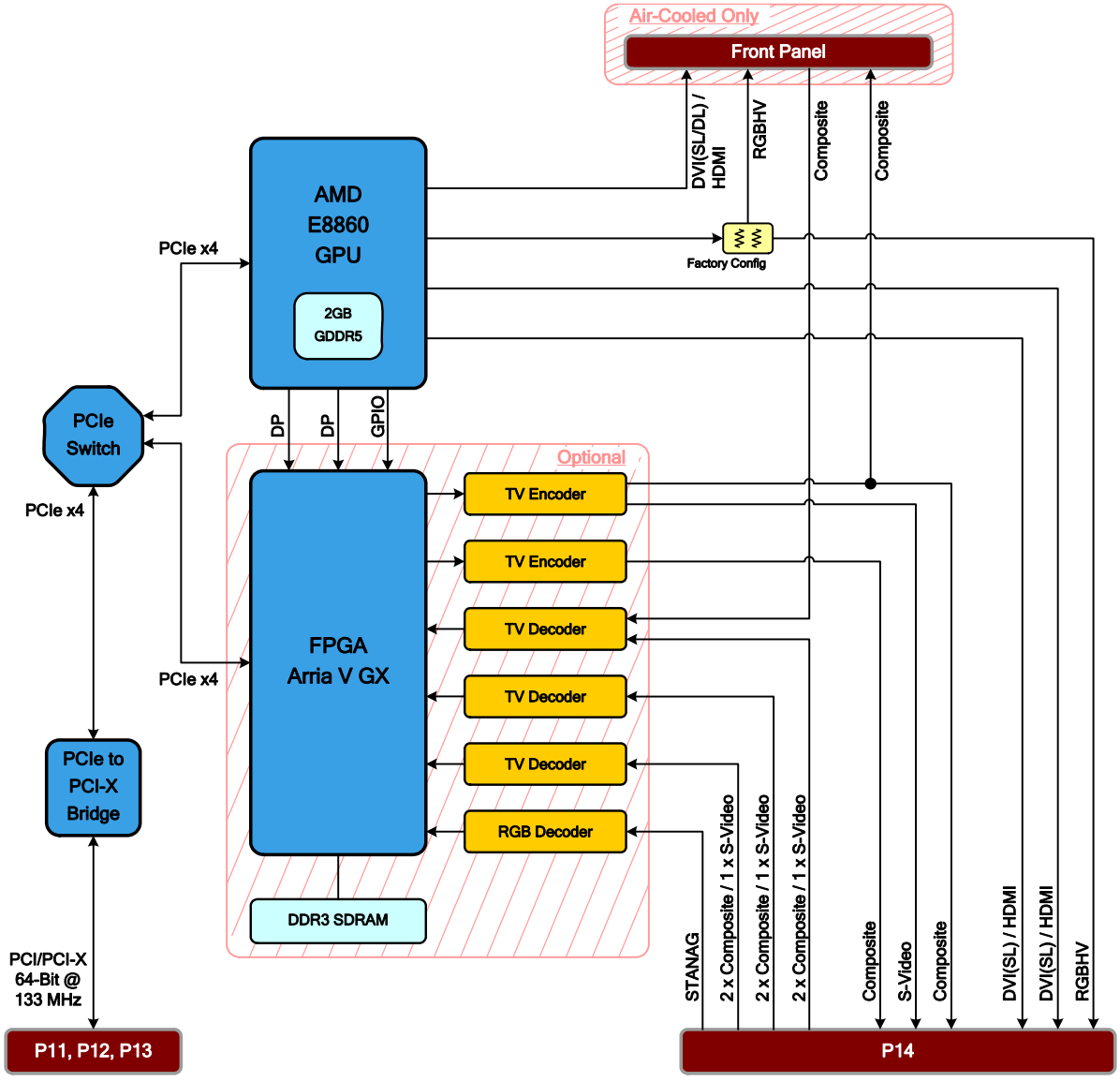
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Aitech's M598 6-Head Multiple Output Graphics PMC provides a high-performance, highly versatile embedded video and graphics solution for harsh environment applications. Designed around the AMD E8860 Six Head Graphics Processing Unit with its 2 GB of GDDR5, the M598 can simultaneously drive several independent video streams in a wide variety of output formats.

The M598 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 M598 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 M598 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. Several independent overlay processes may be implemented simultaneously. The resultant video streams 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 M598 interconnects with the host system via a 64-bit PCI-X link.



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Board Architecture

GPU	AMD Radeon E8860 (Adelaar) • 6 Independent Graphics Heads • Embedded GPU Operating @ up to 500 MHz • 2 GB GDDR5 @ up to 950 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 • 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/PCI-X	• The PCIe switch manages connections between the GPU, FPGA, and PCIe to PCI-X bridge • PCI/PCI-X host interface supporting 33/66/100/133 MHz speeds and 32/64-bit bus widths • Universal PCI host interface (drives 3.3 V signals and is 5 V tolerant, PMC connector V_IO supply not used)
Board Resources	• On-board Temperature Sensor • On-board Status Indicator LEDs

I/O

		Variant 1	Variant 2
Video Outputs	**DVI/HDMI**	2 (1, 2, 3, 5)	2 (1, 2, 3, 5)
	RGBHV	1 (4, 5)	1 (4, 5)
	S-Video	1 (6)	0
	Composite	2 (6, 7)	0
Video Inputs	**S-Video**	3 (9)	0
	Composite	6 (8, 9)	0
	STANAG 3350	1	0

Notes:
(1) One additional DVI/HDMI output is available at the front panel of air-cooled boards
(2) Each channel individually software selectable as DVI/HDMI (only one HDMI output can be active at a time)
(3) P14 DVI outputs are single-link only, front panel DVI output (in air-cooled boards) is single/dual-link
(4) In air-cooled boards the RGBHV output is available only at the front panel (not at P14)
(5) A maximum of two of the DVI/HDMI and RGBHV outputs can be used simultaneously
(6) Composite Output 0 and S-Video Output 0 are clones that are generated by the same video encoder
(7) A clone of P14 Composite Output 0 is routed to the front panel of air-cooled boards, the channel cannot be used simultaneously at both locations
(8) One additional Composite input is available at the front panel of air-cooled boards
(9) 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 three Composite/S-Video inputs can be used simultaneously.
(10) Pinout compatibility with Aitech M591 and M597 PMCs (with some limitations) is available by special order

M598

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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	DVI	HDMI	RGBHV	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	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
	●	●	●			●	●	●
VxWorks® (2) (3)	CoreAVI Drivers (4)							
				●	●		●	●

Notes:
(1) The M598 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

M598

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Power

	+3.3 V	+5 V	Total (1) (2)
Typ. (3)	1.1 A	6.5 A	36.1 W
Max. (4)	1.3A	7.8 A	43.3 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) ±12 V and V_IO PMC connector power supplies are not required
(3) GPU clock @ 400 MHz, GPU memory clock @ 550 MHz, running 3DMark 11 Benchmark @ 1280 x 720
(4) GPU clock @ 500 MHz, GPU memory clock @ 950 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

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

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	Per IEEE 1386-2001	< 300 g [0.66 lbs]
Conduction-Cooled	Per ANSI/VITA 20-2001 (R2011)	< 275 g [0.61 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)			

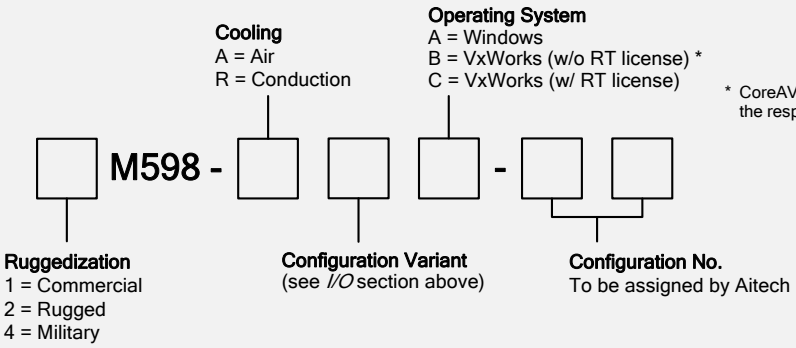
Notes:
(1) -55 ºC available, contact an Aitech representative for more information
(2) Operating ambient air temperature (with sufficient airflow)
(3) Operating card edge temperature
(4) Non-condensing

M598

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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: 4M598-R1C-00

Optional Accessories

TM530	Rear Transition Module (RTM) providing convenient access to M598 I/O interfaces via standard connectors when the M598 is mounted on a CM870 PMC Carrier. Supports both air and conduction-cooled M598 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 M598 and additional software support.



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