A191

GPGPU Based Rugged RediBuilt™ HPEC

Aitech
Embedded Computing *without* Compromise

Rugged GPGPU is Aitech

- GPGPU Based Rugged High Performance Embedded Computer (HPEC)
- 5th Gen. Intel® Core™ i7 CPU, Quad Core @ 2.7 GHz
- NVIDIA® GeForce® GTX 965M GPU
  - Maxwell Architecture
  - 1892 GFLOPS
  - 1024 CUDA Cores @ 950 MHz
  - 4 GB GDDR5 @ 1600 MHz
  - CUDA, PhysX, OpenCL, OpenGL, DirectX 12
- I/O
  - Gigabit Ethernet
  - UART Serial
  - USB 2.0
  - DVI/HDMI Outputs
  - RGBHV Outputs
  - Composite Inputs
  - SDI Inputs
- Up to 16 GB DDR3L with ECC
- SATA Flash SSD Mass Storage
- Windows®, Linux® Support
- Fully Integrated and Ready to Use
- D38999 I/O and Power Connectors
- Compact and Lightweight
- Internally Conduction-Cooled 3U VPX
- Fully Sealed Faraday Cage
- EMI/RFI Filtering
- Environmentally Sealed (IP65)
- Two External Cooling Configurations (both options fanless/no moving parts)
  - Passive Convection & Radiation Cooling
  - Cold Plate-Cooling

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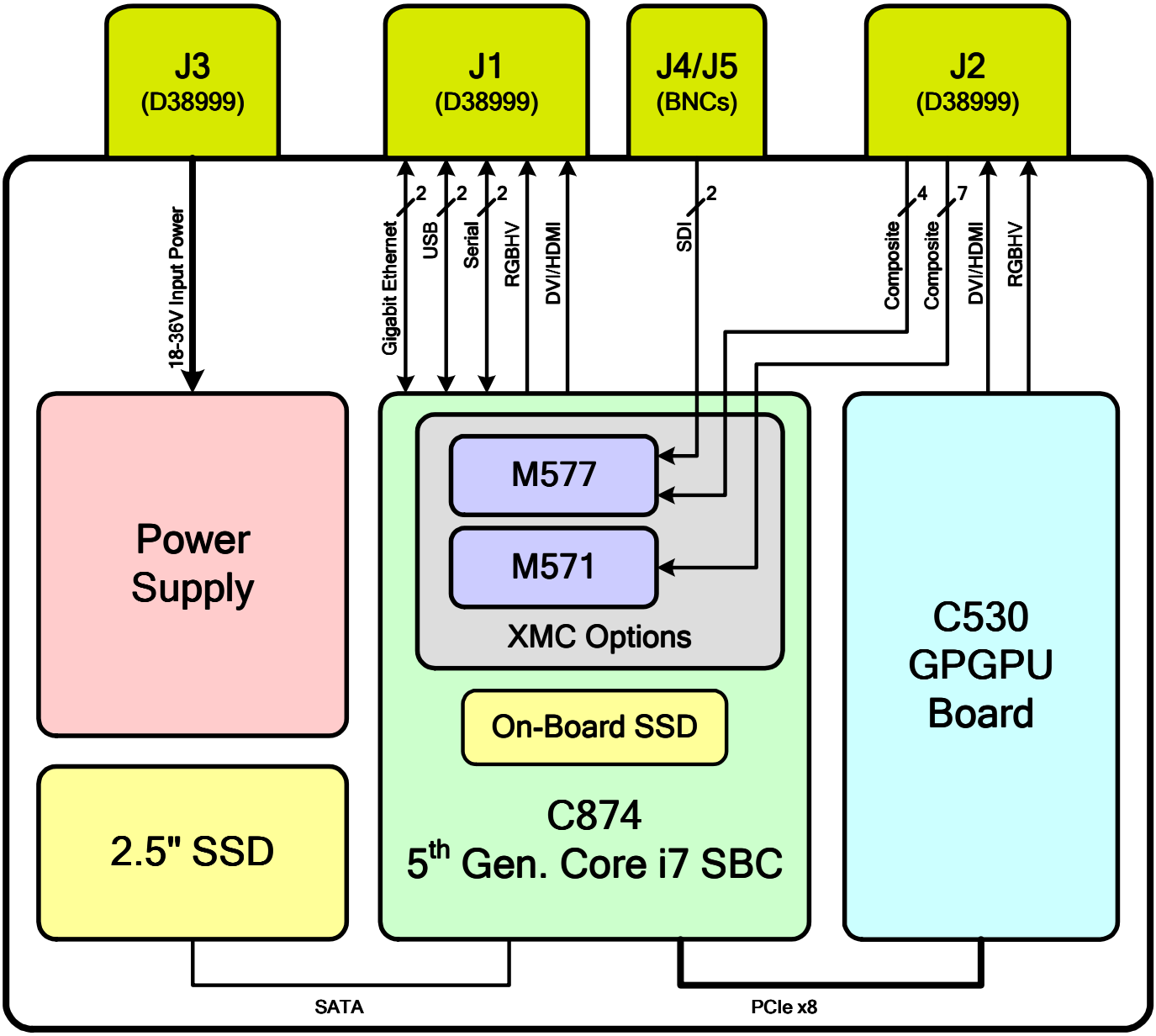
Modern, high-performance GPUs have tremendous processing potential. Utilizing this processing capability for non-graphical applications is known as GPGPU (General Purpose GPU) processing.

Aitech's A191 RediBuilt™ provides GPGPU processing in a fully integrated, ready-to-use system.

The A191 is based on the Aitech's C874 SBC and C530 GPGPU Board. Video inputs are provided by the M577 or M571 frame grabber XMC.

These boards are packaged in an Aitech enclosure along with a high-efficiency power supply, providing a complete High Performance Embedded Computer (HPEC) system in an extremely rugged and compact form factor.



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System Architecture

CPU (C874 SBC)	i7-5850EQ – 5th Gen. Intel® Core™ i7, Quad Core @ 2.7 GHz, Iris™ Pro Graphics 6200, 6 MB Last Level Cache Supports Hyper-Threading, Intel® Virtualization Technology (VT-x), SSE4.1/4.2, AVX 2.0
GPU (C530 GPGPU Board)	NVIDIA® GeForce® GTX 965M • Maxwell Architecture • GM204 Graphics Processor • 1892 GFLOPS • 1024 CUDA Cores • 950 MHz GPU Clock • 4 GB GDDR5 @ 1600 MHz • 128-bit Memory Interface Width • OpenGL 4.5 • OpenCL 1.1 • DirectX 12, Shader 5.0 • CUDA, PhysX • Optimus Technology
Video Capture	Two frame grabber XMC options (M571 or M577), providing different types/quantities of video input interfaces See the *Configuration Variants* section below for more information
System Resources	• Windowed Watchdog Timer • Temperature Sensors • Elapsed Time Recorder • Real Time Clock (1) • Dynamic clock frequency scaling support
VPX Fabric	PCIe x8 backplane link between SBC and GPGPU board

Notes: (1) A small battery is included to backup the system RTC. The battery is soldered in place by default, with a removable option available per customer request (contact an Aitech representative for information).

Memory Resources

RAM	Up to 16GB of DDR3L SDRAM in dual channels with ECC operates at 1600MT/s
Flash Mass Storage	Up to two SATA SSDs: • Up to 256 GB SATA SSD on-board the SBC • Up to 512 GB 2.5" SATA SSD, mounted inside A191 enclosure, connected to SBC via SATA interface SLC (Single-Level Cell) and MLC (Multi-Level Cell) options available as specified in *Ordering Information* below (additional options may be available per customer request, contact an Aitech representative for more information)
BIOS Flash	Dual BIOS Flash devices (Primary device for normal operation, Alternate device for system maintenance)

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Configuration Variants

		Variant (1) (2)	
		Variant 15	**Variant 16**
SBC / CPU		C874 (i7-5850EQ)	
GPGPU Board / GPU		C530 (NVIDIA GeForce GTX 965M)	
Frame Grabber XMC		M571	M577
Video Inputs	**SDI** (3) 480/60i, 576/50i, 720/60p, 1080/60i, 1080/30p	N/A	2
	Composite RS-170A (NTSC)/PAL	7	4
	Max. # Inputs Available Simultaneously	7 (all channels)	4 (both SDI + up to 2 Composites)
Video Outputs	**DVI (single-link) / HDMI**	2 (4)	
	RGBHV	2 (4)	
Gigabit Ethernet Ports 10/100/1000Base-T		2	
UART Serial Ports Software/BIOS configurable as RS-232/422/485		2	
USB 2.0 Ports		2 (5)	

Notes:
(1) Configuration Variants specify the boards used in the A191 system, and determine the type of CPU and GPU, available I/O, and system power consumption
(2) Previous configuration options, with C873 i7-4700EQ SBC and NVIDIA GeForce GTX 770M, are also available but are not recommended for new designs
(3) Factory configured for 75 Ω single-ended SDI operation mode
(4) One channel from SBC, one channel from GPGPU board
(5) Only one USB_VCC pin is available at the A191 front panel

Software

- Supported operating systems
  - Windows 7
  - Linux (1)
- Available with or without supported operating systems pre-installed

Notes:
(1) When using Optimus technology in Linux, the GPU can be used for GPGPU and for rendering graphics routed to an SBC video output, but video output channels routed from the GPGPU board are not supported

Enclosure Options

Passive Convection Cooling	Heat passively dissipated to surrounding air via convection & radiation cooling of the sidewall fins.
Cold Plate-Cooling	Sidewalls conduct heat to enclosure base for cooling via the cold plate. Cold plate cooling is supplemented with convective cooling via sidewall fins.
I/O Routing and Connectors	All variants of the A191 are equipped with front panel D38999 I/O and power connectors. Variants with SDI video inputs use an extended (longer) enclosure, providing two BNC connectors which are accessible from the top side of the enclosure (located near the back of the system).

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Mechanical

Enclosure Type	Variant	Dimensions (max. including handle)			Weight
		Depth	Width	Height	
Convection-Cooled	15	261 mm (10.28")	181 mm (7.13")	133 mm (5.24")	< 6.8 kg (15 lbs)
	16	283 mm (11.15")			
Cold Plate-Cooled	15	261 mm (10.28")	156 mm (6.15")		
	16	283 mm (11.15")			

Power

Input Power	• 85% Typical Efficiency Internal Power Supply • 18 – 36 V_{DC} Input Range • EMI/RFI Input Filter • Input Transient Protection • Input Reverse Polarity Protection • MIL-STD-704D/E Compliance
Power Consumption	120 W Max. (for A191 with i7-5850EQ CPU and NVIDIA GeForce GTX 965M) Power consumption is dependent on system configuration

Environmental

Operating Temp.	**Min**	-40 °C
	Max	Convection-cooled: +55 ºC ambient air Cold plate-cooled: +55 ºC cold plate
Non-Operating Temp.		-55 to +105 °C
Vibration		V3 per VITA 47
Operating Shock		OS2 per VITA 47
Altitude		-1,500 to +60,000 ft. (1)
Relative Humidity		0 – 100%
Ingress Protection		IP65
Rain		MIL-STD-810F, Method 506.4, Procedure III
Dust		MIL-STD-810F, Method 510.4, Procedure I & II
Salt Fog		MIL-STD-810F, Method 509.4
Bench Handling		MIL-STD-810F, Method 516.5, Procedure VI
Fungus		Fungus Resistant
EMI/RFI		MIL-STD-461

Notes: (1) Depending on temperature and system power dissipation

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Ordering Information

Cooling Configuration
1 = Convection-Cooled
2 = Cold Plate-Cooled

SDRAM
B = 8 GB
C = 16 GB

Configuration Variant
See table above

Operating System
0 = None
1 = Windows 7 32-bit
2 = Windows 7 64-bit
3 = Linux

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Ruggedization
2 = Rugged

Processor Speed
S = Standard

SBC On-Board SSD
0 = None *
3 = 64 GB SLC
4 = 128 GB SLC
5 = 256 GB SLC
* With 2.5" SSD only

Input Voltage
3 = 18-36 V_{DC}

2.5" SSD
0 = None
3 = 64 GB SLC
4 = 128 GB SLC
5 = 256 GB SLC
C = 64 GB MLC *
D = 128 GB MLC *
E = 256 GB MLC *
F = 512 GB MLC *
* Not recommended for OS installation

Reserved

Configuration No.
To be assigned by Aitech

Example: 2A191-1SC41532F0-00

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Optional Accessories

MCS191-1-00	Set of Front Panel Mating Connectors
TC191-J1-00	J1 I/O Breakout Cable
TC191-J2-00	J2 I/O Breakout Cable
TC191-J3-00	J3 Power Cable
PS28-150-00	28 V_{DC}/150 W External Power Supply (100 - 240 V_{AC} input)

Contact Aitech

Contact your Aitech sales representative for additional product information, and for inquiries regarding customized configurations of the A191 and additional software support.

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