Embedded Solutions

SMARTER BY DESIGN®

2018 Embedded Product Guide

Leading the industry with high-performance embedded systems targeting demanding thermal and rugged environments for military and industrial applications.

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About ADL Embedded Solutions

ADL Embedded Solutions is a leading provider of high-performance embedded systems targeting demanding thermal and rugged environments.

We provide board level, system and sub-system embedded solutions as well as consulting design services.

24 YEARS OF SUCCESS

Founded in 1994, ADL Embedded Solutions Inc., is a privately held company with headquarters in San Diego, CA. Since 2010 our office in Germany (ADL Embedded Solutions, GmbH) supports our European and other global customers.

We provide a wide range of embedded system solutions which rely heavily on our long history of CPU board design and manufacturing expertise. Our broad portfolio of CPU products range from the latest Intel Core i7 processors to the most current Intel Atom architectures and are available in a variety of form factors. This provides a strong foundation for the many embedded system products and services that ADL Embedded Solutions provides for our clients.

ISO 9001 MANUFACTURING

Our products are designed and manufactured under ISO 9001 with state-of-the art equipment and are fully factory tested prior to shipment. In addition, all computer boards and integrated systems are individually tested at ADL Embedded Solutions before shipment, including extended temperature testing when required.

CUSTOMER SUPPORT

Our committed staff of experienced, well-trained sales and technical engineers, provide our customers with project planning assistance, help with specific application requirements, and can recommend the best integrated solution for a project. Our Technical Support and Customer Service departments are here to ensure your product satisfaction after the sale. We support and service what we sell.

SERVICES

ADL Embedded Solutions can provide full CAD design, build and integration services for custom enclosures, including high IP requirements. Value-added services include ruggedization for high shock and vibration, extended temperature, and harsh environments, as well as CAD support including board models and full enclosure design, build, and integration.

ADL Embedded Solutions

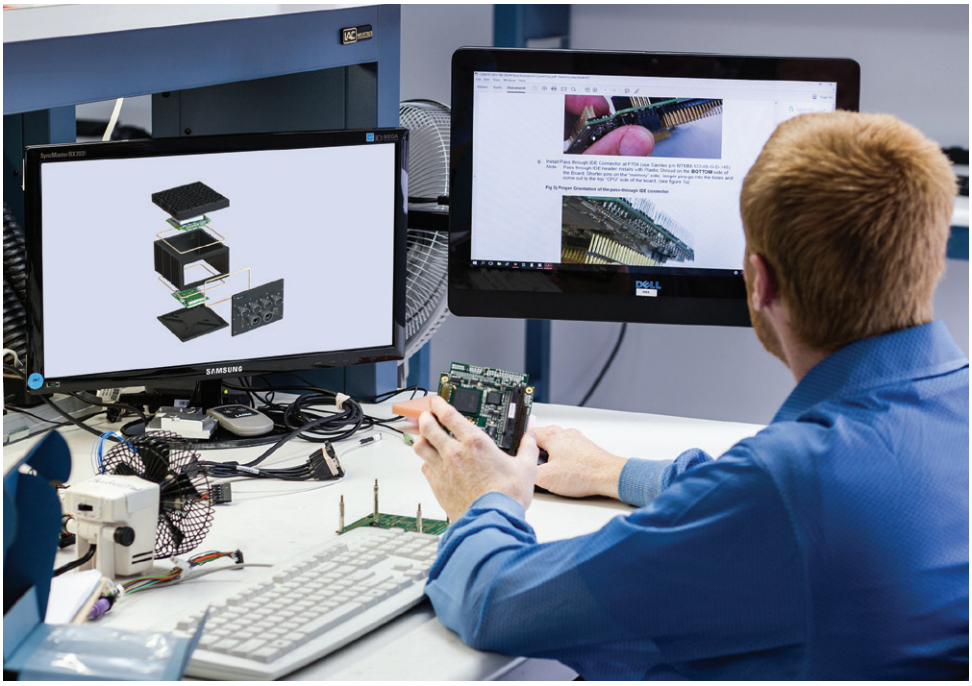
Providing flexible, reliable solutions at the speed our customers need to survive and thrive.

SMARTER BY DESIGN

ADL Embedded Solutions is a leading provider of high-performance embedded systems targeting industrial markets such as factory automation, Vision, traffic engineering, unmanned systems, energy, transportation, as well as military and defense.

ADL is committed to collaborating with customers to design and build quality, reliable embedded solutions that meet their exacting requirements…from concept, through design, build and production.

ADL Embedded Solutions' product line boasts a broad portfolio of long-lived SBCs, ranging from low-power Intel® Atom® architecture through high-performance 7th generation Intel® Core™ i5/i7 processors that ensure access to the latest processor technology and long-lived availability. ADL serves customers in a variety of markets,including Medical, Transportation, Defense, Aerospace, Communication, Security, Process Control, and Science.



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New Products

Leveraging world-class system design and CPU board design capabilities, ADL Embedded Solutions continually strives to provide the latest Intel processor technologies, system products, and capabilities; as well as leading-edge CPU boards and peripherals.

EXCITING NEW PRODUCTS IN 2018

Following the success of the ADLEPC-1500 mini industrial PC in 2017, ADL Embedded Solutions, Inc. is extending its compact industrial PC product line with the addition of a modular version of the ADLEPC-1500 (ADLEPC-1520) which allows for expanded standard and customer-specific I/O functionality within the same small 3.4" x 3.7" footprint. While the ADLEPC-1500 has been popular for network and cyber security applications, the ADLEPC-1520 adds sensor interface and industrial control possibilities that makes it ideal for industrial control or edge devices in an Industrial IoT (IIoT) environment.

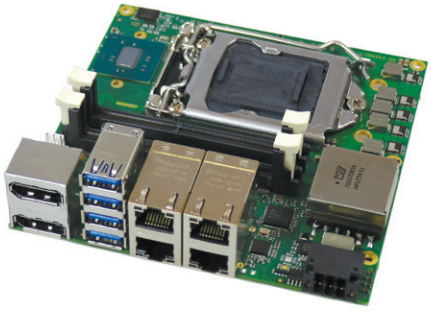
For high-performance applications, ADL Embedded Solutions, Inc. has added a compact (120mm x 120mm) ADL120S/N SBC with support for 6th and 7th generation Intel Core and Xeon® processors and stackable I/O expansion. This makes possible very small system solutions with rugged chassis construction, a wide operating temperature, superior processing and graphics performance with abundant USB 3.0, LAN, DisplayPort and SSD storage options.

ADL120S SYSTEM

ADLEPC-1520
MODULAR, COMPACT INDUSTRIAL PC

Based on 15-year available Intel E3800-Series Atom processors, compact size (58mm x 86mm x 94mm) and a modular expansion architecture, the ADLEPC-1520 is a full-featured embedded PC targeting secure networking and cyber threat security edge devices, as well as system-critical industrial IoT and automation applications.

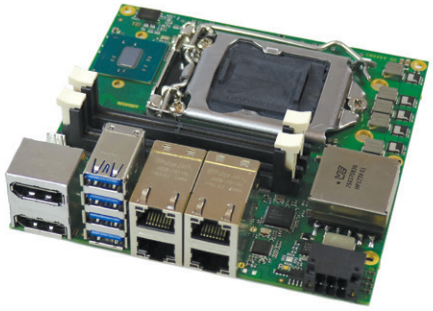
Read more page 9.



ADL120S INTEL CORE I7/I5/I3 SBC 120MM X 120MM, INTEL Q170 CHIPSET STACKABLE I/O

The ADL120S features 6th and 7th generation Intel Core i7, Xeon and Celeron processors, a wide operating temperature, robust USB 3.0 and ethernet I/O. Its small footprint and DisplayPort (4K@60Hz) and storage capabilities allow the ADL120S to provide reliable, long-term high performance to system-critical industrial and military applications. Customer-specific I/O requirements can be addressed via a stackable bus connector.

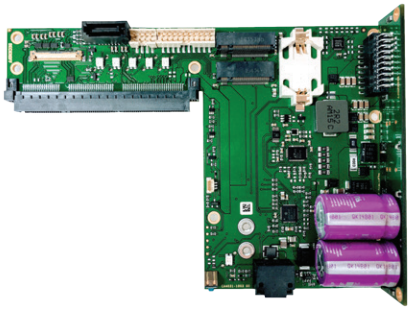
Read more page 15.



COMING SOON!
ADL120N INTEL CORE I7/I5/I3 SBC 120MM X 120MM, INTEL H110 CHIPSET

Based on the ADL120S stackable SBC, this compact SBC features the lower cost Intel H110 chipset no stackable Expansion features. It is ideal for ultra-compact, applications requiring Intel Core i7 performance for long-lived system-critical industrial and military applications.

Read more page 15.



ADLSEC-1710
ADLE3800SEC 3.5" EXPANSION BOARD

Combined with the ADLE3800SEC E3800-Series Atom SBC, the ADLSEC-1710 provides a pseudo 3.5" SBC footprint while expanding the I/O capabilities of the core ADLE3800SEC CPU. Features include PCIe M.2, UPS, GPIO, and other enhanced features.

Read more page 27.

Industrial Embedded Computers

From benign factory floors to embedded applications in harsh environments, much more is demanded from industrial embedded computers than ever before.

ADL Embedded Solutions Industrial Embedded PC's enable high-performance in small, compact designs to fit any application.

BIG PERFORMANCE. SMALL PACKAGE.

Industrial applications for Industrial IoT (IIoT) and network edge devices continue to drive innovation for compact industrial computers.

ADL Embedded Solutions continues to build on its history of providing long-lived embedded solutions for industrial and military applications with new additions to its compact, fanless industrial PC portfolio.
The ADLEPC-1520 adds modular I/O expansion capabilities to the baseline ADLEPC-1500 Atom computer, while the ADL120S / ADL120N SBCs bring high-performance 6th and 7th generation Intel Core to ADL's compact, industrial PC product line.

With rugged chassis construction, long-lived 7 to 15 year processor availability, wide temperatures and a host of customization and engineering services, ADL's line of fanless embedded PCs are the ideal computing solution for a host of system-critical industrial and military applications.

APPLICATIONS

- Secure Network Communication Devices and Gateways
- Edge Devices for Cyber Threat Security
- Industrial Control Systems (ICS) for Critical Infrastructure
- Industrial IoT (IIoT)
- Factory Automation
- Unmanned Systems and Robotics
- Commercial Drone Payload Computing

Feature	ADLEPC-1500	ADLEPC-1520
Dimensions/Weight	33mm x 86mm x 81mm (1.3"x 3.4"x 3.2") Weight = 350gm (12.3oz)	58mm x 86mm x 94mm (2.3" x 3.4" x 3.7") Weight </= 700gm (1.5 lb.)
Processor	Intel E3800-Series Atom	Intel E3800-Series Atom
I/O	2x 1Gb/s LAN (RJ45); 1x USB 2.0, 1x USB 3.0, 1x DisplayPort	2x 1Gb/s LAN (RJ45); 1x USB 2.0, 1x USB 3.0, 1x DisplayPort
Expansion	802.11 b/g/n WIFI 1T1R, AR9271	Standard and Custom Expansion Boards (2x PCIe X1; 1x SATA; 2x USB 2.0)
Storage	2242 KeyB M.2 SATA II	2242 KeyB M.2 SATA II
Power	20-30V; Optional 12-24V, 24-36V	20-30V; Optional 12-24V, 24-36V
Other Features	TPM 2.0 via Chipset/BIOS; Windows and Linux Supported	TPM 2.0 via Chipset/BIOS; Windows and Linux Supported
Operating Temperature	Standard -20C to 60C; Optional Extended Temp.	Standard -20C to 60C; Optional Extended Temp.

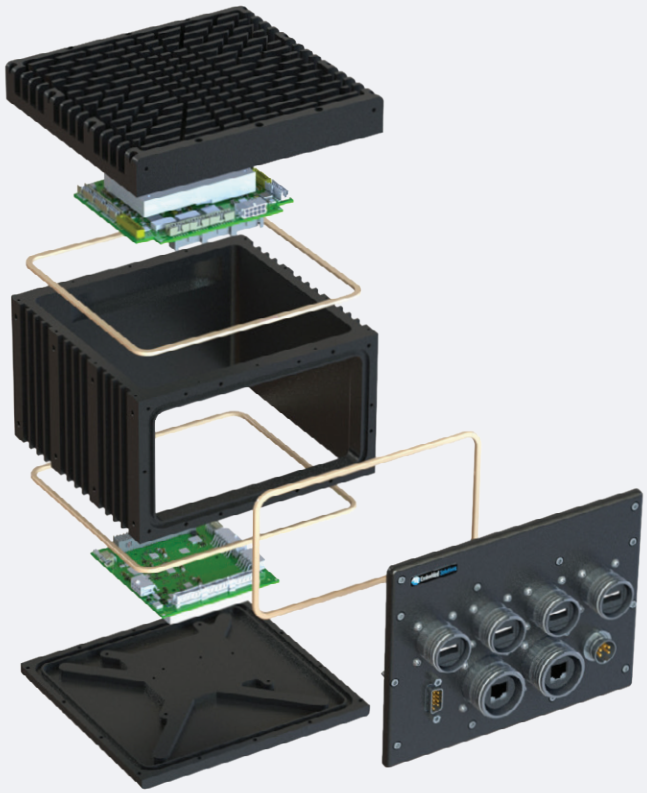
Feature	ADLEPC-1600E	ADLEPC-1600
Dimensions/Weight	41mm x 162mm x 122mm (1.6" x 6.4" x 4.8")	41mm x 162mm x 122 mm (1.6" x 6.4" x 4.8")
Processor	Intel E3800-Series Atom	Intel E3800-Series Atom
I/O	4x LAN (RJ45), 1x USB3.0, 1x USB2.0, 1x DP (4k@30Hz), 1xCOM (RS232)	3x Gb/s LAN (RJ45); 4x USB 2.0; 1x DVI (1920x1080@60Hz; VGA/CRT)
Expansion	Configured as ADLE3800SEC with ADLSEC-1710 Expansion Board	1x 2280 KeyB M.2 with PCIe X1
Storage	1x 2242 KeyB M.2 SATA II	2242 KeyB M.2 SATA II
Power	20-30VDC; Optional 12-24V, 24-26V	20-30V; Optional 12-24V, 24-36V
Other Features	Configured as ADLE3800SEC with ADLSEC-1710 Expansion Board	TPM 2.0 via Chipset/BIOS; Windows and Linux Supported
Operating Temperature	-20 to +60°C; Optional Extended Temp.	Standard -20C to 60C; Optional Extended Temp.

ADLMES9200 Rugged Chassis System

The rugged ADLMES9200 chassis system is a successor to ADL's popular ADLMES8200 IP65 chassis system with improvements that include lower weight, lower cost, quick and reliable IP67 integration for rugged military and industrial embedded systems.

APPLICATIONS INCLUDE:

- Military/Defense Ground Vehicles
- Mission/Payload Computers
- SWaP-constrained Embedded Systems for Mobile, Tactical, Airborne and Vehicle applications.
- Rugged industrial Oil and Gas
- Mining and Construction
- Commercial Unmanned Vehicles



FEATURES AND BENEFITS:

- Improved IP67 ingress protection.
- 1-piece unibody chassis design for lower cost and more reliable IP67 protection.
- EMC-compliant IP67 gasket(s)
- Conductive cooling option with flanged base for maximum operating temperature.
- Designed for MIL-STD 810F shock and vibration. Options for MIL-STD 461/704/1275 Power and EMI specifications.
- Supports all ADL PC/104 and 3.5" single board computers and power supplies.
- Full design and development services are available for custom chassis, cabling, integration, and modeling support.

ADLMES9200 Rugged Chassis System

TECHNICAL SPECIFICATIONS

Specification	Description
Model Sizes	LPP = 3 Card Capacity P1P = 5 Card Capacity
Dimensions (conductive/passive)	LPP = 84/102 x 175 x 170 mm P1P = 117/135 x 175 x 170 mm
Empty Weight	LPPE = 1,95 kg P1PE = 2,27 kg
Shock & Vibration	Designed for rugged industrial and MIL-STD 810 military/defense
EMI	Supports Power Supply Options For MIL-STD 461 Compliance
Power	Supports Power Supply Options For MIL-STD 704F/1275D Compliance.
Mounting	Flanged Plate - M6 Mounting Holes Additional Center Holes For Conductive pressure.

ORDERING OPTIONS

LPP/P1P Variant	Finned Top	Flanged Base	Active Fan*
A	X	X	
B	X	X	X
C	X		
D	X		X
E (Flat Top With Conductive Base)		X	

*P1P - D With Active Fan Option

ADL Vision Solutions

From factory floor machine vision systems for automation, to robotics or commercial drone applications for science and agriculture and military surveillance Machine Vision is Everywhere!

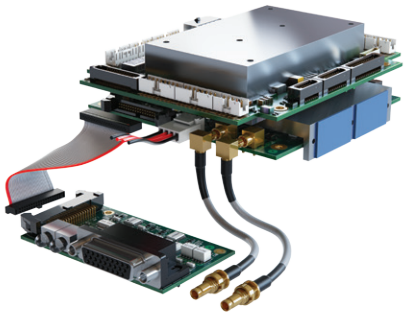
ADL Embedded Solutions is well versed in all aspects of embedded vision design… high-speed framegrabbers, storage, processing, system design and thermal management.

MACHINE VISION IS EVERYWHERE!

ADL Embedded Solutions, Inc. has been putting vision solutions together for customers for many years. This includes systems using NTSC/PAL, SDI, and HD-SDI to high-performance framegrabbers using the latest image capture interfaces like CoaXPress and Cameralink technologies.

APPLICATIONS

- Machine Vision for Factory Automation
- Commercial Drone Payload Computers for Hyperspectral, Multispectral, SWIR or LiDAR
- Traffic Surveillance
- Security Monitoring and Control
- Unmanned Systems - High Resolution Image/Video Capture
- High-Speed Automated Optical Inspection
- Very High-Resolution Line-Scan Image Acquisition
- Military and Defense ISR
- Very High Frame-Rate Motion Analysis and Recording



ADLVIS-1660 2-CH COAXPRESS ASSEMBLY

- PCIe/104 CoaXPress assembly
- Intel Core i7-4700EQ with 8GB DRAM
- Dual CXP-6 Ports
- GENICAM Compliant
- Euresys Memento Event Logging
- I/O Breakout board with GPIO, trigger, and LED Status
- PoCXP Safe Power; 17W

PCIe/104 4-CH CAMERALINK OPTION

- Captures from 1 or 2 Medium, Full, or 10-tap Camera Link Cameras
- Up to 4 Base Camera Link Cameras
- Line Scan or Area Scan
- Camera Frame Rate Sequence Capture
- Triggered Image Sequence Capture
- DMA Image Data to CPU Memory

ADLVIS-1700 Vision System - CoaXPress or Cameralink

APPLICATIONS

- Machine Vision For Factory Automation
- Hyperspectral Imaging
- Traffic Surveillance
- Security Monitoring and Control
- Unmanned Systems - High-Resolution Image/Video Capture
- High-Speed Automated Optical Inspection
- Very High-Resolution Line-Scan Image Acquisition
- Military and Defense ISR
- High Frame-Rate Motion Analysis and Recording

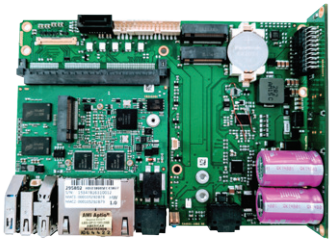
Feature	**ADLVIS-1700-CXP** CoaXPress Configuration	**ADLVIS-1700-CL** Camera Link Configuration
Enclosure	Base Enclosure	Base Enclosure
CPU	Quad Intel Core i7-4700EQ with 8GB DRAM	Quad Intel Core i7-4700EQ with 8GB DRAM
Framegrabber	PCIex16 Euresys 2-port CoaXPress	PCIex16 EPIX Cameralink Card
Standard I/O	2x USB2.0, 2x COM, 2x LAN	2x USB2.0, 2x COM, 2x LAN
Display	VGA	VGA
mSATA	mSATA Pre-loaded with OS and Euresys Drivers and Utilities	mSATA Pre-loaded with OS and EPIX Drivers and Utilities
OS	Linux & Windows	Linux & Windows
Storage	Up to 4x 2.5” SATA SSD	Up to 4x 2.5” SATA SSD
RAID Configuration	2x SATA 3Gb/s and 2x SATA 6Gb/s Available	2x SATA 3Gb/s and 2x SATA 6Gb/s Available.
Expansion	1x PCIe/104 Board	1x PCIe/104 Board

Compact, Industrial SBCs

ADL offers a wide variety of compact, industrial-grade SBCs ranging from low-power Atom boards to high-performance Intel Core SBCs intended for a host of rugged industrial and IIoT applications benefiting from compact design, wide operating temperature, availability up to 15 years and expert BIOS and engineering support.

INDUSTRIAL APPLICATIONS

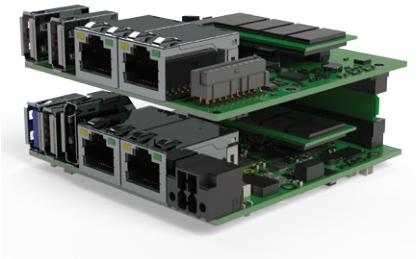
- Secure Network Communication Devices and Gateways
- Edge Devices for Cyber Threat Security
- Industrial Control Systems (ICS) for Critical Infrastructure
- Industrial IoT (IIoT)
- Factory Automation
- Unmanned Systems and Robotics
- Commercial Drone Payload Computing



LOW PROFILE HORIZONTAL EXPANSION

Using an edge connect architecture, the 75mm x 75mm ADLE3800SEC SBC enables low-profile expansion via interface resources including PCIe X1 lanes, SATA, USB 2.0, power, LEDs and more. This allows customers to standardize the computing module for efficiency of software and firmware maintenance while supporting a variety of product variants.

COTS and custom expansion options are available.



SMALL FOOTPRINT VERTICAL EXPANSION

For small footprint applications, stackable platforms like the 75mm x 75mm configuration shown at left allows the development of small, compact industrial solutions like the ADLEPC-1520 Atom industrial PC and the Stackable ADL120S (Intel Core i7) SBC.

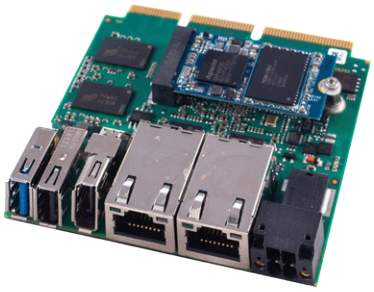
COTS and custom expansion options are available.

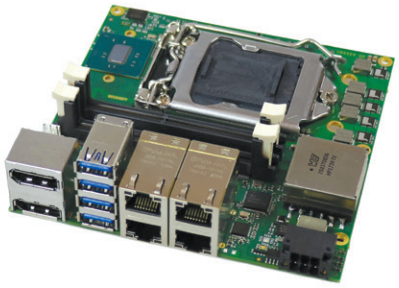
EDGE-CONNECT SBCS

ADL continues to innovate with smaller, feature-rich SBCs with modular expansion architectures to fit a variety of uses and environments.

This architecture addresses the increasing need of small form factor SBCs that allows system designers to deploy intelligent computers for network and cybersecurity edge devices and intelligent controllers for industrial automation of machinery and equipment.

Featuring long-lived Intel processors with 7 to 15 year availability, wide operating temperatures, flexible expansion and expert engineering and custom design services, ADL's line of SBCs are at the heart of many system-critical applications in a variety of industries.





Feature	ADLE3800SEC INTEL E3800-SERIES ATOM	ADL120S 6TH AND 7TH GEN INTEL CORE
Dimensions	75mm x 75mm	120mm x 120mm
Processors	Intel E3800-Series Atom	6th and 7th Generation Intel Core i3/i5/i7/Celeron Chipset: Intel Q170; ADL120N = H110
I/O	2x 1Gb/s LAN (RJ45); 1x USB 2.0, 1x USB 3.0, 1x DisplayPort	4x Gb/s LAN (RJ45); 4x USB 3.0; 2x DisplayPort (4K@60Hz)
Expansion	Standard and Custom Expansion Boards (2x PCIe X1; 1x SATA; 2x USB 2.0)	ADL120S: Stackable I/O Support with PCIe, USB 2.0, USB3.0 and SATA Interfaces
Storage	2242 KeyB M.2 SATA II	2x 2280 KeyB M.2 SATA/PCIe with USB 3.0
Power	20-30V; Optional 12-24V, 24-36V	20-30V; Optional 12-24V, 24-36V
OS	Linux & Windows	Linux & Windows
Other Features	TPM 2.0 via Chipset/BIOS; Windows and Linux Supported; RTC Battery	TPM 2.0 via Chipset/BIOS; Windows and Linux Supported
Operating Temperature	Standard -20C to 70C Optional -40C to 85C Screening	Standard -20C to 70C Up to -40C to 85C (Vary by Processor)

PC/104 COTS & MCOTS SBCs

ADL Embedded Solutions PC/104 SBCs feature a broad range of Intel® processors ranging from the latest, high-performance Intel Core i7 CPU to new low-power Intel Atom architectures.

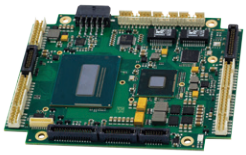
PC/104 SINGLE BOARD COMPUTERS

The actual ADL PCIe/104 formfactor SBCs feature up to the latest generation of Intel Embedded Roadmap Core & Atom CPUs. Latest featuresets linke USB 3.0, SATA 6Gb/s as well as PCIe Gen 3.0 are available. Futureproof expansions with highspeed signaling such as CoaXPress, CameraLink and 10G LAN are available by 3rd party.

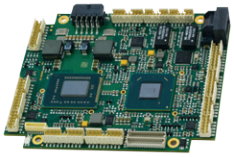
Our legacy formfactors PC/104-Plus and PCI-104 include Intel CPUs of the Core 2 series, Atom D500 and Z500 as well as AMD Geode LX 800.

PCIE104 BOARDS & ADLMES9200 CHASSIS

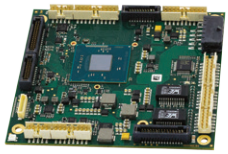
PCIe/104



PCIe/104



PCIe/104



	ADLQM87PC	ADLQM67PC	ADLE3800PC
CPU	Intel® Core™ Celeron/i5/i7 Processor (Haswell)	Intel® Core™ Celeron/i5/i7 Processor (Sandy Bridge, Ivy Bridge)	Intel® Atom™ E3800 Processor (Bay Trail)
RAM	Up to 8GB DDR3L 1600MHz	Up to 8GB DDR3 1600MHz	Up to 8GB DDR3L 1333MHz
LAN	2x GbLAN Intel i210/i218	2x GbLAN Intel 82579L/82574L	2x GbLAN Intel i210/i210
Graphic	VGA/DVI/HDMI/DP/eDP	VGA/DVI/HDMI/DP/LVDS	VGA/DVI/HDMI/DP
USB	8x USB 2.0, 2x USB 3.0 plus 2x USB2.0 via PCIe/104	8x USB 2.0, plus 2x USB2.0 via PCIe/104	4x USB 2.0, 1x USB 3.0 plus 2x USB2.0 via PCIe/104
COM	2x COM RS232	2x COM RS232	2x COM RS232
Storage	2x SATA 6Gb/s, 2 x SATA 3Gb/s (RAID 0/1/5/10)	2x SATA (6Gb/s) (RAID 0/1)	2x SATA (3Gb/s) (RAID 0/1)
Storage	1x mSATA Socket (CPU-Bottom)	No Additional Storage	1x mSATA Socket (CPU-Bottom)
PCIe Expansion	1x PCIe Mini Card (Shared With mSATA)	Additional PCIe Expansion x16 + 4 x x1 by PCIe/104	1x PCIe mini Card (Shared With mSATA)
GPIO	1x GPIO (16) via FCI Option	1x GPIO (16) via FCI Option	1x GPIO (16) via FCI Option
Security	1x TPM 1.2	No Additional TPM	Firmware TPM 2.0
Temp. Operation	-20° to +70°C / -40° to +85°C (Option Upon Request)	-20° to +70°C / -40° to +85°C (Option Upon Request)	-20° to +70°C / -40° to +85°C (Option Upon Request)
Bus-Typ	PCIe/104, Type 1	PCIe/104, Type 1	PCIe/104, Type 2

PCIe/104-Express

PCIe/104-Plus

PCIe/104-Plus

	ADLD25PC	ADLS15PC	ADLLX8PC
CPU	Intel® Atom™ D500 (Pineview)	Intel® ATOM™ Z500 Processor (Silverthorne)	AMD® Geode™ LX800
RAM	Up to 4GB DDR3 800MHz	Up to 2GB DDR2 533MHz	Up to 1GB DDR 400MHz
LAN	1x GbLAN Intel 82567	1x GbLAN Intel 82574L	1x Fast Ethernet Intel 82551ER/82562EZ
Graphic	VGA/LVDS (18bit)	VGA/LVDS (18/24bit)	VGA/LVDS (18bit)
USB	8x USB 2.0, plus 2x USB2.0 via PCIe/104, plus 1x USB2.0 via mPCIe	7x USB 2.0 (Host) plus 1x USB 2.0 (Device)	4x USB 2.0
COM	4x COM (RS232/422/485 Software switchable by BIOS) + 1x LPT	2x COM RS232 + 1x LPT	2x COM RS232 + 1x LPT
Storage	2x SATA (3Gb/s) (RAID 0/1)	1x PATA 44 Pin (Master or Slave)	1x PATA 44 Pin (Master + Slave)
Storage	2x SATA (3Gb/s) via PCIe/104	1x PATA SSD soldered (2-32GB) (Master or Slave)	1x PATA SSD soldered (2-8GB) (Master or Slave)
PCIe Expansion	1x PCIe mini Card (Option)	No Additional PCIe Expansion	No Additional PCIe Expansion
GPIO	1x GPIO (16) via FCI Option	No Additional GPIO	No Additional GPIO
Security	No Additional TPM	No Additional TPM	No Additional TPM
Temp. Operation	-20° to +70°C / -40° to +85°C (Option Upon Request)	-20° to +70°C / -40° to +85°C (Option Upon Request)	-20° to +70°C / -40° to +85°C (Option Upon Request)
Bus-Typ	PCI/104-Express, Type 2	PC/104-Plus	PC/104-Plus

3.5 Inch Embedded Single Board Computers

ADL Embedded Solutions 3.5” SBCs combine user functionality with industrial features like extended temperature operation and rugged build for intelligent systems on the factory floor as well as more harsh and rugged industrial environments.

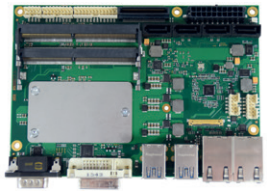
DESIGNED FOR RUGGED INDUSTRIAL APPLICATIONS

Industrial embedded systems can run the gamut from benign factory floor or control room environments to harsh, rugged environments in oil and gas, train control, unmanned systems, alternative energy, transportation, security and surveillance, etc. This requires a particular type of SBC with easy-to-use connectors and interfaces, but also rugged features for shock and vibration as well as extended temperatures.

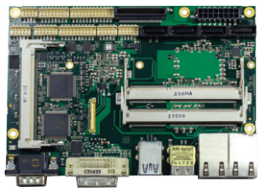
ADL Embedded Solutions’ portfolio of 3.5” SBCs fills this void by leveraging expertise in military-rugged design to provide optimal solutions for rugged industrial applications.

ADL STANDARD 3.5” SBC & EPC1600 CHASSIS

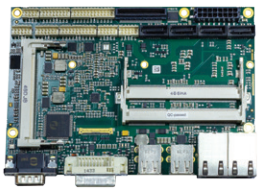
3.5" SBC



3.5" SBC

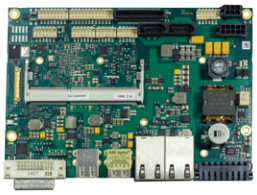


3.5" SBC

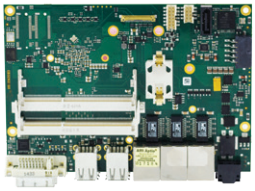


	ADLQ170HDS	ADLQM87HD	ADLQM67HDS
CPU	6th and 7th Generation Intel Core/ Xeon/Celeron Processors	Intel® Core™ Celeron/i5/i7 Processor (Haswell)	Intel® Core™ Celeron/i5/i7 Processor (Sandy Bridge, Ivy Bridge)
RAM	Up to 32GB DDR4L 2133MHz	Up to 16GB DDR3L 1600MHz	Up to 16GB DDR3 1600MHz
LAN (front)	2x GbLAN Intel i210/i219	2x GbLAN Intel i210/i218	2x GbLAN Intel 82579L/28574L
Graphic (front)	DVI 1920x1080 @ 60Hz 24bpp; Supports VGA/CRT	DVI 1920x1080 @ 60Hz 24bpp; Supports VGA/CRT	DVI 1920x1080 @ 60Hz 24bpp; Supports VGA/CRT
USB (front)	4x USB 3.0	2x USB 2.0, 2x USB 3.0	4x USB 2.0
COM (front)	1x COM RS232	1x COM RS232	1x COM RS232
Graphic (int.)	1x DVI/HDMI/DP via I-PEX Option	1x DVI/HDMI/DP via I-PEX Option	1x DVI/HDMI/DP via I-PEX Option
USB (int.)	1x USB3.0 via I-PEX Option 6x USB 2.0 (FCI)	1x USB2.0 via I-PEX Option 6x USB 2.0 (FCI)	4x USB2.0 via FCI Option; 1x USB2.0 via I-PEX Option, 6x USB 2.0 (FCI)
Storage	4x SATA (6Gb/s) (RAID 0/1/5/10)	2x SATA (3Gb/s), 2x SATA (6Gb/s) (RAID 0/1/5/10)	2x SATA (3Gb/s), 2x SATA (6Gb/s) (RAID 0/1/5/10)
PCIe Expansion	1x PCIe (1x4/4x1) 2x40 Pin Connector	1x PCIe (1x4/4x1) 2x40 Pin Connector	1x PCIe (1x4/4x1) 2x40 Pin Connector
GPIO	1x GPIO (8) via FCI Option	1x GPIO (8) via FCI Option	1x GPIO (8) via FCI Option
Security	No Additional TPM	1x TPM 1.2	No Additional TPM
Temp. Operation	-20° to +70°C / -40° to +85°C (Option Upon Request)	-20° to +70°C / -40° to +85°C (Option Upon Request)	-20° to +70°C / -40° to +85°C (Option Upon Request)

3.5" SBC



3.5" SBC



	ADLE3800HD	ADLE3800HDC
CPU	Intel® Atom™ E3800 Processor (Bay Trail)	Intel® Atom™ E3800 Processor (Bay Trail)
RAM	Up to 8GB DDR3L 1333MHz	Up to 8GB DDR3L 1333MHz
LAN (front)	2x GbLAN Intel i210, 1x internal	3x GbLAN Intel i210
Graphic (front)	DVI 1920x1080 @ 60Hz 24bpp; Supports VGA/CRT	DVI 1920x1080 @ 60Hz 24bpp; Supports VGA/CRT
USB (front)	4x USB 2.0	4x USB 2.0
COM (front)	No External COM, 1x Internal RS232 (FCI)	No External COM
Graphic (int.)	1x DVI/HDMI/DP via I-PEX Option	1x DVI/HDMI/DP via I-PEX Option
USB (int.)	4x USB2.0 via FCI Option; 1x USB3.0 via I-PEX Option	1x USB3.0 via I-PEX Option
Storage	2x SATA (3Gb/s) (RAID 0/1/5/10)	1x SATA (3Gb/s)
PCIe Expansion	1x PCIe 2x40 Pin Connector	No Additional PCIe Expansion
GPIO	1x GPIO (8) via FCI Option	No Additional GPIO
Security	Firmware TPM 2.0	Firmware TPM 2.0
Temp. Operation	-20° to +70°C / -40° to +85°C (Option Upon Request)	-20° to +70°C / -40° to +85°C (Option Upon Request)

Custom Systems

Embedded system design needs, challenges and constraints can vary widely and don't always abide by readily-available COTS solutions. Our staff of CPU designers and engineers can custom tailor embedded designs to meet a broad range of customer-specific space, power, electrical, or environmental requirements.

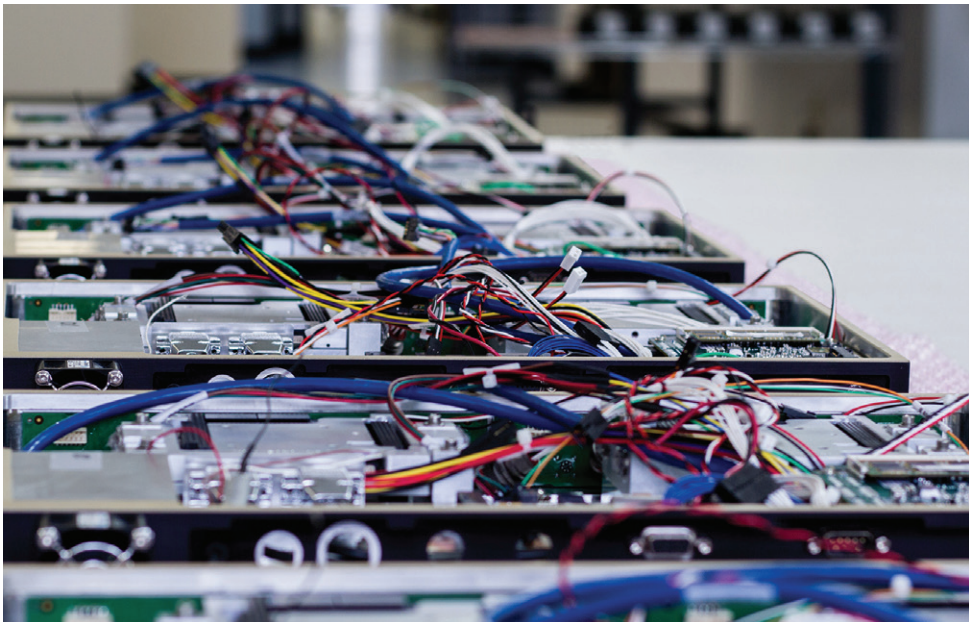
ROBUST DEVELOPMENT PROCESS

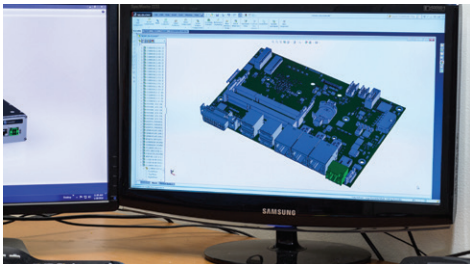
Aided by Solidworks® CAD design and simulation tools, our engineers can help conceptualize, design, manufacture, and system integrate turnkey embedded solutions for both military and rugged industrial applications.

Driven by the product lifecycle requirements of our military and industrial customers, ADL Embedded Solutions has developed a robust System Development Process designed to capture the myriad of requirements, specifications, and changes that can arise during a system development from initial consultation through prototyping and production release.

All system electrical, I/O, mechanical, and environmental requirements are fully documented, design reviewed, customer approved, and form the foundation for all current and future iterations of a customer's design throughout their lifecycle.

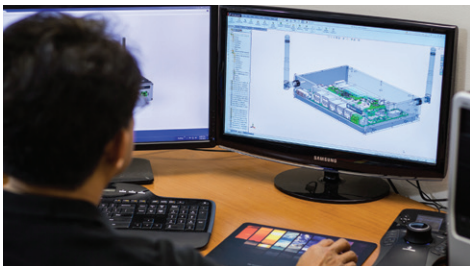
CUSTOM SYSTEM PRODUCTION





BROAD PORTFOLIO OF INTEL-BASED CPU BOARDS

ADL Embedded Solutions designs and manufactures a broad range of Single Board Computers in a variety of different form factors including PC/104, PC/104-PLUS, PCI/104, PCI/104-EXPRESS, PCIe/104, and 3.5" SBCs. Processor options range from the latest Intel CORE i7 processors to the low-power Intel Atom architecture for optimal flexibility of embedded design for our customers. Custom CPU board solutions can also be derived from any existing chipset/processor CPU product.



SYSTEM CONCEPT DEVELOPMENT

Working from customer requirements and concepts, ADL Embedded Solutions can help refine agreed upon critical design requirements. From these requirements, ADL Embedded Solutions can develop implementation strategies, while our Sales Engineers generate development quotes to help guide the NRE process. This collaborative process is the key to developing workable solutions that meet both cost and technical constraints. Often, an intervening "proof of concept" stage will precede commitment of NRE design resources.

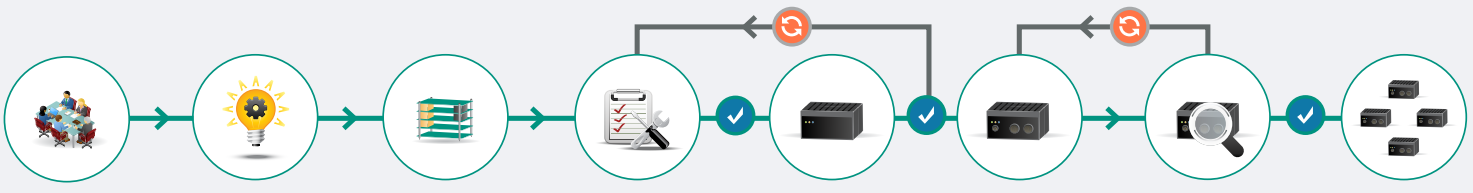
SYSTEM DESIGN

Tools like Solidworks® 3D CAD design software not only aid in rapid development of enclosure and system concepts, but also make for efficient communication of design concepts with customers to minimize development time and time to market. Once approved, Solidworks® 3D CAD designs also become the primary communication vehicle for documenting the system for customer SCDs (Source Control Drawings) as well as for follow-on manufacturing steps. Solidworks® CFD thermal simulation capabilities help ensure systems stay within their specified thermal envelope.

SYSTEM BUILD

Using our strong relationships with metalwork, milling, coating, and component vendors, ADL Embedded Solutions can make even the most complex system a reality. Typically, small quantity prototypes are built to validate manufacturing quality and mechanical specifications. Fully integrated systems are then built to validate ease of integration by production personnel, confirm electrical specifications, and shipped to the end-customer for system verification testing as well as any special tests such as vibration or EMI compliance testing.

OUR CUSTOM SYSTEM DEVELOPMENT PROCESS



Engineering & Design Services

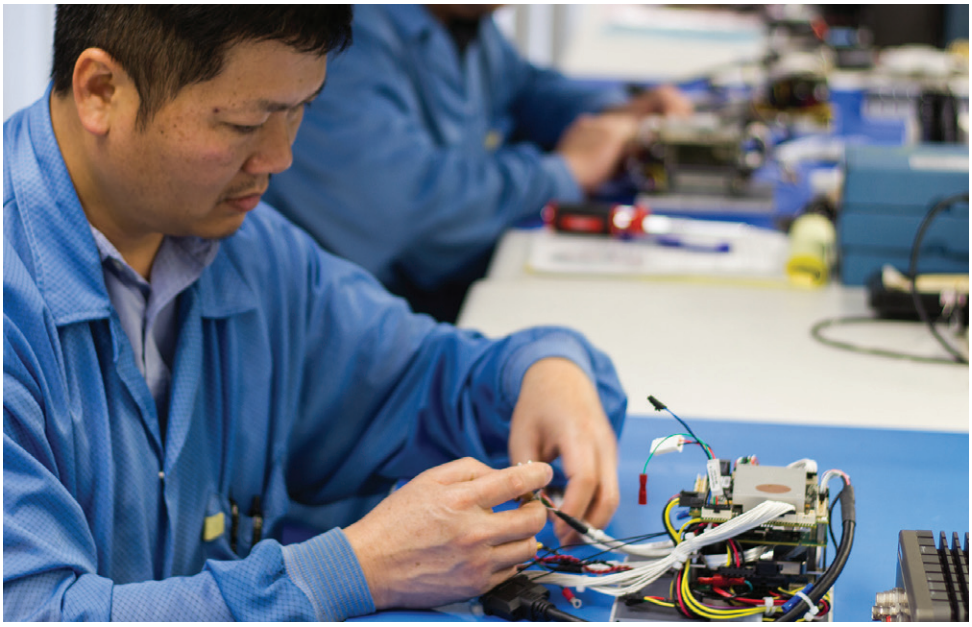
ADL Embedded Solutions strives to be the best development partner possible for our customers every step of the way through their embedded design process. We have a broad range of engineering and design services to help make every customer design or concept a success.

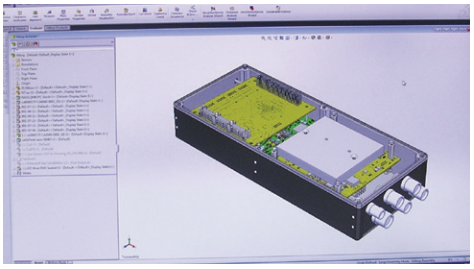
STRIVING TO PROVIDE ALL THE ELEMENTS FOR SUCCESS

Embedded Design is by nature a collaborative team process requiring engineering and technical skills including system design, mechanical and thermal design, electrical design, software development, cable design, and build, testing, and quality control.

Our engineering team excels at partnering with our customers to understand their needs and to provide top-notch engineering support, whether it's just providing CAD models or providing full-turnkey system design services. Support services include: driver support and development, Linux support, cable design, thermal design, BIOS services, and more.

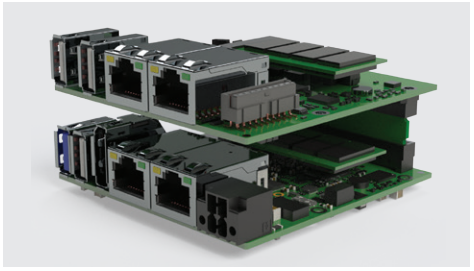
STANDARD SYSTEM PRODUCTION





CUSTOM SYSTEM DESIGN AND BUILD

Working from customer requirements and concepts, ADL Embedded Solutions can help refine customer concepts to develop agreed upon critical design requirements. From these requirements, ADL Embedded Solutions can develop implementation strategies, while our Sales Engineers generate options quotes to help guide the NRE process. This collaborative process is the key to developing workable solutions that meet both cost and technical constraints.

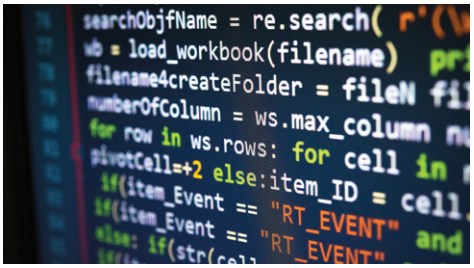


CAD MODELING SUPPORT

3D modeling is a critical part of most embedded system design work. ADL Embedded Solutions is well-versed in Inventor- and Solidworks®-based 3D CAD design and can provide CAD Modeling Support for space planning, system design review, thermal design and modeling, and much more. CAD models for all of our SBCs and select peripherals are available in both Solidworks® and STEP 203/214 formats upon request.

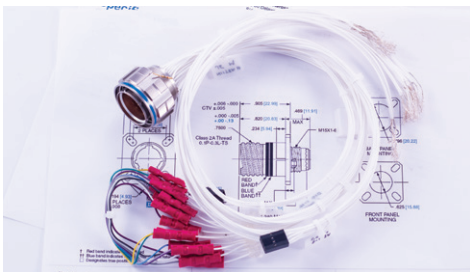
THERMAL DESIGN

ADL Embedded Solutions provides both standard and extended temperature range thermal solutions for all of our SBCs. In addition, ADL Embedded Solutions can provide custom thermal solutions (plates, heatsinks, and enclosures) as required by specific customer specifications. Working closely with local milling and coating facilities, ADL Embedded Solutions engineers can create thermal solutions for the entire thermal path from high-powered SBCs and peripherals to chassis walls and cooling plates. Solidworks® mechanical design tools and CFD thermal simulation software ensure an accurate and time-efficient design process.



SOFTWARE AND BIOS SUPPORT

ADL Embedded Solutions works directly with our board design team to provide BIOS and firmware engineering support including: BIOS-API health monitoring, GPIO, Fan, and watchdog control, Fixed BIOS/firmware revision control, Custom BIOS Configuration Settings and Defaults, etc. Strong collaboration between engineering and BIOS/firmware designers, allow ADL Embedded Solutions to provide a range of software development and driver services including: custom applications, driver support and development, custom operating system image loading during production, custom test scripts and test configurations, and firmware development.



CUSTOM CABLING

Development cable kits are available for all ADL Embedded Solutions CPU boards. In many cases, our standard cabling options are all that is required for a customer's project. Invariably though, custom cabling needs arise…whether it's a simple matter of changing the length of a standard cable, or custom designing a high-IP D38999 cabling harness, ADL Embedded Solutions engineers can help specify, design, and build to our customers' requirements.

Embedded Power Supplies

ADL Embedded Solutions' portfolio of embedded power supplies are optimally designed to work in conjunction with our CPU boards. These power supplies help provide a robust set of system building blocks for military and industrial embedded customers.

DESIGNED FOR LONG-LIFE EMBEDDED APPLICATIONS

ADL Embedded Solutions' embedded power supplies are designed with long-lived, rugged military and industrial applications in mind.

MTBF is optimized through a careful choice of components, connectors, and design architecture to achieve MTBF > 600,000 hours. They are designed for extended temperature operation (-40°C to +85°C) and include a robust set of MILCOTS features for use in military ground vehicles and avionics.

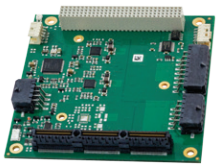
Small Form Factor (SFF) designs are optimized for side-by-side use with ADL Embedded Solutions' line of industrial 3.5" CPUs, but also work well in standalone SwaP-optimized military or space-constrained applications. 3D CAD models and design services are available for all power supply products.

LONG-LIVED EMBEDDED POWER SUPPLIES

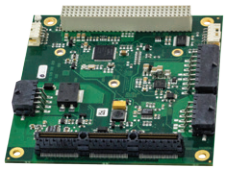
Power Supply Matrix

ADLPS35ISO-150

ADLPS35-150



ADLPS104-150



ADLPS104ISO

Specification	ADLPS35-ISO-150	ADLPS35-150-12	ADLPS104-150-5	ADLPS104-150-12	ADLPS104-ISO-150-5	ADLPS104ISO-150-12
Input Voltages	20 to 30V	14V to 36V	7V to 36V	14V to 36V	7V to 30V	14V to 36V
Output Voltages	5V at 17A	5V at 20A	5V at 20A	5V at 20A	5V at 10A	5V at 10A
	5VS at 5A	5VS at 5A	5VS at 5A	5VS at 5A	5VS at 2A	5VS at 2A
	3.3V at 10A	3.3V at 5A	3.3V at 5A	3.3V at 5A	3.3V at 15A	3.3V at 15A
	12V at 10A	12V at 10A		12V at 10A		12V at 10A
Total Power	150W Max.; 8A Max. Input Current	150W Max; 15A Max Input Current	150W Max; 15A Max Input Current	150W Max; 15A Max Input Current	150W Max; 15A Max Input Current	150W Max; 15A Max Input Current
Input Protection		Overcurrent; Overvoltage / Undervoltage; Surge; Reverse Voltage	Overcurrent; Overvoltage / Undervoltage; Surge; Reverse Voltage	Overcurrent; Overvoltage / Undervoltage; Surge; Reverse Voltage	Overcurrent; Overvoltage / Undervoltage; Surge; Reverse Voltage	Overcurrent; Overvoltage / Undervoltage; Surge; Reverse Voltage
Isolation	500V Galvanic				Galvanic Isolation to 500V	Galvanic Isolation to 500V
Temperature	-40C to 85C With Cooling	-40C to +85C With Conduction Cooling	-40C to +85C With Conduction Cooling	-40C to +85C With Conduction Cooling	-40C to +85C With Conduction Cooling	-40C to +85C With Conduction Cooling
MTBF (MIL-HDBK-217F)		> 600,000 at 25C	> 600,000 at 25C	> 600,000 at 25C	> 600,000 at 25C	> 600,000 at 25C
Recommended Usage	Intel Core i5/i7 SBCs	ADLxxHD(S) 855, 945, GS45, QM67, QM87	ADLxxPC - GS45, Atom D25, QM67, QM87, E3800	ADLxxPC - GS45, Atom D25, QM67, QM87, E3800	ADLxxPC - GS45, QM67, QM87	ADLxxPC - GS45, QM67, QM87
Notes	ATX Compatible; 2"x4" Form Factor	ATX Compatible; 2" x 4" Small Form Factor	ATX Compliant; PCI/104-Express Std; Supports PCI/104 and PCIe/104**	ATX Compliant; PCI/104-Express Std; Supports PCI/104 and PCIe/104**	Optional Mil-Std 704, Mil-Std 1275, and Mil-Std 461 Filter Available**	Optional Mil-Std 704, Mil-Std 1275, and Mil-Std 461 Filter Available**

*** ADLPS35ISO - Galvanic Isolated. ** Voltage/Temp Monitoring**

FEATURES INCLUDE

- MTBF > 600,000 hours; MIL-HDBK-217F on ADLPS35 and ADLPS104
- Rugged Latching and Locking Connectors for High Shock and Vibration Tolerance
- Small 51 x 102 mm Form Factor for Space Constrained Applications and PC/104 Variants for Stacked Configurations
- Options for MIL-STD 704 / 1275 / 461 Available
- Robust ATX Compatibility for High-Performance Intel Core i7 and ADLGS45 Applications
- Thermal Cooling Options for Extended Temperature Applications
- Voltage and Fault Monitoring Options
- Solidworks® 3D CAD Models and Design Support Available

Peripherals & Accessories

ADL Embedded Solutions provides a number of peripherals and accessories readily available to support customer projects. Beyond this, our focus on Standard Form Factors (SFF) make available a vast ecosystem of 3rd party peripherals and custom solutions from partner vendors.

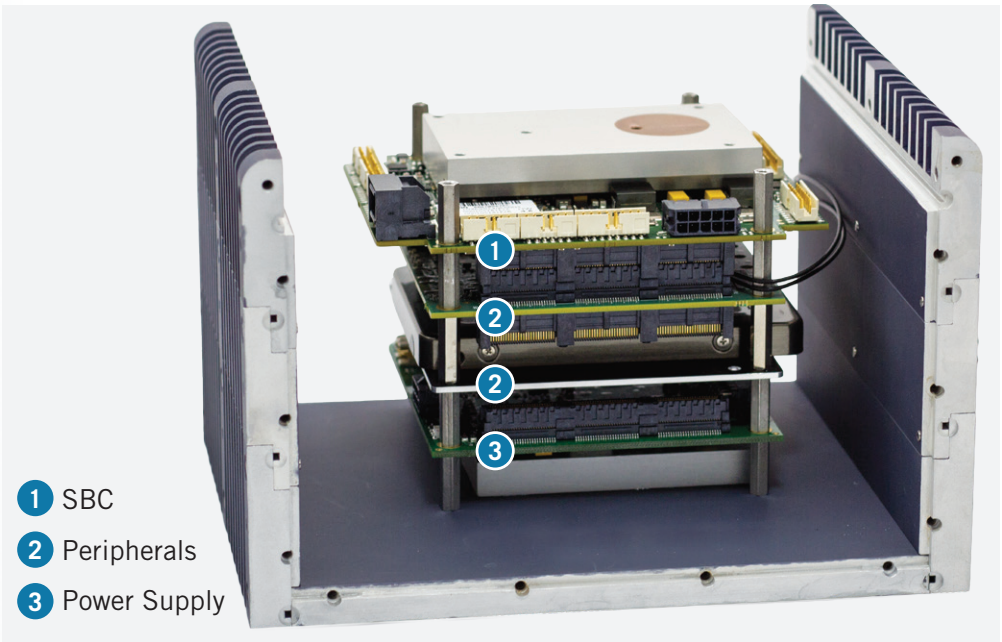
PERIPHERALS

ADL Embedded Solutions has a broad portfolio of I/O peripheral boards and modules to enable the many embedded solutions that our customers require. Our CPUs support a number of expansion busses including PCI-Express and USB 3.0. Peripheral form factors include PC/104, miniPCIe, mSATA, M2. (AHCI and PCIe), a number of custom modules and legacy peripherals like ISA and PCI.

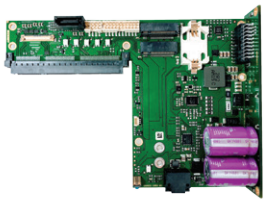
ACCESSORIES

For our customers' convenience, ADL Embedded Solutions carries a wide-range of accessories, such as Drives, Compact Flash modules, individual cables, and cable kits. You can order these products alone, installed onto an SBC, or system sub-assembly.

SYSTEM ASSEMBLY

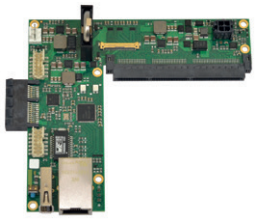


1. SBC
2. Peripherals
3. Power Supply



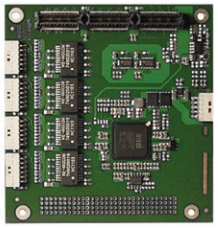
ADLSEC-1710 EDGE-CONNECT EXPANSION BOARD

- Pseudo 3.5“ SBC Footprint mated with ADL3800SEC
- PCIe x1 M.2 2280 With USB 2.0
- PCIe x1 M.2 2262 With USB 2.0
- 1x SATA 3Gb/s
- CR2032 Battery Socket
- IPEX Connector – DP/HDMI
- 8bit GPIO
- 50W Onboard PSU
- Vin = 20-30V
- Push Button Reset
- S-UPS Port



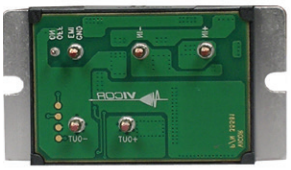
ADLSEC-1720 EDGE-CONNECT EXPANSION BOARD

- Pseudo 3.5“ SBC Footprint mated with ADL3800SEC
- 1x 180° PCIe x1 Socket for PCI-Express Expansion
- Integrated 35W PSU for PCI-Express Boards; Vin = 24VDC
- 1x Ethernet LAN (i210) RJ45 (Optional FCI Locking Connector)
- 1x USB2.0 Type A (Optional FCI Locking Connector)
- 1x Fan-Connector
- 1x Coin-Insert RTC Battery (CB2032)
- IPEX Connector: Displayport/HDMI/USB2.0
- Software Configurable Pushbutton (Pwr-Btn / Reset)
- 8bit GPIO via SMbus
- 2x RGB Status-LED



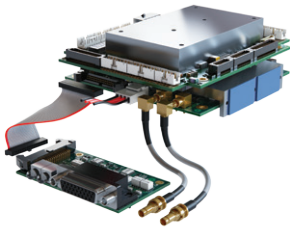
ADLLAN-41000E QUAD-PORT GIGABIT ETHERNET LAN PCI/104-EXPRESS

- Intel® I350-AM4 Quad Port Gigabit LAN Controller
- PCI/104-Express Form Factor with PCI Pass-thru
- Compatible With Type 1 and Type 2 PCIe/104 or PCIe/104-Express SBCs
- PCIe V2.0 (2.5GT/s, 5.0GT/s) Using x1 PCIe Lane
- ACPI / APM Wakeup
- PXI Pre-boot Support
- Jumbo Framing up to 9.5KB
- 2xUSB 2.0 Ports From Host SBC
- Integrated I/O Virtualization
- Up to 4 Boards Possible in Stack, 6 Ports Total at Gigabit Speed



MIL-STD 461 D/E/F MILCOTS FILTER

- Small Size = 45 x 36 x 9 mm
- -40°C to +85°C Operation
- EMI Filtering: MIL-STD-461E/F
- Transient Protection MIL-STD-1275 and MIL-STD-704
- Vin = 16.5 – 50 Vdc
- 350W Max. Output
- Compatible With ADLPS35, ADLPS104, and ADLPS104ISOL
- Optional 293030 PC/104 Mounting Plate Can Fit ADLPS35 Side-By-Side

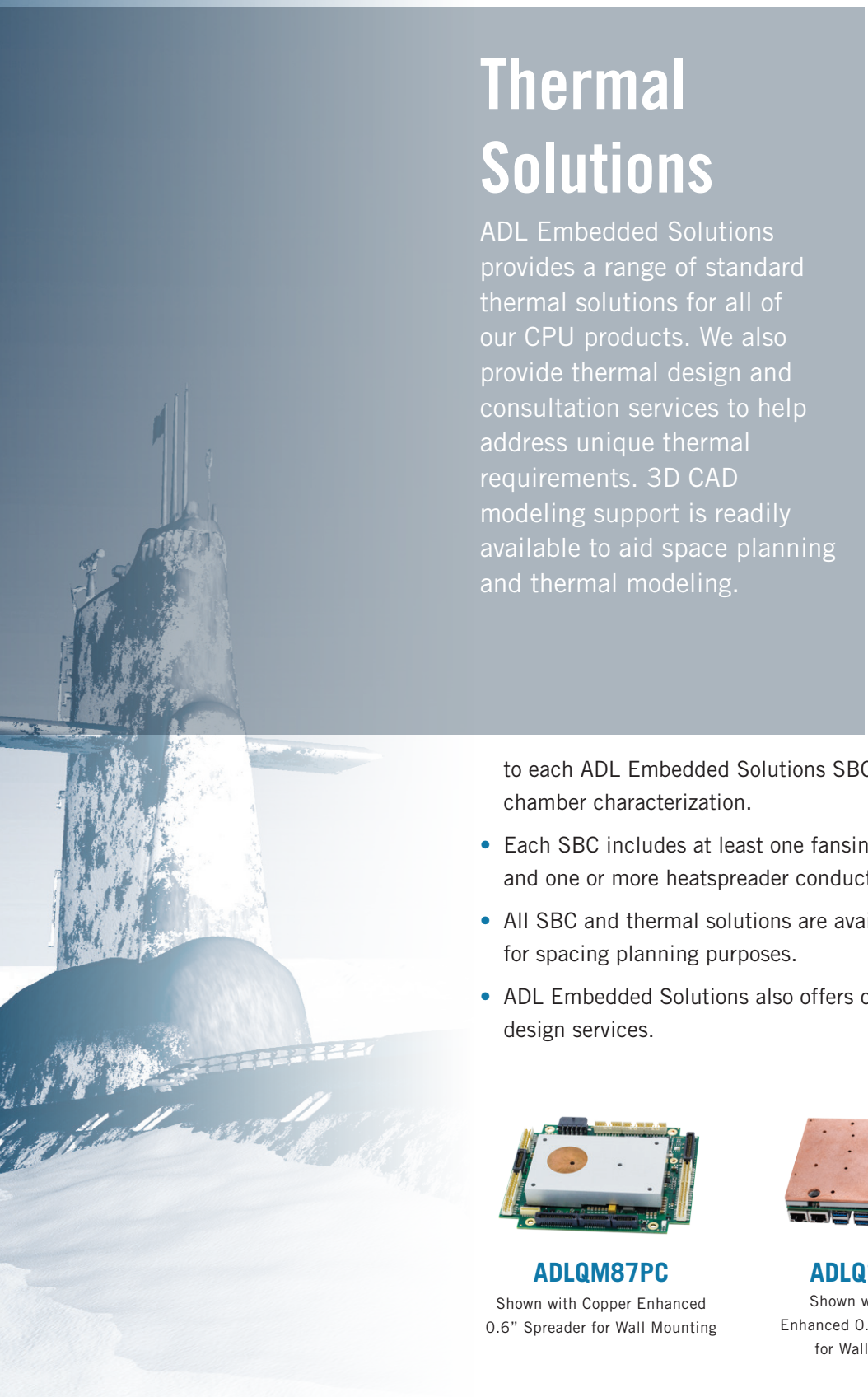


VISION PERIPHERALS PCIe/104

- Available for ADLQM87PC, ADLQM67PC
- PCIe/104 Cards: 2-CH CoaxPress (CXP-6), 4-CH Cameralink (4xBase, 2xMed, 1xFull)
- mPCIe Modules: mPCIe 8-CH NTSC/PAL, 1x Cameralink Base

ADL-CS100 CONDUCTION COOLING DEVELOPMENT PLATE

- 25cm x 25cm x 1.3cm (10” x 10” x 0.5”)
- Equivalent to 6” x 6” x 6” inch SFF Chassis With ¼” Thick Walls
- Excellent Room Temperature Stack Evaluation Prior to Integration
- Simulates “Real World” Conduction Cooling and Provides Good Baseline for Final Chassis Design
- K-100 Powder Cast, 6061 Precision Milled Aluminum
- Compatible with ADL PC/104, PCI/104, PCIe/104-Express and PCIe/104 SBCs



Thermal Solutions

ADL Embedded Solutions provides a range of standard thermal solutions for all of our CPU products. We also provide thermal design and consultation services to help address unique thermal requirements. 3D CAD modeling support is readily available to aid space planning and thermal modeling.

EXPERT THERMAL DESIGN

ADL Embedded Solutions offers highly effective heat conductive and heat convective thermal solutions tailored to maximize the longevity of your SBC.

DESIGN AND ENGINEERING FEATURES INCLUDE:

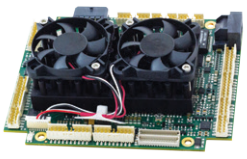
- Designed to exacting specifications by our Solidworks® Design Team.
- Milled locally in US to tolerances of less than 1mil for critical dimensions.
- Anodized color coatings and trivalent chromate (TCP) coatings used for humidity protection and optimal thermal emissivity.
- Each thermal solution is custom design and characterized to each ADL Embedded Solutions SBC and verified through thermal chamber characterization.
- Each SBC includes at least one fansink convective cooling option and one or more heatspreader conduction cooling solutions.
- All SBC and thermal solutions are available in Solidworks® 3D CAD for spacing planning purposes.
- ADL Embedded Solutions also offers custom enclosure and thermal cooling design services.

ADLQM87PC

Shown with Copper Enhanced 0.6" Spreader for Wall Mounting

ADLQ170HDS

Shown with Copper Enhanced 0.375" Spreader for Wall Mounting



ADLQM67PC

Shown with 2" x 2" Fansink

PC/104 THERMAL SOLUTIONS MATRIX

Part No.	Item Code	ADLLX8PC	ADLS15PC	ADLD25PC	ADLE3800PC	ADLGS45PC	ADLQM67PC	ADLQM67PC i7-3517UE	ADLQM87PC	ADLE3800SEC
292055	ADLTS1LX	X								
292056	ADLTS2LX	X								
292057	ADLTS3LX	X								
292059	ADLTS4LX	X								
292061	ADLS15PC-SP0600 SPREADER		X							
292064	ADLS15PC-SP1000 SPREADER		X							
292063	ADLS15PC-FANSINK (1"x2")		X							
292062	ADLS15PC-LP PASSIVE		X							
297413	ADLGS45PC-FANSINK					X				
292406	ADLGS45PC-SP0600 SPREADER					X				
292410	ADLGS45PC-SP1000 SPREADER					X				
292513	ADLD25PC-SP0600			X						
292514	ADLD25PC-SP1000			X						
292517	ADLD25PC-FANSINK (2"x2")			X						
292512	ADLD25PC-LP PASSIVE			X						
292806	ADLE3800PC-SP0600				X					
292808	ADLE3800PC-SP1000				X					
292810	ADLE3800PC-LP Passive				X					
292812	ADLE3800PC-FANSINK (2"x2")				X					
292610	ADLQM67PC-Fansink						X			
292612	ADLQM67PC-SP0600						X			
292614	ADLQM67PC-SP1000						X			
292619	ADLQM67PC-3517UE-SP0600							X		
292760	ADLQM87PC-SP0600								X	
292761	ADLQM87PC-SP1000								X	
929762	ADLQM87PC-FANSINK								X	
295850	ADLE3800SEC-SPREADER									X
290010	CS-100 (10" x 10" x 0.5")	X	X	X	X	X	X	X	X	
290012	CS-50 (5" x 10"x 0.5")									X

3.5-INCH THERMAL SOLUTIONS MATRIX

Part No.	Item Code	ADLQ170HDS	ADL-QM67HDS	ADL-3G67HDS	ADL-QM87HD	ADL-E3800HD	ADL-E3800HDC
29486X	ADLQM67HDS-SPREADER		X	X			
294863	ADLQM87HD-SPREADER				X		
294864	ADLE3800HD-SPREADER					X	
294152	ADL35-BBHS (SPREADER req'd)	X	X	X	X	X	X
294865	ADLE3800HDC-SPREADER						X
294866	ADLQ170HDS-COPPER SPREADER	X					

Thermal Management

Robust embedded designs rely on knowledge of the required CPU performance, I/O, and power requirements as well as a careful consideration of the thermal envelope and the interplay between the various design elements.

ADL Embedded Solutions is an expert at balancing these various factors to develop optimal and reliable solutions for our clients.

DESIGN CONSIDERATIONS

Designing successful embedded systems demands efficient PCB design, choosing low power and long-life components, and the creation of an effective cooling solution within the parameters specified. Since heat reduces the life of embedded systems, efficient cooling solutions directly result in long-term reliability for the overall system.

THERMAL ANALYSIS

The difference between T_{jmax} (maximum CPU junction temperature allowable) of the CPU and the maximum $T_{ambient}$ (ambient temperature taken external to the thermal solution such as the heatsink for an open stack or external to the chassis for an embedded stack) defines the temperature delta which the thermal solution must achieve.

For example, commonly CPU T_{jmax} = 100°C, so if maximum $T_{ambient}$ = 85°C, the thermal solution temperature rise cannot exceed 15°C.

In summary:

$Max\ T_{delta} = T_{jmax} - Max\ T_{ambient}$

Lower-powered SBCs such as Intel Atom architectures can often be sufficiently cooled through passive or forced convection (fan assisted) heatsink solutions and still meet extended temperature requirements.

Higher-powered architectures such as the Intel Core i7-series or GS45GME usually cannot meet extended -40°C to +85°C operation without a conduction cooling path to a larger metal structure (vehicle bulkhead, airframe, system cabinet, etc.) as described below.

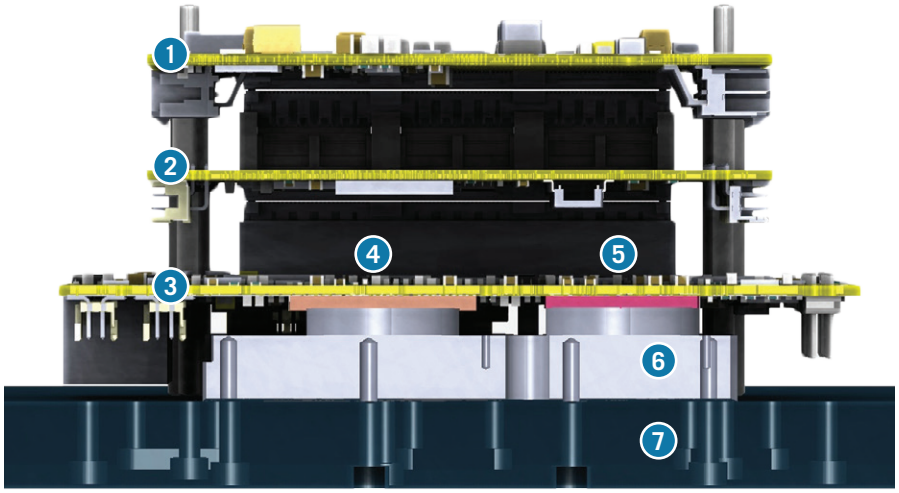
Make note of maximum CPU load required and test final chassis enclosure under these conditions. Reduced CPU load translates directly into lower heat generation and reduced thermal cooling requirements.

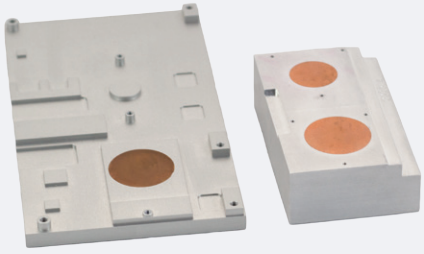
ADL Embedded Solutions also offers custom enclosure and thermal cooling design services.

Cross-Section of PC/104 Stack With Heat Spreader

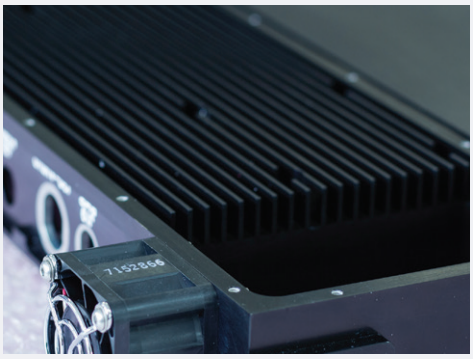
FEATURES

1. Power Supply
2. Peripheral
3. SBC
4. CPU Die
5. Chipset Die
6. ADL Heatspreader
7. Customer Chassis Wall/Base





HEATSPREADERS



CHASSIS FIN

HEAT SPREADER AND CHASSIS COOLING KEY POINTS:

1. Using precision-milled heat spreaders specifically designed for each ADL Embedded Solutions platform, heat from the CPU/Chipset is conduction transferred to the chassis wall/base.
2. Heat spreaders are often copper-enhanced or high-performance / high temperature SBCs, include specialty coatings to optimize emissivity and are coupled with precision standoffs to maintain planarity and optimal mechanical coupling to the chassis wall.
3. The Chassis is designed by the customer or ADL Embedded Solutions to dissipate the heatconducted from the heat spreader as follows:

   Passive Convection Cooling through use of a finned chassis design that takes advantage of available airflow is just one example.

   Forced Convection Cooling of a finned chassis design by adding an appropriate externally-mounted fan.

   Conduction Cooling by mounting the chassis base in such a way as to make metal-to-metal contact with the vehicle bulkhead, airframe, system cabinet, etc., such that the chassis heat is conduction transferred to the larger metal structure. This is the more common cooling strategy for high-powered Intel Core i7 designs, especially quad-core CPUs.

Tech Brief: What is PC/104?

Introduced in 1991 as an expansion method to add I/O to larger size embedded computers. Today, a huge selection of single board computers, I/O cards, and peripheral modules are available in the PC/104 form factor. Over 60 companies around the world offer CPUs, I/O boards, packaging, and accessories for PC/104.

PC/104 BACKGROUND

PC/104 is a stackable, embedded computer standard with a compact footprint and stackable bus architecture. Unlike a regular desktop PC which uses a backplane, PC/104 modules mate together via stackable ISA, PCI, and PCIe bus connectors. PC/104's success in embedded applications is due to:

Compact Size
90 x 96 mm (3.6" by 3.8") Module Size

Self-Stacking
Expands Without Backplanes or Card Cages

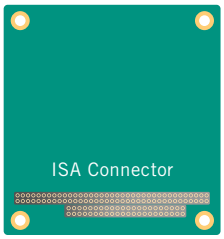
Rugged, Reliable Connectors
Reliable in Harsh Environments; 1000+ Mating Cycles as Compared to <100 for COMs

Four-Corner Mounting Holes Assymetrical Layout with Increased Resistance to Shock and Vibration

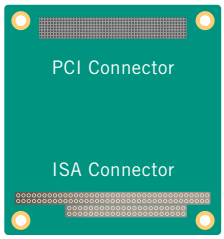
Fully PC Compatible Reduced Development Costs and Time-To-Market

PC/104 BUS EVOLUTION

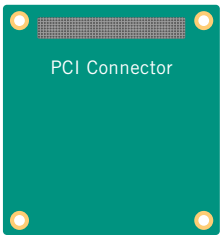
PC/104 stackable embedded PCs have followed the desktop PC leveraging on the hardware and software support developed for this popular platform.



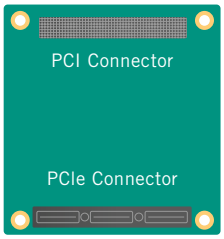
PC/104



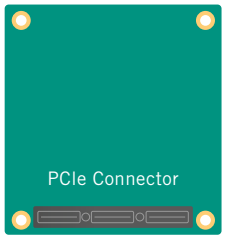
PC/104-Plus



PCI/104



PCI/104-Express



PCIe/104

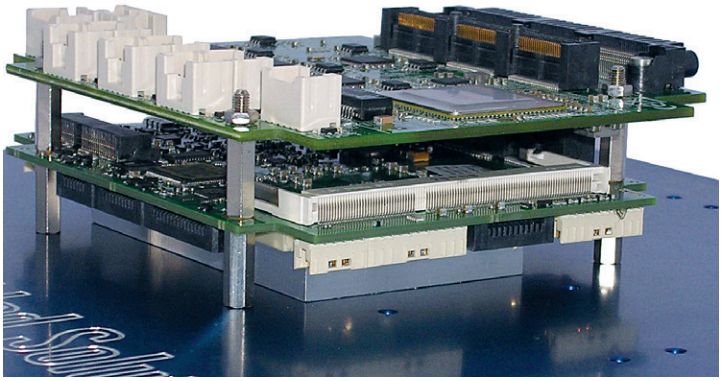
Down Stack Configuration Examples

The flexibility and expandability of the bus and mechanical layout allow many different stack configurations to support an array of diverse project requirements. See full specification below for more examples.

CUSTOM SBCS AND PERIPHERALS FOR OPTIMAL SIZE AND I/O CONFIGURATIONS

Space constrained solutions can be optimized by way of custom I/O boards that help collapse multiple I/O boards on the stack down to one board as illustrated in the example at right with an oversized I/O peripheral card.

Alternatively, custom, single board SBC solutions can also be created by ADL Embedded Solutions for optimal size and I/O configurations.

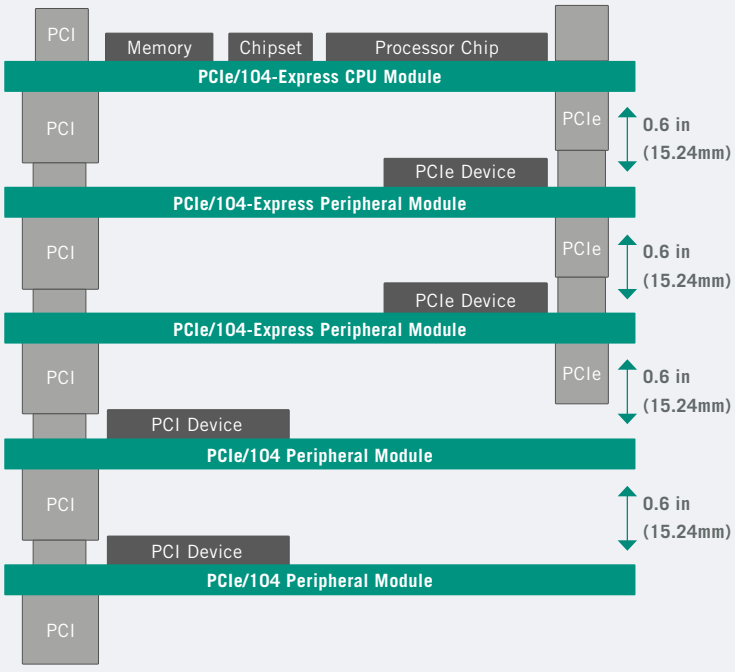


PCIe/104 ADLQM87PC with Custom I/O Board

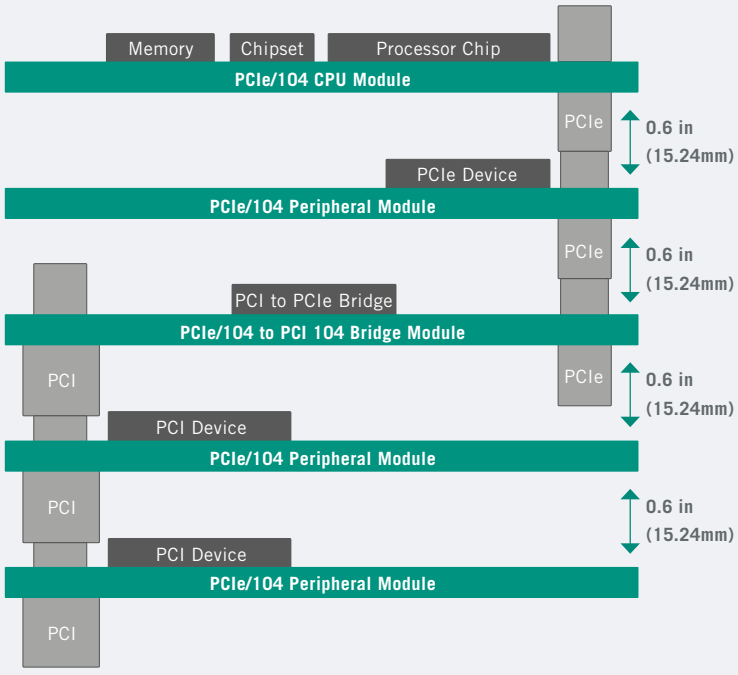
PC/104
Embedded PC Modules

Specification Examples

PCIe/104-Express SBC Stack Example with PCIe/104 and PCI Modules



PCIe/104 SBC Stack Example with Bridge Card for PCI Modules



ADL, Case Studies

COMMERCIAL DRONE CAMERALINK PAYLOAD COMPUTER

Designed for commercial shortwave IR (SWIR) customer application using DJI Ronin MX gimbal, this payload computer features 2x Cameralink base-rate ports for SWIR or Hyperspectral camera use, 2x USB 3.0 ports, and Intel Dual Core i7 CPU, 802.11 Wifi connectivity, and rugged milled aluminum chassis design.

IIOT EDGE DEVICE FOR ICS CYBER SECURITY

Using the ADLEPC-1520 mini industrial PC (58 x 86 x 94 mm), ADL recently used the modular architecture of this compact, fanless PC to create a custom edge device targeting cyber threat security of US power utility sub-stations. Key to the success of this project, aside from the customer's value-added security software, was compact size to ease retrofitting, long-term available (15 year) processors, wide operating temperature, wide input voltages and expert design and engineering services for custom board, firmware and driver development.

FACIAL RECOGNITION FOR NOAA FISH COUNT SURVEYS

ADL Embedded Solutions, Inc. worked closely with the NMFS Alaska Fisheries Science Center to make key improvements to their Camera-Trawl system including: GeniCam vision compliance, Intel Quad i7 CPU performance, IP-67 rated ingress protection and reduction of overall size of the enclosure for mounting flexibility and ease of storage and transportation.

ADL, Markets We Serve

TRANSPORTATION

Embedded PC Solutions can be leveraged in many Transportation applications. Owing to their ruggedness and flexible I/O, what is deployed in one environment is often easily adaptable to another.

Transportation applications can range from solar-powered ticket and information kiosk to tracking and remote power train control in all manners of Transportation environments from Automotive and Avionics to Passenger and Freight Railway.

Areas Include:

- Railway
- Aeronautical Systems
- Automotive Fleet Management
- Traffic Control Management
- Vehicle Advanced System Development

ENERGY

The Energy Sector has come to rely on embedded SBC systems to serve their small to medium volume computation and control node needs.

Energy Infrastructure represents a long-run cyclical upgrade market that benefits greatly from carrying their application investments across multiple generations of hardware.

Areas Include:

- Motor Control Systems
- Oil and Gas Drilling and Exploration
- Mining
- Renewable Energy
- Energy Distribution
- Infrastructure Inspection
- Leak Detection

IIOT & CYBER SECURITY

Industrial Control Systems (ICS) and SCADA are rapidly evolving to keep pace with innovations in IIoT and cloud computing, as well as cyber-threat security of high-value infrastructure.

Embedded hardware must keep pace with rugged, compact, wide-temperature and long-lived products to meet these demands.

Areas Include:

- IIoT Edge Devices
- ICS/SCADA Cyber Threat Security
- Secure Networking
- Network Traffic Monitoring
- Cross-Domain Solutions (CDS)
- NIST, NIAP, DISA Compliant Hardware

INDUSTRIAL

Embedded PC systems offer an encompassing mix of legacy hardware and software support with planned migrations to future hardware.

This results in significant economic advantages by leveraging existing hardware and software as well as shortening the development cycle for new Industrial Automation Systems. Wireless communications, control, and monitoring among industrial devices to enhance capabilities and efficiencies that provide a competitive advantage. Modular/Flexible system platforms and components provide added functionality and upgradability.

Areas Include:

- Process Control
- Robotics
- Building Automation
- Autonomous Factory-Networked Device Systems
- Machine Vision

MEDICAL

There are many reasons to choose high reliability, long-life embedded SBCs and systems for medical industry applications.

The use of COTS Embedded SBCs reduces time to market by enabling Medical OEM manufacturers to focus their expertise on their platform designs, rather than on CPU engine technology. ADL Embedded Solutions offers the best in embedded solutions that provide the performance to drive systems like Medical Imaging where advanced graphics capabilities are a necessity for clear 2D and 3D rendering.

Areas Include:

- Imaging
- Medical Instrumentation
- Biological Inspection Systems

GOVERNMENT & DEFENSE

Technology spending in Government and Defense over the next ten years will place heavy emphasis on Unmanned Aerial Vehicles (UAVs), as well as supporting infrastructure, such as ground control stations, shipboard control stations, and Command and Control Systems. Supporting UAS and battlefield infrastructure like Command and Control and Secure Communications/Networking Systems will also evolve to scale with the ever-increasing demand for secure, distributed communication bandwidth.

Extended Temperature/Ruggedized Systems with long-term Product Support make embedded systems the appropriate choice in these harsh and demanding environments.

Areas Include:

- Avionics ISR
- Secure Communications and Networking
- Command and Control
- Imaging and DSP
- UAV & UAS
- Ground Penetrating Radar Detection

Contact Us

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TECHNOLOGY STANDARDS & CERTIFICATIONS

ISO 9001:2015 CERTIFIED SMITHERS QUALITY ASSESSMENTS

intel

PC/104 Embedded PC Modules

BBB ACCREDITED BUSINESS