



Wide temperature
small form factor SBCs



SBCs with integrated
data acquisition



COM-based SBCs for
long life applications



Modular and
Stackable I/O



PCIe MiniCard I/O



All-in-one systems

2014 Product Guide



The Perfect Fit for Imperfect Environments

Wide variety of rugged, small form
factor SBCs & I/O modules including
industry-leading data acquisition

PCI/104-Express
PC/104-Plus
PC/104
COM Express
QSeven
EPIC
EBX
EMX™
ETX

NEW!



**PCIe
MiniCards**

See
P. 17

www.diamondsystems.com

The Perfect Fit for Imperfect Environments

Table of Contents

Single Board Computers	Description	Form Factor	Page No.
Athena III	1GHz / 1.6GHz Intel Atom E-Series SBC	PC/104	5
Hercules III	1.6GHz Intel Atom E680T SBC	EBX	5
Helios	800MHz / 1GHz Vortex86DX SBC	PC/104	5
Neptune	ETX COM-based SBC with configurable COM module	EPIC	5
Altair	1.6GHz Intel Atom E680T SBC	PC/104-Express	6
Aurora	1.1GHz / 1.6GHz Intel Atom Z-Series SBC	PC/104	6
Pegasus	500MHz Geode LX800 SBC	PC/104-Plus	6
Rhodeus	500MHz Geode LX800 SBC	PC/104	6
Atlas	1.86GHz Intel Atom N2800 SBC	PC/104-Express	7
Quantum	QSeven COM-based SBC with configurable COM module	PC/104-Express	7
Vega	EMX Basic COM-based SBC with configurable COM module	EMX Basic	8
Magellan	COM Express COM-based SBC with configurable COM module	COM Express	8
Pluto	ETX COM-based SBC with configurable COM module	ETX	8

I/O Modules	Description	Form Factor	Page No.
DMM-2000-AT	32 16-bit A/D, 16 16-bit D/A, 21 DIO, PWM analog I/O module	PC/104-Plus	10
DMM-32DX-AT	32 16-bit A/D, 4 16-bit D/A, 24 DIO analog I/O module	PC/104	11
DMM-32X-AT	32 16-bit A/D, 4 12-bit D/A, 24 DIO analog I/O module	PC/104	11
DMM-16-AT	16 16-bit A/D, 4 12-bit D/A, 8 DIO analog I/O module	PC/104	11
DMM-AT	16 12-bit A/D, 2 12-bit D/A, 8 DIO analog I/O module	PC/104	11
GPIO-MM-XT	Up to 96 channel Digital I/O module	PC/104	12
ONYX-MM-XT	48 channel Digital I/O module	PC/104	12
OPMM-1616-XT	16 optoisolated input, 16 relay output module	PC/104	12
Pearl-MM-P	16 relay output module	PC/104	12
EMM-8P-XT	8-port RS-232/422/485 serial module	PC/104	13
EMM-OPT4-XT	4-port optoisolated RS-232/422/485 serial module	PC/104	13
EMM-4M-XT	4-port RS-232/422/485 Module	PC/104	13
EMM-8ML	4 or 8-port RS-232/422/485 serial module	PCle/104	13
RMM-1616AP	16 16-bit D/A, 48 DIO analog output module	PC/104-Plus	14
JMM-512	50W DC/DC power supply	PC/104	14
JMM-LP	25W DC/DC power supply	PC/104	14
EMM-8PLUS-XT	8-port RS-232/422/485 serial module	PC/104-Plus	15
MRC-424-XT	Quad Ethernet with 24 DIO I/O module	PC/104	15
P104-GPIO96	Up to 96 configurable channel Digital I/O module	PC/104-Plus	15
P104-DAQ1616	32 16-bit A/D, 16 16-bit D/A, 56 DIO analog I/O module	PC/104-Plus	15
FP-DAQ1616	32 16-bit A/D, 16 16-bit D/A, 56 DIO analog I/O module	FeaturePak	16
FP-GPIO96	Up to 96 configurable channel Digital I/O module	FeaturePak	16
EMX-ESG200	Dual Gigabit Ethernet module	EMX Compact	16
EMX-ESG614	6 RS-232/422/485 & 14 DIO module	EMX Compact	16
DS-MPE-SER4M	4-port RS-232/422/485 serial module	PCle MiniCard	17
DS-MPE-SEROPT4	4-port optoisolated RS-232/485 serial module	PCle MiniCard	17
DS-MPE-GPIO	36 channel Digital I/O module	PCle MiniCard	17
DS-MPE-DAQ0804	8 16-bit A/D, 4 16-bit D/A, 14 DIO analog I/O module	PCle MiniCard	17
DS-MPE-GE1	1-port Gigabit Ethernet module	PCle MiniCard	17
DS-MPE-CAN2L	Dual CANbus 2.0 I/O module	PCle MiniCard	17
Epsilon-12G2	14-port managed Gigabit Ethernet switch	COM Express	18
Epsilon-8000	8-port managed Gigabit Ethernet switch	PC/104	18
Corona	Dual LAN, Dual USB, wireless socket I/O module	PC/104	18
Janus-MM	Dual CAN with GPS/cellular communications I/O module	PC/104	18

Enclosures and Systems	Description	Form Factor	Page No.
Pandora	Modular embedded enclosure system	PC/104	19
Raptor-Vega	Rugged Application Server		20
Raptor-EG125FP	Rugged 14-port managed Gigabit Ethernet switch system		20
Raptor-EG8	Rugged 8-port managed Gigabit Ethernet switch system		20
Octavio	Embedded application server systems		21

Software		22
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Accessories	Memory modules, adapter kits and other accessories	23
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The Diamond Systems Advantage

Since 1989, Diamond Systems has established a leadership position as a worldwide supplier of compact, rugged, wide-temperature board- and system-level real world embedded computing solutions to companies in a broad range of markets, including transportation, energy, aerospace, defense, manufacturing, medical and research.

Our years of extensive experience have resulted in a unique, comprehensive understanding of customer needs and how to most efficiently serve them.

Our distinctive areas of technology leadership include best-in-class I/O, customization and integration capabilities, rugged design techniques and continuous innovation demonstrated by our growing family of embedded products:

- ◆ Wide temperature, small form factor single board computers based on a broad range of power/performance CPUs
- ◆ Versatile, small form factor computer-on module (COM) boards and baseboards for long-life applications
- ◆ Rugged, compact, modular and stackable I/O offering analog and digital I/O, wired and wireless communications, GPS, solid-state disk and power supply functions
- ◆ High quality, all-in-one systems

As an OEM, system integrator or product developer, you will appreciate our willingness to refine solutions beyond off-the-shelf designs with innovations such as the FeaturePak I/O and EMX standards, our patented analog I/O autocalibration technique as well as advanced rugged design techniques including shock and vibration resistance and conduction cooling.

Discover how we can customize and integrate our formidable capabilities into a streamlined Perfect Fit solution that is ideal for your imperfect environment.



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Perfect Fit Solutions

Diamond Systems' Perfect Fit embedded solutions

optimize feature density, size and cost using innovative ideas and technologies to meet specific customer applications. We understand that every customer's requirements are unique.

Our consultative approach to embedded systems results in greater economy and functionality than traditional off-the-shelf solutions, while meeting your needs more precisely.

Traditional small form factor solutions, consisting of multiple vendors' boards in a tall stack, are often too large and expensive, suffering from interoperability issues and reduced reliability.

In contrast, Diamond's SBCs and embedded solutions use a hybrid approach with customized modules where possible to reduce size and cost or achieve performance optimization.

We also continue to introduce innovative design concepts such as CPU + I/O on one board and conduction cooling for more efficient thermal dissipation that further contribute to the perfect fit.

As part of our collaborative design process, we encourage you to jointly discuss alternatives and techniques with us, and then define an optimized design that meets your needs. The resulting product offers the ideal combination of features for your application, while minimizing size, cost and assembly time. It's a perfect fit!

Benefits of Perfect Fit Solutions

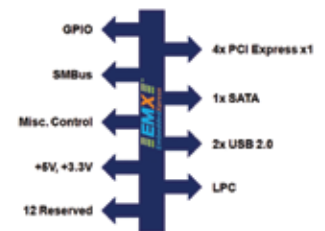
- ◆ Higher functionality in a smaller footprint
 - 2-in-1 SBCs with data acquisition
 - Extensive variety of small form factors
 - Use of COMs (COM Express, Qseven) for longer product lifecycles
 - Custom modular I/O, including PC/104, PCIe MiniCard and FeaturePak to reduce development costs and time to market
- ◆ Proven technologies for reduced risk, longer lifecycles
- ◆ Improved size, weight, and power (SWaP)
- ◆ Optimum combinations of features to reduce cost
- ◆ Increased ruggedness and reliability
 - Wide temperature ranges
 - Conduction cooling
 - Shock and vibration resistance
 - Conformal coating
- ◆ More responsive support from a collaborative supplier

EmbeddedXpress Form Factor Overview

EMX is the only embedded form factor that combines the performance scalability of COMs with the configuration flexibility of stackable I/O. EMX offers choices in both CPU modules AND I/O modules *in the same system*. This gives you unprecedented flexibility in configuration plus increased lifecycle for your application. Since the COM can be upgraded more easily than an SBC, your system is better protected from short processor lifecycles, and you benefit from easier CPU migration and reduced total cost of ownership.

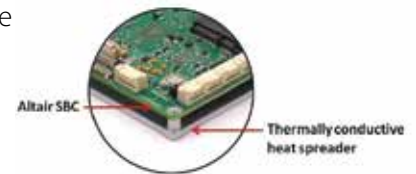
An EMX SBC is just like a typical single board computer, except that it usually consists of two boards, the COM and the baseboard. The COM provides the CPU features, while the baseboard provides the remaining I/O circuitry and turns the COM into a complete off-the-shelf SBC.

The heart of EMX is its low-cost, compact-size I/O expansion connector. This connector offers the same expansion buses found in other stackable I/O formats (PCIe, SATA, LPC, USB, SMB) but in a significantly smaller size and lower cost. This



reduces board costs and means more I/O can fit on the board, potentially reducing the number of I/O modules needed in the system.

EMX SBCs use conduction cooling to dissipate heat efficiently directly to the enclosure, keeping the inside of the system cooler for greater reliability.



Using the same shape and mounting hole pattern as Com Express modules (95x95mm and 95x125mm) increases the surface area available for circuitry, making EMX modules higher feature density. For more information please visit www.emxbus.org.

EMX products in this catalog:

Altair SBC	Page 6
Vega SBC	Page 8
EMX-ESG I/O	Page 16

Single Board Computer Product Selection Guide

Diamond Systems offers a wide variety of rugged, single board computers in a variety of small form factors, including PC/104, PC/104-Plus, PCI/104-Express, EMX, ETX, COM Express, EPIC, and EBX. Our products are notable for their combination of small size, ruggedness, and high degree of I/O. Virtually all of our SBCs operate over the extended temperature range of -40°C to +85°C and are either designed or qualified for MIL-STD-202 shock and vibration ratings. Diamond invented the 2-in-1 concept of SBC + data acquisition on a single board. This 2-in-1 integration reduces the cost, size, and weight of your embedded system while increasing its ruggedness.

2-in-1 SBCs

Data acquisition and other I/O integrated on board to save space

Small Form Factor SBCs

Performance scalability, long lifecycle, and high feature density



Conduction Cooled SBCs

Higher reliability and wider operating temperature ranges

COM-Based SBCs

Performance scalability and longer product lifecycles

Product	Form Factor	Processor/Speed	Power	Memory	Video	Audio	RS-232	RS-232/422/485	Ethernet	USB	DAQ	Expansion	Mass Storage	Input Voltage	Temp Range	Page No.
Altair	EMX Basic	Atom E680T / 1.6GHz	9.4W	Up to 2GB	LVDS, VGA	Yes	3	1	Gigabit	4 V2.0	No	EMX	1 SATA	5VDC	-40°C to +85°C	6
Atlas	PC/104-Express	Atom N2800 / 1.86GHz	6W	Up to 4GB	LVDS, VGA	HD	2	4	Gigabit	4 V2.0	No	PCI-104, PCIe/104	1 SATA	5VDC	-40°C to +80°C	7
Athena III	PC/104	Atom E680T / 1.6GHz Atom E640T / 1.0GHz	13W 9.4W	1GB	LVDS, VGA	HD		4	Gigabit	4 V2.0	Yes	PC/104	1 SATA	5VDC	-40°C to +80°C	5
Aurora	PC/104	Atom Z530P / 1.6GHz Atom Z510 / 1.1GHz	6W 5.4W	Up to 2GB	LVDS, VGA	Yes	2	2	Gigabit	4 V2.0	No	SUMIT-A and PC/104	1 SATA	5VDC	-40°C to +80°C	6
Helios	PC/104	Vortex86DX / 1GHz Vortex86DX / 800MHz	6W 5.4W	256MB	LVDS, VGA		2	2	10/100	4 V2.0	Yes	PC/104	1 IDE 100	5VDC	-40°C to +85°C	5
Hercules III	EBX	Atom E680T / 1.6GHz	14W	Up to 2GB	LVDS, VGA	Yes	4	2	Gigabit (2)	5 V2.0	Yes	PC/104-Plus	1 SATA	7-40VDC	-40°C to +85°C	5
Magellan	COM Express	Core2 Duo LV / 1.6GHz Atom Z510 / 1.1GHz	14.2W 10.3W	Up to 4GB	LVDS, VGA	Yes	2	2	Gigabit (2)	4 V2.0	No	PCI-104, SUMIT, FeaturePak	1 SATA	7-30VDC	-40°C to +85°C	8
Neptune	EPIC	Fusion G-T56N / 1.65GHz Fusion G-T40N / 1.0GHz	16.8W 12.3W	Up to 2GB	LVDS, VGA	Yes	2	4	10/100, Gigabit	4 V2.0	No	PC/104-Plus	2 IDE 100 1 SATA	5V, 7-28VDC	-40°C to +85°C	5
Pegasus	PC/104-Plus	Geode LX800 / 500MHz	5W	256MB	LVDS, VGA		1	1	10/100	4 V2.0	No	PC/104-Plus	1 IDE 33	5VDC	-40°C to +85°C	6
Pluto	ETX	Fusion G-T56N / 1.65GHz Fusion G-T40N / 1.0GHz	16.8W 12.3W	Up to 2GB	LVDS, VGA	Yes	3	1	10/100 (2)	4 V2.0	No	PC/104-Plus	1 IDE, 2 SATA	5VDC	-40°C to +85°C	8
Quantum	PCI/104-Express	i.MX6 single core / 1.0GHz i.MX6 quad core / 1.0GHz Fusion G-T40E / 1.0GHz G-Series eKabini SOC / 1.0GHz	7W 9W 10W 10W	Up to 2GB	LVDS, VGA, DDI	HD	1	2	Gigabit	5 V2.0	Yes	PCI-104, PCIe/104	1 SATA	5VDC, 6-32VDC	-20°C to +71°C	7
Rhodeus	PC/104	Geode LX800 / 500MHz	5W	Up to 1GB	LVDS, VGA		1	1	10/100	2 V2.0	No	PC/104	1 IDE 33	5VDC	-40°C to +85°C	6
Vega	EMX Basic	Intel Core i7-3517UE / 1.7GHz Intel Core i7-2610UE / 1.5GHz Intel Celeron 827ECPU / 1.4GHz	32W 32W 28.5W	Up to 4GB	LVDS, VGA, DVI	Yes		4	Gigabit (2)	4 V2.0	Yes	EMX	1 SATA	5VDC, 7-40VDC	-40°C to +85°C	8

2-in-1 SBCs with Data Acquisition



ATHENA III



**PC/104 SBC with
1.6 / 1.0GHz Intel Atom
E680T/E640T CPU and
Integrated Data Acquisition**



Athena III combines a single board computer with a complete professional-quality analog and digital data acquisition circuit into one compact, rugged board measuring 4.2" x 4.5". Backwards compatibility with Athena II and I ensures easy migration and extended lifetime for existing applications, while offering a significant upgrade in performance.

Athena III can serve as a platform for semi-custom SBC designs using customer-specific I/O. Athena III is available as a complete off-the-shelf Octavio™ DIN-rail mountable system! See page 21.

1.6 / 1.0GHz Intel Atom E-Series CPU

1GB / 2GB memory soldered on board

1 Gigabit Ethernet

VGA CRT and LVDS LCD

1 SATA port

4 RS-232/422/485 serial ports

4 USB 2.0 ports

USB flashdisk socket

PS/2 keyboard & mouse

PC/104 ISA expansion bus

<10W power consumption

Extended PC/104 form factor
4.175" x 4.475"

-40°C to +85°C operation

Data Acquisition Features:

16 16-bit analog inputs with autocalibration

150KHz max sample rate

Interrupt-based A/D sample with
512-sample FIFO

4 12-bit analog outputs

24 programmable digital I/O

Supported by Universal Driver™
programming library

HERCULES III



**EBX SBC with 1.6GHz Intel
Atom E680T CPU, Integrated
Data Acquisition, and DC/DC
Power Supply**



Hercules III is a feature-rich, rugged SBC combining processor, data acquisition, and wide-range power supply onto one board. Two gigabit Ethernet ports and a CAN 2.0 port are included for extra utility and value. It includes expansion sockets for PC/104-Plus, PCIe Minicard, mSATA, and GPS for unparalleled levels of functionality and expandability.

The 3-in-1 design addresses the needs of mobile and industrial applications where a high degree of connectivity is required.

1.6GHz E680T Intel Atom CPU

1GB or 2GB SDRAM

LVDS LCD and VGA CRT

5 USB 2.0 ports (including 1 client port)

2 RS-232/422/485 + 4 RS-232

2 Gigabit Ethernet ports

1 CANbus 2.0 port

1 SATA port; 1 mSATA socket

PCIe MiniCard & GPS sockets

PS/2 keyboard and mouse

PC/104-Plus (ISA + PCI) expansion

40W power supply with 7-40VDC input range

12W total power consumption

EBX form factor 8.00" x 5.75"

-40°C to +85°C operating temp.

Data Acquisition Features:

32 16-bit analog inputs with autocalibration

250KHz max sample rate

2048 A/D sample FIFO

4 12-bit wide-range analog outputs

40 programmable digital I/O

Supported by Universal Driver™
programming library

HELIOS



**Low-Power PC/104 SBC with
800MHz / 1GHz Vortex86DX
Processor, Integrated Data
Acquisition, and Video**



Helios combines a highly integrated, low-power Vortex86DX CPU with Diamond Systems' renowned high-accuracy data acquisition circuitry onto a compact PC/104 board. The 2-in-1 design reduces size, weight, and cost.

Helios can serve as a platform for semi-custom SBC designs using customer-specific I/O.

Helios is available as a complete off-the-shelf Octavio™ DIN-rail mountable system! See page 21.

Vortex86DX CPU at 1GHz or 800MHz

256MB of soldered-on DRAM

4 USB 2.0 ports

2 RS-232 & 2 RS-232/422/485

1 10/100 Ethernet

1 IDE port / Flashdisk socket

CRT and LVDS LCD display support

16 digital I/O lines

PC/104 ISA expansion bus

5W total power consumption

PC/104 form factor 3.55" x 3.775"

-40°C to +85°C operation

Data Acquisition Features:

16 16-bit analog inputs with autocalibration

250KHz max sample rate

Interrupt-based A/D sampling with
2048 FIFO

4 12-bit analog outputs

24 additional digital I/O

Supported by Universal Driver™
programming library

NEPTUNE



**EPIC SBC with
Interchangeable ETX CPUs,
Integration Data Acquisition,
and DC/DC Power Supply**



Neptune is a highly integrated long-life COM-based SBC featuring integrated autocalibrating data acquisition, wide range input voltage compatibility, and conduction cooling in the EPIC form factor.

Neptune's super-high I/O content can eliminate as many as 5 PC/104 IO modules, making your system smaller, lighter, and lower cost. The use of COMs means Neptune can be upgraded for enhanced performance or to extend its lifetime, without requiring any changes in physical system design or cabling.

Choice of AMD Fusion 1.65GHz
G-T56 or 1.0GHz G-T40 CPUs

Up to 2GB SO-DIMM memory

LVDS LCD and VGA CRT display

4 USB 2.0 ports

4 RS-232/422/485 + 2 RS-232

1 10/100 + 1 Gigabit Ethernet

1 SATA & 1 IDE port

CompactFlash & IDE flashdisk sockets

PC/104-Plus (ISA + PCI) expansion

5VDC and 7-28V DC inputs

-20°C to +71°C operating temp.

EPIC form factor 4.5" x 6.5"

Data Acquisition Features:

32 16-bit analog inputs with autocalibration

250KHz max sample rate

1024 A/D sample FIFO with
programmable threshold

4 12-bit wide-range analog outputs

24 logic-level digital I/O lines

8 optoisolated digital inputs +
8 optoisolated outputs

Supported by Universal Driver™
programming library

Small Form Factor SBCs

ALTAIR

EMX Basic™ Ruggedized SBC with Intel Atom E680T 1.6GHz CPU



Altair is a high performance, rugged SBC in the new EMX Basic form factor based on the Intel Atom E680T 1.6GHz CPU. Rugged features include 2GB of DDR2 DRAM soldered on board and latching I/O connectors.

An integrated bottom-mounted heat spreader provides efficient cooling for reliable wide temperature performance plus convenient mounting.

I/O expansion is via stackable high-performance EMX I/O modules and a PCIe MiniCard socket. The onboard System Management Controller offers system monitoring, MTBF, Watchdog timer, and analog & digital I/O features.



- Intel Atom E680T CPU at 1.6GHz
- 2GB soldered DDR2 SDRAM
- 1 Gigabit Ethernet port
- 1 SATA port
- 4 USB 2.0 ports
- 3 RS-232 + 1 RS-232/422/485
- 1 CANbus 2.0 port
- VGA and LVDS video output
- HD Audio
- On-board USB flashdisk socket
- 4 12-bit A/D, 10 GPIO, 4 PWM
- System management controller manages analog I/O, digital I/O, watchdog timer & RTC
- Virtualization ready via physical address extension (PAE)
- PCIe MiniCard socket
- EMX stackable I/O
- EMX Basic form factor 4.9" x 3.7"
- 40°C to +85°C operating temperature

AURORA

Ruggedized Atom Z530 1.6GHz PC/104 SBC with SUMIT and PC/104 Expansion



Aurora is based on the low-power 1.6GHz Intel Atom Z530P CPU. It utilizes a thin bottom-mounted heat spreader for efficient cooling, enabling it to operate at a higher ambient temperature than competitors' Z530 SBCs. The board supports up to 2GB of memory using rugged RSODIMM modules for high shock and vibration resistance. It provides high-resolution LVDS and SDVO graphics interfaces. Additional I/O ports include SATA, USB, serial, digital I/O, and Gigabit Ethernet. System expansion is via PC/104 (ISA) and SUMIT-A (PCIe) modules.

Sumit



- Intel Atom Z530 1.6GHz CPU
- RSODIMM rugged memory up to 2GB
- LVDS and SDVO display interfaces
- VGA adapter available
- 1 Gigabit Ethernet
- 4 USB 2.0 ports
- 2 RS-232/422/485 & 2 RS-232 serial ports
- PS/2 keyboard and mouse
- 8 digital I/O lines
- 1 SATA port
- Socket for USB flashdisk up to 32GB
- Watchdog timer
- PC/104 (ISA) and SUMIT-A (PCIe) I/O expansion
- PC/104 form factor 3.55" x 3.775"
- 40°C to +80°C operating temperature



Rugged SODIMM available in 1GB and 2GB capacities

PEGASUS

Rugged, low power PC/104-Plus SBC with 500MHz AMD LX800 CPU



Pegasus is a rugged, fanless PC/104-Plus SBC featuring the 500MHz AMD Geode LX800 processor with 256MB of soldered-on DDR SDRAM. This SBC offers fully integrated embedded-PC functionality with low power consumption, which enables it to operate in harsh environments where the airflow for heat dissipation is restricted, and heat sinks or fans are unacceptable.



- AMD Geode LX800 processor at 500MHz
- 256MB soldered-on SDRAM
- 4 USB 2.0 ports
- 1 RS-232 & 1 RS-232/422/485
- 1 10/100 Ethernet
- 1 IDE port for board-mounted flashdisk or external hard drive
- CompactFlash Type II socket
- CRT and 18/24-bit LCD support
- PC/104-Plus (ISA + PCI) expansion bus
- PC/104-Plus form factor 4.05" x 3.775"
- 40°C to +85°C operating temperature

RHODEUS

Low-Cost AMD LX800 PC/104 SBC with CRT/LCD, LAN, and CompactFlash



Rhodeus is a low-cost, low-power PC/104 SBC featuring the AMD Geode LX800 processor running at 500MHz. Rhodeus utilizes SODIMM memory with maximum capacity at 1GB. It offers 10/100 Ethernet, 2 serial ports, 2 USB 2.0 ports, parallel port, 1 IDE port, CompactFlash Type-II socket, LCD & CRT interface, floppy, watchdog timer, and PC/104 expansion bus. Rhodeus is available in both commercial and wide temperature models.



- AMD Geode LX800 processor at 500MHz
- Up to 1GB SODIMM memory
- CRT and 18/24-bit LCD support
- 1 10/100 Ethernet
- 2 USB 2.0 ports
- 1 RS-232 + 1 RS-232/422/485
- 1 IDE port
- CompactFlash Type II socket
- PC/104 (ISA) expansion bus
- PC/104 form factor 3.55" x 3.775"
- 20°C to +71°C or -40°C to +85°C fanless operation

Small Form Factor SBCs

ATLAS NEW!

PCI/104-Express SBC
with Intel Atom 1.86GHz
N2800 CPU



Atlas is a compact, rugged, PCI/104-Express single board computer that features the Intel N2800 processor in the PC/104-Plus form factor with wings. In this compact form factor, Atlas offers a wide range of I/O, meeting the majority of today's connectivity requirements.

A shared PCIe MiniCard/mSATA socket is provided to add either additional I/O or a flashdisk of up to 64GB in capacity.

Atlas uses a new miniature PCI Express expansion connector that provides compatibility with PCIe/104 expansion modules, while reducing the connector cost and providing more room on the SBC for additional I/O features. The bottom-mounted heat spreader provides efficient conduction cooling for enhanced reliability.



Intel Atom N2800 CPU at 1.86GHz
2GB or 4GB 64-bit DDR3 SDRAM soldered on board
4 USB 2.0 ports
4 RS-232/422/485 + 2 RS-232
1 Gigabit Ethernet
1 SATA port
mSATA flashdisk socket
18-bit LVDS LCD and VGA CRT display
8 digital I/O lines
HD audio
PCIe MiniCard socket
Bottom-mounted heat spreader for conduction cooling
PCI-104 & PCIe/104 expansion
<10W power consumption
PC/104-Plus form factor 4.55" x 3.775"
-40°C to +80°C operating temperature

Use our EMM-8EL-XT PCIe/104 (Page 13) or PCIe MiniCard (Page 17) I/O modules featuring WiFi, Ethernet, analog I/O, digital I/O and CAN for compact expandability!

COM-based SBCs

QUANTUM NEW!

PCI/104-Express SBC with
configurable Qseven CPU
and PCI-104, PCIe/104 and
PCIe MiniCard Expansion



Quantum is a PCI/104-Express SBC that utilizes Qseven CPU modules to provide a range of processor options, including both x86 and ARM technologies. The bottom-side heat spreader mounts directly to the Quantum baseboard, relieving stress on the Qseven module and enhancing ruggedness.

The board provides a full complement of I/O features to convert the Qseven module into a full-feature SBC. Notable features include a wide-range input power supply and a data acquisition circuit with analog input and digital I/O.

Quantum uses miniature latching I/O connectors for all I/O to provide enhanced ruggedness plus the highest possible feature density.

I/O expansion options include PCI-104, PCIe/104, and PCIe MiniCard. A new miniature high-



1GHz AMD Fusion G-T40E CPU, 1GHz i.MX6 single/quad core CPUs, or 1GHz AMD G-Series eKabini SOC

Up to 2GB of DDR3 SDRAM soldered on board

5 USB 2.0 ports

2 RS-232/422/485 + 1 RS-232

1 Gigabit Ethernet

1 SATA port

mSATA flashdisk socket

Dual channel 18/24-bit LVDS, VGA, DDI

HD audio

5VDC and 6-32V DC inputs

PCIe MiniCard socket

PCI-104 non-stackthrough and PCIe/104 single bank expansion

PCI-104 form factor 4.55" x 3.775"

-20°C to +71°C operating temperature

Data Acquisition Features:

4 12-bit analog inputs

10 digital I/O lines

2 counter/timers

4 pulse width modulators

Watchdog timer

Supported by Universal Driver™ programming library

speed expansion connector supports PCIe/104 I/O module expansion while saving space and reducing cost compared to the full-size PCIe/104 connector.

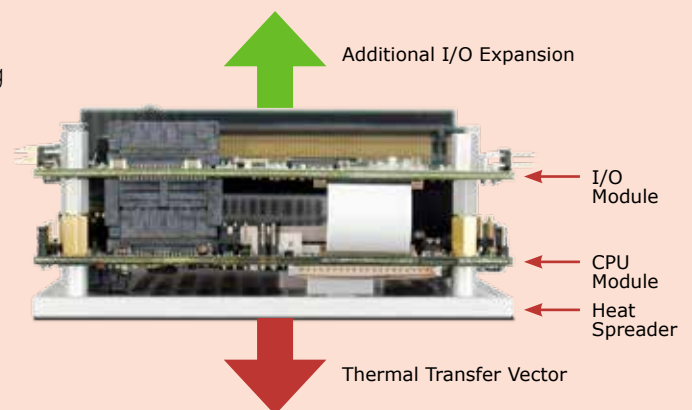
Conduction Cooling Improves Reliability and Adds Convenience

Embedded systems in harsh environments often require fanless, sealed enclosures. High performance processors and peripheral chips generate increased amounts of heat, requiring greater cooling capacity. Traditional heat sink cooling is inefficient for these systems, because it relies on air to conduct heat away from the silicon. System reliability and ambient operating temperature capability decrease as a result. Tall heat sinks interfere with the ability to add peripheral modules to the system.

Benefits of Conduction Cooling

Conduction cooling provides a more efficient path for conducting heat away from processors and other components. The direct-to-enclosure thermal path lowers the processor temperature by as much as 20°C and keeps the inside of the enclosure cooler for other electronics. Elimination of top side heat sinks makes installation of peripheral modules easier.

The heat spreader mates directly with the system enclosure to reduce silicon temperature rise by as much as 20°C, resulting in higher ambient operating temperature capability as well as higher reliability.



COM-based SBCs with Conduction Cooling

VEGA

EMX Basic™ Conduction Cooled SBC with Configurable COM Express CPU and EMX™ I/O Expansion



The efficiency of EMX enables Vega to offer the highest degree of functionality available in a board measuring just 125 x 95mm. Vega's COM Express CPU core protects your investment from CPU obsolescence, while its autocalibrating data acquisition circuit provides a reliable interface for real-world applications. Its integrated bottom-mounted heat spreader provides efficient conduction cooling, and its wide range power supply simplifies system design.

EMX and PCIe MiniCard expansion provide even more flexibility with a wide range of low-cost, high-performance I/O modules.

Vega's notable features include a wide range input power supply,



- 1.7GHz Intel Core i7-3517UE, 1.5GHz Intel Core i7-2610UE, or 1.4GHz Intel Celeron 827E CPU
- VGA, LVDS LCD outputs
- 4 RS-232/422/485 serial ports
- PS/2 keyboard/mouse
- 1 SATA port
- USB flashdisk socket
- 7-36V input power
- EMX I/O expansion
- PCIe MiniCard socket
- EMX Basic form factor 4.92" x 3.74"
- 40°C to +85°C temperature
- Data Acquisition Features:**
- 16 16-bit analog inputs with autocalibration
- 250KHz max sample rate
- 8 16-bit analog outputs
- 100KHz waveform generator
- 24 programmable digital I/O
- 2 counter/timers + 4 PWM
- Watchdog timer
- Supported by Universal Driver™ programming library

a full-featured data acquisition circuit with 16-bit resolution and autocalibration, and two gigabit Ethernet ports. Most I/O connectors are latching for increased ruggedness.

PLUTO

Conduction Cooled ETX SBC with Configurable CPU and PC/104-Plus Expansion



Pluto is a compact, conduction-cooled SBC in the popular ETX COM standard. Pluto's CPU core consists of an ETX CPU module with integrated bottom-mounted heat spreader for efficient cooling and convenient mounting. This innovative design results in a complete solution including stackable PC/104-Plus expansion—all within the compact ETX footprint.



- Choice of AMD Fusion 1.65GHz G-T56 or 1.0GHz G-T40 CPUs
- Up to 2GB SO-DIMM SDRAM
- 4 USB 2.0 ports
- 3 RS-232 + 1 RS-232/422/485
- Dual 10/100 Ethernet
- 1 SATA port
- 1 IDE port
- 1 floppy port
- CompactFlash socket
- CRT, 18-bit or 24-bit LVDS LCD and TV out
- PC/104-Plus expansion
- ETX form factor 4.5" x 3.7"
- 20°C to +71°C operating temp.

MAGELLAN

COM Express SBC with Interchangeable CPUs and PCI-104, SUMIT and FeaturePak™ Expansion



Magellan is a high performance, COM-based SBC in a COM Express Basic footprint with integrated conduction cooling for wide temperature reliability. The CPU consists of a COM Express module mounted on its bottom side. This COM-based design is ideal for long lifetime applications. Magellan features a high degree of flexibility with PCI-104, SUMIT and FeaturePak expansion sockets plus a wide-range power supply integrated on board. Magellan includes an integrated



- Choice of 1.1GHz Intel Atom Z510 or 1.6GHz Intel Core2 Duo CPUs
- Up to 4GB of SODIMM memory (Core2 Duo) or 1GB soldered-on memory (Atom)
- 2 gigabit Ethernet
- 1 SATA port
- On-board USB flashdisk socket
- 4 USB 2.0 ports
- 2 RS-232 & 2 RS-232/422/485
- CRT and LVDS LCD
- PCI-104, SUMIT, and FeaturePak expansion
- 7-36V DC/DC input power
- COM Express form factor 4.9" x 3.7"
- 40°C to +85°C operating temperature

wide-range DC/DC power supply on board for increased compatibility. The baseboard is also available standalone for use with the COM Express module of your choice up to Core i7 performance.

COM-Based SBCs

Our COM-based SBCs combine the high-performance processing and leading-edge system I/O capabilities of COMs with the modular expansion flexibility of stackable single board computers, all within a single compact, rugged, reliable, pre-integrated module.

Additionally, the large thermally-conductive baseplate provides both an efficient cooling solution and a standardized mounting-hole pattern that ensures interchangeability for alternate features or performance upgrades.

Benefits of COM-Based SBCs

- ◆ Maximum product lifecycle
- ◆ Highest feature density
- ◆ Scalable performance
- ◆ Conduction cooling for improved reliability
- ◆ Stackable I/O expansion

Custom or Off-the-Shelf

In addition to standard off-the-shelf products, Diamond Systems can design and build a custom COM baseboard to provide a more optimum solution for higher volume applications. The baseboard may utilize either a standard form factor, as shown here, or a completely custom one, depending on your needs. Our combined experience with COMs, baseboards, power supplies, and I/O results in a cost-efficient, all-in-one embedded computing solution that offers easier system assembly and a longer product lifecycle than off the shelf products.

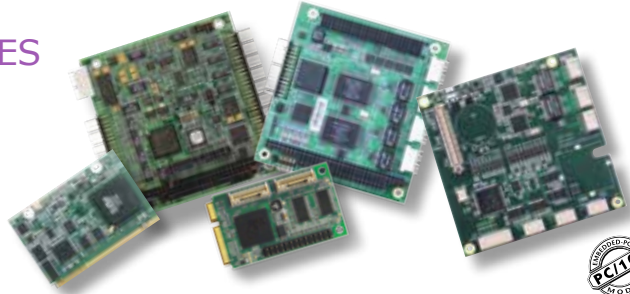
I/O Product Selection Guide

Diamond Systems offers an extensive line of industry-leading I/O modules in a variety of form factors. Our analog I/O boards offer unmatched flexibility due to their advanced architecture that supports the widest range of application needs. Our serial modules offer cost-efficient solutions for extra serial ports. Our digital I/O modules include enhanced functionality including counter/timers, PWM generators, and counter-driven interrupts. All analog and digital I/O modules, as well as the data acquisition circuitry on our SBCs, is supported by our Universal Driver software for Windows and Linux that simplifies application development.

AVAILABLE I/O FEATURES

Analog I/O
Digital I/O
FPGA
Serial Ports
Ethernet

CAN
Relays
Optoisolation
WiFi
DC/DC



FORM FACTORS

PC/104
PC/104-Plus
PCIe/104
PCIe MiniCard

FeaturePak
EMX
Sumit



Data Acquisition Products

Product	Form Factor	Analog Inputs			Analog Outputs		DIO				Page No.
		Qty	Res	Sample Max	Qty	Res	Qty	Opto In	Relay Out	Counter/Timers	
DMM-32DX-AT	PC/104	32 SE, 16 DI	16-bit	250KHz	4	12-bit	24 I/O			2	11
DMM-32X-AT	PC/104	32 SE, 16 DI	16-bit	250KHz	4	12-bit	24 I/O			2	11
DMM-16-AT	PC/104	16SE, 8 DI	16-bit	100KHz	4	12-bit	8 I/O			2	11
DMM-AT	PC/104	16SE, 8 DI	12-bit	100KHz	2	12-bit	8 I/O			2	11
DMM-2000-AT	PC/104-Plus	32SE, 16 DI	16-bit	Up to 2MHz	8 or 16	16-bit	19 I/O			8	10
P104-DAQ1616	EMX	16SE, 8DI	16-bit	2MHz	16	16-bit	56 I/O			2	15
FP-DAQ1616	FeaturePak	16SE, 8DI	16-bit	2MHz	16	16-bit	56 I/O			2	16
DS-MPE-DAQ0804	PCIe MiniCard	8 SE, 4 DI	16-bit	100KHz	4	16-bit	14 I/O				17
RMM-1616AP	PC/104-Plus				16	16-bit	48 I/O			4	14

Digital I/O Products

Product	Form Factor	DIO				Page No.
		Qty	Opto In	Relay Out	Counter/Timers	
GPIO-MM-XT	PC/104	100 I/O			10	12
Onyx-MM-XT	PC/104	48 I/O			2	12
OPMM-1616-XT	PC/104	8 I/O	16	16		12
Pearl-MM-P	PC/104	8 I/O		16		12
P104-GPIO96	PC/104-Plus	96 I/O			8	15
FP-GPIO96	FeaturePak	96 I/O			8	16
DS-MPE-GPIO	PCIe MiniCard	36 I/O				17

Serial I/O Products

Product	Form Factor	Serial	DIO	Page No.
		Qty	Qty	
EMM-8P-XT	PC/104	8	8 I/O	13
EMM-OPT4-XT	PC/104	4 opto	24 I/O	13
EMM-4M-XT	PC/104	4		13
EMM-8PLUS-XT	PC/104-Plus	8	8 I/O	15
EMM-8EL-XT	PCIe/104	4 or 8		13
DS-MPE-SER4M	PCIe-MiniCard	4		17
DS-MPE-SER4OPT	PCIe MiniCard	4 opto		17

Other I/O Products

Product	Form Factor	Features	Page No.
DS-MPE-CAN2L	PCIe MiniCard	Dual CAN 2.0 Ports	17
DS-MPE-GE1	PCIe MiniCard	Gigabit Ethernet Port	17
Epsilon-12G2	COM Express	Managed 14-port Gigabit Ethernet Switch	18
Epsilon-8000	PC/104	Managed 8-port Gigabit Ethernet Switch	18
EMX-ESG200	EMX	Dual Gigabit Ethernet module	16
EMX-ESG614	EMX	6 RS-232/422/485 & 14 DIO	16
MRC-424-XT	PC/104-Plus	Quad Ethernet and Digital I/O	15
JMM-512	PC/104	50W DC/DC Power Supply	14
JMM-LP	PC/104	25W DC/DC Power Supply	14
Janus-MM	PC/104	Dual CAN, GPS & Cellular Communications	18
Corona	PC/104	Dual Ethernet, Dual USB, Wireless	18

PC/104-Plus Analog I/O Modules

DMM-2000-AT

NEW!



PCI/104-Express & PC/104-Plus Analog I/O Modules

Photo not available

The new Diamond-MM-2000 family represents the state of the art in PC/104 analog I/O. The board's architecture has been reinvented from the ground up to offer unparalleled features and value. Its new 32-channel analog input circuit, with 2MHz sampling throughput at 16-bit resolution, places the board far above anything else in its price range. Four-channel simultaneous sampling, programmable analog trigger capability, a 32K sample buffer to support real-time streaming, and autocalibration put the DMM-2000 in a class by itself.

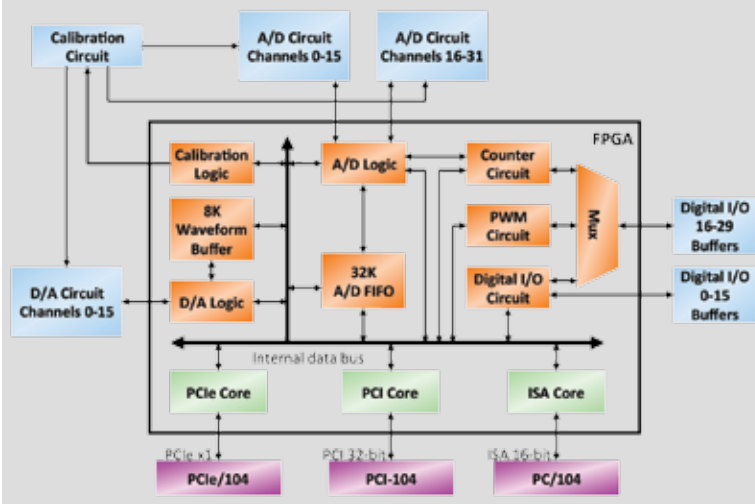
The impressive A/D features are complemented by a 16-channel 16-bit D/A circuit with programmable output range and waveform generator capability, programmable counter/timers and PWM generators, and 21 digital I/O lines. All features are supported by Diamond's Universal Driver programming library that makes harnessing the power of DMM-2000 easy.

DMM-2000 is offered in both PCI/104-Express and PC/104-Plus formats. Our new FPGA architecture incorporates PCIe, PCI, and

- 32 or 16 analog inputs, 16-bit resolution
- 2MSPS or 1MSPS A/D throughput
- 2 or 4 channel simultaneous sampling capability
- 4 channel programmable analog trigger with 8-bit resolution
- 32K sample A/D buffer
- 16 16-bit analog outputs or 8 8-bit analog outputs
- 16-channel analog waveform generator with 16K waveform buffer
- Autocalibration of A/D and D/A for high accuracy
- 8 32-bit counter/timers with frequency generator and pulse counting functions
- 4 24-bit pulse width modulators
- 21 digital I/O lines: A & B are 8-bits; C is 8x 1 bit; D is 3x 1 bit
- PC/104 form factor 3.55" x 3.775"
- PCI/104-Express (dual PCIe/PCI), PC/104-Plus (dual PCI/ISA), or PC/104 (ISA) interfaces
- 40°C to +85°C operation
- Supported by Universal Driver™ programming library

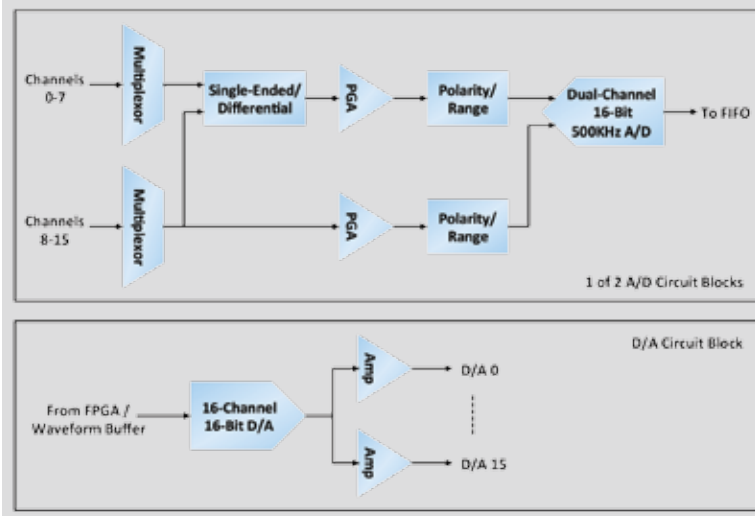
ISA interfaces into a single chip, enabling the product's advanced capabilities to be integrated into both legacy and new generation systems. Both bus connectors in each model may be used, increasing the board's flexibility. A cost reduced model with 16-channels, 1MHz throughput and 2-channel simultaneous sampling is also available.

DMM-2000-AT System Block Diagram



Triple-interface FPGA architecture forms the digital backbone of DMM-2000 and incorporates all of Diamond's best I/O technologies

DMM-2000-AT Analog Block Diagram

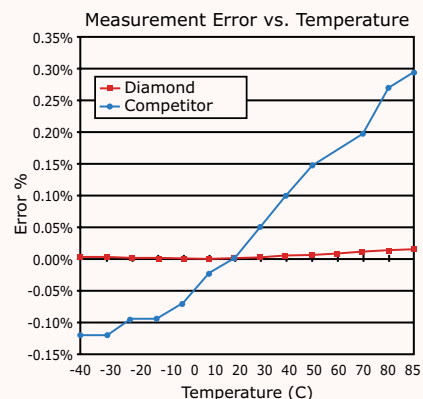


A/D circuit features 2 or 4 channels of simultaneous sampling; each circuit branch is individually calibrated for maximum accuracy

Analog I/O Autocalibration

Every analog circuit exhibits fluctuations in performance due to changes in temperature. Today's complex A/D circuits may exhibit errors that become significant in comparison to the signal being measured. The problem becomes even worse with products which are rated for operation over a wide temperature range of -40°C to +85°C.

Autocalibration solves these problems by enabling the board to be calibrated under software control at any time. No physical access is required, so the process can be done as often as desired, limiting any effects of temperature changes on the system. Diamond's patented Universal Driver software provides built-in autocalibration code with a simple function call to enable quick and easy calibration and ensure accurate measurements at all times.



PC/104 Analog I/O Modules

DMM-32DX-AT

32 Channel, 16-bit Analog I/O with Advanced Automatic Autocalibration



Using Diamond's patented auto-autocalibration technology, DMM-32DX-AT provides precise analog measurements regardless of time or temperature. A temperature sensor automatically initiates an autocalibration process at selected intervals, ensuring accuracy without user involvement.

DMM-32DX-AT provides 32 analog inputs with 16-bit resolution, 250KHz aggregate sampling rate, programmable gain, single-ended/differential operation, and both unipolar and bipolar input ranges, making it the board of choice for applications with high



- 32 single-ended / 16 differential inputs
- 16-bit A/D resolution
- 250KHz max sample rate
- Programmable ranges from $\pm 10V$ down to $\pm 0.625V$ bipolar, 0-10V down to 0-0.625V unipolar
- 1024 sample A/D FIFO with programmable threshold
- Patented auto-autocalibration of A/D and D/A for highest accuracy
- 4 16-bit D/A
- 24 programmable direction DIO
- Counter/timers for A/D control and general use
- Low noise design
- D/A waveform generator with 1024-sample waveform buffer
- PC/104 form factor 3.55" x 3.775"
- 40°C to +85°C operating temp
- Supported by Universal Driver™ programming library

channel count requirements. The features are rounded out with 4 channels of 16-bit D/A, 2 counter/timers, and 24 digital I/O.

DMM-32X-AT

32 Channel, 16-bit Analog I/O with Autocalibration



DMM-32X-AT offers 32 channels of 16-bit A/D for precision, high-channel count, cost-conscious applications. The 250KHz aggregate sample rate supports most common industrial application requirements, while Diamond's autocalibration technology ensures accurate performance over the product's entire lifetime. Programmable gain, single-ended/differential operation, and both unipolar and bipolar input ranges increase the board's flexibility. DMM-32DX-AT includes 4 12-bit D/A outputs, 24 digital I/O, and 2 programmable counter/timers.



- 32 single-ended / 16 differential inputs
- 16-bit A/D resolution
- 250KHz max sample rate
- Programmable ranges from $\pm 10V$ down to $\pm 0.625V$ bipolar, 0-10V down to 0-0.625V unipolar
- 1024 sample A/D FIFO with programmable threshold
- Autocalibration of A/D and D/A for highest accuracy
- 4 12-bit D/A
- 24 programmable direction digital I/O lines
- Counter/timers for A/D control and general use
- Low noise design
- PC/104 form factor 3.55" x 3.775"
- 40°C to +85°C operating temperature
- Supported by Universal Driver™ programming library

DMM-16-AT

16-channel, 16-bit Analog I/O with Autocalibration



Diamond-MM-16-AT features high performance and flexibility for a mid-range price. It has 16 single ended/8 differential analog inputs with both unipolar and bipolar input ranges and programmable gain. It has a maximum sampling rate of 100KHz, supported by a 512-sample FIFO. The A/D can be triggered with a software command, the on-board programmable timer, or an external signal. The board is supported by Diamond's Universal Driver programming software for Linux, Windows 2000/XP/CE/Embedded 7, and DOS.



- 16 single-ended / 8 differential analog inputs
- 16-bit A/D resolution
- 100KHz max sample rate
- Programmable ranges from $\pm 10V$ down to $\pm 0.625V$ bipolar, 0-10V down to 0-1.25V unipolar
- 512 sample A/D FIFO with programmable threshold
- Autocalibration of A/D and D/A for high accuracy
- 4 12-bit D/A
- 8 digital inputs and 8 digital outputs
- Counter/timers for A/D control and general use
- Low-noise design feature
- PC/104 form factor 3.55" x 3.775"
- 40°C to +85°C operating temperature
- Supported by Universal Driver™ programming library

DMM-AT

16 Channel, 12-bit Analog I/O with Autocalibration



DMM-AT offers best-in-class performance for a 12-bit analog I/O module. It features autocalibration for maximum accuracy over time and temperature. This cost-effective board includes Diamond's standard advanced analog architecture, including single-ended/differential inputs, programmable gain, A/D FIFO, and counter/timer for precise A/D timing.

The A/D features are complemented by a full range of D/A, counter/timer, and digital I/O to provide an all-in-one solu-



- 16 single-ended / 8 differential analog inputs
- 12-bit A/D resolution
- 100KHz max sample rate
- Programmable ranges from $\pm 10V$ down to $\pm 0.625V$ bipolar, 0-10V down to 0-1.25V unipolar
- 512 sample FIFO
- Autocalibration for high accuracy
- 2 12-bit D/A
- 8 digital inputs and 8 digital outputs
- Counter/timers for A/D control and general use
- Low noise design
- PC/104 form factor 3.55" x 3.775"
- 40°C to +85°C operating temperature
- Supported by Universal Driver™ programming library

tion for applications requiring a real-world interface.

PC/104 Digital I/O Modules

GPIO-MM-XT

**PC/104 FPGA Module
with pre-configured
Functionality**



GPIO-MM-XT offers a low-cost FPGA platform for the development of custom logic. It offers up to 100 I/O lines for I/O-intensive applications. A ready-made set of FPGA "personalities" is also available to provide off-the-shelf I/O functionality in addition to custom development. The board features the Xilinx Spartan 2 FPGA with 200K gate capacity and 5V tolerance. The standard preprogrammed personality includes 48 digital I/O lines plus 10 counter/timers based on the powerful AMD 9513 IC. They offer



- FPGA-based digital I/O module with pre-programmed feature sets
- 64 GPIO + 10 16-bit counter/timers
- 96 GPIO
- 100 I/O pins on 3 connectors
- 2 programmable interrupts
- 8 diagnostic LEDs
- RAM-based field-reprogrammable FPGA with 200K gates
- 40MHz on-board clock to drive digital logic
- PC/104 form factor 3.55" x 3.775"
- 40°C to +85°C operating temperature
- Supported by Universal Driver™ programming library

extreme flexibility, with programmable input sources and output waveforms, programmable up/down counting, one-shot vs. continuous counting, PWM function, and more. Additional available personalities include 96 digital I/O lines for high I/O density.

ONYX-MM-XT

Low Cost Digital I/O Module



The Onyx-MM family offers a low-cost solution for PC/104 digital I/O, using the popular 82C55 IC. The board has 2 ICs with 3 8-bit programmable direction ports per IC (48 lines in total). Model OMM-XT includes an 82C54 counter/timer IC featuring 3 16-bit counter/timers with oneshot, counting, timing, pulse output, square wave generator, and programmable interrupts. Model OMM-DIO-XT is a low cost version that includes only the 48 digital I/O lines.

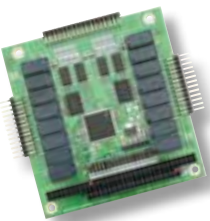


- 48 digital I/O lines using 82C55 ICs
- Programmable I/O direction on all ports
- 10K pull-up resistors on all DIO lines
- 3 16-bit counter/timers using 82C54 IC
- Programmable and timer-driven interrupts
- PC/104 form factor 3.55" x 3.775"
- 40°C to +85°C operating temperature
- Supported by Universal Driver™ programming library

PC/104 Optoisolation & Relay Modules

OPMM-1616-XT

**Optoisolated Input and Relay
Output Module**



OPMM-1616-XT features 16 optoisolated, unidirectional digital inputs that accept DC voltages up to 30VDC. The inputs feature a programmable edge detection circuit (change of state detection circuit) that can generate interrupts on any change on any input. The module also features 16 DPDT (form C) relays with 30VDC / 2A (60W resistive) capacity. Each relay has two sets of NO, C, and NC contacts wired in parallel for greater reliability and longer lifetime.



- 16 optoisolated inputs with current limiting resistors
- 30VDC input capacity
- Programmable edge detection with interrupts
- 16 Form C SPDT relay outputs
- 2A current capacity per relay
- 30VDC / 60W switching capacity
- Interrupt on change of state capability
- 500VDC isolation between board and signals
- PC/104 form factor 3.55" x 3.775"
- 40°C to +85°C operating temperature
- Supported by Universal Driver™ programming library

PEARL-MM-P

16 Relay Module



Pearl-MM offers 16 SPDT relays with normally closed, normally open, and common contacts for maximum flexibility. All relays are in the normally closed position on power-off and power-up. High reliability components and wide temperature operation make Pearl-MM a rugged solution for your application.



- 16 SPDT/Form C relays (NC, NO, C contacts)
- Switching capacity 2A at 30VDC
- Long lifetime—100,000,000 operations
- 500V AC/DC isolation between signals and board
- Pin header connections
- PC/104 form factor 3.55" x 3.775"
- 40°C to +85°C operating temperature
- Supported by Universal Driver™ programming library

EMM-8P-XT

**8-Port RS-232/422/485
PC/104 Module**



Emerald-MM-8P offers eight RS-232/422/485 ports with programmable protocol, address, and IRQ settings for each port. An on-board EEPROM stores the configuration for automatic loading on power-up, and a software utility lets you configure the settings to fit your needs exactly. The UARTS contain larger FIFOs for improved performance and reliability when multiple ports are operating simultaneously. Wide temperature compatibility



- 8 RS-232/422/485 serial ports
- Full handshake RS-232
- Software-programmable protocol, port addresses, and interrupt levels
- Up to 460.8kbps data rate
- Dual 16C654 quad UARTS with 64-byte FIFOs
- Interrupt sharing reduces load on CPU resources
- 8 digital I/O lines
- Dual 40-pin I/O headers (4 ports per header)
- 16-bit PC/104 bus for additional interrupt levels
- +5V only power supply
- PC/104 form factor 3.55" x 3.775"
- 40°C to +85°C operating temperature

makes Emerald-MM -8P suitable for use in outdoor and vehicle applications.

EMM-4M-XT

**4-Port RS-232/422/485
PC/104 Module**



The low-cost Emerald-MM offers 4 RS-232/422/485 ports with jumper-selectable protocol, address, and IRQ settings for each port. Wide temperature compatibility makes Emerald-MM suitable for use in outdoor and vehicle applications.



- 4 RS-232/422/485 serial ports
- Full handshake RS-232
- 115.2K max baud rate
- Jumper-selectable protocols, addresses and interrupts
- 16C554 UARTs with 16-byte FIFOs
- Build-in interrupt sharing
- PC/104 form factor 3.55" x 3.775"
- 40°C to +85°C operating temperature

EMM-OPT4-XT

**4-Port Optoisolated
RS-232/422/485 PC/104
Module**



The EMM-OPT4-XT provides 4 multi-protocol serial ports intended for use in applications with long-distance connections or other factors where ground differentials or noise spikes can damage non-isolated ports. Each port is independently isolated and configurable and features full 8-signal RS-232 as well as full-duplex RS-422 and half-duplex RS-485 communications. Extra-deep 128-byte TX/RX FIFOs ensure reliable communications at speeds up to 460.8kbps. The bonus 24 digital I/O lines based on an 82C55 chip provide extra value and can eliminate the need for an extra board in your system.

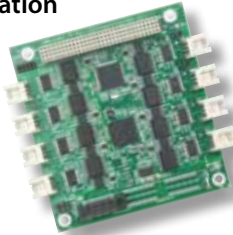


- 4 Optoisolated serial ports, RS-232/422/485
- Full handshake RS-232
- Isolation of 1000V AC or DC, port to port or port to system
- 460.8Kbps max baud rate
- Jumper-selectable protocols, addresses and interrupts
- 16C2850 UARTs with 128-byte FIFOs
- 24 digital I/O lines with programmable direction
- PC/104 form factor 3.55" x 3.775"
- 40°C to +85°C operating temperature

EMM-8EL-XT

**High-speed 4/8 port
RS-232/422/485 PCle/104
Module with Optional Opto-Isolation**

NEW!



The Emerald-MM-8ML family of PCle/104 serial I/O products offers 4 or 8 serial ports with or without opto-isolation in the PC/104-Express form factor. The UART provides 256-byte TX/RX FIFOs, high-speed operation (1Mbps in RS-232 and 10Mbps in RS-422/485), and auto-RS-485 transmit control. Each port is independently isolated with an isolated power and signal chip plus additional isolators for all control signals. All configurable features are programmable including protocols and line termination. An on-board microcontroller provides programmable control of all configuration options and stores the settings in its internal flash for

- 4 or 8 RS-232/422/485 serial ports with programmable protocols
- Optional independent isolation port by port
- PCle interface UART with 256-byte FIFOs and 16 GPIO lines
- Multi-protocol transceivers with high speed, ESD and open-circuit protection
- Data rates up to 1Mbps in RS-232 & 10Mbps in RS-422 / RS-485
- RS-422/485 programmable termination
- +/-15KV ESD protection on all serial ports
- Staggered turn-on of isolated power devices for reduced inrush current
- Onboard microcontroller with flash memory to manage configuration
- Supports Linux, Windows XP, 2000, Vista and 7
- PC/104 form factor (3.55" x 3.775")
- 40°C to +85°C operating temperature

automatic reload on power-up. All settings are automatically reloaded on power up.

PC/104 Power Supply Modules

JMM-512

50 Watt DC/DC Power Supply Module



The Jupiter-MM family of DC/DC power supplies offers mid-range, cost-effective, rugged power solutions for PC/104 systems requiring up to 50W output power. They feature a cascaded power design with secondary outputs driven by the 5V output. The full 50W output power is available on the 5V output if the other outputs are not needed. Power indicator LEDs provide useful feedback on proper output operation. Both dual and quad output models



50W max output power on +5VDC
5VDC/10A max
12VDC/2A max
-12VDC / 1A max (optional)
-5VDC / 0.15A max (optional)
7-34VDC input range
Screw terminal and PC/104 bus power distribution
Shutdown control
PC/104 form factor 3.55" x 3.775"
Output power available on PC/104 bus and detachable screw terminal block
-40°C to +85°C operating temperature

are available. Power is supplied directly to the PC/104 connector as well as to a detachable screw terminal block for additional needs external to the PC/104 system.

JMM-LP

25 Watt DC/DC Power Supply Module



Sizing a power supply to the application is important for maximum efficiency and minimized heat dissipation. JMM-LP is a cost-effective solution for many low- and mid-range PC/104 systems requiring less than 25W. It also offers reduced weight due to the fact that no heat sink is required. Its 25W output power is more than enough to drive today's low-power processors like



Low cost DC/DC supply
25 watts output power
5VDC/5A max
7-34VDC input range
Screw terminal and PC/104 bus power distribution
Shutdown control
PC/104 form factor 3.55" x 3.775"
Output power available on PC/104 bus and detachable screw terminal block
-40°C to +85°C operating temperature

Intel's Atom, a AMD LX800, and a Vortex86. Jupiter-MM-LP meets the requirements of low power, low cost, lightweight, and overall efficiency.

Analog Output Modules

RMM-1616AP

NEW!

PC/104-Plus / PC/104 16-bit analog output module with voltage and current outputs



The RMM-1616AP offers 8 or 16 high-performance 16-bit DACs with both voltage and current outputs. A built-in waveform generator circuit offers up to 100KHz data rate on up to 16 channels simultaneously. Additional features include 48 digital I/O lines and 8 PWM circuits. RMM-1616AP is available with either 8 or 16 analog outputs and in both PC/104 and PC/104-Plus configurations. It features new, ultra-low drift analog components and factory calibration for lifetime accuracy and reliable wide temperature operation.



8 or 16 analog outputs
16-bit D/A resolution
16-bit analog output, voltage and current modes, PC/104 and PC/104-Plus
Voltage output ranges: +/-10V, +/-5V, 0-10V, 0-5V
Current output ranges: 0-20mA, 0-24mA, 4-20mA
30VDC compliance on current outputs
Waveform generator: Up to 100KHz data rate, up to 16 channels simultaneously
48 digital I/O lines with programmable direction
8 32-bit counter/timers
4 24-bit PWM
Factory digital calibration on an individual channel basis for maximum accuracy
Available in both PC/104 and PC/104-Plus form factors
PC/104 form factor 3.55" x 3.775"
-40°C to +85°C operating temperature
Supported by Universal Driver™ programming library

Benefits of Diamond's Data Acquisition Products

Although many data acquisition products look the same at first glance, taking a closer look at their specifications reveals that Diamond's data acquisition products are among the best available in small form factor embedded computing. Our products contain a combination of features rarely found on other boards to provide the highest accuracy and most flexibility in analog circuits. These features include:

- ◆ Single-ended / differential inputs for noise reduction and remote signal measurement
- ◆ Programmable gain for better resolution with low-voltage signals
- ◆ Unipolar / bipolar operation for better adaptability to sensors and signals
- ◆ Autocalibration for increased accuracy in wide temperature environments
- ◆ A/D FIFO with programmable threshold for reliable high-speed sampling
- ◆ Interrupt operation for reduced system overhead
- ◆ Programmable counter/timer for precise A/D timing
- ◆ Multiple A/D trigger sources to fit applications better
- ◆ High signal chain bandwidth for accuracy in multi-channel applications
- ◆ Sample and scan A/D timing for ease of use in real-time and multi-channel applications
- ◆ Simultaneous sampling for precision signal analysis
- ◆ High level programming library (see page 22)

PC/104-Plus I/O Modules

EMM-8PLUS-XT

PC/104-Plus 8-Port
RS-232/422/485 Module



Emerald-MM-8Plus offers 8 RS-232/422/485 ports in a PC/104-Plus module using the PCI bus for improved performance and higher speed. It offers jumper-selectable protocol and termination settings for each port. The larger FIFOs (64 bytes TX/RX) and higher baud rate capability (921.6Kbps for RS-232, 1.8432Mbps for RS-422/485) gives this board dramatically improved performance and reliability over ISA-based serial ports.



- 8 serial ports with up to 1.8432Mbps data rates
- Configurable for RS-232/RS-422/RS-485 protocols or simple TTL level operation
- Max baud rate 1.8432Mbps
- Jumper selectable products
- Exar XR17D158 Octal UART with 64-byte FIFOs
- Plug and Play configuration
- Supports interrupt sharing
- Dual 40-pin I/O headers, 4 ports per header
- 8 programmable digital I/O lines
- PC/104-Plus form factor 3.55" x 3.775"
- 40°C to +85°C operating temperature
- Supported by Universal Driver™ programming library

MRC-424-XT NEW!

PC/104-Plus Expansion
Module with Quad Ethernet
and Digital I/O



The MRC-424-XT PC/104-Plus module integrates 4 PCI-based 10/100 Ethernet ports with 24 user-configurable digital I/O lines in the compact and rugged PC/104-Plus format. This 2-in-1 combination of Ethernet and digital I/O can help lower the size and cost of your embedded system by eliminating one additional board from your PC/104 stack. The dual



- 4 PCI-based 10/100 Ethernet ports
- Dual PCI 2-port switch architecture
- Pin header Ethernet connections for greater ruggedness
- Ethernet activity LEDs for each port
- 24 digital I/O lines on ISA bus
- PC/104-Plus form factor 3.55" x 3.775"
- 40°C to +85°C operating temperature
- Fully PC/104-Plus compliant mechanical design

2-port switch architecture of MRC-424-XT enables the creation of distributed daisy-chain networks of systems, which are able to communicate up and down the chain independently.

P104-GPIO96

PC/104-Plus FPGA Module
with 96 I/O lines



P104-GPIO96 uses a Lattice ECP3 700K gate FPGA with integrated PCI Express endpoint to provide a platform for custom logic design or off-the-shelf I/O functionality. The base hardware configuration features 96 digital I/O lines grouped into 12 8-bit ports. All ports have I/O buffers to protect the FPGA and are feature programmable 5V/3.3V logic levels. The ports are



- FPGA-based design with in-the-field reconfigurability
- 96 buffered, programmable digital I/O
- Byte-wide and bit-wide port direction control
- 5V/3.3V configurable I/O logic levels
- 8 32-bit counter/timers
- 4 24-bit pulse-width modulators
- PC/104-Plus (ISA + PCI) PCI interface
- PC/104-Plus form factor 3.55" x 3.775"
- 40°C to +85°C operating temperature
- Supported by Universal Driver™ programming library

organized into a combination of byte-wide and bit-wide direction control for maximum flexibility and application compatibility.

P104-DAQ1616

PC/104-Plus Data Acquisition
Module with 2MHz A/D, D/A,
Autocalibration, and Digital
I/O



P104-DAQ1616 is a PC/104-Plus data acquisition I/O card based on Diamond's newest and fastest analog I/O technology. This module offers 16 channels of 16-bit or 12-bit A/D sampling at a maximum of 2MHz, supported with an expanded 16K-sample FIFO for reliable data collection in any operating system. All analog I/O features are enhanced with our industry-leading autocalibration technology, featuring independent calibration factors for each input and output range to guarantee maximum accuracy. Digital I/O features include seven 8-bit ports with both bit-wide and byte-wide direction control,



- 16 16-bit or 12-bit analog inputs
- 2MHz maximum aggregate sampling rate
- Programmable ranges from $\pm 10V$ down to $\pm 0.625V$ bipolar, 0-10V down to 0-0.625V unipolar
- 16K sample A/D FIFO with programmable threshold
- 16 16-bit analog outputs with programmable range and polarity
- Autocalibration circuit with precision reference voltages
- 56 programmable digital I/O
- 2 32-bit counter/timers for A/D timing and general purpose use
- 4 24-bit pulse-width modulator circuits
- PC/104-Plus (ISA + PCI) PCI interface
- PC/104-Plus form factor 3.55" x 3.775"
- 40°C to +85°C operating temperature
- Supported by Universal Driver™ programming library

two 32-bit programmable counter/timers, and four 24-bit PWM circuits.

EMX I/O Modules

See Page 3 for more information on the EMX standard.

EMX-ESG200

EMX Compact™ I/O module with Gigabit Ethernet, Serial, GPIO, and GPS receiver



EMX-ESG200 provides 2 PCI Express gigabit Ethernet ports based on the Intel 82574IT industrial temperature gigabit Ethernet controller. The board utilizes two PCIe lanes on the EMX I/O connector, one for each controller, offering higher throughput compared to designs using a PCIe switch that shares one lane for both ports. Status LEDs are provided on board for both ports, and a utility connector provides access to the LED signals for use on a panel display.



Dual Gigabit Ethernet ports

Driver support for:

- Windows Embedded Standard 7
- Windows CE 6
- Linux 2.6

EMX expansion bus for stackable I/O

EMX form factor 3.74" x 3.74"

-40°C to +85°C operating temperature

Both EMX modules can be combined into a 2-in-1 EMX-ESG777 I/O module for greater efficiency!

EMX-ESG614

EMX Compact™ I/O module with Gigabit Ethernet, Serial, GPIO, and GPS receiver



EMX-ESG614 is an EMX Compact form factor I/O module featuring 6 serial ports, 14 GPIO lines, and support for a Trimble Condor 23-channel GPS receiver. The six RS-232/422/485 ports are based on the SMSC SCH3116 industrial temperature UART. The board is available in three different configurations to support both low-cost and high-I/O applications. All I/O uses locking I/O connectors for increased ruggedness.



Six serial ports:

- 4 RS-232/422/485 ports
- 2 RS-232 ports

14 GPIO lines

GPIO is 3.3V logic, 5V tolerant

Support for GPS receiver

Driver support for:

- Windows Embedded Standard 7
- Windows CE 6
- Linux 2.6

EMX expansion bus for stackable I/O

EMX form factor 3.74" x 3.74"

-40°C to +85°C operating temperature

FeaturePak™ I/O Modules

FP-DAQ1616

FeaturePak Data Acquisition Module with 2MHz A/D, D/A, Autocalibration, and Digital I/O



FP-DAQ1616 offers advanced, high-speed data acquisition in an extremely compact module with a PCI Express interface. It offers a convenient, off-the-shelf, complete solution for adding analog and digital I/O features to your COM baseboard or other custom electronics. This module offers 16 channels of 16-bit or 12-bit A/D sampling at a maximum of 2MHz, supported with an expanded 16K-sample FIFO for reliable data collection in any operating system. All analog I/O features are enhanced with our industry-leading autocalibration technology, featuring independent calibration factors for each input and output range to guarantee maximum accuracy. Digital I/O features include seven 8-bit ports with both bit-wide



16 16-bit or 12-bit analog inputs

2MHz maximum aggregate sampling rate

Programmable ranges from $\pm 10V$ down to $\pm 0.625V$ bipolar, 0-10V down to 0-0.625V unipolar

16K sample A/D FIFO with programmable threshold

16 16-bit analog outputs with programmable range and polarity

Autocalibration circuit with precision reference voltages

56 programmable digital I/O

2 32-bit counter/timers for A/D timing and general purpose use

4 24-bit pulse-width modulator circuits

1 PCI Express x1 lane host interface

FeaturePak form factor 1.7" x 2.55"

-40°C to +85°C operating temperature

Supported by Universal Driver™ programming library

and byte-wide direction control, two 32-bit up/down counter/timers with programmable input source and gate, and four 24-bit pulse-width modulation circuits.

FeaturePak™ Standard

The FeaturePak standard defines a highly-compact, low-profile way to add configurable I/O functions to embedded systems. FeaturePak modules provide snap-in I/O for SBCs and COMs, or can be building blocks to simplify the development of fully-custom embedded electronics. FeaturePak modules provide "zero height expansion," fitting within the normal component envelope of an SBC or COM baseboard and adding no height to PC/104-style I/O expansion stacks.

FP-GPIO96

FeaturePak FPGA Module with 96 I/O lines



FP-GPIO96 is a FeaturePak general purpose digital I/O module using a high-capacity (700K gate equivalent) PCI Express FPGA for maximum density and flexibility. The base hardware configuration features 96 digital I/O lines grouped into 12 8-bit ports. All ports have I/O buffers to protect the FPGA and and feature programmable 5V/3.3V logic levels. The ports are organized into a combination of byte-wide and bit-wide direction control for maximum flexibility



FPGA-based design with in-the-field reconfigurability

96 buffered, programmable digital I/O

Byte-wide and bit-wide port direction control

5V/3.3V configurable logic levels

8 32-bit counter/timers

4 24-bit pulse-width modulators

1 PCI Express x1 lane host interface

FeaturePak form factor 1.7" x 2.55"

-40°C to +85°C operating temperature

Supported by Universal Driver™ programming library

and application compatibility. This module can also be used for full-custom FPGA designs.

PCIe MiniCard Modules

DS-MPE-SER4M

PCIe MiniCard 4-Port High Speed RS-232/422/485 Module



The DS-MPE-SER4M provides 4 high-speed multi-protocol serial ports in the ultra-compact PCIe MiniCard form factor. It features deep FIFOs for high speed operation, individual protocol selection for each port, selectable 120-Ohm line termination for RS-422/485,

4 RS-232/422/485 ports

Maximum baud rate:
RS-232: 1 Mbps
RS-422: 10 Mbps
RS-485: 10 Mbps

16550 compatible UARTs

256-byte TX/RX FIFOs

15KV ESD protection

Drivers for Windows XP, Windows 7, and Linux

Full-size MiniCard 2" x 1.18"

-40°C to +85°C operating temperature

wide temperature operation, and latching I/O connectors.

DS-MPE-GE1 NEW!

PCIe MiniCard Gigabit Ethernet Module



The DS-MPE-GE1 provides a convenient, compact, cost-effective means to add an extra gigabit Ethernet port to your embedded system. The Intel 82574IT Ethernet controller provides 10/100/1000Mbps operating speed with industrial temperature range capability. The module includes link

1 10/100/1000Mbps Ethernet port

Wake on LAN

4 LEDs for link, activity, 100 speed, 1000 speed

Latching I/O connectors for increased ruggedness

Drivers for Windows XP, Windows 7, and Linux

Full-size MiniCard 2" x 1.18"

-40°C to +85°C operating temperature

and speed LEDs as well as latching connectors for enhanced ruggedness. Wake-on-LAN functionality is supported.

DS-MPE-SER4OPT

PCIe MiniCard 4-Port Optoisolated Serial Module



The DS-MPE-SER4OPT offers opto-isolation for better reliability in long-distance connections or noisy environments. It offers four RS-232/485 serial ports in the PCIe MiniCard full size form factor with an extended operating temperature of -40°C to +85°C. Models can be ordered with 4 RS-232 ports, 4 RS-485 ports, or 2 RS-232 and 2 RS-485 ports. Latching connectors increase ruggedness.

4 optoisolated RS-232/485 serial ports

Maximum baud rate:
1Mbps RS-232 mode
10Mbps RS-485 mode

Available models:

- 4 RS-232
- 4 RS-485
- 2 RS-232 + 2 RS-485

16550 compatible UARTs

256-byte TX/RX FIFOs

+/-500V input/output isolation

Drivers for Windows XP, Windows 7, and Linux

Full-size MiniCard 2" x 1.18"

-40°C to +85°C operating temperature

DS-MPE-CAN2L NEW!

PCIe MiniCard Dual CAN 2.0 Port Module



The DS-MPE-CAN2L provides 2 CAN2.0B compatible ports in the compact PCIe MiniCard form factor. The FPGA-based CAN controllers feature extra deep FIFOs for enhanced network efficiency. The two ports can be operated independently or in dual-redundant mode. Independent opto-isolation for each port ensures reliability and ruggedness. Basic CAN drivers are provided for Windows and Linux.

2 CAN 2.0B ports

1Mbps data rate

31 receive buffers for improved performance

1 high priority and 16 standard priority transmit

16 programmable acceptance filters

Supports 11-bit and 29-bit identifiers

Dual-independent and dual-redundant modes

500V channel-to-channel isolation

Drivers for Windows XP, Windows 7, and Linux

Full-size MiniCard 2" x 1.18"

-40°C to +85°C operating temperature

DS-MPE-GPIO NEW!

PCIe MiniCard Digital I/O & FPGA Module



The DS-MPE-GPIO provides 36 lines of digital I/O. The I/O lines can be configured for simple I/O operation or can serve as counter/timer I/O and pulse-width modulation outputs. Both byte-wide and bit-wide port direction control is supported. All I/O ports are buffered for enhanced output current capability and protection and feature programmable pull-up/down resistors. Latching I/O connectors

36 buffered digital I/O lines

Configurable for up to 4 24-bit PWM

Configurable for 4 programmable counter/timers

Buffered outputs

Jumper-selectable pull-up / pull-down resistors

Drivers for Windows XP, Windows 7, and Linux

Universal Driver support for all functions

Full-size MiniCard 2" x 1.18"

-40°C to +85°C operating temperature

and wide temperature operation ensure ruggedness

DS-MPE-DAQ0804 NEW!

PCIe MiniCard Data Acquisition I/O Module



The DS-MPE-DAQ0804 offers a compact and economical means to add analog and digital I/O to an embedded system. The 16-bit analog inputs offer flexibility with unipolar/bipolar input ranges and single-ended/differential configuration. The 4 16-bit D/A channels can be operated in single channel, simultaneous update, or waveform generator mode. Digital I/O features include bit/byte I/O, counter/timer, PWM, and interrupt on change of state capability.

8 single ended / 4 differential 16-bit analog inputs

100KHz maximum aggregate sample rate

2048 sample A/D FIFO with programmable threshold

4 16-bit analog outputs

14 digital I/O lines configurable as:
4 24-bit PWMs
8 32-bit counter/timers

Drivers for Windows XP, Windows 7, and Linux

Universal Driver support for all functions

Full-size MiniCard 2" x 1.18"

-40°C to +85°C operating temperature

Ethernet Switches, WiFi, Modem, and GPS

EPSILON-12G2 NEW!

Managed 14-Port Carrier Grade Gigabit Ethernet Switch with Dual Fiber Ports



COM Express

Epsilon-12G2 is a rugged, managed Layer 2+ Ethernet switch offering twelve 10/100/1000Mbps copper twisted pair ports and two SFP sockets on a compact COM Express form-factor board. The SFP ports support 1Gbps and 2.5Gbps operation. Epsilon-12G2 is a stand-alone switch that does not require any host computer interface. The module's built-in microprocessor handles all switch functions, and is accessed via an in-band web interface over one of the Ethernet ports or via an out-of band command-line interface. On-board memory holds dual application images, boot code, MAC addresses, and configuration parameters, and can be used for program execution. Status LEDs are provided on board for all ports, and the LED signals are also available on a connector for external use.

12 Gigabit Ethernet ports and 2 SFP sockets

Built-in microcontroller for configuration and management

In-band web interface or RS-232 serial port out-of band interface

Standalone operation that does not require any host computer interface

8K MAC addresses and 4K VLANs (IEEE 802.1Q)

8K IPv4 and IPv6 multicast group support

Jumbo frame support at all speeds

DSCP remarking for both IPv4 and IPv6 frames

Multicast and broadcast storm control, as well as flooding control

Full-duplex flow control (IEEE 802.3X) and half-duplex backpressure

Rapid Spanning Tree protocol

Flexible link aggregation support based on Layer-2 through Layer-4 information (IEEE 802.3ad)

Multiple protocol support: IEEE 802.1d, IEEE 802.1w, IEEE 802.1s, and IEEE 802.1X

Wide input voltage range: 5-32VDC

Latching I/O connectors for increased ruggedness

COM Express form factor 4.9" x 3.7"

-40°C to +85°C operating temperature

EPSILON-8000

Standalone Managed 8-Port Gigabit Ethernet Switch



Epsilon-8000 is a rugged, managed Layer 2+ Ethernet switch offering eight 10/100/1000Mbps copper twisted pair ports on a PC/104 form-factor board. Epsilon-8000 can be used standalone or mounted on a PC/104 stack. The module's built-in microcontroller handles configuration and management and offers both a web interface and serial port link for configuration and monitoring. On-board memory holds dual application images, boot code, MAC addresses, and configuration parameters. The built-in, wide-range +7-32VDC power offers increased flexibility.

8 Gigabit Ethernet ports with non-blocking wire-speed performance

Built-in 8051 CPU for configuration and management

RS-232 serial port provides out-of-band management interface

Can operate autonomously or in conjunction with a host SBC

176KB on-board frame buffer

8K MAC addresses and 4K VLANs (IEEE 802.1Q), as well as 8K IP multicast group support

Jumbo frame support at all speeds

Programmable multi-layer classifier with 4 QoS classes

DSCP remarking for both IPv4 and IPv6 frames

Multicast and broadcast storm control, as well as flooding control

Full-duplex flow control (IEEE 802.3X) and half-duplex backpressure

Rapid Spanning Tree protocol

Flexible link aggregation support based on Layer-2 through Layer-4 information (IEEE 802.3ad)

Multiple protocol support: IEEE 802.1D, IEEE 802.1w, IEEE 802.1s, and IEEE 802.1X

Wide input voltage range: +7-32VDC or +5VDC input

PC/104 form factor 3.55" x 3.775"

Latching I/O connectors for increased ruggedness

-40°C to +85°C or -40°C to +71°C operating temperature

CORONA

SUMIT-ISM Wireless and Ethernet Module



Corona offers a range of communications and I/O features for SUMIT-expandable systems. It features a Mini-PCI socket for use with WiFi, video capture, serial port, and other I/O modules. An 802.11 a/b/g WiFi module is available pre-integrated onto the board, or add your own module. Corona also includes two

Mini-PCI socket for use with any Mini-PCI module

Pre-integrated 802.11 a/b/g WiFi module offers up to 108Mbps data rates and 23dBm power

WiFi support for Windows XP and Linux

Dual 10/100Base-T Ethernet ports

Dual USB 2.0 ports

SDVO to VGA converter

2.5" SATA solid state flashdisk socket

Sumit-A host interface with PC/104 pass-through connector

PC/104 form factor 3.55" x 3.775"

-40°C to +85°C operating temperature

10/100Base-T Ethernet ports and two USB 2.0 ports. An on-board SDVO to VGA converter offers VGA output when used with Diamond's Aurora Atom Z530 SBC.

JANUS-MM

PC/104 I/O Module with Dual CAN, GPS, and Cellular Communications



Janus-MM provides an integrated solution for vehicle, navigation, and asset tracking applications on a single PC/104 module. The dual CAN 2.0 channels provide interface to vehicle systems, while the GPS and modem sockets offer location identifica-

Dual CAN 2.0B interfaces

Independent opto-isolation on both ports

Philips SJA1000T CAN controllers

Socket for MultiTech™ SocketModem™ modules

Socket for Trimble™ GPS receiver modules

1 pulse per second output from GPS receiver

PC/104 form factor 3.55" x 3.775"

-40°C to +85°C operating temperature

CAN drivers available for Linux and Windows XP

tion and data communication capabilities using a variety of off-the-shelf MultiTech™ SocketModems™ and Trimble™ GPS receivers.

Pandora Cable-Free Enclosure For PC/104 Single Board Computers



- ◆ Compact, easy to assemble
- ◆ Eliminates most cables with convenient panel I/O board
- ◆ Wall mount rear panel
- ◆ Available in multiple lengths to fit additional boards and electronics

Pandora provides a fast, light, rugged, and flexible enclosure solution for PC/104 systems. In the Pandora concept, one end cap comprises a base plate to construct a PC/104 stack, made up of an SBC and I/O modules, and attach cables. Once the stack and cable assembly is complete, insert the system into the enclosure body and bolt it in place. Then attach cables to the second end cap and bolt it into place. Pandora also includes plenty of space all around the stack of boards for cable runs. This results in a solid, reliable, easy-to-use enclosure system and also enables quick disassembly if needed. Select from:

- ◆ 1.7" fits SBC and panel I/O board only
- ◆ 3.0" fits SBC and up to 2 PC/104 modules
- ◆ 5.0" fits SBC and up to 5 PC/104 modules
- ◆ 7.0" fits SBC and up to 7 PC/104 modules

Pandora systems can be customized to meet the specific needs of your application. Contact Diamond Systems to discuss your system requirements.

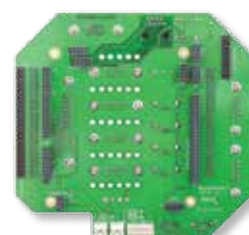
Panel I/O Boards

Our unique Panel I/O Board system is offered on many of our PC/104 single board computers and provides industry standard I/O connectors for the I/O, including CRT, Ethernet, USB, Serial, Parallel, PS/2, and data acquisition. PS/2, data acquisition, and status LEDs.

All panel I/O boards include extra built-in connectors which allows I/O from add-on PC/104 boards to be brought out to the front panel without having to customize the enclosure.



Panel I/O Board for Helios SBC



Rear of Panel I/O Board for Helios SBC



- ← Helios SBC
- ← Helios Panel I/O Board
- ← Helios enclosure front panel

Unique panel I/O board mounting method eliminates cables and mounts the entire system directly to the enclosure front panel

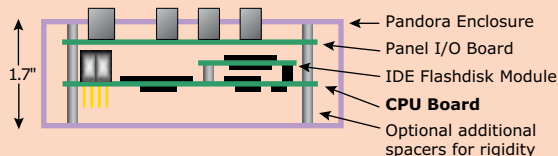
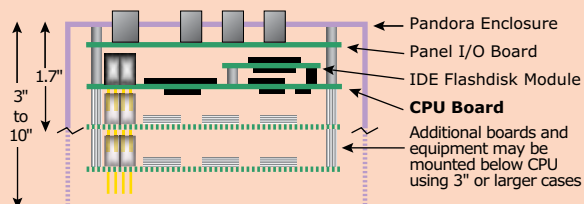
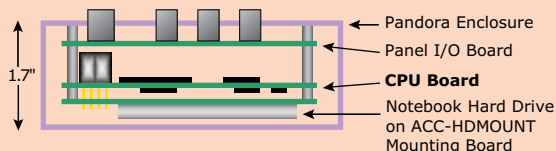
Available SBCs

Athena III	PC/104 SBC with 1.6/1.0GHz Intel Atom E-Series CPU and Integrated Data Acquisition
Helios	PC/104 SBC with 1GHz/800MHz Vortex86DX CPU and Integrated Data Acquisition
Aurora	PC/104 SBC with 1.6GHz Intel Atom Z530 CPU
Rhodeus	PC/104 SBC with 500MHz AMD LX800 CPU

Pandora Configuration Examples

These Pandora cross-section drawings illustrate the relative positions of the components inside 1.7" and larger Pandora enclosures. These can serve as a quick overview of the proper assembly method.

When building an embedded system with Pandora, Diamond recommends you start with the face plate and work your way down to ensure that all the mounting hardware aligns properly.



Raptor Compact, Rugged COTS Systems

The Raptor family is a series of compact, rugged, cost-effective COTS systems that establishes a new price point in systems designed to excel in harsh environments.



Raptor systems comprise two categories: a range of highly configurable embedded computing platforms and a family of ruggedized Ethernet switches. Embedded computing systems offer processors ranging from Intel Celeron 1.4GHz up to Core i7 dual core at 1.7GHz. These systems are highly configurable, with all features customizable, including processor, I/O, connector schemes, and case sizes and finishes. Ethernet switches include both copper and fiber connections with Layer

Features:

- ◆ One-piece aluminum enclosures for ruggedness and environmental protection
- ◆ EMI shielding and environmental sealing gaskets throughout
- ◆ MIL D38999 connectors standard (other types available)
- ◆ Wide temperature SBCs and electronics
- ◆ Conduction cooling
- ◆ Multiple I/O expansion capabilities for configuration flexibility
- ◆ Wide range of I/O including analog, digital, serial, Ethernet, CAN, and more

2+ management capability. All Raptor systems are designed for -40°C to +85°C operation, MIL-STD-202G shock/vibration, and IP65 environmental rating.

RAPTOR-VEGA

Rugged COTS Embedded Computer Systems



The Raptor-VEGA embedded computer system is designed around small form factor SBCs featuring the choice of a low power or high performance CPU and factory-configurable memory capacity. A full suite of I/O provides flexibility for most applications, while the EMX expansion connector inside the box enables installation of expansion boards for analog, digital, serial, Ethernet, MIL-STD1553, CAN or other I/O. A choice of 5VDC input or wide-range 8-36VDC input provides extra flexibility. Conduction cooling provides reliable extended temperature operation, enabling use in vehicle applications or harsh

Processor options:

- Intel Core i7-3517UE 1.7GHz
- Intel Core i7-2610UE 1.5GHz
- Intel Celeron 827E 1.4GHz

Up to 8GB memory

Dual Gigabit Ethernet

4 RS-232/422/485 serial ports

4 USB 2.0 ports

mSATA flashdisk up to 64GB

Stackable I/O expansion for a wide range of I/O modules

Wide range 8-36VDC power supply input

-40°C to +85°C operating temperature

Shock & vibration MIL-STD-810F compliant

Sealed construction, IP67 rated

Aluminum T6061 chassis, HBW or Anodized finish

Dimensions: 7.0" L x 6.5" W x 3.75" H (not including mounting flanges)

environments. The standard system configuration includes 4 MIL D38999 connectors for all power and I/O. Custom cable configurations, enclosure modifications, and coatings are also available.

RAPTOR-EG12SFP

Rugged Layer 2 Managed 14-Port Gigabit Ethernet Switch



The Raptor-EG12SFP is a rugged Layer 2+ managed gigabit Ethernet switch with 12 copper ports and two SFP sockets with 1.0GHz/2.5GHz SFP capability. A separate serial interface enables access to all management functions without occupying an Ethernet port. The wide-range +5 to +32 VDC input provides extra flexibility, while the full industrial operating temperature range enables use in vehicle applications or harsh environments. The standard system configuration includes 6 MIL D38999 connectors: 3 with 4 8-wire Gigabit ports per connector,

12 copper 10/100/1000Mbps ports & 2 SFP sockets

VLAN capability

Jumbo frame support

Programmable multi-layer classifier with 4QoS classes

DSCP remarking for IPv4 and IPv6 frames

Multicast/broadcast storm control/flooding control

Network partitioning

Flexible link aggregation

Web-based and RS-232 management interface

5-32VDC input voltage

-40°C to +85°C operating temperature

Shock & vibration MIL-STD-810F compliant

Sealed construction, IP67 rated

Aluminum T6061 chassis, HBW or Anodized finish

Dimensions: 7.0" L x 6.5" W x 3.75" H (not including mounting flanges)

2 SFP connectors, and 1 power/serial connector. Custom cable configurations, enclosure modifications, and coatings are also available.

RAPTOR-EG8

Rugged Layer 2 Managed 8-Port Gigabit Ethernet Switch



The Raptor-EG8 is a rugged Layer 2+ managed gigabit Ethernet switch with automatic power savings intelligence to power down unused ports and dynamically adjust the power output on each active port based on cable length. A separate serial interface enables access to all management functions without occupying an Ethernet port. A choice of 5VDC input or wide-range 7-32VDC input provides extra flexibility, while the full industrial operating temperature range enables use in vehicle applications or harsh environments. The standard system configuration includes

8 copper 10/100/1000Mbps ports

VLAN capability

Jumbo frame support

Programmable multi-layer classifier with 4QoS classes

DSCP remarking for IPv4 and IPv6 frames

Multicast/broadcast storm control/flooding control

Network partitioning

Flexible link aggregation

Web-based and RS-232 management interface

+5VDC or 7-32VDC input voltage

-40°C to +85°C operating temperature

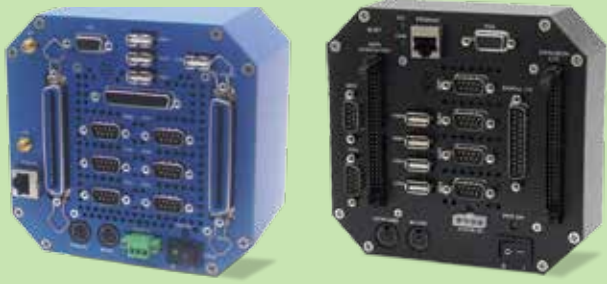
Shock & vibration MIL-STD-810F compliant

Sealed construction, IP67 rated

Aluminum T6061 chassis, HBW or Anodized finish

Dimensions: 7.0" L x 6.5" W x 3.75" H (not including mounting flanges)

4 MIL D38999 connectors; custom cable configurations, enclosure modifications, and coatings are also available.



Embedded-PC subsystem features

- ◆ Gigabit or 10/100BaseT Ethernet ports
- ◆ VGA display interface
- ◆ 4 serial ports
- ◆ 4 USB 2.0 ports
- ◆ SATA or IDE storage interfaces
- ◆ Built-in SSD up to 8GB
- ◆ Keyboard and mouse ports
- ◆ Real-time clock
- ◆ Watchdog timer
- ◆ Up to 16 digital I/O lines

Data Acquisition subsystem features

- ◆ 16 16-bit analog inputs with up to 250KHz sample rate
- ◆ Interrupt-based A/D sampling with 2048 FIFO
- ◆ Programmable input ranges
- ◆ 4 12-bit analog outputs
- ◆ Up to 24 additional programmable digital I/O lines
- ◆ 2 programmable counter/timers
- ◆ Autocalibration
- ◆ Supported by Diamond's Universal Driver software

Physical Characteristics

- ◆ Fanless operation over the full operating temperature range
- ◆ Size: 5.5 x 5.75 x 3.0 inches
- ◆ Alternate heights: 1.7, 5.0, or 7.0 in. (Helios & Rhodeus)
- ◆ Wall and DIN rail mounting options

Octavio systems are compact, lightweight, rugged embedded computer systems ready to run. Connect a display, keyboard and mouse, add power and turn on. The system boots and is running out of the box.

They are powered by Diamond's rugged PC/104 form-factor single board computers based on low-power, highly integrated CPUs such as the Intel Atom E640T, E680T, Z530, AMD LX800, and DMP Vortex86DX system-on-chip processors. Additionally, some Octavio models incorporate Diamond's industry-leading data acquisition circuitry.

Octavio systems come with up to 2GB of SDRAM, and have an internal solid-state flashdisk preloaded with a bootable Linux image. Models with integrated data acquisition functions also include Diamond's Universal Driver data acquisition programming software.

All Octavio models also provide a full set of standard embedded-PC I/O interfaces, including USB, Ethernet LAN, and multi-protocol serial ports, and graphics, keyboard, and mouse interfaces.

All system I/O is brought out to the front, in the form of industry standard connectors. The internal structure of the enclosure eliminates most internal cables, improving reliability of the system. Additionally, the systems feature fanless operation over the full -40°C to +85°C operating temperature range. Systems are available with either wall mount or DIN rail mount capability.

Tailoring Octavio To Your Application's Requirements

Standard Order Options

- ◆ Choice of integrated SBC: Athena III (page 5), Aurora (page 6), Rhodeus (page 6), or Helios (page 5)
- ◆ Available with integrated data acquisition subsystem
- ◆ Up to 8GB flashdisks (includes bootable Linux OS) along with Diamond's Universal Driver software (when applicable)
- ◆ Integrated 7-30V DC power supply: a 25W or 50W internal power supply can be added, allowing Octavio to operate in environments where a source of regulated +5V DC is not available (requires 3.0-inch minimum case height)
- ◆ Case height options: 1.7*, 3.0, 5.0, or 7.0 in. (*Athena III models limited to 3.0 in. max. height)
- ◆ DIN rail mounting option: available pre-installed

Special Order Options

- ◆ Integrated hard drive
- ◆ Integrated PC/104 expansion I/O modules
- ◆ Windows 7 OS instead of Linux
- ◆ Custom BIOS and configuration settings
- ◆ Additional PC/104 I/O modules
- ◆ Contact Diamond Systems for other options!

Available SBCs		Page No.
Athena III	PC/104 SBC with 1.6/1.0GHz Intel Atom E-Series CPU and Integrated Data Acquisition	5
Helios	PC/104 SBC with 1GHz/800MHz Vortex86DX CPU and Integrated Data Acquisition	5
Aurora	PC/104 SBC with 1.6GHz Intel Atom Z530 CPU	6
Rhodeus	PC/104 SBC with 500MHz AMD LX800 CPU	6

Diamond Systems supports a variety of popular standard and embedded operating systems (OS) across our line of single board computers, including Windows 7, Windows XP, Windows CE, Linux 2.6.xx and DOS. Support for any specific OS is SBC dependent so please visit our website and refer each SBC's product page for a listing of its supported operating systems.

If you have a requirement for an OS that is not listed as supported, please contact Diamond to discuss your needs. Other operating systems have often been tested and are known to work on our SBCs even if they are not listed on the website as supported. Additionally, we are willing to discuss specific OS ports to our SBCs based on your requirements.

System Development Kits and Software Development Kits are available for each of Diamond's SBCs and are an excellent way to begin working with the SBC right away and accelerate your application development.

Each kit includes a bootable OS contained on a rugged flash-disk that can be mounted directly to the SBC. Also included on these pre-loaded flashdisks for SBCs with on-board data acquisition functionality is Diamond's Universal Driver software. The Universal Driver toolkit provides C language support for Diamond products having onboard analog I/O, digital I/O, timer/counters, and watch-dog timer functions.

Software Development Kits

Diamond's Software Development Kits (SDKs) let you experience the operating system running on your single board computer out of the box with minimal or no configuration effort. Many SDKs include development tools to accelerate immediate application development.

Diamond's SDKs are sold separately from the single board computer, enabling you to select exactly the right combination of SBC and OS for your application.

Each SDK contains a flashdisk module pre-loaded with a bootable image of the OS. Diamond's Universal Driver software and other development tools are included as appropriate for the combination of OS and SBC. Instructions for mounting the flashdisk on the SBC are included in the kit. After installation, when power is applied to the SBC it will boot the OS that is loaded on the flashdisk and the system will be up and running. There is also ample room remaining on the flashdisk for your application and storage of data.

Universal Driver Software

Diamond's Universal Driver software is a software toolkit that provides a flexible and powerful C language programming library for data acquisition and control.

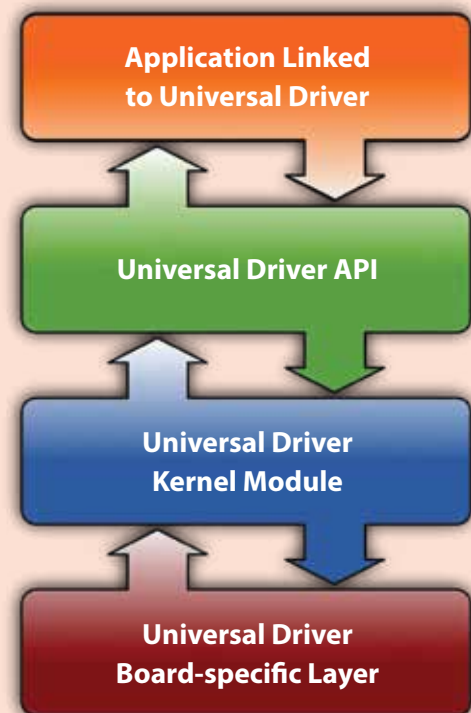
It contains a comprehensive set of functions for controlling the analog I/O, digital I/O, counter/timer, and interrupt features of the underlying hardware.

The Universal Driver is provided free with all our SBCs with integrated data acquisition, and with all our analog I/O expansion boards.

No other vendor provides this level of software functionality for embedded system data acquisition.

Key features include:

- ◆ Cross platform compatibility—supports Linux, Windows CE, Windows XP, and DOS
- ◆ Extensive interrupt handling features
- ◆ Autocalibration with software commands
- ◆ Supports low-level register reads/writes
- ◆ Multi-board operation, up to 16 boards
- ◆ Comprehensive, easy-to-use documentation
- ◆ Extensive programming examples



Flashdisks

- ◆ Rugged, bolt-on installation
- ◆ Requires no additional space on stack or in enclosure
- ◆ Typically support -40°C to +85°C operation
- ◆ Variants available depending on SBC:
 - mSATA SLC – 8GB, 16GB, 32GB, 64GB
 - mSATA MLC – 16GB, 32GB, 64GB
 - USB – 1GB, 2GB, 4GB, 8GB
 - IDE – 128KB, 256KB, 512KB, 1GB, 2GB, 4GB



IDE Flashdisk



USB Flashdisk



mSATA Flashdisk

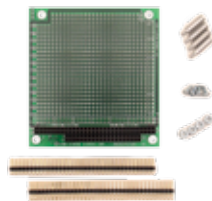
HDD Adapter Kit

- ◆ Mounts a 2.5" hard drive directly on the PC/104 stack
- ◆ Top or bottom stack position
- ◆ Mounting hardware and IDE cable included
- ◆ Dimensions: 3.55" x 3.775"



PC/104 Prototype Board

- ◆ PC/104 size board with mounting holes – fits directly on PC/104 stack
- ◆ .1" x .1" grid of plated .040" diameter holes fits ICs and discrete
- ◆ Grid of +5V & ground on top and bottom sides
- ◆ 50-pin right angle header for user I/O
- ◆ 8-bit & 16-bit PC/104 stackthrough headers
- ◆ Sample schematic included



PC/104 Spacers & Mounting Hardware

- ◆ SPC-104 spacers
- ◆ MTG104 PC/104 mounting kit, includes 4 each spacer, screw, and nut
- ◆ Spacers are 0.6" long x 3/16" diameter x #4-40 thread, with male and female ends; aluminum with clear finish



SPC-104 is the standard PC/104 mounting spacer with 0.6" height and #4-40 threads; male/female thread configuration enables continuous stacking.

MTG104 is a complete mounting kit including 4 spacers, 4 screws, and 4 nuts; one kit required per board.

CompactFlash Adapter Kit

- ◆ Works with type I and II CompactFlash
- ◆ Enables remote placement for greater flexibility in enclosure design
- ◆ Ejector latch for easy media removal
- ◆ Dimensions: 2.95" x 2.76"
- ◆ -40°C to +85°C operating temperature



PC/104 Terminal Board

- ◆ STB-104's PC/104 format board fits conveniently on board stack
- ◆ Angled screw terminals
- ◆ Accepts 12-28AWG solid or stranded wiring
- ◆ 50-pin connector for interface to most Diamond PC/104 I/O boards
- ◆ Second I/O connector provides bypass for I/O signals



Cables and Cable Kits

- ◆ Cable kits are available for all SBCs
- ◆ Cables convert pin headers to PC-style connectors
- ◆ Many individual cables are also available
- ◆ See www.diamondsystems.com/products/cables for specific product requirements.



PC/104 Connectors

PC/104 headers are available in both stackthrough (long pins) and non-stackthrough (short pins) format. All of these connectors require soldering.

Available Models

H104-64-ST	64 pins, stackthrough
H104-64-NS	64 pins, non-stackthrough
H104-40-ST	40 pins, stackthrough
H104-40-NS	40 pins, non-stackthrough



AC Adapters

- ◆ Wide input range 90-240VAC, 50-60Hz
- ◆ 5V/6A output with PS-5V-04
- ◆ 12V 4A output with PS-12V-01
- ◆ Compatible with all DSC +5V and +12V input SBCs



For over 24 years, Diamond Systems has been a leading global provider of compact, rugged, board- and system-level real world embedded computing solutions to companies in a broad range of markets, including transportation, energy, aerospace, defense, manufacturing, medical, and research.

Diamond Systems' products feature:

- ◆ Ruggedness
- ◆ High Integration
- ◆ I/O Rich Features
- ◆ High Functional Density



The Perfect Fit for Imperfect Environments

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