



**DIAMOND SYSTEMS**  
C O R P O R A T I O N

Embedded Computing Solutions  
Product Catalog 2007

# Welcome to Diamond Systems

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**Welcome to Diamond Systems.** Over the years, Diamond Systems has become one of the world's premier suppliers of rugged PC/104 I/O modules, CPUs and system solutions for use in embedded applications. Our success derives from listening to you, our customers, and delivering quality products and services that meet your needs. Diamond Systems continues to satisfy worldwide customer demand for embedded solutions with innovative products and services such as these:

**ETX Solutions:** Diamond Systems is the first to bring cost effective, timely ETX solutions to even the lowest volume applications with the industry's first I/O intensive off the shelf ETX Baseboard. With the equivalent of four PC/104 I/O modules on a single board, the Chameleon ETX baseboard provides instant time-to-market using dozens of commercially available, low cost ETX modules. And for high volume applications, Diamond Systems engineers can turn custom Chameleon derivatives into volume production products in record time.

**CPU-Plus:** Diamond Systems blows past the world of me-too look-alike CPU boards to bring you a unique, powerful set of Single Board Computers that combine low-power, extended temperature CPU circuits with Diamond Systems' proven data acquisition technology (including autocalibrating A/D) on a single board. These highly integrated solutions offer improved reliability and performance as well as a smaller overall solution size than the previous multi-board approach. Today, Diamond Systems customers have more choice than ever before with five CPU boards in PC/104, EPIC and EBX form factors, speeds up to 2.0GHz and state of the art I/O features like Gigabit Ethernet, USB 2.0 and S-ATA hard drive support.

**Advanced rugged PC/104 I/O modules:** As always, Diamond Systems' broad range of PC/104 I/O modules means that we have what you need for your application. Diamond Systems remains a technology leader: We offer seven boards with autocalibrating A/D technology, including two with automatic autocalibration, the most accurate A/D implementation available in our industry today. Our GPIO-MM digital I/O module uses FPGA technology to provide a higher density of I/O as well as reconfigurability. And the Janus-MM module combines a dual CANbus controller with optional GPS and/or cellular wireless modem plug-ins to reduce the size of mobile systems.

**Customization and Integration Services:** Whether you need minor adjustments to standard products, such as conformal coating or latching connectors, to meet specific application requirements or a full custom design, Diamond Systems is ready to respond. If your application needs a complete system solution, with one or more boards integrated into an off-the-shelf or full custom enclosure, Diamond Systems can deliver, as we have done for dozens of customers over the past years.

The following pages give you a brief overview of our product line up for 2007. For more detailed information and a price quote, please visit our web site at [www.diamondsystems.com](http://www.diamondsystems.com).

# Rugged Design For Rugged Performance

Diamond Systems' products are designed from the ground up to meet the challenges of harsh and hostile environments. These may include the extreme cold found in airborne systems at high altitude or extreme heat in a sealed enclosure in a military system in a desert location, or the vibration found in diesel locomotive. The features listed below make Diamond Systems products ideal for applications with demanding environmental requirements.

## Extended Temperature Operation

The Diamond Systems products listed below are all rated for -40 to +85°C operation and are fully tested and guaranteed for proper performance over their entire rated operating temperature. All at no extra cost.



**Environmental Test Chamber**  
used for temperature validation, screening, and burn-in activities.

## Soldered-on Memory

Our Single Board Computers feature soldered-on memory to improve reliability by preventing memory modules from becoming dislodged or occasional memory errors due to vibration. Soldered-on memory also ensures proper performance over the entire operating temperature range and prevents compatibility problems that can occur when memory module suppliers change components or designs.

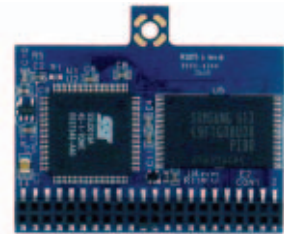


## Fanless Operation

Rotating parts such as fans and hard disks are one of the most common sources of failure in embedded systems. Many of our SBCs are available in fanless versions for increased reliability.

## Solid State Flashdisk Storage

Our SBCs all work with solid state Flash Disks for improved reliability and lighter weight. The Flash Disk works just like a standard hard drive, except it has no moving parts. The tiny module (approx. 1" x 2") installs directly onto the CPU board's IDE connector and is held firmly in place with a mounting screw. Several SBCs also work with a removable CompactFlash device.



## Cable-free Enclosures

Our Pandora and Triton enclosures improve ruggedness by eliminating one of the most common sources of failure — the interconnecting cables. Custom front panels can be designed to accommodate customer-specific applications.

## PRODUCTS WITH EXTENDED TEMPERATURE OPERATION

SBCs	Analog I/O	Digital I/O	Serial Communications	Networking, Power Supplies
Poseidon	Diamond-MM-32X-AT	GPIO-MM-XT	Emerald-8M-XT	Janus-MM-XT
Hercules	Diamond-MM-16-AT	Onyx-MM-DIO-XT	Emerald-8P-XT	Mercator-MM-XT
Athena	Diamond-MM-AT	Onyx-MM-XT	Emerald-8Plus-XT	Jupiter-MM
Elektra	Diamond-MM-XT	Pearl-MM-XT	Emerald-4M-XT	Jupiter-MM-SIO
Prometheus	Ruby-MM-1612-XT	Opal-MM-XT	Emerald-MM-Opto-XT	
	Ruby-MM-812-XT		Emerald-MM-DIO-XT	
	Ruby-MM-412-XT			
	Ruby-MM- 16-XT			

# Auto-Autocalibration Reduces Analog I/O Errors

Every analog circuit exhibits fluctuations in performance due to changes in temperature. Today's complex A/D circuits, containing input multiplexor chips, a programmable gain circuit, a unipolar / bipolar shifting circuit, a single-ended / differential switching circuit, a voltage reference, and finally an A/D chip, 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 range of -40°C to +85°C.

The A/D circuit must have some method to compensate for these built-in errors, or the A/D reading will become unreliable. It is not uncommon for an A/D board with a 16-bit A/D converter to yield measurements with only 9-bit or 10-bit accuracy.

## Calibration Methods

**Analog potentiometers** are used to calibrate the analog circuitry on low-cost A/D boards. This method works well at a fixed temperature, typically room temperature, at which the board was initially calibrated. As the temperature changes, error is induced. Re-calibrating the board requires physical access to the potentiometers, which usually means disassembling the system, an inconvenient and time-consuming process.

**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. However, autocalibration requires direct involvement of the application program to initiate the calibration process. Diamond Systems' Universal Driver software, included free with all our A/D boards, provides built-in autocalibration code to simplify the task. A simple function call is all that is required to initiate autocalibration.

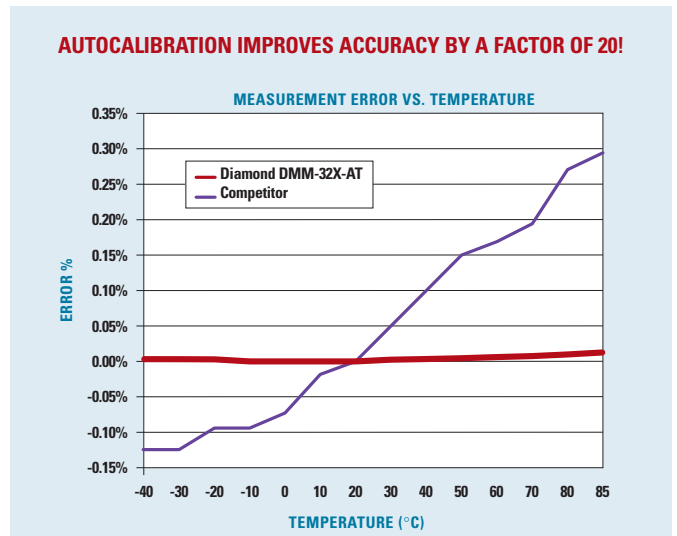
**Auto-autocalibration** takes this process one step further by eliminating the need for application software intervention. With Diamond Systems patented approach, the A/D board contains a built-in temperature sensor and microcontroller. The microcontroller continuously monitors the temperature sensor. When the board's temperature changes by a specified amount, the microcontroller will initiate and control the autocalibraion process automatically, without any need for involvement by the application software.

## Auto-Autocalibration Trade-offs

Since the analog error is directly proportional to temperature change, reducing the size of the temperature change that triggers autocalibration will result in lower maximum error. This threshold may be set using the Universal Driver software.

However, the auto-autocalibration process lasts about 1/2 second. In order to prevent the process from interrupting a time-sensitive data acquisition sequence, auto-autocalibration can be disabled via the Universal Driver software. Once the sensitive operation is complete, the auto-autocalibration feature can be re-enabled. If calibration is then required it will begin immediately. Calibration can also be terminated mid-process if needed, and the board will automatically return to its previous state.

## Illustration of the Benefits



The chart shows the total error of two commercially available PC/104 A/D boards, both of which have an operating temperature range of -40 to +85°C. The purple line shows the error for an A/D board with manual calibration, and the red line shows a Diamond Systems board with auto-autocalibration.

Note that the maximum error of the purple line (manual calibration board) is 0.3%. For a 16-bit A/D converter, this error amounts to 197 A/D counts, reducing the accuracy to between 8 and 9 bits. In comparison, the red line (auto-autocalibration board) shows a maximum error of only .014%, or 9 A/D counts. This represents a 20x reduction in measurement error.

## DIAMOND SYSTEMS BOARDS WITH AUTOCALIBRATION OR AUTO-AUTOCALIBRATION

### Autocalibration

Hercules Diamond-MM-16-AT  
 Athena Diamond-MM-AT  
 Elektra Chameleon

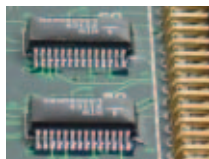
### Auto-autocalibration

Poseidon  
 Diamond-MM-32X-AT

# Custom and Semi-Custom Products

Even with Diamond System's extensive set of off-the-shelf single board computers and PC/104 I/O modules, some applications have unique requirements that cannot be met by off-the-shelf products. Diamond Systems specializes in customizing CPU and I/O solutions for specific application needs.

When you need something special, Diamond Systems' standard products serves as an outstanding starting point to get the specific solution you need to market as quickly as possible. Customization may do as little as provide conformal coating or testing / burn-in over a specific temperature range. Or we may depopulate a board or change a connector to better fit your application. Or we may provide a complete custom design for you, taking advantage of our extensive design library of I/O and CPU circuits. And once your board solution is nailed down, Diamond Systems can integrate that solution into a custom designed or off-the-shelf enclosure, to provide you with a complete system unit ready to use.



## Ruggedization

One area of specialization is making Diamond Systems' rugged standard products even more rugged. These custom ruggedization services are available for the exceptional application that requires an even more rugged and fully tested solution. Such services include:

- Extended temperature screening
- Burn-in testing
- Conformal coating
- Hardwired jumper configuration
- Latching connectors

## PRODUCT VARIANT EXAMPLES

- Connector changes, such as installing vertical headers or latching connectors
- Jumper configuration or elimination with 0-ohm resistors
- BIOS changes, such as custom default settings
- Removal of unneeded components to reduce cost and power consumption

Diamond Systems offers two categories of customization to make our products match the specific needs of your application:

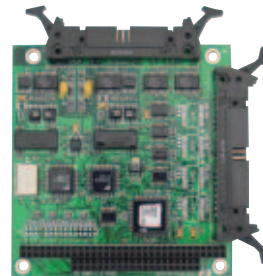
## Standard Product Variants

Standard product variants consist of minor changes to standard, off-the-shelf Diamond Systems products that do not require a new PCB design. These changes modify our boards to meet specific needs by depopulating components or changing component values, changing FPGA code, changing connectors, setting jumpers, customizing the BIOS or setting specific CMOS parameters. These changes can be made quickly and easily, speeding your time to market.



## Full Custom Design

In the event that your needs include specialized form factors or proprietary logic, Diamond Systems is your best choice to design and build a custom embedded CPU or I/O board for your application. Recent examples include a compact VIA Eden CPU with integrated data acquisition, a relay & opto-isolator I/O board for an automotive assembly line tool, and a serial communications board for a locomotive control panel. Each of these products was designed quickly and economically using our extensive portfolio of CPU and I/O technology, reducing development time, development cost and risk.



## CUSTOM TECHNOLOGY PORTFOLIO

- Single-board computers
- Analog I/O
- Digital I/O
- Counter/timers
- RS-232/422/485 serial ports
- CANbus
- Ethernet
- USB 2.0
- GPS
- Wireless communications
- Audio circuitry
- Relays and opto-isolation
- DC/DC power supplies
- Software drivers
- FPGA / logic design
- Autocalibration circuitry

# Integrated Solutions

## Hardware Sub-Assemblies

Design, selection, integration and test of board-level computing hardware

## Complete, System Level Solutions

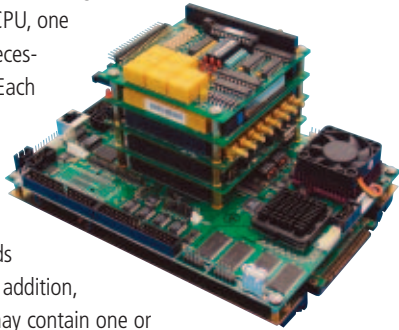
Design, selection, integration and test of all system level components in an enclosure

### From a Board Stack to a Complete System Solution

Diamond Systems provides a broad range of integration services that builds on our design experience and our expertise in providing solutions for the embedded market for over 16 years. We provide complete solutions from concept to volume manufacturing, and act as an extension of your development team.

### Hardware Sub-Assembly

Diamond can provide you with an integrated board stack consisting of a CPU, one or more I/O boards and, if necessary, a power supply board. Each board may be selected from among Diamond's extensive selection of PC/104, EBX or EPIC CPUs, analog or digital I/O or communications boards and power supply boards. In addition, your custom sub-assembly may contain one or more custom boards, and where an adequate Diamond board is unavailable, compatible boards from third party suppliers. Diamond will even load and install your custom software in a solid state disk device.



### Complete System Solution

System solutions build on the hardware sub-assembly level adding substantial value. With a system solution, Diamond defines a system enclosure using either one of Diamond's off-the-shelf enclosures described later in this catalog or a customized version of the enclosure for your specific application. Diamond engineers design a suitable I/O interface with appropriate internal cabling. The resulting solution is a complete system-level solution ready for integration with the remaining hardware and software of your application.

### Example: Vehicle-based Video Capture

Diamond Systems designed and delivered a vehicle-based digital surveillance system to capture and forward video and audio from incidents involving a police officer. The system included a Hercules EBX CPU, a video capture board, and 802.11 wireless communications to forward the resulting data files. Diamond Systems' application engineers identified an appropriate video capture solution as well as a PC-card based approach for the wireless communications. The system was designed to withstand the rigors of vehicular operation including resistance to shock and vibration. The resulting assembled board stack was provided as a complete solution in a rugged system enclosure to the application developer.

### Example: Traffic Control

Diamond Systems designed and delivered a control system for a variable speed-limit traffic sign for use in the vicinity of schools. The system was designed and delivered within two months from initial customer contact. Diamond Systems was able to meet a very aggressive cost target AND provide a complete system solution through inclusion of a low-cost third-party CPU board with Diamond Systems' PC/104 I/O boards. The PC/104 stack was packaged inside the Pandora enclosure and included a custom front panel and I/O connector board to eliminate cables and improve ruggedness.



# Universal Driver Software and OS Development Kits Speed Time-to-Market

Diamond Systems' outstanding array of software tools get application development started fast. Software Development Kits for popular embedded operating systems such as Linux and Windows CE, boot and run on Diamond Systems CPU boards out of the box. Diamond Systems' Universal Driver Software provides a common base for software across our I/O boards and a number of popular operating systems. Taken together, Diamond Systems' Development Kits and Universal Driver Software provide you with powerful tools to start your application development immediately and complete your development on schedule.

## Development Kits

Diamond Systems offers Software Development Kits for popular embedded operating systems. These kits let you experience the operating system running on your CPU board in a quick-start fashion with minimal or no configuration effort. Many kits also include software development tools to enable immediate application development. Availability of operating system software support is shown here, but check our web site for the latest software support information.

OPERATING SYSTEM SOFTWARE SUPPORT				
PRODUCT	Linux	RTLinuxPro	Win CE	QNX
ATHENA	✓	✓	✓	✓
HERCULES	✓	✓	✓	✓
PROMETHEUS	✓	✓		✓
ELEKTRA	✓	✓	✓	✓
POSEIDON	✓		✓	

## Universal Driver Software for I/O Board Programming

Diamond Systems' Universal Driver software provides a powerful C language programming library for data acquisition and control. It contains a comprehensive set of functions that control the analog I/O, digital I/O, counter/timer, and interrupt features of the hardware. Universal Driver is provided free with all our I/O boards, as well as our CPU boards with integrated data acquisition. It may also be downloaded from our website. No other vendor offers you this level of software functionality for embedded systems data acquisition.

- Cross Platform Compatibility
- Multi-Board Operation up to 16 boards simultaneously
- Extensive Interrupt Handling Features
- Hard Real-Time Operation with RTLinuxPro
- Example Programs Save Time
- Comprehensive, Easy-to-Use Documentation

## SUPPORTED OPERATING SYSTEMS

- DOS
- Linux
- RTLinux
- QNX
- Windows 98 / NT / XP / XPe / 2000
- Windows CE
- VxWorks

## SUPPORTED PROGRAMMING LANGUAGES

- C/C++
- Visual Basic
- LabView

## Free, Knowledgeable Technical Support

Technical support for the Universal Driver, as well as for our hardware products, is provided by the actual engineers who designed it. You get quick, friendly, knowledgeable answers to your questions by people who understand the technology in detail.

## OS KIT ORDERING INFORMATION

	Part #	Flash Disk	CD / Download	ACC-IDEEXT	20GB HDD	ACC-HDDMOUNT
Win CE	DK-WCE-DL		Download			
	DK-WCE-32	32MB				
	DK-WCE-64	64MB				
	CD-WCE-128	128MB				
QNX	DK-QNX-DL		Download			
	DK-QNX-32	32MB	CD	✓		
	DK-QNX-64	64MB	CD	✓		
	DK-QNX-128	128MB	CD	✓		
Linux	DK-LINUX-CD		CD			
	DK-LINUX-FD32	32MB	CD	✓		
	DK-LINUX-FD128	128MB	CD	✓		
	DK-LINUX-HD20		CD		✓	✓
	DK-LINUX-COM	32MB	CD	✓	✓	✓
	DK-LINUX-02				✓	✓

\*Includes developer license  
All kits include Universal Driver Software

# Diamond Systems ETX Solutions

## OFF-THE-SHELF OR CUSTOM I/O FOR YOUR ETX SYSTEM

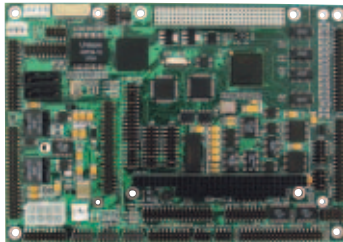
ETX is the most popular among a set of products known as Computer-On-Module, or COM.

COM products implement an architectural approach in which the CPU and fundamental I/O circuits are placed on a daughter card which attaches to a "baseboard" containing any additional I/O required by an application as well as the I/O cable connectors. The interface between the COM board and the baseboard includes both the system busses such as ISA and PCI and the fundamental I/O signals. The COM approach and ETX in particular, has become increasingly popular over the past several years because of inherent advantages over more traditional single board computer (SBC) solutions with fixed form factors and stacking or slot-based I/O expansion.



### ETX Advantages

The ETX / COM approach allows the baseboard form factor to be customized and connectors and connector locations to be chosen as necessary to, for example, fit through the bulkhead panel to the exterior of an existing enclosure. Hence, the ETX approach:



- 1. Reduces or eliminates internal cabling.** An SBC has a pre-defined, fixed set of connectors and connector locations, requiring bulky and unreliable cables to bring the I/O out to the enclosure walls. An ETX approach allows connectors and connector locations (and even connector pin definitions) to be selected to meet the needs of the application, mating directly to the enclosure walls usually without cables.
- 2. Uses existing enclosures.** While SBCs meet specific, standard form factors such as PC/104, EBX or EPIC, an ETX baseboard may be customized to fit the form-factor requirements of an existing enclosure.
- 3. Meets specific I/O requirements.** With an SBC, additional I/O for the system is gained by adding "best available" PC/104 I/O modules or slot cards. These cards may impose unnecessary cost or undesired limitations on the overall system. With an ETX solution, additional I/O meeting the specific needs of the application can be designed into the baseboard, providing a "perfect fit" solution that exactly meets the design requirements without compromise.

These advantages save significantly, not just in the cost of internal cables, but in the cost of assembly of the system. COM-based systems use fewer

boards, since all additional I/O can be put on the baseboard instead of adding I/O cards. This shrinks system size and improves reliability by reducing board interconnect issues. And should additional CPU horsepower be required to support new software features, a more powerful COM module can be substituted without changing the I/O baseboard or driver software, simplifying the upgrade issue.

Finally, because of the rigorous standards behind the ETX and the number of suppliers providing ETX products, ETX has become commoditized. ETX products are available at rock bottom prices.

### ETX Challenges

Hence ETX modules have become the solution of choice for many higher volume applications. However, use of an ETX module requires a baseboard design, which may be too costly for lower volume applications, too time-consuming for applications requiring an ultra-fast time to market, or too much more complex than simply integrating off-the-shelf I/O cards.

### Diamond Systems ETX Solutions

On the following pages, Diamond Systems presents two alternatives to enable and enhance the use of ETX modules in virtually any embedded application.



- First, Diamond Systems introduces Chameleon, the industry's first I/O-intensive off-the-shelf ETX baseboard. Containing the equivalent of four PC/104 expansion cards, Chameleon makes it possible for lower volume applications to take advantage of an ETX solution. And Chameleon-based applications can be brought to market in a matter of days.
- Secondly, Diamond Systems introduces a custom ETX baseboard program that uses the Chameleon technology platform to bring fully custom ETX baseboards, with custom form factor and connectorization, to fruition in the shortest possible timeframe.

The COM approach to embedded design has already bypassed traditional SBC solutions in many high volume applications. By taking advantage of Diamond Systems' proven I/O design expertise with PC/104 I/O modules, bringing an ETX design to production has never been easier or faster with lower risk.

# CHAMELEON

## DATA ACQUISITION ETX BASEBOARD WITH ANALOG AND DIGITAL I/O, SERIAL PORTS, DC/DC POWER SUPPLY AND PC/104-PLUS

### SPECIFICATIONS

#### ETX I/O ENABLED

Display	CRT, flat panel with LCD backlight control, TV-out
USB Ports	(4) USB
Serial Ports	(2) TTL (RS-232/TTL configurable on baseboard)
Networking	10/100 Ethernet
Mass Storage	(2) IDE (Flashdisk and CompactFlash interface)
Keyboard / Mouse	PS/2
Audio	AC '97, Line-in, Line-Out, Mic
Other	SMbus, I2C, IrDA, PC speaker

#### ADDITIONAL PC I/O

Expansion Bus	PC/104-Plus (ISA+PCI)
Serial Ports	(4) RS232/422/485
Networking	Gigabit Ethernet
Mass Storage	(2) S-ATA

#### DATA ACQUISITION

Analog Inputs	32, 16-bit A/D resolution
Max Sample Rate	250KHz total
Input Modes	Single-ended, differential
Input Ranges	$\pm 10V$ , $\pm 5V$ , $\pm 2.5V$ , $\pm 1.25V$ , $0-10V$ , $0-5V$ , $0-2.5V$ , $0-1.25V$
Accuracy	$< \pm 2LSB$ after autocalibration
On-board FIFO	1024 samples with programmable threshold
Analog Outputs	4, 12-bit D/A resolution
Output Ranges	$\pm 5V$ , $\pm 10V$ , $0-5V$ , $0-10V$
Settling Time	7 $\mu$ s to $\pm 0.01\%$
Output Current	$\pm 5mA$ max
Digital I/O	24 lines, 5v logic compatible, programmable
Output Current	0: 12mA max; 1: -4mA max
Opto Inputs / Outputs	8 (5V – 24V DC) / 8 (5V – 24V DC)
Counter / Timers	1 32-bit; 1 16-bit

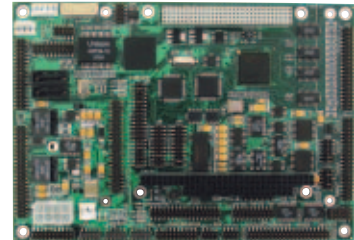
#### POWER SUPPLY

Input Voltage	5VDC or 6-28VDC
Output Power	45W total
Output Voltages	+5V, +3.3V (on PCI Bus)
Operating Temp	-40°C to +85°C
Dimensions	4.53" x 6.50" (115mm x 165mm)

### ORDERING INFORMATION

For part numbers and ordering information, please visit our website at [www.diamondsystems.com](http://www.diamondsystems.com).

- Higher I/O density than any off-the-shelf SBC
- EPIC form factor baseboard with the equivalent of four PC/104 cards
- All ETX I/O plus Gigabit Ethernet, S-ATA and four additional RS232/422/485 ports
- Data acquisition features 32 16-bit A/D with autocalibration, 4 12-bit D/A, 24 DIO, two counter/timers, 8 opto inputs and 8 opto outputs
- 5-28V DC power supply with 45W output power
- -40°C to +85°C operating temperature



The Chameleon ETX Baseboard, the industry's first I/O-intensive off-the-shelf ETX baseboard, contains the equivalent of four PC/104 cards on a single board. Chameleon brings out all I/O offered by an ETX module, including 10/100BaseT Ethernet, 2 serial ports (with RS232 support), 4 USB ports, dual IDE controllers (supporting both a FlashDisk and a CompactFlash), floppy / parallel port, PS/2 keyboard and mouse support, CRT, LCD flat panel and TV-out displays, and AC'97 sound. Chameleon supplements the standard ETX I/O content with a Gigabit Ethernet controller, S-ATA controller and four additional RS232/422/485 ports for a total of six serial ports. PC/104-Plus (ISA + PCI) expansion is also provided.

Chameleon's data acquisition section has 32 16-bit analog inputs with a 250KHz sample rate backed by a 1024 sample FIFO. It also includes 4 12-bit D/A channels. Autocalibration ensures maximum accuracy over time and temperature.

Chameleon provides 24 digital I/O lines with programmable direction, along with optoisolated I/O (8 inputs and 8 outputs), and two counter / timers.

The built-in 5-28VDC power supply enables Chameleon to be used in a wide range of applications without requiring a separate add-on power module. It offers 45 watts of output power, enough to power the ETX module as well as peripherals and add-on boards.

All Chameleon I/O is brought to pin headers. I/O that can utilize PC-style connectors is placed such that a small I/O Panel Board can instantly convert Poseidon to PC-style connectors. Chameleon operates from -40°C to +85°C with an extended temperature ETX module. Universal Driver software for Linux, Windows 98 / 2000 / XP / CE, DOS, QNX, and VxWorks is included.

# Custom ETX Baseboard Solutions

Perhaps the most significant benefit of designing an embedded application around an ETX module is the ability to customize the baseboard to meet the specific I/O requirements, footprint, and connector requirements of the application. A properly executed design can significantly reduce or even eliminate internal cabling and reduce assembly time and cost. Such a design can supply legacy interfaces which may translate to easier installation or upgrade from an earlier version of a product.

But ETX solutions require baseboard design and implementation of a custom baseboard which may include high density surface mount or BGA technology, multiple layers, and combined analog and digital content. This design may be beyond the skill set of an engineering organization previously engaged in integration of off-the-shelf components. It also imposes a significant burden on the engineering and operations divisions of a company, which might prefer to put those valuable resources to better use.

Diamond Systems, with over 17 years experience in the design and manufacture of high density PC/104 I/O modules, including both analog and digital technology, is here to help. Diamond Systems engineering staff can turn your ETX baseboard requirements from the back of the envelope to a full production product in record time while reducing technical and schedule risk.

Need six additional RS485 serial ports? No problem! Diamond Systems engineers will incorporate the proven logic from the Emerald-MM product family.

Need 96 programmable, interrupt driven digital I/O lines? No problem! Diamond Systems engineers will incorporate logic from the GPIO-MM product family.

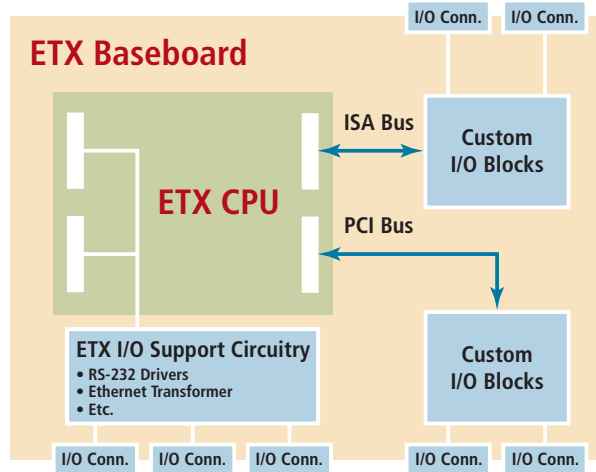
Need optically isolated I/O or relays? No problem! Diamond Systems engineers will incorporate logic from the Opal-MM product family.

Need a 24V DC input? No problem! Numerous Diamond Systems products already incorporate variable input voltage DC / DC power supplies.

Why reinvent the wheel in your shop or take a chance with an ETX supplier who has never done an

analog design before? And should you need more capability than exists in a standard Diamond Systems product today, you'll still get to market faster by using a current Diamond Systems product design as a baseline for the additional capability.

**Call Diamond Systems today for your custom baseboard quotation.**



## CUSTOM I/O BLOCK OPTIONS

### Core / Real World I/O

- Analog I/O
- Digital I/O
- Counter/timers
- FPGA / logic design
- Autocalibration circuitry
- Relays / opto-isolation
- DC / DC power supplies
- Battery backup / charger / UPS

### Communications/System I/O

- RS-232/422/485 serial ports
- Ethernet 10/100 & Gigabit
- CANbus
- GPS
- Wireless communications
- Upgraded video
- USB (1.1 and 2.0)
- 1394 Firewire

### Bus Expansion

- ISA and PCI bus expansion
- PC/104
- Mini-PCI
- Standard slots
- PCI to ISA bridge
- PCI to PCI bridge



# Single Board Computers

## CPU PLUS DATA ACQUISITION ON A SINGLE BOARD

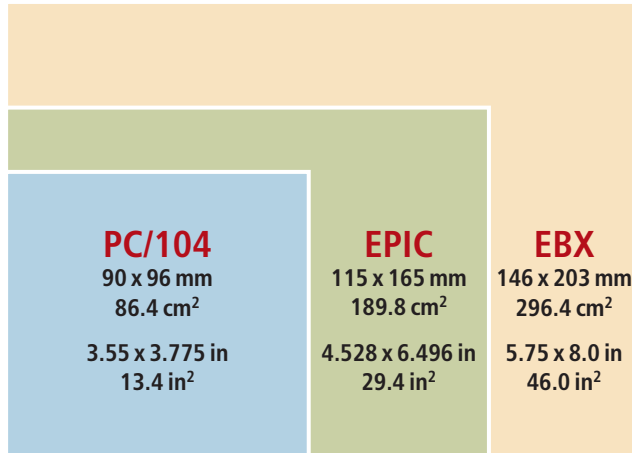
Diamond Systems provides a broad range of single board computers (SBCs) to meet a variety of embedded computing requirements. Diamond Systems' SBCs span the performance range from a 100MHz 486DX4 to a 2.0GHz Pentium M equivalent with up to 512MB of RAM. As shown in the Selection Guide below, Diamond's SBCs support a variety of features including new high performance I/O such as USB 2.0, Gigabit Ethernet and S-ATA mass storage interface.

A unique characteristic of Diamond Systems' SBCs is the combination of CPU, PC I/O and data acquisition circuitry on a single board. This high integration, two-in-one technology saves the cost of a second board, reduces space and weight, and reduces inter-board interconnects to improve reliability. Data acquisition capabilities on these SBCs range up to 32 16-bit analog inputs, 4 12-bit analog outputs and a minimum of 24 digital I/O lines.

Diamond Systems single board computers encompass three industry standard form factors (PC/104, EBX or EPIC) and one custom form factor. Each board supports PC/104 or PC/104-Plus bus expansion. A unique I/O panel board is available for PC/104 and EPIC SBCs, offering a choice of either pin header or PC-style connectors for easy interface. And Diamond Systems also offers a choice of enclosures for PC/104 or EPIC boards enabling easy construction of a complete embedded computing system.

The charts on this page summarize Diamond Systems SBC offerings, allowing you to select appropriate cards for your application at a glance. Additional information on the SBCs can be found on the pages that follow. For the most

detailed information, please go to [www.diamondsystems.com](http://www.diamondsystems.com) and download either a data sheet or user manual for the products of interest.



### SINGLE BOARD COMPUTER CPU FEATURES

PRODUCT	FORM FACTOR	PROCESSOR	SPEED (MHz)	MEMORY (MB)	VIDEO	AUDIO	RS232	RS232 / 422 / 485	ETHERNET	USB	EXPANSION	KEYBD MOUSE	MASS STORAGE	CF	FD	INPUT VOLTAGE	XT
HERCULES	EBX	VIA Mark	800	512	✓	✓	2	2	10/100	4 v1.1 4 v2.0	PC/104-Plus	✓	2 UDMA 100	✓	✓	5-28VDC	✓
POSEIDON	EPIC	VIA C7 VIA ULV EDEN	2.0GHz 1.0GHz	512	✓	✓	2	2	GIGABIT	4 v2.0	PC/104-Plus	✓	1 S-ATA 1 UDMA 100	✓	✓	5VDC	1.0 GHz ONLY
ATHENA	4.2" x 4.5"	VIA Mark	400	256	✓	✓	4		10/100	4 v1.1	PC/104	✓	1 UDMA 100	✓	✓	5VDC	✓
ELEKTRA	PC/104	ST Micro Vega	200	128			4		10/100	2 v1.1	PC/104	✓	1 UDMA 100	✓	✓	5VDC	✓
PROMETHEUS	PC/104	ZF Micro ZFx86	100	16 / 32			4		10/100	2 v1.1	PC/104	✓	1 IDE	✓	✓	5VDC	✓
MORPHEUS	PC/104	ULV CELERON	400 / 650	SODIMM to 512	✓		1	1	10/100	4 V1.1	PC/104	✓	1 UDMA 33	✓		5VDC	

### SINGLE BOARD COMPUTER DATA ACQUISITION FEATURES

PRODUCT	ANALOG INPUTS									ANALOG OUTPUTS				MISC.	
	# SE	# DI	RES	BIP	UNI	PROG	MAX	AUTOCAL	FIFO	# OUT	RES	BIP	UNI	# DIO	CLK
HERCULES	32	16	16	4	4	✓	250	✓	2048	4	12	2	2	40 I/O	✓
POSEIDON	32	16	16	5	5	✓	250	AUTO	1024	4	12	2	2	24 I/O	✓
ATHENA	16	8	16	4	2	✓	100	✓	512	4	12	2	2	24 I/O	✓
ELEKTRA	16	8	16	4	2	✓	100	✓	512	4	12	2	2	24 I/O	✓
PROMETHEUS	16	8	16	4	2	✓	100		48	4	12	2	2	24 I/O	✓

#### LEGEND

<b>SE</b>	Single-ended analog inputs	<b>PROG</b>	Programmable gain	<b>I/O</b>	Programmable direction digital I/O
<b>DI</b>	Differential analog inputs	<b>MAX</b>	Max A/D sample rate in KHz	<b>CLK</b>	A/D pacer clock on board
<b>RES</b>	A/D or D/A resolution in bits	<b>AUTOCAL</b>	Automatic calibration of A/D and D/A circuitry	<b>XT</b>	-40 to +85°C operating temperature
<b>BIP</b>	Bipolar ranges (for example ±5V)	<b>FIFO</b>	A/D sample FIFO buffer on board	<b>CF</b>	CompactFlash support
<b>UNI</b>	Unipolar ranges (for example 0-5V)			<b>FD</b>	IDE FlashDisk support (See page 18)

# POSEIDON

## 1.0-2.0 GHZ EPIC SBC WITH USB 2.0, GIGABIT ETHERNET, SATA AND DATA ACQUISITION

- Low power, high performance PC/104-Plus expandable SBC to 2.0GHz with 400MHz FSB
- Fully featured, including Gigabit Ethernet, CRT and LVDS support, USB 2.0, 4 serial ports and SATA/ IDE
- Optional data acquisition featuring 32 16-bit A/D with auto-autocalibration, 4 12-bit D/A, 24 DIO and two counter/timers
- Extremely rugged, with soldered RAM and -20°C to +85°C operating temperature



**Poseidon** is a high performance EPIC form factor single board computer combining a state of the art CPU and peripheral technology with Diamond Systems' renowned high accuracy data acquisition circuitry on a single board.

Poseidon utilizes the new Via C7 and VIA Eden ULV processors operating at speeds up to 2.0GHz with up to 512MB RAM and a 400MHz FSB. A broad set of system I/O includes Gigabit Ethernet, 4 RS232 ports (two with RS422/485 capability), 4 USB 2.0 ports, S-ATA and IDE controllers, PS/2 keyboard / mouse, an advanced 2D / 3D video controller with integral MPEG-2 hardware acceleration supporting both CRT and LVDS flat panel displays and AC'97 sound with amplified speaker output.

Poseidon's optional data acquisition section has 32 16-bit analog inputs with a 250KHz sample rate along with 4 12-bit D/A channels. Diamond Systems patented automatic autocalibration on both A/D and D/A ensures maximum accuracy over time and temperature without user intervention.

It supports both interrupt and DMA A/D transfers, and it uses an enhanced 1,024-sample FIFO with programmable threshold for maximum flexibility and data reliability. Poseidon II provides 24 digital I/O lines with programmable direction, as well as two counter / timers for A/D sample rate control, pulse counting, frequency generation, or other applications.

Poseidon is extremely rugged, featuring soldered DRAM, optional hardwired jumpers for increased resistance to shock and vibration and an operating temperature range of -40°C to +85°C without a fan for the 1.0GHz model. Conformal coating is available as an extra cost option.

All Poseidon I/O is brought to pin headers along the edges of the board. I/O that can utilize PC-style connectors is placed such that a small I/O Panel Board can be utilized to instantly convert Poseidon to PC-style connectors.

Universal Driver software for Linux, Windows 98 / 2000 / XP / CE, DOS, QNX, and VxWorks is included.

### SPECIFICATIONS

Processor	1.0GHz Via Eden ULV 2.0GHz Via C7
Memory	Up to 512MB (DDR2)
Front Side Bus	400MHz
Bus Interface	PC/104-Plus (ISA + PCI)
Display Support	CRT (2048 x 1536) 24-bit LVDS flat panel (1600 x 1200)
USB Ports	(4) USB 2.0
Serial Ports	(2) RS232, (2) RS232/422/485
Networking	Gigabit Ethernet
Mass Storage	(1) S-ATA and (1) IDE UDMA 100, Flashdisk interface
Keyboard / Mouse	PS/2
Audio	AC '97, Line-in, Line-Out, Mic, Amplified speaker interface
Analog Inputs	32, 16-bit A/D resolution
Max Sample Rate	250KHz total
Input Modes	Single-ended, differential
Input Ranges	±10V, ±5V, ±2.5V, ±1.25V, ±0.625V, 0-10V, 0-5V, 0-2.5V, 0-1.25V, 0-.625V
Accuracy	<±3LSB after autocalibration
On-board FIFO	1024 samples with programmable threshold
Analog Outputs	4, 12-bit D/A resolution
Output Ranges	±5V, ±10V, 0-5V, 0-10V
Settling Time	6µs to ±0.01%
Output Current	±5mA max
Digital I/O	24 lines, 5v logic compatible
Direction	Programmable
Output Current	0: 64mA max; 1: -15mA max
Counter / Timers	1 32-bit; 1 16-bit
Clock	10MHz
Input Voltage	5VDC ±5%
Operating Temp	-20°C to +85°C (1.0GHz) -20°C to +70°C (2.0GHz)
Dimensions	4.53" x 6.50" (115mm x 165mm), EPIC standard

### ORDERING INFORMATION

Part No.	Description
PSDE10-256N	Poseidon SBC, 1.0GHz, 256MB
PSDE10-256A	Poseidon SBC, 1.0GHz, 256MB, Data Acquisition
PSDC20-512N	Poseidon SBC, 2.0GHz, 512MB
PSDC20-512A	Poseidon SBC, 2.0GHz, 512MB, Data Acquisition
PNL-PSD-01	Poseidon Panel I/O Board
PNL-PSD-KIT	Panel I/O Board plus Cables
C-PSD-KIT	Poseidon Cable Kit
DK-PSD-01	1.0GHz Poseidon Development Kit
DS-PSD-02	2.0GHz Poseidon Development Kit

# HERCULES II

## EBX SBC WITH DATA ACQUISITION AND DC/DC POWER SUPPLY

### SPECIFICATIONS

Processor	800MHz VIA Mark
Memory	256MB / 512MB
Bus Interface	PC/104-Plus (ISA + PCI)
Display Support	CRT and / or 18-bit LVDS flat panel
USB Ports	(4) USB 2.0, (4) USB 1.1
Serial Ports	(2) RS232, (2) RS232/422/485
Networking	10/100 Ethernet
Mass Storage	(2) IDE UDMA 100, Flashdisk and CompactFlash interfaces
Keyboard / Mouse	PS/2
Audio	AC '97, Line-in, Line-Out, Mic, Amplified speaker interface
Analog Inputs	32, 16-bit A/D resolution
Max Sample Rate	250KHz total
Input Modes	Single-ended, differential
Input Ranges	$\pm 10V$ , $\pm 5V$ , $\pm 2.5V$ , $\pm 1.25V$ , $0-10V$ , $0-5V$ , $0-2.5V$ , $0-1.25V$ ,
Accuracy	$< \pm 2LSB$ after autocalibration
On-board FIFO	2048 samples
Analog Outputs	4, 12-bit D/A resolution
Output Ranges	$\pm 5V$ , $\pm 10V$ , $0-5V$ , $0-10V$
Settling Time	$7\mu s$ to $\pm 0.01\%$
Output Current	$\pm 5mA$ max, $2k\Omega$ min load
Digital I/O	40 lines, 5v logic compatible
Direction	Programmable in 8-bit ports
Output Current	0: 12mA max; 1: -4mA max
Counter / Timers	1 24-bit; 1 16-bit
Input Voltage	5-28VDC
Output Power	40W total, 24W available
Output Voltages	+5V, +3.3V (on PCI bus)
Switched Outputs	+5V, +12V, +3.3V
Operating Temp	-40°C to +85°C
Dimensions	8.00" x 5.75" (203mm x 146mm)
Weight	10oz / 285g

### ORDERING INFORMATION

Part No.	Description
HRC800-5N256	Hercules II SBC, 256MB RAM, Digital I/O
HRC800-5A512	Hercules II SBC, 512MB RAM, Full Data Acquisition
DK-HRC-01	Hercules II Development Kit*
C-HRCEBX-KIT	Hercules II Cable Kit*

\*See [www.diamondsystems.com](http://www.diamondsystems.com) for specific contents of cable kit and development kit.

- Low power, Pentium III class, 800MHz PC/104-Plus expandable SBC
- Fully featured, including Ethernet, CRT and flat panel support, USB 2.0, 4 serial ports and IDE
- Optional data acquisition featuring 32 16-bit A/D with autocalibration, 4 12-bit D/A, 40 DIO and two counter/timers
- 5-28V DC power supply with 40W output power eliminates need for add-on module
- Extremely rugged, with soldered RAM and fanless -40°C to +85°C operating temperature



**Hercules II** is a high performance, EBX form factor single board computer integrating a Pentium III-level CPU with Diamond Systems' renowned high accuracy data acquisition circuitry and a DC/DC power supply on a single board.

Hercules II is built around an 800MHz low power VIA Mark CPU and 512MB RAM with a broad set of system I/O, including Ethernet, 4 RS232 ports (two with RS422/485 capability), 4 USB 1.1 ports, 4 USB 2.0 ports, dual IDE controllers, PS/2 keyboard / mouse, an advanced 2D / 3D video controller supporting both CRT and LVDS flat panel displays and AC'97 sound with amplified speaker output.

The Hercules II data acquisition section has 32 16-bit analog inputs with a 250KHz sample rate, backed by a 2K-sample FIFO along with 4 12-bit D/A channels. Auto-calibration on both A/D and D/A ensures maximum accuracy over time and temperature. Hercules II provides 40 digital I/O lines with programmable direction, as well as two counter / timers for A/D sample rate control, pulse counting, frequency generation, or other applications.

The 5-28V DC/DC power supply enables Hercules II to be used in a wide range of applications without requiring a separate add-on power module.

Hercules II is extremely rugged, featuring soldered DRAM, optional hardwired jumpers for increased resistance to shock and vibration and an operating temperature range of -40°C to +85°C without a fan. Conformal coating is available as an extra cost option.

Universal Driver software for Linux, Windows 98 / 2000 / XP / CE, DOS, QNX, and VxWorks is included.

# ATHENA II

## COMPACT PC/104 EXPANDABLE SBC WITH DATA ACQUISITION

- Low power, Pentium III class, 400MHz / 660MHz PC/104 expandable SBC
- Fully featured, including Ethernet, CRT and flat panel support, USB, 4 RS-232 ports, audio and IDE
- Optional data acquisition featuring 16 16-bit A/D with autocalibration, 4 12-bit D/A, 24 DIO and two counter/timers
- Extremely rugged, with soldered RAM and fanless -40°C to +85°C operating temperature



**Athena II** is a compact, high performance PC/104-expandable single board computer integrating a Pentium III-level CPU with Diamond Systems' renowned high accuracy data acquisition circuitry on a single board.

Athena II is built around a low power VIA Mark CPU and 256MB RAM with a broad set of system I/O, including Ethernet, 4 RS232 ports, 4 USB ports, Ultra DMA IDE controller, PS/2 keyboard / mouse, an advanced 2D / 3D video controller supporting both CRT and LVDS flat panel displays and AC'97 sound.

The Athena II data acquisition section has 16 16-bit analog inputs with a 100KHz sample rate, backed by a 512 sample FIFO along with 4 12-bit D/A channels. Autocalibration on both A/D and D/A ensures maximum accuracy over time and temperature. Athena II provides 24 digital I/O lines with programmable direction, as well as two counter / timers for A/D sample rate control, pulse counting, frequency generation, or other applications.

Athena II is extremely rugged, featuring soldered SDRAM, optional hard-wired jumpers for increased resistance to shock and vibration and an operating temperature range of -40°C to +85°C without a fan. Conformal coating is available as an extra cost option.

Universal Driver software for Linux, Windows 98 / 2000 / XP / CE, DOS, QNX, and VxWorks is included.

### SPECIFICATIONS

Processor	400MHz or 660MHz VIA Mark
Memory	256MB (128MB without data acquisition)
Bus Interface	PC/104 (ISA)
Display Support	CRT and / or 18-bit LVDS flat panel
USB Ports	(4) USB 1.1
Serial Ports	(4) RS232
Networking	10/100 Ethernet
Mass Storage	(1) IDE UDMA 33 with FlashDisk interface
Keyboard / Mouse	PS/2
Audio	AC '97, Line-in, Line-Out, Mic
Analog Inputs	16, 16-bit A/D resolution
Max Sample Rate	100KHz total
Input Modes	Single-ended, differential
Input Ranges	±10V, ±5V, ±2.5V, ±1.25V, 0-10V, 0-5V, 0-2.5V, 0-1.25V
Accuracy	<±2LSB after autocalibration
On-board FIFO	512 samples
Analog Outputs	4, 12-bit D/A resolution
Output Ranges	±5V, ±10V, 0-5V, 0-10V
Settling Time	7µs to ±0.01%
Output Current	±5mA max, 2kΩ min load
Digital I/O	24 lines, 5v logic compatible
Direction	Programmable in 8-bit ports
Output Current	0: 12mA max; 1: -4mA max
Counter / Timers	1 24-bit; 1 16-bit
Operating Temp	-40°C to +85°C
Dimensions	4.18" x 4.48" (106mm x 114mm)
Input Voltage	5VDC ±10%
Weight	5.3 oz / 150g

### ORDERING INFORMATION

Part No.	Description
ATHM400-128N	Athena II SBC, 400MHz, 128MB RAM, No data acquisition
ATHM400-256A	Athena II SBC, 400MHz, 256MB RAM, Data Acquisition
ATHM660-128N	Athena II SBC, 660MHz, 128MB RAM, No data acquisition
ATHM660-256A	Athena II SBC, 660MHz, 256MB RAM, Data Acquisition
DK-ATHM-01	Athena II Development Kit*
C-ATH-KIT	Athena II Cable Kit*

\*See [www.diamondsystems.com](http://www.diamondsystems.com) for specific contents of cable kit and development kit.

# PROMETHEUS / ELEKTRA / MORPHEUS

## PC/104 CPUS WITH OPTIONAL DATA ACQUISITION



### Prometheus

- Low power 100MHz 486-class CPU with 32MB RAM
- Full featured, including 10/100 Ethernet, 4 serial, 2 USB, floppy, IDE and FlashDisk support
- Optional data acquisition featuring 16 16-bit A/D, 4 12-bit D/A, 24 DIO and two counter / timers
- Extremely rugged, with fanless operation from -40°C to +85°C

### Elektra

- Low power 200MHz Pentium II-class CPU with 128MB RAM
- Full featured, including 10/100 Ethernet, 4 serial, 2 USB, keyboard / mouse, IDE and FlashDisk support
- Optional data acquisition featuring 16 16-bit A/D, 4 12-bit D/A, 24 DIO and two counter / timers
- Extremely rugged, with fanless operation from -40°C to +85°C

### Morpheus

- Low power, high performance Intel ULV Celeron CPUs at 400MHz and 650MHz with up to 512MB RAM
- Full featured, including 10/100 Ethernet, 2 serial, 2USB, keyboard / mouse, floppy, IDE and CompactFlash support
- CRT and flat panel support

### SPECIFICATIONS

Feature	Prometheus	Elektra	Morpheus
Processor	100MHz ZF86	200MHz ST Micro Vega	400MHz or 650MHz Intel ULV Celeron
Memory	Up to 32MB soldered	128MB soldered	Up to 512MB SODIMM
Display	None	None	CRT and flat panel
USB	2 USB 1.1	2 USB 1.1	2 USB 1.1
Serial	4 RS-232	4 RS-232	1 RS-232, 1 RS-232/422/485
Networking	10/100 Ethernet	10/100 Ethernet	10/100 Ethernet
Mass Storage	IDE, FlashDisk	IDE, FlashDisk	IDE, CompactFlash
Kbd / Mouse	PS/2	PS/2	PS/2
Analog Inputs	16, 16-bit A/D	16, 16-bit A/D	
Max Sample Rate	100KHz	100KHz	
Input Modes	Single ended, differential		
Input Ranges	±10V, ±5V, ±2.5V, ±1.25V, 0-10V, 0-5V, 0-2.5V, 0-1.25V, ±10V,		
FIFO	48	512	
Analog Outputs	4, 12-bit D/A	4, 12-bit D/A	
Output Ranges	±10V, 0-10V	±10V, 0-10V	
Digital I/O	24 lines, TTL	24 lines, TTL	
Direction	Programmable	Programmable	
Counter / Timers	1 24-bit, 1 16-bit	1 24-bit, 1 16-bit	
Input Voltage	+5VDC±10%	+5VDC±10%	5VDC±5%
Operating Temp	-40°C to +85°C	-40°C to +85°C	0°C to +60°C
Dimensions	3.55" x 3.775" (90mm x 96mm)		
Weight	3.0oz / 85g	3.8oz / 108g	3.1oz / 110g

**Prometheus, Elektra and Morpheus**, a trio of PC/104 compliant CPU modules, offer varying performance and feature levels to meet the needs of a wide variety of embedded applications. Ranging from low cost 100MHz 486 to a high performance 650MHz ULV Celeron, these fully featured boards all offer 10/100 Ethernet, serial and USB support with IDE and flash disk capability.

Prometheus and Elektra provide optional data acquisition circuitry, offering 16 16-bit analog inputs, 4 12-bit analog outputs, 24 digital I/O lines with programmable direction, and two counter / timers.

Prometheus and Elektra are extremely rugged, utilizing soldered RAM for resistance to shock and vibration, and operate from -40°C to +85°C with only a single +5V power input. The Morpheus board operates from 0°C to +60°C.

The data acquisition features of Prometheus and Elektra are supported by Diamond Systems' Universal Driver programming software for Linux, Windows 98 / 2000 / XP / CE, DOS, QNX, and VxWorks.

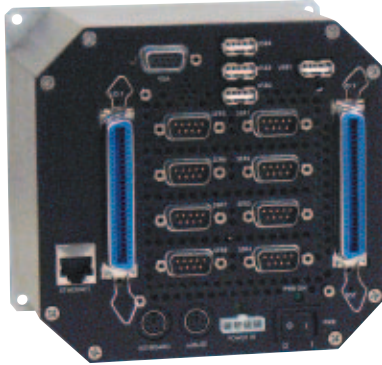
### ORDERING INFORMATION

Part No.	Description
PR-Z32-[EA/E]-ST	Prometheus CPU with 32MB RAM [with / without] Data Acquisition
PR-Z16-LC-ST	Prometheus CPU, 16MB RAM
CPR-Z32-[EA/E]-DK	Prometheus Dev Kit [w-w/o] Data Acquisition (includes CPU)
C-PRZ-KIT	Prometheus Cable Kit
ELK200-[EA/E]-XT	Elektra CPU with 128MB RAM [with / without] Data Acquisition
DK-ELK-01	Elektra Development Kit with Data Acquisition
C-ELK-KIT	Elektra cable kit
MOR-400 / MOR-650	Morpheus CPU, OMB RAM, 400MHz / 650MHz CPU
C-MOR-KIT	Morpheus Cable Kit*

\*See [www.diamondsystems.com](http://www.diamondsystems.com) for specific contents of cable kit and development kit.

# PANDORA / TRITON

## PC/104 AND EPIC ENCLOSURE SYSTEMS



### Pandora

- Compact, flexible, low-cost enclosure system for PC/104 CPUs
- Easy to assemble
- Rugged cable-free design for Athena, Elektra and Prometheus CPUs
- Multiple lengths support varying PC/104 stack sizes

**Pandora and Triton** enclosures provide an easy to assemble, light, rugged, and flexible enclosure for PC/104 and EPIC SBC based systems respectively. They both offer a unique approach to packaging by eliminating most internal cables. This speeds up the assembly process and improves reliability and ruggedness. With each enclosure, a panel I/O board plugs directly onto the CPU and converts most CPU I/O signals to industry-standard connectors. The panel board then mounts directly to the matching front panel of the enclosure. The rear / bottom panel provides convenient holes for mounting of the complete system.



### Triton

- Compact, low-cost enclosure system for EPIC CPUs
- Easy to assemble
- Rugged cable-free design for Diamond Systems Poseidon SBC and Chameleon ETX Baseboard
- Supports 2 PC/104 expansion cards

The Pandora enclosure is available in multiple lengths to support PC/104 stacks of arbitrary size. Once the stack is assembled to the Pandora Panel Board, the entire stack is held firmly in place with direct connections to both the top and bottom of the enclosure for extra rigidity.

### Easy Expansion

The Pandora Panel Board also accommodates the I/O pins from one or two add-on PC/104 modules without requiring costly and time-consuming custom enclosure design. One pin header can be used with any PC/104 board with a 50-pin I/O connector. Two 20-pin connectors can be used with any model of Diamond Systems Emerald-MM to support 4 additional serial ports (for a total of 8). Each connects to PC-style connectors on the Panel Board.

### Supports Multiple CPU Boards

The Pandora Panel Board is compatible with Elektra, Athena, and Prometheus CPU boards. All three CPUs contain the same set of I/O connectors with the same features in the same locations.

The Triton enclosure and Panel Board are compatible with both the Poseidon SBC and Chameleon ETX Baseboard. Additional I/O on the Chameleon ETX baseboard is brought to the front panel, including a total of six serial ports and optically isolated digital I/O.

### ORDERING INFORMATION FOR PANDORA ENCLOSURE

Part No.	Description
PNL-EAP-01	Panel I/O board for Elektra, Athena, Prometheus, with expansion
PB-170-K	Pandora Enclosure, 1.7", generic model
PB-EAP-170-K	Pandora Enclosure, 1.7", with EAP panel board and EAP front panel
PB-300-K	Pandora Enclosure, 3.0", generic model
PB-EAP-300-K	Pandora Enclosure, 3.0", with EAP panel board and EAP front panel
PB-500-K	Pandora Enclosure, 5.0", generic model
PB-EAP-500-K	Pandora Enclosure, 5.0", with EAP panel board and EAP front panel
PB-700-K	Pandora Enclosure, 7.0", generic model
PB-EAP-700-K	Pandora Enclosure, 7.0", with EAP panel board and EAP front panel
C-PNLEAP-KIT	Cable kit for Pandora EAP panel board expansion
PBEC-11-K	Pandora EAP Front Panel, Black, with silkscreen
PBEC-12-K	Pandora EAP Rear / Wall Mount Panel, 4 holes, with mounting ears

### ORDERING INFORMATION FOR TRITON ENCLOSURE

For part numbers and ordering information, please visit our website at [www.diamondsystems.com](http://www.diamondsystems.com).

# CAN-TAINER / VERSA-TAINER

## RUGGED PC/104 ENCLOSURE SYSTEMS FOR HOSTILE AND MOBILE ENVIRONMENTS

- Heavy duty .125" aluminum construction
- Shock and vibration protection system
- Available in lengths from 4" to 12"
- PC/104 and EBX mounting capability
- Multiple pre-formed end caps available

The **Can-Tainer** and **Versa-Tainer** are rugged PC/104 enclosure systems constructed of .125" aluminum and designed for hostile and mobile environments. They feature a dual system of shock and vibration isolation: The PC/104 modules are mounted axially in the enclosure with four internal rubber corner rails to absorb high-frequency vibrations, while the entire enclosure is mounted on the host platform with a thick rubber pad which absorbs low-frequency G-forces. The rubber pad is optional and may be removed for hard mounting.

The Can-Tainer cross section measures 6.00" wide by 5.45" high (not including mounting pad) and is designed to mount PC/104 boards axially along the length of the enclosure body. The Versa-Tainer is a wider version that measures 7.1" wide by 5.7" high. The extra width accommodates EBX boards in addition to PC/104

boards, and it also provides additional room for cable runs along the sides. Both enclosures are available in multiple lengths. To calculate the height of your PC/104 stack, refer to the Ordering Information table. To compute the length of the enclosure you need, add 1-2 inches additional length for each end where cabling will be brought out to I/O connectors.

To mount an EBX format CPU, such as Hercules, inside the Versa-Tainer, use the VT-EBX, which mounts horizontally on the lower two corner guides. Additional PC/104 boards may then be installed on top of the EBX CPU.

Each Can-Tainer and Versa-Tainer comes as a kit with end caps and mounting accessories. Additional blank and pre-designed end caps are available, or you may design your own cutouts using the blank end cap.



### ORDERING INFORMATION

Select length <L> in part numbers below:

<L>	4	4" / 102mm
	5	5" / 127mm
	6	6" / 152mm
	8	8" / 203mm
	10	10" / 254mm
	12	12" / 305mm
CT-<L>	Can-Tainer enclosure; specify length	
VT-<L>	Versa-Tainer enclosure; specify length	
ACC-VT-EBX	EBX mounting plate for Versa-Tainer 8" or longer; includes board mounting hardware	
VT-EC00	Versa-Tainer blank end cap	
VT-EC02	Versa-Tainer end cap, 4x DB9 and 2x DB25	
CT-EC00	Can-Tainer blank end cap	
CT-EC01	Can-Tainer end cap, 4x DB9 and 2x DB25	

### PC/104 STACK HEIGHT

# Boards	1st Board is Non-stackthrough		1st Board is Stackthrough	
	inch	mm	inch	mm
1	0.60	15.2	0.92	23.4
2	1.26	32.1	1.58	40.2
3	1.92	48.9	2.24	57.0
4	2.59	65.7	2.91	73.8
5	3.25	82.5	3.57	90.6
6	3.91	99.3	4.23	107.4
7	4.57	116.1	4.89	124.3
8	5.23	132.9	5.55	141.1

To compute the length of the Pandora, Can-Tainer, or Versa-Tainer enclosure you need, determine the height of your board stack from the table above, then add 1-2 inches more for each end where cables will be brought out to an end cap.



CT-EC00 blank end cap



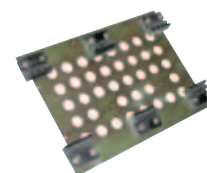
CT-EC01 end cap



Versa-tainer cross section



Can-tainer cross section



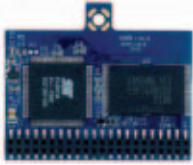
ACC-VT-EBX bottom view



Hercules CPU mounted on ACC-VT-EBX in Versa-Tainer

# CPU ACCESSORIES

## MASS STORAGE OPTIONS, DEVELOPMENT TOOLS, CABLES



FD-xx-XT  
Flashdisk Module

### IDE Flashdisk

- Solid state IDE FlashDisk with 32MB – 4GB capacity
- Rugged bolt-on installation; mounting hardware included
- Requires no additional space on PC/104 stack or in enclosure
- Dimensions: 1.78" x 1.24"
- Operating temperature: -40 to +85°C



ACC-CFEXT  
CompactFlash Adaptor Board

### CompactFlash Adapter Kit

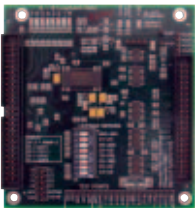
- Works with type I and II CompactFlash
- Enables remote placement for greater flexibility in enclosure design
- Ejector latch for easy media removal
- Dimensions: 2.95" x 2.76"
- Operating temperature: -40 to +85°C



ACC-HDDMOUNT  
PC/104 Hard Drive Mounting Board  
(hard drive not included)

### PC/104 HDD Mount

- 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"



ACC-HRCDAQ  
Hercules Data Acquisition Demo Board

### Hercules Data Acquisition Demo Board

- Convenient test bed for data acquisition hardware and software on Hercules II CPU
- Loops back analog outputs to analog input channels; loops back digital I/O signals
- Pin headers provide access to monitor analog I/O signals
- PC/104 form factor enables stacking or side by side usage



Cable Kit

### Cables

- Cable kits are available for all CPUs
- Cables convert pin headers to PC-style connectors
- Included with development kit
- May be ordered individually

**Diamond Systems CPU options** and accessories speed and simplify your system design. These include three convenient ways to add mass storage to your system. Rugged, compact and convenient IDE FlashDisk modules, models FD-xx-XT, mount directly on an IDE connector and bolt to the board for increased resistance to shock and vibration. The CompactFlash Adapter Kit, ACC-CFEXT, enables incorporation of a CompactFlash socket in your system remote from the CPU board itself. This can provide increased flexibility in enclosure design. The adapter connects to any IDE connector on the CPU board via a ribbon cable. The third mass storage option, ACC-HDDMOUNT, consists of a PC/104 board and mounting hardware to incorporate a 2.5" hard disk drive directly in the PC/104 stack. The HDD itself is cabled to a 44-pin IDE connector on the CPU board.

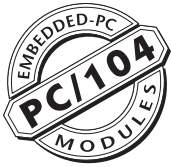
The Hercules Data Acquisition Demo Board, ACC-HRCDAQ, provides a convenient testing base for data acquisition hardware and software on the Hercules II CPU. Both analog output and digital output lines are looped back to analog input and digital input lines.

Cable kits providing access to all I/O features are available for each Diamond Systems CPU board. Cables convert pin headers on the CPU board to PC-style connectors such as RJ-45 for Ethernet or DB-9 for serial ports. Each CPU development kit includes a cable kit. Cables may also be ordered individually.

### ORDERING INFORMATION

Part No.	Description
FD-32-XT	32MB FlashDisk
FD-64-XT	64MB FlashDisk
FD-128-XT	128MB FlashDisk
FD-256-XT	256MB FlashDisk
FD-512-XT	512MB FlashDisk
FD-1G-XT	1GB FlashDisk
FD-2G-XT	2GB FlashDisk
FD-4G-XT	4GB FlashDisk
ACC-IDEEXT	FlashDisk Programming Board
ACC-CFEXT	CompactFlash Adapter Board
ACC-HDDMOUNT	Hard Drive Mounting Kit
ACC-HRCDAC	Hercules Data Acquisition Demo Board

See individual CPU pages for cable kit ordering.



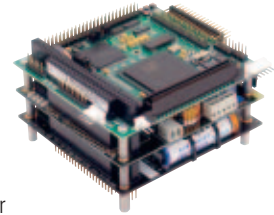
# PC/104 I/O For Every Application

## ANALOG, DIGITAL, SERIAL, NETWORKING

**PC/104** is a widely used industry standard for both processor boards and I/O cards in embedded computing applications. PC/104 shrinks ISA and PCI bus cards to 3.55" x 3.775" (90mm x 96mm) and implements a rugged, stacking architecture that eliminates backplanes and provides superior resistance to shock and vibration. PC/104 has become even more widely used as an I/O expansion architecture, having been adopted by the EBX and EPIC form factor standards as well as on dozens of custom CPU boards.

Diamond Systems has been a leading supplier of PC/104 I/O cards since the initial release of the PC/104 standard in 1992. Our extensive product line includes the following product categories:

- Analog I/O
- Analog Output
- Digital I/O and Counter / Timers
- Serial Communications
- Multi-function Networking
- PC I/O
- Power supplies in PC/104 form factor



The charts on this page summarize Diamond Systems' PC/104 I/O card offerings, allowing you to select appropriate cards for your application at a glance. Additional information on the cards can be found on the pages that follow.

### PC/104 ANALOG I/O MODULES

PRODUCT	ANALOG INPUTS									ANALOG OUTPUTS				MISC.		
	# SE	# DI INPUTS	RESA INPUTS	BIP	UNI	GAIN	MAXS	AUTOCAL (KHz)	FIFO	# OUT	RESA	BIP	UNI	# DIO	CLK	XT
DMM-32X-AT	32	16	16	5	4	PROG	250	AUTO	1024	4	12	2	2	24 I/O	YES	YES
DMM-16-AT	16	8	16	5	4	PROG	100	YES	512	4	12	2	2	8 In, 8 Out	YES	YES
DMM-AT	16	8	12	5	4	PROG	100	YES	512	2	12	2	2	8 In, 8 Out	YES	YES
DMM / DMM-XT	16	8	12	6	6	JUMP	100			2	12		2	8 In, 8 Out	YES	OPT.

### PC/104 ANALOG OUTPUT MODULES

PRODUCT	ANALOG OUTPUTS				MISC.	
	# OUT	RESA	BIP	UNI	# DIO	XT
RMM-412-XT	4	12	4	4	24 I/O	YES
RMM-812-XT	8	12	4	4	24 I/O	YES
RMM-1612-XT	16	12	4	4	24 I/O	YES
RMM-416-XT	4	16	2	1	24 I/O	YES

### PC/104 DIGITAL I/O AND COUNTER/TIMER MODULES

PRODUCT	DIGITAL I/O				COUNTER/TIMERS			MISC.	
	# I/O	BUF	OPTO	RELAY	# CTRS	RESC	MAXC	IRQ	XT
OMM-XT	48 I/O				3	16	10MHz	3	YES
OMM-DIO-XT	48 I/O								YES
GPIO-MM-XT / GPIO-MM-12-XT	48 I/O 8 IN, 8 OUT	YES			10	16	40MHz	2	YES
GPIO-MM-21-XT	96 I/O	48							YES
PMM-XT									YES
OPMM-XT			8	8					YES
IR104			20	20					

#### LEGEND

<b>ADDRESS</b>	I/O address configuration met
<b>AUTOCAL</b>	Automatic calibration of A/D and D/A circuitry
<b>BIP</b>	Bipolar ranges (for example +/-5V)
<b>BUF</b>	Buffered digital outputs for higher current drive
<b>CLK</b>	A/D pacer clock on board
<b>DI</b>	Differential analog inputs
<b>FIFO</b>	A/D sample FIFO buffer on board
<b>I/O</b>	Programmable direction digital I/O
<b>IRQ</b>	Interrupt outputs
<b>JUMP</b>	Jumper-selected gain
<b>MAXB</b>	Max baud rate
<b>MAXC</b>	Max counter clock input rate
<b>MAXS</b>	Max A/D sample rate (KHz)
<b>OPTO</b>	Optocoupler inputs
<b>PROG</b>	Programmable gain
<b>PROTOCOL</b>	Protocol configuration method
<b>RELAY</b>	Relay outputs
<b>RESA</b>	A/D or D/A resolution in bits
<b>RESC</b>	Counter resolution in bits
<b>SE</b>	Single-ended analog inputs
<b>UNI</b>	Unipolar ranges (for example 0-5V)
<b>XT</b>	-40 to +85°C operating temperature

### PC/104 SERIAL COMMUNICATIONS MODULES

PRODUCT	SERIAL PORTS							MISC.	
	# PORTS	RS-232	RS-422	RS-485	MAXB	PROTOCOL	ADDRESS	# DIO	XT
EMM-8M-XT	8	8	8	8	460.8K	JUMPER	JUMPER	8	YES
EMM-4M-XT	4	4	4	4	115.2K	JUMPER	JUMPER		YES
EMM-OPT-2-XT	2 OPTO	2	2	2	460.8K	JUMPER	JUMPER	24	YES
EMM-OPT-4-XT	4 OPTO	4	4	4	460.8K	JUMPER	JUMPER	24	YES
EMM-8P-XT	8	8	8	8	460.8K	SOFTWARE	JUMPER	8	YES
EMM-8PLUS-XT	8	8	8	8	1.832M	JUMPER	SOFTWARE	8	YES
EMM-DIO-XT	4	4			115.2K	FIXED	JUMPER	48	YES

# DIAMOND-MM-32X-AT / DIAMOND-MM-16-AT

## HIGH ACCURACY ANALOG I/O WITH AUTOCALIBRATION

### Diamond-MM-32X-AT

- 32 16-bit A/D with 250KHz sample rate, programmable input ranges and 1024 sample FIFO
- Automatic autocalibration for high accuracy across operating temperature range without user intervention
- 4 12-bit D/A
- 24 high-current digital I/O with programmable direction
- Counter/timers for A/D control and general use



### Diamond-MM-16-AT

- 16 16-bit A/D with 100KHz sample rate, programmable input ranges and a 512 sample FIFO
- 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



The Diamond-MM-32X-AT and Diamond-MM-16-AT high accuracy 16-bit analog I/O PC/104 modules provide two alternatives to meet the varying analog input needs of PC/104 expandable systems. DMM-32X-AT has 32 analog inputs with a 250 KHz sample rate and 1024 sample FIFO, while the DMM-16-AT offers 16 analog inputs with a 100 KHz sample rate and 512 sample FIFO. Both boards provide four 12-bit analog outputs with programmable output ranges, 2 counter/timers, and an operating temperature range from -40 to +85°C. Both boards support both interrupt and DMA A/D transfers. The DMM-32X-AT offers 24 digital I/O lines with programmable direction, while the DMM-16-AT provides 8 input lines and 8 output lines.

While both boards make use of autocalibration technology, the DMM-32X-AT provides Diamond Systems' patented Automatic Autocalibration technology to calibrate its A/D and D/A circuits automatically whenever required, without user intervention. This means you get analog I/O performance with the maximum possible accuracy over the full operating temperature range, without doing anything at all. DMM-32X-AT is the first and only board to offer this advanced capability.

Both boards are supported by Diamond Systems' Universal Driver programming software for Linux, Windows 98 / 2000 / XP / CE, DOS, QNX, and VxWorks.

### SPECIFICATIONS

Feature	DMM-32X-AT	DMM-16-AT
Analog Inputs	32 16-bit	16 16-bit
Input Modes	Single-ended, Differential	Single-ended, Differential
Input Ranges	$\pm 10V$ , $\pm 5V$ , $\pm 2.5V$ , $\pm 1.25V$ , $\pm 0.625V$ , 0-10V, 0-5V, 1.25V, 0-.625V	$\pm 10V$ , $\pm 5V$ , $\pm 2.5V$ , $\pm 1.25V$ , $\pm 0.625V$ , 0-10V, 0-5V, 1.25V, 0-.625V
Max Sample Rate	250KHz	100KHz
Nonlinearity	$\pm 3LSB$ , no missing codes	$\pm 3LSB$ , no missing codes
On-board FIFO	1024, prog. threshold	512, prog. threshold
Calibration	Automatic autocalibration	Software initiated autocalibration
Analog Outputs	4, 12-bit resolution	4, 12-bit resolution
Output Ranges	$\pm 5V$ , $\pm 10V$ , 0-5V, 0-10V	$\pm 5V$ , 0-5V
Output Current	$\pm 5mA$ max per channel	$\pm 5mA$ max per channel
Settling Time	6 $\mu$ S max to 0.01%	6 $\mu$ S max to 0.01%
Relative Accuracy	$\pm 1$ LSB	$\pm 1$ LSB
Digital I/O Lines	24 programmable direction	8 In, 8 Out
DIO Input Voltage	Logic 0: 0.0V min, 0.8V max Logic 1: 2.0V min, 5.0V max	Logic 0: 0.0V min, 0.8V max Logic 1: 2.0V min, 5.0V max
DIO Output Voltage	Logic 0: 0.0V min, 0.33V max Logic 1: 2.4V min, 5.0V max	Logic 0: 0.0V min, 0.33V max Logic 1: 3.8V min, 5.0V max
Counter / Timers	1 - 32-bit; 1 - 16-bit	1 - 32-bit; 1 - 16-bit
Clock Source	10MHz clock or external signal	10MHz clock or external signal
Power Supply	+5VDC $\pm 10\%$ @410mA	+5VDC $\pm 10\%$ @350mA
Operating Temp	-40°C to +85°C	-40°C to +85°C
Weight	3.4oz / 96g	3.3oz / 93g

### ORDERING INFORMATION

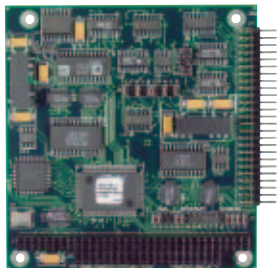
Part No.	Description
DMM-32X-AT	32 16-bit A/D, 250KHz, 4 12-bit D/A, 24 DIO, auto-autocalibration
DMM-16-AT	16 16-bit A/D, 100KHz, 4 12-bit D/A, 8 digital inputs, 8 digital outputs, autocalibration
DMM-16-NA-AT	16 16-bit A/D, 100KHz, No D/A, 8 digital inputs, 8 digital outputs, autocalibration

# DIAMOND-MM-AT / DIAMOND-MM

## LOW COST ANALOG I/O

### Diamond-MM-AT

- 16 12-bit A/D with 100KHz sample rate, programmable input ranges and 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
- -40 to +85°C operation



### Diamond-MM

- 16 12-bit A/D with 100KHz sample rate and programmable input ranges
- 2 12-bit D/A
- 8 digital inputs and 8 digital outputs
- Counter / timers for A/D control and general use
- -40 to +85°C operation



### SPECIFICATIONS

Feature	DMM-AT	DMM
Analog Inputs	16 12-bit	16 12-bit
Input Modes	Single-ended, Differential	Single-ended, Differential
Input Ranges	$\pm 10V$ , $\pm 5V$ , $\pm 2.5V$ , $\pm 1.25V$ , $\pm 0.625V$ , 0-10V, 0-5V, 0-2.5V, 0-1.25V, programmable	$\pm 10V$ , $\pm 5V$ , $\pm 2.5V$ , $\pm 1.0V$ , $\pm 0.5V$ , 0-10V, 0-5V, 0-2.5V, 0-1.0V, 0-0.5V, jumper selected
Max Sample Rate	100KHz	100KHz
Nonlinearity	$\pm 1LSB$ , no missing codes	$\pm 1LSB$ , no missing codes
On-board FIFO	512, 256 threshold	None
Calibration	Autocalibration	Manual calibration
Analog Outputs	2, 12-bit resolution	2, 12-bit resolution
Output Ranges	$\pm 5V$ , 0-5V	0-5V
Output Current	$\pm 5mA$ max per channel	$\pm 8mA$ max per channel
Settling Time	4 $\mu$ s max to $\pm 1/2$ LSB	4mS max to $\pm 1/2$ LSB
Relative Accuracy	$\pm 1$ LSB	$\pm 1$ LSB
Digital I/O Lines	8 In, 8 Out	8 In, 8 Out
DIO Input Voltage	Logic 0: 0.0V min, 0.8V max Logic 1: 1.2V min, 5.0V max	Logic 0: 0.0V min, 0.85V max Logic 1: 2.0V min, 5.0V max
DIO Output Voltage	Logic 0: 0.0V min, 0.33V max Logic 1: 3.8V min, 5.0V max	Logic 0: 0.0V min, 0.33V max Logic 1: 3.8V min, 5.0V max
Counter / Timers	1 - 32-bit; 1-16-bit	1-32-bit; 1-16-bit
Clock Source	10MHz clock or external signal	10MHz clock or external signal
Power Supply	+5VDC $\pm 10\%$ @320mA	+5VDC $\pm 10\%$ @165mA
Operating Temp	-40°C to +85°C	0 to 70°C (standard) -40°C to +85°C (XT models)
Weight	2.6oz / 74g	3.2oz / 91g

For cost-sensitive applications the Diamond-MM-AT and Diamond-MM high accuracy 12-bit analog I/O PC/104 modules provide two alternatives to meet the varying analog input needs of PC/104 expandable systems. DMM-AT has 16 analog inputs with a 100 KHz sample rate and 512-sample FIFO. The DMM also offers 16 analog inputs with a 100 KHz sample rate but without a sample FIFO. Both boards provide two 12-bit analog outputs with programmable output ranges, 2 counter/timers, and an operating temperature range from -40 to +85°C. Both boards support interrupt A/D transfers. Each offers 8 digital inputs and 8 digital outputs.

The DMM-AT board offers programmable input ranges and advanced auto-calibration technology which calibrates both the analog inputs and outputs under software control. This means you get analog I/O performance with the maximum possible accuracy over the full operating temperature range. The Diamond-MM offers jumper selected input ranges and manual calibration with potentiometers.

Both boards are supported by Diamond Systems' Universal Driver programming software for Linux, Windows 98 / 2000 / XP / CE, DOS, QNX, and VxWorks.

### ORDERING INFORMATION

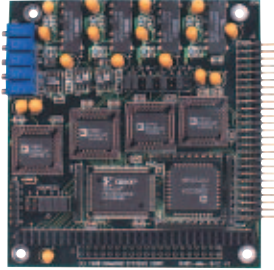
Part No.	Description
DMM-AT	16 12-bit A/D, 100KHz, 2 12-bit D/A, 8 digital inputs, 8 digital outputs, autocalibration
DMM	16 12-bit A/D, 100KHz, 2 12-bit D/A, 8 digital inputs, 8 digital outputs, 0-70°C
DMM-XT	16 12-bit A/D, 100KHz, 2 12-bit D/A, 8 digital inputs, 8 digital outputs, -40°C to 85°C

# RUBY-MM / RUBY-MM-416

## ANALOG OUTPUT WITH DIGITAL I/O

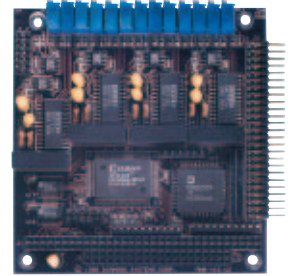
### Ruby-MM-412 / 812 / 1612

- 4, 8, or 16 12-bit analog output channels
- Unipolar and bipolar, user adjustable output ranges
- 24 digital I/O with programmable direction



### Ruby-MM-416

- 4 16-bit analog output channels
- Unipolar and bipolar, user adjustable output ranges
- Simultaneous update of all channels
- 24 digital I/O with programmable direction



The **Ruby-MM series** of PC/104 analog output modules includes the Ruby-MM-412 / 812 / 1612 offering four, eight and sixteen channels of 12-bit analog output respectively and the Ruby-MM-416 offering four channels of 16-bit output. Both boards support both unipolar and bipolar output ranges that are user selectable. Each board also offers 24 digital I/O lines with programmable direction in groups of 8-bits based on an 82C55 chip.

Both boards operate from -40°C to +85°C, only require a +5V power input, and are supported by Diamond Systems' Universal Driver programming software for Linux, Windows 98 / 2000 / XP / CE, DOS, QNX, and VxWorks.

### SPECIFICATIONS

Feature	RMM-412/812/1612	RMM-416
Analog Outputs	4/8/16 12-bit	4 16-bit
Output Ranges	±5V, ±10V, 0-5V, 0-10V	±5V, ±10V, 0-10V
Output Current	±5mA max per channel	±5mA max per channel
Settling Time	6µs max to 0.01%	10µs max to 0.003%
Relative Accuracy	±1 LSB	±2 LSB
Minimum Load	2K Ω	2K Ω
Reset	0V for bipolar ranges, mid-scale for unipolar ranges	All DACs reset to mid-scale
Digital I/O Lines	24, CMOS / TTL compatible	24, CMOS / TTL compatible
DIO Input Voltage	Logic 0: -0.5V min, 0.8V max Logic 1: 2.0V min, 5.5V max	Logic 0: -0.5V min, 0.8V max Logic 1: 2.0V min, 5.5V max
DIO Output Voltage	Logic 0: 0.0V min, 0.4V max Logic 1: 3.0V min, 4.6V max	Logic 0: 0.0V min, 0.4V max Logic 1: 3.0V min, 4.6V max
Output Current	±2.5mA max per line	±2.5mA max per line
Dimensions	3.55" x 3.775" (90mm x 96mm)	
Input Voltage	+5VDC±10%	+5VDC±10%
Current Consumption	220mA (4 channels) 290mA (8 channels) 430mA (16 channels)	650mA
Operating Temp	-40°C to +85°C	-40°C to +85°C
Weight	3.4oz / 96g (4 channel)	3.4oz / 96g

### ORDERING INFORMATION

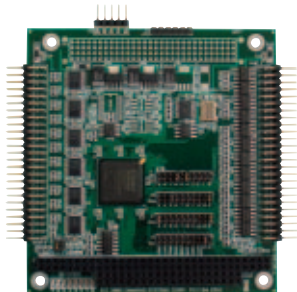
Part No.	Description
RMM-412-XT	4 12-bit D/A, 24 Digital I/O
RMM-812-XT	8 12-bit D/A, 24 Digital I/O
RMM-1612-XT	16 12-bit D/A, 24 Digital I/O
RMM-416-XT	4 16-bit D/A, 24 Digital I/O

# GPIO-MM / ONYX-MM

## DIGITAL I/O WITH COUNTER / TIMERS

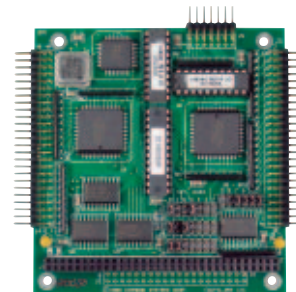
### GPIO-MM

- FPGA-based for multiple configurations and pin definitions
- Up to 96 Digital I/O lines with programmable direction
- Up to 10 16-bit counter / timers with 16 fixed direction digital I/O
- On-board EEPROM for user storage



### ONYX-MM / ONYX-MM-DIO

- 48 digital I/O lines with programmable direction
- 3 optional counter / timers with programmable sources — internal clock, external signal or previous counter output
- 2.5mA output current



### SPECIFICATIONS

Feature	GPIO-MM / GPIO-MM-12	GPIO-MM-21	Onyx-MM / Onyx-MM-DIO
Digital I/O Lines	48 programmable direction, 8 inputs, 8 outputs	96 programmable direction (48 buffered)	48 programmable direction
DIO Input Voltage	Logic 0: -0.5V min, 0.8V max Logic 1: 2.0V min, 5.5V max	Logic 0: -0.5V min, 0.8V max Logic 1: 2.0V min, 5.5V max	Logic 0: -0.5V min, 0.8V max Logic 1: 2.0V min, 5.5V max
DIO Output Voltage	Logic 0: 0.0V min, 0.2V max Logic 1: 3.1V min, 3.3V max	Logic 0: 0.0V min, 0.2V max Logic 1: 3.1V min, 3.3V max	Logic 0: 0.0V min, 0.4V max Logic 1: 3.0V min, Vcc-0.4V max
Program. I/O Output Current (Max per line)	Logic 0: 64mA Logic 1: -15mA	Logic 0: 64mA Logic 1: -15mA	±2.5mA per line
Fixed I/O and Counter / Timers Output Current	±24mA max	N/A	N/A
Counter / Timers	10, 16-bit based on 9513		3, 16-bit based on 82C54 (Onyx-MM only)
Clock	40MHz	40MHz	10MHz
Bus Interface	PC/104 (16-bit ISA)	PC/104 (16-bit ISA)	PC/104 (8-bit ISA)
Dimensions	3.55" x 3.775" (90mm x 96mm)		
Input Voltage	+5VDC±10%	+5VDC±10%	+5VDC±10%
Current Consumption	300mA	300mA	100mA (Onyx-MM-DIO) 120mA (Onyx-MM)
Operating Temp	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
Weight	2.2oz / 62g	2.2oz / 62g	2.3oz / 65g (Onyx-MM-DIO) 2.8oz / 79g (Onyx-MM)

### ORDERING INFORMATION

Part No.	Description
GPIO-MM-XT	48 Digital I/O and 10 Counter / Timers
GPIO-MM-12-XT	48 Digital I/O and 10 Counter / Timers
GPIO-MM-21-XT	96 Digital I/O module
OMM-DIO-XT	48 Digital I/O
OMM-XT	48 Digital I/O, 3 Counter / Timers

The GPIO-MM / Onyx-MM series of PC/104 digital I/O & counter / timer modules offer a range of functionality from a low cost DIO-only version (Onyx-MM-DIO) to a high performance version (GPIO-MM) with 64 digital I/O lines and 10 16-bit counter / timers. Onyx-MM provides 48 digital I/O lines and three counter / timers.

The GPIO-MM family is available in multiple configurations and pin definitions, ranging from a digital I/O intensive solution with 96 lines to a mixed digital I/O — counter / timer solution with 48 DIO lines and 10 counter/timers.

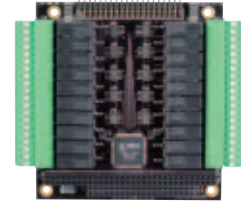
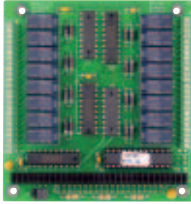
GPIO-MM hardware is based on a Xilinx Spartan II FPGA with field reprogrammability. Hence the GPIO-MM hardware can be modified with new FPGA code to implement custom configurations.

Digital I/O for all three models is based on the 8255 and provides programmable direction in groups of 8 bits.

Each board operates from -40°C to +85°C and only requires a +5V power input. Both boards are supported by Diamond Systems' Universal Driver programming software for Linux, Windows 98 / 2000 / XP / CE, DOS, QNX, and VxWorks.

# PEARL-MM / OPAL-MM / IR104

## RELAYS WITH OPTOISOLATED INPUTS



### Pearl-MM

- 16 SPDT (form C) relays
- Extra long life, 100M operations
- DC switching capacity 30V/2A
- AC switching capacity 125V / 0.5A
- 500VAC/DC isolation between board and signals
- Screw terminal or pin header inputs

### Opal-MM

- 8 SPDT (form C) relays
- Long life 1M operations
- DC switching capacity 30V/1A
- AC switching capacity 125V / 0.1A
- 8 non-polarized optoisolated inputs
- 500VAC/DC isolation between board and signals
- 40 pin header for all I/O

### IR104

- 20 SPST (form A) relays
- Long life, 20M operations
- DC switching capacity 30V/5A
- AC switching capacity 125V / 5A
- 20 non-polarized optoisolated inputs
- Twin, detachable screw terminal output and 40-pin input header

The Pearl-MM / Opal-MM / IR104 series of PC/104 modules provide relay outputs with optional optoisolated digital inputs. Pearl-MM and Opal-MM provide 16 and 8 SPDT (form C) relays respectively that can switch both AC and DC voltages. IR104 provides 20 SPST (form A) relays and also can switch both AC and DC voltages.

Opal-MM and IR104 also provide 8 and 20 optoisolated inputs respectively.

Pearl and Opal boards operate from -40°C to +85°C and only require a +5V power input. The IR104 board operates from -20°C to +70°C. All three boards are supported by Diamond Systems' Universal Driver programming software for Linux, Windows 98 / 2000 / XP / CE, DOS, QNX, and VxWorks.

### SPECIFICATIONS

Feature	Pearl-MM	Opal-MM	IR104
# Relays	16	8	20
Relay Type	SPDT (form C)	SPDT (form C)	SPST (form A)
Max DC Power	30V / 2A	30VDC / 1A	30VDC / 5A
Max AC Power	125VAC / 0.5A resistive	125VAC / 0.1 resistive 125VAC / 0.2 inductive	125VAC / 5A
Max Load	60W / 60VA	30W / 50VA	150W / 1250VA
Max Op Voltage	220VDC, 250VAC	220VDC, 250VAC	150VDC, 250VAC
Contact Resistance	100mΩ max	50mΩ max	30mΩ initially
Relay Lifetime	100,000,000 operations	1,000,000 operations	20,000,000 operations
Actuation Time	4ms max, operate / release	5ms max, operate / release	6ms operate, 3ms release
Opto Inputs	0	8	20
Opto Input Voltage	N/A	3V-28VDC	3V-24V DC or AC
Input Impedance	N/A	1.8KΩ min	2.8KΩ
Dimensions	3.55" x 3.775" (90mm x 96mm)		
Input Voltage	+5VDC±10%	+5VDC±10%	+5VDC±10%
Operating Temp	-40°C to +85°C	-40°C to +85°C	-20°C to +70°C
Weight	3.4oz / 96g 3.6oz / 102g w/screw terminals	3.0oz / 85g	3.2oz / 90g

### ORDERING INFORMATION

Part No.	Description
PMM-S	16 relays, screw terminals
PMM-P	16 relays, pin headers
OPMM-XT	8 relays, 8 opto inputs
IR104	20 relays, 20 opto inputs

# JANUS

## DUAL CAN PORTS, CARRIER FOR WIRELESS AND GPS MODULES

### SPECIFICATIONS

#### CAN CIRCUIT

CAN Channels	2, 2.0B
Controller	Philips SJA1000T
Transceiver	Philips 82C251
Isolation	500V channel to channel
Transceiver Power	5V, on-board or loop
Clock Rate	16MHz
Data Rate	1Mbps
Bus Interface	Memory or I/O

#### WIRELESS MODULES

Manufacturer	MultiTech SocketModem
Type	GSM/GPRS or CDMA
Interface	TTL serial

#### GPS MODULES

Manufacturer	Trimble Navigation
Model	Lassen SKII 8 channel Lassen IQ 12-channel
Interface	1 or 2 channel TTL serial

#### GENERAL

Dimensions	3.55" x 3.775" (90mm x 96mm)
PC/104 Bus	16-bit stackthrough ISA bus
Power Supply	+5VDC±5%@77mA (w/o modules)
Operating Temp	-40 to +85°C
Weight	2.1 oz / 59g (w/o modules)

- 3-in-1 CAN / Wireless / GPS board
- Dual CAN 2.0B interfaces
- Philips SJA1000T controllers
- Channel to channel and channel to system isolation
- Linux CAN driver included; Windows CE.NET CAN driver available
- Socket for GSM/GPRS and CDMA wireless communications modules
- Socket for GPS receiver module



**JANUS-MM** combines dual CAN interfaces as well as sockets for wireless communications and GPS. The dual CAN ports on each board use the Philips chipset, including SJA1000T main controller and 82C251 transceiver, for full CAN2.0B functionality. Each port is independently isolated from the system to eliminate sensitivity to noise and ground shifts in the network. Both boards have jumper options that include slew rate control, transceiver power source (on-board or loop power), address, and interrupt settings. Both memory and I/O addressing are supported.

A Linux driver from CAN expert lxxat is included with the board, and a Windows CE.NET driver is available. JANUS-MM includes sockets and support circuitry for GSM/GPRS and CDMA wireless communication modules from MultiTech, as well as a GPS receiver module from Trimble Navigation (both modules are available separately). Adding these modules to your system turns it into a vehicle tracker or remote data collection system with wireless communications link. A dual UART circuit on each board provides the necessary interface to the wireless and GPS add-on modules.

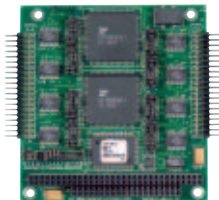
### ORDERING INFORMATION

Part No.	Description	Part No.	Description
JNMM-COMBO-XT	Dual CAN + Carrier PC/104 Module (w/o add-on modules)	JNMM-GPS-G-DK	Janus-MM GPS module development kit, select G from list
MOD-GPS-G	GPS Lassen Module w/ mounting hardware, select G from list	JNMM-WSM-W-DK	Janus-MM Wireless SocketModem development kit, select W from list
MOD-WSM-W	Wireless Socket Modem w/ mounting hardware, select W from list	JNMM-DUO-G-W-DK	Janus-MM GPS + WSM development kit, select G and W from lists
JNMM-GPS-G	Janus-MM with GPS module installed, select G from list	CK-GPS-G	Cable kit for Lassen iQ module, incl. transition cable + antenna, select G from list
JNMM-WSM-W	Janus-MM with Wireless SocketModem installed, select W from list	CK-WSM-01	Cable kit for SocketModem, incl. transition cable + antenna
JNMM-DUO-G-W	Janus-MM with GPS and WSM modules installed, select G and W from lists		

G	Description	W	Description (GPRS Models)	W	Description (CDMA Models)
IQ	Lassen iQ GPS module	F1	GPRS 900/1800MHz GPRS Class 10, MTSMC-G-F1, Cingular	N1	CDMA 800/1900MHz CDMA2000 1xRTT, MTSMC-C-N1
SK	Lassen SKII GPS module	F2	GPRS 850/1900MHz GPRS Class 10, MTSMC-G-F2, Cingular	N2	CDMA 800/1900MHz CDMA2000 1xRTT, MTSMC-C-N2, Sprint
				N3	CDMA 800/1900MHz CDMA2000 1xRTT, MTSMC-C-N3, Verizon
				N4	CDMA 800MHz CDMA2000 1xRTT, MTSMC-C-N4, with R-UIM

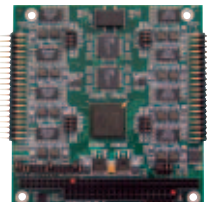
# EMERALD-MM FAMILY

## 8-PORT SERIAL COMMUNICATIONS



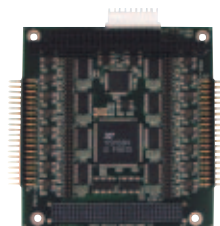
### EMM-8M

- 8 RS-232/422/485 serial ports
- Full handshake RS-232
- Jumper selectable protocols, addresses and interrupts
- 16C654 UARTs with 64-byte FIFOs
- 460.8Kbps max baud rate
- 8 programmable digital I/O lines
- Interrupt sharing



### EMM-8P

- 8 RS-232/422/485 serial ports
- Full handshake RS-232
- Software selectable protocols, jumper selectable addresses and interrupts
- 16C654 UARTs with 64-byte FIFOs
- 460.8Kbps max baud rate
- 8 programmable digital I/O lines
- Interrupt sharing



### EMM-8PLUS

- 8 RS-232/422/485 serial ports
- Full handshake RS-232
- PC/104-Plus (PCI Plug and Play) interface
- Jumper selectable protocols
- Max baud rate 1.832Mbps
- 8 programmable digital I/O lines

The Emerald family of serial communications PC/104 and PC/104-Plus modules provides both low cost and high performance alternatives to meet the varying communications needs of PC/104 expandable systems. The EMM-8M / EMM-8P / EMM-8Plus all offer eight RS-232/422/485 serial ports with performance ranging from 460.8K bps (EMM-8M or EMM-8P on PC/104) to 1.832Mbps (EMM-8Plus on PC/104-Plus). All three utilize 16C550 compatible UARTs with 64-byte FIFOs and all offer 8 programmable digital I/O lines.

The three boards operate from -40 to +85°C, differing in their configuration mechanisms. The EMM-8P offers software configurable protocol selection while the EMM-8M uses jumpers to configure the protocols. Both boards use jumpers to select the base address and interrupt configuration. Both support interrupt sharing. The EMM-8Plus uses jumpers to select the protocols and the PCI bus Plug and Play logic to configure address and interrupt usage.

### SPECIFICATIONS

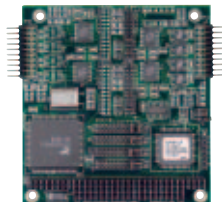
Feature	EMM-8M	EMM-8P	EMM-8PLUS
# Ports	8	8	8
Protocols Supported	RS-232, RS-422, RS-485	RS-232, RS-422, RS-485	RS-232, RS-422, RS-485
Max Baud Rate	460.8Kbps	460.8Kbps	1.832Mbps
Communications	5,6,7 or 8 data bits; Even, odd or no parity	5,6,7 or 8 data bits; Even, odd or no parity	5,6,7 or 8 data bits; Even, odd or no parity
Base UART	16C654	16C654	17d158
FIFO	64 bytes	64 bytes	64 bytes
Protocol Configuration	Jumper	Software	Jumper
Address / Interrupt Configuration	Jumper	Jumper	Plug and Play
Digital I/O	8 individually prog.	8 individually prog.	8 individually prog.
Short Protection	Continuous, all outputs	Continuous, all outputs	Continuous, all outputs
Bus Interface	PC/104 (ISA)	PC/104 (ISA)	PC/104-PLUS (ISA)
Input Voltage	+5VDC±10%	+5VDC±10%	+5VDC±10%
Current Consumption	80mA	160mA	80mA
Operating Temp	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
Weight	2.6oz / 74g	2.1oz / 71g	2.6oz/74g

### ORDERING INFORMATION

Part No.	Description
EMM-8M-XT	8 jumper configurable RS-232/422/485 port PC/104 module
EMM-8P-XT	8 software configurable RS-232/422/485 port PC/104 module
EMM-8Plus-XT	8 jumper configurable RS-232/422/485 port PC/104-Plus module

# EMERALD-MM FAMILY

## 4-PORT SERIAL COMMUNICATIONS



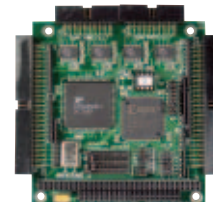
### EMM-4M

- 4 serial ports, RS-232/422/485 protocols
- Full handshake RS-232
- Jumper-selectable protocols, addresses and interrupts
- 16C554 UARTs with 16-byte FIFOs
- 115.2K max baud rate
- Built-in interrupt sharing



### EMM-OPTO

- 2-4 Optoisolated serial ports, RS-232/422/485 protocols
- Full handshake RS-232
- Jumper-selectable protocols, addresses and interrupts
- 16C2850 UARTs with 128-byte FIFOs
- 460.8Kbps max baud rate
- 24 programmable digital I/O lines
- Built-in interrupt sharing



### EMM-DIO

- 4 RS-232 serial ports
- Full handshake RS-232
- Jumper selectable addresses and interrupts
- 16C554 UARTs with 16-byte FIFOs
- 115.2Kbps max baud rate
- 48 programmable digital I/O lines
- Built-in interrupt sharing

### SPECIFICATIONS

Feature	EMM-4M	EMM-OPT2/OPT4	EMM-DIO
# Ports	4	2 or 4	4
Protocols Supported	RS-232, RS-422, RS-485	RS-232, RS-422, RS-485	RS-232
Max Baud Rate	115Kbps	460.8Kbps	115.2Kbps
Communications	5,6,7 or 8 data bits; Even, odd or no parity	5,6,7 or 8 data bits; Even, odd or no parity	5,6,7 or 8 data bits; Even, odd or no parity
Base UART	16C554	16C2850	16C554
FIFO	16 bytes	128 bytes	16 bytes
Protocol Configuration	Jumper	Jumper	N/A
Address / Interrupt Configuration	Jumper	Jumper	Jumper
Digital I/O	N/A	24, programmable direction	48, programmable direction
Short Protection	Continuous, all outputs	Continuous, all outputs	Continuous, all outputs
Bus Interface	PC/104 (ISA)	PC/104 (ISA)	PC/104-Plus (ISA)
Input Voltage	+5VDC±10%	+5VDC±10%	+5VDC±10%
Current Consumption	80mA	160mA	80mA
Operating Temp	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
Weight	2.5oz / 71g	3.0oz / 85g	3.2oz / 91g

### ORDERING INFORMATION

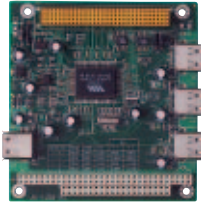
Part No.	Description
EMM-4M-XT	4 configurable RS-232/422/485 ports
EMM-OPT2-XT	2 opto-isolated RS-232/422/485 ports, 24 digital I/O
EMM-OPT4-XT	4 opto-isolated RS-232/422/485 ports, 24 digital I/O
EMM-DIO-XT	4 RS-232 ports, 48 digital I/O

The Emerald family of serial communications PC/104 modules provides low cost and optically isolated versions to meet the varying communications needs of PC/104 expandable systems. The EMM-4M / EMM-DIO offer four serial ports with RS-232/422/485 protocols. The EMM-OPTO2 / OPTO4 offer two or four RS-232/422/485 serial ports with optical isolation of 1000V or AC to protect the system from ground differentials or noise spikes. The EMM-OPTO and EMM-DIO also offer on board digital I/O using an 82C55 chip. 24 lines feature interrupt generation capabilities on change of state. Edge detection and direction change are programmable on a line-by-line basis. This can help to reduce board count in a PC/104 stack as well as reduce cost. All three boards feature jumper configurable address and interrupt configuration.

All three boards operate from -40 to +85°C. The digital I/O features of the EMM-OPTO and EMM-DIO are supported by Diamond Systems' Universal Driver programming software for Linux, Windows 98 / 2000 / XP / CE, DOS, QNX, and VxWorks.

# TMM-USB4P / TMM-PCM2P / MERCATOR

## USB 2.0, PC CARD, DUAL ETHERNET PC/104-PLUS BOARDS



### TMM-USB4P

- 4 PCI-based USB 2.0 ports (480 Mbps)
- USB 1.1/USB 2.0 compatibility
- OHCI and EHCI host controller
- Plug-and-Play installation
- Windows XP, 2000, 98 support



### TMM-PCM2P

- 2 PCI-based Cardbus Slots
- Supports Type I, II, III PC Cards
- Meets PCMCIA v2.1 and JEIDA 4.2
- Supports 5V and 3.3V cards
- Supports 16-bit and 32-bit cards
- Supports hot swapping
- Uses TI 1420 controller



### Mercator

- 2 PCI-based 10/100Mbps Ethernet Ports
- NS DP83815 Mac+Phy chips
- Latching pin headers and RJ-45 jacks for flexibility
- 24 digital I/O using 82C55
- Operating temperature: -40 to +85°C

**TMM-USB4P** is a 4-port Universal Serial Bus (USB) 2.0 PC/104-Plus adapter for upgrading embedded computers to a higher performance USB interface. This card is intended for applications requiring high speed communications, such as video cameras or mass storage. It is 40 times faster than previous USB adapters and 20% faster than Firewire (IEEE-1394). The USB 2.0 ports can transfer data at 480Megabits per second each, making this board ideal for external storage, backup, networking and video applications.

The TMM-PCM2P provides two PC Card slots with a PCI bus interface. The PC Card slots work with Type I, Type II and Type III memory, I/O and ATA hard disk Cardbus compatible cards. The module fully complies with PCMCIA v. 2.1 and JEIDA 4.2, has 16-bit legacy mode support, and PCI way legacy mode support. Both 5v and 3.3V-only PC Cards are supported. 5V and 3.3V PC Cards may be combined in a system. 16-bit and 32-bit cards may be combined in a system. The TMM-PCM2P allows hot swapping of Cardbus modules. The PC/104 ISA bus connector is provided for pass-through to additional PC/104 boards mounted in the stack.

Mercator combines two PCI-based 10/100BaseT Ethernet ports with 24 user-configurable digital I/O lines on one board. 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 Ethernet ports utilize the National Semiconductor DP83815 MAC + Phy PCI controller chip. Two I/O connectors are provided for each Ethernet port: A standard RJ-45 jack for convenience and a rugged friction-lock header for applications requiring vibration protection.

The 24 digital I/O lines are based on an 82C55 chip accessed via the ISA bus. They feature programmable direction in 4- and 8-bit groups. Jumper-configurable options include I/O address and 10K-Ohm pull-up resistors on the I/O lines.

### SPECIFICATIONS

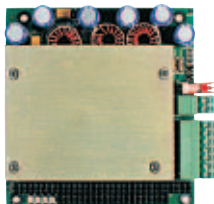
Feature	TMM-USB4P	TMM-PCM2P	Mercator
# Ports / Slots	4 USB 2.0	2 PC Card Slots	2 10/100BaseT Ethernet
Configuration	Plug and Play	Plug and Play	Plug and Play
Bus Interface	PC/104-Plus (PCI with ISA pass through)		PC/104-Plus
Dimensions	3.55" x 3.775" (90mm x 96mm)		
Input Voltage	5VDC±10%	5VDC±10%	5VDC±10%
Operating Temp	0°C to +70°C	0°C to +70°C	-40°C to +85°C
Weight	2.5oz / 71g	2.1oz / 71g	3.0oz / 85g

### ORDERING INFORMATION

Part No.	Description
TMM-USB4P	PC/104+ USB 2.0 4 Port Module
TMM-PCM2P	PC/104+ PCMCIA 2 Card Module
MRC-224-XT	PC/104+ Dual 10/100Mbps Ethernet

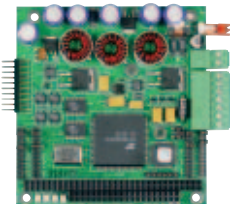
# JUPITER-MM / JUPITER-MM-SIO / JUPITER-MM-LP

## RUGGED PC/104 POWER SUPPLY MODULES



### JMM

- 50 watts output power
- $\pm 5V$ ,  $\pm 12V$  outputs
- 7-30VDC input range
- Shutdown control
- Current limiting and short-circuit protection
- Slim heat sink conforms to PC/104 mechanical limits



### JMM-SIO

- 50 watts output power
- $\pm 5V$ ,  $\pm 12V$  outputs
- 7-30VDC input range
- Shutdown control
- Rugged, lightweight design
- Current limiting and short-circuit output protection
- Integrated dual RS-232/422/485 serial ports



### JMM-LP

- 25 watts output power: +5VDC @ 5A
- 7-30VDC input range
- Low-cost, lightweight unit
- -40 to +85° operation

## SPECIFICATIONS

Feature	JMM-512-V512	JMM-SIO	JMM-LP
Input Voltage	7-30VDC	7-30VDC	7-30VDC
Transient Protection	1500W transient voltage suppressor	1500W transient voltage suppressor	1500W transient voltage suppressor
Transient Cutoff	31V nominal	31V nominal	31V nominal
+5V Output	10A	10A	5A
+12V Output	2A	2A	
-5V Output	0.15A	0.1A	
-12V Output	0.8A	0.5A	
Output Protection	Current limit / short circuit protection	Current limit / short circuit protection	Current limit / short circuit protection
Output Ripple	<50mV RMS (+5V output, 50% load)	<50mV RMS (+5V output, 50% load)	<50mV RMS (+5V output, 50% load)
Load Regulation	$\pm 3\%$	$\pm 3\%$	$\pm 3\%$
Efficiency	80% to 92%, varies with load and input voltage	80% to 92%, varies with load and input voltage	80% to 92%, varies with load and input voltage
Dimensions	3.55" x 3.775" (90mm x 96mm)		
PC/104	Stackthrough connectors installed	Stackthrough connectors installed	Stackthrough connectors installed
Operating Temp	-40 to +85°C	-40 to +85°C	-40 to +85°C
Weight	5.0oz / 142g	4.0oz / 113g	2.5oz / 71g

The Jupiter-MM family provides competitively priced, stable DC power for compact, mobile PC/104 systems. The small magnetics and SMT components combined with slim heat sink design create a fully PC/104-compliant module that can be stacked above or below other boards. The input on each board is protected against transients, and the outputs have built-in protection against short circuits. Power circuits are cascaded, allowing all power to be utilized on the +5V output or shared across multiple outputs. Power I/O connections are through convenient detachable screw terminals. All output voltages are also routed to their respective PC/104 bus pins. Power output LEDs provide a convenient indication of power supply operation. Jupiter-MM-SIO provides two useful RS-232/422/485 serial ports, potentially eliminating a card from the PC/104 stack. The low cost Jupiter-MM-LP provides 25 watts of 5V-only power for cost sensitive systems.

## ORDERING INFORMATION

Part No.	Description
JMM-512-V512	50 Watts, $\pm 5V$ , $\pm 12V$ outputs
JMM-SIO-XT	50 Watts, $\pm 5V$ , $\pm 12V$ outputs, 2 RS232/422/485 ports
JMM-LP-XT	25 watts, +5V output

# POWER SUPPLIES AND BATTERIES



HESC-104



BAT104-SLA25, 2.5Ah



BAT104-NiMH, 2.3Ah

- Designed for vehicle applications
- Multi-output DC power for PC/104 systems
- Wide-range input voltages
- Battery charger for UPS capability
- Power management feature
- Output power on PC/104 bus
- Auxiliary power out on screw terminals
- -40 to +85°C operation

These power supplies accept a DC input voltage from a vehicle power system, battery, or other power source and provide multi-voltage clean output power for PC/104 systems. Input power is provided on a detachable screw terminal block. Output power is provided directly on the PC/104 stack and/or on a separate screw terminal block. LEDs provide indications of output power status, and load dump protection prevents potential damage to the embedded system.

These rechargeable battery packs are provided in PC/104 form factor so they can be easily mounted inside a PC/104 enclosure or assembled together with a PC/104 computer. All models are compatible with the HESC-104 and HESC-SER DC/DC power supplies, which provide smart charging capability. The BAT104 and HESC products used together form a reliable uninterruptible power supply (UPS) for PC/104 embedded systems.

## ORDERING INFORMATION

Part No.	Description
HESC-104	60W DC/DC PS, smart charger, power management, PC/104 bus
HESC-SER	60W DC/DC PS, smart charger, power management, serial interface
HE104-DX	60W DC/DC power supply, quad outputs, PC/104
HE104+DX	60W DC/DC power supply, quad outputs, PC/104-Plus
HE-HP	100W DC/DC power supply, discrete wire I/O
BAT104-NiMH	19.4WH nickel metal hydride backup battery
BAT104-SLA25	25WH sealed lead acid backup battery
BAT104-SLA45	45WH sealed lead acid backup battery

## POWER SUPPLY SPECIFICATIONS

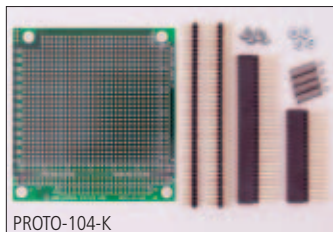
Model	HESC-104	HESC-SER	HE104-DX	HE104+DX	HE-HP
<b>POWER</b>					
Input Voltage	6-40VDC	6-40VDC	6-40VDC	6-40VDC	6-40VDC
Max Output Power	60W	60W	60W	60W	100W
Max +3.3V Output				10A	
Max +5V Output	12A	12A	12A	12A	
Max +12V Output	2.5A	2.5A	2.5A	2.5A	2.5A
Max -5V Output	0.4A	0.4A	0.4A		
Max -12V Output	0.5A	0.5A	0.5A	0.5A	
Max Efficiency	95%	95%	95%	95%	95%
Soft Start	10ms on +5V output	10ms on +5V output			
Opto Inputs		8	20		
Input Voltage		3V-28VDC	3V-24V DC or AC		
Input Impedance		1.8KΩ min	2.8KΩ		
<b>MECHANICAL</b>					
Size		3.550" x 3.775" (90mm x 96mm)			
Weight	6.6oz / 186g	7.3oz / 207g	6.1oz / 173g	6.1oz / 173g	6.1oz / 173g
Operating Temp	-40 to +85°C	-40 to +85°C	-40 to +85°C	-40 to +85°C	-40 to +85°C
PC/104 Connector	✓		✓	✓	
PC/104-Plus Connector				✓	
<b>BATTERY CHARGER</b>					
Max Charge Current	4.0A	4.0A			
Charge Voltage	9.5-19.5V	10-35V			
Charger Control	PC/104 bus	Serial port			

## BACKUP BATTERY SPECIFICATIONS

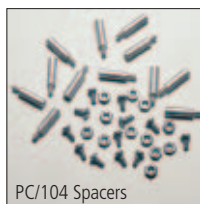
Model	BAT104-NiMH	BAT104-SLA25	BAT104-SLA45
Technology	Nickel Metal Hydride	Sealed Lead Acid	Sealed Lead Acid
Configuration	7 x AA	5 x D	5 x DD
Max Output Voltage	8.4V	10V	10V
Capacity	2.3Ah	2.5Ah	4.5Ah
Max Energy	19.4 WH	25WH	45WH
Length x Width	3.55" x 3.775"	3.55" x 3.775"	3.55" x 3.775"
Height	.59"	2.80"	4.15"
Weight	7.8oz / 221g	40.8oz / 1155g	52.1oz / 1474g
Temperature Range	-10 to +65°C discharge, 0 to 45°C charge	-65 to +65°C	-65 to +65°C

# PC/104 ACCESSORIES

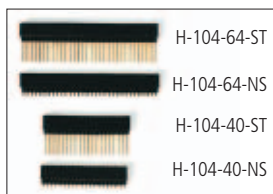
## PROTOTYPE BOARDS, SPACERS, HEADERS, SCREW TERMINAL BOARDS, AC ADAPTORS, CABLE KITS AND ACCESSORY BOARDS



PROTO-104-K



PC/104 Spacers

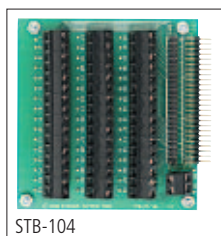


H-104-64-ST

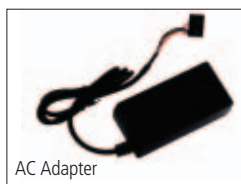
H-104-64-NS

H-104-40-ST

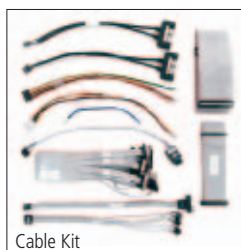
H-104-40-NS



STB-104



AC Adapter



Cable Kit



AC-104-16

### PC/104 Prototype Boards

- Includes corner mounting holes for mounting on the P/C 104 stack
- Provides grids of +5V and ground on both the top and bottom sides
- Kit and assembled versions

### PC/104 Spacers

- 0.6" long x 3/16 diameter x #4-40 thread, with male and female ends
- Clear aluminum material

### PC/104 Headers

- Use to build your own PC/104 I/O boards
- Available in both stackthrough and non-stackthrough configuration
- Gold plating on all contact areas
- Complete PC/104 bus includes 1 40-pin and 1 64-pin connector

### PC/104 Screw Terminal Board

- Provides convenient transition between field wiring and PC/104 I/O boards
- Mounts directly on the PC/104 stack to maintain a neat, integrated assembly
- A 50-pin header allows cable connection to Diamond Systems I/O boards
- Accepts 12-28AWG wire

### AC Adapters

- Convenient way to power your embedded CPU during development or demos
- Contains the proper connector for direct connection to the CPU board

### Cable Kits

- Cables convert the pin headers on the CPU board to PC-style connectors
- Allows you to make quick connections to your peripherals

### AC-104

- Protects bus signals from noise sources
- Stackthrough bus connectors enable top or bottom mounting

Diamond Systems offers a variety of **PC/104 accessories** to speed your implementation of a PC/104 solution.

PC/104 prototype boards provide a blank board with a 0.1" x 0.1" grid of holes for the installation of custom circuitry or components. All PC/104 bus connector signals can be tapped with accessory holes for use by your circuitry. Spacers and headers are also available to help in the construction of your prototype.

The AC-104 is an accessory board that mounts on the PC/104 stack and can be used to reduce noise on bus signals.

The compact PC/104-size screw terminal board mounts directly on the PC/104 stack and converts a 50-pin header to screw terminal input. Multiple boards can be stacked together without interference.

The AC adapter and CPU cable kits help facilitate quick project startup. The adapter powers your embedded CPU during development while the cables convert the pin headers on the CPU board to PC-style connectors.

### ORDERING INFORMATION

Part No.	Description
SPC104	PC/104 spacer, English, single piece
MTG104	PC/104 mounting hardware kit
AC-104-16	AC termination board for PC/104 bus
PROTO-104-A	PC/104 prototype board, loose PC/104 headers
PROTO-104-K	PC/104 prototype board, assembled PC/104 headers
STB-104	Screw terminal board, 50 positions
H-104-64-ST	PC/104 header, 64-pin stackthrough J1
H-104-64-NS	PC/104 header, 64-pin non stackthrough J1
H-104-40-ST	PC/104 header, 40-pin stackthrough J2
H-104-40-NS	PC/104 header, 40-pin non stackthrough J2
PS-5V-03	5VDC 5A AC adapter for Athena, Elektra, and Prometheus
PS-5V-MOR	5VDC adapter for Morpheus
PS-12V-01	12VDC 4A adapter, Hercules

See individual CPU pages for cable kit ordering.



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Catalog 1701

