



# DIAMOND SYSTEMS CORPORATION

## SMALL FORM FACTOR EMBEDDED COMPUTING

Featuring PC/104, SUMIT™, EPIC, EBX, COM Express™, and FeaturePak™

**New  
Diamond  
Products!**

**COM Express**



**COM Express and ETX**  
Wide temperature Atom  
and Core CPU modules  
*See page 10*



**Embedded-Ready  
Subsystems**  
Compact, I/O rich,  
rugged, pre-integrated  
computing platforms  
*See page 6*

**Sumit™**



**SUMIT**  
PCI Express I/O  
expansion modules  
featuring 2MHz A/D and  
96 digital I/O  
*See page 4*

**FeaturePak™**



**FeaturePak**  
Ultra-small, low cost  
PCI Express® I/O  
modules for SBCs and  
COM baseboards  
*See page 18*



ENERGY



DEFENSE



TRANSPORTATION



AEROSPACE



MEDICAL DEVICES



PROCESS CONTROL



INSTRUMENTATION

# WHAT'S NEW AT DIAMOND?

It's our pleasure to present Diamond Systems Corporation's 2010 catalog—packed with exciting new embedded products, services, and solutions. We're confident that our new offerings will advance our reputation as one of the embedded market's top providers of board-, subsystem-, and system-level products for companies requiring high quality, rugged, and reliable embedded solutions in a wide range of markets and applications.

Here are a few highlights of our recent product introductions and technology innovations:

♦ **Intel Processors** — We've introduced a range of Single Board Computer (pp. 12-16), Embedded-Ready Subsystem (pp. 6-8), and Computer-on-Module (pp. 10-11) products, featuring Intel's low-power Atom™ and high-performance Core™ processors.



♦ **FeaturePak™ I/O** — Diamond is proud to be the originator of FeaturePak, the embedded market's newest and most compact I/O expansion standard. Check out our growing line of FeaturePak cards (pp. 18-19).



♦ **COM Express** — New this year is a line of compact, highly integrated COM Express Computer-on-Modules (pp. 10-11). Based on low-power Intel™ processors and chipsets, these products boast high-performance PCI Express expansion, high-resolution graphics, SATA storage interfaces, gigabit Ethernet LAN interfaces, and much more.



♦ **Embedded-Ready Subsystems** — Yet another recent Diamond innovation is the Embedded-Ready Subsystem (pp. 6-8). This new board-level embedded solution merges the high integration, high performance, and low cost of COMs with the stackable expandability of PC/104, PCI-104, and SUMIT. Plus, it provides an integrated thermal solution and standardized mounting-hole pattern for simplified system integration.



♦ **SUMIT-ISM I/O Modules** — Billed as a successor to PC/104, SUMIT-ISM (pp. 4-5) brings the latest high-speed serial buses and expansion interfaces from the desktop PC world to the popular 3.6 x 3.8-inch embedded form-factor, while preserving legacy PC/104 (ISA) or PCI-104 (PCI) expansion capabilities.



We look forward to serving you!

*Jonathan Miller*

Founder and President

**DIAMOND SYSTEMS CORPORATION**

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Diamond Systems is committed to industry open standards:

- ♦ Member of Small Form Factor Special Interest Group (SFF-SIG).
- ♦ Founding member of PC/104 Consortium.
- ♦ Originator of FeaturePak™ I/O module standard.

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**Diamond Systems is a leading supplier of compact, rugged, wide-temperature embedded computing solutions for a wide range of applications in fixed and mobile environments.**

## BROAD PRODUCT LINE

- ◆ **Single Board Computers**—An extensive line of compact, rugged single board computers (SBCs) based on a wide range of power/performance CPUs, ranging from DMP's Vortex86 to Intel's Core™ families. Form-factors include PC/104, EPIC, and EBX.
- ◆ **COMs and COM-Based Solutions**—Rugged, wide-temperature computer-on-module (COM) products, which integrate compact, embedded computing cores for a wide variety of embedded applications. Additionally, Diamond's custom baseboard design services provide complete COM-based solutions. Both ETX 3.0 and COM Express COMs are supported.
- ◆ **Embedded-Ready Subsystems**—A growing family of embedded-ready subsystem (ERS) products combine the high performance processing and leading-edge I/O of COMs with the modular flexibility of stackable single board computers—all within a compact, rugged, reliable, pre-integrated module.
- ◆ **I/O and Power Supply Modules**—Compact, rugged, wide temperature expansion modules offering analog and digital I/O, communications, GPS, and power supply functions. Supported form-factors include PC/104, PCI-104, SUMIT, and FeaturePak.
- ◆ **Integrated Systems**—A line of high quality, fully-integrated platforms for a wide variety of fixed and mobile applications.

## COMPACT, RUGGED, RELIABLE DESIGNS

Our board- and system-level embedded products feature compactness, ruggedness, and reduced power consumption. Distinguishing characteristics include:

- ◆ **High Integration**—Our "2-in-1" SBC and ERS products combine core computing capabilities with the equivalent functions of up to five I/O expansion modules.
- ◆ **Wide-Temperature Operation**—Most Diamond products support -40°C to +85°C operation.
- ◆ **Fanless**—Most of our SBC and ERS products are offered in fanless versions.



Environmental Test Chamber

- ◆ **Solid-State Flashdisks**—For enhanced reliability and reduced power consumption, size, and weight



IDE flashdisk



USB flashdisk

- ◆ **Soldered-on Memory**—Protects against the effects of shock and vibration.
- ◆ **Cable-Free Enclosures**—Our unique Pandora enclosure reduces the unreliability of interconnecting cables, by means of a panel I/O board that brings SBC I/O directly to external connectors.

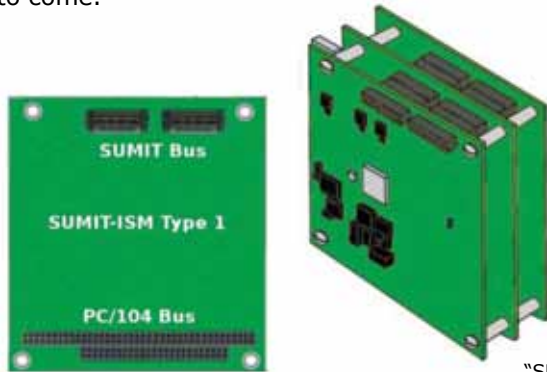
## SPECIAL SERVICES

We offer a variety of customization and integration services, including:

- ◆ **Conformal Coating**—Greatly reduce the risk of board damage due to moisture, corrosion or fungus.
- ◆ **Hardwired Configuration**—Replaces jumper options with hard-wired settings for increased ruggedness.
- ◆ **Custom BIOS Settings**—SBC and ERS BIOS settings can be configured to your system's requirements.
- ◆ **Burn-In Testing**—Weeds out infant mortality by means of a fixed elevated temperature test.
- ◆ **Extended Temperature Testing**—Validates a product's extended temperature operation via monitored burn-in over its rated operating temperature range.
- ◆ **Removal of IC Sockets**—Products can be ordered with normally-socketed ICs soldered directly onboard.
- ◆ **Removal of Components/Depopulation**—To reduce cost or power consumption, or to prevent interference between components on a board and other system components.
- ◆ **Modified I/O Connectors**—Certain I/O connectors can be changed from plain to latching style; many right-angle connectors can be replaced with straight versions.
- ◆ **Modified Bus Connectors**—PC/104 stackthrough connectors can be replaced with non-stackthrough versions, allowing a board to be mounted closer to the base of an enclosure
- ◆ **Custom Enclosures**—An enclosure can be tuned to your application's requirements, including body pieces and/or modified holes, cutouts, markings/silkscreens, and colors.
- ◆ **Configuration Control**—Ensures you obtain the same version of your custom configuration for the life of your product.

## OVERVIEW

SUMIT™ is the next generation self-stacking expansion bus for board-level embedded computers on a wide range of standardized and custom form-factors. The bus consists of a pair of rugged, high density board-to-board connectors, which carry an optimal blend of high, medium-, and low-speed system interfaces, including PCI Express®, USB, SPI, and SMBus. Additionally, SUMIT can be combined with legacy buses, such as PC/104 and PCI-104, enabling a smooth migration path for existing designs. Thanks to these features, SUMIT is becoming the backbone of stackable embedded system designs for many years to come.



"SUMIT-ISM Type 1" is a stackable module format that implements SUMIT along with a PC/104 legacy bus



### Key Features

- ◆ Up to 6 PCI Express lanes
- ◆ Up to 4 USB 2.0 channels
- ◆ SPI/uWire and SMBus/I2C serial buses
- ◆ Implemented on 2 high-density 52-pin shrouded pin-and-socket connectors for scalability
- ◆ Multiple SUMIT-based modules may be stacked in a single expansion location

### Key Benefits

- ◆ Leverages next-generation embedded PC buses and interfaces
- ◆ Range of host interface options maximizes design flexibility and minimizes system costs
- ◆ Supported by a large and growing global ecosystem
- ◆ Provides options, upgrades, and obsolescence protection
- ◆ Compatible with a wide array of current and future processors, including Intel's Atom family

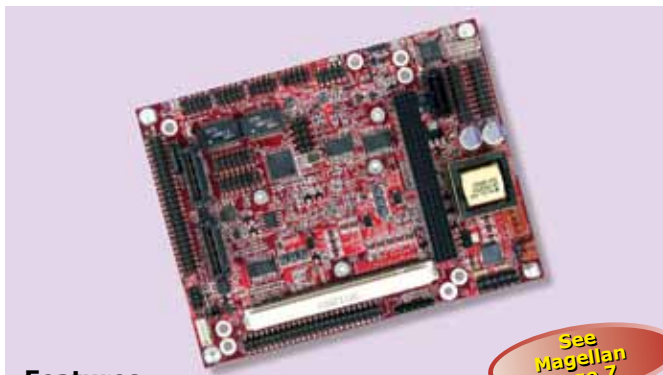
## SUMIT-EXPANDABLE PROCESSOR MODULES

The following Diamond embedded-ready subsystem provides stackable SUMIT-compatible system expansion.

## MAGELLAN



### COM Express form-factor Embedded-Ready Subsystem with SUMIT, PCI-104, and FeaturePak expansion, plus interchangeable COM Express CPUs



### Features

- ◆ Intel Atom or Core 2 Duo CPU
- ◆ Up to 4GB SO-DIMM
- ◆ 4 Serial ports
- ◆ Dual gigabit Ethernet
- ◆ SATA port
- ◆ PCIe and PCI expansion
- ◆ FeaturePak expansion
- ◆ 7-30VDC input

See Magellan page 7

**Magellan** is a high performance, highly integrated, I/O rich, embedded-ready subsystem in a COM Express computer-on-module (COM) footprint.

Its CPU core consists of a COM Express CPU module and heatspreader mounted on its bottom side, resulting in optimal thermal management and increased space for I/O functions and connectors.

This innovative design makes it possible for Magellan to integrate dual gigabit Ethernet LAN ports, a 7-30V DC/DC power supply, a full set of peripheral interface header connectors, modular PCI-104 or SUMIT expansion, and a FeaturePak socket, in addition to a complete embedded-PC core—all within the compact COM Express footprint.

## SUMIT-DAQ1616

### SUMIT-ISM Analog I/O Module with 2MHz A/D and Autocalibration

- ◆ 16 16-bit analog inputs with 2MHz maximum sampling rate
- ◆ Programmable input ranges, polarity, and mode
- ◆ 16K sample A/D FIFO with programmable threshold
- ◆ 16 16-bit analog outputs with programmable range and polarity
- ◆ Autocalibration circuit with precision reference voltages
- ◆ 56 programmable digital I/O
- ◆ 2 32-bit counter/timers for A/D timing and general purpose use
- ◆ 4 24-bit pulse-width modulator circuits
- ◆ Watchdog timer with system reset capability
- ◆ 1 PCI Express x1 lane host interface
- ◆ SUMIT-ISM Type 1 form factor compliant
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver software support



**SUMIT-DAQ1616** is a SUMIT-ISM type 1 analog I/O module featuring Diamond's newest and fastest analog I/O technology and a PCI Express interface. This board offers 16-bit A/D sampling at 2MHz, supported with an expanded 16K-sample FIFO for reliable data collection in any operating system. Analog output capability has been expanded to 16 16-bit channels with programmable output ranges. All analog I/O features are enhanced with our industry-leading autocalibration technology, featuring independent calibration factors for each input and output range to guarantee maximum accuracy across all operating modes and the entire operating temperature range.

Digital I/O features include 7 8-bit ports with both bit-wide and byte-wide direction control, 2 32-bit up/down counter/timers with programmable input source and gate, 4 24-bit pulse-width modulation circuits with 0-100% duty cycle, and a watchdog timer. Universal Driver software support is included for Linux, Windows XP/Embedded Standard, and Windows CE.

The board is available in analog I/O and analog out-only configurations.

#### Available Models

<b>SMT-DAQ1616</b>	Analog I/O and Digital I/O SUMIT-ISM module
<b>SMT-DA16</b>	Analog output and Digital I/O SUMIT-ISM module

## SUMIT-GPIO96

### SUMIT-ISM Programmable Digital I/O Module with Customizable Personality

- ◆ FPGA- based design with in-the-field reconfigurability
- ◆ 96 buffered, programmable digital I/O
- ◆ Byte-wide and bit-wide port direction control
- ◆ 3.3V and 5V user-selectable I/O configuration
- ◆ 8 32-bit counter/timers
- ◆ 4 24-bit pulse-width modulators
- ◆ Watchdog timer with system reset capability
- ◆ 50MHz system clock
- ◆ 1 PCI Express x1 lane host interface
- ◆ SUMIT-ISM Type 1 form factor compliant
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver software support



**SUMIT-GPIO96** is a general purpose I/O SUMIT-ISM Type 1 module using a high-capacity (700K gate equivalent) PCI Express FPGA for maximum density and flexibility. The base hardware configuration features 96 digital I/O lines grouped into 12 8-bit ports. All ports have I/O buffers to protect the FPGA and offer user-selectable 3.3V or 5V logic drive levels. The ports are organized into a combination of byte-wide, nibble-wide, and bit-wide direction control for maximum flexibility and application compatibility.

The built-in FPGA personality provides multiple configuration options. All 96 I/O lines may be used in common I/O mode; Six of these ports can be reconfigured to enable an array of additional features, including 8 32-bit up/down counter/timers with programmable input source and gate, 4 24-bit PWM circuits with 0-100% duty cycle capability, interrupt/latched mode operation, and even a watchdog timer feature.

The flash-based design enables easy field upgrades using a Diamond-provided software utility (no cable or 3rd party software required!) as well as custom code development.

Universal Driver software support is included for Linux, Windows XP/Embedded Standard, and Windows CE.

#### Available Models

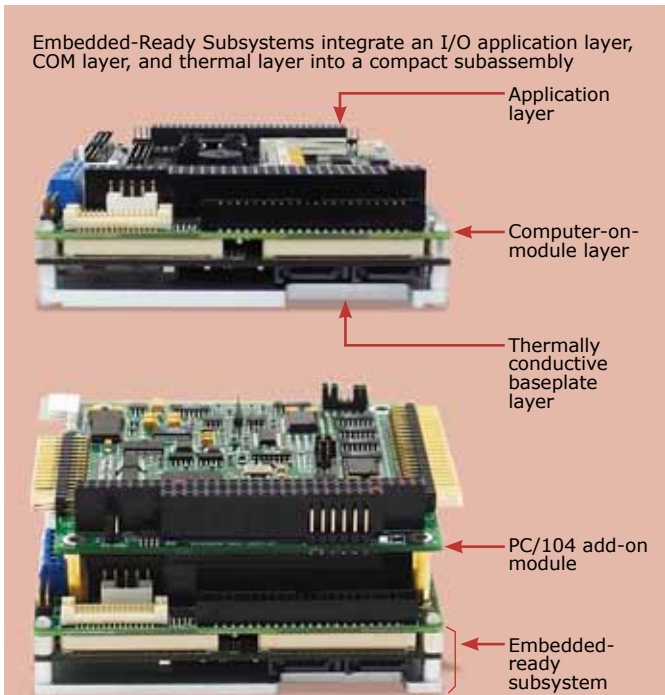
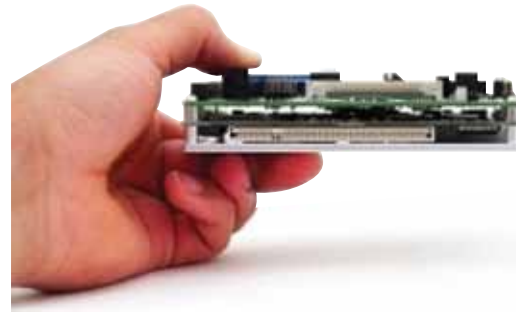
<b>SMT-GPIO96</b>	General Purpose Digital I/O Module
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## Fully integrated embedded computing platform ready for application development

To satisfy the market's need for migrating legacy PC/104 stacks to higher-performance CPUs, Diamond invented the Embedded-Ready Subsystem (ERS). An ERS merges the best of both the SBC and COM worlds, by combining an off-the-shelf Application Layer, an off-the-shelf Computer-on-Module (COM), and a thermally conductive baseplate.

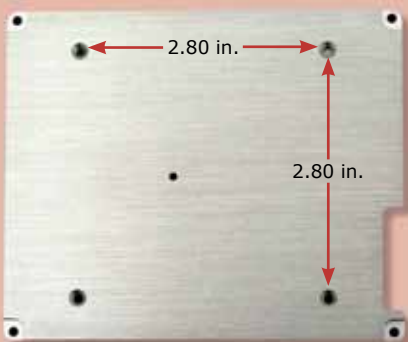
An Embedded-Ready Subsystem combines the high performance processing and leading-edge system I/O capabilities of COMs with the modular expansion flexibility of stackable SBCs, all within a single compact, rugged, reliable, pre-integrated module.

The Embedded-Ready Subsystem's thermally-conductive baseplate provides an efficient cooling solution. Its thermal surface is on the opposite side of the I/O expansion, which is more optimal than typical SBC approaches. Additionally, the baseplate's standardized mounting hole pattern ensures interchangeability for alternate features or performance upgrades.



Embedded-Ready Subsystems integrate an I/O application layer, COM layer, and thermal layer into a compact subassembly

ERS systems expand easily with PC/104 and other industry standard format I/O modules



Baseplate with standardized mounting hole pattern

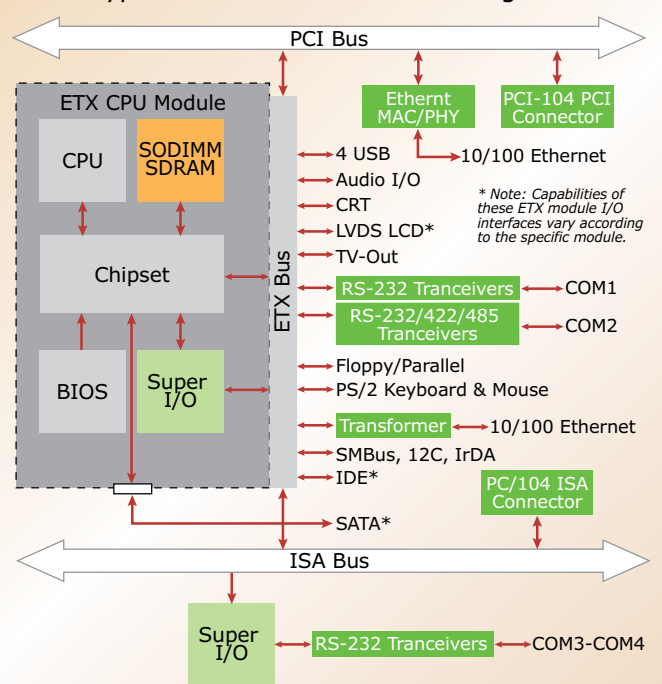
### ERS Key Features

- ◆ Fully off-the-shelf solution
- ◆ Highly integrated boardset
- ◆ Expands flexibly via off-the-shelf modules
- ◆ Multi-sourced components
- ◆ Scalable performance
- ◆ Upgradable to next-generation CPU and I/O technologies
- ◆ Bus, CPU, interface, and form-factor agnostic
- ◆ Comprehensive thermal management solution
- ◆ Standardized mounting across multiple formats

### ERS Key Benefits

- ◆ Shortens time-to-market
- ◆ Reduces development costs
- ◆ Leverages low-cost, commoditized computing cores
- ◆ Minimizes space requirements
- ◆ Rugged, wide-temperature, reliable solution
- ◆ Protects from component obsolescence
- ◆ Convenient migration path for both stackable-SBC and COM based designs
- ◆ Lengthens time-in-market

### Typical ERS Functional Block Diagram



## PLUTO



### ETX form-factor Embedded-Ready Subsystem with PC/104-Plus expansion and interchangeable ETX CPUs



Side view showing application layer, COM, and thermal layer

- ◆ Choice of Intel Atom or Core Duo LV CPUs
- ◆ Up to 2GB DDR2 SO-DIMM SDRAM
- ◆ Dual 10/100Base-T Ethernet
- ◆ CRT, LVDS, and TV Out display support
- ◆ 4 USB 2.0 ports
- ◆ 4 serial ports (1 with RS-232/422/485 capability)
- ◆ SATA and IDE mass storage ports
- ◆ On-board CompactFlash port
- ◆ Stackable PC/104-Plus expansion
- ◆ -40°C to +85°C extended operating temperature available

**Pluto** is a high performance, highly integrated embedded-ready subsystem that matches the footprint of the popular ETX computer-on-module (COM) standard. Pluto's CPU core consists of an ETX CPU module and heatspreader mounted on its bottom side, an approach that improves thermal management and increases the space available for I/O functions and connectors. This innovative design enables Pluto to integrate additional serial and Ethernet controllers, a complete set of peripheral interface header connectors, and stackable PC/104-Plus expansion—all within the compact ETX footprint.

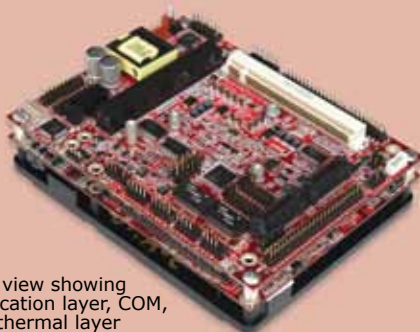
#### Available Models

Model Number	CPU	RAM	Heatspreader
<b>PLT-N270-2G</b>	1.6GHz Atom N270	2GB	Yes
<b>PLT-N270-1G</b>	1.6GHz Atom N270	1GB	Yes
<b>PLT-945CDL-2G</b>	1.66GHz Core Duo LV	2GB	Yes
<b>PLT-945CDL-1G</b>	1.66GHz Core Duo LV	1GB	Yes
<b>DK-PN270</b>	Pluto N270 System Development Kit: PLT-N270-1G, cable kit, OS drivers		
<b>DK-P945</b>	Pluto 945 System Development Kit: PLT-945CDL-1G, cable kit, OS drivers		
<b>C-PLT-KIT</b>	Pluto Cable Kit		

## MAGELLAN



### COM Express form-factor Embedded-Ready Subsystem with PCI-104, SUMIT, and FeaturePak expansion, plus interchangeable COM Express CPUs



Side view showing application layer, COM, and thermal layer

- ◆ Choice of Intel Atom or Core 2 Duo CPUs
- ◆ Up to 4GB DDR2 SO-DIMM SDRAM (Core 2 Duo)
- ◆ 1GB soldered-on DDR2 SDRAM (Atom)
- ◆ Dual gigabit Ethernet
- ◆ CRT and LVDS display support
- ◆ 4 USB 2.0 ports
- ◆ 4 serial ports (2 with RS-232/422/485 capability)
- ◆ 1 SATA mass storage port
- ◆ On-board USB flashdisk option
- ◆ Triple-play modularity: PCI-104, SUMIT, and **FeaturePak** for unexcelled expansion flexibility
- ◆ 7-30V DC/DC power supply
- ◆ -40°C to +85°C extended operating temperature available

**Magellan** is a high performance, highly integrated embedded-ready subsystem in a COM Express computer-on-module (COM) footprint. Its CPU core consists of a COM Express CPU module and heatspreader mounted on its bottom side, resulting in optimal thermal management and increased space for I/O functions and connectors. This innovative design makes it possible for Magellan to integrate dual gigabit Ethernet LAN ports, a 7-30V DC/DC power supply, a full set of peripheral interface header connectors, modular PCI-104 or SUMIT expansion, and a FeaturePak socket, in addition to a complete embedded-PC core—all within the compact COM Express footprint.

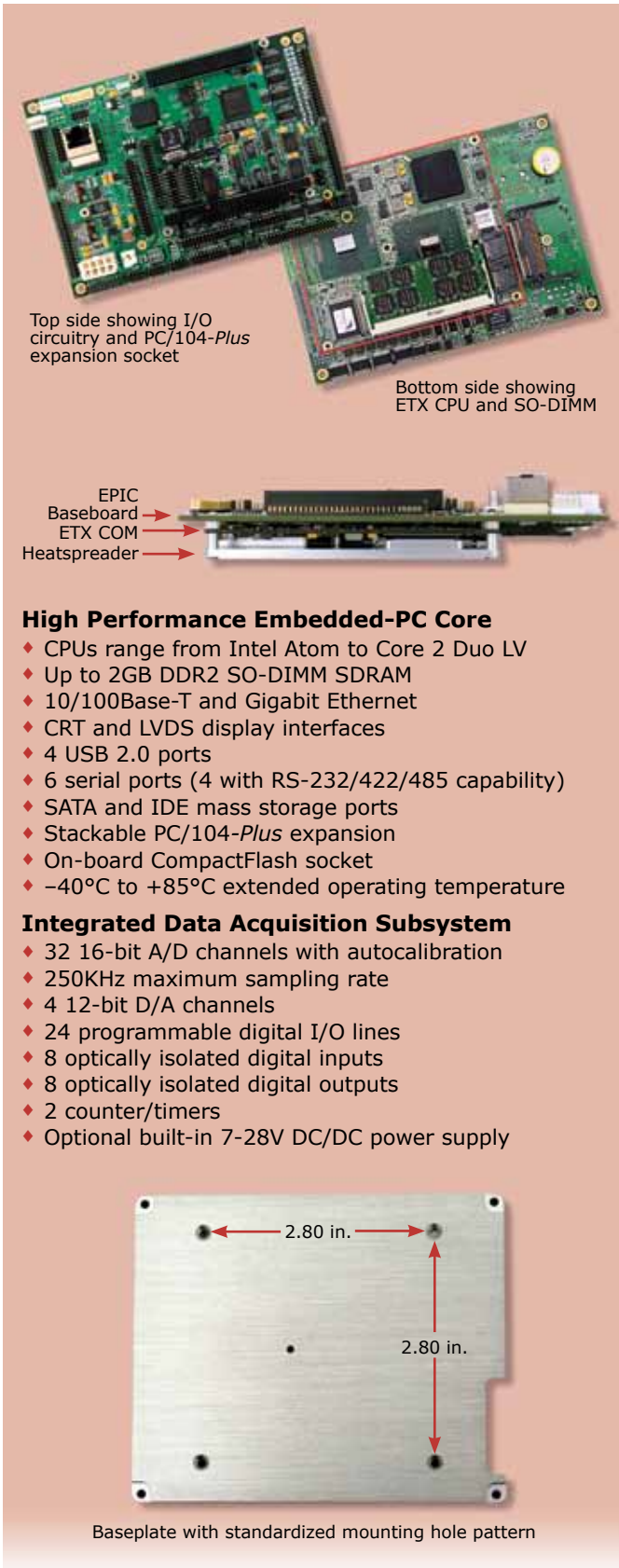
#### Available Models

Model Number	CPU	RAM	Heatspreader
<b>MAG-965-4G</b>	1.6GHz Core 2 Duo LV	4GB	Yes
<b>MAG-965-1G</b>	1.6GHz Core 2 Duo LV	1GB	Yes
<b>MAG-Z510-1G</b>	1.1GHz Atom Z510	1GB	Yes
<b>DK-MAG965</b>	Magellan 965 System Development Kit: MAG-965-1G, cable kit, OS drivers		
<b>DK-MAGZ510</b>	Magellan Z510 System Development Kit: MAG-Z510-1G, cable kit, OS drivers		
<b>C-MAG-KIT</b>	Magellan Cable Kit		

## NEPTUNE



### Highly Integrated EPIC Embedded-Ready Subsystem with Interchangeable ETX CPUs



Top side showing I/O circuitry and PC/104-Plus expansion socket

Bottom side showing ETX CPU and SO-DIMM

EPIC Baseboard  
ETX COM  
Heatspreader

#### High Performance Embedded-PC Core

- ◆ CPUs range from Intel Atom to Core 2 Duo LV
- ◆ Up to 2GB DDR2 SO-DIMM SDRAM
- ◆ 10/100Base-T and Gigabit Ethernet
- ◆ CRT and LVDS display interfaces
- ◆ 4 USB 2.0 ports
- ◆ 6 serial ports (4 with RS-232/422/485 capability)
- ◆ SATA and IDE mass storage ports
- ◆ Stackable PC/104-Plus expansion
- ◆ On-board CompactFlash socket
- ◆ -40°C to +85°C extended operating temperature

#### Integrated Data Acquisition Subsystem

- ◆ 32 16-bit A/D channels with autocalibration
- ◆ 250KHz maximum sampling rate
- ◆ 4 12-bit D/A channels
- ◆ 24 programmable digital I/O lines
- ◆ 8 optically isolated digital inputs
- ◆ 8 optically isolated digital outputs
- ◆ 2 counter/timers
- ◆ Optional built-in 7-28V DC/DC power supply

Baseplate with standardized mounting hole pattern

**Neptune** is a high performance, highly integrated embedded-ready subsystem (ERS) in the compact EPIC SBC form-factor. Its uniquely modular design combines an off-the-shelf ETX CPU module with an EPIC-sized I/O baseboard, resulting in higher integration and greater scalability than that of a conventional SBC.

Thanks to this approach, Neptune is the first board-level embedded computer to integrate high-performance processor, comprehensive system I/O, market-leading data acquisition, and wide-input DC/DC power supply functions into the EPIC form-factor.

### MODULARITY

Neptune's unique modularity makes it possible to select from a range of interchangeable CPU modules to match an application's precise cost and performance requirements, or to change CPU modules in the future in order to upgrade performance or avoid component obsolescence. Its PC/104-Plus expansion lets you select from a wide range of off-the-shelf modules for adding I/O or other features, and its built-in wide-input DC/DC power supply maximizes system integration flexibility.

### THERMAL MANAGEMENT

Neptune also provides a superior thermal management solution relative to conventional SBCs. This results from the fact that the CPU module is positioned below the I/O baseboard, allowing direct contact—and highly efficient heat transfer—between the CPU module's heatsink and the system enclosure.

### SUPPORTED SOFTWARE

All Neptune models run Linux and Windows Embedded Standard operating systems. Diamond's Universal Driver software provides a C programming library for the integrated data acquisition circuit.

Available Models			
Model Number	CPU	RAM	DAQ
<b>NPT-N270-2GA</b>	1.6GHz Atom N270	2GB	Yes
<b>NPT-N270-2GN</b>	1.6GHz Atom N270	2GB	No
<b>NPT-N270-1GA</b>	1.6GHz Atom N270	1GB	Yes
<b>NPT-N270-1GN</b>	1.6GHz Atom N270	1GB	No
<b>NPT-945CDL-2GA</b>	1.66GHz Core Duo LV	2GB	Yes
<b>NPT-945CDL-2GN</b>	1.66GHz Core Duo LV	2GB	No
<b>NPT-945CDL-1GA</b>	1.66GHz Core Duo LV	1GB	Yes
<b>NPT-945CDL-1GN</b>	1.66GHz Core Duo LV	1GB	No
<b>DK-NN270</b>	Neptune Intel Atom N270 Development Kit: SBC with data acquisition, cables, FlashDisk with Linux, docs and software		
<b>DK-N945CDL</b>	Neptune Core Duo LV Development Kit: SBC with data acquisition, cables, FlashDisk with Linux, docs and software		
<b>C-NPT-KIT</b>	Neptune Cable Kit		

Diamond offers a selection of Software Development Kits (SDKs), device drivers, and other support software for operation of our products under a range of popular standard and embedded operating systems. Operating System Software Development Kits (OS SDKs) let you rapidly experience the OS running on your Diamond processor module with little or no configuration effort. Additionally, the Diamond Universal Driver toolkit provides C language support for most Diamond products having onboard Analog I/O, digital I/O, timer/counters, and watch-dog timer functions. The available products are summarized below.

### SUPPORTED OPERATING SYSTEMS

The table below indicates supported operating systems across Diamond’s processor module products, including single-board computers, computer-on-modules, and embedded-ready subsystems. Any model of supported processor module may be used with any model of compatible software development kit. Support for other operating systems will be considered upon request.

SBCs & COMs	DOS	Linux	Win CE	Win XP	Win XPe	QNX
Athena II	6.22	2.6.23		✓	✓	6.4.0
COM Express COMs		2.6.23	5.0	✓	✓	
ETX COMs		2.6.23	5.0	✓	✓	
Helios	6.22	2.6.23	6.0 R2			
Hercules II	6.22	2.6.23		✓	✓	6.4.0
Neptune	6.22	2.6.23		✓	✓	
Pegasus		2.6.11	6.0 R2	✓	✓	
Pluto	6.22	2.6.23	5.0	✓	✓	
Magellan	6.22	2.6.23	5.0	✓	✓	
Poseidon	6.22	2.6.19		✓		6.4.0
Rhodeus		2.6.11	5.0	✓	✓	

### UNIVERSAL DRIVER SOFTWARE

Diamond’s 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. The Universal Driver is provided free with all our SBCs with integrated data acquisition, and with our analog I/O expansion boards. No other vendor offers you this level of software functionality for embedded systems data acquisition.

- ◆ Cross platform compatibility
- ◆ Multi-board operation, for up to 16 boards simultaneously
- ◆ Extensive interrupt handling features
- ◆ Example programs save development time
- ◆ Comprehensive, easy-to-use documentation

### OPERATING SYSTEM SOFTWARE DEVELOPMENT KITS

Diamond’s Operating System Software Development Kits (OS SDKs) let you experience the operating system running on your processor module in a quick-start fashion with minimal or no configuration effort. Many kits include development tools to enable immediate application development. Additionally, many of our processor modules are supported by solid-state flashdisks, which are offered with pre-flashed operating system images.

Diamond’s OS SDKs are sold separately from the processor modules, enabling you to select exactly the right combination for your application. A typical order includes the processor module of your choice, a hardware development kit or cable kit, and a software development kit. If you already have the processor module, you can simply order the software development kit.

The following OS SDKs are available:

#### Linux Software Development Kits

- SDK-ATHM-LNX** Athena II Linux 2.6.23 SDK with 512MB flashdisk
- SDK-HLV-LNX** Helios Linux 2.6.23 SDK with 256MB flashdisk
- SDK-HRC-LNX** Hercules II Linux 2.6.23 SDK with 512MB flashdisk
- SDK-NPT-LNX** Neptune Linux 2.6.23 SDK for N270 and 945 CPUs with 512MB flashdisk

#### Windows Embedded Standard Software Development Kits

- SDK-ATHM-XPE** Athena II Windows XPe SDK with 1GB flashdisk
- SDK-HRC-XPE** Hercules II Windows XPe SDK with 1GB flashdisk

#### Windows Embedded CE Software Development Kits

- SDK-HLV-WCE** Helios Windows CE 6.0 SDK with 128MB flashdisk
- SDK-PGS-WCE** Pegasus Windows CE 6.0 SDK with 128MB flashdisk

#### QNX Software Development Kits

- SDK-ATHM-QNX** Athena II QNX 6.4 SDK with 512MB flashdisk
- SDK-HRC-QNX** Hercules II QNX 6.4 SDK with 512MB flashdisk
- SDK-PSD-QNX** Poseidon QNX 6.4 SDK with 512MB flashdisk



## OVERVIEW

Diamond's rugged, wide-temperature Computer-on-Module (COM) families provide a range of compact, plug-compatible, embedded computing cores for powering a wide variety of custom embedded applications. The modules are intended to be plugged into application-specific baseboards to create a customized embedded computing subsystem—an approach that minimizes product development investments and risks, and shortens time-to-revenue.

By virtue of their conformance to the industry-standard ETX or COM Express specifications, these modules provide a consistent set of on-board controllers and I/O interfaces, and are essentially interchangeable with one another.

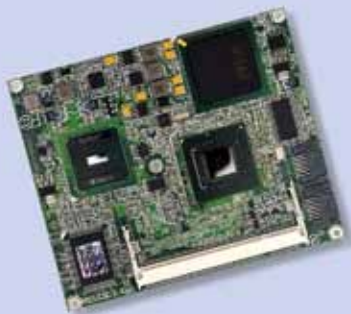
Each of our COMs integrates a complete set of PC-compatible functionality, including a high-performance processor, up to 4GB of SDRAM, and an extensive set of system controllers and peripheral interfaces. CPU options range from the low-power Intel Atom to the high-performance Intel Core 2 Duo, enabling an optimal match to the application's performance, power, and cost requirements.

Various heatsink and heatspreader options are available for optimal thermal management. To accommodate harsh outdoor environments, some modules also support extended operating temperatures.

## ETX 3.0



**Low-power, wide temperature, high performance ETX 3.0 Computer-on-Modules**



Intel N270 ETX 3.0 COM

- ◆ Selection of CPUs from Intel Atom to Core 2 Duo
- ◆ Up to 2GB of DDR2 SDRAM
- ◆ 10/100Base-T Ethernet
- ◆ CRT and LVDS display support
- ◆ 4 USB 2.0 ports
- ◆ 2 serial ports
- ◆ SATA and IDE mass storage ports
- ◆ PS/2 keyboard and mouse ports
- ◆ Parallel port
- ◆ AC'97 audio
- ◆ PCI and ISA expansion buses
- ◆ -20°C to +71°C or -40°C to +85°C operating temperature (some models)

### Available Models

<b>ETX-N270-1600</b>	1.6GHz Atom N270 ETX COM, 0GB RAM
<b>ETX-945-L2400</b>	1.66GHz Core Duo LV ETX COM, 0GB RAM
<b>ETX-945-T7400</b>	2.16GHz Core 2 Duo ETX COM in socket*, 0GB RAM
<b>ETX-945-L7400</b>	1.5GHz Core 2 Duo LV ETX COM*, 0GB RAM
<b>ETX-945-U7500</b>	1.06GHz Core 2 Duo ULV ETX COM*, 0GB RAM
<b>ETX-945-U2500</b>	1.2GHz Core Duo ULV ETX COM*, 0GB RAM
<b>ETX-945-CM423</b>	1.06GHz Celeron M ULV ETX COM*, 0GB RAM
<b>MEM-1024-05</b>	1GB SO-DIMM SDRAM
<b>MEM-2048-05</b>	2GB SO-DIMM SDRAM

\* Special Order Only

## COM EXPRESS



**Low-power, wide temperature, high performance COM Express Computer-on-Modules**



Intel Z510 COM Express module

- ◆ Selection of CPUs from Intel Atom to Core 2 Duo
- ◆ Up to 4GB of DDR SO-DIMM SDRAM (two sockets on Core 2 Duo)
- ◆ 2GB soldered-on DDR2 SDRAM (Atom Z530)
- ◆ 1GB soldered-on DDR2 SDRAM (Atom Z510)
- ◆ Gigabit Ethernet
- ◆ CRT and dual LVDS display support
- ◆ Up to 8 USB 2.0 ports
- ◆ SATA and IDE mass storage ports
- ◆ AC'97 audio
- ◆ PCI and PCI Express expansion buses
- ◆ -20°C to +71°C or -40°C to +85°C operating temperature

Various heatsink and heatspreader options are available for optimal thermal management. To accommodate harsh outdoor environments, the modules also support extended operating temperatures.

### Available Models

<b>CME-965-L7500</b>	1.6GHz Core 2 Duo LV COM, 0GB RAM
<b>MEM-1024-05</b>	1GB SO-DIMM SDRAM module
<b>MEM-2048-05</b>	2GB SO-DIMM SDRAM module
<b>CME-Z530-2G</b>	1.6GHz Atom Z530 COM, 2GB RAM
<b>CME-Z510-1G</b>	1.1GHz Atom Z510 COM, 1GB RAM

# COMPUTER-ON-MODULE SOLUTIONS

Efficient Solutions for Application Specific Embedded Computers



Custom baseboard with application specific I/O



CPU Off-the-shelf

### Benefits of a COM-Based Solution

- ◆ ETX, COM Express, and Qseven™ COMs
- ◆ Rapid time-to-market
- ◆ Reduced development cost
- ◆ Reduced total system cost
- ◆ Smaller size with higher functional density
- ◆ Wide choice of processor performance levels
- ◆ CPU obsolescence protection via plug-compatible COM CPU modules
- ◆ Designed to your physical specifications
- ◆ Rugged, embedded single-board system
- ◆ Single vendor solution



### Off-the-shelf Technology / Capabilities

- ◆ Industry-leading analog I/O
- ◆ Counters and Timers
- ◆ Digital I/O
- ◆ Serial I/O
- ◆ USB 2.0
- ◆ Ethernet
- ◆ FPGA and Logic Design
- ◆ GPS and Wireless
- ◆ Relays and Opto-isolation
- ◆ ISA, PCI, PCI Express or FeaturePak expansion
- ◆ DC/DC Power Supplies
- ◆ Drivers and BIOS
- ◆ Operating System Support
- ◆ Program Management
- ◆ System Integration

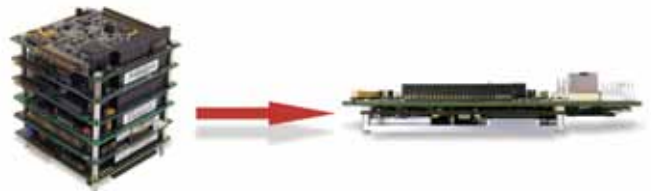
### Custom Computing Solutions without the Risk

Diamond Systems can provide you with a low-risk customized application-specific computing solution. The solution consists of a COM baseboard populated with the required I/O, coupled with a COM CPU module with the processing power needed to drive the application. Our solutions are based on Diamond's proven engineering building blocks (see box to left), which are designed into numerous applications around the world today.

Diamond's development approach reduces your design risk by using state-of-the-art functional design blocks, enabling us to deliver a solution that meets your specifications in less time and at a reduced development cost.

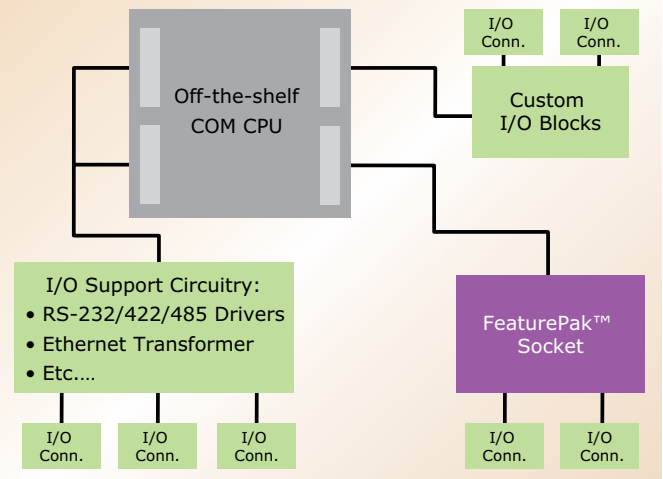
### Diamond Systems is a part of your extended R&D Team!

Working with us is like bringing an R&D partner on-board. Together we will engage in a consultative relationship to agree on a proposal, define specifications, build prototypes, and begin production. Whether your application requires a simple product variant or demands a full custom design, Diamond Systems will work with you to quickly and efficiently to produce a solution that fits your embedded computing application. We will work together in a phased project approach, beginning with a Definition Phase, followed by a Design Phase, Prototype Phase, and then Full Production.



A COM-based custom design can reduce an SBC plus multiple I/O modules into a single highly-integrated baseboard, reducing system height, complexity, cost, and assembly time.

### Typical Application-Specific COM Baseboard

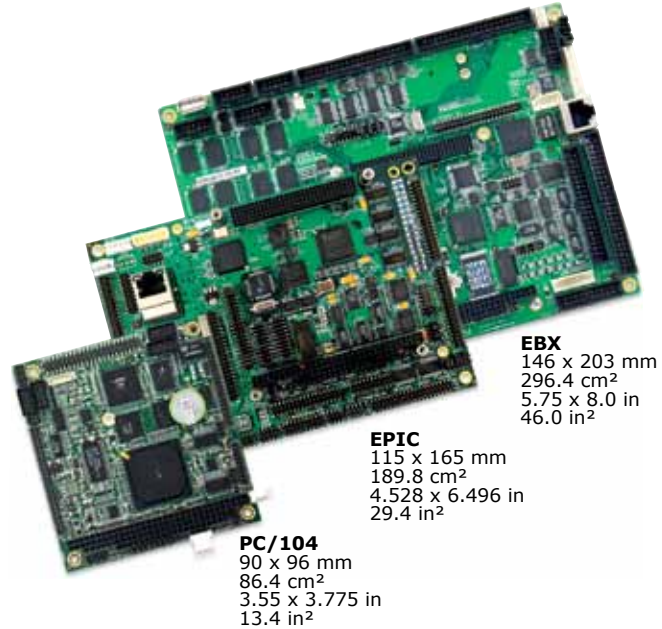


## CPU, System I/O, and Data Acquisition on a Single Board

Diamond Systems provides an extensive line of single board computers (SBCs) to meet a wide variety of embedded computing requirements. Our SBC products range in performance from a 300MHz Vortex86SX to a 1.66GHz Core 2 Duo LV with up to 2GB of RAM, and provide high performance standard I/O interfaces, including USB 2.0, gigabit Ethernet, and SATA.

Additionally, our SBCs are unique in their inclusion of on-board, industry-leading data acquisition functions. This high level of integration saves the cost of additional boards, reduces overall space and weight, and improves reliability by eliminating unnecessary inter-board interconnects. Data acquisition capabilities on these SBCs range up to 32 16-bit analog inputs, 4 12-bit analog outputs, and 40 digital I/O lines.

Our SBCs are implemented on industry standard form-factors, such as PC/104, PC/104-Plus, EPIC, and EBX, as well as on custom form-factors. Each SBC supports modular system expansion via PC/104, PCI-104, or SUMIT buses. Additionally, panel I/O boards are available for our PC/104 and EPIC SBCs, replacing most cables with PC-style connectors for easy system assembly and enhanced reliability.



## Single Board Computer and Embedded-Ready Subsystems Features

Product	Form Factor	Processor	Speed (MHz)	Memory (MB)	Video	Audio	RS-232	RS-232 422/485	Ethernet	USB	Expansion	Keybd Mouse	Mass Storage	CF	FD	Input Voltage	XT
Hercules II	EBX	VIA Mark	800	512	✓	✓	2	2	10/100	4 v1.1 4 v2.0	PC/104-Plus	✓	2 UDMA 100	✓	✓	5-28VDC	-20°C to +85°C
Neptune	EPIC	Atom or Core	Up to 1.66 GHz	Up to 2GB	✓	✓	2	4	10/100, GIGABIT	4 v2.0	PC/104-Plus	✓	2 UDMA 100 1 S-ATA	✓	✓	5V, 7-28VDC	-40°C to +85°C
Poseidon	EPIC	VIA C7 VIA ULV EDEN	2.0GHz 1.0GHz	Up to 1GB	✓	✓	2	2	GIGABIT	4 v2.0	PC/104-Plus	✓	1 S-ATA 1 UDMA 100	✓		5VDC	-40°C to +85°C
Athena II	4.2" x 4.5"	VIA Mark CoreFusion	500 800	256	✓	✓	2	2	10/100	4 v1.1	PC/104	✓	1 UDMA 33	✓		5VDC	-40°C to +85°C
Pluto	ETX	Atom or Core	Up to 1.66GHz	Up to 2GB	✓	✓	3	1	10/100 (2)	4 v2.0	PC/104-Plus	✓	1 IDE, 2 SATA	✓		5VDC	-40°C to +85°C
Magellan	COM Express	Atom or Core	Up to 1.6GHz	Up to 4GB	✓	✓	2	2	GIGABIT (2)	4 v2.0	PCI-104, SUMIT, FeaturePak	✓	1 SATA	✓		7-30VDC	-40°C to +85°C
Helios	PC/104	Vortex86DX /SX	300 800	128 256	✓		2	2	10/100	4 v2.0	PC/104	✓	1 UDMA 100	✓	✓	5VDC	-40°C to +85°C
Rhodeus	PC/104	AMD Geode LX800	500	256, 512 1024	✓		1	1	10/100	2 v2.0	PC/104	✓	1 UDMA 33	✓	✓	5VDC	-40°C to +85°C
Pegasus	PC/104-Plus	AMD Geode LX800	500	256	✓		1	1	10/100	4 v2.0	PC/104-Plus	✓	1 UDMA 33	✓	✓	5VDC	-40°C to +85°C

## Single Board Computer and Embedded-Ready Subsystems Data Acquisition Features

Product	#SE	#DI	RES	Analog Inputs						Analog Outputs				Misc.		
				BIP	UNI	PROG	MAX	AUTOCAL	FIFO	#OUT	#RES	BIP	UNI	#DIO	CLK	
Hercules II	32	16	16	4	4	✓	250	✓	2048	4	12	2	2	2	40 I/O	✓
Neptune	32	16	16	4	4	✓	250	✓	1024	4	12	2	2	2	24 I/O	✓
Poseidon	32	16	16	5	5	✓	250	AUTO*	1024	4	12	2	2	2	24 I/O	✓
Athena II	16	8	16	4	4	✓	100	✓	2048	4	12	2	2	2	24 I/O	✓
Helios	16	8	16	4	3	✓	250	✓	2048	4	12	2	2	2	40 I/O	✓

**SE** Single-ended analog inputs  
**DI** Differential analog inputs  
**RES** A/D or D/A resolution in bits  
**BIP** Bipolar ranges (for example ±5V)

**UNI** Unipolar ranges (for example 0-5V)  
**PROG** Programmable gain  
**MAX** Max A/D sample rate in KHz  
**AUTOCAL** Automatic calibration of A/D and D/A circuitry

**FIFO** A/D sample FIFO buffer on board  
**I/O** Programmable direction digital I/O  
**CLK** A/D pacer clock on board

**XT** -40°C to +85°C operating temperature  
**CF** CompactFlash support  
**FD** IDE Flashdisk support

\* Patented auto-autocal

# HELIOS

**300MHz - 800MHz PC/104 SBC with Integrated Data Acquisition and Video**



### CPU Features

- ◆ Vortex86DX/SX CPU at up to 800MHz
- ◆ 128MB or 256MB of soldered-on DRAM
- ◆ 4 USB 2.0 ports
- ◆ 4 serial ports (2 RS-232, 2 RS-232/422/485)
- ◆ 10/100Base-T Ethernet
- ◆ 1 UDMA-100 IDE port
- ◆ Solid-state flashdisk interface
- ◆ CRT and LVDS display support
- ◆ PC/104 (ISA) expansion bus
- ◆ -40°C to +85°C fanless operating temperature

### Data Acquisition Features

- ◆ 16 16-bit analog inputs
- ◆ 250KHz maximum sampling rate
- ◆ Interrupt-based A/D sampling with 2048 FIFO
- ◆ 4 12-bit analog outputs
- ◆ Autocalibration
- ◆ 24 programmable digital I/O

**Helios** is a compact, mid-range, single board computer based on a low-power Vortex86 processor clocked at up to 800MHz. The highly integrated SBC offers a full complement of PC-style I/O, including CRT, LVDS, IDE, Ethernet, USB, serial, parallel, and PS/2 interfaces, plus Diamond's industry-leading data acquisition (DAQ) circuitry—all on a single PC/104-sized board.

Additionally, Helios is extremely rugged and supports -40°C to +85°C fanless operation. Overall, its unique mix of ruggedness, reliability, performance, functionality, and low power consumption, make Helios an exceptionally cost-effective platform for use in a wide range of embedded applications.

To further simplify system development, an optional Helios Panel I/O Board (pictured below) provides PC-style interface connectors for standard embedded-PC and data acquisition I/O. It also includes extra connectors for I/O from add-on PC/104 modules.

### Available Models

Model Number	CPU	RAM	DAQ	Video
<b>HLV800-256AV</b>	800MHz Vortex86DX	256MB	Yes	VGA/LCD
<b>HLV800-256DV</b>	800MHz Vortex86DX	256MB	No	Digital I/O, VGA/LCD
<b>HLV300-128DV</b>	300MHz Vortex86SX	128MB	No	Digital I/O, VGA/LCD
<b>DK-HLV800-01</b>	Helios Development Kit with HLV800-256AV SBC, cables and software			
<b>C-HLV-KIT</b>	Helios Cable Kit			
<b>PB-HLV-170-K</b>	1.7" Pandora Enclosure for Helios with panel I/O board and front panel			
<b>PB-HLV-300-K</b>	3.0" Pandora Enclosure for Helios with panel I/O board and front panel			
<b>PB-HLV-500-K</b>	5.0" Pandora Enclosure for Helios with panel I/O board and front panel			
<b>PB-HLV-700-K</b>	7.0" Pandora Enclosure for Helios with panel I/O board and front panel			
<b>PNL-HLV-01</b>	Helios Panel I/O Board			

See Octavio page 17

The Octavio enclosure system provides a convenient and rugged way to house Helios SBCs. Key features of Octavio include:

- ◆ Compact
- ◆ Rugged
- ◆ Pre-assembled
- ◆ Cable-free
- ◆ Wall-mountable or DIN-rail mountable rear panel
- ◆ Available in multiple lengths to fit additional boards

Octavio system with Helios SBC



Helios mounts to a unique panel I/O board, which converts pin-headers on the SBC to industry-standard I/O connectors for most features. The entire assembly mounts to the front panel of the enclosure. Multiple body lengths provide room for additional PC/104 boards, batteries, modems, etc. Available body lengths include:

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



Helios panel I/O board



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

## POSEIDON

### 1.0-2.0GHZ EPIC SBC With Integrated Data Acquisition



#### CPU Features

- ◆ VIA 1.0GHz Eden ULV or 2.0GHz C7 CPU
- ◆ Up to 1GB soldered-on DDR2 DRAM
- ◆ 400MHz Front Side Bus
- ◆ 4 USB 2.0 ports
- ◆ 4 serial ports (2 RS-232, 2 RS-232/422/485)
- ◆ Gigabit Ethernet
- ◆ Advanced 2D/3D graphics engine
- ◆ CRT and LVDS display support
- ◆ SATA and UDMA-100 IDE ports
- ◆ PS/2 keyboard/mouse ports
- ◆ PC/104-Plus (ISA + PCI) expansion
- ◆ -40°C to +85°C fanless operating temperature



Poseidon panel I/O board

#### Data Acquisition Features

- ◆ 32 16-bit analog inputs with 250KHz sampling rate
- ◆ 4 12-bit analog outputs
- ◆ Auto-autocalibration
- ◆ 24 digital I/O lines

**Poseidon** is a high-performance EPIC form-factor single board computer combining state-of-the-art embedded-PC CPU and peripheral interface technologies with Diamond's industry-leading data acquisition circuitry on a single, rugged board. The SBC features VIA's 1.0GHz C7 or 2.0GHz Eden ULV processor, along with up to 1GB of DDR2 DRAM. Its optional built-in data acquisition subsystem provides 32 16-bit analog inputs with a 250KHz sample rate, plus four 12-bit D/A channels and 24 digital I/O lines. Diamond's patented automatic autocalibration on both A/D and D/A ensures maximum accuracy over time and temperature without user intervention. Additionally, Poseidon supports fanless -40°C to +75°C operation.

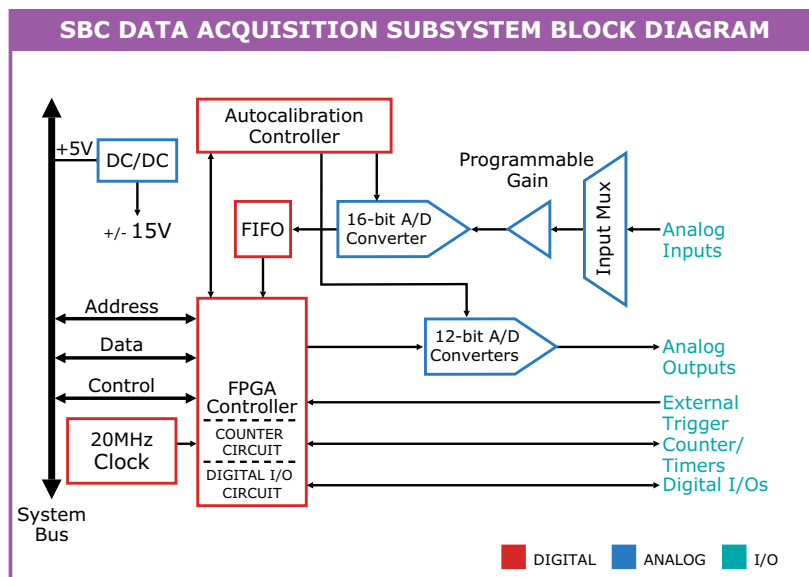
#### Available Models

<b>PSDC20-1024A</b>	2.0GHz VIA C7 with fan, 1024MB RAM, data acquisition
<b>PSDC20-1024N</b>	2.0GHz VIA C7 with fan, 1024MB RAM, no data acquisition
<b>PSDE10-512A</b>	1.0GHz VIA Eden ULV fan-less, 512MB RAM, data acquisition
<b>PSDE10-512N</b>	1.0GHz VIA Eden ULV fan-less, 512MB RAM, no data acquisition
<b>DK-PSDC20-02</b>	Poseidon Development Kit with PSDC20-1024A SBC
<b>DK-PSDE10-02</b>	Poseidon Development Kit with PSDE10-512A SBC
<b>C-PSD-KIT</b>	Poseidon Cable Kit
<b>PNL-PSD-01</b>	Panel I/O board for Poseidon includes panel I/O board and mounting hardware

## ON-BOARD DATA ACQUISITION SUBSYSTEM

Diamond's "2-in-1" single board computers are unique in their inclusion of an extensive set of on-board industry-leading data acquisition (DAQ) functions. This high level of integration saves the cost of additional boards, reduces overall space and weight, and improves reliability by eliminating unnecessary inter-board interconnects. DAQ features on these SBCs range up to 32 16-bit analog inputs,

4 12-bit analog outputs, and 40 digital I/O lines, plus FIFO buffering, counter/timer functions, and autocalibration (see page 20) for enhanced analog accuracy. What's more, Diamond's Universal Driver Software toolkit (see page 9) makes it fast and easy for you to incorporate these DAQ features into your application.



# ATHENA II

**Compact 500-800MHz PC/104-expandable SBC with Integrated Data Acquisition**



### CPU Features

- ◆ VIA Mark Processor at 500 or 800MHz
- ◆ 256MB soldered-on memory
- ◆ 4 USB 1.1 ports
- ◆ 4 RS-232 serial ports
- ◆ 10/100Base-T Ethernet
- ◆ CRT and LCD display support
- ◆ 1 UDMA-33 IDE interface
- ◆ PS/2 keyboard/mouse ports
- ◆ Real-time clock and watchdog timer
- ◆ PC/104 (ISA) expansion bus
- ◆ -40°C to +85°C fanless operating temperature



800MHz model with tall heatsink



500/800MHz model with low profile heatsink

### Data Acquisition Features

- ◆ 16 16-bit analog inputs with 100KHz sampling rate
- ◆ Interrupt-based A/D sampling with 2048 FIFO
- ◆ 4 12-bit analog outputs
- ◆ Autocalibration on both A/D and D/A functions
- ◆ 24 programmable digital I/O

See Octavio page 17

Complete systems are also available.

**Athena II** is a compact, high performance PC/104-expandable single board computer that integrates a Pentium III-level CPU, a complete set of embedded-PC functionality, plus Diamond's industry-leading data acquisition circuitry in a rugged design featuring wide temperature operation without a fan. The SBC is based on a low-power VIA Mark CPU clocked at either 500 or 800MHz. Its built-in data acquisition subsystem provides 16 16-bit analog inputs with a 100KHz sample rate, backed by a 2048 sample FIFO, along with 4 12-bit D/A channels and 24 programmable digital I/O lines. Autocalibration on both A/D and D/A ensures maximum accuracy over time and temperature. Most Athena II models support fanless -40°C to +85°C operation (ATHM800-256ALP/NLP support -40°C to +71°C).

### Available Models

Model Number	CPU	RAM	DAQ	Heatsink
<b>ATHM500-256A</b>	500MHz	256MB	Yes	
<b>ATHM500-256N</b>	500MHz	256MB	No	
<b>ATHM800-256A</b>	800MHz	256MB	Yes	High profile
<b>ATHM800-256N</b>	800MHz	256MB	No	High profile
<b>ATHM800-256ALP</b>	800MHz	256MB	Yes	Low profile
<b>ATHM800-256NLP</b>	800MHz	256MB	No	Low profile
<b>DK-ATHM800A-01</b>	800MHz Athena II Development Kit			
<b>DK-ATHM500A-01</b>	500MHz Athena II Development Kit			
<b>C-ATH-KIT</b>	Athena II cable kit			
<b>PB-EAP-170-K</b>	1.7" Pandora Enclosure for Athena II			
<b>PB-EAPV-300-K</b>	3.0" Pandora Enclosure for Athena II			
<b>PB-EAP-500-K</b>	5.0" Pandora Enclosure for Athena II			
<b>PB-EAP-700-K</b>	7.0" Pandora Enclosure for Athena II			
<b>PNL-EAP-01</b>	Athena II Panel I/O Board			

# HERCULES II

**800MHz EBX SBC with Integrated Data Acquisition and DC/DC Power Supply**



### CPU Features

- ◆ 800MHz VIA Mark CoreFusion CPU
- ◆ 512MB soldered-on SDRAM
- ◆ 4 USB 2.0 ports; 4 USB 1.1 ports
- ◆ 4 serial ports (2 RS-232; 2 RS-232/422/485)
- ◆ 10/100Base-T Ethernet
- ◆ VGA display support, up to 1920x1440 resolution
- ◆ LCD display support, up to 1400x1050 resolution
- ◆ 1 UDMA-100 IDE interface
- ◆ IDE flashdisk module socket
- ◆ Type II CompactFlash socket
- ◆ AC'97 audio
- ◆ PS/2 keyboard and mouse
- ◆ PC/104-Plus (ISA and PCI) expansion bus
- ◆ -20°C to +71°C or -40°C to +85°C operating temperature



### DC/DC Power Supply Features:

- ◆ 5-28VDC input range standard
- ◆ 40W output power

### Data Acquisition Features

- ◆ 32 16-bit analog inputs with 250KHz sample rate
- ◆ 2048 A/D sample FIFO
- ◆ 4 12-bit analog outputs
- ◆ 40 digital I/O lines with programmable direction
- ◆ Autocalibration of A/D and D/A

**Hercules II** is an EBX form-factor single board computer that integrates a Pentium III-level CPU, a complete set of embedded-PC functionality, Diamond's industry-leading data acquisition subsystem, and a variable-input, 40W DC/DC power supply. The SBC is based on the low-power, 800MHz VIA Mark CPU clocked at 800MHz. Its built-in data acquisition subsystem provides 32 16-bit analog inputs with a 250KHz sample rate, backed by a 2048 sample FIFO, along with 4 12-bit D/A channels and 40 programmable digital I/O lines. Autocalibration on both A/D and D/A ensures maximum accuracy over time and temperature. It is available in models that support -40°C to +85°C or -20°C to +71°C operation.

### Available Models

Model Number	CPU	RAM	DAQ	Temp
<b>HRC800-5A512</b>	800MHz Via Mark	512MB	Yes	-40°C to +85°C
<b>HRC800-5A512E</b>	800MHz Via Mark	512MB	Yes	-20°C to +71°C
<b>HRC800-5N512</b>	800MHz VIA Mark	512MB	No	-40°C to +85°C
<b>HRC800-5N512E</b>	800MHz VIA Mark	512MB	No	-20°C to +71°C
<b>DK-HRCEBX-02</b>	Hercules II Development Kit			
<b>C-HRCEBX-KIT</b>	Hercules II Cable Kit			

# PEGASUS

## Rugged, Low-power 500MHz AMD LX800 PC/104-Plus SBC



- ◆ AMD Geode LX800 processor at 500MHz
- ◆ 256MB soldered-on SDRAM
- ◆ 4 USB 2.0 Ports
- ◆ 2 Serial Ports (1 RS-232, 1 RS-232/422/485)
- ◆ 10/100Base-T Ethernet
- ◆ 1 UDMA-33 IDE port
- ◆ 2GB on-board solid-state IDE flashdisk
- ◆ Type II CompactFlash socket
- ◆ CRT and 18/24-bit LCD support
- ◆ PC/104-Plus (ISA + PCI) expansion bus
- ◆ -40°C to +85°C fanless operating temperature



**Pegasus** is a rugged, fanless PC/104-Plus SBC featuring the 500MHz AMD Geode LX800 processor with 256MB of soldered-on DDR SDRAM plus an optional on-board 2GB solid-state disk, for reduced weight and cost and increased reliability. The SBC offers fully integrated embedded-PC functionality with low power consumption, which enables it to operate in harsh environments where the airflow for heat dissipation is restricted and heatsinks or fans are unacceptable. Pegasus's ruggedness enables it to perform around-the-clock in unattended environments.

### Available Models

<b>PGS800-256-2G</b>	500MHz LX800, 256MB on-board DRAM, 2GB on-board IDE flashdisk
<b>PGS800-256-1G</b>	500MHz LX800, 256MB on-board DRAM, 1GB on-board IDE flashdisk (Minimum Order Quantity Product)
<b>PGS800-256</b>	500MHz LX800, 256MB on-board DRAM
<b>C-PGS-KIT</b>	Pegasus Cable Kit

# RHODEUS

## Low-Power 500MHz AMD LX800 PC/104 SBC with CRT/LCD, LAN, and CompactFlash



- ◆ AMD Geode LX800 processor at 500MHz
- ◆ 200-pin SO-DIMM socket, for up to 1GB DDR SDRAM
- ◆ 2 USB 2.0 ports
- ◆ 2 serial ports (1 RS-232, 1 RS-232/422/485)
- ◆ 10/100Base-T Ethernet
- ◆ 1 UDMA-33 IDE port
- ◆ Type II CompactFlash socket
- ◆ CRT and 18/24-bit LCD support
- ◆ PC/104 (ISA) expansion bus
- ◆ -20°C to +71°C or -40°C to +85°C operating temperature



**Rhodeus** is a low-cost, fanless PC/104 SBC featuring the 500MHz AMD Geode LX800 processor and a 200-pin SO-DIMM socket for up to 1GB of DDR SDRAM. The SBC combines fully integrated embedded-PC functionality with small size, low power consumption, and low cost, and is available in models supporting either an industrial or extended operating temperature range.

Rhodeus can be equipped with an optional panel I/O board, which converts the pin headers on the SBC to industry-standard external I/O connectors for most features. The entire assembly mounts to the front panel of the Pandora enclosure. Multiple Pandora body lengths provide room for additional PC/104 boards, batteries, modems, etc.

### Available Models

<b>RDS800-LC</b>	Rhodeus SBC, 500MHz LX800, 0MB RAM, -20°C to +71°C industrial operating temperature
<b>RDS800-XT</b>	Rhodeus SBC, 500MHz LX800, 0MB RAM, -40°C to +85°C extended operating temperature
<b>MEM-256-04</b>	256MB DDR SO-DIMM SDRAM
<b>MEM-512-04</b>	512MB DDR SO-DIMM SDRAM
<b>MEM-1024-04</b>	1024MB DDR SO-DIMM SDRAM
<b>C-RDS-KIT</b>	Rhodeus Cable Kit

See Pandora page 26

The Pandora enclosure provides a convenient and rugged way to house the Rhodeus SBC. Key Pandora features include:

- ◆ Compact
- ◆ Rugged
- ◆ Easy to assemble
- ◆ Eliminates most cables with convenient panel I/O board
- ◆ Wall-mountable or DIN-rail mountable rear panel
- ◆ Available in multiple lengths to fit additional boards



Rhodeus in a Pandora enclosure



Panel I/O Board for Rhodeus SBCs



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

# OCTAVIO



## Compact, Rugged, Low-power Embedded Application Servers



### CPU Features

- ◆ 500MHz VIA Mark CPU or 800MHz DMP Vortex86DX CPU
- ◆ 256MB soldered-on SDRAM
- ◆ 10/100Base-T Ethernet
- ◆ VGA CRT display interface
- ◆ 4 RS-232 serial ports, some with RS-422/485 options
- ◆ 4 USB 2.0 or 1.1 ports
- ◆ PS/2 keyboard and mouse ports
- ◆ Real-time clock
- ◆ Watchdog timer
- ◆ -40°C to +85°C fanless operation

### Data Acquisition Features *(depends on CPU)*

- ◆ 16 16-bit analog inputs with 100KHz sample rate
- ◆ Interrupt-based A/D sampling with 512 or 2048 FIFO
- ◆ Programmable input ranges
- ◆ 4 12-bit analog outputs
- ◆ Up to 40 programmable digital I/O lines
- ◆ 2 programmable counter/timers
- ◆ Supported by Diamond's Universal Driver software

The **Octavio** embedded application servers are based on low-power PC/104 form-factor single board computers combining a low-power, highly integrated CPU with Diamond's industry-leading data acquisition circuitry. The systems are powered by either an integrated Athena II (Octavio-ATHM) or Helios (Octavio-HLV) SBC.

Octavio systems come with 256MB of soldered-on DRAM, for increased resistance to shock and vibration. They also have an internal solid-state IDE flashdisk preloaded with a bootable Linux image, plus Diamond's Universal Driver data acquisition programming software.

Octavio also provides a full set of standard embedded-PC I/O interfaces, including four USB ports, a 10/100Base-T Ethernet interface, four serial ports, VGA graphics, and PS/2 keyboard and mouse interfaces.

The Octavio enclosure is compact, lightweight, and rugged. All system I/O is brought out to the front in the form of industry standard connectors. The internal structure of the enclosure eliminates most internal cables, improving reliability of the system. Additionally, all Octavio servers feature fanless -40°C to +85°C operation.

### Configuration Information

Octavio embedded application servers are configurable to meet the needs of your particular application. Octavio systems are ordered using the nomenclature Octavio-P-F-D-S-R where the following configurable system attributes are defined as follows:

- P = single board computer model
- F = integrated flashdisk size
- D = optional integrated power supply
- S = enclosure height
- R = optional DIN rail adapter

#### P: Single Board Computer Options

Several SBC options exist that allow you to select the right balance of power and performance for your application, as well as whether to include the onboard data acquisition circuitry or not.

#### F: Flashdisk Options

The flashdisk size can be specified allowing enough room onboard for your application and eliminating the need for an additional hard drive. All flashdisks come with a Linux 2.6.23 bootable image and Diamond's Universal Driver 6.02 software pre-loaded.

#### D: Integrated Power Supply Options

An integrated power supply can be added to the Octavio system, allowing Octavio to operate in environments where +5V is not accessible. A 25W or 50W power supply

#### S: Case Height Options

The Octavio case comes in several different heights for I/O expansion. The height of the basic system is 1.7-inch. If an integrated power supply is added, the case must be at least 3 inches in height.

#### R: DIN Rail Options

A DIN rail adapter may be added to the Octavio system.

### Ordering Information

<b>Octavio-P-F-D-S-R</b>	Octavio Embedded Application Server (Please select from the options below)
<b>P = A5A</b>	Athena II SBC, 500MHz CPU, with DAQ
<b>A5N</b>	Athena II SBC, 500MHz CPU, no DAQ
<b>H8A</b>	Helios SBC, 800MHz CPU, with DAQ
<b>H8D</b>	Helios SBC, 800MHz CPU, no DAQ
<b>F = AL512</b>	Athena II 512MB Linux flashdisk
<b>AL4G</b>	Athena II 4GB Linux flashdisk
<b>HL128</b>	Helios 128MB Linux flashdisk
<b>HL1G</b>	Helios 1GB Linux flashdisk
<b>D = 00</b>	No integrated DC/DC power supply
<b>LP</b>	25 Watt integrated DC/DC power supply
<b>J5</b>	50 Watt integrated DC/DC power supply (Options LP or J5 require S=30 or greater)
<b>S = 17</b>	1.7 inch enclosure height
<b>30</b>	3.0 inch enclosure height
<b>50</b>	5.0 inch enclosure height
<b>70</b>	7.0 inch enclosure height
<b>R = 00</b>	No DIN rail adapter
<b>DR</b>	Add DIN rail adapter



## WORLD'S SMALLEST PCI EXPRESS OPEN ARCHITECTURE EMBEDDED I/O STANDARD

### Key Features

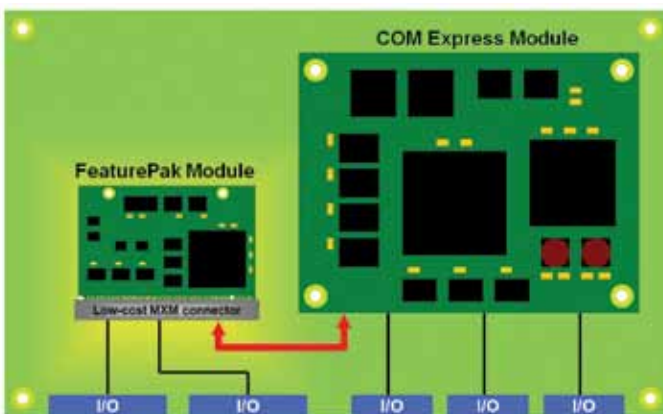
- ◆ Compact, low profile form-factor—0.6x the size of a credit card!
- ◆ Single low-cost connector integrates all host and external I/O signals
- ◆ Provides up to 100 I/O points per module
- ◆ Leverages industry-standard buses such as PCI Express, USB, and SMBus
- ◆ Host form-factor and processor agnostic
- ◆ Coexists with PC/104, SUMIT, Qseven, ETX, XTX, COM Express, etc.
- ◆ Multiple FeaturePak modules may be present within one system
- ◆ Rugged and reliable
- ◆ Open industry standard

### Key Benefits

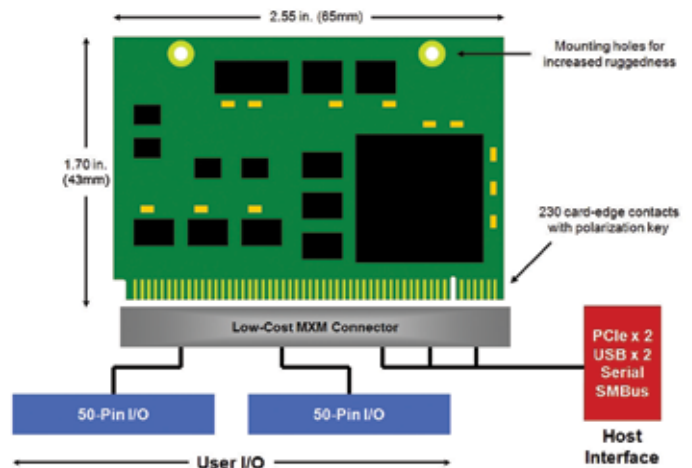
- ◆ Shortens time-to-market
- ◆ Reduces board-level development costs and risks
- ◆ Simplifies system design
- ◆ Eliminates cables, resulting in higher reliability, lower cost, and faster assembly
- ◆ Enables scalable and reconfigurable system design
- ◆ Enables easy product upgrades
- ◆ Protects from component obsolescence
- ◆ Encapsulates intellectual property
- ◆ Suitable for SBCs, baseboards, and proprietary all-in-one hardware designs
- ◆ Ideal for rapid-prototyping through high-volume applications
- ◆ Ideal format for silicon vendor reference designs
- ◆ Open standard increases market acceptance

**FeaturePak** is an exciting new embedded system expansion standard, originated by Diamond Systems, that provides a compact, low-cost method of adding I/O to board-level embedded computers. FeaturePak modules can be used as snap-in customization modules for commercial, off-the-shelf single-board computers (SBCs) and computer-on-module (COM) baseboards, or as functional blocks on fully-custom embedded electronics.

This new mezzanine-style embedded I/O expansion standard is highly synergistic with existing and emerging bus-, I/O-, chip- and board-level technologies. It leverages the latest high-speed serial expansion standards—such as PCI Express and USB—and is compatible with a wide range of current and future processors, including both x86 and RISC architectures.



FeaturePak on COM Express baseboard



### FeaturePak modules Enable Faster and More Flexible Baseboard Design

With their compact size and standardized connector, FeaturePak modules are easy-to-use macrocomponents that target a wide range of embedded applications. Embedded computer design can be greatly simplified by treating complex I/O subsystems as components, just as various types of COMs (computer-on-modules)

allow designers to treat the core embedded computing functions as a plug-in building block. This macrocomponent approach greatly accelerates design cycles, and also enables the creation of reconfigurable and upgradable products.

# FEATUREPAK-DAQ1616 NEW!



## FeaturePak Analog I/O Module with 2MHz A/D and Autocalibration

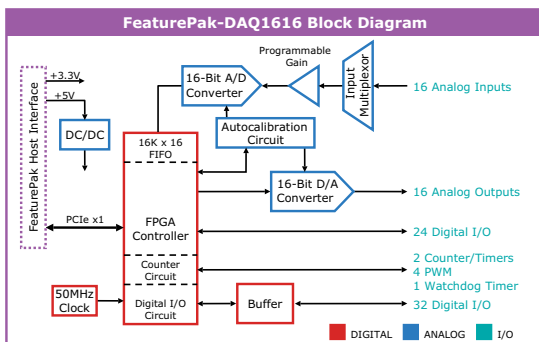
- ◆ 16 16-bit analog inputs with 2MHz maximum sampling rate
- ◆ Programmable input ranges, polarity, and mode
- ◆ 16K sample A/D FIFO with programmable threshold
- ◆ 16 16-bit analog outputs with programmable range and polarity
- ◆ Autocalibration circuit with precision reference voltages
- ◆ 56 programmable digital I/O
- ◆ 2 32-bit counter/timers for A/D timing and general purpose use
- ◆ 4 24-bit pulse-width modulator circuits
- ◆ Watchdog timer with system reset capability
- ◆ 1 PCI Express x1 lane host interface
- ◆ FeaturePak form-factor compliant
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver software support



**FP-DAQ1616** is a FeaturePak I/O card featuring Diamond's newest and fastest analog I/O technology and a PCI Express interface. This board offers 16-bit A/D sampling at 2MHz, supported with an expanded 16K-sample FIFO for reliable data collection in any operating system. Analog output capability has been expanded to 16 16-bit channels with programmable output ranges. All analog I/O features are enhanced with our industry-leading autocalibration technology, featuring independent calibration factors for each input and output range to guarantee maximum accuracy across all operating modes and the entire operating temperature range.

Digital I/O features include 7 8-bit ports with both bit-wide and byte-wide direction control, 2 32-bit up/down counter/timers with programmable input source and gate, 4 24-bit pulse-width modulation circuits with 0-100% duty cycle, and a watchdog timer. Universal Driver software support is included for Linux, Windows XP/Embedded Standard, and Windows CE.

The board is available in analog I/O and analog out-only configurations.



### Available Models

<b>FP-DAQ1616</b>	FeaturePak 2MHz 16-Bit Analog I/O and Digital I/O Module
<b>FP-DA16</b>	FeaturePak Analog Output and Digital I/O Module

# FEATUREPAK-GPIO96 NEW!



## FeaturePak Programmable Digital I/O Module with Customizable Personality

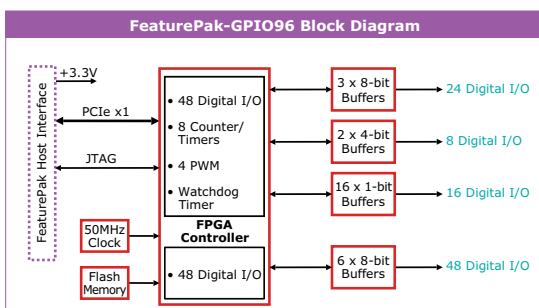
- ◆ FPGA-based design with in-the-field reconfigurability
- ◆ 96 buffered, programmable digital I/O
- ◆ Byte-wide and bit-wide port direction control
- ◆ 3.3V and 5V user-selectable I/O configuration
- ◆ 8 32-bit counter/timers
- ◆ 4 24-bit pulse-width modulators
- ◆ Watchdog timer with system reset capability
- ◆ 50MHz system clock
- ◆ 1 PCI Express x1 lane host interface
- ◆ FeaturePak form-factor compliant
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver software support



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

The built-in FPGA personality provides multiple configuration options. All 96 I/O lines may be used in common I/O mode; Six of these ports can be reconfigured to enable an array of additional features, including 8 32-bit up/down counter/timers with programmable input source and gate, 4 24-bit PWM circuits with 0-100% duty cycle capability, interrupt/latched mode operation, and even a watchdog timer feature.

The flash-based design enables easy field upgrades using a Diamond-provided software utility (no cable or 3rd party software required!) as well as custom code development. Universal Driver software support is included for Linux, Windows XP/Embedded Standard, and Windows CE.



### Available Models

<b>FP-GPIO96</b>	FeaturePak Programmable GPIO Module with standard personality
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# 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 been adopted by the EBX and EPIC form factor standards as well as 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 Input/Output
- ◆ Digital I/O and Counter/Timers
- ◆ Serial Communications
- ◆ Multi-function Networking
- ◆ Opto I/O
- ◆ Power supplies
- ◆ Relays



Analog I/O Modules							
Page #	Product	# Analog Inputs	A/D Res	# Analog Outputs	D/A Res	# DIO	# Counters
21	<b>DMM-32DX-AT</b>	32	16	4	12	24	2
21	<b>DMM-16-AT</b>	16	16	4	12	8	2
21	<b>DMM-AT</b>	16	12	2	12	8	2
21	<b>DMM</b>	16	12	2	12	8	2
22	<b>RMM-412-XT</b>			4	12	24	
22	<b>RMM-812-XT</b>			8	12	24	
22	<b>RMM-1612-XT</b>			16	12	24	
22	<b>RMM-416-XT</b>			4	16	24	

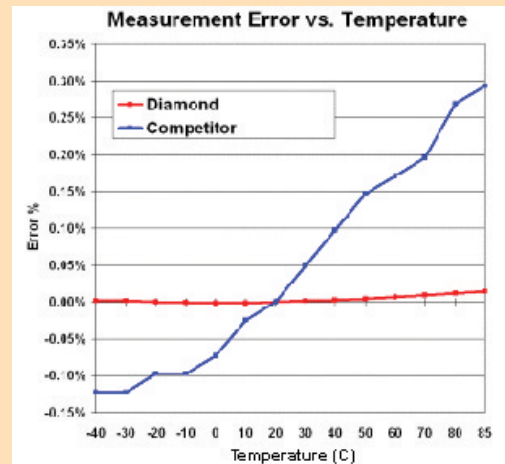
Digital I/O Modules					
Page #	Product	# DIO	# Relays	# Counters	Networking
24	<b>GPIO-MM</b>	48		10	
24	<b>GPIO-MM-12</b>	48		10	
24	<b>GPIO-MM-21</b>	96			
24	<b>Onyx-MM</b>	48		3	
24	<b>Onyx-MM-DIO</b>	48			
24	<b>Pearl-MM</b>		16		
24	<b>Opal-MM</b>	8	8		
25	<b>JNMM-Combo</b>				CAN (2), GPS
25	<b>MRC-224</b>	24			10/100 (2)

Serial Communications Modules									
Page #	Product	RS-232	RS-422	RS-485	Max	Protocol Config.	Address Config.	Digital I/O	Extended Temp.
23	<b>EMM-XT</b>	2	2	2	115.2K	Jumper	Jumper		Yes
23	<b>EMM-4M-XT</b>	4	4	4	115.2k	Jumper	Jumper		Yes
23	<b>EMM-8P-XT</b>	8	8	8	460.8K	Software	Software	8 I/O	Yes
23	<b>EMM-OPT4-XT</b>	4	4	4	230.4K	Jumper	Jumper	24 I/O	Yes
23	<b>EMM-8Plus-XT</b>	8	8	8	1.8432M	Jumper	Software	8 I/O	Yes

### Autocalibration

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

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



## DIAMOND-MM-32DX-AT

**Analog I/O PC/104 Module with Advanced Automatic Autocalibration**



- ◆ 32 16-bit A/D with 250KHz sample rate
- ◆ Programmable input ranges
- ◆ 1024 sample FIFO
- ◆ Patented auto-autocalibration of A/D and D/A for highest accuracy
- ◆ 4 16-bit D/A
- ◆ 24 programmable direction digital I/O lines
- ◆ Counter/timers for A/D control and general use
- ◆ Low noise design
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver Software



**Diamond-MM-32DX-AT** is Diamond's most advanced embedded A/D board. Using Diamond's patented auto-autocalibration technology, DMM-32DX-AT provides analog measurements across its entire rated operating temperature range with maximum accuracy, ensuring reliable performance for critical applications. DMM-32DX-AT is supported by Diamond's Universal Driver programming software for Linux, Windows 2000/XP/CE, and DOS.

Available Models	
<b>DMM-32DX-AT</b>	Analog I/O PC/104 Module with autocalibration

## DIAMOND-MM-16-AT

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



- ◆ 16 16-bit A/D with 100KHz sample rate
- ◆ Programmable input ranges
- ◆ 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
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver Software



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

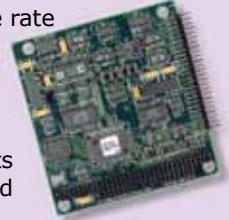
Available Models	
<b>DMM-16-AT</b>	Autocalibrating 16-ch 16-bit A/D + 4-channel 12-bit D/A, extended temperature
<b>DMM-16-NA-AT</b>	Autocalibrating 16-ch 16-bit A/D only, extended temperature

## DIAMOND-MM-AT

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



- ◆ 16 12-bit A/D with 100KHz sample rate
- ◆ Programmable input ranges
- ◆ 512 sample FIFO
- ◆ Autocalibration for high accuracy
- ◆ 2 12-bit D/A
- ◆ 8 digital inputs and 8 digital outputs
- ◆ Counter/timers for A/D control and general use
- ◆ Low noise design
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver Software



**Diamond-MM-AT** analog I/O module offers autocalibration, programmable gain, A/D FIFO, and extended temperature operation to mid-range 12-bit analog I/O users. The board is supported by Diamond's Universal Driver programming software for Linux, Windows 98/2000/XP/CE, and DOS.

Available Models	
<b>DMM-AT</b>	Autocalibrating 16-ch 12-bit A/D + 2-channel 12-bit D/A

## DIAMOND-MM

**12-bit Analog I/O PC/104 Module**



- ◆ 16 12-bit A/D with 100KHz sample rate, programmable input ranges, 512 FIFO
- ◆ 2 12-bit D/A
- ◆ 8 digital inputs and 8 digital outputs
- ◆ Counter/timers for A/D control and general use
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver Software



**Diamond-MM** high accuracy 12-bit analog I/O PC/104 modules provides alternatives to meet the varying analog input needs of embedded systems. The DMM offers 16 analog inputs with a 100 KHz sample rate but without a sample FIFO. It provides two 12-bit analog outputs with jumper selectable output ranges, 2 counter/timers, and an operating temperature range from -40°C to +85°C. It supports interrupt A/D transfers and it offers 8 digital inputs and 8 digital outputs. It offers jumper selected input ranges and manual calibration with potentiometers. It is supported by Diamond's Universal Driver programming software for Linux, Windows 2000/XP/CE, and DOS.

Available Models	
<b>DMM</b>	16-ch 12-bit A/D + 2-ch 12-bit D/A
<b>DMM-XT</b>	16-ch 12-bit A/D + 2-ch 12-bit D/A, extended temperature

## RUBY-MM-412/812/1612

### PC/104 12-Bit Analog Output Module with Digital I/O



- ◆ 4, 8, or 16 analog voltage outputs
- ◆ 12-bit D/A resolution
- ◆ Configurable output ranges including user-adjustable range
- ◆ 24 digital I/O lines using 82C55 IC
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver software



## RUBY-MM-416

### PC/104 16-Bit Analog Output Module with Digital I/O

- ◆ 4 analog voltage outputs
- ◆ 16-bit D/A resolution
- ◆ Configurable output ranges each channel
- ◆ 24 digital I/O lines using 82C55 IC
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver software



The **Ruby-MM** family offers 4, 8, or 16 12-bit analog voltage outputs with multiple output ranges. Each bank of 8 outputs can be configured for a different range, including 0-5V, 0-10V, +/-5V, +/-10V, and user-adjustable. Individual or simultaneous channel update is supported. On-board analog power supplies and a precision on-board reference voltage ensure quiet, accurate performance. The board includes 24 digital I/O lines based on the 82C55IC, configured as 3 8-bit ports with programmable direction. All digital I/O lines feature 10K pull-up resistors.

The **Ruby-MM-416** offers 4 16-bit analog voltage outputs with output ranges selectable for each channel, including 0-10V, +/-5V, and +/-10V. Individual or simultaneous channel update is supported. On-board filtered analog power supplies and a precision on-board reference voltage ensure quiet, accurate performance. The board included 24 digital I/O lines based on the 82C55IC, configured as 3 8-bit ports with programmable direction. All digital I/O lines feature 10K pull-up resistors.

#### Available Models

<b>RMM-412-XT</b>	4 12-bit D/A + 24 digital I/O
<b>RMM-812-XT</b>	8 12-bit D/A + 24 digital I/O
<b>RMM-1612-XT</b>	16 12-bit D/A + 24 digital I/O

#### Available Models

<b>RMM-416-XT</b>	4 16-bit D/A + 24 digital I/O
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# PC/104 POWER SUPPLIES

## JUPITER-MM-512

### PC/104 50 Watt DC/DC Power Supply Module



- ◆ 50 watts output power
- ◆ 5VDC/10A max
- ◆ 12VDC/2A max
- ◆ -12VDC/1A max
- ◆ -5VDC/150mA max
- ◆ 7-30VDC input range
- ◆ Screw terminal and PC/104 bus power distribution
- ◆ Shutdown control
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver software



## JUPITER-MM-LP

### PC/104 25 Watt DC/DC Power Supply Module



- ◆ 25 watts output power
- ◆ Low cost DC/DC supply
- ◆ 25 watts output power
- ◆ 5VDC/5A max
- ◆ 7-30VDC input range
- ◆ Screw terminal and PC/104 bus power distribution
- ◆ Shutdown control
- ◆ -40°C to +85°C operating temperature



The **Jupiter-MM-512** family of power supplies provides a mid-range, compact power source for embedded systems. The full 50W power can be utilized on the +5V line if the other outputs are not needed. Power indicator LEDs provide a useful status report of supply operation. Also available: Jupiter-MM-SIO with integrated 2 RS-232/422/485 serial ports for increased functionality and reduced system size and weight.

The low-cost, light-weight **Jupiter-MM-LP** is the ideal choice for low-power vehicle-based PC/104 systems. Its 25W output power is more than enough to drive today's low-power processors like Intel's Atom, a LX800, and a Vortex86. Jupiter-MM-LP meets the requirements of low power, low cost, lightweight, and overall efficiency.

#### Available Models

<b>JMM-512</b>	50 watts, +5V, +12V outputs
<b>JMM-512-V512</b>	50 watts, +/-5V, +/-12V outputs

#### Available Models

<b>JMM-LP-XT</b>	25 watts, +5V output
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## EMERALD-MM

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



- ◆ 4 serial ports, RS232/422/485 protocols
- ◆ Full handshake RS-232
- ◆ Jumper-selectable protocols, addresses and interrupts
- ◆ 16C554 UARTs with 16-byte FIFOs
- ◆ 115.2K max baud rate
- ◆ Build-in interrupt sharing
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver software



## EMERALD-MM-OPTO

### PC/104 4-Port Opto-Isolated RS-232/422/485 Module



- ◆ 4 Optoisolated serial ports, RS-232/422/485
- ◆ Jumper-selectable protocols, addresses and interrupts
- ◆ 16C2850 UARTs with 128-byte FIFOs
- ◆ 460.8Kbps max baud rate
- ◆ 24 digital I/O lines with programmable direction
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver software



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

**Emerald-MM-Opto** provides an integrated, rugged, and reliable solution for PC/104 expandable embedded systems requiring serial communications in demanding applications. It offers 4 optically isolated serial ports with RS-232, RS-422, and RS-485 protocols, as well as 24 digital I/O lines, all on a single board.

#### Available Models

**EMM-4M-XT** 4 RS-232/422/485 Serial Ports, PC/104

#### Available Models

**EMM-OPT4-XT** 4 Opto-isolated RS-232/422/485

## EMERALD-MM-8P

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



- ◆ 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
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver software



## EMERALD-MM-8PLUS

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



- ◆ 8 RS-232/422/485 serial ports
- ◆ Full handshake RS-232
- ◆ Jumper selectable protocols
- ◆ Max baud rate 1.8432Mbps
- ◆ 8 programmable digital I/O lines
- ◆ PC/104-Plus (PCI) interface
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver software



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

**Emerald-MM-8Plus** offers 8 RS-232/422/485 ports in a PC/104-Plus module using the PCI bus for improved performance and higher speed. It offers programmable protocol, address, and IRQ settings for each port. An on-board EEPROM stores the configuration for automatic loading on power-up, and a software utility lets you configure the settings to fit your needs exactly. The larger FIFOs and super-fast baud rate capability (921.6Kbps for RS-232, 1.8432Mbps for RS-422/485) gives this board dramatically improved performance and reliability over ISA-based serial ports.

#### Available Models

**EMM-8P-XT** 8 RS-232/422/485 Serial Ports, PC/104

#### Available Models

**EMM-8Plus-XT** 8 RS-232/422/485 Serial Ports, PC/104-Plus

## GPIO-MM

### PC/104 FPGA-Based Reconfigurable Digital I/O Module



- ◆ FPGA-based digital I/O module with re-programmable feature sets: 64 digital I/O + 10 9513-style 16-bit counter/timers, 96 digital I/O, and custom designs
- ◆ 3 I/O connectors for a total of 100 I/O pins
- ◆ 2 programmable interrupts
- ◆ 8 diagnostic LEDs
- ◆ RAM-based field-reprogrammable FPGA with 200K gates
- ◆ 40MHz on-board clock to drive digital logic
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver software



**GPIO-MM** is based on a Xilinx Spartan 2 RAM-based FPGA with 200K gates, allowing multiple feature sets to be implemented on the same hardware platform. Several off-the-shelf personalities are available, and custom ones can be developed either by users or by Diamond. The counter/timers are modeled after the high performance AMD9513 IC. They offer extreme flexibility, with programmable input sources and output waveforms, programmable up/down counting, one-shot vs. continuous counting, PWM function, and more. The digital I/O lines offer ESD protection and/or buffering for protection and improved performance.

#### Available Models

<b>GPIO-MM-XT</b>	64 digital I/O + 10 16-bit counter/timers
<b>GPIO-MM-12-XT</b>	Same as GPIO-MM-XT, alternate pinout
<b>GPIO-MM-21-XT</b>	96 digital I/O

## PEARL-MM

### PC/104 16 Relay Module



- ◆ 16 SPDT/Form C relays (NC, NO, C contacts)
- ◆ Switching capacity 2A at 30VDC
- ◆ Long lifetime—100,000,000 operations
- ◆ 500V AC/DC isolation between signals and board
- ◆ Pin header connections
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver software



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

#### Available Models

<b>PMM-P</b>	16 relays, pin header connections
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## ONYX-MM

### PC/104 Low Cost Digital I/O Module



- ◆ 48 digital I/O lines using 2x 82C55 IC
- ◆ Programmable I/O direction
- ◆ 10K pull-up resistors on all DIO lines
- ◆ 3 16-bit counter/timers using 82C54 IC
- ◆ Programmable and timer-driven interrupts
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver software



The **Onyx-MM** family offers a low-cost solution for PC/104 digital I/O, using the popular 82C55 IC. The board has 2 ICs with 3 8-bit programmable direction ports per IC. Model OMM-XT includes an 82C54 counter/timer IC featuring 3 16-bit counter/timers with one-shot, counting, timing, pulse output, and square wave generation features.

#### Available Models

<b>OMM-XT</b>	48 digital I/O and 3 16-bit counter/timers
<b>OMM-DIO-XT</b>	48 digital I/O

## OPAL-MM

### PC/104 Module With 8 Opto-Isolated Inputs + 8 Relays



- ◆ 8 SPDT/Form C relays (NC, NO, C contacts)
- ◆ Switching capacity 2A at 30VDC
- ◆ 8 opto-isolated digital inputs
- ◆ Input range 3-24V AC and DC
- ◆ Long life relays—10,000,000 operations
- ◆ 500V AC/DC isolation between signals and board
- ◆ -40°C to +85°C operating temperature
- ◆ Universal Driver software



**Opal-MM** offers both input and output with 8 SPDT relays and 8 opto-isolated digital inputs. The relays have normally closed, normally open, and common contacts for maximum flexibility. All relays are in the normally closed position on power-off and power-up. The opto-isolated inputs offer wide input voltage range and also work with AC signals.

#### Available Models

<b>OPMM-XT</b>	8 relays, 8 opto-isolated inputs, pin headers
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## JANUS-MM

### PC/104 CAN Module with GPS/ Cellular Communications



Dual CAN PC/104 module      With GPS and wireless modem

- ◆ 2 opto-isolated CAN 2.0B interfaces
- ◆ Philips SJA1000 controllers
- ◆ Socket for Trimble GPS receiver
- ◆ Socket for Multitech GSM/CDMA SocketModem family
- ◆ Available as CAN only or with navigation/communication modules installed
- ◆ 40°C to +85°C operating temperature



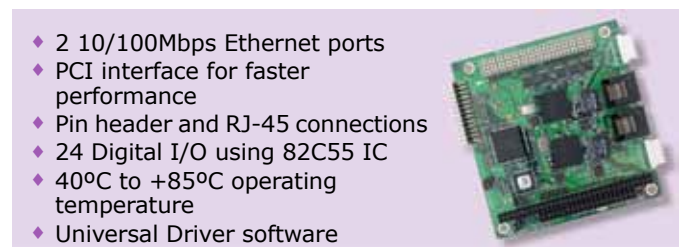
Lassen SKII GPS      SocketModem GSM/GPRS      Lassen iQ GPS

**Janus-MM** provides an integrated solution for vehicle, navigation, and asset tracking applications on a single PC/104 module. The CAN channels provide interface to the vehicle systems, while the GPS and SocketModem offer location identification and data communication via on-board RS-232 ports. GPS options include Trimble Lassen SKII 8-channel or Lassen iQ 12-channel receivers. Wireless modem options are provided by the MultiTech SocketModem family, including GSM/GPRS, CDMA, Bluetooth (special order), and even WiFi (special order). A separate I/O connector provides access to the GPS 1PPS timing signal and enables connection of backup GPS power for maintenance of the almanac and faster location fixing. Complete kits include antennas and transition cables.

Available Models	
<b>JNMM-COMBO-XT</b>	Janus Dual CAN + Carrier PC/104 Module
<b>JNMM-GPS-g</b>	Janus-MM, SKII/iQ module, dual CAN
<b>JNMM-WSM-w</b>	Janus-MM, wireless modem, dual CAN
<b>JNMM-DUO-g-w</b>	Janus-MM, GPS & wireless, dual CAN
<b>JNMM-GPS-g-DK</b>	Janus-MM, SKII/iQ module, dual CAN, antenna
<b>JNMM-WSM-w-DK</b>	Janus-MM, wireless modem, dual CAN, antenna
<b>JNMM-DUO-g-w-DK</b>	Janus-MM, GPS & wireless, dual CAN, antenna
<b>JNMM-CAN2-XT</b>	Janus-MM dual CAN ports only
<b>JNMM-GPS-g-XT</b>	Janus-MM, SKII/iQ module, no CAN
<b>CK-GPS-g</b>	Antenna Kit for SKII/iQ modules
<b>CK-WSM-01</b>	Antenna Kit for SocketModem modules {g = iQ or SK; w = wireless module}

## MERCATOR

### PC/104-Plus Ethernet Module with Digital I/O



- ◆ 2 10/100Mbps Ethernet ports
- ◆ PCI interface for faster performance
- ◆ Pin header and RJ-45 connections
- ◆ 24 Digital I/O using 82C55 IC
- ◆ 40°C to +85°C operating temperature
- ◆ Universal Driver software

**Mercator** helps to reduce the size and cost of your PC/104 system. The dual 10/100Mbps Ethernet channels expand the networking capabilities of your system while the 24 digital I/O provide control and monitor interface capability. Wide temperature operation makes Mercator an excellent choice for vehicle and harsh environment applications.

Available Models	
<b>MRC-224-XT</b>	Dual Port 10/100Mbps Ethernet + 24 Digital I/O PC/104-Plus Module

# PANDORA

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



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

The Pandora enclosure system provides a convenient and rugged way to house your PC/104 system based on Diamond PC/104 SBCs.

The PC/104 SBC mounts to a unique panel I/O board, which converts the pin headers on the SBC to industry-standard I/O connectors for most features. The entire assembly mounts to the front panel of the enclosure. Multiple body lengths provide room for additional PC/104 boards, batteries, modems, etc. Select from:

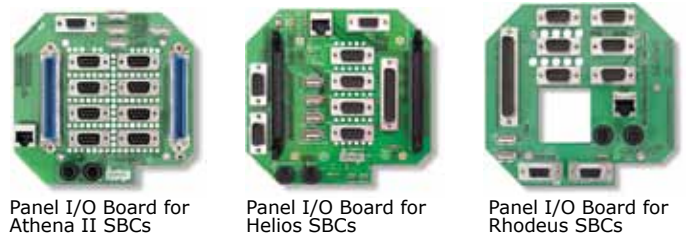
- ◆ 1.7" fits SBC and panel I/O board only
- ◆ 3.0" fits SBC and up to 2 PC/104 modules
- ◆ 5.0" fits SBC and up to 5 PC/104 modules
- ◆ 7.0" fits SBC and up to 7 PC/104 modules

### Panel I/O Boards

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

For use with Athena II SBCs is the PNL-EAP-01 panel I/O board. The PNL-EAP-01 can be used with Athena II models ATHM500-256A, ATHM500-256N, ATHM800-256ALP, and ATHM800-256NLP. For use with Helios SBCs is the Helios panel I/O board, PNL-HLV-01. For use with Rhodeus SBCs is the Rhodeus panel I/O board, PNL-RDS-01.

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



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

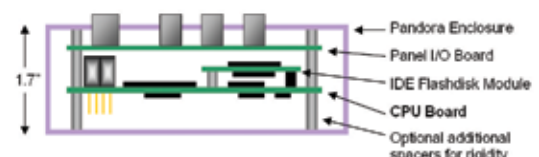
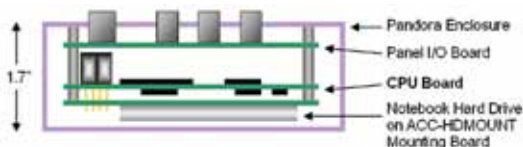
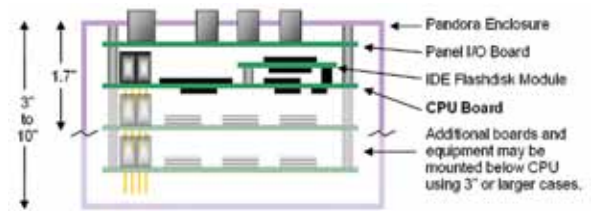
### Available Models

<b>PB-EAP-xxx-K</b>	Pandora enclosure for Athena II SBC, includes PNL-EAP-01 panel I/O board
<b>PB-HLV-xxx-K</b>	Pandora enclosure for Helios SBC, includes PNL-HLV-01 panel I/O board
<b>PB-RDS-xxx-K</b>	Pandora enclosure for Rhodeus SBC, includes PNL-RDS-01 panel I/O board
<b>xxx</b>	Specify 170, 300, 500, or 700

### Pandora Cross-Section Examples

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

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



Diamond's accessories speed up and simplify your system design. These include three convenient ways to add mass storage to your system, cable kits and other accessories.

## FLASHDISKS

- ◆ 128MB to 4GB solid state Flashdisks
- ◆ Rugged bolt-on installation; mounting hardware included
- ◆ Requires no additional space on PC/104 stack or in enclosure
- ◆ Dimensions: 1.78" x 1.24"
- ◆ -40°C to +85°C operating temperature



## CABLE KITS

- ◆ Cable kits are available for all SBCs
- ◆ Cables convert pin headers to PC-style connectors
- ◆ Included with SBC development kits



### Available Cable Kits

<b>C-ATH-KIT</b>	Athena II Cable Kit
<b>C-AUR-KIT</b>	Aurora Cable Kit
<b>C-HLV-KIT</b>	Helios Cable Kit
<b>C-HRCEBX-KIT</b>	Hercules II Cable Kit
<b>C-NPT-KIT</b>	Neptune Cable Kit
<b>C-PGS-KIT</b>	Pegasus Cable Kit
<b>C-PLT-KIT</b>	Pluto Cable Kit
<b>C-MAG-KIT</b>	Magellan Cable Kit
<b>C-PSD-KIT</b>	Poseidon Cable Kit
<b>C-RDS-KIT</b>	Rhodeus Cable Kit

## PC/104 TERMINAL BOARD

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



## PC/104 SPACERS

- ◆ SPC-104 spacer kit
- ◆ 0.6" long x 3/16" diameter x #4-40 thread, with male and female ends
- ◆ Clear aluminum material



## COMPACTFLASH ADAPTER KIT

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



The CompactFlash Adapter Kit, ACC-CFEXT, enables incorporation of a CompactFlash socket in your system remote from the SBC itself. The adapter connects to any IDE connector on the board via a ribbon cable.

## HDD ADAPTER KIT

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



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.

## PC/104 MOUNTING HARDWARE

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

SPC-104 is the standard PC/104 mounting spacer with 0.6" height and #4-40 threads. Male/female thread configuration enables continuous stacking. MTG104 is a complete mounting kit including 4 spacers, 4 screws, and 4 nuts. One kit required per board.

## PC/104 CONNECTORS

These PC/104 headers are available in both stackthrough (long pins) and non-stackthrough (short pins) format. Both 64-pin and 40-pin connectors are available.



### Available Models

<b>H104-64-ST</b>	64 pins, stackthrough
<b>H104-64-NS</b>	64 pins, non-stackthrough
<b>H104-40-ST</b>	40 pins, stackthrough
<b>H104-40-NS</b>	40 pins, non-stackthrough

## AC ADAPTERS

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





**Emerald-MM-8P-XT** serial I/O module provides precision targeting of a solar telescope



**Hercules II EBX** Single Board Computer powers an on-vehicle digital video systems



**GPIO-MM** digital I/O module with custom programmed FPGA provides motion control to aim solar mirror arrays

*Diamond's products are used around the world in these and many other applications.*



**Diamond-MM-32DX-AT** analog I/O module provides high accuracy data collection in-flight



Custom Single Board Computer designed to meet specific embedded control specifications



**Athena II PC/104** Single Board Computer powers instrumentation data collection and analysis



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