EmbeddedXpress™ Small Form Factor

DIAMOND SYSTEMS

EmbeddedXpress (EMX) is a new industry standard form factor for embedded computers that combines COM Express CPU modules with stackable I/O expansion. SBCs offer convenient off-the-shelf solutions but pose challenges for performance enhancement or product migration in an end of life situation. COMs offer performance scalability, wider choice of processors, and easier migration but (until now) require custom baseboard design. By utilizing COM modules in a stackable SBC format, EMX offers the best of both SBCs and COMs without the disadvantages of either.

In a typical small form factor system, the processor is fixed, while the I/O modules are interchangeable. With EMX, both processor and I/O modules are interchangeable. EMX offers greater flexibility, scalability, and longevity through the use of interchangeable COM modules.

EMX boards are off-the-shelf products requiring no customer hardware development. They offer easy expansion with stackable I/O modules. They provide an easy way to utilize the wide selection of COM Express COM modules available from multiple vendors worldwide, resulting in performance scalability, protection from CPU obsolescence, and earlier access to the latest processor technology.

The flexible design of EMX defines two sizes of processor modules: EMX Basic (125mm x 95mm) and EMX Compact (95mm x 95mm). Each size is compatible with all EMX expansion modules. An EMX processor module can be either a two-board combination of carrier plus COM module or a traditional single-board computer.

One of the major improvements offered by EMX is the new expansion connector used for add-on I/O modules. The EMX expansion connector is smaller and lower cost than other standards, helping to reduce cost while increasing the PCB area available for processor and I/O circuitry. Thus EMX enables boards with higher feature density than other small form factor standards. The EMX expansion connector contains ample reserved pins, ensuring a long lifetime by providing the capacity to incorporate new features as they become available and desirable.

EMX Benefits

- Appeals to a wider range of high- and low-volume customers
- Earlier access to new CPU technology, longer product lifetimes, wider choice of processors, better protection from CPU obsolescence, and performance scalability
- Standard size and shape boards fit into systems without worrying about non-standard board shapes and sizes
- The size of EMX Compact is roughly equivalent to PC/104, providing sufficient room for popular I/O circuits.
- The expansion connector is optimized for size, cost, interconnectivity, PCB area, and PCB coastline, plus it contains sufficient reserved pins for future upgrades.

EMX Features

- Small form factor standard for embedded computers with stackable I/O expansion
- Integrates COM Express modules into an off-the-shelf stackable ecosystem
- Processor module may be a single board computer or a carrier module with a COM Express module mounted underneath
- The use of COM Express modules aids in performance scalability and protection from obsolescence
- Two sizes of processor modules:
  - EMX Basic (95 x 125mm)
  - EMX Compact (95 x 95mm)
- Supports efficient conduction cooling to chassis
- Expansion modules are EMX Compact size
- New small, low-cost, high-density I/O connector for I/O expansion modules
- Expansion buses include PCI Express x1 and x4, USB 2.0, LPC, and SATA
- Reserved pins for future upgrades
- 5VDC main power, 3.3VDC and 5VDC power for expansion modules
- Open standard, freely usable with no licenses or royalties

EMX™ EmbeddedXpress

EmbeddedXpress Products

EMX Basic form factor SBC with Intel Atom E-Series CPU

Altair is a high performance, highly integrated small form factor single board computer in the EmbeddedXpress (EMX) Basic form factor. Altair incorporates a wealth of standard PC-style I/O plus on-board digital I/O. It accepts both EMX and PCIe MiniCard add-on I/O modules.

Altair was designed to meet the needs of real-world applications. The SBC integrates an optimal selection of features for its size, power, and cost budgets, yielding maximum functionality and performance within a compact board. Latest generation connectivity such as SATA, dual Gigabit Ethernet, and PCI Express ensures long lifetime and top performance. EMX and PCIe MiniCard expandability provides access to current and future high-speed I/O.

- Low-power, high-performance, stackable SBC
- Intel Atom E-series CPU at 1.6GHz
- 2GB soldered DDR2 DRAM
- Comprehensive set of I/O interfaces:
  - 4 USB 2.0 ports
  - 4 RS-232/422/485 serial ports
  - 2 Gigabit Ethernet ports
  - 1 SATA port
  - LVDS and VGA display interfaces
  - USB keyboard and mouse support
  - 16 programmable GPIO lines
  - Watchdog timer
- Optional on-board USB flashdisk
- EMX Basic form factor
- System expansion flexibility
  - EMX stackable I/O
  - MiniPCIe socket
- -40°C to +85°C operating temperature

Family of COM Express-based SBCs

Vega is an EMX Compact family of SBCs powered by a COM Express CPU module mounted its bottom side. Vega integrates CPU, system I/O, industry-leading data acquisition, gigabit Ethernet, and a wide-input DC/DC power supply within the compact and modularly expandable EMX Basic form-factor.

Vega offers EMX stackable I/O expansion. Its on-board PCIe MiniCard expansion socket facilitates the addition of an off-the-shelf mini PCIe add-on module, helping you satisfy your application's precise requirements.

In addition to its comprehensive embedded-PC system core, Vega also optionally integrates Diamond's industry-leading data acquisition I/O subsystem and DC/DC power supply.

- Choice of Intel Atom, Core2 Duo, or i7 COM Express CPU module
- I/O connectors for a wide range of I/O devices:
  - 2 Gigabit Ethernet ports
  - 4 USB 2.0 ports
  - 4 RS-232/422/285 ports
  - LVDS, VGA, DVI or HDMI display interfaces
  - 1 SATA port
  - High definition audio
  - Optional on-board USB flashdisk
- Best-in-class data acquisition featuring:
  - 16 16-bit analog inputs with autocalibration
  - 8 16-bit analog outputs
  - 24 programmable digital I/O lines
  - 2 counters / timers
- 7-36V DC/DC power supply
- EMX stackable I/O expansion and PCIe MiniCard socket
- -40°C to +85°C operating temperature

EMX-ESG I/O Module

EMX-ESG is an EMX Compact form factor I/O module featuring two PCI Express Gigabit Ethernet ports, an LPC UART with 6 serial ports, 24 GPIO lines, and support for a GPS receiver.

- 2 Gigabit Ethernet ports on pin headers, with on-board magnetics
- 6 serial ports: 4 RS-232/422/485, 2 RS-232
- 24 GPIO lines, 3.3V logic levels with 5V compatibility, buffered for protection
- Support for a Condor 23-channel GPS receiver
- -40°C to +85°C operating temperature