

Embedded Computer I/O Today & Tomorrow



PCI 5 Volt Connector
Key



ACCES I/O PRODUCTS



PCI 5 Volt Connector
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About ACCES

- ❑ Founded in 1987 in San Diego, California
- ❑ Family owned corporation
- ❑ Acquisition, Control, Communications, Engineering Systems.
- ❑ Analog, Digital, Serial, Specialty I/O products, Systems
- ❑ Long life products, still shipping earliest products
- ❑ Custom and Semi-custom engineering



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Acquisition and Control

- ❑ Large line of 12 and 16 bit analog input boards
- ❑ One of the largest lines of analog output boards
- ❑ From 24 to 120 line TTL digital input output cards
- ❑ Major line of optically isolated digital input products
- ❑ Peerless line of digital solid State and mechanical relay Boards and products

104-IIRO-16 shown



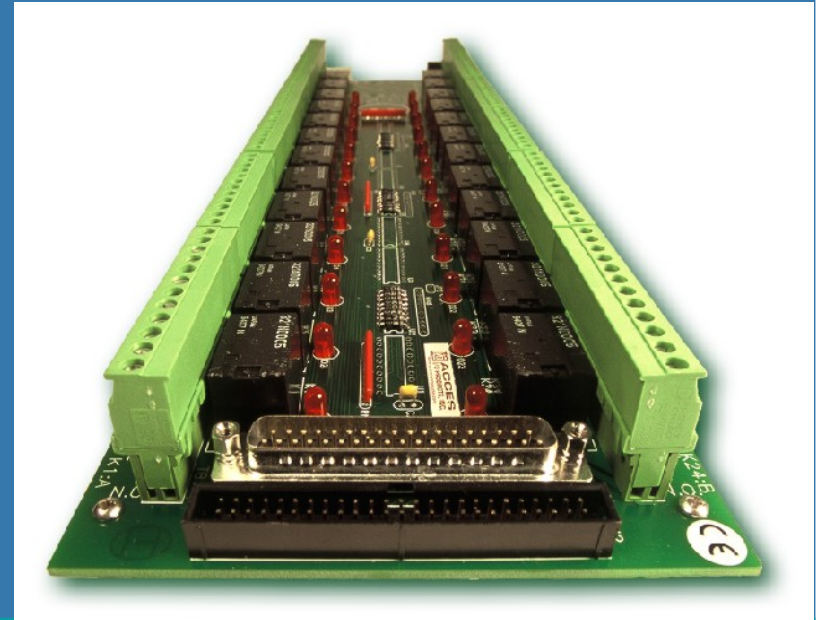
Serial Communications

- ❑ Large lines of RS-232, RS-422 and RS-485
- ❑ From one port to eight port models.
- ❑ Many models available with optical isolation
- ❑ Low cost serial and USB converters
- ❑ LPCI-COM-8SM shown



Specialty Products

- External Mux, signal conditioning and relay boards
 - Watchdog boards
 - Expansion Bus cards
 - Arbitrary Waveform board
 - Quadrature Encoder board
-
- ROB-24H shown



Distributed I/O

- ❑ RS-485 remote intelligent analog and digital units
- ❑ Wireless remote data acquisition and control
- ❑ Ethernet remote intelligent analog and digital units
- ❑ NEMA4 enclosures for small remote units
- ❑ Wireless RIDAC shown



PC/104 System Enclosures

- ❑ Rugged Aluminum stack enclosures
- ❑ Rugged NEMA4 dual stack enclosure
- ❑ Small dual stack PC/104 backplane enclosure
- ❑ All purpose EBX, EPIC, PC/104 box enclosure
- ❑ Custom Military PC/104 enclosure solutions
- ❑ E4-DAS(104E-BOX) shown



Σ^4 DAS
THE SUM OF ALL DATA ACQUISITION

Form Factors

Existing Standards

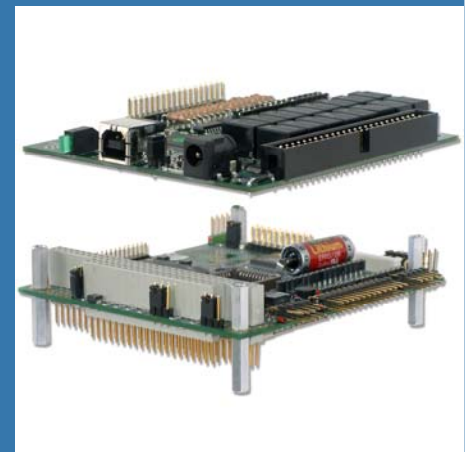
- ❑ ISA- Original PC Bus, one of few large sources
- ❑ PCI- All boards are universal 3.3/5V capable
- ❑ PC/104- Modern designs with high density and E2 extended temperature models
- ❑ PCMCIA-Digital and A/D product
- ❑ Low Profile PCI- Only 16-bit
16 ch. A/D LPCI available.
- ❑ LPCI-A16-16A shown



Form Factors

New or Potential Standards

- ❑ USB/104- ACCES conceived USB I/O built to PC/104 size & mounting holes. Can be used in stacks and existing PC/104 enclosures. See Photo.
- ❑ ETX baseboards- Semi-Custom customer solutions can combine any of our I/O designs on to a single ETX baseboard
- ❑ PC/104 Express- Awaiting STD approval on connectors
- ❑ PCIe-PCI Express on a slot card.
New ACCES line being developed



Expertise

- ❑ Custom hardware engineering design
- ❑ Custom software driver support for hardware
- ❑ Special military system testing
- ❑ PC/104 & Embedded System Integration
- ❑ Long term availability & 3 year hardware warranty
- ❑ Designed and
Made in the U.S.A.



New PCI boards: PCI-IDI Series

Digital Isolated Inputs

- ❑ Qty 16, 32, 48 digital optically isolated DC/AC inputs
- ❑ Change-of-state detection (IRQ) on selected inputs (C models)
- ❑ Polarity insensitive AC/DC inputs accept up to 60VDC or AC rms(B models)
- ❑ AC or voltage transient filtering
- ❑ Optically isolated channel to channel and channel to ground
- ❑ Universal PCI, PCi-X, 3.3V and 5V compatible

PCI-IDI-48BC



New PCI boards: PCI-IDO Series Digital Solid State Isolated Outputs

PCI-IDO-48

- ❑ Qty 16, 32, 48 digital isolated solid state relay outputs
- ❑ Universal PCI, PCi-X, 3.3V and 5V compatible
- ❑ Solid-state design permits high-speed switching and long-life expectancy
- ❑ Load voltages up to 60 Volts, current up to 2A
- ❑ Optically isolated CH. to CH. and CH. to ground.



ACCES PC/104 SOLUTIONS



Easy
Ethernet
Embedded
Environmental
 Σ^4 DAS
THE SUM OF ALL DATA ACQUISITION

 **ACCES**
I/O PRODUCTS, INC.



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PC/104 CONCEPT

- ❑ Self stacking bus (no backplane)
- ❑ Approved standard in 1992
- ❑ First built in 1987
- ❑ PC/104-Named for original 104 pins used on the ISA connector
- ❑ 3.550" X 3.755" (90 by 96mm)
- ❑ Bus drive 4mA, I/O modules
- ❑ Spacing is .06" (15mm) using four corner standoffs
- ❑ I/O modules typically <2W

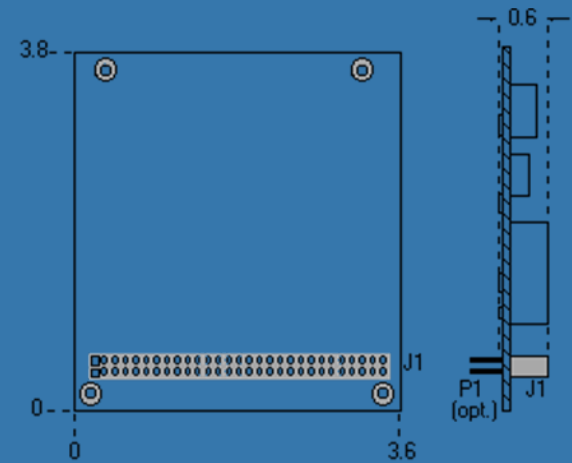


Figure 1. Basic Mechanical Dimensions (8-bit Version)

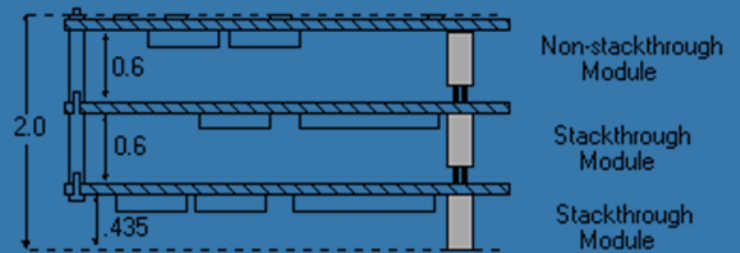
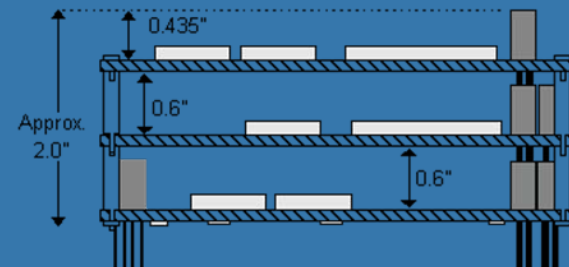
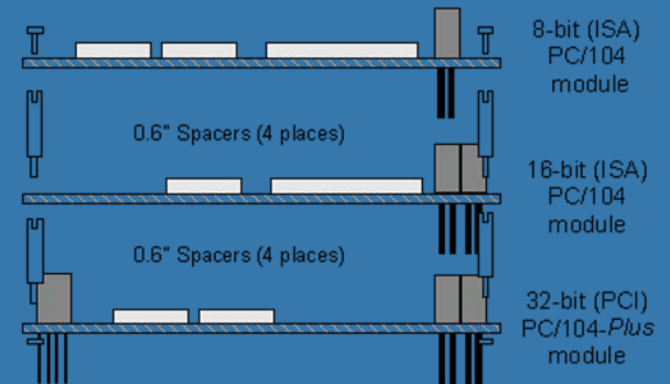


Figure 2. Standalone Module Stacks

PCI-104 & PC/104-Plus

- ❑ New PCI addition to stacking PC concept (approved in 1997)
- ❑ Adds 120 pin PCI connector
- ❑ PC/104 size & spacing
- ❑ PC/104-Plus adds PCI stack connector to PC/104
- ❑ PCI-104 is the same with PCI only (no ISA)
- ❑ On Plus cards PC/104 ISA is pass through only



Note: PCI connector shroud not shown, for clarity

PC/104 BASIC ANALOG IN

- ❑ Eight Channels, 12-bit resolution
- ❑ Low cost multifunction board
- ❑ Bipolar/unipolar programmable ranges
0-5V, 0-10V, +/-5V, +/-10V
(4-20mA factory option)
- ❑ Single Ended or True Differential
- ❑ 100K samples per second
- ❑ Direct Sensor Interface,
optional gain of 1-200
- ❑ 24 Digital TTL I/O 50pin w/COS

104-AI12-8



PC/104 ANALOG IN/OUT

- ❑ Eight Channels, 12-bit resolution
- ❑ Low cost multifunction board with four 12-bit D/A
- ❑ Bipolar/unipolar programmable ranges
0-5V, 0-10V, +/-5V, +/-10V
(4-20mA factory option)
- ❑ Single Ended or True Differential
- ❑ 100K samples per second
- ❑ Direct Sensor Interface,
optional gain of 1-200
- ❑ 24 Digital TTL I/O 50pin w/COS

104-AIO12-8



PC/104 16-BIT ANALOG IN

- ❑ 16-bit Channels, 16-bit resolution w/ 2K FIFO
- ❑ Economic multifunction board with two 12-bit D/A
- ❑ 11 software/hardware selectable ranges
- ❑ Channel programmable gain of 1, 2, 5 and 10.
- ❑ 16 Single Ended or 8 Differential
- ❑ 250K samples per second
- ❑ Auto calibration
- ❑ 16 Digital TTL I/O
- ❑ Optional 5V only, E2 temp.

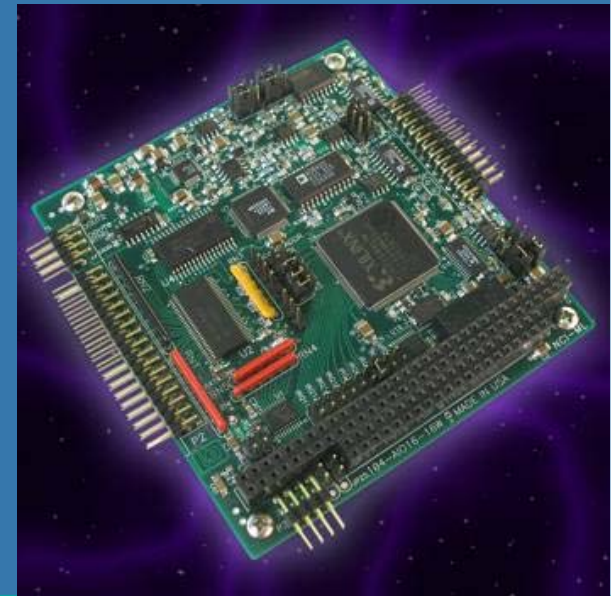
104-AIO16-16E



PC/104 HIGH SPEED 16-BIT ANALOG INPUT

- ❑ Multifunction 16 A/D Channels, 16-bit resolution
- ❑ 11 software/hardware selectable ranges
- ❑ Channel programmable gain of 1, 2, 5 and 10.
- ❑ 16 Single Ended or 8 Differential
- ❑ 500K samples per second with full 16-bit wide data path & FIFO
- ❑ Auto calibration
- ❑ 16 Digital TTL I/O & Two High Speed 12-bit D/A channels

104-AIO16-16W



PC/104 ANALOG INPUT MULTIPLEXER

- ❑ Expand one PC/104 A/D input to 32 Ch A/D inputs
- ❑ Programmable ranges +/-25mV, +/-50mv, +/- .1V, +/-2.5V, +/-5V, +/-10V
- ❑ 32 Single Ended or 16 Differential Inputs
- ❑ Up to 8 boards per stack(256)IN
- ❑ Direct Sensor Interface options, 4-20mA, RTD, Thermocouples,
- ❑ 5V only operation, E2 option

104-AIM-32



PC/104 ANALOG OUTPUT

- ❑ Standard Eight D/A Channels, 12-bit resolution
- ❑ Extra Arbitrary Waveform Generator 8A model
- ❑ Output programmable ranges
0-5V, 0-10V, +/-5V, +/-10V, 4-20mA
- ❑ 128K SRAM for ARB data storage
- ❑ 32-bit counter for timed outputs
- ❑ 16-bit counter for interrupt generation
- ❑ 5V only operation, Extended temperature option -40 to 85C

104-DA12-8A



PC/104 DIGITAL TTL I/O

- ❑ Standard 24 & 48 Digital TTL Inputs or Outputs
- ❑ Type 83C55 PPI mode 0 & 50-pin connector compatible with Opto-22 or Greyhill module racks
- ❑ Each 24-bit group (two 8 bit ports, two 4 bit ports) per connector
- ❑ Buffered, 64mA sink, 32mA source
- ❑ I/O pulled up to 5V, option for pull-down resistors.
- ❑ Fused 5V only operation, Extended temperature option -40 to 85C

104-DIO-48E



PC/104 DIGITAL TTL I/O

w/ Change-of-State interrupt

- ❑ 24 & 48 Digital TTL In/Out w/ Change-of-State Interrupts allows reduced CPU load
- ❑ Type 83C55 PPI mode 0 & 50-pin connector compatible with Opto-22 or Greyhill module racks using relay modules
- ❑ Each 24-bit group (two 8 bit ports, two 4 bit ports) per connector
- ❑ Buffered, 64mA sink, 32mA source
- ❑ Fused 5V only operation, Extended temperature option -40 to 85C

104-DIO-48S



PC/104 PLUS DIGITAL HIGH SPEED 96 TTL I/O

- ❑ 96 Digital TTL-DTL Input/Output channels
- ❑ Four 50-pin connectors compatible with Opto-22 or Greyhill module racks using relay modules
- ❑ Emulates Type 8255 PPI mode 0
- ❑ 7.37M bytes per second data rate from I/O connector to/from PCI bus:
- ❑ Full 32-bit PCI interface design
- ❑ Buffered, 64mA sink, 32mA source
- ❑ Fused 5V only operation, Extended temperature option -40 to 85C

P104-DIO-96



PC/104 8 DIGITAL ISOLATED & RELAY BOARDS

- ❑ 8 Optically Isolated Inputs for up to 31V DC or AC
- ❑ Change-of-State Interrupt model reduces CPU load from constant polling
- ❑ 8 Form C Electro-mechanical relays for digital outputs
- ❑ 8 non-isolated TTL digital inputs
- ❑ Slow/fast filter to accommodate AC voltages and noisy DC inputs
- ❑ Relay contact rating of 1A@24VDC & .5A@125VAC

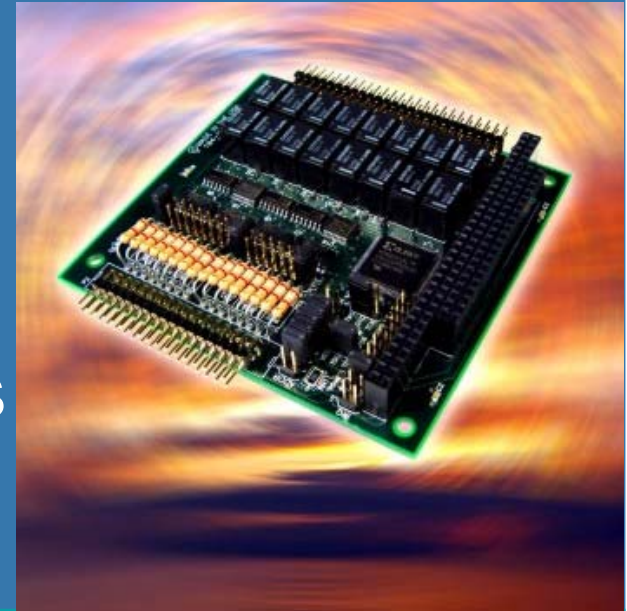
104-IIRO-8



PC/104 16 DIGITAL ISOLATED & RELAY BOARDS

- ❑ 16 Optically Isolated Inputs for up to 31V DC or AC
- ❑ Change-of-State Interrupt model reduces CPU load from constant polling
- ❑ 16 Form C Electro-mechanical relays for digital outputs
- ❑ Relay only, Input only versions
- ❑ Slow/fast filter to accommodate AC voltages and noisy DC inputs
- ❑ Relay contact rating of 1A@24VDC & .5A@125VAC

104-IIRO-16



PC/104 32 DIGITAL ISOLATED & 4 RELAY BOARD

- ❑ 32 Optically Isolated Inputs for up to 31V DC or AC
- ❑ Change-of-State Interrupt model reduces CPU load from constant polling
- ❑ 4 Form C Electro-mechanical relays for digital outputs
- ❑ Economy(No COS) & E2 options
- ❑ Slow/fast filter to accommodate AC voltages and noisy DC inputs
- ❑ Relay contact rating of 1A@24VDC & .5A@125VAC

104-II32-4RO



PC/104 DIGITAL ISOLATED & SOLID STATE BOARDS

- ❑ 8/16 Optically Isolated Inputs up to 31V DC or AC
- ❑ Change-of-State Interrupt model reduces CPU load from constant polling
- ❑ 8/16 FET solid state isolated relays for digital outputs
- ❑ Economy (No COS) models
- ❑ Solid State output only models
- ❑ Slow/fast filter to accommodate AC voltages and noisy DC inputs

104-IDIO-16



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PC/104 RS-232 SERIAL BOARDS

- ❑ PC/104 8/4/2 RS-232 asynchronous serial COM
- ❑ Operates as a standard COM port in all OS
- ❑ Speeds up to 230.4K with 64-byte FIFO
- ❑ Programmable IRQ sharing simplifies system design and installation
- ❑ Low power required: 5VDC @80mA typical
- ❑ E2 Extended temp option

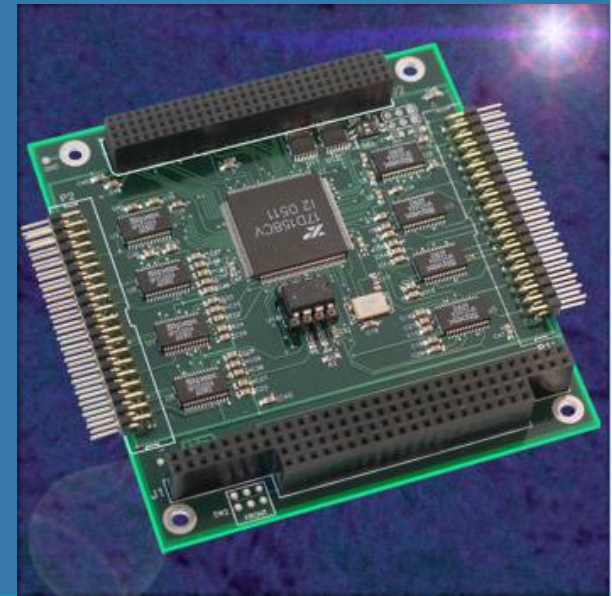
104-COM232-8



PC/104 PLUS 8 PORT RS-232 SERIAL BOARD

- ❑ PC/104 Plus 8 RS-232 asynchronous serial COM
- ❑ Operates as a standard COM port in all OS
- ❑ Speeds up to 460K with 64-byte FIFO on PCI bus
- ❑ Global interrupt source register
- ❑ Data Transfer in Byte, Word or Double-Word
- ❑ Transmit & Receive FIFO counters
- ❑ Extended Temperature Standard

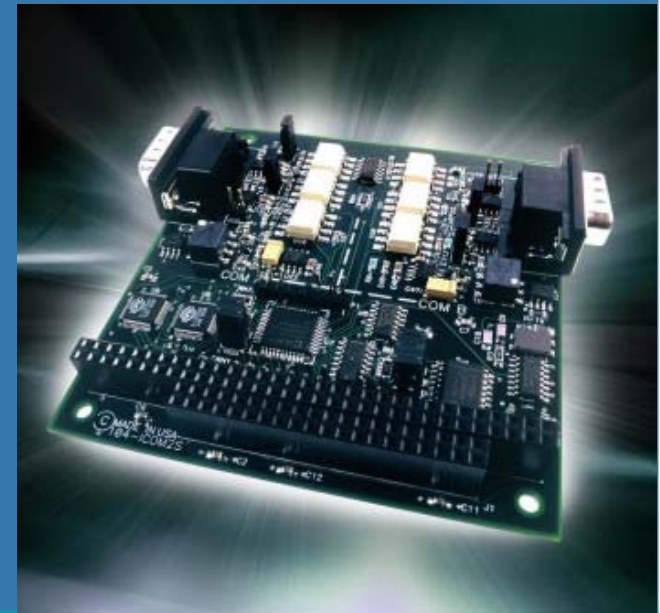
P104-COM232-8



PC/104 2 PORT ISOLATED RS-422/485 SERIAL

- ❑ PC/104 two optically isolated asynch serial COMs
- ❑ Field selectable RS-422/485 on either port
- ❑ Auto-RTS for half-duplex RS-485
- ❑ Speeds up to 115.2K STD,
460.8K w/128-byte FIFO option
- ❑ Fixed bias and jumper selectable
termination provided
- ❑ Operates as a standard COM
port in all OS
- ❑ E2 Extended temp option

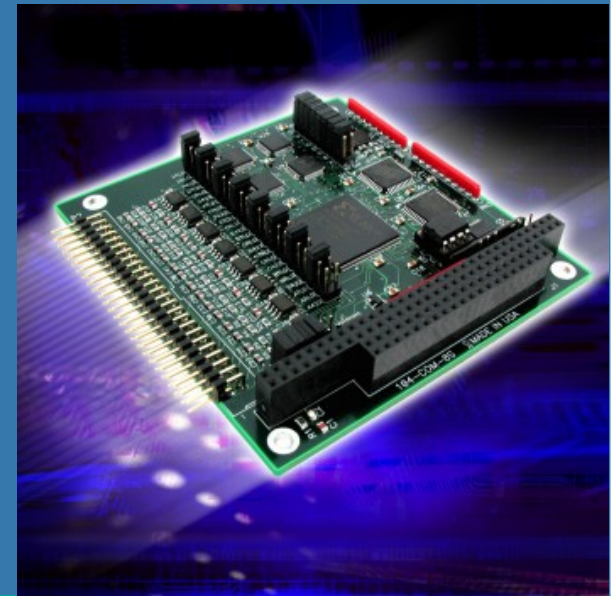
104-ICOM-2S



PC/104 RS-422/485 SERIAL BOARDS

- ❑ PC/104 8/4/2 port RS-422/485 asynch serial COM
- ❑ Field selectable RS-422/485 on each port
- ❑ Speeds up to 115.2K STD,
up to 921.6K w/jumper
selection & 128-byte FIFO option
- ❑ Auto-RTS for half-duplex RS-485
- ❑ Fixed bias and jumper select-
able termination provided
- ❑ E2 Extended temp option
- ❑ Standard COM port under all OS

104-COM-8S



PC/104 RS-232/422/485 SERIAL BOARDS

- ❑ PC/104 8/4/2 port RS-232/422/485 asynch serial
- ❑ Field selectable RS-232/422/485 on each port
- ❑ Speeds up to 115.2K STD, up to 921.6K w/jumper selection & 128-byte FIFO option
- ❑ Auto-RTS for half-duplex RS-485
- ❑ Fixed bias and jumper selectable termination provided
- ❑ E2 Extended temperature option
- ❑ Operates as a Standard COM port in all Operating Systems

104-COM-8SM



PC/104 DIGITAL QUADRATURE ENCODER INPUT BOARD

- ❑ 4 or 8 channels of quadrature encoder inputs and channel index inputs
- ❑ Input ranges: $\pm 25V$ and $\pm 7V$ common mode
- ❑ 4.3MHz maximum clock rate
- ❑ Programmable for counting, speed, and direction
- ❑ limit setting with interrupts; factory flexible interrupt options

104-QUAD-8



PC/104 DC-DC POWER SUPPLY BOARDS

- ❑ PC/104 Bus 30/40Watt DC/DC Power Supplies
- ❑ Three Wide Input Voltage Ranges of 12, 24, 48V
- ❑ Multiple outputs of 5, 12 and -12VDC,
with 5VDC only economy model
- ❑ Up to 84% efficiency
- ❑ Voltage status LEDs
- ❑ Reverse power protection on inputs
- ❑ Top or Bottom fanless heat sinking
- ❑ Resettable fused input line
- ❑ Fully protected outputs

104-PWR-512A



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PC/104 TWO BOARD CHASSIS

- ❑ PC/104 dual board backplane in low profile chassis
- ❑ Two PC/104 boards can be mounted side by side
- ❑ Opening on both ends for ribbon cables, wiring and cooling
- ❑ Rugged low cost enclosure
- ❑ Easy panel mounting provisions
- ❑ Protect system components during proto development

104T-BOX



PC/104 FOUR BOARD NEMA4 CHASSIS

- ❑ PC/104 dual board backplane in NEMA4 chassis
- ❑ Four PC/104 boards can be mounted side by side
- ❑ Provision for heat sinking CPU & Power Supply to Aluminum chassis.
- ❑ Measures just 8.7" x 5.6" x 3.25"
- ❑ Cover incorporates a recessed gasket to maintain seal
- ❑ Two or four watertight glands provide cable strain relief

104GH-BOX



PC/104 RUGGED STACK ENCLOSURE

- ❑ PC/104 conductive cooled aluminum chassis
- ❑ Four, Five & Six PC/104 board models
- ❑ Removable railed card cage subassembly
- ❑ Measures just 6.75" x 5" x 5" on four board model
- ❑ Lightweight, attractive, Chem-Film finished aluminum enclosure
- ❑ Perfect for rugged E2 environments

104E-BOX



ACCES USB SOLUTIONS



ACCESS I/O PRODUCTS, INC.



PCI 5 Volt Connector Key



USB I/O Concept

- ❑ Standard created in 1996
- ❑ USB-Stands for Universal Serial Bus
- ❑ Serial bit stream up 480Mbits/s
- ❑ External Hot-plugging I/O Interface
- ❑ Up to 127 devices from single USB Host port
- ❑ Motherboard host uses Type “A” connector & USB I/O uses Type B connector

Type B I/O connector



Type A MB connector



USB Speed

- ❑ USB 1.1 supports Low-Speed and Full-Speed
- ❑ USB-2.0 supports these plus High-Speed
- ❑ Low-Speed, data rate up to 1.5Mbps
- ❑ Full-Speed, data rate up to 12Mbps
- ❑ Hi-Speed, data rate up to 480Mbps or theoretical maximum of less than 60MBs(55MBs) for a single device.
- ❑ Control transfers, 4k transactions per second due to overhead and latency on digital units. 32bits per transaction

Standard USB



High Speed USB








USB I/O Power

- ❑ Maximum available power at host port is 500mA
- ❑ Bus powered hubs supply only 400mA for all four ports
- ❑ Some motherboards supply less than 500mA
- ❑ ACCES USB I/O has external power option on most designs
- ❑ Only a few models require external power, ie 16 relays

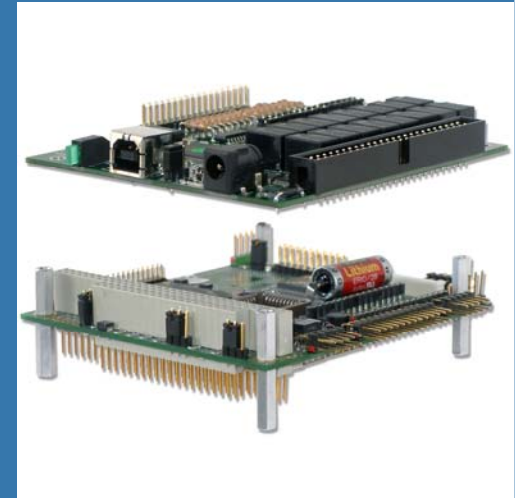
Type A & B pins



1		Vcc 4.75-5.25VDC
2		Data -
3		Data +
4		Ground
5		Shield

USB/104

- ❑ Creating a full USB/104 product line
- ❑ OEM “board only” USB products
- ❑ Bus agnostic PC/104 size I/O board with the same hole mounting
- ❑ Fits in most PC/104 Chassis
- ❑ Mounts on PC/104 stack
- ❑ Can be used inside rack mount and bench mount computers as extra I/O when all slots are full
- ❑ Can be used inside OEM products



USB Serial Single Port

- ❑ Add a RS-232, RS-422 or RS-485 serial port to any USB equipped computer
- ❑ Data transfer rates up to 920K baud
- ❑ Built in six foot cable
- ❑ Ideal for laptops & portables
- ❑ No available board slots needed
- ❑ RoHS versions available
- ❑ Plug-n-Play Hot Swap device for quick connect/disconnect

USB-232,-422,485



USB Serial Dual Port

- ❑ Add two RS-232/422/485 serial ports to any USB equipped computer
- ❑ Data transfer rates up to 921.6K baud on RS-422/485
- ❑ Small (4" x 3.75" x 1.8") rugged metal enclosure, USB/104 board
- ❑ Ideal for laptops & portables
- ❑ No available board slots needed
- ❑ USB bus power only required
- ❑ Plug-n-Play Hot Swap device

USB-COM-2SM



PCI 5 Volt Connector Key



USB Serial Four Port

USB-COM-4SM

- ❑ Add four RS-232/422/485 serial ports to any USB equipped computer
- ❑ Data transfer rates up to 921.6K baud on RS-422/485
- ❑ Compact low-profile rugged metal enclosure with power/activity LEDs
- ❑ Ideal for laptops & portables
- ❑ No available board slots needed
- ❑ USB bus power only required
- ❑ Plug-n-Play Hot Swap device



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USB 32 Digital I/O

- ❑ Add Qty 32 digital TTL input/outputs to any USB equipped computer
- ❑ High-speed USB 2.0
- ❑ Small (4" x 4" x 1.25") rugged metal enclosure, USB/104 board
- ❑ Four 8-bit ports, individually selectable as inputs or outputs
- ❑ Buffered lines with Sink 64mA & Source 32mA current capabilities
- ❑ USB bus power only required

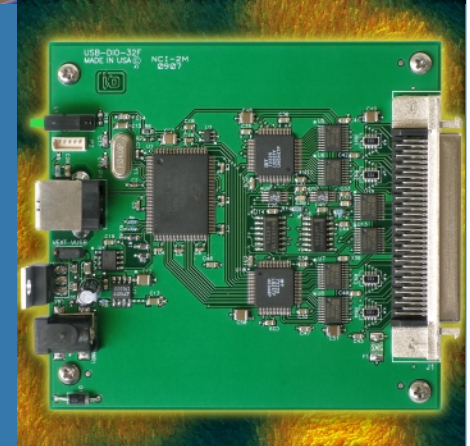
USB-DIO-32



USB FAST 32 Digital I/O

- ❑ 32 high-speed digital I/O lines feature continuous throughput of 24MB/s
- ❑ Digital outputs capable of 132MB/s bursts with synchronous clocking
- ❑ Small (4" x 4" x 1.25") rugged metal enclosure, USB/104 board
- ❑ Two 16-bit ports, one for inputs & one for outputs on 68 pin SCSI HD
- ❑ Buffered lines with Sink 64mA & Source 32mA current capabilities

USB-DIO16-16A



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USB Digital Isolated Inputs & Relay Outputs

USB-IIRO-16

- ❑ Add Qty 16 isolated input/16 relays to any USB equipped computer
- ❑ High-speed USB 2.0
- ❑ Small (4" x 4" x 1.5") rugged metal enclosure, USB/104 board
- ❑ Removable internal screw terminals
- ❑ Form C electro-mech. 1A relays
- ❑ 16 Relay versions require external power supply, 8 & 4 relay pwr. option



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USB Digital Isolated Inputs, Relays & Serial Combo

USB-IIRO4-2SM

- ❑ Qty 4 digital isolated inputs
- ❑ Four Form C electro-mech. relay outputs, 1A
- ❑ Two serial RS-232/422/485 ports
- ❑ USB 2.0 & 1.1 compatible
- ❑ Small (4" x 3.75" x 1.8") rugged metal enclosure, USB/104 board
- ❑ USB bus power only required
- ❑ Expansion USB hub connector



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USB Counters

- ❑ Add 15 independent 16-bit counter/timers to any USB equipped computer
- ❑ Clock, gate and out signals from all 15 counters buffered & accessed via 1 connector
- ❑ Small (4" x 4" x 1.25") rugged metal enclosure, USB/104 board
- ❑ Removable screw-termination board
- ❑ User wiring card adaptor supplied
- ❑ USB bus power only required

USB-CTR-15



USB Analog Input

- ❑ Add 16 single-ended or 8 differential channels of 16-bit A/D at 500kHz to any USB equipped PC
- ❑ Two 16 digital I/O lines & 16-bit programmable counter
- ❑ High-speed USB 2.0 device
- ❑ Small (4" x 4" x 1.25") rugged metal enclosure, USB/104 board
- ❑ Auto calibration & Programmable Gain (choose from 8 ranges)
- ❑ Self standing mode optional w/1M

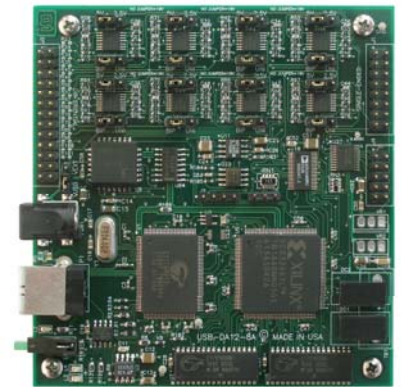
USB-AI16-16



USB Analog Output

- ❑ Add 8 independent 12-bit DACs to any USB equipped computer
- ❑ Two models either Standard D/A or Arbitrary Waveform generator
- ❑ USB 2.0 bulk buffered or streaming waveform output
- ❑ Small (4" x 4" x 1.5") rugged metal enclosure, USB/104 board
- ❑ 128K sample buffer outputs one million DACs/second

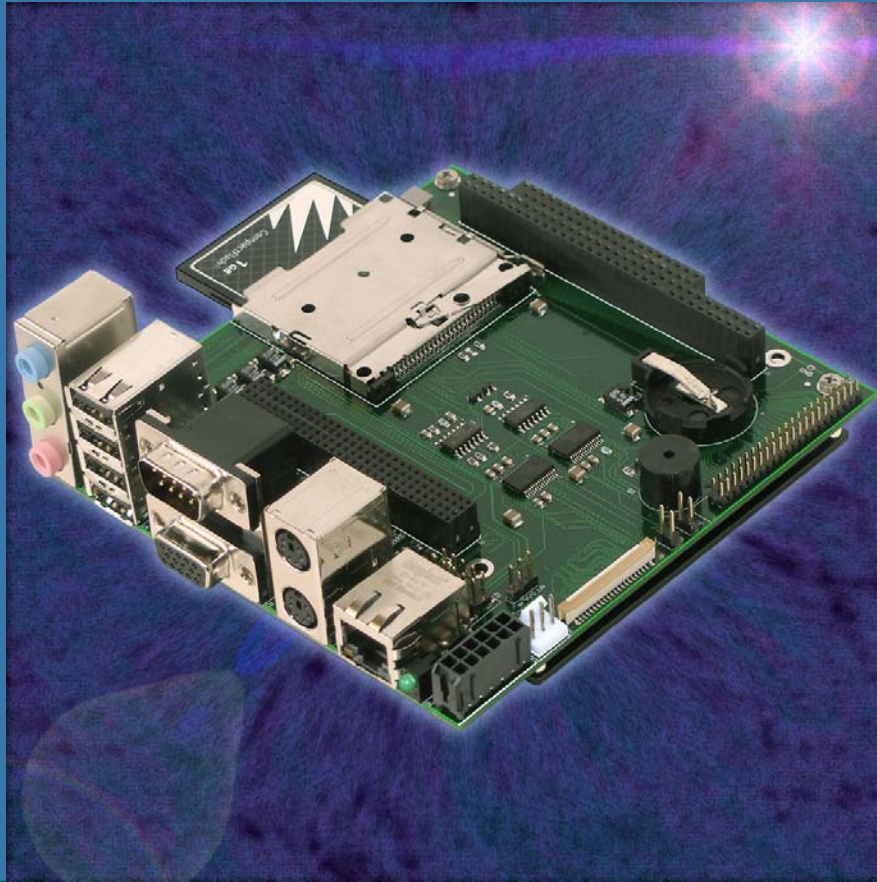
USB-DA12-8E
USB-DA12-8A



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ACCES ETX SOLUTIONS



 **ACCES**
I/O PRODUCTS, INC.

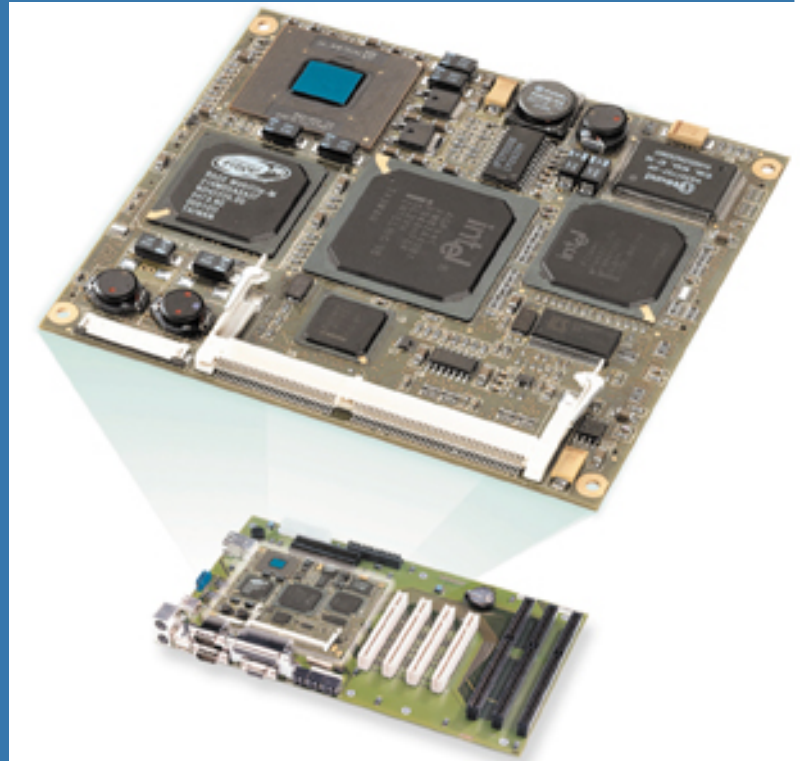


**PCI 5 Volt Connector
Key**



ETX Concept

- ❑ Standard created by Kontron in 2000
- ❑ ETX-Stands for Embedded Technology eXtended
- ❑ Computer module size 95mm X 114mm
- ❑ Uses four surface mount Hirose FX8 connectors
- ❑ Routes PCI/ISA Bus & all motherboard I/O lines through connectors



ACCES & ETX

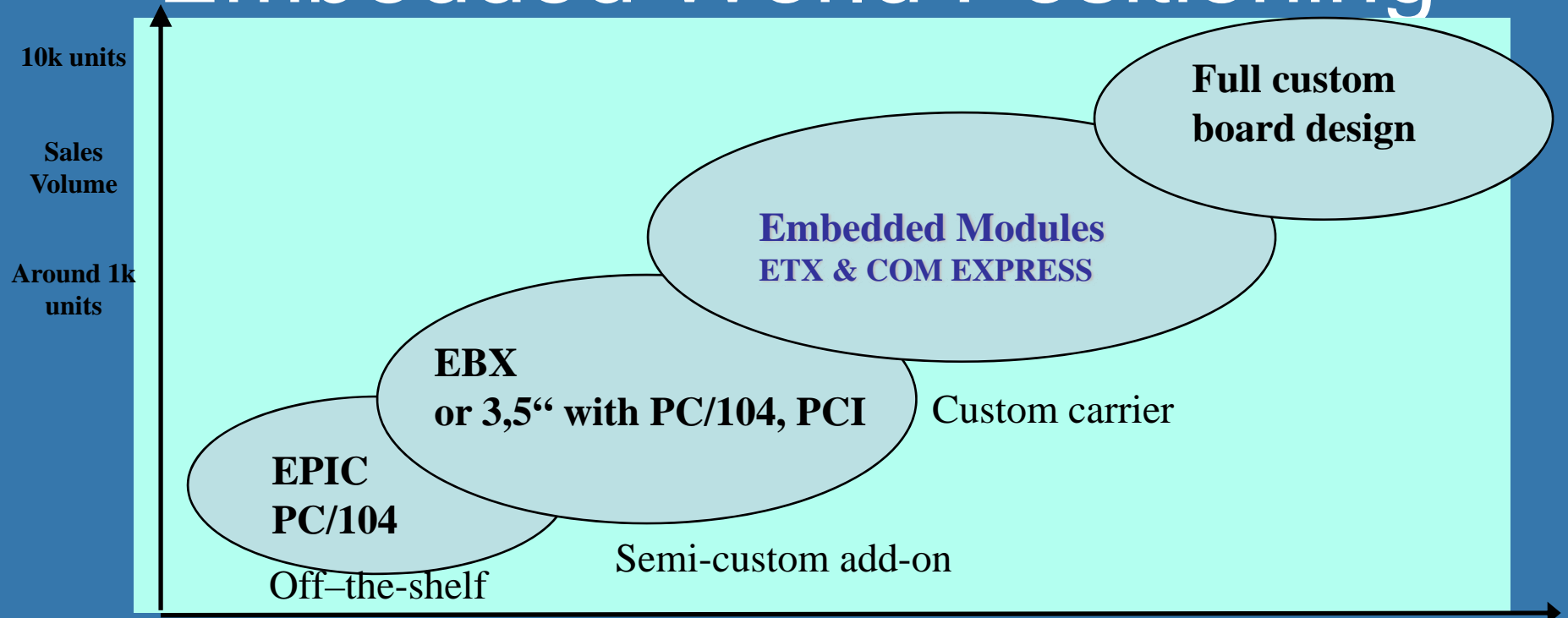
- ❑ First exclusive I/O manufacturer doing ETX baseboards
- ❑ Semi-Custom ETX Baseboard concept introduced
- ❑ Select ACCES COTS I/O for foundation
- ❑ Kontron Certified ETX baseboard partner & distributor



PCI 5 Volt Connector Key



Embedded World Positioning

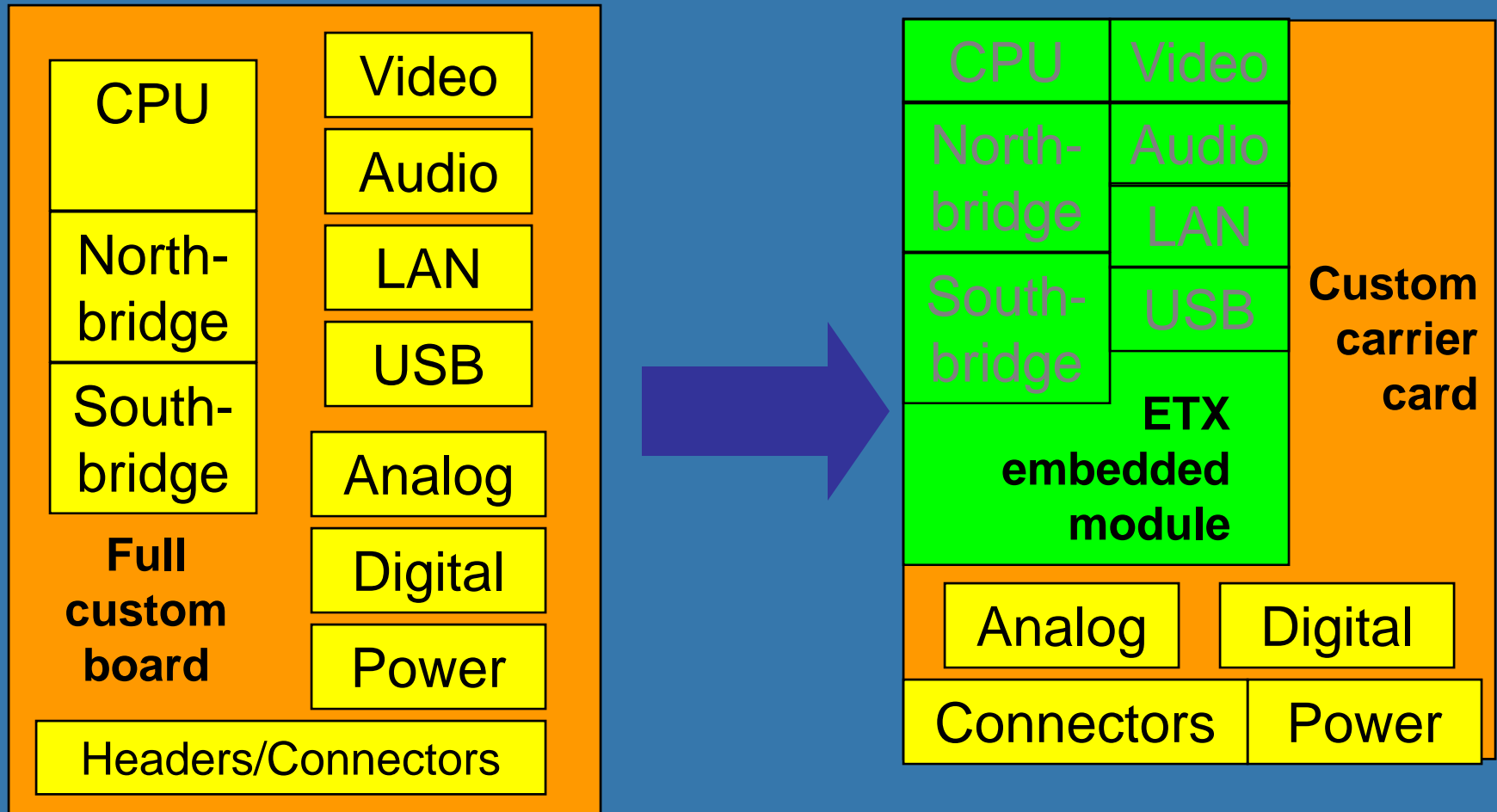


Off-the-shelf
Complexity low
High margin
Distribution
Standardized
ASP high

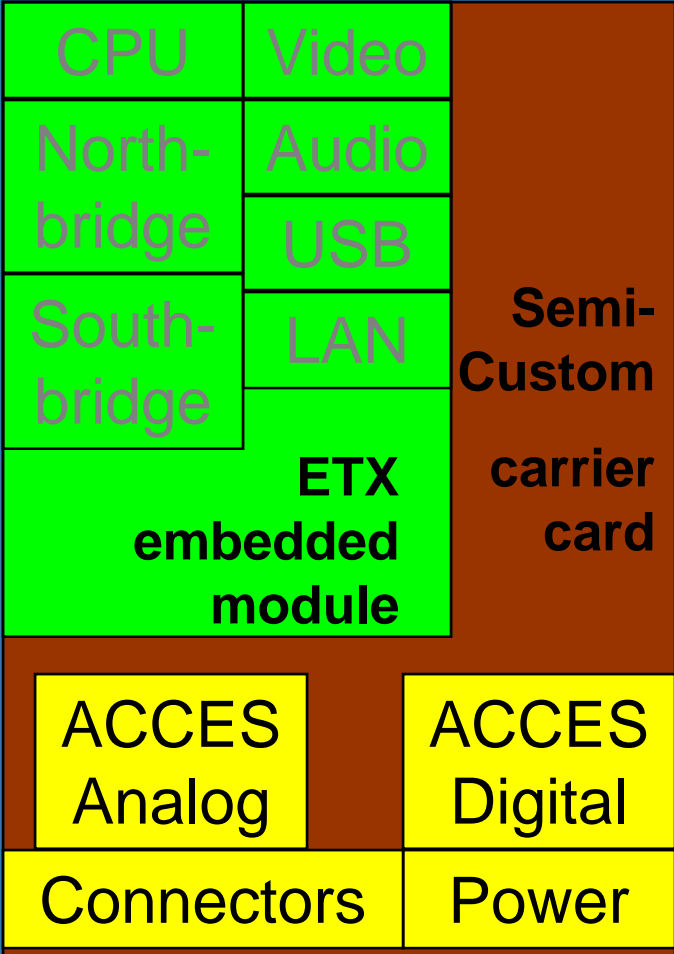
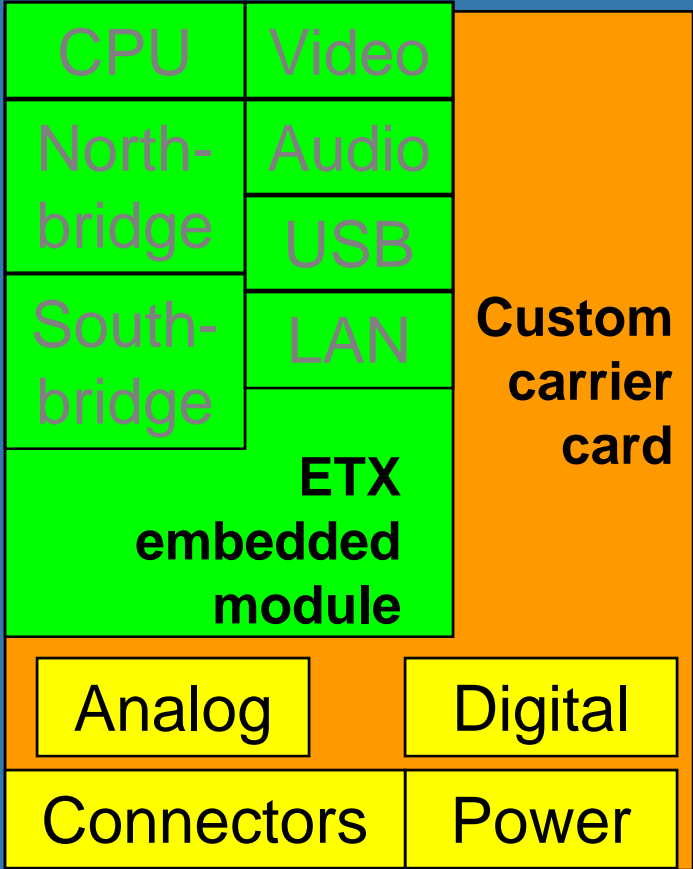


Project business
Complexity high
Low margin
Direct sales
Semi/full custom
ASP low

?Puzzle vs ETX Building Block

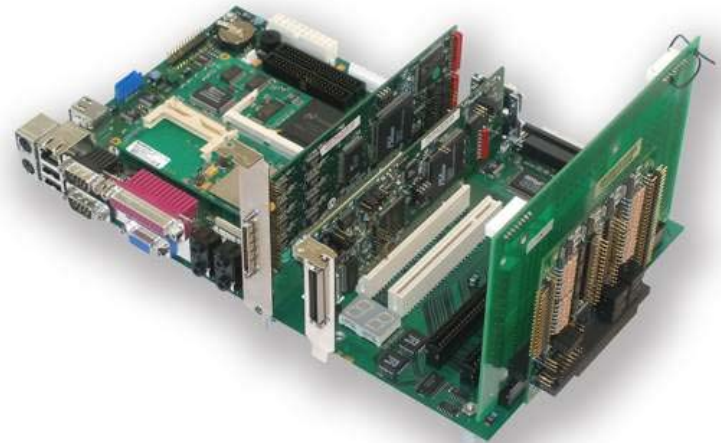


ETX CUSTOM vs ACCES ETX



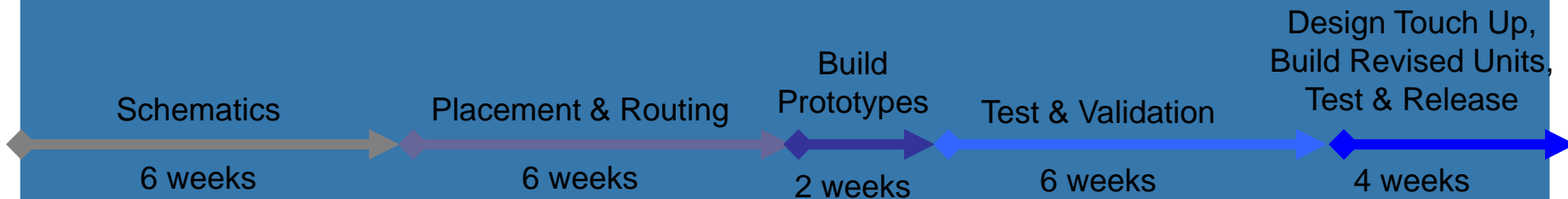
Semi-Custom ETX Baseboard

- ❑ First define all your I/O needs both motherboard and application add on I/O
- ❑ Get development baseboard
- ❑ Select ACCES I/O cards
- ❑ Select computer module
- ❑ Use this to write software and prove application
- ❑ ACCES provides proto baseboard with I/O & connectors included

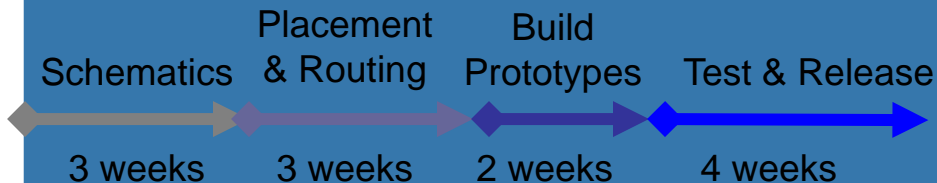


ETX vs. CUSTOM COMPARISON

Full Custom Design == 24 Weeks



ETX Semi-Custom Design == 12 Weeks



Enter market 3 months ahead

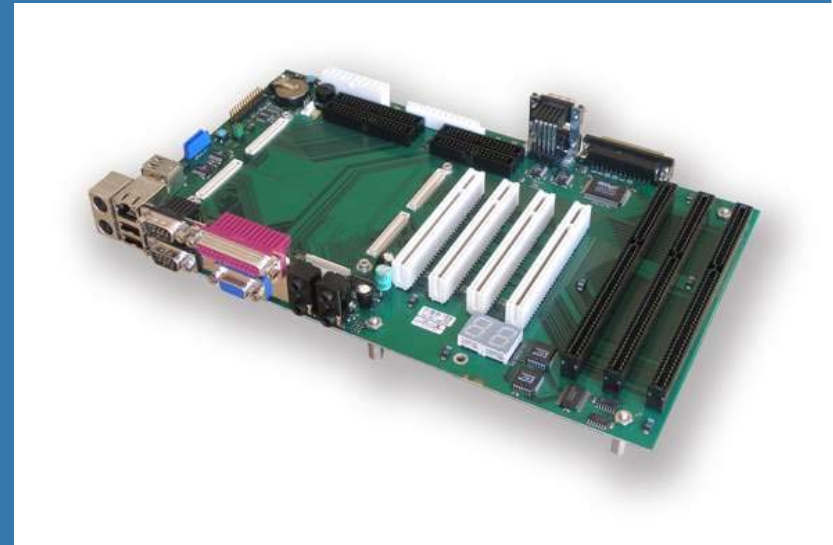


PCI 5 Volt Connector Key



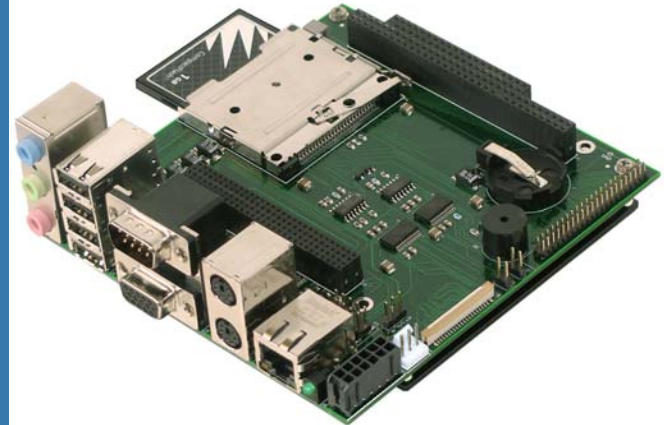
ETX-EVAL Development Baseboard

- ❑ ATX motherboard ETX baseboard
- ❑ Power connectors for ATX & Baby AT P/S
- ❑ FFC connector for LVDS flat panels
- ❑ Four PCI & Three ISA slot
- ❑ All STD motherboard I/O
- ❑ Standard four ETX connectors for using all ETX compatible modules
- ❑ Use for application proto custom development



ETX-NANO-104

- ❑ Wide range of ETX CPU modules supported
- ❑ Small size only 120mm X 125mm(4.72" X 4.92")
- ❑ Full PC/104 Plus I/O Expansion
- ❑ Four rear mounted USB 2.0
- ❑ VGA, PS/2 Mouse/Keyboard
- ❑ Two Serial, 1 RS232/422/485
- ❑ 10/100 Ethernet LAN port
- ❑ Flat Panel, IDE, Flash support
- ❑ AC97 audio; Line In/Out/MIC



NANO I/O SERVER

- ❑ Up to Core Duo 1.66Mhz Fanless computer
- ❑ Small size only 127mm X 159mm(5.00" W X 6.25")
- ❑ 2.5" laptop drive mount if only one PC/104 board
- ❑ 2 two PC/104 Plus I/O cards
- ❑ Flush side opening for Compact Flash card
- ❑ Black anodized aluminum
- ❑ Rear I/O Panel
- ❑ 12VDC to ATX P/S



PCI Express (PCIe)



Catch the PCI Express!



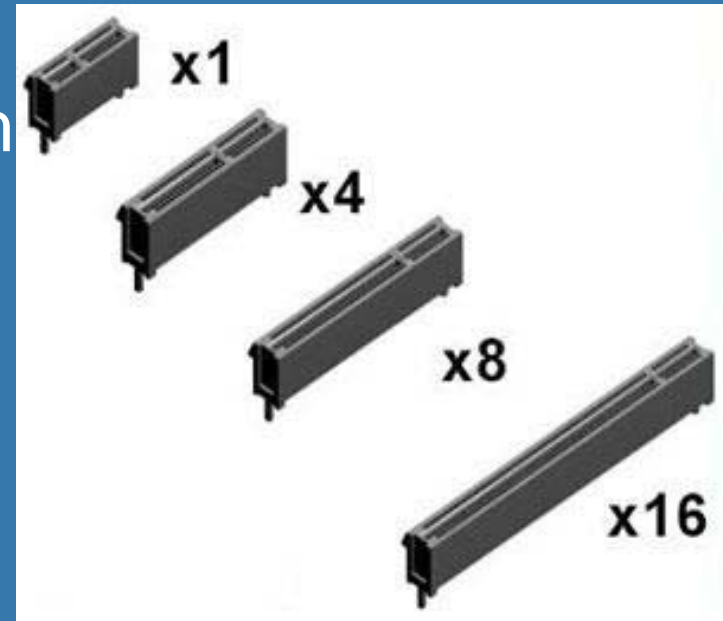
PCI 5 Volt Connector
Key



PCI Express I/O Concept

- ❑ Intel standard created in 2004
- ❑ 1X lane serial bit stream up 250MB/s
- ❑ Slots in 1X, 4X, 8X & 16X and eventually 32X lanes
- ❑ 1X double PCI slot bandwidth
- ❑ Full duplex and point to point
- ❑ No shared bandwidth between I/O boards
- ❑ One device per slot
- ❑ I/O path of 1 bit serial

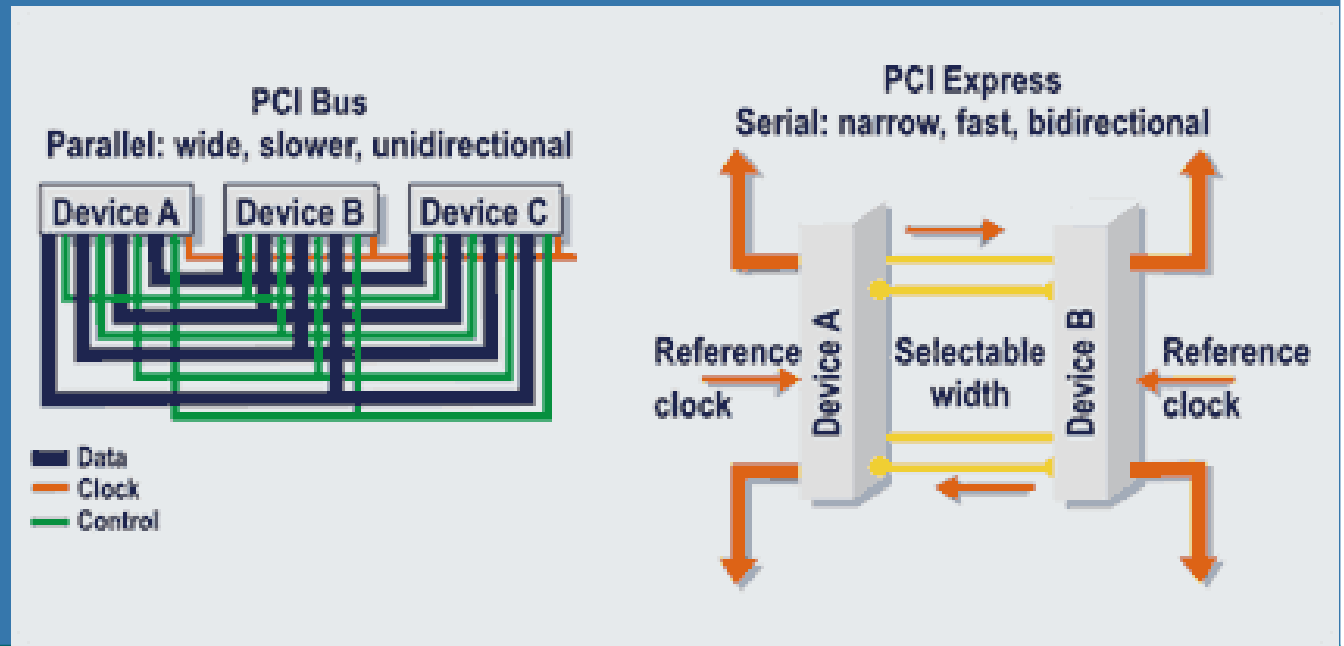
PCIe I/O slot connectors



PCI Express Non-Bus “bus”

- ❑ Riding on a public bus vs private freeway lane
- ❑ Even 16X device has parallel private data lanes that do not act as shared data bus

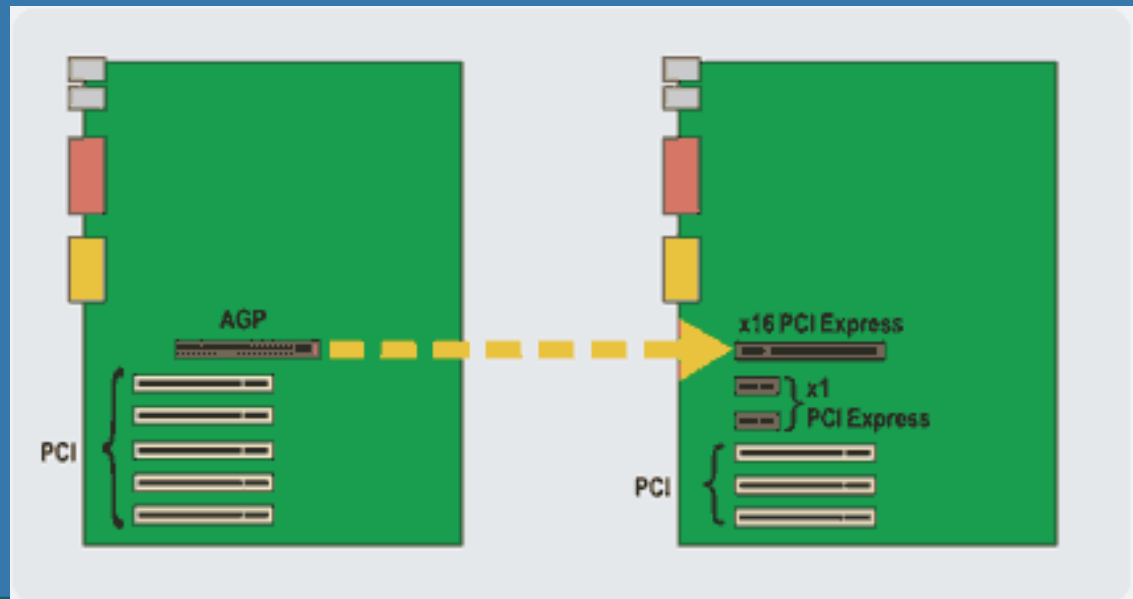
PCI Bus vs
PCI Express



PCI vs PCIe Motherboards

- ❑ Common motherboards mostly have 16X to replace AGP and 1X for I/O boards
- ❑ Motherboards will often not be able to used for embedded

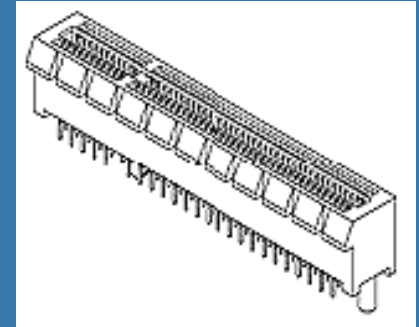
Current PCI & PCIe Motherboards



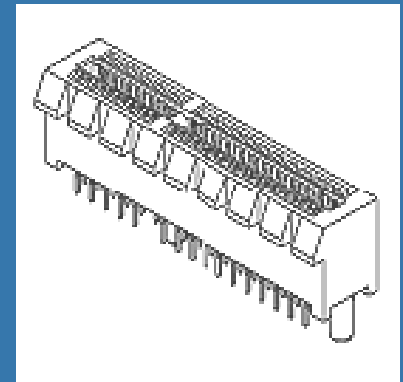
PCI Express Device Lane I/O Use

- ❑ 16X mostly used by graphic boards
80 Gbps (encoded), 64Gbps(8 GBs)
- ❑ 8X for dual 10Gig Ethernet board or
advanced graphic capture boards
- ❑ 4X for SAS drive controllers and
multiple Gigbit Lan server boards
- ❑ 1X single Gigabit workstation
board, SATA drive controller,
other I/O boards 5 Gbps (encoded)
4 Gbps, 500 MBs (unencoded)

PCIe 8X connector

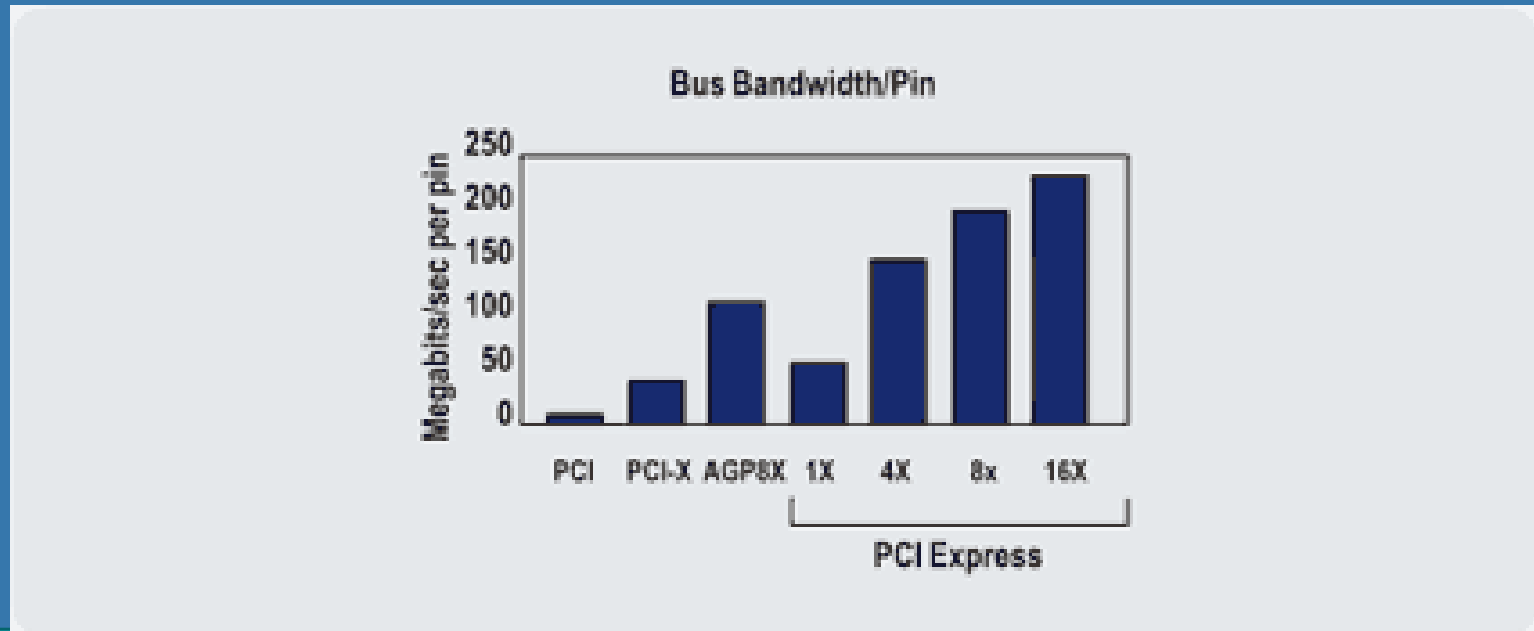


PCIe 4X connector



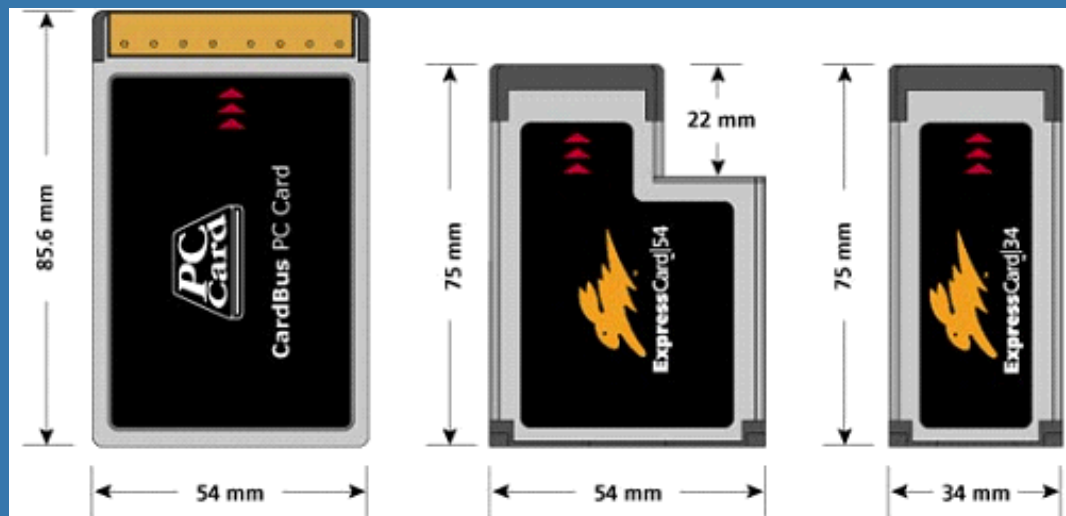
PCIe Embedded Density

- ❑ PCIe provides higher performance with less pins
- ❑ This saves space on small embedded boards
- ❑ Allowing more capability on smaller I/O board



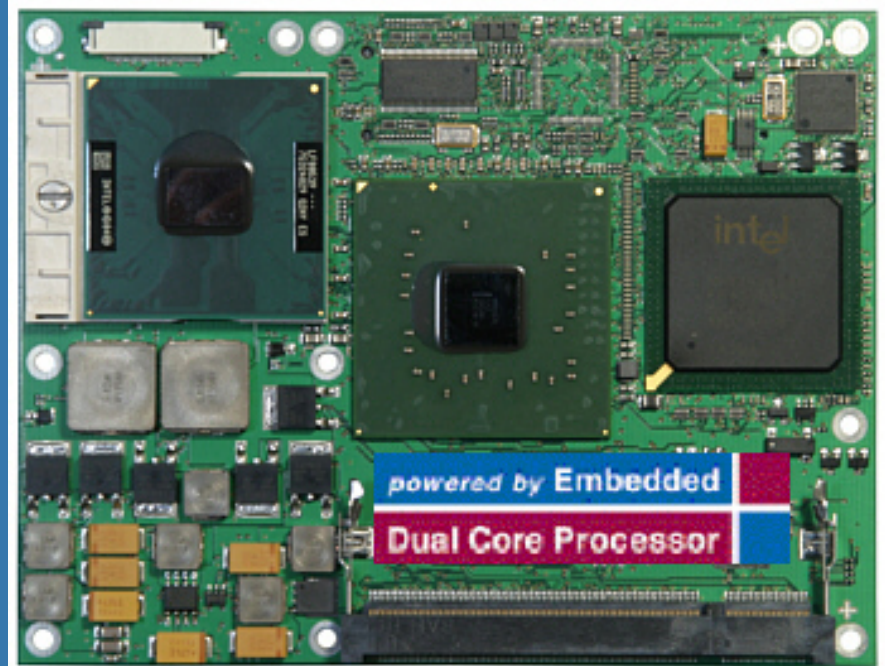
PCI Express Form Factors

- ❑ Slot based PCI Express low profile, 1X, 4X, 8X, 16X for motherboards and PICMG 1.3 passive backplanes
- ❑ Mini Card replaces Mini PCI(1X, USB, SMBus)
- ❑ Express Card:
successor to PC Card or PCMCIA
(1X PCIe and USB 2.0 hot-pluggable)



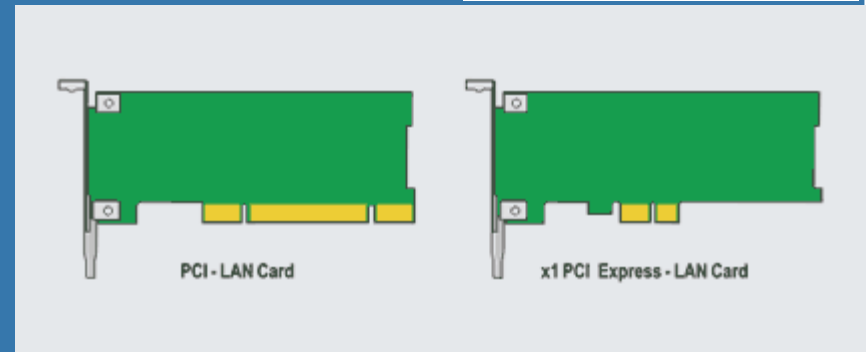
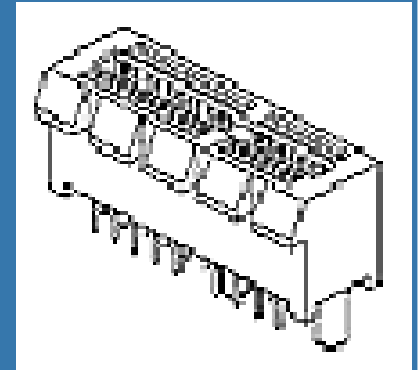
PCI Express Form Factors

- ❑ XMC: replaces CMC/PMC (4X PCIe or Rapid I/O)
- ❑ MXM & AXIOM graphics modules for laptops
- ❑ PC/104 Express coming(1year)
- ❑ COM Express: (shown) successor to ETX CPU modules



PCI Express Slots

- ❑ 1X slot cards can fit in 1X, 4X, 8X slots
- ❑ Meets the needs of most data acquisition, control and communication boards
- ❑ 1X connector shown to the right
- ❑ PCIe 1X will have reduced costs
- ❑ PCI compared to 1X PCIe seen below
- ❑ Less of PCB allocated to bus routing



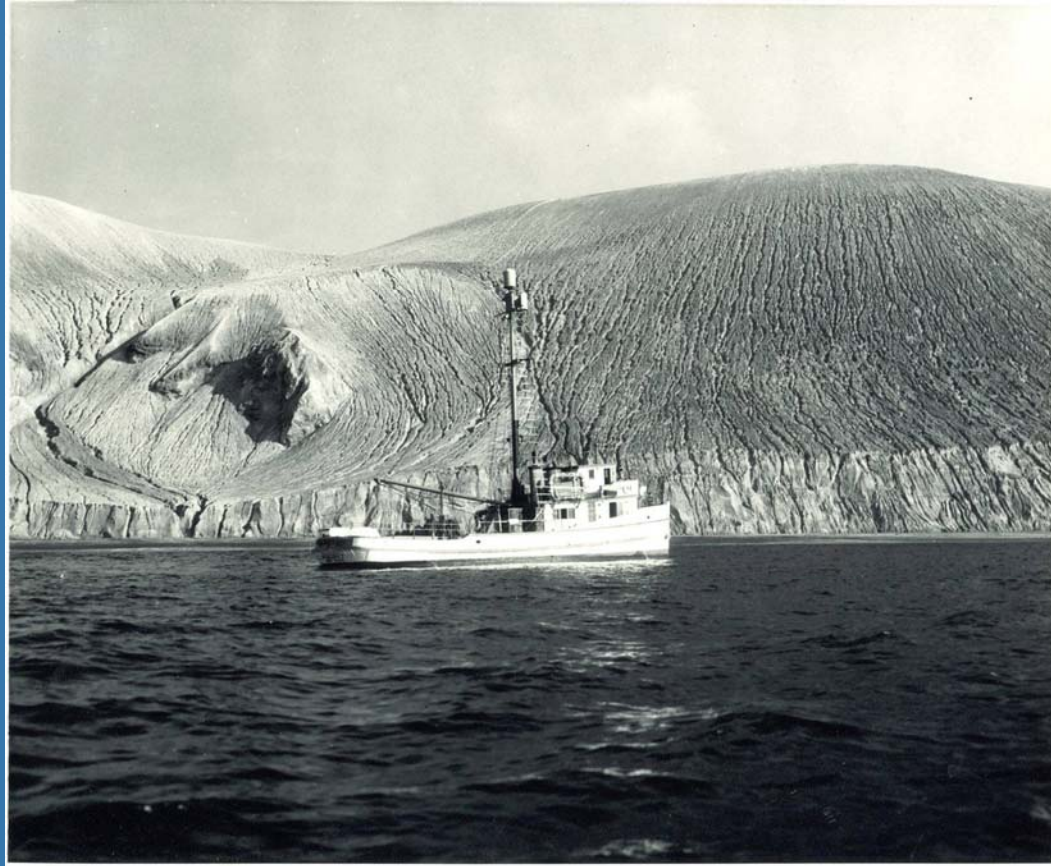
We have come a long way



PCI 5 Volt Connector
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Computer I/O Yesterday, Today & Tomorrow



PCI 5 Volt Connector
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Contacts

- ❑ ACCES I/O Products
10623 Roselle Street (Sorrento Valley)
San Diego, Ca 92121, (858)550-9559
- ❑ John Persidok, President
X3003 jpersidok@accessio.com
- ❑ Chris Persidok, Marketing & Operations
X3002 cpersidok@accessio.com
- ❑ Peter Persidok, Engineering
X3007 ppersidok@accessio.com
- ❑ Stephen Newbegin, Sales & Business
Development, X3024 snewbegin@accessio.com



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