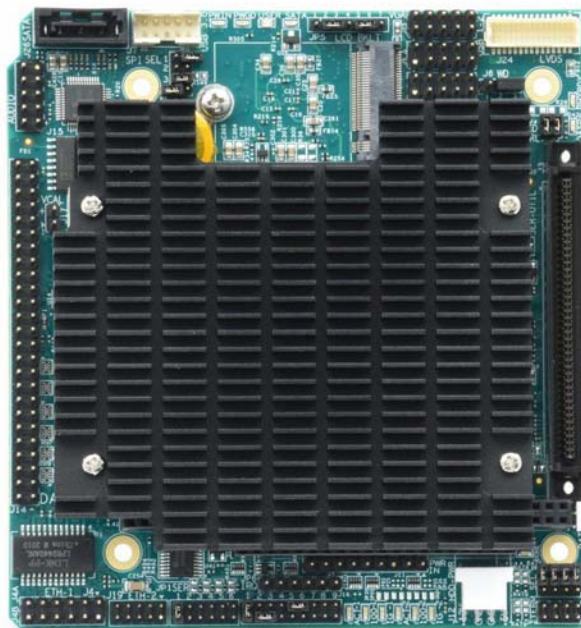


Athena IV

COM-based PC/104 SBC with integrated Data Acquisition



Athena IV baseboard with COM installed; heat sink removed for illustration purposes



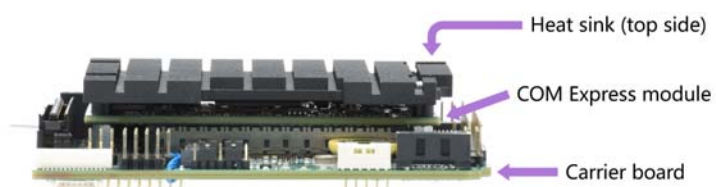
Athena IV with heat sink installed



Athena IV baseboard



Athena IV bottom view



A COM-based SBC consists of 3 elements: carrier board, COM, and thermal solution

FEATURES

- COM-based architecture for long product life and performance scalability
- Integrated professional quality data acquisition circuit saves space
- Downward stacking PC/104 ISA bus connector supports a wide range of I/O modules for easy system I/O expansion
- M.2 2230 SATA socket supports up to 128GB flashdisk
- Form factor and most connectors backwards compatible with previous generations of Athena for easy product migration
- Heat sink cooling
- 5VDC input voltage
- 4.175 x 4.475" / 106 x 114mm W x H
- -40/+85°C operation fanless
- Windows 10 and Ubuntu Linux OS support

SBC features:

- Bay Trail E3845 quad core 1.91GHz CPU
- 4GB RAM soldered on COM
- 2 gigabit Ethernet
- VGA port
- Single-channel 24-bit LVDS
- 1 USB 3.0 port
- 4 USB 2.0 ports
- 4 RS-232/422/485 serial ports with dual software/jumper configuration control
- HDA audio (ALC262)
- 7-pin SATA connector plus M.2 2230 socket
- On-board RTC backup battery with external battery connector

Data acquisition subsystem features:

- 16 single-ended / 8 differential analog inputs
- 16-bit A/D resolution
- Unipolar and bipolar analog inputs
- Single-ended and differential input configuration
- Programmable gain 1/2/4/8 providing input ranges +/-10V / 0-10V down to +/- 1.25V / 0-1.25V
- 150KHz maximum A/D sample rate, single-channel and multi-channel mode
- Internal clock / external clock / software A/D triggering
- Single-channel and multi-channel-scan A/D operation
- Interrupts with FIFO to support reliable high-speed sampling
- 4 12-bit single-ended analog outputs
- +/-10V, +/-5V, 0-10V and 0-5V output ranges
- Autocalibration with Universal Driver software maintains accuracy over time and temperature
- 24 digital I/O, 3.3V logic / 5V tolerant inputs
- 2 programmable counter/timers for A/D timing and general counting purposes

◆ Description

Athena IV is the fourth generation in the Athena family of rugged, wide-temperature PC/104 SBCs with Integrated data acquisition, extending back to the original Athena in 2004. Athena IV is an excellent choice for:

- Customers using previous generations of Athena seeking to extend the lifetime of their existing product;
- Customers seeking to replace an obsolete PC/104 SBC with a newer generation one to extend their existing product's lifetime; or
- Customers seeking to build a PC/104 system expected to have a long lifetime.

◆ Advantages of a COM-based architecture

Athena IV uses a COM Express Type 10 "mini" Computer-on-Module (COM) to provide the core CPU functionality, mounted on a carrier board that provides the PC/104 expansion and the remaining I/O circuitry.



The use of a COM instead of a directly soldered CPU circuit provides several key advantages and benefits:

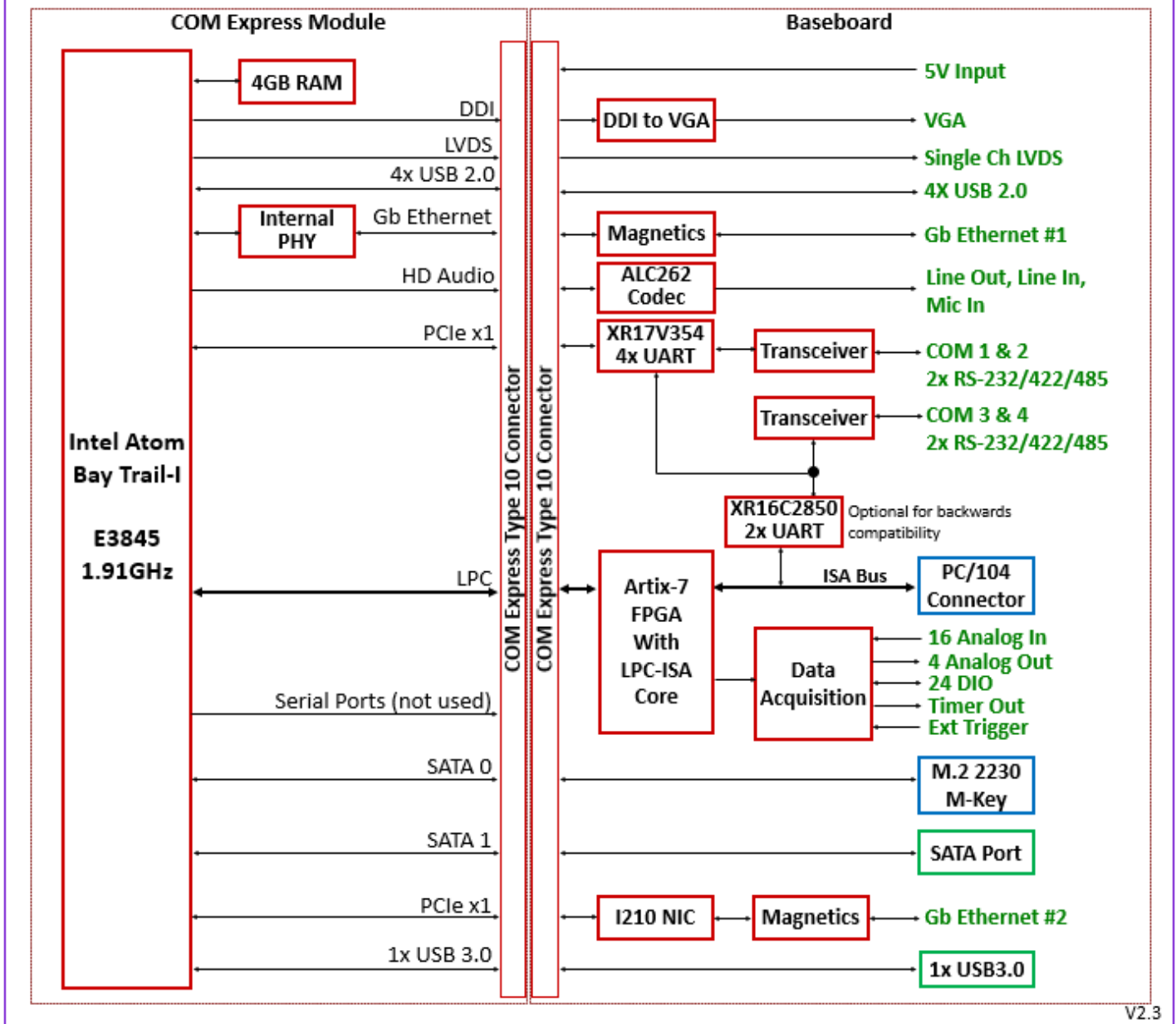
- Higher feature density: a 2-board solution provides twice the PCB area in the given footprint, allowing more circuitry and more features to be included.
- Longer lifetime: Since all COMs in a given form factor support essentially the same features, if the COM becomes obsolete or unavailable, a newer one can be used in its place, usually with minimal re-engineering.
- Performance scalability: COM Express modules are available from a number of suppliers around the world with multiple processor and memory options, allowing a single design to be used for a range of applications. For a lower-end application, choose a low-power, low-performance COM. For a higher end application, choose a higher performance COM. In both cases the rest of the system remains identical, allowing your investment in engineering and product design to be reused multiple times.
- Easier access to newer generation CPUs: Most processors enter the market initially in the form of COMs. By using a COM-based SBC, you can gain access to the latest generation of CPU sooner than waiting for a true SBC with that processor to be available. Again, upgrading is simple since the rest of the system remains unchanged.

◆ Maintaining a legacy for long life applications

Each generation of Athena maintained the same physical shape and most of the I/O connectors and features of the previous generations, while updating key features to stay current with the state of the art. In this way the Athena platform has maintained a low-impact migration path for customers with extended product lifecycles that outstrip the lifetimes of the CPU. Many customers have been able to maintain their products for up to 16 years as a result.

to view a comparison chart of the features and differences between Athena II, Athena III, and Athena IV.

ATHENA IV Block Diagram



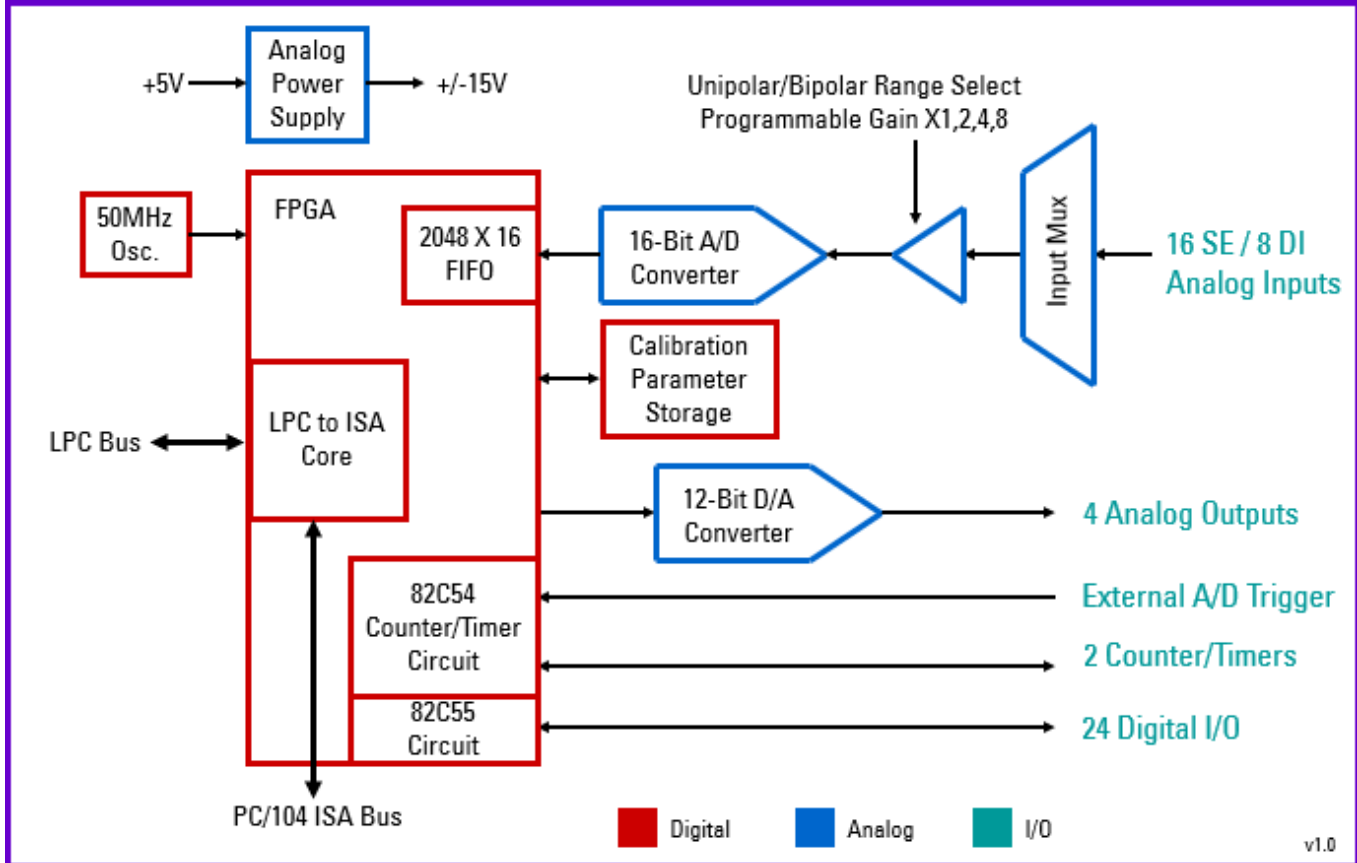
◆ Integrated Data Acquisition

Athena IV is a member of Diamond's 2-in-1 series of SBCs with integrated data acquisition. For applications requiring precision analog I/O, a 2-in-1 SBC is an ideal choice because it reduces the number of boards in the system, resulting in a system that is smaller, lighter, lower cost, and easier to assemble and maintain.

The data acquisition circuit on Athena IV includes 16 channels of 16-bit A/D, 4 channels of 12-bit D/A, and 24 channels of digital I/O. The analog inputs feature single-ended and differential configuration, programmable input ranges, and fault-protected channel multiplexors to protect against overvoltages. The D/A channels feature programmable output ranges and simultaneous update capability. Both A/D and D/A circuits include Diamond's advanced autocalibration technology, enabling the board to be quickly calibrated in software without the use of trim pots that are subject to tampering, mis-adjustment, or shock and vibration. The A/D and D/A circuits feature lower noise, higher bandwidth, and more configuration flexibility than competing analog I/O circuits.

All Diamond's analog and digital I/O circuits are supported by our Universal Driver programming library for Windows and Linux. This software package includes a suite of demo programs in source and executable form. A convenient GUI program supports quick and convenient operation of all I/O features and can be used for rapid prototyping as well as system debugging.

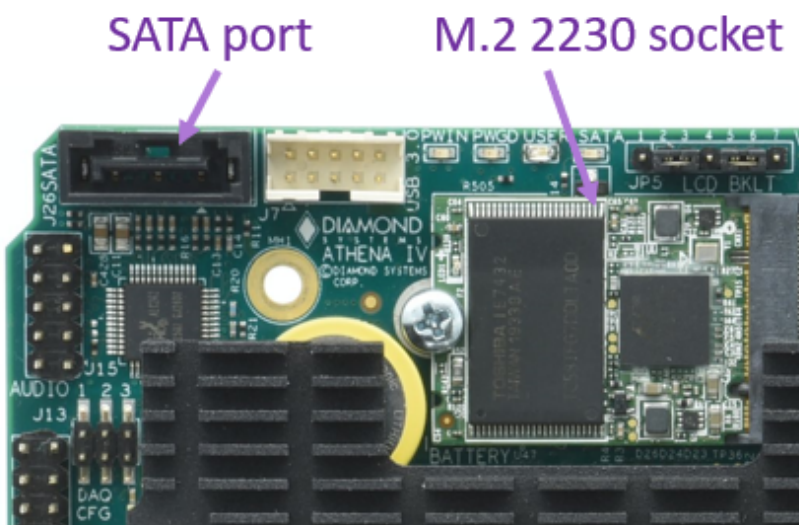
ATHENA IV Data Acquisition Block Diagram



◆ Mass storage

Athena IV offers two methods for mass storage:

- An M.2 2230 size SATA socket is provided for onboard mass storage. Modules up to 128GB are available. This is the most common choice.
- A standard 7-pin SATA connector is available for connecting a standard 2.5" or other form factor hard drive. This connector can be used when higher capacity storage is needed. Diamond offers accessory board ACC-HDDMOUNT which allows a 2.5" drive to be mounted on the PC/104 stack.



◆ PC/104 expansion

Athena IV uses the rugged and widely supported PC/104 ISA bus for I/O expansion. Choose from hundreds of I/O modules from vendors all over the world, including our own extensive selection using the links below. Although the board has both top side and bottom side PC/104 connectors, bottom side mounting of I/O modules is preferred to avoid blocking airflow over the top-side heat sink on Athena.

PC/104 specifications are available [here](#). Learn more about PC/104 [here](#).

Analog I/O expansion modules

Digital I/O expansion modules

Serial port expansion modules

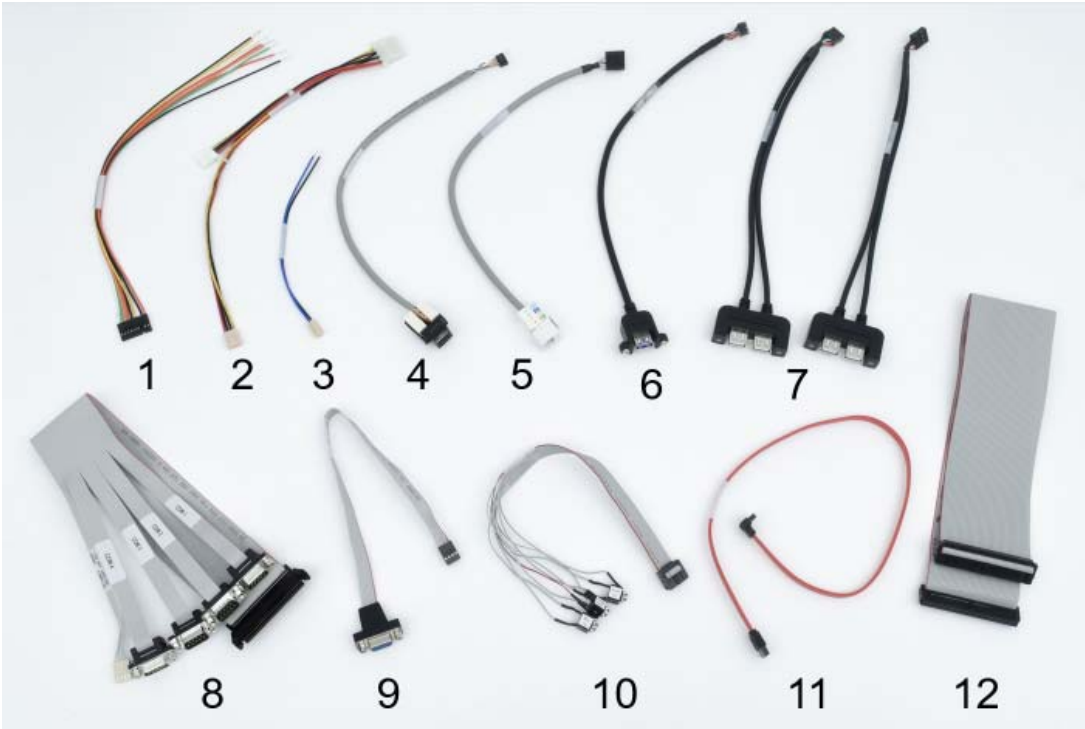
◆ Development Kit

Development kits are available to support quick project startup. Each kit includes the Athena SBC, a cable kit, and a programmed 64GB flashdisk with your choice of Windows 10 or Linux operating system, ready to run. Simply plug in the flashdisk, attach the cables, add your keyboard, mouse, and display, and you’re ready to boot into a fully functional OS. Configuration files and instructions are provided to rebuild the OS with your application. The Linux kit includes all the tools needed to rebuild the OS. The Windows 10 kit includes a runtime license.

◆ Cable Kit

Athena IV is designed to use most of the same cables as previous generations of Athena, along with upgrades for the latest technology. New with Athena IV is a second gigabit Ethernet port which is backwards compatible with the original board’s 10/100 connector along with a USB 3.0 cable.

Cables are normally sold as complete kits. Individual cables may be available in some cases or may be ordered with minimum order quantities; contact us for details.



CK-ATH4-01 includes the following cables:

No.	Qty	Cable	Description	Drawing
1	1	6981009	Power I/O cable	Show
2	1	6981006	Output power cable	Show
3	1	6981011	External battery cable	Show
4	1	6981080	Gigabit Ethernet cable, RJ-45 socket, 10 pin board connector	Show
5	1	6981086	Gigabit Ethernet cable, RJ-45 socket, 12 pin board connector	Show
6	1	6980603	Dual USB 3.0 type A, latching	Show
7	1	6981012	Dual USB cable, ports 0 & 1	Show
8	1	6981014	Cable Assy, 80 Pin Socket, 2x20 to 4x Serial DB9M	-

9	1	6981030	VGA cable	Show
10	1	6981031	Audio cable	Show
11	1	6989101	SATA Cable, 7-Pin Data, Straight to Right Angle, 500mm	Show
12	1	C-50-18	50-conductor .1" pitch 18" ribbon cable, Data acquisition Cable	Show

◆ Product Configurations

Athena IV is available with a COM featuring the "Bay Trail" E3845 quad core 1.91GHz CPU with 4GB soldered RAM. Contact Diamond for information about other processor options. The board is available both with and without the integrated data acquisition circuit.

◆ Models and Accessories

Athena IV

available models:

- **ATH4-E3845-4GA** Athena IV SBC, E3845 1.91GHz CPU, 4GB RAM, With DAQ
- **ATH4-E3845-4GN** Athena IV SBC, E3845 1.91GHz CPU, 4GB RAM, No DAQ (minimum order quantity applies)
- **ATH4-BB01A** Athena IV Baseboard, with DAQ, requires engineering consultation
- **ATH4-BB01N** Athena IV Baseboard, without DAQ, requires engineering consultation (minimum order quantity applies)
- **DK-ATH4-E3845A-LNX64** Development Kit, Athena IV SBC, E3845 CPU, with DAQ, Linux 64-Bit BSP
- **DK-ATH4-E3845A-WE1064** Development Kit, Athena IV SBC, E3845 CPU, with DAQ, Windows 10 64-Bit BSP
- **SDK-ATH4-E3845A-LNX64** Software Development Kit, Athena IV SBC with DAQ, Linux 64-bit OS
- **SDK-ATH4-E3845A-WE1064** Software Development Kit, Athena IV SBC with DAQ, Windows 10 64-bit OS

Please login or signup for an online quote request.

Cables and accessories

available models:

- **CK-ATH4-01** CK-ATH4-01 cable kit
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- **6981030** VGA cable
- **6981031** Audio cable
- **6989101** SATA Cable, 7-Pin Data, Straight to Right Angle, 500mm
- **C-50-18** 50-conductor .1" pitch 18" ribbon cable, Data acquisition Cable

Please login or signup for an online quote request.

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