ATHENA III

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

PC/104 Single Board Computer

Intel Atom E640T CPU and Integrated Autocalibrating Data Acquisition

Highly Integrated SBC
Athena III combines all of the functionality of a single board computer with a complete analog and digital data acquisition circuit into a single board, offering the most functionality available in a small, compact form factor. Athena III is also an excellent migration path for Athena II customers.

Price/Performance/Power Optimization
The 1GHz Intel Atom E640T CPU offers an excellent balance of performance, power consumption and price, making Athena III an ideal choice for a wide variety of embedded computing applications.

Rugged Design
Athena III was designed with rugged applications in mind. From an operating temperature of -40°C to +80°C, to its soldered DRAM, Athena III thrives in the most extreme environments.

◆ Highly integrated Intel Atom E-Series SBC

◆ 2-in-1 design (CPU + DAQ) reduces size and cost, increases ruggedness and reliability

2 in 1 CPU+DAQ

◆ Intel Atom 1GHz E640T or 1.6GHz E680T CPU

◆ 1GB memory soldered on-board
   (2GB memory special order option)

◆ PC/104 (ISA) stackthrough expansion

◆ Support for:
   – Four USB 2.0 ports
   – Four RS-232/422/485 ports
   – One Gigabit Ethernet
   – SATA port for hard drive or solid state flashdisk
   – VGA CRT or LVDS LCD display
   – USB flashdisk mounting location
   – 24 programmable digital I/O lines

◆ Optional data acquisition circuitry featuring:
   – Multiplexed 16 channel 16-bit A/D with autocalibration
   – 200KHz maximum sample rate
   – Four 12-bit D/A channels
   – Two counter/timers
   – Autocalibration with Universal Driver software support

◆ Extremely rugged with -40°C to +80°C (-40°F to +176°F) operating temperature

◆ Highly resistant to shock and vibration

◆ Ruggedization / customization options available
   – Conformal coating
   – Shock / vibration testing
   – Hardwired configuration
   – Burn-in testing
   – Custom BIOS settings

◆ Fully backward compatible with Athena II with almost 3 times the CPU performance

Athena III: Small Form Factor SBC

DIAMOND SYSTEMS
CORPORATION

CPU Specifications

Processor	Intel Atom E640T CPU at 1GHz or E680T CPU at 1.6GHz
Cooling	Heat sink, fan-less
Memory	1GB soldered-on DRAM (also available with 2GB DRAM)
Display type	VGA CRT and LVDS LCD
Display resolution	VGA 1600 X 1200 maximum LVDS 1280 X 768 maximum
USB ports	4 USB 2.0
Serial ports	4 RS-232/422/485
Networking	1 Gigabit Ethernet
Mass storage	1 SATA port; USB flashdisk interface
Keyboard/Mouse	PS/2
Audio	HD Audio
Expansion bus	PC/104 (ISA)
Input power	5V ±5%
Power consumption	9.4W
Operating temperature	-40°C to +80°C (-40°F to +176°F)
Shock	IEC68-2-27 compatible
Vibration	MIL-STD-810E 514.4 compatible
Dimensions	4.175" x 4.475" (106mm x 114mm)
Weight	8.8oz (249g) with heat sink
RoHS	Compliant

Data Acquisition Specifications

ANALOG

Number of inputs	16 single-ended or 8 differential, user selectable
A/D resolution	16 bits
Input ranges	±10V, ±5V, ±2.5V, ±1.25V, 0-10V, 0-5V, 0-2.5V programmable
Max sample rate	200KHz
Protection	±35V on any analog input without damage
Nonlinearity	±3LSB, no missing codes
On-board FIFO	512 samples, programmable threshold
A/D and D/A calibration	Autocalibration with software support
Number of outputs	4, 12-bit resolution
Output ranges	±5V, ±10V, 0-5V, 0-10V
Output current	±5mA max per channel
Settling time	6µS max to 0.01%
Relative accuracy	±1 LSB
Nonlinearity	±1 LSB, monotonic

DIGITAL I/O

Number of I/O lines	24 lines, programmable direction
Input voltage	Logic 0 : 0.0V min, 0.8V max Logic 1 : 2.0V min, 5.0V max
Input current	±1µA max
Output voltage	Logic 0 : 0.0V min, 0.33V max Logic 1 : 2.4V min, 5.0V max
Output current	Logic 0 : 64mA max per line Logic 1 : -15mA max per line

COUNTER / TIMERS

A/D Pacer clock	32-bit down counter
Clock source	10MHz on-board clock or external signal
General purpose	16-bit down counter

Data Acquisition

Athena III's integrated data acquisition circuit includes 16 analog inputs with 16-bit A/D and 200KHz maximum sample rate, four 12-bit analog outputs, 24 digital I/O lines, and two counter/timers. It uses an enhanced 512-sample FIFO with programmable threshold for maximum flexibility and data reliability.

The analog circuitry utilizes Diamond Systems' industry-leading autocalibration technology to calibrate A/D and D/A circuits. This means you get analog I/O performance with the maximum possible accuracy over the full operating temperature range of the product.

Software Support

Athena III runs Linux, Windows Embedded Standard 7, and Windows Embedded CE. Linux and Windows Embedded Standard 7 Software Development Kits are available with bootable images and drivers to get you started on your design project right out of the box. Diamond's free industry-leading Universal Driver software is also included. It provides a C programming library for the integrated data acquisition circuit, demo programs, and example code to assist in rapid application development.

Development Kit

A complete Development Kit, DK-ATHE-A-LNX, is available with all the components you need to get started on your embedded design project. The kit contains an Athena III SBC, flashdisk with Linux pre-loaded, cable kit, and software CD.

Ordering Information

ATHE1000A-1G	Athena III SBC, 1GHz Atom E640T CPU, 1GB RAM, full data acquisition
ATHE1000D-1G	Athena III SBC, 1GHz Atom E640T CPU, 1GB RAM, digital I/O only
ATHE1600A-1G	Athena III SBC, 1.6GHz Atom E680T CPU, 1GB RAM, full data acquisition
ATHE1600D-1G	Athena III SBC, 1.6GHz Atom E680T CPU, 1GB RAM, digital I/O only
DK-ATHE-A-LNX	Athena III Development Kit with ATHE1600A-1G SBC, cables and Linux software
DK-ATHE-A-WE7	Athena III Development Kit with ATHE1600A-1G SBC, cables and WE7 software
SDK-ATHE-A-WE7	Athena III Windows Embedded Standard 7 Software Development Kit
SDK-ATHE-A-LNX	Athena III Linux Software Development Kit
C-ATHE-KIT	Athena III Cable Kit for all on-board I/O
FDU-1G-XT	1GB USB Flashdisk
FDU-2G-XT	2GB USB Flashdisk
FDU-4G-XT	4GB USB Flashdisk
FDU-8G-XT	8GB USB Flashdisk

Athena III: Small Form Factor SBC

Upgrade Path for Long Product Life

Athena III is a backward compatible single board computer upgrade for Diamond's Athena II SBC.

To provide long term support for its customers, with Athena III Diamond Systems maintains and extends its Athena SBC platform by providing a drop in replacement for Athena II that is highly compatible and offers improved performance. All connector locations and pinouts have been preserved with the exception of the IDE, Gigabit Ethernet, power input, and LVDS backlight connectors.

The table below highlights the differences between the Athena III and Athena II SBCs.

Athena III and Athena II Differences

Feature	Athena III	Athena II
CPU	Intel Atom E640T or E680T	VIA Mark
CPU Speed	1.0GHz or 1.6GHz	500MHz or 800MHz
CPU Rating (Passmark)	160 at 1.0GHz	56 at 800MHz
Memory	1GB on-board	256MB on-board
USB Ports	4 USB 2.0	4 USB 1.1
Serial Ports	4 RS-232/422/485	2 RS-232 2 RS-232/485
Ethernet	1 Gigabit	1 10/100Base-T
Mass Storage – External	1 SATA	1 IDE UDMA-33
Mass Storage – Internal	USB flashdisk up to 8GB	IDE flashdisk up to 4GB
LVDS Resolution	24 bit	16 bit
Analog I/O	16 16-bit A/D @200KHz 4 12-bit D/A	16 16-bit A/D @100KHz 4 12-bit D/A
Digital I/O	24 DIO standard	Optional 24 DIO with DAQ
Operating Temperature	-40°C to +80°C	-40°C to +70°C or -40°C to +85°C
Power Consumption	9.4W	10W