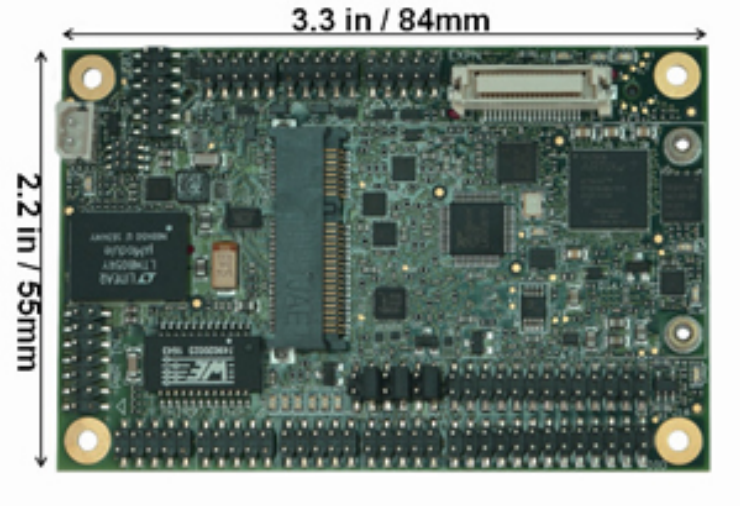
Zeta Miniature COM-Based SBC

Ultra-Small Solution with Integrated DAQ using COM Express Mini Type 10 CPU Modules

Complete Zeta SBC



Zeta Carrier Board top, with data acquisition

FEATURES

- Ideal solution for airborne and other vehicle applications
- Interchangeable industry standard COMs support long product lifecycles
- 2x Gigabit Ethernet ports
- 4x RS-232/422/485 serial ports
- 4x USB 2.0 ports + 1x USB 3.0 port
- VGA and single-channel LVDS display
- PCIe MiniCard / mSATA socket
- Micro SD socket
- 16 single-ended / 8 differential analog inputs
- 16-bit A/D resolution
- 100KHz max A/D sample rate
- 4 16-bit analog outputs
- 27 digital I/O configurable as counter/timers and PWM
- Expansion connector with PCIe, SATA and audio interfaces
- 6-36VDC input range
- COM Express Mini form factor: 3.3 x 2.2 in / 84 x 55mm
- -40°C to +85°C (-40°F to +185°F). For the N4200 module, the temperature range is 0°C to 60°C operating temperature.
- Bottom-mounted heat spreader cooling

Description

The **Zeta** COM Express SBC family of ultra-small embedded computer boards combines a COM Express Mini CPU module with a same-size carrier board to create a complete embedded PC. Designed in the COM Express Mini Type 10 form factor (84 x 55mm/ 3.3 x 2.2 in), Zeta provides an ultra-compact, industry-standard form factor solution.

3 key components pre-assembled:

- A Computer on Module (COM) providing the core CPU functionality
- A carrier board providing the I/O transceivers and connectors, power supplies, and expansion sockets
- A heat spreader with a flat exterior surface for direct mounting and heat transfer to the system enclosure

This layered architecture offers the highest functional density for any given footprint. As a comparison, Zeta offers functionality and performance equivalent to Diamond's top-selling **Aries SBC** at just 40% of the size.

Zeta currently supports four processor options:

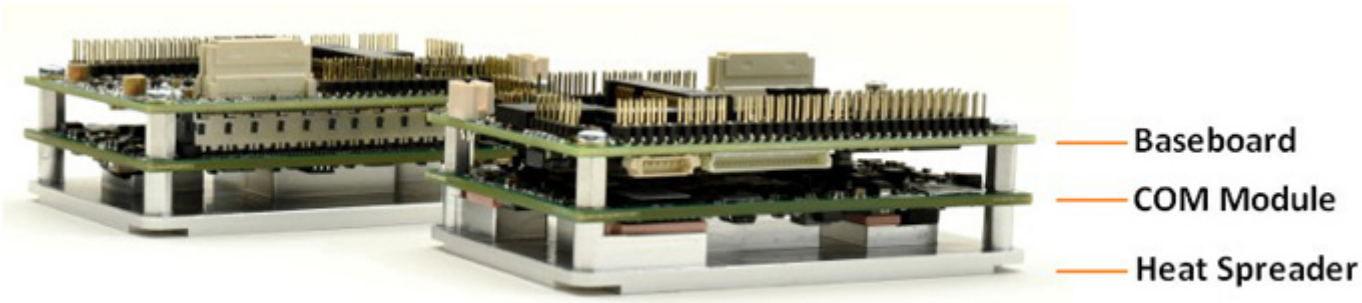
- Intel Bay Trail E3825 1.33GHz Dual Core CPU with 2GB RAM
- Intel Bay Trail E3845 1.91GHz Quad Core CPU with 2GB RAM
- Apollo Lake E3940 1.6GHz quad core CPU with 4GB RAM
- Apollo Lake N4200 1.1GHz (burstable to 2.5GHz) Quad Core CPU with 8GB RAM

Zeta's small size and high feature density make it an ideal choice for mobile applications. It stands ready to meet the challenges of these environments with a wide range 6-36VDC input voltage, a -40 to +85°C operating temperature range, and fanless heat spreader cooling (heat sink options are available).

Benefits of COM-based SBCs

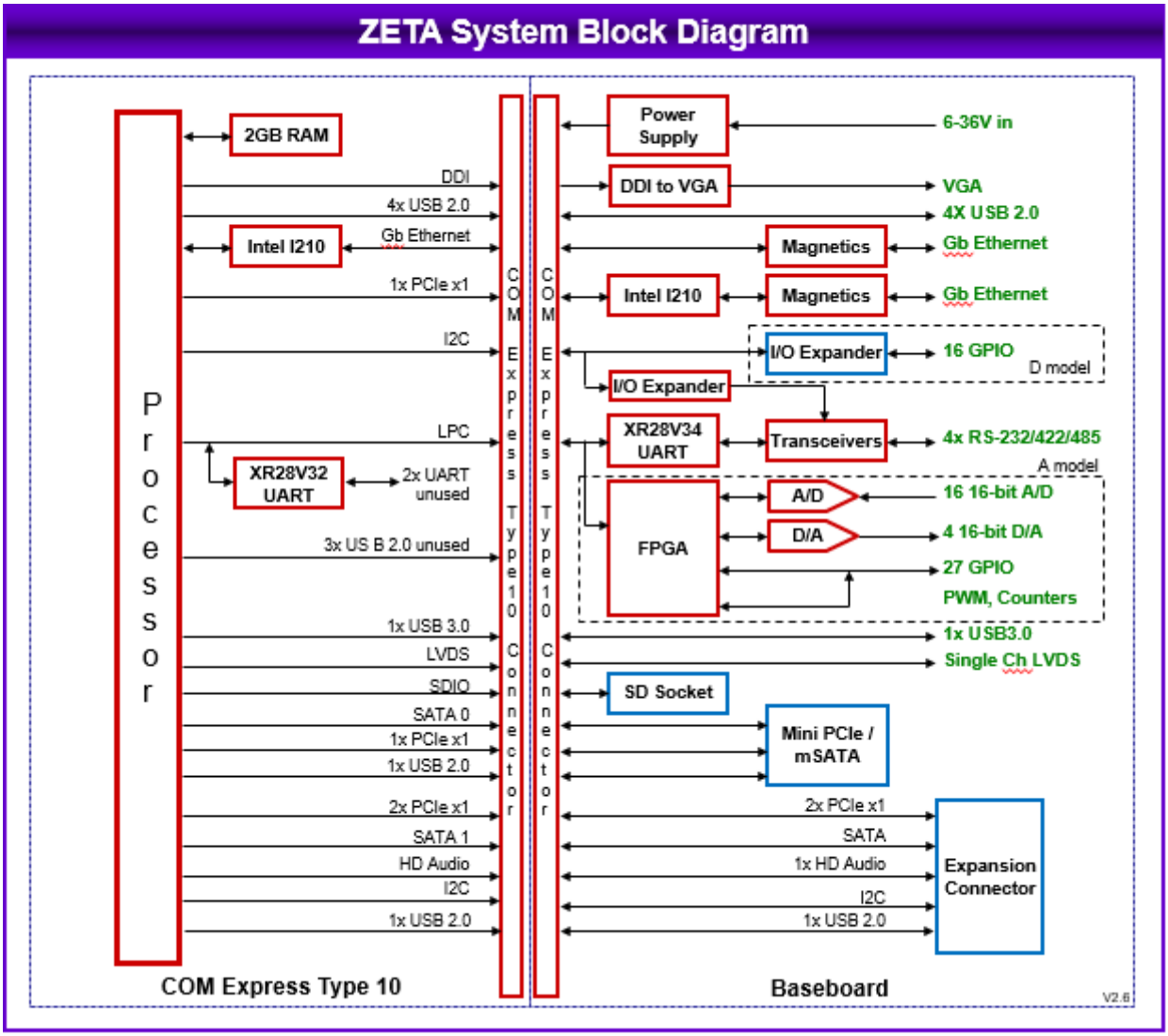
The use of interchangeable industry-standard CPU modules on Zeta offers two important system designer benefits:

- Performance scalability: One can design multiple applications based on a consistent hardware platform and select the CPU that best fits the price / performance / power requirements of each one. In addition, as time goes on and your application needs more horsepower to support increased functionality, you can simply upgrade to a newer CPU with minimal to no redesign effort.
- Long product life: The majority of today's x86 embedded processors offer limited lifecycles of 5-7 years, so any long-life product dependent on an x86 single-board computer (SBC) is likely to require redesign sometime during its lifecycle. Using industry-standard COMs lets you easily migrate to a new generation CPU module in the exact same form factor and containing the same feature set, with virtually no hardware or physical redesign efforts. Zeta is ideal for long-life applications such as Military, Medical, and Transportation.



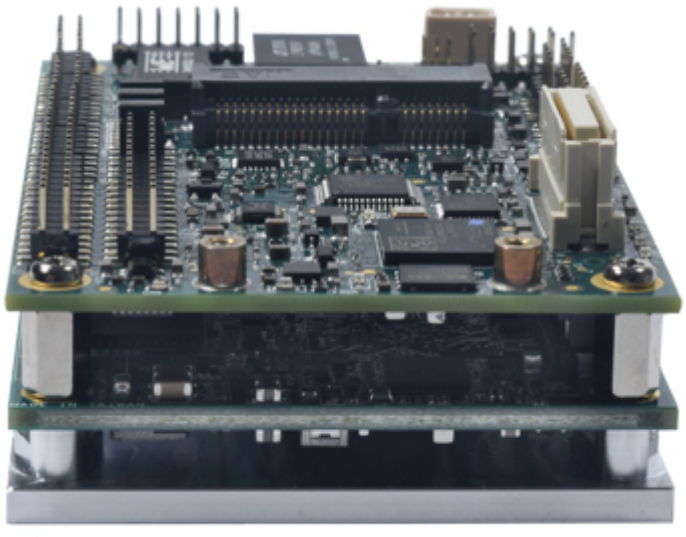
Overview

Block Diagram



Conduction Cooling

The bottom side heat spreader on Zeta provides the most efficient cooling solution in a size-optimized design, enabling Zeta to run reliably at up to 85ºC. The heat spreader conducts heat directly to the system chassis for maximum heat dissipation to the ambient environment and minimum radiation into the enclosure interior. By reducing the interior temperature, Zeta helps to improve overall system reliability. In addition the bottom side heat spreader leaves the entire top side of the board free for expansion and simplifies system configuration and maintenance.



Available Models

Zeta is available with four different processor options. Each CPU may be paired with both the digital I/O and full analog/digital I/O baseboard.

Model	Processor /Speed / Memory	
ZETA-E3825-2GA	E3825 1.33GHz CPU, 2GB RAM	Data acquisition circuit
ZETA-E3825-2GD	E3825 1.33GHz CPU, 2GB RAM	Digital I/O circuit
ZETA-E3845-2GA	E3845 1.91GHz CPU, 2GB RAM	Data acquisition circuit
ZETA-E3845-2GD	E3845 1.91GHz CPU, 2GB RAM	Digital I/O circuit
ZETA-E3940-4GA	E3940 1.6GHz CPU, 4GB RAM	Data acquisition circuit
ZETA-E3940-4GD	E3940 1.6GHz CPU, 4GB RAM	Digital I/O circuit
ZETA-N4200-8GA	N4200 1.1GHz CPU, 8GB RAM	Data acquisition circuit
ZETA-N4200-8GD	N4200 1.1GHz CPU, 8GB RAM	Digital I/O circuit

Development Support

Operating system support is available for Linux (Ubuntu 16.04 LTS), Windows Embedded 7, and Windows 10 IoT Enterprise LTSB. Drivers and instructions are available for free download on the Diamond website. Software development kits / board support packages are available as well and consist of the selected operating system installed and pre-configured on a solid state flashdisk (SSD).

Model	Linux	Windows
ZETA-E3825-2GA / 2GD	Ubuntu 16.04 LTS 32-bit	Windows Embedded 7 32-bit
ZETA-E3845-2GA /2GD	Ubuntu 16.04 LTS 32-bit	Windows 10 IoT Enterprise LTSB 64-bit
ZETA-E3940-4GA / 4GD	Ubuntu 16.04 LTS 64-bit	Windows 10 IoT Enterprise LTSB 64-bit
ZETA-N4200-8GA / 8GD	Ubuntu 16.04 LTS 64-bit	Windows 10 IoT Enterprise LTSB 64-bit

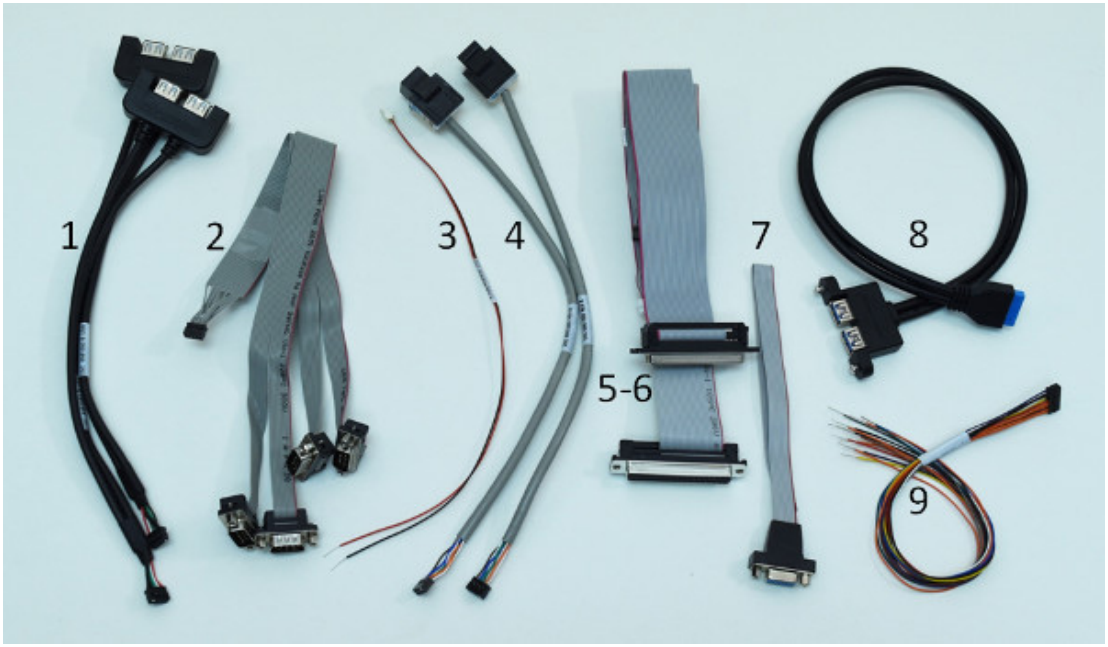
Development Kits

Zeta is available in a complete development kit that includes a full set of I/O cables and the selected SDK. Simply install the pre-configured flashdisk, attach cables / keyboard / mouse / monitor, power up, and the system is ready to run.

CK-ZETA-01: Cable kit for Zeta Miniature COM-Based SBC

he Zeta cable kit includes cables for all I/O features on Zeta except LCD. Details are provided below. Individual cables are available as a special order item; minimum order quantities and leadtimes may apply.

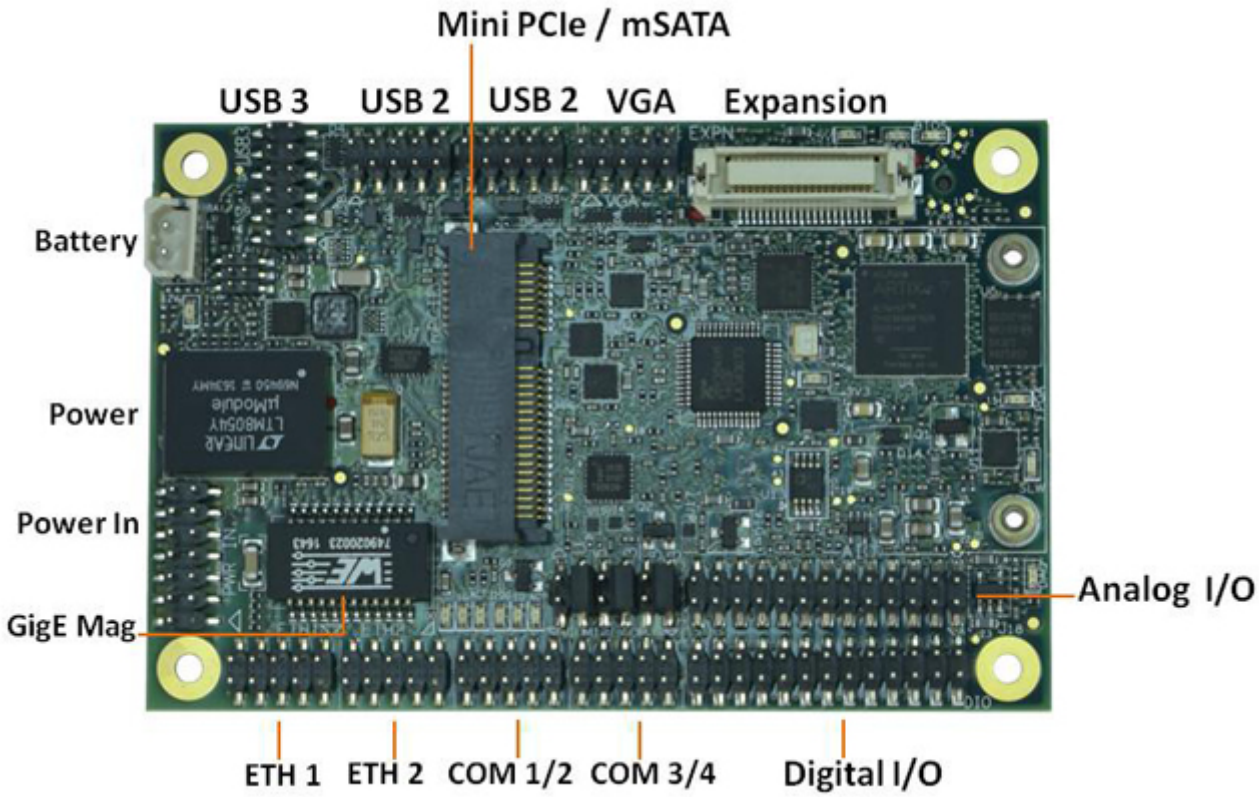
An LCD / backlight cable kit is available for specific displays used in our manufacturing environment. Customers may purchase this cable kit as a starting point and modify the LCD ends to support their specific display.



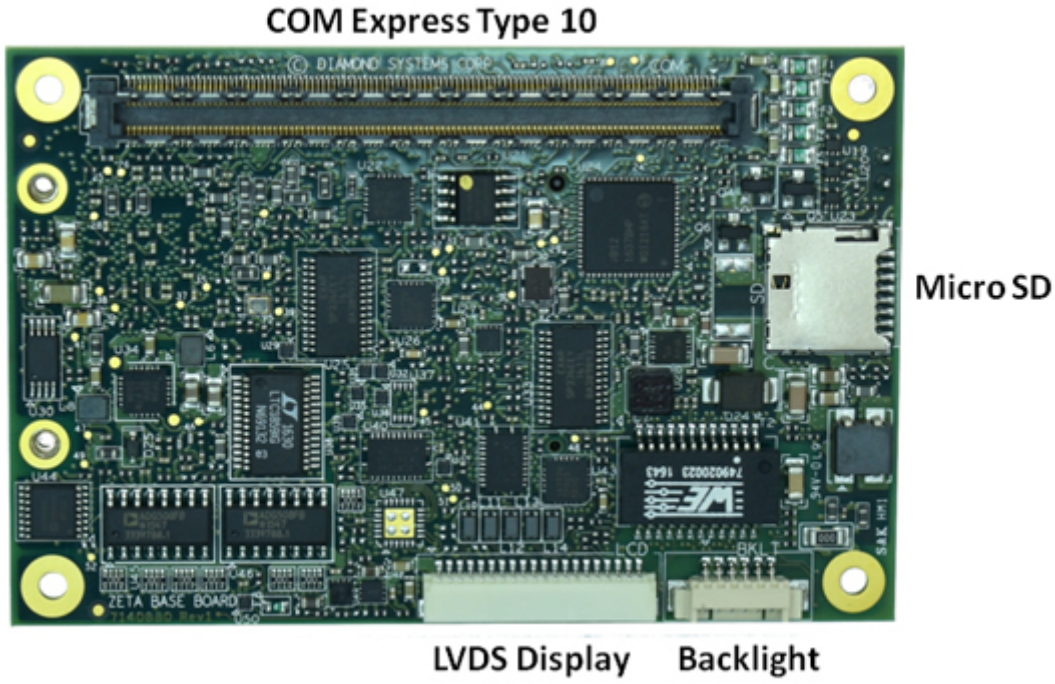
CK-ZETA-01 includes the following cables:

No.	Qty	Cable	Description	Drawing
1	2	6981082	Dual USB 2.0 type A	**Show**
2	2	6981075	Dual serial port DB9M	**Show**
3	1	6980524	Cable, External Battery, Molex Spox	**Show**
4	2	6981080	Gigabit Ethernet cable	**Show**
5-6	2	6980516	Analog I/O and Digital I/O cables	-
7	1	6981084	VGA	**Show**
8	1	6980100	Dual USB 2.0/3.0 type A	-
9	1	6981070	Power input cable	**Show**

I/O Features



Zeta (top) "A" Model baseboard layout and baseboard bottom (below).



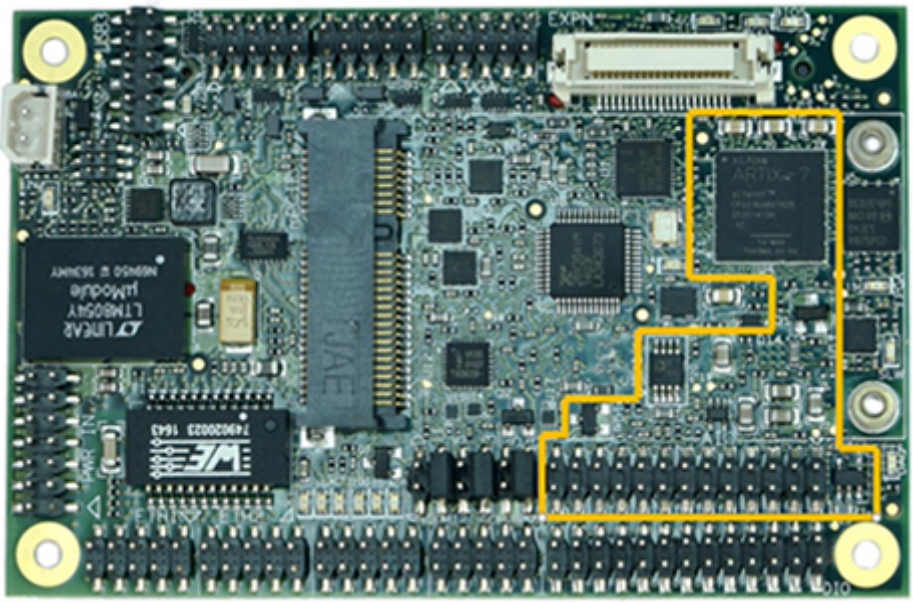
Zeta provides a wide variety of on-board PC-type I/O, including:

- 2 Gigabit Ethernet ports
- 4 RS-232/422/485 serial ports with programmable protocol selection port-by-port and programmable 120-ohm line termination for RS-422/485
- 4 USB 2.0 ports + 1 USB 3.0 port
- VGA and LVDS display outputs
- 16-27 GPIO lines with 3.3V/5V logic level configurability
- Wide range 6-36V input power supply

A PCIe minicard socket and an expansion connector (see below) provide the ability for further I/O expansion using industry standard I/O modules.

Data Acquisition

Data Acquisition Circuit



Zeta baseboard with integrated analog and digital data acquisition circuit

Zeta is available with two different data acquisition circuits, denoted by either A or D in the model number. Both circuits are available with any processor option.

All digital and analog I/O features are supported by Diamond's industry-leading Universal Driver software, which provides a C language programming library that supports all features in an easy-to-use, high-level fashion. Demo programs with source code and executables are included to demonstrate the use of each library function. A graphical monitor and control program provides easy access to all the I/O features and lets you prototype your application quickly as well as debug problems. Universal Driver is available as a free download from our website upon acceptance of our software license agreement.

"A" Model Full Data Acquisition

Zeta "A" models include a complete data acquisition circuit with a combination of analog and digital I/O features. The circuit controller is an FPGA that interfaces to the host CPU via the LPC bus.

A/D Features

- 16 analog voltage inputs
- 16-bit resolution (1 part in 65536)
- Programmable input ranges: 0-5V, 0-10V, +/-5v, +/-10V
- Single-ended and differential input configuration options
- Precision, low-drift 2.5V reference voltage
- 100KHz maximum total A/D sample rate (all active channels combined)
- Integrated 2048-sample FIFO and interrupt service for efficient high-speed sampling

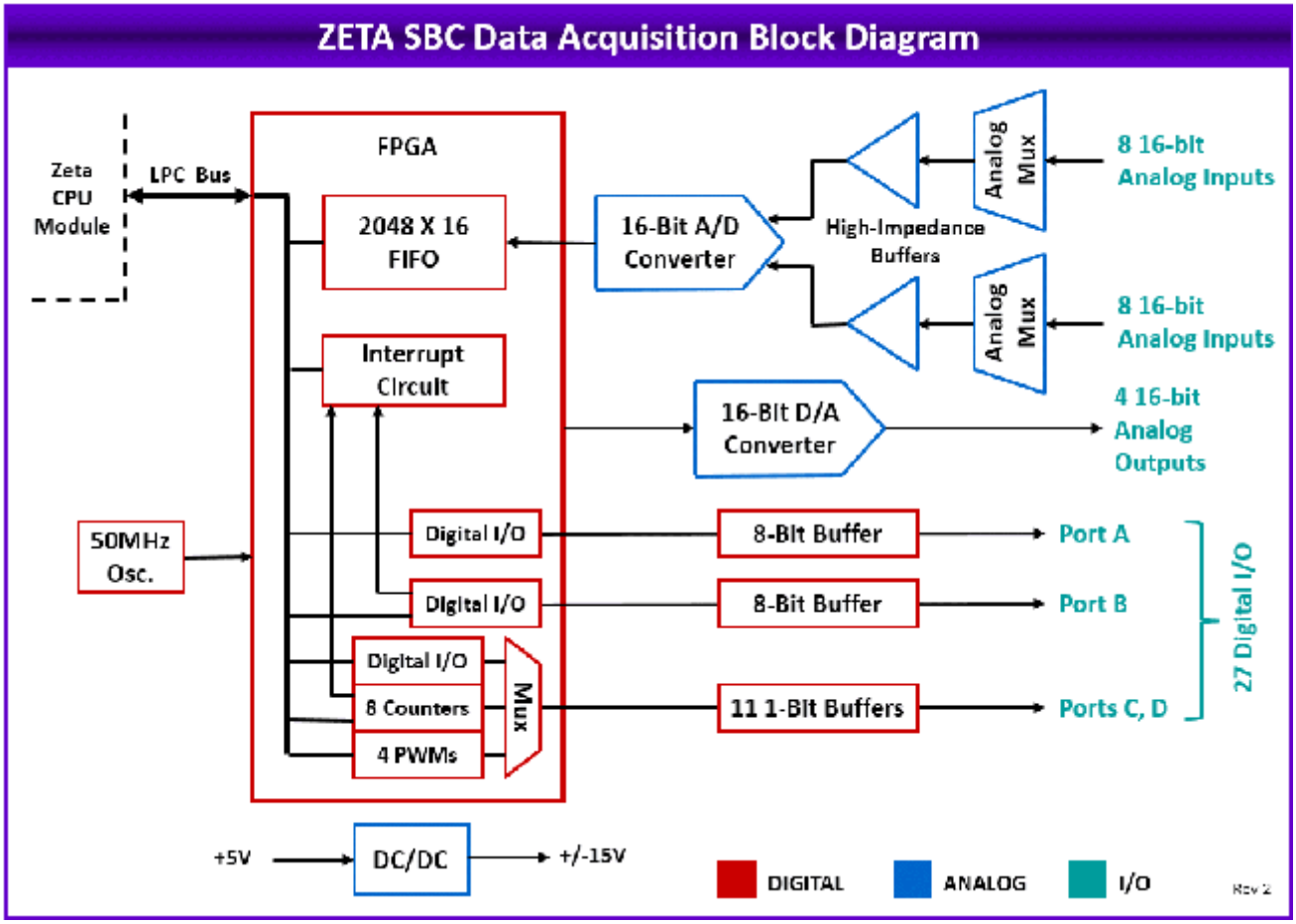
D/A Features

- 4 analog voltage outputs
- 16-bit resolution (1 part in 65536)
- Single-channel and multi-channel simultaneous update modes
- Programmable output range: 0-5V, 0-2.5V
- 30KHz update rate capability

- Waveform generator on 1 to 4 outputs with user-defined waveforms and 2048-sample waveform buffer

Digital I/O features

- 27 digital I/O lines
- User-selectable 3.3V / 5V logic levels
- User-selectable 10K pull-up / pull-down resistors
- Programmable direction in 8-bit and 1-bit groups
- 8-bit programmable edge detection circuit
- Buffers for protection and higher current drive
- 8 32-bit counter/timers with up counting, down counting, pulse output, and interrupt features
- 4 24-bit pulse-width modulators with programmable duty cycle and output polarity
- Interrupt support on ISA bus for A/D, digital I/O, and counter/timer circuits



"D" Model Digital I/O

Zeta "D" models include a digital I/O (GPIO) circuit based on the popular PCA9535 GPIO expander chip with the following features:

- 16 digital I/O lines
- User-selectable 3.3V / 5V logic levels
- User-selectable 10K pull-up / pull-down resistors
- Programmable direction in 8-bit groups
- Buffers for protection and higher current drive

Mass Storage and Expansion

Mass Storage Options

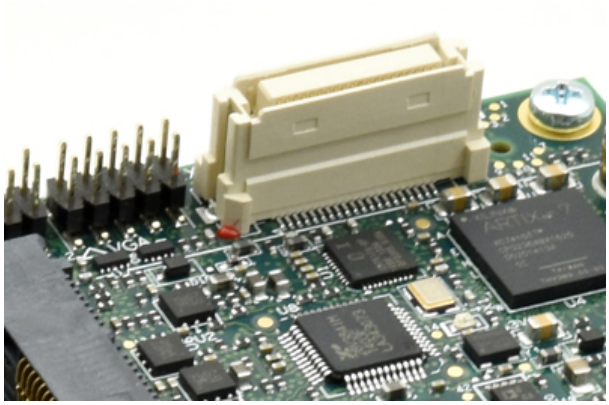
Systems which do not require any additional I/O beyond the baseboard features may use the baseboard's MiniCard/mSATA socket to contain the system bootable mass storage. For Linux operation,

the Micro SD socket may also be used for bootable mass storage, leaving the MiniCard socket available for expansion. A system running Windows which requires additional I/O must use the optional daughterboard. In this case the designer has the choice of either the baseboard mSATA socket or the daughterboard's M.2 socket for the bootable mass storage. If the M.2 socket is used, then both the baseboard and the daughterboard minicard sockets are available for I/O module installation.

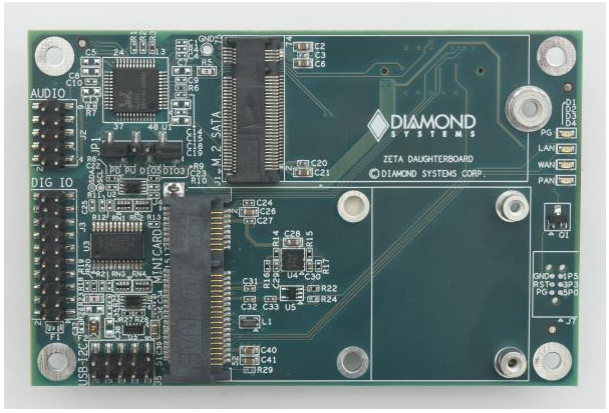
Zeta Daughterboard

Zeta includes an expansion connector which supports the installation of a daughterboard with additional I/O and expansion features:

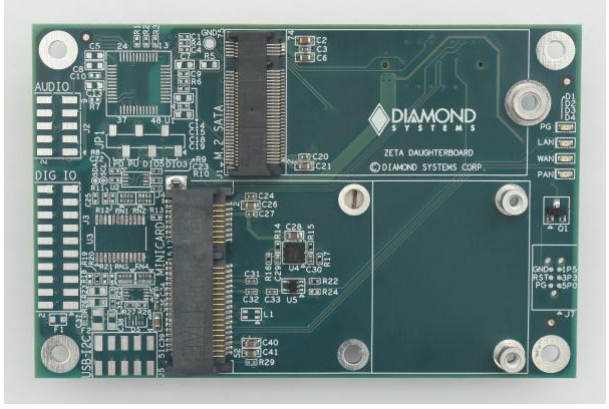
- Full/half-size MiniCard socket with PCIe x1 and USB2.0 connectivity
- M.2 M-keying SSD connector for 2242 size M.2 SATA flashdisk
- HD Audio with Line In, Mic In, Line Out
- 16 Digital IO lines with configurable 3.3V/ 5V logic levels and Pull-up/down resistors



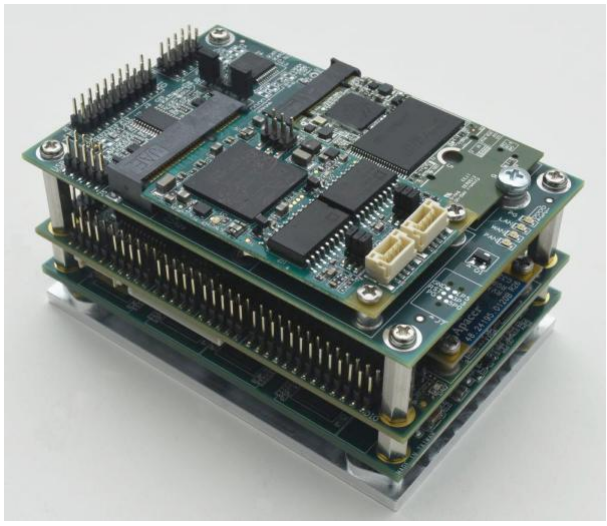
Zeta daughterboard expansion connector



ZETA-DB-01 full-feature daughterboard with expansion sockets, audio and GPIO

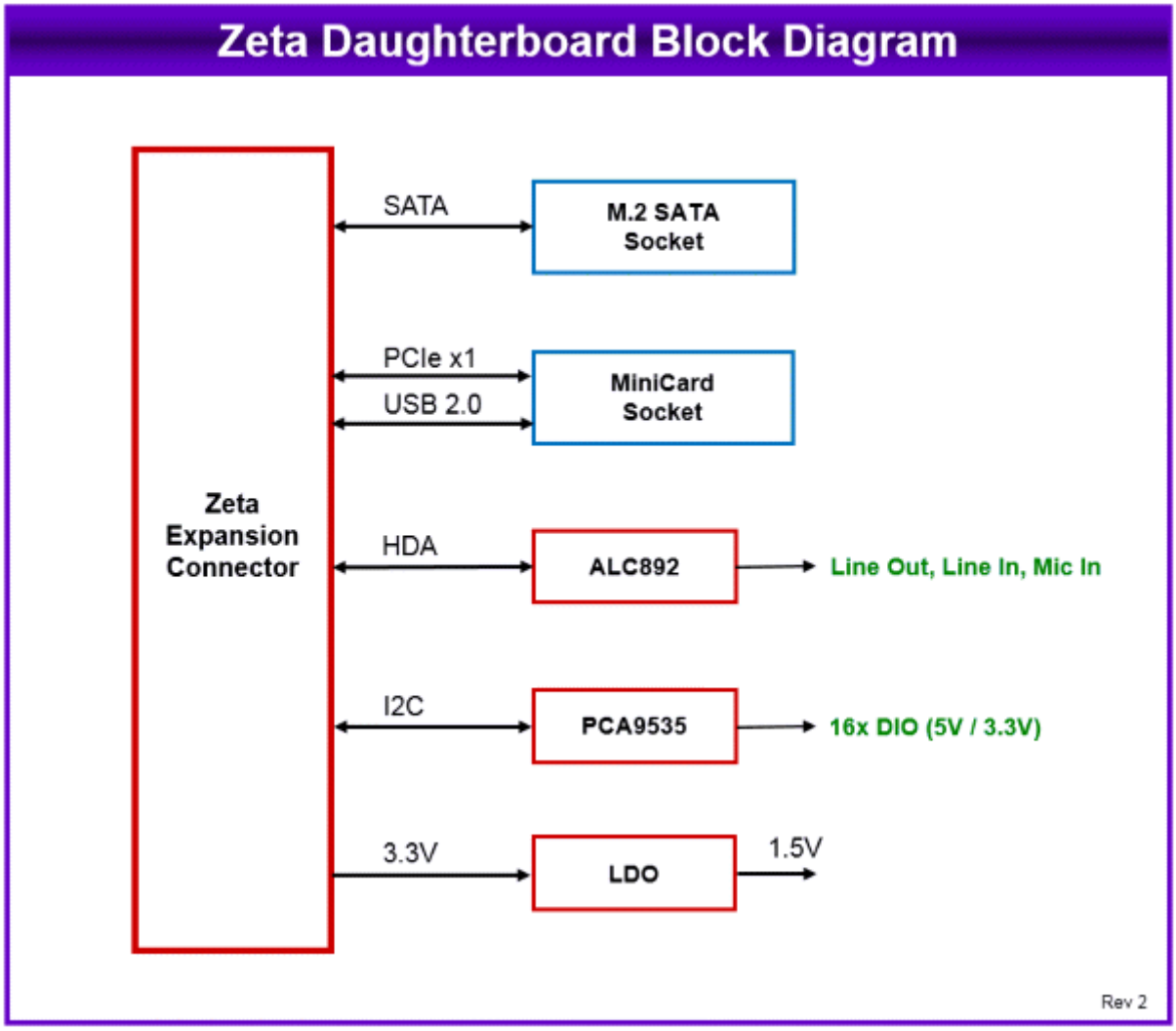


ZETA-DB-02 low-cost daughterboard with minicard and M.2 sockets only



Zeta SBC with full-feature daughterboard and modules installed

Block Diagram



Specifications

Core CPU Features

Processor/memory options Intel Bay Trail E3825 1.33GHz Dual Core CPU with 2GB RAM
Apollo Lake E3940 1.6GHz quad core CPU with 4GB RAM
Apollo Lake N4200 1.1GHz (burstable to 2.5GHz) Quad Core CPU with 8GB RAM

System I/O Interfaces	
Serial Ports	4 RS-232/422/485 ports
USB	1x USB 3.0; 4 x USB 2.0
Networking	2 Gigabit Ethernet ports
Keyboard/Mouse	USB keyboard/mouse
Display	VGA and LVDS
Audio	HDA audio on expansion connector
Watchdog timer	Reset mode; Programmable interval 0-255 seconds
Mass Storage	1 Mini PCIe /mSATA socket; 1 Micro-SD socket
Data Acquisition Features	
Analog Inputs	16 Single-Ended / 8 Differential voltage inputs
Input ranges	+/-10V, +/-5V, 0-10V, 0-5V
Maximum Sample Rate	100,000 samples/sec aggregate
On-board FIFO	2048 samples, programmable threshold
DAQ Calibration	No calibration required
Analog Outputs	4 16-bit voltage outputs
Output ranges	0-5V, 0-2.5V programmable
A Model Digital I/O	27 lines independently programmable
D Model Digital I/O	16 lines independently programmable for input/output
PWM	4 24-bit pulse width modulators
Counter / timers	8 32-bit counter/timers
Logic signal voltage levels	3.3V/5V logic levels jumper-selectable
Expansion Buses	
MiniCard	1 socket combining PCIe x1, mSATA, and USB 2.0 interfaces
SATA	1 port on expansion connector
PCIe	2x PCIe x1 links on expansion connector
USB	1 USB 2.0 port on expansion connector
Physical and Mechanical	
Power input	6V to 36V option
Cooling	Heat spreader standard, no fan
Power Consumption	TBD
Operating Temperature	-40ºC to +85ºC (-40ºF to +185ºF)
Form Factor	COM Express Mini Type 10
Dimensions	84 x 55mm / 3.3 x 2.2in
Weight	1.30 oz baseboard; TBD COM module; TBD SBC complete
RoHS	Compliant

Models and Accessories

Zeta Miniature COM-Based SBC

available models:

ZETA-E3845-4GA	Zeta SBC, E3845 CPU, 4GB RAM, with Data Acquisition
ZETA-E3845-4GD	Zeta SBC, E3845 CPU, 4GB RAM, with Digital I/O
ZETA-E3940-4GA	E3940 1.6GHz CPU, 4GB RAM Data acquisition circuit
ZETA-E3940-4GD	E3940 1.6GHz CPU, 4GB RAM Digital I/O circuit
ZETA-N4200-8GA	N4200 1.1GHz CPU, 8GB RAM Data acquisition circuit
ZETA-N4200-8GD	N4200 1.1GHz CPU, 8GB RAM Digital I/O circuit
DK-ZETA-E3845A-LNX64	Development Kit, Zeta SBC with E3845 processor and DAQ, Cable kit, Linux 64-bit OS
DK-ZETA-E3845A-WE1064	Development Kit, Zeta SBC with E3825 processor and DAQ, Cable kit, Windows 10 64-bit OS
DK-ZETA-E3940A-LNX	Development Kit, Zeta SBC with E3940 processor and DAQ, Cable kit, Linux OS
DK-ZETA-E3940A-WE10	Development Kit, Zeta SBC with E3940 processor and DAQ, Cable kit, Windows 10 IoT Ent LTSB OS
DK-ZETA-N4200A-LNX	Development Kit, Zeta SBC with N4200 processor and DAQ, Cable kit, Linux OS
DK-ZETA-4200A-WE10	Development Kit, Zeta SBC with N4200 processor and DAQ, Cable kit, Windows 10 IoT Ent LTSB OS
ZETA-DB-01	Zeta daughterboard with MiniCard and M.2 sockets, audio, and GPIO
ZETA-DB-02	Zeta daughterboard with MiniCard and M.2 sockets

Please login or signup for an online quote request.

Cables and accessories

available models:	
CK-ZETA-01	Zeta SBC cable kit
6981082	Dual USB 2.0 type A
6981075	Dual serial port DB9M
6980524	Cable, External Battery, Molex Spox
6981080	Gigabit Ethernet cable
6980516	Analog I/O and Digital I/O cables
6981084	VGA
6980100	Dual USB 2.0/3.0 type A
6981070	Power input cable

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