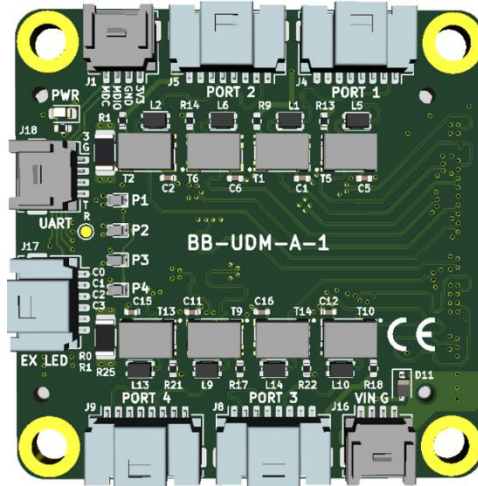


UbiSwitch Baseboard Mini

Daughterboard for UbiSwitch



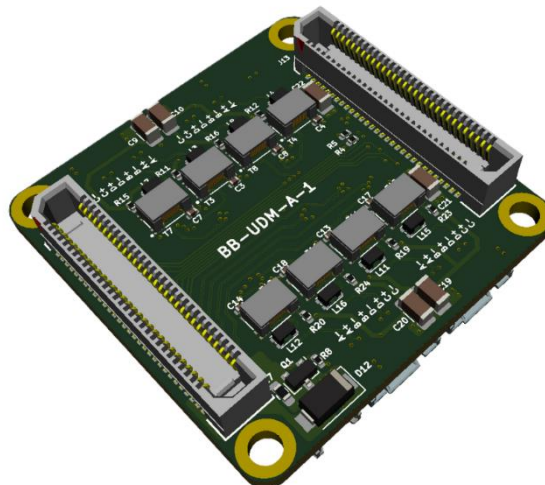
DESCRIPTION

The Amphenol UbiSwitch BaseBoard Mini is a breakout system designed to provide a very compact (42mm x 42mm) plug and play system for UbiSwitch. UbiBaseBoard provides 4 x 1Gbps ethernet ports on Molex PicoClasp headers.

The UbiSwitch Baseboard itself does not contain any ethernet switching silicon, rather it contains the necessary connectors and routing required to use UbiSwitch as a complete system. This includes three 10GBASE-R SFP+, and eight Molex PicoClasp headers for direct connection to an external system.

When used with UbiSwitch, UbiSwitch BaseBoard will automatically begin auto negotiation with any connected devices and begin receiving and forwarding frames as an unmanaged ethernet switch.

UbiSwitch BaseBoard runs from a wide input voltage range of 8V to 60V allowing integration into a wide range of applications.



FEATURES

- 4 x 10/100/1000BASE-T ethernet ports
- Input voltage range from 8V to 60V
- 42mm x 42mm board size
- Positive Locking Molex PicoClasp connectors for power and Ethernet ports

HOW TO ORDER

Part Number	CF-02BBUDM	UbiSwitch Baseboard Mini
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GENERAL SPECIFICATIONS

Voltage Input	8V to 60V DC
Supported Protocols	10BASE-T, 100BASE-TX, 1000BASE-T,
Weight	40 grams
Size	42mm x 42mm x 11mm
Operating Temperature	-40°C to +85°C
Storage Temperature	-40°C to +125°C

GENERAL OPERATING INSTRUCTIONS

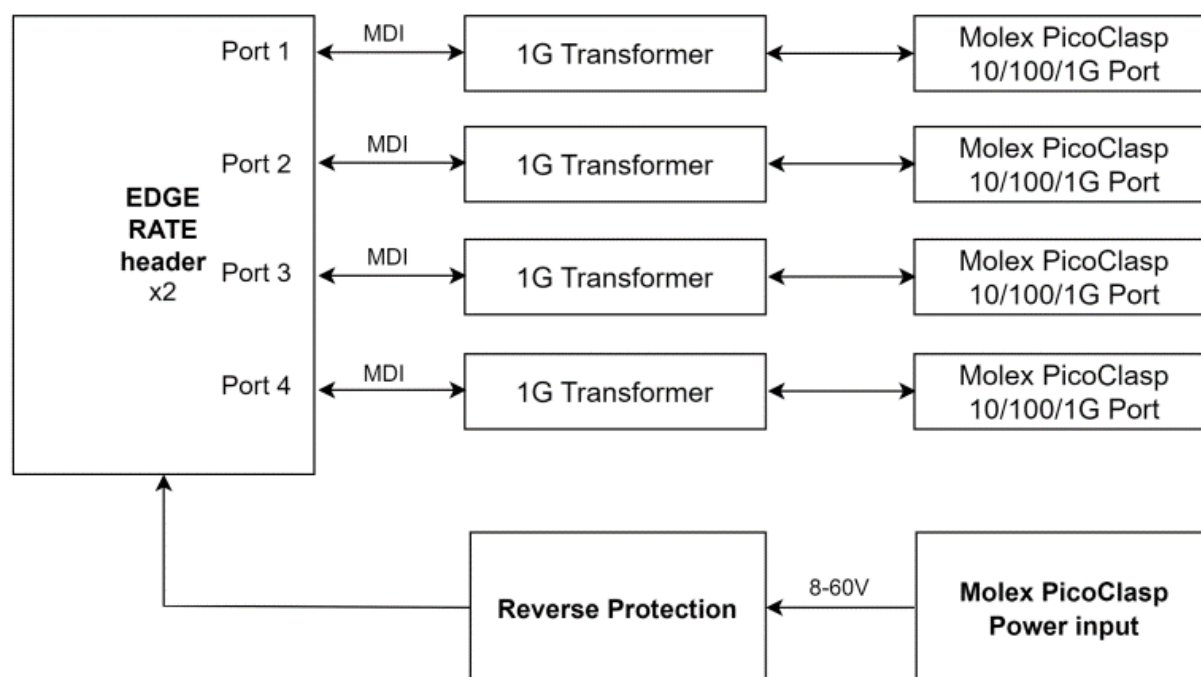
UbiSwitch Baseboard is designed for use in harsh environments, operating from a nominal supply voltage of 24V, but with the ability to operate from as low as 8V and as high as 60V. UbiSwitch Baseboard is purely a breakout board, and contains no switching capabilities by itself. It must be used with UbiSwitch to create a full ethernet switch system.

To use UbiSwitch Baseboard, first mate the board with UbiSwitch then apply an input voltage from 8 to 60V. Then connect external devices and the Ubi system will begin functioning as an unmanaged switch with up to 3 x 10GBASE-R SFP+ ports and 8 x 1GBASE-T ports.

SAFETY INFORMATION

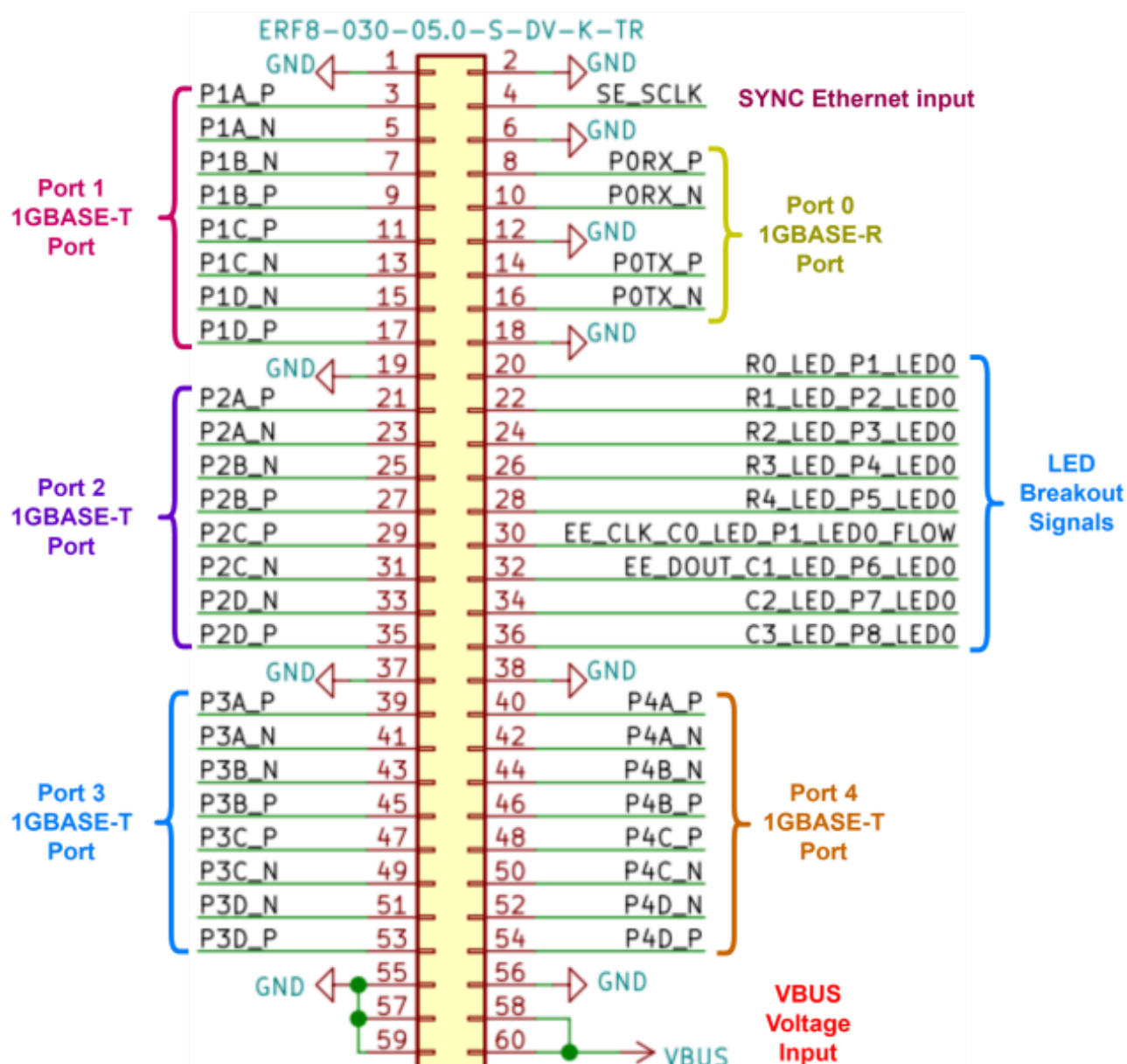
- This device can operate on voltages near and above 60V. Please read this manual before operating.
- This device is provided “as is” In-application testing prior to integration is recommended.
- This device is provided as an electronic circuit board, and requires integration into chassis for full ingress protection.
- Do not use this product in wet environments without integrating into a chassis.
- Do not operate this product beyond the rated temperature and voltages.

BLOCK DIAGRAM

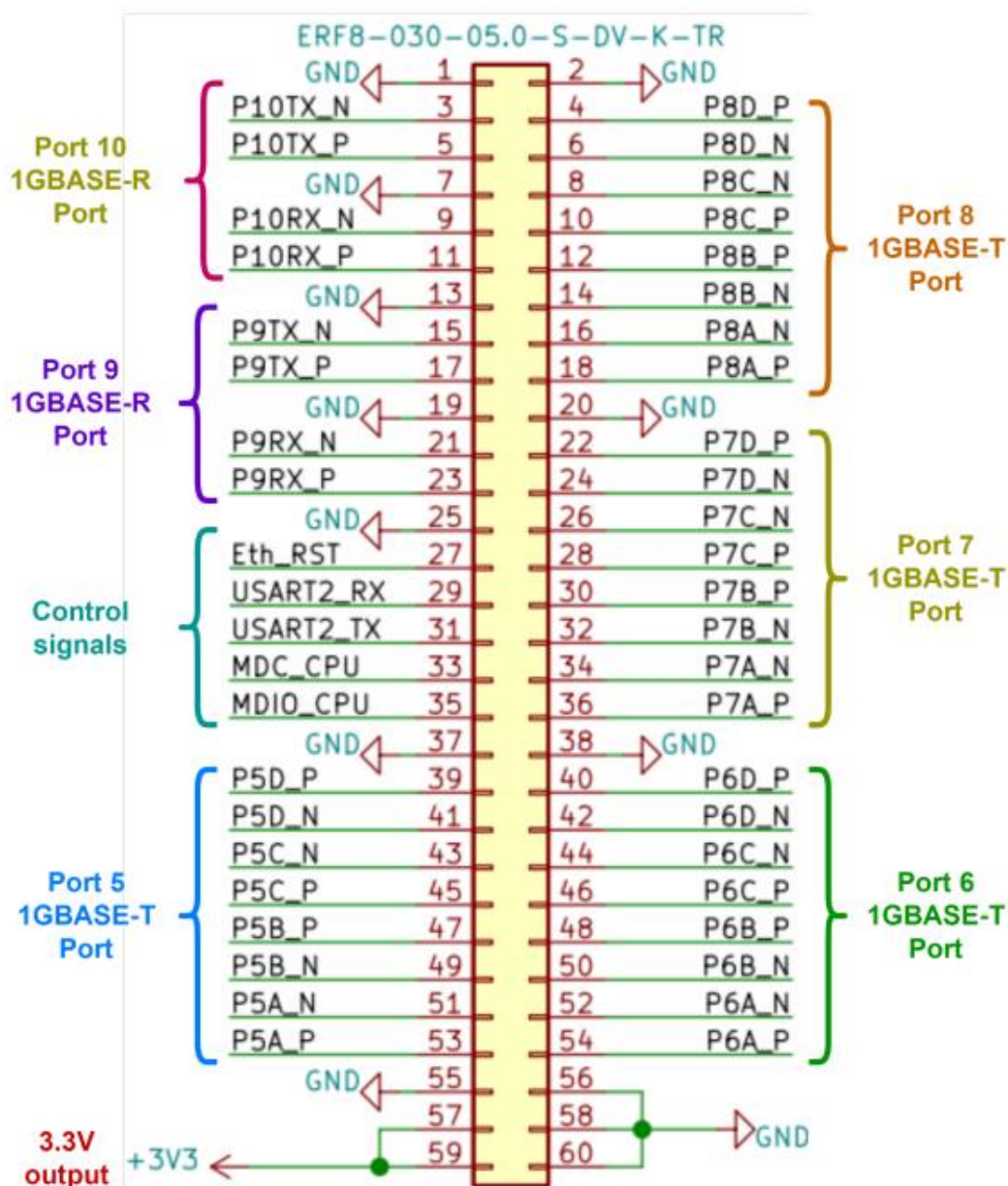


SYSTEM DESIGN

UbiSwitch contains the main ethernet switch IC. This IC provides eight 1GBASE-T ethernet ports and three 10Gbps 10GBASE-R ports. These eleven ports are routed directly to a Samtec Edge Rate connector on UbiSwitch, along with several other power and control lines.



Signals on the UbiSwitch carried on the Samtec Edge Rate header 1



Signals on the UbiSwitch carried on the Samtec Edge Rate header 2

The signals shown in the previous diagrams enter UbiSwitch Baseboard through its corresponding Samtec EdgeRate header. UbiSwitch Baseboard then routes these signals in the following ways

- Ports 1-4 (the 10/100/1GBASE-T ports) are routed to Molex PicoClasp headers through ethernet magnetics.
- UbiBaseBoard houses a Molex PicoClasp header for 8-60V power input (VBus). This is then routed to the Samtec Edge Rate header to power the UbiSwitch.
- Serial signals are routed to a Molex PicoClasp header.
- SMI signals are routed to a Molex PicoClasp header.
- LED signals are routed to a Molex PicoClasp header.

In this way UbiBaseBoard provides physical access to the 1GBASE-T ports from UbiSwitch

Auto negotiation

All ports on the UbiSwitch system support auto negotiation, auto-MDI/MDIX and polarity correction. Each port will auto negotiate with the connected device to achieve the fastest possible speed. The fastest possible speed will depend on what the connected device is capable of, and the quality of the cabling between UbiSwitch Baseboard and the connected device. This simplifies system connectivity, meaning eight of the ports on UbiSwitch Baseboard are compatible with any 10/100/1G device and three ports are compatible with Fiber SFP+ devices.

INCLUDED EQUIPMENT

The product includes the following:

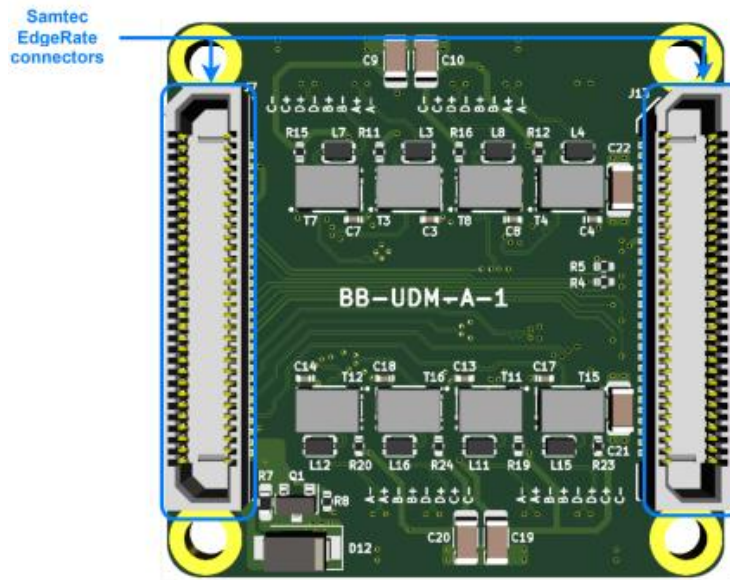
- 1 x UbiSwitch Baseboard board
- 4 x Molex PicoClasp to RJ45 4-way Shielded Twisted Pair cables (300mm)
- 1 x Molex PicoClasp Power Cable to bare, tinned leads (300mm)

RoHS Compliance

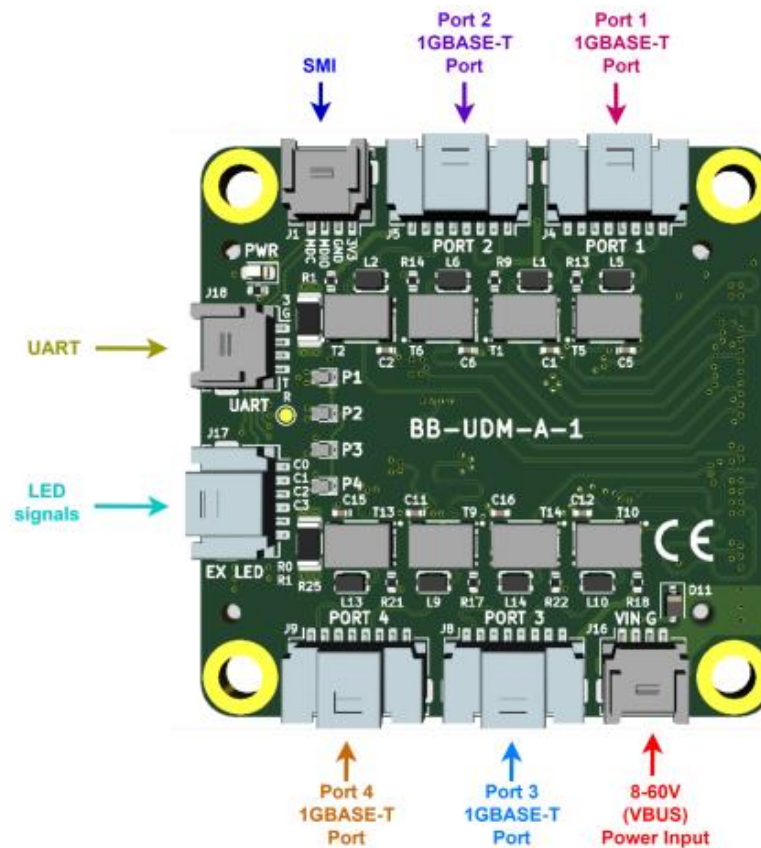
The Amphenol UbiSwitch Baseboard complies with the RoHS (Restriction of Hazardous Substances Directive) Certificate of Compliance.

HARDWARE INTERFACES

Board Map (front)



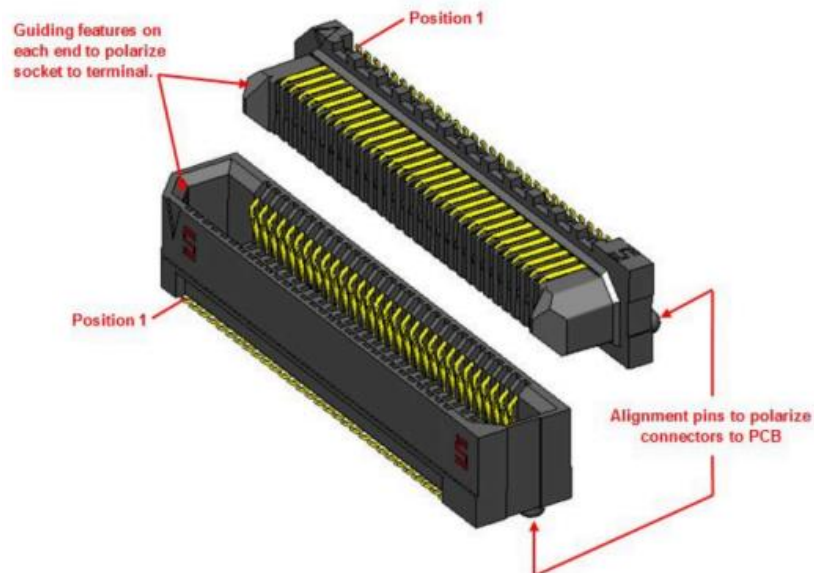
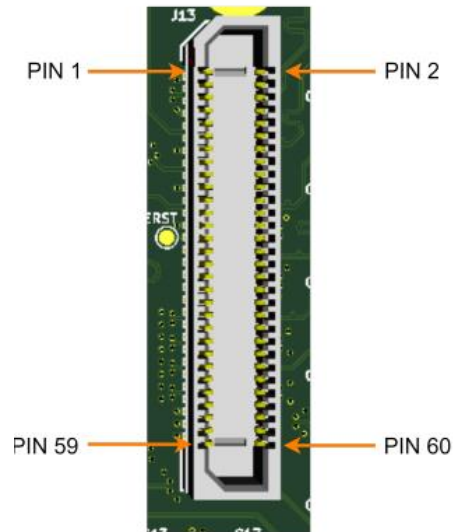
Board Map (Back)



CONNECTORS AND PINOUTS

Edge Rate connector

The 8 ports, 3 SerDES, SMI, LED signals, UART, input voltage and output voltage are placed onto a Samtec Edge Rate™ (MPN: ERF8-030-05.0-S-DV-K-TR) stackable header. The Edge Rate connector on the UbiSwitch Baseboard Board is shown below.



Edge rate connector mating

SIGNAL TO PIN ASSIGNMENTS

Connector	Pin Name	Pin Number	Description
J7	GND	1	Ground
	GND	2	Ground
	GND	6	Ground
	GND	12	Ground
	GND	18	Ground
	GND	19	Ground
	GND	37	Ground
	GND	38	Ground
	GND	55	Ground
	GND	56	Ground
	GND	57	Ground
	GND	59	Ground
	VBUS	58	Input supply voltage, 8V to 60V
	VBUS	60	Input supply voltage, 8V to 60V
	P1A_P	3	Port 1 1000BASE-T Differential Data Pair A ~ D Note: 100BASE-TX and 10BASE-Te are also supported on the A and B pairs.
	P1A_N	5	
	P1B_P	9	
	P1B_N	7	
	P1C_P	11	
	P1C_N	13	
	P1D_P	17	
	P1D_N	15	
	P2A_P	21	Port 2 1000BASE-T Differential Data Pair A ~ D Note: 100BASE-TX and 10BASE-Te are also supported on the A and B pairs.
	P2A_N	23	
	P2B_P	27	
	P2B_N	25	
	P2C_P	29	
	P2C_N	31	
	P2D_P	35	
	P2D_N	33	
	P3A_P	39	Port 3 1000BASE-T Differential Data Pair A ~ D Note: 100BASE-TX and 10BASE-Te are also supported on the A and B pairs.
	P3A_N	41	

	P3B_P	45	Port 4 1000BASE-T Differential Data Pair A ~ D Note: 100BASE-TX and 10BASE-Te are also supported on the A and B pairs.
	P3B_N	43	
	P3C_P	47	
	P3C_N	49	
	P3D_P	53	
	P3D_N	51	
	P4A_P	40	
	P4A_N	42	
	P4B_P	46	
	P4B_N	44	
	P4C_P	48	
	P4C_N	50	
	P4D_P	54	
	P4D_N	52	
	P0TX_P	14	SerDES Port 0 Transmit Data bus positive
	P0TX_N	16	SerDES Port 0 Transmit Data bus negative
	P0RX_P	8	SerDES Port 0 Receive Data bus positive
	P0RX_N	10	SerDES Port 0 Receive Data bus negative
	R0_LED	20	Parallel multiplexed LED outputs. These active low LED pins directly drive the port's LEDs supporting a range from 1 to 20 LEDs in a multiplexed fashion. In this mode the cathode of each LED connects to these pins through a series current limiting resistor. The anode of each LED connects to one of the Cx_LED pins below
	R1_LED	22	
	R2_LED	24	
	R3_LED	26	
	R4_LED	28	
	C0_LED	30	connect to the anode of LED column 0 for each row
	C1_LED	32	connect to the anode of LED column 1 for each row
	C2_LED	34	connect to the anode of LED column 2 for each row
	C3_LED	36	connect to the anode of LED column 3 for each row
	SE_SCLK	2	Synchronous Ethernet Source Clock. This is a 25 MHz reference clock which can be used as a synchronous clock input from the board or system. This signal must come from a high quality clock conditioning circuit or Synchronous Ethernet PLL.

Connector	Pin Name	Pin Number	Description
J13	GND	1	Ground
	GND	2	Ground
	GND	7	Ground
	GND	13	Ground
	GND	19	Ground
	GND	20	Ground
	GND	25	Ground
	GND	37	Ground
	GND	38	Ground
	GND	55	Ground
	GND	56	Ground
	GND	58	Ground
	GND	60	Ground
	+3V3	57	Output 3.3V, maximum 0.5A
	+3V3	59	Output 3.3V, maximum 0.5A
	P5A_P	53	Port 5 1000BASE-T Differential Data Pair A ~ D Note: 100BASE-TX and 10BASE-T _e are also supported on the A and B pairs.
	P5A_N	51	
	P5B_P	47	
	P5B_N	49	
	P5C_P	45	
	P5C_N	43	
	P5D_P	39	
	P5D_N	41	
	P6A_P	54	Port 6 1000BASE-T Differential Data Pair A ~ D Note: 100BASE-TX and 10BASE-T _e are also supported on the A and B pairs.
	P6A_N	52	
	P6B_P	48	
	P6B_N	50	
	P6C_P	46	
	P6C_N	44	
	P6D_P	40	
	P6D_N	42	
	P7A_P	36	Port 7 1000BASE-T Differential Data Pair A ~ D

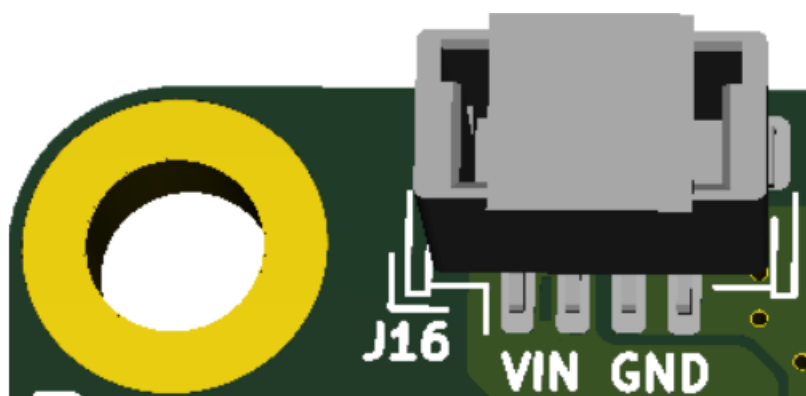
	P7A_N	34	Note: 100BASE-TX and 10BASE-T _e are also supported on the A and B pairs.
	P7B_P	30	
	P7B_N	32	
	P7C_P	28	
	P7C_N	26	
	P7D_P	22	
	P7D_N	24	
	P8A_P	18	Port 8 1000BASE-T Differential Data Pair A ~ D Note: 100BASE-TX and 10BASE-T _e are also supported on the A and B pairs.
	P8A_N	16	
	P8B_P	12	
	P8B_N	14	
	P8C_P	10	
	P8C_N	8	
	P8D_P	4	
	P8D_N	6	
	P9TX_P	17	SerDES Port 9 Transmit Data bus positive
	P9TX_N	15	SerDES Port 9 Transmit Data bus negative
	P9RX_P	23	SerDES Port 9 Receive Data bus positive
	P9RX_N	21	SerDES Port 9 Receive Data bus negative
	P10TX_P	5	SerDES Port 10 Transmit Data bus positive
	P10TX_N	3	SerDES Port 10 Transmit Data bus negative
	P10RX_P	11	SerDES Port 10 Receive Data bus positive
	P10RX_N	9	SerDES Port 10 Receive Data bus negative
	ETH_RST	27	Active low system reset
	MDC_CPU	33	Management Data Clock, Slave. MDC_CPU is the reference clock input for the serial management interface (SMI) that connects to an external SMI master, typically a CPU. A continuous clock stream is not expected. The maximum frequency supported is 20.0 MHz The CPU's SMI interface is used to access the device's registers but it cannot be used until the device's INTn pin becomes active low.
	MDIO_CPU	35	Management Data I/O, Slave. MDIO_CPU is used to transfer management data in and out of the device synchronously to MDC_CPU
	USART2_RX	29	Microcontroller USART RX line
	USART2_TX	31	Microcontroller USART TX line

Voltage Input

The top left connector is the voltage input terminal. A four pin PicoClasp connector is used to allow the input voltage to be easily daisy chained between boards (two wires per power rail).

The voltage input has the following features:

- Voltage input can range from 8 to 60V
- Maximum allowable voltage of 65V
- Transient voltage protection above 66.3V
- Reverse polarity protection

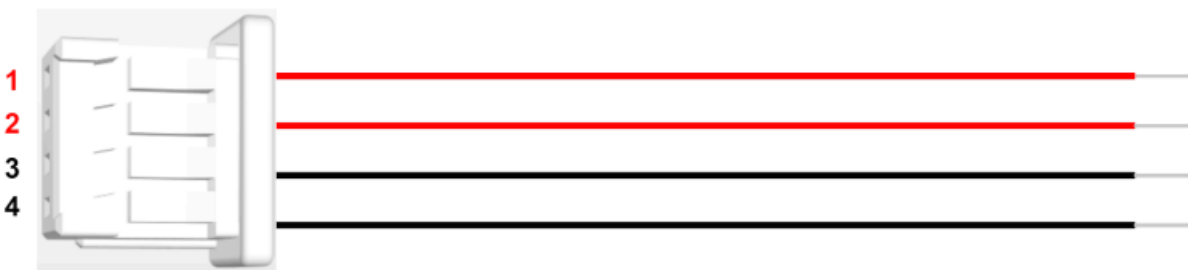


Voltage input header pinout

Voltage input connector part numbers

Connector on board	Mating header	Crimp used	Wire used
5019400407	5019390400	5013340000	UL1061, 28AWG

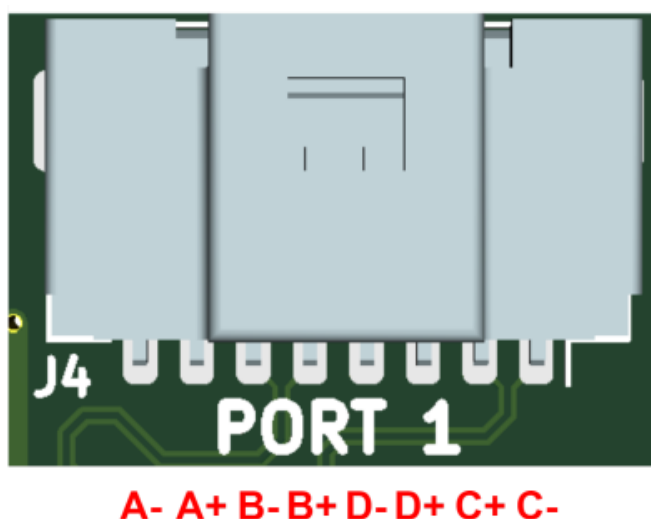
Cable pinout



Voltage input cable pinout (red = V+, black = GND)

Ethernet Ports

There are eight ethernet connectors on UbiBaseBoard. Each connector has eight pins corresponding to the eight signals required for 1000BASE-T which are A-, A+, B-, B+, D-, D+, C+, C-. The pin mapping of all eight connectors is identical.

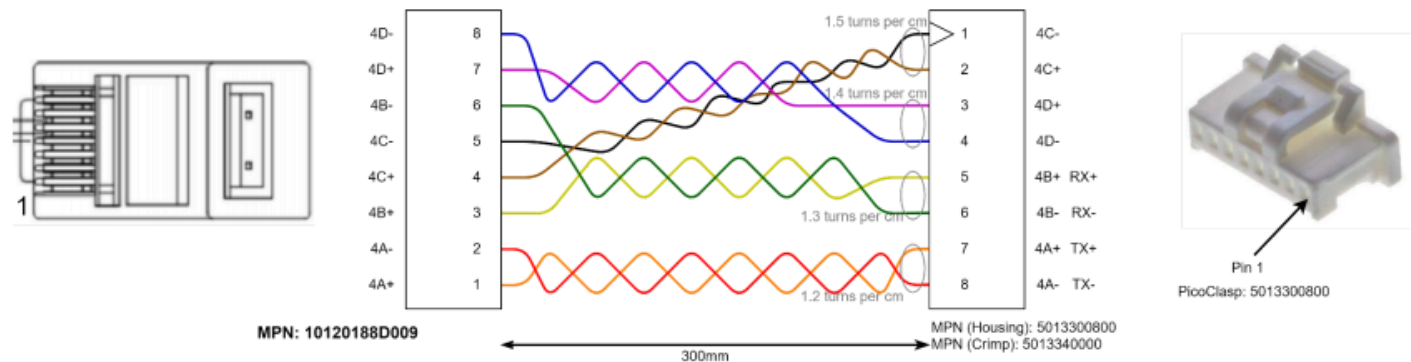


Ethernet Port Pinout

Ethernet connector pinout and part numbers

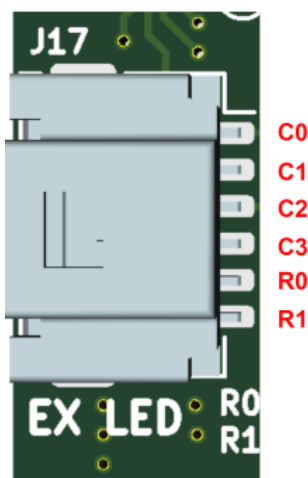
Connector on board	Mating header	Crimp used	Wire used
5013310807	5013300800	5013340000	UL1061, 28AWG

Ethernet Cable pinout



External LED Header

An External LED header on the top of the board allows port activity indicator signals can be brought off-board for integration into a chassis.

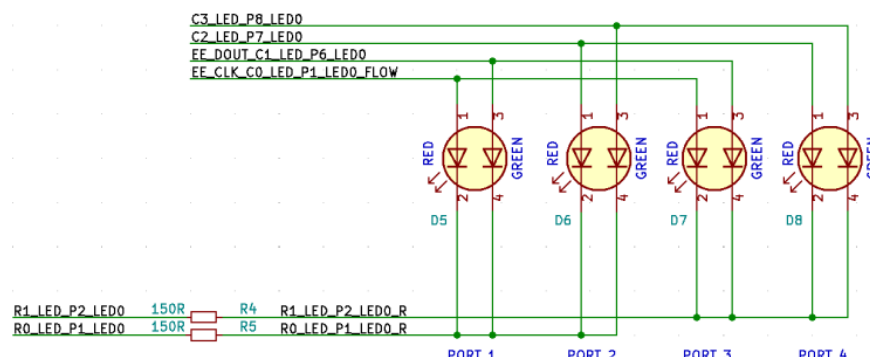


External LED header pinout

Ethernet connector pinout and part numbers

Connector on board	Mating header	Crimp used	Wire used
5013310907	5013300900	5013340000	UL1061, 28AWG

External LEDs connection should be followed below diagram:

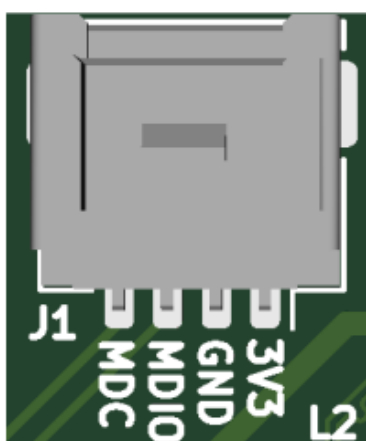


Ports 1 to 4 use two LED signals to indicate link speed and activity. In the diagram above, these two LED signals are mapped to a dual color LED, but this could alternatively be two single color LEDs. The color corresponds to the link speed and activity is shown via blinking. (Green blinking indicates a 1000 Mbps connection, Red blinking indicates a 100Mbps connection, Orange blink indicates a 10Mbps connection). A solid on LED indicates Link/No Activity.

150 Ω resistors are embedded onto the board and hence will already be in series with any external LEDs. This means that additional series resistors may not need to be added to any external LEDs.

SMI header

The SMI header on the top of the board allows access to the registers of Switch IC on the UbiSwitch module. We do not recommend using the SMI header for switch configuration. Instead, use the serial header.



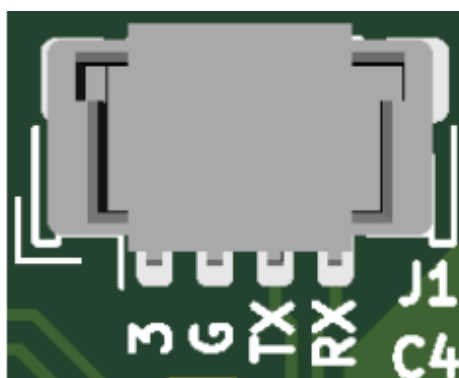
SMI header pinout

SMI connector part numbers

Connector on board	Mating header	Crimp used	Wire used
5019400407	5019390400	5013340000	UL1061, 28AWG

Serial header

The serial header allows control messages to be sent/received to/from the microcontroller on UbiSwitch to configure the device. This allows the user to wire any external serial device to UbiBaseBoard, and send serial commands to the system to provide switch configuration



header pinout

Connector and part numbers

Connector on board	Mating header	Crimp used	Wire used
5019400407	5019390400	5013340000	UL1061, 28AWG

Other Interfaces

LEDs

There are 5 LEDs on UbiBaseBoard in total. Four of these LEDs are dual color LEDs, meaning there are a total of nine LED signals on this board. Eight of the LED signals can be taken off board.

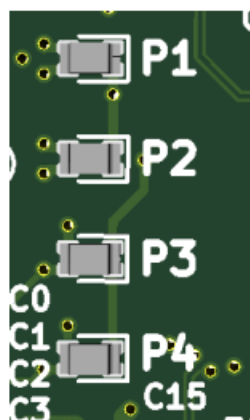
The 3.3V UBI Power Indicator LED (**Green**) indicates that 3.3V of the UbiSwitch module is present. That indicates that the UbiSwitch is stacked on the UbiSwitch Baseboard board correctly and both are powered. It should be solid green in normal operation.



Power Indicator LED

There are three LEDs (**Green**) at bottom left of UbiSwitch Baseboard indicating when SFP+ module is plugged to the SFP+ connector. Each LED indicates one SFP+ module at port 0, 9, 10. It should be solid green when SFP+ module is plugged.

Each Port from 1 to 4 Activity LED is a Red/Green dual color LED and each corresponds to a specific port. They indicate activity on each port and will blink when there is traffic on a port. They should be solid off when a port is not connected to any device, and they should blink under normal operation (**Green** blinking indicates a 1000 Mbps connection, **Red** blinking indicates a 100Mbps connection, **Orange** blink indicates a 10Mbps connection). A solid on LED indicates Link/No Activity.

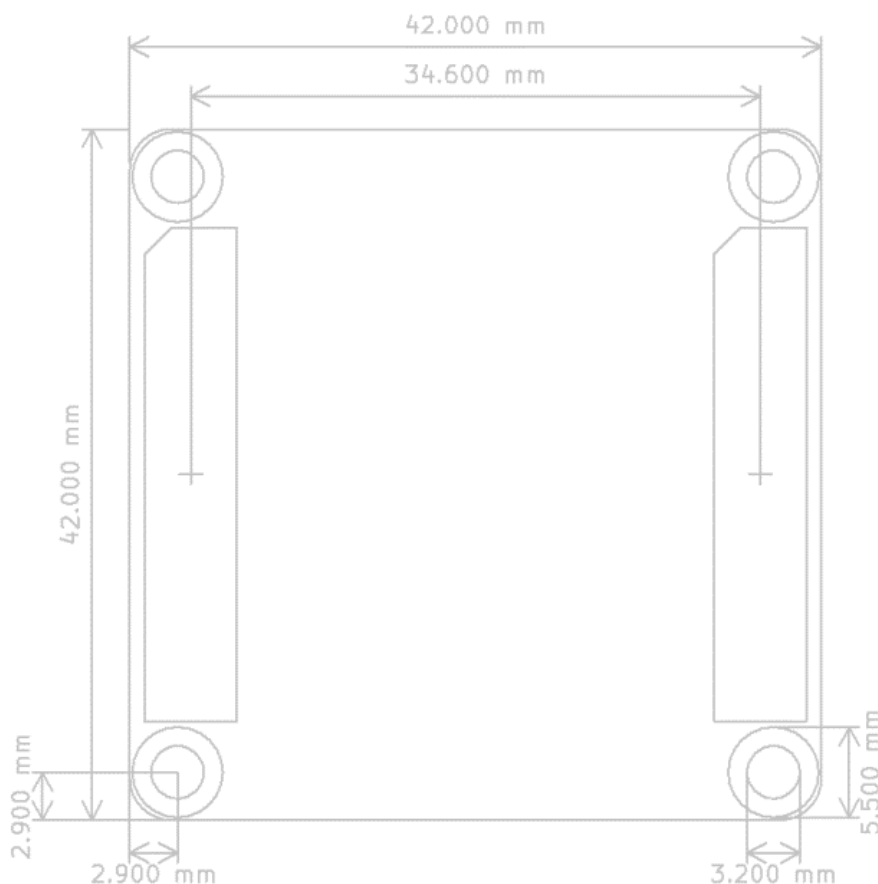


Port 1-4 Link/Activity LEDs

DEVICE CONFIGURATION

UbiSwitch Baseboard itself is a passive board and requires no configuration. For information on how to configure UbiSwitch, please refer to the UbiSwitch Datasheet.

MECHANICAL DRAWING



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Amphenol

MILITARY HIGH SPEED

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