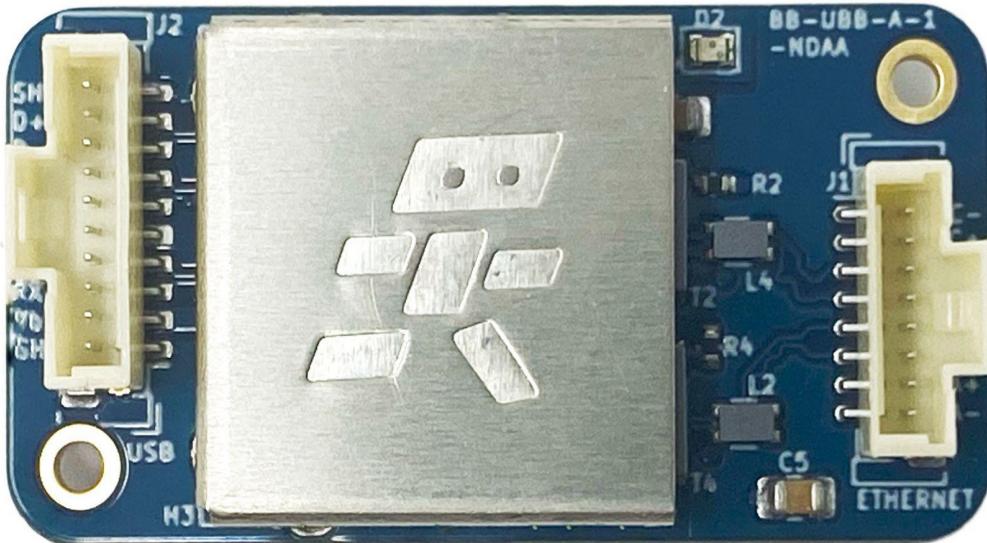


# USBBLOX

Embedded USB3.1 to GigaBit Ethernet Converter



## DESCRIPTION

USBBlox is a compact USB 3.1 to 10/100/1000 Ethernet converter providing reliable and robust USB to ethernet conversion for harsh applications where Size, Weight and Power are limited (SWaP). Unlike the majority of USB to Ethernet conversion devices, USBBlox uses industrially rated chipsets and focuses on shielding of the USB 3.1 signals through extensive grounding and shielding. This is all achieved in an extremely compact form factor (19mm x 37mm), using vibration tolerant connectors.

These features allow USBBlox to achieve an extended operating temperature range, suitable for use in high vibration and noisy environments where size and weight are limited, such as drones, robots and other compact industrial applications.

USBBlox is powered through its USB port and contains a single USB 3.1 port and 10/100/1000 Ethernet port.

## FEATURES

- 1 x USB 3.1 SuperSpeed port (backwards compatible with USB 2.0)
- 1 x 1000BASE-T Ethernet port (compatible with 10BASE-T and 100BASE-TX)
- USB powered, no external other power input required
- -40°C to +85°C operating temperature range
- 19 mm x 37 mm x 9.4 mm board size (not including cables)
- Vibration tolerant, positive-locking Molex PicoClasp connectors for USB/Ethernet ports
- Auto-MDIX, auto-negotiation, auto polarity correction on ethernet port
- Automatic USB detach functionality when ethernet port is removed
- Extended EMI shielding
- Plug and play functionality (no configuration needed)

- Advanced configuration possible over USB port
- Ethernet activity LED onboard
- All cables included

## HOW TO ORDER

<b>Part Number</b>	CF-02BBUBBNDA	USBBlox NDAA Compliant
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## GENERAL SPECIFICATIONS

<b>Voltage Input</b>	5V (from USB port)
<b>Supported Protocols</b>	10BASE-T, 100BASE-TX, 1000BASE-T, USB 3.1, USB 3.1, USB 2.0
<b>Power Consumption</b>	200mW (idle) to 1,076mW (1Gbps throughput)
<b>Weight</b>	6 grams (board only), 28 grams (board and cables)
<b>Size</b>	19 mm x 37 mm x 9.4 mm
<b>Operating Temperature</b>	-40°C to +85°C
<b>Storage Temperature</b>	-65°C to +150°C

## Device Bringup

In the simplest case of an unmanaged media conversion application, USBBlox can be operated immediately by following the following steps.

- 1) Connect USBBlox to a USB host using the included USB A to Molex PicoClasp cable.
- 2) Connect USBBlox to an ethernet device using the included RJ-45 to Molex PicoClasp cable.
- 3) The device connected to the USB port on USBBlox will now show an additional network interface present.

## Block Diagram

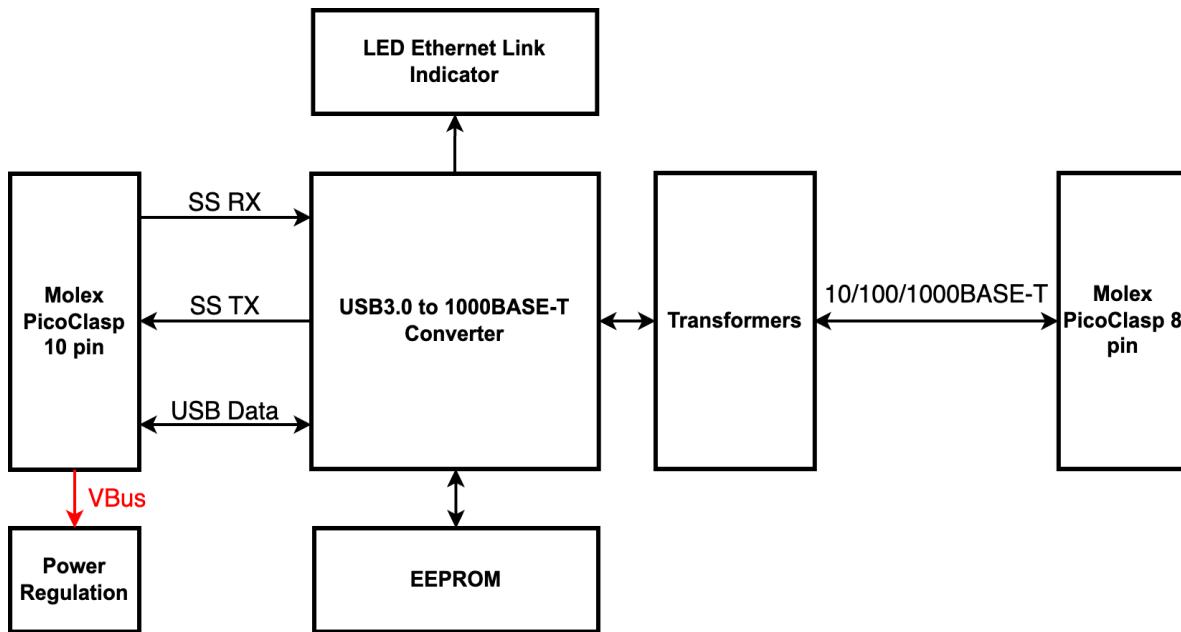


Figure 1: USBBlox Block Diagram

## Included Equipment

The product includes the following:

- 1 x USBBlox
- 1 x Molex PicoClasp to USB C, (Shielded, USB3.1, 400mm, 10 way)
- 1 x Molex PicoClasp to RJ-45, (Unshielded, Ethernet, 300mm, 8 way)

## RoHS Certification of Compliance

The BotBlox USBBlox complies with the RoHS (Restriction of Hazardous Substances Directive) Certificate of Compliance.

## Hardware Interfaces

### Board Map

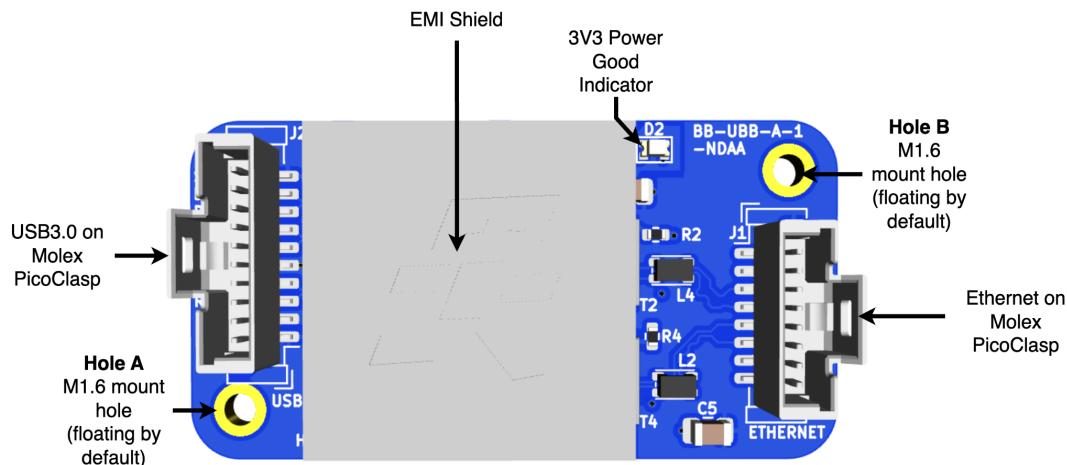


Figure 2: USBBlox Board Map (front)

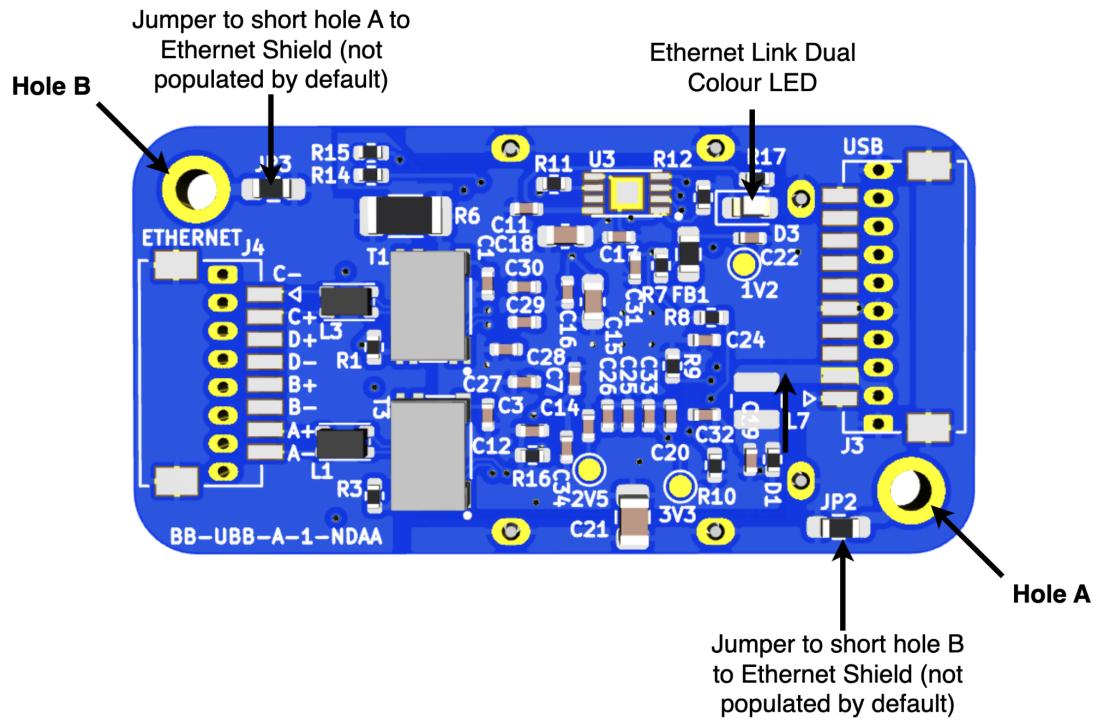


Figure 3: USBBlox Board Map (back)

## USB Port

Connector Pinout

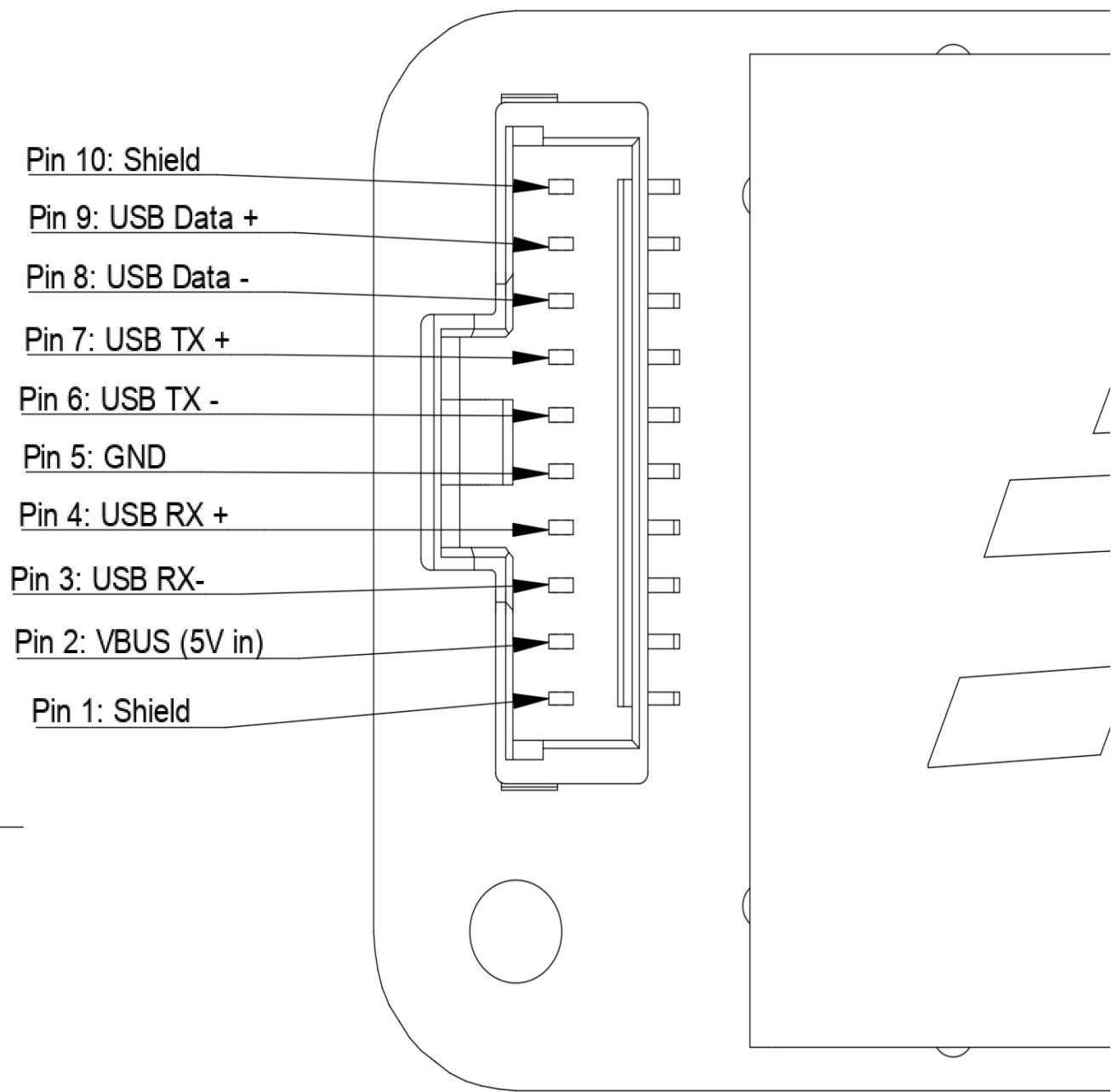


Figure 4: Connector pinout of the USB port on USBBlox

Table 2 below shows the connectors and associated mating header and crimp used for the USB port.

Connector on board	Mating header	Crimp used	Wire used
<a href="#">5013311007</a>	<a href="#">5013301000</a>	<a href="#">5011937000</a>	UL1061, 28AWG

Table 2: USB connector pinout and part numbers

Pin number	Signal Name	Direction with respect to USB-Blox	Description
1	Shield	Not applicable	Connects to the cable shield of the USB cable. Not connected to the USB power ground
2	VBUS	Input	5V power rail from USB Host; this powers USBBlox
3	USB RX-	Input	USB 3.1 SuperSpeed receiver negative. Must connect to the USB host transmitter negative.
4	USB RX+	Input	USB 3.1 SuperSpeed receiver positive. Must connect to the USB host transmitter positive.
5	GND	Input	GND power rail from USB Host; this powers USBBlox
6	USB TX-	Output	USB 3.1 SuperSpeed transmitter negative. Must connect to the USB host receiver negative.
7	USB TX+	Output	USB 3.1 SuperSpeed transmitter positive. Must connect to the USB host receiver positive.
8	USB Data -	Bidirectional	USB 2.0 data negative. Must connect to USB host data negative.
9	USB Data +	Bidirectional	USB 2.0 data positive. Must connect to USB host data positive.
10	Shield	Not applicable	Connects to the cable shield of the USB cable. Not connected to the USB power ground.

Table 3: USB connector signal descriptions

## Mating Cable Pinout

USBBlox is supplied with a Molex PicoClasp (10 pin) to USB A cable to allow easy integration with typical USB 3.0 devices. The mapping for this cable is shown in figure 5 below.

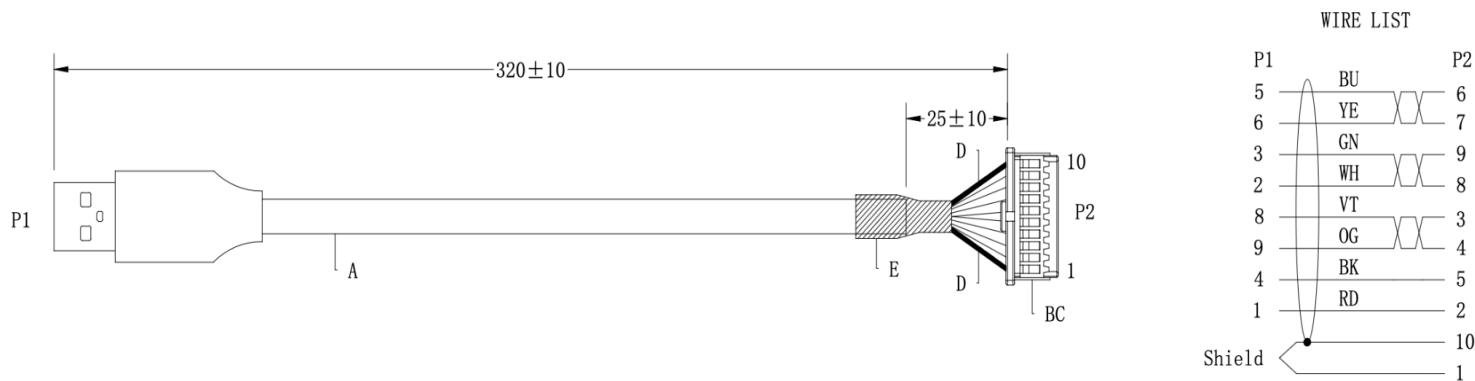


Figure 5: Cable diagram for the Molex PicoClasp to USB A 3.0 cable.

Item	Name	P/N No.	Specification	QTY	Unit	Cutting Length	Note
E	Tube		BLACK H.S.TUBE Ø4.5mm L=15mm	1	PCS		LT
D	Tube		BLACK H.S.TUBE Ø1.0mm L=27mm	2	PCS		LT
C	Tier		MOLEX : 501334-0000 PIN-PLATED	10	PCS		MOLEX
B	HSG		MOLEX:501330-1000	1	PCS		MOLEX
A	WIRE		USB 3.0 data line BLACK+ USB3.0 A MALE Blue rubber core L=325mm	1	PCS		

Table 4: Summary of cable types, quantities, and specifications for each connection as per the cable diagram.

USB3.0 is very sensitive to signal integrity and EMI considerations. Therefore any cable used for the connection between the USB Host and USBBlox must be as short as possible, with adequate shielding, and good quality internal twisted pairs.

## Ethernet Port

### Connector Pinout

Figure 6 below shows the pinout on the 8 pin Molex PicoClasp connector for the ethernet port. This mapping is the same mapping as used on all of our other gigabit boards that use a Molex PicoClasp header. This allows easy integration of USBBlox with other BotBlox hardware through the use of a Molex PicoClasp to Molex PicoClasp 8 way cable.

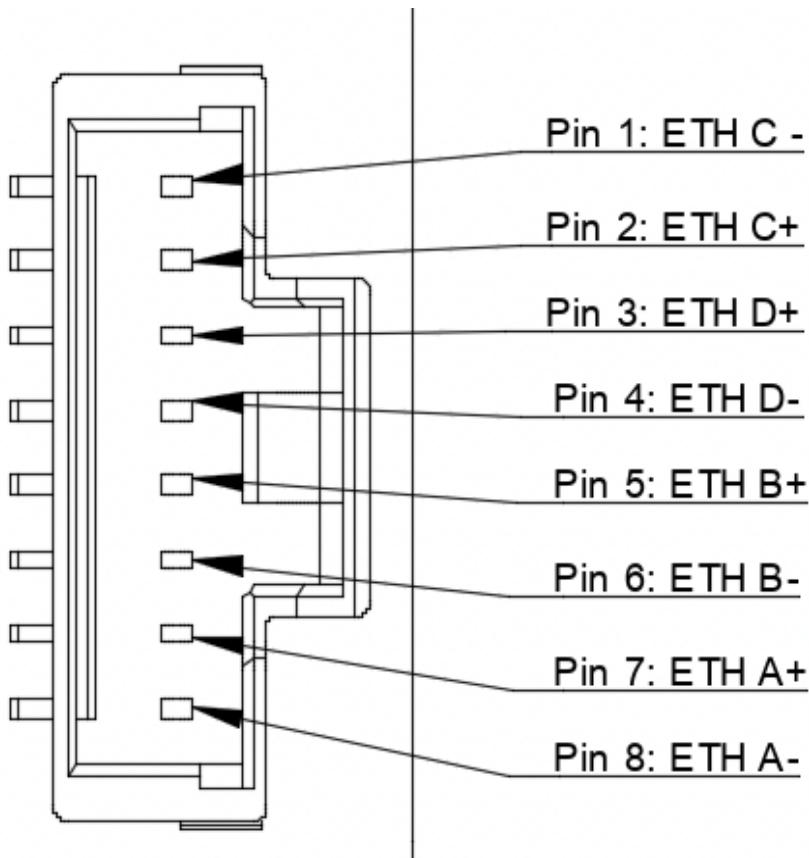


Figure 6: Connector pinout of the USB port on USBBlox

Table 4 below shows the connectors and associated mating header and crimp used for the ethernet port.

Connector on board	Mating header	Crimp used	Wire used
<a href="#">5013310807</a>	<a href="#">5013300800</a>	<a href="#">5013340000</a>	UL1061, 28AWG

Table 5: Ethernet connector pinout and part numbers

## Mating Cable Pinout

Figure 7 below shows the mapping of the Molex PicoClasp to RJ-45 cable used for the ethernet port on USBBlox. This cable is unshielded.

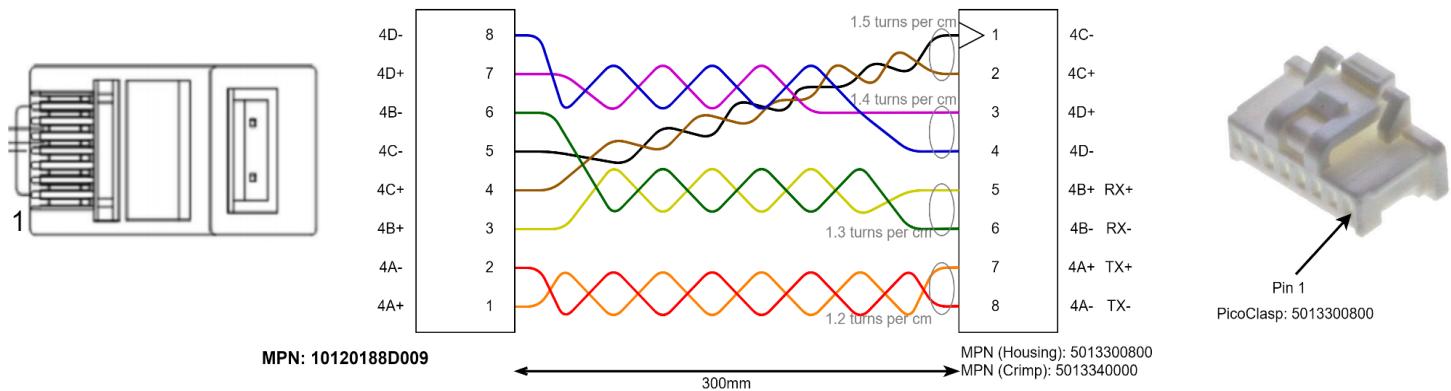


Figure 7: Ethernet cable pinout

## LED Link Indication

A dual colour LED on USBBlox is used to communicate both link activity and link speed.

**Orange/Red** LED: 1000BASE-T link  
**Green** LED: 100BASE-Tx or 10BASE-T link

## Ethernet Fabric

### Ethernet port characteristics

The ethernet port on USBBlox is a 10/100/1000 MAC and PHY that supports auto-negotiation, auto-polarity correction and auto-MDIX capability. This means the ethernet port will automatically detect polarity and TX/RX mismatches between itself and the connected ethernet device, and adjust itself accordingly to establish a link.

The auto negotiation functionality means that the port will automatically downshift from 1000BASE-T to 100BASE-Tx or 10BASE-T in the case of a degraded cable, or a link device that can only run at 100BASE-Tx/10BASE-T. This will also occur if a 2 pair cable is connected to the port, meaning USBBlox can interoperate with older network cabling that only uses two pairs of the cable.

## MAC Address

The default MAC address of USBBlox is 00:80:0F:78:00:00. This can be modified using MPLAB® Connect Configurator, as described in section 3 Device Configuration.

## NetDetach function

NetDetach is a mode of operation where the device detaches from the USB bus after the Ethernet cable is disconnected. This prevents a situation where a link still appears as present even when the ethernet device is disconnected. This feature is similar to Link Fault Pass-Through, a common feature in media converters.

## Mechanical Drawing

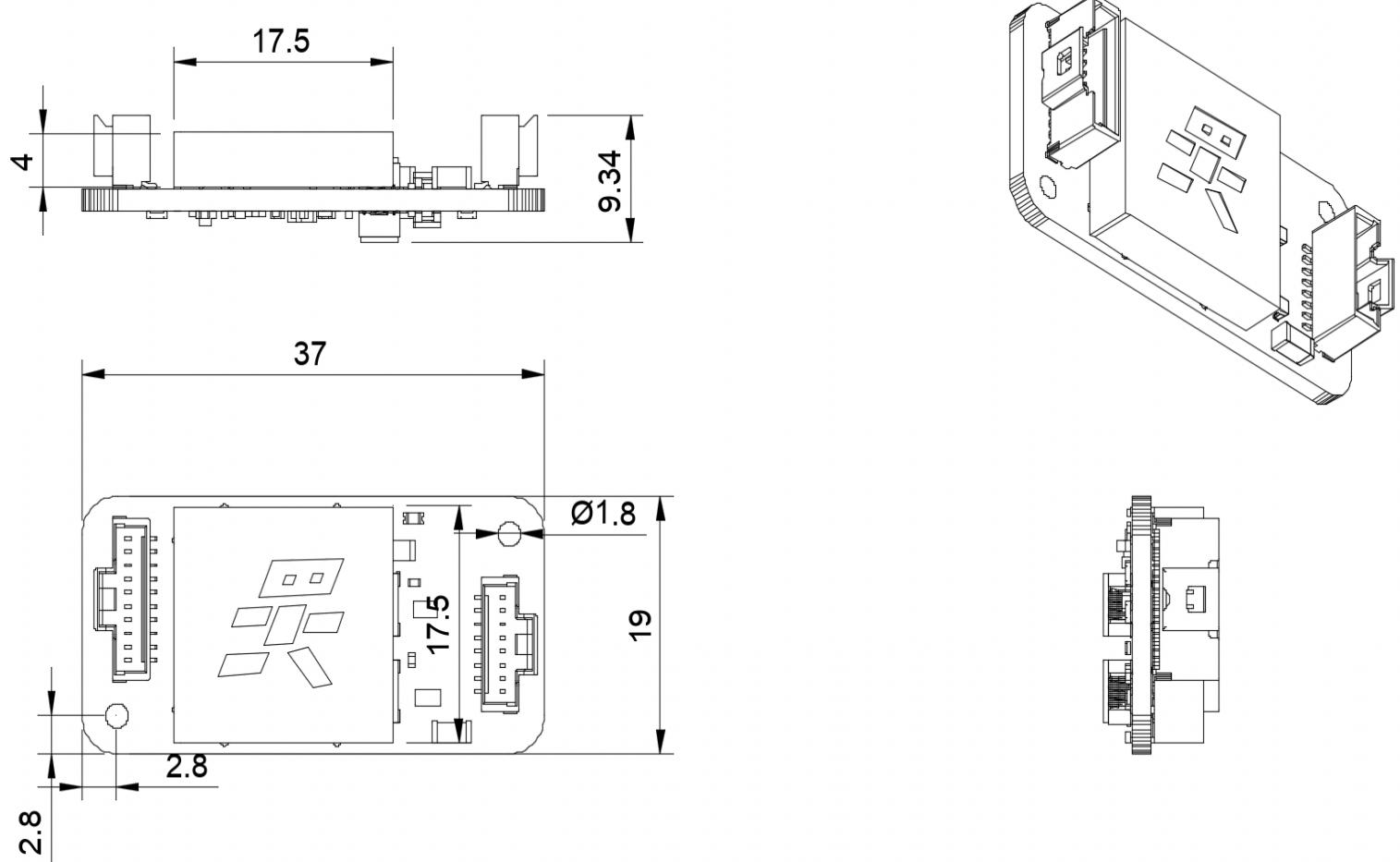


Figure 8: The basic mechanical dimensions of USBBlox