10GBlox-Switch

Small 7 port with
3 x 10 Gigabit Ethernet

MPN: BB-10S-A-1

Datasheet

September 2022
Board revision A

Contents

1 General Information

1.1 Functionality and Features of 10GBlox Switch

The BotBlox 10GBlox Switch is the main switching fabric for the 10GBlox assembly, providing 4 x 1Gbps PHY ethernet ports and 3 x 10Gbps USXGMII ports.

10GBlox switch is a modular board and has to be mated with a board providing power supply, connectors and physical layer transceivers for the 3 USXGMII ports. 10GBlox Switch is designed to be mated with 10GBlox BASE-T PHY to provide a plug-and-play ethernet switch solution with 4 x 1Gbps PHY ports and 3 x 10Gbps ports.

When used with 10GBlox BASE-T PHY 10GBlox Switch will initialize and forward frames without any other configuration or external interaction. The configuration of the system is static.

1.1.1 Features
- 3 x 10/100/1000/2.5/5/10GBASE-T ethernet ports
- 4 x 10/100/1000BASE-T ethernet ports
- Input voltage range from 8V to 60V
- 40mm x 40mm board size
- Samtec RAZOR BEAM™ connector for modularity of connectors
- Automatic MDI-X crossover and polarity correction
- Auto-negotiation with connected devices to achieve maximum speed
- Require an programmed external flash for unmanaged (out-the-box) functionality
- SMI interface for accessing the PHY registers and programming external Flash

1.1.2 General Information

Voltage Input	8V to 60V DC
Supported Protocols	10BASE-T, 100BASE-TX, 1000BASE-T, 2.5GBASE-T,5GBASE-T, 10GBASE-T
Power Consumption	7.2W (idle) to 20W (when used with 10GBlox BASE-T PHY)
Weight	20 grams
Size	40 mm x 40 mm x 10 mm
Operating Temperature	-40°C to +85°C
Storage Temperature	-40°C to +125°C

Table 1: General Information

1.1.3 General Operating Instructions

10GBlox-Switch is designed for use in commercial and industrial 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.

A daughterboard (BB-10P-A-1) needs to be used with 10GBlox-Switch to provide access to the ports and power on the board.

To use 10GBlox-Switch, first mate the board with a daughterboard then apply an input voltage from 8 to 60V. Then connect external devices and 10GBlox-Switch will begin functioning as an unmanaged 10/100/1G/2.5G/10G and/or 10/100/1G network switch (depending on which ports are used).

1.2 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.
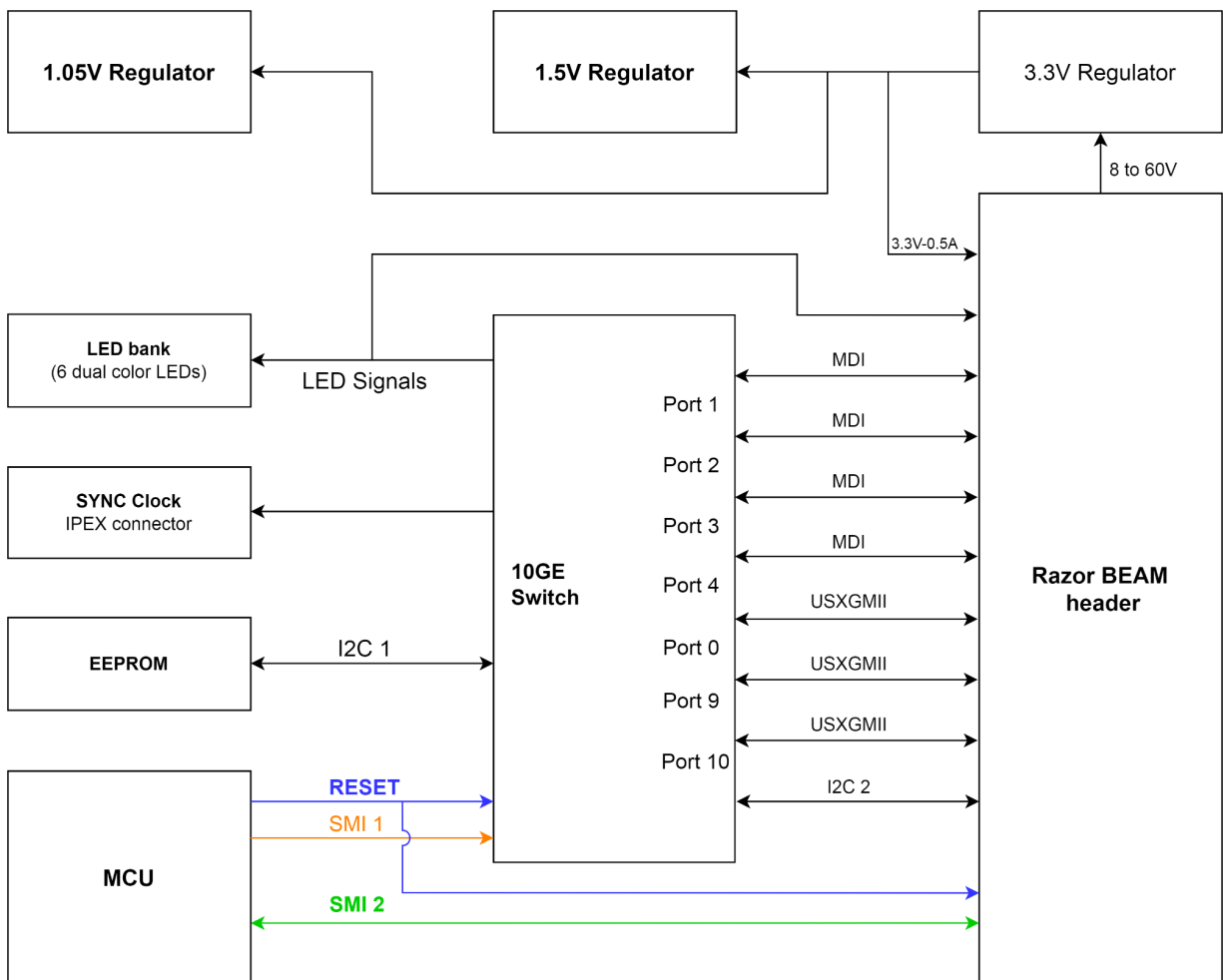
1.3 Block Diagram

Figure 1: 10GBlox-Switch Block Diagram

1.4 Included Equipment

The product includes the following:
1 x 10Blox-Switch board

1.5 RoHS Certification of Compliance

The BotBlox 10GBlox-Switch complies with the RoHS (Restriction of Hazardous Substances Directive) Certificate of Compliance.
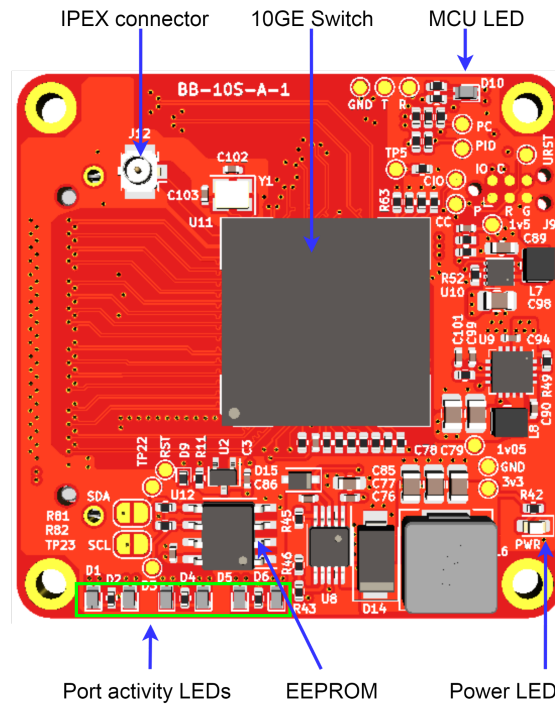
2 Hardware Interfaces

2.1 Board Map
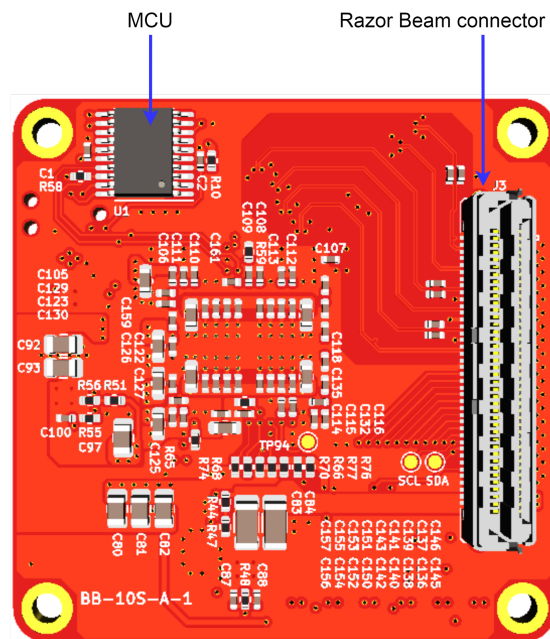

Figure 2: 10GBlox-Switch Board Map (front)

Figure 3: 10GBlox-Switch Board Map (back)

2.2 Connectors and Pinouts

2.2.1 Razor Beam connector

The 7 ports, USXGMII, SMI, LED signals, input voltage and output voltage are placed onto a Samtec Razor Beam™ (MPN: LSHM-140-03.0-L-DV-A-S-K-TR) stackable header. The Razor Beam connector on the 10GBlox-Switch Board is shown in figure 4 below.
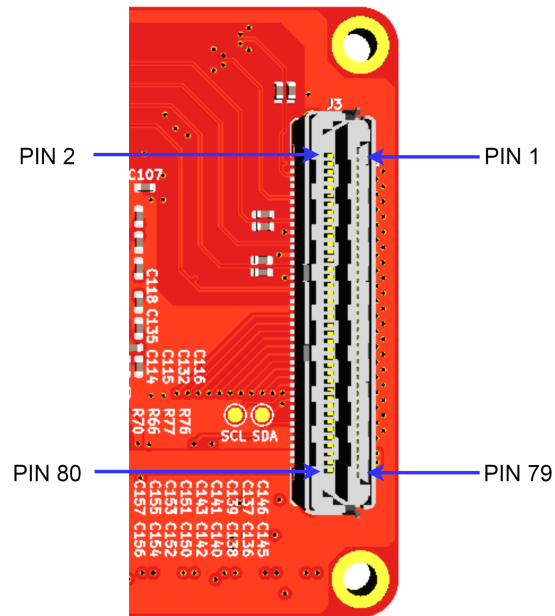

Figure 4: Razor Beam connector

The Razor Beam connector is a hermaphroditic (genderless) connector, meaning the same part is required on the daughtboard for mating. The mating method is shown in figure 5 below.
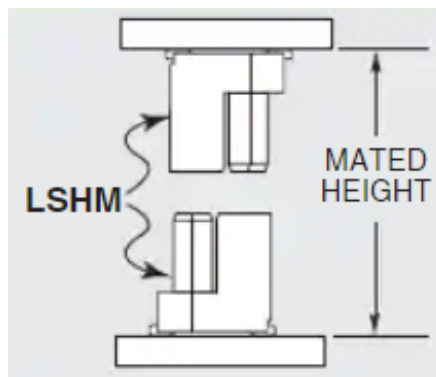

Figure 5: Razor Beam connector self-mating

The pin mapping between two mated LSHM-140-03.0-L-DV-A-S-K-TR Razor Beam connectors is shown in table 2 below.

Connector A Pin	Connector B Pin	Connector A Pin	Connector B Pin	Connector A Pin	Connector B Pin
1	2	28	27	55	56
2	1	29	30	56	55
3	4	30	29	57	58
4	3	31	32	58	57
5	6	32	31	59	60
6	5	33	34	60	59
7	8	34	33	61	62
8	7	35	36	62	61
9	10	36	35	63	64
10	9	37	38	64	63
11	12	38	37	65	66
12	11	39	40	66	65
13	14	40	39	67	68
14	13	41	42	68	67
15	16	42	41	69	70
16	15	43	44	70	69
17	18	44	43	71	72
18	17	45	46	72	71
19	20	46	45	73	74
20	19	47	48	74	73
21	22	48	47	75	76
22	21	49	50	76	75

23	24	50	49	77	78
24	23	51	52	78	77
25	26	52	51	79	80
26	25	53	54	80	79
27	28	54	53		

Table 2: Pin matching for mating connector

The signal to pin assignments used on 10GBlox-Switch detailed in table 3 below.

Pin name	Pin number	Description
GND	1	Ground
GND	2	Ground
GND	8	Ground
GND	14	Ground
GND	19	Ground
GND	20	Ground
GND	26	Ground
GND	32	Ground
GND	37	Ground
GND	38	Ground
GND	40	Ground
GND	55	Ground
GND	72	Ground
GND	73	Ground
GND	74	Ground
GND	75	Ground

GND	76	Ground
VBUS	78	Input supply voltage, 8V to 60V
VBUS	80	Input supply voltage, 8V to 60V
+3V3	77	**Output** 3.3V, maximum 0.5A
+3V3	79	**Output** 3.3V, maximum 0.5A
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	
P3B_N	43	
P3C_P	47	

P3C_N	49	
P3D_P	53	
P3D_N	51	
P4A_P	57	Port 4 1000BASE-T Differential Data Pair A ~ D Note: 100BASE-TX and 10BASE-Te are also supported on the A and B pairs.
P4A_N	59	
P4B_P	63	
P4B_N	61	
P4C_P	65	
P4C_N	67	
P4D_P	71	
P4D_N	69	
P0TX_P	34	USXGMII Port 0 Transmit Data bus positive
P0TX_N	36	USXGMII Port 0 Transmit Data bus negative
P0RX_P	28	USXGMII Port 0 Receive Data bus positive
P0RX_N	30	USXGMII Port 0 Receive Data bus negative
P9TX_P	10	USXGMII Port 9 Transmit Data bus positive
P9TX_N	12	USXGMII Port 9 Transmit Data bus negative
P9RX_P	4	USXGMII Port 9 Receive Data bus positive
P9RX_N	6	USXGMII Port 9 Receive Data bus negative
P10TX_P	22	USXGMII Port 10 Transmit Data bus positive
P10TX_N	24	USXGMII Port 10 Transmit Data bus negative
P10RX_P	16	USXGMII Port 10 Receive Data bus positive
P10RX_N	18	USXGMII Port 10 Receive Data bus negative
I2C_SDA	64	I2C SDA Data In/Out
I2C_SCL	62	I2C SCL serial clock
ETH_RST	70	Active low system reset

INT	56	INTn is an active low, open drain pin that is asserted to indicate an unmasked interrupt event occurred. A single external pull-up resistor is required somewhere on this interrupt net for it to go high when it is inactive
MDC_PHY	58	As a Management Data Clock, in Master mode, this pin is the reference clock output for the serial management interface (SMI) that connects to an external SMI slave device, typically external PHYs.
MDIO_PHY	60	As a Management Data Clock, in Master mode, this pin is used to transfer management data in and out of the device synchronously to MDC_PHY
R0_LED	42	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	44	
R4_LED	46	
C0_LED	48	connect to the anode of LED column 0 for each row
C1_LED	50	connect to the anode of LED column 1 for each row
C2_LED	52	connect to the anode of LED column 2 for each row
C3_LED	54	connect to the anode of LED column 3 for each row
NC	66	Not connected
NC	68	Not connected

Table 3: 10GBlox-Switch connector pin assignments

2.2.2 SWD Programming Header

A programming header on the front of the board allows the STM32L021D4P7 on GigaStax Rugged to be programmed over SWD.
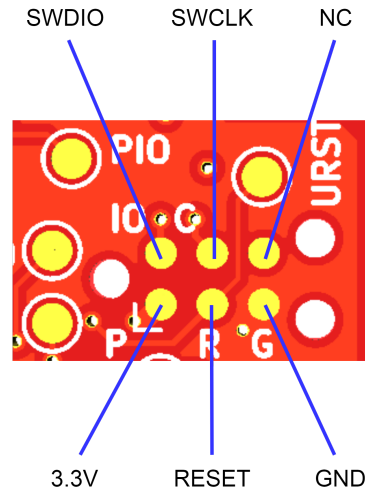

Figure 6: SWD programming header pinout

This header allows access to the SWD port on the onboard STM32 microcontroller, and requires the use of a 6-pin needle adapter such as the J-Link 6-pin needle adapter along with an in-circuit programmer such as the J-Link.

2.3 Other Interfaces

2.3.1 LEDs

There are 8 LEDs on 10GBlox-Switch in total. Seven of these LEDs are dual color LEDs, meaning there are a total of fifteen LED signals on this board. Seven of the LED signals can be taken off board.

The 3.3V Power Indicator LED (**Green**) indicates that voltage is present on the 3.3V line. It should be solid green in normal operation.

Figure 7: Power Indicator LED

Each Port 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.
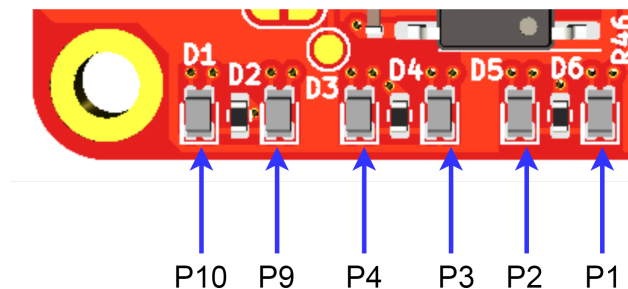

Figure 8: Port Activity Dual Red/Green LED

MCU LED is a **Red**/**Green** dual color LED indicating configuration status. Solid Green indicates configuration successfully and solid Red indicates error status.
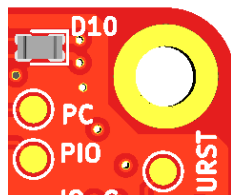

Figure 9: MCU Dual Red/Green LED

3 Software Interfaces

There is currently no software interface on 10GBlox-Switch. It functions solely as an unmanaged switch.

4 Device Configuration

4.1 Unmanaged Switch

To use 10GBlox-Switch in an unmanaged application requires no configuration. Simply connect the daughter board and apply a voltage to the voltage input and connect downstream devices.

4.2 Managed Switch

Operating 10GBlox-Switch is possible through configuring the 88E6393X switch chip by way of custom firmware running on the STM32 microcontroller.

5 Device Characteristics

5.1 Operating Conditions

5.1.1 Absolute Maximum Ratings
Operating in these ranges will reduce the lifetime of the device.

Voltage Input Maximum	65V
Storage Temperature	-40°C to +125°C
Operating Temperature	-40°C to +85°C

6 Datasheet Changelog

Date	Datasheet Version	Author	Notes
1/10/2022	A_A	Josh Elijah	Initial release

7 Contact

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