



# Technical Manual

## MAMBA Neo



**P/N – TV20 0011:** Red Mamba Neo video encoder for LVDS zoom cameras

**P/N – TV50 0011:** Cable kit for TV20 0011 - Red Mamba Neo IP streaming platform

**Includes:** 30-way micro-coax camera cable, 2-way cable (power supply), 12-way cable (RS232/TTL/GPIOs), Wi-Fi antenna

**P/N – TV20 0012:** Blue Mamba Neo video encoder for LVDS zoom cameras

**P/N – TV50 0012:** Cable kit for TV20 0012 - Blue Mamba Neo IP streaming platform

**Includes:** 30-way micro-coax camera cable, 2-way cable (power supply), 12-way cable (RS232/TTL/GPIOs)

**P/N – TV50 0013:** Evaluation kit for TV20 0011 / TV20 0012 - Red / Blue Mamba Neo

**Includes:** 30-way micro-coax camera cable, 2-way jack cable (power supply), 12-way cable (RS232/TTL/GPIOs), Wi-Fi antenna, Ethernet cable, HDMI A to Micro HDMI D cable, 12V 2A jack universal power supply

	Writing	Approval
Date	07/04/2023	11/04/2023
Name	Cédric Boulanger	Cédric Boulanger
Signature		



## Revision History

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Date	Revision	Description	Modified by	Note
10/05/2022	A	Creation of the document	CBO	
07/04/2023	B	Update board and kit references	CBO	

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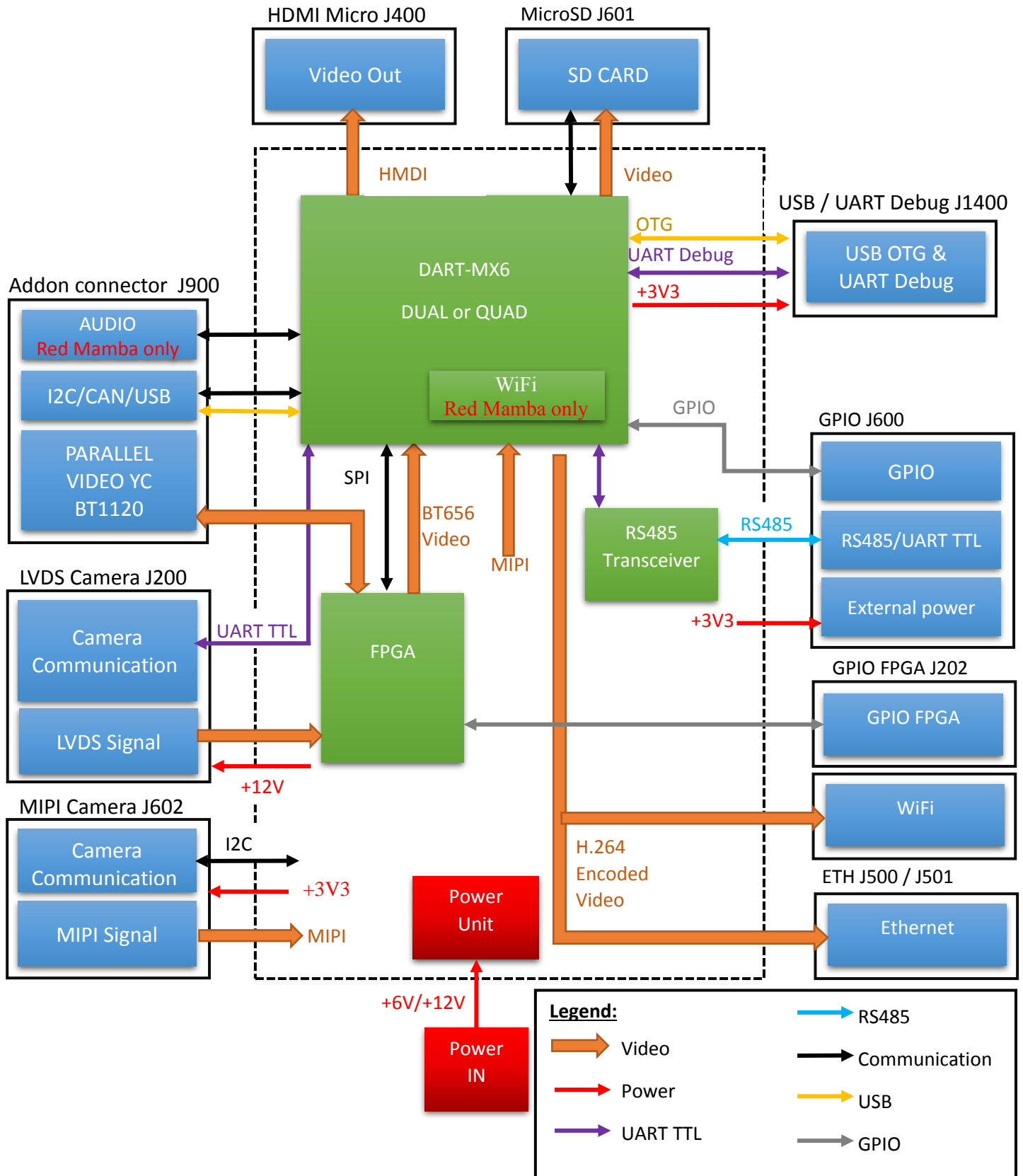
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# 1. Presentation

Mamba Neo provides H.264 encoded video via Ethernet & Wifi. The user controls the board via a website. The user can also send VISCA commands to control the camera over ethernet.

## 1.1. Synoptic



## 1.2. Features

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### Board specific:

- Supports digital 8 channels LVDS input
- Supports MIPI-CSI2
- Micro HDMI 1.4 output
- MicroSD card
- Ethernet 10/100
- ONVIF Protocol (S Profile)
- Set of GPIOs
- External sync signal from camera
- RS485 - UART TTL
- Power supply: 6-12V
- Size (mm): 57.50 x 50 x 22 or 57.25 x 50 x 13 with no Ethernet connector
- Weight: 28g

### Add-on specific

- Microphone In (Red Mamba Only)
- Stereo Audio out (Red Mamba Only)
- SPI, I2C
- YCbCr BT1120 Video input (muxed)
- RTC
- USB host

### SoM specific:

- Video encoding H.264 Constrained Baseline up to 1080p30
- Video decoding: Baseline, Main, High Profile, up to 1080p60
- CPU: iMX6 Quad (Red Mamba) or Dual (Blue Mamba)
- Max CPU frequency: up to 800MHz
- DDR3 RAM Size: 1GB
- eMMC Size: 8GB
- WiFi a/b/g/n (Red Mamba Only)

### Supported Cameras:

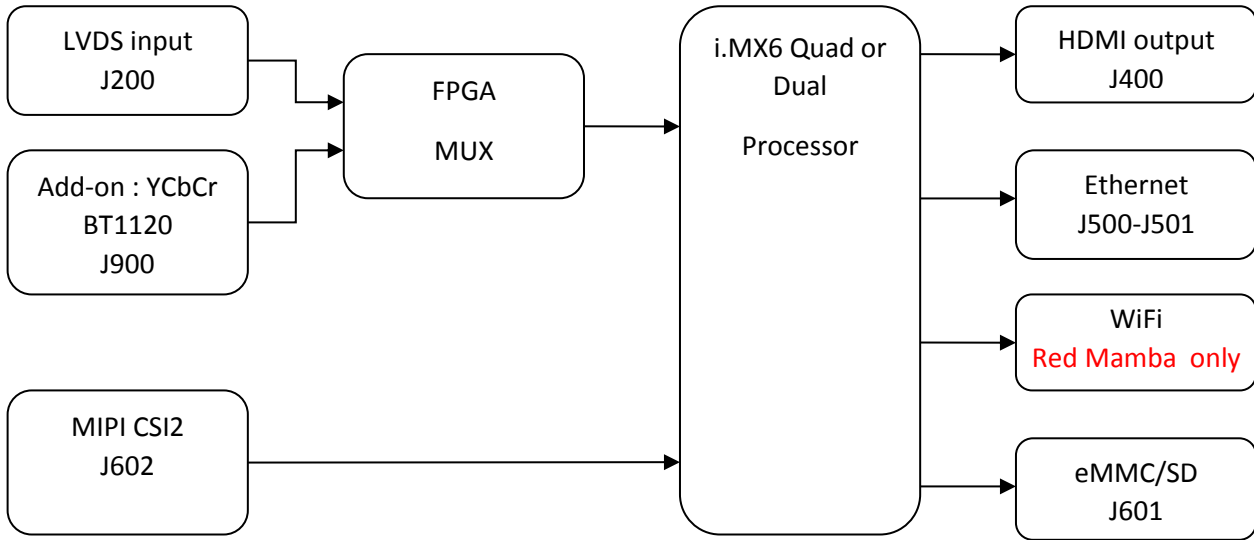
- **Sony EH** (EH3150, EH3300, EH3310, EH3400, EH3410, EH4300, EH6300)
- **Sony EV** (EV5300, EV5500, EV7100, EV7300, EV7310, EV7320, EV7500, EV7520, EV7520A, EV9500L)
- **Tamron** (MP1010M, MP1110M, MP2030, MP3010M)
- **Wonwoo** (MC-108, MC-108-M2, MC-108-M3)
- **Sentech** (AF243 LVDS)
- **Powerview** (PH8403-F22D, PH8536-H2D)
- **KT&C** (KZ33)

The differences between Blue/Red Mamba are:

- WiFi (none / a/b/g/n and BT)
- Audio (none / Mic and phones)
- Number of cores (2 / 4)

### 1.3. Video Flow

#### 1.3.1. Flowsheet



#### 1.3.2. Video Flow Detail

##### 1.3.2.1. LVDS Input

The video is sent from the camera to Mamba LVDS input. The board acquires the LVDS video signal. A pre-processing based on the FPGA is first made. Data is sent to the embedded iMX6. The video can be displayed or streamed.

Mamba Board

Signal	LVDS
Connector	USL30 ways
Link	Micro Coaxial Cable
Connector	USL30 ways
Signal	LVDS
Processing (MUX)	FPGA
Signal	BT656
Processing	iMX6 Processor
Signal	RTSP/HDMI...
Output connector	Ethernet, HDMI...
Output	Eth Cable, HDMI Cable ...

##### 1.3.2.2. MIPI Input

The video is sent from the camera to Mamba MIPI CSI2 input. The video signal is directly processed by the iMX6 processor.

Mamba Board

Signal	MIPI CSI2
Link	FFC
Connector	FFC 22 pts Wurth 687322124422
Signal	MIPI
Processing	iMX6 Processor
Signal	RTSP/HDMI...
Output connector	Ethernet, HDMI...
Output	Eth Cable, HDMI Cable ...

1.3.2.3. Add-on Input

Additional video input/output can be sent through the add-on connector on the back of Mamba board. The video input is multiplexed via the FPGA and processed by the iMX6 Processor.

Mamba Board	Signal	BT1120
	Connector	Hirose DF40HC(4.0)-50DP-0.4V(51)
	Link	B to B connector
	Connector	Hirose DF40HC(4.0)-50DS-0.4V(51)
	Signal	BT1120
	Processing (MUX)	FPGA
	Signal	BT656
	Processing	iMX6 Processor
	Signal	RTSP/HDMI...
	Output connector	Ethernet, HDMI...
	Output	Eth Cable, HDMI Cable ...

1.3.3. Communication flow

1.3.3.1. LVDS camera Communication

There is a bi-directional communication between iMX6 processor and LVDS camera. The COM protocol used is UART TTL.

Mamba Board	Signal	UART
	Link	Micro Coaxial Cable
	Connector	USL30 ways
	Signal	UART
	Processing	iMX6 Processor

Note that the iMX6 can send commands to the camera. You will be able to handle the functions of the LVDS camera, by sending VISCA commands via a dedicated website. You might also develop on Mamba platform your specific application to control the camera.

1.3.3.2. MIPI camera communication

The MIPI camera communication is done by the I<sup>2</sup>C.

Mamba Board	Signal	I2C
	Connector	FFC
	Link	Micro Coaxial Cable
	Connector	FFC 22 pts Wurth 687322124422
	Signal	I <sup>2</sup> C
	Processing	iMX6 Processor

NOTE: a specific add-on board can be necessary to use a new MIPI camera and a software development to add drivers.



### 1.3.3.3. Add-on Input communication

The add-on input communication is done by the I<sup>2</sup>C or SPI or CAN

Mamba Board

Signal	I <sup>2</sup> C
Connector	Hirose DF40HC(4.0)-50DP-0.4V(51)
Link	B to B connector
Connector	Hirose DF40HC(4.0)-50DS-0.4V(51)
Signal	I <sup>2</sup> C
Processing	iMX6 Processor

Mamba Board

Signal	SPI
Connector	Hirose DF40HC(4.0)-50DP-0.4V(51)
Link	B to B connector
Connector	Hirose DF40HC(4.0)-50DS-0.4V(51)
Signal	SPI
Processing	iMX6 Processor

Mamba Board

Signal	CAN
Connector	Hirose DF40HC(4.0)-50DP-0.4V(51)
Link	B to B connector
Connector	Hirose DF40HC(4.0)-50DS-0.4V(51)
Signal	CAN
Processing	iMX6 Processor

## 1.4. Video Input/output description

### 1.4.1. LVDS Input

- Video: Digital
- Connector KEL USL00-30L, 30 way – **J200**
- Signals: LVDS
- Formats: 720p25 to 1080p30
- Clock: 74.25MHz

### 1.4.2. MIPI Input

- Video digital
- Connector: WURTH 687322124422, 22 way – **J602**
- Signals: 4 lanes MIPI CSI-2
- Formats: 720p25 to 1080p30, possibility to capture large images at lower FPS (6MPix image at 15fps)
- Clock: depending on the format, up to 200MHz
- Mating: Wurth Elektronik 687622100002, 22way 0.5mm FFC

### 1.4.3. Add-on Input

- Video digital
- Connector: Hirose DF40HC(4.0)-50DS-0.4V(51), 50 way – **J900**
- Signal: YCbCr BT.1120 16bits
- Formats: 720p25 to 1080p30
- Clock 74.25MHz
- Mating: Hirose DF40C-50DP-0.4V(51)

#### 1.4.4. HDMI Output

- Up to 1080p60 output
- Connector: Micro HDMI Molex 46765-0301 – **J400**
- Mating: Micro HDMI

#### 1.4.5. Ethernet Output

- Ethernet 10/100
- Connector: RJ45 Amphenol RJHSE-3381 – **J501**
- Status LED: orange
- Activity LED: green
- Mating: RJ45

#### 1.4.6. Remote Ethernet

- Ethernet 10/100
- Remote connector: Molex 53398-1071, 10 way – **J500**
- Mating: Molex 51021-1000

#### 1.4.7. Wifi Output

- Wifi a/b/g/n
- Type: Access Point or Station
- Frequency: 2.4GH or 5GHz
- Connector: U.FL Coaxial
- Recommended antennas: Molex 47950 series

### 1.5. Communication description

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#### 1.5.1. LVDS Camera / Board

- Communication: UART
- Level: TTL (0-3,3V)
- Connector: KEL USL00-30L, 30 way – **J200**
- Signals: Rx, Tx

#### 1.5.2. MIPI Camera / Board

- Communication: I<sup>2</sup>C
- Level: TTL (0-3,3V)
- Connector: WURTH 687322124422, 22 way – **J602**
- Signals: SDA, SCL
- Mating: Wurth Elektronik 687622100002, 22way 0.5mm FFC

#### 1.5.3. Add-on Camera / Board

- Communication: I<sup>2</sup>C, SPI or CAN
- Level: TTL (0-3,3V)
- Connector: Hirose DF40HC(4.0)-50DS-0.4V(51), 50 way – **J900**
- Signals: SDA, SCL / MISO, MOSI, CS0, CLK / CANTx CANRx

#### 1.5.4. RS485 / Board

- Communication: RS485 (Half/Full switchable)
- Connector: 53398-1271, 12 way – **J600**
- Signals: Rx, Tx
- Can be configured as UART TTL 3V3 (hardware modification)
- Mating: Molex 51021-1200
- Full duplex on all four pins, Half duplex on TX- and TX+ pins

#### 1.5.5. Debug / Board

- Communication: UART TTL
- Connector: JST SM08B-SRSS-TB (LF)(SN), 12 way – **J1400**
- Signals: Rx, Tx
- Mating: JST SHR-08V-S-B

### 1.6. Power supply

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The power supply of the board is +6V to 12V. It powers up the camera.

#### 1.6.1. Camera / Board

- Voltage: 6-12VDC
- Connector: KEL USL00-30L, 30 way – **J200**
- **The board powers the camera**

#### 1.6.2. Board

- Voltage: 6-12VDC
- Connector: Molex Picoblade 53398-0271, 2 way – **J800**
- Mating: Molex 51021-0200

1.7. Physical dimensions

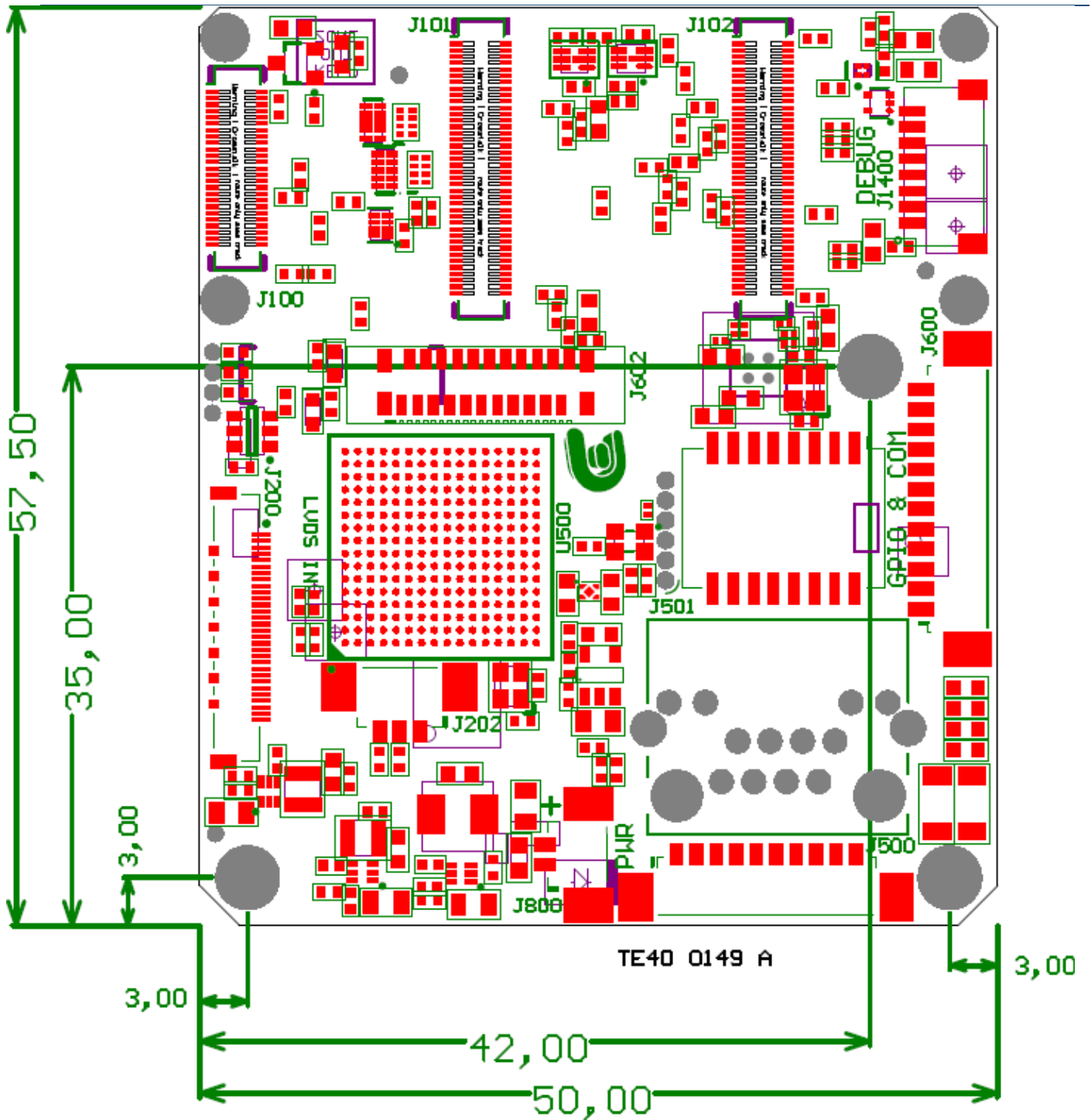


Figure 1: Top dimensions of the Mamba board

NOTE: J900 (Addon connector) is located at 34.35mm from the bottom, and at 8.9mm from the left side.

## 2. Hardware

### 2.1. Connectors overview – Red Mamba

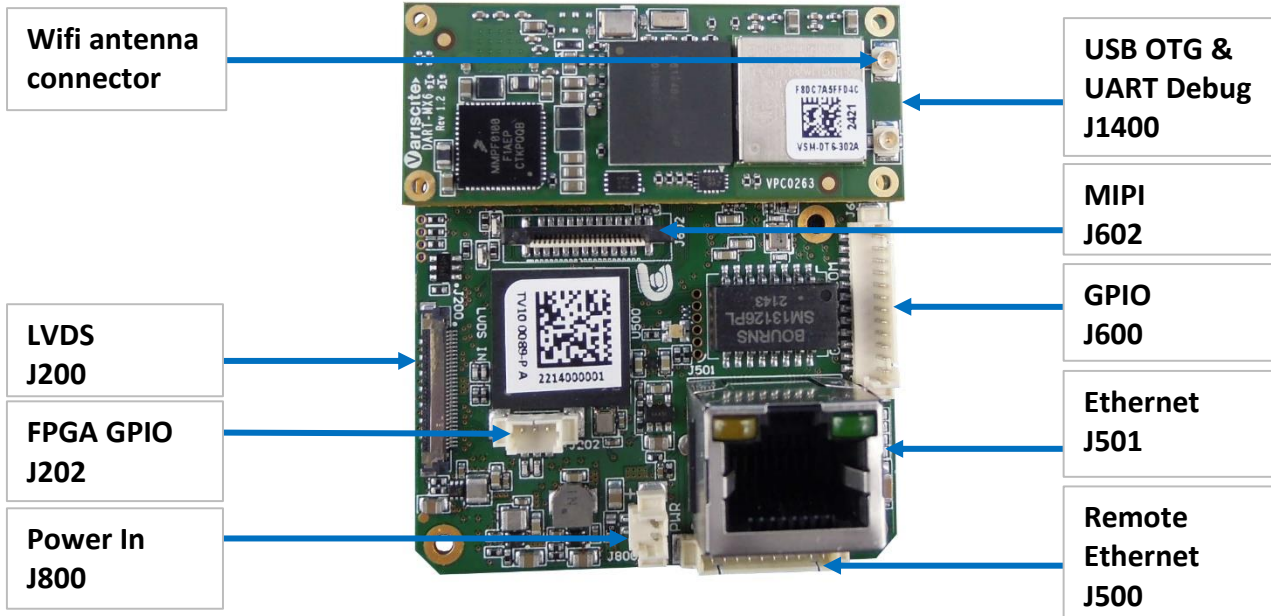


Figure 3: Top view of the Red Mamba board

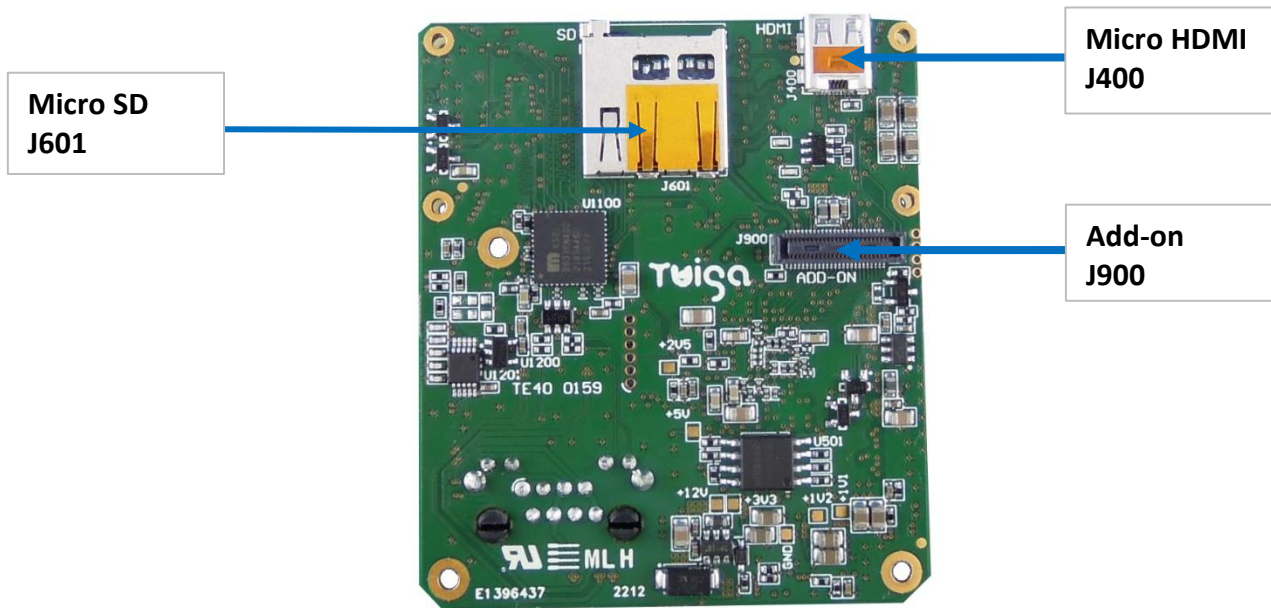


Figure 4: Bottom view of the Red Mamba board

## 2.2. Connectors overview – Blue Mamba

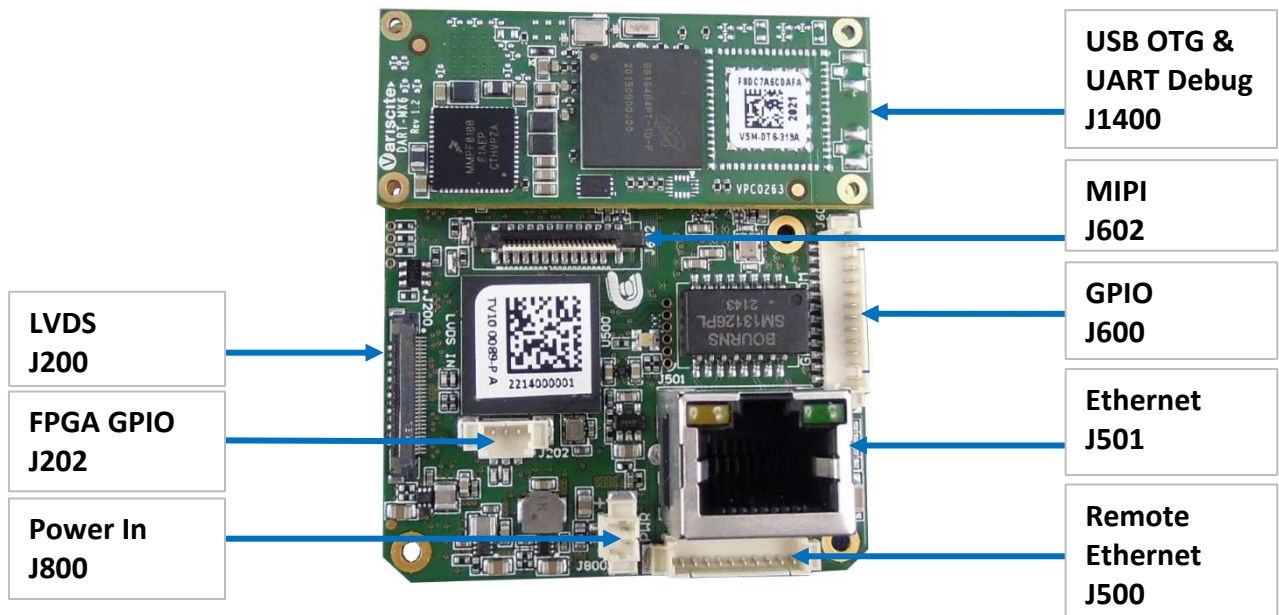


Figure 5: Top view of the Blue Mamba board

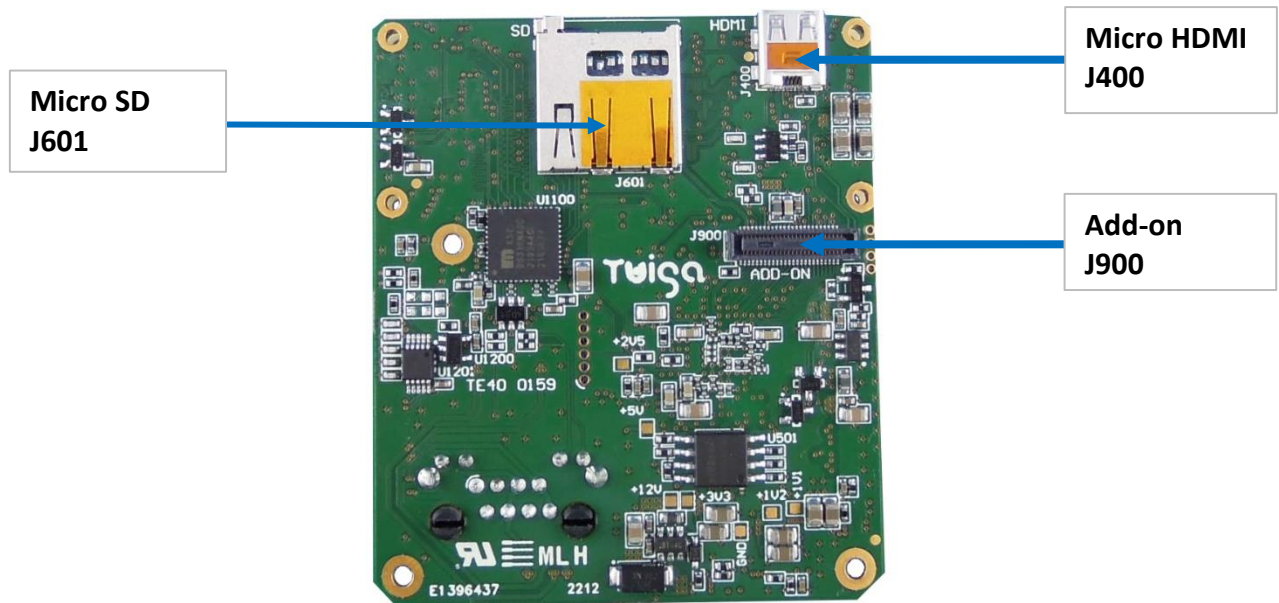
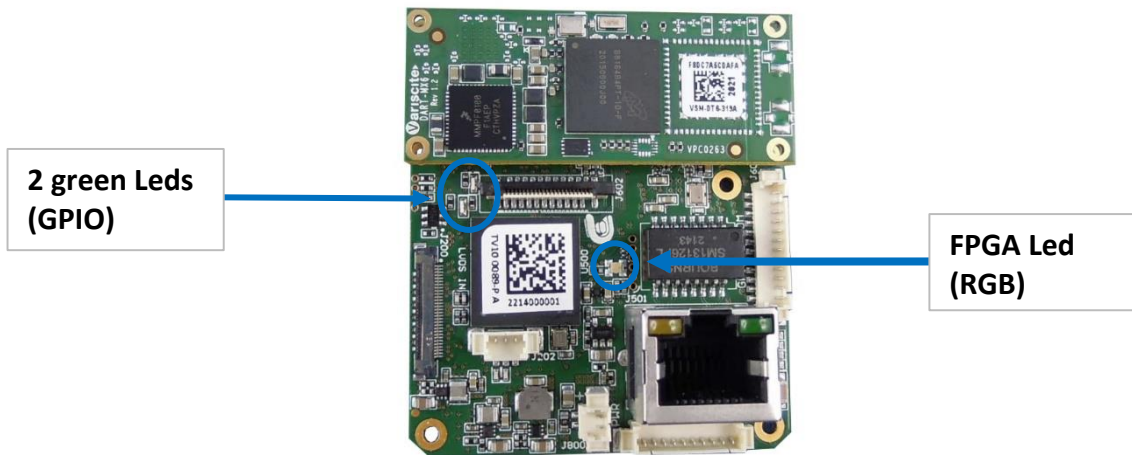


Figure 6: Bottom view of the Blue Mamba board

### 2.3. Led signalization



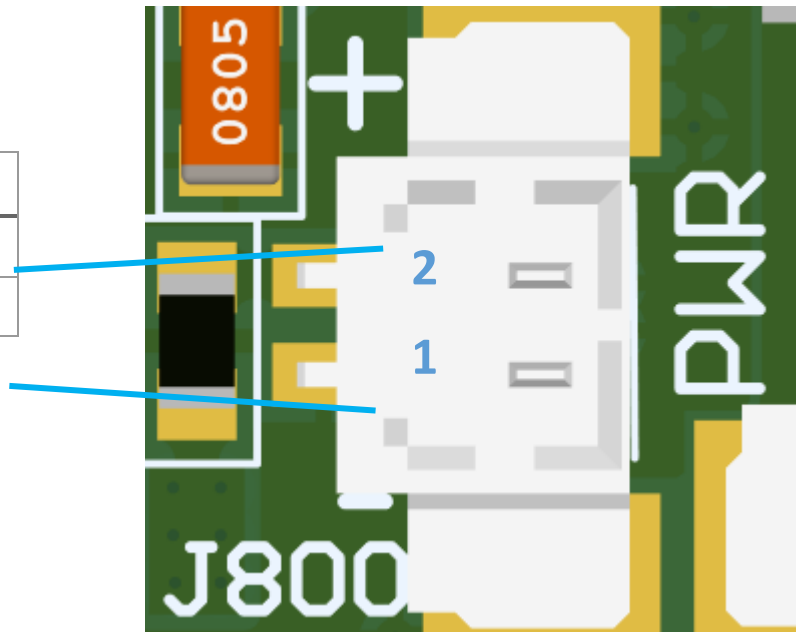
Two green Leds are configurable via the website as GPIOs.  
 The RGB Led shows the FPGA status:

- **Red / Orange:** video input not locked
- **Yellow:** locking in progress
- **Green / Blue:** video locked

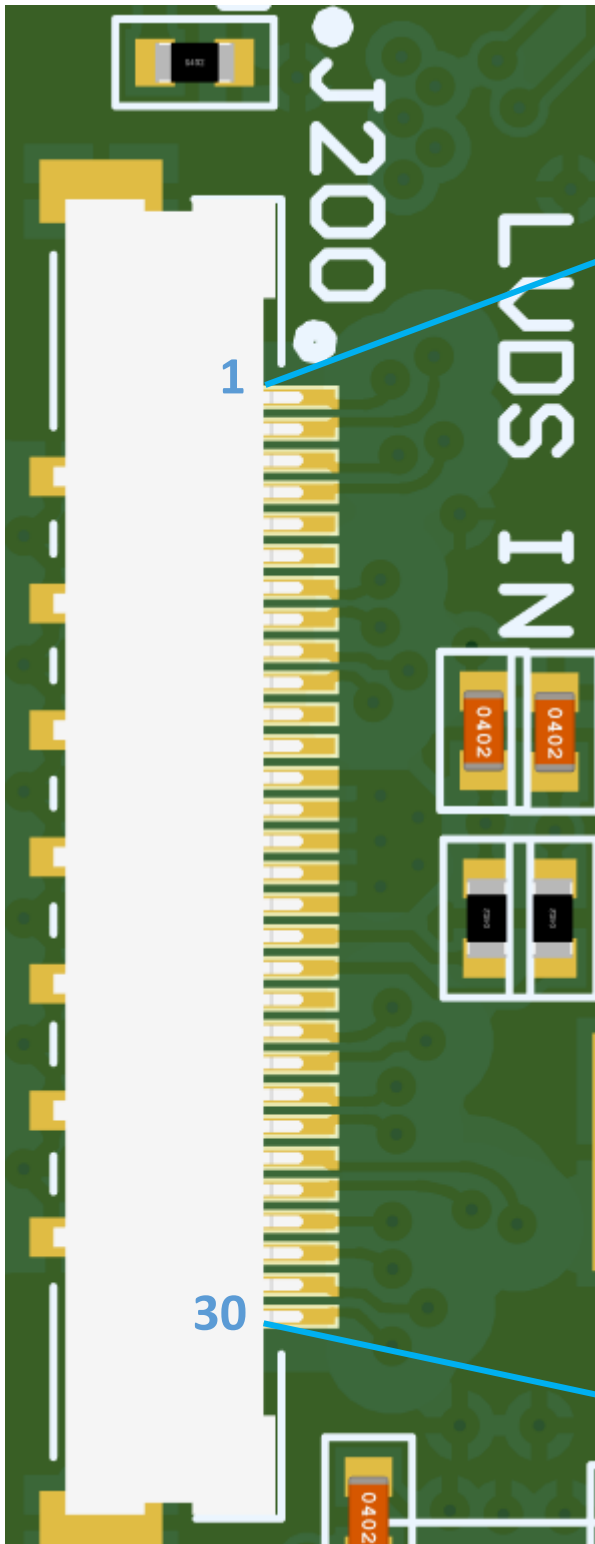
### 2.4. Connector description

#### 2.4.1. J800 – Power Input

Pin No.	Name	Level
2	VIN	6-12V
1	GND	0V



2.4.2. J200 – LVDS Input

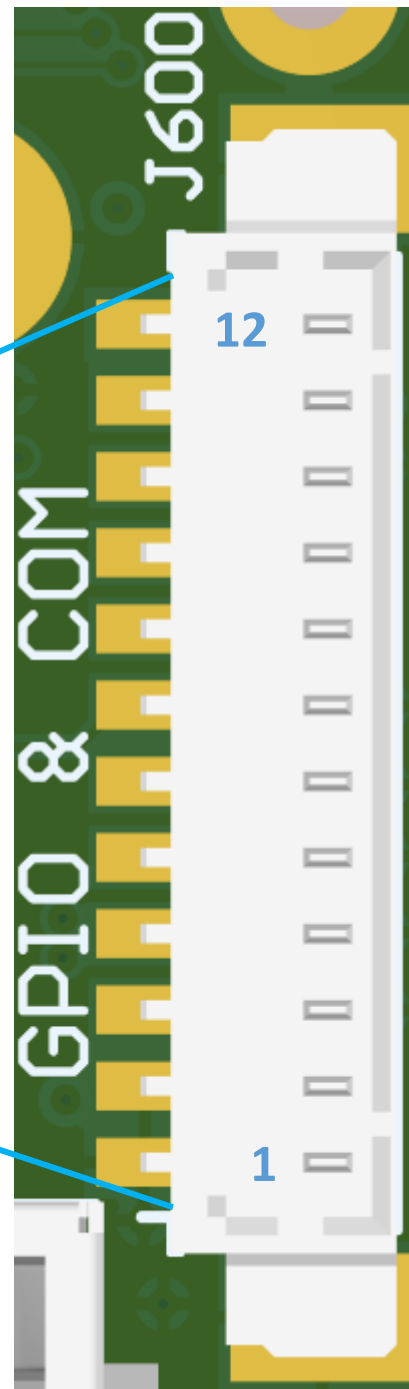


Pin No.	Name	Level
1	TX4_N	
2	TX4_P	
3	TX5_N	
4	TX5_P	
5	NC	
6	NC	
7	TX6_N	
8	TX6_P	
9	TX7_N	
10	TX7_P	
11	GND	0V
12	GND	0V
13	VCAM	+[6-12V]
14	VCAM	+[6-12V]
15	VCAM	+[6-12V]
16	VCAM	+[6-12V]
17	VCAM	+[6-12V]
18	RxD (TTL camera input)	+3V3
19	TxD (TTL camera input)	+3V3
20	GND	0V
21	TX0_N	
22	TX0_P	
23	TX1_N	
24	TX1_P	
25	TX2_N	
26	TX2_P	
27	TXCLK_N	
28	TXCLK_P	
29	TX3_N	
30	TX3_P	

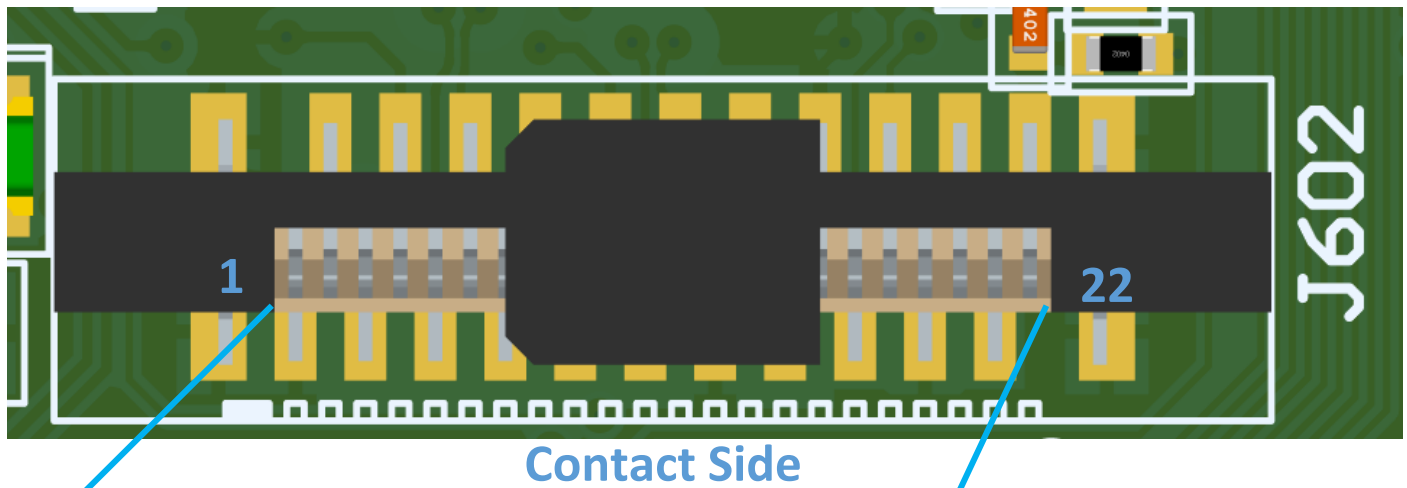


## 2.4.3. J600 – GPIOs

Pin No.	Name	Level
12	Power out	3V3
11	RS485 TX_P (Half Duplex TX_P and RX_P)	3V3
10	RS485 TX_N (Half Duplex TX_N and RX_N)	3V3
9	RS485 RX_N (UART Tx)	3V3
8	RS485 RX_P (UART Rx)	3V3
7	RESET	3V3
6	GPIO4	3V3
5	GPIO3	3V3
4	GPIO2	3V3
3	GPIO1	3V3
2	GND	0V
1	GND	0V



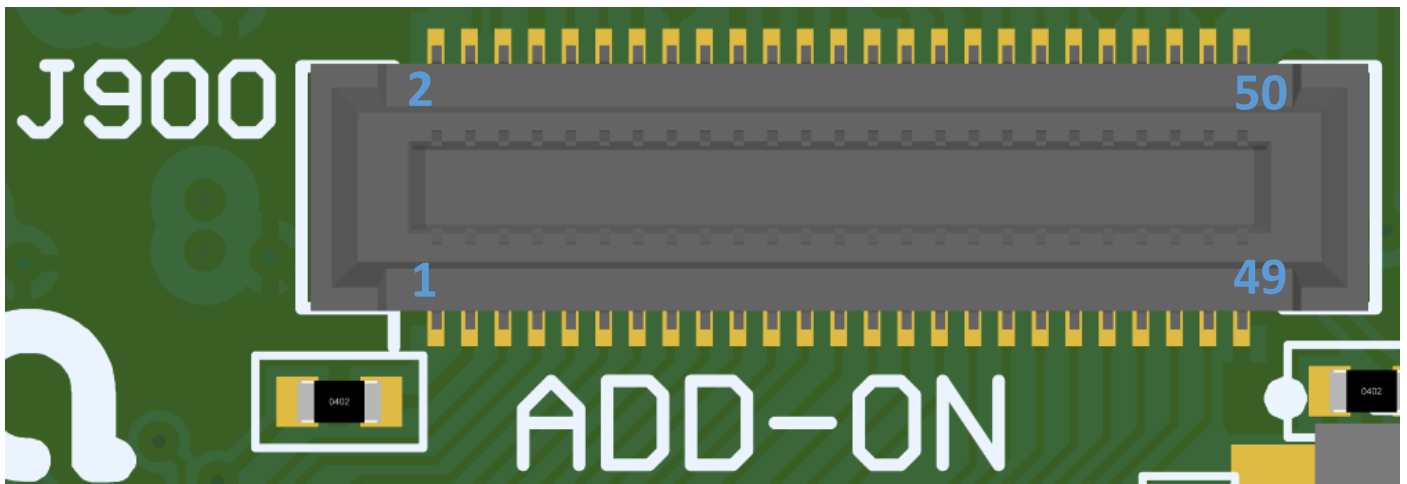
## 2.4.4. J602 – MIPI Input



Pin No.	Name	Level
1	GND	0V
2	MIPI D0 N	
3	MIPI D0 P	
4	GND	0V
5	MIPI D1 P	
6	MIPI D1 N	
7	GND	0V
8	MIPI CLK N	
9	MIPI CLK P	
10	GND	0V
11	MIPI D2 N	
12	MIPI D2 P	
13	GND	0V
14	MIPI D3 N	
15	MIPI D3 P	
16	GND	0V
17	MIPI IO0	3V3
18	MIPI IO1	3V3
19	GND	0V
20	SCL	3V3
21	SDA	3V3
22	Power	3V3

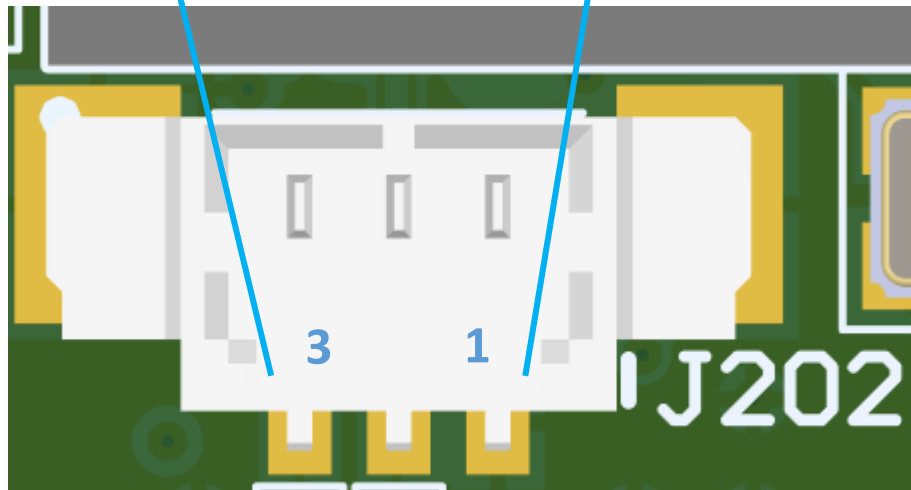
2.4.5. J900 – Add-on Input

Pin No.	Name	Level	Pin No.	Name	Level
1	GND		2	GND	
3	YC CLK	3V3	4	USB_H D_N	5V
5	YC OK	3V3	6	USB_H D_P	5V
7	YC NRESET	3V3	8	GND	
9	YC D0	3V3	10	SDA	3V3
11	YC D1	3V3	12	SCL	3V3
13	YC D2	3V3	14	USB_H VBUS	5V
15	YC D3	3V3	16	V_RTC	
17	YC D4	3V3	18	GND	
19	YC D5	3V3	20	Power	12V
21	YC D6	3V3	22	Power	12V
23	YC D7	3V3	24	Power	12V
25	YC D8	3V3	26	Power	12V
27	YC D9	3V3	28	GND	
29	YC D10	3V3	30	UART2_TX	3V3
31	YC D11	3V3	32	UART2_RX	3V3
33	YC D12	3V3	34	GND	
35	YC D13	3V3	36	MX6 ON OFF	3V3
37	YC D14	3V3	38	AUDIO LINEIN_LP	
39	YC D15	3V3	40	AUDIO LINEIN_RP	
41	YC D16	3V3	42	AGND	
43	YC D17	3V3	44	AUDIO HPROUT	
45	YC D18	3V3	46	AUDIO HPLOUT	
47	YC D19	3V3	48	AUDIO AGND	
49	GND		50	GND	

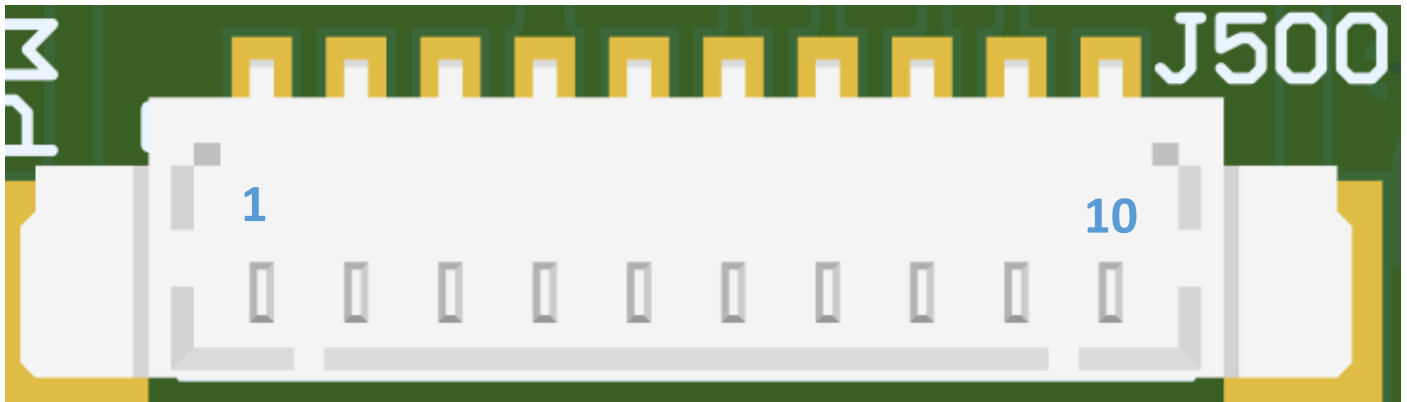


2.4.6. J202 – FPGA GPIO

Pin No.	Name	Level
1	GND	0V
2	FPGA GPIO1	3V3
3	FPGA GPIO0	3V3

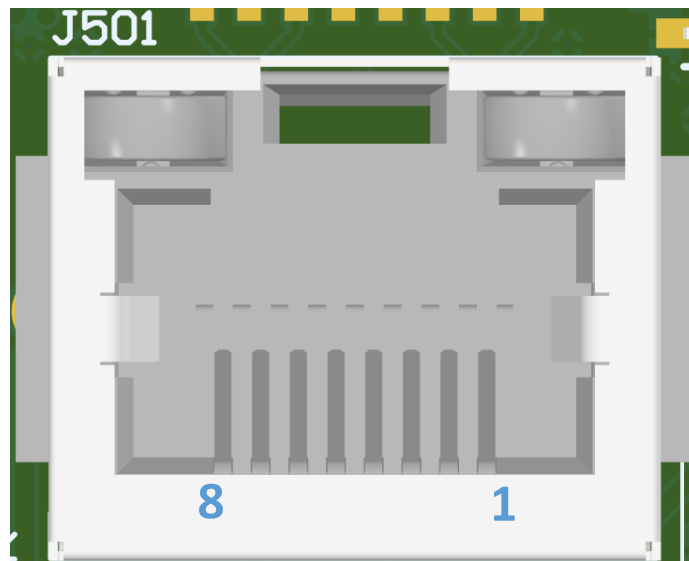


2.4.1. J500 – Ethernet remote



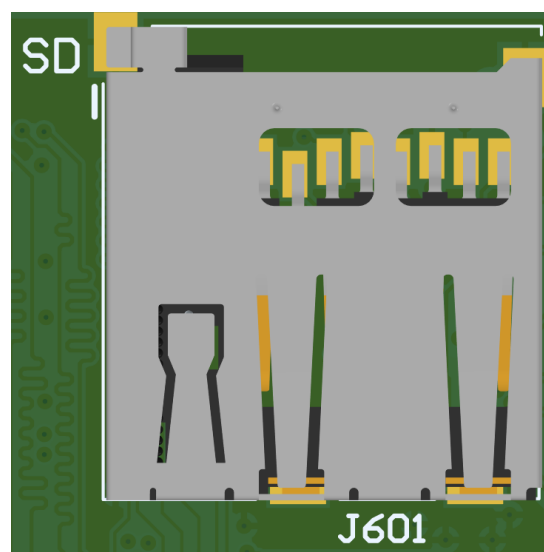
Pin No.	Name	Level
1	GND	0V
2	POE_CRX	
3	POE_CTX	
4	POE_SPARE_2	
5	POE_SPARE_1	
6	RX_N	±2.5V
7	RX_P	±2.5V
8	TX_N	±2.5V
9	TX_P	±2.5V
10	GND	0V

### 2.4.2. J501 – Ethernet



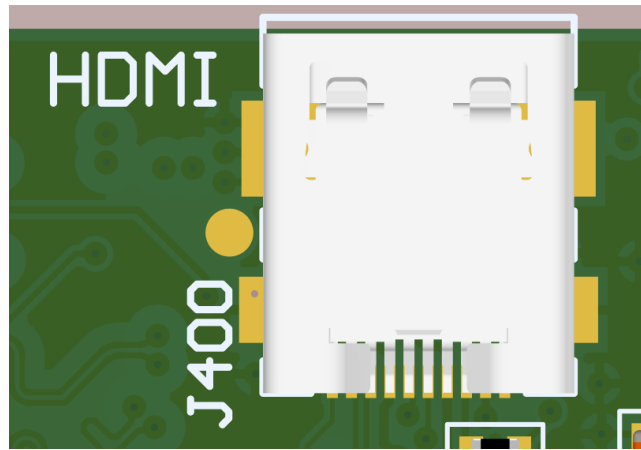
Pin No.	Name	Level
1	TX_P	±2.5V
2	TX_N	±2.5V
3	RX_P	±2.5V
4	POE_SPARE 1 N	
5	POE_SPARE 1 P	
6	RX_N	±2.5V
7	POE SPARE 2 P	
8	POE SPARE 2 N	

### 2.4.3. J601 – MicroSD



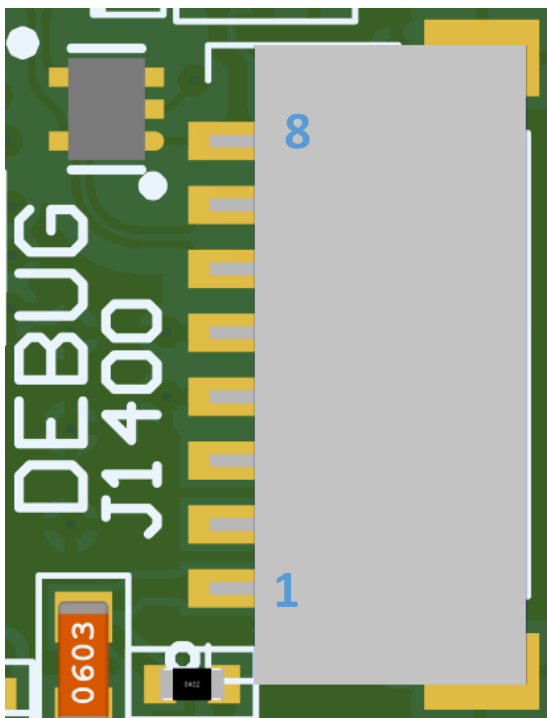
Standard Micro SD connector. Up to 64GB memory card.

2.4.4. J400 – Micro HDMI



Standard Micro HDMI v1.4.

2.4.5. J1400 – USB OTG & UART Debug



Pin No.	Name	Level
1	V_REG	3.3V
2	UART1_TX	3.3V
3	UART1_RX	3.3V
4	GND	0V
5	GND	0V
6	USB_DEBUG_D_N	
7	USB_DEBUG_D_P	
8	DEBUG_VBUS	

JST SM08B-SRSS-TB (LF)(SN) connector. USB OTG and IMx6 debug UART interface.

### 2.4.6. RS485/TTL configuration

The serial interface of the Mamba board can be configured either in RS485 or in UART TTL (3V3 level).

By default, the Mamba board is configured in RS485. To switch from RS485 to UART TTL configuration some hardware modifications are needed. Please contact us at: [info@twiga-web.com](mailto:info@twiga-web.com) for more information.

## 3. Functions

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### 3.1. Basic communication (DEBUG)

The debug console of the processor is accessible by the Debug connector. Connecting J1400 to a PC with an external FTDI will create a dedicated COM port. Use 115200 baud rate. Please contact us at: [info@twiga-web.com](mailto:info@twiga-web.com) if you need a special debug cable.

### 3.2. Live Display

A HDMI display is available over the micro-HDMI (J400). At boot the board display a loading screen and after that the live video from the camera.

### 3.3. Ethernet functionalities

A lot of functionalities are provided over Ethernet. A website is available, with a control over the camera, a video streaming, and an ONVIF server.

### 3.4. Wi-Fi functionalities (Red Mamba only)

Wi-Fi provides the same functionalities as Ethernet. The network is secured by a WPA key.

### 3.5. Recording

You can record the video on the local eMMC of the iMX6 or on the SDCARD plugged into J601.

### 3.6. To go further

For all others software functions please refer to the User Manual document (MU-2203-01).



116 Route d'Espagne  
Bâtiment Hélios 6  
31100 Toulouse  
FRANCE

Tel : 33 5 32 09 17 24 – Fax : 33 5 61 44 36 62

Email : [Info@twiga-web.com](mailto:Info@twiga-web.com)

Web : [www.twiga-web.com](http://www.twiga-web.com)