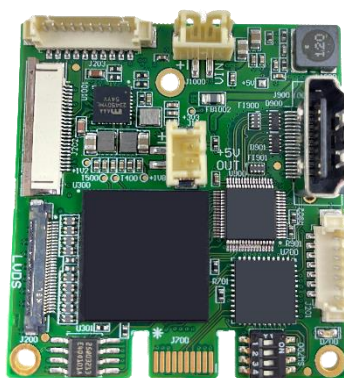




# Technical Manual

## HDMI Interface board





**P/N – TV10 0032:** HDMI interface board for LVDS zoom cameras

**P/N – TV50 0022:** Mounting kit for TV10 0032 - HDMI I/F board

**Includes:** 30-way micro-coax camera cable, 2-way cable (power supply), 10-way cable (RS232/TTL/Analog output), 7-way cable (GPIOs), 24-way FFC cable, right angle black anodized bracket, screws and spacers

**P/N – TV50 0017:** Cable kit for TV10 0032 - HDMI I/F board

**Includes:** 30-way micro-coax camera cable, 2-way cable (power supply), 10-way cable (RS232/TTL)

	Writing	Approval
Date	07/04/2023	10/04/2023
Name	Cédric Boulanger	Cédric Boulanger
Signature		

## Revision History

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Date	Revision	Description	Modified by	Note
10/01/20	B	Add 3V3 for TTL level voltage	NMA	10/01/20
12/02/20	C	Add Visca command for camera and 5V MOS	TLE	
28/09/20	D	Update RS232/TTL part	CBO	
07/04/23	E	Update board and kit references	CBO	

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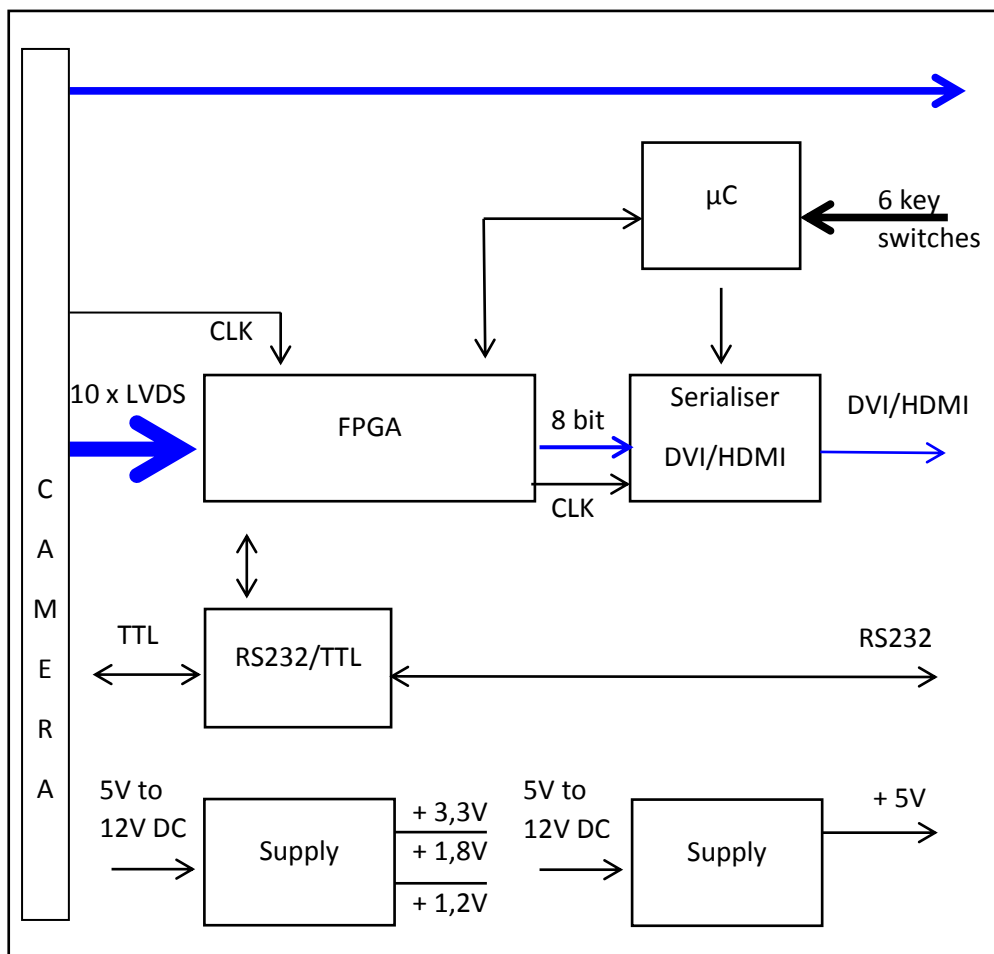
## 1. Presentation

The Twiga interface board provides an HDMI output from LVDS camera blocks.

The HDMI interface board automatically detects the model of camera and adapts the video processing consequently. It also provides analog video outputs depending on the camera model. The board controls the video format of the camera using built in DIP switches and in parallel handles RS232 & TTL levels.

A visca controlled power supply output (+5V) is included for auxiliary equipment.

### 1.1. Synoptic



#### Main Functions:

- Receiving and decoding LVDS signal (FPGA)
- Formatting 16-bit BT656 (FPGA)
- Serialization and adaptation of the HDMI standard (HDMI emitter)
- At startup, reading the video format of the camera, configuration according switches configuration (RS232 VISCA protocol).
- Conversion of RS232/TTL Level for external control
- Switchable camera power (6 to 12V)
- Board voltages: 1.2V, 1.8V, 3.3V
- Additional switchable power output +5V 1A

## 1.2. Characteristics summary

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### 1.2.1. HD Video Input

- 8 pairs data LVDS signal and 1 pair clock signal (74,25MHz)
- Y Cb/Cr 8 bit + HVF
- Formats: 1080p50/59,94/60, 1080p25/29,97/30, 1080i50/59,94/60, 720p50/59,94/60, 720p25/29,97/30, NTSC, PAL, according to camera model.
- KEL USL30 pin connector
- FFC 24 pins connector

### 1.2.2. HDMI output

- HDMI Connector
- 8 bits DVI Signal
- Formats: Depend on camera available format.

### 1.2.3. 1.2.3 Analog output

- Molex connector: 1,25mm 10 pins
- HD: format YPbPr

### 1.2.4. Serial RS232 Communication

- Molex Connector 1,25mm 10pins

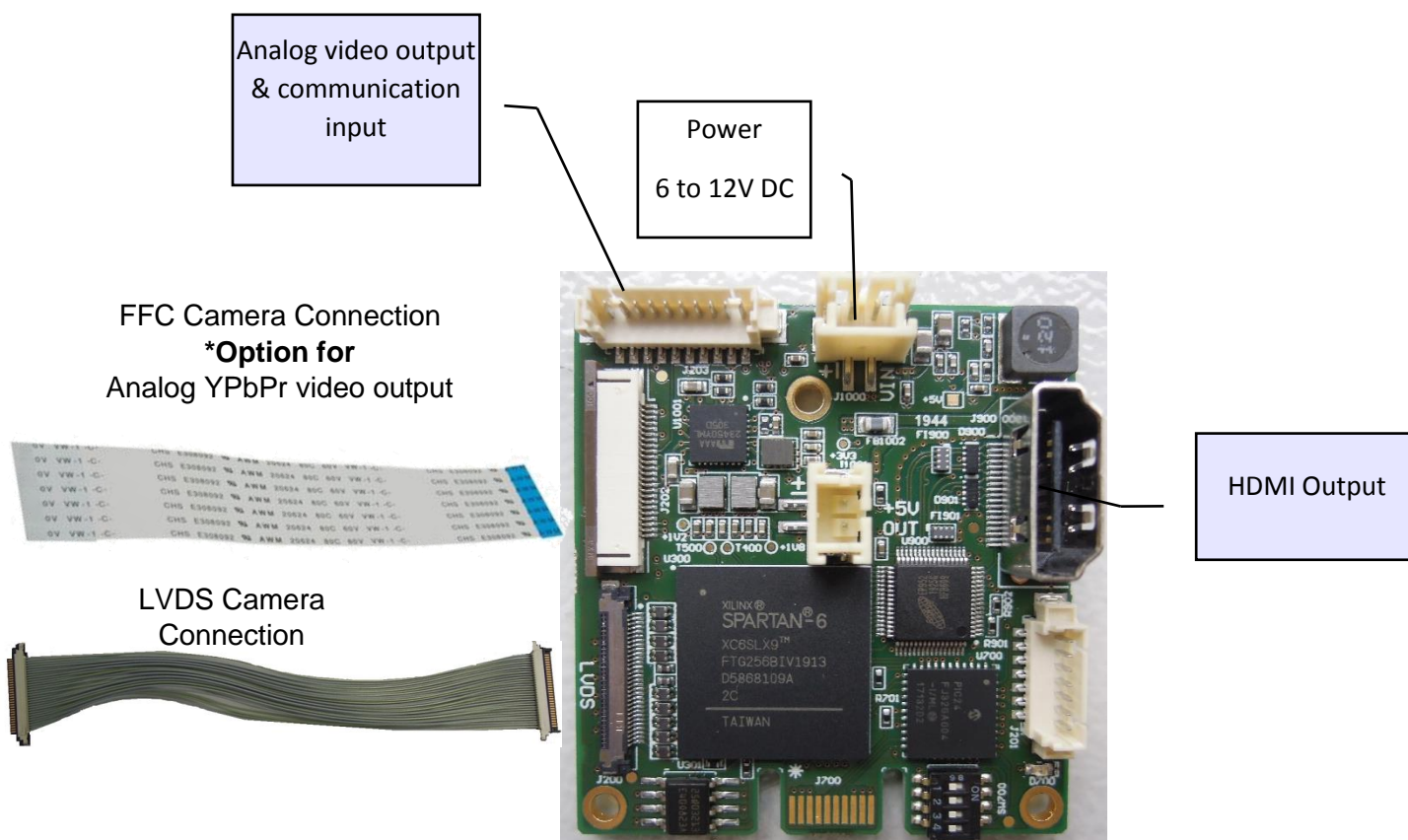
### 1.2.5. Buttons input

- Molex Connector 1,25mm 7 pins

### 1.2.6. Miscellaneous

- Power supply +6 to12VDC (5v for FCB-SE600), Power consumption: about 1,5W – 6,5W with 5V 1A output
- Size: 45mm x 48mm

## 2. Camera connection



\* Depending on the model of camera

- LVDS cable assembly: cable 30 ways micro coaxial harness KEL ref USL20-30SS-xxx-C, carries LVDS HD signals, power, and command.
- FFC cable: 24 ways 0.5mm, carries analog HD, SD video, power, and command.

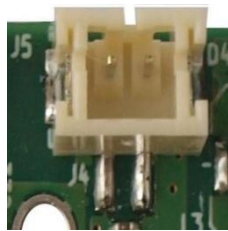
## 2.1. Pin assignments

### 2.1.1. Power (J4)

JST 2mm B2B-PH-SM4-TB

Connector

+V	0V
1	2



### 2.1.2. FFC camera (J3)

MOLEX 53398-0271



1	0V-GND
2	+V
3	0V-GND
4	+V
5	+V
6	+V
7	+V
8	0V-GND
9	Pr
10	0V-GND
11	Pb
12	0V-GND
13	Y
14	0V-GND
15	CVBS
16	0V-GND
17	NC
18	0V-GND
19	NC
20	0V-GND
21	Reset In
22	RxD (TTL camera input)
23	TxD (TTL camera input)
24	0V-GND

### 2.1.3. LVDS camera output (J2)

KEL USL00-30L



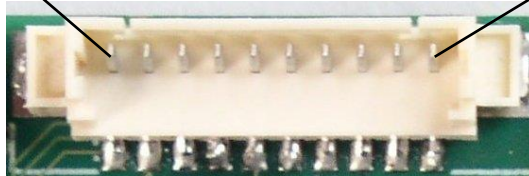
1	TX4-
2	TX4+
3	TX5-
4	TX5+
5	NC
6	NC
7	TX6-
8	TX6+
9	TX7-
10	TX7+
11	0V-GND
12	0V-GND
13	+V
14	+V
15	+V
16	+V
17	+V
18	RxD (TTL camera input)
19	TxD (TTL camera input)
20	0V-GND
21	TX0-
22	TX0+
23	TX1-
24	TX1+
25	TX2-
26	TX2+
27	TXCLKOUT-
28	TXCLKOUT+
29	TX3-
30	TX3+



### 2.1.4. Analog Video output and communication (J5)

MOLEX 53398-1071

Y	Gnd	Pb	Gnd	Pr	Gnd	TxD	RxD	Gnd	CVBS
10	9	8	7	6	5	4	3	2	1



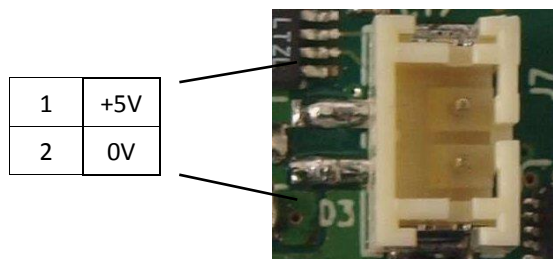
- TxD: Interface Board output
- RxD: Interface Board input
- RS232 or TTL level depending on R24, R25, R26, R27 resistors configuration.

#### **Using a RS232 standard PC cable:**

- TxD: interface module output to PC SUBD9 pin2
- RxD: interface module input to PC SUBD9 pin3

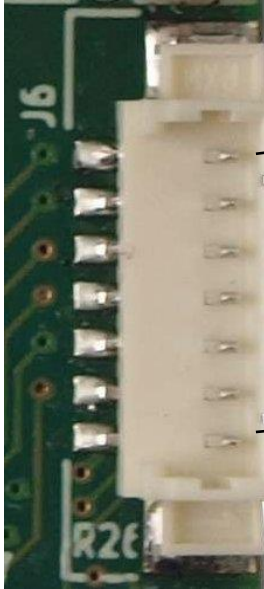
### 2.1.5. Power output +5V (J7)

JST 2mm B2B-PH-SM4-TB



### 2.1.6. GPIO input (J6)

MOLEX 53098-0710



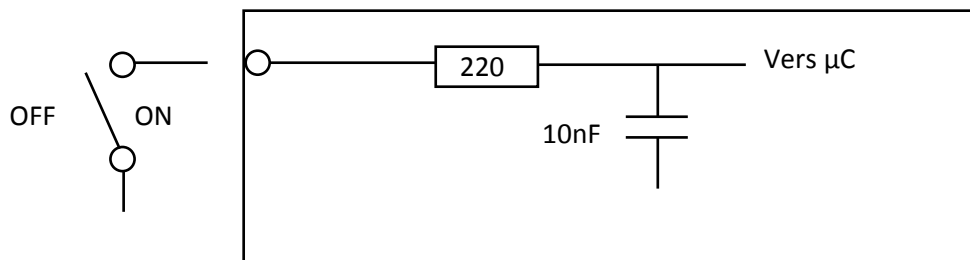
Pinout	
7	Cde5
6	Cde4
5	Cde3
4	Cde2
3	Cde1
2	Cde0
1	0V

### 3. GPIO activation

A command is switched on by connection between the input channel and the ground.

It is switched off when input is not connected.

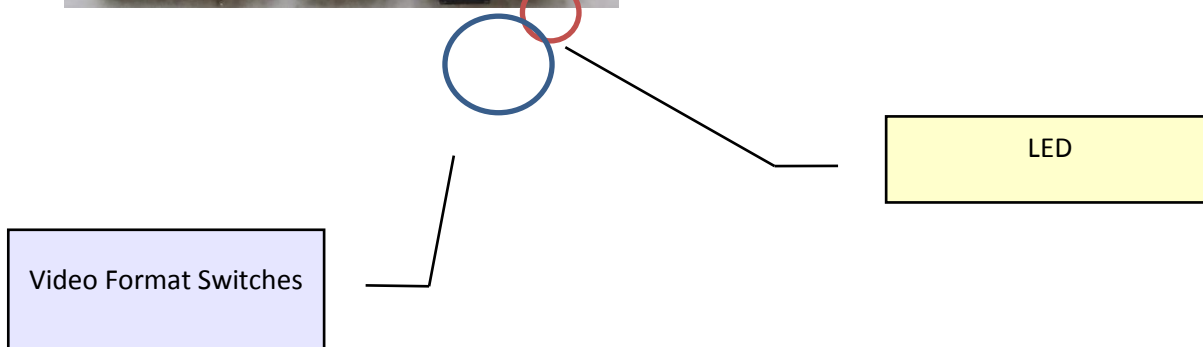
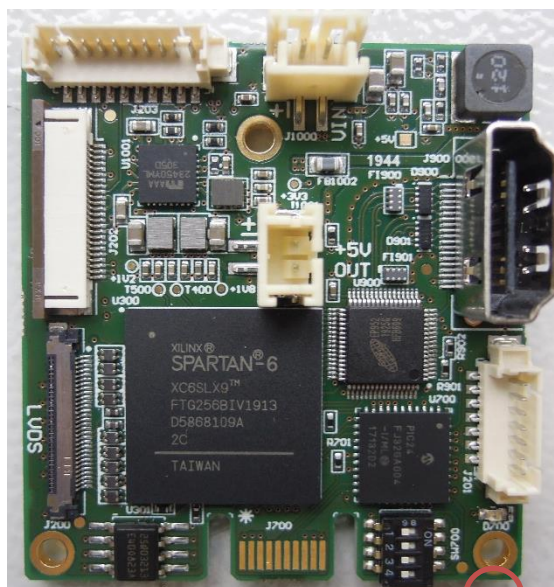
A RC filter (R =220 ohm, C= 10nF) and a software 10ms waiting loop realize a debounce filter.



#### 3.1.1. Command list

- **Contact Cde0 : Zoom TELE– Speed 2/7**
- Releasing Cde0 : **Zoom Stop**
  
- **Contact Cde1 : Zoom WIDE– Speed 2/7**
- Releasing Cde1 : **Zoom Stop**
  
- **Contact Cde2 : Focus NEAR– Speed 0/7**
- Releasing Cde2 : **Focus Stop**
  
- **Contact Cde3 : Focus FAR– Speed 0/7**
- Releasing Cde3 : **Focus Stop**
  
- **Contact Cde4 : one Push autofocus (FCB-SE600)**
  
- **Contact Cde5 :**
  - First contact: **Color bar chart ON**
  - Second contact: **Reticle (green cross) ON**
  - Third contact: **OSD OFF**

## 4. LED signalization and video format configuration



### 1.1 Signalization LED

The LED is blinking periodically. The number of flashes indicates different states of the board:

- 1 flash every 2 seconds: module firmware boot.
- 2 flashes every 2 seconds: decoder initialization OK.
- 3 flashes every 2 seconds: FPGA loading OK.
- 4 flashes every 2 seconds: VISCA dialog with camera OK
- 5 flashes every 2 seconds: Camera video format configuration OK
- 6 flashes every 2 seconds: FPGA video configuration OK
- 7 flashes every 2 seconds: demand of video format modification by micro switch

## 1.2 Video format configuration with DIP switches

In the "External" mode, the interface module does not change the format of the video camera.

In other modes, the board checks, when the camera power is on, if the camera video format corresponds to the switches, otherwise it sends a VISCA command to change the format.

**The camera must be powered off and powered on to take the new format into account.**

1	2	3	4	FCB-EV Video Format
OFF	OFF	OFF	OFF	External (switches inactive)
OFF	OFF	ON	ON	1080p59.94/60*
ON	ON	OFF	ON	1080P50
ON	OFF	OFF	OFF	1080p29.97/30*
OFF	ON	OFF	OFF	1080p25
ON	ON	OFF	OFF	1080i59,94/60*
OFF	OFF	ON	OFF	1080i50
ON	OFF	ON	OFF	720p59,94/60*
OFF	ON	ON	OFF	720p50
ON	ON	ON	OFF	720P29.97/30*
OFF	OFF	OFF	ON	720P25

*\*format depend of the camera model used*

*Please note that this table is for information purposes only and depends of your camera model. For more information, please refer to the TWIGA support.*

## 1.3 RS232 / TTL level switch

This interface board supports either RS232 (default) or TTL voltage level.

To switch from RS232 to TTL configuration some hardware modifications are needed. Please contact us at: [info@twiga-web.com](mailto:info@twiga-web.com) for more information.

## 5. Camera and 5V output power control

Both the camera and the 5V output can be turned ON and OFF by VISCA commands:

Inquiry	Packet	Reply message	Description
5V MOSFET status	87 09 04 00 FF	90 50 0x FF	x = 0x02: 5V MOSFET ON x= 0x03: 5V MOSFET OFF
Camera MOSFET status	81 09 04 00 FF	90 50 0x FF	x = 0x02: Camera MOSFET ON x= 0x03: Camera MOSFET OFF
Command	Packet	Reply message	Description
5V output ON	87 01 04 00 02 FF	90 41 FF 90 51 FF	Turn on the 5V output.
5V output OFF	87 01 04 00 03 FF	90 41 FF 90 51 FF	Turn off the 5V output.
Camera ON	81 01 04 00 02 FF	90 41 FF 90 51 FF	Turn ON the camera.
Camera OFF	81 01 04 00 03 FF	90 41 FF 90 51 FF	Turn OFF the camera.