



# Technical Manual

## 6G-SDI Interface for ER series





**P/N – TV10 0080:** 6G-SDI interface board for Sony FCB-4K camera range

**P/N – TV50 0023:** Mounting kit for TV10 0080 - 4K 6G-SDI I/F board

**Includes:** 30-way micro-coax camera cable, 2-way cable (power supply), 3-way cable (RS232/TTL), 4-way cable (synchro), right angle black anodized bracket, screws and spacers

**P/N – TV50 0008:** Cable kit for TV10 0080 - 4K 6G-SDI I/F board

**Includes:** 30-way micro-coax camera cable, 2-way cable (power supply), 3-way cable (RS232/TTL)

	Writing	Approval
Date	11/04/2023	11/04/2023
Name	Cédric Boulanger	Robert Galwas
Signature		

## Revision History

Date	Revision	Description	Modified by	Note
28/09/20	A	Creation of the document	CBO	
04/02/21	B	Added video format compatibility list	RGA	<a href="#">§1.4.5</a>
20/01/22	C	Added additional information's	RGA	<a href="#">§2.3.2</a>
03/10/22	D	Remove outdated information for heatsink compatibility	RGA	<a href="#">§1.3.2</a>
11/04/23	E	Update board and kit references	CBO	

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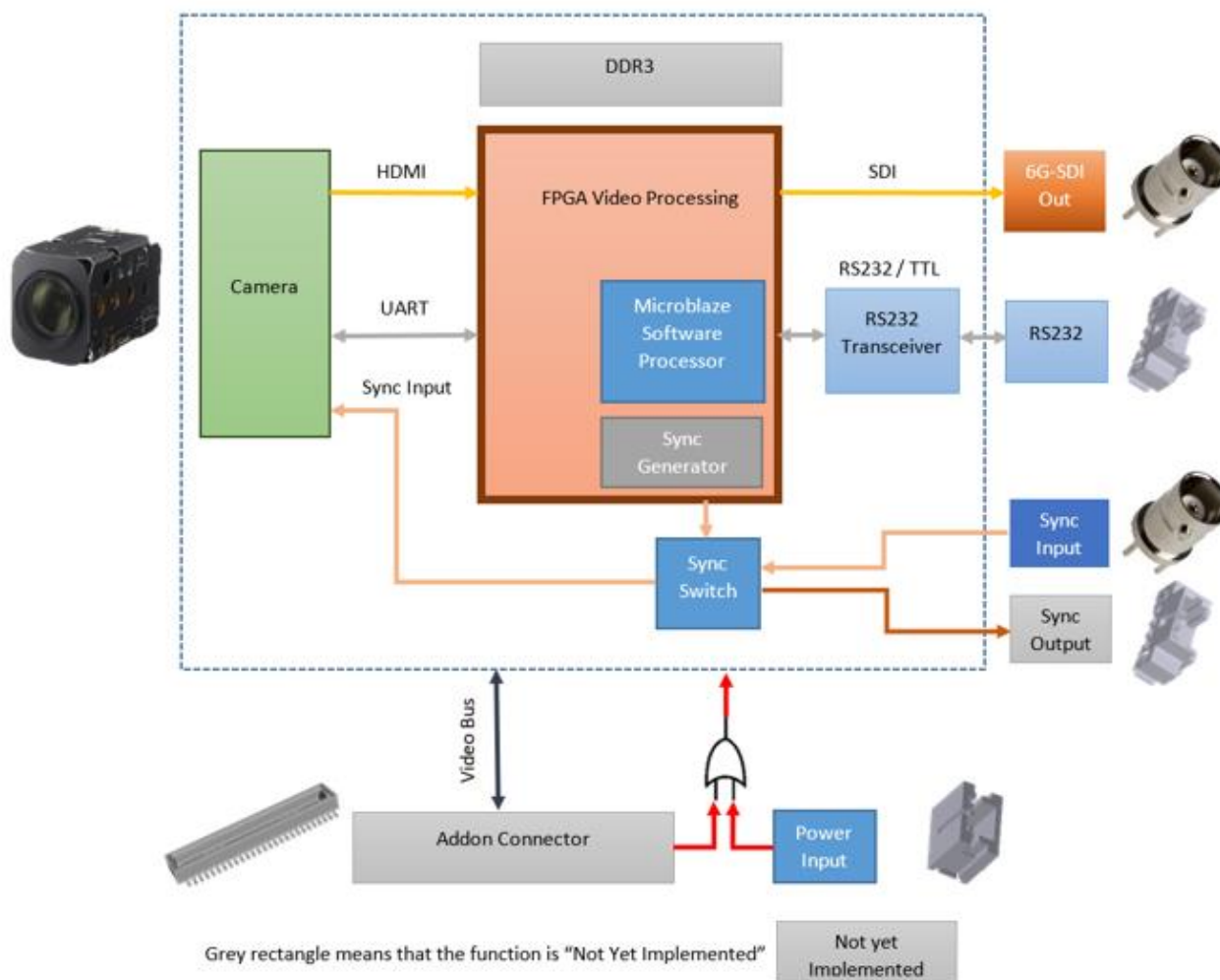
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## 1. Presentation

### 6G-SDI interface board for Sony ER/ES Series with Synchronization input/output

#### 1.1. Synoptic

TV10 0080 architecture



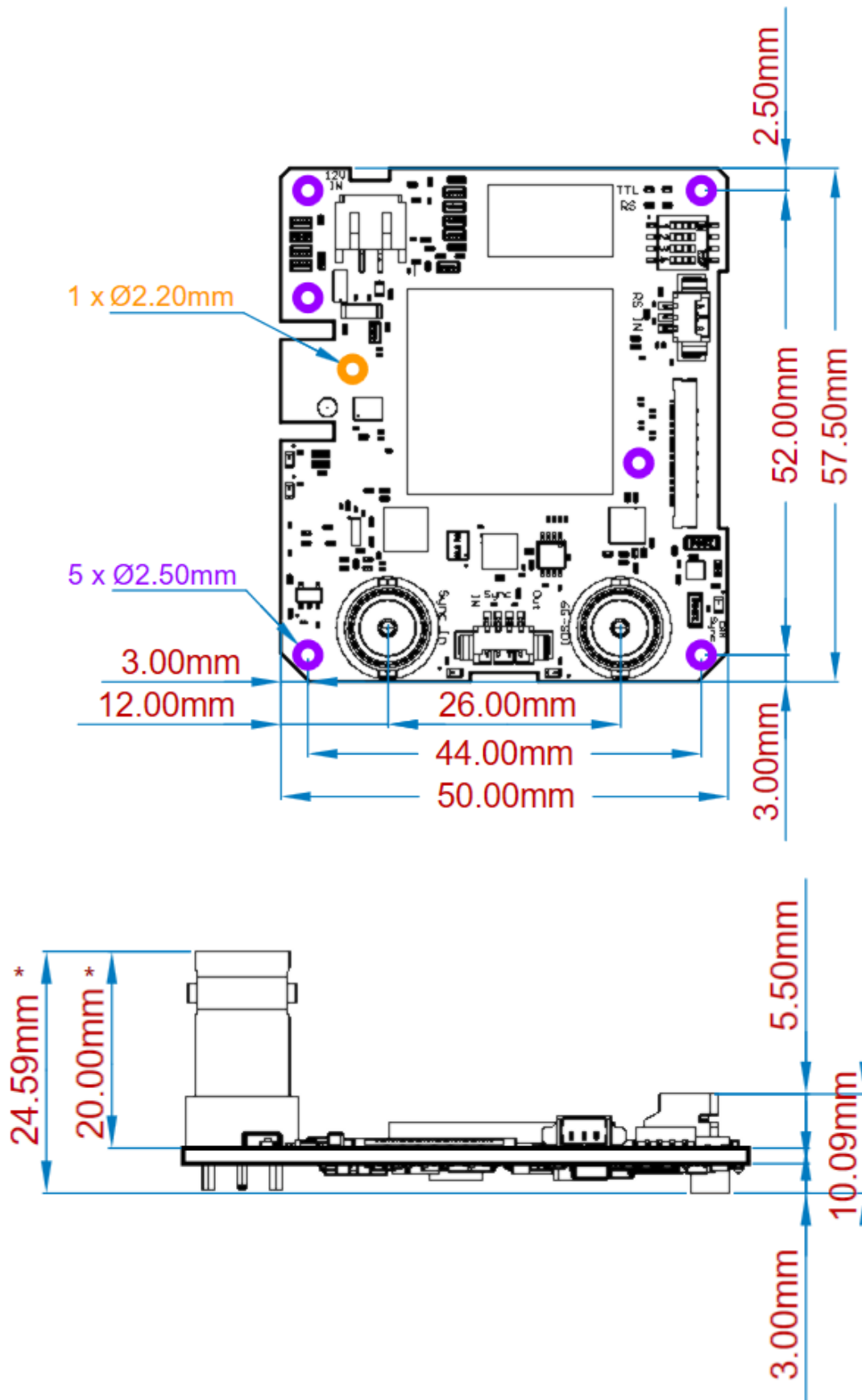
#### 1.2. Characteristics summary

The TV10 0080 board features:

- SDI output SMPTE 292M, SMPTE 274M, SMPTE ST-2081
- Compatible with SONY ER8230, ER8300, ER8530 and ER8550 4K Camera Bloc
- Support external synchronization input
- Support external Synchronization output (not yet implemented)
- Generates synchronization signal for another TV10 0080 Board (not yet implemented)
- Serial communication **RS232 or TTL**
- System control through **VISCA** protocol Camera Management
- +6V to +12V power supply input
- BNC, SMB or MCX optional connector for SDI output and Synch Input
- Led Status indicator

1.3. Physical Overview

1.3.1. Dimensions



\* the overall height of the board could vary depends of the height of the Connector used (BNC, SMB, MCX)

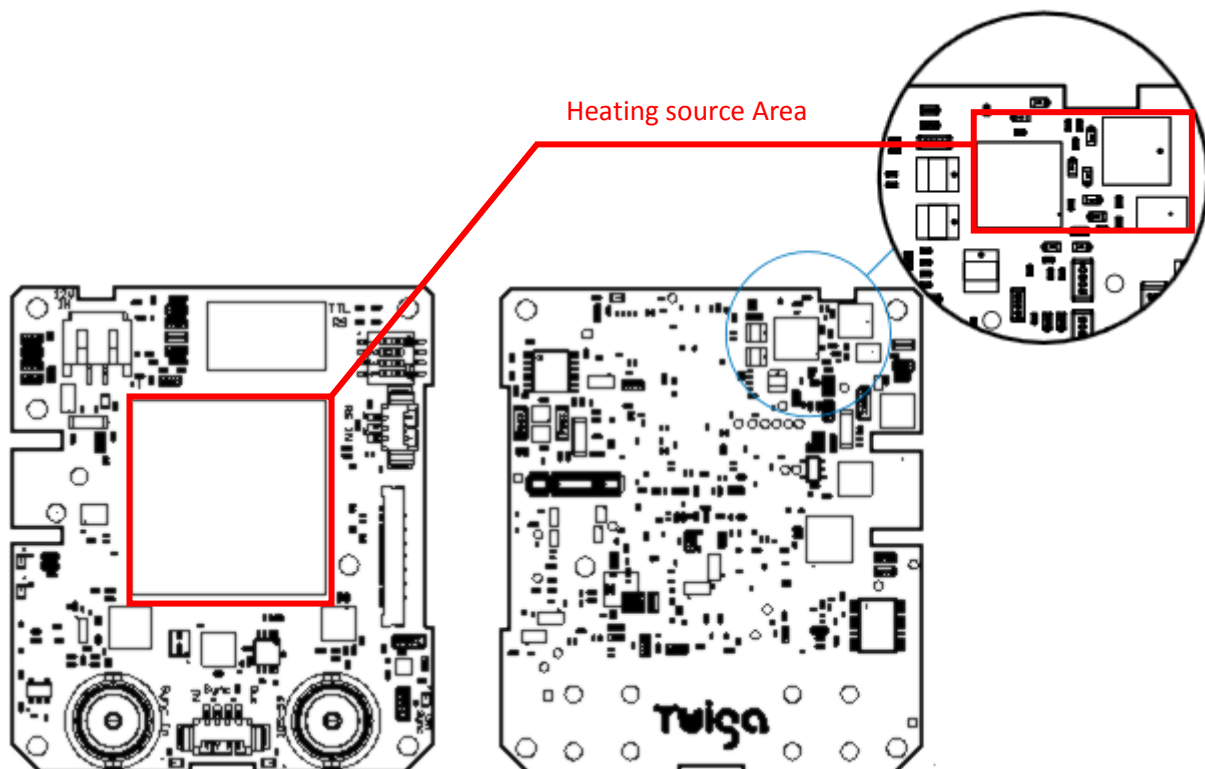
### 1.3.2. Thermal

Due to a tiny size of the board, there maybe need of use an external gap-pad between the heating source and the housing or to use a dissipator. The main source of the heat is the FPGA core, therefore an additional gap pad on the power chip would improve the dissipation of the heat.

Please do not hesitate to contact us at: [info@twiga-web.com](mailto:info@twiga-web.com) for more information.



The actual product may differ from image shown



1.4. Input – output Overview

1.4.1. Video Input

Camera video signals are connected to the interface board with a Flexible Coaxial Cable 30 pts, the length of the coaxial cable can reach 400mm and even more thanks to the internal signal equalization of the powerful Kintex-7. The video signal is decoded and processed by the FPGA and encoded to meet the SDI video standard. Thanks to the SDI Cable Driver integrated circuit, the signal is optimized for the optimal transmission.

FCB ER Series	Signals	TMDS
	Connector	USL30 pts
	Link	Micro Coaxial Cable
Interface Board	Input Connector	USL30 pts
	Signals	TMDS
	Signal acquisition	FPGA – Kintex 7
	Processing	FPGA – Kintex 7
	6G-SDI Output	Cable Driver
End User	Output Connector	BNC or MCX
	Link	Coaxial Cable
User Application		

1.4.2. VISCA and System management

The communication with the camera and microcontroller is done by RS232 or TTL as selected.

With VISCA protocol, you can control all the system over serial communication port.

FCB ER Series	Signals	UART
	Connector	USL30 pts
	Link	Micro Coaxial Cable
Interface Board	Input Connector	USL30 pts
	Signals	UART
	Processing	FPGA – Kintex 7
	Driver	RS232 / TTL
	Hardware Resistor Switch	RS232 / TTL
End User	Link	Standard Molex Cable
	User Application	

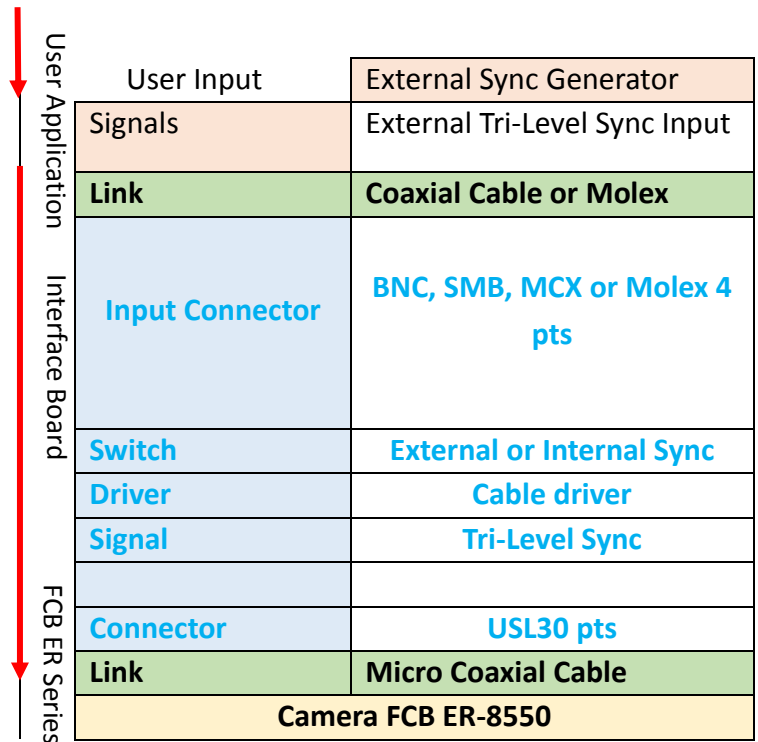
### 1.4.3. Synchronization Input for ER8550

The synchronization option allows the user to use a real-time source generator in order to synchronize in parallel many devices.

Sony ER8550 incorporate internal synchronization module which follows the following specifications:

- Tri-State Sync: partial part of SMPTE 240M/274M
- NTSC Black burst: EBU N14/SMPTE RP-154
- PAL Black burst: ITU-R BT.470-6

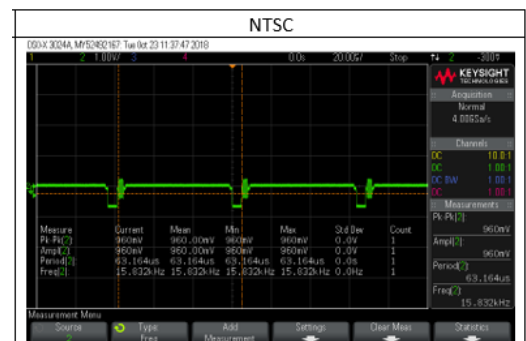
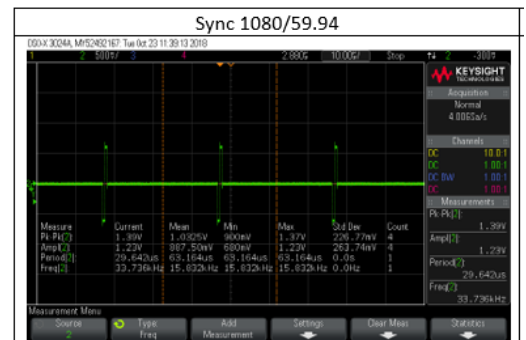
*Note: The H phase adaptation function is not available on Sony Camera.*



Valid synchronizations signals:

Camera Mode \ Input External Signal format	Tri-State Sync			NTSC Black burst	PAL Black burst
	1080/59.94i	1080/50i	1080/47.95i		
3840x2160/29.97p	○	×	×	○	×
3840x2160/25p	×	○	×	×	○
3840x2160/23.98p	×	×	○	×	×
1920x1080/59.94p	○	×	×	○	×
1920x1080/59.94i	○	×	×	○	×
1920x1080/50p	×	○	×	×	○
1920x1080/50i	×	○	×	×	○
1920x1080/29.97p	○	×	×	○	×
1920x1080/25p	×	○	×	×	○
1920x1080/23.98p	×	×	○	×	×
1280x720/59.94p	○	×	×	○	×
1280x720/50p	×	○	×	×	○
720x480/59.94p	○	×	×	○	×
720x576/50p	×	○	×	×	○

An example of synchronization signals:





**1.4.4. Synchronization output for TV10 0080**

The new 6G-SDI board can extract the video from camera and regenerates the synchronization signal for others 6G-SDI board (not implemented yet).

Internal Sync Generator	Camera Input	FCB ER Series Interface Board Twiga Board
TMDS Video from Camera	Signals	
Micro Coaxial Cable	Link	
USL30 pts	Input Connector	
FPGA Internal Sync Extractor and Generator	Processing	
High quality DAC	Video generator	
External or Internal Sync	Switch	
Cable driver	Driver	
Tri-Level Sync	Signal	
Molex 4 pts	Connector	
Standard Molex Cable	Link	
<b>TV10 0080</b>		

**1.4.5. Video format compatibility list**

*Software 1.2-6G or later*

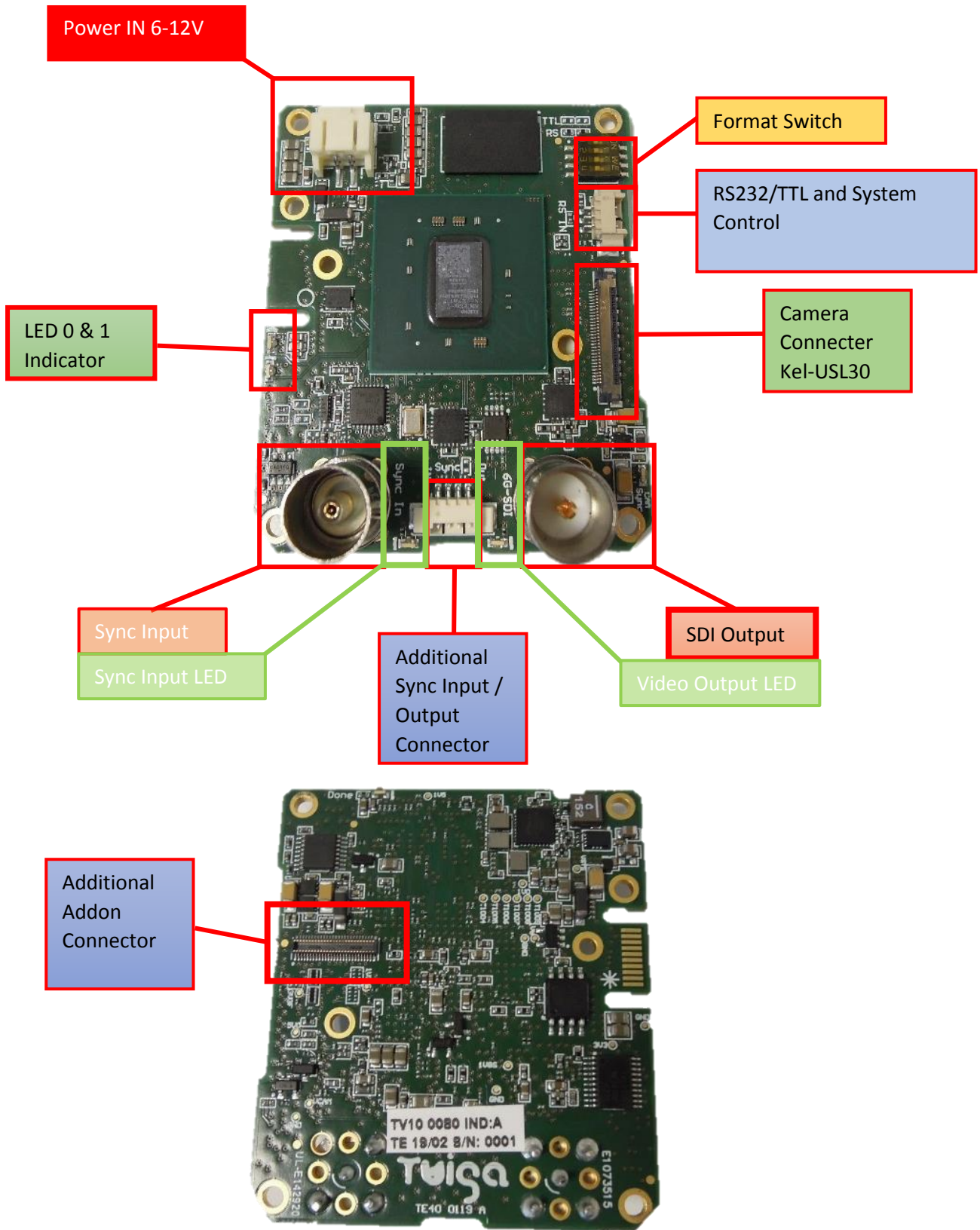
- 2160p @ 23.98 / 24 / 25 / 29.97 / 30
- 1080p @ 23.98 / 24 / 25 / 29.97 / 30 / 50 / 59.94 / 60
- 1080i @ 50 / 59.94 / 60
- 720p @ 50 / 59.94 / 60

*Software 1.1-6G*

- 2160p @ 23.98 / 25 / 29.97
- 1080p @ 23.98 / 25 / 29.97 / 50 / 59.94
- 1080i @ 50 / 59.94
- 720p @ 50 / 59.94

## 2. Features

### 2.1. Hardware - Connectors

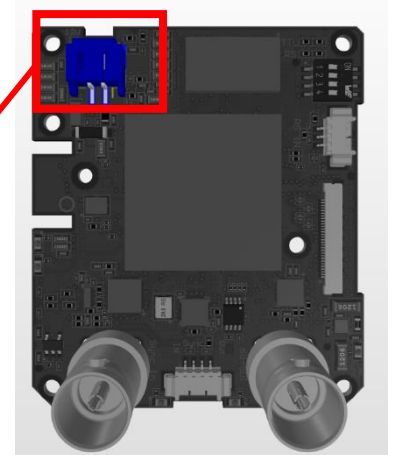
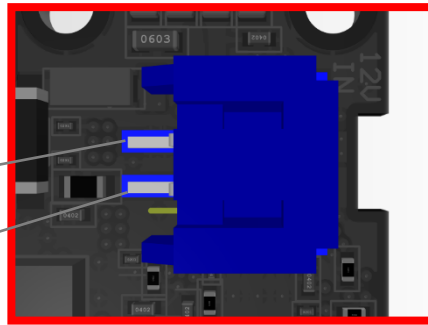


The actual product may differ from image shown

### 2.1.1. Power Input J300

Connector references: JST S2B-PH-SM4-TB Right Angle

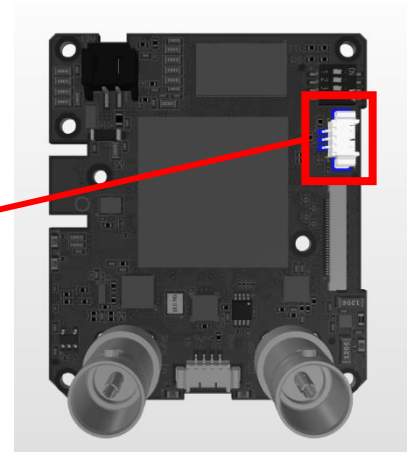
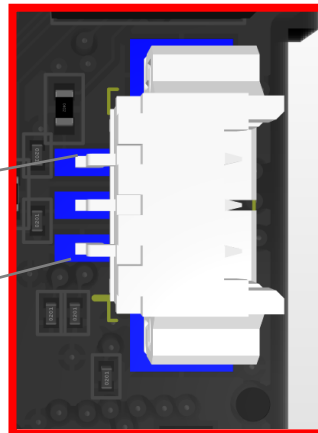
Pin No.	Name
2	0V
1	+6V to +12V



### 2.1.2. Visca and System Management J1701

Connector references: Molex Picoblade 3 pts Right Angled 53261-0371

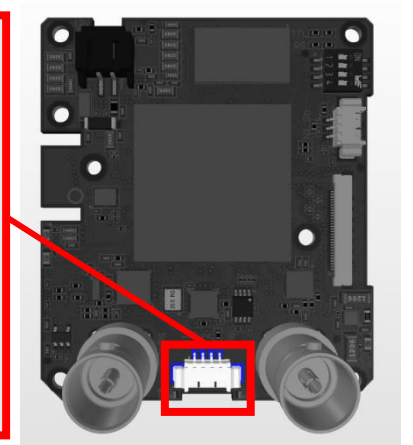
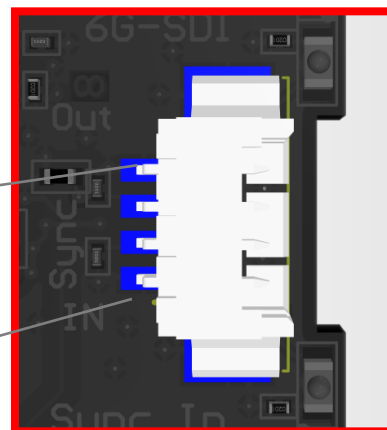
Pin No.	Name
3	UART RX (RS232)
2	UART TX (RS232)
1	GND



### 2.1.3. Additional Sync input output Connector J1702

Connector references: Molex Picoblade 4 pts Right Angled 53261-0471

Pin No.	Name
4	GND
3	Sync Output
2	Sync Input
1	GND

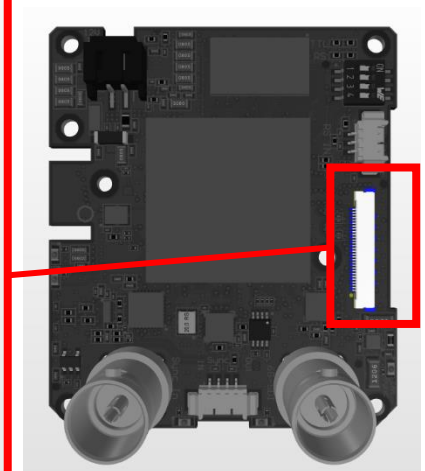
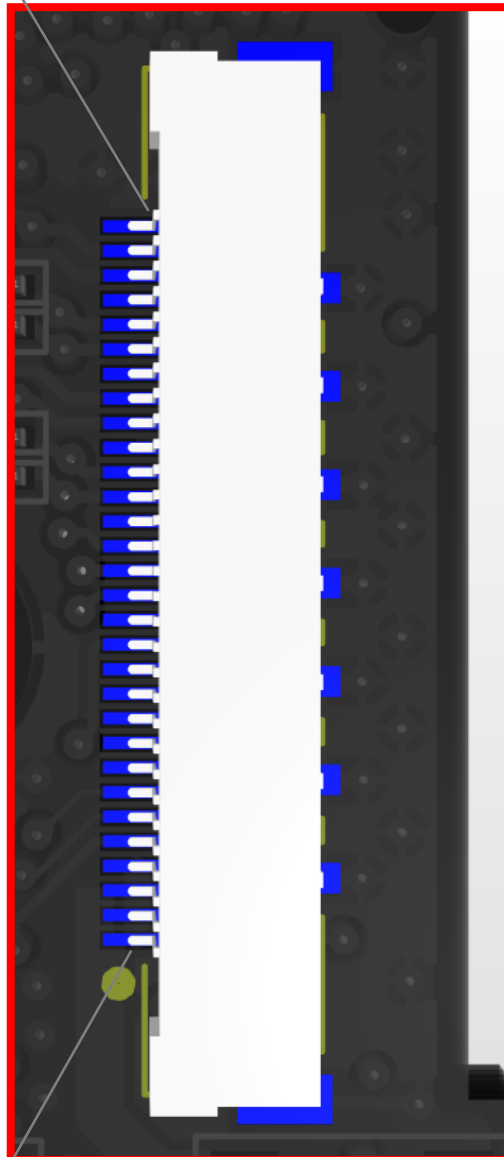


### 2.1.4. Camera Input J301

Connector reference: USL20-30SS-005-C

Cable reference: KEL USL20-30SS-012-C

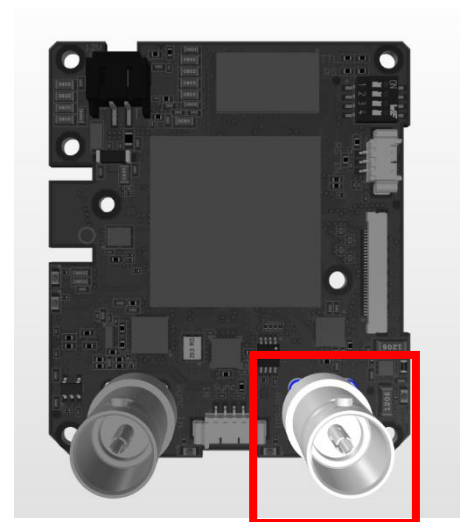
Pin No.	Name
30	GND
29	TXCLKOUT-
28	TXCLKOUT+
27	GND
26	TX0OUT-
25	TX0OUT+
24	GND
23	TX1OUT-
22	TX1OUT+
21	GND
20	TX2OUT-
19	TX2OUT+
18	GND
17	XSD0_ACC_LED
16	EXT_SYNC
15	EXT_SYNC_LOCK
14	HDP
13	D_5.0V_OUT
12	USB_VBUS
11	GND
10	NC
9	NC
8	GND
7	UART_RX
6	UART_TX
5	RESET
4	DC_IN
3	DC_IN
2	DC_IN
1	DC_IN



### 2.1.5. SDI Output J1700

Output the high-speed SDI signal thru 6G BNC 75 Ohms compatible connector.

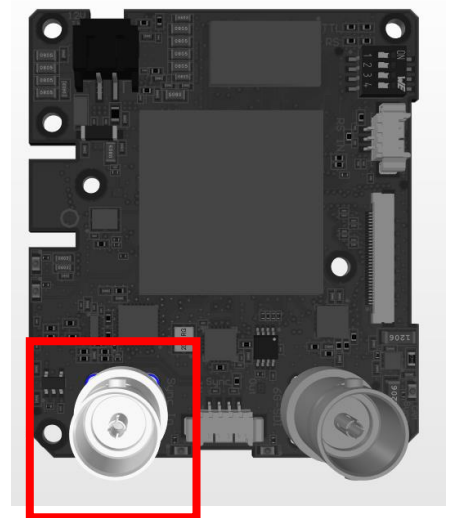
Additionally, the SDI output and Sync Input connector can be replaced with MCX connector in order to meet the mechanical constraints of your application.



### 2.1.6. Sync Input J1703

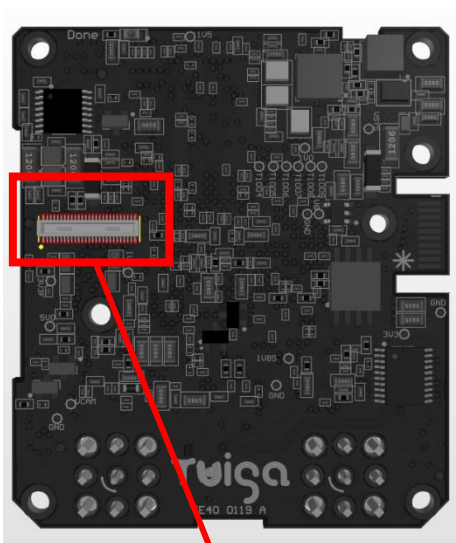
Input of the Sync signal thru standard BNC 75 Ohms compatible connector

Additionally, the SDI output and Sync Input connector can be replaced with SMB, MCX connector in order to meet the mechanical constraints of your application.

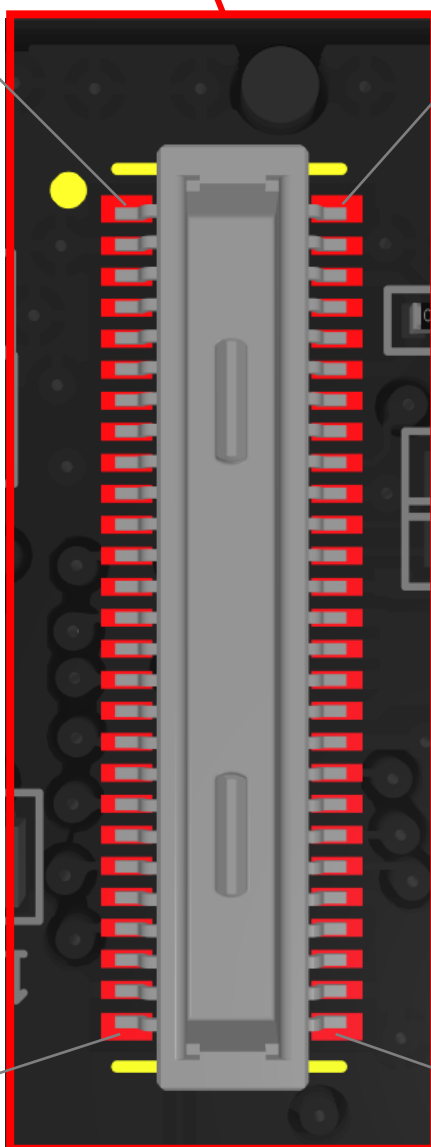


2.1.7. Addon connector J1400

Connector reference: Hirose DF40C-50DP-0.4V(51)



Pin No.	Name
51	NC
1	GND
3	Data15
5	Data14
7	Data13
9	Data12
11	Data11
13	Data10
15	Data9
17	Data8
19	SCLK
21	Data7
23	MOSI
25	Data6
27	Miso
29	Data5
31	CS#
33	Data4
35	Data3
37	Data2
39	Data1
41	Data0
43	Reset
45	Data Valid
47	Data CLK
49	GND
53	NC



Pin No.	Name
52	NC
2	GND
4	AGND
6	NC
8	NC
10	AGND
12	NC
14	NC
16	Addon EN
18	NC
20	UART RxD
22	UART TxD
24	GND
26	DC IN/OUT
28	DC IN/OUT
30	DC IN/OUT
32	DC IN/OUT
34	GND
36	Reserved
38	NC
40	I2C SCL
42	I2C SDA
44	GND
46	NC
48	NC
50	GND
54	NC

## 2.2. Hardware

### 2.2.1. Board Status LED D1002

The status LED displays the system state every 2 second. The number of blinks indicates the current state.

Status	Number of blinks	Description
System started	1	System initialization done
System initialized	2	System Configuration done
Searching camera	3	The system tries to detect camera
Format Video	4	Camera ready
System is Configured	5	System Ready
Running mode	6	Normal operation

*LED signalization meaning*

### 2.2.2. Video Input LED indicator D1003

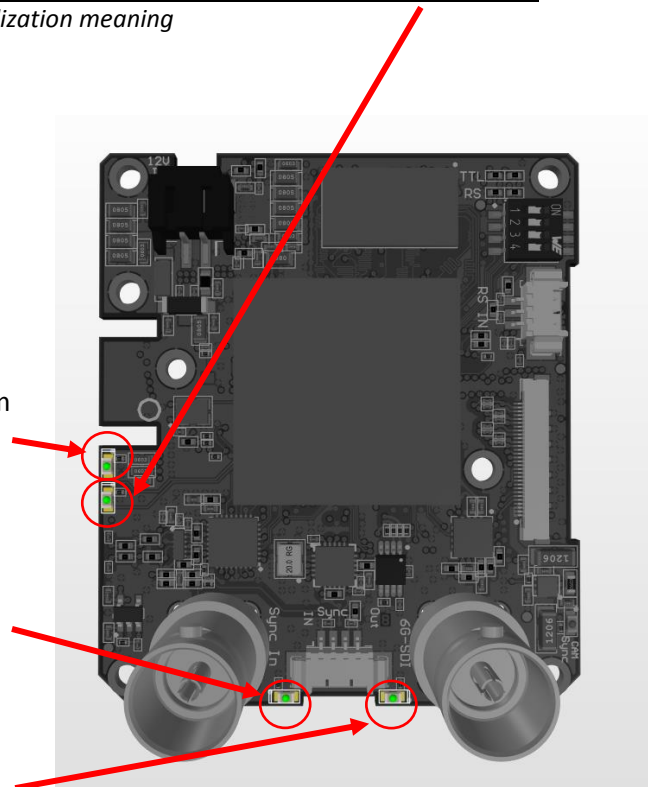
The LED indicate if an invalid video format is inputted from the camera.

### 2.2.3. Sync Input LED D1100

The Sync Input LED indicate that the Synchronization process is done with the external sync input and the camera.

### 2.2.4. Video Output Led D1101

The video Output LED indicate valid video on SDI output.



## 2.3. Hardware Switch

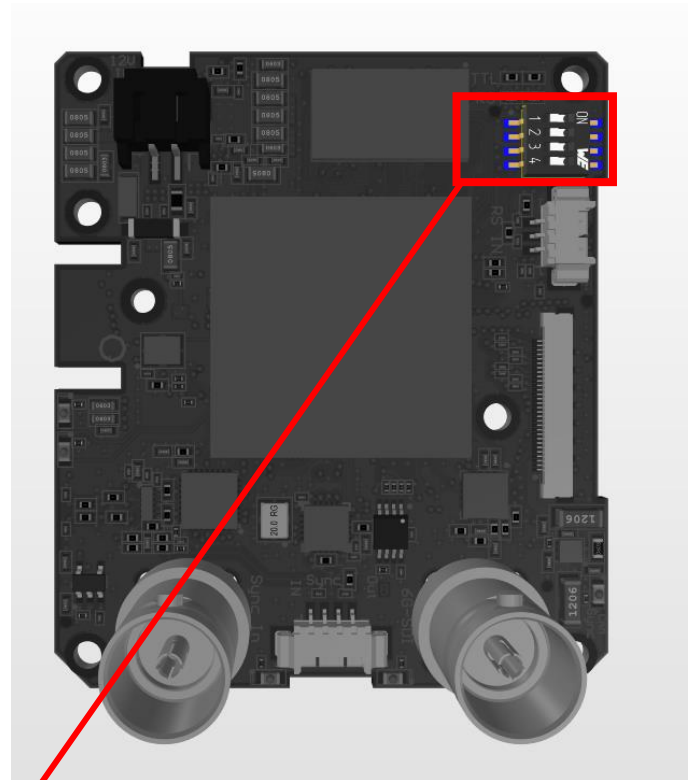
### 2.3.1. RS232 / TTL Switch

The system can be configured in RS232 or TTL. By default, the board work in RS232 mode. 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.

### 2.3.2. DIP Switch Format Selection and Sync

In order to change the video format, you can use dedicated external software (Dip switch needs to be in “External” Mode).

Additionally, the camera format can be changed using the SW1200 DIP switch. Its value is checked each time power is issued to the camera and the camera format is automatically set accordingly.



DIP switch format selection

Software **1.3-6G** or later

For HDMI TV10 0080												
					SONY					Skoopia	Wonwoo	
Switch					ES8230	ER8300	ER8530	ER8550	EW9500H	85Z18H	MC-S185U	
	1	2	3	4								
	OFF	OFF	OFF	OFF	External	External	External	External	External	External	External	
	ON	OFF	OFF	OFF	1080p29,97	1080p29,97*	1080p29,97	1080p29,97	1080p29,97	1080p29,97	1080p30	
	OFF	ON	OFF	OFF	1080p25	1080p25*	1080p25	1080p25	1080p25	1080p25	1080p25	
	ON	ON	OFF	OFF	1080i59,94	1080i59,94	1080i59,94	1080i59,94	1080i59,94	1080i59,94	NA	
	OFF	OFF	ON	OFF	1080i50	1080i50	1080i50	1080i50	1080i50	1080i50	NA	
	ON	OFF	ON	OFF	720p59,94	720p59,94	720p59,94	720p59,94	720p59,94	720p59,94	720p60	
	OFF	ON	ON	OFF	720p50	720p50	720p50	720p50	720p50	720p50	720p50	
	ON	ON	ON	OFF	ept29,97	ept29,97*	ept29,97	etp29,97	WQFHD 4k30 <sup>3</sup>	4k23,98	NA	
	OFF	OFF	OFF	ON	ept25	ept25*	ept25	ept25	WQFHD 4k25 <sup>3</sup>	4k24	NA	
	ON	OFF	OFF	ON	4k29,97	4k29,97	4k29,97	4k29,97	QFHD 4k29,97 <sup>2</sup>	4k29,97	4k30	
	OFF	ON	OFF	ON	4k25	4k25	4k25	4k25	QFHD 4k25 <sup>2</sup>	4k25	4k25	
	ON	ON	OFF	ON	1080p50	1080p50	1080p50	1080p50	1080p50	1080p50	1080p50	
	OFF	OFF	ON	ON	1080p59,94	1080p59,94	1080p59,94	1080p59,94	1080p59,94	1080p59,94	1080p60	
	ON	OFF	ON	ON	reserved	reserved	reserved	reserved	reserved	reserved	reserved	
	OFF	ON	ON	ON	etp23,98	NA	etp23,98	etp23,98	QFHD 4k30 <sup>2</sup>	NA	NA	
	ON	ON	ON	ON	4k23,98	NA	4k23,98	4k23,98	NA	NA	NA	

External : Control the camera video format via external RS232/TTL communication cable, default setting.

\*: Output indicates that the same image is output two times, please refer to the datasheet of the camera for more information.

<sup>2</sup>: Adds the black frame on the periphery of the image output 2688x1512, please refer to the datasheet of the camera for more information.

<sup>3</sup>: Adds the black frame on the periphery of the image output 2560x1440, please refer to the datasheet of the camera for more information.



## 2.4. Board Accessories TV50 0008

List of Twiga accessories set TV50 0008 for the TV10 0080 Board

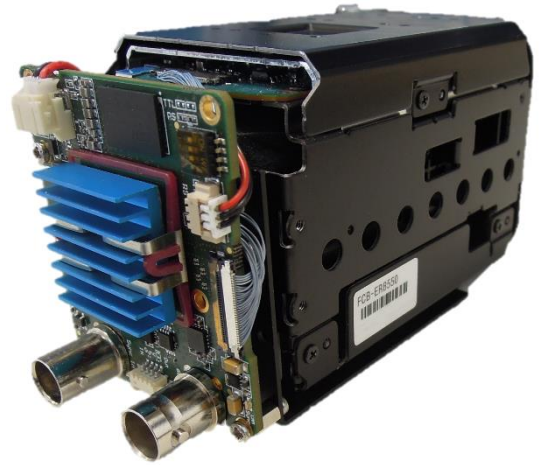
### 2.4.1. Camera Cable TE30 0074 L=12cm



### 2.4.2. Wires for power connector TE30 0031 L=20cm



### 2.4.3. 3 Wires for RS232/TTL communication L=20cm TE30 0170

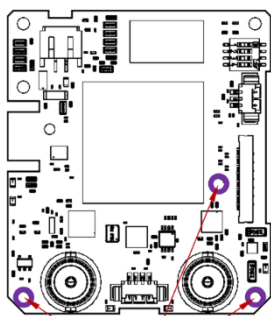


The actual product may differ from image shown

## 2.5. Additional mechanical information

Twiga has a standard set of mechanical accessories TV50 0018 to facilitate the integration of the camera or for fast prototyping. The set is compatible with ER8300/ER8530/ER8550

- TM30 0001 Angle Bracket (x 1)
- TM30 0002 M2x3 A2 Screw (x 6)
- TM10 0001 Hex-Spacer F/F M2 4x5 (x 3)
- TM10 0004 M2x4 A2 Screw (x 4)



holes to use with bracket



The actual product may differ from image shown

### 3. Environmental

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Constraint	Value
Operating Temperature	-10 to +60°C
Storage Temperature	-20 to +60°C
Humidity	20% to 80%
UL	UL 94
FCC	FCC Part 15
RoHS	2002/95/EC
Weight*	24g
Standby Mode**	4.8W
Running mode**	6W
Dimensions (W x L x H) *	57.5 x 50 x 25mm

*\* with two BNC connectors mounted*

*\*\*with Sony ER8550 Camera and video format set to 2160p29.97*

#### 3.1. Additional information

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**The 6G SDI interface board can integrate more option personalized for your own application, if you have any question, please contact your OEM vendor.**