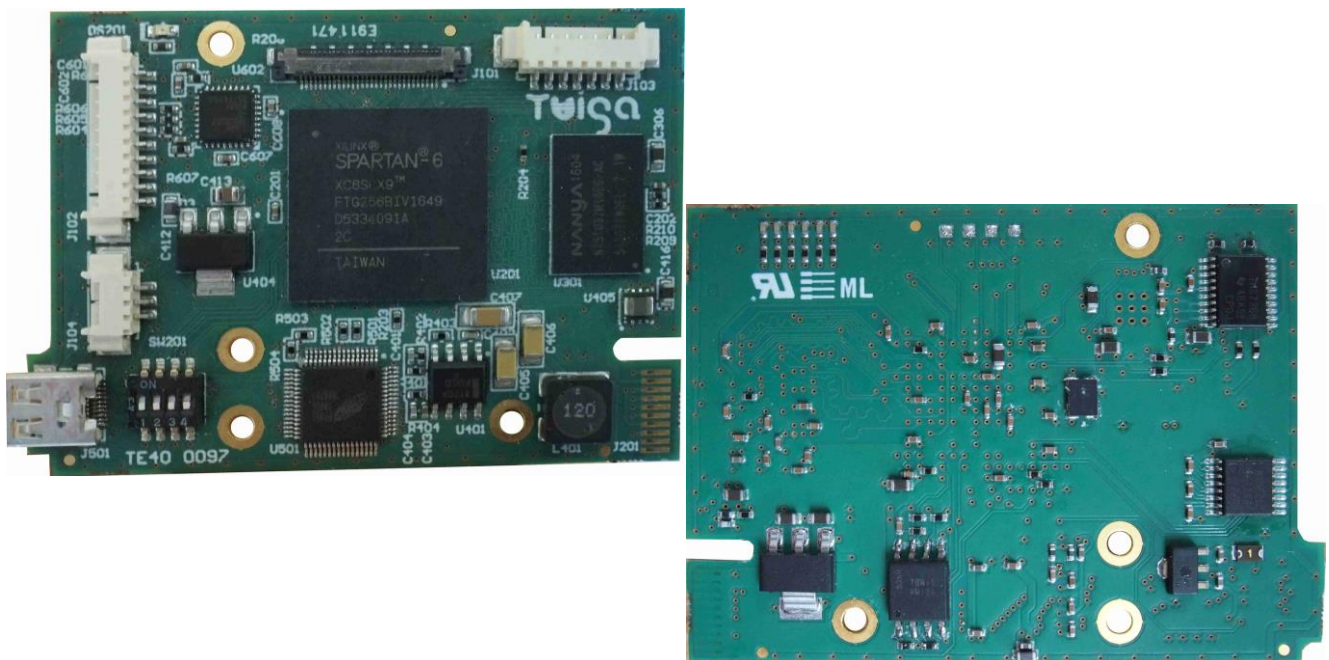


# Technical manual

## LVDS to YPbPr, CVBS or HDMI converter board



**P/N – TV10 0070:** LVDS to HDMI / Analog YPbPr, CVBS, Y/C, interface board interface board for Tamron MP1010M-VC, MP1110, MP3010

**P/N – TV50 0015:** Mounting kit for TV10 0070 - LVDS to Analog / HDMI I/F board

**Includes:** 30-way micro-coax camera cable, 10-way cable (Power supply/TTL/Analog output), 3-way cable (RS232), 7-way cable (GPIOs), screws and plastic spacers

Ref: LVDS\_YPbPr\_SD\_HDMI\_Technical\_Manual  
Date: 11 Apr 2023

## Documentation Revision History

Date	Revision	Description	Modified by	Note
10/01/20	B	In Specification: Modification of video formats for HDMI, SD and HD analogue outputs	NMA	
11/04/23	C	Update board and kit references	CBO	

## Contents

Product overview .....	3
Synoptics .....	3
1 Main functions .....	3
Specifications .....	3
2 LVDS camera input .....	3
3 HDMI Output .....	3
4 SD Analog Outputs .....	3
5 HD Analog Outputs .....	3
6 Serial control.....	4
7 GPI control .....	4
8 Power .....	4
9 Mechanical.....	4
Board connections.....	5
Connectors pinout .....	5
10 Analog video, RS, power (J102).....	5
11 RS 232 (J104) .....	5
12 LVDS camera (J101) .....	6
13 GPI controls (J103).....	7
GPI controls .....	7
Output modes selection.....	8
HDMI output .....	8
YPbPr output .....	8
SD output.....	8
LED signalization .....	9

## **Product overview**

This board converts a LVDS HD video signal to component YPbPr or composite SD (PAL or NTSC) or HDMI output.

Format supported are 720p and 1080p/i – up to 1080p25/30 for YPbPr and 1080p50/60 for HDMI.

The composite SD video corresponds to complete area of the HD 1080p25 or 1080p30 view with letter box or cropped option to realize 16/9 to 4/3 adaptation.

Output mode is selected with micro switches.

The remote configuration of the camera with a serial communication - TTL or RS232 level - is in accordance with VISCA protocol.

## ***Synoptics***

### **1. Main functions**

- LVDS signal decoding (with FPGA)
- Serialization and adaptation of the signal to HDMI standard
- Memorization of the SD image to realize NTSC or PAL interlacing
- SD NTSC / PAL Signal scaling (FPGA)
- NTSC & PAL Coding (SD video encoder)
- YPbPr digital to analog conversion
- TTL/RS232 for remote control
- Power supply of the camera (8 to 12V), and of the board functions (1.2V, 1.8V and 3.3V)

## ***Specifications***

### **2. LVDS camera input**

- LVDS (Y, Cb, Cr, Sync, Clk) 5 channels 8 bits (“Channel link format”)
- LVDS clock: 74,25MHz or 148,5MHz
- HD video formats: 720p50/60, 1080p25/30, 1080i50/60, 1080p50/60
- KEL 30 ways connector

### **3. HDMI Output**

- Same HD video formats as LVDS input (from 720p50 to 1080p50/60)
- RGB 8-bit encoding
- HDMI connector

### **4. SD Analog Outputs**

- VBS and YC :1V pp, 75ohm
- NTSC (with 1080p30/29,97 or 1080p60/59,94 configuration)
- PAL (with 1080p25 or 1080p50 configuration)
- “Letter box” or “crop” conversion from HD 16/9 to SD 4/3 aspect ratio
- Delay from LVDS inputs to analog outputs: about 40ms for PAL and moving from 33ms to 67ms for NTSC
- MOLEX 10 ways connector

### **5. HD Analog Outputs**

- YPbPr :1V pp, 75ohm
- From 720p50 to 1080p30 video formats
- MOLEX 10 ways connector

## 6. Serial control

- VISCA (SONY) protocol
- Baud rate: 9600, 19200, 38400, 115200
- Logical level +3V3 on MOLEX 10 ways connector
- RS232 level on MOLEX 3 ways connector

## 7. GPI control

- Zoom, focus and freeze controls
- Connection to ground to activate the control.
- Logical level +3V3
- MOLEX 7 ways connector

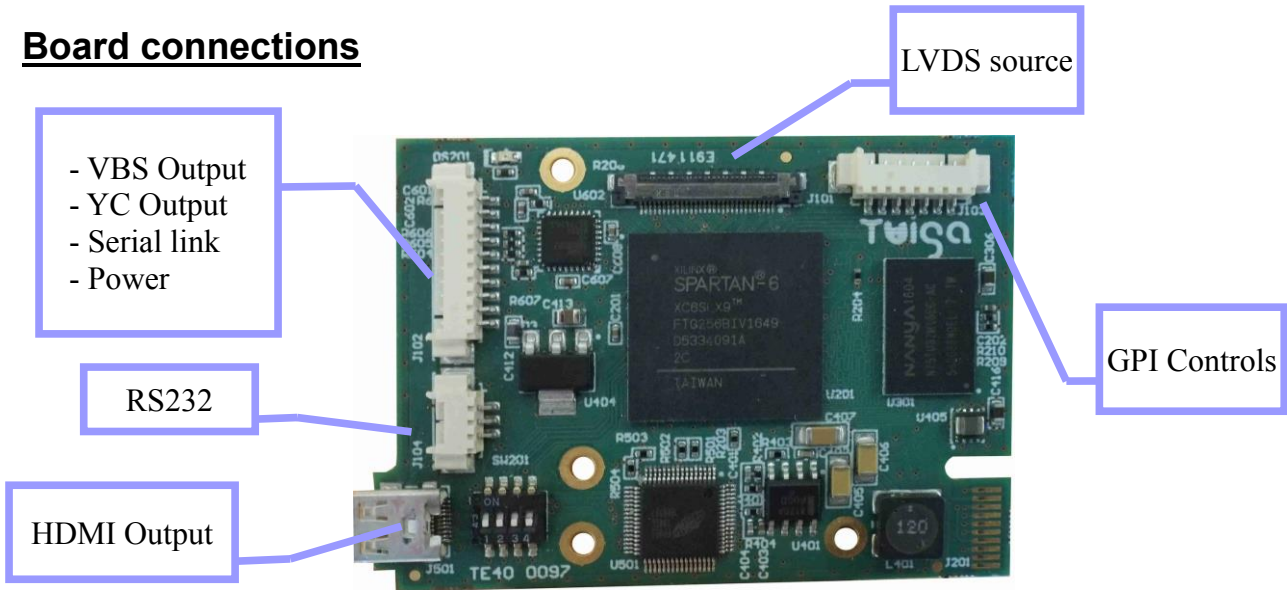
## 8. Power

- +8 to 12V voltage, about 5W consumption with camera
- MOLEX 10 ways connector

## 9. Mechanical

- Board dimensions: 55mm x 41,5mm
  - Four 2,2mm diameter mounting holes
-


## Board connections



## Connectors pinout

### 10. Analog video, RS, power (J102)

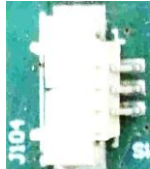
MOLEX 53261-1071 connector



1	Y / CVBS
2	0V-GND
3	TxD-TTL (board input)
4	RxD-TTL (board output)
5	0V-GND
6	+8 to 12V
7	0V-GND
8	Pr / S-video (C)
9	0V-GND
10	Pb / S-video (Y)

### 11. RS 232 (J104)

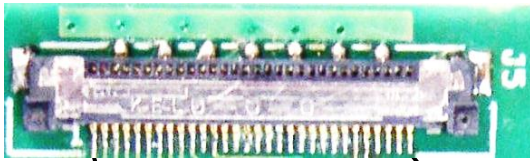
MOLEX 53261-0371 connector



1	0V-GND
2	RxD-232 (board output)
3	TxD-232 (board input)

## 12. LVDS camera (J101)

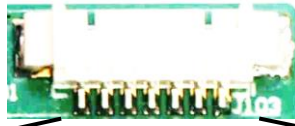
KEL USL00-30L Connector



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

### 13. GPI controls (J103)

MOLEX 53261-0771 Connector



7	6	5	4	3	2	1
Ctrl6	Ctrl5	Ctrl4	Ctrl3	Ctrl2	Ctrl1	0V-GND
Freeze	Focus far	Focus near	Focus Auto/Manual	Zoom -	Zoom +	

### GPI controls

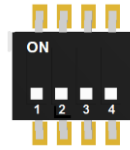
Pin	Action	Control	VISCA command (hexa)
Ctrl1	Press	Zoom +	81 01 04 07 23 FF
	Release	Zoom stop	81 01 04 07 00 FF
Ctrl 2	Press	Zoom -	81 01 04 07 33 FF
	Release	Zoom stop	81 01 04 07 00 FF
Ctrl 3	Press	Focus auto/manual	81 01 04 38 10 FF
Ctrl 4	Press	Focus near	81 01 04 08 30 FF
	Release	Focus stop	81 01 04 08 00 FF
Ctrl 5	Press	Focus far	81 01 04 08 20 FF
	Release	Focus stop	81 01 04 08 00 FF
Ctrl 6	Press	Image freeze	81 01 04 62 02 FF
	Next press	End of freeze	81 01 04 62 03 FF

A control is activated (= Press) when the pin is grounded, it is deactivated (= Release) when the pin is unconnected.

## Output modes selection

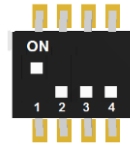
### **HDMI output**

when SW2 = OFF and SW1 = OFF  
 Warning: HDMI is not available with all cameras



### **YPbPr output**

when SW2 = OFF and SW1 = ON



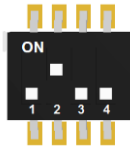
### **SD output**

when SW2 = ON and SW1 = OFF  
 SW3 selects 16/9 to 4/3 conversion:

➤ **« Letter box » aspect ratio**

No part of HD view is cut, black horizontal bars are added on top and bottom of SD output

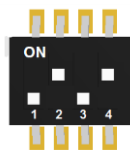
This mode is selected when SW4 switch is OFF



➤ **« Crop » aspect ratio**

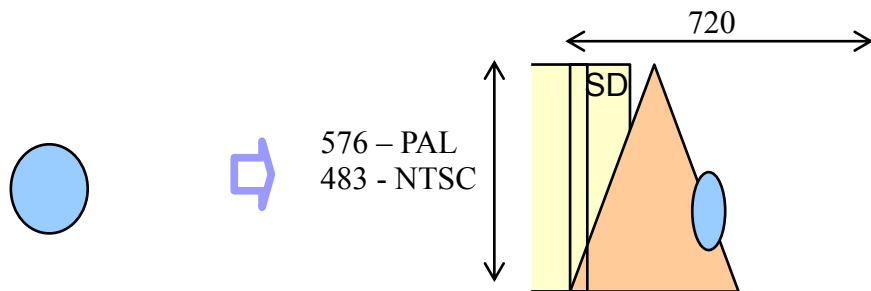
Left and right sides of HD view are cut, whole high is preserved on SD output.

This mode is selected when SW4 switch is ON



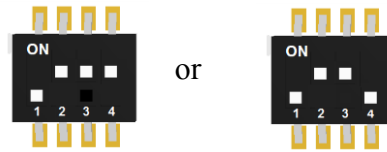
➤ **« Squeeze » aspect ratio**

16/9 HD video content converted to 4/3 SD output resulting in vertical elongation,





This mode is selected when SW3 switch is ON



## LED signalization

During initialization phase, led blinking indicates the state of the board:

- 1 flash every 2 seconds: waiting for RX pin ready
- 2 flashes every 2 seconds: waiting for message reception (3s time out)
- 3 flashes every 2 seconds: camera baud rate measurement
- 4 flashes every 2 seconds: camera identification
- 5 flashes every 2 seconds: initialization OK

LED indicator

