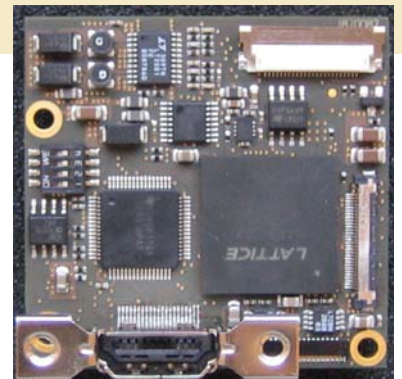


Thunder Link is a family of small form factor modules for formatting and converting generic digital video streams to standard compliant formats. Different interface standards are supported from the transmitter side including DVI/HDMI, 3G-SDI and HD-SDI. Supported physical media are copper and fibre cables.

These modules connect to the digital video interface of Tamron block cameras and support several progressive and interlace HDTV formats. As no analog to digital conversion is done on these modules, excellent output image quality is achieved.

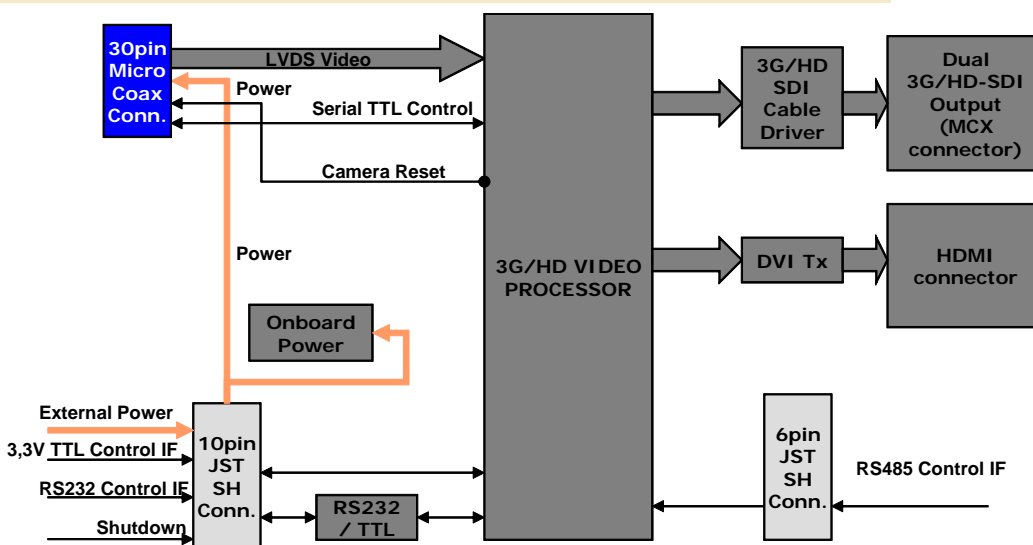
## TL765x Series Features

- + Supports Tamron MP1010M-VC ultra compact camera module
- + Digital 4channel LVDS video input from camera
- + 1080p output at 30Hz and 25Hz
- + 720p output at 60Hz and 50Hz
- + 1080i output at 60Hz and 50Hz
- + Full automatic video input standard detection
- + Dual HD-SDI outputs (TL7650 and TL7651 only)
- + SDI outputs compliant to SMPTE424M / SMPTE292M
- + DVI video output over HDMI connector (TL7650 and TL7652 only)
- + Native digital signal processing chain for best image quality
- + RS232 and TTL level serial control interface
- + Robust RS485 differential serial control interface
- + Supply voltage 5V or 12V DC regulated
- + Board temperature monitoring with alert function



Dual HD-SDI +  
DVI (HDMI)  
Output

## Block Diagram TL7650



Order Codes:

**TL7650**

Dual HD-SDI output plus DVI(HDMI) output

**TL7651**

Dual HD-SDI output

**TL7652**

DVI(HDMI) output

**TLCK-B**

Cable Kit

### Specification Camera Interface

**INPUTS:**  
 DATA 4 CH. LVDS digital video (from camera)  
 CLOCK LVDS (from camera)  
 CONTROL Rx 3.3V TTL serial control interface

**OUTPUTS:**  
 CONTROL Tx 3.3V TTL serial control interface  
 RESET 3.3V TTL, active low

### Power and Environment

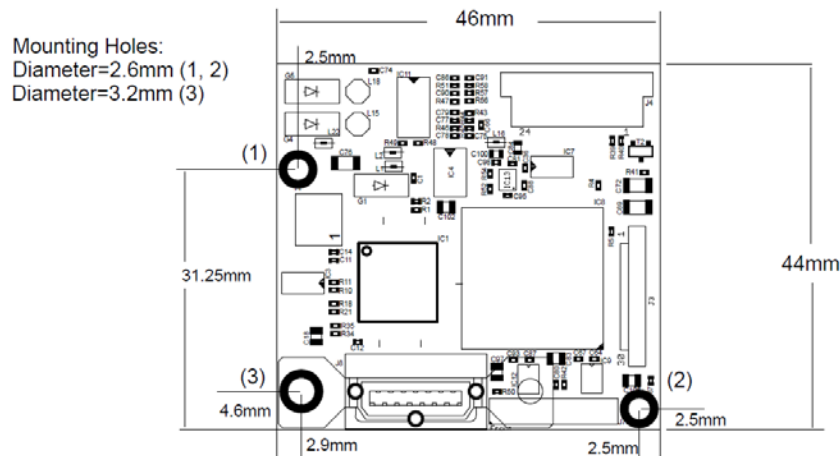
**POWER INPUT:**  
 8V to 12V DC regulated (12.5V DC absolute maximum)  
 Power consumption (MP1010M-VC + TL7651) 4.8W (cam motors inactive)  
 Power consumption TL7651: 150mA @ 12V DC (typ.)  
 Power consumption value conditions:  
 Power 12V DC, video mode 1080p60  
 Ambient temperature +25°C/77°F  
 Humidity 30%

For 1080p30 operation:  
 Power consumption (MP1010M-VC + TL7651) 4.1W (cam motors inactive)

**OPERATING CONDITIONS:**  
 Ambient temperature (min/max): -5°C/+60°C = 23°F/140°F  
 Humidity: 20%-80%

**STORAGE CONDITIONS:**  
 Temperature (min/max): -20°C/+60°C = -4°F/140°F  
 Humidity: 20%-80%

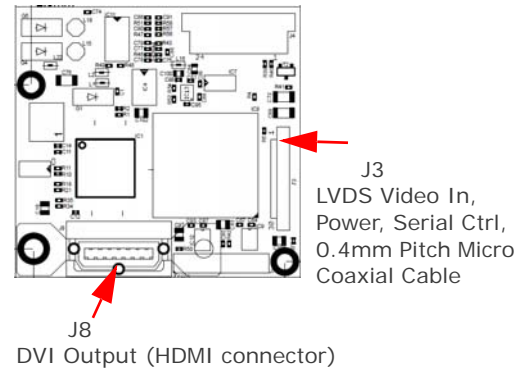
### Board Mechanical



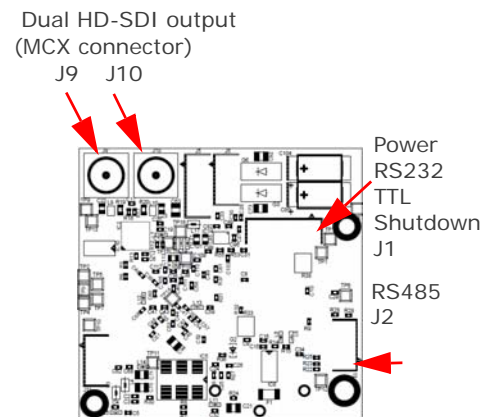
Maximum top component height = 10.5mm (HDMI connector)  
 Maximum bottom component height = 6.8mm (MCX connectors)  
 PCB thickness = 1.56mm

### Onboard Connectors

PCB Top Side:



PCB Bottom Side:



Note: Arrowheads indicate pin 1 location

J4, J5, J6, J7, J11: Do not connect

#### SAFETY NOTES:

All digital inputs are specified for maximum voltages of 3.3V (+5%).

## Pin Assignment of external Interfaces

**J8 HDMI connector type is Molex 48307-8012 or equivalent**

(for TL7650 and TL7652 only)

**J1 JST BM10B-SRSS-TB**

**Power and RS232/TTL Control IF**

- 1 DC IN
- 2 DC IN
- 3 GND
- 4 GND
- 5 Reset / Shut Down, pull to GND to reset/shut down TL7650 and camera\*
- 6 GND
- 7 TXD\_TTL (serial IF transmit, 3.3V) and/or temperature alert output
- 8 RXD\_TTL (serial IF receive, 3.3V)
- 9 RXD\_232 (serial IF receive, RS232 level)
- 10 TXD\_232 (serial IF transmit, RS232 level)

**Note: Connect RS232 or TTL serial interface, not both**

**J9, J10 75 ohms MCX coaxial jack**

(for TL7650 and TL7651 only)

**HD-SDI outputs**

**J2 JST BM06B-SRSS-TB**

**RS485 Control IF \*\***

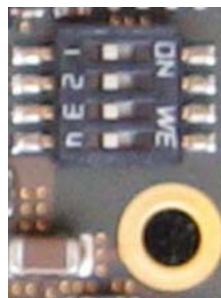
- 1 TXD\_P (to controller)
- 2 TXD\_N (to controller)
- 3 RXD\_N (from controller)
- 4 RXD\_P (from controller)
- 5 GND
- 6 3.45V typ. (max. current 50mA)

\*for reset, pull to GND for one second or longer

## Onboard Mode Switches

Switch	OFF (default)	ON
1 - no function	Keep OFF	--
2 - cam control	RS232/TTL	RS485
3 - temp alert enable	no alert on J1/ pin7	J1/pin7 alert enabled
4 - mode	Keep OFF	--

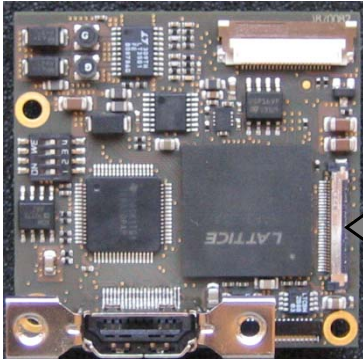
**Table 1: Onboard Switch Functions**



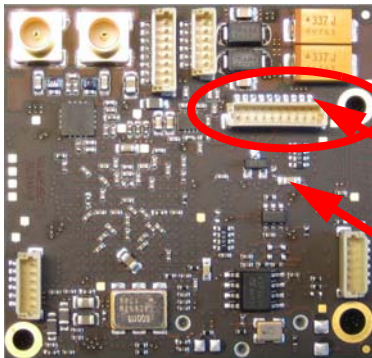
**SAFETY NOTES:** All digital inputs are specified for maximum voltages of 3.3V (+5%).

## Connection Diagram

TL7650/TL7652 top side



MP1010M-VC Camera



J1, 12V DC Power input, Reset and RS232/TTL serial interface

Pin 1 location

Temperature alert signalling LED (red colour when on)

TL7650/TL7651 bottom side

**SAFETY NOTES:** All digital inputs are specified for maximum voltages of 3.3V (+5%).

## Reset Operation

When applying power to TL7650, TL7651 or TL7652, the camera is also automatically powered. During power up all functions on the video transceiver boards, are reset and initialized.

During operation a manual reset can be applied by pulling pin no. 5 of connector J1 to 0V (GND). This resets also the camera.

## Camera Control

Camera control can be done by connecting a PC or CCU via RS485, RS232 or serial 3.3V TTL interface to TL7650, TL7651 or TL7652. The interface is passed through to the camera that all VISCA protocol based software can be used. Serial interface selection must be done by appropriate setting of switch-2.

## Cable Kit Contents

### TLCK-B cable kit:

#### External connecting cables:

1 pcs. - 10pin flying leads cable for power and control (RS232/TTL), lead length = 15cm / 5.9inch

#### Camera connecting cables:

1 pcs. - 30pin KEL USL type micro coaxial cable, connector on both sides, length = 20cm / 7.8inch

**SAFETY NOTES:** All digital inputs are specified for maximum voltages of 3.3V (+5%).