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 4 channel 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

**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
**TL7650/TL7651/TL7652**
Dual HD-SDI / DVI(HDMI) Output Video Transceiver

### Specification Camera Interface

**INPUTS:**
- DATA
- CLOCK
- CONTROL Rx

**OUTPUTS:**
- CONTROL Tx
- RESET

### Power and Environment

**POWER INPUT:**
- 8V to 12V DC regulated (12.5V DC absolute maximum)

**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:**
- J3: LVDS Video In, Power, Serial Ctrl, 0.4mm Pitch Micro Coaxial Cable
- J8: DVI Output (HDMI connector)

**PCB Bottom Side:**
- Dual HD-SDI output (MCX connector)
  - J9, J10
- Power RS232 TTL Shutdown J1
- RS485 J2

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

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**Internet:** www.aivion.com
**E-Mail:** sales@aivion.com
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)  

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

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)

Onboard Mode Switches

<table>
<thead>
<tr>
<th>Switch</th>
<th>OFF (default)</th>
<th>ON</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - no function</td>
<td>Keep OFF</td>
<td>--</td>
</tr>
<tr>
<td>2 - cam control</td>
<td>RS232/TTL</td>
<td>RS485</td>
</tr>
<tr>
<td>3 - temp alert enable</td>
<td>no alert on J1/pin7</td>
<td>J1/pin7 alert enabled</td>
</tr>
<tr>
<td>4 - mode</td>
<td>Keep OFF</td>
<td>--</td>
</tr>
</tbody>
</table>

**Table 1: Onboard Switch Functions**

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

**TL7650/TL7651/TL7652 top side**

**MP1010M-VC Camera**

30pin Micro Coax Cable

**TL7650/TL7651 bottom side**

- J1, 12V DC Power input, Reset and RS232/TTL serial interface
- Pin 1 location
- Temperature alert signalling LED (red colour when on)

**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%).