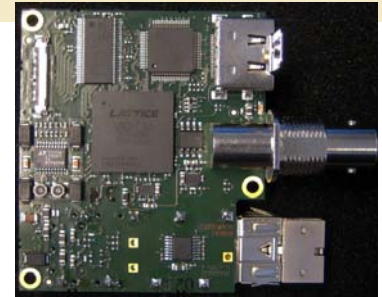


Thunder Link is a family of small form factor modules for formatting and converting generic digital video streams to standard compliant formats. Different interface standards are supported from the transmitter side including DVI/HDMI, VGA, 3G-SDI, HD-SDI, SDI, CVBS and USB. Supported physical media are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

The modules connect to the digital video interfaces of various Sony FCB block cameras and support several progressive and interlace HDTV or SDTV formats. As no analog to digital conversion is done on these modules, excellent output image quality is guaranteed.

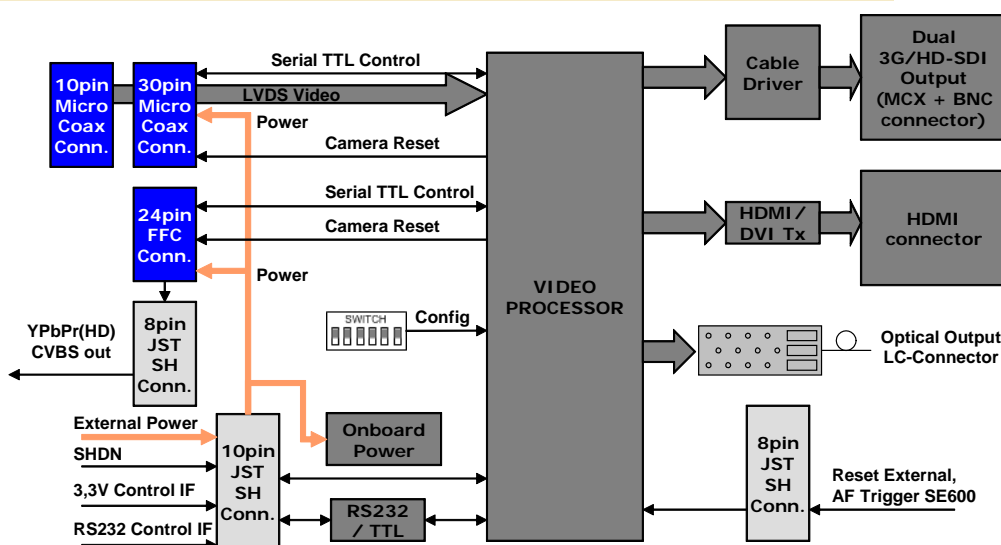
TL7070 - Features

- + Supports Sony FCB-EV7500/7310/7300/7100/5500/5300
- + Supports Sony FCB-EH6500/6300/3400/3300/3150/3410/3310
- + Supports Sony FCB-SE600
- + Digital LVDS video input from camera
- + 1080i, 1080p and 720p output standard support
- + 25Hz, 29.97Hz, 30Hz, 50Hz, 59.94Hz and 60Hz frame rates
- + Automatic camera and video standard detection
- + Optical 3G/HD-SDI output based on SFP compatible transmitter
- + Optical transmitter 1310nm/10km/LC for SMF included
- + BNC + MCX coax 3G/HD-SDI outputs
- + HD-SDI outputs compliant to SMPTE425M/424M/292M/274M/296M
- + DVI (HDMI connector) video output
- + Native digital signal processing chain for best image quality (no scaling)
- + Breakout of camera analog HDTV YPbPr and CVBS video
- + Dual serial control interface (RS232 or 3.3V TTL)
- + Supply voltage: 7V to 12V DC regulated (5V only when used with FCB-SE600)



Optical + Coax
3G/HD-SDI,
HDMI Output

Block Diagram TL7070



WARNING
Class 1 Laser
Product

Order Codes:

TL7070

Optical 3G/HD-SDI output plus
dual coax HD-SDI output plus
DVI (HDMI) output

TL7070CK-EH

CableKit for FCB-EH, FCB-EV and
SE600 solutions

Specification Camera Interface

INPUTS:

DATA	LVDS digital video (from camera)
CLOCK	LVDS (from camera)
CONTROL Rx	3.3V TTL serial control interface
ANALOG	YPbPr and CVBS video 1Vpp into 75 ohms

OUTPUTS:

CONTROL Tx	3.3V TTL serial control interface
RESET	3.3V TTL, active low
OnePush AF	3.3V TTL, active low (FCB-SE600 only)

The camera serial control interface speed is selected by dip switch setting.

Power, Environment and optical Output

POWER:

Input voltage: 7V TO 12V DC regulated,
5V to 6V DC regulated must be used for FCB-SE600.

Power consumption for FCB-EV7500 and TL7070
Camera in 3G operation mode, 1080p59.94 video output (cam motors inactive)

- All TL7070 video outputs active, fiber, BNC and HDMI cables connected:	7.2W total (TL7070 4.3W)
- MCX, BNC and HDMI outputs disabled, cables disconnected:	6.1W total (TL7070 3.2W)

Power consumption value conditions:
Power input 12V DC
Ambient temperature +25°C/77°F
Humidity 30%

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%

OPTICAL OUTPUT (SFP module Viita RM3-S1-4103K-T or equivalent):

For single mode fibre (9/125), LC connector, wavelength = 1310nm, range = 10km
Optical output power -5dBm typical

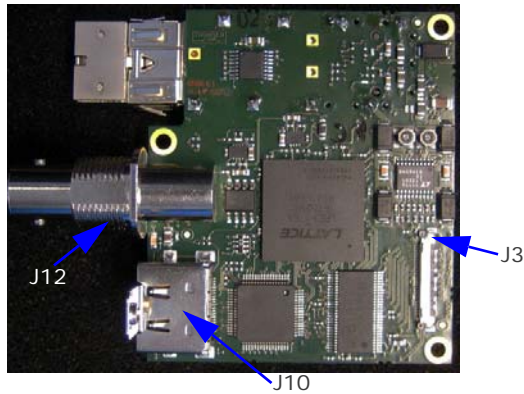
SAFETY NOTES:

FFC with contacts on SAME side **MUST** be used when connecting J4 of TL7070 to the camera.

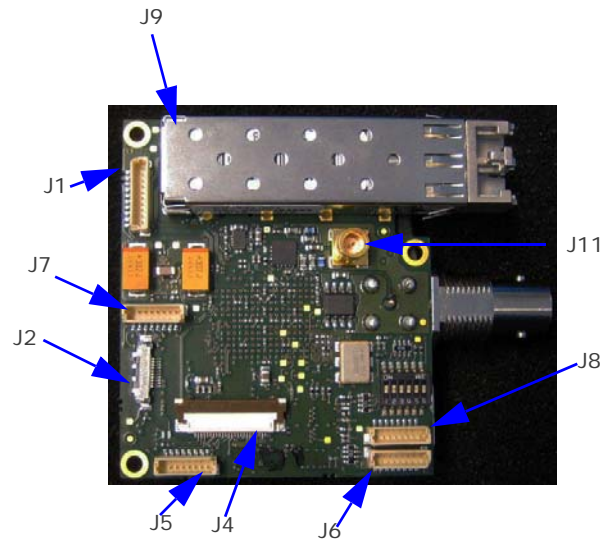
All digital inputs are specified for maximum voltages of 3.3V (+5%).

Onboard Connectors

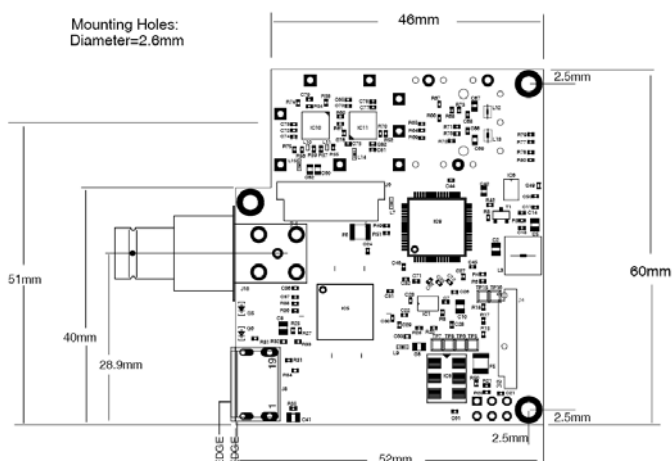
PCB Top Side:



PCB Bottom Side:



Board Mechanical



Maximum bottom component height = 11.0mm (SFP cage)
 Maximum top component height = 11.0mm (BNC connector)
 PCB thickness = 1.5mm

SAFETY NOTES:

FFC with contacts on SAME side MUST be used when connecting J4 of TL7070 to the camera.

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

Pin Assignment of Onboard Connectors

J10 HDMI output connector type is HDMR Samtec No. 19-02-F-SM

J1 JST BM10B-SSRS-TB

Power and Control IF

- 1 DC IN
- 2 DC IN
- 3 GND
- 4 GND
- 5 Reset / Shut Down, pull to GND to reset/shut down TL7070 and camera*
- 6 GND
- 7 TXD_TTL (serial IF transmit, 3.3V)
- 8 RXD_TTL (serial IF receive, 3.3V)
- 9 RXD_232 (serial IF receive, RS232 level)
- 10 TXD_232 (serial IF transmit, RS232 level)

Only one serial IF should be connected, not both simultaneously

J5 JST BM08B-SSRS-TB, analog YPbPr video direct from camera

Analog component YPbPr and CVBS output

- 1 Pr
- 2 GND
- 3 Pb
- 4 GND
- 5 Y
- 6 GND
- 7 CVBS
- 8 GND

J11 75 ohms MCX jack, 3G/HD-SDI output

J12 75 ohms BNC jack (CEI XBV1049-NAAY), 3G/HD-SDI output

J6, J7 reserved, do not connect

J8 JST BM08B-SSRS-TB

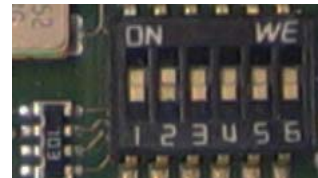
External control/reset

- 1 AF trigger for FCB-SE600 (has 10kohms pullup)
- 2 SPARE (reserved)
- 3 SPARE (reserved)
- 4 SPARE (reserved)
- 5 SPARE (reserved)
- 6 SPARE (reserved)
- 7 RESET EXTERNAL (has 10kohms pullup)
- 8 GND

J9 SFP Compatible Optical Transmitter

Operation Mode Setting

The TL7070 operation mode is selected by dip switch (T1).



Switch	Function
1-2	CAMERA SERIAL IF SPEED OFF-OFF = 9600 Baud ON-OFF = 19200 Baud OFF-ON = 38400 Baud ON-ON = 115200 Baud
3	FOR FACTORY USE ONLY Keep OFF at all times
4	RESERVED Keep OFF at all times
5	RESERVED Keep OFF at all times
6	COAX/HDMI OUTPUT STATE OFF = Outputs active ON = Outputs disabled

Sony factory defaults for camera serial IF speed:

SE600 and all EH/EV models: 9600 Baud

Operation with FCB-SE600

SAFETY NOTE:

External power Supply Voltage must be 6V DC maximum.

External Keys for Zoom and Focus control

Contact Aivion for further information.

One Push Auto Focus operation

Pull pin 1 of connector J8 to GND (OV) to trigger auto focus operation. Keep it open or pull to 3.3V with a resistor of 10kohms or higher for idle state.

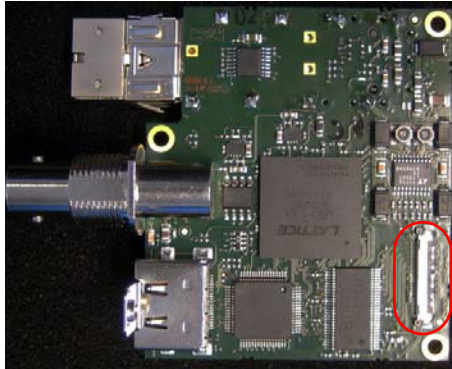
*for reset, pull to GND for one second or longer

SAFETY NOTES: FFC with contacts on SAME side MUST be used when connecting J4 of TL7070 to the camera. All digital inputs are specified for maximum voltages of 3.3V (+5%).

Connection Diagram for FCB-EH, -EV and -SE600 Camera Blocks

TL7070 top side

FCB-EH / FCB-EV / FCB-SE600

**SAFETY NOTE:**

Power Supply Voltage is 6V DC maximum for FCB-SE600 operation.

SAFETY NOTES: FFC with contacts on SAME side MUST be used when connecting J4 of TL7070 to the camera. All digital inputs are specified for maximum voltages of 3.3V (+5%).

Video Standard Selection Tables for FCB-EH and FCB-EV Solutions

Camera model and video standard provided by the camera are automatically detected by TL7070.



Camera Setting	TL7070 output format	Camera Support EH	Camera Support EV
1080p / 50Hz	1080p / 50Hz	-	FCB-EV7500/7310/7300/7100
1080p / 59.94Hz	1080p / 59.94Hz	-	FCB-EV7500/7310/7300/7100
1080p / 60Hz	1080p / 60Hz	-	FCB-EV7500/7310/7300/7100
1080i / 50Hz	1080i / 50Hz	FCB-EH6500/6300(4300)	FCB-EV7500/7310/7300/7100
1080i / 59.94Hz	1080i / 59.94Hz	FCB-EH6500/6300(4300)	FCB-EV7500/7310/7300/7100
1080i / 60Hz	1080i / 60Hz	FCB-EH6500/6300(4300)	FCB-EV7500/7310/7300/7100
1080p / 25Hz	1080p / 25Hz	FCB-EH6500/6300(4300)	FCB-EV7500/7310/7300/7100
1080p / 29.97Hz	1080p / 29.97Hz	FCB-EH6500/6300(4300)	FCB-EV7500/7310/7300/7100
1080p / 30Hz	1080p / 30Hz	FCB-EH6500/6300(4300)	FCB-EV7500/7310/7300/7100
720p / 50Hz	720p / 50Hz	all FCB-EH	all FCB-EV
720p / 59.94Hz	720p / 59.94Hz	all FCB-EH	all FCB-EV
720p / 60Hz	720p / 60Hz	all FCB-EH	all FCB-EV
720p / 25Hz	720p / 25Hz	all FCB-EH	all FCB-EV
720p / 29.97Hz	720p / 29.97Hz	all FCB-EH	all FCB-EV
720p / 30Hz	720p / 30Hz	all FCB-EH	all FCB-EV

Table 1: Video output matrix for TL7070 with FCB-EH and FCB-EV

Note: Refer to Sony FCB-EV or FCB-EH manuals on camera operation and setting adjustments

Camera Monitoring Mode Setting	Camera Register[74] Value (LVDS Mode)
1080p / 59.94Hz or 50Hz	01
All others modes	00

Table 2: Required Camera Register[74] Settings for 1080p59.94Hz, 1080p50Hz and 1080p60Hz operation

SAFETY NOTES: FFC with contacts on SAME side MUST be used when connecting J4 of TL7070 to the camera. All digital inputs are specified for maximum voltages of 3.3V (+5%).

Video Standard Selection Tables for FCB-SE600

Camera model and video standard provided by the camera are automatically detected by TL7070.



Camera Setting	TL7070 output format
1080i / 50Hz	1080i / 50Hz
1080i / 60Hz	1080i / 60Hz
1080p / 25Hz	1080p / 25Hz
1080p / 30Hz	1080p / 30Hz
720p / 50Hz	720p / 50Hz
720p / 60Hz	720p / 60Hz
720p / 25Hz	720p / 25Hz
720p / 30Hz	720p / 30Hz

SAFETY NOTE:

External Power Supply Voltage is 6V DC maximum for FCB-SE600

Table 4: Video output matrix for TL7070 with FCB-SE600

Note: Refer to Sony FCB-SE600 manual on camera operation and setting adjustments

SAFETY NOTES: FFC with contacts on SAME side MUST be used when connecting J4 of TL7070 to the camera. All digital inputs are specified for maximum voltages of 3.3V (+5%).

Analog Video Output

TL7070 provides analog HDTV YPbPr and analog SDTV CVBS video output signals. These signals are directly taken from the camera. **The signal availability in different modes depends on the capabilities of the camera model used.**

In some camera modes no or only limited analog video output might be available. Please refer to the related camera documentation provided by Sony.

For using analog video output from FCB-EV and FCB-EH series cameras, 24pin FFC must be also connected.

Reset/Power Down

When applying power to TL7070, the camera is also automatically powered. During power up all functions on TL7070 are reset and initialized.

During operation a manual reset can be applied by pulling pin no. 7 of connector J8 to 0V (GND). This resets also the camera. Alternatively a manual system reset can be applied by pulling pin no. 5 of connector J1 to 0V (GND). This resets all onboard circuits including the camera. System reset can be used to switch TL7070 in power down mode.

Camera Control

Camera control can be done by connecting a PC or CCU via RS232 or serial 3.3V TTL interface to TL7070. The interface is passed through to the camera that all VISCA protocol based software can be used.

Serial interface selection is done automatically. Note: Connect only one serial IF line at a time, RS232 or 3.3V TTL, not both.

Cable Kit Contents

TL7070CK-EH, Cable kit for FCB-EH, FCB-EV and FCB-SE600 solutions:

External connecting cables:

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

1 pcs. - 8pin flying leads cable for analog video (ext. control for FCB-SE600), lead length = 15cm / 5.9inch

1 pcs. - 8pin flying leads cable for external control, lead length = 15cm / 5.9inch

Camera connecting cables:

1 pcs. - 30pin KEL USL type micro coaxial cable, connector on both sides, length = 20cm / 7.86inch

1 pcs. - 24pin flat flex cable, contacts on same side, pitch = 0.5mm, length = 10cm / 3.9inch

SAFETY NOTES: FFC with contacts on SAME side MUST be used when connecting J4 of TL7070 to the camera. All digital inputs are specified for maximum voltages of 3.3V (+5%).