THUNDER LINK

3G fiber

TL7075/76
Optical 3Gbit/s Link solution
## with full duplex Communication Channel

Thunderlink TL7075/7076 video modules provide a compact and flexible optical fiber based 3G/HD-SDI transmission solution. TL7075 connects to any Sony FCB-EV, FCB-EH or FCB-SE block camera module and acts as an optical transmitter. TL7076 is an optical receiver unit and provides copper based 3G/HD-SDI and full HD HDMI outputs. A camera controller unit (CCU) can be connected to TL7076 via a serial RS232 based interface. Full duplex communication between CCU and camera is provided by using bidirectional optical fiber technology. This allows transmitting digital video from any camera over long distances with having camera remote control available over the same optical fiber cable.

TL7075 - Features

+ **Supports all Sony FCB-EV, all FCB-EH and FCB-SE600 camera models**

+ **Digital LVDS video input from camera**

+ **Optical 3G/HD-SDI output compliant to SMPTE297M-2006**

+ **SFP transceiver λ_{TX}=1310nm, SMF/LC included**

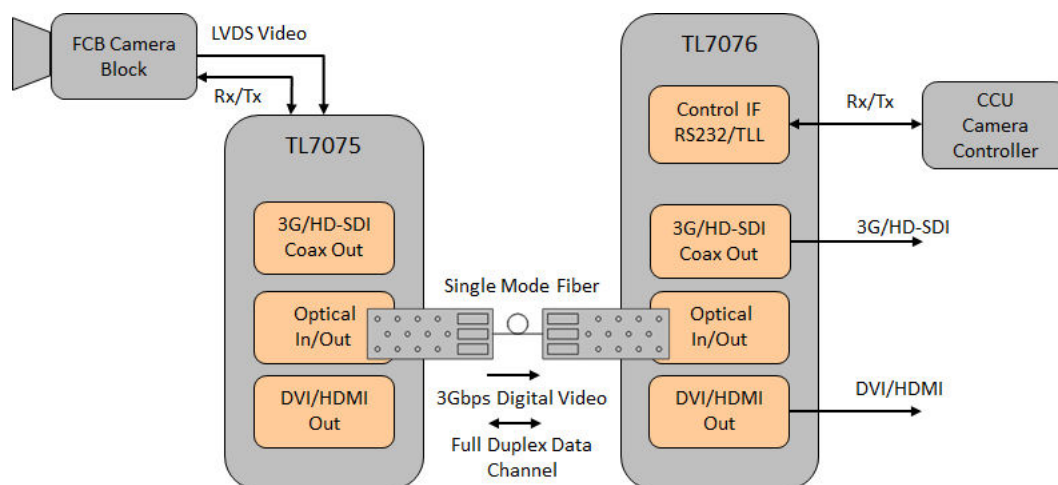+ **Local BNC coax, MCX coax and DVI (HDMI connector) 3G/HD-SDI outputs**
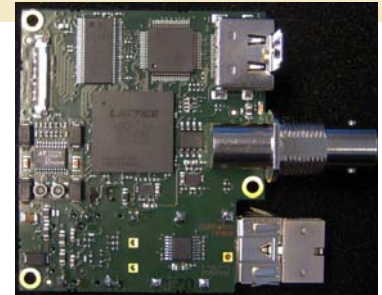
TL7076 - Features

+ **Optical receiver compliant to SMPTE297M-2006 serial optical 3G/HD video standard**

+ **Automatic video standard detection**

+ **Input signal jitter removal**

+ **SFP transceiver λ_{TX}=1550nm, SMF/LC included**

+ **Reclocked 3G/HD-SDI BNC + MCX coax outputs, format conversion for DVI(HDMI) RGB output**

+ **Dual serial control interface (RS232 or 3.3V TTL)**

+ **Supply voltage: 7V to 12V DC regulated (6V DC maximum with FCB-SE600)**

Note:

+ All encoded SDI signals are compliant to SMPTE425M/424M/292M/274M/296M standards

TL7075/7076 System Diagram

WARNING Class 1 Laser Product

This datasheet is valid for all CV8461A Revision Boards.
A1_DS_TL7075_76_V.2.4.0.fm , 23 Apr. 2016

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Specification Camera Interface

INPUTS:

DATA   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
OnePush AF   3.3V TTL, active low (FCB-SE600 only)

Note: Camera serial IF speed MUST be set to 9600 Baud (Sony factory default).

Power, Environment and optical Output

POWER:

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

TL7075:
Power consumption when operated with FCB-EV7500
Camera in 1080p59.94 operation mode (cam motors inactive)
- All local video outputs active, fiber, BNC and HDMI cables connected: P_D = 7.5W total (TL7075 P_D = 4.6W)
- MCX, BNC and HDMI outputs disabled, cables disconnected: P_D = 6.4W total (TL7075 P_D = 3.5W)

TL7076:
- TL7076 in 3G operation mode, video standard 1080p59.94
- BNC and HDMI cables connected P_D = 4.3W

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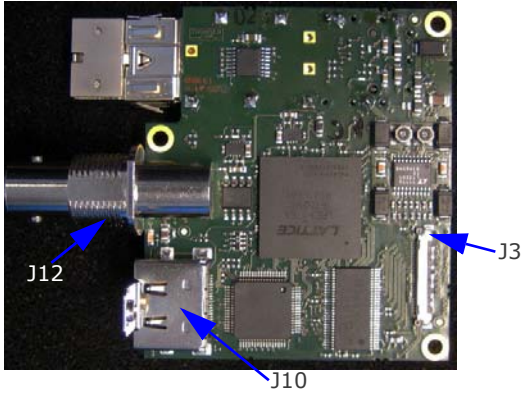Temperature (min/max): -20°C/+60°C = -4°F/140°F
Humidity: 20%-80%

OPTICAL OUTPUT (SFP bidirectional modules) on TL7075:
For single mode fibre (9/125), LC connector, range = 10km
Optical output power -5dBm typical
On TL7075: Transmit wavelength = 1310nm
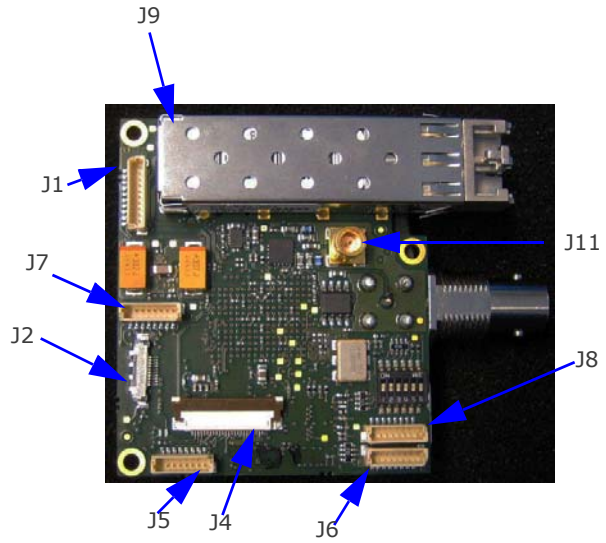On TL7076: Transmit wavelength = 1550nm

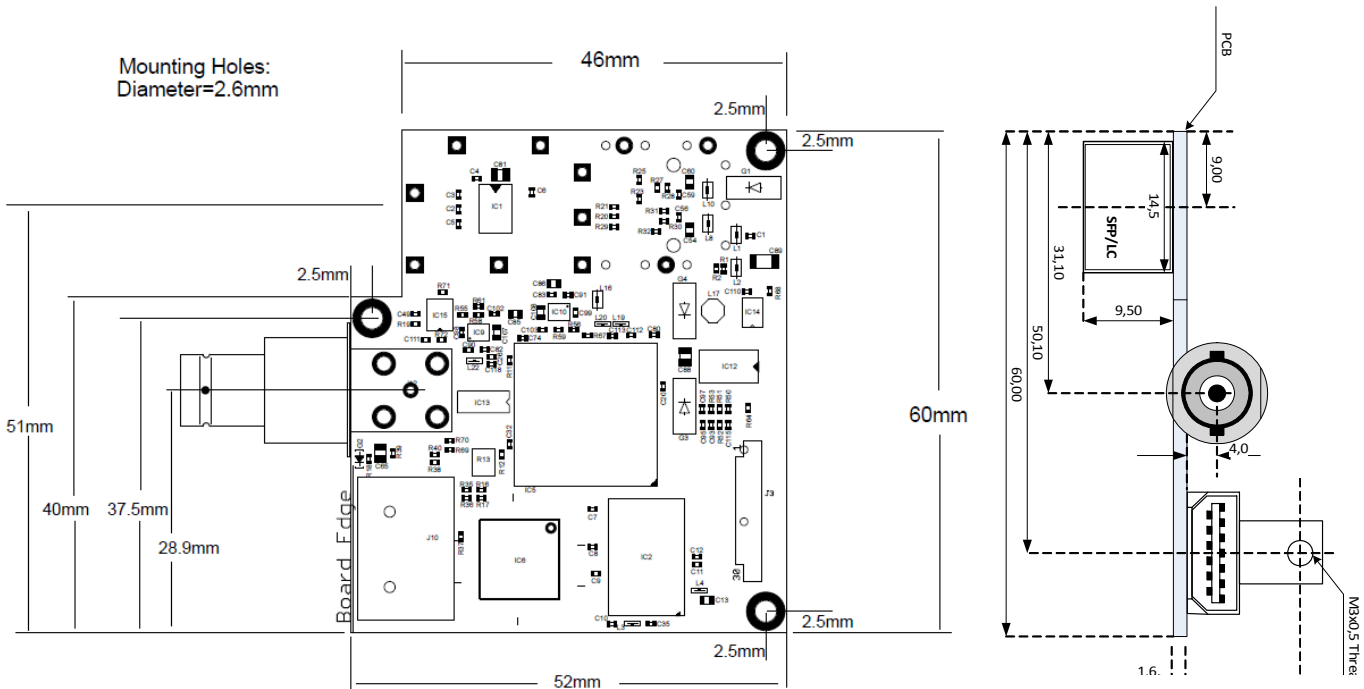**SAFETY NOTES:** All digital inputs are specified for maximum voltages of 3.3V (+5%).

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Onboard Connectors

PCB Top Side:

PCB Bottom Side:

Board Mechanical

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

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Pin Assignment of Onboard Connectors

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 TL7075 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)

J3   30pin Micro Coaxial connector, LVDS video input from camera

J9   SFP Compatible Optical bidirectional Transceiver, LC connector

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

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

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

J2, J4, J5, J6, J7, J8 reserved, do not connect

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

Notes:

a) Do not connect Pins 7 to 10 on TL7075 as camera control is done by a CCU connected to TL7076 over optical fiber link.

b) Connect TTL IF (Pins 7 and 8) or RS232 IF (Pins 9 and 10) on TL7076, not both simultaneously.

c) Keep J3 unconnected on TL7076

Configuration Switch

Configuration is done by adjusting any of the six slider DIL switches.
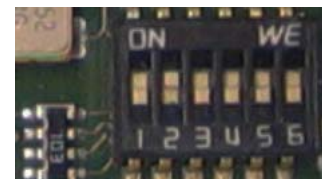
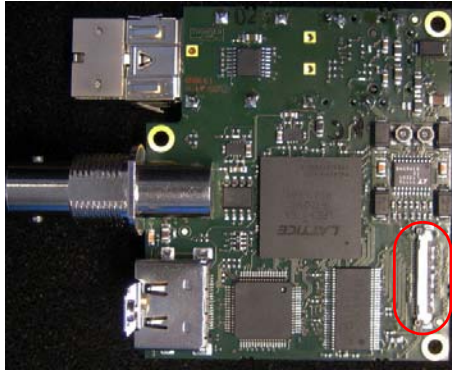| Switch	Function TL7075	Function TL7076
1-2	**RESERVED** Keep OFF at all times	**RESERVED** Keep OFF at all times
3	**FOR FACTORY USE ONLY** **Keep OFF** at all times	**FOR FACTORY USE ONLY** **Keep ON** at all times
4	**RESERVED** Keep OFF at all times	**RESERVED** Keep OFF at all times
5	**RESERVED** Keep OFF at all times	**RESERVED** Keep OFF at all times
6	**LOCAL COAX/HDMI OUTPUTS** OFF = Outputs active ON = Outputs disabled	**RESERVED** Keep OFF at all times

Note: Camera serial IF speed MUST be set to 9600 Baud (Sony factory default).

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

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

TL7075 top side

FCB-EH / FCB-EV / FCB-SE600

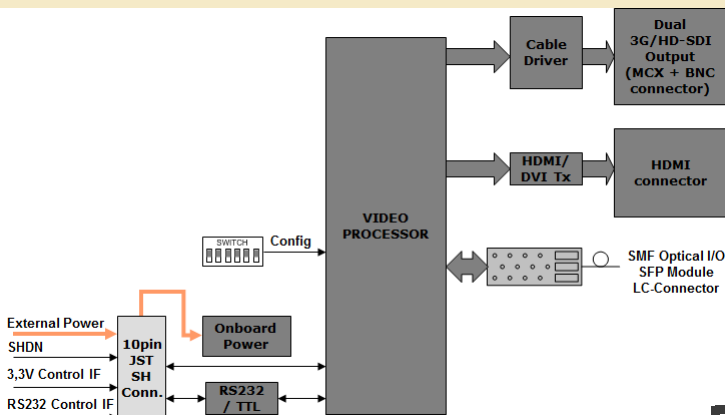**30pin micro coax cable**

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

Block Diagram TL7075
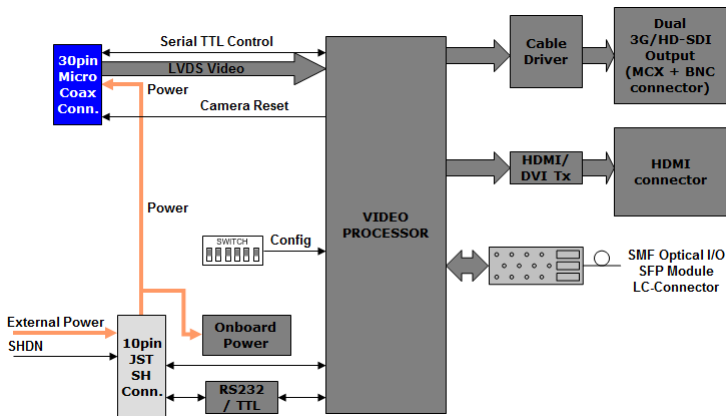
Block Diagram TL7076

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

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

Camera model and video standard provided by the camera are automatically detected by TL7075.

Camera Setting	TL7070 output format	Camera Support EH	Camera Support EV
1080p / 50Hz	1080p / 50Hz	-	FCB-EV75xx/73xx/7100
1080p / 59.94Hz	1080p / 59.94Hz	-	FCB-EV75xx/73xx/7100
1080p / 60Hz	1080p / 60Hz	-	FCB-EV75xx/73xx/7100
1080i / 50Hz	1080i / 50Hz	FCB-EH6500/6300(4300)	FCB-EV75xx/73xx/7100
1080i / 59.94Hz	1080i / 59.94Hz	FCB-EH6500/6300(4300)	FCB-EV75xx/73xx/7100
1080i / 60Hz	1080i / 60Hz	FCB-EH6500/6300(4300)	FCB-EV75xx/73xx/7100
1080p / 25Hz	1080p / 25Hz	FCB-EH6500/6300(4300)	FCB-EV75xx/73xx/7100
1080p / 29.97Hz	1080p / 29.97Hz	FCB-EH6500/6300(4300)	FCB-EV75xx/73xx/7100
1080p / 30Hz	1080p / 30Hz	FCB-EH6500/6300(4300)	FCB-EV75xx/73xx/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 TL7075 with FCB-EH and FCB-EV

Notes:
- Refer to Sony FCB-EV or FCB-EH manuals on camera operation and setting adjustments
- Changing the video output standard of the camera requires that TL7075 gets a power off/on cycle.

Camera Monitoring Mode Setting	Camera Register[74] Value (LVDS Mode)
1080p / 60Hz, 59.94Hz, 50Hz	01
All others modes	00

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

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Video Standard Selection Tables for FCB-SE600

Camera model and video standard provided by the camera are automatically detected by TL7075.

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

Table 4: Video output matrix for TL7075 with FCB-SE600

Notes:
- TL7075 external power supply voltage is 6V DC maximum when operated with FCB-SE600
- Refer to Sony FCB-SE600 manual on camera operation and setting adjustments
- Changing the video output standard of the camera requires that TL7075 gets a power off/on cycle.

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TL7075/TL7076 Link Power Up Sequence

Users can build easily single fiber bidirectional optical link systems by using any FCB-EV, FCB-EH or FCB-SE HD camera connected to a TL7075 plus a TL7076 unit as a receiver.

For correct and proper initialization, TL7075 must be powered up before or at the same time as TL7076. Camera power up is controlled by TL7075. During power up all required circuits are initialized.

TL7076 can be powered up together with TL7075 or at any later time. It checks for an optical input signal to be present and adjusts all required settings automatically.

It is possible to connect serial communication channels of more than one optical link system in a daisy chain configuration to allow control of all cameras over one serial communication link. Sony's VISCA control protocol supports daisy chaining up to seven cameras by using individual camera addresses.

In case of using more than one system in a daisy chain configuration, it is strongly recommended to power up all TL7075 units at once. Since initialization of each TL7075 can take slightly different amounts of time, it is recommended to power up all TL7076 units 5 seconds or more after power up of the TL7075 units. All TL7076 units should be also powered up together.

The camera controller unit is required to initialize a daisy chain by specific commands. Refer to Sony VISCA protocol specification for more information.

Please contact Aivion technical support (techsupport@aivion.com) for further information on daisy chain configurations.

Camera Control

Camera control can be done by connecting a PC or CCU via RS232 or serial 3.3V TTL interface to TL7076. Control data is passed through to the camera over optical fiber cable, camera response data is received over the same fiber cable.

Serial interface selection is done automatically. Note: Connect only one serial IF line at a time to TL7076, RS232 or 3.3V TTL, not both.

Note: Camera serial IF speed must be set to 9600 Baud (Sony factory default).

Cable Kit Contents

TLCK-B, base cable kit for TL7075:

External connecting cables:

1 pcs. - 10pin flying leads cable for power and 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

TLCK-B7076, cable kit for TL7076:

External connecting cables:

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

Order Codes

TL7075, camera interface with optical video transmitter

TL7076, optical video receiver and converter unit

Included:

TLCK-B, Base Cable Kit for TL7075

TLCK-B7076, CableKit for TL7076

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