INNOVA

Innova LINK series
Analogue Video Board
USER MANUAL

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1 General

1.1 Scope of document

This document provides detailed information required for system integration of the INNOVA analogue video boards. These boards are part of the Innova LINK series of products for transfer of electrical signals over optic fibre. The information aims to provide a clear understanding of the features of the device as well as the operation limits and interface requirements.

1.2 Definitions

1.2.1 Abbreviations

ESD	Electro Static Discharge
PCB	Printed Circuit Board
MUX	Multiplexer
SFP	Small Form-factor Pluggable (electrical to optical converter module)
WDM	Wave Division Multiplexing
CWDM	Coarse Wave Division Multiplexing

1.3 ESD precautions

The unit contains components that are sensitive to the high voltages that can be generated by the human body due to static charges. To prevent ESD damage, the unit should be stored in anti static packing and be handled in an environment protected from static electricity. Use grounded wrist band while handling the unit.

2 General description

The analogue video boards are members of the Innova LINK family of products for providing an optical link to a remote video system including serial communication via RS232 / RS422 / RS485. The units are designed to transfer analogue video signal such as PAL or NTSC. By the use of expansion board(s) the transfer of serial data is accomplished. The transmission line consists of 2 boards. At the signal source end, the input board which is connected to the analogue video source (camera) and converts this to an optical signal. At the receiver end the output board converts the optical signal back to an electrical analogue video signal. The serial lines are bi-directional. The picture below shows the 2 boards.

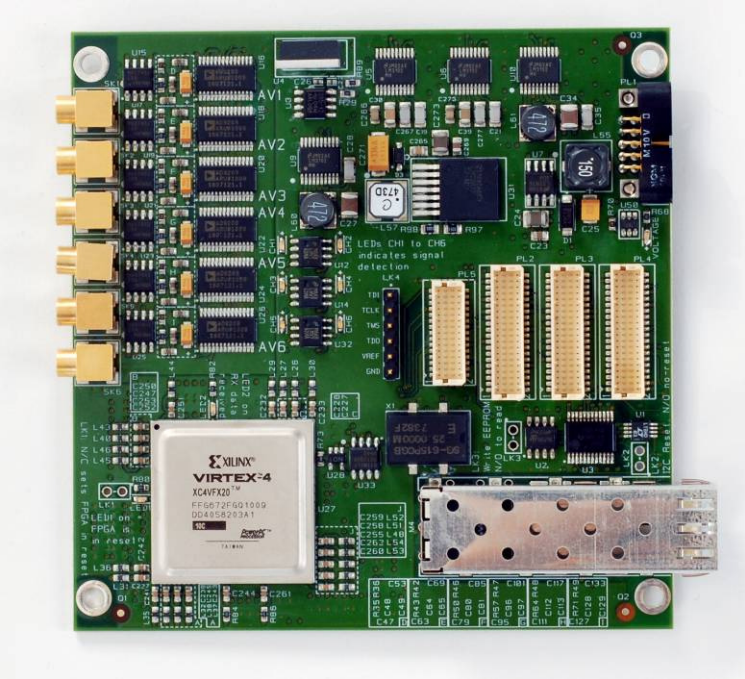

Figure 1, analogue video input board.

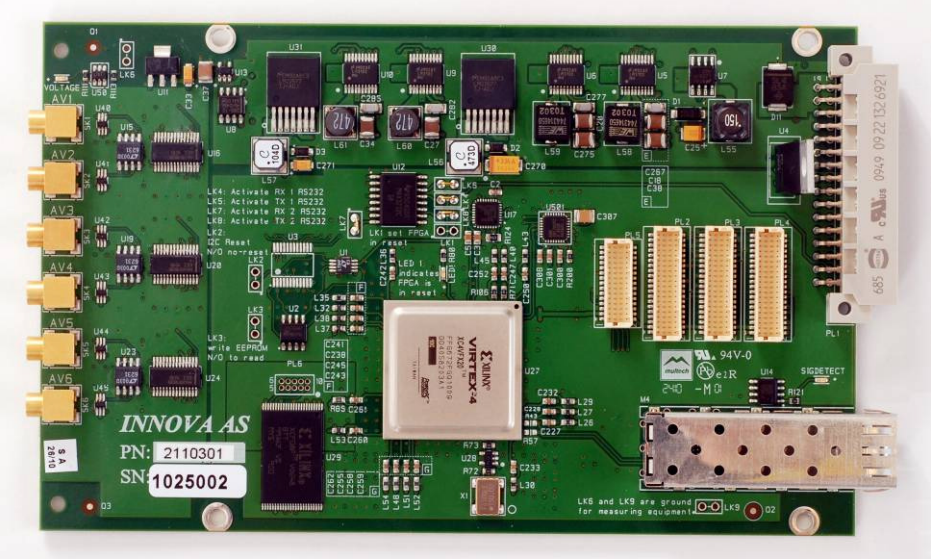

Figure 2, analogue video output board.

Each board has 6 video channels on board, by the use of an expansion board a further 2 channels are included. A total of up to 8 analogue video signals can be handled by a pair of boards. Up to 3 serial expansion boards can be used, each board has 12 bidirectional serial lines. 2 optical fibres (one in each direction) or 2 wavelengths in a WDM system are required for each set of analogue video boards.

3 Features

Power supply: 6 - 12VDC

6 on board analogue video channels

Additional 2 analogue channels by use of an expansion board

Up to 3 serial expansion boards (each board has 12 channels)

Diagnostics interface

Size of input board: 100 * 100 mm

Size of output board: 100 * 160 mm (Euro card)

4 Functional description

4.1 General

The units are designed to transfer analogue video signals and serial lines. The analogue video transmission line consists of 2 boards. At one end the input boards is connected to the analogue video source and converts this to an optical signal. At the other end the output board converts the optical signal back to an electrical analogue video signal.

The analogue video signals are sampled and transferred digitally over the optical fibre. To prevent possible ground loops in subsea applications the analogue video signal is AC coupled at the input board. Both the centre conductor and screen are connected through capacitors. Because of this it is important to ensure the same reference voltage level between the analogue video board and the video sources (cameras) by using the same 0V on the power supplies to both the board and the camera power supply.

As the video signal is AC coupled, the absolute voltage levels are lost. A video signal conditioner circuit with AGC and black level clamp is used to restore the video signal levels before sampling.

In principle any AC analogue signal within the bandwidth and voltage levels of an analogue video signal can be transferred. But in order to do this the video signal conditioner circuit must be bypassed. Please contact Innova if it is desirable to transfer other signals than video.

The sampled analogue video signals are multiplexed together with the serial lines and transferred over 1 optic fibre link. Up to 8 video signals and 32 serial lines can be multiplexed by the input analogue video board and de-multiplexed by the output board. Only the serial lines are multiplexed and sent the other way.

The units utilise standard SFP's for the fibre optic interface. This allows for easy customisation of the fibre optic link characteristics, including wavelengths and optic budget. Single mode fibre is typically used with these boards. Multi mode fibre can also be supported, but at drastically reduced optical distance (typically less than 1 km).

4.1.1 SFP's

SFP's are bi-directional devices and care must be taken to ensure the correct optical port (Rx or Tx) is used. See the figure below for the physical outline of an SFP.

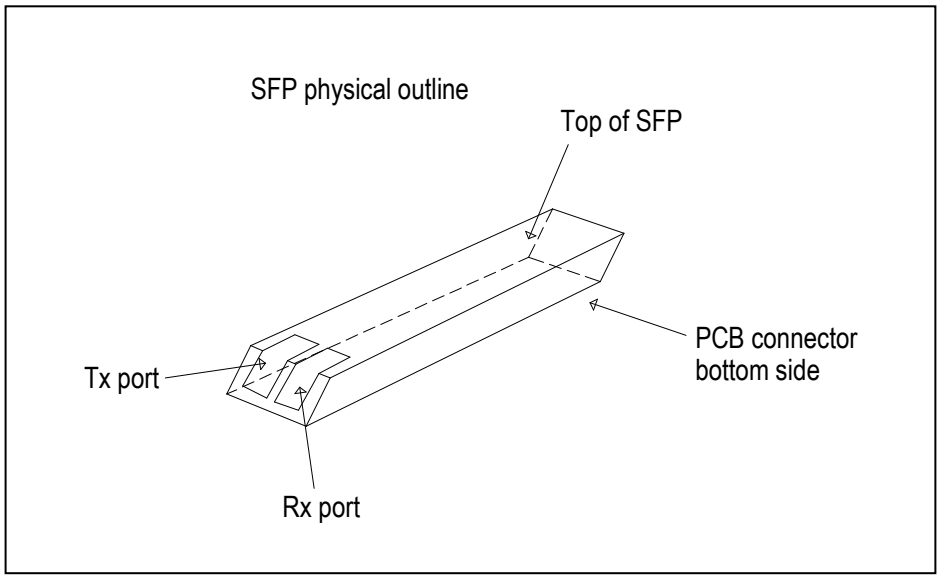

Figure 3, SFP layout.

4.1.2 Diagnostics

2 diagnostic serial ports are available on the back plane connector on the output board. These are RS232 and one provides diagnostics information for the input board and the other for the output board. The diagnostic information from the input board is sent on a dedicated serial line, it does not use any of the 36 channels externally available serial lines.

In a larger system including other boards in the Innova LINK family, the analogue video board will also collect diagnostics information from the other boards provided proper connections are made at the back plane connectors. Diagnostics data from the other boards are read via I^2C bus. The back plane connections connect the I^2C bus and provide addressing for the boards.

The diagnostics data contains information about the board (PN, SN, HW and SW revisions) as well as SFP data for all the boards connected to the analogue video board.

5 Connections

5.1 Connectors

5.1.1 Input board

Mother board	Nicomatic 222S10M16
Video inputs	Radiall MCX
Video expansion board	Hirose DF20A-30DS-1C
Serial expansion board	Hirose DF20A-40DS-1C
Optic output (from SFP)	LC

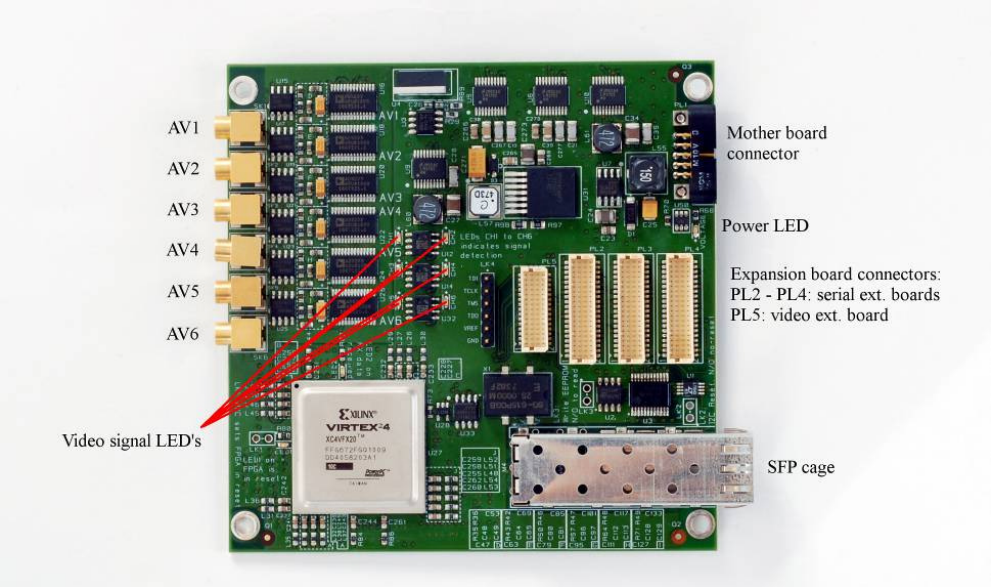

Figure 4, Input board layout.

5.1.2 Output board

Mother board	DIN B/2
Video output	Radiall MCX
Video expansion board	Hirose DF20A-30DS-1C
Serial expansion board	Hirose DF20A-40DS-1C
Optic input (to SFP)	LC

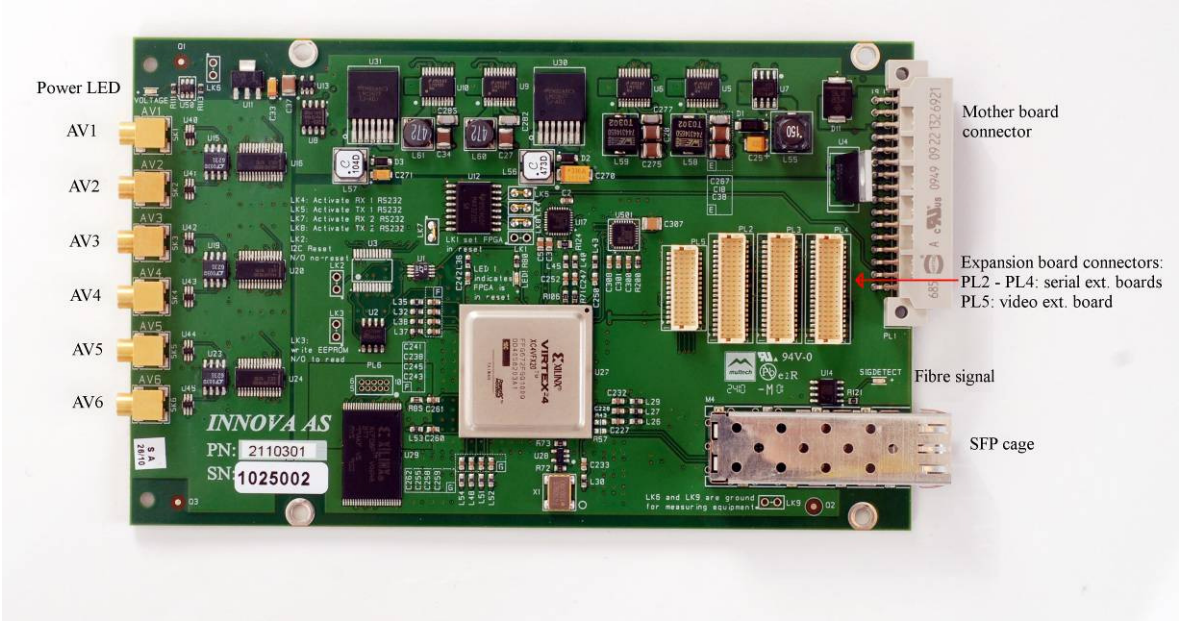

Figure 5, Output board layout.

5.2 LED's

The input board has LED's indicating power and video signal present for each channel.

The output board has LED's indicating power and fibre link connected.

5.3 Power

The unit requires 6 - 12VDC power connected via the mother board connector.

5.4 Diagnostics

The diagnostics RS232 lines are available on the output board back plane connector, PL1.

5.5 Expansion boards

The 2 channel video expansion board is connected to the analogue video board on PL5.

The serial expansion boards are connected to the analogue video board on PL2, PL3 or PL4. Any of these 3 connectors can be used, but one must use the same connector at both input and output board. The serial expansion boards only convert the signal levels between the logic levels used by the analogue video board and RS232 / RS422 / RS485 signal levels. If desirable it is possible to use a different type of expansion boards at each end to convert between signal types.

5.6 Summary of connector pin configurations

5.6.1 Back plane connections

In a system with several boards it is natural to use the back plane (mother boards) to connect power to the boards. This also connects the diagnostics I^2C bus between the boards and provides addressing of the boards. But in a system with a single board or very few boards the preferred solution may be to wire up power etc. to the board(s) directly without the back plane. The pin out of the back plane connectors are given in the tables below.

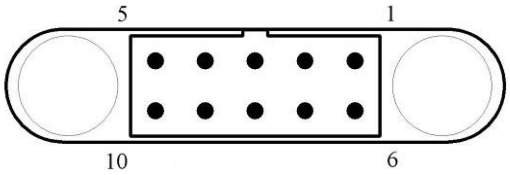

Figure 6, Input board back plane connector pin configuration.

Input board, back plane connector	
Pin #	**Function**
1	0V
2	0V
3	A0
4	A1
5	A2
6	SCL
7	SDA
8	3V3
9	Vin (power supply)
10	Vin (power supply)

Output board, back plane connector	
Pin #	**Function**
a1	0V
a2	0V
a3	0V
a4	0V
a5	0V
a6	0V
a7	NC
a8	NC
a9	Diagnostics 1, RS232 Rx
a10	Diagnostics 1, RS232 Tx
a11	Diagnostics 2, RS232 Rx
a12	Diagnostics 2, RS232 Tx
a13	NC

a14	RST
a15	SCL
a16	SDA
b1	Vin (power supply)
b2	Vin (power supply)
b3	3V3
b4	3V3
b5	3V3 SFP
b6	3V3 SFP
b7	NC
b8	NC
b9	NC
b10	NC
b11	NC
b12	NC
b13	MUXRST
b14	A0
b15	A1
b16	A2

When building up a LINK system including other types of LINK family boards than analogue video boards and access to diagnostics information is desired the boards I^2C bus and address pins must be properly connected via the back plane connector. When using the back plane this is taken care of, but if the back plane connections are wired directly make sure to include the diagnostics wiring.

The I^2C pins that need connection is the SCL (serial clock) and SDA (serial data). The SDA pins from all the boards must be connected together. Similarly, all the SDA pins from all the boards must be connected together.

Addressing is done with the A0, A1 and A2 pins. These have internal pull down resistors on the boards, the address bits are set by connecting the addressing pins to 3.3V (pin 8 on the input boards and pins b3 & b4 on the output boards). The addressing is binary with A2 most significant, 8 different addresses are possible. Leaving all address pins open gives address 0, normally used by the AV board. Connecting A0 and A2 to 3.3V gives address 5 and so on.

The actual address for each board is not important as the analogue video board will scan through all possible addresses to determine which boards are connected. But all the boards with its diagnostics bus connected must have a different address.

5.6.2 Signal connections

All video signal connections are via Radiall MCX connectors.

6 Physical layout

The units must be mounted inside a suitable enclosure to protect it against dust and moisture. To comply with EMC regulation a metal enclosure will be required and suitable filtering of power and signals must be applied.

6.1 Input board

Size	100x100x27mm (LxWxH).
Mounting	By 4 holes for M3 bolts, 1 in each corner 3.5mm from the edges with the connections and 5.5mm from the 2 other edges.
Housing	None

6.2 Output board

Size	160x100x24mm (LxWxH).
Mounting	Rail mounting in DIN sub-rack.
Housing	None

7 Configuration instructions

There are no user configurations on these boards.

8 Specifications

Power supply voltage: 6 - 12 VDC

Video bandwidth: 6MHz

Video voltage levels: 0 - 1 V

Video quantisation: 10 bit

Maximum number of video channels (with expansion board): 8

Maximum serial data speed: 115 kbps

Maximum number of serial channels (with expansion boards): 36

Data rate between boards over the optic link (both ways): 1.5 Gbps

Current consumption will vary slightly with working conditions and SFP type used. Current consumption of any extension boards come in addition. The figures below give typical idle current consumption @ 12V with 26dB SFP:

Current consumption input board: 530mA

Current consumption output board: 750mA

9 Appendix 1, PN numbers including related products

Description	PN
LINK Motherboard Input	2100101
LINK Motherboard connector Input	2101101
LINK Motherboard Output	2100301
AV 6 ch Input	2110101
Ext 2 ch AV Input	2111101
Ext 12 ch RS232 Input	2112101
Ext 12 ch RS-422/485 FD Input	2113101
Ext 12 ch RS-422/485 HD Input	2114101
AV 6 ch PR Input	2110201
Ext 2 ch AV PR Input	2111201
Ext 12 ch RS232 PR Input	2112201
Ext 12 ch RS-422/485 FD PR Input	2113201
Ext 12 ch RS-422/485 HD PR Input	2114201
AV 6 ch Output	2110301
Ext 2 ch AV Output	2111301
Ext 12 ch RS232 Output	2112301
Ext 12 ch RS-422/485 FD Output	2113301
Ext 12 ch RS-422/485 HD Output	2114301
DV HD-SDI 4 ch Input	2120101
DV HD-SDI 4 ch PR Input	2120201
DV HD-SDI 4 ch Output	2120301
Ethernet Base-T 4 ch Input	2130101
Ethernet Base-T 4 ch PR Input	2130201
Ethernet Base-T 4 ch Ouput	2130301
PECL Bi-dir 2ch Input	2140101
PECL, Bi-dir 2ch PR Input	2140201
PECL Bi-dir 2ch Output	2140301