Video Accessory Corporation

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SDI
H264 Encoder
Video Modifier

2 Channel SDI H264 Encoder/Video Modifier 90-111-202

This product has two SDI inputs with active loop-thru outputs and an additional two SDI outputs from the FPGA. It also has two audio inputs. The Encode can be used in two different modes:

Single Channel Low/High Rate Encoder

This mode performs H264 encoding on a single video signal. The product will encode the video into a low bite rate TS and a high bit rate TS at the same time. The video signal can be from either SDI input or a combination of the two (picture-in-picture). The product can also scale (up/down) the video signal before it is encoded. One of the additional SDI outputs can be used to output the modified video signal. The audio and meta data will also be encoded into the TS.

Two Channel Encoder

This mode performs H264 encoding on each of the two SDI inputs independently of each other. The video for each channel can be scaled (up/down) and the two additional video outputs can be used to output the modified video. The data rate for the two channels is independent from each other. The audio and meta data will also be encoded into the TS.

This product uses the new Brick form factor which includes an integrated heat sink and cooling blowers. The basic package is epoxy encapsulated electronics with an outer layer of conducting epoxy to form an outer EMI shield. The heat sink is bonded to the epoxy during the encapsulation process. Two small blowers provide air movement over the internal heat sink fins.

A USB port is provided for loading new code and also to provide access to the Maintenance Mode for system debug and access to customer accessible internal parameters. The USB port can also be used to connect to an LCD status monitor that displays the current state of each input (any active video) and the current routing matrix for the switch. The LCD display can be used to help with both overall system debug and software development.

Each of the SDI video Inputs also has stereo audio input. The audio can be either unbalanced or balanced. The audio input connectors are 6 pin Lemo 1B series mini snap connectors.

 The video connections are HD-BNC connectors. The power connector is a Lemo 1B series 3 pin mini snap connector.

The unit will operate correctly on 10-32 VDC (est. 8 watts). The internal switcher power supply provides isolated (from the input rails) power to the internal electronics. Four 6-32 mounting inserts are molded into the bottom of the unit to provide a means to mount the unit to a flat surface.

Figure 1 shows a block diagram of the encoder. The key component is the Altera 5ASXMB3E4F31C5N dual core ARM FPGA. This device provides the logic to modify the video streams and the dual core ARM provides the processing power to control the video logic and assemble the TS to include the video data, audio, and meta data. The video logic will be able to perform the following functions on either or both of the SDI inputs:

> Scale up or down
> Add overlays
> Alpha blending
> Picture-in-Picture
> Clipper

The FPGA also removes the meta data from the SDI bit streams and passes it to the ARM to be encoded into the TS.

The actual H264 encoding is performed with the Fujitsu MB86M05. There are two of these devices, one to encode a low bit rate TS and one to encode a high bit rate TS.

A separate uProcessor is used to perform the initial power-up tasks and load the FPGA.

Three LEDs provide status to the user. A Green LED indicates the unit has power, the uProcessor is running, and the code is operating normally. A Yellow LED indicates the unit has detected a thermal issue. Two thermal sensors monitor the temperature of the unit. A Red LED indicates the unit has a major problem and needs diagnostics performed on it to resolve the issue. The RJ45 has the standard LEDs to show connection status and activity.
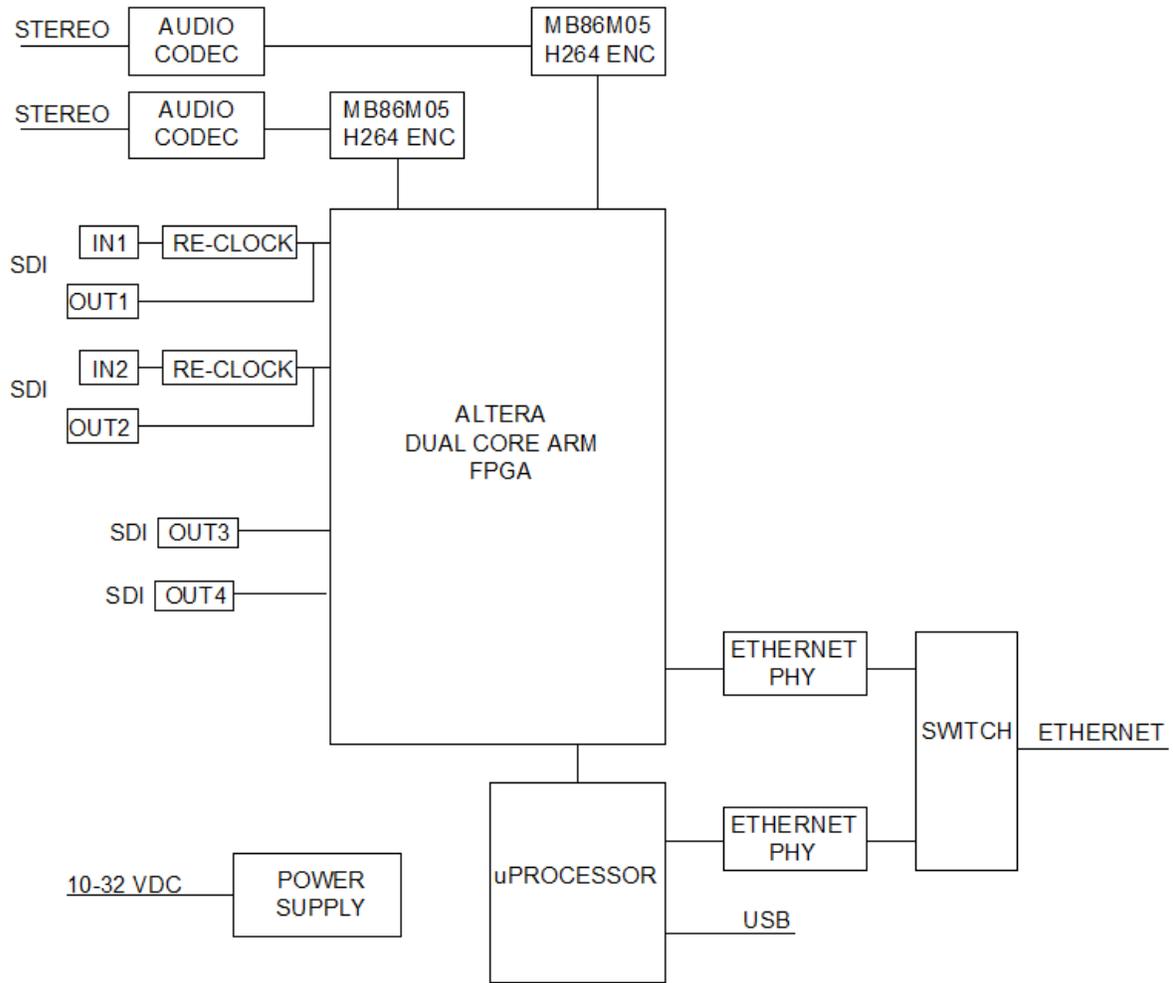
Figure 1 – H264 Encoder Block Diagram

Overall Specifications

Video Formats: SMPTE 292M   (1.48Gbit/s) (up to 1080P/30)
                                         SMPTE 259M   (270/360Mbit/s)

Video Input Connectors   HD-BNC

Video Input Termination   75 Ohms

Audio Input Connectors: 6 pin Lemo 1B series mini snap

Audio Input Termination: 10K Ohms

USB Interface (ASCII data)   8 bit
                                           9600 baud
                                       1 stop
                                       No parity
                                       XON/XOFF flow control

Ethernet: RJ45 (10/100/1G)
                                         Ethernet Control: HTTP2 & Telnet
                                         Video: MPEG2 TS (Video, Audio, Meta Data)

LEDs: Green (Indicates uP is running)
                                         Yellow (Indicates unit has a thermal issue)
                                       Red (Indicates unit has a major detected fault)

Operating Temperature Range: -40C to +70C

Power: 10-32V DC (either polarity on PWR connector)

Supply Current: 28 VDC   < 350 ma (est.)

Power Connector: 3 pin Lemo 1B series mini snap

Package: 4.4" X 4.4" X 2.8"

Mounting: Four 6-32 threaded inserts

Weight: < 3.5 lb. (est.)

Package Drawing