Digital Video Recorder

Hardware Technical Reference

Revision 1.1

October 2008

Fast Forward Video
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Contents

Overview

The *Q HD* is a board level high definition digital video recorder based on J2K compression. With its broadcast level image quality and near lossless J2K compression, it is ideal for high definition recording applications that demand only the very best image quality including: high end surveillance, law enforcement, military and medical.

Q HD is designed with the same cutting-edge digital video recorder technology used in the Omega HD. It provides outstanding image quality at 1080i, 720p and 480i, records at data rates up to 100Mbits/s, offers 4:2:2 sampling and a full 10 bit quantization.
High definition recordings are full resolution - 1920 x 1080 (1080i) or 1280 x 720 (720p), regardless of the compression level used.

With HD-SDI and SD-SDI I/O capabilities the *Q HD* also features RS-422 control using Sony, Odetics and FFV serial protocol and an extensive menu of control and configuration options. *Q HD* is versatile enough to satisfy a variety of demanding DVR applications.

Configuration

Prior to use, set the configuration to verify operation as expected. Specific settings that should be checked:

Resolution: 1080i, 720p or 480i; and frame rate: 59.94, and 50.

Disk Format: MOE (Fast Forward Proprietary) or FAT32
File Format: MOE (Fast Forward Proprietary) or QuickTime
Following any change in the Disk or File formats:
"Delete All Video" to prepare the disk for recording.

Other settings as shown in the Serial Control Protocol Document, Section 3.1. The document, serialxx.pdf, is available from the Technical Support page of www.ffv.com.

Architecture

The *Q HD DVR*'s primary design goal was to maintain video quality at a level suitable for use in professional video applications. Since image quality is of utmost importance, JPEG2000 compression is used to provide the highest picture quality.

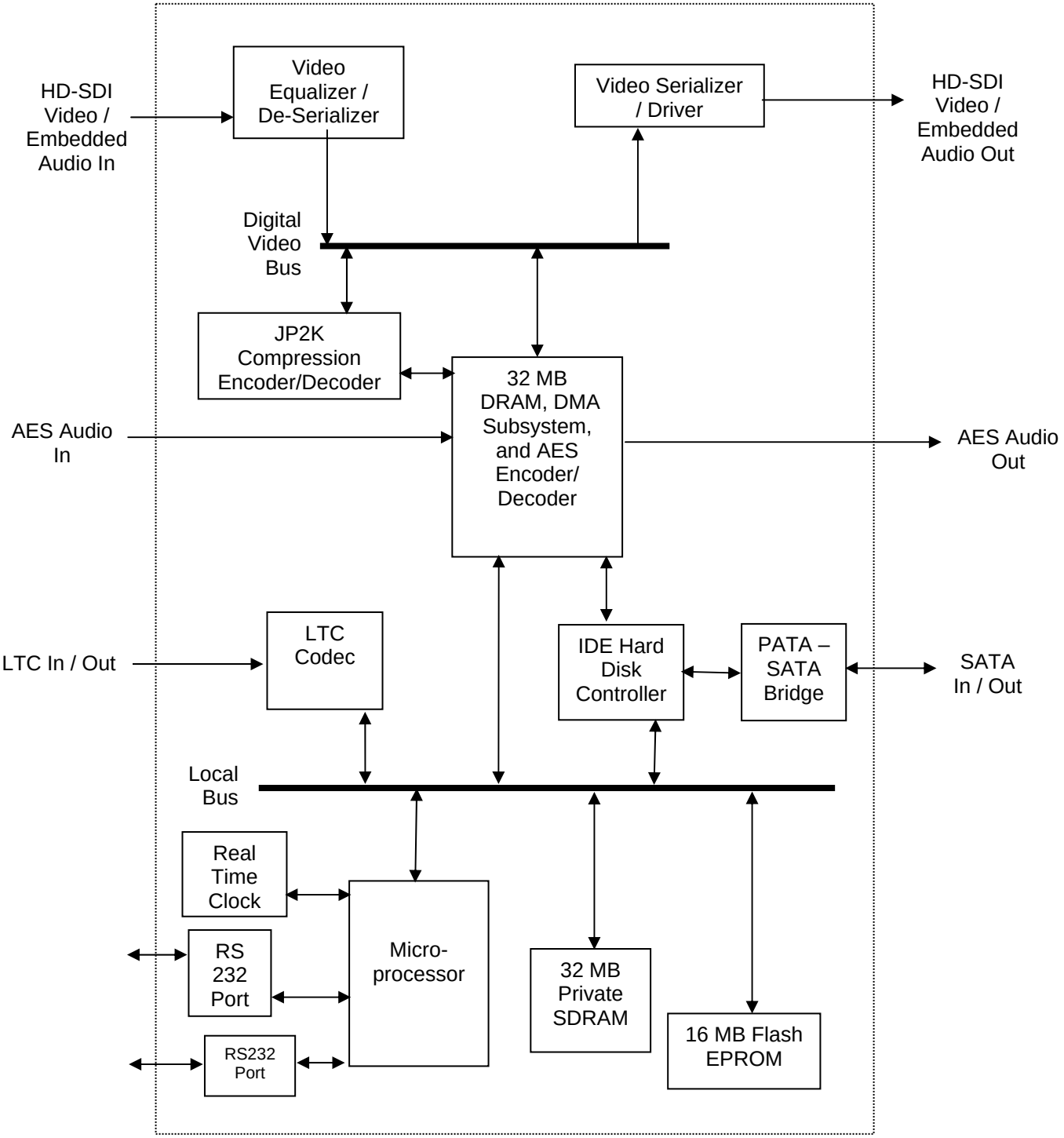
To support a sustained data rate at this level, the designers of the *Q HD DVR* included a SATA hard disk controller on the circuit board.

The design includes an on-board ARM processor to oversee the hardware and to provide a control interface through the serial ports.

All of the *Q HD DVR*'s subsystems share thirty-two (32) megabytes of dynamic random access memory. This memory is based on a true multi-port architecture that allows direct access by the JPEG codec, the disk controller, and the local ARM processor. Direct access to this memory permits each of the subsystems to perform to their maximum potential without concern for DMA contention.

Following is a block diagram of the *Q HD DVR*.

HARDWARE BLOCK DIAGRAM



Specifications

VIDEO INPUT

Digital Input:	Multi-Rate SD/HD–SDI
Standards:	SMPTE 274M (1080i) SMPTE 296M (720p) SMPTE 347M (NTSC & PAL)
Supported Resolutions:	1080i/29.97 (1920 x 1080I/59.94/2:1 Interlace) 720p/59.94 (1280 x 720/59.94/Progressive) NTSC (720 x 486/59.94/2:1 Interlace) PAL (720 x 576/50/2:1 Interlace)
Connections:	BNC 75 Ohms

AUDIO INPUT / OUTPUT

Digital Input / Output:	8 Channels embedded HD-SDI 4 Channels embedded SD-SDI
Connections:	BNC 75 Ohms

AUDIO SPECIFICATIONS

Resolution:	24 bits
Audio Channels:	HD Embedded: 8 in, 8 out SD Embedded: 4 in, 4 out 4 Channel AES/EBU these replace embedded channels.
Sampling Rate:	48 KHz

COMMUNICATIONS INTERFACE

RS-422 Interface:	38,400 baud
Protocols:	Sony Remote-1 (9-Pin) Odetics Fast Forward Native
Firmware update:	57,600 baud, 8 data bits, No parity, 1 stop bit.

DISK CONTROLLER

Protocol:	SATA I/II
Maximum Data Rate:	60 Mbit/sec Single Drive
Maximum Hard Drives:	1
Supported Hard Drives:	Hitachi, Western Digital, Seagate

Q HD DVR
CIRCUIT BOARD

TIME CODE

SMPTE / EBU	Longitudinal (LTC)

VIDEO COMPRESSION

Method:	Motion JPEG 2000
Maximum Bit Rate:	HD: 100 Mbit / Sec. SD: 50 Mbit / Sec.

WARRANTY I Year

GENERAL

Physical Dimensions:	4.5” W x 7.0” L x .75” D – D depends on config.
Power Consumption:	10.8 watts not including storage device(s).
Input Voltages:	+ 3.3 and +5V DC

Specifications subject to change without notice

JUMPER AND CONNECTOR LOCATIONS

LEGEND		
REF #	**FUNCTIONAL DESCRIPTION**	**MFR. P/N OR DESCRIPTION**
J1	AUDIO MONITOR OUTPUT	3 pin, .1" spacing
J4	AES3 and LTC In / Out	26 pin, 2 row, .1"spacing
J5	RS-422 PORT/ RS-232 OPT.	10 pin, 2 row, .1" spacing
J6	RS-232 Front Panel Port	10 pin, 2 row, .1" spacing
J13	SDI Input	BNC – Not Stuffed
J14	SDI Input	SMB
J19	SDI OUT	BNC – Not Stuffed
J20	SDI OUT	SMB
J21	SATA DATA	STD. SATA DATA
J23	POWER IN	10 pin, .1" spacing, shrouded
RST	RESET	STD. 2 PIN IDE, .100 SPACING
FIRMWARE UPDATE	FORCE LOAD FIRMWARE	STD. 2 PIN IDE, .100 SPACING

Connector Pin-Outs

AUDIO MONITOR OUTPUT J1	
Pin	**Output**
1	Left Headphone
2	Right Headphone
3	Ground

RS-232 – FFV FRONT PANEL PORT J6	
Pin	**Function**
2	DTR
3	Receive Data (RX)
5	Transmit Data (TX)
9	Ground

AES3 AND LTC J4			
Pin	**Function**	**Pin**	**Function**
1	No Connect	2	Ground
3	No Connect	4	Ground
5	No Connect	6	Ground
7	No Connect	8	Ground
9	3 / 4 AES3 IN-	10	3 / 4 AES3 IN+
11	1 / 2 AES3 IN-	12	1 / 2 AES3 IN+
13	1 / 2 AES3 OUT-	14	1 / 2 AES3 OUT+
15	3 / 4 AES3 OUT-	16	3 / 4 AES3 OUT+
17	LTCI-	18	Ground
19	LTCI+	20	Ground
21	LTCLIK – Sync Clock In*	22	Ground
23	LTCOUT	24	Ground
25	No Connect	26	Ground

Incoming LTC data is loaded into the receive buffer following the receipt of a valid LTC SYNC pattern.
*** SMPTE SYNC Sources -** A time code generator must have a SYNC input from a stable source in order to position the LTC code properly on an audio track of video tape or film. Two SYNC sources, click input, and free running, are available. If some external SYNC source is available it can be input on the CLICK input. Otherwise, a free running SMPTE SYNC is generated from the oscillator at the selected frame rate.

RS-422 - USER COMMUNICATION J5 - STANDARD			
Pin	**Function**	**Pin**	**Function**
1	GROUND	2	GROUND
3	Transmit Data (-)	4	Transmit Data (+)
5	Receive Data (+)	6	Receive Data (-)
7	GROUND	8	GROUND

RS-232 – USER COMMUNICATION J5 - ALTERNATE	
Pin	**Function**
3	Transmit Data (TX)
5	Receive Data (RX)
9	Ground

SATA DATA J21	
Pin	**Function**
1	Ground
2	SATA Tx+
3	SATA Tx-
4	Ground
5	SATA Rx-
6	SATA Rx+
7	Ground

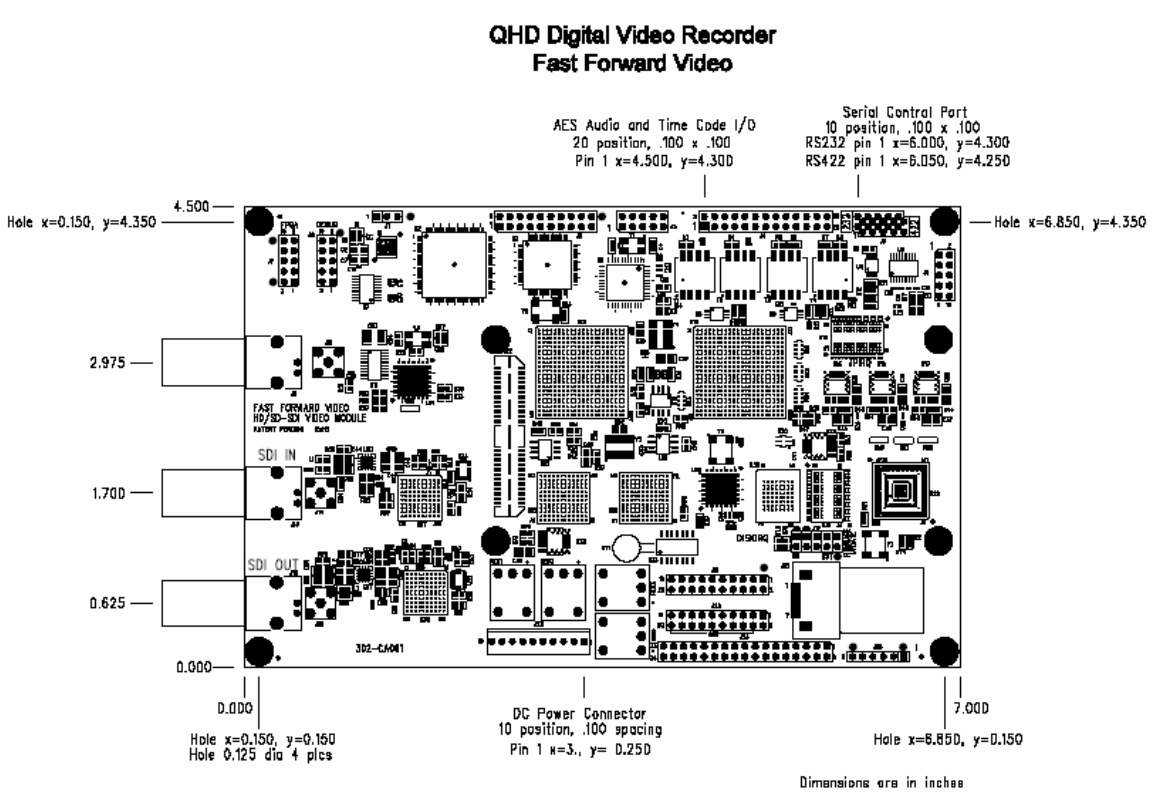
POWER J23	
Pin	**Function**
1	+12V – Not Needed
2	+5 Volt / 2 Amp
3	+5 Volt / 2 Amp
4	+3.3 Volt / 0.33Amp
5	+3.3 Volt / 0.33Amp
6	Ground
7	Ground
8	Ground
9	Ground
10	No Connect

JUMPER BLOCK RST, FIRMWARE UPDATE	
Jumper	**Function**
RST	Hardware Reset or Initialize DVR
Firmware Update	Force DVR into firmware update when shorted during power on.
Default Update Protocol - 57600 baud, 8 data, No parity, 1 stop bits	

Appendix

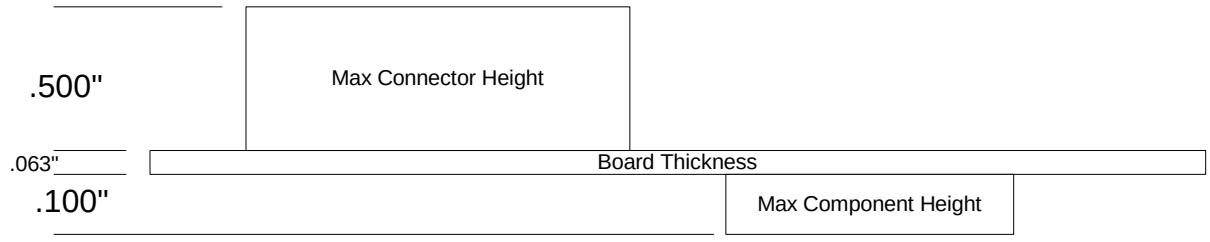
MECHANICAL DIMENSIONS

The following dimensional information represents the Rev. C board.



ELEVATION

The following dimensions assume all connectors are used. Non-use of connectors will vary total installed height. Wiring loop may effect space requirements.



REVISION HISTORY

Rev. 1.0 – Aug. 28, 2008 - New Release
Rev. 1.1 – Oct. 23, 2008 – Add details for LTC Sync Clock Input.