

BLUEBIRD SDI - H.264 IP ADAPTER

3G/HD-SDI to IP/Ethernet

- 3G/HD-SDI to H.264 video over IP
- 1080p60/30 video
- Low latency RTP Ethernet output

FEATURES

- 100 Ohm differential 3G/HD-SDI input
- Single multi-way connector for all signals
- Low-latency H.264 RTP streaming
- RTSP and ONVIF Profile S compatible
- Built-in webserver for setup and configuration
- ONVIF server for control of video stream and camera
- Remote update support
- 2x serial ports for Device I/O
- Compact size
- Evaluation board available



OVERVIEW

The **BlueBird SDI - H.264 IP Adapter** (AS-ADP-H264-001-A) is a compact interface solution from Active Silicon's BlueBird series of video adapters. It converts a 3G/HD-SDI video signal into a low-latency ONVIF compatible Ethernet/IP output.

The adapter contains a high-performance processor device that supports ONVIF and web page servers. The web server hosts an administration web page that can be used to control the adapter output.

A single high density/performance multi-way mezzanine connector carries all signals to/from the board to enable quick and easy fitting/replacement in production and during field maintenance.

The Bluebird SDI - H.264 IP Adapter can be easily evaluated using the Bluebird SDI - H.264 IP Adapter Evaluation Board (AS-ADP-H264-001-EVAL-A). The evaluation board connects to the BlueBird SDI - H.264 IP Adapter and carries a 75 Ohm BNC input (for the 3G/HD-SDI input signal), a standard RJ45 socket (for Ethernet interface/video output), a camera power/serial interface cable socket to drive a camera, and a USB-Serial converter for serial communications.

Sample application code for interfacing to the adapter is available in the Harrier IP Example Software.



SPECIFICATION

Video input:	100Ω SMPTE differential video signals at HD (1.485Gps) or 3G (2.97Gps) data rates	Protocol support:	ONVIF (Profile S compatible), IPv4, HTTP, HTTPS, RTSP, RTP, TCP, UDP, RTCP, DHCP
Video resolution/rate:	1080p 60/50/30 fps 720p 60/50/30 fps	Video compression:	H.264
Serial control:	ONVIF Device service	Physical serial interface:	2x 3.3V LVCMOS RS-232 ports



Figure 1. Bluebird SDI - H.264 IP Adapter, top and bottom views.

Operation

When connected to a suitable carrier board the Bluebird SDI - H.264 IP Adapter will simply power up and start to scan the SDI input for a SMPTE compatible video signal. The adapter will detect and lock into the video signal; then it will begin to H.264 compress the video stream, packetize and transmit the video data from the Ethernet port. Any RTSP/ONVIF compatible application (e.g. VLC media player or GStreamer) can then receive and control the video. Once the adapter is connected to the network the ONVIF Device Manager (<https://sourceforge.net/projects/onvifdm/>) may be used to connect to the board/streaming video.

ONVIF services can be used to control the video and its H.264 parameters, they can also be used to send data to the serial ports on the adapter. The adapter can be assigned a fixed IP address or can use DHCP to automatically obtain an IP address. A webpage interface that is served from the IP address assigned to the adapter (e.g. <http://192.168.189.100>) can be used to control the adapter and change the adapter settings (e.g. the fixed IP address, camera video mode, etc.).

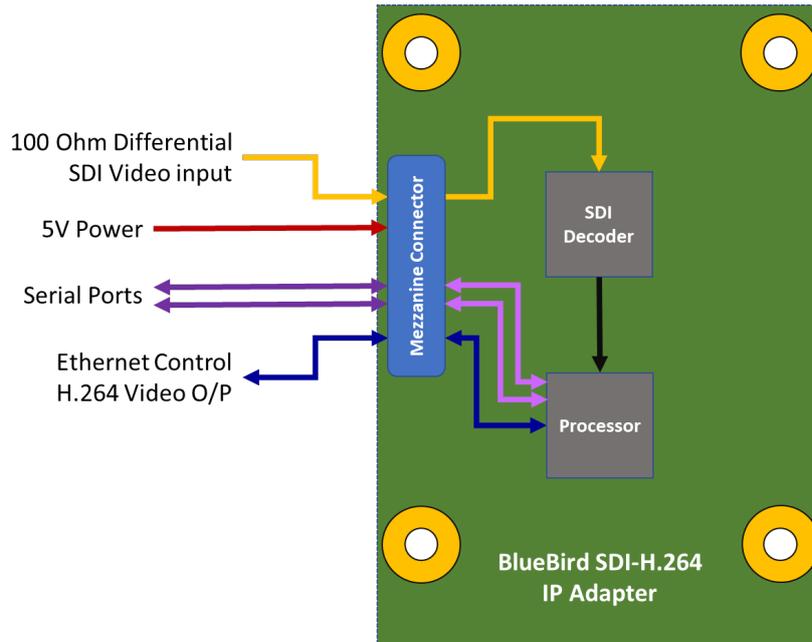


Figure 2. Bluebird SDI - H.264 IP Adapter block diagram.

Setting an IP address

An IP address can be automatically assigned using DHCP, or a fixed IP address can be set using the ONVIF Device Management service or the BlueBird SDI - H.264 IP Adapter webpage.

SD Card interface

The SD card interface is used in production to boot and program firmware into the board. Currently no other functions are supported.

Booting from an external SD card

The BlueBird SDI - H.264 IP Adapter has internal fuse settings and 10k pull-down resistors on the BOOT_MODE signals to set the default boot source.

The boot mode of the adapter can be set using the BOOT_MODE signals. These signals are pulled to ground by default (10k), connection to a 3V3 source will assert the signal to change the mode.

SIGNAL ASSERTED	BOOT SOURCE
None	1. Micro SD card, 2. USB (if no micro SD card)
BOOT_MODE_0	USB serial downloader
BOOT_MODE_1	On board eMMC device
BOOT_MODE_0 & 1	Reserved - Do not use

Harrier IP Example Software

The Active Silicon Harrier IP Example Software contains sample application code for interfacing to the adapter and controlling the serial ports and the adapter platform.



ONVIF Services

The BlueBird SDI - H.264 IP Adapter implements the ONVIF Profile S standard. The main services are listed below.

- Media service: enables control of the H.264 encoder and on-screen displays (OSD).
- DeviceIO service: provides direct communication to the serial ports (SendReceiveSerialCommand(): this enables VISCA communication with an attached camera to allow full control of the camera and all its features).
- Device Management service: allows control of the platform (e.g. set time and date, etc.).

For detailed information on these services please see the ONVIF documentation; examples of how to use these services are included in Harrier IP Example Software.

H.264 Encoder settings

Using the ONVIF API (or an ONVIF based application like ONVIF Device Manager) H.264 encoder features/settings such as Bitrate, Quality, GOP can be set.

Status LED (“LED1”)

This LED illuminates when the adapter is powered, the color of the LED indicates the status of the adapter.

- | | |
|--------------|--|
| Solid Green: | Adapter is powered and working correctly. |
| Solid Red: | The adapter is powered, but there is a fault/problem, e.g. no video data is being received, etc. |

Power supply

The BlueBird SDI - H.264 IP Adapter is powered by 5V.

The adapter evaluation board is powered by a 12V, centre positive, 5.5 x 2.1mm barrel connector; the 5V power supply for the adapter board is generated by power regulators on the evaluation board.



The BlueBird SDI - H.264 IP Adapter Evaluation Board

The BlueBird SDI - H.264 IP Adapter Evaluation Board (AS-ADP-H264-001-EVAL-A) has been designed to enable fast and effective evaluation of the BlueBird SDI - H.264 IP Adapter. The IP adapter plugs directly into the evaluation board. The evaluation board supplies power and gives easy access to all the signals on the IP adapter board mezzanine connector. It carries a micro SD card socket that can be used as boot media. A standard RJ45 socket allows easy connection to a PC Ethernet cable/port. A standard 75 Ohm BNC is used to connect SDI video input to the evaluation board, making connection to a video source straightforward. Using jumpers on the evaluation board, the serial interfaces of the adapter can be directed to the USB UART or the RS-232/TTL camera control outputs. The control outputs are pinned out to sockets that are compatible with all 3G-SDI output cameras in the Active Silicon product range; this enables a 3G-SDI camera to be powered and controlled directly from the adapter evaluation board.

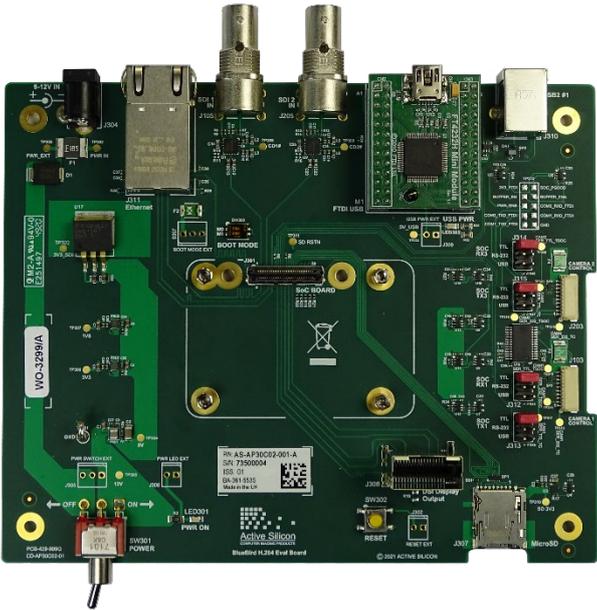


Figure 3. Bluebird SDI - H.264 IP Adapter Evaluation Board.

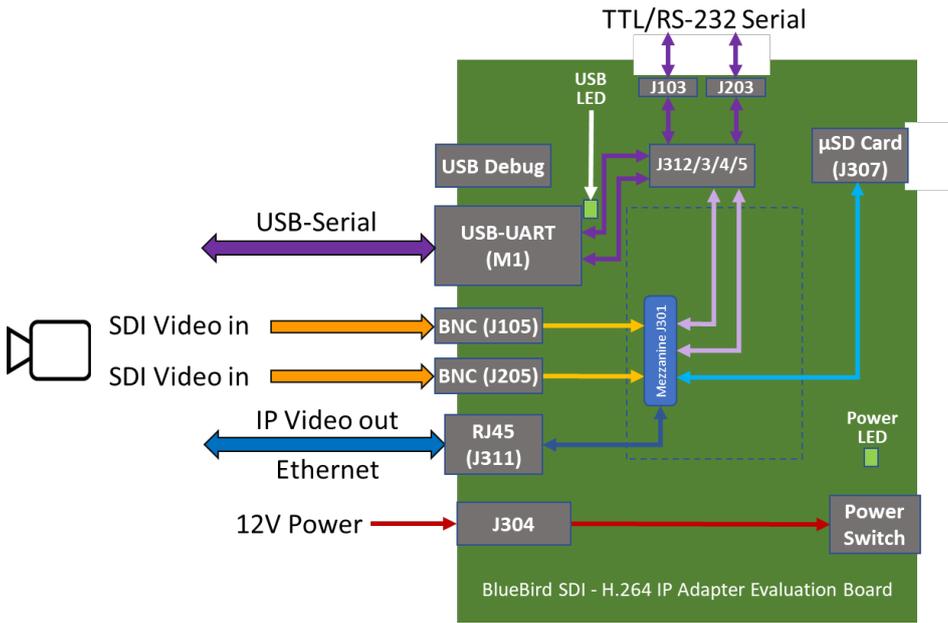


Figure 4. Bluebird SDI - H.264 IP Adapter Evaluation Board block diagram.



CONNECTOR SPECIFICATION

Mezzanine Connector: 60-way (J1)

The BlueBird SDI - H.264 IP Adapter interfaces to external systems via a 60-way, 3mm height, hermaphroditic board to board mezzanine connector. Mating connectors can have heights from 2.5mm to 6mm giving mated stack height options of 5.5mm, 6mm, 7mm and 9mm (board-to-board distance).

Connection direction in the following tables is with reference to the adapter, i.e. connections labelled input are an input to the adapter, outputs are outputs from the adapter (to the mated carrier board).

Connector type: Samtec LSHM-130-03.0-L-DV-A-S-K-TR

Mating part: Samtec LSHM-130-0X.X-L-DV-A-S-K-TR

Note: The tables below list the pinout of the adapter, due to the hermaphroditic nature of these connectors the pinout on the connector mounted on the carrier board will be mirrored (odd and even pins will swap. E.g. pin 1 on the adapter will connect to pin 2 on the carrier board, pin 2 on the adapter will connect to pin 1 on the carrier board, and so on). This can be illustrated by comparing to the pin out on the BlueBird SDI - H.264 IP Adapter Evaluation Board datasheet.

For a more detailed description of the signals and information required to design a carrier board please see the Bluebird SDI - H.264 IP Carrier Board Design Guide.



PIN NO.	FUNCTION	TYPE	SIGNAL LEVEL	COMMENT
2	GND			
4	DDIO_P	Differential Input +ve	SMPTE	See Design Guide
6	DDIO_N	Differential Input -ve	SMPTE	See Design Guide
8	GND			
10	DDI1_P	Differential Input +ve	SMPTE	See Design Guide
12	DDI1_N	Differential Input -ve	SMPTE	See Design Guide
14	GND			
16	USB1_DN	Differential IO	USB2	See Design Guide
18	USB1_DP	Differential IO	USB2	
20	USB1_ID	USB host / peripheral select input	GND= host NC=peripheral	
22	USB1_VBUS	USB Bus voltage sense (input)	Max 5V5	
24	COM3 Tx	Output	LVC MOS 3V3	10k pull up to 3V3 on inputs. See Design Guide.
26	COM3 Rx	Input	LVC MOS 3V3	
28	COM1 Tx	Output	LVC MOS 3V3	
30	COM1 Rx	Input	LVC MOS 3V3	
32	SD_DET	Input	10k pull up to 3V3	Tied to GND when SD card is present. 10k pull up to 3V3 on Adapter
34	SD_DATA2	I/O Push-Pull	3V3 / 1V8	Interface to micro SD card mounted on the carrier board. If the firmware in the adapter flash memory is corrupt, it will boot from the micro SD card connected to this interface. See Design Guide
36	SD_CD/DATA3	I/O Push-Pull	3V3 / 1V8	
38	SD_CMD	Output	3V3 / 1V8	
40	SD_CLK	I/O Push-Pull	3V3 / 1V8	
42	SD_DATA0	I/O Push-Pull	3V3 / 1V8	
44	SD_DATA1	I/O Push-Pull	3V3 / 1V8	
46	SD_RST#	Output	LVC MOS 3V3	Disables power to micro SD Card when low.
48	BOOT_MODE0	Input	10k pull down to GND	Strap to 3V3 to override defaults
50	BOOT_MODE1	Input	10k pull down to GND	Strap to 3V3 to override defaults
52	LINK1000_LED	Output	LVC MOS 3V3	Ethernet (1000 Base T)
54	LINK10_100_LED	Output	LVC MOS 3V3	Ethernet (10 / 100 Base T)
56	ACT_LED	Output	LVC MOS 3V3	Ethernet Activity
58	GND			
60	5V	Power Input		

Table 1. Multi-way mezzanine connector (J1) pinout (even pins).



PIN NO.	FUNCTION	TYPE	SIGNAL LEVEL	COMMENT
1	GND			
3	Ethernet pair 0 P	Differential IO +ve	1000BASET (IEEE 802.3) PAM5 encoding Max +/- 1V swing	100-Ohm matched differential pairs
5	Ethernet pair 0 N-	Differential IO -ve		
7	Ethernet pair 1 P	Differential IO +ve		
9	Ethernet pair 1 N	Differential IO -ve		
11	Ethernet pair 2 P	Differential IO +ve		
13	Ethernet pair 2 N	Differential IO -ve		
15	Ethernet pair 3 P+	Differential IO +ve		
17	Ethernet pair 3 N	Differential IO -ve		
19	GND			
21	DSI_CLK_N	Output	MIPI DSI	100-Ohm matched differential pairs
23	DSI_CLK_P	Output	MIPI DSI	
25	DSI_D0_N	Output	MIPI DSI	
27	DSI_D0_P	Output	MIPI DSI	
29	DSI_D1_N	Output	MIPI DSI	
31	DSI_D1_P	Output	MIPI DSI	
33	DSI_D2_N	Output	MIPI DSI	
35	DSI_D2_P	Output	MIPI DSI	
37	DSI_D3_N	Output	MIPI DSI	
39	DSI_D3_P	Output	MIPI DSI	
41	GND			
43	DSI_SDA	Open drain I/O	1V8	4k7 pull up to 1V8
45	DSI_SCL	Open drain output	1V8	4k7 pull up to 1V8
47	DSI_EN	Output	LVC MOS 1V8	Display Enable
49	DSI_BL_PWM	Output	LVC MOS 1V8	Display Backlight PWM
51	DSI_TS_INT#	Output	LVC MOS 1V8	Display Reset
53	SYS_RST#	Open drain input	1V8	4k7 pull up to 1V8
55	MEZZ_PGOOD	Output	LVC MOS 3V3	Power Up Sequence complete (not including software- controlled power rails)
57	GND			
59	5V	Power Input		

Table 2. Multi-way mezzanine connector (J1) pinout (odd pins).



CONFORMANCE

SMPTE: Compliant with SMPTE 424M and SMPTE 292M.

ONVIF Profile S compatible

Approvals: Active Silicon makes the following approval statements:

CE In accordance with the CE Marking regulations, the **BlueBird SDI – H.264 IP Adapter** is not a finished product and is supplied for further integration into a finished product that will be CE marked by the final manufacturer/integrator. Therefore, no CE marking or Declaration of Conformity is required or allowed.

RoHS3 This product is compliant with the RoHS3 requirements (Directive 2015/863/EU).

EMC This product is designed to be compliant with the following requirements when housed in a suitable enclosure:

- EN 55022:2010 (Class A) and EN 55024:2010 (EU Directive 2014/30/EU Electromagnetic Compatibility)
- FFC Rules for Class A digital devices

REACH Please contact Active Silicon for the latest formal REACH declaration (EC 1907/2006).

UL All printed circuit boards used in this product are manufactured by UL recognized manufacturers and have a flammability rating of 94-V0.

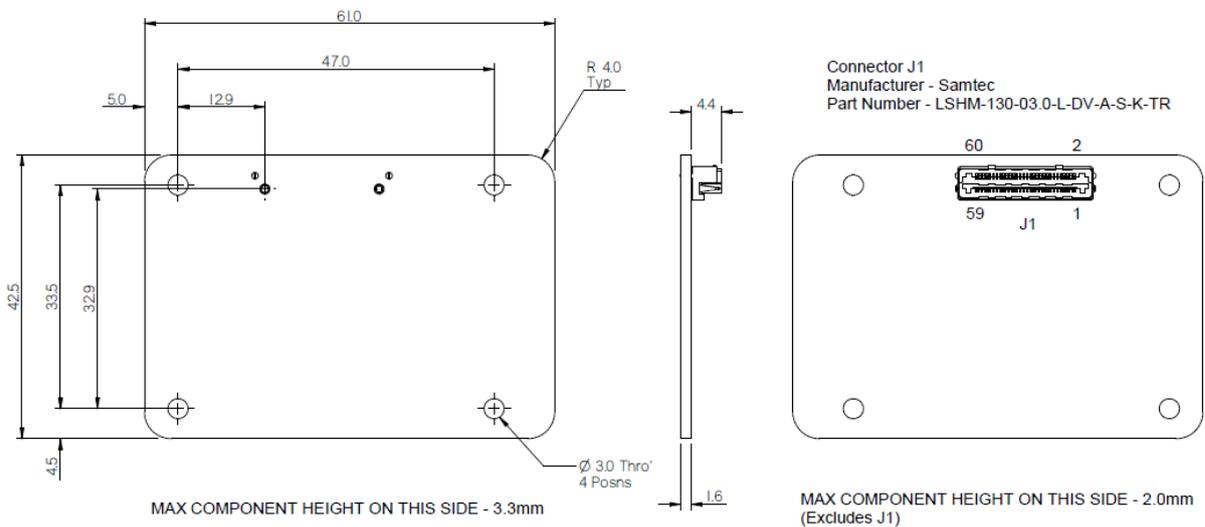


Figure 5. BlueBird SDI - H.264 IP Adapter (AS-ADP-H264-001-A) mechanical overview (all dimensions in mm).



PHYSICAL AND ENVIRONMENTAL DETAILS

<i>Dimensions:</i>	61mm x 42.5mm
<i>Weight:</i>	12g
<i>Power Supply:</i>	5V
<i>Power Consumption:</i>	1.2-1.7W - Typical power at 1080p60, values will vary with video mode.
<i>Storage Temperature:</i>	-20°C to +70°C
<i>Operating Temperature:</i>	0°C to +60°C (ambient environment).
<i>Relative Humidity:</i>	10% to 90% non-condensing (operating and storage).

ORDERING INFORMATION

PART NUMBER	DESCRIPTION
AS-ADP-H264-001-A	BlueBird SDI - H.264 IP Adapter (SDI to IP video with H.264 compression and serial ports).
AS-ADP-H264-001-EVAL-A	BlueBird SDI - H.264 IP Adapter Evaluation Board



CONTACT DETAILS

Head Office:

Active Silicon Ltd
1 Waterside Court, Waterside Drive,
Langley, Berks, SL3 6EZ, UK.

Tel: +44 (0)1753 650600
Email: info@activesilicon.com
Website: www.activesilicon.com

North America Office:

Active Silicon, Inc.
479 Jumpers Hole Road, Suite 301,
Severna Park, MD 21146, USA.

Tel: +1 410-696-7642
Email: sales.us@activesilicon.com
Website: www.activesilicon.com