

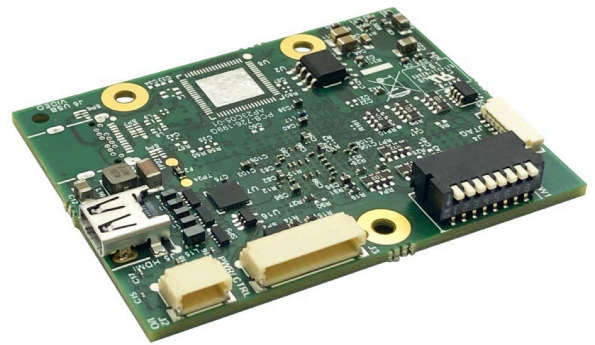
CAMERA INTERFACE BOARD: HDMI For Tamron and Sony Block Cameras



- HDMI interface board for Tamron MP1x10 series and Sony EV-series cameras
- 1080p/1080i/720p high definition video output
- HDMI v.1.4a output

FEATURES

- HDMI interface solution for the Tamron MP1110M, MP1010M and Sony EV series (e.g. EV7520A) cameras.
- HDMI output via (micro) Type D connector.
- Supports HD video modes up to 1080p60.
- Remote camera control (VISCA™) via TTL serial port.
- Video output mode selected by DIP switches or VISCA™ control.
- Built-in test pattern generator.
- Kits for mounting the interface board to Tamron or Sony cameras are available.
- Interface boards and cameras can be purchased as pre-assembled modules.



OVERVIEW

The **Harrier HDMI Camera Interface Board (AS-CIB-HDMI-001-A)** is a member of Active Silicon's **Harrier series** of camera interface boards; it provides HDMI output for autofocus zoom cameras such as the Tamron MP1110M-VC/-WP and MP1010M-VC cameras, and the Sony EV-series (e.g. Sony FCB-EV7520A). The HDMI output is enabled when an HDMI cable is connected. The DIP switch settings on the board can be used to set the camera video mode on power-up. Camera video modes, along with other camera and interface board functions, may also be controlled by TTL serial communication and the VISCA™ protocol.

The Harrier HDMI Camera Interface Board can also be supplied as USB & HDMI or USB-only variants. The current HDMI product only supports TTL serial communication, but RS-232 communication can be added as a custom build option.

For more details please contact Active Silicon.

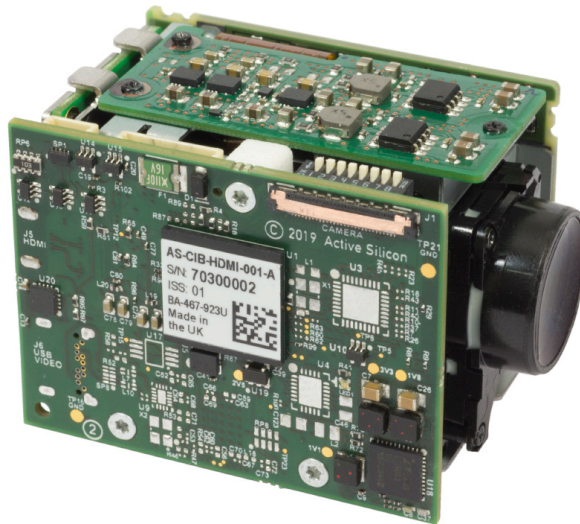


Figure 1. Harrier HDMI Camera Interface Board mounted on a Tamron MP1110M camera.



Figure 2. Harrier HDMI Camera Interface Board mounted on a Sony FCB-EV7520A camera.

HDMI Operation

The HDMI output is enabled when an HDMI cable is plugged in. The video mode of the HDMI output is always the same as the output of the camera. To change the mode of the HDMI output the mode of the camera should be changed using VISCA serial commands or by changing the DIP switch settings (and power cycling). Video modes up to 1080p60 are supported.

Status LED (“LED1”)

The interface board is fitted with a multi-color LED to indicate camera status.

Solid Green:	Camera and interface board are powered and working correctly.
Solid Red:	The interface board is powered but there is a fault/problem e.g. no video data is being received; internal power supply voltages outside specification; temperature is over recommended limit.

Video Mode on Power-up

On power-up, the camera interface board will read the SW1 DIP switches and set the camera video mode accordingly. If the DIP switches are set for ‘Default Camera Mode’ then the camera (and camera interface board) will power-up in the video mode last set on the camera.

For more information see the section on [DIP switch settings](#) below.

Analog Output

Some cameras can be set to output an analog video signal (e.g. Tamron MP1110M-VC), this signal is accessible as an output on the PWR/CTRL (J3) connector on the camera interface board. When the Tamron camera mode is set to PAL/NTSC (analog) output there is no digital video output from the camera and hence no HDMI output.

Note: the ground for the analog video signal is connected to the camera ground.

Test Pattern

A video test pattern output may be selected by (a) driving pin 1 of connector J2 low, or (b) sending the appropriate VISCA command over serial communications. For interface board operation using extended VISCA serial commands, refer to the section [Camera Interface Board VISCA Commands](#) below.



Figure 3. SMPTE RP-219-2002 test pattern generated by the interface board.

Camera Control

The camera settings (including video mode) can be controlled by serial VISCA commands (via the board PWR/CTRL connector - J3).

The camera VISCA serial signal is routed through the interface board and VISCA commands may be used to control both the camera and the interface board.

For interface board operation using extended VISCA serial commands, refer to the section [Camera Interface Board VISCA Commands](#) below.

For information on camera operation using VISCA serial commands please refer to the camera's user/technical manual.

Camera Interface Board VISCA Commands

The VISCA protocol can support connection of up to 8 cameras in a network; each camera is assigned a separate address. The default camera address is 1. To differentiate camera interface board specific commands from camera commands, the interface board is pre-assigned a fixed VISCA address of 2.

VISCA commands are composed of a series of hexadecimal format numbers that are sent to the camera. In this document the commands are formatted with a blank space between each byte to aid legibility, but the numbers sent to the camera/interface board must be sent without blank spaces.

The camera interface board supports the following custom VISCA commands.

FUNCTION	INQUIRY STRING	REPLY PACKET	DESCRIPTION
Query Interface Board Firmware Version	82 09 0A 00 FF	90 50 <i>r1 r2 r3</i> FF	r1 = Major Version r2 = Minor Version r3 = Sub Minor Version
Query Hardware ID/ Board Rev	82 09 0A 01 FF	90 50 <i>r1 r2</i> FF	r1 = Hardware ID r2 = Board ID
Query Hardware Health Status	82 09 0A 02 FF	90 50 <i>r1 r2</i> FF	r1 = Status (Bit set indicates fault condition) Bit 0 = Voltage Bit 1 = Cam Clock Bit 2 = Si5317 loss of lock. Bit 3 = GV7700 loss of lock. Bits 4-7 Reserved. r2 = Temperature (in hex) +60°C (0x3C) offset.
Query DIP Switch Status	82 09 0A 03 FF	90 50 <i>r1</i> FF	r1 = DIP Switch Settings
Query Product ID	82 09 0A 04 FF	90 50 <i>r1 r2 r3 r4 r5</i> FF	<i>r1</i> = project code <i>r2</i> = project board <i>r3</i> = board issue <i>r4</i> = build version1 <i>r5</i> = build version 2
Camera Hard Reset (50 ms)	82 01 0A 00 FF	90 40 FF	Acknowledge
Set Pattern Generation Output Mode	82 01 0A 01 <i>xx</i> FF	90 40 FF	Acknowledge Where <i>xx</i> is: 00 - External Control 01 - Pattern Gen off 02 - Pattern Gen on
Set Cross Hairs On/Off	82 01 0A 03 <i>xx</i> FF	90 40 FF	Acknowledge Where <i>xx</i> is: 00 - Off (Default) 01 - On
Set Sync Output Mode	82 01 0A 04 <i>xx</i> FF	90 40 FF	Acknowledge Where <i>xx</i> is: 00 - Vsync (Default) 01 - Vsync# 02 - Hsync 03 - Hsync# 04 - Fsync 05 - Fsync# 06 - Logic low 07 - Logic high

Note: Temperature (in degrees C) is measured in the FPGA device and is reported with a +60°C offset in hexadecimal format. To calculate the temperature in the FPGA, perform the following steps:

1. Convert hexadecimal value reported by extended VISCA command to decimal.
2. Subtract 60 to calculate FPGA temperature in degrees C.

CONNECTOR SPECIFICATION

KEL30 Connector (“CAMERA”): 30 way (J1)

The interface board is fitted with a 30-way miniature connector to link to the matching connector on the camera.

Connector type: KEL USL00-30L

Mating cable: KEL USL20-30SS-010-C (100mm length) or
KEL USL20-30SS-005-C (50mm length) 30-way micro coaxial cable.

This cable can be supplied with the interface board (see ordering information below)
Other lengths also available (subject to minimum order quantities).

Input/Output Connector (“I/O”): 4-way (J2)

The interface board is fitted with an industry standard 4-way connector for Vsync signal output and test pattern/reset control inputs.

Connector type: JST SM04B-SRSS-TB

Mating cable: Suitable cable can be purchased as part of a cable kit (see ordering information).

PIN	SIGNAL	LEVEL	NOTES
1	PGEN#	TTL compatible 5V tolerant. Active low signaling.	Input pin with 10kΩ pullup resistor. Drive low to enable the SMPTE test pattern output.
2	SYNC OUT	TTL (3.3V CMOS compatible with 5V TTL).	Sync active high by default. Alternate configurations selectable by software.
3	GND	0V	GND
4	RESET#	TTL compatible 5V tolerant. Active low signaling.	Input pin with 10kΩ pullup resistor. Drive low to reset the camera and interface board.

Note: After some signal conditioning to remove noise, the RESET# input is also fed into the camera; hence a reset from this input will reset both the camera and the camera interface board.

Power and Control Connector (“PWR/CTRL”): 10-way (J3)

The interface board is fitted with an industry standard 10-way connector for power and serial control.

Connector type: JST SM10B-SRSS-TB

Mating cable: Suitable cable can be purchased as part of a cable kit (see ordering information).

PIN	SIGNAL	LEVEL	NOTES
1	No Connection		
2	No Connection		
3	Analog SD video out ⁽¹⁾	PAL/NTSC levels	Sourced direct from camera. <i>Note: not available with Sony FCB EV cameras.</i>
4	Power GND	0V	Also used as analog ground.
5	Power GND	0V	GND
6	DC Power In	8.25V to 12.25V	Power supply, nominal 9V.
7	VISCA GND	0V	GND for VISCA Comms.
8	RxD#	TTL compatible input 5V tolerant. Active low.	VISCA communications.
9	TxD#	TTL output. (3.3V CMOS compatible with 5V TTL)	VISCA communications.
10	DC Power In	8.25V to 12.25V	Power supply, nominal 9V.

Note:

- 1) Analog SD output for Tamron cameras is only available when the camera is set in PAL/NTSC mode, in this mode there is no digital output from the camera or on the HDMI output connector (J5). Sony EV-series cameras do not support Analog SD output.

JTAG Connector (J4)

Test connector used in manufacturing for circuit verification.

HDMI Output Connector (“HDMI”) (J5)

The interface board is fitted with a micro HDMI display output connector.
HMDI output is active when an HDMI cable is connected.

Connector type: HDMI Type D (micro)

Mating Connector: Standard micro HDMI cable

Video Mode DIP Switch (SW1)

The interface board is fitted with an 8-way DIP switch (SW1) to enable selection of camera video format on power-up. Switches 5-8 are reserved for future use. The camera interface board supports the following video modes:

Camera Mode Settings (only read/set on power-up)

SW1-4	SW1-3	SW1-2	SW1-1	VIDEO FORMAT	MODE	HDMI
OFF	OFF	OFF	OFF	Default Camera Mode ⁽¹⁾	0	✓
OFF	OFF	OFF	ON	1080p60 ⁽²⁾	1	✓
OFF	OFF	ON	OFF	1080p59.94 ⁽²⁾	2	✓
OFF	OFF	ON	ON	1080p50 ⁽²⁾	3	✓
OFF	ON	OFF	OFF	1080p30	4	✓
OFF	ON	OFF	ON	1080p29	5	✓
OFF	ON	ON	OFF	1080p25	6	✓
OFF	ON	ON	ON	1080i60	7	✓
ON	OFF	OFF	OFF	1080i59.94	8	✓
ON	OFF	OFF	ON	1080i50	9	✓
ON	OFF	ON	OFF	720p60	10	✓
ON	OFF	ON	ON	720p59.94	11	✓
ON	ON	OFF	OFF	720p50	12	✓
ON	ON	OFF	ON	720p30	13	✓
ON	ON	ON	OFF	720p29	14	✓
ON	ON	ON	ON	720p25	15	✓

Notes:

- 1) "Default Camera Mode": on power-up, the camera will start in the video format/mode that was being set/used when it was last powered down. The HDMI video output will be the same mode as the camera output. After power-up is complete the camera video mode can be changed using a VISCA serial command, followed by a camera Reset (there is also a camera hard reset in the extended VISCA commands which will also serve this purpose).
- 2) Due to the high data bandwidth required, to output these video modes (above 1080p30) cameras **must** be set to dual LVDS mode. For other modes (1080p30 and below) the camera must be set to single LVDS mode. **When using VISCA commands to change camera video mode the LVDS mode must be set correctly, otherwise there will be no video output from the camera.**
- 3) **The DIP switches to select the video format are only read on power-up.** To change mode using the DIP switches, power down the camera, set the switches and then power-up the camera. DIP switches will only be effective for operating modes supported by the camera currently in use.
- 4) Once the camera has completed power-up and is in the video mode selected by the DIP switches, VISCA serial commands can change the camera video mode and select any of the modes supported by the camera. See note 2).

CONFORMANCE

HDMI: Compliant with HDMI specification v.1.4a

Approvals: The **Harrier HDMI Camera Interface Board** has been designed to meet EMC and FCC requirements when housed in a suitable enclosure:

CE Compliant with the relevant EU directives as listed below.

RoHS Conforms to RoHS3, the European Union's Restriction on Use of Certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment Directive 2015/863/EU.

EMC Compliant with EN 55022:2010 (class A) and EN 55024:2010 in accordance with EU Directive 2014/30/EU Electromagnetic Compatibility.

REACH Compliant with the requirements of REACH (Registration, Evaluation, Authorization and Restriction of Chemicals, EC 1907/2006), the European Union's chemical substances regulatory framework for Substances of Very High Concern.

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

FCC Compliant with FCC Rules for Class A digital devices.

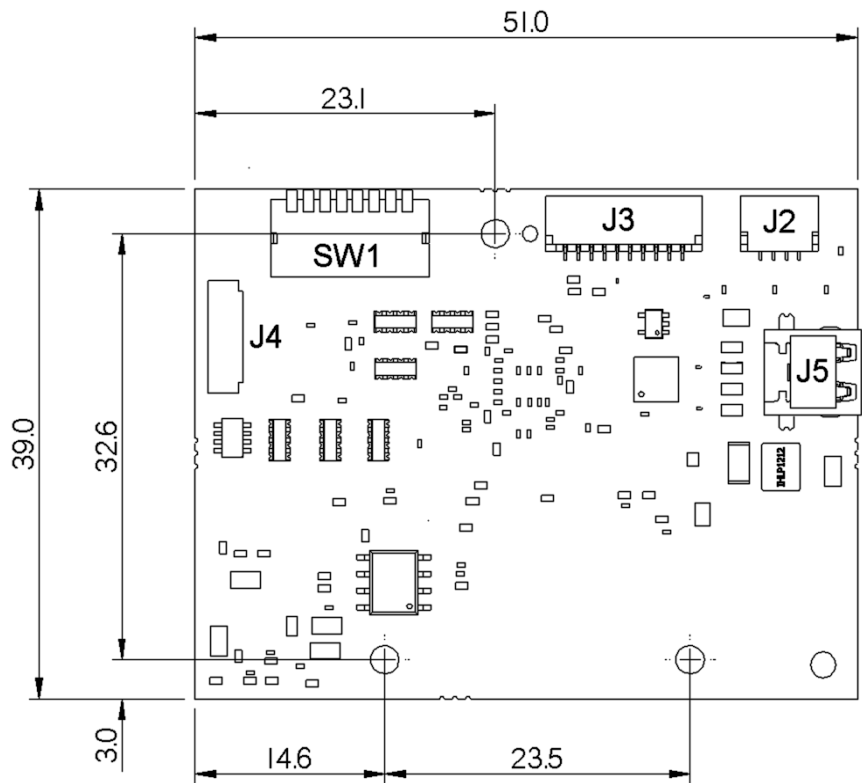


Figure 4. Mechanical overview, side B
 (Note – when mounted on a camera, this side faces the camera)

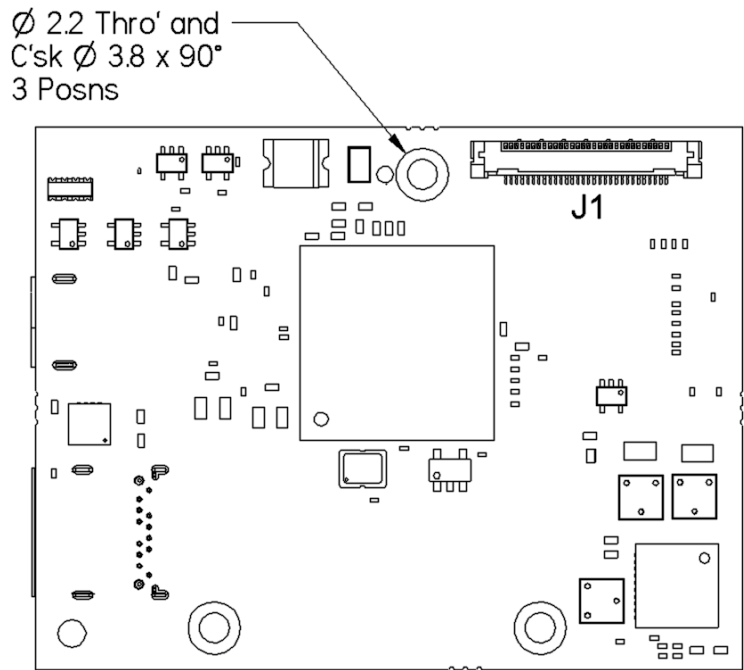


Figure 5. Mechanical overview, side A
 (Note – when mounted on a camera, this side faces away/out from the camera)

PHYSICAL AND ENVIRONMENTAL DETAILS

<i>Dimensions:</i>	51mm x 39mm.
<i>Weight:</i>	~10g (interface board only, no cables).
<i>Power Supply:</i>	8.25V to 12.25V
<i>Power Consumption:</i>	0.2 - 0.4W typical with HDMI active @1080p60. (Note: does not include camera power).
<i>Storage Temperature:</i>	-40°C to +125°C
<i>Operating Temperature:</i>	0°C to +70°C (ambient environment).
<i>Relative Humidity:</i>	10% to 90% non-condensing (operating and storage).

ORDERING INFORMATION

PART NUMBER	DESCRIPTION
AS-CIB-HDMI-001-A	HDMI output camera interface board for the Tamron MP1x10M and Sony EV cameras. Analog composite output from Tamron camera. Board only, no cables included.
AS-CIB-HDMI-001-1110-A	AS-CIB-HDMI-001-A supplied mounted on a Tamron MP1110M-VC, with AS-CIB-USL30-100MM connecting cable fitted.
AS-CIB-HDMI-001-1110WP-A	AS-CIB-HDMI-001-A supplied mounted on a Tamron MP1110M-WP, with AS-CIB-USL30-100MM connecting cable fitted.
AS-CIB-HDMI-001-7520A-A	AS-CIB-HDMI-001-A supplied mounted on a Sony FCB-EV7520A, with AS-CIB-USL30-100MM connecting cable fitted.
AS-CIB-USBHDMI-001-EVAL-A	Evaluation Kit for Harrier USB/HDMI output camera interface board. Includes power supply, cabling and Harrier Evaluation Board with PC serial interface (via USB UART).
AS-CIB-USL30-100MM	30-way micro-coax cable for connecting the interface board (J1) to the camera. Length 100mm. (Manufacturer: KEL, part number: USL20-30SS-010-C).
AS-CIB-USL30-50MM	30-way micro-coax cable for connecting the interface board (J1) to the camera. Length 50mm. (Manufacturer: KEL, part number: USL20-30SS-005-C).
AS-CIB-CBLKIT-003-A	Cable kit for AS-CIB-HDMI-001-A containing cables for J2, and J3 that connect to the Harrier Evaluation Board.
AS-CIB-FIXKIT-001-A	Plastic clip, screws and spacers for mounting AS-CIB-HDMI-001-A to Tamron MP1110M camera.
AS-CIB-BRK-002-B	Metal bracket, screws and spacers for mounting AS-CIB-HDMI-001-A to Sony FCB-EV7520A camera.



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