

# HARRIER EVALUATION BOARD

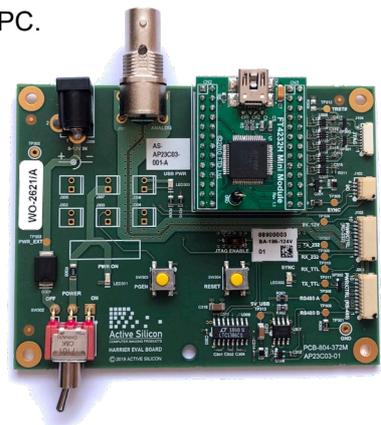
## For Harrier Camera Interface Boards

- Enables quick and easy evaluation of Harrier Camera Interface Boards
- Supports VISCA communications over RS-485, RS-232 and TTL
- Supports JTAG programming
- Easy access to analog video, test pattern output and reset signals

### FEATURES

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- USB-UART with virtual COM ports for VISCA communications from PC.
- VISCA communications over RS-485, RS-232 and TTL.
- LED to indicate SYNC signal status.
- BNC connector for analog output.
- Reset button.
- Button to trigger test pattern generation.
- JTAG connection and programming capability.
- 12V power supply, with switch for camera power.



### OVERVIEW

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The **Harrier Evaluation Board** has been designed to enable quick and easy evaluation of Harrier camera interface boards. The board provides power and serial communications to the camera/camera interface board, easy access to analog video output and push-button control of reset and test pattern generation signals. Digital video signals are available directly from the Camera Interface Board and are not routed through this board.

The **Harrier Evaluation Board** is included in the latest Harrier Camera Interface Board Evaluation Kits; these kits include a multi-region 12V power adapter and a set of cables specific to the Harrier Camera Interface Board being evaluated. Once you have a kit/board you can connect it to other Harrier Camera Interface Boards using additional cable kits that can be purchased from Active Silicon.

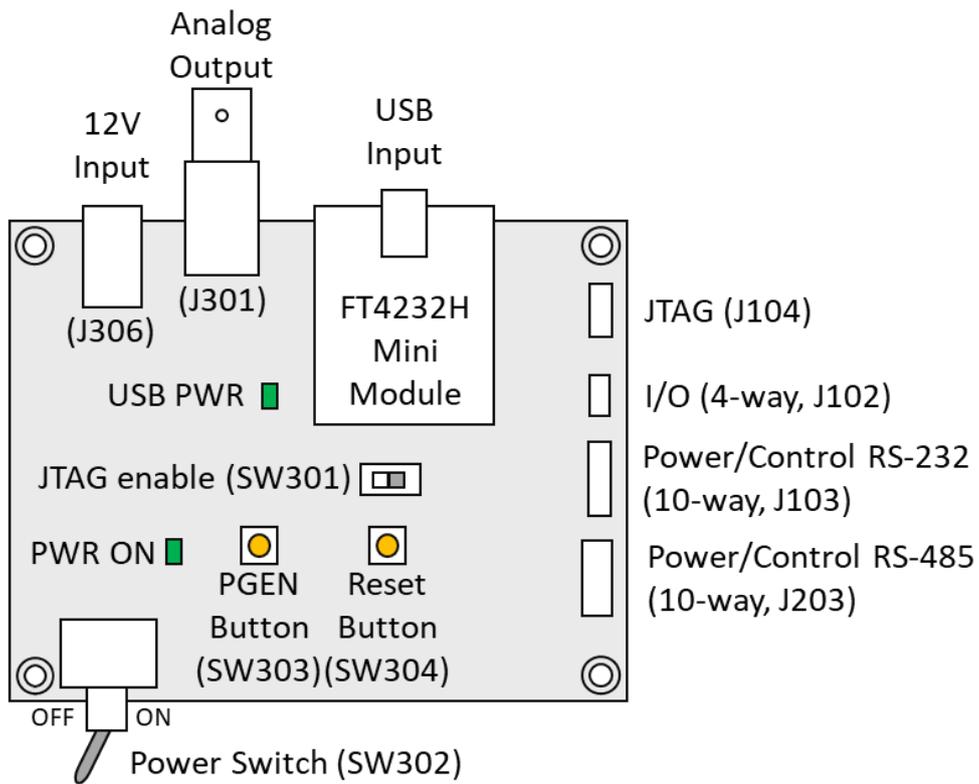


Figure 1. Harrier Evaluation Board diagram

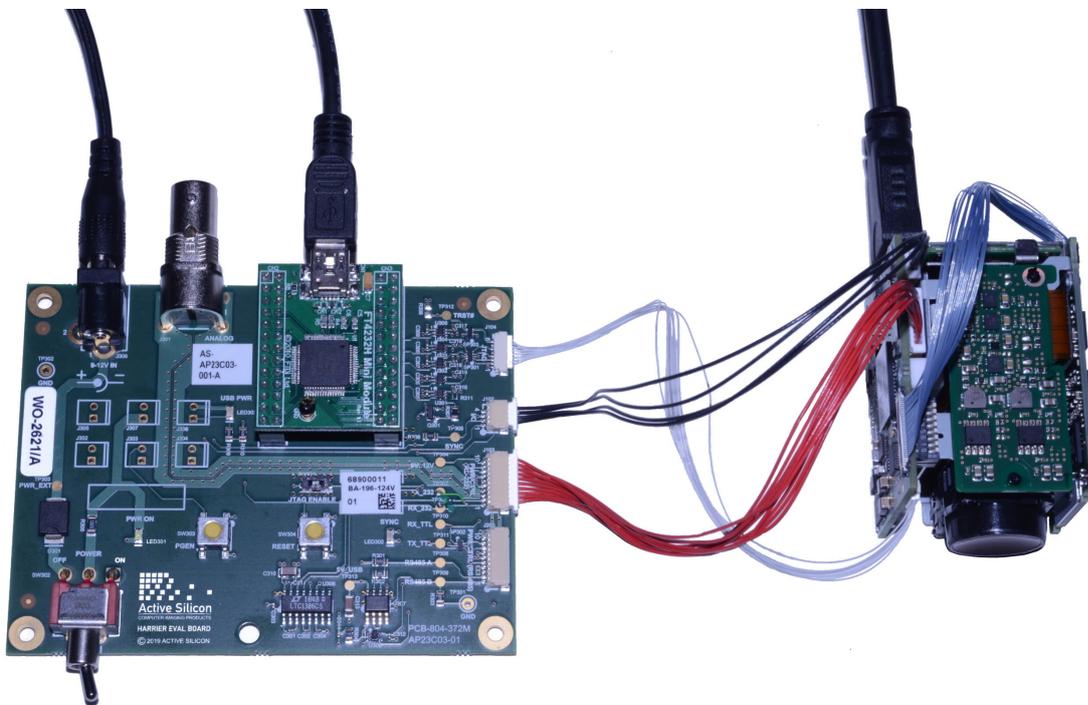


Figure 2. Harrier Evaluation Board in use with a Harrier Camera Interface Board and Tamron camera



### **Analog Output (J301)**

This BNC connector will supply the analog video output that is supplied (when enabled) from the PWR/CTRL connector(s) (J3) on the camera interface board. Note: not all camera interface boards support this output and special camera video modes may need to be used to enable it.

### **PGEN Button (SW303)**

Pressing this button will activate the I/O signal (on J102) that causes the camera interface board to generate a test pattern video output (if this feature is supported by the camera interface board). The test pattern will only be displayed whilst the button is being held down.

### **Reset Button (SW304)**

Pressing this button will activate the I/O signal (on J102) that causes the camera interface board to reset. Reset is required to activate some features of Tamron cameras (e.g. change of video mode). It is also possible to trigger a camera reset via VISCA command.

### **Power (J306)**

Power to the board is supplied from a 12V power supply via a barrel connector (J306). A connected camera and interface board are powered from the same supply via the Power Switch (SW302). When the Power Switch (and power supply) is switched ON the PWR ON LED will illuminate. The power supply is protected against reverse connection by a diode.

### **Serial Communications/USB Input (FTDI FT4232H Mini Module)**

Serial camera/camera interface board control is provided by the USB interface. A standard a USB Type A to mini USB Type B cable is used to connect the board to a PC.

FTDI drivers are required to communicate with the FTDI module. These drivers are usually automatically installed on Windows 10. For Windows 7, it is recommended that the latest drivers are installed; these are available from here:

<https://www.ftdichip.com/Drivers/D2XX.htm>

The board USB connection will be seen by the PC software/OS as three standard virtual COM port connections. The number of each COM port is assigned by the software/OS being used. Windows Device Manager (section: Ports (COM & LPT)) can be used to identify the three actual port numbers assigned.

These COM ports can be used by standard serial camera communication software, such as the Tamron or Sony Camera Application, to communicate with and control cameras. Each COM port connects to a different serial communications interface on the evaluation board; typically:

1. The lowest port number is the RS-232 interface (J103).
2. The second port number is the RS-485 interface (J203).
3. The highest port number is the TTL interface (J103 & J203).



## JTAG Programming/Firmware Update

The **Harrier Evaluation Board** can be used to update the camera interface board firmware using the USB interface. A standard a USB Type A to mini USB Type B cable is used to connect the board to a PC.

FTDI drivers are required to communicate with the FTDI FT4232H module mounted on the board. These drivers are usually automatically installed on Windows 10. For Windows 7, it is recommended that the latest drivers are installed; these are available from here:

<https://www.ftdichip.com/Drivers/D2XX.htm>

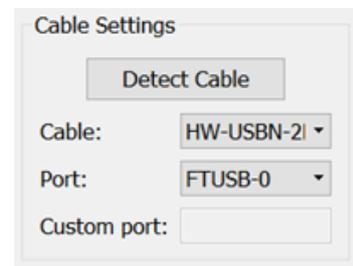
JTAG programming requires the Lattice Diamond programmer tool; this is available free of charge (for Windows or Linux) from [www.latticesemi.com](http://www.latticesemi.com):

<http://www.latticesemi.com/en/Products/DesignSoftwareAndIP/ProgrammingAndConfigurationSw/Programmer>

Please ensure that this tool is installed correctly and that you have the correct programming files (.xcf project file and bit file (\*.bit, \*.mcs, \*.hex, \*.bin, etc.)) for your camera interface board.

To create a JTAG connection between the **Harrier Evaluation Board** and a camera interface board connect the white 8-way cable to JTAG connector (J104) on the **Harrier Evaluation Board** and the JTAG connector on the camera interface board (usually J4).

One of the channels of the FT4232H module has been configured as an MPSSE core so that it will be recognized by the Lattice tool. Once powered up, the Lattice Diamond Programmer will see the FTDI module connection as a programming cable, shown in Figure 3. The Lattice Diamond Programmer software cannot distinguish between different FTDI devices connected to the computer. Having multiple FTDI devices connected to the PC may therefore cause the connection to fail.



**Figure 3. Evaluation board JTAG cable detected with the Lattice Diamond Programmer**

In order to program the firmware into the board the JTAG ENABLE DIP switch (SW301) must be set ON.



## CONNECTOR SPECIFICATIONS

### Input/Output Connector (“I/O”): 4-way (J102)

The **Harrier Evaluation Board** is fitted with an industry standard 4-way connector for test pattern and reset control, plus Vsync out.

Connector type: JST SM04B-SRSS-TB

Mating cable: A suitable cable is supplied with the Harrier Camera Interface Board Evaluation Kit or as part of a separate camera interface board cable kit (see ordering information).

PIN	SIGNAL	LEVEL	NOTES
1	PGEN#	TTL compatible 5V tolerant. Active low signaling.	Drive low to enable the SMPTE test pattern.
2	VSYNC	TTL (3.3V CMOS compatible with 5V TTL)	Connected to LED.
3	GND	0V	GND
4	RESET#	TTL compatible 5V tolerant. Active low signaling.	Drive low to reset the camera and interface board.

**Note:** The RESET# signal is usually passed on by the camera interface board to the camera.

### Power and Control Connector (“PWR/CTRL RS-232”): 10-way (J103)

The **Harrier Evaluation Board** is fitted with an industry standard 10-way connector for power and serial control. **Note: connecting cameras to J103 and J203 at the same time will damage the camera interface boards. Always ensure that only one camera is plugged in to these connectors.**

Connector type: JST SM10B-SRSS-TB

Mating cable: A suitable cable is supplied with the Harrier Camera Interface Board Evaluation Kit or as part of a separate camera interface board cable kit (see ordering information).

PIN	SIGNAL	LEVEL	NOTES
1	RS-232 Tx	EIA/TIA-562 output	VISCA control.
2	RS-232 Rx	EIA/TIA-562 input	VISCA control.
3	Analog SD video	PAL/NTSC levels	
4	Power GND	0V	Also used as analog ground.
5	Power GND	0V	GND
6	DC Power	12V	Direct from power supply and protection diode.
7	VISCA GND	0V	GND for VISCA Comms.
8	TxD#	TTL output. (3.3V CMOS, 5V TTL compatible)	VISCA control.
9	RxD#	TTL compatible input. 5V tolerant. Active low.	VISCA control.
10	DC Power	12V	Direct from power supply and protection diode.

**Power and Control Connector (“PWR/CTRL RS-485”): 10-way (J203)**

The **Harrier Evaluation Board** is fitted with an industry standard 10-way connector for power and serial control. **Note: connecting cameras to J103 and J203 at the same time will damage the camera interface boards. Always ensure that only one camera is plugged in to these connectors.**

Connector type: JST SM10B-SRSS-TB

Mating cable: A suitable cable is supplied with the Harrier Camera Interface Board Evaluation Kit or as part of a separate camera interface board cable kit (see ordering information).

PIN	SIGNAL	LEVEL	NOTES
1	RS-485 B	EIA/TIA-485-B	VISCA control.
2	RS-485 A	EIA/TIA-485-A	VISCA control.
3	Analog SD video out	PAL/NTSC levels	
4	Power GND	0V	Also used as analog ground.
5	Power GND	0V	GND
6	DC Power In	12V	Direct from power supply and protection diode.
7	VISCA GND	0V	GND for VISCA Comms.
8	TxD#	TTL output. (3.3V CMOS 5V TTL compatible)	VISCA control.
9	RxD#	TTL compatible input. 5V tolerant. Active low.	VISCA control.
10	DC Power In	12V	Direct from power supply and protection diode.

**JTAG Programmer (“JTAG”): 8-way (J104)**

The **Harrier Evaluation Board** is fitted with an industry standard 8-way connector for power and serial control.

Connector type: JST SM08B-SURS-TF(LF)(SN)

Mating cable: JST A08SUR08SUR32W152A - A suitable cable is supplied with Harrier Camera Interface Board Evaluation Kits (see ordering information).

PIN	SIGNAL	NOTES
1	Power	
2	TDI	Board output / Target input
3	TMS	Board output / Target input
4	TCK	Board output / Target input
5	GND	
6	TDO	Board input / Target output
7	GND	
8	TRST#	Board output / Target input - From DIP switch SW301



## Test Software

Active Silicon supplies a command line application (HarrierControl.exe) that can be used to drive the camera serial communications.

This is available from the Active Silicon website:

<https://www.activesilicon.com/products/harriercontrol-camera-software/>

It has an interactive mode where users can follow a sequence of menu options to query or change settings on a supported camera/camera interface board. This is opened by starting the program with no command line options; in this mode it will scan the COM ports, detect the camera and report the camera type and firmware versions.

```
C:> HarrierControl
Application Version 1.1.1 Copyright (C) Active Silicon 2021
Auto-detected connected device
..
TTL port connected at 9600 Baud
Tamron MP1110-VC
Camera Firmware Version 0x0038
Harrier Firmware Version 2.3.1
Dual LVDS Mode
Monitoring Mode 1080p 60Hz
Choose Query Command (Q), Setting Command (S), or press X to exit.
```

It can be used in single line mode (intended for use in scripts, batch files, etc) by passing 4 parameters on the command line.

```
HarrierControl P1 P2 P3 P4
```

**P1** = communication type.

Values:

- '**TTL**' - TTL comms selected,
- '**RS485**' - RS-485 comms selected,
- '**RS232**' - RS-232 comms selected,
- '**USB3**' - Harrier USB comms selected,
- '**COMX**' COM port number X selected.

**P2** = baud rate.

Values: **9600**, **19200**, **38400** and **115200**. (not used with USB3 option)

**P3**: VISCA command to the camera/camera interface board in comma separated format.

Values: any valid VISCA command, e.g. **81,09,00,02,FF**

**P4**: Option to print text describing the VISCA command (will only interpret some commands/responses).

Value: **/P**

```
C:> HarrierControl TTL 9600 81,09,00,02,ff /P
Tx: [ 81 09 00 02 ff ]
Get Camera Details
Rx: [ 90 50 00 23 f0 12 00 30 02 ff ]
Tamron MP1110-VC
Firmware Version: 0x0038
```



## CONFORMANCE

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<i>Approvals:</i>	The <b>Harrier Evaluation Board</b> has been designed to meet EMC and FCC requirements when housed in a suitable enclosure:
<i>CE</i>	CE marked and compliant with the relevant EU directives as listed below.
<i>RoHS</i>	Conforms to RoHS3, the European Union's Restriction on Use of Certain Hazardous Substances (RoHS) in Electrical and Electronic Equipment Directive 2015/863/EU.
<i>EMC</i>	Compliant with EN 55022:2010 (class A) and EN 55024:2010 in accordance with EU Directive 2014/30/EU Electromagnetic Compatibility.
<i>REACH</i>	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.
<i>UL</i>	All printed circuit boards used in this product are manufactured by UL recognized manufacturers and have a flammability rating of 94-V0.
<i>FCC</i>	Compliant with FCC Rules for Class A digital devices.

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## PHYSICAL AND ENVIRONMENTAL DETAILS

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<i>Dimensions:</i>	100mm x 78mm (not including connectors).
<i>Weight:</i>	~60g
<i>Power Supply:</i>	12V $\pm$ 5%.
<i>Power Consumption:</i>	Maximum 1W + connected device power consumption.
<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).

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## ORDERING INFORMATION

<b>PART NUMBER</b>	<b>DESCRIPTION</b>
<b>AS-CIB-3GSDI-002-EVAL-B</b>	Evaluation Kit for Harrier 3G-SDI to evaluate <b>AS-CIB-3GSDI-002-A</b> and Harrier 3G-SDI camera assemblies that include this interface board (includes <b>AS-CIB-CBLKIT-002-B</b> and <b>AS-CIB-USL30-100MM</b> ; camera interface board <u>not</u> included).
<b>AS-CIB-3GSDI-002-EVAL-C</b>	Evaluation Kit for Harrier SDI cameras to evaluate <b>AS-CAM-10SHD-A</b> and <b>AS-CAM-36SGHD-A</b> ; camera <u>not</u> included).
<b>AS-CIB-USBHDMI-001-EVAL-A</b>	Evaluation Kit for Harrier USB/HDMI to evaluate <b>AS-CIB-USBHDMI-002-A</b> and <b>AS-CIB-HDMI-001-A</b> (includes <b>AS-CIB-CBLKIT-003-A</b> and <b>AS-CIB-USL30-100MM</b> ; camera interface boards <u>not</u> included).
<b>AS-CIB-CBLKIT-002-B</b>	Cable Kit for connecting the <b>Harrier Evaluation Board</b> to the <b>AS-CIB-3GSDI-002-A</b> camera interface board.
<b>AS-CIB-CBLKIT-003-A</b>	Cable Kit for connecting the <b>Harrier Evaluation Board</b> to the <b>AS-CIB-USBHDMI-002-A</b> or <b>AS-CIB-HDMI-001-A</b> camera interface board.
<b>AS-CIB-USL30-100MM</b>	30-way micro-coax cable for connecting the interface board (J1) to the camera. Length 100mm. (Manufacturer: KEL, part number: USL20-30SS-010-C)



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