

QUICK START GUIDE

HARRIER USB/HDMI CAMERA INTERFACE BOARD

Introduction

This guide is designed to get you quickly up and running with the **Harrier USB/HDMI Camera Interface Board** (AS-CIB-USBHDMI-002-A) and the Harrier USB/HDMI Evaluation Kit (AS-CIB-USBHDMI-001-EVAL-A). The interface board can be purchased as a pre-assembled camera module with the Tamron MP2030M-GS (AS-CIB-USBHDMI-002-2030-A, shown in Figure 3) or Tamron MP1110M camera (AS-CIB-USBHDMI-002-1110-A, shown in Figure 1).

This document should be read in conjunction with the datasheet and other documents available on [Active Silicon's website](https://www.activesilicon.com), (see Harrier USB/HDMI Camera Interface Board - Downloads section):

<https://www.activesilicon.com/products/harrier-usb-hdmi-camera-interface-board/>



Figure 1. Harrier USB/HDMI Interface Board mounted on a MP1110M camera (J1 – KEL cable not connected)

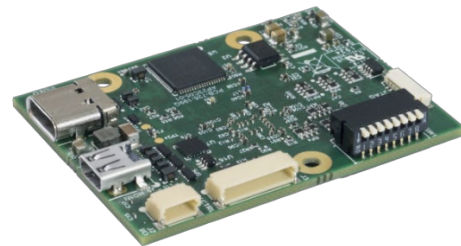


Figure 2. Reverse side of Harrier USB/HDMI Camera Interface Board



Figure 3. Harrier USB/HDMI Interface Board mounted on a MP2030-GS camera

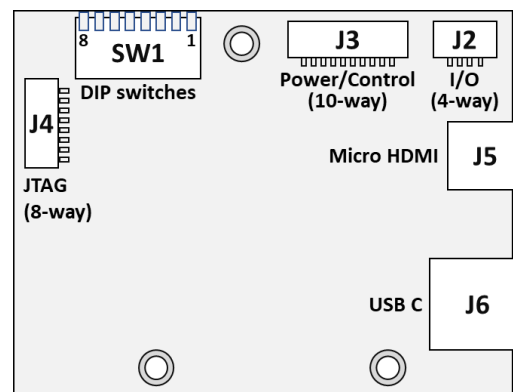


Figure 4. Interface board block diagram showing position of connectors and DIP switches

The Harrier USB/HDMI Camera Interface Board can also be supplied in HDMI- or USB-only variants. A 3G-SDI/HD-SDI camera interface board is also available. For more details contact Active Silicon.

Evaluation Kit Contents

The Evaluation Kit (AS-CIB-USBHDMI-001-EVAL-A) contains all the parts needed to evaluate the Harrier USB/HDMI Camera Interface Board.

Note that the Evaluation Kit does not include a Harrier USB/HDMI Camera Interface Board or camera, these need to be ordered separately.

Please check that you have all the parts listed below:

- Harrier Evaluation Board
- Red 10-way cable
- Black 4-way cable
- White 8-way cable
- USB Type A to mini USB Type B cable
- Micro HDMI cable
- USB3 USB Type C SuperSpeed (5 Gbps minimum) cable
- Multi-region 12V power supply (please fit the adapter suitable for your region)

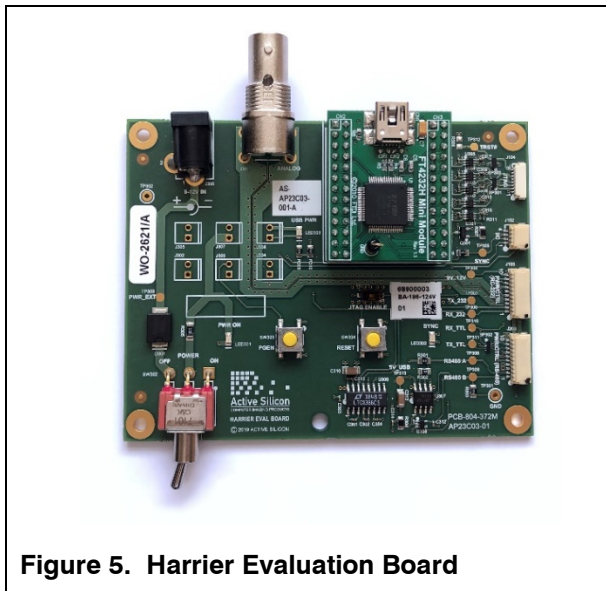


Figure 5. Harrier Evaluation Board

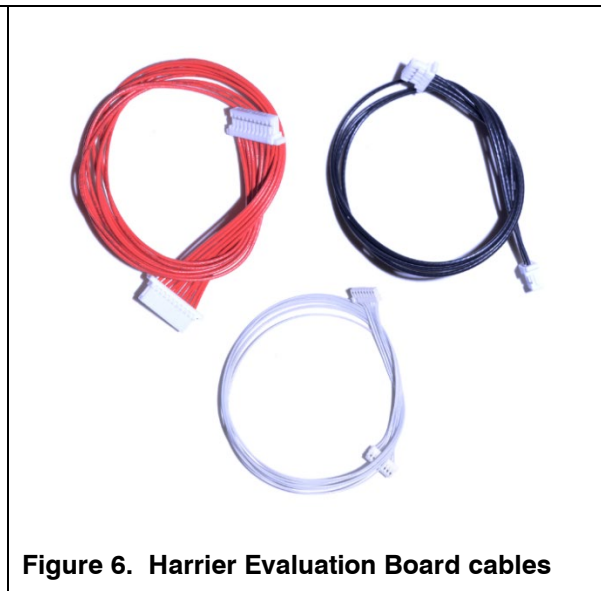


Figure 6. Harrier Evaluation Board cables

Quick Start

You can get the board up and running very quickly with the Evaluation Kit and these items:

- PC with Superspeed USB port with high current capability (typically Type C socket rated at 1.5 Amp or more) or externally powered USB3 hub (e.g. Startec ST4300MINI).
- Tamron MP1110M or MP2030M-GS Camera and 30 way KEL cable.
Note: the MP2030M-GS camera will need a 3Amp rated USB socket or powered hub.
- UVC software.

For the UVC software we recommend the HarrierView UVC demo application that is part of the [Harrier USB SDK](#); this can be downloaded from the Active Silicon web site.

1. Connect the camera and interface board socket J1 using the KEL cable.
2. Set DIP switch SW1 [7] ON, and all others OFF.
3. Connect the interface board to the Superspeed USB port (via the powered hub if the port does not have the current capability).
4. If the port/hub can supply enough current, the camera will start up and you can now access the video using any UVC application.
5. If you have installed the Harrier USB SDK you will also be able to use the Harrier Virtual COM port to control the camera using VISCA commands from an application that uses standard COM ports, e.g. the [Tamron Camera Control Application](#) (this is also available from the Active Silicon web site).

Note: if you are using the Tamron MP2030M-GS camera the Harrier USB/HDMI interface board needs to be configured to support different video modes. When the interface board is plugged in the camera will appear in the camera section of Device Manager.

Active Silicon Harrier CIB002 = Tamron MP1110M support

Active Silicon Harrier 2030-002 = Tamron MP2030M-GS support

UVC Example Application - Harrier USB SDK

To evaluate the USB video capability, you will need a USB Video Class (UVC) application. If you do not have a UVC application you can download the [Harrier USB SDK](#) from the Active Silicon website. When you install this SDK, it will create a folder with working UVC example application called HarrierView. For information on how to use the application please see the section [Using the HarrierView UVC Application](#) below.

Tamron Camera Control Application

To evaluate the serial communications capability or Harrier Virtual COM port, you will need an application that can provide RS-232, RS-485 or TTL serial communication via a COM port. If you do not have a serial camera control application download the [Tamron Camera Control Application](#) for your camera model from the Active Silicon website.

For information on how to use the application please see the section [Using the Tamron Camera Control Application](#) below.

Setting the Camera Control Interface (DIP Switches)

The Harrier USB/HDMI Camera Interface Board supports serial communication over RS-232, RS-485 and TTL communications interfaces (on the J3 connector). The camera can be controlled by sending VISCA commands over the serial interface (usually via a COM port), or over the USB connection using the Harrier Virtual COM port (if installed), or by using UVC commands.

You can select which one of these you want to use by setting DIP switches 5, 6 and 7 on the Harrier USB/HDMI Camera Interface Board when the board power is off.

| SW1-7 | SW1-6 | SW1-5 | COMMUNICATIONS MODE |
|-------|-------|-------|--|
| OFF | OFF | OFF | J3: RS-232 VISCA |
| OFF | OFF | ON | J3: RS-485 VISCA termination enabled |
| OFF | ON | OFF | J3: RS-485 VISCA termination disabled |
| OFF | ON | ON | J3: TTL VISCA |
| ON | OFF | OFF | J6: USB3.0 SuperSpeed (UVC/USB Virtual COM port) |

Table 1. Harrier USB/HDMI Camera Interface Board DIP switch settings for selection of camera communication interface before board power-up.

On the Harrier Evaluation Board, J103 supports RS-232 and TTL communications, J203 supports RS-485 and TTL communications.

The Harrier USB/HDMI Camera Interface Board is shipped by default with all DIP switches in the “OFF” position. In this state, the board is configured for RS-232 communications.

Setting the Camera Video Mode

To change the video output mode of the Camera/Harrier USB/HDMI Camera Interface Board the host/control device can send VISCA commands (via a COM port or similar serial interface) or send UVC commands (over the USB interface). For more information on setting this up see the section [Setting the Camera Control Interface \(DIP Switches\)](#) above.

Cameras usually start up in the same video mode that was set when the camera was powered down. Immediately after power-up completes, the camera interface board can be set to change the camera video mode to a user chosen mode; this ensures that on application start-up the camera is always in a known video mode. This is done by setting DIP switches 1 to 4 on the Harrier USB/HDMI Camera Interface Board as shown below, please check that your camera can support the selected mode. VISCA/UVC commands can be used at any time to change the camera video mode (requires camera reset).

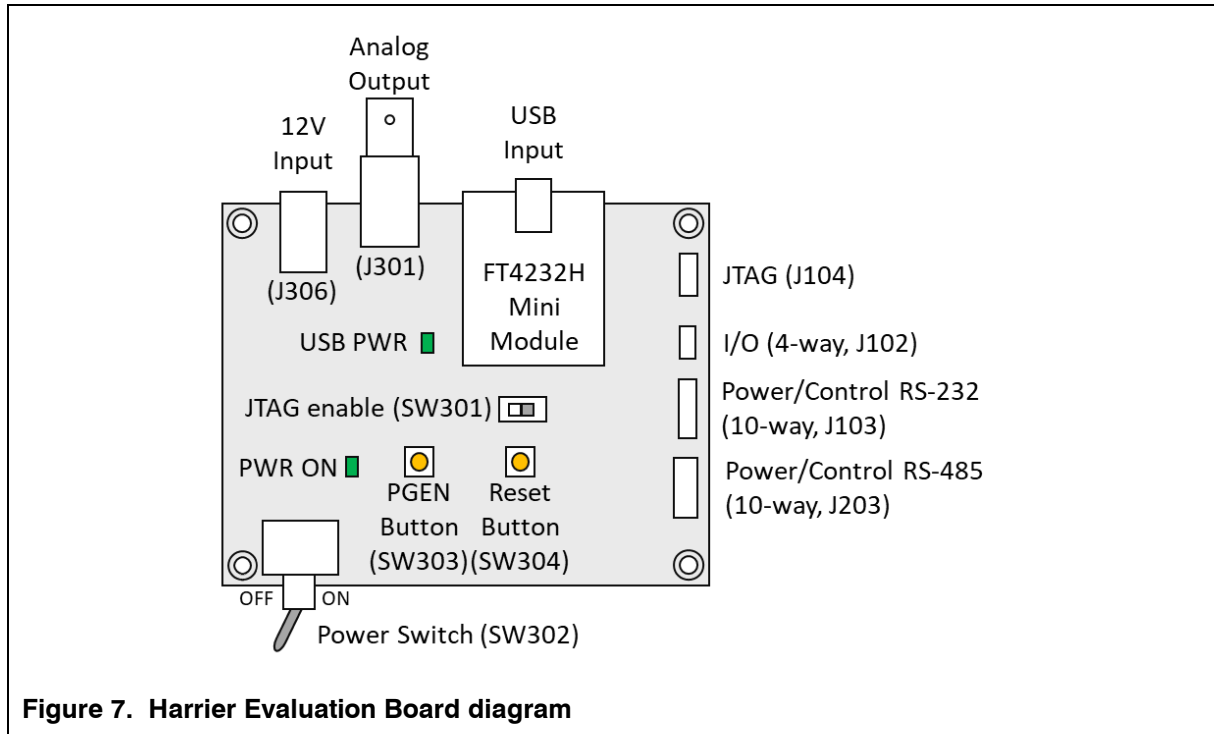
| SW1-4 | SW1-3 | SW1-2 | SW1-1 | VIDEO FORMAT | MODE | HDMI | USB |
|-------|-------|-------|-------|------------------------------------|------|------|----------|
| OFF | OFF | OFF | OFF | Default Camera Mode ⁽¹⁾ | 0 | ✓ | As below |
| OFF | OFF | OFF | ON | 1080p60 ⁽²⁾ | 1 | ✓ | ✓ |
| OFF | OFF | ON | OFF | 1080p59.94 ⁽²⁾ | 2 | ✓ | ✓ |
| OFF | OFF | ON | ON | 1080p50 ⁽²⁾ | 3 | ✓ | ✓ |
| OFF | ON | OFF | OFF | 1080p30 ⁽³⁾ | 4 | ✓ | ✓ |
| OFF | ON | OFF | ON | 1080p29 | 5 | ✓ | ✓ |
| OFF | ON | ON | OFF | 1080p25 ⁽³⁾ | 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 ⁽³⁾ | 10 | ✓ | ✓ |
| ON | OFF | ON | ON | 720p59.94 | 11 | ✓ | ✓ |
| ON | ON | OFF | OFF | 720p50 ⁽³⁾ | 12 | ✓ | ✓ |
| ON | ON | OFF | ON | 720p30 | 13 | ✓ | |
| ON | ON | ON | OFF | 720p29 | 14 | ✓ | |
| ON | ON | ON | ON | 720p25 | 15 | ✓ | |

Table 2. DIP switch settings for selecting camera video output mode

Notes:

- 1) “Default camera mode”: on power-up, the camera will start in the video format/mode that was set/being used when it was last powered down. The video mode can then be changed by UVC control or by using a VISCA serial command, followed by a camera reset (there is also the camera hard reset in the extended VISCA commands which will also serve this purpose).
- 2) Due to the high data bandwidth required, these video modes (above 1080p30) require the camera to be set to dual LVDS mode. Other modes (1080p30 and below) require the camera to be set to single LVDS mode. When using VISCA commands to change camera video mode the LVDS mode must also be set correctly, otherwise there will be no video output from the camera. See your camera documentation for more information on VISCA commands and setting LVDS modes.
Note: the MP2030M-GS camera does not support Dual LVDS mode or 1080p60/50 output.
- 3) The MP2030M-GS camera only supports these video modes.
- 4) **The DIP switches to select the video format are only read on power-up.** Therefore, 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 the operating modes supported by the camera currently in use.

Harrier Evaluation Board Overview



The Harrier Evaluation Board connects to the camera interface board using the supplied cable kit.

- JTAG (J104) - white 8-way cable (connects to J4, not required in normal use).
- I/O (J102) - black 4-way cable (connects to J2).
- Power/control, RS-232 (J103) - red 10-way cable (connects to J3).

The board is powered by the 12V power supply via a barrel connector (J306). This supply is also used as a power supply for the camera and is connected to the camera via the Power Switch (SW302). When the Power Switch (and camera power supply) is switched ON the PWR ON LED will illuminate.

For more information please see the [Harrier Evaluation Board datasheet](#) on the Active Silicon website (see Harrier USB/HDMI Camera Interface Board - Downloads section).

Setting up the system for full evaluation

To set up and get the Harrier USB/HDMI interface board running please follow the instructions below:

1. Connect the camera to the camera interface board connector (J1) using a KEL30 multi-way cable (connector type: KEL USL00-30L). (If you have purchased a pre-assembled camera module, e.g. AS-CIB-USBHDMI-002-1110-A, this cable will be already be connected).
2. **RS-232/RS-485/TTL communications:** to use serial communications with the camera, connect the USB A - mini USB cable to the mini USB connector on the Harrier Evaluation Board, and connect the USB A plug to a PC USB socket.
The USB PWR LED should light up indicating a live connection to the PC.
3. Connect the camera interface board PWR/CTRL connector (J3) to the Harrier Evaluation Board PWR/CTRL connector using the 10-way cable. For:
RS-232 connect the 10-way cable to J103,
RS-485 connect the 10-way cable to J203
TTL connect the 10-way cable to either J103 or J203.
4. Connect the camera interface board I/O connector (J2) to the Harrier Evaluation Board I/O connector (J102) using the 4-way cable.

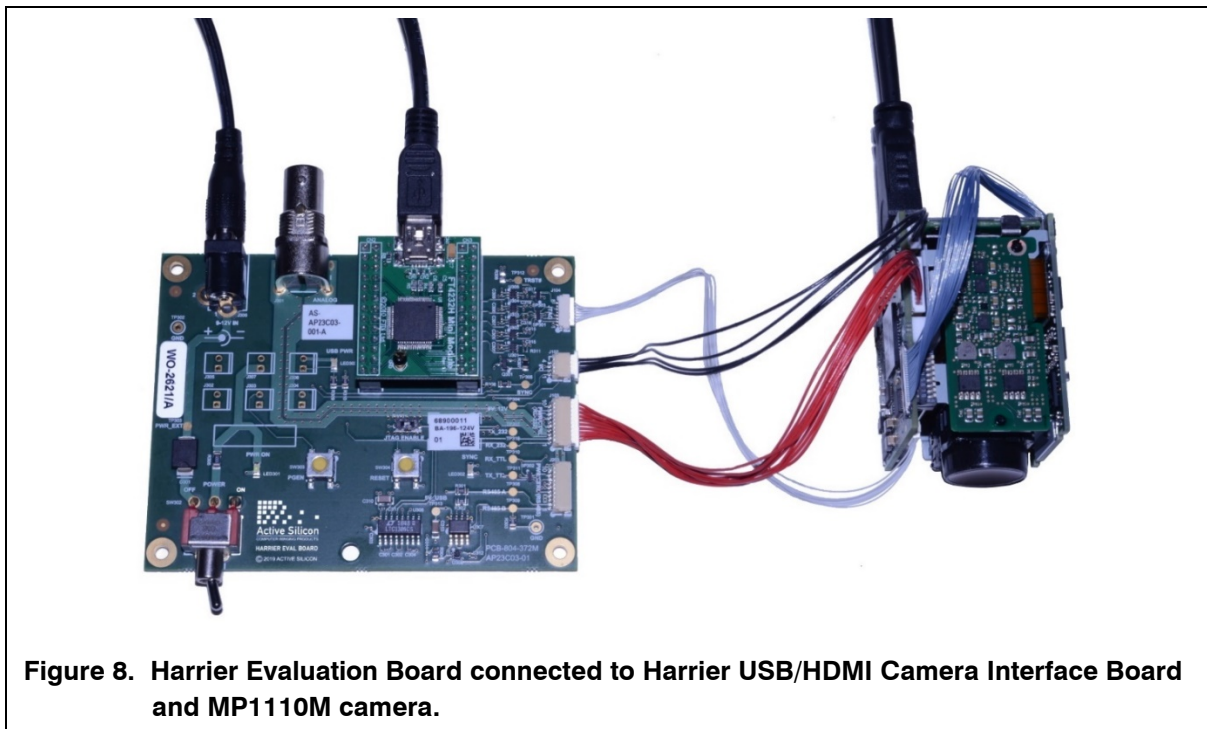


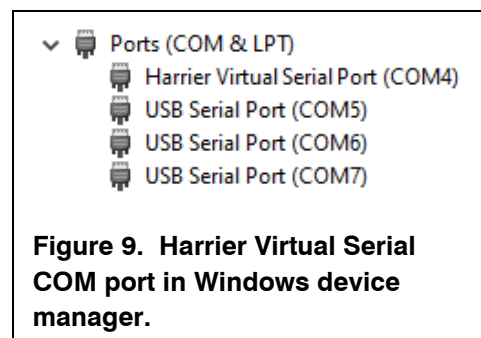
Figure 8. Harrier Evaluation Board connected to Harrier USB/HDMI Camera Interface Board and MP1110M camera.

5. Set/check the DIP switch settings, e.g. SW1 [1-4] OFF (no mode change on power up), SW1 [5-8] OFF (RS232 serial communications mode), or SW1 [7] ON for UVC/USB control.
6. Set the Harrier Evaluation Board power switch (SW302) to OFF (left, viewed from above).
7. Connect the power supply barrel connector to the Harrier Evaluation Board power input connector (J306) and plug in the power supply using the plug adapter suitable for your region.

8. **HDMI:** to see the camera output on HDMI, connect the camera interface board micro HDMI out connector (J5) to a monitor that can display the video modes that you intend to use (maximum 1080p60) using the micro HDMI cable. **Note:** some monitors are not able to display 1080p30.
9. Unless you want to power the board from the USB cable, switch ON the Harrier Evaluation Board power switch (SW302). The PWR ON LED should light up.
10. **USB/UVC:** to see the camera output on USB/UVC, connect the camera interface board USB Type C connector (J6) to a PC USB Superspeed capable socket using the 5 Gbps USB Type C cable. Note the board will try to power up from the USB cable unless power from the Harrier Evaluation Board is being used.
11. The camera will make audible mechanical noises as it goes through its power up sequence and after a short time the video outputs will be working.
Note: if the DIP switches have been used to set the camera mode, and the mode last used was different to the DIP switch setting, it will take a few seconds for the camera interface board to detect this, change the camera mode and re-start the camera.
12. **HDMI:** If the HDMI cable is connected you will see the camera video on the monitor (if the monitor supports the mode set on the camera).
13. **USB/UVC:** If the USB Type C cable is connected you can start your UVC application and it will capture the camera video (video mode settings for the camera and UVC application must match). If you do not have a UVC application, download and install [Harrier USB SDK](#) from the Active Silicon website. This SDK contains the HarrierView UVC example application. For instructions on how to use HarrierView please see the section [Using the Harrier USB SDK Example Application](#) below).
14. **RS-232/RS-485/TTL control:** The [Tamron Camera Control Application](#) provides an easy way to use serial communications; please see the section [Using the Tamron Camera Control Application](#) below.
To use your own program you can use the three COM ports that are set up when the Harrier Evaluation board is plugged in. Typically the lowest COM port number is the RS-232 interface, the middle port number is the RS-485 interface and the highest port number is the TTL interface. COM port settings for Harrier interface boards are (baud rate is user selectable):

| | | | | | |
|------------|------|------------------|-----|------------------|-----|
| Baud rate: | 9600 | Timeout: | ON | DSR sensitivity: | OFF |
| Parity: | None | XON/XOFF: | OFF | DTR circuit: | OFF |
| Data Bits: | 8 | CTS handshaking: | OFF | RTS circuit: | OFF |
| Stop Bits: | 1 | DSR handshaking: | OFF | | |

15. **Harrier Virtual Serial COM port:** if the Harrier USB SDK is installed, DIP switch SW1 [7] is ON and the interface board USB port is connected to the PC, this COM port will appear in the device manager COM/LPT port list. It can be used to send and receive VISCA commands in exactly the same way as an ordinary serial COM port. As there is no physical serial hardware, the serial port settings will not affect the function of the Harrier Virtual Serial COM port.

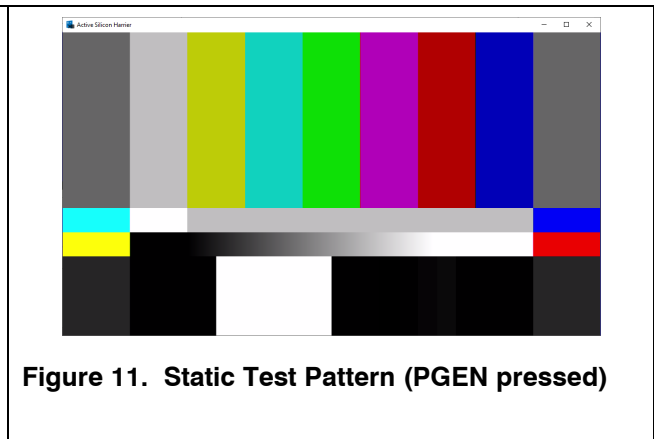
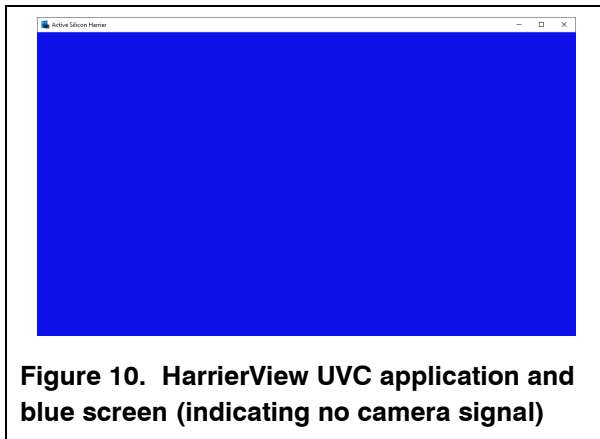


Test Pattern

With no video input connected, a simple blue/gray screen is displayed (see Figure 10). You may see this when the camera resets.

To display a static test pattern (see Figure 11), press the PGEN button on the Harrier Evaluation Board.

Note: this button will only work if the 4-way cable is connected between the Harrier Evaluation Board (J102) and the camera interface board (J2).



Analog Output

The BNC connector on the Harrier Evaluation Board will supply the analog video output from the camera interface board. Note: this signal is generated by the Tamron camera; to enable this the camera must be set into PAL/NTSC output mode using the appropriate VISCA command and a camera reset. When this video mode is set there will be no digital video output from the camera (and the HDMI and USB video interfaces will not work).

Reset Button

Pressing this button on the Harrier Evaluation Board causes the camera interface board and camera to reset. Many block cameras require a Reset activate certain features (e.g. change of video mode). Note: this only works if the 4-way cable is connected between the Harrier Evaluation Board (J102) and the camera interface board (J2).

Using the HarrierView UVC Application

Go to the Active Silicon website, download and install the [Harrier USB SDK](#).

The installation of additional drivers is not required.

Currently the SDK is only supported on Windows 10.

Once installed, the Harrier USB SDK documentation and HarrierView application appear in the Windows Start Menu, under “Harrier USB SDK” (see Figure 12).

In order to use the UVC controls the Harrier USB/HDMI Camera Interface Board DIP switches must be set to enable USB communications (SW1 [7] ON, SW1 [5 & 6] OFF).

Open the HarrierView Application from the Windows 10 Start menu (see Figure 13).

The application will start up and automatically locate a USB video device, the devices found will be displayed in the drop down panel in the Control Panel – Camera panel. Video acquisition can be stopped/started using the control button on the top left of the control panel (shown in Figures 13 and 14).

If you are using a laptop with a built-in camera, the application may select the laptop camera or the Harrier USB/HDMI Camera Interface Board as the initial video device. To select video from the Harrier USB/HDMI Camera Interface Board you may need to stop the current video (using the stop button shown in Figure 13), select the Active Silicon Harrier camera (as shown in Figure 14), and start the video again.

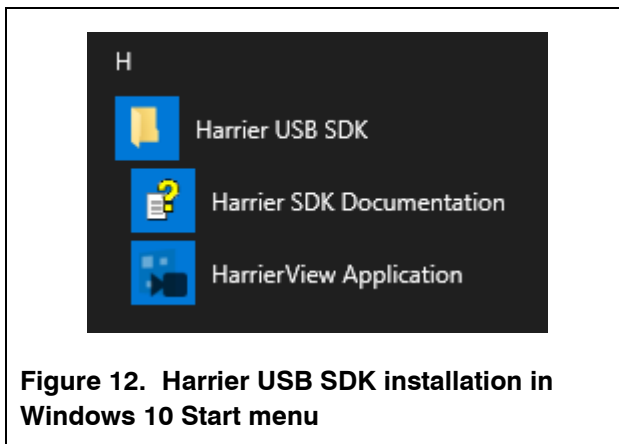


Figure 12. Harrier USB SDK installation in Windows 10 Start menu

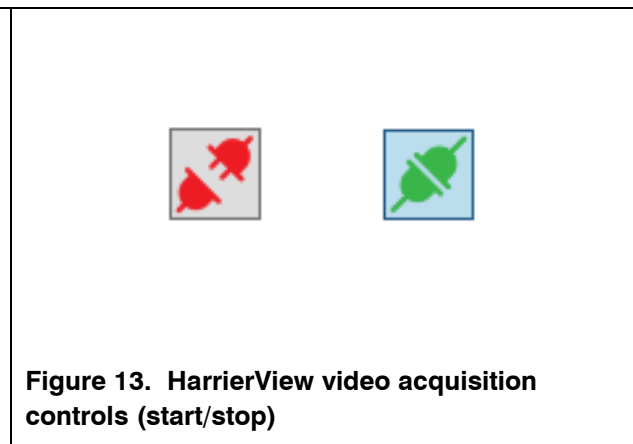


Figure 13. HarrierView video acquisition controls (start/stop)

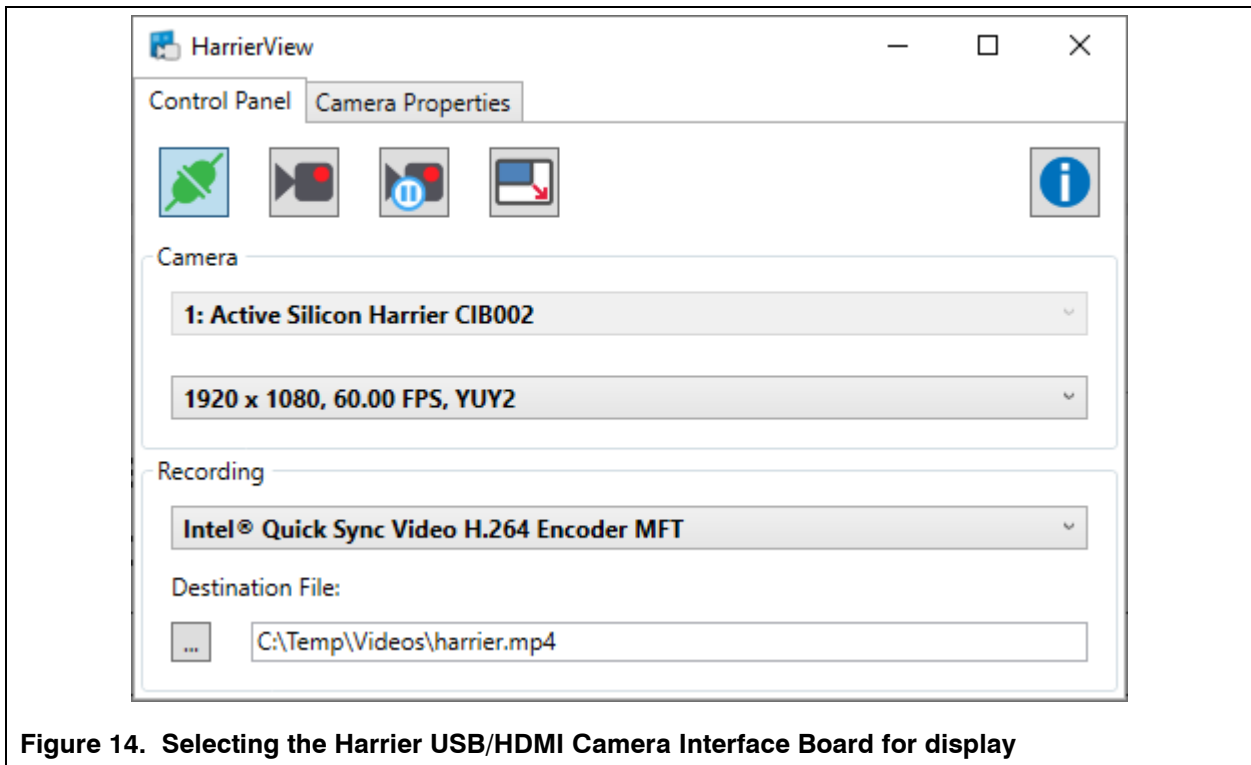


Figure 14. Selecting the Harrier USB/HDMI Camera Interface Board for display

Once the video has started in the default video mode, you can then select a different video mode (see Figure 15). The video modes supported/listed will depend on the camera connected.

Once the video mode has been selected the HarrierView Application will change the camera mode with a UVC command and will then capture USB video from the Harrier USB/HDMI Camera Interface Board / camera in that format. Note: DIP switch SW1 [7] must be set to ON.

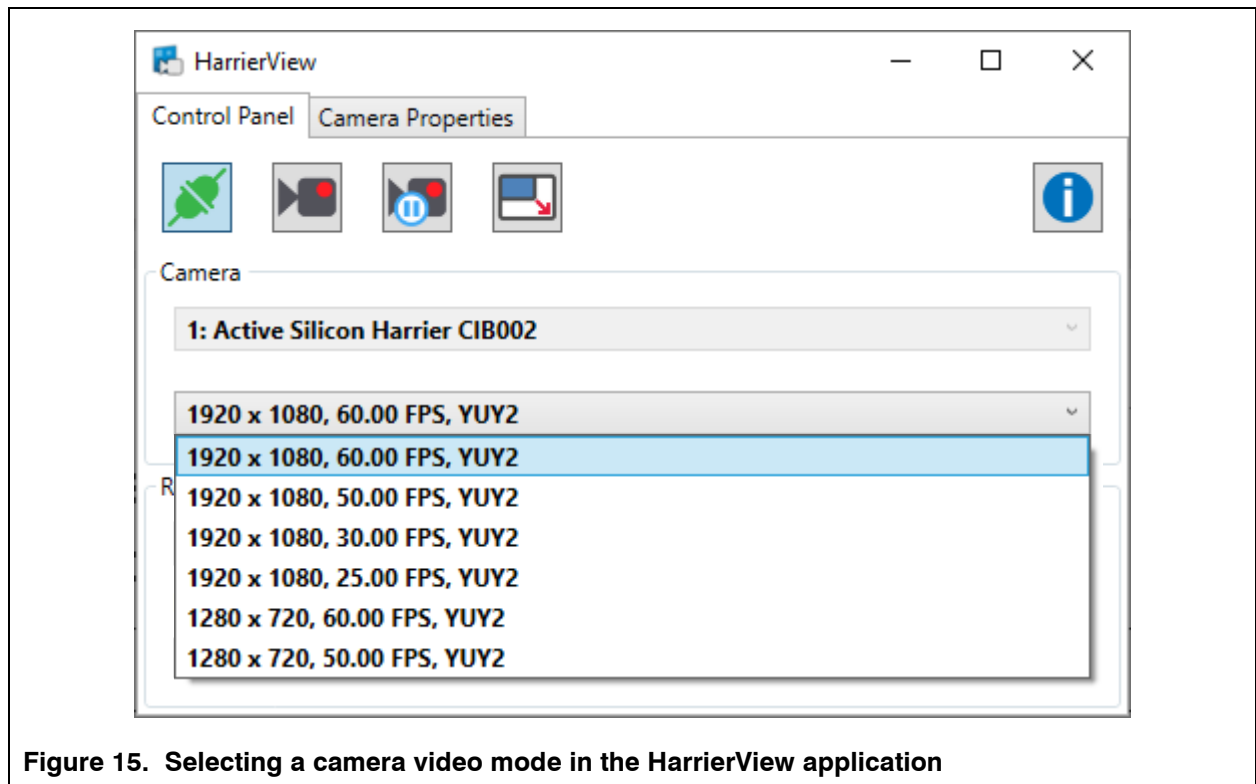


Figure 15. Selecting a camera video mode in the HarrierView application

Note: If the video mode is then changed using VISCA control, the HarrierView Application may not be able to capture the video. The actual video mode of the camera output can be easily determined by checking the format of the HDMI output of the Harrier USB/HDMI Camera Interface Board or by using a VISCA inquiry. If the output from the HDMI interface and the mode selected in the HarrierView Application are the same please check the interface board LED for error conditions and ensure that you have a USB Type C cable of the correct specification (USB3.X Type A/C to Type C, SuperSpeed, minimum 5 Gbps). If there is a USB video error the LED will flash red and the USB and HDMI video outputs will be disabled.

You can use the other controls in HarrierView to record video and (if the video view window is larger than the resolution of the video from the camera) enlarge the video to fit the view window.

Using the Tamron Camera Control Application

Go to the Active Silicon website [Software products page](#) and download the Tamron Camera Control Application for your Tamron camera. Unzip the executable and move it to a suitable folder on your PC. Tamron Camera Control Applications are only supported on Windows. If Windows 7 is used, then it is recommended that the latest drivers from FTDI are installed. These are available here:

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

Please check that the Harrier USB/HDMI Camera Interface Board DIP switches are set for the serial interface standard that you intend to use and check that you have connected the 10-way cable to the correct connector on the Harrier Evaluation Board. For more information please see the sections [Setting The Camera Control Interface \(DIP switches\)](#) and [Setting Up The System](#).

Run the Tamron Camera Control Application executable.

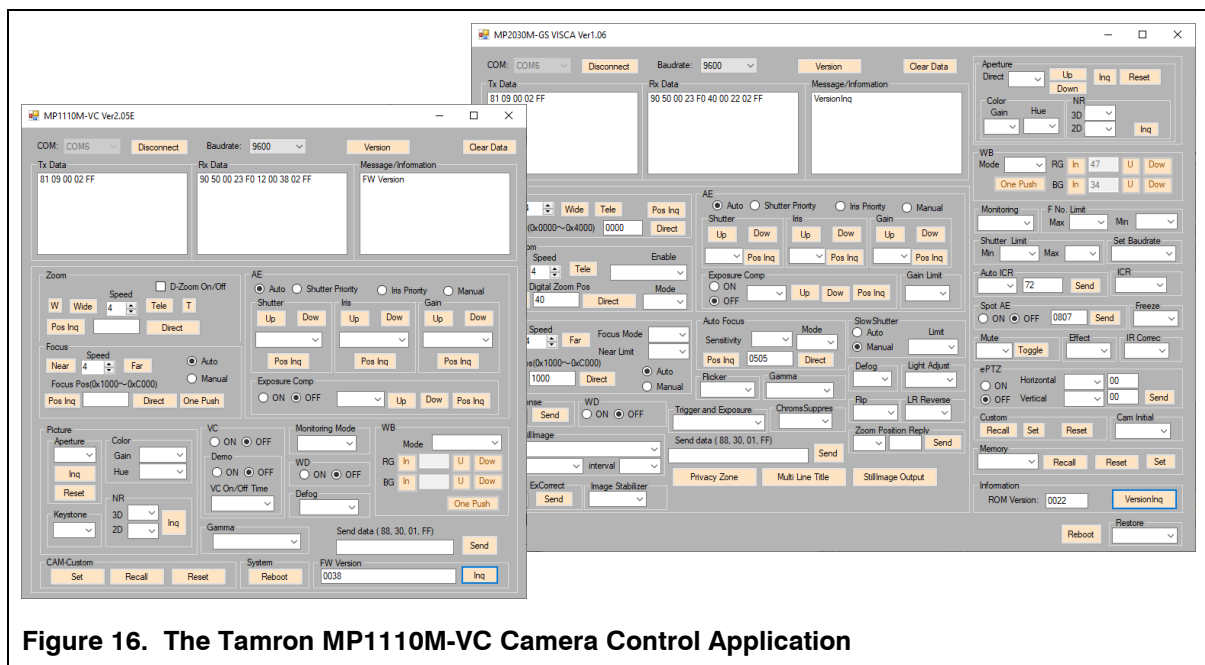


Figure 16. The Tamron MP1110M-VC Camera Control Application

When the Harrier Evaluation Board is plugged in using the mini USB cable, the Windows operating system will see three virtual COM ports; these ports are automatically assigned (incrementing) numbers by Windows. To successfully use the Tamron application, it is necessary to identify the COM port numbers which Windows has assigned to the board and use the correct one.

Open Device Manager and look at the COM & LPT ports. You can identify the three port numbers by comparing reported port numbers with the board connected, and the board disconnected.

- The lowest port number added is the RS-232 interface.
- The second added port number is the RS-485 interface.
- The highest port number added is the TTL interface.

In the Tamron Application, use the **COM:** drop-down box at the top left of the application window to select the COM port that supports the serial interface standard you want to use. Then click on the **Connect** button.

Click on the **Inq** button on the bottom right hand side of the window. You should see the application send a VISCA command enquiry and the camera sending a response in the TxData and RxData dialog boxes.

Using the Harrier Virtual Serial COM port

The Harrier Virtual Serial COM port is part of the [Harrier USB SDK](#). This can be downloaded from the [Software section](#) of the Active Silicon website. If the SDK is installed, DIP switch SW1 [7] on the interface board is set to ON and the Harrier USB/HDMI interface board USB port is connected to the PC with a suitable cable, the Harrier Virtual Serial COM port appears in the Device Manager COM/LPT Port list (Figure 9).

The Harrier Virtual Serial COM port can be used to send and receive VISCA commands in the same way as an ordinary serial COM port. As there is no physical serial hardware, the serial port settings will not affect the function of the Harrier Virtual Serial COM port.

Note: by default the Harrier USB/HDMI interface board is configured not to send VISCA command Acknowledge and Complete responses to optimize the USB video transfer. This behavior can be changed using the Harrier USB/HDMI interface board VISCA command.

Technical Support

In case of any issues, please contact Active Silicon Technical Support on the telephone numbers below or by email to techsupport@activesilicon.com.



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