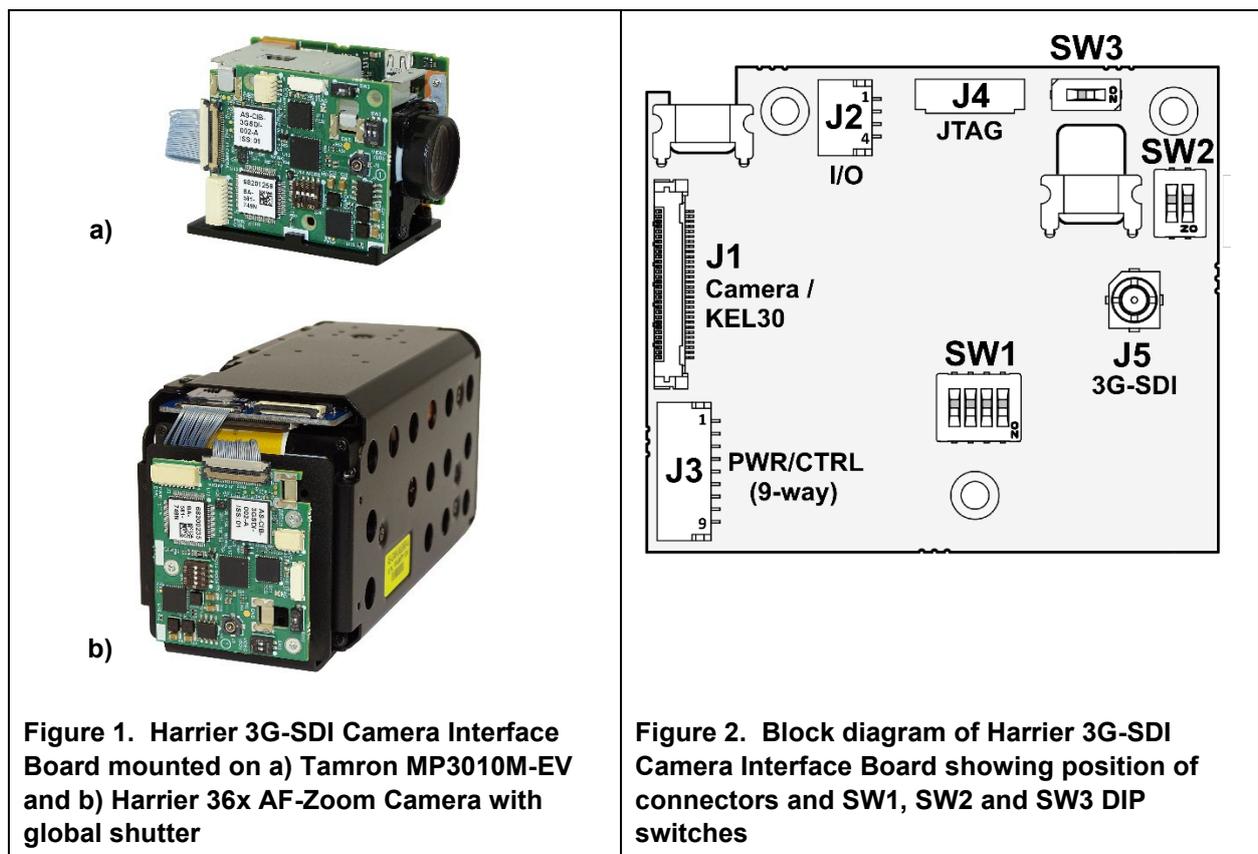# QUICKSTART GUIDE

HARRIER 3G-SDI CAMERA INTERFACE BOARD

Introduction

This guide is designed to get you quickly up and running with the Harrier 3G-SDI Evaluation Kit (AS-CIB-3GSDI-002-EVAL-B) and the **Harrier 3G-SDI Camera Interface Board** (AS-CIB-3GSDI-002-A). The interface board can be purchased as a pre-assembled camera module with a range of different cameras, e.g. Tamron MP3010M, Sony EV-series or Harrier 10x/36x/40x/55x AF-Zoom Cameras.

This document should be read in conjunction with the Harrier 3G-SDI Camera Interface Board datasheet and other documents available on Active Silicon's website, (see Harrier 3G-SDI Camera Interface Board - Downloads section):

https://www.activesilicon.com/products/harrier-3g-sdi-camera-interface-board-75-ohm/

Figure 1. Harrier 3G-SDI Camera Interface Board mounted on a) Tamron MP3010M-EV and b) Harrier 36x AF-Zoom Camera with global shutter

Figure 2. Block diagram of Harrier 3G-SDI Camera Interface Board showing position of connectors and SW1, SW2 and SW3 DIP switches

The Harrier 3G-SDI Camera Interface Board can be customized to deliver application specific functions; USB/HDMI, HDMI-only or USB-only interface boards are also available.
For more details contact Active Silicon.

Evaluation Kit Contents

The Evaluation Kit (AS-CIB-3GSDI-002-EVAL-B) contains all the parts needed to evaluate the Harrier 3G-SDI Camera Interface Board and all camera solutions based on this camera interface board. Note that the evaluation kit does not include a Harrier 3G-SDI Camera Interface Board or camera, these need to be ordered separately.

Please check that you have all the parts listed below:

- Harrier Evaluation Board (Figure 3)
- 9-way cable (Figure 4)
- 4-way cable (Figure 4)
- White 8-way cable (Figure 4)
- H.FL micro coaxial cable and BNC adapter (Figure 5)
- 30-way micro coax cable (KEL cable; Figure 6)
- USB Type A to mini USB Type B cable
- Multi-region 12V power supply (please fit the adapter suitable for your region)
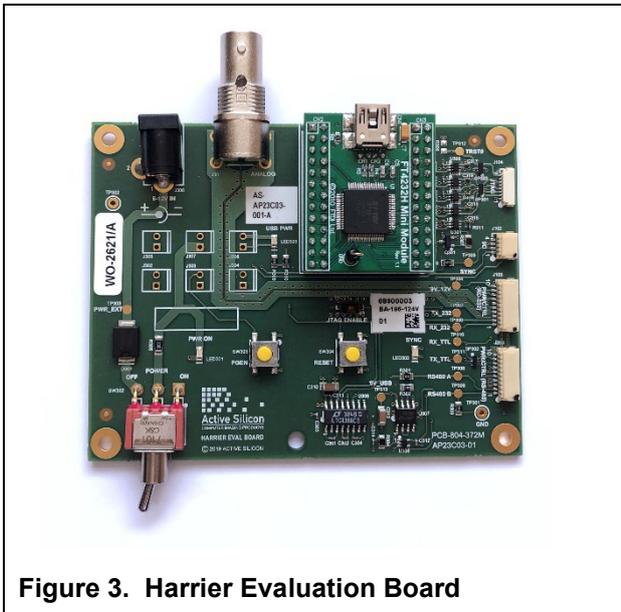

Figure 3. Harrier Evaluation Board

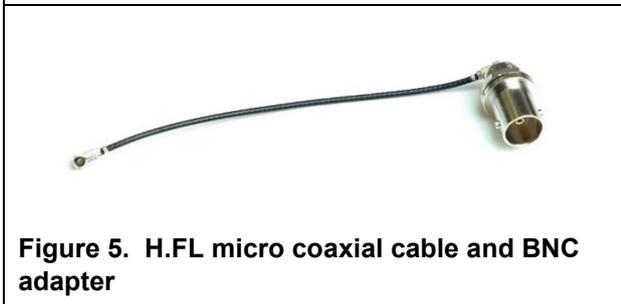**Figure 4. Harrier Evaluation Board cables**

Figure 5. H.FL micro coaxial cable and BNC adapter

Figure 6. 30-way micro coax cable (KEL cable)
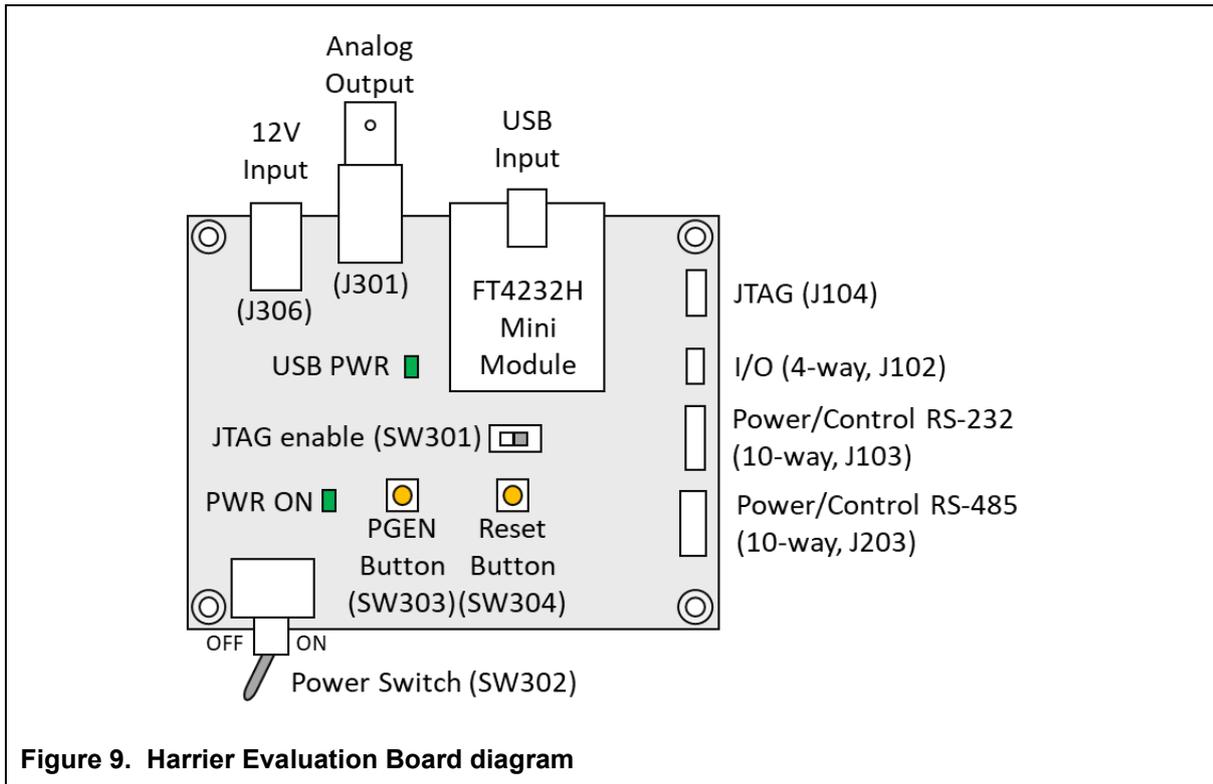
Harrier Evaluation Board Overview

Figure 9. Harrier Evaluation Board diagram

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

- I/O (J102) - 4-way cable (connects to interface board J2).

- Power/control, RS-232 (J103) - 9-way cable (connects to interface board J3).

- JTAG (J104) - white 8-way cable (connects to interface board J4, not required for normal use).

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.
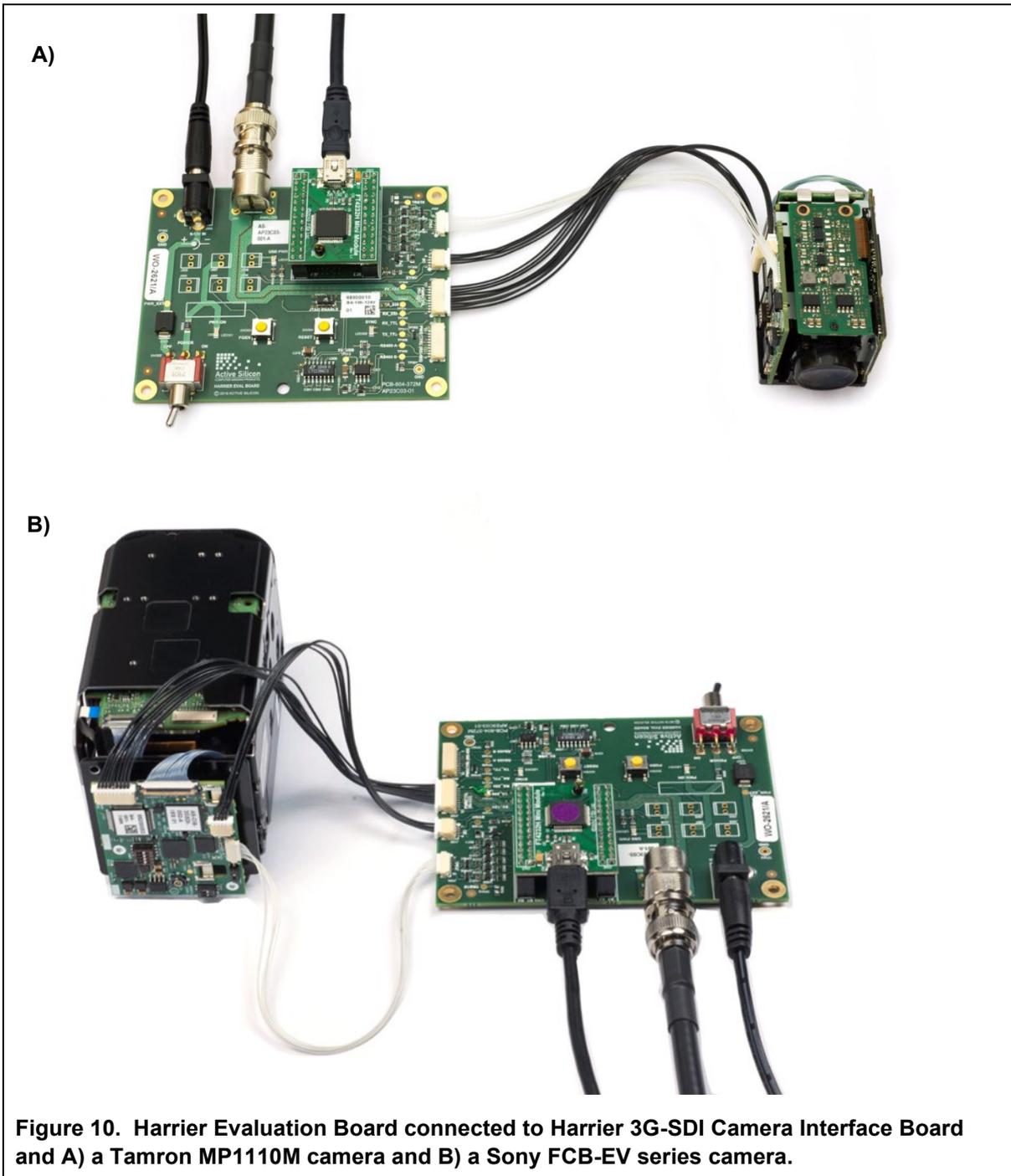
For more information please see the Harrier Evaluation Board datasheet (PDF for download) on the Active Silicon website (see Evaluation Kit for Harrier 3G-SDI - Downloads section).

Setting up the System

To get the 3G-SDI Camera Interface Board running, please follow the instructions below:

1. Connect the camera to the camera interface board connector (J1) using the 30-way micro coax cable (connector type: KEL USL00-30L). (If you have purchased a pre-assembled camera module, this cable will already be connected).

2. Connect the camera interface board I/O connector (J2) to the Harrier Evaluation board I/O connector (J102) using the 4-way cable.

3. Connect the camera interface board PWR/CTRL connector (J3) to the Harrier Evaluation Board PWR/CTRL connector using the 9-way cable. For:
   RS-232 connect the 9-way cable to J103,
   RS-485 connect the 9-way cable to J203,
   TTL communications connect the 9-way cable to either J103 or J203.

4. For **analog camera output** (720p50 & 720p60 modes only), connect the J301 (Analog) BNC socket on the Harrier Evaluation Board to an analog monitor/display using a suitable cable.

5. For **3G-SDI/HD-SDI camera output**, connect the H.FL micro coaxial cable to the J5 (SDI video) socket. Connect the other end of the H.FL micro coaxial cable to the BNC adapter and use a 75 Ohm 3G-SDI/HD-SDI digital video quality BNC cable to connect the adapter to a 3G-SDI/HD-SDI capable monitor/display.

6. For **serial communications** with the camera, use the mini USB–USB Type-A cable to connect the mini USB socket on the Harrier Evaluation Board to a PC. The USB PWR LED should light up indicating a live connection to the PC. Three serial interfaces will appear as COM ports on the PC and be accessible to PC software. These COM ports can be tested using the HarrierControl command line software; if you have a Sony camera, the Sony Camera Control application can be used, and if you have a Tamron camera, the Tamron Camera Control Application (see the section *Using the Tamron Camera Control Application* below). The Tamron application can be used with other cameras, but as the VISCA commands vary between cameras the controls may not be compatible. All of these applications can be downloaded from www.activesilicon.com from the Software page.

7. Set/check the interface board DIP switch settings, e.g. SW1(1-4) OFF (no mode change on power up), SW2 (1,2) OFF (RS232 serial communications), SW3 OFF (HD-VLC mode off).

8. Connect the power supply barrel connector to the Harrier Evaluation Board power input connector (J306).

9. Set the Harrier Evaluation Board power switch (SW302) to OFF (left viewed from above).

10. Plug in the power supply and switch ON the Harrier Evaluation Board power switch (SW302). The PWR ON should light up.

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 setting, it will take a few additional seconds for the camera interface board to detect this, change mode and reset the camera to set the new video mode.

12. If an analog monitor is connected to the Harrier Evaluation board, and the camera mode is set to 720p50/720p60, you will see the camera output on the analog monitor.

13. If the 3G-SDI/HD-SDI output is connected you will see the camera output on the 3G-SDI/HD-SDI monitor/display.

Figure 10. Harrier Evaluation Board connected to Harrier 3G-SDI Camera Interface Board and A) a Tamron MP1110M camera and B) a Sony FCB-EV series camera.

Setting the Camera Serial (VISCA) Control Interface (DIP Switches)

The Harrier 3G-SDI Camera Interface Board supports VISCA serial communication over RS-232, RS-485 and TTL communications interfaces (on the J3 connector). Select which one to use by setting DIP switches SW2-1 and SW2-2 on the Harrier 3G-SDI Camera Interface Board.

SW2-2	SW2-1	COMMUNICATIONS MODE
OFF	OFF	RS-232 VISCA communications on J3 pins 1 and 2.
OFF	ON	RS-485 VISCA communications with RS-485 termination *disabled* on J3 pins 1 and 2.
ON	OFF	RS-485 VISCA communications with RS-485 termination *enabled* on J3 pins 1 and 2.
ON	ON	TTL VISCA communications on J3 pins 8 and 9. Transceivers connected to J3 pins 1 and 2 will be shut down. Applications using this configuration should leave J3 pins 1 and 2 unconnected.

Table 1. Harrier 3G SDI Camera Interface Board DIP switch settings for selection of the camera serial communications interface type.

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

The Harrier 3G SDI 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

Changing the video output mode of the Harrier 3G-SDI Camera Interface Board can be done using the serial control interfaces and an external controller. For more information on setting this up see the section *Setting the Camera Serial (VISCA) 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 the camera power-up completes, the Harrier 3G-SDI Camera Interface Board reads the DIP switches SW1:1 to 4, and will then change the camera video mode to the mode set by the DIP switch (SW1:1 to 4) settings as shown in Table 2. below. This ensures that on application start-up the camera is always in a known video mode; once the start-up is complete and the camera is in the selected mode, VISCA commands can be used at any time to change the camera video mode. Please check that your camera can support the selected mode.

SW1-4	SW1-3	SW1-2	SW1-1	VIDEO FORMAT	MODE
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

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 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. 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.
See your camera documentation for more information on VISCA commands for setting the LVDS mode. Note: the Tamron MP2030M-GS or Harrier 36x AF-Zoom Camera do not support Dual LVDS mode hence these video output modes are not supported (output limited to 1080p30 and below). Example commands:

Set Single LVDS mode [1080p30 and below] = 81,01,04,24,74,00,00,FF
Set Dual LVDS mode [1080p50/60] = 81,01,04,24,74,00,01,FF

3) **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.

Test Pattern

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).
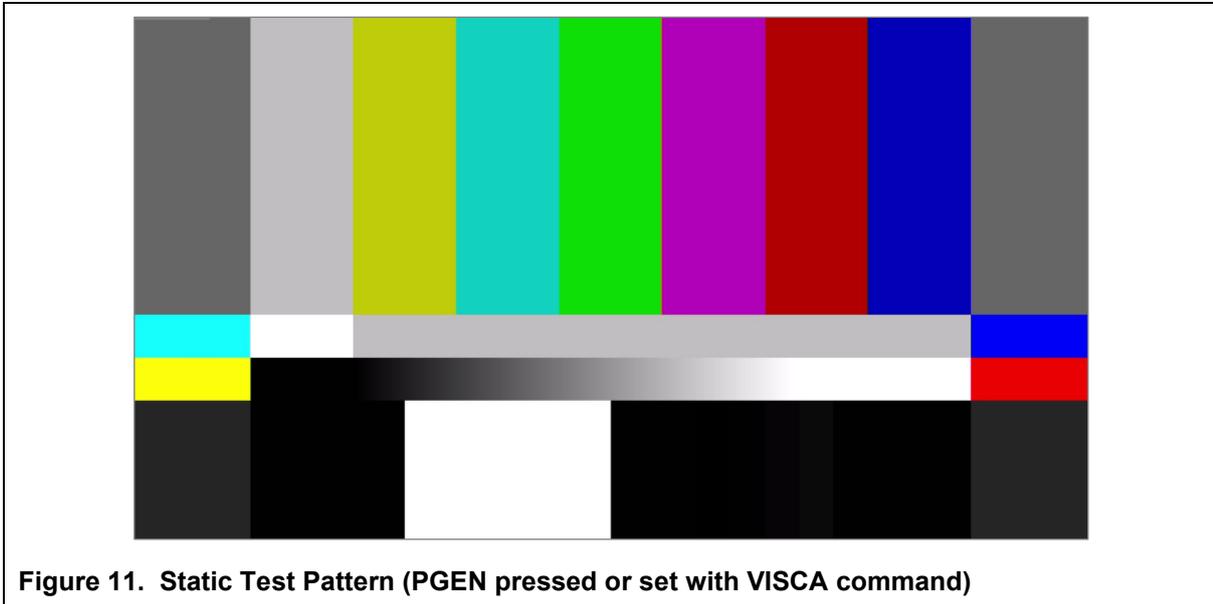

Figure 11. Static Test Pattern (PGEN pressed or set with VISCA command)

Reset Button

Pressing this button on the Harrier Evaluation Board causes the camera interface board and camera to reset. Some features require a camera reset to activate/complete certain VISCA commands (e.g. change of video mode).

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 Video Output

The BNC connector on the Harrier Evaluation Board will supply the analog video output of the camera interface board. The Harrier 3G-SDI Camera Interface Board generates the analog signal by downscaling the camera digital output. To enable this the camera must be set into 720p50/720p60 output mode. By default, when this camera video mode is set, both analog and digital outputs are enabled. A VISCA command can be used to select 4:3 or 16:9 analog output modes.

Camera Control Application

To evaluate the serial communications capability, you will need an application that can provide RS-232, RS-485 or TTL serial communication. The HarrierControl command line software can be used for this, or if you have a Sony camera the Sony Camera Control Application and if you have a Tamron camera the Tamron Camera Control Application. All of these applications can be downloaded from www.activesilicon.com from the Software products page.

For information on how to use the Tamron application please see below.

Using the Tamron Camera Control Application

Go to the Active Silicon website, and find the Software page, or the page for your model of camera (downloads tab), and download the Tamron Camera Control Application for your camera:

Tamron MP3010M-EV

Unzip the executable and move it to a suitable folder on your PC.

The Tamron Camera Control Application is 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 3G-SDI Camera Interface Board DIP switches are set for the serial interface standard that you intend to use, and check that you have connected the 9-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*.

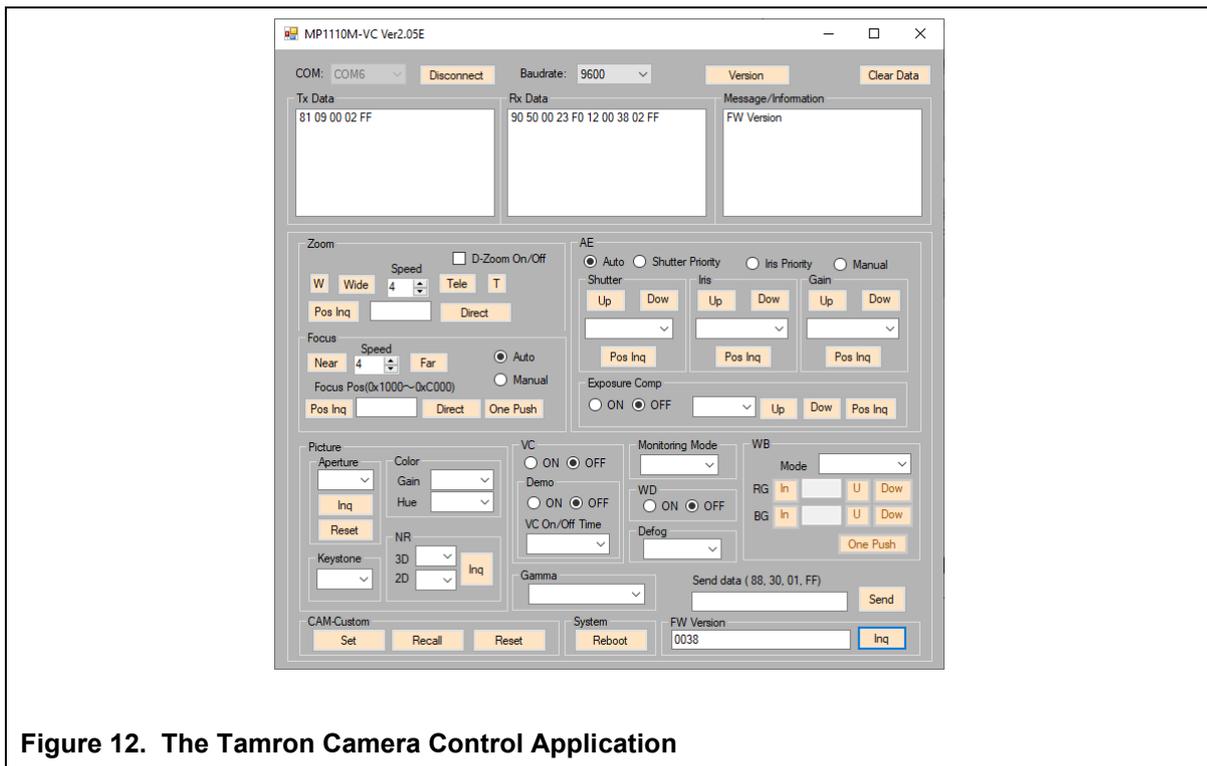Run the Tamron Camera Control Application executable.

Figure 12. The Tamron 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 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 inquiry and the camera sending a response in the TxData and RxData dialog boxes.

Once the application is communicating with the camera you can use the GUI controls to operate the camera functions. Note changing camera mode will require a re-boot, also on the MP1110M you may need to change the camera LVDS mode (Single / Dual) by entering the set LVDS command into the Send Data box:

Set Single LVDS mode [1080p30 and below] = 81,01,04,24,74,00,00,FF

Set Dual LVDS mode [1080p50/60] = 81,01,04,24,74,00,01,FF

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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