FireBird Frame Grabbers - Installation and Use

QUICKSTART GUIDE

Active Silicon

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Part Information
Part Number: FBD-MAN-QS.

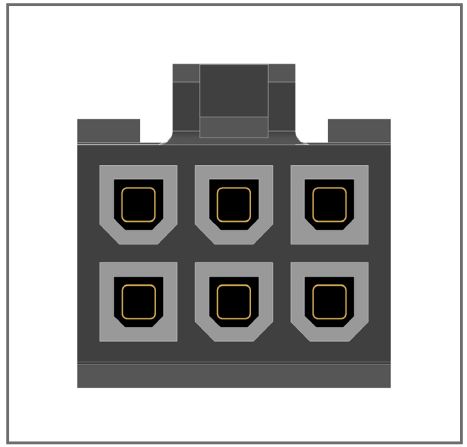
- Power off and open up the computer taking the usual **anti-static** precautions.
- Please note: The boards are **keyed** so that they can only be fitted into a slot in which they will work. **Do not** modify the FireBird board or the motherboard in an attempt to override the keying as this could result in serious damage.
- For full performance, boards with a part number including ’PE8’ must be fitted in a slot that supports PCI Express at x8 width; similarly those including ‘PE4’ must use a slot supporting x4. Boards with a part number including ’3PE’ must be fitted in a slot that supports PCI Express at Gen 3 speeds; those including ‘2PE’ must use a slot supporting Gen 2 speeds. Check your computer documentation for details of the PCI Express connectors.
- **CoaXPress Boards Only**: For multichannel CoaXPress boards, and the 1XCXP6-2PE8 board, if the board will be used to power cameras through the CoaXPress cables using PoCXP then the auxiliary power connector J13 must be connected to the computer power supply. The correct power supply cable is one intended for PCI Express Graphics (PEG) cards, and may have 6 or 8 ways. To distinguish it from other similar connectors in the computer, the connector should be black and may be marked ‘PCI-E’ or ‘PEG’. Similar connectors that are not PEG should be white. However, this is often not the case, so the cables should be checked for the pattern of squares and chamfers on the plastic body of the connector at the end of the cable. See the images below.

  Also, the wires should be black on the side with the connector clip, and colored (often yellow or blue) on the other side.

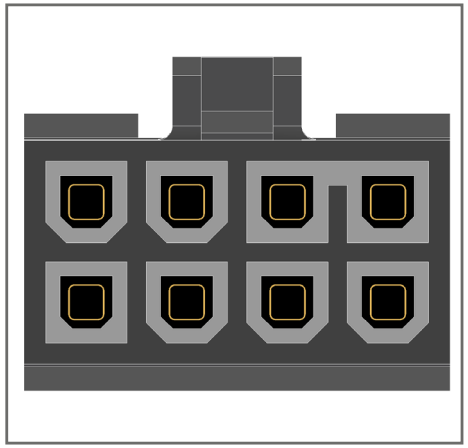
  If the connector does not match those shown above, DO NOT attempt to force it into FireBird; it could result in serious damage.

  FireBird frame grabbers have either 6 or 8 way PEG sockets. If a 6 way connector is plugged into a 8 way socket it should be aligned at the upper 6 ways of the 8 way FireBird connector as shown below.

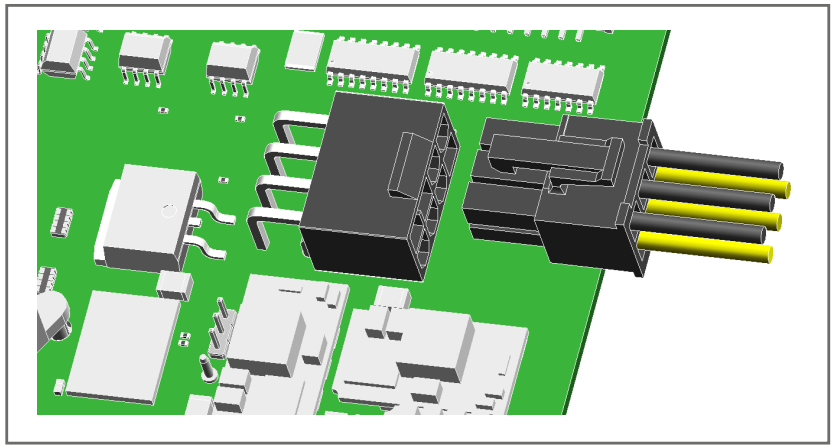
  PEG cable splitters, PEG to SATA adapters and PEG to ‘Molex’ adapters are available from Active Silicon and are included in the optional cable starter kit.
- Close and power on the computer.



6-way PEG Cable Connector



8-way PEG Cable Connector



6-way Cable Alignment

The *Active Silicon FireBird Package* includes the FireBird Driver (device driver and core libraries), various applications including ***ActiveCapture***, a GenICam-based GUI program, and the GenTL Producer. Additionally, ActiveSDK is for software developers.

By default, selecting *Typical* installs everything, but individual options can be deselected if required (see image below).

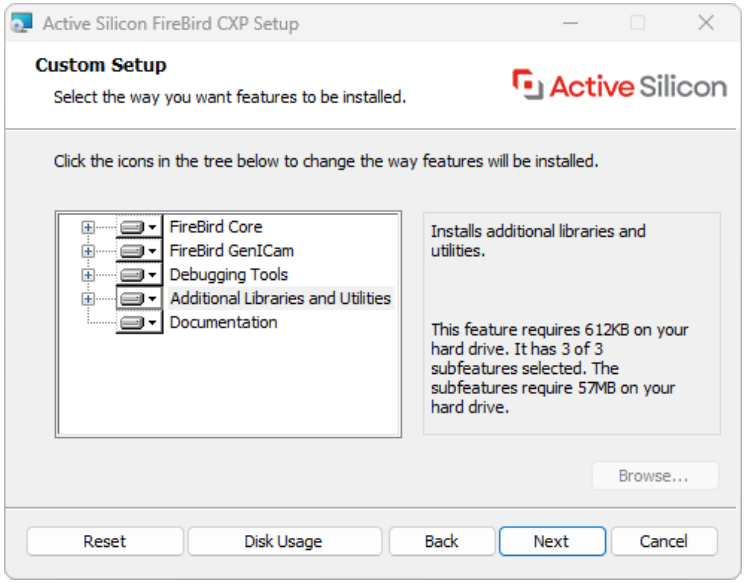
The packages are supplied as a compressed file which includes the installation package along with these instructions and the release notes.

The file naming convention is:

as-<product>-<OS>- vXX_YY_ZZ

where *<product>* is:

- *fbd-cxp* for the FireBird CoaXPress Package.
- *fbd-cl* for the FireBird Camera Link Package.
- *fbd-sdk* for the FireBird ActiveSDK Package.



Software Installation Options

Windows® 10 and 11

- Uninstall any previous version of the *Active Silicon FireBird Package* (see page 11). Note: The previous SDK can be left on the PC to allow developers to refer to both old and new SDKs.
- Un-zip the required *msi* package to a local disk.
- Run the *msi*.
- Follow the on-screen prompts, including to reboot the PC once installation has completed.
- After completing installation it is recommended to update the FireBird firmware (see the next page).

Windows Service

Part of the installation is a Windows service '*Active Silicon FireBird*' which automatically runs as Windows starts. This loads the main firmware into FireBird boards with part numbers including '3PE'. Until the service runs these boards have limited functionality, and from a hardware viewpoint they do not power or discover connected cameras and LEDs do not function. This process is needed to meet PCI Express requirements with the larger FPGA used.

Other Operating Systems

See the specific Quickstart Guide supplied with the installation package.

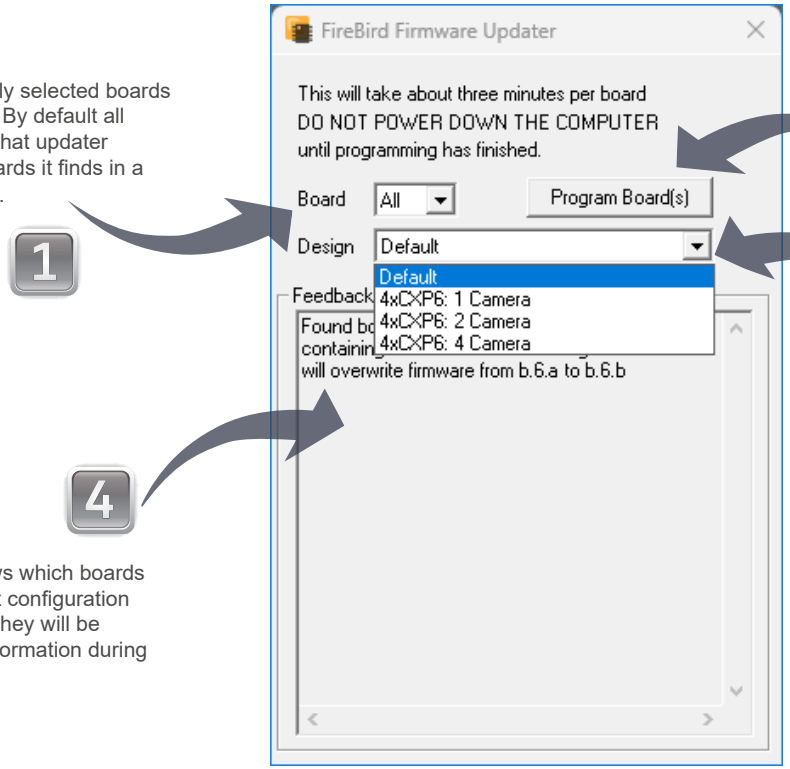
Note: <xx> represents the camera interface, e.g. CXP or CL.

It is recommended to always update the firmware on FireBird boards to match that in the current driver set. This is also important because new boards ship with firmware used in production testing.

To update firmware select ***Flash Programming*** from the Tools menu in ***ActiveCapture*** to run the *FireBird Firmware Updater* utility.

This utility also allows the **configuration mode** of the board to be changed – for example a four input CoaXPress board by default supports one camera with up to four coax cables, but it can be configured e.g. to support four cameras each with one coax cable by selecting *Design 4xCXP6: 4 Camera*.

The *Board* option allows only selected boards in a system to be updated. By default all boards are updated. Note that updater will update any Phoenix boards it finds in a system as well as FireBirds.



Click the *Program Board(s)* button to start the update process. Wait for the process to complete, then reboot the PC.

The *Design* option controls the **configuration mode** of the board. The options presented depend on the board in use. The options with a 4xCXP6 FireBird are shown here.

Default updates the firmware keeping the same configuration mode as before the update.
4xCXP6: 1 Camera selects the configuration mode with 1 camera with up to 4 coax cables.
4xCXP6: 2 Camera selects the configuration mode with 2 cameras each with 2 coax cables.
4xCXP6: 4 Camera selects the configuration mode with 4 cameras each with 1 coax cable.

The *Feedback* window shows which boards will be updated, their current configuration and firmware version, what they will be updated to, and progress information during updating.

Note: The above refers to Windows. For the location of utilities and documentation for other for other operating systems refer to the specific Quickstart Guide.

Note: <xx> represents the camera interface, e.g. CXP or CL.

If the updater fails for any reason so that the board is no longer recognized, jumper J8 can be moved to the 'FF' position before rebooting the PC to allow the board to configure from its 'Factory' design, to allow the update process to be run again. When the updater has finished, shut down the PC and move the jumper back to its default position before powering up the board. See the *Jumpers* section of the ***FireBird Hardware Manual*** for more information.

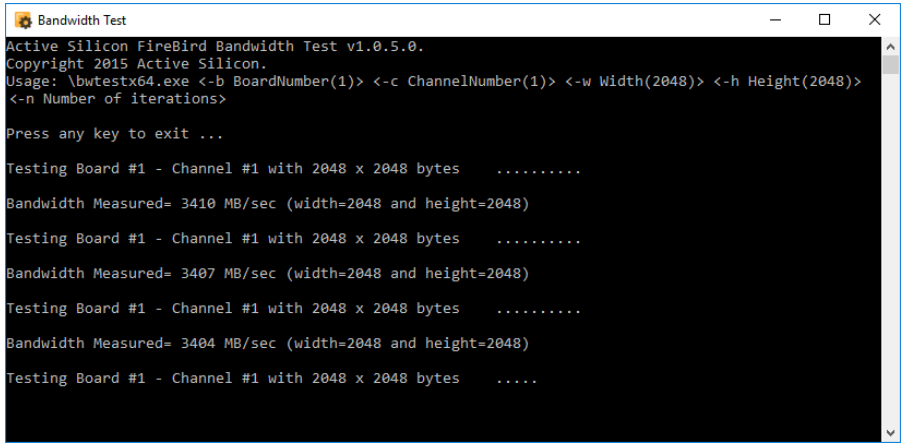
Check the PC BIOS

- Older BIOS versions in PCs can give noticeably lower PCI Express bandwidth. It is recommended to check for available BIOS updates, especially if any bandwidth problems are seen.
- Many PCs now support power saving features in the BIOS. These can result in poor PCI Express bandwidth, maybe only occasionally. Therefore Active Silicon recommends that the following settings are used (where available):
  - *C-States* set to 'Off'.
  - *Speedstep* set to 'Off'.
  - *PCI Performance Mode* set to 'On'.
  - *PCI Express Power Management* set to 'Off'.

Check the Bandwidth

Next run the ***Bandwidth Test*** utility. FireBird can transfer data at very high rates but if the PC cannot keep up the system will not work. This utility, in the *Tools* menu in ***ActiveCapture***, shows the maximum rate that FireBird can transfer data to the PC.

For a board with part number including '3PE8' a value around 6800 Mbytes/sec is typical of a good PC; similarly 3400 Mbytes/sec for a '3PE4' or '2PE8' and 1700 Mbytes/sec for a '2PE4'. A low or unstable value means that problems are likely to be seen.

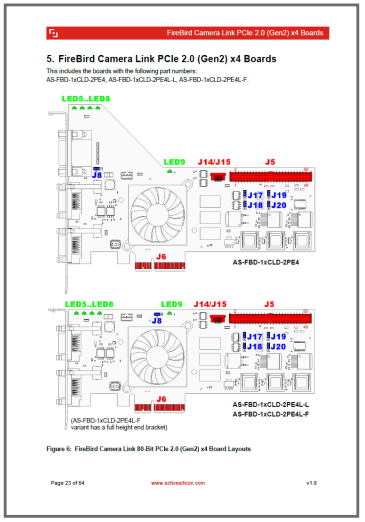


Bandwidth Test Results

Low Bandwidth?

If the bandwidth test reports a low or unstable value, check the following:

- Check that a suitable PCI Express slot is in use (see ***Hardware Installation*** on page 3). Sometimes motherboard restrictions mean that a Gen 2 x16 slot works better than a Gen 2 x8 slot, so try using a x16 slot.
- Check the BIOS settings (see ***Check the PC BIOS*** opposite).
- How old is the motherboard? Old chipsets may show worse performance than current ones.



Hardware Manual Example

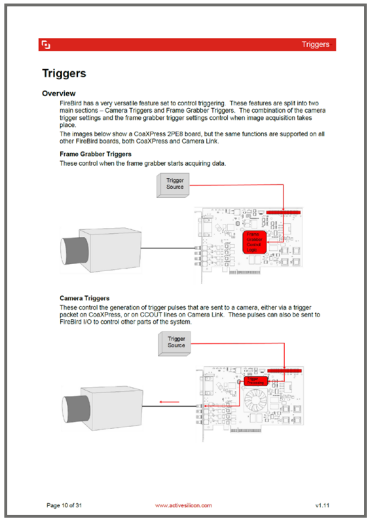
Documentation

The *Start Menu* under *Active Silicon FireBird <xx>* – Documentation includes this document, release notes, and the following key documents:

The ***FireBird Hardware Manual*** gives full details of all **connectors**, **LEDs** and jumpers on FireBird, **I/O support**, and PC requirements.

The ***FireBird System Manual*** is the first place for system developers and programmers to go. It gives an overview of the options to configure a system, describes all the trigger modes in detail, and discusses system issues.

Documentation on the API is described in the ***ActiveSDK*** section (page 10).



System Manual Example

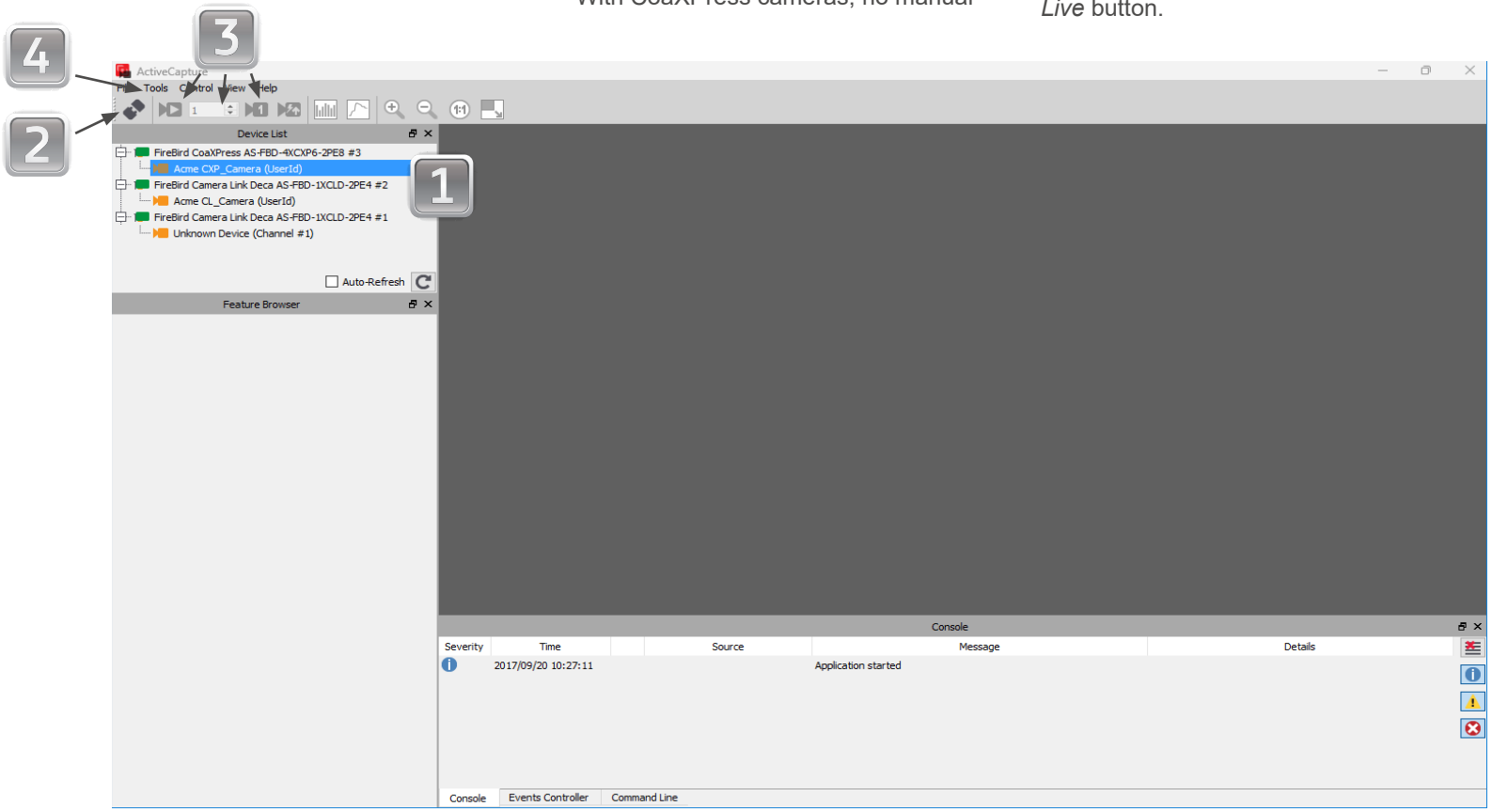
ActiveCapture is the frontend software for Active Silicon FireBird frame grabbers. It is a GenICam GenTL program that can be used with cameras supporting GenICam, such as CoaXPress, and Camera Link ones using CLProtocol, but it can also be used with non-GenICam Camera Link cameras. Additionally, it provides access to utility functions including the firmware updater.

Run the program from the *Start Menu* under *Active Silicon FireBird <xx> – ActiveCapture*.

With CoaXPress cameras, no manual setup of the camera or frame grabber is needed to get a picture – simply connect and click the *Live* button.

With Camera Link GenICam cameras, the ***GenTL CL Setup Utility*** must first be run (see page 9), but once that is done, again simply connect and click the *Live* button.

With non-GenICam Camera Link cameras, the frame grabber needs to be set up manually, using the feature browser or a PCF configuration file (see page 10), before a valid image can be displayed. The camera will be listed as “Unknown Device”, because there is no GenICam system to provide device details.

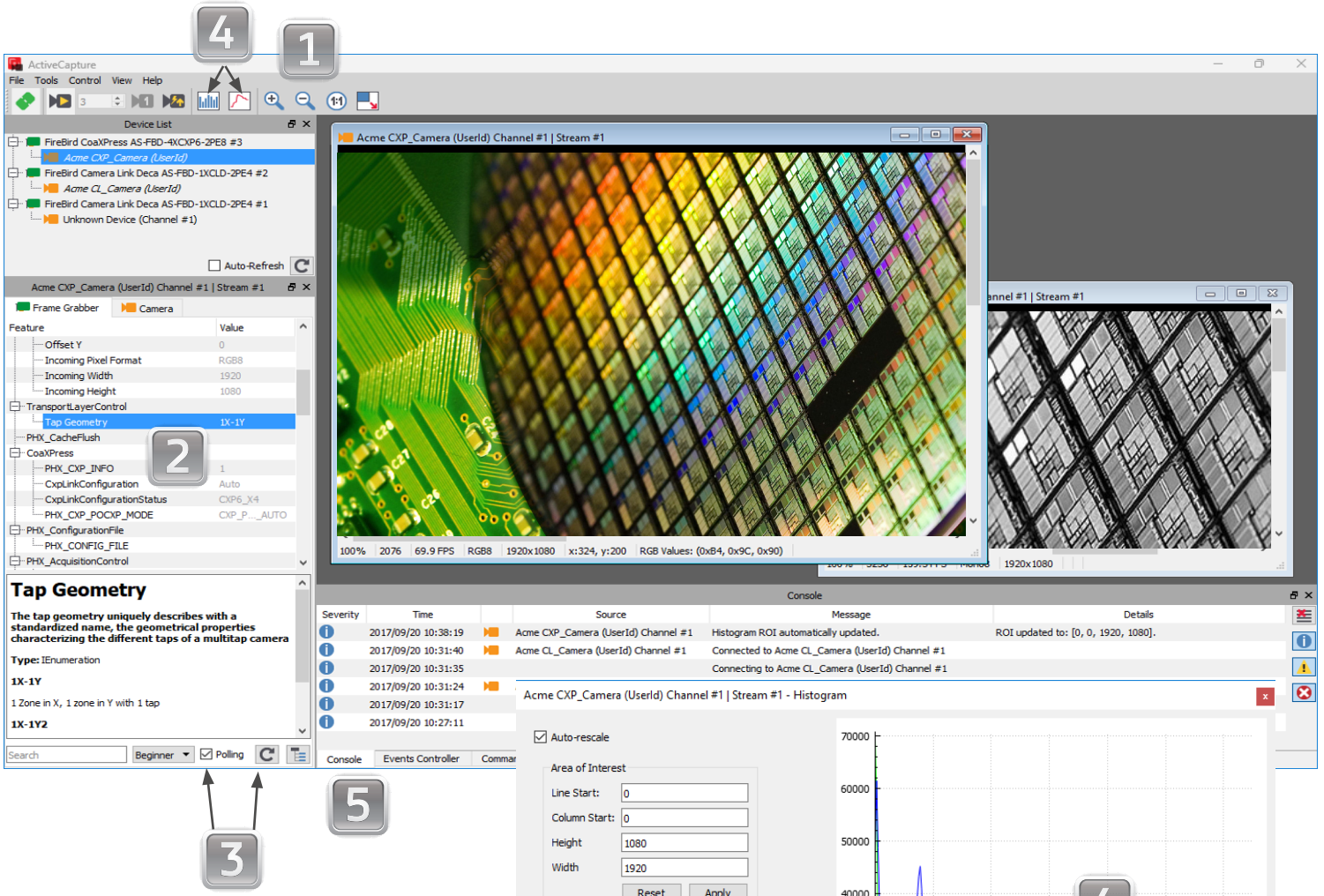


Operation Notes:

1. When the program is opened it attempts to communicate with the camera(s) and download the XML file(s) from them. This can be quite slow, especially with Camera Link cameras. The discovered devices will be shown in the ***Device List***. Any Camera Link cameras that are not GenICam, or GenICam ones that have not been set up, show as “Unknown Device” (see above).
2. Select a camera, such as “*Acme CXP_Camera*” highlighted here, and click the ***Connect*** button.
3. Click the ***Live*** button for continuous acquistion, using the specified number of acquistion buffers. Click the ***Single Sequence*** button to capture the number of images set by the the specified number of acquistion buffers.
4. The ***Tools*** menu gives access to utilities such as the firmware updater and the GenTL CL Setup Utility.

Note: The above refers to Windows. For the location of utilities and documentation for other operating systems refer to the specific Quickstart

Note: <xx> represents the camera interface, e.g. CXP or CL.



See the built-in **Help** for a full description of ***ActiveCapture*** features

1. The image can be **zoomed** in or out using the zoom controls, or the "+" and "-" keys on the keyboard, or the mouse wheel.
2. The ***Feature Browser*** shows the available features for the device selected in the *Device List*.

   Any feature that is not greyed out can be changed. Note that many features are greyed out while acquisition is in progress – first stop acquistion to change them.

   The FireBird features for pixel format, width and height are automatically set to match the camera. Therefore to change the values of these features, change them on the camera.
3. The Feature Browser refreshes visible features periodically while the system is in use. With Camera Link cameras this can be slow, and turning off ***Polling*** can be useful. The *Refresh* button can then be used to update features on demand.
4. Clicking the ***Histogram*** button displays a histogram and statistics for the selected image, or by entering coordinates, for just part of the image.
   Similarly, the ***1D Profile*** button shows the intensity profile of all or part of a line or column.
5. The ***Console*** shows status information and details of any error messages.

The ***GenTL CL Setup Utility*** needs to be run to allow the use of Camera Link cameras that support GenICam. It is needed because Camera Link pre-dates GenICam so cameras cannot be discovered automatically.

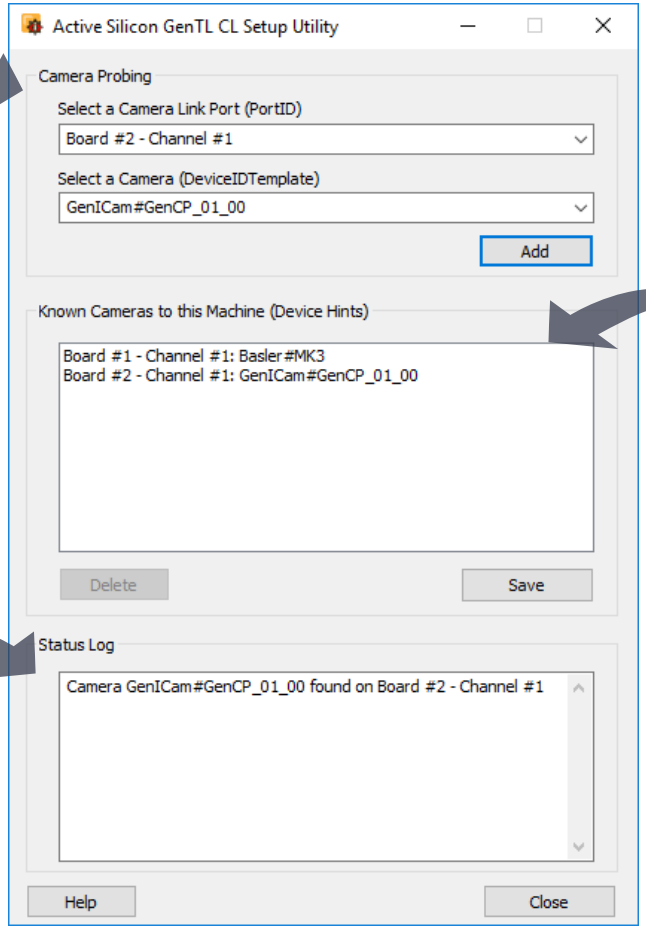
The utility only needs to be run once for a given camera connection.

To do this run it from the Tools menu in ***ActiveCapture***, after ensuring that no cameras are open in ***ActiveCapture***, and closing any other application that may have the cameras open.

After it has been run, refresh the Device List in the GenTL consumer application in use, such as ***ActiveCapure***, and the camera should then be listed and operate correctly.

The utility associates a CLProtocol DLL with a specific Camera Link port on FireBird. For cameras using GenCP, a generic GenCP DLL is provided as part of the FireBird installation.

For other cameras, note that only Camera Link cameras that are provided with a CLProtocol DLL can be used with GenICam. Older Camera Link cameras may not provide a suitable DLL and therefore will not work with GenICam applications. Contact the camera vendor to obtain the correct DLL file.



1

Use *Camera Probing* to select a channel on a FireBird board, and the camera that is connected to it.

The list of cameras will show all the CLProtocol DLLs installed on the machine, including the generic *GenICam#GenCP_01_00* DLL which should be used for all GenCP cameras.

Click ***Add*** to attempt to connect to the camera. If it is found it will be added to the list of known cameras.

2

This list shows all the cameras that have been found and added using the *Camera Probing* controls.

Click ***Save*** when the cameras have been correctly added.

A GenTL application will attempt to connect to these cameras, so if a camera is removed from a system or moved to another port, select the camera and click ***Delete***.

3

The Status Log shows what the utility has done.

GenICam GenTL

The **GenTL Producer** allows GenTL based GenICam applications to control the camera and FireBird. It should work with third party applications described as '**GenTL Consumers**', without needing any custom interface code.

Note that some GenICam applications do not use GenTL, but rely on direct image transfer from GigE Vision cameras – these will not work with FireBird.

Documentation on the Producer and the following GenTL utilities is in the ***FireBird GenTL Producer Manual*** which can be found in the *Start Menu* under *Active Silicon FireBird <xx> – Documentation.*

ActiveSDK

The ***FireBird ActiveSDK Introductory Manual*** gives an overview of ActiveSDK, and the various ***API Manuals*** describe the available ActiveSDK functions in detail. These are in the *Start Menu* under *Active Silicon ActiveSDK vXX. YY.ZZ – Documentation*.

Example source code is in the the *Start Menu* under *Active Silicon ActiveSDK vXX.YY.ZZ – View Example Source*, and the Visual Studio project can be opened from the *Start Menu* under *Active Silicon ActiveSDK vXX. YY.ZZ – Open Example Projects*.

Support Information

The *Help* menu in ***ActiveCapture*** gives two groups of information that can be useful when contacting Active Silicon's support team.

Show Board Information gives details of the Active Silicon boards in the system.

System Information gives more general information about a system. The information is both displayed to the screen, and saved in file *as_sysinfo.txt* in *Public Documents \ Active Silicon*.

Miscellaneous:

PCF setup files for many cameras are in the *Start Menu* under *Active Silicon FireBird <xx> – PCF Files*. These configure the FireBird board to match the specified camera. They can be used with ***ActiveCapture***, and can be read into programs written using the PHX API.

PhoenixCapture: This is Active Silicon's original application to display images from cameras. It has been replaced by ***ActiveCapture***, but for users familiar with the application it can be found in the *Program Files \ Active Silicon \ FireBird<xx> \ Bin \ Win64/32* directory. The utility is best used in conjunction with **PCF** files (see above).

Note: The above refers to Windows. For the location of utilities and documentation for other operating systems refer to the specific Quickstart Guide.
Note: <xx> represents the camera interface, e.g. CXP or CL.

Windows

- **Windows 10 and 11**: Remove the package using the Windows Settings ***Apps & features***. All packages are listed with names starting “Active Silicon”.
- Note that it is not necessary to remove previous copies of ActiveSDK before installing a new one. Multiple copies of ActiveSDK can be installed on the PC to allow developers to refer to both old and new versions.

Other Operating Systems

See the specific Quickstart Guide supplied with the installation package.

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