xiB

[ksi-bi: or sai-bi:]

PCI express camera series

1. Starter Kit Content

1.1. Copper cable option

- xiB PCI express camera: CB200MU-CM (monochrome) or CB200CU-CM (color)

  CB120MU-CM (monochrome) or CB120CU-CM (color)

- 3m, PCIe Gen.2 x4, copper cable: CBL-PCI-COP-3M0
- PCIe Gen.2 x4 extender host adapter for copper cables: PEX4-G2-COP
- MD / CB series tripod mounting bracket: MECH-60MM-BRACKET-T
- xiB power supply 24V: BACS30M-24-C8
- 3m xiB series I/O Sync and power cable: CBL-CB-PWR-SYNC-3M0
- (optional) Canon 50mm EF-mount lens

1.2. Optical cable option

- xiB PCI express camera: CB200MU-CM (monochrome) or CB200CU-CM (color)

  CB120MU-CM (monochrome) or CB120CU-CM (color)

- 10m, PCIe Gen.2 x4, fiber optics cable: CBL-PCI-FIB-10M0
- PCIe Gen.2 x4 extender host adapter for fiber optics cables: PEX4-G2-FIB
- MD / CB series tripod mounting bracket: MECH-60MM-BRACKET-T
- xiB power supply 24V: BACS30M-24-C8
- 3m xiB series I/O Sync and power cable: CBL-CB-PWR-SYNC-3M0
- (optional) Canon 50mm EF-mount lens

2. System Requirements

Windows 7 64bit [Windows 8 x64] operating system as well as one of the following hardware configurations:

Setup 1:

> **Mainboard** : GIGABYTE MB Sc LGA1150 G1.SniperM5, Intel Z87
> **CPU**: Intel® Core™ i5-4670, 3.4GHz, 6MB, Soc1150
>
> **Memory** : 8GB 1866MHz DDR3

Setup 2:

> **Mainboard :** P8Z77-M PRO
> **CPU :** Intel® Core™ i7-3770, 3.4GHz, 8MB, Soc1155, VGA, Box
> **RAM :** 2x4GB (Corsair CMP8GX3M2A1600C9)

Note: Newer configurations, based on Intel chipsets from the Haswell, Broadwell or Skylake generation are likely to be compatible as well but have not been tested completely by XIMEA yet.

3. Installation (Windows only)

To start working with the xiB camera follow these simple steps:

3.1. Connect

- Connect the camera to the power supply.
- Insert PCIe Adapter into PC (if not occupied by a GPU, use PCIe-Graphics slot which is located nearest to CPU).
- If you have a copper cable: Connect one plug of PCIe cable to PCIe adapter and other to the camera.

- If you have fiber/optical cable: Connect the plug marked as **Host** into PCIe adapter. Connect the plug marked as **Target** into the camera.

- Power on the camera power supply

- Power on the PC

3.2.   Check LEDs

The Camera should have the following LEDs status:

LED1-ON

LED2-Blink

LED3-Blink

LED4-ON

If the LEDs are in different configuration - please check LED status at:

LEDs signalization   http://www.ximea.com/support/wiki/pcie-cam/Wiki#LEDs-signalization

3.3.   Install Software Package

- Located the XIMEA software package on the supplied USB key: \Windows\ XIMEA_API_Installer_Beta_vXX.XX.XX.exe

- Alternatively: Download the XIMEA Software Package - Beta

xiB Software Package   http://www.ximea.com/downloads/recent_beta/XIMEA_Installer.exe

- Execute the installer file and follow the installation process

- **Note:** in order to install the programming examples, please make sure that the option "Examples" is enabled

3.4.   Install Driver (if not automatically installed during step 3.3)

- Open Device Manager and locate "Multimedia Adapter"
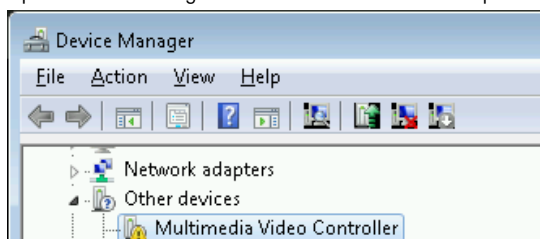
- Update the driver by selection of driver directory in C:\XIMEA\Drivers\

- The camera should now be visible in the Device Manager as "XIMEA PCIe Driver ver.2.X.X [x64]"

3.5.   Run XIMEA CamTool

- Start C:\XIMEA\xiCamTool\xiCamTool.exe

- The connected camera should be recognized by the software and listed in the top bar menu.

- Press the "PLAY" button to start the acquisition and view the live image

4.   Installation (Linux)

For the installation of XIMEA Linux package with PCIe support please use the following shell commands:

- wget http://www.ximea.com/downloads/recent/XIMEA_Linux_SP.tgz
  (alternatively copy the archive from the included USB key)

- tar xzf XIMEA_Linux_SP.tgz

- cd package

- ./install -pcie

- cp /usr/lib/libm3api.so.2.0.0 /usr/lib/libm3api.so.0.0.0

Now you can use xiSample.cpp or similar applications to access all camera parameters and to control the acquisition.

5.   Helpful Links

- XIMEA Homepage   http://www.ximea.com/
- xiB PCIe Camera Zone   http://www.ximea.com/support/wiki/xib/PCI_Express_camera_-_xiB
- xiB Frequently Asked Questions   http://www.ximea.com/support/wiki/xib/FAQ
- XIMEA Registration   http://www.ximea.com/en/products/register
- XIMEA General Terms & Conditions   http://www.ximea.com/en/corporate/generaltc

6.   XIMEA Software Package (Windows only)

6.1.   Content

- **Driver** for Windows 7 [Windows 8], 64bit

    Binary files: C:\XIMEA\Drivers\

- **xiAPI**

    Header file: C:\XIMEA\API\xiApi.h

    Binary file: 64bit - C:\XIMEA\API\x64\xiapi64.lib | xiapi64.dll [32bit - C:\XIMEA\API\x86\xiapi32.lib | xiapi32.dll]

- **xiSpample**

    Binary file: C:\XIMEA\Examples\Bin\xiSample.exe

    Source files: C:\XIMEA\Examples\xiSample\

    Note: By default, xiSample is precompiled based on **m3api.lib**.

    The xiB cameras however require the **xiapi32.lib** or **xiapi64.lib**, in conjunction with xiapi32.dll or xiapi64.dll.

    If you wish to use xiSample with a xiB camera, you must replace the m3api.lib with xiapi.lib in the linker options.

- **xiViewer**

    Application to display live image from connected camera (will be replaced by XIMEA CamTool)

    Binary file: C:\XIMEA\Examples\Bin\xiApiViewer.exe

    Source files: C:\XIMEA\Examples\xiViewer\

    Note: By default, xiViewer is precompiled based on **m3api.lib**. Please use **xiapi64.lib | xiapi64.dll** for operation with xiB cameras

6.2.   System Architecture

User application
xiAPI
XIMEA PCIe Camera Driver
xiB Camera

7.   XIMEA CamTool

The **CamTool** is a cross-platform viewer application which is capable of setting basic camera parameters, controlling certain features, displaying the video stream and saving snapshots and sequences.

Further, the program can extended with custom functionality using its plugin infrastructure.

CamTool is based on **Qt** for the UI and **xiAPI** for the camera control.

The CamTool's camera settings menu resembles the parameter set of the xiAPI.

Usage:

- Start CamTool with the executable found in C:\XIMEA\xiCamTool\.

- Upon start, CamTool will enumerate all connected cameras. If a camera is connected or disconnected during operation, a pop-up will appear which shows the name of the respective camera.

- All available cameras are queued in the top bar menu, showing their names, acquisition controls and further information.

- By default, only basic camera parameters are displayed in the camera settings menu. Further controls can be activated by switching the view mode to "Expert" or "Guru": Main Menu-> Edit->Options-> Visibility level

- Each camera's image view can be moved and scaled using the left mouse button as well as the scroll wheel.

- The lens control for the EF-mount on the xiB cameras covers two functions: aperture and focus. The aperture can be set directly by selecting the respective F-value using the aperture slider. The focus requires as movement value for the stepper motor to be defined first. Positive numbers will direct the movement to infinity. Negative numbers will direct the movement to macro. Then the specified move can be applied with the "Focus Move" button.

- CamTool saves each camera's parameters as well as most user interface setting when the program is closed. The saved values are restored on the next start.

Adjusting the default settings:

- By default Auto-Exposure/Auto-Gain (AEAG) is enabled. Disable this feature using the "AEAG" checkbox to fine tune the exposure and gain settings

- By default the defect pixel correction is disabling. If you experience hot pixels or defective row or columns enable the correction using the "Defect Correction" checkbox.

Bandwidth Limitation:

- By default the camera uses an automatic bandwidth calculation which measures the available interface bandwidth when the device is started. After the measurement a bandwidth limit is set using a 20% safety margin.

- You can control the bandwidth limitation manually by changing the "Limit Bandwidth" value in the performance section. In order to evaluate the system limits, please monitor the ratio between triggered, transported and processed frame using the Tools->Camera Framerate view. If the processed frame rate is lower than the transported or triggered frame rate, it is required to reduce the bandwidth limit value.

- The bandwidth limitation is especially helpful when setting up multi-camera systems to distribute the available bandwidth among all devices.

8. Image Modes

- RAW8: 1 byte (8 bit) per pixel transport and buffer format

- RAW16: 10 or 12 bit transport in packed or unpacked format, 2 byte (16 bit) buffer format with padding

  o Unpacked: every pixel is transported as 2 bytes, which results in half the transfer speed, compared to RAW8

  o Packed: every pixel is combined with the following pixel to the next bigger number of bytes, e.g. 24x 12bit in 192bit.
  If the packed mode is used, during the call of xiGetImage, the image data is unpacked to 2 bytes per pixels. Since this processing step is executed on the CPU and requires certain resources, depending on the image size, the overall acquisition frame rate will be lower than the measured transport speed.

- RGB24: RAW8 image data is transported and then converted into RGB (demosaicing) during the call of xiGetImage. The result are 3 channels R, G; B with 8 bit per channel.

- RGB32: Similar to RGB24 but with an additional 4th channel, representing the alpha value. This mode results in larger images, but usually faster processing.

- Mono8/Mono16: On mono cameras equivalent to RAW8/RAW16. On color cameras the result is a single channel grey image, after the demosaicing (interpolation) has been applied.

- TRANSPORT: This mode provides access to the transported image data, without further processing, such as unpacking or demosaicing. One possible application is a direct storage of the packaged 12bit data for later 'offline' processing.

9.   Limitations

Although the aim is to support all common xiAPI and sensor features for the xiB camera, some of those features are still being implemented and will be offered to users via a software and/or firmware update. The list of planned features includes:
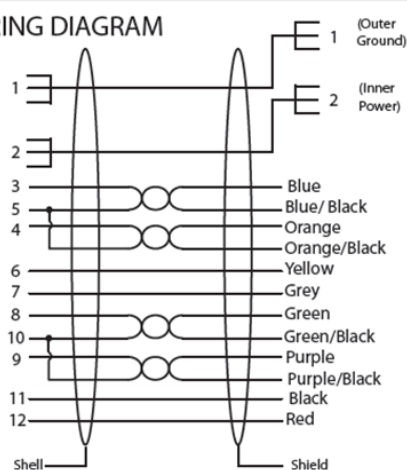
- Binning(Skipping) Modes (CB120 only)
- High Dynamic Range (Piecewise Linear Response): currently only available for CB200
- Digital Output Debounce
- User-Sets

10.   Sync Cable Pinout

Pinout for the CBL-CB-PWR-SYNC-3M0 I/O Sync and power cable:

IO Connector Pin Definition

PIN NUM	Signal Name	Direction	Voltage Level	Description
PIN 1	GND	NA	NA	External Ground for Power Supply and non-isolated I/O Pins
PIN 2	PWR	NA	(+5V - +24V)	Power Supply (typ. 5 - 5.5W)
PIN 3	IN1	Input	Low: 0-0.8V High: 5-24V	Opto - Isolated Input1
PIN 4	IN2	Input	Low: 0-0.8V High: 5-24V	Opto - Isolated Input2
PIN 5	IN_GND	NA	NA	Common Ground for Opto-Isolated Input1 / Input2
PIN 6	INOUT1	Input/Output	LVTTL(3.3V, 50uA)	Non - Isolated Input/Output 1
PIN 7	INOUT2	Input/Output	LVTTL(3.3V, 50uA)	Non - Isolated Input/Output 2
PIN 8	OUT1	Output	Open Collector	Opto - Isolated Output1
PIN 9	OUT2	Output	Open Collector	Opto - Isolated Output2
PIN 10	OUT_GND	NA	NA	Common Ground for Opto-Isolated Output1 / Output2
PIN 11	INOUT3	Input/Output	LVTTL(3.3V, 50uA)	Non - Isolated Input/Output 3
PIN 12	INOUT4	Input/Output	LVTTL(3.3V, 50uA)	Non - Isolated Input/Output 4

WIRING DIAGRAM

1	(Outer Ground)
2	(Inner Power)
3	Blue
5	Blue/Black
4	Orange
	Orange/Black
6	Yellow
7	Grey
8	Green
10	Green/Black
9	Purple
	Purple/Black
11	Black
12	Red
Shell	Shield

11.   Copyright

All texts, pictures and graphics are protected by copyright and other laws protecting intellectual property. It is not permitted to copy or modify them for trade use or transfer, nor may they be used on websites.