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Choosing a Frame Grabber for Evaluation Boards



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APPLICATION NOTE

Introduction

ON Semiconductor currently provides three types of evaluation kits. The oldest kit, referred to as “gen1”, supports our full frame family of image sensors and some interlines. The gen1 kit needs to be used with image capture software provided by the frame grabber vendor. ON Semiconductor does however provide camera files. The newer kit, referred to as “gen2”, supports the TRUESENSE 5.5 μm and 7.4 μm pixel family of interline sensors. This system has an LCD display on the processor board and works with ON Semiconductor’s SensorStudio

software. The newest kit was developed for use with the ON Semiconductor CMOS family of sensors. This kit is referred to as “SP6_FX3”. This kit also works with SensorStudio. This application note addresses frame grabbers for all evaluation kits.

GEN I FRAME GRABBER SELECTION

ON Semiconductor gen1 evaluation kits work with frame grabbers from both National Instruments and BitFlow. The right choice for a particular evaluation system depends on several factors.

BitFlow

BitFlow supports operation of their frame grabbers on Windows XP, Vista and Windows 7 32/64 bit operating systems. When purchasing a frame grabber from BitFlow, the SDK (Software Developers Kit), which includes the drivers for the board and software for image capture, should also be obtained.

Bitflow provides image capture software called *CiView*, which allows the user to capture images and save them as bitmaps. There is also BiFlow which can be used to capture a sequence of frames and allows captured sequences to be saved as 10 or 12 bit RAW files.

BitFlow offers a selection of cables to connect ON Semiconductor’s evaluation boards to their frame grabbers.

For information about BitFlow’s products or for technical support related to BitFlow’s frame grabbers, visit www.bitflow.com.

National Instruments

National Instruments frame grabbers are supported on Windows XP, Vista and Windows 7 32/64 bit operating systems.

When purchasing a frame grabber from National Instruments, the drivers and image capture software are included automatically.

The image capture software provided by National Instruments, *Measurement and Automation Explorer*, allows the user to capture images and save them as PNG files. This file format saves the full bit depth of the image as a compressed file. The PNG compression algorithm is lossless.

National Instruments provides a cable that interfaces to all of ON Semiconductor’s KAI evaluation boards, and some of the KAF evaluation boards. For most KAF and all KLI evaluation boards, there is no commercially available cable for connecting to the National Instruments frame grabbers.

For information about National Instruments products or for technical support related to National Instruments frame grabbers, visit www.ni.com.

Whether ordering a frame grabber from either BitFlow or National Instruments, work with them to determine which model is best for you. This will depend on:

1. The speed of the evaluation board being used.
2. The bit depth of the images from the evaluation board.
3. Whether the evaluation board will run the sensor in single or dual output mode.
4. Whether the output of the evaluation board is LVDS or RS422.

GEN II FRAME GRABBER SELECTION

The gen2 evaluation kit is designed to work with SensorStudio and the AD9928A plugin which is loaded into SensorStudio. SensorStudio configures the gen2 evaluation kit's imager board by using CameraLink serial or USB. Because each frame grabber vendor provides an SDK for serial communications, only frame grabbers supported by SensorStudio can be used. Support is provided for WINDOWS XP/Vista/W7/W8 32/64 bit

USB

Using SensorStudio, it is possible to setup the gen2 imaging hardware and capture images using USB2.0. This provides the option of not purchasing a frame grabber at the expense of video display speed. When using USB2.0 the transfer rate is very limited due to USB2.0 specification.

The USB option also allows you to set up the imaging hardware and use non-supported frame grabbers and software. You can run the setup scripts with USB and this will start the direction of image data out the CameraLink ports.

IMPORTANT: When USB is used for capture, only single channel sensor operation is supported.

Imperx Framelink Express

The Imperx Framelink Express (part # VCE-CLEX01) is an Expresscard54 format card designed for use in laptops. This frame grabber can also be used in desktop computers with a PCI express to ExpressCard54 adapter. Imperx also has PCIe versions of this frame grabber but they have not been tested with SensorStudio

This frame grabber supports base/medium CameraLink and can be used for 1, 2 or 4 channel operation.

The Expresscard54 bandwidth is 254 MB/sec. When 4 channels are selected, the pixel clock is dropped from 40 to 20 MHz so we do not exceed this specification. In 1 and 2 channel mode the pixel clock is 40 MHz.

The FrameLink Express frame grabber uses two of the small CameraLink connectors referred to as SDR type connectors. You will need 1 SDR-SDR Camera Link cable for 2 channel operation and 2 when you operate the gen2 evaluation kit in 4 channel mode.

The Imperx Framelink Express does not require a camera file.

BitFlow NEON and KARBON

The gen2 Evaluation kit and SensorStudio supports the BitFlow NEON-CLB (base camera link, part number NEO-PCE-CLB) and KARBON-CL2-F (full camera link, part number KBN-PCE-CL2-F) frame grabbers. BitFlow's SDK uses a "virtual frame grabber" implementation to reduce or eliminate frame grabber specific code. This means that any BitFlow NEON-CL or KARBON-CL frame grabber should work with SensorStudio, however, we can only recommend the NEON-CLB and KARBON-CL2-F because we have used them within ON Semiconductor.

The NEON-CLB uses PCIe4X and supports 2 channel mode at 85 MHz. The KARBON-CLF is PCIe8X and supports 4 channel mode at 85 MHz. BitFlow requires the use of

The NEON-CLB and KARBON-CL2-F use large Camera Link connectors referred as MDR. You will need 1 MDR-SDR Camera Link cable for 2 channel operation and 2 for 4 channel operation.

BitFlow requires the use of camera files and 3 are provided with the SensorStudio release. They are automatically loaded as needed for you.

The Bitflow SDK currently has an issue changing image sizes in 4 channel mode. You can use USB2 to configure the gen2 kit and read the sizes in the status panel and then edit the 4 channel camera file for these sizes. The camera files are located in: C:\Program Files\Truesense Imaging\SensorStudio\Bitflow\CameraFiles.

CMOS EVAL KIT FRAMEGRABBER SELECTION

The CMOS evaluation kit is designed to work with SensorStudio and the KAC series of plugins. SensorStudio configures the evaluation kit imager board by using CameraLink serial or USB. Because each frame grabber vendor provides an SDK for serial communications, only frame grabbers supported by SensorStudio can be used.

USB


The CMOS evaluation kits support USB2 and USB3. The throughput with USB3 is over 10x the throughput of USB2 and may exceed 300 MB/sec. If you have an older computer with USB2 you can use it but transfer rates will be around 30 MB/sec. You may be able to upgrade to USB3 if you buy inexpensive adaptors. Here are some we have tested:

- Desktop PC with PCIe X1 GEN2
 - ◆ Silverstone SST-EC04-P, Tested at 189 MB/sec
 - ◆ Startech PEXUSBS2, Tested at 133 MB/sec
- Laptop PC with Expresscard 54
 - ◆ Startech ECUSB3S2, Tested at 86 MB/sec

Most USB3.0 adapters are PCIe X1 so maximum throughput will be realized if the PC slot is GEN2 and the USB adaptor is GEN2 as well. PCIe X1 GEN2 is good for 500 MB/sec while GEN1 is 250 MB/sec. With Expresscard54 USB3 adaptors make sure the vendor lists the throughput since some of these do not yield much of an improvement over USB2.

Imperx Framelink Express

See the information in the [Gen2](#) section about this frame grabber.

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