

# **NanoUSB3 Evaluation Kit for NanEye GS**





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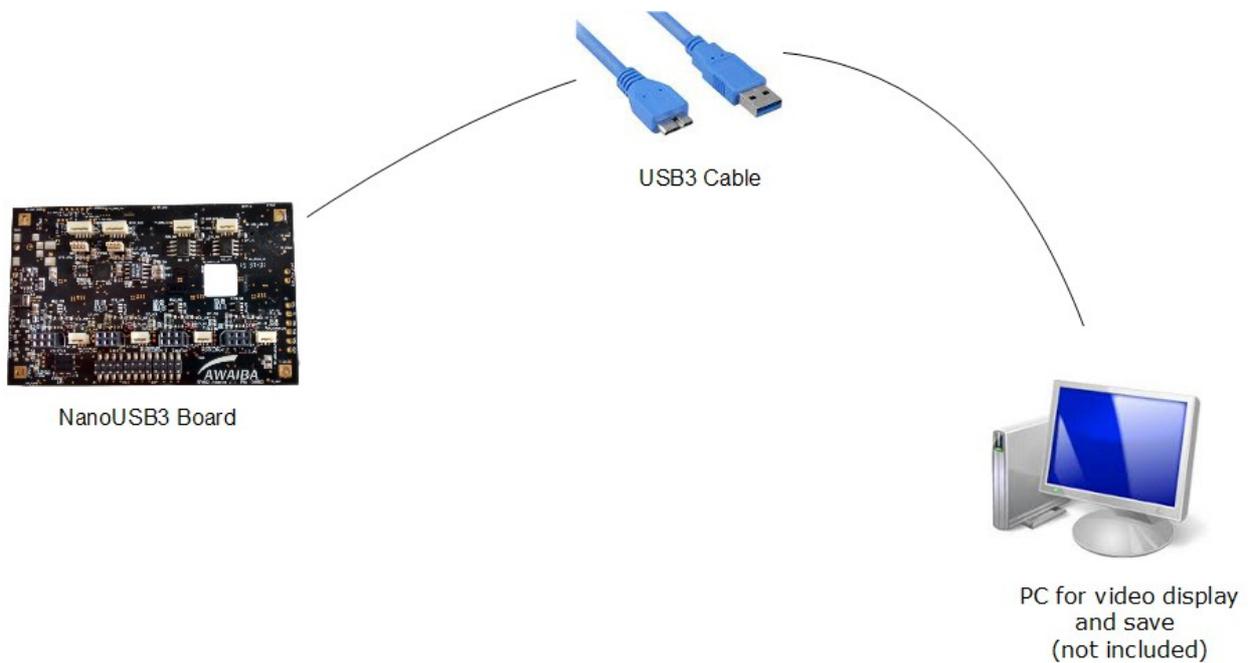
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## 1 Overview

The NanEye GS is a small form factor high sensitivity global shutter sensor with external trigger properties and frame rate up to 100Fps. The sensors data Interface provides a bit serial LVDS data stream easy to receive in standard FPGA's. The device is directly mounted on the interface board.

The supplied viewer software allows to display the images from the sensor on a screen and also manipulate the sensor registers.



*Figure 1: NanEye GS Evaluation Kit*

## 2 USB3 Evaluation Board

The evaluation kit is composed of two boards, one with the FPGA and USB3 interface and another for the specific NanEye GS sensor.

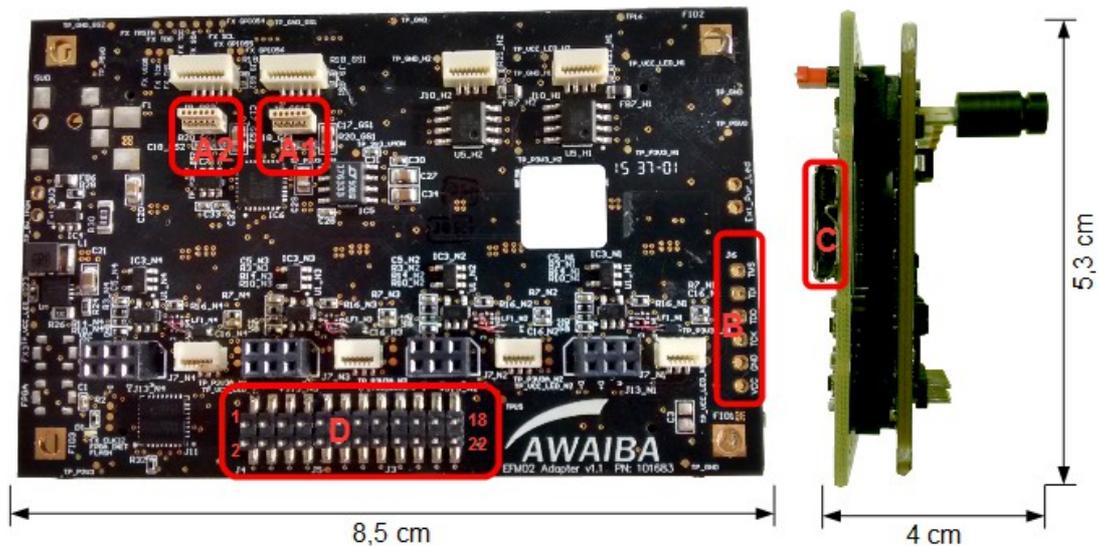


Figure 2: NanEye GS interface board

### Legend

A1 - Connector J8

A2 - Connector J9

B - JTAG Connection

C - USB3 Plug

D - GPIO: 1 - Integration Period to A1

7 - FVAL to A1

2 - External Trigger to A1

9 - LVAL to A1

3 - Integration Period to A2

10 - FVAL to A2

4 - External Trigger to A2

11 - LVAL to A2

5 - Trigger Out

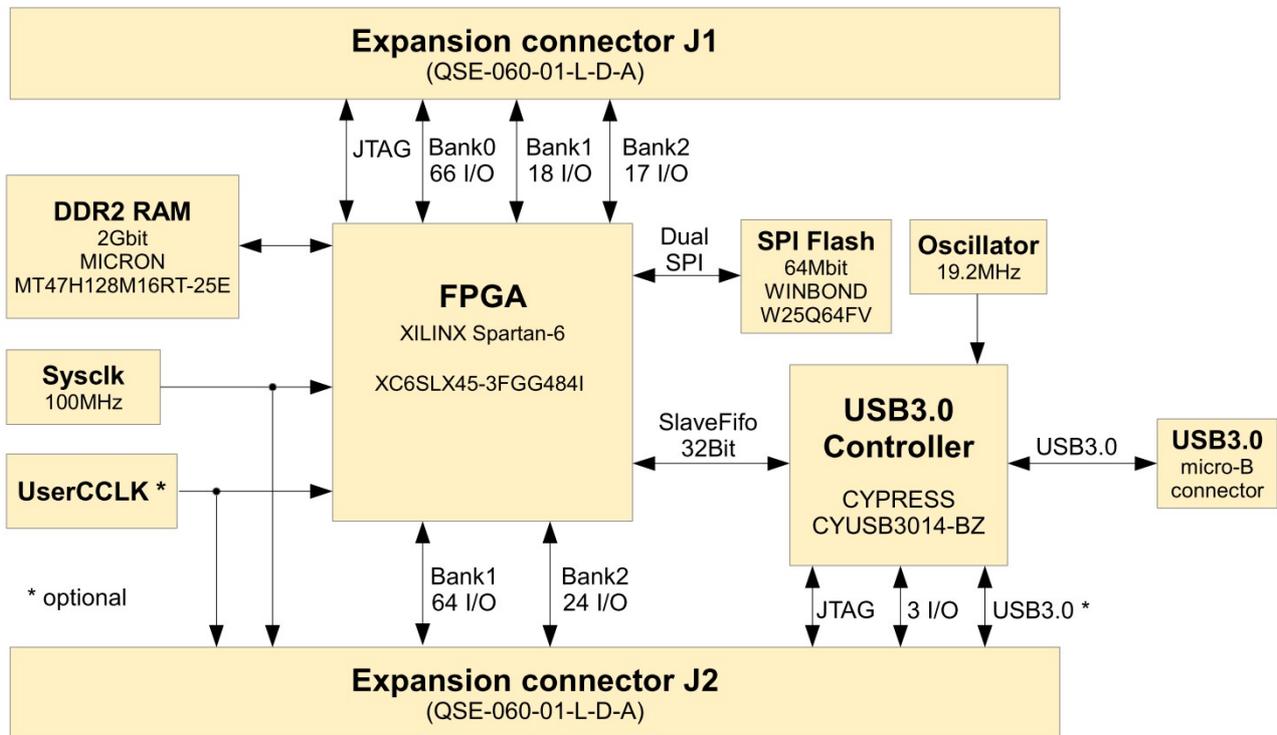


Figure 3: FPGA – USB3 board functional Diagram

The FPGA/USB3 board is an embedded module featuring a XILINX™ SPARTAN-6 FPGA in conjunction with the CYPRESS™ FX3 SuperSpeed USB 3.0 interface controller.

## Features:

- USB3.0 SuperSpeed interface through versatile Cypress™ EZ-FX3 controller
- USB bus-powered, no external power supply necessary
- Two FX3 GPIO on expansion connector
- Xilinx™ Spartan-6 FPGA (LX45)
- 2Gbit DDR2 memory
- 64Mbit dual SPI configuration/data memory
- High stability 100MHz +/-25ppm onboard clock oscillator
- 512Kbit I<sup>2</sup>C EEPROM for FX3 configuration data
- I<sup>2</sup>C interface available on expansion connector to increase available FX3 configuration memory for standalone applications
- FPGA configuration from SPI memory, JTAG or USB 3
- JTAG for FPGA and FX3 controller available on expansion connectors
- 2 EndPoints enabled for read images and write control registers from FPGA

## 3 Operating Instructions

### 3.1 Recommended Equipment

- Oscilloscope
- Desktop PC, Portable
- USB3
- Signal Generator

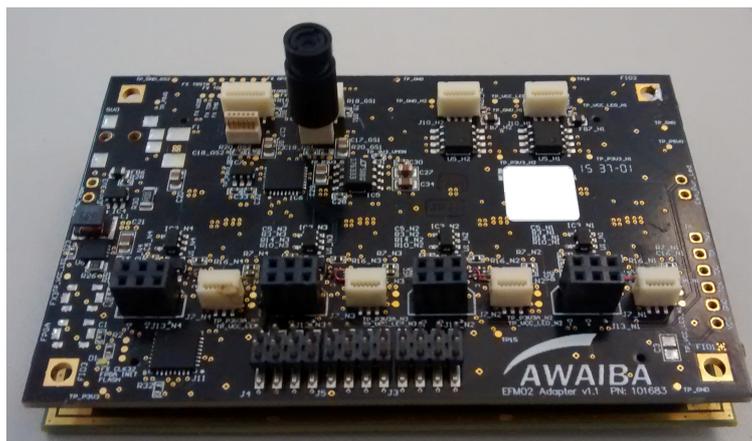
### 3.2 Basic operational instructions

When the USB3 board is connected to a PC it is reconsigned as **Cypress FX3 USB BootLoader Device**, on Device Manager.

When you install the Awaiba Viewer software the Cypress drivers are installed.

When you run the program (as shown in figure 5, for instance) the firmware is loaded to the RAM and the board is recognised as **Cypress FX3 USB StreamerExample Device**. Also the bit file is programmed in the FPGA.

### 3.3 Connect NanEye GS sensor



*Figure 4: Connecting NanEye GS in NanoUSB3 board*

## 4 Evaluation Software

Along with the USB3 board to evaluate NanEye GS sensors, a windows software is provided to display and store images from the sensor.

The **Viewer Software** has the following features:

- Possibility to save directly to .avi streams of the processed image, or save the raw data in the awvideo format
- Possibility to save snapshots in PNG and in PGM (saving the 10 bit raw data)
- Possibility to display the pixel graphic
- Pre-scaler, Dynamic Gain, Offset and Exposure switching
- Internal or External trigger for NanEye GS
- Possibility to acquire black and white gain masks
- Possibility to adjust white balance automatically

This software also contains some Image processing algorithms:

- Colour Reconstruction
- Adjust colour saturation
- Gamma Correction (only for colour version)
- Adjust brightness

An **API interface** to the data stream is available for easy integration in existing display systems and evaluation of image processing algorithms.

## 5 Troubleshooting

### 5.1 How to Install Awaiba Viewer

Please take a look in Awaiba Viewer Quick Start file.

### 5.2 How to Start Awaiba Viewer

After installing the Awaiba Viewer Software and with the board connected to a PC, you can start the Viewer with the following options, for instance.

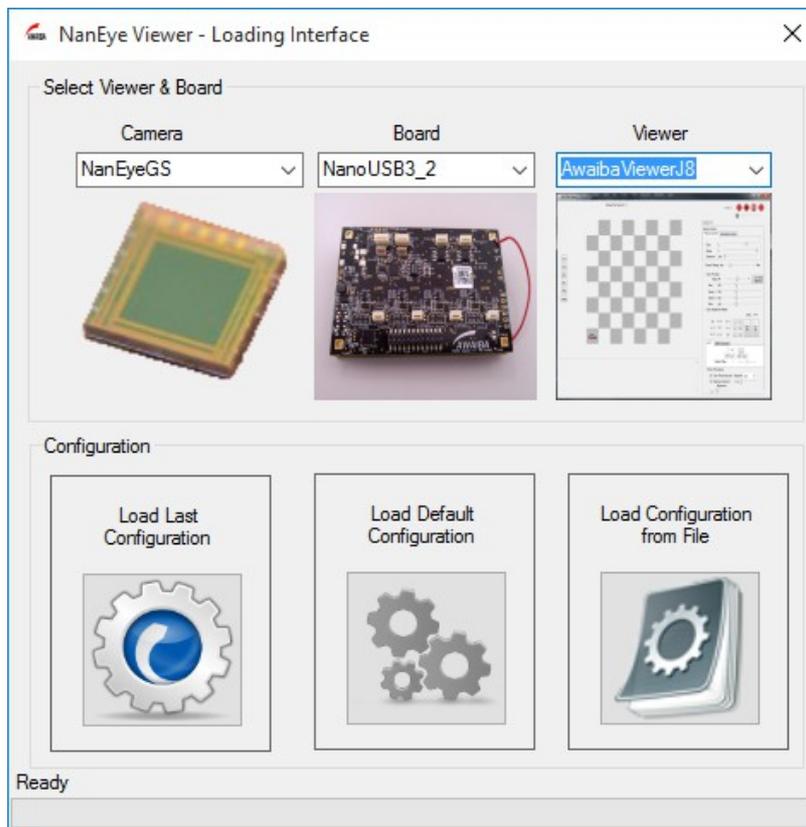


Figure 5: Starting the Viewer with the sensor connected on the J8 connector

## 5.3 How to Use NanEye GS Awaiba Viewer

Please take a look into NanEye GS - Awaiba Viewer file.

## 5.4 How to Debug USB3 board

If you can not receive images, this section can help you to debug the board.

When the viewer is installed, inside the **application/debug/USB3** folder, there is several programs that can be used to debug the user's problem.

### 5.4.1 NanEye GS

First, you should start the Template. Following the instructions on that window you should download the firmware and then program the FPGA. You can find the bit file at **\ProgramData\Awaiba\Awaiba Viewer\Fpga Files\NanEyeGS\_USB3**.

When this task is completed you should be able to have the information as in the image 6.

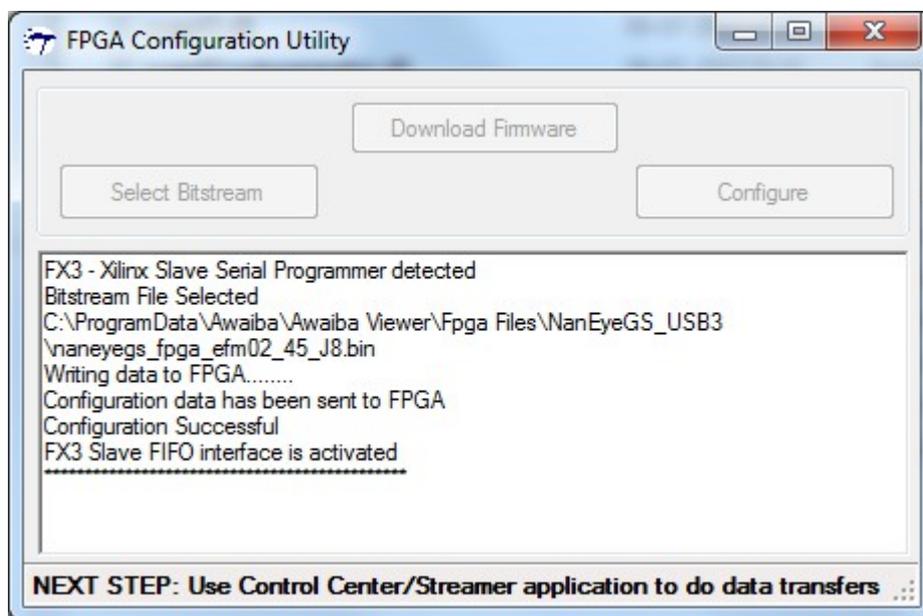


Figure 6: FPGA Configuration for NanEye GS

After this one LED should turn on and other should start blinking, on the USB3 board.

Secondly, start the USB Control Center (CyControl.exe). You should have two end points as shown in figure 7.

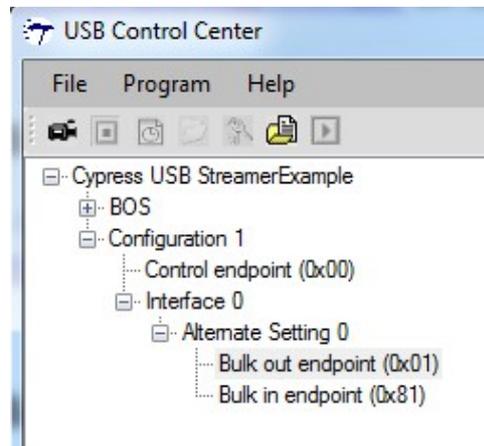


Figure 7: Endpoints list

Please start the streamer program with the **0x81 endpoint**, 32 packets per Xfer and 16 Xfers to Queue. Then click start, and you should get data from this endpoint, as shown in figure 8.

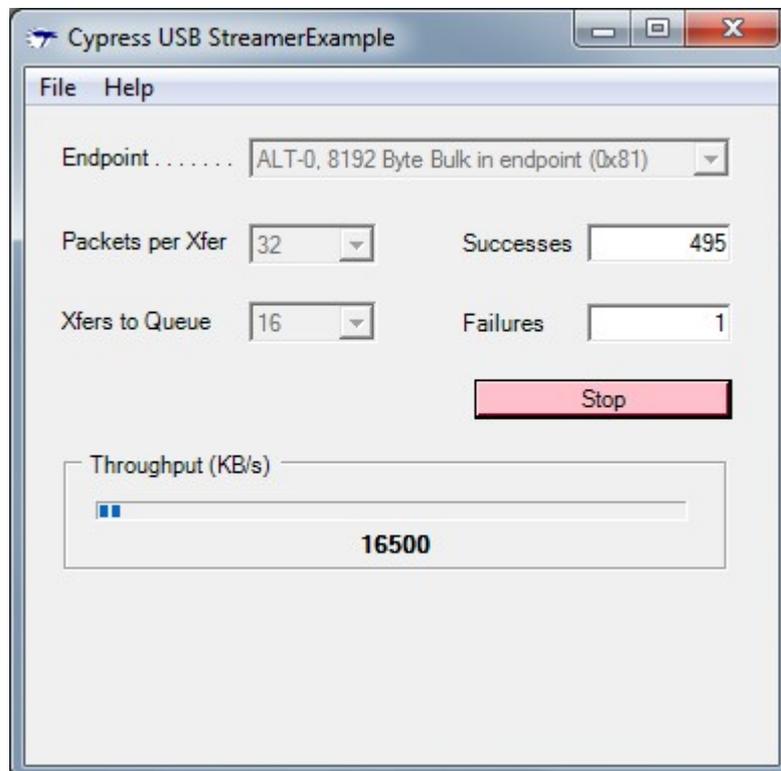
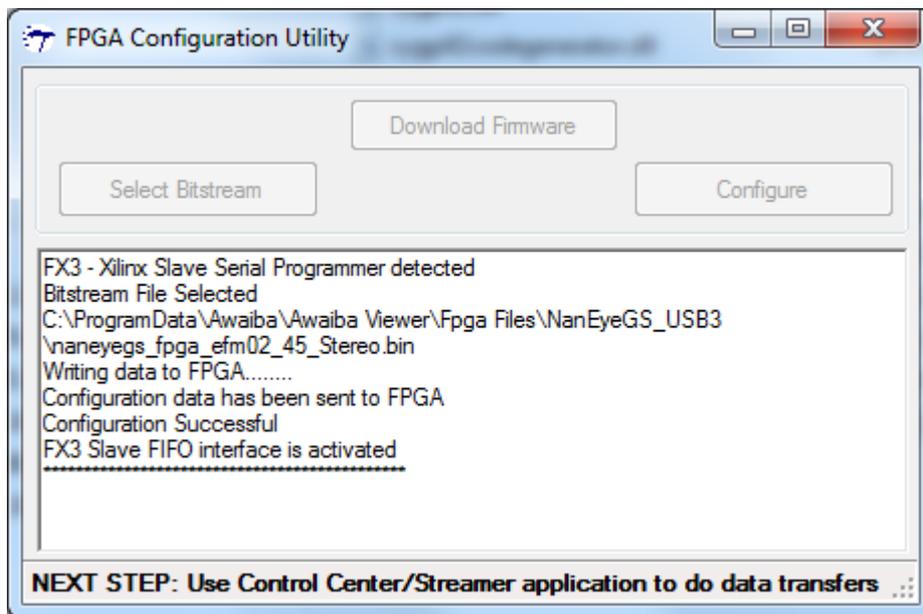


Figure 8: Streamer example data from endpoint 0x81

If you have around 16500 KB/s, then the transfer rate is good, and you are receiving all the data from the sensor. If the data is lower than that, you should use a **USB3 PCI adapter**.

## 5.4.2 NanEye GS Stereo

Start the Template and download the firmware and then program the FPGA. You can find the bit file at `\ProgramData\Awaiba\Awaiba Viewer\Fpga Files\NanEyeGS_USB3`.



*Figure 9: FPGA configuration for NanEye GS Stereo*

After this a LED should turn on, on the USB3 board.

Secondly, start the USB Control Center (CyControl.exe). You should have two end points as shown in figure 10.

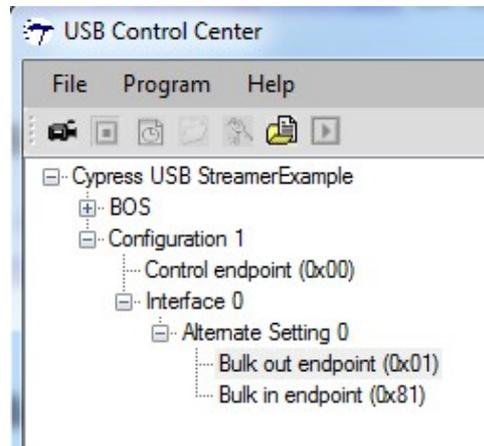


Figure 10: Orion USB3 Endpoints list

Please start the streamer program with the **0x81 endpoint**, 32 packets per Xfer and 16 Xfers to Queue. Then click start, and you should get data from this endpoint, as shown in figure 11.

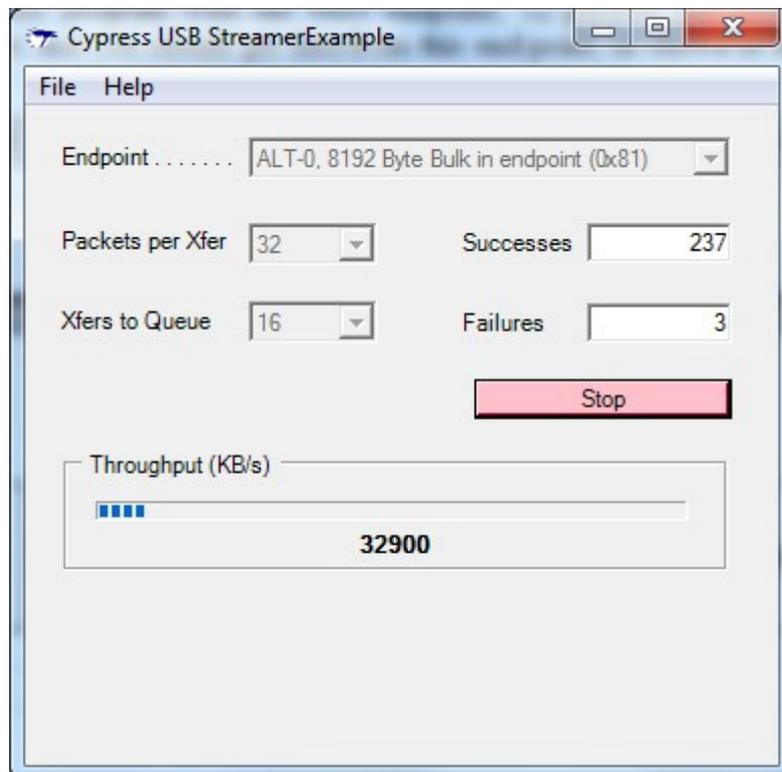


Figure 11: Streamer example data from endpoint 0x81

If you have around 32900 KB/s, then the transfer rate is good, and you are receiving all the data from the sensor. If the data is lower than that, you should use a **USB3 PCI adapter**.



## **NanoUSB3 Evaluation Kit for NanEye GS**

For additional information or assistance please contact our technical support through [support@awaiba.com](mailto:support@awaiba.com).



## **NanoUSB3 Evaluation Kit for NanEye GS**

**End of Document**