



Etaluma LumaScope 600-Series SDK User Guide

Version 15.5.15

File: LumaScope600_SDK_User_Guide_v15.5.15.doc

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1 INTRODUCTION

This guide (LumaScope 600 Software Development Kit) explains how to use the Etaluma “LumaUSB” DLL. LumaUSB.DLL contains functionality allowing a user to interface with the Lumascope 620 and 720. The DLL has functions for streaming image data, setting gain and exposure, controlling the fluorescent LEDs of the Lumascope and x/y/z stage control with the Lumascope 720.

The user of the DLL needs to write an application, using LumaUSB.DLL, to present an interface to a user for controlling the microscope and to display received image data. Included in the development package is an application (ReadISO.exe, StageController.exe), written in C#, demonstrating the interface to LumaUSB.DLL.

This document is part of a development package, which is zipped together with binaries files and the C# projects for the demo applications.

Note that this DLL does not work with the LumaScope 500/400.

2 INSTALLATION FILE CONTENTS

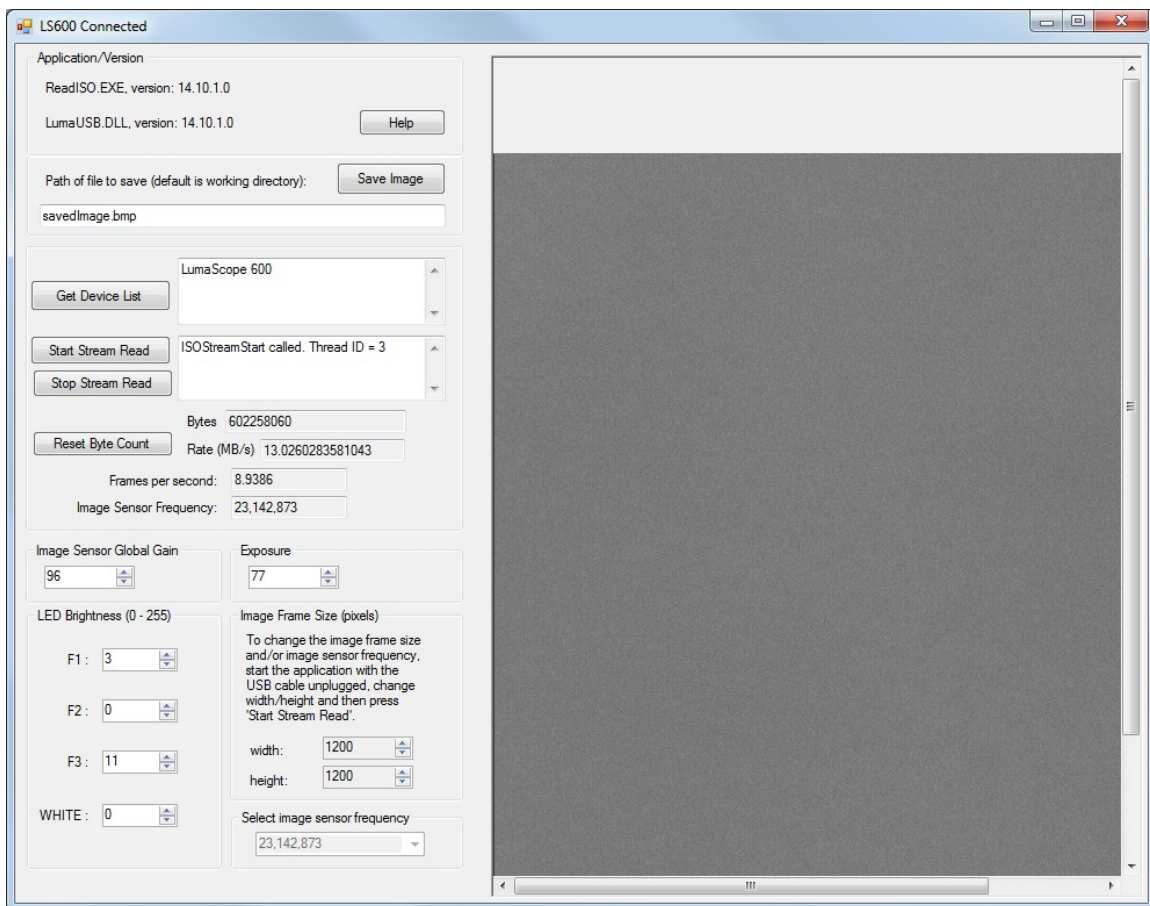
After the installation is unzipped the contents are as show in the picture below.

| File Names | Description |
|--|---|
| LumaScope600_SDK_User_Guide_v15.5.15.pdf LumaUsbApi_Part1.pdf LumaUsbApi_Part2.pdf | These files are in the “Documentation” folder. “LumaScope600_SDK_User_Guide_v15.5.15.pdf” is this document, you should read this first. “LumaUsbApi_Partx.pdf” are the help files explaining the details and API of “LumaUSB.dll”. |
| Lumascope600.hex LumaUSB.dll ReadISO.exe ReadISO.pdf StageController.exe | These files are in the “Binary_Files” folder. “ReadISO.exe” is the application, which you can immediately run and see work; “LumaUSB.dll” is the DLL containing functionality for interfacing to the LumaScope; “Lumascope600.hex” is a file, that gets loaded into the LumaScope at startup of the application if the LumaScope was previously powered off. “ReadISO.pdf” is the help file for “ReadISO.exe”. “StageController.exe” is an application to control basic functions of the x/y/zx stage. |
| ReadISO.csproj | This is the Visual Studio project file for the example application, which is found in the “\CsharpProjects\ReadISO” folder. The rest of the Visual Studio files are to be found here and also in the sub-folders. |
| StageController.csproj | This is the Visual Studio project file for the example application, which is found in the “\CsharpProjects\StageController” folder. The rest of the Visual Studio files are to be found here and also in the sub-folders. |

3 INSTALLATION PROCEDURE

If you are reading this file, you have already unzipped the development file (LumaScope600SDK_v15.5.15.zip).

- ⌚ In order to run the demo application (ReadISO.exe), you need to install the latest version of LumaView 620 (or 720 if using the x/y/z stage). The reason for this is so that the USB drivers get installed. For the Lumascope 720 you will need to manually install the Trinamic unsigned virtual COM driver.
- ⌚ Plug the Lumascope into the computer using the USB cable (and the cable to the Trinamic board if using the Lumascope 720).
- ⌚ Run ReadISO.exe and/or StageController.exe.



4 DLL INTERFACE DETAILS

Interfacing to the LumaUSB.DLL is fairly straight forward; one can see how it is done by examining the example C# project.

The one aspect that may be less than clear is the initialization sequence. Just after the LumaScope is powered up, it contains no custom Etaluma code for on-board control of the microscope. The custom Etaluma code is contained in “Lumascope600.hex” and gets loaded into the LumaScope when ReadISO.exe starts up. Here is what happens (start ReadISO.exe and then plug in the USB to the LumaScope):

- ⌚ ReadISO.exe receives a 'WM_USER_HOT_ARRIVAL' message.
- ⌚ ReadISO.exe sees that the USB PID (product ID) is 0x8613 (34323 base 10) and knows, based on the PID, that it needs to load the contents of “Lumascope600.hex” into the LumaScope.
- ⌚ After loading the contents of “Lumascope600.hex”, the LumaScope simulates a USB reboot and thus getting a 'WM_USER_HOT_REMOVAL' message followed by a 'WM_USER_HOT_ARRIVAL' message.
- ⌚ After all of this, the LumaScope gives itself a new PID of 0x1004 (4100 base 10).
- ⌚ Ready for action!

Here are the trace statements you would see in the Visual Studio “Output” window during 'ReadISO.exe' startup when the code in 'Lumascope600.hex' has not already been loaded into the LumaScope 600:

```
Selected 23,142,873, index = 7
WM_USER_HOT_ARRIVAL
Instantiated 'LumaUSB' with width = 1200, height = 1200.
DeviceAdded()
HexFileDownload()
HexFileDownload().....
Lumascope600.hex
HexFileDownload(): 8051 placed in reset.
HexFileDownload(): Released 8051 from reset.
WM_USER_HOT_REMOVAL
WM_USER_HOT_ARRIVAL
Instantiated 'LumaUSB' with width = 1200, height = 1200.
DeviceAdded()
```

Here are the trace statements you would see in the Visual Studio “Output” window during 'ReadISO.exe' startup when the code in 'Lumascope600.hex' has already been loaded into the LumaScope 600:

```
Selected 23,142,873, index = 7
WM_USER_HOT_ARRIVAL
Instantiated 'LumaUSB' with width = 1200, height = 1200.
DeviceAdded()
```

Note that the project uses the namespace, “using libusbK”. This namespace is in the LumaUSB.DLL. The C# project needs the DLL in the project references. In the project, the DLL is found in the “\CSharpProject\ReadISO\bin\Release” folder.

5 UPDATE HISTORY

| Version | Updates |
|-----------|--|
| v15.5.15 | Added the “StageController” EXE and project for the x/y/z stage control. |
| v14.10.1B | Changed the *.CHM help files to PDF format. |
| v14.10.1 | More abstraction of image sensor documentation. |
| v14.9.26 | Help files added for both the “LumaUSB.DLL” and “ReadISO.exe”. |
| v14.9.15 | First release. |

6 KNOWN PROBLEMS/ISSUES/CAUTIONS

⌚ Please report issues to support@etaluma.com.