Input and Output Trigger for OverDrive Plus

Meadowlark PCIe 8-bit SLMs with OverDrive Plus support input and output trigger functionality, allowing the SLM controller to behave as a Master or Slave. This document will explain the modes of operation and usage.

OverDrive Plus is an algorithm designed to provide faster optical response times via the use of several calculated Transient Frames loaded in between two Desired Holograms. Triggering for OverDrive Plus is different from a standard SLM in that we only wish to have trigger events on Desired Holograms, and not for all of the intermediate Transient Frames.

Your controller may require firmware or software upgrades to support these features, which may require returning your controller for factory service.

The controllers utilize double-buffered memory – one memory buffer for downloading from the controller to the SLM, and the other buffer for downloading in parallel from the computer to the controller. The load time from the controller to the SLM, or the SLM refresh cycle, is 164.1 µs for a 512 x 512 SLM, and 103.2 µs for the 256 x 256 SLM. On the other hand, load times from the computer to the controller will vary from computer to computer. However, typical times tend to be about three SLM refresh cycles for a 512 x 512 SLM, or 492.3 µs. Some computers have been measured as slow as seven SLM refresh cycles, or 1148.7 us.

PCIe 8-bit controllers have four RCA connectors labeled Input and Output A and B. All Output connectors use TTL 3.3V logic. All Input connectors use TTL 3.3V logic and are 5V tolerant. Input and Output use low-true logic. Only the input or the output trigger can be used – simultaneous use is not supported.

Figure 1 - Image of a PCIe 8-bit controller showing the Input and Output connectors.

SLM as Master

PCIe 8-bit SLMs with OverDrive Plus support an output trigger pulse when the buffers are swapped to start the download of the desired Hologram from the controller to the SLM. The signal is normally high, and goes low when the buffers are swapped. The output pulse stays low for 100 microseconds, see Figure 2.

The trigger pulse is output on ***Output B*** from the PCIe8 controller.

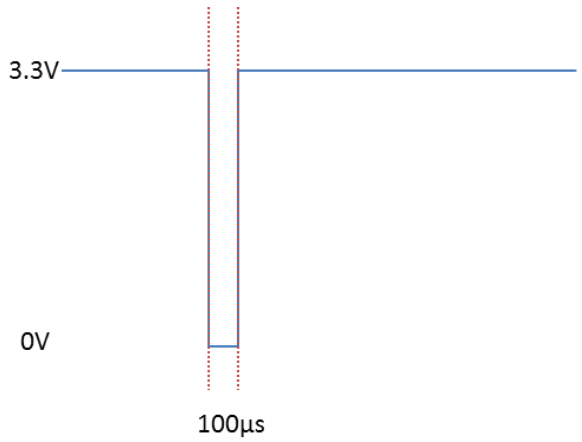

Figure 2 - Output trigger pulse from the PCIe 8-bit controllers.

SLM as Slave

PCIe 8-bit SLMs with OverDrive Plus support an input trigger pulse to begin loading the next set of Transient Frames and the next Desired Hologram. Input pulses are ignored until after the Desired Hologram has loaded to the SLM.

The input trigger pulse should be connected to ***Input A***.

The input trigger pulse width must be a minimum of 200 nanoseconds and is edge-triggered, see Figure 3. The input trigger pulse tells the controller to swap buffers and download the new buffer to the SLM. Because of this, the new buffer must first be downloaded from the computer to the controller before the input trigger is received. Receiving input triggers faster than the controller can download holograms may cause erratic behavior.

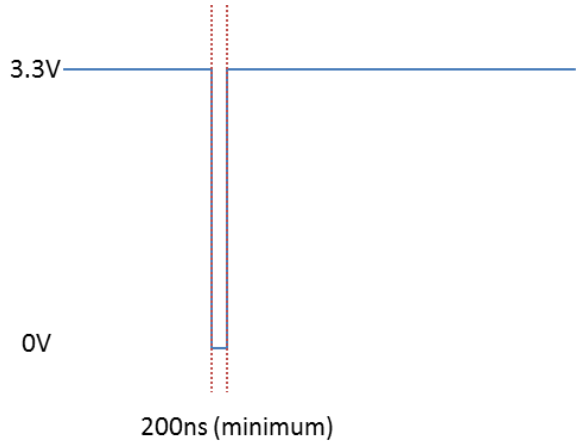

Figure 3 - Input pulse for PCIe 8-bit controllers.

An example of the input trigger is shown with corresponding SLM optical response in Figure 4.

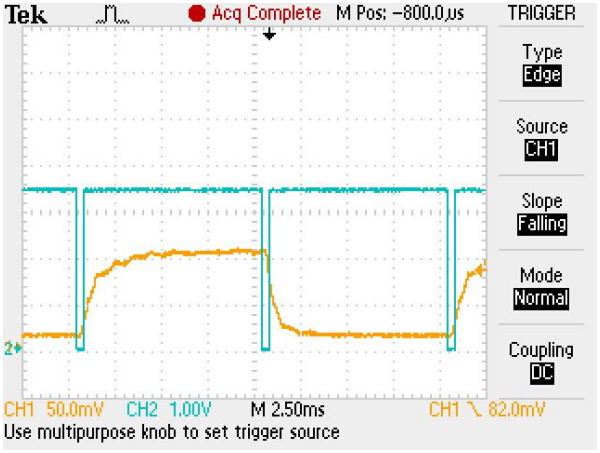

Figure 4 – Example input trigger with SLM optical response.

Using Input and Output Trigger in Blink

Blink with OverDrive Plus supports input and output triggers. By default, input and output triggers are disabled. These can be enabled by setting one of two parameters in the Preferences.ini file located in C:\ProgramData\Meadowlark Optics\Blink PCIe.

- `Use_external_trigger` controls whether the input trigger is enabled (SLM as Slave mode). Blink only uses the input trigger while sequencing. Selecting holograms manually in Blink will load the hologram without waiting for the input trigger.
- `Use_external_pulse` controls whether the output trigger pulse is enabled (SLM as Master mode). Blink fires the output trigger pulse whenever a new Desired Hologram starts loading to the SLM.

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Using Input and Output Trigger in Blink SDK

Blink SDK supports input and output triggers. SDK functions which send Holograms to the SLM now have two parameters `wait_for_trigger` and `external_pulse`.

- `Wait_for_trigger` will enable the input trigger for that Desired Hologram (SLM as Slave mode). The function will not return until the trigger is sensed and the Desired Hologram is loaded.
- `External_pulse` will enable the output trigger (SLM as Master mode) for the Desired Hologram.

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