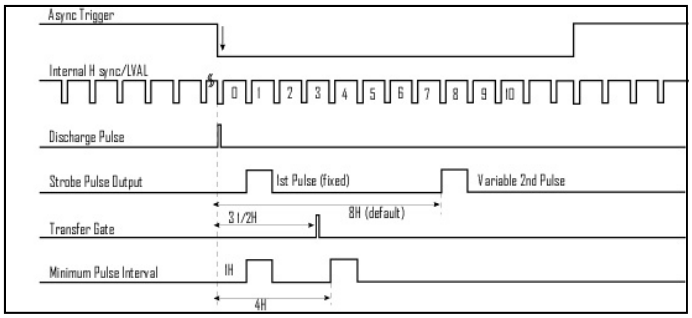
Back-to-back Strobe Function

What is Back-to-back strobe?

The GEViCAM platform provides a back-to-back strobe function as standard. This is a function to create double strobe pulses for each trigger input and then outputs two consecutive frames. Two strobes are positioned before and after the transfer gate pulse, which is a gate pulse that transfers photodiode charges to the CCD shift registers once each frame.
The first strobe generates and then outputs the first frame image right after the trigger. The second strobe is still very close to the first one (20 to 40 µs apart) and it creates a second frame image. Therefore, one trigger generates two consecutive images with back-to-back strobes.
Since each strobe generates its own image, it is called "Back-to-back".

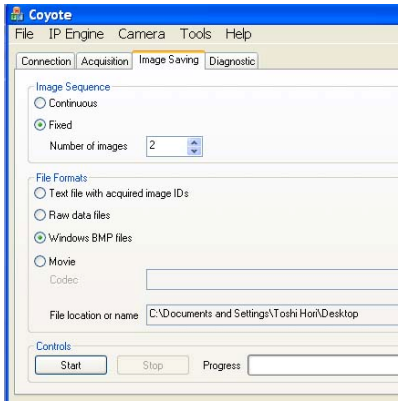
GEViCAM features

GEViCAM platforms (GP-series and GD-series) provide the back-to-back strobe functions as standard. The first strobe is fixed immediately after the trigger and the discharge pulse (second H from trigger edge). The second pulse timing is programmable by 1H (=horizontal clock = 20 µs for VGA, 40 µs for SXGA) increments and the minimum number is 4H.
Therefore, the GEViCAM back-to-back strobe is very flexible and useful for many applications.



Pulse Timing

GEViCAM has the capability of resetting internal H and V sync with pixel clock timing (4 clocks) after the external trigger.
When triggered, a discharge pulse is generated to purge electrons from the photodiode area which have accumulated in previous frames for an indefinite period. In this mode, the first transfer gate, which transfers photo-charges to CCD shift registers, occurs at midpoint of 3rd H period. The first strobe output occurs with the second H from the trigger. The second pulse is variable but it must be after the discharge pulse to generate two consecutive frames per trigger. The shortest number is 4 (H) and the maximum duration is 1 frame period (i.e. 494 for VGA, 1040 for SXGA).



The control register is 57 00 25 00 00 xx yy (Hex).

Image Capture

Two consecutive images are taken with the Coyote application using "Image Saving". The acquisition can be continuous and then after triggering, captures two images and saving them as shown on left. These two images are one frame apart but the images are frozen by the strobe lights at almost the same time.

Applications

Back-to-back strobing is a very useful tool for various image capturing applications.
A typical use is to measure **particle velocities and trajectory** with known strobe intervals. Since the interval is accurately controlled, the analysis is easily done.
This is also a useful tool to freeze fast moving objects with **different lighting**. For *glass bottle inspection*, one strobe is front lit and second strobe is back lit.
Short wave spectrum (blue or violet) can be used for shallow surface and IR for deeper *surface inspection*.
Two separate LED light sources can be used to *analyze the color* of objects, i.e., the color of letters on *license plates*, etc.
As an option, long intervals beyond multiple frames can be implemented to measure *traffic speed violation*. The first strobe is synchronized with the trigger timing and the second strobe timing is selected as a custom option.
Note: Back-to-back strobe is for strobe light applications and camera exposure time is maximum during image capture. Therefore it is important to keep the background dark for this application.

Example circuit for separating double pulse.