

Multiple Pulse Generator by PLC Programming

PLC programming for multiple pulses per trigger

This describes one method of generating multi-shot triggers in GP/GD series cameras for each trigger input.

By using the internal PLC functions, you can generate multiple pulses from one single trigger. If camera is set to async reset mode (0x00 23 00 00 00 01), it can generate a programmable sequence of images using the multi-shot generator.

Step 1

Create feed back to PLC Pulse generator in trigger mode (unmark the periodic pulse selection).

Trigger input to pulse generator_0 is Q9.

The trigger can be external trigger (Line 0) or internal trigger (PLC control bit 0 for example). Let's use I0 as the trigger input and select GPIO control bit 0.

The output from the pulse generator_0 can be selected as the LUT but default is I7.

If periodic pulse is unmarked, the pulse generator creates a single shot pulse from the trigger.

In order to create feed back loop to retrigger from the first one shot, the output must be fed back to the trigger.

$Q9 = I0 \ \& \ !I7$ will generate continuous pulses after the trigger.

Step 2

Configure pulse generator to create a 10ms pulse per trigger. The first pulse is needed immediately after the trigger. Delay is minimum and the width is set to be 10ms.

If we make the granularity = 33, each count is 1µs. So, 10ms width is 10,000.

Enhanced Function Block	
Pulse Generator 0	
Width (high)	10000
Delay (low)	1
Granularit...	33
Emit perio...	<input type="checkbox"/>
Trigger mode	Triggered on rising edge
Pulse peri...	10202040
Pulse freq...	98.019612
Pulse Generator 1	

Step 3

Now the number of pulses required for each trigger needs to be set. For this example, we need to create 4 pulses (4 images) per trigger at 10ms interval.

The PLC counter is convenient for programming the number of pulses per trigger.

The clear input to counter_0 is Q3 and increment input is Q17 (Q16 is decrement). In this application, the first

pulse is generated from the original trigger and counter number required is n-1. If we need 4 pulses to be created, the counter is set at 3 for compare value.

Counter 0	
Incremen...	Rising edge
Decreme...	Disabled
Clear trigg...	Rising edge
Clear signal	Q3
Compare ...	3
Current c...	3
Timestamp Counter	

The inputs to this counter is coming from pulse generator_0 output and the trigger.

$Q3 = I0$ trigger
 $Q17 = I7$ increment

After counting up to the compare value (3), it outputs "greater" and "equal" signal. In this application, we use greater signal to limit pulses from the pulse generator. Counter 0 Greater is chosen for "I5".

Step 4

Feed back to pulse generator_0 with counter value is achieved as follows,

$Q9 = I0 \ \& \ !I7 \ \& \ !I5$
 All together, the LUT looks like this.

Signal Routing Block and Lookup Table	
I0	GPIO Control Bit 0
I1	Camera Link Frame Valid
I2	LVDS Input
I3	Optically-Isolated Input
I4	GPIO Control Bit 1
I5	Counter 0 Greater
I6	Pulse Generator 1 Output
I7	Pulse Generator 0 Output
Lookup Table $I0 = (!I7 \ \& \ !I5)$ $Q1 = I1$ $Q3 = I0$ $Q9 = (!I7 \ \& \ !I5 \ \& \ I0)$ $Q17 = I7$	

Note:

Camera function is set to Async mode. The minimum pulse duration must be set with exposure + frame output period. If frame rate is 100fps (10ms) and exposure is 2ms, the duration must be 12 ms.

For Async_0 option, it can be set to the same frame rate as the continuous frame rate.