Logic16

FEATURE SUMMARY

On-board coincidence counting:

- Simultaneously count all possible patterns @ 100 MHz
- Coincidences (AND), anti-coincidences (NOT), ignore



Programmable outputs¹

- Pulse generator, pattern-triggered outputs and multi-hit delay.
- Flexible for integration with gated photon detectors, electro optical modulators, pulsed light sources and more.

Time-tag hardware operation modes:

Continuous time tag streaming

Keep all time tags

Gated

- Trigger off a single input (e.g., heralding photon source)
- Keep time tags only when the gate is active

Filtered

- Keep time tags only when a defined number of events occur, within the user-set time filter window.
- Use for time of flight or stop-start measurements requiring absolute time tags from an excitation laser (e.g. 76 MHz)
- Use in multiphoton experiments to prevent unnecessarily large output file size

SOFTWARE & SYSTEM CAPABILITIES

Timetag Explorer (Windows only)

- Monitor time tag streaming, coincidence counts, stop-start measurements
- Save time tags to file

Correlation Counter (Windows only, perform and record coincidence counting)

- Monitor and record coincidence counts
- Create start-stop histograms

NET for Windows, and C++ drivers for Windows and Linux

Control .NET driver directly from Matlab, Labview, MS Visual Studio, C#, VB, Python

Sample code for C++, Visual Basic, C#, Python, LabView provided

Disclaimer: All specifications and external appearances are subject to change without notice. All information stated here is provided to the best knowledge of UQDevices, however, no responsibility is assumed for possible inaccuracies or omissions.

¹ For on-board coincidence counting mode

Logic16 was developed in collaboration with DotFAST consulting.

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SPECIFICATIONS

Note: Users can switch between configuration A and B with a firmware update

TIMING	Configuration A	Configuration B
Time bin, digital	156.25 ps	78.125 ps
Time jitter (RMS)	71.6 ps	58.5ps
Dead time	5 ns [†]	5 ns [†]
Time-tag filter window	156.25 ps	78.125 ps
Max. input delay	0 to + 40 µs ^{††} (2 ¹⁸ – 1	0 to + 20 µs ^{††} (2 ¹⁸ – 1 units)
	units)	
Input delay adjustment step	156.25 ps	78.125 ps
Coincidence window	0.156 ns – 2.6 ms	0.078ns – 1.3 ms
	(2 ²⁴ -1 units)	(2 ²⁴ -1 units)
SYSTEM PERFORMANCE		
Time tag rate burst rate	200 Mtags/s for up to 1024 events/channel	
Sustained data rate (time-tagging mode)	~ 11 M tags/s (USB 2.0)	
Time tag processing rate, time tag filter mode ^{†††}	190 M events/s	
Max. on-board coincidence count rate	100 MHz (summed across all channels)	
Input channel settings (for coincidence pattern definition)	Tri-state: Active, Inactive, Ignore	
Maximum number of simultaneously processed patterns	> 43 million (3 ¹⁶)	> 6 thousand (3 ⁸)
INPUTS		
Number of inputs	16	8
Input definition	SMA, 50Ω termination, DC coupled	
I/P discriminator		
Threshold range	-2 V to +2 V , steps of 15 mV	
Min. pulse amplitude	50 mV typical	
Edge Detection	Rising or Falling	
Min. pulse duration	300 ps	
(above threshold)		
Max I/P level	-2.5 V to + 5.0V	
Counters	32-bit	
GENERAL		
Power	NIM standard from crate, + 12V @ 1.0 A (-12V @ 0.5A) .	
	DC: can be operated by external DC power supply (12V DC, 1.5A, user must supply)	
Interface	USB 2.0	
OTHER I/O		
External time base input *	BNC, 10 MHz sine, 1KΩ, AC-coupled 1VPP	
Outputs		
Output definition	SMA, 50Ω termination	
Output signal	TTL pulse, >2.5 V high, 100ns duration	
Type: Pattern-detection triggered – No. of outputs	3	
Type: Pulse generator – No. of outputs	1	

[†]Double pulse time differences to guarantee capture of all consecutive pulses. Shorter double pulse time differences will be capture probabilistically ^{††} The maximum detection rate without loss of data is 25 MHz (50 MHz) with a delay of 40 µs (20 µs) due to the buffer of 1024 events / channel. Higher detection rates possible for shorter delays.

⁺⁺⁺ In filtering mode Logic-16 can process up to 190 Mtag/s internally to allow time of flight measurements with respect to fast laser pulses.

* Note, use of external time base makes channel 16 (8) inactive.

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