QBLOX

QTM | 20 ps Timetagging
Qubit Timetag Module | Cluster Series 19" Rack Mounted

Description

The Qubit Timetag Module (QTM) adds digital signal generation and acquisition to the Cluster in a module optimized for optically addressable qubits.

The output facilitates fast and precisely timed TTL signals for direct laser control.While at the input, a configurable analog threshold and windowing with photon counting and timetag functionalities ensure fast and reliable optical readout.

The integration of signal generation and acquisition in a single control instrument ensures inherent synchronization, rendering triggers redundant.
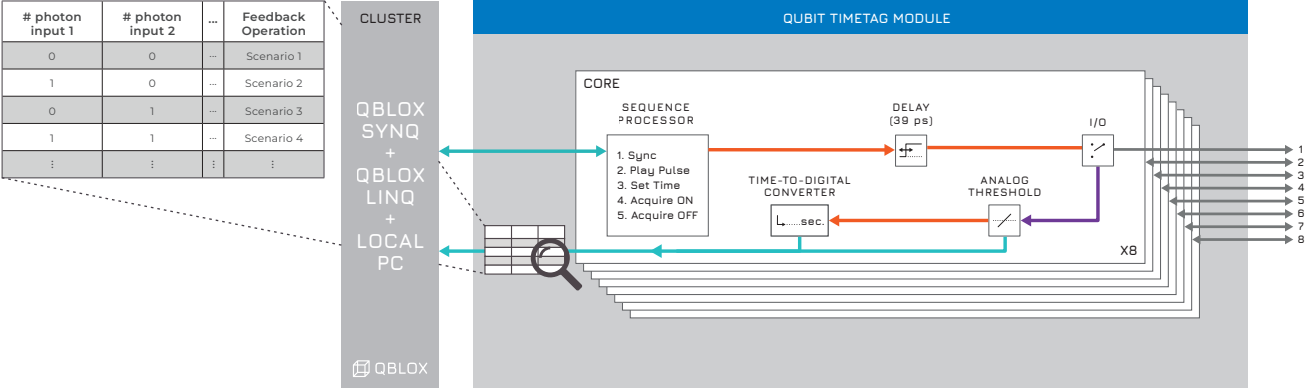
The module houses eight independent pulse sequence cores, that each are routed to an input/output channel. The flexibility of real-time pulse sequencing allows for conditional feedback based on the measured photon count to coordinate the continuation of the control sequence.

Features

- Digital channels can be configured as inputs or outputs
- TTL acquisition with configurable analog threshold
- TTL acquisition windowing for optimal readout
- Coincidence detection scheme up to 4 channels.

- Time-to-digital converters enable accurate timetagging
- TTL output signal with precise pulse placement
- Synchronized to all other modules via SYNQ protocol
- LINQ allows for photon-count based conditional feedback with low-latency to all other modules

Coincidence detection lookup table

# photon input 1	# photon input 2	...	Feedback Operation
0	0	...	Scenario 1
1	0	...	Scenario 2
0	1	...	Scenario 3
1	1	...	Scenario 4
⋮	⋮	⋮	⋮

Specifications QTM

Digital input/output channels	8 I/O	Timetag memory	131,072 timetags
Output voltage	3.3 V LVTTL (in 50 Ohm)	Count result memory	131,072 bins
Output rate	1 GS/s	Maximum no. of counts per bin	4,000,000,000
Output skew resolution	39 ps	Ethernet data rate	1 Gbit/s
Input threshold voltage	0 - 5 V (11 bit)	Driver/API	SCPI / Python / QCoDeS
Input resolution TDC	20 ps (RMS)	Max. power consumption via Cluster	48 W
Dead time TDC	44 ns	Input/Output connector type	SMP
Repetition rate	22.7 MHz	Dimensions	269 x 130 x 20 mm3
Timetag trace memory	2,048 timetags	Weight	0.356 kg