

Time-to-digital Converter (TDC)

Reduces costs for systems that require a large number of channels.

Features

- 64- or 8-channel configurable
- Timing resolution better than 32 ps
- Onboard storage capacity >65K time-stamps per channel
- Input count rate of 15MHz events per second across all channels
- 13.3 ms measurement range with infinite time rollover capability
- User-friendly Windows-based software
- Gigabit Ethernet communication
- 1U rack-mountable enclosure
- Optional board or chip-based OEM modules available
- Software GUI and DLL for easy integration into user applications

Fields & Applications

- LIDAR/LADAR time measurements
- On-focal-plane time processing
- Quantum information processing
- Pulse-timing (period, frequency, time interval analysis) measurements
- Photon-counting and single photon-timing (SPT) measurements
- Coincidence detection
- Nuclear and high-energy physics
- Medical imaging (e.g. positron emission tomography, fluorescence lifetime spectrometry, ultrasound imaging)



Model YVX-657-D64: 64-channel TDC
Model YVX-657-S08: 8-channel TDC

Voxtel's YVX-657 TDC is a fully digital design that supports 32 picosecond timing resolution and an input event rate of 15 MHz on each channel. Onboard memory can store more than 65,000 time-stamps per channel. To bring top performance and reliability, the TDC incorporates state of the art components, including: an advanced field-programmable gate array (FPGA); a low-jitter, low-noise phase-locked loop (PLL); and a high-stability, high-accuracy oven-controlled crystal oscillator (OCXO).

- **Novel Capability for Legacy Systems:** The TDC is easily configured for use with various systems, like those used for quantum cryptography, atmospheric LIDAR, and medical imaging.
- **Easy-to-use Graphical User Interface:** Users can control the TDC and acquire data easily. The YVX-657 comes with a user manual and Microsoft Windows™-based software with an intuitive graphical user interface (GUI) that allows setup, data acquisition, data transfer and display via a gigabit Ethernet connection.
- **Software Development Kit:** A hardware-dependent server program supports all core functions in the National Instruments Lab Windows/CVI programming environment. The DLL is also supplied to facilitate custom user interface and control.

Specifications

Model YVX-657-D64: 64-channel TDC

Model YVX-657-S08: 8-channel TDC

	64-Channel	8-Channel
Input Signal Type	LVDS (2.5V)	CMOS (+3.3V) ¹
Event Input Connector	40-pin mini delta ribbon (MDR)	SMA
No. of Event Input Connectors	4 ²	8
Other Inputs (CMOS, SMA)	Reference ³ ; Enable ⁴ ; Hold ⁵	
Time Range (before rollover)	13.3 ms ⁶	
Resolution	32 ps LSB ⁷	
Pulse Pair Resolution	75 ns ⁸	35 ns ⁸
Maximum Input Count Rate on each input channel	13 MHz	28 MHz
Minimum Input Pulse Width	8 ns	
Differential Non-linearity	±1 LSB	
Operating Modes	single start; single and multi-stop	
Onboard Storage Events (Hits) Per Channel	65,535	262,144
Input Termination	100Ω	50Ω
PC Requirement	Win XP, SP2, or Win 7	
PC Interface	Gigabit Ethernet	
Software	Lab Windows CVI based GUI and DLL	
Power	+5V, 3A ⁹	
Mounting options	1U rack-mountable enclosure	
Dimensions	272 mm x 203 mm x 44 mm	

1 Protected to +4.6V absolute maximum.

2 16 channels per connector.

3 Used for varying needs (e.g., to record start time in response to a detected laser pulse).

4 Control signal that starts the TDC operation. Required at all times.

5 Control signal used to mask event at the input.

6 Measurement range can be extended by using rollover logic, allowing data acquisition over extended periods of time.

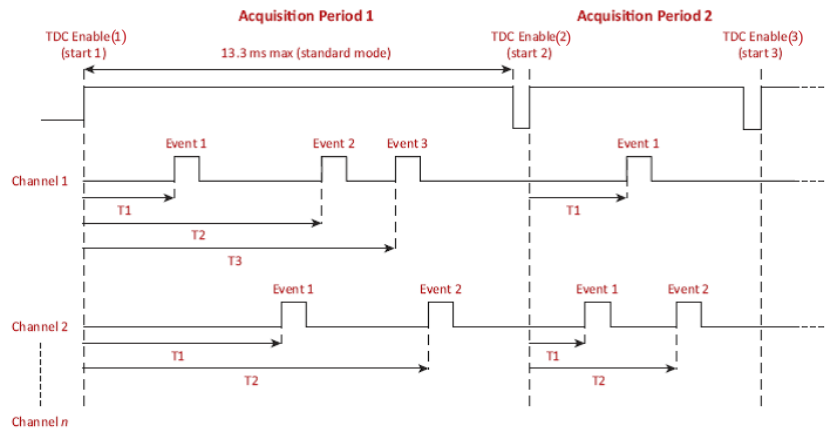
7 32-bit time stamps.

8 Minimum difference between rising edge of incoming events

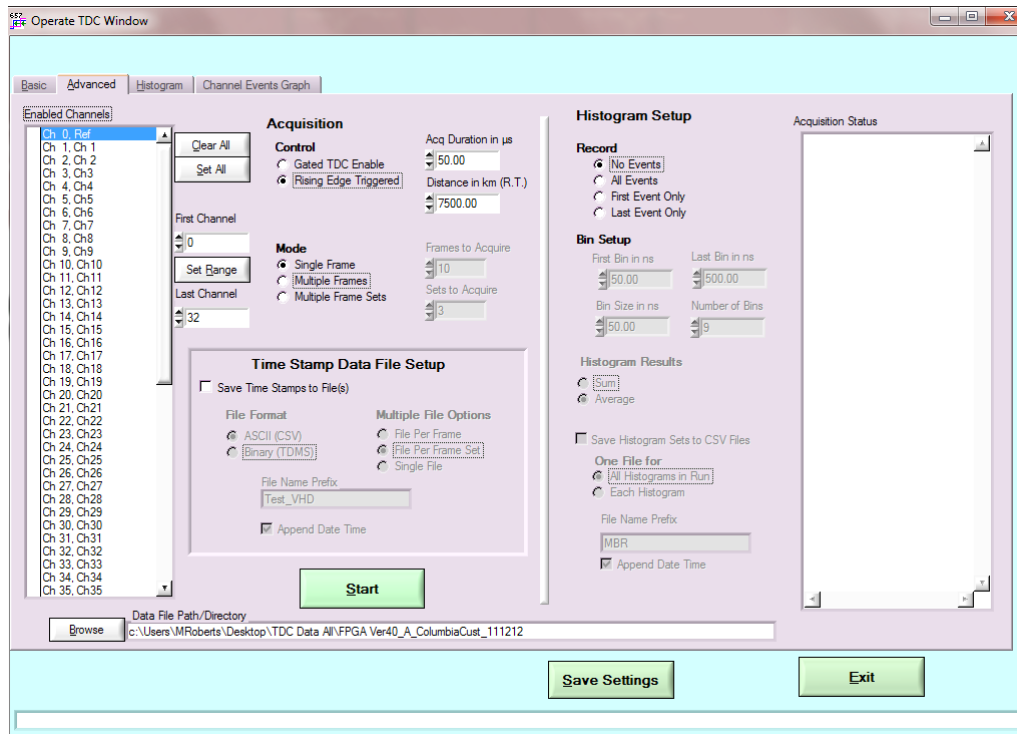
9 Alternate pin connector is provided to facilitate the use of board as a sub-module in a larger system

Operational Overview

- To initiate operation, choose one of two options to generate a TDC Enable pulse (start pulse):
 - Gated TDC Enable:** User supplies a TDC Enable pulse of desired acquisition duration; or
 - Rising Edge Triggered:** User supplies a short positive pulse, such as from a laser, and supplies the TDC Enable acquisition duration in the software GUI. A TDC Enable pulse of specified duration, synced with the rising edge of the laser pulse, in this example, is generated in the hardware.
- While the TDC Enable pulse is held high, each channel records the time of arrival of subsequent input events relative to the rising edge of the TDC Enable pulse until:
 - The TDC Enable pulse goes low; or
 - Memory capacity for storage events on a channel is reached.
- At the end of each TDC Enable period, each time-stamp is stored in local memory (SRAM) and downloaded to PC through a gigabit Ethernet (GbE) connection.

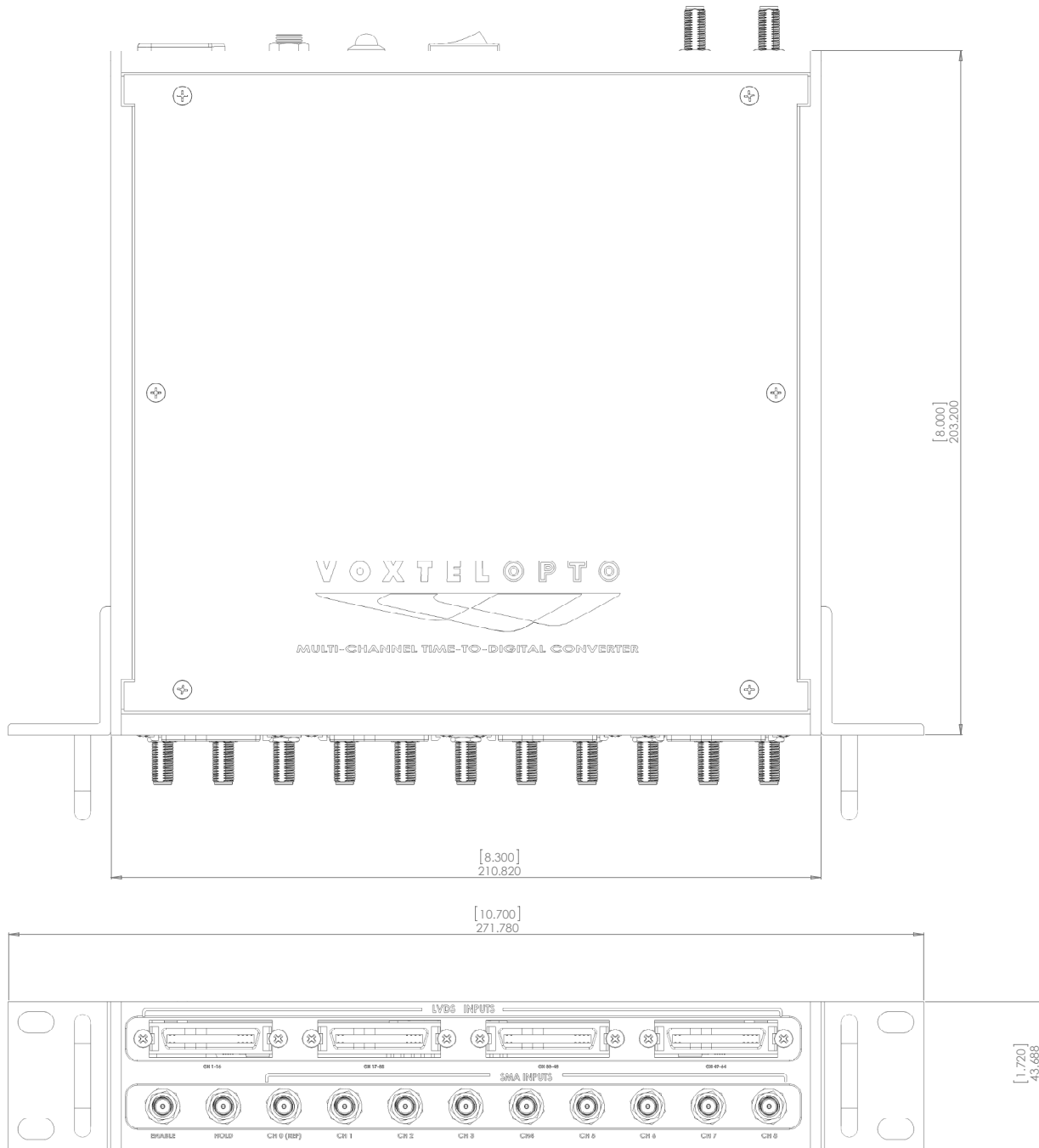


Operating Principle: Voxtel’s common-start/multi-stop time-to-digital converter. Following each acquisition period, data is downloaded from onboard memory to the host PC.



TDC software GUI for setup, data transfer and display.

Mechanical Overview



Instrument outline shows input, output, and power connectors.