

Timer/Counter/Analyzer with 2.8 nanosecond resolution

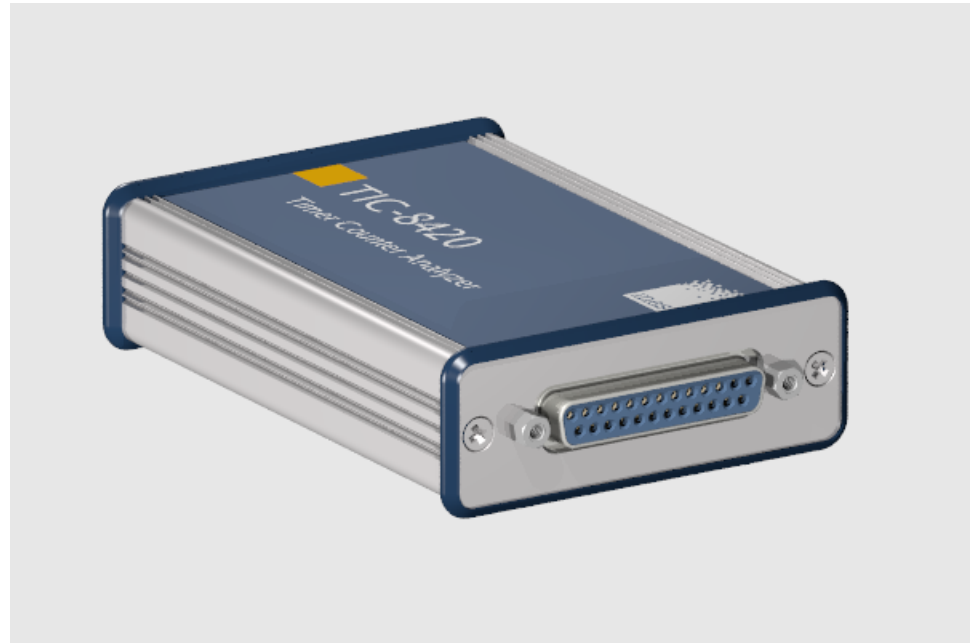
- Digitizes Time Intervals
- USB controlled instrument
- TTL/CMOS logic inputs/outputs
- Flexible Arming/Triggering
- Windows 10/11, Linux, 32/64 bit

Features

- 2.8 ns resolution, 6 ns minimum Pulse Width, 100 MHz fMax
- Two independent input channels
- External reference and trigger channels
- Jitter, Frequency, Time Interval, Pulse-width Measurements
- Two channel start/stop measurements
- Repetitive measurements: Single-Stop Histogram, Multi-Stop Histogram

Applications

- Edge Counter, Time Stamping
- Pulse-Width, Pulse, Semi-Period, Frequency, Period, Position Measurement
- Simple Pulse, Pulse Train, Frequency Generation
- Time-to-digital conversion (TDC)
- Time-of-flight (TOF) measurements

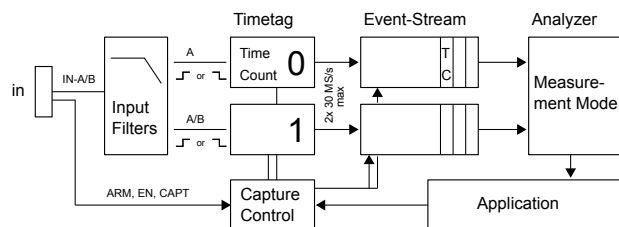


Overview

The TIC-8420 is a novel Timer/Counter/Analyzer based on digitization of time intervals in pulse trains with 2.8 ns resolution.

The software application on the computer can be developed in Python, LabView, C, C++, or any other compatible programming language supporting standard libraries.

TIC Architecture



An IMPORTANT NOTICE at the end of this document addresses availability, warranty, changes, use in safety-critical applications, intellectual property matters and other important disclaimers.

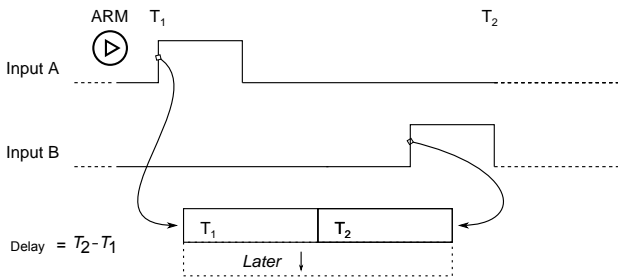


The block diagram shows the key components of the instrument from the user's point of view. To suppress glitches, the input signals are filtered by programmable low-pass filters. Leading or falling edges in the input signals are now counted and converted to timetags (time/count pairs) with a resolution of 2.6 ns. The Capture Control unit decides when to capture a timestamp in the Event-Stream Fifos, based on the active Measurement Mode.

The raw data from the Event-Stream Fifos are then converted to meaningful data by the analyzer, also based on the active Measurement Mode. All this happens in parallel, so no information is lost.

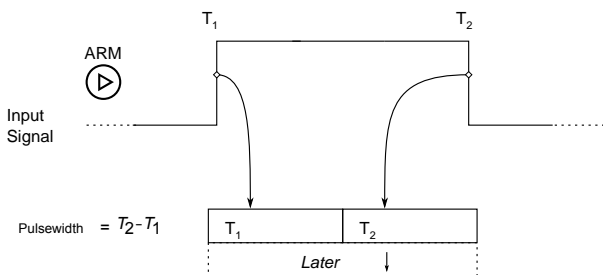
Measurement Modes

MDEL Measurement Mode



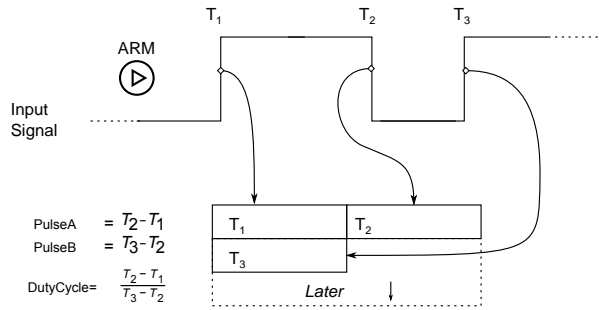
Delay is the time difference between the activation of the A and B channel.

MPWI Measurement Mode



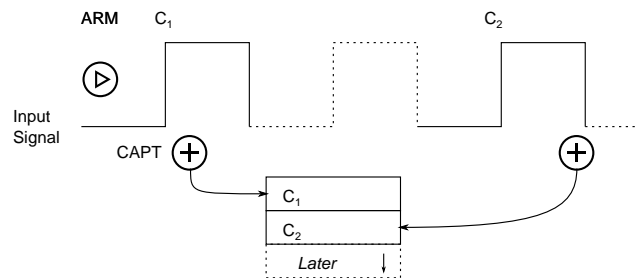
Pulse width is the distance between the leading and the subsequent trailing edge of a pulse.

MPUL Measurement Mode



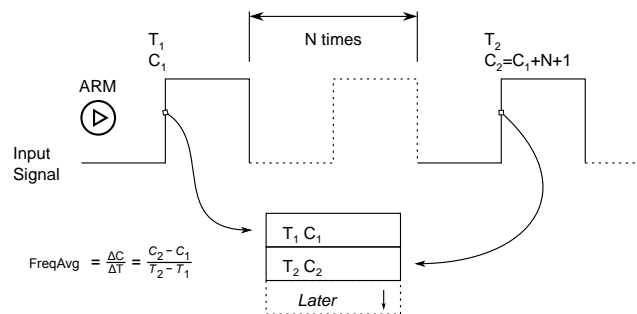
This mode measures the active as well as the inactive time of a pulse. The pulse period and the duty cycle are calculated.

MTOC Measurement Mode



In totalizing counter mode, the Timetag unit continuously counts the active edges of the input signal.

MFAV Measurement Mode



For frequency/period average measurements an interval N must be selected. An event is captured for every Nth leading signal edge.

Specifications

Time Base

Stability (vs. ambient temperature): ± 3.0 ppm

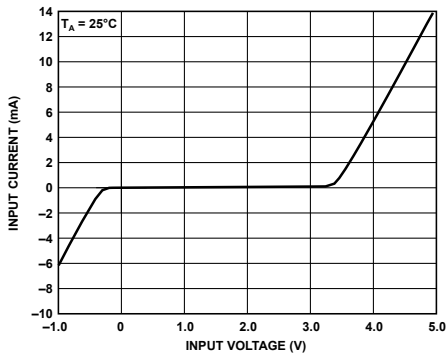
Aging (first year): ± 2.0 ppm

Electrical Data

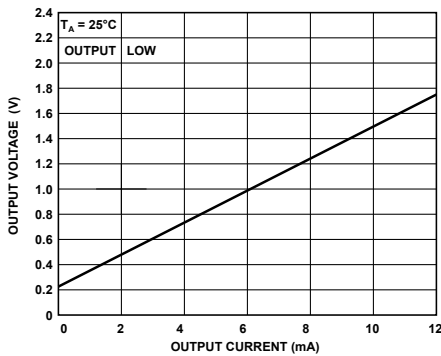
Overvoltage Protection (permanent, all inputs): $-5.0V \dots +8.7V$

Overvoltage Protection (peak, max. 10 ms, 2% duty cycle): $\pm 20V$

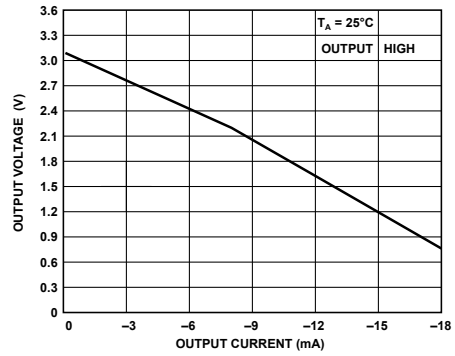
Input Characteristics (Pull-down $33k\Omega$ at each input):
Logic L $\leq 0.8V$, Logic H $\geq 2.0V$



Output Characteristics (low):



Output Characteristics (high):



3.3V Output Pin (Output current): 1.6 mA max.

Supply Voltage (USB): $5V \pm 5\%$

Supply Current (USB): 150 mA max.

Environmental and Physical

Size (excluding connectors): 111 mm L x 76 mm W x 29 mm H

Weight: 160 g

Operating ambient temperature: $0 \dots 50^\circ C$

Storage temperature: $-20 \dots 80^\circ C$

Relative humidity: 5 ... 95%, noncondensing

USB connector: Extraction force $\geq 15N$, Mating force $\leq 35N$

Ordering Information

TIC-8420 - Instrument, USB cable (1m), Software Download Card

Important Notice

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, the publisher does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. The publisher takes no responsibility for the content in this document if provided by an information source outside of the publisher. In no event shall the publisher be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory. Notwithstanding any damages that customer might incur for any reason whatsoever, the publishers' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Terms and conditions of commercial sale of the publisher.

Trademarks — Product, service, or company names used in this document are for identification purposes only and may be either trademarks or registered trademarks of the relevant trademark owners. LabView, NI-488.2, LabWindows, PXI, DASyLab, DIAdem are trademarks or registered trademarks of National Instruments Corp., USA, in the United States and/or other countries. Microsoft, Windows, Windows NT, Windows CE, Windows 2000, Windows ME, Windows XP, Windows Vista, Visual Basic, Visual-C++ are trademarks or registered trademarks of Microsoft Corporation in the United States and/or other countries.

Specifications — All specifications are subject to change without prior notice.

B2B only — Our range of products and services is directed exclusively at commercial customers, institutes and public authorities, as well as other natural or legal persons or partnerships with legal capacity, who, when concluding a legal transaction, act in the exercise of their commercial or independent professional activity. Any business to consumers (i.e. natural persons who conclude a legal transaction for purposes which can predominantly be attributed neither to their commercial nor to their self-employed professional activity) is excluded.

Software — ALL SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR

IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM, OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE SOFTWARE.