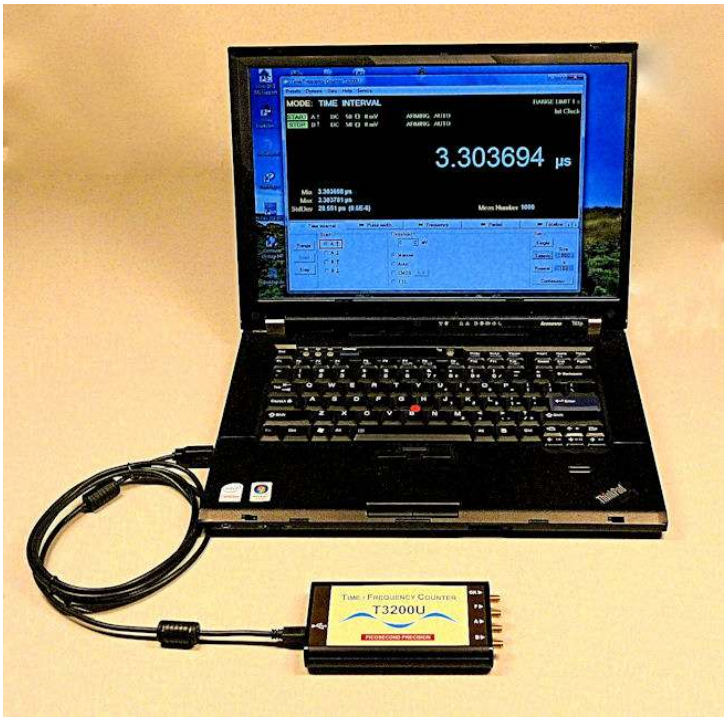
Time/Frequency Counter Model T3200U

High Performance Miniature Instrument with USB interface

- Small box with USB control and supply by notebook, netbook, or PC
- Time interval measurement range: **0 – 4400 seconds**
- Precision (standard deviation) **< 35 ps** at time interval measured from 0 to 200 ms
- Frequency range up to **3.5 GHz**
- **Frequency sampling** up to **2 MSa/s**
- Measurement of **Allan Deviation** (ADEV)
- Measurement of **Time Interval Error** (TIE, MTIE), TDEV
- Totalize mode
- Built-in automatic calibrator
- Selectable pulse edge and polarity
- Selectable input threshold level or automatic threshold search
- Comprehensive statistical data processing
- User-friendly software for Windows and DLL file for user's applications
- Export of data files for processing in other programs (*Stable32*, *MS Excel*)



The advanced Time/Frequency Counter T3200U is contained in a small, light, and handy case connected by the USB 2.0 interface to computer (notebook, netbook, or PC). It combines a 35 ps precision (RMS) of single-shot time-interval measurement with affordable cost and reliability for thorough industrial and scientific applications. The supplied software creates a user-friendly graphic interface and provides many useful functions for accurate control, diagnostics and statistical processing of the measurement data.

The heart of the instrument is a newly developed counter chip, which contains an interpolation time counter with two precise two-stage Time-to-Digital Converters, a FIFO memory which allows for high measurement rate, and a dedicated microcontroller. The counter T3200U contains a *Temperature-Compensated Crystal Oscillator* (TCXO) which provides high accuracy and stability at reasonable cost.

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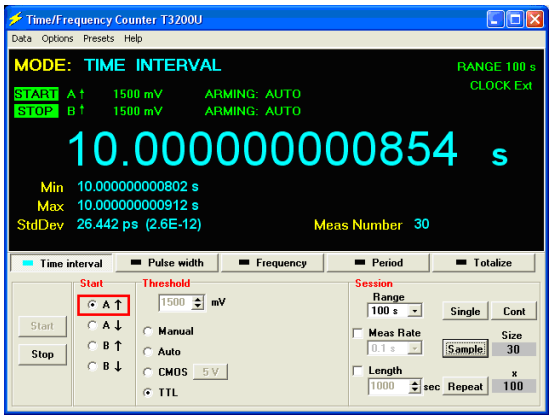
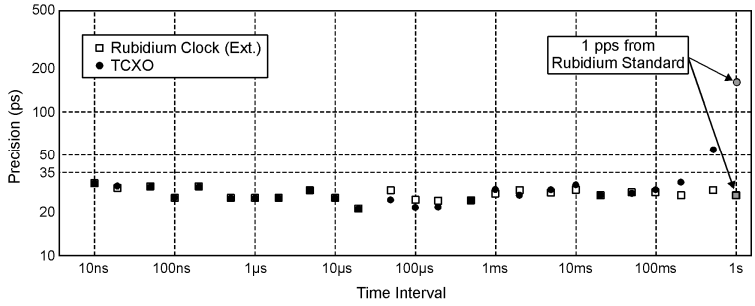


Display in Time Interval mode



Precision (Standard Deviation of TI measurements)

Specifications

Functions	Time Interval (between two pulses at two inputs or pulses appearing consecutively at a single, common input), Period, Pulse Width, Frequency, Frequency Sampling, Allan Deviation, Time Interval Error (TIE), Maximum TIE (MTIE), Time Deviation (TDEV), Totalize
Statistics	Mean, Min and Max Values, Standard Deviation
Graphics	Tables and plots of statistical distributions, display of frequency sampling in time domain to show possible frequency variation (Sampling mode)
Time Interval	
Range	0 – 4400 seconds (Inputs **A** and **B**)
Resolution (LSB)	25 ps in single-shot measurements, may be reduced with averaging
Precision (*Standard Deviation*)	< 35 ps at time interval measured from 0 to 200 ms < 35 ps at time interval measured from 0 to **1 second**, when using an atomic clock as external reference clock $< 35/\sqrt{Sample\_Size}$ ps with averaging
Systematic Error	< ± (1 ns max + (Timebase Error x Interval) + Trigger Level Timing Error)
Range Limit (*Overflow*)	presettable: 1 s, 10 s, 100 s, 4400 s
Start Enable	internal (controlled by software)
Stop Disable	referred to Start, internally programmable over the range (1…999)·20 units, where the unit is selected as ns, µs, and ms
Dead Time	200 ns
Measurement Rate	up to $5 \cdot 10^6$ measurements per second (when measuring zero time interval and storing data in internal FIFO memory), up to $5 \cdot 10^4$ measurements per second stored to memory in PC
Frequency & Period	
Range	Inputs **A** and **B**: 0.1 Hz to 200 MHz Sensitivity < 75 mV RMS typ. (0.01 to 200 MHz) Minimum slew rate: 10 V/µs Input **F**: 100 MHz to 3.5 GHz Sensitivity < -12 dBm (< 55 mV RMS) from 400 MHz to 3 GHz Sensitivity < - 3 dBm (< 160 mV RMS) from 100 MHz to 3.5 GHz
Gate Time	selected from 1 µs to 10 s (reciprocal method)
Dead Time	200 ns + 2 periods of tested signal
Measurement Rate	up to $8 \cdot 10^5$ measurements/sec (when measuring frequency in 1 µs gate and storing data in internal FIFO memory), up to $3.3 \cdot 10^4$ measurements/sec stored to memory in PC
Frequency Sampling	
Range	Inputs **A** and **B**: 1 to 200 MHz Input **F**: 100 MHz to 3.5 GHz
Sampling Rate	0.1, 0.2, 0.5, 1.0, 2.0 MSa/s
Totalize	
Range	0 to 10^{12} counts
Input frequency	max. 200 MHz
Gate Time	Internal: from 1 µs to 10 s, Manual Start-Stop
Inputs A and B	Impedance: 50 Ω, DC coupled; SMA sockets Amplitude: within ± 4 V Pulse edge: selectable, rising or falling Threshold: manually adjustable from -4 V to +4 V with 40 mV resolution, or set automatically
Internal Clock Generator	10 MHz TCXO, stability 5×10^{-7} (- 40 to +85 °C), ageing 1×10^{-6}/year
External Clock Generator	10 MHz, min. 100 mV on 50 Ω input impedance, DC coupled; SMA socket
Capacity of FIFO Memory	4 K time/delay measurements, 2.5 K frequency measurements
USB receptacle	Type B, USB 2.0
Power Supply	provided by the USB 2.0 interface
Supplied Software	for *Windows*® XP/Vista/7, DLL file for other applications
Size	135 (L) × 70 (W) × 17 (H) mm
Weight	160 g