

NEW! Time/Frequency Counter Model T4100U(e)

High Performance Miniature Instrument with USB Interface

- ◆ Precise and versatile counter powered and controlled via USB port
- ◆ Time interval measurement range:
0 – 1000 seconds
- ◆ Precision (standard deviation) **< 10 ps** at time interval measured from 0 to 50 ms
- ◆ Frequency range up to **3.5 GHz**
- ◆ Measurement rate up to **5·10⁶ meas./s**
- ◆ Measurement of Allan Deviation (ADEV)
- ◆ Totalize mode
- ◆ Selectable pulse edge and polarity
- ◆ Selectable input threshold level or automatic threshold search
- ◆ Comprehensive statistical data processing
- ◆ User-friendly software for Windows and drivers for user's applications
- ◆ Easy export of data files for processing in other programs (*Stable32, MS Excel*)
- ◆ Built-in automatic calibrator

TIME INTERVAL COUNTER WITH PICOSECOND PRECISION IN A SMALL, LIGHT, AND HANDY CASE WITH USB INTERFACE

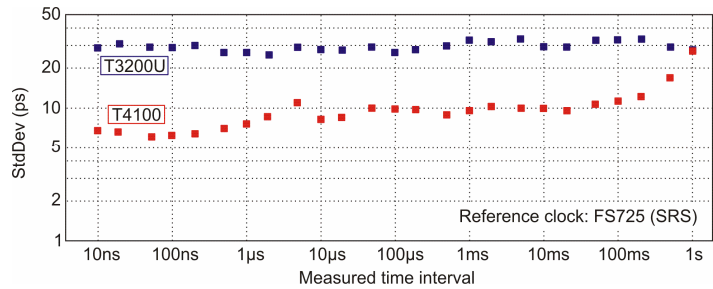


The advanced Time/Frequency Counter T4100U is contained in a small, light, and handy case connected by two USB 2.0 ports to computer (notebook, netbook, or PC). It combines a 10 ps precision (RMS) of single-shot time-interval measurement with affordable cost and reliability for thorough industrial and 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. Extended built-in memory of measurement results (model with external power supplier) helps designing complex measurement sessions.

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 and a built-in microcontroller. The on-board data memory allows for a high measurement rate. The counter T4100U contains a *Temperature-Compensated Crystal Oscillator* (TCXO) which provides high accuracy at reasonable cost. An external reference clock, e.g. atomic standard, can also be used.



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**, **Allan Deviation**, **Totalize**

Statistics

Mean, Min and Max Values, Standard Deviation

Graphics

Tables and plots of statistical distributions and frequency stability

Time Interval

Range

0 – 1000 seconds (Inputs **A** and **B**)

Resolution (LSB)

1.8 ps in single-shot measurements, may be reduced with averaging

Precision (Standard Deviation)

< 10 ps at time interval measured from 0 to 50 ms
 < $10 / \sqrt{\text{Sample_Size}}$ ps with averaging

Systematic Error

< $\pm (1 \text{ ns max} + (\text{Timebase Error} \times \text{Interval}) + \text{Trigger Level Timing Error})$

Range Limit (Overflow)

presettable: 1 s, 10 s, 100 s, 1000 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, μ s, and ms

Dead Time

< 200 ns

Measurement Rate

up to $5 \cdot 10^5$ measurements per second (when measuring zero time interval and storing data in on-board RAM),
 up to $4 \cdot 10^6$ measurements per second stored to memory in PC

Frequency & Period

Range

Inputs **A** and **B**: 1 MHz to 200 MHz
 Sensitivity < 75 mV RMS typ. (0.01 to 200 MHz)
 Minimum slew rate: 10 V/ μ s

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 μ s 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)

Totalize

Range

0 to 5×10^{11} counts

Input frequency

max. 200 MHz

Gate Time

Internal: from 1 μ s to 10 s, Manual Start-Stop, External Gate (Input B)

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 8 mV resolution, or set automatically

Internal Clock Generator

10 MHz TCXO, stability 5×10^{-7} (-40 to +85 $^{\circ}$ 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 on-board memory

4 M meas. (version e – external supplier) or 16 K meas. (USB supplied)

USB receptacle

Type B, USB 2.0 Hi-Speed

Power Supply

provided by two USB 2.0 ports (typical) or external supplier (version e)

Supplied Software

for Windows[®] XP/Vista/7/8, Royalty free USB drivers

Size

135 (L) \times 70 (W) \times 17 (H) mm

Weight

160 g