

APPLICATION NOTE 01 / EVENT TIMING

From pulses to coincidences.

A practical starting point for detector timing with the NexAtom UTT810.

For quantum optics, atomic physics and AMO experiments, useful timing starts before the first histogram. This note explains the measurement logic and the questions to settle during configuration. It is an original Precisometer guide, not a manufacturer performance test.

A SIMPLE MEASUREMENT CHAIN**Detector pulses**

A + B / reference

**UTT810**

Time-stamped events

**Analysis**

Delay, coincidence, correlation

Conceptual workflow; electrical compatibility is checked for the actual detector and interface.

Three timing numbers, three different meanings

1 ps**BIN WIDTH**

The smallest published histogram increment. A finer grid does not remove detector or electronics uncertainty.

<10 ps**STATED JITTER**

NexAtom's timing-jitter specification. The public page does not state its statistical convention or test conditions.

4 ns**DEAD TIME**

The published dead-time figure. Confirm behavior for the intended input pattern and acquisition mode.

Hardware figures: nexatom.in/products/time-taggers/utt810/ | Checked 24 October 2026



BUILD AN ACQUISITION YOU CAN INTERPRET

Start with the pulses.

01

Match the electrical interface

Check detector polarity, amplitude under load, pulse width, rise time, overshoot and repetition behavior against the ordered hardware. Published UTT810 inputs are 0-5 V at 50 ohm; threshold adjustment is 0-2.5 V in 1 mV steps. Do not assume a detector label alone establishes compatibility.

02

Establish a clean timing reference

Use consistent cables and record their lengths. Inspect a representative pulse at the intended termination. Choose the threshold and hysteresis to reject noise without missing valid events; quantify timing shifts when pulse amplitude changes.

03

Measure the delay distribution

Form time differences between selected events on channels A and B. Locate the peak, estimate its width and identify background or reflections. Subtract a calibrated channel offset before comparing physical delays across setups.

04

Choose and document the coincidence rule

Select a window around the expected delay. A wider window accepts more signal and more accidental pairs. Define whether every valid pair is counted or one match is retained, then use that rule consistently in software and reporting.

Keep pairs inside the chosen delay window

Illustration



A reproducible coincidence gate

Accept a pair when $|t_B - t_A - \text{delay offset}| \leq \text{window width} / 2$.

Record the window width, delay offset, pairing rule and any background correction.

Input ranges: nexatom.in/products/time-taggers/utt810/ | Confirm thresholds and interface for your configuration.

CHECK THE RESULT, THEN REPORT IT

Make the timing meaningful.

Bin size, peak width and system performance

NexAtom publishes an example two-channel coincidence peak of approximately 49 ps FWHM / 20.81 ps RMS. It includes the source and measurement chain. These are combined measurement values, not an independently established per-channel specification.

For independent random timing contributions, variances add. Recovering a single-channel value requires a stated statistical model and known reference contributions. Dividing a combined peak width by two does not establish single-channel jitter.

Before a long acquisition

Count-rate behavior	Increase the input activity and look for losses, buffer warnings or changes in measured ratios. Confirm sustained throughput in the actual recording mode; USB bandwidth is not a time-tag rate.
Stability / synchronization	Repeat the reference measurement after warm-up and over the intended acquisition duration. For external synchronization, confirm the clock interface and lock status.
Analysis choice	Use delay histograms for timing structure; coincidence gates for joint events; correlation for time-dependent relationships. Histogram bin width and correlation bin width are distinct settings.

Keep a measurement record

Save the instrument and software versions, channel mapping, detector settings, thresholds, hysteresis, cable delays, synchronization state, acquisition duration, input activity, analysis bins, pairing rule and uncertainty method. Retain raw time tags when your workflow and storage permit.

UTT810 Windows software

Ask about your experiment

Official installer and SDK preview: nexatom.in/downloads/

European distributor: precisometer.com/nexatom | info@precisometer.com

Source for hardware and published measurement example: nexatom.in/products/time-taggers/utt810/

Prepared by Precisometer, 24 October 2026. General measurement guidance; validate the actual experimental setup.