TIMEPIX3

A pixel detector read-out chip for X-ray imaging and particle track reconstruction developed by the Medipix3 Collaboration.

Timepix3 is a general-purpose integrated circuit suitable for readout of both semiconductor detectors and gas-filled detectors. Timepix3 can be used in a wide range of applications varying from X-ray imaging to particle track reconstruction. Depending on the application requirements, users can choose one out of three data acquisition modes available in the Timepix3. In the data driven mode both arrival-time information and charge deposit information are sent off chip for each hit together with the coordinates of the active pixel. The chosen architecture allows for continuous and trigger-free readout of sparsely distributed data with the rate up to 40 Mhits/s/cm².

For imaging applications and for calibrations, the possibility exists of operating in frame-based (non-continuous) data read-out mode.

TECHNOLOGY READINESS LEVEL

Commercially available.

CONTACT

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Find out more at:
kt.cern

FEATURES

- Pixel size 55µm x 55µm.
- 256 x 256 pixels.
- Timepix3 is suitable for read-out of both semiconductor detectors and gas-filled detectors.
- Single thresholds per pixel each with 4 bits of local adjustment.
- Two main measurement modes: (1) simultaneous 10 bit TOT and 18 bit TOA and (2) 10 bit event counting and 14 bit integral TOT.
- TOT monotonic for large positive charges.
- Fast TOA for time stamping with a precision of 1.56 ns.
- Data driven read-out: dead time free, for a maximum hit rate of 40 Mhits/s/cm².
- Shutdown/wake-up features for power pulsing tests on a full system.
- 3-side buttable (with a single 1.2mm dead edge).
- TSV ready.

APPLICATIONS

- X-ray imaging.
- Particle track reconstruction.
- Timepix3 is suitable for readout of both semiconductor detectors and gas-filled detectors.
- Electron microscopy.

Knowledge Transfer
Accelerating Innovation

technology