Docket #: S11-314

Adjustable Amplifier and Time-Based Digitizer with Fast Timing for SiPM- and APD-based PET Photodetectors

A team of Stanford engineers have developed a patented integrated circuit to amplify and digitize pulse signals from silicon photomultiplier (SiPM) and avalanche photodiode (APD) -based semiconductor photodetectors for Positron Emission Tomography (PET) applications while providing fast timing, wide input dynamic range, adjustable amplification parameters and multiple input channels, consuming low power, and using an efficient digitization scheme.

Applications

- **Positron Emission Tomography (PET) systems:**
  - PET systems with silicon photomultiplier (SiPM) or avalanche photodiode (APD) photodetectors
  - Time-of-Flight Positron Emission Tomography (PET) systems which require time resolution of at least 100-300ps
  - High resolution (about 1mm) PET systems which require tens-of-thousands of electronics channels
  - Data acquisition for prototype and research systems where it is necessary to easily adjust the circuit parameters for use with various silicon photodetectors

Advantages

- Efficient and simple digitization scheme which achieves **excellent time resolution** and provides pulse energy information while consuming **low power** and capturing a small number of samples

- **Digitized pulse waveform** facilitates pulse processing algorithms to achieve better time and energy resolution and to resolve pulse pile-up
- Fully digital output is **robust** against amplitude and pulse-width noise
- Adjustable input impedance and gain allows the integrated circuit to be **used with a variety of silicon photodetectors**

Patents

- Published Application: WO2013085923
- Published Application: 20150001404
- Issued: 9,244,179 (USA)

Innovators

- Frances Lau
- Craig Levin
- Hwang Ho Choi
- Jaeha Kim
- Mark Horowitz

Licensing Contact

David Mallin

Licensing Manager, Physical Sciences

Email