



Temporoc

Multi-Purpose Mixed-Signal SiPM read-out ASIC

Temporoc is a 64-channel front-end ASIC designed to readout silicon photomultipliers (SiPMs) for particle time-of-flight measurement applications. Temporoc combines a very fast and low-jitter trigger with accurate charge and time measurements. Energy and time are digitized internally with a 10-bit ADC and 40 ps-bin TDC. In total, Temporoc is capable of providing two distinct time tagging and two energy measurement of each event.

The concept of this ASIC is combining two measurement lines that won't interfere one with each other to measure both first incident photon timing measurement and whole crystal light charge integration. Additionally, Temporoc features clustering triggers readout which could be useful for particle detection with monolithic scintillator.

An adjustment of the SiPM high voltage is possible using a channel-by-channel input DAC. It allows a fine SiPM gain and dark noise adjustment at the system level to correct for the non-uniformity of SiPMs.

The power consumption is 6.5 mW/channel. Temporoc is suitable for any application that requires both accurate time resolution and precise energy measurement such as time-of-flight gamma detection.



Detector Read-Out	SiPM, SiPM array
Number of Channels	64
Signal Polarity	Positive
Sensitivity	Trigger on first photo-electron
TDC precision	Below 50 ps RMS
Dynamic Range	3000 photo-electrons (10^6 SiPM gain), Integral Non Linearity: 1% up to 2000 ph-e
Packaging & Dimension	BGA (20x20mm, 516 balls)
Power Consumption	410 mW (Power supply: 1.2V)
Inputs	64 voltage inputs with DC adjustment for SiPM HV tuning
Outputs	Digital output (dual ADC and dual TDC per channel) – selectable transmission mode. 1 multiplexed time trigger output 2 ASIC trigger OR outputs (64 channels, 2 levels)
Internal Programmable Features	64 HV adjustment for SiPM (64x8bits), time trigger threshold adjustment (10bits), charge measurement tuning, ADC Peak Sensing, 64 trigger masks, internal temperature sensor, channel by channel output enable, trigger latch, programmable data output

More about Temporoc

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