

NIRCA MkII – IR Image Sensor Readout and Controller ASIC

Tobjørn Østmo, Amir Hasanbegovic, Hans Kristian Otnes Berge, Jørgen M. Sandvik, Ali Dadashi, Suleyman Azman, Jahanzad Talebi, Jan-Erik Holter, Jusong Choe, Tor Magnus Johansen, Petter Øya, Anders E. Olsen, Anja Kohfeldt, Jörg Ackermann, Dirk Meier, Codin Gheorghe, Gunnar Mæhlum

Integrated Detector Electronics AS, Oslo, Norway

Abstract

NIRCA MkII is the second-generation ASIC from IDEAS for readout from infrared (IR) image sensors, e.g., HgCdTe/MCT-based focal plane arrays (FPA). The ASIC aims at reducing the size, weight, power and cost (SWaP-C) of infrared sensor readout systems by integrating the necessary functions and performance on a single ASIC. The NIRCA MkII is a radiation-tolerant integrated circuit (IC) system-on-chip with operating temperature between -40°C and $+85^{\circ}\text{C}$. Figure 1 shows the block diagram and interfaces. The ASIC includes 16 video channels, each with a $1 \times 8 \times$ programmable gain amplifier (PGA) and a pipeline ADC with 14-bit and 16-bit output options running at 12 Msps. Analog input offset is adjustable in the analog domain with fine-tuning of gain and offset in the digital domain. Digitized sensor data is output on a 9×480 -Mbps high-speed serial LVDS interface (TX<0:8>). The ASIC provides a digital interface (DIN/DOU) for controlling the sensor, and analog reference voltages (AOUT) for biasing the sensor.

NIRCA MkII is programmed via an SPI interface. After a program has been loaded into the internal ECC RAM the internal sequencer can execute a variety of tasks, e.g., waveform generation, ADC sampling control, configuration and control of both internal analog and digital modules. At this workshop, we will present an overview of the ASIC, typical use cases, the results of the validation campaign and ongoing further developments.

The NIRCA MkII ASIC is developed under the ESA project *Control ASIC for Earth Observation Infrared Detector*. The project has been funded by the European Space Agency (ESA), the Norwegian Space Agency (NSA) and IDEAS.

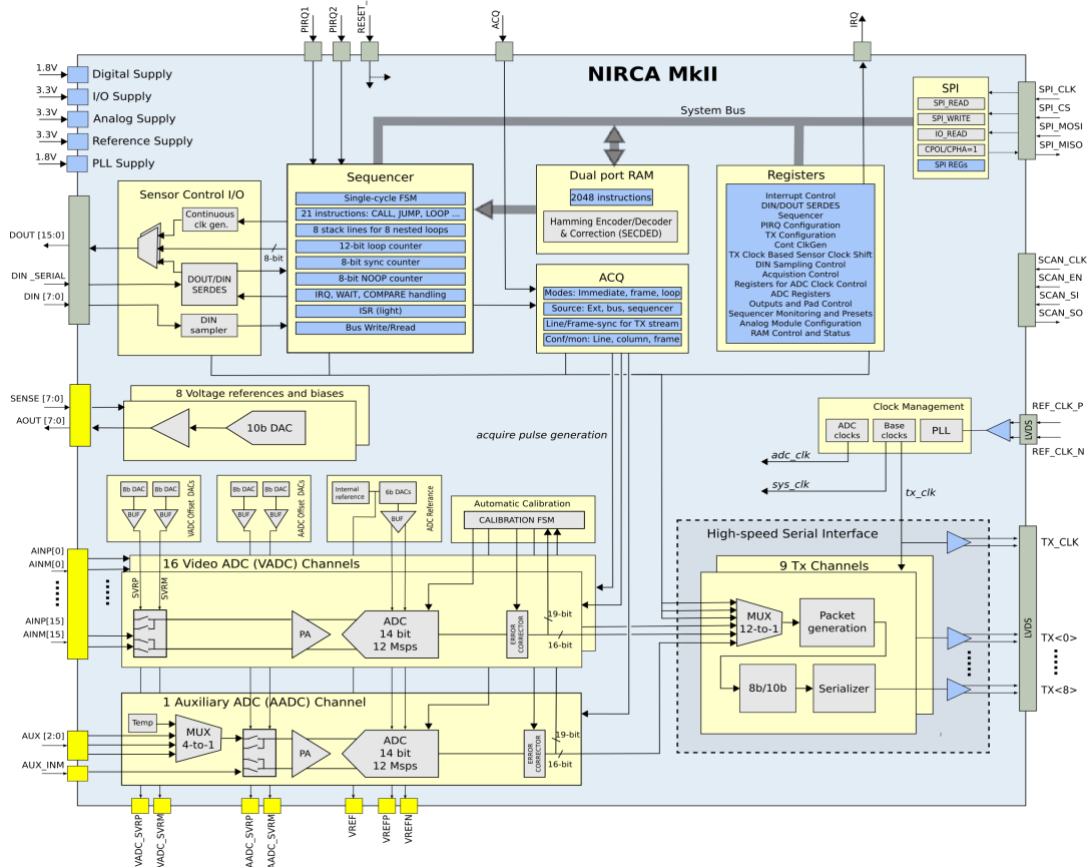


Figure 1: NIRCA MkII block diagram