



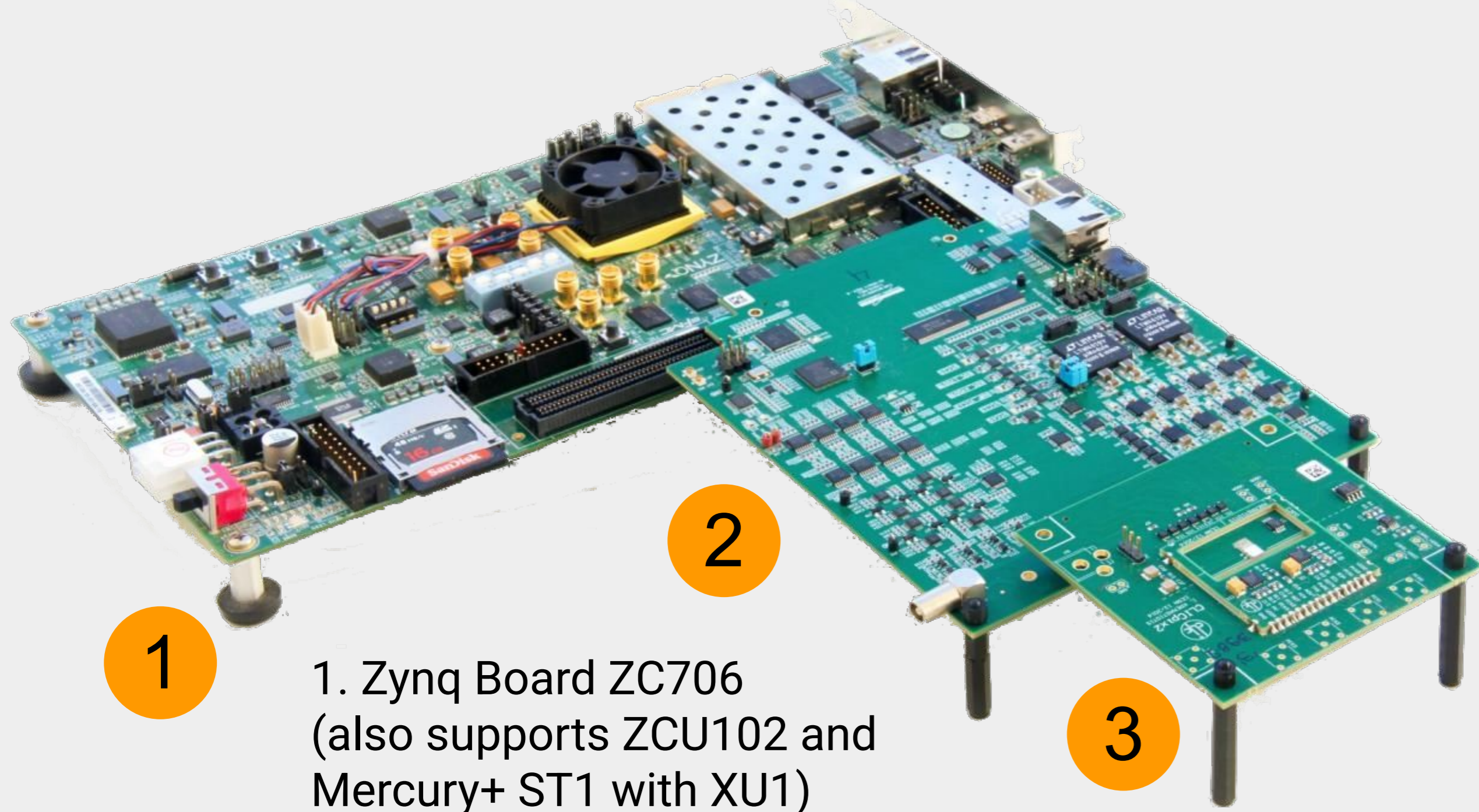
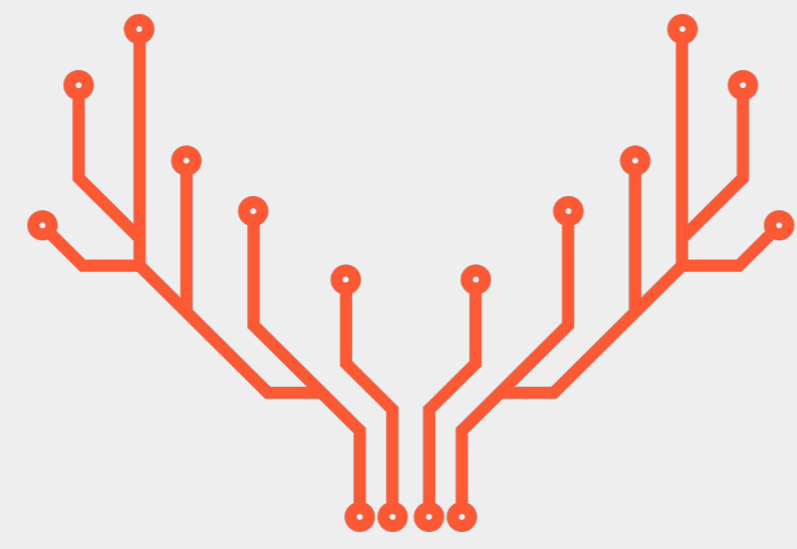
EP R&D

# Advancements and future expansions of the Caribou DAQ system

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## System Overview

- Data Acquisition System for Silicon Pixel Detector Prototyping
- Open source hardware, firmware and software for laboratory and beam tests
- Offers reusable hardware, firmware and software components
- Minimizes device integration effort
- Reduces time to get first data from a new detector



1. Zynq Board ZC706 (also supports ZCU102 and Mercury+ ST1 with XU1)
2. CaR Board
3. Chip Board

## Getting Started

Design your DUT chip board

Design your DUT firmware + software interfaces

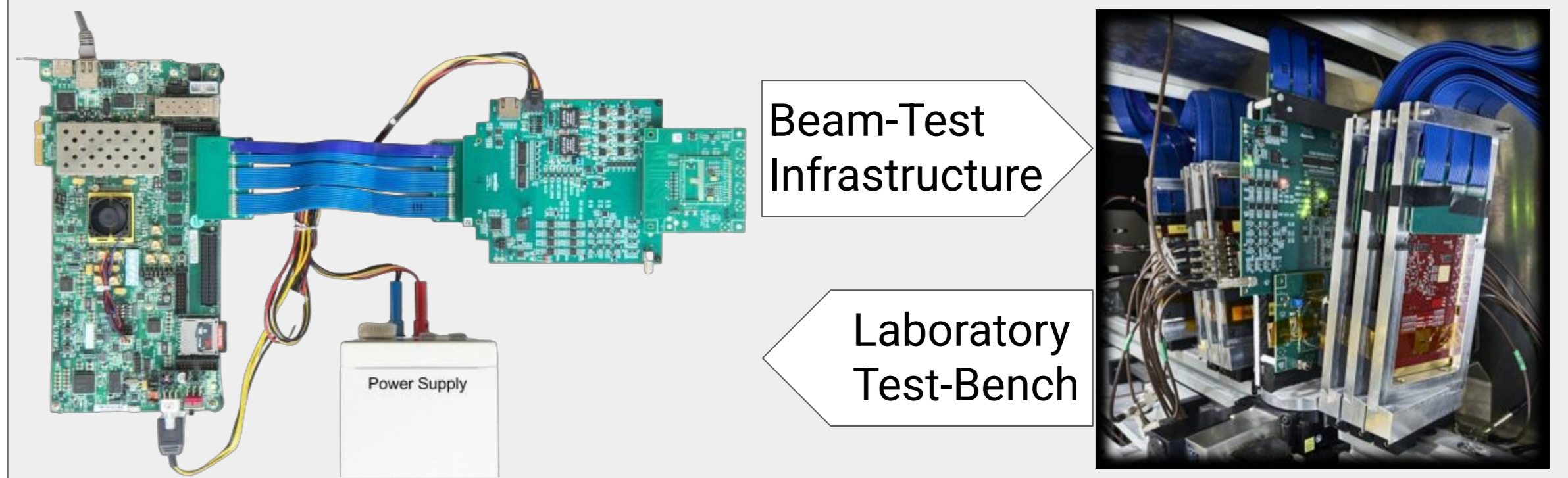
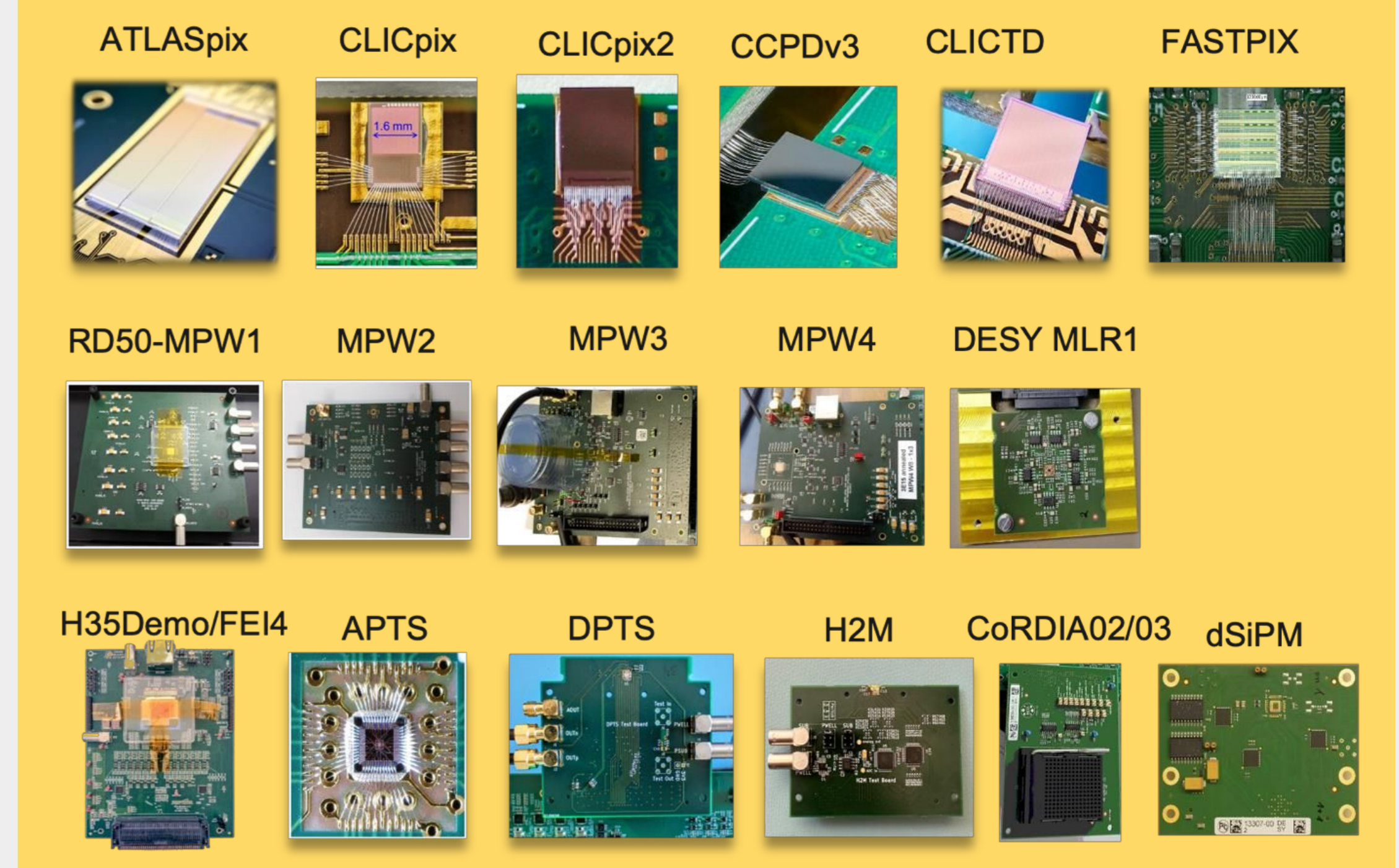
Integrate and test your DUT



[caribou-project.docs.cern.ch](http://caribou-project.docs.cern.ch)

## Applications

> 60 CaR boards delivered to 20 institutes and > 15 tested prototypes



## Test Board: Towards Caribou v2

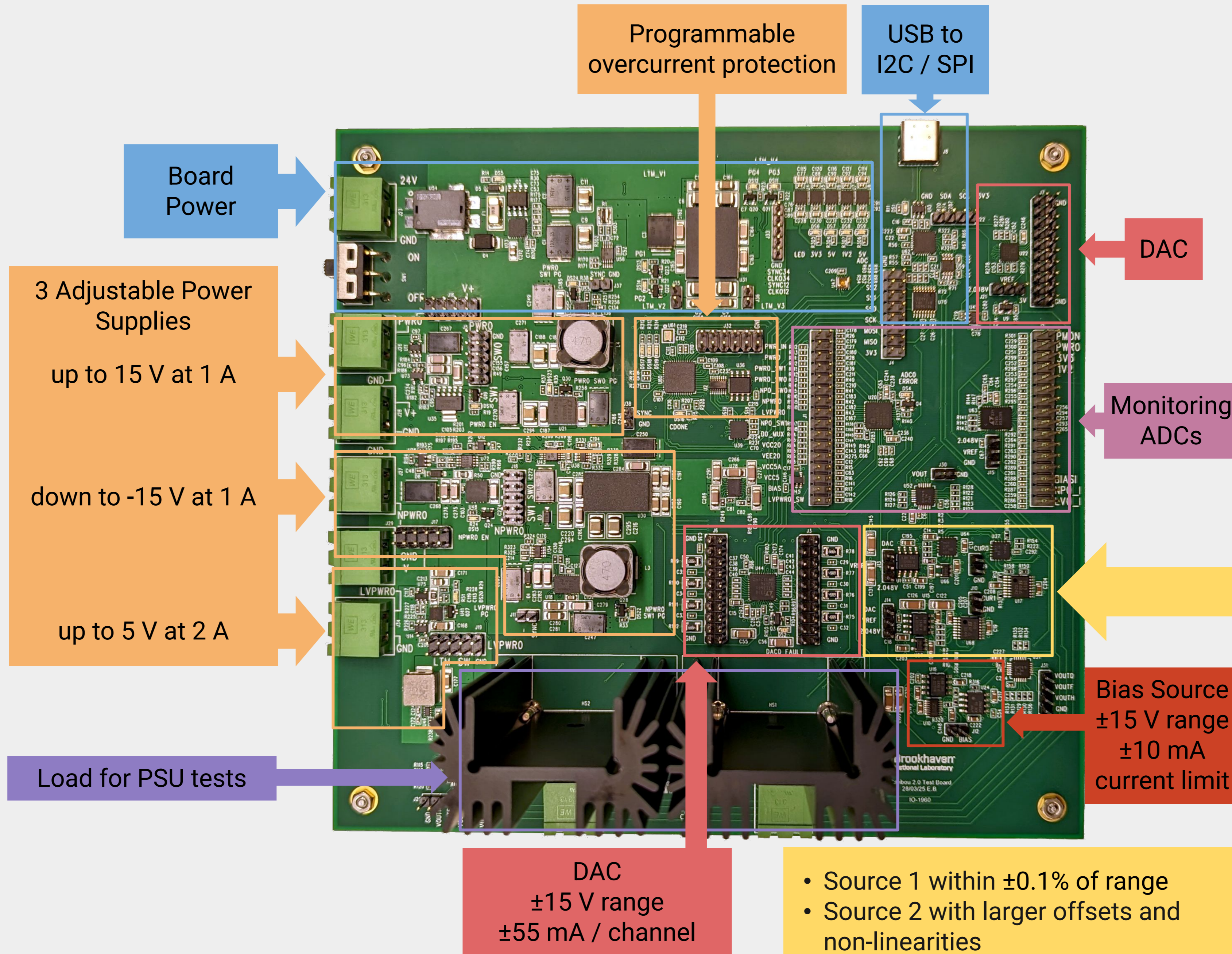
- Next generation of Caribou currently under development
- Redesign with lessons learned from version 1
- Replace evaluation board with **System-on-Module (SoM)**
- Optimize system cost, increase flexibility and performance

- Simpler test board as intermediate step towards v2
- Small board without SoM / FPGA
- Only 1 or 2 channels per type

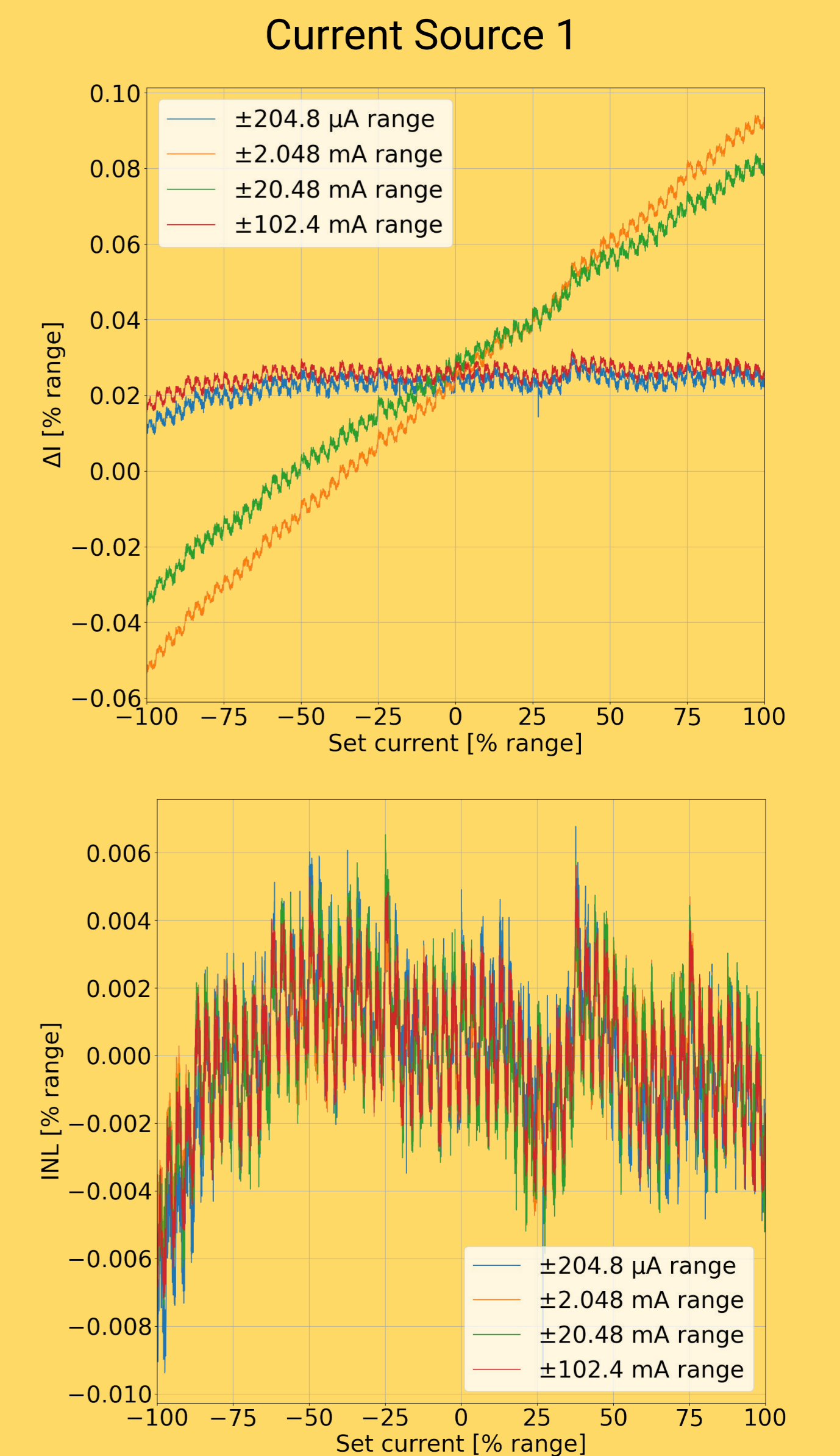
- Goals:
- Test and validate power supplies, analog circuits, and other peripherals
- Evaluate different design options: integrated DC-DC converter modules / discrete regulators, high / low current sources, ...

- Design improvements include:
- Increased range for power supplies and current sources
- Negative supply voltage
- Improved overcurrent protection

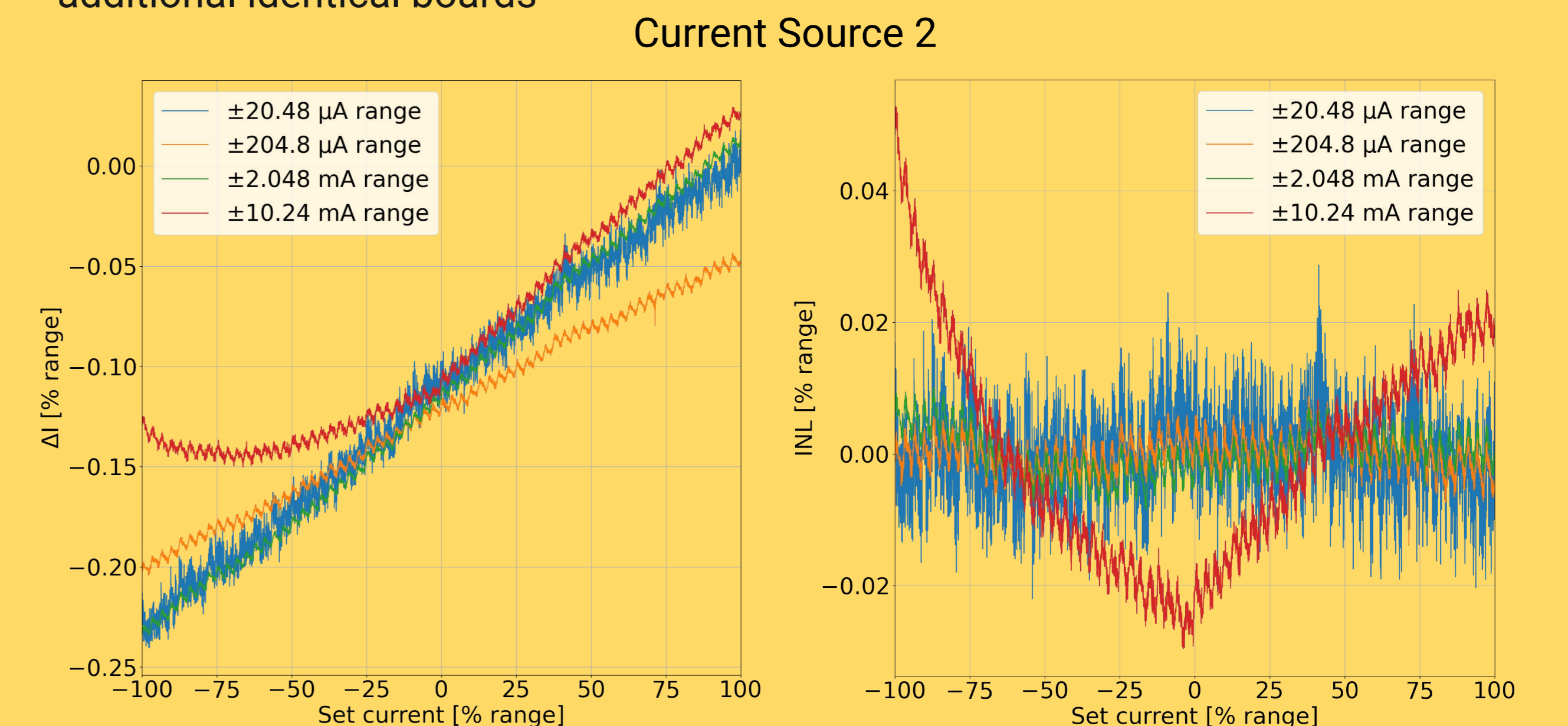
- Status:
- Boards have been produced
- Testing is ongoing



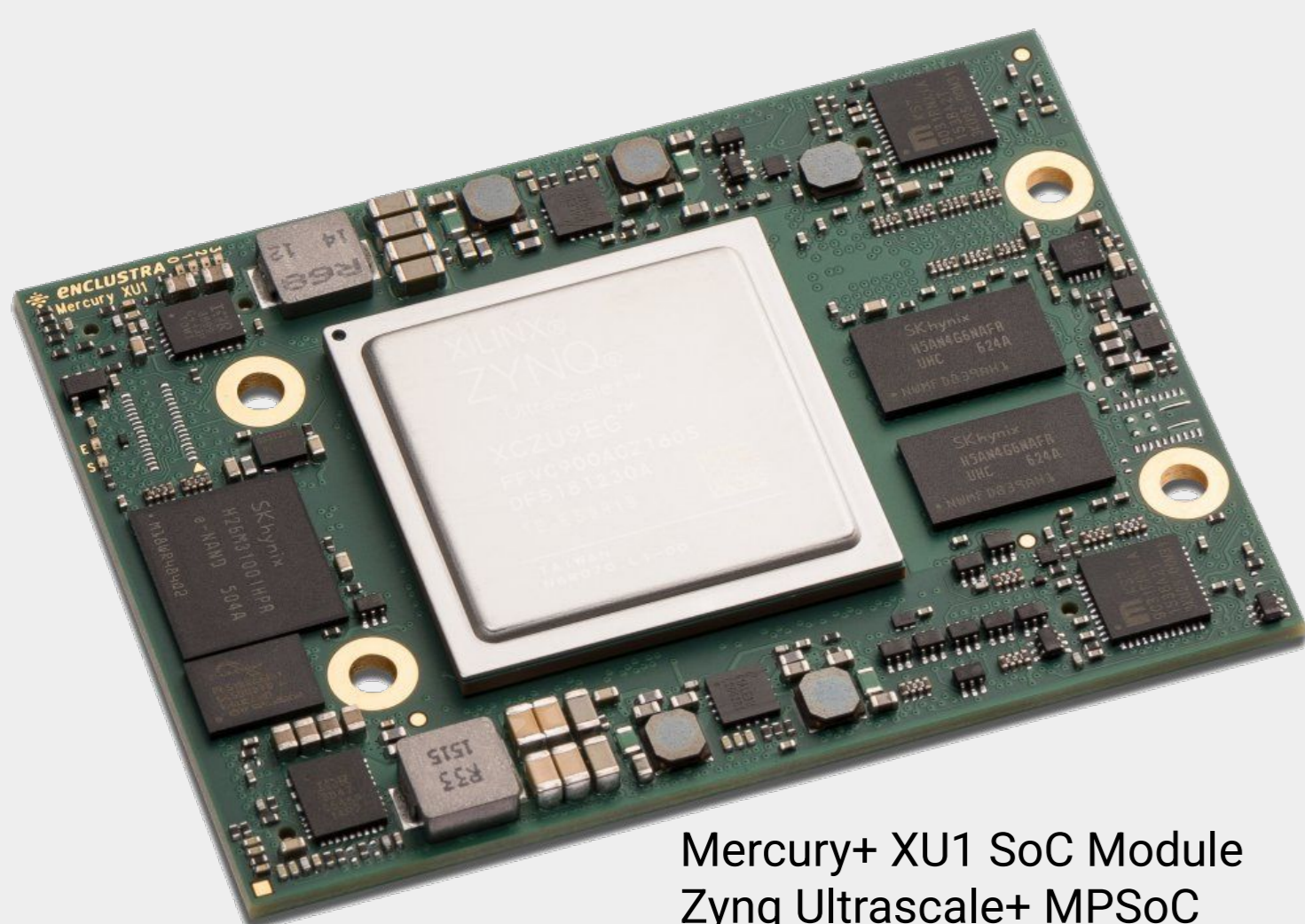
2 current sources with adjustable ranges



- Source 1 within ±0.1% of range
- Source 2 with larger offsets and non-linearities
- Performance to be confirmed with 2 additional identical boards



## Summary & Outlook



Mercury+ XU1 SoC Module  
Zynq Ultrascale+ MPSoC

- Caribou: flexible DAQ system used for many pixel-detector R&D projects
- Development of v2 is ongoing
- Circuits are being evaluated on test board
- Next:
  - Scale up design from test board
  - Integrate with System-on-Module