

# Slotted FOD for Qi

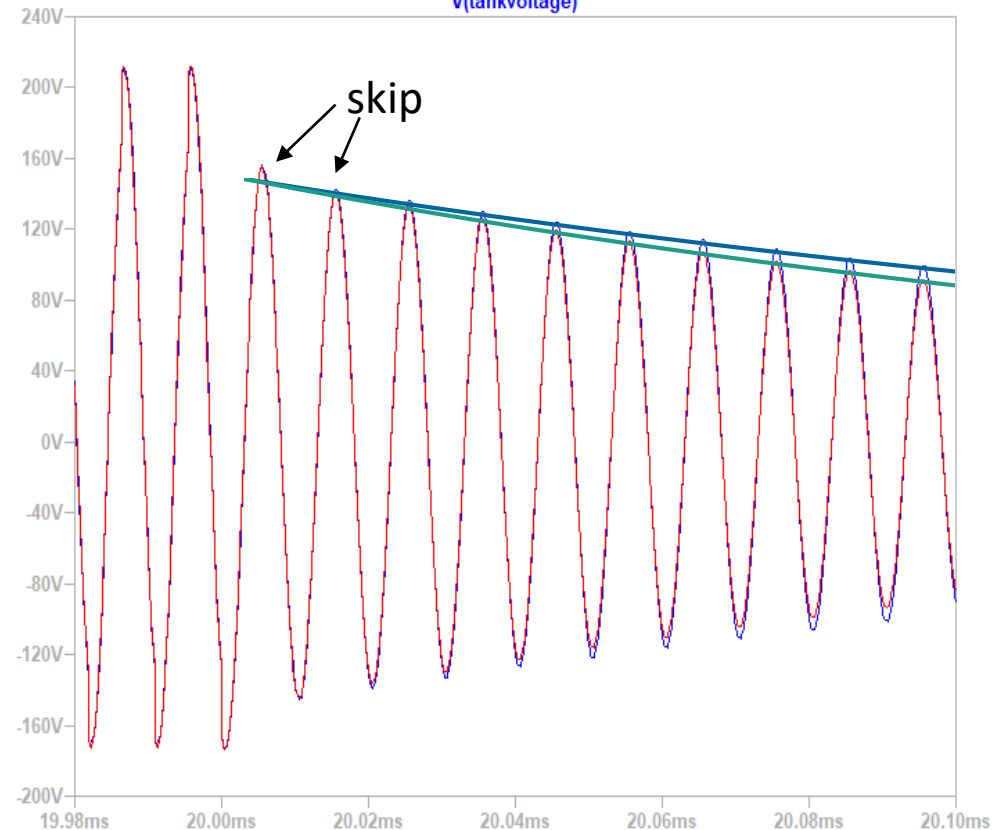
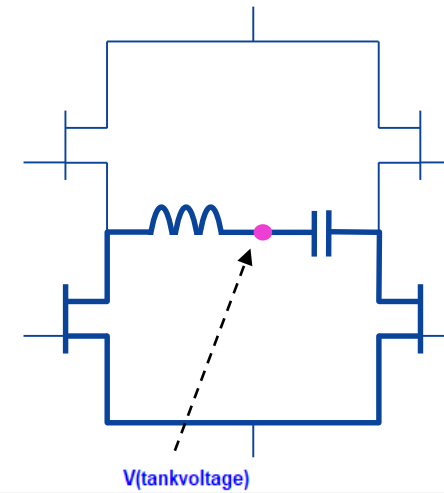
## With 8-pin ARM Cortex-M0+ MCU

17.02.2020

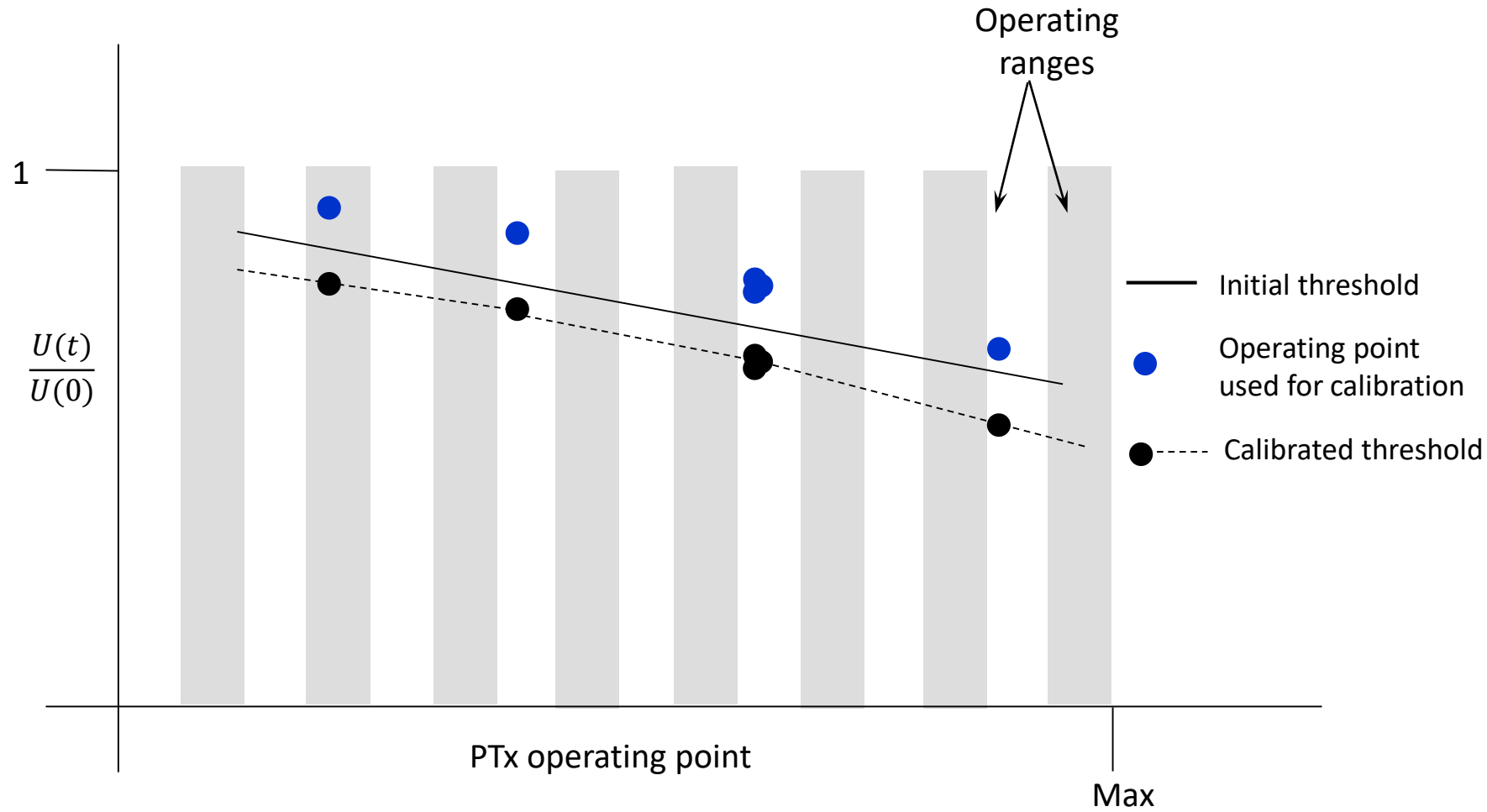
# Recap earlier WPC meetings

## $\Delta$ -decay method

- Short-circuit the resonant tank
- Load is 'disconnected' (after 2 cycles)
- Decay influenced by Foreign Object
- Improve accuracy by averaging over multiple slots
  - E.g. during 2 sec @ 75 slots/sec
- Compare average decay against threshold
  - FOD trigger:  $\frac{U(t)}{U(0)} < \text{Threshold}$
- **Decay depends on operating point**
  - calibration for multiple operating points



# Self-calibration for $\Delta$ -decay



## Decay depends on operating point

- Estimate initial threshold

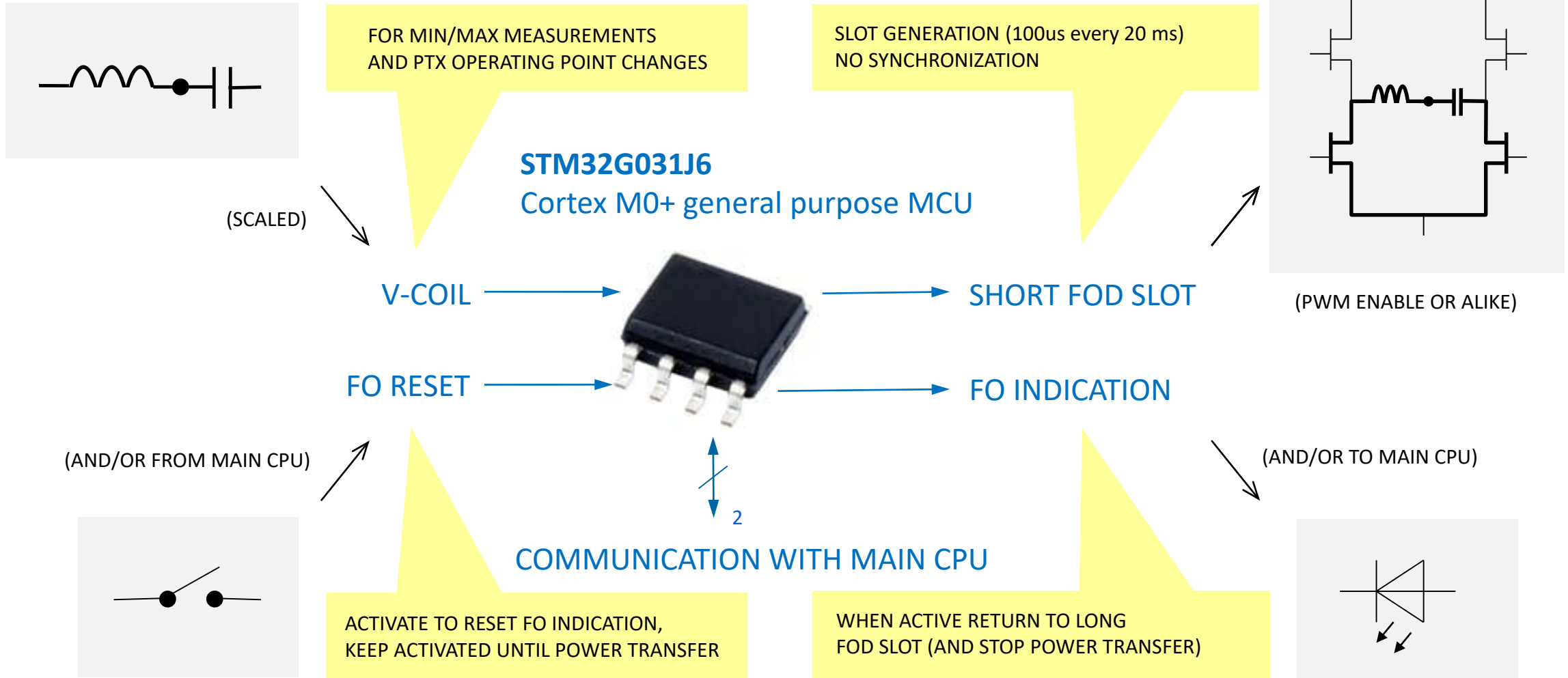
## In power transfer phase

- Apply self-calibration

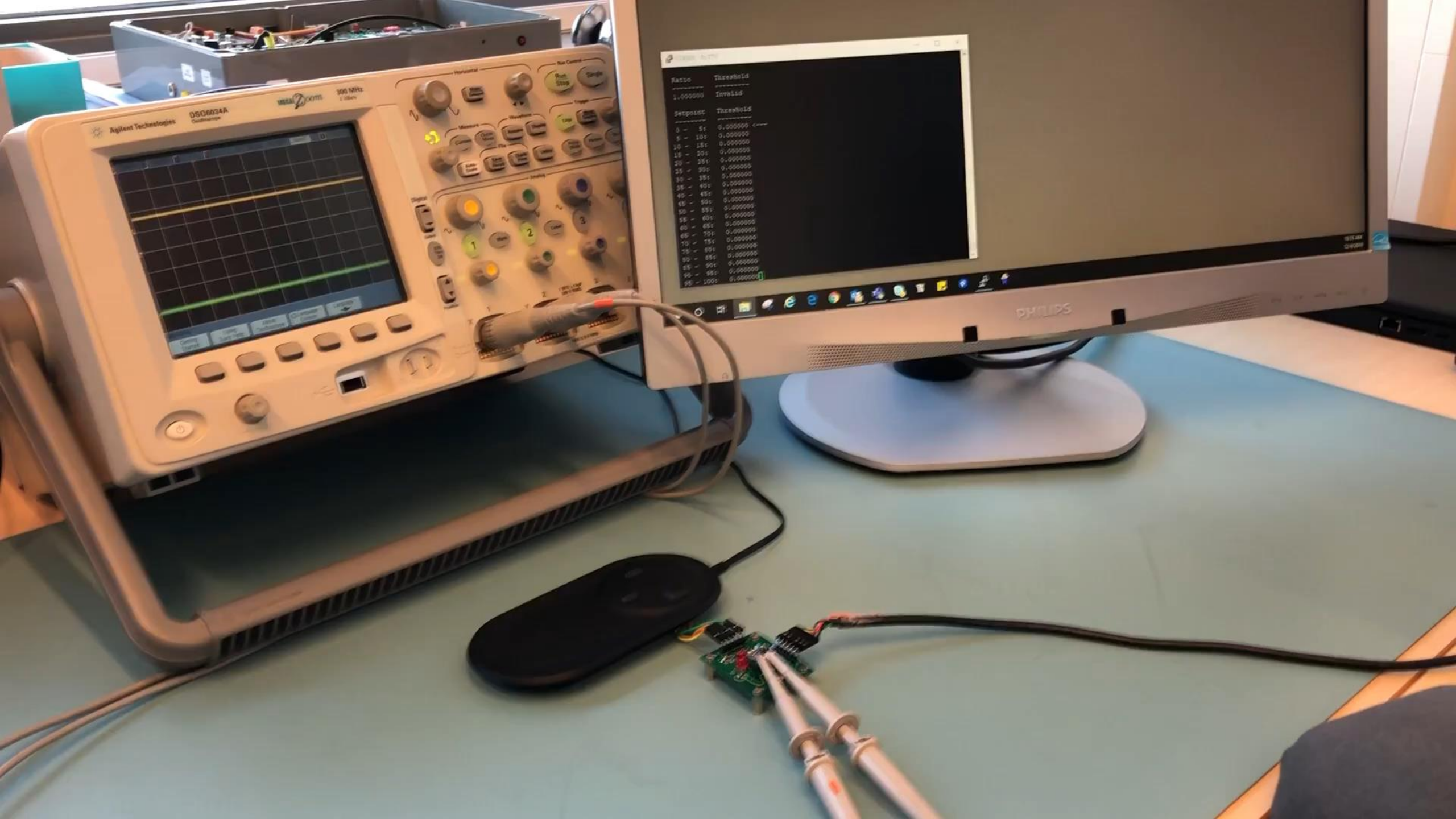
## Trigger for calibration at:

- Start of power transfer
  - Up to e.g. 10s
- Change of operating range
- Periodically
  - E.g. every 10s
- Improve threshold

# FOD co-processor







# Conclusions



- Standalone FOD solution based on general purpose MCU demonstrated
- Solution implements  $\Delta$ -decay FOD method and self-calibration
- Solution works across wide power range (Qi BPP to 100W)
- $\Delta$ -decay FOD provides better sensitivity than pre-implemented FOD in transmitter
- PRx does not detect interruption of power delivery
- Future IOP investigation required
- **Philips and ST are proposing  $\Delta$ decay FOD method as an alternative FOD method for Qi**