

TPS: Corrector Power Supply Controller

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With acknowledgements and thanks to:
TPS Feedback Team, NSRRC, Taiwan.
ITRI, Taiwan.

www.d-tacq.com

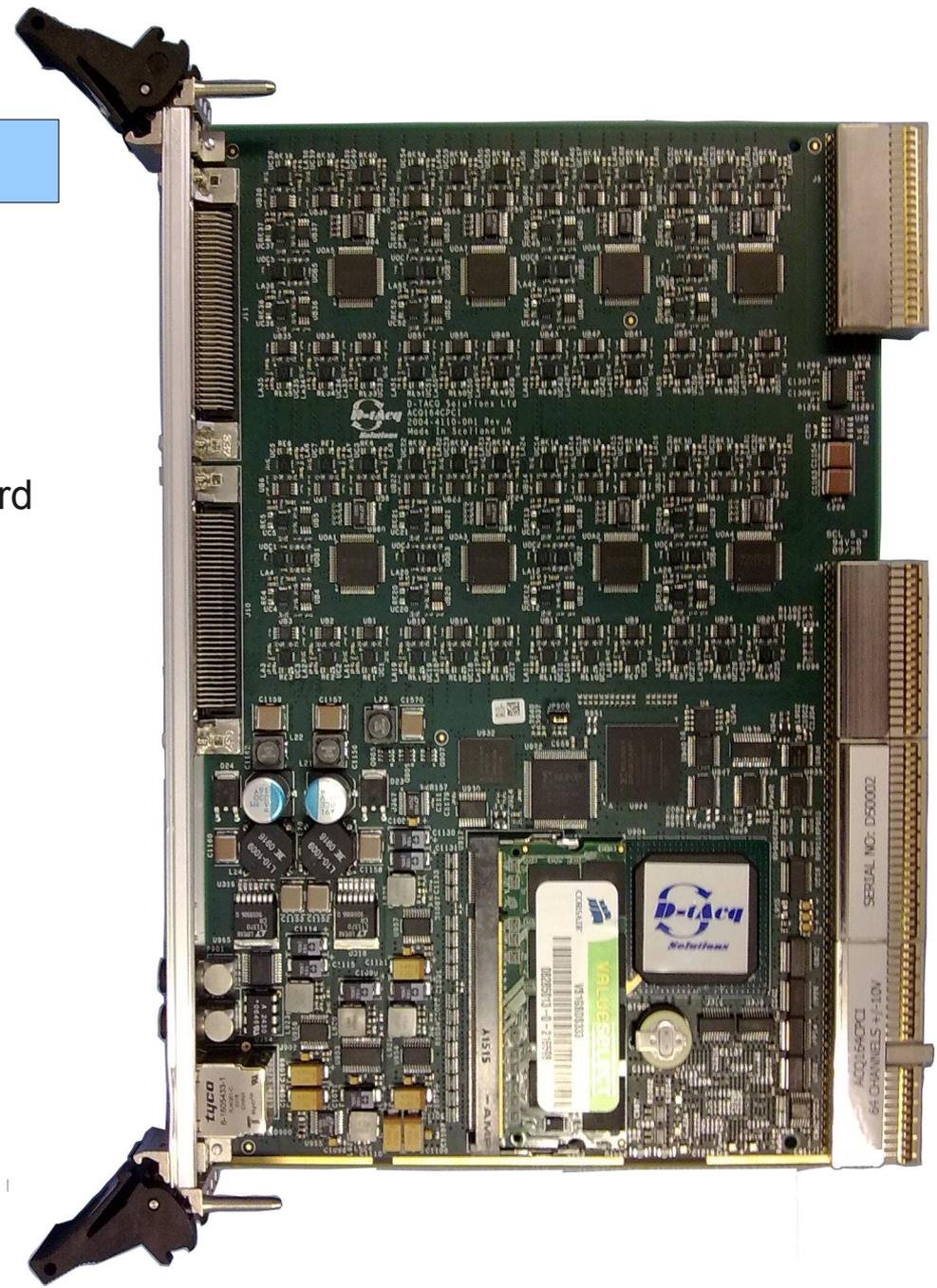
ACQ164CPCI

High Channel Count, Very High Resolution

- 64 channels x 128kS/s continuous operation
- 24 bit resolution.
- New technology sigma delta converters, with excellent DC performance characteristic.
- 56kHz Bandwidth, brick wall filtering
- Compact PCI standalone, and system slot card
- Ethernet Transient Recorder, 1GB memory.

Applications

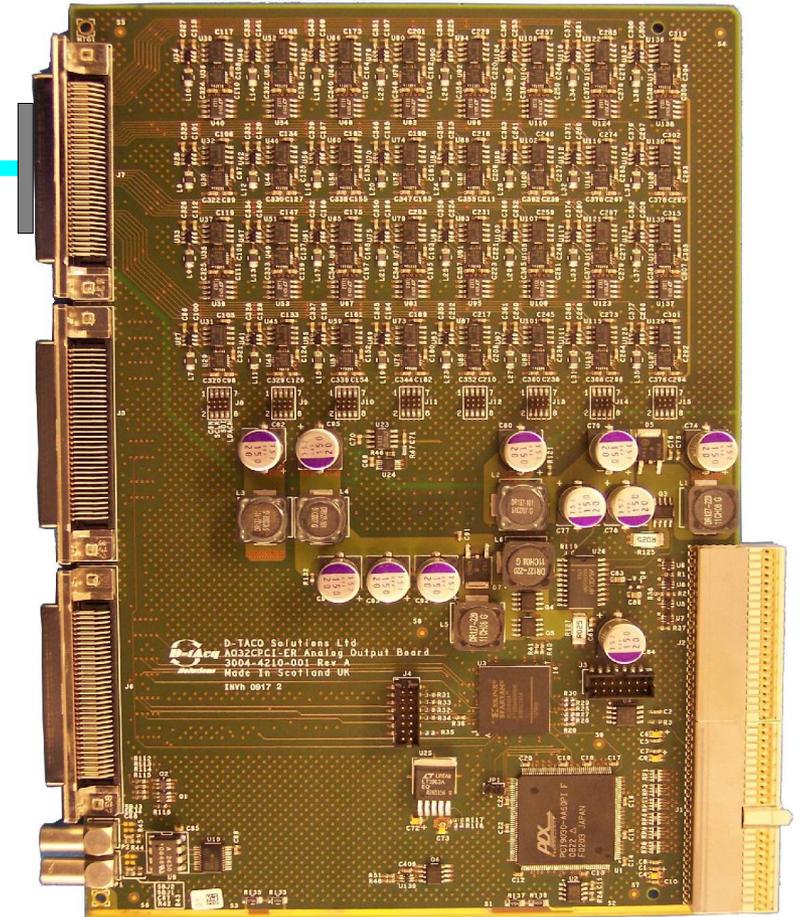
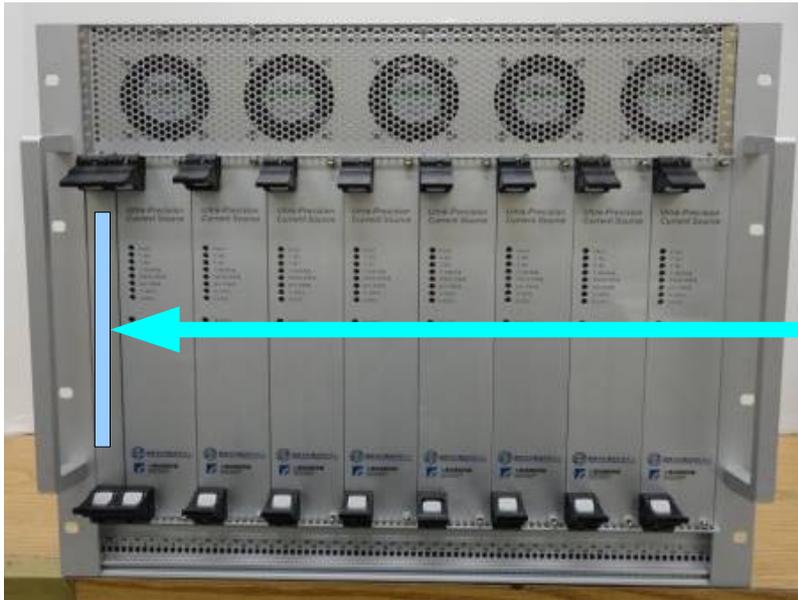
- Magnet power supply monitor.
- Sonar
- HF Radar
- Structural testing.
- Precision Monitoring and Control Systems



Power Supply Controller: Take 1

Power Supply Unit

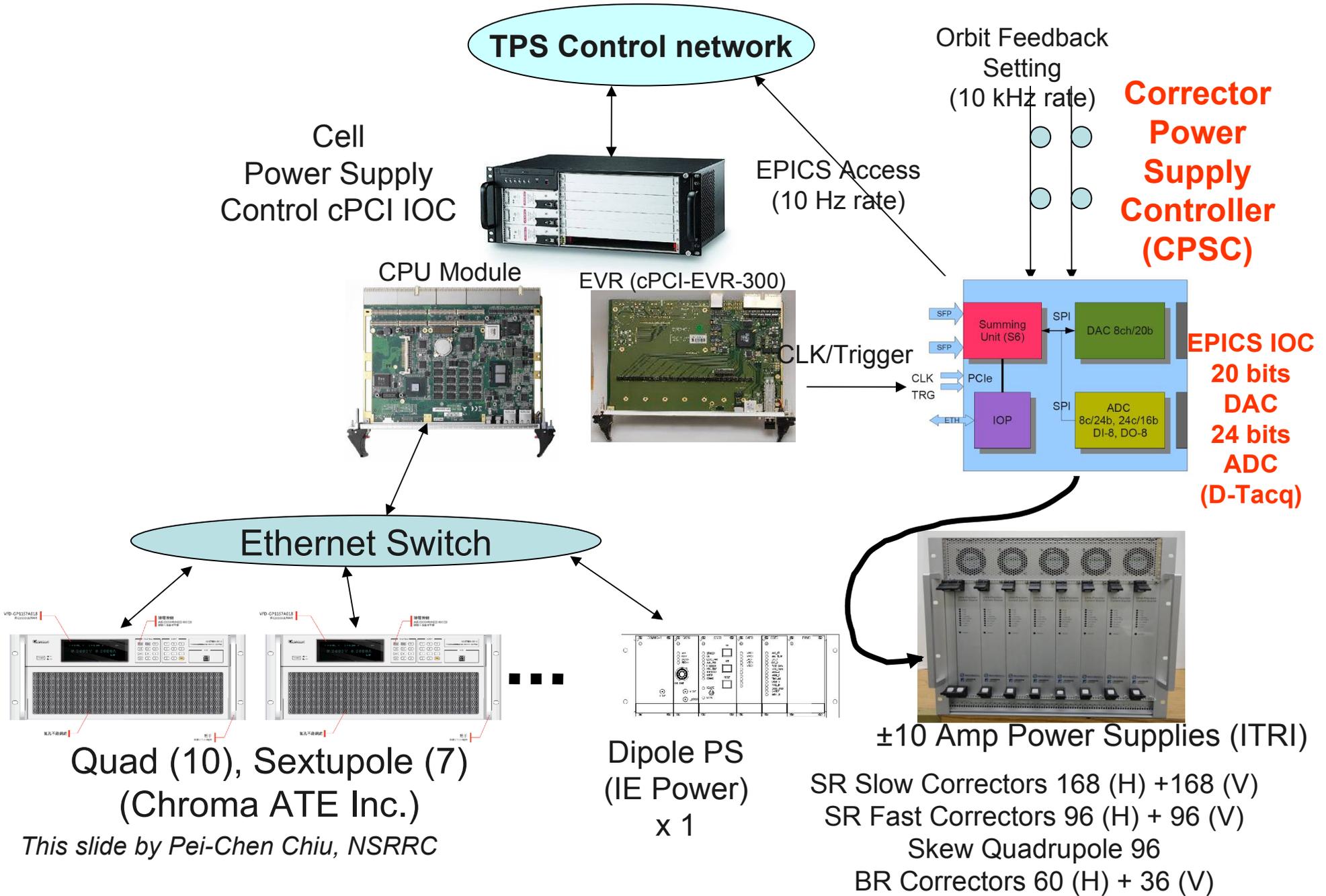
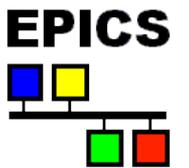
AO32-ER : 18 bit DAC output.



External DAC Linked with ribbon cable:
Noise on ribbon cable dominates: Too Noisy.
Also, application really wanted 20 bit resolution.

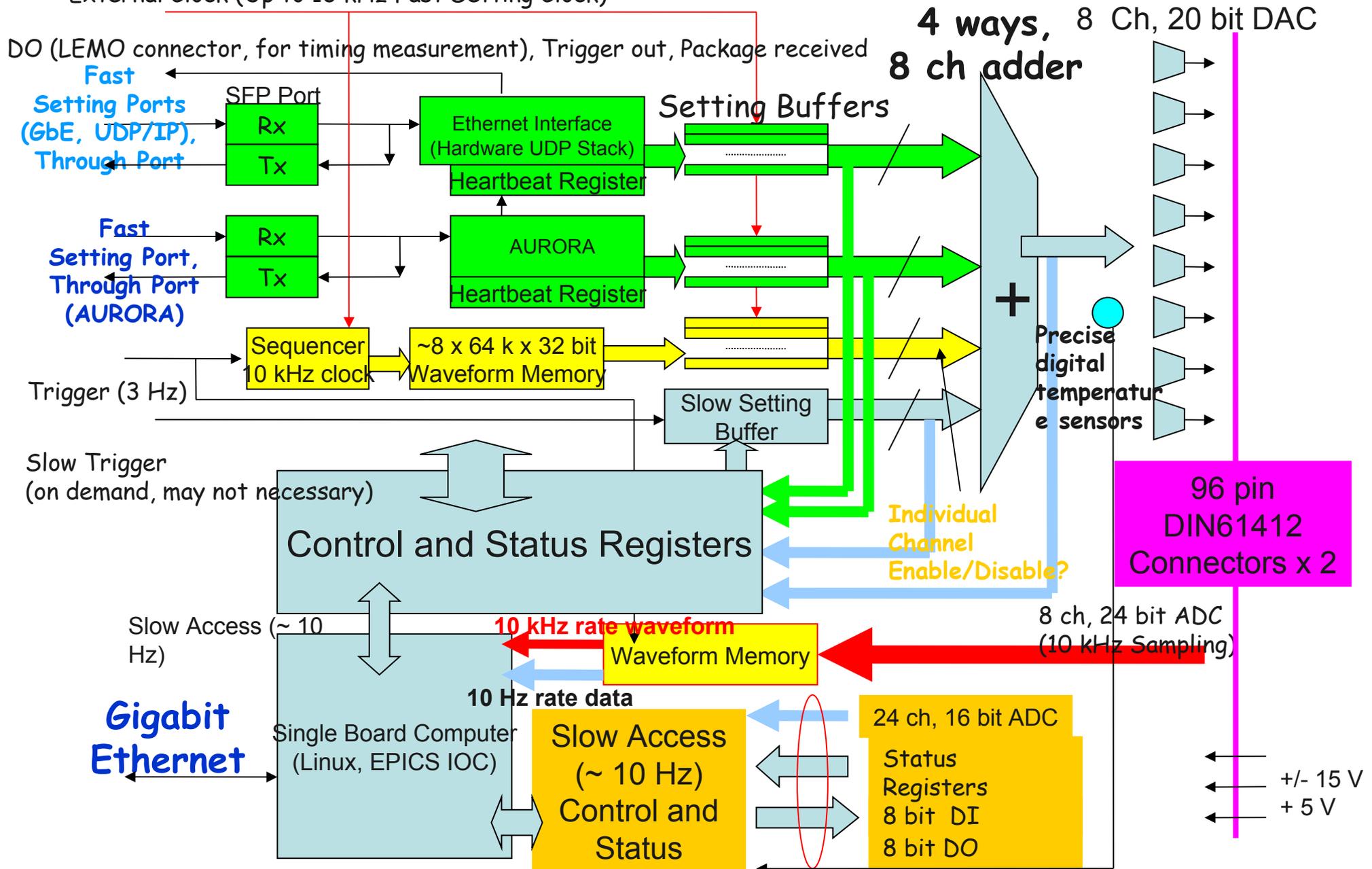


SR Power Supply Control in one Cell



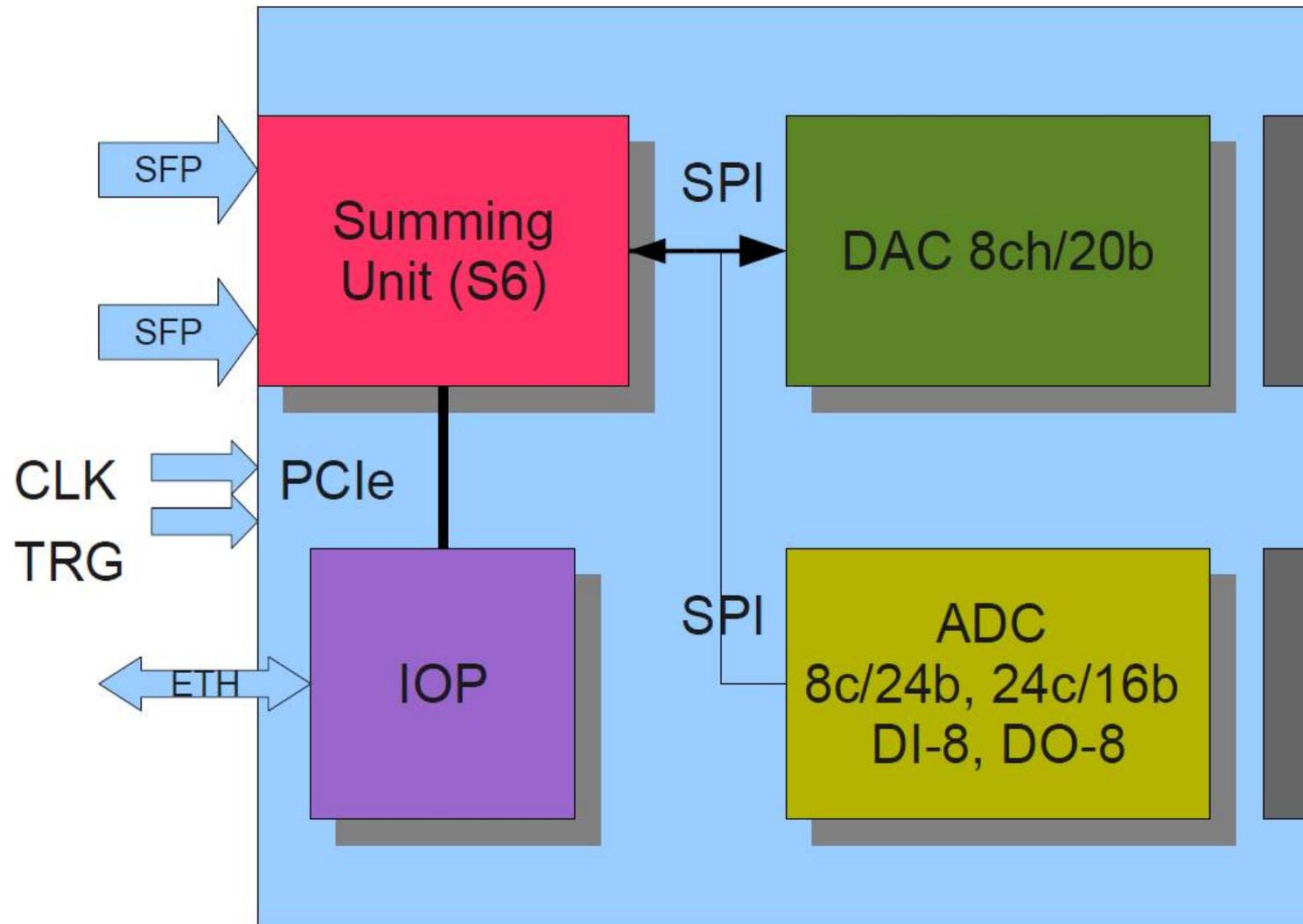
Corrector Power Supply Controller (CPSC)

External Clock (Up to 10 kHz Fast Setting Clock)



This slide by Pei-Chen Chiu, NSRRC

Physical Concept, CPSC



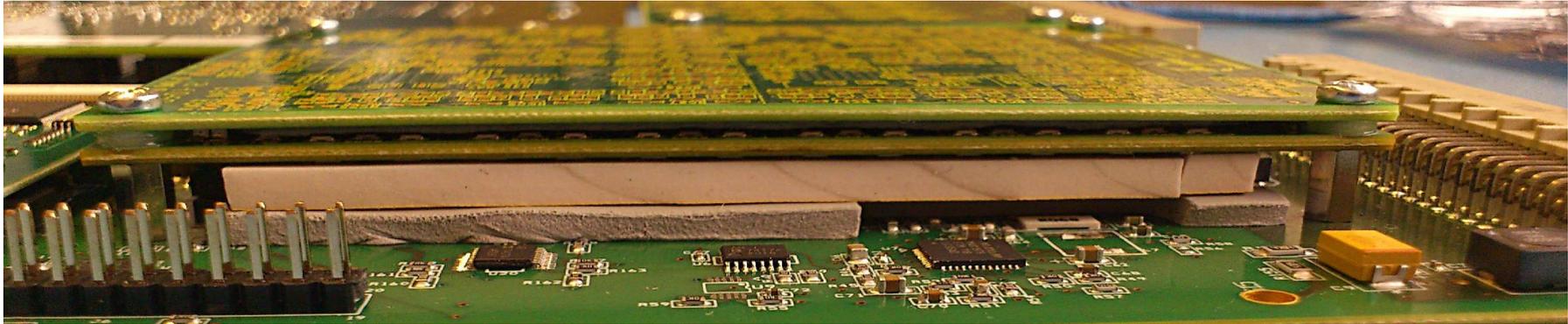
CPSC Actual Layout: Prototype



CPSC Actual Layout: Production



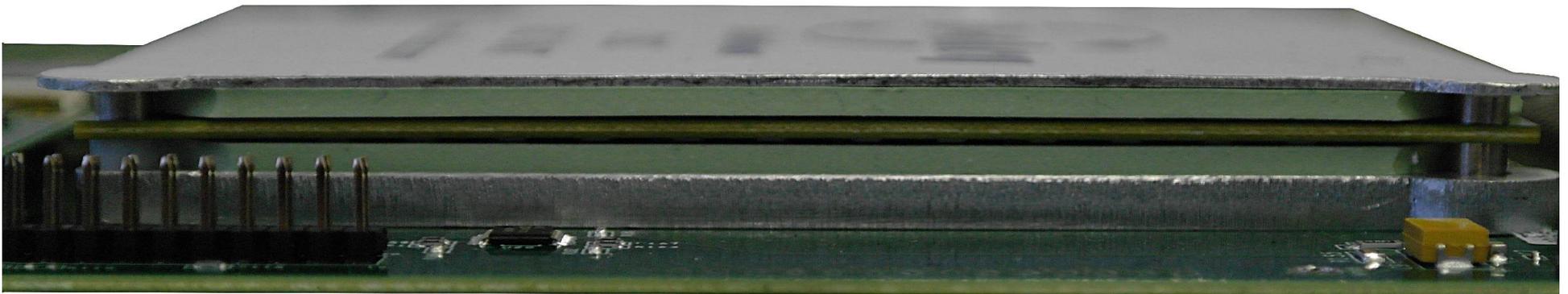
Steps to Gaining Performance



20 Bit DAC signal on Base Board is exceptionally clean.

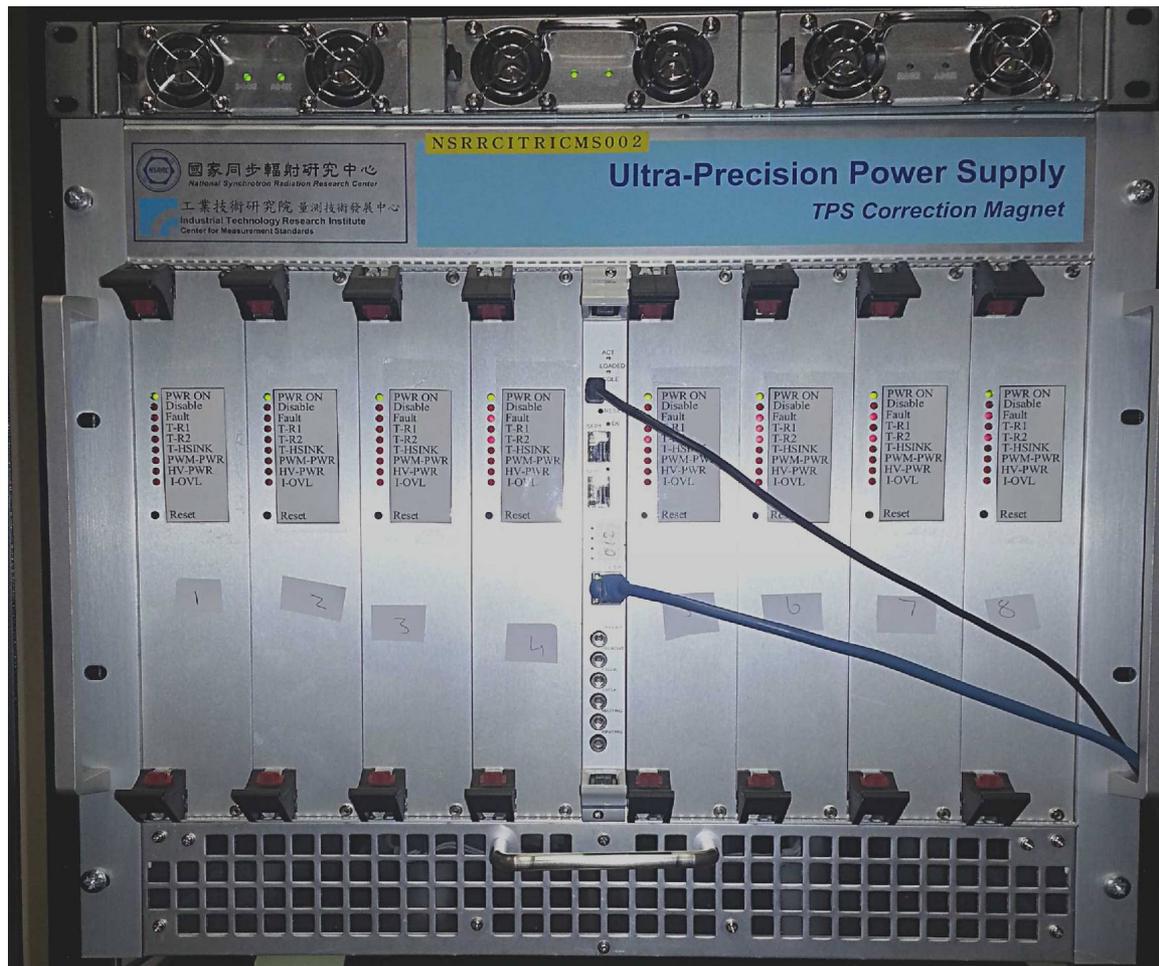
Biggest source of noise/drift is random thermal effects:

Thermal Stabilization : add thermal mass to smooth thermal noise



Steps To Gaining Performance (2)

- Layout
- Layout
- Layout



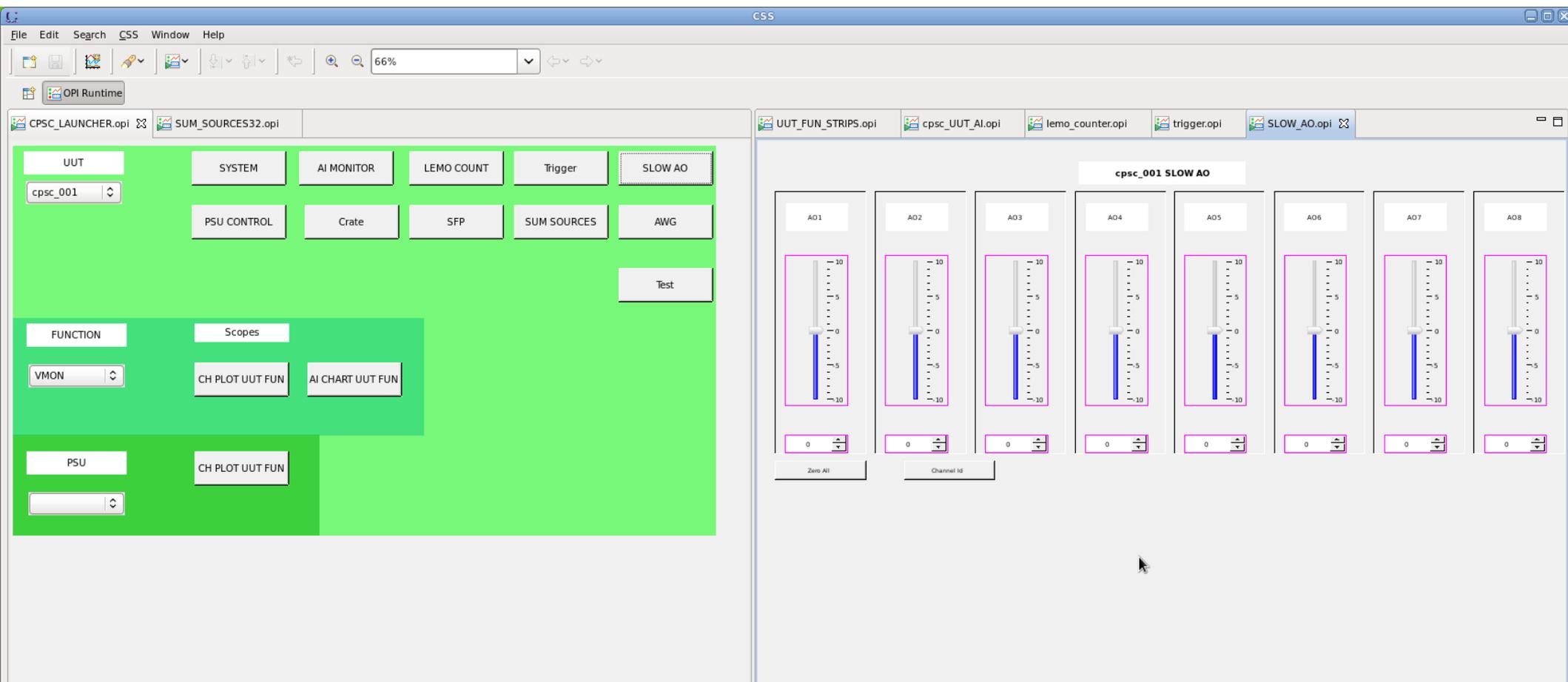
EPICS on the CPSC

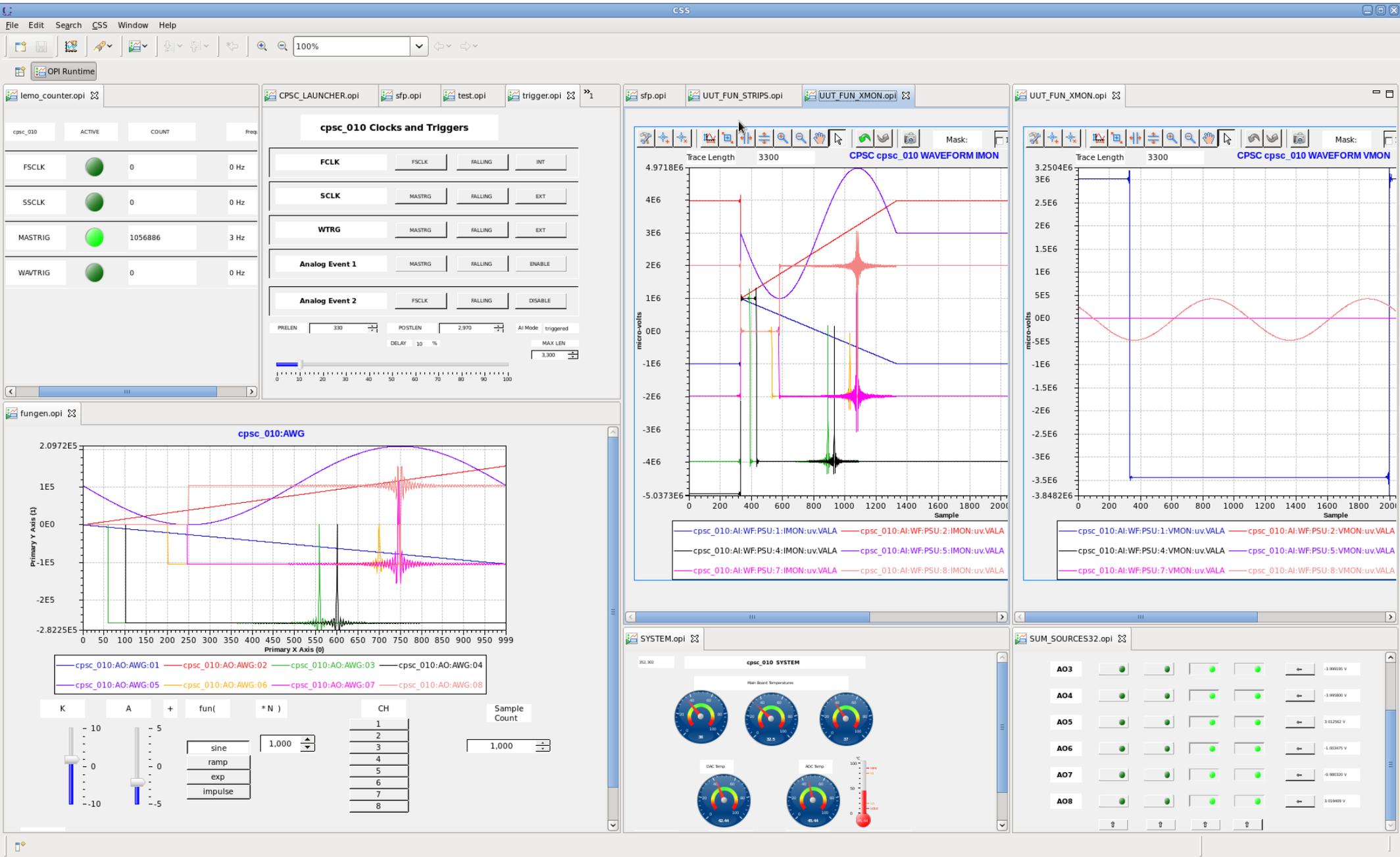
- 1GHz Marvell, runs Linux, netboot.
- About 500 PV's
- Temp, Volts
- AI waveforms
- Summing Junction control
- Slow AO
- AWG
- External Fiber-optic monitoring.

CSS OPI – Crate Mimic

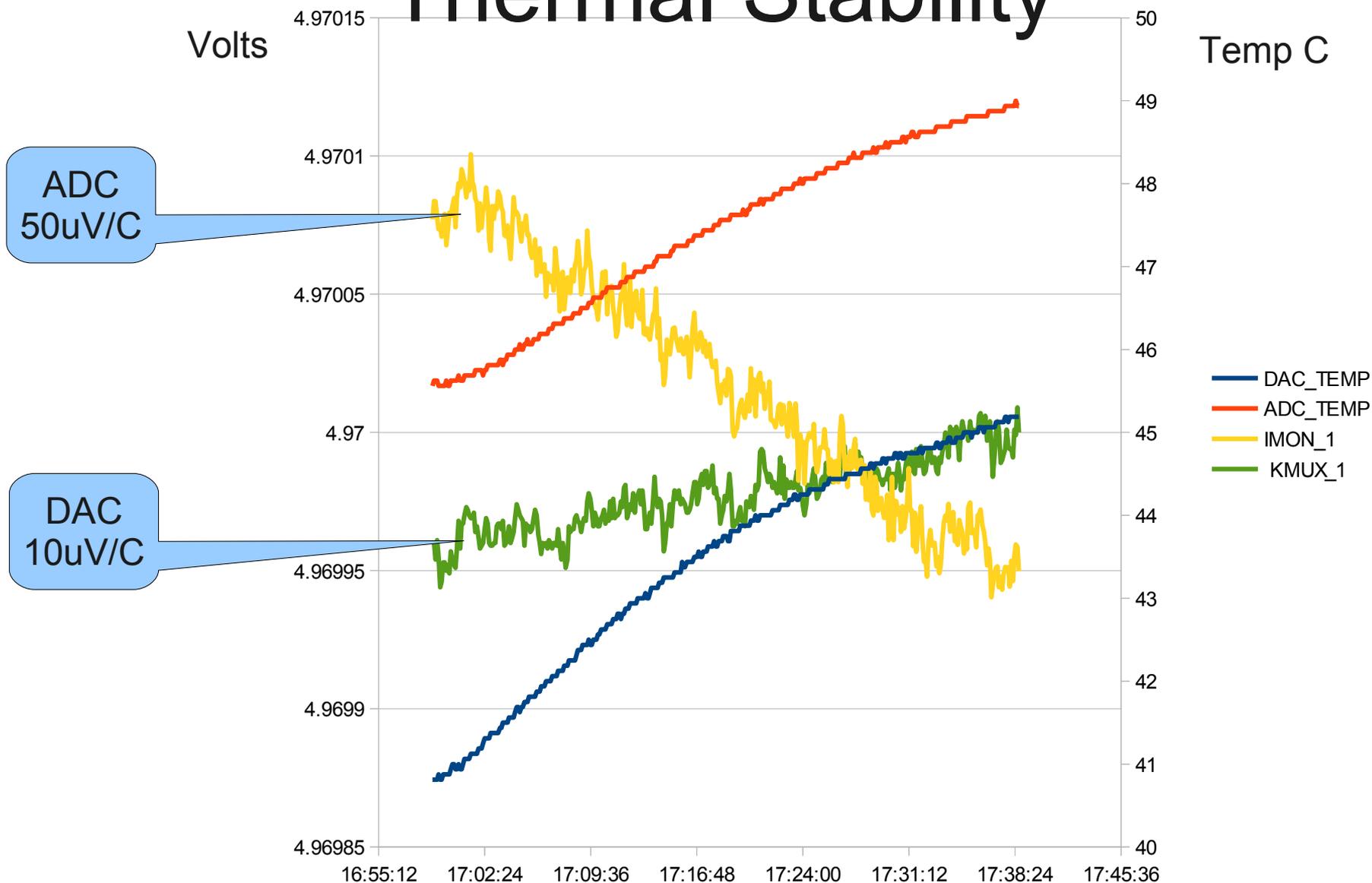
The image displays a 'Crate Mimic' interface for a CSS OPI system. It consists of eight vertical columns representing individual power supply channels, labeled cpssc_010 1 through cpssc_010 8. Each channel is titled 'Ultra-Precision Power Supply' and contains a series of status indicators: PWR ON (green), Disable (brown), Fault (red), T-R1 (red), T-R2 (red), T_HSINK (red), PWM-PWR (red), HV-PWR (red), and I-OVL (red). Below these indicators is a 'Reset' button and an 'I2C OK' indicator (green). A central column, labeled cpssc_010, serves as a control hub, featuring a 'PWRGOOD' indicator (green), a 'FAULT' indicator (red), two 'SFP' ports (SFP 1 and SFP 2), an 'ETH' indicator (green), and several large circular status LEDs: TRIGOUT (green), PACKOUT (green), FSCLK (green), SSCLK (green), MASTRIG (green), and WAVTRIG (green). The interface is designed for monitoring and managing multiple power supplies simultaneously.

CSS Launcher

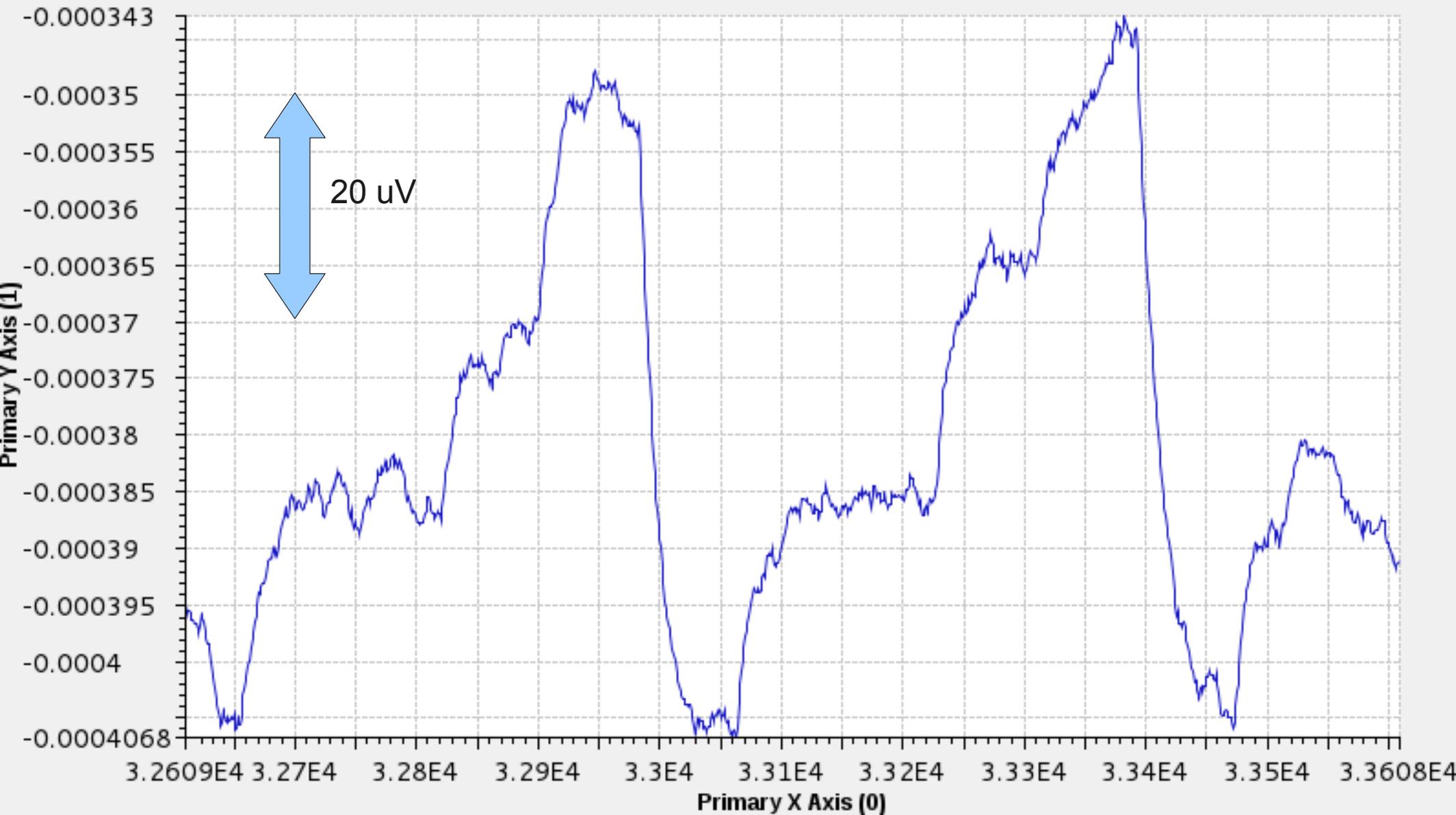




Thermal Stability

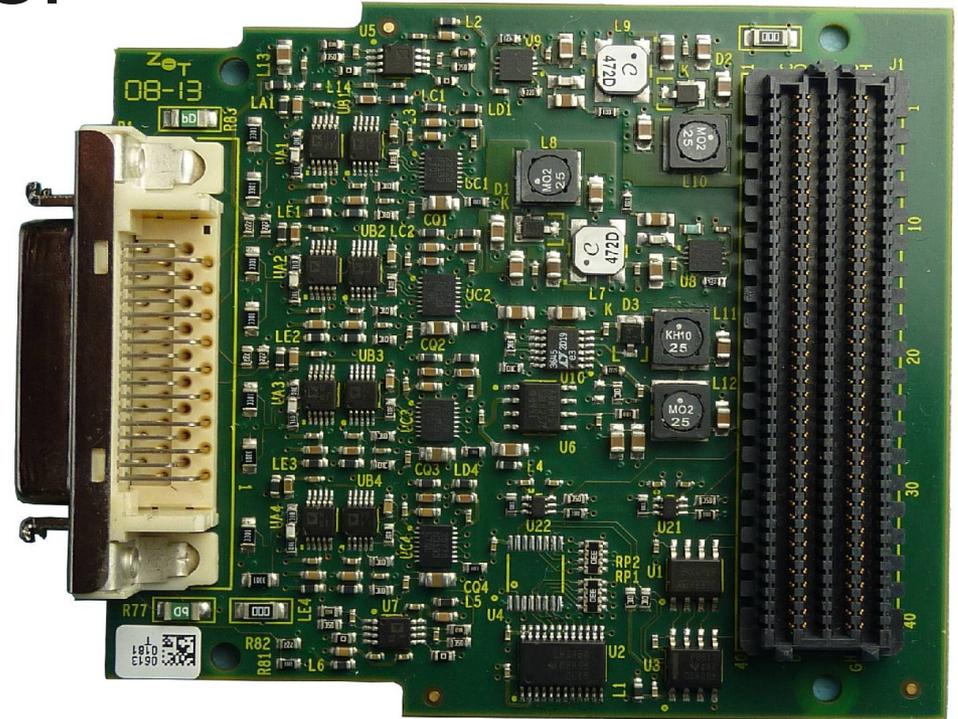


20-bit DAC: Single LSB Steps



Conclusion

- CPSC, 20bit DAC performance, proven
- A complex system with many inputs and controls, run by EPICS.
- Now in Production.
- New range of standard product based on FMC
- Please come and see the DEMO!



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