

3rd Generation EPS plus some other stuff

Craig Clark

Outline

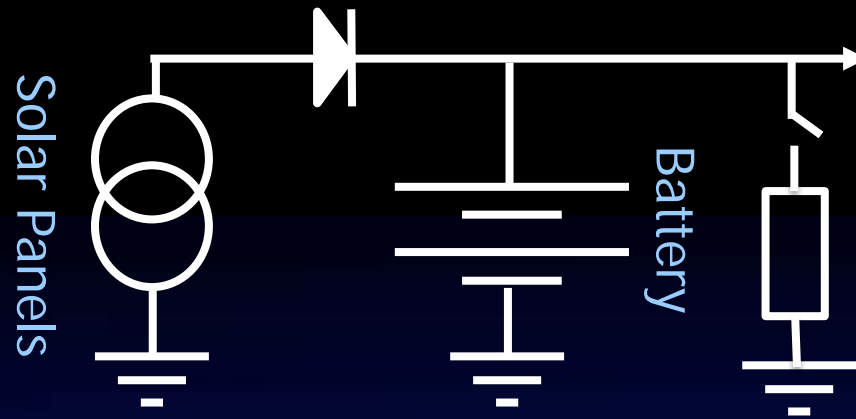


1. Who needs an EPS anyway?
2. What's new on the 3G?
3. Quick rundown of other Clyde Space stuff...

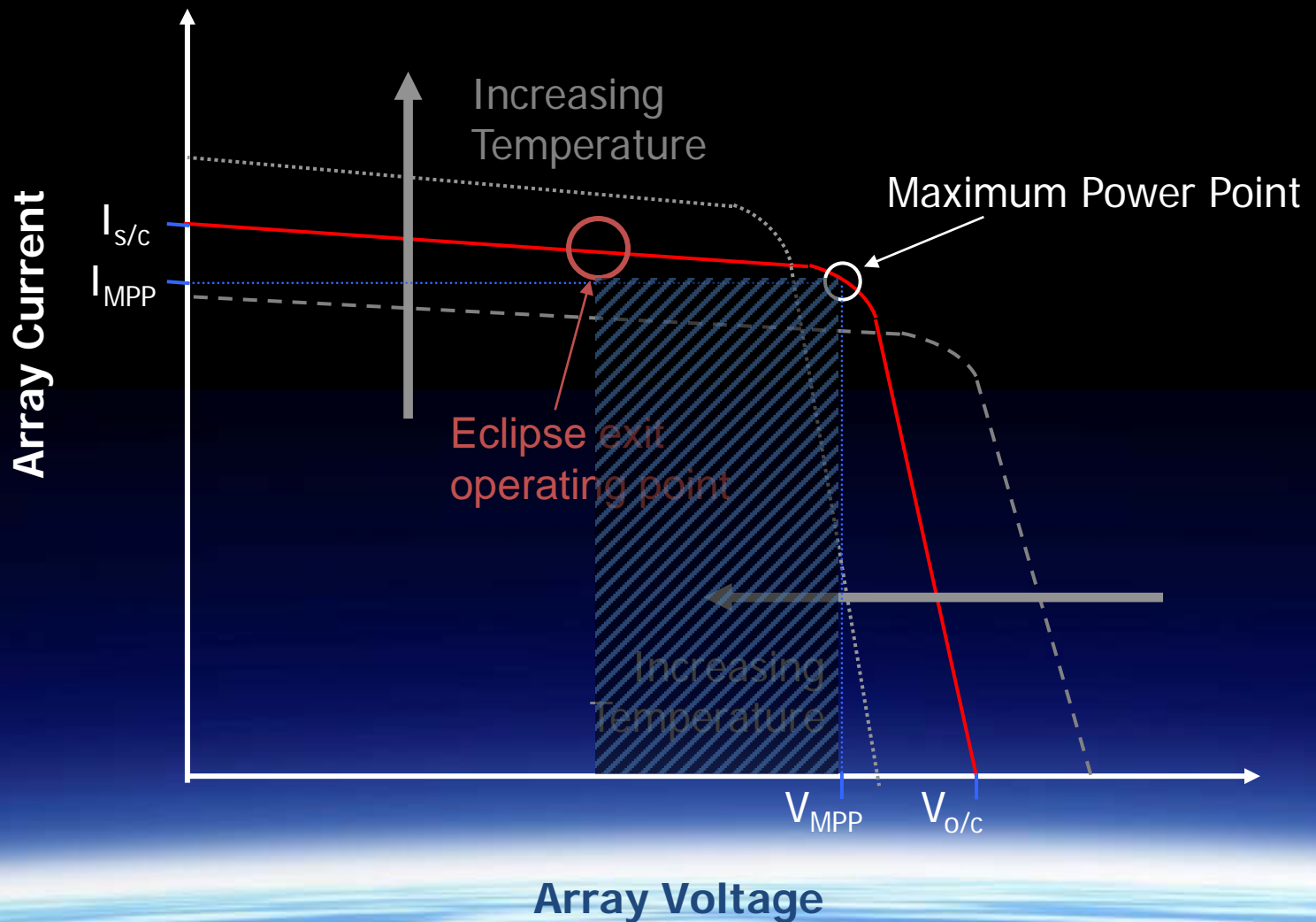


WHO NEEDS AN EPS ANYWAY?

Why not just connect the solar panels to the battery and... viola?



Solar Array Characteristic

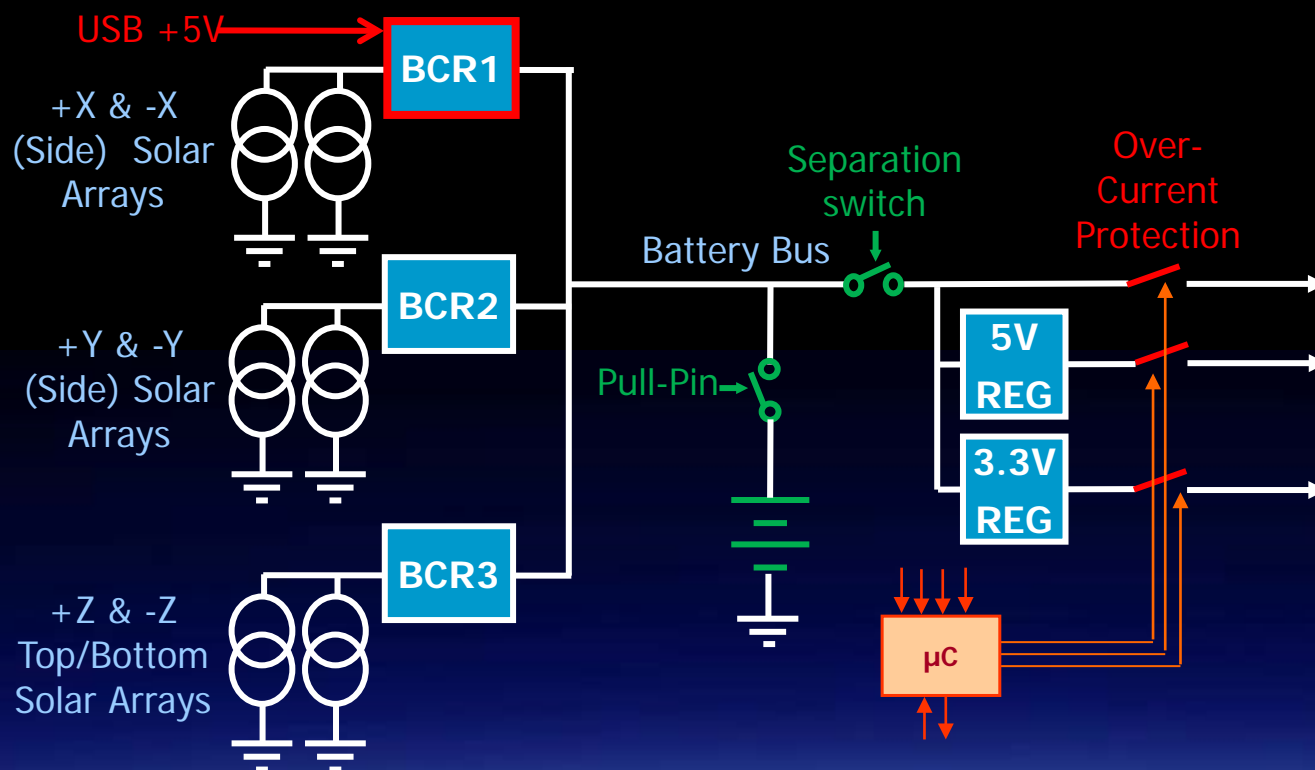


Clyde Space Product Objective

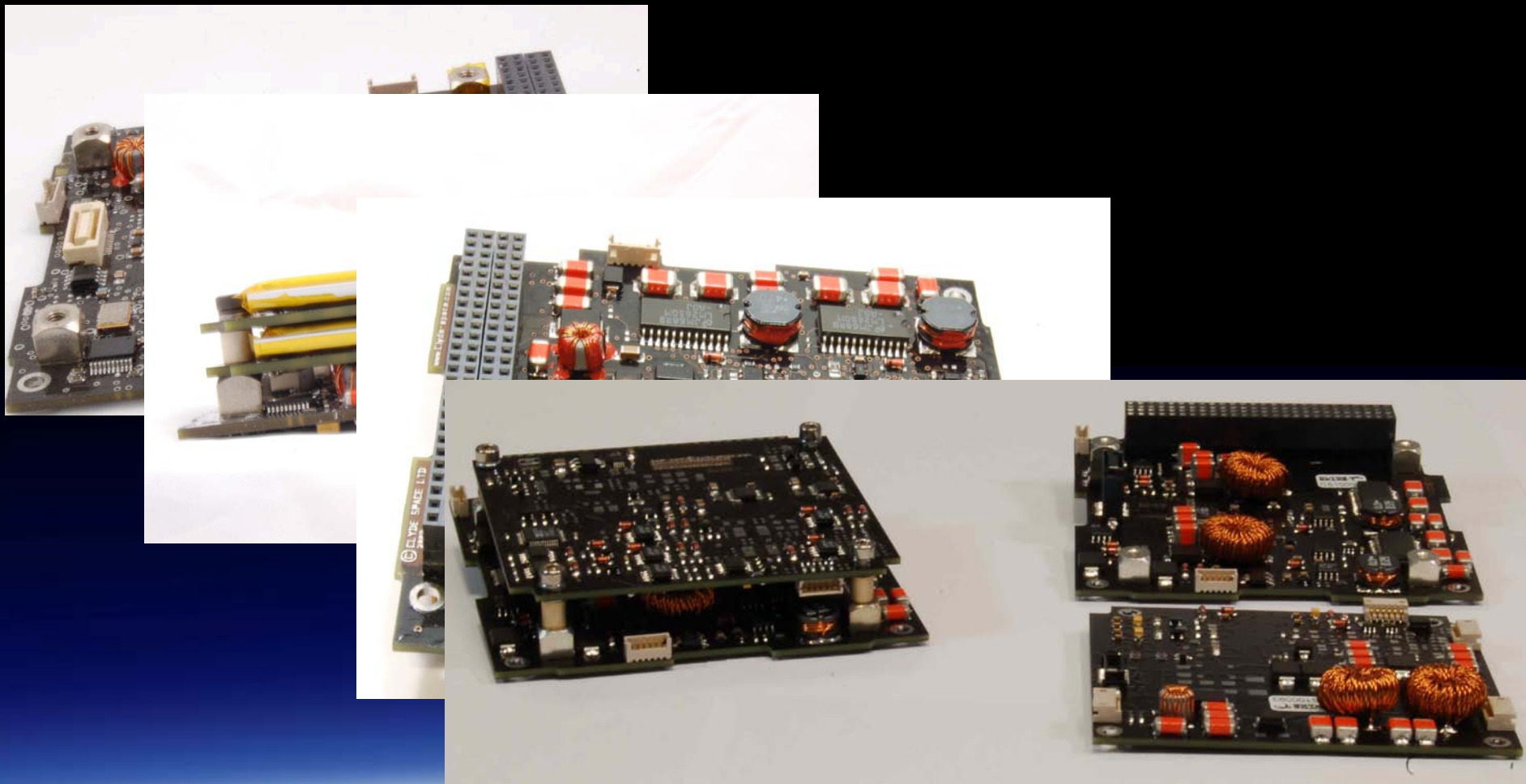


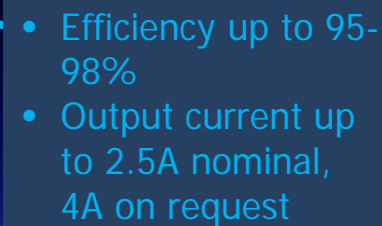
- Objective was and still is to produce products that are highly usable.
 - Fit for purpose
 - High performance
 - Reliable design and build quality
 - Within most budget constraints
 - Easy to use

EPS1 Block Diagram



EPS 1

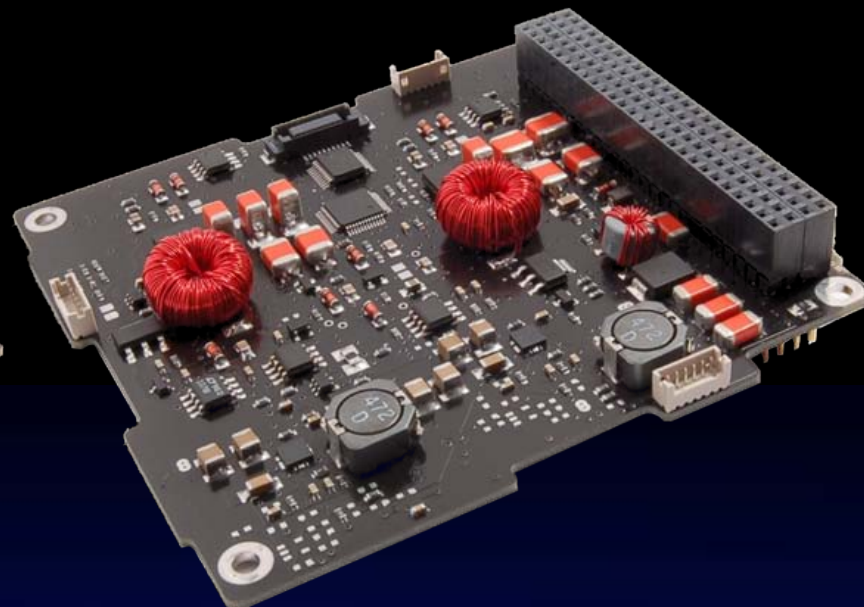




EPS2



1U EPS2



3U EPS2

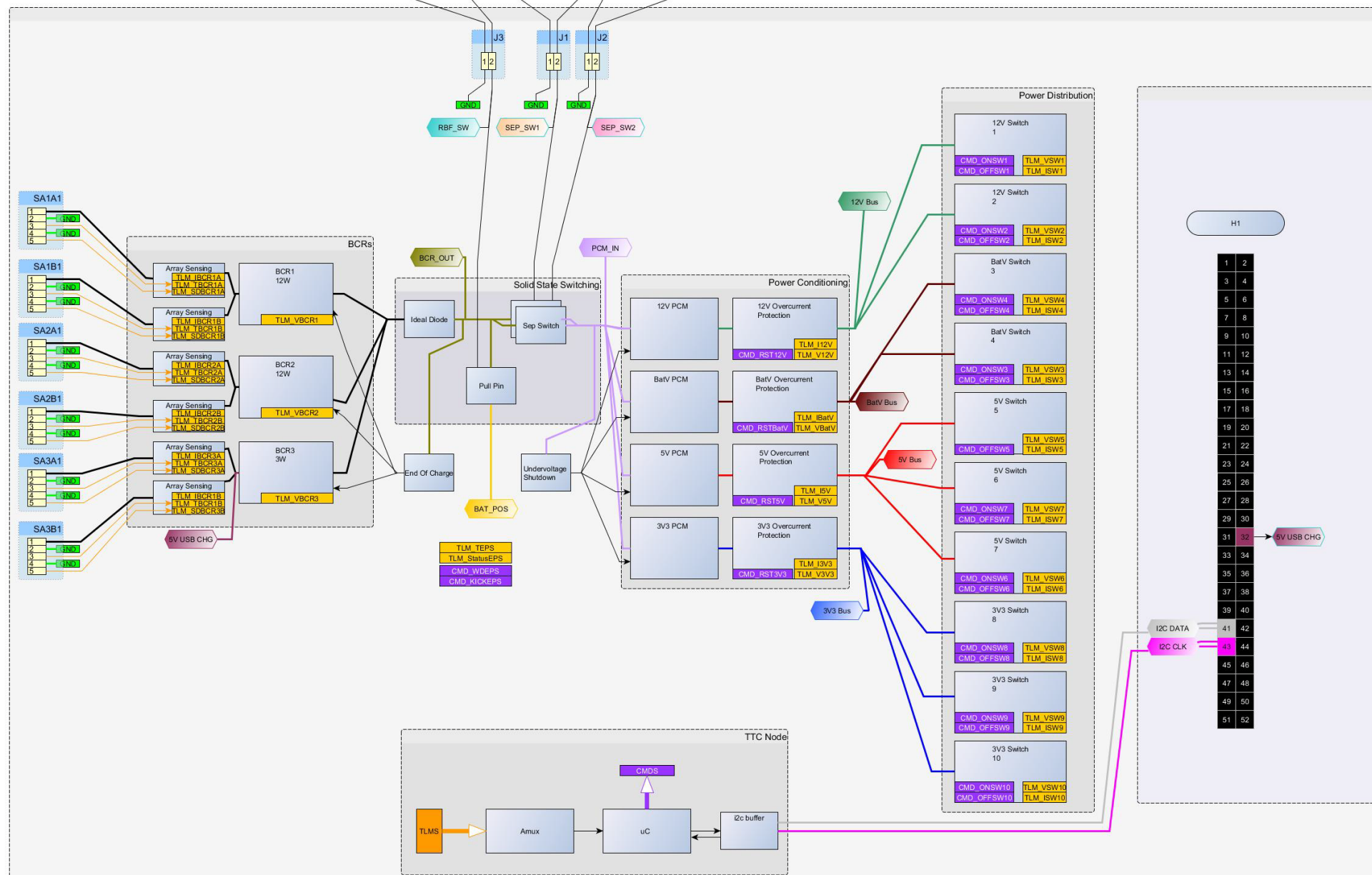
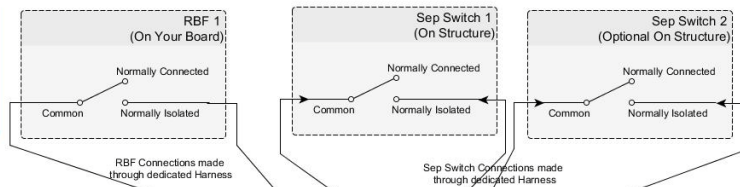


WHAT'S NEW ON THE 3G?

Design updates on EPS3



- Subsystem and Payload commanding
- Improved inhibit systems
- Expanded power delivery capability
- Increased efficiency for the solar panel interfaces
- 12V regulator as standard alongside the 3.3V, 5V and VBat buses
- Standardised layout on PCB.
- Heritage designs remain essentially the same as EPS2.
- Daughter boards make customization easier
- 12.3V Battery version also now available



Protections still incorporated



- Battery under-voltage protection/unloading function.
- 'Dead man's hand' to reset the spacecraft.
- Over current protection on all power buses.
- Zero-current draw on the launch vehicle.

3U EPS3

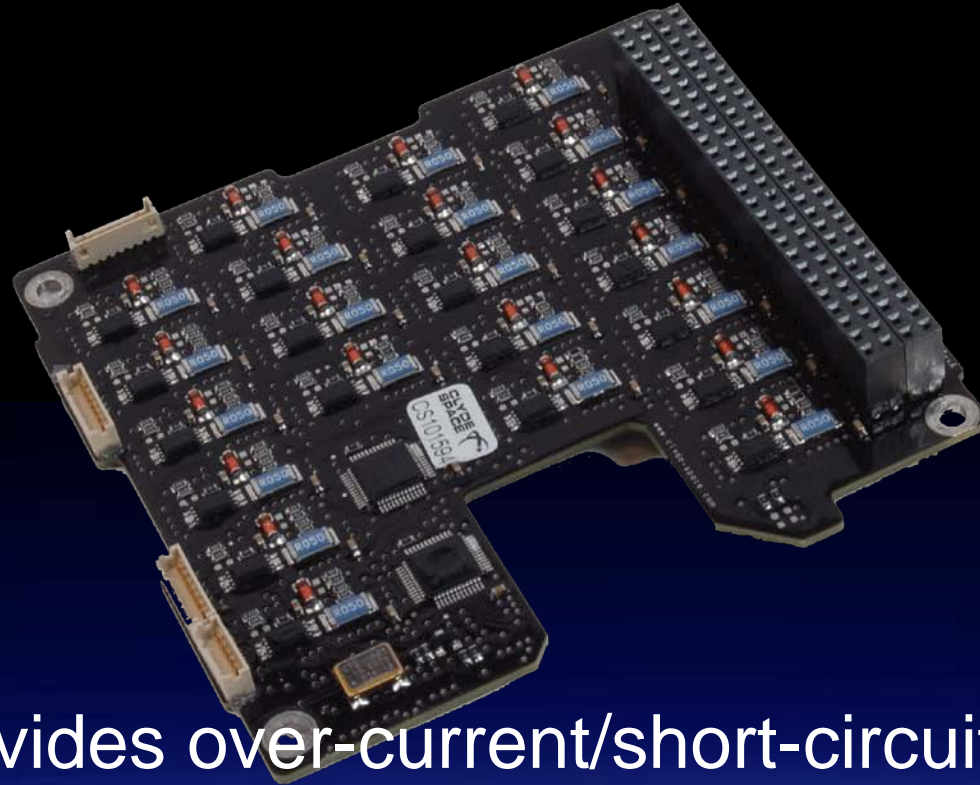




QUICK RUNDOWN OF OTHER CLYDE SPACE STUFF...

CubeSat Power Distribution Module

provides 24 dedicated switched lines...



each switch provides over-current/short-circuit protection,
command ON/OFF and current telemetry

CubeSat Lithium Polymer Batteries

now with years of operation on-orbit...



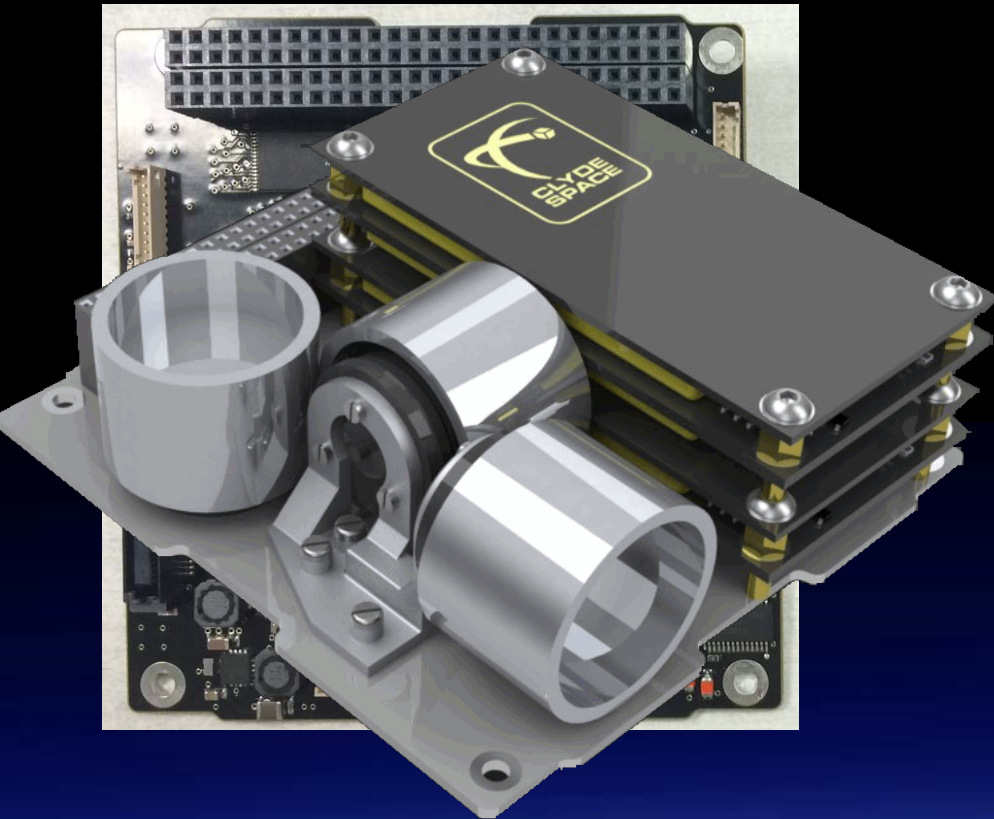
- Qualified for ISS launch
- High volume and mass to energy density
- Modular in multiples of 2s1p strings and now also 3s2p packs.
- Integrated heaters, I2C interface, telemetry.
- Flight proven on multiple missions

High quality **CubeSat Solar Panels** **body mounted & deployable** panel assemblies



- Processes based on traditional, proven techniques and materials
- Deployable panel assemblies & hinges; flight qualified and incorporate thermal knives and driver electronics.
- Thousands of CubeSat panels supplied using either Spectrolab UTJ (28.3%) or Azur Space 3G30C (30%)

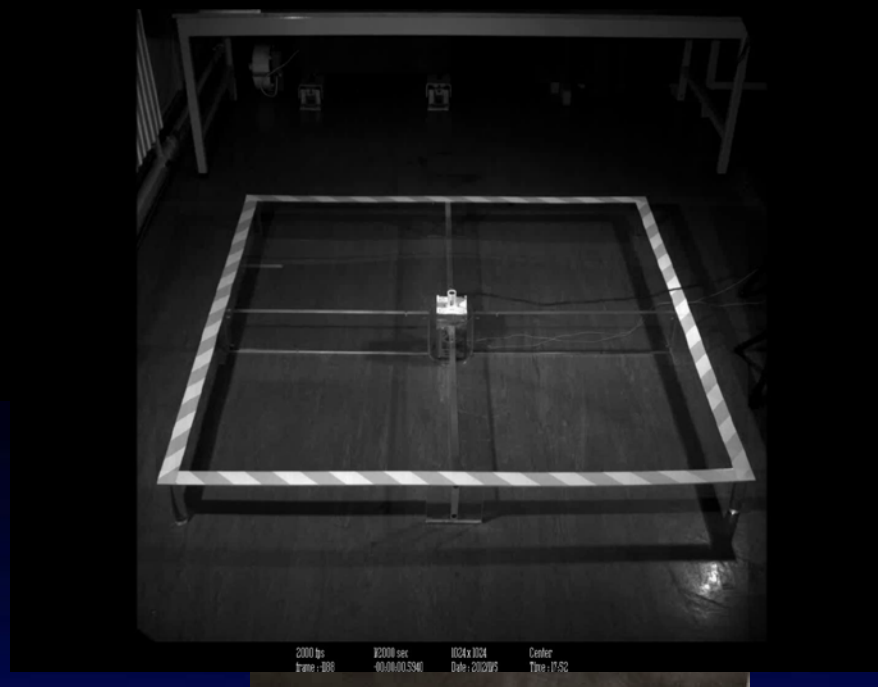
Off-the-shelf CubeSat ADCS



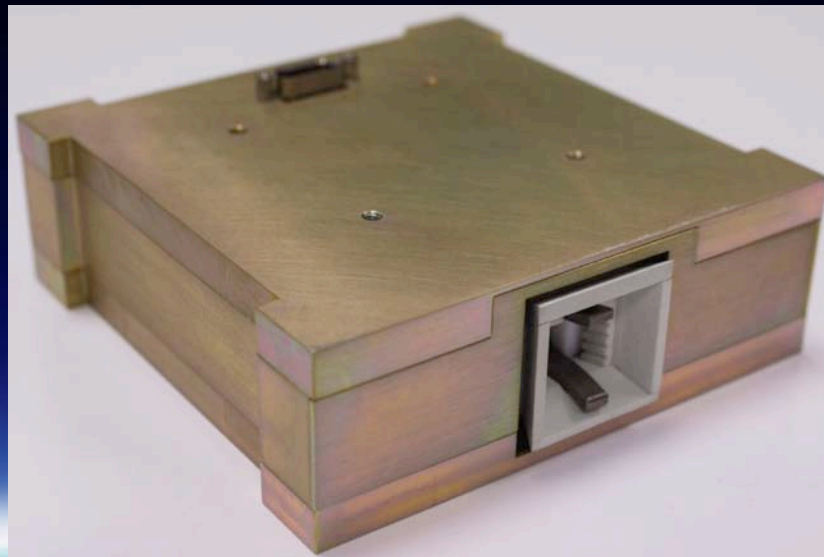
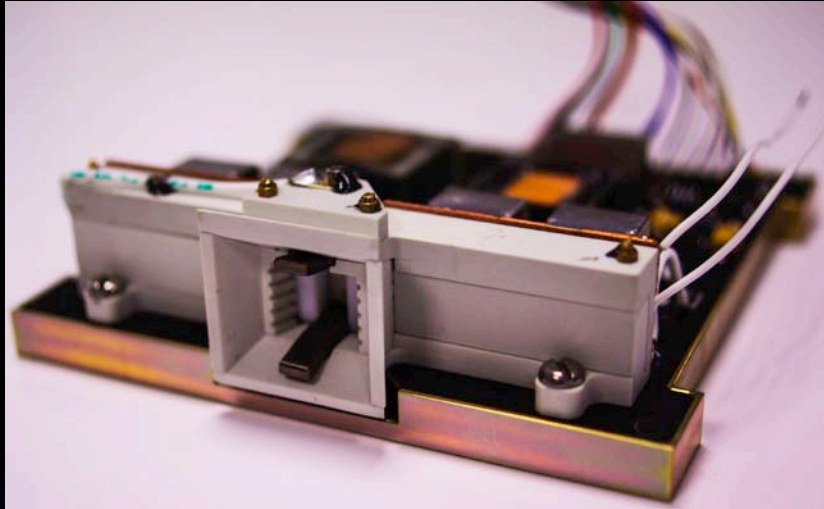
- FPGA based motherboard providing excellent radiation tolerance performance.
- Control modes embedded in the FPGA.
- Solar panels can have embedded magnetorquers, and integrated coarse and fine sunsensors
- 3-axis CubeSat Reaction Wheels; 5mNm, inertia of $5 \times 10^{-6} \text{kgm}^2$

Off the shelf **De-Orbit Module**

- 0.3U module that can fit directly to the structure
- Automatic deployment at end of life

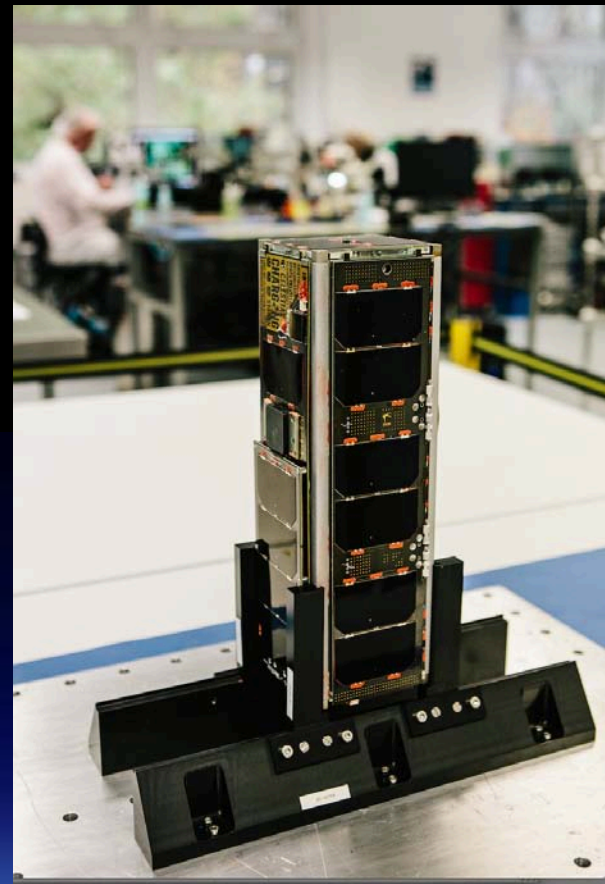
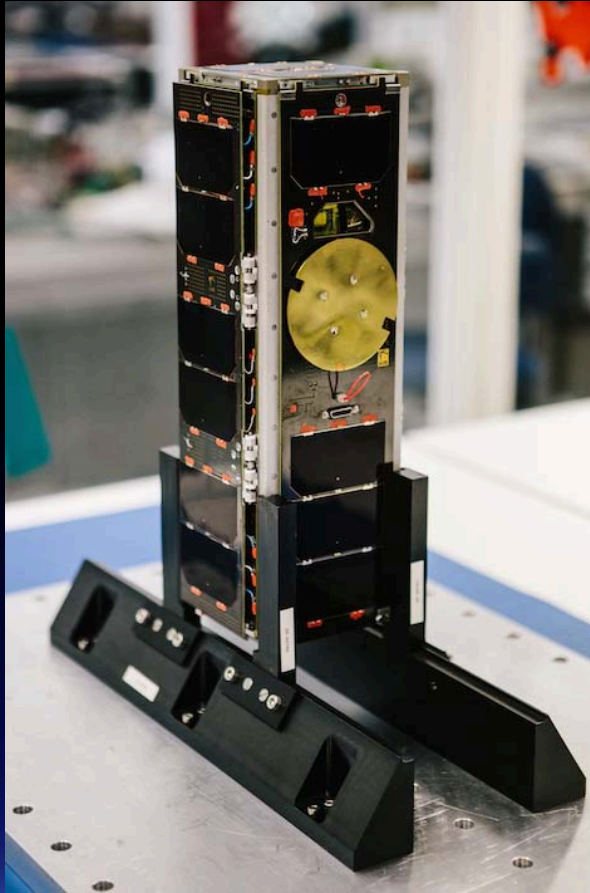


CubeSat Electric Propulsion; Pulsed Plasma Thruster...



- Qualified and tested to 1 Million shots
- Specific Impulse 600s, Total Impulse: 44Ns, Impulse Bit = 40 μ Ns
- 0.3U enclosed EMC shielded module
- Commanded over the I2C CubeSat bus

And UKube-1 ready for Launch



A small satellite with a rectangular body and several thin antennas is shown in space. The satellite has a brownish-orange frame and a blue and white sensor or camera at the bottom. The Earth's blue and white horizon is visible in the bottom right corner, and the black void of space with some distant stars is in the background.

Thanks for listening!

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