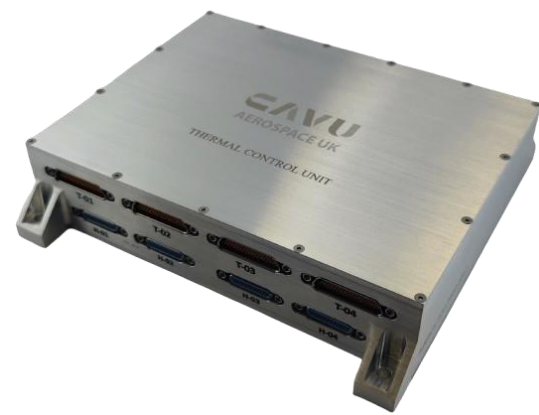
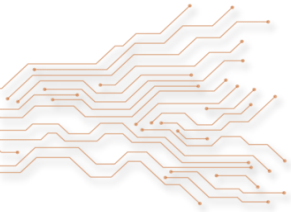




THERMAL CONTROL UNIT

Std. version 110- Temp. Sensor 48- Heater Channel



The TCU is a flight proven, modular, customizable subsystem designed to manage the thermal environment of spacecraft, ensuring the reliable operation of critical systems in LEO, GEO & Beyond. Featuring FPGA and SoC based control, the TCU provides precise and adaptable temperature regulation, making it suitable for a wide range of satellite missions.

Variations: Std. TCU, TCU-L, TCU-Max, TCU-Linear.

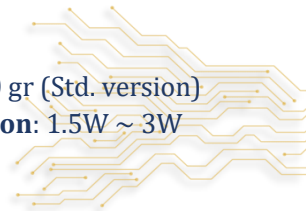
- FPGA-based control with SEU mitigation
- Real-time thermal monitoring and adjustment with Programmable Logging Rate
- Interface to **Thermistors, Thermocouple, RTD**, etc.
- Live data management & store data for 45 days for cases spacecraft can't provide live data
- Mission Life 3 to 5 Years in Low Earth Orbit with COTS components, **30 kRad, SEE 60 MeV**, Latch-up Immune
- Customizable Configuration Tailored Sensor Inputs & Heater Control Options
- Temperature Control Accuracy $\pm 0.2^{\circ}\text{C}$
- Real-Time Monitoring Programmable Update Rate of Better Than 1Hz
- **Budget:**

Chassis: AL7075-T6, Dimensions: 160 mm $\times$ 170 mm $\times$ 38 mm

Power Supply: 28V / 75V $\pm$ 4V, Custom Range Available

Mass: 1,000 gr (Std. version)

Consumption: 1.5W ~ 3W



KEY FEATURES

- **Interfaces:** CAN, RS422 RS485, RS232, GPIO, Debug: JTAG, SoftConsole or Keil
- Fully Customizable with GUI software to define regions in spacecraft for modular thermal management:
 - TCU-L** with half I/O: 24 heater channels
 - PWM or Linear Control** (for super quiet Env.)
 - TCU-Max** with up to 128 heater channels 3,200W
 - ICU**- Radiation Tolerant version
- **Advanced Networking Capabilities:**
 - FTP logging and file service to store telemetry and housekeeping logs on eMMC, with start/stop control and status reporting
 - gRPC unary server for remote command execution (ping, configuration, telemetry, control, logging commands) over TCP/IP
 - SNTP client to synchronize device RTC time from a network time server
 - RTC management for read/write timekeeping and timestamped logging
 - Heater and thermistor control pipeline for configuration, state control, and power/temperature readback.
 - Housekeeping telemetry acquisition and converted engineering-value reporting
 - eMMC management features including filesystem operations and format command
 - RS232 and RS422 command compatibility path alongside network gRPC control
 - FreeRTOS-based multitask firmware architecture with lwIP networking
- **Docs:** FMEA, CIL, Reliability, FDIR, Radiation Analysis, Worst Case, Mechanical Analysis, MPMPL, EDD, PA
- **Test Reports:** EMC, Vibration, Shock, TVAC, Radiation, Burn-In



W: CavuAerospace.UK

T: +44 (0) 1786 628002

E: Sales@CavuAerospace.UK

12 Scion House, Stirling University Innovation Park, United Kingdom, FK9 4NF

SOSA[®]
Sensor Open Systems Architecture[®]

MICROCHIP
Authorized
Design Partner