CMCube - Technical Specifications

Description:

CMCube is a CubeSat Onboard Computer (OBC) powered by Raspberry Pi CM4 with a ARM Cortex M4 based Co-Processor and integrated with NASA's cFS framework that runs on Linux. It provides efficient and versatile computing for CubeSats, allowing easy extension of both software and hardware capabilities. With its modular software design, users can add mission-specific apps without compromising OBC performance, and it supports Multiple ADC interfaces interfaceable with Analog sensors, RTDs, NTCs along with RS485, CAN, I2C, UART interfaces. On-board power isolation and signal isolation for all interfaces are integrated. The built-in hardware watchdog ensures reliability during long-duration missions.

Specifications:

	Parameter	Value
Compute	Processor Type	Main - Quad-core 64-bit Arm Cortex-A72 CPU, Co-processor - Arm Cortex-M4 MCU
	Processor Clock Speed	Main - 1.5 GHz Co-processor - 168 MHz
	RAM Size	8GB SDRAM
	Non-volatile Memory	32GB eMMC (Boot), 2TB NVMe SSD (Storage)
	Real-Time Clock (RTC)	TCXO based RTC with Battery Backup
	Data Retention	10 Years with < 10% of Rated P/E Cycles
	Rated P/E Cycle	60,000 Cycles
	Clock Synchronization	RTC and External GPS Synchronisation
	Fault Tolerance	External Watchdog Timer(configurable)
Power	Power Consumption (Idle)	3 W
	Power Consumption (Nominal)	6 W
	Power Consumption (Peak)	9 W
	Processor Voltage Range	4.75V - 5.25V
	Peripheral Voltage Range	3.18V - 3.45V
Interfaces	Interfaces Supported	16 x Isolated 24 Bit ADC 3 x Multiplexed Isolated UART 4 x Multiplexed Isolated I2C, 2 x Isolated HS-CAN 3 x Isolated RS-485 1 x USB-C 1 x USB-C(Power Only) 1 x MIPI-CSI Camera Connector
	GPIO Pins	10 x Isolated GPIO (3 X PWM Enabled)
Mechanical	Dimensions	90.1mm x 95.6mm x 20.2mm
	Weight	250g*
	Form factor	PC104 compliant with stackable connector
	Material	Hard anodised Al 6061 T6
	Temperature Range	-40 C to 85 C
	Storage Temperature	-55C to + 85C
	Connectors	2 x 20 Pin Harwin Gecko Latch 5 x 6-pin Harwin Gecko Latch 6 x 4-pin Molex picolock 1 x PC104 1 x USB-C 1 x 22-pin CSI

Software	Software Development Kit (SDK)	OrbitOS , a fork of NASA cFS , implemented on 32 Bit raspbian bullseye
	Supported Languages for SDK	C - Language
	Firmware Update Mechanism	eMMC Flash
	CCSDS Compliance	Compliant with ground stations following CCSDS 1v2 protocol
	Boot Time	75 Seconds
	Debug Interface	USB-C
Testing & compliance	ETL: TVAC, EMI/EMC, Vibration and Shock Tolerance	TBD
		TBD
	Mission Life Expectancy	5 Years
	Radiation Tolerance	Radshield protection with proprietary Ta-tape for up to 10x reduction in TID for LEO