AAC CLYDE SPACE

Command & Data Handling

Sirius QuadCore

Our next generation Sirius Command and Data Handling solution, Sirius QuadCore, has been engineered for high performance data processing for New Space nanosatellite missions. This cutting-edge space data handling solution runs mission specific software and can manage the spacecraft system as well as payload computing processing. This solution was designed for advanced satellite constellations in LEO and deep space exploration missions and utilises a powerful processor, LEON4FT, to deliver 'always on' reliable operations that work every time on time with precision performance. Not only does is surpass its predecessor in processing capability it also comes with inbuilt protections, based on over a decade of error correction design heritage to guarantee realtime-on-time operations. With this enhanced error detection and correction, the Sirius QuadCore is tolerant to Single-Event- Effects (SEE) in logic and data storage. Fault tolerance is secured through TMR (Triple-Modular Redundancy) on boot flash and EDAC (error detection and correction) on memories. Making this one of the most reliable C&DH solutions available on the market. Sirius QuadCore has a standard single string system that consists of an on-board computer (the Sirius OBC), quad core computing and a combined mass memory with CCSDS stack (Sirius TCM). The TCM receives and stores payload data and platform housekeeping data and can at the same time distribute telecommands and serve mass memory and real time data to the transceiver. Sirius spacecraft avionics are modular in design, modules can be combined to offer new configurations or to simply accommodate mission specific requirements.

PERFORMANCE

Our solution utilises a 250 MHz LEON4 quad core fault-tolerant processor, which can run Linux or RTEMS real-time operating system compliant to IEEE 1754 SPARCv8.

RELIABILITY

Sirius QuadCore solutions have fault-tolerance for uninterrupted software execution in the presence of eventual errors. The inbuilt protections are based on over a decade of error correction design heritage to guarantee realtime-on-time operations. This next generation solution is designed and qualified for five years in LEO.

MODULARITY

The Sirius QC adopts a modular design approach which enables easy system integration. This solution utilises CAN bus for low level commanding and monitoring, and a SpaceWire router for fast communication between subsystems/ payloads.

TECHNICAL SPECIFICATIONS

General	
Design Life	5-7 years in LEO
Processor	Quad core LEON4 (IEEE-1754 SPARC v8) fault-tolerant processor @ max 250MHz/core
Operating System	LEON Linux 4.9 or RTEMS 5*
Toolchain	GCC (10.2.0)
Capabilities	MMU and double precision FPU IEEE-754 (1 FPU/core)
SMP support	Multiprocessor interrupt controller for asymmetric and symmetric multiprocessing
Instruction cache	2 MiB Level-2 cache
Boot memory	MRAM (bootflash) 2Mbit
Image memory	SPI-Flash 256Mbit
SDRAM Memory	SDRAM 4Gbit data plus 2Gbit EDAC
Operating Temperature Range	-30°C to +60°C
Radiation (TiD)	20 kRAD (qualified >30 kRAD,Si)

Electrical Interfaces	
4x Space wire	Up to 300Mbit (inbuilt router)
2x CAN	Supports CAN 2.0b
9x GPIO	3V LVTTL
1x UART	Serial comm (RS422)
1x SPI	
Internal/ext comm SPI	SPI flash, ADC
Debug	Debug and programming purpose with GRMON (uses External debugger unit delivered with the product)
Reset input (debug)	Active low reset (resets the board approx 30ms)

Size, Weight & Power	
Length	100 mm
Width	100 mm
Height	15 mm
Mass	~100 grams (PCBA)
Input Voltage	5-12 V
Normal Power Consumption	4W

To make an enquiry, request a quotation or learn about AAC Clyde Space's other products and services, please contact:
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