

Contacts

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Airbus Crisa designs and produces state-of-the-art electronic products for space applications that range from satellites, deep space probes and orbital infrastructure to space transportation systems. From ensuring proper on-board temperatures, energy management, and providing the delicate control for spacecraft and launchers, Airbus Crisa's innovative solutions build on the company's heritage in almost all types of electronics with the highest precision and performance.

Motivated by a commitment to continuous innovation, and backed by the strategy of investments in research and development, the company's products continually evolve in response to customer's needs. Airbus Crisa has proven its ability to meet requirements for all types of missions, equipping everything from large telecommunication satellites, new-space constellations and agile Earth observation platforms to scientific and deep space exploration probes.

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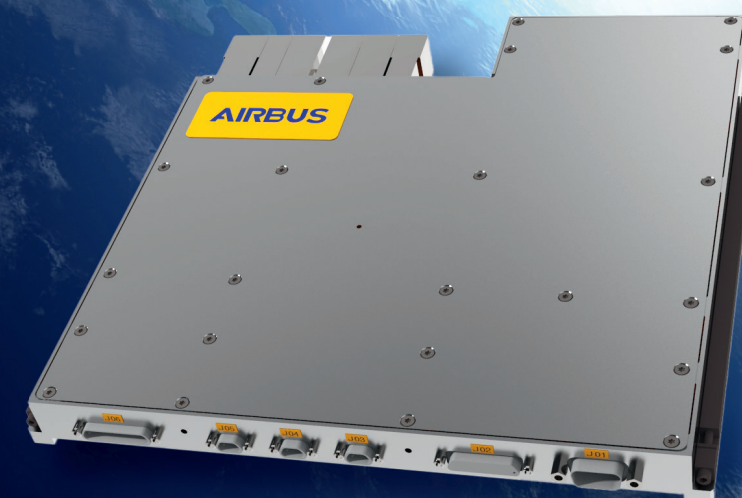
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Reference 0261_24_1.

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ADHA PCM

Versatile ADHA Payload Controller Module (PCM) suited for a wide range of data handling and data processing mission's needs.



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ADHA PCM

Key Features

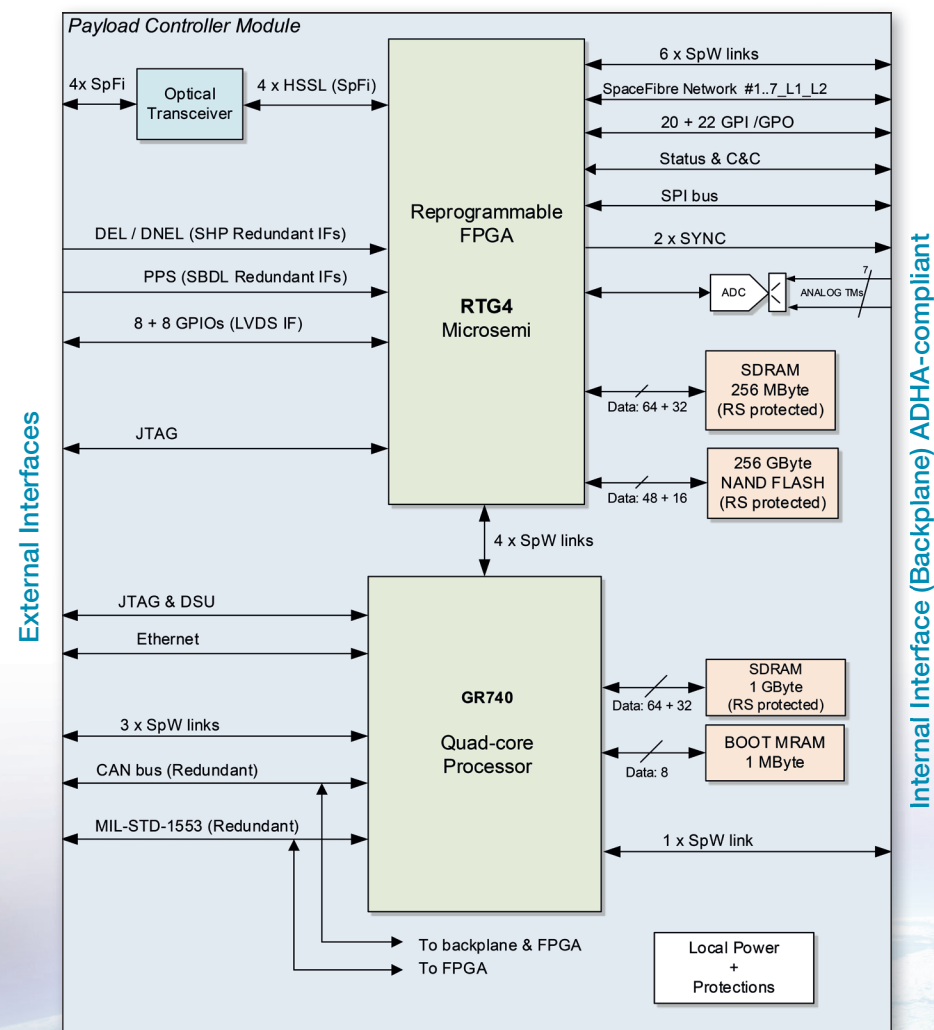
- High-performance module compatible with ESA standard ADHA.
- Designed for high-reliability equipment's with class 1 / class 2 components.
- Highly configurable:
 - A broad range of interfaces that can be used for your payload applications: from low-speed interfaces as CAN, 1553, UART, to high speed interfaces such as SpaceWire, LVDS-based ad-hoc protocols or SpaceFibre (optical & copper).
- Processor booting from NAND FLASH for short term missions or from MRAM for long duration missions (GEO).
- Power Supply and Protections:
 - The module can be supplied from a main +12V bus as per ESA ADHA standard. Optionally it can be supplied from +3.3V for non-ADHA applications.
 - Overcurrent protection in main power supply configurable as RLCL or LCL with undervoltage protection.
 - Overvoltage protection configurable as latching/non-latching.
- Massive volatile and non-volatile memory banks:
 - Up to 256 GBytes (BOL) NAND-FLASH with Reed Solomon protection for mass memory.
 - Up to 1 GByte SDRAM with Reed Solomon protection for GR740 processor.
 - 256 MBytes SDRAM with Reed Solomon protection for RTG4 data buffering.
 - 1 MByte MRAM EDAC protected.

The PCM is a processing module that can be used in a 6U ADHA (Advanced Data Handling Architecture) rack to fulfil your processing and payload in-orbit needs. It is based in the high-performance GR740, 250MHz quad-core processor, and the reprogrammable FPGA RTG4. The PCM allows multiple hardware configurations at manufacturing to answer a broad range of mission needs, while reducing costs and development times.

Two Software products are developed with the PCM: Boot Software (BSW) and Hardware-Dependent Software (HDSW) hiding hardware initialization, configuration and management to upper SW layers. The drivers are independent from any OS used. The reprogrammable FPGA complements and provides further processing capabilities, interfaces (SpW, HSSL, etc.) and features (mass memory, SpW router, etc.) to the PCM. The adherence to ESA ADHA standard and the aforementioned capabilities, allows the PCM to answer the market demands for modularity, versatility, design reusability and higher in-orbit performances.

Architecture

The architecture of the PCM allows to maximize the number of available interfaces in a 6U ADHA form factor. Maximized data bandwidth between SDRAM and processor allowing data transfers >100 MBps. 4x internal SpW links for high-speed data transfers to avoid bottlenecks between processor and FPGA.



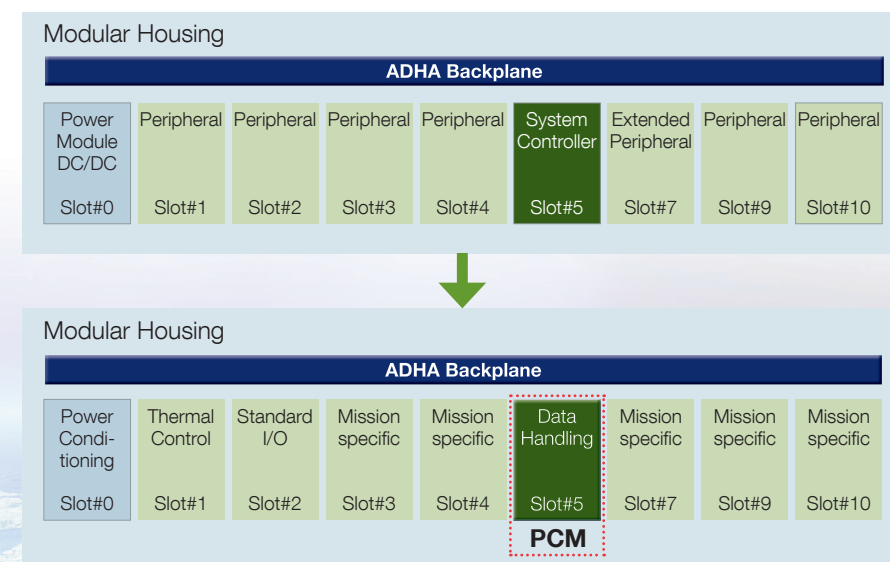
Budgets

Module Dimensions	
Length	255.36 mm
Width	245.1 mm (w/o connectors protrusion)
Height	30.48 mm (6HP)
Mass budget	
Module mass	1440 g (+ 20% contingency)
Power budget	
30.48 mm (6HP)	22 W (+ 20% contingency)
Processing capability	
Single core	459 Dhrystone MIPS @250MHz core clock
Quad cores	1.744 PARSEC 3.0 MIPS @250MHz core clock
Interfaces Data throughput	
SpW link #1	200Mbps
SpW link #2	200Mbps
SpW link #3	200Mbps
MIL-STD-1553 bus	1 Mbps
CAN	1 Mbps
Ethernet LAN (for debug only)	100 Mbps
Redundant GPIO interface (as SpW)	100Mbps / 200 Mbps
HSSL (SpaceFibre single lane)	3.125 Gbps
HSSL (SpaceFibre optical multilane)	12.5 Gbps

ADHA Modularity

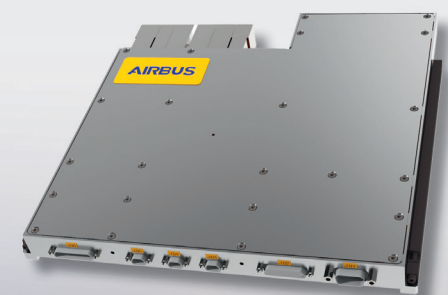
The PCM fits in a standard ADHA rack as System Controller able to manage up to 7 peripherals without internal cross-strapping. The architecture does not precludes the use of internal redundancy, with two PCMs in cold-spare or warm/hot-spare depending on unit configuration/power dissipation.

ADHA architecture (non redundant equipment)



Interfaces

- Command & Control:
 - MIL 1553B (N&R)
 - CAN (N&R)
 - SpaceWire
- High-Speed Serial Lines (HSSL):
 - 7x SpaceFibre multilane (x2) up to 3.125Gbps in backplane.
 - 4x Optical SpaceFibre lanes up to 3.125Gbps in rear connector. Configurable as multilane up to 12.5Gbps.
- 3x SpaceWire in front panel and 7x SpaceWire in backplane.
- 8+8 General purpose Input and Output lines in front panel that can be configured as follows:
 - 2x N & R SpW links
 - 1x N & R SpW link and 2x N & R UART links.
 - Ad-hoc protocol based on LVDS or SBDL.
- 1x N & R Pulse Per Second (PPS) synchronization signal interface in front panel.
- 1x N & R Power Loss alarms (DEL & DNEL) signals in front panel.
- 20 General Purpose Input and 22 General Purpose Output lines in backplane.
- SPI interface for managing low-speed slaves in backplane.
- Health Monitoring System to control its own and peripherals housekeeping telemetries.
- Debugging:
 - Ethernet and JTAG for processor.
 - JTAG for programming FPGA.



ADHA PCM with rear optical link configuration