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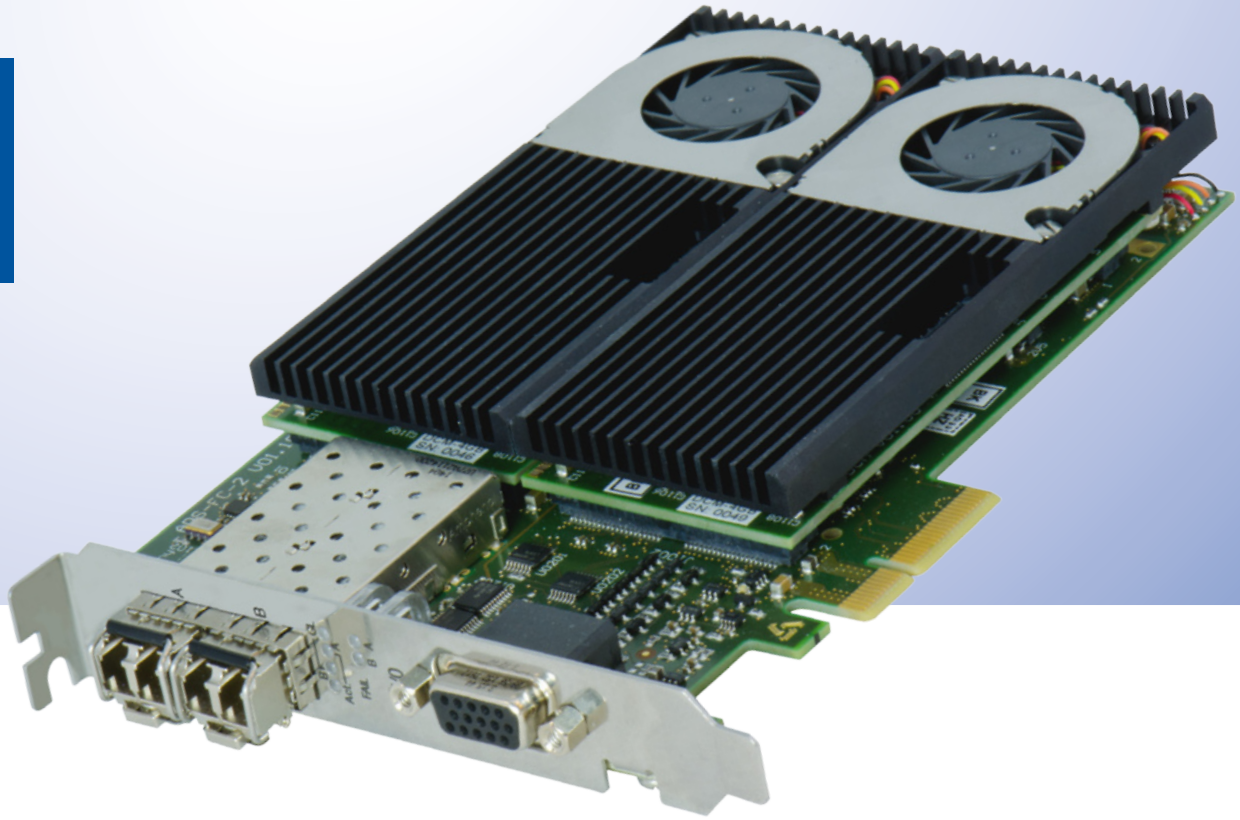
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Avionics Databus Solutions

APS-FC-2

2 Port 4GFC Fibre Channel Test, Simulator and Monitor Module for PCIe

Data Sheet



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APS-FC-2

2 Port 4GFC Fibre Channel Test, Simulator and Monitor Module for PCIe

General Features

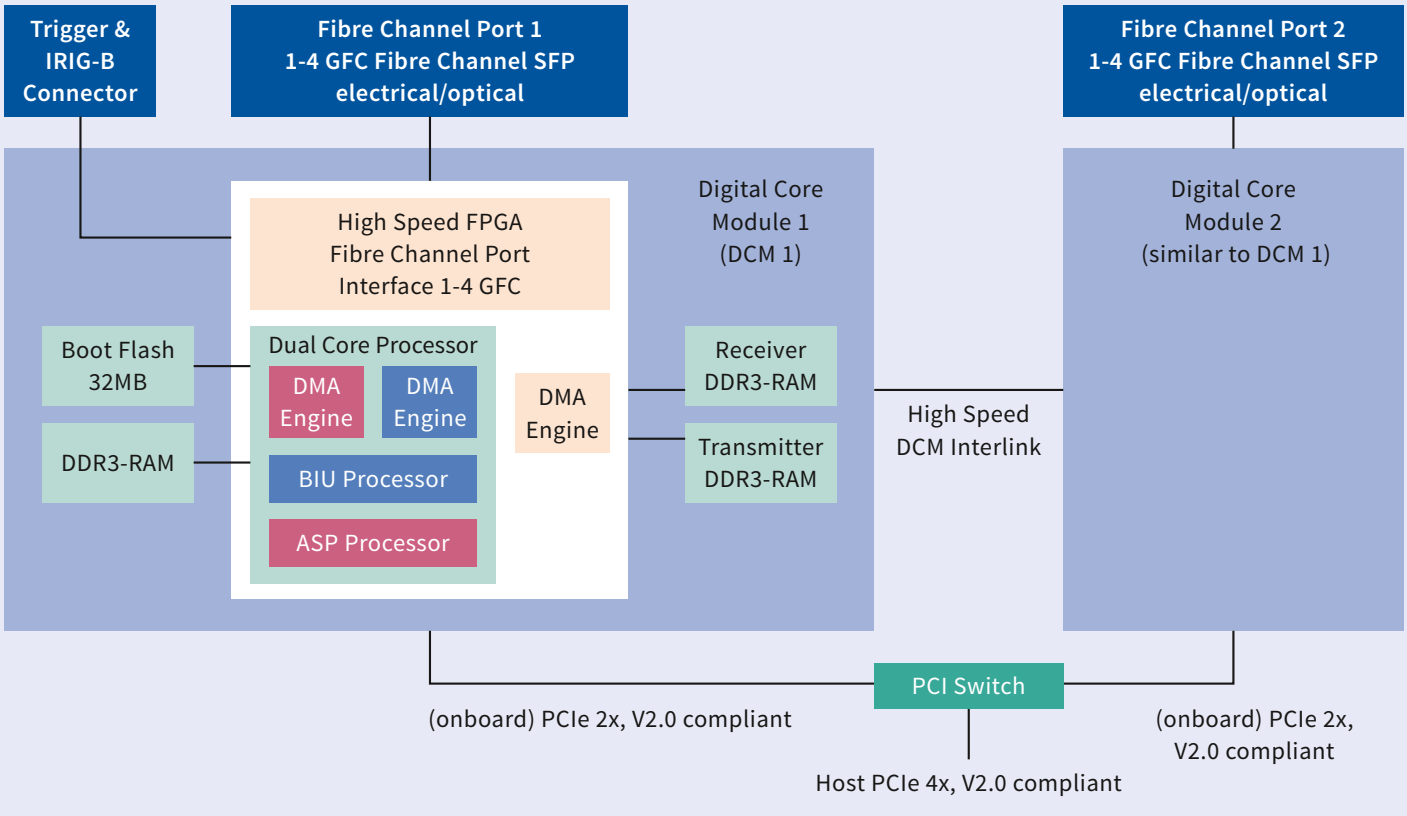
The APS-FC-2 is AIM's new high performance intelligent PCIe module offering 2 ports with full function test, simulation, monitoring and analyser functions for Fibre Channel networks. The APS-FC-2 is a powerful State-of-the-Art 4-lane PCIe 2.0 compliant board with a maximum bandwidth of up to 2000MB/s concurrently in each direction. The architecture of the APS-FC-2 provides a dual core processor or each port and dedicated DDR3 RAM for handling Receiver and Transmitter tasks. Each port provides 4GB of low power DDR3 RAM, summarizing to 8GB for the complete module. This separation of the processing capabilities and onboard RAM per port makes each port operating independent from the other port. 2 high performance FPGAs implementing the customised Fibre Channel interfaces enables the board to analyse incoming and modify outgoing data in real time.

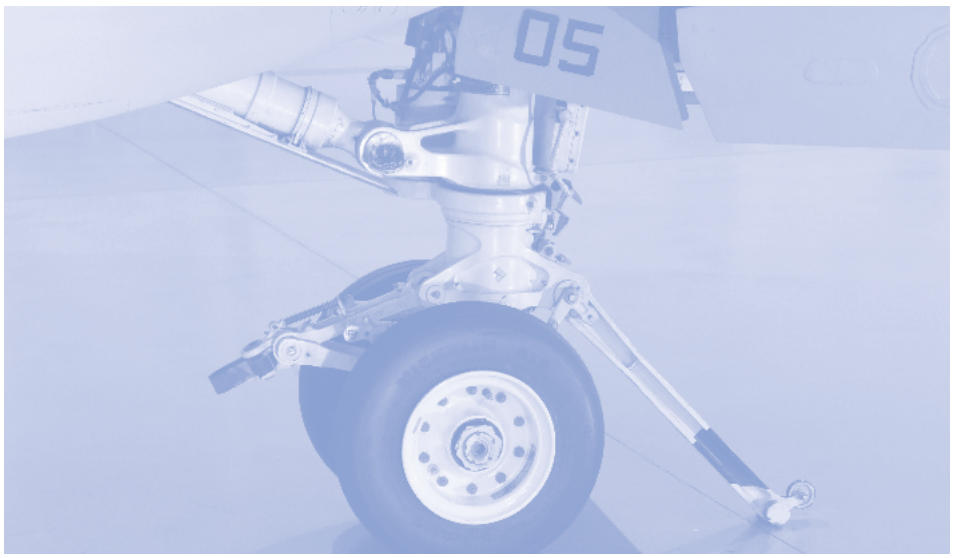
The ports can operate concurrently in Traffic Simulator or Receiver/Monitor modes with support for port related Frame Statistics. The TAP mode provides a possibility of monitoring traffic between 2 Fibre Channel ports without interacting to the attached ports. Source or destination ID packet capturing and monitoring features are complimented with powerful triggering and filtering capabilities. Supported Fibre Channel network topologies are Point-to-Point, Switched Fabric and Arbitrated Loop. Service Classes 1, 2 and 3 are fully supported, Link Level parameters are user definable. 4GB DDR3 RAM is provided for each port to implement large receive buffers and complex transmit scenarios onboard.

The flexible frontend implementation allows the user to select the Fibre Channel network speed of 1 to 4GFC by software command. The APS-FC-2 module provides 2 Fibre Channel ports implementing either an optical or electrical full duplex interface. The SFP cage makes it suitable for different media types as optical or electrical network technologies.

The APS-FC-2 module is available with following optional software: PBA.pro™ the most scalable and flexible application framework focusing on Test, Simulation and Integration under Windows and Linux offering ARINC818, FC-AE-RDMA or FC-AE-ASM Analyser functionality including decoding of Payload Data. PBA.pro Database Support offers great flexibility for analysing and easily setup of user defined frame contents.

APS-FC-2 Block Diagram





Traffic Generation

The APS-FC-2 provides real time Traffic Generation on all ports concurrently. Different Traffic Generation modes are available:

Generic Traffic Simulation

(based on the setup of FC-2 frame lists)

- Service Classes 1, 2 and 3 fully supported
- Data Flow Management
- Simulation of FC-2 Layer Fibre Channel Traffic with fully programmable Frame Attributes (Protocol Headers, Protocol Payload Data, Timing, Physical Error Injection, FC-0/1/2 Error Injection)
- Simulation support for different Upper Layer Protocols (ULP) Traffic with fully programmable Frame Attributes (Headers and Payload, Physical and Logical Error Injection)
- Autonomous Payload Generation Modes with support for Time Tag Insertion into Frame Payload for Delay/Latency Measurements in Network Integration Applications
- Fully programmable Timing and Sequencing of Frames

ULP Message Simulation

- Simulation of ARINC818, FC-AE-RDMA and FC-AE-ASM compliant Networks (other ULPs on request)
- ULP depending generation of traffic, fully configurable in Timing, Error Injection and Message Repeat Rates
- Node Simulation Mode for End-System-Simulation
- Mapping of user-definable data sources to FC-4 depending on ULP with automatic sequence splitting and frame generation
- Autonomous Link and Data Flow Management with Error Injection/Detection and reporting facilities

Traffic Reception & Monitoring

The APS-FC-2 provides real time Traffic Reception on all ports concurrently. Messages can be analyzed in FC-2 and FC-4 mode. Different Traffic Receiver modes are available:

Chronological Receive Mode

(based on the reception of FC-2 frames)

- Sequential Storage of frames in a dynamically adapted onboard buffer
- Programmable Data Capture modes
- Time Stamping of captured frames with extended IRIG-B Time Code with 10ns resolution incl. Inter Frame Gap/Idle Measurement
- Error Detection for SOF/EOF Errors, Physical Coding Errors, CRC, Size and Alignment Errors
- FC-Protocol Error Detection and Management
- Powerful Filtering, Complex Triggering and Capture modes allows users to select only the frames, data and errors of interest
- Support for Fibre Channel specific source ID or destination ID based filtering
- Configurable Error Detection

TAP-Monitoring Mode

- Monitoring of bi-directional FC data without physically appearing to the network (TAP functionality)
- Low-Skew interface keeps the real time behavior of networks
- Global Statistic Information is available providing information about the received number of frames and sequences, the number/type of detected errors, the size distribution of received frames and sequences, etc.

Application Support Processor

The Application Support Processor (ASP) provides unique on-module processing functions typically provided by host PC processing systems:

- Executes LINUX Operating System
- Execution of the different ULP Protocol Support tasks
- Individual (configurable) dynamic Buffer Management for recorded data
- Snapshot mode for ARINC818 image reception of captured video data
- Configurable dynamic reassembling of fragmented ULP messages to provide high level message interface incl. message time-stamping with 10ns resolution

IRIG-B Time Encoder/Decoder

An onboard IRIG-B time Encoder/Decoder allows synchronization of multiple FC ports by using multiple APS-FC-2 modules. The modules can be easily synchronized using an external IRIG-B time source or the onboard time decoder of 1 APS-FC-2 module as the reference for accurate correlation of data across multiple ports.

Physical Bus Interface

The APS-FC-2 provides 2 ports with either electrical or optical front end.

- Customised Fibre Channel interfaces implemented in FPGA for maximum flexibility
- Large internal FPGA Burst buffers running at full system speed
- Standard SFP (Small Form Pluggable) transceiver allowing the customer in a flexible way to adapt the required physical medium

Standard supplied optical SFP (others available on request):

- 850nm Oxide VCSEL laser transmitter
- Duplex LC connector
- 50/125µm MMF or 62.5/125µm MMF usable
- 75Ohm coaxial SFP on request
- 1310nm SFP on request

Driver Software Support

The APS-FC-2 module is supplied with a full function Application Programming Interface (API) which is compatible with 32-/64bit Windows 7/8/10 and Linux. Host applications can be written in C and C++. A LabView application interface is available.

Technical Data

Sub-System Interface
APS-FC-2: 4-lane PCIe 2.0 interface with up to 2000MB/s of bandwidth
Processors
1 Dual Core RISC Processor per port
Memory
8GB DDR3 RAM
Encoder/Decoder
2 Fibre Channel Encoder/Decoder with Link Control facilities
Time Tagging
IRIG-B Time with 10ns resolution
Physical Bus Interface
2 full duplex Fibre Channel ports with up to 4GFC
Connectors
PCIe 4-lane backplane connector,
2x SFP cages for electrical or optical SFPs compliant to the SFP-MSA,
1x 15-way D-Sub connector (female) for Time Code and Trigger I/O
Dimensions
175mm x 107mm standard PCIe format

Power Consumption
APS-FC-1: 10W, APS-FC-2: 19W
Operating Temperature Range
Standard: 0°C to +55°C ambient

Storage Temperature Range
-40°C to +85°C
Humidity
0 to 95% non-condensing

Ordering Information

APS-FC-2-s-p-u
2 Port PCIe x4 bus to Fibre Channel Interface:
Traffic Simulator, Receiver and Chronological Monitor for Layer 2;
IRIG-B Time Decoder/Generator;
8GB RAM total;
coaxial or optical physical front end via Small Form factor Pluggable (SFP)
Ordering options:
-s: Speed option
1=1GFC / 2=1 to 2GFC / 4=1 to 4GFC, others on request
-p: Physical Front End option
o = optical interface
c = coaxial interface, 75Ohm (contact factory)
-u: Upper Layer Protocol option
0 = no Upper Layer Protocol, FC Layer 2 only
RDMA = FC-AE-RDMA
A818 = ARINC818
ASM = FC-AE-ASM

FC-SFP-o
Additional Small Form factor Pluggable (SFP) optical for use with APS-FC-2
FC-SFP-c
Additional Small Form factor Pluggable (SFP) coaxial, 75Ohm for use with APS-FC-2 (contact factory)

Please contact AIM for further types of optical or electrical front end SFP modules.

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