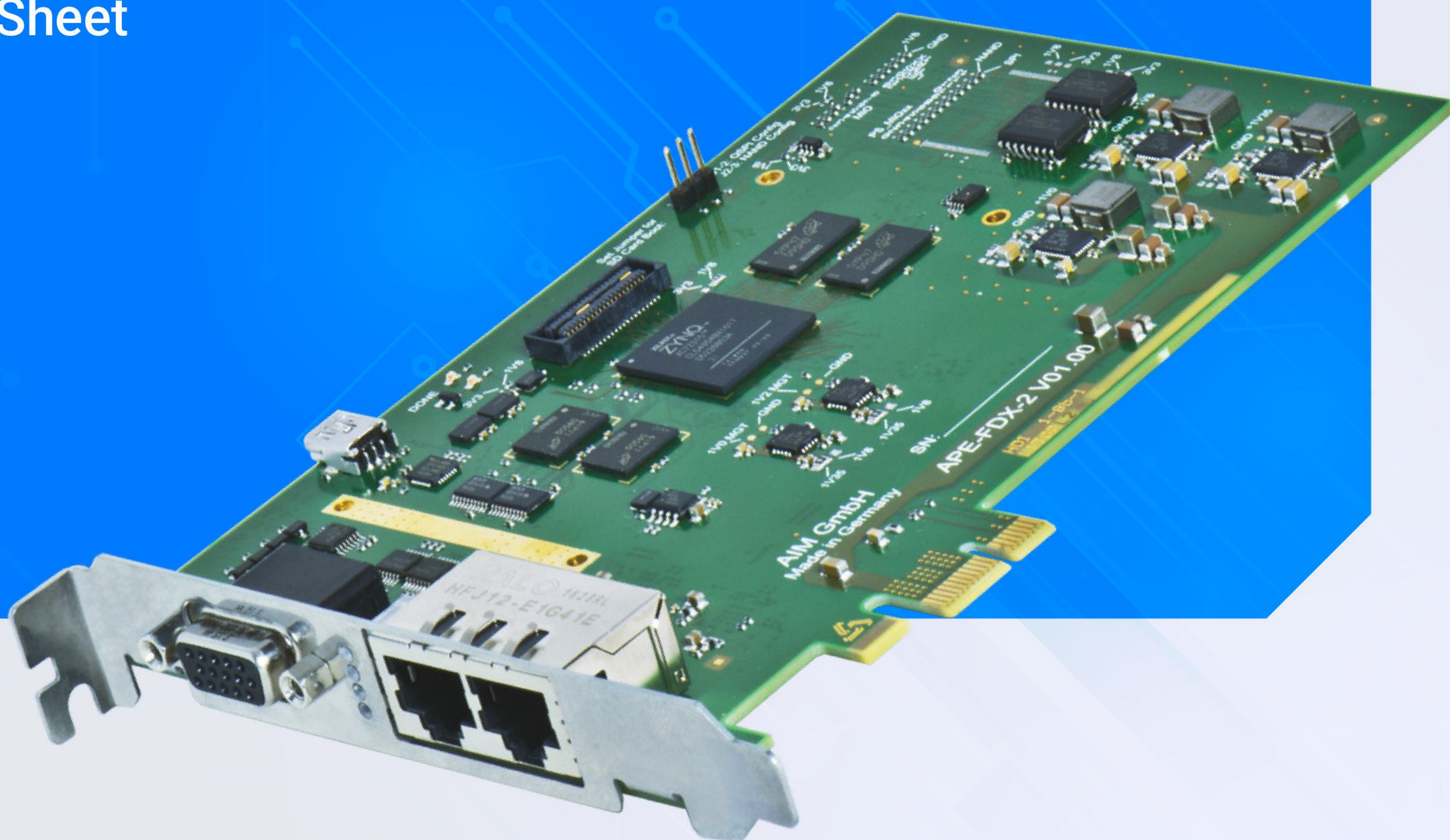


APE-FDX-2

2 Port 10/100/1000Mbit/s
AFDX®/ARINC664P7
Test, Simulator and
Monitor Module for PCIe

Data Sheet



APE-FDX-2

General Features

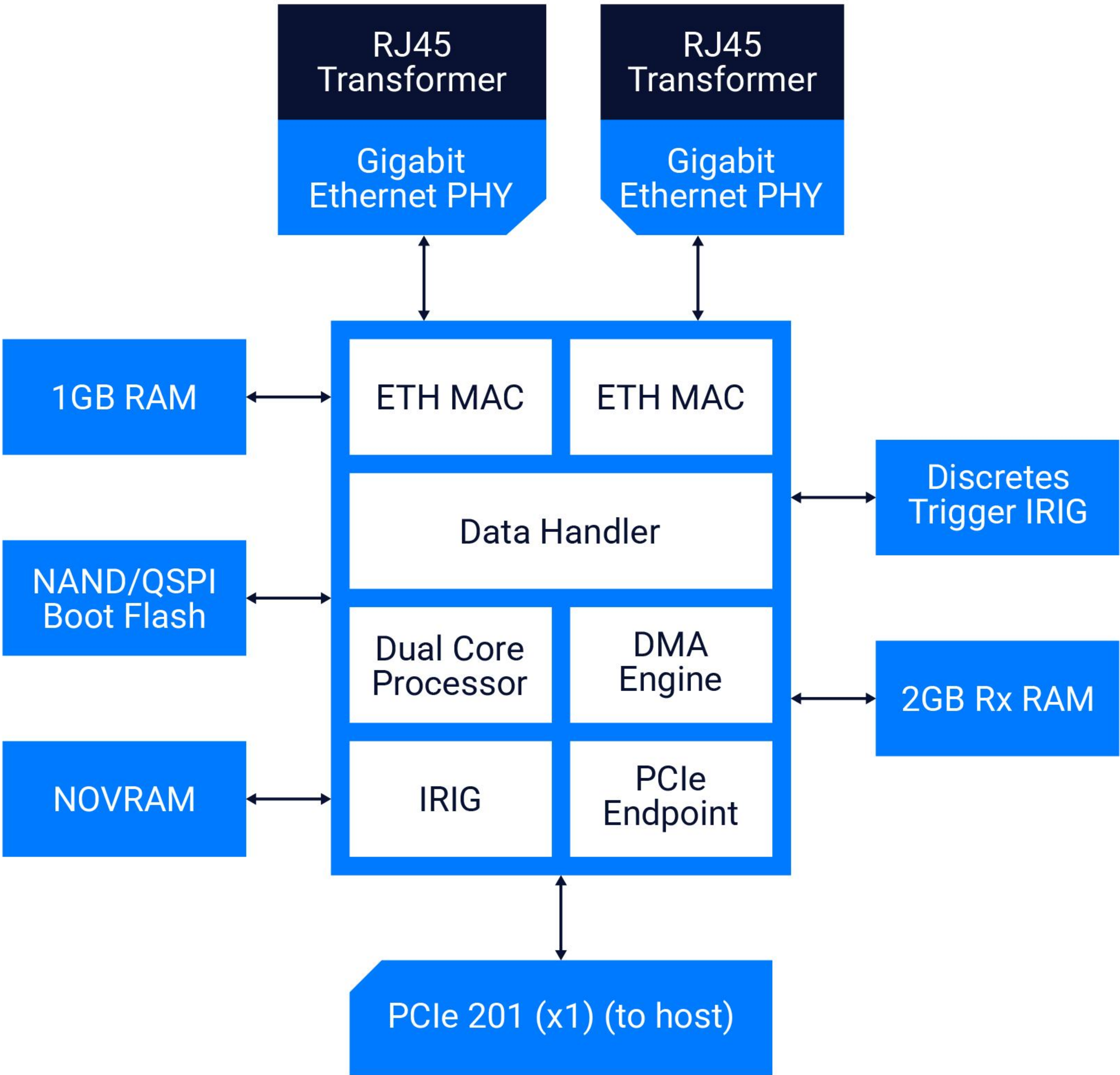
The APE-FDX-2 is AIM’s new high performance PCIe module offering full function test, simulation, monitoring and analyzer functions for AFD®/ARINC664P7 (Avionics Full Duplex Switched Ethernet) networks. Versions available for both Airbus and Boeing variants of the ARINC664P7.

The board supports the Boeing ARINC664 extensions for EDE at the hardware interface layer with field proven real time simulation of EDE subscribers to meet all parts and multiple revisions of the EDE specifications. It's unique onboard processing capability, memory resources, customized AFDX® MACs and IRIG-B time code decoder/generator gives AFDX® users a comprehensive feature set for the most demanding AFDX® applications.

The APE-FDX-2 PCIe module provides two AFDX®/ARINC664P7 ports being configured as two single or one dual redundant ports each implementing a 10/100/1000Mbit/s full duplex Ethernet interface. Ports can operate concurrently in traffic simulator or receiver/monitor modes with support for AFDX®/ARINC664P7 port related frame statistics.

Virtual Link (VL) packet capturing and monitoring features are complimented with powerful triggering and filtering capabilities. An integrated TAP mode enables analyzing network traffic in-line, with all onboard and PBA.pro features between two attached Ethernet devices.

APE-FDX-2 Block Diagram



The extensive memory resources onboard allow to implement large receive buffers and complex transmit scenarios onboard. An AFDX®/ARINC664P7 specific Physical Bus Interface implements two full duplex ports for connection to AFDX® networks.

The APE-FDX-2 module is available with the optional PBA.pro analyzer software package for Windows and Linux.

- 10/100/1000Mbit/s Ethernet compliant Frontend
- Designed for Applications such as:
 - Test and Verification of End Systems
 - Switch Testing
 - Monitoring of Traffic between End Systems and Switch
 - Inter Switch Traffic Analysis
 - Multi Stream High Level System Integration
- Programmable Ports – Traffic Simulator and Receiver/Monitor Concurrently
- Synchronized Timing across Multiple Modules
- Driver Software for Windows and Linux

Traffic Generation

The APE-FDX-2 provides real time traffic generation on both ports concurrently.

Transmitter operation allows users to fully control all fields of the AFDX®/ARINC664P7 frame including the Virtual Link identifier, MAC source address, IP structure, UDP structure, payload and sequence number. Multiple modes of transmit sequencing are supported, these being generic/replay and UDP port oriented shaped transmissions.

Users can program payload data with user defined or fixed data. Inserting the time tag in the payload data provides an elegant solution to measure frame transmit delays through the network. Synchronization of transmissions across multiple ports is achieved by using strobe inputs/outputs.

- Programmable Timing and Sequencing of Frames
- Physical Error Injection – CRC, Gap, Size, Alignment
- Logical Error Injection on Layers 2, 3, 4
- Timing Error Injection – Violation of Bandwidth Allocation Gap (BAG)
- Autonomous Dynamic Data Generation
- UDP Port Simulation with Traffic Shaping and Sequence Numbering
- Onboard Support for AFDX®/ARINC664P7 Sampling and Queuing Ports

TAP Mode

The APE-FDX-2 can operate in TAP mode in all network speeds. This allows to analyze the network traffic between two attached network devices. Inter-message-timing will not be changed in this operational mode and network data will not be modified ensuring full operation of attached ports.

Time Synchronization

An onboard IRIG-B time code decoder and generator allows synchronization of multiple AFDX®/ARINC664P7 ports using multiple APE-FDX-2 modules. Modules can be synchronized using an external IRIG-B time source or the onboard time code generator of one module as the reference for accurate correlation of data across multiple AFDX®/ARINC664P7 ports

Physical Bus Interface

The APE-FDX-2 modules provide two AFDX®/ARINC664P7 ports which can be used as two single channels or as one dual redundant channel AFDX® specific physical bus interface.

- Customized Media Access Controllers (MAC's) implemented in FPGA (SoC), optimized for AFDX®/ARINC664P7
- 3GByte DDR3 Memory for System, Receive and Transmit Buffer
- Physical Interface and Magnetics (COTS)
- 8-Socket Network Interface Connectors – RJ45
- Trigger I/O, Discrete I/O and Time Code I/O Connector

Driver Software Support

The driver software is supplied with the APE-FDX-2 module. A full functional Application Programming Interface (API) is provided compatible with Windows and Linux.

Host applications can be written in C/C++ and Python. A LabView/VI application interface as well as LabViewRT drivers are provided.

Technical Data

Sub-System Interface

PCIe 2.0 (x1)

Processors

Dual Core Processing System,
integrated in SoC Device

Memory

1GByte DDR3 Processing System RAM
2GByte DDR3 MAC Receiver RAM

Encoder/Decoder

2 AFDX®/ARINC664P7 specific
Ethernet MAC's, integrated in SoC Device

- Inter Frame Gap Generation and
Measurement with 8ns Resolution
(1000Mbit/s Operation)

Time Tagging

46-bit absolute IRIG-B Time with 100ns
Resolution Inter Frame Gap Generation
and Measurement with 8ns Resolution

Physical Bus Interface (PBI)

2 full duplex AFDX®/ARINC664P7 Ports
configurable to 1 dual-redundant
AFDX®/ARINC664P7 Port or to 1 TAP Port

Connectors

- PCIe 2.0 (x1) Back Plane Connector
- 2 x 8 way RJ45 Connectors, one per
AFDX®/ARINC664P7 Port
- 1 x 15 way DSUB Connector (female)
for Time Code, Discrete I/O and Trigger I/O

Dimensionst

75 x 107 mm Short Length Standard
PCIe Format

Power Consumption

Typical 6.5W (operating)

Operating Temp. Range

Standard: 0°C to +55°C ambient
Extended: -15°C to +60°C ambient

Storage Temp. Range

-40°C to +85°C ambient

Humidity:

0 to 95% non-condensing
Versions available for both Airbus
and Boeing variants of the
ARINC664P7

Ordering Information

APE-FDX-2

2 Port, PCIe 2.0 (x1) Bus to
10/100/1000Mbit/s AFDX®/ARINC664P7
Interface:
Traffic Simulator, Receiver and Chrono
logical Monitor, Integrated Tap Mode,
IRIG-B Time Decoder, 3GB DDR RAM.
Includes Driver Software for Windows,
LabVIEW VI's, LabVIEW RT and Linux

APE-FDX-2-G

2 Port, PCIe 2.0 (x1) Bus to
10/100/1000Mbit/s AFDX®/ARINC664P7
Interface:
Generic TX/RX Function Only, Integrated
Tap Mode, IRIG-B Time Decoder, 3GB DDR3
RAM. Includes Driver Software for
Windows, LabVIEW VI's, LabVIEW RT, Linux

APE-FDX-2B

2 Port, PCIe 2.0 (x1) Bus to
10/100/1000Mbit/s AFDX®/ARINC664P7
Interface:
Traffic Simulator, Receiver and Chrono
logical Monitor, Integrated Tap Mode,
IRIG-B Time Decoder, 3GB DDR3 RAM.
Including Boeing EDE Specific Extensions
Includes Driver Software for Windows,
LabVIEW VI's, LabVIEW RT, Linux

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