iSAFT Quad SpaceWire PCIe

The iSAFT Quad SpaceWire Interface Card is an advanced PCIe SpaceWire interface, supporting SpW simulation with error injection and built-in recording capabilities. It is suitable for multiple applications in the space sector, including Data Front-Ends, EGSE/SCOEs.

The card is based on TELETEL's powerful SpaceWire codec, and it is a proven solution in various spacecraft / satellite testbeds in Europe and Japan.

The board is delivered with a practical SDK, and can be complemented with additional software modules allowing to save development / integration time.

Main Features

- Full height / Half length PCIe form factor board with multi-Gbps overall throughput
- Four SpW Ports with independently programmable Link speed up to 400Mbps, full compliance to ECSS-E-ST-50-12C
- Electrically isolated SpW ports (3.75kV rms isolation) with over-voltage protected power supply
- SpW Simulation / Emulation capabilities with built-in packet recording functions, Asynchronous transmission & Traffic generation support
- Two SpW links passive recording capabilities (optional), continuous real-time capture per link
- IRIG-B002/006 generator / receiver TTL/RS-422 electrical levels, with down to 8 nano-seconds accuracy / resolution, with IRIG signal regeneration capability in order to cascade multiple boards / systems
- Per port / packet triggered transmission conditions (packet to packet delay, transmission on Time-Code / IRIG Timestamp with / without time offset, etc.)
- Provision of trigger in / out signals with multipurpose functionality (start of capture stimulation, generation of events, synchronization with external equipment, SpaceWire packet transmission on trigger etc.) with optional add-on board
- SpW Error injection (EEP, parity, ESC error, disconnect, credit error, etc.), programmable fault tolerance modes
- Flight equipment protection against internal failures (FMEA available)
- 8 ns timestamp resolution for Rx / Tx data
- Transmit more than 2 Million packets / sec, support more than 2,5 Gbps aggregate traffic
- Multi-board management, concurrent access
- Industry's most advanced SpW codec verified in multiple space mission testbeds
- C driver API (Windows / Linux)
- Seamless integration with EGSE software
- Proven solution in multiple EGSE test benches across Europe, Japan, South Korea

Competitive Advantages

- High performance: 400 Mbps maximum link speed
- Dual Use: Switch of operation from simulation to recording with a simple reconfiguration
- Timestamp resolution: 8 nanoseconds at hardware level for increased accuracy
- Protection of connected equipment by isolation barrier supporting high rates up to 400 Mbps
- Certified to connect to space flight equipment - FMEA available
- First class support at both SW & HW level

Application Areas

- SpW Data Front Ends with online data recording
- Recording / Protocol Analysis equipment
- Electrical Ground Support Equipment (EGSE) / Test Benches
- Hardware In the Loop Simulation
- New prototyping / experimentation

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Specifications

Block Diagram
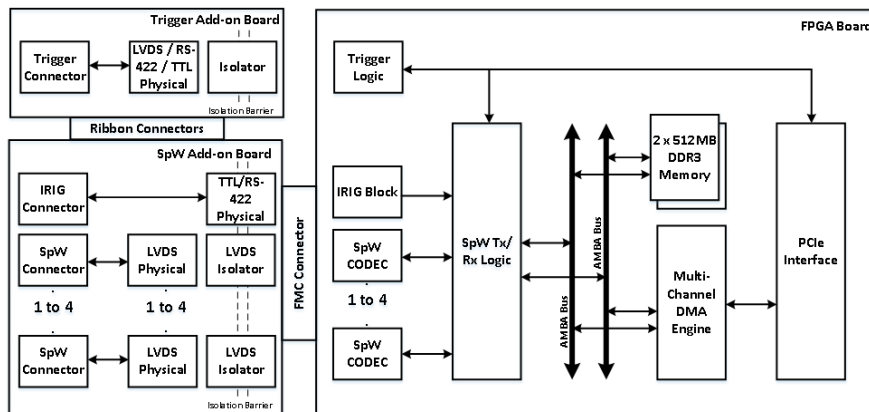
Technical Data

General

Form factor	Standard PCIe board, half-length 1 PCIe slot (or 2 PCIe slots with the optional trigger add-on board)
Dimensions	168mm x 110mm (L x W)
PCIe interface	PCIe x4, Gen2
PCIe bandwidth	16Gbps
FPGA	Xilinx Kintex7 (KX325T)
Memory	1GB DDR3
Power supply	+12V, +3.3V DC supplied from PCIe connector
Operating temperature range	0°C to 50°C
Storage temperature range	-55°C to 125°C
Compliances / Standards	CE, RoHS, FMEA available
Warranty	1 year (extendable)

Software

Supported OS / Driver	Windows 10 x64 driver and Linux CentOS, Debian x64 drivers
APIs	C driver API (Windows / Linux)
Utilities	Source Code Examples
Optional	iSAFT SpaceWire Simulator / Recorder software
	iSAFT EDEN or CCSDS C&C Remote Control - SpW

SpaceWire Interface

Number of ports	4
Connector	9-pin micro-D
Link speed	Up to 400Mbps per port (independently set per port)
IP Core	TELETEL SpaceWire IP core
Protocols	SpaceWire (ECSS-E-ST-50-12C), customizable on request
Functionalities	Simulation, Recording, Error Injection, Traffic Generation, Timestamping support
Electrical standards	LVDS signaling (galvanically isolated)
LED indicators	Status / activity LED per port

IRIG Interface

Type	IRIG-B002/006 (DCLS)
Functionality	IRIG generator, IRIG receiver 8 ns timestamping resolution
Electrical standards	TTL / RS-422 (selectable)
Connector	Omnetics MNCP-06-WD Circular Nano connector

Trigger Interface (Optional)

Type	Input / Output trigger signals
Functionality	Generation / reception of one input & one output trigger signal per SpaceWire port, timestamping support on reception, multiple trigger conditions / actions
Electrical standards	Selectable LVDS, RS-422/SBDL, TTL
Connector	51-pin micro-D

Order Information

■ iSAFT-NIC007: Quad SpaceWire PCIe Interface Card

Contact

TELETEL S.A., Athens, Greece
Tel.: +30 210 6983 393

Email: RTD@teletel.eu
Web: www.teletel.eu

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www.TELETEL.eu