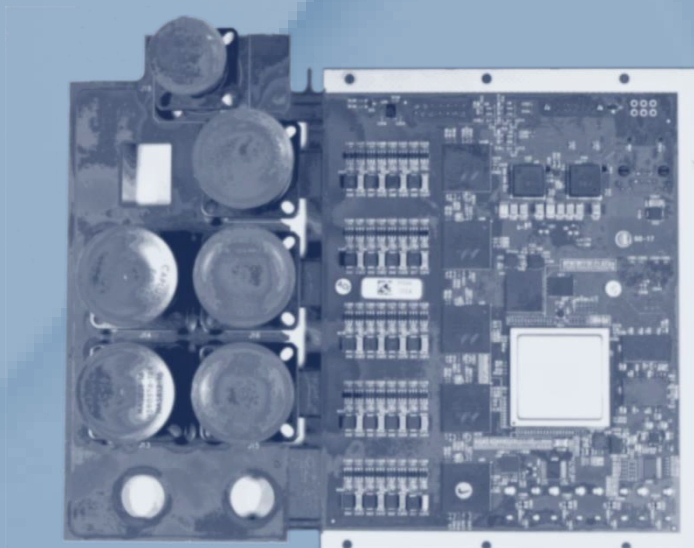# 1/10G TSN/HSR/PRP MILITARY SWITCH-ROUTER SOM WITH CONNECTORS

POWERFUL, OPEN AND FLEXIBLE COTS 1/10G TSN/HSR/PRP SWITCH-ROUTER WITH EDGE-COMPUTING CAPABILITIES

RELY-MIL-SOM-FLEX

High-availability for mission-critical applications

HSR, PRP and TSN-CB for zero-delay recovery time in case of network failure

Full IEEE 1588 (PTP) support

Nano-second range time accuracy even over redundant networking paths

SW and HW microservices supported

Cutting Edge multi-core CPU with FPGA to support user applications

Security-by-design

Multi-layered security to protect the system against heterogeneous threats.
Cybersecurity certified

MIL-STD

1st class military enclosure
MIL-STD-461G
MIL-STD-810G

Multiple media type

Support for copper and fiber based connections

RELYUM
by SoCe

Overview

The RELY-MIL-SOM-FLEX is a Managed 1/10G Ethernet Switch, Router and Edge Computing COTS SOM family focused on Ground and Airborne applications.

It supports up to 20x 1G copper ports and up to 4x 1/10G Fiber Optic (FO) ports. An extension bus and connector is provided to extend functionalities via an auxiliary board.

An additional 1x 1G RJ45 Ethernet Service port is accessible in a specific connector. The support for different media type and its distribution in the MIL-DTL-38999 connectors allow implementing complete and cost-effective network infrastructures.

The heart of this versatile equipment is a Xilinx Ultrascale+ MPSoC device that includes 6x ARM CPUs, 1x GPU and a latest generation FPGA in the same Integrated Circuit. The switching and routing functions are accelerated by hardware in the FPGA section. This flexibility allows offering different Switching & Routing & Computing personalities according to the requirements of the program.

As an example, this flexibility allows offering equipment versions supporting HSR, (M)RSTP or Time-Sensitive Networking protocols with the same hardware. Fiber Optic rings combining these protocols are feasible thanks to the inter-switch coordination mechanism developed by RELYUM.

This module is qualified for environmental, mechanical and electromagnetic military certifications according to MIL-STD-810G and MIL-STD-461G. Additionally, specific personalities embedded in the module have obtained the cybersecurity certification Common Criteria-LINCE by the Spanish Cryptologic National Center.

Main Features

- Up to on-board 20x 10/100/1000-BaseT copper ports
- Up to on-board 4x Fiber Optic ports. Options:
    - 4x 1G FO SR ports
    - 4x 1G/10G FO Short Range (SR) or Long Range (LR) ports.
- General purpose Ethernet Service port
- Latest generation ARM, GPU and FPGA hardware
- High-availability Seamless Redundancy (HSR)
- Parallel Redundancy Protocol (PRP)
- Time-Sensitive Networking (TSN)
- Precision Time Protocol (PTP)
- Auxiliary RS232 console port
- Edge-computing capabilities for user defined applications
- General Purpose, PPS and IRIGb Input and Output available on auxiliary connector
- Optional Grand Master/Time Server/Clock bridging capabilities
- Qualified for MIL-STD-810G & MIL-STD-461G & Lince Common-Criteria Cybersecurity
- Extensible through high-speed connector to support additional features (high-speed networking, time-server, etc.)

General Functionalities*

Layer 2 General Functionalities
- IEEE 802.3-2000
- Automatic MAC address learning and aging
- Static MAC Table
- Port-Based Virtual LANs (VLANs)
- IEEE 802.1Q for VLAN tagging
- IEEE 802.1Q for VLAN based Ethernet priorities
- Ethertype based switching
- IEEE 802.1p for Class of Service (CoS)
- IEEE 802.1ab for Link Layer Discovery Protocol (LLDP)
- Priority Modes: PCP (802.1p), Ethertype (Up to 16)
- Broadcast protection configurable via register
- Layer 2 multicast filtering
- Jumbo frame support
- IEEE 1588 StateLess TC (Transparent Clock
- IEEE 802.1s/w for (M)RSTP (Rapid Spanning Tree Protocol)

High-availability Ethernet
- IEC 62439-3 Clause 4 PRP "Parallel Redundancy Protocol"
- IEC 62439-3 Clause 5 HSR "High-availability Seamless Redundancy"

Time-Sensitive Networking (TSN) ^

Layer 3 General Functionalities
- IPv4/IPv6 unicast and multicast routing
- Static routing
- Dynamic Routing:
  - OSPFv2, OSPFv3, RIPv2, BGPv4, BGPv6
  - EIGRP, PIM-DM, PIM-SM
  - VRRP
- IGMP Snooping
- DSCP ToS
- L3 Firewall
- L3 Tunneling:
  - PPP
  - GRETAP
  - L2TPv2/v3 support

Wire-speed cryptographic
- In-line hardware implemented crypto-processor to cipher or decipher traffic

Synchronization
- IEEE 1588v2 PTP "Precision Time Protocol" profiles with E2E mode and P2P mode of operation
- IEEE 1588v2 PTP "Precision Time Protocol" over HSR & PRP
- Grand Master capability
- S(NTP) & Client

Management and Monitoring
- Protocol SNMP V1/V2/V3
- HTTPS Web GUI interface with secure firmware/bitstream update
- Graphic representation of Network status (HSR DANs & VDANs)
- Statistics independent per port
- SNMP RFC 1157/RFC
- DHCP (Client and Server)
- System Syslog
- MIB support
- Console port

*: Not all features are available in all personalities. See the specific features supported in each personality and equipment variation.
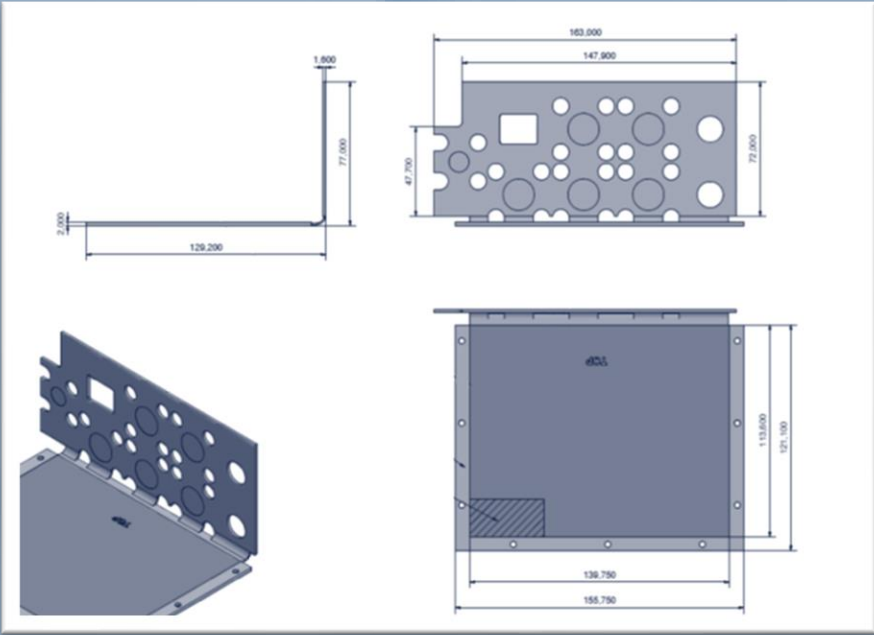^ This functionality is available only in TSN pesonalities.
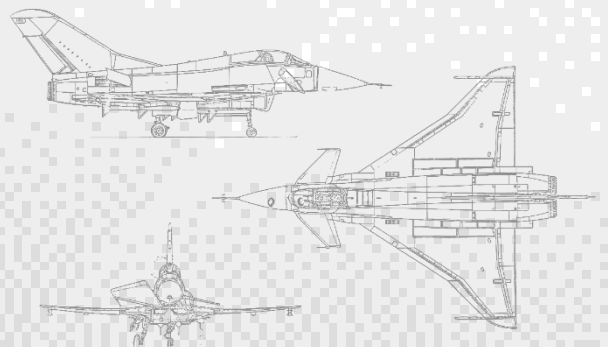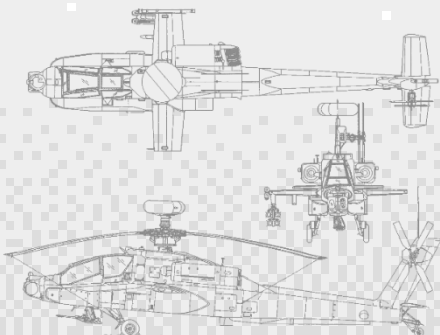
MIL-STD Testing & Dimensions

MIL-STD-461G	CE101, CE102, CS101, CS114, CS115, CS116, RE101, RE102, RS101, RS103
MIL-STD-810G	Method: 501.5, 507.4, 508.5, 509.3 513.6, 514.6, 516.6
MIL-DTL-38999, MIL-STD-704F, MIL-STD-1474D, MIL-STD-110F, MIL-STD-1275D, IP66	

Tests performed with RELY-MIL-SWITCH-ROUTER enclosure

Dimmensions (mm)	See drawing
Weight (Kg)	422 gr.
DC Power Input / Consumption	+3V3DC / 30W (depending on the configuration)
Power & Control	Miscellaneous, Power

Cold plate installation is recommended to significantly improve thermal performance and decrease payload Delta-T by approximately 12-15°C. This will double the MTBF of the enclosed electronics.

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