RelyUm® Rugged



Time-Sensitive Networking
Military Switch

MIL-TSN

MIL-10TSN

Overview

The MIL-TSN and MIL-10TSN series are military-certified switches that take full advantage of TSN technology to deliver both performance and availability improvements over traditional networks, being the difference between them that the former only supports 1G ports while the latter also supports 10G ports.

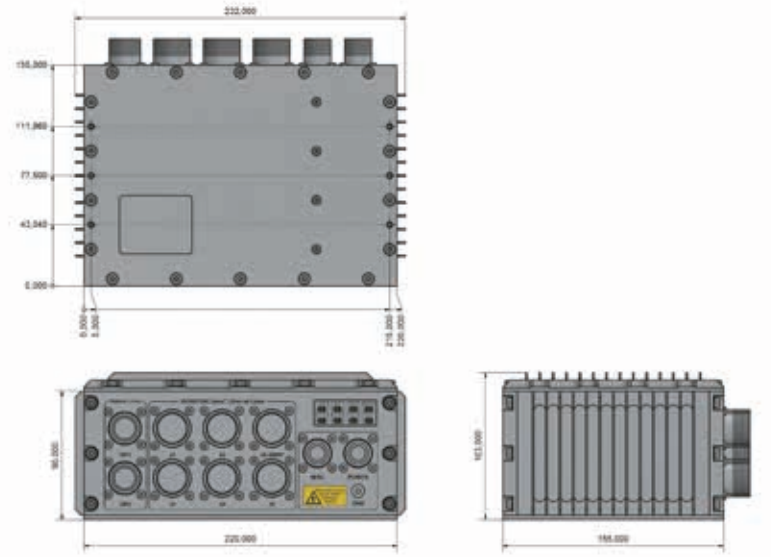
TSN allows to merge hard real-time and best effort traffic on the same network, and to deliver messages on-time without any loss or disturbance in the traffic. This leads to reduce equipment costs and to simplify maintenance, making it the first choice for future Ethernet networks.

With fully customisable external network connectivity and a lightweight and compact MIL-STD-810G certified enclosure, the MIL-TSN / MIL-10TSN series adapt to almost any situation and meet the requirements of the most demanding military programmes. The switching electronics is implemented in a high-performance FPGA, allowing to adapt the equipment to the latest versions of the TSN profiles, keeping it at the forefront of technology.

Key Features

- Up to 26 configurable **Time-Sensitive Networking (TSN) 10/100/1000BASE-T and 1GbE /10GbE** Fibre Optic ports.
- **Reconfigurable MPSoC platform** with edge computing capabilities to be fully compliant with IEEE 802.1DP and other TSN profiles.
- **“Zero-Packet Loss” redundancy** using TSN FRER for selected traffic combined with MSTP.
- All-in-one equipment with optional **Grand Master and Clock bridging** capabilities with accurate time distribution via IEEE 802.1AS.
- **Advanced security means** including IEEE 802.1X and MACsec, and optional firewall and VPN capabilities.
- Simplified management and monitoring via a user-friendly HTTPS web interface or a flexible console port. **Compliant with Qcc for centralised configuration through YANG model configuration files**.
- **Sealed military grade and compact enclosure** with MIL-STD-704 / MIL-STD-1275E power supply.

Dimensions



Technical Specifications

Communication Interfaces

- Up to 22x 10/100/1000BASE-T Copper Ethernet ports
- Up to 6x 1GbE/10GbE Fibre Optic Ethernet ports
- 1 x 10/100/1000BASE-T Ethernet Service port
- 1 x PPS output (Miscellaneous connector)
- 1 x RS-232 serial line (Miscellaneous connector)
- 2 x General purpose input/output pins or PPS (Miscellaneous connector)

Layer 2 Features

- IEEE 802.3-2008 (Ethernet)
- Automatic MAC address learning and aging
- Static MAC Table
- Port-Based Virtual LANs (VLANs):
  - Logical segmentation of network for optimal use of bandwidth
  - IEEE 802.1Q for VLAN tagging (up to 4K VLAN groups)
  - IEEE 802.1p for Class of Service (CoS) / Quality of Service (QoS)
- IEEE 802.1AB for Link Layer Discovery Protocol (LLDP)
- Port rate limiting
- Storm control for flooded broadcast, multicast and unicast
- Layer 2 multicast filtering
- IGMP Snooping (up to 1024 multicast filters)
- Flexible Link Aggregation (up to 4 groups with 8 members each) (Expected 2025)
- Spanning Tree Protocol:
  - IEEE 802.1D (STP)
  - IEEE 802.1w (RSTP)
  - IEEE 802.1s (MSTP)

TSN Features

- IEEE 802.1AS - Timing and Synchronization
- IEEE 802.1Qav - Credit Based Shaper (CBS)
- IEEE 802.1Qbv - Time Aware Shaper (TAS)
- IEEE 802.1Qci - Per-Stream Filtering and Policing
- IEEE 802.1CB - Frame Replication and Elimination for Reliability (FRER)
- IEEE 802.1Qcc - Stream Reservation Protocol (SRP) Enhancements and Performance Improvements

Gateway

- Edge-computing capabilities for user defined applications
- Support for DDS standard and MQTT protocol in KVM Virtual Machine for user application
- Compliant with “DDS Extension for TSN” (OMG Group Standard)
- Optional CAN 2.0 integrated ports
- Optional RS-232/RS-422/RS-485 buses with Modbus/Serial console

Synchronization

- IEEE 802.1AS - Timing and Synchronization
- Optional time server and time bridging capabilities

Security

- IEEE 802.1X for port-based network access control
- MAC port binding & authentication for login security
- RADIUS authentication
- LDAP (Lightweight Directory Access Protocol)
- RBAC (Role Based Access Control)
- Selective ports disabling capability
- Unsecure protocols disabling capability
- Per port ingress and egress port mirroring including 10G mirroring
- Mirroring per VLAN and per content awareness match
- HTTPS for web interface
- Secure Shell (SSH) Protocol v2 for command line interface
- TPM 2.0 IC for identity authentication
- Encryption/authentication & signature for firmware and bitstream
- Secure-boot capability
- IEEE 802.1AE - MACsec (Media Access Control Security) support
- Other optional security features based on MIL-SSR and MIL-10SSR series:
  - Virtual Private Network (VPN)
  - Stateful inspection firewall
  - Intrusion Prevention System / Intrusion Detection System
- Certifications:
  - Tempest Level B rated
  - LINCE (Common Criteria based) certification

Not all the features may be supported in all the product models.

Configuration & Management

- HTTPS web interface
- SSHv2 command line interface (CLI)
- SNMP V1/V2c/V3 protocol support
- SNMP V3 encrypted authentication and access security
- SNMP over TLS support (optional)
- Netconf protocol (YANG model-based configuration) support
- Encrypted and digitally signed firmware / bitstream upgrades
- Saving and restoring configuration
- Internal status monitoring and logging
- Event notification through Syslog
- Statistics independent per port
- DHCP/DHCPv6 server and relay (optional)
- Built-in-Test capability including:
  - PBIT (Power-on BIT)
  - CBIT (Continuous BIT)
  - IBIT (Initiated BIT)
- In-band management via any Ethernet switch port or out-of-band via Ethernet service port
- RS-232 serial console

Physical & Electrical Characteristics

- Military certified fanless rugged design
- Dimensions (mm): 220(W) | 155(D) | 103(H)
- Weight: 3kg (combination of metalwork, PSU and payload)
- Power Input: 28VDC*
- Power consumption: 20-35W
- Copper, Fibre Optic, Power supply and Miscellaneous port with RS-232/ PPS capability via D38999 connector
- Service port via RJ45 or D38999 connector

* Other PSU available under demand. Contact your sales representative for more information

Processing

- Xilinx UltraScale + MPSoC device:
  - 4x 64bit CPU ARM-Cortex-A53
  - 2x 32bit CPU ARM-Cortex-R5F
  - 1x GPU ARM-Mali 400MHz
  - 1x 16nm UltraScale+ FPGA
- Up to 4GB DDR4 RAM memory
- 32GB eMMC Flash memory
- 512Mb QSPI Flash memory

MTBF

- 200,000 hours GB@25
- MTTR = 0.5 hour

Certifications

- MIL-STD-461: CE101, CE102, CS101, CS114, CS115, CS116, RE101, RE102, RS101, RS103
- MIL-STD-810: Methods: 500.5, 501.5, 502.5, 504.1, 506.5, 507.4, 508.6, 509.5, 513.6, 514.6, 516.6
- RTCA DO-160: Section 22
- MIL-STD-704F, MIL-STD-1275E
- ESD EN61000-4-2
- MIL-DTL-38999, MIL-STD-1474D, IP66, DO-254/DO-178 DAL-D certifiable

A qualification campaign is currently underway to incorporate new standards and tests.

For more information, please contact your sales representative.

Warranty

- 2 years

Export Control

- ITAR Free

Ordering Code

Ordering code	Model and description
CCFF-TSN-XX.YY	MILCCFF-TSN: 1G Time-Sensitive Networking Military Switch
CCFF-10TSN-XX.YY	MILCCFF-10TSN: 1G/10G Time-Sensitive Networking Military Switch

CC: Number of copper parts **FF:** Number of FO ports **XX:** Firmware personality code* **YY:** Hardware platform code*

*In most cases, this code is defined upon receipt of the order.

Accessories

Ordering code	Model and description
CEA0N15ETH-04-0.01	1MIL4RJ45: 1.5m 4x UTP breakout cable with RJ45 connector (4xports). Keying N.
CEA0N13FMM-02-0.01	1MIL2LC-multi: 1.5 m 4x Multimode FO breakout cable with duplex LC connectors (2xports). Keying N.
CEA0N13FSM-02-0.01	1MIL2LC-mono: 1.5m 4x Singlemode FO breakout cable with duplex LC connector (2xports). Keying N.
CEA0N11MISC-01-0.01	1MIL1DB91DB15: 1.5m Serial breakout cable with DB9/DB15 connectors. Keying N.
CEA0N11PWR-01-0.01	1MILPS: 1.75m Power Supply breakout cable. Keying N.

To know more about other available references, please contact your sales representative.

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By

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Military Switch

SOC-E®

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