TTESwitch A664 Pro (19 Inch)

Deterministic Ethernet Switch for safety critical applications in rack mountable setups

KEY BENEFITS

- Supported Ethernet profiles: IEEE 802.3, 802.1D, IEEE 1588:2008, IEEE 802.1Q, ARINC 664 part 7, SAE AS 6802
- Aerospace Development Assurance per AMC20-152A / DO-254 / DO-178C
- Port Density – x6 GE plus x18 FE
- Flexible Media Copper/Fiber support
- Up to 4,096 VLs, 256 VLANs supported
- Up to 8 priority queues
- Ruggedized design for safety-sensitive environments
- Offline Configuration management and built-in self-test function

Enable your application to fully utilize the potential of Deterministic Ethernet with TTESwitch A664 Pro (19 Inch). Its aerospace certifiable hardware design enables the usage at safety critical applications like aviation ground control stations or critical infrastructure. TTEthernet is a fault-tolerant real-time communication protocol for safety-related systems that integrates data flows of standard Ethernet (IEEE 802.3), ARINC 664 part 7 and Time-Triggered Ethernet (SAE AS6802) traffic in one physical infrastructure. The combination of standard IEEE 802.1Q bridging, VLAN-based traffic segregation, ARINC 664 ingress policing, and strict priority scheduling makes it a capable integration point between a non-critical TSN network and a mixed-criticality TTE network.

Aerospace Development Assurance

TTESwitch A664 Pro (19 inch) supports DAL C functions and is developed to comply with Aerospace AMC20-152A for COTS and CBA-1 objectives, taking guidance from DO-254. Development lifecycle data includes evidence for Identification & Control of AIP (Activities Important for Protection) in support of IEC 61513 / IEC 61226, ensuring demonstrable traceability, consistency, and independent verification that all safety-critical activities are properly defined and executed.

Port Density and Media support

TTESwitch A664 Pro (19 inch) provides a switch fabric that operates with a total throughput of 15.6 Gbit/s, sufficient for full wire-speed forwarding across its 24 operational ports, with 6x 10/100/1000 Mbps links via SFP slots supporting copper and fiber media, and 18x 10/100 Mbps links via RJ45.

Traffic Classification / Priority Queuing

TTESwitch A664 Pro (19 inch) allows the configuration of up to 4,096 virtual links (VLs). Virtual links can be configured with 8 priorities and a bandwidth allocation gap (BAG) of 0.01 ms to 1,300 ms. The configuration of the network is stored in the switch's non-volatile memory (256 Mbit). As an option, IEEE 802.1Q VLANs can be configured, in support of up to 256 VLANs. Profiled IP/UDP, redundancy management and traffic shaping are implemented in hardware. Additionally, the switch supports frame forwarding based on layer 3 (IPv4 addresses).

Ruggedized Switch

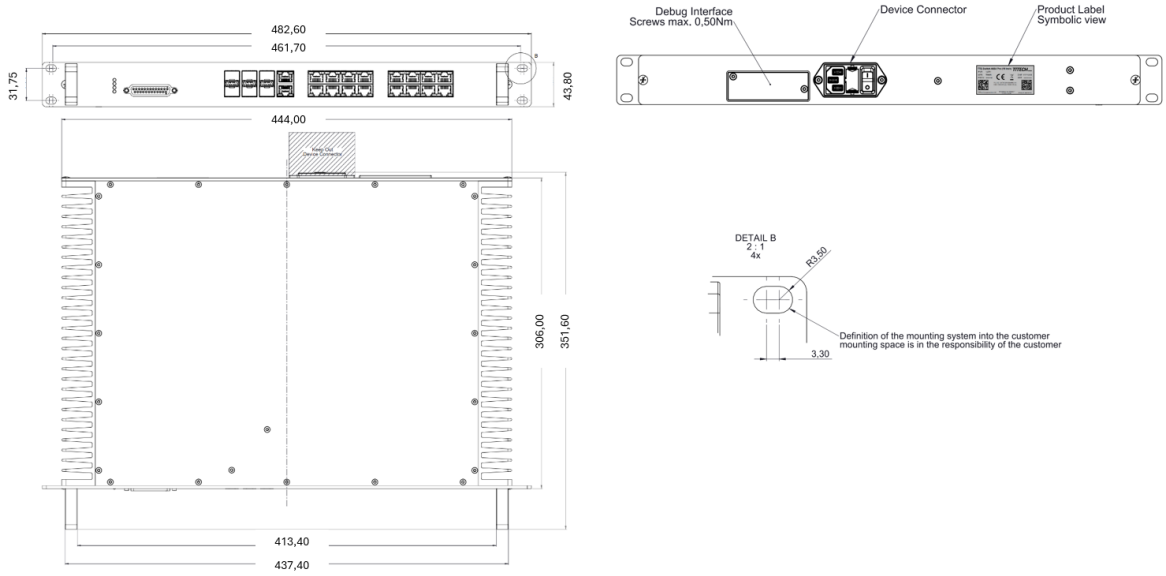
TTESwitch A664 Pro (19 inch) design incorporates conformal coatings to withstand harsh qualification environments for salt spray, moisture, chemical and corrosion throughout its operational life. Its robust design has proven continuous and safe operation under seismic and shock conditions, making it suitable for safety-sensitive environments.

Data Loading and Diagnosis

The built-in management module runs on a separate CPU and allows for static configuration loading as well as for querying the network status via SNMP. Data loading is done according to ARINC 615A/TFTP (and ARINC 665 loadable software parts). It supports flexible multi-port mirroring and configurable period for Health Status message.

Application Fields

- → *Aerospace Ground Control Systems*
- → *Safety Critical Infrastructures*



TTE Switch A664 Pro (19 Inch), outline dimensions

Interfaces	→ Ethernet • 6x 10BASE-T / 100BASE-TX / 1000BASE-T / 1000BASE-X by SFP • 18x 10BASE-T / 100BASE-TX by RJ-45 → Power Input: IEC60320 C14 → Static configuration / mode selection: DB-25S → Status LEDs (power, status. sync, default config.)
Deterministic Ethernet	→ Supported Profiles: • IEEE 802.3 and 802.1D (MAC Ethernet bridge) • IEEE 1588:2008 (PTPv2 transparent clock update) • IEEE 802.1Q (VLAN core capabilities) • ARINC 664 part 7 (Avionics Full-Duplex Switched Ethernet Network) • SAE AS 6802 (Time-Triggered Ethernet)
Flexible core switching function:	→ Supported flows: Port, VLAN, Virtual Link MAC address, Virtual Link IPv4 address → Priority Queues: 8 → VLANs: 256 → Virtual Links (VLs): 4096
System Management & Support Functions	→ ARP → ICMP → SNMPv1 get get-next (operation mode), set (maintenance mode) → Time Management • SNTPv4 according to RFC 4330, sections 3, 4, 5 with restriction to unicast. • TTE clock synchronization (AS 6802) with precision ≤ 1 µs → Health Status Message → Configuration Information Message
Aerospace Development Assurance	→ AMC20-152A for COTS and CBA-1 objectives, taking guidance from DO-254 – DAL C → DO330 Level 4 (Verification Tool)
Assurance other	→ Identification & Control of AIP (Activities Important for Protection) in support of IEC 61513 / IEC 61226
Physical Characteristics	→ Dimensions: 351.6 x 482.6 x 43.8 mm (1U IEC 60297) → Weight: 5kg max.

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	→ Protection rating: IP30 (IEC 60529) → Mounting: DIN Rail mounting → Cooling: Passive
Power Parameters	→ Rated Voltage: 110-230VAC 60/50Hz → Operating Voltage: 85-260VAC → Power consumption: 40W max (80% bus utilization, 30C)
Security	→ Project Security Plan available, aligned with ISO/IEC 27001 principles • Cybersecurity policies and guidelines overview • Special considerations for the product development • Product Security • Supply Chain Management • Project/Product Data Storage and Archiving → read-only SNMP → MAC-based ACL support (layer 2 access restriction) → IP-based ACL support (layer 3 access restriction) → CAM flooding protection → Inherent DoS protection with A664p7 network protocol
Environmental	→ Operating temperature: 0 °C to +50 °C → Humidity: Up to 95 % RH non-condensing (DO-380 section 6 Cat. A) → Vibration: IEC 60721 3.3 Class 3M11 → Altitude: up to 4572 m / 15000 ft. → Flammability: UL 94 rated materials for enclosure parts → EMC Immunity Interference: • ESD (IEC 61000-4-2 level 4, DO-380 section 25) • Interference immunity verified per IEC 61000-6-1, IEC 61000-6-2 and IEC 61000-6-5 • Compliant with IEC 61000-4-13 (Harmonics and Interharmonics) • Compliant with DO-380 Section 19 – Induced Signal Susceptibility (Cat. AX & BX) • Compliant with DO-380 Section 20 – Radio-Frequency Susceptibility (Cat. A) → EMC Immunity Emitted: • Compliant with FCC Part 15 Class A and IEC 61000-6-3 / -6-4 / -3-2 / -3-3
Robustness	→ Designed with protective coatings to withstand salt-spray environments → Robustness evidence to Seismic and Shock qualification conditions per IEC 60068-2-57 and IEC 60980 through dedicated derisking tests • Up to 6g 3-10Hz (Seismic), 20g 10-50 Hz (shock)
Safety / Reliability	→ MTBF: 80,000h @ 30C (MIL-HDBK-217F) → Failure rates (Ground Benign environment per MIL-HDBK-217F) • Availability 1.0e05 /OH • Integrity: 1.0e-5 /OH → Compliant to EN 62368-1:2014
Configuration and Management	→ Offline Configuration management; no runtime management interfaces • Dynamic and Static configuration (safety case) options • Data loading according to ARINC 615A-3 via TFTP • Up to 16 loadable configurations for logistics management • Out-of-band ethernet management port, configurable at any port • Support for Management VLAN → Application Modes • Operational Restrictive (max safety) / Unrestricted (max flexibility) → Maintenance (diagnostics, configuration updates, software upgrades)
Diagnostics	→ Built In Self Test (BIST) function: • Power Up, Continuous, Initiated • 95% internal functional failures detection rate → Port Status monitoring → Frame Drops per cause → Port utilization (Tx/Rx bytes, frames) → Alerting: Logs exposed via management MIBs → Flexible multi-port mirroring → Health Status message with configurable period (1,2,5,10,30,60 sec)

Certificates	→ 
Warranty	→ 1 year min, extendable up to 5 years
Long Term Support	→ Yearly maintenance service upon request → Obsolescence management plan → Long Term Storage options
Order Number	→ 14251 - TTE-Switch A664 Pro (19 inch) • Contact TTTECH for customizations
Package Content	→ 1x TTE-Switch A664 Pro (19 inch) • Dust caps for RJ-45 socket & SFP slot included
Accessories (sold separately)	→ 13405 Remote configuration Plug → 12107 Optical SFP AXGD-5854-0511 → 12108 Copper SFP AXGT-R1T4-0511 → support for other SFPs upon request
Recommended Products And Services	→ 13057 TTE-Tools 5 Development Suite - Expert Edition → 14746 TTE-Switch A664 (19 inch) Certification Data Package, Project License → 14258 TTE-Verify Switch IP (TTE-SW CTRL A664 Pro) → 14259 Qualification Data Package for TTE-Verify for TTE-Switch Controller A664 Pro → 14260 TTE-Verify for TTE-Switch Controller A664 Pro – End System IP → 14261 Qualification Data Package for TTE-Verify for TTE-Switch Controller A664 Pro - End System IP → 15231 TTE-Switch A664 Pro (19 inch) Maintenance
Export Control	→ Not listed according EU Dual Use VO 821/2021 → HS Code: 8517.62