

# TTE<sup>Development</sup> Switch 100 Mbit/s 8 Ports

Ethernet Switch with TTEthernet and ARINC 664 Support



TTEthernet switches maintain hard real-time data communication and take care of partitioning among standard Ethernet, rate-constrained and time-triggered Ethernet message traffic. Time-triggered messages are routed through the switch according to a predefined schedule with transport delay jitter in the sub-microsecond range. All other Ethernet messages are forwarded when bandwidth is available. The TTE<sup>Development</sup> Switch by TTEch supports seamless integration of real-time applications with extremely demanding latency, jitter requirements and regular Ethernet traffic.

### Full Scalability for Real-Time Architectures

The key benefit of the TTE<sup>Development</sup> Switch is its native support for time-triggered, hard real-time Ethernet traffic based on the TTEthernet protocol. Unlike other real-time Ethernet variants, TTEthernet offers full scalability for real-time architectures based on Ethernet, from low-cost low-integrity to fault-tolerant high-criticality systems. The TTE<sup>Development</sup> Switch is compatible with software implementations of the TTEthernet protocol and with TTEthernet NICs (hardware implementations), providing high-speed synchronization startup and integration services of TTEthernet.

### KEY FEATURES/BENEFITS

- Deterministic Ethernet for safety-critical real-time applications
- Robust partitioning between three traffic classes (time-triggered, rate-constrained and standard Ethernet traffic)
- 8 full-duplex 100 Mbit/s Ethernet ports
- 8 subschedules
- 4096 VL IDs
- 256 shared bandwidth allocation gaps
- Clock synchronization at sub- $\mu$ s level

### Flexible Product

The TTE<sup>Development</sup> Switch supports three traffic classes: time-triggered, rate-constrained and best-effort traffic class. The time-triggered traffic calls can be used for strictly deterministic communication in safety-critical applications. With the rate-constrained traffic class, bandwidth constraints can be applied to each Ethernet port without imposing strict timing or transmission order. The switch performs traffic-policing, according to the ARINC 664 part 7 standard. Best-effort traffic class can be used for applications that do not require deterministic latency or bandwidth guarantees. As a result, this flexible product can be used in different application domains.

### TTEthernet Switch Internals

The <sup>TTE</sup>Development Switch is based on an Altera Cyclone III FPGA. The FPGA-based architecture offers maximum flexibility for customer-specific extensions, making the <sup>TTE</sup>Development Switch a versatile platform for many kinds of Ethernet-based networking devices.

### TTEthernet Switch Interfaces

- 8 ports 100 Base-TX Ethernet, TTEthernet capable (Note: appropriate configuration data must be loaded into the switch for TTEthernet operation)
- Option: digital I/O for triggering measurements, status LEDs or other customer-specific extensions

### Specifications

- Dimensions: 170 x 121 x 55 (in mm)
- Weight: ca. 800 g
- Operating temperature: 0 °C to +70 °C
- Storage temperature: -40 °C to +85 °C
- Robust housing

### TTEthernet Switch Variants

<sup>TTE</sup>Development Switch 100 Mbit/s 8-Port can be delivered in two variants:

- <sup>TTE</sup>Development Switch 100Mbit/s A664
- <sup>TTE</sup>Development Switch 100 Mbit/s 8-Port (without ARINC 664 support)

### TTEthernet Switch Features

- Configurable time-triggered schedule for deterministic real-time communication
- Guaranteed real-time delivery and microsecond synchronization
- Legacy Ethernet devices can synchronize to network time base without knowing about TTEthernet
- Support for legacy Ethernet and best-effort delivery
- Standard TCP/IP-based protocols and applications can be used
- Routing of TTEthernet transmissions to non-TTEthernet devices possible

### Order Number

- HE08.10.1: <sup>TTE</sup>Development Switch 100 Mbit/s 8-Port with TTEthernet
- HE08.30.1: <sup>TTE</sup>Development Switch 100 Mbit/s 8-Port with TTEthernet and ARINC 664 support

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