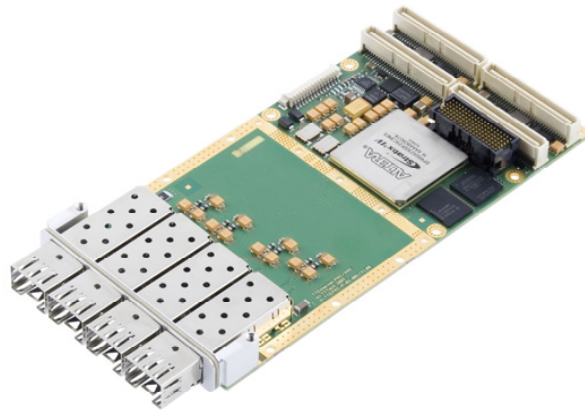


## TTE<sup>™</sup>XMC Card

*The 1 Gbit/s TTEthernet Network Board*



The TTE<sup>™</sup>XMC Card brings the full power of time-triggered Ethernet communication technology to the XMC form factor. The TTEthernet technology enables hard real-time operation in distributed systems based on Ethernet networks. TTEthernet hardware provides robust architecture level building blocks for integrating a deterministic high-speed fault-tolerant communication system.

The TTE<sup>™</sup>XMC Card supports the three TTEthernet traffic classes:

- Time-triggered traffic with hard real-time guarantee and transport delay jitter in sub-microsecond range
- Rate-constrained traffic (supporting ARINC 664 part 7 data reception) with guaranteed bandwidth
- Standard (COTS) Ethernet traffic

The TTE<sup>™</sup>XMC Card network interface card implements the distributed fault-tolerant clock synchronization algorithm of TTEthernet in hardware. It is a switched mezzanine card (Vita 42 XMC) for network communication and combines the IEEE 802.3 Ethernet standard for up to Gigabit Ethernet with safety-critical time-triggered technology. It enables real-time Ethernet communication between an embedded computer and TTE<sup>™</sup>Switches for redundant channels in a safety-critical system.

### KEY FEATURES/BENEFITS

- Standard XMC form factor end system for use in lab environments
- Support of IEEE 802.3 Ethernet
- Supports 1 Gbit/s full duplex Ethernet links
- PCIe 1.1 x4 Gen1 (2.5 Gbit/s)
- Supports up to 3 channels using SFP connectors
- Software driver for Linux
- DMA support
- Support of ARINC 664 part 7 data reception
- Conduction cooled board design or cooler mounted (default)
- Variant suitable for use in flight tests

The card transmits time-critical and safety-critical data in a 100% deterministic way and according to a predefined schedule.

TTE<sup>™</sup>XMC Card is available with passive COTS PCIe carrier boards allowing use in PCI Express (PCIe) x4, x8, and x16 slots. It is offered in a lab version supporting three SFP channels. A copper-only variant and a ruggedized version for field application are planned to be available. In its default configuration, the card is available with a passive cooler. Conduction cooling is supported.

## Hardware Features

### Form Factor

- IEEE 1386.1-2001 PMC 149 x 74 (in mm)
- Vita 42 Conduction Cooled XMC with faceplate I/O
- Conduction cooled board design

### Connectivity

- Host Interfaces:  
PCIe 1.1 x4 Gen1 (2.5 Gbit/s)
- Front Connectors:  
3 ports 1 Gbit/s SFPs

### Environment

- Lab environment
- Conduction cooling

### TTEthernet End System

- The FPGA implements the TTEthernet End System IP with 3 channels
- DMA controller allowing up to 120 Mbyte/s throughput on the host interface

### TTEthernet Connections

- Up to 3 Ports 1 Gbit/s SFPs
- Connectors as faceplate I/Os

### Bus Interfaces

- PCIe

### Power Supply

- + 12 V supply from J15 connector and
- + 3.3 V Supply from J15 connector
- + 12 V or + 5 V over VPWR from J15 available on request

### Environmental Operating Ranges

- Lab equipment
- Operating temperature: 0 °C to 40 °C
- Non-operating temperature: -40 °C to 100 °C
- Operating/non-operating humidity:  
humidity level from 25 to 90 %

## Dimensions

- Size: 170 x 75 (in mm)
- Weight: 200 g

## Versions

- Basic Lab Version  
Lab Version with 3 SFP cages (no magnetics, no PHYs)  
Note: SFP slots add flexibility, but do not full comply with the XMC form factor (+2 cm)
- Copper Version  
Lab Version supporting fixed-mounted copper ports (1000 Base-TX); planned as follow-up release
- Rugged Version  
Rugged Version with -40 °C to +85 °C operating temperature range; planned as follow-up release
- Full ARINC 664 support  
As a future release, an ARINC 664 part 7 compliant end system variant is planned

## Software Support

- A Linux driver is available (64 bit/32 bit Linux)
- An optional LabView driver is available

## Complementing Products

- TTEthernet Tools
- TTEthernet Switches

## Packaging Contents

- TTEthernet XMC Card hardware board
- User Manual
- Linux driver
- Ports to other operating systems can be provided upon request

## Order Number

- HE07.10.1: Three 1000Base-SX SFPs (optical)
- HE07.11.1: Three 1000Base-TX SFPs (copper)
- SE10.02.1: <sup>TTTech</sup>PMC/XMC LabView

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