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# TXMC395

**Conduction Cooled, Four Channel 10/100/1000 Mbit/s  
Ethernet**

Version 1.0

## **User Manual**

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**TEWS TECHNOLOGIES GmbH**

Am Bahnhof 7 25469 Halstenbek, Germany

Phone: +49 (0) 4101 4058 0 Fax: +49 (0) 4101 4058 19

e-mail: [info@tews.com](mailto:info@tews.com) www.tews.com

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## **TXMC395-10R**

Conduction Cooled, Four Channel 10/100/1000  
Mbit/s Ethernet, Intel I210IT, P16 Back I/O

(RoHS compliant)

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# 1 Product Description

The TXMC395 is a Conduction Cooled Switched Mezzanine Card (CCXMC) compatible module providing a four channel Ethernet 10Base-T / 100Base-TX / 1000Base-T interface.

A PCIe Switch provides access to the Intel I210IT Gigabit Ethernet controllers. Each Ethernet interface supports 10, 100 and 1000 Mbit/s transmission rates and is equipped with a 16 Mbit Serial Flash to support PXE and iSCSI boot.

The four Ethernet interfaces of the TXMC395 are capable of performing an auto negotiation algorithm which allows both link-partners to determine the best link-parameters. The TXMC395 supports IEEE 1588/802.1AS Precision Time Protocol (PTP) and IEEE 802.1Qav Audio/Video Bridging (AVB) traffic shaping (with software extensions).

The TXMC395-10R routes four Ethernet ports to the Back I/O P16 connector. Two ports are mapped in the X12d range and two ports are mapped in the X8d range specified in VITA46.9 standard.

All ports are galvanically isolated from the Ethernet controllers and LEDs on the board indicate the different network activities.

The module meets the requirements to operate in extended temperature range from -40°C to +85°C.

## Software Support:

- Software support for Intel I210IT at [www.intel.com](http://www.intel.com)
- For operating systems not supported by Intel, please contact TEWS.

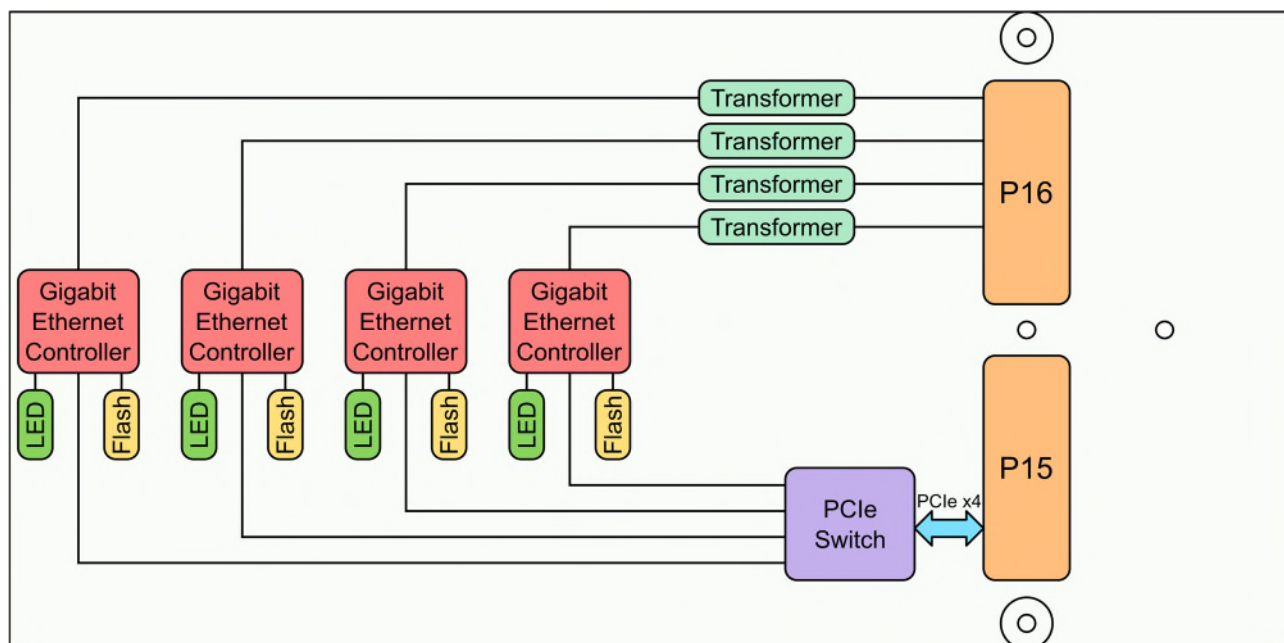


Figure 1-1 : Block Diagram

## 2 Technical Specification

XMC Interface	
<b>Mechanical Interface</b>	Conduction Cooled Switched Mezzanine Card (CCXMC) Interface conforming to ANSI/VITA 42.0 and ANSI/VITA 20 Standard single-width (143.75 mm x 74 mm)
<b>Electrical Interface</b>	x4 PCI Express (Specification 2.1) compliant interface conforming to ANSI/VITA 42.3

On Board Devices	
<b>PCIe Switch</b>	PI7C9X2G608GP (Diodes Incorporated)
<b>Gigabit Ethernet Controllers</b>	For each interface: I210-IT (Intel)
<b>16 Mbit Serial Flashes for Boot ROM</b>	For each interface: W25Q16JV (Winbond)

I/O Interface	
<b>Number of Channels</b>	4
<b>I/O Standards</b>	1000Base-T 100Base-TX 10Base-T
<b>I/O Connector</b>	Back I/O P16 (Samtec ASP-103614-04 or compatible) Two ports mapped in X12d range and two ports mapped in X8d range (VITA46.9)

Physical Data	
<b>Power Requirements</b>	600mA typical @ VPWR = +5V (four channel, no link) app. additional 10mA to 100mA per link  270mA typical @ VPWR = +12V (four channel, no link) app. additional 4.5mA to 45mA per link
<b>Temperature Range</b>	Operating    -40°C to +85°C Storage       -40°C to +85°C
<b>MTBF</b>	922000 h MTBF values shown are based on calculation according to MIL-HDBK-217F and MIL-HDBK-217F Notice 2; Environment: G <sub>g</sub> 20°C. The MTBF calculation is based on component FIT rates provided by the component suppliers. If FIT rates are not available, MIL-HDBK-217F and MIL-HDBK-217F Notice 2 formulas are used for FIT rate calculation.
<b>Humidity</b>	5 – 95 % non-condensing
<b>Weight</b>	68 g

Table 2-1 : Technical Specification

## 3 Handling and Operation Instructions

### 3.1 ESD Protection



This CCXMC module is sensitive to static electricity. Packing, unpacking and all other module handling has to be done with appropriate care.

### 3.2 Power Dissipation



This CCXMC module requires adequate conduction cooling!



## 4 PCI Express Interface

### 4.1 TXMC395 PCI Express Device Topology

The TXMC395 uses four Gigabit Ethernet Controllers (Intel I210-IT) each communicating via a PCIe Rev. 2.1 compliant x1 Interface.

To be able to access the Ethernet controllers they are connected to the x1 Downstream Ports of a PCIe Switch (Diodes Incorporated PI7C9X2G608GP).

The x4 Upstream Port of the PCIe Switch is connected to the host system.

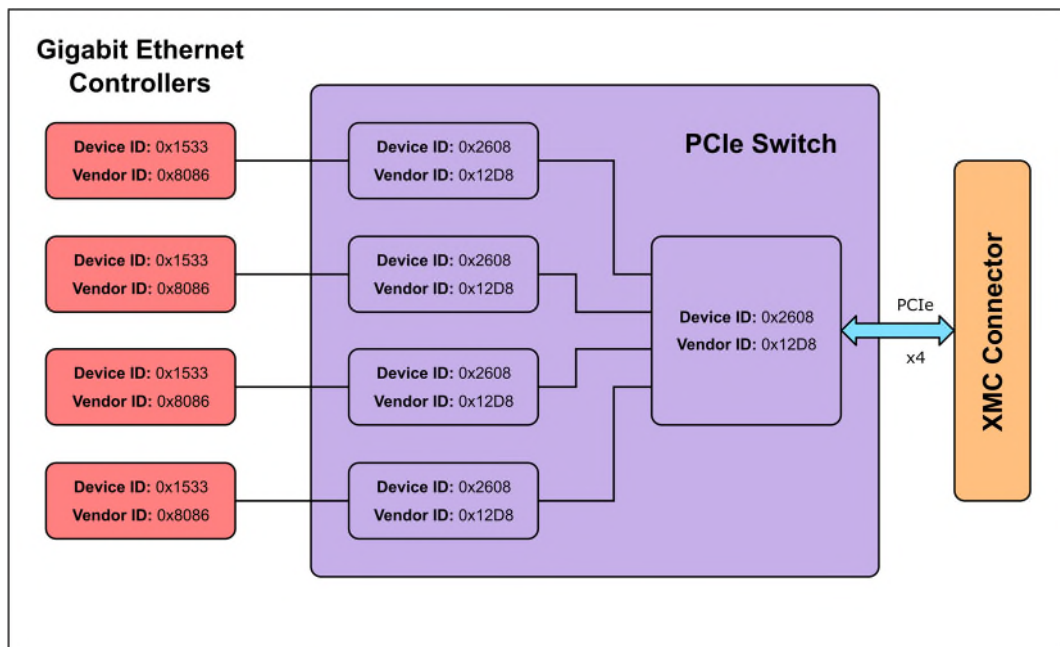


Figure 4-1 : TXMC395 PCI Express Device Topology

### 4.2 TXMC395 PCI Express Memory and I/O Size Requirements

PCIe Space Mapping	Four Channel (Byte)	Two Channel (Byte)
MEM	4M	2M
I/O	16K	8K

Table 4-1 : TXMC395 PCI Express Memory and I/O Size Requirements

## 4.3 I210 PCI Express Identifiers

<b>Vendor-ID</b>	0x8086 (Intel)
<b>Device-ID</b>	0x1533 (I210-IT copper only)
<b>Class Code</b>	0x020000 (Ethernet Controller)
<b>Subsystem Vendor-ID</b>	0xFFFF
<b>Subsystem Device-ID</b>	0x0000

Table 4-2 : I210 PCI Express Identifiers

## 4.4 I210 PCI Express Base Address Register Configuration

<b>PCIe Base Address Register (Offset in PCIe Configuration Space)</b>	<b>PCIe Space Mapping</b>	<b>Size (Byte)</b>	<b>Description</b>
0 (0x10)	MEM	128K	Internal Registers
1 (0x14)	-	-	-
2 (0x18)	I/O	32	Internal Registers via I/O Space
3 (0x1C)	MEM	16K	MSI-X

Table 4-3 : I210 PCI Express Base Address Register Configuration

## 5 Ethernet Interface Status LEDs

The TXMC395 provides an individual Status LED for every Ethernet Interface. Due to the fact that CCXMCs are mounted upside-down on the carrier card the Status LEDs are visible on the back side of the TXMC395. A marking is placed close to each Status LED to indicate the Ethernet Port it corresponds to.

See table below for more details:

Status LED	Description
OFF	No cable is connected or no link is established
ON	A link is established
BLINKING	Activity (the Ethernet Port transmits or receives data)

Table 5-1 : Status LED

## 6 Pin Assignment – I/O Connectors

### 6.1 Back I/O P16 Connector

	A	B	C	D	E	F
19	NC	NC	NC	NC	NC	NC
18	NC	NC	NC	NC	NC	NC
17	ETHERNET_2_TX2/RX2+	ETHERNET_2_TX2/RX2-	NC	ETHERNET_2_TX3/RX3+	ETHERNET_2_TX3/RX3-	NC
16	NC	NC	NC	NC	NC	NC
15	ETHERNET_2_TX0/RX0+	ETHERNET_2_TX0/RX0-	NC	ETHERNET_2_TX1/RX1+	ETHERNET_2_TX1/RX1-	NC
14	NC	NC	NC	NC	NC	NC
13	ETHERNET_4_TX2/RX2+	ETHERNET_4_TX2/RX2-	NC	ETHERNET_4_TX3/RX3+	ETHERNET_4_TX3/RX3-	NC
12	NC	NC	NC	NC	NC	NC
11	ETHERNET_4_TX0/RX0+	ETHERNET_4_TX0/RX0-	NC	ETHERNET_4_TX1/RX1+	ETHERNET_4_TX1/RX1-	NC
10	NC	NC	NC	NC	NC	NC
9	NC	NC	NC	NC	NC	NC
8	NC	NC	NC	NC	NC	NC
7	ETHERNET_1_TX2/RX2+	ETHERNET_1_TX2/RX2-	NC	ETHERNET_1_TX3/RX3+	ETHERNET_1_TX3/RX3-	NC
6	NC	NC	NC	NC	NC	NC
5	ETHERNET_1_TX0/RX0+	ETHERNET_1_TX0/RX0-	NC	ETHERNET_1_TX1/RX1+	ETHERNET_1_TX1/RX1-	NC
4	NC	NC	NC	NC	NC	NC
3	ETHERNET_3_TX2/RX2+	ETHERNET_3_TX2/RX2-	NC	ETHERNET_3_TX3/RX3+	ETHERNET_3_TX3/RX3-	NC
2	NC	NC	NC	NC	NC	NC
1	ETHERNET_3_TX0/RX0+	ETHERNET_3_TX0/RX0-	NC	ETHERNET_3_TX1/RX1+	ETHERNET_3_TX1/RX1-	NC

Table 6-1 : Back I/O P16 Connector

PORT1 and PORT2 lie within the X12d mapping (VITA46.9)

PORT3 and PORT4 lie within the X8d mapping (VITA46.9)