PMC and XMC Modules

Data Sheets of TEWS’ PMC Modules and Carrier
About TEWS TECHNOLOGIES

TEWS TECHNOLOGIES is a leading solutions provider of embedded I/O and CPU products based on open architecture standards such as IndustryPack, PMC, XMC, CompactPCI, PCI, PCI Express, PCI Express Mini Card, VMEbus, PC104+, AMC, MicroTCA, and FMC.

TEWS has more than 40 years of experience designing and building turn-key embedded interface solutions using the philosophy to listen and respond to our customers' needs.

Using this ‘customer first’ approach, TEWS has developed a large number of standard and custom products for applications in industrial control, telecommunication infrastructure, medical equipment, traffic control and COTS.

TEWS’ line of embedded I/O solutions is available worldwide through a global network of distributors.

Software support

Software support is a critical and defining component of the TEWS’ I/O product offering. Our modular hardware designs are coupled with extensive software drivers and support for most major real-time and server operating systems such as VxWorks, Windows, Integrity, Linux, and QNX. Supported CPU architectures are Intel, PowerPC and 68k (for IndustryPack only).

For IndustryPack carriers and modules, TEWS has developed a layered driver concept that includes both a carrier driver layer and an IP module driver layer.

All TEWS’ IndustryPack carriers are supported directly by the carrier driver, and a generic driver is included for integration of third party products.

A key element of our software is our support staff. All TEWS’ support engineers are professionally trained to ensure in-depth support for software drivers and integration.
Quality Assurance / Warranty

TEWS operates three subsidiaries to meet global demand for pre and post sales support, reduced development time, long term product availability, and complete product lifecycle management.

TEWS is committed to continuously improving the quality of our products and services. As a reflection of our commitment to quality, TEWS has implemented and received ISO9001:2008 certification.

All TEWS’ products feature a five-year limited warranty.

RoHS / WEEE Compliance

TEWS TECHNOLOGIES believes in conducting business in a manner that respects the environment and consequently has embraced the RoHS regulations of the European Community.

Non-compliant products will continue to be available for all applications which are exempt from the RoHS directives and have a continuing requirement for leaded solder.
PMC Modules

PMC is a mezzanine standard largely based on the PCI standard. The electrical and logical layers are the same as those defined by the PCI standard. With a module size of 149 mm x 74 mm, a 6U VME or cPCI carrier board can hold two PMC modules.

If you need high performance and/or intelligent I/O, choose a PMC-module. TEWS TECHNOLOGIES PMC modules plug into VME, CompactPCI, PCI, PCIe, and AMC carrier cards to perform high-speed and high-resolution A/D, D/A, digital I/O, motion control, FPGA and serial communication functions amongst others.

Many of our new PMC modules are based on upgraded technologies and circuit designs from our IndustryPack I/O module line, which are well proven in several hundred OEM installations. Note that nearly all TEWS modules are galvanically isolated to protect your system, and most have front panel high-density connectors.

If you wish to inquire about custom PMC designs, please contact TEWS directly at our offices in Germany or the United States. TEWS works closely with OEM and government customers to deliver accelerated time to market, long-term product availability and comprehensive product lifecycle management -- from the design stage through manufacturing, testing and beyond to post-sales support.

In addition to our well known PMC modules, we offer a complete line of XMC, CompactPCI, PCI, PCI Express, PCI Express Mini Card, VMEbus, PC104+, AMC, MicroTCA, FMC, and numerous IndustryPack modules off-the-shelf.

All TEWS modules feature a five-year limited warranty, and many are offered standard in extended temperature (-40°C to +85°C). Software drivers for VxWorks, Linux, QNX, Integrity and Windows are available.

For more information go to [www.tews.com](http://www.tews.com).
Compact PCI Modules

As part of our continued commitment to the embedded I/O market, TEWS TECHNOLOGIES has expanded development of I/O solutions based on the CompactPCI standard.

The modules are designed for data communications, LAN/WAN networking, traffic control, simulation, telecommunication, and COTS applications. Our CompactPCI product line will offer comparable functionality to our PMC module product line.

If you wish to inquire about custom cPCI designs, please contact TEWS directly at our offices in Germany or the United States.

In addition to our well known cPCI modules, we offer a complete line of PMC, XMC, CompactPCI, PCI, PCI Express, PCI Express Mini Card, VMEbus, PC104+, AMC, MicroTCA, FMC, and numerous IndustryPack® modules off-the-shelf.

All TEWS modules feature a five-year limited warranty, and many are offered standard in extended temperature (-40°C to +85°C). Software drivers for VxWorks, Linux, QNX, Integrity and Windows are available. For more information go to www.tews.com.
TCP020-TM PIM Carrier Transition Module for 6U cPCI

**Application Information**

The TCP020-TM is a 6U PIM Carrier Transition Module to be used with 6U cPCI PMC carrier like TEWS’ TCP260. It provides easy access to the PMC I/O lines of cPCI PMC carrier with back I/O via J3 and J5.

The PIM Carrier TCP020-TM distributes all I/O lines of both PMCs from the cPCI RJ3 and RJ5 connector to two PIM modules.

The operating temperature range is -40°C to +85°C.

**Technical Information**

- **Form Factor:** cPCI 6U Rear Transition Module (233 mm x 80 mm)
- **I/O Routing:**
  - PMC I/O mapping via RJ3 and RJ5
  - I/O lines are accessible via two PIM modules
- **EMI front panel**
- **Operating temperature:** -40°C to +85°C

**Order Information**

RoHS Compliant

TCP020-TM-10R 6U Transition Module, RJ3/RJ5, 2 PIM Slot

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**


**Related Products**

TPIM001 PIM I/O Module, HD50 connector
TPIM002 PIM I/O Module, HD68 connector
TPIM003 PIM I/O Module, HD68 connector, special pin assignment
TPIM005 PIM I/O Module, HD68 connector, for TPMC863/TPMC363
TPIM006 PIM I/O Module for Quad 10/100/1000 Ethernet PMC

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TCP021-TM  PIM Carrier Transition Module for 6U cPCI

**Application Information**

The TCP021-TM is a 6U PIM Carrier Transition Module to be used with 6U cPCI PMC carrier like TEWS’ TCP261. It provides easy access to the PMC I/O lines of cPCI PMC carrier with back I/O via J3 and J4.

The PIM Carrier TCP021-TM distributes all I/O lines of both PMCs from the cPCI RJ3 and RJ4 connector to two PIM modules.

The operating temperature range is -40°C to +85°C.

**Technical Information**

- Form Factor: cPCI 6U Rear Transition Module (233 mm x 80 mm)
- I/O Routing:
  - PMC I/O mapping via RJ3 and RJ4
  - I/O lines are accessible via two PIM modules
- EMI front panel
- Operating temperature: -40°C to +85°C

**Order Information**

RoHS Compliant
TCP021-TM-10R  6U Transition Module, RJ3/RJ4, 2 PIM Slot

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**


**Related Products**

TPIM001  PIM I/O Module, HD50 connector
TPIM002  PIM I/O Module, HD68 connector
TPIM003  PIM I/O Module, HD68 connector, special pin assignment
TPIM005  PIM I/O Module, HD68 connector, for TPMC863/TPMC363
TPIM006  PIM I/O Module for Quad 10/100/1000 Ethernet PMC
TCP030-TM  Transition Module for 3U cPCI PMC Carrier

Application Information
The TCP030-TM is a 3U Transition Module to be used with 3U cPCI PMC carrier like TEWS’ TCP270-11R. It provides easy access to the PMC I/O lines of cPCI PMC carrier with back I/O. All 64 PMC I/O lines are distributed from the cPCI RJ2 connector to a 68 pin SCSI-3 type connector located in the front panel. The pin assignment corresponds to the PICMG 2.3 R1.0 PMC on CompactPCI signal mapping. The operating temperature range is -40°C to +85°C.

Technical Information
- Form Factor: cPCI 3U Rear Transition Module (100 mm x 80 mm)
- I/O Routing:
  - I/O lines are accessible via HD68 SCSI-3 type connector
- Front panel
- Operating temperature: -40°C to +85°C

Order Information
RoHS Compliant
TCP030-TM-10R  3U Transition Module for 1 slot PMC Carrier, HD68 connector

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation

Related Products
TPIM001  PIM I/O Module, HD50 connector
TPIM002  PIM I/O Module, HD68 connector
TPIM003  PIM I/O Module, HD68 connector, special pin assignment
TPIM005  PIM I/O Module, HD68 connector, for TPMC863/TPMC363
TPIM006  PIM I/O Module for Quad 10/100/1000 Ethernet PMC

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TCP040-TM  PIM Carrier Transition Module for 3U cPCI

Application Information
The TCP040-TM is a 3U PIM Carrier Transition Module to be used with 3U CompactPCI PMC carrier like TEWS’ TCP270 or 3U CompactPCI modules with back I/O. It provides easy access to the PMC I/O lines of 3HE CompactPCI PMC carriers and most TEWS CompactPCI Modules with back I/O.

It distributes all I/O lines of one PMC from the cPCI RJ2 connector to a PIM module.

The operating temperature range is -40°C to +85°C.

Technical Information
- Form Factor: cPCI 3U Rear Transition Module (100 mm x 80 mm)
- I/O Routing:
  - PMC I/O mapping via RJ2
  - I/O lines are accessible via the PIM modules
- EMI front panel
- Operating temperature: -40°C to +85°C

Order Information
RoHS Compliant
TCP040-TM-10R  3U Transition Module for 1 slot PMC Carrier, 1 PIM slot

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TCP040-TM-DOC  User Manual

Related Products
TPIM001  PIM I/O Module, HD50 connector
TPIM002  PIM I/O Module, HD68 connector
TPIM003  PIM I/O Module, HD68 connector, special pin assignment
TPIM005  PIM I/O Module, HD68 connector, for TPMC863/TPMC363
TPIM006  PIM I/O Module for Quad 10/100/1000 Ethernet PMC
TCP260  Dual PMC Carrier for 6U CompactPCI (J3/J5 I/O)

Application Information
The TCP260 is a standard 6U CompactPCI carrier that provides front I/O and rear I/O for up to two single width PMC modules.
The transparent PCI to PCI Bridge is used as the PCI bridging device between the primary CompactPCI bus and the on board secondary PCI bus where the two PMC slots reside.
Supported PCI bus data widths are 32 bit and 64 bit. Supported PCI bus frequencies are 33 MHz and 66 MHz.
The TCP260 supports standard PMC front I/O and CompactPCI rear I/O. The PMC slot 1 I/O lines are connected directly to the CompactPCI connector J3. The PMC slot 2 I/O lines are connected directly to the CompactPCI connector J5.
The TCP260 also provides hot swapping capability. The TCP260 on board hot swap controller controls the installation and reinstallation process of the TCP260 without powering down the CompactPCI system.
The TCP260 carrier complies with the PICMG 2.0 Revision 3.0 CompactPCI specification.
The TCP260 is available in extended temperature range as TCP260-10R-ET and TCP260-11R-ET.

Technical Information
- Standard 6U 32/64 bit CompactPCI module conforming to PICMG 2.0 R3.0
- PCI 2.2 compliant interface
- Two PMC sites conforming to PMC standard
- Board size: 160 mm x 233.35 mm
- Front panel I/O
- CompactPCI rear I/O : Connector J3 and J5
- PCI Interface : 33 / 66 MHz; 32 / 64 bit
- PCI-to-PCI bridge Pericom PI7C8154
- CompactPCI hot swap conforming to PICMG 2.1 R2.0
- 5V and 3.3V signaling
- Temperature range: 0°C to +70°C (TCP260-10R/-11R) and -40°C to +85°C (TCP260-10R-ET/-11R-ET)
The Embedded I/O Company

Order Information

RoHS Compliant
TCP260-10R  6U Dual PMC Carrier, J3/J5 I/O, 5V PMC I/O signaling voltage
TCP260-10R-ET 6U Dual PMC Carrier, J3/J5 I/O, 5V PMC I/O signaling voltage, ext. temp.
TCP260-11R  6U Dual PMC Carrier, J3/J5 I/O, 3.3V PMC I/O signaling voltage
TCP260-11R-ET 6U Dual PMC Carrier, J3/J5 I/O, 3.3V PMC I/O signaling voltage, ext. temp.

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TCP260-DOC  User Manual

Related Products
TCP020-TM  6U Transition Module, RJ3/RJ5, 2 PIM Slot

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TCP261 Dual PMC Carrier for 6U CompactPCI (J3/J4 I/O)

Application Information
The TCP261 is a standard 6U CompactPCI carrier that provides front I/O and rear I/O for up to two single width PMC modules.

32 bit and 64 bit PCI accesses are supported on PCI bus with PCI frequency 33 MHz and also 66 MHz. The transparent PCI-to-PCI bridge provides the real connection between primary CompactPCI bus and the two secondary PMC slots. The bridge controls all PCI accesses, data bus width and in each case the frequency for a PMC access to one of the connected modules.

The TCP261 supports standard PMC front I/O and for both PMC slots CompactPCI rear I/O. The PMC slot 2 is connected directly to the CompactPCI connector J4 and J3. The PMC slot 1 is connected directly to the CompactPCI connector J3.

Capability of hot swapping is realized by a hot swap controller for the TCP261. The hot swap controller and the PCI-to-PCI Bridge are controlling the installation and reinstallation process of the TCP261 without power down the system.

The TCP261 carrier complies with the PICMG 2.0 Revision 3.0 CompactPCI specification.

Technical Information
- Standard 6U 32/64 bit CompactPCI module conforming to PICMG 2.0 R3.0
- PCI 2.2 compliant interface
- Two PMC sites conforming to PMC standard
- Board size: 160 mm x 233.35 mm
- Front panel I/O
- CompactPCI rear I/O: Connector J3 and J4 conforming to PICMG 2.3 R1.0
- PCI Interface: 33/66 MHz; 32/64 bit
- PCI-to-PCI bridge Pericom PI7C8154
- CompactPCI hot swap conforming to PICMG 2.1 R2.0
- 5V and 3.3V signaling
- Operating temperature 0°C to +70°C (TCP261-10R/-11R) and -40°C to +85°C (TCP261-10R-ET/-11R-ET)

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**Order Information**

**RoHS Compliant**
- **TCP261-10R** 6U Dual PMC Carrier, J3/J4 I/O, 5V PMC I/O signaling voltage
- **TCP261-10R-ET** 6U Dual PMC Carrier, J3/J4 I/O, 5V PMC I/O signaling voltage, ext. temp.
- **TCP261-11R** 6U Dual PMC Carrier, J3/J4 I/O, 3.3V PMC I/O signaling voltage
- **TCP261-11R-ET** 6U Dual PMC Carrier, J3/J4 I/O, 3.3V PMC I/O signaling voltage, ext. temp.

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**
- **TCP261-DOC** User Manual

**Related Products**
- **TCP021-TM** 6U Transition Module, RJ3/RJ4, 2 PIM Slot
TCP270  PMC Carrier for 3U CompactPCI

**Application Information**

The TCP270 is a standard 3U CompactPCI carrier that provides front I/O and rear I/O for a single width PMC module. This PMC to 3U CompactPCI adapter is used to build modular, flexible and cost effective I/O solutions with PMC devices in CompactPCI systems.

32 bit / 33 MHz accesses are supported on the PCI bus. The TCP270 is used as a mechanical adaptor to connect a standard PMC module in 3U CompactPCI systems.

The TCP270 supports PMC front I/O and optional CompactPCI rear I/O at CompactPCI connector J2/P2. The pin assignment corresponds to the PICMG 2.3 R1.0 PMC on CompactPCI signal mapping.

The use of PMC I/O on the J2/P2 connector (TCP270-11) precludes the use of 64 bit CompactPCI backplanes.

The TCP270 carrier complies with the PICMG 2.0 Revision 3.0 CompactPCI specification.

Operating temperature range is -40°C to +85°C.

**Technical Information**

- 3U 32 bit / 33 MHz CompactPCI module conforming to PICMG 2.0 Rev 3.0
- PCI 2.2 compliant interface
- Board size: 160 mm x 100 mm
- PCI Interface: 33 MHz; 32 bit
- 5V and 3.3V PCI I/O signaling voltage possible

- One PMC site conforming to PMC standard
- Front panel I/O
- CompactPCI rear I/O: Connector J2 optional
- Operating temperature -40°C to +85°C
Order Information

RoHS Compliant
TCP270-10R 3U 1 Slot Passive PMC Carrier, 32bit/33Mhz, PMC front I/O
TCP270-11R 3U 1 Slot Passive PMC Carrier, 32bit/33Mhz, PMC front I/O and rear I/O on J2

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TCP270-DOC User Manual

Related Products
TCP030-TM 3U Transition Module for 1 slot PMC Carrier, HD68 connector
TCP040-TM 3U Transition Module for 1 slot PMC Carrier, 1 PIM slot
TCP001-FP 6U Front Panel Extension for 3U cPCI Boards
The TPCE260 is a standard height PCI Express Revision 1.1 compatible module that provides one slot for a single-width PMC module used to build modular, flexible and cost effective I/O solutions for all kinds of applications like process control, medical systems, telecommunication and traffic control.

The TPCE260 is a versatile solution to upgrade well known PMC I/O solutions to the PCI Express signalling standard.

The bridging between the PCI Express x1 link to the host board and the PCI bus signals to the PMC slot is handled by the transparent PCIe-to-PCI Bridge PI7C9X111SL from Pericom.

The PCI bus side of the bridge allows 32-bit PCI accesses with either 33 MHz or 66 MHz. Both 3.3V (TPCE260-x1R) and 5V (TPCE260-x0R) PCI I/O signalling voltages are supported.

The TPCE260 supports PMC front panel I/O and also PMC P14 Rear I/O through a VME P2 style connector.

(IEC 60603-2, Type C). The I/O mapping of P14 complies with VITA-35 ("PMC P4 to VME-P2, Rows A-C mapping").

The PCIe edge card connector provides +12V and +3.3V. All TPCE260-xx variants do use the +3.3V solely to power the PCIe-to-PCI Bridge.

The TPCE260-1xR uses the +12V of the PCIe edge card connector to generate all four power supply voltages for the PMC slot (+3.3V, +5V, +12V and -12V).

According to the PCIe specification, a PCIe x1 card is limited to 6W on the +12V which allows to operate most of the available 32-bit 33/66 MHz PMC modules on the TPCE260-1xR.

For increased power requirements of a PMC module, the TPCE260-2xR offer a PCIe Graphics Power Connector to supply the +12V for generating all the power supply voltages for the PMC slot providing a power of up to 25W.
**Technical Information**

- **Form Factor:** PCI Express x1, Revision 1.1
  - **Board size:** 178.8mm x 107mm
- **One PMC Slot:**
  - **PCI Interface:** 33/66 MHz, 32-Bit
  - **PCI I/O Signalling Voltage:** 3.3V or 5V (factory build option)
  - **PMC Front Panel I/O**
  - **PMC P14 I/O connected to VME P2 Style Connector (IEC 60603-2 compatible)**
- **All PMC Power Supplies generated from +12V**
  - **TPCE260-1xR:** +12V from PCIe edge card connector
  - **TPCE260-2xR:** +12V from PCIe Graphics Power Connector
- **Operating temperature:** -40°C to +85°C
- **MTBF (MIL-HDBK217F/FN2 G6 20°C):**
  - **TPCE260-1xR:** 664000 h
  - **TPCE260-2xR:** 582000 h

**Order Information**

**RoHS Compliant**

- **TPCE260-10R**
  - 1 Slot PMC Carrier, 32 bit, 33/66 MHz, 5V PCI I/O signaling voltage, PCIe x1, 12V from PCIe connector
- **TPCE260-11R**
  - 1 Slot PMC Carrier, 32 bit, 33/66 MHz, 3.3V PCI I/O signaling voltage, PCIe x1, 12V from PCIe connector
- **TPCE260-20R**
  - 1 Slot PMC Carrier, 32 bit, 33/66 MHz, 5V PCI I/O signaling voltage, PCIe x1, 12V from PCIe Graphics connector
- **TPCE260-21R**
  - 1 Slot PMC Carrier, 32 bit, 33/66 MHz, 3.3V PCI I/O signaling voltage, PCIe x1, 12V from PCIe Graphics connector

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**

- **TPCE260-DOC**
  - User Manual

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**Issue 1.0.2**

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The TPCE275 is a standard height PCI Express Revision 1.1 compatible module that provides one slot for a single-width XMC module used to build modular, flexible and cost effective I/O solutions for all kinds of applications like process control, medical systems, telecommunication and traffic control.

The TPCE275 is a versatile solution to upgrade well known XMC I/O solutions to the PCI Express signalling standard.

The PCI Express x1 link from the host board to the XMC module is enhanced by a PCIe Redriver, allowing safe operation of XMC modules on PCIe mainboards.

VPWR is selectable via order option. The TPCE275-x0R variants provide for 12V VPWR and the TPCE275-x1R order options provide 5V VPWR.

The TPCE275 supports XMC front panel I/O, and also P14 and P16 rear I/O independently.

XMC P14 rear I/O is provided through a VME P2 style connector (IEC 60603-2, Type C). The I/O mapping of P14 complies with VITA-35 ("PMC P4 to VME-P2, Rows A-C mapping").

XMC P16 rear I/O is provided through two 50-pin flat cable connectors mounted in a 2.54mm grid.

The PCIe edge card connector provides +12V and +3.3V. The TPCE275-1xR uses the +12V of the PCIe edge card connector to generate all power supply voltages for the XMC slot (+3.3V, VPWR and +12V).

According to the PCIe specification, a PCIe x1 card is limited to 6W on the +12V which allows to operate many of the available XMC modules on the TPCE275-1xR. For increased power requirements of an XMC module, the TPCE275-2xR offer a PCIe Graphics Power Connector to supply the +12V for generating all the power supply voltages for the XMC slot providing power of up to 25W.

A 10-pin JTAG header is available for XMC module debugging purposes. All five JTAG signals are routed directly to the XMC slot.
**Technical Information**

- **Form Factor:** PCI Express x1, Revision 1.1
- **Board size:** approx. 200mm x 111mm
- **One XMC Slot:**
  - PCIe Interface: x1, Rev. 1.1
  - XMC Front Panel I/O
  - XMC P14 I/O connected to VME P2 Style Connector (IEC 60603-2 compatible)
  - XMC P16 I/O connected to two 50-pin flat cable connectors
- **All XMC Power Supplies generated from +12V**
  - TPCE275-1xR: +12V from PCIe edge card connector
  - TPCE275-2xR: +12V from PCIe Graphics Power Connector
- **JTAG:**
  - 10-pin header with all five JTAG signals routed to XMC connector
- **Operating temperature:** 0°C to +70°C
- **MTBF (MIL-HDBK217F/FN2 G8 20°C):**
  - TPCE275-10R: 664000h
  - TPCE275-11R: 664000h
  - TPCE275-20R: 637000h
  - TPCE275-21R: 637000h

**Order Information**

**RoHS Compliant**

- **TPCE275-10R** 1 Slot XMC Carrier, PCIe x1, VPWR = 12V, 12V from PCIe connector
- **TPCE275-11R** 1 Slot XMC Carrier, PCIe x1, VPWR = 5V, 12V from PCIe connector
- **TPCE275-20R** 1 Slot XMC Carrier, PCIe x1, VPWR = 12V, 12V from PCIe Graphics connector
- **TPCE275-21R** 1 Slot XMC Carrier, PCIe x1, VPWR = 5V, 12V from PCIe Graphics connector

For the availability of non-RoHS compliant (leadend solder) products please contact TEWS.

**Documentation**

- **TPCE275-DOC** User Manual
TPCE276 PCI Express x1, Gen2 XMC Carrier

The TPCE276 is a standard height PCI Express Revision 2.0 compatible module that provides one slot for a single-width XMC module used to build modular, flexible and cost effective I/O solutions for all kinds of applications like process control, medical systems, telecommunication and traffic control.

The TPCE276 is a versatile solution to upgrade well known XMC I/O solutions to the PCI Express signalling standard.

The PCI Express x1 link from the host board to the XMC module is enhanced by a PCIe Gen2 Redriver, allowing safe operation of XMC modules on PCIe mainboards.

VPWR is selectable via order option. The TPCE276-x0R variants provide for 12V VPWR and the TPCE276-x1R order options provide 5V VPWR.

The TPCE276 supports XMC front panel I/O, and also P14 and P16 rear I/O independently.

XMC P14 rear I/O is provided through a Tyco AMPMODU System 50 0.050x0.100 flat ribbon cable connector. The I/O lines are routed differential.

XMC P16 rear I/O is implemented through two Samtec QTH-DP 0.50mm Q Pairs® High Speed Ground Plane Socket Strip, Differential Pair connector providing access to all P16 I/O lines.

The PCIe edge card connector provides +12V and +3.3V. The TPCE276-1xR uses the +12V of the PCIe edge card connector to generate all power supply voltages for the XMC slot (+3.3V, VPWR and +12V).

According to the PCIe specification, a PCIe x1 card is limited to 6W on the +12V which allows to operate many of the available XMC modules on the TPCE276-1xR.

For increased power requirements of an XMC module, the TPCE276-2xR offer a PCIe Graphics Power Connector to supply the +12V for generating all the power supply voltages for the XMC slot providing power of up to 25W.

A 10-pin JTAG header is available for XMC module debugging purposes. All five JTAG signals are routed directly to the XMC slot.
**Technical Information**

- **Form Factor:** PCI Express x1, Revision 2.0
  - Board size: approx. 257mm x 111mm
- **One XMC Slot:**
  - PCIe Interface: x1, Rev. 2.0
  - XMC Front Panel I/O
  - XMC P14 I/O connected to Tyco AMPMODU System 50 0.050x0.100 connector
  - XMC P16 I/O connected to two Samtec QTH-DP 0.50mm Q Pairs® High Speed Ground Plane Socket Strip, Differential Pair connectors
- **All XMC Power Supplies generated from +12V**
  - TPCE276-1xR: +12V from PCIe edge card connector
  - TPCE276-2xR: +12V from PCIe Graphics Power Connector
- **JTAG:**
  - 10-pin header with all five JTAG signals routed to XMC connector
  - Operating temperature: -40°C to +85°C
  - MTBF (MIL-HDBK217F/FN2 Gb 20°C):
    - TPCE276-10R: 603000h
    - TPCE276-11R: 603000h
    - TPCE276-20R: 535000h
    - TPCE276-21R: 535000h

**Order Information**

**RoHS Compliant**

- **TPCE276-10R** 1 Slot XMC Carrier, PCIe x1, VPWR = 12V, 12V from PCIe connector
- **TPCE276-11R** 1 Slot XMC Carrier, PCIe x1, VPWR = 5V, 12V from PCIe connector
- **TPCE276-20R** 1 Slot XMC Carrier, PCIe x1, VPWR = 12V, 12V from PCIe Graphics connector
- **TPCE276-21R** 1 Slot XMC Carrier, PCIe x1, VPWR = 5V, 12V from PCIe Graphics connector

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**

- **TPCE276-DOC** User Manual
TPCE277 is a standard height PCI Express Revision 3.0 compatible module that provides one slot for a single-width XMC module used to build modular, flexible and cost effective I/O solutions for all kinds of applications like process control, medical systems, telecommunication and traffic control.

The TPCE277 is a versatile solution to upgrade well known XMC I/O solutions to the PCI Express signalling standard.

The PCI Express x1 link from the host board to the XMC module is improved by a PCIe Gen3 Redriver, allowing safe operation of XMC modules on PCIe mainboards.

VPWR is selectable via order option. The TPCE277-x0R variants provide for 12V VPWR and the TPCE277-x1R order options provide 5V VPWR.

The TPCE277 supports XMC front panel I/O. The PCIe edge card connector provides +12V and +3.3V. The TPCE277-1xR uses the +12V of the PCIe edge card connector to generate all power supply voltages for the XMC slot (+3.3V, VPWR and +12V). According to the PCIe specification, a PCIe x1 card is limited to 6W on the +12V which allows to operate many of the available XMC modules on the TPCE277-1xR.

For increased power requirements of an XMC module, the TPCE277-2xR offer a PCIe Graphics Power Connector to supply the +12V for generating all the power supply voltages for the XMC slot providing power of up to 25W.

A 10-pin JTAG header is available for XMC module debugging purposes. All five JTAG signals are routed directly to the XMC slot.

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Issue 1.0.2

2017-08-31
The Embedded I/O Company

Technical Information

- Form Factor: PCI Express x1, Revision 3.0
  - Board size: approx. 143mm x 111mm
- One XMC Slot:
  - PCIe Interface: x1, Rev. 3.0
  - XMC Front Panel I/O
- All XMC Power Supplies generated from +12V
  - TPCE277-1xR: +12V from PCIe edge card connector
  - TPCE277-2xR: +12V from PCIe Graphics Power Connector
- JTAG:
  - 10-pin header with all five JTAG signals routed to XMC connector
- Operating temperature: -40°C to +85°C
- MTBF (MIL-HDBK217F/FN2 Gb 20°C):
  - TPCE277-10R: 1764000h
  - TPCE277-11R: 1631000h
  - TPCE277-20R: 1288000h
  - TPCE277-21R: 1216000h

Order Information

RoHS Compliant
TPCE277-10R  1 Slot XMC Carrier, PCIe x1, VPWR = 12V, 12V from PCIe connector
TPCE277-11R  1 Slot XMC Carrier, PCIe x1, VPWR = 5V, 12V from PCIe connector
TPCE277-20R  1 Slot XMC Carrier, PCIe x1, VPWR = 12V, 12V from PCIe Graphics connector
TPCE277-21R  1 Slot XMC Carrier, PCIe x1, VPWR = 5V, 12V from PCIe Graphics connector

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPCE277-DOC  User Manual

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Issue 1.0.2  
2017-08-31
Application Information

The TPCE278 is a standard height PCI Express Revision 3.0 compatible module that provides one slot for a single-width XMC module used to build modular, flexible and cost effective I/O solutions for all kinds of applications like process control, medical systems, telecommunication and traffic control.

The TPCE278 is a versatile solution to upgrade well known XMC I/O solutions to the PCI Express signalling standard.

The PCI Express x4 link from the host board to the XMC module is enhanced by a PCIe Gen3 Redriver, allowing safe operation of XMC modules on PCIe mainboards.

VPWR is selectable via order option. The TPCE278-x0R variants provide 12V VPWR and the TPCE278-x1R order options provide 5V VPWR.

The TPCE278 supports XMC front panel I/O, and also P14 and P16 rear I/O independently.

XMC P14 rear I/O is provided through a Tyco AMPMODU System 50 0.050x0.100 flat ribbon cable connector. The I/O lines are routed differentially.

XMC P16 rear I/O is implemented through two Samtec QTH-DP 0.50mm Q Pairs® High Speed Ground Plane Socket Strip, Differential Pair connector providing access to all P16 I/O lines.

The PCIe edge card connector provides +12V and +3.3V. The TPCE278-1xR uses the +12V of the PCIe edge card connector to generate all power supply voltages for the XMC slot (+3.3V, VPWR and +12V).

According to the PCIe specification, a PCIe x4 card is allowed to use 25W on the +12V which allows to operate most of the available XMC modules on the TPCE278-1xR. For increased power requirements of an XMC module, the TPCE278-2xR offer a PCIe Graphics Power Connector to supply the +12V for generating all the power supply voltages for the XMC slot providing power of up to 75W.

A 10-pin JTAG header is available for XMC module debugging purposes. All five JTAG signals are routed directly to the XMC slot.
### Technical Information

- **Form Factor:** PCI Express x4, Revision 3.0
- **Board size:** approx. 257mm x 111mm
- **One XMC Slot:**
  - PCIe Interface: x4, Rev. 3.0
  - XMC Front Panel I/O
  - XMC P14 I/O connected to Tyco AMPMODU System 50 0.050x0.100 connector
  - XMC P16 I/O connected to two Samtec QTH-DP 0.50mm Q Pairs® High Speed Ground Plane Socket Strip, Differential Pair connectors
- **All XMC Power Supplies generated from +12V**
  - TPCE278-1xR: +12V from PCIe edge card connector
  - TPCE278-2xR: +12V from PCIe Graphics Power Connector
- **JTAG:**
  - 10-pin header with all five JTAG signals routed to XMC connector
- **Operating temperature:** -40°C to +85°C
- **MTBF (MIL-HDBK217F/FN2 Gb 20°C):**
  - TPCE278-10R: 564000h
  - TPCE278-11R: 551000h
  - TPCE278-20R: 505000h
  - TPCE278-21R: 494000h

### Order Information

**RoHS Compliant**

- **TPCE278-10R**
  - 1 Slot XMC Carrier, PCIe x4, VPWR = 12V, 12V from PCIe connector
- **TPCE278-11R**
  - 1 Slot XMC Carrier, PCIe x4, VPWR = 5V, 12V from PCIe connector
- **TPCE278-20R**
  - 1 Slot XMC Carrier, PCIe x4, VPWR = 12V, 12V from PCIe Graphics connector
- **TPCE278-21R**
  - 1 Slot XMC Carrier, PCIe x4, VPWR = 5V, 12V from PCIe Graphics connector

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

### Documentation

**TPCE278-DOC**

User Manual
AMC Modules

Advanced Mezzanine Card (AdvancedMC) AMC is a PCI Industrial Computer Manufacturers Group specification (PICMG AMC.0 and PICMG AMC.x, respectively) for hot-swappable and field-replaceable mezzanine cards.

AdvancedMC represents the industries next generation mezzanine standard. In addition to providing hot swap capability, intelligent platform management (IPMI), greater potential power/size, and the other enhancements made possible by AdvancedTCA, AdvancedMC is intended to help customers take advantage of the performance enhancements of new, fast, wide-bandwidth serial buses, including PCI Express.

TEWS Technologies is expanding its industry leading embedded I/O product line to support the next-generation open-architecture standard. With its background and long-term experience in interface products based on IndustryPack, PMC, XMC, CompactPCI, PCI, PCI Express, PCI Express Mini Card, VMEbus, PC104+, AMC, MicroTCA, and FMC industrial standards. TEWS is growing its product range with the introduction of AMC (Advanced Mezzanine Card) modules.

AMCs are designed to work on a carrier card (primarily AdvancedTCA) and can also be plugged into a backplane directly as defined by the MicroTCA specification.

Especially the latter offers attractive possibilities for industrial grade COTS systems with improved Reliability, Availability, Serviceability and Performance. If you wish to inquire about custom VME designs, please contact TEWS directly at our offices in Germany or the United States. TEWS works closely with OEM and government customers to deliver accelerated time to market, long-term product availability and comprehensive product lifecycle management -- from the design stage through manufacturing, testing and beyond to post-sales support.

All TEWS modules feature a five-year limited warranty, and many are offered standard in extended temperature (-40°C to +85°C). Software drivers for VxWorks, Linux, QNX, Integrity and Windows are available.

For more information go to www.tews.com.
XMC Modules

ANSI/VITA 42.0 is a mezzanine card standard providing high-speed, switched interconnect protocols on the existing, widely deployed CMC (Common Mezzanine Card) IEEE P1386 form factor.

The mechanical and dimensional specifications are the same as those defined by the CMC form factor. A standard, single width XMC Mezzanine Card has a module size of 149 mm x 74 mm, which means that a 6U carrier board can hold up to two XMC modules.

The conventional bus architectures like PCI (Peripheral Component Interconnect) which are limited in speed have evolved to next generation high-speed point-to-point interconnects like PCI Express or Serial RapidIO. These offer higher bandwidths over greater transmission distances using fewer pins. To use these advantages on CMCs, the XMC standard with its protocol sub-standards like VITA 42.3 (PCI Express) or VITA 42.2 (Serial RapidIO) was developed as an evolution of the PMC (PCI Mezzanine Card).

In addition to the high-speed XMC Connector(s) an XMC can optionally be equipped with PMC Connectors which offers the possibility to remain compatibility to existing transition module back I/O solutions for example.

If you wish to inquire about custom XMC designs, please contact TEWS directly at our offices in Germany or the United States. TEWS works closely with OEM and government customers to deliver accelerated time to market, long-term product availability and comprehensive product lifecycle management -- from the design stage through manufacturing, testing and beyond to post-sales support. For more information go to www.tews.com.
TXMC375 Conduction Cooled XMC, 8 Channel RS232/RS422/RS485 Programmable Serial Interface

Application Information

The TXMC375 is a conduction cooled Switched Mezzanine Card (XMC) compatible module offering 8 channels of high performance RS232/RS422/RS485 programmable asynchronous serial interface with P14 I/O (TXMC375-10R) or P16 I/O (TXMC375-20R).

The serial channels can be individually programmed to operate as RS232, RS422 or RS485 full duplex/half duplex interface. In addition programmable termination is provided for the RS422/RS485 interfaces. After power-up all serial I/O lines are in a high impedance state.

Each RS232 channel supports RxD, TxD, RTS, CTS and GND. RS422 and RS485 full duplex supports a four wire interface (RX+, RX-, TX+, TX-) plus ground (GND). RS485 half duplex supports a two wire interface (DX+, DX-) plus ground (GND).

Each channel has 256 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 1 Mbps for RS232 channels and 10 Mbps for RS422/RS485 channels. The UART offers readable FIFO levels.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

Software Support (TDRV002-SW-xx) for different operating systems is available.
**Technical Information**

- **Form Factor:** Standard single-width XMC module conforming to ANSI/VITA 42.0-2008
  - Board size: 149 mm x 74 mm
  - x1 PCI Express (Base Specification 2.0 Gen 1) compliant interface conforming to ANSI/VITA 42.3-2006
  - IPMI resource: FRU hardware definition information stored in on-board EEPROM
- **Asynchronous serial interface**
- **Octal UART:** Exar XR17V358
- **Programmable Interfaces:**
  - RS232
  - RS422
  - RS485 full duplex
  - RS485 half duplex
  - Programmable Termination for RS422/RS485
- **Programmable baud rates:**
  - RS232: up to 1 Mbps
  - RS422/RS485: up to 10 Mbps
  - 256 byte transmit FIFO per channel
  - 256 byte receive FIFO per channel
  - Readable FIFO levels
  - Global Interrupt Source Register
  - General Purpose 16 bit Timer/Counter
- **Back I/O**
  - TXMC375-10R: P14
  - TXMC375-20R: P16
  - ESD protected transceiver (up to ± 15KV)
  - Operating temperature -40°C to +85°C
  - MTBF (MIL-HDBK217F/FN2 Gb 20°C) TXMC375-10R: 1.479.000 h

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**Terminology and Diagram**

- **Termination**
- **Full / Half Duplex**
- **RS232 / RS422 / RS485**
- **CPLD**
- **PCIe UART**
- **Programmable Transceiver**

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Issue 1.0.2

2017-09-07
Order Information

RoHS Compliant
TXMC375-10R   ccXMC, 8 Channel Programmable RS232/RS422/RS485, P14 I/O
TXMC375-20R   ccXMC, 8 Channel Programmable RS232/RS422/RS485, P16 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TXMC375-DOC   User Manual

Software
TDRV002-SW-25   Integrity Software Support
TDRV002-SW-42   VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV002-SW-65   Windows Software Support
TDRV002-SW-82   Linux Software Support
TDRV002-SW-95   QNX Software Support

For other operating systems please contact TEWS.
The TXMC376 is a conduction cooled Switched Mezzanine Card (XMC) compatible module offering 4 channels of high performance RS232/RS422/RS485 programmable asynchronous serial interface with P14 I/O (TXMC376-10R) or P16 I/O (TXMC376-20R).

The serial channels can be individually programmed to operate as RS232, RS422 or RS485 full duplex/half duplex interface. In addition programmable termination is provided for the RS422/RS485 interfaces. After power-up all serial I/O lines are in a high impedance state.

Each RS232 channel supports RxD, TxD, RTS, CTS and GND. RS422 and RS485 full duplex supports a four wire interface (RX+, RX-, TX+, TX-) plus ground (GND). RS485 half duplex supports a two wire interface (DX+, DX-) plus ground (GND).

Each channel has 256 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 1 Mbps for RS232 channels and 10 Mbps for RS422/RS485 channels. The UART offers readable FIFO levels.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

Software Support (TDRV002-SW-xx) for different operating systems is available.
### Technical Information

- **Form Factor:** Standard single-width XMC module conforming to ANSI/VITA 42.0-2008
  - Board size: 149 mm x 74 mm
- **x1 PCI Express (Base Specification 2.0 Gen 1) compliant interface conforming to ANSI/VITA 42.3-2006**
- **IPMI resource:** FRU hardware definition information stored in on-board EEPROM
- **Asynchronous serial interface**
- **Quad UART:** Exar XR17V354
- **Programmable Interfaces:**
  - RS232
  - RS422
  - RS485 full duplex
  - RS485 half duplex
  - Programmable Termination for RS422/RS485
- **Support of RxD, TxD, RTS, CTS and GND for each RS232 channel; RxD+/-, TxD+/- and GND for each RS422/RS485 FD channel; D+/- and GND for each RS485 HD channel**
- **Programmable baud rates:**
  - RS232: up to 1 Mbps
  - RS422/RS485: up to 10 Mbps
  - 256 byte transmit FIFO per channel
  - 256 byte receive FIFO per channel
  - Readable FIFO levels
  - Global Interrupt Source Register
  - General Purpose 16 bit Timer/Counter
- **Back I/O**
  - TXMC376-10R: P14
  - TXMC376-20R: P16
  - ESD protected transceiver (up to ± 15KV)
  - Operating temperature -40°C to +85°C
  - MTBF (MIL-HDBK217F/FN2 G9 20°C) TXMC376-10R: 1.508,000 h

![Diagram of TXMC376-10R and TXMC376-20R connections](image)

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Issue 1.0.2  2017-09-07
Order Information

RoHS Compliant
TXMC376-10R  ccXMC, 4 Channel Programmable RS232/RS422/RS485, P14 I/O
TXMC376-20R  ccXMC, 4 Channel Programmable RS232/RS422/RS485, P16 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TXMC376-DOC  User Manual

Software
TDRV002-SW-25  Integrity Software Support
TDRV002-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV002-SW-65  Windows Software Support
TDRV002-SW-82  Linux Software Support
TDRV002-SW-95  QNX Software Support

For other operating systems please contact TEWS.
The TXMC385 is a Conduction Cooled Switched Mezzanine Card (CCXMC) compatible module providing a four channel Ethernet 10BASE-T / 100BASE-TX / 1000BASE-T interface.

A PCI Express Switch provides access to the Intel™ 82574IT Gigabit Ethernet controllers. Each Ethernet interface supports 10, 100 and 1000 Mbit/s transmission rates for full duplex operation, 10 and 100 Mbit/s transmissions for half duplex operation, and is equipped with a 32 Kbit serial EEPROM.

The four Ethernet interfaces of the TXMC385 are capable of performing an auto-negotiation algorithm which allows both link-partners to determine the best link parameters. The TXMC385 is user configurable via configuration and register accesses over the PCI Express interface.

The TXMC385-10R routes all four 10/100/1000 Mbit/s Ethernet ports to the XMC 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° to +85°C.

Software Support:
- Software support for Intel™ 82574IT at [www.intel.com](http://www.intel.com)
- For operating systems not supported by Intel™, please contact TEWS.
The Embedded I/O Company

Technical Information

- Form Factor: Standard single-width CCXMC module conforming to ANSI/VITA 42.0
- Board size: 143.75 mm x 74 mm
- x4 PCI Express (Base Specification 1.1) compliant interface conforming to ANSI/VITA 42.3
- IPMI resource: FRU hardware definition information stored in on-board EEPROM
- 4 Intel™ 82574IT Gigabit Ethernet controllers
- 10Base-T / 100Base-TX / 1000Base-T
- Half or full-duplex operation
- For each interface: Configurable receive and transmit data FIFO, programmable in 1 KB increments
- Operating temperature -40°C to +85°C
- MTBF (MIL-HDBK217F/FN2 GB 20°C) TXMC385-10R: 740000 h

Order Information

RoHS Compliant
TXMC385-10R ccXMC, 4 channel 10/100/1000Base-T Ethernet Interface, Intel 82574IT, P16 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TXMC385-DOC User Manual

Related Products
TPIM007 PIM I/O Module for Gigabit Ethernet XMCs

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The TXMC387 is a Conduction Cooled Switched Mezzanine Card (CCXMC) compatible module providing a two channel Ethernet 100BASE-TX / 1000BASE-T / 10GBASE-T interface.

The XMC-Connector P15 provides access to the Intel™ X540 dual port 10GbE controller via an x8 PCIe link. Both Ethernet interfaces support 100, 1000 Mbit/s and 10 Gbit/s transmission rates at full duplex operation. The controller is equipped with a 16 Mbit serial flash memory which is accessed by hardware at power-up, which has a firmware area and which can be accessed by software.

The two Ethernet interfaces of the TXMC387 are capable of performing an auto-negotiation algorithm which allows the link-partners to determine the best link parameters. The Ethernet controller on the TXMC387 is user configurable via configuration and register accesses over the PCIe interface.

LEDs indicate the different network activities.

The TXMC387 routes both Ethernet ports which are galvanically isolated from the Ethernet controllers to the XMC back I/O P16 connector. On the TXMC387-10R the Ethernet ports are mapped in the X12d range specified in VITA46.9 standard. The TXMC387-20R maps both Ethernet ports in the X8d range specified in VITA46.9 standard.

The module meets the requirements to operate in extended temperature range from -40°C to +85°C (Card Edge Temperature).

Software Support:
- Software support for Intel™ X540 at www.intel.com
- For operating systems not supported by Intel™, please contact TEWS.
The Embedded I/O Company

Technical Information

- Form Factor: Standard single-width CCXMC module conforming to ANSI/VITA 42.0
- Board size: 143.75 mm x 74 mm
- x8 PCI Express (Base Specification 2.1) compliant interface conforming to ANSI/VITA 42.3
- IPMI resource: FRU hardware definition information stored in on-board EEPROM
- Dual Port Intel™ X540 10 Gigabit Ethernet controller
- 100Base-TX / 100Base-T / 10GBase-T
- Full-duplex operation
- 16 Mbit serial flash memory connected to Ethernet controller
- Operating temperature -40°C to +85°C (Card Edge)
- MTBF (MIL-HDBK217F/FN2 G9 20°C) 592000 h

Order Information

RoHS Compliant
TXMC387-10R ccXMC, 2 Channel 10/100/1000BaseT Ethernet Interface, Intel X540, P16 I/O (X12d)
TXMC387-20R ccXMC, 2 Channel 10/100/1000BaseT Ethernet Interface, Intel X540, P16 I/O (X8d)

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TXMC387-DOC User Manual

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Issue 1.0.3  2017-09-07
Application Information

The Thermo-/Strain-Measurement XMC module TXMC590 is able to measure thermocouples, resistive sensors like RTD and thermistors, and strain gauges.

It provides 16 independent measurement channels. Each channel consists of a differential analog input and a differential sensor excitation output. The setup of the analog in-/outputs, the signal conditioning and the translation into data values is handled by a microcontroller with an integrated ADC and current source.

For thermocouples, the cold junction compensation is done onboard, freeing the user application from this task. There are three possibilities to measure the cold junction temperature:

1) A second channel configured as resistive temperature sensor
2) An onboard I2C temperature sensor
3) An external I2C temperature sensor (not included)

For measuring RTDs ratio metric, there is a high precision reference resistor onboard. The excitation current is set up automatically according to the RTD channel settings.

All Strain Gauge types are supported (e.g. quarter, half and full bridge configurations). However, there is no bridge completion circuit onboard the TXMC590. Therefore, if quarter or half bridges are used, these have to be completed outside of the module. The excitation current is set up automatically according to the strain gauge channel settings. As well, every channel can be calibrated and the measured value is cleared of offset errors.

Each channel can separately be configured for any sensor type. The measured value is translated into a data value according to the sensor type, i.e. into temperature or microstrain. The translation may be set up to provide the data in a format that allows direct usage without further calculations. Measurements can be set up to operate periodically with different time bases or can be triggered via register access.

The TXMC590 features predefined parameter sets for the most common sensor types. Additionally, up to 16 user-defined parameter sets can be persistently stored on board. These user-defined parameter sets allow supporting even user defined sensors. A software tool to build these user-defined parameter sets is part of TXMC590-SW-xx.

For special customer requirements, the microcontroller is also programmable via PCI Express which allows developing and programming special firmware into the controller.

Software Support (TXMC590-SW-xx) is available for different operating systems.
Technical Information

- Form Factor: Standard single-width XMC module conforming to ANSI/VITA 42.0-2008 (R2015)
- Board size: 149 mm x 74 mm
- x1/x4 PCI Express (Base Specification 2.1) compliant interface conforming to ANSI/VITA 42.3
- IPMI resource: FRU hardware definition information stored in onboard EEPROM
  Intermittent configurable for channel configuration cycles and for channel conversion cycles
- 16 analog thermo-/strain measurement channels based on ADuC7061 Microcontroller, capable of measuring:
  - Thermocouples
  - Resistive Sensors (e.g. RTD)
  - Strain Gauges
- 16x Sensor excitation onboard
- Onboard Cold Junction Compensation for Thermocouples with several options
- 16 pre-defined parameter sets for standard sensors
- 16 user-definable parameter sets for specific sensors storable in flash memory
- Operating temperature: -40°C to +85°C
- MTBF (MIL-HDBK217F/FN2 G° 20°C): 464000h

Order Information

RoHS Compliant
TXMC590-10R 16 Channel Thermo-/Strain-Measurement

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TXMC590-DOC User Manual

Software
TXMC590-SW-25 Integrity Software Support
TXMC590-SW-42 VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TXMC590-SW-65 Windows Software Support
TXMC590-SW-82 Linux Software Support
TXMC590-SW-95 QNX Software Support

For other operating systems please contact TEWS.
TPIM001  PIM I/O Module with 50 pin Connector

Application Information
The TPIM001 is a standard single-width PIM I/O module to be used with any PIM carrier. It offers easy access to the PMC back I/O lines of PMC carrier with back I/O.

The TPIM001 distributes the lower 50 I/O lines of the PMC to a standard 50 pin SCSI-2 type connector located in the EMI front panel.

The operating temperature range is -40°C to +85°C.

Technical Information
- Standard single-width PIM I/O Module
- Board size: 69 mm x 74 mm
- I/O lines 1 to 50 are routed to a HD50 SCSI-2 type connector in the front panel
- EMI Front Panel
- Operating Temperature: -40°C to +85°C

Order Information
RoHS Compliant
TPIM001-10R  PIM I/O Module, HD50 connector

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPIM001-DOC  User Manual

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TPIM002  PIM I/O Module with 68 pin Connector

Application Information

The TPIM002 is a standard single-width PIM I/O module to be used with any PIM carrier. It offers easy access to the PMC back I/O lines of PMC carrier with back I/O.

The TPIM002 distributes all PMC back I/O lines to a 68 pin SCSI-3 type connector located in the EMI front panel.

The operating temperature range is -40°C to +85°C.

Technical Information

- Standard single-width PIM I/O Module
- Board size: 69 mm x 74 mm
- I/O lines are routed to a HD68 SCSI-3 type connector in the front panel
- EMI Front Panel
- Operating Temperature: -40°C to +85°C

Order Information

RoHS Compliant
TPIM002-10R  PIM I/O Module, HD68 connector

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPIM002-DOC  User Manual
TPIM003  PIM I/O Module with 68 pin Connector

Application Information
The TPIM003 is a standard single-width PIM I/O module to be used with any PIM Carrier like TEWS’ TCP020-TM, TVME020-TM or others. It offers easy access to the PMC back I/O lines of PMC carriers with back I/O like TEWS’ TCP260 or TVME8400.

The TPIM003 distributes all 64 PMC back I/O lines to a 68 pin SCSI-3 type connector located in the EMI front panel. Additional GND pins are inserted by solder jumpers at pin 9, 26, 43 and 60 of the 68 pin SCSI-3 type connector. The routing and I/O signal mapping of the TPIM003 is optimized for differential pair routing.

The TPIM003 recreates the PMC front I/O signal mapping in its 68 pin SCSI-3 type connector when used with e.g. the TPMC460, TPMC630 or TPMC868. Refer to the TPMC Data Sheets to find out if the TPIM003 recreates the PMC front I/O signal mapping in its 68 pin SCSI-3 type connector.

The operating temperature is -40°C to +85°C.

Technical Information
- Standard single-width PIM I/O Module
- Board size: 69 mm x 74 mm
- I/O lines are routed to a HD68 SCSI-3 type connector in the front panel
- EMI Front Panel
- Operating Temperature: -40°C to +85°C

Order Information
RoHS Compliant
TPIM003-10R  PIM I/O Module, HD68 connector, special pin assignment

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPIM003-DOC  User Manual

TEWS TECHNOLOGIES GmbH keeps the right to change technical specification without further notice. Issue 1.0.1 2017-08-31

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The Embedded I/O Company

TPIM005  PIM I/O Module with 68 pin Connector

Application Information

The TPIM005 is a standard single-width PIM I/O module to be used with any PIM Carrier like TEWS’ TCP020-TM-10R, TVME020-TM-10R or others. It offers easy access to the PMC back I/O lines of PMC carriers with back I/O like TEWS TCP260 or TVME8400.

The TPIM005 distributes all 64 PMC back I/O lines to a 68 pin SCSI-3 type connector located in the EMI front panel. The routing and I/O signal mapping of the TPIM005 is optimized for differential pair routing.

The TPIM005 recreates the PMC front I/O signal mapping in its 68 pin SCSI-3 type connector when used with the TPMC862/TPMC863 or TPMC362 /TPMC363. Refer to the TPMC Data Sheet to find out if the TPIM005 recreates the PMC front I/O signal mapping in its 68 pin SCSI-3 type connector.

The operating temperature is -40°C to +85°C.

Technical Information

- Standard single-width PIM I/O Module
- Board size: 69 mm x 74 mm
- I/O lines are routed to a HD68 SCSI-3 type connector in the front panel
- EMI Front Panel
- Operating Temperature: -40°C to +85°C

Order Information

RoHS Compliant
TPIM005-10R  PIM I/O Module, HD68 connector, for TPMC863/TPMC363

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPIM005-DOC  User Manual

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Issue 1.0.1
2017-08-31
TPIM006  PIM I/O Module for Gigabit Ethernet PMCs

Application Information
The TPIM006 is a standard single-width PIM I/O module to be used with any PIM carrier like TEWS' TCP020, TVME020 or others. It offers easy access to the PMC back I/O lines of PMC carriers like TEWS' TCP260 or TVME8400.

The TPIM006 distributes the Ethernet signals of the TEWS' Gigabit Ethernet modules with back I/O to RJ-45 connectors located in the front panel of the PIM module.

The TPIM006 reproduces the front I/O signal mapping of TEWS four channel 10/100/1000 Mbit/s Ethernet adapter PMCs in its RJ-45 connectors when used with the TPMC885-11R or TPMC385-10R for example.

The operating temperature is -40°C to +85°C.

Technical Information
- Form Factor: Standard single-width PIM I/O module conforming to VITA 36 – 199X Draft 0.1
- Board size: 69 mm x 74 mm
- I/O lines routed to RJ45 connectors in the front panel
- EMI Front Panel
- Operating temperature: -40°C to +85°C
- MTBF (MIL-HDBK217F/FN2 GB 20°C)
  TPIM006-10R: 758081 h

Order Information
RoHS Compliant
TPIM006-10R  PIM I/O Module for Quad 10/100/1000 Ethernet PMC

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPIM006-DOC  User Manual
The TPIM007 is a standard single-width PIM I/O module to be used on a PIM carrier. It offers easy access to the XMC back I/O lines of XMC carriers.

The TPIM007 distributes the Ethernet signals of TEWS' Gigabit Ethernet XMC modules with P16 back I/O to RJ-45 connectors located in the front panel of the PIM module.

Impedance mismatches, caused by CMC connectors and backplane connectors, lead to signal distortion of the Ethernet signals. To reduce these effects, the routing on the TPIM007 is optimized for differential Ethernet signals.

Additionally, common mode choke filters are placed into the Ethernet signal lines to improve signal quality by suppressing common mode noise on the Ethernet signal lines.

The TPIM007-10R reproduces the front I/O signal mapping of TEWS four channel 10/100/1000Mbit/s Ethernet adapter XMC in its RJ-45 connectors when used with the TXMC385-10R for example.

The operating temperature is -40°C to +85°C.

**Technical Information**

- **Form Factor:** Standard single-width PIM I/O module conforming to VITA 36 – 199X Draft 0.1
- **Board size:** 69 mm x 74 mm
- **I/O lines routed to RJ45 connectors in the front panel**
- **EMI Front Panel**
- **Operating temperature:** -40°C to +85°C
- **MTBF (MIL-HDBK217F/FN2 GB 20°C)**
  - TPIM007-10R: 667000 h

**Order Information**

- **RoHS Compliant**
- **TPIM007-10R** PIM I/O Module for Quad 10/100/1000 Ethernet XMC

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**

- **TPIM007-DOC** User Manual

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PCI Modules

PCI is the most widely-used computer board form factor and bus structure in the world of personal computer technology. With the introduction of high-reliability systems and ruggedized packaging, the use of standard PCI edge cards has spread widely into the industrial and COTS marketplaces. Demand for functionality such as serial communications, field bus, networking, analog and digital I/O, and motion control has increased.

In addition to our well known PCI modules, we offer a complete line of CompactPCI, PCI Express, PCI Express Mini Card, VMEbus, PMC, XMC, PC104+, AMC, MicroTCA, FMC, and numerous IndustryPack modules off-the-shelf.

Software support for major operating systems such as Windows, Linux, Integrity, VxWorks, and QNX is available. All products feature a five-year warranty.

If you wish to inquire about custom PCI designs, please contact TEWS directly at our offices in Germany or the United States. TEWS works closely with OEM and government customers to deliver accelerated time to market, long-term product availability and comprehensive product lifecycle management -- from the design stage through manufacturing, testing and beyond to post-sales support. For more information go to www.tews.com.
TPCI270     PMC Carrier for PCI Card Interface

Application Information

The TPCI270 is a standard 33 MHz, 32 bit PCI carrier for a single PMC Card. It provides PMC front I/O and PMC P14 rear I/O. This PMC to PCI adapter is used to build modular, flexible and cost effective I/O solutions with PMC devices in standard PCI systems.

The TPCI270 is used as a mechanical adapter to connect a PMC module into standard PCI bus based systems.

Operation with 3.3V and 5.0V PCI I/O signaling voltage guarantees compatibility with nearly all PC main boards.

The TPCI270-2xR provides a local 3.3V Generation with a typical current limit of 2A for PC mainboards that do not support 3.3V as PCI supply voltage.

The TPCI270 offers standard PMC front I/O and PMC P14 rear I/O routed to a VME P2 style connector (603-2-IEC-C064-M).

Operating temperature range is -40°C to +85°C.

Technical Information

- PCI Card Interface, PCI 2.2 compliant interface
- One PMC sites conforming to PMC standard (IEEE 1386)
- PCI Interface: 33 MHz; 32 bit
- PCI I/O signaling voltage: 3.3V or 5.0V PCI 2.2 compliant interface
- Front panel I/O
- PMC P14 rear I/O connected to VME P2 style connector (603-2-IEC-C064-M)
- Size: 107 mm x 170 mm
- Operating temperature -40°C to +85°C
Order Information

RoHS Compliant
TPCI270-10R  1 Slot Passive PMC Carrier
TPCI270-20R  1 Slot Passive PMC Carrier, on board generation of 3.3V

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPCI270-DOC  User Manual
The TPMC 117 is a standard single-width 32 bit PMC module and offers six independent channels. Each of these channels can operate as a standard SSI interface controller, in a SSI ‘Listen only’ Mode, as an incremental encoder or general purpose counter.

The standard SSI interface controller outputs a clock burst to the absolute encoder and receives the returned positional data. The SSI interface controller operates with a programmable clock rate from 1µs to 15µs and programmable data word length from 1 bit to 32 bit.

In ‘Listen only’ Mode the channel listens to an existing SSI interface to observe its data transfer. It takes both the SSI clock and data as inputs. In ‘Listen only’ Mode the channel also has a programmable data word length from 1 bit to 32 bit; the SSI clock rate of the observed SSI interface can be in the range of 1µs to 15µs.

In both modes the data word can be encoded in Binary- or in Gray code and with odd, even or no parity.

The 32 bit incremental encoder counter is a preloadable up- and down counter. The counter is programmable for single, double and quadruple analysis of the encoder signals. In conjunction with the isolated 24V digital inputs it provides the possibility of automatic preload of the counter whenever the motion system passes a reference position.

The 32 bit general purpose preloadable up- and down counter can be fed with an internal clock or with external signals.

Both counter modes offer a 32 bit preload register, a 32 bit compare register and various count modes.

A ‘Multiple Channel Read’ function latches the actual values of all enabled channels whose values can then be read without interfering with normal function.

In addition the TPMC117 provides a 16 bit down-counter with preload register which allows timing intervals of up to 65ms. It can be used as reference timer for closed loop applications or as trigger for the Multiple Channel Read function.

All data inputs are isolated. The level of the input signals can be RS422 or TTL. The input signals pass a digital filter for noise suppression before they are further used.

The level of the SSI clock output signals is RS422.

Each of the six motion control channels of the TPMC117 offers one isolated 24V digital input. The input circuit ensures a defined switching point and polarization protection against confusing the pole. The input has an electronic debounce circuit. All six 24V digital inputs can generate an interrupt, triggered on rising or falling edge. Depending on the selected mode the input can be used as general purpose input or reference input.

All TPMC117-10R signals are accessible through a HD68 SCSI-3 type front I/O connector. The TPMC117-20R offers P14 back I/O and a dummy front panel.

The TPMC117 can operate with 3.3V and 5.0V PCI I/O signaling voltage.

Software Support (TDRV005-SW-xx) for different operating systems is available.

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TEWS TECHNOLOGIES GmbH

Issue 1.0.1
2017-08-31
Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- Target Chip: PCI9030 (PLX Technology)
- PCI 2.2 compliant interface
- 5V and 3.3V PCI I/O signaling voltage
- Board size: 149 mm x 74 mm
- HD68 SCSI-3 type I/O connector mounted in front panel
- 6 Channels, independently configurable as standard SSI interface controller, SSI 'Listen only' Mode, incremental encoder or general purpose counter
- Standard SSI Interface
  - SSI data word length programmable from 1 bit to 32 bit
  - Data word encoding: Binary- or Gray-Code
  - Parity: Odd, even or without
  - SSI clock rate: 1µs – 15µs
- SSI 'Listen only' Mode
  - SSI data word length programmable from 1 bit to 32 bit
- Data word encoding: Binary- or Gray-Code
- Parity: Odd, even or without
- 32 bit incremental encoder counter
- 32 bit preload register
- 32 bit compare register
- 1x, 2x or 4x resolution multiplier
- Reference preload function
- Various count- and control modes
- 32 bit general purpose counter
- 32 bit preload register
- 32 bit compare register
- Various count and control modes
- Multiple channel read
- 16 bit down-counter with preload
- Inputs are isolated and TTL/RS422 compatible
- 6 isolated 24 V digital inputs: reference input or general purpose input depending on mode
- Operating temperature -40°C to +85°C
## Order Information

### RoHS Compliant

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPMC117-10R</td>
<td>6 Channel SSI, Incremental Encoder, Counter Interface, RS422 or TTL I/O, Timer, HD68</td>
</tr>
<tr>
<td>TPMC117-20R</td>
<td>6 Channel SSI, Incremental Encoder, Counter Interface, RS422 or TTL I/O, Timer, P14 I/O, no front panel</td>
</tr>
</tbody>
</table>

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

### Documentation

<table>
<thead>
<tr>
<th>Documentation Code</th>
<th>Description</th>
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<tbody>
<tr>
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### Software

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<tr>
<td>TDRV005-SW-25</td>
<td>Integrity Software Support</td>
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<tr>
<td>TDRV005-SW-42</td>
<td>VxWorks Software Support (Legacy and VxBus-Enabled Software Support)</td>
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<tr>
<td>TDRV005-SW-65</td>
<td>Windows Software Support</td>
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<tr>
<td>TDRV005-SW-82</td>
<td>Linux Software Support</td>
</tr>
<tr>
<td>TDRV005-SW-95</td>
<td>QNX Software Support</td>
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</tbody>
</table>

For other operating systems please contact TEWS.

### Related Products

<table>
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<tr>
<th>Product Code</th>
<th>Description</th>
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<tr>
<td>TA304</td>
<td>Cable Kit for Modules with HD68 Connector</td>
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</tbody>
</table>

TEWS TECHNOLOGIES GmbH keeps the right to change technical specification without further notice. All trademarks mentioned are property of their respective owners.
The TPMC150 is a standard single-width 32 bit PMC module providing four (TPMC150-10R), three (TPMC150-11R), two (TPMC150-12R) or one channel (TPMC150-13R) of a Tracking Synchro/Resolver-To-Digital Converter (RDC) with a converter accuracy of 2 arcmin + 1 LSB.

The TPMC150 is designed for use in high performance commercial and industrial systems. It can be used for many applications like motor control, robot axes control, process control, radar antenna position information, and CNC machine tooling.

Each of the up to four RDC channels on the TPMC150 utilizes DDC’s versatile state-of-the-art Tracking Synchro/Resolver-To-Digital Converter RDC19230 with programmable resolution. Resolution programming allows selection of 10, 12, 14 or 16 bit conversion. This combines the high tracking rate of a 10 bit converter with the precision of a 16 bit converter. The RDC19230 provides incremental encoder emulation. Encoder phase signals A, B and Index I are fed to an on board 32 bit up-/down encoder counter with preload and output register. Additionally the synthesized encoder signals are available for external use via RS485/422 output drivers. The RDC19230 provides a 4V velocity output with a linearity of 0.75%, which can be used to replace a tachometer. A 24V isolated digital input per channel can be used as general purpose input or as reference input.

A ‘Simultaneous Read’ function allows latching of the actual values of the selected converters at the same time.

Signal Conditioning Adapters (TPMC150-Ay-xx) are required for each Synchro/Resolver channel to adapt the signal levels of the Synchro/Resolver to the RDC19230 and to configure the optional reference oscillator input/output. The Signal Conditioning Adapters will be built individually to customer specification of the Synchro or Resolver specifications.

A2-xx use high precision, low TK discrete resistors. These adapters are mainly used for resolver applications. The TPMC150-A3-xx and the TPMC150-A4-xx use a high precision resistor network with matched resistors. These adapters are mainly used for synchro applications or resolver applications which require highest accuracy. Additionally the TPMC150-A2-xx and the TPMC150-A4-xx offer an on board reference oscillator with factory selectable frequencies in the range of 2 kHz to 10 kHz.

The on board encoder counter for each channel is a 32 bit up-/down counter with preload and output register. The encoder counter is fed with the emulated A, B and Index signals from the RDC19230. The counters are programmable for single, double and quad analysis of the incremental encoder signals. The counter can be manually or automatically loaded with the value of the preload register, depending on mode. An ‘Auto-reference Mode’ provides the possibility of automatic preload of the encoder counter during normal operation, whenever the motion system passes the reference position. A ‘Simultaneous Read’ function allows latching of the actual values of the selected encoder counters. These values can then be read successively without interfering with normal counter function.

The TPMC150 offers per channel one digital 24V Input which is galvanically isolated by optocouplers. A high performance input circuit ensures a defined switching point and polarization protection against confusing the pole. The inputs are electronically debounced. Each of the four digital 24V inputs can generate an interrupt, triggered on rising or falling edge. Depending on the selected mode the input can be used as general purpose input or as reference input.

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Issue 1.0.1 2017-08-31
**Technical Information**

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- Target Chip: PCI 9030 (PLX Technology)
- PCI 2.2 compliant interface
- PCI I/O Signaling Voltage 3.3V and 5V
- Four, three, two or one channel Tracking Synchro/Resolver-To-Digital-Converter
- Based on DCC’s RDC19230
- Programmable resolution 10, 12, 14 or 16 bits
- Converter accuracy up to 2 arcmin + 1 LSB
- Velocity and built-in-test output
- Incremental Encoder Emulation, encoder signals available as RS422/485 outputs
- Simultaneous Read: The values of selected converters are latched and can be read successively without interfering with normal converter function
- Individual input voltage for each channel by signal conditioning adapter TPMC150-Ay-xx
- Signal Conditioning Adapter
  - TPMC150-A1/A2: Signal conditioning by high precision, low TK discrete resistors
  - TPMC150-A3/A4: Signal conditioning by high precision resistor network with matched resistors
  - TPMC150-A2/A4: Reference oscillator on signal conditioning adapter
  - Oscillator frequency factory selectable 2 - 10 kHz
- Oscillator amplitude max. 11.8Vrms / 70mA
- 32 bit up/down encoder counter with preload and output register per channel
- Utilizes the Incremental Encoder Emulation Signals of the RDC19230
- Single, double or quad analysis of the Incremental Encoder signals
- Preload register, manual or automatic preload of the counter, depending on mode
- Simultaneous Read: The values of selected counters are latched and can be read successively without interfering with normal counter function
- 1 digital 24V input per channel
- Acts as reference input or general purpose input depending on mode
- Generate an interrupt on rising or falling edge, depending on mode
- Galvanic isolation by optocoupler
- Electronically debounced
- Protected against confusing the pole
- All I/O on HD68 SCSI-3 type female connector; No P14 I/O
- Operating temperature -40° to +85°C

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Block diagram TPMC150-10x
Order Information

RoHS Compliant
TPMC150-10R  4 x Synchro / Resolver Interface, RDC19230, 2 arcmin, HD68. TPMC150-Ay-xx per ch. required
TPMC150-11R  3 x Synchro / Resolver Interface, RDC19230, 2 arcmin, HD68. TPMC150-Ay-xx per ch. required
TPMC150-12R  2 x Synchro / Resolver Interface, RDC19230, 2 arcmin, HD68. TPMC150-Ay-xx per ch. required
TPMC150-13R  1 x Synchro / Resolver Interface, RDC19230, 2 arcmin, HD68. TPMC150-Ay-xx per ch. required
TPMC150-A1-xxR Resolver Signal Cond. Adapter (factory installed)
TPMC150-A2-xxR Resolver Signal Cond Adapter with Reference Oscillator (factory installed)

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Non- RoHS Compliant
TPMC150-A3-xx  High Precision Synchro / Resolver Signal Cond. Adapter (factory installed)
TPMC150-A4-xx  High Precision Synchro / Resolver Signal Cond. Adapter with Reference Oscillator (factory installed)

Documentation
TPMC150-DOC  User Manual

Software
TPMC150-SW-25  Integrity Software Support
TPMC150-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TPMC150-SW-65  Windows Software Support
TPMC150-SW-82  Linux Software Support
TPMC150-SW-95  QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA304  Cable Kit for Modules with HD68 Connector (Please note: Cables, Terminal Blocks and Cable Kits are rated up to 30V only!)
Application Information

The TPMC310 is a conduction cooled single-width 32 bit PMC module providing two channel of high speed CAN bus interface.

The PLX PCI9030 PCI Target Chip is used for the PCI interface.

Two Philips SJA1000 CAN controllers (CAN specification 2.0B supported) are used for the two CAN bus channels. The CAN bus I/O interface provides two independent channels, isolated from system logic and from each other.

CAN High Speed transceivers are used for the CAN bus I/O interface. An on board termination option (solder pads) is provided for each CAN bus channel allowing to configure on board termination and pass through mode for the CAN bus.

The TPMC310 uses the P14 I/O connector for the CAN bus I/O interface.

Software support (TDRV010-SW-xx) for different operating systems is available.

Technical Information

- Conduction Cooled single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 2.1 compliant interface
- 3.3V and 5V PCI Signaling Voltage
- Board size: 144 mm x 74 mm
- CAN Bus Interface
  - Two channel High Speed CAN interface
  - Two Philips SJA1000 CAN controller
  - Supports CAN specification 2.0B
- I/O interface based on TJA1050 transceiver, channels isolated from system logic and from each other
- On board termination option for each CAN bus channel
- Operating temperature range –40°C to +85°C
Order Information

RoHS Compliant
TPMC310-10R  ccPMC, 2 x isolated CAN Bus based on Philips SJA1000, ISO11898 CAN High Speed, P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC310-DOC  User Manual

Software
TDRV010-SW-25  Integrity Software Support
TDRV010-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV010-SW-65  Windows Software Support
TDRV010-SW-82  Linux Software Support
TDRV010-SW-95  QNX Software Support

For other operating systems please contact TEWS.

Related Products
TPIM001  PIM I/O Module, HD50 connector
Application Information

The TPMC316 is a conduction cooled single-width 32 bit PMC module and provides two complete CAN bus interfaces using two Bosch CC770 CAN controllers. The CC770 offers pin compatibility with Intel's 82527 CAN Controller and is a function replacement. Both channels are completely independent and support CAN specification 2.0 part A and B (standard 11 bit identifier and extended 29 bit identifier).

Each physical interface is optically isolated from the CAN controller and powered by an on board DC/DC converter and a voltage regulator. Two versions of physical interface are available: the TPMC316-10R supports CAN high speed for each of the two channels. The TPMC316-11R provides a modified RS485 interface for each of the two channels. The bus line termination can be enabled or disabled for each channel by solder pads (disabled per default).

The TPMC316 has no front panel. It uses P14 I/O connector with the same pin assignment as the TPMC816. Software Support (TDRV011-SW-xx) for different operating systems is available.

Technical Information

- Conduction Cooled single-width 32 bit PMC module conforming to IEEE P1386.1, no front panel
- PCI 2.1 compliant interface
- 3.3V and 5V PCI Signaling Voltage
- Board size: 144 mm x 74 mm
- CAN bus interface based on Bosch CC770 chip
- Support CAN specification 2.0 part A and B (standard and extended data frames)
- Programmable global mask
- 15 message objects of 8 byte data length
- Powerful error handling
- Programmable transfer rates
- Physical interface CAN High Speed (according to ISO 11 898) on TPMC316-10R or modified RS485 on TPMC316-11R per channel
- Physical interface optically isolated from CAN controller by on board DC/DC converter and optocoupler per channel
- Transfer rate 1 Mbit/s maximum (bus length up to 40 m)
- Operating temperature range –40°C to +85°C
Order Information

RoHS Compliant
TPMC316-10R  ccPMC, 2 x isolated CAN Bus based on Bosch CC770, ISO11898 Can Hig Speed, P14 I/O
TPMC316-11R  ccPMC, 2 x isolated CAN Bus based on Bosch CC770, mod. RS485, P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC316-DOC  User Manual

Software
TDRV011-SW-25  Integrity Software Support
TDRV011-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV011-SW-65  Windows Software Support
TDRV011-SW-82  Linux Software Support
TDRV011-SW-95  QNX Software Support

For other operating systems please contact TEWS.

Related Products
TPIM001  PIM I/O Module, HD50 connector
TPMC317   Conduction Cooled, 6 Channel SSI, Incremental Encoder, Counter

Application Information

The TPMC317 is a conduction cooled single-width 32 bit PMC module and offers six independent channels. Each of these channels can operate as a standard SSI interface controller, in a SSI 'Listen only' Mode, as an incremental encoder or general purpose counter.

The standard SSI interface controller outputs a clock burst to the absolute encoder and receives the returned positional data. The SSI interface controller operates with a programmable clock rate from 1µs to 15µs and programmable data word length from 1 bit to 32 bit.

In 'Listen only' Mode the channel listens to an existing SSI interface to observe its data transfer. It takes both the SSI clock and data as inputs. In 'Listen only' Mode the channel also has a programmable data word length from 1 bit to 32 bit; the SSI clock rate of the observed SSI interface can be in the range of 1µs to 15µs.

In both modes the data word can be encoded in Binary- or in Gray code and with odd, even or no parity.

The 32 bit incremental encoder counter is a preloadable up- and down counter. The counter is programmable for single, double and quadruple analysis of the encoder signals. In conjunction with the isolated 24V digital inputs it provides the possibility of automatic preload of the counter whenever the motion system passes a reference position.

The 32 bit general purpose preloadable up- and down counter can be fed with an internal clock or with external signals.

Both counter modes offer a 32 bit preload register, a 32 bit compare register and various count modes.

A 'Multiple Channel Read' function latches the actual values of all enabled channels whose values can then be read without interfering with normal function.

In addition the TPMC317 provides a 16 bit down-counter with preload register which allows timing intervals of up to 65ms. It can be used as reference timer for closed loop applications or as trigger for the Multiple Channel Read function.

All data inputs are isolated. The level of the input signals can be RS422 or TTL. The input signals pass a digital filter for noise suppression before they are further used.

The level of the SSI clock output signals is RS422.

Each of the six motion control channels of the TPMC317 offers one isolated 24V digital input. The input circuit ensures a defined switching point and polarization protection against confusing the pole. The input has an electronic debounce circuit. All six 24V digital inputs can generate an interrupt, triggered on rising or falling edge. Depending on the selected mode the input can be used as general purpose input or reference input.

All signals are accessible through the P14 back I/O connector.

The TPMC317 can operate with 3.3V and 5.0V PCI I/O signaling voltage.

Software Support (TDRV005-SW-xx) for different operating systems is available.
Technical Information

- Conduction cooled single-width 32 bit PMC module conforming to IEEE P1386.1
  - Target Chip: PCI9030 (PLX Technology)
  - PCI 2.2 compliant interface
  - 5V and 3.3V PCI I/O signaling voltage
- Board size: 149 mm x 74 mm
- P14 Back I/O connector
- 6 Channels, independently configurable as standard SSI interface controller, SSI 'Listen only’ Mode, incremental encoder or general purpose counter
- Standard SSI Interface
  - SSI data word length programmable from 1 bit to 32 bit
  - Data word encoding: Binary- or Gray-Code
  - Parity: Odd, even or without
  - SSI clock rate: 1µs – 15µs
  - SSI 'Listen only’ Mode
  - SSI data word length programmable from 1 bit to 32 bit
- Data word encoding: Binary- or Gray-Code
- Parity: Odd, even or without
- 32 bit incremental encoder counter
- 32 bit preload register
- 32 bit compare register
- 1x, 2x or 4x resolution multiplier
- Reference preload function
- Various count- and control modes
- 32 bit general purpose counter
- 32 bit preload register
- 32 bit compare register
- Various count and control modes
- Multiple channel read
- 16 bit down-counter with preload
- Inputs are isolated and TTL/RS422 compatible
- 6 isolated 24 V digital inputs: reference input or general purpose input depending on mode
- Operating temperature -40°C to +85°C

Diagram:

Diagram showing the layout of the module with various inputs, outputs, and control logic.
Order Information

RoHS Compliant
TPMC317-10R ccPMC, 6 Channel SSI, Incremental Encoder, Counter, RS422 or TTL I/O, Timer, P14 I/O
For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC317-DOC User Manual

Software
TDRV005-SW-25 Integrity Software Support
TDRV005-SW-42 VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV005-SW-65 Windows Software Support
TDRV005-SW-82 Linux Software Support
TDRV005-SW-95 QNX 6 Software Support
For other operating systems please contact TEWS.

Related Products
TPIM002 PIM I/O Module with 68 pin SCSI-3 type connector
Application Information

The TPMC371 is a conduction cooled single-width 32 bit PMC module and offers 8 channels of high performance asynchronous serial interface.

Three different standard modules are available: The TPMC371-10xR provides 8 RS232 interfaces. The TPMC371-11xR provides 8 RS422 interfaces. The TPMC371-12xR provides 4 RS232 and 4 RS422 interfaces.

Other configurations are available as factory build option on a per channel base.

All modules offer P14 I/O. Each RS232 channel supports RxD, TxD, RTS, CTS and GND. Each RS422 channel supports RxD+/-, TxD+/- and GND. Two channels of the TPMC371-10xR/-12xR offer full modem support (TxD, RxD, CTS, RTS, DSR, DTR, CD, RI and GND) for RS232. Two channels of the TPMC371-11xR support RxD+/-, TxD+/-, RTS+/-, CTS+/- and GND for RS422.

Each channel has 64 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 921.6 kbps for RS232 channels and 5.5296 Mbps for RS422 channels. The UART offers readable FIFO levels.

All channels generate interrupts on PCI interrupt INTA. For fast interrupt source detection the UART provides a special Global Interrupt Source Register.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

The TPMC371 can operate with 3.3V and 5.0V PCI I/O signaling voltage.

Software Support (TDRV002-SW-xx) for different operating systems is available.
Technical Information

- Conduction cooled single-width 32 bit PMC module conforming to IEEE P1386.1, no front panel
- Target Chip: XR17D158 (Exar)
- PCI 2.3 compliant interface
- PCI I/O signaling voltage 5V and 3.3V
- Board size: 143.75 mm x 74 mm
- Asynchronous serial interfaces
- Octal UART: Exar XR17D158
- Support of RxD, TxD, RTS, CTS and GND for each RS232 channel; RxD+/-, TxD+/- and GND for each RS422 channel. Two channels offer extended support (full modem or RTS+/- and CTS+/-)
- Programmable baud rates:
  - RS232: up to 921.6 kbps
  - RS422: up to 5.5296 Mbps
- 64 byte transmit FIFO per channel
- 64 byte receive FIFO per channel
- Readable FIFO levels
- Global Interrupt Source Register
- General Purpose 16 bit Timer/Counter
- ESD protected transceiver (up to ± 15KV )
- Operating temperature -40°C to +85°C
### Order Information

**RoHS Compliant**
- **TPMC371-10R**: ccPMC, 8 Channel Serial RS232, P14 I/O
- **TPMC371-11R**: ccPMC, 8 Channel Serial RS422, P14 I/O
- **TPMC371-12R**: ccPMC, 4 Ch. Serial RS232, 4 Ch. Serial RS422, P14 I/O

Other configurations are available as factory option on a per channel base.

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**
- **TPMC371-DOC**: User Manual

**Software**
- **TDRV002-SW-25**: Integrity Software Support
- **TDRV002-SW-42**: VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
- **TDRV002-SW-65**: Windows Software Support
- **TDRV002-SW-82**: Linux Software Support
- **TDRV002-SW-95**: QNX Software Support

For other operating systems please contact TEWS.

**Accessories**
- **TPIM001**: PIM I/O Module, HD50 connector
TPMC372 is a conduction cooled single-width 32 bit PMC module and offers 4 channels of high performance asynchronous serial interface.

Three different standard modules are available: The TPMC372-10xR provides 4 RS232 interfaces. The TPMC372-11xR provides 4 RS422 interfaces. The TPMC372-12xR provides 2 RS232 and 2 RS422 interfaces.

Other configurations are available as factory build option on a per channel base.

All modules offer P14 I/O. Each RS232 channel supports RxD, TxD, RTS, CTS and GND. Each RS422 channel supports RxD+/-, TxD+/- and GND. One channel of the TPMC372-10xR/-12xR offers full modem support (TxD, RxD, CTS, RTS, DSR, DTR, CD, RI and GND) for RS232. One channel of the TPMC372-11xR supports RxD+/-, TxD+/-, RTS+/-, CTS+/- and GND for RS422.

Each channel has 64 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 921.6 kbps for RS232 channels and 5.5296 Mbps for RS422 channels. The UART offers readable FIFO levels.

All channels generate interrupts on PCI interrupt INTA. For fast interrupt source detection the UART provides a special Global Interrupt Source Register.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

The TPMC372 can operate with 3.3V and 5.0V PCI I/O signaling voltage.

Software Support (TDRV002-SW-xx) for different operating systems is available.

Application Information
Technical Information

- Conduction cooled single-width 32 bit PMC module conforming to IEEE P1386.1, no front panel
- Target Chip: XR17D154 (Exar)
- PCI 2.3 compliant interface
- PCI I/O signaling voltage 5V and 3.3V
- Board size: 143.75 mm x 74 mm
- Asynchronous serial interface
- Quad UART: Exar XR17D154
- Support of RxD, TxD, RTS, CTS and GND for each RS232 channel; RxD+/-, TxD+/- and GND for each RS422 channel. One channel offers extended support (full modem or RTS+/-. and CTS+/-.)
- Programmable baud rates:
  - RS232: up to 921.6 kbps
  - RS422: up to 5.5296 Mbps
- 64 byte transmit FIFO per channel
- 64 byte receive FIFO per channel
- Readable FIFO levels
- Global Interrupt Source Register
- General Purpose 16 bit Timer/Counter
- ESD protected transceiver (up to ± 15KV)
- Operating temperature -40°C to +85°C
# Order Information

**RoHS Compliant**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>TPMC372-10R</td>
<td>ccPMC, 4 Channel Serial RS232, P14 I/O</td>
</tr>
<tr>
<td>TPMC372-11R</td>
<td>ccPMC, 4 Channel Serial RS422, P14 I/O</td>
</tr>
<tr>
<td>TPMC372-12R</td>
<td>ccPMC, 2 Ch. Serial RS232, 2 Ch. Serial RS422, P14 I/O</td>
</tr>
</tbody>
</table>

Other configurations are available as factory option on a per channel base.

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
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<tbody>
<tr>
<td>TPMC372-DOC</td>
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**Software**

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<th>Model</th>
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<td>TDRV002-SW-25</td>
<td>Integrity Software Support</td>
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<tr>
<td>TDRV002-SW-42</td>
<td>VxWorks Software Support (Legacy and VxBus-Enabled Software Support)</td>
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<td>TDRV002-SW-65</td>
<td>Windows Software Support</td>
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<tr>
<td>TDRV002-SW-82</td>
<td>Linux Software Support</td>
</tr>
<tr>
<td>TDRV002-SW-95</td>
<td>QNX Software Support</td>
</tr>
</tbody>
</table>

For other operating systems please contact TEWS.

**Accessories**

<table>
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<tr>
<th>Model</th>
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</thead>
<tbody>
<tr>
<td>TPIM001</td>
<td>PIM I/O Module, HD50 connector</td>
</tr>
</tbody>
</table>

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Issue 1.1.1

2017-08-31
The TPMC375 is a conduction cooled single-width 32 bit PMC module offering 8 channels of high performance RS232/RS422/RS485 programmable asynchronous serial interface with P14 I/O.

The serial channels can be individually programmed to operate as RS232, RS422 or RS485 full duplex/half duplex interface. In addition programmable termination is provided for the RS422/RS485 interfaces. After power-up all serial I/O lines are in a high impedance state.

Each RS232 channel supports RxD, TxD, RTS, CTS and GND. RS422 and RS485 full duplex support a four wire interface (RX+, RX-, TX+, TX-) plus ground (GND). RS485 half duplex supports a two wire interface (DX+, DX-) plus ground (GND).

Each channel has 64 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 921.6 kbps for RS232 channels and 5.5296 Mbps for RS422/RS485 channels. The UART offers readable FIFO levels.

All channels generate interrupts on PCI interrupt INTA. For fast interrupt source detection the UART provides a special Global Interrupt Source Register.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

The TPMC375 can operate with 3.3V and 5.0V PCI I/O signaling voltage.

Software Support (TDRV002-SW-xx) for different operating systems is available.
Technical Information

- Conduction cooled single-width 32 bit PMC module conforming to IEEE P1386.1, no front panel
- Target Chip: XR17D158 (Exar)
- PCI 2.3 compliant interface
- PCI I/O signaling voltage 5V and 3.3V
- Board size: 143.75 mm x 74 mm
- Asynchronous serial interface
- Octal UART: Exar XR17D158
- Programmable Interfaces:
  - RS232
  - RS422
  - RS485 full duplex
  - RS485 half duplex
  - Programmable Termination for RS422/RS485
- Support of RxD, TxD, RTS, CTS and GND for each RS232 channel; RxD+/-, TxD+/- and GND for each RS422/RS485 FD channel; D+/- and GND for each RS485 HD channel.
- Programmable baud rates:
  - RS232: up to 921.6 kbps
  - RS422/RS485: up to 5.5296 Mbps
- 64 byte transmit FIFO per channel
- 64 byte receive FIFO per channel
- Readable FIFO levels
- Global Interrupt Source Register
- General Purpose 16 bit Timer/Counter
- ESD protected transceiver (up to ± 15KV)
- Operating temperature -40°C to +85°C

![Diagram of the module](image-url)
Order Information

RoHS Compliant
TPMC375-10R  ccPMC, 8 Channel Programmable RS232/RS422/RS485, P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC375-DOC  User Manual

Software
TDRV002-SW-25  Integrity Software Support
TDRV002-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV002-SW-65  Windows Software Support
TDRV002-SW-82  Linux Software Support
TDRV002-SW-95  QNX Software Support

For other operating systems please contact TEWS.

Accessories
TPIM001  PIM I/O Module, HD50 connector
TPMC376  Conduction Cooled PMC, 4 Channel RS232/RS422/RS485 Programmable Serial Interface

Application Information

The TPMC376 is a conduction cooled single-width 32 bit PMC module offering 4 channels of high performance RS232/RS422/RS485 programmable asynchronous serial interface with P14 I/O.

The serial channels can be individually programmed to operate as RS232, RS422 or RS485 full duplex / half duplex interface. In addition programmable termination is provided for the RS422/RS485 interfaces. After power-up all serial I/O lines are in a high impedance state.

Each RS232 channel supports Rx, Tx, RTS, CTS and GND. RS422 and RS485 full duplex support a four wire interface (RX+, RX-, TX+, TX-) plus ground (GND). RS485 half duplex supports a two wire interface (DX+, DX-) plus ground (GND).

Each channel has 64 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 921.6 kbps for RS232 channels and 5.5296 Mbps for RS422/RS485 channels. The UART offers readable FIFO levels.

All channels generate interrupts on PCI interrupt INTA. For fast interrupt source detection the UART provides a special Global Interrupt Source Register.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

The TPMC376 can operate with 3.3V and 5.0V PCI I/O signaling voltage.

Software Support (TDRV002-SW-xx) for different operating systems is available.
Technical Information

- Conduction cooled single-width 32 bit PMC module conforming to IEEE P1386.1, no front panel
- Target Chip: XR17D154 (Exar)
- PCI 2.3 compliant interface
- PCI I/O signaling voltage 5V and 3.3V
- Board size: 143.75 mm x 74 mm
- Asynchronous serial interface
- Quad UART: Exar XR17D154
- Programmable Interfaces:
  - RS232
  - RS422
  - RS485 full duplex
  - RS485 half duplex
  - Programmable Termination for RS422/RS485

- Support of RxD, TxD, RTS, CTS and GND for each RS232 channel; RxD+/-, TxD+/- and GND for each RS422/RS485 FD channel; D+/- and GND for each RS485 HD channel.
- Programmable baud rates:
  - RS232: up to 921.6 kbps
  - RS422/RS485: up to 5.5296 Mbps
- 64 byte transmit FIFO per channel
- 64 byte receive FIFO per channel
- Readable FIFO levels
- Global Interrupt Source Register
- General Purpose 16 bit Timer/Counter
- ESD protected transceiver (up to ±15KV)
- Operating temperature -40°C to +85°C
### Order Information

**RoHS Compliant**
TPMC376-10R  ccPMC, 4 Channel Programmable RS232/RS422/RS485, P14 I/O

For the availability of non-RoHS compliant (lead solder) products please contact TEWS.

### Documentation

TPMC376-DOC  User Manual

### Software

- **TDRV002-SW-25**  Integrity Software Support
- **TDRV002-SW-42**  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
- **TDRV002-SW-65**  Windows Software Support
- **TDRV002-SW-82**  Linux Software Support
- **TDRV002-SW-95**  QNX Software Support

For other operating systems please contact TEWS.

### Accessories

TPIM001  PIM I/O Module, HD50 connector

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Issue 1.0.1  2017-08-31
TPMC377 Conduction Cooled PMC, 4 Channel Isolated RS232/RS422/RS485 Programmable Serial Interface

Application Information

The TPMC377 is a conduction cooled single-width 32 bit PMC module offering 4 channels of high performance RS232/RS422/RS485 programmable asynchronous serial interface with P14 I/O. Each of the four channels are isolated from the system and against each other by digital isolator and on board integrated DC/DC converter.

The serial channels can be individually programmed to operate as RS232, RS422 or RS485 full duplex / half duplex interface. In addition programmable termination is provided for the RS422/RS485 interfaces. After power-up all serial I/O lines are in a high impedance state.

Each RS232 channel supports RxD, TxD, RTS, CTS and GND. RS422 and RS485 full duplex support a four wire interface (RX+, RX-, TX+, TX-) plus ground (GND). RS485 half duplex supports a two wire interface (DX+, DX-) plus ground (GND).

Each channel has 64 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 921.6 kbps for RS232 channels and 5.5296 Mbps for RS422/RS485 channels. The UART offers readable FIFO levels.

All channels generate interrupts on PCI interrupt INTA. For fast interrupt source detection the UART provides a special Global Interrupt Source Register.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

The TPMC377 can operate with 3.3V and 5.0V PCI I/O signaling voltage.

Software Support (TDRV002-SW-xx) for different operating systems is available.
Technical Information

- Conduction cooled single-width 32 bit PMC module conforming to IEEE P1386.1, no front panel
  - Target Chip: XR17D154 (Exar)
  - PCI 2.3 compliant interface
  - PCI I/O signaling voltage 5V and 3.3V
- Board size: 143.75 mm x 74 mm
- Asynchronous serial interface
- Quad UART: Exar XR17D154
- Programmable Interfaces:
  - RS232
  - RS422
  - RS485 full duplex
  - RS485 half duplex
  - Programmable Termination for RS422/RS485
- Support of RxD, TxD, RTS, CTS and GND for each RS232 channel; RxD+/-, TxD+/- and GND for each RS422/RS485 FD channel; D+/- and GND for each RS485 HD channel.
- Programmable baud rates:
  - RS232: up to 921.6 kbps
  - RS422/RS485: up to 5.5296 Mbps
- 64 byte transmit FIFO per channel
- 64 byte receive FIFO per channel
- Readable FIFO levels
- Global Interrupt Source Register
- General Purpose 16 bit Timer/Counter
- Galvanic isolation of each Transceiver Channel
- ESD protected transceiver (up to ± 15KV )
- Operating temperature -40°C to +85°C
- MTBF (MIL-HDBK217F/FN2 G6 20°C)
  - TPMC377-10R: 805000h

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Issue 1.0.1 2017-08-31
The Embedded I/O Company

Order Information

RoHS Compliant
TPMC377-10R    ccPMC, 4 Channel Isolated Programmable RS232/RS422/RS485, P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC377-DOC    User Manual

Software
TDRV002-SW-25    Integrity Software Support
TDRV002-SW-42    VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV002-SW-65    Windows Software Support
TDRV002-SW-82    Linux Software Support
TDRV002-SW-95    QNX Software Support

For other operating systems please contact TEWS.

Related Products
TPIM001    PIM I/O Module, HD50 connector
TPMC378  Conduction cooled 8 channel isolated RS422 interface

Application Information

The TPMC378 is a conduction cooled single-width 32 bit PMC module offering 8 channels of high performance RS422 asynchronous serial interface with P14 I/O. Each of the eight channels is isolated from the system and against each other by isolated transceivers with integrated DC/DC converters.

Each RS422 channel supports a four wire interface (RX+, RX-, TX+, TX-) plus ground (GND). Two channels additionally support flow control with RTS+/- and CTS+/-.

Each channel has 64 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 5.5296 Mbps for RS422 channels. The UART offers readable FIFO levels.

All channels generate interrupts on PCI interrupt INTA. For fast interrupt source detection the UART provides a special Global Interrupt Source Register.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

The TPMC378 can operate with 3.3V and 5.0V PCI I/O signaling voltage.

Software Support (TDRV002-SW-xx) for different operating systems is available.

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The Embedded I/O Company

Technical Information

- Conduction cooled single-width 32 bit PMC module conforming to IEEE P1386.1
- Board size: 143.75 mm x 74 mm
- Target Chip: XR17D158 (Exar)
- PCI 2.3 compliant interface
- Universal PCI I/O signaling voltage: 5 V or 3.3 V
- Asynchronous serial interface
- Octal UART: Exar XR17D158
- Supports RxD+/-, TxD+/- and GND for each channel. Two channels offer extended support (RTS+/- and CTS+/-)
- Galvanic isolation of each Transceiver Channel
- Programmable baud rates: up to 5.5296 Mbps
- 64 byte transmit FIFO per channel
- 64 byte receive FIFO per channel
- Readable FIFO levels
- Global Interrupt Source Register
- General Purpose 16 bit Timer/Counter
- ESD protected transceiver (up to ± 15KV)
- Operating temperature -40°C to +85°C
- MTBF (MIL-HDBK217F/FN2 GB 20°C) TPMC378-10R: 1.000.000 h

Order Information

RoHS Compliant
TPMC378-10R ccPMC, 8 Channel Isolated RS422, P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC378-DOC User Manual

Software
TDRV002-SW-25 Integrity Software Support
TDRV002-SW-42 VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV002-SW-65 Windows Software Support
TDRV002-SW-82 Linux Software Support
TDRV002-SW-95 QNX Software Support

For other operating systems please contact TEWS.

Related Products
TPIM001 PIM I/O Module, HD50 connector

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TPMC385  Conduction Cooled, 4x 10/100/1000 Mbit/s Ethernet

Application Information
The TPMC385 is a Conduction Cooled PCI Mezzanine Card (CCPMC) compatible module providing a four channel Ethernet 10BASE-T / 100BASE-TX / 1000BASE-T interface.

A transparent 64 bit, up to 133 MHz PCI-X/PCI to PCIe Bridge and a PCIe Switch provide access to the Intel™ 82574IT Gigabit Ethernet controllers. Each Ethernet interface supports 10, 100 and 1000Mbit/s transmission rates for full duplex operation, 10 and 100Mbit/s transmissions for half duplex operation, and is equipped with a 32 Kbit Serial EEPROM.

The four Ethernet interfaces of the TPMC385 are capable of performing an auto negotiation algorithm which allows both link-partners to find out the best link-parameters by themselves. The TPMC385 is widely user configurable via configuration and status register access over the PCI bus.

The TPMC385-10R routes all four 10/100/1000Mbit/s Ethernet ports to the PMC back I/O P14 connector. 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° to +85°C.

Software Support:
- Software support for Intel™ 82574IT at www.intel.com
- For operating systems not supported by Intel™, please contact TEWS.

Technical Information
- Form Factor: Conduction cooled single-width 64 bit PMC module, no front panel
  - Board size: 143.75 mm x 74 mm
- PCI 3.0 (up to 66 MHZ) and PCI-X 2.0a (up to 133 MHZ) compliant interface
- 3.3V PCI signaling with 5V I/O tolerance
- 4 Intel™ 82574IT Gigabit Ethernet controllers
- 10Base-T / 100Base-TX / 1000Base-T

- Half or full-duplex operation
- For each interface: Configurable receive and transmit data FIFO, programmable in 1 KB increments
- Operating temperature -40°C to +85°C
- MTBF (MIL-HDBK217F/FN2 GB 20°C) TPMC385-10R: 502000 h
Order Information

RoHS Compliant
TPMC385-10R  ccPMC, 4 Channel 10/100/1000BaseT Ethernet Interface, Intel 82574IT, P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC385-DOC  User Manual

Related Products
TPIM006      PIM I/O Module for Quad 10/100/1000 Ethernet PMC
TEWS TECHNOLOGIES is expanding its I/O offering from PMC and IndustryPack modules to include PCIe form factor solutions. With our background and long-term experience in interface products based on IndustryPack, PMC, XMC, CompactPCI, PCI, AMC, FMC and VME standards, TEWS is applying its expertise to the introduction of PCIe modules.

If you wish to inquire about custom PCIe designs, please contact TEWS directly at our offices in Germany or the United States. TEWS works closely with OEM and government customers to deliver accelerated time to market, long-term product availability and comprehensive product lifecycle management -- from the design stage through manufacturing, testing and beyond to post-sales support. For more information go to www.tews.com.
The TPMC500 is a PCI Mezzanine Card compatible module providing 32 galvanically isolated multiplexed 16 bit ADC channels. The data acquisition and conversion time is mode-dependent: Maximum 10µs without channel / gain change, maximum 12.5µs with channel / gain change.

The ADC input channels can be software configured to operate in single-ended mode (up to 32 input channels) or differential mode (up to 16 input channels). Mixed mode operation is also possible.

The ADC multiplexer is overvoltage protected up to 70Vpp. A programmable gain amplifier allows gains of 1, 2, 5, 10 (TPMC500-10R, -12R, -20R and –22R) or 1, 2, 4, 8 (TPMC500-11R, -13R, -21R and –23R). For a gain of 1, the full-scale input voltage range is +/-10V for the TPMC500-10R, -11R, -20R, -21R and 0V to 10V for the TPMC500-12R, -13R, -22R, -23R.

Additionally the TPMC500 provides a sequencer to control the analog inputs without wasting CPU time. Each channel can be independently enabled and configured by a sequencer instruction RAM. After the last instruction of a programmed sequence has been completed the ADC data of all channels enabled for the sequence are stored in the data RAM.

The repeat frequency of the sequencer can be programmed by using the sequence timer. The sequence timer is programmable from 100µs to 6.5535sec in steps of 100µs. Whenever the timer reaches the programmed value the sequencer starts a new sequence. A special function is the sequencer continuous mode. It is activated, if the sequence timer register is set to 0. In this mode the sequencer will start again with the first instruction of the sequence as soon as the last instruction of the previous sequence has been completed.

Each TPMC500 is factory calibrated. The calibration data is stored in an EEPROM unique to each TPMC500.

Software support (TPMC500-SW-xx) is available for different operating systems.
Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 2.1 compliant interface
- 3.3V and 5V PCI Signaling Voltage
- Board size: 149 mm x 74 mm
- 32 single-ended or 16 differential channels of isolated 12 bit A/D conversion
- Acquisition and conversion time up to 10 µs without and up to 12.5 µs with channel / gain change

- ESD protected input multiplexer
- Programmable gain amplifier: gain 1, 2, 5, 10 or 1, 2, 4, 8 (order option)
- 12 bit A/D converter with internal S/H and reference
- Full-scale input range +/-10V or 0-10V (order option)
- Interrupt capability at end-of-conversion
- Factory calibrated, calibration information stored in EEPROM
Order Information

RoHS Compliant
TPMC500-10R  32 Channel Isolated Multiplexed 12 bit A/D, gain 1,2,5,10, +/-10V, HD50
TPMC500-11R  32 Channel Isolated Multiplexed 12 bit A/D, gain 1,2,4,8, +/-10V, HD50
TPMC500-12R  32 Channel Isolated Multiplexed 12 bit A/D, gain 1,2,5,10, 0-10V, HD50
TPMC500-13R  32 Channel Isolated Multiplexed 12 bit A/D, gain 1,2,4,8, 0-10V, HD50
TPMC500-20R  32 Channel Isolated Multiplexed 12 bit A/D, gain 1,2,5,10, +/-10V, P14 I/O
TPMC500-21R  32 Channel Isolated Multiplexed 12 bit A/D, gain 1,2,4,8, +/-10V, P14 I/O
TPMC500-22R  32 Channel Isolated Multiplexed 12 bit A/D, gain 1,2,5,10, 0-10V, P14 I/O
TPMC500-23R  32 Channel Isolated Multiplexed 12 bit A/D, gain 1,2,4,8, 0-10V, P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC500-DOC  User Manual

Software
TPMC500-SW-25  Integrity Software Support
TPMC500-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TPMC500-SW-65  Windows Software Support
TPMC500-SW-82  Linux Software Support
TPMC500-SW-95  QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA301  Cable Kit for modules with HD50 connector
TPIM001  PIM I/O Module, HD50 connector
TPMC501 32 Channels of Isolated 16 bit A/D

Application Information

The TPMC501 is a PCI Mezzanine Card compatible module providing 32 galvanically isolated multiplexed 16 bit ADC channels. The data acquisition and conversion time is mode-dependent: Maximum 12\(\mu\)s without channel / gain change, maximum 14.5\(\mu\)s with channel / gain change.

The ADC input channels can be software configured to operate in single-ended mode (up to 32 input channels) or differential mode (up to 16 input channels). Mixed mode operation is also possible.

The ADC multiplexer is overvoltage protected up to 70Vpp. A programmable gain amplifier allows gains of 1, 2, 5, 10 (TPMC501-10R, -12R, -20R and –22R) or 1, 2, 4, 8 (TPMC501-11R, -13R, -21R and –23R). The full-scale input voltage range for a gain of 1 is +/-10V for the TPMC501-10R, -11R, -20R, -21R and 0V to 10V for the TPMC501-12R, -13R, -22R, -23R.

Additionally the TPMC501 provides a sequencer to control the analog inputs without wasting CPU time. Each channel can be independently enabled and configured by a sequencer instruction RAM. After the last instruction of a programmed sequence has completed the ADC data of all channels enabled for the sequence are stored in the data RAM.

The repeat frequency of the sequencer can be programmed by using the sequence timer. The sequence timer is programmable from 100\(\mu\)s to 6.5535s in steps of 100\(\mu\)s. Whenever the timer reaches the programmed value the sequencer starts a new sequence. A special function is the sequencer continuous mode. It is activated, if the sequence timer register is set to 0. In this mode the sequencer will start again with the first instruction of the sequence as soon as the last instruction of the previous sequence has been completed.

Each TPMC501 is factory calibrated. The calibration data is stored in an EEPROM unique to each TPMC501 in the Calibration-PROM unique to each PMC module.

Software support (TPMC501-SW-xx) is available for different operating systems.
**Technical Information**

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 2.1 compliant interface
- 3.3V and 5V PCI Signaling Voltage
- Board size: 149 mm x 74 mm
- 32 single-ended or 16 differential channels of isolated 16 bit A/D conversion
- Acquisition and conversion time up to 12µs without and up to 14.5µs with channel / gain change
- ESD protected input multiplexer
- Programmable gain amplifier: gain 1, 2, 5, 10 or 1, 2, 4, 8 (order option)
- 16 bit A/D converter with internal S/H and reference
- Full-scale input range +/-10V or 0-10V (order option)
- Interrupt capability at end-of-conversion
- Factory calibrated, calibration information stored in EEPROM
Order Information

RoHS Compliant
TPMC501-10R 32 Channel Isolated Multiplexed 16 bit A/D, gain 1,2,5,10, +/-10V, HD50
TPMC501-11R 32 Channel Isolated Multiplexed 16 bit A/D, gain 1,2,4,8, +/-10V, HD50
TPMC501-12R 32 Channel Isolated Multiplexed 16 bit A/D, gain 1,2,5,10, 0-10V, HD50
TPMC501-13R 32 Channel Isolated Multiplexed 16 bit A/D, gain 1,2,4,8, 0-10V, HD50
TPMC501-20R 32 Channel Isolated Multiplexed 16 bit A/D, gain 1,2,5,10, +/-10V, P14 I/O
TPMC501-21R 32 Channel Isolated Multiplexed 16 bit A/D, gain 1,2,4,8, +/-10V, P14 I/O
TPMC501-22R 32 Channel Isolated Multiplexed 16 bit A/D, gain 1,2,5,10, 0-10V, P14 I/O
TPMC501-23R 32 Channel Isolated Multiplexed 16 bit A/D, gain 1,2,4,8, 0-10V, P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC501-DOC User Manual

Software
TPMC501-SW-25 Integrity Software Support
TPMC501-SW-42 VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TPMC501-SW-65 Windows Software Support
TPMC501-SW-82 Linux Software Support
TPMC501-SW-95 QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA301 Cable Kit for modules with HD50 connector
TPIM001 PIM I/O Module, HD50 connector
The TPMC530 is a standard single width 32 bit PMC with faceplate I/O. The TPMC530-10R provides 16 channels of isolated 16 bit simultaneous sampling analog input and 8 channels of isolated 16 bit simultaneous update analog output. The TPMC530-20R provides 8 ADC channels and 4 DAC channels. All signals are accessible through a HD50 SCSI-2 type front I/O connector.

The ADC offers true differential inputs with software selectable ±5 V and ±10 V bipolar input voltage ranges (one setting for all channels). The sampling rate is up to 200 kSPS and the ADC offers an oversampling capability with digital filter.

The DAC offers software selectable 0-5 V, 0-10 V, ±5 V and ±10 V output voltage ranges (one setting for all channels). The conversion time is typ. 10 µs and the DAC outputs are capable to drive a load of 2 kΩ, with a capacitance up to 4000 pF.

Both ADC and DAC offer programmable sample clocks. External synchronization is possible with a Trigger/Sync RS485 I/O.

Each ADC / DAC provides a 1024 sample input / output FIFO with programmable trigger levels. Data transfer on the PCI bus is handled by TPMC530 initiated scatter-gather DMA cycles with minimum host/CPU intervention.

Each TPMC530 is factory calibrated. The calibration can be automatically applied to data written to and read from the TPMC530.

Software Support (TPMC530-SW-xx) is available for different operating systems.
**Technical Information**

- **Form Factor:** Standard single width 32 bit PMC module with faceplate I/O conforming to IEEE P1386.1
- **Board size:** 149 mm x 74 mm
- **PCI 3.0 compatible master/slave interface**
- **Universal PCI I/O signaling voltage:** 5 V or 3.3 V
- **16/8 channels 16 bit isolated analog input**
  - Simultaneous sampling
  - True differential inputs
  - Programmable input voltage (one setting for all channels): ±5 V, ±10 V
  - Sampling rate: 200 kSPS
  - Overvoltage protection
- **8/4 channels single-ended 16 bit isolated analog output**
  - Simultaneous update
- **Programmable output voltage (one setting for all channels):** 0-5 V, 0-10 V, ±5 V, ±10 V
- **Conversion time:** typ.10 µs
- **Up to 2 kΩ resistive, 4000 pF capacitive load**
- **Overcurrent protection**
- **1024 sample FIFO for both ADC & DAC**
- **Scatter-gather DMA for both ADC & DAC**
- **Internal correction using factory calibration data stored in EEPROM**
- **Operating temperature:** -40°C to +85°C
- **MTBF (MIL-HDBK217F/FN2 GB 20°C):** 544,000 h
Order Information

RoHS Compliant
TPMC530-10R  16/8-Ch. Isolated Simultaneous Sampling AD/DA
TPMC530-20R  8/4-Ch. Isolated Simultaneous Sampling AD/DA

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC530-DOC  User Manual

Software
TPMC530-SW-25  Integrity Software Support
TPMC530-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TPMC530-SW-65  Windows Software Support
TPMC530-SW-82  Linux Software Support
TPMC530-SW-95  QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA301  Cable Kit for Modules with HD50 Connector
TPMC532 16x/8x ADC, 8x/4x DAC and 14x Digital I/O

Application Information

The TPMC532 is a standard single-wide PCI Mezzanine Card (PMC) compatible module providing 16 or 8 channels of simultaneous sampling true differential bipolar 16bit analog input, 8 or 4 channels of simultaneous update single-ended unipolar/bipolar 16bit analog output and 14 channels of tri-state 5V-tolerant TTL digital input/output. All signals are accessible through a Mini D Ribbon (MDR68) type front I/O connector.

The PMC-Connectors P11 and P12 provide access to the control logic via a 32bit 33MHz PCI link.

The ADCs offer true differential inputs with software selectable ±5V and ±10V bipolar input voltage ranges (one common setting for all eight channels of each ADC). The maximum sample rate of the ADCs is 200kSPS and they offer an oversampling capability with digital filter.

The DACs offer software selectable 0-5V, 0-10V, 0-10.8V, ±5V, ±10V and ±10.8V output voltage ranges (individual setting for each of the four channels of each DAC). The settling time is typically 10μs and the DAC channels are capable to drive a load of 2kΩ, with a capacitance up to 4000pF.

Each TPMC532 is factory calibrated. The correction data is stored in an on-board serial EEPROM unique to each PMC module. These correction values can be used to perform a hardware correction of every analog-to-digital and digital-to-analog conversion. Additionally, a temperature sensor on-board can be used to compensate temperature dependent errors.

The TPMC532 provides two Sequencers, one for AD Conversions and another one for DA Conversions. To perform periodic simultaneous conversions the conversion rates are programmable and can be output to other modules on PMC Back I/O Connector P14 or Front I/O Connector DIO pins for synchronization purposes. The TPMC532 can also operate as a target which means that the conversion rates can be sourced from P14 or Front I/O, created by another module.

A Frame Trigger signal, which can also either be generated by the TPMC532 and output on P14/Front I/O or generated by other modules and input from P14/Front I/O, can be used to synchronize ADC frames and DAC frames.

The signals on PMC Back I/O Connector P14 are ESD protected and driven or read by tri-state 5V-tolerant TTL buffers.

To be able to collect ADC frames and to output DAC frames the TPMC532 provides input and output FIFOs. Data transfer on the PCI bus is handled by TPMC532 initiated block transfer mode DMA cycles with minimum host/CPU intervention.
The 14 Digital TTL tri-state I/O lines with 4.7kΩ pull resistors are ESD protected. The voltage, the pull resistors are connected to, is programmable by software and can be 3.3V, 5V, GND or floating level (one common setting for all fourteen Digital I/Os).

All 14 DIOs can be programmed whether to have their Digital I/O transmitters enabled or disabled individually per I/O line. The Digital I/O receivers are always enabled, so each DIO level can always be monitored and can generate an interrupt, triggered on rising edge, falling edge or both. Additionally, a debounce filter can be configured to get rid of bounce on the Digital I/O lines.

**Technical Information**

- **Standard single-wide PCI Mezzanine Card (PMC)**
  - conforming to IEEE P1386/P1386.1
  - Board size: 149mm x 74mm
  - 32bit / 33MHz PCI
  - DMA Master functionality

- **16 or 8 channels of simultaneous sampling true differential bipolar 16bit analog input**
  - Input voltage ranges: ±5V and ±10V
  - Maximum sample rate: 200kSPS
  - Oversampling capability

- **8 or 4 channels of simultaneous update single-ended unipolar/bipolar 16bit analog output**
  - Output voltage ranges: 0-5V, 0-10V, 0-10.8V, ±5V, ±10V and ±10.8V
  - Settling time: typ. 10μs
  - load of 2kΩ with a capacitance up to 4000pF

- **Hardware Correction**
  - Factory calibrated

- **Temperature Sensor on-board**

- **Programmable conversion rates**
  - Can be output to other modules
  - Can be input from other modules

- **Frame Trigger signal for synchronization purposes**

- **14 channels of tri-state 5V-tolerant TTL digital input/output**
  - ESD protection
  - Mini D Ribbon (MDR68) type front I/O connector
  - Operating temperature: -40°C to +85°C

- **MTBF (MIL-HDBK217F/FN2 GB 20°C)**
  - TPMCS32-10R: 511000 h
  - TPMCS32-20R: 526000 h

**TPMC532 Block Diagram**
## Order Information

<table>
<thead>
<tr>
<th>RoHS Compliant</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>TPMC532-10R</td>
<td>16 Channels of Simultaneous Sampling Differential 16 bit A/D, 8 Channels of Simultaneous Update Single-Ended 16 bit D/A and 14 Channels of TTL Digital I/O, with MDR68 front panel I/O</td>
</tr>
<tr>
<td>TPMC532-20R</td>
<td>8 Channels of Simultaneous Sampling Differential 16 bit A/D, 4 Channels of Simultaneous Update Single-Ended 16 bit D/A and 14 Channels of TTL Digital I/O, with MDR68 front panel I/O</td>
</tr>
</tbody>
</table>

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

### Documentation

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPMC532-DOC</td>
<td>User Manual</td>
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### Software

<table>
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<tbody>
<tr>
<td>TDRV019-SW-25</td>
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<tr>
<td>TDRV019-SW-42</td>
<td>VxWorks Software Support (Legacy and VxBus-Enabled Software Support)</td>
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<tr>
<td>TDRV019-SW-65</td>
<td>Windows Software Support</td>
</tr>
<tr>
<td>TDRV019-SW-82</td>
<td>Linux Software Support</td>
</tr>
<tr>
<td>TDRV019-SW-95</td>
<td>QNX Software Support</td>
</tr>
</tbody>
</table>

For other operating systems please contact TEWS.

### Related Products

<table>
<thead>
<tr>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>TA113</td>
<td>MDR68 Cable</td>
</tr>
<tr>
<td>TA207</td>
<td>MDR68 Terminal Block</td>
</tr>
<tr>
<td>TA312</td>
<td>Cable Kit for Modules with MDR68 Connector</td>
</tr>
</tbody>
</table>
TPMC533  32x ADC, 16x/0x DAC and 8x Digital I/O

Application Information

The TPMC533 is a standard single-wide PCI Mezzanine Card (PMC) compatible module providing 32 channels of simultaneous sampling true differential bipolar 16bit analog input, 16 or no channels of simultaneous update single-ended unipolar/bipolar 16bit analog output and 8 channels of tri-state 5V-tolerant TTL digital input/output. All signals are accessible through a HDRA100 type front I/O connector.

The PMC-Connectors P11 and P12 provide access to the control logic via a 32bit 33MHz PCI interface.

The ADCs offer true differential inputs with software selectable ±5V and ±10V bipolar input voltage ranges (one common setting for all eight channels of each ADC). The maximum sample rate of the ADCs is 200kSPS and they offer an oversampling capability with digital filter.

The DACs offer software selectable 0-5V, 0-10V, 0-10.8V, ±5V, ±10V and ±10.8V output voltage ranges (individual setting for each of the four channels of each DAC). The settling time is typically 10μs and the DAC channels are capable to drive a load of 2kΩ, with a capacitance up to 4000pF.

Each TPMC533 is factory calibrated. The correction data is stored in an on-board serial EEPROM unique to each PMC module. These correction values can be used to perform a hardware correction of every analog-to-digital and digital-to-analog conversion. Additionally, measurement data read out of a temperature sensor onboard can be used to compensate temperature dependent errors.

The TPMC533 provides two Sequencers, one for AD Conversions and another one for DA Conversions. To perform periodic simultaneous conversions the conversion rates are programmable and can be output to other modules on PMC Back I/O Connector P14 or Front I/O Connector DIO pins for synchronization purposes. The TPMC533 can also operate as a target which means that the conversion rates can be sourced from P14 or Front I/O, created by another module.

A Frame Trigger signal, which can also either be generated by the TPMC533 and output on P14/Front I/O or generated by other modules and input from P14/Front I/O, can be used to synchronize ADC frames and DAC frames.

The signals on PMC Back I/O Connector P14 are ESD protected and driven or read by tri-state 5V-tolerant TTL buffers.

To be able to collect ADC frames and to output DAC frames the TPMC533 provides input and output FIFOs. Data transfer on the PCI bus is handled by TPMC533 initiated block transfer mode DMA cycles with minimum host/CPU intervention.
The Embedded I/O Company

The 8 Digital TTL tri-state I/O lines with 4.7kΩ pull resistors are ESD protected. The voltage, the pull resistors are connected to, is programmable by software and can be 3.3V, 5V, GND or floating level (one common setting for all eight Digital I/Os).

All 8 DIOs can be programmed whether to have their Digital I/O transmitters enabled or disabled individually per I/O line. The Digital I/O receivers are always enabled, so each DIO level can always be monitored and can generate an interrupt, triggered on rising edge, falling edge or both. Additionally, a debounce filter can be configured to get rid of bounce on the Digital I/O lines.

### Technical Information

- Standard single-wide PCI Mezzanine Card (PMC) conforming to IEEE P1386/P1386.1
- Board size: 149mm x 74mm
- 32bit / 33MHz PCI
- DMA Master functionality
- 32 channels of simultaneous sampling true differential bipolar 16bit analog input
  - Input voltage ranges: ±5V and ±10V
  - Maximum sample rate: 200kSPS
  - Oversampling capability
- 16 or no channels of simultaneous update single-ended unipolar/bipolar 16bit analog output
  - Output voltage ranges: 0-5V, 0-10V, 0-10.8V, ±5V, ±10V and ±10.8V
  - Settling time: typ. 10μs
  - load of 2kΩ with a capacitance up to 4000pF

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**TPMC533 Block Diagram**

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Issue 1.0.0

2017-12-05
The Embedded I/O Company

**Order Information**

**RoHS Compliant**
- **TPMC533-10R** 32 Channels of Simultaneous Sampling Differential 16 bit A/D, 16 Channels of Simultaneous Update Single-Ended 16 bit D/A and 8 Channels of TTL Digital I/O, with HDRA100 front panel I/O
- **TPMC533-20R** 32 Channels of Simultaneous Sampling Differential 16 bit A/D and 8 Channels of TTL Digital I/O, with HDRA100 front panel I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**
- **TPMC533-DOC** User Manual

**Software**
- **TDRV019-SW-25** Integrity Software Support
- **TDRV019-SW-42** VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
- **TDRV019-SW-65** Windows Software Support
- **TDRV019-SW-82** Linux Software Support
- **TDRV019-SW-95** QNX Software Support

For other operating systems please contact TEWS.

**Related Products**
- **TA114** 1.2 m Cable with one male HDRA100 Connector and two male HD50 Connectors
- **TA201** HD50 Terminal Block
- **TA313** Cable Kit for Modules with HDRA100 Connector
The TPMC542 is a standard single-wide PCI Mezzanine Card (PMC) compatible module providing 16 or 8 channels of simultaneous update single-ended unipolar/bipolar 16bit analog output and 20 channels of tristate capable 5V-tolerant LVTTL/TTL digital input/output.

A 32 bit 33 MHz PCI interface is provided at the PMC P11 and P12 connectors. The digital I/O signals and analog output signals are accessible via a Mini D Ribbon (MDR68) type front I/O connector.

For each individual D/A channel, the following output ranges are configurable:

- 0V to 5V Voltage Range
- 0V to 10V Voltage Range
- ±5V Voltage Range
- ±10V Voltage Range
- 4mA to 20mA Current Range
- 0mA to 20mA Current Range
- 0mA to 24mA Current Range

Additionally, for each Voltage Range a 20% over-range may be enabled.

The TPMC542 provides a D/A Sequencer unit for periodic simultaneous digital to analog conversions at a configurable conversion rate. In sequencer mode, the D/A conversion data is fetched from buffers in host memory by PCI master DMA transfer and is temporarily stored in an on-board data buffer. The Sequencer provides a Frame Mode used for repetitive frames of simultaneous D/A conversions upon an appropriate frame trigger signal event.

Conversion clock (conversion rate) and frame trigger signals may be generated on-board for internal use and may also be driven out on P14 rear I/O if the card is operating as a master card in a Multi-Board configuration. The conversion clock (conversion rate) and frame trigger signals may also be sourced externally via the P14 rear I/O interface if the card is operating as a target card in a Multi-Board configuration.

Each TPMC542 is factory calibrated. The correction data is stored in an on-board serial EEPROM unique to each PMC module. These correction values may be used to perform a hardware correction for every D/A channel and output range.
The digital I/O lines are ESD protected. Each digital I/O line has a dedicated line transmitter with individual output enable control and a dedicated line receiver. The line receivers are always enabled, so the digital I/O line level can always be monitored. Each digital I/O line input is capable of generating an interrupt triggered on rising edge, falling edge or both. Additionally, a debounce filter can be configured to get rid of bouncing on the digital I/O inputs. Each digital I/O line has a 4.7kΩ pull resistor to a common reference. The common pull resistor reference is programmable by software (one setting for all digital I/O lines) to +3.3V, +5V or GND.

**Technical Information**

- Standard single-wide PCI Mezzanine Card (PMC)
  - 32bit / 33MHz PCI
  - DMA Master functionality
- 16 or 8 channels of simultaneous update single-ended unipolar/bipolar 16bit analog output
  - Up to 38ksps
  - Settling time: typ. 24μs
- Output voltage ranges:
  - 0-5V, 0-10V, ±5V, ±10V,
  - 0-6V, 0-12V, ±6V, ±12V,
  - Up to 10mA load with a capacitance up to 10nF
- Output current ranges
  - 4-20mA, 0-20mA, 0-24mA

- Hardware Correction
  - Factory calibrated
- Temperature Sensor on-board
- Programmable conversion rates
  - Can be output to other modules
  - Can be input from other modules
- Frame Trigger signal for synchronization purposes
- 20 channels of tristate capable 5V-tolerant TTL digital input/output
  - ESD protection
- Mini D Ribbon (MDR68) type front I/O connector

**TPMC542 Block Diagram**
## Order Information

<table>
<thead>
<tr>
<th>RoHS Compliant</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPMC542-10R</td>
<td>16 Channels of Simultaneous Update Single-Ended 16 bit Voltage &amp; Current Range D/A and 20 Channels of LVTTTL/TTL Digital I/O, with MDR68 front panel I/O</td>
</tr>
<tr>
<td>TPMC542-20R</td>
<td>8 Channels of Simultaneous Update Single-Ended 16 bit Voltage &amp; Current Range D/A and 20 Channels of LVTTTL/TTL Digital I/O, with MDR68 front panel I/O</td>
</tr>
</tbody>
</table>

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

### Documentation

- **TPMC542-DOC**: User Manual

### Software

- **TDRV019-SW-25**: Integrity Software Support
- **TDRV019-SW-42**: VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
- **TDRV019-SW-65**: Windows Software Support
- **TDRV019-SW-82**: Linux Software Support
- **TDRV019-SW-95**: QNX Software Support

For other operating systems please contact TEWS.

### Related Products

- **TA113**: MDR68 Cable
- **TA207**: MDR68 Terminal Block
- **TA312**: Cable Kit for Modules with MDR68 Connector
Application Information

The TPMC550 is a standard single-width 32 bit PMC module and provides 8 channels of isolated 12 bit analog outputs. 4 channel and rear-I/O order options are also available. The settling time to 0.012% is 10µs maximum. The TPMC550 supports immediate and simultaneous load. The sequencer allows periodically update of enabled channels and the sequence timer range extends from 100µs to 6.5s.

The programmable output voltage range is +/-10V or 0-10V selectable by jumper. An on board DC/DC converter powers the isolated DAC and the output buffer. Each TPMC550 is factory calibrated. The calibration information is stored in the Identification-PROM unique to each PMC module.

Software Support (TPMC550-SW-xx) is available for different operating systems.

Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 2.1 compliant interface
- 3.3V and 5V PCI Signaling Voltage
- Board size: 149 mm x 74 mm
- 8 or 4 channels of isolated 12 bit analog outputs
- Settling time to 0.012% is 10µs maximum

- Full-scale output range +/- 10V or 0-10V
- Factory calibrated, calibration information stored in EEPROM
- Operating temperature -40°C to +85°C
The Embedded I/O Company

Order Information

RoHS Compliant
TPMC550-10R  8 Channel Isolated 12 bit D/A, +/- 10V or 0-10V, DB25
TPMC550-11R  4 Channel Isolated 12 bit D/A, +/- 10V or 0-10V, DB25
TPMC550-20R  8 Channel Isolated 12 bit D/A, +/- 10V or 0-10V, P14 I/O
TPMC550-21R  4 Channel Isolated 12 bit D/A, +/- 10V or 0-10V, P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC550-DOC  User Manual

Software
TPMC550-SW-25  Integrity Software Support
TPMC550-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TPMC550-SW-65  Windows Software Support
TPMC550-SW-82  Linux Software Support
TPMC550-SW-95  QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA303  Cable Kit for Modules with DB25 Female Connector
TPIM001  PIM I/O Module, HD50 connector
TPMC551  8/4 Channels of Isolated 16-Bit D/A

Application Information
The TPMC551 is a standard single-width 32-bit PMC module providing optically isolated 16-bit analog outputs. The number of D/A channels and the I/O connector depends on the module version. Settling time to 0.003% is 10µs typical. Immediate and simultaneous loading are supported.

A sequencer allows periodical updates of enabled channels and the sequence timer range extends from 100µs to 6.5s.
The TPMC551 offers two output voltage ranges, ±10 V and 0-10V, which are selectable by solder pads. An on-board DC/DC converter powers the isolated DAC and the output buffers.

Each TPMC551 is delivered factory calibrated. The calibration information is stored in the Calibration-PROM unique to each PMC module.

Software Support (TPMC551-SW-xx) is available for different operating systems.

Technical Information
- Form Factor: Standard single-width 32-bit PMC module conforming to IEEE P1386/P1386.1
- Board size: 147.5 mm x 74 mm
- PCI v2.2 compliant interface
- 3.3V and 5V PCI Signaling Voltage
- 16-bit D/A conversion
  - 0…10V or ±10V selectable output voltage range
  - 10µs maximum settling time
  - 4mA, 1000pF maximum load
- I/O access:
  - Front panel I/O: DB25 female connector
  - Back I/O: PMC P14 I/O connector
- Operating temperature -40°C to +85°C
- MTBF (MIL-HDBK217F/FN2 Gb 20°C)
  - TPMC551-10R: 371000h
  - TPMC551-11R: 512000h
  - TPMC551-20R: 353000h
  - TPMC551-21R: 479000h

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Issue 1.1.1  2017-08-31
Order Information

RoHS Compliant
TPMC551-10R  8 Channel Isolated 16 bit D/A, +/- 10V or 0-10V, DB25
TPMC551-11R  4 Channel Isolated 16 bit D/A, +/- 10V or 0-10V, DB25
TPMC551-20R  8 Channel Isolated 16 bit D/A, +/- 10V or 0-10V, P14 I/O
TPMC551-21R  4 Channel Isolated 16 bit D/A, +/- 10V or 0-10V, P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC551-DOC  User Manual

Software
TPMC551-SW-25  Integrity Software Support
TPMC551-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TPMC551-SW-65  Windows Software Support
TPMC551-SW-82  Linux Software Support
TPMC551-SW-95  QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA303    Cable Kit for Modules with DB25 Female Connector
TPIM002  PIM I/O Module, HD50 connector

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TPMC553  32 /16 Channels of 16 bit D/A

Application Information
The TPMC553 is a standard single-wide 32 bit PMC module and provides 32/16 channels of 16 bit analog outputs. All signals are accessible through a HD68 SCSI-3 type front I/O connector.
The software selectable output voltage ranges are 0-5V, 0-10V, 0-10.8V, ±5V, ±10V or ±10.8V. The output voltage range can be individually set per channel. The conversion time is typ. 10 µs and the DAC outputs are capable to drive a load of 2kΩ, with a capacitance up to 4000pF. Beside of an individual channel update, the double buffered DACs allow simultaneous update of all channels. Additionally a sequencer on the TPMC553 allows to periodically update enabled channels with a sequence timer range that extends from 10μs to 167s. Each TPMC553 is factory calibrated. The calibration information is stored in an on board serial EEPROM unique to each PMC module. Software Support (TDRV016-SW-xx) is available for different operating systems.

Technical Information
- Form Factor: Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- Board size: 149 mm x 74 mm
- Target Chip: PCI9030 (PLX Technology)
- PCI 2.1 compliant interface
- PCI I/O signaling voltage 5V or 3.3V
- 32/16 channels single-ended 16 bit analog output
- Programmable output voltage: 0-5V, 0-10V, 0-10.8V, ±5V, ±10V, ±10.8V
- Conversion time: typ.10μs
- Up to 2kΩ resistive, 4000pF capacitive load
- Overcurrent protection
- Individual channel update, simultaneous update of all channels or sequencer mode
- Factory calibration data stored in EEPROM
- Operating temperature -40°C to +85°C
- MTBF (MIL-HDBK217F/ FN2 G6 20°C):
  - TPMC553-10R: 683000 h
  - TPMC553-11R: 689000 h

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Order Information

RoHS Compliant
TPMC553-10R  32 Channel 16 bit D/A, sequencer, simultaneous update, progr. Vout, HD68
TPMC553-11R  16 Channel 16 bit D/A, sequencer, simultaneous update, progr. Vout, HD68

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC553-DOC  User Manual

Software
TDRV016-SW-25  Integrity Software Support
TDRV016-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV016-SW-65  Windows Software Support
TDRV016-SW-82  Linux Software Support
TDRV016-SW-95  QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA304  Cable Kit for Modules with HD68 Connector
TPIM002  PIM I/O Module, HD68 connector
**Application Information**

The TPMC554 is a standard single-wide 32 bit PMC module and provides 32/16 channels of 16 bit analog outputs. All signals are accessible through a HD68 SCSI-3 type front I/O connector.

The software selectable output voltage ranges are 0V-5V, 0V-10V, 0V-10.8V, ±5V, ±10V and ±10.8V. The output voltage range can be set individually per channel. The conversion time is typ. 10µs and the DAC outputs are capable to drive a load of 2kΩ, with a capacitance up to 4000pF.

Besides of an individual channel update, the double buffered DACs allow simultaneous update of all channels. Additionally a sequencer on the TPMC554 allows updating enabled channels periodically with a sequence timer range that extends from 10µs to 11.93h.

In addition to the double buffered distributed RAM inside the FPGA the TPMC554 provides 2 M x 16 bit external SRAM to store values that are known in advance. This feature can also be used to periodically output any kind of waveform or bit pattern. The size of the FIFO for each DAC channel is adjustable.

Each TPMC554 is factory calibrated. The calibration information is stored in an on board serial EEPROM unique to each PMC module.

Software Support (TDRV016-SW-xx) is available for different operating systems.

**Technical Information**

- Form Factor: Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- Board size: 149 mm x 74 mm
- Target Chip: PCI9030 (PLX Technology)
- PCI 2.1 compliant interface
- PCI I/O signaling voltage 5V or 3.3V
- 32/16 channels single-ended 16 bit analog output
- Programmable output voltage: 0V-5V, 0V-10V, 0V-10.8V, ±5V, ±10V, ±10.8V
- Conversion time: typ. 10µs
- Up to 2kΩ resistive, 4000pF capacitive load
- Overcurrent protection
- Individual channel update, simultaneous update of all channels or sequencer mode
- 2 M x 16 bit SRAM to store voltage values
- Factory calibration data stored in EEPROM
- Operating temperature -40°C to +85°C
- MTBF (MIL-HDBK217F/FN2 GB 20°C):
  - TPMC554-10R: 665000 h
  - TPMC554-11R: 678000 h

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Issue 1.0.1  2017-08-31
**Order Information**

**RoHS Compliant**

TPMC554-10R  32 Channel 16 bit D/A with FIFOs, sequencer, simultan update, pgm. Vout, HD68
TPMC554-11R  16 Channel 16 bit D/A with FIFOs, sequencer, simultan update, pgm. Vout, HD68

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**

TPMC554-DOC  User Manual

**Software**

TDRV016-SW-25  Integrity Software Support
TDRV016-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV016-SW-65  Windows Software Support
TDRV016-SW-82  Linux Software Support
TDRV016-SW-95  QNX Software Support

For other operating systems please contact TEWS.

**Related Products**

TA304  Cable Kit for Modules with HD68 Connector
TPIM002  PIM I/O Module, HD68 connector

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TPMC851  Multifunction I/O (16 bit AD, 16 bit DA, TTL I/O, Counter)

Application Information

The TPMC851 combines 32 single ended / 16 differential channels of 16 bit multiplexed analog input, 8 channels of 16 bit analog output, 16 digital I/O lines and a 32 bit multi-purpose counter on a standard single-width PMC module.

A 16 bit ADC converts 32 single-ended or 16 differential multiplexed ADC input channels. The data acquisition and conversion time is up to 1.25 µs without channel/gain change and to 17.25 µs with channel/gain change. The input multiplexer of the A/D circuit offers analog overvoltage protection of up to 70Vpp. A programmable gain amplifier allows gains of 1, 2, 4 or 8 resulting in input voltage ranges of ±10V, ±5V, ±2.5V or ±1.25V.

The ADC part of the TPMC851 can operate in Manual Mode or Sequencer Mode:

- **Manual Mode**
  
  In Manual Mode the multiplexer, programmable gain amplifier and the converter are fully controlled by the user. A conversion for a selected channel / gain can be started automatically after the settling time has elapsed, or manually by the user.

- **Sequencer Mode**
  
  In Sequencer Mode each of the A/D channels can be independently enabled and configured for the sequencer. The sequencer can run continuously, at specific time intervals, or it may be triggered by an external event. Conversion data is stored in a data RAM.

The 8 analog output channels are realized by eight 16 bit digital to analog converters (DACs). The conversion time is 10 µs. An operational amplifier drives the full-scale range of ±10V and is capable to drive high capacitive loads. Similar to the analog inputs a sequencer can control the analog outputs.

Following operation modes are available:

- **Immediate Update**: Updates the DAC output immediately when new data is written to the DAC channel.

- **Simultaneous Update**: DAC data is buffered and all DAC outputs are updated simultaneously on a trigger event:
  - **Manual Update**: Updates all DAC outputs on a manual event (register write)
  - **Trigger Update**: Updates all DAC outputs on an external event
  - **Sequencer Update**: Updates all DAC outputs after the sequencer timer has elapsed

Each TPMC851 is factory calibrated. The calibration data is stored in an EEPROM unique to each TPMC851.

The 16 digital TTL tri-state I/O lines with 4.7kΩ pull up resistors are ESD protected and protected against overvoltage. All 16 lines can be individually programmed as input or output, and can generate an interrupt on negative and positive transitions. Each input has an electronic debounce circuit to prevent short spikes on the input lines to cause an interrupt. The digital inputs can supply the external signals for the ADC and DAC sequencer and the 32 bit counter.
Additionally the TPMC851 offers a 32 bit multi-purpose counter. The counter includes a 32 bit preload register and a 32 bit compare register. The 32 bit counter can be fed with an internal clock or with an external signal supplied by the digital inputs. The 4 counter input modes determine the interpretation of the input signals. Additionally 3 count modes, which describe the behavior of the counter, and 4 control modes are available:

- **Counter Input Modes**
  - Internal clock with prescaler
  - Up/Down count
  - Direction count
  - Quadrature count with 1x, 2x or 4x resolution multiplier

- **Count Modes**
  - Cycling Counter
  - Divide-by-N
  - Single Cycle

- **Control Modes**
  - Load on Control
  - Latch on Control
  - Gate on Control
  - Reset on Control

Software Support (TPMC851-SW-xx) for different operating systems is available.

**Technical Information**

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- Target Chip: PCI9030 (PLX Technology)
- PCI 2.2 compliant interface
- PCI I/O signaling voltage 5V and 3.3V
- 32 channels single-ended or 16 channel differential 16 bit multiplexed analog input
- Programmable gain amplifier (gain 1, 2, 4 or 8)
- Full-scale input range: ±10V (at gain 1)
- Conversion time depends on mode: min 1.25 µs, max 17.25 µs
- 70Vpp overvoltage protection
- Sequencer
- 8 channels 16 bit analog output
  - Output voltage: ±10V
  - Conversion time: 10 µs
  - Up to 10,000pF capacitive load
  - Sequencer

- 16 digital TTL I/O lines with pull up resistors
- Individually programmable as input or output
- Programmable debounce time (100ns – 6.55ms)
- Interrupt capable
- 32mA source/sink
- 4.7kΩ pull-up resistor
- ESD and overvoltage protected
- 32 bit multi-purpose counter
- 32 bit preload register
- 32 bit compare register
- Various count- and control modes
- Count frequency: External clock up to 10 MHz; internal clock 5, 10, 20 or 40 MHz
- Factory calibrated, calibration data stored in EEPROM
- Operating temperature -40°C to +85°C
Order Information

RoHS Compliant
TPMC851-10R Multifunction I/O, 32 x 16 bit ADC +/-10V, 8 x 16 bit DAC +/-10V, 16 x TTL I/O, Counter, HD68

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC851-DOC User Manual

Software
TPMC851-SW-25 Integrity Software Support
TPMC851-SW-42 VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TPMC851-SW-65 Windows Software Support
TPMC851-SW-82 Linux Software Support
TPMC851-SW-95 QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA304 Cable Kit for Modules with HD68 Connector
TPMC600  32 / 16 Interrupt Generating Digital Inputs (24V)

Application Information
The TPMC600 is a PMC compatible module and has 32 digital inputs galvanically isolated by optocouplers. The individual inputs are separated in groups of 4 sharing a common ground input. These groups are potential free to each other. A high performance input circuit ensures a defined switching point and polarization protection against confusing the pole. All inputs have an electronic debounce circuit with a programmable debounce time.

A version with 16 inputs is also available where modules with front respectively back panel I/O are available. All inputs can generate an interrupt. The signal edge handling is programmable.

Software Support (TPMC600-SW-xx) for different operating systems is available.

Technical Information
- Form Factor: Standard single-width 32 bit PMC module conforming to IEEE P1386.1
  - Board size: 149 mm x 74 mm
- PCI r2.2 compliant interface, 32 bit, 33 MHz
- 3.3V and 5V PCI Signaling Voltage
- 32 / 16 interrupt generating digital inputs
- 24 V signal voltage for inputs, other voltages on request
- Optocoupler for galvanic isolation of inputs to computer
- All inputs isolated to each other in groups of four inputs
- Protection against confusing the pole
- Programmable electronic debounce circuit (7µs to 440ms in steps of 7µs)
- Operating temperature: -40°C to +85°C
Order Information

RoHS Compliant
TPMC600-10R  32 Interrupt Generating Digital Inputs, Front panel I/O, HD50
TPMC600-11R  16 Interrupt Generating Digital Inputs, Front panel I/O, HD50
TPMC600-20R  32 Interrupt Generating Digital Inputs, P14 I/O
TPMC600-21R  16 Interrupt Generating Digital Inputs, P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC600-DOC  User Manual

Software
TPMC600-SW-25  Integrity Software Support
TPMC600-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TPMC600-SW-65  Windows Software Support
TPMC600-SW-82  Linux Software Support
TPMC600-SW-95  QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA301  Cable Kit for modules with HD50 connector
TPIM001  PIM I/O Module with HD50 SCSI-2 type connector
The TPMC632 is a standard single-width 32 bit PMC module providing a user configurable XC6SLX45T-2 or XC6SLX100T-2 Spartan-6 FPGA. The integrated Spartan-6’s PCIe Endpoint Block is connected to a PCIe-to-PCI Bridge which routed to the PMC PCI Interface.

Different variants of the TPMC632 provide ESD-protected TTL lines, ESD-protected differential I/O lines and differential Multipoint-LVDS lines. Also combination of 32 TTL and 16 differential I/O lines are supported.

All lines are individually programmable as input, output or tri-state. The receivers are always enabled, which allows determining the state of each I/O line at any time. This can be used as read back function for lines configured as outputs. Each TTL I/O line has a pull resistor. The pull voltage level is selectable to be either +3.3V, +5V and additionally GND. The differential I/O lines are terminated by 120Ω resistors and the differential Multipoint-LVDS lines are terminated by 100Ω resistors.

The FPGA is connected to a 128 Mbytes, 16 bit wide DDR3 SDRAM. The SDRAM-interface uses a hardwired internal Memory Controller Block of the Spartan-6.

The FPGA is configured by a platform flash or SPI flash. Both configuration flashes are in-system programmable. An in-circuit debugging option is available via a JTAG header for read back and real-time debugging of the FPGA design (using Xilinx “ChipScope”).

The TPMC632 provides front panel I/O via a HD68 SCSI-3 type connector and rear panel I/O via P14.

User applications for the TPMC632 with XC6SLX45T-2 FPGA can be developed using the design software ISE WebPACK which can be downloaded free of charge from www.xilinx.com. The larger FPGA densities require a full licensed ISE Design Suite.

TEWS offers an FPGA Development Kit (TPMC632-FDK) which consists of well documented basic example design. It includes an .ucf file with all necessary pin assignments and basic timing constraints. The example design covers the main functionalities of the TPMC632. It implements a DMA capable PCIe endpoint with interrupt support, register mapping, DDR3 memory access and basic I/O. It comes as a Xilinx ISE project with source code and as a ready-to-download bitstream.

Please note: The basic example design requires the Embedded Development Kit (EDK), which is part of the Embedded or System Edition of the ISE Design Suite from Xilinx (downloadable from www.xilinx.com, a 30 day evaluation license is available).

Software Support (TDRV015-SW-xx) for different operating systems is available.
Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 2.1 compliant interface
- 3.3V and 5V PCI Signaling Voltage
- Board size: 149 mm x 74 mm
- TPMC632-1x: Xilinx XC6SLX45T-2 Spartan6 FPGA configured by serial Flash XCF16PFS
- TPMC632-2x: Xilinx XC6SLX100T-2 Spartan6 FPGA configured by serial Flash XCF32PFS
- Flash device is programmable via JTAG and in-system programmable
- FPGA clock options:
  - Local clock generator as source for the FPGA internal PLL
- 1 DDR3 SDRAM bank, 64M x 16 (128 MB)
- 32 Mbit SPI-EEPROM for User Data or FPGA configuration
- I/O lines
  - 64 TTL I/O, or 32 differential I/O or 32 TTL I/O and 16 differential I/O
  - TTL signaling voltage (maximum current: +/-32mA), EIA-422/-485 signaling level or M-LVDS Standard (TIA/EIA-899)
- I/O access:
  - 64 I/O lines on HD68 front connector, parallel to up to 64 I/O lines on rear connector P14
- Operating temperature -40°C to +85°C
## Order Information

### RoHS Compliant

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPMC632-10R</td>
<td>Spartan-6 FPGA XC6SLX45T-2, 128 MB DDR3, 32bit 33/66 MHz PCI, HD68 and P14 I/O, 64 TTL I/O</td>
</tr>
<tr>
<td>TPMC632-11R</td>
<td>Spartan-6 FPGA XC6SLX45T-2, 128 MB DDR3, 32bit 33/66 MHz PCI, HD68 and P14 I/O, 32 RS422</td>
</tr>
<tr>
<td>TPMC632-12R</td>
<td>Spartan-6 FPGA XC6SLX45T-2, 128 MB DDR3, 32bit 33/66 MHz PCI, HD68 and P14 I/O, 32 TTL I/O, 16 RS422</td>
</tr>
<tr>
<td>TPMC632-13R</td>
<td>Spartan-6 FPGA XC6SLX45T-2, 128 MB DDR3, 32bit 33/66 MHz PCI, HD68 and P14 I/O, 32 M-LVDS</td>
</tr>
<tr>
<td>TPMC632-14R</td>
<td>Spartan-6 FPGA XC6SLX45T-2, 128 MB DDR3, 32bit 33/66 MHz PCI, HD68 and P14 I/O, 32 TTL I/O, 16 M-LVDS</td>
</tr>
<tr>
<td>TPMC632-20R</td>
<td>Spartan-6 FPGA XC6SLX100T-2, 128 MB DDR3, 32bit 33/66 MHz PCI, HD68 and P14 I/O, 64 TTL I/O</td>
</tr>
<tr>
<td>TPMC632-21R</td>
<td>Spartan-6 FPGA XC6SLX100T-2, 128 MB DDR3, 32bit 33/66 MHz PCI, HD68 and P14 I/O, 32 RS422</td>
</tr>
<tr>
<td>TPMC632-22R</td>
<td>Spartan-6 FPGA XC6SLX100T-2, 128 MB DDR3, 32bit 33/66 MHz PCI, HD68 and P14 I/O, 32 TTL I/O, 16 RS422</td>
</tr>
<tr>
<td>TPMC632-23R</td>
<td>Spartan-6 FPGA XC6SLX100T-2, 128 MB DDR3, 32bit 33/66 MHz PCI, HD68 and P14 I/O, 32 M-LVDS</td>
</tr>
<tr>
<td>TPMC632-24R</td>
<td>Spartan-6 FPGA XC6SLX100T-2, 128 MB DDR3, 32bit 33/66 MHz PCI, HD68 and P14 I/O, 32 TTL I/O, 16 M-LVDS</td>
</tr>
</tbody>
</table>

For the availability of non-RoHS compliant (lead solder) products please contact TEWS.

### Documentation

- **TPMC632-DOC**: User Manual
- **TPMC632-FDK**: FPGA Development Kit for TPMC632, includes TPLD005 Example Design

### Accessories

- **TA900-10R**: Program and Debug Box, USB, JTAG, 20pin FPC connector, including USB A-USB B and FPC Flexcable

### Software

- **TDRV015-SW-25**: Integrity Software Support (for the example design TPLD005 of the TPMC632-FDK)
- **TDRV015-SW-42**: VxWorks Software Support (Legacy and VxBus-Enabled) Software Support (for the example design TPLD005 of the TPMC632-FDK)
- **TDRV015-SW-65**: Windows Software Support (for the example design TPLD005 of the TPMC632-FDK)
- **TDRV015-SW-82**: Linux Software Support (for the example design TPLD005 of the TPMC632-FDK)
- **TDRV015-SW-95**: QNX Software Support (for the example design TPLD005 of the TPMC632-FDK)

For other operating systems please contact TEWS.

### Related Products

- **TA304**: Cable Kit for Modules with HD68 Connector
- **TPIM003**: PIM I/O Module, HD68 connector, special pin assignment
TPMC634 Re-Configurable FPGA with 64 TTL I/O / 32 Diff. I/O

Application Information
The TPMC634 is a standard single-width PMC module providing a user configurable Xilinx XC6SLX25 Spartan-6 FPGA.

The TPMC634-10R provides 64 ESD-protected TTL lines using TTL compatible buffers. The TPMC634-11R provides 32 differential I/O lines using ESD-protected EIA-422 / EIA-485 compatible line transceivers. The TPMC634-12R provides a mix of 32 TTL and 16 differential RS422/485 I/O lines. The TPMC634-13R provides 32 differential I/O lines using M-LVDS line transceivers. The TPMC634-14R provides a mix of 32 TTL and 16 differential M-LVDS I/O lines. All I/O lines are individually programmable as input or output. The receivers are always enabled. This allows reading the state of each I/O line at any time (monitoring I/O lines configured as outputs).

Each TTL I/O line has an on-board pull resistor to a common/shared reference. The pull resistor reference is configurable by an on-board rotary switch to 3.3V, 5V or GND. The differential I/O lines have on-board termination resistors.

The User FPGA is auto-configurable by an on-board serial SPI Flash. Both the User FPGA and the SPI flash for User FPGA configuration are in-system-programmable via the PCI bus. An on-board JTAG header provides access to the user FPGA JTAG port.

PCI configuration space parameters are configurable by an on-board serial EEPROM.

Technical Information
- Standard single-width 32 bit 33 MHz PCI PMC Module conforming to IEEE P1386.1
- PCI 3.0 compatible Interface
- Universal PCI Signaling Voltage
- Xilinx XC6SLX25 Spartan-6 User FPGA accessible on Local Address/Data Bus
- PCI to Local Bus Interface is handled by the PCI Target Chip
- Programmable EEPROM for PCI Configuration Space Parameters
- In-System-Programmable SPI Flash for User FPGA Configuration
- User FPGA directly In-System-Programmable by Software
- Baud Rate Oscillator available at User FPGA Pin
- I/O options:
  - 64 TTL I/O (-10R)
  - 32 differential I/O RS422/485 (-11R)
  - 32 TTL I/O and 16 diff. I/O RS422/485 (-12R)
  - 32 differential I/O M-LVDS (-13R)
  - 32 TTL I/O and 16 diff. I/O M-LVDS (-14R)
- 64 I/O lines accessible on both HD68 Front Connector and P14 Rear Connector
- Operating Temperature -40°C to +85°C
The Embedded I/O Company

Order Information

RoHS Compliant
TPMC634-10R  Re-Configurable FPGA with 64 TTL Inputs/Outputs
TPMC634-11R  Re-Configurable FPGA with 32 Differential RS422/485 Inputs/Outputs
TPMC634-12R  Re-Configurable FPGA with 32 TTL Inputs/Outputs and 16 Differential RS422/485 Inputs/Outputs
TPMC634-13R  Re-Configurable FPGA with 32 Differential M-LVDS Inputs/Outputs
TPMC634-14R  Re-Configurable FPGA with 32 TTL Inputs/Outputs and 16 Differential M-LVDS Inputs/Outputs

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC634-DOC  User Manual

Software
TDRV018-SW-25  Integrity Software Support
TDRV018-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV018-SW-65  Windows Software Support
TDRV018-SW-82  Linux Software Support
TDRV018-SW-95  QNX Software Support

Related Products
TA304  Cable Kit for Modules with HD68 SCSI-3 type connector
TPIM003  PIM I/O Module with HD68 SCSI-3 type connector and special pin assignment
TPMC670  16/8 Digital Inputs (24V) 16/8 Digital Outputs (24V, 0.5A)

Application Information

The TPMC670 is a standard single-width 32 bit PMC with 16 / 8 24V digital inputs galvanically isolated from the computer system by optocoupler. The inputs are also potential free to each other in groups of four inputs. A high performance input circuit ensures a defined switching point and polarization protection against confusing the pole. All inputs have a common electronic debounce circuit with a freely programmable debounce time. All inputs can generate an interrupt. The signal edge handling is programmable to interrupt on rising, falling or both edges of the input signal.

The TPMC670 has 16 / 8 digital high side switches with galvanic isolation from the computer system by optocoupler. The outputs are also isolated against each other in groups of four outputs. All outputs are protected against short-circuit and thermal overload. The output drivers are capable of driving 0.5A continuous per channel. A hardware watchdog clears all outputs in case of trigger fail. The TPMC670-1xR provides front panel I/O, the TPMC670-2xR provides P14 I/O.

Software Support (TDRV003-SW-xx) for different operating systems is available.

Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 3.0 compatible interface
- 3.3V and 5V PCI Signaling Voltage
- Board size: 149 mm x 74 mm
- 16 / 8 interrupt generating digital inputs
  - 24 V signal voltage for inputs
  - Optocoupler for galvanic isolation
  - All inputs isolated to each other in groups of four inputs
  - Programmable electronic debounce circuit (7µs to 440ms in steps of 7µs),
- 16 / 8 digital outputs, high side switches
  - 24V signal voltage, current per output 0.5A
- Optocoupler for galvanic isolation
- Outputs are short-circuit protected
- Outputs are isolated to each other in groups of four outputs
- Outputs protected against thermal overload
- Watchdog timer resets all channels in case of trigger failure
- Operating temperature -20°C to +85°C
- MTBF (MIL-HDBK217F/FN2 GB 20°C)
  - TPMC670-x0x: 850.000 h
  - TPMC670-x1x: 979.000 h

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Order Information

RoHS Compliant
TPMC670-10R  16 Digital In (24V, isolated, pgm. interrupts, pgm. Debounce), 16 Digital Out (High Side 24V 0.5A), HD50
TPMC670-11R  8 Digital In (24V, isolated, pgm. interrupts, pgm. Debounce), 8 Digital Out (High Side 24V 0.5A), HD50
TPMC670-20R  16 Dig. In (24V, isolated, pgm. interrupts, pgm. Debounce), 16 Dig. Out (High Side 24V 0.5A), P14 I/O
TPMC670-21R  8 Dig. In (24V, isolated, pgm. interrupts, pgm. Debounce), 8 Dig. Out (High Side 24V 0.5A), P14 I/O

For the availability of non-RoHS compliant (lead solders) products please contact TEWS.

Documentation
TPMC670-DOC  User Manual

Software
TDRV003-SW-25  Integrity Software Support
TDRV003-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV003-SW-65  Windows Software Support
TDRV003-SW-82  Linux Software Support
TDRV003-SW-95  QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA301  Cable Kit for Modules with HD50 Connector
TPIM001  PIM I/O Module, HD50 connector

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TPMC671 16 Digital Inputs (24V) 16 Digital Outputs (24V, 0.5A)

Application Information

The TPMC671 is a standard single-width 32 bit PMC with 16 24V digital inputs galvanically isolated from the computer system by optocoupler. The inputs are also potential free to each other. A high performance input circuit ensures a defined switching point and polarization protection against confusing the pole. All inputs have a common electronic debounce circuit with a freely programmable debounce time. All inputs can generate an interrupt. The signal edge handling is programmable to interrupt on rising, falling or both edges of the input signal.

The TPMC671 has 16 digital high side or low side switches (build option) with galvanic isolation from the computer system by optocoupler. The outputs are also isolated against each other in groups of four outputs. All outputs are protected against short-circuit and thermal overload. The output drivers are capable of driving 0.5A continuous per channel. A hardware watchdog clears all outputs in case of trigger fail. The TPMC671-1xR provides front panel I/O, the TPMC671-2xR provides P14 I/O.

Software Support (TDRV003-SW-xx) for different operating systems is available.

Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 3.0 compliant interface
- 3.3V and 5V PCI Signaling Voltage
- Board size: 149 mm x 74 mm
- 16 interrupt generating digital inputs
- 24 V signal voltage for inputs
- Optocoupler for galvanic isolation
- All inputs isolated to each other
- Programmable electronic debounce circuit (7µs to 440ms in steps of 7µs),
- 16 digital outputs, high side or low side switches (build option)
- 24V signal voltage, current per output 0.5A
- Optocoupler for galvanic isolation
- Outputs are short-circuit protected
- Outputs are isolated to each other in groups of four
- Outputs are protected against thermal overload
- Watchdog timer resets all channels in case of trigger failure
- Operating temperature -25°C to +85°C
- MTBF (MIL-HDBK217F/FN2 GB 20°C) TPMC671: 860.000 h

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Issue 2.0.2 2017-08-31
The Embedded I/O Company

Order Information

**RoHS Compliant**
- **TPMC671-10R**: 16 Dig. In (24V, isolated, pgm. interrupts, pgm. Debounce), 16 Dig. Out (High Side 24V 0.5A), HD68
- **TPMC671-11R**: 16 Dig. In (24V, isolated, pgm. interrupts, pgm. Debounce), 16 Dig. Out (Low Side 24V 0.5A), HD68
- **TPMC671-20R**: 16 Dig. In (24V, isolated, pgm. interrupts, pgm. Debounce), 16 Dig. Out (High Side 24V 0.5A), P14 I/O
- **TPMC671-21R**: 16 Dig. In (24V, isolated, pgm. interrupts, pgm. Debounce), 16 Dig. Out (Low Side 24V 0.5A), P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**
- **TPMC671-DOC**: User Manual

**Software**
- **TDRV003-SW-25**: Integrity Software Support
- **TDRV003-SW-42**: VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
- **TDRV003-SW-65**: Windows Software Support
- **TDRV003-SW-82**: Linux Software Support
- **TDRV003-SW-95**: QNX Software Support

For other operating systems please contact TEWS.

**Related Products**
- **TA304**: Cable Kit for Modules with HD68 Connector
- **TPIM002**: PIM I/O Module, HD68 connector

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Issue 2.0.2

2017-08-31
TPMC680 8 x 8 Bit Digital Inputs/Outputs (5V TTL)

Application Information

The TPMC680 is a standard single-width 32 bit PMC module offering 64 bit of TTL I/O arranged in 8 x 8 bit ports. Direction of the I/O lines is software programmable for each of the 8 bit ports. Each 8 bit port is built up using a TTL bus transceiver. Each line is protected against ESD and overvoltage.

Each input can generate an interrupt. Signal edge handling is programmable to interrupt on rising and/or falling edge of the input signal. Interrupts can be enabled and disabled for each bit. For interrupt source detection the status of each bit can be read from the interrupt status register.

The TPMC680 supports three basic modes of operation: standard byte I/O with interrupts, 2 x 16 bit port with handshake and 1 x 32 bit port with handshake. The two handshake modes offer double buffered inputs or outputs and interlocked or pulsed handshake output protocol.

In byte I/O mode it is possible to read or write synchronously all 64 lines.

The TPMC680 provides front panel I/O via a HD68 SCSI-3 type connector and rear panel I/O via P14.

Software Support (TPMC680-SW-xx) for different operating systems is available.

Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 2.1 compliant interface
- 3.3V and 5V PCI Signaling Voltage
- Board size: 149 mm x 74 mm
- Interrupt generating digital I/O lines
  - TTL I/O’s arranged in 8 x 8 bit ports
  - Direction programmable per 8 bit port
  - TTL signaling voltage (maximum current: ±16mA)
- ESD and overvoltage protection for each I/O line

- I/O access:
  - 64 I/O lines on HD68 front connector, parallel to
  - 56 I/O lines [55:0] and system ground on rear connector P14; changeable to up to 64 I/O lines without ground
- Basic operating modes: Byte I/O and two handshake modes
- Temperature range: -40°C to +85°C
Order Information

RoHS Compliant
TPMC680-10R  64-bit TTL I/O, 8 x 8-bit Port, interrupts, handshake modes, HD68, 7 ports available at P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC680-DOC  User Manual

Software
TPMC680-SW-25  Integrity Software Support
TPMC680-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TPMC680-SW-65  Windows Software Support
TPMC680-SW-82  Linux Software Support
TPMC680-SW-95  QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA304  Cable Kit for Modules with HD68 Connector
TPIM002  PIM I/O Module, HD68 connector
Application Information

The TPMC681 is a standard single-width 32 bit PMC module offering 64 ESD-protected TTL I/Os. Each line is individually programmable as input, output or tri-state. The receivers are always enabled, which allows determining the state of each I/O line at any time. This can be used as read back function for lines configured as outputs. Each TTL I/O line has a pull-up resistor. The pull-up voltage is selectable to be either +3.3V or +5V.

Each input can generate an interrupt. Signal edge handling is programmable to interrupt on rising and/or falling edge of an input signal. Interrupts can be enabled and disabled for each bit. For interrupt source detection the status of each bit can be read from interrupt status registers.

The TPMC681 provides front panel I/O via a HD68 SCSI-3 type connector and rear panel I/O via P14.

Software Support (TDRV006-SW-xx) for different operating systems is available.

Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 3.0 compatible interface
- 3.3V and 5V PCI Signaling Voltage
- Board size: 149 mm x 74 mm
- 64 interrupt generating digital I/O lines
  - 64 TTL I/Os
  - Direction individually programmable per line
  - TTL signaling voltage (maximum current: +/-24mA)
- ESD and overvoltage protection for each I/O line
- I/O access:
  - 64 I/O lines on HD68 front connector, parallel to up to 64 I/O lines on rear connector P14 (upper 8 lines changeable to system ground)
- Temperature range: -40°C to +85°C
Order Information

RoHS Compliant
TPMC681-10R  64-bit TTL I/O, Bit I/O, interrupts, HD68 and P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC680-DOC  User Manual

Software
TDRV006-SW-25  Integrity Software Support
TDRV006-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV006-SW-65  Windows Software Support
TDRV006-SW-82  Linux Software Support
TDRV006-SW-95  QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA304  Cable Kit for Modules with HD68 Connector
TPIM003  PIM I/O Module, HD68 connector, special pin assignment

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TPMC682 3 x 16 bit I/O Ports with 512 Word FIFO and Handshake

Application Information

The TPMC682 is a standard single-width 32 bit PMC with three 16 bit TTL digital input/output lines controlled by handshake signals. These handshake signals run over an additional 8 bit input and an 8 bit output port. Interlocked or pulsed handshake protocol is provided. Each I/O port has a 512 words deep FIFO. All I/O lines are protected by bus transceivers and ESD protection devices.

The PLX PCI9030 PCI target chip is used for the PCI interface.

An interrupt can be generated on INTA, when the filling level of a FIFO exceeds the value of the individually programmable threshold. Each port has a programmable timeout counter for input direction of data.

The TPMC682 provides front panel I/O via a HD68 SCSI-3 type connector and rear panel I/O via P14.

Software Support (TDRV008-SW-xx) for different operating systems is available.

Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 2.1 compliant interface
- 3.3V and 5V PCI Signaling Voltage
- Board size: 149 mm x 74 mm
- Digital Input/Output Ports
  - TTL I/O’s arranged in 3 x 16 bit ports and 2 x 8 bit ports for handshake signals and for general purpose
  - 512 word FIFO for each I/O port
  - individually programmable FIFO thresholds
  - programmable timeout for reading
  - Direction programmable per 16 bit port
  - TTL signaling voltage (maximum current: +/-8mA)

- ESD and overvoltage protection for each I/O line
- I/O access:
  - 64 I/O lines on HD68 front connector, parallel to 56 I/O lines (Port 0/1 [15:0], Port 2 [7:0]) and system ground on rear connector P14; changeable to 64 I/O lines (Port 0/1/2 [15:0]) without ground
- Temperature range: -40°C to +85°C
Order Information

RoHS Compliant
TPMC682-10R 3 x 16-bit I/O Port, 512 Word FIFO, Handshake, interrupts, HD68 and P14 I/O
For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC682-DOC User Manual

Software
TDRV008-SW-25 Integrity Software Support
TDRV008-SW-42 VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV008-SW-65 Windows Software Support
TDRV008-SW-82 Linux Software Support
TDRV008-SW-95 QNX Software Support
For other operating systems please contact TEWS.

Related Products
TA304 Cable Kit for Modules with HD68 Connector
TPIM002 PIM I/O Module, HD68 connector
TPMC683  32 RS422/RS485 Differential I/O

Application Information

The TPMC683 is a standard single-width 32 bit PMC module offering 32 differential I/O lines using EIA-422 / EIA-485 compatible, ESD-protected line transceivers.

Each line is individually programmable as input or output. The receivers are always enabled, which allows determining the state of each I/O line at any time. This can be used as read back function for lines configured as outputs.

Each input can generate an interrupt. Signal edge handling is programmable to interrupt on rising and/or falling edge of an input signal. Interrupts can be enabled and disabled for each bit. For interrupt source detection, the status of each line can be read from interrupt status registers.

The TPMC683 provides front panel I/O via a HD68 SCSI-3 type connector and rear panel I/O via P14.

Software Support (TDRV012-SW-xx) for different operating systems is available.

Technical Information

- Form Factor: Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- Board size: 149 mm x 74 mm
- PCI 2.1 compliant interface
- 3.3V and 5V PCI Signaling Voltage
- Interrupt generating differential I/O lines
  - 32 differential I/Os
  - EIA-422/-485 signaling level
  - Direction individually programmable per line
  - 120Ω termination resistor
  - 15kV ESD protection
- I/O access:
  - 32 I/O lines on HD68 front connector, parallel to up to 32 I/O lines on rear connector P14
- Operating temperature -40°C to +85°C
- MTBF (MIL-HDBK217F/FN2 G9 20°C) TPMC683-10R: 451000 h

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Order Information

RoHS Compliant
TPMC683-10R 32 RS422/RS485 Differential I/O, interrupts, HD68 and P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC683-DOC User Manual

Software
TDRV012-SW-25 Integrity Software Support
TDRV012-SW-42 VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV012-SW-65 Windows Software Support
TDRV012-SW-82 Linux Software Support
TDRV012-SW-95 QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA304 Cable Kit for Modules with HD68 Connector
TPIM003 PIM I/O Module, HD68 connector, special pin assignment
Application Information

The TPMC685 is a standard single-width 32 bit PMC module offering up to 128 bit of TTL I/O arranged in 16 x 8 bit ports. Direction of the I/O lines is software programmable for each of the ports. Each port is built up using a TTL bus transceiver. Each line is protected against ESD and overvoltage.

Software selectable Pullup / Pulldown Resistors are available on all I/O lines.

Each input can generate an interrupt. Signal edge handling is programmable to interrupt on rising and/or falling edge of the input signal. Interrupts can be enabled and disabled for each bit. For interrupt source detection the status of each bit can be read from the interrupt status register.

To eliminate spikes and glitches, keeping interrupts to a minimum, each port has its own user configurable input filter.

All outputs drive 5V TTL levels with up to 24mA.

It is possible to read or write synchronously all 128 lines. The first 64 bits of TTL I/O are accessible via the front panel HD68 SCSI-3 type connector and the second 64 bits of TTL I/O via rear panel P14.

TPMC685-11R provides 8 additional ground contacts on the P14 connector. These grounds reduce the number of Back-I/O lines to 56, but improve the signal integrity.

To deal with software faults, the TPMC685 provides a user configurable Watchdog timer. It can set all outputs in a user defined (save) state when the watchdog expires.

Two Timers are included in the TPMC685 for easy implementation of equidistant input sampling or output setting.

Software Support for different operating systems is available.
### Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 3.0 compliant interface
- 3.3V and 5V PCI Signaling Voltage tolerant
- Board size: 149 mm x 74 mm
- Interrupt generating digital I/O lines
  - TTL I/O’s arranged in 16 x 8 bit ports
  - Direction programmable per port
  - TTL signaling voltage (maximum current: ±24mA)
  - Software selectable Pullup / Pulldown per port
- ESD and overvoltage protection for each I/O line
- I/O access:
  - 64 I/O lines on HD68 front connector
  - 64 I/O lines without ground on rear connector P14;
    changeable to 56 I/O lines [55:0] plus system ground
- Temperature range: -40°C to +85°C
- MTBF: 617000 h

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![Diagram](image-url)
**Order Information**

**RoHS Compliant**

TPMC685-10R  128bit TTL I/O, interrupts, 8 x 8bit on HD68 and 8 x 8bit at P14 I/O
TPMC685-11R  128bit TTL I/O, interrupts, 8 x 8bit on HD68 and 7 x 8bit plus 8 x GND at P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**

TPMC685-DOC   User Manual

**Software**

TPMC685-SW-25  Integrity Software Support
TPMC685-SW-42  VxWorks Software Support (Legacy and VxBus Software Support)
TPMC685-SW-65  Windows Software Support
TPMC685-SW-82  Linux Software Support
TPMC685-SW-95  QNX Software Support

For other operating systems please contact TEWS.

**Related Products**

TA304  Cable Kit for Modules with HD68 Connector
TPIM002  PIM I/O Module, HD68 connector

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Issue 1.0.1  2017-08-31
TPMC700 32 / 16 Digital Outputs (24V, 0.5A) High Side Switches

Application Information
The PMC compatible module TPMC700 has 32 (16) digital outputs with galvanic isolation via optocouplers. All outputs resist short-circuits and are protected against thermal overload. The output drivers are capable of driving 0.5A continuous per channel as high side switch. A hardware watchdog clears all outputs in case of trigger failure.

The TPMC700-1xR provides front panel I/O with a HD50 SCSI-2 type connector, the TPMC700-2xR provides P14 I/O.
Software Support (TPMC700-SW-xx) is available for different operating systems.

Technical Information
- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 2.1 compliant interface
- Board size: 149 mm x 74 mm
- 32 / 16 digital outputs, high side switches
- 24 V signal voltage, current per output 0.5A
- Optocoupler for galvanic isolation

- Outputs are short-circuit protected
- Outputs are isolated by optocouplers from the system and in two groups against each other
- Outputs are protected against thermal overload
- Watchdog timer resets all channels in case of trigger failure
The Embedded I/O Company

Order Information

RoHS Compliant
TPMC700-10R  32 Digital Outputs, High Side 24V 0.5A, HD50
TPMC700-11R  16 Digital Outputs, High Side 24V 0.5A, HD50
TPMC700-20R  32 Digital Outputs, High Side 24V 0.5A, P14 I/O
TPMC700-21R  16 Digital Outputs, High Side 24V 0.5A, P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC700-DOC  User Manual

Software
TPMC700-SW-25  Integrity Software Support
TPMC700-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TPMC700-SW-65  Windows Software Support
TPMC700-SW-82  Linux Software Support
TPMC700-SW-95  QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA301  Cable Kit for modules with HD50 connector
TPIM001  PIM I/O Module, HD50 connector
The Embedded I/O Company

TPMC810  Isolated 2 x CAN Bus

Application Information
The TPMC810 is a standard single-width 32 bit PMC with two independent CAN bus channels, isolated from system logic and from each other.
Two Philips SJA1000 CAN controllers (CAN specification 2.0B supported) are used.
CAN High Speed transceivers are used for the CAN bus I/O interface. An on board termination option (DIP switches) is provided for each CAN bus channel allowing to configure on board termination and pass through mode.

Each channel can generate an interrupt on INTA. Interrupts can be enabled and disabled separately.
The TPMC810 provides front panel I/O via two DB9 male connectors and rear panel I/O via P14.
Software support (TDRV010-SW-xx) for different operating systems is available.

Technical Information
- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 2.1 compliant interface
- 3.3V and 5V PCI Signaling Voltage
- Board size: 147 mm x 74 mm
- Two CAN bus interfaces based on Philips SJA1000
- I/O access:
  - DB9 male front connectors with pinout following CiA DS-102, parallel to rear connector P14
- Physical interface: CAN High Speed (according to ISO 11898-2)
- Physical interface optically isolated from CAN controller by on board DC/DC converters and optocouplers for each channel
- Transfer rate 1 Mbit/s maximum (bus length up to 30 m)
- Temperature range: -40°C to +85°C
Order Information

RoHS Compliant
TPMC810-10R 2 x isolated CAN Bus based on Philips SJA1000, ISO11898 CAN High Speed, 2 x DB9 and P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC810-DOC User Manual

Software
TDRV010-SW-25 Integrity Software Support
TDRV010-SW-42 VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV010-SW-65 Windows Software Support
TDRV010-SW-82 Linux Software Support
TDRV010-SW-95 QNX Software Support

For other operating systems please contact TEWS.

Related Products
TPIM001 PIM I/O Module, HD50 connector
The TPMC815 is a standard single-width 32 bit PMC module with a complete ARCNET interface using the controller COM20020. The COM20020 contains the ARCNET controller with transceiver and Dual Port RAM. Various network topologies are supported (Star, Tree, Bus).

Two interface types of the TPMC815 are available. The TPMC815-11R offers the traditional isolated hybrid interface and the TPMC815-21R supports an isolated RS485 differential driver interface.

The maximum speed of the TPMC815-11R is 2.5 Mbps. The maximum speed of the TPMC815-21R is 5.0 Mbps. The module is ideal suited for industrial / factory automation and automotive applications.

Software support (TDRV007-SW-xx) is available for different operating systems.

Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 2.1 compliant interface
- Board size: 149 mm x 74 mm
- ARCNET Interface based on COM20020
- Complete ARCNET controller with transceiver and Dual Port RAM
- Ideal for industrial / factory automation and automotive applications
- Deterministic 2.5 Mbps (TPMC815-11R) or 5 Mbps (TPMC815-21R) Token Passing Protocol
- Improved diagnostics
- Flexible media interface
- Supports various network topologies (star, tree, bus)
- Physical interface
- Traditional hybrid interface (isolated) for long distances
- Isolated RS485 differential driver interface with on board DC/DC converter

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**Order Information**

**RoHS Compliant**

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<td>ARCNET, COM20020, 2.5 Mbps, Hybrid Interface, BNC and DB9</td>
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<tr>
<td>TPMC815-21R</td>
<td>ARCNET, COM20020, 5 Mbps, isolated RS485 Interface, DB9</td>
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**Documentation**

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
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<tr>
<td>TPMC815-DOC</td>
<td>User Manual</td>
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**Software**

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For other operating systems please contact TEWS.
The TPMC816 is a standard single-width 32 bit PMC module with two complete CAN bus interfaces using two Bosch CC770 CAN controllers. The CC770 offers pin compatibility with Intel's 82527 CAN Controller and is a function replacement. Both channels are completely independent and support CAN specification 2.0 part A and B (Standard 11 bit identifier and extended 29 bit identifier).

Each channel provides CAN High Speed and modified RS485 as physical interface. The physical interfaces are optically isolated from the CAN controller and powered by an on board DC/DC converter for each channel. The TPMC816-11R provides one CAN bus channel.

Software Support (TDRV011-SW-xx) for different operating systems is available.

Technical Information
- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 2.1 compliant interface
- 3.3V and 5V PCI Signaling Voltage
- Board size: 149 mm x 74 mm
- CAN bus interface based on Bosch CC770 chip
- I/O access: DB9 male front connector with pinout following CiA DS-102, parallel to rear connector P14
- Support CAN specification 2.0 part A and B (standard and extended data frames)
- Programmable global mask
- 15 message objects of 8 byte data length
- Powerful error handling
- Programmable transfer rates
- Physical interface CAN High Speed (according to ISO 11 898) and modified RS485 per channel
- Physical interface optically isolated from CAN controller by on board DC/DC converter per channel
- Maximum transfer rate 1 Mbit/s (bus length up to 40 m)
- Operating temperature -40°C to +85°C
Order Information

RoHS Compliant
TPMC816-10R  2x isolated CAN Bus based on Bosch CC770, ISO11898 CAN High Speed or RS485, 2x DB9 and P14 I/O
TPMC816-11R  1x isolated CAN Bus based on Bosch CC770, ISO11898 CAN High Speed or RS485, DB9 and P14 I/O
For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC816-DOC  User Manual

Software
TDRV011-SW-25  Integrity Software Support
TDRV011-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV011-SW-65  Windows Software Support
TDRV011-SW-82  Linux Software Support
TDRV011-SW-95  QNX Software Support
For other operating systems please contact TEWS.

Related Products
TPIM001  PIM I/O Module with HD50 connector
The TPMC821 is a standard single-width 32 bit PMC module and offers a complete PMC INTERBUS Master Generation 4 (G4) Interface. A MC68332 local controller and the IPMS3 INTERBUS protocol controller are used as controlling units on board of the TPMC821.

The communication between the host CPU and the TPMC821 is handled via a 4 Kbyte Dual Port Memory. The on board firmware running on the MC68332 is the original INTERBUS Master Generation 4 (G4) firmware from Phoenix Contact.

Furthermore the TPMC821 provides a RS232 diagnostic port, the optically isolated INTERBUS interface and status LEDs.

For First Time Users the Engineering Documentation TPMC821-ED is recommended. The Engineering Documentation includes TPMC821-DOC, schematics and data sheets.

Software support (TPMC821-SW-xx) is available for different operating systems.

Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 2.1 compliant interface
- Board size: 149 mm x 74 mm
- Local MCU Motorola MC68332 20 MHz
- Interbus Controller IPMS3 Interbus Master Protocol Chip
- Memory configuration SRAM: 512k x 16 (1MB)
- FLASH: 512k x 16 (1MB) + 256k x 16, DPM: 4K x 8
- Interbus interface (front I/O) DB9 female connector
- RS-232 interface (front I/O) Shielded 8P. Mod.-Jack
- LED Diagnostic (front I/O)
- Enhanced Diagnostic port at the P14 Mezzanine Connector (back I/O), RESET Push-Button (front I/O)
- G4 Phoenix Contact Firmware (4.66)
The Embedded I/O Company

Order Information

RoHS Compliant
TPMC821-10R INTERBUS Master G4 (Generation 4) based on firmware from Phoenix
For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC821-DOC User Manual
TPMC821-ED Engineering Documentation, TPMC821-DOC, schematics, data sheets, Phoenix Documentation

Software
TPMC821-SW-25 Integrity Software Support
TPMC821-SW-42 VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TPMC821-SW-65 Windows Software Support
TPMC821-SW-82 Linux Software Support
TPMC821-SW-95 QNX Software Support
For other operating systems please contact TEWS.

Related Products
TPIM001 PIM I/O Module with HD50 connector
The TPMC363 is a conduction cooled single-width 32 bit PMC with four high speed serial data communication channels.

The TPMC363 is the successor of the discontinued TPMC362, providing similar functionality and full connector and pin-out compatibility.

The serial communication controller is implemented in FPGA logic, along with the bus master capable PCI interface, guaranteeing long term availability and having the option to implement additional functions in the future.

Each channel provides dedicated receive and transmit FIFOs for high data throughput.

Data transfer on the PCI bus is handled via TPMC363 initiated DMA cycles with minimum host/CPU intervention.

Several serial communication protocols are supported by each channel, such as asynchronous, isochronous, synchronous and HDLC mode.

A 14.7456 MHz oscillator provides standard asynchronous baud rates. An additional 24 MHz oscillator is provided for other baud rates. A 10 MHz oscillator is used for the synchronous baud rate of 10 Mbit/s.

Each channel also provides various interrupt sources, generated on INTA. The interrupt sources can be enabled or disabled individually.

Multiprotocol transceivers are used for the line interface. The physical interface is selectable by software, individually for each channel as EIA-232, EIA-422, EIA-449, EIA-530, EIA-530A, V.35, V.36 or X.21.

The following signals are provided by the TPMC363 for each channel at the front and rear-I/O connectors: Receive Data (RxD +/-), Transmit Data (TxD +/-), Receive Clock (RxC +/-), Transmit Clock (TxC +/-), Ready-To-Send (RTS +/-), Clear-To-Send (CTS +/-), Carrier-Detect (CD +/-) and GND.

The TPMC363 provides rear panel I/O via P14.

Software Support (TDRV009-SW-xx) for different operating systems is available.

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### Technical Information

- Conduction Cooled single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 2.1 compliant master/slave interface
- 3.3V and 5V PCI Signaling Voltage
- Board size: 143.75 mm x 74 mm
- Four high speed asynchronous/synchronous (HDLC) serial interfaces
- Support of RxD, TxD, RxC, TxC, RTS, CTS, CD and GND on rear connector P14
- Physical interface (individually programmable per channel):
  - EIA-232, EIA-422, EIA-449, EIA-530, EIA-530A, V.35, V.36 and X.21
- Maximum data rate: 10 Mbit/s (synchronous), 2 Mbit/s (asynchronous), internally or externally provided clock
- EIA-232: up to 115.2 kbit/s
- Temperature range: -40°C to +85°C

### Order Information

**Non-RoHS Compliant**

TPMC363-10R  ccPMC, 4 Channel High Speed Synch/Asynch Serial Interface, P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

### Documentation

TPMC363-DOC  User Manual

### Software

- TDRV009-SW-25  Integrity Software Support
- TDRV009-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
- TDRV009-SW-65  Windows Software Support
- TDRV009-SW-82  Linux Software Support
- TDRV009-SW-95  QNX Software Support

For other operating systems please contact TEWS.

### Related Products

TPIM005  PIM I/O Module, HD68 connector, for TPMC863/TPMC363
TPMC460 16 Channel Serial Interface RS232/RS422

Application Information

The TPMC460 is a standard single-width 32 bit PMC module and offers 16 channels of high performance asynchronous serial interface.

Five different standard modules are available: The TPMC460-10R provides 16 RS232 interfaces. The TPMC460-11R provides 16 RS422 interfaces. The TPMC460-12R provides 8 RS232 and 8 RS422 interfaces. The TPMC460-13R provides 12 RS232 and 4 RS422 interfaces. The TPMC460-14R provides 4 RS232 and 12 RS422 interfaces.

Other configurations are available as factory option on a per channel basis.

All modules offer front panel I/O with a HD68 connector and P14 I/O. Each RS232 channel supports RxD, TxD, RTS and CTS. Each RS422 supports RxD+/− and TxD+/−.

A transparent 32 bit / 66 MHz PCI-to-PCI Bridge provides access to the two Exar XR17D158 octal PCI-UARTs. The PCI-to-PCI Bridge allows 32 bit accesses on the local PCI bus and permits the high data throughput necessary for the high performance serial interfaces.

Each channel has 64 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 921.6 kbps for RS232 channels and 5.5296 Mbps for RS422 channels. The UART offers readable FIFO levels.

Interrupts are supported. For fast interrupt source detection each octal UART provides a special Global Interrupt Source Register.

All serial channels use ESD protected transceivers up to ±15KV according to IEC 1000-4-2.

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The Embedded I/O Company

Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- Board size: 149 mm x 74 mm
- Asynchronous serial interface
- PCI-to-PCI Bridge
  - PCI2050b
  - PCI I/O signaling voltage 5V and 3.3V
  - 32 bit / 66 MHz
- UARTs:
  - XR17D158 Octal UART (Exar)
  - PCI 2.2 compliant interface
  - 32 bit / 33 MHz
  - 64 byte transmit FIFO per channel
  - 64 byte receive FIFO per channel

- Readable FIFO levels
- Global Interrupt Source Register
- General Purpose 16 bit Timer/Counter
- Support of RxD, TxD, RTS and CTS for each RS232 channel and RxD+/− and TxD+/− for each RS422 channel of the TPMC460
- Programmable baud rates:
  - RS232: up to 921.6 kbps
  - RS422: up to 5.5296 Mbps
- ESD protected transceiver (up to ±15KV according to IEC 1000-4-2)
- Operating temperature -40° to +85°

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Issue 1.0.1 2017-08-31
Order Information

RoHS Compliant
TPMC460-10R  16 Channel Serial RS232, HD68
TPMC460-11R  16 Channel Serial RS422, HD68
TPMC460-12R  8 Channel Serial RS232, 8 Channel Serial RS422, HD68
TPMC460-13R  12 Channel Serial RS232, 4 Channel Serial RS422, HD68
TPMC460-14R  4 Channel Serial RS232, 12 Channel Serial RS422, HD68

Other configurations are available as factory option on a per channel base.

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC460-DOC  User Manual

Software
TDRV002-SW-25  Integrity Software Support
TDRV002-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV002-SW-65  Windows Software Support
TDRV002-SW-82  Linux Software Support
TDRV002-SW-95  QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA304  Cable Kit for Modules with HD68 Connector
TPIM003  PIM I/O Module, HD68 connector, special pin assignment
TPMC461  8 Channel Serial Interface RS232/RS422

Application Information
The TPMC461 is a standard single-width 32 bit PMC module and offers 8 channels of high performance asynchronous serial interface.

Three different standard modules are available: The TPMC461-10R provides 8 RS232 interfaces. The TPMC461-11R provides 8 RS422 interfaces. The TPMC461-12R provides 4 RS232 and 4 RS422 interfaces.

Other configurations are available as factory build option on a per channel base.

All modules offer front panel I/O with a HD50 SCSI-2 type connector and P14 I/O. Each RS232 channel supports RxD, TxD, RTS, CTS and GND. Each RS422 channel supports RxD+/-, TxD+/=- and GND. Two channels of the TPMC461-10R/-12R offer full modem support (TxD, RxD, CTS, RTS, DSR, DTR, CD, RI and GND) for RS232. Two channels of the TPMC461-11R support RxD+/-, TxD+/=, RTS+/=, CTS+/= and GND for RS422.

Each channel has 64 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 921.6 kbps for RS232 channels and 5.5296 Mbps for RS422 channels. The UART offers readable FIFO levels.

All channels generate interrupts on PCI interrupt INTA. For fast interrupt source detection the UART provides a special Global Interrupt Source Register.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

The TPMC461 can operate with 3.3V and 5.0V PCI I/O signaling voltage.

Software Support (TDRV002-SW-xx) for different operating systems is available.
The Embedded I/O Company

Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- Target Chip: XR17D158 (Exar)
- PCI 2.3 compliant interface
- PCI I/O signaling voltage 5V and 3.3V
- Board size: 149 mm x 74 mm
- Asynchronous serial interface
- Octal UART: Exar XR17D158
- Support of RxD, TxD, RTS, CTS and GND for each RS232 channel; RxD+/-, TxD+/- and GND for each RS422 channel. Two channels offer extended support (full modem or RTS+/- and CTS+/-)
- Programmable baud rates:
  - RS232: up to 921.6 kbps
  - RS422: up to 5.5296 Mbps
- 64 byte transmit FIFO per channel
- 64 byte receive FIFO per channel
- Readable FIFO levels
- Global Interrupt Source Register
- General Purpose 16 bit Timer/Counter
- ESD protected transceiver (up to ±15KV)
- Operating temperature -40° to +85°
Order Information

RoHS Compliant
- TPMC461-10R 8 Channel Serial RS232, HD50
- TPMC461-11R 8 Channel Serial RS422, HD50
- TPMC461-12R 4 Channel Serial RS232, 4 Channel Serial RS422, HD50

Other configurations are available as factory option on a per channel base.

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
- TPMC461-DOC User Manual

Software
- TDRV002-SW-25 Integrity Software Support
- TDRV002-SW-42 VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
- TDRV002-SW-65 Windows Software Support
- TDRV002-SW-82 Linux Software Support
- TDRV002-SW-95 QNX Software Support

For other operating systems please contact TEWS.

Related Products
- TA301 Cable Kit for Modules with HD50 Connector
- TPIM001 PIM I/O Module, HD50 connector
TPMC462  4 Channel Serial Interface RS232/RS422

Application Information

The TPMC462 is a standard single-width 32 bit PMC module and offers 4 channels of high performance asynchronous serial interface.

Three different standard modules are available: The TPMC462-10R provides 4 RS232 interfaces. The TPMC462-11R provides 4 RS422 interfaces. The TPMC462-12R provides 2 RS232 and 2 RS422 interfaces. Other configurations are available as factory build option on a per channel base.

All modules offer front panel I/O with a HD50 SCSI-2 type connector and P14 I/O. Each RS232 channel supports RxD, TxD, RTS, CTS and GND. Each RS422 channel supports RxD+/-, TxD+/- and GND. One channel of the TPMC462-10R/-12R offers full modem support (TxD, RxD, CTS, RTS, DSR, DTR, CD, RI and GND) for RS232. One channel of the TPMC462-11R supports RxD+/-, TxD+/-, RTS+/-, CTS+/-, and GND for RS422.

Each channel has 64 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 921.6 kbps for RS232 channels and 5.5296 Mbps for RS422 channels. The UART offers readable FIFO levels.

All channels generate interrupts on PCI interrupt INTA. For fast interrupt source detection the UART provides a special Global Interrupt Source Register.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

The TPMC462 can operate with 3.3V and 5.0V PCI I/O signaling voltage.

Software Support (TDRV002-SW-xx) for different operating systems is available.

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Issue 1.0.1
2017-08-31
### Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- Target Chip: XR17D154 (Exar)
- PCI 2.3 compliant interface
- PCI I/O signaling voltage 5V and 3.3V
- Board size: 149 mm x 74 mm
- Asynchronous serial interface
- Quad UART: Exar XR17D154
- Support of RxD, TxD, RTS, CTS and GND for each RS232 channel; RxD+/-, TxD+/- and GND for each RS422 channel. One channel offers extended support (full modem or RTS+/- and CTS+/-)
- Programmable baud rates:
  - RS232: up to 921.6 kbps
  - RS422: up to 5.5296 Mbps
- 64 byte transmit FIFO per channel
- 64 byte receive FIFO per channel
- Readable FIFO levels
- Global Interrupt Source Register
- General Purpose 16 bit Timer/Counter
- ESD protected transceiver (up to ± 15KV)
- Operating temperature -40°C to +85°C
**Order Information**

RoHS Compliant
TPMC462-10R  4 Channel Serial RS232, HD50
TPMC462-11R  4 Channel Serial RS422, HD50
TPMC462-12R  2 Channel Serial RS232, 2 Channel Serial RS422, HD50

Other configurations are available as factory option on a per channel base.

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**
TPMC462-DOC  User Manual

**Software**
TDRV002-SW-25  Integrity Software Support
TDRV002-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV002-SW-65  Windows Software Support
TDRV002-SW-82  Linux Software Support
TDRV002-SW-95  QNX Software Support

For other operating systems please contact TEWS.

**Related Products**
TA301  Cable Kit for Modules with HD50 Connector
TPIM001  PIM I/O Module, HD50 connector
The TPMC463 is a standard single-width 32 bit PMC module and offers 4 channels of high performance asynchronous serial interface.

Three different standard modules are available: The TPMC463-10R provides 4 RS232 interfaces. The TPMC463-11R provides 4 RS422 interfaces. The TPMC463-12R provides 2 RS232 and 2 RS422 interfaces. The TPMC463-20R provides 4 RS232 interfaces with non-standard RJ45 I/O pinout (as used on Motorola CPU boards).

Other configurations are available as factory build option on a per channel base.

All modules offer front panel I/O with four RJ45 connectors and P14 I/O. Each RS232 channel supports TxD, RxD, CTS, RTS, DTR, CD, DSR/RI and GND. Each RS422 channel supports RxD+/-, TxD+/-, and GND on front and RxD+/-, TxD+/-, RTS+/-, CTS+/- and GND on back I/O.

Each channel has 64 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 921.6 kbps for RS232 channels and 5.5296 Mbps for RS422 channels. The UART offers readable FIFO levels.

All channels generate interrupts on PCI interrupt INTA. For fast interrupt source detection the UART provides a special Global Interrupt Source Register.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

The TPMC463 can operate with 3.3V and 5.0V PCI I/O signaling voltage.

Software Support (TDRV002-SW-xx) for different operating systems is available.
Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- Target Chip: XR17D154 (Exar)
- PCI 2.3 compliant interface
- PCI I/O signaling voltage 5V and 3.3V
- Board size: 149 mm x 74 mm
- Asynchronous serial interface
- Quad UART: Exar XR17D154
- Support of RxD, TxD, RTS, CTS, DTR, DCD, DSR/RI, and GND for each RS232 channel; RxD+/-, TxD+/-, and GND on front and RxD+/-, TxD+/-, RTS+/-, CTS+/-, and GND on back I/O for each RS422 channel
- Programmable baud rates:
  - RS232: up to 921.6 kbps
  - RS422: up to 5.5296 Mbps
- 64 byte transmit FIFO per channel
- 64 byte receive FIFO per channel
- Readable FIFO levels
- Global Interrupt Source Register
- General Purpose 16 bit Timer/Counter
- ESD protected transceiver (up to ±15KV)
- Operating temperature -40°C to +85°C
Order Information

RoHS Compliant
- TPMC463-10R  4 Channel Serial RS232, RJ45
- TPMC463-11R  4 Channel Serial RS422, RJ45
- TPMC463-12R  2 Channel Serial RS232, 2 Channel Serial RS422, RJ45
- TPMC463-20R  4 Channel Serial RS232, RJ45 (Motorola compatible pinout)

Other configurations are available as factory option on a per channel base.

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
- TPMC463-DOC User Manual

Software
- TDRV002-SW-25 Integrity Software Support
- TDRV002-SW-42 VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
- TDRV002-SW-65 Windows Software Support
- TDRV002-SW-82 Linux Software Support
- TDRV002-SW-95 QNX Software Support

For other operating systems please contact TEWS.

Related Products
- TPIM001 PIM I/O Module, HD50 connector
TPMC465 8 Channel RS232/RS422/RS485 Programmable Serial Interface

Application Information

The TPMC465 is a standard single-width 32 bit PMC module and offers 8 channels of high performance RS232/RS422/RS485 programmable asynchronous serial interface. The module offers front panel I/O with a HD50 SCSI-2 type connector and P14 I/O.

The serial channels can be individually programmed to operate as RS232, RS422 or RS485 full duplex/half duplex interface. In addition programmable termination is provided for the RS422/RS485 interfaces. After power-up all serial I/O lines are in a high impedance state.

Each RS232 channel supports RxD, TxD, RTS, CTS and GND. RS422 and RS485 full duplex support a four wire interface (RX+, RX-, TX+, TX-) plus ground (GND). RS485 half duplex supports a two wire interface (DX+, DX-) plus ground (GND).

Each channel has 64 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 921.6 kbps for RS232 channels and 5.5296 Mbps for RS422/RS485 channels. The UART offers readable FIFO levels.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

The TPMC465 can operate with 3.3V and 5.0V PCI I/O signaling voltage.

Software Support (TDRV002-SW-xx) for different operating systems is available.
Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- Target Chip: XR17D158 (Exar)
- PCI 2.3 compliant interface
- PCI I/O signaling voltage 5V and 3.3V
- Board size: 149 mm x 74 mm
- Asynchronous serial interface
- Octal UART: Exar XR17D158
- Programmable Interfaces:
  - RS232
  - RS422
  - RS485 Full Duplex
  - RS485 Half Duplex
  - Programmable Termination for RS422/RS485
- Support of RxD, TxD, RTS, CTS and GND for each RS232 channel; RxD+/-, TxD+/- and GND for each RS422/RS485 FD channel; D+/- and GND for each RS485 HD channel.
- Programmable baud rates:
  - RS232: up to 921.6 kbps
  - RS422/RS485: up to 5.5296 Mbps
- 64 byte transmit FIFO per channel
- 64 byte receive FIFO per channel
- Readable FIFO levels
- Global Interrupt Source Register
- General Purpose 16 bit Timer/Counter
- ESD protected transceiver (up to ± 15KV)
- Operating temperature -40°C to +85°C
**Order Information**

**RoHS Compliant**
TPMC465-10R  8 Channel Programmable RS232/RS422/RS485, HD50

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**
TPMC465-DOC  User Manual

**Software**
TDRV002-SW-25  Integrity Software Support
TDRV002-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV002-SW-65  Windows Software Support
TDRV002-SW-82  Linux Software Support
TDRV002-SW-95  QNX Software Support

For other operating systems please contact TEWS.

**Related Products**
TA301  Cable Kit for Modules with HD50 Connector
TPIM001  PIM I/O Module, HD50 connector
TPMC466  4 Channel RS232/RS422/RS485 Programmable Serial Interface

Application Information

The TPMC466 is a standard single-width 32 bit PMC module and offers 4 channels of high performance RS232/RS422/RS485 programmable asynchronous serial interface. The module offers front panel I/O with a HD50 SCSI-2 type connector and P14 I/O.

The serial channels can be individually programmed to operate as RS232, RS422 or RS485 full duplex/half duplex interface. In addition, programmable termination is provided for the RS422/RS485 interfaces. After power-up all serial I/O lines are in a high impedance state.

Each RS232 channel supports RxD, TxD, RTS, CTS and GND. RS422 and RS485 full duplex support a four wire interface (RX+, RX-, TX+, TX-) plus ground (GND). RS485 half duplex supports a two wire interface (DX+, DX-) plus ground (GND).

Each channel has 64 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 921.6 kbps for RS232 channels and 5.5296 Mbps for RS422/RS485 channels. The UART offers readable FIFO levels.

All channels generate interrupts on PCI interrupt INTA. For fast interrupt source detection the UART provides a special Global Interrupt Source Register.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

The TPMC466 can operate with 3.3V and 5.0V PCI I/O signaling voltage.

Software Support (TDRV002-SW-xx) for different operating systems is available.
Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- Target Chip: XR17D154 (Exar)
- PCI 2.3 compliant interface
- PCI I/O signaling voltage 5V and 3.3V
- Board size: 149 mm x 74 mm
- Asynchronous serial interface
- Quad UART: Exar XR17D154
- Programmable Interfaces:
  - RS232
  - RS422
  - RS485 Full Duplex
  - RS485 Half Duplex
  - Programmable Termination for RS422/RS485
- Support of RxD, TxD, RTS, CTS and GND for each RS232 channel; RxD+/-, TxD+/- and GND for each RS422/RS485 FD channel; D+/- and GND for each RS485 HD channel.
- Programmable baud rates:
  - RS232: up to 921.6 kbps
  - RS422/RS485: up to 5.5296 Mbps
- 64 byte transmit FIFO per channel
- 64 byte receive FIFO per channel
- Readable FIFO levels
- Global Interrupt Source Register
- General Purpose 16 bit Timer/Counter
- ESD protected transceiver (up to ± 15KV)
- Operating temperature -40°C to +85°C
Order Information

RoHS Compliant
TPMC466-10R   4 Channel Programmable RS232/RS422/RS485, HD50

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC466-DOC   User Manual

Software
TDRV002-SW-25   Integrity Software Support
TDRV002-SW-42   VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV002-SW-65   Windows Software Support
TDRV002-SW-82   Linux Software Support
TDRV002-SW-95   QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA301   Cable Kit for Modules with HD50 Connector
TPIM001   PIM I/O Module, HD50 connector
Application Information

The TPMC467 is a standard single-width 32 bit PMC module and offers 4 channels of high performance RS232/RS422/RS485 programmable asynchronous serial interface. The module offers front panel I/O with four RJ45 type connectors. The TPMC467-10R provides a RJ45 I/O pinout according to EIA-232D. The TPMC467-11R provides a non-standard RJ45 I/O pin out (as used on Motorola CPU boards).

The serial channels can be individually programmed to operate as RS232, RS422 or RS485 full duplex/half duplex interface. In addition programmable termination is provided for the RS422/RS485 interfaces. After power-up all serial I/O lines are in a high impedance state.

Each RS232 channel supports RxD, TxD, RTS, CTS and GND. RS422 and RS485 full duplex support a four wire interface (RX+, RX-, TX+, TX-) plus ground (GND). RS485 half duplex supports a two wire interface (DX+, DX-) plus ground (GND).

Each channel has 64 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 921.6 kbps for RS232 channels and 5.5296 Mbps for RS422/RS485 channels. The UART offers readable FIFO levels.

All channels generate interrupts on PCI interrupt INTA. For fast interrupt source detection the UART provides a special Global Interrupt Source Register.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

The TPMC467 can operate with 3.3V and 5.0V PCI I/O signaling voltage.

Software Support (TDRV002-SW-xx) for different operating systems is available.
Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- Target Chip: XR17D154 (Exar)
- PCI 2.3 compliant interface
- PCI I/O signaling voltage 5V and 3.3V
- Board size: 149 mm x 74 mm
- Asynchronous serial interface
- Quad UART: Exar XR17D154
- Programmable Interfaces:
  - RS232
  - RS422
  - RS485 Full Duplex
  - RS485 Half Duplex
  - Programmable Termination for RS422/RS485
- Support of RxD, TxD, RTS, CTS and GND for each RS232 channel; RxD+/-, TxD+/- and GND for each RS422/RS485 FD channel; D+/- and GND for each RS485 HD channel.
- Programmable baud rates:
  - RS232: up to 921.6 kbps
  - RS422/RS485: up to 5.5296 Mbps
- 64 byte transmit FIFO per channel
- 64 byte receive FIFO per channel
- Readable FIFO levels
- Global Interrupt Source Register
- General Purpose 16 bit Timer/Counter
- ESD protected transceiver (up to ± 15KV)
- Operating temperature -40°C to +85°C

Support of RxD, TxD, RTS, CTS and GND for each RS232 channel; RxD+/-, TxD+/- and GND for each RS422/RS485 FD channel; D+/- and GND for each RS485 HD channel.

Programmable baud rates:
- RS232: up to 921.6 kbps
- RS422/RS485: up to 5.5296 Mbps

64 byte transmit FIFO per channel
64 byte receive FIFO per channel
Readable FIFO levels
Global Interrupt Source Register
General Purpose 16 bit Timer/Counter
ESD protected transceiver (up to ± 15KV)
Operating temperature -40°C to +85°C
### Order Information

**RoHS Compliant**
- **TPMC467-10R** 4 Channel Programmable RS232/RS422/RS485, RJ45
- **TPMC467-11R** 4 Channel Programmable RS232/RS422/RS485, RJ45 (Motorola compatible pinout)

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**
- **TPMC467-DOC** User Manual

**Software**
- **TDRV002-SW-25** Integrity Software Support
- **TDRV002-SW-42** VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
- **TDRV002-SW-65** Windows Software Support
- **TDRV002-SW-82** Linux Software Support
- **TDRV002-SW-95** QNX Software Support

For other operating systems please contact TEWS.
The TPMC 470 is a standard single-width 32 bit PMC module offering 4 channels of high performance RS232/RS422/RS485 programmable asynchronous serial interface with front panel I/O. Each of the four channels are isolated from the system and against each other by digital isolator and on board integrated DC/DC converter.

The serial channels can be individually programmed to operate as RS232, RS422 or RS485 full duplex/half duplex interface. In addition programmable termination is provided for the RS422/RS485 interfaces. After power-up all serial I/O lines are in a high impedance state.

All modules offer front panel I/O with a HD50 SCSI-2 type connector. Each RS232 channel supports RxD, TxD, RTS, CTS and GND. RS422 and RS485 full duplex support a four wire interface (RX+, RX-, TX+, TX-) plus ground (GND). RS485 half duplex supports a two wire interface (DX+, DX-) plus ground (GND).

Each channel has 64 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 921.6 kbps for RS232 channels and 5.5296 Mbps for RS422 channels. The UART offers readable FIFO levels.

All channels generate interrupts on PCI interrupt INTA. For fast interrupt source detection the UART provides a special Global Interrupt Source Register.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

The TPMC470 can operate with 3.3V and 5.0V PCI I/O signalling voltage.

Software Support (TDRV002-SW-xx) for different operating systems is available.
Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- Target Chip: XR17D154 (Exar)
- PCI 2.3 compliant interface
- PCI I/O signaling voltage 5V and 3.3V
- Board size: 149 mm x 74 mm
- Asynchronous serial interface
- Quad UART: Exar XR17D154
- Programmable Interfaces:
  - RS232
  - RS422
  - RS485 Full Duplex
  - RS485 Half Duplex
  - Programmable Termination for RS422/RS485
- Support of RxD, TxD, RTS, CTS and GND for each RS232 channel; RxD+/-, TxD+/-, and GND for each RS422/RS485 FD channel; D+/- and GND for each RS485 HD channel.

- Programmable baud rates:
  - RS232: up to 921.6 kbps
  - RS422/RS485: up to 5.5296 Mbps
- 64 byte transmit FIFO per channel
- 64 byte receive FIFO per channel
- Readable FIFO levels
- Global Interrupt Source Register
- General Purpose 16 bit Timer/Counter
- Galvanic isolation of each Transceiver Channel
- ESD protected transceiver (up to ± 15KV)
- Operating temperature -40°C to +85°C
- MTBF (MIL-HDBK217F/FN2 G6 20°C) TPMC470-10R: 694000h
**Order Information**

**RoHS Compliant**

TPMC470-10R  4 Channel Isolated Programmable RS232/RS422/RS485, HD50

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**

TPMC470-DOC  User Manual

**Software**

TDRV002-SW-25  Integrity Software Support
TDRV002-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV002-SW-65  Windows Software Support
TDRV002-SW-82  Linux Software Support
TDRV002-SW-95  QNX Software Support

For other operating systems please contact TEWS.

**Related Products**

TA301  Cable Kit for Modules with HD50 Connector
The TPMC463 is a standard single-width 32 bit PMC module and offers 4 channels of high performance asynchronous serial interface.

Three different standard modules are available: The TPMC463-10R provides 4 RS232 interfaces. The TPMC463-11R provides 4 RS422 interfaces. The TPMC463-12R provides 2 RS232 and 2 RS422 interfaces. The TPMC463-20R provides 4 RS232 interfaces with non-standard RJ45 I/O pinout (as used on Motorola CPU boards).

Other configurations are available as factory build option on a per channel base.

All modules offer front panel I/O with four RJ45 connectors and P14 I/O. Each RS232 channel supports TxD, RxD, CTS, RTS, DTR, CD, DSR/RI and GND. Each RS422 channel supports RxD+/-, TxD+/-, and GND on front and RxD+/-, TxD+/-, RTS+/-, CTS+/- and GND on back I/O.

Each channel has 64 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 921.6 kbps for RS232 channels and 5.5296 Mbps for RS422 channels. The UART offers readable FIFO levels.

All channels generate interrupts on PCI interrupt INTA. For fast interrupt source detection the UART provides a special Global Interrupt Source Register.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

The TPMC463 can operate with 3.3V and 5.0V PCI I/O signaling voltage.

Software Support (TDRV002-SW-xx) for different operating systems is available.
### Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- Target Chip: XR17D154 (Exar)
- PCI 2.3 compliant interface
- PCI I/O signaling voltage 5V and 3.3V
- Board size: 149 mm x 74 mm
- Asynchronous serial interface
- Quad UART: Exar XR17D154
- Support of RxD, TxD, RTS, CTS, DTR, DCD, DSR/RI and GND for each RS232 channel; RxD+/-, TxD+/- and GND on front and RxD+/-, TxD+/-, RTS+/-, CTS+/- and GND on back I/O for each RS422 channel
- Programmable baud rates:
  - RS232: up to 921.6 kbps
  - RS422: up to 5.5296 Mbps
- 64 byte transmit FIFO per channel
- 64 byte receive FIFO per channel
- Readable FIFO levels
- Global Interrupt Source Register
- General Purpose 16 bit Timer/Counter
- ESD protected transceiver (up to ± 15KV)
- Operating temperature -40°C to +85°C

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![Diagram of the PMC module](image-url)
Order Information

RoHS Compliant
TPMC463-10R  4 Channel Serial RS232, RJ45
TPMC463-11R  4 Channel Serial RS422, RJ45
TPMC463-12R  2 Channel Serial RS232, 2 Channel Serial RS422, RJ45
TPMC463-20R  4 Channel Serial RS232, RJ45 (Motorola compatible pinout)

Other configurations are available as factory option on a per channel base.

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC463-DOC  User Manual

Software
TDRV002-SW-25  Integrity Software Support
TDRV002-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV002-SW-65  Windows Software Support
TDRV002-SW-82  Linux Software Support
TDRV002-SW-95  QNX Software Support

For other operating systems please contact TEWS.

Related Products
TPIM001  PIM I/O Module, HD50 connector
The TPMC860 is a standard single-width 32 bit PMC module with four channels of high performance RS232 asynchronous interface. Each of the four channels is isolated from the system and against each other by optocoupler and on board DC/DC converter per channel. The serial channels are accessible through a DB25 connector mounted in the front panel and via P14 I/O. Each channel has a 64 byte transmit FIFO and a 64 byte receive FIFO to significantly reduce the overhead required to provide data to and get data from the transmitter and receivers. The FIFO trigger levels are programmable. The TPMC860 supports Receive Data (RxD), Transmit Data (TxD), Ready-To-Send (RTS), Clear-To-Send (CTS) and isolated GND per channel. The baud rate is individually programmable up to 460.8 Kbaud for each channel. Interrupts are supported.

All channels generate interrupts on PCI interrupt INTA. For fast interrupt source detection the TPMC860 provides a special interrupt status register.

Each RS232 receiver input and transmitter output is protected against electrostatic discharge (ESD) up to +/-15kV according to IEC 1000-4-2.

Software Support (TPMC860-SW-xx) is available for different operating systems.
### Order Information

**RoHS Compliant**
TPMC860-10R 4 Channel Isolated Serial Interface RS232, DB25

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**
TPMC860-DOC User Manual

**Software**
TPMC860-SW-25 Integrity Software Support
TPMC860-SW-42 VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TPMC860-SW-65 Windows Software Support
TPMC860-SW-82 Linux Software Support
TPMC860-SW-95 QNX Software Support

For other operating systems please contact TEWS.

**Related Products**
TA303 Cable Kit for Modules with DB25 Female Connector
TPIM001 PIM I/O Module, HD50 connector
The TPMC861 is a standard single-width 32 bit PMC module with four channels of high performance RS422/485-HD/FD asynchronous serial interface. Each of the four channels is isolated from the system and against each other by optocoupler and on board DC/DC converter per channel.

The serial channels are accessible through a DB25 connector mounted in the front panel and via P14 I/O. Each channel has a 128 byte transmit FIFO and a 128 byte receive FIFO to significantly reduce the overhead required to provide data to and get data from the transmitter and receivers. The FIFO trigger levels are programmable. For RS422 and RS485-FD a four wire interface (RX+, RX-, TX+, TX-) plus isolated ground (GND) per channel is supported. For RS485-HD a two wire interface (DX+, DX-) plus isolated ground (GND) per channel is supported. The baud rate is individually programmable up to 460.8 Kbaud for each channel. The interrupts are supported.

All channels generate interrupts on PCI interrupt INTA. For fast interrupt source detection the TPMC861 provides a special interrupt status register. Each receiver input and transmitter output of all channels is protected against electrostatic discharge (ESD) up to +/- 15KV according to IEC 1000-4-2.

Software Support (TPMC861-SW-xx) is available for different operating systems.

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 2.1 compliant interface
- 3.3V and 5V PCI Signaling Voltage
- 4 channel RS422/485 asynchronous serial interface
- Serial channels isolated from system and against each other by optocoupler and on board DC/DC converter per channel
- For RS422 and RS485-FD support of RxD, TxD and GND per channel
- For RS485-HD support of DX+, DX- and GND per channel
- Programmable baud rates up to 460.8 Kbaud
- 128 byte transmit FIFO and 128 byte receive FIFO per channel
- ESD protected transceiver (up to +/- 15KV according to IEC 1000-4-2)
- Operating temperature –40°C to +85°C
Order Information

RoHS Compliant
TPMC861-10R 4 Channel Isolated Serial Interface RS422 / RS485, DB25

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC861-DOC User Manual

Software
TPMC861-SW-25 Integrity Software Support
TPMC861-SW-42 VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TPMC861-SW-65 Windows Software Support
TPMC861-SW-82 Linux Software Support
TPMC861-SW-95 QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA303 Cable Kit for Modules with DB25 Female Connector
TPIM001 PIM I/O Module, HD50 connector

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Issue  1.0.1  2017-08-31
TPMC863  4 Channel High Speed Synch/Asynch Serial Interface

Application Information

The TPMC863 is a standard single-width 32 bit PMC with four high speed serial data communication channels.

The TPMC863 is the successor of the discontinued TPMC862, providing similar functionality and full connector and pin-out compatibility.

The serial communication controller is implemented in FPGA logic, along with the bus master capable PCI interface, guaranteeing long term availability and having the option to implement additional functions in the future.

Each channel has a receive and a transmit FIFO of 512 long words (32 bit) per channel for high data throughput.

Data transfer on the PCI bus is handled via TPMC863 initiated DMA cycles with minimum host/CPU intervention.

Several serial communication protocols are supported by each channel, such as asynchronous, isochronous, synchronous and HDLC mode.

A 14.7456 MHz oscillator provides standard asynchronous baud rates. An additional 24 MHz oscillator is provided for other baud rates. A 10 MHz oscillator is used for the synchronous baud rate of 10 Mbit/s.

Each channel also provides various interrupt sources, generated on INTA. The interrupt sources can be enabled or disabled individually.

Multi-protocol transceivers are used for the line interface. The physical interface is selectable by software, individually for each channel as EIA-232, EIA-422, EIA-449, EIA-530, EIA-530A, V.35, V.36 or X.21.

The following signals are provided by the TPMC863 for each channel at the front and rear I/O connectors: Receive Data (RxD +/-), Transmit Data (TxD +/-), Receive Clock (RxC +/-), Transmit Clock (TxC +/-), Ready-To-Send (RTS +/-), Clear-To-Send (CTS +/-), Carrier-Detect (CD +/-) and GND. Additionally serial channel 3 provides Data-Set-Ready (DSR3 +/-) and Data-Terminal-Ready (DTR3 +/-) at the front I/O connector.

The TPMC863 provides front panel I/O via an HD68 SCSI-3 type connector and rear I/O via P14.

Software Support (TDRV009-SW-xx) for different operating systems is available.
Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 2.1 compliant master/slave interface
- 3.3V and 5V PCI Signaling Voltage
- Board size: 147 mm x 74 mm
- Four high speed synchronous/asynchronous serial interfaces
- Support of RxD, TxD, RxC, TxC, RTS, CTS, CD and GND on HD68 front connector, parallel to rear connector P14; DTR3 and DSR3 at front I/O only
- Physical interface (individually programmable per channel):
  EIA-232, EIA-422, EIA-449, EIA-530, EIA-530A, V.35, V.36 and X.21
- Maximum data rate: 10 Mbit/s (synchronous), 2 Mbit/s (asynchronous), internal or external provided clock
- EIA-232: up to 115.2 kbit/s
- Temperature range: -40°C to +85°C

Order Information

RoHS Compliant
TPMC863-10R 4 Channel High Speed Synch/Asynch Serial Interface, HD68

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC863-DOC User Manual

Software
TDRV009-SW-25 Integrity Software Support
TDRV009-SW-42 VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV009-SW-65 Windows Software Support
TDRV009-SW-82 Linux Software Support
TDRV009-SW-95 QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA304 Cable Kit for Modules with HD68 Connector
TPIM005 PIM I/O Module, HD68 connector, for TPMC863/TPMC363

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Issue 1.4.1 2017-08-31

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The Embedded I/O Company

TPMC866  8 Channel Serial Interface RS232 / RS422 / RS485

Application Information

The TPMC866 is a standard single-width 32 bit PMC module and has eight channels of high performance asynchronous serial interface with front I/O and back I/O.

The TPMC866-10R offers an 8 channel RS232 interface and supports Receive Data (RxD), Transmit Data (TxD), Ready-To-Send (RTS), Clear-To-Send (CTS) and GND for each channel. Additionally serial channel one and serial channel two provide Data-Set-Ready (DSR), Data-Terminal-Ready (DTR), Data-Carrier-Detect (DCD) and Ring-Detect-Indicator (RI).

The TPMC866-11R supports an 8 channel RS422 interface and offers RS422 signal levels by differential transmitters and receivers. The Transmit Data (TxD +/-), Receive Data (RxD +/-) and GND are provided for each serial channel. The receiver signal termination (120ohms between RxD+ and RxD-) is provided on the TPMC866 per channel.

Each channel of the TPMC866-10R/-11R has a 64 byte transmit FIFO and a 64 byte receive FIFO to significantly reduce the overhead required to provide data to and get data from the transmitter and receivers. The FIFO trigger levels are programmable.

The TPMC866-12R provides an 8 channel serial interface. Each serial channel can be configured by a DIP switch to operate as an RS422, RS485-FD-M (Full Duplex Master), RS485-FD-S (Full Duplex Slave) or RS485-HD (Half Duplex) interface.

For RS422 and RS485-FD a four wire interface (RX+, RX-, TX+, TX-) plus ground (GND) is offered. For RS485-HD a two wire interface (DX+, DX-) plus ground (GND) is supported. For the front I/O a HD50 SCSI-2 type female connector is located in the front panel. For the back I/O the P14 I/O connector is supported. Each channel of the TPMC866-12R provides a 128 byte transmit FIFO and a 128 byte receive FIFO to significantly reduce the overhead required to provide data to the transmitters and get data from the receivers. The FIFO trigger levels are programmable.

For all modules the baud rate is individually programmable up to 460.8 Kbaud per channel. All channels use the PCI interrupt INTA together but for fast interrupt source detection the TPMC866-xxR provides a special interrupt status register. Receiver and transmitter are protected against electrostatic discharge (ESD).

All TPMC866 modules are available in extended temperature range as TPMC866-xxR-ET versions.

Software support (TPMC866-SW-xx) for different operating systems is available.
Technical Information

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- Board size: 149 mm x 74 mm
- PCI r2.1 compliant interface, 32 bit, 33 MHz
- TPMC866-10R/-11R: 3.3V & 5V PCI Signaling Voltage
- TPMC866-12R: 5V PCI Signaling Voltage
- 8 channel asynchronous serial interface
- Support of RxD, TxD, RTS, CTS and GND for TPMC866-10R; support of RxD+/-, TxD+/- and GND for TPMC866-11R and support of TXD+/-, RXD+/-, GND (RS422 and RS485-FD M/S) and DX+/-, GND (RS485-HD) for TPMC866-12R
- Programmable baud rates up to 460.8 Kbaud
- 64 byte transmit FIFO per channel, 64 byte receive FIFO per channel for TPMC866-10R/-11R and 128 byte transmit FIFO per channel, 128 byte receive FIFO per channel for TPMC866-12R
- ESD protected transceiver (up to +/- 15KV according to IEC 1000-4-2)
- Temperature range: 0°C to +70°C (TPMC866-10R/-11R/-12R) and -40°C to +85°C (TPMC866-10R-ET/-11R-ET/-12R-ET)
## Order Information

**RoHS Compliant**

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For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**

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**Software**

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For other operating systems please contact TEWS.

**Related Products**

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<td>TPIM001</td>
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TPMC866-IO DIN Rail Mounting I/O Module (8x DB9) for TPMC866

Application Information
The TPMC866-IO is a DIN Rail Mounting I/O module for the serial interface TPMC866 (versions with front panel access).
The TPMC866-IO supports all versions of the TPMC866 (RS232, RS422 and RS485 interfaces). Eight DB9 male connectors are mounted on the module.

The TPMC866-IO supports TXD, RXD, RTS, CTS and GND for each of the eight serial channels of the TPMC866-10R (RS232).
TxD+/-, RxD+/-, GND are supported for the TPMC866-11R/-12R (RS422) and Dx+/-, GND for the TPMC866-12R (RS485).

Technical Information
- DIN Rail Mounting I/O module, 95 mm x 83 mm
- 8 DB9 male connectors
- Terminal point for shield of all DB9 connectors
- Supports front panel I/O versions of the TPMC866
- Cable TA105-10R, 0.8m ribbon cable with 50 pin ribbon cable connector and 50 pin SCSI-2 male connector, is included

Order Information
RoHS Compliant
TPMC866-IO-10R Mounting Rail I/O Module, 8 x DB9

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC866-IO-10-DOC User Manual

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2017-10-12
Application Information

The TPMC866-TM-10R is a transition module for the serial interface TPMC866 (versions with front panel access). The transition module supports all versions of the TPMC866 (RS232, RS422 and RS485 interfaces).

Eight DB25 female connectors are mounted in a 6U 8TE EMV front panel.

The transition module supports TXD, RXD, RTS, CTS and GND for each of the eight serial channels of the TPMC866-10R (RS232).

Each serial channel can be configured by jumper as DTE or DCE.

On board termination is provided for RS422/RS485. Termination can be activated by jumper.

A 2 pin terminal block on the transition module can be used to provide +5V to each of the eight DB25 connectors (pin 9) and to supply the on board termination for RS422/RS485. Support of the +5V is selectable by jumper for each serial channel. The +5V is fuse protected by a 1A multi-fuse.

Technical Information

- 6U / 8TE EMV front panel
- 8 DB25 female connectors mounted in front panel
- Supports front panel I/O versions of the TPMC866
- DTE and DCE configuration by jumper fields
- RS422 and RS485 termination selectable by jumper
- +5V / GND by 2 pin terminal block; Power only required to supply on board termination or to provide +5V to pin 9 of the DB25 connectors of channel 1 to 8
- Fuse protected by a 1A multi-fuse
- Cable TA105-10R, 0.8m ribbon cable with 50 pin ribbon cable connector and 50 pin SCSI-2 male connector, is included

Order Information

RoHS Compliant
TPMC866-TM-10R 8 Channel Transition Module, DB25

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
Application Information

The TPMC866-TM-20R is a transition module for the serial interface TPMC866 (versions with front panel access).

The transition module TPMC866-TM-20R supports all versions of the TPMC866 (RS232, RS422 and RS485 interfaces).

Eight shielded RJ45 connectors are mounted in a 6U 4TE EMV front panel.

The transition module supports TXD, RXD, RTS, CTS and GND for each of the eight channels of the TPMC866-10R (RS232).

TxD+/-, RxD+/-, GND are supported for the TPMC866-11R/12R (RS422) and Dx+/-, GND for the TPMC866-12R (RS485).

Each serial channel can be configured by jumper as DTE or DCE.

On board termination is provided for RS422/RS485. Termination can be activated by jumper.

A 2 pin terminal block on the transition module can be used to provide +5V to the RJ45 connectors (pin 1) of channel 3 to 8 and to supply the on board termination for RS422/ RS485. Support of the +5V is selectable by jumper. The +5V is fuse protected by a 1A multi-fuse.

Technical Information

- 6U / 4TE EMV front panel
- 8 shielded RJ45 mounted in front panel
- Supports front panel I/O versions of the TPMC866
- DTE and DCE configuration by jumper fields
- RS422 and RS485 termination selectable by jumper

- +5V / GND by 2 pin terminal block; Power only required to supply on board termination or to provide +5V to pin 1 of RJ45 connectors of channel 3 to 8
- Fuse protected by a 1A multi-fuse
- Cable TA105-10R, 0.8m ribbon cable with 50 pin ribbon cable connector and 50 pin SCSI-2 male connector, is included

Order Information

RoHS Compliant

TPMC866-TM-20R  8 Channel Transition Module, RJ45

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation

The Embedded I/O Company

TPMC866-TM-30 Transition Module (16x RJH) for TPMC866

Application Information

The TPMC866-TM-30R is a high density transition module for the TPMC866 with front panel access. The TPMC866-TM-30R supports the TPMC866-10R (RS232 interface) and the TPMC866-12R (RS485 HD configuration only). Up to two modules can be connected to one transition module TPMC866-TM-30R. Sixteen 4 pin RJH connectors are mounted in a 6U 4TE EMV front panel.

The transition module supports TXD, RXD, GND for each set of the eight channels of the TPMC866-10R (RS232) and Dx+/-, GND for the TPMC866-12R (RS485 HD configuration).

On board termination is provided for RS485. Termination can be activated by jumper. A two pin screw terminal (X9) can be used to supply the on board termination for RS485.

Technical Information

- 6U / 4TE EMV front panel
- Sixteen 4 pin RJH connectors mounted in front panel
- Supports front panel I/O versions of the TPMC866-10R/-12R
- RS485 termination selectable by jumper
- +5V / GND by 2 pin terminal block; Power only required to supply on board termination
- Fuse protected by a 1A multi-fuse
- Two TA105-10R, 0.8m ribbon cables with 50 pin ribbon cable connector and 50 pin SCSI-2 male connector, are included

Order Information

RoHS Compliant
TPMC866-TM-30R 16 Channel Transition Module, 4-pin RJ connectors

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation

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**Application Information**

The TPMC871 is a standard single-width 32 bit PMC module with one interface for 16 bit PC Card or 32 bit CardBus cards using a PC Card controller and a power management unit. The register map of the PC Card controller is Intel 82365-DF compatible.

The power management unit provides 3.3V or 5.0V PC Card power supply and 3.3V, 5.0V or 12V PC Card programming voltage. Due to the short circuit and thermal protection of the power management unit no external fuses are needed on the module.

The TPMC871 provides full ExCA register implementation of one 16 bit PC Card compatible with PCMCIA 2.1/JEIDA 4.2 standards. Both memory and I/O cards are supported. Up to five memory windows and up to two I/O windows are available for PC Card 16 accesses. For 32 bit CardBus cards two memory windows and two I/O windows are supported by the controller. CardBus card status information can be accessed in five CardBus socket registers which can be mapped in the host memory space.

**Software Support:**
- Driver support (TPMC871-SW-xx) for different operating systems is available.
- The TPMC871 is directly supported from Windows and Linux.
- For further operating systems please contact TEWS.

**Technical Information**

- Standard single-width 32 bit PMC module conforming to IEEE P1386.1
- PCI 2.1 compliant interface
- 3.3V and 5V PCI Signaling Voltage
- Board size: 149mm x 74mm
- 1 PC Card Slot with hot insertion and removal
- Supports memory and I/O cards of type I and II

**Note:** The PC Card assembly has a maximum component height of 5.6mm which is 0.9mm above the specified component height (4.7mm) according to IEEE1386.1
Order Information

RoHS Compliant
- TPMC871-10R  1 Socket CardBus/PC Card Interface, access through front panel
- TPMC871-11R  1 Socket CardBus/PC Card Interface, recessed socket, no front panel
- TPMC871-50R  1 Socket CardBus/PC Card Interface, recessed socket, front panel

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
- TPMC871-DOC  User Manual

Software
- TPMC871-SW-42  VxWorks Software Support

For other operating systems please contact TEWS.

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Issue 3.0.1
2017-09-20
TPMC883  Single Channel 10/100/1000 Mbit/s Ethernet

Application Information

The TPMC883 is a PCI Mezzanine Card (PMC) compatible module providing a single channel Gigabit Ethernet 10 / 100 / 1000BASE-TX interface.

For highest data rates, the TPMC883 has a 64 bit, 133/100/66 MHz PCI bus interface and is capable of full speed bus-master DMA operations utilizing maximum PCI bandwidth.

An Intel™ 82545EM Ethernet Controller (82545GM for RoHS compliant product) is used, which supports 10, 100 and 1000 Mbit/s transmission rates for half and full duplex operation. The TPMC883 is capable of performing an auto negotiation algorithm which allows both link-partners to find out the best link-parameters by themselves. The TPMC883 is widely user configurable via configuration and status register access over the PCI bus. Front panel mounted LEDs indicate various network activities.

The TPMC883 provides a 10/100/1000 Mbit/s network connection via a front panel RJ45 connector. The port is galvanically isolated from the Ethernet Controller.

Driver Support:
- Software Support Windows and several other operating systems is available from Intel.
- For other operating systems please contact TEWS.

Technical Information

- Standard single-width 64 bit PMC module conforming to IEEE P1386.1
- PCI 2.2 (64 bit / 66 MHz) and PCI-X 1.0a (64 bit / 133 MHz) compliant interface
- 3.3V and 5V PCI Signaling Voltage
- Board size: 147 mm x 74 mm
- IEEE802.3 compliant Gigabit LAN interface
- Support of front panel status LEDs
- 10BASE-T/100BASE-TX 1000BASE-T interface available
- Half or full-duplex operation
- 64 Kbyte Transmit and Receive FIFOs
- Controller supports DMA cycles as a bus master
- Operating temperature range: 0°C to +70°C
Order Information

RoHS Compliant
TPMC883-10R  1 Channel 10/100/1000BaseT Ethernet Interface, Intel 82545EM, RJ45
For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TPMC883-DOC  User Manual
The TPMC885 is a PCI Mezzanine Card (PMC) compatible module providing a dual or four channel Ethernet 10BASE-T / 100BASE-TX / 1000BASE-T interface.

A transparent 64 bit, up to 133 MHz PCI-X/PCI to PCIe Bridge and a PCIe Switch provide access to the Intel 82574IT Gigabit Ethernet controllers. Each Ethernet interface supports 10, 100 and 1000 Mbit/s transmission rates for full duplex operation, 10 and 100 Mbit/s transmissions for half duplex operation, and is equipped with a 32 Kbit Serial EEPROM.

The two/four Ethernet interfaces of the TPMC885 are capable of performing an auto negotiation algorithm which allows both link-partners to find out the best link-parameters by themselves. The TPMC885 is widely user configurable via configuration and status register access over the PCI bus.

The TPMC885-10R provides four 10/100/1000 Mbit/s Ethernet connections via front panel RJ45 connectors.

The TPMC885-11R routes four Ethernet ports to the back I/O P14 connector without any RJ45 connector at the front.

The TPMC885-20R provides two 10/100/1000 Mbit/s Ethernet connections via front panel RJ45 connectors.

The TPMC885-21R routes two Ethernet ports to the back I/O P14 connector without any RJ45 connector at the front.

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° to +85°C.

Software Support:
- Software support for Intel™ 82574IT at www.intel.com
- For operating systems not supported by Intel™, please contact TEWS.
Technical Information

- Form Factor: Standard single-width 64 bit PMC module conforming to IEEE P1386/P1386.1
- Board size: 149 mm x 74 mm
- PCI 3.0 (up to 66 MHZ) and PCI-X 2.0a (up to 133 MHz) compliant interface
- 3.3V PCI signaling with 5V I/O tolerance
- 2 or 4 Intel™ 82574IT Gigabit Ethernet controllers
- 10Base-T / 100Base-TX / 1000Base-T
- Half or full-duplex operation
- For each interface: Configurable receive and transmit data FIFO, programmable in 1 KB increments
- Operating temperature -40°C to +85°C, constant airflow of 2m/s is required
- MTBF (MIL-HDBK217F/FN2 GB 20°C):
  - TPMC885-10R: 359000 h
  - TPMC885-11R: 502000 h
  - TPMC885-20R: 491000 h
  - TPMC885-21R: 579000 h

Order Information

- RoHS Compliant
  - TPMC885-10R 4 Channel 10/100/1000BaseT Ethernet Interface, Intel 82574IT, RJ45
  - TPMC885-11R 4 Channel 10/100/1000BaseT Ethernet Interface, Intel 82574IT, P14 I/O
  - TPMC885-20R 2 Channel 10/100/1000BaseT Ethernet Interface, Intel 82574IT, RJ45
  - TPMC885-21R 2 Channel 10/100/1000BaseT Ethernet Interface, Intel 82574IT, P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation

- TPMC885-DOC User Manual

Related Products

- TPIM006 PIM I/O Module for 10/100/1000 Ethernet PMC
TPMC901 6/4/2 Channel Extended CAN Bus

Application Information

The TPMC901 is a PCI Mezzanine Card (PMC) compatible module. The TPMC901-10R provides six independent CAN bus interfaces using six Bosch CC770F CAN Controllers. The CC770 offers pin compatibility with Intel's 82527 CAN Controller and is a function replacement. Additionally to the standard data and remote frame, all channels support the extended data and remote frame according to the CAN specification 2.0 part A and B (standard 11 bit identifier and extended 29 bit identifier).

All channels have the capability to transmit, receive and perform message filtering on extended and standard messages.

Each channel supports CAN High Speed according to ISO11898 as the physical interface. The bus line termination is selectable by a jumper separate for each bus line pair. The data transfer rates of up to 1 Mbps are supported for a bus line length of 40 m.

The TPMC901-11R supports four CAN bus channels and the TPMC901-12R has two CAN bus channels.

Software Support (TDRV011-SW-xx) for different operating systems is available.

Technical Information

- Form Factor: Standard single-width 32 bit PMC module conforming to IEEE P1386/P1386.1
- Board size: 149 mm x 74 mm
- PCI 2.2 (33 MHz) compliant interface
- 3.3V PCI signaling with 5V I/O tolerance
- CAN Bus interface based on CC770F CAN Controller
- Function replacement of Intel's 82527
- Support of CAN specification 2.0 Part A and B (standard and extended data frames)
- Programmable global mask
- 15 message objects of 8 byte data length
- Powerful error handling
- Programmable transfer rates
- Physical interface CAN High Speed (according to ISO 11898) per channel
- Maximum transfer rate 1 Mbit/s (bus length up to 40m)
- Operating temperature -40°C to +85°C
- MTBF (MIL-HDBK217F/FN2 G6 20°C)
  - TPMC901-10R: 621000 h
  - TPMC901-11R: 632000 h
  - TPMC901-12R: 645000 h

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Order Information

RoHS Compliant
TPMC901-10R  6 x CAN Bus based on Bosch CC770, ISO11898 CAN High Speed, DB25
TPMC901-11R  4 x CAN Bus based on Bosch CC770, ISO11898 CAN High Speed, DB25
TPMC901-12R  2 x CAN Bus based on Bosch CC770, ISO11898 CAN High Speed, DB25

For the availability of non-RoHS compliant (leded solder) products please contact TEWS.

Documentation
TPMC901-DOC  User Manual

Software
TDRV011-SW-25  Integrity Software Support
TDRV011-SW-42  VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV011-SW-65  Windows Software Support
TDRV011-SW-82  Linux Software Support
TDRV011-SW-95  QNX Software Support

For other operating systems please contact TEWS.

Related Products
TA302  Cable Kit for modules with DB25 male connector
TPMC917  4MB SRAM with Battery Backup and 4 Channel RS232

Application Information
The TPMC917 is a standard single-width 32bit PMC module providing 4Mbyte of SRAM with battery backup by an on board lithium cell and four ESD protected RS232 channels (TPMC917-10R only).

The 4Mbyte of NV-SRAM are organized in two banks, each providing 512K x 32bit of memory. During normal operation (standard 5V supply applied to the SRAM) the capacity of the lithium cell is monitored every 24 hours by a battery monitor device and an interrupt can be generated if the battery voltage is too low.

The monitor device switches the power supply of the SRAM from the standard 5V to the battery if the 5V supply drops below the battery monitor device threshold level. Any active access to the SRAM at this point is executed correctly within 1.5µs. After this time any further accesses to the SRAM are not possible.

A miniature DIP switch allows the selection of the battery backup source either from the on board lithium cell or from an external battery via the P14 I/O connector.

The TPMC917-10R provides four RS232 channels. Each channel has a programmable baud rate up to 115.2Kbaud. The 4 channel UART provides a 64Byte transmit FIFO and a 64Byte receive FIFO for each channel to significantly reduce the overhead required to provide data to and get data from the transmitter and the receiver. The FIFO trigger levels are programmable. The channels are ESD protected up to +/-15kV according to the human body model and IEC1000-4-2.

For applications which do not need the UARTs of the TPMC917-10R, the TPMC917-20R provides 4MByte of NV-SRAM without any UARTs.

The TPMC917-21R has a reduced memory size. It provides 2MByte of NV-SRAM and has no UARTs.

Software Support (TPMC917-SW-xx) for different operating systems is available.
## Technical Information

- **Form Factor:** Standard single-width 32 bit PMC module conforming to IEEE P1386.1
  - Board size: 149mm x 74mm
- **PCI 2.1 compliant interface**
- **3.3V and 5V PCI Signaling Voltage**
- **4MByte of NV-SRAM (TPMC917-10R/-20R) or 2MByte of NV-SRAM (TPMC917-21R)**
  - with battery backup by an on board lithium cell
  - Battery capacity is monitored every 24 hours
  - Interrupt can be generated to control battery voltage
- **4 channel asynchronous serial RS232 interface, ESD protected (TPMC917-10R only):**
  - 64Byte transmit FIFO per channel, 64Byte receive FIFO per channel
  - Programmable baud rates up to 115.2Kbaud
  - Operating temperature 0°C to +70°C
  - MTBF (MIL-HDBK217F/FN2 G8 20°C)
    - TPMC917-10R: 346000 h
    - TPMC917-20R: 380000 h
    - TPMC917-21R: 560000 h

## Order Information

**RoHS Compliant**
- **TPMC917-10R** 4MB SRAM with Battery Backup, 4 Channel RS232, DB25
- **TPMC917-20R** 4MB SRAM with Battery Backup
- **TPMC917-21R** 2MB SRAM with Battery Backup

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**
- **TPMC917-DOC** User Manual

**Software**
- **TPMC917-SW-25** Integrity Software Support
- **TPMC917-SW-42** VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
- **TPMC917-SW-65** Windows Software Support
- **TPMC917-SW-82** Linux Software Support
- **TPMC917-SW-95** QNX Software Support

For other operating systems please contact TEWS.

**Related Products**
- **TA303** Cable Kit for Modules with DB25 Female Connector
- **TPIM001** PIM I/O Module, HD50 connector

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**Issue** 1.1.0

2018-02-20
Application Information

The TXMC463 is a standard Switched Mezzanine Card (XMC) compatible module offering 4 channels of high performance asynchronous serial interface.

All modules offer front panel I/O with four RJ45 connectors. Four different standard modules are available: The TXMC463-10R and -15R provide 4 RS232 interfaces. The TXMC463-11R provides 4 RS422 interfaces. The TXMC463-12R provides 2 RS232 and 2 RS422 interfaces. The TXMC463-15R uses a non-standard RJ45 I/O pinout (as used on Motorola CPU boards). Other configurations are available as factory build option on a per channel base.

Each RS232 channel supports TxD, RxD, CTS, RTS, DTR, CD, DSR/RI and GND. Each RS422 channel supports RxD+/-, TxD+/- and GND.

Each channel has 256 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 1 Mbps for RS232 channels and 16 Mbps for RS422 channels. The UART offers readable FIFO levels.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

Software Support (TDRV002-SW-xx) for different operating systems is available.
The Embedded I/O Company

Technical Information

- Form Factor: Standard single-width XMC module conforming to ANSI/VITA 42.0-2008
- Board size: 149 mm x 74 mm
- x1 PCI Express (Base Specification 2.0 Gen 1) compliant interface conforming to ANSI/VITA 42.3-2006
- IPMI resource: FRU hardware definition information stored in on-board EEPROM
- Asynchronous serial interface
- Quad UART: Exar XR17V354
- Support of RxD, TxD, RTS, CTS, DTR, DCD, DSR/RI and GND for each RS232 channel; RxD+/-, TxD+/- and GND on front and RxD+/-, TxD+/-, RTS+/-, CTS+/- and GND on back I/O for each RS422 channel
- Programmable baud rates:
  - RS232: up to 1 Mbps
  - RS422: up to 16 Mbps
- 256 byte transmit FIFO per channel
- 256 byte receive FIFO per channel
- Readable FIFO levels
- Global Interrupt Source Register
- General Purpose 16 bit Timer/Counter
- ESD protected transceiver (up to ± 15KV)
- Operating temperature -40°C to +85°C
- MTBF (MIL-HDBK217F/FN2 GB 20°C) TXMC463: 740.000 h

Order Information

RoHS Compliant
TXMC463-10R 4 Channel RS232, RJ45
TXMC463-11R 4 Channel RS422, RJ45
TXMC463-12R 2 Channel RS232, 2 Channel RS422, RJ45
TXMC463-15R 4 Channel RS232, RJ45 (Motorola compatible pinout)

Additional P14 or P16 back I/O is available on request.
For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TXMC463-DOC User Manual

Software
TDRV002-SW-25 Integrity Software Support
TDRV002-SW-42 VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
TDRV002-SW-65 Windows Software Support
TDRV002-SW-82 Linux Software Support
TDRV002-SW-95 QNX Software Support

For other operating systems please contact TEWS.

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Issue 1.0.2 2017-09-07
TXMC465 8 Channel RS232/RS422/RS485 Programmable Serial Interface

Application Information

The TXMC465 is a standard Switched Mezzanine Card (XMC) compatible module offering 8 channels of high performance RS232/RS422/RS485 programmable asynchronous serial interface. The module offers front panel I/O with a HD50 SCSI-2 type connector. The TXMC465-20R offers additional P16 I/O, the TXMC465-30R offers additional P14 I/O.

The serial channels can be individually programmed to operate as RS232, RS422 or RS485 full duplex/half duplex interface. In addition programmable termination is provided for the RS422/RS485 interfaces. After power-up all serial I/O lines are in a high impedance state.

Each RS232 channel supports RxD, TxD, RTS, CTS and GND. RS422 and RS485 full duplex supports a four wire interface (RX+, RX-, TX+, TX-) plus ground (GND). RS485 half duplex supports a two wire interface (DX+, DX-) plus ground (GND).

Each channel has 256 byte transmit and receive FIFOs to significantly reduce the overhead required to provide data to and get data from the transmitters and receivers. The FIFO trigger levels are programmable and the baud rate is individually programmable up to 1 Mbps for RS232 channels and 10 Mbps for RS422/RS485 channels. The UART offers readable FIFO levels.

All serial channels use ESD protected transceivers. ESD protection is up to ±15KV.

Software Support (TDRV002-SW-xx) for different operating systems is available.
Technical Information

- Form Factor: Standard single-width XMC module conforming to ANSI/VITA 42.0-2008
  - Board size: 149 mm x 74 mm
- x1 PCI Express (Base Specification 2.0 Gen 1) compliant interface conforming to ANSI/VITA 42.3-2006
- IPMI resource: FRU hardware definition information stored in on-board EEPROM
- Asynchronous serial interface
- Octal UART: Exar XR17V358
- Programmable Interfaces:
  - RS232
  - RS422
  - RS485 full duplex
  - RS485 half duplex
  - Programmable Termination for RS422/RS485
- Support of RxD, TxD, RTS, CTS and GND for each RS232 channel; RxD+/-, TxD+/- and GND for each RS422/RS485 FD channel; D+/- and GND for each RS485 HD channel
- Programmable baud rates:
  - RS232: up to 1 Mbps
  - RS422/RS485: up to 10 Mbps
- 256 byte transmit FIFO per channel
- 256 byte receive FIFO per channel
- Readable FIFO levels
- Global Interrupt Source Register
- General Purpose 16 bit Timer/Counter
- Back I/O:
  - TXMC465-20R: P16
  - TXMC465-30R: P14
- ESD protected transceiver (up to ±15KV)
- Operating temperature -40°C to +85°C
- MTBF (MIL-HDBK217F/FN2 GB 20°C) TXMC465-10R: 1 355 000 h
## Order Information

**RoHS Compliant**
- **TXMC465-10R** 8 Channel Programmable RS232/RS422/RS485, HD50
- **TXMC465-20R** 8 Channel Programmable RS232/RS422/RS485, HD50, P16 I/O
- **TXMC465-30R** 8 Channel Programmable RS232/RS422/RS485, HD50, P14 I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**
- **TXMC465-DOC** User Manual

**Software**
- **TDRV002-SW-25** Integrity Software Support
- **TDRV002-SW-42** VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
- **TDRV002-SW-65** Windows Software Support
- **TDRV002-SW-82** Linux Software Support
- **TDRV002-SW-95** QNX Software Support

For other operating systems please contact TEWS.

**Related Products**
- **TA301** Cable Kit for Modules with HD50 Connector
The Embedded I/O Company

TXMC633  Reconfigurable FPGA with 64 TTL I/O / 32 Diff. I/O

Application Information

The TXMC633 is a standard single-width Switched Mezzanine Card (XMC) compatible module providing a user configurable XC6SLX45T-2 or XC6SLX100T-2 Spartan-6 FPGA.

The TXMC633-x0R has 64 ESD-protected TTL lines; the TXMC633-x1R provides 32 differential I/O lines using EIA 422 / EIA 485 compatible, ESD-protected line transceivers. The TXMC633-x2R provides 32 TTL and 16 differential I/Os. The TXMC633-x3R provides 32 differential I/O lines using Multipoint-LVDS Transceiver. The TXMC633-x4R provides 32 TTL and 16 differential I/O Multipoint-LVDS Transceivers.

For customer specific I/O extension or inter-board communication, the TXMC633-xx provides 64 FPGA I/Os on P14 and 3 FPGA Multi-Gigabit-Transceiver on P16. P14 I/O lines could be configured as 64 single ended LVCMOS33 or as 32 differential LVDS33 interface.

All I/O lines are individually programmable as input or output. Setting as input sets the I/O line to tri-state and could be used with on-board pull-up also as tri-stated output. Each TTL I/O line has a pull-resistor. The pull-voltage level is programmable to be either +3.3V, +5V and additionally GND. The differential RS485 I/O lines are terminated by 120Ω resistors and the differential MLVDS I/O lines are terminated by 100Ω resistors.

The User FPGA is connected to a 128 Mbytes, 16 bit wide DDR3 SDRAM. The SDRAM-interface uses a hardwired internal Memory Controller Block of the Spartan-6.

The User FPGA is configured by a platform SPI flash or via PCIe download. The flash device is in-system programmable. An in-circuit debugging option is available via a JTAG header for read back and real-time debugging of the FPGA design (using Xilinx “ChipScope”).

The direct configuration via PCIe of the User FPGA is realized by the Configuration FPGA. Configuration data is programmed via 32 bit transfer register to the User FPGA (Spartan6). Data source are XILINX ISE binary files (.bit file or .bin file) which are generated by XILINX ISE Design Software. These binary files consist of header, preamble and configuration data. Only configuration data must be transferred. See also the XILINX User Guide (ug380) “Spartan6 FPGA Configuration” for more information about configuration details and configuration data file formats.

User applications for the TXMC633 with XC6SLX45T-2 FPGA can be developed using the design software ISE Project Navigator (ISE) and Embedded Development Kit (EDK). IDE versions are 14.7. Licenses for both design tools are required.

TEWS offers a well-documented basic FPGA Example Application design. It includes an .ucf file with all necessary pin assignments and basic timing constraints. The example design covers the main functionalities of the TXMC633. It implements local Bus interface to local Bridge device, register mapping, DDR3 memory access and basic I/O. It comes as a Xilinx ISE project with source code and as a ready-to-download bit stream.
The Embedded I/O Company

Technical Information

- Form Factor: Standard single-width XMC module conforming to ANSI/VITA 42.0-2008
  - Board size: 149 mm x 74 mm
- PCI Express (Base Specification 1.1) compliant interface conforming to ANSI/VITA 42.3-2006
- IPMI resource: FRU hardware definition information stored in on-board EEPROM
- TXMC633-1xR: Xilinx XC6SLX45T-2 Spartan6 FPGA configured by serial Flash
- TXMC633-2xR: Xilinx XC6SLX100T-2 Spartan6 FPGA configured by serial Flash
- FPGA clock options:
  - Local clock generator as source for the FPGA internal PLL
  - 1 DDR3 SDRAM bank, 64M x 16 (128 MB)
- 32 Mbit SPI-EEPROM for User Data and FPGA configuration
- Front I/O lines
  - 64 TTL I/O, or 32 differential I/O or 32 TTL I/O and 16 differential I/O
  - TTL compatible signaling voltage, EIA-422/-485 signaling level or M-LVDS Standard (TIA/EIA-899)
  - direction individually programmable
- Back I/O lines
  - 64 FPGA I/Os on P14 and 3 FPGA Multi-Gigabit-Transceiver on P16
  - P14 with 64 single ended LVCMOS33 or 32 differential LVDS33 depends on Spartan6 Configuration
- I/O access:
  - 64 I/O lines on HD68 front connector
  - 64 I/O lines on P14 Mezzanine connector
  - 3 MGT RxTx lines on P16 Mezzanine connector
  - Operating temperature -40°C to +85°C
  - MTBF (MIL-HDBK217F/FN2 Gb 20°C): 320000 h

TXMC633 Block Diagram
## Order Information

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<tr>
<td>TXMC633-10R</td>
<td>Spartan-6 FPGA XC6SLX45T-2, 128 MB DDR3 64 TTL I/O on HD68 64 direct FPGA I/O on P14, 3 MGTs on P16</td>
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<tr>
<td>TXMC633-11R</td>
<td>Spartan-6 FPGA XC6SLX45T-2, 128 MB DDR3 32 Diff. I/O on HD68 64 direct FPGA I/O on P14, 3 MGTs on P16</td>
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<td>TXMC633-12R</td>
<td>Spartan-6 FPGA XC6SLX45T-2, 128 MB DDR3 32 TTL I/O and 16 Diff. I/O on HD68 64 direct FPGA I/O on P14, 3 MGTs on P16</td>
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<tr>
<td>TXMC633-13R</td>
<td>Spartan-6 FPGA XC6SLX45T-2, 128 MB DDR3 32 M-LVDS I/O on HD68 64 direct FPGA I/O on P14, 3 MGTs on P16</td>
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<td>TXMC633-14R</td>
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<tr>
<td>TXMC633-20R</td>
<td>Spartan-6 FPGA XC6SLX100T-2, 128 MB DDR3 64 TTL I/O on HD68 64 direct FPGA I/O on P14, 3 MGTs on P16</td>
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<td>TXMC633-21R</td>
<td>Spartan-6 FPGA XC6SLX100T-2, 128 MB DDR3 32 Diff. I/O on HD68 64 direct FPGA I/O on P14, 3 MGTs on P16</td>
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<td>TXMC633-22R</td>
<td>Spartan-6 FPGA XC6SLX100T-2, 128 MB DDR3 32 TTL I/O and 16 Diff. I/O on HD68 64 direct FPGA I/O on P14, 3 MGTs on P16</td>
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<tr>
<td>TXMC633-23R</td>
<td>Spartan-6 FPGA XC6SLX100T-2, 128 MB DDR3 32 M-LVDS I/O on HD68 64 direct FPGA I/O on P14, 3 MGTs on P16</td>
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<tr>
<td>TXMC633-24R</td>
<td>Spartan-6 FPGA XC6SLX100T-2, 128 MB DDR3 32 TTL I/O and 16 M-LVDS I/O on HD68 64 direct FPGA I/O on P14, 3 MGTs on P16</td>
</tr>
</tbody>
</table>

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

### Documentation
- **TXMC633-DOC** User Manual

### Software
- **TDRV018-SW-25** Integrity Software Support
- **TDRV018-SW-42** VxWorks Software Support (Legacy and VxBus-Enabled Software Support)
- **TDRV018-SW-65** Windows Software Support
- **TDRV018-SW-82** Linux Software Support
- **TDRV018-SW-95** QNX Software Support

For other operating systems please contact TEWS.

### Related Products
- **TA304** Cable Kit for modules with HD68 SCSI-3 type connector
- **TPIM003** PIM I/O Module with HD68 SCSI-3 type connector and special pin assignment
The TXMC635 is a standard single-width Switched Mezzanine Card (XMC) compatible module providing a user configurable XC6SLX45T-2 or XC6SLX100T-2 Xilinx Spartan-6 FPGA.

48 ESD-protected TTL lines provide a flexible digital interface. All I/O lines are individually programmable as input or output. Setting as input sets the I/O line to tri-state and could be used with on-board pull up also as open drain output. Each TTL I/O line has a pull resistor. The pull voltage level is selectable to be either +3.3V, +5V and additionally GND.

8 channels of 16 bit analog outputs allow software selectable output voltage ranges of ±10V, ±10.2564V or ±10.5263V. The output voltage range can be individually set per channel. The conversion time is at most 10 µs and the DAC outputs are routed via operational amplifier in order to protect DAC from damage.

32 ADC input channels can be software configured to operate in single-ended or differential mode with 16 input channels. Each of the 32 channels has a resolution of 16 bit and can work with up to 1 MSPS. The programmable gain amplifier is software configurable and allows a full-scale input voltage range of up to ±24.576V.

For customer specific I/O extension or inter-board communication, the TXMC635-xxR provides 64 FPGA I/Os lines on P14 and 3 FPGA Multi-Gigabit-Transceiver on P16. P14 I/O lines could be configured as 64 single ended LVCMOS33 or as 32 differential LVDS33 interface.

The User FPGA is connected to a 128 Mbytes, 16 bit wide DDR3 SDRAM. The SDRAM-interface uses a hardwired internal Memory Controller Block of the Spartan-6.

The User FPGA is configured by a platform SPI flash or via PCIe download. The flash device is in-system programmable. An in-circuit debugging option is available via a JTAG header for read back and real-time debugging of the FPGA design (using Xilinx “ChipScope”).

The direct configuration via PCIe of the User FPGA is realized by the Configuration FPGA. Configuration data is programmed via 32 bit transfer register to the User FPGA (Spartan6). Data source are XILINX ISE binary files (.bit file or .bin file) which are generated by XILINX ISE Design Software. These binary files consist of header, preamble and configuration data. Only configuration data must be transferred. See also the XILINX User Guide (ug380) “Spartan6 FPGA Configuration” for more information about configuration details and configuration data file formats.

User applications for the TXMC635 with XC6SLX45T-2 FPGA can be developed using the design software ISE Project Navigator (ISE) and Embedded Development Kit (EDK). IDE versions are 14.7. Licenses for both design tools are required.
TEWS offers a well-documented basic FPGA Example Application design. It includes an .ucf file with all necessary pin assignments and basic timing constraints. The example design covers the main functionalities of the TXMC635.

The example design covers the main functionalities of the TXMC635.

### Technical Information
- Form Factor: Standard single width XMC
- PCI Express (Base Specification 1.1) compliant interface conforming to ANSI/VITA 42.3-2006
- IPMI resource: FRU hardware definition information stored in on-board EEPROM
- TXMC635-10R Xilinx XC6SLX45T-2 Spartan6 FPGA
- TXMC635-20R Xilinx XC6SLX100T-2 Spartan6 FPGA
- Serial Flash for FPGA Configuration
- FPGA clock options:
  - Local clock generator as source for the FPGA internal PLL
- 8 channels single-ended 16 bit analog output
  - Programmable output voltage: ±10V, ±10.2564V or ±10.5263V
  - Conversion time: typ.10µs
  - Factory calibration
- 32 single ended or 16 differential analog inputs
- 16 bit resolution
- Conversion time: 1.1µs
- User programmable input voltage range
- Factory calibration
- Back I/O lines
  - 64 single ended or 32 differential back I/O lines on rear connector P14.
  - 3 FPGA Multi-Gigabit-Transceiver on rear connector P16
- Operating temperature -40°C to +85°C

It implements local bus interface to local bridge device, register mapping, DDR3 memory access and basic I/O. It comes as a Xilinx ISE project with source code and as a ready-to-download bit stream.
## Order Information

### RoHS Compliant

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<tr>
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<td>TXMC635-10R</td>
<td>Spartan-6 FPGA XC6SLX45T-2,128 MB DDR3</td>
<td>48 TTL Front I/O, 32x 16bit AD, 8 x 16 bit DA, 64 direct FPGA I/O on P14, 3 MGTs on P16</td>
</tr>
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<td>TXMC635-20R</td>
<td>Spartan-6 FPGA XC6SLX100T-2,128 MB DDR3</td>
<td>48 TTL Front I/O, 32x 16bit AD, 8 x 16 bit DA, 64 direct FPGA I/O on P14, 3 MGTs on P16</td>
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For the availability of non-RoHS compliant (lead solder) products please contact TEWS.

### Documentation

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<td>Windows Software Support</td>
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<tr>
<td>TDRV018-SW-82</td>
<td>Linux Software Support</td>
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<tr>
<td>TDRV018-SW-95</td>
<td>QNX Software Support</td>
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For other operating systems please contact TEWS.
TXMC638  Reconfigurable FPGA with 24 x 16 bit Analog Input

Application Information

The TXMC638 is a standard single-width Switched Mezzanine Card (XMC) compatible module providing a user configurable Kintex-7 FPGA with 24 ADC input channels.

The TXMC638 ADC input channels are based on the Linear Dual 16-Bit 5Msps Differential LTC2323-16 ADCs. Each of the 24 channels has 16bit resolution and works with up to 5Msps. The analog input circuit is designed to allow input voltages up to ±2.5 V on each input-pin resulting in a ±5 V differential voltage range.

For customer specific I/O extension or inter-board communication, the TXMC638 provides 64 I/Os on P14 and 4 Multi-Gigabit-Transceiver on P16. The P14 I/O lines are connected directly to the FPGA and can be used as 64 single ended LVCMOS24 or as 32 differential LVDS25 interfaces. Additionally the TXMC638 provides three 100 Ohm terminated ac-coupled, differential inputs with wide Input voltage range.

All front I/O lines such as the ADC interface and the three 100 Ohm inputs are connected to a 98-pin. Samtec ERF8-049 Rugged EdgeRate Connector.

A 1GB, 32 bit wide DDR3 SDRAM is connected to the user FPGA. The SDRAM-Interface uses an internal Memory Controller of the Kintex-7.

The user FPGA is configured by a serial SPI flash. For full PCIe specification compliance, the XILINX Tandem Configuration Feature can be used for FPGA configuration. XILINX Tandem Methodologies “Tandem PROM” is the favored methodology. The SPI flash device is in-system programmable. An in-circuit debugging option is available via a JTAG header for read back and real-time debugging of the FPGA design (using Xilinx “ChipScope”).

User applications for the TXMC638 with Kintex-7 FPGA can be developed using the design software Vivado Design Suite. A license for the Vivado Design Suite design tool is required.

TEWS offers a well-documented FPGA Board Reference Design. It includes constraint file with all necessary pin assignments and basic timing constraints. The FPGA Board Reference Design covers the main functionalities of the TXMC638.

The TXMC638 is delivered with the FPGA Board Reference Design. The user FPGA can be programmed via the on-board Board Configuration Controller (BCC). Programming via the JTAG interface using an XILINX USB programmer is also possible. In accordance with the PCI specification and the buffering of PCI header data, the contents of the user FPGA can be changed during operation.

User applications for the TXMC638 with Kintex-7 FPGA can be developed using the design software Vivado Design Suite. A license for the Vivado Design Suite design tool is required.

TEWS offers a well-documented FPGA Board Reference Design. It includes constraint file with all necessary pin assignments and basic timing constraints. The FPGA Board Reference Design covers the main functionalities of the TXMC638.

The TXMC638 is delivered with the FPGA Board Reference Design. The user FPGA can be programmed via the on-board Board Configuration Controller (BCC). Programming via the JTAG interface using an XILINX USB programmer is also possible. In accordance with the PCI specification and the buffering of PCI header data, the contents of the user FPGA can be changed during operation.

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Issue 1.0.4
2018-01-25
Technical Information

- Form Factor: Standard single width XMC
  - Board size: 149 mm x 74 mm
- PCI Express x4 Link (Base Specification 1.1) compliant interface conforming to ANSI/VITA 42.3-2006
- IPMI resource: FRU hardware definition information stored in on-board EEPROM
- TXMC638 FPGA options:
  - -10R Xilinx XC7K160T-2FBG676I Kintex-7
  - -11R Xilinx XC7K325T-2FBG676I Kintex-7
  - -12R Xilinx XC7K410T-2FBG676I Kintex-7
- Serial Flash for FPGA Configuration
- FPGA clock options:
  - Local clock generator as source for the FPGA internal PLL
  - Free programmable Si514 Oscillator

- DDR3 SDRAM bank, 256M x 32 Bit (1GB)
- Front I/O lines
  - 24 differential analog inputs
    - 16 bit resolution
    - 5Msps
    - Factory calibration
- Back I/O lines
  - 64 single ended or 32 differential back I/O lines on rear connector P14.
  - 4 FPGA Multi-Gigabit-Transceiver on rear connector P16
- Operating temperature -40°C to +85°C
- MTBF (MIL-HDBK217F/FN2 GB 20°C): 269000

![Block Diagram TXMC638](image-url)
## The Embedded I/O Company

### Order Information

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<td>TXMC638-10R</td>
<td>Kintex-7</td>
<td>XC7K160T-2</td>
<td>1GBDDR3</td>
<td>24 x Analog In and 64 direct FPGA Back I/O Lines on P14, 4 MGTs on P16</td>
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<tr>
<td>TXMC638-11R</td>
<td>Kintex-7</td>
<td>XC7K325T-2</td>
<td>1GBDDR3</td>
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<tr>
<td>TXMC638-12R</td>
<td>Kintex-7</td>
<td>XC7K410T-2</td>
<td>1GBDDR3</td>
<td>24 x Analog In and 64 direct FPGA Back I/O Lines on P14, 4 MGTs on P16</td>
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### Documentation

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</table>

For other operating systems please contact TEWS.

### Related Products

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>TA310</td>
<td>Cable Kit for Modules with Samtec ERF8-049-Connector</td>
</tr>
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</table>
The TXMC885 is a Switched Mezzanine Card (XMC) compatible module providing a four channel Ethernet 10BASE-T / 100BASE-TX / 1000BASE-T interface. A PCI Express Switch provides access to the Intel™ 82574IT Gigabit Ethernet controllers. Each Ethernet interface supports 10, 100 and 1000 Mbit/s transmission rates for full duplex operation, 10 and 100 Mbit/s transmissions for half duplex operation, and is equipped with a 32 Kbit serial EEPROM.

The four Ethernet interfaces of the TXMC885 are capable of performing an auto negotiation algorithm which allows both link-partners to find out the best link-parameters by themselves. The TXMC885 is widely user configurable via configuration and status register access over the PCI Express interface.

The TXMC885-10R provides four 10/100/1000 Mbit/s Ethernet connections via front panel RJ45 connectors. 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° to +85°C.

Software Support:
- Software support for Intel™ 82574IT at www.intel.com
- For operating systems not supported by Intel™, please contact TEWS.
**Technical Information**

- Form Factor: Standard single-width XMC module conforming to ANSI/VITA 42.0-2008
- Board size: 149 mm x 74 mm
- PCI Express (Base Specification 1.1) compliant interface conforming to ANSI/VITA 42.3-2006
- IPMI resource: FRU hardware definition information stored in on-board EEPROM
- 4 Intel™ 82574IT Gigabit Ethernet controllers
- 10Base-T / 100Base-TX / 1000Base-T
- Half or full-duplex operation
- For each interface: Configurable receive and transmit data FIFO, programmable in 1 KB increments
- Operating temperature -40°C to +85°C, constant airflow of 2m/s is required
- MTBF (MIL-HDBK217F/FN2 GB 20°C) TXMC885-10R: 482000 h

**Order Information**

RoHS Compliant
TXMC885-10R 4 Channel 10/100/1000BaseT Ethernet Interface, Intel 82574IT, RJ45

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**

TXMC885-DOC User Manual
Application Information

The TXMC887 is a Switched Mezzanine Card (XMC) compatible module providing a two channel Ethernet 100BASE-TX / 1000BASE-T / 10GBASE-T interface. The XMC-Connector P15 provides access to the Intel™ X540 dual port 10GbE controller via an x8 PCIe link. Both Ethernet interfaces support 100, 1000 Mbit/s and 10 Gbit/s transmission rates at full duplex operation. The controller is equipped with a 16 Mbit serial flash memory which is accessed by hardware at power-up, which has a firmware area and which can be accessed by software. The two Ethernet interfaces of the TXMC887 are capable of performing an auto-negotiation algorithm which allows the link-partners to determine the best link parameters. The Ethernet controller on the TXMC887 is user configurable via configuration and register accesses over the PCIe interface.

The TXMC887-10R provides two 100/1000/10000 Mbit/s Ethernet interfaces via front panel RJ45 connectors. Both ports are galvanically isolated from the Ethernet controllers and LEDs indicate the different network activities.

Software Support:
- Software support for Intel™ X540 at www.intel.com
- For operating systems not supported by Intel™, please contact TEWS.
The Embedded I/O Company

Technical Information

- Form Factor: Standard single-width XMC module conforming to ANSI/VITA 42.0
- Board size: 149 mm x 74 mm
- x8 PCI Express (Base Specification 2.1) compliant interface conforming to ANSI/VITA 42.3
- IPMI resource: FRU hardware definition information stored in on-board EEPROM
- Dual Port Intel™ X540 10 Gigabit Ethernet controller
- 100Base-TX / 1000Base-T / 10GBase-T
- Full-duplex operation
- 16 Mbit serial flash memory connected to Ethernet controller
- Operating temperature 0°C to +55°C
- MTBF (MIL-HDBK217F/FN2 GB 20°C) 489000 h

Order Information

RoHS Compliant
TXMC887-10R  2 Channel 100Base-TX/1000/10000Base-T Ethernet Interface, Intel X540, RJ45, PCIe x8

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TXMC887-DOC  User Manual

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TEWS TECHNOLOGIES GmbH
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e-mail: info@tews.com  www.tews.com
The TXMC888 is a Switched Mezzanine Card (XMC) compatible module providing a two channel 10 Gigabit Ethernet Enhanced Small Form Factor Pluggable (SFP+) interface.

The XMC-Connector P15 provides access to the Intel™ 82599ES dual port 10GbE controller via an x8 PCIe link.

The TXMC888's SFP+ Cages accept various SFP and SFP+ transceiver modules. These two SFP+ hosts are connected to the Ethernet Controller’s SFI Interfaces.

The following transceiver modules have been successfully tested with the TXMC888:

- Intel XDACBL1M (SFP+ Direct Attach Twinaxial Cable)
- Finisar FCBG110SD1C01 (SFP+ SFPwire Active Optical Cable)
- Intel E10GSFPSR (SFP+ 10GBASE-SR or 1000BASE-SX)
- Finisar FTLX8571D3BCV (SFP+ 10GBASE-SR or 1000BASE-SX)
- Intel E10GSFPLR (SFP+ 10GBASE-LR or 1000BASE-LX)
- Finisar FTLX1471D3BCV (SFP+ 10GBASE-LR or 1000BASE-LX)
- Finisar FCLF8522P2BTL (SFP 1000BASE-T)

All compatible transceivers modules and replacements of the tested modules will also work properly with the TXMC888.

The controller is equipped with a 1 Mbit serial flash memory for Boot ROM and a 128 Kbit EEPROM storing configuration data. LEDs in the front panel indicate the different network activities.

For preconfigured variants of the hardware module containing transceiver modules, please contact TEWS.

The TXMC888-10R provides two 10GbE Interfaces via front panel SFP+ connectors.

Software support:
- Software support for Intel™ 82599ES at www.intel.com
- For operating systems not supported by Intel™, please contact TEWS.
The Embedded I/O Company

Technical Information

- **Form Factor:** Standard single-width XMC module conforming to ANSI/VITA 42.0
- **Board size:** 149 mm x 74 mm
- **x8 PCI Express (Base Specification 2.0) compliant interface conforming to ANSI/VITA 42.3**
- **IPMI resource:** FRU hardware definition information stored in on-board EEPROM
- **Dual Port Intel™ 82599ES 10 Gigabit Ethernet controller providing SFI Interfaces**
- **Two SFP+ Cages**

10 Gigabit-CU (SFP+ Direct Attach, twinax)
SFPwire SFP+ Active Optical Cable
10GBase-SR/SW / 1000Base-SX
10GBase-LR/LW / 1000Base-LX
1000Base-T

- **1 Mbit serial flash memory for Boot ROM**
- **128 Kbit EEPROM storing configuration data**
- **Operating temperature:** 0°C to +70°C
- **MTBF (MIL-HDBK217F/FN2 G9 20°C): 555000 h**

Order Information

**RoHS Compliant**

**TXMC888-10R** Two channel 10 Gigabit Ethernet interface SFP+ front panel I/O

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

**Documentation**

**TXMC888-DOC** User Manual
The TAMC260 is a standard Mid-Size/Full-Size AMC module that provides one slot for a single-width PMC module used to build modular, flexible and cost effective I/O solutions for applications in process control, medical systems, telecommunication and traffic control.

32 bit PCI accesses are supported on PCI bus with PCI frequency 33 MHz and also 66 MHz. The PLX8112 PCIe-to-PCI bridge provides the real connection between primary PCIe link and the secondary PMC slot. The bridge controls all PCI accesses and the frequency for the PMC access.

The TAMC260 supports front panel I/O, alternatively a 68 pin SCSI-V type connector provides access to the PMC P14 back I/O lines.

The TAMC260 is a versatile solution to upgrade well known legacy I/O solutions to a high performance form factor.

According to AMC.0, the TAMC260 provides an IPMI compliant Module Management Controller (MMC) with temperature monitoring and hot-swap support.

**Application Information**

**Technical Information**

- Form Factor: PICMG AMC.1 Module
  - Board size: 180.6 mm x 146.5 mm
  - Double-width / Mid-Size or Full-Size
- PCIe single lane (1x) port (AMC.1 Type 1 compliant)
- IPMI support
- Front Panel LEDs:
  - Blue Hot-Swap LED
  - Red Power Good LED (LED1)
  - Green PMC-Present LED (LED2)
- One PMC site conforming to PMC standard (IEEE 1386.1)
- Front panel I/O
- P14 back I/O via a 68 pin SCSI-V type connector
- PCI 3.0 compliant interface
- PCI Interface: 33/66 MHz; 32 bit
- 5V and 3.3V PCI I/O signaling voltage possible
- Operating temperature -40°C to +85°C

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Order Information

RoHS Compliant
TAMC260-10R  Full-Size PMC-Carrier for AMC, 5V PMC I/O Voltage
TAMC260-11R  Full-Size PMC-Carrier for AMC, 3.3V PMC I/O Voltage
TAMC260-20R  Mid-Size PMC-Carrier for AMC, 5V PMC I/O Voltage
TAMC260-21R  Mid-Size PMC-Carrier for AMC, 3.3V PMC I/O Voltage

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TAMC260-DOC  User Manual

Related Product
TA307  Cable Kit for Modules with VHD68 Connector
The TAMC261 is a standard Mid-Size/Full-Size AMC.1 (PCI-Express) and MTCA.4 compliant PMC carrier module that provides one slot for a single-width PMC, used to build modular, flexible and cost effective I/O solutions for applications in process control, medical systems, telecommunication and traffic control.

A PI7C9X130 PCIe-to-PCI bridge provides the connection between primary PCIe link and the secondary PMC slot. The bridge controls all PCI accesses and the frequency for the PMC access. PCI is supported up to 64-bit @66MHz and PCI-X is supported up to 64-bit @133MHz.

The TAMC261 supports front panel I/O, alternatively the MTCA.4 interface provides access to the PMC P14 back I/O lines. According to MTCA.4, the TAMC261 provides two 30-pair ADF connectors at the Zone 3 interface (Rear I/O) that provide access to all P14 back I/O lines via a compatible µRTM.

The TAMC261-2x additionally provide M-LVDS transceivers connected to AMC port 12-15, port 17-20 and the TCLKA-D. All control and data lines of the M-LVDS transceivers are routed to the zone 3 interface, enabling a mounted PMC to access the AMC port signals via the µRTM.

The TAMC261 is a versatile solution to upgrade well known legacy I/O solutions to a high performance form factor.

According to AMC.0, the TAMC261 provides an IPMI compliant Module Management Controller (MMC) with temperature monitoring and hot-swap support.

### Technical Information

- Form Factor: PICMG MTCA.4 Module
- Board size: 180.6 mm x 146.5 mm
- Double-width / Mid-Size or Full-Size
- x4 PCIe Link (AMC.1 Type 1 compliant)
- IPMI V1.5 support
- Front Panel LEDs:
  - Blue Hot-Swap LED
  - Red Power Good LED (LED1)
  - Green PMC-Present LED (LED2)
- One PMC site conforming to IEEE 1386.1 (PMC) and ANSI/VITA 39-2003 (PCI-X for PMCs)
- Rear-I/O access to all 64 P14 back I/O lines via a compatible RTM (for example TAMC020-TM)
- 64-bit PCI @66MHz
- 64-bit PCI-X @133MHz
- 5V tolerant PCI I/O signaling
- TAMC261-2x: M-LVDS transceivers on AMC port 12-15, port 17-20 and TCLKA, TCLKB, TCLKC and TCLKD connected to zone 3 interface
- Operating temperature -40°C to +85°C
- MTBF (MIL-HDBK217F/FN2 GB 20°C)
  - TAMC261-1x: 281.000 h
  - TAMC261-2x: 254.000 h
Order Information

RoHS Compliant
TAMC261-10R Mid-Size PMC-Carrier for MTCA.4 Rear-I/O.
TAMC261-11R Full-Size PMC-Carrier for MTCA.4 Rear-I/O.
TAMC261-20R Mid-Size PMC-Carrier for MTCA.4 Rear-I/O, with additional M-LVDS transceivers
TAMC261-21R Full-Size PMC-Carrier for MTCA.4 Rear-I/O, with additional M-LVDS transceivers

For the availability of non-RoHS compliant (leaded solder) products please contact TEWS.

Documentation
TAMC261-DOC User Manual

Related Products
TAMC020-TM MTCA.4 compatible μRTM for Rear-I/O access to the PMC back I/O lines