

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

**Artisan Technology Group**
(217) 352-9330 | sales@artisantg.com | artisantg.com

**Full-service, independent repair center**
with experienced engineers and technicians on staff.

**We buy your excess, underutilized, and idle equipment**
along with credit for buybacks and trade-ins.

**Custom engineering**
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

**Expert team | Trust guarantee | 100% satisfaction**

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

**Visit our website - *Click HERE***

*The Embedded I/O Company*

TEWS TECHNOLOGIES

# TPMC316

## Conduction Cooled

## CAN Bus PMC Module

Version 1.2

## User Manual

Issue 1.2.1

August 2014

**TEWS TECHNOLOGIES GmbH**

Am Bahnhof 7 25469 Halstenbek, Germany

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

e-mail: info@tews.com www.tews.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## TPMC316-10R

Conduction cooled CAN bus PMC module with CAN High Speed interface

## TPMC316-11R

Conduction cooled CAN bus PMC module with modified RS485 interface

This document contains information, which is proprietary to TEWS TECHNOLOGIES GmbH. Any reproduction without written permission is forbidden.

TEWS TECHNOLOGIES GmbH has made any effort to ensure that this manual is accurate and complete. However TEWS TECHNOLOGIES GmbH reserves the right to change the product described in this document at any time without notice.

TEWS TECHNOLOGIES GmbH is not liable for any damage arising out of the application or use of the device described herein.

### Style Conventions

Hexadecimal characters are specified with prefix 0x, i.e. 0x029E (that means hexadecimal value 029E).

For signals on hardware products, an ‚Active Low' is represented by the signal name with # following, i.e. IP_RESET#.

Access terms are described as:

| | |
|---|---|
| W | Write Only |
| R | Read Only |
| R/W | Read/Write |
| R/C | Read/Clear |
| R/S | Read/Set |

©2014 by TEWS TECHNOLOGIES GmbH

All trademarks mentioned are property of their respective owners



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

| Issue | Description | Date |
|---|---|---|
| 1.0 | First Issue | August 2000 |
| 1.1 | Change default values for Hot Swap Register | June 2002 |
| 1.2 | General Revision | May 2003 |
| 1.3 | New Hardware Revision | July 2006 |
| 1.4 | New address TEWS LLC | September 2006 |
| 1.0.5 | (1) New Notation for User Manual and Engineering Documentation<br>(2) Added Note for TPMC316-10 Min. Baud Rate in the Technical Specification Table | February 2010 |
| 1.1.0 | New hardware version with new CAN controller | October 2011 |
| 1.2.0 | New hardware version with new CAN controller | January 2013 |
| 1.2.1 | General Revision | August 2014 |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# Table of Contents


1 PRODUCT DESCRIPTION ..... 6
2 TECHNICAL SPECIFICATION ..... 7
3 LOCAL SPACE ADDRESSING ..... 8
3.1 PCI9030 Local Space Configuration ..... 8
3.2 Local Address Space 0 ..... 8
3.3 CAN Controller Address Map ..... 9
4 PCI9030 TARGET CHIP ..... 12
4.1 PCI Configuration Registers (CFG) ..... 12
4.1.1 PCI9030 Header ..... 12
4.1.2 PCI Base Address Initialization ..... 13
4.2 Local Configuration Register (LCR) ..... 14
4.3 Configuration EEPROM ..... 15
5 CONFIGURATION HINTS ..... 16
5.1 PCI Interrupt Control/Status ..... 16
5.2 Local Software Reset ..... 16
5.3 Big / Little Endian ..... 17
6 INSTALLATION ..... 19
6.1 CAN bus Termination ..... 19
6.2 Physical Interface ..... 19
7 PIN ASSIGNMENT – I/O CONNECTOR ..... 20
7.1 Mezzanine Card Connector P14 ..... 20





Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# List of Figures

FIGURE 1-1 : BLOCK DIAGRAM ..... 6
FIGURE 6-1 : SOLDERING CONNECTION LOCATION LB1 – LB2 ..... 19

# List of Tables

TABLE 2-1 : TECHNICAL SPECIFICATION ..... 7
TABLE 3-1 : PCI9030 LOCAL SPACE CONFIGURATION ..... 8
TABLE 3-2 : MEMORY ADDRESS MAP CAN CONTROLLER CHANNEL 0 CANCH0 ..... 10
TABLE 3-3 : MEMORY ADDRESS MAP CAN CONTROLLER CHANNEL 1 CANCH1 ..... 11
TABLE 4-1 : PCI9030 HEADER ..... 12
TABLE 4-2 : PCI9030 BASE ADDRESS USAGE ..... 13
TABLE 4-3 : PCI9030 LOCAL CONFIGURATION REGISTER ..... 14
TABLE 4-4 : CONFIGURATION EEPROM TPMC316-XX ..... 15
TABLE 5-1 : INTERRUPT CONTROL/STATUS REGISTER (INTCSR; 0X4C) ..... 16
TABLE 5-2 : LOCAL BUS LITTLE/BIG ENDIAN ..... 17
TABLE 7-1 : MEZZANINE P14 CONNECTOR ..... 20



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# 1 Product Description

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.

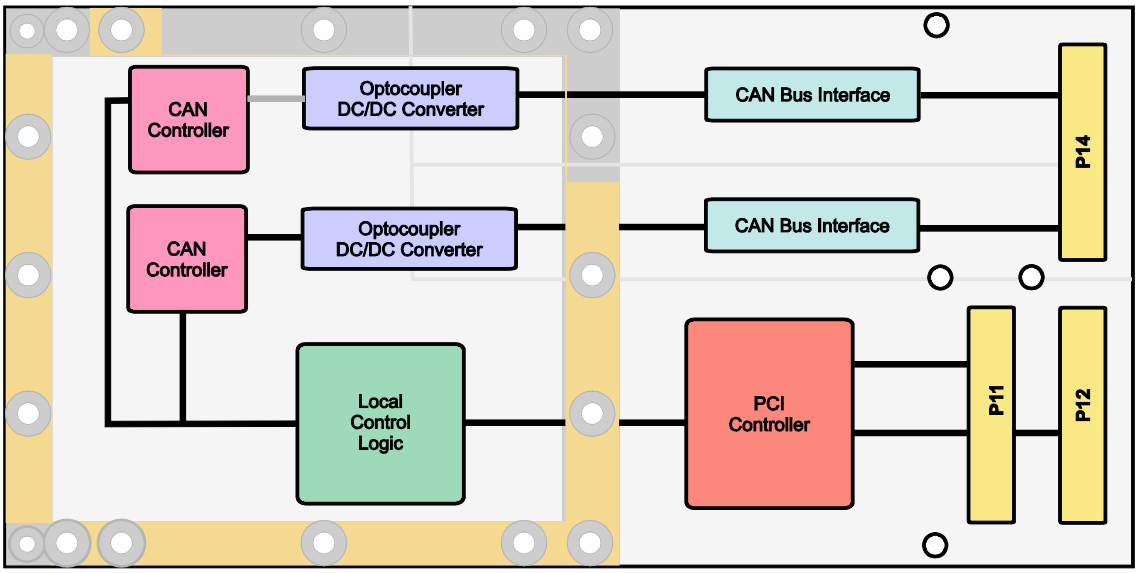



Figure 1-1 : Block Diagram



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# 2 Technical Specification

| | | |
|---|---|---|
| **PMC Interface** | | |
| **Mechanical Interface** | PCI Mezzanine Card (PMC) Interface<br>Single Size | |
| **Electrical Interface** | PCI Rev. 2.1 compliant<br>33 MHz / 32 bit PCI<br>3.3V and 5V PCI Signaling Voltage | |
| **On Board Devices** | | |
| **PCI Target Chip** | PCI9030 (PLX Technology) | |
| **CAN Controller** | Bosch CC770 | |
| **I/O Interface** | | |
| **Number of Channels** | 2 | |
| **Physical Interface** | TPMC316-10R: CAN High Speed (according to ISO 11898)<br>TPMC316-11R: modified RS485 | |
| **Bus Line Termination** | On board 120 ohms, disabled per default | |
| **Transfer Rate** | Up to 1 Mbps at bus line length of up to 40 m<br>Minimum Baud Rate for the TPMC316-10R is 60 Kbps (TJA1050 CAN Transceiver Timeout Feature) | |
| **Isolation** | CAN bus isolated by optocouplers and DC/DC converter for each channel | |
| **I/O Connector** | PMC P14 I/O (64 pin Mezzanine Connector) | |
| **Physical Data** | | |
| **Power Requirements** | 120mA typical @ +3.3V DC<br>200mA typical @ +5V DC<br>Note:<br>Both CAN channels connect to each other and termination active. | |
| **Temperature Range** | Operating<br>Storage | -40 °C to +85 °C<br>-40°C to +85°C |
| **MTBF** | TPMC316-10R: 816000 h<br>TPMC316-11R: 1047000 h<br>MTBF values shown are based on calculation according to MIL-HDBK-217F and MIL-HDBK-217F Notice 2; Environment: $G_B$ 20°C.<br>The MTBF calculation is based on component FIT rates provided by the component suppliers. If FIT rates are not available, MIL-HDBK-217F and MIL-HDBK-217F Notice 2 formulas are used for FIT rate calculation. | |
| **Humidity** | 5 – 95 % non-condensing | |
| **Weight** | 61 g | |

Table 2-1 : Technical Specification



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# 3 Local Space Addressing

## 3.1 PCI9030 Local Space Configuration

The local on board addressable regions are accessed from the PCI side by using the PCI9030 local spaces.

| PCI9030 Local Space | PCI9030 PCI Base Address (Offset in PCI Configuration Space) | PCI Space Mapping | Size (Byte) | Port Width (Bit) | Endian Mode | Description |
|---|---|---|---|---|---|---|
| 0 | 0 (0x10) | MEM | 128 | 32 | LITTLE | Local Configuration Registers |
| 1 | 1(0x14) | I/O | 128 | 32 | LITTLE | Local Configuration Registers |
| 2 | 2 (0x18) | MEM | 512 | 8 | LITTLE | Local Address Space 0 |
| 3 | 3 (0x1C) | - | - | - | - | Local Address Space 1 |
| 4 | 4 (0x20) | - | - | - | - | Local Address Space 2 |
| 5 | 5 (0x24) | - | - | - | - | Local Address Space 3 |
| 6 | 6 (0x30) | - | - | - | - | Local Expansion ROM Space |

Table 3-1 : PCI9030 Local Space Configuration

## 3.2 Local Address Space 0

The complete register sets of the two CAN controllers of the TPMC316 are accessible in the memory space of the PMC module.

Address range: PCI Base Address 2 for Local Address Space 0 + (0x0000 to 0x00FF)

CAN Controller channel 0 CANCH0: PCI Base Address 2 + (0x0000 to 0x00FF)

CAN Controller channel 1 CANCH1: PCI Base Address 2 + (0x0100 to 0x01FF)



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## 3.3 CAN Controller Address Map

| Address | Description |
|---|---|
| **CAN Controller Channel 0 CANCH0** | |
| 0x0000 | Control Register |
| 0x0001 | Status Register |
| 0x0002 | CPU Interface Register |
| 0x0003 | Reserved |
| 0x0004-0x0005 | High Speed Read Register |
| 0x0006-0x0007 | Global Mask – Standard |
| 0x0008-0x000B | Global Mask – Extended |
| 0x000C-0x000F | Message 15 Mask |
| 0x0010-0x001E | Message 1 |
| 0x001F | CLKOUT Register |
| 0x0020-0x002E | Message 2 |
| 0x002F | Bus Configuration Register |
| 0x0030-0x003E | Message 3 |
| 0x003F | Bit Timing Register 0 |
| 0x0040-0x004E | Message 4 |
| 0x004F | Bit Timing Register 1 |
| 0x0050-0x005E | Message 5 |
| 0x005F | Interrupt Register |
| 0x0060-0x006E | Message 6 |
| 0x006F | Reserved |
| 0x0070-0x007E | Message 7 |
| 0x007F | Reserved |
| 0x0080-0x008E | Message 8 |
| 0x008F | Reserved |
| 0x0090-0x009E | Message 9 |
| 0x009F | P1CONF |
| 0x00A0-0x00AE | Message A |
| 0x00AF | P2CONF |
| 0x00B0-0x00BE | Message B |
| 0x00BF | P1IN |
| 0x00C0-0x00CE | Message C |
| 0x00CF | P2IN |
| 0x00D0-0x00DE | Message D |
| 0x00DF | P1OUT |
| 0x00E0-0x00EE | Message E |
| 0x00EF | P2OUT |
| 0x00F0-0x00FE | Message F |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

| Address | Description |
|---|---|
| 0x00FF | Serial Reset Address |

Table 3-2 : Memory Address Map CAN Controller Channel 0 CANCH0

| Address | Description |
|---|---|
| **CAN Controller Channel 1 CANCH1** | |
| 0x0000 | Control Register |
| 0x0101 | Status Register |
| 0x0102 | CPU Interface Register |
| 0x0103 | Reserved |
| 0x0104-0x0105 | High Speed Read Register |
| 0x0106-0x0107 | Global Mask – Standard |
| 0x0108-0x010B | Global Mask – Extended |
| 0x010C-0x010F | Message 15 Mask |
| 0x0110-0x011E | Message 1 |
| 0x011F | CLKOUT Register |
| 0x0120-0x012E | Message 2 |
| 0x012F | Bus Configuration Register |
| 0x0130-0x013E | Message 3 |
| 0x013F | Bit Timing Register 0 |
| 0x0140-0x014E | Message 4 |
| 0x014F | Bit Timing Register 1 |
| 0x0150-0x015E | Message 5 |
| 0x015F | Interrupt Register |
| 0x0160-0x016E | Message 6 |
| 0x016F | Reserved |
| 0x0170-0x017E | Message 7 |
| 0x017F | Reserved |
| 0x0180-0x018E | Message 8 |
| 0x018F | Reserved |
| 0x0190-0x019E | Message 9 |
| 0x019F | P1CONF |
| 0x01A0-0x01AE | Message A |
| 0x01AF | P2CONF |
| 0x01B0-0x01BE | Message B |
| 0x01BF | P1IN |
| 0x01C0-0x01CE | Message C |
| 0x01CF | P2IN |
| 0x01D0-0x01DE | Message D |
| 0x01DF | P1OUT |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

| Address | Description |
|---|---|
| 0x01E0-0x01EE | Message E |
| 0x01EF | P2OUT |
| 0x01F0-0x01FE | Message F |
| 0x01FF | Serial Reset Address |

Table 3-3 : Memory Address Map CAN Controller Channel 1 CANCH1



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# 4 PCI9030 Target Chip

## 4.1 PCI Configuration Registers (CFG)

### 4.1.1 PCI9030 Header

| PCI CFG Register Address | Write '0' to all unused (Reserved) bits | | | | PCI writeable | Initial Values (Hex Values) |
|---|---|---|---|---|---|---|
| | 31 24 | 23 16 | 15 8 | 7 0 | | |
| 0x00 | Device ID | | Vendor ID | | N | 013C 1498 |
| 0x04 | Status | | Command | | Y | 0280 0000 |
| 0x08 | Class Code | | | Revision ID | N | 028000 0A |
| 0x0C | BIST | Header Type | PCI Latency Timer | Cache Line Size | Y[7:0] | 00 00 00 00 |
| 0x10 | PCI Base Address 0 for MEM Mapped Config. Registers | | | | Y | FFFFFF80 |
| 0x14 | PCI Base Address 1 for I/O Mapped Config. Registers | | | | Y | FFFFFF81 |
| 0x18 | PCI Base Address 2 for Local Address Space 0 | | | | Y | FFFFFE00 |
| 0x1C | PCI Base Address 3 for Local Address Space 1 | | | | Y | 00000000 |
| 0x20 | PCI Base Address 4 for Local Address Space 2 | | | | Y | 00000000 |
| 0x24 | PCI Base Address 5 for Local Address Space 3 | | | | Y | 00000000 |
| 0x28 | PCI CardBus Information Structure Pointer | | | | N | 00000000 |
| 0x2C | Subsystem ID | | Subsystem Vendor ID | | N | 000A 1498 |
| 0x30 | PCI Base Address for Local Expansion ROM | | | | Y | 00000000 |
| 0x34 | Reserved | | | New Cap. Ptr. | N | 000000 40 |
| 0x38 | Reserved | | | | N | 00000000 |
| 0x3C | Max_Lat | Min_Gnt | Interrupt Pin | Interrupt Line | Y[7:0] | 00 00 01 00 |
| 0x40 | PM Cap. | | PM Nxt Cap. | PM Cap. ID | N | 4801 48 01 |
| 0x44 | PM Data | PM CSR EXT | PM CSR | | Y | 00 00 0000 |
| 0x48 | Reserved | HS CSR | HS Nxt Cap. | HS Cap. ID | Y[23:16] | 00 00 0000 |
| 0x4C | VPD Address | | VPD Nxt Cap. | VPD Cap. ID | Y[31:16] | 0000 00 03 |
| 0x50 | VPD Data | | | | Y | 00000000 |

Table 4-1 : PCI9030 Header



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

### 4.1.2 PCI Base Address Initialization

**PCI Base Address Initialization is scope of the PCI host software.**

**PCI9030 PCI Base Address Initialization:**

1. Write 0xFFFF_FFFF to the PCI9030 PCI Base Address Register.
2. Read back the PCI9030 PCI Base Address Register.
3. For PCI Base Address Registers 0:5, check bit 0 for PCI Address Space.

   Bit 0 = '0' requires PCI Memory Space mapping

   Bit 0 = '1' requires PCI I/O Space mapping

   For the PCI Expansion ROM Base Address Register, check bit 0 for usage.

   Bit 0 = '0': Expansion ROM not used

   Bit 0 = '1': Expansion ROM used
4. For PCI I/O Space mapping, starting at bit location 2, the first bit set determines the size of the required PCI I/O Space size.

   For PCI Memory Space mapping, starting at bit location 4, the first bit set to '1' determines the size of the required PCI Memory Space size.

   For PCI Expansion ROM mapping, starting at bit location 11, the first bit set to '1' determines the required PCI Expansion ROM size.

   For example, if bit 5 of a PCI Base Address Register is detected as the first bit set to '1', the PCI9030 is requesting a 32 byte space (address bits 4:0 are not part of base address decoding).
5. Determine the base address and write the base address to the PCI9030 PCI Base Address Register. For PCI Memory Space mapping the mapped address region must comply with the definition of bits 3:1 of the PCI9030 PCI Base Address Register.

**After programming the PCI9030 PCI Base Address Registers, the software must enable the PCI9030 for PCI I/O and/or PCI Memory Space access in the PCI9030 PCI Command Register (Offset 0x04). To enable PCI I/O Space access to the PCI9030, set bit 0 to '1'. To enable PCI Memory Space access to the PCI9030, set bit 1 to '1'.**

| Offset in Config. | Description | Usage |
|---|---|---|
| 0x10 | PCI9030 LCR's MEM | Used |
| 0x14 | PCI9030 LCR's I/O | Used |
| 0x18 | PCI9030 Local Space 0 | Used |
| 0x1C | PCI9030 Local Space 1 | Not used |
| 0x30 | Expansion ROM | Not used |

Table 4-2 : PCI9030 Base Address Usage



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# 4.2 Local Configuration Register (LCR)

After reset, the PCI9030 Local Configuration Registers are loaded from the on board serial configuration EEPROM.

**The PCI base address for the PCI9030 Local Configuration Registers is PCI9030 PCI Base Address 0 (PCI Memory Space) (Offset 0x10 in the PCI9030 PCI Configuration Register Space) or PCI9030 PCI Base Address 1 (PCI I/O Space) (Offset 0x14 in the PCI9030 PCI Configuration Register Space).**

**Do not change hardware dependent bit settings in the PCI9030 Local Configuration Registers.**

| Offset from PCI Base Address | Register | Value | Description |
|---|---|---|---|
| 0x00 | Local Address Space 0 Range | 0x0FFFFFF0 | Memory Space CAN |
| 0x04 | Local Address Space 1 Range | 0x0FFFFFC0 | Not used |
| 0x08 | Local Address Space 2 Range | 0x0FFFFE00 | Not used |
| 0x0C | Local Address Space 3 Range | 0x00000000 | Not used |
| 0x10 | Local Exp. ROM Range | 0x00000000 | Not used |
| 0x14 | Local Re-map Register Space 0 | 0x00000001 | Enabled, Offset 0 |
| 0x18 | Local Re-map Register Space 1 | 0x00001001 | Not used |
| 0x1C | Local Re-map Register Space 2 | 0x00002001 | Not used |
| 0x20 | Local Re-map Register Space 3 | 0x00000000 | Not used |
| 0x24 | Local Re-map Register ROM | 0x00000000 | Not used |
| 0x28 | Local Address Space 0 Descriptor | 0x1500C0A0 | Local Timing |
| 0x2C | Local Address Space 1 Descriptor | 0x1580C062 | Not used |
| 0x30 | Local Address Space 2 Descriptor | 0x15024120 | Not used |
| 0x34 | Local Address Space 3 Descriptor | 0x00000000 | Not used |
| 0x38 | Local Exp. ROM Descriptor | 0x00000000 | Not used |
| 0x3C | Chip Select 0 Base Address | 0x00000009 | Chip select CAN0 |
| 0x40 | Chip Select 1 Base Address | 0x00001021 | Chip select CAN1 |
| 0x44 | Chip Select 2 Base Address | 0x00002081 | Not used |
| 0x48 | Chip Select 3 Base Address | 0x00002181 | Not used |
| 0x4C | Interrupt Control/Status | 0x0041 | Interrupt Configuration |
| 0x4E | EEPROM Write Protect Boundary | 0x0030 | No write protection |
| 0x50 | Miscellaneous Control Register | 0x00780000 | Retry Delay = max. |
| 0x54 | General Purpose I/O Control | 0x026DB6D2 | All pins are outputs |
| 0x70 | Hidden1 Power Management data select | 0x00000000 | Not used |
| 0x74 | Hidden 2 Power Management data scale | 0x00000000 | Not used |

Table 4-3 : PCI9030 Local Configuration Register



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# 4.3 Configuration EEPROM

After power-on or PCI reset, the PCI9030 loads initial configuration register data from the on board configuration EEPROM.

The configuration EEPROM contains the following configuration data:

- Address 0x00 to 0x27 : PCI9030 PCI Configuration Register Values
- Address 0x28 to 0x87 : PCI9030 Local Configuration Register Values

See the PCI9030 Manual for more information.

| Address | Offset | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 0x00 | 0x02 | 0x04 | 0x06 | 0x08 | 0x0A | 0x0C | 0x0E |
| 0x00 | 0x013C | 0x1498 | 0x0280 | 0x0000 | 0x0280 | 0x000A | s.b. | 0x1498 |
| 0x10 | 0x0000 | 0x0040 | 0x0000 | 0x0100 | 0x4801 | 0x4801 | 0x0000 | 0x0000 |
| 0x20 | 0x0000 | 0x4C06 | 0x0000 | 0x0003 | 0x0FFF | 0xFE00 | 0x0000 | 0x0000 |
| 0x30 | 0x0000 | 0x0000 | 0x0000 | 0x0000 | 0x0000 | 0x0000 | 0x0000 | 0x0001 |
| 0x40 | 0x0000 | 0x0000 | 0x0000 | 0x0000 | 0x0000 | 0x0000 | 0x0000 | 0x0000 |
| 0x50 | 0x5400 | 0xC042 | 0x0000 | 0x0000 | 0x0000 | 0x0000 | 0x0000 | 0x0000 |
| 0x60 | 0x0000 | 0x0000 | 0x0000 | 0x0081 | 0x0000 | 0x0181 | 0x0000 | 0x0000 |
| 0x70 | 0x0000 | 0x0000 | 0x0030 | 0x0049 | 0x0078 | 0x0000 | 0x0224 | 0xA492 |
| 0x80 | 0x0000 | 0x0000 | 0x0000 | 0x0000 | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF |
| 0x90 | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF |
| 0xA0 | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF |
| 0xB0 | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF |
| 0xC0 | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF |
| 0xD0 | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF |
| 0xE0 | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF |
| 0xF0 | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF | 0xFFFF |

Table 4-4 : Configuration EEPROM TPMC316-xx

Subsystem-ID Value (Offset 0x0C): TPMC316-10R 0x000A

TPMC316-11R 0x000B



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# 5 Configuration Hints

## 5.1 PCI Interrupt Control/Status

Both CAN controllers generate interrupts at pin INTA# of the PCI bus. The interrupt status can be read at the Interrupt Status Register INTCSR of the PCI controller PCI9030.

| Bit | Description | Access | Reset Value |
|---|---|---|---|
| 31:8 | unused | R | 0 |
| 7 | Software Interrupt | R/W | 0 |
| 6 | PCI Interrupt Enable | R/W | 1 |
| 5 | CAN Controller 1 Interrupt Status | R | 0 |
| 4 | Local Interrupt 2 Polarity | R/W | 0 |
| 3 | Local Interrupt 2 Enable | R/W | 1 |
| 2 | CAN Controller 0 Interrupt Status | R | 0 |
| 1 | Local Interrupt 1 Polarity | R/W | 0 |
| 0 | Local Interrupt 1 Enable | R/W | 1 |

Table 5-1 : Interrupt Control/Status Register (INTCSR; 0x4C)

## 5.2 Local Software Reset

The PCI9030 Local Reset Output LRESETo# is used to reset the on board local logic.

The PCI9030 local reset is active during PCI reset or if the PCI Adapter Software Reset bit is set in the PCI9030 local configuration register CNTRL (offset 0x50).

**CNTRL[30] PCI Adapter Software Reset:**

Value of ‘1’ resets the PCI9030 and issues a reset to the Local Bus (LRESETo# asserted). The PCI9030 remains in this reset condition until the PCI Host clears this bit. The contents of the PCI9030 PCI and Local Configuration Registers are not reset. The PCI9030 PCI Interface is not reset.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# 5.3 Big / Little Endian

- PCI – Bus (Little Endian)

| | |
|---|---|
| Byte 0 | AD[7..0] |
| Byte 1 | AD[15..8] |
| Byte 2 | AD[23..16] |
| Byte 3 | AD[31..24] |

- Every Local Address Space (0...3) and the Expansion ROM Space can be programmed to operate in Big or Little Endian Mode.

| **Big Endian** | | **Little Endian** | |
|---|---|---|---|
| **32 Bit** | | **32 Bit** | |
| Byte 0 | D[31..24] | Byte 0 | D[7..0] |
| Byte 1 | D[23..16] | Byte 1 | D[15..8] |
| Byte 2 | D[15..8] | Byte 2 | D[23..16] |
| Byte 3 | D[7..0] | Byte 3 | D[31..24] |
| **16 Bit upper lane** | | **16 Bit** | |
| Byte 0 | D[31..24] | Byte 0 | D[7..0] |
| Byte 1 | D[23..16] | Byte 1 | D[15..8] |
| **16 Bit lower lane** | | | |
| Byte 0 | D[15..8] | | |
| Byte 1 | D[7..0] | | |
| **8 Bit upper lane** | | **8 Bit** | |
| Byte 0 | D[31..24] | Byte 0 | D[7..0] |
| **8 Bit lower lane** | | | |
| Byte 0 | D[7..0] | | |

Table 5-2 : Local Bus Little/Big Endian

**Standard use of the TPMC316:**

| | |
|---|---|
| Local Address Space 0 | 16 bit bus in Little Endian Mode |
| Local Address Space 1 | not used |
| Local Address Space 2 | not used |
| Local Address Space 3 | not used |
| Expansion ROM Space | not used |

To change the Endian Mode use the Local Configuration Registers for the corresponding Space. Bit 24 of the according register sets the mode. A value of 1 indicates Big Endian and a value of 0 indicates Little Endian.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Use the PCI Base Address 0 + Offset or PCI Base Address 1 + Offset:

| Short cut Offset | Name | |
|---|---|---|
| LAS0BRD | 0x28 | Local Address Space 0 Bus Region Description Register |
| LAS1BRD | 0x2C | Local Address Space 0 Bus Region Description Register |
| LAS2BRD | 0x30 | Local Address Space 0 Bus Region Description Register |
| LAS3BRD | 0x34 | Local Address Space 0 Bus Region Description Register |
| EROMBRD | 0x38 | Expansion ROM Bus Region Description Register |

You could also use the PCI - Base Address 1 I/O Mapped Configuration Registers.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# 6 Installation

## 6.1 CAN bus Termination

Each end of a CAN bus must be terminated by a 120 ohms resistor between the CAN bus lines CAN high and CAN low.

This termination could be activated by closing the soldering connection LB2 and LB1. There is one solder connection for each channel.

Solder connection LB2 closed: bus line termination for CAN bus channel 0 active

Solder connection LB1 closed: bus line termination for CAN bus channel 1 active.

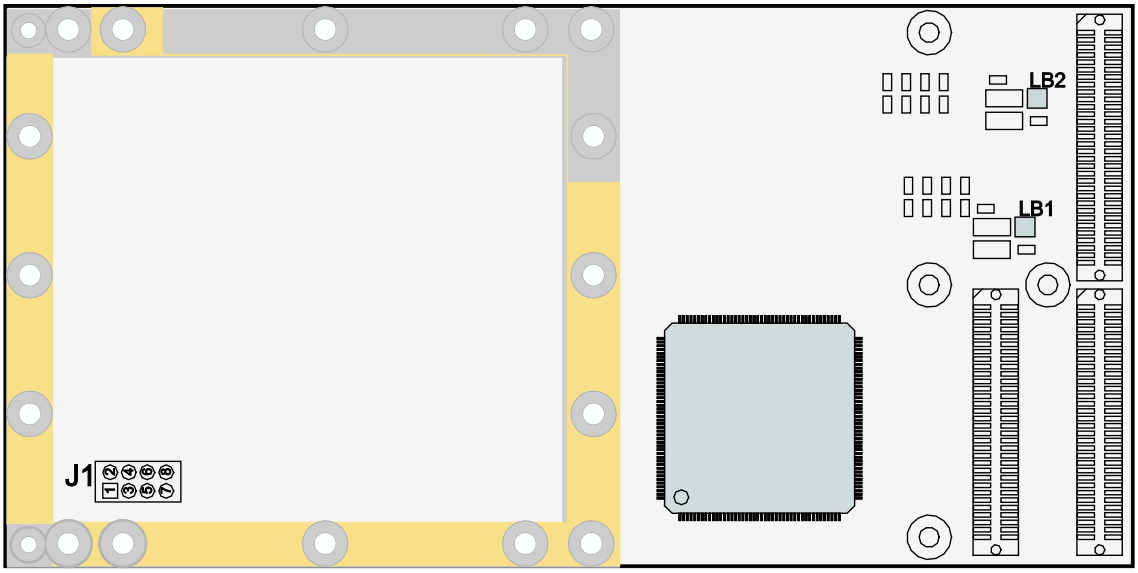



Figure 6-1 : Soldering Connection Location LB1 – LB2

## 6.2 Physical Interface

The TPMC316-10R provides a CAN High Speed interface and the TPMC316-11R a modified RS485 interface.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# 7 Pin Assignment – I/O Connector

## 7.1 Mezzanine Card Connector P14

| Pin | Signal | Function |
|---|---|---|
| 1 | NC | |
| 2 | Ground channel 0 | |
| 3 | Low level CAN voltage input/output channel 0 | CAN High Speed or modified RS485 |
| 4 | High level CAN voltage input/output channel 0 | CAN High Speed or modified RS485 |
| 5 | Ground channel 0 | |
| 6 | NC | |
| 7 | NC | |
| 8 | NC | |
| 9 | NC | |
| 10 | NC | |
| 11 | Ground channel 1 | |
| 12 | Low level CAN voltage input/output channel 1 | CAN High Speed or modified RS485 |
| 13 | High level CAN voltage input/output channel 1 | CAN High Speed or modified RS485 |
| 14 | Ground channel 1 | |
| 15 | NC | |
| 16…32 | NC | |

Table 7-1 : Mezzanine P14 Connector



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

**Artisan Technology Group** is an independent supplier of quality pre-owned equipment

## Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

## We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

## Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP