CP932

Gigabit Ethernet Switch

Manual ID: 30048, Rev. Index 01
June 22, 2005

User Guide

The product described in this manual is in compliance with all applied CE standards.

30048.01.UG.VC.050622/191301

Revision History

Publication Title:	CP932 Gigabit Ethernet Switch	
ID Number:	30048	
Rev. Index	**Brief Description of Changes**	**Date of Issue**
01	Initial Issue	Jun 22, 2005

Imprint

Kontron Modular Computers GmbH may be contacted via the following:

MAILING ADDRESS

Kontron Modular Computers GmbH
Sudetenstraße 7
D - 87600 Kaufbeuren Germany

TELEPHONE AND E-MAIL

+49 (0) 800-SALESKONTRON
sales@kontron.com

For further information about other Kontron Modular Computers products, please visit our Internet web site: **www.kontron.com**

Copyright

Disclaimer:

Kontron Modular Computers GmbH rejects any liability for the correctness and completeness of this manual as well as its suitability for any particular purpose.

30048.01.UG.VC.050622/191301

Table of Contents

Chapter 1

30048.01.UG.VC.050622/191301

Chapter 2

Chapter 3

Chapter 4

30048.01.UG.VC.050622/191301

30048.01.UG.VC.050622/191301

This page has been intentionally left blank.

30048.01.UG.VC.050622/191301

List of Tables

30048.01.UG.VC.050622/191301

This page has been intentionally left blank.

30048.01.UG.VC.050622/191301

List of Figures

30048.01.UG.VC.050622/191301

This page has been intentionally left blank.

30048.01.UG.VC.050622/191301

Proprietary Note

This document contains information proprietary to Kontron Modular Computers GmbH. It may not be copied or transmitted by any means, disclosed to others, or stored in any retrieval system or media without the prior written consent of Kontron Modular Computers GmbH or one of its authorized agents.

The information contained in this document is, to the best of our knowledge, entirely correct. However, Kontron Modular Computers GmbH cannot accept liability for any inaccuracies or the consequences thereof, or for any liability arising from the use or application of any circuit, product, or example shown in this document.

Kontron Modular Computers GmbH reserves the right to change, modify, or improve this document or the product described herein, as seen fit by Kontron Modular Computers GmbH without further notice.

Trademarks

Kontron Modular Computers GmbH, the *PEP* logo and, if occurring in this manual, “CXM” are trademarks owned by Kontron Modular Computers GmbH, Kaufbeuren (Germany). In addition, this document may include names, company logos and trademarks, which are registered trademarks and, therefore, proprietary to their respective owners.

Environmental Protection Statement

This product has been manufactured to satisfy environmental protection requirements where possible. Many of the components used (structural parts, printed circuit boards, connectors, batteries, etc.) are capable of being recycled.

Final disposition of this product after its service life must be accomplished in accordance with applicable country, state, or local laws or regulations.

30048.01.UG.VC.050622/191301

Explanation of Symbols

CE Conformity

This symbol indicates that the product described in this manual is in compliance with all applied CE standards. Please refer also to the section “Applied Standards” in this manual.

Caution, Electric Shock!

This symbol and title warn of hazards due to electrical shocks (> 60V) when touching products or parts of them. Failure to observe the precautions indicated and/or prescribed by the law may endanger your life/health and/or result in damage to your material.

Please refer also to the section “High Voltage Safety Instructions” on the following page.

Warning, ESD Sensitive Device!

This symbol and title inform that electronic boards and their components are sensitive to static electricity. Therefore, care must be taken during all handling operations and inspections of this product, in order to ensure product integrity at all times.

Please read also the section “Special Handling and Unpacking Instructions” on the following page.

Warning!

This symbol and title emphasize points which, if not fully understood and taken into consideration by the reader, may endanger your health and/or result in damage to your material.

Note ...

This symbol and title emphasize aspects the reader should read through carefully for his or her own advantage.

30048.01.UG.VC.050622/191301

For Your Safety

Your new Kontron product was developed and tested carefully to provide all features necessary to ensure its compliance with electrical safety requirements. It was also designed for a long fault-free life. However, the life expectancy of your product can be drastically reduced by improper treatment during unpacking and installation. Therefore, in the interest of your own safety and of the correct operation of your new Kontron product, you are requested to conform with the following guidelines.

High Voltage Safety Instructions

Warning!

All operations on this device must be carried out by sufficiently skilled personnel only.

Caution, Electric Shock!

Before installing your new Kontron product into a system always ensure that your mains power is switched off. This applies also to the installation of piggybacks.

Serious electrical shock hazards can exist during all installation, repair and maintenance operations with this product. Therefore, always unplug the power cable and any other cables which provide external voltages before performing work.

Special Handling and Unpacking Instructions

ESD Sensitive Device!

Electronic boards and their components are sensitive to static electricity. Therefore, care must be taken during all handling operations and inspections of this product, in order to ensure product integrity at all times.

- Do not handle this product out of its protective enclosure while it is not used for operational purposes unless it is otherwise protected.
- Whenever possible, unpack or pack this product only at EOS/ESD safe work stations. Where a safe work station is not guaranteed, it is important for the user to be electrically discharged before touching the product with his/her hands or tools. This is most easily done by touching a metal part of your system housing.
- It is particularly important to observe standard anti-static precautions when changing piggybacks, ROM devices, jumper settings etc. If the product contains batteries for RTC or memory backup, ensure that the board is not placed on conductive surfaces, including anti-static plastics or sponges. They can cause short circuits and damage the batteries or conductive circuits on the board.

30048.01.UG.VC.050622/191301

General Instructions on Usage

- In order to maintain Kontron's product warranty, this product must not be altered or modified in any way. Changes or modifications to the device, which are not explicitly approved by Kontron Modular Computers GmbH and described in this manual or received from Kontron's Technical Support as a special handling instruction, will void your warranty.
- This device should only be installed in or connected to systems that fulfill all necessary technical and specific environmental requirements. This applies also to the operational temperature range of the specific board version, which must not be exceeded. If batteries are present, their temperature restrictions must be taken into account.
- In performing all necessary installation and application operations, please follow only the instructions supplied by the present manual.
- Keep all the original packaging material for future storage or warranty shipments. If it is necessary to store or ship the board, please re-pack it as nearly as possible in the manner in which it was delivered.
- Special care is necessary when handling or unpacking the product. Please consult the special handling and unpacking instruction on the previous page of this manual.

30048.01.UG.VC.050622/191301

Two Year Warranty

Kontron Modular Computers GmbH grants the original purchaser of Kontron's products a ***TWO YEAR LIMITED HARDWARE WARRANTY*** as described in the following. However, no other warranties that may be granted or implied by anyone on behalf of Kontron are valid unless the consumer has the express written consent of Kontron Modular Computers GmbH.

Kontron Modular Computers GmbH warrants their own products, excluding software, to be free from manufacturing and material defects for a period of 24 consecutive months from the date of purchase. This warranty is not transferable nor extendible to cover any other users or long-term storage of the product. It does not cover products which have been modified, altered or repaired by any other party than Kontron Modular Computers GmbH or their authorized agents. Furthermore, any product which has been, or is suspected of being damaged as a result of negligence, improper use, incorrect handling, servicing or maintenance, or which has been damaged as a result of excessive current/voltage or temperature, or which has had its serial number(s), any other markings or parts thereof altered, defaced or removed will also be excluded from this warranty.

If the customer's eligibility for warranty has not been voided, in the event of any claim, he may return the product at the earliest possible convenience to the original place of purchase, together with a copy of the original document of purchase, a full description of the application the product is used on and a description of the defect. Pack the product in such a way as to ensure safe transportation (see our safety instructions).

Kontron provides for repair or replacement of any part, assembly or sub-assembly at their own discretion, or to refund the original cost of purchase, if appropriate. In the event of repair, refunding or replacement of any part, the ownership of the removed or replaced parts reverts to Kontron Modular Computers GmbH, and the remaining part of the original guarantee, or any new guarantee to cover the repaired or replaced items, will be transferred to cover the new or repaired items. Any extensions to the original guarantee are considered gestures of goodwill, and will be defined in the "Repair Report" issued by Kontron with the repaired or replaced item.

Kontron Modular Computers GmbH will not accept liability for any further claims resulting directly or indirectly from any warranty claim, other than the above specified repair, replacement or refunding. In particular, all claims for damage to any system or process in which the product was employed, or any loss incurred as a result of the product not functioning at any given time, are excluded. The extent of Kontron Modular Computers GmbH liability to the customer shall not exceed the original purchase price of the item for which the claim exists.

Kontron Modular Computers GmbH issues no warranty or representation, either explicit or implicit, with respect to its products' reliability, fitness, quality, marketability or ability to fulfil any particular application or purpose. As a result, the products are sold "as is," and the responsibility to ensure their suitability for any given task remains that of the purchaser. In no event will Kontron be liable for direct, indirect or consequential damages resulting from the use of our hardware or software products, or documentation, even if Kontron were advised of the possibility of such claims prior to the purchase of the product or during any period since the date of its purchase.

Please remember that no Kontron Modular Computers GmbH employee, dealer or agent is authorized to make any modification or addition to the above specified terms, either verbally or in any other form, written or electronically transmitted, without the company's consent.

30048.01.UG.VC.050622/191301

This page has been intentionally left blank.

30048.01.UG.VC.050622/191301

Chapter 1

Introduction

30048.01.UG.VC.050622/191301

This page has been intentionally left blank.

30048.01.UG.VC.050622/191301

1. Introduction

1.1 System Overview

The CompactPCI board described in this manual operates with the PCI bus architecture to support additional I/O and memory-mapped devices as required by various industrial applications. For detailed information concerning the CompactPCI standard, please consult the complete Peripheral Component Interconnect (PCI) and CompactPCI Specifications. For further information regarding these standards and their use, visit the home page of the *PCI Industrial Computer Manufacturers Group (PICMG)*.

Many system-relevant CompactPCI features that are specific to Kontron Modular Computers CompactPCI systems may be found described in the Kontron CompactPCI System Manual. Due to its size, this manual cannot be downloaded via the internet. Please refer to the section “Related Publications” at the end of this chapter for the relevant ordering information.

The CompactPCI System Manual includes the following information:

- Common information that is applicable to all system components, such as safety information, warranty conditions, standard connector pinouts etc.
- All the information necessary to combine Kontron’s racks, boards, backplanes, power supply units and peripheral devices in a customized CompactPCI system, as well as configuration examples.
- Data on rack dimensions and configurations as well as information on mechanical and electrical rack characteristics.
- Information on the distinctive features of Kontron CompactPCI boards, such as functionality, hot swap capability. In addition, an overview is given for all existing Kontron CompactPCI boards with links to the relating data sheets.
- Generic information on the Kontron CompactPCI backplanes, such as the slot assignment, PCB form factor, distinctive features, clocks, power supply connectors and signalling environment, as well as an overview of the Kontron CompactPCI standard backplane family.
- Generic information on the Kontron CompactPCI power supply units, such as the input/output characteristics, redundant operation and distinctive features, as well as an overview of the Kontron CompactPCI standard power supply unit family.

30048.01.UG.VC.050622/191301

1.2 Board Overview

1.2.1 Board Introduction

The CP932 Gigabit Ethernet switch is a 3U/4HP CompactPCI board designed for use in a CompactPCI system or as a standalone application. The CP932 comes in two variants, with five Gigabit Ethernet channels, and with six Gigabit Ethernet channels. The five-channel variant is fitted with an ATX power connector which enables the CP932 to be used as a standalone application. The six-channel variant is equipped with an additional Gigabit Ethernet channel which enables the network traffic to be effected via the CompactPCI interface.

The function of the CP932 is to connect up to five different Gigabit Ethernet-enabled devices with each other. The major component involved in this process is the high-performance, five-port Gigabit Ethernet switch controller for the five-channel variant, and the eight-port Gigabit Ethernet switch controller for the six-channel variant. The controllers provide full support for 10Base-T, 100Base-TX, and 1000Base-T via all available ports.

The CP932 includes five front panel Gigabit Ethernet ports and one CompactPCI connector. On the six-channel variant, one Gigabit Ethernet PCI NIC port is available, which is realized through a PCI Gigabit Ethernet chip connected, on the one side, to the host CPU via the CompactPCI interface and, on the other side, directly to the switch chip.

Network interfacing is accomplished using CAT5 UTP or better cabling for 10Base-T, 100Base-TX, and 1000-Base-T.

The power supply for the CP932 is delivered via the CompactPCI connector. On the five-channel variant, the power supply can be optionally delivered via the ATX power connector.

The CP932 five-channel/six-channel, unmanaged Gigabit Ethernet switch is part of a comprehensive concept to provide CompactPCI system integrators with a complete range of CompactPCI communications products for data networks. This concept ensures a maximum degree of system design flexibility, thus allowing efficient and effective use of available resources.

The following table provides a quick overview of the CP932 variants.

Table 1-1: CP932 Variant Overview

CP932 VARIANT	CP932 FEATURES	DESCRIPTION
FIVE-CHANNEL VARIANT	Ethernet Switch Controller	BCM5385 from Broadcom
	External Interfaces	Power connection via one of the following connectors: • CompactPCI connector • ATX power connector Ethernet channels: • five copper RJ45 connectors
	Monitor and Control	• Status LEDs: ACT, LINK, SPEED
SIX-CHANNEL VARIANT	Ethernet Switch Controller	BCM5388 from Broadcom
	PCI NIC Channel	82541PI from Intel
	External Interfaces	Power connection via the: • CompactPCI connector Ethernet channels: • five copper RJ45 connectors • one onboard PCI NIC port
	Monitor and Control	• Status LEDs: ACT, LINK, SPEED

30048.01.UG.VC.050622/191301

1.2.2 Board-Specific Information

Specific board components involved in the Ethernet communications and data handling process are:

- Front panel connectors:
  - Five RJ45 connectors with two integrated bicolor LEDs per channel
- Gigabit Ethernet switch:
  - One five-port or eight-port Gigabit Ethernet switch, depending on the variant
- One CompactPCI connector
- One 4-pin ATX power connector to be used optionally as power source if the CP932 is used as a standalone application (only on the five-channel variant)
- Two onboard dual switching voltage regulators
- Magnetics chips for galvanic isolation of each channel

1.2.3 System Level Interfacing

Depending on the variant, there are two different possibilities to integrate the CP932 into a system. The CP932 is equipped with a CompactPCI Connector for integration within a CompactPCI System.

On the five-channel variant, the CompactPCI connector is used only for delivering the power. If the ATX power connector is used as power source, the CP932 operates as a standalone application, i.e. no backplane is necessary.

Warning!

Either the CompactPCI connector or the ATX power connector may be used at the same time. Failure to comply with the above may result in damage to your board.

On the six-channel variant, the CompactPCI connector is used both for connecting the power supply and for the PCI interfacing.

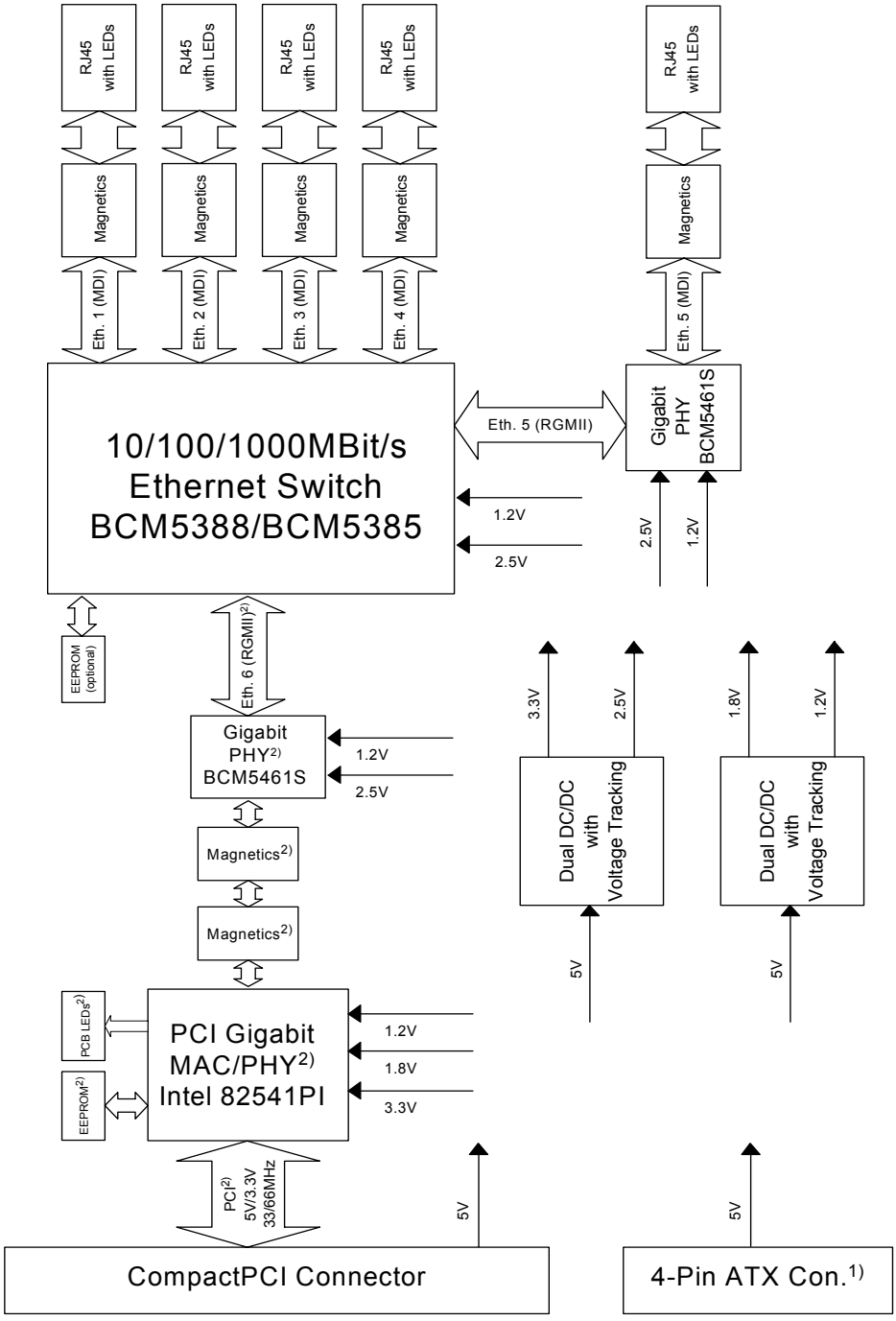
30048.01.UG.VC.050622/191301

1.3 Board Diagrams

The following diagrams provide additional information concerning board functionality and component layout.

1.3.1 Functional Block Diagram

Figure 1-1: CP932 Functional Block Diagram



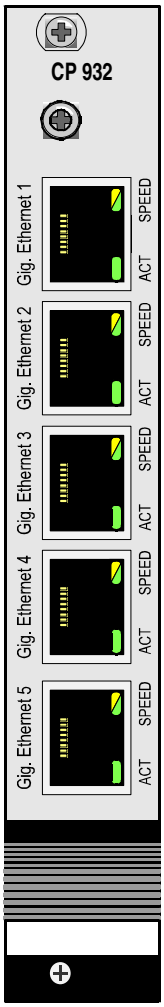
1) Only on the five-channel variant of the CP932

2) Only on the six-channel variant of the CP932

30048.01.UG.VC.050622/191301

1.3.2 Front Panel

Figure 1-2: CP932 Front Panel



LEGEND:

ACT LED (Green)

- ACT ON: Ethernet Link
- ACT OFF: No Ethernet Link
- ACT BLINKING: Ethernet Activity

SPEED LED (Green/Yellow)

- SPEED ON (green): 100 Mbit
- SPEED ON (yellow): 1000 Mbit
- SPEED OFF: 10 Mbit

30048.01.UG.VC.050622/191301

1.3.3 Board Layout

Figure 1-3: Board Layout of the Five-Channel Variant

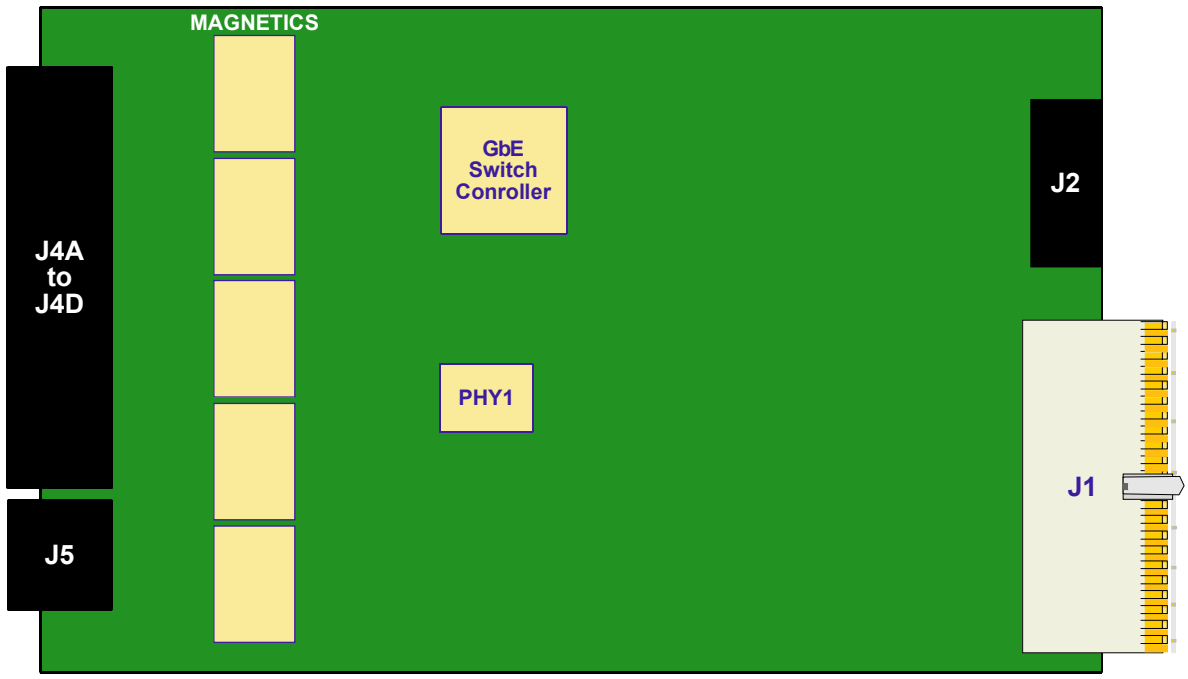
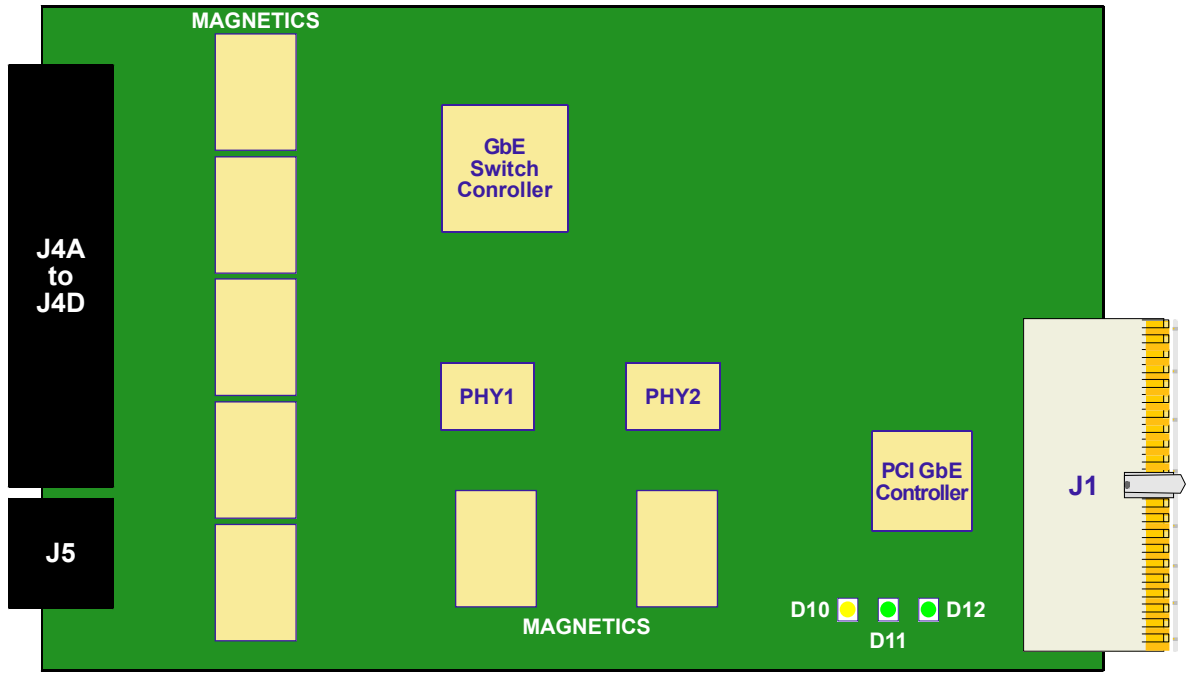


Figure 1-4: Board Layout of the Six-Channel Variant



30048.01.UG.VC.050622/191301

1.4 Technical Specifications

Table 1-2: CP932 Main Specifications

GROUP	TYPE	DESCRIPTION
Controllers	BCM5385 / BCM5388 Gigabit Ethernet Switch Controller from Broadcom	On the five-channel variant: Broadcom BCM5385 high-performance, five-port Gigabit Ethernet switch controller with • Four integrated PHYs, and • One RGMII interface in 324-pin FBGA package. On the six-channel variant: Broadcom BCM5388 high-performance, eight-port Gigabit Ethernet switch controller with • Four integrated PHYs, and • Four RGMII interfaces in 324-pin FBGA package.
	PCI Gigabit Ethernet Controller	Only on the six-channel variant: • Intel 82541PI PCI Gigabit Ethernet controller
Internal Interfaces	PCI Bus	Only on the six-channel variant: • 32-bit, 33/66 MHz PCI bus compliant with the CompactPCI Specification, V. 2.0, Rev. 3.0 • universal signaling: 3.3 V or 5 V V(I/O) • PCI interrupt INTA#
External Interfaces	Front Panel Connectors	• five, 8-pin, female, RJ45 connector(s) • The CP932 supports up to five channels of full or half duplex 10Base-T, 100Base-TX, 1000-Base-T Ethernet operation with up to 100 meters cable length.
	Onboard Connectors	• One CompactPCI connector • One ATX power connector (only on the five-channel variant)
Indicators	Front Panel LEDs	Two bicolor LEDs per channel are provided for indicating the Ethernet channel operational status: ACT LED (Green): • ACT ON: Ethernet Link • ACT OFF: No Ethernet Link • ACT BLINKING: Ethernet Activity SPEED LED (Green/Yellow): • SPEED ON (green): 100 Mbit • SPEED ON (yellow): 1000 Mbit • SPEED OFF: 10 Mbit
Thermal Aspects	Heat Sink	The CP932 is fitted with an optimally designed heat sink to ensure overtemperature protection.
	Forced Air Flow	For proper operation at the specified temperatures, a minimum airflow of 1 m/s is required.

30048.01.UG.VC.050622/191301

Table 1-2: CP932 Main Specifications (Continued)

GROUP	TYPE	DESCRIPTION
General	Jumpers	No jumpers must be set. The CP932 is a Plug&PLay card.
	Power Requirements	Board power supply: 5 V ±5%
	Power Consumption	See Table 5-4 for details.
	Temperature Range	Operational: 0°C to +70°C Storage: -40°C to +90°C
	Humidity	93% at 40°C, non-condensing
	Dimensions	100mm x 160mm single-height Eurocard
	Board Weight	Five-channel variant: 173 grams, with heat sink Six-channel variant: 178 grams, with heat sink

1.5 Applied Standards

The CP932 complies with the requirements of the following standards:

Table 1-3: Applied Standards

	TYPE	STANDARD
CE	Emission	EN 55022 EN 61000-6-3
	Immission	EN 55024 EN 61000-6-2
	Electrical Safety	EN 60950-1
MECHANICAL	Mechanical Dimensions	IEEE 101.10
ENVIRONMENTAL AND HEALTH ASPECTS	Vibration (Sinusoidal)	IEC 60068-2-6
	Shock	IEC 60068-2-27
	Bump	IEC 60068-2-29
	Vibration, broad-band random (digital control) and guidance	IEC 60068-2-64
	Climatic Humidity	IEC 60068-2-78
	WEEE	Directive 2002/96/EC
	RoHS	Directive 2002/95/EC

1.6 Related Publications

Table 1-4: Related Publications

	ISSUED BY	DOCUMENT
COMPACTPCI SYSTEMS	PICMG	CompactPCI Specification, V. 2.0, Rev. 3.0
	Kontron Modular Computers GmbH	CompactPCI Systems Manual (ID 19953)

30048.01.UG.VC.050622/191301

Chapter 2

Functional Description

30048.01.UG.VC.050622/191301

This page has been intentionally left blank.

30048.01.UG.VC.050622/191301

2. Functional Description

The following chapters present more detailed, board level information about the CP932 Gigabit Ethernet switch whereby the board components and their basic functionality are discussed in general.

2.1 General Information

The CP932 is comprised basically of the following:

- Gigabit Ethernet switch controller
  - Five-channel controller on the five-channel variant of the CP932
  - Eight-channel controller on the six-channel variant of the CP932
  - Integrated (on chip):
    - MAC for all channels
    - PHY for four channels
  - External PHYs:
    - One external PHY on the five-channel variant of the CP932
    - Two external PHYs on the six-channel variant of the CP932
- System interfaces for:
  - Up to six Gigabit Ethernet channels
    - Five RJ45, 8-pin, female connectors for CAT5 UTP or better cabling (J4A - J4D and J5)
    - One PCI NIC channel (only on the six-channel variant)
  - Power Supply
    - CompactPCI connector (J1)
    - 4-pin ATX Power Connector (J2), only on the five-channel variant
- Monitor and Control
  - Five sets of two integrated bicolor LEDs for each RJ45 for monitoring of link, activity, and speed
  - One set of three onboard LEDs for monitoring of link, activity, and speed of the Gigabit Ethernet PCI interface

2.2 Gigabit Ethernet Switch Controller

The Gigabit Ethernet Switch controller is responsible for providing up to six channels of Gigabit Ethernet MAC and PHY layer functionality. Depending on the variant, two different Gigabit Ethernet switch controllers are used. The five-channel variant uses the Broadcom BCM5385 Gigabit Ethernet switch controller, whereas the six-channel variant uses the Broadcom BCM5388 Gigabit Ethernet switch controller.

The highly integrated Broadcom BCM5388 and BCM5385 switch controllers combine all the functions of a high-speed switch system, including packet buffer, PHY transceivers, media access controllers, address management, and a non-blocking switch fabric into a single CMOS device. They comply with the IEEE 802.3, 802.3u, 802.3ab, and 802.3x specifications, including the MAC control, pause frame, and auto-negotiation subsections, providing compatibility with all industry-standard Ethernet, Fast Ethernet, and Gigabit Ethernet devices.

30048.01.UG.VC.050622/191301

These devices contain four full-duplex 10/100/1000BASE-T transceivers, each of which performs all of the physical layer interface functions for 10BASE-T Ethernet, 100BASE-TX, and 1000BASE-T Ethernet.

On the Broadcom BCM5388 switch controller, the remaining four ports feature a standard RGMII interface to allow connection to the external 10/100/1000 Mbit/s PHY transceivers. The six-channel variant of the CP932 uses only two of the remaining four ports of the Broadcom BCM5388 switch controller.

On the Broadcom BCM5385 switch controller, the remaining port features a standard RGMII interface to allow connection to the external 10/100/1000 Mbit/s PHY transceiver.

For further information on the Broadcom BCM5388 and BCM5385 switch controllers, refer to the respective data sheets.

2.2.1 Thermal Aspects

The CP932 is equipped with a heat sink mounted on the Gigabit Ethernet switch controller. The physical size, shape, and construction ensures the best possible thermal resistance (R_{th}) coefficients. In addition, the CP932 is specifically designed to efficiently support forced air flow concepts as found in a modern CompactPCI system chassis.

2.3 Gigabit Ethernet PHY

The Broadcom BCM5461S Gigabit PHY transceiver converts the RGMII signals from the MAC of the switch controller into the appropriate Ethernet signals.

The five-channel variant of the CP932 is equipped with one Gigabit PHY transceiver, whereas the six-channel variant of the CP932 is fitted with two Gigabit PHY transceivers.

The Gigabit PHY1 transceiver converts one RGMII channel on the BCM5385/BCM5388 to a PHY level channel on the RJ45 connector, J5, on the front panel.

The Gigabit PHY2 transceiver converts one RGMII channel on the BCM5388 to a PHY level channel connected to the Intel 82541PI PCI Gigabit Ethernet controller. It is responsible for the realization of the onboard NIC channel. PHY2 is only available on the six-channel variant of the CP932.

The Gigabit PHY1 and PHY2 are fully integrated 10/100/1000BASE-T Gigabit Ethernet transceivers optimized for low power and small footprint size to enable backplane and uplink applications. The Gigabit PHY architecture also meets the requirements of 802.3, 802.3u, and 802.3ab.

For further information on the Broadcom BCM5461S Gigabit PHY transceivers, refer to the respective data sheets.

30048.01.UG.VC.050622/191301

2.4 PCI Gigabit Ethernet Controller (Integrated NIC)

The six-channel variant of the CP932 provides one onboard NIC Gigabit Ethernet channel used with the Intel 82541PI PCI Gigabit Ethernet controller. This chip provides, on the one hand, a PCI interface communicating with the host over the CompactPCI backplane and, on the other hand, a ready-to-use Gigabit Ethernet channel on copper PHY level.

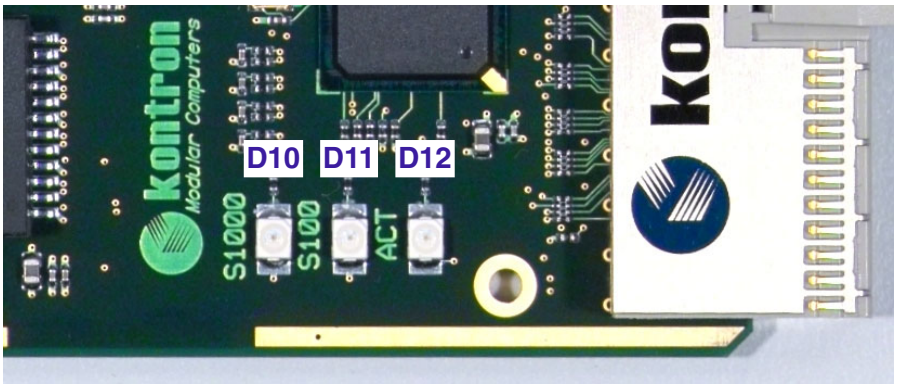
The NIC Gigabit Ethernet channel is connected to the onboard PHY2 transceiver over two magnetic devices. PHY2 itself is connected to the Broadcom BCM5388 Gigabit Ethernet switch over the RGMII interface.

The network status of the PCI Gigabit Controller can be monitored via three onboard LEDs.

2.4.1 Onboard LEDs

The six-channel CP932 is equipped with three onboard LEDs for monitoring the network status of the PCI Gigabit Controller.

Figure 2-1: Onboard LEDs D10, D11 and D12



ACT LED D12 (green)

- D12 ON: Ethernet Link
- D12 OFF: No Ethernet Link
- D12 BLINKING: Ethernet Activity

SPEED LEDs D11 (green) and D10 (yellow)

- D11 (green) ON and D10 (yellow) OFF: 100 Mbit/s
- D11 (green) OFF and D10 (yellow) ON: 1000 Mbit/s
- D11 (green) OFF and D10 (yellow) OFF: 10 Mbit/s

30048.01.UG.VC.050622/191301

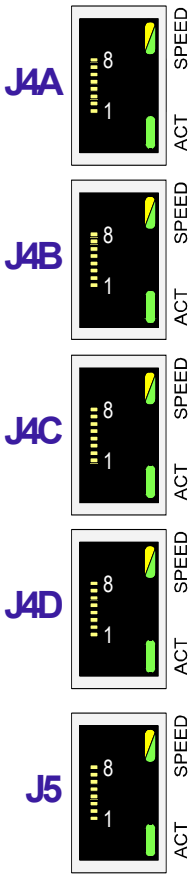
2.5 Board Interfaces

2.5.1 Gigabit Ethernet Interfaces

The Ethernet wire cabling interface is implemented using five 8-pin, female, RJ45 connectors. Connectors J4A - J4D are implemented as channels 1 - 4, and connector J5 is implemented as channel 5. As the Gigabit Ethernet controller is able to automatically detect the cabling configuration and Ethernet standard in use, the pinout of the individual connectors is a function of the implementation.

The following figure illustrates the pinout and LED positioning of the J4 and J5 connectors.

Figure 2-2: Gigabit Ethernet Connectors J4A - J4D and J5



The Ethernet connectors are realized as RJ45 connectors. The interfaces provide automatic detection and switching between 10Base-T, 100Base-TX and 1000Base-T data transmission. Auto-wire switching for crossed cables is also supported.

30048.01.UG.VC.050622/191301

RJ45 Connector J4A - J4D and J5 Pinouts

The following table indicates the pinout of the J4A - J4D and J5 connectors.

Table 2-1: Pinouts of J4A - J4D and J5 Based on the Implementation

MDI / STANDARD ETHERNET CABLE						PIN	MDIX / CROSSED ETHERNET CABLE					
10BASE-T		100BASE-TX		1000BASE-T			10BASE-T		100BASE-TX		1000BASE-T	
I/O	SIGNAL	I/O	SIGNAL	I/O	SIGNAL		I/O	SIGNAL	I/O	SIGNAL	I/O	SIGNAL
O	TX+	O	TX+	I/O	BI_DA+	1	I	RX+	I	RX+	I/O	BI_DB+
O	TX-	O	TX-	I/O	BI_DA-	2	I	RX-	I	RX-	I/O	BI_DB-
I	RX+	I	RX+	I/O	BI_DB+	3	O	TX+	O	TX+	I/O	BI_DA+
-	-	-	-	I/O	BI_DC+	4	-	-	-	-	I/O	BI_DD+
-	-	-	-	I/O	BI_DC-	5	-	-	-	-	I/O	BI_DD-
I	RX-	I	RX-	I/O	BI_DB-	6	O	TX-	O	TX-	I/O	BI_DA-
-	-	-	-	I/O	BI_DD+	7	-	-	-	-	I/O	BI_DC+
-	-	-	-	I/O	BI_DD-	8	-	-	-	-	I/O	BI_DC-

The signal pinouts on the left side of the table are for the standard Media Dependent Interface (MDI) using appropriate CAT5 UTP cabling for the Ethernet standard in use.

The signal pinouts on the right side of the table are for the Media Dependent Interface Crossed (MDIX) using appropriate CAT5 UTP cabling for the Ethernet standard in use.

In addition, the input / output status of each signal is also indicated in the table.

2.5.1.1 Ethernet LED Status

ACT (green): This LED monitors network connection and activity. The LED lights up when a network link is established and blinks when packets are sent or received through the RJ45 port. When this LED is not lit, it means that either the link is not present or the cable connection is faulty.

SPEED (green/yellow): This LED lights up to indicate a successful 100Base-TX or 1000BASE-T connection. When green it indicates a 100Base-TX connection and when yellow it indicates a 1000Base-T connection. When not lit and the ACT LED is active, the connection is operating at 10Base-T.

30048.01.UG.VC.050622/191301

2.5.2 CompactPCI Interface

The CP932 is equipped with one 2 mm x 2 mm pitch, 32-bit, female, CompactPCI connector, J1, with support for PCI bus signals, arbitration, clock and power.

The CP932 is designed for a CompactPCI bus architecture. The CompactPCI standard is electrically identical to the PCI local bus. However, these systems are enhanced to operate in rugged industrial environments and to support multiple slots.

The CompactPCI interface is based on the specification PICMG 2.0 R 3.0, 10/1/99. The following figure and table indicate the pin layout and pinout of the CompactPCI connector, J1.

Figure 2-3: CompactPCI Connector J1

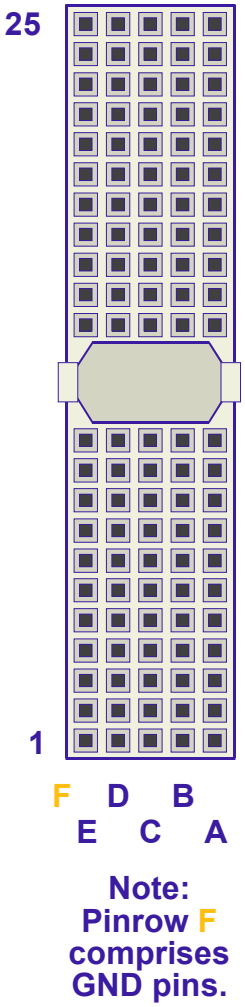


Table 2-2: CompactPCI Connector J1 Pinout

PIN	ROW A	ROW B	ROW C	ROW D	ROW E	ROW F
25	+5V	NC	NC	NC	+5V	GND
24	AD[1]	+5V	V(I/O)	AD[0]	NC	GND
23	NC	AD[4]	AD[3]	+5V	AD[2]	GND
22	AD[7]	GND	NC	AD[6]	AD[5]	GND
21	NC	AD[9]	AD[8]	M66EN	C/BE[0]#	GND
20	AD[12]	GND	V(I/O)	AD[11]	AD[10]	GND
19	NC	AD[15]	AD[14]	GND	AD[13]	GND
18	SERR#	GND	NC	PAR	C/BE[1]#	GND
17	NC	NC	NC	GND	PERR#	GND
16	DEVSEL#	GND	V(I/O)	STOP#	LOCK#	GND
15	NC	FRAME#	IRDY#	GND	TRDY#	GND
12-14 Key Area						
11	AD[18]	AD[17]	AD[16]	GND	C/BE[2]#	GND
10	AD[21]	GND	NC	AD[20]	AD[19]	GND
9	C/BE[3]#	IDSEL	AD[23]	GND	AD[22]	GND
8	AD[26]	GND	V(I/O)	AD[25]	AD[24]	GND
7	AD[30]	AD[29]	AD[28]	GND	AD[27]	GND
6	REQ#	GND	NC	CLK	AD[31]	GND
5	NC	NC	RST#	GND	GNT#	GND
4	NC	NC	V(I/O)	NC	NC	GND
3	INTA#	NC	NC	+5V	NC	GND
2	NC	+5V	NC	TDO	TDI	GND
1	+5V	NC	NC	NC	+5V	GND

Note ...

On the five-channel variant of the CP932, the PCI signals are not connected.

30048.01.UG.VC.050622/191301

Warning!

Either the CompactPCI connector or the ATX power connector may be used at the same time. Failure to comply with the above may result in damage to your board.

2.5.3 ATX Power Interface

The 4-pin ATX power connector is only available on the five-channel variant of the CP932 and is used for connecting the ATX power supply to the CP932. This connector may only be used if the CompactPCI connector, J1, is not connected to the power supply.

Figure 2-4: ATX Power Connector J2

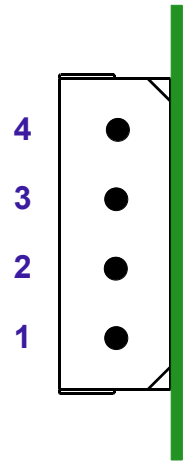


Table 2-3: ATX Power Connector J2 Pinout

PIN	SIGNAL
4	+5V
3	GND
2	GND
1	NC

Warning!

Either the ATX power connector or the CompactPCI connector may be used at the same time. Failure to comply with the above may result in damage to your board.

This page has been intentionally left blank.

30048.01.UG.VC.050622/191301

Chapter 3

Installation

30048.01.UG.VC.050622/191301

This page has been intentionally left blank.

30048.01.UG.VC.050622/191301

3. Installation

The CP932 has been designed for easy installation. However, the following standard precautions, installation procedures, and general information must be observed to ensure proper installation and to preclude damage to the board or injury to personnel.

3.1 Hardware Installation

The product described in this manual can be installed in any available 3U slot of a CompactPCI system except for the system master slot.

3.1.1 Safety Requirements

The board must be securely fastened to the chassis using the two front panel retaining screws located at the top and bottom of the board to ensure proper grounding and to avoid loosening caused by vibration or shock.

In addition, the following electrical hazard precautions must be observed.

Caution, Electric Shock Hazard!

Ensure that the system main power is removed prior to installing or removing this board. Ensure that there are no other external voltages or signals being applied to this board or other boards within the system. Failure to comply with the above could endanger your life or health and may cause damage to this board or other system components including process-side signal conditioning equipment.

ESD Equipment!

This Kontron board contains electrostatically sensitive devices. Please observe the following precautions to avoid damage to your board:

Discharge your clothing before touching the assembly. Tools must be discharged before use.

Do not touch any onboard components, connector pins, or board conductive circuits.

If working at an anti-static workbench with professional discharging equipment, ensure compliance with its usage when handling this product.

30048.01.UG.VC.050622/191301

3.1.2 Installation Procedures

To install the board proceed as follows:

1. Ensure that the safety requirements indicated above are observed.

Warning!

Failure to comply with the instruction below may cause damage to the board or result in improper system operation.

2. To install the board perform the following:
    1. Prior to installation of the board disengage the insertion/extraction handle by first unlocking the handle and pressing it down.
    2. Insert the board into an appropriate slot, and, using the insertion/extraction handle, ensure that it is properly seated in the backplane. (Front panel is flush with the rack front; the insertion/extraction handle is locked.)
    3. Fasten the front panel retaining screws.
    4. Connect external interfacing cables to the board as required.
    5. Ensure that the interfacing cables are properly secured.
3. The CP932 is now ready for operation.

3.1.3 Removal Procedures

To remove the board proceed as follows:

1. Ensure that the safety requirements indicated above are observed.

Warning!

Care must be taken when applying the procedures below to ensure that when the board is removed it is not damaged through contact with other boards in the system.

2. Disconnect any interfacing cables that may be connected to the board.
3. Loosen both of the front panel retaining screws.
4. To remove the board from the backplane perform the following:
    1. Unlock the insertion/extraction handle by pressing down on the grey locking mechanism in the middle of the handle. (This should be achievable with a minimum of force. If necessary lift the handle up slightly while pressing down on the grey locking mechanism.)
    2. Disengage the board from the backplane by pressing down on the insertion/extraction handle and pull the board out of the slot ensuring that the board does not make contact with adjacent boards. (If the handle does not move, it is not unlocked. Repeat the unlocking procedure above and try again. Do not use force!)

3.2 Software Installation

Installation of the CP932 driver software is a function of the application operating system. For further information, refer to the appropriate software documentation.

30048.01.UG.VC.050622/191301

Chapter 4

Configuration

30048.01.UG.VC.050622/191301

This page has been intentionally left blank.

30048.01.UG.VC.050622/191301

4. Configuration

The CP932 is designed for plug-and-play operation, and, as such, it does not have any user configurable board settings which are required for operation.

30048.01.UG.VC.050622/191301

This page has been intentionally left blank.

30048.01.UG.VC.050622/191301

Chapter 6

Power Considerations

30048.01.UG.VC.050622/191301

This page has been intentionally left blank.

30048.01.UG.VC.050622/191301

5. Power Considerations

5.1 System Power

The considerations presented in the ensuing sections must be taken into account by system integrators when specifying the CP932 system environment.

5.2 CP932 Voltage Ranges

The CP932 board itself has been designed for optimal power input and distribution. Still it is necessary to observe certain criteria essential for application stability and reliability.

The table below indicates the absolute maximum input voltage ratings that must not be exceeded. Power supplies to be used with the CP932 should be carefully tested to ensure compliance with these ratings.

Table 5-1: Absolute Maximum Ratings

SUPPLY VOLTAGE	ABSOLUTE MAXIMUM RATINGS
+5 V	+5.25 V

Warning!

The maximum permitted voltage indicated in the table above must not be exceeded. Failure to comply with the above may result in damage to your board.

The following table specifies the ranges for the different input power voltages within which the board is functional. The CP932 is not guaranteed to function if the board is not operated within the prescribed limits.

Table 5-2: DC Operational Input Voltage Ranges

INPUT SUPPLY VOLTAGE	ABSOLUTE RANGE	RECOMMENDED RANGE	REMARKS
+5 V	4.85 V min. to 5.25 V max.	5.0 V min. to 5.25 V max.	Main voltage

5.3 Backplane Requirements

Backplanes to be used with the CP932 must be adequately specified. The backplane must provide optimal power distribution for the +3.3 V, +5 V and +12 V power inputs. It is recommended to use only backplanes which have two power planes for the 3.3 V and +5 V voltages.

Input power connections to the backplane itself should be carefully specified to ensure a minimum of power loss and to guarantee operational stability. Long input lines, under dimensioned cabling or bridges, high resistance connections, etc. must be avoided. It is recommended to use POSITRONIC or M-type connector backplanes and power supplies where possible.

30048.01.UG.VC.050622/191301

5.4 Power Supply Units

Power supplies for the CP932 must be specified with enough reserve for the remaining system consumption. In order to guarantee a stable functionality of the system, it is recommended to provide more power than the system requires. An industrial power supply unit should be able to provide at least twice as much power as the entire system requires. An ATX power supply unit should be able to provide at least three times as much power as the entire system requires.

As the design of the CP932 has been optimized for minimal power consumption, the power supply unit shall be stable even without minimum load.

Where possible, power supplies which support voltage sensing should be used. Depending on the system configuration this may require an appropriate backplane. The power supply should be sufficient to allow for die resistance variations.

Note ...

Non-industrial ATX PSUs require a greater minimum load than a single CP932 is capable of creating. When a PSU of this type is used, it will not power up correctly and the CP932 may hangup. The solution is to use an industrial PSU or to add more load to the system.

If DC/DC power supplies are used, please ensure that the external main supply provides sufficient power in order to start-up the system properly. The external main supply should provide at least as much power as the system power supply is able to provide taking into consideration the inrush current.

Warning!

An underdimensioned power supply may cause damage to system components.

The start-up behavior of CompactPCI and PCI (ATX) power supplies is critical for all new CompactPCI boards. These boards require a defined power sequence and start-up behavior of the power supply. The required behavior is described in the ATX (http://www.formfactors.org/FF-Detail.asp?FFID=1&CatID=2) and the CompactPCI (PICMG, http://www.picmgeu.org/) specification.

30048.01.UG.VC.050622/191301

5.4.1 Voltage Ramp

Power supplies must comply with the following guidelines, in order to be used with the CP932.

- Beginning at 10% of the nominal output voltage, the voltage must rise within > 0.1 ms to < 20 ms to the specified regulation range of the voltage. Typically: > 5 ms to < 15 ms.
- There must be a smooth and continuous ramp of each DC output voltage from 10% to 90% of the regulation band.
- The slope of the turn-on waveform shall be a positive, almost linear voltage increase and have a value from 0 V to nominal Vout.

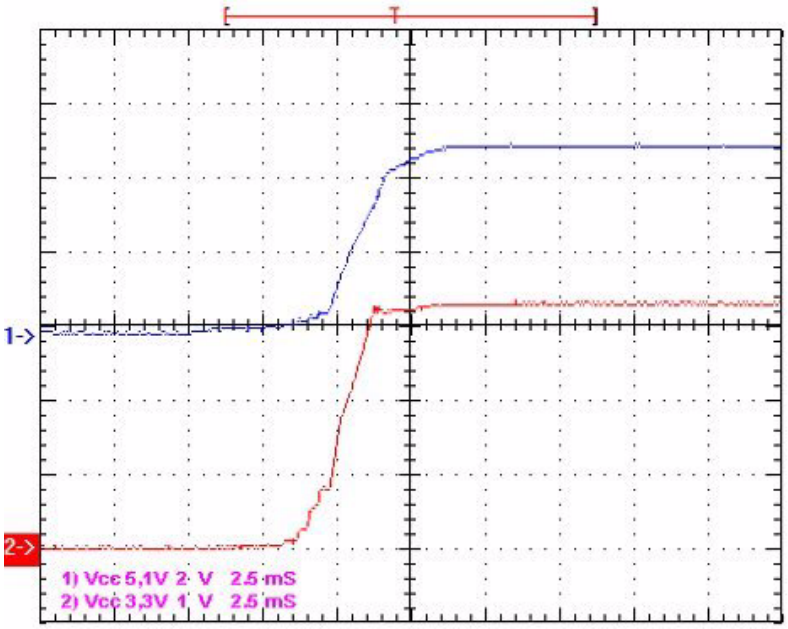
5.4.2 Voltage Sequencing Requirements

The +5 VDC output level must always be equal to or higher than the +3.3 VDC output during power-up and normal operation.

5.4.3 Rise Time Diagram

The following figure illustrates an example of the recommended voltage ramp of a CompactPCI power supply for all Kontron boards delivered up to now.

Figure 6-1: Voltage Ramp of the CP3-SVE180 AC Power Supply



30048.01.UG.VC.050622/191301

5.4.4 Recommended Operating Conditions

The tolerance of the voltage lines is described in the CompactPCI specification (PICMG 2.0 R3.0).The recommended measurement point for the voltage is the CompactPCI connector on the CP932.

The output voltage overshoot generated during the application (load changes) or during the removal of the input voltage must be less than 5% of the nominal value. No voltage of reverse polarity may be present on any output during turn-on or turn-off.

The following table provides information regarding the required characteristics for each board input voltage.

Table 5-3: Input Voltage Characteristics

VOLTAGE	NOMINAL VALUE	TOLERANCE	MAX. RIPPLE (p-p)
5 V	+5.0 VDC	+5%/-3%	50 mV
V I/O (PCI signaling voltage)	+3.3 VDC or +5 VDC	+5%/-3%	50 mV
GND	Ground, not directly connected to protective earth (PE)		

5.4.5 Supply Voltage Regulation

The power supply shall be unconditionally stable under line, load, unload and transient load conditions including capacitive loads. The operation of the power supply must be consistent even without the minimum load on all output lines.

Note ...

Non-industrial ATX PSUs require a greater minimum load than a single CP932 is capable of creating. When a PSU of this type is used, it will not power up correctly and the CP932 may hang up. The solution is to use an industrial PSU or to add more load to the system.

Note ...

If the main power input is switched off, the supply voltages will not go to 0V instantly. It will take a couple of seconds until capacitors are discharged. If the voltage rises again before it has gone below a certain level, the circuits may enter a latch-up state where even a hard RESET will not help any more. The system must be switched off for at least 3 seconds before it may be switched on again. If problems still occur, turn off the main power for 30 seconds before turning it on again.

30048.01.UG.VC.050622/191301

5.5 Power Consumption of the CP932

Table 5-4: Power Consumption of the CP932

CP932 VARIANT	POWER CONSUMPTION (typical)			
	OPERATIONAL CONFIGURATION			
	NO LINK	10 MBit/s	100 MBit/s	1000 MBit/s
five-channel variant	1.6W	1.3W	1.9W	4.6W
six-channel variant	3.7W	3.4W	4.0W	6.7W

Note ...

The values were measured at a nominal voltage of 5V with all available front panel channels operating at the specified speed.

Only the PCI NIC channel is permanently working with 1000 MBit/s.

This page has been intentionally left blank.

30048.01.UG.VC.050622/191301