CP6925

CPCI 16 Channel Gigabit Ethernet Switch

6U Board, PICMG 2.16

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User Guide

kontron

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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 products, please visit our Internet web site: www.kontron.com

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

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.

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Chapter **1**

Introduction

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1.   Introduction

1.1   System Overview

The CompactPCI board described in this manual operates using the CompactPCI PICMG specification 2.16, CompactPCI Paket Switching Backplane. For further information regarding this CompactPCI standard and its 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. 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.

1.2 Board Overview

1.2.1 Board Introduction

The CP6925 Gigabit Ethernet switch is a 6U/4HP, unmanaged layer 2, Ethernet fabric board designed for use with CompactPCI PICMG 2.16 packet switching backplane (PSB) systems. The CP6925 provides 16 channels of Gigabit Ethernet: 14-channels on the backplane and two channels on a dual RJ45 connector at the front panel. It supports 10, 100, and 1000 Mbit/s data transfer rates.

The purpose of the CP6925 is to connect up to 14 Gigabit Ethernet nodes on the backplane using the J3 and J5 connectors. In addition, two Gigabit Ethernet uplink channels are provided on the J6A/B connectors. Front panel LEDs are available for each channel to indicate activity and speed.

The major components involved in this process are: the high-performance, 16-port Gigabit Ethernet switch controller, BMC5396; four quad-channel Gigabit Ethernet transceivers (BMC5464), and associated Magnetics for each channel.

Power is supplied to the CP6925 is via the CompactPCI connector J1.

1.2.2 Board Specific Information

Major board components of the CP6925 board are:

- a Gigabit Ethernet switch: BMC5396
- four quad-channel Gigabit Ethernet transceivers: BMC5464
- Magnetics
- dual RJ45 connector
- a configuration EEPROM

Other board features are:

- 14 link ports (LP01 to LP14) via fabric slot connectors J3 and J5
- layer 2, unmanaged
- three speed operation: 10/100/1000 Mbit/s
- auto-negotiation
- galvanic de-coupling

1.2.3 System Considerations

Within any given CompactPCI PICMG 2.16 system there may be up to two CP6925 boards installed (depends on the availability fabric slots, one or two). Only power is supplied by the CPCI connector J1. No other backplane signals are available on this connector. There is no link port 'f' (fabric-to-fabric) interface available.

1.3   System Relevant Information

The following system relevant information is general in nature but should still be considered when developing applications using the CP6925.

Table 1-1:   System Relevant Information

SUBJECT	INFORMATION
System Configuration	The CP6925 may be used in any CompactPCI PICMG 2.16 PSB system.
Board Location in the System	The CP6925 board may only be installed in a fabric slot.
Hot Swap Compatibility	The CP6925 is not Hot Swap capable.
Operating Systems	The CP6925 requires no drivers or operating system support.

1.4   Board Diagrams

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

LEGEND FOR FIGURES 1-1 to 1-4

BP NODE	Backplane node
CPCI	CompactPCI
Dnn	LEDnn; D1 to D16, paired LEDs
GbE	Gigabit Ethernet
GbE SW	Gigabit Ethernet Switch
Jn	Connector number n; J1, J3, J5, J6A/B
LPnn	Link port nn; LP01 to LP14
MAG	Magnetic
nn	Ethernet channel number nn; 15 and 16
PSB	Packet Switching Backplane
RX	Receive
TSE	Three Speed Ethernet; 10/100/1000 Mbits/s
TX	Transmit
TXRX	Transceiver

1.4.1 Application System Interfacing

Figure 1-1: CP6925 Application System Interfacing Diagram
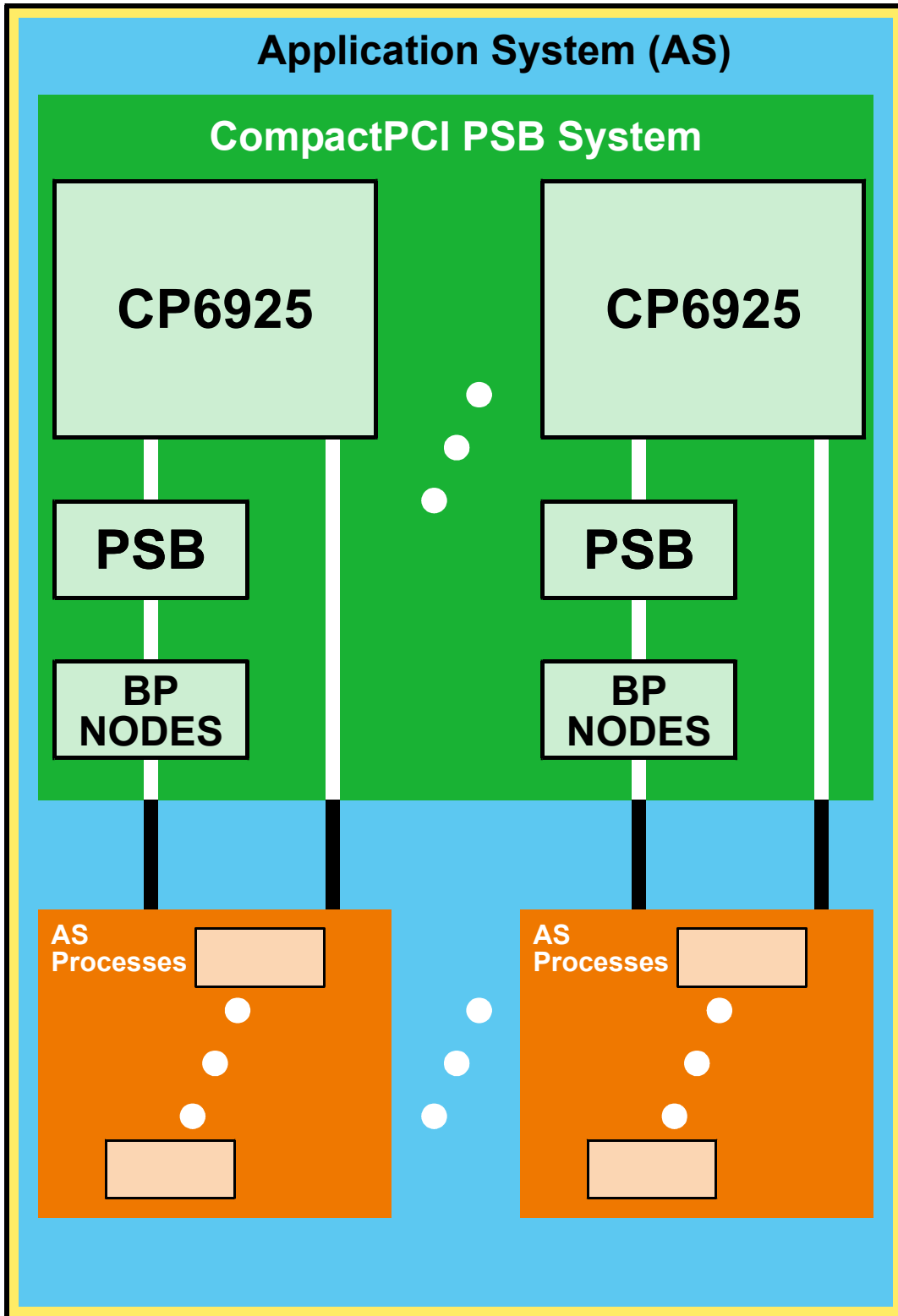
1.4.2   System Level Interfacing

Figure 1-2: CP6925 System Level Interfacing Diagram
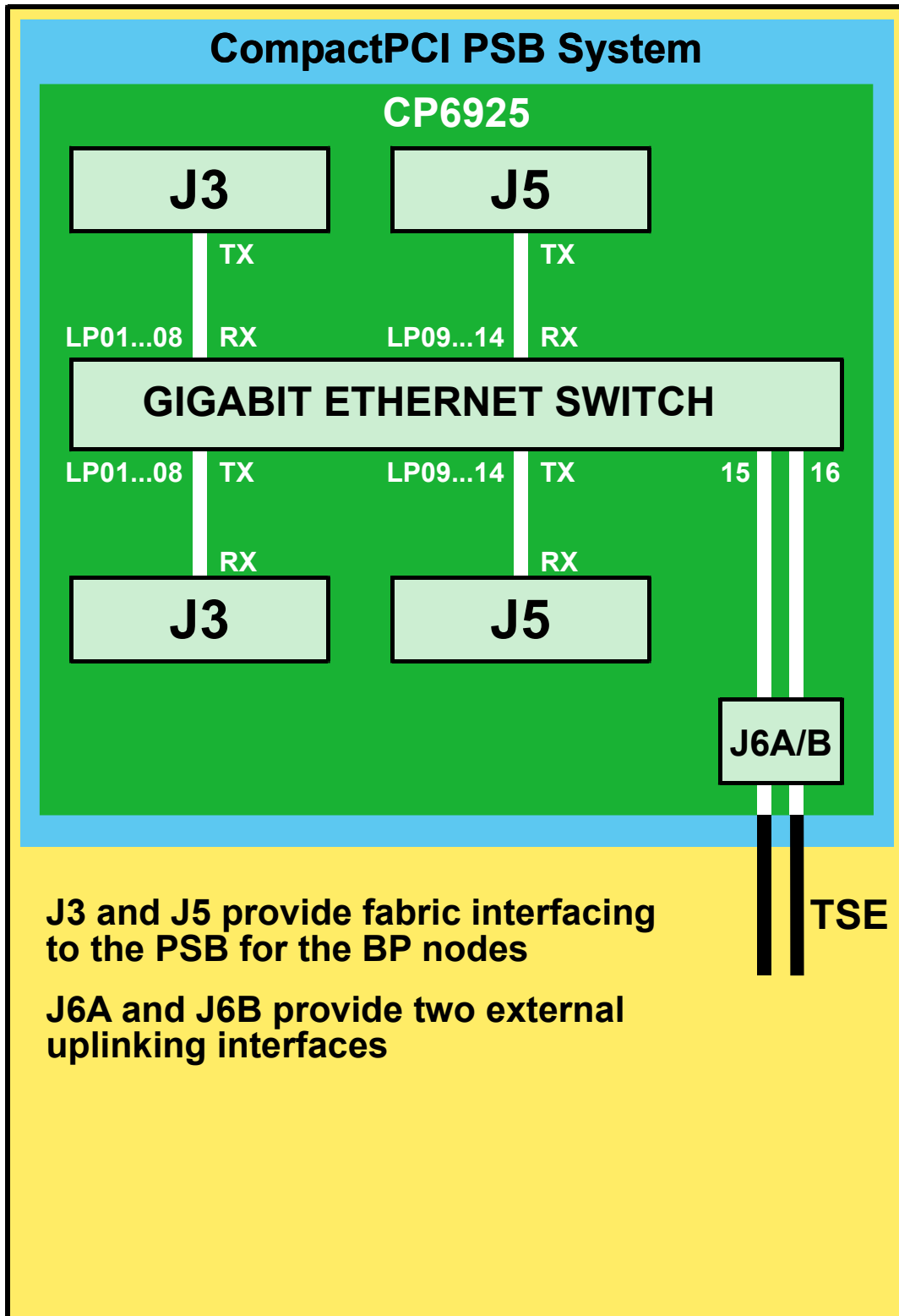
1.4.3   Front Panel

Figure 1-3: CP6925 Front Panel
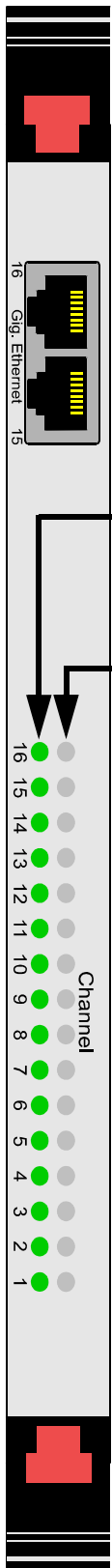
LEGEND FOR THE LEDS:

LED	COLOR	FUNCTION
Activity	green	Blinks when activity takes place on the corresponding link: LP01 to LP14, channels 15 and 16
Speed	LED off	Link speed is 10 Mbits/s
	green	Link speed is 100 Mbit/s
	yellow	Link speed is 1000 Mbit/s

1.4.4 Board Layout

Figure 1-4: CP6925 Board Layout (Top View)
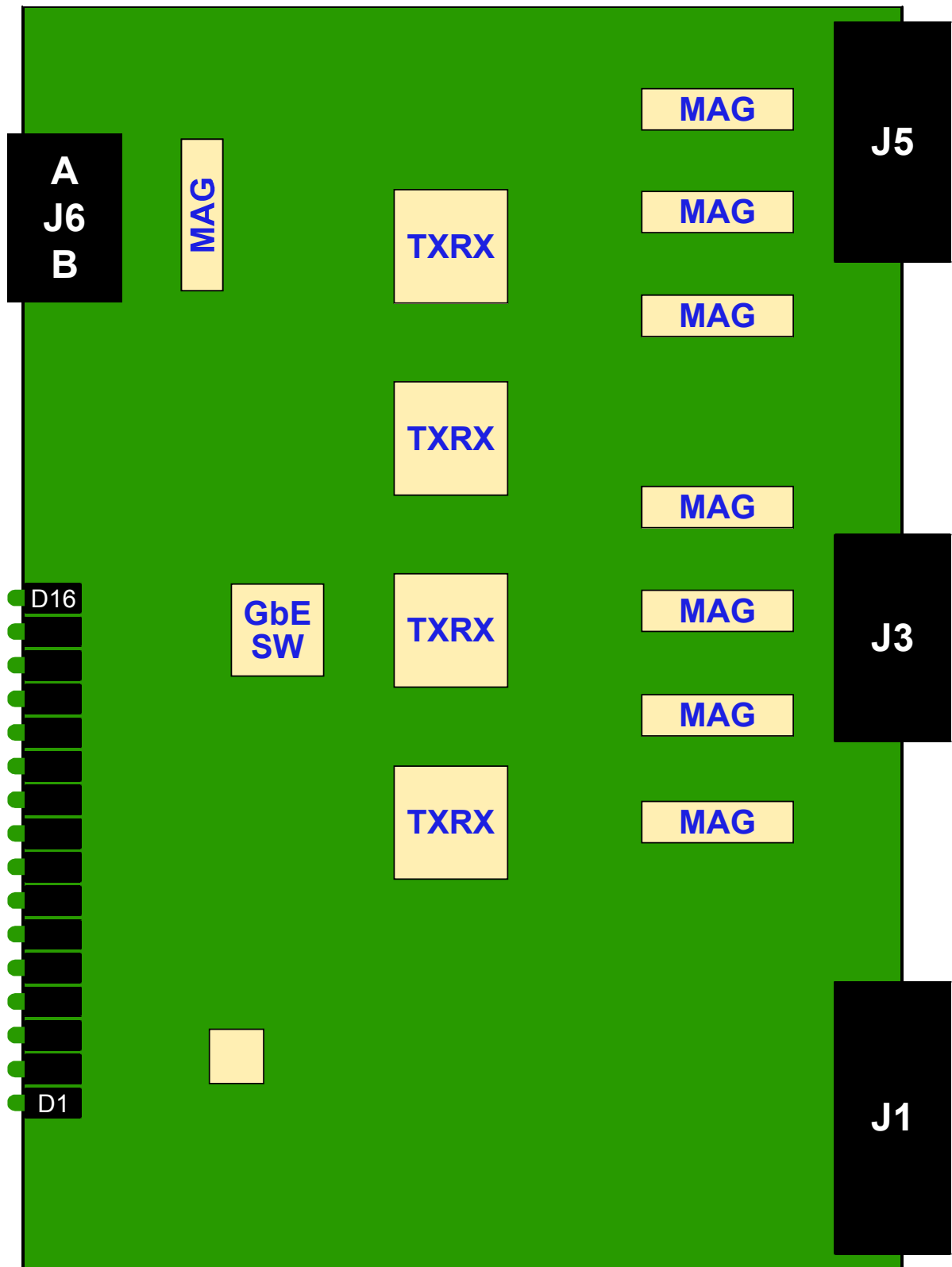
1.5 Technical Specifications

Table 1-2: Main Specifications

TYPE	SPECIFICATIONS
Controller	Broadcom® BCM5396, 16-port Gigabit Ethernet Switch with integrated SerDes/ SGMII interfacing, operates in unmanaged mode, layer 2
Ethernet	14 channels of fabric three speed Ethernet: 10/100/1000 Mbit/s 2 channels of Gigabit Ethernet, routed to the front panel
Ethernet Interfaces	Two CPCI backplane connectors: J3 and J5, fabric PICMG 2.16 One dual RJ45 front panel connector for uplink interfacing
LEDs	16, paired status LEDs, two per channel, integrated in the front panel, green activity LED, yellow and green speed LED
Speed Configuration	Auto-negotiation for speed and switching
Plug & Play Design	No jumpers to be configured
Power Supply Voltage	5 volt via backplane connector, J1
Power Consumption	Source: 5 V: consumption: 21 watts (max.)
Temperature Range	Operational: 0ºC to +55ºC Standard -40ºC to +85ºC E2 (on request) Storage: -20ºC to +60ºC Standard -40ºC to +85ºC E2 (on request)
Climatic Humidity	93% relative humidity at 40°C, non-condensing
Dimensions	160 mm L x 233 mm W (dual height Eurocard)
Board Weight	ca. 276 g

1.6 Applied Standards

The Kontron Modular Computers' CompactPCI module CP6925 complies with the requirements of the following standards:

Table 1-3: Applied Standards

	TYPE	STANDARD
CE	Emission	EN55022, EN61000-6-3
	Immunity, Industrial Environment	EN61000-6-2
	Immunity, IT Equipment	EN55024
	Electrical Safety	EN60950-1 Note: The CP6925 is specified I/O only for: SELV and EVL. It is **NOT SPECIFIED** for "Hazardous"
MECHANICAL	Mechanical Dimensions	IEEE1101.10
ENVIRONMENTAL	Vibration, Sinusoidal	IEC 60068-2-6
	Random Vibration, Broadband	IEC 60068-2-64
	Bump	IEC 60068-2-29
	Single Shock	IEC 60068-2-27
	Temperature Tests A: Cold	IEC 60068-2-1
	Temperature Tests B: Dry Heat	IEC 60068-2-2
	Climatic Humidity	IEC 60068-2-78

1.7 Related Publications

Table 1-4: Related Publications

	ISSUED BY	DOCUMENT
CompactPCI	PICMG	CompactPCI Specification 2.0, Rev. 3.0
	PICMG	CompactPCI Specification 2.16, Rev. 1.0
	Kontron	Kontron's CompactPCI System Manual, ID 19954

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Chapter **2**

Functional Description

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2. Functional Description

The following chapters present more detailed, board level information about the CP6925 whereby the board components and their basic functionality are discussed in general.

2.1 General Information

The CP6925 is designed as a 16 channel Gigabit Ethernet Switch board with interfacing for front panel connectors as well as supporting fabric interfacing on the J3 and J5 backplane connectors. In addition, there are two operational status LEDs provided each channel on the board front panel.

2.2 Board-Level Interfacing Diagram

The following figure demonstrates the interfacing structure between the internal processing modules of the CP6925 and other major CP6925 module components. Where CP6925 system elements have common interfacing they are grouped into a block. Interfacing common to only one element of a block is indicated with a direct connecting line. The interfacing lines are shown in white where they are on board and in black for board external interfacing.

LEGEND FOR FIGURE 2-1:

GbE	Gigabit Ethernet (1000 Mbit/s)
Jn[a]	Board Connector
LPnn	Link port nn: LP01 to LP14
MAG	Magnetics
RX	Receive
TX	Transmit
TXRX	Transceiver

Figure 2-1: CP6925 Board Level Interfacing
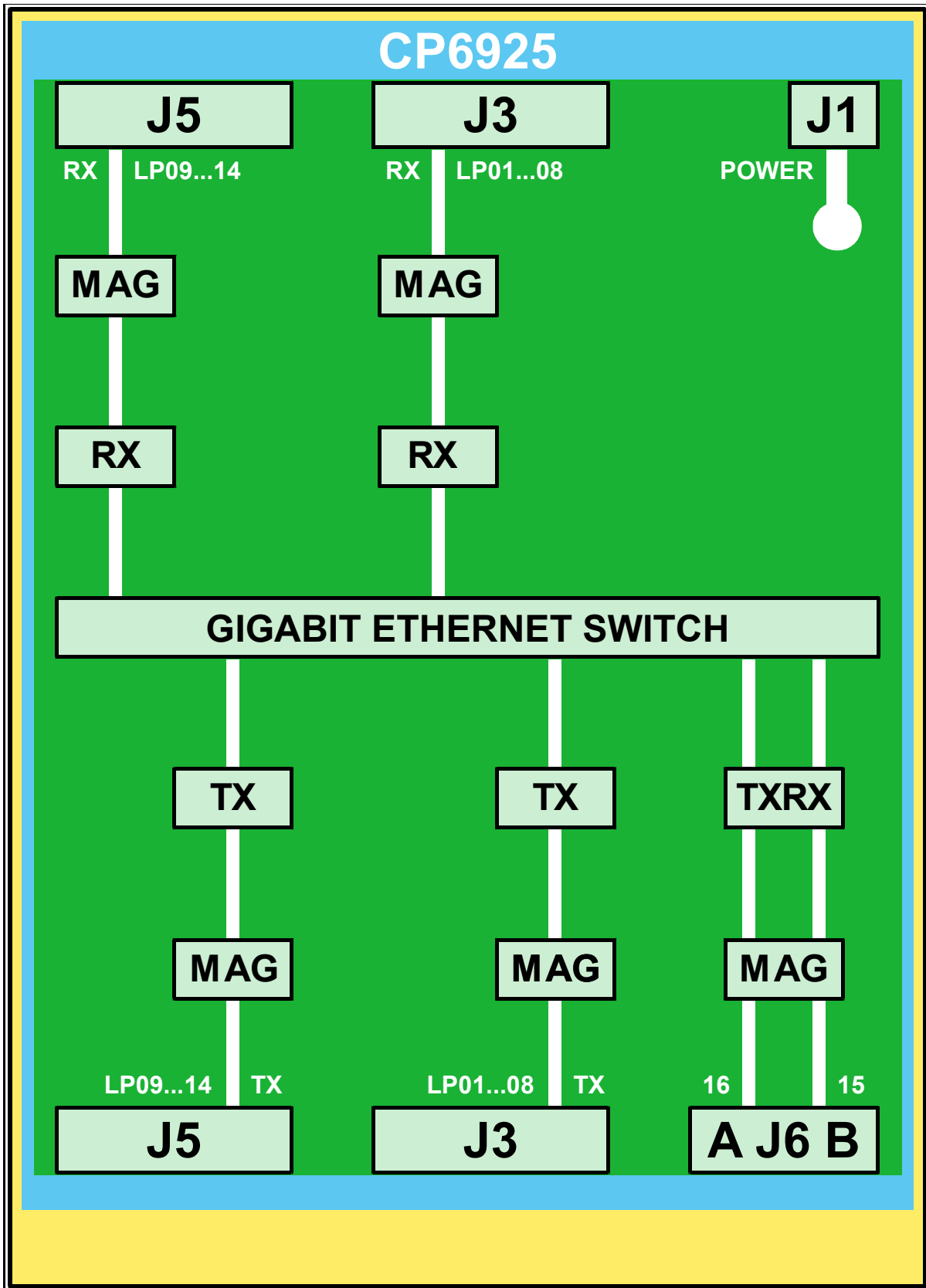
2.3 Interfaces

2.3.1 CompactPCI Bus Interface

The complete CompactPCI connector configuration comprises three connectors designated as J1, J3, and J5.

Their function is as follows:

- J1: Power only: 5V and 3.3V
- J3: Fabric link ports: LP01 to LP08
- J5: Fabric link ports: LP09 to LP14

2.3.1.1 CompactPCI Connector Keying

CompactPCI connectors support guide lugs to ensure a correct polarized mating. A proper mating is further assured by the use of color coded keys for 3.3 V and 5 V operation. In the case of the CP6925 there is no keying required as only power (3.3V or 5V) is provided to the CP6925 via J1.

Figure 2-2: CPCI Connectors J1/J3/J5

Note: Pinrows F and Z are GND pins.
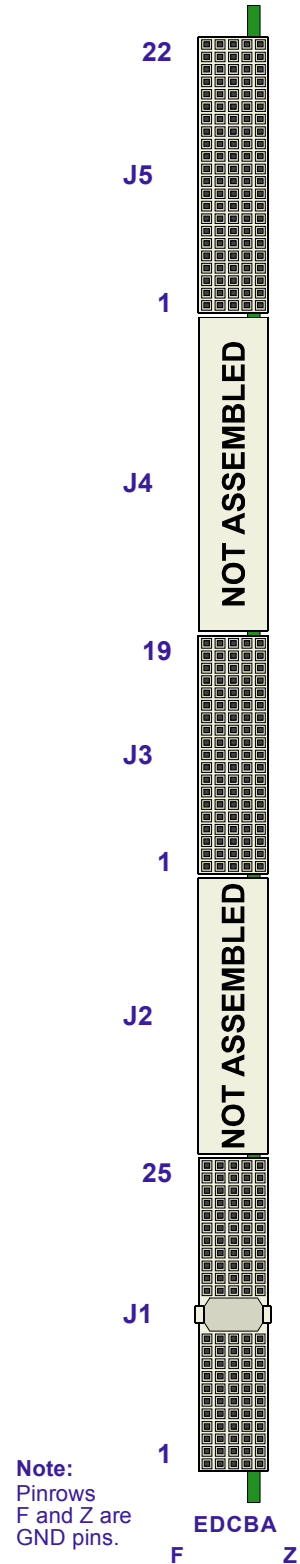
2.3.1.2 CompactPCI Connector J1

Table 2-1: CompactPCI Bus Connector J1 Pinout

PIN	ROW Z	ROW A	ROW B	ROW C	ROW D	ROW E	ROW F
25	NC	5V	NC	NC	3.3V	5V	GND
24	NC	NC	5V	V(I/O)	NC	NC	GND
23	NC	3.3V	NC	NC	5V	NC	GND
22	NC	NC	GND	3.3V	NC	NC	GND
21	NC	3.3V	NC	NC	NC	NC	GND
20	NC	NC	GND	V(I/O)	NC	NC	GND
19	NC	3.3V	NC	NC	GND	NC	GND
18	NC	NC	GND	3.3V	NC	NC	GND
17	NC	3.3V	NC	NC	GND	NC	GND
16	NC	NC	GND	V(I/O)	NC	NC	GND
15	NC	3.3V	NC	NC	GND	NC	GND
12-14	Key Area						
11	NC	NC	NC	NC	GND	NC	GND
10	NC	NC	GND	3.3V	NC	NC	GND
9	NC	NC	NC	NC	GND	NC	GND
8	NC	NC	GND	V(I/O)	NC	NC	GND
7	NC	NC	NC	NC	GND	NC	GND
6	NC	NC	GND	3.3V	NC	NC	GND
5	NC	NC	NC	NC	GND	NC	GND
4	NC	NC	GND	V(I/O)	NC	NC	GND
3	NC	NC	NC	NC	5V	NC	GND
2	NC	NC	5V	NC	NC	NC	GND
1	NC	5V	NC	NC	NC	5V	GND

2.3.1.3 CompactPCI Connector J3

Table 2-2: CompactPCI Bus Connector J3 Pinout

PIN	ROW Z	ROW A	ROW B	ROW C	ROW D	ROW E	ROW F
19	NC	NC	NC	GND	NC	NC	GND
18	NC	NC	NC	GND	NC	NC	GND
17	NC	NC	NC	GND	NC	NC	GND
16	NC	LP8_DA+	LP8_DA-	GND	LP8_DC+	LP8_DC-	GND
15	NC	LP8_DB+	LP8_DB-	GND	LP8_DD+	LP8_DD-	GND
14	NC	LP7_DA+	LP7_DA-	GND	LP7_DC+	LP7_DC-	GND
13	NC	LP7_DB+	LP7_DB-	GND	LP7_DD+	LP7_DD-	GND
12	NC	LP6_DA+	LP6_DA-	GND	LP6_DC+	LP6_DC-	GND
11	NC	LP6_DB+	LP6_DB-	GND	LP6_DD+	LP6_DD-	GND
10	NC	LP5_DA+	LP5_DA-	GND	LP5_DC+	LP5_DC-	GND
9	NC	LP5_DB+	LP5_DB-	GND	LP5_DD+	LP5_DD-	GND
8	NC	LP4_DA+	LP4_DA-	GND	LP4_DC+	LP4_DC-	GND
7	NC	LP4_DB+	LP4_DB-	GND	LP4_DD+	LP4_DD-	GND
6	NC	LP3_DA+	LP3_DA-	GND	LP3_DC+	LP3_DC-	GND
5	NC	LP3_DB+	LP3_DB-	GND	LP3_DD+	LP3_DD-	GND
4	NC	LP2_DA+	LP2_DA-	GND	LP2_DC+	LP2_DC-	GND
3	NC	LP2_DB+	LP2_DB-	GND	LP2_DD+	LP2_DD-	GND
2	NC	LP1_DA+	LP1_DA-	GND	LP1_DC+	LP1_DC-	GND
1	NC	LP1_DB+	LP1_DB-	GND	LP1_DD+	LP1_DD-	GND

2.3.1.4 CompactPCI Connector J5

Table 2-3: **CompactPCI Bus Connector J5 Pinout**

PIN	ROW Z	ROW A	ROW B	ROW C	ROW D	ROW E	ROW F
22	NC	NC	NC	GND	NC	NC	GND
21	NC	NC	NC	GND	NC	NC	GND
20	NC	NC	NC	GND	NC	NC	GND
19	NC	NC	NC	GND	NC	NC	GND
18	NC	NC	NC	GND	NC	NC	GND
17	NC	NC	NC	GND	NC	NC	GND
16	NC	NC	NC	GND	NC	NC	GND
15	NC	NC	NC	GND	NC	NC	GND
14	NC	NC	NC	GND	NC	NC	GND
13	NC	NC	NC	GND	NC	NC	GND
12	NC	LP14_DA+	LP14_DA-	GND	LP14_DC+	LP14_DC-	GND
11	NC	LP14_DB+	LP14_DB-	GND	LP14_DD+	LP14_DD-	GND
10	NC	LP13_DA+	LP13_DA-	GND	LP13_DC+	LP13_DC-	GND
9	NC	LP13_DB+	LP13_DB-	GND	LP13_DD+	LP13_DD-	GND
8	NC	LP12_DA+	LP12_DA-	GND	LP12_DC+	LP12_DC-	GND
7	NC	LP12_DB+	LP12_DB-	GND	LP12_DD+	LP12_DD-	GND
6	NC	LP11_DA+	LP11_DA-	GND	LP11_DC+	LP11_DC-	GND
5	NC	LP11_DB+	LP11_DB-	GND	LP11_DD+	LP11_DD-	GND
4	NC	LP10_DA+	LP10_DA-	GND	LP10_DC+	LP10_DC-	GND
3	NC	LP10_DB+	LP10_DB-	GND	LP10_DD+	LP10_DD-	GND
2	NC	LP9_DA+	LP9_DA-	GND	LP9_DC+	LP9_DC-	GND
1	NC	LP9_DB+	LP9_DB-	GND	LP9_DD+	LP9_DD-	GND

2.3.2   Gigabit Ethernet

The CP6925 board includes two 10Base-T/100Base-TX/1000Base-T Ethernet ports.

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-Negotiation). Auto-wire switching for crossed cables is also supported (Auto-MDI/X).

Figure 2-3: Dual Gigabit Ethernet Connector J6A/B

RJ45 Connector J6A/B Pinouts

The J6A/B connector supplies the 10Base-T, 100Base-TX and 1000Base-T interfaces.
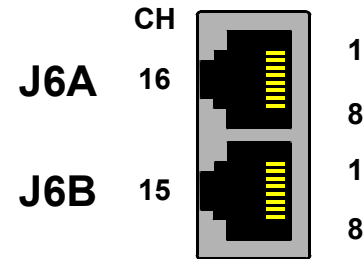
Table 2-4:   Pinouts of J6A/B Based on the Implementation

MDI / STANDARD ETHERNET CABLE						PIN	MDIX / CROSSED ETHERNET CABLE					
10BASE-T		100BASE-TX		1000BASE-T		PIN	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-

2.3.3   Ethernet Operational Status LEDs

The operational status LEDs for all Ethernet ports are on the front panel. There are two status LEDs available for each channel: an activity LED, and a speed LED. Their functions are defined as follows:

Activity (green): This LED monitors network connection and activity. The LED lights up when a valid link (cable connection) has been established. The LED goes temporarily off if network packets are being sent or received through the RJ45 port. When this LED remains off, a valid link has not been established.

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 Activity LED is active, the connection is operating at 10Base-T.

2.4 Power Supply

The CP6925 is designed to be able to generate its own 3.3V power from the 5V input power from the backplane. If required, 3.3V power, however, can be obtained from the backplane. This can be especially advantageous in systems where it is necessary to balance the power supply loading. Please contact Kontron to clarify the system requirements before ordering the CP6925.

Chapter 3

Installation

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3.   Installation

The CP6925 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, other system components, or injury to personnel.

3.1   Safety Requirements

The following safety precautions must be observed when installing or operating the CP6925. *Kontron* assumes no responsibility for any damage resulting from failure to comply with these requirements.

Caution!

This board is not hot swap capable, therefore it is mandatory to switch off the CompactPCI system power before installing the board. Failure to do so could endanger your life or health and may damage your board or system.

Note ...

Certain CompactPCI boards require bus master and/or Rear I/O capability. If you are in doubt whether such features are required for the board you intend to install, please check your specific board and/or system documentation to make sure that your system is provided with an appropriate free slot in which to insert the board.

ESD Equipment!

This CompactPCI board contains electrostatic sensitive devices. Please observe the necessary precautions to avoid damage to your board:

- Discharge your clothing before touching the assembly. Tools must be discharged before use.
- Do not touch components, connector-pins or traces.
- If working at an anti-static workbench with professional discharging equipment, please do not omit to use it.

3.2 CP6925 Installation Procedures

The following procedures are applicable the installation of the CP6925 in a system. Procedures for standard removal are found in its respective chapter.

To perform an installation of the CP6925 in a system proceed as follows:

1. Ensure that the safety requirements indicated in Chapter 3.1 are observed.

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

2. Ensure that the board is properly configured for operation in accordance with application requirements before installing.

> *Warning!*
>
> Care must be taken when applying the procedures below to ensure that neither the CP6925 nor other system boards are physically damaged by the application of these procedures.

3. To install the CP6925 perform the following:

   1. Ensure that no power is applied to the system before proceeding.

> *Warning!*
>
> When performing the next step, **DO NOT** push the board into the backplane connectors. Use the ejector handles to seat the board into the backplane connectors.

   2. Carefully insert the board into the slot designated by the application requirements for the board until it makes contact with the backplane connectors.
   3. Using the ejector handles, engage the board with the backplane. When the ejector handles are locked, the board is engaged.
   4. Fasten the front panel retaining screws.
   5. Connect all external interfacing cables to the board as required.
   6. Ensure that the board and all required interfacing cables are properly secured.

The CP6925 is now ready for operation. For operation of the CP6925, refer to appropriate CP6925 specific software, application, and system documentation.

3.3   Standard Removal Procedures

To remove the board proceed as follows:

1. Ensure that the safety requirements indicated in Chapter 3.1 are observed.

> ### Warning!
>
> Care must be taken when applying the procedures below to ensure that neither the CP6925 nor system boards are physically damaged by the application of these procedures.

2. Ensure that no power is applied to the system before proceeding.
3. Disconnect any interfacing cables that may be connected to the board.
4. Unscrew the front panel retaining screws.
5. Disengage the board from the backplane by first unlocking the board ejection handles and then by pressing the handles as required until the board is disengaged.
6. After disengaging the board from the backplane, pull the board out of the slot.
7. Dispose of the board as required.

3.4   Software Installation

There is no software installation required for this board.

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