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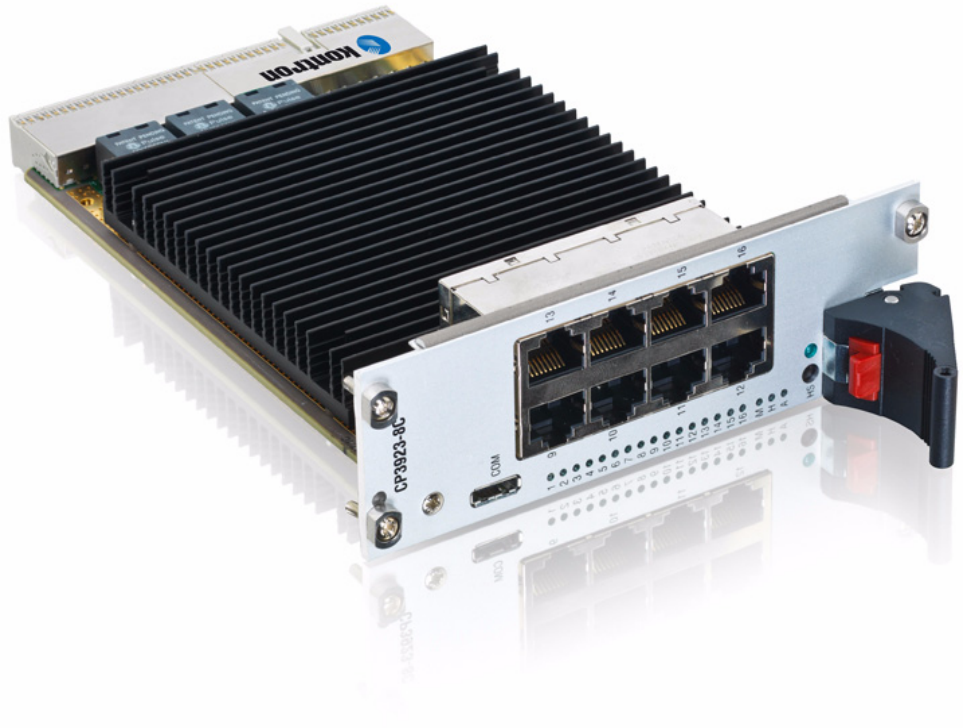
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User Guide



CP3923

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

Advisory Conventions

CAUTION

This symbol and title indicate potential damage and tells you how to avoid the problem.

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.

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.

ESD Sensitive Device



This symbol and title inform that electronic systems 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”.



Note...

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



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 „Regulatory compliance Statements“ in this manual.

Safety Instructions

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.

Temperature and High Voltage Safety Instructions

WARNING





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

Be careful, this device will heat up during operation, and if touched may cause burns. The temperature of the product housing may reach up to approximately 50°C. Allow for sufficient cool down before handling after power is turned off.

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 systems 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 back-up, ensure that the system 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 system.

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 AG 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 system 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 system, 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.

Two Year Warranty

Kontron 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.

Kontron 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 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).

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1 Introduction

1.1 Product Overview

The CP3923 is a Standard Fabric 3U CompactPCI Gigabit Ethernet Switch with 16 channels providing Layer 2 and Layer 3 switching/routing functions in a PICMG 2.0 compliant form factor.

The board is available in four different versions based on the same technology:

- CP3923-8C-E2 (short: CP3923-8C) 3U CompactPCI Switch with 8 RJ45 10/100/1000Base-T Ethernet Uplinks
- CP3923-4M-EX-C (short: CP3923-4AM) 3U CompactPCI Switch with 4 M12 10/100Base-T Ethernet Uplinks
- CP3923-8M-EX-C (short: CP3923-8C) 3U CompactPCI Switch with 8 M12 10/100Base-T Ethernet Uplinks
- CP3923-RC-E2-C (short: CP3923-RC) 3U CompactPCI Switch with heat sink frame for conduction cooled solutions

1.1.1 CP3923 Features

The board is composed of the following building blocks:

- Ethernet Infrastructure
- Unit Computer and Memory
- IPMI
- Power Supply

1.1.1.1 Ethernet Infrastructure

- Broadcom StrataXGS®III Ethernet Switch Architecture
- BCM56226: 16 SGMII + 4 HiGig Port Gigabit Ethernet Layer-2/3 Switch
- PCIe 1.1. 2.5Gbps Gen1 single lane Management IF
- Line rate switching for all packet sizes and conditions
- Supports 8x 10/100/1000Base-T Rear Ports
- Supports Ethernet Front Ports:
  - CP3923-8C: 8 RJ45 10/100/1000Base-T Ports
  - CP3923-4M: 4 M12 10/100Base-T Ports
  - CP3923-8M: 8 M12 10/100Base-T Ports
- Pulse Quad Transformers

1.1.1.2 Unit Computer and System Memory

- Socketless PowerPC IBM PPC405Ex 600 MHz
- Used for switch provisioning and diagnostics
- 512 MBytes DDR2 RAM 200 MHz
- 64 MBytes NOR Flash
- 1 GByte NAND Flash
- PCIe Management interface to BCM5622x
- 10/100/1000Base-T Management Port to backplane via external Copper PHY BCM54610
- 1000Base-BX CPU-Switch Interlink via external PHY, BCM54616S
- RTC Clock support

1.1.1.3 IPMI

- NXP LPC2368 32-Bit Microcontroller
- PICMG 2.9 / IPMI 1.5 compliant
- 64 kByte EEPROM (FRU)
- Board Voltage, current monitoring via internal ADC
- Board Temperature monitoring via I²C enabled sensors

1.1.1.4 Power Supply

- 5V and 3.3V only board, no 12V or -12V required
- IPMB_PWR or 5V used for 3.3V PM (generated by LDO)
- Hot Swap support
- 5V and 3V3 V stabilization
- Point of Load Converters for chip core voltages

1.1.1.5 Miscellaneous

- Management connection to Unit Computer via RS232 front RJ45
- Management connection to Unit Computer using rear 10/100/1000Base-T management port
- Management connection to Unit Computer via RS232 at J2 backplane connector

1.1.2 General compliances

The Board is compatible to the following standards:

- PICMG® 2.0 R3.0 CompactPCI® Specification
- PICMG® 2.1 R2.0 CompactPCI® Hot Swap Specification
- PICMG® 2.9 R1.0 CompactPCI® System Management Specification
- PICMG® 2.10 R1.0 Keying of CompactPCI® System Management Specification
- Intelligent Platform Management Interface Specification V1.5
- IEEE 802.3, 2000
- ANSI/VITA 47-2005
- ANSI/VITA 30.1-2008: 2mm Equipment Practice for Conduction Cooled Eurocard Systems (RC version only)
- EN50155
- IEC 61067-2-101 Industrial Ethernet (M4, M8 versions only)

1.1.3 Hot Swap Capability

The board supports Full Hot Swap capability as required by PICMG 2.1 R2.0. It can be removed or inserted in a powered slot. Please refer to the PICMG 2.1 R2.0 specification for additional details.

1.2 Optional Accessories

1.2.1 Rear IO Module

The Rear IO module CP-RIO3-923-8C provides additional GbE switch ports and out-of-band management access. With an appropriate backplane, eight switch ports of the CP3923 that connect to the backplane can be accessed using the module.

For more information on the Rear IO module, see chapter 3.6

1.2.2 Serial Adapter Cable

For more information on the serial adapter cable, see chapter 3.5.1

1.3 Technical Specification

1.3.1 Mechanics

Compliant to PICMG® 2.0 3U/8HP respective 12HP (Option 1d/2d/3d)(100.00 mm by 160 mm / height 40.64 mm typ. respective 60.96 mm typ.)

The non-conduction-cooled versions use a one piece custom heat sink extending from the bottom to the top of the board covering all major chips and ensuring stiffness of the complete PCB assembly. These boards have standard CompactPCI front panels and handles.

The CP3923-RC cooling concept consists of a cooling frame with wedge locks which covers the complete top side of the PCB. The RC version has no front panel.

Table 1-1: CP3923 Weight

Version	Weight
CP3923-8C	590g
CP3923-4M	625g
CP3923-8M	700g
CP3923-RC	400g

1.3.2 CPCI Keying

The J1 backplane connector cavity does not contain any coding. The user or system integrator has to ensure that the backplane J2 pinning matches the one of the CP3923 (see chapter “J2 Connector” on page 33) to provide Ethernet connectivity and avoid possible damage to the board or system.

WARNING

Only use a CPCI peripheral slot with 32Bit and rear IO support.

Operation in a 64-bit CompactPCI slot or in a system master slot causes short circuit between 3.3V or 5V VIO supply rail and ground and can damage the board.

1.3.3 Power

Supply voltages are:

- 5.0 Volt
- 3.3 Volt
- 5.0 Volt IPMB_PWR

Power consumption of the CP3923:

- Management only (handle open): <1W
- Idle (no links): 11W
- Maximum (full traffic/load): <20W

1.3.4 Temperature

- Operation from -40° C to +70° C (+85°C for 10 min) according EN50155, convection cooled
- RC version: up to 85°C under continuous operation according to VITA 47 (measured at frame-to-housing contact surface)
- Storage temperature range -50° C to +105° C. For the CP3923-RC, the storage temperature is not compliant to VITA C4, only to VITA C2.

Required average inlet airflow should be around 400LFM (2 m/s) for the maximum cooling of the non-conduction-cooled versions. Other thermal limitations may apply and are the responsibility of the system integrator. For more information on temperature, see chapter "Thermal Considerations" on page 67.

1.3.5 Humidity

The board is designed to meet Bellcore GR63, Section 4.1, resp. VITA 47 (RC version).

- Operating: 93% (non-condensing) at 40°C
- Non-Operating: 5%-95% (non-condensing) at 40°C

1.3.6 Altitude

The board is designed to meet the following requirements:

- Operating: 15000 ft, additional cooling might be required above 6000ft
- Non-Operating: 60000 ft

1.3.7 Vibration

The board is designed to meet the following requirements:

- Standard
    - DIN/IEC 60068-2-6
    - DIN/IEC 60068-2-64
    - VITA 47 (RC version)
- 10Hz to 300Hz, Acceleration: 5 g, Test Cycle: 1 oct./min., Cycle Count: 10/axis, 3 axis
- 20Hz to 500Hz / 500Hz to 2000Hz, Acceleration: 3,5 g RMS, Duration: 30 min/axis

1.3.8 Bump

The board is designed to meet the following requirements:

- Standard
    - DIN/IEC 60068-2-29
    - VITA 47 (RC version)
- Peak Acceleration: 15 g, Shock Duration: 11 ms half sine, Shock Counts: 500/direction, Recovery Time: 1 s

1.3.9 Shock

The board is designed to meet the following requirements:

- Standard
    - DIN/IEC 60068-2-27
    - VITA 47 (RC version)
- Peak Acceleration: 30 g, Shock Duration: 9 ms half sine, Recovery Time: 5 s, Shock Count: 3/direction, 6 directions

1.3.10 Safety

The board is designed to meet or meets the following requirements:

- UL 60950-1, 3rd edition (US and Canada)
- EN 60950-1 (Europe)
- CSA22.2 No. 950
- EN 50155 (Europe)

The board is designed to meet the following flammability requirement (as specified in Telcordia GR-63-CORE):

- UL 94V-0/1 with Oxygen index of 28% or greater material

1.3.11 Electromagnetic Compatibility

The board is designed to meet or exceed class B limit of the following specifications/requirements (assuming an adequate system/chassis):

- EN55022 (Europe)
- EN61000-6-3 (Europe)
- EN61000-6-2 (Europe)

1.3.12 Reliability

MTBF is >230,000h @ 40° C, calculations based on Bellcore/Telcordia SR-332 Issue 1.

1.3.13 RoHS

Compliant to Directive 2002/95/EC: Restriction of the use of certain hazardous substances in electrical and electronic equipment.

1.3.14 Lead-free

The product has to be completely lead-free concerning the production process and the components used.

1.4 Software Support

The following table contains information related to software supported by the CP3923.

Table 1-2: CP3923 Software Specification

CP3923	SPECIFICATIONS
General	• Reliable field upgrades for all software components • Dual boot images with roll-back capability • Management via SNMP and Command Line Interface • System access via TELNET, SSH and serial line • Hot-Swap support (IPMI)
Ethernet/Bridging	• Link aggregation (IEEE 802.3ad) • Classic and rapid spanning tree algorithms(IEEE 802.1D, IEEE 802.1w) • Multiple Spanning Tree (IEEE 802.S) • Quality Of Service on all ports (IEEE 802.1p) • Full Duplex operation and flow control on all ports (IEEE 802.3x) • Static MAC filtering • Port Authentication (IEEE 802.1X) • Auto negotiation of speeds and operational mode on all external copper GE interfaces as well as on all base fabric interfaces • Layer 2 multicast services using GARP/GMRP (IEEE 802.1p) • VLAN support including VLAN tagging (IEEE 802.3ac), dynamic VLAN registration with GARP/GVRP (IEEE 802.1Q) and Protocol based VLANs (IEEE 802.1v) • Double VLAN tagging • Port Mirroring
IP Routing	• Redundancy of routing functionality using a second switch hub board • IPv4 Forwarding on all base channels and connected uplink ports • Quality of service according to the DiffServ standards • ARP for all routable interfaces • ICMP for all routable interfaces • OSPF routing protocol version 2 • RIP routing protocol version 2 • VRRP (virtual router redundancy protocol) for transparent fail over of default routers • IGMP snooping
QoS	• CoS (Class of Service) • DifffServ (Differentiated Services) • ACL (Access Control List)
IP Multicast	• DVMRP • PIM-DM • PIM-SM • IGMP (Internet Group Message Protocol) v2 and v3 • IGMP Proxy

Table 1-2: CP3923 Software Specification (Continued)

CP3923	SPECIFICATIONS
Applications	• SNTP client for retrieving accurate time and date information • DHCP server • Onboard event management • Test and trace facilities • POST (power on self tests) diagnostics • Standards based SNMP implementation supporting SNMP v1, v2 and v3 for monitoring and management purposes • Persistent storage of configuration across restarts • Support for retrieving and installing multiple configurations • Support for startup configurations based on the cPCI system/ slot address
Supported MIBS	• For a list of supported MIBs, see chapter “Supported MIBs” on page 43
Bootloader	• u-boot Version 1.3.4 • POST • Multi image support • Reliable field upgradable • H/W protected • KCS interface to PM • Serial console support
Operating System	• Wind River PNE 2.0

2 Installation

The CP3923 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.

2.1 Safety Requirements

The following safety precautions must be observed when installing or operating the CP3923. Kontron assumes no responsibility for any damage resulting from failure to comply with these requirements.

WARNING



Due care should be exercised when handling the board due to the fact that the heat sink can get very hot. Do not touch the heat sink when installing or removing the board.

In addition, the board should not be placed on any surface or in any form of storage container until such time as the board and heat sink have cooled down to room temperature.



ESD Equipment



This CompactPCI board contains electrostatically 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.
- When unpacking a static-sensitive component from its shipping carton, do not remove the component's antistatic packing material until you are ready to install the component in a computer. Just before unwrapping the antistatic packaging, be sure you are at an ESD workstation or grounded. This will discharge any static electricity that may have built up in your body.
- When transporting a sensitive component, first place it in an antistatic container or packaging.
- Handle all sensitive components at an ESD workstation. If possible, use antistatic floor pads and workbench pads.
- Handle components and boards with care. Don't touch the components or contacts on a board. Hold a board by its edges or by its metal mounting bracket.
- Do not handle or store system boards near strong electrostatic, electromagnetic, magnetic, or radioactive fields.

2.2 CP3923 Initial Installation Procedures

The following procedures are applicable only for the initial installation of the CP3923 in a system. Procedures for standard removal and hot swap operations are found in their respective chapters.

To perform an initial installation of the CP3923 in a system proceed as follows:

1. Ensure that the safety requirements indicated in chapter Safety Requirements 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. For information regarding the configuration of the CP3923 refer to the CLI Reference Manual.

WARNING

Care must be taken when applying the procedures below to ensure that neither the CP3923 nor other system boards are physically damaged by the application of these procedures.

3. To install the CP3923 perform the following:
   - Ensure that no power is applied to the system before proceeding.
   - Carefully insert the board into the slot designated by the application requirements for the board until it makes contact with the backplane connectors.

WARNING

DO NOT push the board into the backplane connectors. Use the ejector handle to seat the board into the backplane connectors.

   - Using the ejector handle, engage the board with the backplane. When the ejector handle is locked, the board is engaged.
   - Fasten the front panel retaining screws.
   - Only non-conduction-cooled versions: Connect all external interfacing cables to the board as required.
   - Ensure that the board and all required interfacing cables are properly secured.

4. The CP3923 is now ready for operation.

2.3 Standard Removal Procedures

To remove the board proceed as follows:

5. Ensure that the safety requirements indicated in chapter Safety Requirements are observed.

WARNING



Care must be taken when applying the procedures below to ensure that neither the CP3923 nor other system boards are physically damaged by the application of these procedures.



6. Ensure that no power is applied to the system before proceeding.
7. Disconnect any interfacing cables that may be connected to the board.
8. Unscrew the front panel retaining screws.

WARNING



Due care should be exercised when handling the board due to the fact that the heat sink can get very hot. Do not touch the heat sink when changing the board.



9. Disengage the board from the backplane by first unlocking the board ejection handle and then by pressing the handle as required until the board is disengaged.
10. After disengaging the board from the backplane, pull the board out of the slot.
11. Dispose of the board as required.

2.4 Software Installation

The CP3923 comes as a pre-installed system with all necessary OS, filesystem, drivers and applications factory-installed with default configurations.

Updating the Software with new operating system or applications or new versions is provided by a dedicated update mechanism, which is described in Chapter 4.

2.5 Quick Start

This section gives instructions for (initially) accessing the CLI (Command Line Interface) of the CP3923 using either in-band access via the Ethernet fabric or the out-of-band management interfaces (serial port or Gigabit Ethernet) accessible from the front plate serial connector or via an appropriate RIO module. The CLI is required for configuring the GbE switch.

2.5.1 Out-of-Band CLI Access

The CLI can be accessed

- via the front plate serial port using the serial adapter cable (not available for CP3923-RC)
- or using the serial port on the CP-RIO3-923-8C RIO module
- or the Gigabit Ethernet port on the RIO module.

2.5.1.1 Serial Port

The serial port is ready to use offhand without further configuration.

Port settings are:

- 115200 bps (serial speed might be different for customized board variants)
- 8 bit, no parity, 1 stop bit (8N1)
- no flow control

2.5.1.2 Ethernet Serviceport

The Gigabit Ethernet serviceport on the CP3923 RIO module has no IP address set by default, it is necessary to assign an IP address statically or enable dhcp on the serviceport. Because the required configuration steps are done in the CLI, an initial access using the serial port is required.

The procedure for assigning an IP address to the serviceport is described in the following. User input is printed in bold letters.

12. Connect to serial port on the front plate (using the Kontron DB9 adapter cable) or RIO module (using a RJ45 straight cable).
13. Ensure that the board is powered up.
14. Log in as **admin** and enter privileged mode by typing '**enable**' (no passwords required by default).

```
User:admin
Password:
(Ethernet Fabric) >enable
Password:

(Ethernet Fabric) #
```

15. Set IP address and netmask. (see below for an example IP address setting)

```
(Ethernet Fabric) #serviceport ip 192.168.50.107 255.255.255.0
```

The GbE management interface is available from now on.

Alternatively, DHCP can be set for the serviceport

```
(Ethernet Fabric) #serviceport protocol dhcp
```

An IP address will be assigned to the serviceport by a DHCP server.

16. Save configuration using the '**write mem**' command and confirm with 'y''

```
(Ethernet Fabric) #write mem

This operation may take a few minutes.
Management interfaces will not be available during this time.

Are you sure you want to save? (y/n) y

Config file 'current/startup-config' created successfully.

Configuration Saved!

(Ethernet Fabric) #
```

To access the CLI via Gigabit Ethernet serviceport, open a telnet connection to the configured IP address, port 23.

2.5.2 In-Band CLI Access

The GbE switch network port (in-band management access) on the CP3923 has no IP address set by default, it is necessary to assign an IP address either statically or by using DHCP to the network port. Because the required configuration steps are done in the CLI, an initial access using the serial port is required.

The procedure for assigning an IP address to the network port is described in the following. User input is printed in bold letters.

17. Connect to serial port on the front plate (using the Kontron DB9 adapter cable) or RIO module (using a RJ45 straight cable).
18. Ensure that the board is powered up.
19. Log in as **admin** and enter privileged mode by typing '**enable**' (no passwords required by default).

```
User:admin
Password:
(Ethernet Fabric) >enable
Password:

(Ethernet Fabric) #
```

20. Set IP address, netmask and default gateway. (see below for an example IP address setting)

```
(Ethernet Fabric) #network parms 192.168.50.107 255.255.255.0 192.168.50.254
```

The GbE management interface is available from now on.

Alternatively, DHCP can be set for the network port

```
(Ethernet Fabric) #network protocol dhcp
```

An IP address will be given to the network port by a DHCP server.

21. Save configuration by using the '**write mem**' command and confirm '**y**'

```
(Ethernet Fabric) #write mem

This operation may take a few minutes.
Management interfaces will not be available during this time.
```

```
Are you sure you want to save? (y/n) y

Config file 'current/startup-config' created successfully.

Configuration Saved!

(Ethernet Fabric) #
```

To access the CLI via the Gigabit Ethernet in-band networkport, open a telnet connection to the configured IP address, port 23.

It might make sense to separate the management network from the data path by setting appropriate VLANs

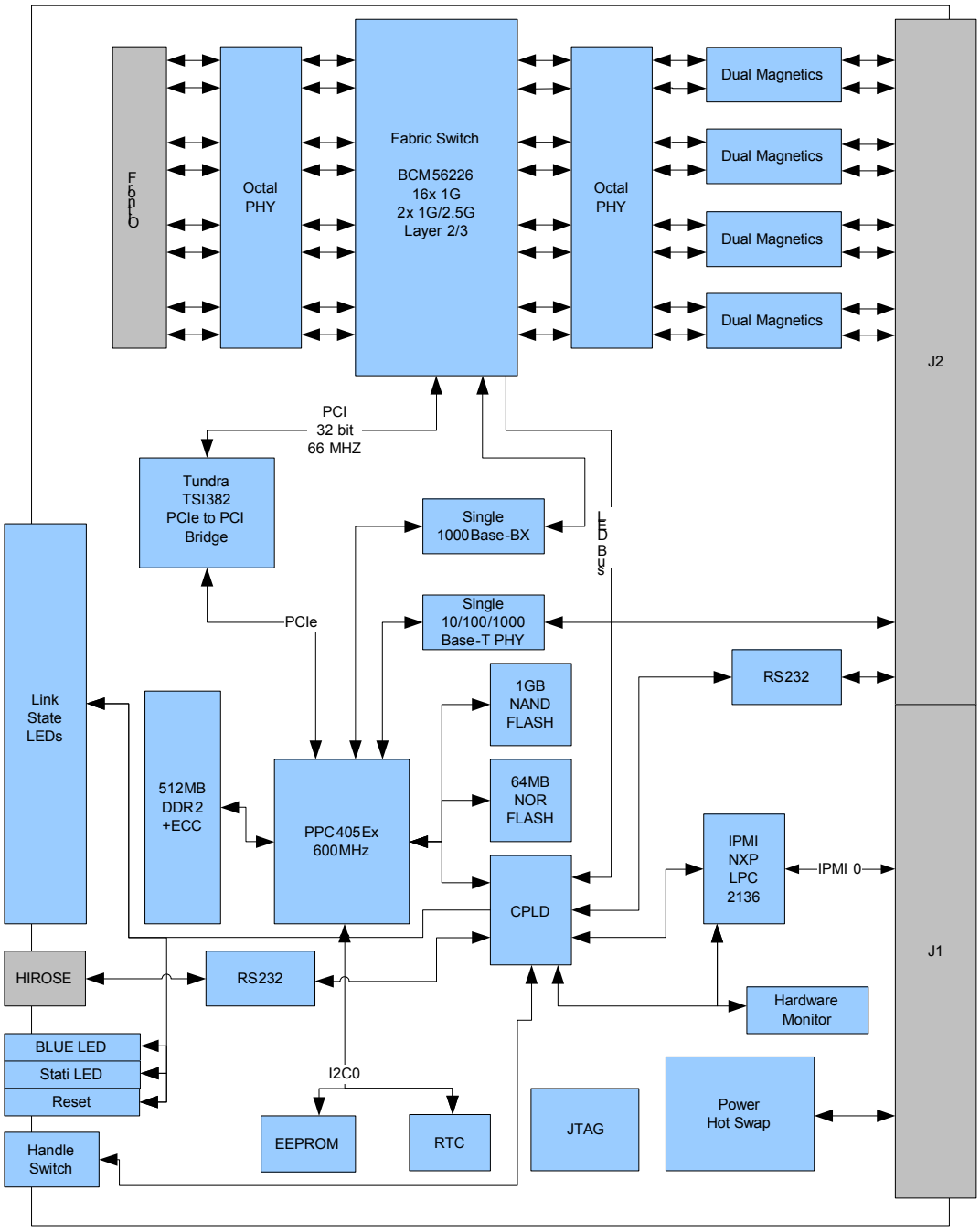
For additional information on the system configuration, refer to the *CP3923 CLI Reference Manual*.

3 Functional Description

The board is composed of the following building blocks:

- Ethernet Infrastructure
- Unit Computer and Memory
- IPMI
- Power Supply

Figure 3-1: Functional Block Diagram CP3923



3.1 Ethernet Infrastructure

The fabric switch is a Broadcom StrataXGS®III Chip BCM56226 with 16 SGMII + 4 HiGig Port Gigabit Ethernet Layer-2/3 Switch. Line rate switching for all packet sizes and conditions is supported on all interfaces.

The CPCI interface numbering is according to the PICMG 2.16 Specification. The on-board management software identifies the interfaces as 0/1 to 0/17. The LED numbering on the front panel corresponds to this numbering scheme.

Table 3-1: Ethernet Port Mapping

CLI	Interface	Speed Settings
0/1	Backplane Link 1	10/100/1000 Mbps
0/2	Backplane Link 2	10/100/1000 Mbps
0/3	Backplane Link 3	10/100/1000 Mbps
0/4	Backplane Link 4	10/100/1000 Mbps
0/5	Backplane Link 5	10/100/1000 Mbps
0/6	Backplane Link 6	10/100/1000 Mbps
0/7	Backplane Link 7	10/100/1000 Mbps
0/8	Backplane Link 8	10/100/1000 Mbps
0/9**	Front I/O Link 9	10/100/1000 Mbps *
0/10**	Front I/O Link 10	10/100/1000 Mbps *
0/11**	Front I/O Link 11	10/100/1000 Mbps *
0/12**	Front I/O Link 12	10/100/1000 Mbps *
0/13 ***	Front I/O Link 13	10/100/1000 Mbps *
0/14 ***	Front I/O Link 14	10/100/1000 Mbps *
0/15 ***	Front I/O Link 15	10/100/1000 Mbps *
0/16 ***	Front I/O Link 16	10/100/1000 Mbps *
0/17	Unit Computer Link	1000 Mbps

*) The CP3923-4M and CP3923-8M support only 100 Mbps

**) Not available on CP3923-RC

***) Not available on CP3923-RC and CP3923-4M

3.2 Unit Computer and Memory

The Unit Computer controls the Ethernet infrastructure and hosts the management application. It is a PowerPC 405EX with following features:

- 600MHz core frequency
- PCIe management connection to Ethernet Switch
- GbE connections to front management port and Ethernet Switch

The Unit Computer is equipped with following peripherals:

- 512MB DDR2 Memory with 400MHz data rate and ECC
- 64MB NOR Flash Memory for two Firmware images
- 1024MB NAND Flash for high volume storage (TFTP Server applications) with high frequency read
- Real Time Clock with integrated oscillator, powered by a capacitor with up to 1 week of back up power

3.3 IPMI

The CP3923 board supports an intelligent hardware management system, based on the Intelligent Platform Management Interface Specification 1.5. The hardware management system provides the ability to manage the power, cooling and interconnect needs of intelligent devices, to monitor events and to log events to a central repository intelligent FRU (Field Replaceable Unit).

The Peripheral Manager is a 16-bit microcontroller with on chip memory of 512 Kbyte Flash and 32 Kbyte SRAM. It provides several I²C interfaces for access to sensors and IPMB busses. Board voltage, current and temperature monitoring are accomplished through internal and external sensors.

The following section provides a listing of all inputs to the IPMI subsystem for H/W supervision.

- Thermal Sensors
- Reset status of the Unit Computer
- Power Status, the PM reads all supply voltages and status signals for possible failure and value reporting
- Ethernet Link status
- SFP status and control signals
- CompactPCI Handle switch (Hot Swap, not on CP3923-RC)

The PM uses the following outputs to control the CP3923:

- Power and Reset control of the payload
- LED HEALTHY (not on CP3923-RC)
- Unit Computer reset

The Peripheral Manager provides additional feature and is equipped with following peripherals:

- The FRU Data Flash device contains the CP3923 FRU information
- Internal watchdog monitoring PM operation
- The external watchdog is implemented in glue logic. The PM will be reset if its alive signal fails. The watchdog is disabled in case of a local update.
- CompactPCI IPMB-0 interface

3.3.1 Voltage and Current Sensors

The following voltages and currents are measured by the Peripheral Manager:

Table 3-2: Voltage Sensors

Voltage	Accuracy [%]
V_5V_CPCI_CURRENT	+/- 4.8
V_0V9_VTT	+/- 2.2
V_1V25	+/- 1.6
V_1V2	+/- 1.6
V_2V5	+/- 1.0
V_3V3_CPLD	+/- 3.0
V_3V3_SUS	+/- 3.0
V_5V_CPCI	+/- 3.4
V_3V3_CPCI_CURRENT	+/- 4.8
V_0V9_VREF	+/- 2.2
V_1V8	+/- 1.1
V_3V3	+/- 3.0
V_3V3_CPCI	+/- 3.0
V_5V_IPMB_PWR	+/- 3.4

The complete list of sensors and their alarm thresholds can be found in chapter “Board Sensors” on page 60.

3.4 Write Protection Feature

The CP3923 supports hardware driven write protection for all non-volatile memory devices. Depending on the device, the protection is implemented either by a dedicated write protection signal, by disabling the write enable signal, or the whole interface.

Two levels of HW write protection are supported: standard and enhanced. The protection level is set by a backplane signal (EWP). It is located on connector J2, pin A19. If left open, the signal is inactive. If pulled to GND, the signal is active.

The following table shows how to configure the write protection. Default setting is 'standard'.

Table 3-3: Write protection level set by EWP

EWP Signal	Write Protection Level
inactive (3.3V or open)	standard
active (GND)	enhanced

Standard write protection provides protection for Unit Computer Flash data, enhanced write protection provides protection for all memories.

Table 3-4: Non-volatile memories on the CP3923

Description	Protected by Level
Unit Computer Bootloader + Firmware	standard, enhanced
IPMI Firmware	enhanced
FRU Data	enhanced
Unit Computer Config EEPROM	enhanced
PM internal Flash	enhanced

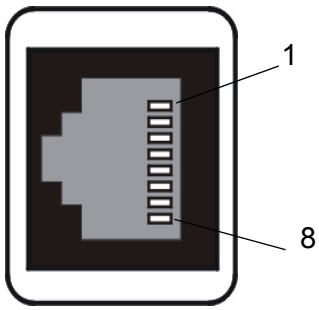
3.5 Board Interfaces

3.5.1 Uplink Ethernet Ports (CP3923-8C)

The eight Ethernet Ports provide automatic detection and switching between 10Base-T, 100Base-TX and 1000Base-T data transmission (Auto-Negotiation) and are implemented as an RJ-45 connector on the front panel. Auto wire switching for crossed cables is also supported (Auto-MDI/X). This interface is connected as an uplink port to the on-board Ethernet switch.

The following figure provides pinout information on the Gigabit Ethernet connectors.

Table 3-5: MDI-X RJ45 Pin Assignment

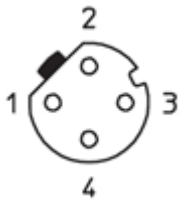
Pin	Signal 10/100Base-T	Signal 1000Base-T	
1	RX+	BI_DB+	
2	RX-	BI_DB-	
3	TX+	BI_DA+	
4	NU	BI_DD+	
5	NU	BI_DD-	
6	TX-	BI_DA-	
7	NU	BI_DC+	
8	NU	BI_DC-	

3.5.2 Uplink Ethernet Ports (CP3923-8M and CP3923-4M)

The eight/four Ethernet Ports support 100Base-TX operation and are implemented as an Industrial M12 D-coded female connector on the front panel. This interface is connected as an uplink port to the on-board Ethernet switch.

The following figure provides pinout information on the M12 Industrial Ethernet connectors.

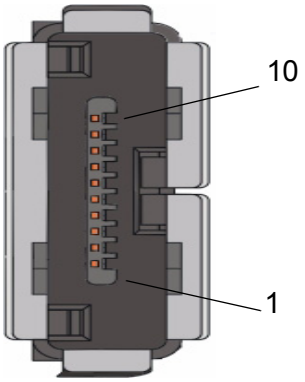
Table 3-6: M12 Connectors (d-coded, female)

Pin	Signal	Industrial Ethernet M12
1	TD+	
2	RD+	
3	TD-	
4	RD-	
Housing	Shield	

3.5.3 Serial Port (not on CP3923-RC)

An RS232 interface of the Unit Computer is the serial port which is routed to a miniature connector on the front plate. An adapter cable is available from Kontron to establish a connection with a terminal with a standard DB9 serial port.

Table 3-7: Serial Port Pinout

Pin Number	Signal	
1	N.C.	
2	RXD	
3	TXD	
4	DTR	
5	GND	
6	DSR	
7	RTS	
8	CTS	
9	N.C.	
10	N.C.	

3.5.4 Front Panel LEDs (not on CP3923-RC)

The front panel provides 12 or 16 LEDS (depending on variant) for status indication for the standard fabric interfaces. The LED color is green with the following states:

- Off link down
- On link up but no activity
- Blinking link up and activity

3.5.4.1 Health LED (Green LED)

The CP3923 Switch Board supports a Health LED „H“mounted on the front panel. The following states are possible:

Table 3-8: Health LED state

LED state	Description
ON	Normal state when board is in operation.
Short Blinking	“Health Error" sensor asserted

3.5.4.2 Activity LED (Green LED)

The position of this LED „A“ is near the bottom handle beside the health LED. The LED is not used.

Table 3-9: Activity LED state

LED state	Description
off	Default setting (LED not used)

3.5.4.3 Management LED (Green LED)

The management LED „M“ indicates link and activity status on the management Ethernet link on the CP-RIO3-923-8C (see chapter “Rear IO Module” on page 35.). The LED color is green with the following states:

- Off link down
- On link up but no activity
- Blinking link up and activity

3.5.5 Front Panel Switches (not on CP3923-RC)

The handle switch is actuated with the ejector handle of the board. It is used to signal the inserting or impending extraction of the board.

A reset switch is provided being activated with an adequate tool (e.g. pencil). When the switch is pressed, the board performs a power cycle to all payload devices and resets the PM.

3.5.6 Backplane Connectors

The complete CompactPCI connector configuration comprises two connectors named J1 and J2.

The board supports signaling voltages V(I/O) of either 3.3 V or 5 V. No keying is required on J1 which designates universal V(I/O).

For accessing the GbE interfaces signals without a rear I/O module, a backplane is required which routes the Ethernet signals directly to the CPU slots without the need of external cabling. Please contact Kontron if you're looking for such a solution.

3.5.6.1 J1 Connector

- Power +3.3V, +5.0V, V(I/O)
- IPMB Power (+5.0V)
- IPMB 0
- Hot Swap

Table 3-10: Connector J1 Pinout

Pin	Row A	Row B	Row C	Row D	Row E	Row F
25	V_5V_CPCI	NC	NC	V_3V3_CPCI	V_5V_CPCI	GND
24	NC	V_5V_CPCI	V_IO_CPCI	NC	NC	GND
23	V_3V3_CPCI	NC	NC	V_5V_CPCI	NC	GND
22	NC	GND	V_3V3_CPCI	NC	NC	GND
21	V_3V3_CPCI	NC	NC	NC	NC	GND
20	NC	GND	V_IO_CPCI	NC	NC	GND
19	V_3V3_CPCI	NC	NC	GND	NC	GND
18	NC	GND	V_3V3_CPCI	NC	NC	GND
17	V_3V3_CPCI	IPMB0_SCL	IPMB0_SDA	GND	NC	GND
16	NC	GND	V_IO_CPCI	NC	NC	GND
15	V_3V3_CPCI	NC	NC	CPCI_BD_SEL#	NC	GND
14	Key Area					
13						
12						
11	NC	NC	NC	GND	NC	GND
10	NC	GND	V_3V3_CPCI	NC	NC	GND
9	NC	NC	NC	GND	NC	GND
8	NC	GND	V_IO_CPCI	NC	NC	GND
7	NC	NC	NC	GND	NC	GND
6	NC	NC	V_3V3_CPCI	NC	NC	GND
5	NC	NC	CPCI_PCI_RST#	GND	NC	GND
4	V_5V_IPMB_PWR	CPCI_HEALTHY#	V_IO_CPCI	NC	NC	GND
3	NC	NC	NC	V_5V_CPCI	NC	GND
2	NC	V_5V_CPCI	NC	NC	NC	GND
1	V_5V_CPCI	NC/V_-12V_CPCI	NC	NC/V_+12V_CPCI	V_5V_CPCI	GND

3.5.6.2 J2 Connector

- Georgraphic Address
- CP-RIO3-923-8C control signals
- Ethernet Ports
- Management Ports

Table 3-11: Connector J2 Pinout

Pin	Row A	Row B	Row C	Row D	Row E	Row F
22	CPCI_GA[4]	CPCI_GA[3]	CPCI_GA[2]	CPCI_GA[1]	CPCI_GA[0]	GND
21	RTM_TXD# *	I2C1_SCL	I2C1_SDA	I2C1_ALERT#	RTM_RXD# *	GND
20	JTAG_TCK	JTAG_TMS	JTAG_TDI	JTAG_TRST#	JTAG_TDO	GND
19	EWP *	JP_MFT_EN#/ (JTAG_HALT#)	JP_DEBUG_EN#/ JTAG_NOR_WE#	JTAG_PWR_EN#	JTAG_EN#	GND
18	MP_DA+	MP_DA-	GND	MP_DC+	MP_DC-	GND
17	MP_DB+	MP_DB-	GND	MP_DD+	MP_DD-	GND
16	FL_DA8+	FL_DA8-	GND	FL_DC8+	FL_DC8-	GND
15	FL_DB8+	FL_DB8-	GND	FL_DD8+	FL_DD8-	GND
14	FL_DA7+	FL_DA7-	GND	FL_DC7+	FL_DC7-	GND
13	FL_DB7+	FL_DB7-	GND	FL_DD7+	FL_DD7-	GND
12	FL_DA6+	FL_DA6-	GND	FL_DC6+	FL_DC6-	GND
11	FL_DB6+	FL_DB6-	GND	FL_DD6+	FL_DD6-	GND
10	FL_DA5+	FL_DA5-	GND	FL_DC5+	FL_DC5-	GND
9	FL_DB5+	FL_DB5-	GND	FL_DD5+	FL_DD5-	GND
8	FL_DA4+	FL_DA4-	GND	FL_DC4+	FL_DC4-	GND
7	FL_DB4+	FL_DB4-	GND	FL_DD4+	FL_DD4-	GND
6	FL_DA3+	FL_DA3-	GND	FL_DC3+	FL_DC3-	GND
5	FL_DB3+	FL_DB3-	GND	FL_DD3+	FL_DD3-	GND
4	FL_DA2+	FL_DA2-	GND	FL_DC2+	FL_DC2-	GND
3	FL_DB2+	FL_DB2-	GND	FL_DD2+	FL_DD2-	GND
2	FL_DA1+	FL_DA1-	GND	FL_DC1+	FL_DC1-	GND
1	FL_DB1+	FL_DB1-	GND	FL_DD1+	FL_DD1-	GND

Note...

RTM_TXD# (driven by CP3923) and RTM_RXD# (driven by RIO module) are the two-pin RS232 rear I/O interface.

Note...

Signal EWP only triggers the enhanced write protection feature, see chapter 3.4

3.5.7 Front Panel Drawings

Figure 3-2: Front Panel of the CP3923-4M

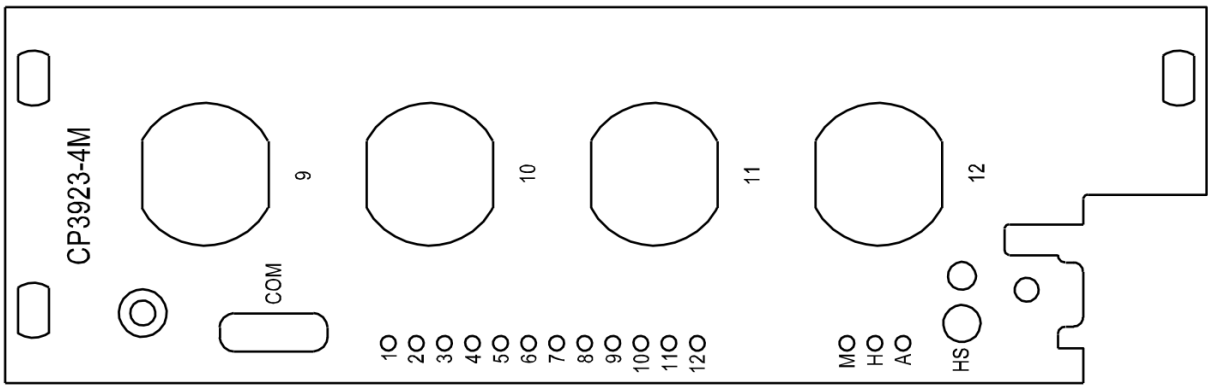


Figure 3-3: Front Panel of the CP3923-8M

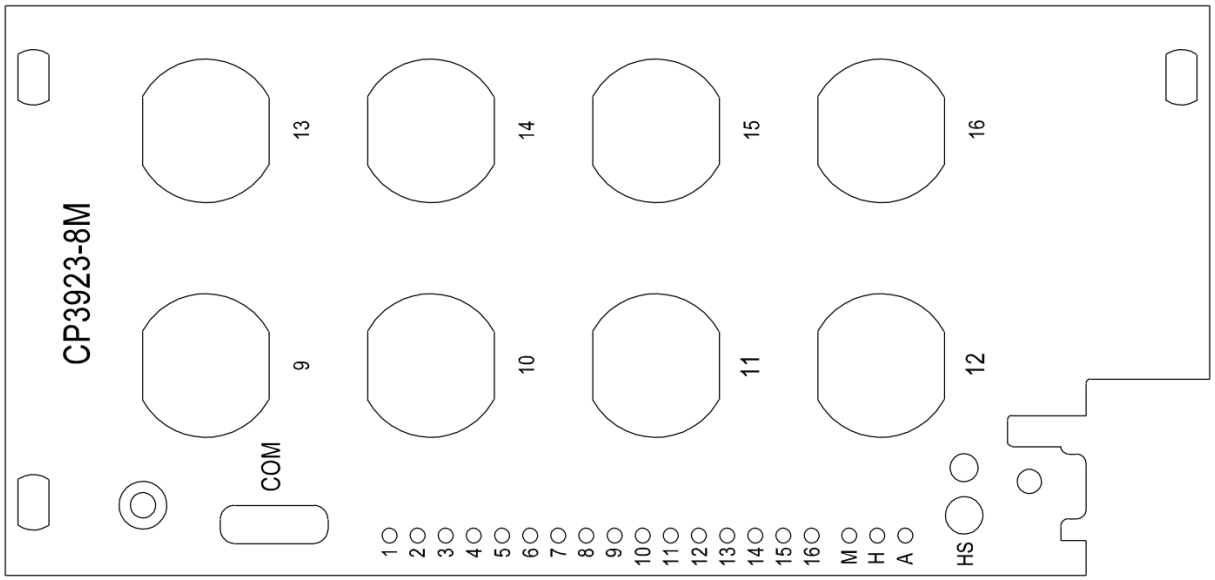
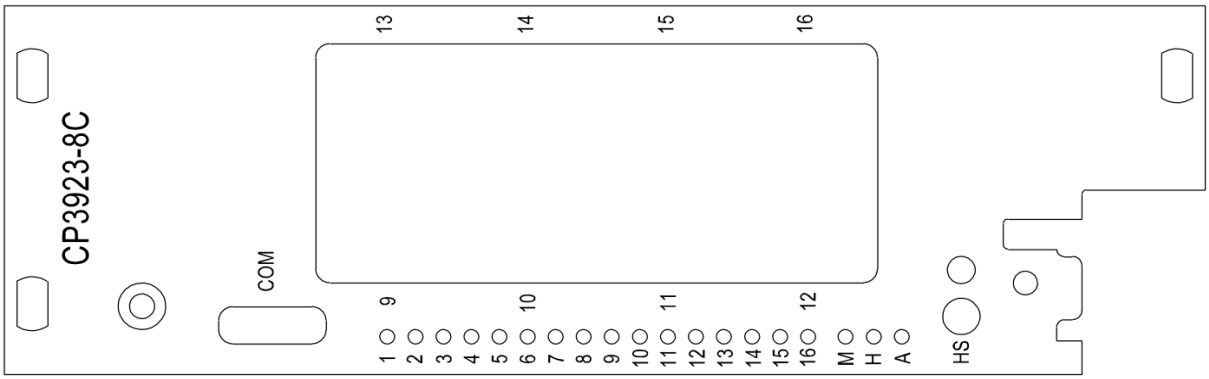


Figure 3-4: Front Panel of the CP3923-8C



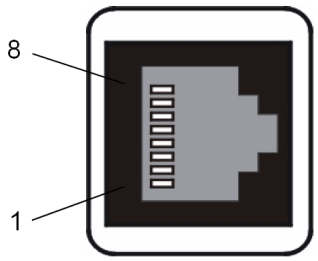
3.6 Rear IO Module

The CP-RIO3-923-8C is a PICMG 2.0 compliant Rear-panel I/O board that enables access to the CP3923 management and switch uplink ports. Management access is either possible via serial RS232 interface or Gigabit Ethernet. For both, a RJ45 connector is provided. Eight 10/100/1000Base-T ports are provided which connect to FL1 to FL8.

3.6.1 Serial RS232 Interface

The RS232 signals from connector J4 are routed to a RJ45 connector in the faceplate. The connector has the following pin assignment.

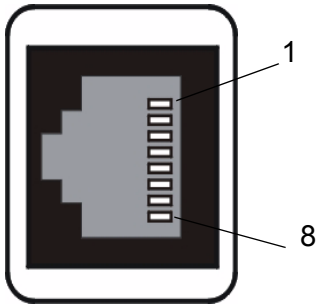
Table 3-12: Serial Port (RJ45) Pin Assignment

Signal	Pin	
N.C.	1	
N.C.	2	
TXD	3	
GND	4	
GND	5	
RXD	6	
N.C.	7	
N.C.	8	

3.6.2 Ethernet Management Interface

The Unit Computer's Ethernet Interface is routed to the CP-RIO3-923-8C as a management access port. The standard RJ45 connector has the following pin assignment.

Table 3-13: Ethernet Management RJ45 Connector Pin Assignment

Pin	Signal 10/100Base-T	Signal 1000Base-T	
1	TX+	BI-DA+	
2	TX-	BI-DA-	
3	RX+	BI-DB+	
4	NU	BI-DC+	
5	NU	BI-DC-	
6	RX-	BI-DB-	
7	NU	BI-DD+	
8	NU	BI-DD-	

3.6.3 10/100/1000Base-T Ports

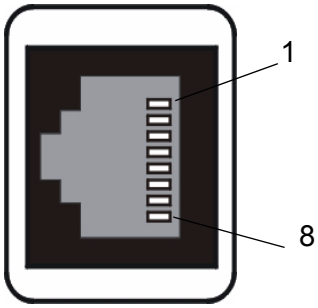
The following tables show the port assignment of the 10/100/1000Base-T ports at the RJ45 modules on the faceplate.

Table 3-14: RIO Port Assignment

CLI	Interface	Speed Settings
0/1	Backplane Link 1	10/100/1000 Mbps
0/2	Backplane Link 2	10/100/1000 Mbps
0/3	Backplane Link 3	10/100/1000 Mbps
0/4	Backplane Link 4	10/100/1000 Mbps
0/5	Backplane Link 5	10/100/1000 Mbps
0/6	Backplane Link 6	10/100/1000 Mbps
0/7	Backplane Link 7	10/100/1000 Mbps
0/8	Backplane Link 8	10/100/1000 Mbps

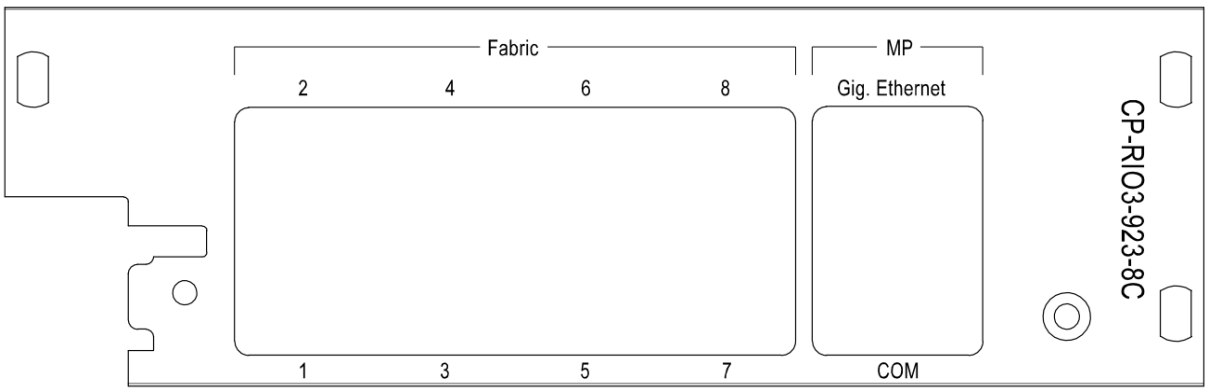
The table on the following page shows the pin assignment of one 10/100/1000BASE-T RJ45 connector.

Table 3-15: MDI-X RJ45 Pin Assignment

Pin	Signal 10/100Base-T	Signal 1000Base-T	
1	RX+	BI_DB+	
2	RX-	BI_DB-	
3	TX+	BI_DA+	
4	NU	BI_DD+	
5	NU	BI_DD-	
6	TX-	BI_DA-	
7	NU	BI_DC+	
8	NU	BI_DC-	

3.6.4 Front Panel Elements

Figure 3-5: Front Panel of the CP-RIO3-923-8C



4 Software Description

Software on the CP3923 includes the following parts:

- Bootloader
- initrd (including rootFS, kernel and application software)
- IPMI FW

The Software accomplishes operation of the switching hardware and is therefore also referenced as firmware. It is preinstalled on the system and can only be updated by a dedicated update procedure. This manual only describes bootloader, its self tests and IPMI Firmware and introduces the update procedure.

For additional information of system configuration using CLI commands refer to documentation "*CP3923 CLI Reference Manual*".

4.1 Supported RFCs

The Software supports the following standards and RFCs.

4.1.1 Management

- RFC 826 - ARP
- RFC 854 - Telnet
- RFC 855 - Telnet Option
- RFC 1155 - SMI v1
- RFC 1157 - SNMP
- RFC 1212 - Concise MIB Definitions
- RFC 1901 - Community based SNMP v2
- RFC 2246 - The TLS Protocol, Version 1.0
- RFC 2271 - SNMP Framework MIB
- RFC 2295 - Transparent Content Negotiation
- RFC 2296 - Remote Variant Selection; RSVA/1.0 State Management "cookies"
- RFC 2346 - AES Ciphersuites for Transport Layer Security
- RFC 2576 - Coexistence between SNMP v1,v2 & v3
- RFC 2578 - SMI v2
- RFC 2579 - Textual Conventions for SMI v2
- RFC 2580 - Conformance statements for SMI v2
- RFC 3410 - Introduction and Applicability Statements for Internet Standard Management Framework
- RFC 3411 - An Architecture for Describing SNMP Management Frameworks

- RFC 3412 - Message Processing and Dispatching (December 2002)
- RFC 3413 - SNMP Applications (December 2002)
- RFC 3414 - User-based Security Model (December 2002)
- RFC 3415 - View-based Access Control Model (December 2002)
- RFC 3416 - Version 2 of SNMP Protocol Operations (December 2002)
- RFC 3417 - Transport Mappings (December 2002)
- RFC 3418 - MIB for the Simple Network Management Protocol.
- RFC 3635 - Definition of Managed Objects for Ethernet-like Interface Types
- SSL 3.0 and TLS 1.0
  - RFC 2246—The TLS protocol, version 1.0
  - RFC 2346—AES cipher suites for Transport layer security
  - RFC 2818—HTTP over TLS
- SSH 1.5 and 2.0
  - RFC 4253—SSH transport layer protocol
  - RFC 4252—SSH authentication protocol
  - RFC 4254—SSH connection protocol
  - RFC 4251—SSH protocol architecture
  - RFC 4716—SECSH public key file format
  - RFC 4419—Diffie-Hellman group exchange for the SSH transport layer protocol
- Configurable Management VLAN ID
- Industry Standard CLI
- HTML 4.0 specification, December 1997
- Java® Plug-in and Java Script™ 1.3

4.1.2 Switching

- IEEE 802.1AB—Link level discovery protocol
- IEEE 802.1D—Spanning tree
- IEEE 802.1p—Ethernet priority with user provisioning and mapping
- IEEE 802.1Q—Virtual LANs w/ port-based VLANs
- IEEE 802.1S—Multiple spanning tree compatibility
- IEEE 802.1v—Protocol-based VLANs
- IEEE 802.1W—Rapid spanning tree
- IEEE 802.1X—Port-based authentication
- IEEE 802.3—10BASE-T
- IEEE 802.3u—100BASE-T

- IEEE 802.3ab—1000BASE-T
- IEEE 802.3ac—VLAN tagging
- IEEE 802.3ad—Link aggregation
- IEEE 802.3x—Flow control
- ANSI/TIA-1057—LLDP-MED
- GARP—Generic Attribute Registration Protocol: clause 12, 802.1D-2004
- GMRP—Dynamic L2 multicast registration: clause 10, 802.1D-2004
- GVRP—Dynamic VLAN registration: clause 11.2, 802.1Q-2003
- RFC 4541—IGMP snooping and MLD snooping
- Broadcast storm recovery
- Double VLAN/vMAN tagging
- DHCP Snooping
- Dynamic ARP inspection
- Independent VLAN Learning (IVL) support
- Jumbo Ethernet frames
- Port mirroring
- Static MAC filtering
- IGMP and MLD snooping querier
- Port MAC locking
- MAC-based VLANs
- IP source guard
- IP subnet-based VLANs
- Voice VLANs
- Protected ports
- Event and error logging facility
- Runtime and configuration download capability
- PING utility
- RFC 768—UDP
- RFC 783—TFTP
- RFC 791—IP
- RFC 792—ICMP
- RFC 793—TCP
- RFC 826 — ARP

- RFC 951—BootP
- RFC 1321—Message digest algorithm
- RFC 1534—Interop. between BootP and DHCP
- RFC 2030—Simple Network Time Protocol (SNTP) V4 for IPv4, IPv6, and OSI
- RFC 2131—DHCP Client/Server
- RFC 2132—DHCP options and BootP vendor ext.
- RFC 2865—RADIUS client
- RFC 2866—RADIUS accounting
- RFC 2868—RADIUS attributes for tunnel protocol support
- RFC 2869—RADIUS extensions
- rfc28869bis — RADIUS support for Extensible Authentication Protocol (EAP)
- RFC 3164—The BSD syslog protocol
- RFC 3580—802.1X RADIUS usage guidelines

4.1.3 Routing

- Weighted Static Routes
- RFC 819 - Domain Naming Convention for Internet User Applications
- RFC 826—Ethernet ARP
- RFC 894—Transmission of IP datagrams over Ethernet networks
- RFC 896—Congestion control in IP/TCP networks
- RFC 1027—Using ARP to implement transparent subnet gateways (Proxy ARP)
- RFC 1256—ICMP router discovery messages
- RFC 1321—Message digest algorithm
- RFC 1519—CIDR
- RFC 1765—OSPF database overflow
- RFC 1812—Requirements for IPv4 routers
- RFC 2082—RIP-2 MD5 authentication
- RFC 2131—DHCP relay
- RFC 2328—OSPFv2
- RFC 2453—RIP v2
- RFC 3046—DHCP/BootP relay
- RFC 3101—The OSPF “Not So Stubby Area” (NSSA) option
- RFC 3768—Virtual Router Redundancy Protocol (VRRP)
- Route redistribution across RIP and OSPF
- VLAN routing

4.1.4 QoS

4.1.4.1 DiffServ

- RFC 2474—Definition of the differentiated services field (DS Field) in the IPv4 and IPv6 headers
- RFC 2475—An architecture for differentiated services
- RFC 2597—Assured forwarding PHB group
- RFC 3246—An expedited forwarding PHB (Per-Hop Behavior)
- RFC 3260—New terminology and clarifications for DiffServ

4.1.4.2 Access Control Lists (ACL)

- Permit/deny actions for inbound or outbound IP traffic classification based on:
  - Type of service (ToS) or differentiated services (DS) DSCP field
  - Source IP address
  - Destination IP address
  - TCP/UDP source port
  - TCP/UDP destination port
  - IPv6 flow label
  - IP protocol number
- Permit/deny actions for inbound or outbound Layer 2 traffic classification based on:
  - Source MAC address
  - Destination MAC address
  - EtherType
  - VLAN identifier value or range (outer and/or inner VLAN tag)
  - 802.1p user priority (outer and/or inner VLAN tag)
- Optional rule attributes:
  - Assign matching traffic flow to a specific queue
  - Redirect or mirror (flow-based mirroring) matching traffic flow to a specific port
  - Generate trap log entries containing rule hit counts

4.1.4.3 Class of Service (CoS)

- Direct user configuration of the following:
  - IP DSCP to traffic class mapping
  - IP precedence to traffic class mapping
  - Interface trust mode: 802.1p, IP Precedence, IP DSCP, or untrusted
  - Interface traffic shaping rate
  - Minimum and maximum bandwidth per queue
  - Strict priority versus weighted (WRR/WDRR/WFQ) scheduling per queue
  - Tail drop versus Weighted Random Early Detection (WRED) queue depth management

4.1.5 Multicast

- RFC 1112—Host extensions for IP multicasting
- RFC 2236—IGMP v2
- RFC 2710—MLDv1
- RFC 2365—Administratively scoped boundaries
- RFC 3376—IGMPv3
- RFC3810—MLDv2
- RFC3973—PIM-DM
- RFC4601—PIM-SM
- Draft-ietf-idmr-dvmrp-v3-10—DVMRP
- Draft-ietf-magma-igmp-proxy-06.txt—IGMP/MLD-based multicast forwarding (IGMP/MLD proxying)
- Draft-ietf-magma-igmpv3-and-routing-05.txt—IGMPv3 and multicast routing protocol interaction
- Static RP configuration

4.2 Supported MIBs

The Software supports the following MIBs.

4.2.1 Enterprise MIB

- Support for all managed objects not contained in standards based MIBs.

4.2.2 Switching Package MIBs

- RFC 1213 - MIB-II
- RFC 1493 - Bridge MIB: Definitions of Managed Objects for Bridges (dot1d)
- RFC 1643 – Definitions of managed objects for the Ethernet-like interface types
- RFC 2233 - The Interfaces Group MIB using SMI v2
- RFC 2618 - RADIUS Authentication Client MIB
- RFC 2620 - RADIUS Accounting MIB
- RFC 2674 - VLAN & Ethernet Priority MIB: The Bridge MIB Extension module for managing Priority and Multicast Filtering, defined by IEEE 802.1D-1998.
- RFC 2674 - Q-BRIDGE-MIB: The VLAN Bridge MIB module for managing Virtual Bridged Local Area Networks
- RFC 2737 – Entity MIB version 2
- RFC 2819 - RMON Groups 1,2,3 & 9

- RFC 2863 – Interfaces Group MIB
- RFC 3291 - Textual Conventions for Internet Network Addresses
- RFC 3635 - Etherlike-MIB: Definitions of Managed Objects for the Ethernet-like Interface Types
- IANA-ifType-MIB
- IEEE 802.1X MIB (IEEE8021-PAE-MIB)
- IEEE 802.3AD MIB (IEEE8021-AD-MIB)

4.2.3 Routing Package MIBs

- Draft-ietf-ipv6-rfc2096-update-07.txt - IP Forwarding Table MIB
- IANA-Address-Family-Numbers-MIB
- RFC 1724 - RIP v2 MIB Extension
- RFC 1850 - OSPF-MIB: OSPF Version 2 Management Information Base
- RFC 1850 - OSPF-TRAP-MIB: The MIB module to describe traps for the OSPF Version 2 Protocol.
- RFC 2787 - VRRP MIB: Definitions of Managed Objects for the Virtual Router Redundancy Protocol
- DVMRP-STD-MIB: Distance-Vector Multicast Routing Protocol MIB
- IANA-RTPROTO-MIB: IANA IP Route Protocol and IP MRoute Protocol Textual Conventions

4.2.4 QoS Package MIBs

- RFC 3289 - DIFFSERV-MIB: Management Information Base for the Differentiated Services Architecture
- RFC 3289 - DIFFSERV-DCSP-TC MIB: Management Information Base for the Textual Conventions used in DIFFSERV-MIB

4.2.5 Multicast package MIBs

- RFC 2932 – IPv4 multicast routing MIB
- RFC 2933 - IGMP MIB
- RFC 2934 – PIM MIB for IPv4 (PIMDMv4)
- Draft-ietf-pim-mib-v2-03 (PIM-SM MIB)
- Draft-ietf-magma-mgmd-mib-05.txt – Multicast group membership discovery MIB
- Draft-ietf-idmr-dvmrp-mib-11.txt - DVMRP MIB
- IANA-RTP-PROTO_MIB

4.2.6 SNMP MIBs

- RFC 1907 - SNMPv2-MIB: The MIB module for SNMPv2 entities
- SNMP-COMMUNITY-MIB: This MIB module defines objects to help support coexistence between SNMPv1, SNMPv2 and SNMPv3.
- SNMP-FRAMEWORK-MIB: The SNMP Management Architecture MIB
- SNMP-MPD-MIB: The MIB for Message Processing and Dispatching
- SNMP-NOTIFICATION-MIB: The Notification MIB Module
- SNMP-TARGET-MIB: The Target MIB Module
- SNMP-USER-BASED-SM-MIB: The management information definitions for the SNMP User-based Security Model.
- SNMP-VIEW-BASED-ACM-MIB: The management information definitions for the View-based Access Control Model for SNMP.

4.2.7 Kontron Private MIBs

For the CP3923, Kontron provides several MIBs in addition to the Standard MIBs (see “Supported MIBs” on page 43) that allows to use SNMP for configuration of :

- IPMI features
- extended Ethernet features
- Geographical Address
- extended management features

Kontron specific MIBs start with a “kex_”. Here’s a list of MIBs provided (in this example for release GA 2.0) including its content:

- kex_config
  - SNMP engine ID
  - Set Hardware Date and Time
  - Set BSP startup services
  - Handle arbitrary config. files
  - DHCP Server packet manipulation
  - ACL Trap Sleep Time
  - Delete Configuration File
  - DHCP Client Identifier
- kex_ipmi
  - Basic IPMI features:
    - Sensor list
    - SEL entries
    - FRU entries
    - FRU-Device information
    - FRU-Control commands

    - Extended IPMI monitoring functions
        - Site table
        - SEL-trap filter
        - SEL-trap
- kex_mgmt
    - Protection Port Groups
    - Advertise Speed
    - Update/Startup status
    - VLAN multicast flooding
    - Port multicast flooding
    - LAG unicast enhanced hashing
    - Send IGMP reports
    - CPU load
    - Port learning
    - Fast Reload
    - Memory Usage
    - L2 port bridge
- kex_oem
    - Customer specific information
        - OEM serial number
        - OEM hardware part number
        - OEM software part number
        - OEM software configuration
- kex_phy
    - handling of PHY interfaces (SFP/XFP)
- kex_ref
    - basic Kontron Information
- kex_version
    - Support FPGA version of board
    - Basic IPMI features supported
    - Support for system/slot address
    - Support PCB version of board
    - Support write-protect feature

To use the MIBs, you must import the MIBs into the MIB browser. The MIBs are provided on demand for current releases.

SNMP can also be used for updating System Software, IPMI FW and PLD.

4.3 Bootloader

On the CP3923 CPCI Ethernet Switch board, the bootloader 'u-boot' (universal bootloader) is used. The bootloader initializes the main components of the board like Unit Computer, DDR2 RAM, serial lines etc. for operation and performs a power on self test (POST). After these steps have been finished, kernel and application are started from flash.

4.3.1 Power On Self Test

4.3.1.1 Test Routines

Upon power on or system reset, the bootloader performs the following power on self tests (POST):

Table 4-1: POST tests

Test	Description
Serial	Onboard Unit Computer serial controller loopback test
I2C	Check for presence of onboard I2C devices
PCI Express	Check for PCI Express switch device presence
Serviceport	Onboard PPC405EX ethernet internal loopback test
DDR RAM data line	Data line test. Checks for stucked or shortened data lines
DDR RAM address line	Adress line test. Checks for stucked or shortened address lines
DDR RAM memory cells	Checkerboard standard test algorithm
Bootloader environment	Check for valid bootloader environment (CRC correct or both CRCs are 0xFFFFFFFF == not initialized)
VPD area	Check for valid VPD area (CRC is valid)

In the case that a POST fails, a POST error code is written into the postcode register of the onboard CPLD. The boot process is not stopped as there are good chances that the board can finish startup sequence successfully. The postcode register is also accessible by the PM which can report error codes to a separate management instance.

The following table shows the POST code values written into the CPLDs postcode register in case of a POST error.

Table 4-2: POST routines and error codes

Device	Test
0x00	All POST were successful
0x01	Serial POST failed
0x02	I2C POST failed
0x04	PCIe POST failed
0x08	Ethernet POST failed
0x10	Environment POST failed
0x20	VPD POST failed
0x40	Memory data/address line POST failed
0x80	Memory device cells POST failed

4.3.2 Bootloader Shell options

The boot process can be interrupted by entering the bootstopkey phrase “stop”. This will open a bootloader shell session.

Entering “?” provides a list of possible built-in commands, “printenv” provides a list of current environment settings. The bootloader shell can be used to customize boot options and system startup by changing some of its environment variables. A list of available environment variables and its description can be seen in the table below.

Table 4-3: Bootloader Shell Options

Name	Type	Description
bootargs	Var	Default kernel arguments. (mem=504M root=/dev/ram0 quiet)
bootcmd	Script	This variable defines a command string that is automatically executed when the initial countdown is not interrupted. This command is only executed when the variable bootdelay is also defined!
bootcmdflash	Script	contains the standard startup script for loading OS image from flash partition command. This will load the Linux kernel and start it with a CRAMFS (TBC, maybe INITRD) type root file system.
bootcmdnet	Script	contains the standard startup script for loading OS image from network
bootcmdprd	Script	contains the standard startup script for use during board production
bootcmdrecover	Script	contains standard startup script for board firmware recovery in boot firmware
bootdelay	Var	After reset, U-Boot will wait this number of seconds before it executes the contents of the bootcmd variable. During this time a countdown is printed, which can be interrupted by pressing any key. Set this variable to 0 boots without delay. Be careful: depending on the contents of your bootcmd variable, this can prevent you from entering interactive commands again forever! Set this variable to -1 to disable autoboot. default: 3 for boot monitor, 10 for boot write-protected boot firmware.
bootsource	Var	When the standard boot sequence is used, contains the boot source, either flash, net, prd to select the respective boot sequence to activate. It is only used when bootcmd contains the default startup script, which may be overridden by the user. default: flash
bootstopkey	Var	Defines the key phrase that the user needs to type to drop into the bootloader command line interface during startup. not set – use string “stop” as bootstop key phrase (default) <any> - use string <any> as bootstop key phrase
clear_config	Script	Erase config partition to restore factory defaults for Linux BSP settings.
clear_env	Script	Command script (use with “run clear_env”) that erases the U-Boot environment for the active image
disable_rollback	Var	0 – rollback when CRC check of kernel or rootfs fails (default) 1 – do not rollback
ethact	Var	Default network interface used by network commands (bootp, tftpboot et al) default: ppc_4xx_eth0
ethaddr	Auto	contains the default base MAC address of the board. If this is not set, the MAC address from VPD is used.
flash_update	Script	Command script to flash a Linux kernel and rootfs image transferred with tftpboot to the active Linux kernel and rootfs partition
loadaddr	Var	Default load address for network transfers. This is used as a temporary storage for netbooting and firmware updates. default: 0x20000000
memtest	Var	Controls POST memory test execution: 0: only data and address line test is executed 1: fast memory test with checkerboard pattern (tests 4MB of memory divided on different 128kB memory chunks) 2: full memory test with checkerboard pattern If not set, the fast memory test is performed

Table 4-3: Bootloader Shell Options (Continued)

Name	Type	Description
postresult	Auto	Stores the POST result 0 – no POST error occurred 1 – a POST error occurred
recover_flash	Script	Command script that is executed when the onboard flash is corrupted
reset_unknown	Var	0 – do not cold reset when unknown reset type is detected 1 – enable cold reset when unknown reset type is detected (default)
ignore_posterr	Var	0 – ignore POST errors (default) 1 – Start CLI on POST errors
uboot_flash_update	Script	Command script to flash a U-Boot binary image transferred with tftp-boot to the active image bootloader
watchdogboot	Var	0 – disable boot monitor watchdog 5...n – timeout in seconds before boot monitor watchdog fires default: 45 Note: This is the pBMWD watchdog.
watchdogos	Var	0 – disable OS load watchdog 15..dis.n – timeout in seconds before load OS watchdog fires default: 45 Note: This is the pOSWD watchdog.

There are three different types of bootloader environment variables:

- Script: The variable is a set of consecutive (more simple) bootloader commands to perform a specific task. A command script is invoked using the 'run <script>' syntax. E.g. the 'run clear_env' command would erase the bootloader environment sectors causing the bootloader to use its default environment upon next restart.
- Var: The variable controls a specific behaviour of the bootloader startup sequence. E.g. the 'bootdelay' variable controls the time u-boot waits before execution of the bootcmd which normally loads and starts the linux kernel.
- Auto: The variable is automatically set during bootloader startup sequence. E.g. the 'postresult' variable stores the result of the POST.

It is possible to modify envionment variables and start the pre-defined scripts form the bootloader shell. It is strongly discouraged to modify the pre-defined script variables. However, definition and execution of user-defined script variables can be done.



Note...

Meddling with the bootloader environment variables can affect significantly the startup sequence of the board and may cause the system to be un-bootable.

Modification of bootloader environment variables is done using the 'setenv' and 'saveenv' bootloader CLI commands. In the following example, the new environment script variable 'bootcmdmyscript' is defined. After that, the 'bootsource' is set to <myscript> causing the bootloader to execute <bootcmdmyscript> upon next restart. In addition, bootdelay is increased to 10. Finally, all changes are stored into flash environment sector.

```
=> setenv bootcmdmyscript 'bootp; tftpboot ${loadaddr} myimg.multi; bootm ${loadaddr}'
=> setenv bootsource myscript
=> setenv bootdelay 10
=> saveenv
```

Environment changes are stored in one of the redundant bootloader environment sectors. In case of failure (e.g. power loss), the settings of the redundant sector are still available. However, the fabric default setting is running with environment sectors erased. In this case the following startup message is displayed:

```
ENV: Using default environment
```

Any changes of the environment can be cleared using the 'clear_env' script (provided that 'clear_env' itself was not changed):

```
=> run clear_env
```

4.4 IPMI Firmware

The PPC communicates with the Peripheral Manager (PM) using a serial interface. The bootloader is able to communicate with the PM, e.g. for POST error logging purposes and fault resilient purposes.

The memory subsystem of the PM consists of an integrated flash memory to hold the PM operation code and integrated RAM for data. The field replaceable unit (FRU) inventory information is stored in the nonvolatile memory on an EEPROM connected via a local I2C interface to the PM microcontroller. It is possible to store up to 4 Kbytes within the FRU inventory information. Communication over IPMB bus e.g. to the BMC ensures that 'post-mortem' logging information is available even if the main processor becomes disabled.

The PM provides several I2C bus connections. One of them is used as the IPMB bus connections to the backplane, one for the Board Sensors and one is for local EEPROM storage.

If an IPMB bus fault or PM failure occurs, IPMB isolators are used to switch and isolate the backplane/system IPMB bus from the faulted Hub Board.

The onboard DC voltage, current, and temperature sensors are monitored by the PM microcontroller continuously. The PM will log an event into the local System Event Log (SEL) if any of the thresholds are exceeded.

To increase the reliability of the board management subsystem, an external watchdog supervisor for the PM is implemented. The PM strobes the external watchdog at one-second intervals to ensure continuity of operation of the board's management subsystem. If the PM ceases to strobe the watchdog supervisor for more than six seconds, the watchdog isolates the PM from the IPMBs and resets the PM. The watchdog supervisor does not reset the payload power and the restart of the PM will not affect the payload. The external watchdog supervisor is not configurable and must not be confused with the IPMI v1.5 watchdog timer commands.

4.4.1 Supported IPMI Commands

4.4.1.1 Standard Commands

Part of the command list in IPMI specification 2.0

M = mandatory, O = optional

Table 4-4: Standard Commands

Command	IPMI 2.0 Spec. section	NetFn	CMD	Support on CP3923
Get Device ID	20.1	App	01h	M / **Yes** [1]
Cold Reset	20.2	App	02h	O / **Yes**
Warm Reset	20.3	App	03h	O / No
Get Self Test Results	20.4	App	04h	O / No
Manufacturing Test On	20.5	App	05h	O / **Yes**
Set ACPI Power State	20.6	App	06h	O / No
Get ACPI Power State	20.7	App	07h	O / No
Get Device GUID	20.8	App	08h	O / No
Broadcast “Get Device ID”	20.9	App	01h	M / **Yes**
Reset Watchdog Timer	27.5	App	22h	O / **Yes**
Set Watchdog Timer	27.6	App	24h	O / **Yes**
Get Watchdog Timer	27.7	App	25h	O / **Yes**
Set BMC Global Enables	22.1	App	2Eh	O / No
Get BMC Global Enables	22.2	App	2Fh	O / No
Clear Message Flags	22.3	App	30h	O / No
Get Message Flags	22.4	App	31h	O / No
Enable Message Channel Receive	22.5	App	32h	O / No
Get Message	22.6	App	33h	O / No
Send Message	22.7	App	34h	O / **Yes**
Read Event Message Buffer	22.8	App	35h	O / No
Get BT Interface Capabilities	22.9	App	36h	O / No
Get System GUID	22.14	App	37h	O / No
Get Channel Authentication Capabilities	22.13	App	38h	O / No
Get Session Challenge	22.15	App	39h	O / No
Activate Session	22.17	App	3Ah	O / No
Set Session Privilege Level	22.18	App	3Bh	O / No
Close Session	22.19	App	3Ch	O / No
Get Session Info	22.20	App	3Dh	O / No
Get AuthCode	22.21	App	3Fh	O / No
Set Channel Access	22.22	App	40h	O / No
Get Channel Access	22.23	App	41h	O / No
Get Channel Info	22.24	App	42h	O / No
Set User Access	22.26	App	43h	O / No

Table 4-4: Standard Commands (Continued)

Command	IPMI 2.0 Spec. section	NetFn	CMD	Support on CP3923
Get User Access	22.27	App	44h	O / No
Set User Name	22.28	App	45h	O / No
Get User Name	22.29	App	46h	O / No
Set User Password	22.30	App	47h	O / No
Activate Payload	24.1	App	48h	O / No
Deactivate Payload	24.2	App	49h	O / No
Get Payload Activation Status	24.4	App	4Ah	O / No
Get Payload Instance Info	24.5	App	4Bh	O / No
Set User Payload Access	24.6	App	4Ch	O / No
Get User Payload Access	24.7	App	4Dh	O / No
Get Channel Payload Support	24.8	App	4Eh	O / No
Get Channel Payload Version	24.9	App	4Fh	O / No
Get Channel OEM Payload Info	24.10	App	50h	O / No
Master Write-Read	22.11	App	52h	O / **Yes**
Get Channel Cipher Suits	22.15	App	54h	O / No
Suspend/Resume Payload Encryption	24.3	App	55h	O / No
Set Channel Security Keys	22.25	App	56h	O / No
Get System Interface Capabilities	22.9	App	57h	O / No
Get Chassis Capabilities	28.1	Chassis	00h	O / **Yes**
Get Chassis Status	28.2	Chassis	01h	O / **Yes**
Chassis Control	28.3	Chassis	02h	O / **Yes**
Chassis Reset	28.4	Chassis	03h	O / No
Chassis Identify	28.5	Chassis	04h	O / No
Set Chassis Capabilities	28.7	Chassis	05h	O / No
Set Power Restore Policy	28.8	Chassis	06h	O / No
Get System Restart Cause	28.11	Chassis	07h	O / No
Set System Boot Options	28.12	Chassis	08h	O / No
Get System Boot Options	28.13	Chassis	09h	O / No
Get POH Counter	28.14	Chassis	0Fh	O / No
Set Event Receiver	29.1	S/E	01h	M / **Yes**
Get Event Receiver	29.2	S/E	02h	M / **Yes**
Platform Event (a.k.a. “Event Message”)	29.3	S/E	03h	M / **Yes**
Get PEF Capabilities	30.1	S/E	10h	O / No
Arm PEF Postpone Timer	30.2	S/E	11h	O / No
Get Device SDR Info	35.2	S/E	20h	M / **Yes**
Get Device SDR	35.3	S/E	21h	M / **Yes**
Reserve Device SDR Repository	35.4	S/E	22h	M / **Yes**

Table 4-4: Standard Commands (Continued)

Command	IPMI 2.0 Spec. section	NetFn	CMD	Support on CP3923
Get Sensor Reading Factors	35.5	S/E	23h	O / No
Set Sensor Hysteresis	35.6	S/E	24h	O / No
Get Sensor Hysteresis	35.7	S/E	25h	O / No
Set Sensor Threshold	35.8	S/E	26h	O / No
Get Sensor Threshold	35.9	S/E	27h	O / No
Set Sensor Event Enable	35.10	S/E	28h	O / No
Get Sensor Event Enable	35.11	S/E	29h	O / No
Re-arm Sensor Events	35.12	S/E	2Ah	O / No
Get Sensor Event Status	35.13	S/E	2Bh	O / No
Get Sensor Reading	35.14	S/E	2Dh	M / **Yes**
Set Sensor Type	35.15	S/E	2Eh	O / No
Get Sensor Type	35.16	S/E	2Fh	O / No
Get FRU Inventory Area Info	34.1	Storage	10h	M / **Yes**
Read FRU Data	34.2	Storage	11h	M / **Yes**
Write FRU Data	34.3	Storage	12h	M / **Yes**
Get SDR Repository Info	33.9	Storage	20h	O / No
Get SDR Repository Allocation Info	33.10	Storage	21h	O / No
Reserve SDR Repository	33.11	Storage	22h	O / No
Get SDR	33.12	Storage	23h	O / No
Add SDR	33.13	Storage	24h	O / No
Partial Add SDR	33.14	Storage	25h	O / No
Delete SDR	33.15	Storage	26h	O / No
Clear SDR Repository	33.16	Storage	27h	O / No
Get SDR Repository Time	33.17	Storage	28h	O / No
Set SDR Repository Time	33.18	Storage	29h	O / No
Enter SDR Repository Update Mode	33.19	Storage	2Ah	O / No
Exit SDR Repository Update Mode	33.20	Storage	2Bh	O / No
Run Initialization Agent	33.21	Storage	2Ch	O / No
Get SEL Info	40.2	Storage	40h	O / **Yes**
Get SEL Allocation Info	40.3	Storage	41h	O / **Yes**
Reserve SEL	40.4	Storage	42h	O / **Yes**
Get SEL Entry	40.5	Storage	43h	O / **Yes**
Add SEL Entry	40.6	Storage	44h	O / **Yes**
Partial Add SEL Entry	40.7	Storage	45h	O / No
Delete SEL Entry	40.8	Storage	46h	O / **Yes**
Clear SEL	40.9	Storage	47h	O / **Yes**

Table 4-4: Standard Commands (Continued)

Command	IPMI 2.0 Spec. section	NetFn	CMD	Support on CP3923
Get SEL Time	40.10	Storage	48h	0 / **Yes**
Set SEL Time	40.11	Storage	49h	0 / **Yes**
Get Auxiliary Log Status	40.12	Storage	5Ah	0 / No
Set Auxiliary Log Status	40.13	Storage	5Bh	0 / No

[1] Has oem extensions

4.4.1.2 Kontron OEM Commands and Extensions

Table 4-5: Kontron OEM Commands

Command	LUN	NetFn	CMD
OemApSetNvParam	3	3Eh	05h
OemApFormatStorage	3	3Eh	09h
OemApRefreshExternUpdatedSensor	3	3Eh	02h
OemApSetManufacturingDate	3	3Eh	0dh
OemApGetManufacturingDate	3	3Eh	0eh
OemApGetReleaseInfo	3	30h	01h
OemApGetFirmwareCapabilities	3	30h	03h
OemApSetFirmwareCapabilities	3	30h	04h
OemApInitMemoryErase	3	30h	A0h

Get Device ID Command with OEM Extensions

	LUN	NetFn	CMD
Get Device ID command with OEM extensions	3	App = 06h	01h

	Byte	Data Field
Request Data	-	-
Response Data	1	Completion Code
	2	Device ID, returned as 0fh.
	3	Device Revision. [7] returned as 1 = device provides device SDRs [6..4] Reserved. Returned as 0. [3..0] Device Revision, binary encoded, returned as 0.
	4	Firmware Revision 1 [7] Device available. Returned as 0 (normal operation). [6..0] Major Firmware Revision, binary encoded, returned as 5.
	5	Firmware Revision 2 Minor Firmware Revision, BCD encoded, returned as 24h.
	6	IPMI Version, returned as 51h
	7	Additional Device Support [7] Chassis device, returned as 1 [6] Bridge, returned as 0 [5] IPMB Event Generator, returned as 1 [4] IPMB Event Receiver, returned as 1 [3] FRU Inventory Device, returned as 1 [2] SEL Device, returned as 1 [1] SDR Repository Device, returned as 0 [0] Sensor Device, returned as 1
	8..10	Manufacturer ID, LS Byte first Returned as 3A98h
	11..12	Product ID, LS Byte first Returned as 6A5h
	13..16	Auxiliary Firmware Revision Information Byte 13: Sensor Data Record Version Byte 14: Slot ID Byte 15: Firmware Maintenance Revision Byte 16: Unused
	2	Device ID, returned as 0fh.

oemApSetNvParam

	LUN	NetFn	CMD
oemApSetNvParam	3	OEM = 3Eh	05h

	Byte	Data Field
Request data	1...4	Pass Code 0: ~'K' (0xBA) Pass Code 1: ~'o' (0x90) Pass Code 2: ~'n' (0x91) Pass Code 3: ~'t' (0x8B)
	5	Command Flag: [7..2] reserved [1] 1=set values, 0= get values [0] is cold reset required flag
	6	Operation Mode: [7..5] reserved [4] IPMB Mode: 1=redundant, 0= non-redundant [3..1] reserved [0] Controller mode: 1=BMC mode, 0=Satellite Mode
	7	KCS IRQ: default is 11h
Response data	1	Completion code

OemApFormatStorage

	LUN	NetFn	CMD
OemApFormatStorage	3	OEM = 3Eh	09h

	Byte	Data Field
Request data	1...4	Pass Code 0: ~'K' (0xBA) Pass Code 1: ~'o' (0x90) Pass Code 2: ~'n' (0x91) Pass Code 3: ~'t' (0x8B)
Response data	1	Completion Code

Oem Refresh Extern Updated Sensor

	LUN	NetFn	CMD
OemRefreshExternUpdatedSensor	3	OEM = 3Eh	02h

	Byte	Data Field
Request data	1...4	Pass Code 0: ~'K' (0xBA) Pass Code 1: ~'o' (0x90) Pass Code 2: ~'n' (0x91) Pass Code 3: ~'t' (0x8B)
	4..N	Externally Updated Sensor Values
Response data	1	Completion Code

OemApSetManufacturingDate

	LUN	NetFn	CMD
OemApSetManufacturingDate	3	OEM = 3Eh	0dh

	Byte	Data Field
Request data	1...4	Token Pass Code 0: ~'K' (0xBA) Pass Code 1: ~'o' (0x90) Pass Code 2: ~'n' (0x91) Pass Code 3: ~'t' (0x8B)
	5...7	Manufacturing Date
Response data	1	Completion Code

OemApGetManufacturingDate

	LUN	NetFn	CMD
OemApGetManufacturingDate	3	OEM = 3Eh	0eh

	Byte	Data Field
Request data	1...4	Pass Code 0: ~'K' (0xBA) Pass Code 1: ~'o' (0x90) Pass Code 2: ~'n' (0x91) Pass Code 3: ~'t' (0x8B)
Response data	1	Completion Code
	2...4	Manufacturing Date

OemApGetReleaseInfo

This command returns firmware related release information.

	LUN	NetFn	CMD
OemApGet ReleaseInfo	3	OEM = 30h	01h

	Byte	Data Field
Request data	1	Pass Code 0: ~'S'
	2	Pass Code 1: ~'1'
	3	Pass Code 2: ~'8'
	4	Pass Code 3: ~'0'
	5	Pass Code 4: ~'0'
Response data	1	Completion Code.
	2...5	Release Code
	6...13	Subrelease Release Code
	14...21	Date Code

OemApGetFirmwareCapabilities

This command retrieves the firmware capabilities vector.

	LUN	NetFn	CMD
OemApGetFirmwareCapabilities	3	OEM = 30h	03h

	Byte	Data Field
Request data	1	Pass Code 0: ~'S'
	2	Pass Code 1: ~'1'
	3	Pass Code 2: ~'8'
	4	Pass Code 3: ~'0'
	5	Pass Code 4: ~'0'
Response data	1	Completion Code.
	2..19	Firmware capabilities vector

OemApSetFirmwareCapabilities

This command sets the firmware capabilities vector.

	LUN	NetFn	CMD
OemApSetFirmwareCapabilities	3	OEM = 30h	04h

	Byte	Data Field
Request data	1	Pass Code 0: ~'S'
	2	Pass Code 1: ~'1'
	3	Pass Code 2: ~'8'
	4	Pass Code 3: ~'0'
	5	Pass Code 4: ~'0'
	6...23	Firmware capabilies vector
Response data	1	Completion Code.

OemApInitMemoryErase

This command initiates the memory erase process.

	LUN	NetFn	CMD
OemApInitMemoryErase	3	OEM = 30h	a0h

	Byte	Data Field
Request data	1	Pass Code 0: ~'S'
	2	Pass Code 1: ~'1'
	3	Pass Code 2: ~'8'
	4	Pass Code 3: ~'0'
	5	Pass Code 4: ~'0'
	6	Action: 00h: memory erase one time 01h: init memory erase (short term) 02h: init memory erase (long term)
Response data	1	Completion Code.

4.4.2 Board Sensors

The Management Controller includes many sensors for voltage, current and temperature monitoring and various others for pass/fail type signal monitoring.

Every sensor is associated with a Sensor Data Record (SDR). Sensor Data Records contain information about the sensors identification such as sensor type, sensor name, sensor unit. SDRs also contain the configuration of a specific sensor such as thresholds, hysteresis, event generation capabilities, etc. that specify the sensor's behavior. Some fields of the sensor SDR are configurable through IPMI v1.5 command and are set to a built-in initial value.

Module sensors that have been implemented are listed in the sensor list in Table 4-6.

4.4.2.1 Sensor List

The sensor name (ID string) has a name prefix which is 'Sxx:' in the lists below. When reading the sensor name after module insertion this prefix becomes automatically adapted to the role (BMC or PM) and the physical position (slot number) of the module in a rack. If the module's Management Controller is set up as a BMC the prefix will be 'BMC:' independent of the slot where it resides. If the module's Management Controller is set up as a SMC the prefix will be 'Sxx:' where xx is the slot number (e.g. 09).

The sensor number is the number which identifies the sensor e.g. when using the IPMI command “Get Sensor Reading”.

Table 4-6: Sensor List

Sensor Number / ID string	Sensor Type (CODE)	Event Type Code / Event Offsets
NA / CP3923	NA (Management Controller Locator Record)	NA
1 / IPMI Info-1	C0h (OEM Kontron IPMI Firmware Info)	Event Type: A0h (Discrete)
2 / IPMI Info-2	C0h (OEM Kontron IPMI Firmware Info)	Event Type: A0h (Discrete)
3 / Storage Err	28h (Management Subsystem Health)	Event Type: 6Fh (Sensor Specific) Refer to IPMI v1.5
4 / PM Reboot	24h (Platform Alert)	Event Type 03h (Generic) Offset 0: Reset Asserted
5 / SEL State	10h (Event Logging Disabled)	Event Type: 6Fh (Sensor Specific) Refer to IPMI v1.5 Offset 2: Log Area Reset/Cleared Offset 4: SEL full Offset 5: SEL almost full (75%)
6 / IPMI Wdt	23h (Watchdog 2)	Event Type: 6Fh (Sensor Specific) Refer to IPMI v1.5
7 / Board Reset	CFh (Kontron OEM)	Event Type: 03h (Digital Discrete) Offset 1: Event data 2: reset type 01h cold reset Event data 3: reset source 00h IPMI watchdog 01h IPMI command 04h reset button 05h Power Up 07h PPC watchdog 08h SW initiated FFh unknown
8 / HandleSwitch	24h (Platform Alert)	Event Type: 6Fh Offset 0: assertion Handle state opened
9 / Health Error	24h (Platform Alert)	Event Type: 03h (Digital Discrete) Offset 0: System is unhealthy
10 / Temp-PCB1	01h (Temperature)	Event Type: 01h (Threshold)
11 / Temp-PHY1	01h (Temperature)	Event Type: 01h (Threshold)
12 / Temp-PHY2	01h (Temperature)	Event Type: 01h (Threshold)
13 / Vcc5.0vCPCI	02h (Voltage)	Event Type: 01h (Threshold)
14 / Icc5.0vCPCI	03h (Current)	Event Type: 01h (Threshold)
15 / Vcc3.3vCPCI	02h (Voltage)	Event Type: 01h (Threshold)
16 / Icc3.3vCPCI	03h (Current)	Event Type: 01h (Threshold)
17 / Vcc3.3vCPLD	02h (Voltage)	Event Type: 01h (Threshold)
18 / Vcc3.3vSUS	02h (Voltage)	Event Type: 01h (Threshold)
19 / Vcc3.3v	02h (Voltage)	Event Type: 01h (Threshold)
20 / Vcc2.5v	02h (Voltage)	Event Type: 01h (Threshold)
21 / Vcc1.8v	02h (Voltage)	Event Type: 01h (Threshold)
22 / Vcc1.25v	02h (Voltage)	Event Type: 01h (Threshold)
23 / Vcc1.2v	02h (Voltage)	Event Type: 01h (Threshold)

Table 4-6: Sensor List (Continued)

Sensor Number / ID string	Sensor Type (CODE)	Event Type Code / Event Offsets
24 / Vcc0.9vVREF	02h (Voltage)	Event Type: 01h (Threshold)
25 / Vcc0.9vVTT	02h (Voltage)	Event Type: 01h (Threshold)
26 / Vcc 5.0vIPMB	02h (Voltage)	Event Type: 01h (Threshold)
35 / POST Value	C6h (Kontron OEM)	Event Type: 6Fh (Sensor Specific) Offset 0Eh: POST Error Event Data 2: POST code
36 / Boot Error	1Eh (Boot Error)	Event Type: 6Fh (Sensor Specific) Refer to IPMI v1.5
37 / Fwupg Status	CAh (Firmware Upgrade Status)	Event Type: 6Fh (Sensor Specific) Offset 0: Firmware upgrade in progress Offset 1: Firmware upgrade succeeded
38 / Memory State	24h (Platform Alert)	Event Type: 6Fh (Sensor Specific) Offset 0: memory clear finished Offset 1: memory clear not finished
39 / Diag Status	C9h (Diagnostic Status)	Event Type: 6Fh (Sensor Specific) Offset 0: Diagnostic Started Offset 1: Diagnostic PASS Offset 2: Diagnostic FAIL

4.4.2.2 Sensor Thresholds

Following tables show sensor thresholds for temperature, voltage and current sensors.

Table 4-7: Temperature Sensor Thresholds [°C]

SENSOR Number/ ID string	Lower critical	Lower non critical	Nominal	Upper non critical	Upper critical	Upper Non Recoverable
10 / Temp-PCB1	NA	NA	NA	75	85	95
11 / Temp-PHY1	NA	NA	NA	115	125	135
12 / Temp-PHY2	NA	NA	NA	115	125	135

Table 4-8: Voltage/Current Sensor Thresholds

SENSOR Number / ID string	Lower critical	Lower non critical	Nominal	Upper non critical	Upper critical	Upper Non Recoverable
13 / Vcc5.0vCPCI	4.760 V	NA	5.00 V	NA	5.236 V	NA
14 / Icc5.0vCPCI	NA	NA	NA	NA	9.94 A	NA
15 / Vcc3.3vCPCI	3.136 V	NA	3.30 V	NA	3.456 V	NA
16 / Icc3.3vCPCI	NA	NA	NA	NA	9.75 A	NA
17 / Vcc3.3vCPLD	3.136 V	NA	3.30 V	NA	3.456 V	NA
18 / Vcc3.3vSUS	3.136 V	NA	3.30 V	NA	3.456 V	NA
19 / Vcc3.3v	3.136 V	NA	3.30 V	NA	3.456 V	NA
20 / Vcc2.5v	2.376 V	NA	2.50 V	NA	2.628 V	NA
21 / Vcc1.8v	1.715 V	NA	1.80 V	NA	1.891 V	NA
22 / Vcc1.25v	1.196 V	NA	1.23 V	NA	1.264 V	NA

Table 4-8: Voltage/Current Sensor Thresholds (Continued)

SENSOR Number / ID string	Lower critical	Lower non critical	Nominal	Upper non critical	Upper critical	Upper Non Recoverable
23 / Vcc1.2v	1.166 V	NA	1.23 V	NA	1.264 V	NA
24 / Vcc0.9vVREF	0.853 V	NA	0.90 V	NA	0.941 V	NA
25 / Vcc0.9vVTT	0.853 V	NA	0.90 V	NA	0.941 V	NA
26 / Vcc 5.0vIPMB	4.855 V	NA	5.00 V	NA	5.236 V	NA

Note...

LNR (Lower Non Recoverable) and UNR (Upper Non Recoverable) values and values marked n.a. are not defined.

4.4.3 Board FRU Information

This FRU information contains the IPMI defined Board and Product Information areas that hold the part number and serial number of the board.

The Internal Use Area is preallocated to 384 bytes and is free for customer use. This FRU information responds to FRU ID #0, which is the ID for the PM.

4.4.3.1 Structure and Functionality

The Management Controller provides 4 kB non-volatile storage space for FRU information.

Full low level access to read or write a module's FRU Information is provided by regular IPMI FRU Device commands. Please be careful when writing FRU information directly using standard IPMI commands because there is no write protection.

4.4.3.2 Board Specific FRU Data

Supported are the following FRU data areas and data fields (shown values are examples, which may differ, depending on the used board typ):

FRU Board Info Area

- Manufacturing date / time
- Board manufacturer: "Kontron"
- Board Product Name: " CP3923-8M"
- Board Serial Number : "1234567890" *)
- Board Part Number: "S1800"
- FRU File ID: "FRU-S1800-CP3923-8M-XX" (XX - template file version)

FRU Product Info Area

- Manufacturing date / time
- Product manufacturer: "Kontron"
- Product Name: "CP3923-8M"
- Product Part Number: "1036-8076"
- Product Version: "01"
- Product Version: "FRU-S1800-CP3923-8M-XX" (XX - template file version)
- Product Serial Number: "1234567890" *)
- Asset Tag: "0000000000"

*) Shown values are examples.

4.5 Firmware Administration

A running CP3923 system requires – after the bootloader has passed control to the kernel – the kernel itself, the root file system (initrd) and the FASTPATH switching application. These software components make up the CP3923 firmware.

The board supports two permanent storage devices, one is an on-board integrated 64 MB NOR flash that is also used as the power-up boot source and contains bootloader as well as operating system and application data. The other is an onboard NAND flash device with 1GB in size that can be used to hold image data if the board is operated as a TFTP server for CPU blades in a system.

The onboard NOR flash is logically divided into two banks, where the first bank is used during normal system operation. The second bank contains an exact copy of the first bank and can be used to restore normal system operation in case the first bank contains an invalid boot image. The first bank involves flash partitions mtd0-4 whereas the second bank is stored in partition mtd5. Partition mtd6 holds the bootloader boot firmware which is stored in one single write-protected flash sector. The partition scheme of the flash is shown below:

Table 4-9: On-board NOR FLASH Partition Scheme (64MB)

Physical Address	Offset in Flash	Size	Linux Partition	Designation	Description
0xFC000000	0x0000000	512KB	mtd0	u-boot	Secondary bootloader based on U-Boot
0xFC080000	0x0080000	128KB	mtd1	vpd	Vital Product Data
		128KB		inv	Inventar Data
0xFC0C0000	0x00C0000	128KB	mtd2	env	Redundant bootloader environment (each 128 KB)
0xFC0E0000	0x00E0000	128KB			
0xFC100000	0x0100000	26112KB	mtd3	kernel	Linux system (kernel and initrd multi image)
0xFDA80000	0x1A80000	5376KB	mtd4	config	Read/Write Configuration data
0xFDFC0000	0x1FC0000	32512KB	mtd5	backup	Contains backup image. Verbatim copy of mtd0-4
0xFFF80000	0x3F80000	512KB	mtd6	boot-fw	Write protected boot firmware based on U-Boot



Note...

The board does support OS images up to 25.5 MB size.



Note...

Note that only flash partition mtd4 is using the JFFS2 file system for storage. All other flash partitions are not formatted and accessible from linux only as raw devices.

Note...



The u-boot boot loader uses one flash sector for storing its environment variables. These can be saved and manipulated from the u-boot CLI and using linux tools. To enable atomic updates of the environment variables, u-boot uses redundant environment sectors; in case of a failure in completely writing the current sector (e.g. due to loss of power or reset during writes), it will automatically use the redundant environment. Therefore each boot monitor uses two flash sectors (partition mtd2) for storing its environment and redundant copy.

A complete software release for the CP3923 consists of three files:

- cp3923-update-<release>.pkg
- cp3923-ipmi-<release>.hpm
- cp3923-8727-firmware.<release>.tar

In the following, the CLI commands to setup and copy FW images and the CLI commands necessary to perform firmware upgrades are described.

The CLI commands described below are executed in the privileged mode of the CLI hierarchy, which is entered by executing the 'enable' command. Please refer to the "CP3923 CLI Reference Manual" for more information regarding the CLI commands and the way to use them.

4.5.1 Updating Firmware

The firmware - including bootloader - image is updated using the CLI. The following precautions are met to ensure a reliable and failsafe update procedure:

- Two independent system partitions, containing system 1 and system 2 firmware. The active system is always system 1. System 1 is stored in flash mtd partitions mtd0-4, system 2 is a verbatim copy of system 1 and is stored in flash partition mtd5 as a whole. This allows flash recovery from the redundant system in case that update fails due to power loss or similar errors.

The system update package(cp3923-update-<release>.pkg) contains an image of bootloader, kernel, root filesystem and config partition as well as a MD5 checksum file for consistency check.

When performing a firmware update, the software package is loaded from a remote TFTP server. A software update of the CP3923 CPCI Switch is done by performing the following steps:

1. Prepare network access of the board
2. Log in to the privileged exec mode of the CLI of the board
3. Copy system image into the system 1 of the flash memory.

```
(Ethernet Fabric) #copy tftp://192.168.50.154/CP3923-update-GA-2.00.pkg image1
(Ethernet Fabric) #
```

4. Check availability of valid boot image in image1 using the command ‘show bootvar’

```
(Ethernet Fabric) #show bootvar
Image Descriptions
    image1 : Product ID      : 1800
             Product Variant : 0
             U-Boot Release  : GA 2.00
             Manufacturer ID : 15000
             Build-Date      : 20100520030324
    image2 : Product ID      : 1800
             Product Variant : 0
             U-Boot Release  : BETA 1.00
             Manufacturer ID : 15000
             Build-Date      : 20100119185922

Images currently available on Flash

  active (image1)  backup (image2)
  ---------------- ----------------
  GA 2.00          BETA 1.00

Restart the board

(Ethernet Fabric) #reload
```

5. In case of problems with booting the sysetm, last working image2 will automatically be copied to image1. This procedure restores normal system behaviour. Configuration settings made with image1 are lost and shoud be saved by copying image1 to image 2 before.
6. It is recommended to copy image 1 to image 2 to have a fully redundant system

```
(Ethernet Fabric) #copy image1 image2
Copying image1 to image2

(Ethernet Fabric) #
```

The image will be copied including the configuration settings currently stored for image 1

4.5.2 Updating IPMI

Updating the IPMI firmware is done with the “copy” command. In case that the update procedure fails or the update image is corrupted, the PM will be able to restart by means of its rollback functionality.

The IPMI firmware package file is provided in HPM.1 format and is stored in the data/update directory of the release directory tree.

```
(Ethernet Fabric) #copy tftp://192.168.50.5/cp3923-ipmi-GA-2.00.pkg nvram:ipmi

Flashing a new IPMI firmware will disable the IPMI Controller for some minutes.
Are you sure to update the IPMI firmware? (y/n)y
...

(Ethernet Fabric) #
```

5 Thermal Considerations

The CP3923 has three temperature sensors which ensure operation within the specified temperature limits. The CP3923-RC has a different set of sensors than the non-conduction-cooled versions. Sensor data is accessible via the Peripheral Manager. Although temperature sensing information is made available to the PM, the CP3923 itself does not provide any active means of temperature regulation.

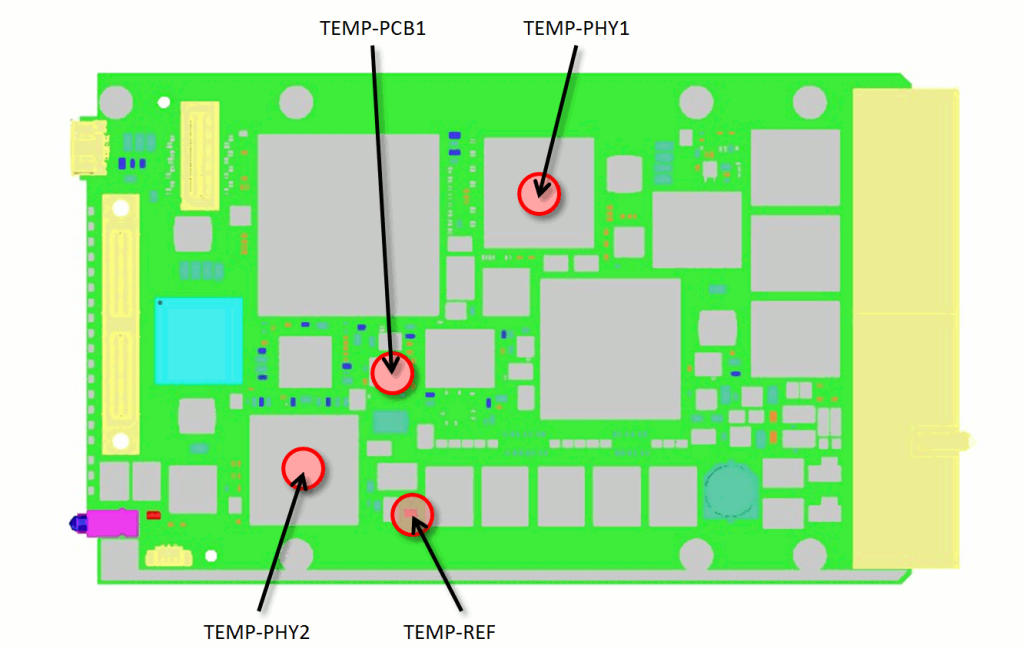
Table 5-1: Temperature Sensors

Sensor Name	Board version				Position
	8C	4M	8M	RC	
TEMP-PCB1	X	X	X	X	Upper PCB area
TEMP-PHY1	X	X	X	X	Octal GbE PHY #1 (internal sensor)
TEMP-PHY2	X	X	X		Octal GbE PHY #2 (internal sensor)
TEMP-REF				X	Near Reference Point

The complete list of sensors and their alarm thresholds can be found in chapter “Board Sensors” on page 60.

As long as the temperature values stay below their upper critical threshold, all components on the CP3923 are considered to be operated within their specified temperature range.

Figure 5-1: Temperature Sensors Location



When developing applications using the CP3923, the system integrator must be aware of the overall system thermal requirements. A system chassis must be provided which satisfy these requirements.

Measurements proofed that following conditions (maximum ambient temperature under maximum load) are possible while all temperatures of on-board components stay below their critical thresholds.

Table 5-2: Thermal Requirements

Device	Operation Mode	Cooling	Maximum Temperature
CP3923-8C	8x 1Gbps traffic rear 8x 1Gbps traffic front ports	Forced Air > 1.5 m/s	85°C
	8x 1Gbps traffic rear 8x 100Mbps traffic front ports	Natural Convection	65°C
CP3923-8M	8x 1Gbps traffic rear 8x 100Mbps traffic front ports	Natural Convection	65°C
	4x 1Gbps traffic rear 8x 100Mbps traffic front ports	Natural Convection	70°C 85°C (for 15 min)
CP3923-4M	8x 1Gbps traffic rear 4x 100Mbps traffic front ports	Natural Convection	65°C
	4x 1Gbps traffic rear 4x 100Mbps traffic front ports	Natural Convection	70°C 85°C (for 15 min)
CP3923-RC	8x 1Gbps traffic rear	Conduction Cooling	85°C

For the CP3923-RC, the specified temperature refers to the mean temperature of both spacers (metal strips along the PCB edge, bottom side) - these are the reference points according Vita 47.1. The IPMI temperature sensor TEMP-REF is located close to one of the spacers. The value measured by this sensor is 5°C higher than the reference point temperature. This difference is almost constant over the specified temperature range with an accuracy of +/- 1°C.

The temperature at the reference point (or of sensor TEMP-REF) provides an indication of the overall thermal conditions. The relation between the reference temperature value and the ambient temperature strongly depends on the construction of the conduction cooled frame. Using a frame with good conduction cooling capabilities can decrease the difference between reference and ambient temperature.



Note...

The holdup time of the real time clock (all CP3923 versions) is up to 2 weeks under moderate storage temperature conditions. It may decrease at lower or higher temperatures (aberration is not qualified).



WARNING

As Kontron assumes no responsibility for any damage to the CP3923 or other equipment resulting from overheating any of the components, it is highly recommended that system integrators as well as end users confirm that the operational environment of the CP3923 complies with the thermal considerations set forth in this document.



6 Power Considerations

6.1 System Power

The considerations presented in the ensuing chapters must be taken into account by system integrators when specifying the CP3923 system environment.

6.1.1 Baseboard

The CP3923 baseboard 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 board is supplied by the 3.3V and the 5.0V from the backplane. All supply voltages from the backplane are enabled with a predefined ramp-up time. The inrush current is limited by Hot-Swap controllers.

The table below indicates the absolute maximum input voltage ratings that must not be exceeded. Power supplies to be used with the CP3923 should be carefully tested to ensure compliance with these ratings.

Table 6-1: Maximum Input Power Voltage Limits

Supply Voltage	Maximum permitted Voltage
+3.3 V	+3.6 V
+5 V	+5.5 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.

6.1.2 Backplane

Backplanes to be used with the CP3923 must be adequately specified. The backplane must provide optimal power distribution for the +3.3 V and +5 V power inputs.

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.

6.1.3 Power Supply Units

Power supplies for the CP3923 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 CP3923 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 backplane input line resistance variations due to temperature changes, etc.



Note...

Non-industrial ATX PSUs require a greater minimum load than a single CP3923 is capable of creating. When a PSU of this type is used, it will not power up correctly and the CP3923 may hang up. The solution is to use an industrial PSU or to add more load to the system.

6.1.3.1 Start-up Requirement

Power supplies must comply with the following guidelines, in order to be used with the CP3923:

- The input voltage shall rise at a rate of max. 1.5A per 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.

6.1.3.2 Power-up Sequence

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

Both voltages must reach their minimum in-regulation level not later than 20 ms after the output power ramp start.

6.1.3.3 Tolerance

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

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

Table 6-2: Input Voltage Characteristics

Voltage	Nominal Value	Tolerance	Maxi. Ripple (p-p)	Remarks
5 V	+5.0 VDC	+5%/-3%	50 mV	Main Voltage
3.3 V	+3.3 VDC	+5%/-3%	50 mV	-
VI/O (PCI) Voltage	+3.3 VDC or +5 VDC	+5%/-3%	50 mV	-
GND	Ground, not directly connected to potential earth (PE)			

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.

6.1.3.4 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.

WARNING

All of the input voltages must be functionally coupled to each other so that if one input voltage fails, the other input voltages must be regulated proportionately to the failed voltage. For example, if the +5V begins to decrease, +3.3V must decrease accordingly. This is required in order to preclude cross currents within the CP3923.

Failure to comply with above may result in damage to the board or improper system operation.

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 the 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.

6.2 Power Consumption

Typical idle and traffic operational (all ports, maximum speed) power values were measured. The maximum value is the typical value plus 10%, accounting for additional load which depends on the actual setup.

If not all ports are operated, the total power is reduced by 420mW per port (1000Base-T).



Note...

The power consumption values indicated in the tables below can vary depending on the ambient temperature or the system performance. This can result in deviations of the power consumption values of up to 10%.

Table 6-3: Input Current and Power

		5V input current/A	3V3 input current/A	Total power /W
CP3923-8C	Idle typ	1.38	1.25	11
	Traffic typ	2.5	1.38	17.2
	Traffic max	2.8	1.51	19.3
CP3923-8M	Idle typ	1.38	1.25	11
	Traffic typ	2.1	1.33	14.8
	Traffic max	2.3	1.43	17.4
CP3923-4M	Idle typ	1.38	1.25	11
	Traffic typ	1.8	1.33	13.4
	Traffic max	2.0	1.43	14.7
CP3923-RC	Idle typ	1.38	1.25	11
	Traffic typ	1.5	1.33	11.9
	Traffic max	1.7	1.43	13.2

6.2.1 Start-up Currents

The start-up currents of the CP3923 during the first 2-3 seconds after power has been applied (power-on or hot-swap insertion) are less than the maximum currents given in Table 6-3 for each of the variants.

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