



CPC514

3U CPCI Serial Elbrus CPU Module

User Manual

Rev. 002

November 2020



The product described in this manual is compliant with all related CE standards.

Product Title: CPC514
Document name: CPC514 User Manual
Manual version: 002
Ref. docs:

Copyright © 2020 Fastwel Co. Ltd. All rights reserved.

Revision Record

Rev. Index	Brief Description	Product Index	Date
001	Preliminary version	CPC514	February 2019
002	Compliance assessment	CPC514	November 2020

Contact Information

Fastwel Co. Ltd
Address: 108 Profsoyuznaya St.,
Moscow 117437,
Russian Federation
Tel.: +7 (495) 232-1681
Fax: +7 (495) 232-1654

E-mail: info@fastwel.com
Web: <http://www.fastwel.com/>

Fastwel Corporation US
6108 Avenida Encinas,
Suite B, Carlsbad,
CA92011, USA
Tel.: **+1 (858) 488-3663**
E-mail: info@fastwel.com

Table of Contents

Table of Contents.....	1
List of Tables.....	2
List of Figures.....	3
Conventions.....	5
General rules of usage	7
Manufacturer's warranties.....	7
Transportation, Unpacking and Storage	9
1 Introduction.....	11
1.1 General features.....	11
1.2 Differences in the general features of the CPC514RC Module	13
1.3 CPC514 Module versions	13
1.4 Delivery checklist of the module.....	13
1.5 Packaging information.....	14
1.6 Location of elements.....	14
2 Functional description.....	21
2.1 Block diagram.....	21
2.2 Specific features of the functional nodes operation	22
2.3 Module's interfaces	23
2.4 LEDs	27
2.5 Configuration switches	28
2.6 Power supply interaction	28
3 Installation.....	32
3.1 Safety requirements.....	32
3.2 Module installation procedure.....	33
3.3 Procedure for module's removal.....	34
4 Setting Operation Modes.....	36
4.1 Reset the loader to default settings, enable Transparent mode, loader microchip protection against rewriting.....	36
4.2 Loader settings reset sequence.....	37
4.3 Starting the BOOT SETUP subprogram.....	38
4.4 Updating the loader's code.....	38
4.5 Boot disk configuration.....	38
5 Additional system settings.....	39
5.1 Cooling system of CPC514/CPC514RC	39
5.2 Power consumption	40
5.3 Operating conditions	40
ANNEX A:	42
ANNEX B: DICSLAIMER.....	43

List of Tables

Table 1-1:	Version of the CPC514 module	13
Table 1-2:	Delivery checklist of the CPC514	13
Table 1-3:	Packaging information	14
Table 2-1:	Device addresses on SMBus	23
Table 2-2:	Assignment of the XS4 connector pins for installing the mezzanine module	24
Table 2-3:	Assignment of pins of the XP6 programming and debugging control microcontroller	26
Table 2-4:	Assignment of microchip programming connector with the XP3 bootloader code	26
Table 2-5:	Assignment of pins of the JTAG connector for XS6 processor debugging	26
Table 2-6:	Assignment of COM1 connector contacts and DisplayPort XP1 settings	27
Table 2-7:	Designations and functions of the LEDES in CPC514/CPC514RC	27
Table 2-8:	Assignment of configuration switches	28
Table 3-1:	Purpose of the configuration switches	37
Table 5-1:	Power supply voltage	40
Table 5-2:	External influencing factors	41
Table A-1:	Terms, acronyms and abbreviations	42

List of Figures

Figure 1-1:	External view of CPC514.....	14
Figure 1-2:	External view of CPC514RC	15
Figure 1-3:	Overall dimensions of the CPC514 module.....	16
Figure 1-4:	Overall dimensions of the CPC514RC module.....	17
Figure 1-5:	Location of the main components of the CPC514/CPC514RC elements block, top view.....	18
Figure 1-6:	The location of the main components of the CPC514/CPC514RC elements block, bottom view....	18
Figure 1-7:	Front panel of the CPC514 Module	19
Figure 1-8:	Front panel of the CPC514RC Module	20
Figure 2-1:	Block diagram of the CPC514/CPC514RC module.....	21
Figure 2-2:	Numbering of interfaces supported by the CPC514/CPC514RC module in the Compact PCI Serial backplane	25
Figure 2-3:	Algorithm of the system initial start from the “Mechanical Shutdown” state.....	29
Figure 2-4:	Algorithm for shutting down the system with the extractor’ handle button, Power Button, or using software via ACPI.....	30
Figure 2-5:	Algorithm for enabling the system from the “software shutdown state”.....	31
Figure 3-1:	Installing the module to the system enclosure.....	33
Figure 4-1:	Switch SA1 in CPC514.....	36
Figure 4-2:	Switch SA2 in CPC514.....	36

All information in this document is provided for reference only, with no warranty of its suitability for any specific purpose. This information has been thoroughly checked and is believed to be entirely reliable and consistent with the product that it describes. However, Fastwel accepts no responsibility for inaccuracies, omissions or their consequences, as well as liability arising from the use or application of any product or example described in this document.

Fastwel Co. Ltd. reserves the right to change, modify, and improve this document or the products described in it, at Fastwel's discretion without further notice. Software described in this document is provided on an "as is" basis without warranty. Fastwel assumes no liability for consequential or incidental damages originated by the use of this software.

This document contains information, which is property of Fastwel Co. Ltd. It is not allowed to reproduce it or transmit by any means, to translate the document or to convert it to any electronic form in full or in parts without antecedent written approval of Fastwel Co. Ltd. or one of its officially authorized agents.

Fastwel and Fastwel logo are trademarks owned by Fastwel Co. Ltd., Moscow, Russian Federation. CompactPCI is a trademark of the PCI industrial Computers Manufacturers Group. Ethernet is a registered trademark of Xerox Corporation. IEEE is a registered trademark of the Institute of Electrical and Electronics Engineers Inc. Intel is a trademark of Intel Corporation. Pentium M and Celeron M are trademarks of Intel Corporation. Microsoft is a trademark of the Microsoft Corporation. In addition, this document may include names, company logos and trademarks, which are registered trademarks and, therefore, are property of their respective owners.

Fastwel welcomes suggestions, remarks and proposals regarding the form and the content of this Manual.

Ownership rights

This document contains information that is the property of Fastwel Group. It may not be copied or transmitted by any known means, nor may it be stored in information storage and retrieval systems without the prior written consent of Fastwel Group or one of its authorized agents. The information contained in this document, to the best of our knowledge, is free from any errors, however, Fastwel Group accepts no responsibility for any inaccuracies and their consequences, as well as liability arising from the use or application of any diagram, product or example given in this document. Fastwel Group reserves the right to change and improve both this document and the product presented inside of it at its discretion without any further notice.

Safety requirements

This Fastwel Group's product is developed and tested for the purpose of ensuring compliance to the electric safety requirements. Its design provides long-term trouble-free operation. The service life of the product can be significantly reduced due to the improper handling during unpacking and installation. Therefore, in the interests of your safety and in order to ensure proper operation of the product, you should follow the recommendations below.

Conventions



Caution, High Voltage!

This sign and text warn of the dangers associated with electrical discharges (> 60 V) when touching the device or any part of it. Failure to follow the precautions mentioned or prescribed in the regulations may endanger your life or health, and may result in damages to the equipment. Please also read the below subparagraph dedicated to the rules for working with high voltage.



Attention! Static-sensitive device!

This sign and text indicate that electronic boards and their components are sensitive to static electricity, so care should be taken when handling this device and performing inspections to ensure integrity and functionality of the device.



Attention! Hot surface!

This sign and text warn of the danger associated with touching hot surfaces of the device.



Attention!

This sign is aimed at drawing your attention to aspects of this User Manual that, if not fully understood or ignored, may endanger your health or cause damages to the equipment.



Note

This sign is used to text fragments that should be read carefully.

Safety requirements

This Fastwel Group product has been developed and tested to ensure compliance with electrical safety requirements. Its design provides long-term fail-safe operation. The product's life cycle may be significantly shortened due to mishandling during unpacking and installation. Therefore, for your own safety and for ensuring proper operation of the device, you should follow the recommendations given below.

Rules for safe handling with high voltage



Attention!

All operations with this device should only be performed by personnel with sufficient qualifications.



Caution, High Voltage!

Before installing the board in the system, make sure that the mains power supply is off. The same also applies to the installation of expansion boards.

There is a serious risk of electric shock during installation, repairs, and maintenance of the device, so always unplug the power supply cord while carrying out of works. The same also applies to the other power supply cables.

Instructions for board handling



Static-sensitive device!

Electronic boards and their components are sensitive to static electricity. Therefore, special attention should be given when handling these devices to ensure their safety and operability.

- ✓ Do not leave the board in the non-operating position without protective packaging.
- ✓ If possible, always work with the board in workplaces protected against static electricity. Should this not be possible, the user should remove the static charge before touching the product with their hands or tools. The best way to do so is by touching any metal part of the system enclosure.
- ✓ It is especially important to observe precautions when replacing expansion boards, memory modules, jumpers, etc. If the product is equipped with batteries to power the memory or real-time clock, avoid placing the board on conducting surfaces such as anti-static mats or sponges. They can cause short circuits and damage the battery and the board's conducting circuits.

General rules of usage

- ✓ In order to keep the warranty, the product must not be altered or changed in any way. Any changes and improvements unauthorized by Fastwel Group other than those contained in this User Manual or received from the technical support service of Fastwel Group in the form of a set of instructions for their implementation will void the warranty.
- ✓ This device should be installed and connected only to systems that meet all necessary technical and climatic requirements. This also applies to the operating temperature range of a particular version of the board. You should also consider the temperature limits of the batteries installed on the board.
- ✓ Follow the instructions in this User Manual only when performing all necessary installation and configuration operations.
- ✓ Retain the original packaging for storing products in the future or to transport in case of a warranty claim. If it is necessary to transport or store the board, pack it the same way as it was packed at the time of receipt.
- ✓ Proceed with extra caution when handling and unpacking the device. Follow the instructions given below.

MANUFACTURER'S WARRANTIES

Warranty liabilities

The manufacturer guarantees that the CPC514 meets the requirements of technical specifications of the «MODULES IN 3U COMPACT PCI FORMAT» IMES.469555.001 TU, the CPC514RC module meets the requirements of technical specifications of the «RC MODULES IN 3U COMPACT PCI FORMAT» IMES.469555.002 TU provided that the Consumer complies with the operating conditions, transportation, storage, installation and mounting, set by the operational documents.

The manufacturer guarantees that the products supplied by it will not show any manufacturing defects and materials used in compliance with the rules of operation and maintenance during the warranty period established at the moment. The Manufacturer's obligation under this warranty is to repair or replace, free of charge, any defective electronic component included in the returned product.

Products that failed through the Manufacturer's fault during the warranty period will be repaired free of charge. In other cases, the Consumer will be billed based on current remuneration rates and the cost of consumables.

Right of limitation liability

The manufacturer is not responsible for any damages caused to the Consumer's property due to the failure of the product in the process of its use.

Warranty period

The warranty period for the manufacturer's products is 36 months from the date of sale (unless otherwise provided by the delivery agreement).

For customized products, the warranty period is 60 months from the date of sale (unless otherwise provided by the delivery agreement).

Limitation of warranty obligations

The above warranty does not apply to:

- the products (including software) that have been repaired or modified by the employees who do not represent the Manufacturer. The exception is when the Consumer has made repairs or made changes to the product strictly in accordance with the instructions previously agreed and approved by the Manufacturer in writing;

- the products which have failed because of inappropriate change of a polarity sign (to the opposite one) of the power supply source, incorrect operation, transportation, storage, installation, mounting or accident.

Procedure for returning products for repairs

Sequence of actions when returning products for repairs:

- contact the product Supplier for return material authorization for the product;
- attach to the returned product the fault identification report made in the form adopted by the Consumer, indicating the list of circumstances and signs of malfunction;
- place the product in the consumer packaging of the Manufacturer (antistatic packaging) and cardboard packaging (box)), in which the product was delivered to the Consumer. If there is no antistatic packaging, the Consumer loses the right to warranty service unilaterally;
- the Consumer pays all the expenses related to the delivery of the product to the Supplier.

Transportation, Unpacking and Storage

Transportation

The modules should be transported in the separate manufacturer's packaging (container), consisting of an individual antistatic packaging and a cardboard box, in closed transport (road, rail, air in heated and sealed compartments) under storage conditions 5 according to the GOST standard 15150-69 or under storage conditions 3 for sea transportation.

It is allowed to transport the modules packed in individual antistatic bags in manufacturer's group packaging (container).

Transportation of packaged modules should be carried out in accordance with the rules of transportation of goods currently valid for this type of transport.

During handling operations and transportation, the packed modules should not be subjected to sudden shocks, drops, impacts and precipitation. The packed modules should be placed on the vehicle in such a way as to preclude their further movements.

Unpacking

Before unpacking, after transportation at negative ambient temperatures, the modules must be kept for 6 hours under storage conditions 1, in accordance with the GOST standard 15150-69.

Do not place the packed modules near any heat sources before unpacking.

When unpacking the modules, it is necessary to observe all precautions to ensure their safety, as well as marketable condition of manufacturer's consumer packaging.

When unpacking, it is necessary to check the modules for any external mechanical damages after transportation.

Storage

Storage conditions of the modules 1 comply with the GOST standard 15150-69.

Three Year Warranty

Fastwel Co. Ltd. (Fastwel), warrants that its standard hardware products will be free from defects in materials and workmanship under normal use and service for the currently established warranty period. Fastwel's only responsibility under this warranty is, at its option, to replace or repair any defective component part of such products free of charge.

Fastwel neither assumes nor authorizes any other liability in connection with the sale, installation or use of its products. Fastwel shall have no liability for direct or consequential damages of any kind arising out of sale, delay in delivery, installation, or use of its products.

If a product should fail through Fastwel's fault during the warranty period, it will be repaired free of charge. For out of warranty repairs, the customer will be invoiced for repair charges at current standard labor and materials rates.

Warranty period for Fastwel products is 36 months since the date of purchase.

For customized products, the warranty period is 60 months from the date of sale (unless otherwise provided by the delivery agreement).

The warranty set forth above does not extend to and shall not apply to:

1. Products, including software, which have been repaired or altered by other than Fastwel personnel, unless Buyer has properly altered or repaired the products in accordance with procedures previously approved in writing by Fastwel.
2. Products, which have been subject to power, supply reversal, misuse, neglect, accident, or improper installation.

Returning a product for repair

1. Apply to Fastwel Company or to any of the Fastwel's official representatives for the Product Return Authorization.
2. Attach a failure inspection report with a product to be returned in the form, accepted by customer, with a description of the failure circumstances and symptoms.
3. Carefully package the product in the antistatic bag, in which the product had been supplied. Failure to package in antistatic material will VOID all warranties. Then package the product in a safe container for shipping.
4. The customer pays for shipping the product to Fastwel or to an official Fastwel representative or dealer.

1 Introduction

The CPC514/CPC514RC CPU Module (hereinafter referred to as the Module) is implemented in the CPCI Serial 3U form-factor and is a highly integrated solution based on the domestic Elbrus platform.

The module is designed for use in real-time systems, manufacture control, and other data acquisition and processing systems that operate in harsh environments and require reliability, information security, and flexibility while supporting various extension interfaces.

The CPC514 module is used in forced air cooling systems, while the CPC514RC module is intended for conduction cooled systems.

The conduction heat sink of the CPC514RC module enables you to build special-purpose systems for working under harsh operating conditions.

This User Manual covers the both module versions.

1.1 General features

Elbrus-4S CPU (1891VM8YA):

- VLIW-processor of Elbrus architecture, 600 MHz;
- 4 processor cores;
- L1 cache of data for a core 64 KB;
- L1 cache of commands for a core 128 KB;
- L2 cache 8 MB.

RAM:

- DDR3 SDRAM 800 MHz with ECC support, 8 GB, soldered, 2-channel.

Flash BIOS:

- 64 Mb SPI-Flash.

SSD 16 GB:

- Innodisk 3SE, SLC, soldered. Connected to the SATA II interface.

Video output:

- DisplayPort connector (resolution up to 1600x1200), routed to the front panel.

PCI-E bus:

- Routed via the PCI-E switch to J1 and J2 CPCI Serial connectors with of 2 devices x4;
- Routed via the PCI-E switch to J4 and J5 CPCI Serial connectors with support of 6 devices x2;
- Support of the Non-transparent mode for the first x4 port;
- Support of PCI-E 2.0 (up to 5 Gb/sec).

SATA II interface:

- 3 interfaces for connecting drives are routed to the J3 CPCI Serial connector.

USB 2.0 ports:

- 2 x ports are routed to the front panel connectors;
- 7x ports are routed to the J3 CPCI Serial connector.

Ethernet 10/100/1000 Mb/sec interface:

- 2 x ports are routed to the front panel connectors;
- 1 x port is routed to the J6 CPCI Serial connector.

Real Time Clock:

- Powered from a lithium battery CR2032 (3 V).

Audio support:

- Integrated audiocodec AC97, interfaces Audio IN/OUT/MIC are routed to the Mezzanine connector.

Hardware monitor:

- Implemented via the SMBUS interface;
- CPU temperature monitoring;
- PCB temperature monitoring.

LED indication:

- Board start diagnostics LED/Hot Swap indicator;
- NT PCI Express port status LED;
- LED for addressing to SATA drives;
- LED for module's temperature mode indication;
- Two program-controlled LEDs (user LEDs).

Power supply and current consumption:

- +5 V $\pm 5\%$, no more than 0.5 A;
- +12 V $\pm 5\%$, no more than 3 A.

Humidity:

- Up to 80%, non-condensing.
- Up to 98%, non-condensing for the /Coated option.

Resistance to mechanical stress:

- Sinusoidal vibrations for frequencies from 10 to 150 Hz with an acceleration of no more than 2 g;
- Single shocks with duration of 11 ms with a peak acceleration of no more than 50 g;
- Multiple shocks with duration of 6 ms with a peak acceleration of no more than 25 g;

Operating temperature range:

- from -40 to +70 °C for SRC514;
- from -50 to +70 °C for SRC514RC;

Mean Time Between Failures (MTBF):

- No less than 80,000 hours.

Software compatibility:

- Elbrus OS;

- Neutrino-E protected Reel-Time Operating System.

1.2 Differences in the general features of the CPC514RC Module

The general features of the CPC514RC Module comply with those of the CPC514 Module (see subparagraph 1.1). The features of the CPC514RC module are as follows:

- Instead of the finned heatsinks, conduction heat-dissipating frame is used.
- The XS4 mezzanine connector is not available, and no mezzanine modules can be installed.
- Module switching off/restarting function by the extractor button is not supported.

1.3 CPC514 Module versions

Versions of the CPC514 Module and their ordering designations (order information) are shown in Table 1-1.

Table 1- 1 – Version of the CPC514 module

Name	Conventional designation	Ordering name	Note
CPC514 CPU Module	CPC514	CPC514-01	The CPCI Serial 3U/4HP Module, with 4-core CPU 600 MHz, 8GB RAM, with convection cooling, designed for operation within the temperature range from –40 to +70 °C
		CPC514RC-01	The CPCI Serial 3U/5HP Module, with 4 core CPU 600 MHz, 8GB RAM, with conduction cooling, designed for operation within the temperature range from -50 to +70 °C

For the CPC514-01 version you will need to use forced cooling with the flow rate of no less than 0.5 m/s.



Note

1. When ordering a product with the conformal coating option, suffix “/COATED” will be added to the version’s name.

1.4 Delivery checklist of the module

The delivery checklists for the CPC514 and CPC514RC modules are shown in Table 1 - 2, respectively.

Table 1 - 2 – Delivery checklist of the CPC514

No.	Name
1.	CPC514 CPU Module
2.	Datasheet
3.	Packaging

1.5 Packaging information

The CPC514 and CPC514RC modules are packaged in a box with the following dimensions: 230 x 150 x 45 mm.

Table 1 - 3 – Packaging information

Packaged module weight, in kg, no more than	CPC514	0,75
	CPC514RC	0,83



Note

Keep the original antistatic packaging and consumer packaging of the module until the end of the warranty period.

1.6 Location of elements

The figures below show the external view of the CPC514/CPC514RC modules, their overall dimensions, and the location of elements.

1.6.1 External view of the module

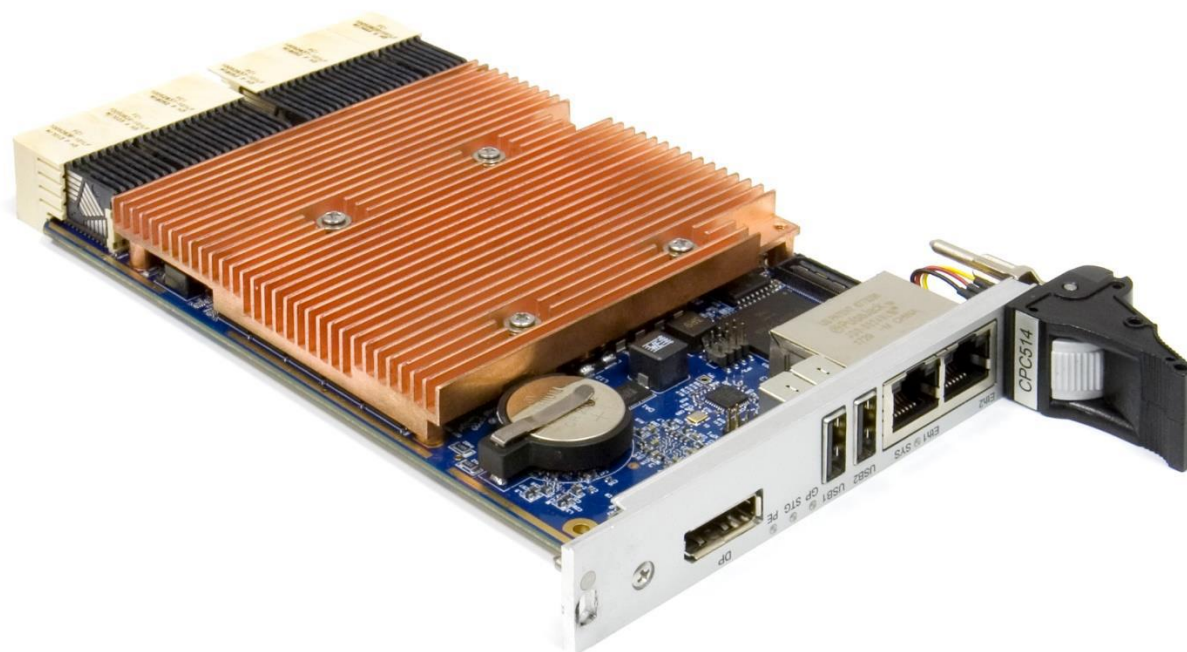


Fig. 1 - 1 External view of CPC514



Fig. 1 - 2 – External view of CPC514RC



Note

The external view of the module versions may slightly differ from the one shown in the figures.

1.6.2 Overall dimensions, mounting dimensions and location of the main components

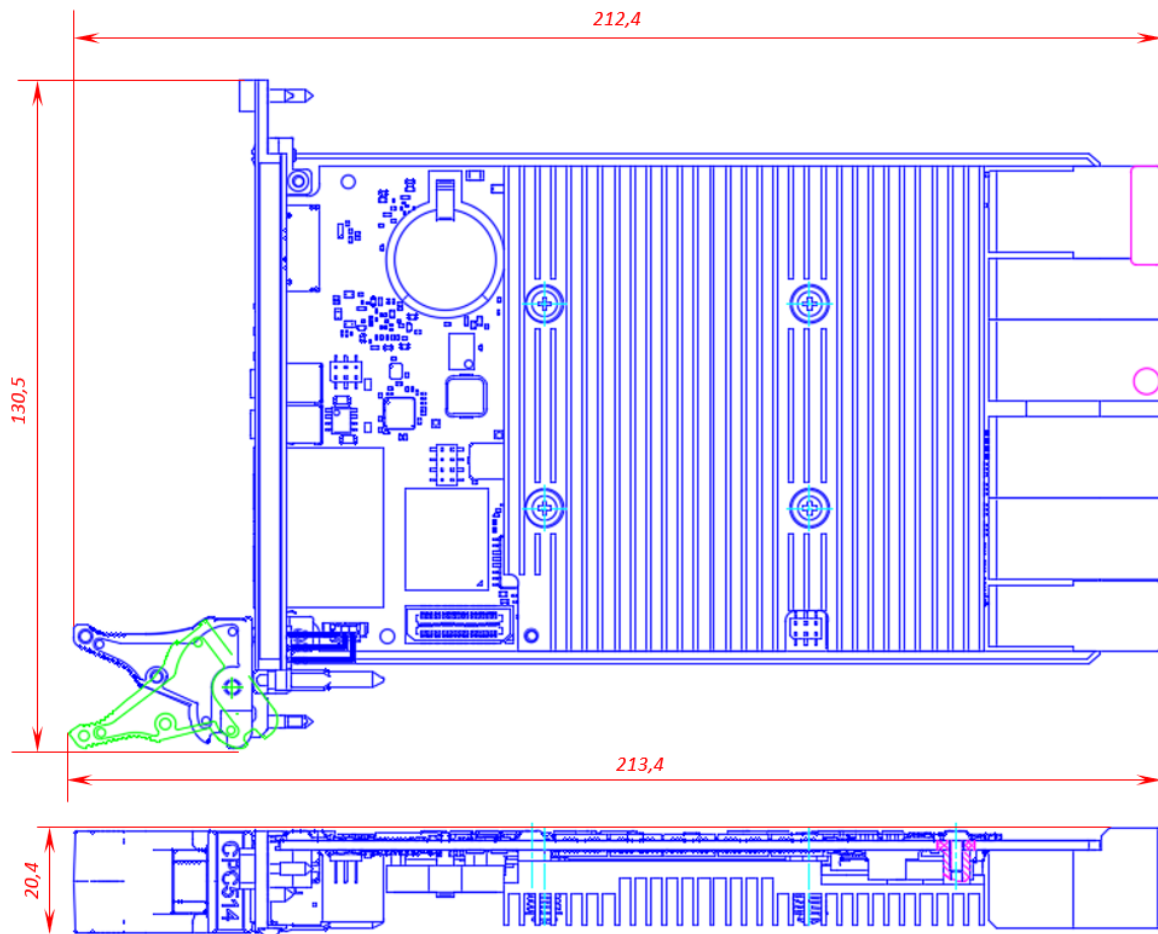


Fig. 1 - 3 – Overall dimensions of the CPC514 module

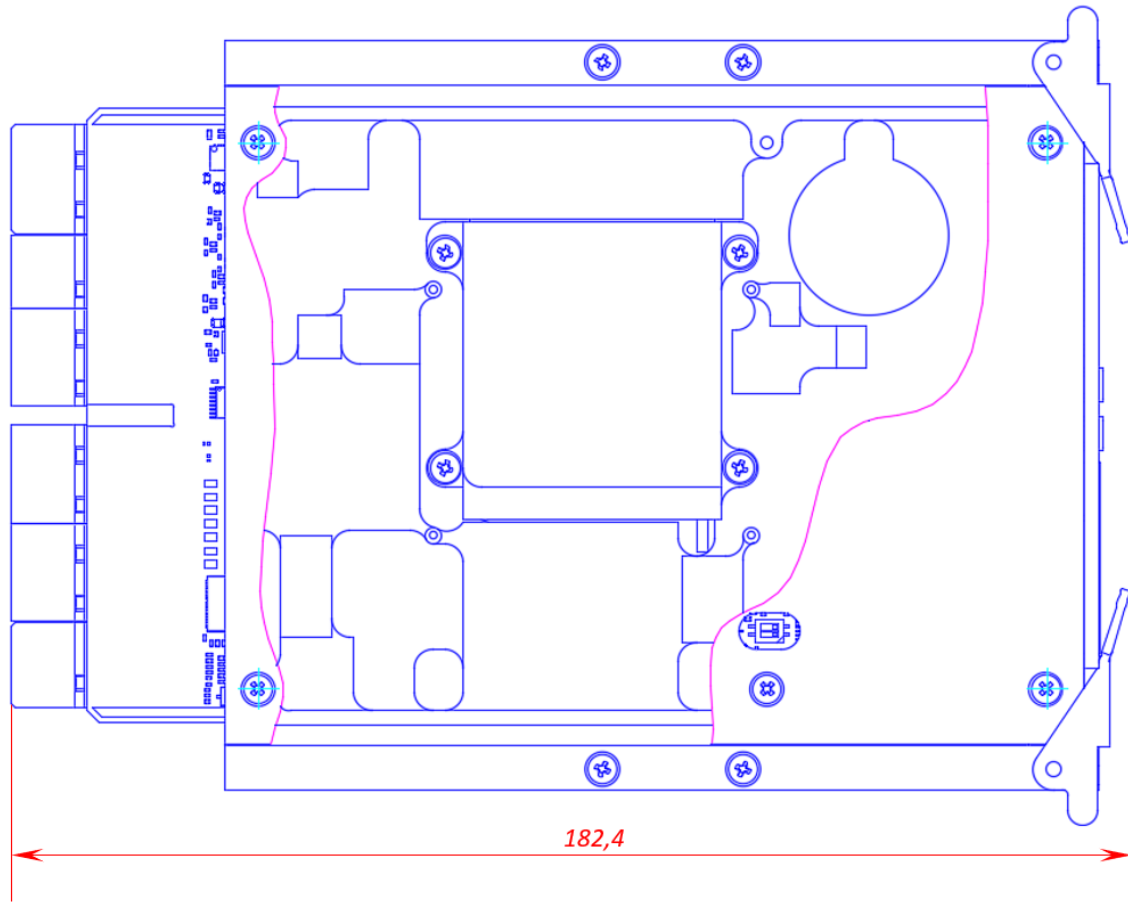


Fig. 1 - 4 – Overall dimensions of the CPC514RC module

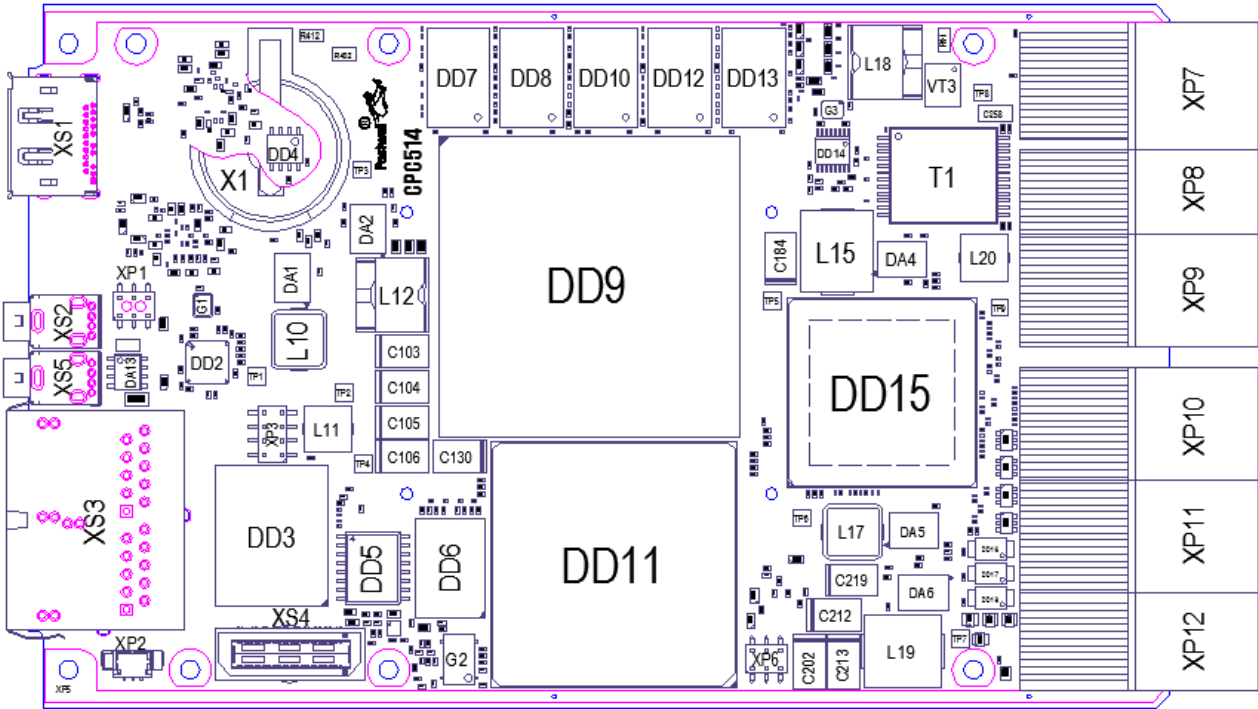


Fig. 1 - 5 - Location of the main components of the CPC514/CPC514RC elements block, top view

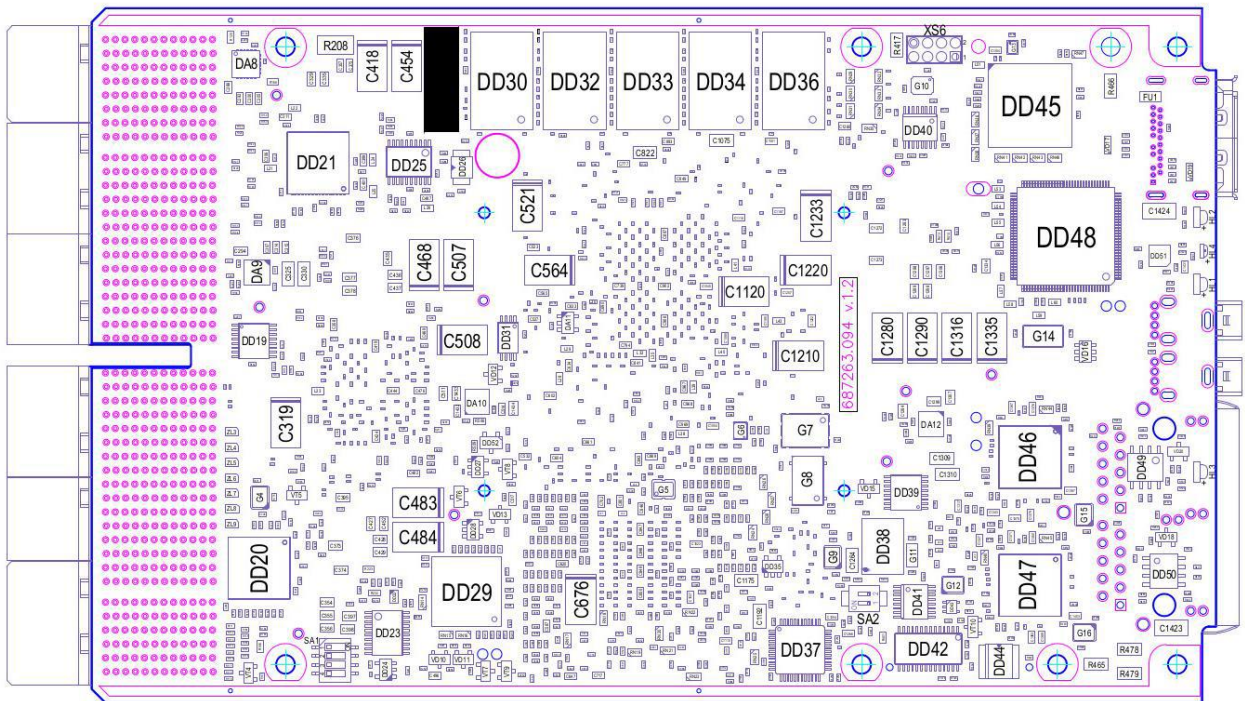


Fig. 1 - 6 - The location of the main components of the CPC514/CPC514RC elements block, bottom view

1.6.3 Front panel

Figure 1-7 demonstrates the front panel of the CPC514 module. The extractor button (shown as “button A”) performs a mechanical function: it is used for installing / removing the CPC514 module (see subparagraph 3.2 Installation Procedure and 3.3 Module Removal Procedure). You can also use the extractor button to manually activate and deactivate module.

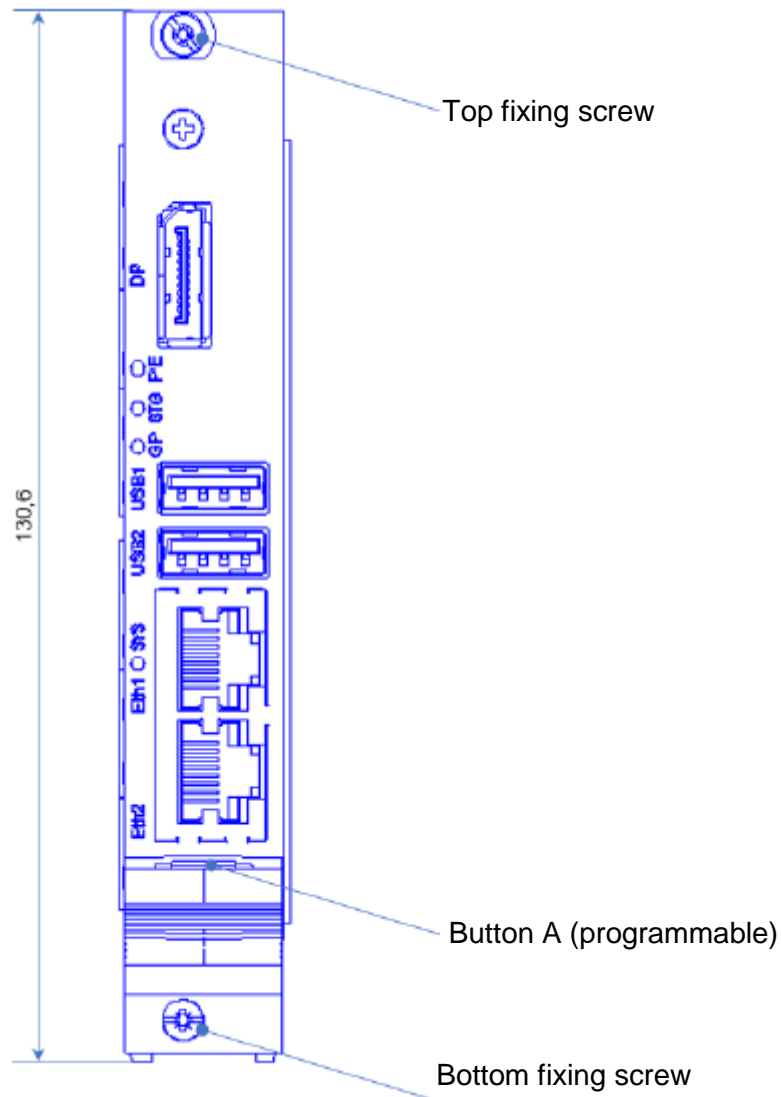


Fig. 1 - 7 – Front panel of the CPC514 Module

Figure 1-8 shows the front panel of the CPC514RC module. The extractor's handles fulfill a mechanical function: they are used for installing/removing the CPC514RC module.

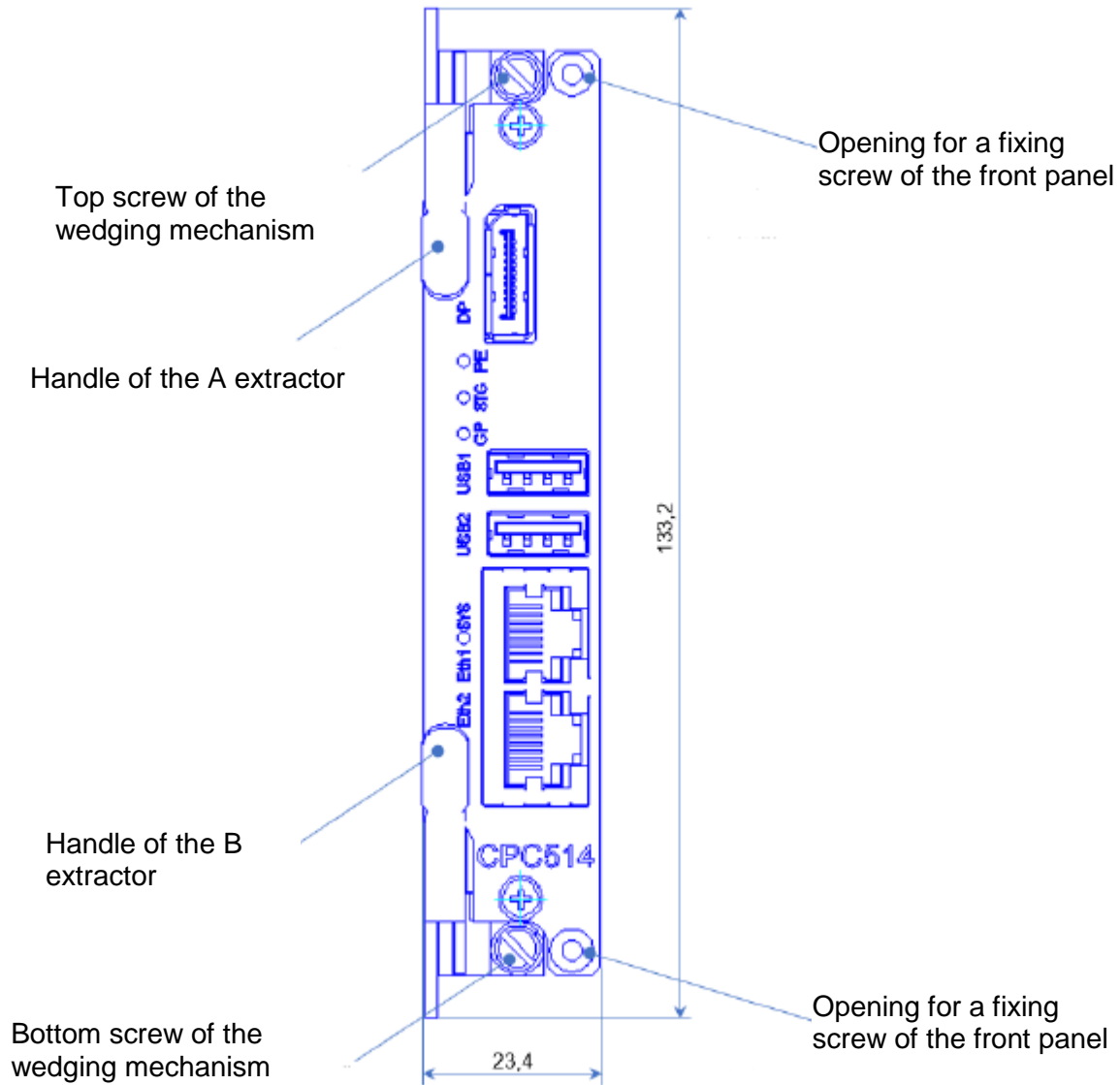


Fig. 1 - 8 – Front panel of the CPC514RC Module

2 Functional description

2.1 Block diagram

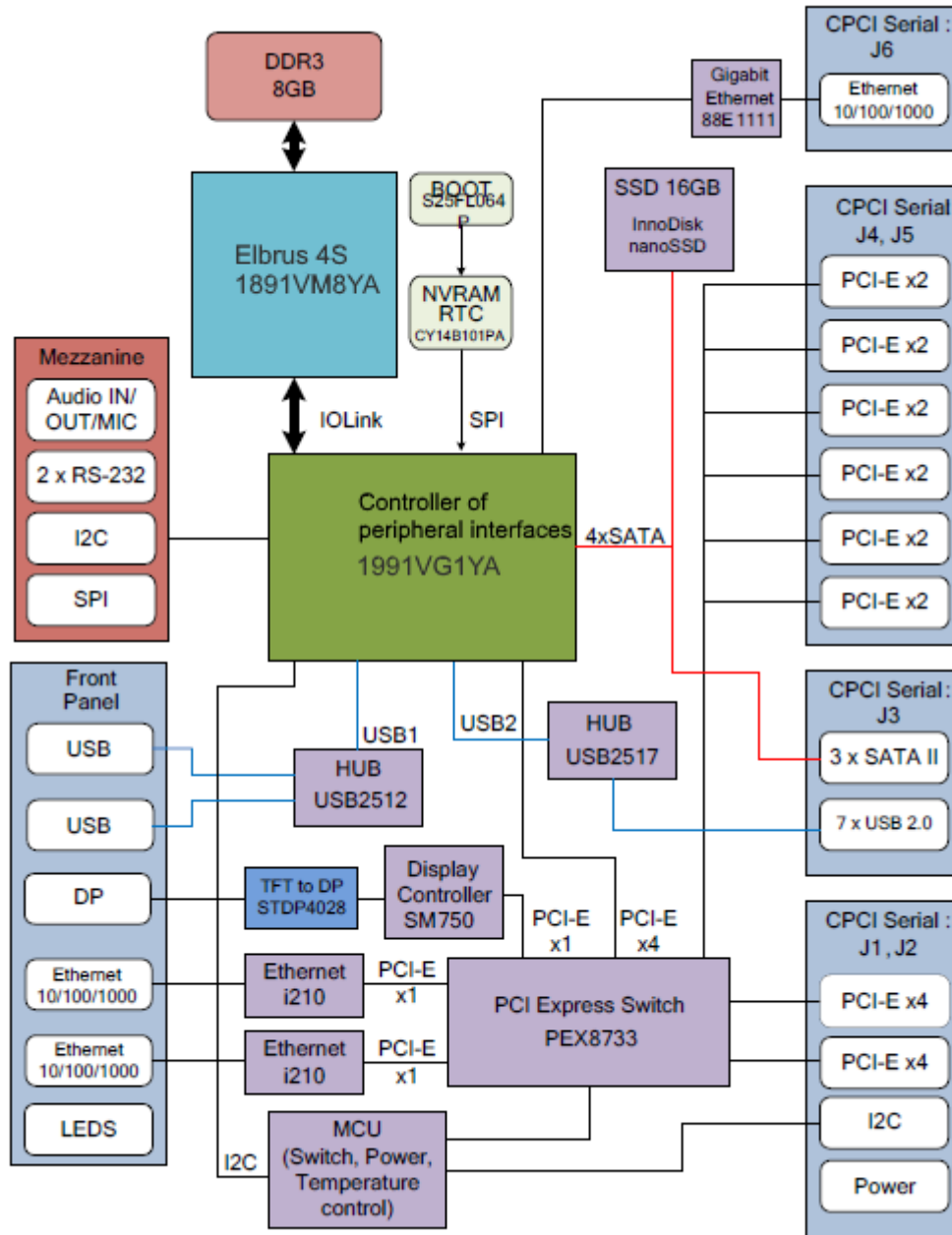


Fig. 2 - 1 – Block diagram of the CPC514/CPC514RC module

2.2 Specific features of the functional nodes operation

Elbrus-4S

Multi-core general-purpose high-performance microprocessor built compliance with the improved “Elbrus” architecture. The Elbrus-4S is a system on a chip (SoC) containing 4 computing cores, L2 cache memory with a total volume of 8 MB, 3 x DDR3 ECC memory controllers, 3 x interprocessor communication channels and an I/O channel.

Controller of peripheral interfaces

Peripheral interface controller’s microchip, controller hub that connects peripheral devices and buses to the CPU. The microchip contains controllers for the main up-to-date interfaces and peripherals.

DDR3 Memory

8 GB DDR3L SDRAM 800 MHz ECC memory is soldered to the module’s board. Installation of the memory expansion module is not applicable.

BIOS

A 64 Mbit Flash chip on the SPI bus is used to store the system loader.

RTC-NVRAM

A real-time clock and non-volatile memory for storing BOOT settings are implemented in the CY14B101PA (1 Mbit) chip located on the SPI bus.

i210 Ethernet Controllers

The module has 2 built-in Gigabit Ethernet interfaces. Two ports are routed to the front panel connectors. The interfaces are implemented on Intel high-speed server controller.

Marvell 88E1111 Ethernet Controller

In addition, the module has a Gigabit Ethernet interface implemented on the Controller of peripheral interfaces+PHY Marvell 88E1111 bundle. The interface is routed to the J6 CPCI Serial connector.

USB 2.0

The module has 9 x USB 1.1, USB 2.0 channels:

- Two of them are routed to the USB connectors (type A) of the front panel,
- 7 interfaces are routed to the CPCI Serial connectors (slots 3-9).

SATA II

- One interface is permanently connected to the Innodisk 16 GB SSD used for system installation and booting.
- 3 interfaces are routed to the J3 backplane connector.

DisplayPort

The port is designed for connection of the digital monitor with the DisplayPort interface. The SM750 video adapter supports a maximum resolution of 1600x1200 and 2D graphics rendering.

PCI-E x4 interface (FAT Pipe) PCI-E Switch PLX8733

2 x PCI-E Gen2 x4 channels are routed to J1 and J2 CPCI Serial connectors. They enable you to connect 3U Compact PCI Serial expansion modules with a set of links x1, x2, x4. Supports the Non-Transparent mode (for FatPipe port#1) in order to work in a multiprocessor system.

PCI-E x2 interface PCI-E Switch PLX8733

6 x PCI-E Gen2 x2 channels are routed to J4, J5 CPCI Serial connectors. They enable you to connect 3U Compact PCI Serial expansion modules with a set of links x1, x2.

SPI

The interface is supported by the built-in controller in the controller of peripheral interfaces, and is routed to the mezzanine connector. BIOS and RTC microchips are also connected to it.

RS-232

2 x COM ports are connected to the mezzanine connector. Port 1 serves for displaying debugging information while the loader is running. The port 1 is also routed to the XP1 connector for using without a mezzanine.

Audio

Built-in AC97 codec. The line input, output, and microphone interface are routed to the mezzanine connector.

Reset and power supply monitoring

CPU reset signal is generated from the following sources:

- From the managing microcontroller when power is on;
- From the Reset button of the Utility backplane connector;
- From the button in the handle-extractor of the CPU module (only for CPC514);

Switches (Jumpers)

The module is equipped with switches for the following functionalities:

- NVRAM reset (Reset of BOOT Setup)
- Protection against overwriting BOOT
- Enabling the Peripheral Root mode.
- Process switches.

LEDs

The LEDs indicating start diagnostics, activity of the drives, and user-programmable LEDs are routed to the front panel.

2.3 Module's interfaces**2.3.1 System Bus**

The CPC514/CPC514RC module has an SMBus (System Management Bus) that ensures system monitoring and configuration functions. This bus uses a two-wire I2C™ interface, and a number of devices with sequential access are connected to it (temperature monitor microchips, EEPROM memory).

Table 2- 1 below shows device addresses on SMBus.

Table 2- 1 – Device addresses on SMBus

No.	SMB address	Device
1	57h	EEPROM AT24C02 for storing the module-related information
2	50h and 52h	SPD EEPROM memory module
3	4Ch	LM96163 Digital Temperature Sensor (PCB & CPU Sensor)
4	18h	LM95235 Precision Remote Diode Temperature Sensor (PCIe Switch temperature monitoring)

2.3.2 Connector for mezzanine module installation

The mezzanine expansion modules can be connected to CPC514 via the XS4 connector. The assignment of the XS4 connector pins for installing the mezzanine module is shown in Table 2-2.

Table 2- 2 – Assignment of the XS4 connector pins for installing the mezzanine module

Contact	Purpose	Contact	Purpose
A1	+5V	B1	+5V
A2	+5V	B2	+5V
A3	NC	B3	NC
A4	NC	B4	NC
A5	GND	B5	GND
A6	COM1_RX	B6	COM2_CTS
A7	COM1_TX	B7	COM2_DCD
A8	GND	B8	GND
A9	COM2_RX	B9	COM2_RTS
A10	COM2_TX	B10	COM2_DTR
A11	GND	B11	GND
A12	NC	B12	SPI_CS2
A13	GND	B13	SPI_CS3
A14	LINE_IN_L	B14	SPI_SCK
A15	LINE_IN_R	B15	SPI_MISO
A16	MIC_IN	B16	SPI_MOSI
A17	MIC_POWER	B17	GND
A18	+3.3V	B18	NC
A19	LINE_OUT_L	B19	+3.3V
A20	LINE_OUT_R	B20	NC
A21	+3.3V	B21	+3.3V
A22	AGND_AUDIO	B22	I2C_SCL2
A23	GND	B23	I2C_SDA2
A24	NC	B24	GND
A25	GND	B25	COM2_DSR
A26	NC	B26	NC
A27	GND	B27	NC
A28	DP_UART_RX	B28	I2C_SCL3
A29	GND	B29	I2C_SDA3
A30	DP_UART_TX	B30	NC

2.3.3 USB, DisplayPort and Ethernet Interfaces

The assignment of the USB, DisplayPort, and Ethernet interface pins on the front panel and backplane connectors complies with the description given in the specifications for the corresponding interfaces and the CPCI Serial standard. Figure 2-2 shows the numbering of interfaces supported by the CPC514/CPC514RC module in the Compact PCI Serial backplane.

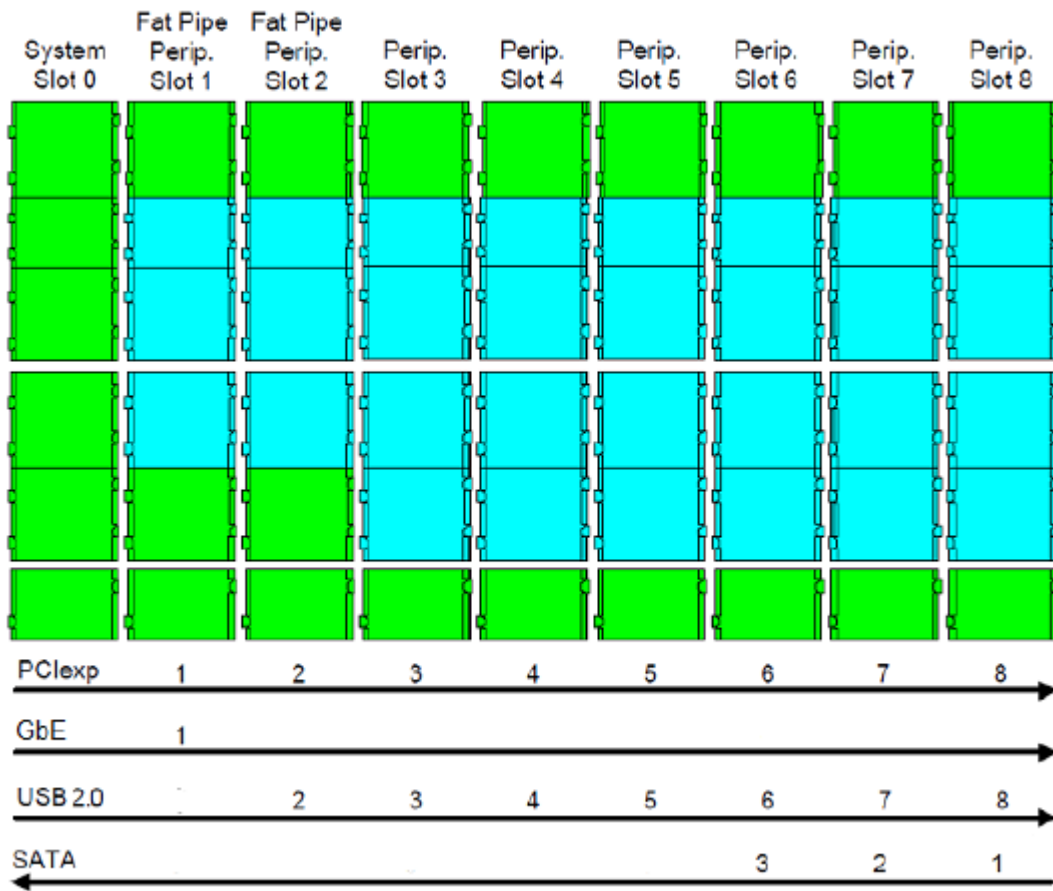


Figure 2 – 2 - Numbering of interfaces supported by the CPC514/CPC514RC module in the Compact PCI Serial backplane

2.3.4 Programming and debugging connectors

Table 2 - 3 – Assignment of pins of the XP6 programming and debugging control microcontroller

Pin number	Signal	Name
1	SWDIO	Data channel for programming the microcontroller
2	UART_TX	Transmission channel of the MK serial port (TTL level)
3	SWDCLK	Synchronization channel for programming the microcontroller
4	UART_RX	Reception channel of the MK serial port (TTL level)
5	+3V3	+3.3 V
6	GND	Ground

Table 2-4 - Assignment of microchip programming connector with the XP3 bootloader code

Pin number	Signal	Name
1	VCC	Power supply voltage for programming (3.3V)
2	GND	Ground
3	CS#	Microchip selection
4	SCK	Clocking
5	SO	Data output
6	SI	Data input
7	OE#	Switching the microchip pinouts to the connector (you should set "1" for programming)
8	NC	No connect

Table 2-5 - Assignment of pins of the JTAG connector for XS6 processor debugging

Pin number	Signal	Name
1	GND	Ground
2	VCC	+2.5 V
3	NC	
4	TDO	Data output
5	TMS	Mode selection
6	TDI	Data input
7	TCK	Clocking
8	GND	Ground

Table 2 - 6 – Assignment of COM1 connector contacts and DisplayPort XP1 settings

Pin number	Signal	Name
1	COM1_TX	Transmission channel of the COM1 port
2	DP_UART_TX	Transmission channel of the STDP4028 serial port (TTL level)
3	COM1_RX	Reception channel of the COM1 port
4	DP_UART_RX	Reception channel of the STDP4028 serial port (TTL level)
5	+3V3	+3.3 V
6	GND	Ground

2.4 LEDs

The front panel of the CPC514 (see Fig. 1 - 7) and CPC514RC (see Fig. 1 - 8) modules is equipped with LED indicators, which are described in Table 2 - 7.

Table 2 - 7 – Designations and functions of the LEDs in CPC514/CPC514RC

LED designation	Description
SYS	<p>Two color, red and blue</p> <p>Blue:</p> <p>Not illuminated – normal operation.</p> <p>flashing –waiting for the OS to complete operation when hardware shutdown is performed using the extractor button.</p> <p>Is ON constantly – the supply is off.</p> <p>Red – hardware failure (power supplies startup error).</p>
GP	<p>Two color, red and green</p> <p>Red – programmable</p> <p>Green – programmable</p> <p>Routed to GPIO0 and GPIO1 KPI. The LEDs are available from the operating system via the user space (/sys/class/gpio/).</p>
PE	<p>Two color, red and green</p> <p>Green:</p> <p>Flashing –connection via PCI-E interface FAT Pipe #1 when installing the module into the peripheral slot.</p> <p>Red – processor overheating.</p>

2.5 Configuration switches

In order to configure the module, the user utilizes the SA1 and SA2 configuration switches on the bottom side of the board. The tables 2-8 below indicate their assignments.

Table 2 - 8 – Assignment of configuration switches

Designation	Position	Purpose
SA1.1	ON	Operation in the Peripheral Root mode during installation into the peripheral slot.
	OFF	Normal operation of the module in the system slot, operation in the Non-Transparent mode in the peripheral slot.
SA2.1	ON	NVRAM memory clearing at the reboot.
	OFF	Normal position, memory is not cleared.
SA2.2	ON	Protection against overwriting the microchip with the “boot” code is enabled.
	OFF	Protection against overwriting is disabled.

2.6 Power supply interaction

The CPC514/CPC514RC module is equipped with a universal power supply circuit that enables power supply in two modes: with support for power supply control (similar to the control that is used in ATX power supplies) and without control support. When the CPC514/CPC514RC module is running, each of the above modes can be used in the system slot of the Compact PCI Serial backplane.

The power supply control is supported by the CPC514/CPC514RC module only when installed in the system slot of the Compact PCI Serial backplane. At the same time, the power supply should provide support for the control function and should have:

- built-in standby power supply voltage of +5V “Standby” with a minimum load current of 1 A.
- “enable” input (PS_ON#).

The control can be performed using one of the following methods: the “Power Button” on the 19” frame control panel, the extractor’s handle button (only for the CPC514 module), or the ACPI software module of the operating system used. The “Power Button” is connected to the “Utility” connector located on the Compact PCI Serial backplane. The power supply control input (PS_ON#) is connected to the same connector, as well as an external “Reset” button.

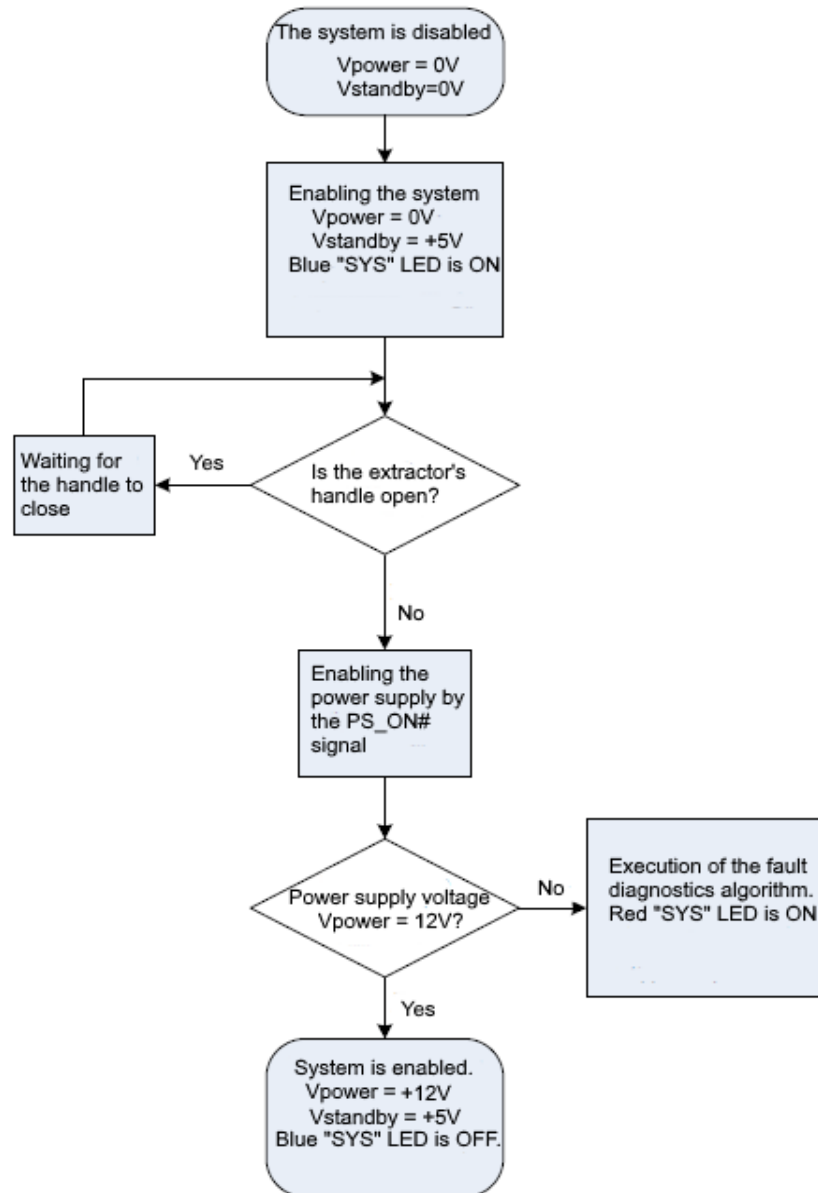


Fig. 2 - 3 – Algorithm of the system initial start from the “Mechanical Shutdown” state

The algorithm for initial activation from a completely disabled state of the system is the same for all cases of CPC514 module application. If power supply does not support management and does not have a +5V “Standby” source, the module starts automatically if there is +12 V. If one of the power sources (both external and internal) fails, the red “SYS” LED is illuminated. The main power supply from the CPU module is turned off and only the LED display system works.

Complete shutdown of the system (CPU module and peripheral modules) is only possible for the power supply with management support. If the power supply unit does not support it, only the CPU module will be disabled. The shutdown procedure can be initiated by the extractor’s handle button, software shutdown via ACPI operating system, or the Power Button.

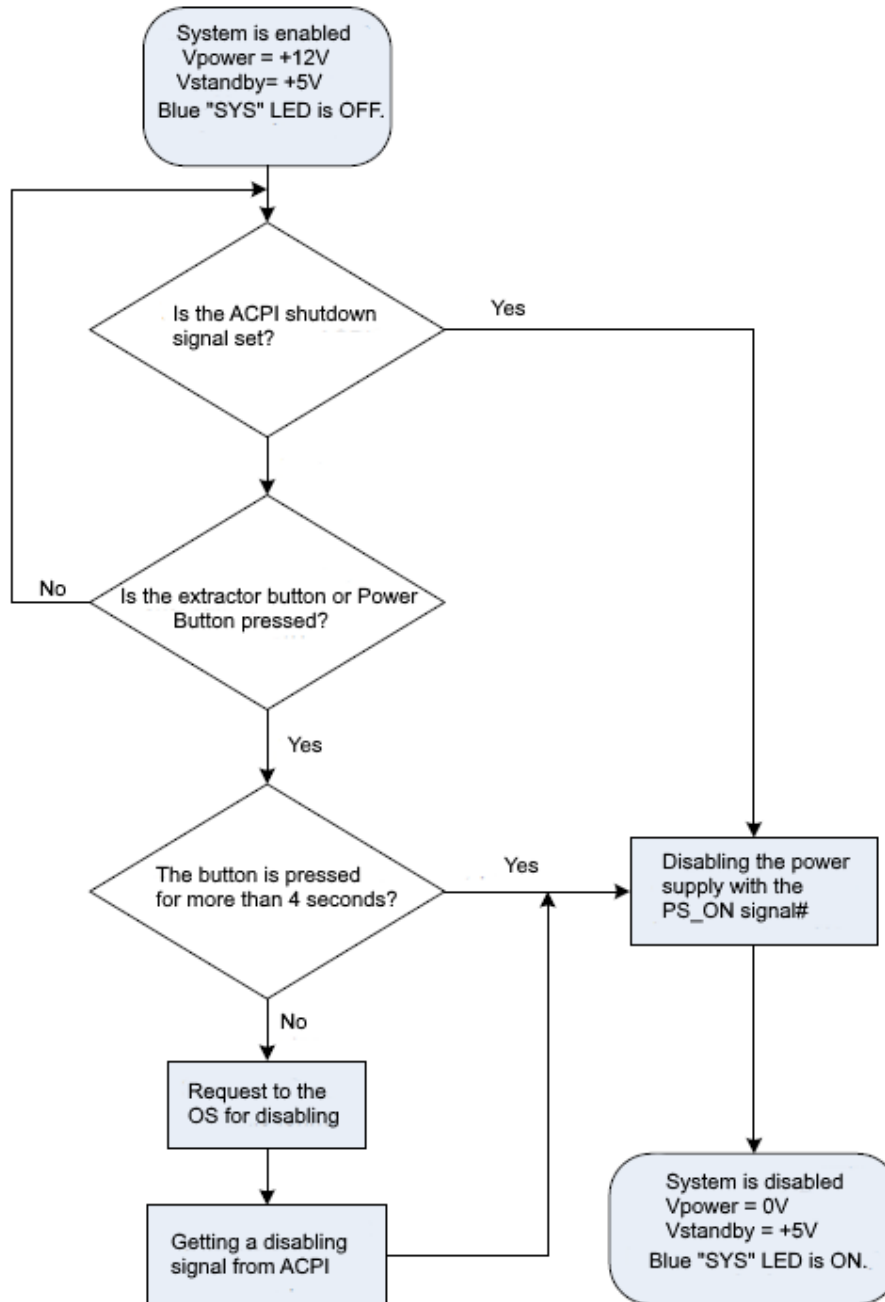


Fig. 2-4-Algorithm for shutting down the system with the extractor's handle button, Power Button, or using software via ACPI

After executing any of the shutdown algorithms, the system (or only the CPC514 CPU Module) enters the "Software shutdown" state. From this state, switching to the complete disabled state ("Mechanical shutdown"), or to a completely enabled state is possible. Switching to the enabled state is performed by pressing the extractor's handle button or the Power Button.

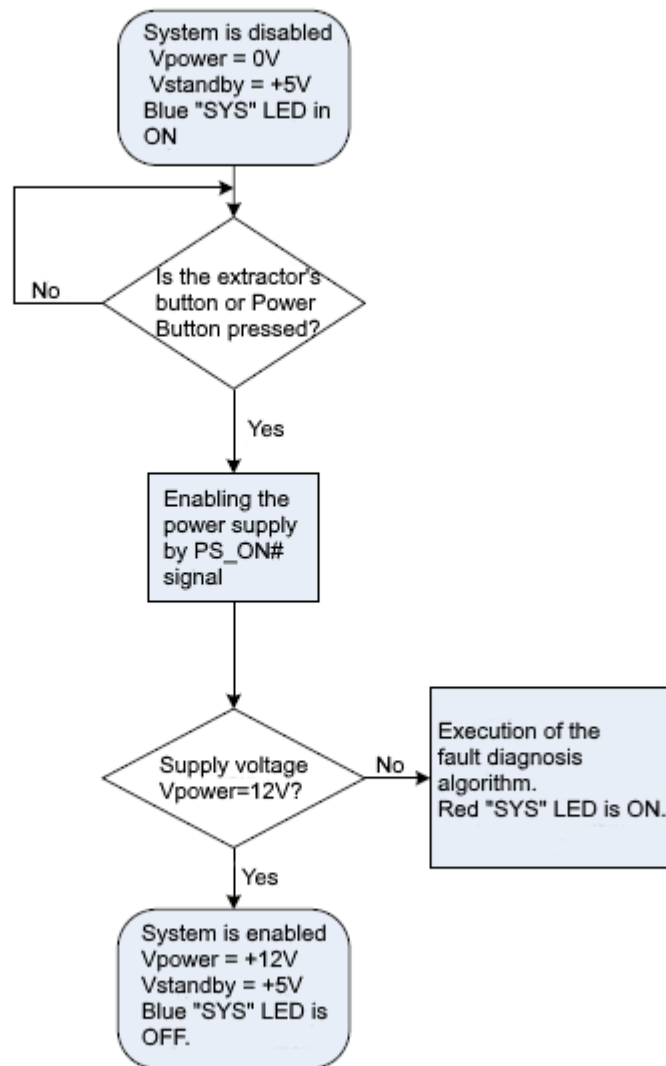


Fig. 2- 5 - Algorithm for enabling the system from the “software shutdown state”

3 Installation

In order to install the CPC514/CPC514RC properly and safely, you should strictly follow the below rules, warnings, and procedures.

3.1 Safety requirements

While handling the CPC514/CPC514RC module, you should observe the following safety requirements. The manufacturer is not responsible for any damage resulting from non-compliance with these requirements.

**Caution!**

Be careful when handling the module, as the cooling heatsink may get very hot. Do not touch the hot heatsink. Use gloves to protect your hands against burns or wait for the module to cool down.

The module should not be placed in any container until the heatsink has cooled down to the room temperature.

**Attention!**

Turn off the system power before installing the module in an empty slot.

Violation of this rule may pose a threat to your health and life, as well lead to the damages to the system or module.

If you need to place the module on the table, make sure that the module is facing down.

**Static-sensitive device!**

The module contains elements that are sensitive to electrostatic discharges. In order to avoid damage to the module, you should observe the following precautions:

- ✓ Before touching the module, remove the static charge from the clothes, and remove the charge from the tools before using them.
- ✓ Do not touch electronic components or connector contacts.
- ✓ If you have a professional workplace with anti-static protection, do not miss the opportunity to use it.

3.2 Module installation procedure

Make sure that you meet the safety requirements listed in the previous chapter.

Prior to start the work, make sure that the system is powered off. In order to install the module, follow the steps in the below sections.

3.2.1 Installation of CPC514

In order to install the module, you should perform the following actions:

- Carefully insert the module into the desired slot, moving it along the guiderails until it touches the backplane connector.
- Using the handle on the front panel, push the module into the backplane connector. Do not put too much effort when you insert the module connector into the backplane connector.
- Finish the module's installation by lowering the handle down, hooking it to the frame of the system enclosure and snapping the connection (see Fig. 3-1). Make sure that the module is flush-mounted with other system modules or plugs. Secure the module with two locking screws (top and bottom) on the front panel.



Fig. 3 - 1 – Installing the module to the system enclosure

- Connect the necessary interface cables to the connectors on the module's front panel and make sure that they are securely fixed.
- The module is ready for operation.

3.2.2 Installation of CPC514RC

In order to install the CPC514RC module, follow the below steps:

- Loosen the wedging mechanism by unscrewing the coupling screws for a few turns.
- Carefully insert the module into the desired slot, moving it along the guiderails until it touches the backplane connector.
- Slide the module into the backplane connector by applying a slight pressure to the front panel. Make sure that the module is installed on the same level as the other modules within the system.
- Secure the module with wedges by tightening both coupling screws. If necessary, secure the module with two locking screws (upper and lower screws).
- Connect the necessary interface cables to the connectors on the module's front panel and make sure that they are securely fixed attached.
- The module is ready for operation.

3.3 Procedure for module's removal

Make sure that you meet the safety requirements listed in Chapter 3.1. Special attention should be given to the warning concerning the heatsink temperature!

Prior to start the work, make sure that the system is powered off. In order to remove the module, follow the steps in the below sections.

3.3.1 Removal of CPC514

In order to remove the CPC514 module, follow the below steps:

- Disconnect all interface cables from the module.
- Unscrew the retaining screws (upper and lower) on the front panel.
- Unlock the front panel handle by pressing the extractor's handle button and pulling it down to remove the module from the backplane connector.
- After the module is removed from the backplane connector, pull it out of the slot along the guiderails.
- Removal of the module is completed.

3.3.2 Removal of CPC514RC

In order to remove the CPC514RC module, follow the below steps:

- Disconnect all interface cables from the module.
- Unscrew the retaining screws (upper and lower) on the front panel, in case they are mounted. Loosen the wedging mechanism by unscrewing both coupling screws for a few turns.
- Pull the upper and lower extractor's handles in order to remove the module from the backplane connector.

- After the module is removed from the backplane connector, pull it out of the slot.
- Removal of the module is completed.

4 Setting Operation Modes

4.1 Reset the loader to default settings, enable Transparent mode, loader microchip protection against rewriting

For a prompt reset of loader settings to default parameters and protection of the loader memory chip against program rewriting from the OS, SA2 switch is used.

In order to switch the module to the Peripheral Root mode (only when the CPC514/CPC514RC module is installed into peripheral slot), the SA1 switch is used.

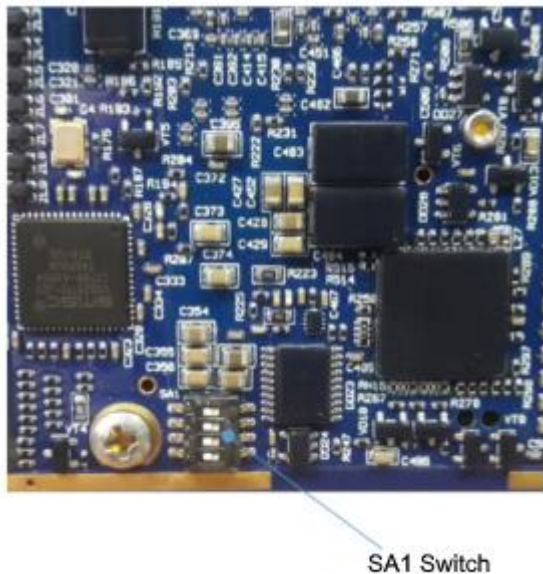


Fig. 4 - 1 – Switch SA1 in CPC514

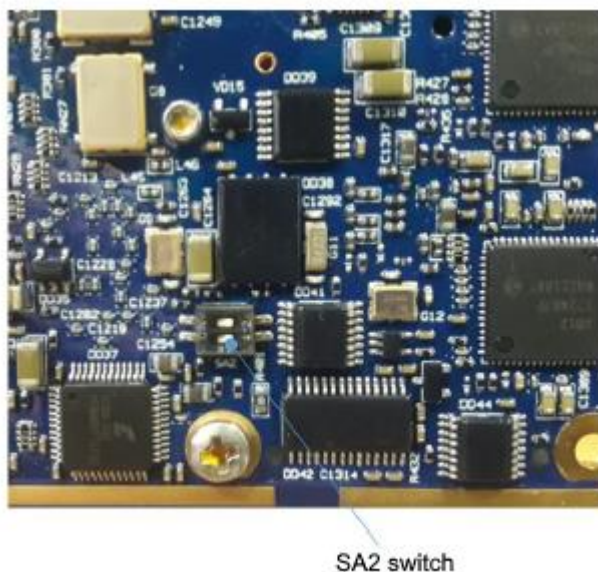


Fig. 4 - 2 – Switch SA2 in CPC514

Positions of the SA1 and SA2 switches are shown in Table 4- 1.

Table 4 - 1 – Purpose of the configuration switches

Position designation of the switch group	Switch number (specified on the enclosure)	Switch purpose	SA1 switch position	Function
SA1	1	Switching the module to the Peripheral Root mode	ON	Operation in the Peripheral Root mode when installed in the peripheral slot. "PE" LED is orange.
			OFF	Normal operation of the module in the system slot, operation in the Non-transparent mode in the peripheral slot. The "PE" LED is green.
SA2	1	Reset of loader settings to standard values	ON	Clearing the NVRAM memory by reboot
			OFF	Normal position, memory is not cleared.
	2	Protection against rewriting the loader's memory chip	ON	Protection against rewriting the chip with the bootloader code is enabled.
			OFF	Rewriting protection is disabled.

4.2 Loader settings reset sequence

Sequence of loader settings reset:

- Switch off the power;
- Remove the CPC514/CPC514RC module from the crate;
- Change the SA2.1 operating mode switch to the ON position;
- Install the CPC514/CPC514RC module into the crate;
- Switch on the power, wait for the loader to complete its operations (the startup timer appears);
- Switch off the power;
- Remove the CPC514/CPC514RC module from the crate;
- Change the SA2.1 operating mode switch to the OFF position;
- Install the CPC514/CPC514RC module into the crate.

4.3 Starting the BOOT SETUP subprogram

In order to start the boot loader setup, after completion of the initial system configuration, when the message appears:

```
“Autoboot in 10 sec. PRESS SPACE TO DISABLE IT.”
```

with a countdown, press the “Space” key. The following message should appear:

```
BOOT SETUP
```

```
Fastwel adaptation v0.2
```

```
Press command letter, or press 'h' to get help
```

All setup operations are performed in loader’s text menu by serial input of the required parameters upon request of the configuration program.

4.4 Updating the loader’s code

The update is performed using the flashboot utility program, which is included in the standard delivery checklist of the Elbrus OS distribution kit. In order to update, run the following command:

```
flashboot.sh <boot image filename>
```

4.5 Boot disk configuration

To specify the disk from which the operating system will be loaded, enter the following commands:

1. Enter “d” to view the available disks and partitions.
2. Enter “u” to view the current boot disk and partition.
3. If the current section needs to be changed, enter “c”. After that, upon request you should enter the disk number and partition number. You can skip command-line parameters and names of the boot files by pressing Enter. The “Autoboot in:” parameter sets the delay for the message “Autoboot in XX sec. PRESS SPACE TO DISABLE IT.”. Parameter “Try other devices” is set if you need to make attempts to boot from other carrier, if the carrier specified in the settings does not have a boot file.
4. In order to save the boot parameters to NVRAM, you should enter “m”.
5. Enter the Boot.conf menu by entering “b”.
6. In order to download from the default file, press “Enter”. The system starts booting.
7. In order to select the load file (e.g., a different version of the operating system kernel), click Tab to view the available loading options. Enter the name of the file to download (you can automatically fill in the line by pressing the Tab key), then press Enter.

5 Additional system settings

For entering the advanced configuration mode, please enter “~” or “^” in your console. The following message will appear:

```
ENHANCED CMD MODE
```

```
Enter command, 'help' to get help, or Esc to exit
```

In order to set the time and date, enter the following commands in sequence:

```
set rtc time <hh:mm:ss>
```

```
set rtc date <dd.mm.yy>
```

```
set rtc weekday <number of a day of week>
```

In order to configure the video output to a specific video adapter, if you use a video output which is different from the built-in one, enter the following command:

```
set vga primary <adapter's number>
```

A list of adapters can be obtained by entering a command without specifying parameters.

In order to disable the video output, when working only via a remote connection using COM1, enter the following command:

```
set vga output_disable 1
```

For restarting the system, enter the reset command.

You can get a list of all available commands by entering the “help” command. For proper operation of the system, there is no need to change other parameters than those specified above. Changing other parameters may result in system instability.

5.1 Cooling system of CPC514/CPC514RC

The CPC514 CPU module generates about 35 watts of heat during its operation. A specially designed copper heatsink is used to maintain the temperature of the processor chip within the acceptable values.

Elbrus-4C processors do not have dynamic thermal control, so the value of the module's heat output remains to be constant (maximum) regardless of the processor core load.

The cooling radiator is designed to use the module at ambient temperatures of no more than +70 °C and with an air flow rate of 2 m/s. When using the module as part of high-load systems, while installing it next to the modules that have high heat emission, or when constantly working at high ambient temperatures, it is recommended to increase the air flow rate to 3 m/s or more.

The LM96163 digital temperature sensor located on the I2C-0 bus at the address 0x98 is used to monitor the temperature of CPU and the printed circuit board. Its values can be read by such Linux tools as lm-sensors, i2cget, etc.

The CPC514RC module uses contact-type transfer of heat to the metal enclosure of the system, which removes this heat to the external environment through convection, or through liquid cooling or other methods of heat transfer.

The main way to transfer heat to the system enclosure is through the cleat wedges, which are used to fix the module in the enclosure, so you need to make sure that they are carefully tightened when the system is assembled. The quality of heat transfer from the board to the enclosure directly affects the temperature inside the board, including the temperature of the processor chip.

The heat removal can be advanced by improving the contact of the wedges with the board and the enclosure (e.g., using thermal paste) and by using the material of the system enclosure with the increased thermal conductivity.

The operating temperature of the conduction-cooled module is the temperature of the points on the board near the wedges. When performing thermal calculations of the system, the temperature at these points should be considered for the case when the system is operating at the maximum ambient air operating temperature.

5.2 Power consumption

The CPC514/CPC514RC module, regardless of its design, specifies the following power requirements listed in Table 5-1. The table shows the acceptable ranges of supply voltage changes, as well as the average current consumption.

Table 5 - 1 – Power supply voltage

Nominal voltage, V	Minimum voltage, V	Maximum voltage, V	Average current consumption, A
+5V Standby	4.75	5.25	0.5
+12	10.8	13.2	3.5

The CPC514/CPC514RC module for its operation uses two voltages: +12 V and +5 V “Standby”. The +5 V “Standby” voltage is optional. While using it, you can control the power supply source using the PS_ON # signal in the Utility connector of the backplane.

If the supply voltage exceeds the specified limits, the module’s functionalities are not guaranteed. The maximum starting (short-term) current consumption on the +12 V bus does not exceed 4.5 A.



Attention!!!

The start time of the power supply should not exceed 200 milliseconds. After switching off, the module can be restarted not earlier than in 10 seconds.

The system backplane should ensure optimal distribution of supply voltages between connected devices.

5.3 Operating conditions

The CPC514 module complies with the general safety requirements for information technology equipment as per the GOST R IEC 60950-2002 standard (for equipment connected to the electrical grid with a voltage of up to 600V).

5.3.1 CPC514/CPC514RC operating conditions

CPC514/CPC514RC is resistant to the following external influencing factors:

Table 5 - 2 – External influencing factors

Parameter		Value
Changing ambient temperature at relative humidity up to 80 %, non-condensing - for CPC514RC	Low, °C	-50
	High, °C	+70
Changing ambient temperature at relative humidity up to 80 %, non-condensing - for CPC514	Low, °C	-40
	High, °C	+70
Sinusoidal vibration for CPC514	Range, Hz	10-150
	Acceleration, g	2
Sinusoidal vibration for CPC514RC	Range, Hz	10-500
	Acceleration, g	6
Single-action mechanical shock for CPC514	Peak acceleration, g	50
	Duration, ms	11
Single-action mechanical shock for CPC514RC	Peak acceleration, g	75
	Duration, ms	1-5
Repeated mechanical shock for CPC514	Peak acceleration, g	25
	Duration, ms	6
Repeated mechanical shock for CPC514RC	Peak acceleration, g	15
	Duration, ms	5-15
Damp heat for coated devices at temperature of +55 °C (only product strength is guaranteed)	No more than, %	98

The modules should be forced-cooled by air flow along the surface of the heatsink fins at the rate of at least 0.5 m/s at a temperature less than or equal to the ambient temperature.

ANNEX A

Table A 1 – Terms, acronyms and abbreviations

Term	Definition
EEPROM	Electrically Erasable Programmable Read-Only Memory
Gigabit Ethernet	Gigabit Ethernet
I2C™	Inter Integrated Circuit
PC	Personal Computer
PCI Express (PCIe or PCI-E)	PCI Express (Peripheral Component Interconnect Express) officially abbreviated as PCIe or PCI-E. Represents a high-speed serial computer expansion bus standard, designed to replace the older PCI, PCI-X and AGP bus standards.
MTBF	Mean time before failure
SATA	Serial ATA
SMBus	System Management Bus
USB	Universal Serial Bus

ANNEX B: DISCLAIMER

This Disclaimer contains special operating conditions of Fastwel in the following areas: intellectual property, warranty policy, conditions of the order and delivery.

1 INTELLECTUAL PRORETY

1.1 If any infraction, interference, improper use, illegitimate exploitation and/or violation of the industrial and/or intellectual property rights of any third party and/or property, exploitation during the use of Fastwel Embedded Module will take place – Fastwel does not guarantee to replace the materials, computer programs, procedures or equipment affected by the complaint and under no circumstances doesn't bear responsibility in any form for possible refusal in case of such a replacement.

1.2 Use of the Fastwel products as well as the objects of intellectual property containing in them, in the ways and for the purposes, not provided by the present user manual and datasheet isn't allowed without preliminary written approval of Fastwel.

1.3 Fastwel is not responsible for possible incidents and losses, related to the operation of end devices, in which the original Fastwel equipment is used.

2 WARRANTY POLICY

2.1 When the detected flaws in an element can be corrected without decreasing the foreseen technical features and functionality for it, User may demand Fastwel the urgent correction of the failures in additionally agreed period and an increasing of the period of the guarantee of the element equal as the time elapsed from the formal request to repair the failures, until the receipt of the repaired element. All costs associated to the correction of failures, included those of assembly, dismantle, transport, tests, etc., if they exist, shall be prosecuted according the Warranty Policy of Fastwel.

3 ORDER AND DELIVERY CONDITIONS

3.1 The general rule is that all Fastwel equipment prices are determined with due consideration of delivery under the EXW terms and conditions (Incoterms 2010). Delivery of the products under other terms and conditions should be preliminary agreed and stated in writing between the parties.

3.2 Unless otherwise expressly agreed with Fastwel, all the deliveries of Fastwel equipment will be carried out only after the official purchase order is obtained and provided that the ordered products have been prepaid in full. Other terms and conditions of cooperation should be made in writing.

3.3 Any delivery of Fastwel electronics is submitted with the right package in accordance with the current rules and standards in the Member States of the European Economic Area. The purchaser independently bears all risks regarding the compliance of package and marking of Fastwel products with legislation requirements being in effect at the place of purchased products destination (in the buyer's country). The specified condition excludes unequivocally any liability of Fastwel for possible non-compliance of package and marking of products with the requirements of legislation of the country of products destination.

3.4 In general, all components of the supply are properly protected with respect to freight, in order to avoid any damage to the supply, third parties, environmental damages or unrelated goods, as consequence of wrong packaging.

3.5 Each package unit is labeled on the exterior area with the indications of product's Part Number and Serial Number.

3.6 The support documents for the order should be made either in English or in Russian unless otherwise agreed between parties in writing.

3.7 Fastwel does not pay penalties and does not cover costs associated with delay in the delivery of the products caused by actions of the third parties, force-majeure etc. - Fastwel doesn't bear any responsibility for non-execution or inadequate execution of the obligations in a case when it is caused by actions of the third parties (for example producers or suppliers of accessories), force majeure etc.

3.8 Fastwel declares that independently and at any time without damage, it has an exclusive right to define and change functionality architecture, bill of materials of its products without any preliminary coordination and approvals of the third parties.

4 OTHER CONDITIONS

4.1 Fastwel has the obligation to respect the current Russian legislation (including, but not limited to environmental, labor, social laws) in each moment and to apply it to its embedded electronics considering all and each execution phase, that is to say, from the design until the commissioning and subsequent maintenance. In this regard Fastwel is not liable to the user or other persons in connection with possible changes of the company's rules (including, but not limited to warranty, ordering policy) caused by changes of the Russian legislation.

4.2 Unless otherwise expressly agreed in writing, Fastwel provides no training for assembly\installation\adjustment\operation of its equipment.