CPC308

PC/104-Plus Intel Atom N450/D510 Processor Module

User Manual

Ver. 0.5

December 2015

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Rev. Index	Brief Description	Product Index	Date
001	Initial version	CPC308	June 2012
001a	Partially corrected text	CPC308	February 2013
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001c	ACS00041 accessory was excluded from the table 1-3, ACS00051 accessory was added to the table 1-3, purpose of contacts in XP1 connector (table 3-4) was changed, section 7 was updated, errors were eliminated.	CPC308	December 2013
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Safety Requirements

This product of Fastwel Group Co. Ltd has been developed and tested with the purpose of ensuring its compliance with electrical safety requirements. Its design provides long-term trouble-free functioning. The product service life can be significantly shortened because of its incorrect handling during unpacking and installation. Therefore, for your safety and ensuring of the correct operation of the product you should adhere to the recommendations given below.

High Voltage Safety Rules

Any work with this device must be performed only by sufficiently skilled personnel.

Before installing the board into your system, make sure that the mains power supply is disconnected. This is also true for the installation of expansion boards.

There is a serious hazard of electrocution in the process of the product installation, repair and maintenance; therefore, always unplug the power cord during work performance. This is also true for other power cables.

Board Handling Instructions

Electronic boards and their components are static sensitive. Therefore, special attention is needed to ensure safety and normal operation while handling those devices.

- Do not leave the board without protective package when it does not operate.
- Always work with the board on static-safe workplaces if possible. If it is impossible, the user must remove static charge from him/herself before touching the product with his/her hands or tools. This is best done by touching a metal part of the system body.
- It is especially important to observe precaution while replacing expansion boards, jumpers, etc. Since there is a battery powering memory and real-time clock on the board, do not put it on conductive surfaces, like antistatic carpets or sponges. They may cause a short circuit and inflict damage to the battery and the board conductors, as well as loss of real-time clock (RTC) data.

General Board Operation Rules

- To preserve the manufacturer's guarantee, the product must not be reworked or altered in any way. Any alterations and improvements not authorized by Fastwel Group Co. Ltd company, except those described in this Manual or obtained from the Fastwel Group Co. Ltd technical support service in the form of a set of instructions describing their performance cancel the guarantee.

- This device must be only installed into and connected to systems meeting all necessary technical and climatic requirements. This relates to the operating temperatures range of the specific board design version. The temperature limitations of the batteries installed on the board should be taken into account as well.

- Please follow only the instructions of this Manual while performing all necessary installation and configuring operations.

- Keep original package to store the product in the future or to transport it in case of a guarantee event. Should it become necessary to transport or store the board, pack it in the same way it was packed upon receipt.

- Take particular care during handling the product and its unpacking. Act in accordance with the instructions of the above section and Chapter 8 Transportation, Unpacking and Storage.

The Manufacturer's Guarantees

Guarantee Liabilities

The Manufacturer hereby guarantees the product conformity with the requirements of TU 4013-004-52415667-05 specifications, provided the Consumer abides by the conditions of operation, transportation, storage, installation and assembly established by the accompanying documents.

The Manufacturer hereby guarantees that the products supply thereby are free from defects in workmanship and materials, provided operation and maintenance norms were observed during the currently established guarantee period. The Manufacturer's obligation under this guarantee is to repair or replace free of charge any defective electronic component being a part of a returned product.

Products that broke down through the Manufacturer's fault during the guarantee period will be repaired free of charge. Otherwise the Consumer will be invoiced as per the current labor remuneration rates and expendable materials cost.

Liability Limitation Right

The Manufacturer shall not be liable for the damage inflicted to the Consumer's property because of the product breakdown in the process of its utilization.

Guarantee Period

The guarantee period for the products made by the manufacturer company is 36 months since the sale date (unless otherwise provided by the supply contract).

The guarantee period for the products made to special order is 60 months since the sale date (unless otherwise provided by the supply contract).

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

1.1   The Purpose of the Product

This Operation manual (hereinafter, the Manual) is intended to inform about the design, operation and basic information necessary for the commissioning, proper use and maintenance of the product known as CPC308 Processor Module (hereinafter, the module).

> ☑ NOTE: THIS DOCUMENT PRESENTS THE ACTIVE VERSION 0.1 OF THE MANUAL[1].

The module is a single-board, PC/104-Plus format computer. It is intended for onboard applicationы requiring high performance and low power consumption.

The module has a CompactFlash connector, two Ethernet channels, two USB ports, two Serial ATA ports, four serial ports and NAND Flash data storage.

It is possible to expand the module functionality by connecting complementary PC/104 and PC/104-Plus format modules.

The module is delivered with pre-installed FreeDOS operation system (hereinafter, the OS). It is compatible with the following OSs: [2] QNX 6.5, Windows XP (embedded) and Linux 2.6.

The Manual gives instructions on correct and safe installation, enabling and configuring of the module, its connection to and interaction with expansion modules or external devices.

The Manual also covers the matters of starting, debugging and running programs from among basic and utility software (hereinafter, the Software).

For safe and correct operation of the module during its established service life, one must familiarize oneself with this manual beforehand.

> ❗ WARNING: THE MODULE OPERATION WITHOUT OBSERVING SAFETY REQUIREMENTS, UTILIZATION AND OPERATION INSTRUCTION IS NOT PERMITTED! [3]

> ⚠ ATTENTION: THE MODULE CONTAINS STATIC SENSITIVE COMPONENTS! [4]

> 🚫 FORBIDDEN: OPERATION, MAINTENANCE AND REPAIRS OF THE MODULE BY PERSONS LACKING THE RESPECTIVE SKILLS AND THE REQUIRED LEVEL OF SPECIAL TRAINING! [5]

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[1] The graphic symbol (sign) is hereinafter used together with the explanatory word "Note" and the explanation text.

[2] Unless operating system presets were ordered separately. See Table 1-1 below.

[3] The graphic symbol (safety sign as per GOST R 12.4.026-2001) is hereinafter used jointly with the warning word "WARNING" and the warning text (as per GOST 2.601-2006).

[4] The graphic symbol (safety sign as per GOST R 12.4.026-2001) is hereinafter used jointly with the warning word "ATTENTION" and the warning text (as per GOST 2.601-2006).

[5] The graphic symbol (safety sign as per GOST R 12.4.026-2001) is hereinafter used jointly with the warning word "FORBIDDEN" and the warning text (as per GOST 2.601-2006).

1.2   Hardware Versions, Package Contents, Ordering Information

1.2.1   Hardware Versions, Ordering Information

The module hardware versions and their designation for the purposes of ordering (ordering information) are shown in the table and the figure below:

Table 1-1: Ordering information

Name	Conventional designation	Ordering designation	Note
CPC308 processor module	CPC308	CPC308-01[1]	Intel Pineview N450/1GB DDR2 RAM/ 4GB NAND Flash/ Compact Flash/ 2xSATA/ Discrete IO/ 2x Ethernet/ 4x USB 2.0/ 2x RS232/ 2x RS422/485/ VGA/ LVDS
		CPC308-03[2]	Intel Pineview D510/1GB DDR2 RAM/ 4GB NAND Flash/ Compact Flash/ 2xSATA/ Discrete IO/ 2x Ethernet/ 4x USB 2.0/ 2x RS232/ 2x RS422/485/ VGA/ LVDS
		CPC308-xx\LNX[3]	Module option with a preinstalled Linux 2.6. operating system
		CPC308-xx\yy\Coated[4]	A moisture protected module option

[1] The module contains a complete set of hardware interfaces and functional elements.

[2] Unlike CPC308-01, the module has an Intel Pineview D510 dual core processor installed.

[3] Where xx – is the module version (01, 03).

[4] Where yy – is the operating system (LNX) preinstallation option.

Fig. 1-1: CPC308 processor module ordering template
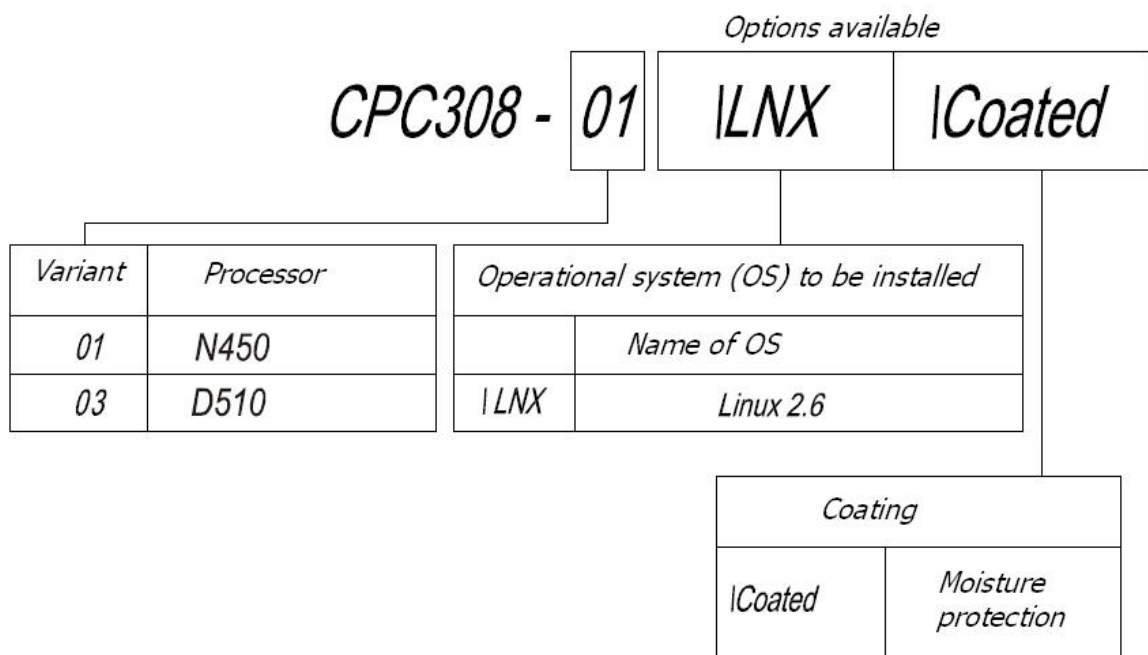
1.2.2   Package Contents

Package contents for all the module versions are shown in the table below:

Table 1-2: Package contents

Ordering designation	Decimal number	Description
CPC308-01, CPC308-03	ИМЕС.467444.308, ИМЕС.467444.308-02	CPC308 processor module
ACS00023	–	Adapter cable (DB9F – IDC10) for connecting to XP3, XP6 (COM1, COM2) connectors
ACS00027	–	Adapter cable (DB15F – IDC10) for VGA monitor connecting to XP connector
ACS00043	–	Adapter cable for connecting a PS/2 keyboard and mouse to XP15 connector
ACS00057	–	Power socket with contacts for connecting to XP25 power connector
–	–	Package

1.2.3   Additional Accessories

Additional accessories for connecting to the module are shown in the table below.

Table 1-3: Additional accessories

Ordering designation	Description
ACS00031-01	ACS00031-01 installation kit. The kit includes a JST PHR-5 socket and a SPH-002T-P0.5S set of contacts for connecting to XP18 and XP19 (COM3, COM4, Audio) connectors of the module
ACS00031-02	ACS00031-02 installation kit. The kit includes a JST PHR-6 socket and a SPH-002T-P0.5S set of contacts for connecting to XP15 (KB/Mouse) connector of the module
ACS00031-03	ACS00031-03 installation kit. The kit includes a JST PHR-2 socket and a SPH-002T-P0.5S set of contacts for connecting to XP20, XP21 (Mic In, Opto Reset) connectors of the module
ACS00037	ACS00037 installation kit. The kit includes a Hirose DF13-20DS-1.25C socket and a DF13-2630SCF set of contacts for connecting to XP8 (LVDS) connector of the module
ACS00040-01	ACS00040-01 installation kit. The kit includes a Leotronics 2040-3102 socket for connecting to XP3, XP6, XP4, XP5, XP1 (COM1, COM2, USB1,2, USB3,4, VGA) connectors of the module
ACS00040-04	ACS00040-04 installation kit. The kit includes a Leotronics 2040-320 socket for connecting to XP11 (2xEthernet) connector of the module
ACS00051	Cable IDC2-10 – 2xUSBA for the connection to XP4, XP5 (USB)
ACS00035-01	A radiator and installation screws.

NOTE: ADDITIONAL ACCESSORIES FOR CONNECTING TO THE MODULE ARE NOT DELIVERED WITH IT; THEY ARE PURCHASED SEPARATELY.

2   Specifications

2.1   Functional Structure of the Module

The module includes the following basic functional elements:

- Intel Pineview-M (N450)[1] or Intel Pineview-D (D510)[2] microprocessor:
  – Single 32/64-bit x86 core (for N450),
  – Two 32/64-bit x86 cores (for D510),
  – SSE2, SSE3, SSSE3 support,
  – Hyperthreading support,
  – 64-bit memory bus,
  – Level I cache - 32 KB programs area, 24 KB data area),
  – Level II cache - 512 KB (for N450),
  – Level II cache - 1 MB (for D510),
  – Intel SpeedStep technology support (for N450);
- DDR2 SDRAM 667 MHz system memory (soldered) - 1 GB;
- Flash BIOS:
  – 16 Mbit,
  – In-system modification possible;
- Two SATA interfaces: two standard onboard connectors;
- NAND Flash storage (soldered and connected to the SATA interface) - 4 GB;
- CompactFlash connector:
  – Type I / Type II devices support,
  – UDMA mode support;
- Video controller:
  – 2D/3D accelerator,
  – Video memory size (allocated from system memory) – 256 MB max,
  – Connectivity for LCD panels (LVDS 18-bit) with resolution up to 1280 x 800 (60 Hz) and VGA interface monitors with resolution up to 1400 x 1050 (60 Hz)[3],
  – Connectivity for LCD panels (LVDS 18-bit) with resolution up to 1366 x 768 (60 Hz) and VGA interface monitors with resolution up to 2048 x 1536 dots (60 Hz)[4],
- Two 10/100/1000 Mb Ethernet controllers
- USB ports:
  – Up to four devices;
  – USB 1.1 and USB 2.0 specifications support;
  – Supported OS loading from USB media;
- Serial ports:
  – COM1, COM2: RS 232, nine-cable (complete) console input/output enabled, maximum data exchange rate 115.2 Kbit/s,

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[1] Installed in the CPC308-01 module
[2] Installed in the CPC308-03 module
[3] For CPC308-01 module
[4] For CPC308-03 module

- COM3, COM4: RS 422/485, galvanically isolated (breakdown voltage 500 V), maximum data exchange rate 9221 Kbit/s;
- HD Audio controller;
  - Stereo line input/output,
  - Microphone input;
- PS/2 keyboard and mouse port;
- Discrete input/output port:
  - 8 separately programmable input/output lines;
- Optically isolated external reset/interrupt input:
  - dielectric breakdown voltage - 500 V;
- Real time clock (RTC);
- CMOS+Serial FRAM (for system configuration storage);
- Two watchdog timers (WDTs):
  - WDT1 - with a fixed timeout period - 1.6 s,
  - WDT2 - with a programmable timeout period - from 1 to 255 minutes;

The module is software compatible with the following OS: FreeDOS, QNX 6.5, Windows XP (embedded), Linux 2.6.

2.2   Module Power Supply

Electric power supply of the module must meet the requirements cited in the table below.

The module may be powered through both the power connector (XP25) and through the PC/104 bus connector. The module's maximum current consumption value is 3.1 A [1] without external devices.

Table 2-1: Power Supply Requirements

Output voltage, V	Rated load current, A	Output buildup time to the +4.75 V level, ms
From +4.75 to +5.25	6	Maximum 10

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[1] For CPC308-03 module

2.3 Operating Conditions

The module must be used under the following operating conditions:

– Operating temperature range: –40 to +85°C[1],

Modules are resistant to alteration (change) of ambient temperature in the specified temperature range, at relative humidity up to 80%, without moisture condensation.

🚫	**FORBIDDEN:**	**USE THE MODULE AT AMBIENT TEMPERATURE EXCEEDING 70°C WITHOUT ACS00035-01 ACCESSORY OR ANOTHER HEATSINK ATTACHED TO THE HEAT-SPREADING PLATE (ANOTHER RADIATOR, THE DEVICE BODY, ETC.).**

2.4 Mechanical Characteristics

The module has the following mechanical characteristics:

– Vibration resistance: 5g max.
– Single shock resistance: 100 g max.
– Multiple shock resistance: 50 g max.

2.5 Weight and Dimensions

The weight and dimension values for various hardware versions of the module are shown in the table below:

Table 2-2: The Module Weight and Sizes

Module	Weight, kg, max.	Weight, kg, in package	Dimensions, mm, max.	Package dimensions, mm,
CPC308	0.3 [1]	0,484± 0,05	116* x 96* x 29* [2]	230x155x45 mm
[1] Without CompactFlash device.	[2] "*" - dimensions for reference.			

The general sizes and interface dimensions of the module are shown on figures below.

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[1] The value of the top temperature limit (plus 85°C) is valid when the module is used with the ACS00035-01 accessory or when it is used as a part of a cabinet device where heat is withdrawn from the heat-spreading plate to the device body.

Fig. 2-1: Overall and Mounting Dimensions of the Module (Top View)
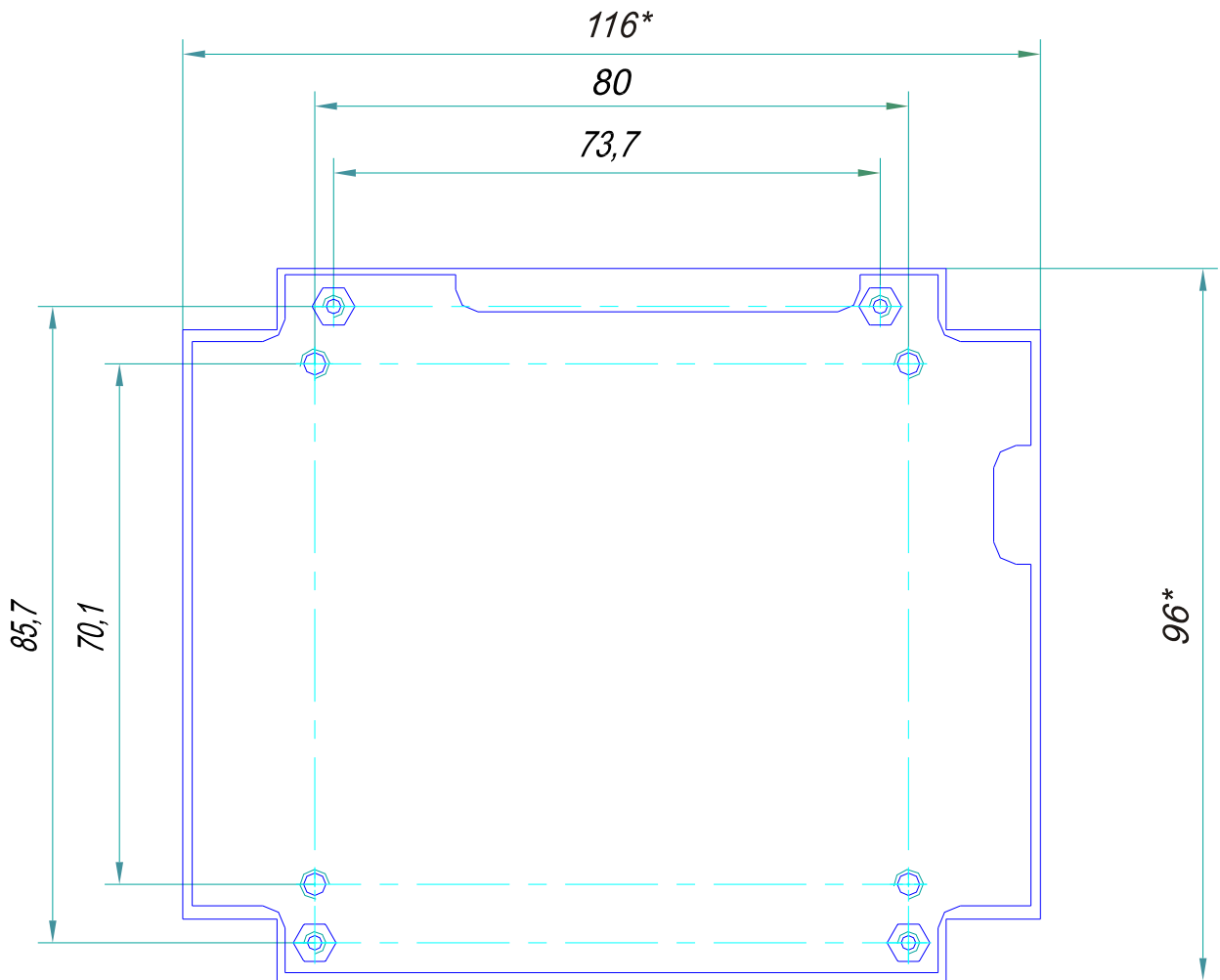
Fig. 2-2: Dimensions (Side View)
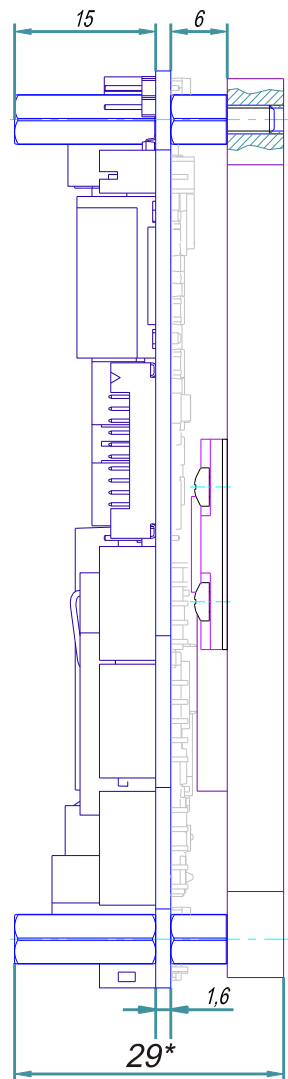
2.6   MTBF:

The MTBF value for the module is 120,000 hours.

| | NOTE: | THIS MTBF VALUE HAS BEEN CALCULATED ACCORDING TO THE TELCORDIA ISSUE 1 CALCULATION MODEL, METHOD I CASE 3 CALCULATION PROCEDURE, FOR CONTINUOUS OPERATION ON EARTH UNDER THE CONDITIONS MEETING UKHL4 UNDER GOST 15150-69, AT AMBIENT TEMPERATURE +30°C. |

3   The Module Structure and Functioning

3.1   Block Diagram of the Module

Block diagram of the module is shown below:

Fig. 3-1: Block Diagram of the Module
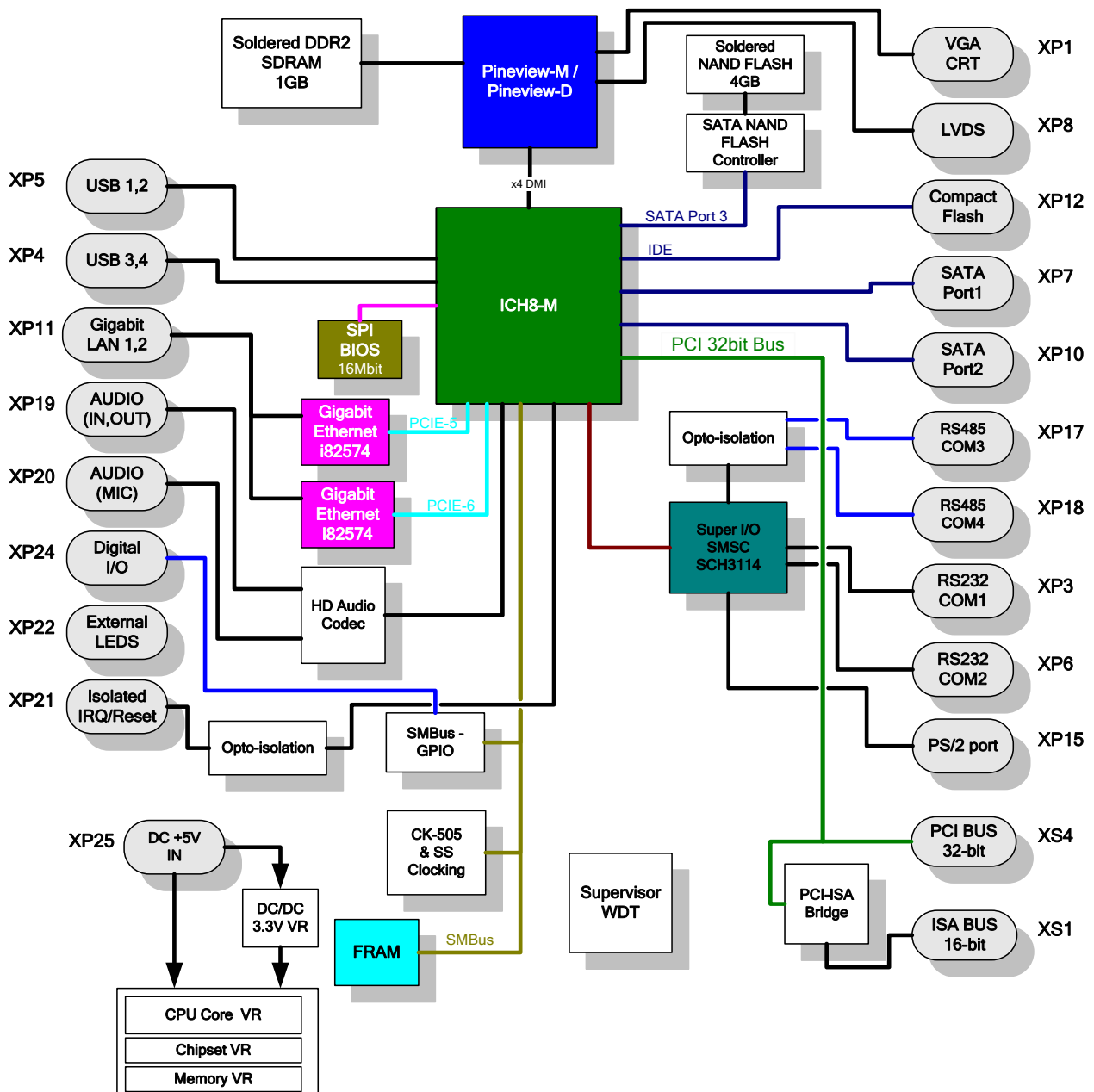
The following functional elements are shown in the module block diagram:

– Intel Atom N450 or Intel Atom D510 microprocessor (depending on the module version);
– DDR2 SDRAM system memory (up to 1 GB);
– Flash BIOS (16 Mbit);
– NAND Flash data storage (4 GB);
– VGA monitor port **(XP1)**;
– LVDS interface connector for TFT panel connecting **(XP8)**;
– 2 SATA channels **(XP7 and XP10)**;
– CompactFlash connector **(XP12)**;
– Two 10/100/1000 Mb Ethernet channels **(XP11)**;
– 4x USB 2.0 channels **(XP4 and XP5)**;
– COM1 (RS232) **(XP3)**, COM2 (RS 232) **(XP6),** COM3 (RS422/285) **(XP17)**, COM4 (RS 422/485) serial ports **(XP18)**;
– PS/2 keyboard and mouse port **(XP15)**;
– Discrete input/output port **(XP24)**;
– External indication connector **(XP22)**;
– HD Audio controller with line input/output and microphone connectors **(XP19 and XP20)**;
– External optoisolated reset **(XP21)**;
– 16 bit ISA bus **(XS1)**;
– 32 bit, 33 MHz PCI bus**(XS4)**;
– Serial FRAM (for system configuration storage);
– Two watchdog timers (WDTs).

Technical features of the module's main functional elements are described in subsection 2.1 of the Manual.

3.2　　The Module Main Elements Layout

The layout of main components, their corresponding connectors, as well as jumper switches for top and bottom sides is shown, respectively, in Fig. 3-2 and Fig. 3-3.

The default positions of jumpers in jumper switches are also shown in Fig. 3-2, and jumpers settings by functions are shown in Section 5 Configuring CPC308.

Fig. 3-2: Layout of Connectors and Main Components (Top Side)

Isolated
IRQ/Reset
(XP21)

Reset
(XP16)

Isolated IRQ/Reset
Selector
(XP23)

PCI BUS
(XS4)

PCI VIO
Selector
(XP13)

Discrete I/O
(XP24)

Power LED
(HL3)

SATA1
(XP7)
SATA2
(XP10)

LVDS
(XP8)
VGA
(XP1)

LVDS Panel
Power Selector
(XP2)

Isolated
COM4
(XP18)

Isolated
COM3
(XP17)

Audio
IN/OUT
(XP19)

8Mx16x8

8Mx16x8

8Mx16x8

8Mx16x8

LINEAR
LTM2881
uModule

LINEAR
LTM2881
uModule

HD
Audio

SM2242T AC

HCS9905H

SCH3114

Pulse
HX5020NL

USB3,4
(XP5)

USB1,2
(XP4)

COM2
(XP6)

COM1
(XP3)

Gigabit
Ethernet 1,2
(XP11)

Power
(XP25)

Audio
MIC
(XP20)

ISA 16bit BUS
(XS1)

CMOS Reset
(XP9)

External
LEDs
(XP22)

User LED1 Green
(HL1)
User LED2 Yellow
(HL2)
PS/2
KB/MS
(XP15)

Fig. 3-3: Layout of Connectors and Main Components (Bottom Side)
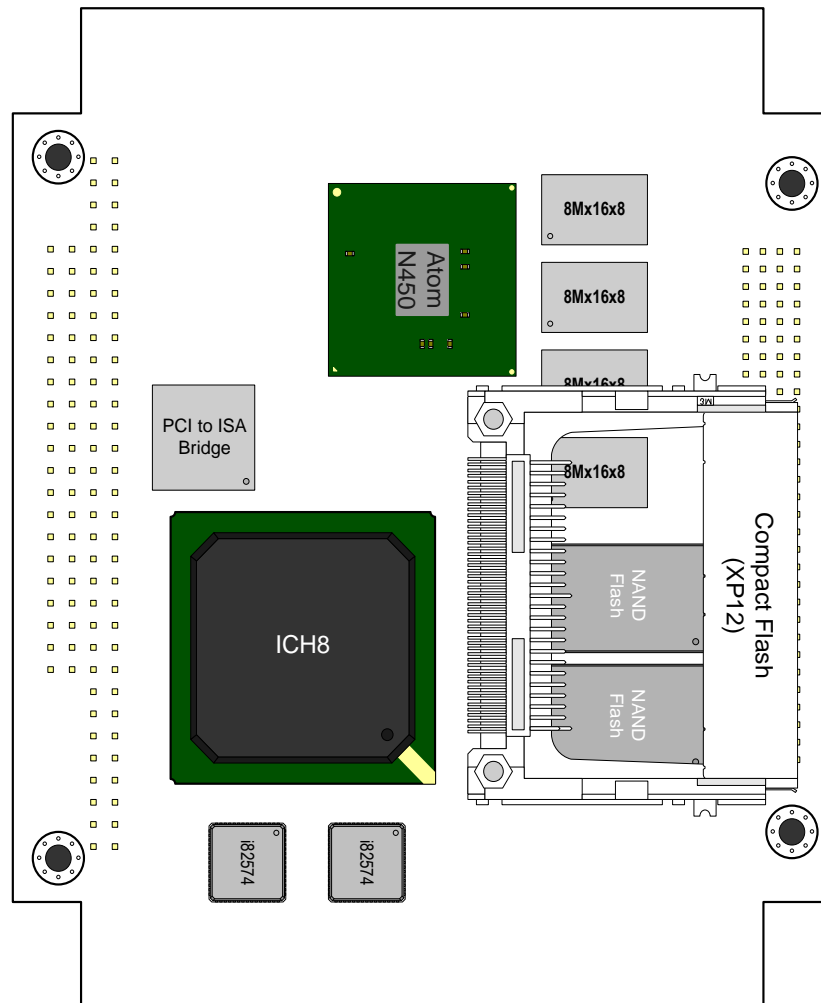
3.3 Operation Features of Functional Units

- **Intel PineView-M (-D)**

An energy efficient (~5.5 W) 32-bit Intel microprocessor built on Atom core[1]. A highly integrated solution uniting the processor core itself, as well as the SDRAM/DDR2 controller and a 3D/2D accelerated graphic adapter.

- **ICH-8M**

A highly integrated interface controller including standard IBM PC AT platform peripherals.

- **Memory**

A 1 GB DDR2-667 RAM is soldered on board. The installation of memory expansion modules is not supported.

- **BIOS**

A Flash 16 microchip on the SPI bus is used for BIOS storage.

- **RTC, CMOS**

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[1] In case of Intel Pineview-M (N450) processor

The real time clock is built in ICH8. The clock operability without power is ensured by a lithium battery installed on the board. BIOS Setup settings are saved in the FRAM.

- **FRAM**

64-Kbit non-volatile memory, may be used to save user data and store BIOS Setup parameters.

- **NAND Flash**

NAND Flash microchips having total volume up to 4 GB are soldered on board. The NAND Flash connection to the SATA bus (SATA Flash Disk Controller is used) permits to increase operation speed and ensure compatibility with various OSs. A two-channel NAND Flash operation mode is supported.

- **CompactFlash**

The module permits to use CompactFlash (Type I/II) cards as a data storage, the socket is placed on the bottom side for that purpose.

- **Ethernet**

Two 10/100/1000 Mbit PCIe Ethernet controllers built on Intel i82574 microchip are used, both channels are connected to a joint IDC20 connector on the board having 2 mm contact spacing.

- **USB 2.0**

The board has 4 USB 2.0 channels: They are connected to two IDC 10 type connectors having 2 mm contact spacing installed on the board.

- **COM1/COM2/COM3/COM4**

COM1/COM2 – 9-wire RS232 interface. Each port is connected to an IDC 10 type board connector with 2 mm contact spacing.

COM3/COM4 - galvanically isolated RS422/485, insulation voltage up to 500 V. The transmitter is controlled in an automatic mode. Each port is connected to a straight 5-pin connector with 2 mm contact spacing. Termination resistors (RS422/485) can be connected with the help of BIOS Setup software.

- **PS/2 Keyboard & Mouse**

Intended for connecting a PS/2 keyboard and a mouse to the module, a straight single-in-line 6-pin connector having 2 mm contact spacing is used for that purpose.

- **SATA**

Two SATA interfaces: both standard connectors are placed on the board.

- **VGA, LVDS**

The ports are intended for connecting a VGA analog monitor and/or a LVDS interface matrix. Dual-monitor configurations are supported in clone/extended desktop modes.

- **Audio**

The support is realized with the help of HD Audio codec. The following signal connectors are installed on the board: line input, line output (a 5-pin connector with 2 mm contact spacing), as well as a microphone input (a 3-pin connector with 2 mm contact spacing).

- **Indication**

There are power-on indication LEDs placed on the board, as well as two programable LEDs for user needs.

External LEDs may be connected through a connector on the board. This connector allows to connect the following LEDs: disc storages activity, indication of LAN1 and LAN1 ports connection and activity, LED1 and LED2 user LEDs, a power-on indicator.

- **Watchdog**

There are two watchdog timers in the module. One of them (WDT1) is built into the supervisor microchip and has a fixed timeout period (1.6 s), the other is built into the SIO microchip; it has programmable timeout period (up to 255 min).

- **Reset and Power Monitoring**

The microprocessor reset signal is formed from the following sources:
  - Supervisor when power is turned on;
  - "Reset" button;
  - Watchdog timers.

- **Jumpers**

The following functional selectors are placed on the board:
  - Isolated discrete input operation mode selector (Reset/Interrupt) XP23;
  - LVDS panel power selector (XP2)
  - PCI VIO selector (XP13);
  - CMOS Reset selector (XP9).

3.4   Module Interfaces and Connectors

3.4.1   PC/104-Plus Connectors

There are standard PC/104-Plus format connectors installed in the CPC308 module. With their help CP308 can be connected to such devices as analog-digital converters, digital input/output modules, etc. As per the PC/104-Plus specification, the module includes PC/104-ISA and PC/104-PCI connectors described below.

PC/104-ISA Interface

PC/104-ISA interface permits the module to operate with 8- or 16-digit PC/104 expansion modules. A 104-pin 0.10" (2.54 mm) connector located on the top side of the module is used for the PC/104 bus. Through that connector ISA bus signals are transmitted at 8 MHz frequency.

The CPC308 processor module supports up to four PC/104 expansion modules without additional bufferization.

The layout and designation of the PC/104-ISA connector contacts is shown in a figure and in tables below.

Fig. 3-4: XS1 PC/104-ISA Connector Contacts
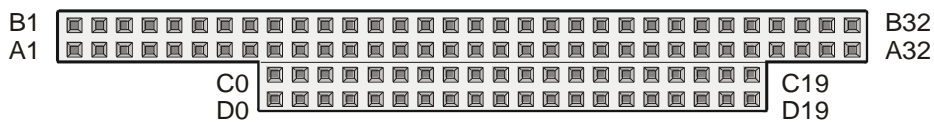
Table 3-1: XS1 PC/104-ISA Connector Contacts Designation

Contact	Signal	Status	Contact	Signal	Status
A1	/IOCHK	–	B1	GND	Power
A2	SD7	Input/Output	B2	RESET	Output
A3	SD6	Input/Output	B3	+5V	Power
A4	SD5	Input/Output	B4	IRQ9	Input
A5	SD4	Input/Output	B5	-5V	Power
A6	SD3	Input/Output	B6	DRQ2	Input
A7	SD2	Input/Output	B7	-12V	Power
A8	SD1	Input/Output	B8	0WS	Input
A9	SD0	Input/Output	B9	+12V	Power
A10	IOCHRDY	Input	B10	GND	Power
A11	AEN	Output	B11	/SMEMW	Output
A12	SA19	Output	B12	/SMEMR	Output
A13	SA18	Output	B13	/IOW	Output
A14	SA17	Output	B14	/IOR	Output
A15	SA16	Output	B15	/DACK3	Output
A16	SA15	Output	B16	DRQ3	Input
A17	SA14	Output	B17	/DACK1	Output
A18	SA13	Output	B18	DRQ1	Input
A19	SA12	Output	B19	/REFRESH	Output
A20	SA11	Output	B20	BCLK	Output
A21	SA10	Output	B21	IRQ7	Input
A22	SA9	Output	B22	IRQ6	Input
A23	SA8	Output	B23	IRQ5	Input
A24	SA7	Output	B24	IRQ4	Input
A25	SA6	Output	B25	IRQ3	Input
A26	SA5	Output	B26	/DACK2	Output
A27	SA4	Output	B27	TC	Output
A28	SA3	Output	B28	BALE	Output
A29	SA2	Output	B29	+5V	Power
A30	SA1	Output	B30	OSC	Output
A31	SA0	Output	B31	GND	Power
A32	GND	Power	B32	GND	Power
C0	GND	Power	D0	GND	Power
C1	/SBHE	Output	D1	/MEMCS16	Input
C2	LA23	Output	D2	/IOCS16	Input
C3	LA22	Output	D3	IRQ10	Input
C4	LA21	Output	D4	IRQ11	Input

Contact	Signal	Status	Signal	Contact	Status
C5	LA20	Output	D5	IRQ12	Input
C6	LA19	Output	D6	IRQ13	Input
C7	LA18	Output	D7	IRQ14	Input
C8	LA17	Output	D8	/DACK0	Output
C9	/MEMR	Output	D9	DRQ0	Input
C10	/MEMW	Output	D10	/DACK5	Output
C11	SD8	Input/Output	D11	DRQ5	Input
C12	SD9	Input/Output	D12	/DACK6	Output
C13	SD10	Input/Output	D13	DRQ6	Input
C14	SD11	Input/Output	D14	/DACK7	Output
C15	SD12	Input/Output	D15	DRQ7	Input
C16	SD13	Input/Output	D16	+5V	Power
C17	SD14	Input/Output	D17	/MASTER	Input
C18	SD15	Input/Output	D18	GND	Power
C19	KEY	–	D19	GND	Power

Note:

Designation "–" is not used in these tables.

The "Status" column shows the direction of the data transfer for the processor module being the bus master.

The table below cites electrical characteristics of the ISA interface lines.

Table 3-2: Electrical Characteristics of the ISA Interface Lines

Symbol	Parameter	Conditions	Min.	Typical	Max.	Units
V_{IL}	Input Low Voltage for 5V cell	TTL			0.8	V
V_{IL}	Input Low Voltage for 3.3V cell	CMOS			0.3*VCC3	V
V_{IL}	Schmitt Input Low Voltage	TTL		1.10		V
V_{IH}	Input Low Voltage for 5V cell	TTL	2.2			V
V_{IH}	Input Low Voltage for 3.3V cell	CMOS	0.7*VCC3			V
V_{IH}	Schmitt Input Low Voltage	TTL		1.87		V
V_{IH}	Input Low Voltage for 5V cell				0.4	V
V_{OL}	Input Low Voltage for 3.3V cell				0.4	V
V_{OH}	Output High Voltage for 5V cell		3.5			V
V_{OH}	Output High Voltage for 3.3V cell		2.3			V
V_{IL}	Input Low Current	no P/D or P/U	-1		1	µA
I_{IH}	Input High Current	no P/D or P/U	-1		1	µA
I_{OZ}	Tri-state Leakage Current		-10		10	µA
C_{IN}	Input Capacitance			3		ρF
C_{OUT}	Output Capacitance			3 to 6		ρF
C_{BID}	Bi-directional buffer Capacitance			3 to 6		ρF

PC/104-PCI Interface

PC/104-PCI interface uses a 120-pin (30x4) XS4 connector located on the top side of the board. It is used to transmit all the necessary signals of the 32-bit PCI bus at 33 MHz frequency. Three Bus Master devices are supported.

The layout of the PC/104-PCI connector contacts is shown in a figure below. The designation of the connector contacts is described in Table 3-3: The Designation of the PC/104-PCI (XS4) Connector Contacts.

Fig. 3-5: PC/104-PCI (XS4) Connector Contacts
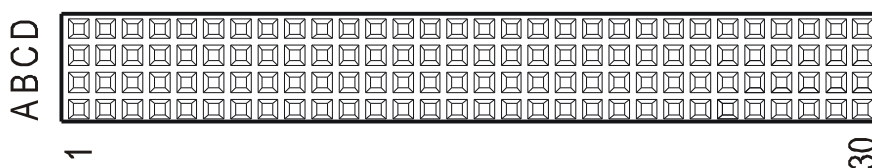
Table 3-3: The Designation of the PC/104-PCI (XS4) Connector Contacts

Contact	Signal	Contact	Signal	Contact	Signal	Contact	Signal
A1	GND	A16	AD21	B1	RESERVED	B16	AD20
A2	VI/O	A17	+3.3V*	B2	AD02	B17	AD23
A3	AD05	A18	IDSEL0	B3	GND	B18	GND
A4	C/BE0#	A19	AD24	B4	AD07	B19	C/BE3#
A5	GND	A20	GND	B5	AD09	B20	AD26
A6	AD11	A21	AD29	B6	VI/O	B21	+5V
A7	AD14	A22	+5V	B7	AD13	B22	AD30
A8	+3.3V*	A23	REQ0#	B8	C/BE1#	B23	GND
A9	SERR#	A24	GND	B9	GND	B24	REQ2#
A10	GND	A25	GNT1#	B10	PERR#	B25	VI/O
A11	STOP#	A26	+5V	B11	+3.3V*	B26	CLK0
A12	+3.3V*	A27	CLK2	B12	TRDY#	B27	+5V
A13	FRAME#	A28	GND	B13	GND	B28	INTD#
A14	GND	A29	+12V	B14	AD16	B29	INTA#
A15	AD18	A30	-12V	B15	+3.3V*	B30	REQ3#

Contact	Signal	Contact	Signal	Contact	Signal	Contact	Signal
C1	+5V	C16	GND	D1	AD0	D16	AD19
C2	AD01	C17	AD22	D2	+5V	D17	+3.3V*
C3	AD04	C18	IDSEL1	D3	AD03	D18	IDSEL2
C4	GND	C19	VI/O	D4	AD06	D19	IDSEL3
C5	AD08	C20	AD25	D5	GND	D20	GND
C6	AD10	C21	AD28	D6	M66EN	D21	AD27
C7	GND	C22	GND	D7	AD12	D22	AD31
C8	AD15	C23	REQ1#	D8	+3.3V*	D23	VI/O
C9	RESERVED	C24	+5V	D9	PAR	D24	GNT0#
C10	+3.3V*	C25	GNT2#	D10	RESEVED	D25	GND
C11	/LOCK	C26	GND	D11	GND	D26	CLK1
C12	GND	C27	CLK3	D12	DEVSEL#	D27	GND
C13	IRDY#	C28	+5V	D13	+3.3V*	D28	RST#
C14	+3.3V*	C29	INTB#	D14	C/BE2#	D29	INTC#
C15	AD17	C30	GNT3#	D15	GND	D30	GND

PCI VIO Selector switch (XP13) is located on the top side of the board (near the XS4 connector, see Fig. 3 2: Layout of Connectors and Main Components on the Top Side). It is used to select power voltage of PC\104-Plus modules PCI interface buffers.

The following states of the XP13 switch contacts are possible:

- Contacts 1-2 closed – PCI bus signal level is +5 V;

- Contacts 2-3 closed – PCI bus signal level is +3.3 V;

   ▪ All contacts open - signal levels are selected at the PC/104-Plus power source.

XP13 switch is described in more detail in subsection 5.1 Selection of Buffers Power Voltage on the PCI Bus of PC/104-Plus. Pay attention to the note:

Note

If you use a PC/104-Plus power source, the VIO voltage must be set at the power supply module. In this case remove the jumper from the VIO (XP13) selector switch: **all contacts should be open**.

If a PC/104-Plus power supply is not used, the jumper on the XP13 selector switch must be put into the 1-2 or 2-3 position, see Fig. 5-1: Status of the PCI VIO Selector (XP13) Switch Contacts.

3.4.2   Graphics Controller

The Intel Pineview microprocessor is a highly integrated solution uniting the processor core itself, as well as the SDRAM/DDR2 controller and a 3D/2D accelerated graphics adapter.

It enables the module to efficiently process 2D/3D graphics. A built-in graphics controller permits to connect the module directly to a standard analog monitor through the VGA connector on the board and/or with digital TFT panels through a LVDS connector. Dual-monitor configurations are supported in clone/extended desktop modes.

3.4.2.1   VGA CRT Interface

A 10-pin XP1 IDC10 type connector with 2 mm contact spacing is installed on the top side of the board to connect an analog monitor to CPC308.
 – It is possible to connect VGA interface monitors having a resolution up to 1400 x 1050 (60 Hz) (for CPC308-01 modules);
 – it is possible to connect VGA interface monitors having a resolution up to 2048 x 1536 (60 Hz) (for CPC308-03 modules);

Fig. 3-6: VGA CRT (XP1) Connector
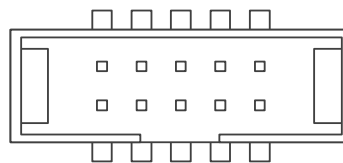
Table 3-4: Designation of the VGA (XP1) Connector Contacts

Contact	Signal	Contact	Signal
1	RED	6	GND
2	GND	7	HSYNC
3	GREEN	8	VSYNC
4	GND	9	-
5	BLUE	10	-

A monitor is connected either with the help of the ACS00027 accessory delivered with the module or with the help of a self-made cable. It is recommended to use a 2040-3102 Leotronics socket or the ACS00040-01 from additional accessories (see Table 1 3).

3.4.2.2   LVDS Interface

There is a 20-pin LVDS interface connector located on the top side of the board. It is intended for connection of digital TFT-panels with cables crimped for 1.25 contact spacing. Supported mode: Single LVDS, up to 18 bit/pixel, 25-112 MHz frequency range.

–   It is possible to connect LCD panels (LVDS 18-bit) having a resolution up to 1280x800 (60 Hz) (for CPC308-01 modules);

–   It is possible to connect LCD panels (LVDS 18-bit) having a resolution up to 1366x768 (60 Hz) (for CPC308-01 modules);

Fig. 3-7: LVDS (XP8) Connector
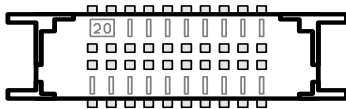
20-pin LVDS connector for connecting digital TFT panels

Table 3-5: The Designation of the LVDS (XP8) Connector Contacts

Contact	Signal	Contact	Signal
1	+3.3V	11	TxOUT2+
2	+3.3V	12	TxOUT2-
3	TxOUT0+	13	GND
4	TxOUT0-	14	GND
5	GND	15	DDC_CLK
6	GND	16	DDC_DATA
7	TxOUT1+	17	GND
8	TxOUT1-	18	GND
9	GND	19	TxCLK+
10	GND	20	TxCLK-

To make a custom a cable, it is recommended to use either a DF13-20DS-1.25C (Hirose) type connector having DF13-2630SCF (Hirose), or an ACS00037 accessory (see Table 1 3).

3.4.2.2.1.   Power Voltage Selection for a Digital TFT Panel

Standard tri-contact selector switch XP2 is intended to select digital panel power voltage (see Fig. 3 2: Layout of Connectors and Main components on the Top Side).

TFT panel power voltage selection is described in detail in section 5.2 Selecting TFT Panel Power Voltage.

If contacts 1-2 are closed, the digital panel is powered by +3.3 V voltage.

If contacts 2-3 are closed, it is powered by +5 V voltage.

Attention!

Be very careful when selecting the TFT panel power voltage! Incorrect power voltage setting may make the panel inoperative. To define the exact value of the TFT panel power voltage, please look at the reference information provided by the panel manufacturer or inquire the dealer from whom you have bought the panel.

3.4.3   Audio Interface

There are two audio connectors for wire crimp (support is realized with the help of HD Audio codec):

- For line input and line output signals (XP19, 5-pin connector with 2 mm contact spacing);
- For microphone input signals (XP20, 2-pin connector with 2 mm contact spacing)

Fig. 3-8: XP19 Audio Connector
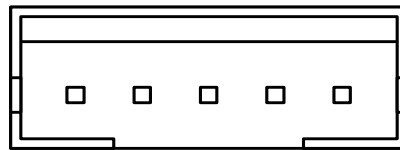
Fig. 3-9: XP20 Audio Connector
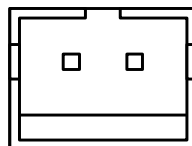
The designation of audio connectors contacts are specified in the table below.

Table 3-6: The Designation of the Audio Connectors Contacts

Contact	Signal XP19 connector	Contact	Signal XP 20 connector
1	LIN_IN_L	1	MIC_IN
2	LIN_IN_R		
3	GND		
4	LIN_OUT_R	2	GND
5	LIN_OUT_L		

To make adapter cables for connecting to XP19 and XP20 connectors, it is recommended to use either PHR-5 (JST) / PHR-2 (JST) respectively for cables crimp with SPH-002T-P0.5S (JST) contacts, or ACS00031-01 and ACS00031-03 accessories, respectively (see Table 1 3).

3.4.4   Serial Interfaces

The module has four serial ports: COM1 – COM4.

3.4.4.1   COM1 and COM2 Ports

COM1 and COM2 ports operate in complete (nine-cable) RS232 interface mode. They have standard PC/AT base addresses (see Table 3 21) and interrupts (see Table 3 22). The ports can be also used for console input/output. The number of the COM port for a remote console connection to COM1 (XP3) or COM2 (XP6) is selected with the help of the respective BIOS Setup module setting (see subsection 7.3.2 Console Redirection). To communicate with a remote console (PC emulating a terminal with the data exchange parameter for a COM port: 115200 bps, 8, N, 1), use connection through the "null-modem" cable[1] and the ASC00023 cable delivered with the module, e.g. to the COM1(XP) port connector of the module (by default). See subsection 1.2.2 Package Contents.

> ⚠️ **Attention!**
>
> If you use the Hyperterminal software as a terminal, for correct operation deselect the "Wrap lines that exceeded terminal width" item in the ASCII parameters settings of the program.

The maximum data exchange rate for COM1 and COM2 ports is 115.2 Kbit/s. The ports are software compatible with the UART 16550 model.
COM1 and COM2 ports are connected, respectively, to XP3 and XP6 IDC10 connectors (with 2 mm contact spacing). The designation of contacts of XP3 and XP6 connectors for connection to COM1 and COM2 ports is shown in Table 3 7.

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[1] The standard cable is neither delivered with the module nor is the module additional accessory; it is to be acquired separately.

Fig. 3-10: COM1/COM2 (XP3 and XP6) Connectors
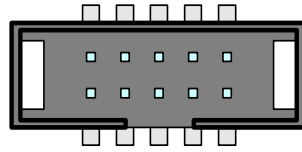
Table 3-7: The Designation of COM1/COM2 (XP3 and XP6) Connectors Contacts

Contact	Signal	Contact	Signal
1	DCD	6	CTS
2	DSR	7	DTR
3	RXD	8	RI
4	RTS	9	GND
5	TXD	10	+5V

When using XP3 and XP6 (IDC10) connectors, it is also recommended to use the ACS00040-01 additional accessory (see Table 1 3).

3.4.4.2 COM3 and COM4 Ports

Serial ports COM3 and COM4 are intended for operation in RS422/485 interface modes. They have galvanic isolation (500V optoisolation). The ports have standard PC/AT base addresses and interrupts. The maximum data exchange rate is 921 Kbit/s. In Rs485 mode, transmitters are controlled automatically. Each port can operate both with the receiver permanently enabled (ECHO mode) and with the receiver disabled at the moment of the data transmission.
The ECHO mode is disabled, and the 120 Ohm terminating resistors (terminators) are control for each port with the help of the BIOS Setup program.
Each port is connected to a straight 5-contact connector with 2 mm contact spacing.

Fig. 3-11: COM3 and COM4 Ports Connectors (XP17 and XP18)
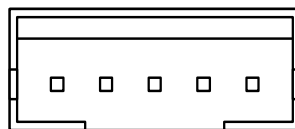
The designation of the connectors contacts are shown below.

Table 3-8: The Designation of COM3 and COM4 Connectors (XP17 and XP18) Contacts

Contact	Signal	Contac	Signal
1	TX+	4	RX-
2	TX-	5	GND
3	RX+	-	-

The connection diagrams explaining the structure of RS422 and RS485 interfaces are shown, respectively, in Fig. 3 12 and Fig. 3 13.
"Point-to-point" connection of two devices through RS422 interface is shown in Fig. 3 12. The terminator is installed on the receiving side (on RX+ and RX- lines). The integration of several devices

through RS485 interface is shown in Fig. 3 13. Terminators are only installed if the devices are connected to the line ends.

Fig. 3-12 "Point-to-point" Type Connection of Two Devices Through RS422 Interface
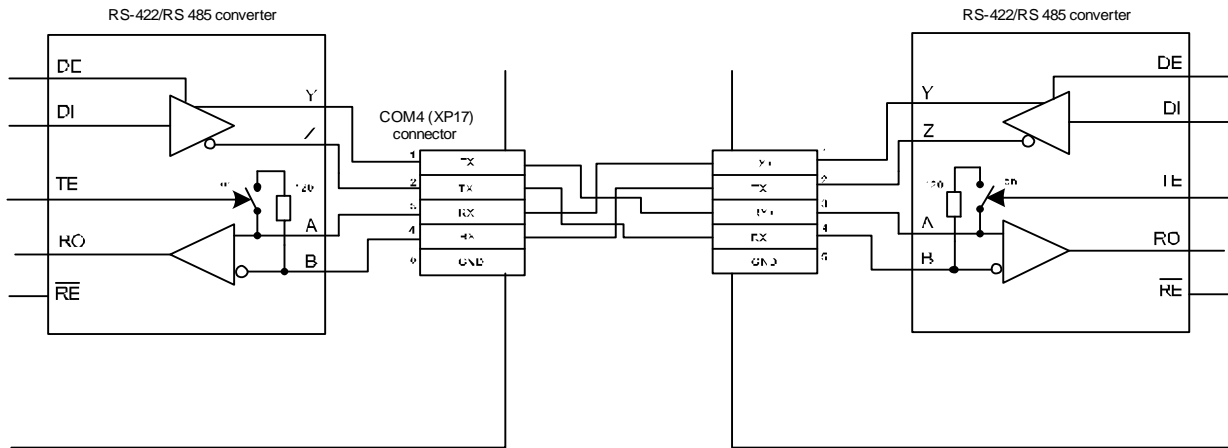
Fig. 3-13: Integration of Several Devices Through the RS 485 Interface
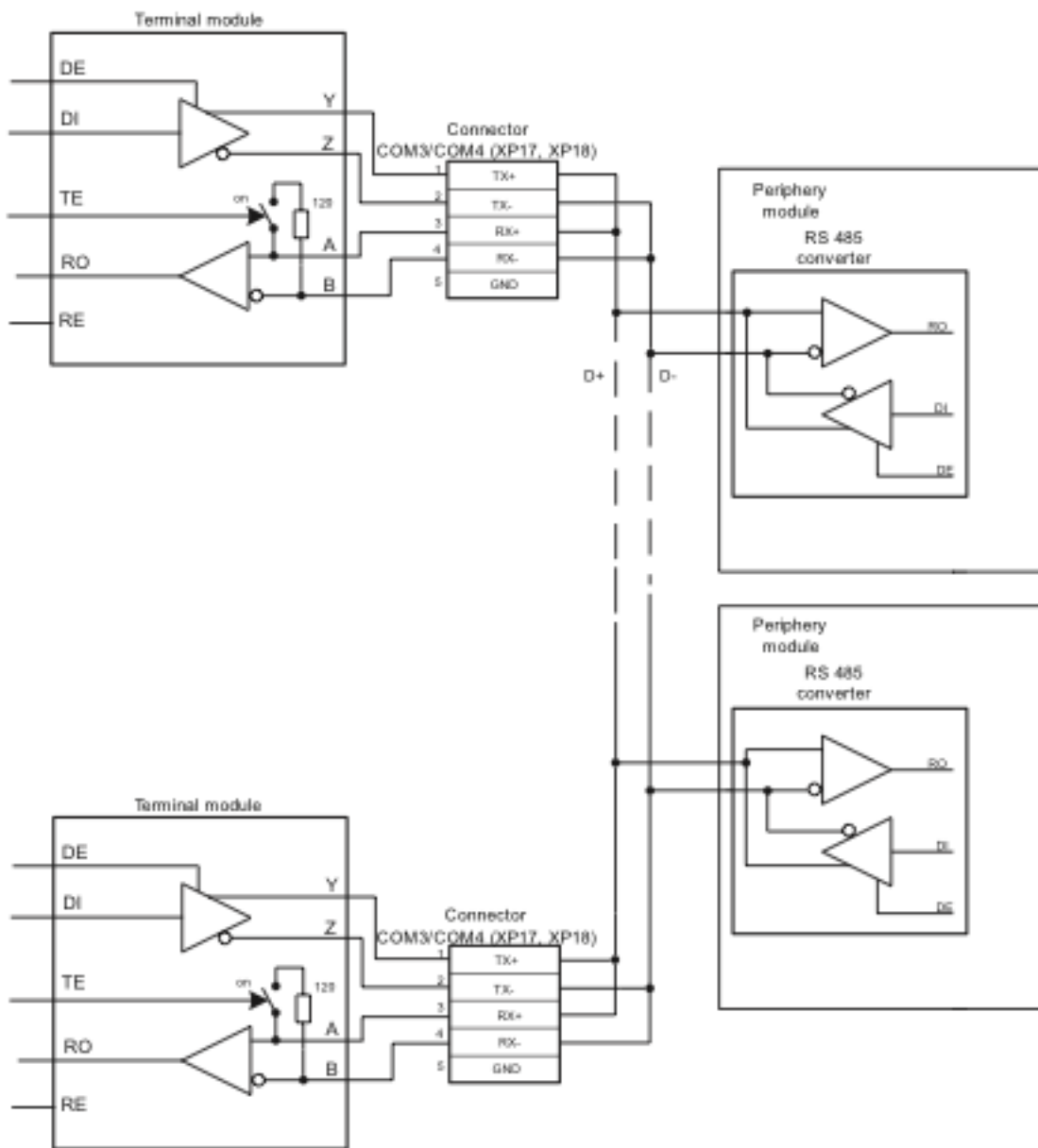
For making adapter cables for connecting to XP17 and XP18 connectors, it is recommended to use a PHR-5 (JST) socket for wires crimp with SPH-002T-P0.5S (JST) contacts or the ACS00031-01 accessory (see Table 1 3).

3.4.5   USB Interfaces

Two IDC10 type connectors with 2 mm contact spacing are installed on the CPC308 boards. Four USB 2.0 channels are connected to them:

– USB 1.1 and USB 2.0 specifications support;
– Supported OS loading from USB media;

Fig. 3-14: USB1-USB4 Connectors (XP4, XP5)
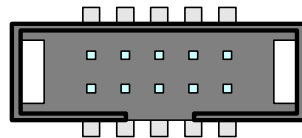
The designations of USB connectors contacts are specified in the table below.

Table 3-9: The Designation of USB1-USB4 Connectors (XP4, XP5) Contacts

Contact	Signal	Contact	Signal
1	USB1_+5V	6	USB2_DAT+
2	USB2_+5V	7	USB1_GND
3	USB1_DAT-	8	USB2_GND
4	USB2_DAT-	9	–
5	USB1_DAT+	10	–

When making an interface cable for connecting to XP4, XP5 (IDC10) connectors, it is recommended to use the ACS00040-01 additional accessory (see Table 1 3).

3.4.6   Gigabit Ethernet Interface

Two 10/100/1000 Mbit PCIe Ethernet controllers built on Intel i82574 microchip are used in the CPC308 module. Both channels are connected to a joint IDC20 type connector with 2 mm contact spacing.

Fig. 3-15: Gigabit Ethernet (XP11) Connector
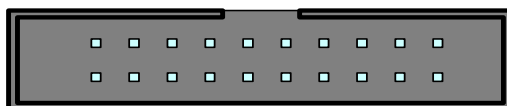
Interfaces provide automatic transmission speed determination and swapping between 10Base-T, 100Base-TX and 1000Base-T data transmission modes. Each of the two Ethernet channels may be independently disabled with the help of the BIOS Setup program or user software in order to release system resources.

Table 3-10: The Designation of the Gigabit Ethernet (XP11) Connector Contacts

Contact	Signal	Contact	Signal
1	LAN1_MD0+	11	LAN2_MD0+
2	LAN1_MD0-	12	LAN2_MD0-
3	LAN1_MD1+	13	LAN2_MD1+
4	LAN1_MD2+	14	LAN2_MD2+
5	LAN1_MD2-	15	LAN2_MD2-
6	LAN1_MD1-	16	LAN2_MD1-
7	LAN1_MD3+	17	LAN2_MD3+
8	LAN1_MD3-	18	LAN2_MD3-
9	GND	19	GND
10	GND	20	GND

When making an interface cable for connecting to the XP11 (IDC10) connector, it is recommended to use the ACS00040-04 additional accessory (see Table 1 3).

3.4.7   SerialATA Interface

There are standard SATA interface connectors (XP7 and XP10) located on the CPC308 module board. The maximum transmission rate is 300 MB/s.

Fig. 3-16: SATA Connectors (XP7 and XP10)
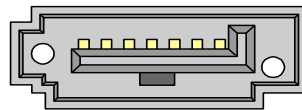
Table 3-11: The Designation of SATA Connectors (XP7 and XP10) Contacts

Contact Number	Function
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND

It recommended to use cables whose length does not exceed 45 cm in order to connect SATA devices.

Attention!

Connecting and disconnecting standard SATA devices when the module is switched on may result in the module or power supply breakdown. **It is permitted to connect and disconnect standard SATA devices only when the module is switched off!**

3.4.8   CompactFlash Connector

A flash memory card is a compact removable data storage device. To enable memory cards utilization as disc storage devices, a 50-pin CompactFlash (XP12) connector is installed on the bottom side of the CPC308 board:

– Type I / II devices support,
– UDMA mode support.

Fig. 3-17: CompactFlash XP12 Connector
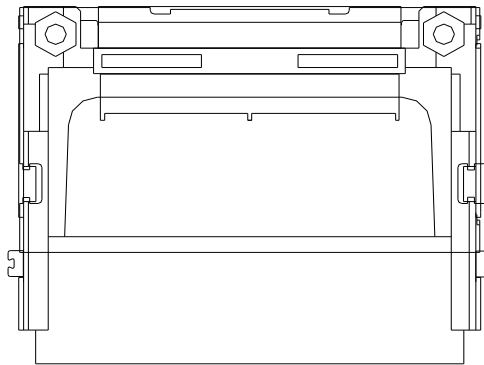
Attention!

If the module is used in severe operating conditions, it is necessary to take additional measures to fix the CompactFlash device in the connector!

The designation of the CompactFlash connector contacts are shown in the table below.

Table 3-12: The Designation of the CompactFlash (XP12) Connector Contacts

Contact Number	Signal	Function	Input/output
1	GND	Ground signal	–
2	D03	Data 3	In/Out
3	D04	Data 4	In/Out
4	D05	Data 5	In/Out
5	D06	Data 6	In/Out
6	D07	Data 7	In/Out
7	IDE_CS0	Chip select 0	Out
8	GND	–	–
9	GND	–	–
10	GND	–	–
11	GND	–	–
12	GND	–	–
13	3.3 V	3.3 V power	–
14	A06	–	–
15	A05	–	–
16	A04	–	–
17	A03	–	–
18	A02	Address 2	Out
19	A01	Address 1	Out
20	A00	Address 0	Out
21	D00	Data 0	In/Out
22	D01	Data 1	In/Out
23	D02	Data 2	In/Out
24	IOCS16	–	–
25	CD2	–	–
26	CD1	–	–
27	D11	Data 11	In/Out
28	D12	Data 12	In/Out
29	D13	Data 13	In/Out
30	D14	Data 14	In/Out
31	D15	Data 15	In/Out
32	IDE_CS1	Chip select 1	Out
33	VS1	–	–
34	DIOR	I/O read	Out
35	DIOW	I/O write	Out
36	3.3 V WE	3.3 V power	–
37	INTRQ	Interrupt	In
38	3.3 V	3.3 V power	–
39	CSEL	Master/Slave	Out
40	VS2	–	–
41	Reset	Reset	Out
42	IORDY	I/O ready	In
43	INPACK	DMA Request	Out
44	REG	DMA Acknowledge	–
45	ACTIVE	IDE Activity	–
46	PDIAG	DMA Mode Detect	–
47	D08	Data 08	In/Out
48	D09	Data 09	In/Out
49	D10	Data 10	In/Out
50	GND	–	–

3.4.9 PS/2 Keyboard/Mouse Interface

The module PS/2 keyboard port and PS/2 mouse port are integrated in a single connector. The enable connection of the respective input devices: a PS/2 keyboard and a PS/2 mouse. Structurally, the PS/2 keyboard and mouse port is a 6-pin single-in-line connector with 2 mm contact spacing for crimpling (XP15). To connect a PS/2 keyboard to the module, it is recommended to use the ASC00043 adapter cable (supplied with the module). Should it become necessary to connect a PS/2 mouse as well, it is recommended to use an ASC00043 accessory together with a Y-cable (bought separately).

When making one's own cable, it is recommended to use a PHR-6 (JST) type crimped socket with SPH-002T-P0.5S (JST) contacts or an ACS00031-02 accessory (see Table 1 3).

Fig. 3-18: PS/2 (XP15) Connector
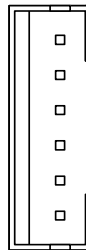
Table 3-13: Designation of PS/2 (XP15) Connector Contacts

Contact	Signal	Contact	Signal
1	KBD CLK	4	GND
2	KBD DATA	5	+5V
3	MOUSE CLK	6	MOUSE DATA

Note

The keyboard/mouse power source is protected by a 500 mA fuse.
All signal lines have electromagnetic filters.

3.4.10 Power Connector

Electric power supply of the module must meet the requirements cited in Table 2 1.

The module may be powered through both the power connector (XP25) and through the PC/104 bus connector. The module's maximum current consumption value is 3.1 A [1] without external devices.

Read subsection 2.2 Module Power Supply before you start working.

---

[1] For CPC308-03 module

A power socket with ACS00057 contacts is used to connect power through XP25 (supplied with the module, see Table 1-2).

Fig. 3-19: XP25 Power Connector
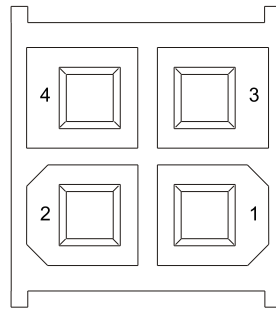
Table 3-14: The Designation of XP12 Power Connector Contacts

Contact	Signal
1	GND
2	GND
3	+5V
4	+5V

3.4.11   Discrete Input/Output Port

The discrete input/output port has 8 separately programmable input/output lines. In output mode, each line is a push-pull type output having the following parameters:

Table 3-15: Discrete Input/Output Port Line Parameters in Output Mode

Designation	Description	Minimum value	Rated value	Maximum value
I_{OL}	Low-level output current	8 mA	14 mA	-
V_{OH}	High-level output voltage	2.6 V	3.3 V	-

In input mode, each line has the following characteristics:

Table 3-16: Discrete Input/Output Port Line Parameters in Input Mode

Designation	Description	Minimum value	Rated value	Maximum value
V_{IL}	Low-level input voltage	- 0.5 V	-	+0.8 V
V_{IH}	High-level input voltage	2 V	-	5.5 V
C_i	Input capacitance	-	5 pF	10 pF

See description of the discrete input/output port programming in subsection 6.4.

The discrete input/output port is connected to a single-in-line XP24 connector with 2 mm contact spacing installed on the top side of the board.

Fig. 3-20: XP24 Discrete Input/Output Port Connector

The first contact of the XP24 connector is shown in Fig. 3 2: Layout of connectors and main components on the TOP side. The designation of the discrete input/output port connector contacts are shown in the table below.

Table 3-17: The Designation of the XP24 Discrete Input/Output Port Connector Contacts

Contact	Signal
1	DISCIO_0
2	DISCIO_1
3	DISCIO_2
4	DISCIO_3
5	DISCIO_4
6	DISCIO_5
7	DISCIO_6
8	DISCIO_7
9	GND

When making a cable, it is recommended to use a 2018-3091 (Leotronics) socket with 2023-2000 (Leotronics) contacts for crimped wires.

3.4.12   External LEDs Connector (XP22)

XP22 connector is used to connect external LEDs. The XP22 connector permits one to connect the following LEDs: disc storages activity, indication of LAN1 and LAN2 ports connection and activity, LED1 and LED2 user LEDs, a power-on indicator.

Each LED output is an "open collector" type output with a 300-Ohm current limiting resistor. Therefore, one only needs to connect LEDs. The LEDs connection diagram is shown in the figure below:

Fig. 3-21: LEDs Connection Diagram

Circuit	Contact
HDD_LED	1
USER_LED1	2
USER_LED2	3
LAN1_LED	4
LAN2_LED	5
POWER_LED	6
+3.3V	7
GND	8
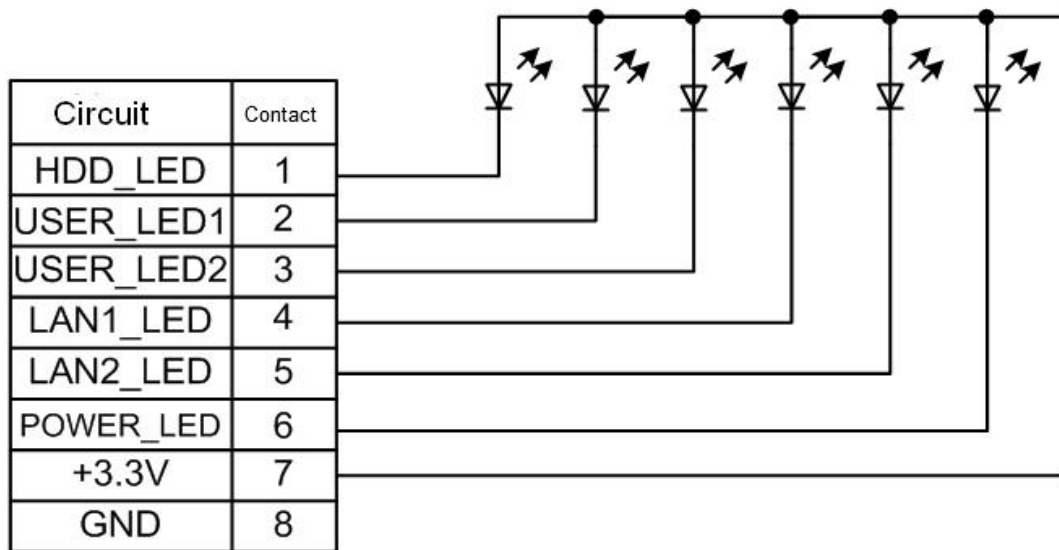
Fig. 3-22: XP22 External LEDs Connector

The first contact of the XP24 connector is shown in Fig. 3 2: Layout of connectors and main components on the TOP side. The designation of the XP22 connector contacts are described in the following table:

Table 3-18: Designation of the XP22 External LEDs Connector Contacts

Contact	Circuit	Description
1	HDD_LED	Storage devices (SATA, Onboard NAND Flash, CompactFlash) activity LED connection
2	USER_LED1	User light emitting diode LED1 connection
3	USER_LED2	User light emitting diode LED2 connection
4	LAN1_LED	Ethernet1 network activity LED
5	LAN2_LED	Ethernet2 network activity LED
6	POWER_LED	Processor module secondary power sources power-on LED connection
7	+3.3V	All LEDs "anode" connection
8	GND	Processor module "ground"

When making a cable, it is recommended to use a 2018-3081 (Leotronics) socket with 2023-2000 (Leotronics) contacts for crimped wires.

Note

See the description of LED1 and LED2 user LEDs programming in subsection 6.3.

3.4.13   Optically Isolated External Reset Input

The module's optically isolated discrete input is connected to a separate connector and intended for connecting remote (external) reset devices. It ensures galvanic isolation (optical isolation with 500 V breakdown voltage) when the respective devices are connected to the module. Structurally, the optically isolated discrete input is a two-pin Opto Reset (XP21) connector with 2 mm contact spacing.

Fig. 3-23: XP21 Optically Isolated External Reset Input Connector
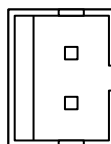
A fragment of the schematic diagram of the discrete output optical isolation realization is shown in the figure below:

Fig. 3-24: Diagram of the Module Discrete Input Optical Isolation Realization

Optically isolated reset input
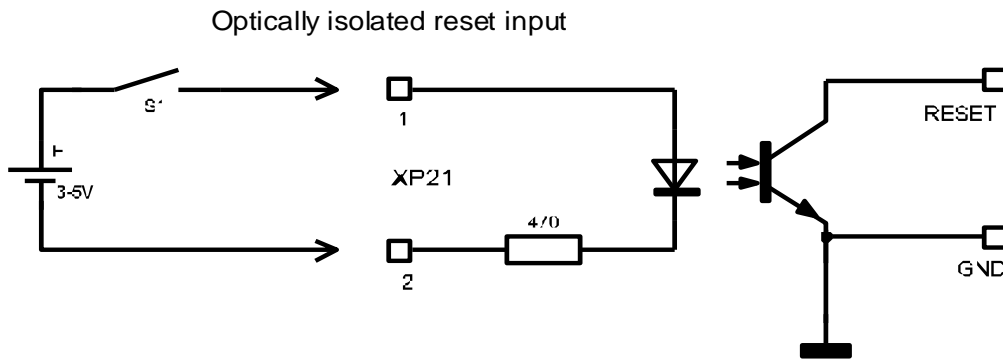
When making a cable, it is recommended to use a PHR-2 (JST) type crimped wire socket with SPH-002T-P0.5S (JST) contacts or an ACS00031-03 accessory (see Table 1 3).

3.4.14   System Reset Connector

The two-pin reset connector (XP16) is intended for connecting a non-locking button. Pushing the button causes a system reset of the module and the system restart.

Fig. 3-25: XP16 Reset Connector

3.5   LED Indicators

There are three LED indicators located on the CPC308 board. Their functions are shown in the table below. Two software-controlled LEDs are intended for user needs. They backup USER_LED1 and USER_LED2 external outputs on the XP22 connector, respectively (see subsection 3.4.12).

Fig. 3-26: User LED Indicators on CPC308 Board

User LED1 Green (HL1)

User LED2 Yellow (HL2)

Fig. 3-27: Power Indicator on CPC308 Board

Power LED (HL3)

Table 3-19: The Purposes of LED Indicators

Name	Purpose	Function
HL3	Power indicator	Lit when the power is on

HL1 green	User LEDs
HL2 yellow	

Note

See the description of LED1 and LED2 user LEDs programming in subsection 6.3.

3.6   Watchdog Timers

The CPC308 module is equipped with two watchdog timers. One of them (WDT1) is built into the supervisor microchip and has a fixed timeout period (1.6 s), the other is built into the SIO microchip; its timeout period is programmable (up to 255 min).

Note

See the description of the watchdog timers programming in subsection 6.

3.7   The Module Address Space

3.7.1   Distribution of the Memory Address Space

The distribution of the module memory address space is shown in the table below:

Table 3-20: Distribution of the Memory Address Space

Address range	Size	Description
00000h – 9FFFFh	640 Kbytes	Random-access memory
A0000h – BFFFFh	128 Kbytes	Video memory
C0000h – C7FFFh	32 Kbytes	BIOS video memory
C8000h – CBFFFh	16 Kbytes	BIOS video memory / external bus memory
CC000h - CFFFFh	16 Kbytes	Reserved
D0000h – D3FFFh	16 Kbytes	Reserved
D4000h – D7FFFh	16 Kbytes	Reserved / ISA external bus memory
D8000h – DBFFFh	16 Kbytes	Reserved / ISA external bus memory
DC000h - DFFFFh	16 Kbytes	Reserved / ISA external bus memory
E0000h – EFFFFh	65 Kbytes	BIOS POST
F0000h – FFFFFh	65 Kbytes	ROM BIOS

3.7.2 The Module Input/Output Address Space Distribution

The distribution of the module input/output address space is shown in the table below:

Table 3-21: Distribution of the Input/Output Address Space

Address range	Function	Note
0000h – 001Fh	DMA Master	
0020h – 0021h	PIC Master	
0022h – 003Fh	Reserved	
0040h – 005Fh	Timer	
0060h – 006Fh	POST, Keyboard, Speaker, Shadow registers	
0070h – 007Fh	CMOS, NMI Mask control registers	
0081h – 008Fh	DMA page registers	
0090h – 009Fh	Reserved	
00A0h – 00BFh	PIC Slave	
00C0h – 00DFh	DMA slave	
00F0h – 00FEh	Numeric coprocessor	
0100h – 016Eh	External ISA (PC/104) bus access	
0170h – 017Fh	Reserved	
0180h – 01EFh	External ISA (PC/104) bus access	
01F0h – 01F7h	Primary IDE	
01F8h – 020Fh	Reserved	
0210h – 02EFh	External ISA (PC/104) bus access	
02E8h – 02EFh	COM4	
02F0h – 02F7h	Reserved	
02F8h – 02FFh	COM2	
0300h – 031Fh	Reserved	
0320h – 03AFh	External ISA (PC/104) bus access	
03B0h – 03DFh	Video	
03E0h – 03E7h	Reserved	
03E8h – 03EFh	COM3	
03F0h – 03F7h	Reserved	
03F8h – 03FFh	COM1	
0400h – 04FFh	External ISA (PC/104) bus access	
0500h – 057Fh	Super IO Runtime registers	
0580h – 0777h	External ISA (PC/104) bus access	
0778h – 077Fh	Reserved	
0780h – 0CFBh	External ISA (PC/104) bus access	
0CFCh – 0CFFh	Reserved	
0D00h – 0FFFh	External ISA (PC/104) bus access	

3.7.3   Interrupt Lines Distribution

By default, interrupt requests are formed by the devices being parts of the module. Interrupt sources are shown in the table below. PC/104 and PC/104-Plus modules connected to system bus may be alternative devices forming interrupt requests.

Table 3-22: Interrupt Lines Distribution

Interrupt	Primary purpose (by default)	Alternative source
IRQ0	System timer	--
IRQ1	Keyboard	--
IRQ2	8259 Interrupt	--
IRQ3	COM3, COM4	External ISA (PC/104) IRQ3 line
IRQ4	COM1, COM3	External ISA (PC/104) IRQ4 line
IRQ5	Video/USB/Ethernet/PCI-devices (PC/104-Plus)	External ISA (PC/104) IRQ5 line
IRQ6	--	External ISA (PC/104) IRQ6 line
IRQ7	--	External ISA (PC/104) IRQ7 line
IRQ8	RTC (Real time clock)	--
IRQ9	ACPI	External ISA (PC/104) IRQ9 line
IRQ10	Video/USB/Ethernet/PCI-devices (PC/104-Plus)	External ISA (PC/104) IRQ10 line
IRQ11	Video/USB/Ethernet/PCI-devices (PC/104-Plus)	External ISA (PC/104) IRQ11 line
IRQ12	Mouse	--
IRQ13	Reserved for math coprocessor	--
IRQ14	CompactFlash	--
IRQ15	--	--

4   CPC308 Module Installation

It is necessary to strictly follow the rules, warnings and procedures cited below in order to install the module correctly, avoid damage to the product, the system components, as well as personal injuries.

The procedure of installing drivers of all the peripheral devices installed on the module is cited in the descriptions supplied with those drivers. This Manual also does not describe the procedure of operating systems installation. Please refer to the documents supplied with the operating system.

4.1   Safety Requirements

Strictly follow the safety requirements below when handling the CPC308. The Manufacturer, Fastwel Group Co. Ltd incurs no liability for any damage resulting from non-compliance with these requirements.

Careful!

Be careful when you handle the module, because the heatsink can become very hot. Don't touch the heatsink when you install or dismantle the module.

Besides, the module should not be put on any surface or placed in any package until both the module and the heatsink are cooled down to the room temperature.

Attention!

Always power the system off before connecting or disconnecting the module power cable. Violations of this rule may jeopardize your health and life, as well as inflict damage to the system or the module.

Electrostatic Sensitive Device (ESD)!

The module contains elements that are sensitive to the impact of electrostatic charges. To avoid damage to the module, observe the following safety precautions:

- Remove electrostatic charges from your clothes before you touch the module; remove the charges from tools before you use them as well.
- Do not touch electronic components and connector contacts.
- Disconnect power cable before installing/dismantling PC/104-Plus expansion module.

If you work at a professional workplace with antistatic protection, do not neglect the opportunity to use it.

4.2   Possible Heat Removal Methods

The Appendix cites technical requirements the user must take into account while developing his own cooling system. Temperature should be controlled with the help of a thermal sensor. Heat removal methods are shown in the figure below.

Fig. 4-1: Heat Removal Methods
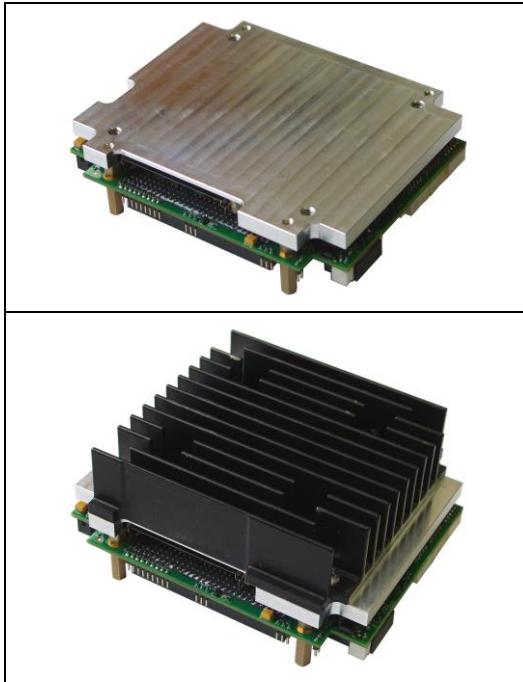
There is a heatsink (heat spreading plate) installed on the bottom side of the CPC308 module. With such a configuration, it is possible to ensure heat dissipation by installing the module directly onto a body or a chassis (the body plays the role or a large radiator).
Heat is removed from the central processor and the ICH8 microchip with the help of a heat sink and transferred to the PC/104 system body.

A ribbed radiator may be additionally installed onto the CPC308 module (ACS00035-01 from additional accessories). The radiator is installed on the heat sink (with the help of thermal compound) and fastened with the screws supplied with the radiator.

4.3   The Procedure of CPC308 Installation

To install the CPC308 module into a system, follow the procedure described below:

1.   Make sure that the safety requirements listed in Section 4.1 have been observed.

Attention!

Non-observance of the following instructions may cause damage to the module and incorrect operation of the system.

2.   Before installing make sure that the module has been configured as per Section 5 (information about the CPC308 module configuration is provided in Section 5 of this Manual). Information about installing peripheral devices, expansion modules and input/output devices is provided in the respective clauses of Section 4.5 of this Manual.

3.   Perform the following actions to install the CPC308 module:

■   Before installing, make sure that the system power has been disconnected.

■   Depending on the application, system configuration and temperature requirements, the CPC308 module is installed by various methods:

- ▪ For a CPC308 module with an installed heat spreader: Fasten the module to a flat surface (if the module is intended to operate in a system or is fastened to a chasses) by four screws. The mounting dimensions are provided on Fig. 2 1: Overall and mounting dimensions of the module.
- ▪ For CPC308 with an additional ribbed radiator:

  Fasten the radiator on the heat spreader with four screws (using the thermal compound supplied with the radiator). Fasten the module to the surface with the utilization of struts. Provide conditions for sufficient air cooling.

■   Connect necessary external interface cables and the power cable to the module connectors. Make sure that the CPC308 module and all the cables are reliably fastened.

Now the CPC308 module is ready for operation. Use the documents supplied with the software, devices and the system as a whole to familiarize yourself with further actions.

Attention!

Wrong power connection can result in the module breakdown.

Attention!

When installing the CPC308 module inside an airtight body, it is especially necessary to ensure minimum thermal resistance between the heatsink (heat spreading plate) of the module and the heat removing wall of the body. This will prevent excessive heating of the system components inside the body.

4.4   The Procedure of the Module Dismounting

To remove the module, perform the following operations:

1.   Make sure that the safety requirements listed in Section 4.1 have been observed. Special attention is to be given to the warning concerning the radiator temperature!

2.   Before starting work, make sure that the system power has been disconnected.

3.   Disconnect all interface cables from the module.

4.   Unscrew the fastening screws. Do not touch the radiator because it can become very hot during operation.

5.   Dispose of the module at your discretion. Do not put it into a box or a package until the module and the cooling radiator are cooled down to the room temperature.

4.5   Installing Peripheral Devices onto the CPC308 Module

A wide range of various peripheral devices may be connected to the CPC308 module; the methods of their installation can vary greatly. Therefore the following sections provide general installation instructions, not detailed algorithms. Detailed information about connecting external devices can be found in the documents accompanying them.

4.5.1   Installing CompactFlash Memory Cards

The CPC308 module CompactFlash connector supports only ATA Type I/II CompactFlash memory cards with 3.3 V operating voltage. Slide a correctly oriented card cautiously along the guides and press slightly, so that the contacts would enter the socket as far as they would go.

Attention!

Installing a CompactFlash with the power on can damage your system.

Note

It is recommended to use CompactFlash cards that were initialized and formatted on the CPC308 module.

CPC308 uses the LBA mode by default. Using CompactFlash cards that were initialized and formatted in another mode may result in incorrect operation of the module.

4.5.2   Connecting USB Devices

The CPC308 module supports the use of any Plug&Play USB 2.0 computer devices (e.g., keyboards, mice, printers, etc.). All the USB devices may be connected and disconnected without cutting power off from the devices themselves and the head system.

4.5.3 Battery Replacement

Use Renata BR2032 lithium batteries as replacement.

The expected service life of a battery having 190 mAh capacity is approximately 5 years. However, the battery service life depends on the operating temperature and on the length of the time during which the system is powered off.

Note

It is recommended to replace the battery approximately in 4 years of operation without waiting for its service life expiry.

Attention!

When you replace the battery observe polarity. Replacing the battery, make sure that the polarity is correct (**"+" is on the top**).

Recycle the used battery in accordance with the established regulations.

4.5.4 Installing PC/104 and PC/104-Plus Expansion Modules

PC/104 and PC/104-Plus expansion modules are installed into the respective sockets. It is possible to install modules one above the other in order to obtain highly integrated control systems. Read Section 3.4.1 PC/104-Plus Connectors before installing.

Attention!

PC/104 and PC/104-Plus modules are to be installed with the power off.

Attention!

Please do not bend or deform the CPC308 module board when installing the PC/104 or PC/104-Plus modules. Mate contacts correctly and use necessary fastening parts.

Note

Before installing and operating PC/104-Plus expansion modules, one must select the voltage fed to the PCI interface input/output buffer (use the PCI VIO Selector (XP13). Read Section 5.1 Selection of Buffers Power Voltage on the PCI Bus of PC/104-Plus carefully.

5   Configuring CPC308

5.1   Selection of Buffers Power Voltage on the PCI Bus of PC/104-Plus Modules

Before installing PC/104-Plus expansion modules, it is necessary to select the PCI buffers power voltage with the help of XP13 switch (PCI VIO Selector).

⚠️ **Attention!**

All operations are to be performed with the module power off.

The XP13 switch is located on the top side of the board near the XS4 connector, see Fig. 3 2: Layout of connectors and main components on the TOP side (pay attention to the note at the end of that subsection).

Fig. 5-1: Status of the PCI VIO Selector (XP13) Contacts
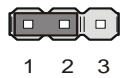
Contacts 1-2 closed – PCI bus signal level is +5 V
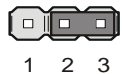
Contacts 2-3 closed – PCI bus signal level is +3.3 V
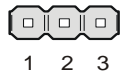
All contacts open - signal levels are selected at the PC/104-Plus power source

⚠️ **Attention!**

If you use a PC/104-Plus power source, the VIO voltage must be set at the power source module. In this case remove the jumper from the VIO (XP13) selector switch: **all contacts are open**.

If a PC/104-Plus power source is not used, the jumper on the XP13 selector switch must be put into the 1-2 or 2-3 position.

5.2   Selecting TFT Panel Power Voltage.

TFT digital panel power voltage is selected with the help of XP2 (LVDS Panel Power Selector) three-pin switch, see Fig. 3 2: Layout of connectors and main components on the TOP side.

The switch positions are explained below:

Fig. 5-2: TFT Digital Panel Power Voltage Switch
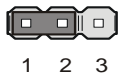
Contacts 1-2 are closed - the digital panel is powered with +3.3 V voltage.
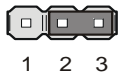
Contacts 2-3 are closed - it is powered by +5 V voltage.

Attention!

Be very careful when selecting the TFT panel power voltage! Incorrect power voltage setting may make the panel inoperative. To define the exact value of the TFT panel power voltage, please look at the reference information provided by the panel manufacturer or inquire the dealer from whom you have bought the panel.

5.3　　　Restoring Factory CMOS Settings (Clear CMOS)

In case the system cannot be loaded (e.g., because of incorrect BIOS configuration or an incorrect password), the settings saved in the CMOS may be cleared with the help of CMOS Reset (XP9) switch, see Fig. 3 2: Layout of connectors and main components on the TOP side. The procedure of CMOS clearing:

1. Power off the system.
2. Close the CMOS Reset (XP9) switch with a jumper supplied with the module.
3. Power on the system.
4. Wait till BIOS data are shown on the monitor screen.
5. Power off the system.
6. Open the CMOS Reset (XP9) switch.
7. Power on the system.
8. Further loading will be performed with the factory BIOS Setup settings.
9. Factory parameters will be saved in the Flash memory after POST is over.
10. Start BIOS Setup if it is necessary to change the parameters.

5.4　　　BIOS Update

The fwflash.exe utility is used to update BIOS on the module. To update BIOS, load FreeDOS or MS DOS operating system and start the fwflash.exe utility with parameters, e.g.:

```
Fwflsh.exe \f 308xxx.bin,
```

where 308xxx.bin – the name of the file with BIOS version to be uploaded.

Attention!
The fwflash.exe utility operates only under MS DOS, FreeDOS OSs!

If BIOS modification error screen messages appear, run fwflash.exe on PC one more time without switching power of the module off!

It is not allowed to upload BIOS files other than supplied and recommended by manufacturer and located on manufacturer's or official representative's servers!

6   CPC308 Programming

6.1   Work with WDT1 Watchdog Timer

After the POST is over, the WDT1 watchdog timer is off. This timer is user controllable; it is controlled with the help of GPIO outputs of the ICH8 chipset.

Two registers are available for that purpose in the input/output space; the table below specifies the purposes and addresses of those registers.

Table 6-1: WDT1 Watchdog Timer Control Registers

Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
118Eh	Reserved	WDT1_EN	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved
11B8h	LED2_EN	WDT1_RES	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved

Where:

- WDT1_EN – WDT1 activation bit (write «0» - WDT1 is enabled, «1» – WDT1 is disabled);
- WDT1_RES – WDT1 resetting bit (WDT1 is reset when the status of this bit is changed);
- LED2_EN – USER_LED2 LED activation bit (see subsection 6.3 User LEDs Control: LED1, LED2).

Attention: WDT1 has fixed timeout period of 1.6 s; after the WDT1_EN bit is set, WDT1 will trigger in 1.6 s.

It is not allowed to assign any values to the bits designated as "Reserved". This can disrupt the module functioning.

6.2 Work with WDT2 Watchdog Timer

The WDT2 watchdog timer is integrated in SuperIO SMSC3114 microchip. It has more settings than WDT1; four registers in the module input/output space are used for its configuring. The purposes and addresses of those registers are provided in the table below.

Table 6-2: WDT2 Control Registers

Name	Address	Description	
WDT2_TIMEOUT	565h	The register for setting the WDT2 timeout period units	
		Bits[6:2]	Reserved
		Bit [7]	«0» - time is counted in minutes «1» - time is counted in seconds
WDT2_VAL	566h	The register for setting the WDT2 timeout period	
		Bits[7:0]	Write timeout into the register, e.g. 01h – operation time 1 minute or 1 second; FFh – operation time 255 minutes or seconds Time is counted in seconds if bit[7] was set in register 565h. Writing 00h disables the watchdog timer 2
WDT2_CFG	567h	WDT2 configuring register	
		Bit [0]	Reserved
		Bit [1]	«0» - watchdog timer reset by keyboard interrupt is disabled. «1» - watchdog timer may be reset by keyboard interrupt.
		Bit [2]	«0» - watchdog timer reset by mouse interrupt is disabled. «1» - watchdog timer may be reset by mouse interrupt.
		Bit [3]	Reserved
		Bits[7:4]	Reserved (must be «0»s)
WDT2_CTRL	568h	WDT2 watchdog timer control register	
		Bit [0]	If read: «0» - watchdog timer countdown is in process «1» - watchdog timer countdown is completed
		Bit [1]	Reserved
		Bit [2]	If «1» is written, the watchdog timer count immediately ends (the watchdog timer triggers)
		Bit [3]	«1» - watchdog timer count ends when a key is pressed on the keyboard (the watchdog timer triggers) «0» - the keyboard does not affect the watchdog timer operation

6.3　　　User LEDs Control: LED1, LED2

LED1 user LED is controlled with the help of the module input/output space register. The designation and address of that register are given in the table below.

Table 6-3: User LED1 Control Register

Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
11BAh	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	Reserved	LED1

Where:

LED1 – LED1 activation bit (write "1" - LED1 is on, "0" – LED1 is off).

LED2 user light emitting diode is also programmed with the help of the module input/output register. The designation and address of that register were specified in subsection 6.1 in Table 6-1: WDT1 Watchdog Timer Control Registers. Write "1"- LED2 is on, "0" – LED2 is off).

It is not allowed to assign any values to the bits designated as "Reserved". This can disrupt the module functioning.

6.4　　　Discrete Input/Output Port Programming

The discrete input/output port is realized on the PCA9538 (NXP) input/output port microchip. This microchip is connected to SMBus and has the following address: E4h.
The microchip has 4 registers to control the port. The designation of these registers is described below.

Register 0 - Input buffer register

This register is read-only; it reflects the status of the discrete input/output port channels.

Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
00h	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0

If any bit of this register has been set, the respective port channel has a high level, if the bit has been reset, the channel level is low.

Register 1 - Output buffer register

This register is intended for setting the output levels of the discrete input/output port channels.

Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
01h	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0

If any bit of this register has been set, the respective port channel has a high level, if the bit has been reset, the channel level is low.

By default, all the port bits are set.

Register 2 - Inversion register

Permits to invert the input buffer status.

Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
02h	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0

If any bit of this register has been set, the respective bit of the input register will be inverted, if the bit has been reset, there is no inversion.

By default, all the port bits are reset.

Register 3 - Configuration register.

This register is intended for setting the direction of each input/output port channel.

Address	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
03h	Input 7	Input 6	Input 5	Input 4	Input 3	Input 2	Input 1	Input 0

If any bit of this register has been set, the respective port channel is configured as "input", if the bit has been reset, the channel is configured as "output".

By default, all the port bits are set.

7   Phoenix® BIOS
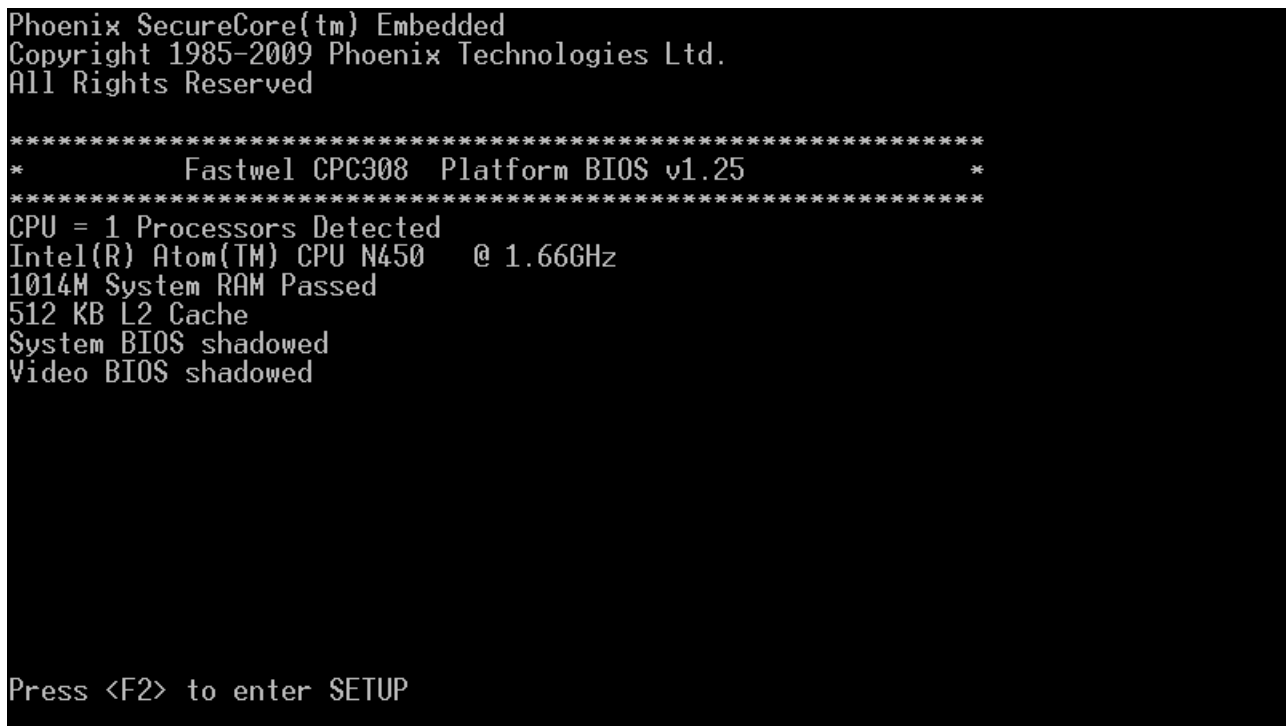
Your computer is equipped with an adapted version of Phoenix® BIOS, a standard system for IBM PC AT compatible computers. It supports Intel®x86 and compatible processors, provides low-level support to the processor, memory and input/output subsystem.

With the help of the BIOS Setup utility, you are able to change BIOS parameters and to control special computer operation modes. It allows you to change the basic parameters of the system setup. These parameters are stored in the FRAM non-volatile memory.

7.1   Starting BIOS Setup Software

To start the BIOS Setup software, press the F2 key on the keyboard or the console PC keyboard (if the Hyperterminal software is used as a terminal) during the POST (Power On Self Test) procedure. An example of the POST procedure screen is shown in the figure below.

Fig. 7-1: Screen during POST

```
Phoenix SecureCore(tm) Embedded
Copyright 1985-2009 Phoenix Technologies Ltd.
All Rights Reserved

****************************************************************
*           Fastwel CPC308  Platform BIOS v1.25              *
****************************************************************
CPU = 1 Processors Detected
Intel(R) Atom(TM) CPU N450    @ 1.66GHz
1014M System RAM Passed
512 KB L2 Cache
System BIOS shadowed
Video BIOS shadowed




Press <F2> to enter SETUP
```

After the F2 key has been pressed, the BIOS Setup utility menu will be shown with the tab "Main" being active.

7.2   Main

This tab of the BIOS Setup utility is the title one upon entry. In the menu allows to set system time and date, ATA/SATA devices parameters, cashing control parameters, module booting features. Data about the installed and available system memory are also shown in this tab.

Fig. 7-2: Main Menu Screen

```
            Phoenix SecureCore(tm) Setup Utility
   Main    Advanced    Intel    Security    Boot    Custom    Exit

                                             Item Specific Help

   System Time:          [00:43:04]
   System Date:          [10/13/2009]        <Tab>, <Shift-Tab>, or
                                             <Enter> selects field.
 > IDE Primary/Master    [None]
 > SATA Port 1           [None]
 > SATA Port 2           [1979MB SATA2]
 > SATA Port 3           [None]

 > Memory Cache
 > Boot Features

   Installed memory      1024 MB
   Available to OS       1013 MB
   Used by devices       11 MB




   F1   Help  ^v  Select Item  -/+    Change Values     F9   Setup Defaults
   Esc  Exit  <>  Select Menu  Enter  Select > Sub-Menu  F10  Save and Exit
```

Use the cursor keys "Up" and "Down" to navigate through the menu. To navigate through the tabs, use the "Right" and "Left" cursor keys. Use the "Enter" key to enter setup submenus, use the "Escape" key to withdraw from setup submenus. Use the "+" and "-" keys of the numeric part of the keyboard to change any values in the chosen menu option.

⚠️ **Note**

This algorithm of working with menus applies to all the other tabs of the Bios Setup utility as well.

When choosing the settings of ATA/SATA devices, cashing, the module boot parameters, new submenu screens become available.

7.2.1   IDE Primary/Master

This submenu allows to set the IDE storage parameters. The CompactFlash storage is always the IDE Primary Master drive. The "IDE Primary/Master" submenu screen is shown in the figure below.

Fig. 7-3: IDE Primary/Master Submenu Screen

```
                 Phoenix SecureCore(tm) Setup Utility
    Main

          IDE Primary/Master     [None]              Item Specific Help

    Type:                        [Auto]            User = you enter
                                                   parameters of hard-disk
    Multi-Sector Transfers:      [Disabled]        drive installed at this
    LBA Mode Control:            [Disabled]        connection.
    32 Bit I/O:                  [Disabled]        Auto = autotypes
    Transfer Mode:               [FPIO 4 / DMA 2]  hard-disk drive
    Ultra DMA Mode:              [Disabled]        installed here.
    SMART Monitoring:            Disabled          CD-ROM = a CD-ROM drive
                                                   is installed here.
                                                   ATAPI Removable =
                                                   removable disk drive is
                                                   installed here.



    F1   Help   ^v  Select Item  -/+    Change Values   F9   Setup Defaults
    Esc  Exit   <>  Select Menu  Enter  Select > Sub-Menu  F10  Save and Exit
```

Where:
>   **Type**: storage type setting
>>   **[Auto]** – the system autodetects the storage type
>>   **[None]** – ATA storage disabled
>>   **[ATAPI Removable]**, **[IDE Removable]** – removable ATAPI, IDE devices
>>   **[CD-ROM]** – CD-ROM drive
>>   **[Other ATAPI]** – other ATAPI devices
>>   **[User]** – the user enters the ATA device parameters himself
>   **Multi-Sector Transfers**: multisector data transfer control
>   **LBA Mode Control**: control in LBA mode
>   **32 Bit I/O**: controlling the 32-bit data transfer mode
>   **Transfer Mode**: choosing the data transfer mode (PIO, DMA)
>   **Ultra DMA Mode**: Ultra DMA mode selection
>   **SMART Monitoring**: S.M.A.R.T. monitoring enable

7.2.2   SATA Port 1 – Port 3

These submenus set the parameters of drives connected to the SATA bus, namely SATA Port 1, Port 3 - drives connected to XP7 and XP10 connectors respectively, SATA Port 2 - a built-in Fastwel Flash Disk.
The settings of those submenus are analogous to those of the "IDE Primary/Master" submenu.

CPC308 Processor Module **Phoenix® BIOS**

7.2.3   Memory Cache

Submenu for controlling the cashing of certain memory areas. It is shown in the figure below.

Fig. 7-4: Memory Cache Submenu Screen

```
                  Phoenix SecureCore(tm) Setup Utility
    Main

          Memory Cache                      Item Specific Help

     Cache System BIOS area:    [Write Protect]    Controls caching of
     Cache Video BIOS area      [Write Protect]    system BIOS area.
     Cache Base 0-512k:         [Write Back]
     Cache Base 512k-640k:      [Write Back]
     Cache Extended Memory Area: [Write Back]
     Cache A000 - AFFF:         [Disabled]
     Cache B000 - BFFF:         [Disabled]
     Cache C800 - CBFF:         [Disabled]
     Cache CC00 - CFFF:         [Disabled]
     Cache D000 - D3FF:         [Disabled]
     Cache D400 - D7FF:         [Disabled]
     Cache D800 - DBFF:         [Disabled]
     Cache DC00 - DFFF:         [Disabled]
     Cache E000 - E3FF:         [Write Protect]
     Cache E400 - E7FF:         [Write Protect]    v

     F1   Help   ^v  Select Item  -/+   Change Values    F9   Setup Defaults
     Esc  Exit   <>  Select Menu   Enter Select > Sub-Menu F10  Save and Exit
```

C P C 3 0 8   U s e r   M a n u a l   © 2 0 1 5   F a s t w e l   V e r . 0 . 5

64

7.2.4 Boot Features

Module boot parameters setting submenu. The screen is shown in the figure below.

Fig. 7-5: Boot Features Submenu Screen

```
            Phoenix SecureCore(tm) Setup Utility
    Main

         Boot Features                        Item Specific Help

   Summary screen:            [Disabled]     Display system
   Boot-time Diagnostic Screen: [Enabled]    configuration on boot
   QuickBoot Mode:            [Enabled]
   Extended Memory Testing    [None]

   F1   Help   ^v  Select Item  -/+   Change Values      F9   Setup Defaults
   Esc  Exit   <>  Select Menu   Enter Select > Sub-Menu  F10  Save and Exit
```

Where:
  Summary screen: displaying the system configuration when booting
  Boot-time Diagnostic Screen: displaying diagnostic screen when booting
  QuickBoot Mode: QuickBoot mode control (certain tests will be skipped during the module booting)
  Extended Memory Testing: setting the type of extended memory test

7.3 Advanced

Advanced module parameters are set in this menu. The "Advanced" menu is shown in the figure below.

Fig. 7-6: Advanced Menu Screen

```
                 Phoenix SecureCore(tm) Setup Utility
    Main     Advanced     Intel     Security     Boot     Custom     Exit

                                                        Item Specific Help
    Installed O/S:            [Win2000]
    Reset Configuration Data: [No]
    Large Disk Access Mode:   [DOS]                Select the operating
                                                   system installed
  > PnP Configuration                              on your system which
                                                   you will use most
    Port 80h Cycles:          [LPC Bus]            commonly.
    Legacy USB Support:       [Enabled]
                                                   Note: An incorrect
  > Console Redirection                            setting can cause
  > I/O Device Configuration                       some operating
                                                   systems to display
                                                   unexpected behavior.



    F1   Help   ^v  Select Item  -/+   Change Values    F9   Setup Defaults
    Esc  Exit   <>  Select Menu   Enter  Select > Sub-Menu  F10  Save and Exit
```

Where:
Installed O/S: setting the type of operating system installed on the module
Reset Configuration Data: Extended System Configuration Data (ESCD) area reset control
Large Disk Access Mode: Large Disk Access mode selection
Port 80h Cycles: selection of the bus to transmit debugging data to the «80h» port
Legacy USB Support: USB devices support control at the BIOS level.

Some submenus for supplementary settings are available as well.

7.3.1　　　PnP Configuration

Submenu for setting distribution of interrupts and memory among PCI- and ISA-devices. The submenu screen is shown in the figure below.

Fig. 7-7: PnP Configuration Submenu Screen

```
            Phoenix SecureCore(tm) Setup Utility
      Advanced

           PnP Configuration                Item Specific Help

  > PCI/PNP ISA UMB Region Exclusion      Reserve specific
  > PCI/PNP ISA IRQ Resource Exclusion    upper memory blocks
                                          for use by legacy ISA
                                          devices




  F1   Help   ^v  Select Item  -/+  Change Values     F9   Setup Defaults
  Esc  Exit   <>  Select Menu  Enter Select > Sub-Menu F10  Save and Exit
```
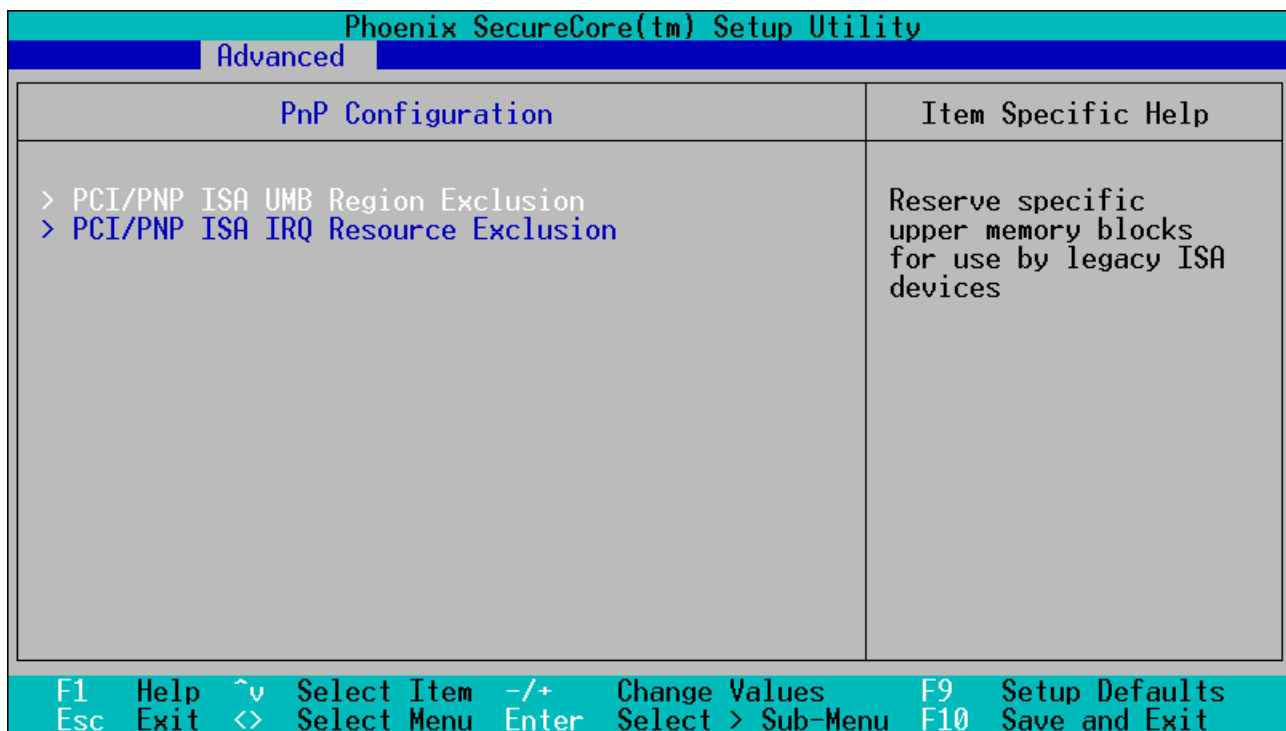
Where:
>**PCI/PNP ISA UMB Region Exclusion**
>Submenu for reserving certain memory areas for utilization by the ISA bus devices. When entering this submenu, several address ranges in the memory space will be displayed and it will be possible to set the [Available] of [Reserved] value for each range, where:
>　　**[Available]** – the memory range is available to PCI devices
>　　**[Reserved]** – the memory range is reserved for the ISA bus.
>
>**PCI/PNP ISA IRQ Resource Exclusion**
>Submenu for reserving certain interrupts for utilization by the ISA bus devices. In this submenu, several interrupt request lines are displayed and it is possible to set the [Available] of [Reserved] value for each range, where:
>　　**[Available]** – the interrupt is available for PCI and the module built-in devices
>　　**[Reserved]** – the interrupt is reserved for the ISA bus.

7.3.2   Console Redirection

Console redirection setting submenu (the port address, speed, type, flow control). The submenu screen is shown in the figure below.

Fig. 7-8: Console Redirection Submenu Screen

```
                Phoenix SecureCore(tm) Setup Utility
        Advanced

        Console Redirection                    │  Item Specific Help

 Com Port Address          [On-board COM 0x3F8h] │  If enabled, it will
                                                 │  use a port on the
 Baud Rate                 [115.2K]              │  motherboard.
 Console Type              [PC ANSI]             │
 Flow Control              [None]                │
 Continue C.R. after POST: [Off]                 │
                                                 │
                                                 │
                                                 │
                                                 │
                                                 │
                                                 │
                                                 │
                                                 │
                                                 │

 F1   Help   ^v  Select Item  -/+   Change Values   F9   Setup Defaults
 Esc  Exit   <>  Select Menu  Enter Select > Sub-Menu F10  Save and Exit
```
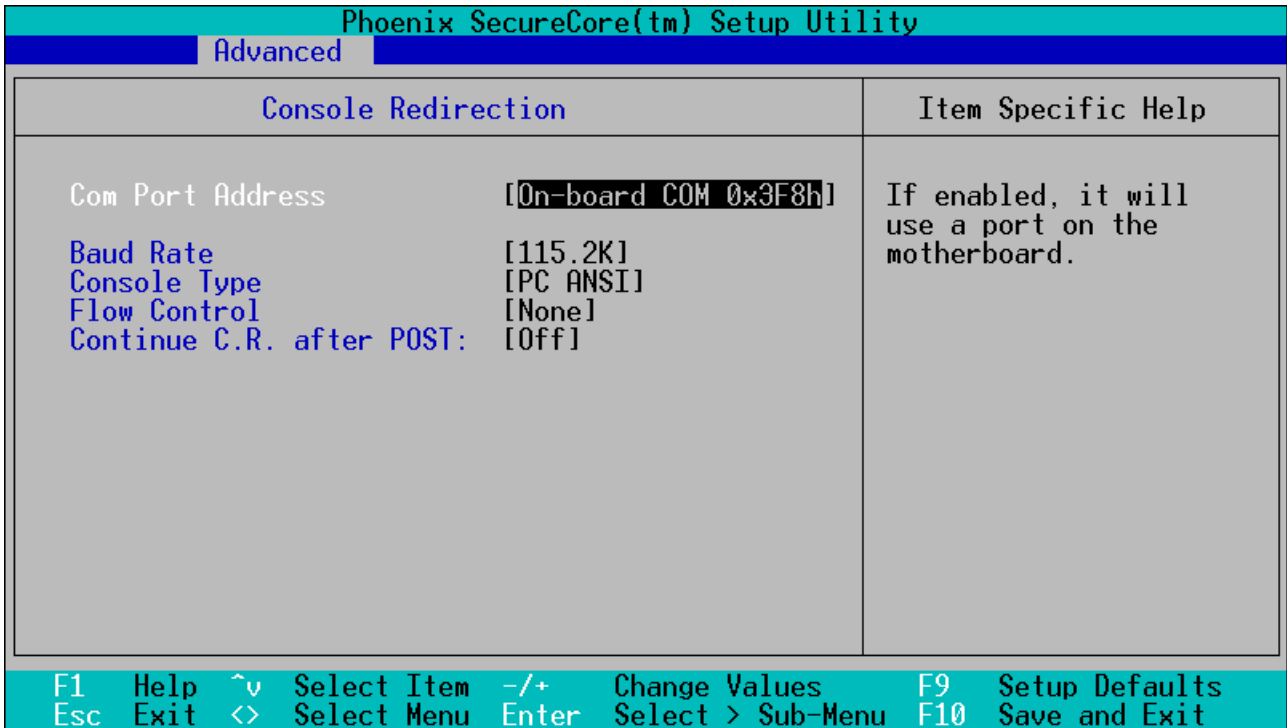
Where:
> **Com Port Address:** - selection of a COM port for console redirection
>> **[On-board COM 0x3F8h]** – COM1
>> **[On-board COM 0x2F8h]** – COM2
>> **[Disabled]** – console redirection disabled

> **Baud Rate** - data transfer rate when working with the console (300 – 115.2K)
> **Console Type** – terminal type
> **Flow Control** – flow control setting
> **Continue C.R. after POST**: - console redirection control after loading operating system

7.3.3   I/O Device Configuration

Input/output devices configuration menu. The submenu screen is shown in the figure below.

Fig. 7-9: I/O Device Configuration Submenu Screen

```
                  Phoenix SecureCore(tm) Setup Utility
           Advanced

            I/O Device Configuration                    Item Specific Help

     XP3                  [Enabled]            Configure serial port
        Base I/O address: [3F8]                using options:
        Interrupt:        [IRQ 4]
                                               [Disabled]
     XP18 [485/422]       [Enabled]              No configuration
        Base I/O address: [3E8]
        Interrupt:        [IRQ 4]              [Enabled]
        Echo:             [Disabled]             User configuration
        Terminator:       [Enabled]

     XP6                  [Enabled]
        Base I/O address: [2F8]
        Interrupt:        [IRQ 3]

     XP17 [485/422]       [Enabled]        v

     F1   Help   ^v  Select Item  -/+   Change Values    F9   Setup Defaults
     Esc  Exit   <>  Select Menu  Enter Select > Sub-Menu F10  Save and Exit
```

Where:

XP3, XP6, XP18 [485/422], XP17 [485/422] – Setting RS232 COM1, COM2 ports, as well as RS485/422 COM3, COM4 parameters respectively;

Echo: Echo mode control (receiver enabling or disabling at the moment of data transfer) for COM3 and COM4 ports (XP18 and XP17 connectors)

Terminator: control of 120 Ohm terminating resistors connection for COM3 and COM4 ports (XP18 and XP17 connectors).

7.4   Intel

This tab is for changing the Intel microprocessor and chipset settings. The Intel menu is shown in the figure below.

Fig. 7-10: Intel Menu Screen

```
                    Phoenix SecureCore(tm) Setup Utility
     Main      Advanced      Intel      Security      Boot      Custom      Exit

                                                      Item Specific Help

   > CPU Control Sub-Menu
   > Video (Intel IGD) Control Sub-Menu
   > ICH Control Sub-Menu                           These items control
                                                    various CPU parameters.



















     F1   Help   ^v   Select Item   -/+    Change Values      F9    Setup Defaults
     Esc  Exit   <>   Select Menu   Enter  Select > Sub-Menu  F10   Save and Exit
```
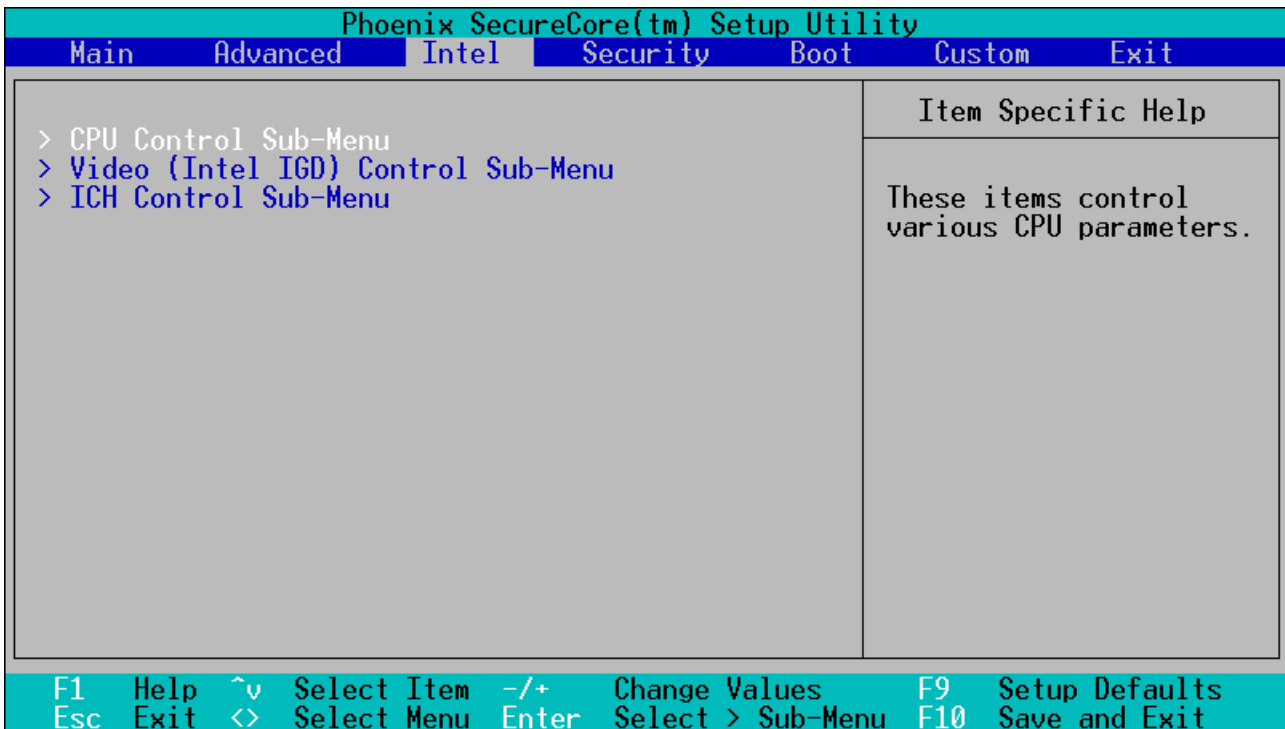
The menu has several additional submenus.

7.4.1   CPU Control Submenu

The submenu for CPU parameters control. The submenu screen is shown in the figure below.

Fig. 7-11: CPU Control Submenu Screen

```
               Phoenix SecureCore(tm) Setup Utility
                        Intel

        CPU Control Sub-Menu                    Item Specific Help

 Hyperthreading:                [Enabled]      Enabling Hyperthreading
 Processor Power Management:    [GV3 Only]     activates additional
                                              CPU threads.  These
 No Execute Mode Mem Protection [Enabled]      threads may appear as
 Set Max Ext CPUID = 3          [Disabled]     additional processors
                                              but will share some
                                              resources with the
                                              other threads within
                                              the physical package.




 F1   Help   ^v  Select Item  -/+  Change Values   F9   Setup Defaults
 Esc  Exit   <>  Select Menu   Enter  Select > Sub-Menu  F10  Save and Exit
```

Where:
> **Hyperthreading:** - CPU Hyperthreading mode control
> **Processor Power Management:** - setting the CPU power supply control algorithm ("Power Management")
> **No Execute Mode Mem Protection** – use the mechanism of memory areas protection
against the code being implemented (Intel NX bit). Enabled by default.
> **Set Max Ext CPUID = 3** – Setting the maximum value of microprocessor identifier (support for old operating systems)

7.4.2   Video (Intel IGD) Control Submenu

Built-in video controller parameters control submenu. The submenu screen is shown in the figure below.

Fig. 7-12: Video (Intel IGD) Control Submenu Screen

```
            Phoenix SecureCore(tm) Setup Utility
                        Intel

    Video (Intel IGD) Control Sub-Menu        Item Specific Help

                                           Select 'IGD' to have
    Default Primary Video Adapter:  [Auto]  Internal Graphics,
    IGD - Device 2:                 [Auto]  if supported and
    IGD - Device 2, Function 1:     [Auto]  enabled, be used
    DVMT 4.0 Mode:                  [Auto]  for the boot
       DVMT Graphics Memory:        376MB   display device.

                                           Select 'PEG' to have
                                           PCI Express Graphics,
                                           if supported and
                                           enabled, be used
                                           for the boot display
                                           device.

                                           To use PCI Video,
                                           select IGD.

    F1   Help   ^v  Select Item  -/+  Change Values   F9   Setup Defaults
    Esc  Exit   <>  Select Menu  Enter Select > Sub-Menu  F10  Save and Exit
```

Where:

       Default Primary Video Adapter: the selection of a primary video controller

           [Auto] – automatic setting

           [IGD] – built-in video controller

           [PCI] – external PCI video controller

       IGD - Device 2: built-in video controller control

       IGD - Device 2, Function 1: control of the LVDS output of the built-in video controller

       DVMT 4.0 Mode: Dynamic video memory technology mode control

       DVMT Graphics Memory: setting the memory size allocated for the built-in video controller

This submenu also contains another submenu for setting the parameters of LCD panel, connected to the module via LVDS interface.

7.4.2.1   IGD – LCD Control Sub-Menu

The submenu is used for setting LCD panel parameters. The submenu screen is shown in the figure below.

Fig. 7-13: IGD – LCD Control Sub-Menu Sub-Menu Screen

```
                  Phoenix SecureCore(tm) Setup Utility
                            Intel

        IGD - LCD Control Sub-Menu              Item Specific Help


    IGD - LCD Panel Type:      [ 3: 1024x768  LVDS]   Select the LCD Panel
    IGD - Panel Scaling:       [Auto]                 used by the Internal
                                                      Graphics Device by
                                                      selecting the
    Spread Spectrum Clock Chip: [Off]                 appropriate setup
                                                      item.  The first
                                                      item is Panel 1,
                                                      the last item is
                                                      Panel 16.  Some
                                                      Panels are not
                                                      numbered due to
                                                      size constraints.




    F1   Help   ↑↓  Select Item  -/+   Change Values   F9   Setup Defaults
    Esc  Exit   ↔   Select Menu   Enter Select ► Sub-Menu  F10  Save and Exit
```

Where:
IGD – LCD Control Sub-Menu: selection of resolution of the connected LCD panel;
IGD – Panel Scaling: Control of image scaling mode on LCD panel;
[Auto] – Automatic mode;
[Force Scaling] – Force mode;
[Off] – Image scaling is off;
Spread Spectrum Clock Chip: Spread Spectrum Clock Chip for LCD panel;
[Off] – Spread Spectrum process is off;
[Hardware] – Spread spectrum process control is carried out by hardware;
[Software] – Spread spectrum process control is carried out by software (BIOS).

7.4.3   ICH Control Submenu

Submenu for controlling internal chipset controllers. The submenu screen is shown in the figure below.

Fig. 7-134: ICH Control Submenu Screen

```
                  Phoenix SecureCore(tm) Setup Utility
                         Intel

      Integrated Device Control Sub-Menu          Item Specific Help

  > ICH USB Control Sub-Menu                     These items control
                                                 various ICH USB Devices.
    Azalia - Device 27, Function 0:  [Auto]

      AHCI Configuration:            [Disabled]
      Disable Vacant Ports:          [Disabled]




   F1   Help   ^v  Select Item  -/+   Change Values    F9   Setup Defaults
   Esc  Exit   <>  Select Menu  Enter Select > Sub-Menu F10  Save and Exit
```

Where:

> **Azalia - Device 27, Function 0**: control of the "Azalia" built-in audio controller
> **AHCI Configuration**: AHCI mode control for SATA devices
> **Disable Vacant Ports**: control of vacant SATA ports automatic disabling.

This submenu also contains another submenu for USB devices setting.

7.4.3.1   ICH USB Control Submenu

USB devices control submenu. The submenu screen is shown in the figure below.

Fig. 7-145: ICH USB Control Submenu Screen

```
              Phoenix SecureCore(tm) Setup Utility
                     Intel

         ICH USB Control Sub-Menu              Item Specific Help

   USB Dev #29            [Fun #0,1,2,3,7]     Controls Dev #29
   USB Dev #26            [Fun #0,1,7]

   Overcurrent Detection:  [Enabled]




   F1   Help   ^v  Select Item   -/+   Change Values     F9   Setup Defaults
   Esc  Exit   <>  Select Menu   Enter Select > Sub-Menu  F10  Save and Exit
```
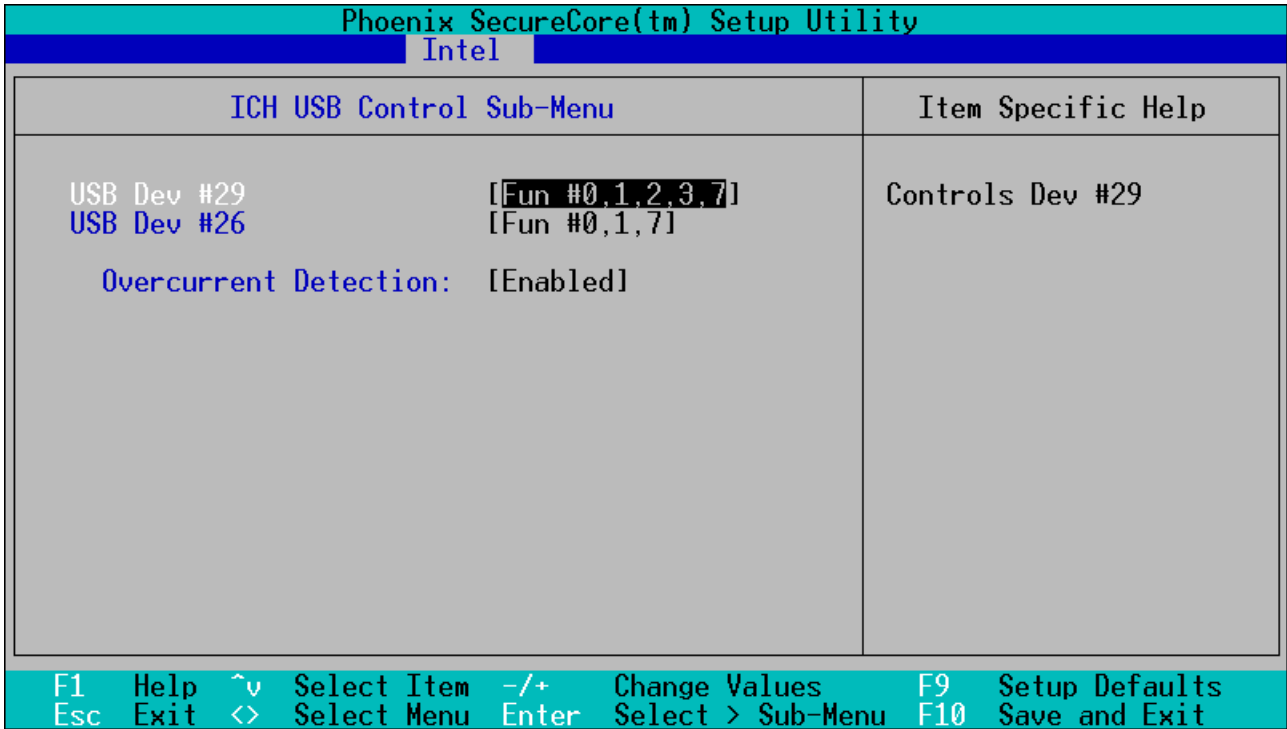
Where:
    USB Dev #29 , USB Dev #26: integrated USB ports control
    Overcurrent Detection: enabling interrupt in case consumption current in one of the USB ports is exceeded

7.5   Security

This menu is intended to set the module security functions. The screen of this menu is shown in the figure below.

Fig. 7-156: Security Menu Screen

```
                Phoenix SecureCore(tm) Setup Utility
    Main     Advanced     Intel    Security    Boot    Custom    Exit

                                              Item Specific Help

      Supervisor Password Is:   Clear
      User Password Is:         Clear         Supervisor Password
                                              controls access to the
      Set Supervisor Password  [Enter]        setup utility.
      Set User Password        [Enter]

      Fixed disk boot sector:  [Write Protect]
      Virus check reminder:    [Daily]
      Password on boot:        [Enabled]



    F1   Help   ^v  Select Item  -/+   Change Values     F9   Setup Defaults
    Esc  Exit   <>  Select Menu   Enter Select > Sub-Menu F10  Save and Exit
```

Where:
    Set Supervisor Password: setting BIOS Setup entry password
    Set User Password: setting module start and BIOS Setup entry password
    Fixed disk boot sector: write protection control for the hard disk boot sector
    Virus check reminder: reminding the user about the necessity to check the system for viruses during the BIOS POST
    Password on boot: control of the password request on boot (see **Set User Password**)

7.6   Boot

Menu for setting the module boot devices. The screen of this menu is shown in the figure below.

Fig. 7-167: Boot Menu Screen

```
┌──────────────────────────────────────────────────────────────────────┐
│            Phoenix SecureCore(tm) Setup Utility                        │
│   Main     Advanced     Intel     Security     Boot    Custom    Exit  │
├─────────────────────────────────────────────┬────────────────────────┤
│                                             │   Item Specific Help     │
│   Boot priority order:                      │                          │
│    1:  IDE 3: Fastwel CPC308 ONBOARD SSD    │  Keys used to view or    │
│    2:                                       │  configure devices:      │
│    3:                                       │  Up and Down arrows      │
│    4:                                       │  select a device.        │
│    5:                                       │  <+> and <-> moves       │
│    6:                                       │  the device up or down.  │
│    7:                                       │  <f> and <r> specifies   │
│    8:                                       │  the device fixed or     │
│   Excluded from boot order:                 │  removable.              │
│     :  All IDE HDD                          │  <x> exclude or include  │
│     :  All USB Floppy                       │  the device to boot.     │
│     :  ALL USB KEY                          │  <Shift + 1> enables or  │
│     :  All USB HDD                          │  disables a device.      │
│     :  All USB CDROM                        │  <1 - 4> Loads default   │
│     :  All USB ZIP                          │  boot sequence.          │
│     :  All USB LS120                     v  │                          │
│                                             │                          │
├─────────────────────────────────────────────┴────────────────────────┤
│  F1   Help   ^v  Select Item  -/+   Change Values     F9   Setup Defaults │
│  Esc  Exit   <>  Select Menu  Enter Select > Sub-Menu F10  Save and Exit  │
└──────────────────────────────────────────────────────────────────────┘
```
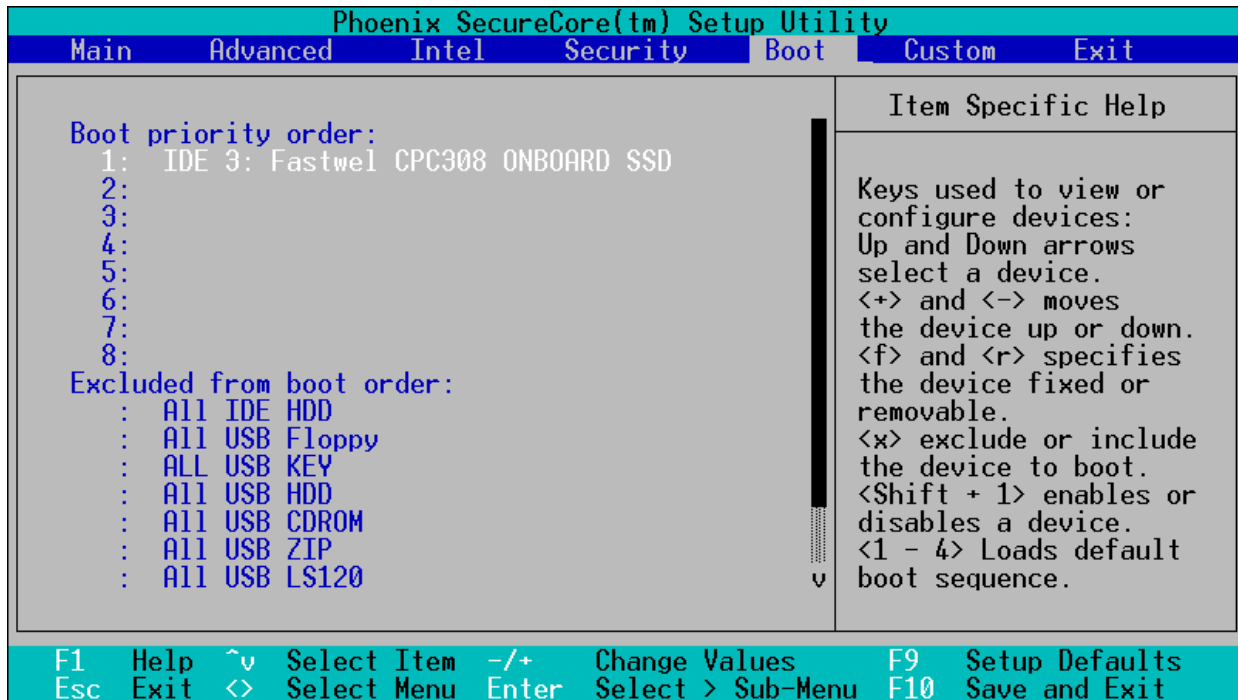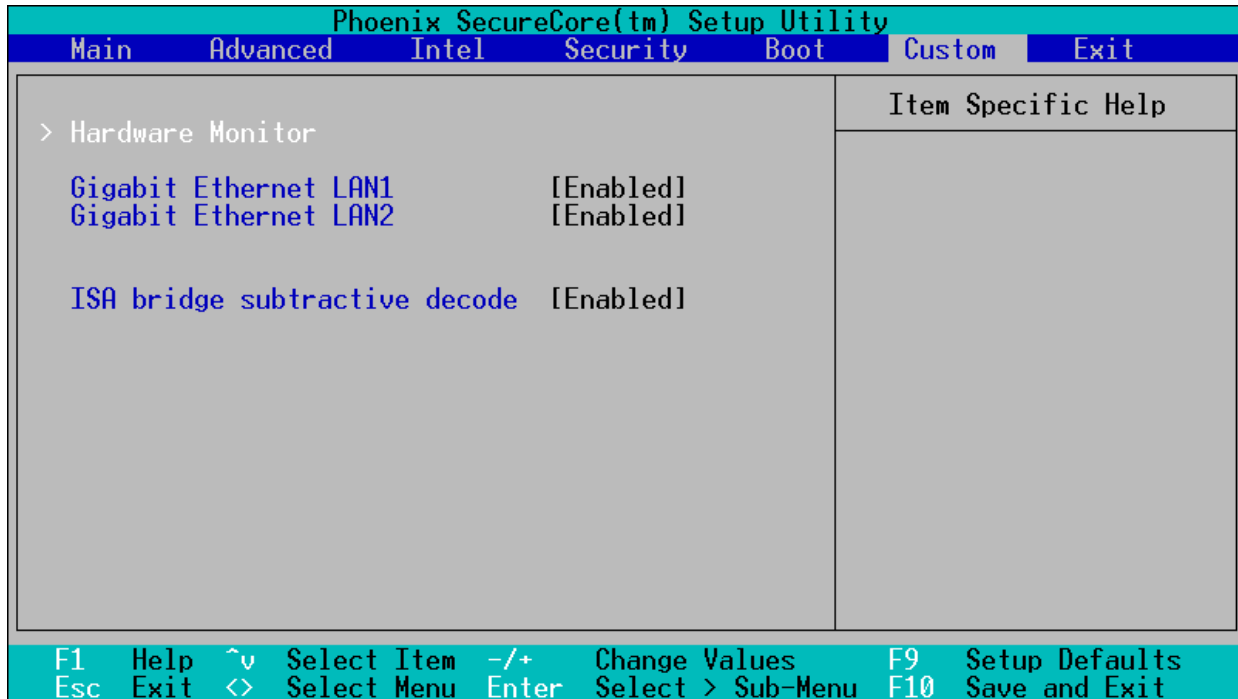
Where:

> **Boot priority order**: setting the priority of the devices to boot from (choose the devices with arrow keys, navigate upward or downwards with "+" and "-" keys, select or unselect with "X" key).

7.7   Custom

Menu for custom module settings. The screen of this menu is shown in the figure below.

Fig. 7-178: Custom Menu Screen


```
                    Phoenix SecureCore(tm) Setup Utility
      Main      Advanced     Intel     Security     Boot    Custom     Exit

                                                     Item Specific Help
  > Hardware Monitor

    Gigabit Ethernet LAN1         [Enabled]
    Gigabit Ethernet LAN2         [Enabled]

    ISA bridge subtractive decode  [Enabled]




    F1    Help   ^v   Select Item  -/+    Change Values    F9   Setup Defaults
    Esc   Exit   <>   Select Menu  Enter  Select > Sub-Menu  F10  Save and Exit
```

Where:
        Hardware Monitor: displaying the current hardware parameters
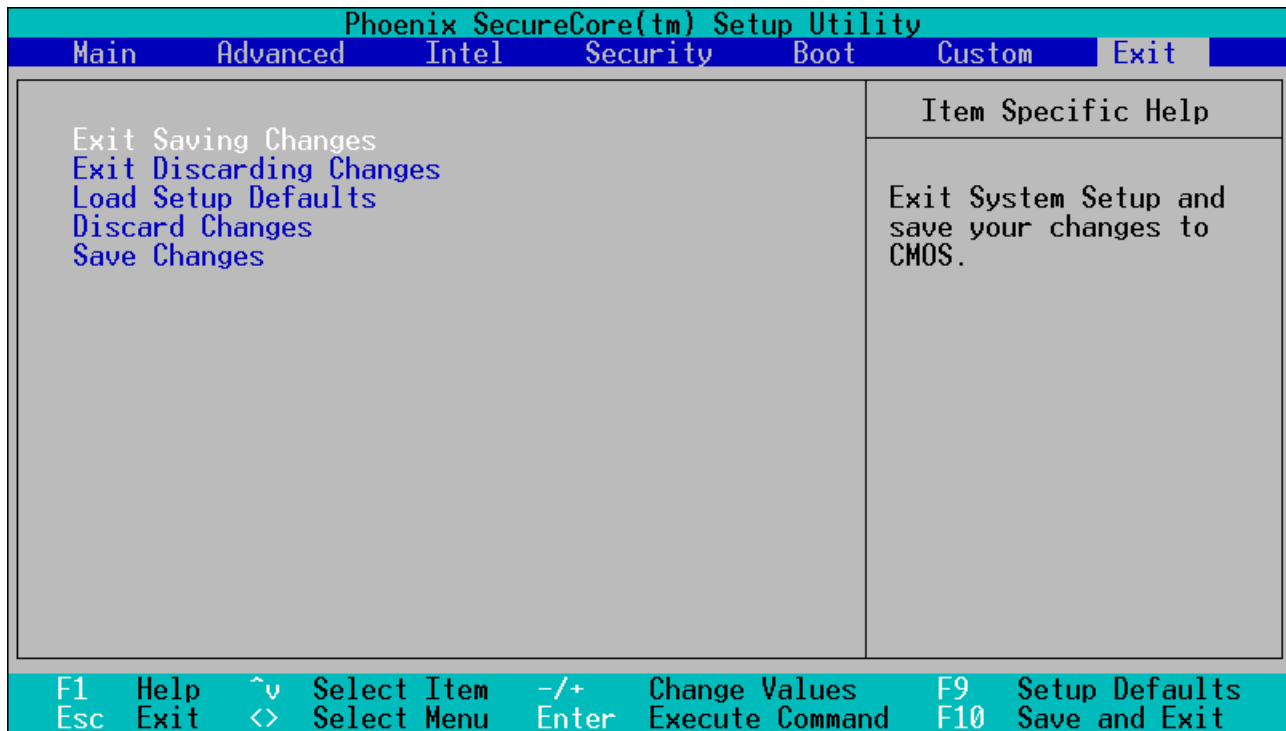   **Gigabit Ethernet LAN1, LAN2**: control of integrated network controllers
        ISA bridge subtractive decode: PCI-ISA bridge subtractive decoding control
The "**Hardware Monitor**" submenu displaying the current hardware parameters is available in this menu as well.

7.8   Exit

The menu for selection of BIOS Setup utility exit options. The screen of this menu is shown in the figure below.

Fig. 7-18: Exit Menu Screen

```
                    Phoenix SecureCore(tm) Setup Utility
    Main      Advanced     Intel     Security     Boot     Custom     Exit

                                                   Item Specific Help
    Exit Saving Changes
    Exit Discarding Changes
    Load Setup Defaults             Exit System Setup and
    Discard Changes                 save your changes to
    Save Changes                    CMOS.













    F1    Help    ^v  Select Item   -/+   Change Values    F9    Setup Defaults
    Esc   Exit    <>  Select Menu   Enter Execute Command  F10   Save and Exit
```

Where:
        Exit Saving Changes: exit from BIOS Setup with saving changes
        Exit Discarding Changes: cancel changes and exit BIOS Setup
        Load Setup Defaults: Load the settings set by the manufacturer by default
        Discard Changes: cancel the changes made after the BIOS Setup entry
        Save Changes: save the changes

8   Transportation, Unpacking and Storage

8.1   Transportation

The module must be transported in individual factory packages consisting of an individual antistatic bag and a cardboard box, in closed vehicles (in heated and airtight compartments of motor, railroad or airborne vehicles) under storage conditions 5 as per GOST 15150-69 or under storage conditions 3 during transportation by sea.

It is allowed to transport modules packed in individual antistatic bags in factory multipacks.

Packed modules must be transported pursuant to the cargo transportation rules applicable to this mode of transport.

During loading and unloading work and transportation, packed modules must not be exposed to jerks, falls, shocks and atmospheric precipitation. The stowage of packed modules in a vehicle must exclude their shifting.

8.2   Unpacking

The modules that were transported at subzero ambient temperature must be stored for 6 hours under storage conditions 1 as per GOST 15150-69 before they can be unpacked.

Placing packed modules in front of a heat source before their unpacking is forbidden.

In the process of the modules unpacking one must observe all the precautions ensuring their safety and marketable appearance of the factory packages.

Upon unpacking, the modules must be checked for external mechanical damage after transportation.

8.3   Storage

Modules storage conditions: 1 as per GOST 15150-69 (IEC721).

Appendix A

A   Cooler Development Recommendations

This Appendix provides recommendations the user must take into account while developing his own cooling system. To enable the processor to work in the maximum performance mode without switching to the reduced power consumption and temperature reduction mode, the heat sink temperature must not exceed the values specified in the table below.

Table A-1: Threshold Temperature Values of the Module Switching to Reduced Capacity Mode

№	Module/Processor Type	Heatsink Threshold Temperature, °C
1	CPC308-01/Atom Pineview-M (N450)	90
2	CPC308-03/Atom Pineview-D (D510)	85

Thereby, if the cooler installed on the heat sink maintains its temperature at a level not exceeding the above threshold value, the processor will operate in the maximum performance mode.

The figure below shows a plot of the heat sink temperature as a function of the ambient temperature when using a radiator (ACS00035-01 kit), see subsection 1.2.3 Additional Accessories.

Fig. A-1: Heatsink Temperature as a Function of the Ambient Temperature When Using a Radiator (ACS00035-01 kit)
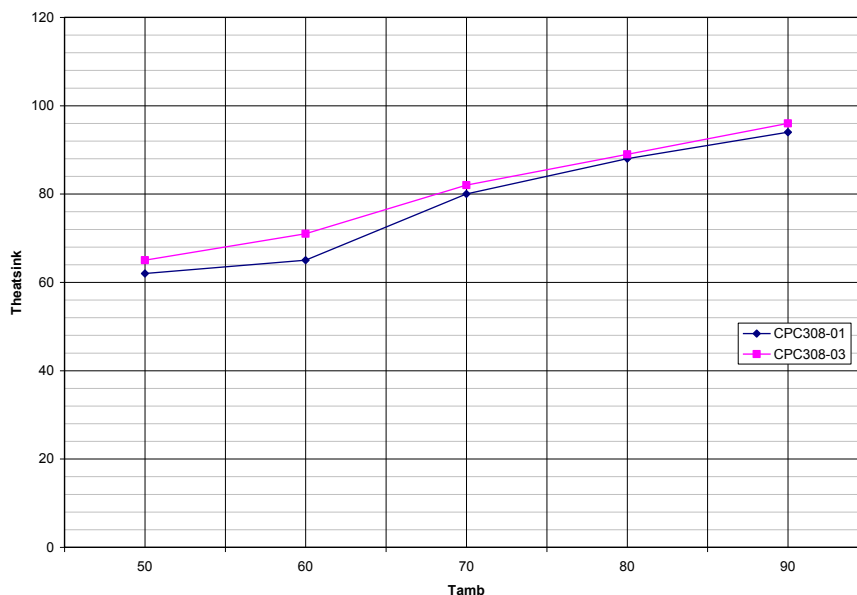
$T_{heatsink}$ – Heatsink temperature, °C;

T_{amb} - Ambient temperature, °C.

APPENDIX 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.