CPC805

EPIC
Intel Atom N450 Based
Processor Module

User Manual

Rev. 001a E Pre

May 2012

P R E L I M I N A R Y

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

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Rev. Index	Brief Description of Changes	Board Index	Date of Issue
001 Pre	Initial preliminary version	CPC805	May 2012
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Notation Conventions

Warning, ESD Sensitive Device!

This symbol draws your attention to the information related to electro static sensitivity of your product and its components. To keep product safety and operability it is necessary to handle it with care and follow the ESD safety directions.

Warning!

This sign marks warnings about hot surfaces. The surface of the heatsink and some components can get very hot during operation. Take due care when handling, avoid touching hot surfaces!

Caution: Electric Shock!

This symbol warns about danger of electrical shock (> 60 V) when touching products or parts of them. Failure to observe the indicated precautions and directions may expose your life to danger and may lead to damage to your product.

Warning!

Information marked by this symbol is essential for human and equipment safety.
Read this information attentively, be watchful.

Note...

This symbol and title marks important information to be read attentively for your own benefit.

General Safety Precautions

This product was developed for fault-free operation. Its design provides conformance to all related safety requirements. However, the life of this product can be seriously shortened by improper handling and incorrect operation. That is why it is necessary to follow general safety and operational instructions below.

Warning!

Only sufficiently skilled personnel must handle this product.

Warning!

When handling this product, special care must be taken not to hit the heatsink (if installed) against another rigid object. Also, be careful not to drop the product, since this may cause damage to the heatsink, CPU or other sensitive components as well.

Please, keep in mind that any physical damage to this product is not covered under warranty.

Note:

This product is guaranteed to operate within the published temperature ranges and relevant conditions. However, prolonged operation near the maximum temperature is not recommended by Fastwel or by electronic chip manufacturers due to thermal stress related failure mechanisms. These mechanisms are common to all silicon devices, they can reduce the MTBF of the product by increasing the failure probability. Prolonged operation at the lower limits of the temperature ranges has no limitations.

Caution, Electric Shock!

Before installing this product into a system and before installing other devices on it, always ensure that your mains power is switched off.

Always disconnect external power supply cables during all handling and maintenance operations with this module to avoid serious danger of electrical shock.

Unpacking, Inspection and Handling

Please read the manual carefully before unpacking the module or mounting the device into your system. Keep in mind the following:

ESD Sensitive Device!

Electronic modules and their components are sensitive to static electricity. Even a non-perceptible by human being static discharge can be sufficient to destroy or degrade a component's operation! Therefore, all handling operations and inspections of this product must be performed with due care, in order to keep product integrity and operability:

- Preferably, unpack or pack this product only at EOS/ESD safe workplaces. Otherwise, it is important to be electrically discharged before touching the product. This can be done by touching a metal part of your system case with your hand or tool. It is particularly important to observe anti-static precautions when setting jumpers or replacing components.
- If the product contains batteries for RTC or memory back-up, ensure that the module is not placed on conductive surfaces, including anti-static mats or sponges. This can cause short-circuit and result in damage to the battery and other components.
- Store this product in its protective packaging while it is not used for operational purposes.

Unpacking

The product is carefully packed in an antistatic bag and in a carton box to protect it against possible damage and harmful influence during shipping. Unpack the product indoors only at a temperature not less than +15°C and relative humidity not more than 70%. Please note, that if the product was exposed to the temperatures below 0°C for a long time, it is necessary to keep it at normal conditions for at least 24 hours before unpacking. Do not keep the product close to a heat source.

Following ESD precautions, carefully take the product out of the shipping carton box. Proper handling of the product is critical to ensure correct operation and long-term reliability. When unpacking the product, and whenever handling it thereafter, be sure to hold the module preferably by the front panel, card edges or ejector handles. Avoid touching the components and connectors.

Retain all original packaging at least until the warranty period is over. You may need it for shipments or for storage of the product.

Initial Inspection

Although the product is carefully packaged, it is still possible that shipping damages may occur. Careful inspection of the shipping carton can reveal evidence of damage or rough handling. Should you notice that the package is damaged, please notify the shipping service and the manufacturer as soon as possible. Retain the damaged packing material for inspection.

After unpacking the product, you should inspect it for visible damage that could have occurred during shipping or unpacking. If damage is observed (usually in the form of bent component leads or loose socketed components), contact Fastwel's official distributor from which you have purchased the product for additional instructions. Depending on the severity of the damage, the product may even need to be returned to the factory for repair. DO NOT apply power to the product if it has visible damage. Doing so may cause further, possibly irreparable damage, as well as result in a fire or electric shock hazard.

If the product contains socketed components, they should be inspected to make sure they are seated fully in their sockets.

Handling

In performing all necessary installation and application operations, please follow only the instructions supplied by the present manual.

In order to keep Fastwel's warranty, you must not change or modify this product in any way, other than specifically approved by Fastwel or described in this manual.

Technical characteristics of the systems in which this product is installed, such as operating temperature ranges and power supply parameters, should conform to the requirements stated by this document.

Retain all the original packaging, you will need it to pack the product for shipping in warranty cases or for safe storage. Please, pack the product for transportation in the way it was packed by the supplier.

When handling the product, please, remember that the module, its components and connectors require delicate care. Always keep in mind the ESD sensitivity of the product.

Three Year Warranty

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

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

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

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

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 Overview

CPC805 is a EPIC single board computer based on Intel® Atom N450 processor operating at 1.66 GHz. The core of Intel® Atom N450 processor has a unique performance to power consumption ratio.

CPC805 is designed for the systems requiring reliable embedded computers combining small size and high performance. Such systems can be used for data acquisition and processing, for video processing, in telecommunications, for building computer networks, etc. For, example, they can be devices for video communication, testing and medical equipment, traffic control systems, security and access control systems, process control systems. The StackPC connector allows connection of additional expansion modules to CPC805.

Intel® Atom N450 processor is a highly integrated solution combining the processor core, DDR2 SDRAM memory controller and graphics controller with 2D/3D acceleration. This module provides great opportunity to work with graphics through VGA or TFT LVDS interfaces. There are two Gigabit Ethernet ports for the networking.

The module has up to 2 GB DDR2 memory onboard.

CPC805 processor module also has a set of standard PC interfaces: USB 2.0 ports, SATA, serial ports, CompactFlash socket, PS/2, audio and one multi-mode parallel port.

The components of CPC805 are carefully selected on the criteria of applicability in embedded systems and long-term availability in the market. This makes CPC805 an ideal device for building systems with long life cycle.

The module is compatible with MS DOS, Fastwel DOS, Microsoft® Windows® XP Embedded, Windows 7 (Windows Embedded Compact 7), QNX, and Linux® operating systems.

Some of the CPC805's outstanding features are:

- Intel Atom N450 processor, 1.66 GHz
  - IA 32-bit & 64- bit;
  - Intel SIMD2&3 (SSE2 + SSE3 + SSSE3);
  - Hyperthreading;
  - 1 level cache: 32 KB instructions, 24 KB data;
  - 2 level cache 512 KB;
  - Intel SpeedStep
- Up to 2 GB of soldered 667 MHz DDR2 SDRAM memory without ECC
- Integrated high performance VGA controller
  - VGA: up to 1400 x 1050, @ 60 Hz, front panel connector;
  - LVDS: up to 1280 x 800 @ 60 Hz, single channel, onboard connector
- PCI bus
  - Routed to PC/104 PCI connector
  - Conforms to v.2.3 specification
  - 32-bit/33 MHz
  - Up to 4 bus master devices support
- LPC bus
  - Routed to StackPC connector
  - Conforms to v.1.0 specification
  - Support for 1 Master/DMA
- PCIE bus
  - Routed to StackPC connector
  - Conforms to v.1.1 specification
  - Support for up to four x1 devices (up to 2.5 Gb/s) or one x4 device (10 Gb/s)
- SMbus
  - Routed to StackPC connector
  - Conforms to v.2.0 specification
  - Up to 100 Kb/s
- Flash BIOS
  - 8 Mb SPI-flash
- Flash disk (CPC805-01)
  - 4 GB NAND flash, 4 channel
  - IDE interface
- CompactFlash type II socket
  - PIO and BMIDE modes
  - UltraATA 100/66/33 support
- SerialATA II channels
  - Up to 300 MB/s
  - One onboard connector with Innodisk SATA DOM support
  - Two channels routed to StackPC connector
- SPI interface
  - Up to 3 devices (CS)
  - Up to 25 MHz
  - Routed to StackPC connector
- Two Gigabit Ethernet interfaces (via two PCIE x1 lanes)
  - Switchable to front panel or StackPC connector
- Two EIDE Ultra ATA/100 channels

- USB 2.0 ports
  - Up to 480 Mb/s
  - Four ports at front panel
  - Six ports routed to Stack PC connector
- Parallel port
  - SPP/ECP/EPP compatible
  - Onboard connector
- PS/2 keyboard and mouse interface
  - Onboard connector
- Six serial ports
  - High speed NS16C550 compatible
  - COM1 and COM3: RS-232, up to 1.5 Mbod, front panel
  - COM2 and COM4: RS-485, up to 460 kbod, isolated, onboard connectors
  - COM5 and COM6: RS-232, up to 1.5 Mbod (TTL), StackPC connector
- FRAM
  - 32 KB: 1 KB for BIOS setup parameters, 31 KB for user data
  - SPI bus
- Real-time clock with Li battery (CR2032, 3V)
- Audio
  - HD audio codec
  - Line In, Line Out, Microphone In onboard connectors
- Programmable integrated watchdog timer
- Hardware monitor
  - Three voltages monitoring
  - CPU and PCB temperatures monitoring
- Indicators
  - CPU module startup diagnostics LED
  - IDE/SATA activity LED
  - Ethernet activity (Link/Act) LEDs
  - Two programmable LEDs
- OS compatibility
  - MS DOS 6.22, FDOS 6.22;
  - Windows XP (Embedded);
  - Windows 7 (Windows embedded compact 7);
  - Linux 2.6;
  - QNX 6.5.
- Power
  - From external ATX power supply with +5V, +12V, -12V, +3.3V, +5V_STBY voltages and PS_ON signal support;
  - From unipolar power supply 7 to 30 VDC;
  - From PC/104+ power supply (StackPC).
- MTBF
  - Not less than 100000 hours
- Single shock/vibration stability
  - 100 g / 5 g
- Dimensions
  - 165 × 123.8 x 43 mm

1.2 CPC805 Versions

All variants are available in two versions, for industrial (-40°C to +85°C) and for commercial (0°C to 70°C) temperature ranges.

The customer can choose necessary configuration options using the following template:

1	–	2	–	3	\	4

1 Basic product name:
CPC805

2 Version:

1	2 GB RAM, 4 GB NAND flash
2	1 GB RAM, no NAND flash

3 Operating temperature range:

I	Industrial, -40°C to +85°C
C	Commercial, 0°C to +70°C

4 Other options:

Coating

\COATED	Protective coating

Operating system (for CPC805-01 only)

\XPE	Windows XP Embedded (IMES 421947.013)
\LNX	Linux 2.6 (IMES 421947.013-01)

1.3 Delivery Checklist

The CPC805 supplied set includes:

1. CPC805 processor module
2. LVDS mating connector for FPC cable or discrete connectors
3. Jumpers for XP2 (LVDS voltage) and XP10 (power source selection)
4. Two jumpers for terminators connection (XP18, XP19)
5. ATX 20 to 10 power cable (XP5)
6. One SATA angle data cable
7. One SATA power cable
8. Innodisk SATA DOM fasteners: standoff, M2.5 screw, 2.5 washer, 2.5 retaining washer
9. Fasteners for mounting of PC/104 PCI and StackPC modules: four PCB standoffs, four washers, four retaining washes, four M3 nuts, four M3 screws
10. Package

Additional accessories (supplied separately):

1. PS/2 adapter cable
2. Horizontal Low Profile Type D SATA DOM
3. CompactFlash disk

Package:

Dimensions: 230 × 155 × 45 mm

Gross weight: 595 grams

Note:

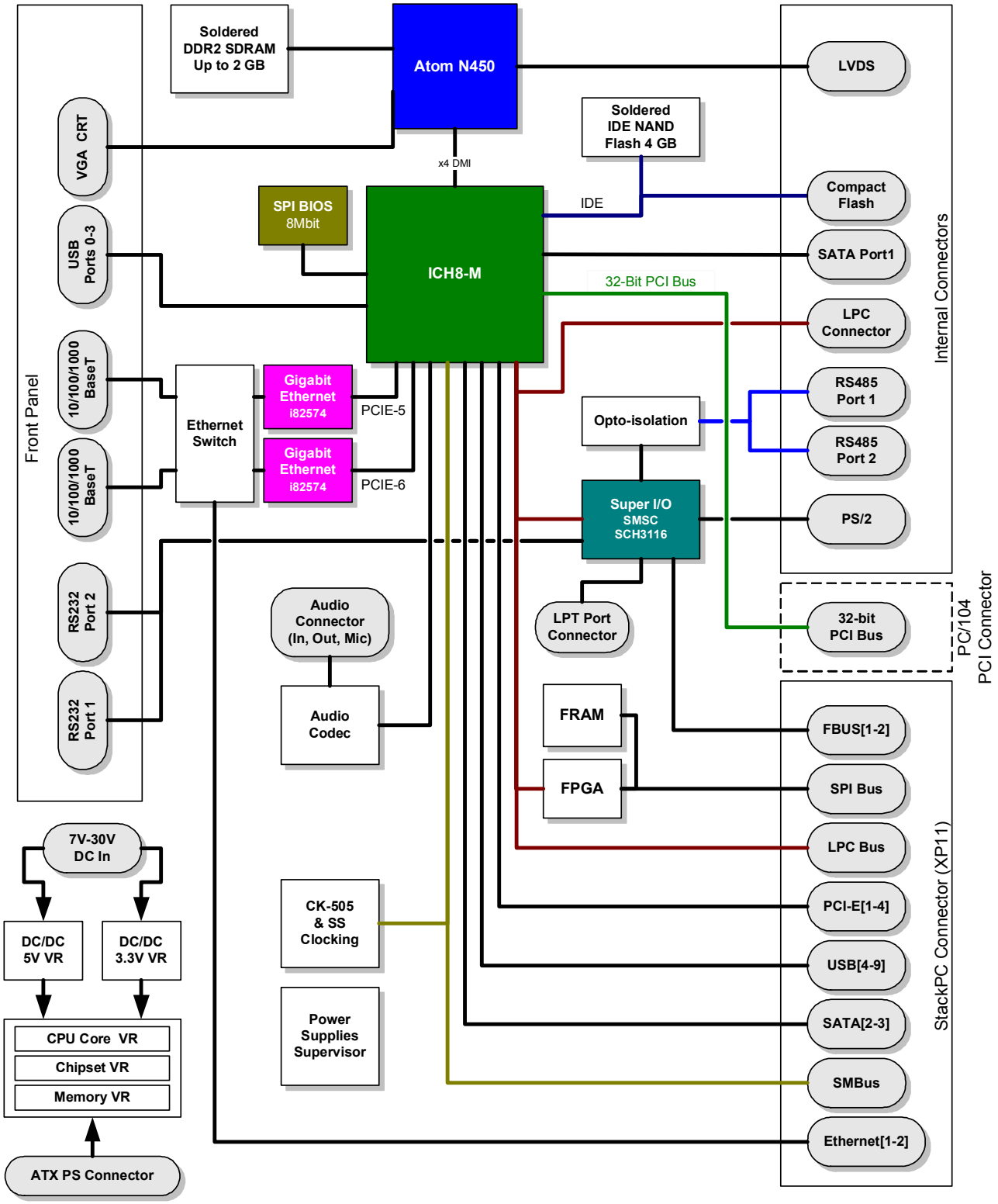
Keep the antistatic bag and the original package at least until the warranty period is over. It can be used for future storage or warranty shipments.

1.4 Module Diagrams

The diagrams in this section give visual information about the CPC805 module design, connectors and components layout. The diagrams may not reflect insignificant differences between the CPC805 versions.

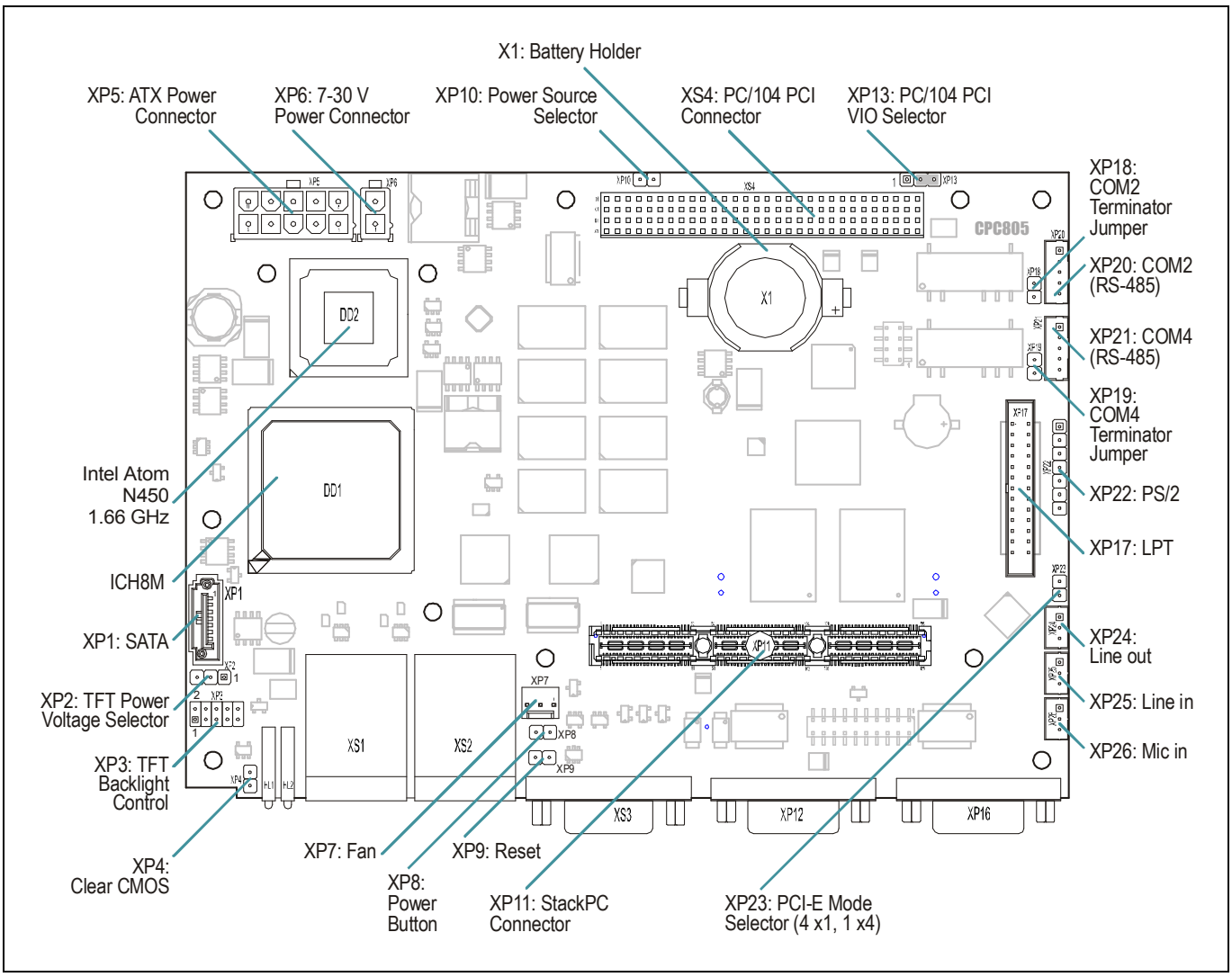
1.4.1 Block Diagram

Figure 1-1: CPC805 Block Diagram



1.4.2 Module Layout

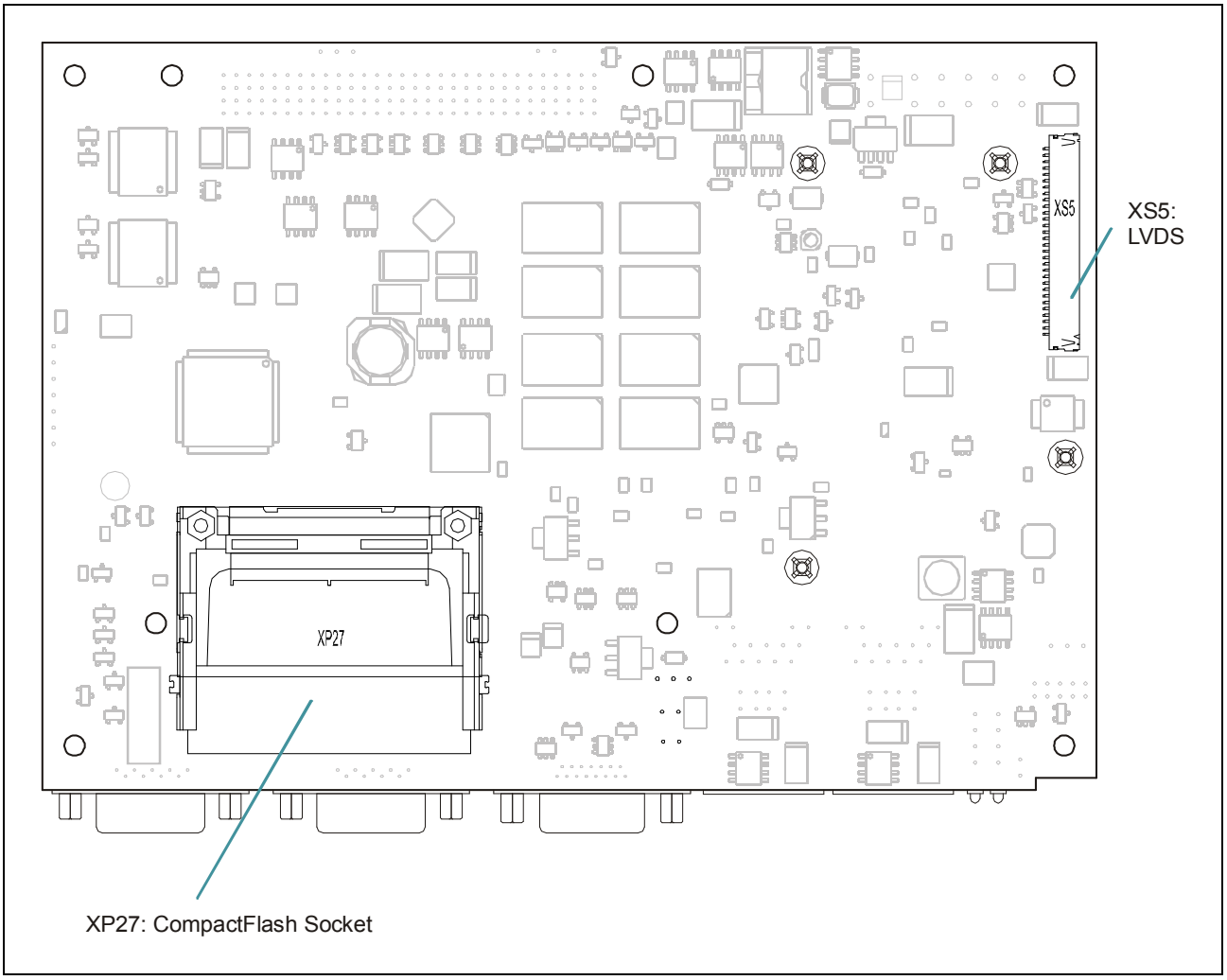
Figure 1-2: CPC805 Module Layout (top view)



The layout may slightly vary for different versions of the module.

Processor cooling fan is not shown.

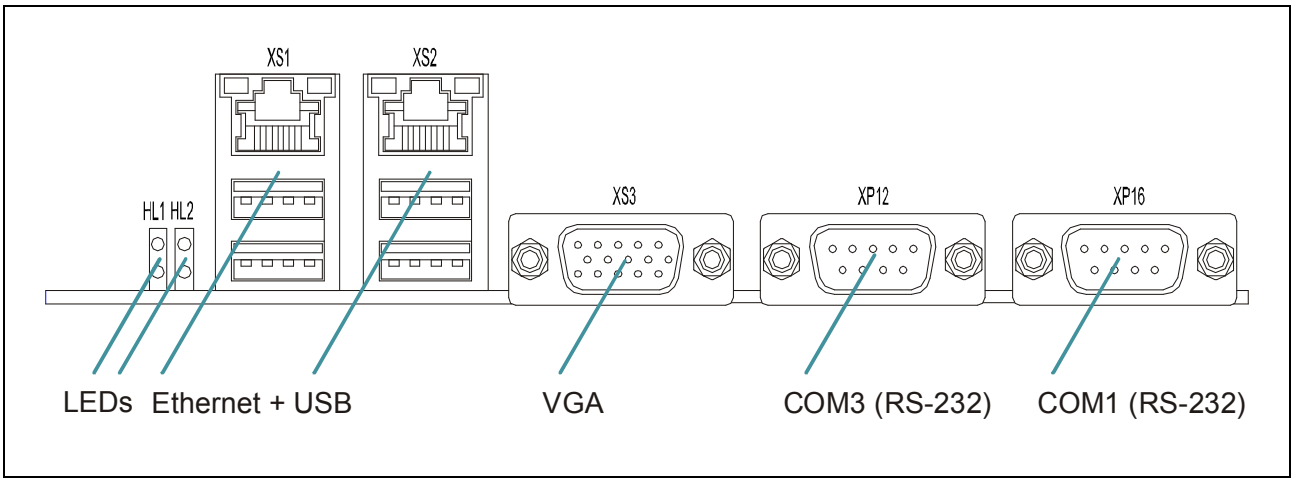
Figure 1-3: CPC805 Module Layout (bottom view)



The layout may slightly vary for different versions of the module.

1.4.3 Front Side Connectors

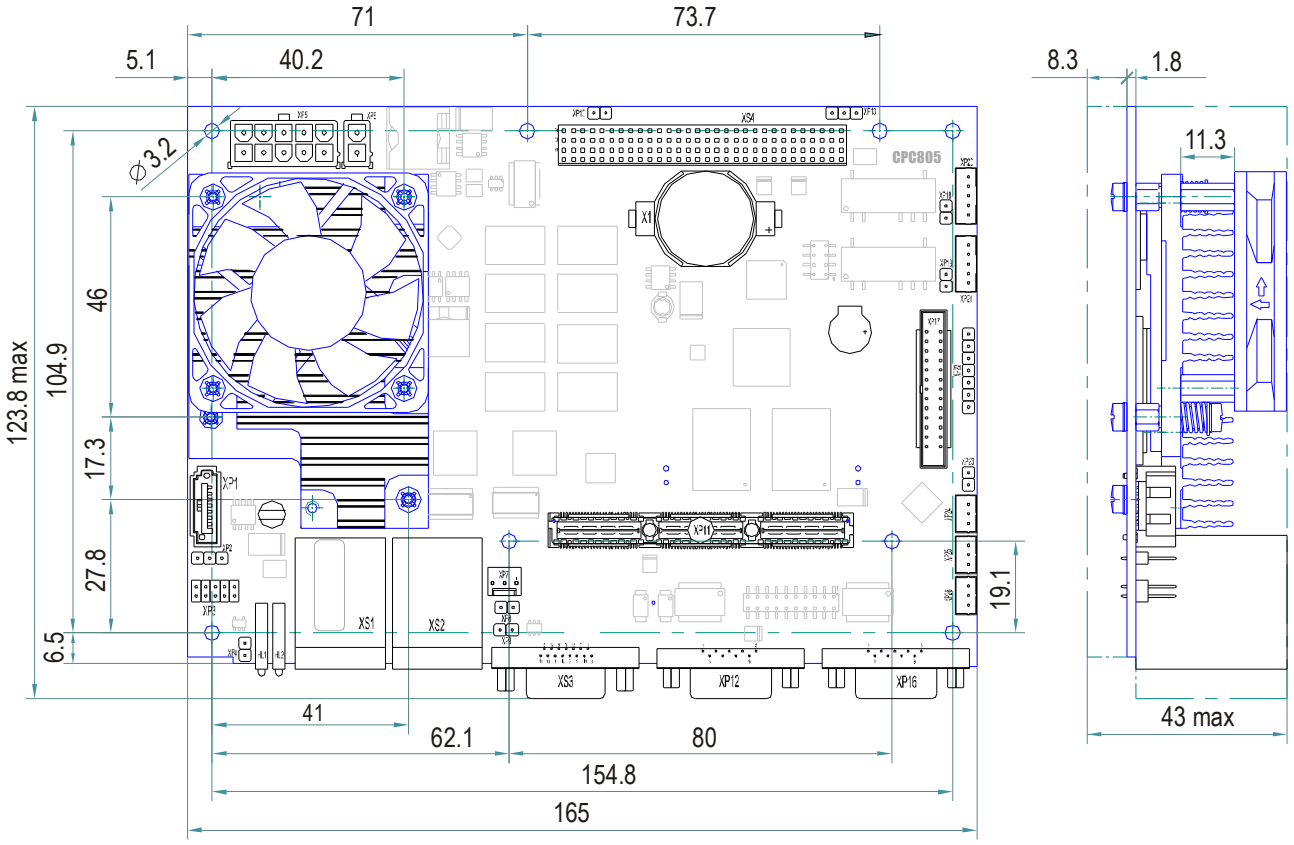
Figure 1-4: CPC805 Front Side View (Connectors)



The layout may slightly vary for different versions of the module. This view shows only the front side items.

1.4.4 Dimensions Diagram

Figure 1-5: CPC805 Mounting Dimensions Diagram



1.5 Technical Specifications

1.5.1 Processor, Memory and Chipset

CPU

CPC805 is a EPIC single board computer based on Intel® Atom N450 processor operating at 1.66 GHz. The core of Intel® Atom N450 processor has a unique performance to power consumption ratio.

- IA 32-bit & 64- bit;
- Intel SIMD2&3 (SSE2 + SSE3 + SSSE3);
- Hyperthreading;
- 1 level cache: 32 KB instructions, 24 KB data;
- 2 level cache 512 KB;
- Intel SpeedStep
- Integrated graphics controller
- Max memory addressing: 2 GB
- Memory type: DDR2-667
- Number of memory channels: 1

Memory

Main system memory:

- Up to 2 GB of soldered 2GB DDR2-667 memory, without ECC support

Flash memory:

- FRAM

  Non-volatile memory, 32 KB, used for user data (31 KB) and BIOS Setup parameters storage (1 KB), on SPI bus
- BIOS

  8 Mb chip on SPI bus
- NAND flash / CompactFlash

  CPC805-01 has 4 GB NAND flash memory disk connected to ATA Flash Disk Controller.

  CompactFlash Type II socket is located on the bottom side of the module. NAND flash disk is used as Master, CompactFlash – as slave.
- SATA DOM

  The module accepts Innodisk Low-profile horizontal Type D SATA DOM.
  SATA DOM is powered via SATA XP1 connector. Details on SATA DOM at www.innodisk.com.

Chipset

Intel® ICH8-M

- 32-bit PCI
- Configurable PCI Express
- Three SATA II channels
- One IDE (UDMA100) channel
- Ten USB 2.0 ports
- Integrated RTC with CMOS memory
- Power controller with ACPI and APM support
- LPC, HD-link, and SPI support.

1.5.2 Interfaces

PCI Bus

- Spec. v.2.3 support
- 32-bit, 33 MHz PCI bus
- Up to four PCI bus mastering devices are supported
- Routed to PC/104 PCI connector

PCI-E Bus

- Routed to StackPC connector;
- Conforms to PCI-E v.1.1 specification;
- Support for up to four x1 devices (up to 2.5 Gb/s) or one x4 device (10 Gb/s)

SPI Interface

- Up to 3 devices (CS) support;
- Frequency - up to 25 MHz;
- Routed to StackPC connector

Serial Ports

- COM1, COM3 – 9-wire RS232, each port routed to standard DSUB-9 front panel connector.
- COM5, COM6 – 2-wire RS232 with SOUT (RTS/DTR) control signal, routed to StackPC connector (FBUS), 3.3 V signals.
- COM2, COM4 – individually isolated (500 V) RS485, each port is routed to 5-contact onboard connector, jumpers are used to connect terminators.

USB Interface

- Ten USB channels
- Four USB 2.0 Type A front side sockets
- Six ports routed to Stack PC connector
- Support for UHCI and EHCI

Parallel Port

Multi-Mode™ bidirectional parallel port

- Onboard IDC connector
- Compatible with SPP (PC-compatible printer port), EPP (Enhanced Parallel Port), ECP (Extended Capabilities Port) modes

Gigabit Ethernet

Two 10/100/1000 MB/s Gigabit Ethernet interfaces based on PCI-E bus controllers

- Two RJ45 front side connectors
- Switchable to StackPC connector in BIOS Setup
- Automatic mode recognition
- Automatic cabling configuration recognition
- Cabling requirement: category 5, UTP, four-pair cabling

Graphics

Integrated graphics controller allows connection of analog CRT monitor and/or matrix display with LVDS interface. Dual monitor configurations are supported (clone/extended desktop).

VGA interface:

- Supports analog display resolutions of up to 1400 x 1050, at 60 Hz
- 15-pin D-sub VGA CRT-display front side connector with analog video signals

LVDS Interface

- Resolutions up to 1280 x 800
- Frequency range 25-112 MHz (single-channel mode)
- 30-contact Single LVDS interface connector for digital TFT-panels
- 10-pin IDC2-10 connector for TFT panels backlight control

PS/2 Keyboard and Mouse

- Available via 7-pin 1-row 2.5 mm pitch on-board connector
- Mouse and keyboard simultaneous connection is possible via Y-cable

Audio Interface

- Integrated HD Audio compatible controller
- Three standard 3-contact onboard connectors: line output, line input, and microphone input

SATA II Interface

- Data transfer rate: 300 MB/s
- One standard SATA on-board connector with Innodisk Low-profile horizontal Type D SATA DOM support
- Two channels are routed to StackPC connector

1.5.3 Power, Monitoring and Control

Power

Power voltage can be supplied to the module using various methods:

- From external ATX power supply with +5V, +12V, -12V, +3.3V, +5V_STBY voltages and PS_ON signal support;
- From unipolar power supply 7 to 30 VDC;
- From PC/104 PCI power supply (StackPC).

Power Monitoring and Reset

Processor Reset signal sources:

- Supervisor in power-on state
- Remote Reset button (2-contact connector on board)
- Watchdog timer

Jumpers and External Buttons

List and functions of the onboard jumpers:

- BIOS Setup parameters reset to default values (XP4);
- LVDS power voltage selection: 5 V or 3.3 V (XP2);
- PCI voltage selection: 5 V or 3.3 V (XP13);
- The module's power mode selection: unipolar or ATX (XP10);
- Connection of terminators for RS-485: (XP18 and XP19);
- PCI-E mode selector: four x1 or one x4) (XP23);
- 2-contact external Reset connector (XP9);
- 2-contact connector for "Power" button (XP8)

TFT Backlight and Power Control

- TFT backlight control is realized via on-board 10-contact connector
- TFT power voltage onboard selector

Thermal Management

CPU overtemperature protection is provided by:

- Internal processor temperature control unit initiates CPU shut down
- Processor frequency and cooling fan control conforms to ACPI specification
- Processor die temperature monitor can report processor temperature to the user program
- Custom designed heatsinks

Watchdog Timer

- FPGA based programmable watchdog timer (on LPC bus)

LEDs

Four LEDs are located on the front side of the module:

Name	Function	Description
HL1 green	Startup diagnostics	Fast blinking (~8 Hz) after power-on, slow blinking (~1 Hz) after BIOS is started until INT 19h BIOS procedure is finished then lights constantly.
HL1 red	IDE/SATA activity	On when IDE/SATA devices are accessed
HL2 green	User LEDs. Controlled through 317h register (see subsection SPI Controller Registers description.	
HL2 red		

Gigabit Ethernet status (1 and 2) LEDs integrated in sockets:

- Line: (green) Line connected
- Act: (green) Network activity

RTC

- Integrated in ICH8
- Li battery backup

1.5.4 Other

Mechanical

EPIC form factor

Dimensions: 165 × 123.8 × 43 mm (6.5" × 4.85" × 1.58", max with connectors), see Dimensions Diagram

Module Weight: 326 g

MTBF

Not less than 100000 hours

The value is calculated according to: Telcordia Issue 1 model, Method I Case 3, for continuous operation at a surface location, at normal environmental conditions (Russian State Standard GOST 15150-69, "UHL4" climatic parameters) and at ambient temperature 30°C.

Single Shock/Vibration Stability

- 100 g / 5 g

Temperature Ranges

Industrial:	CPC805... -I	-40°C ... +85°C
Commercial	CPC805... -C	0°C ... +70°C

Battery

3.0 V lithium battery for RTC in a battery holder; use Renata BR2032 or compatible

1.5.5 Software

Operating Systems

Supported operating systems:

- MS DOS 6.22, Fastwel DOS 6.22;
- Windows XP (Embedded);
- Windows 7 (Windows embedded compact 7);
- Linux 2.6;
- QNX 6.5.

To get additional information on other operating systems support, please, apply to Fastwel company.

2 Functional Description

2.1 Module Interfaces and Connectors

2.1.1 PC/104 PCI and StackPC Interfaces

PC/104 PCI and StackPC connectors allow CPC805 to interface with expansion modules such as A/D converters, digital I/O modules, etc. A maximum of four expansion boards may be stacked on the PC/104 PCI connector to form a fully-integrated system.

PC/104 PCI Interface

The interface uses a 120-pin (30x4) 2 mm header (XS4) located on the top of the board. This interface header accepts 4 stackable modules and carries all of the appropriate 32-bit 33 MHz PCI signals. Four PCI bus mastering devices are supported.

Figure 2-1: PC/104 PCI XS4 Connector Contacts Layout

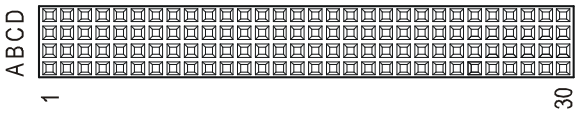


Table 2-1: PC/104 PCI XS4 Connector Contacts Designation

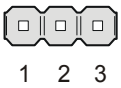
Pin	A	B	C	D
1	GND/5.0V_KEY2	Reserved	+5	AD00
2	VI/O	AD02	AD01	+5V
3	AD05	GND	AD04	AD03
4	/C/BE0	AD07	GND	AD06
5	GND	AD09	AD08	GND
6	AD11	VI/O	AD10	M66EN
7	AD14	AD13	GND	AD12
8	+3.3V	/C/BE1	AD15	+3.3V
9	/SERR	GND	Reserved	PAR
10	GND	/PERR	+3.3V	Reserved
11	/STOP	+3.3V	/LOCK	GND
12	+3.3V	/TRDY	GND	/DEVSEL
13	/FRAME	GND	/IRDY	+3.3V
14	GND	AD16	+3.3V	/C/BE2
15	AD18	+3.3V	AD17	GND
16	AD21	AD20	GND	AD19
17	+3.3V	AD23	AD22	+3.3V

Pin	A	B	C	D
18	IDSEL0	GND	IDSEL1	IDSEL2
19	AD24	/C/BE3	VI/O	IDSEL3
20	GND	AD26	AD25	GND
21	AD29	+5V	AD28	AD27
22	+5V	AD30	GND	AD31
23	/REQ0	GND	/REQ1	VI/O
24	GND	/REQ2	+5V	/GNT0
25	/GNT1	VI/O	/GNT2	GND
26	+5V	CLK0	GND	CLK1
27	CLK2	+5V	CLK3	GND
28	GND	/INTD	+5V	/RST
29	+12V	/INTA	/INTB	/INTC
30	-12V	Reserved	Reserved	GND/3.3V_KEY

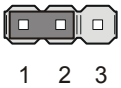
When the processor module is powered via the unipolar power supply, the voltages +12V and -12V are not supplied to PC/104 PCI and StackPC expansion modules.

The PC/104 PCI VIO selector (XP13) is located on the top side of the module and allows to set the voltage supplied to PCI interface I/O buffers. It is a standard 3-pin header. Figure below presents explanation of its jumper positions.

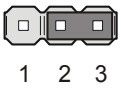
Figure 2-2: PC/104 PCI VIO Selector XP13 Positions



The jumper should be removed only if the module is powered via XS4 connector from a PC/104 PCI power supply module; the voltage is set on the power supply module.
In case the processor module receives power not from PC/104 PCI power supply module, the jumper must be installed in one of the two positions, described below.



Contacts 1-2 closed, +5 V power is supplied to PCI interface I/O buffers



Contacts 2-3 closed, +3.3 V is supplied.

StackPC Interface

StackPC connector allows to connect to CPC805 expansion modules (four x1 PCI-E, six USB, two SATA, two GEthernet, SMBUS, SPI, LPC, two RS-232 interfaces).

Figure 2-3: StackPC Connector (XP11)

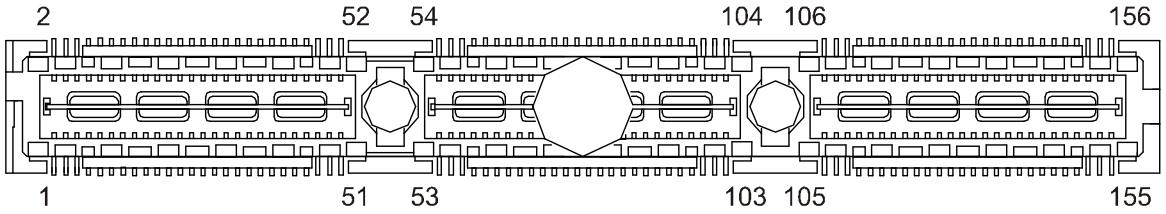


Table 2-2: StackPC Connector (XP11) Contacts Designation

	Contact	Signal		Signal	Contact	
To PCB edge	1	USB_OC#		PE_RST#	2	To PCB center
	3	3.3V		3.3V	4	
	5	USB_5p		USB_4p	6	
	7	USB_5n		USB_4n	8	
	9	GND		GND	10	
	11	PEx1_1Tp		PEx1_0Tp	12	
	13	PEx1_1Tn		PEx1_0Tn	14	
	15	GND		GND	16	
	17	PEx1_2Tp		PEx1_3Tp	18	
	19	PEx1_2Tn		PEx1_3Tn	20	
	21	GND		GND	22	
	23	PEx1_1Rp	+5 V	PEx1_0Rp	24	
	25	PEx1_1Rn		PEx1_0Rn	26	
	27	GND		GND	28	
	29	PEx1_2Rp		PEx1_3Rp	30	
	31	PEx1_2Rn		PEx1_3Rn	32	
	33	GND		GND	34	
	35	PEx1_1Clkp		PEx1_0Clkp	36	
	37	PEx1_1Clkn		PEx1_0Clkn	38	
	39	5V_Always		5V_Always	40	
	41	PEx1_2Clkp		PEx1_3Clkp	42	
	43	PEx1_2Clkn		PEx1_3Clkn	44	
	45	GND		PWRGOOD	46	
	47	SMB_DAT		NC	48	
	49	SMB_CLK		NC	50	
	51	SMB_ALERT		PSON#	52	
	53	NC		SATA_ACT#	54	
	55	Type_DETECT#		GND	56	
	57	ETH_0_MDI(0)p		NC	58	
	59	ETH_0_MDI(0)n		NC	60	
	61	GND		GND	62	
	63	ETH_1_MDI(0)p		NC	64	
	65	ETH_1_MDI(0)n		NC	66	
	67	GND		GND	68	
	69	ETH_0_MDI(1)p		NC	70	
	71	ETH_0_MDI(1)n	+5 V	NC	72	
	73	GND		GND	74	
	75	ETH_1_MDI(1)p		NC	76	
	77	ETH_1_MDI(1)n		NC	78	
	79	ETH_1_LINK_ACT#		ETH_0_LINK_ACT#	80	
	81	SATA_T1p		SATA_T0p	82	
	83	SATA_T1n		SATA_T0n	84	
	85	GND		GND	86	
	87	USB2_2p		USB2_3p	88	
	89	USB2_2n		USB2_3n	90	

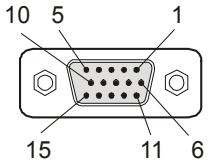
	91	**GND**		**GND**	**92**	
	93	USB2_1p		USB2_0p	**94**	
	95	USB2_1n		USB2_0n	**96**	
	97	**GND**		**GND**	**98**	
	99	ETH_1_CTREF		ETH_0_CTREF	**100**	
	101	SPI_MOSI		SPI_SS0#	**102**	
	103	SPI_MISO		SPI_SS1#	**104**	
	105	SPI_SCK		LPC_CLK	**106**	
	107	SPI_SS2#		**GND**	**108**	
	109	ETH_0_MDI(2)p		NC	**110**	
	111	ETH_0_MDI(2)n		NC	**112**	
	113	**GND**		**GND**	**114**	
	115	ETH_1_MDI(2)p		NC	**116**	
	117	ETH_1_MDI(2)n		NC	**118**	
	119	**GND**		**GND**	**120**	
	121	ETH_0_MDI(3)p		NC	**122**	
	123	ETH_0_MDI(3)n		NC	**124**	
	125	**GND**		**GND**	**126**	
	127	ETH_1_MDI(3)p		NC	**128**	
	129	ETH_1_MDI(3)n	**+12 Volts**	NC	**130**	
	131	PE_PRSNT1#		PE_PRSNT0#	**132**	
	133	SATA_R1p		SATA_R0p	**134**	
	135	SATA_R1n		SATA_R0n	**136**	
	137	**GND**		**GND**	**138**	
	139	TXD6		TXD5	**140**	
	141	RXD6		RXD5	**142**	
	143	**GND**		**GND**	**144**	
	145	LPC_AD0		LPC_DRQ#	**146**	
	147	LPC_AD1		LPC_SERIRQ#	**148**	
	149	**GND**		**GND**	**150**	
	151	LPC_AD2		LPC_FRAME#	**152**	
	153	LPC_AD3		***RTC_Battery***	**154**	
	155	RTS6#		RTS5#	**156**	

2.1.2 Graphics Controller

(TBA)

2.1.2.1 VGA CRT Interface and Connector

Figure 2-4: D-Sub VGA-CRT XS3 Connector



The 15-contact female D-Sub standard connector is used to connect a VGA CRT analog monitor to the CPC805 module. This connector is located on the front side of the module.

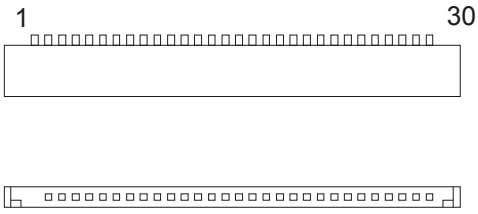
Table 2-3: SVGA J22 Front Side Connector Pinout

Pin Number	Signal	Function	In/Out
1	Red	Red video signal output	Out
2	Green	Green video signal output	Out
3	Blue	Blue video signal output	Out
9	VCC_MON	Power +5V, 200 mA	Out
12	DDC_DATA	I^2C™ data	In/Out
13	HSYNC	Horizontal sync.	TTL out
14	VSYNC	Vertical sync.	TTL out
15	DDC_CLOCK	I^2C™ clock	Out
5, 6, 7, 8	GND	Signal ground	–
4, 10, 11	NC	–	–

2.1.2.2 LVDS Interface

Single LVDS interface is available via a 30-contact XS5 connector located on bottom side of the board. A 10-pin connector XP3 (IDC2-10 mating socket) is used for backlight control. Resolutions up to 1280×800 are supported at 18 bpp. Operating frequency range is 25 – 112 MHz.

Figure 2-5: XS5 LVDS Connector



30-contact LVDS header is used for connection of digital TFT panels

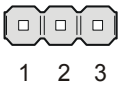
Table 2-4: XS5 LVDS Connector Pinout

Contact #	Signal	Description	In/Out
27	LA_DATA_P0	Differential Signal Positive	–
28	LA_DATA_N0	Differential Signal Negative	–
25	LA_DATA_P1	Differential Signal Positive	–
26	LA_DATA_N1	Differential Signal Negative	–
23	LA_DATA_P2	Differential Signal Positive	–
24	LA_DATA_N2	Differential Signal Negative	–
19	LA_DATA_P3	Differential Signal Positive	–
20	LA_DATA_N3	Differential Signal Negative	–
21	LA_CLK_P	Differential Clock Positive	–
22	LA_CLK_N	Differential Clock Negative	–
15	NC		–
16	NC		–

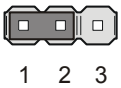
Contact #	Signal	Description	In/Out
13	NC		–
14	NC		–
11	NC		–
12	NC		–
7	NC		–
8	NC		–
9	NC		–
10	NC		–
1, 2, 3, 4	VDD	Panel Power 5V or 12V	–
5, 6, 17, 18, 29, 30	GND	Signal ground	–

TFT Panel Power Voltage Selection

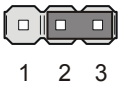
Figure 2-6: XP2 TFT Panel Power Voltage Selector



XP2 is a standard 3-pin header used for TFT power voltage (V_{DD}) selection. It is located on the top side of the module. Figure below presents explanation of its jumper positions.



Pins 1-2 closed: +3.3 V power is supplied to a panel



Contacts 2-3 closed: +5 V is supplied

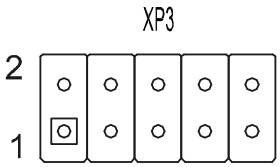
Attention!

Take due care selecting TFT panel power voltage!

Wrong setting can result in a damage to the panel. Please, apply to specifications of a panel for correct voltage level.

Digital Panel Backlight Control

Figure 2-7: XP3 Panel Backlight Control Connector



A 10-pin header on top side of CPC805 is used for connection of an invertor via IDC2-10 mating connector. Backlight control mode is selected by internal graphics controller driver for the installed operating system.

Table 2-5: XP3 Backlight Control Connector Pinout

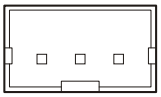
Pin #	Signal
1	+5V
2	+5V
3	GND
4	GND
5	BKLEN
6	BKLCTL
7	NC
8	NC
9	DDC_CLK
10	DDC_DAT

2.1.3 Audio Interface

Audio connectors mounted on the top side of the board: LineOut (XP24); LineIn (XP25); Microphone (XP26).

(TBA)

Figure 2-8: Onboard CRIMP Audio Connectors: XP24, XP25, XP26



Pinouts of 3-pin onboard audio connectors are presented in two tables below.

Table 2-6: Audio Connectors Pinout

Connctor	Contact	Signal
XP24	1	LINEOUT_R
	2	GND
	3	LINEOUT_L
XP25	1	LINEIN_R
	2	GND
	3	LINEIN_L
XP26	1	MIC_R
	2	GND
	3	MIC_L

2.1.4 Serial Interfaces

(TBA)

2.1.5 USB Interfaces

(TBA)

2.1.6 Gigabit Ethernet

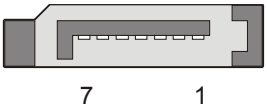
(TBA).

2.1.7 Parallel Port Interface

(TBA)

2.1.8 SerialATA Interface

Figure 2-9: SATA Connector



XP1 (TBA)

Table 2-7: SATA Connector Pinout

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

It is recommended to use a 45 cm cable for connection of SATA drives.

2.1.9 CompactFlash Socket

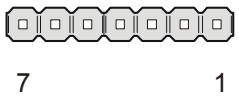
CPC805 has a CompactFlash Type I/II 50-pin socket XP27 on the bottom side of the board. (TBA)

Table 2-8: CompactFlash Socket XP27 Pinout

Pin Number	Signal	Function	In/Out
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	GND	–	–
15	GND	–	–
16	GND	–	–
17	GND	–	–
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	IORD	I/O read	Out
35	IOWR	I/O write	Out
36	3.3 V	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	–	–

2.1.10 PS/2 Keyboard/Mouse Interface

Figure 2-10: PS/2 Connector



PS/2 port is available via a 1-row 7-contact onboard connector (XP22). Mouse and keyboard can be connected simultaneously using Y-cable (supplied with the module).

The pinout of this connector is shown in the table below.

Table 2-9: PS/2 Connector Pinout

Pin Number	Signal	Pin Number	Signal
1	VCC 5 V	5	MCLK
2	KBDDAT	6	GND
3	KBDCLK	7	NC
4	MDAT	–	–

Note:

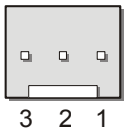
The keyboard/mouse power supply unit is protected by a 500 mA fuse. All signal lines are EMI-filtered.

2.1.11 Power Supply Connectors

(TBA)

2.1.12 Fan Connector

Figure 2-11: Fan Connector XP7



There is a standard 3-pin 2.54 mm pitch header for connection of the processor cooling fan on the top side of the board.

The connector's pinout is presented in the table below.

Table 2-10: XP7 Fan Connector Pinout

Pin Number	Function
1	FANTACH
2	FANCTL (+5 V)
3	GND

2.1.13 Soft Power and Reset Connectors

2-pin connectors SoftPower and Reset (XP8 and XP9) are located on the top side of the module. They are used for connection of remote buttons without closed (depressed) state latching.

A button connected to XP8 pins allows to switch between several power states. Pressed once in S5 (Soft-off) mode, it switches the module into S0 (Full-on) mode. Pressed once in S0 (Full-on) mode, it switches the system into S1, S3 or S5 mode depending on setup settings. Retention of this button in pressed position for more than 4 seconds in S0 (Full-on) mode switches the system into S5 (Soft-off) mode.

Depressing the button connected to XP9 pins initiates system Reset and restart of the module.

(TBA)

2.1.14 Counterpart Connectors

The user can make custom cables for connection to the CPC805 onboard connectors using the information on the counterpart connectors below:

Table 2-11: Recommended Counterparts for Onboard Connectors

Onboard Connector	Counterpart
XP17	IDC2-26
XP20, XP21	MU-5F
XP22	BLS-7
XP24, XP25, XP26	MU-3F
XP6	MF-2F
XP5	MF-10F
XP3	BLD2-10

2.2 LED Indicators

Four LEDs are located on the front side of the module:

Table 2-12: Front Side LEDs

Name	Function	Description
HL1 green	Startup diagnostics	Fast blinking (~8 Hz) after power-on, slow blinking (~1 Hz) after BIOS is started until INT 19h BIOS procedure is finished then lights constantly.
HL1 red	IDE/SATA activity	On when IDE/SATA devices are accessed
HL2 green	User LEDs. Controlled through 317h register (see subsection SPI Controller Registers description.	
HL2 red		

Gigabit Ethernet status (1 and 2) LEDs integrated in sockets:

- Line: (green) Line connected
- Act: (green) Network activity

(TBA)

2.3 SPI Controller

2.3.1 SPI Controller Registers

Table 2-13: SPI Controller and User LEDs Registers

Index	I/O Port Address	Type	Hard Reset	Configuration Register
	310h	R/W	00h	FRAM address value [7:0]
	311h	R/W	00h	FRAM address value [14:8]
	312h	R/W	00h	SPI data value [7:0]
	313h	R/W	00h	SPI Control/Status register [7] – Busy status [6] – Last 1K fram lock status [5] – FPGA EEPROM mode [4] – Reserved [3] – Mode [0-fram, 1-ext dev) [2] – CPOL [1] – CPHA [0] – BURST mode
	314h	R/W	00h	SPI control reg 2 [7:5] – Reserved [4:2] – FREQ select 000 – 25 MHz 001 – 12.5 MHz 010 – 6.25 MHz 011 – 3.125 MHz 100 - 1.5625 MHz [1:0] – ext dev select (if MODE=1) 00 – CS0 01 – CS1 10 – CS2 11 – Reserved
HL2 User LEDs Control Register				
	317h	R/W	00h	User LEDs control [7:2] – Reserved [1] – Led2 (red) On/Off [0] – Led1 (green) On/off

SPI controller supports two operation modes – FRAM or EXTDEV, it is selected in Control Register (313h bit <3>). In FRAM mode the controller automatically forms sequence for accessing FRAM memory on SPI bus; address from registers 310h and 311h in read/write modes, 312h – Data register. In this mode external devices (CS0-CS2) are not active and FRAM memory is always selected on CPC805.

On selection of the FRAM mode the bus frequency is always 12.5 MHz. The last kilobyte of 32 KB is reserved for storage of BIOS Setup parameters and is not available for user. Bit <0> in 313h Control register switches the Automatic address increment mode when reading from / writing to the Data register (312h).

The EXTDEV mode enables addressing the external devices connected to CS[2:0] at the StackPC bus. The external device is selected in Control register (314h), bits <1:0>, bus frequency is selected in bits <4:2>. On every call to Data register 8 clocks are generated on the bus and data are either read to the Data register (Read cycle) or sent to the bus (Write cycle). To keep the CS active after access cycle, the BURST mode is used; BURST mode is enabled in bit <0> of Configuration register (313h). To end the transaction in BURST mode, bit <0> should be cleared before the last addressing to Data register 312h.

Bits <1> and <2> of Cofiguration register (313h) allow to change phase and polarity of clock signal. Bit <7> of Cofiguration register (313h) indicates the SPI bus occupation, it is active during generation of 8 clocks at the bus. It is used to indicate possibility to perform the next write operation to Data register.

Example of FRAM operation of CPC805:

- Write data byte (32h) to FRAM at address 144h

```
MOV   DX, 310H
MOV   AL, 44H
OUT   DX, AL
MOV   DX, 311H
MOV   AL, 01H
OUT   DX, AL
MOV   DX, 312h
MOV   AL, 32h
OUT   DX,AL
```

- Reading data byte from FRAM at address (101h)

```
MOV   DX, 310H
MOV   AL, 01H
OUT   DX, AL
MOV   DX, 311H
MOV   AL, 01H
OUT   DX, AL
MOV   DX, 312h
IN    AL,DX
```

2.3.2 Devices on SPI Bus

2.3.2.1 FRAM Serial Access Memory

CPC805 has 32 KB FRAM chip with serial access on SPI bus. This nonvolatile memory is used for BIOS settings (last kilobyte) and user data storage. FRAM is accessed through SPI controller registers.

2.3.2.2 External Devices on SPI

CPC805 allows connection of external devices to SPI bus via StackPC connector.

2.4 Timers

CPC805 is equipped with the following timers:

- **RTC – Real-Time Clock**

ICH contains a real-time clock. The RTC includes 256 bytes of battery-backed CMOS RAM. The RTC features include timekeeping with alarm function and 100-year calendar. A coin-cell battery powers the real-time clock and CMOS memory.

- **Counter/Timer**

Three 8254-type counters/timers are available on the CPC805.

- **Watchdog Timer**

2.4.1 Watchdog Timer

Programmable the watchdog timer is realized in FPGA and an LPC bus device. WDT is enabled and IRQ is selected in BIOS Setup.

WDT consists of the counter register [Timer Current Value Register] decremented with 32.768 KHz frequency, and initial value register [Timer Initial Value Register]. It is possible to set the timeout period from 0 to 512 seconds with increments of 30.52 μs by changing the value in this register. On zeroing the counter either an interrupt is generated or the Reset of the module occurs on double zeroing.

By default, WDT is inactive. The equation below can be used to calculate the timeout T_{WD} in μs as a function of the decimal value in the WD register (K_{WD}):

$$T_{WD}\,[\mu s] = K_{WD} * 10^6 / 2^{15}$$

For example, decimal value "1" of K_{WD} (000001h) corresponds to the timeout of 30.52 μs, and K_{WD} = 16777215 (FFFFFFh) – 512 seconds.

WDT is reset in different ways:

1) Write any value to the counter register [Timer Current Value Register]

2) Write any value to 80h port (the mode is enabled in BIOS Setup and is active only if access cycles to the port 80h are translated to LPC bus.)

After the first expiry of the timeout the TMF flag is set, after the second timeout expiry – STF flag.

WDT is controlled via I/O registers:

1) Stop countdown

2) Write the timeout value to [Timer Initial Value Register]

3) Initialize the WDT register by any of the reset methods (i.e. by writing any value to [Timer Current Value Register]). This leads to wring the initial value from [Timer Initial Value Register] to [Timer Current Value Register].

4) Start decrementing the counter and, if necessary, enable auto reset of the module.

5) Then, with a period less than timeout perform regular strobing of the WDT. In case WDT was not srobed, TMF flag is set after first timeout expiry and an interrupt occurs. After the second timeout expiry STF flag is set and the second interrupt is issued or the module will be Reset if this is enabled.

I/O Registers of the WDT Controller

Timer Current Value Register [23:0]

Base+0h		
Bit	**Name**	**Description**
7:0	Timer_Current_Value[7:0]	Write/read: Bits 7:0 of the current counter value
Base+1h		
Bit	**Name**	**Description**
7:0	Timer_Current_Value[15:8]	Write/read: Bits 15:8 of the current counter value
Base+2h		
Bit	**Name**	**Description**
7:0	Timer_Current_Value[23:16]	Write/read: Bits 23:16 of the current counter value

Timer Initial Value Register [23:0]

Base+3h		
Bit	**Name**	**Description**
7:0	Timer_Initial_Value[7:0]	Write/read: Bits 7:0 of the initial counter value
Base+4h		
Bit	**Name**	**Description**
7:0	Timer_Initial_Value[15:8]	Write/read: Bits 15:8 of the initial counter value
Base+5h		
Bit	**Name**	**Description**
7:0	Timer_Initial_Value[23:16]	Write/read: Bits 23:16 of the initial counter value

Status Register

Base+6h		
Bit	**Name**	**Description**
7:3	-	Reserved
2	STF	Write/read: Second timeout flag. Is set "1" provided TMF=1. An interrupt is generated on this flag. If the module Reset is enabled (RSTE=1), Reset occurs. Cleared by writing "1" into this bit.
1	-	Reserved
0	TMF	Write/read: First timeout flag. Is set to "1" on zeroing the counter. An interrupt is generated on this flag. Cleared by writing "1" into this bit or by writing to 80h port, if enabled.

Control Register

Base+7h		
Bit	**Name**	**Description**
7:2	-	Reserved
1	CNTE	Write/read: Countdown 1 – Enabled 0 – Disabled
0	RSTE	Write/read: Reset on timeout 1 – Reset enabled 0 – Reset disabled

3 Installation

CPC805 is easy to install. However, it is necessary to follow the procedures and safety regulations below to install the module correctly without damage to the hardware, or harm to personnel.

The installation of the peripheral drivers is described in the accompanying information files. For details on installation of an operating system, please refer to the relevant software documentation.

3.1 Safety Regulations

The following safety regulations must be observed when installing or operating the CPC805. Fastwel assumes no responsibility for any damage resulting from infringement of these rules.

Warning!

When handling or operating the module, special attention should be paid to the heatsink, because it can get very hot during operation. Do not touch the heatsink when installing or removing the module.

Moreover, the module should not be placed on any surface or in any kind of package until the module and its heatsink have cooled down to ambient temperature.

Caution!

Always switch off the system power before connecting or disconnecting the power supply cable to the module's power connector. Disregarding this requirement could be harmful for your life or health and can damage the module or entire system.

ESD Sensitive Equipment!

This product comprises electrostatically sensitive components. Please follow the ESD safety instructions to ensure module's operability and reliability:

- Use grounding equipment, if working at an anti-static workbench. Otherwise, discharge yourself and the tools in use before touching the sensitive equipment.
- Try to avoid touching contacts, leads and components.
- Disconnect power cable before mounting or removing PC/104 PCI or StackPC expansion modules.

Extra caution should be taken in cold and dry weather.

3.2 CPC805 Installation Procedure

To install CPC805, follow the instructions below.

1. Keep to the safety regulations of the Section 3.1 when performing the following operations.

Warning!

Failure to accomplish the following instruction may damage the module or result in incorrect system operation.

2. Ensure that the module configuration corresponds to the application requirements before installing. For information regarding the configuration of the CPC805, refer to Chapter 4. For the installation of CPC805 specific peripheral devices, I/O devices and expansion modules refer to the appropriate sections of this chapter.
3. To install the CPC805 perform the following:
   1. Fasten the included stud spacers on the board.

      Verify that the washers and spacers do not touch any of the component pads adjoining to the mounting holes. This will lead to damage at power-up.
   2. Install the CPC805 on a panel and fasten the spacers on it.
      Please, refer to Figure 1-5 for mounting openings coordinates.

Warning!

Make sure the power supply is OFF when connecting the power cable to the CPC805 module. Damage to the module may occur if the power is ON when connecting the power cable.

Accidentally crossing the wires, i.e., plugging the voltage supply wires into the ground connector or vice versa will damage the CPC805 module.

   3. Connect all the required interface cables.
   4. Check the state of XP10 contacts (power source selection).Connect a power supply to the CPC805 processor module. Refer to the Power Supply Requirements. The power supply connectors are located at the top side of the module. (TBA)

Warning!

It is not allowed to connect two power supplies simultaneously to XP5 and XP6 connectors.
Check the position of XP13 jumper.

4. CPC805 is now ready for operation. Please, refer to appropriate software, application, and system documentation to get further instructions.

3.3 Dismounting Procedures

To dismount the module do the following:

1. When performing the next actions, keep to safety regulations of the Section 3.1. Pay special attention to the temperature of the heatsink!
2. Ensure that the system power is switched off before proceeding.
3. Disconnect all interface cables that may be connected to the module.
4. Unscrew all the retaining screws. Do not touch the heatsink, since it can get very hot during operation.
8. Dispose of the module at your discretion. The module should not be placed on any surface or in any form of storage container until the board and the heatsink have cooled down to room temperature.

3.4 Installation of CPC805 Peripheral Devices

A lot of peripheral devices can be connected to the CPC805. Their installation procedures differ significantly. Therefore the following sections provide mainly general guidelines regarding installation of peripheral devices. The details on external devices connection can be found in documentation supplied with these devices.

3.4.1 USB Devices Connection

CPC805 can accept Plug&Play connection of USB 2.0 computer peripheral devices (printers, keyboards, mice, etc.) All USB devices may be connected or disconnected while the host power is on.

3.4.2 SATA DOM Mounting

(TBA)

3.4.3 CompactFlash Cards Installation

CompactFlash socket of CPC805 supports any 3.3 V CompactFlash ATA type I/II cards. Carefully slide the correctly oriented card in and gently press to engage the contacts completely.

Note:

Connection of the CompactFlash cards while the power is on may damage your system.

Note

It is recommended to use CompactFlash-cards, which has been initialized and formatted in this module.
By default, CPC805 utilizes LBA mode. Utilization of CompactFlash cards, which has been initialized and formatted in another mode, may lead to errors in operation of the module.

3.4.4 Battery Replacement

The lithium battery must be replaced with Renata 3V CR2032 or a battery with similar characteristics.

The expected life of a 190 mAh battery (Renata 3V CR2032) is about 5 years. However, this typical value may vary because battery life depends on the operating temperature and the shutdown time of the system in which the battery is installed.

Note...

It is recommended to replace the battery after approximately 4 years to be sure it is operational.

Note:

Replacing the battery, make sure the polarity is correct ("+" up).

Dispose of used batteries according to the local regulations.

3.4.5 PC/104 PCI and StackPC Expansion Modules Installation

PC/104 PCI and StackPC connectors allow you to install interface expansion modules. They can be stacked to form a highly integrated control system. (TBA)

Warning!

When installing any expansion module, avoid excessively flexing the CPC805 board. Mate pins correctly and use the required mounting hardware.

Make sure the power is off!

Note...

Before installing and operating the PC/104 PCI expansion modules it is necessary to set the voltage supplied to PCI interface I/O buffers using the XP13 VIO selector. See details in Section 4.1.

4 Configuration

4.1 Power Supply Unit Type Selection

A standard 2-pin jumper switch (XP10 near XS4) for selection of an external power supply type is installed on the top side of the module. Figure 4-1 below explains jumper positions.

Figure 4-1: XP10 Power Supply Type Selector Positions

ATX power supply with control functions (TBA)

Open position of the jumper (default) corresponds to an unipolar power supply

Important!

Make sure the XP10 jumper is in correct position before connection of a power supply!

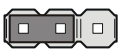
4.2 PC/104 PCI Voltage Selection

The PC/104 PCI voltage should be set before installation of expansion modules. All operations should be performed when the power is off.

There is a standard 3-pin header for PC/104 PCI voltage selection. The explanation of its jumper positions is presented below.

Figure 4-2: PC/104 PCI VIO Selector XP13 Positions

All contacts open – the voltage is selected at the PC/104 PCI power supply module. In case of using this type of power source, all contacts must be open!



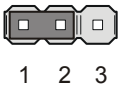
Contacts 1-2 closed, +5 V power is supplied to PCI interface I/O buffers

Contacts 2-3 closed, +3.3 V

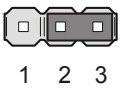
4.3 TFT Panel Power Voltage Selection

XP2 is a standard 3-pin header used for TFT power voltage (V_{DD}) selection. It is located on the top side of the module. Figure below presents explanation of its jumper positions.

Figure 4-3: XP2 TFT Panel Power Voltage Selector



Pins 1-2 closed: +3.3 V power is supplied to a panel



Contacts 2-3 closed: +5 V is supplied

Attention!

Take due care selecting TFT panel power voltage!

Wrong setting can result in a damage to the panel. Please, apply to specifications of a panel for correct voltage level.

4.4 RS-485 Terminators Connection

Terminator for COM2 – XP18, terminator for COM4 – XP19.

(TBA)

4.5 PCI-E Mode Selection

XP23 is a standard 2-pin header used for selection of PCI Express lanes configuration. It is located on the top side of the module.

Contacts closed – one x4 channel, contacts open – four x1 lanes.

(TBA)

5 Phoenix® BIOS Setup

The Phoenix® BIOS in your SBC is an adapted version of a standard BIOS for IBM PC AT-compatible personal computers equipped with Intel®x86 and compatible processors. The BIOS provides low-level support for the central processing, memory, and I/O system units.

With the help of BIOS Setup program, you can modify BIOS configuration parameters and control special features of your module. The Setup program is launched by pressing the F2 key and offers a convenient menu interface to modify basic system configuration settings and switching between the subsystems operation modes. Setup parameters are stored in a nonvolatile FRAM memory that keeps the information when the power is switched off.

5.1 Boot Details

5.1.1 Booting without a Monitor, Keyboard or Mouse

To boot without a monitor, keyboard or mouse set the item "POST Errors" to "Disabled" at the page "Main" in PhoenixBIOS Setup program. This setting is a default one.

Note!

If the module was booted without a connected monitor, the display will be empty, even if a monitor is connected later during operation. To get the correct display output it is necessary to reboot the module with a connected monitor. This is a Intel VideoBIOS particularity.

5.1.2 Booting from USB

To boot from a device connected to USB:

- Connect the device to boot from to a USB port. The appropriate USB controller should be enabled;
- Enter the PhoenixBIOS Setup program;
- Find this USB device at the "Boot" page and use «+» «–» buttons to move it in order to change its boot priority;
- Save changes and reboot the module.

To get the on-line help about the details of BIOS Setup program operation, please apply to the screen tips and the integrated help system.

6 System Power

6.1 Voltage Limits

Table 6-1: DC Input Voltage Ranges and Limits (ATX or PC/104 PCI Power Supply)

Power Voltage, V	Maximum Permitted Value, V	Absolute Limits, V
+3.3	-0.3 to +4	3.135 to 3.465
+5	-0.3V до 5.5V	4.75 to 5.25
+5B_SBY	-0.3V до 5.5V	4.75 to 5.25
+12	(*)	11.4 to 12.6
-12	(*)	-11.4 to -12.6

(*) Depends on expansion modules limits. The processor module does not use these voltages.

Table 6-2: DC Input Voltage Ranges and Limits (Unipolar Power Supply)

Power Voltage, V	Maximum Permitted Value, V	Absolute Limits, V
DC In	-36 to +36	7 to 30

(TBA)

6.2 CPC805 Consumption Currents

Table 6-3: Power Consumption (ATX Power Supply)

Version	Mode	Voltage	Max Consumption Current (TDP)	Peak Consumption Current	Max Power Dissipation (TDP)
CPC805-01	Max. load	5 V	2 A	3 A	14.5 W
		3.3 V	1.2 A	2.5 A	
		5V_STBY	62 mA	0.5 A	
	S3	5V_STBY	0.27 A	0.5 A	1.4 W
CPC805-02	Max. load	5 V	1.62 A	2.8 A	12.5 W
		3.3 V	1.23 A	2.4 A	
		5V_STBY	62 mA	0.5 A	
	S3	5V_STBY	0.26 A	0.5 A	1.3 W

Table 6-4: Power Consumption (Unipolar Power Supply)

Version	Mode	Voltage	Max Consumption Current (TDP)	Peak Consumption Current	Max Power Dissipation (TDP)
CPC805-01	Max. load	7 V	2.2 A	3.9 A	15.5 W
		12 V	1.3 A	2.4 A	16 W
		30 V	0.6 A	1.1 A	18.5 W
	S3	7 V	0.2 A	0.35 A	1.4 W
		12 V	0.13 A	0.23 A	1.6 W
		30 V	0.1 A	0.17 A	3 W
CPC805-02	Max. load	7 V	2 A	3.7 A	13.5 W
		12 V	1.2 A	2.3 A	14 W
		30 V	0.6 A	1.05 A	16.5 W
	S3	7 V	0.18 A	0.35 A	1.3 W
		12 V	0.13 A	0.23 A	1.6 W
		30 V	0.1 A	0.17 A	3 W

Note:

Indicated consumption currents do not include consumption of expansion modules and peripheral devices.

Peak consumption current is an estimated value of maximum possible consumption current within a pulse.

Max consumption current (TDP) is a measured value of consumption current during maximum loading of the CPU and memory using testing software utilities at ambient temperature +25°C.

Input power connections should provide minimum power loss. Avoid using long input lines, low carrying capacity cables, high resistance connections.

6.3 Power Consumption of Expansion Modules (Unipolar Power Supply)

Maximum total current consumption of StackPC (PC/104 PCI) expansion modules and USB, PS/2, and SATADOM devices should not exceed the values shown in the table below.

When powered from a unipolar power source, it is allowed to connect additional load (+3.3 V and +5 V) to XP5 connector considering the total consumption current limitations.

When powered from a unipolar power source, +12 V and -12 V voltages are not supplied to StackPC (PC/104 PCI) expansion modules.

Table 6-5: Maximum Allowed Consumption Currents (Unipolar Power Supply)

Voltage	Max Consumption Current (TDP)	Peak Consumption Current
+3.3 V	1.5 A	2 A
+5 V	1.5 A	2 A

7 Troubleshooting

Before contacting the service center in case of a problem, please read the following; the reason may be not the failure of the module.

Problem	Possible Reason	Solution
The module does not start, HL1 LED is not lit.	Autostart of the module is disabled in BIOS. The module can be switched on only using PWRBTN signal (closing of XP8 contacts).	Shortly close XP8 contacts.
	Incorrect position of XP10 jumper.	Set XP10 jumper according to the power supply type.
	No power voltage.	Check presence and correctness of connection of power voltages (+5V_STBY, +5V, +3.3V for ATX power supply, 7 to 30V for DC_IN).
	The module is out of order.	Contact service center.
The module does not start, HL1 LED is blinking fast (~8 Hz).	1) BIOS is absent or damaged. 2) The module is out of order.	Contact service center.
The module does not start, HL1 LED blinks slowly (~1 Hz), the module probably beeps.	BIOS does not reach the moment of OS loading (INT19H).	Check if XP13 jumper is set in correct position. Reset BIOS Setup settings by setting XP4 and switching the module on.
	BIOS is damaged or the module is out of order.	Contact service center.

8 Appendices

8.1 Related Standards and Specifications

The Fastwel's EPIC boards comply with the requirements of the following standards:

Table 8-1: Related Standards

Type	Standard	Test Parameters
CE: Emission	EN50081-1	–
CE: Immission	EN61000-6-2	–
CE: Electrical safety	EN60950	–
Mechanical dimensions	IEEE 1101.10	–
Vibration (sinusoidal)	IEC60068-2-6-82; Fc	10-50 Hz, amplitude 0.5 mm 5g / 50-500 Hz / 10 (acceleration / frequency range / test cycles per axis)
Permanent shock	IEC60068-2-29-87; Eb	50g / 11 ms / 1000±10 / 1 s (peak acceleration / shock duration half sine / number of shocks / recovery time)
Single shock	IEC60068-2-27-87; Ea	100g / 9 ms / 18 / 3 s (peak acceleration / shock duration / number of shocks / recovery time in seconds)

Important...

Some versions of the module may have the test results differing from the ones presented in the above table. For more information please contact Fastwel's official representatives.

Information related to this product and its components can be found in the following specifications:

Table 8-2: Related Specifications

Product	Specification
EPIC Boards	EPIC Specification Revision 1.1 July 2004 http://www.epic-sbc.org
PC/104, PC/104 PCI, and StackPC Interfaces	PC/104 Specification Revision 2.5, November 2003 PC/104-Plus Specification Revision 2, November 2003 For latest revision of the PC/104 specifications, contact the PC/104 Consortium, at http://www.pc104.org
PCI Bus	PCI 2.2 Compliant Specifications For latest revision of the PCI specifications, contact the PCI Special Interest Group Office at: http://www.pcisig.com
CompactFlash Cards	CF+ and CompactFlash Specification Revision 4.1