**Fastwel**

# CPC306

**PC/104-*Plus***
**Vortex86DX Based**
**CPU Module**

# User Manual

Rev. 002a E

February 2012

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## Revision Record

| Rev. Index | Brief Description of Changes | Board Index | Date of Issue |
|---|---|---|---|
| 001 | Initial preliminary version (incomplete) | CPC306 PCB v.3.0 + KIB386 | August 2011 |
| 002 | Functional description and BIOS sections added | CPC306 PCB v.3.0 + KIB386 | October 2011 |
| 002a | Dimensions corrected | CPC306 PCB v.3.0 + KIB386 | February 2012 |

## Contact Information

# Table of Contents

# List of Tables

# List of Figures

**3**

# 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!**

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

**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

This document presents general information on CPC306 CPU module, the details of its proper and safe installation, configuration and operation. The issues of PC/104 modules and external devices connection are also considered. This document applies to the module with PCB version 3.0; version is indicated on board.

## 1.1      Module Introduction

Fastwel CPC306 is designed for applications requiring high-performance low-power industrial controller being able to process a wide range of analog and discrete signals. Fastwel CPC306 conforms to PC/104-Plus specification and is compatible with a large number of PC/104 and PC/104-Plus peripheral and power supply modules delivered by a wide range of manufacturers.

Based on x86-compatible Vortex86DX System-on-Chip (SoC) operating at 600 MHz, the module bears 256 MB soldered DDR2 memory and wide range of input/output interfaces. CPC306 allows system designers simple programming and provides portability of previously developed libraries for x86 architecture with MS DOS 6.22, FreeDOS, Windows CE 5.0, Linux 2.6, and QNX 6.4 support. Integrated Ethernet channel, four COM ports and large number of digital and analog input/output ports give developers an excellent set of interconnects to the sensors, slave devices and host systems. Four USB 2.0 and LPT ports give CPC306 connectivity to various devices from PC environment.

Full 16-bit ISA bus support ensures expansion capability of CPC306 with legacy peripheral modules and power supplies, while 32-bit PCI provides interconnect for mainstream expansion modules.

CPC306 has onboard CF and EIDE interfaces, providing developers a choice of storage media to be used with. With all components soldered on board CPC306 withstands vibration up to 10g, shock up to 100g.

For debugging purposes or for applications requiring graphical interface, CPC306 can operate together with Fastwel VIM301 graphics controller module providing VGA, LVDS, TFT, and SGD interfaces. KIB386 interface adapter module can be used for connection of external devices via standard interface connectors.

The module is designed for operation at temperatures from -40°C to +85°C.

**Figure 1.1:** **CPC306 Module Appearance**



*The appearance may vary for different versions of the module.*

## 1.2 CPC306 Versions

At the present time the CPC306 module is manufactured in two versions differing in interface capabilities.

**Table 1.1:** **CPC306 Versions**

| Name | Version | Features |
|---|---|---|
| CPC306 controller module | CPC306-01 | Analog and discrete input/output |
| | CPC306-02 | No analog and discrete input/output |

Other options include:

|  |  |
|---|---|
| \COATED | – protective coating; |
| \CE | – Windows CE 5 preinstalled; |
| \LNX | – Linux 2.6 preinstalled; |
| \QNX | – QNX 6.4.1 preinstalled |

## 1.3 Delivery Checklist

**Table 1.2:** **CPC306 Supplied Set**

| Name | Description |
|---|---|
| CPC30601 CPC30602 | CPC306 processor module |
| ACS00023 | DSUB9M to IDC10 2 mm adapter cable for connection to COM port (685611.082) |
| – | Mounting standoffs kit |
| – | Jumpers set |
| – | Antistatic bag and consumer carton box |

**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 Additional Accessories

Peripheral devices are attached to the module directly or via additional accessories and cables listed in the following table. Additional accessories are not supplied with the CPU module, are ordered separately.

**Table 1.3:** **CPC306 Additional Accessories**

| Name | Description |
|------|-------------|
| KIB386-01 | Interface module with installed standard PC interface connectors |
| CDM02 | Adapter module for connection of 3.5" HDD or CD-ROM drive (469535.023) |
| ACS00010 | FC44 cable for 2.5" HDD connection to 44-contact header |
| ACS00031-01 | PHR-5 connector set. Includes JST PHR-5 socket and a set of contacts SPH-002T-P0.5S for connection to XP4 or XP8 headers of the module |
| ACS00031-02 | PHR-5 connector set. Includes JST PHR-2 socket and a set of contacts SPH-002T-P0.5S for connection to XP27 header of the module |
| ACS00038 | Connector set for connection of a power supply unit to the module. Includes AMP 4-171822-4 socket and a set of contacts 170262-1 for connection to XP26 power connector of the module |
| ACS00040-01, ACS00040-03, ACS00040-04, ACS00040-05 | IDC2 socket for ribbon cable with 10, 26, 20, 44 contacts respectively. Recommended counterpart for IDC2 headers of the module |
| ACS00042 | Null modem cable |
| ACS00043 | PS/2 cable. Cable length: 200 mm. Connectors: PS/2 and JST PHR-6 socket. Recommended counterpart for XP27 header of the module |
| ACS00047, ACS00047-03, ACS00047-05 | 2 mm pitch one row contact holder (socket) for 2, 6, 14 contacts respectively. Recommended counterpart for XP1, XP9, XP25, XP33 headers of the module |
| ACS00048, ACS00048-02, ACS00048-03, ACS00048-04 | 2 mm pitch two row contact holder (socket) for 10, 26, 20, 44 contacts respectively. Recommended counterpart for IDC headers of the module |
| ACS00049 ACS00049-01, ACS00049-02 | Set of contacts for contact holders (sockets) ACS00047 and ACS00048: - Set of contacts, 10 pcs. - One contact crimped on MGTF 1x0.14 wire, 1 m length - Contact crimped on MGTF 1x0.14 wire, 1 m length, 5 pcs. |

# 2 Technical Specifications

## 2.1 General

- ■ Form-factor:
  - ▪ PC/104-Plus
- ■ CPU: Integrated in DM&P Vortex86DX SoC
  - ▪ 600 MHz
  - ▪ 32-bit x86 compatible core
  - ▪ 16-bit memory bus
  - ▪ Math coprocessor
  - ▪ 32 KB L1, 256 KB L2 cache
  - ▪ 6-stage pipeline
- ■ System memory:
  - ▪ 256 MB soldered DDR2 SDRAM
  - ▪ DDR333
- ■ IDE port:
  - ▪ One IDE channel (Primary)
  - ▪ Support for up to two UltraDMA-100 IDE devices with NAND Flash disabled in BIOS Setup and if the CompactFlash socket (XP34) is not populated
- ■ CompactFlash socket
  - ▪ Type I/II
  - ▪ Bottom side location
- ■ Solid State Disk
  - ▪ Soldered
  - ▪ 1 GB NAND flash
  - ▪ IDE interface
  - ▪ Can be used as bootable device
  - ▪ UltraDMA/100 support
- ■ PS/2:
  - ▪ PS/2 keyboard and mouse interface
- ■ Remote Reset/IRQ:
  - ▪ Discrete remote reset/interrupt input
  - ▪ 500V optoisolation
- ■ USB:
  - ▪ Four USB 2.0 channels
  - ▪ One device can be connected to each channel

- LAN:
    - Two Fast Ethernet ports 10/100 Mbit/s
    - 500 V isolation
- Serial ports:
    - Four serial ports
    - High speed NS16C550 compatible
    - COM1, COM2: RS422/485, up to 115.2 Kbaud, 500 V isolation
    - COM3, COM4: RS232, complete, up to 115.2 Kbaud
    - Console operation via COM1 ... COM4
- Parallel port:
    - SPP/ECP/EPP compatible
- Expansion buses:
    - PCI and ISA
- Redundancy support
- Analog input port:
    - 8 input channels
    - ADC resolution: 12 bit
    - Voltage measurement ranges: 0...+5V; $\pm$5V; 0...+10V; $\pm$10V;
      Max basic reduced error: 0.3%
    - Current measurement ranges: 0...20 mA; $\pm$20 mA;
      Max basic reduced error: 0.3%
    - Hardware averaging: N=1, 4, 8 or 16 samples
    - Conversion time for one ADC channel: 12.5 $\mu$s*N
    - Input resistance: 200 kohm
    - External shunt resistance (current measurement): 249 ohm
    - Overvoltage protection: $\pm$16.5 V
    - Isolation voltage: min 500 V
- Analog output port:
    - 2 output channels
    - DAC resolution: 12 bit
    - Output ranges: 0...+5V; $\pm$5V; 0...+10V
      Max basic reduced error: $\pm$0.6%
    - Max conversion time for one DAC channel: 10 $\mu$s
    - Min output resistance: 2 kohm
    - Isolation voltage: min 500 V
- Universal discrete I/O port:
    - 72 CMOS/TTL lines;
    - Output capacity of logic 0 / logic 1, max: 12.0 / 4.0 mA
    - Output capacity for opto-modules: 20 mA
    - In-system programming
    - The lines [71:48] can be programmed as LCD and matrix keyboard ports
- Three watchdog timers:
    - One with fixed timeout period of 1.6 s
    - Two integrated in Vortex86DX with programmable timeout period

- ■ Flash BIOS:
    - ▪ Main BIOS: 512 KB, soldered, ISA bus
    - ▪ Reserve BIOS: 256 KB, integrated in the controller
    - ▪ In-system modification
    - ▪ Automatic switching
- ■ RTC:
    - ▪ On-board real time clock with Li battery backup
- ■ Safety:
    - ▪ System configuration settings stored in CMOS+Serial FRAM (256 Kb)
    - ▪ Possibility of batteryless operation
- ■ Software support:
    - ▪ AMI BIOS
    - ▪ Software compatibility with FreeDOS, MS DOS 6.22, Windows CE 5, QNX 6.4, and Linux 2.6 operating systems

## 2.2      Power Requirements

The module can be powered via XS1 and XS2 connectors. Additionally, power can be supplied via XP26 (4-contact AMP 4-171826-4) power connector by an external DC power source; polarity reversal and overvoltage protection provided.

Power supply unit should provide starting current, which is 5.6 A for 0.5 ms for CPC306-01 version and 4.2 A for 0.5 ms for CPC306-02. It is allowed to use power supply units with current limiting not less than 1.5 A. Selecting a power supply unit, the starting current should be considered as well as the consumption current of expansion modules.

Consumption current typical valuation is 0.6 A.

**Table 2.1:          Power Supply Requirements**

| Connectors | Power Voltage | Voltage Limits | Consumption current | Starting current | |
|---|---|---|---|---|---|
| PC/104 and PCI-104 | +5 V | +4.75V to +5.25V | 1.3 A | 5.6 A | |
| XP26 (auxiliary power connector) | +5 V | +4.75V to +5.25V | 1.3 A | 5.6 A | Polarity reversal and overvoltage protection ±26V |

⚠ **Important:**

Please, find important notes on power supply in subsection 3.2.17 of this document.

## 2.3 Environmental

- Operating temperature range: −40°C to +85°C
- Storage temperature: −55°C to +90°C
- Relative humidity: 5% to 90% at 25°C, noncondensing

**Note:**

Protective coating of CPC306 versions makes them resistant to damp heat cyclic exposure at temperatures up to +55±2°C and relative humidity of up to 93±3%.

## 2.4 Mechanical

- Vibration (5 ... 50 Hz) – 1 mm amplitude;
- Vibration (50 ... 2000 Hz) – 10g;
- Single shock, peak acceleration – 150 g;
- Multiple shock, peak acceleration – 50 g.

**Important:**

If CPC306 is operated in rugged environment, it is recommended to additionally fasten counterparts on connectors.

## 2.5     Dimensions and Weight

- Weight:

| Version | Weight, kg |
|---------|-----------|
| CPC306-01 | 0.150 |
| CPC306-02 | 0.135 |

- Dimensions, max:     103.5 × 115.8 × 23.7 mm (4.07" × 4.56" × 0.93")
  *(dimensions may differ within PCB manufacturing tolerance, ±0.8 mm)*

**Figure 2.1:**     **CPC306: Overall and Mounting Dimensions**
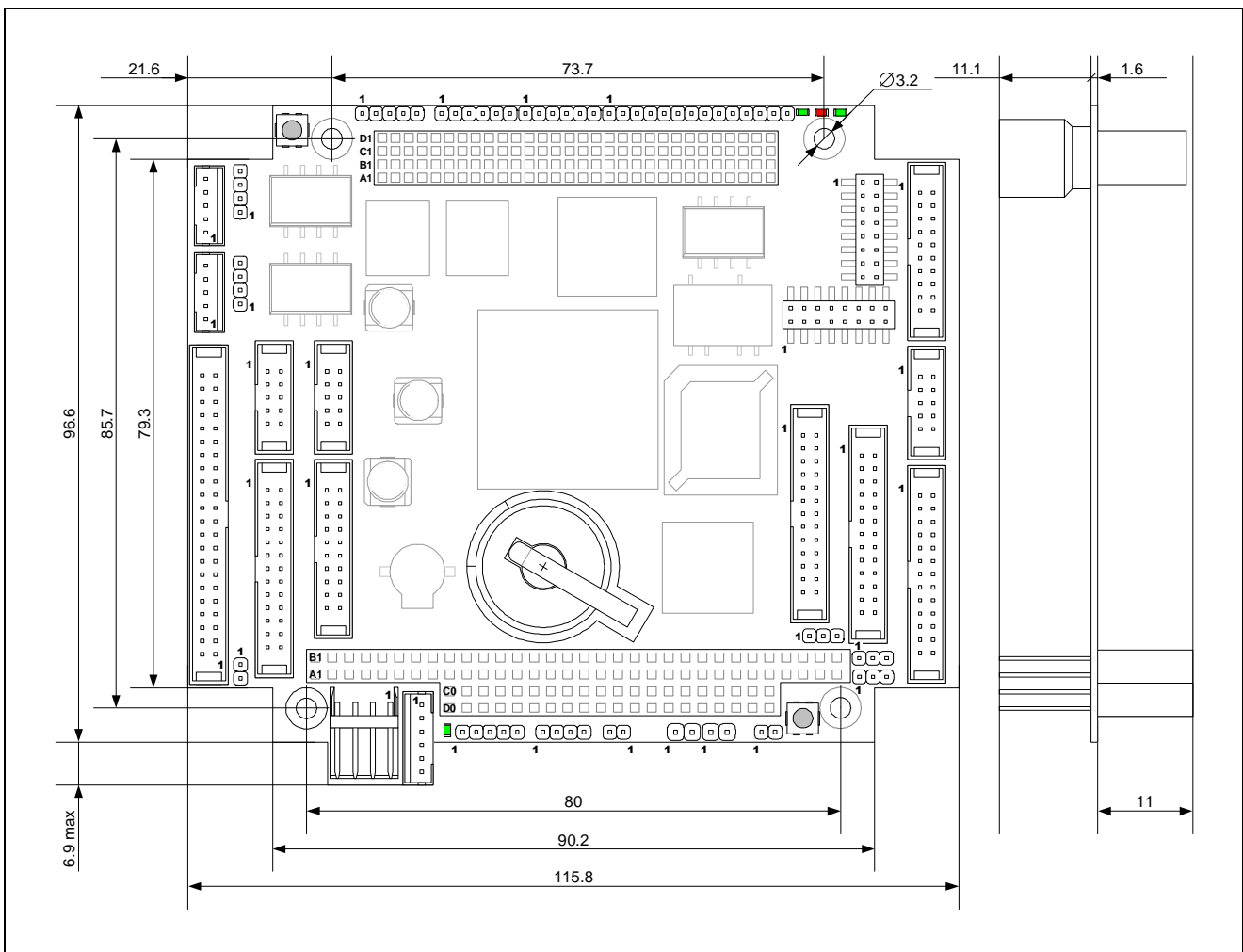


The module is built according to PC/104-Plus specification v.2.0. On the bottom side there are deviations in maximum (4.83 mm) components hight: CompactFlash socket (XP34, 8.3 mm) and Ethernet port transformers (T1 and T2, 5.97 mm). On the top side there is insignificant deviation in maximum (8.76 mm) component hight: DA6 microcircuit is 8.9 mm high.

## 2.6    MTBF

■    MTBF for CPC306 is 170000 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 and at ambient temperature 30℃.*

# 3     Functional Description

## 3.1     Structure and Layout

Functional diagram of the CPC306 module is shown in Figure 3.1.

**Figure 3.1:**      **CPC306 Block Diagram**
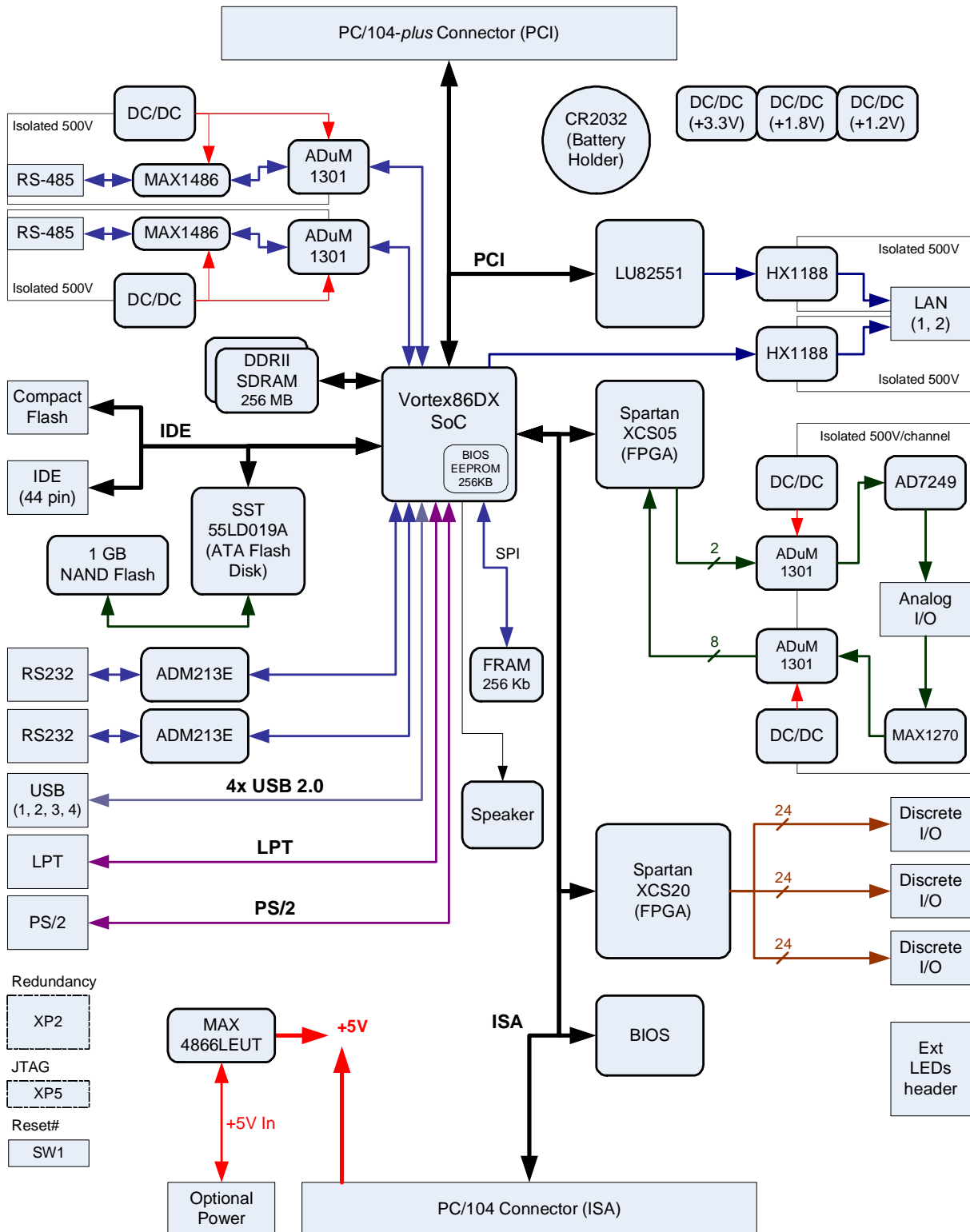
CPC306 includes the following main functional units:

- DM&P Vortex86DX SoC
- 256 MB soldered DDR2 SDRAM system memory;
- IDE port with support for up to two UltraDMA/100 devices (primary channel only);
- CompactFlash socket for Type I/II cards;
- ATA flash disk controller; onboard NAND flash-disk, 1 GB;
- PS/2 keyboard/mouse port;
- Optoisolated (500V) remote Reset/interrupt input;
- Four USB 1.1/2.0 channels;
- Two Fast Ethernet controllers, 10/100 Mbit/s, 500V isolation;
- Serial ports:
  - COM1, COM2: RS422/485, up to 115.2 Kbaud, 500V isolation;
  - COM3, COM4: RS232, up to 115.2 Kbaud, complete;
  - Console operation via COM1 ... COM4
- Universal parallel port (LPT), SPP/ECP/EPP compatible
- PCI and ISA expansion buses
- Redundancy support
- Analog input port:
  - 8 channels
  - 12-bit resolution
  - Voltage measurement ranges: 0..+5 V, 0..+10 V, ±5 V, ±10 V;
    max permissible basic reduced error within operating temp range: 0.3%
  - Current measurement ranges: ±20 mA, 0..20 mA
    max permissible basic reduced error within operating temp range: 0.3%
  - Hardware averaging for 1, 4, 8, or 16 samples
  - Min conversion time for one ADC channel: 12.5 $\mu$s * N
  - Input resistance of a channel in voltage measurement mode ($R_{IN}$): 200 kohm
  - Shunt resistor for current measurement ($R_{SHUNT}$): 249 ohm ± 0.05%
  - Overvoltage protection: $\pm$16.5 V
  - 500V isolation
- Analog output port:
  - 2 channels
  - 12-bit resolution
  - Output ranges: 0..+5 V, ±5 V, 0..+10 V;
    max permissible basic reduced error within operating temp range: 0.6%
  - Conversion time for one DAC channel: 10 $\mu$s max
  - Min output load: 2 kohm
  - 500V isolation
- Universal discrete I/O port:
  - 72 CMOS/TTL lines
  - Output capacity Log. "0" / Log. "1": 12.0 mA / 4.0 mA
  - Output capacity for opto modules (w/o keeping signal level): 20 mA max
  - In-system programming
  - [71:48] lines can be used as a matrix keyboard and LCD port

- ■ Three watchdog timers:
    - ▪ One with fixed timeout period of 1.6 s
    - ▪ Two integrated in Vortex86DX with programmable timeout period
- ■ Flash memory based reserved BIOS:
    - ▪ 256 KB, integrated in controller (reserve);
    - ▪ 512 KB on flash memory chip connected to ISA bus (main)
    - ▪ In-system modification
    - ▪ Auto loading from reserve copy, if loading from the main failed
- ■ Real time clock with Li battery backup;
- ■ CMOS memory and non-volatile FRAM (256 Kbit) for BIOS configuration storage;

Layouts of main CPC306 components and connectors on top and bottom sides are presented in Figures 3.2 and 3.3 respectively.

External connections are illustrated in .

**Figure 3.2:** **Top Side: Connectors and Main Components Layout**
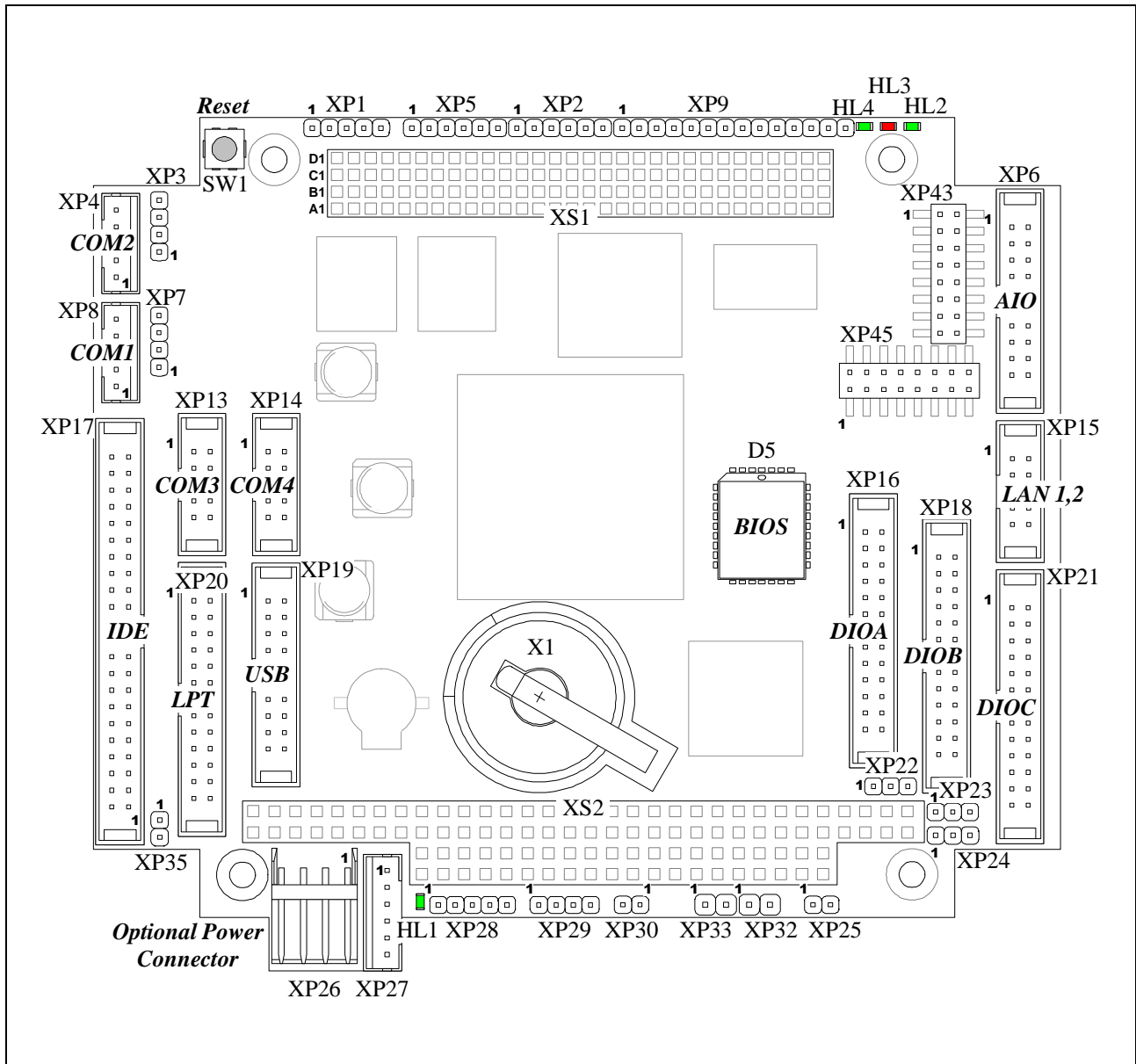


*The layout may slightly differ for various versions of the module.*

**Figure 3.3:** **Bottom Side: Connectors and Main Components Layout**
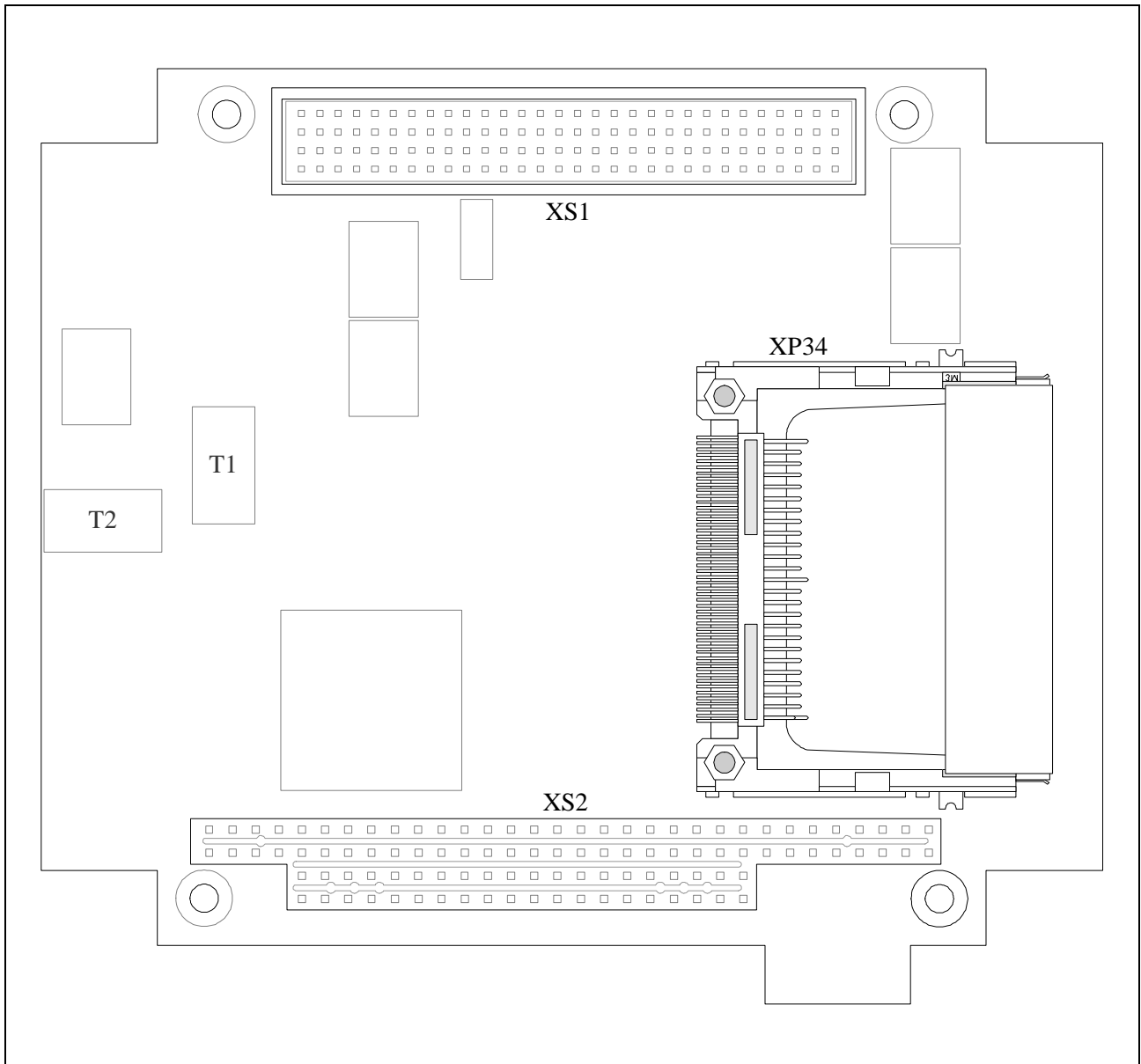


*The layout may slightly differ for various versions of the board.*

## 3.2     Functional Description

### 3.2.1     Vortex86DX SoC

DM&P Vortex86DX includes the following main functional units:

- ■  32-bit x86 compatible core operating at 600 MHz;
- ■  32 KB L1, 256 KB L2 cache;
- ■  Math coprocessor;
- ■  16-bit DDR2 SDRAM memory bus;
- ■  IDE/SD controller;
- ■  Five RS-232 serial ports;
- ■  Universal parallel port;
- ■  Four USB 2.0 ports;
- ■  PS/2 keyboard/mouse port;
- ■  PCI, ISA, LPC, and SPI bus controllers;
- ■  Two I2C interfaces;
- ■  Built-in Ethernet 10/100 controller;
- ■  RTC;
- ■  CMOS memory for configuration storage;
- ■  Integrated flash-memory for BIOS storage;
- ■  Integrated redundancy system;
- ■  Two programmable watchdog timers.

**Figure 3.4:**     **Vortex86DX SoC Block Diagram**
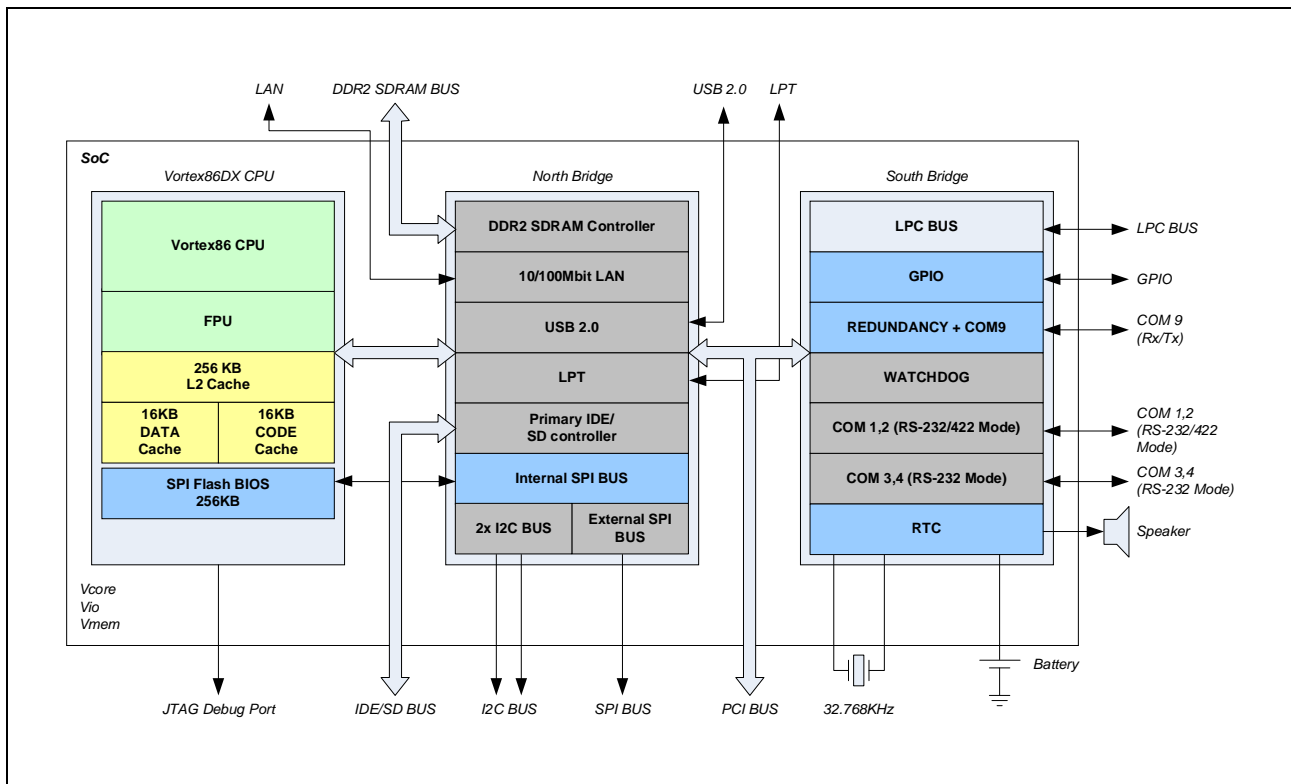
### 3.2.2　　SDRAM Memory

Two DDR2 SDRAM memory chips operating at 266 MHz are soldered on board. Total memory size is 256 MB.

### 3.2.3　　IDE Interface

One-channel IDE controller allows connection of up to two IDE devices. UDMA-100 mode is supported.

If soldered NAND flash disk is enabled, one external device can be connected to XP17 or CompactFlash card with no external devices. If the onboard flash disk is disabled, two external drives can be connected as illustrated in the following table.

**Table 3.1:　　IDE Channel: Devices Connection Variants**

| Onboard Flash Disk | XP17 (Primary IDE) | XP34 (CompactFlash) |
|---|---|---|
| Enabled | No connection | No connection |
| Enabled | One device | No connection |
| Enabled | No connection | One device |
| Disabled | Two devices | No connection |
| Disabled | One device | One device |

**Figure 3.5:　　XP17 IDC44 Pins Numbering**
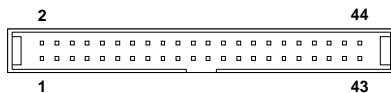


IDE interface is routed to XP17 connector. It is 2 mm pitch 2-row IDC44 pin header (Leotronics 4446-3440). Its pinout is presented in the table below.

Recommended counterpart is Leotronics 2040-3442 socket for ribbon cable (available as ACS00040-05 set) or Leotronics 2067-2442 socket (ACS00048-04 set) and 2023-2000 contacts set (ACS00049).

**Table 3.2:　　XP17 Connector Pinout (IDE)**

| Pin# | Signal | Pin# | Signal | Pin# | Signal | Pin# | Signal |
|---|---|---|---|---|---|---|---|
| 1 | /RESET | 12 | DD12 | 23 | /IOWR | 34 | /PDIAG |
| 2 | GND | 13 | DD2 | 24 | GND | 35 | DA0 |
| 3 | DD7 | 14 | DD13 | 25 | /IORD | 36 | DA2 |
| 4 | DD8 | 15 | DD1 | 26 | GND | 37 | /CS0 |
| 5 | DD6 | 16 | DD14 | 27 | /IOCHRDY | 38 | /CS1 |
| 6 | DD9 | 17 | DD0 | 28 | GND | 39 | DASP |
| 7 | DD5 | 18 | DD15 | 29 | /DACK | 40 | GND |
| 8 | DD10 | 19 | GND | 30 | GND | 41 | +5V |
| 9 | DD4 | 20 | – | 31 | IRQ | 42 | +5V |
| 10 | DD11 | 21 | DRQ | 32 | /CS16 | 43 | GND |
| 11 | DD3 | 22 | GND | 33 | DA1 | 44 | – |

The ACS00010 (FC44) cable allows direct connection of a 2.5" HDD to the XP17 connector. Other IDE devices (3.5" HDD, CD-ROM) having 40-contact 2.5 mm pitch connector can be connected to CPC306 via the CDM02 (469535.023) adapter. This adapter is plugged directly to the 40-contact connector of the IDE device, and with ACS00010 cable is connected to XP17 connector of CPC306.

The operation modes of external IDE devices are set using jumpers on these devices.

### 3.2.4 CompactFlash

One CompactFlash Type I/II card can be connected to CPC306 using XP34 socket on the bottom side (3M N7E50-M516RB-50). The socket is connected to Primary IDE channel. Booting from CompactFlash is available. Master mode is enabled by closing contacts 2 and 3 at XP28 connector; Slave mode is enabled if these contacts are open (jumper removed).

**Table 3.3:**      **XP34 CompactFlash Socket Pinout**

| Pin # | Function | Pin # | Function |
|---|---|---|---|
| 1 | GND | 26 | CD1# |
| 2 | D03 | 27 | D11 |
| 3 | D04 | 28 | D12 |
| 4 | D05 | 29 | D13 |
| 5 | D06 | 30 | D14 |
| 6 | D07 | 31 | D15 |
| 7 | CS0# | 32 | CS1# |
| 8 | A10 (not used) | 33 | VS1# |
| 9 | ATA SEL# | 34 | IORD# |
| 10 | A09 (not used) | 35 | IOWR# |
| 11 | A08 (not used) | 36 | WE# |
| 12 | A07 (not used) | 37 | INT |
| 13 | VCC (+3.3V) | 38 | VCC (+3.3V) |
| 14 | A06 (not used) | 39 | CSEL# |
| 15 | A05 (not used) | 40 | VS2# |
| 16 | A04 (not used) | 41 | RESET# |
| 17 | A03 (not used) | 42 | IORDY |
| 18 | A02 | 43 | INPACK# (DRQ) |
| 19 | A01 | 44 | REG# (DACK#) |
| 20 | A00 | 45 | DASP# |
| 21 | D00 | 46 | PDIAG# |
| 22 | D01 | 47 | D08 |
| 23 | D02 | 48 | D09 |
| 24 | IOCS16# | 49 | D10 |
| 25 | CD2# | 50 | GND |

## 3.2.5    ATA Flash Disk

CPC306 has ATA flash disk controller connected to Primary IDE interface. The capacity of the soldered on-board NAND flash memory chip is 1 GB. The system detects this controller as an IDE disk which can be used as bootable.

Closing contacts 1-2 of XP28 sets Master mode for the controller; Slave mode is set by removing jumper from these contacts.

The controller can be disabled by closing contacts 4-5 of XP28 (while jumper must be removed from contacts 1-2 of XP28) or in BIOS Setup->Advanced.

## 3.2.6    PS/2 Keyboard and Mouse Interface

PS/2 keyboard and mouse interface is routed to XP27 6-pin 2 mm pitch IDC6 header
(JST B 6B-PH-KL).

**Figure 3.6:**      **XP27 Connector Contacts Numbering**
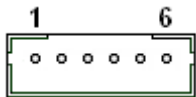


To make a custom cable it is recommended to use as a counterpart connector JST PHR-6 socket with SPH-002T-P0.5S contact set (available for order as ACS00031-02).

The following table shows pinout of CPC306 XP27 connector.

**Table 3.4:**      **XP27 Contacts Designation**

| Pin # | Signal | Pin # | Signal |
|-------|----------|-------|-----------|
| 1 | KBD CLK | 4 | GND |
| 2 | KBD DATA | 5 | +5V |
| 3 | MOUSE CLK | 6 | MOUSE DATA |

## 3.2.7 Optoisolated Reset/IRQ Input

**Figure 3.7:** **XP25 Connector**

**1 2**

XP25 is a 2-pin 2 mm pitch IDC2 connector (PLS2-40/2) that is intended for connection of a remote Reset/IRQ signal source with voltage of 3 to 5 V. The discrete input has 500 V optoisolation.

Recommended counterpart is Leotronics 2018-3021 socket (ordering code ACS00047) and 2023-2000 contact set (ACS00049).

**Figure 3.8:** **Discrete Input Optoisolation and Reset or IRQ Source Selection**
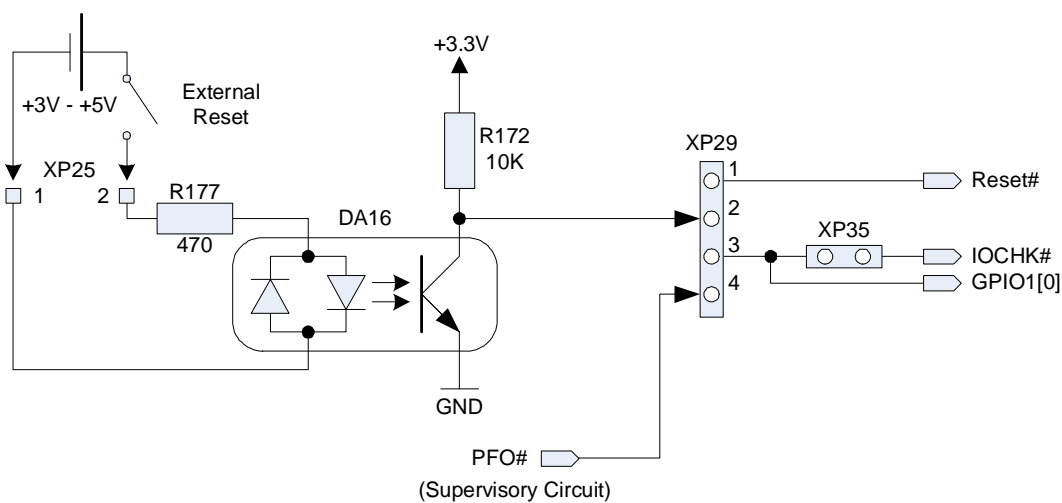


Depending on position of jumpers of XP29 pin header, the input is connected to different circuits:

- Closing contacts 1-2 of XP29 enables Reset on input;

- Closing contacts 2-3 of XP29 connects input to line 0 of GPIO1 port. Selection Reset function or IRQ line number is possible in BIOS Setup utility or by programming registers of GPIO1 port.

- Closing contacts 2-3 of XP29 and 1-2 of XP35 enables NMI interrupt generation on input. This position of jumpers connects the input to IOCHK# line of ISA bus.

XP29 pinpad also allows to set function of PFO# signal (Power Fail Output) from Power voltage supervisor chip. See also "Configuration Jumpers", "Power Supply Supervisor", and "GPIO Ports" sections of this document.

## 3.2.8      USB Interface

The module is equipped with four USB 2.0 host ports routed to XP19 header. USB 1.1 and USB 2.0 modes are supported. Operation mode is selected in BIOS Setup -> Advanced. Each channel has separate power control and protection circuit (+5V, 500 mA). One USB device may be connected to each port. USB drive boot is supported.

XP19 is a 2-row IDC20 pin header (Leotronics 2073-3202) with 2 mm pitch.

**Figure 3.9:       XP19 Connector**
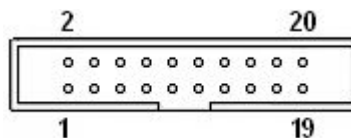


USB devices can be connected to XP19 header using a custom adaptor cable with Leotronics 2040-3202 socket for ribbon cable (order code ACS00040-04) or Leotronics 2022-2202 socket (ACS00048-03) with 2023-2000 contacts (ACS00049).

**Table 3.5:       XP19 Connector Pinout (USB)**

| Pin Number | Signal | Pin Number | Signal |
|---|---|---|---|
| 1 | +5V (USB1) | 2 | +5V (USB4) |
| 3 | D1- | 4 | D4- |
| 5 | D1+ | 6 | D4+ |
| 7 | GND (USB1) | 8 | GND (USB4) |
| 9 | – | 10 | – |
| 11 | +5V (USB2) | 12 | +5V (USB3) |
| 13 | D2- | 14 | D3- |
| 15 | D2+ | 16 | D3+ |
| 17 | GND (USB2) | 18 | GND (USB3) |
| 19 | – | 20 | – |

## 3.2.9      Fast Ethernet Interface

There are two Fast Ethernet channels available onboard CPC306. One Ethernet controller is integrated in Vortex86DX SoC; another Ethernet controller – Intel LU82551IT – is connected to PCI bus. Both ports are not intended for use with network cables passing outside the building.
is available via XP8 connector on all versions of CPC306 except CPC30601. Ethernet controller is integrated in Vortex86DX SoC.

**Figure 3.10:** **XP15 Connector**
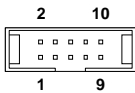


Both Ethernet ports are routed to XP15
(2-row 2 mm pitch IDC10 header Leotronics 2073-3102).

Recommended counterpart – 2040-3102 socket for ribbon cable (ordering code ACS00040-01) or Leotronics 2022-2102 socket (ACS00048) with 2023-2000 contacts (ACS00049).

**Table 3.6:** **XP15 Ethernet Header Pinout**

| Pin # | Signal | Pin # | Signal |
|-------|----------|-------|----------|
| 1 | LAN1_TX+ | 6 | NC |
| 2 | LAN1_TX- | 7 | LAN2_TX+ |
| 3 | LAN1_RX+ | 8 | LAN2_TX- |
| 4 | LAN1_RX- | 9 | LAN2_RX+ |
| 5 | NC | 10 | LAN2_RX- |

## 3.2.10    Serial Ports

The CPC306 is furnished with four serial ports.

### 3.2.10.1    COM1 and COM2

Galvanically isolated COM1 and COM2 ports operate in RS485/422 mode and have standard PC AT base addresses. IRQ line and base address selection is performed in BIOS Setup.

**Figure 3.11:** **XP8 and XP4 Pins Numbering**
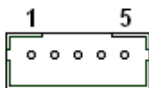


COM1 is routed to XP8 connector, COM2 – to XP4. Both are single-row 2 mm pitch IDC5 connectors (JST B 5B-PH-KL).

Recommended counterpart is JST PHR-5 socket with SPH-002T-P0.5S contacts (ordering code for the set is ACS00031-01).

**Table 3.7:** **XP8 (COM1) and XP4 (COM2) Pin Assignments**

| Pin # | XP8 (COM1) Signals | XP4 (COM2) Signals |
|-------|--------------------|--------------------|
| 1 | TX+ | TX+ |
| 2 | TX- | TX- |
| 3 | RX+ | RX+ |
| 4 | RX- | RX- |
| 5 | AGND | AGND |

Maximum transmission rate for these ports is 115.2 Kbaud; these ports are fully compatible with UART16550. The driver of RS485/422 lines is hardware controlled. The receiver is constantly "on", providing "echo" in RS485 mode.

In RS485 mode (half duplex operation of RS485/422 converter) the lines TX+ and RX+ are connected in the driver, as well as TX- and RX- lines at the side of interface connector. In RS422 mode these lines are not connected and routed to the connector separately.

RS485 mode is enabled for COM1 by closing of TX+ and RX+ lines and TX- and RX- lines at XP8 connector; for COM2 – by closing the same lines at XP4 connector.

**Figure 3.12:** **XP3 and XP7 Pinpads**
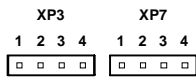


There is possibility to connect terminating resistors by setting appropriate jumpers at XP7 (COM1) and XP3 (COM2) pinpads. The rating of these resistors is 120 ohm ±5%.

**Table 3.8:** **XP3 and XP7 Pinpads Jumpers**

| Closed Contacts | Connected Resistors |
|---|---|
| XP7: 1-2 | Rtt for TX-/TX+ lines of COM1 |
| XP7: 3-4 | Rtr for RX-/RX+ lines of COM1 |
| XP3: 1-2 | Rtt for TX-/TX+ lines of COM2 |
| XP3: 3-4 | Rtr for RX-/RX+ lines of COM2 |

If RS485 network is inactive, all drivers are switched to the third state, therefore all nodes are in receive mode. Thus, the state of a network is not determined. If the potential difference between RX+ and RX– inputs of a receiver is less than ±200 mA threshold level, then the receiver output (RX) logical level will be equal to the last received data bit. To provide proper voltage level in the network inactive state, protective bias resistors are used. To set the initial high voltage level at TX+ line, a 4.7 kilohm bias resistor (Rcm+) is installed. To set the initial low voltage level at TX– line, a 4.7 kilohm bias resistor (Rcm-) is installed as shown in the figure below.

**Figure 3.13:** **RS485/422 Transmitter with Bias Elements and Terminating Resistors**
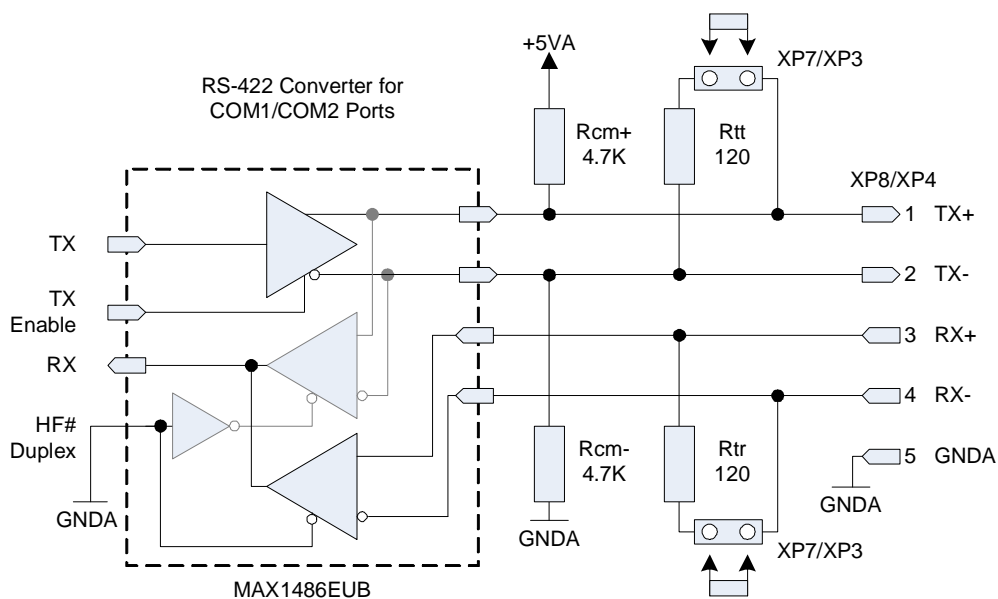
**Figure 3.14:** **Connection of Several Devices in RS422 Mode**
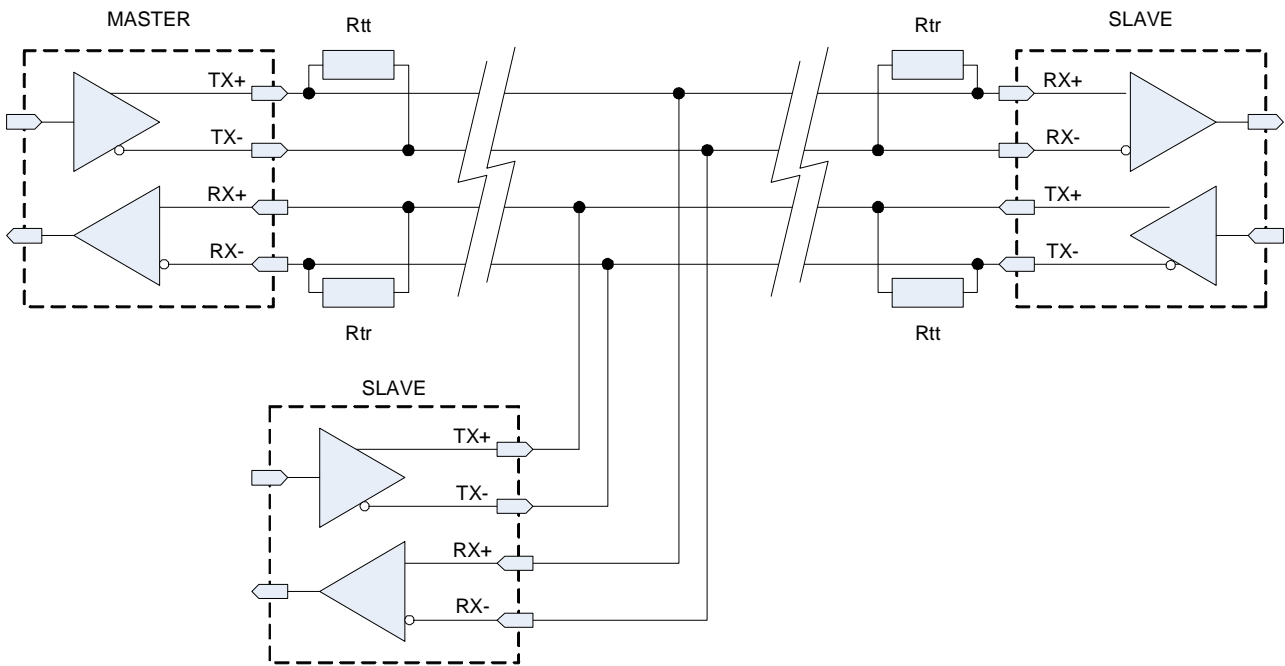


**Figure 3.15:** **Connection of Several Devices in RS485 Mode**

**Fastwel**
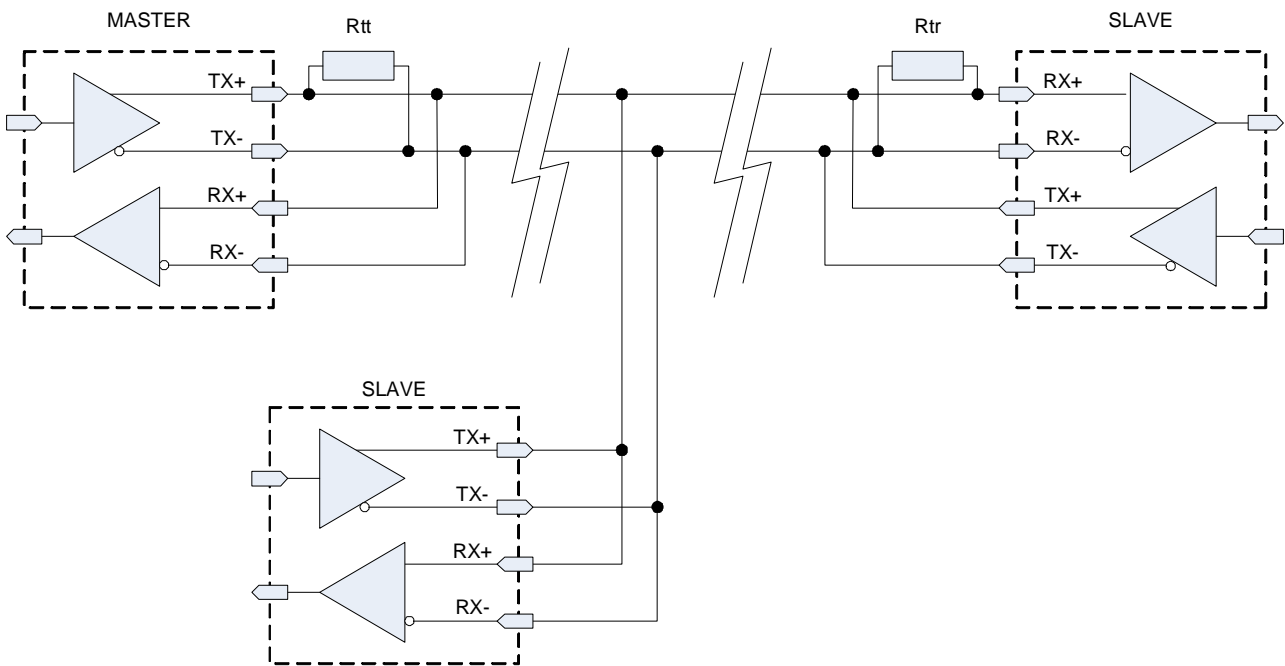
### 3.2.10.2    COM3 and COM4

COM3 (XP13) and COM4 (XP14) ports operate in 9-wire RS232 mode and have standard PC AT base addresses. IRQ line and base address selection is performed in BIOS Setup. Maximum transmission rate for these ports is 115.2 Kbaud; they are fully compatible with UART16550.

**Figure 3.16:    IDC10 Pins Numbering**
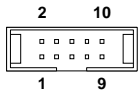
Both connectors are 2-row, 2 mm pitch pin headers (Leotronics 2073-3102). Recommended counterparts are: Leotronics 2040-3102 socket for ribbon cable or Leotronics 2022-2102 socket with 2023-2000 contacts (ordering codes ACS00048 and ACS00049).

The following table shows pins designation for XP13 and XP14 headers.

**Table 3.9:    XP13 and XP14 Pin Assignments**

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

**Important:**

+5V lines are protected by 0.5A self-resettable switch. Recommended consumption current for connected external modules is 0.4A. It is not recommended to power more than one external module via interface connectors in order not to overload power circuits of CPC306.

## 3.2.11    Parallel Printer Port (LPT)

LPT port is available via XP20 2-row 2 mm pitch IDC26 connector (Leotronics 2073-3262). LPT port of CPC306 supports SPP, EPP, and ECP operation modes and has standard PC/AT base addresses. Base address and interrupt line are selected in BIOS Setup.

**Figure 3.17:       XP20 Connector**
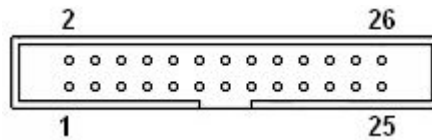


Recommended counterpart connector for making a custom adaptor cable is Leotronics 2040-3462 socket for ribbon cable (ACS00040-03 set) or Leotronics 2022-2462 socket (ACS00048-02) with 2023-2000 contacts (ACS00049).

**Important:**

+5V lines are protected by 0.5A self-resettable switch. Recommended consumption current for connected external modules is 0.4A. It is not recommended to power more than one external module via interface connectors in order not to overload power circuits of CPC306.

The table below describes pin assignments of XP20 connector.

**Table 3.10:       XP11 (LPT) Connector Pinout**

| Pin # | Signal | Pin # | Signal |
|-------|--------|-------|--------|
| 1 | STB# | 2 | AFD# |
| 3 | PD0 | 4 | ERR# |
| 5 | PD1 | 6 | INIT# |
| 7 | PD2 | 8 | SLIN# |
| 9 | PD3 | 10 | GND |
| 11 | PD4 | 12 | GND |
| 13 | PD5 | 14 | GND |
| 15 | PD6 | 16 | GND |
| 17 | PD7 | 18 | GND |
| 19 | ACK# | 20 | GND |
| 21 | BUSY | 22 | GND |
| 23 | PE | 24 | GND |
| 25 | SLCT | 26 | +5V |

## 3.2.12    Expansion Buses: ISA and PCI

The module is equipped with two interface expansion headers stipulated by PC/104-Plus specification – 104-pin ISA and 120-pin PCI (except for CPC30601) connectors. They allow stacking up to four PC/104 or PC/104-Plus modules. Up to four PC/104-Plus PCI-master expansion modules are supported. Both connectors are available as a socket at the top side of the module and as a pin array with organizer at the bottom side of CPC306.

### 3.2.12.1    PCI Header

PC/104-Plus standard specifies availability of 120-pin (30x4) 2 mm header. This interface header accepts up to 4 stackable PC/104-Plus PCI bus mastering modules and carries all of the appropriate 32-bit 33 MHz PCI signals. PCI signals are available both via the socket at the top side of the module (XS1, AMP 1375799-1) and via a pin array with organizer (AMP 1375801-1) at the bottom side of CPC306.

XS1 contacts designation and load capacity (LC) are shown in the following table.

**Figure 3.18:    XS1 Connector Contacts Layout**
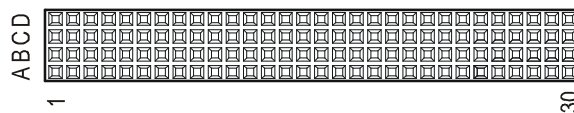


**Table 3.11:    XS1 Connector Contacts Designation (Rows A, B)**

| Pin | Signal | State (*) | LC, mA | Pin | Signal | State (*) | LC, mA |
|-----|--------|-----------|--------|-----|--------|-----------|--------|
| A1 | GND | Power | – | B1 | – | – | – |
| A2 | VI/O | +3.3V (Out) | – | B2 | AD2 | In / Out | 12 |
| A3 | AD5 | In / Out | 12 | B3 | GND | Power | – |
| A4 | C/BE0# | In / Out | 12 | B4 | AD7 | In / Out | 12 |
| A5 | GND | Power | – | B5 | AD9 | In / Out | 12 |
| A6 | AD11 | In / Out | 12 | B6 | VI/O | +3.3V (Out) | – |
| A7 | AD14 | In / Out | 12 | B7 | AD13 | In / Out | 12 |
| A8 | – | – | – | B8 | C/BE1# | In / Out | 12 |
| A9 | SERR# | PU (10K) | – | B9 | GND | Power | – |
| A10 | GND | Power | – | B10 | PERR# | PU (10K) | – |
| A11 | STOP# | In / Out | 12 | B11 | – | – | – |
| A12 | – | – | – | B12 | TRDY# | In / Out | 12 |
| A13 | FRAME# | In / Out | 12 | B13 | GND | – | – |
| A14 | GND | Power | – | B14 | AD16 | In / Out | 12 |
| A15 | AD18 | In / Out | 12 | B15 | – | – | – |
| A16 | AD21 | In / Out | 12 | B16 | AD20 | In / Out | 12 |
| A17 | – | – | – | B17 | AD23 | In / Out | 12 |
| A18 | IDSEL0 | AD12 | – | B18 | GND | Power | – |
| A19 | AD24 | In / Out | 12 | B19 | C/BE3# | In / Out | |
| A20 | GND | Power | – | B20 | AD26 | In / Out | 12 |
| A21 | AD29 | In / Out | 12 | B21 | +5V | Power | – |

| Pin | Signal | State (*) | LC, mA | Pin | Signal | State (*) | LC, mA |
|-----|--------|-----------|--------|-----|--------|-----------|--------|
| A22 | +5V | Power | – | B22 | AD30 | In / Out | 12 |
| A23 | REQ0# | In | – | B23 | GND | Power | – |
| A24 | GND | Power | – | B24 | REQ2# | In | – |
| A25 | GNT1# | Out | 12 | B25 | VI/O | +3.3V (Out) | – |
| A26 | +5V | Power | – | B26 | CLK0 | Out | 12 |
| A27 | CLK2 | Out | 6 | B27 | +5V | In | – |
| A28 | GND | Power | – | B28 | INTD# | In | – |
| A29 | +12V | – | – | B29 | INTA# | In | – |
| A30 | -12V | – | – | B30 | – | – | – |
| | *LC – Load Capacity* | | | | | | |

**Table 3.12:**      **XS1 Connector Contacts Designation (Rows C, D)**

| Pin | Signal | State | LC, mA | Pin | Signal | State | LC, mA |
|-----|--------|-------|--------|-----|--------|-------|--------|
| C1 | +5V | Power | – | D1 | AD0 | In / Out | 12 |
| C2 | AD1 | In / Out | 12 | D2 | +5V | Power | – |
| C3 | AD4 | In / Out | 12 | D3 | AD3 | In / Out | 12 |
| C4 | GND | Power | – | D4 | AD6 | In / Out | 12 |
| C5 | AD8 | In / Out | 12 | D5 | GND | Power | – |
| C6 | AD10 | In / Out | 12 | D6 | M66EN (GND) | – | – |
| C7 | GND | Power | – | D7 | AD12 | In / Out | 12 |
| C8 | AD15 | In / Out | 12 | D8 | – | – | – |
| C9 | – | – | – | D9 | PAR | In / Out | 12 |
| C10 | – | – | – | D10 | – | – | – |
| C11 | LOCK# | PU (10K) | – | D11 | GND | Power | – |
| C12 | GND | Power | – | D12 | DEVSEL# | In / Out | 12 |
| C13 | IRDY# | In / Out | 12 | D13 | – | – | – |
| C14 | – | – | – | D14 | C/BE2# | In / Out | 12 |
| C15 | AD17 | In / Out | 12 | D15 | GND | Power | – |
| C16 | GND | Power | – | D16 | AD19 | In / Out | 12 |
| C17 | AD22 | In / Out | 12 | D17 | – | – | – |
| C18 | IDSEL1 | AD13 | – | D18 | IDSEL2 | AD14 | – |
| C19 | VI/O | +3.3V (Out) | – | D19 | IDSEL3 | AD15 | – |
| C20 | AD25 | In / Out | 12 | D20 | GND | Power | – |
| C21 | AD28 | In / Out | 12 | D21 | AD27 | In / Out | 12 |
| C22 | GND | Power | – | D22 | AD31 | In / Out | 12 |
| C23 | REQ1# | In | – | D23 | VI/O | +3.3V (Out) | – |
| C24 | +5V | Power | – | D24 | GNT0# | Out | 12 |
| C25 | GNT2# | Out | 12 | D25 | GND | Power | – |
| C26 | GND | Power | – | D26 | CLK1 | Out | 12 |
| C27 | CLK3 | Out | 6 | D27 | GND | Power | – |
| C28 | +5V | Power | – | D28 | RST# | Out | 12 |
| C29 | INTB# | In | – | D29 | INTC# | In | – |
| C30 | GNT3# | PU (10K) | – | D30 | GND | Power | – |
| | *LC – Load Capacity* | | | | | | |

**Note:**

In two tables above:
"–" – Not used;
"Power" – supplied to the stacked modules
In/Out column shows the data transfer direction for a processor
module being the bus master.

### 3.2.12.2    ISA Header

XS2 header mounted on CPC306 allows connection of PC/104 expansion modules via ISA bus (8/16-bit, 8.3/16.6 MHz, DMA support). Master mode is not supported. ISA signals are available both via the socket at the top side of the module (AMP 1375795-5) and via a pin array with organizer (AMP 1445251-1) at the bottom side of CPC306.

The contact configuration of XS2 header is shown in the figure below. The tables following the figure presents the designation of its contacts and load capacity.

**Figure 3.19:    ISA Header Contacts Layout**
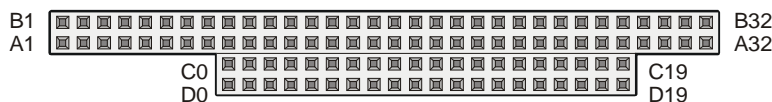


**Table 3.13:    ISA XS2 Connector (Rows A and B) Contacts Designation**

| Pin # | Signal | In/Out | LC, mA | Pin # | Signal | In/Out | LC, mA |
|-------|--------|--------|--------|-------|--------|--------|--------|
| A1 | /IOCHK | – | – | B1 | GND | Power | – |
| A2 | SD7 | In/Out | 16 | B2 | RESET | Out | 16 |
| A3 | SD6 | In/Out | 16 | B3 | +5V | Power | – |
| A4 | SD5 | In/Out | 16 | B4 | IRQ9 | In | – |
| A5 | SD4 | In/Out | 16 | B5 | -5V | Power | – |
| A6 | SD3 | In/Out | 16 | B6 | DRQ2 | In | – |
| A7 | SD2 | In/Out | 16 | B7 | -12V | Power | – |
| A8 | SD1 | In/Out | 16 | B8 | 0WS | In | – |
| A9 | SD0 | In/Out | 16 | B9 | +12V | Power | – |
| A10 | IOCHRDY | In | 16 | B10 | KEY | – | – |
| A11 | AEN | Out | 16 | B11 | /SMEMW | Out | 16 |
| A12 | SA19 | Out | 16 | B12 | /SMEMR | Out | 16 |
| A13 | SA18 | Out | 16 | B13 | /IOW | Out | 16 |
| A14 | SA17 | Out | 16 | B14 | /IOR | Out | 16 |
| A15 | SA16 | Out | 16 | B15 | /DACK3 | Out | 8 |
| A16 | SA15 | Out | 16 | B16 | DRQ3 | In | – |
| A17 | SA14 | Out | 16 | B17 | /DACK1 | Out | 8 |
| A18 | SA13 | Out | 16 | B18 | DRQ1 | In | – |

| Pin # | Signal | In/Out | LC, mA | Pin # | Signal | In/Out | LC, mA |
|-------|--------|--------|--------|-------|--------|--------|--------|
| A19 | SA12 | Out | 16 | B19 | /REFRESH | Out | 8 |
| A20 | SA11 | Out | 16 | B20 | BCLK | Out | 8 |
| A21 | SA10 | Out | 16 | B21 | IRQ7 | In | – |
| A22 | SA9 | Out | 16 | B22 | IRQ6 | In | – |
| A23 | SA8 | Out | 16 | B23 | IRQ5 | In | – |
| A24 | SA7 | Out | 16 | B24 | IRQ4 | In | – |
| A25 | SA6 | Out | 16 | B25 | IRQ3 | In | – |
| A26 | SA5 | Out | 16 | B26 | /DACK2 | Out | 8 |
| A27 | SA4 | Out | 16 | B27 | TC | Out | 8 |
| A28 | SA3 | Out | 16 | B28 | BALE | Out | 16 |
| A29 | SA2 | Out | 16 | B29 | +5V | Power | – |
| A30 | SA1 | Out | 16 | B30 | OSC | Out | 16 |
| A31 | SA0 | Out | 16 | B31 | GND | Power | – |
| A32 | GND | Power | – | B32 | GND | Power | – |

**Table 3.14:      ISA XS2 (Rows C and D) Contacts Designation**

| Pin # | Signal | In/Out | LC, mA | Pin # | Signal | In/Out | LC, mA |
|-------|--------|--------|--------|-------|--------|--------|--------|
| C0 | GND | Power | – | D0 | GND | Power | – |
| C1 | /SBHE | Out | 8 | D1 | /MEMCS16 | In | 8 |
| C2 | LA23 | Out | 8 | D2 | /IOCS16 | In | 8 |
| C3 | LA22 | Out | 8 | D3 | IRQ10 | In | – |
| C4 | LA21 | Out | 8 | D4 | IRQ11 | In | – |
| C5 | LA20 | Out | 8 | D5 | IRQ12 | In | – |
| C6 | LA19 | Out | 8 | D6 | IRQ13 | In | – |
| C7 | LA18 | Out | 8 | D7 | IRQ14 | In | – |
| C8 | LA17 | Out | 8 | D8 | /DACK0 | Out | 8 |
| C9 | /MEMR | Out | 16 | D9 | DRQ0 | In | – |
| C10 | /MEMW | Out | 16 | D10 | /DACK5 | Out | 8 |
| C11 | SD8 | In/Out | 16 | D11 | DRQ5 | In | – |
| C12 | SD9 | In/Out | 16 | D12 | /DACK6 | Out | 8 |
| C13 | SD10 | In/Out | 16 | D13 | DRQ6 | In | – |
| C14 | SD11 | In/Out | 16 | D14 | /DACK7 | Out | 8 |
| C15 | SD12 | In/Out | 16 | D15 | DRQ7 | In | – |
| C16 | SD13 | In/Out | 16 | D16 | +5V | Power | – |
| C17 | SD14 | In/Out | 16 | D17 | /MASTER | In | – |
| C18 | SD15 | In/Out | 16 | D18 | GND | Power | – |
| C19 | KEY | – | – | D19 | GND | Power | – |

> **Note:**
>
> In two tables above:
> "–" – Not used;
> "Power" – supplied to the stacked modules
> In/Out column shows the data transfer direction for a processor
> module being the bus master.

### 3.2.13    Redundancy

CPC306 supports redundancy connection. To do so, connect the main and the reserve modules in PC/104 stack with no connection via XS1 (PCI) connector. Make connection between XP1 (COM9) and XP2 (Redundancy Connector) pinpads according to the figure below.

Additional information on redundancy arrangement is available upon request.

**Figure 3.20:** **Redundancy Pinpads Connection**
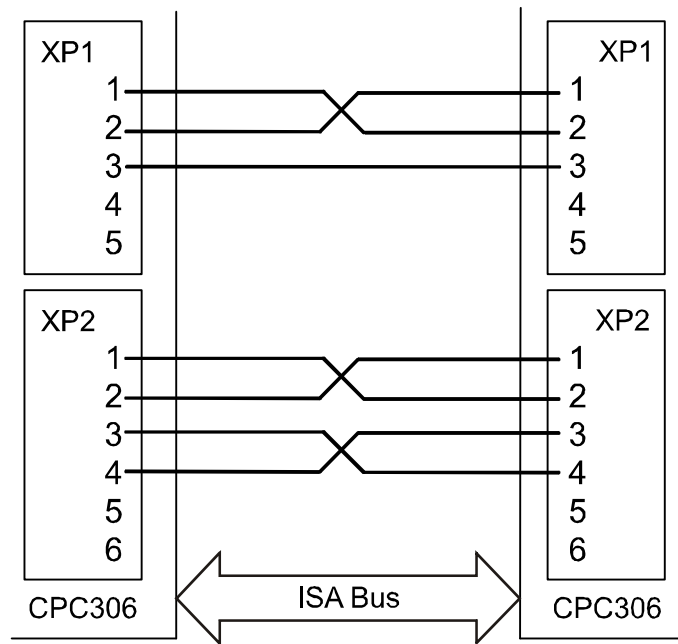


COM9 signals for redundancy function support are routed to XP1 connector. This connector is not installed on the module; its installation is ordered separately. The place for installation of this connector (PLS2-40/5) is reserved onboard.

**Figure 3.21:** **XP1 Pinpad**



XP1 is a 1-row 5-pin 2 mm pitch pinpad (IDC5).

Recommended counterpart: Leotronics 2018-3051 socket with 2023-2000 contacts.

**Table 3.15:      XP1 Pinout**

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1 | RX | 4 | – |
| 2 | TX | 5 | – |
| 3 | GND | | |

Redundancy signals are routed to XP2 connector. This connector is not installed on the module; its installation is ordered separately. The place for installation of this connector (PLS2-40/6) is reserved onboard.

**Figure 3.22:      XP2 Pinpad**

1           6

XP10 is a 1-row 6-pin 2 mm pitch pinpad (IDC6).

Recommended counterpart: 2018-3061 socket (available for order as ACS00047-03) with 2023-2000 contacts (ACS00049).

**Table 3.16:      XP2 Pinout**

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 1 | Fail_out# | 4 | GPCS0# |
| 2 | Fail_in# | 5 | Sw_in# |
| 3 | GPCS_in# | 6 | GPCS1# |

## 3.2.14      Analog Input/Output

(TBA)

## 3.2.15      Discrete Input/Output (UNIO)

(TBA)

## 3.2.16　Watchdog Timers

CPC306 has three watchdog timers.

WDT0 and WDT1 have programmable timeout period from 30.5 $\mu$s to 512 seconds and are integrated in Vortex86DX SoC. WDT0 and WDT1 are controlled via internal processor registers. Description of these registers will be added later (*TBA*).

WDT2 has fixed timeout period of 1.6 seconds; it is integrated in ADM706T power supply supervisor chip. Expiry of its timeout period trigger special registers, which are available to BIOS function for reading after reboot. The fact of watchdog operation (expiry of timeout period) is also reflected by lighting HL3 green LED. WDT2 is controlled via GPIO1 port lines (1, 2, 3, 4) of Vortex86DX. WDT2 can be disabled by setting a jumper on XP30 pinpad; in this case it can not be enabled by a program. «Z» state of line 2 of GPIO1 port should be enabled. See also detailed description of GPIO ports in relevant subsection of this Manual (*TBA*).

## 3.2.17　RTC, CMOS, Serial FRAM and Reserved BIOS

### 3.2.17.1　Reserved BIOS

The CPC306 takes advantage of flash-memory based BIOS. The main (working) copy of BIOS occupies 512 KB on a soldered chip. Reserve BIOS copy occupies 256 KB of flash memory integrated in the controller and is used for emergency boot.

On power-up the module is always booted using main BIOS copy. If the timeout of WDT2 (ADM706T) is expired, the module is rebooted using the reserve copy. After that the module every time will be rebooted using the reserve copy. To enable boot using the main BIOS copy, do one of the following:

- Reset the module by pressing the SW1 (RESET#) button;
- Reset the module by an external reset, contacts 1-2 of XP29 should be closed;
- Set the GPIO1 port line 1 to "0" and then reset the module;
- Swith the power off. On power-up the module will boot using the main BIOS copy.

WDT timeout expiry and the reserve BIOS copy use can be indicated by a LED connected to contacts 5-6 of XP9.

BIOS settings can be changed only in BIOS Setup utility.

### 3.2.17.2　RTC, CMOS and Battery

The supplied with CPC306 3 V lithium battery (CR2032) is installed in X1 holder. It is used to power the RTC and CMOS memory when the system power is off. BIOS settings are duplicated to FRAM memory and automatically recovered in case of CMOS data loss. This allows using the module without battery, but system date and time are not stored in this case.

The capacity of the battery is 235 mA/h. The consumption current of the module in power-off state is about 2 $\mu$A. Expected life-time of the battery is about 10 years at 23°C, but it depends on operating or storage temperature and power off time. It is recommended to replace the battery every 5 years.

Replacing the battery, observe polarity: "+" is up.

Dispose of used batteries according to the local regulations.

### 3.2.17.3     FRAM

FRAM is non-volatile memory with SPI interface. It serves as a back-up storage for BIOS Setup parameters and for restoration of the CMOS memory (except the time and date settings) if an error is detected. This feature enables the possibility to operate the module even when the battery is disconnected. High FRAM memory units (7 KB) are available to the user via INT17H BIOS extensions (common with print service interrupt). The lower 1 KB of FRAM is reserved; writing to this area leads to operation instability.

FRAM can be addressed direcly via SPI registers, for details, please refer to Vortex86DX and FRAM descriptions supplied on CD in ...\CPC306\Techinfo folder. A sample is available in …\CPC306\Software\SFRAM307.zip file on the CD.

(*TBA*)

### 3.2.17.4     BIOS Upgrade

Reserved BIOS allows riskless upgrade of BIOS copies. Both the main and the reserve BIOS copies can be upgraded using the utilities supplied with the module.

(*TBA*)

## 3.2.18     Power Supply

The power is supplied to CPC306 via XS1 and XS2 connectors or via dedicated XP26 (AMP 4-171826-4) connector from an external power source. For XP26 polarity reversal and overvoltage ($\pm$26 V) protection is realized.

**Figure 3.23:     XP26 Power Supply Connector**
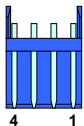
The main power voltage of the processor module is +5V $\pm$5%. For stable operation of the module without external devices, the external power supply unit should provide not less than 1.5 A consumption current.

The following table gives assignments of XP26 contacts.

**Table 3.17:     XP26 Power Connector Pinout**

| Pin | Assignment |
|-----|------------|
| 1 | +5 V |
| 2 | GND |
| 3 | GND |
| 4 | – |

For making a custom power cable it is recommended to use AMP 4-171822-4 socket with 170263-1 contacts (sets ACS00038 or ACS00038-01). (TBA)

### 3.2.19　　Power Supply Supervisor

CPC306 is equipped with ADM706T power supply supervisor. If during the operation +5V voltage drops below +4.45V, then PFO# signal is generated. This signal can be connected to different circuits using contacts 3-4 of XP29 pinpad and contacts 1-2 of XP35. If the voltage drops below +3.08V, then hardware Reset is issued.

(*TBA*)

**Figure 3.24:**　　**Power Supply Supervisor Diagram**
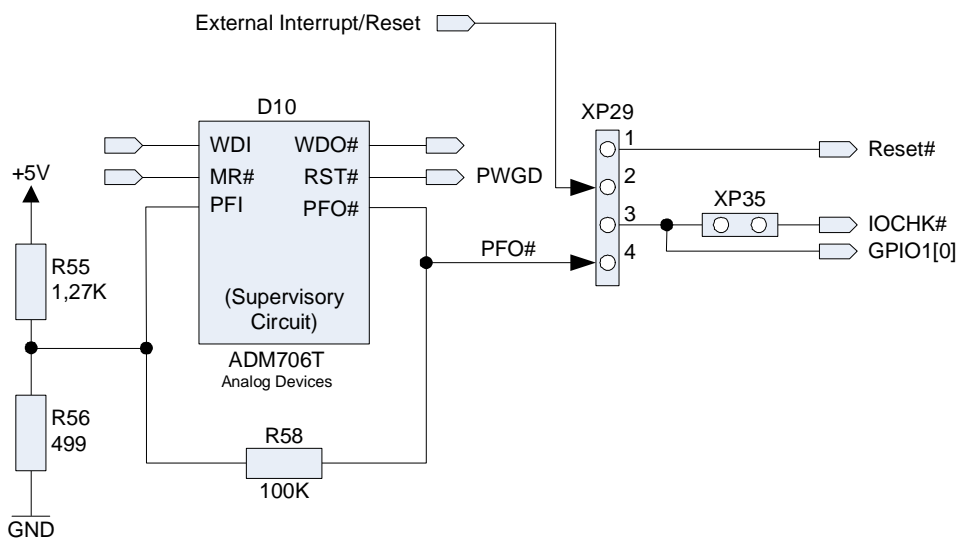


### 3.2.20　　GPIO Ports

Vortex86DX SoC includes three general purpose I/O ports available via internal registers. Each port consists of 8 programmable input/output lines. (*TBA*)

GPIO1 is used for watchdog timer (WDT2) control, for switching on/off the ATA flash disk controller, for processing of external interrupt/reset signals, and for detection of the type of the module in use.

GPIO2 is not available for the user programs and can not be controlled by application software.

(*TBA*)

### 3.2.21　　Configuration Jumpers

XP3, XP7, XP22, XP23, XP24, XP28, XP29, XP30, XP35, XP43, and XP45 jumpers description (*TBA*).

### 3.2.22 Diagnostic LEDs

CPC306 has four diagnostic LEDs (HL1 … HL4). The following table describes the function of these LEDs.

**Table 3.18:** **CPC306 Diagnostic LEDs Function**

| LED | Color | Function |
|-----|-------|----------|
| HL1 | Green | +5V presence |
| HL2 | Green | LAN1. Duplex mode indication |
| HL3 | Red | FPGA analog IO. User LED 1 |
| HL4 | Green | FPGA analog IO. User LED 2 |

Moreover, XP9 connector (PLS2-40/14) is used for connection of external LEDs. Recommended counterpart: Leotronics 2018-3141 socket and 2023-2000 contacts set (available for order as ACS00047-05 and ACS00049 sets).

**Table 3.19:** **XP9 Contacts Function**

| Pins | Current | Function |
|------|---------|----------|
| 1 – 2 | R=510, U=+5V | LAN1 Ethernet Link/Active |
| 3 – 4 | R=330, U=+3.3V | LAN2 Ethernet Link/Active |
| 5 – 6 | R=160, U=+1.8V | WDT2 timeout expiry event |
| 7 – 8 | R=330, U=+3.3V | Power OK. CPU_RESET |
| 9 – 10 | R=510, U=+5V | IDE ACT |
| 11 – 12 | R=510, U=+5V | User LED 1 |
| 13 – 14 | R=510, U=+5V | User LED 2 |

**Figure 3.25:** **External LEDs Connection (XP9)**
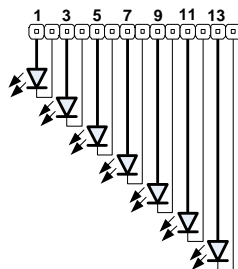


### 3.2.23 Reset Button

In the event of a contingency (module hang-up, for example) use the Reset button SW1 on the top side of the module to reset the system.

## 3.3 Address Mapping

### 3.3.1 Memory Addressing

**Table 3.20:** **Memory Address Mapping**

| Address Range | Size | Description |
|---|---|---|
| 00000h – 9FFFFh | 640 KB | System memory |
| A0000h – BFFFFh | 128 KB | PCI/ISA VGA Graphics |
| C0000h – C7FFFh | 32 KB | VGA BIOS |
| C8000h – CFFFFh | 32 KB | Expansion Card Boot ROM |
| D0000h - EFFFFh | 128 KB | Not used |
| F0000h – FFFFFh | 64 KB | BIOS |

### 3.3.2 I/O Addressing

**Table 3.21:** **I/O Address Space**

| Address Range | Function | Note |
|---|---|---|
| 0000h – 001Fh | 8237 DMA Controller #1 | – |
| 0020h – 0021h | 8259 Master Interrupt Controller | – |
| 0022h – 0023h | Indirect Access | WDT0 |
| 0024h – 002Dh | ISA bus | External bus access |
| 002Eh – 002Fh | Reserved | No access |
| 0030h – 003Fh | ISA bus | External bus access |
| 0040h – 0043h | 8253 Programmable Timer | – |
| 0044h – 0047h | ISA bus | External bus access |
| 0048h – 004Bh | Reserved | No access |
| 004Eh – 005Fh | ISA bus | External bus access |
| 0060h – 0064h | 8042 Keyboard Controller | – |
| 0065h | WDT0 | – |
| 0066h | ISA bus | External bus access |
| 0067h – 006Dh | WDT1 | – |
| 006Eh – 006Fh | ISA bus | External bus access |
| 0070h – 007Fh | RTC, NMI Mask Register | – |
| 0080h – 009Fh | DMA Page Registers | – |
| 00A0h – 00B1h | 8259 Slave Interrupt Controller | – |
| 00B2h – 00BFh | ISA bus | External bus access |
| 00C0h – 00DFh | 8237 DMA Controller #2 | – |
| 00E0h – 01EFh | ISA bus | External bus access |
| 01F0h – 01F8h | Primary IDE Controller | – |
| 01F9h – 0277h | ISA bus | External bus access |

| Address Range | Function | Note |
|---|---|---|
| 0278h – 027Fh | Порт LPT | (possible designation) |
| 0280h – 028Fh | I/O ports of matrix keyboard, LEDs, analog I/O, and internal control registers realized in XCS05 FPGA | CPC306-01 |
| 0290h – 029Fh<br>02A0h – 02AFh<br>02B0h – 02BFh | Discrete I/O ports (UNIO) realized in XCS20 FPGA | CPC306-01 |
| 02C0h – 02E7h | ISA bus | External bus access |
| 02E8h – 02EFh | Serial Port 4 | (possible designation) |
| 02F0h – 02F7h | ISA bus | External bus access |
| 02F8h – 02FFh | Serial Port 2 | (possible designation) |
| 0300h – 0377h | ISA bus | External bus access |
| 0378h – 037Fh | Порт LPT | (possible designation) |
| 0380h – 03AFh | ISA bus | External bus access |
| 03B0h – 03BBh | MDA Adapter | (possible designation) |
| 03BCh – 03BFh | Порт LPT | (possible designation) |
| 03C0h – 03CFh | EGA, VGA Adapter | (possible designation) |
| 03D0h – 03DFh | CGA Adapter | (possible designation) |
| 03E0h – 03E7h | ISA bus | External bus access |
| 03E8h – 03EFh | Serial Port 3 | (possible designation) |
| 03F0h – 03F7h | Floppy Controller #1 | (possible designation) |
| 03F8h – 03FFh | Serial Port 1 | (possible designation) |
| 0400h – 04CFh | ISA bus | External bus access |
| 04D0h – 04D1h | Reserved | No access |
| 04D2h – 0777h | ISA bus | External bus access |
| 0778h – 077Fh | Reserved | No access |
| 0780h – 0CF7h | ISA bus | External bus access |
| CF8h – 0CFFh | Host PCI controller configuration registers | – |
| 0D00h – EDFFh | ISA bus | External bus access |
| EE00h – EF3Fh | Reserved | No access |
| EF40h – FBFFh | ISA bus | External bus access |
| FC00h – FC0Dh | Reserved | No access |
| FC0Eh – FFEFh | ISA bus | External bus access |
| FFF0h – FFFFh | Reserved | No access |

### 3.3.3 Interrupt Settings

By default, interrupts are generated by the devices belonging to the CPC306 module. The table below presents interrupt settings. Interrupt request configuration is performed in BIOS Setup.

**Table 3.22:      Interrupt Settings**

| System Units | | NMI | IRQ Lines | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| System timer | | | ● | | | | | | | | | | | | | | | |
| PS/2 keyboard | | | | ● | | | | | | | | | | | | | | |
| PS/2 mouse | | | | | | | | | | | | | | | ● | | | |
| Cascading | | | | | ● | | | | | | | | | | | | | |
| COM1 | | | | | | ○ | ● | | | | | ○ | ○ | ○ | | | | |
| COM2 | | | | | | ● | ○ | | | | | ○ | ○ | ○ | | | | |
| COM3 | | | | | | ○ | ● | | | | | ○ | ○ | ○ | | | | |
| COM4 | | | | | | ● | ○ | | | | | ○ | ○ | ○ | | | | |
| LPT | | | | | | | | ○ | | ● | | | | | | | | |
| RTC | | | | | | | | | | | ● | | | | | | | |
| Ethernet1 | | | | | | | | | | | | | | | | | | ● |
| Ethernet2 | | | | | | | | | | | | | | | | | | ● |
| USB | | | | | | | | ● | | | | ● | ● | ● | | | | |
| Co-Processor | | | | | | | | | | | | | | | | ● | | |
| IDE (Primary Channel) | | | | | | | | | | | | | | | | | ● | |
| WDT0, WDT1 (SoC) | | ○ | | | | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ | | ○ | ○ |
| WDT2 (ADM706) | | o | | | | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ | | ○ | ○ |
| External isolated Reset/IRQ | | o | | | | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ | | ○ | ○ |
| ADC/DAC Ready | | o | | | | | | | | ● | | | | ● | ● | | | ● |
| Discrete IO | | | | | | | | | | ● | | | | ● | ● | | | ● |
| PC104 (ISA) | | o | | | | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ | | ○ | ○ |
| PCI104 (PCI) | INT A | | | | | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ | | ○ | ○ |
| | INT B | | | | | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ | | ○ | ○ |
| | INT C | | | | | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ | | ○ | ○ |
| | INT D | | | | | ○ | ○ | ○ | ○ | ○ | | ○ | ○ | ○ | ○ | | ○ | ○ |

Legend:

| | |
|---|---|
| | Not allowed |
| ○ | Possible |
| ● | Default |
| o | Via IOCHK# signal of ISA bus |

Hardware IRQ assignments changes are made by means of BIOS only.
IRQ[3..7], IRQ[9..12], and IRQ[14..15] lines are routed to PC/104 connector.

### 3.3.4    DMA Channels

**Table 3.23:**    **DMA Settings**

|  | **LPT Port** | **PC/104 Connector (ISA)** |
|---|:---:|:---:|
| **DREQ0** | ● |  |
| **DREQ1** | ○ | ● |
| **DREQ2** | ○ | ● |
| **DREQ3** | ○ | ● |
| **DREQ5** |  | ● |
| **DREQ6** |  | ● |
| **DREQ7** |  | ● |

Legend:

|  |  |
|---|---|
|  | Not allowed |
| ○ | Possible |
| ● | Default |

DMA assignments changes are made by means of BIOS only.
DREQ[0..3] and DREQ[5..7] lines are routed to PC/104 connector.

# 4 External Connections

The following precautions must be observed to ensure proper installation and to avoid damage to the module, other system components, or harm to personnel.

## 4.1 Safety Regulations

The following safety regulations must be observed when installing or operating the module. 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.

**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.

Extra caution should be taken in cold and dry weather.

## 4.2        Connection of Peripheral Devices

**Figure 4.1:**        **External Devices Connection**
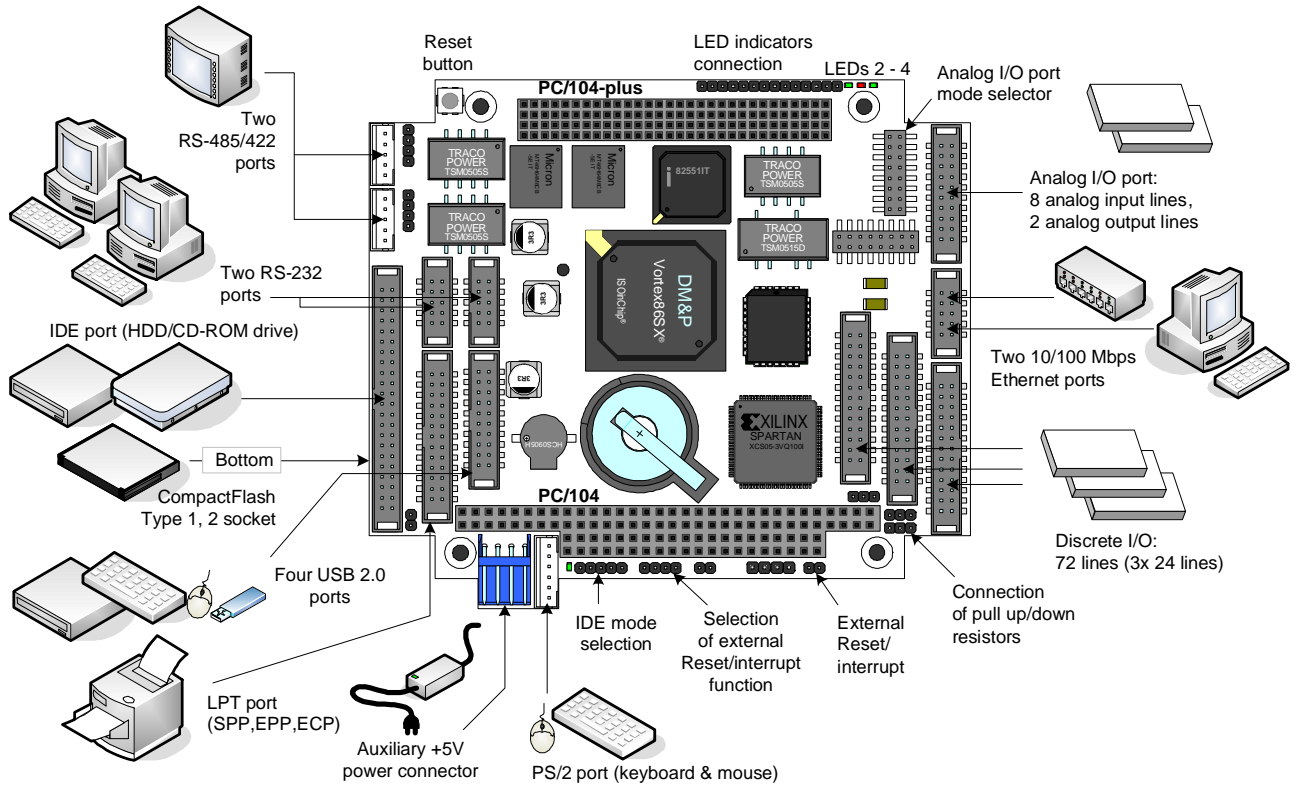


The following devices are necessary to put the module into operation:

- PC/104 power supply or an external power supply unit connected to XP26 power connector with +5 V and not less than 1.5 A output;

- A remote PC in console operation mode connected to one of RS-232 ports selected in BIOS Setup (COM3 – default setting; 115200, 8, n, 1).

## 4.3 KIB386 Interface Adapter Module

This module is connected directly to CPC306 controller module without using additional cables to simplify the connection of external devices with standard interface connectors and the connection of DIB912 (TBI-24/0C), DIB913 (TBI-0/24C), DIB915 (TBI-16/8C) discrete IO modules. KIB386 can be used with CPC306-01 and CPC306-02 modules only.

KIB386 comes in two versions: KIB386-01 and KIB386-02. Standard interface connectors are installed on the top side of KIB386-01 module only. KIB386-02 is supplied without standard interface connectors on the top side and is intended for soldering interface cables directly to the PCB of the module.

Weight of KIB386-01 is 0.15 kg max; KIB386-02 – 0.120 kg max.

KIB386 is not included in CPC306 supplied set and is ordered separately.

**Figure 4.2:** **KIB386-01 Connections**
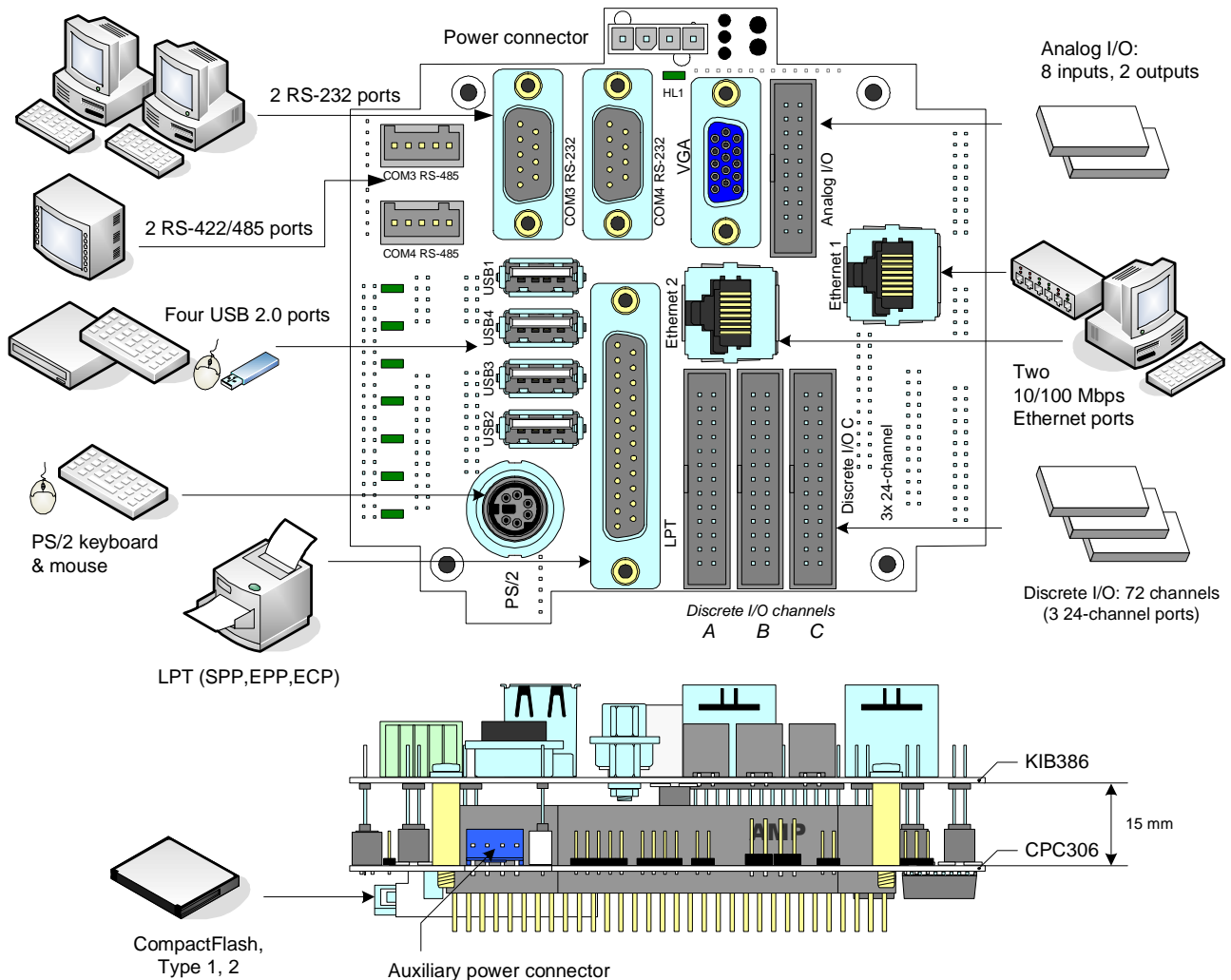


Dimensions of KIB386 may differ from the presented below within tolerance of PCB manufacturing (±0.8 mm).

**Figure 4.3:**      **KIB386-01 Dimensions**
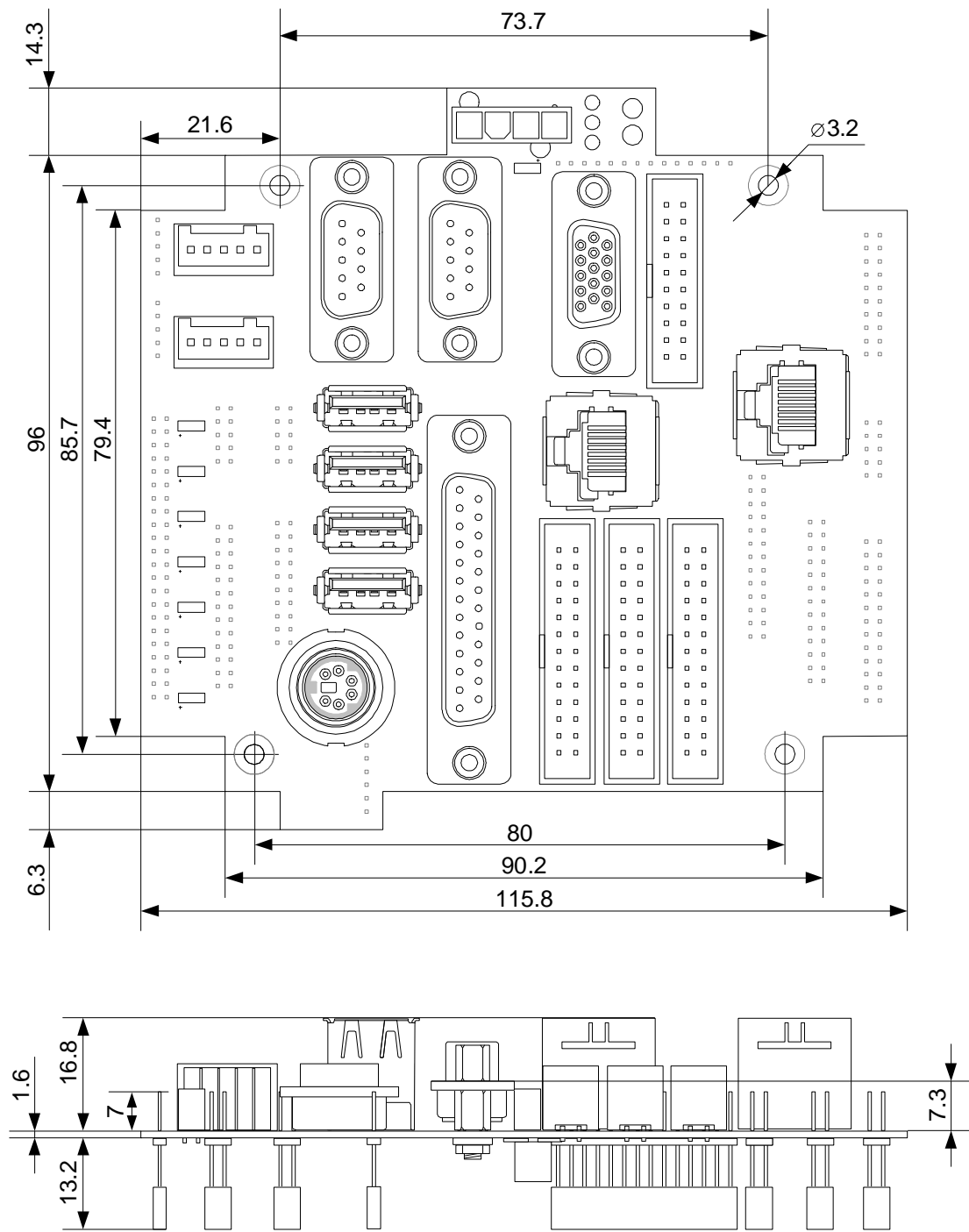
**Figure 4.4:** **KIB386-01 Layout, Top**
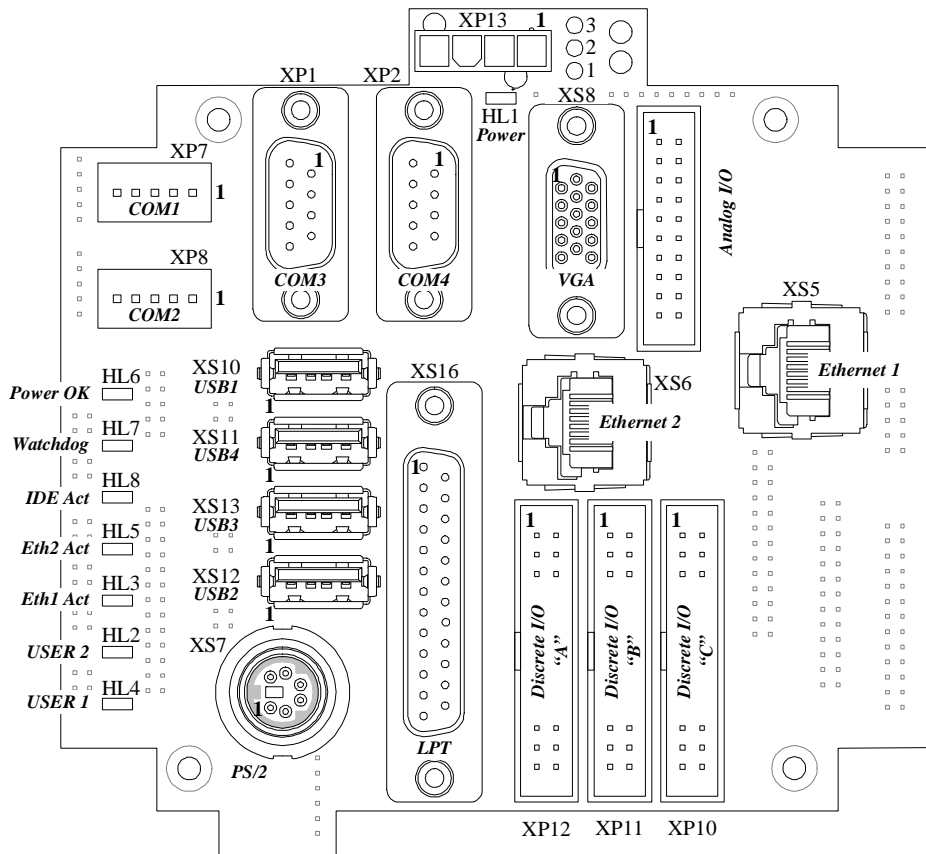


**Figure 4.5:** **KIB386-01 Layout, Bottom**
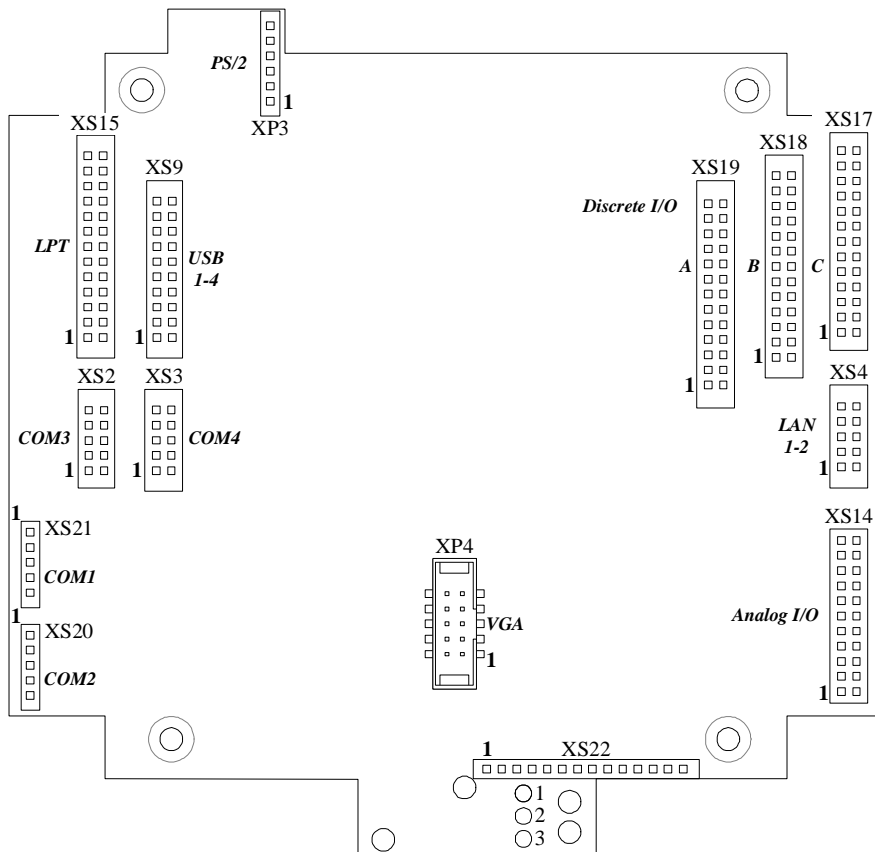
The following interface connectors of KIB386: XP1 (COM3 RS-232), XP2 (COM4 RS-232), XS5 (Ethernet 1 100 Mbps), XS6 (Ethernet 2 100 Mbps), XS8 (VGA RGB), XS10 (USB1), XS11 (USB4), XS12 (USB2), XS13 (USB3), XS16 (LPT) have standard pinouts for these types of connectors.

All interface connectors at bottom side, as well as XP7, XP8, XP9, XP10, XP11, XP12 connectors of KIB386-01 module have the same layouts as the corresponding connectors of CPC306.

**Table 4.1:**     **KIB386-01 and CPC306 Connectors Correspondence**

| Interface Name | CPC306 Interface (Top) | KIB386 Interconnecting (Bottom) | KIB386 Interface (Top) |
|---|---|---|---|
| PS/2 | XP27 | XP3 | XS7 |
| COM4 (RS-232) | XP14 | XS2 | XP2 |
| COM3 (RS-232) | XP13 | XS3 | XP1 |
| LAN1, 2 (100 Mbps) | XP15 | XS4 | XS5, XS6 |
| USB1, 2, 3, 4 | XP19 | XS9 | XS10, XS11, XS12, XS13 |
| Analog I/O | XP6 | XS14 | XP9 |
| LPT | XP20 | XS15 | XS16 |
| Discrete I/O C | XP21 | XS17 | XP10 |
| Discrete I/O B | XP18 | XS18 | XP11 |
| Discrete I/O A | XP16 | XS19 | XP12 |
| COM2 (RS-422/485) | XP4 | XS20 | XP7 |
| COM1 (RS-422/485) | XP8 | XS21 | XP8 |
| LED indication HL2 – HL8 | XP9 | XS22 | – |

KIB386-01 has XP13 connector which can be used for power supply when the stack is installed inside a housing.

If the module is operated in rugged environment, it is recommended to additionally fasten mating parts of connectors.

## 4.4     Software Installation

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.

# 5     AMI BIOS

The AMI BIOS in CPC306 is an adapted version of a standard BIOS for IBM PC AT-compatible personal computers equipped with x86 compatible processors. BIOS provides low-level support for the central processing, memory, and I/O system units. System settings can be changed using the BIOS Setup program.

## 5.1     BIOS Setup Program. Introduction

With the BIOS Setup program, you can modify BIOS settings and control special features of the module. The Setup program offers a convenient menu interface to modify basic system configuration settings and switching between the subsystems operation modes. These settings are stored in a dedicated battery-backed memory, CMOS RAM, that keeps the information while the power is switched off. For extra safety, the system settings are stored also in the nonvolatile serial FRAM.

## 5.2     Main Menu

To start the BIOS Setup program switch on the power or restart the system. By default the startup screen looks like this:

```
AMIBIOS(C)2006 American Megatrends, Inc.
BIOS Date: 10/07/09 16:09:14 Ver: 08.00.15
Fastwel Adaptation CPC306 BIOS V.2.00
CPU : Vortex86DX A9121
 Speed : 600MHz


Press DEL to run Setup (F4 on Remote Keyboard)
Press F11 for BBS POPUP  (F3 on Remote Keyboard)
Initializing USB Controllers .. Done.
128MB OK


Auto-Detecting Pri Master..IDE Hard Disk
Pri Master :  1024MB ATA Flash Disk  ADAA408J
Auto-detecting USB Mass Storage Devices ..
00 USB mass storage devices found and configured.
```

To start BIOS Setup, press "Del" key on a keyboard after the message

```
"Hit <Del> if you want to run SETUP"
```

appeared on the screen. This will lead you to the Main Menu screen, shown in the Figure below.

> **Attention!**
>
> In remote console mode the BIOS Setup utility is started by F4 on the keyboard of a remote PC with "Console Redirect" option enabled.

**Figure 5.1:**  **Main Menu Screen Image**



```
                        BIOS SETUP UTILITY
 Main    Advanced    PCIPnP    Boot    Security    Chipset    Exit

 System Overview                                  Use [ENTER], [TAB]
                                                  or [SHIFT-TAB] to
 AMIBIOS                                          select a field.
 Version   :08.00.15
 Build Date:09/23/10                              Use [+] or [-] to
 ID        :3BABT000                              configure system Time.
 Fastwel FPGA Firmware
 XCS95 Rev.:7.8
 XCS20 Rev.:2.0
 XCS20 ID :n00n00n00

 Processor
 Vortex A9121                                     <->    Select Screen
 Speed     :600MHz                                up/dw  Select Item
                                                  +-     Change Field
 System Memory                                    Tab    Select Field
 Size      :256MB                                 F1     General Help
                                                  F10    Save and Exit
 System Time               [10:36:01]             ESC    Exit
 System Date               [Thu 10/21/2009]

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```

The Main Menu items and their functions are described in the table below.

**Table 5.1:**  **Main Menu Items**

| Menu Item | Purpose |
|---|---|
| (*TBA*) | |
| | |

Use "Up" and "Down" cursor keys or <Tab> key to move between menu items. <Enter> selects the item and allows to proceed with the command or opens the submenu screen.

## 5.3        Advanced

On selection of this Main menu item the following screen is shown:

**Figure 5.2:        Advanced Screen Image**
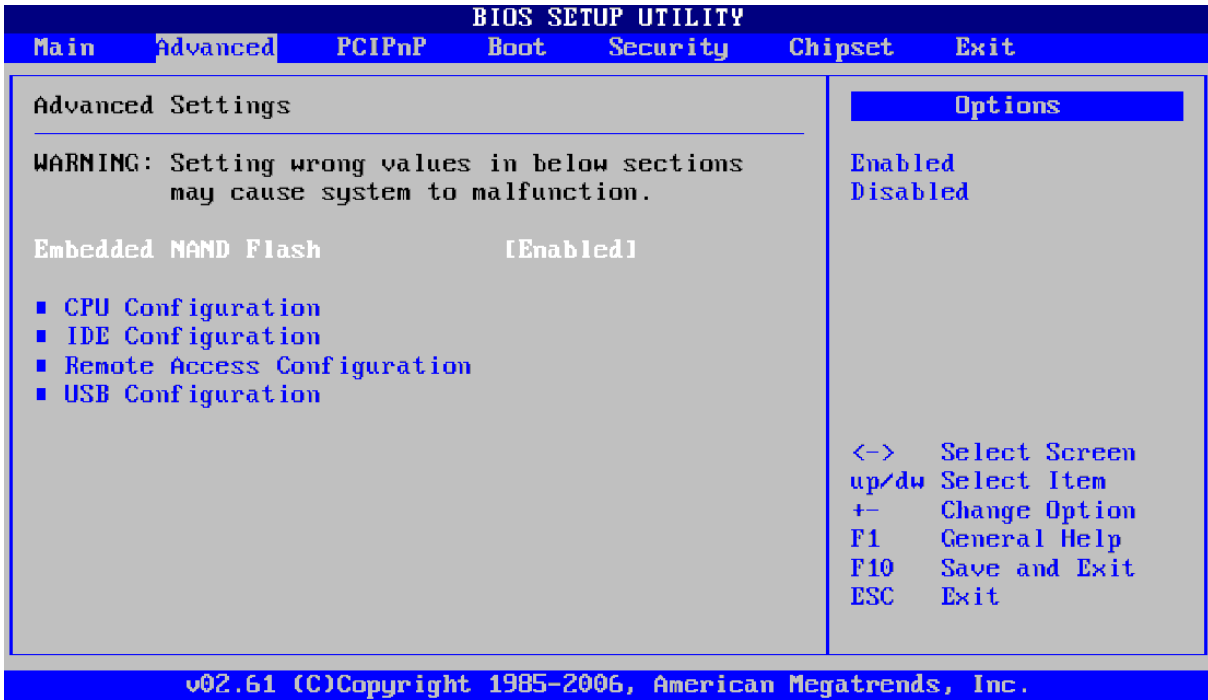


The following table presents explanations on "Advanced" menu screen.

**Table 5.2:        Advanced Menu Items**

| Menu Item | Function |
| --- | --- |
| (*TBA*) | |

## 5.3.1    CPU Configuration

On selection of this item the following screen is shown:

**Figure 5.3:        CPU Configuration Screen Image**

```
                          BIOS SETUP UTILITY
      Advanced

   CPU Configuration                                    Options
   Module Version - 00.01
                                                Disabled
   Manufacturer: RDC                            Enabled
   Brand String: Vortex86DX A9121
   Frequency   : 600MHz

   L1 Cache                     [Enabled]
   Cache L1    : 16 KB
   L2 Cache                     [Enabled]
   Cache L2    : 256 KB

                                                <->    Select Screen
                                                up/dw  Select Item
                                                +-     Change Option
                                                F1     General Help
                                                F10    Save and Exit
                                                ESC    Exit

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```
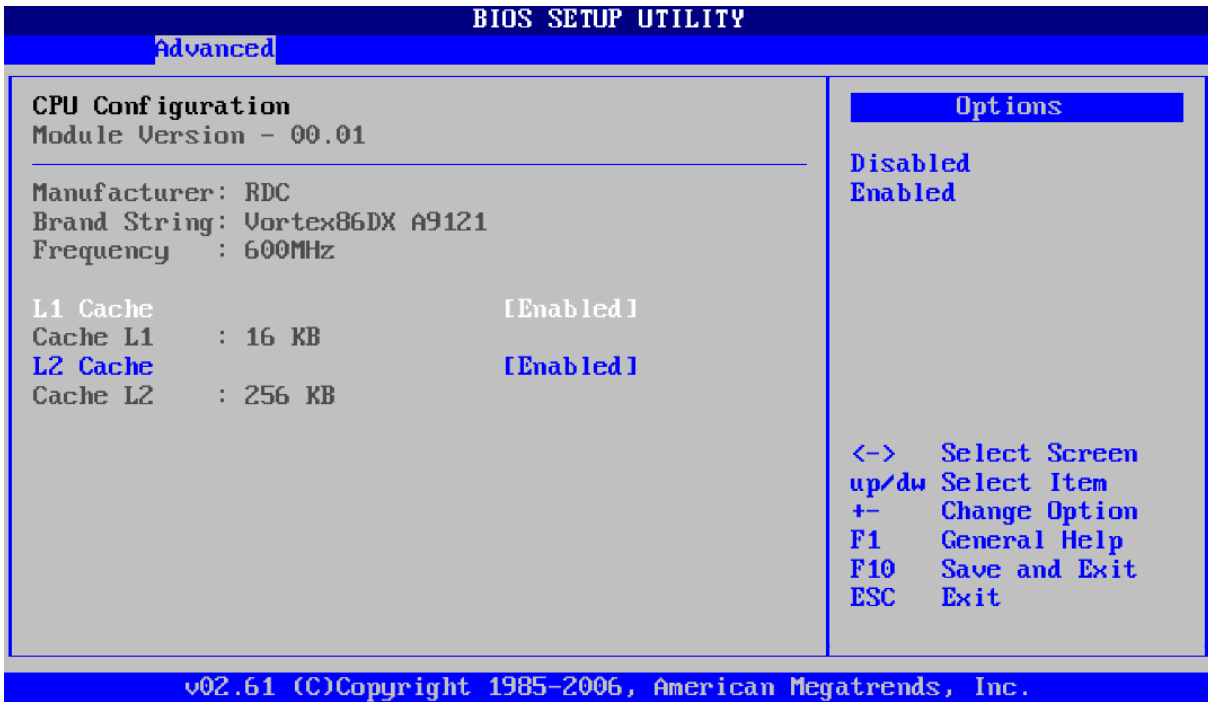
The following table presents explanations on "CPU Configuration" menu screen.

**Table 5.3:        CPU Configuration Items**

| Menu Item | Function |
|---|---|
| (*TBA*) | |

## 5.3.2 IDE Configuration

On selection of this item the following screen is shown:

**Figure 5.4:       IDE Configuration Screen Image**
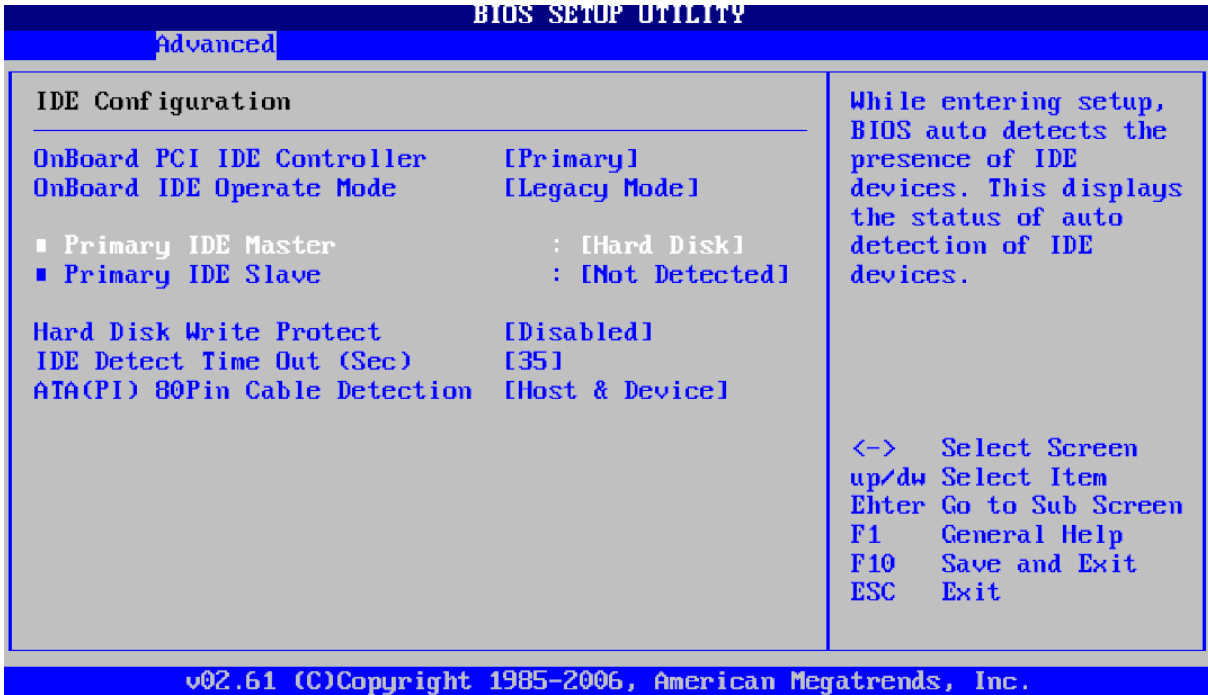


The following table presents explanations on "IDE Configuration" menu screen.

**Table 5.4:       IDE Configuration Items**

| Menu Item | Function |
|-----------|----------|
| (*TBA*) | |

### 5.3.2.1 Primary IDE Master

On selection of this item the following screen is shown:

**Figure 5.5:** Primary IDE Master Screen Image
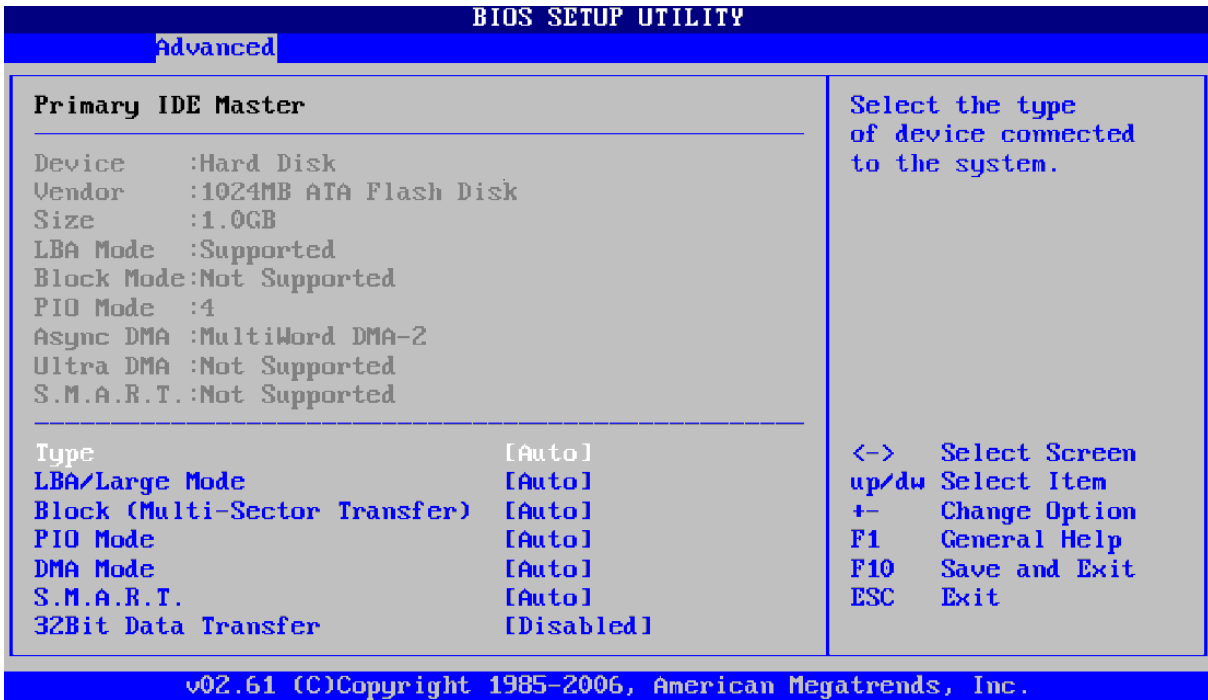


The following table presents "Primary IDE Master" settings. Primary IDE Slave menu is identical to Primary IDE Master menu.

**Table 5.5:** Primary IDE Master Items

| Menu Item | Function |
|-----------|----------|
| (*TBA*) | |

## 5.3.3 Remote Access Configuration

On selection of this item the following screen is shown:

**Figure 5.6:** **Remote Access Configuration Screen Image**

```
                        BIOS SETUP UTILITY
       Advanced

Configure Remote Access type and parameters          Select Remote Access
                                                     type.
Remote Access              [Enabled]

Serial port number         [COM3]
    Base Address, IRQ      [3F8h, 4]
Serial Port Mode           [115200 8,n,1]
Flow Control               [None]
Redirection After BIOS POST [Boot Loader]
Terminal Type              [ANSI]
VT-UTF8 Combo Key Support  [Disabled]
Sredir Memory Display Delay [No Delay]
Terminal Display Mode      [Normal Mode]     <->    Select Screen
Terminal Size              [80 X 25]         up/dw  Select Item
                                             +-     Change Option
                                             F1     General Help
                                             F10    Save and Exit
                                             ESC    Exit

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```

The following table presents explanations on "Remote Access Configuration" menu screen.

**Table 5.6:** **Remote Access Configuration Items**

| Menu Item | Function |
|-----------|----------|
| (*TBA*) | |

## 5.3.4    USB Configuration

On selection of this item the following screen is shown:

**Figure 5.7:        USB Configuration Screen Image**
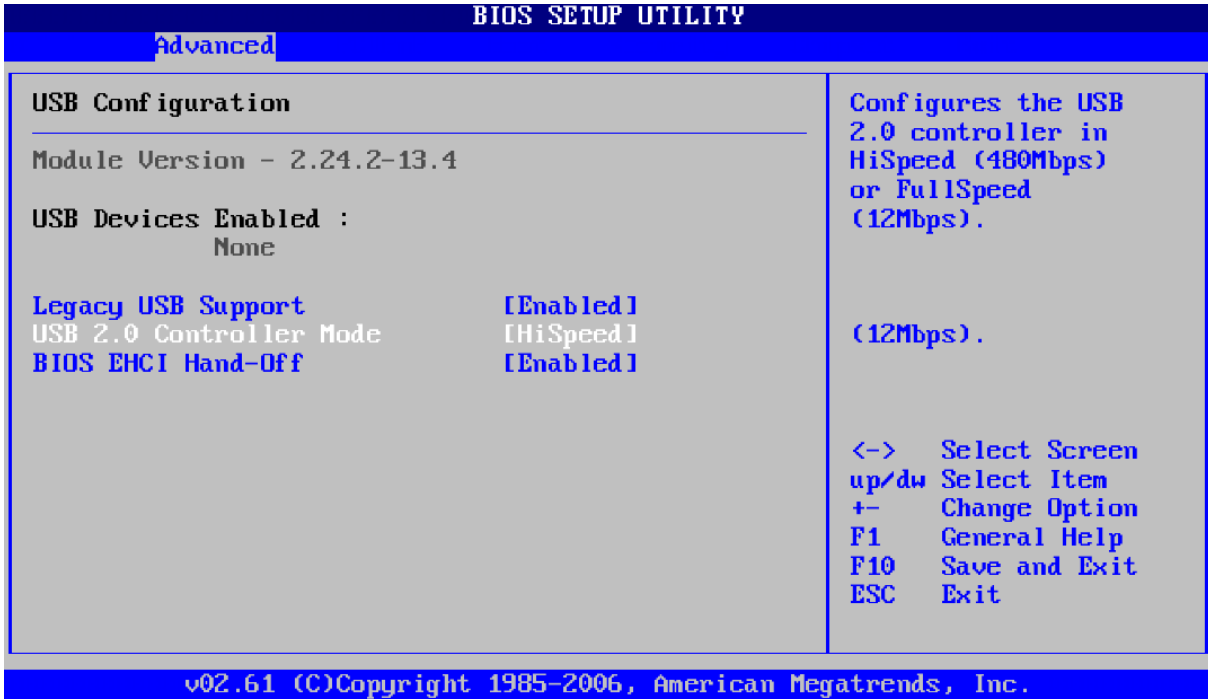


The following table presents explanations on "USB Configuration" menu screen.

**Table 5.7:        USB Configuration Items**

| Menu Item | Function |
|-----------|----------|
| (*TBA*) | |

# 5.4        Advanced PCI/PnP Settings

PCI Plug and Play menu screen is shown below:

**Figure 5.8:        PCI / Plug and Play Menu Screen**
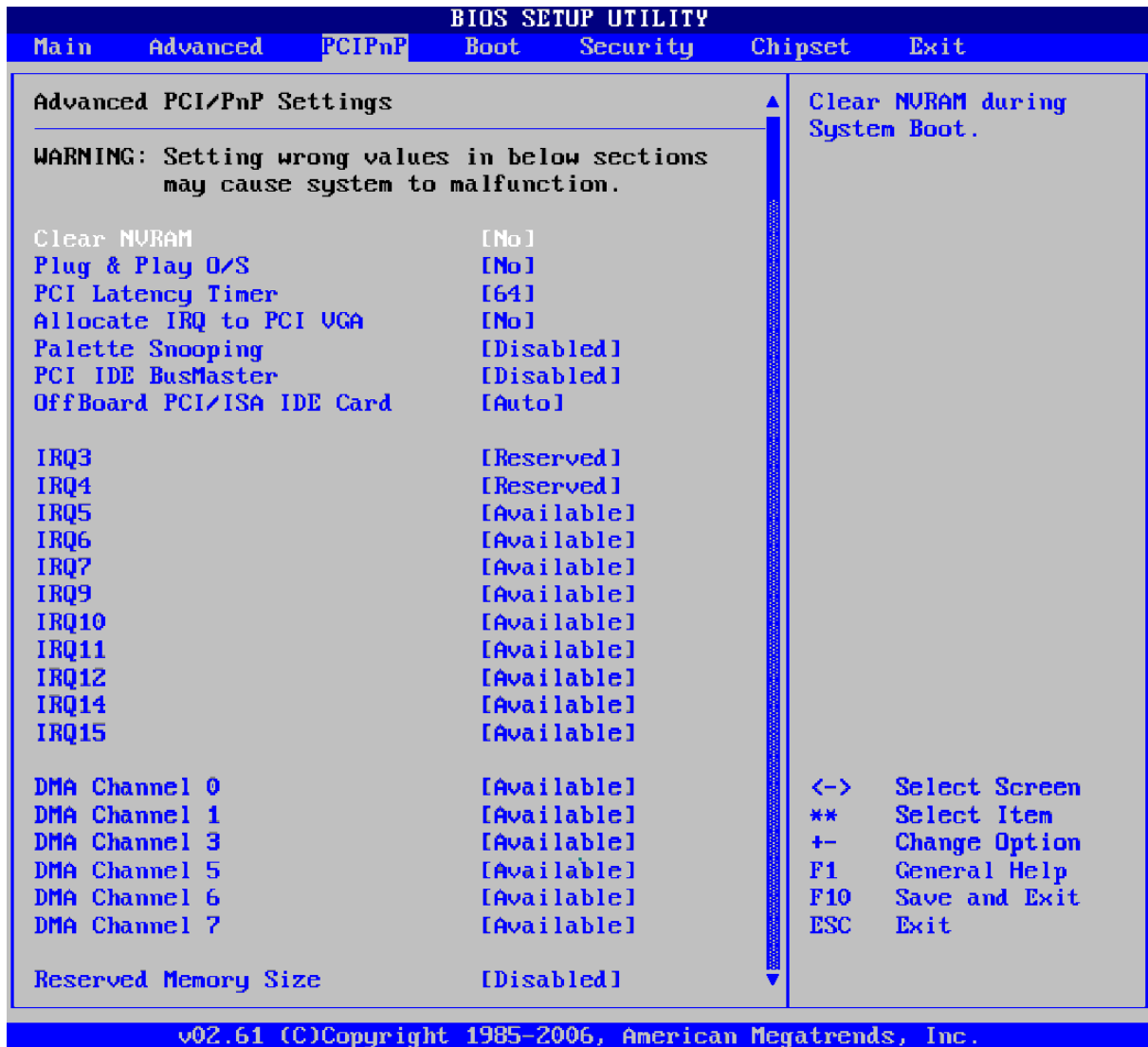


The figure shows the default settings. (TBA)

PCI / Plug and Play menu items are described in the table below.

**Table 5.8:        PCI / Plug and Play Menu Items**

| Menu Item | Options | Description |
|-----------|---------|-------------|
| (*TBA*)   |         |             |

**Remember!**  Wrong or incorrect settings may lead to abnormal system performance.
To correct possible errors, restart the BIOS Setup program and restore manufacturer's settings by selection of "Reset CMOS to factory defaults" command in Main menu.

# 5.5        Boot Options

Boot menu screen is shown below:

**Figure 5.9:        Boot Menu Screen**



Boot menu items are described in the table below.

**Table 5.9:        Boot Menu Items**

| Menu Item | Options | Description |
|-----------|---------|-------------|
| (*TBA*)   |         |             |

| | |
|---|---|
| **Remember!** | Wrong or incorrect settings may lead to abnormal system performance. <br> To correct possible errors, restart the BIOS Setup program and restore manufacturer's settings by selection of "Reset CMOS to factory defaults" command in the Main menu. |

## 5.5.1        Boot Settings Configuration

On selection of this item the following screen is shown:

**Figure 5.10:        Boot Settings Configuration Screen Image**

```
                    BIOS SETUP UTILITY
                          Boot

  Boot Settings Configuration                    Allows BIOS to skip
  ─────────────────────────────                  certain tests while
  Quick Boot                   [Enabled]         booting. This will
  Add On ROM Display Mode       [Force BIOS]     decrease the time
  Bootup Num-Lock               [On]             needed to boot the
  PS/2 Mouse Support            [Auto]           system.
  Wait For 'F1' If Error        [Disabled]
  Hit 'DEL' Message Display     [Enabled]
  Interrupt 19 Capture          [Enabled]


                                                 <->    Select Screen
                                                 up/dw  Select Item
                                                 +-     Change Option
                                                 F1     General Help
                                                 F10    Save and Exit
                                                 ESC    Exit


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```

The following table presents explanations on "Boot Settings Configuration" menu screen.

**Table 5.10:        Boot Settings Configuration Items**

| Menu Item | Function |
|-----------|----------|
| (*TBA*)   |          |

## 5.5.2 Boot Device Priority

On selection of this item the following screen is shown:

**Figure 5.11: Boot Device Priority Screen Image**
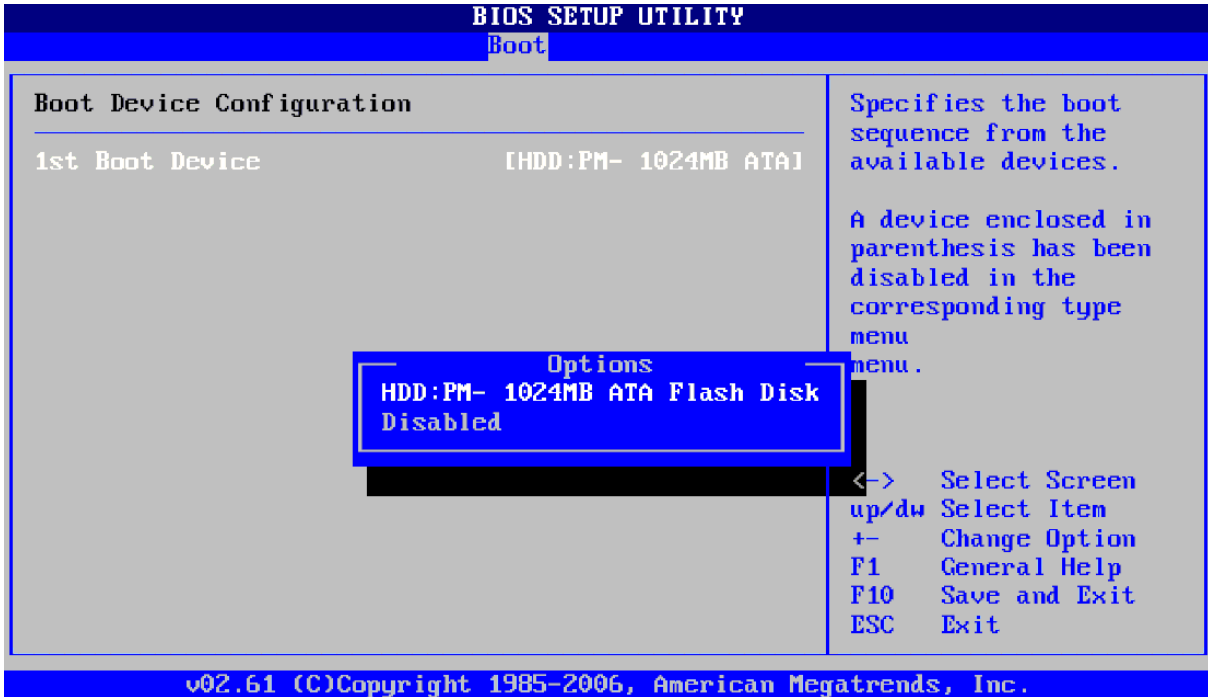


"Boot Device Priority" menu screen allows to set the first device to load operating system from. Booting from USB or IDE devices is possible.

# 5.6 Security Settings

Security menu screen is shown on the following figure:

**Figure 5.12:      Security Menu Screen**

```
                    BIOS SETUP UTILITY
  Main    Advanced   PCIPnP    Boot   Security   Chipset    Exit

  Security Settings                          Install or Change the
                                             password.
  Supervisor Password :Not Installed
  User Password        :Not Installed

  Change Supervisor Password
  Change User Password

  Boot Sector Virus Protection   [Disabled]


                                             <->    Select Screen
                                             up/dw Select Item
                                             Enter  Change
                                             F1     General Help
                                             F10    Save and Exit
                                             ESC    Exit


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```

**Table 5.11:      Security Menu Items**

| Menu Item | Options | Description |
|-----------|---------|-------------|
| (*TBA*)   |         |             |

# 5.7    Chipset Menu

The menu screen is shown in the figure below.

**Figure 5.13:        Chipset Menu Screen Image**

```
                          BIOS SETUP UTILITY
 Main     Advanced    PCIPnP    Boot     Security   Chipset     Exit

 Advanced Chipset Settings                       Options for NB

 WARNING: Setting wrong values in below sections
          may cause system to malfunction.

 ▶ NorthBridge Configuration
 ▶ SouthBridge Configuration




                                                 <->     Select Screen
                                                 up/dw Select Item
                                                 Ehter Go to Sub Screen
                                                 F1    General Help
                                                 F10   Save and Exit
                                                 ESC   Exit


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```

This menu provides access to North and South Bridges configuration sections.

**Table 5.12:        Chipset Menu Items**

| Menu Item | Options | Description |
|-----------|---------|-------------|
| (*TBA*) |  |  |

## 5.7.1    NorthBridge Configuration

On selection of this item the following screen is shown:

**Figure 5.14:    NorthBridge Configuration Screen Image**
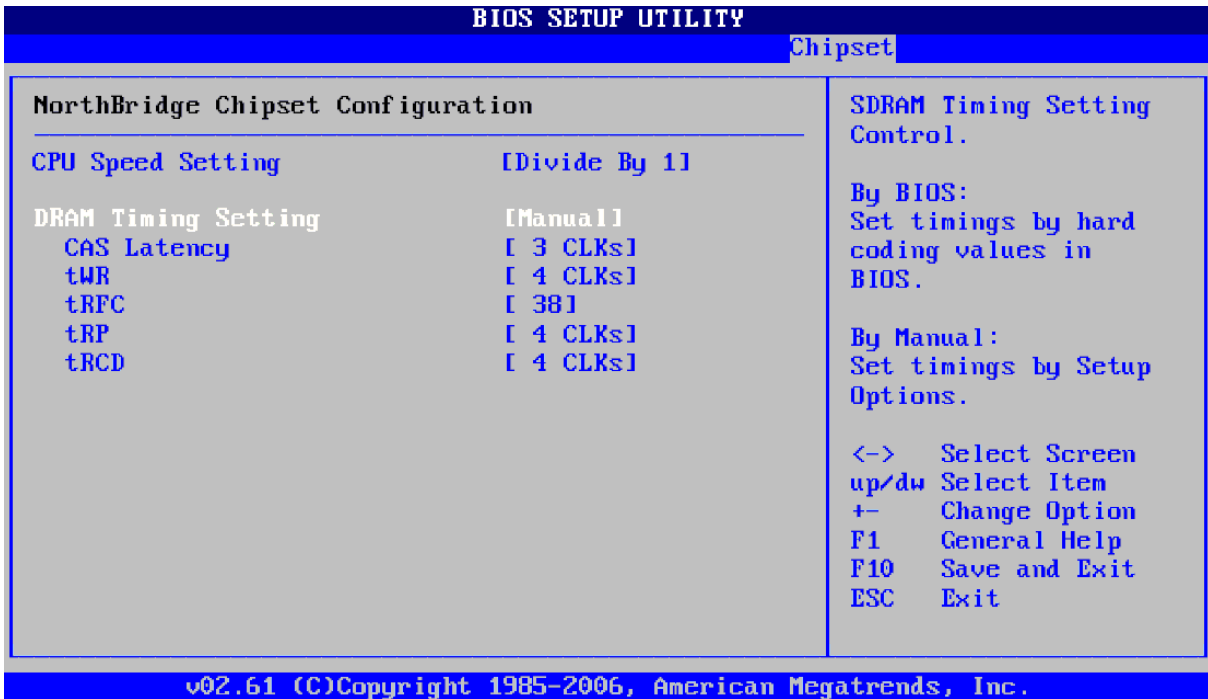


The following table presents explanations on "NorthBridge Configuration" menu screen.

**Table 5.13:    NorthBridge Configuration Items**

| Menu Item | Function |
|-----------|----------|
| (*TBA*)   |          |

## 5.7.2        SouthBridge Configuration

On selection of this item the following screen is shown:

**Figure 5.15:**        **SouthBridge Configuration Screen Image**



The following table presents explanations on "SouthBridge Configuration" menu screen.

**Table 5.14:**        **SouthBridge Configuration Items**

| Menu Item | Function |
|-----------|----------|
| (*TBA*)   |          |

## 5.7.2.1          ISA Configuration

On selection of this item the following screen is shown:

**Figure 5.16:          ISA Configuration Screen Image**

```
                        BIOS SETUP UTILITY
                                                    Chipset

ISA Clock                          [8.3MHz]                 Options
ISA 16bits I/O wait-state          [1 clock]
ISA 8bits I/O wait-state           [4 clock]       8.3MHz
ISA 16bits Memory wait-state       [1 clock]       16.6MHz
ISA 8bits Memory wait-state        [4 clock]




                                                   <->    Select Screen
                                                   up/dw  Select Item
                                                   +-     Change Option
                                                   F1     General Help
                                                   F10    Save and Exit
                                                   ESC    Exit


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```
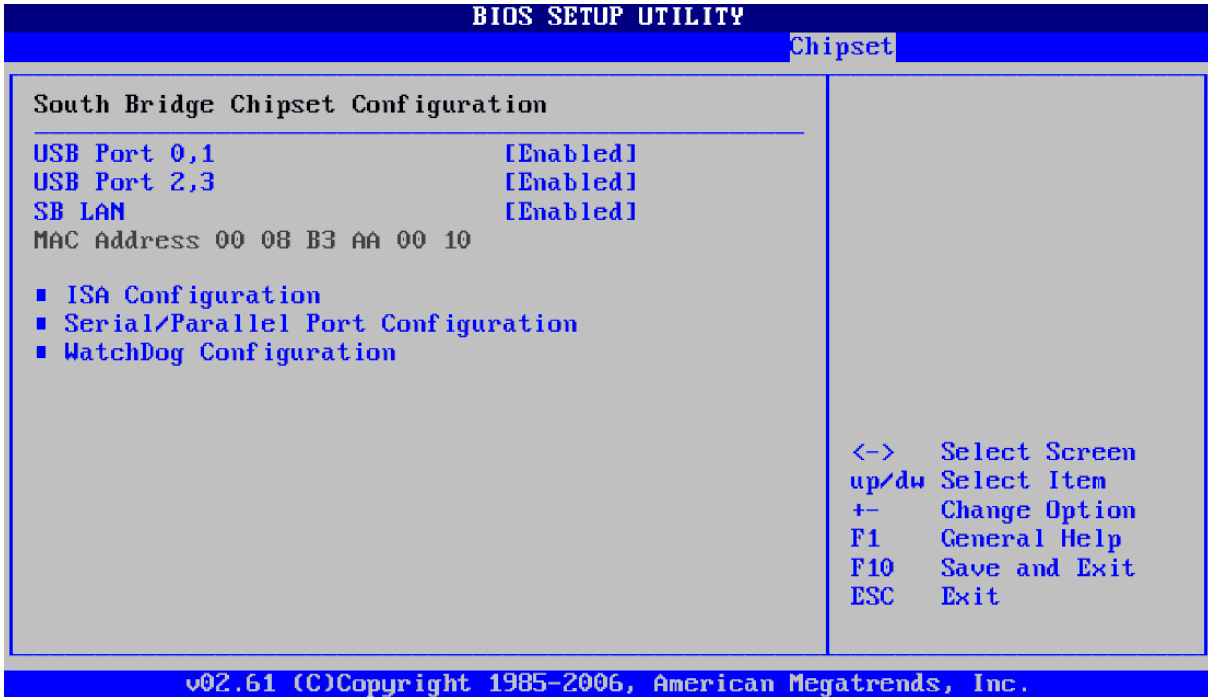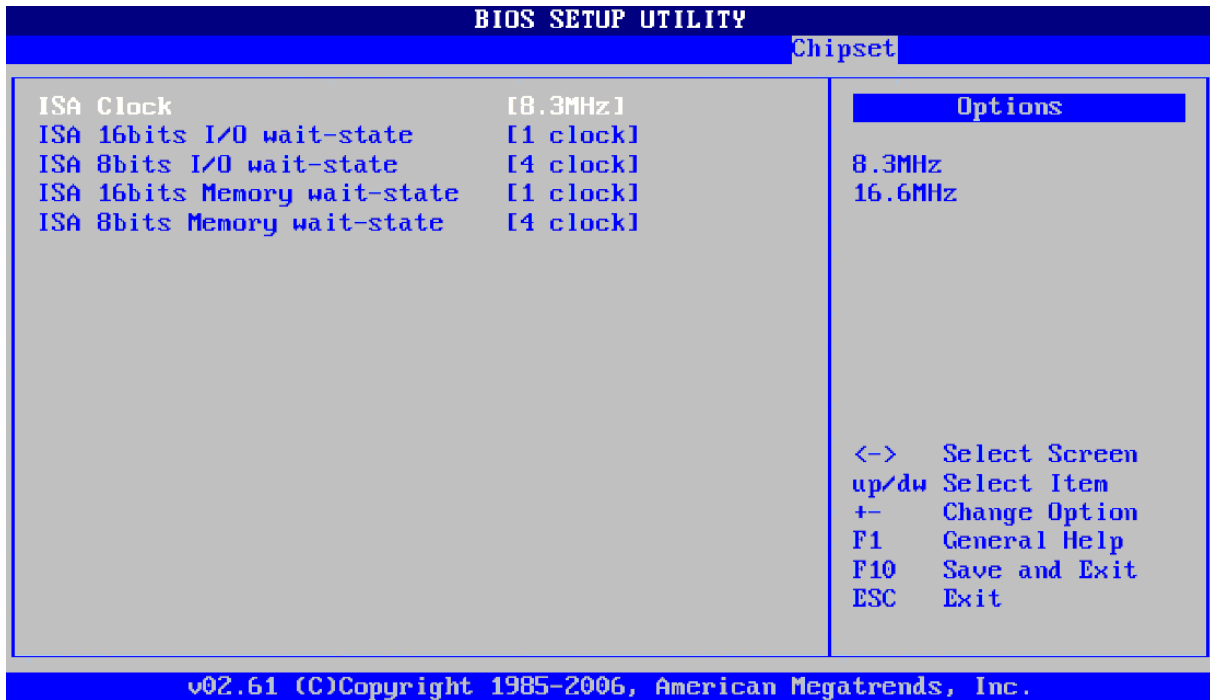
The following table presents ISA bus settings.

**Table 5.15:          ISA Configuration Items**

| Menu Item | Function |
|-----------|----------|
| (*TBA*)   |          |

## 5.7.2.2 Serial/Parallel Port Configuration

On selection of this item the following screen is shown:

**Figure 5.17:** **Serial/Parallel Port Configuration Screen Image**

```
                        BIOS SETUP UTILITY
                                                  Chipset

 SB Serial Port 1            [3E8]              Allows BIOS to Select
     Serial Port IRQ 1       [IRQ4]            Parallel Port Base
     Serial Port Boud Rate   [115200 BPS]      Addresses.
 SB Serial Port 2            [2E8]
     Serial Port IRQ 2       [IRQ3]
     Serial Port Boud Rate   [115200 BPS]
 SB Serial Port 3            [3F8]
     Serial Port IRQ 3       [IRQ4]
     Serial Port Boud Rate   [115200 BPS]
 SB Serial Port 4            [2F8]
     Serial Port IRQ 4       [IRQ3]
     Serial Port Boud Rate   [115200 BPS]
 SB Serial Port 9            [Disabled]        <->    Select Screen
 SB Parallel Port Address    [378]             up/dw  Select Item
     Parallel Port Mode      [EPP 1.7 AND SPP] +-     Change Option
     Parallel Port IRQ       [IRQ7]            F1     General Help
                                               F10    Save and Exit
                                               ESC    Exit

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```

The following table presents settings for serial/parallel ports.

**Table 5.16:** **Serial/Parallel Ports Settings**

| Menu Item | Function |
|---|---|
| (*TBA*) | |

### 5.7.2.3　WatchDog Configuration

This menu item allows to make settings for WDT0 and WDT1 watchdog timers. On selection of this item the following screen is shown:

**Figure 5.18:　WatchDog Configuration Screen Image**
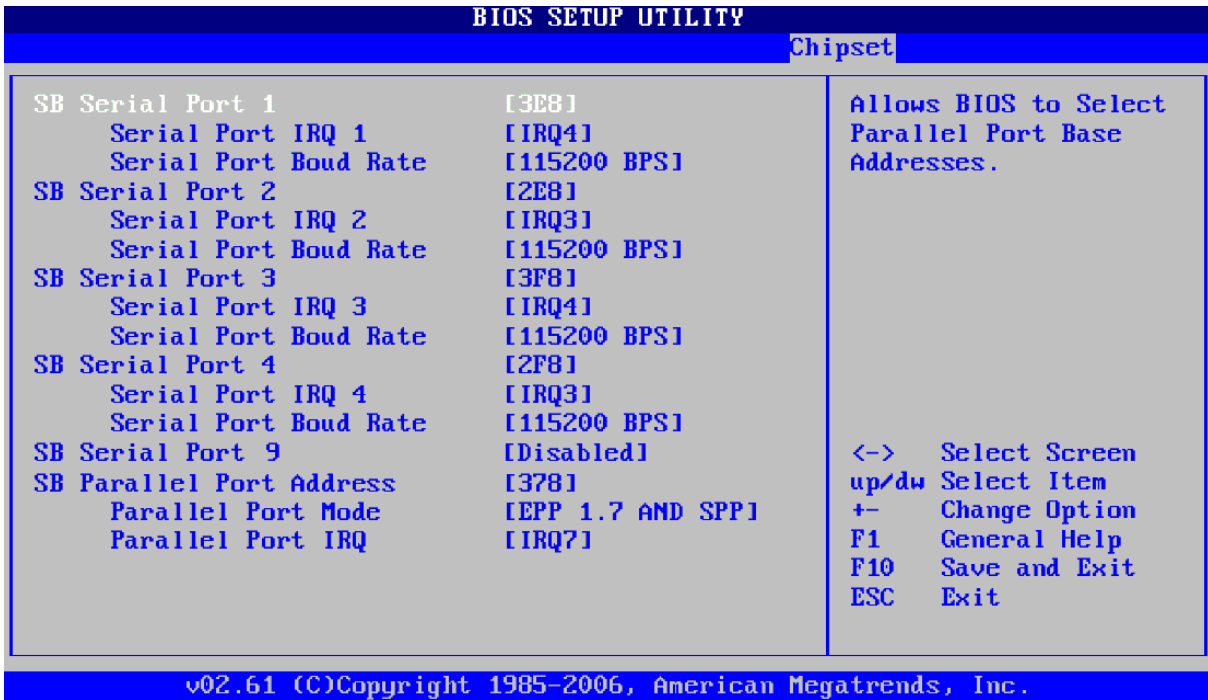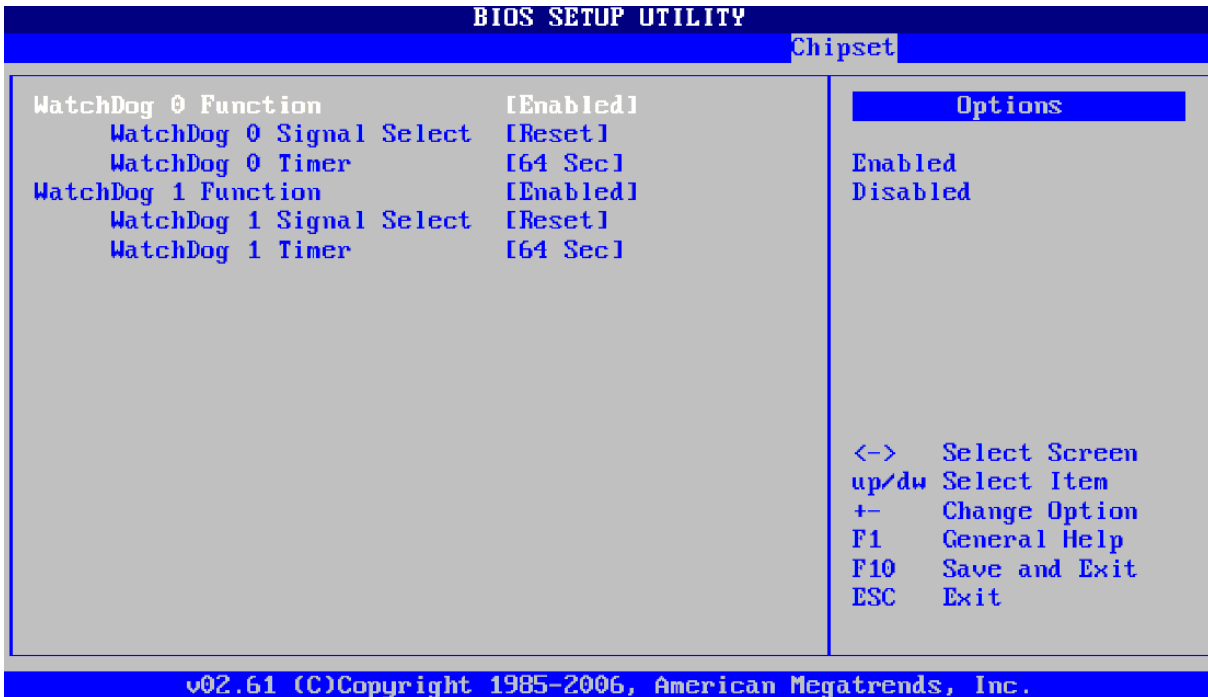


The following table presents settings for WDT0 and WDT1 watchdog timers.

**Table 5.17:　WDT0 and WDT1 Settings**

| Menu Item | Function |
|-----------|----------|
| (*TBA*) | |

# 5.8      Exit Menu

The figure below presents the Exit menu screen.

**Figure 5.19:      Exit Menu Screen Image**
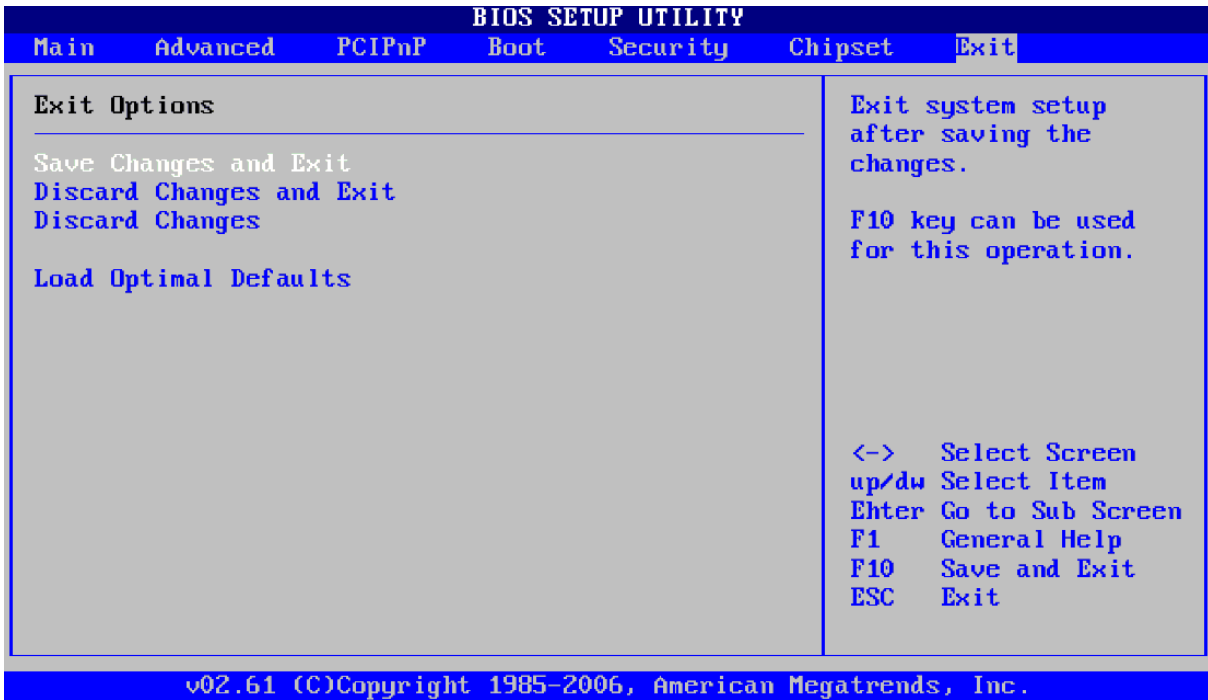


**Table 5.18:      Exit Menu Items**

| Menu Item | Description |
|-----------|-------------|
| Save Changes and Exit | Save settings in CMOS and FRAM memory and leave BIOS Setup |
| Discard Changes and Exit | Leave BIOS Setup without saving changes in CMOS and FRAM |
| Discard Changes | Discard the changes of BIOS settings without leaving BIOS Setup |
| Load Optimal Defaults | Load optimal (factory) settings without leaving BIOS Setup |