CPB906

Vortex86DX Based
COM Module

User Manual

Rev. 001 E

November 2010

P R E L I M I N A R Y

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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!

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 CPB906 CPU module, the details of its proper and safe installation, configuration and operation.

1.1 Module Introduction

CPB906 is the computer-on-module (COM) designed for use as a computing core in application specific embedded systems. CPB906 module is based on 32-bit x86 compatible highly-integrated Vortex86DX processor operating at 600 MHz with low power consumption and heat dissipation.

Small size (65x40 mm) of the CPB906 module together with low power consumption, high performance and functional expandability provide decisions flexibility in modern real-time control systems, industrial control systems, data aquisition and processing systems. It is equipped with wide range of interfaces, such as ISA, PCI, IDE/2xSDIO, 2xUSB2.0, Ethernet 10/100 Mbit, I2C, 2xRS232 (TTL), and GPIO.

All basic interface signals are routed to carrier board through high-density 220-contact connector (3-6318490-6, COM-Express Connector Socket 220-pin Type I, TYCO). Signals necessary for building a redundancy system are routed to separate 10-contact connector (JST BM10B-SRSS-TB, SMT Vertical Top Entry 10-pin Plug 1.00 mm, SH-Series).

1.2 Main Specifications

- CPU: Integrated in DM&P Vortex86DX SoC
  - 32-bit x86 x86 compatible core
  - 16-bit memory bus
  - Math coprocessor
  - 32 KB L1, 256 KB L2 cache
  - 6-stage pipeline
- System Memory
  - 256 MB DDR2 SDRAM
  - Soldered onboard
  - DDR333
- Flash-disk
  - 1 GB NAND Flash (SLC)
  - Soldered onboard
  - Connected to Secondary Master IDE channel
  - Can be used as bootable device

- IDE port
  - One Primary channel
  - Connection of up to two external devices
  - UltraDMA 100 support
- Flash BIOS
  - 256 KB reserved. One copy in SPI-Flash embedded in processor, another – external Flash on the carrier board – ISA bus
  - In-system modification
- Ethernet port:
  - 10/100 Mb/s
  - Operation mode LED indication
- USB ports (host):
  - USB 1.1, USB 2.0 support
  - Connection of up to two devices
- Serial ports:
  - COM1: RS-232 (5-wires, TTL-levels)
  - COM2: RS-232 (5-wires, TTL-levels)
  - Each port additionally supports automatic data flow control signal
  - Exchange rate: up to 115200 b/s
- 8-bit ISA expansion bus, 8/16 MHz
- 32-bit PCI expansion bus, 33 MHz
- LPC expansion bus
- PS/2 keyboard and mouse port
- I2C port
- Redundancy support
- Digital input/output port:
  - 6 CMOS/TTL lines (5 V level compatible)
  - 2 lines of embedded in the processor address decoder GPCS0#, GPCS1#; I/O or Memory address space
  - Input voltage: log. ‘0’ max 0.8 V, log. ‘1’ min 2.5 V
  - Output voltage: log. ‘0’ max 0.4 V @ 5 mA, log. ‘1’ min 2.4 V @ 2 mA
  - FPGA: XILINX XCS20-3TQ144I
- Two hardware watchdog timers:
  - Embedded in the processor
  - Programmable: 30.5 μs … 512 s
- 64 Kbit FRAM for user data storage
- Real time clock: power off consumption current 2 μA (normal conditions)
- Onboard lithium battery: 3 V (CR2032; 180…200 mAh capacity)
- Hardware reset/interrupt port
- External Power Fail signal source port
- Interrupt/reset generation on the power supply voltage drop below 4.7 V
- PC-buzzer port

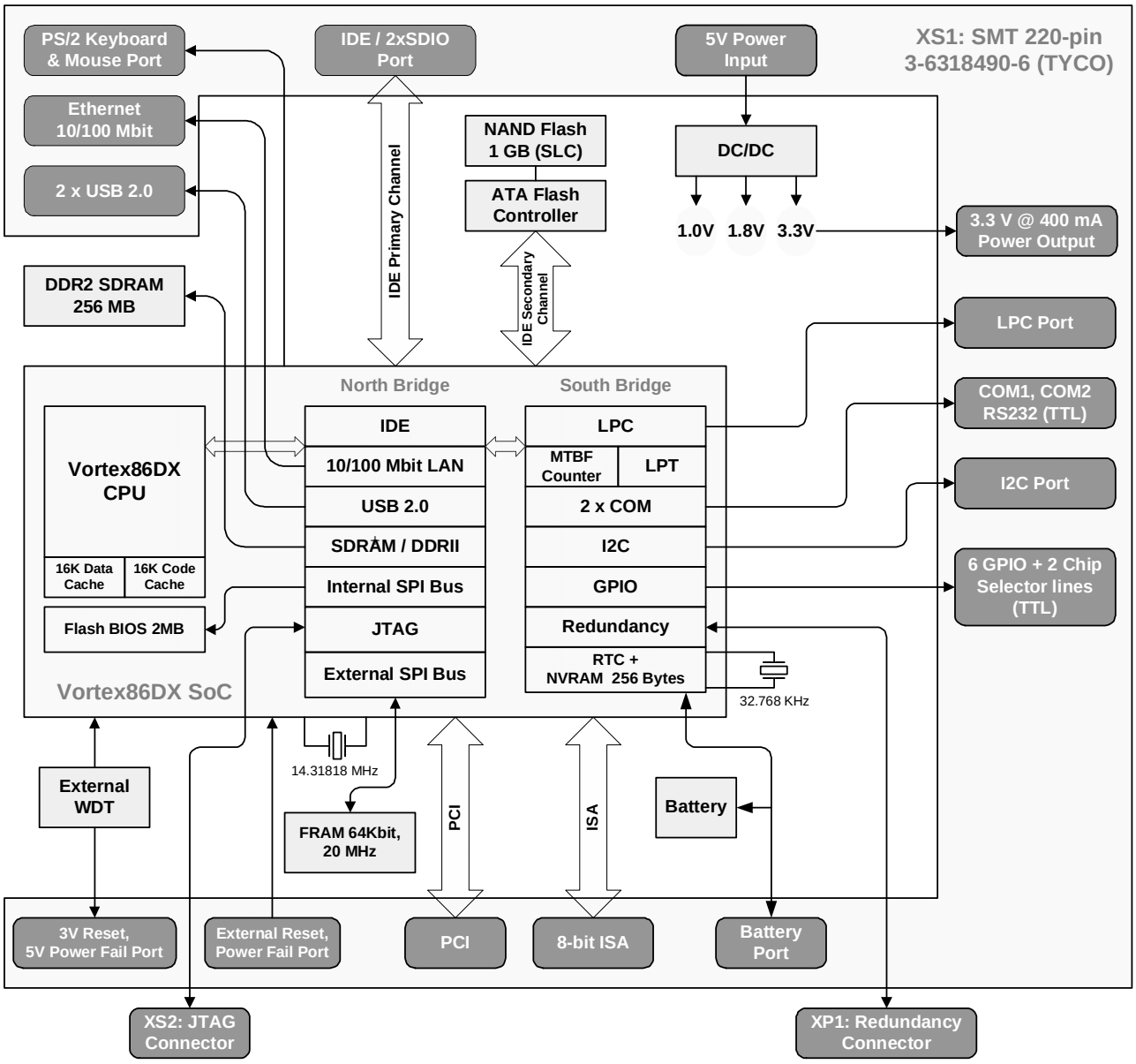
- Operatiing systems support:
  - Microsoft™ MS-DOS® 6.22
  - Fastwel™ FDOS 6.22
  - Microsoft™ Windows CE 5
  - Linux 2.6
  - QNX 6.4x
- Console ports
  - COM1/COM2 and/or VGA/LCD (via an external video adapter) and/or keyboard
- Power supply voltage and consumption current:
  - Not more than 5 V (± 10%) @ 450 mA (without external devices)
  - Max. consumption current (including internal and external devices): 3 A (limited by onboard fuse)
- Additional power supply voltage generated by module for use by external devices on the carrier board:
  - +3.3 V (± 5%) @ 400 mA
  - Max. current: 500 mA
  - Current is limited by self-resettable fuse
- Operating temperature range:
  - Industrial: -40°..+85°C:(CPB906-01-I)
  - Commercial: 0°...+70°C (CPB906-01-C)
- Relative humidity: up to 80%, non-condensing
- Storage conditions: 1 under GOST 15150-69
- Multiple shock resistance: 50 g
- Vibration resistance: 5 g
- MTBF: not less than 320000 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°C.
- Dimensions: 65.2×40.2×10.5 mm
- Weight: not more than 50 g

1.3 Functional Diagram

Functional diagram of the CPB906 module is shown in the figure below.

Figure 1.1: CPB906 Block Diagram

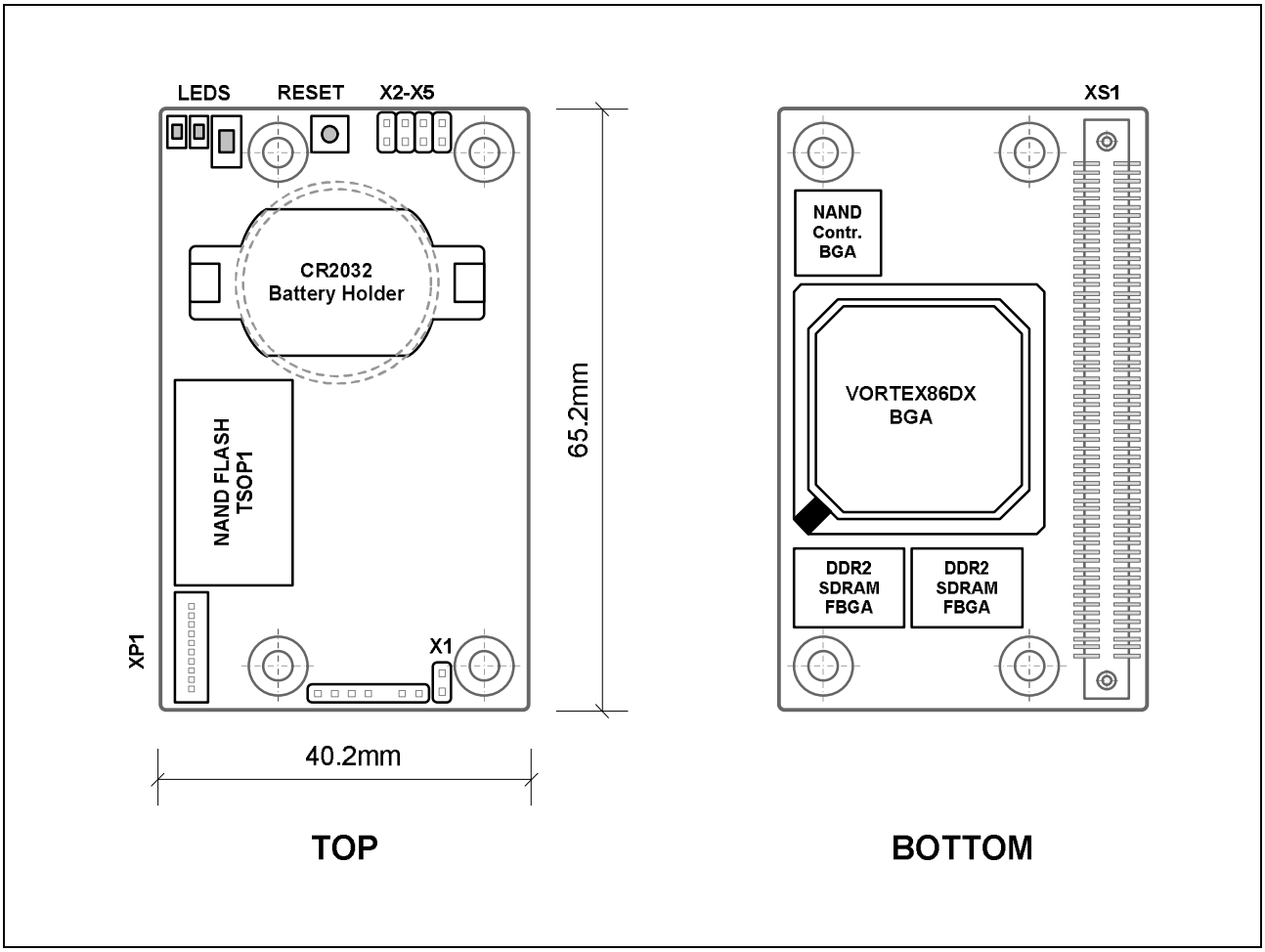


1.4 Appearance and Layout

Figure 1.2: CPB906 Module Appearance

The appearance may vary for different versions of the module.

Figure 1.3: CPB906 Main Components Layout



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

Connectors of module are described in corresponding sections of this document. Switches X1…X5 are described in Jumper Settings section of this document.

1.5 CPB906 Versions

At the present time the CPB906 module is manufactured in four versions differing in operating temperature range and protective coating.

Table 1.1: CPB906 Versions

Version	Operating Temperature	Protective Coating
CPB906-01-I	-40°C to +85°C	–
CPB906-01-C	0°C to +70°C	–
CPB906-01-I \COATED	-40°C to +85°C	+
CPB906-01-C \COATED	0°C to +70°C	+

1.6 Delivery Checklist

The standard delivery checklist of CPB906 processor module includes:

1. CPB906 processor module
2. CD-ROM with documentation and service software
3. Package

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.

1.7 Additional Accessories

Additional accessories are not supplied with the CPU module, are ordered separately.

Table 1.2: CPB906 Additional Accessories

Name	Description
KIB880-01	Carrier board for CPB906 processor module
DVK906-01	Development kit including: ▪ CPB906 processor module ▪ KIB880 carrier board ▪ VIM301 video processor module ▪ Set of cables and adaptors ▪ CD with software and documentation including list of components and electric schematic diagram of KIB880 carrier board
DVK906-02	Development kit including in addition to DVK906-01 kit: ▪ Windows CE 5.0 pre-installed on onboard flash-disk
DVK906-03	Development kit including in addition to DVK906-01 kit: ▪ Linux 2.6 pre-installed on onboard flash-disk

1.8 Functional Description

1.8.1 Vortex86DX SoC

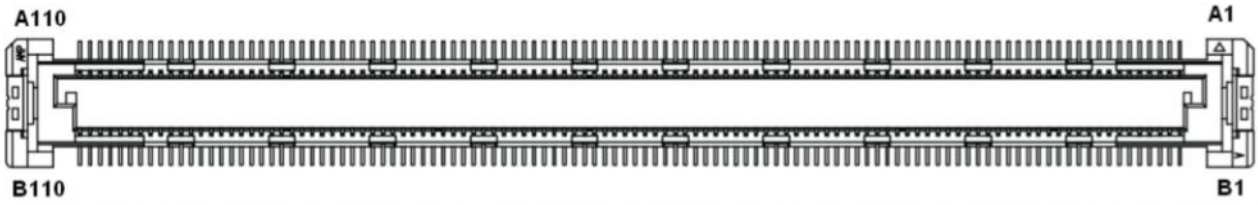
DM&P Vortex86DX includes the following main functional units:

- 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/SDIO controller;
- RS-232 serial ports;
- Universal parallel port;
- Four USB 2.0 ports;
- PS/2 keyboard/mouse port;
- PCI, ISA, LPC, and SPI bus controllers;
- I2C interface;
- 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.

1.8.2 XS1 Main High-Dencity Connector

All basic interfaces are routed to high-density 220-contact XS1 connector (TYCO 3-6318490-6, COM-Express Connector Socket, 220-pin, Type I).

Figure 1.4: XS1 Main High-Dencity Connector



It is recommended to use as a counterpart on carrier board TYCO 3-1827253-6 (5 mm between CPB906 and carrier board) or TYCO 3-6318491-6 (8 mm distance).

Figure 1.5: Connection of CPB906 COM-Express Connector and the Carrier Board Counterpart

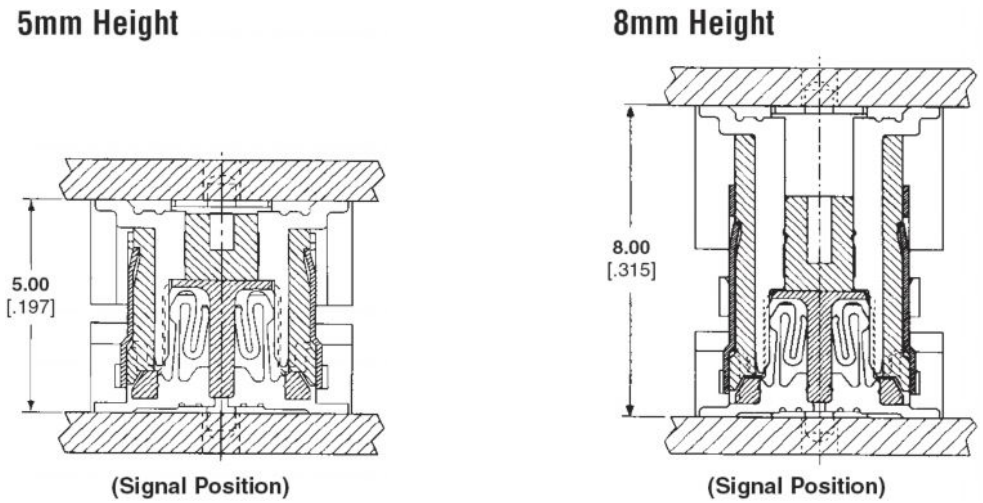


Table 1.3: XS1: Main High-Density Connector Pinout

Pin#	Signal	In/Out
A1	GND (Fixed)	–
A2	ISA_GPCS1#	Output
A3	ISA_GPCS0#	Output
A4	ISA_SD6	Input/Output
A5	ISA_SA5	Output
A6	ISA_SA1	Output
A7	ISA_SD2	Input/Output
A8	ISA_SD4	Input/Output
A9	ISA_SA2	Output
A10	ISA_SA3	Output
A11	GND (Fixed)	–

Pin#	Signal	In/Out
B1	GND (Fixed)	–
B2	ISA_IOCHK#	Input
B3	ISA_SD3	Input/Output
B4	ISA_IOR#	Output
B5	ISA_IRQ9	Input
B6	ISA_DACK2#	Output
B7	ISA_MEMW#	Output
B8	ISA_MEMR#	Output
B9	ISA_SMEMR#	Output
B10	ISA_SMEMW#	Output
B11	GND (Fixed)	–

Pin#	Signal	In/Out
A12	ISA_BCLK	Output
A13	ISA_SA4	Output
A14	ISA_SA19	Output
A15	ISA_SA17	Output
A16	ISA_SD0	Input/Output
A17	ISA_SA10	Output
A18	ISA_SD7	Input/Output
A19	ISA_SA8	Output
A20	ISA_SA9	Output
A21	GND (Fixed)	–
A22	ISA_SA18	Output
A23	ISA_SD5	Input/Output
A24	ISA_SA0	Output
A25	ISA_SA6	Output
A26	ISA_SA14	Output
A27	ISA_RST_DRV	Output
A28	ISA_SA15	Output
A29	ISA_DRQ3	Input
A30	ISA_ROMCS#	Output
A31	GND (Fixed)	–
A32	GPIO_P0_5	Input/Output
A33	GPIO_P0_3	Input/Output
A34	GPIO_P0_0	Input/Output
A35	GPIO_P0_1	Input/Output
A36	GPIO_P0_4	Input/Output
A37	GPIO_P0_2	Input/Output
A38	IDE_D7 SD0_WP	Input/Output Input
A39	IDE_D6 SD0_CD	Input/Output Input
A40	IDE_D8 SD1_D2	Input/Output
A41	GND (Fixed)	–
A42	IDE_D14 SD1_CD	Input/Output Input
A43	IDE_CS1#	Output
A44	IDE_D15 SD1_WP	Input/Output Input
A45	IDE_D4 SD0_D0	Input/Output
A46	IDE_PDIAG#	Input

Pin#	Signal	In/Out
B12	ISA_OSC14M	Out, 14.318MHz
B13	ISA_AEN	Output
B14	ISA_IRQ5	Input
B15	ISA_IRQ7	Input
B16	ISA_DACK3#	Output
B17	ISA_SA7	Output
B18	ISA_DACK1#	Output
B19	ISA_IRQ6	Input
B20	ISA_IRQ4	Input
B21	GND (Fixed)	–
B22	ISA_IOCHRDY#	Input
B23	ISA_IOW#	Output
B24	ISA_0WS#	Input
B25	ISA_REFRESH	Output
B26	ISA_TC	Output
B27	ISA_IRQ3	Input
B28	ISA_DRQ2	Input
B29	ISA_BALE	Output
B30	ISA_DRQ1	Input
B31	GND (Fixed)	–
B32	ISA_SA13	Output
B33	ISA_SD1	Input/Output
B34	ISA_SA11	Output
B35	ISA_SA12	Output
B36	ISA_SA16	Output
B37	IDE_D11 SD1_CLK	Input/Output Output
B38	IDE_IOR#	Output
B39	IDE_DACK#	Output
B40	IDE_IOW#	Output
B41	GND (Fixed)	–
B42	IDE_DRQ	Input
B43	IDE_IORDY	Input
B44	IDE_INT	Input
B45	IDE_A2	Output
B46	IDE_D3	Input/Output

Pin#	Signal	In/Out
A47	IDE_D0 SD0_D2	Input/Output
A48	IDE_A0	Output
A49	IDE_CS0#	Output
A50	SPK_DRV	Input/Output
A51	GND (Fixed)	–
A52	LAN_TX-	Output
A53	LAN_TX+	Output
A54	GND	
A55	LAN_RX+	Input
A56	LAN_RX-	Input
A57	GND	–
A58	USB0_D+	Input/Output
A59	USB0_D-	Input/Output
A60	GND (Fixed)	–
A61	COM1_RTS#	Output
A62	COM2_RTS#	Output
A63	COM2_TXD	Output
A64	COM1_TXD	Output
A65	COM2_RXD	Input
A66	COM1_RXD	Input
A67	COM2_TXEN	Output
A68	COM1_CTS#	Input
A69	COM2_CTS#	Input
A70	GND (Fixed)	–
A71	COM1_TXEN	Output
A72	RMT_PFO#	Input
A73	RMT_RESET#	Input
A74	PCI_AD2	Input/Output
A75	PCI_AD3	Input/Output
A76	PCI_AD4	Input/Output
A77	PCI_AD0	Input/Output
A78	PCI_INTA#	Input
A79	PCI_AD12	Input/Output
A80	GND (Fixed)	–

Pin#	Signal	In/Out
	SD0_CLK	Output
B47	IDE_D1 SD0_D3	Input/Output
B48	IDE_D9 SD1_D3	Input/Output
B49	IDE_D5 SD0_D1	Input/Output
B50	IDE_RST#	Output
B51	GND (Fixed)	–
B52	IDE_D2 SD0_CMD	Input/Output
B53	IDE_D10 SD1_CMD	Input/Output
B54	IDE_D12 SD1_D0	Input/Output
B55	IDE_A1	Output
B56	IDE_D13 SD1_D1	Input/Output
B57	GND	–
B58	USB1_D+	Input/Output
B59	USB1_D-	Input/Output
B60	GND (Fixed)	–
B61	LAN_LED_ACTIVE#	Input/Output
B62	LAN_LED_DUPLEX#	Input/Output
B63	CLOCK_24M	Output, 24 MHz
B64	LPC_AD3	Input/Output
B65	LPC_SERIRQ	Input/Output
B66	LPC_AD2	Input/Output
B67	LPC_DRQ#	Input
B68	LPC_AD0	Input/Output
B69	LPC_AD1	Input/Output
B70	GND (Fixed)	–
B71	LPC_FRAME#	Output
B72	MS_DAT	Input/Output
B73	KB_DAT	Input/Output
B74	KB_CLK	Input/Output
B75	MS_CLK	Input/Output
B76	I2C_SDA	Input/Output
B77	I2C_SCL	Input/Output
B78	PCI_AD1	Input/Output
B79	PCI_FRAME#	Input/Output
B80	GND (Fixed)	–

Pin#	Signal	In/Out
A81	PCI_AD8	Input/Output
A82	PCI_AD7	Input/Output
A83	PCI_CBE1#	Input/Output
A84	PCI_AD5	Input/Output
A85	PCI_AD9	Input/Output
A86	PCI_AD10	Input/Output
A87	PCI_AD14	Input/Output
A88	PCI_AD13	Input/Output
A89	PCI_STOP#	Input/Output
A90	GND (Fixed)	–
A91	PCI_RESET#	Output
A92	PCI_IRDY#	Input/Output
A93	PCI_TRDY#	Input/Output
A94	PCI_CBE3#	Input/Output
A95	PCI_AD26	Input/Output
A96	PCI_AD25	Input/Output
A97	PCI_GNT0#	Output
A98	PCI_AD24	Input/Output
A99	PCI_PREQ0#	Input/Output
A100	GND (Fixed)	–
A101	PCI_AD30	Input/Output
A102	PCI_PREQ1#	Input/Output
A103	PCI_PREQ2#	Input/Output
A104	PCI_AD28	Input/Output
A105	PCI_AD29	Input/Output
A106	PCI_AD27	Input/Output
A107	VBAT	Input/Output
A108	+5V_POWER	Input
A109	+5V_POWER	Input
A110	GND (Fixed)	–

Pin#	Signal	In/Out
B81	PCI_CBE0#	Input/Output
B82	PCI_DEVSEL#	Input/Output
B83	PCI_AD6	Input/Output
B84	PCI_PAR	Input/Output
B85	PCI_AD11	Input/Output
B86	PCI_AD15	Input/Output
B87	PCI_AD16	Input/Output
B88	PCI_CBE2#	Input/Output
B89	PCI_AD17	Input/Output
B90	GND (Fixed)	–
B91	PCI_AD19	Input/Output
B92	PCI_CLKB	Output
B93	PCI_CLKA	Output
B94	PCI_AD20	Input/Output
B95	PCI_AD18	Input/Output
B96	PCI_AD21	Input/Output
B97	PCI_AD31	Input/Output
B98	PCI_INTC#	Input
B99	PCI_INTB#	Input
B100	GND (Fixed)	–
B101	PCI_AD22	Input/Output
B102	PCI_AD23	Input/Output
B103	PCI_INTD#	Input
B104	PCI_GNT2#	Output
B105	PCI_GNT1#	Output
B106	+3V	Output
B107	+3V	Output
B108	+5V_POWER	Input
B109	+5V_POWER	Input
B110	GND (Fixed)	–

1.8.3 Supervisor and Watchdog Timers

CPB906 module includes power supply supervisor for monitoring of main voltages. Supervisor forms hardware reset signal (hereinafter – RESET) if 3.3V power supply voltage drops below 3.08 V level, as well as NMI / IRQ / RESET signal if 5V input power supply voltage drops below 4.7 V level. This helps in saving user data in nonvolatile memory if it is necessary. RESET signal generation on dropping the voltage below 4.7 V is enabled by a jumper switch (see the Jumper Settings section).

Two watchdog timers WDT0 and WDT1 having programmable timeout period from 30.5 μs to 512 seconds are integrated in Vortex86DX SoC. WDT0 and WDT1 are controlled via internal processor registers. Internal watchdog timers are enabled in BIOS Setup. The internal watchdog timers timeout expiry does not lead to hardware RESET signal generation.

Watchdog timers are used to eliminate software hang-ups.

1.8.3.1 WDT0 and WDT1 Registers Description

Access to WDT0 timer registers is performed via port 65h and ports 22h (Index address register) and 23h (Data register). To access the registers it is necessary to write the port address in 22h port, data reading and/or writing is performed via port 23h. The detailed description of WDT0 watchdog timer control registers is given in Tables 1.4…1.12.

Access to WDT1 timer registers is performed via port 67h – 6Dh. The detailed description of WDT1 watchdog timer control registers is given in Tables 1.13…1.19.

Table 1.4: WDT0 Restart Register

Address	Action	Bits							
		7	6	5	4	3	2	1	0
65h	Write	RST_WDT0							
	Read	-	-	-	-	-	-	-	-

Writing to this port leads to the WDT0 timer restart.

Table 1.5: WDT0 Port Address Index Register

Address	Action	Bits							
		7	6	5	4	3	2	1	0
22h	Write	ADDR_REG_WDT0							
	Read	-	-	-	-	-	-	-	-

ADDR_REG_WDT0. Indicates address of chosen WDT0 watchdog timer register for access via data register 23h.

Table 1.6: WDT0 Port Data Register

Address	Action	Bits							
		7	6	5	4	3	2	1	0
23h	Write	WRDATA_REG_WDT0							
	Read	WRDATA_REG_WDT0							

WRDATA_REG_WDT0. Contains data for writing in the internal WDT0 timer register; the address is indicated in the field ADDR_REG_WDT0 of address index register 22h.

WRDATA_REG_WDT0. Contains data while reading from the internal WDT0 timer register; the address is indicated in the field ADDR_REG_WDT0 of address index register 22h.

Table 1.7: WDT0 Timer Control Register

Address (in Address Register 22h)	Action	Bits (in Data Register 23h)							
		7	6	5	4	3	2	1	0
37h (40h)	Write	-	WDT0_WE	-	-	-	-	-	-
	Read	-	WDT0_WE	-	-	-	-	-	-

WDT0_WE. Enable/disable WDT0 watchdog timer operation:

1 – WDT0 enabled (default value);

0 – WDT0 disabled.

Table 1.8: WDT0 Event Selection Register

Address (in Address Register 22h)	Action	Bits (in Data Register 23h)							
		7	6	5	4	3	2	1	0
38h (D0h)	Write	WDT0_SSEL							
	Read								

WDT0_SSEL. Event selection on WDT0 timeout expiry.

Bits	Event	Bits	Event
0000	Reserved	1000	IRQ[11]
0001	IRQ[3]	1001	IRQ[12]
0010	IRQ[4]	1010	IRQ[14]
0011	IRQ[5]	1011	IRQ[15]
0100	IRQ[6]	1100	NMI
0101	IRQ[7]	1101	Module reset (default value)
0110	IRQ[9]	1110	Reserved
0111	IRQ[10]	1111	Reserved

Table 1.9: WDT0 Timer Value CNT0 Register

Address (in Address Register 22h)	Action	Bits (in Data Register 23h)							
		7	6	5	4	3	2	1	0
39h (00h)	Write	WDT0_CNT0							
	Read	WDT0_CNT0							

WDT0_CNT0. Bits [7:0] of WDT0_CNT [23:0] counter of WDT0 timer. LSB is 30.5 microseconds.

Table 1.10: WDT0 Timer Value CNT1 Register

Address (in Address Register 22h)	Action	Bits (in Data Register 23h)							
		7	6	5	4	3	2	1	0
3Ah (00h)	Write	WDT0_CNT1							
	Read	WDT0_CNT1							

WDT0_CNT1. Bits [15:8] of WDT0_CNT [23:0] counter of WDT0 timer. LSB is 30.5 microseconds.

Table 1.11: WDT0 Timer Value CNT2 Register

Address (in Address Register 22h)	Action	Bits (in Data Register 23h)							
		7	6	5	4	3	2	1	0
3Bh (20h)	Write	WDT0_CNT2							
	Read	WDT0_CNT2							

WDT0_CNT2. Bits [23:16] of WDT0_CNT [23:0] counter of WDT0 timer. LSB is 30.5 microseconds.

Table 1.12: WDT0 Timer Mode Register

Address (in address Register 22h)	Action	Bits (in the data Register 23h)							
		7	6	5	4	3	2	1	0
3Ch (00h)	Write	WDT0_WDTF	WDT0_WDTRL	-	-	-	-	-	-
	Read	WDT0_WDTF	-	-	-	-	-	-	-

WDT0_WDTF. WDT0 timer operation flag.

1 – There was timer operation (writing “1” in this bit resets the flag);

2 – There was no timer operation.

WDT0_WDTRL. WDT0 timer reset.

1 – WDT0-CNT counter reset;

0 – Writing of this value is not allowed.

Table 1.13: WDT1 Restart Register

Address	Action	Bits							
		7	6	5	4	3	2	1	0
67h	Write	RST_WDT1							
	Read	-	-	-	-	-	-	-	-

Writing to this port leads to the WDT1 timer restart.

Table 1.14: WDT1 Timer Control Register

Address	Action	Bits							
		7	6	5	4	3	2	1	0
68h (00h)	Write	-	WDT1_WE	-	-	-	-	-	-
	Read	-	WDT1_WE	-	-	-	-	-	-

WDT1_WE. Enable/disable WDT1 watchdog timer operation.

1 – WDT1 enabled;

0 – WDT1 disabled (default value).

Table 1.15: WDT1 Event Selection Register

Address	Action	Bits							
		7	6	5	4	3	2	1	0
69h (00h)	Write	WDT1_SSEL							
	Read								

WDT1_SSEL. Event selection on WDT1 timeout expiry.

Bits	Event	Bits	Event
0000	Reserved	1000	IRQ[11]
0001	IRQ[3]	1001	IRQ[12]
0010	IRQ[4]	1010	IRQ[14]
0011	IRQ[5]	1011	IRQ[15]
0100	IRQ[6]	1100	NMI
0101	IRQ[7]	1101	Module reset (default value)
0110	IRQ[9]	1110	Reserved
0111	IRQ[10]	1111	Reserved

Table 1.16: WDT1 Timer Value CNT0 Register

Address	Action	Bits							
		7	6	5	4	3	2	1	0
6Ah (00h)	Write	WDT1_CNT0							
	Read	WDT1_CNT0							

WDT1_CNT0. Bits [7:0] of WDT1_CNT [23:0] counter of WDT1 timer. LSB is 30.5 microseconds.

Table 1.17: WDT1 Timer Value CNT1 Register

Address	Action	Bits (in the data Register 23h)							
		7	6	5	4	3	2	1	0
6Bh (00h)	Write	WDT1_CNT1							
	Read	WDT1_CNT1							

WDT1_CNT1. Bits [15:8] of WDT1_CNT [23:0] counter of WDT1 timer. LSB is 30.5 microseconds.

Table 1.18: WDT1 Timer Value CNT2 Register

Address	Action	Bits							
		7	6	5	4	3	2	1	0
6Ch (00h)	Write	WDT1_CNT2							
	Read	WDT1_CNT2							

WDT1_CNT2. Bits [23:16] of WDT1_CNT [23:0] counter of WDT1 timer. LSB is 30.5 microseconds.

Table 1.19: WDT1 Timer Mode Register

Address	Action	Bits							
		7	6	5	4	3	2	1	0
6Dh (00h)	Write	WDT1_WDTF	-	-	-	-	-	-	-
	Read	WDT1_WDTF	-	-	-	-	-	-	-

WDT1_WDTF. WDT1 timer operation flag.

1 – There was timer operation (writing “1” in this bit resets flag);

2 – There was no timer operation.

1.8.4 SDRAM Memory

DDR2 SDRAM memory chips operating at 333 MHz are soldered on board. Total memory size is 256 MB. Add-in memory modules installation is not supported.

1.8.5 Flash BIOS

Built in processor 2 MB SPI-Flash memory is used for BIOS storage.

Usage of external flash memory installed on a carrier board for storage of BIOS copy is enabled by a set of signals: ISA_ROMCS#, ISA_MEMR#, and ISA_MEMW# routed to XS1 main high-density connector.

In case flash memory chip for BIOS storage is installed on carrier board, it is necessary to provide breaking of ISA_ROMCS# line between the main CPB906 connector and this flash memory chip in order to enable booting using internal BIOS copy from built in processor SPI-Flash memory.

1.8.6 ATA Flash Disk

CPB906 has SST55LD019B ATA flash disk controller connected to Secondary master IDE interface. The system detects this controller as an IDE disk which can be used as bootable; the disk can be disabled in BIOS Setup. Standard IDE driver may be used for work with the disk. The capacity of the soldered on-board NAND flash memory chip is 1 GB.

NAND flash disk contains the preinstalled FDOS 6.22 operating system compatible with MS DOS 6.22 and some software utilities providing operational availability of the module.

1.8.7 IDE/SDIO Port

Two devices with IDE interface can be connected to the module (HDD, CompactFlash, CD/DVD-ROM etc.). To enable this, Primary IDE channel signals (“IDE_” prefix) are routed to the main XS1 connector; Master / Slave modes are supported. Modes up to UDMA-100 are supported by IDE interface.

Alternatively, the port van be used for connection of two drives in SD-card format (“SD0_” and “SD1_” prefixes). Connected devices will be detected as Primary Master and Primary Slave.

Primaty IDE port function (IDE or SD) is set in BIOS Setup.

Important:

Simultaneous connection of external IDE devices and SD cards is not allowed. Before connecting external IDE devices to CPB906 make sure that no SD slot is populated and “IDE” mode is selected for Primary IDE in BIOS Setup. And vice versa, all IDE devices must be physically disconnected and the channel must be set to “SD” mode in BIOS Setup before connection of SD cards.

1.8.8 COM1, COM2 Serial Ports

The processor module has two asynchronous serial ports COM1 and COM2 routed to the main XS1 connector (“COM1_” and “COM2_” prefixes). COM1 and COM2 ports operate as 5-wire RS-232 interfaces (TTL-levels) and have standard PC/AT base addresses. Each port also includes additional transfer direction automatic control signal for convenience in building of RS422/485 ports on the basis of COM1 and COM2.

Both ports can be used for console input/output and files tranfer. By default, port COM1 is used for console operation.

Maximum data transfer rate for COM1 and COM2 is 750 Kb/s. The ports are fully software compatible with UART 16550.

Serial ports exchange rate is set in BIOS Setup. Exchange rate is determined by the value in processor frequency divider register. Value of divider is calculated using the following equation:

$$DIV = F / (16 \cdot BR),\ \ BR=F / (DIV \cdot 16)$$

F – Internal oscillator frequency, 1.8432 or 24 MHz;

DIV – Divider value.
For F = 1.8432 MHz minimum value is DIV = 1;
for F = 24 MHz minimum value is DIV = 2;

BR – Required exchange rate, bit/sec.

Attention:

Receiver allows deviation of exchange rate value: -3.0 % and +2.5 %.

Frequency divider values for some exchange rates are given in the table below:

Table 1.20: Frequency Divider Values for Serial Ports

Exchange Rate, bit/sec	F = 1.8432 MHz		F = 24 MHz	
	Divider	Error, %	Divider	Error, %
50	2304	-	30000	-
75	1536	-	20000	-
110	1047	-0.026	13636	-
150	768	-	10000	-
300	384	-	5000	-
600	192	-	2500	-
1200	96	-	1250	-
1800	64	-	833	-
2000	58	+0.69	750	-
2400	48	-	625	-
3600	32	-	417	-
4800	24	-	312	-
7200	16	-	208	-
9600	12	-	156	-
19200	6	-	78	-
38400	3	-	39	-
57600	2	-	26	-
115200	1	-	13	-
250000	-	-	6	-
256000	-	-	6	+2.34
375000	-	-	4	-

1.8.9 PS/2 Keyboard and Mouse Interface

PS/2 keyboard and mouse interface is routed to the main XS1 connector (signals with “KB_” and “MS_” prefixes).

1.8.10 RTC and Battery

CPB906 module includes AT-compatible real time clock with lithium battery backup. Expected battery life is about 10 years. However, the battery life depends greatly on operating and storage temperatures, as well as on power off time. Therefore, it is recommended to replace the battery approximately every four years.

Important!

Replacing the battery, observe polarity: “+” is up.

Dispose of used batteries according to the local regulations.

It is possible to connect an external battery or to use the battery mounted on CPB906 module by the carrier board (“RMT_VBAT” signal) if necessary. Battery power lines are routed to the main XS1 high density connector.

1.8.11 USB Interface

The module has two USB 2.0 host ports routed to the main XS1 connector (signals with “USB0_”, “USB1_” prefixes). Operation mode is selected in BIOS Setup. Each channel has separate power control and protection circuit (+5V, 500 mA). One USB device may be connected to each port. Booting from USB drive is supported.

1.8.12 Fast Ethernet Interface

One Fast Ethernet channel (10/100 Mb/s) is available via the main XS1 connector (signals with “LAN_” prefix). Ethernet controller is integrated in Vortex86DX SoC. Two more signals can be used for operation mode indication: LAN_LED_ACTIVE# - channel activity (active level ‘0’) and LAN_LED_DUPLEX# - channel operation mode (active level ‘0’).

1.8.13 FRAM

FRAM is non-volatile memory with serial SPI interface. 8 KB are available to the user.

FRAM can be addressed directly via SPI registers, for details, please refer to Vortex86DX and FRAM descriptions supplied on CD in **`...\CPB906\Techinfo`** folder. A sample is available in …**`\CPB906\Software\SFRAM906.zip`** file on the CD. (TBA)

1.8.14 Remote Reset/Interrupt, Remote Power Fail Signal Source Ports

To enable hardware reset signal from external RMT_RESET# signal (active level ‘0’) it is necessary to close X5 jumper switch contacts.

To enable hardware reset signal from external RMT_PFO# signal (active level ‘0’) it is necessary to close X2 jumper switch contacts.

1.8.15 8-bit ISA Port

8-bit ISA port includes all signals of standard 8-bit EISA expansion bus; it is routed to the main XS1 high density connector (signals with “ISA_” prefix).

1.8.16 LPC Port

LPC port includes all signals of standard LPC expansion bus and is routed to the main XS1 high density connector (“LPC_” prefix).

1.8.17 PCI Port (XS1)

PCI port includes standard 32-bit PCI bus signal set and is routed to the main XS1 high density connector (“PCI_” prefix).

1.8.18 I2C Port

I2C port is routed to the main XS1 high density connector (“I2C_” prefix) and is intended for connection of “slow” peripheral devices, such as temperature sensors, ADC, FRAM etc.

1.8.19 GPIO Port

GPIO port includes 6 CMOS/TTL lines (GPIO_P0(5:0) processor port) and 2 lines of built-in processor address decoder – ISA_GPCS0# and ISA_GPCS1# signals. All port signals are routed to the main XS1 high density connector.

1.8.20 PC-Buzzer Port

PC-buzzer port (“SPK_DRV” signal) is routed to the main XS1 connector.

1.8.21 LED indicators

Table 1.21: LED Indicators

LED	Function
HL1	Built-in FFD activity (green)
HL2	Two-color user LED (red/green)
HL3	Diagnostic LED (green)

HL2 LED is controlled via GPIO_P2[0] (red) and GPIO_P2[1] (green) processor ports. HL3 LED is controlled via GPIO_P0[7] processor port. Writing ‘0’ to GPIO port switches the corresponding LED on, writing ‘1’ switches LED off.

1.8.22 Redundancy Port

The redundancy port is routed to XP1 connector (JST BM10BSRSS-TB, SMT Vertical Top Entry 10-pin Plug 1.00 mm, SH-Series). It is used for connection to the other CPB906 module via the hardware redundancy interface embedded in processor.

It is recommended to use SSH-003-P0.2-H contacts (10 items for one connector) and JST SHR-10V-S housing as a counterpart.

Additional information on redundancy arrangement is available upon request.

Figure 1.6: Redundancy Connection

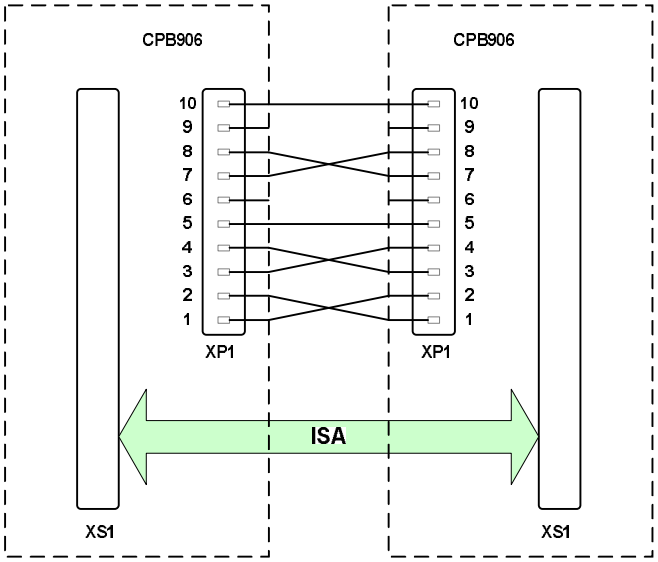


Table 1.22: XP1 Redundancy Connector Pinout

Pin #	Signal	In/Out
1	EXT_SYS_FAIL_OUT#	Output
2	EXT_SYS_FAIL_IN#	Input
3	RXD9	Input
4	TXD9	Output
5	GND	–
6	EXT_SYS_SWITCH_FAIL#	Input
7	EXT_GPCS#	Input
8	ISA_GPCS0#	Output
9	ISA_GPCS0#	Output
10	GND	–

2 Technical Information

2.1 Hardware Interrupts

Table 2.1: Interrupt Settings

IRQ	Default Source	Alternative Sources
NMI	-	▪ External ISA – devices (IOCHCK#) ▪ Internal WDT
IRQ0	Reserved (system timer)	-
IRQ1	PS/2 Keyboard	-
IRQ2	Reserved (cascading)	-
IRQ3	COM2 (Vortex86DX)	External ISA devices (IRQ3)
IRQ4	COM1 (Vortex86DX)	External ISA devices (IRQ4)
IRQ5	External ISA devices (IRQ5)	-
IRQ6	External FDD / External ISA devices	Internal WDT
IRQ7	External ISA devices (IRQ7)	-
IRQ8	RTC	-
IRQ9	External ISA devices (IRQ9)	-
IRQ10	Ethernet controller & USB	-
IRQ11	Ethernet controller & USB	-
IRQ12	PS/2 Mouse	-
IRQ13	Reserved (coprocessor support)	-
IRQ14	Primary IDE (HDD, CompactFlash, …)	-
IRQ15	Secondary IDE (FFD)	-

2.2 DMA Channels

Table 2.2: DMA Channels

DRQ	Source
DRQ0	–
DRQ1	External ISA devices
DRQ2	External ISA devices
DRQ3	External ISA devices
DRQ5	External ISA devices
DRQ6	External ISA devices
DRQ7	External ISA devices

2.3 I/O Addressing

Table 2.3: I/O Address Space

Address	Function	Note
0000h – 000Fh	Slave DMA	
0020h – 0021h	Master Interrupt Controller	
0022h – 0023h	Indirect Access	
0040h – 0043h	Timer / Counter	
0048h – 004Bh	PWM Control	
0060h 0064h	Keyboard / Mouse Control	
0061h	NMI Status / Control	
0065h 0067h	WDT Reload	
0068h – 006Dh	WDT Control	
0070h – 0071h	CMOS Memory / RTC	
0072h – 0075h	MTBF	
0081h – 008BFh	DMA Page	
0092h	System Control	
00A0h – 00A1h	Slave Interrupt Controller	
00C0h – 00DFh	Master DMA	
0278h – 027Fh	LPT	
0280h – 02BFh	ISA bus	
02E8h – 02EFh	COM4	
02F8h – 02FFh	COM2	
03E8h – 03EFh	COM3	
03F8h – 03FFh	COM1	
0481h – 0483h 0487h 0489h – 048Bh	DMA High Page	
0490h – 0499h	Interrupt Edge / Level Control	
04D0h – 04D1h	Instruction Counter	
0CF8h – 0CFFh	PCI Configuration	

2.4 Memory Addressing

Table 2.4: Memory Address Mapping

Address Range	Function	Note
00000 – 9FFFFh	DOS	DOS area, 640 KB
A0000 – BFFFFh	VGA	Video memory area, 128 KB
C0000 – DFFFFh	NV RAM ISA Expansion	Nonvolatile RAM / ISA devices
E0000 – EFFFFh	System BIOS	Extended System BIOS area, 64 KB (16KB×4)
F0000 – FFFFFh	System BIOS	System BIOS area, 64 KB

Address Range	Function	Note
10 0000 – Memory Top	DRAM	DDR2 SDRAM (256 MB installed)
Memory Top – FFE0 0000	PCI	PCI
FFE0 0000 – FFFF FFFFh	High BIOS	High BIOS area 2 MB (mapped to PCI)

2.5 GPIO Processor Ports

Vortex86DX includes four General Purpose Input Output ports (GPIO) available for user via internal SoC registers. Every port consists of 8 input-output lines; each line may be set as input or output by programming of the corresponding port registers.

Two 8-bit registers for each port are used to work with GPIO ports – Data register and Direction register. Each data register bit conforms to the corresponding circuit on the board: Bit 0 conforms to port line 0 (GPIO_Px0), Bit 7 conforms to port line 7 (GPIO_Px7) etc. Each direction register bit conforms to the corresponding circuit on the board: Bit 0 conforms to port line 0 (GPIO_Px0), bit 7 conforms to port line 7 (GPIO_Px7) etc

Table 2.5: Processor GPIO Control Registers

	GPIO_P0	GPIO_P1	GPIO_P2	GPIO_P3	Description
Data register	78h	79h	7Ah	7Bh	
Direction register	98h	99h	9Ah	9Bh	0: Line is input 1: Line is output

Table 2.6: Processor GPIO Lines Description

Line	Direction	Description
GPIO_P0[5:0]	Input / Output	Lines are routed to 220-contact connector
GPIO_P0[6]	–	Not used
GPIO_P0[7]	Output	HL2 green LED control: 1 – LED is on, 0 – LED is off
GPIO_P1[0]	Input	Reserved
GPIO_P1[1]	Output	Reserved
GPIO_P1[2]	Input	Power Fail line state (supply voltage dropped below 4.75 V): 1 – Normal Operation, 0 – PF signal created
GPIO_P1[3]	Input	External Power Fail signal line state: 1 – Normal operation, 0 – External PF signal received
GPIO_P1[4]	Input	External Reset signal line state: 1 – Normal operation, 0 – External Reset signal received
GPIO_P1[5]	Input	Reserved
GPIO_P1[6]	Input	Reserved
GPIO_P1[7]	Input	Built-in NAND Flash controller state: 0 – On, 1 – Off. Controlled only by BIOS program; control via the line is not allowed.
GPIO_P2[0]	Output	Two-colored HL3 – red LED control: 1 – LED is off, 0 – LED is on.
GPIO_P2[1]	Output	Two-colored HL3 – green LED control: 1 – LED is off, 0 – LED is on
GPIO_P2[7:2]	Input	Not used
GPIO_P3[3:0]	–	Reserved (SPI FRAM interface)
GPIO_P3[5:4]	–	Reserved (I2C interface)
GPIO_P3[6]	Input	Not used
GPIO_P3[7]	Input	Reserved

2.6 Overall and Mounting Dimensions

Figure 2.1: CPB906: Overall and Mounting Dimensions

TBA

3 System Setup

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

3.1 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.

The module can be installed on a carrier board with the compatible connector and properly positioned mounting holes.

Warning!

Preferably, 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.

Important!

When mounting the module on a carrier board make sure that the Main connector of CPB906 is properly oriented in relation to its counterpart connector. Misalignment of the connectors leads to possible damage to the module and a carrier board.

To provide the declared mechanical and electric characteristics, the use of supplied with the module fasteners and mounting hardware is obligatory.

Mounting or dismounting the module on a carrier board with system power on is not allowed. This can damage the module as well as a carrier board.

3.2 Jumper Settings

Some hardware configuration options are enabled with the help of X1 to X5 jumper switches. X1 switch is used to switch between internal and external BIOS copies. X2 to X5 switches are used to connect Power Fail, remote reset/interrupt signals to the hardware reset line of the processor.

“X# [0-0]” in the table below means that the jumper switch is open.

Table 3.1: Jumper Positions

Jumper Position	Description
X1 [1-2]	Use of external BIOS copy enabled
X1 [0-0]	Internal BIOS copy (built in processor SPI Flash) enabled
X2 [1-2]	External Power Fail signal (from XS1 connector) is connected to the processor hardware reset line
X3 [1-2]	Internal Power Fail signal (from internal power supply supervisor) is connected to the processor hardware reset line
X5 [1-2]	External remote reset/interrupt signal (from XS1 connector) is connected to the processor hardware reset line

3.3 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.

3.4 AMI BIOS

The AMI BIOS in CPB906 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.

3.4.1 BIOS Setup Program. Introduction

To enter the BIOS Setup program press “Del” on a keyboard connected to the module or F4 key on a keyboard of a console PC provided the “Remote Control” option is enabled. 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.

The highlighted with grey fields are information fields intended to show system information and are not available for editing.

Working with BIOS Setup, please refer to the integrated help system.

(TBA)

3.5 Basic Software

CPB906 is delivered with the onboard NAND Flash disk containing programs providing operational availability of the module:

- FDOS (Fastwel DOS) operating system compatible with MS-DOS 6.22
- Data tranfer service program (ftrans.exe)
- Utility for system files transfer (sys.com)

3.6 Service Software

3.6.1 SPIFLASH.EXE Utility

The **spiflash.exe** service utility is intended for modification of the internal BIOS copy stored in the SPI-Flash memory built in processor.

For modification of the SPI-Flas based BIOS it is necessary to run the utility with the "**u**" key and the BIOS file name as a parameter:

```
spiflash u bios.rom
```

3.7 CPB906 Programming FAQ

Q: My C program “hangs” when a screen output function is called. What is the reason?

A: Part of screen output functions in high-level language library directly address registers and memory of a graphics controller. If a CPB906 based system does not include a graphics controller, calling such functions will result in complications. Selecting a screen output function, one should consider its pecularities. Such information can always be found in the description of a library.

Q: Working with CPB906 module, I use **SmartLink** terminal program. I discovered that some files tranferred to the module with the help of **FTRANS.EXE** program are saved in the module with errors. What is the reason for that?

A: The reason is that SmartLink program for files transfer using **FTRANS.EXE** program employs XMODEM protocol. This protocol has low transmission errors detection capability.

In order to completely avoid file transfer errors, it is strongly recommended not to use **SmartLink** program. Instead, use a terminal program supporting XMODEM/CRC protocol (e.g. HYPERTERMINAL, TELEMAX, TERM90, TERM95). To tranfer files, use **FTRANS** utility with **/CRC** key.

4 Appendices

4.1 KIB880 Carrier Board

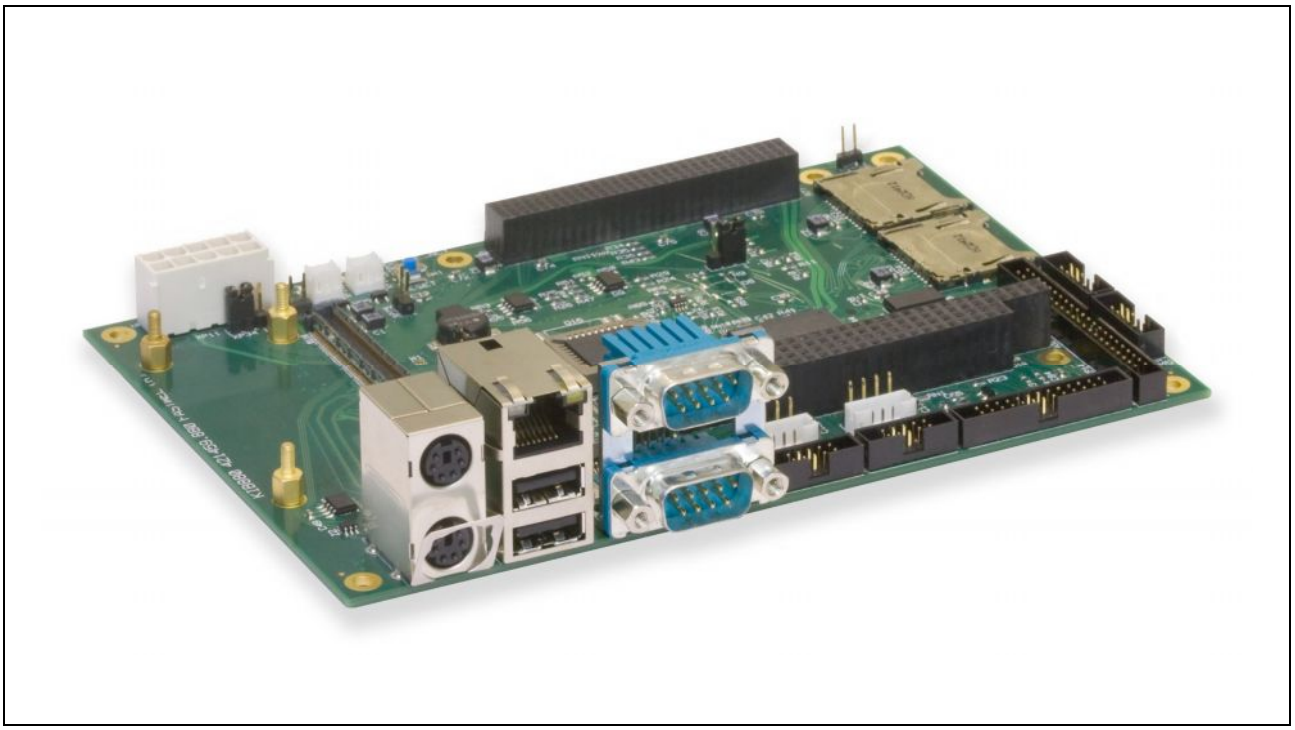
This section contains brief description of KIB880 carrier board.

4.1.1 Introduction

KIB880 is an EPIC development board for CPB906 processor module, designed especially to provide a quick start for CPB906-based applications. It can be used for initial software and hardware development and debugging. KIB880 with CPB906 processor module can also be used as a ready-to-use solution for some applications.

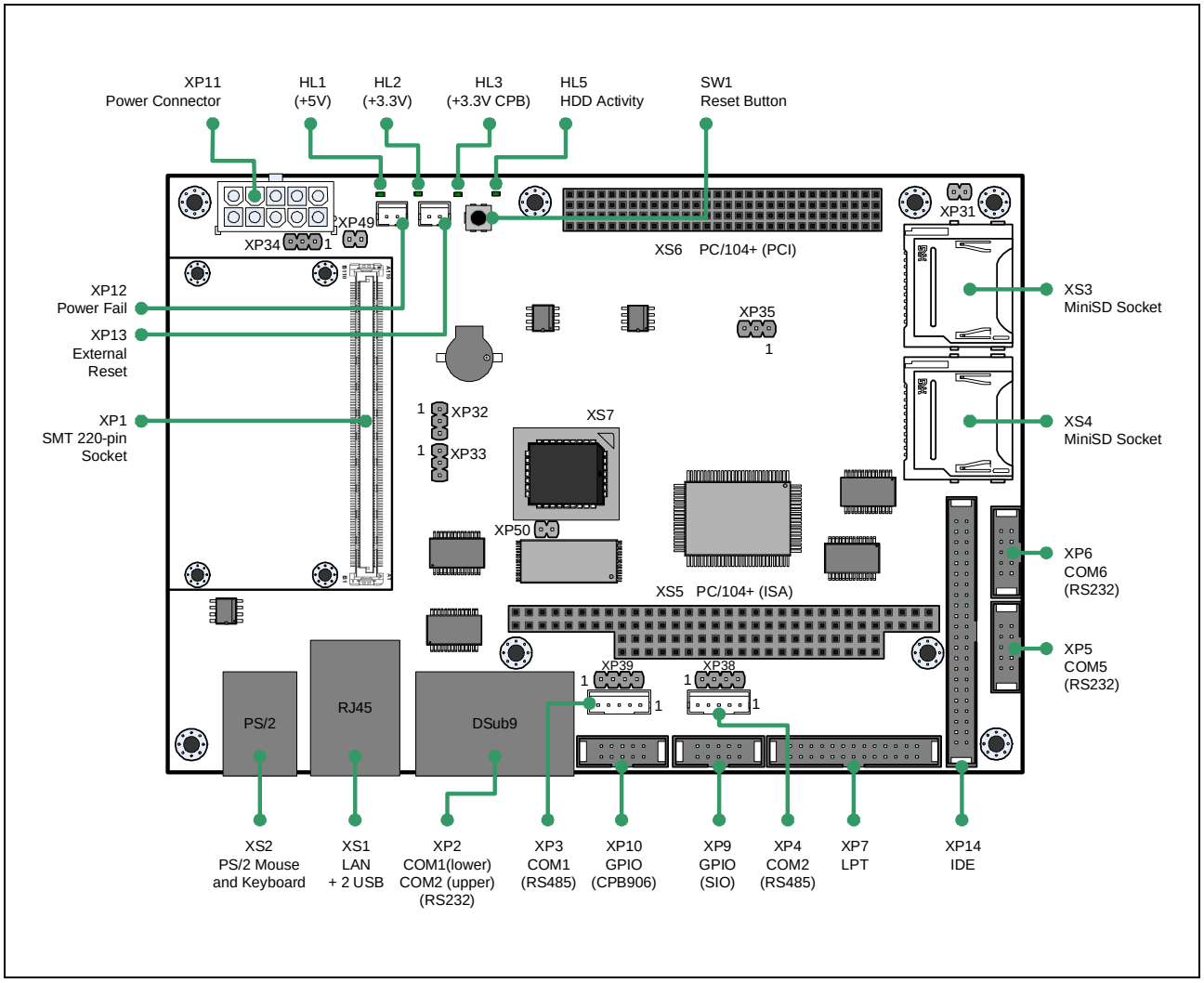
4.1.2 Appearance and Layout

Figure 4.1: KIB880 Appearance



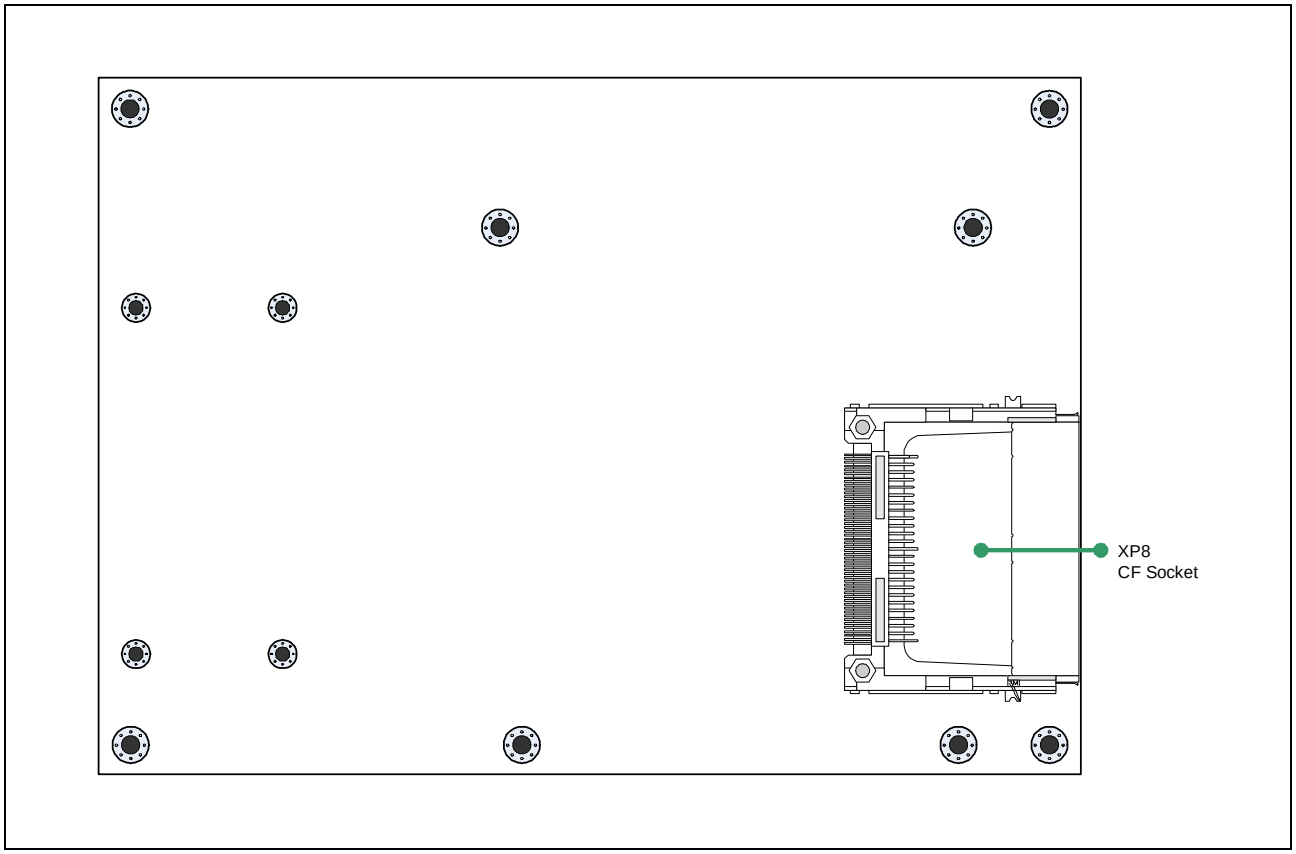
The appearance may vary for different versions of the module.

Figure 4.2: KIB880 Main Components Layout: Top Side



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

Figure 4.3: KIB880 Main Components Layout: Bottom Side

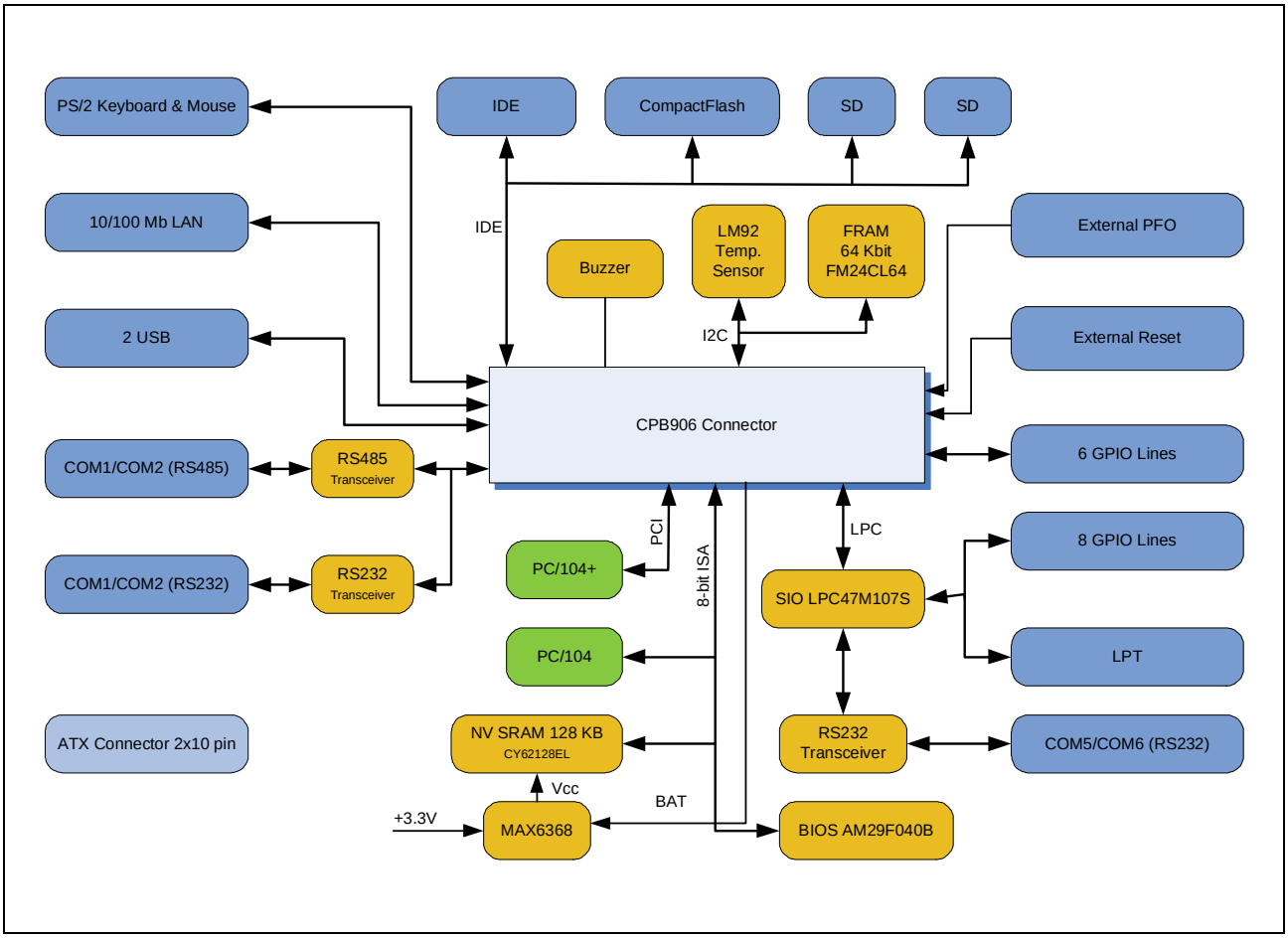


The layout may slightly differ for various versions of the module.

4.1.3 Functional Diagram

Functional diagram of the KIB880 carrier board is shown in the figure below.

Figure 4.4: KIB880 Block Diagram



4.1.4 Specifications

- Compatibility with CPB906
- Form-factor: EPIC
- Expansion modules support:
  - PC/104 (8-bit ISA);
  - PC/104+ (8-bit ISA, PCI)
- IDE channel:
  - Shared with SDIO port;
  - Primary channel;
  - Up to two devices;
  - UltraDMA 100 support;
  - CompactFlash Type I/II socket

- SDIO channel:
  - shared with IDE port;
  - MiniSD cards support;
  - Up to two devices
- LAN:
  - One 10/100 Mb/s Ethernet channel
  - MAC + PHY
  - Not less than 500 V isolation
- USB:
  - USB 1.1, 2.0 (HS, FS, LS) support;
  - Up to two devices via Type A connectors
  - 500 V isolation
- Serial ports:
  - COM1, COM2: 4 wire RS232, up to 115200 b/s;
  - COM1, COM2: RS422/485, up to 115200 b/s;
  - Automatic data flow control signals supported;
  - COM5*, COM6*: via LPC47M107S SuperIO, RS232, up to 115200 b/s
- Universal parallel port*:
  - SPP, EPP, ECP modes support
  - Via LPC47M107S SuperIO
- PS/2 mouse and keyboard port
- Discrete I/O ports (TTL, 5V):
  - 6 channels via CPB906 GPIO;
  - 8 channels via LPC SuperIO GPIO*.
- External Reset & PFO (TTL, 5V)
- Temperature sensor: NS LM92 (I2C port)
- FRAM: 64 Kb (I2C port)
- Flash memory (AM29F040) for reserve BIOS copy storage
- Non-volatile SRAM:
  - 128 KB
  - CPB906 battery support
- Console operation via COM1, COM2 serial ports
  - (TBA)
- Power supply:
  - +5 V ±5%
  - +12V and -12V routed from ATX connector to PC/104 lines
- Power consumption:
  - 0.1 A @ +5 V, 0.1 A @ +3.3 V
- Operating temperature: –40°C to +85°C
- MTBF: Not less than 400000 hours (*TBA*)

  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.

- Stability:
  - Vibration: 5g
  - Single shock: 100g
  - Multiple shock: 50g
- Weight: not more than 0.2 kg

Interfaces marked with (*) are not supported by BIOS version of 22.10.2009.

4.1.5 Delivery Checklist

1. KIB880 module;
2. A set of counterparts for KIB880 connectors;
3. CD with software and documentation (developer's kit);
4. CD with software and documentation (standard Fastwel CD);
5. Consumer package

4.1.6 External Connections

Figure 4.5: KIB880 External Connections Diagram