Fastwel

CPB904

ETX
AMD Geode LX 800 Based
Computer-on-Module

User Manual

Rev. 001 E

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P r e l i m i n a r y

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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 Faswel 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 CPB904 processor module, the details of its proper and safe installation, configuration and operation.

1.1   Module Introduction

CPB904 is an ETX computer-on-module (COM), highly integrated and compact single board computer for use in systems requiring low power consumption and wide operating temperature range. All I/O signals as well as full realization of ISA and PCI buses are mapped to four standard high density, low profile connectors on the bottom side of the module. CPB904 is designed for use in applications being mounted on an ETX baseboard.

CPB904 is based on low power AMD Geode LX800 CPU and AMD CS5536AC I/O companion. Dynamic Memory interface supports 64-bit DDR SDRAM via SODIMM socket and soldered 128 or 256 MB memory bank.

All key components including CPU, chipset, memory, and periphery controllers are soldered on-board providing excellent vibration stability and increased efficiency of protective conformal coating.

CPB904 offers wide variety of data display capabilities. It allows simultaneous operation of standard VGA interface, 24-bit LVDS interface, and 18-bit interface for TFT or DSTN LCD panels connection. In addition TV output is available.

Data storage subsystem is based on single-channel IDE controller, that is able to drive up to two IDE devices: two external hard drives, CompactFlash card.

For data exchange, CPB904 uses one independent Fast Ethernet port, three COM ports, four USB 2.0 ports, IrDA port, and parallel port combined with FDD and with 17 programmable discrete input/output lines.

System control and management capabilities of CPB904 include watchdog timer, reserved BIOS, and possibility to save system configuration and emergency parameters in FRAM chip.

CPB904 is manufactured in three versions: CPB904-01 (256 MB of soldered system memory), CPB904-02 (512 MB soldered), and CPB904-03 with SODIMM socket for up to 512 MB DDR SDRAM.

CPB904 is designed for operation within industrial temperature range from –40 C to +85°C.

CPB904 supports wide range of operating systems – Fastwel DOS (MS DOS-compatible), Windows XP embedded, QNX 4.25 and 6.3x, Linux 2.4, and Windows CE.NET 4.2.

The appearance may vary for different versions of the module.

1.2 CPB904 Versions

At the present time the CPB904 module is manufactured in three versions differing in system memory size.

Table 1.1: **CPB904 Versions**

Version	Decimal ID
CPB904-01	256 MB DDR SDRAM soldered memory
CPB904-02	512 MB DDR SDRAM soldered memory
CPB904-03	SODIMM socket for DDR SDRAM, no soldered memory

1.3   Delivery Checklist

Table 1.2:   **CPB904 Supplied Set**

Code	Description	Note
CPB904-01 CPB904-02 CPB904-03	Processor module	–
	CD ROM with documentation and service software	
	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   Supplementary Information

1.4.1   Related Documents

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

Table 1.3:   **Related Publications**

Product	Publication
CompactFlash cards	CF+ and CompactFlash Specification Revision 1.4
Processor	AMD Geode™ LX Processor Reference Schematic AMD Geode™ LX Processors Data Book AMD Geode™ CS5536 Companion Device Preliminary Data Book AMD Geode™ LX Processor and CS5535/CS5536 Companion Devices Layout Recommendations
Super I/O	Winbond W83627HF SuperIO Data sheet

2   Technical Specifications

2.1   General

- CPU: AMD Geode LX800 500 MHz
    - 32-bit x86/x87 compatible core
    - 64-bit coprocessor
    - 64-bit memory bus, up to 400 MHz
    - 64 KB L1, 128 KB L2 cache
    - Integrated FPU supports the Intel MMX™ and AMD 3DNow!™ Technology instruction sets
- System memory
    - 256 or 512 MB soldered SDRAM
    - DDR333
    - Up to 512 MB in SODIMM socket (for CPB904-03)
- Flash BIOS
    - 2x512 KB, reserved
    - In-system modification
- Storage:
    - Support for up to two UltraDMA-100 IDE devices
    - Solid state disk: soldered, 64 MB NAND flash, with MS DOS-compatible Fastwel file system
    - MiniSD socket on board
    - CompactFlash (via KIB1282)
- Serial ports
    - Three serial ports
    - High speed 16C550 compatible
    - COM1, COM2: RS232, 9 wires, up to 115.2 Kb/s
    - COM3: RS232, TX/RX, for remote PC connection
- USB
    - Four USB 2.0 channels
- Ethernet
    - One Fast Ethernet port 10/100 Mb/s

- Video controller
  - 2D accelerator
  - Video memory 64 MB shared with system
  - LCD (TFT or DSTN) panels support, resolution up to 1600×1200 at 60 Hz
  - 18-bit color via TFT interface, 24-bit color via LVDS
  - Analog display support,
    resolution 1600×1200 at 100 Hz, 1920×1440 at 85 Hz, 32-bit
  - LVDS interface
- Discrete I/O
  - 17 discrete I/O lines, shared with LPT port
- Watchdog timer
  - Fixed timeout period 1.6 s
- Safety
  - System configuration settings stored in CMOS+SFRAM
  - Saving essential user data in SFRAM in case of power failure
  - CPU temperature and voltages monitoring
- RTC
  - On-board real time clock with Li battery on baseboard
- PS/2
  - PS/2 keyboard and mouse interface
- FDD
  - Floppy disk interface
- Parallel port
  - SPP/ECP/EPP compatible. Lines, shared with FDD controller
- Expansion Buses
  - 32-bit PCI
  - 16-bit ISA
- X1-X4 ETX headers
- Software Support:
  - General Software® BIOS
  - Fastwel DOS, Windows XP Embedded, QNX® 4.25 and 6.3x, Linux® 2.4, Windows CE.NET 4.2

2.2   Power Requirements

The module is powered via X1-X4 ETX connectors by an external DC power source providing the following characteristics:

- Voltage: +5 V ±5% (from +4.75 V to +5.25 V)
- Consumption current (without external devices): 1.2 A

Note:

+5 V SB voltage is used in testing mode. +5 V voltage may be supplied via J6 connector while testing the module

2.3 Environmental

- Operating temperature range from: -40°C to +85°C
- Storage temperature: -55°C to +90°C
- Relative humidity: 5% to 95% at 25°C, noncondensing

2.4 Mechanical

- Vibration – TBD;
- Single shock, peak acceleration – TBD;
- Multiple shock, peak acceleration – TBD.

2.5 Dimensions and Weight

- Dimensions, not more: 114 × 95 × 11.4 mm (4.5" × 3.7" × 0.45")
- Weight, not more: ~0.1 kg (TBD later)
  (without SODIMM memory module and MiniSD card)

2.6 MTBF

- MTBF for CPB904 is 200000 hours

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

3   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.

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.

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 oparability 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.

3.2   Connection of Peripheral Devices

External devices, except for MiniSD cards, are connected to CPB904 via KIB1282 ATX carrier board for ETX/XTX computer modules.

Figure 3.1:   KIB1282 Baseboard Appearance
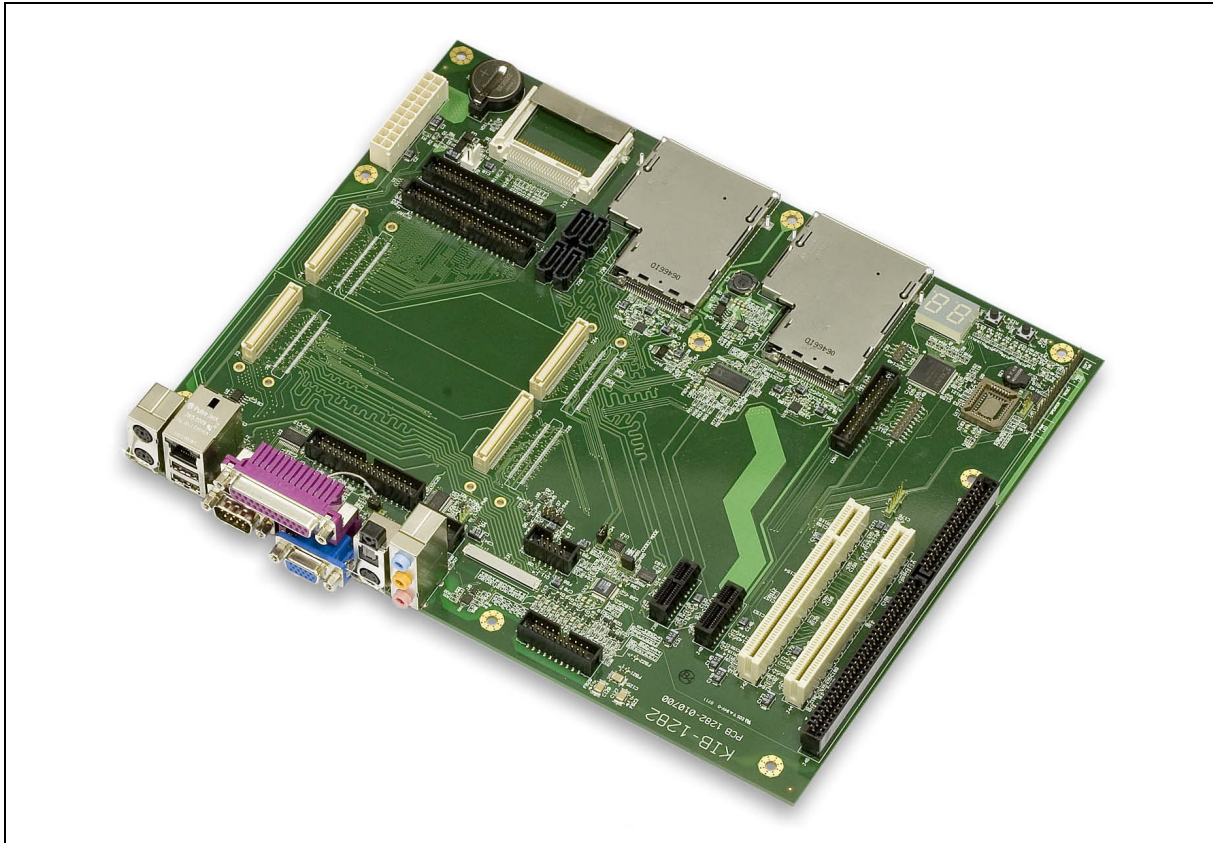
The appearance may vary for different versions of the module.

KIB1282 baseboard provides access to the following interfaces and connectors:
VGA (D-Sub connector), S-Video, LVDS, FastEthernet 10/100-BaseT (one RJ45 connector), two x1 PCI Express connectors, one 16-bit ISA and two PCI headers, USB 2.0 (four Type A connectors), IDE UltraATA, four standard SATA connectors, CF Type I/II socket with IDE interface, two RS232 COM ports, LPT and FDD standard connectors, two PS/2 connectors, two ExpressCard™ slots, Audio line in/out, HD (5+1 out) Audio Codec, two MIC, IrDA, LPC interface, SMBUS, PLCC, fan connector, control&signalling interfaces and LEDs, ATX power supply header.

3.3   Software Installation

Operating system is loaded from the on-board NAND Flash memory by default. Operating system on this flash-disk is FDOS supplemented with utilities.

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.

4   Functional Description

4.1   Structure and Layout

Functional diagram of the CPB904 module is shown in Figure 4.1.

Figure 4.1:   **CPB904 Block Diagram**
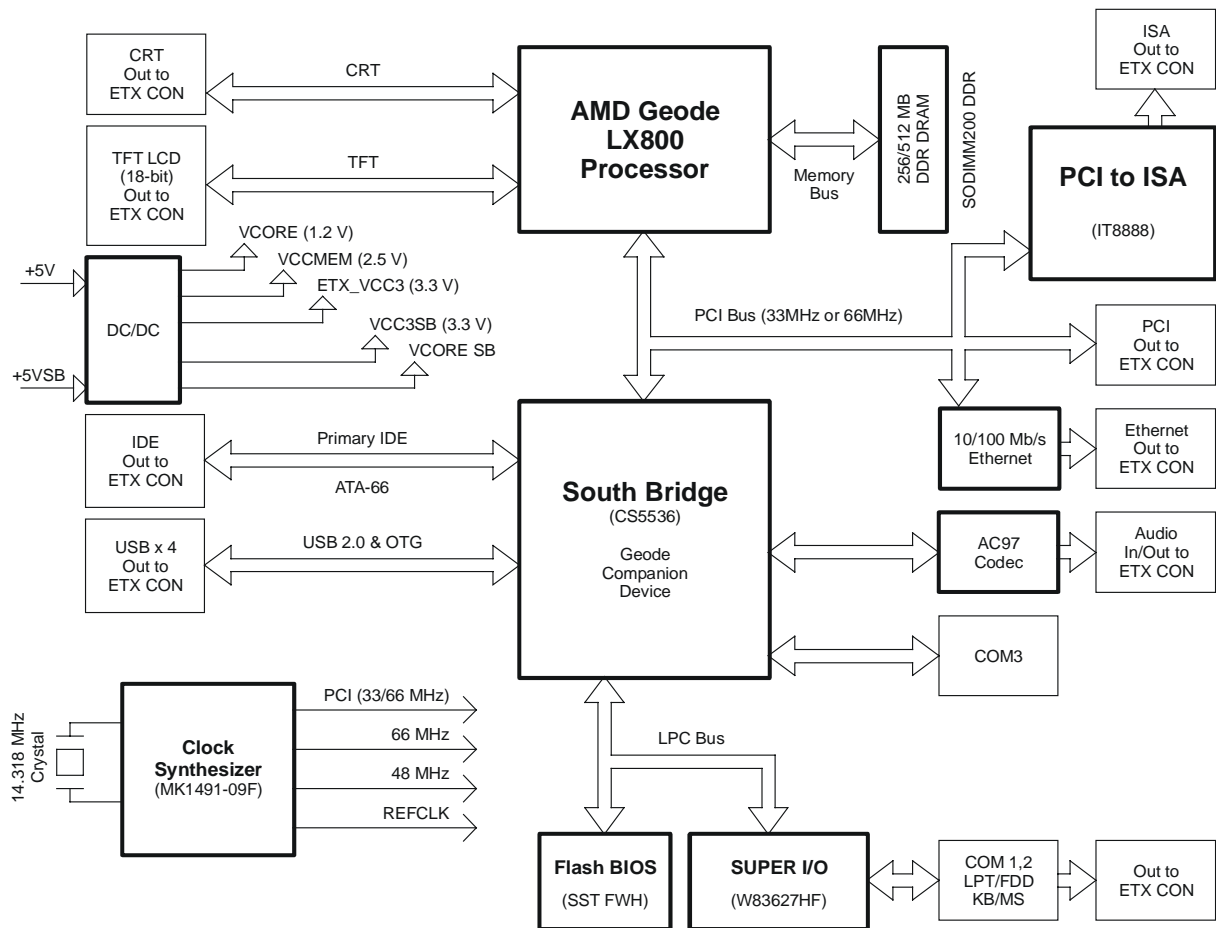
CPB904 includes the following main functional units:

- AMD Geode LX 800 500 MHz microprocessor including 32-bit x86 core, 64-bit coprocessor, 64-bit SDRAM memory bus;
- 256/512 MB soldered DDR SDRAM system memory, up to 512 MB in SODIMM socket (for CPB904-03);
- Flash memory based reserved BIOS, in-system modification;
- Onboard NAND flash-disk, 64 MB;
- IDE port with support for two UltraDMA/100 devices;
- MiniSD socket;
- Serial ports:
  - COM1, COM2: RS232, full control, maximum exchange rate – 115.2 Kbit/s;
  - COM3: RS232, TX/RX, for remote PC connection
- One Fast Ethernet channel 10/100 Mbit/s;
- Four USB 2.0 channels;
- Watchdog timer;
- CMOS+SFRAM for BIOS configuration storage;
- Real time clock with Li battery backup;
- PS/2 keyboard/mouse port;
- IrDA port;
- 17 programmable discrete I/O channels share lines with FDD/LPT ports. Universal parallel port supports EPP and ECP modes;
- Integrated graphics controller:
  - Video memory up to 64 MB, shared with system;
  - LCD (TFT or DSTN) panels support, resolution up to 1600x1200;
  - Analog RGB display support;
  - LVDS interface

Layouts of main CPB904 components and connectors on top and bottom sides are presented in Figures 4.2 and 4.3 respectively.

Figure 4.2:   **Top Side: Connectors and Main Components Layout**
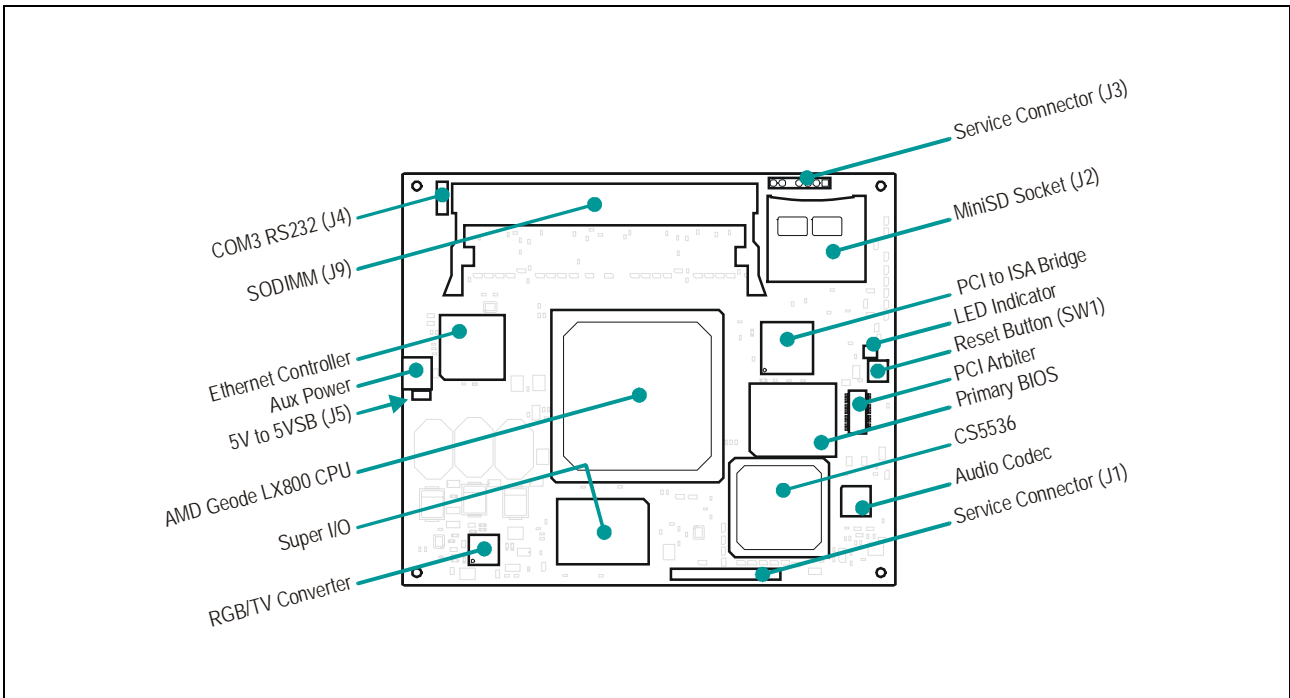
The layout may slightly differ for various versions of the board.

Figure 4.3:   **Bottom Side: Connectors and Main Components Layout**
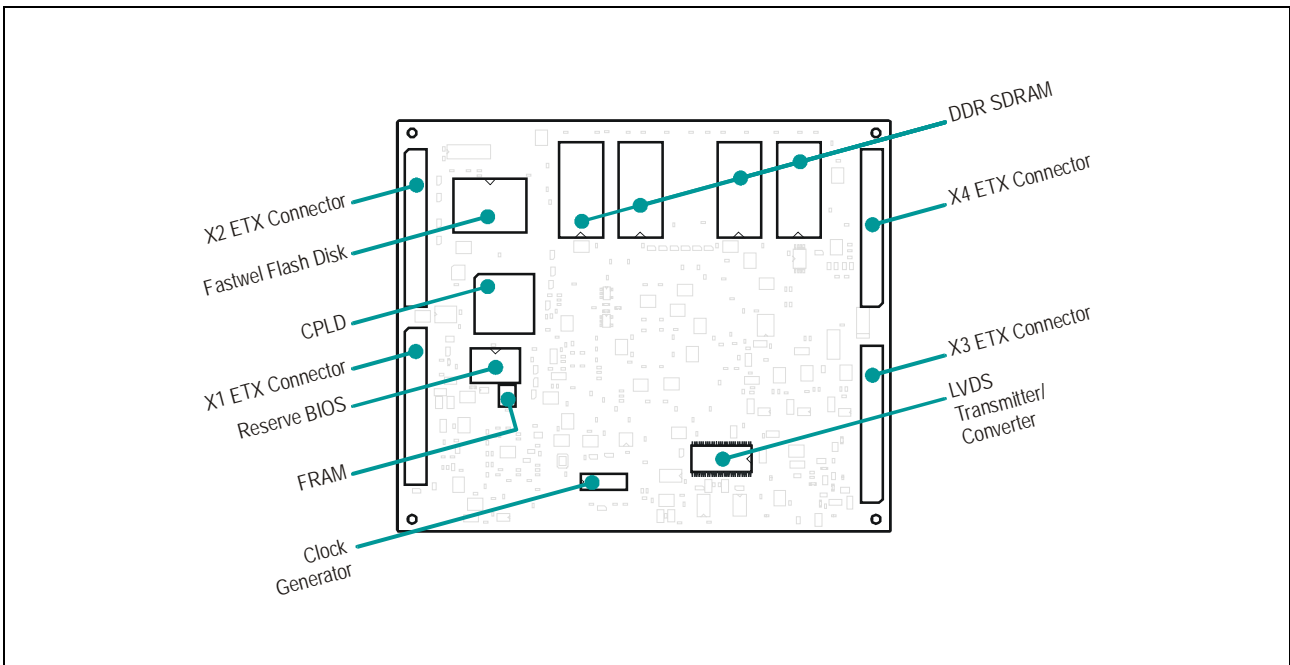
The layout may slightly differ for various versions of the board.

4.2   Address Mapping

4.2.1   Memory Addressing

Table 4.1:   **Memory Address Mapping**

Address Range	Size	Description
00000h – 09FFFh	640 KB	System memory
A0000h – BFFFFh	128 KB	Video memory
C0000h – C7FFFh	32 KB	Display BIOS memory or external bus memory
C8000h – DBFFFh	80 KB	External bus memory
DC000h – DFFFFh	16 KB	SMI handler
E0000h – FFFFFh	128 KB	System BIOS area
100000h – FFFFFFFh	255 MB	Extended system memory
FFFFFFFFh – 10007FFFFh	512 KB	ROM BIOS area

4.2.2   I/O Addressing

Table 4.2:   **I/O Address Space**

Address Range	Function	Note
0000h – 001Fh	DMA1	–
0020h – 0021h	PIC master	–
0022h – 0023h	LX configuration	–
0028h – 002Fh	Local bus	–
0040h – 005Fh	Timer	–
0060h – 006Fh	POST, keyboard shadow registers	–
0070h – 007Fh	CMOS, NMI mask control registers	–
0080h – 009Fh	DMA page registers	–
00A0h – 00BFh	Slave PIC	–
00C0h – 00DFh	DMA2	–
00F0h – 00FFh	Numeric coprocessor	–
0100h – 016Fh	External 16-bit ISA bus	External bus access
0170h – 0177h	Reserved	–
0180h – 01EFh	External 16-bit ISA bus	External bus access
01F0h – 01F7h	Primary IDE	–
0200h – 020Ah	External 16-bit ISA bus	External bus access
020Bh – 020Fh	CPB904 control registers	–
0210h – 026Fh	External 16-bit ISA bus	External bus access
0270h – 027Fh	Reserved	–
0280h – 02E7h	External 16-bit ISA bus	External bus access
02E8h – 02EFh	Reserved	–

Address Range	Function	Note
02F8h – 02FFh	COM2	RS232
0300h – 0301h	CPB904 FFD	–
0302h – 036Fh	External 16-bit ISA bus	External bus access
0370h – 0377h	Reserved	–
0378h – 037Fh	LPT1	–
0380h – 03AFh	Reserved	–
03B0h – 03DFh	EGA, VGA, CGA	–
03E8h – 03EFh	COM3	RS232
03F0h – 03F75h	FDD Controller	–
03F8h – 03FFh	COM1	RS232
0400h – FFFFh	External 16-bit ISA bus	External bus access
0CF8h – 0CFFh	Host PCI controller configuration registers	–

4.2.3   Interrupt settings

Table below presents interrupt settings. Interrupt request configuration is performed in BIOS Setup.

Table 4.3:   **Interrupt Settings**

IRQ	Source
IRQ0	System timer
IRQ1	Keyboard
IRQ2	8259 interrupt
IRQ3	COM2
IRQ4	COM1
IRQ5	Ethernet / USB / Audio
IRQ6	FDD
IRQ7	LPT
IRQ8	RTC
IRQ9	Ethernet / USB / Audio
IRQ10	Free
IRQ11	Free
IRQ12	Mouse
IRQ13	Reserved for math. coprocessor
IRQ14	HDD, CompactFlash
IRQ15	COM3

4.2.4   DMA Channels

Table 4.4:   **DMA Request Map**

DMA Channel	Main Function	Alternative Source
0	Reserved	–
1	LPT	DRQ1 line of external ISA bus
2	FDD	–
3	DRQ3 line of external ISA bus	–
4	Slave controller	–
5	–	–
6	–	–
7	–	–

4.3   Functional Description

4.3.1   Microprocessor

The module is based on AMD Geode LX800 microprocessor with 1.8W typical power consumption at 500 MHz, maximum power 3.6W (TDP). The processor includes 32-bit x86 core, 64-bit coprocessor and 64-bit DDR memory bus up to 400 MHz, graphics and video controller with VGA monitors and LCD panels simultaneous operation support. FPU of the processor supports MMX™ and AMD 3DNow!™ technology instruction sets. The CPU is complemented with AMD Geode CS5536 companion device providing support for numerous I/O functions including IDE, USB, audio, and power management interfaces.

4.3.2   SDRAM Memory

Four DDR 333 SDRAM memory chips are soldered on the bottom side of the PCB. Total memory size is 256 or 512 MB depending on the version of the module. In addition, the module can accept up to 512 MB of DDR SDRAM via SODIMM socket on the top side of the board (for CPB904-03).

4.3.3   PCI and ISA Buses

Expansion capabilities of CPB904 are supported by 32-bit PCI bus routed to X1 ETX connector. Moreover, ITE IT8888G PCI-to-ISA bridge provides full-functional 16-bit ISA bus available via X2 ETX connector.

4.3.4 Reserved Flash BIOS

The CPB904 takes advantage of flash-memory based BIOS. Two Flash BIOS chips have storage capacity of 512 KB each. The main (working) copy of BIOS occupies 512 KB on a chip in PLCC32 panel. Reserve BIOS copy is stored on a soldered chip and is used for emergency boot. Switching to reserve BIOS copy is performed automatically.

It is possible to upgrade the main copy of BIOS in-system. It is done with the help of **fwflash.exe** program. For example:

```
fwflash.exe b304v1_3.bin
```

> where   b304v1_3.bin – BIOS image binary file name.

BIOS can be upgraded via RS232 (COM1) serial port in console operation mode. To do so, connect COM ports of the module and of a remote PC, enable Start RS232 Manufacturing Link mode in BIOS Setup, and run fwflash.exe utility at a remote PC with the following parameters:

```
fwflash.exe b304v1_3.bin 1
```

> where   b304v1_3.bin – BIOS image binary file name
>
> 1 – PC COM port number (COM1)

4.3.5 UIDE Interface

CPB904 has one IDE ATA-5/ATAPI interface with support of PIO mode 0-4, MDMA mode 0-2, UDMA mode 0-5 including UltraDMA100. It allows connection of two UDMA-100 compatible devices (master and slave) to the primary IDE channel. External devices are connected to IDE interface via HDD connector and CompactFlash type I/II socket located on KIB1282 carrier board.

4.3.6 NAND Flash

Capacity of the on-board NAND flash memory chip is 64 MB. It is available only under DOS, Windows CE, and Linux operating systems. It can be used as a bootable disk or can be disabled in BIOS Setup. Since only one IDE channel is used, it is possible to connect storage devices in one of the ways described below.

Connection Variant	IDE-Master	IDE-Slave	CF-Master	CF-Slave	NAND Flash
1	+	+	–	–	+
2	+	–	–	+	+
3	–	+	+	–	+

Selection of disk drives operation mode (master of slave) is performed in BIOS Setup.

4.3.7 MiniSD Socket

CPB904 is equipped with a MiniSD socket, located on the top side of the module. It is not used in current versions of the module.

4.3.8　　　Video Controller and Connection of Monitors

The module utilizes graphics controller integrated in Geode LX CPU with the following main features:

- Video memory size up to 64 MB shared with system;
- Support of TFT or DSTN LCD-panels with resolution up to 1600×1200 at 18 bpp, LVDS panels with resolution up to 1600×1200 at 24 bpp;
- Support of VGA RGB monitors with resolution up to 1920×1440 (85 Hz, 32 bpp);
- LVDS interface

CRT VGA monitors and/or LCD panels are connected to KIB1282 carrier board. Video interfaces are routed to KIB1282 via X3 ETX connector. As an option, CPB904 can be equipped with TV encoder chip providing TV Output function.

4.3.9　　　Audio Controller

AC'97 audio codec functions are performed by Realtek ALC203 chip incorporating two channel 20-bit DAC. Audio lines are routed to X1 ETX connector.

4.3.10　　Watchdog Timer and Power Votage Monitoring

CPB904 has one watchdog timer with fixed timeout period of 1.6 s, which is controlled by CPLD. Watchdog timer is in "on" state on power up. Watchdog timer operation modes are switched in BIOS Setup program.

Power voltage monitoring and watchdog functions are performed by ADM706T supervisor chip. +5V voltage is monitored. Reset signal is generated when +5V voltage goes down to +4.75V.

3.3 V can be monitored by Winbond W83627HF SuperIO chip using software utilities. Moreover, this chip is also used to monitor CPU temperature by means of a sensor integrated in microprocessor and board temperature using optional on-board sensor.

4.3.11　　PS/2 Keyboard and Mouse Interface

PS/2 keyboard and mouse interface is routed to KIB1282 baseboard via X3 connector. Keyboard and mouse are connected to separate connectors on the baseboard.

4.3.12　　USB Interface

The module is equipped with four USB 2.0 host ports. All channels have power control circuit. One USB device may be connected to each port. All channels are routed to KIB1282 baseboard via X1 ETX connector.

4.3.13 Fast Ethernet Interface

CPB904 has one 10Base-TX/100Base-TX Ethernet channel provided by Intel LU82551IT controller. It is routed through X4 ETX header to KIB1282 baseboard, where Ethernet port is available via RJ45 connector.

4.3.14 Serial Ports

The CPB904 is furnished with three serial ports having standard PC AT base addresses. Their operation is provided by Winbond W83627HF Super I/O chip internal UARTs.

COM1 and COM2 (RS232) operate as full function 9-wire RS232 interfaces with maximum transfer rate of 115.2 Kb/s. They are fully compatible with UART16550. Both COM1 and COM2 ports are routed via X3 ETX connector to standard D-Sub connectors at KIB1282 baseboard.

COM3 is available via 3-pin 2 mm pitch connector (J4) mounted on the top side of CPB904 module. It is a dedicated connector for remote PC console operation, it transfers only RXD, TXD, and GND lines. For communication with a remote PC (console operation) a null-modem cable is needed.

4.3.15 FDD/LPT Port

Super I/O chip includes FDD controller and universal parallel port sharing the same lines routed via X3 ETX connector to KIB1282 baseboard connectors. Switching between LPT and FDD ports is performed in BIOS Setup. FDD port allows connection of one device. LPT port of CPB904 supports EPP and ECP operation modes. ECP is the default mode.

LPT uses IRQ7 interrupt line, IRQ6 is assigned to FDD port. If "On-board LPT/FDC" parameter is set to "Disabled" in BIOS Setup, IRQ7 and IRQ6 interrupts are available for user application.

4.3.16 RTC and Serial FRAM

The module is equipped with a standard Real Time Clock. FRAM is non-volatile memory with I^2C serial interface. It serves as a back-up storage for BIOS Setup parameters, for critical system events information recording, and for restoration of the RTC memory if an error is detected. FRAM write access is allowed for system software only.

In case of operating system crash and if BIOS Setup program can not be started, BIOS settings can be reset using CMOS_RST.COM program. It is started under MS DOS 6.22 on a remote PC connected to switched off CPB904 module with a null-modem cable via COM1 port. After this procedure, BIOS settings are reset to default on module's power-up.

4.3.17 LED Indicator

CPB904 has a dual color programmable LED indicator on the top side of the module. Red light turns into green on BIOS successful loading.

4.3.18   Discrete Input/Output

17 programmable input/output channels use FDD/LPT port lines.

4.3.19   Power Supply Connector

The power is supplied to CPB904 via ETX connectors in normal operation mode or via Aux Power connector (J6) located on the top side of the module in module's test mode only. To enable module's ability to be powered via J6 connector it is necessary to close pins on J5 pinpad. This connects +5VSB voltage to module's +5V lines. Please, observe polarity while connecting wires to J6 connector.

The main power voltage of the processor module is +5V. +3.3V voltage is generated onboard, it may be used to power devices on baseboard with consumption current of up to 0.2 A.

4.3.20   ETX Connectors

CPB904 is equipped with four standard ETX low-profile 100-contact Hirose connectors to supply module's interfaces to KIB1282 baseboard. The following four tables provide information on ETX connectors contacts designation.

Table 4.5:   **X1 ETX Connector Pinout**

Pin#	Signal	Pin#	Signal	Pin#	Signal	Pin#	Signal
1	GND	26	AD2	51	+5V	76	USB0#
2		27	AD4	52		77	AD22
3	PCICLK3	28	AD3	53	PAR	78	AD21
4	PCICLK4	29	AD6	54	SERR#	79	AD23
5	GND	30	AD5	55	PERR#	80	USB1#
6		31	CBE0#	56	USBPWREN2	81	AD24
7	PCICLK1	32	AD7	57	PME#	82	CBE3#
8	PCICLK2	33	AD8	58	USB2#	83	+5V
9	–	34	AD9	59	LOCK#	84	
10	–	35	GND	60	DEVSEL#	85	AD25
11	–	36		61	TRDY#	86	AD26
12	+3.3V	37	AD10	62	USB3#	87	AD28
13	–	38	AUXAL	63	IRDY#	88	USB0
14	GNT1#	39	AD11	64	STOP#	89	AD27
15	REQ1#	40	MIC	65	FRAME#	90	AD29
16	+3.3V	41	AD12	66	USB2	91	AD30
17	GNT0#	42	AUXAR	67	GND	92	USB1
18	USBPWREN1	43	AD13	68		93	PCIRST#
19	+5V	44	VCC_AUD	69	AD16	94	AD31
20		45	AD14	70	CBE2#	95	INTC#
21	SERIRQ	46	SNDL	71	AD17	96	INTD#
22	REQ0#	47	AD15	72	USB3	97	INTA#
23	AD0	48	GND_AUD	73	AD19	98	INTB#
24	+3.3V	49	CBE1#	74	AD18	99	GND
25	AD1	50	SNDR	75	AD20	100	

Table 4.6:   X2 ETX Connector Pinout

Pin#	Signal	Pin#	Signal	Pin#	Signal	Pin#	Signal
1	GND	26	IRQ15	51	+5V	76	IOW#
2		27	LA20	52		77	SA18
3	SD14	28	IRQ12	53	SA6	78	SA17
4	SD15	29	LA21	54	IRQ5	79	SA19
5	SD13	30	IRQ11	55	SA7	80	SMEMR#
6	MASTER#	31	LA22	56	IRQ6	81	IOCHRDY
7	SD12	32	IRQ10	57	SA8	82	AEN
8	DREQ7	33	LA23	58	IRQ7	83	+5V
9	SD11	34	IOCS16#	59	SA9	84	
10	DACK7#	35	GND	60	SYSCLK	85	SD0
11	SD10	36		61	SA10	86	SMEMW#
12	DREQ6	37	SBHE#	62	REFRESH#	87	SD2
13	SD9	38	MEMCS16#	63	SA11	88	SD1
14	DACK6#	39	SA0	64	DREQ1	89	SD3
15	SD8	40	OSC	65	SA12	90	NOWS#
16	DREQ5	41	SA1	66	DACK1#	91	DREQ2
17	MEMW#	42	BALE	67	GND	92	SD4
18	DACK5#	43	SA2	68		93	SD5
19	MEMR#	44	TC	69	SA13	94	IRQ9
20	DREQ0	45	SA3	70	DREQ3	95	SD6
21	LA17	46	DACK2#	71	SA14	96	SD7
22	DACK0#	47	SA4	72	DACK3#	97	IOCHK#
23	LA18	48	IRQ3	73	SA15	98	RSTDRV
24	IRQ14	49	SA5	74	IOR#	99	GND
25	LA19	50	IRQ4	75	SA16	100	

Table 4.7:   X3 ETX Connector Pinout

Pin#	Signal	Pin#	Signal	Pin#	Signal	Pin#	Signal
1	GND	26	G4	51	LPT_FLOPPY#	76	PD2 / WP#
2		27	GND	52	SEL66_33#	77	COM2_TXD
3	RED	28	GND	53	+5V	78	PD1 / TRK0#
4	BLUE	29	R4 / TX2#	54	GND	79	COM2_RI#
5	HSYNC	30	G1 / TCLK	55	STROBE# / –	80	PD0 / INDEX#
6	GREEN	31	R5 / TX2	56	AFD# / DENSEL	81	+5V
7	VSYNC	32	G0 / TCLK#	57	–	82	+5V
8	CRT_CLK	33	GND	58	PD7 / DSA#	83	COM1_RXD
9	–	34	GND	59	IRRX	84	ACK# / DSB#
10	CRT_DAT	35	R1 / TX0	60	ERR# / HDSEL#	85	COM1_RTS#
11	B4	36	R3 / TX1	61	IRTX	86	BUSY/MOTORB#
12	DOTCLK / –	37	R0 / TX0#	62	PD6 / MOTORA#	87	COM1_DTR#
13	B5	38	R2 / TX1#	63	COM2_RXD	88	PE / WDATA#
14	LDEMOD / –	39	+5V	64	INIT# / DIR#	89	COM1_DCD#
15	GND	40	+5V	65	GND	90	SLCT#/WE#
16	GND	41	–	66	GND	91	COM1_DSR#
17	B1	42	–	67	COM2_RTS#	92	MS_CLK
18	B3	43	–	68	PD5 / –	93	COM1_CTS#
19	B0	44	DISPEN# / –	69	COM2_DTR#	94	MS_DAT
20	B2	45	–	70	SELIN# / STEP#	95	COM1_TXD
21	GND	46	VDDEN / –	71	COM2_DCD#	96	KB_CLK
22	GND	47	COMP	72	PD4 / DSKCHG#	97	COM1_RI#
23	G2 / TX3#	48	Y	73	COM2_DSR#	98	KB_DAT
24	G5	49	–	74	PD3 / RDATA#	99	GND
25	G3 / TX3	50	C	75	COM2_CTS#	100	

Table 4.8: **X4 ETX Connector Pinout**

Pin#	Signal	Pin#	Signal		Pin#	Signal	Pin#	Signal
1	GND	26	–		51	–	76	P_IDE_D11
2		27	–		52	P_IDE_IOR#	77	–
3	+5VCC_SB	28	–		53	–	78	P_IDE_D4
4	–	29	–		54	P_IDE_IOW#	79	–
5	PS_ON	30	P_IDE_CS1#		55	–	80	P_IDE_D10
6	SPEAKER	31	–		56	P_IDE_DRQ	81	+5V
7	PWR_BTN#	32	P_IDE_CS0#		57	–	82	+5V
8	BATTERY	33	GND		58	P_IDE_D15	83	–
9	RES_INMR#	34	GND		59	–	84	P_IDE_D5
10	LINK_LED#	35	–		60	P_IDE_D0		–
11	SYS_RES#	36	P_IDE_A2		61	–	86	P_IDE_D9
12	ACT_LED#	37	–		62	P_IDE_D14	87	–
13	USB_ID	38	P_IDE_A0		63	–	88	P_IDE_D6
14	SPEED_LED#	39	–		64	P_IDE_D1	89	–
15	–	40	P_IDE_A1		65	GND	90	CABLE_ID
16	USB_VBUS	41	–		66	GND	91	ETH_RXD#
17	+5V	42	–		67	–	92	P_IDE_D8
18	+5V	43	–		68	P_IDE_D13	93	ETH_RXD
19	OVCR#	44	P_IDE_INTRQ		69	–	94	–
20	WORK_AUX	45	–		70	P_IDE_D2	95	ETH_TXD#
21	–	46	P_IDE_ACK#		71	–	96	P_IDE_D7
22	–	47	–		72	P_IDE_D12	97	ETH_TXD
23	SMB_CLK	48	P_IDE_RDY		73	–	98	HD_RST#
24	SMB_DAT	49	+5V		74	P_IDE_D3	99	GND
25	–	50	+5V		75	–	100	

4.4 Overall and Mounting Dimensions

Figure 4.4: **CPB904 Top Side: Overall and Mounting Dimensions**

TBA
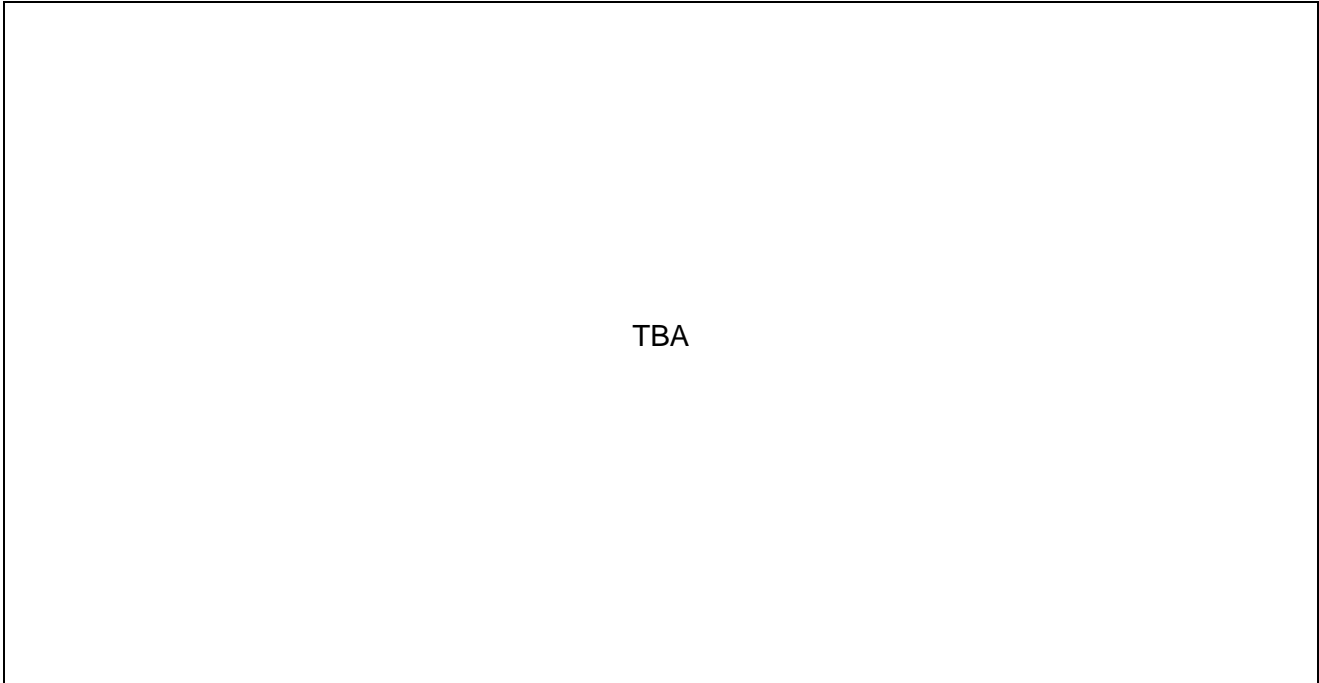
5   General Software® BIOS

The General Software® BIOS in CPB904 is an adapted version of a standard BIOS for IBM PC AT-compatible personal computers equipped with Intel®x86 and compatible processors. BIOS provides low-level support for the central processing, memory, and I/O system units.

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 when the power is switched off.