20CB70C00 E1 – 2014-06-18

User Manual

CB70C – Intel® Core™ i7 Rugged COM Express®

and CB70 COM Express

CB70C - Rugged COM Express® (VITA 59 RCE) with Intel® Core™ i7

The CB70C is a member of a new family of Rugged COM Express® modules which is controlled by a third generation Intel® Core™ i7 processor running at up to 3.1 GHz maximum turbo frequency bringing state-of-the-art PC technology onto a small form factor. This means a scalable performance with 1 up to 4 cores, integrated graphics, as well as support of Intel® AMT or Open CL 1.1.

The board can be controlled using a Board Management Controller and an adaptable BIOS which ensures flexibility in tailoring the complete system for the final application. Intel® AMT support is actively integrated in the BIOS adaptation.

The modules are 100% compatible to COM Express® modules of Pin-out Type 6. They conform to the new VITA-59 standard which specifies the mechanics to make COM Express® modules suitable for operation in harsh environments.

The modules are embedded in a covered frame ensuring EMC protection and allowing efficient conductive cooling. Air cooling is also possible by applying a heat sink on top of the cover.

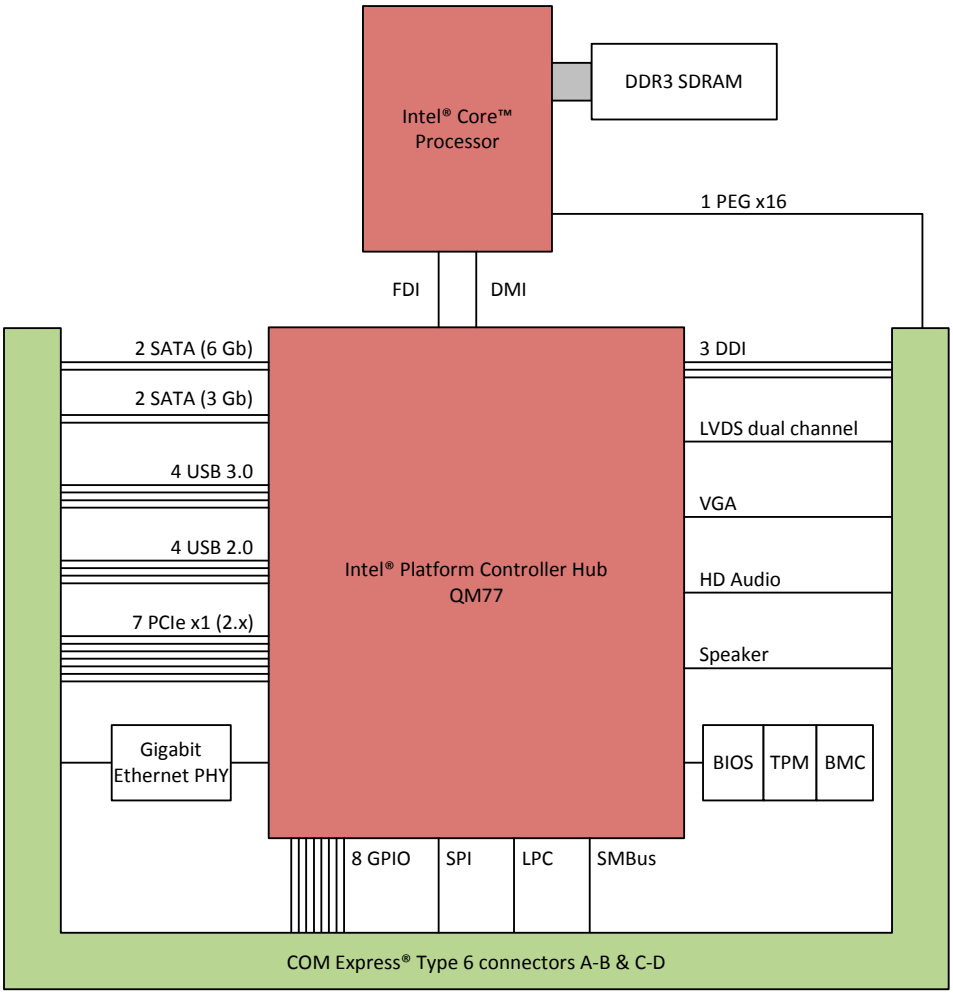
The CB70C accommodates up to 16 GB of directly soldered main memory and supports other memory like USB Flash on the carrier board.

The interfaces include a combination of PCI Express® links, LVDS, DDI, VGA, high-definition audio, SATA, Ethernet and USB.

The CB70C is screened for operation from -40°C to +85°C (Tcase). Only soldered components are used to withstand shock and vibration, and the design is optimized for conformal coating.

For evaluation and development purposes a microATX carrier board is in preparation.

Diagram


Intel® Core™ Processor
DDR3 SDRAM
1 PEG x16
FDI
DMI
2 SATA (6 Gb)
2 SATA (3 Gb)
4 USB 3.0
4 USB 2.0
7 PCIe x1 (2.x)
Intel® Platform Controller Hub QM77
3 DDI
LVDS dual channel
VGA
HD Audio
Speaker
Gigabit Ethernet PHY
BIOS
TPM
BMC
8 GPIO
SPI
LPC
SMBus
COM Express® Type 6 connectors A-B & C-D

Technical Data

CPU

- Intel® Core™ i7-3612QE
  - 2.1 GHz processor core frequency
  - 3.1 GHz maximum turbo frequency
  - 1066 MHz system bus frequency
- Chipset
  - QM77 Platform Controller Hub (PCH)

Memory

- 6 MB last level cache integrated in i7 processor
- Up to 16 GB SDRAM system memory
  - Soldered
  - DDR3 with ECC support
  - Up to 1066 MHz memory bus frequency
- 16 MB boot Flash

Serial ATA (SATA)

- Four ports via COM Express® connector
- Two ports with SATA Revision 2.x support
  - Transfer rates up to 300 MB/s (3 Gbit/s)
- Two ports with SATA Revision 3.x support
  - Transfer rates up to 600 MB/s (6 Gbit/s)
- RAID level 0/1/5/10 support

Graphics

- Integrated in processor and chipset
- Maximum resolution: 2560 x 1600 pixels
- One x16 link (PCI Express® graphics)
- One VGA
- Three DDI ports
  - For DP, HDMI, DVI, SDVO
- One LVDS dual channel
  - Up to 48-bit RGB
- Available via COM Express® connector

USB

- Four USB 3.0 host ports
  - xHCI implementation
  - Data rate up to 5 Gbit/s
- Four USB 2.0 host ports
  - EHCI implementation
  - Data rates up to 480 Mbit/s
- Available via COM Express® connector

Ethernet

- One 10/100/1000Base-T Ethernet channel
- Three LED signals for LAN link, activity status and connection speed
- Available via COM Express® connector

PCI Express®

- Seven x1 links
- PCIe® 2.x support
- Data rate up to 500 MB/s in each direction (5 Gbit/s per lane)
- Available via COM Express® connector

GPIO

- 8 lines via COM Express® connector

HD Audio

- Via COM Express® connector

Board Management Controller

- Input voltage supervision
- Power sequencing
- Board monitoring
- Watchdog
- Accessible via SMBus

Miscellaneous

- Real-time clock (with supercapacitor or battery backup on the carrier board)
- SMBus interface
- LPC
- SPI
- Speaker

Rugged COM Express® Specifications

- In accordance with proposed standard VITA 59 RCE: Rugged COM Express® in process
  - With conduction cooling cover and frame
  - Rugged COM Express® Basic, Module Pin-out Type 6

Electrical Specifications

- Supply voltage/power consumption:
  - +12V (9 to 16 V), 48 W typ./ 70 W max.
  - +5V (-5%/+5%) standby voltage, 1.1 W in standby operation

Mechanical Specifications

- Dimensions:
  - 135 mm x 105 mm x 18 mm (height) (conforming to VITA 59 RCE Basic format)
- Rugged COM Express® PCB mounted between a cover and a frame
- Weight:
  - 460 g (incl. cover and frame)
  - 90 g (without cover and frame)

Environmental Specifications

- Temperature range (operation): -40..+85°C Tcase (Rugged COM Express® cover/frame) (screened)
- Temperature range (storage): -40..+85°C
- Relative humidity (operation): max. 95% non-condensing
- Relative humidity (storage): max. 95% non-condensing
- Altitude: -300 m to +3000 m
- Shock: 50 m/s², 30 ms (EN 61373)
- Vibration (function): 1 m/s², 5 Hz – 150 Hz (EN 61373)
- Vibration (lifetime): 7.9 m/s², 5 Hz – 150 Hz (EN 61373)
- Conformal coating on request

MTBF

- 415 714 h @ 40°C according to IEC/TR 62380 (RDF 2000)

Safety

- Flammability
  - PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers

EMC

- EMC behavior depends on the system and housing surrounding the COM Express® module.
- The Rugged COM Express® module in its cover and frame supports the system to meet the requirements of
  - EN 55022 (radio disturbance)
  - IEC 61000-4-2 (ESD)
  - IEC 61000-4-3 (electromagnetic field immunity)
  - IEC 61000-4-4 (burst)
  - IEC 61000-4-5 (surge)
  - IEC 61000-4-6 (conducted disturbances)

BIOS

- InsydeH2O™ UEFI Framework

Intel® Active Management Technology

- Out of Band (OOB) Access
  - Power off Access
  - Independent of OS status
  - Power status control
  - Keyboard-Video-Mouse (KVM) Viewer (VNC-compatible)
  - IDE-Redirect
  - Serial-over-LAN
- Manageability Engine in Chipset
- Network Filters in Chipset
- Dedicated Flash Storage Area

Software Support

- Windows®
- Linux

For more information on supported operating system versions and drivers, please see the online data sheet.

Configuration Options

CPU

- Intel® Core™ i7-3615QE
  - Quad Core, 2.3 GHz, 6 MB Cache, 45 W
- Intel® Core™ i7-3612QE
  - Quad Core, 2.1 GHz, 6 MB Cache, 35 W
- Intel® Core™ i7-3555LE
  - Dual Core, 2.5 GHz, 4 MB Cache, 25 W
- Intel® Core™ i7-3517UE
  - Dual Core, 1.7 GHz, 4 MB Cache, 17 W
- Intel® Core™ i5-3610ME
  - Dual Core, 2.7 GHz, 3 MB Cache, 35 W
- Intel® Core™ i3-3120ME
  - Dual Core, 2.4 GHz, 3 MB Cache, 35 W
- Intel® Core™ i3-3217UE
  - Dual Core, 1.6 GHz, 3 MB Cache, 17 W
- Intel® Celeron® 1020E
  - Dual Core, 2.2 GHz, 2 MB Cache, 35 W
- Intel® Celeron® 1047UE
  - Dual Core, 1.4 GHz, 2 MB Cache, 17 W
- Intel® Celeron® 927UE
  - Single Core, 1.5 GHz, 1 MB Cache, 17 W
- Intel® Celeron® 827E
  - Single Core, 1.4 GHz, 1.5 MB Cache, 17 W

Memory

- System RAM
  - 2 GB, 4 GB, 8 GB or 16 GB

COM Express®

- Also available in accordance with PICMG COM.0 COM Express® Module Base Specification
  - Without conduction cooling wings, without cover and frame
- COM Express® Basic (135 mm x 105 mm), Module Pin-out Type 6

Cooling Concept

- Conduction-cooled versions according to VITA 59 RCE: Rugged COM Express® in process
- Air-cooled versions according to PICMG COM.0 COM Express® standard

Please note that some of these options may only be available for large volumes. Please ask our sales staff for more information.

For available standard configurations see the online data sheet.

Product Safety

Electrostatic Discharge (ESD)

Computer boards and components contain electrostatic sensitive devices. Electrostatic discharge (ESD) can damage components. To protect the board and other components against damage from static electricity, you should follow some precautions whenever you work on your computer.

- Power down and unplug your computer system when working on the inside.
- Hold components by the edges and try not to touch the IC chips, leads, or circuitry.
- Use a grounded wrist strap before handling computer components.
- Place components on a grounded antistatic pad or on the bag that came with the component whenever the components are separated from the system.
- Only store the board in its original ESD-protected packaging. Retain the original packaging in case you need to return the board to MEN for repair.

About this Document

This user manual is intended only for system developers and integrators, it is not intended for end users.

It describes the hardware functions of the board, connection of peripheral devices and integration into a system. It also provides additional information for special applications and configurations of the board.

The manual does not include detailed information on individual components (data sheets etc.). A list of literature is given in the appendix.

Product Naming

'CB70C' is used throughout this document to name the products described. However, descriptions are generally valid for the CB70 COM Express module, too. Specific differences will be mentioned explicitly.

History

Issue	Comments	Date
E1	First issue	2014-06-18

Conventions

Indicates important information or warnings concerning proper functionality of the product described in this document.

The globe icon indicates a hyperlink that links directly to the Internet, where the latest updated information is available.
When no globe icon is present, the hyperlink links to specific elements and information within this document.

italics	Folder, file and function names are printed in *italics*.
bold	**Bold** type is used for emphasis.
`mono`	A `monospaced` font type is used for hexadecimal numbers, listings, C function descriptions or wherever appropriate. Hexadecimal numbers are preceded by `"0x"`.
comment	Comments embedded into coding examples are shown in green text.
IRQ# /IRQ	Signal names followed by a hashtag "#" or preceded by a forward slash "/" indicate that this signal is either active low or that it becomes active at a falling edge.
in/out	Signal directions in signal mnemonics tables generally refer to the corresponding board or component, "in" meaning "to the board or component", "out" meaning "from it the board or component".
	Blue vertical lines in the outer margin indicate sections where changes have been made to this version of the document.

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Since July 1, 2006 all MEN standard products comply with RoHS legislation.

Since January 2005 the SMD and manual soldering processes at MEN have already been completely lead-free. Between June 2004 and June 30, 2006 MEN's selected component suppliers have changed delivery to RoHS-compliant parts. During this period any change and status was traceable through the MEN ERP system and the boards gradually became RoHS-compliant.

WEEE Application

The WEEE directive does not apply to fixed industrial plants and tools. The compliance is the responsibility of the company which puts the product on the market, as defined in the directive; components and sub-assemblies are not subject to product compliance.

In other words: Since MEN does not deliver ready-made products to end users, the WEEE directive is not applicable for MEN. Users are nevertheless recommended to properly recycle all electronic boards which have passed their life cycle.

Nevertheless, MEN is registered as a manufacturer in Germany. The registration number can be provided on request.

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Tables

1 Getting Started

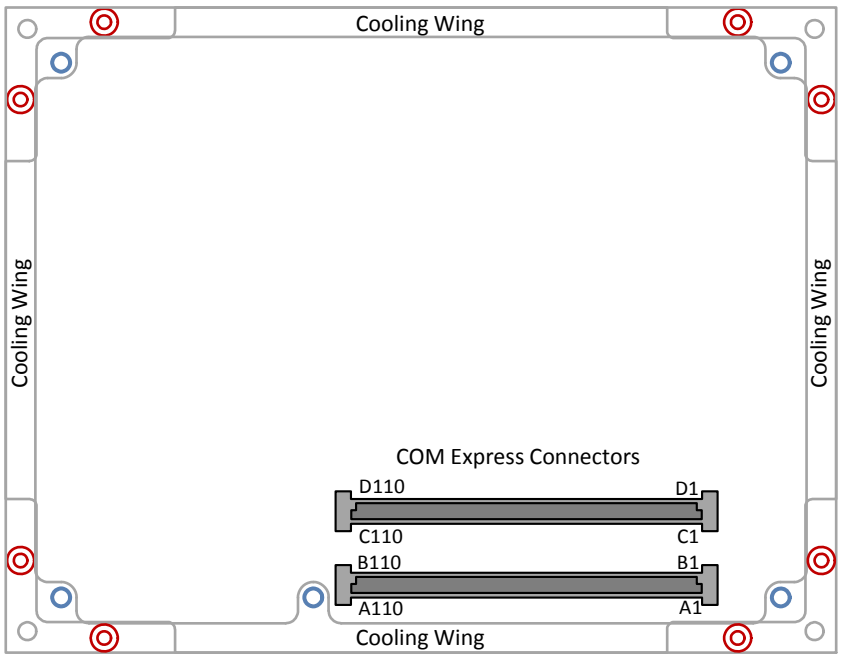
This chapter gives an overview of the board and some hints for first operation.

1.1 Map of the Board

1.1.1 CB70C Rugged COM Express

The following board map shows the board inside the cover and frame from its connector side (bottom). The cover includes holes for mounting the Rugged COM Express module onto a carrier.

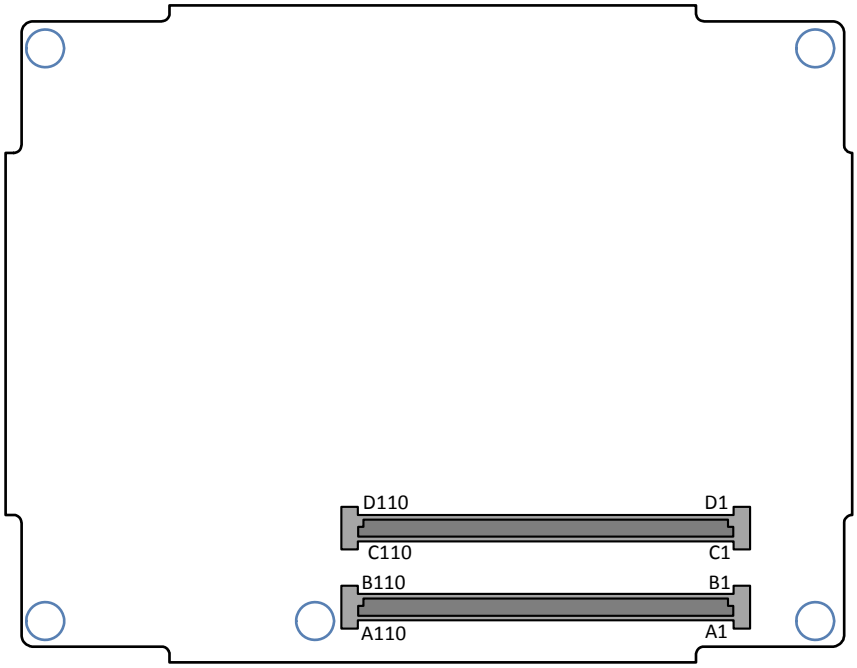
Figure 1. *Map of the board (CB70C Rugged COM Express)*



1.1.2 CB70 COM Express

The following board map shows the board from its connector side (bottom) including the holes for mounting the Rugged COM Express module onto a carrier.

Figure 2. *Map of the board (CB70 COM Express)*



1.2 First Operation

You can use the following check list when installing the board for the first time and with minimum configuration using a Windows host PC.

- ☑ Power-down the system.
- ☑ Plug the CB70C on your carrier board, making sure that the COM Express connectors are properly aligned.
- ☑ Fasten the five screws connecting the COM Express module to the carrier (marked in blue in Figure 1, Map of the board (CB70C Rugged COM Express) on page 18 and Figure 2, Map of the board (CB70 COM Express) on page 19).
- ☑ Connect a USB keyboard and mouse to the USB connectors of the carrier board.
- ☑ Connect a flat-panel display to the DVI connector of the carrier board.
- ☑ Power-up the system.
- ☑ You can start up the BIOS setup menu by hitting the <F2> key (see Chapter 3 UEFI Firmware (BIOS) on page 47).
- ☑ Now you can make configurations in BIOS (see Chapter 3 UEFI Firmware (BIOS) on page 47).
- ☑ Observe the installation instructions for the respective software.

1.3 Configuring BIOS

The CB70C is equipped with an InsydeH2O UEFI framework. Normally you won't need to make any changes in the BIOS setup. If you do, however, you find further details on the CB70C's BIOS in Chapter 3 UEFI Firmware (BIOS) on page 47.

1.4 Installing Operating System Software

The board supports Windows and Linux.

By default, no operating system is installed on the board. Please refer to the respective manufacturer's documentation on how to install operating system software!

You can find any software available on the CB70C pages on MEN's website.

1.5 Installing Driver Software

For a detailed description on how to install driver software please refer to the respective documentation.

You can find any driver software available for download on the CB70C pages on MEN's website.

2 Functional Description

The following describes the individual functions of the board and their configuration on the board. There is no detailed description of the individual controller chips and the CPU. They can be obtained from the data sheets or data books of the semiconductor manufacturer concerned (Chapter 4.1 Literature and Web Resources on page 73).

2.1 Power Supply

The CB70C board is supplied with +12V (9..16V) only. It can optionally be supplied with +5V (±5%) standby voltage for the standby function in compliance with the COM Express standard.

All other required voltages are generated onboard.

The CB70C supports the *PWR_OK* signal (input from main power supply) available at the COM Express connector according to the PICMG COM.0 standard.

2.2 Power States

The CB70C board supports the system power states S0, S3, S4 and S5.

Table 1. *Supported power states*

State	Description	Supported by CB70C
S0	Working	yes
S1	All the processor caches are flushed, and the CPU(s) stops executing instructions. The power to the CPU(s) and RAM is maintained. Devices that do not indicate they must remain on may be powered off.	no
S2	CPU powered off. Cache is flushed to RAM.	no
S3	Commonly referred to as Standby, Sleep, or Suspend to RAM (STR). RAM remains powered.	yes
S4	Hibernation or Suspend to Disk. All content of main memory is saved to non-volatile memory such as a hard drive, and is powered down.	yes
S5	Soft Off: G2/S5 is almost the same as G3 Mechanical Off, except that the PSU still supplies power, at a minimum, to the power button to allow return to S0. A full reboot is required. No previous content is retained. Other components may remain powered so the computer can "wake" on input from the keyboard, clock, modem, LAN, or USB device.	yes

2.3 Board Management Controller

The CB70C provides an intelligent board management controller (BMC) with the following main features:

- Supervision of power sequences
- Supervision of board supply voltages and power good signals
- Supervision of CPU overtemperature signal
- Board status signaling
- Watchdog functionality
- SMBus communication

MEN provides a dedicated software driver for the board controller. For a detailed description of the functionality of the driver software please refer to the drivers' documentation.

You can find any driver software and documentation available for download on the CB70C pages on MEN's website.

Input Supply Voltage Monitoring

The BMC monitors the input supply voltage. The nominal input supply voltage is +12V with a range from 9V up to 16V.

The state of the monitored voltage is provided to the BMC via a power good signal. The BMC delays the power-up sequence until the input supply voltage is within limits. If the high or low voltage limit is exceeded while the system is not in S5 or S4 state, the BMC shuts down the CB70C for at least 4 seconds and signals a power failure via the LEDs.

When the input voltage returns to the normal range, the BMC restarts the board.

RTC Supply Voltage Monitoring

The BMC measures at power-up time and once every hour whether the supply voltage for the real-time clock provided by the COM.0 carrier is in the correct range. Measurement is done while the system is in S0 state only, with all voltages stable. If the RTC voltage is too low, a power failure is signaled to the BMC.

External Watchdog

The watchdog device monitors the board on operating system level. If enabled, the watchdog must be triggered by application software. If the trigger is overdue, the watchdog initiates a board reset and this way can put the system back into operation when the software hangs.

The watchdog uses a configurable time interval or is disabled. Settings are made through BIOS or via an MEN software driver.

COM.0 power supply status signals

The board controller generates a shutdown signal to the platform controller hub if there is an external power supply failure event (via the PWR_OK pin at the COM Express connectors). At system start the signal is used to control the power sequencing start.

Failure Management

The board controller detects and solves error conditions. When the system is running into an error condition, the board controller tries to recover the system using a range of different measures ranging from simply switching off power to a complete reset of the configuration.

Failure Shutdown

In case of a power failure or if the error condition cannot be cleared, the board controller tries to restart the system.

Reset Reason Register

The board controller provides a reset reason register, which can be read using MEN's software and holds as much information as possible about the reason of the last reset.

Operating Hour Counter

The board controller provides an operating hour counter, which counts the time the system is in S0 state and which can be queried by MEN's software.

Power Cycle Counter

The board controller provides a power cycle counter, which counts the number of times the system has been powered-up and which can be queried by MEN's software.

Over Temperature Signal

The over temperature signal of the CPU is monitored by the board controller.

Power Resume

The board controller starts the Power-up Sequence or stays off at power resume after power loss depending on the "Power Resume Mode" setting in the BIOS.

See Chapter 3 UEFI Firmware (BIOS) on page 47.

2.4 Status LED

The CB70C provides a user-defined signal for the status LED. By using the signal GPO0 on the COM Express connector J1, board status messages can be shown with a LED on the carrier board. See Chapter 2.20 General Purpose Outputs on page 33. This signal is controlled by the board management controller. When the BIOS starts, the carrier LED can be switched on. It is switched off when the board is switched off and it flashes slowly when the board is in stand-by (S3) status.

During normal operation the LED can be switched on and off using the MEN driver for the board controller.

You can find any driver software available for download on the CB70C pages on MEN's website.

For the exact position of the signal on the COM Express J1 connector see Table 8, Pin assignment of COM Express connectors J1 and J2 on page 38.

In case of a board failure, the LED displays the following error messages:

Table 2. *Error codes signaled by board management controller via LED flashes*

Number of Flashes	Error	Description
0	*CPUBCI_ERR_NONE*	No error
1	*CPUBCI_ERR_33V*	3.3 V failure
2	*CPUBCI_ERR_INP*	Input voltage failure
3	*CPUBCI_ERR_NO_EXT_PWR_OK*	External power supply failure
4	*CPUBCI_ERR_CPU_TOO_HOT*	CPU temperature too high
5	*CPUBCI_ERR_BIOS_TIMEOUT*	BIOS startup failure
>5		Internal error

2.5 Reset

The CB70C provides the reset signals CB_RESET# and SYS_RESET# which are available at the COM Express connector according to the PICMG COM.0 standard.

You can find the pinout for the reset signals in Table 8, Pin assignment of COM Express connectors J1 and J2 on page 38.

2.6 Real-Time Clock

The board includes a real-time clock connected to the processor as a system RTC. The RTC has an accuracy of approximately 1.7 seconds/day (11 minutes/year) at 25°C.

The real-time clock device is connected to the CPU via SMBus. Due to its reduced current consumption, the life time of the battery or supercapacitor installed on the carrier can be increased considerably compared to the CPU internal RTC.

MEN provides a dedicated software driver for the RTC device in order to set date and time as usual in Windows. For a detailed description of the functionality of the driver and for downloading the software please refer to the drivers' documentation on MEN's website.

The real-time clock should be buffered by a supply voltage from the carrier board. The supply voltage can be provided by an external supercapacitor or battery device mounted on the carrier.

2.7 Processor Core

Table 3. *Processor core options on CB70C*

Processor Type	Core Frequency	Cores/ Threads	Power Consumption	Cache	AMT Support
Core i7-3615QE	2.3 GHz	4/8	45 W	6 MB	yes
Core i7-3612QE	2.1 GHz	4/8	35 W	6 MB	yes
Core i7-3555LE	2.5 GHz	2/4	25 W	4 MB	yes
Core i7-3517UE	1.7 GHz	2/4	17 W	4 MB	yes
Core i5-3610ME	2.7 GHz	2/4	35 W	3 MB	yes
Core i3-3120ME	2.4 GHz	2/4	35 W	3 MB	no
Core i3-3217UE	1.6 GHz	2/4	17 W	3 MB	no
Celeron 1020E	2.2 GHz	2/2	35 W	2 MB	no
Celeron 1047UE	1.4 GHz	2/2	17 W	2 MB	no
Celeron 927UE	1.5 GHz	1/1	17 W	1 MB	no
Celeron 827E	1.4 GHz	1/1	17 W	1.5 MB	no

2.7.1 Thermal Considerations

The CB70C has a power dissipation of up to 45 W.

The Rugged COM Express module is enclosed inside a cover and frame and therefore provides a flexible thermal interface that can be used as needed to fulfill the thermal needs of the application. Typically you should use it for conduction cooling or convection cooling. It depends on the system configuration and airflow if an additional heat sink is needed or not. In any case you should check your thermal conditions and implement appropriate cooling.

See also Chapter 2.24.2 Thermal Concept on page 36.

Please note that if you do not use the cover and frame supplied by MEN and/or no heat sink, warranty on functionality and reliability of the CB70C may cease. If you have any questions or problems regarding thermal behavior, please contact MEN.

2.8 Intel Active Management Technology (AMT)

CB70C boards equipped with an Intel Core i7 or i5 processor support Intel Active Management Technology (AMT 8.0). Intel AMT is powered by a separate hardware engine in Intel chipsets which enables e.g. out-of-band (OOB) diagnostics, remote control, IDE-Redirect, Serial-over-LAN (SOL), agent presence checking and network traffic filtering.

For information on how to enable the AMT BIOS extension see Chapter 3 UEFI Firmware (BIOS).

MEN provides an application note on how to switch on the AMT functionality and log onto the CPU board via VNC afterwards. See MEN's website.

If the supercapacitor and/or the battery is empty, the CB70C loses its complete AMT settings due to Intel's security standards.

2.9 Trusted Platform Module

A trusted platform module to protect the content of the SATA storage devices is implemented on the CB70C. The module is compliant to the TPM v1.2 specification.

2.10 Memory and Mass Storage

2.10.1 DRAM System Memory

The board provides up to 16 GB onboard, soldered DDR3 (double data rate) SDRAM. The memory bus is 2x72 bits wide (dual channel) and operates with up to 1066 MHz.

2.10.2 Boot Flash

The CB70C has an 64-Mbit SPI Serial Flash implemented as onboard Flash for BIOS data and the AMT firmware. It supports Flash devices with up to 16 MB.

2.11 Mass Storage

2.11.1 Serial ATA (SATA)

The CB70C provides four SATA ports at the COM Express connector.

Two interfaces are compliant with SATA Revision 2.x and support transfer rates of 3.0 Gbit/s; two interfaces are compliant with SATA Revision 2.x and support transfer rates of 6.0 Gbit/s.

The interfaces support AHCI and RAID mode.

You can find the pinout for the SATA signals in Table 8, Pin assignment of COM Express connectors J1 and J2 on page 38.

2.12 Graphics

The graphics subsystem is part of the CPU and the chipset and supports the following features:

- Up to three independent displays
- Digital display resolutions up to 2560 x 1600 pixels @ 60Hz
- HDMI 1.4a specification
- DisplayPort 1.1a specification
- Dynamic Video Memory Technology (DVMT)
- DirectX® 11, OpenCL 1.1, OpenGL 3.1
- High-bandwidth Digital Content Protection for high definition content playback over digital interfaces
- Integrated audio codecs for audio support over HDMI and DisplayPort interfaces

2.12.1 Display Configuration

There are two different display configurations possible:

- If two display interfaces are used simultaneously, resolutions of up to 2560x1600 pixels are possible for each interface. DisplayPort, HDMI, DVI or LVDS are supported on both interfaces.
- Three display interfaces can be used simultaneously if two interfaces are fixed as DisplayPort. The third interface can then be used as DisplayPort, HDMI, DVI or LVDS. The maximum resolution of one fixed DisplayPort interface is 2560x1600, the maximum resolution of the second fixed DisplayPort interface is 1920x1200 and the maximum resolution of the third DisplayPort, HDMI, DVI or LVDS capable interface is 1920x1200.

2.12.2 Digital Display Interface

The CB70C provides three Digital Display Interfaces at the COM Express connector according to the PICMG COM.0 standard. See Table 4, Digital Display Interfaces for the supported interface types and maximum resolutions per port.

Table 4. *Digital Display Interfaces*

Digital Display Port#	Usage	Supported Interfaces	Resolution
B	COM.0 R2.0 DDI1	DP, HDMI, DVI, SDVO	1920x1200 60 Hz
C	COM.0 R2.0 DDI2	DP, HDMI, DVI	2560x1600 60 Hz
D	COM.0 R2.0 DDI3	DP, HDMI, DVI	2560x1600 60 Hz/ 1920x1200 in a three display configuration

2.12.3 LVDS

The CB70C supports one dual channel LVDS interface at the COM Express connector according to the PICMG COM.0 standard.

The interface can be operated in single channel mode with up to 24-bit RGB data or dual channel mode with up to 48-bit RGB data.

You can find the pinout for the LVDS signals in Table 8, Pin assignment of COM Express connectors J1 and J2 on page 38.

2.12.4 VGA

The CB70C supports one VGA interface at the COM Express connector according to the PICMG COM.0 standard.

You can find the pinout for the VGA signals in Table 8, Pin assignment of COM Express connectors J1 and J2 on page 38.

2.13 USB

The CB70C provides four USB 3.0 interfaces and four USB 2.0 interfaces at the COM Express connector.

The USB 2.0 interfaces are controlled by an EHCI controller in the platform controller hub which also supports USB 1.1. The USB 3.0 interfaces are controlled by an xHCI controller.

You can find the pinout for the USB signals in Table 8, Pin assignment of COM Express connectors J1 and J2 on page 38.

2.14 Ethernet Interface

The CB70C provides one Gigabit Ethernet interface at the COM Express connector.

The interface is controlled by an Intel 82579LM Ethernet PHY which supports AMT functionality. It supports 10 Mbits/s up to 1000 Mbits/s as well as full-duplex operation, autonegotiation and Wake-on-LAN functionality.

The Ethernet transformer has to be mounted on the carrier board.

You can find the pinout for the Ethernet signals in Table 8, Pin assignment of COM Express connectors J1 and J2 on page 38.

The unique MAC address is set at the factory and should not be changed. Any attempt to change this address may create node or bus contention and thereby render the board inoperable.

The naming of the interfaces may differ depending on the operating system. The MAC addresses on CB70C are:

- CB70: `0x 00 C0 3A C5 A0 00 - 0x 00 C0 3A C5 AF FF`
- CB70C: `0x 00 C0 3A C5 B0 00 - 0x 00 C0 3A C5 BF FF`

where "00 C0 3A" is the MEN vendor code. The last six digits describe the range from which the addresses for the board are taken. The serial number is added to the first number in the range:

Serial number 0042: `0x A0 xx = 0xA000 + 0x002A = 0x A0 2A.`

See Chapter 4.2 Finding out the Product's Article Number, Revision and Serial Number on page 74.

2.14.1 Ethernet Status LEDs

The CB70C provides four control signals for the Ethernet status LEDs at the COM Express connector according to the PICMG COM.0 standard. See Table 5, Ethernet status LED modes.

Table 5. *Ethernet status LED modes*

Signal	Mode	On	Off	Blinking
GBE0_ACT#	ACT	Tx/Rx activity	No activity	Tx/Rx activity
GBE0_LINK1000#	LINK 1000	Link Up 1000	No link	n/a
GBE0_LINK100#	LINK 100	Link Up 100	No link	n/a
GBE0_LINK#	LINK	LinkUp	No link	n/a

2.15 Audio

The CB70C supports one high definition audio interface at the COM Express connector according to the PICMG COM.0 standard. Three HD Audio devices can be connected to the interface.

You can find the pinout for the audio signals in Table 8, Pin assignment of COM Express connectors J1 and J2 on page 38.

2.16 Speaker Interface

The CB70C support one speaker interface at the COM Express connector according to the PICMG COM.0 standard.

You can find the pinout for the speaker signal in Table 8, Pin assignment of COM Express connectors J1 and J2 on page 38.

2.17 PCI Express

According to the COM Express standard, the CB70C supports 7 PCI Express x1 lanes and 1 PEG x16 interface on the COM Express connectors.

The board also supports lane grouping of the PCI Express ports according to the COM.0 standard.

The ports support the PCIe 2.x standard; i.e. data rates up to 500 MB/s in each direction (5 Gbit/s per lane).

You can find the pinout for the PCI Express signals in Table 8, Pin assignment of COM Express connectors J1 and J2 on page 38.

2.18 Express Card Interface (Optional)

As an option, the CB70C provides two Express Card interfaces at the COM Express connector according to the PICMG COM.0 standard. Each interface consists of the EXCDx_PERST# and the EXCDx_CPPE# signal.

By default, the signals are deactivated on the CB70C. On request, MEN can implement a BIOS item for activating the interfaces.

Please contact MEN's sales team for further information.

You can find the pinout for the Express card signals in Table 8, Pin assignment of COM Express connectors J1 and J2 on page 38.

2.19 General Purpose Inputs (Optional)

As an option, the CB70C provides four GPI pins at the COM Express connector according to the PICMG COM.0 standard.

The GPIs are not supported by MEN's software drivers. On request, MEN can implement support for these signals.

Please contact MEN's sales team for further information

You can find the pinout for the GPI in Table 8, Pin assignment of COM Express connectors J1 and J2 on page 38.

2.20 General Purpose Outputs

The CB70C provides four GPO pins at the COM Express connector according to the PICMG COM.0 standard.

The four GPO outputs are used as LEDs and can be accessed via MEN's driver for the board management controller.

For available downloads see the CB70C pages on MEN's website.

The following LED functions are available:

- 1 board status LED (yellow, see Chapter 2.4 Status LED on page 24)
- 1 user LED (blue)
- 2 user LEDs (yellow)

Table 6. *GPIO usage*

COM.0 GPIO	PCH[1] GPIO	BC GPIO	Function
GPO0	GPIO36	BRD_STAT_LED	Board Status Indicator
GPO1	GPIO37	HOT_LED_R	User-defined
GPO2	GPIO16	BC_LED[2]	User-defined
GPO3	GPIO49	BC_LED[3]	User-defined

1 Platform Controller Hub

You can find the pinout for the GPO signals in Table 8, Pin assignment of COM Express connectors J1 and J2 on page 38.

2.21 SMBus

The CB70C provides one SMBus interface at the COM Express connector according to the PICMG COM.0 standard.

The SMBus can be used to access the Board Management Controller (BMC), the board information EEPROM and external real-time clock. See Table 7, SMBus address map. for the addresses.

Table 7. *SMBus address map.*

Device	Address	Function
SPD EEPROM CHA-A	0xA1 / 0xA0	
	0x61/0x60	Protect Register
	0x31/0x30	Temp. Sensor A
SPD EEPROM CHA-B	0xA5 / 0xA4	
	0x65/0x64	Protect Register
	0x35/0x34	Temp. Sensor B
Board Info EEPROM	0xAF / 0xAE	
	0x6F/0x6E	Protect Register
	0x3F/0x3E	Temp. Sensor Board
BC	0x9B/0x9A	
External RTC	0xA3/0xA2	

You can find the pinout for the SMBus signals in Table 8, Pin assignment of COM Express connectors J1 and J2 on page 38.

2.22 LPC Bus

The CB70C provides one LPC bus interface at the COM Express connector.

Note: In contrast to the COM Express standard, it is not possible to load the BIOS via this interface.

The LPC bus can provide legacy I/O support on the carrier board via a Super I/O and system management devices.

You can find the pinout for the LPC bus signals in Table 8, Pin assignment of COM Express connectors J1 and J2 on page 38.

2.23 SPI Interface

The CB70C provides one SPI interface at the COM Express connector.

Note: In contrast to the COM Express standard, it is not possible to load the BIOS via this interface.

You can find the pinout for the SPI bus signals in Table 8, Pin assignment of COM Express connectors J1 and J2 on page 38.

2.24 Rugged COM Express (VITA 59)

Rugged COM Express is a Computer-On-Module (COM/SOM) standard that is based on PICMG standard COM.0 or COM Express but is especially ruggedized and provides a high-performance, low-power architecture for harsh environments.

RCE modules are electrically compatible to standard COM Express (PICMG COM.0) boards. For this reason, MEN is able to provide every Rugged COM Express board also as a standard COM Express board without much development effort.

The RCE concept has been developed for applications that require highly robust electronics to ensure safe and reliable operation even in severe environments, e.g., in railways and avionics, industrial automation and medical engineering or mobile applications in general.

To make standard COM Express modules suitable for this kind of applications they were embedded in a frame and a cover which ensures 100% EMC protection. Only soldered components are used to withstand shock and vibration, and the design is optimized for conformal coating.

2.24.1 Module Form Factors

Three form factors are defined for Rugged COM Express:

- Mini Module (MEN products in this form factor are named CMxx; the name of the Rugged COM Express module ends with a C for conduction cooling)
- Compact Module (MEN products in this form factor are named CCxx)
- Basic Module (MEN products in this form factor are named CBxx)

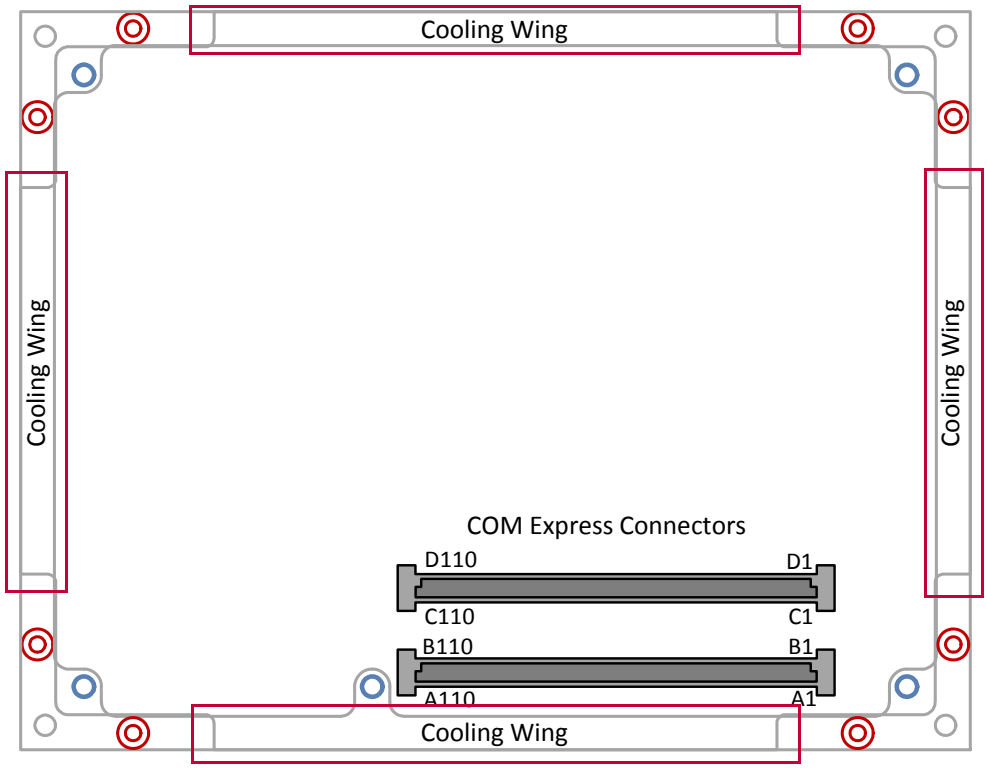
2.24.2 Thermal Concept

Rugged COM Express modules are equipped with four cooling wings for conductive cooling. The heat generated on the board is transported to the frame and the cover via the cooling wings. The frame and the cover, however, are only part of the thermal solution for a module. They only provide a common interface between the Rugged COM Express module and implementation-specific thermal solutions.

The module can e.g. be cooled via conductive cooling, where the heat is transported to a housing or a heat sink built on top of the cover.

For applications where operating temperatures are moderate and in combination with a suitable low-power processor and airflow, MEN's modules can also be used without the frame and cover as standard COM Express modules in accordance with the PICMG COM.0 standard.

Figure 3. *RCE thermal concept: cooling wings between frame and cover*



Please contact MEN's sales team for further information.

2.24.3 COM Express Connectors

The CB70C is connected to the carrier board via two 220-pin connectors using Type 6 connector pin-out.

Connector types:

- 2-row, 220-pin free height 4H receptacle, 0.5 mm pitch,
  e.g., Tyco Electronics 3-6318490-6
- Mating connector:
  2-row, 220-pin free height 5H plug connector, 0.5 mm pitch,
  e.g., Tyco Electronics 3-1827253-6

In the following pinout tables the COM Express connectors are shown as seen on a carrier board.

Table 8. *Pin assignment of COM Express connectors J1 and J2*

J1				J2			
A1	GND	B1	GND	C1	GND	D1	GND
A2	GBE0_MDI3-	B2	GBE0_ACT#	C2	GND	D2	GND
A3	GBE0_MDI3+	B3	LPC_FRAME#	C3	USB_SSRX2-	D3	USB_SSTX2-
A4	GBE0_LINK100#	B4	LPC_AD0	C4	USB_SSRX2+	D4	USB_SSTX2+
A5	GBE0_LINK1000#	B5	LPC_AD1	C5	GND	D5	GND
A6	GBE0_MDI2-	B6	LPC_AD2	C6	USB_SSRX1-	D6	USB_SSTX1-
A7	GBE0_MDI2+	B7	LPC_AD3	C7	USB_SSRX1+	D7	USB_SSTX1+
A8	GBE0_LINK#	B8	LPC_DRQ0#	C8	GND	D8	GND
A9	GBE0_MDI1-	B9	LPC_DRQ1#	C9	USB_SSRX3-	D9	USB_SSTX3-
A10	GBE0_MDI1+	B10	LPC_CLK	C10	USB_SSRX3+	D10	USB_SSTX3+
A11	GND	B11	GND	C11	GND	D11	GND
A12	GBE0_MDI0-	B12	PWRBTN#	C12	USB_SSRX4-	D12	USB_SSTX4-
A13	GBE0_MDI0+	B13	SMB_CK	C13	USB_SSRX4+	D13	USB_SSTX4+
A14	GBE0_CTREF	B14	SMB_DAT	C14	GND	D14	GND
A15	SUS_S3#	B15	SMB_ALERT#	C15	SDVO_STALL+	D15	DDI1_CTRL-CLK_AUX+
A16	SATA0_TX+	B16	SATA1_TX+	C16	SDVO_STALL-	D16	DDI1_CTRL-CLK_AUX-
A17	SATA0_TX-	B17	SATA1_TX-	C17	-	D17	-
A18	SUS_S4#	B18	SUS_STAT#	C18	-	D18	-
A19	SATA0_RX+	B19	SATA1_RX+	C19	PCIE_RX2+	D19	PCIE_TX2+
A20	SATA0_RX-	B20	SATA1_RX-	C20	PCIE_RX2-	D20	PCIE_TX2-
A21	GND	B21	GND	C21	GND	D21	GND
A22	SATA4_TX+	B22	SATA5_TX+	C22	-	D22	-
A23	SATA4_TX-	B23	SATA5_TX-	C23	-	D23	-
A24	SUS_S5#	B24	PWR_OK	C24	DDI1_HPD	D24	-
A25	SATA4_RX+	B25	SATA5_RX+	C25	SDVO_INT+	D25	-

J1				J2			
A26	SATA4_RX-	B26	SATA5_RX-	C26	SDVO_INT-	D26	DDI1_PAIR0+
A27	BATLOW#	B27	-	C27	-	D27	DDI1_PAIR0-
A28	(S)ATA_ACT#	B28	HDA_SDIN2	C28	-	D28	-
A29	HDA_SYNC	B29	HDA_SDIN1	C29	SDVO_TVCLKIN+	D29	DDI1_PAIR1+
A30	HDA1_RST#	B30	HDA_SDIN0	C30	SDVO_TVCLKIN-	D30	DDI1_PAIR1-
A31	GND	B31	GND	C31	GND	D31	GND
A32	HDA1_BITCLK	B32	SPKR	C32	DDI2_CTRL-CLK_AUX+	D32	DDI1_PAIR2+
A33	HDA1_SDOUT	B33	-	C33	DDI2_CTRL-DATA_AUX-	D33	DDI1_PAIR2-
A34	-	B34	-	C34	DDI2_DDC_AUX_-SEL	D34	DDI1_DDC_AUX_-SEL
A35	THRMTRIP#	B35	THRM#	C35	-	D35	-
A36	USB10-	B36	USB11-	C36	DDI3_CTRL-CLK_AUX+	D36	DDI1_PAIR3+
A37	USB10+	B37	USB11+	C37	DDI3_CTRL-DATA_AUX-	D37	DDI1_PAIR3-
A38	USB_10_11_OC#	B38	USB_8_9_OC#	C38	DDI3_DDC_AUX_-SEL	D38	-
A39	USB8-	B39	USB9-	C39	DDI3_PAIR0+	D39	DDI2_PAIR0+
A40	USB8+	B40	USB9+	C40	DDI3_PAIR0-	D40	DDI2_PAIR0-
A41	GND	B41	GND	C41	GND	D41	GND
A42	USB2-	B42	USB3-	C42	DDI3_PAIR1+	D42	DDI2_PAIR1+
A43	USB2+	B43	USB3+	C43	DDI3_PAIR1-	D43	DDI2_PAIR1-
A44	USB_2_3_OC#	B44	USB_0_1_OC#	C44	DDI3_HPD	D44	DDI2_HPD
A45	USB1-	B45	USB1-	C45	-	D45	-
A46	USB1+	B46	USB1+	C46	DDI3_PAIR2+	D46	DDI2_PAIR2+
A47	VCC_RTC	B47	EXCD1_PERST#	C47	DDI3_PAIR2-	D47	DDI2_PAIR2-
A48	EXCD0_PERST#	B48	EXCD1_CPPE#	C48	-	D48	-
A49	EXCD0_CPPE#	B49	SYS_RESET#	C49	DDI3_PAIR3+	D49	DDI2_PAIR3+
A50	LPC_SERIRQ	B50	CB_RESET#	C50	DDI3_PAIR3-	D50	DDI2_PAIR3-
A51	GND	B51	GND	C51	GND	D51	GND
A52	PCIE_TX3+	B52	PCIE_RX3+	C52	PEG_RX0+	D52	PEG_TX0+
A53	PCIE_TX3-	B53	PCIE_RX3-	C53	PEG_RX0-	D53	PEG_TX0-
A54	GPI0	B54	GPO1	C54	-	D54	-
A55	PCIE_TX4+	B55	PCIE_RX4+	C55	PEG_RX1+	D55	PEG_TX1+
A56	PCIE_TX4-	B56	PCIE_RX4-	C56	PEG_RX1-	D56	PEG_TX1-
A57	GND	B57	GPO2	C57	-	D57	GND
A58	PCIE_TX8+	B58	PCIE_RX8+	C58	PEG_RX2+	D58	PEG_TX2+
A59	PCIE_TX8-	B59	PCIE_RX8-	C59	PEG_RX2-	D59	PEG_TX2-
A60	GND	B60	GND	C60	GND	D60	GND

J1				J2			
A61	PCIE_TX7+	B61	PCIE_RX7+	C61	PEG_RX3+	D61	PEG_TX3+
A62	PCIE_TX7-	B62	PCIE_RX7-	C62	PEG_RX3-	D62	PEG_TX3-
A63	GPI1	B63	GPO3	C63	-	D63	-
A64	PCIE_TX6+	B64	PCIE_RX6+	C64	-	D64	-
A65	PCIE_TX6-	B65	PCIE_RX6-	C65	PEG_RX4+	D65	PEG_TX4+
A66	GND	B66	WAKE0#	C66	PEG_RX4-	D66	PEG_TX4-
A67	GPI2	B67	WAKE1#	C67	-	D67	GND
A68	PCIE_TX5+	B68	PCIE_RX5+	C68	PEG_RX5+	D68	PEG_TX5+
A69	PCIE_TX5-	B69	PCIE_RX5-	C69	PEG_RX5-	D69	PEG_TX5-
A70	GND	B70	GND	C70	GND	D70	GND
A71	LVDS_A0+	B71	LVDS_B0+	C71	PEG_RX6+	D71	PEG_TX6+
A72	LVDS_A0-	B72	LVDS_B0-	C72	PEG_RX6-	D72	PEG_TX6-
A73	LVDS_A1+	B73	LVDS_B1+	C73	GND	D73	GND
A74	LVDS_A1-	B74	LVDS_B1-	C74	PEG_RX7+	D74	PEG_TX7+
A75	LVDS_A2+	B75	LVDS_B2+	C75	PEG_RX7-	D75	PEG_TX7-
A76	LVDS_A2-	B76	LVDS_B2-	C76	GND	D76	GND
A77	LVDS_VDD_EN	B77	LVDS_B3+	C77	-	D77	-
A78	LVDS_A3+	B78	LVDS_B3-	C78	PEG_RX8+	D78	PEG_TX8+
A79	LVDS_A3-	B79	LVDS_BKLT_EN	C79	PEG_RX8-	D79	PEG_TX8-
A80	GND	B80	GND	C80	GND	D80	GND
A81	LVDS_A_CK+	B81	LVDS_B_CK+	C81	PEG_RX9+	D81	PEG_TX9+
A82	LVDS_A_CK-	B82	LVDS_B_CK-	C82	PEG_RX9-	D82	PEG_TX9-
A83	LVDS_I2C_CK	B83	LVDS_BKLT_CTRL	C83	-	D83	-
A84	LVDS_I2C_DAT	B84	VCC_5V_SBY	C84	GND	D84	GND
A85	GPI3	B85	VCC_5V_SBY	C85	PEG_RX10+	D85	PEG_TX10+
A86	-	B86	VCC_5V_SBY	C86	PEG_RX10-	D86	PEG_TX10-
A87	-	B87	VCC_5V_SBY	C87	GND	D87	GND
A88	PCIE_CLK_[1]+	B88	-	C88	PEG_RX10+	D88	PEG_TX10+
A89	PCIE_CLK_[1]-	B89	VGA_RED	C89	PEG_RX10-	D89	PEG_TX10-
A90	GND)	B90	GND	C90	GND	D90	GND
A91	SPI_POWER	B91	VGA_GRN	C91	PEG_RX12+	D91	PEG_TX12+
A92	SPI_MISO	B92	VGA_BLU	C92	PEG_RX12-	C92	PEG_TX12-
A93	GPO0	B93	VGA_HSYNC	C93	GND	D93	GND
A94	SPI_CLK	B94	VGA_VSYNC	C94	PEG_RX13+	D94	PEG_TX13+
A95	SPI_MOSI	B95	VGA_I2C_CK	C95	PEG_RX13-	D95	PEG_TX13-
A96	TPM_PP	B96	VGA_I2C_DAT	C96	GND	D96	GND
A97	-	B97	SPI1_CS#	C97	-	D97	-
A98	-	B98	-	C98	PEG_RX14+	D98	PEG_TX14+
A99	-	B99	-	C99	PEG_RX14-	D99	PEG_TX14-
A100	GND	B100	GND	C100	GND	D100	GND

J1				J2			
A101	-	B101	-	C101	PEG_RX15+	D101	PEG_TX15+
A102	-	B102	-	C102	PEG_RX15-	D102	PEG_TX15-
A103	LID#	B103	SLEEP#	C103	GND	D103	GND
A104	VCC_12V	B104	VCC_12V	C104	VCC_12V	D104	VCC_12V
A105	VCC_12V	B105	VCC_12V	C105	VCC_12V	D105	VCC_12V
A106	VCC_12V	B106	VCC_12V	C106	VCC_12V	D106	VCC_12V
A107	VCC_12V	B107	VCC_12V	D107	VCC_12V	C107	VCC_12V
A108	VCC_12V	B108	VCC_12V	D108	VCC_12V	C108	VCC_12V
A109	VCC_12V	B109	VCC_12V	C109	VCC_12V	D109	VCC_12V
A110	GND	B110	GND	C110	GND	D110	GND

Table 9. *Signal Mnemonics*

	Signal	Direction	Function
Ethernet	GBE0_ACT#	out	Signal for activity status LED, port 0
	GBE0_CTREF	out	Port 0 reference voltage
	GBE0_LINK#	out	Signal for link status LED, port 0
	GBE0_MDI[0:3]+, GBE0_MDI[0:3]-	in/out	Media Dependent Interface data, differential pairs 0 to 3, port 0 (Gigabit Ethernet)
	GBE0_LINK100#	Open drain output	Gigabit Ethernet Controller 0 100 Mbit / sec link indicator, active low
	GBE0_LINK1000#	Open drain output	Gigabit Ethernet Controller 0 1000 Mbit / sec link indicator, active low
Power	GND	-	Ground
	VCC_12V	in	Primary power input: +12V nominal
	VCC_RTC	in	Real-time clock circuit-power input. Nominally +3.0 V
	VCC_5V_SBY	in	Standby power input

	Signal	Direction	Function
Power and System Management	BATLOW#	in	Indicates that external battery is low. This port provides a battery-low signal to the module for orderly transitioning to power saving or power cut-off ACPI modes.
	CB_RESET#	out	Reset output from module to carrier board
	LID#	in	LID button, used by the ACPI operating system for a LID switch
	PWR_OK	in	Power OK signal from external main power supply
	PWRBTN#	in	Power button to bring system out of S5 (soft off)
	SLEEP#	in	Sleep button, used by the ACPI operating system to bring the system to sleep state or to wake it up again
	SYS_RESET#	in	Reset button input
	WAKE0#	in	Wake signal from PCIe device to wake CB70C from sleep state
	WAKE1#	in	General purpose wake-up signal
	SUS_S3#	out	Indicates system is in Suspend to RAM state. Active low output. An inverted copy of SUS_S3# on the Carrier Board may be used to enable the non-standby power on a typical ATX supply
	SUS_S4#	out	Indicates system is in Suspend to Disk state. Active low output
	SUS_S5#	out	Indicates system is in Soft Off state
	SUS_STAT#	out	Indicates imminent suspend operation; used to notify LPC devices
Thermal Protection	THRM#	in	Input from off-Module temp sensor indicating an over-temp situation.
	THERMTRIP#	out	Active low output indicating that the CPU has entered thermal shutdown.
PCI Express	PCIE_CLK_REF+, PCIE_CLK_REF-	out	Reference clock output for all PCI Express lanes
	PCIE_RX0+, PCIE_RX0-	in	Differential PCIe receive lines, lane 0
	PCIE_TX0+, PCIE_TX0-	out	Differential PCIe transmit lines, lane 0
PCI Express Card	EXCD0_CPPE#	in	PCI ExpressCard: PCI Express capable card request
	EXCD0_PERST#	out	PCI ExpressCard: reset
PCI Express Graphics	PEG_RX[0:15]+, PEG_RX[0:15]-	in	PCI Express Graphics Receive Differential Pair or regular PCIe 1x16 or 2x8. SDVO and PCI Express Interface for Graphics architecture are muxed together

	Signal	Direction	Function
	PEG_TX[0:15]+, PEG_TX[0:15]-	out	PCI Express Graphics Transmit Differential Pair or regular PCIe 1x16 or 2x8
	PEG_ENABLE#	in	Strap to enable PCI Express x16 external graphics interface
	PEG_LANE_RV#	in	PCI Express Graphics lane reversal input strap
LVDS	LVDS_A_CK+, LVDS_A_CK-	out	Differential LVDS clock output, port A
	LVDS_A[0:3]+, LVDS_A[0:3]-	out	Differential LVDS lines, port A
	LVDS_B_CK+, LVDS_B_CK-	out	Differential LVDS clock output, port B
	LVDS_B[0:3]+, LVDS_B[0:3]-	out	Differential LVDS lines, port B
	LVDS_BKLT_CTRL	out	LVDS panel backlight brightness control
	LVDS_BKLT_EN	out	LVDS panel backlight enable
	LVDS_I2C_CK	in/out	I2C clock output for LVDS display use
	LVDS_I2C_DAT	in/out	I2C data line for LVDS display use
	LVDS_VDD_EN	out	LVDS panel power enable
DDI	DDI[1:3]_PAIR[0:3]+ DDI[1:3]_PAIR[0:3]-	out	Digital Display Interface 1 to 3 Pair[0:3] differential pairs
	DDI[1:3]_HPD	in	Digital Display Interface Hot-Plug Detect
	DDI2_CTRLCLK_AUX+	in/out	Multiplexed DDI[0:2] Data Channel Clock & AUX +
	DDI3_CTRLDATA_AUX-	in/out	Multiplexed DDI[0:2] Data Channel Data & AUX -
	DDI[0:2]_DDC_AUX_SEL	in	DDI[0:2] DDC/AUX Select
VGA	VGA_RED	out	Red for monitor. Analog DAC output, designed to drive a 37.5 Ohm equivalent load
	VGA_GRN	out	Green for monitor. Analog DAC output, designed to drive a 37.5 Ohm equivalent load
	VGA_BLU	out	Blue for monitor. Analog DAC output, designed to drive a 37.5 Ohm equivalent load
	VGA_HSYNC	out	Horizontal sync output to VGA monitor
	VGA_VSYNC	out	Vertical sync output to VGA monitor
	VGA_I2C_CK	in/out	DDC clock line (I2C port dedicated to identify VGA monitor capabilities)
	VGA_I2C_DAT	in/out	DDC data line

	Signal	Direction	Function
SDVO	SDVO_STALL+ SDVO_STALL-	in	Serial Digital Video Field Stall input differential pair.
	SDVOC_INT+ SDVOC_INT-	in	Serial Digital Video C interrupt input differential pair.
	SDVO_TVCLKIN+ SDVO_TVCLKINI	in	Serial Digital Video TVOUT synchronization clock input differential pair.
SATA	SATA0_RX+, SATA0_RX-	in	Differential SATA receive lines, port 0
	SATA0_TX+, SATA0_TX-	out	Differential SATA transmit lines, port 0
	SATA1_RX+, SATA1_RX-	in	Differential SATA receive lines, port 1
	SATA1_TX+, SATA1_TX-	out	Differential SATA transmit lines, port 1
	SATA4_RX+, SATA4_RX-	in	Differential SATA receive lines, port 4
	SATA4_TX+, SATA4_TX-	out	Differential SATA transmit lines, port 4
	SATA5_RX+, SATA5_RX-	in	Differential SATA receive lines, port 5
	SATA5_TX+, SATA5_TX-	out	Differential SATA transmit lines, port 5
	SATA_ACT#	in/out	SATA activity indicator
USB	USB0+, USB0-	in/out	Differential USB 2.0 lines, port 0
	USB1+, USB1-	in/out	Differential USB 2.0 lines, port 1
	USB2+, USB2-	in/out	Differential USB 2.0 lines, port 2
	USB3+, USB3-	in/out	Differential USB 2.0 lines, port 3
	USB4+, USB4-	in/out	Differential USB 2.0 lines, port 4
	USB5+, USB5-	in/out	Differential USB 2.0 lines, port 5
	USB_0_1_OC#	in	USB overcurrent sense, ports 0 and 1
	USB_2_3_OC#	in	USB overcurrent sense, ports 2 and 3
	USB_4_5_OC#	in	USB overcurrent sense, ports 4 and 5
	USB_SSTX[0:3]+ USB_SSTX[0:3]-	out	Differential USB 3.0 transmit lines, port 0 to 3
	USB_SSRX[0:3]+ USB_SSRX[0:3]-	in	Differential USB 3.0 receive lines, port 0 to 3

	Signal	Direction	Function
HD Audio	HDA_IO	-	Reference voltage for external HDA codec I/O voltage level
	HDA_BIT_CLK	in/out	HD audio serial data clock
	HDA_RST#	out	HD audio reset
	HDA_SDIN[0:2]	in/out	HD audio serial data in
	HDA_SDOUT	out	HD audio serial data out
	HDA_SYNC	out	HD audio synchronization
LPC	LPC_AD[0:3]	in/out	LPC multiplexed address, command and data bus
	LPC_FRAME#	out	LPC frame indicates the start of an LPC cycle
	LPC_DRQ[0:1]#	in	LPC serial DMA request
	LPC_SERIRQ	in/out	LPC serial interrupt
	LPC_CLK	out	LPC clock output - 33MHz nominal
SPI	SPI_CS#	out	Chip select for Carrier Board SPI - may be sourced from chipset SPI0 or SPI1
	SPI_MISO	in	Data out from Module to Carrier SPI
	SPI_MOSI	out	Data in to Module from Carrier SPI
	SPI_CLK	out	Clock from Module to Carrier SPI
	SPI_POWER	out	Power supply for Carrier Board SPI – sourced from Module – nominally 3.3V. The Module shall provide a minimum of 100mA on SPI_POWER. Carriers shall use less than 100mA of SPI_POWER. SPI_POWER shall only be used to power SPI devices on the Carrier.
SMB	SMB_CK	in/out	System Management Bus bidirectional clock line. Power sourced through 5V standby rail and main power rails.
	SMB_DAT	in/out	System Management Bus bidirectional data line. Power sourced through 5V standby rail and main power rails.
	SMB_ALERT#		System Management Bus Alert – active low input can be used to generate an SMI# (System Management Interrupt) or to wake the system. Power sourced through 5V standby rail and main power rails.

	Signal	Direction	Function
Miscellaneous	SPKR	out	Output for audio enunciator - the "speaker" in PC-AT systems. This port provides the PC beep signal and is mostly intended for debugging purposes.
	TPM_PP	in	Physical Presence pin of Trusted Platform Module (TPM). Active high. TPM chip has an internal pull down. This signal is used to indicate Physical Presence to the TPM.

3 UEFI Firmware (BIOS)

3.1 InsydeH2O Framework

The CB70C is equipped with an InsydeH2O setup utility from Insyde Software. InsydeH2O is Insyde Software's firmware product line designed to replace traditional PC BIOS. It is an implementation of the Intel's Platform Innovation Framework for UEFI/EFI. The UEFI/EFI specification defines a new model for the interface between operating systems and platform firmware. This interface consists of data tables that contain platform-related information, plus boot and runtime service calls that are available to the operating system and its loader. Together, these provide a standard environment for booting an operating system and running pre-boot applications. This product line is the next generation of PC BIOS technology.

3.2 UEFI Firmware System Setup Utility

The CB70C UEFI firmware comes with a Setup Configuration Utility (SCU), simply called "system setup", as commonly known.

The ">" character in front of a menu item means that a sub-menu is available. An "x" in front of a menu item means that there is a configuration option which needs to be activated through a higher configuration option before being accessible.

The CB70C BIOS has two configuration modes. One mode shows only a selection of the most important items and hides items where normally no changes in the settings are required. This manual only describes the short mode. You can easily switch between the two modes via a menu item About this Software.

The settings shown in the following description are usually the default settings.

3.2.1 Main

InsydeH2O Setup Utility					Rev. 3.5
Main	Advanced	Security	Power	Boot	Exit
InsydeH2O Version			CB70-02 1.18		
Processor Type			Intel(R) Core(TM) i7-3615QE CPU @ 2.30 GHz		
System Bus Speed			100 MHz		
System Memory Speed			1600 MHz		
MEN BMC Rev			1.6.0		
MEN Board Model/Rev			Not detected		
MEN Board S/N			2344		
Cache RAM			256 kB		
Total Memory			16384 MB		
Channel A					
SODIMM 0			8192 MB		
SODIMM 1			[Not installed]		

InsydeH2O Setup Utility			Rev. 3.5
Channel B			
SODIMM 0	8192 MB		
SODIMM 1	[Not installed]		
Platform Configuration			
CPU ID:	0x306A9		
Microcode Rev:	0x15		
Number of Core:	4		
Number of Thread:	8		
SMX/TXT:	Supported		
VT-d:	Supported		
VMX:	Supported		
PCH-Rev:	04 (PPT-C1 Stepping)		
VBIOS Ver.:	2137		
Intel ME Version:	8.1.20.1336		
SA-Rev:	09 (E1 Stepping)		
Language	[English]		
System Time	[hh:mm:ss]		
System Date	[mm/dd/yyyy]		
About this Software			
Full configuration mode	[No]		
F1 Help	↑↓ Select Item	F5/F6 Change Values	F9 Setup Defaults
Esc Exit	← → Select Menu	Enter Select > Submenu	F10 Save and Exit

InsydeH2O Version / Processor Type / System Bus Speed / System Memory Speed/MEN Board Rev/ MEN BMC Rev / MEN Board Rev/ MEN Board S/N/ Cache RAM/ Total Memory / SODIMM 0 / SODIMM 1/Platform Configuration/CPU ID/Microcode Rev/Number of Core/Number of Thread/SMX/TXT/VT-d/VMX/PCH-Rev/VBIOS Version/Intel ME Version/ SA-Rev

Description	You cannot change any values in these fields. They are only for information. The values shown in the menu above are example values.

Language

Description	Select the default language.
Options	*English*

System Time

Description	Change the internal clock.	
Options	*hh*	Hours (Valid range from 0 to 23)
	mm	Minutes (Valid range from 0 to 59)
	ss	Seconds (Valid range from 0 to 59)

System Date

Description	Change the date	
Options	*mm*	Month (Valid range from 1 to 12)
	dd	Day (Valid range from 1 to 31)
	yyyy	Year (Valid range from 2000 to 2099)

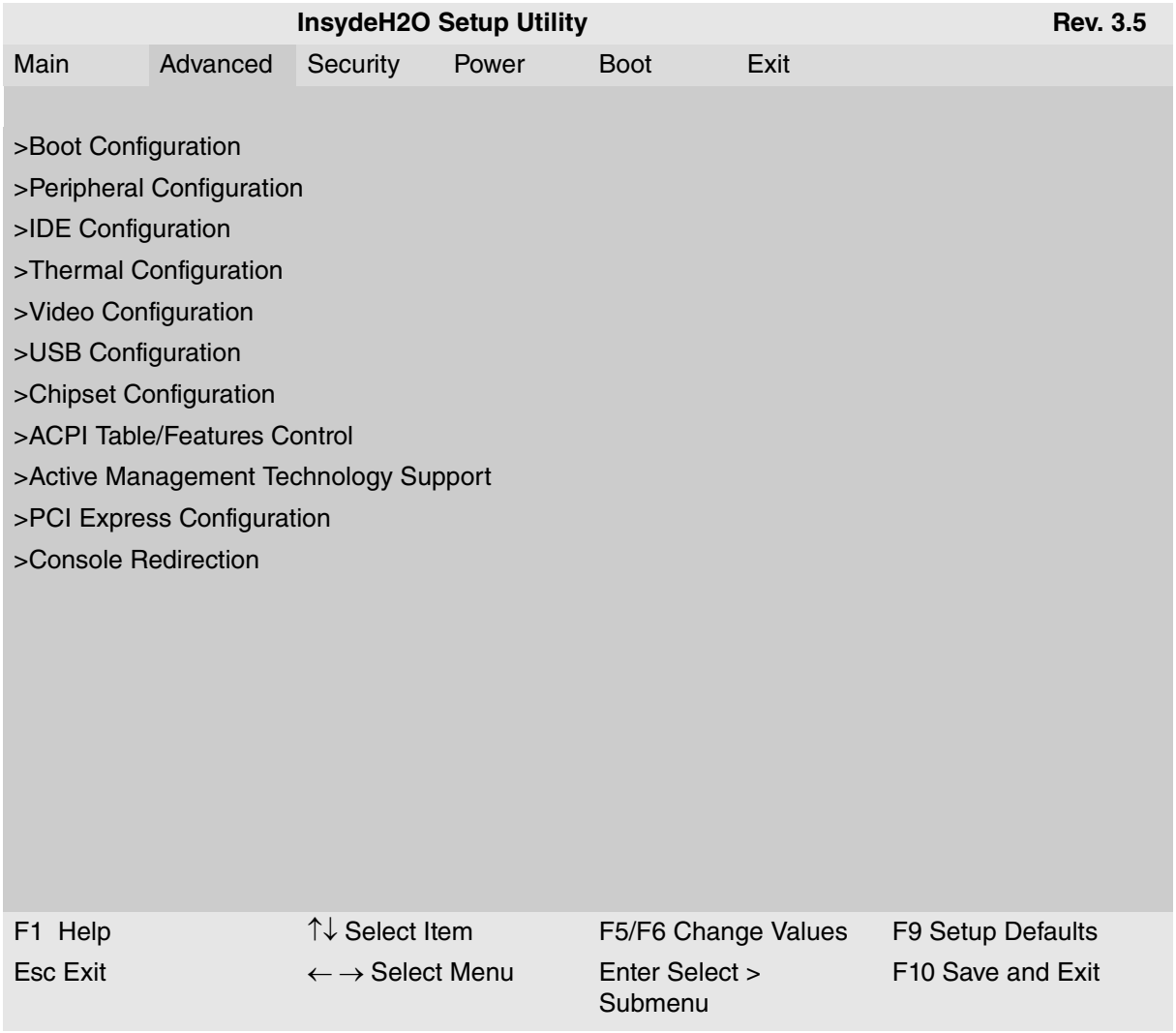
About this Software

Description	Under this item you can find information about the UEFI BIOS.

Full Configuration Mode

Description	The CB70C BIOS has two configuration modes. One mode shows only a selection of the most important items and hides items where normally no changes in the settings are required.	
Options	*Yes*	Enable full configuration mode
	No	Disable full configuration mode

3.2.2 Advanced Menu



3.2.2.1 Boot Configuration — Sub-menu

SCU Resolution	[1024 x 768]
Add additional delay during BIOS boot process	[No delay]
Power Supply Type	[ATX]
Watchdog	[Off]
PWRON after PWR-Fail	[On]
ATX_PWRGD Failure Mode	[Check at Start-Up]
External PS Control	[Switched]
Platform Reset Management	[RESET_IN is enabled]

SCU Resolution

Description	Change resolution of setup utility.	
Options	*640 x 480*	*800 x 600*

Add additional delay during BIOS boot process

Description	Helpful for init delay of peripheral boards	
Options	*No delay*	*100 ms delay*
	200 ms delay	*300 ms delay*
	400 ms delay	*500 ms delay*
	600 ms delay	*700 ms delay*
	800 ms delay	

Power Supply Type

Description	Selects the type of power supply	
Options	*AT*	*ATX*

Watchdog

Description	Enables or disables the CB70C Watchdog.	
Options	*Off*	*10 min*
	1 min	*15 min*
	2 min	*20 min*
	5 min	*30 min*

PWRON after PWR-Fail

Description	Sets the system power status when power returns to the system from a power failure situation.	
Options	*On*	*Off*
	Former State	

ATX_PWRGD Failure Mode

Description	Determines the system behavior in case of a failure at the ATX power good signal	
Options	*Check at Start-Up*	*Check always*

External PS Control

Description	Controls the external Power Supply	
Options	*Always on*	*Switched*

Platform Reset Management

Description	Controls the external Power Supply	
Options	*Always on*	*Switched*

3.2.2.2 Peripheral Configuration — Sub-menu

Serial Port A	[Auto]
Infrared Port	[Disabled]
HD Audio	[Auto]
HD Audio internal HDMI codec	[Disabled]
HD Audio PME enable	[Disabled]
LAN-1	[Enabled]

Serial Port A

Description	Configures Serial Port A options.	
Options	*Auto*	Configuration is determined automatically by the BIOS or operating system.
	Disabled	No configuration.
	Enabled	User configuration.

Infrared Port

Description	Configures Infrared Port options.	
Options	*Auto*	Configuration is determined automatically by the BIOS or operating system.
	Disabled	No configuration.
	Enabled	User configuration.

HD Audio

Description	Enables or disables the Audio controller.	
Options	*Auto*	The controller is enabled if a codec is found.
	Disabled	The controller is disabled even when there is an audio codec.
	Enabled	The controller is enabled independent of the presence of a codec.

HD Audio internal HDMI codec

Description	Enables or disables the HD Audio internal HDMI codec.	
Options	*Enabled*	*Disabled*

HD Audio PME Enable

Description	Enables or disables the HD Audio PME enable.	
Options	*Enabled*	*Disabled*

LAN-1

Description	Enables or disables Intel 82579 GbE (AMT).	
Options	*Enabled*	*Disabled*

3.2.2.3 IDE Configuration — Sub-menu

IDE Controller	[Enabled]
HDC Configure as	[AHCI]
>Software Feature Mask Configuration	
Aggressive LPM Support	[Enabled]
SATA Port 0	[Enabled]
SATA Port Hot Plug	[Disabled]
Spin-Up Device	[Disabled]
SATA Device Type	[Hard Disk Drive]
Port Multiplier	[Disabled]
SATA Port 1	[Enabled]
SATA Port Hot Plug	[Disabled]
Spin-Up Device	[Disabled]
SATA Device Type	[Hard Disk Drive]
Port Multiplier	[Disabled]
SATA Port 2	[Disabled]
SATA Port 3	[Disabled]
SATA Port 4	[Enabled]
SATA Port Hot Plug	[Disabled]
Spin-Up Device	[Disabled]
SATA Device Type	[Hard Disk Drive]
Port Multiplier	[Disabled]
SATA Port 5	[Enabled]
SATA Port Hot Plug	[Disabled]
Spin-Up Device	[Disabled]
SATA Device Type	[Hard Disk Drive]
Port Multiplier	[Disabled]

IDE Controller

Description	Enables or disables the IDE controllers.	
Options	*Enabled*	*Disabled*

HDC Configure as

Description	Set hard disk controller configure type.	
Options	*IDE*	*RAID*
	AHCI	

>Software Feature Mask Configuration - Sub-Menu

HDD Unlock	[Enabled]
LED Locate	[Enabled]

The RAID OROM/RST driver will refer to SWFM configuration to enable/disable the storage feature

HDD Unlock

Description	Enables or disables the unlock button for protected drives in the Intel RST manager.	
Options	*Enabled*	*Disabled*

LED Locate

Description	If enabled, it is indicated that the LED/SGPIO hardware is attached and the pin to locate the feature is enabled in the OS.	
Options	*Enabled*	*Disabled*

Aggressive LPM Support

Description	Enables or disables aggressive LPM support.	
Options	*Enabled*	*Disabled*

SATA Port 0/1/2/3/4/5

Description	Enables or disables SATA ports.	
Options	*Enabled*	*Disabled*

SATA Port Hot Plug

Description	Enables or disables the SATA Port Hot Plug feature.	
Options	*Enabled*	*Disabled*

Spin-Up Device

Description	Enables or disables Spin-up device.	
Options	*Enabled*	*Disabled*

SATA Device Type

Description	Selects the SATA device.	
Options	*Hard Disk Drive*	*Solid State Drive*

Port Multiplier

Description	Enables or disables port multiplier.	
Options	*Enabled*	*Disabled*

3.2.2.4 Thermal Configuration — Sub-menu

>Platform Thermal Configuration	
>CPU Thermal Configuration	

Platform Thermal Configuration - Sub-Menu

Automatic Thermal Reporting	[Enabled]

Automatic Thermal Reporting

Description	Enables or disables the Intel Adaptive Thermal monitor	
Options	*Enabled*	*Disabled*

CPU Thermal Configuration - Sub-Menu

DTS	[Disabled]
Bidirectional PROCHOT#	[Disabled]
ACPI 3.0 T-States	[Disabled]

DTS

Description	Enables CPU Digital Thermal Sensor function. Out of spec: ACPI Thermal Management uses EC reported temperature values and DTS SMM is used to handle Out of Spec condition.	
Options	*Critical reporting*	*Disabled*
	Enabled	

Bidirectional PROCHOT#

Description	This value cannot be changed.
Options	*Disabled*

ACPI 3.0 T-States

Description	Enable or disable ACPI 3.0 T-States	
Options	*Disabled*	*Enabled*

3.2.2.5 Video Configuration — Sub-menu

Primary Display	[Auto]
>Internal Graphic Device	

Primary Display

Description	Selects Primary Display Mode.	
Options	*Auto*	*IGFX*
	PEG	*PCI*

>Internal Graphic Device - Sub-Menu

Internal Graphics Device	[Auto]
IGD - Gtt Size	[2 MB]
IGD - Aperture Size	[256 MB]
IGD - DVMT Pre-Allocated	[64 MB]
IGD - Boot Type	[VBIOS Default]

Internal Graphics Device

Description	Enables or disables the Internal Graphics Device (IGD).	
Options	*Enabled*	The IGD is enabled in any case.
	Disabled	The IGD is disabled
	Auto	The IGD is enabled only when a monitor is found

IGD - Gtt Size

Description	Selects the size of the Gtt (graphics translation table) memory.	
Options	*1 MB*	*2 MB*

IGD - Aperture Size

Description	Selects the size of the system memory that is used by the Internal Graphics Device.	
Options	*128 MB*	*256 MB*
	512 MB	

IGD - DVMT Pre-Allocated

Description	Select DVMT Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.	
Options	*0 MB*	*32 MB*
	64 MB	*96 MB*
	128 MB	*160 MB*
	192 MB	*224 MB*
	256 MB	*288 MB*
	320 MB	*352 MB*
	384 MB	*416 MB*
	448 MB	*480 MB*
	512 MB	*1024 MB*

IGD - Boot Type

Description	Select the video device that will be activated during POST	
Options	*VBIOS Default*	*LFP-SDVO*
	CRT	*EFP*
	LFP	*TV-SDVO*
	CRT+LFP	*CRT+LFP-SDVO*
	TV	*CRT+EFP*

3.2.2.6 USB Configuration — Sub-menu

USB BIOS Support	[Enabled]
EHCI 1	[Enabled]
EHCI 2	[Enabled]
Pre-Port Control	[Disabled]

USB BIOS Support

Description	If this menu item is enabled it is possible to boot from USB devices and use a USB keyboard under DOS. Cannot be changed. No BIOS setup is possible if this item is not enabled.	
Options	*Enabled*	

EHCI 1/2

Description	Enable/Disable EHCI 1/2.	
Options	*Enabled*	*Disabled*

Pre-Port Control

Description	Enable/Disable the pre-port disable control override.	
Options	*Enabled*	*Disabled*

3.2.2.7 Chipset Configuration

```
Setup warning
Setting items on this screen to incorrect values may cause your system
to malfunction!
```

VT-d	[Enabled]

VT-d

Description	Check to enable the VT-d (Intel Virtualization Technology for Directed I/O) function.	
Options	*Enabled*	*Disabled*

3.2.2.8 ACPI Table/Feature Control

FACP - RTC S4 Wakeup	[Enabled]
APIC - IO APIC Mode	[Enabled]
TCO Watchdog Support	[Enabled]
Watchdog ACPI Table	[Enabled]

FACP - RTC S4 Wakeup

Description	Value only for ACPI. Enable/Disable for S4 Wakeup from RTC.	
Options	*Enabled*	*Disabled*

APIC - IO APIC Mode

Description	This item is valid only for WIN2k and WINXP.Also, a fresh install of the OS must occur when APIC Mode is desired.Test the IO ACPI by setting item to Enable.The APIC Table will then be pointed to by the RSDT, the Local APIC will be initialized, and the proper enable bits will be set in chipset.	
Options	*Enabled*	*Disabled*

TCO Watchdog Support

Description	Enables or disables TCO Watchdog Support.	
Options	*Enabled*	*Disabled*

Watchdog ACPI Table

Description	Enables or disables Watchdog ACPI Table.	
Options	*Enabled*	*Disabled*

3.2.2.9 Active Management Technology Support

Intel AMT Support	[Enabled]

Intel AMT Support

Description	Enable/disable Intel Active Management Technology BIOS extension. Note: iAMT H/W is always enabled. This option just controls the BIOS extension execution.	
Options	*Enabled*	*Disabled*

3.2.2.10 PCI Express Configuration

PCIE Port assigned to LAN	2
>PCI Express Root Port 1	
>PCI Express Root Port 2	
>PCI Express Root Port 3	
>PCI Express Root Port 4	
>PCI Express Root Port 5	
>PCI Express Root Port 6	
>PCI Express Root Port 7	
>PCI Express Root Port 8	

PCIE Port assigned to LAN

Description	Determines the number of the PCI Express port which is assigned to the LAN interface.
Options	*2*

>PCI Express Root Port 1/2/3/4/5/6/7/8 - Sub-Menu

>PCI Express Root Port 1	[Enabled]

PCI Express Root Port 1/2/3/4/5/6/7/8

Description	Enables or disables PCI Express ports. If PCI Express Root Port 1 is disabled, PCI Express Root Ports 2 to 7 will also be disabled.	
Options	*Enabled*	*Disabled*

3.2.2.11 Console Redirection — Sub-menu

Console Serial Redirect	[Enabled]
Information Wait Time	[5 Second]
Serial Port	[COM A]
Terminal Type	[VT100]
Baud Rate	[115200]
Data Bits	[8 Bits]
Parity	[None]
Stop Bits	[1 Bit]
Flow Control	[None]
C.R. After Post	[Yes]
Text Mode Resolution	[AUTO]
ACPI SPCR Table	[Disabled]

Console Serial Redirect

Description	Enables or disables the console redirection feature.	
Options	*Enabled*	*Disabled*

Information Wait Time

Description	Sets the information wait time value.	
Options	*0 seconds*	*2 seconds*
	5 seconds	*10 seconds*
	30 seconds	

Serial Port

Description	Selects the serial port.	
Options	*COM A*	*COM B*
	COM C	*COM D*
	PCI Devices	*All Ports*

Terminal Type

Description	Selects the terminal type.	
Options	*VT100*	*VT100+*
	VT_UTF8	*PC_ANSI*

Baud Rate

Description	Selects the baud rate.	
Options	*115200*	*57600*
	38400	*19200*
	9600	*4800*
	2400	*1200*

Data Bits

Description	Selects the data bit number.	
Options	*8 Bits*	*7 Bits*

Parity

Description	Selects the type of parity.	
Options	*None*	*Even*
	Odd	

Stop Bits

Description	Selects the stop bits.	
Options	*1 Bit*	*2 Bits*

Flow Control

Description	Select the type of flow control.	
Options	*None*	*RTS/CTS (hardware flow control)*
	XON/XOFF (software flow control)	

C.R. After Post

Description	Enables Console Redirection after the operating system has loaded	
Options	*Yes*	*No*

Text Mode Resolution

Description	Selects the type of text mode resolution.	
Options	*Auto*	Display uses VGA text mode resolution
	Force 80x25	Forces a text mode resolution of 80x25
	Force 80x24 (DEL First Row)	Forces a text mode resolution of 80x24 (the first row is deleted)
	Force 80x24 (DEL last Row)	Forces a text mode resolution of 80x24 (the last row is deleted)

ACPI SPCR Table

Description	When this feature is enabled, the SPCR table is added into the ACPI tables.	
Options	*Disabled*	*Enabled*

3.2.3 Security

InsydeH2O Setup Utility						Rev. 3.5
Main	Advanced	Security	Power	Boot	Exit	
TPM Status			Enabled and Active			
TPM Operation			[No Operation]			
Supervisor Password			[Installed] or [Not Installed]			
Set BIOS Supervisor Password						
F1 Help		↑↓ Select Item		F5/F6 Change Values		F9 Setup Defaults
Esc Exit		← → Select Menu		Enter Select > Submenu		F10 Save and Exit

TPM Status

Description	Shows TPM (Trusted Platform Module) status. No changes can be made in this field. It is only for information.

TPM Operation

Description	TPM (Trusted Platform Module) operation. The TPM module can be used if the status is *Enable and Activate.*
Options	*No operation* *Disable and Deactivate* *Enable and Activate*

For more information regarding TPM see Chapter 6.1 Literature and Web Resources on page 81.

Supervisor Password

Description	Shows whether a supervisor password has been entered.

Set BIOS Supervisor Password

Description	Enter and confirm a BIOS supervisor password under this menu item. To delete the password enter an empty password. Please note that the password is only saved when you explicitly save the settings, e.g., using <F10> or via menu *Exit* > *Save Change Without Exit*.

The following option becomes visible if a BIOS supervisor password was set:

Power on Password

Description	Select when the set password has to be entered.	
Options	*Enabled*	The password has to be entered when the system starts.
	Disabled	The password has to be entered when the InsydeH2O Setup Utility is opened.

3.2.4 Power

InsydeH2O Setup Utility						Rev. 3.5
Main	Advanced	Security	Power	Boot	Exit	
>Advanced CPU Control						
Wake on PME			[Disabled]			
Wake on Lan-1			[Enabled]			
F1 Help		↑↓ Select Item		F5/F6 Change Values		F9 Setup Defaults
Esc Exit		← → Select Menu		Enter Select > Submenu		F10 Save and Exit

3.2.4.1 Advanced CPU Control – Sub-Menu

P-States(IST)	[Enabled]
Active Processor Cores	[All Cores]
HT Support	[Auto]
VT Support	[Disabled]
Max CPUID Value Limit	[Disabled]
C-States	[Enabled]
Enhanced C-States	[Enabled]
Turbo Mode	[Disabled]

P-States(IST)

Description	Enable processor performance states (P-States).	
Options	*Enabled*	*Disabled*

Active Processor Cores

Description	Selects the number of active processor cores.	
Options	*All Core*	*1 Core*
	2 Core	*3 Core*

HT Support

Description	Enable or disable Hyper Threading.	
Options	*Auto*	*Disabled*

VT Support

Description	Enable or disable Vanderpool technology.	
Options	*Enabled*	*Disabled*

Max CPUID Value Limit

Description	Enable or disable Max CPUID Value Limit.	
Options	*Enabled*	*Disabled*

C-States

Description	Enable processor idle power saving states (C-States).	
Options	*Enabled*	*Disabled*

Enhanced C-States

Description	Enable P-State transitions to occur in combination with C-States.	
Options	*Enabled*	*Disabled*

Turbo Mode

Description	Enables/disables processor turbo mode (the EMTTM feature has to be enabled too)	
Options	*Enabled*	*Disabled*

3.2.4.2 Wake on PME

Description	Determines the action taken when the system power is off and a PCI power management enable wake up event occurs.	
Options	*Enabled*	*Disabled*

3.2.4.3 Wake on Lan

Description	Determines the action taken when the system power is off and a Wake on Lan event occurs.	
Options	*Enabled*	*Disabled*

3.2.5 Boot

InsydeH2O Setup Utility					Rev. 3.5
Main	Advanced	Security	Power	Boot	Exit
Boot Type					
Quick Boot			[Enabled]		
Quiet Boot			[Enabled]		
Network Stack			[Disabled]		
PXE Boot Capability			[Disabled]		
Add Boot Options			[Auto]		
ACPI Selection			[ACPI 5.0]		
USB Boot			[Enabled]		
EFI Device First			[Disabled]		
Timeout			[0]		
Automatic Failover			[Disabled]		
Power-up in standby support			[Disabled]		
>EFI					
F1 Help		↑↓ Select Item		F5/F6 Change Values	F9 Setup Defaults
Esc Exit		← → Select Menu		Enter Select > Submenu	F10 Save and Exit

3.2.5.1 Boot Type

Description	Determines the boot type.	
Options	*Dual Boot Type*	*Legacy Boot Type*
	UEFI Boot Type	

3.2.5.2 Quick Boot

Description	Allows InsydeH2O to skip certain tests while booting. This will decrease the time needed to boot the system.	
Options	*Enabled*	*Disabled*

3.2.5.3 Quiet Boot

Description	Disables or enables booting in Text Mode	
Options	*Enabled*	*Disabled*

3.2.5.4 Network Stack

Description	Network Stack Support: Windows 8, Bitlocker Unlock, UEFI IPv4/ IPv6 PXE, Legacy PXE OPROM	
Options	*Enabled*	*Disabled*

3.2.5.5 PXE Boot Capability

Description	Disables or enables PXE boot to LAN. Cannot be changed.	
Options	*Disabled*	

3.2.5.6 Add Boot Options

Description	Position in boot order for shell, network and removables.	
Options	*Auto*	*First*
	Last	

3.2.5.7 ACPI Selection

Description	Select booting to Acpi4.0/Acpi5.0	
Options	Acpi5.0	Acpi4.0

3.2.5.8 USB Boot

Description	Disables or enables booting to USB boot devices.	
Options	*Enabled*	*Disabled*

3.2.5.9 EFI Device First

Description	Determines whether the EFI device or the legacy device is booted first. If enabled the EFI device is booted first. If disabled the legacy device is booted first.	
Options	*Enabled*	*Disabled*

3.2.5.10 Timeout

Description	The number of seconds that the firmware will wait before booting the original default boot selection.
Options	*0*

3.2.5.11 Automatic Failover

Description	Enable: if boot to default device fails, it will directly try to boot next device. Disable: if boot to default device fails, it will pop warning then go into firmware UI.	
Options	*Enabled*	*Disabled*

3.2.5.12 Power-up in Standby Support

Description	The PUIS feature set allows devices to be powered up into the standby power mangement state to minimize inrush current at power-up and to allow the host to sequence the spin-up of devices.	
Options	*Enabled*	*Disabled*

3.2.5.13 EFI – Sub-Menu

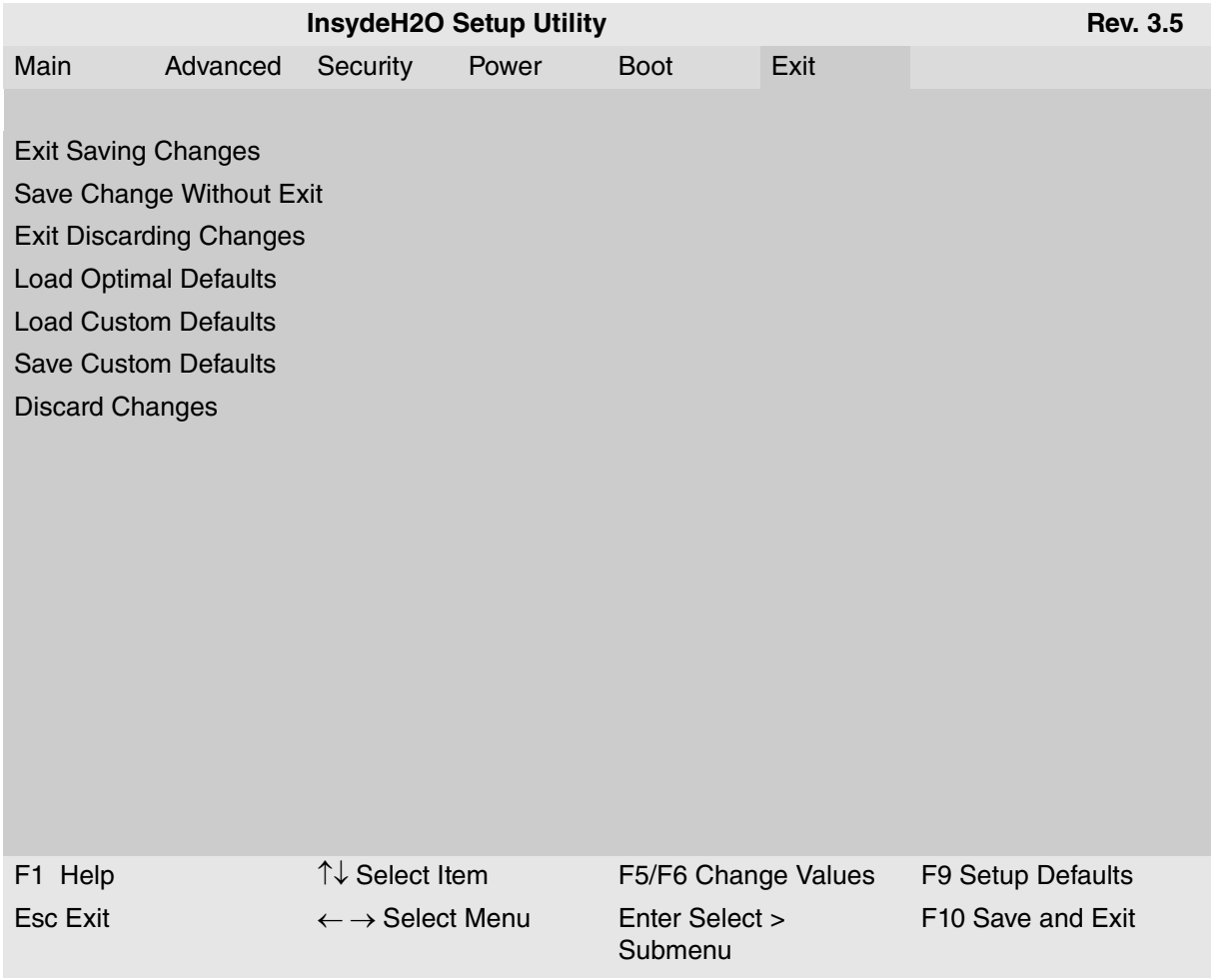
EFI

Internal EFI Shell

EFI Boot Menu

Description	Displays a list of EFI boot media.

3.2.6 Exit



3.2.6.1 Exit Saving Changes

Exit system setup and save your changes.

3.2.6.2 Save Change Without Exit

Save your changes without exiting the system.

3.2.6.3 Exit Discarding Changes

Exit system setup without saving your changes.

3.2.6.4 Load Optimal Defaults

If this option is selected, a verified factory setup is loaded.

On the first BIOS setup configuration, this loads safe values for setup, which make the board boot up.

3.2.6.5 Load Custom Defaults

If this option is selected the custom defaults that have been saved in a former session with Save Custom Defaults (see Chapter 3.2.6.6 Save Custom Defaults) are loaded.

3.2.6.6 Save Custom Defaults

Save custom defaults.

3.2.6.7 Discard Changes

Discard changes.

4 Appendix

4.1 Literature and Web Resources

CB70C data sheet with up-to-date information and documentation:
www.men.de/products/15CB70C.html

4.1.1 COM Express

- COM Express Specification PICMG COM.0 Rev. 2.1:
  2012; PCI Industrial Computers Manufacturers Group (PICMG)
  www.picmg.org
- COM Express Carrier Design Guide Rev. 2.0:
  2013; PCI Industrial Computers Manufacturers Group (PICMG)
  www.picmg.org/v2internal/resourcepage2.cfm?id=3

4.1.2 Rugged COM Express

Rugged COM Express Specification VITA 59.0:
Working Group - Draft; VMEbus International Trade Association (VITA)
www.vita.com/home/Specification/Specifications.html

4.1.3 CPU

Intel Processors
www.intel.com

4.1.4 Ethernet

- ANSI/IEEE 802.3-1996, Information Technology - Telecommunications and Information Exchange between Systems - Local and Metropolitan Area Networks - Specific Requirements - Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications; 1996; IEEE
  www.ieee.org
- Charles Spurgeon's Ethernet Web Site
  Extensive information about Ethernet (IEEE 802.3) local area network (LAN) technology.
  www.ethermanage.com/ethernet/
- InterOperability Laboratory, University of New Hampshire
  This page covers general Ethernet technology.
  www.iol.unh.edu/services/testing/ethernet/training/

4.1.5 HD Audio

Intel High Definition Audio:
www.intel.com/design/chipsets/hdaudio.htm

4.1.6 PCI Express

PCI Special Interest Group
www.pcisig.com

4.1.7 SATA

Serial ATA International Organization (SATA-IO)
www.serialata.org

4.1.8 USB

USB Implementers Forum, Inc.
www.usb.org

4.2 Finding out the Product's Article Number, Revision and Serial Number

MEN user documentation may describe several different models and/or design revisions of the CB70C. You can find information on the article number, the design revision and the serial number on two labels attached to the board.

- **Article number:** Gives the product's family and model. This is also MEN's ordering number. To be complete it must have 9 characters.
- **Revision number:** Gives the design revision of the product.
- **Serial number:** Unique identification assigned during production.

If you need support, you should communicate these numbers to MEN.

Figure 4. *Labels giving the product's article number, revision and serial number*