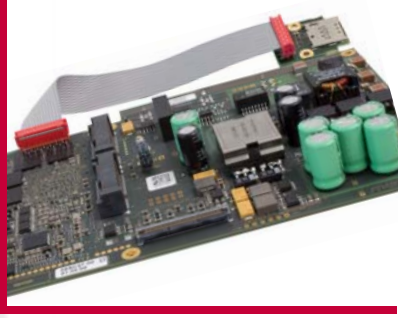
20SC27-00 E2 – 2013-10-22

User Manual

SC27 – Intel® Atom™ SBC for Intelligent Displays

Configuration example



SC27 – Intel® Atom™ SBC for Intelligent Displays

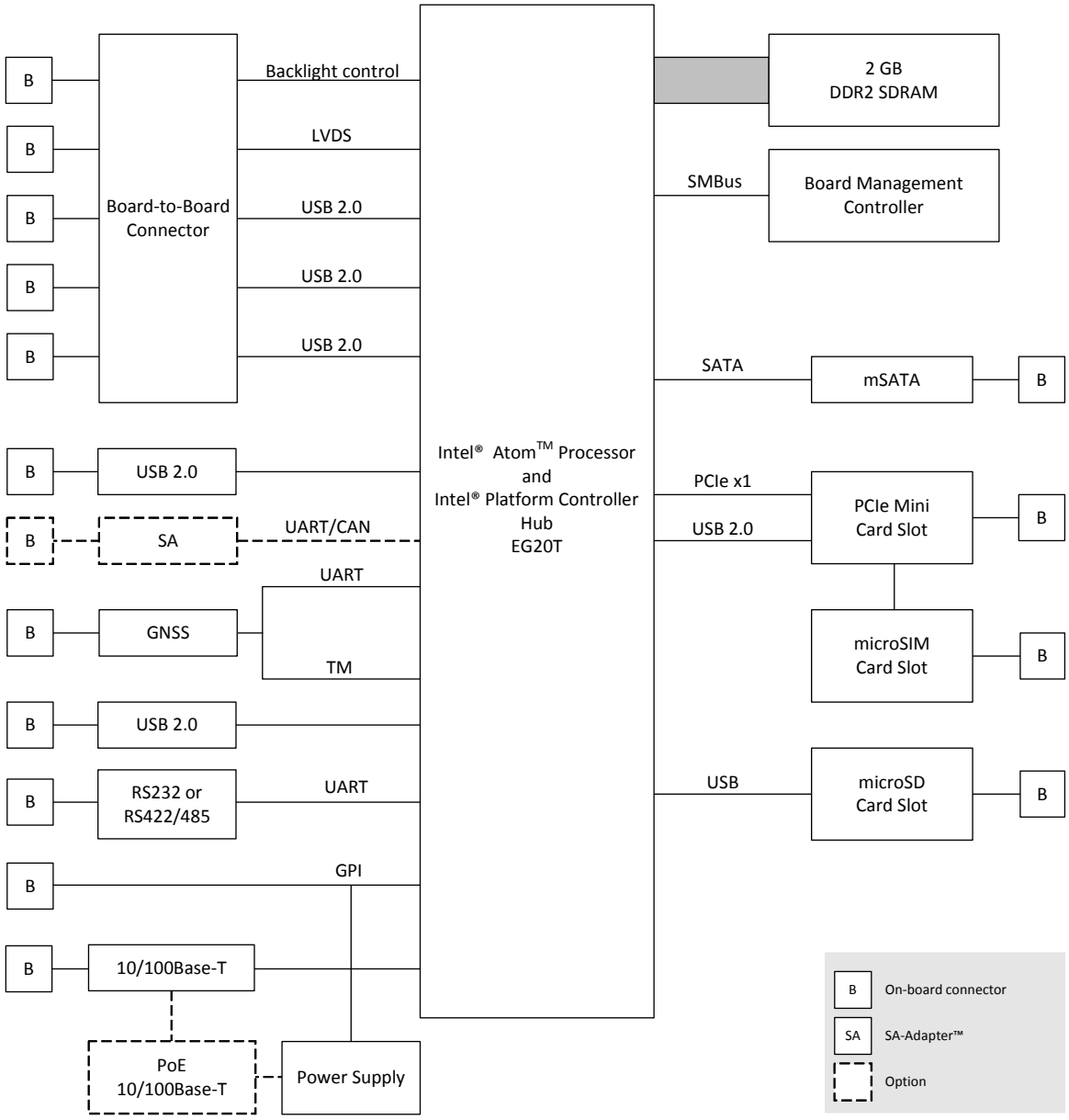
The SC27 is a rugged, fanless and maintenance-free single-board computer for rugged display computers, e.g., for in-seat infotainment purposes in trains, public buses or airplanes. Its small size makes it suitable for display devices with TFT LCD panels as small as 7".

The SC27 is controlled by an Intel® Atom™ E6xx processor running at 1.6 GHz and comes with 2 GB of DDR2 SDRAM and a MicroSD card slot. The standard interfaces comprise one Fast Ethernet (via M12 connector), two USB ports as well as a GNSS and RS232 or RS422/485 interface. Further I/O can be added via SA-Adapters™. A temperature sensor is provided to monitor and control the display. The board's microSIM card slot and the microSD™ card slot can be made accessible on the display computer.

The SC27 is equipped with an internal 10 to 50.4 V (24 VDC nom. or 36 VDC nom.) wide-range power supply and able to operate in a -40 to +85°C environment with sufficient cooling. Optionally the SC27 can be supplied by a Power over Ethernet source with a power range of 37 to 57 V (48 VDC nom.). The SC27 provides EN 50155 conformity, which makes it ideal for any kind of railway application. All electronic components are soldered to withstand shock and vibration and are prepared for conformal coating.

Options include other types of the Intel® Atom™ E6xx series and a UART or CAN bus interface via an SA-Adapter™. A PCI Express® Mini Card slot (with a microSIM card slot) in combination with an external antenna can be used to incorporate wireless functions like Wi-Fi, WIMAX, GSM/GPRS, UMTS, HSDPA and LTE.

Diagram


B
B
B
B
B
Board-to-Board Connector
Backlight control
LVDS
USB 2.0
USB 2.0
USB 2.0
B
USB 2.0
B
SA
UART/CAN
B
GNSS
UART
TM
B
USB 2.0
B
RS232 or RS422/485
UART
B
GPI
B
10/100Base-T
PoE 10/100Base-T
Power Supply
Intel® Atom™ Processor and Intel® Platform Controller Hub EG20T
2 GB DDR2 SDRAM
SMBus
Board Management Controller
SATA
mSATA
B
PCIe x1
USB 2.0
PCIe Mini Card Slot
B
microSIM Card Slot
B
USB
microSD Card Slot
B
B On-board connector
SA SA-Adapter™
Option

Technical Data

CPU

- Intel® Atom™ E680T
  - 1.6 GHz processor core frequency
- Chipset
  - Intel® EG20T Platform Controller Hub (PCH)

Memory

- 2 GB DDR2 SDRAM system memory
  - Soldered
  - 800 MHz memory bus frequency
- 16 Mbits boot Flash
- mSATA disk slot
  - Connected via one SATA channel
  - SATA Revision 2.x support
  - Transfer rates up to 300 MB/s (3 Gbit/s)
- One microSD™ card slot
  - Via USB

Graphics

- Integrated in Intel® Atom™ processor
- One single-channel LVDS interface via board-to-board connector
  - For connection to a display adapter board
  - 80 MHz maximum pixel clock
  - Maximum resolution of up to 1280x768 @ 60 Hz

PCI Express® Mini Card slot

- PCI Express® and USB interface
- microSIM card slot

GPS Interface (Rev. 00.xx.xx)

- 48-channel GPS (Global Positioning System) receiver based on SIRF IV
- GPS Band/Code: L1 frequency, C/A code, SPS
- Integrated TCXO, RTC
- Time mark signal is readable by application software
- Accuracy (unaided):
  - Position: 2.5 m (CEP50)
  - Velocity: 0.01 m/s (50%)
  - Time: 1 µs typ.
- Time To First Fix (TTFF):
  - Cold start: 35 s typ.
  - Warm start: 35 s typ.
  - Hot start: 1 s typ.

- Sensitivity:
  - Acquisition (cold): -147 dBm
  - Re-Acquisition: -162 dBm
  - Tracking: -163 dBm
- Protocol: NMEA 0183 (configurable to SiRF® binary OSP)
- One U.FL antenna connector
  - For the use of an external active or passive antenna
  - Connected via UART
  - Data transfer rate configurable (default: 4800 baud 8N1)

GNSS Interface (Rev. 01.xx.xx)

- 32-channel GNSS (Global Navigation Satellite System) receiver
- GPS Band/Code: L1 frequency
- Integrated TCXO, RTC
- Time mark signal is readable by application software
- Accuracy (unaided):
  - Position: < 1.5 m
  - Time mark pulse: 15 ns standard deviation
- Time To First Fix (TTFF):
  - Cold start: < 35 s
  - Warm start: < 35 s
  - Hot start: < 1 s
- Sensitivity:
  - Acquisition (cold): -146 dBm
  - Tracking: -158 dBm
- Protocol: NMEA 0183
- One U.FL antenna connector
  - For the use of an external active or passive antenna
  - Connected via UART
  - Data transfer rate configurable (default: 9600 baud 8N1)

I/O

- USB
  - One USB 2.0/1.1 port via Type A connector
  - One USB 2.0/1.1 port via M12 connector
  - OHCI (USB1.1) and EHCI (USB2.0) implementation
  - Data rates up to 12 Mbit/s (for USB1.1)
  - Data rates up to 480 Mbit/s (for USB2.0)
- Ethernet
  - One 10/100Base-T Ethernet channel
  - Accessible via M12 connector
  - Power over Ethernet Class 0 optional
- One RS232
  - Accessible via M12 connector
  - RS422/RS485 optionally available
- One GPI line (General Purpose Input)
  - Accessible via M12 power input connector

Intelligent Power Supply with Board Management Controller

- Voltage supervision
- Temperature supervision via sensor
- Backlight control
  - 12 V backlight supply
  - Backlight enable, backlight dimming
- Real-time clock with buffer functionality via supercapacitor
- Watchdog
- Accessible via SMBus

Electrical Specifications

- Supply voltage/power consumption:
  - +24 VDC/+36 VDC nom. (10..50.4 V), 10.8 W typ
  - +110 VDC nom. (66..154 V), 10.8 W typ (optional)
  - +48 VDC nom. (37..57 V), 10.8 W typ (optional power supply via Power over Ethernet)
  - EN 50155 power interruption class S2

Mechanical Specifications

- Dimensions: 160 mm x 110 mm x 44 mm
- Weight: approx. 165 g

Environmental Specifications

- Temperature range (operation):
  - -40..+85°C (screened or with qualified components)
- 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

- 500 000 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 Conformity

- EN 50121-3-2 (table 4, 5 and 6) / EN 55011 (radio disturbance)
- EN 50121-3-2 (table 9) / EN 61000-4-2 (ESD)
- EN 50121-3-2 (table 9) / EN 61000-4-3 (electromagnetic field immunity)
- EN 50121-3-2 (table 8) / EN 61000-4-4 (burst)
- EN 50155 / EN 61000-4-5 (surge)
- EN 50121-3-2 (table 7) / EN 61000-4-6 (conducted disturbances)
- Conducted Emission (Power Line): 2004/104/EC; 2005/83/EC; ISO7637-2
- Prepared for certification according to e1 requirements of the German Federal Motor Transport Authority

BIOS

- InsydeH2O™ UEFI Framework

Software Support

- Windows®
- Linux
- For more information on supported operating system versions and drivers see online data sheet.

Configuration Options

CPU

- Intel® Atom™ E620, 0.6 GHz, 320 MHz graphics frequency, 3.3 W
- Intel® Atom™ E620T, 0.6 GHz, 320 MHz graphics frequency, 3.3 W
- Intel® Atom™ E640, 1.0 GHz, 320 MHz graphics frequency, 3.6 W
- Intel® Atom™ E640T, 1.0 GHz, 320 MHz graphics frequency, 3.6 W
- Intel® Atom™ E660, 1.3 GHz, 400 MHz graphics frequency, 3.6 W
- Intel® Atom™ E660T, 1.3 GHz, 400 MHz graphics frequency, 3.6 W
- Intel® Atom™ E680, 1.6 GHz, 400 MHz graphics frequency, 4.5 W
- Intel® Atom™ E680T, 1.6 GHz, 400 MHz graphics frequency, 4.5 W

Memory

- System RAM
  - 512 MB, 1 GB or 2 GB

I/O

- SA-Adapter™ slot
  - Supports one UART SA-Adapter™ (SA1, SA2, SA3 or SA22) or one CAN SA-Adapter™ (SA8)

Power Supply

- Power over Ethernet powered device instead of PSU
  - Class 0

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 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.
- Store the board only 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.

History

Issue	Comments	Date
E1	First issue	2013-07-15
E2	Updated to Revision 01.xx.xx	2013-10-22

Conventions

This sign marks important notes or warnings concerning the use of voltages which can lead to serious damage to your health and also cause damage or destruction of the component.

This sign marks important notes or warnings concerning proper functionality of the product described in this document. You should read them in any case.

italics — Folder, file and function names are printed in *italics*.

bold — **Bold** type is used for emphasis.

`monospace` — 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 color.

hyperlink — Hyperlinks are printed in blue color.

The globe will show you where hyperlinks lead directly to the Internet, so you can look for the latest information online.

IRQ# /IRQ — Signal names followed by "#" or preceded by a 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 "coming from it".

Vertical lines on the outer margin signal technical changes to the previous issue 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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Contents

Figures

Tables

1 Getting Started

This chapter gives an overview of the board and some hints for first installation in a system.

1.1 Map of the Board

Figure 1. *Map of the board – top view*

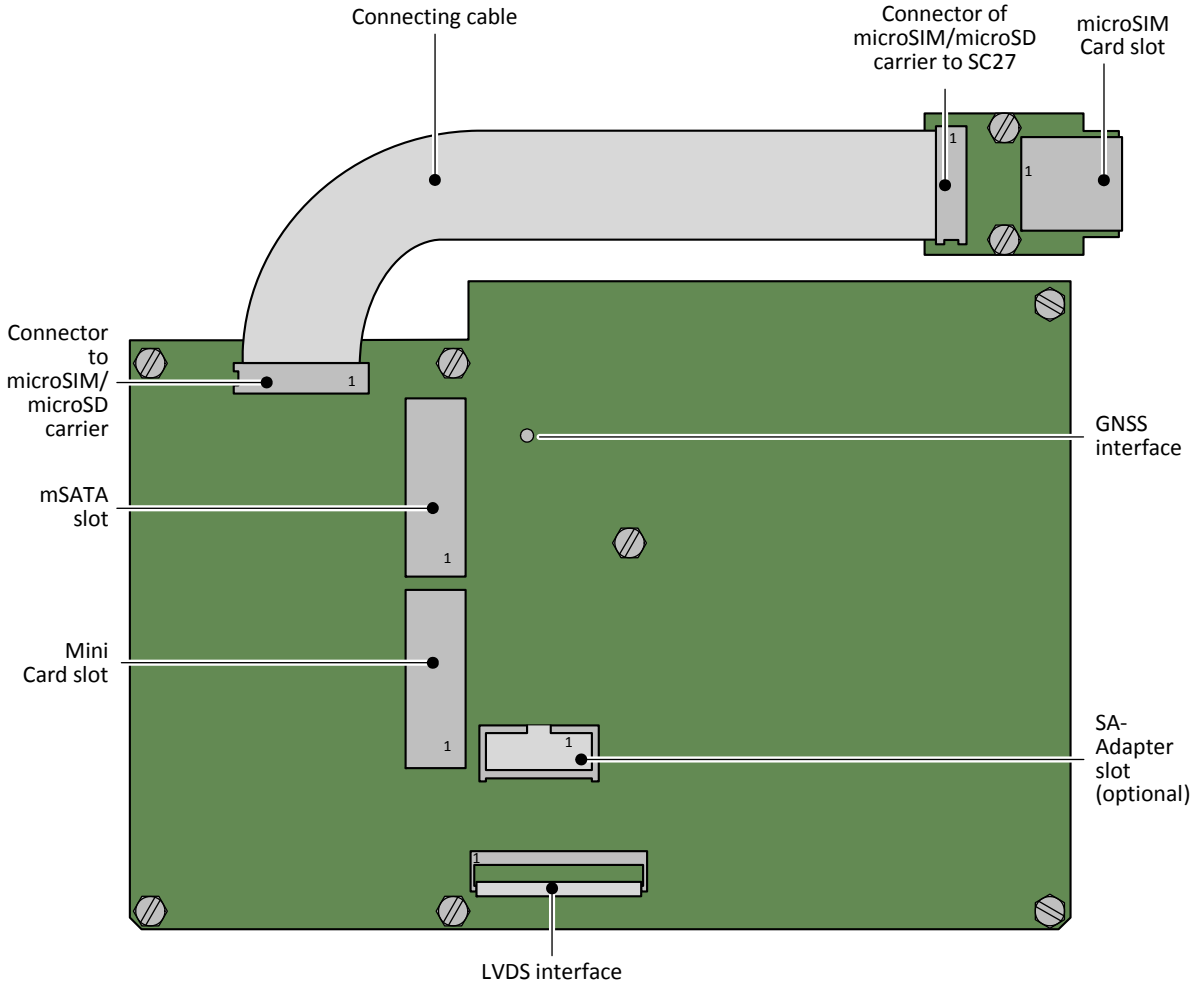
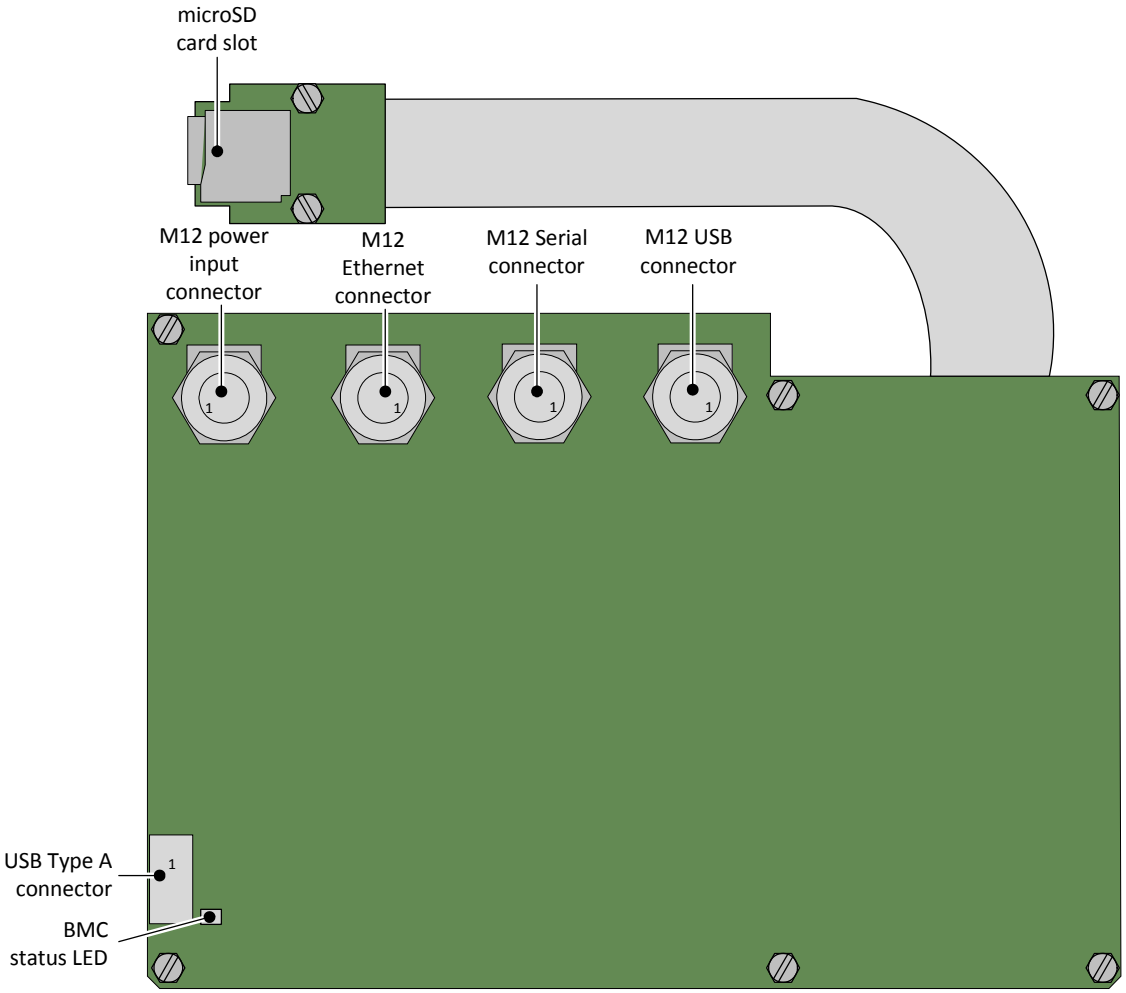
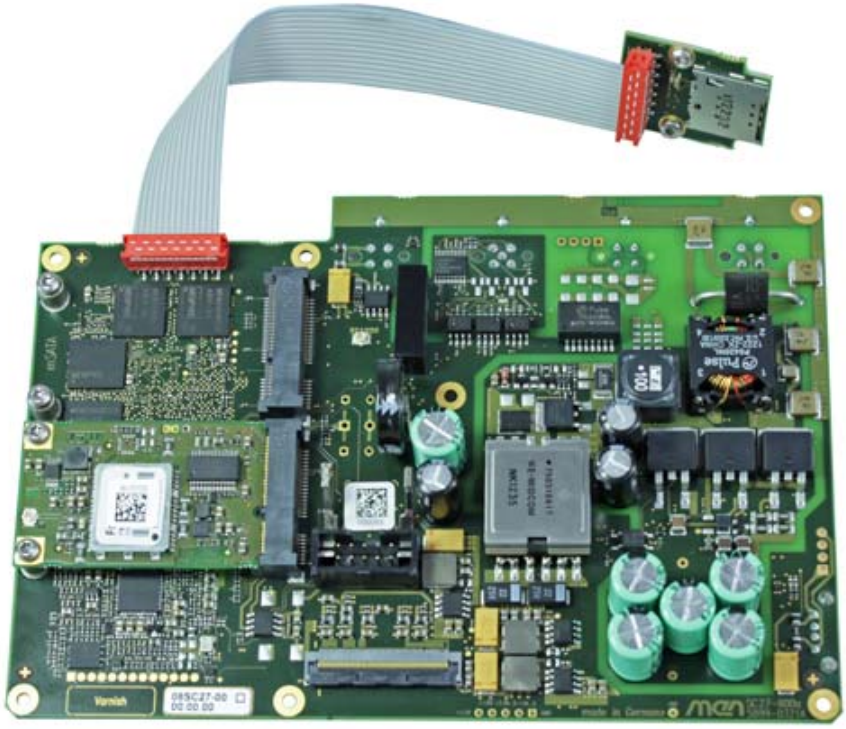


Figure 2. *Map of the board – bottom view*



The microSIM and microSD card holder is connected to the main board via a 14-pin MicroMatch cable (see Figure 3, SC27 – top view). The cable is delivered with the SC27.

Figure 3. *SC27 – top view*



1.2 First Operation

You can use the following check list when installing the board for the first time and with minimum configuration.

- ☑ Connect a USB keyboard and mouse to the USB connectors of the SC27.
- ☑ Connect a flat-panel display capable of displaying the resolution of 800x480 to the LVDS connector of the SC27.
- ☑ Power-up the system.
- ☑ You can start up the BIOS setup menu by hitting the F2 key (see Chapter 3 BIOS on page 41).
- ☑ Now you can make configurations in BIOS (see Chapter 3 BIOS on page 41).
- ☑ Observe the installation instructions for the respective software.

1.3 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 SC27 pages on MEN's website.

1.4 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 SC27 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 4.2 Literature and Web Resources on page 60).

Please note that the board BSPs for the different operating systems may not support all the functions of the SC27. For more information on hardware support please see the respective BSP data sheet on MEN's website.

2.1 Power Supply

The board is supplied with +24 VDC and +36 VDC (10 to 50.4 V) nominal input voltage. Optionally the board can be supplied with +110 VDC (66 to 154 V) or via Power over Ethernet (class 0) with +48 VDC (37 to 57 V). Power over Ethernet is accessible at the M12 Ethernet connector (see Chapter 2.13.2 M12 Connector on page 34).

The internal power supply is EN 50155 compliant, which implies that it has a built-in power-on threshold of about 0.7xUn = 16.8 V for the 24 VDC model. Once the unit is turned on, the input voltage may drop as low as 10 V before the board switches off.

The internal power supply is compliant with EN 50155 class S2 und with the automotive standard e1.

2.1.1 Power Input Connector

The SC27 provides one power input connector.

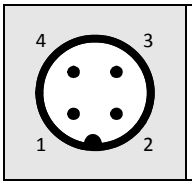
Connector type:

- 4-pin M12 receptacle

Mating connector:

- 4-pin M12 plug

Table 1. *Pin assignment of power input connector*



1	PWRCON_IN
2	PWRCON_GND
3	GPI
4	PWRCON_IN

Table 2. *Signal mnemonics of power input connector*

Signal	Direction	Function
PWRCON_IN	in	Positive input
PWRCON_GND	in	Negative input
GPI	in	General purpose input

The power input connector provides one general purpose input line. For more information, see Chapter 2.17 GPI Interface on page 38.

2.2 Board Supervision

The SC27 provides an intelligent board management controller (BMC) with the following main features:

- Board power sequencing control
- Voltage supervision
- System watchdog
- Software reset functionality
- Error state logging
- Power mode settings
- SMBus communication with main CPU

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.

In addition, the SC27 uses a temperature device to measure the local board temperature.

MEN provides dedicated software drivers for the board controller and the temperature device. 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 MEN's website.

2.3 Reset

The SC27 provides the reset signal *RESET_OUT#*. The *RESET_OUT#* signal is available at the PCIe Mini Card connector and at the microSD card holder.

The RESET_OUT# is the platform reset of the board. It goes high at board start-up and goes low during reset of the board.

2.4 Real-Time Clock

The supply voltage for the real-time clock is buffered with a capacitor that provides at least 24 hours buffer time at 40°C. Optionally an additional capacitor can be assembled to achieve at least 72 hours buffer time.

2.5 Processor Core

The SC27 is equipped with an Intel Atom E600 processor. The following table gives a performance overview:

Table 3. *Processor core options on SC27*

Processor Type	Temperature Range	Core Frequency	Power Class	Graphics Frequency
Intel Atom E620	0 to +70°C	0.6 GHz	3.3 W	320 MHz
Intel Atom E620T	-40 to +85°C			
Intel Atom E640	0 to +70°C	1.0 GHz	3.6 W	
Intel Atom E640T	-40 to +85°C			
Intel Atom E660	0 to +70°C	1.3 GHz		400 MHz
Intel Atom E660T	-40 to +85°C			
Intel Atom E680	0 to +70°C	1.6 GHz	4.5 W	
Intel Atom E680T	-40 to +85°C			

2.5.1 Thermal Considerations

The SC27 generates around 10.8 W of power dissipation (without a display).

The SC27 is designed for an operating temperature from -40 to +85°C. This temperature range can only be achieved with sufficient cooling. In order for the board to meet the thermal requirements, the surrounding system must provide the necessary means to dissipate heat.

2.6 Memory

2.6.1 DRAM System Memory

The board provides up to 2 GB onboard, soldered DDR2 (double data rate) SDRAM. The memory bus is 32 bits wide (one channel) and operates with up to 800 MHz.

2.6.2 Boot Flash

The SC27 has a 16-Mbit SPI Flash implemented as on-board Flash for BIOS data. See Chapter 3 BIOS on page 41.

2.7 Mass Storage

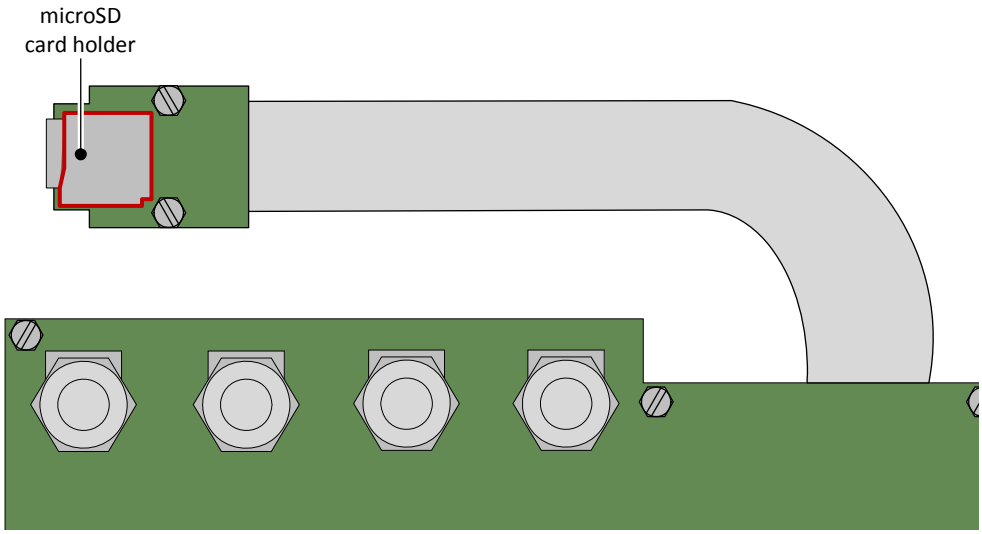
The SC27 offers the possibility to connect a standard mSATA disk and a standard microSD card directly on the board.

2.7.1 microSD Card Slot

The SC27 provides one ready-to-use microSD card slot on the bottom side of the board. The SC27 is shipped without a microSD card installed.

Please see the SC27 page on MEN's website for ordering options.

Figure 4. *Position of the microSD card slot on the bottom side of the SC27*



2.7.1.1 Inserting and Extracting a microSD Card

To install a microSD card, please stick to the following procedure.

- ☑ Power down your system and remove the SC27 from the system.
- ☑ Put the board on a flat surface carefully with the bottom side facing up.
- ☑ Insert the microSD card into the slot with the contacts facing down. (see picture below)

- ☑ Make sure that it clicks into place properly.
- ☑ For extracting the card push it into the slot a little bit more. It is then released and you can pull it out.

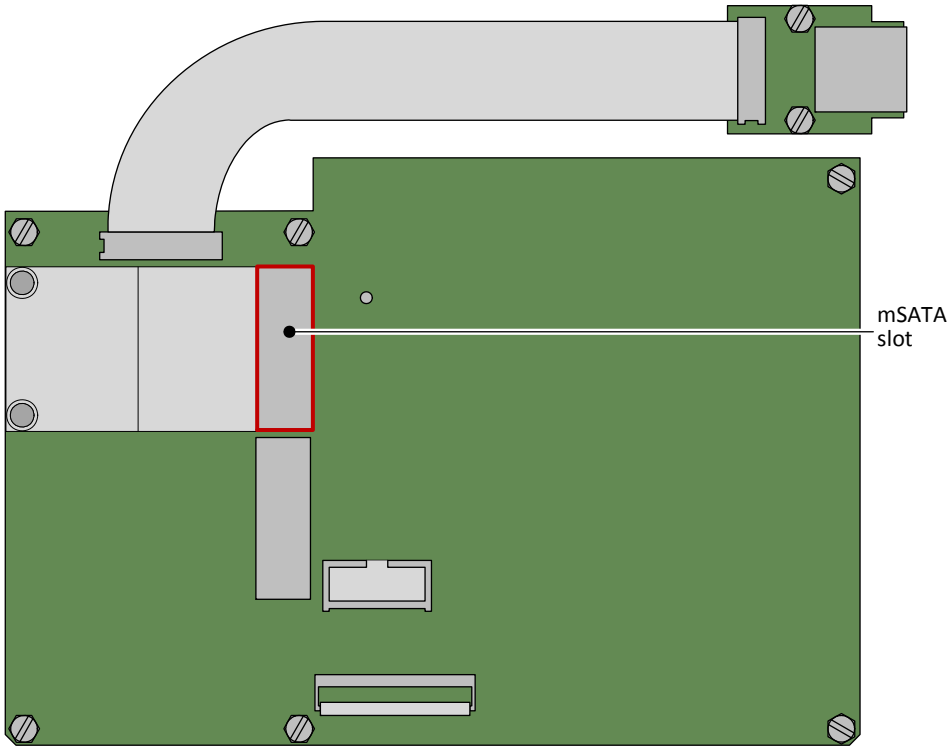
2.7.2 mSATA Slot

The board supports one SATA channel directly controlled by the processor. The SATA interface is compliant with SATA Revision 2.x and supports transfer rates of 3 Gbit/s.

The onboard mSATA disk slot of SC27 is ready-to-use and assembled by standard. The SC27 is shipped without an mSATA disk installed.

Please see the SC27 page on MEN's website for ordering options.

Figure 5. *Position of mSATA slot on the top side of SC27*

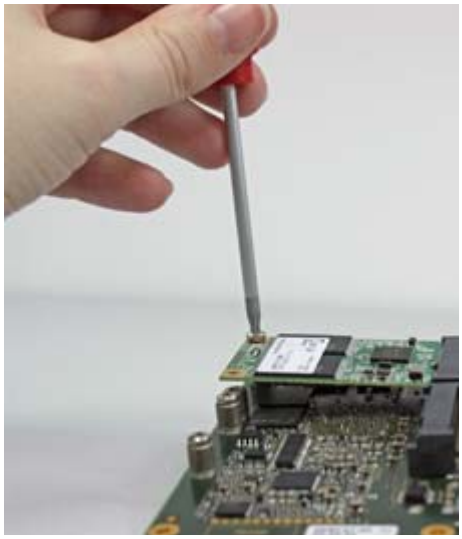


2.7.2.1 Installing an mSATA Disk

To install an mSATA disk, please stick to the following procedure.

- ☑ Power down your system and remove the SC27 from the system.
- ☑ Put the board on a flat surface.
- ☑ Remove the two M2.5 x8 screws from the spacers (marked in red in the picture below)

- ☑ Insert the mSATA disk carefully in a 30° angle (see picture on the left).
- ☑ Make sure that all the contacts are aligned properly and the card is firmly connected with the card connector.
- ☑ Fix the card using the two M2.5 x8 screws (see picture on the right).



2.8 Graphics

2.8.1 LVDS

The SC27 provides one LVDS interface with a 80 MHz maximum pixel clock. The default one is a 18/24-bit LVDS interface and supports a resolution of up to 1280x768 pixels. The default resolution is 800x480 pixels.

Connector type:

- 50-pin ZIF connector, 0.5 mm

Mating connector:

- Flexible flat cable (FFC), downside contacts, 0.5 mm

Table 4. *Pin assignment of LVDS connector*

	1	GND	26	LVDS_2-
	2	+5V_BB	27	LVDS_2+
	3	USB_0-	28	GND
	4	USB_0+	29	LVDS_CLK-
	5	GND	30	LVDS_CLK+
	6	+5V_BB	31	GND
	7	+5V_BB	32	LVDS_3-
	8	GND	33	LVDS_3+
	9	GND	34	GND
	10	+12V_BL	35	USB_1-
	11	+12V_BL	36	USB_1+
	12	+12V_BL	37	GND
	13	+12V_BL	38	USB_5-
	14	+12V_BL	39	USB_5+
	15	GND	40	GND
	16	+3.3V_LVDS	41	-
	17	+3.3V_LVDS	42	GND
	18	+3.3V_LVDS	43	+3.3V_BB
	19	GND	44	+3.3V_BB
	20	LVDS_0-	45	GND
	21	LVDS_0+	46	LVDS_BKLTEN
	22	GND	47	LVDS_VDDEN
	23	LVDS_1-	48	+3.3V_BB
	24	LVDS_1+	49	GND
	25	GND	50	+3.3V_S_BB

Table 5. *Signal mnemonics of LVDS connector*

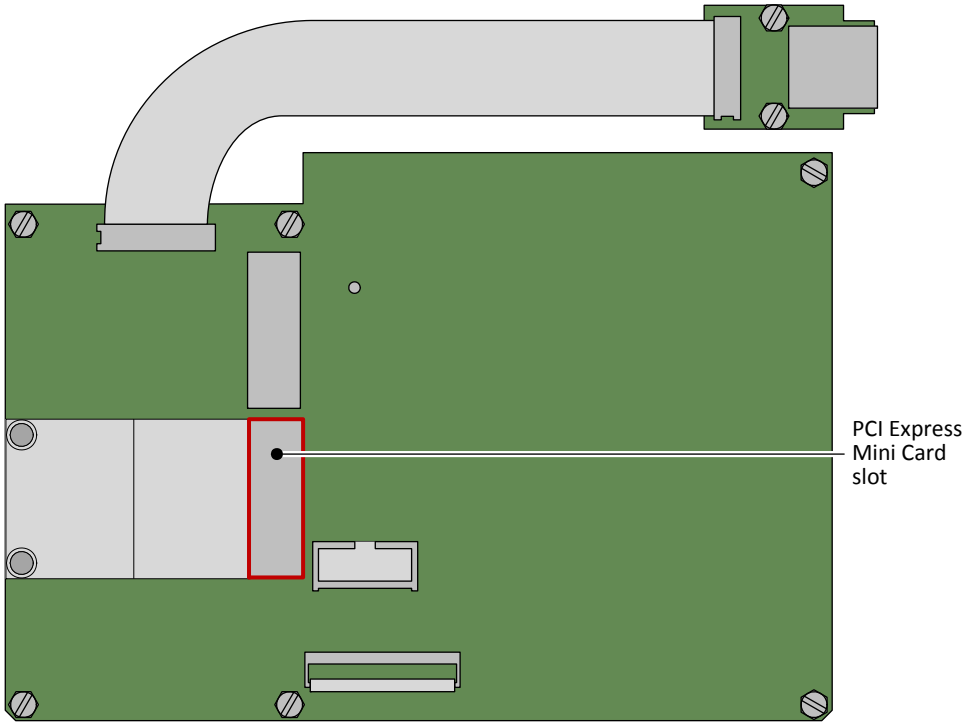
Signal	Direction	Function
+3.3V_BB	-	Filtered +3.3 V
+3.3V_LVDS	-	Filtered +3.3 V for display electronics
+3.3V_S_BB		Filtered +3.3 V_A (always on from S0 to S5)
+5V_BB	-	Filtered +5 V (optionally resettable by chipset GPIO)
+12V_BL	-	Filtered +12 V for display backlight
GND	-	Ground
LVDS_[0:3]-	out	Differential pair of LVDS data lines, link 0..3
LVDS_[0:3]+	out	Differential pair of LVDS data lines, link 0..3
LVDS_CLK- LVDS_CLK+	out	Differential clock
LVDS_BKLTEN	out	backlight power enable signal from the chipset
LVDS_VDDEN	out	display electronics power enable signal from the chipset
USB_0- USB_0+	out	Differential pair of USB data lines, link 0, for general purpose (e.g. micro-controller for backlight control)
USB_1+ USB_1-	out	Differential pair of USB data lines, link 1, for general purpose (e.g. touch)
USB_5+ USB_5-	out	Differential pair of USB data lines, link 5; this signal is optional and can be used for general purpose. It is mutually exclusive with the microSD card slot.

2.9 PCI Express® Mini Card Interface

The SC27 supports the PCI Express Mini Card standard.

The onboard PCI Express Mini Card slot of SC27 is ready-to-use and assembled by standard. The SC27 is shipped without a PCI Express Mini Card installed.

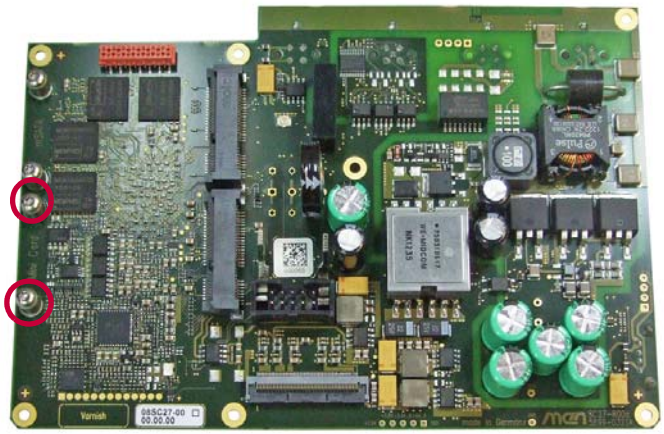
Figure 6. *Position of PCI Express Mini Card slot on the top side of SC27*



2.9.1 Installing a PCI Express® Mini Card

To install a PCI Express® Mini Card, please stick to the following procedure.

- ☑ Power down your system and remove the SC27 from the system.
- ☑ Put the board on a flat surface.
- ☑ Remove the two M2.5 x8 screws from the spacers (marked in red in the picture below)

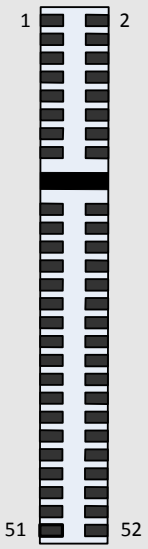


- ☑ Insert the PCI Express® Mini Card carefully in a 30° angle (see picture on the left).
- ☑ Make sure that all the contacts are aligned properly and the card is firmly connected with the card connector.
- ☑ Fix the card using the two M2.5 x8 screws (see picture on the right).

2.9.2 PCI Express® Mini Card Connector

PCI Express® Mini Cards use either a single PCI Express lane (x1) or a USB connection; the SC27 supports both. It is equipped with one 52-pin standard PCI Express Mini Card connector. The following standard signals are supported (signal directions according to PCI Express Mini Card standard):

Table 6. *Pin assignment of PCI Express Mini Card connector*



1	WAKE#	2	+3.3Vaux
3	reserved	4	GND
5	reserved	6	1.5V
7	CLKREQ#	8	UIM_PWR
9	GND	10	UIM_DATA
11	REFCLK-	12	UIM_CLK
13	REFCLK+	14	UIM_RST
15	GND	16	UIM_VPP
17	reserved	18	GND
19	reserved	20	W_DISABLE#
21	GND	22	RESET_OUT#
23	PERn0	24	+3.3Vaux
25	PERp0	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PETn0	32	SMB_DATA
33	PETp0	34	GND
35	GND	36	USB_D-
37	GND	38	USB_D+
39	+3.3Vaux	40	GND
41	+3.3Vaux	42	LED_WWAN#
43	GND	44	LED_WLAN#
45	Reserved	46	LED_WPAN#
47	Reserved	48	+1.5V
49	Reserved	50	GND
51	Reserved	52	+3.3Vaux

Table 7. *Signal mnemonics of 52-pin PCI Express Mini Card connector*

	Signal	Direction	Function
Power	GND	-	Ground
	+3.3Vaux	out	+3.3V (Switchable by chipset GPIO2)
	+1.5V	out	+1.5V (Switchable by chipset GPIO2)
SIM card	UIM_PWR	in	SIM card power
	UIM_DATA	in/out	SIM card data
	UIM_CLK	in	SIM card clock
	UIM_RST	in	SIM card reset
	UIM_VPP	in	not connected
PCI Express	REFCLK- REFCLK+	out	PCI Express differential reference clock
	PERn0/PERp0	in	PCI Express receive signals
	PETn0/PETp0	out	PCI Express transmit signals
Auxiliary Signals	CLKREQ#	in	Clock request
	RESET_OUT#	out	Reset for the Mini Card
	W_DISABLE#	out	not connected
	WAKE#	in	Wake signal
	SMB_CLK	out	not connected
	SMB_DATA	in/out	not connected
USB	USB_D-	in/out	USB line
	USB_D+	in/out	USB line
Communi-cations - specific signals	LED_WWAN#	in	not connected
	LED_WLAN#	in	not connected
	LED_WPAN#	in	not connected

Please refer to the PCI Express Mini Card Specification for further details. See Chapter 4.2 Literature and Web Resources on page 60.

2.10 GPS Interface (Rev. 00.xx.xx)

The SC27 Rev. 00.xx.xx is equipped with a 48-channel SiRF IV GPS receiver. The GPS signals are received via a U.FL antenna connector which has to be connected to an external antenna.

The SC27 itself has no antenna. You need to select and connect an antenna suitable for your application. Please note that MEN does not supply antennas with the SC27, since the choice of a suitable antenna depends on your application.

The GPS receiver converts the data received from the antenna to GPS data packets. The time mark signal is readable by application software. The data transfer rate is configurable (default: 4800 baud 8N1).

For technical details see Chapter Technical Data on page 4.

2.11 GNSS Interface (Rev. 01.xx.xx)

The SC27 Rev. 01.xx.xx is equipped with a 32-channel GNSS receiver, which supports GPS, GLONASS, Galileo and QZSS. The GNSS signals are received via a U.FL antenna connector which has to be connected to an external antenna.

The SC27 itself has no antenna. You need to select and connect an antenna suitable for your application. Please note that MEN does not supply antennas with the SC27, since the choice of a suitable antenna depends on your application.

The GNSS receiver converts the data received from the antenna to GNSS data packets. The time mark signal is readable by application software. The data transfer rate is configurable (default: 9600 baud 8N1).

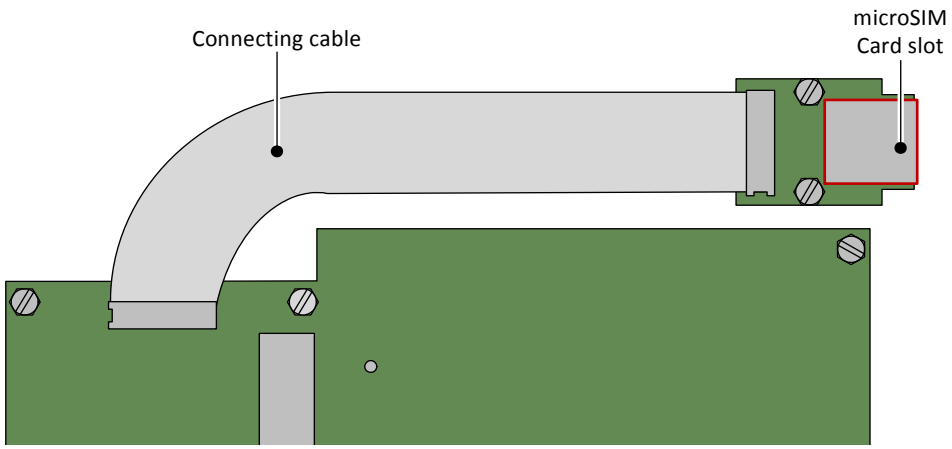
For technical details see Chapter Technical Data on page 4.

2.12 microSIM Card Slot

The SC27 provides one microSIM Card slot.

To get access to a mobile phone network you need a microSIM card (subscriber identity module) and a contract with a mobile service provider. Please note that MEN does not provide mobile services or microSIM cards!

Figure 7. *Position of the microSIM card slot on the top side of the SC27*



2.12.1 Inserting a microSIM Card

To install a microSIM card, please stick to the following procedure.

- ☑ Power down your system and remove the SC27 from the system.
- ☑ Insert the microSIM card into the slot with the contacts facing down (see picture below).

2.13 USB 2.0 Interfaces

The SC27 provides two USB interfaces, one via a USB header and one via an M12 connector.

2.13.1 Type A connector

The SC27 provides a 4-pin USB Type A connector.

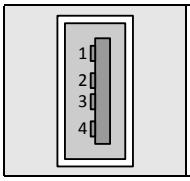
Connector type:

- 4-pin USB Series A receptacle according to Universal Serial Bus Specification Revision 1.0

Mating connector:

- 4-pin USB Series A plug according to Universal Serial Bus Specification Revision 1.0

Table 8. *Pin assignment of USB Type A connector*



1	+5V
2	USB_D-
3	USB_D+
4	GND

Table 9. *Signal mnemonics of USB Type A connector*

Signal	Direction	Function
+5V	out	+5 V power supply, max. 500 mA
GND	-	Digital ground
USB_D+, USB_D-	in/out	USB lines, differential pair

2.13.2 M12 Connector

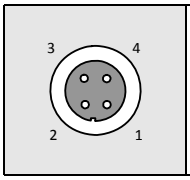
Connector type:

- A-coded 4-pin M12 straight receptacle connector

Mating connector:

- A-coded 4-pin M12 plug

Table 10. *Pin assignment of USB M12 connector*



1	+5V
2	USB_D-
3	USB_D+
4	GND

Table 11. *Signal mnemonics of USB M12 connector*

Signal	Direction	Function
+5V	out	+5 V power supply, max. 500 mA
GND	-	Digital ground
USB_D+, USB_D-	in/out	USB lines, differential pair

2.14 Ethernet Interface

The SC27 provides one 10/100Base-T Ethernet channel, which is controlled by an Intel Ethernet controller.

The interface is controlled by an Ethernet MAC in the platform controller hub and a PHY on the SC27 board.

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 SC27 are:

```
0x 00 C0 3A C2 18 00 - 0x 00 C0 3A C2 37 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 38 xx = 0x3800 + 0x002A = 0x 38 2A.`

(See Chapter 4.3 Finding out the Product's Article Number, Revision and Serial Number on page 61.)

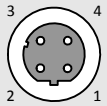
Connector types:

- D-coded 4-pin M12 straight receptacle connector

Mating connector:

- D-coded 4-pin M12 plug

Table 12. *Pin assignment of Ethernet M12 connector*



1	TX+
2	RX+
3	TX-
4	RX-

Table 13. *Signal mnemonics of Ethernet M12 connector*

Signal	Direction	Function
RX+/-	in	Differential pair of receive data lines for 10/100Base-T
TX+/-	out	Differential pair of transmit data lines for 10/100Base-T

2.15 UART Interface

The SC27 provides one isolated serial UART interface on an M12 connector. It supports RS232 mode, RS422/RS485 mode is available optionally. The interface is ESD protected.

Connector types

- A-coded 5-pin M12 straight receptacle connector

Mating connector:

- A-coded 5-pin M12 plug

Table 14. *Pin assignment of RS232 M12 connector*

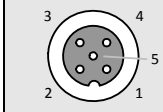
		RS232	RS422/RS485	
			half duplex	full duplex
	1	-	TX-_RX-	TX-
	2	TXD	TX+_RX+	TX+
	3	GND	-	RX-
	4	RXD	-	RX+
	5	GND	GND	GND

Table 15. *Signal mnemonics of RS232 M12 connector*

Mode	Signal	Direction	Function
All modes	GND	-	Ground
RS232	TXD	out	Transmit data
	RXD	in	Receive data
RS422	RX+/-	in	Differential receive data
	TX+/-	out	Differential transmit data
RS485	TX+/-_RX+/-	in/out	Differential transceive data

2.16 SA-Adapter Slot

The SC27 optionally provides one SA-Adapter slot for connecting a UART SA-Adapter. This way, a serial interface can be used which can be flexibly configured as needed, e.g., RS232 or RS422, isolated or non isolated, or IBIS.

Optionally the slot can also be used with a CAN SA-Adapter.

See the SC27 pages on MEN's website for a list of SA-Adapters which can be used on the SC27.

The SA-Adapter must be connected to the SA-Adapter slot via a 10-pin ribbon cable. Please consult the respective SA-Adapter user manual for detailed installation instructions.

Connector types:

- 10-pin receptacle, 2.54 mm pitch, for SA-Adapter connection

Mating connector:

- 10-pin SA-Adapter plug

Table 16. *Pin assignment of SA-Adapter slot*

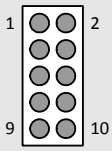
	1	GND	2	+5V_A
	3	COM2_TXD/ CAN_TX	4	COM2_RXD/ CAN_RX
	5	-	6	-
	7	-	8	-
	9	-	10	-

Table 17. *Signal mnemonics of SA-Adapter slot*

Signal	Direction	Function
GND	-	Ground
+5V_A	out	+5 V power supply
COM2_RXD/CAN_RX	in	Receive data
COM2_TXD/CAN_TX	out	Transmit data

2.17 GPI Interface

The SC27 has one GPI (Gerenal Purpose Input) pin available on the power input connector (see Chapter 2.1.1 Power Input Connector on page 20). The pin is isolated and connected to one of the GPIO lines of the controller hub.

Table 18. *GPI characteristics*

	Voltage	Current	Tolerance
Low level	0 V..0.7 V	0 mA .. 0.005 mA	+/-10%
High level	7.5 V..154 V	0.05 mA..1 mA	+/-10%

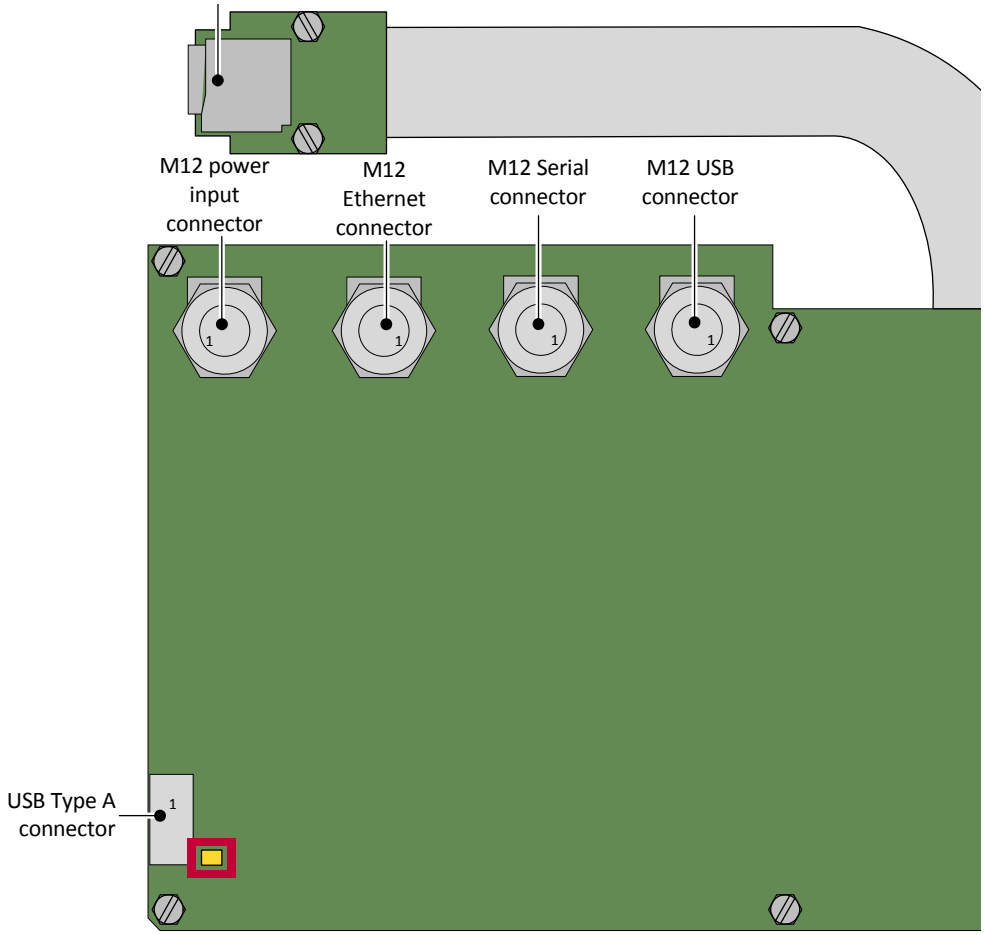
2.18 Chipset GPIO Interface

The following chipset GPIOs are used:

GPIO	Direction	Description
GPIO_[0]	in	GPI (GPI is pulled low while not connected. This results in a low GPIO_[0])
GPIO_[1]	in	GPS time mark signal
GPIO_[2]	out	Mini Card off (default 0 = mini card enabled)
GPIO_[3]	out	(optional) +5V_BB (display board) off (default 0 = +5V_BB enabled)

2.19 Status LED

Figure 8. *Position of BMC status LED on the bottom of the SC27*



The SC27 (Rev. 00.xx.xx) provides one BMC status LED which is yellow and lights up when the input voltage is within valid range.

For revision 01.xx.xx the SC27 provides one BMC status LED which is yellow and shows board status messages. The LED is controlled by the board controller. It is switched on when the BIOS starts, switched off when the board is switched off and flashing 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. See MEN's website for further information.

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

Table 19. *Error codes via LED flashes (Rev. 01.xx.xx)*

Number of Flashes	Error	Description
1	*CPUBCI_ERR_33A*	+V3.3 voltage failure
2	*CPUBCI_ERR_INP*	Input voltage failure
3	*CUBCI_ERR_EXT_PWR_FAIL*	External power supply failure
4	*CPUBCI_ERR_CPU_TOO_HOT*	CPU temperature too high
5	*CPUBCI_ERR_BIOS_TIMEOUT*	BIOS startup failure
6	*CPUBCI_ERR_SYS_RST_TIMEOUT*	System reset timeout
7	*CPUBCI_ERR_PLT_RST_TIMEOUT*	Platform reset failure
8	*CPUBCI_ERR_HANDSHAKE*	Chipset handshake failure
9	*CPUBCI_ERR_NO_SYS_PWROK*	System power OK failure
255	*CPUBCI_INVALID_MAIN_STATE*	Invalid PIC state

3 BIOS

The SC27 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.

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 SC27 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 (see Chapter Full Configuration Mode on page 43).

3.1 Main

InsydeH2O Setup Utility						Rev. 3.5
Main	Advanced	Security	Power	Boot	Exit	
SC27 BIOS Version			1.00			
Processor Type			Intel(R) Atom(TM) CPU E680@ 1.60GHz			
System Bus Speed			400 MHz			
System Memory Speed			800 MHz			
Cache RAM			512 kB			
Total Memory			1024 MB			
Language			<English>			
System Time			[hh:mm:ss]			
System Date			[mm/dd/yyyy]			
Full Configuration Mode			[No]			
MEN EC Version (PIC)			1.5.0			
MEN Board			SC27			
MEN Board S/N			48			
F1 Help		↑↓ Select Item		F5/F6 Change Values		F9 Setup Defaults
Esc Exit		← → Select Menu		Enter Select > Sub-menu		F10 Save and Exit

BIOS Version/Processor Type / System Bus Speed / System Memory Speed / Cache RAM/ Total Memory / MEN EC Version (PIC) / MEN Board / MEN Board S/N

Description	You cannot change any values in these fields. They are only for information.	

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)

Full Configuration Mode

Description	The SC27 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 Advanced

InsydeH2O Setup Utility						Rev. 3.5
Main	Advanced	Security	Power	Boot	Exit	
>Boot Configuration						
>Peripheral Configuration						
>Video Configuration						
>ACPI Table/Features Control						
>PCI Express Root Port 1						
>PCI Express Root Port 2						
>PCI Express Root Port 3						
>PCI Express Root Port 4						
>Thermal Configuration						
F1 Help		↑↓ Select Item		F5/F6 Change Values		F9 Setup Defaults
Esc Exit		← → Select Menu		Enter Select > Sub-menu		F10 Save and Exit

Boot Configuration — Sub-menu

```
Watchdog                        [Off]
Spread Spectrum Control         [On]
Power-Supply Type               [AT]
Power-On after Power-Fail       [On]
ATX Power-Good Failure Mode     [Check at Start-up]
External PS Control             [Switched]
Platform Reset Management       [RESET_IN is enabled]

Delay for HDD                   [Off]
```

Watchdog

Description	Sets the time for the watchdog.	
Options	*1 min*	*2 min*
	5 min	*10 min*
	15 min	*20 min*
	30 min	

Spread Spectrum Control

Description	Enables or disables Spread Spectrum Control.	
Options	*On*	*Off*

Power Supply Type

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

Power on after Power Fail

Description	Sets the system power status when power returns to the system from a power failure situation.	
Options	*S0*	*S5*
	Former-State	

ATX Power-Good Failure Mode

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

External PS Control

Description	Controls the external power supply.	
Options	*Switched*	*Always On*

Platform Reset Management

Description	Enables or blocks the RESET_IN signal of the board.	
Options	*RESET_IN is enabled*	*RESET_IN is blocked*

Delay for HDD		
Description	Delay for spin-up in seconds.	
Options	*Off*	*1 second*
	2 seconds	*3 seconds*
	4 seconds	*5 seconds*

Peripheral Configuration — Sub-menu

```
HD-Audio            [Auto]
LAN-1               [Enabled]
GbE Feature at LAN-1[Enabled]
LAN-2               [Enabled]
```

HD-Audio		
Description	Enable or disable 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.

LAN-1/LAN-2		
Description	Enables or disables the LAN interfaces. The SC27 only supports LAN-1. LAN-2 is inactive.	
Options	*Enabled*	*Disabled*

GbE Feature at LAN-1		
Description	Enables or disables Gigabit Ethernet half/full duplex capability at Ethernet interface LAN-1.	
Options	*Enabled*	*Disabled*

Video Configuration — Sub-menu

```
Primary Video              [Auto]

IGD Pre-Allocated Memory   [UMA = 8MB]
IGD - LCD Panel Type       [VBIOS Default]
Boot Type                  [VBIOS Default]
```

Primary Video

Description	Set the primary display.	
Options	*Auto*	*Scans and activates the graphics devices with the following priority:* *- PCIe* *- PCI* *- IGD*
	IGD	
	PCIe	

IGD Pre-Allocated Memory

Description	Select the amount of pre-allocated memory that the internal graphics device will use.Warning: some feature may not be supported with 1MB pre-allocated memory.	
Options	*UMA = 1MB*	*UMA = 4MB*
	UMA = 8MB	*UMA = 16MB*
	UMA = 32MB	*UMA = 48MB*
	UMA = 64MB	

IGD - LCD Panel Type

Description	Shows the panel used by the Internal Graphics Device. No changes can be made here.

Boot Type

Description	Shows the video device that will be activated during POST. No changes can be made here.

ACPI Table/Feature Control - Sub-Menu

```
APIC - IO APIC Mode      [Enabled]
HPET - HPET Support      [Enabled]
```

APIC - IO APIC Mode

Description	Disabled should be selected if operating systems older than Win2K/WinXP are going to be used. Enabled is only valid for 2K/XP or newer OS and a fresh OS install must occur if enabling this option after OS installation.	
Options	*Enabled*	*Disabled*

HPET - HPET Support

Description	High Precision Event Timer support in Windows XP. If this feature is enabled, the HPET table will be added to the ACPI tables.	
Options	*Enabled*	*Disabled*

PCI Express Root Port 1/2/3/4

Description	Enable/disable PCI Express Root Ports.	
Options	*Enabled*	*Disabled*

Thermal Configuration — Sub-menu

```
Thermal Configuration

     >Platform Thermal Configuration
     >Cpu Thermal Configuration
     >External Thermal Configuration
```

> Platform Thermal Configuration

```
Shut Down Temperature [110 °C]
Throttle On Temperature [100 °C]
```

Shut Down Temperature

Description	ACPI Active Trip Point - the point at which the OS will shut down the system.	
Options	*20°C*	*25°C*
	30°C	*35°C*
	40°C	*45°C*
	50°C	*55°C*
	60°C	*65°C*
	70°C	*75°C*
	80°C	*85°C*
	90°C	*100°C*
	105°C	*110°C*

Throttle on Temperature

Description	Set the CPU temperature point of Throttle on.	
Options	*20°C*	*25°C*
	30°C	*35°C*
	40°C	*45°C*
	50°C	*55°C*
	60°C	*65°C*
	70°C	*75°C*
	80°C	*85°C*
	90°C	*100°C*
	105°C	*110°C*

> Cpu Thermal Configuration

```
DTS                          [Enabled]
Thermal Mode                 [TM1 and TM2]
Bi-directional PROCHOT#      [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 *Enabled* *Disabled*

Thermal Mode

Description Setting this bit enables the thermal control circuit portion of the Thermal Monitor feature of the CPU. Intel Thermal Monitor TM1= 50% duty cycle TM2 = Geyserville 3

Options *Disabled* *TM1*

TM2 *TM1 and TM2*

Bi-Directional PROCHOT#

Description Enables or disables the bi-directional PROCHOT# signal.

Options *Disabled* *Enabled*

> External Thermal Configuration

```
Local Temperature            +062.000°C
Remote Temperature           +081.992°C
```

Description Shows the local and the remote temperature. No settings can be made here.

3.3 Security

InsydeH2O Setup Utility						Rev. 3.5
Main	Advanced	Security	Power	Boot	Exit	
Supervisor Password			[Installed/Not Installed]			
User Password			[Installed/Not Installed]			
Set Supervisor Password						
Power on password			[Disabled]			
User Access level			[View Only]			
Set User Password						
Clear User Password						
F1 Help		↑↓ Select Item		F5/F6 Change Values		F9 Setup Defaults
Esc Exit		← → Select Menu		Enter Select > Sub-menu		F10 Save and Exit

Supervisor Password

Description	Shows whether a supervisor password has been entered.

User Password

Description	Shows whether a user password has been entered.

Set Supervisor Password

Description	Enter and confirm the supervisor password under this menu item. To delete the password enter an empty password.

Power On Password

Description	Select when the 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 changing to the setup menu.

User Access Level

Description	Set the User Access Level.	
Options	*View Only*	Access to InsydeH2O Setup allowed but the fields cannot be changed.
	Full	Any field can be changed except the Supervisor password.
	Limited	Only limited fields can be changed.

Set User Password

Description	Enter and confirm the user password under this menu item.

Clear User Password

Description	Clear the user password. Only possible for a supervisor or user in the access levels full or limited.

3.4 Power

InsydeH2O Setup Utility						Rev. 3.5
Main	Advanced	Security	Power	Boot	Exit	
>Advanced CPU Control						
ACPI Sleep State Configuration						
ACPI S3		[Enabled]				
Wake on LAN		[Disabled]				
Wake on USB activity		[Enabled]				
F1 Help		↑↓ Select Item		F5/F6 Change Values		F9 Setup Defaults
Esc Exit		← → Select Menu		Enter Select > Sub-menu		F10 Save and Exit

Advanced CPU Control – Sub-Menu

```
P-States(IST)                   [Enabled]
HT Support                      [Auto]
Use XD Capability               [Enabled]
VT Support                      [Disabled]
SMRR Support                    [Disabled]
Limit CPUID Max Value           [Disabled]

C-States                        [Enabled]
Enhanced C-States               [Enabled]
Hard-C4E                        [Enabled]
Enable C6                       [Enabled]
```

P-States

Description	Enable processor performance states.	
Options	*Enabled*	*Disabled*

HT Support

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

Use XD Capability		
Description	XD is a CPU feature for perventing malicious buffer overflow attacks (a supporting OS is necessary)	
Options	*Enabled*	*Disabled*

VT Support		
Description	Enable or disable virtualization technology.	
Options	*Enabled*	*Disabled*

SMRR Support		
Description	Enable or disable SMRR support.	
Options	*Auto*	*Disabled*

Limit CPUID Max Value		
Description	Limit CPUID max value to 3 (if max CPUID value > 3) when enabled.	
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*

Hard-C4E		
Description	Enable P-state transitions to minimum state on C4E.	
Options	*Enabled*	*Disabled*

Enable C6		
Description	Enable C6.	
Options	*Enabled*	*Disabled*

ACPI Sleep State Configuration

Description	Enable/Disable ACPI S3 sleep state.	
Options	*Enabled*	*Disabled*

Wake on LAN

Description	Enable/Disable integrated LAN to wake the system.	
Options	*Enabled*	*Disabled*

Wake on USB Activity

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

3.5 Boot

InsydeH2O Setup Utility					Rev. 3.5
Main	Advanced	Security	Power	Boot	Exit
Option ROM Support					
PXE Option ROM			[Disabled]		
PXE Boot to LAN Retry			[Disabled]		
Boot Options Support					
UEFI Boot			[Enabled]		
Quick Boot			[Enabled]		
Quiet Boot			[Enabled]		
ACPI Selection			[ACPI 3.0]		
USB Boot			[Enabled]		
Boot Order			[Enabled]		
First-In/First-Boot					
>EFI					
>Legacy					
F1 Help		↑↓ Select Item		F5/F6 Change Values	F9 Setup Defaults
Esc Exit		← → Select Menu		Enter Select > Sub-menu	F10 Save and Exit

PXE Option ROM

Description	Loads PXE Option ROM when enabled.	
Options	*Enabled*	*Disabled*

PXE Boot to LAN Retry

Description	Disables or enables the reentry of PXE boot.	
Options	*Enabled*	*Disabled*

UEFI Boot

Description	Enable/Disable UEFI Boot Function	
Options	*Enabled*	*Disabled*

Quick Boot

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

Quiet Boot

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

ACPI Selection

Description	Select booting to Acpi4.0/Acpi3.0/Acpi1.0B	
Options	*Acpi3.0*	*Acpi1.0B*
	Acpi4.0	

USB Boot

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

Boot Order First-In/First-Boot

Description	Enabled: boot devices that have been attached first remain at the top of the boot order; Disabled: boot devices that are attached later are entered at the top of the boot order.	
Options	*Enabled*	*Disabled*

EFI – Sub-Menu

```
EFI

Internal EFI Shell
```

Internal EFI Shell

Description Displays a list of EFI shells.

Legacy – Sub-Menu

```
Boot Device Priority

Normal Boot Menu        [Normal][Advance]

>Boot Type Order
>Hard Disk Drive
>USB
```

Normal Boot Menu

Description Select normal boot option priority or advance boot option priority.
If the normal boot option is selected, bootable devices are listed in groups (USB, hard disk drive, etc.), if advance is selected all bootable devices are listed in one list.

Options *Normal* *Advance*

Boot Type Order

Description Lists the boot order. Can be used to select from which type of devices is booted first. For example:

```
USB
Floppy Drive
Hard Disk Drive
CD/DVD-ROM Drive
Others
```

Hard Disk Drive

Description Lists the hard disk drives, for example:

```
SD04G
```

USB

Description Lists the USB drives, for example:

```
SanDisk Cruzer Edge
```

3.6 Exit

InsydeH2O Setup Utility						Rev. 3.5
Main	Advanced	Security	Power	Boot	Exit	
Exit Saving Changes						
Save Change Without Exit						
Exit Discarding Changes						
Load Optimal Defaults						
Load Custom Defaults						
Save Custom Defaults						
Discard Changes						
F1 Help		↑↓ Select Item		F5/F6 Change Values		F9 Setup Defaults
Esc Exit		← → Select Menu		Enter Select > Sub-menu		F10 Save and Exit

3.6.1 Exit Saving Changes

Exit system setup and save your changes.

3.6.2 Save Change Without Exit

Save your changes without exiting the system.

3.6.3 Exit Discarding Changes

Exit system setup without saving your changes.

3.6.4 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.

3.6.5 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 3.6.6 Save Custom Defaults) are loaded.

3.6.6 Save Custom Defaults

Save custom defaults.

3.6.7 Discard Changes

Discard changes.

4 Appendix

4.1 SMBus Devices

Table 20. *SMBus devices*

Address	Function
0x98	Thermal sensor
0x9A	Board controller (PIC)
0xAA	Board information EEPROM
0xD2	PMIC (DA6011)
0x64	External RTC

4.2 Literature and Web Resources

- SC27 data sheet with up-to-date information and documentation:
  www.men.de/products/08SC27-.html

4.2.1 CPU

- Intel Atom Processor E6xx Series with Intel Platform Controller Hub EG20T
  www.intel.com/content/www/us/en/intelligent-systems/queens-bay/embedded-intel-atom-e6xx-series-with-intel-platform-controller-hub-eg20t.html

4.2.2 LVDS

- Online Tutorial at International Engineering Consortium (IEC):
  www.iec.org/online/tutorials/low_voltage/

4.2.3 SATA

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

4.2.4 USB

- USB Implementers Forum, Inc.
  www.usb.org

4.2.5 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/

4.2.6 PCI Express Mini Card

- PCI Express Mini Card Electromechanical Specification
  Revision 1.2; October 26, 2007
  PCI Special Interest Group
  www.pcisig.com

4.3 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 SC27. You can find information on the article number, the design revision and the serial number on a label 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 9. *Labels giving the product's article number, revision and serial number*