

PROTEUS

Single board computer

Issue D – January 2010 – ETH_PROTEUS_USM

WARRANTY

For Warranty terms and conditions users should contact their local Eurotech Sales Office.

TRADEMARKS

All trademarks both marked and not marked appearing in this document are the property of their respective owners.

REVISION HISTORY

<i>Issue no.</i>	<i>Date</i>	<i>Comments</i>
A	PROTEUS V1I1	1 st October 2008
B	PROTEUS V1I1	18 th December 2008
C	PROTEUS V1I1	2 nd April 2009
D	PROTEUS XL V1I1	8 th January 2010

© 2010 Eurotech Ltd. All rights reserved.

See [Eurotech Worldwide Presence](#) (on the back cover) for full contact details.

Table of contents

Important user information	5
Safety notices and warnings	5
Life support policy	6
CE notice.....	6
WEEE.....	6
RoHS.....	7
Technical assistance.....	7
Introduction	8
Features of standalone variants	9
Features of COM Express variants	11
Comparison of PROTEUS variants	13
Power consumption	15
Support products	16
Getting started with your PROTEUS	19
What do need?.....	19
Connecting your PROTEUS.....	19
Identifying your PROTEUS	20
Connecting a SATA hard disk	20
Connecting a CD-ROM	20
Connecting a keyboard	20
Connecting a mouse	20
Turning on/off your PROTEUS	21
Using the serial interface (RS232)	21
Using the audio features	21
Using the on board FLASH	21
Using the USB ports.....	21
Using Ethernet interface.....	22
Using the flat panel interface.....	22
Using the backlight connector	22
Using the touchscreen interface	22
Using the PCIE minicard sockets.....	22
Using the micro SD	23
Using the general purpose inputs/outputs (GPIO)	23
Using the GPS	23
Using the ZigBee (optional).....	23
Using the Bluetooth (optional).....	23
Software specification	24
Operating system support	24
Drivers	24
BIOS.....	24

Hardware implementation.....	25
COM Express specification	25
Type 1 module pinout feature set	25
Power	26
Block diagram	27
Layout and dimensions	28
COM Express Type 1 carrier board expansion.....	30
Processor and chipset.....	30
US15W System Controller Hub	30
Graphics support.....	30
Bandwidth limitations	30
Main memory	31
BIOS ROM memory	31
Clock generation	31
Trusted platform module (Build option).....	31
Intel HD Audio	31
USB.....	32
PCI Express interface	32
PCI Express Mini Card.....	33
Ethernet.....	33
Serial ATA	33
Solid state hard disk.....	33
LPC	33
RTC.....	33
Serial ports	33
GPS receiver (Build option).....	34
Bluetooth (Build option).....	34
ZigBee (Build option).....	34
GPIO	34
Touch screen	34
SMBus.....	34
Micro SD socket	35
Module power supply	35
Indicator LEDs.....	35
Connectors and LEDs	36
Connectors.....	39
LEDs.....	62
GPIO mapping	65
Appendix A – Reference information	69
Appendix B – RoHS Compliance	70
Appendix C – PROTEUS V1I1 vs. PROTEUS XL V1I1	71
Compatibility.....	71
New features/changes in XL.....	71
Incompatibility	72
Eurotech Worldwide Presence.....	74

Important user information

In order to lower the risk of personal injury, electric shock, fire or equipment damage, users must observe the following precautions as well as good technical judgment, whenever this product is installed or used.

All reasonable efforts have been made to ensure the accuracy of this document; however, Eurotech assumes no liability resulting from any error/omission in this document, or from the use of the information contained herein.

Eurotech reserves the right to revise this document and to change its contents at any time without obligation to notify any person of such revision or changes.

Safety notices and warnings

The following general safety precautions must be observed during all phases of operation, service, and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the equipment. Eurotech assumes no liability for the customer's failure to comply with these requirements.

The safety precautions listed below represent warnings of certain dangers of which Eurotech is aware of. You, as the user of the product, should follow these warnings and all other safety precautions necessary for the safe operation of the equipment in your operating environment.

Installation in cupboards and safes

In the event that the product is placed within a cupboard or safe, together with other heat generating equipment, ensure proper ventilation.

Do not operate in an explosive atmosphere

Do not operate the equipment in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment constitutes a definite safety hazard.

Alerts that can be found throughout this manual

The following alerts are used within this manual and indicate potentially dangerous situations:



Danger, electrical shock hazard:

Information regarding potential electrical shock hazards:

- Personal injury or death could occur. Also damage to the system, connected peripheral devices, or software could occur if the warnings are not carefully followed.
 - Appropriate safety precautions should always be used, these should meet the requirements set out for the environment that the equipment will be deployed in.
-



Warning:

Information regarding potential hazards:

- Personal injury or death could occur. Also damage to the system, connected peripheral devices, or software could occur if the warnings are not carefully followed.
 - Appropriate safety precautions should always be used, these should meet the requirements set out for the environment that the equipment will be deployed in.
-



Information and/or Notes:

These will highlight important features or instructions that should be observed.

Use an appropriate power supply

Only start the product with a power supply that conforms to the voltage requirements as displayed on the voltage label attached to the system. In case of uncertainty about the required power supply, please contact your local [Eurotech Technical Support Team](#) (see page [Z](#)) or the electricity authority.

Use power supplies that are compliant with SELV regulation.

Use certified power cables. The power cable must fit the product, the voltage and the required current.

Position cable with care, Avoid positioning cables in places where they may be trampled on or compressed by objects placed on it. Take particular care of the plug, power-point and outlet of power cable.

Avoid overcharging power-points.


Antistatic precautions

To avoid damage caused by ESD (Electro Static Discharge), always use appropriate antistatic precautions when handling any electronic equipment.

Life support policy

Eurotech products are not authorized for use as critical components in life support devices or systems without the express written approval of Eurotech.

CE notice (Wrong template? From System manual?)

The product described in this manual is marked with the  label in accordance with the 1999/5/EC regulation.

Eurotech shall not be liable for use of its products with equipment (i.e. power supplies, personal computers, etc.) that are not CE marked.

WEEE

The information below is issued in compliance with the regulations as set out in the 2002/96/EC directive, subsequently superseded by 2003/108/EC. It refers electrical and electronic equipment and the waste management of such products.

When disposing of a device, including all of its components, subassemblies and materials that are an integral part of the product, you should consider the WEEE directive.

The symbol to the right has been attached to the equipment or, if this has not been possible, on the packaging, instruction literature and/or the guarantee sheet. By using this symbol, it states that the device has been marketed after August 13th 2005, and implies that you must separate all of its components when possible, and dispose of them in accordance with local waste disposal legislations.



Because of the substances present in the equipment, improper use or disposal of the refuse can cause damage to human health and to the environment.

With reference to WEEE, it is compulsory not dispose of the equipment with normal urban refuse, arrangements should be instigated for separate collection and disposal.

Contact your local waste collection body for more detailed recycling information.

In case of illicit disposal, sanctions will be levied on transgressors.

RoHS

This device, including all its components, subassemblies and the consumable materials that are an integral part of the product, has been manufactured in compliance with the European directive 2002/95/EC known as the RoHS directive (Restrictions on the use of certain Hazardous Substances). This directive targets the reduction of certain hazardous substances previously used in electrical and electronic equipment (EEE).

Technical assistance

For any technical questions, or if you cannot isolate a problem with your device, or for any enquiry about repair and returns policies, feel free to contact your local Eurotech Technical Support Team.

See [Eurotech Worldwide Presence](#) (the back cover) for full contact details.

Transportation

When transporting any module or system, for any reason, it should be packed using anti-static material and placed in a sturdy box with enough packing material to adequately cushion it.



Any product returned to Eurotech that is damaged due to inappropriate packaging will not be covered by the warranty!

Device labelling

The PROTEUS serial label is affixed to the end panel of the enclosure this contains the Eurotech part number which in turn contains information on the version and issue of this product the label also contains a serial number which is unique to each individual PROTEUS.

The labels will also display product conformity marking.

Introduction

The PROTEUS is a single board computer primarily based on the Type-1 COM Express extended format CPU module. It also has a secondary build option which allows it to operate in a standalone (base-board free) operating mode.

The module provides the capability to support a combination of wireless standards including:

- 802.11a/b/g/n.
- Bluetooth.
- ZigBee.
- WiMAX.
- Cellular options including (EV-DO, HSUPA, HSDPA, UMTS, EDGE, GPRS, GSM).
- Support for a SiRFStar III based GPS module.

It also provides limited IO functionality including USB, LVDS, SATA and a resistive touch screen interface.

For applications requiring functionality beyond that provided by the standalone module a COM Express connector supporting PCI Express, LPC, USB, HD Audio, Gigabit Ethernet and SMBus interfaces is provided to allow expansion onto a carrier board.

The board is able to run all x86 operating systems including Windows XP/ XP Embedded, Vista, and Linux.

The PROTEUS board can currently be purchased in the following variants:

- PROTEUS-1.6-M1G-F2G-GPS fitted with 1.6GHz Intel Atom Z530P Processor, US15WPT SCH, 1GB DDRII, 2GB FLASH, GPS and standalone configuration.
- PROTEUS-XL-COM-1.6-M1G-F2G-GPS fitted with 1.6GHz Intel Atom Z530P Processor, US15WPT SCH, 1GB DDRII, 2GB FLASH, GPS and COM Express connector.
- PROTEUS-1.33-M1G-F2G-GPS-I and PROTEUS-1.6-M1G-F2G-GPS
- PROTEUS-COM-1.33-M1G-F2G-GPS-I and PROTEUS-COM-1.6-M1G-F2G-GPS

Features of standalone variants

Processor

- Intel® Atom™ processor options:
 - Z530P Processor 1.6GHz TDP: 2.2W, or
 - Z510PT Processor 1.1GHz TDP: 2.2W.

Chipset

- Intel US15WPT chipset TDP: 2.3W.

System memory

- DDR2 SDRAM (up to 1GB 400/533MHz).

Supported OS

- Windows XP, XP Embedded, CE.
- Embedded Linux.

BIOS

- Insyde H20 BIOS - EFI and legacy support.
- SPI Flash (proprietary interface).

On board flash

- Up to 4GB parallel ATA Flash on board (2GB default).

Graphics

- Ultra low power integrated 3D Graphics.
- Two single-channel LVDS 24-bit interfaced to two connectors.
- One backlight connector.

Audio

- HD Audio CODEC and 2W audio amplifier supporting stereo speakers, line in, microphone and headphone.

Touch screen

- 4, 5 and 8 wire resistive touch screen support.

USB support

- USB 2.0 supporting low/full/high speed modes.
- Two ports connected to PCI Express MiniCard sockets.
- Two user accessible ports (Pin header, one client configurable).
- One port to board edge Type A connector.
- One port to ZIF connector.

Ethernet

- Gigabit Ethernet port supporting 10/100/1000 BaseT.
- Output to board edge RJ-45 connector.

Serial ATA

- One SATA connector.
- One power connector for SATA drive.

Serial ports

- One port used to connect to on-board GPS receiver OR ZIF connector (build option).
- One port used to connect to on-board Bluetooth module OR nanoZigBee OR ZIF connector (build option).
- One port used to connect touch screen controller.
- One port used for general purpose RS232 TX/RX port.

PCI Express

- One PCIe MiniCard socket with SIM card slot.
- One PCIe MiniCard socket with SIM card interface on header.

SDIO/MMC

- One MicroSD socket.
- One 8 bit SD on ZIF connector.

GPIO

- Eight GPIO on header.

TPM (build option)

- Atmel Trusted Platform Module Device, TCG v1.2 compatible.
- LPC interface.

GPS receiver (build option)

- 20-channel GPS receiver SirFStar III chipset module.

Bluetooth OR ZigBee (build option)

- Bluetooth wireless communication provided by on-board Bluetooth module.
- ZigBee interface provided by an on-board NanoZigBee module.

Test support

- JTAG Interface (Intel XDP).

Power requirements

- On-board voltage regulators and power management.
- Power / Sleep / HD Activity LED.
- +12V (optional: +5V standby, +3.3V battery).
- +8.5V DC to +24V DC (+12V nominal).

Physical/other

- 155mm x 110mm x 17.8mm.
- Commercial temperature range: 0 °C to +70 °C.
- RoHS Directive: Lead-free.

Features of COM Express variants

Processor

- Intel® Atom™ processor options:
 - Z530P Processor 1.6GHz TDP: 2.2W, or
 - Z510PT Processor 1.1GHz TDP: 2.2W.

Chipset

- Intel US15WPT chipset TDP: 2.3W.

System memory

- DDR2 SDRAM (up to 1GB 400/533MHz).

Supported OS

- Windows XP, XP Embedded, CE.
- Embedded Linux.

BIOS

- Insyde H20 BIOS - EFI and legacy support.
- SPI Flash (proprietary interface).

On board flash

- Up to 4GB parallel ATA Flash on board (2GB default).

Graphics

- Ultra low power integrated 3D Graphics.
- One single-channel LVDS 24-bit interface to COM Express.
- One single-channel LVDS 24-bit interface to connector.

Audio

- HD Audio interface on board-to-board connector.

Touch screen

- 4, 5 and 8 wire resistive touch screen support.

USB support

- USB 2.0 supporting low/full/high speed modes.
- Two ports connected to PCI Express MiniCard socket.
- Two user accessible ports (Pin header, one client configurable).
- Four ports on board-to-board connector.

Ethernet

- Gigabit Ethernet port supporting 10/100/1000 BaseT.
- Output to board-to-board connector.

Serial ATA

- Two SATA outputs to board-to-board connector.

Serial ports

- One port used to connect to on-board GPS receiver (build option).
- One port used to connect to on-board Bluetooth module OR nanoZigBee (build option).
- One port used to connect touch screen controller.
- One port used for general purpose RS232 TX/RX port.

PCI Express

- One PCIe MiniCard socket with SIM card slot.
- One PCIe MiniCard socket with SIM card interface on header.
- Four PCIe to COM Express board-to-board connectors (One from chipset, three from PCIE switch).

SDIO/MMC

- One MicroSD socket.

GPIO

- Eight GPIO on COM express connector.
- Eight GPIO on header

TPM (build option)

- Atmel Trusted Platform Module Device, TCG v1.2 compatible.
- LPC interface.

COM Express board-to-board connector

- Four PCI Express, LPC, four USB host, SMBus/I2C, HD Audio, one LVDS video output, Gigabit Ethernet, two SATA, system and control, Power.

GPS receiver (build option)

- 20-channel GPS receiver SirFStar III chipset module.

Bluetooth OR ZigBee (build option)

- Bluetooth wireless communication provided by on-board Bluetooth module.
- ZigBee interface provided by an on-board NanoZigBee module.

Test support

- JTAG Interface (Intel XDP).

Power requirements

- On-board voltage regulators and power management.
- Power / Sleep / HD Activity LED.
- +12V (optional: +5V standby, +3.3V battery).

Physical/other

- 155mm x 110mm x 16.8mm.
- Commercial temperature range: 0 °C to +70 °C.
- RoHS Directive: Lead-free.
- COM Express connector Type 1, extended module mechanical footprint.

Comparison of PROTEUS variants

Features		COM Express	Standalone
Processor	Intel® Atom™ processor options:		
	<ul style="list-style-type: none"> Z530P processor 1.6GHz TDP: 2.2W. Z510PT processor 1.1GHz TDP: 2.2W. 	✓	✓
Chipset	Intel US15WPT chipset: US15W TDP: 2.3W.	✓	✓
Supported OS	Windows XP, XP Embedded, CE, Embedded Linux.	✓	✓
System memory	DDR2 SDRAM: up to 1GB (400/533MHz).	✓	✓
BIOS	Insyde H20 BIOS - EFI and legacy support. SPI Flash (proprietary interface).	✓	✓
Flash	Up to 4GB parallel ATA Flash on board.	2GB	2GB
Graphics	Ultra low power integrated 3D graphics.	✓	✓
	One single-channel LVDS 24-bit interface to COM Express. One single-channel LVDS 24-bit interface to connector.	✓	✗
	Two single-channel LVDS 24-bit interface to two connectors.	✗	✓
	One backlight connector.	✓	✓
Audio	HD Audio interface on board-to-board connector.	✓	✗
	HD Audio CODEC and 2W audio amplifier supporting two speakers, line in, mic in and headphone.	✗	✓
Touch Screen	4, 5 and 8 wire resistive touch screen support.	✓	✓
USB Support	USB 2.0 supporting low/full/high speed modes. Two ports connected to PCI Express MiniCard socket. Two user accessible ports (Pin header, one client configurable).	✓	✓
	Four ports on board-to-board connector.	✓	✗
	One port to board edge Type A connector.	✗	✓
	One port to ZIF connector.		
Ethernet	Gigabit Ethernet port supporting 10/100/1000 BaseT.	✓	✓
	Output to board-to-board connector.	✓	✗
	Output to board edge RJ-45 connector.	✗	✓
Serial ATA	Supports two SATA output to board-to-board connector.	✓	✗
	Output to one SATA connector.	✗	✓
	One power connector for SATA drive.		

Features	COM Express	Standalone	
Serial ports	COM4 used to connect to on-board GPS receiver or ZIF connector	Optional	Optional
	COM3 used to connect to on-board Bluetooth module OR nanoZigBee OR ZIF connector (build options).	Optional	ZIF
	COM2 used to connect touch screen controller.	✓	✓
	COM1 used for general purpose RS232 TX/RX port.	✓	✓
PCI Express	Two x1 PCIe MiniCard sockets (from PCIE switch). Four x1 PCIe to COM Express board-to-board connector.(One from chipset, three from PCIE switch)	✓	✗
	x1 PCIe MiniCard socket (from PCIE switch).	✗	✓
	x1 PCIe MiniCard socket (from Poulsbo).		
SIM	One SIM card slot connected to PCIE MiniCard socket	✓	✓
	One SIM card interface on header connected to PCIE MiniCard socket		
SDIO/MMC	One MicroSD socket.	✓	✓
	One 8 bit SD on ZIF connector.	✗	✓
GPIO	Eight GPIO on COM express connector.	✓	✗
	Eight GPIO on header.	✓	✓
TPM	Atmel Trusted Platform Module Device, TCG v1.2 compatible LPC interface.	Optional	Optional
COM Express board-to-board connector	Four PCI Express, LPC, four USB host, SMBus/I2C, HD Audio, one LVDS video outputs, Gigabit Ethernet, two SATA, system and control, Power.	✓	✗
GPS Receiver	20-channel GPS receiver SirFStar III chipset module.	Optional	Optional
Bluetooth OR ZigBee (build option)	Bluetooth wireless communication provided by on-board WT11 Bluetooth module.	Optional	Optional
	ZigBee interface provided by an on-board NanoZigBee module.	Optional	Optional
Test Support	JTAG Interface (Intel XDP).	✓	✓
	On-board voltage regulators and power management. Power / Sleep / HD Activity LED.	✓	✓
	+12V (optional: +5V standby, +3.3V Battery).	✓	✗
	+8.5V DC to +24V DC (+12V nominal).	✗	✓
Physical/other	155mm x 110mm. Commercial: 0°C to +70°C RoHS Directive: Lead-free	✓	✓
	COM Express Extended module mechanical footprint.		

Power consumption

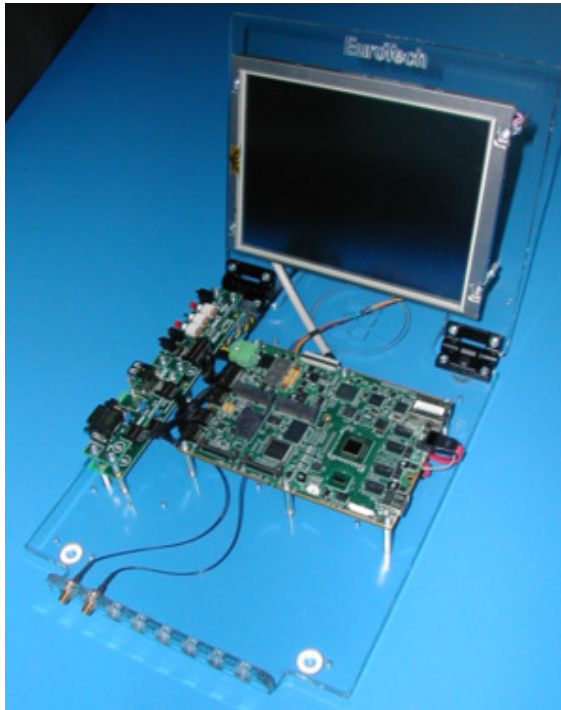
HW / SW	Board power – VIN rail input voltage [V]	Board power – VIN rail current [mA]	Total board power [W]	Note
Board only / XPe, idle	20	400	8	
Board only / XPe, BurnIn test (CPU, Memory, 2D and 3D test)	20	520	10.4	Board only
Board, 8.4" display with backlight, keyboard, mouse, USB hub, Ethernet / XPe, Burn In test (CPU, MEM, 2D, 3D)	20	980	19.6	Standard, no HDD
Board, 8.4" display with backlight, keyboard, mouse, USB hub, Ethernet, active hard disk drive / XPe, BurnIn + video	20	1110	22.20	Standard, with HDD
Board, 8.4" display with backlight, Ethernet, active hard disk drive, 3x full loaded USB (3x500mA), Wifi card, GSM card / XPe, BurnIn + video	20	1520	30.4	Heavy loaded
S3 – sleep, board only / sleep mode (suspend mode)	20	40	0.80	Board in sleep
Power button configuration: S5 – power off, board only	20	23	0.46	S5 power off
Power button configuration: Low power off mode (build option)	20	1.5	0.03	Low power off mode

Support products

The PROTEUS is supported by the following optional products:

- PROTEUS development kit. See below.
- PROTEUS ICE (Industrial Compact Enclosure). See below.
- Breakout boards. See the next page.
- LVDS to VGA adapter.

PROTEUS development kit:



PROTEUS ICE (Industrial Compact Enclosure):



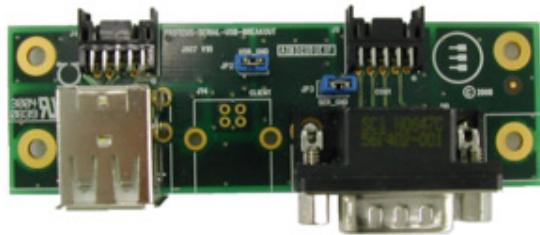
Breakout boards

Four breakout boards are available:

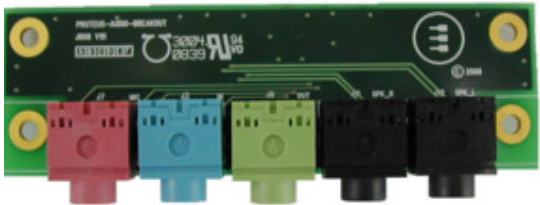
- **System**
Buttons (on/off, Reset, user button) and LEDs (power, HDD activity, PCIE minicards activity, two user LEDs).



- **USB and serial:**
One DB9M RS232, one double USB A type connector



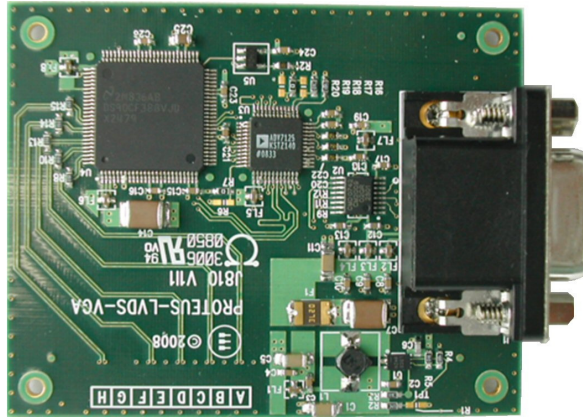
- **Audio:**
Mic input, line input, headphone, speaker jacks



- **GPIO:**
Eight general purpose input/output on screw terminal, eight line status LED



LVDS to VGA adapter



Getting started with your PROTEUS

What do need?

There are three basic configurations that can be used to access to your PROTEUS board:

- PROTEUS board, TFT LCD display kit, keyboard/mouse, USB hub, and power.
- PROTEUS board, LVDS to VGA adapter, monitor, keyboard/mouse, USB hub, and power.
- PROTEUS board with preinstalled remote access, Ethernet connection, network with DHCP server, and power.

Connecting your PROTEUS

PROTEUS stand alone configuration

1. Connect display/adaptor cable to LVDS A connector ([J4](#)).
2. Connect USB hub to USB connector.
3. Connect keyboard and mouse to the USB hub.
4. Connect green power connector plug to a cable coming from a DC power supply. The power supply output voltage should be between +8.5 to +24V (+12V nominal). Check polarity.
5. Switch on display/monitor power.
6. Connect power cable to the PROTEUS board.
7. Switch on power supply.

The board starts with the Eurotech logo splash screen. If a device with booting capability is connected (or on board FLASH is preloaded with OS) then the board boots from this, if not the BIOS screen is shown.

Identifying your PROTEUS

You can identify the version of your PROTEUS board in two ways:

- Visually. All PROTEUS PCBs are marked on the top side with the PROTEUS name, board version with issue number and MODBOX letters.
- Using the BIOS (see below).

To identify your PROTEUS from the BIOS follow the instructions below:

1. Boot the PROTEUS board.
2. Press **F2** as the Eurotech splash screen appears until the BIOS main screen is shown with the following details:

BIOS version

BIOS version xx.xx.xx.xx

CPLD version

CPLD version x.xx

Embedded controller firmware version

uCtrl version x.xx

Unique silicon ID number

System serial number xxxx-xxxx-xxxx



If you want to restore the default BIOS settings, press the **F3** key at keyboard initialization to OS load. This causes the BIOS to rewrite all stored settings and reboot which is useful in cases when display settings were set incorrectly.

Connecting a SATA hard disk

PROTEUS stand alone

PROTEUS (stand alone) supports one SATA drive via a SATA cable. A 7-wire SATA cable is used to provide a direct connection between the PROTEUS board connector ([J3](#)) and the hard disk connector. Power for the hard drive is provided through [J23](#) and a 4-wire cable with a 4 pin Molex PicoBlade plug on one side and a standard SATA power connector on the other. This power cable carries 5V only and can be used with 2.5" HDD. Alternatively if the PROTEUS is powered from an ATX power supply then the standard SATA power cable can be used.

The BIOS automatically detects the hard disk drive and configures the hardware correctly.

PROTEUS COM Express

PROTEUS (COM Express) supports two SATA drives. For information on connecting a SATA hard drive see the COM Express base board manual.

Connecting a CD-ROM

If a CD-ROM drive is required in the system, it may be connected directly via the SATA interface or through a USB to IDE adapter. It is recommended to use the same power source (for example one ATX power supply) for the PROTEUS board and CD-ROM hard drive (especially when a USB to IDE adaptor is used).

Connecting a keyboard

A USB keyboard can be connected straight to the USB connector or via a USB hub.

Connecting a mouse

A USB mouse can be connected straight to the USB connector or via a USB hub.

Turning on/off your PROTEUS

Always ON configuration (default)

Power ON: PROTEUS board starts automatically after power is connected.

Power OFF: Use the Shut down option in the OS and then disconnect power cable.

Power button configuration

The PROTEUS board enters to a standby mode when power is connected. The operator must turn the unit ON via a remote switch connected to the board. The PROTEUS power button connection should be connected to a momentary ON push switch; this is described in [J6 - System connector](#), page [43](#).

Using the serial interface (RS232)

The COM1 port is decoded at the standard PC address location. PC applications can use this port without any special configuration.

The COM1 port is interfaced via a 10-way boxed header. A suitable breakout board is provided in the development kit.

See [J8 - RS232 header](#), page [46](#) for further details about the serial port interface.

Using the audio features

The PROTEUS Stand alone provides an HD Audio codec that supports standard mono mic input, stereo line input, stereo headphone and stereo speaker. Speaker outputs are connected via 2W audio amplifier.

See [J17 – Audio connector](#), page [51](#) for future details about the connection.

Using the on board FLASH

The PROTEUS provides on board FLASH memory. The memory is connected to IDE interface and for BIOS and system is visible as standard IDE hard disk drive.

Using the USB ports

The standard USB connector is a 4-way socket, which provides power and data signals to the USB peripheral. It is a USB Type A connector.

USB ports 0 and 2 are provided on a 10-way header (J7). USB port 2 can be configured as *device* (optional). In this case Pin 9 of connector J7 needs to be connected to +5V and USB client feature has to be enabled in BIOS.

See [J7 - USB0/2 header](#), page [46](#) for more information.

Proteus stand alone

USB port 1 is a standard USB Type A connector (J1). An additional USB port 3 can be found on FFC connector (J19).

See [J1 - USB Type A connector](#), page [39](#) and [J19 - Misc ZIF connector](#), page [63](#) for more information.

Proteus COM Express

Low/full/high speed USB ports 1, 3 and high speed USB ports 6, 7 are connected to the COM Express connector. See your COM Express base board manual for information on how to use them.

Using Ethernet interface

The PROTEUS board provides one 10/100/1000 Ethernet port as standard.

Proteus stand alone

One panel RJ-45 pin connector provides the Ethernet interface. To support Gigabit Ethernet capabilities, a cable rated to CAT5e or above with four signals pairs should be used.

PROTEUS COM Express

See your COM Express base board manual.

Using the flat panel interface

PROTEUS stand alone

The PROTEUS V111 stand alone provides two LVDS outputs working in Single, Cloned or Extended mode. These are connected to LVDS A ([J4](#)) and LVDS B ([J21](#)) connector. The LVDS connector pin out is compatible with most standard LVDS flat panel displays and direct cable connection is possible. Display scan direction can be set in BIOS. Alternatively an [LVDS to VGA adapter](#) provided by Eurotech can be used.

See [J4 - LVDS A connector](#), page [41](#) and [J21 – LVDS B connector](#), page [54](#) for more information.

PROTEUS COM Express

The PROTEUS V111 COM Express provides one single-channel 24-bit LVDS interfaces to COM Express board to board connector and one single-channel 24-bit LVDS interface to connector J21.

For more information how to use LVDS see your COM express base board manual.

See [J21 – LVDS B connector](#), page [54](#) for more information.

Using the backlight connector

The PROTEUS provides one +5V backlight connector (J20). Backlight power ON/OFF signal is OR combination of LVDS A and LVDS B backlight power enable signals. Display brightness regulation is supported for LVDS A only.

See [J20 - Backlight](#), page [53](#) for more information.

Using the touchscreen interface

The PROTEUS provides a touchscreen interface. A touchscreen controller is placed on the PROTEUS board and uses Eurotech TSC1 firmware.

4-wire and 8-wire touchscreens are directly supported.

See [J18 – Touchscreen](#), page [51](#) for more information.

Using the PCIE minicard sockets

The PROTEUS provides two PCIE minicard sockets. PCIE minicard socket 0 provides SIM card slot (J12). PCIE minicard socket 1 provides SIM card interface on header (J29). PCIE minicard sockets don't support hot plug and cards should be inserted or removed only when board is powered off.

See [J12 - SIM card socket](#), page [48](#) for more information.

See [J29 - SIM interface header](#) page [61](#) for more information.

PROTEUS stand alone

PCIE minicard socket 0 (J13) is connected directly to the Intel System Hub Controller US15W. Some cards may require direct PCIE connection to the controller and may not work via a switch. PCIE minicard socket 1 (J14) is connected to on board PCIE switch.

See [J13 - PCI Express Mini Card slot 0](#), page 49 and [J14 - PCI Express Mini Card slot 1](#), page 50 for more information.

COM Express

Both PCIE minicard sockets (J13, J14) are connected to the PCIE switch.

Using the micro SD

The PROTEUS provides one micro SD slot ([J24](#)). The slot supports micro SD cards with a capacity up to 2GB.

Using the general purpose inputs/outputs (GPIO)**PROTEUS stand alone**

The PROTEUS provides eight GPIO pins. These are connected to I²C IO expander and connector J9.

To control GPIO pins use the driver provided by Eurotech.

See [J9 - GPIO header](#), page 47 for more information.

PROTEUS COM Express

The PROTEUS COM Express provides sixteen GPIO pins. Eight GPIO pins are connected to I²C IO expander and connector [J9](#). The other eight pins are connected between Super IO and COM Express connector (J22).

To control GPIO pins use the driver provided by Eurotech.

See [J22 - COM Express connector](#), page 55 for more information.

Using the GPS

The PROTEUS provides an on board GPS module. The GPS module is connected to COM4 port. The port needs to be set as follows: 4800bps, 8, N, 1, N. For proper functionality an external antenna should be connected to the GPS antenna connector (J25).

See [J25 - GPS antenna](#), page 59 for more information.

Using the ZigBee (optional)

The PROTEUS provides an optional on board ZigBee module.

Using the Bluetooth (optional)

The PROTEUS provides an optional on board Bluetooth module. For more information on how to use Bluetooth visit the module manufacturer web site www.bluegiga.com/WT11_Class_1_Bluetooth_Module

Software specification

Operating system support

The PROTEUS is compatible with the following operating systems:

- Microsoft Windows XP, XP Embedded, CE.
- Linux.
- Other x86 OS's however driver support may be limited

Drivers

All system components have drivers available for Windows XP and Linux.

BIOS

The PROTEUS incorporates a custom system BIOS which is based on the InsydeH2O core from Insyde Software, www.insydesw.com/products/products-efi-h2o.htm.

The BIOS provides operating system support for Windows XP, Windows XP Embedded, Windows CE and Linux. Utilities to update the BIOS and the LAN PXE boot ROM are provided.

Hardware implementation

COM Express specification

The PCI Industrial Computer Manufacturers Group (PICMG) COM Express Module Base Specification Revision 1.0 is used to define the primary mechanical and electrical interconnects for the PROTEUS module design. A Type 1 connector pinout and an Extended module mechanical format are used.

The Extended module mechanical footprint is intended for mobile systems and space constrained stationary systems. Key features of the module include:

- 155mm x 110mm module size.
- 5mm and 8mm stack height options.
- 18mm 'z' height with heat spreader (with 5mm stack option).

Type 1 module pinout feature set

There are five connector pinout configurations defined in the COM Express Specification, Type 1 through to Type 5, each with increasing complexity. A Type 1 pinout has been selected as this best suits the functionality supported on the chipset.

A 220-pin high speed, high density, 0.5mm FH connector from Tyco Electronics is specified for the COM Express Type 1 interface to the carrier board.

The table below summarises the feature set of the PROTEUS module:

System I/O	Type 1 COM Express 220-pin connector (# ports)
PCI Express lanes 0-5	4
LVDS video – 24bit	1
SATA port	2
HD Audio Digital Interface	1
USB 2.0 ports	4
LAN0 (10/100 Base-T min)	1
Express card support	2
LPC Bus	1

The following system and power management functions are also interfaced via the Type 1 COM Express connector:

System management	Type 1 COM Express 220-pin connector (# ports)
General purpose inputs	4
General purpose outputs	4
SMBus	1
I ² C	1
Watch dog timer	1
Speaker out	1
External BIOS ROM support	1
Reset functions	1

Power management	Type 1 COM Express 220-pin connector (# ports)
Thermal protection	1
Battery low alarm	1
Suspend	1
Wake	1
Power button support	1
Power good	1

Power

The COM Express Type 1 module specifies three power rails, +12V, +5V standby and an RTC input all of which are provided via the board-to-board connector from the carrier board.

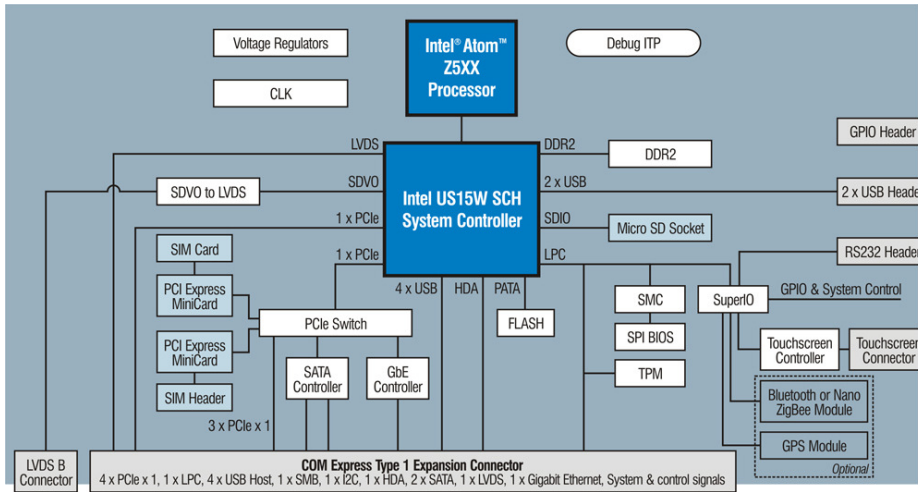
In the standalone implementation of the PROTEUS module the power rails are provided on a PCB mounted connector on the side of the module, input power is protected from over voltage and over current events.

On board backup battery used to power CMOS and RTC is available for both variants.

Block diagram

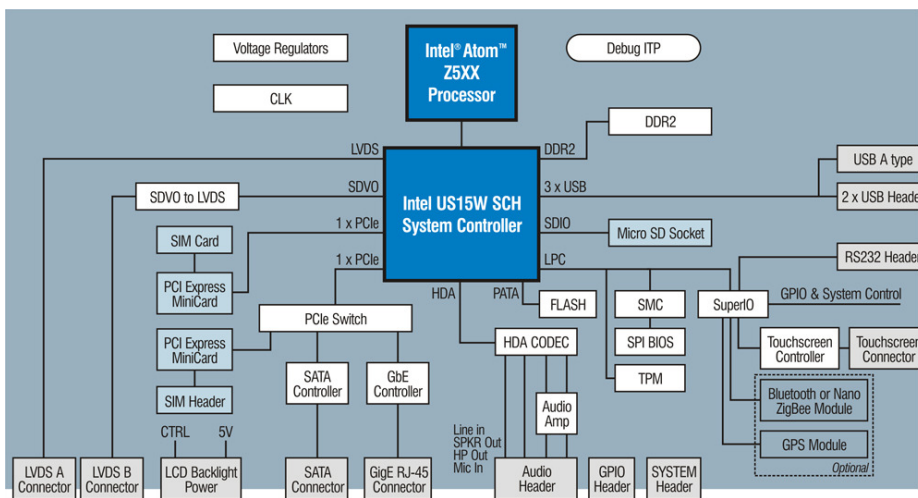
Type 1 COM Express implementation

The following block diagram shows the COM Express Type 1 extended module implementation of the PROTEUS with connections to the COM Express board-to-board connector:



Standalone implementation

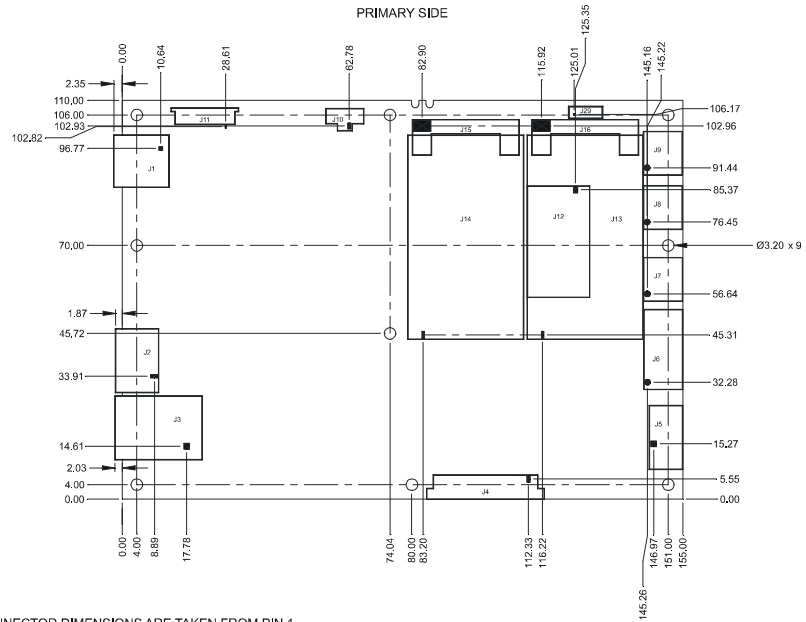
This format of the PROTEUS module removes the COM Express board-to-board connector and associated components and allows for a processor core with bootable storage, two LVDS display support, touch screen, wireless connectivity, Ethernet, SATA and USB expansion:



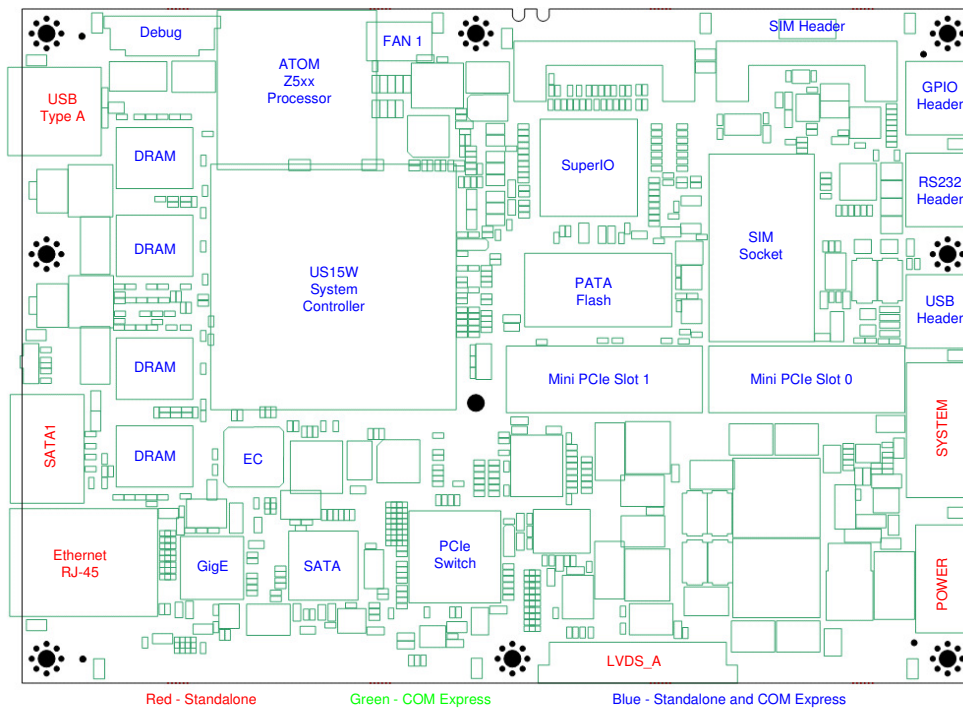
Layout and dimensions

The following PROTEUS diagrams show the connector placement for both COM Express and standalone implementations:

Primary side

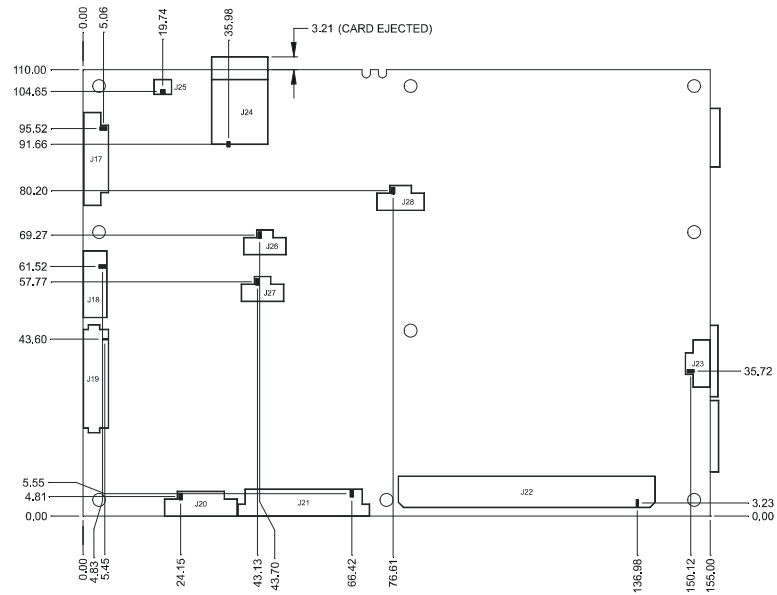


NOTES
1) ALL CONNECTOR DIMENSIONS ARE TAKEN FROM PIN 1

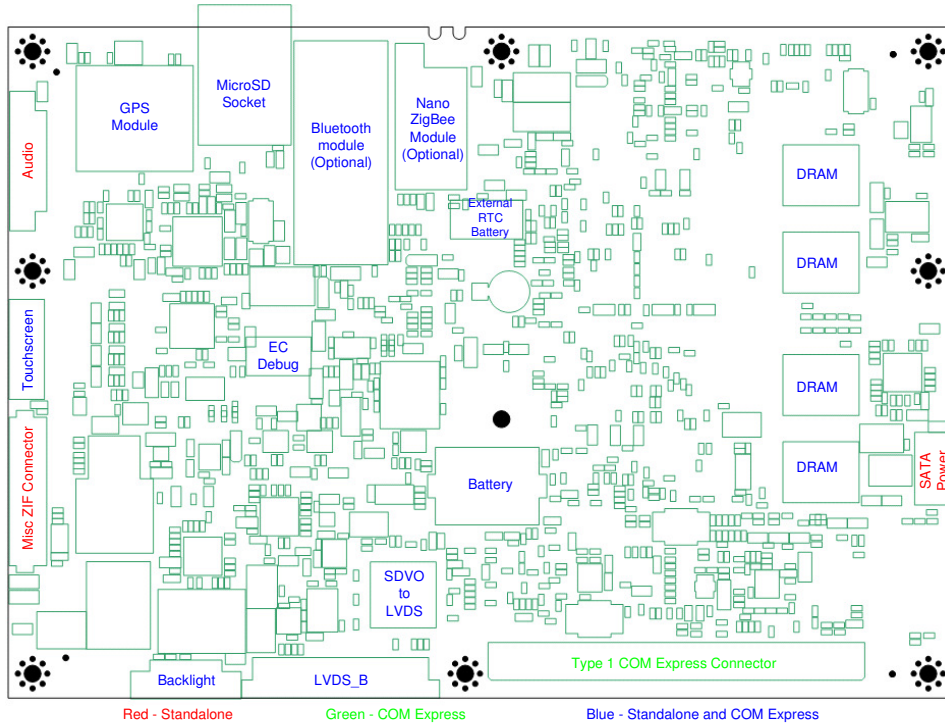


Secondary side

SECONDARY SIDE



NOTES
 1) ALL CONNECTOR DIMENSIONS ARE TAKEN FROM PIN 1



COM Express Type 1 carrier board expansion

In the COM Express carrier board implementation the external IO from the module is provided via the COM Express board-to-board connector. The carrier board can be implemented using a method that best suits your needs.

Processor and chipset

Intel ATOM processor

The Intel ATOM Z5xx series processor is a high-performance, ultra low power processor with several microarchitectural enhancements over existing Intel mobile processors. The ATOM Z5xx series offers the benefits of the following Intel architecture for small form factor, thermally constrained and fanless embedded systems:

- Intel's 45nm technology, based on a Hafnium, high-K metal gate formula, reduces power consumption, increases switching speed, and significantly increases transistor density over the previous 65nm technology.
- Multiple micro-ops per instruction are combined into a single micro-op and executed in a single cycle, resulting in improved performance and power savings.
- in-order execution core consumes less power than out-of-order execution.
- Hyper-Threading Technology (HT Technology; 1.6 GHz SKU only) provides high performance-per-watt efficiency in an in-order pipeline. HT Technology provides increased system responsiveness in multi-tasking environments. One execution core is seen as two logical processors, and parallel threads are executed on a single core with shared resources.

US15W System Controller Hub

The US15W is a single-chip System Controller Hub (SCH) that consists of an integrated graphics controller, a memory controller, and I/O controller. The SCH combines the functionality normally found in separate GMCH (front side bus interface, integrated graphics and memory controller) and ICH (platform I/O expansion) components, in a single device providing the functionality necessary to support fully featured operating systems.

The Intel® System Controller Hub US15W combines the Intel® Graphics Media Accelerator 500 (Intel® GMA 500), memory controller, and I/O controller in a single-chip solution. It also features advanced 3D graphics and extensive I/O capabilities such as USB 2.0, SDIO and PCI Express. Additionally, it supports Intel® High Definition Audio, hardware video decode acceleration, a 400/533 MHz CMOS front-side bus (FSB), dual independent display and 2 GB memory.

Graphics support

The IGD (Integrated Graphics Device) provides LVDS and Serial DVO (SDVO) display ports permitting simultaneous independent operation of two displays.

In the COM Express configuration SCH LVDS interface is connected directly to the board-to-board COM Express connector and SDVO interface is connected via a Chrontel CH7308B SDVO to LVDS converter to a edge connector. In the standalone configuration two LVDS onboard connectors are used.

Bandwidth limitations

The ATOM chipset has been optimized for low power operation and therefore has some limitations in terms of its data throughput capabilities. The internal bus architecture has a maximum theoretical throughput of approximately 254MB/s. System IO devices are interfaced to the US15W backbone, so if the PCI Express controller has control of the backbone then no other devices are able to gain access.

The backbone does not allow peer-to-peer transactions, so if the incoming PCI Express data is being transferred to the PATA port, then the two devices have to share the backbone with PCI Express data being transferred to memory, and then from memory to the PATA port. In some usage models for the PROTEUS, full data bandwidth of devices is not available.

Main memory

The PROTEUS is populated with eight on-board 16-bit DDR-2 memory devices. The COM Express specification lists a SODIMM implementation for adding memory whilst the physical requirements for this are such that it limits the available area for wireless expansion. A decision was made to support only soldered down memory components.

Both industrial and commercial temperature range memory components are available as build options. These have a population option to run at either 400 MHz or 533 MHz. The chipset supports only non-ECC memory.

The system memory is shared with the video memory and therefore limits the maximum available system memory. The BIOS configuration allows for the default video memory size to be specified.

BIOS ROM memory

The PROTEUS module incorporates a minimum of 4Mb of FLASH memory with a default population of 8Mb of FLASH memory for support of the BIOS.

An external FWH, required by the COM Express specification, is supported and enabled as a boot ROM device via control signals available on the COM Express board-to-board connector.

Clock generation

A clock generator is used on the PROTEUS design to generate clocks required by system components. Additional zero delay clock buffers are added as required for PCI Express components.

Trusted platform module (Build option)

The PROTEUS supports an Atmel AT97SC3204 trusted platform module (TPM), the TPM implements version 1.2 of the Trusted Computing Group (TCG) specification for TPMs. A Trusted Platform Module offers facilities for secure generation of cryptographic keys, the ability to limit the use of cryptographic keys, as well as a hardware random number generator. The TPM is interfaced via the LPC.

Hardware monitoring and control

Hardware temperature monitoring and board voltage measuring is available via the Super IO.

Intel HD Audio

The US15W SCH provides an Intel HD Audio digital interface which is made available via the COM Express board-to-board connector. An on-board audio codec is provided on the module in standalone mode only, this is interfaced to an onboard 2W audio amplifier for speakers and headphone functionality. The HDA audio codec also provides support for microphone and line in functions.

Further information on Intel High Definition Audio is available at:
www.intel.com/design/chipsets/hdaudio.htm.

USB

The US15W SCH contains one EHCI and three UHCI USB controllers to provide support for up to six USB 2.0 ports allowing high, full and low speed USB ports and two ports supporting high speed only operation.

USB ports 1, 3, 6 and 7 are made available on the COM Express board-to-board connector. Port 1 is connected to USB A type connector for standalone configuration. USB ports 6 and 7 operate as high speed only ports and as such do not support low and full speed USB operation. Care should be taken in base board applications to ensure these ports are only used to interface to USB high speed devices on the COM Express carrier board and not made available externally.

Ports 0 and 2 are connected via a pin header to allow for off module expansion. Port 2 can be reconfigured in software to be a USB client port allowing the PROTEUS to appear as a peripheral. Ports 4 and 5 are routed to the PCI Express Mini Card sockets.

The following table shows the USB 2.0 ports routing on the PROTEUS:

Port 1	Ports 3,6,7	Ports 0,2	Ports 4,5
Standalone USB A type connector.	Standalone Port 3 is connected to ZIF connector.	Standalone and COM Express Pin header. Port 2 is selectable between client/host.	Standalone and COM Express PCIe Mini Cards.
COM Express board-to-board Connector.	COM Express Board-to-board connector. Ports 6 and 7 are high speed only.		

PCI Express interface

The US15W SCH has two PCI Express root ports supporting the PCI Express Base Specification, Revision 1.0a. Each root port supports 2.5-Gb/s bandwidth in each direction.

PROTEUS COM Express implementation

In the standard COM Express implementation PCI Express root port 1 is connected to a PLX Technology PEX8509 8-port PCI Express switch. Interfaced to the switch is a Gigabit Ethernet controller, Serial ATA controller, two PCI express Mini card sockets. The remaining ports are interfaced to the COM Express board-to-board connector to allow for carrier board expansion over PCI Express.

PCI Express root port 0 is connected to the COM Express board-to-board connector and used for custom requirements. As required by the COM Express specification the module provides additional logic to allow for the detection and control of PCMCIA ExpressCards.

PROTEUS standalone implementation

In the standalone PROTEUS implementation the primary PCI Express root port is interfaced to the WAN PCI Express mini card socket and the secondary port to a PEX8505 four port PCI Express switch. The PCI Express four port switch interfaces to the WLAN PCI Express mini card socket, the Gigabit Ethernet controller and to the serial ATA controller. IO connectors are fitted to the edge of the standalone PROTEUS module to allow these interfaces to be used on the module.

PCI Express Mini Card

Two PCI Express mini card sockets conforming to the PCI Express™ Mini Card Electromechanical Specification Revision 1.2 are provided on the COM Express module. To support cellular wireless mini cards one mini card socket provides a SIM card slot and the second mini card socket provides a SIM card interface on header.

Ethernet

An Intel 82574L Gigabit Ethernet controller is provided on the PROTEUS module which is interfaced via a x1 PCI Express channel to the PCI Express switch.

The 82574L is a fully-integrated Gigabit Ethernet Media Access Control (MAC) and Physical Layer (PHY) device that is designed for server and client configurations. The PHY interface signals are interfaced via the COM Express connector to a carrier board mounted Ethernet magnetic and an RJ-45 connector.

Serial ATA

Serial ATA (SATA) support is provided on the PROTEUS module using a Silicon Image (SiI3132) PCI Express SATA controller. The SiI3132 supports two independent Serial ATA ports with generation 2 transfer rates of 3.0GB/s and is compliant with the Serial ATA 1.0 specification. The Serial ATA ports are interfaced via the COM Express board-to-board connector. In the standalone implementation only port 1 is available via a Serial ATA connector.

Solid state hard disk

The PROTEUS module supports a soldered down solid state FLASH disk with boot support. This is interfaced via the IDE bus and provides options for 2GB and 4GB NAND flash devices.

LPC

The SCH implements an LPC interface which is routed to COM Express connector.

RTC

The SCH Real Time Clock (RTC) module provides a battery backed-up date and time keeping device. Three interrupt features are available: time of day alarm with once a second to once a month range, periodic rates of 122 ms to 500 ms, and end of update cycle notification. Backup power options for the RTC are described in [Power requirements](#) on page [10](#).

Serial ports

The SMSC SCH3114 provides four NS16C550 compatible serial ports on the PROTEUS board. It supports up to 1.5Mbaud data rates and 16-Byte Send/Receive FIFO's.

The serial ports are used to interface to the Bluetooth module or NanoZigBee module, GPS module and touch screen controller. One serial port is used to provide RS232 interface on board header.

Port	Function
COM1	RS232
COM2	Touchscreen
COM3	Bluetooth OR ZigBee OR ZIF connector
COM4	GPS or ZIF connector

GPS receiver (Build option)

A GPS module is provided as a factory build option on the PROTEUS to allow complete GPS functionality including position, velocity and time (PVT).

A Fastrax iTrax300 GPS module is used, the iTrax300 is based on SiRF GSC3e/LP single chip. The GPS module uses a serial interface (Rx/Tx only) to communicate with a host, the SuperIO COM port 4 is used for this purpose.

More information on iTrax 300 Family can be found at www.fastrax.fi.

Bluetooth (Build option)

The PROTEUS supports an optional BlueGiga WT11 Bluetooth module. This module supports up to seven simultaneous data connections and one audio connection. The WT11 is interfaced via a high serial port connection and use HCI firmware to communicate with the host operating system running a BlueTooth stack. Bluetooth module is connected to the SuperIO COM port 3.

ZigBee (Build option)

An optional ZigBee interface is available using a Eurotech NanoZigBee module. This interface is provided instead of the Bluetooth module and interfaced via a COM port 3 to the host.

GPIO

Four general purpose inputs and four general purpose output pins are provided on the COM Express board-to-board connector. The GPIO is +5V tolerant +3.3V level signal and upon a hardware reset all outputs are low. Input pins are pulled high on the module to 3.3V.

Additional eight general purpose inputs/outputs are connected to GPIO header. An I²C GPIO expander is used for this function. All pins are set to be input after reset. The pins are 5V tolerant with 3.3V level output and they are pulled high.

Touch screen

A serial based resistive touch screen controller supporting 4, 5 and 8 wire resistive touch screens are provided on the PROTEUS module and interfaced via a pin header. The touchscreen controller is connected to the SuperIO COM port 2.



If touchscreen is not required then the touchscreen controller can be loaded with custom firmware. Example: Serial line bypass firmware connects COM2 serial interface with touchscreen connector.

SMBus

A buffered version of the system management bus is interfaced via the COM Express board-to-board connector. The US15W SCH provides an SMBus 1.0-compliant host controller. Maximum operating frequency of SMBus is 100KHz.

The SMBus interface is also provided on a pin header during the standalone implementation of the PROTEUS board.

Micro SD socket

A MicroSD memory socket is provided on the PROTEUS module. The US15W SCH contains three SDIO/MMC ports. SDIO Port 1 is connected to a 4-bit MicroSD card socket. Port 2 is connected to a ZIF connector and port 0 is not used.

The SDIO/MMC controller supports MMC4.0 and SDIO1.1 specifications. MMC 4.0 transfer rates can be up to 48MHz. SDIO 1.1 supports transfer rates of up to 24MHz. The US15W SDIO/MMC controller supports only flash cards using byte addressing limiting the maximum memory density to 2GB; sector based addressing is not supported.

Module power supply

The PROTEUS module supports a wide input voltage range from +8.5V to +24V DC with a nominal operating voltage of +12V. Over current and over voltage protection are provided on these main input rails. In the COM Express implementation an additional +5V standby rail is available with an input voltage range from 4.75V to 5.25V. Applications requiring Real Time Clock (RTC) backup support have the option of fitting a lithium battery or using a SuperCap. In standalone operation the power supply input is via a PCB mounted connector and via the 220-pin COM Express connector in the COM Express primary configuration.

Indicator LEDs

Indicator LEDs are provided on the module to indicate:

- PCIE express minicard slot 0 activity.
- PCIE express minicard slot 1 activity.
- Bluetooth activity.
- Micro SD card activity.
- Power states S0, S3 and S5.
- Additional dual state on board edge LED indicates sleep state (orange), full power (green) and HD/SD activity (green flashing).

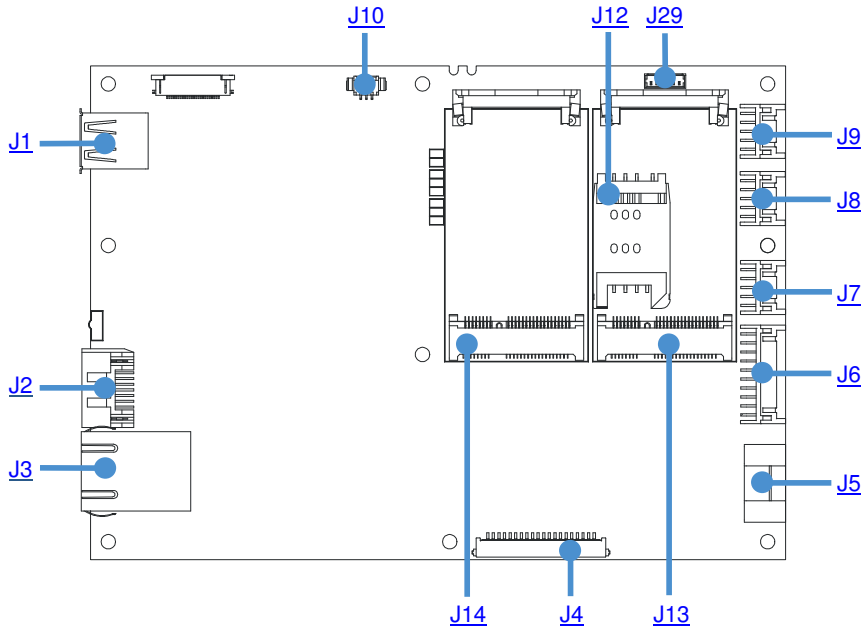
Connectors and LEDs

The PROTEUS has the following connectors:

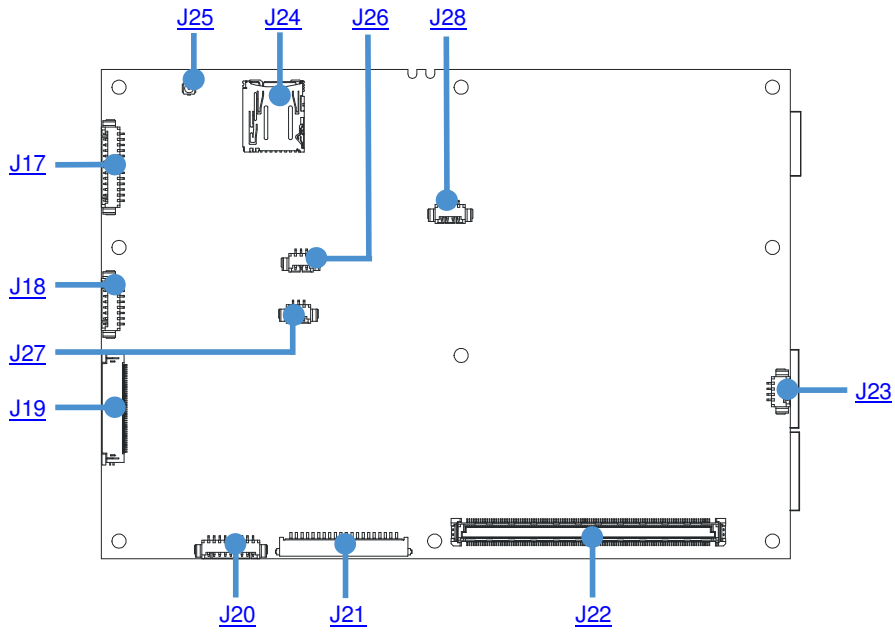
Connector	Function	Connector details in section
J1	USB 1, connector Type A	J1 - USB Type A connector , page 39
J2	SATA	J2 - SATA connector , page 39
J3	GBe Ethernet	J3 - GB Ethernet connector , page 40
J4	LVDS A	J4 - LVDS A connector , page 41
J5	Power	J5 - Power connector , page 42
J6	System	J6 - System connector , page 43
J7	USB 0/2	J7 - USB0/2 header , page 46
J8	RS232	J8 - RS232 header , page 46
J9	GPIO	J9 - GPIO header , page 47
J10	FAN 1	J10 - FAN 1 connector , page 47
J12	SIM	J12 - SIM card socket , page 48
J13	PCIe Minicard slot 0	J13 - PCI Express Mini Card slot 0 , page 49
J14	PCIe Minicard slot 1	J14 - PCI Express Mini Card slot 1 , page 49
J17	Audio	J17 - Audio connector , page 51
J18	Touchscreen	J18 - Touchscreen connector , page 51
J19	Misc ZIF connector	J19 - Misc ZIF connector , page 52
J20	Backlight	J20 - Backlight , page 53
J21	LVDS B	J21 - LVDS B connector , page 54
J22	COM express connector	J22 - COM Express connector , page 55
J23	SATA power connector	J23 - SATA power connector , page 58
J24	Micro SD slot	J24 - Micro SD slot , page 59
J25	GPS antenna connector	J25 - GPS antenna , page 59
J26	FAN 2	J26 - FAN 2 connector , page 60
J27	EC serial debug output	J27 - EC serial debug output , page 60
J28	External RTC battery	J28 - External RTC battery , page 61
J29	SIM interface header	J29 - SIM interface header , page 61

The diagrams on the following page show the location of the connectors on the PROTEUS.

Connector - top view

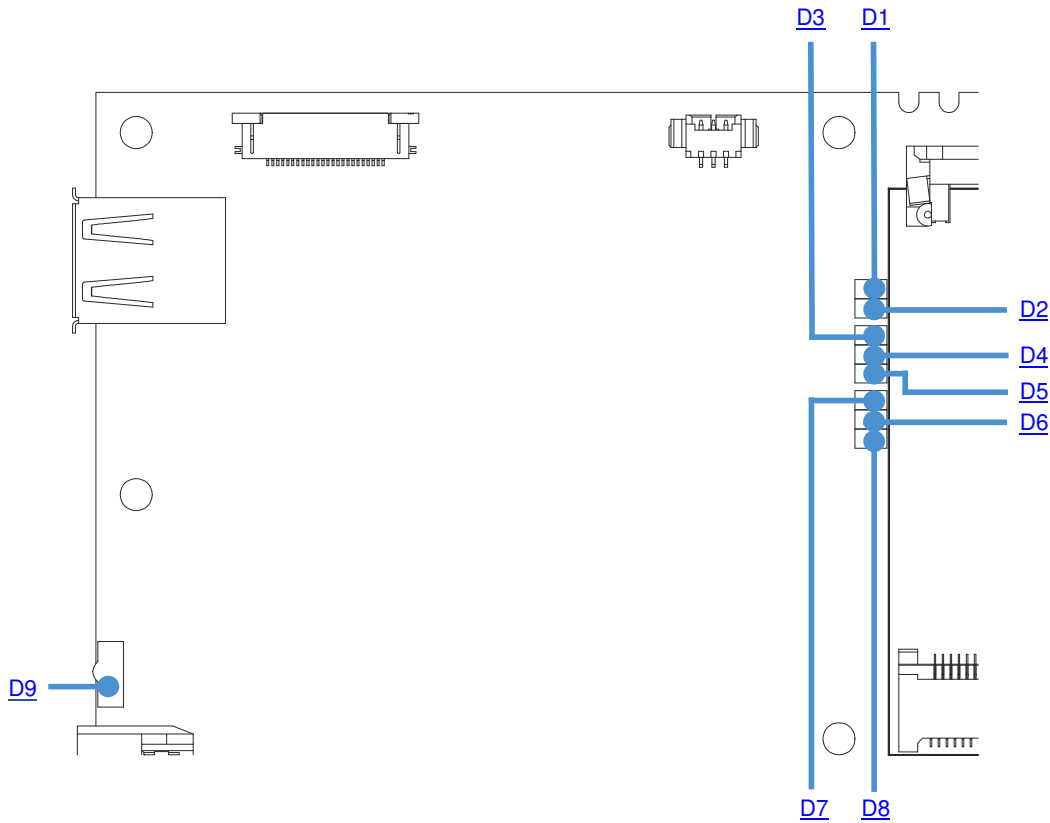


Connectors - bottom view



LEDs

The following diagram shows the location of the LEDs on the PROTEUS.



The PROTEUS has the following connectors LEDs:

LED	Function	LED details in section
D1	PCIe Minicard slot 0 activity	D1 - PCIe Minicard slot 0 activity , page 62
D2	PCIe Minicard slot 1 activity	D2 - PCIe Minicard slot 1 activity , page 62
D3	IDE / SATA activity (Not Fitted)	D3 - Thunderbolt / SATA activity , page 62
D4	Bluetooth activity	D4 - Bluetooth activity , page 63
D5	Micro SD card activity	D5 - Micro SD card activity , page 63
D6	S3 power state indicator	D6 - S3 power state indicator , page 63
D7	S0 power state indicator	D7 - S0 power state indicator , page 64
D8	S5 power state indicator	D8 - S5 power state indicator , page 64
D9	Power / sleep LED / HD ACT	D9 - Power / sleep LED , page 64

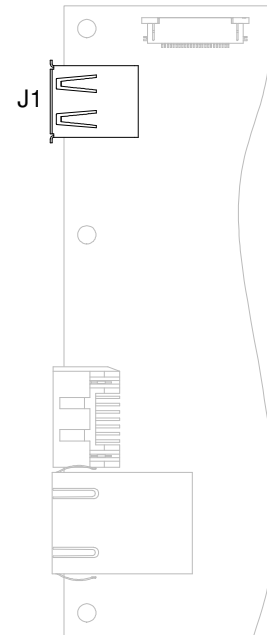
Connectors

J1 - USB Type A connector (stand alone only)

J1 is connected to SCH USB port 1.

Connector: EDAC 690-004-621-013.

Pin	Signal name
1	+5V
2	D- (USB port 1)
3	D+ (USB port 1)
4	GND

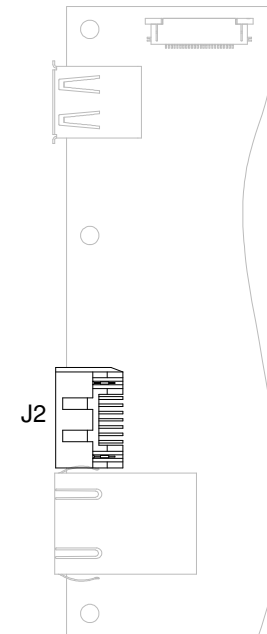


J2 - SATA connector (stand alone only)

J2 is connected to channel 1 of SATA controller.

Connector: MOLEX 470804001.

Pin	Signal name
1	GND
2	TX+
3	TX-
4	GND
5	RX-
6	RX+
7	GND



J3 - Gb Ethernet connector (stand alone only)

J3 is connected to GBe controller.

Connector: L829-1J1T-43 Gigabit Ethernet Ultra Low Profile Single Port MagJack® with LEDs.

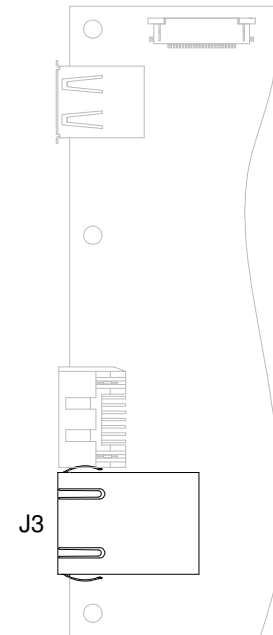
Pin	Signal name
1	TRP1+
2	TRP1-
3	TRP2+
4	TRP3+
5	TRP3-
6	TRP2-
7	TRP4+
8	TRP4-

LED1 (orange):

- OFF: Not connected.
- ON: Link.
- BLINKING: Activity.

LED2 (orange/green):

- OFF: 10Mb.
- Green: 100Mb.
- Orange: 1Gb.



J4 - LVDS A connector (stand alone only)

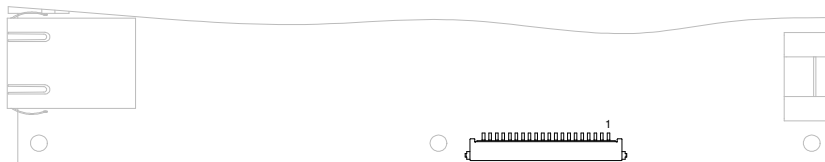
J4 is connected to SCH LVDS interface.

Connector: JAE FI-SE20P-HFE, 20-way.

Housing: 20Way 1.25mm pitch single row housing Hirose, part number DF14-20S-1.25C.

Crimps: Gold 26-28 AWG crimps Hirose, part number DF14-2628SCFA.

Pin	Signal name
1	+3.3V
2	+3.3V
3	GND
4	GND
5	D0-
6	D0+
7	GND
8	D1-
9	D1+
10	GND
11	D2-
12	D2+
13	GND
14	CK-
15	CK+
16	GND
17	FRC (pulled high)
18	DPS (default low, but level can be set in BIOS)
19	D3-
20	D3+



J4

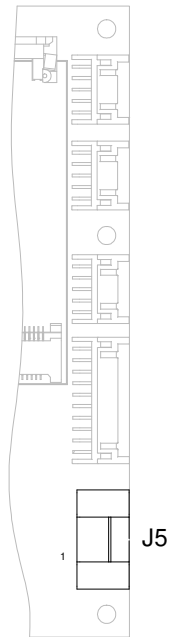
J5 - Power connector (stand alone only)

J5 is main power input connector (8.5V ~ 24V DC).

Connector: IMO PC 20.155MHF/2.

Mating socket: IMO PC 20.1550MF/2.

Pin	Signal name
1	VIN+ (Power in)
2	VIN- (Power in)



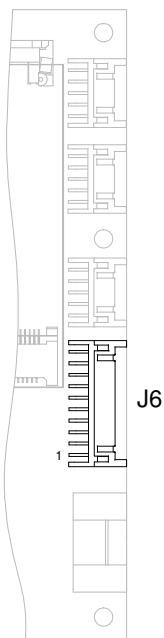
J6 - System connector (stand alone only)

Connector: HIROSE DF11-20DP-2DS(24).

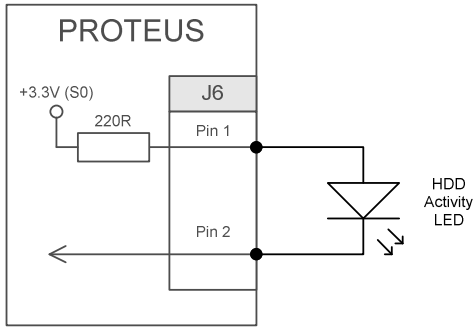
Housing: 20Way HIROSE Housing (DF11-20DS-2C) or equivalent.

Crimps: Crimps for Housing (DF11-2428SCA) or equivalent.

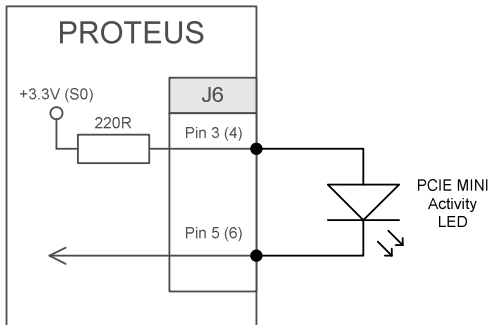
Pin	Signal name	Pin	Signal name	Description
1	HDD LED ANODE	2	HDD LED CATODE	HDD activity LED (220 Ω series resistor on board).
3	MINI0 LED ANODE	4	MINI0 LED CATODE	PCIe Minicard slot 0 activity LED (220 Ω series resistor on board).
5	MINI1 LED ANODE	6	MINI1 LED CATODE	PCIe Minicard slot 1 activity LED (220 Ω series resistor on board).
7	+3.3V (S0)	8	+3.3V (S3)	Power output.
9	I/O USER PIN	10	220 Ω series resistor to +3.3V (S3)	General purpose input/output user pin connected to I2C GPIO expander.
11	POWER LED ANODE	12	POWER LED CATODE	Power LED (220 Ω series resistor on board).
13	SMB DATA (in/out)	14	SMB CLK (out)	SMBUS.
15	GPIO9 (in/out)	16	GPIO10 (in/out)	General purpose GPIO pins from SUPER IO.
17	GND	18	ON/OFF# BUTTON (in)	Power button.
19	GND	20	RESET# (in)	Reset button.



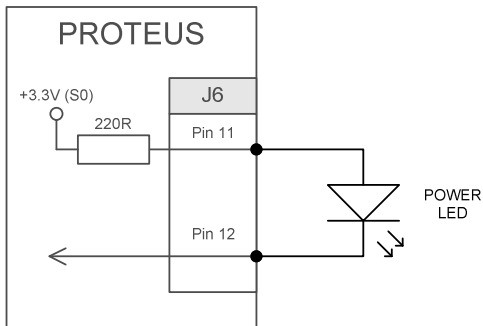
HDD LED connection example



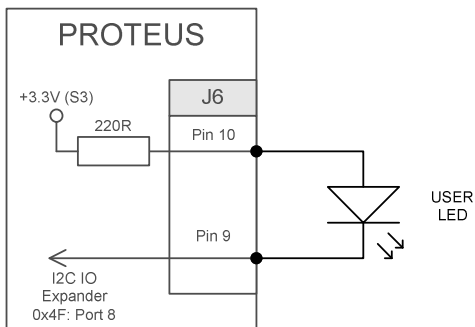
PCIe mini card LED connection example



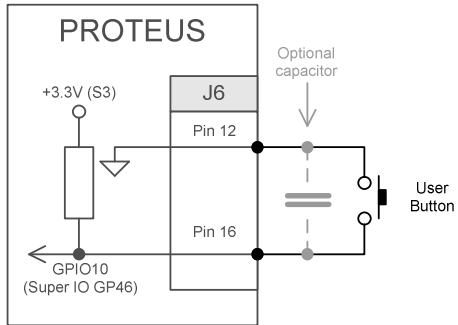
Power LED connection example



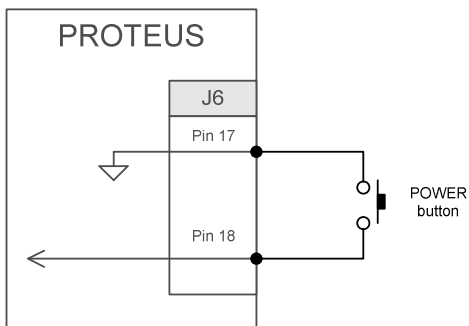
User LED connection example



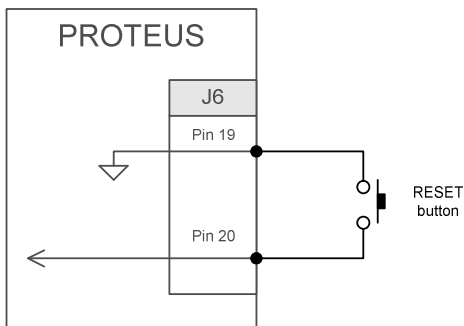
User button connection example



POWER button connection example



RESET button connection example



J7 - USB0/2 header

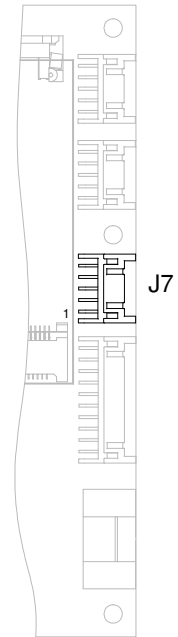
J7 is connected to SCH USB ports 0 and 2. High level on Pin 9 change HOST USB port 2 to USB CLIENT mode (The mode needs to be enabled in BIOS too). If Pin 9 is low or not connected then USB port 2 is running in HOST mode.

Connector: HIROSE DF11-10DP-2DS(24).

Housing: 10Way HIROSE Housing (DF11-10DS-2C) or equivalent.

Crimps: Crimps for HIROSE Housing (DF11-2428SCA) or equivalent.

Pin	Signal name	Pin	Signal name
1	+5V USB0	2	+5V USB2
3	D- (USB port 0)	4	D- (USB port 2)
5	D+ (USB port 0)	6	D+ (USB port 2)
7	GND	8	GND
9	Port 2: Client/Host#	10	GND



J8 - RS232 header

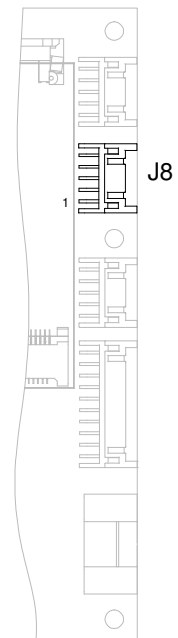
J8 is connected to COM1 serial port via an RS232 transceiver.

Connector: HIROSE DF11-10DP-2DS(24).

Housing: 10Way HIROSE Housing (DF11-10DS-2C) or equivalent.

Crimps: Crimps for HIROSE Housing (DF11-2428SCA) or equivalent.

Pin	Signal name	Pin	Signal name
1	DCD (in)	2	DSR (in)
3	RXD (in)	4	RTS (out)
5	TXD (out)	6	CTS (in)
7	DTR (out)	8	RI (in)
9	GND	10	GND



J9 - GPIO header

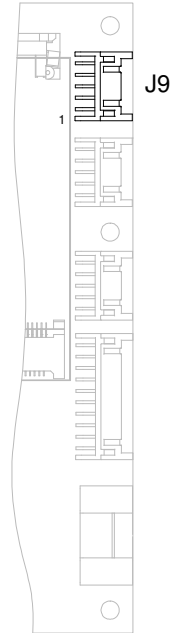
J9 is connected to I2C GPIO expander. Each GPIO line has 100KΩ pull up to 3.3V. The GPIO pins are 5V tolerant.

Connector: HIROSE DF11-10DP-2DS(24).

Housing: 10Way HIROSE Housing (DF11-10DS-2C) or equivalent.

Crimps: Crimps for HIROSE Housing (DF11-2428SCA) or equivalent.

Pin	Signal name	Pin	Signal name
1	GPIO0 (in/out)	2	+3.3V
3	GPIO1 (in/out)	4	GPIO2 (in/out)
5	GPIO3 (in/out)	6	GPIO4 (in/out)
7	GPIO5 (in/out)	8	GPIO6 (in/out)
9	GPIO7 (in/out)	10	GND



J10 - FAN 1 connector

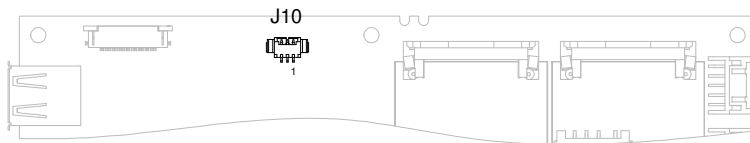
J10 is connected to Super IO FAN 1 control pins.

Connector: MOLEX 53261-0371.

Housing: 3Way MOLEX Housing (51021-0300) or equivalent.

Crimps: Crimps for MOLEX Housing (50058-8000) or equivalent.

Pin	Signal name	Description
1	FANTACH1 (in)	RPM input from FAN1
2	+5V	FAN1 power
3	GND (PWM)	FAN1 ground

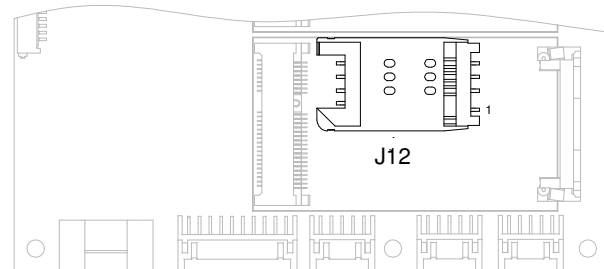


J12 - SIM card socket

J12 is a SIM card socket connected to J13 PCIe Minicard slot 0.

Connector: JAE SF7W008S1AE900.

Pin	Signal name
C1	VCC (out)
C2	RESET (out)
C3	CLK (out)
C5	GND
C6	VPP (out)
C7	IO (in/out)
S1	CD1 (default NC)
S2	CD2 (default NC)



J13 - PCI Express Mini Card slot 0

Stand alone: J13 is connected to PCI Express channel 0 of SCH.

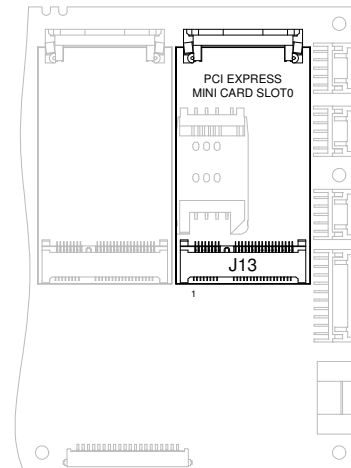


Hot plug is not supported. Please switch off the board when PCIE mini card is being inserted or removed.

COM Express: J13 is connected to PCI Express switch port 2.

Connector: FOXCONN AS0B226-S68N-7F, MINIPCI express, 52.SMT, 0.7, 6.8mm, STD, 25.

Pin	Signal name	Pin	Signal name
1	WAKE# (in)	2	+3.3Vaux (powered in S3/S0)
3	N.C.	4	GND
5	N.C.	6	+1.5V
7	CLKREQ# (in)	8	SIM J12 PWR (out)
9	GND	10	SIM J12 DATA (in/out)
11	REFCLK- (out)	12	SIM J12 CLK (out)
13	REFCLK+ (out)	14	SIM J12 RST# (out)
15	GND	16	SIM J12 VPP (out)
17	N.C. (Optional J12.CD2)	18	GND
19	N.C. (Optional J12.CD1)	20	W_DIS# (out)
21	GND	22	PERST# (out)
23	PCIE_RXD2- (in)	24	+3.3Vaux (powered in S3/S0)
25	PCIE_RXD2+ (in)	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK (out)
31	PCIE_TXD2- (out)	32	SMB_DATA (in/out)
33	PCIE_TXD2+ (out)	34	GND
35	GND	36	USB_D7- (in/out)
37	GND	38	USB_D7+ (in/out)
39	+3.3V aux (powered in S3/S0)	40	GND
41	+3.3V aux (powered in S3/S0)	42	LED_WWAN# (in)
43	GND	44	LED_WLAN# (in)
45	N.C.	46	LED_WPAN# (in)
47	N.C.	48	+1.5V
49	N.C.	50	GND
51	N.C.	52	+3.3V aux (powered in S3/S0)



J14 - PCI Express Mini Card slot 1

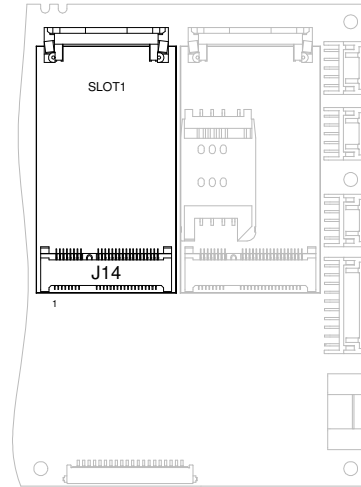
J14 is connected to PCI Express switch port 1.



Hot plug is not supported. Please switch off the board when PCIE mini card is being inserted or removed.

Connector: FOXCONN AS0B226-S68N-7F, MINIPCI express, 52.SMT, 0.7, 6.8mm, STD, 25.

Pin	Signal name	Pin	Signal name
1	WAKE# (in)	2	+3.3V aux (powered in S3/S0)
3	N.C.	4	GND
5	N.C.	6	+1.5V
7	CLKREQ# (in)	8	SIM HDR J29 PWR (out)
9	GND	10	SIM HDR J29 DATA (in/out)
11	REFCLK- (out)	12	SIM HDR J29 CLK (out)
13	REFCLK+ (out)	14	SIM HDR J29 RST# (out)
15	GND	16	SIM HDR J29 VPP (out)
17	N.C.	18	GND
19	N.C.	20	W_DIS# (out)
21	GND	22	PERST# (out)
23	PCIE_RXD2- (in)	24	+3.3V aux (powered in S3/S0)
25	PCIE_RXD2+ (in)	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK (out)
31	PCIE_TXD2- (out)	32	SMB_DATA (in/out)
33	PCIE_TXD2+ (out)	34	GND
35	GND	36	USB_D7- (in/out)
37	GND	38	USB_D7+ (in/out)
39	+3.3V aux (powered in S3/S0)	40	GND
41	+3.3V aux (powered in S3/S0)	42	LED_WWAN# (in)
43	GND	44	LED_WLAN# (in)
45	N.C.	46	LED_WPAN# (in)
47	N.C.	48	+1.5V
49	N.C.	50	GND
51	N.C.	52	+3.3V aux (powered in S3/S0)



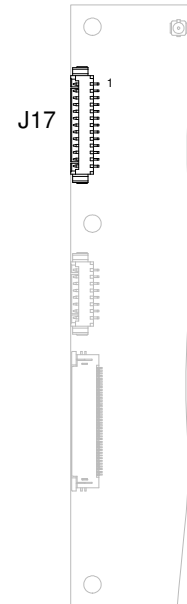
J17 - Audio connector (stand alone only)

Connector: MOLEX 53261-137.

Housing: 3Way MOLEX Housing (51021-1300) or equivalent.

Crimps: Crimps for MOLEX Housing (50058-8000) or equivalent.

Pin	Signal name	Description
1	FMIC_IN_R (in)	Microphone input
2	FMIC_IN_L (in)	Microphone input
3	GND	Analogue ground
4	FLINEIN_R (in)	Line input (right)
5	FLINEIN_L (in)	Line input (left)
6	GND	Analogue ground
7	NC	Not connected (Build option: SPDIF)
8	HP_OUTL (out)	Headphones out (left)
9	HP_OUTR (out)	Headphones out (right)
10	ROUT+ (out)	+ive speaker differential output (right)
11	ROUT- (out)	-ive speaker differential output (right)
12	LOUT+ (out)	+ive speaker differential output (left)
13	LOUT- (out)	-ive speaker differential output (left)



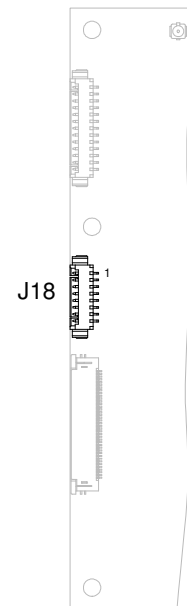
J18 - Touchscreen connector

Connector: MOLEX 53261-0871.

Housing: 3Way MOLEX Housing (51021-0800) or equivalent.

Crimps: Crimps for MOLEX Housing (50058-8000) or equivalent.

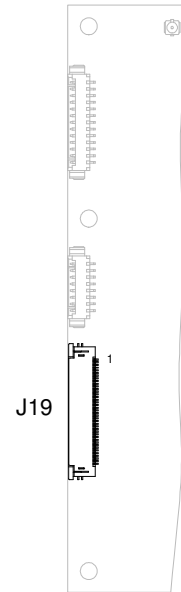
Pin	Signal name	Pin	Signal name
1	Left (X-)	1	Left excite
2	Right (X+)	2	Right excite
3	Bottom (Y-)	3	Bottom excite
4	TOP (Y+)	4	Top excite
5	Connect to Pin 4	5	Top sense
6	Connect to Pin 3	6	Bottom sense
7	Connect to Pin 2	7	Right sense
8	Connect to Pin 1	8	Left sense
4 wire mode		8 wire mode	



J19 - Misc ZIF connector (stand alone only)

Connector: MOLEX 54104-4096.

Pin	Signal name	Pin	Signal name
1	3.3V (S3/S0)	2	3.3V (S3/S0)
3	3.3V (S3/S0)	4	SDIO2_DATA0
5	SDIO2_DATA1	6	SDIO2_DATA2
7	SDIO2_DATA3	8	SDIO2_DATA4
9	SDIO2_DATA5	10	SDIO2_DATA6
11	SDIO2_DATA7	12	GND
13	SDIO2_PWR	14	SDIO2_CMD
15	SDIO2_CLK	16	SDIO2_CD
17	SDIO2_WP (pulled up)	18	SLOT2_LED (220Ω series resistor)
19	GND	20	SMB_CLK (out)
21	SMB_DATA (in)	22	GND
23	NC (COM4_RXD (in) ¹)	24	COM4_TXD (out)
25	GND	26	COM3_RXD (in) ²
27	COM3_TXD (out) ²	28	COM3_RTS (out) ²
29	COM3_CTS (in) ²	30	GND
31	EXT_PRPH_RST# (out)	32	WAKE_PRPH_3V3# (in)
33	GND	34	D- (USB SCH Port 3) ³
35	D+ (USB SCH Port 3) ³	36	GND
37	Reserved	38	+5V (S3/S0)
39	+5V (S3/S0)	40	+5V (S3/S0)



¹ If GPS is not fitted this is a build option.

² If Bluetooth or ZigBee are fitted then COM3 is not available.

³ Standalone only.

J20 - Backlight

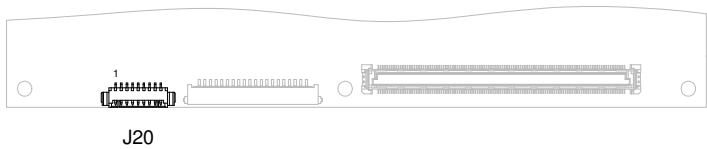
J20 is backlight connector for LVDS_A (J4).

Connector: MOLEX 53261-0971.

Housing: 3Way MOLEX Housing (51021-0900) or equivalent.

Crimps: Crimps for MOLEX Housing (50058-8000) or equivalent.

Pin	Signal name
1	SMB DATA
2	SMB CLK
3	GND
4	BRTH – controlled with LVDS A PWM signal. Default +3.3V.
5	BRTI – pulled to +3.3V
6	+5V
7	+5V
8	GND
9	GND



J21 - LVDS B connector

J21 is connected to CH7308 SDVO LVDS Transmitter.

Connector: JAE FI-SE20P-HFE, 20-way.

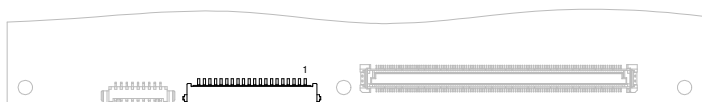
Mating socket: 2 off 20Way 1.25mm pitch single row housing.

Manufacturer: Hirose, part number DF14-20S-1.25C.

40 off gold 26-28 AWG crimps.

Manufacturer: Hirose, part number DF14-2628SCFA.

Pin	Signal name
1	+3.3V
2	+3.3V
3	GND
4	GND
5	D0-
6	D0+
7	GND
8	D1-
9	D1+
10	GND
11	D2-
12	D2+
13	GND
14	CK-
15	CK+
16	GND
17	FRC (pulled high)
18	DPS (default low, but level can be set in BIOS)
19	D3-
20	D3+



J21

J22 - COM Express connector (COM Express only)

Connector: TYCO 3-1318490-6.

Mating socket: 5mm: TYCO 3-1827253-6, 8mm: TYCO 3-1318491-6.

Pin	Signal name	Pin	Signal name
A1	GND	B1	GND
A2	GBE0_MDI3-	B2	GBE0_ACT# (out) (160R series resistor)
A3	GBE0_MDI3+	B3	LPC_FRAME# (out)
A4	GBE0_LINK100# (out) (160R series resistor)	B4	LPC_AD0 (in/out)
A5	GBE0_LINK1000# (out) (160R series resistor)	B5	LPC_AD1 (in/out)
A6	GBE0_MDI2-	B6	LPC_AD2 (in/out)
A7	GBE0_MDI2+	B7	LPC_AD3 (in/out)
A8	GBE0_LINK# (220R pull down)	B8	LPC_DRQ0# (in)
A9	GBE0_MDI1-	B9	LPC_DRQ1# (in)
A10	GBE0_MDI1+	B10	LPC_CLK (out)
A11	GND	B11	GND
A12	GBE0_MDI0-	B12	PWRBTN# (in)
A13	GBE0_MDI0+	B13	SMB_CK (out) (SCH US15W)
A14	GBE0_CTREF (Power out)	B14	SMB_DAT (in/out) (SCH US15W)
A15	SUS_S3# (out)	B15	SMB_ALERT# (in)
A16	SATA0_TX+	B16	SATA1_TX+
A17	SATA0_TX-	B17	SATA1_TX-
A18	SUS_S4# (out)	B18	SUS_STAT# (out) (LPCPD#)
A19	SATA0_RX+	B19	SATA1_RX+
A20	SATA0_RX-	B20	SATA1_RX-
A21	GND	B21	GND
A22	NC	B22	NC
A23	NC	B23	NC
A24	SUS_S5# (out)	B24	PWR_OK (in)
A25	NC	B25	NC
A26	NC	B26	NC
A27	BATLOW# (in) (SuperIO: GP14)	B27	WDT (out) (SuperIO: GP60)
A28	ATA_ACT# (out)	B28	NC

continued...

Pin	Signal name	Pin	Signal name
A29	AC_SYNC (out)	B29	NC
A30	AC_RST# (out)	B30	AC_SDIN0 (in)
A31	GND	B31	GND
A32	AC_BITCLK (out)	B32	SPKR (out) (220R series resistor)
A33	AC_SDOOUT (out)	B33	I2C_CK (out) (EC LPC2132)
A34	BIOS_DISABLE# (in) (CPLD)	B34	I2C_DAT (in/out) (EC LPC2132)
A35	THRMTRIP# (in) (CPLD)	B35	THRM# (in) (CPLD)
A36	NC	B36	NC
A37	NC	B37	NC
A38	NC	B38	NC
A39	NC	B39	NC
A40	NC	B40	NC
A41	GND	B41	GND
A42	USB2- (SCH US15W port 6 - high speed only!)	B42	USB3- (SCH US15W port 7 - high speed only!)
A43	USB2+ (SCH US15W port 6 - high speed only!)	B43	USB3+ (SCH US15W port 7 - high speed only!)
A44	USB_2_3_OC# (in) (SCH US15W port 6 and 7 overcurrent)	B44	USB_0_1_OC# (in) (SCH US15W port 1 and 3 overcurrent)
A45	USB0- (SCH US15W port 1)	B45	USB1- (SCH US15W port 3)
A46	USB0+ (SCH US15W port 1)	B46	USB1+ (SCH US15W port 3)
A47	VCC_RTC	B47	EXCD1_PERST# (out)
A48	EXCD0_PERST# ⁴ (out)	B48	EXCD1_CPPE# (in) (SuperIO: GP37)
A49	EXCD0_CPPE# (in) (SuperIO: GP34)	B49	SYS_RESET# (in)
A50	LPC_SERIRQ (in)	B50	CB_RESET# (out)
A51	GND	B51	GND
A52	NC	B52	NC
A53	NC	B53	NC
A54	GPIO (CPLD)	B54	GPO1 (SuperIO: GP57)
A55	NC	B55	NC
A56	NC	B56	NC
A57	GND	B57	GPO2 (SuperIO: GP50)

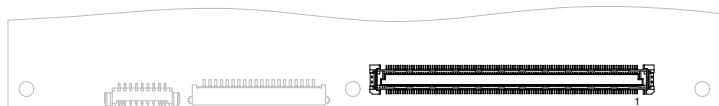
continued...

⁴ Connected to EXT_PRPH_RST# = Board reset (RST#) AND MANUAL_EXT_AND_CB_RST# (I2C expander PCA9535 port P11) This pin can be controlled by writing to I2C expander chip.

Pin	Signal name	Pin	Signal name
A58	PCIE_TX3+ (PCIE switch port 7)	B58	PCIE_RX3+ (PCIE switch port 7)
A59	PCIE_TX3- (PCIE switch port 7)	B59	PCIE_RX3- (PCIE switch port 7)
A60	GND	B60	GND
A61	PCIE_TX2+ (PCIE switch port 6)	B61	PCIE_RX2+ (PCIE switch port 6)
A62	PCIE_TX2- (PCIE switch port 6)	B62	PCIE_RX2- (PCIE switch port 6)
A63	GPI1 (CPLD)	B63	GPO3 (SuperIO: GP51)
A64	PCIE_TX1+ (PCIE switch port 5)	B64	PCIE_RX1+ (PCIE switch port 5)
A65	PCIE_TX1- (PCIE switch port 5)	B65	PCIE_RX1- (PCIE switch port 5)
A66	GND	B66	WAKE0# (in)
A67	GPI2 (SuperIO: GP61)	B67	WAKE1# (in)
A68	PCIE_TX0+ (SCH US15W port 1)	B68	PCIE_RX0+ (SCH US15W port 1)
A69	PCIE_TX0- (SCH US15W port 1)	B69	PCIE_RX0- (SCH US15W port 1)
A70	GND	B70	GND
A71	LVDS_A0+ (SCH US15W LVDS)	B71	NC
A72	LVDS_A0- (SCH US15W LVDS)	B72	NC
A73	LVDS_A1+ (SCH US15W LVDS)	B73	NC
A74	LVDS_A1- (SCH US15W LVDS)	B74	NC
A75	LVDS_A2+ (SCH US15W LVDS)	B75	NC
A76	LVDS_A2- (SCH US15W LVDS)	B76	NC
A77	LVDS_VDD_EN (SCH US15W LVDS)	B77	NC
A78	LVDS_A3+ (SCH US15W LVDS)	B78	NC
A79	LVDS_A3- (SCH US15W LVDS)	B79	LVDS_BKLT_EN (out) (SCH US15W LVDS)
A80	GND	B80	GND
A81	LVDS_A_CK+ (SCH US15W LVDS)	B81	NC
A82	LVDS_A_CK- (SCH US15W LVDS)	B82	NC
A83	LVDS_I2C_CK (out) (SCH US15W LVDS)	B83	LVDS_BKLT_CTRL (out) (SCH US15W LVDS)
A84	LVDS_I2C_DAT (in/out) (SCH US15W LVDS)	B84	VCC_5V_SBY (+5V standby power)

continued...

Pin	Signal name	Pin	Signal name
A85	GPI3 (SuperIO: GP54)	B85	VCC_5V_SBY (+5V standby power)
A86	NC	B86	VCC_5V_SBY (+5V standby power)
A87	NC	B87	VCC_5V_SBY (+5V standby power)
A88	PCIE0_CK_REF+ (out)	B88	NC
A89	PCIE0_CK_REF- (out)	B89	NC
A90	GND	B90	GND
A91	NC	B91	NC
A92	NC	B92	NC
A93	GPO0 (SuperIO: GP56)	B93	NC
A94	NC	B94	NC
A95	NC	B95	NC
A96	GND	B96	NC
A97	VCC_12V (input power +12V)	B97	NC
A98	VCC_12V (input power +12V)	B98	NC
A99	VCC_12V (input power +12V)	B99	NC
A100	GND	B100	GND
A101	VCC_12V (input power +12V)	B101	VCC_12V (input power +12V)
A102	VCC_12V (input power +12V)	B102	VCC_12V (input power +12V)
A103	VCC_12V (input power +12V)	B103	VCC_12V (input power +12V)
A104	VCC_12V (input power +12V)	B104	VCC_12V (input power +12V)
A105	VCC_12V (input power +12V)	B105	VCC_12V (input power +12V)
A106	VCC_12V (input power +12V)	B106	VCC_12V (input power +12V)
A107	VCC_12V (input power +12V)	B107	VCC_12V (input power +12V)
A108	VCC_12V (input power +12V)	B108	VCC_12V (input power +12V)
A109	VCC_12V (input power +12V)	B109	VCC_12V (input power +12V)
A110	GND	B110	GND



J22

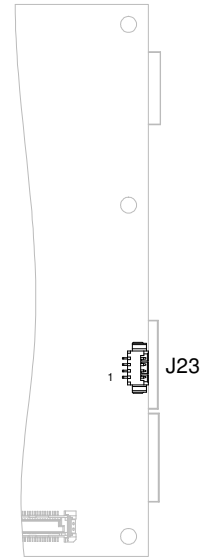
J23 - SATA power connector (stand alone only)

Connector: MOLEX 53261-0471.

Housing: 4Way MOLEX Housing (51021-0400) or equivalent.

Crimps: Crimps for MOLEX Housing (50058-8000) or equivalent.

Pin	Pin name
1	+5V
2	GND
3	GND
4	+5V

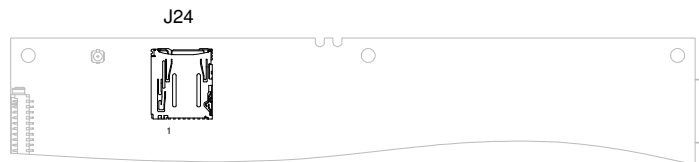


J24 - Micro SD slot

J24 is connected to SCH SDIO slot 1.

Connector: HIROSE DM3AT-SF-PEJ.

Pin	Pin name
1	DAT2
2	CD/DAT3
3	CMD
4	VDD
5	CLK
6	VSS
7	DAT0
8	DAT1
9	SW1 (CD#)
10	GND



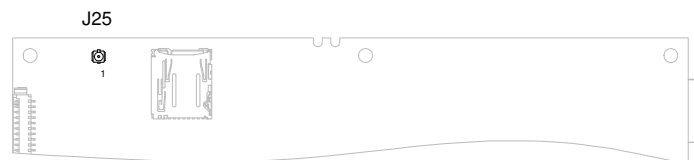
J25 - GPS antenna

J25 is connected to GPS module.

Connector: HIROSE U.FL-R-SMT.

Mating sockets: HIROSE U.FL-LP-040 or U.FL-LP-066 or U.FL-LP-062 or U.FL-LP-088 or equivalent.

Pin	Pin name
1	GPS RF IN (in)
2	GND
3	GND



J26 - FAN 2 connector (optional)

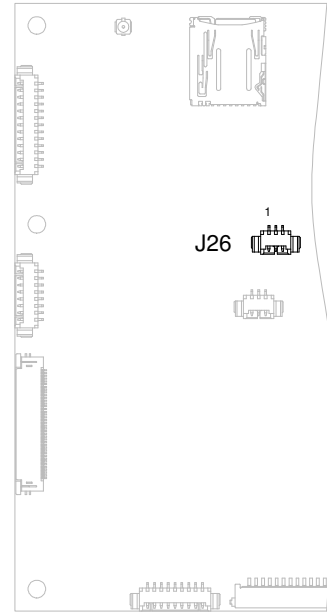
J26 is connected to Super IO FAN 2 control pins.

Connector: MOLEX 53261-0371.

Housing: 3Way MOLEX Housing (51021-0300) or equivalent.

Crimps: Crimps for MOLEX Housing (50058-8000) or equivalent.

Pin	Signal name	Description
1	FANTACH2 (in)	RPM input from FAN2
2	+5V	FAN2 power
3	GND (PWM)	FAN2 ground



J27 - EC serial debug output (for debugging purpose only)

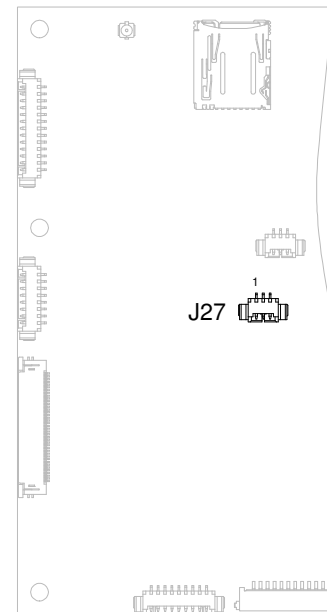
J27 is connected to Embedded controller serial line interface.

Connector: MOLEX 53261-0371.

Housing: 3Way MOLEX Housing (51021-0300) or equivalent.

Crimps: Crimps for MOLEX Housing (50058-8000) or equivalent.

Pin	Signal name	Description
1	EC_RX (in)	Embedded controller RX signal
2	EC_TX (out)	Embedded controller TX signal
3	GND	Ground



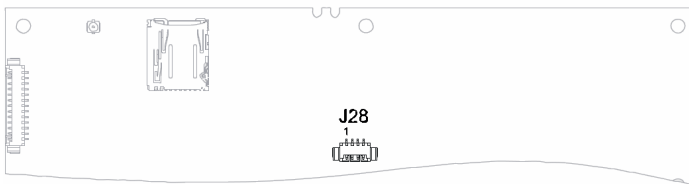
J28 - External RTC battery (stand alone only)

Connector: MOLEX 53261-0471.

Housing: 4Way MOLEX Housing (51021-0400) or equivalent.

Crimps: Crimps for MOLEX Housing (50058-8000) or equivalent.

Pin	Pin name
1	GND
2	+Battery (3.3V)
3	I2C_SDA (Embedded controller)
4	I2C_SCL (Embedded controller)

**J29 - SIM interface header**

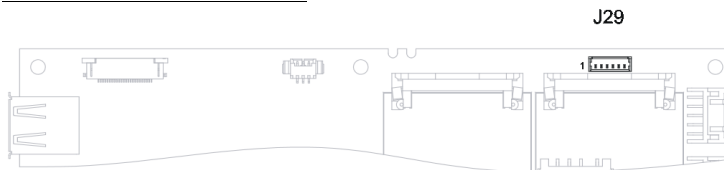
J29 is a SIM card interface header connected to J14 PCIe Minicard slot 1.

Connector: MOLEX 530470610.

Housing: 6Way MOLEX Housing (0510210600) or equivalent.

Crimps: Crimps for MOLEX Housing (0500588100) or equivalent.

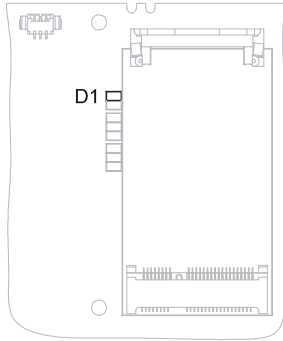
Pin	Signal name
1	RESET (out)
2	VCC (out)
3	DATA (in/out)
4	CLK (out)
5	VPP (out)
6	GND



LEDs

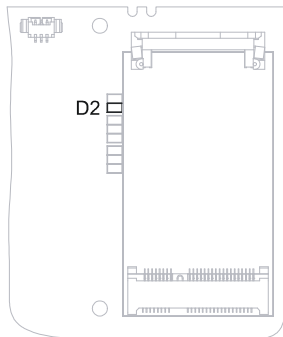
D1 - PCIe Minicard slot 0 activity

D1 indicates PCIe Minicard slot 0 activity. This signal is AND of WPAN, WLAN and WWAN signals coming from PCIE minicard 0 and depends on card setting.



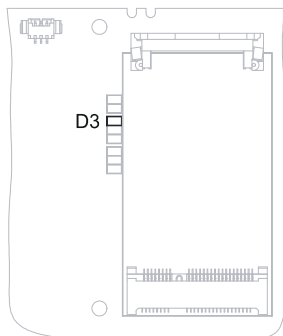
D2 - PCIe Minicard slot 1 activity

D2 indicates PCIe Minicard slot 1 activity. This signal is AND of WPAN, WLAN and WWAN signals coming from PCIE minicard 1 and depends on card setting.



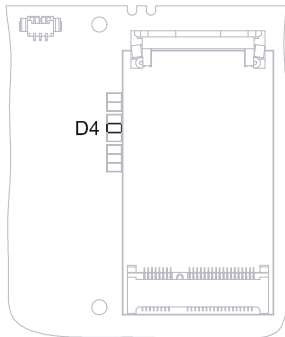
D3 - IDE / SATA activity (build option)

D3 indicates access to on board FLASH or SATA drive.



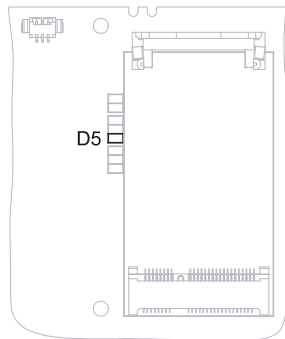
D4 - Bluetooth activity

D4 indicates Bluetooth activity and depends on WT11 module settings.



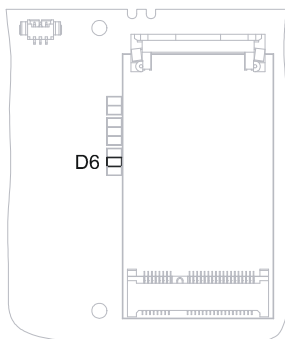
D5 - Micro SD card activity

D5 indicates access to micro SD card.



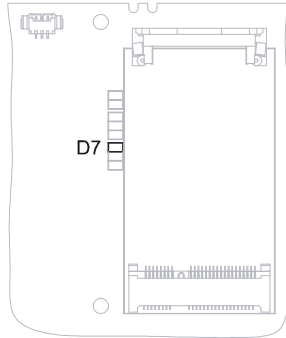
D6 - S3 power state indicator

If D6 is ON all S3 power supplies are switched ON and output voltages / currents are in allowed tolerance.



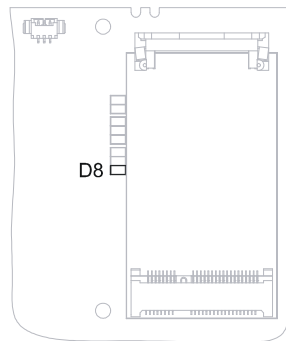
D7 - S0 power state indicator

If D7 is ON all S0 power supplies are switched ON and output voltages / currents are in allowed tolerance.



D8 - S5 power state indicator

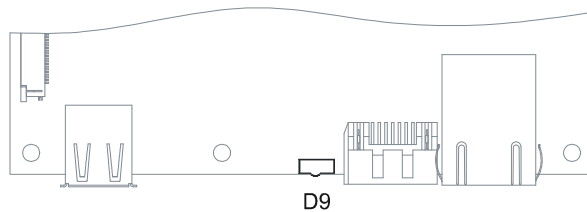
If D8 is ON all S5 power supplies are switched ON and output voltages / currents are in allowed tolerance.



D9 - Power / Sleep LED / HD Activity

D9 is dual colour LED:

- Green colour indicates S0 state. In this state the board is fully running.
- Blinking green colour indicates IDE, SATA or micro SD activity
- Orange colour indicates S3 state. In this state the board is in sleep mode.



GPIO mapping

There are three groups of GPIO pins on PROTEUS. First group is connected between I2C GPIO expander and connector J9. The second group is connected between SUPERIO and COM express connector (J22) and the third group is connected between CPLD and J22.

I2C GPIO pin mapping

PCA9535 I2C GPIO expander is mapped to I2C address 0x4E/0x4F (Read/Write). Following table shows GPIO expander port connections.

PCA9535 port number	Signal	Description
P0	GPIO_P0	Connected to J9 pin 1
P1	GPIO_P1	Connected to J9 pin 3
P2	GPIO_P2	Connected to J9 pin 4
P3	GPIO_P3	Connected to J9 pin 5
P4	GPIO_P4	Connected to J9 pin 6
P5	GPIO_P5	Connected to J9 pin 7
P6	GPIO_P6	Connected to J9 pin 8
P7	GPIO_P7	Connected to J9 pin 9
P8	I2C_USER_LED	Connected to J6 pin 9
P9	USBPWR_02_EN#	USB power enable for ports 0 and 2
P10	USBPWR_1_EN#	USB power enable for port 1
P11	DNU	DO NOT USE, DO NOT CHANGE
P12	DNU	DO NOT USE, DO NOT CHANGE
P13	NC	Not connected
P14	Read RTC Battery	Disconnect RTC battery from +3.3 Always
P15	I2C_SATA_VDD_EN	SATA power enable

SUPER IO pin mapping

There is SCH3114 super IO used on PROTEUS. Following table shows connection some of the SUPER IO pins.

SUPER IO GP pin number	Signal	Description
GP61	GPIO3	Connected to J22 pin A67
GP54	GPIO4	Connected to J22 pin A85
GP56	GPIO5	Connected to J22 pin A93
GP57	GPIO6	Connected to J22 pin B54
GP50	GPIO7	Connected to J22 pin B57
GP51	GPIO8	Connected to J22 pin B63
GP31	GPIO9	Connected to J6 pin 15
GP46	GPIO10	Connected to J6 pin 16
GP14	COM_BATLOW#	Connected to J22 pin A27
GP60	COM_WDT	Connected to J22 pin B27
GP67	GPS_SHDN#	GPS power shutdown
GP62	UART1_SHDN#	RS232 transceiver shutdown
GP34	SIO_SLOT0_PRESENT#	Connected to J22 pin A49
GP37	SIO_SLOT1_PRESENT#	Connected to J22 pin B48
GP55	PCIE_MINI0_W_DIS#	Disables RF part of PCIE mini card inserted in socket 0
GP15	PCIE_MINI1_W_DIS#	Disables RF part of PCIE mini card inserted in socket 0
GP12	LVDS_SCAN_DIR	This pin controls LVDS A scan direction
GP13	LVDS2_SCAN_DIR	This pin controls LVDS B scan direction

CPLD pin mapping

Some of GPIO pins are controlled through CPLD. Control these pins use register mapped to I/O address 0x5A. Other registers can be found on 0x5B and 0x5C. See following tables with detailed description.

Address: 0x5A (Read/Write)

Bit	Description	Note
0	GPIO0 Data	Connected to J22 pin A54
1	GPIO1 Data	Connected to J22 pin A63
2	GPIO0 Direction	1 – Output / 0 – Input
3	GPIO1 Direction	1 – Output / 0 – Input
4	GPIO0 Enable	1 – Enabled / 0 – Disabled
5	GPIO1 Enable	1 – Enabled / 0 – Disabled
6	-	Reserved
7	-	Reserved

Address: 0x5B (Read only)

Bit	Signal	Description
0	COM_THRM#	Connected to J22 pin B35
1	COM_LPC_DRQ0#	Connected to J22 pin B8
2	COM_LPC_DRQ1#	Connected to J22 pin B9
3	-	Reserved
4	-	Reserved
5	-	Reserved
6	-	Reserved
7	LVDS_OC#	LVDS A or B display power over current flag

Address: 0x5C (Read only)

Bit	Signal	Description
0	SDIO_SLOT1_OC#	SDIO card over current flag
1	PCIE_MINI0_OC#	PCIE mini card slot 0: +3.3V over current flag
2	PCIE_MINI1_OC#	PCIE mini card slot 1: +3.3V over current flag
3	-	Reserved
4	-	Reserved
5	-	Reserved
6	-	Reserved
7	-	Reserved

Appendix A – Reference information

Product information

Product notices, updated drivers, support material:

www.eurotech.com

PCI special interest group

PCI Bus specification and list of manufacturers:

www.pcisig.org

USB information

Universal Serial Bus (USB) specification and product information:

www.usb.org

Intel

Information about Pentium M and Celeron M processors:

developer.intel.com

PCI SIG

Information about PCI development:

www.pcisig.com

Digital Display Working Group

Information about developing a digital connectivity specification for high-performance PCs and digital displays:

www.ddwg.com

IEEE Specifications

Information about wired and wireless communication:

www.ieee.org

Trusted Computing Group

Information about TCG open specifications:

www.trustedcomputinggroup.org

Trusted Computing Platform Alliance

Information about Trusted Platform:

www.trustedcomputing.org

Appendix B – RoHS Compliance



The Restriction of the use of certain Hazardous Substances (RoHS) Directive came into force on 1st July 2006. The PROTEUS board is designed using RoHS compliant components, and manufactured to comply with the RoHS Directive.

Eurotech has based its material content knowledge on a combination of information provided by third parties and auditing our suppliers and sub-contractor's operational activities and arrangements. This information is archived within the associated Technical Construction File. Eurotech has taken reasonable steps to provide representative and accurate information, though may not have conducted destructive testing or chemical analysis on incoming components and materials.

Additionally, packaging used by Eurotech for its products complies with the EU Directive 2004/12/EC in that the total concentration of the heavy metals cadmium, hexavalent chromium, lead and mercury do not exceed 100 ppm.

Appendix C – PROTEUS V111 vs. PROTEUS XL V111

The PROTEUS XL uses CPU and System Controller Hub (Poulsbo) in larger packages designed for industrial temperature range operations.

Compatibility

- All edge connectors are in the same place (J1-9, J12-14, J17-25).
- All connector pins are the same.
- All modules are in the same place (GPS, ZigBee, Bluetooth).

New features/changes in XL

Stand alone

- Connector for external RTC battery added with I2C bus signals to support read system battery information.
- Analog Device AD1986 replaced by IDT 92HD75B.
- Hardware support for low battery / low Input voltage indication.
- Added support for LVDS A display backlight regulation.
- Power button configuration: added support for very low power consumption in S5# (0.03W) – Build option.

COM Express

- GPI3 is pulled high.
- GPO3 is pulled low.
- SUS_S5#: Initially low, when press power button it goes high and stays high until system is shut down when it then goes low.
- SUS_S4#: Low in S5 and high in S3, S1.
- SUS_S3#: Low in S5, S3 and high in S1.
- Support for SuperIO address 0x162E implemented to give the option to support customer boards with SuperIO placed at address 0x02E.

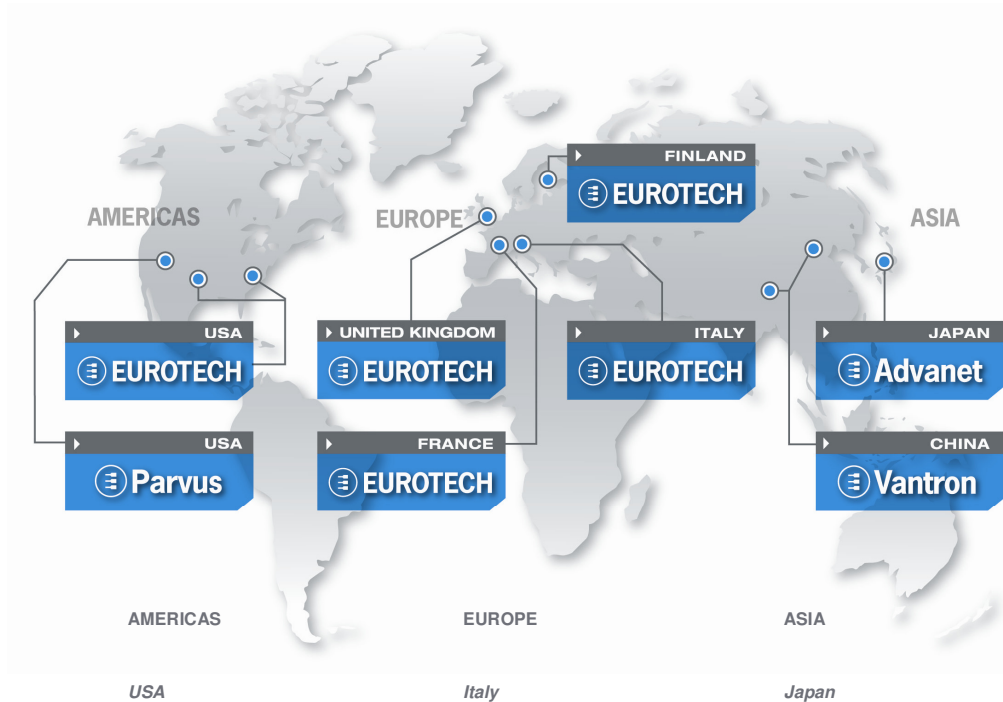
Stand alone & COM Express

- Second LVDS routed to PROTEUS edge LVDS B connector – this connector is always fitted for both variants.
- On board FLASH: Intel P-140 replaced with on board SST NANDRIVE (2GB).
- SIM signals for PCIE Minicard socket 1 are connected to new connector. This provides the option to use two modem cards simultaneously and use remote mounting of the SIM card
- Edge power LED changes brightness during SATA/PATA/SD access to show board activity.
- Added hardware support for disabling write access to SD and on board PATA FLASH in BIOS.
- Added hardware support to set LVDS scan direction in BIOS.
- I²C TPM chip replaced with LPC TPM.
- Hardware support for possible Keypad connection (if touchscreen is not used).
- Hardware support to read RTC battery voltage.
- Hardware support to read input voltage value.
- GPS disconnected from RTC battery to improve RTC battery lifetime.

Incompatibility

- Heat spreader will require redesign, due to large CPU and SCH footprints.
- J10 (FAN1), J26 (FAN2, not fitted) and J27 (serial debug connector) have been slightly moved. These connectors are not normally used and are placed deep in the board. Therefore this change should not have any impact on customer designs.
- Component heights and locations have been slightly adjusted.

Eurotech Worldwide Presence



EUROTECH

EUROTECH

Toll free +1 888.941.2224
 Tel. +1 301.490.4007
 Fax +1 301.490.4582
 E-mail: sales.us@eurotech.com
 E-mail: support.us@eurotech.com
 Web: www.eurotech-inc.com

PARVUS

Tel. +1 800.483.3152
 Fax +1 801.483.1523
 E-mail: sales@parvus.com
 E-mail: tsupport@parvus.com
 Web: www.parvus.com

EUROTECH

Tel. +39 0433.485.411
 Fax +39 0433.485.499
 E-mail: sales.it@eurotech.com
 E-mail: support.it@eurotech.com
 Web: www.eurotech.com

United Kingdom

EUROTECH

Tel. +44 (0) 1223.403410
 Fax +44 (0) 1223.410457
 E-mail: sales.uk@eurotech.com
 E-mail: support.uk@eurotech.com
 Web: www.eurotech.com

France

EUROTECH

Tel. +33 04.72.89.00.90
 Fax +33 04.78.70.08.24
 E-mail: sales.fr@eurotech.com
 E-mail: support.fr@eurotech.com
 Web: www.eurotech.com

Finland

EUROTECH

Tel. +358 9.477.888.0
 Fax +358 9.477.888.99
 E-mail: sales.fi@eurotech.com
 E-mail: support.fi@eurotech.com
 Web: www.eurotech.com

ADVANET

Tel. +81 86.245.2861
 Fax +81 86.245.2860
 E-mail: sales@advanet.co.jp
 E-mail: tsupport@advanet.co.jp
 Web: www.advantec.co.jp

China

VANTRON

Tel. +86 28.85.12.39.30
 Fax +86 28.85.12.39.35
 E-mail: sales@vanrontech.com.cn
 E-mail: support.cn@eurotech.com
 Web: www.vanrontech.com.cn