

Helios™ Platform

Programmable Edge Controller

Rev. A – November 2010 - 110124-3000A

Disclaimer

The information in this document is subject to change without notice and should not be construed as a commitment by any Eurotech company. While reasonable precautions have been taken, Eurotech assumes no responsibility for any error that may appear in this document.

Trademarks

Helios™ and Everyware™ are trademarks of Eurotech Inc.

All other product or service names are the property of their respective owners.

Revision History

<i>Issue no.</i>	<i>PWB</i>	<i>Date</i>	<i>Comments</i>
1		Jul-09	Preliminary release
2		Oct-09	Second preliminary release
A		Nov-10	Updates for Rev B carrier boards

© 2009 Eurotech Inc.

For contact details, see page [24](#).

Contents

Introduction.....	4
Block Diagram	4
Features	5
Further Reading.....	6
Handling Your System Safely	6
Conventions.....	6
Software Support.....	8
Operating System	8
BIOS.....	8
Boot Options.....	8
Everyware™ Software Framework	8
Hardware Reference.....	9
Rear Panel.....	9
USB Bay	11
Indicators	12
Enclosure.....	13
Configurations	14
Processor	14
Memory.....	14
CompactFlash® Card or Secure Digital Card	14
On-Board Flash.....	14
SATA Drive.....	14
USB Disk Drive	15
Communications	15
Universal Serial Bus.....	15
Serial Port.....	15
Ethernet	15
GPS	15
Multimedia Cards.....	16
Power Supply.....	16
Peripherals	17
USB Device Support	17
System Specification.....	18
Processor	18
Power	18
Electrical	19
EMI/EMC	20
Environmental.....	21
Appendix A – Reference Information.....	22
Appendix B – System Revision	23
Eurotech Worldwide Presence.....	24

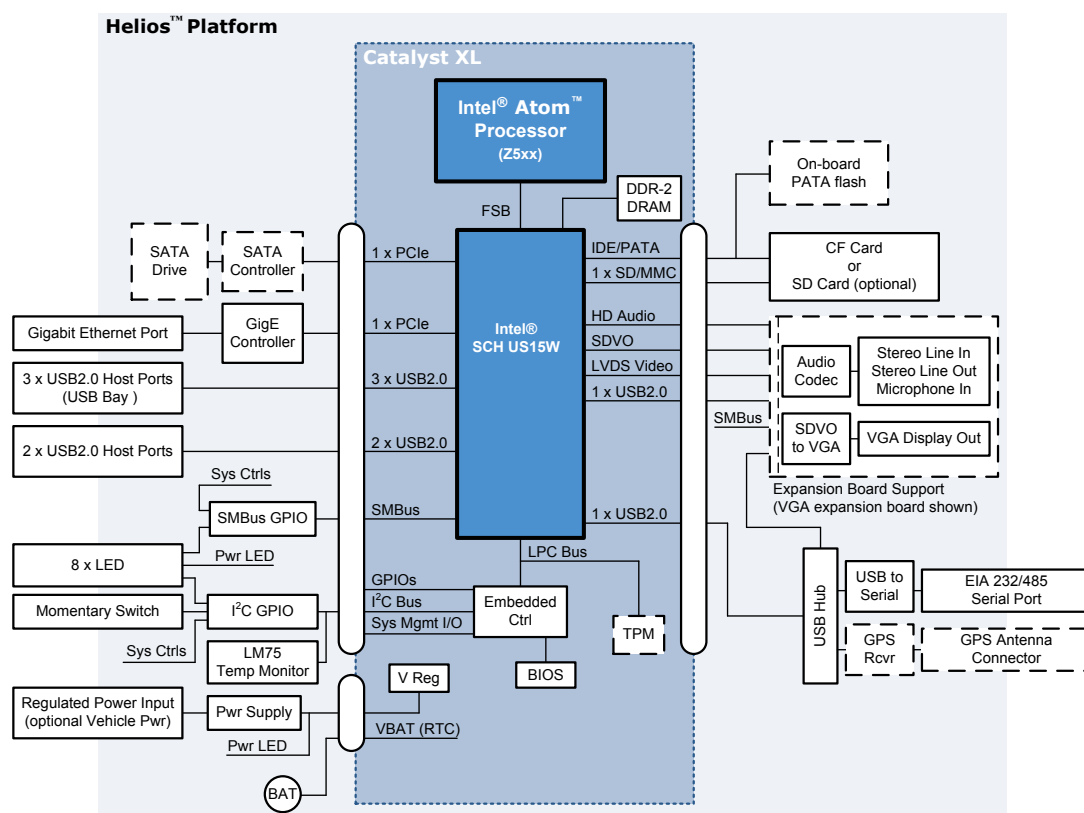
Introduction

Helios™ is a programmable edge controller that provides a flexible application-ready hardware platform with enhanced wireless capabilities. It is based on the Catalyst XL which integrates with a carrier board and supporting peripheral devices. All electronics are housed in an enclosure. Three USB host ports for wireless devices and additional storage are accessible in the USB Bay located under the removable cover.

With the Helios platform, you can quickly and easily create an edge controller device, loaded with your application software that precisely meets your requirements. Several options are available allowing you to choose the hardware based on your specifications. Using pre-certified wireless modules in the USB Bay, the Helios platform can be easily customized for any network. Software support includes Eurotech's Everyware™ Software Framework offering an easy-to-use, Java-based development environment that minimizes time to market and allows for easy portability for future expansion.

Block Diagram

The following diagram illustrates the system organization of the Helios platform. Notice that the data connector on the Catalyst XL has been divided into two sections for this illustration. Dotted lines indicate configuration options. For information about these options, see [Configurations](#), page 14.



Features

Processor

- Intel® Atom™ Z5xx processor at 1.1 GHz (options for 1.33 GHz or 1.6 GHz)
- Intel® System Controller Hub US15W

Integrated System Functions

- Embedded Controller
- Trusted Platform Management (option)

Memory

- 1 GB DDR-2 DRAM (options for 512 MB or 2 GB)
- Integrated system BIOS
- Battery-backed real-time clock
- On-board PATA flash (option)
- CompactFlash® card or SD card (option)
- Internal SATA drive (option)
- External USB disk drive support

Communications

- Five USB 2.0 host ports operating low, full, and high speeds
 - Two general-purpose ports
 - Three USB Bay ports for wireless devices and storage (option for up to three external antenna connections)
- EIA-232/EIA-485 serial port (software-selectable)
- Gigabit Ethernet port
- GPS receiver with external antenna connection (option)

User Interface and Display

- Multimedia card support for various display and audio options (For details about expansion boards, see [Multimedia Cards](#), page 16.)
- Power indicator
- Seven software-controlled LED status indicators
- Software-readable push-button

Power Supply

- 12 V DC power input (up to 36 V vehicle power input option)

Mechanical

- ABS plastic and aluminum enclosure

Further Reading

This document describes the Helios platform and is intended for system integrators. A system-level overview is provided in the following sections. Check the Eurotech support site (<http://support.eurotech-inc.com/>) for errata reports and for the latest releases of these documents.

Handling Your System Safely

Anti-Static Handling

The Helios platform is designed to meet the Electrostatic Discharge (ESD) criteria contained in IEC 61000-4-2 (*EMC – Part 4-2: Testing and Measurement Techniques – Electrostatic Discharge Immunity Test*). The electronics included in the enclosure contain CMOS devices that could be damaged by electrostatic discharge (ESD). Observe industry-standard electronic handling procedures when handling these electronics. Where possible, work on a grounded anti-static mat. At a minimum, touch an electrically grounded object before handling any electronics.

Packaging



Please ensure that, should a system need to be returned to Eurotech, it is adequately packed, preferably in the original packing material.

Electromagnetic Compatibility

The Helios platform is defined as an unintentional radiator of electromagnetic energy. For additional information about the EMI/EMC specification, see [EMI/EMC](#), page 20.

Conventions

The following table lists the symbols used in this document.

Symbol	Explanation
	Note – information that requires your attention
	Warning – proceeding with a course of action may damage your equipment or result in loss of data

The following table describes the conventions for signal names used in this document.

Convention	Explanation
GND	digital ground plane
+	positive signal in differential pair
-	negative signal in differential pair

The following table describes the abbreviations for direction and electrical characteristics of a signal used in this document.

Type	Explanation
I	signal is an input to the system
O	signal is an output from the system
IO	signal may be input or output
P	power and ground
nc	no connection
reserved	use is reserved to Eurotech

Software Support

Eurotech provides an application-ready platform including BIOS, operating system, and development environment. This section gives a brief description of the software support available for the Helios platform. For additional details, contact your local Eurotech technical support.

Operating System

The Helios platform is available with the following operating systems:

- Wind River Linux 3.0
- Windows® Embedded Standard
- Windows® CE 6.0

BIOS

The Helios platform incorporates a custom system BIOS developed by Eurotech.

Boot Options

The Helios platform has the capability to boot and install the operating system from five sources. The following are the boot options:

- CF card
- USB disk drive
- SD card (future option)
- SATA drive
- On-board PATA flash

Everyware™ Software Framework

Everyware Software Framework (ESF) is an inclusive software framework that puts a middleware layer between the operating system and the OEM application. It provides industry-standard interfaces that shorten development time, simplify coding, and allow software to be ported from one Eurotech hardware platform to another. ESF is available on the Helios platform.

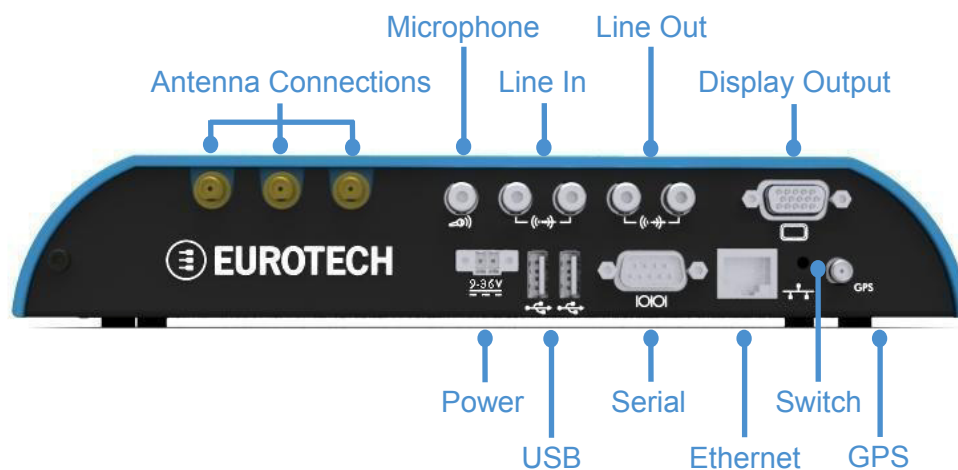
Information about ESF is available at <http://esf.eurotech.com>.

Hardware Reference

This section gives an overview of the hardware features of the Helios platform. The overview includes location and function of connectors, indicators, and switches and details about the enclosure.

Rear Panel

The following diagram illustrates the location of connectors and switches on the rear panel. Notice that the system shown uses the VGA Expansion Board and includes additional connectors not found on the standard system. For other multimedia card options, see [Multimedia Cards](#), page 16.



Standard system

The following table describes the connectors on the rear panel of a standard system.

Connector	Enclosure Connector	Description
Power	1 x 2 header, 3.5 mm	Main power input
USB 1-2	USB Type A receptacle	USB 2.0 host ports
Serial	DB-9 plug	EIA-232 (default) or EIA-485
Ethernet	RJ-45 socket	Gigabit Ethernet network
GPS	SMA socket	GPS external antenna connection
Antenna 1-3	Device dependent	USB device external antenna connections (optional)

Expansion Board Options

The following table describes the additional connectors on the rear panel of a system that includes an expansion board. For additional details about the expansion boards offered by Eurotech, see [Multimedia Cards](#), page 16.

Connector	Enclosure Connector	Description
Microphone	RCA jack	Mono microphone input
Line In	RCA jack	Stereo line in
Line Out	RCA jack	Stereo line out
Display Output	Display dependent	VGA, LVDS, or DVI output

Connectors

The following tables describe connectors that do not follow an industry-standard pinout.

Power Input

Connector: 2-pin header, 3.5 mm, Phoenix Contact 1937318
 Mating connector: 2-pin plug, Phoenix Contact 1847055

The Helios platform accepts input power from a regulated external supply. For details about input power options, see [Power Supply](#), page 16.

Pin	Name	Type	Description
1	GND	P	ground
2	VIN	PI	12 V (nominal) power input

Serial Port

Connector: DB9 plug
 Mating connector: DB9 socket

By default the Helios platform provides an EIA-232 serial port. As an alternate configuration, the serial port can operate in EIA-485 mode. This configuration requires software support for EIA-485 mode.

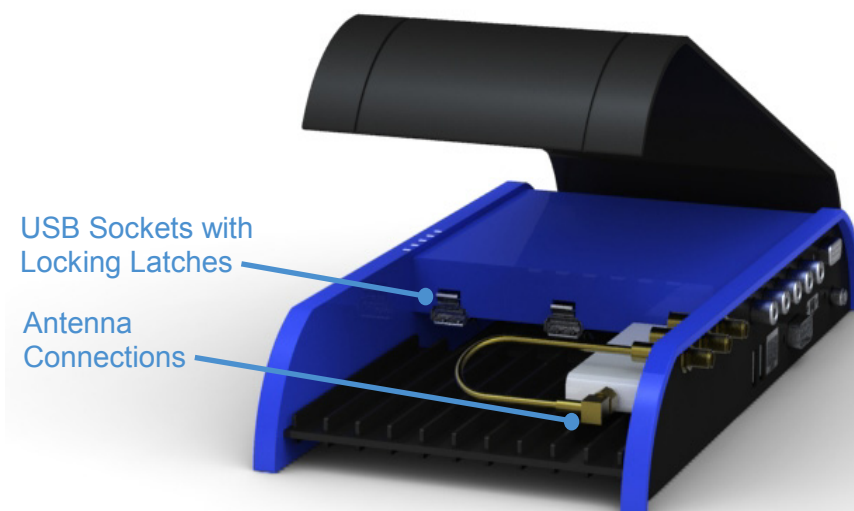
Pin	EIA-232 (default)			EIA-485		
	Name	Type	Description	Name	Type	Description
1	DCD	I	Data Carrier Detect	RX+	I	Receive Data +
2	RXD	I	Receive Data	RX-	I	Receive Data -
3	TXD	O	Transmit Data	TX-	O	Transmit Data -
4	nc			nc		
5	GND	P	ground	GND	P	ground
6	nc			nc		
7	RTS	O	Request To Send	TX+	O	Transmit Data +
8	CTS	I	Clear To Send	nc		
9	nc			nc		

Boot Mode Button

The Helios platform includes a momentary push-button switch accessible through a small hole on the rear panel near the GPS connector. This switch generates an interrupt to the processor and is software-definable.

USB Bay

The following diagram illustrates the location of connectors inside the USB Bay.



The three USB 2.0 host ports located in the USB Bay permit use of wireless USB devices inside the enclosure. These ports use USB sockets with locking latches preventing accidental disconnects or lost connections due to vibration. Each USB port includes a corresponding connection for an external antenna. The type of connection is dependent on the USB device used.

Some USB devices will not fit in the USB Bay or require cabling external to the enclosure. For these types of devices, cables for the USB interface can plug into the locking sockets in the USB Bay and then pass through the larger external cooling vents in the bottom of the USB Bay cover. A CAN interface is one example of such a device. For additional information about the enclosure, see [Enclosure](#), page 13.



Warning: Do not forcibly pull on the USB device to disconnect. Raise the latch on the socket to remove the device.

Indicators

The Helios platform has eight red/green/yellow light-emitting diodes (LEDs). The following diagram illustrates the location of the LEDs. The LEDs are visible to the operator on two sides of the enclosure.



Power Indicator

LED 1 indicates the system power as described in the following table.

Color	Description
Green	Normal operation
Yellow	Sleep mode

Software-definable LED Indicators (SMBus)

The Helios platform has six red/green/yellow light-emitting diodes (LEDs) that are software-definable using the SMBus. The following table lists the SMBus GPIO that drives each LED.

LED	CR (note 1)	Description	SMBus GPIO	
			Red Signal	Green Signal
2	1	Software-definable	17	16
3	2	Software-definable	19	18
4	3	Software-definable	21	20
5	4	Software-definable	23	22
6	8	Software-definable	3	2
7	9	Software-definable	5	4

Note:

1. CR refers to the reference designator located on the carrier board.

Software-definable LED Indicators (I²C Bus)

LED 8 is software-definable using the I²C bus. The following table lists the I²C Bus GPIO that drives this LED.

LED	CR (note 2)	Description	I ² C Bus GPIO	
			Red Signal	Green Signal
8	6	Software-definable	1	0

Note:

2. CR refers to the reference designator located on the carrier board.

Enclosure

The Helios platform is housed in an enclosure 25.9 x 12.1 x 4.5 cm (10.2 x 4.75 x 1.75 inches) in size, as shown in the following diagram.



This enclosure includes the following features:

- ABS plastic
- Adaptable I/O side plates
- Removable USB Bay cover
 - Accommodates USB devices with length up to 3.5 inches
 - Includes security screws to secure the cover to the enclosure
- Aluminum base plate
 - Provides various mounting options
 - Supports thermal management
- External cooling vents
 - Allows cooling by an external fan
 - Provides openings for routing cables external to the enclosure



Note: To open the USB Bay, use the tool supplied with the development kit.

Configurations

The Helios platform's flexible design enables several options supporting many possible combinations to meet your system requirements. These options are factory-installed, and the system is configured for operation at the factory with the specific combination of options. This section describes the options available for the Helios platform.

Processor

The Helios platform bases its architecture on the high-performance, low-power Catalyst XL. This module uses an integrated two-chip solution comprised of the Intel Atom Z5xx processor and Intel SCH US15W.

The Catalyst XL is available in various versions based on the following features:

- Processor speed
- On-module DRAM
- Operating temperature

The standard system includes a 1.1 GHz, 1 GB Catalyst XL for the commercial temperature range. For the various performance variants, see [Processor](#), page 18.

Memory

Five types of memory provide mass storage options for the Helios platform. In addition, the system can boot from any of these memory options. For information about boot options, see [Boot Options](#), page 8. The following sections describe the memory options.

CompactFlash[®] Card or Secure Digital Card

The standard system includes a CompactFlash (CF) card. As a volume production option, a Secure Digital (SD) card can replace the CF card. Each type of card is located internal to the enclosure and is not accessible when the system is completely assembled.



Note: The CF card slot and the SD card slot are mutually exclusive. Only one socket can be installed. This option is set at time of production. The CF card slot is the default.

On-Board Flash

On-board Parallel ATA (PATA) flash is available as an option, populated in increments of 1 GB.

SATA Drive

As an option, the Helios platform can include a single, 2.5-inch form factor SATA drive internal to the enclosure. For SATA drive specifications, see [SATA Drive](#), page 19.

USB Disk Drive

A USB disk drive can connect to any of the five USB host ports on the Helios platform.

Communications

A key capability of the Helios platform is its network and wireless connectivity. The system offers five USB host ports, an EIA-232/485 serial port, a Gigabit Ethernet port, and GPS. The following sections describe these interfaces.

Universal Serial Bus

Five Universal Serial Bus (USB) ports included on the Helios platform support connectivity with a wide range of available USB devices. All ports support the USB 2.0 specification operating at high (480 Mbps), full (12 Mbps), or low (1.5 Mbps) speeds. Two ports are general-purpose USB host ports, while the remaining three ports are designed to support higher-current, plug-in USB modules.

For power requirements, see [Universal Serial Bus](#), page 19. For additional information about the high-current USB ports, see [USB Device Support](#), page 17.

Serial Port

The Helios platform provides a serial port accessible on the rear panel. By default, this port is an EIA-232, 6-wire interface. Under software-control, the port can be configured as an EIA-485 interface.

Ethernet

For network connectivity, the Helios platform includes a Gigabit Ethernet port.

GPS

The standard system includes a u-blox GPS module with an external antenna connection on the rear panel. This module is a population option.

Multimedia Cards

To provide custom display and audio solutions, the Helios platform includes an internal card slot for add-in multimedia cards. This hardware flexibility enables the Helios platform to support a wide variety of display types and audio requirements.

Eurotech offers various expansion boards for use with the Helios platform as described in the following table. For additional details, contact your local Eurotech sales representative.

Expansion Board	Display	Audio
VGA	Analog RGB output	Stereo line input
	S-Video output (option)	Stereo line output
	CBVS output (option)	Microphone input
LVDS	LVDS display output	Stereo line input
	Backlight control	Stereo line output
	Touch panel controller	Microphone input
DVI/HDMI	DVI output	Stereo line input
	HDMI (option)	Stereo line output

For electrical specifications, see [Audio Interface](#), page 20.

Power Supply

The standard system requires a regulated DC power input. As an option, the Helios platform can be powered from vehicle rated power. For power specifications, see [Power](#), page 18.

Peripherals

Support for a wide variety of plug-in USB devices enables the Helios platform to be easily customized for any application. This section describes the types of peripherals available for use with the Helios platform.

USB Device Support

The three USB ports located in the USB Bay expand the capability and connectivity of the Helios platform, in addition to providing the option to boot from a USB device. These ports enable customization for your specific application with no hardware modifications to the system.

The Helios platform supports the following types of USB devices:

- Cellular modem
- ZigBee
- Wi-Fi
- Bluetooth
- Telematics / CAN
- Mass storage
- HID (Human Interface Device)

For additional information about the USB Bay, see [USB Bay](#), page 11.

Eurotech has pretested and approved several USB devices for use with the Helios platform. For the latest list of devices, contact your local Eurotech sales representative.

System Specification

Processor

The Helios platform is based on the Catalyst XL and is compatible with all versions of the module allowing several performance variants. The following table specifies the processor performance.

Parameter (note 3)	Min	Typ.	Max	Units
Processor operating frequency (commercial temperature)	1.1		1.6	GHz
Processor operating frequency (industrial temperature)	1.1		1.33	GHz
Front side bus clock	400		533	MHz
Front side bus width		64		bit
On-board DDR-2 DRAM	512		2000	MB

Notes:

- The standard Helios platform includes a 1.1 GHz, 1 GB Catalyst XL, commercial temperature.

Power

Power Supply

The following table specifies the power requirements for the Helios platform. For additional information about the input voltage options, see [Power Supply](#), page 16.

Symbol	Parameter	Min	Typ.	Max	Units
Input Voltage					
VIN	Input voltage, regulated power	10.8	12	13.2	V
	Input voltage, vehicle power (note 4)	9		36	V
VIN _{TRANS}	Input transient voltage, regulated power			36	V
	Input transient voltage, vehicle power			100	V
t _{UV/OV}	Overvoltage or undervoltage timeout (note 5)		87		ms

Notes:

- The Helios platform is designed to be unpowered when vehicle ignition is off.
- The input protection circuitry immediately cuts off the main input power when an overvoltage or undervoltage condition occurs. These conditions are the minimum and maximum input voltage specified for vehicle power. Power is restored t_{UV/OV} after VIN becomes valid.

Power Consumption

The following table lists power consumption for various configurations of the Helios platform.

Symbol	Parameter	Min	Typ.	Max	Units
Fully loaded, without USB (note 7)					
P	Power		12		W
I_{INRUSH}	Inrush current			17	A
Fully loaded, with USB devices (note 8)					
P	Power		15		W
I_{INRUSH}	Inrush current			18	A

Notes:

- Power consumption was measured on a Helios platform with a VGA Expansion Board and the following conditions: 12 V input voltage, video and audio clips playing from a SATA drive, Ethernet port pinged, serial port transferring a file in 1K XMODEM at 115200 baud, and GPS unit responding consistently.
- Power consumption was measured on a Helios platform with a VGA Expansion Board and the following conditions: 12 V input voltage, Belkin Wi-Fi device enabled and playing a video, Verizon cellular modem enabled, video and audio clips playing from a SATA drive, Ethernet port pinged, serial port transferring a file in 1K XMODEM at 115200 baud, and GPS unit responding consistently.

Electrical

This section provides electrical specifications for the Helios platform.

Universal Serial Bus

The Helios platform provides five USB host ports. Each port supplies 5 V power through a power switch with over-current detection. For a description of the USB host ports, see [Universal Serial Bus](#), page 15.

Symbol	Parameter	Min	Typ.	Max	Units
General-purpose USB Ports					
I_{USB}	USB current			500	mA
USB Bay Ports					
I_{USB}	USB current			1	A

SATA Drive

The following table lists the specification for the optional SATA drive. For additional information, see [SATA Drive](#), page 14.

Parameter	Min	Typ.	Max	Units
Transfer rate (SATA2)			300	MBps
Power consumption (seek)			3	W
Power consumption		1		W

Real-Time Clock

The Helios platform provides a RTC function that retains the system date and time. To supply backup power when the power input is disconnected, the system includes a long-life, lithium coin battery. The following table specifies the RTC function.

Parameter	Typ.	Units
Accuracy per month @ 25°C	+/-55	sec
Battery	3	V
Operating temperature	-30 to +80	°C



Warning: The RTC battery is located inside the enclosure and is not user serviceable. Incorrect removable of the module or battery could damage the Catalyst XL.

Audio Interface

The following table lists the specification for the audio interface provided by the optional expansion boards. For additional information, see [Multimedia Cards](#), page 16.

Symbol	Parameter	Min	Typ.	Max	Units
D _{VDD}	Codec digital supply voltage		3.3		V
A _{VDD}	Codec analog supply voltage		3.3		V
f _s	Sample rate		192		kHz
---	A/D sample resolution		24		bit
Line In, Microphone					
V _{IN}	Full scale input voltage	1.00	1.03		V _{rms}
Gain _{IN}	Microphone boost	0		30	dB
R _{IN}	Input impedance		50		kΩ
C _{IN}	Input capacitance		15		pF
Line Out					
V _{OUT}	Full scale output voltage, 10kΩ load	0.707	0.758		V _{rms}
P _{UT}	Headphone output, 32Ω load	31	42		mW (peak)

EMI/EMC

The Helios platform is designed to meet the EMI/EMC requirements listed in the following table. The external USB wireless devices are covered by separate qualifications.

Requirement	Characteristic	Condition/Comments
EN 55022/CISPR22	Emissions	Sub-clause 8.2 - EN 55022/CISPR 22 for class B device - Radiated emissions for 30 MHz – 1 GHz
EN 55022/CISPR22	Immunity	Sub-clause 9.3 - EN61000-4-2 - Electrostatic discharge. Sub-clause 9.2 - EN 61000-4-3 - Radiated immunity
FCC CFR47 Part 15/B	Emissions	Rules 15.101-109

Environmental

The Helios platform is designed to meet the environmental specifications listed in the following table.

Parameter	Specification
Commercial operating temperature	0°C to +70°C
Industrial operating temperature (note 8)	-40°C to +85°C
Vibration profile	SAE J1455-2006, vehicle
Shock	Mil-Std-810F, 20 g/s, 11 ms
Drop	1 m, hard surface, cosmetic damage only
Humidity	95% non-condensing
Ingress protection (IEC 60529)	IP-50 (note 9)

Notes:

8. The industrial temperature range is available as a volume production option.
9. Enclosure protects electronics from dust. It does not protect against water ingress.

Appendix A – Reference Information

Product Information

Product notices, updated drivers, support material:

www.eurotech.com

Intel

Information about the Intel Atom processor, Intel System Controller Hub US15W, Intel High Definition Audio specification:

www.intel.com

USB

Universal Serial Bus specification and product information:

www.usb.org

SD Card

SD Card Association and SDIO specification:

www.sdcard.org

MMC Card

JEDEC MMC 4.0 specification:

www.jedec.org

CompactFlash

CompactFlash Association and specification:

www.compactflash.org

Appendix B – System Revision

This manual applies to the current revision of the Helios platform as given in the following sections.

Revision History

The following is an overview of the revisions to the system.

Revision 1

Prototype

Revision A

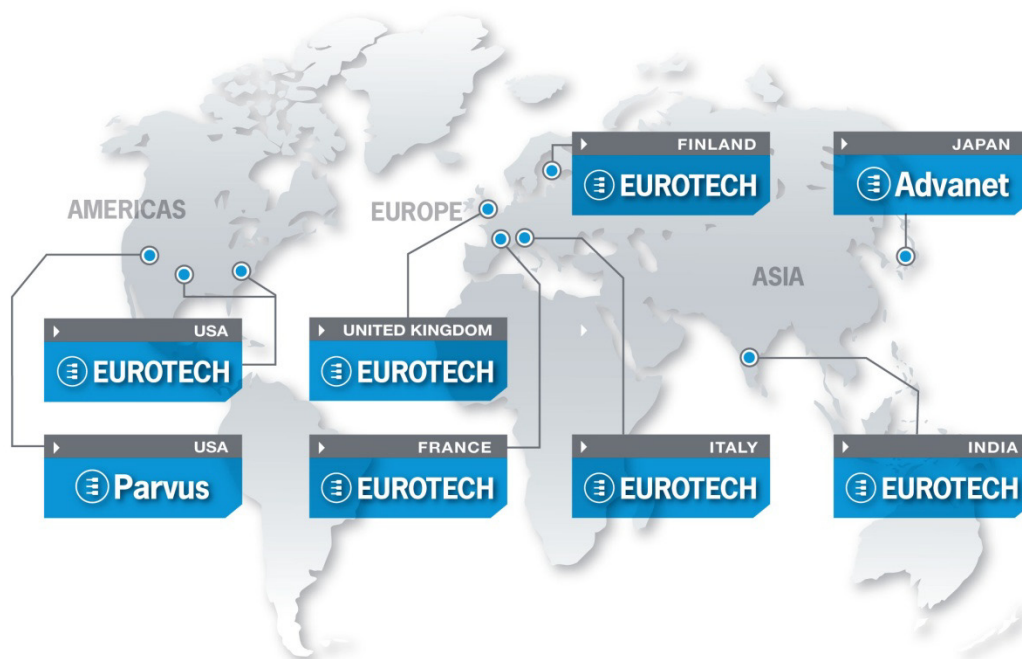
Changes control and brightness of LED indicators

Revision B

Adds software control for switching between EIA-232 mode and EIA-485 mode

Swaps pin 4 and pin 7 on Serial Port for EIA-485 mode

Eurotech Worldwide Presence



AMERICAS

USA



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

EUROPE

Italy

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

ASIA

Japan

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.advanet.co.jp

India

EUROTECH

Tel. +91 80.43.35.71.17
E-mail: sales.in@eurotech.com
E-mail: support.in@eurotech.com
Web: www.eurotech.com

To find your nearest contact refer to: www.eurotech.com/contacts



www.eurotech.com

EUROTECH HEADQUARTERS

Via Fratelli Solari 3/a

33020 Amaro (Udine) – ITALY

Phone: +39 0433.485.411

Fax: +39 0433.485.499

For full contact details go to: www.eurotech.com/contacts