

Catalyst EC

Embedded Computer System

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Document Revision History

<i>Issue no.</i>	<i>PWB</i>	<i>Date</i>	<i>Comments</i>
3		Nov-2008	Initial release
4		Aug-2009	Updates for revision A carrier board, touch screen, power indicators, and development kits Appendix E added
A		July-2010	Updates for Catalyst Module XL, backlight signal type, EIA-232 mode on J17 and J18, mounting hole connectivity, and input power specification ESF information added Recommendations for hard drive cable length and PWB mounting added

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For contact details, see page [61](#).

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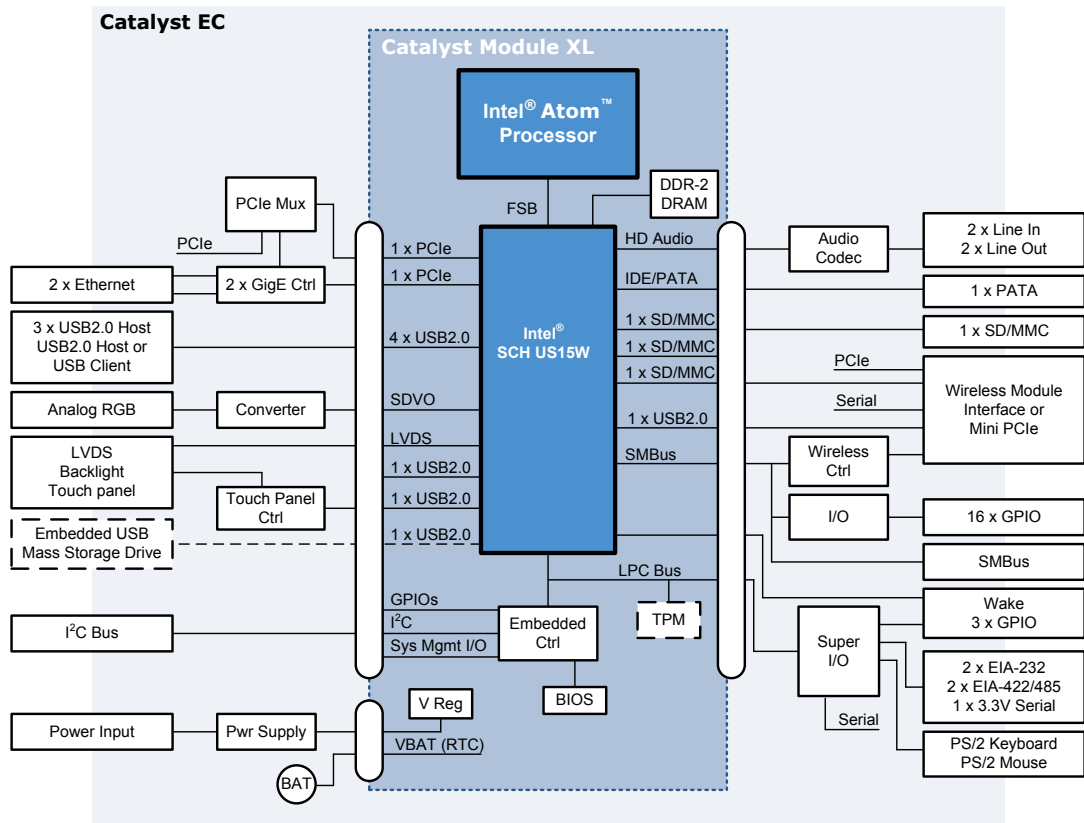
Introduction

The Catalyst Module XL is a high-performance, low-power module based on the Intel® Atom™ processor. It uses an integrated two-chip solution comprised of the Intel Atom processor and Intel® System Controller Hub US15W (Intel® SCH US15W). The Intel Atom processor utilizes the new low-power Intel micro architecture, while the Intel SCH US15W contains an integrated 2D/3D graphics controller supporting hardware-accelerated graphics display and video processing capabilities. The Catalyst Module XL allows embedded users to gain higher performance with greater energy efficiency.

An EPIC form factor carrier board integrates with the Catalyst Module XL for a total production solution. The Catalyst EC carrier board implements industry-standard interfaces supporting a broad spectrum of end-use applications.

Block Diagram

The following diagram illustrates the system organization of the Catalyst EC. Notice that the data connector on the Catalyst Module XL has been divided into two sections for this illustration. Options are shown with dotted lines.



Features

Processor

- Intel® Atom™ processor
- Intel System Controller Hub US15W
- Clock rates of 1.1 GHz, 1.33 GHz, or 1.6 GHz
- Front side bus from 400 MHz to 533 MHz

Memory

- 512 MB, 1 GB, or 2 GB DDR-2 DRAM
- System BIOS flash memory
- Battery-backed real-time clock
- External memory support
 - PATA disk drive
 - USB disk drive
 - SD/MMC card
 - Embedded USB Mass Storage drive (optional)

Communications

- Five USB 2.0 ports
 - Three host ports operating at low, full, and high speeds
 - USB host port or USB client port (alternate configuration)
 - One host port for wireless module support
- Six serial ports
 - Two EIA-232, 9-wire
 - Two EIA-422/485 or EIA-232, 4-wire
 - One LVTTL, 3-wire
 - One LVTTL for wireless module support
- Wireless module or Mini PCIe socket
 - Wireless module support for 802.11 b/g WLAN, Bluetooth, and GPS
 - Mini PCIe socket (alternate configuration)
- Up to two 10/100/1000 Mbps Ethernet ports
- System Management Bus (SMBus)
- I²C bus with I²C master device

Audio Interface

- Two stereo line inputs
- Two stereo line outputs
- PC beep support

User Interface and Display

- Two independent display outputs
 - LVDS
 - Analog RGB
- Resistive touch panel (4-, 5-, or 8-wire options)
- Backlight interface with control signals for intensity and on/off
- PS/2 keyboard and mouse support

Inputs and Outputs

- Nineteen general-purpose inputs and outputs
- Wake input

Power Supply

- 8-16 V main power input
 - Optional custom input protection for a 6-28 V main power input
- ACPI power management

Mechanical

- EPIC form factor (165 mm x 115 mm)

Environmental

- Extended-operating temperature
- FCC Class A compliant
- RoHS compliant
- IPC-A-610 compliant assembly process

Related Documents

This document describes the Catalyst EC and is intended for software application developers and system integrators. A system-level overview of the Catalyst EC is provided in the following sections. The following documents are also important resources for developing applications for the Catalyst EC.

Document	
Catalyst Module Design-In Guide	110122-2003
Catalyst EC Development Kit with LCD Quick Start	110123-4001
Catalyst EC Development Kit Quick Start	110123-4002

Check the Eurotech support site (<http://support.eurotech-inc.com/>) for errata reports and for the latest releases of these documents.

Handling Your Board Safely

Anti-Static Handling

The Catalyst EC contains CMOS devices that could be damaged by electrostatic discharge (ESD). Observe industry-standard electronic handling procedures when handling the board. Where possible, work on a grounded anti-static mat. At a minimum, touch an electrically grounded object before handling the board or touching any components on the board.

Packaging

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

Electromagnetic Compatibility

The Catalyst EC is classified as a component with regard to the European Community Electromagnetic Compatibility (EMC) regulations. As a part of its design cycle, the Catalyst EC has successfully completed FCC and CE emissions testing and meets the FCC Class A requirements.



Because Eurotech supplies only the embedded computer system and not fully integrated systems, Eurotech cannot provide meaningful system-level emissions test results. It is the responsibility of the user to ensure that systems using the Catalyst EC are compliant with the appropriate EMC standards.

RoHS Compliance

The European RoHS Directive (Restriction on the use of certain Hazardous Substances – Directive 2002/95/EC) limits the amount of six specific substances within the composition of the product. The Catalyst EC fully complies with the RoHS directive. A full *RoHS Compliance Materials Declaration Form* for the Catalyst EC is included as [Appendix B – RoHS Compliance](#), page 56. Further information regarding RoHS compliance is available on the Eurotech web site at www.eurotech.com. Additionally, the Catalyst EC is assembled in a lead-free process that also meets IPC-A-610 guidelines.

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
#	Active low signal
+	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
A	Analog signal
OD	Open-drain
CMOS	3.3 V CMOS
LVTTTL	Low Voltage TTL
5	5 V signal level
LVDS	Low Voltage Differential Signalling
nc	No connection
reserved	Use is reserved to Eurotech

Software Specification

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 Catalyst EC. For additional details, contact your local Eurotech technical support.

Operating System Support

The Catalyst EC is compatible with the following operating systems:

- Windows® XP Professional
- Windows XP Embedded
- Windows Embedded Standard
- Windows CE 6.0
- Wind River Linux 3.0
- Select real-time operating systems

Drivers

System components have drivers available for the Windows operating system and Linux.

BIOS

The Catalyst EC incorporates a custom system BIOS developed by Eurotech.

PC Beep

The Catalyst EC supports PC beep providing optional beep codes for system activity, analysis, and error code indications.

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 Catalyst EC.

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

Hardware Specification

Core Processor

The Catalyst EC bases its architecture on the high-performance, low-power Catalyst Module XL. This module uses an integrated two-chip solution comprised of the Intel Atom processor and Intel SCH US15W. The module is available in various versions based on the following features:

- Processor speed
- On-module DRAM
- Operating temperature

For the various performance variants, see [Performance](#), page 48.

Memory

The Catalyst Module XL combined with a carrier board provides a variety of storage capabilities. The following sections describe the different types of memory supported by the Catalyst EC.

Synchronous DRAM

Double Data Rate Synchronous DRAM (DDR-2) is used on the Catalyst Module XL for system main memory and frame buffer memory. Modules are available with 512 MB, 1 GB, or 2 GB memory. The data bus supports 64-bit accesses with a maximum burst bandwidth of 4.2 GBps (8 B @ 533 MHz). The memory bus operates at the same frequency as the front side bus.

The Intel Atom processor supports unified memory architecture in which the integrated 2D/3D graphics controller memory is “unified” with the system main memory. The default frame buffer is 4 MB with an 8 MB option. BIOS Setup settings select the frame buffer size. Extended graphics memory space is available up to 256 MB. The graphics driver controls this size based on usage.

Non-volatile Memory

The Catalyst Module XL includes non-volatile memory for system BIOS storage and a real-time clock (RTC) functionality.

BIOS and Configuration Data

A serial interface flash memory device stores the BIOS boot firmware, BIOS Setup settings, and module configuration data on the Catalyst Module XL. Standard configuration is 1 MB. The flash device performs logically as a firmware hub (FWH) and connects to the on-module embedded controller using a serial peripheral interface (SPI). This system BIOS memory supports pre-programmability at the device level, in-circuit programming on module, and updates using a run-time flash utility. In addition, programmable write protection is available using multiple flash sectors.

Real-Time Clock

The Catalyst Module XL includes a RTC function. It retains the system date and time when the system is powered down as long as the 3.3 V “always” power or backup power is provided to the module. To supply backup power, the Catalyst EC includes a long-life battery. For general specifications, see [Real-Time Clock](#), page 53.

External Memory Interfaces

Four types of external memory interfaces provide mass storage options for the Catalyst EC. The carrier board includes a PATA header, a SD/MMC socket, four USB host ports, and an optional embedded USB mass storage drive interface that can connect external memory to the system.

PATA Drive

Parallel ATA (PATA) disk drives provide removable storage in a wide variety of capacities. The Catalyst EC supports an optional 2.5-inch PATA magnetic or solid-state disk drive on header [J24](#), page 43. This capability can be a cost-effective means to expand system storage.

The Catalyst EC uses the ATA-50 cable pinout, which is commonly used for connecting 2.5-inch hard drives to laptop motherboards. Cable lengths should be kept short, especially if you want to reliably achieve the higher data rates of UDMA 4 or UDMA 5. Eurotech recommends that cables be less than six inches in length for high-speed use (UDMA4/5). For low-speed use, in no case should the cable be longer than ten inches.

SD/MMC Card

The Secure Digital and MultiMediaCard (SD/MMC) socket on the Catalyst EC enables mass storage and I/O expansion. Socket [J23](#), page 43 connects to the Catalyst Module XL SD/MMC 0 interface. This interface provides 4-bit operation and supports the following specifications:

- MMC 4.0 specification allowing clock frequencies up to 48 MHz and bus widths of 1 or 4 bits
- SDIO 1.1 specification allowing clock frequencies up to 24 MHz and bus widths of 1 or 4 bits

USB Disk Drive

A USB disk drive can connect to one of four USB host ports on the carrier board: J8, J9, J10 and J11. For a description of these ports, see [Universal Serial Bus](#), page 14.

Embedded USB Mass Storage Drive (optional)

Embedded USB mass storage drives provide high capacity in a small form factor. As a volume production option, the Catalyst EC includes header [J34](#), page 47 to support this type of external memory. Examples of supported devices include the Micron RealSSD Embedded USB Mass Storage devices: MTFDCAE001SAF, MTFDCAE002SAF, MTFDCAE004SAF, and MTFDCAE008SAF.

Communications

The Catalyst EC supports several industry-standard channels for communication with peripheral and peer devices. These interfaces include USB, serial, wireless, PCIe x 1, Ethernet, I²C, and SMBus. The following sections describe these interfaces.

Universal Serial Bus

The Catalyst EC includes four general-purpose Universal Serial Bus (USB) ports. Three ports are dedicated USB host ports, while the fourth port supports USB host or USB client capability. All ports support the USB 2.0 specification.

The following table describes the four USB ports.

Default	Socket Alternate	Speed
J8: USB Host 0, page 34		
J9: USB Host 1, page 34		High (480 Mbps), Full (12 Mbps), or Low (1.5 Mbps)
J10: USB Host 2, page 35	J10: USB Client, page 35	
J11: USB Host 3, page 35		

USB Host Ports (default configuration)

In the default configuration, the Catalyst EC provides four USB host ports managed by the Catalyst Module XL. Connect client devices such as USB mouse, keyboard, and storage to these ports.

Support circuitry including power switch, current limiter circuit, common mode chokes, and over-current protection is included on the carrier board. The USB protocol allows client devices to negotiate the power they need from 100 mA to 500 mA in 100 mA increments. The Catalyst EC supplies 5 V power to each USB host port through a power switch with over-current detection. Make sure to account for power used through USB in your power budget. For electrical specifications, see [Universal Serial Bus](#), page 49.

USB Client Port (alternate configuration)

Socket J10 can function as a USB host or USB client port. Jumper J35, page 29 selects the configuration of this port. By default, this jumper is not installed and socket J10 operates as a USB host port.

Serial Ports

The carrier board includes a Super I/O Controller that is connected to the Catalyst Module XL using the LPC Bus. This device provides six serial ports. Five serial ports are available for general-purpose serial communication. A sixth serial port is dedicated to the wireless module interface. For details about this port, see [Wireless Module](#), page 15.

The following table describes the five general-purpose serial interfaces.

Header	Communications	Baud Rate
J15: Serial 1, page 38	EIA-232, 9-wire	50 bps to 230,400 bps
J16: Serial 2, page 38	EIA-232, 9-wire	50 bps to 230,400 bps
J17: Serial 3, page 39	EIA-422/485 (default) or EIA-232, 4-wire	50 bps to 460,800 bps 50 bps to 115,200 bps
J18: Serial 4, page 39	EIA-422/485 (default) or EIA-232, 4-wire	50 bps to 460,800 bps 50 bps to 115,200 bps
J19: Serial 5, page 40	LVTTL, 3-wire	50 bps to 1.5 Mbps

For electrical specifications of Serial 5, see Super I/O Controller, page 52.

Wireless Module or Mini PCI Express Interface

The Catalyst EC supports either an Intel McCaslin platform compliant wireless module or a Mini PCI Express (Mini PCIe) card on socket J26, page 46. Jumper J36, page 29 selects the configuration of this socket. By default, this socket does not include a PCIe bus connection and conforms to the Intel McCaslin platform I/O pin definition.

Wireless Module (default configuration)

In the default configuration, the Catalyst EC supports an Intel McCaslin platform compliant module providing fully integrated 802.11 b/g WLAN, Bluetooth, and GPS solutions. This wireless module interface includes a 4-bit SD/MMC interface, a USB host port, a NEMA style GPS serial interface, three LED control signals, and five wireless control signals on socket J26, page 46.

A power switch included on the Catalyst EC enables sequencing of the power to socket J26. Header J19, page 40 includes a 2-pin jumper to control this power switch. By default, this jumper is not installed. With this jumper installed, socket J26 directly supports the Wi2Wi W2CBWG01 wireless module.

Application software controls the five wireless control signals using an I/O expansion device connected to the Catalyst Module XL SMBus. This device includes four registers: input port, output port, polarity inversion, and configuration. For details about accessing these registers, see [System Management Bus](#), page 17.

Each wireless control signal is mapped to a bit in the output port register as defined in the following table.

Bit	Function	Description
7	WIFI_PD#	Wi-Fi power (0 = off, 1 = on)
6	BT_RESET#	Bluetooth power (0 = off, 1 = on)
5	BT_WAKE	Bluetooth wakeup (0 = sleep, 1 = wake)
4	WIFI_RESET#	Wi-Fi reset (0 = reset, 1 = run)
3	GPS_ON_OFF	Pulsing this bit changes the power state
2	nc	
1	nc	
0	nc	

Mini PCI Express (alternate configuration)

A key capability of the Catalyst Module XL is its PCIe Express (PCIe) support. The module provides two PCIe x1 busses to the carrier board. Each bus supports 2.5 Gbps bandwidth in each direction.

One PCIe x1 bus connects directly to Ethernet Controller 0, while the second bus connects to a PCIe port multiplexer on the carrier board. This multiplexer routes the second PCIe bus to either Ethernet controller 1 or to socket J26. Jumper J36, page 29 controls the PCIe multiplexer. By default, the PCIe bus is disconnected on socket J26. For additional information about the Ethernet interfaces, see [Ethernet](#), page 16.



Note: Ethernet 1 is mutually exclusive with the PCIe bus connection on socket J26. The default configuration of jumper J36 selects Ethernet 1.

Ethernet

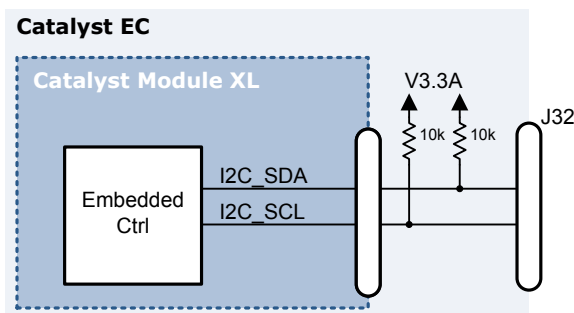
The Catalyst EC supports up to two 10/100/1000 Mbps Ethernet ports with individual MAC addresses. Contact your local Eurotech technical support about special programming of MAC addresses. The two Ethernet ports are included on socket J7, page 33. This dual RJ-45 socket also includes two [Ethernet LEDs](#), page 30 and built-in magnetics for each Ethernet connection.

The carrier board includes two Intel 82574L Gigabit Ethernet Controllers. Ethernet Controller 0 connects directly to the Catalyst Module XL using a PCIe bus, while Ethernet Controller 1 connects to the Catalyst Module XL through a PCIe port multiplexer. Jumper J36, page 29 controls this multiplexer. By default, the Ethernet 1 interface is enabled.

I²C Bus

I²C (Inter-IC) is a multi-master, "two-wire" synchronous serial bus for communications between integrated circuits (ICs) and for addressing peripherals in a system. The Catalyst EC includes an external connection to the I²C bus of the Catalyst Module XL embedded controller on header J32, page 46. For electrical specifications, see [I²C Bus](#), page 49.

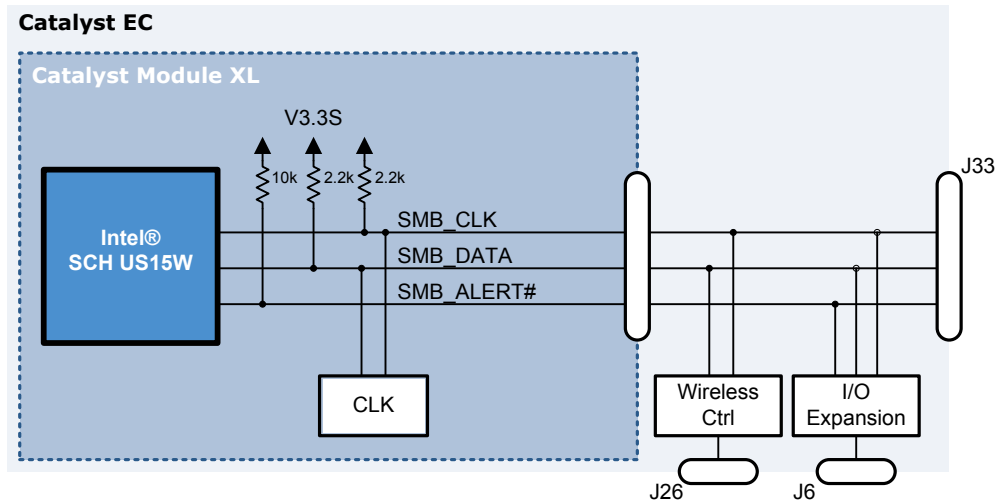
The following diagram illustrates the I²C architecture on the Catalyst EC.



System Management Bus

System Management Bus (SMBus) is a serial interface allowing multiple devices to communicate with each other. The Catalyst Module XL acts as bus master and uses this interface to communicate with devices on the carrier board or external to the carrier board on header J33, page 47. For electrical specifications, see SMBus, page 49.

The following diagram illustrates the SMBus architecture on the Catalyst EC. Notice that the I/O expansion port is connected to SMB_ALERT#. The GPIOs on header J6 can generate system interrupts using this signal. This capability requires software support.



The following table lists the addresses of the SMBus devices on the Catalyst EC.

Device	Address	Function
Catalyst Module XL		
Reserved	0101 0010	Write
	0101 0011	Read
Clock Generator	1101 0010	Write
	1101 0011	Read
Carrier Board		
I/O Expansion GPIO 7:0	0100 0000	Write
	0100 0001	Read
I/O Expansion GPIO 15:8	0100 0010	Write
	0100 0011	Read
Wireless Control	0100 0100	Write
	0100 0101	Read

The following table lists the commands available for the SMBus devices on the carrier board.

Carrier Board Device	Command	Register
Wireless Control	0	Input
	1	Output
	2	Reserved
	3	Reserved
I/O Expansion GPIO 7:0	0	Input
	1	Output
	2	Polarity 0=normal, 1=invert
	3	Direction 0=output, 1=input
I/O Expansion GPIO 15:8	0	Input
	1	Output
	2	Polarity 0=normal, 1=invert
	3	Direction 0=output, 1=input

User Interface and Display

The Catalyst EC provides two independent display interfaces. A 4-channel LVDS interface drives the primary display, while an analog RGB interface drives a secondary display. In addition, the Catalyst EC provides discrete backlight control signals and supports a 4-, 5-, or 8-wire resistive touch panel.

This section summarizes the Catalyst EC graphics display and video processing capabilities. Display resolutions are specified at the maximum refresh rate and color depth. Higher resolutions may be possible at lower refresh rates and color depths. This relationship is due primarily to the increased processing bandwidth required at higher output resolutions.

LVDS Display

The growing demand for higher resolution displays has been met with design limitations on the interface between the LCD and graphics controller. Increased resolution LCDs require an increased clock speed, a larger number of data lines, and a higher power consumption. LVDS serial data transmission addresses these issues by providing a high-speed, low-power interface on a single pair of wires per channel.

The Catalyst EC provides an LVDS display output to drive a primary display on header [J22](#), page 41. This interface consists of four LVDS data pairs, as well as an LVDS pixel clock, and supports 18-bit (6-bit RGB) or 24-bit (8-bit RGB) color. The carrier board includes an LVDS buffer/repeater with configurable pre-emphasis to drive lossy backplanes and cables. A standard Catalyst EC is configured for pre-emphasis off. Other configurations are available as volume production options.

The following table summarizes the LVDS display capabilities.

Feature	LVDS Display
Resolution	Single display up to 1366 x 768 at 85 Hz, 8-bit per lane or dual display up to 1280 x 768 at 85 Hz, 8-bit per lane
Configurations	Extended Display Identification Data (EDID) and non-EDID
Operation	Extended desktop or clone mode
Display parameter	Centering, scaling, and rotation

Additional capabilities of the LVDS display output include software-controlled display power, display scan control, and an I²C bus for communication with the display. The signals L_CLK and L_DATA are connected to the Catalyst Module XL LCD Display Data Channel (DDC) I²C bus on a standard Catalyst EC. An alternate connection to the backlight I²C bus is available as a volume production option. For electrical and power specifications, see [LVDS Display](#), page 50.

Analog RGB

In addition to the LVDS display output, the Catalyst EC drives a secondary display on its analog RGB output. A Chrontel CH7317A Display Converter accepts the SDVO output from the Catalyst Module XL, encodes the data, and drives the analog RGB output. Signals from three 10-bit DACs internal to the display converter are mapped onto eight-bit color channels for red, green, and blue data. Connector [J14](#), page 37 provides the analog RGB output. For electrical specifications, see [Analog RGB](#), page 50.

In addition to the 8:8:8 RGB data, the display controller provides a DDC bus on connector J14 for monitor Plug and Play.

Touch Panel

A USB controller and separate analog multiplexer included on the carrier board drives resistive touch panels. Header [J22](#), page 41 includes the touch panel signals, while header [J25](#), page 45 includes a 2-pin jumper to configure the touch panel. By default, the Catalyst EC supports 4-, 5-, and 8-wire touch panels. This section provides the signal mapping for these configurations. For electrical specifications, see [Touch Panel Controller](#), page 50.

4-Wire Touch Panel

The following table describes the wiring for 4-wire resistive touch panels on header J22.

J22 Pin	Name	4-Wire	4-Wire (Alternate)
26	SX-		
28	SY-		
30	SY+		
32	SX+ (TC3)	Right	
34	TC4	Bottom	Bottom
36	TC2	Top	Top
38	TC1	Left	Right
40	TC0		Left

5-Wire Touch Panel

The following table describes the wiring for 5-wire resistive touch panels on header J22.

J22 Pin	Name	5-Wire	5-Wire (Alternate)
26	SX-		
28	SY-		
30	SY+		
32	SX+ (TC3)	Lower right	Upper left
34	TC4	Lower left	Lower left
36	TC2	Wiper	Wiper
38	TC1	Upper left	Lower right
40	TC0	Upper right	Upper right

8-Wire Touch Panel

The following table describes the wiring for 8-wire resistive touch panels on header J22. This table also includes an example of the wiring from header J22 to an AMT 9546, 8-wire touch screen.

J22 Pin	Name	8-Wire	AMT 9546 Touch panel
26	SX-	Left sense	7
28	SY-	Top sense	2
30	SY+	Bottom sense	3
32	SX+ (TC3)	Right sense	6
34	TC4	Top	1
36	TC2	Bottom	4
38	TC1	Left	8
40	TC0	Right	5

Backlight

Most LCDs include one or more cold-cathode fluorescent lamp (CCFL) tubes to backlight the displays. Backlight inverters drive the panel backlights. These circuits are typically external to the display and generate the several hundred volts required to drive the CCFL tubes. Backlights can easily become the greatest source of power consumption in a portable system. To reduce power consumption, applications can dim or turn off the backlighting.

The Catalyst EC supplies software-controlled backlight power and two backlight control signals. Header [J22](#), page [41](#) includes the backlight signals.

The following table describes the backlight control signals.

Signal	J22 Pin	Type	Description
L_BKLTEN	10	O	Turns power to the backlight on or off
L_BKLTCTL	12	O-A	Controls the intensity of the backlight

For backlight power specifications, see [Backlight](#), page [51](#).

PS/2 Keyboard and Mouse

The Catalyst EC supports a direct connection to a PS/2 mouse and keyboard using the dedicated keyboard/mouse interface of the Super I/O Controller. Connect a PS/2 keyboard to socket [J20](#), page [40](#) and a PS/2 mouse to socket [J21](#), page [41](#). For electrical specifications, see [Super I/O Controller](#), page [52](#).

Discrete I/O

To meet the requirement for general-purpose I/O and legacy I/O capabilities, the carrier board includes an I/O expansion port and a Super I/O Controller. The I/O expansion port connects to the Catalyst Module XL SMBus, while the Super I/O Controller connects to the Catalyst Module XL LPC bus. The following sections describe the discrete I/O provided by these devices.

I/O Expansion Port

The Catalyst EC includes an I/O expansion port providing sixteen general-purpose inputs and outputs (GPIO) on header [J6](#), page [33](#). All GPIOs are software-controlled using the SMBus and are programmed as inputs at power up. These GPIOs can generate system interrupts using the SMB_ALERT# signal. This capability requires software support.

For electrical specifications, see [General-Purpose Inputs and Outputs](#), page [51](#).

Super I/O Controller

A Super I/O Controller connects to the LPC bus providing system control and three GPIOs. These GPIOs can be used as external interrupts and are available on header J25, page 45.

The following table lists the various discrete I/O controls that are specific to the Catalyst EC.

GPIO	Name	Type	Description
GP40	IDE_PATADET	I	Indicates that a IDE compatible disk drive is installed in the system
GP30	LVDS_PRESENT#	I	Indicates that LVDS buffering circuitry is installed in the system
GP60	LVDS_PDWN#	O	Powers down the LVDS buffers
GP62	CTS4_SIO	IO	GPIO or external interrupt (J25 pin 6)
GP63	DCD4_SIO	IO	GPIO or external interrupt (J25 pin 4)
GP66	DSR4_SIO	IO	GPIO or external interrupt (J25 pin 5)
GP36	H_INIT#		
GP42	PCIE_WAKE#		
CTS5_SIO	Revision bit	I	Indicates carrier board revision: Rev 0-3: pulled high Rev 4: pulled low

The Super I/O Controller's configuration base address is 0x002E. For detailed information about the control of the Super I/O Controller including a memory map, refer to the SMSC SCH3116 datasheet.

System Monitoring

The Super I/O Controller includes temperature sensing, voltage monitoring, and motor or external cooling control. This section describes how the Catalyst EC uses each of these capabilities.

Temperature

The carrier board includes three temperature sensors that are accessible using the Super I/O Controller hardware monitoring registers. The following table identifies these sensors and their location on the carrier board.

Sensor	Location
Internal	Internal to the Super I/O Controller
Remote 1 (Q26)	Component side of the PWB in the power supply section
Remote 2 (Q27)	Underside of the PWB under the Super I/O Controller

Voltage

Four analog inputs to the Super I/O Controller monitor the on-board voltages as described in the following table.

Input	On-board Voltage
+12V_MON	VIN
VCCP_IN	1.8 V
+2.5V_IN	V3.3S
+5V_IN	V5S

Tachometer

The Super I/O Controller includes two tachometer inputs and two pulse width modulation (PWM) outputs for motor control or external cooling applications. The Catalyst EC is a low-power device and does not require external cooling. The tachometer inputs and PWM outputs are not supported on the standard Catalyst EC. Contact your local Eurotech technical support if your application requires this function.

Audio Interface

An Intel High Definition Audio (Intel HD Audio) compatible codec located on the carrier board provides the audio interface for the Catalyst EC. The Catalyst Module XL supports the Intel HD Audio specification implementing high quality audio in an embedded environment. This specification defines a uniform interface between a host computer and audio codec, specifying register control, physical connectivity, programming model, and codec architectural components.

The audio codec supports two stereo line inputs and two stereo line outputs on the carrier board. Stereo jack [J12](#), [page 36](#) provides direct connections to a stereo line input and a stereo line output, while header [J13](#), [page 36](#) connects to a secondary stereo line input and a secondary stereo line output. For electrical specifications, see [Audio Interface](#), [page 52](#).

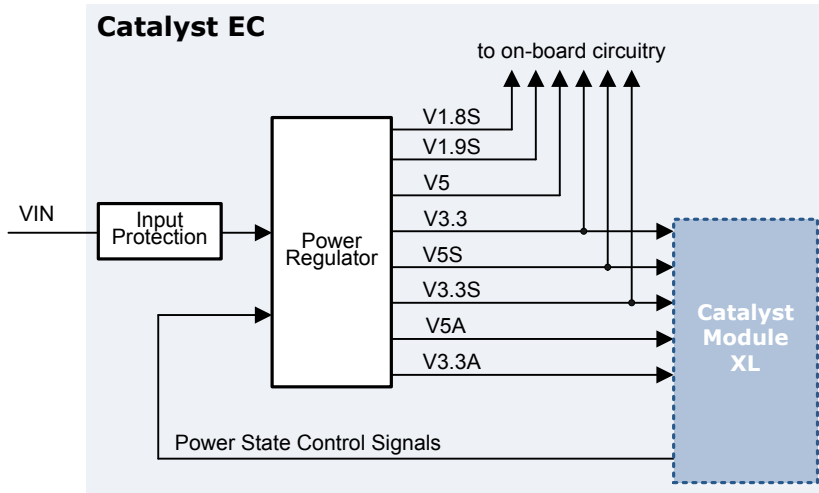
Power and Power Management

Power management is especially critical in high-performance systems that also require low power dissipation. Handheld and portable systems available today never really turn "off." They make use of power management techniques that cycle the electronics into power saving modes but never fully remove power from the full system. The Catalyst EC includes advanced power management features, including the low-power Atom processor, Advanced Configuration and Power Interface (ACPI) power management, the ability to operate in power-saving modes, and partitioned power distribution.

This section provides an overview of the power supply architecture and summarizes the Catalyst EC power management system. Power regulators on the carrier board accept the main input voltage and generate all other voltages required by the Catalyst Module XL and carrier board circuitry.

Power Supply Architecture

The following diagram illustrates the power supply architecture of the Catalyst EC. Notice that voltages ending with an “A” indicate supplies that are always on, while voltages ending with an “S” indicate supplies that are switchable.



The architecture of the power supply partitions power distribution across the Catalyst Module XL and the Catalyst EC carrier board. The Catalyst EC requires a main power input VIN on header J5, page 32. The maximum main input voltage is limited by input protection. Configurations for higher voltage inputs are available as volume production options. For further details, see [Power Supply](#), page 48.

The Catalyst EC can selectively turn off power to various subsystems. This load-shedding feature can significantly reduce power consumption. Applications and the operating system determine how selective power management is utilized.

The following are the subsystems that can be disabled selectively:

- User Interface (LVDS Display, Touch Panel, and Backlight)
- SD/MMC socket
- Wireless module

ACPI Power Management States

The Catalyst EC supports the ACPI specification. Unlike previous power standards that were BIOS-based, ACPI allows OS-directed power management. It specifies an industry-standard interface for both hardware and software that facilitates power and thermal management. This section describes how the Catalyst EC makes use of the ACPI low power modes.

The ACPI specification defines the low power states for ACPI-compliant systems. The following table describes the states supported by the Catalyst EC.

State	Mode	Description
S0	Full Operation	All devices are operational with dynamic power management functions active.
S3	Standby or Sleep	Most devices are powered down. DRAM is retained using low-power self-refresh. Wake events are active and enable a transition back to full operation.
S4	Hibernation	All devices are powered down. Operating system context is saved to disk storage prior to powering down system voltage rails. Limited wake events are active. Resume to full operation is dependent on numerous system components including the disk storage device.
S5	Power down	All devices are powered down. The Catalyst Module XL embedded controller is active but may be in low-power mode. No operating system context is preserved. Limited wake events are active.

Wake events transition the Catalyst EC from sleep mode back to full operation. Header [J25](#), page [45](#) includes the signal FWH_WP# providing an external wake event input. For electrical specifications, see [Power Supply](#), page [48](#).

Power state signals from the Catalyst Module XL combined with power management circuitry on the carrier board enable transition between these power states. The following table describes the power voltages active in each power state.

Power State	Active Power Rails	Description
S0 and S3 operation	V5, V3.3	5 V and 3.3 V primary supply voltage
S0 operation	V5S, V3.3S, V1.9S, V1.8S	5 V, 3.3 V, 1.9 V, and 1.8 V power for normal operation
S4 and S5 exit & S0 and S3 operation	V5A, V3.3A	5 V and 3.3 V “always” power for up/down circuitry only

Mechanical

The Catalyst EC conforms to the EPIC form factor. This section describes mounting and dimensions of the board.

Mounting Holes

The carrier board includes three sets of four mounting holes that enable the following mountings:

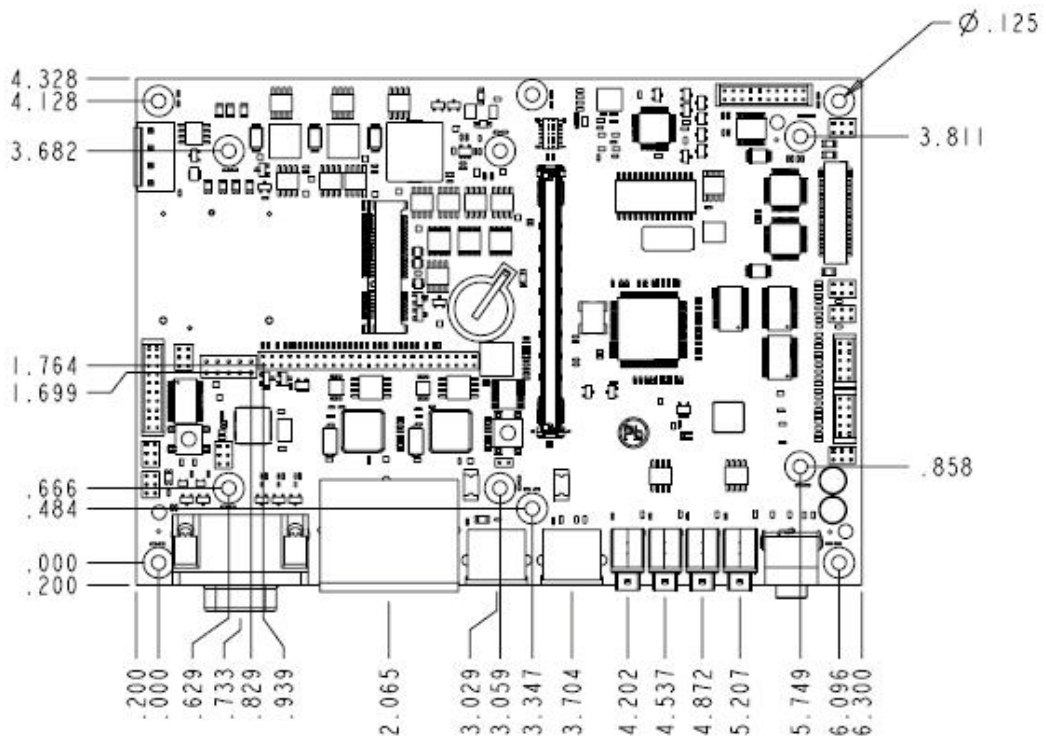
- Catalyst Module XL to carrier board
- Disk drive to carrier board
- Carrier board to enclosure

The mounting holes for the Catalyst Module XL connect electrically to the ground plane, while the mounting holes for the disk drive and carrier board connect electrically to chassis ground. The ground plane and chassis ground are electrically connected. All connections are made using 0Ω resistors.

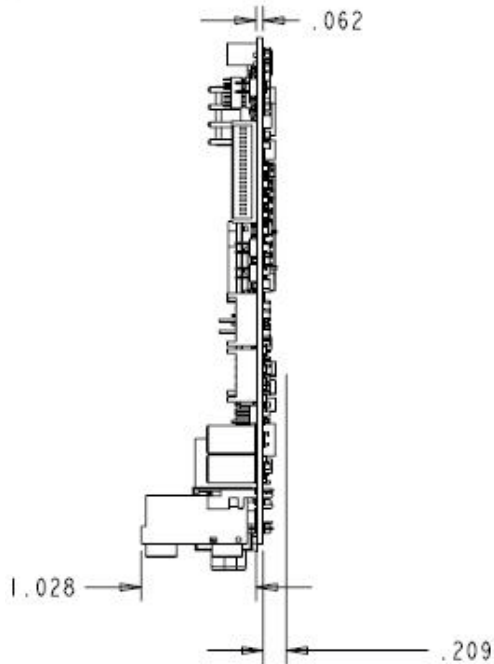
Per IPC-A-610D section 4.2.3, secure the board to standoffs using a flat washer against the board with a split washer on top between the flat washer and the screw head or nut. Do not use toothed star washers, as they cut into the plating and laminations of the board over time and will not produce an attachment that will withstand vibration and thermal cycling.

Mechanical Drawing

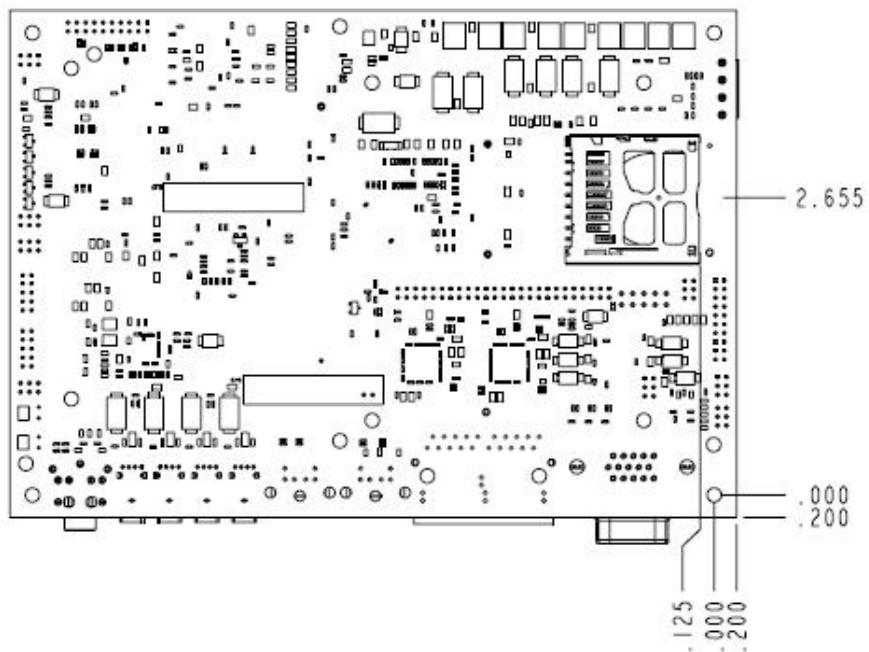
The following mechanical drawings specify the dimensions of the Catalyst EC, as well as locations of key components on the board. All dimensions are in inches. The first view illustrates the component side of the board.



The next diagram illustrates the side view of the Catalyst EC.



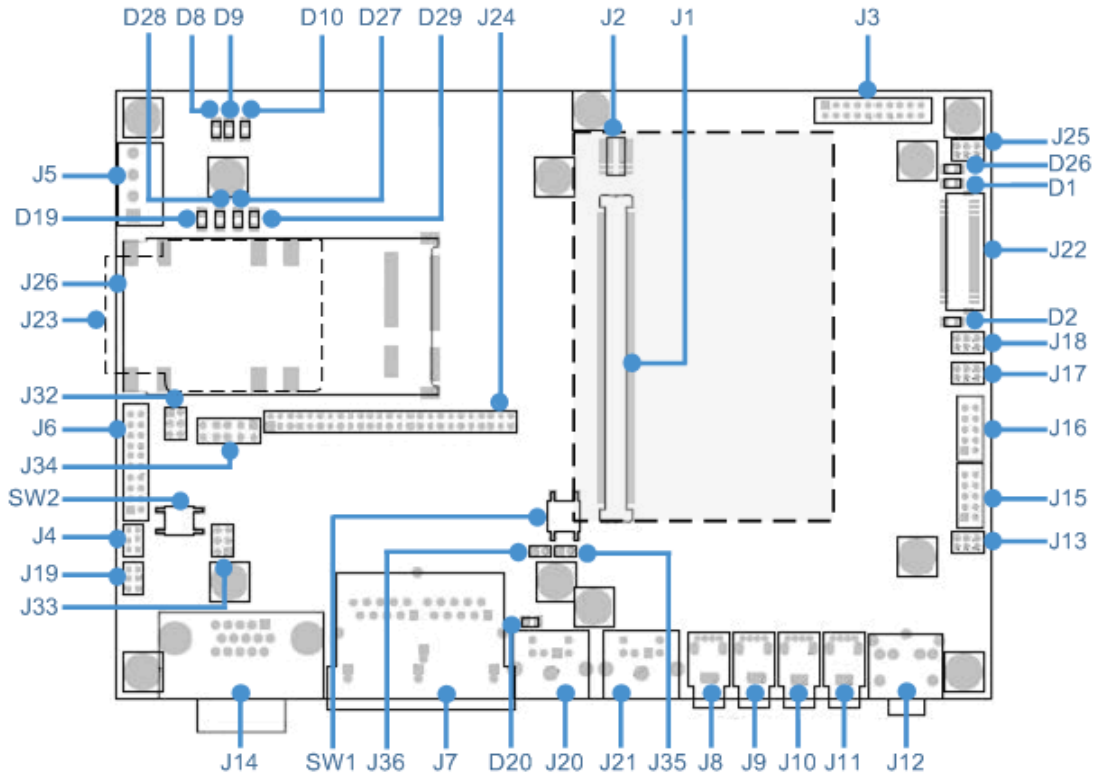
The final view illustrates the underside of the Catalyst EC. Notice SD/MMC socket J23 is located on the underside.



Connectors, Switches, Jumpers, and Indicators

Identifying Connectors

The following diagram illustrates the location of key components on the Catalyst EC. The Catalyst Module XL is located on the right half of the carrier board indicated by a shaded area. Two docking connectors, J1 and J2, lie under the module. Socket J23 is populated on the underside of the carrier board and is indicated with a dashed line border.



Switches, Jumpers, and Indicators

This section describes various switches, jumpers, and indicators on the carrier board.

SW1: Reset

SW1 is the reset button for the Catalyst EC. Pressing SW1 initiates a hardware reset of module circuitry including the processor. Press this button to restart the system without cycling power.

SW2: On/Off

SW2 is the On/Off button for the Catalyst EC. SW2 turns power used for normal operation on and off or indicates a power state change. This switch also connects to the discrete on/off control signal `BTN_ONOFF#` on header J4, page 32.

J35: USB Host/Client Jumper

Type: 2-post header

Jumper J35 selects either USB host or USB client operation on socket J10, page 35.

Jumper setting	Configuration of J10
nc	USB Host (default)
1-2	USB Client

J36: PCIe Multiplexer Jumper

Type: 2-post header

Jumper J36 controls a PCIe port multiplexer included on the Catalyst EC carrier board that selects the Ethernet 1 interface on socket J7, page 33 or the PCIe bus connection on socket J26, page 46.

Jumper setting	Configuration	
	J7: Ethernet 1	J26: PCIe connection
nc (default)	Enable	Disable
1-2	Disable	Enable

Carrier Board LED Indicators

The carrier board has up to twelve, green light-emitting diodes (LEDs) to indicate system operation. The tables provided in this section describe the LED functionalities.

D1: Backlight LED

LED	Type	Description
D1	green	Indicates the backlight enable signal is active

D2: LVDS LED

LED	Type	Description
D2	green	Indicates power is applied to the LVDS display

D8-D10: Power LEDs

LED	Type	Description
D8	green	Indicates normal operating power (V3.3S)
D9	green	Indicates primary supply voltage (V3.3)
D10	green	Indicates power is connected (V3.3A)

D19: SD/MMC LED

LED	Type	Description
D19	green	Indicates activity on the SD/MMC socket

D20: PATA LED

LED	Type	Description
D20	green	Blinking indicates activity on a PATA disk drive

D26: Touch Panel LED

LED	Type	Description
D26	green	Blinking indicates activity on the touch panel

D27-D29: Wireless Module LEDs

LED	Type	Description
D27	green	Indicates Wireless Wide Area Network (WWAN)
D28	green	Indicates Wireless Local Area Network (WLAN)
D29	green	Indicates Wireless Personal Area Network (WPAN)

D30: Embedded USB Mass Storage LED (optional)

LED	Type	Description
D30	green	Blinking indicates activity on the USB interface

Ethernet LEDs

The dual Ethernet socket J7 integrates two LEDs with each RJ-45 socket. The LED on the left side indicates speed as described in the following table.

Color	Speed (Mbps)
Green	1000
Yellow	100
Off	10

The green LED on the right side indicates connection and activity as described in the following table.

Operation	Link/Activity
On	Valid connection
Blinking	Ethernet activity
Off	No connection

Signal Headers

The following tables describe the electrical signals available on the connectors of the carrier board. Each section provides relevant details about the connector including part numbers, mating connectors, signal descriptions, and references to related sections.

For the location of the connectors, see [Identifying Connectors](#), page 28.

J1: Docking Connector: Data

The Catalyst Module XL connector J1 mates to the carrier board connector J1. Most data signals are provided on this docking connector.

J2: Docking Connector: Power

The Catalyst Module XL receives the power input and controls for interfacing with an external power supply on this docking connector.

J3: JTAG

Board connector: 2x10 socket, 2 mm, Hirose DF11-20DP-2DSA

The Catalyst EC includes a JTAG interface for factory test and for board-level software debugging; otherwise, the JTAG port is not supported for application use.

Pin	Name	Type	Description
1	JTAG_TRST#	I	
2	GND	P	
3	JTAG_TDI	I	
4	GND	P	
5	JTAG_TDO	O	
6	GND	P	
7	JTAG_TMS	I	
8	GND	P	
9	JTAG_TCK	I	
10	GND	P	
11	ATE_GPIO1	IO	JTAG interface
12	GND	P	
13	ATE_GPIO2	IO	
14	GND	P	
15	ATE_GPIO3	IO	
16	GND	P	
17	MON_3.3VAO	PO	
18	GND	P	
19	MON_5VAO	PO	
20	GND	P	

J4: Maintenance Port

Board connector: 2x3 header, 2 mm, Samtec TMM-103-03-T-D

Header J4 provides an EIA-232 serial port for the Catalyst Module XL embedded controller. This maintenance port is not supported for application use. It is intended for reprogramming the embedded controller, troubleshooting, and software debug. For additional information about using this port, see [Appendix E – Maintenance Port](#), page 60.

The signal BTN_ONOFF# connects to J4 and to switch [SW2](#), page 28. This signal controls power on/off or indicates a power state change. For electrical specifications, see [Power Supply](#), page 48.

Pin	Name	Type	Description
1	DEBUG_TX	O	Transmit Data
2	DEBUG_RX	I	Receive Data
3	BTN_ONOFF#	I-5	Power on/off
4	GND	P	ground
5	GND	P	ground
6	GND	P	ground

J5: Power Input

Board connector: 4-pin header, 0.156 inch, Tyco Electronics 1-1318300-4

Mating connector: plug housing, Tyco Electronics 1-1123722-4 and crimp pins, Tyco Electronics 1318912-1

Header J5 accepts input power from an external supply. VIN is the main power input to the Catalyst EC. Power regulators on the carrier board accept a 12 V main input voltage and generate all other voltages required by the Catalyst Module XL and carrier board circuitry. For details about the power supply architecture, see [Power Supply Architecture](#), page 24.

Pin	Name	Type	Description
1	GND	P	ground
2			
3	VIN	PI	12 V (nominal) power input
4			



Disconnect the power input before removing the Catalyst Module XL. Removing the module from a powered carrier board may result in damage to both the carrier board and to the module.

J6: GPIO

Board connector: 2x10 header, 2 mm, Hirose DF11-20DP-2DSA

Mating connector: Hirose DF11 series socket

The Catalyst EC includes sixteen GPIO signals on header J6. For further details, see [I/O Expansion Port](#), page 21.

Pin	Name	Type	Description
1	V5S	PO	5 V power output
2			
3	GPIO0	IO-LVTTL	GPIO
4	GPIO1	IO-LVTTL	
5	GPIO2	IO-LVTTL	
6	GPIO3	IO-LVTTL	
7	GPIO4	IO-LVTTL	
8	GPIO5	IO-LVTTL	
9	GPIO6	IO-LVTTL	
10	GPIO7	IO-LVTTL	
11	GND	P	ground
12			
13	GPIO8	IO-LVTTL	GPIO
14	GPIO9	IO-LVTTL	
15	GPIO10	IO-LVTTL	
16	GPIO11	IO-LVTTL	
17	GPIO12	IO-LVTTL	
18	GPIO13	IO-LVTTL	
19	GPIO14	IO-LVTTL	
20	GPIO15	IO-LVTTL	

J7: Ethernet 0 and Ethernet 1

Board connector: dual RJ-45 socket with LEDs

Mating connector: RJ-45 plug

Socket J7 is a dual RJ-45 type that provides up to two 10/100/1000 Mbps Ethernet ports with indicators and built-in magnetics included for each Ethernet connection. The connector shield is tied to chassis ground. For further details, see [Ethernet](#), page 16.



Note: Ethernet 1 is mutually exclusive with the PCIe bus connection on socket J26. To enable Ethernet 1 and disconnect the PCIe bus, do not install jumper [J36](#), page 29.

J8: USB Host 0

Board connector: USB Type A receptacle, Molex 89485-8000

Mating connector: USB Type A plug

Socket J8 provides a general-purpose USB 2.0 host port. The connector shield is tied to chassis ground. For further details, see [Universal Serial Bus](#), page 14.

Pin	Name	Type	Description
1	USB_HOST0_PWR	PO	5 V DC power output
2	USB_HOST0-	IO	USB Host 0
3	USB_HOST0+		
4	GND	P	ground

J9: USB Host 1

Board connector: USB Type A receptacle, Molex 89485-8000

Mating connector: USB Type A plug

Socket J9 provides a general-purpose USB 2.0 host port. The connector shield is tied to chassis ground. For further details, see [Universal Serial Bus](#), page 14.

Pin	Name	Type	Description
1	USB_HOST1_PWR	PO	5 V DC power output
2	USB_HOST1-	IO	USB Host 1
3	USB_HOST1+		
4	GND	P	ground

J10: USB Host 2 or USB Client

Board connector: USB Type A receptacle, Molex 89485-8000

Mating connector: USB Type A plug

The USB signals on socket J10 support a USB host or USB client port. Jumper J35, page 29 selects the operation of this port. The connector shield is tied to chassis ground. For further details, see [Universal Serial Bus](#), page 14.

Pin	Name	Type	Description	
			USB Host (default)	USB Client
1	USB_HOST2_PWR	PO	5 V DC output	nc
2	USB_HOST2-	IO	USB Host 2	USB Client
3	USB_HOST2+			
4	GND	P	ground	ground



Warning: Socket J10 pin 1 is a power output in USB host operation. Check the setting of jumper J35 before connecting a USB device to this port.

J11: USB Host 3

Board connector: USB Type A receptacle, Molex 89485-8000

Mating connector: USB Type A plug

Socket J11 provides a general-purpose USB 2.0 host port. The connector shield is tied to chassis ground. For further details, see [Universal Serial Bus](#), page 14.

Pin	Name	Type	Description
1	USB_HOST3_PWR	PO	5 V DC power output
2	USB_HOST3-	IO	USB Host 3
3	USB_HOST3+		
4	GND	P	ground

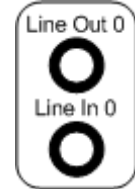
J12: Stereo Line Out 0 and Stereo Line In 0

Board connector: dual stack stereo jack, 3.5 mm, CUI Inc SJD-3510-45

Mating connector: 3.5 mm stereo plug

The audio codec included on the carrier board provides two audio inputs and two audio outputs on stereo jack J12 and header J13.

Stereo jack J12 provides direct connections to a stereo line input and a stereo line output. The line out is wired to the upper socket of the dual stack, while the line in is wired to the lower socket. The diagram at the right illustrates stereo jack J12. In the following table, pins in the upper socket are indicated by a “U” and pins in the lower socket are indicated by an “L”.



For further details, see [Audio Interface](#), page 23.

Pin	Name	Type	Description
1U	LINE_OUT0_R	AO	Line Out 0, right channel
3U	nc		
4U	LINE_OUT0_L	AO	Line Out 0, left channel
5U	GND_HDA	P	HD Audio ground
1L	LINE_IN0_R	AI	Line In 0, right channel
2L	nc		
3L	nc		
4L	LINE_IN0_L	AI	Line In 0, left channel
5L	GND_HDA	P	HD Audio ground

J13: Stereo Line Out 1 and Stereo Line In 1

Board connector: 2x3 header, 2 mm, Samtec TMM-103-03-T-D

Mating connector: Samtec TCSD series socket

The audio codec included on the carrier board provides two audio inputs and two audio outputs on stereo jack J12 and header J13. Header J13 provides the connections to a secondary stereo line input and a secondary stereo line output. For further details, see [Audio Interface](#), page 23.

Pin	Name	Type	Description
1	LINE_IN1_R	AI	Line In 1, right channel
2	GND_HDA	P	HD Audio ground
3	LINE_IN1_L	AI	Line In 1, left channel
4	LINE_OUT1_L	AO	Line Out 1, left channel
5	GND_HDA	P	HD Audio ground
6	LINE_OUT1_R	AO	Line Out 1, right channel

J14: Analog RGB

Board connector: high-density 15-pin D-sub connector, Tyco Electronics 1734530-3

Mating connector: high-density 15-pin D-sub plug

The Catalyst EC drives an analog RGB display using a direct connection to J14. This interface supports an 8:8:8 RGB port and DDC bus that is used to identify the type of monitor connected. The connector shield is tied to chassis ground. For further details, see [Analog RGB](#), page 19.

Pin	Name	Type	Description
1	VGA_RED	AO	Red data
2	VGA_GREEN	AO	Green data
3	VGA_BLUE	AO	Blue data
4	nc		
5	GND	P	ground
6	GND	P	ground
7	GND	P	ground
8	GND	P	ground
9	nc		
10	GND	P	ground
11	nc		
12	DDC_DATA	IO-5	DDC I ² C data
13	VGA_HSYNC	AO	Horizontal sync
14	VGA_VSYNC	AO	Vertical sync
15	DDC_CLK	O-5	DDC I ² C clock

J15: Serial 1

Board connector: 2x5 header, 2 mm, Hirose DF11-10DP-2DSA

Mating connector: Hirose DF11 series socket

Header J15 supports a full-feature EIA-232 serial port. For further details, see [Serial Ports](#), page 14.

Pin	Name	Type	Description
1	DCD1	I	Data Carrier Detect 1
2	RXD1	I	Receive Data 1
3	TXD1	O	Transmit Data 1
4	DTR1	O	Data Terminal Ready 1
5	GND_COM1	P	ground
6	DSR1	I	Data Set Ready 1
7	RTS1	O	Request To Send 1
8	CTS1	I	Clear To Send 1
9	RIB1	I	Ring Indicator 1
10	GND_COM1	P	ground

J16: Serial 2

Board connector: 2x5 header, 2 mm, Hirose DF11-10DP-2DSA

Mating connector: Hirose DF11 series socket

Header J16 supports a full-feature EIA-232 serial port. For further details, see [Serial Ports](#), page 14.

Pin	Name	Type	Description
1	DCD2	I	Data Carrier Detect 2
2	RXD2	I	Receive Data 2
3	TXD2	O	Transmit Data 2
4	DTR2	O	Data Terminal Ready 2
5	GND_COM2	P	ground
6	DSR2	I	Data Set Ready 2
7	RTS2	O	Request To Send 2
8	CTS2	I	Clear To Send 2
9	RIB2	I	Ring Indicator 2
10	GND_COM2	P	ground

J17: Serial 3

Board connector: 2x3 header, 2 mm, Samtec TMM-103-03-T-D

Mating connector: Samtec TCSD series socket

Header J17 supports a serial port that can be configured for EIA-232 or EIA-422/485 operation. The input signal MODE3 selects EIA-232 or EIA-422/485 mode. This input is pulled up on a standard Catalyst EC defaulting to EIA-422/485 mode. To convert to EIA-232 mode, connect this input to ground. For further details, see [Serial Ports](#), page 14.

Pin	Name	Type	EIA-422/485 (default)	EIA-232
1	RX3+	I	Non-inverting Receive Data 3	
2	RX3-	I	Inverting Receive Data 3	Receive Data 3
3	COM_GND3	P	ground	ground
4	MODE3	I	NC	GND
5	TX3+	O	Non-inverting Transmit Data 3	Request To Send 3
6	TX3-	O	Inverting Transmit Data 3	Transmit Data 3

J18: Serial 4

Board connector: 2x3 header, 2 mm, Samtec TMM-103-03-T-D

Mating connector: Samtec TCSD series socket

Header J18 supports a serial port that can be configured for EIA-232 or EIA-422/485 operation. The input signal MODE4 selects EIA-232 or EIA-422/485 mode. This input is pulled up on a standard Catalyst EC defaulting to EIA-422/485 mode. To convert to EIA-232 mode, connect this input to ground. For further details, see [Serial Ports](#), page 14.

Pin	Name	Type	EIA-422/485 (default)	EIA-232
1	RX4+	I	Non-inverting Receive Data 4	
2	RX4-	I	Inverting Receive Data 4	Receive Data 4
3	COM_GND4	P	ground	ground
4	MODE4	I	NC	GND
5	TX4+	O	Non-inverting Transmit Data 4	Request To Send 4
6	TX4-	O	Inverting Transmit Data 4	Transmit Data 4

J19: Serial 5 and Wireless Module Power Control

Board connector: 2x3 header, 2 mm, Samtec TMM-103-03-T-D

Mating connector: Samtec TCSD series socket

Header J19 supports a 3-wire serial port at LVTTTL levels and includes a 2-pin jumper for controlling the power sequencing on the wireless module socket J26, page 46. For further details, see [Serial Ports](#), page 14 and [Wireless Module](#), page 15, respectively.

Pin	Name	Type	Description
1	TX5	O-LVTTTL	Transmit Data 5
2	RX5	I-LVTTTL	Receive Data 5
3	COM_GND5	P	ground
4	SLOT1_CD#		
5	PWR_SW		Wireless module power control
6	PWR_PU		

Wireless Module Power Control Jumper

Header J19 includes a 2-pin jumper that controls the power sequencing to the wireless module socket J26, as shown in the following table.

Header J19 Pin	Power Sequencing
5-6	Enable
nc	Disable (default)

J20: PS/2 Keyboard

Board connector: 6-pin mini-DIN socket, MDJ-104-6PS

Mating connector: mini-DIN plug

The Catalyst EC supports a PS/2 keyboard on socket J20. The 5 V power output supplied on this socket includes a 0.5 A fuse. The connector shield is tied to chassis ground. For a description of the PS/2 keyboard port, see [PS/2 Keyboard and Mouse](#), page 21.

Pin	Name	Type	Description
1	KBD_DATA	O	PS/2 keyboard data
2	nc		
3	GND	P	ground
4	5V_KBD	PO	5 V power output
5	KBD_CLK	O	PS/2 keyboard clock
6	nc		

J21: PS/2 Mouse

Board connector: 6-pin mini-DIN socket, MDJ-104-6PS

Mating connector: mini-DIN plug

The Catalyst EC supports a PS/2 mouse on socket J21. The 5 V power output supplied on this socket includes a 0.5 A fuse. The connector shield is tied to chassis ground. For a description of the PS/2 mouse port, see [PS/2 Keyboard and Mouse](#), page 21.

Pin	Name	Type	Description
1	MSE_DATA	O	PS/2 mouse data
2	nc		
3	GND	P	ground
4	5V_MSE	PO	5 V power output
5	MSE_CLK	O	PS/2 mouse clock
6	nc		

J22: LVDS Display, Backlight, and Touch Panel

Board connector: 2x20 shrouded header, 1 mm, JST SM40B-SRDS-G-TF

Mating connector: housing, JST SHDR-40V-S-B and contact, JST SSH-003GA-P0.2

Header J22 provides the primary display output that includes LVDS data, backlight control, and touch panel signals. For further details, see [LVDS Display](#), page 18.

Pin	Name	Type	Description
1	GND	P	ground
2	V5S_BKL_F	PO	5 V for the backlight inverter
3	GND	P	ground
4	V5S_BKL_F	PO	5 V for the backlight inverter
5	DPSR	O-LVTTL	Scan select (default normal scan)
6	GND	P	ground
7	nc		
8	GND	P	ground
9	GND	P	ground
10	L_BKLTEN	O-LVTTL	Backlight power on/off
11	LVDS_CLK+	O-LVDS	LVDS clock
12	L_BKLTCTL	O-A	Controls backlight intensity
13	LVDS_CLK-	O-LVDS	LVDS clock
14	GND	P	ground
15	GND	P	ground
16	LVDS_DATA3+	O-LVDS	LVDS data 3
17	LVDS_DATA2+	O-LVDS	LVDS data 2

Pin	Name	Type	Description
18	LVDS_DATA3-	O-LVDS	LVDS data 3
19	LVDS_DATA2-	O-LVDS	LVDS data 2
20	GND	P	ground
21	GND	P	ground
22	L_CLK	O-LVTTL	LCD DDC I ² C clock
23	LVDS_DATA1+	O-LVDS	LVDS data 1
24	L_DATA	IO-LVTTL	LCD DDC I ² C data
25	LVDS_DATA1-	O-LVDS	LVDS data 1
26	SX-	AIO	Touch panel
27	GND	P	ground
28	SY-	AIO	Touch panel
29	LVDS_DATA0+	O-LVDS	LVDS data 0
30	SY+	AIO	Touch panel
31	LVDS_DATA0-	O-LVDS	LVDS data 0
32	SX+	AIO	Touch panel
33	GND	P	ground
34	TC4	AIO	Touch panel
35	GND	P	ground
36	TC2	AIO	Touch panel
37	V3.3S_LCD_F	PO	3.3 V for the display
38	TC1	AIO	Touch panel
39	V3.3S_LCD_F	PO	3.3 V for the display
40	TC0	AIO	Touch panel

J23: SD/MMC

Board connector: SD memory card socket, Molex 67913-0002

Mating card: SD/MMC card

The Catalyst EC provides SD/MMC socket J23 for memory and I/O expansion. For further details, see [External Memory Interfaces](#), page 13.

Pin	Name	Type	Description
1	SD_DAT3	IO-LVTTL	SD/MMC data
2	SD_CMD	IO-LVTTL	SD/MMC command
3	GND	P	ground
4	SD_PWR	PO	Software-controlled 3.3 V power output
5	SD_CLK	O-LVTTL	SD/MMC clock
6	GND	P	ground
7	SD_DAT0	IO-LVTTL	SD/MMC data
8	SD_DAT1	IO-LVTTL	SD/MMC data
9	SD_DAT2	IO-LVTTL	SD/MMC data
10	SD_CD#	I-LVTTL	SD/MMC card detect
11	SD_WP#	I-LVTTL	SD/MMC write protect

J24: PATA Interface

Board connector: 2x25 terminal strip, 2 mm, Samtec TMM-125-03-T-D

Mating connector: IDC socket cable assembly, Samtec TCSD series

Header J24 conforms to the PATA Standard supporting an optional 2.5-inch PATA magnetic or solid-state disk drive. For a description of the external memory interfaces available on the Catalyst EC, see [External Memory Interfaces](#), page 13.

Pin	Name	Type	Description
1	IDE_A		Primary/Secondary jumper pins
2	IDE_B		
3	IDE_C		
4	IDE_D		
5	nc		
6	nc		
7	IDE_RST#	O	PATA interface
8	GND	P	
9	IDE_PDDR7	IO	
10	IDE_PDDR8	IO	
11	IDE_PDDR6	IO	
12	IDE_PDDR9	IO	

Pin	Name	Type	Description
13	IDE_PDDR5	IO	
14	IDE_PDDR10	IO	
15	IDE_PDDR4	IO	
16	IDE_PDDR11	IO	
17	IDE_PDDR3	IO	
18	IDE_PDDR12	IO	
19	IDE_PDDR2	IO	
20	IDE_PDDR13	IO	
21	IDE_PDDR1	IO	
22	IDE_PDDR14	IO	
23	IDE_PDDR0	IO	
24	IDE_PDDR15	IO	
25	GND	P	
26	nc		
27	IDE_PDDREQ	I	
28	GND	P	
29	IDE_PDIOW#	O	
30	GND	P	
31	IDE_PDIOA#	O	PATA interface
32	GND	P	
33	IDE_PDIORDY	I	
34	IDE_PDCSEL#	O	
35	IDE_PDDACKR#	O	
36	GND	P	
37	INT_INTRQ#	I	
38	nc		
39	IDE_PDA1	O	
40	IDE_PATADET	I	
41	IDE_PDA0	O	
42	IDE_PDA2	O	
43	IDE_PDCS1#	O	
44	IDE_PDCS3#	O	
45	IDE_PDACTIVE#	I	
46	GND	P	
47	V5S	PO	
48	V5S	PO	
49	GND	P	
50	nc		

Header J24 includes the 44-pin PATA interface and four primary/secondary jumper pins. Jumper settings can be controlled from the printed wiring board using the jumper pins and a 50-pin ribbon cable. Alternatively, the jumper settings can be configured on the disk drive header using jumpers and a 44-pin ribbon cable.

The following table gives the setting for these pins on a standard Catalyst EC.

Description	Jumper Settings
Slave address select	IDE-A to IDE_B
Cable select	IDE-B to IDE_D
Cable select master	IDE-C to GND

J25: Touch Panel, Wake, and GPIO

Board connector: 2x3 header, 2 mm, Samtec TMM-103-03-T-D tbd

Header J25 includes a 2-pin jumper to configure the touch panel, an input to wake the system from sleep mode, and three GPIOs. For additional information about these features, see [Touch Panel](#), page 19, [ACPI Power Management States](#), page 24, and [Super I/O Controller](#), page 22, respectively.

Pin	Name	Type	Description
1	SX-	AIO	Touch panel configuration
2	TC1		
3	FWH_WP#	I-CMOS	External wake event input
4	GP63	IO-LVTTL	Super IO Controller GPIO
5	GP66		
6	GP62		

Touch Panel Jumper

Header 25 includes a 2-pin jumper to configure the touch panel, as shown in the following table.

Header J25 Pin	Configuration
1-2	4-, 5-, and 8-wire support (default)
nc	8-wire only support

J26: Wireless Module or Mini PCIe Interface

Board connector: 52-pin Mini Card, full or half-size, Molex 67910-0001

Mating module: Compliant to the Intel® McCaslin Platform Wireless Specification rev. 1.0 (Dec 2006)

Socket J26 supports either an Intel McCaslin platform compliant wireless module or a Mini PCIe card. Jumper J36, page 29 selects the configuration of this socket. By default, this socket does not include a PCIe bus connection and conforms to the Intel McCaslin platform I/O pin definition. For further details, see [Wireless Module or Mini PCI Express Interface](#), page 15.

Notes:

When jumper J36 is not installed, socket J26 uses the Intel McCaslin platform I/O pin definition. Install compliant modules only. Do not install PCIe cards in this socket.



To support the Wi2Wi W2CBWG01 wireless module, install the jumper in header J19, page 40, enabling proper sequencing of power to the wireless module.

The optional PCIe bus connection on socket J26 is mutually exclusive with Ethernet 1 on socket J7. To select the PCIe port connection on J26 and disable Ethernet 1, install jumper J36.

J32: I²C Bus

Board connector: 2x3 header, 2 mm, Samtec TMM-103-03-T-D

Header J32 provides an external connection to the I²C bus of the Catalyst Module XL embedded controller. This interface can be used for SMART battery management of external circuits and battery devices. Power all devices connected to this bus using the 3.3 V “Always” power included on the header or isolate the devices from the bus when powered off. For further details, see [I²C Bus](#), page 16.

Pin	Name	Type	Description
1	I2C_SDA	IO	I ² C data
2	I2C_SCL	O	I ² C clock
3	GND	P	ground
4	nc		
5	nc		
6	V3.3A	PO	3.3 V “Always” power

J33: SMBus

Board connector: 2x3 header, 2 mm, Samtec TMM-103-03-T-D

The SMBus provides I/O expansion capabilities on header J33. Use this interface to communicate with external devices. For further details, see [System Management Bus](#), page 17.

Pin	Name	Type	Description
1	SMB_DATA	IO-LVTTL	SMBus data
2	SMB_CLK	OD-LVTTL	SMBus clock
3	GND	P	ground
4	SMB_ALERT#	OD-LVTTL	SMBus interrupt
5	nc		
6	V3.3S	PO	3.3 V normal operating power



Note: The SMBus is not compatible with all I²C devices. Review the device data sheet carefully before connecting an I²C device to the SMBus.

J34: Embedded USB Mass Storage Drive (optional)

Board connector: 2x5 header, 2 mm, Samtec HMTSW-105-07-L-D-200

As a volume production option, header J34 provides a USB2.0 high speed interface for an embedded USB mass storage drive. For a description of the external memory interfaces available on the Catalyst EC, see [External Memory Interfaces](#), page 13.

Pin	Name	Type	Description
1	USB_HOST_PWR	PO	5 V DC power output
2	nc		
3	USB_HOST-	IO	USB Host data (high speed only)
4	nc		
5	USB_HOST+	IO	USB Host data (high speed only)
6	nc		
7	GND	P	ground
8	nc		
9	nc		
10	USB_HD_LED	I	Activity LED control

System Specification

Performance

The Catalyst EC bases its architecture on the high-performance, low-power Catalyst Module XL. The following table specifies the processor performance.

Parameter	Min	Typ.	Max	Units
Processor operating frequency (Commercial temperature)			1.6	GHz
Processor operating frequency (Industrial temperature)	1.1		1.33	GHz
Front side bus clock	400		533	MHz
On-board DDR-2 DRAM	512		2000	MB

Power Supply

The Catalyst EC accepts the main power input on **J5**, page 32. For details about the power supply architecture, see [Power Supply Architecture](#), page 24.

Absolute Maximum Ratings

Supply voltage (VIN) 16 V (note 1)

Symbol	Parameter	Min	Typ.	Max	Units
Main Power Input					
VIN	Supply voltage (note 1)	8	12	16	V
$t_{UV/OV}$	Overshoot or undervoltage timeout (note 2)		87		ms
System Power Outputs					
V3.3	Primary supply voltage	3.135	3.3	3.465	V
V3.3A	“Always” power	3.135	3.3	3.465	V
V3.3S	Normal operating power	3.135	3.3	3.465	V
V5A	“Always” power	4.75	5.0	5.25	V
V5S	Normal operating power	4.75	5.0	5.25	V
BTN_ONOFF#					
V _{IH}	High-level input voltage	2.5	5		V
V _{IL}	Low-level input voltage			1.0	V
FWH_WP#					
R _{PU}	Pull-up resistance on FWH_WP#		10		k Ω
V _{PU}			3.3		V

Notes:

1. The maximum VIN is limited by input protection. Configurations for main power inputs up to 28 V are available as volume production options.
2. The input protection circuitry immediately cuts off the main input power when an overvoltage or undervoltage condition occurs. Power is restored $t_{UV/OV}$ after VIN becomes valid.

Electrical

This section provides electrical specifications for the Catalyst EC.

Universal Serial Bus

The Catalyst EC provides four USB host ports on socket J8, page 34, J9, page 34, J10, page 35, and J11, page 35. 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 14.

Symbol	Parameter	Min	Typ.	Max	Units
USB _{OC}	Over current indication			500	mA

I²C Bus

Header J32, page 46 provides an external connection to the I²C Bus of the Catalyst Module XL embedded controller. For further details, see [I²C Bus](#), page 16.

Symbol	Parameter	Min	Typ.	Max	Units
I2C_SDA, I2C_SCL (note 3)					
R _{PU}	Pull-up resistance on I2C_SDA, I2C_SCL		10		kΩ
V _{PU}			3.3		V

Notes:

- I2C_SDA and I2C_SCL include pull-up resistors to V3.3A.

SMBus

Header J33, page 47 provides an external connection to the Catalyst Module XL SMBus. For further details, see [System Management Bus](#), page 17.

Symbol	Parameter	Min	Typ.	Max	Units
SMB_DATA, SMB_CLK (note 4)					
R _{PU}	Pull-up resistance on SMB_DATA, SMB_CLK		2.2		kΩ
V _{PU}			3.3		V
SMB_ALERT#					
R _{PU}	Pull-up resistance on SMB_ALERT#		10		kΩ
V _{PU}			3.3		V

Notes:

- SMB_CLK, SMB_DATA, and SMB_ALERT# include pull-up resistors to V3.3S.

Analog RGB

The Catalyst EC drives an analog RGB display using a direct connection to connector **J14**, page 37. In addition to the 8:8:8 RGB data, the display controller provides a DDC bus on connector J14 for monitor plug and play. This interface includes ESD protection and EMI/RFI filtering. For a description of this interface, see [Analog RGB](#), page 19.

Symbol	Parameter	Min	Typ.	Max	Units
R_{VGA}	Display cable impedance		75		Ω
DDC I ² C					
R_{PU}	Pull-up resistance on DDC_CLK, DDC_DATA		10		k Ω
V_{PU}			5		V

LVDS Display

Header **J22**, page 41 provides an output to a LVDS display. This header includes LVDS data, software-controlled display power, display scan control, and an I²C bus for communication with the display. For a description of these signals, see [LVDS Display](#), page 18.

Symbol	Parameter	Min	Typ.	Max	Units
LVDS Display Power Output					
V3.3S_LCD_F	Soft-start power		3.3		V
I _{V3.3S_LCD_F}				1.5	A
LCD DDC I ² C bus (note 5)					
R_{PU}	Pull-up resistance on L_CLK, L_DATA		2.2		k Ω
V_{PU}			3.3		V

Notes:

- An alternate connection to the SSC I2C bus is available as a volume production option.

Touch Panel Controller

A Hampshire TSHARC USB controller and separate analog multiplexer included on the carrier board drives 4-, 5-, and 8-wire resistive touch panels on header **J22**, page 41. For a description of this interface, see [Touch Panel](#), page 19.

Symbol	Parameter	Min	Typ.	Max	Units
VDD	Supply voltage		5.0		V

Backlight

Header J22, page 41 provides software-controlled backlight power and two backlight control signals. For further details, see [Backlight](#), page 21.

Symbol	Parameter	Min	Typ.	Max	Units
Backlight Power Output					
V5S_BKL_F	Soft-start power		5		V
I _{V5S_BKL_F}				1.5	A
L_BKLTCTL_RC					
V _{OH}	High-level output voltage I _{OH} = -0.1 mA (note 6)	2.0			V
V _{OL}	Low-level output voltage I _{OL} = 0.1 mA			0.5	V

Notes:

- High-level output voltage is 2.5 V at no load.

General-Purpose Inputs and Outputs

An I/O expansion port provides sixteen GPIO on header J6, page 33. These GPIOs are implemented by two NXP PCA9554 devices. Each device supplies 8 bits of general-purpose I/O expansion. For a description of the GPIOs, see [I/O Expansion Port](#), page 21.

Symbol	Parameter	Min	Typ.	Max	Units
GPIO (note 7)					
V _{IH}	High-level input voltage	2.0	3.3		V
V _{IL}	Low-level input voltage			0.8	V
V _{OH}	High-level output voltage I _{OH} = -8 mA, V _{DD} = 3.0 V	2.6			V
V _{OL}	Low-level output voltage I _{OL} = 8 mA, V _{DD} = 3.0 V			0.5	V
R _{PU}	Pull-up resistance on GPIO		10		kΩ
V _{PU}			3.3		V

Notes:

- Specifications are taken from the NXP PCA9554 Product data sheet, Rev. 07 – 13 November 2006.

Super I/O Controller

The SMSC SCH3116 Super I/O Controller supports common I/O capabilities on the Catalyst EC that include serial ports, keyboard, mouse, discrete I/O, interrupts, and hardware monitoring. The externally available signals include Serial 5 on header J19, page 40, direct connections to a PS/2 keyboard and mouse on socket J20, page 40 and socket J21, page 41, and GPIOs on header J25, page 45. For descriptions of these I/O capabilities, see [Serial Ports](#), page 14, [PS/2 Keyboard and Mouse](#), page 21, and [Super I/O Controller](#), page 22.

Symbol	Parameter	Min	Typ.	Max	Units
LVTTTL Serial Port and GPIO					
V_{IH}	High-level input voltage	2.0	3.3		V
V_{IL}	Low-level input voltage			0.8	V
V_{OH}	High-level output voltage $I_{OH} = -4$ mA	2.4			V
V_{OL}	Low-level output voltage $I_{OL} = 8$ mA			0.4	V
PS/2 Keyboard and Mouse					
V_{IH}	High-level input voltage	2.0			V
V_{IL}	Low-level input voltage			0.8	V

Audio Interface

The IDT 92HD71B8 4-channel HD audio codec provides the audio interface for the Catalyst EC. This audio codec supports two stereo line inputs and two stereo line outputs on stereo jack J12, page 36 and header J13, page 36. For a description of this interface, see [Audio Interface](#), page 23.

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					
V_{IN}	Full scale input voltage	1.00	1.03		V_{rms}
$Gain_{IN}$	Microphone boost	0		30	dB
R_{IN}	Input impedance		50		$k\Omega$
C_{IN}	Input capacitance		15		pF
Line Out					
V_{OUT}	Full scale output voltage	0.707	0.758		V_{rms}
P_{OUT}	Headphone output, 32 Ω load	31	42		mW (peak)

General

This section provides general specifications for the Catalyst EC.

Crystal Frequencies

Agencies certifying the Catalyst EC for compliance for radio-frequency emissions typically need to know the frequencies of on-system oscillators. The following table lists the frequencies of all crystals on the Catalyst EC.

Crystals	Device	Typ.	Units
Catalyst Module XL			
X1	RTC	32.768	kHz
X2	Clock Generator	14.31818	MHz
X4	Embedded Controller	14.7456	MHz
Carrier Board			
X1 & X2	Ethernet	25.000	MHz
X3	Display Controller	27.000	MHz
X4	Super I/O Controller	14.31818	MHz
X5	Touch Panel Controller	4.000	MHz

Real-Time Clock

The Intel SCH US15W provides a RTC function on the Catalyst Module XL that retains the system date and time. To supply backup power when the power input is disconnected, the Catalyst EC includes a long-life, lithium coin battery. For a description of the RTC function, see [Non-volatile Memory](#), page 12.

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

Environmental

The Catalyst EC is designed to meet the environmental specifications listed in the following table.

Parameter	Min	Typ.	Max	Units
Commercial operating temperature	0		+70	°C
Industrial, extended operating temperature (note 8)	-40		+85	°C
Storage temperature	-40		+85	°C
Relative humidity, non-condensing	5		95	%

Notes:

8. The industrial temperature range is available as a volume production option.

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

EPIC Information

Embedded Platform for Industrial Computing:

www.pc104.org

USB

Universal Serial Bus specification and product information:

www.usb.org

Wireless Module

Information about Wi2Wi, Inc wireless modules:

www.wi2wi.com/multiradio.php

SDIO Card

SD Card Association and SDIO specification:

www.sdcard.org

MMC Card

JEDEC MMC 4.0 specification:

www.jedec.org

ACPI Specification

Information about the ACPI specification:

www.acpi.info

NXP

Information about the general-purpose I/O expansion port:

www.nxp.com

SMSC

Information about the Super I/O Controller:

www.smsc.com

IDT

Information about the HD audio codec:

www.idt.com

Micron

Information about the embedded USB mass storage drives:

www.micron.com

Appendix B – RoHS Compliance

EUROTECH

The Restriction of the use of certain Hazardous Substances (RoHS) Directive came into force on 1st July 2006. This product shall be 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 100ppm.

Appendix C – Board Revision

This manual applies to the current revision of the Catalyst EC carrier board as given in the following sections. For the Catalyst Module XL revision history, refer to the Catalyst Module Design-In Guide (Eurotech document #110122-2003).

Identifying the Board Revision

The revision number of the carrier board is printed on the printed wiring board (PWB). That number is 170123-400Rx, where "x" is the revision level of the PWB.

Carrier Board Revision History

The following is an overview of the revisions to the carrier board.

Revision 2

Initial release

Revision A

New Features

Adds I²C Bus on header J32

Adds SMBus on header J33

Adds power sequencing and optional PCIe bus connection to wireless module socket J26

Adds optional support for Embedded USB Mass Storage drives on header J34

Adds optional USB client support on J10

Adds monitoring of input voltage

Adds PC beep support

Adds revision bit

Adds capability to generate interrupts from GPIO header J6

Adds three GPIOs and external wake event input to header J25

Changes

Improves accessibility of SD/MMC socket J23

Improves visibility of PATA LED D20

Appendix D – Development Kit

Catalyst EC Development Kits are designed to get the developer up and running quickly. These kits allow you to become familiar with the Catalyst Module XL functionality and to develop applications prior to customization for your specific requirements.

Eurotech offers two types of development kits for the Catalyst EC: without LCD and with LCD. The following table lists the development kits that are currently available.

Development Kit	Part Number
Catalyst EC Development Kit	CTECX3400
Catalyst EC Development Kit with LCD	CTECX4000

Catalyst EC Development Kit

The Catalyst EC Development Kit provides a development platform using the EPIC form-factor carrier board and your standard VGA monitor. This configuration accommodates adding a LVDS display and touch screen later in your development cycle, if required.

Development Kit Components

The Catalyst EC Development Kit consists of the following components:

- Catalyst Module XL
- Carrier EC carrier board
- Three USB keys loaded with
 - Windows Embedded Standard
 - Windows CE
 - Wind River Linux
- USB BIOS recovery key and USB UTILIBOOT key
- 12 VDC adapter with power connector and AC cord
- Serial port adapter cable (for J15 and J16)
- Maintenance port adapter and black DB9FF cable (for connection to J4 only)
- Stylus and screen cleaning cloth
- Catalyst EC Development Kit Quick Start (Eurotech document #110123-4002)

Please make sure you have received **all** the components before you begin your development. For details about getting started, refer to the Catalyst EC Development Kit Quick Start (#110123-4002).

Catalyst EC Development Kit with LCD

The Catalyst EC Development Kit with LCD provides a complete out-of-the-box development platform. This kit combines the extensive I/O provided on the EPIC form-factor carrier board with a LVDS display and touch screen.

Development Kit Components

The Catalyst EC Development Kit with LCD consists of the following components:

- Catalyst Module XL
- Carrier EC carrier board
- 10.4-inch TFT LCD with SVGA resolution (800 x 600), 6-bit color, and cable
- CCFL backlight inverter and cable
- 4-wire resistive touch panel and cable
- Three USB keys loaded with
 - Windows Embedded Standard
 - Windows CE
 - Wind River Linux
- USB BIOS recovery key and USB UTILIBOOT key
- 12 VDC adapter with power connector and AC cord
- Two serial port adapter cables (for J15 and J16)
- Maintenance port adapter and black DB9FF cable (for connection to J4 only)
- Plexiglas mounting
- Stylus and screen cleaning cloth
- Catalyst EC Development Kit Quick Start (Eurotech document #110123-4001)

Please make sure you have received **all** the components before you begin your development. For details about getting started, refer to the Catalyst EC Development Kit Quick Start (#110123-4001).

Appendix E – Maintenance Port

The serial port located on header J4, page 32 is not available for application use. This port is intended for maintenance functions such as reprogramming the embedded controller, troubleshooting, and software debug. If you are directed to use this port when working with Eurotech staff, use the information provided in this appendix to connect the port to your computer.

Cable Connection

Connect any available serial port of your computer to header J4 on your Catalyst EC. Use the maintenance port adapter cable and black DB9FF cable supplied with the Catalyst EC Development Kit or create a custom cable using the information given on page 32.

Port Settings

Use a terminal emulation application such as HyperTerminal or TeraTerm to access the maintenance port. Configure the port settings as follows:

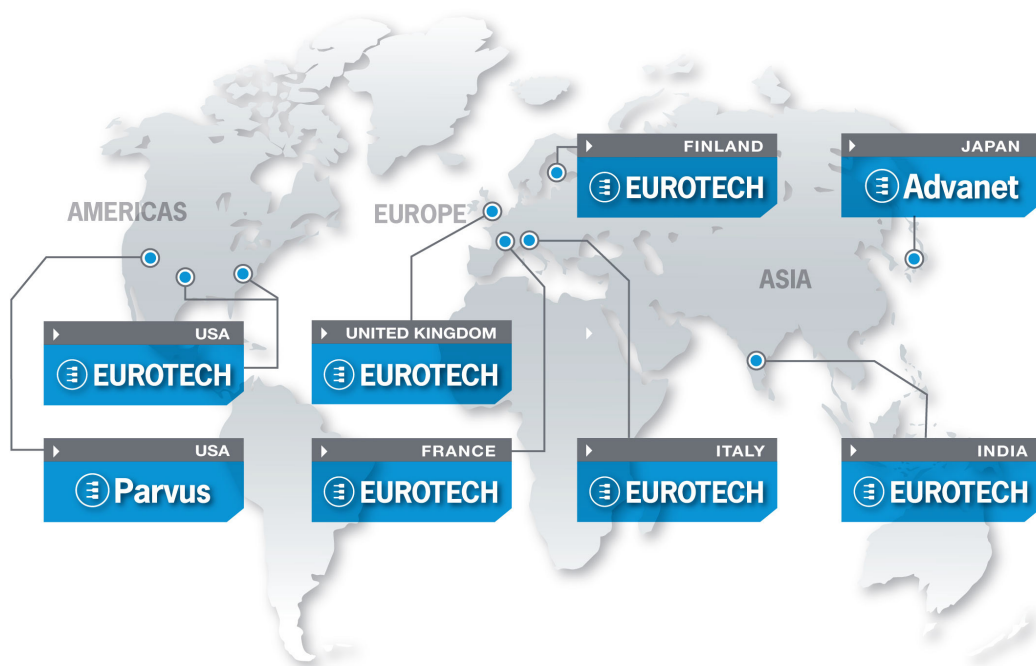
- Baud: 57600 bps
- Data bits: 8
- Parity: None
- Stop Bits: 1
- Flow control: none

Port Output

Connect power to the Catalyst EC. LED D10 lights, and the following text is displayed on the terminal.

```
EUROTECH, INC.  
Catalyst Core Module: Embedded Controller Firmware  
Copyright (c) 2007 EuroTech, Inc. All rights reserved.  
=====
```

Eurotech Worldwide Presence



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