Catalyst FX

Low Power Embedded Computer System

DIGITAL TECHNOLOGIES FOR A BETTER WORLD

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Document Revision History

REVISION	DESCRIPTION	DATE
1	Initial release	December 2009
A	Updates for Rev B carrier board	November 2010

Table of Contents

Important User Information

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

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

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

Safety Notices and Warnings

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

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

Installation in Cupboards and Safes

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

Do Not Operate in an Explosive Atmosphere

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

Alerts that can be found throughout this manual

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

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

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

Information and/or Notes:
These will highlight important features or instructions that should be observed.

Use an Appropriate Power Supply

- Only start the product with a power supply that conforms to the voltage requirements as specified in Power Supply, page 29. In case of uncertainty about the required power supply, please contact your local Eurotech Technical Support Team or the electricity authority.
- Use power supplies that are compliant with SELV regulation.
- Use certified power cables. The power cable must fit the product, the voltage, and the required current.
- Position cable with care. Avoid positioning cables in places where they may be trampled on or compressed by objects placed on it. Take particular care of the plug, power-point, and outlet of power cable.
- Avoid overcharging power-points.

Antistatic Precautions

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

Life Support Policy

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

Warranty

For Warranty terms and conditions users should contact their local Eurotech Sales Office.
See Eurotech Worldwide Presence, page 37 for full contact details.

CE Notice

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

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

WEEE

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

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

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

- Because of the substances present in the equipment, improper use or disposal of the refuse can cause damage to human health and to the environment.
- With reference to WEEE, it is compulsory not to dispose of the equipment with normal urban refuse and arrangements should be instigated for separate collection and disposal.
- Contact your local waste collection body for more detailed recycling information.
- In case of illicit disposal, sanctions will be levied on transgressors.

RoHS

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

Technical Assistance

If you have any technical questions, cannot isolate a problem with your device, or have any enquiry about repair and returns policies, contact your local Eurotech Technical Support Team.

See Eurotech Worldwide Presence, page 37 for full contact details.

Transportation

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

> **Warning:**
> Any product returned to Eurotech that is damaged due to inappropriate packaging will not be covered by the warranty.

Conventions

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
LVTTL	Low Voltage TTL
3.3	3.3 V signal level
5	5 V signal level
HDA	High Definition Audio signal, 3.3 V (default) or 1.5 V
LVDS	Low Voltage Differential Signalling
NC	No Connection
Reserved	Use is reserved to Eurotech

Product Overview

The Catalyst FX is a low-power embedded computer system offering extensive I/O, communication, and multimedia capabilities that can be easily customized to meet your application requirements. It is based on the Catalyst XL, which integrates with a carrier board, optional expansion board, and supporting peripheral devices to provide a total production solution. With the Catalyst FX, you can quickly and easily create a system loaded with your application software that precisely meets your requirements.

Several options are available, allowing you to choose the hardware based on your specifications. An expansion connector supports add-in boards, expanding the multimedia and I/O capabilities of the Catalyst FX and allowing customization for your application.

The Catalyst FX is available with Windows® CE, Windows Embedded Standard, and Wind River Linux 3.0 operating systems. Support is also available for the Java Virtual Machine and Eurotech's Everyware™ Software Framework, which offers 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 Catalyst FX. Notice that the data connector on the Catalyst XL has been divided into two sections for this illustration. Dotted lines indicate options.
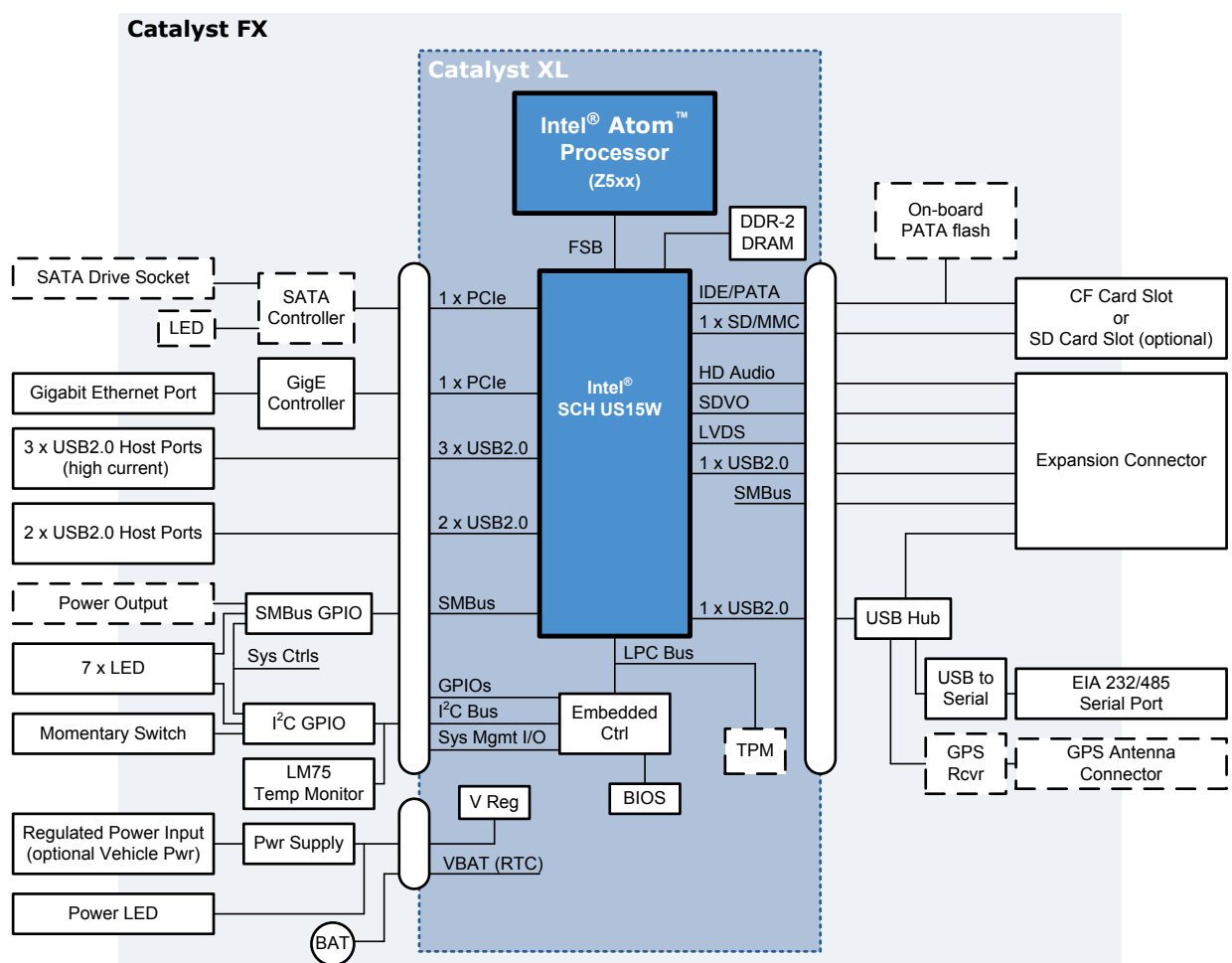
Figure 1.   Catalyst FX Block Diagram

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)
- External memory support
  - USB disk drive
  - CF card or SD card (option)
  - 2.5-inch SATA drive (option)

Communications

- Five USB 2.0 host ports operating at low, full, and high speeds
  - Two general-purpose ports
  - Three ports for plug-in USB modules and additional storage
- EIA-232/485 serial port (software-selectable)
- Gigabit Ethernet port
- GPS receiver with external antenna connection (option)

User Interface, Display, and I/O

- Expansion connector supporting display, audio, and I/O options
- Nine LED indicators
  - Power indicator
  - SATA drive indicator
  - Seven software-controllable indicators
- Software-readable push-button

Power Supply

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

Related Documents

This document describes the Catalyst FX at the system level and is intended for software application developers and system integrators. The following documents are also important resources for developing applications for the Catalyst FX.

Document	Eurotech Document Number
Catalyst FX VGA Expansion Board User Manual	110124-3200
Catalyst FX LVDS Expansion Board User Manual	110124-3300
Catalyst FX DVI/HDMI Expansion Board User Manual	110124-3400

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

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

Operating System

The Catalyst FX is available with the following operating systems:

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

BIOS

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

Boot Options

The Catalyst FX 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 Catalyst FX.

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

Hardware Specification

Processor

The Catalyst FX 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 Catalyst FX includes a 1.1 GHz, 1 GB Catalyst XL for the commercial temperature range. For the various performance variants, see Processor, page 29.

For further details about the Catalyst XL, refer to the Catalyst XL Design-In Guide (Eurotech document #110123-3003).

Memory

The Catalyst FX provides a variety of storage capabilities, both on-board and external. The following sections describe the different types of memory supported by the Catalyst FX.

Synchronous DRAM

Double Data Rate Synchronous DRAM (DDR-2) is used on the Catalyst FX for system main memory and frame buffer memory. Standard systems include 1 GB with 512 MB and 2 GB options available. The data bus supports 64-bit accesses with a maximum burst bandwidth of 4.2 GB/s (8 B @ 533 MHz). The memory bus operates at the same frequency as the front side bus. See Processor, page 29.

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 8MB 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 FX 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 configuration data on the Catalyst FX. 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).

Real-Time Clock

The Catalyst FX includes a RTC function. It retains the system date and time when the system is powered down as long as backup power is provided. To supply backup power, the Catalyst FX includes a long-life battery. For general specifications, see Real-Time Clock, page 31.

On-Board Flash

On-board Parallel ATA (PATA) flash is available as an option, populated in increments of 1 GB. In addition to providing mass storage, this memory is a system boot option. For a list of the storage devices from which the system can boot, see Boot Options, page 10.

External Memory Interfaces

Four types of external memory interfaces provide mass storage and boot options for the Catalyst FX. The following sections describe these external memory options.

CompactFlash® Card or Secure Digital Card

The Catalyst FX includes a CompactFlash (CF) card slot on J25, page 26. As a volume production option, a Secure Digital (SD) card slot on J22, page 26 can replace the CF card slot. Both media provide mass storage in a wide variety of capacities and can be a cost-effective means to expand system storage.

> *i* **Notes:**
> 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.

SATA Drive

Serial ATA (SATA) disk drives provide high-capacity, removable storage. The Catalyst FX supports an optional 5 V, 2.5-inch form factor SATA drive on socket J28, page 27. For SATA drive specifications, see SATA Drive, page 30.

USB Disk Drive

A USB disk drive can connect to any of the five USB host ports on the Catalyst FX: J26, J27, J10, J15, and J7. For a description of these ports, see Universal Serial Bus, page 12.

Communications

A key capability of the Catalyst FX is its flexible system connectivity. It includes five USB host ports, an I^{2}C bus, a SMBus, an EIA-232/485 serial port, a Gigabit Ethernet port, and a u-blox GPS receiver. The following sections describe these interfaces.

Universal Serial Bus

Five Universal Serial Bus (USB) ports included on the Catalyst FX 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.

The following table describes the five USB ports.

Socket	Description
J26: USB Host 0	General-purpose
J27: USB Host 1	
J10: USB Host 2	USB module support (high current)
J15: USB Host 3	
J7 : USB Host 4	

Table 1.   USB Host Ports

For electrical specifications, see Universal Serial Bus, page 30.

General-purpose USB Host

The Catalyst FX provides two general-purpose USB host ports managed by the Catalyst 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 FX 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.

USB Module Support

The three remaining USB host ports are designed to support higher-current, plug-in USB modules. Similar to the two general-purpose USB host ports, these ports include support circuitry on the carrier board. However, the current rating is higher than the general-purpose ports allowing expanded capability and connectivity. These ports enable expanded customization for your application with no hardware modifications to the Catalyst FX.

The Catalyst FX supports the following types of USB modules:

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

Eurotech has pretested and approved several USB modules for use with the Catalyst FX. For the latest list of modules, contact your local Eurotech sales representative.

Warning:
Sockets J10, J15, and J7 include locking latches to prevent accidental disconnects or lost connections due to vibration.
Do not forcibly pull on a USB module to disconnect or overextend the locking latches.
Gently raise the latch on the socket to remove a device.

I^2C Bus

I^2C (Inter-IC) bus is a multi-master, "two-wire" synchronous serial bus for communications between integrated circuits (ICs) and for addressing peripherals in a system. The Catalyst FX uses an internal I^2C bus to communicate with a temperature sensor and to control various on-board GPIO. The following diagram illustrates the I^2C architecture on the Catalyst FX.
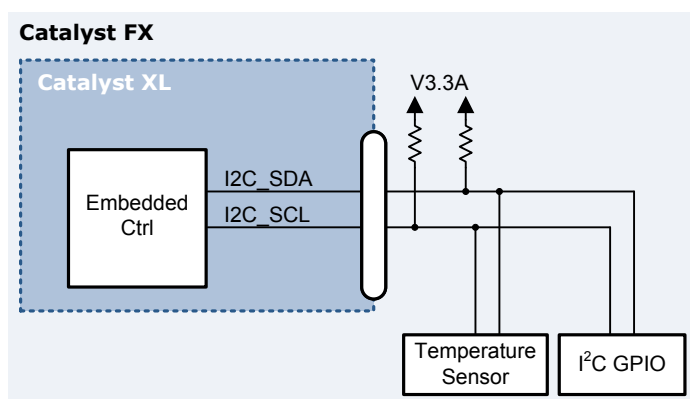
Figure 2. I^2C Bus Architecture

The following table lists the addresses of the I^2C devices on the carrier board.

Device	Address	Function
Temperature Sensor	1001 0000	Write
	1001 0001	Read
I^2C GPIO	0100 0000	Write
	0100 0001	Read

Table 2. I^2C Bus Addresses

For details about the functions performed by the I^2C GPIO, see .

System Management Bus

System Management Bus (SMBus) is a serial interface allowing multiple devices to communicate with each other. Devices function as bus masters and bus slaves. The Catalyst XL acts as bus master and uses this interface to control a clock generator on the module, GPIO on the carrier board, and devices connected to the expansion board connector J19, page 25. The following diagram illustrates the SMBus architecture on the Catalyst FX.
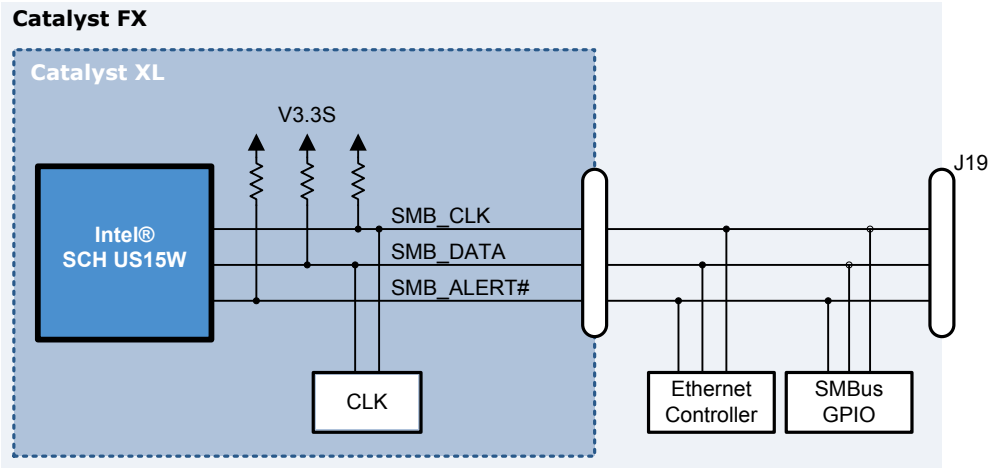
Figure 3.   SMBus Architecture

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

Device	Address	Function
Module		
Reserved	0101 0010	Write
	0101 0011	Read
Clock Generator	1101 0010	Write
	1101 0011	Read
Carrier board		
SMBus GPIO 7:0	0100 0000	Write
	0100 0001	Read
SMBus GPIO 15:8	0100 0100	Write
	0100 0101	Read
SMBus GPIO 23:16	0100 1000	Write
	0100 1001	Read

Table 3.   SMBus Addresses

For details about the functions performed by the SMBus GPIO, see SMBus GPIO, page 16.

Serial Port

The Catalyst FX provides a serial port on connector J5, page 23. By default, this port is configured as a 6-wire, 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 including control of the I^2C bus GPIO signal GPIO2, which selects the mode of operation.

The serial port enable is also software-controlled using the I^2C bus GPIO signal GPIO3. This signal enables or shutdowns the serial ports. For details about these control signals, see I^2C Bus GPIO, page 15.

Ethernet

For direct network connectivity, the Catalyst FX includes an Intel 82574L Gigabit Ethernet Controller and the RJ-45 socket J16, page 24. This RJ-45 socket includes two Ethernet LEDs, page 22 and built-in magnetics.

GPS

The standard Catalyst FX includes a u-blox GPS module with an external antenna connection. This module is a population option.

Expansion Connector

To provide custom display, audio, and I/O solutions, the Catalyst FX includes the expansion connector J19, page 25. This hardware flexibility enables the Catalyst FX to support a wide variety of display types, audio requirements, and system I/O. Expansion boards can be supplied by Eurotech or from a third-party design.

This expansion connector includes the following signal groups:

- Intel® High Definition Audio
- LVDS display output
- Serial Digital Video (SDVO) display output
- Backlight control signals
- LCD I^{2}C bus
- USB Host
- SMBus
- Discrete control
- Power

Eurotech offers various expansion boards for use with the Catalyst FX. For the latest list of boards, contact your local Eurotech sales representative.

Discrete I/O

To control functionality on the carrier board and the expansion board, the Catalyst FX includes two I/O ports. One I/O port connects to the I^{2}C bus, while the other I/O port connects to the SMBus. The following sections describe the discrete I/O provided by these devices.

I^{2}C Bus GPIO

The Catalyst FX includes an I/O port on the I^{2}C bus providing eight general-purpose inputs and outputs (GPIO). This port is implemented by an NXP PCA9554 device. For the I^{2}C address of this device, see I^{2}C Bus, page 13.

The following table lists the function of each I^{2}C GPIO on the Catalyst FX.

I^{2}C GPIO	Name	Type	Description
0	CR6_GRN	O	LED CR6 green control
1	CR6_RED	O	LED CR6 red control
2	RS485/RS232	O	RS232/RS485 mode select
3	RSBUFF_EN	O	RS232/RS485 buffer enable
4	Reserved		
5	PPS_1SEC	I	GPS controller time pulse (1PPS)
6	BOOT_SWITCH	I	Input from switch SW1
7	V_SHDN	O	Vehicle power supply enable

Table 4. I^{2}C GPIO

SMBus GPIO

The I/O port on the SMBus provides twenty four GPIO. This port is implemented by three NXP PCA9554 devices with each device supplying 8 bits of general-purpose I/O expansion. For the SMBus address of this device, see System Management Bus, page 14.

The following table lists the function of each SMBus GPIO on the Catalyst FX.

SMBus GPIO	Name	Type	Description
0	EX_BRD_ID0	I	Expansion board ID0
1	EX_BRD_ID1	I	Expansion board ID1
2	CR8_GRN	O	LED CR8 green control
3	CR8_RED	O	LED CR8 red control
4	CR9_GRN	O	LED CR9 green control
5	CR9_RED	O	LED CR9 red control
6	IDE_PATADET	O	Master/slave mode configuration between the CF and PATA flash
7	PWR_OUT_EN	O	Enable for the software-switchable power on J29
8	USB0_EN	O	USB Host 0 enable
9	USB1_EN	O	USB Host 1 enable
10	USB2_EN	O	USB Host 2 enable
11	USB3_EN	O	USB Host 3 enable
12	USB4_EN	O	USB Host 4 enable
13	GPS_PWR_EN#	O	GPS power enable
14	ATA_FLASH_WP#	O	PATA Flash Write Protect / Power-down
15	ATA_FLASH_POR#	O	PATA Flash Power-on Reset
16	CR1_GRN	O	LED CR1 green control
17	CR1_RED	O	LED CR1 red control
18	CR2_GRN	O	LED CR2 green control
19	CR2_RED	O	LED CR2 red control
20	CR3_GRN	O	LED CR3 green control
21	CR3_RED	O	LED CR3 red control
22	CR4_GRN	O	LED CR4 green control
23	CR4_RED	O	LED CR4 red control

Table 5.   SMBus GPIO

System Monitoring

Both the module and carrier board include system monitoring. The Catalyst XL embedded controller provides hardware monitoring for temperature and voltage. Temperature monitoring measures temperatures on the Intel Atom processor die and near the memory chips. Voltage monitoring measures the input power and on-module voltage regulators. These functions are accessible using the I^2C bus. For further details about the Catalyst XL, refer to the Catalyst XL Design-In Guide (Eurotech document #110123-3003).

For monitoring the temperature on the carrier board, the Catalyst FX includes a National Semiconductor LM75 digital temperature sensor that is accessible using the I^2C bus. This device is located along the edge of the carrier board near the Catalyst XL. For the I^2C address of this device, see I^2C Bus, page 13.

Power and Power Management

Power management is especially critical in high-performance systems that also require low power dissipation. These systems never really turn "off" but make use of power management techniques that cycle the electronics into power saving modes. The Catalyst FX 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 FX power management system. Power regulators on the carrier board accept the main input voltage and generate all other voltages required by the Catalyst XL and carrier board circuitry.

Power Supply Architecture

The following diagram illustrates the power supply architecture of the Catalyst FX. Notice that voltages ending with an "A" indicate supplies that are always on, while voltages ending with an "S" indicate supplies that are switchable.
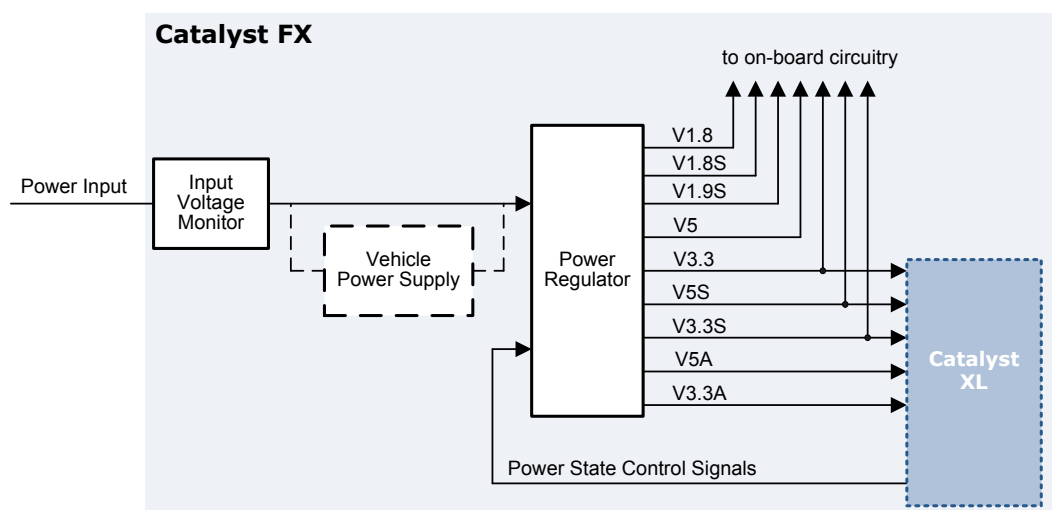
Figure 4.   Power Supply Architecture

The architecture of the power supply partitions power distribution across the Catalyst XL and the carrier board. The Catalyst FX requires a main power input on header J17, page 25 with the maximum voltage limited by input protection. A standard Catalyst FX is configured to accept a regulated power input. As an option, the Catalyst FX can be powered from vehicle-rated power. For power specifications, see Power, page 29.

ACPI Power Management States

The Catalyst FX 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 FX 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 FX.

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 XL embedded controller is active but in low-power operational mode. No operating system context is preserved. Limited wake events are active.

Table 6.   Low Power States

Power state signals from the Catalyst XL combined with power management circuitry on the carrier board enable transitions 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

Table 7.   Low Power States with Active Voltages

Mechanical

The Catalyst FX includes the Catalyst XL and carrier board. This section provides an overview of the mounting and dimensions of the carrier board. For detailed mechanical design of an enclosure, 3-D mechanical models in STP file format are available to customers who establish a business relationship with Eurotech. For additional information, contact your local Eurotech sale representative.

Mechanical Drawing

The following mechanical drawings specify the dimensions of the Catalyst FX, as well as locations of key components on the board. All dimensions are in inches.
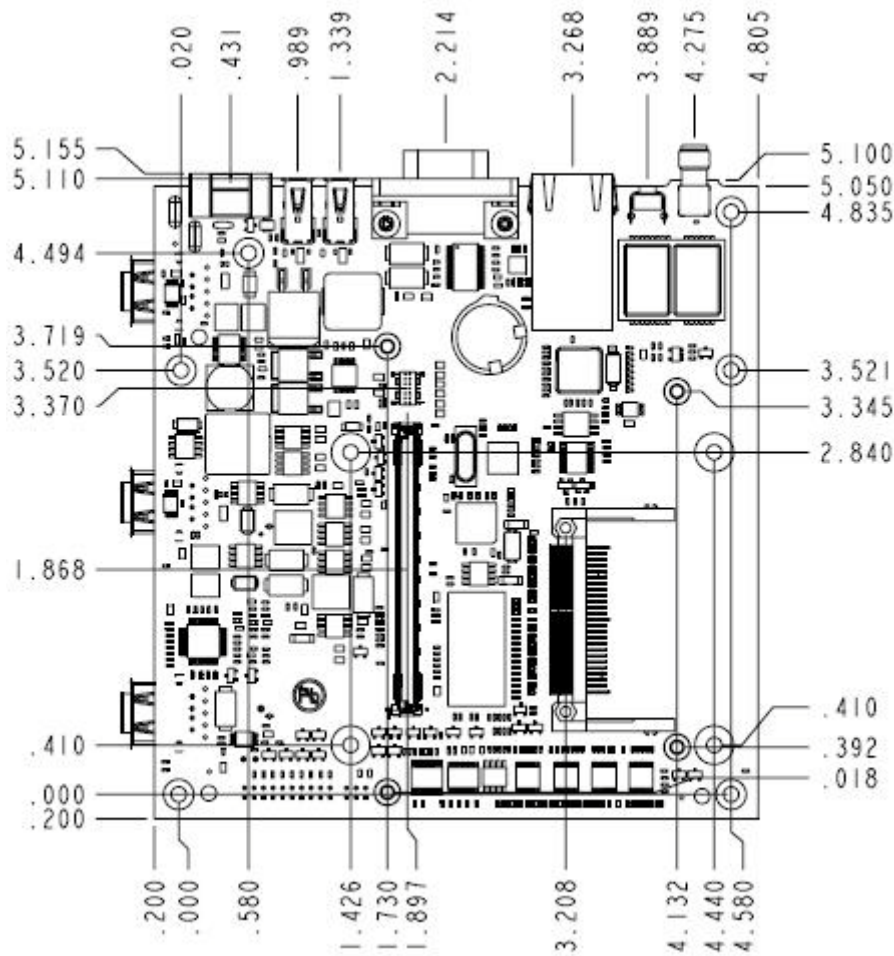
Figure 5.   Catalyst FX Carrier Board, Top View

Notes:
CF socket J25 is slightly recessed from the edge of the board. This allows you to use a foam retaining pad to secure the CF card in the socket when the board is installed in an enclosure.

Figure 6. Catalyst FX Carrier Board, Side View

Figure 7. Catalyst FX Carrier Board, Bottom View

Mounting Holes

The carrier board includes mounting holes to secure the following components:

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

The mounting holes for the Catalyst XL and disk drive connect electrically to the ground plane, while the mounting holes for the expansion board and enclosure connect electrically to chassis ground using 0Ω resistors. The ground plane and chassis ground are electrically connected. The two mounting holes located in the top, right corner, above and below the u-blox GPS module do not connect electrically to the ground plane.

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.

Connectors, Switches, and Indicators

Identifying Connectors

The following diagrams illustrate the location of key components on the Catalyst FX.

J17
J27
J26
J5

J18

J3

J14
SW1
J16

J25

J22

**Catalyst XL
(indicated by shaded area)**
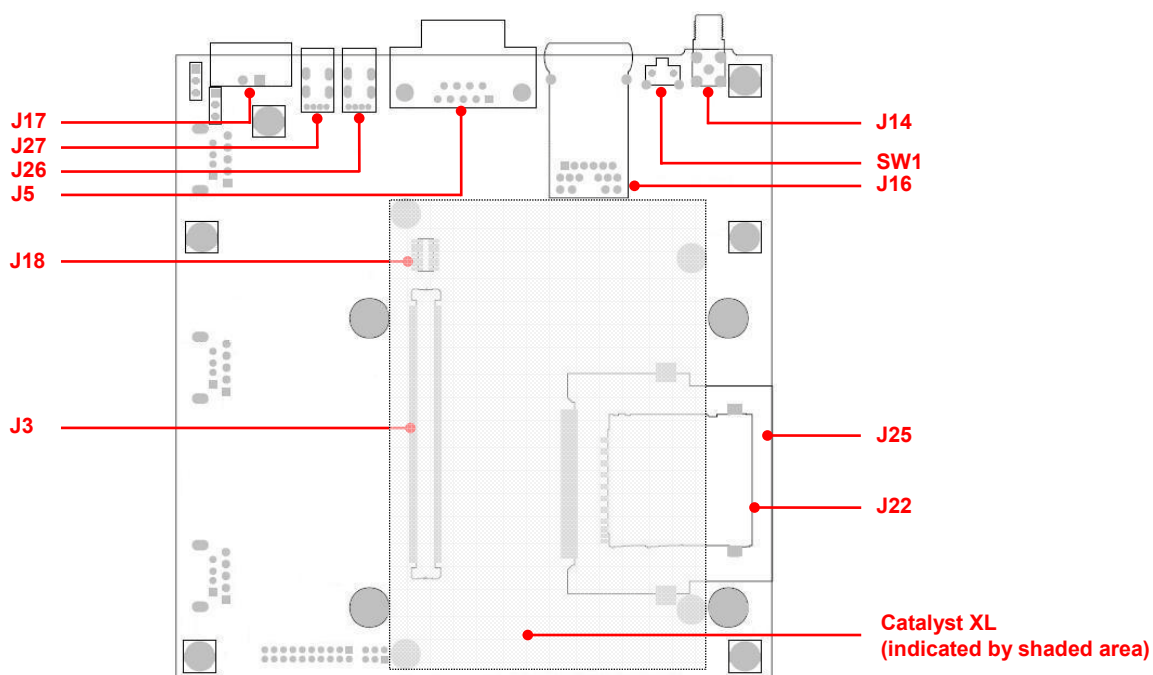
Figure 8.   Connector Location, Top View

J19

J28

CR3
CR2
CR1
CR7

CR4
CR8
CR9
CR6
CR5

J10

J7

J15

J29
J30
J1
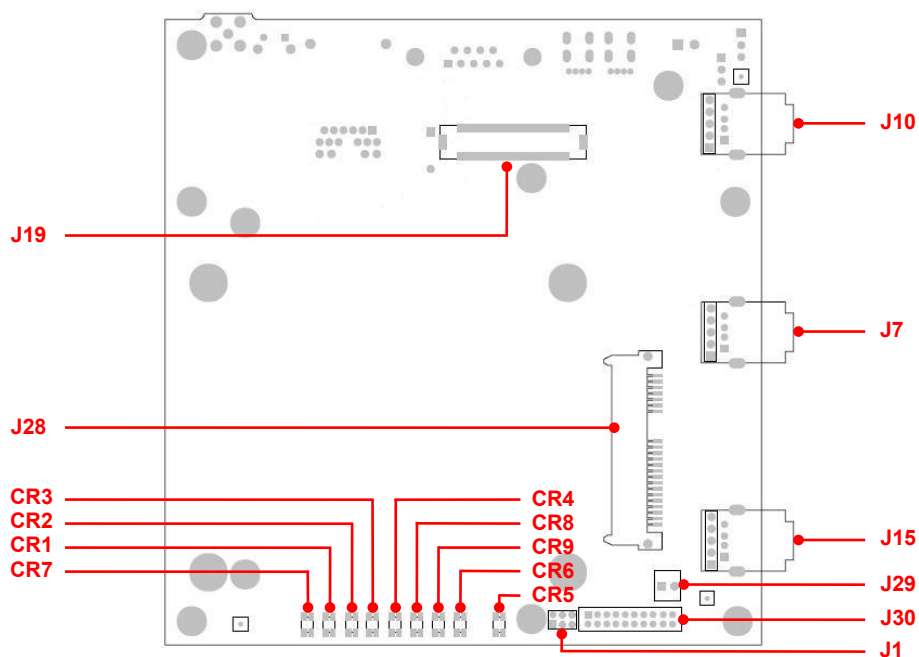
Figure 9.   Connector Location, Bottom View

Switches and Indicators

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

SW1: Switch

The Catalyst FX includes a momentary push-button switch SW1. This switch generates an interrupt to the processor and is software-definable.

Ethernet LEDs

Ethernet socket J16 includes two LEDs. The LED on the left side indicates speed as follows.

Color	Speed (Mbps)
Green	1000
Yellow	100
Off	10

The green LED on the right side indicates connection and activity as follows.

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

CR1-4 and CR8-9: Software-definable LED Indicators (SMBus)

The Catalyst FX 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.

SMBus GPIO		
CR	**Red Signal**	**Green Signal**
1	17	16
2	19	18
3	21	20
4	23	22
8	3	2
9	5	4

For further details about controlling the SMBus GPIO, see SMBus GPIO, page 16.

CR5: SATA Indicator

For systems that include a SATA drive, the SATA controller drives LED CR5 as described in the following table.

Color	Description
Red	Indicates connection to the SATA drive
Green	Indicates activity on the SATA drive

CR6: Software-definable LED Indicators (I^{2}C Bus)

The Catalyst FX has one red/green/yellow LED that is software-definable using the I^{2}C bus. The following table lists the I^{2}C Bus GPIO that drives this LED.

I^{2}C Bus GPIO		
CR	**Red Signal**	**Green Signal**
6	1	0

For further details about controlling the I^{2}C GPIO, see I^{2}C Bus GPIO, page 15.

CR7: Power Indicator

LED CR7 indicates the system power as described in the following table.

Color	Description
Green	Normal operation mode
Yellow	Sleep mode

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 21.

J1: Maintenance Port

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

Header J1 provides an EIA-232 serial port for the Catalyst 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 C – Maintenance Port, page 35.

This header also includes the input signal PWR_BUTTON# which controls power on/off. For electrical specifications, see Power Supply, page 30.

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

J3: Docking Connector: Data

The Catalyst XL connector J1 mates to the carrier board connector J3. Most data signals are provided on this docking connector.

J5: Serial Port

Board connector: DB9 plug, Tyco 5747840-4
Mating connector: DB9 socket

Connector J5 provides an EIA-232 serial port. For further details, see Serial Port, page 14.

Pin	EIA-232 Name	Type	Description (Default)	EIA-485 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		

J7: USB Host 4

Board connector: USB Type A receptacle with locking, Amphenol LUSB-A111-00
Mating connector: USB Type A plug

Socket J7 provides the USB Host 4 port. This port supports high-current devices such as plug-in USB modules. For further details, see Universal Serial Bus, page 12.

> **Notes:**
> As a volume production option, the Catalyst FX can provide USB Host 4 on a header in place of the USB Type A socket. For additional information, contact your local Eurotech sales representative.

J10: USB Host 2

Board connector: USB Type A receptacle with locking, Amphenol LUSB-A111-00
Mating connector: USB Type A plug

Socket J10 provides the USB Host 2 port. This port supports high-current devices such as plug-in USB modules. For further details, see Universal Serial Bus, page 12.

> **Notes:**
> As a volume production option, the Catalyst FX can provide USB Host 2 on a header in place of the USB Type A socket. For additional information, contact your local Eurotech sales representative.

J14: GPS Antenna

Board connector: SMA socket, Adam Tech RF2-03-T-00-50-G
Mating device: GPS antenna

Socket J14 provides a connection to a GPS antenna. For further details, see GPS, page 15.

J15: USB Host 3

Board connector: USB Type A receptacle with locking, Amphenol LUSB-A111-00
Mating connector: USB Type A plug

Socket J15 provides the USB Host 3 port. This port supports high-current devices such as plug-in USB modules. For further details, see Universal Serial Bus, page 12.

> **Notes:**
> As a volume production option, the Catalyst FX can provide USB Host 3 on a header in place of the USB Type A socket. For additional information, contact your local Eurotech sales representative.

J16: Ethernet

Board connector: RJ-45 socket with LEDs, Pulse Engineering JK0-0036NL
Mating connector: RJ-45 plug

Socket J16 is an RJ-45 connector providing connection to a Gigabit Ethernet network. The socket includes two Ethernet LEDs, page 22 and built-in magnetics. For further details, see Ethernet, page 14.

J17: Power Input

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

The Catalyst FX accepts a main power input on header J17. For details about input power options, see Power Supply Architecture, page 17.

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

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

J18: Docking Connector: Power

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

J19: Expansion Connector

Board connector: 2x40 board-to-board connector, 0.5 mm, Hirose FX10A-80S/8-SV (71)
Mating connector: FX10A-80P/8-SV(71)

Socket J19 provides an expansion connector supporting custom expansion boards. This hardware flexibility enables the Catalyst FX to support a wide variety of display types, audio requirements, and system I/O. For further details, see Expansion Connector, page 15.

Pin	Name	Type	Description
1	GND	P	Ground
2	HDA_SYNC	O-HDA	Audio frame sync
3	HDA_RST#	O-HDA	Audio reset
4	HDA_SDI0	I-HDA	Audio serial data in 0
5	GND	P	Ground
6	GND		
7	LVDS_DATA0+	O-LVDS	LVDS data 0
8	LVDS_DATA0-		
9	GND	P	Ground
10	LVDS_CLK-	O-LVDS	LVDS clock
11	LVDS_CLK+		
12	GND	P	Ground
13	LVDS_DATA3+	O-LVDS	LVDS data 3
14	LVDS_DATA3-		
15	GND	P	Ground
16	GND		
17	L_CTLA_CLK	O-LVTTL	LCD SSC I^{2}C clock
18	L_CTLB_DATA	IO-LVTTL	LCD SSC I^{2}C data
19	L_DDC_DATA	IO-LVTTL	LCD DDC I^{2}C data
20	L_DDC_CLK	O-LVTTL	LCD DDC I^{2}C clock
21	GND	P	Ground
22	NC		
23	L_BKLTSEL	O-LVTTL	Backlight selection
24	PWR_BUTTON#	O-5	Power button
25	FP_RESET#	OD-3.3	Front panel reset
26	GND	P	Ground
27	SDVO_GREEN+	O	SDVO green data
28	SDVO_GREEN-		
29	GND	P	Ground
30	SDVO_RED+	O	SDVO red data
31	SDVO_RED-		
32	GND	P	Ground
33	V3.3S	PO	Normal operating 3.3 V
34	V3.3S		

Pin	Name	Type	Description
35	V3.3S		
36	V9-36	PO	9 V (option for up to 36 V)
37	EX_BRD_ID1	I-LVTTL	Expansion board ID1
38	SMB_CLK	OD-LVTTL	SMBus clock
39	SMB_DATA	IO-LVTTL	SMBus data
40	EX_BRD_ID0	I-LVTTL	Expansion board ID0
41	SMB_ALERT#	OD-LVTTL	SMBus activity alert
42	USB6_P-	IO	USB Host 6 (high speed only)
43	USB6_P+		
44	GND		Ground
45	V9-36	PO	9 V (option for up to 36 V)
46	V5S	PO	Normal operating 5 V
47	V5S		
48	V5S		
49	GND	P	Ground
50	SDVO_BLUE-	O	SDVO blue data
51	SDVO_BLUE+		
52	GND	P	Ground
53	SDVO_CLK-	O	SDVO clock reference
54	SDVO_CLK+		
55	GND	P	Ground
56	SDVO_CTLCLK	O	SDVO DDC I^{2}C clock
57	SDVO_CTLDATA	IO	SDVO DDC I^{2}C data
58	RESET_SDVO#	O-CMOS	SDVO reset
59	GPIO2	IO-CMOS	GPIO from Catalyst XL
60	GND	P	Ground
61	L_VDDEN	O-LVTTL	LCD power enable
62	L_BKLTCTL	O-LVTTL	Backlight brightness control PWM signal
63	L_BKLTEN	O-LVTTL	Backlight power on/off
64	VIDEO_PWRGD	I-3.3	Indicator for input power voltages
65	GND	P	Ground
66	GND		
67	USB_HUB3-	IO	USB Host 3 (from USB Hub)
68	USB_HUB3+		
69	GND	P	Ground
70	LVDS_DATA2-	O-LVDS	LVDS data 2
71	LVDS_DATA2+		
72	GND	P	Ground
73	LVDS_DATA1-	O-LVDS	LVDS data 1
74	LVDS_DATA1+		
75	GND	P	Ground
76	GND		
77	HDA_CLK	O-HDA	Audio clock
78	HDA_SDO	O-HDA	Audio serial data out
79	HDA_SPKR	O-HDA	Audio speaker
80	GND	P	Ground

J22: SD Card Slot (option)

Board connector: SD/MMC socket, 3M™ SD-RSMT-2-MQ-WF
Mating connector: SD/MMC card

As a volume production option, the Catalyst FX can include a SD card slot on socket J22 in place of the CF card socket J25. The 10-pin SD socket J22 supports both SD card and MMC card formats. For a description of the external memory interfaces available on the Catalyst FX, see External Memory Interfaces, page 12.

J25: CompactFlash Card Slot

Board connector: Type I and II CompactFlash card header, 3M™ N7E50-Q516RB-40
Mating connector: CompactFlash card

The Catalyst FX includes a CF card slot on socket J25. The 50-pin CF socket J25 conforms to the CompactFlash standard for Type I and II cards operating at 3.3 V. For a description of the external memory interfaces available on the Catalyst FX, see External Memory Interfaces, page 12.

J26: USB Host 0

Board connector: USB Type A receptacle, Molex 67329-8001
Mating connector: USB Type A plug

Socket J26 provides the general-purpose USB Host 0 port. For further details, see Universal Serial Bus, page 12.

J27: USB Host 1

Board connector: USB Type A receptacle, Molex 67329-8001
Mating connector: USB Type A plug

Socket J27 provides the general-purpose USB Host 1 port. For further details, see Universal Serial Bus, page 12.

J28: SATA Drive

Board connector: 22-pin SATA socket FCI 10029364-001LF
Mating device: 2.5-inch SATA disk drive

Socket J28 supports an optional 2.5-inch SATA disk drive. For a description of the external memory interfaces available on the Catalyst FX, see External Memory Interfaces, page 12.

Pin	Name	Type	Description
S1	GND	P	Ground
S2	SATA_TX+		Transmit +
S3	SATA_TX-		Transmit -
S4	GND	P	Ground
S5	SATA_RX-		Receive -
S6	SATA_RX+		Receive +
S7	GND	P	Ground
P1	nc		
P2	nc		
P3	nc		
P4	GND	P	Ground
P5	GND	P	Ground
P6	GND	P	Ground
P7	+5VS_SATA	PO	5V power
P8	+5VS_SATA	PO	5V power
P9	+5VS_SATA	PO	5V power
P10	GND	P	Ground
P11	reserved		
P12	GND	P	Ground
P13	nc		
P14	nc		
P15	nc		

J29: 5V Power Output (software-switchable)

Board connector: 2-pin header, 0.1-inch, Molex 22-23-2021
Mating connector: crimp housing, Molex 22-01-2021

Header J29 provides an optional software-switchable power output that is controlled by the SMBus GPIO7. This output can be used to power buzzers, haptic feedback, or other peripherals. For electrical specifications, see Power Supply, page 29.

> **Warning:**
> The 5V PWR_OUTPUT connects directly to the Catalyst FX 5V power plane with no current limiting. If there is any chance that the connected peripheral might experience over-current conditions or it will draw significant in-rush current, include a current limiting device in your design.
>
> If the 5V power plane is drawn down by excessive external loads, the system may reset or experience other undesirable behaviour.

Pin	Name	Type	Description
1	GND	P	Ground
2	PWR_OUTPUT	PO	5V power output (software-switchable)

J30: JTAG

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

The Catalyst FX 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	JTAG interface
11	ATE_GPIO1	IO	
12	GND	P	
13	ATE_GPIO2	IO	
14	GND	P	
15	RS485/RS232	I	
16	GND	P	
17	MON_3.3VAO	PO	
18	GND	P	
19	MON_5VAO	PO	
20	GND	P	

System Specifications

Processor

The Catalyst FX 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 1)	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:
1. The standard Catalyst FX includes a 1.1 GHz, 1 GB Catalyst XL, commercial temperature.

Power

Power Supply

The following table specifies the power requirements for the Catalyst FX. For additional information about the input voltage options, see Power Supply Architecture, page 17.

Absolute Maximum Ratings
VPWR_OUT .... 1000 mA (note 2)

Symbol	Parameter	Min	Typ.	Max	Units
Input Voltage					
V_{IN}	Input voltage, regulated power	10.8	12	13.2	V
	Input voltage, vehicle power (note 2)	9		36	V
$V_{IN TRANS}$	Input transient voltage, regulated power			36	V
	Input transient voltage, vehicle power			100	V
$t_{UV/OV}$	Overvoltage or undervoltage timeout (note 3)		87		ms
PWR_OUTPUT					
V_{PWR_OUT}	Output voltage		5		V
I_{PWR_OUT}	Output current (note 4)			200	mA
PWR_BUTTON#					
V_{IH}	High-level input voltage	2.5	5		V
V_{IL}	Low-level input voltage			1.0	V

Notes:
2. The Catalyst FX is designed to be unpowered when vehicle ignition is off.
3. 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.
4. The 5V PWR_OUT on J29 connects directly to the Catalyst FX 5V power plane through a transistor. It does not include any over-current protection. See the warnings on page 28 for further details.

Power Consumption

The following table lists power consumption for example configurations of the Catalyst FX.

Symbol	Parameter	Min	Typ.	Max	Units
Fully loaded, without USB (note 5)					
P	Power		12		W
I$_{INRUSH}$	Inrush current			17	A
Fully loaded, with USB devices (note 6)					
P	Power		15		W
I$_{INRUSH}$	Inrush current			18	A

Notes:
5. Power consumption was measured on a Catalyst FX 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.
6. Power consumption was measured on a Catalyst FX 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 Catalyst FX.

Universal Serial Bus

The Catalyst FX provides five USB host ports: J26, J27, J10, J15, and J7. 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 12.

Symbol	Parameter	Min	Typ.	Max	Units
USB Host 0, USB Host 1					
I$_{USB}$	USB current			500	mA
USB Host 2, USB Host 3, USB Host4					
I$_{USB}$	USB current			1	A

SATA Drive

The following table lists the specification for the optional SATA drive. For additional information, see External Memory Interfaces, page 12.

Parameter	Min	Typ.	Max	Units
Supply voltage		5		V
Transfer rate (SATA2)			300	MB/s
Power consumption (seek)			3	W
Power consumption		1		W

General

This section provides general specifications for the Catalyst FX.

Crystal Frequencies

Agencies certifying the Catalyst FX 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 FX.

Crystals	Device	Typ.	Units
Module			
X1	RTC	32.768	kHz
X2	Clock Generator	14.31818	MHz
X4	Embedded Controller	14.7456	MHz
Carrier board			
X1	Ethernet	25.000	MHz
X2	SATA Controller	25.000	MHz
X3	USB Hub	6.000	MHz

Real-Time Clock

The Catalyst FX 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 Catalyst XL must be removed to replace the RTC battery. Incorrect removal of the module or battery could damage the Catalyst XL. For detailed module removal instructions, refer to the Catalyst Module Installation and Removal Technical Support Bulletin (Eurotech document #110122-2014).

EMI/EMC

The Catalyst FX is designed to meet the EMI/EMC requirements listed in the following table. Any plug-in USB modules 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 Catalyst FX is designed to meet the environmental specifications listed in the following table. The mechanical specifications assume that the Catalyst FX is mounted in an enclosure.

Parameter	Specification
Commercial operating temperature	0°C to +70°C
Industrial operating temperature (note 7)	-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

Notes:

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

Board Revision History

This manual applies to the current revision of the Catalyst FX carrier board as given in the following sections. For the Catalyst XL revision history, refer to the Catalyst XL Design-In Guide (Eurotech document #110123-3003).

Identifying the Board Revision

The revision number of the carrier board is printed on the printed wiring board (PWB). That number is 170124-300Rx, 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 A

Production release

Revision B

Changes

Adds software control for switching between EIA-232 and EIA485 on serial port J5
Swaps J5 pin 4 and J5 pin 7 for EIA-485 mode

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

ACPI Specification

Information about the ACPI specification:
www.acpi.info

NXP

Information about the general-purpose I/O ports:
www.nxp.com

Appendix B – Development Kit

Catalyst FX Development Kits are designed to get the developer up and running quickly. These kits allow you to become familiar with the Catalyst FX functionality and to develop applications prior to customization for your specific requirements. Eurotech offers development kits for the Catalyst FX with a LCD and without a LCD. Each type is available with the Wind River Linux or Windows Embedded Standard operating system. For additional information about the Catalyst FX Development Kits, contact your local Eurotech sales representative.

Catalyst FX Development Kit

The Catalyst FX Development Kit provides a development platform using the Catalyst FX with your standard VGA monitor.

Development Kit Components

The development kit includes the following components:

- Catalyst FX carrier board with Catalyst XL and Catalyst FX VGA Expansion Board
- Null modem cable (For Wind River Linux)
- GPS Antenna
- 12 VDC adapter and regional AC power cord
- CF card loaded with Wind River Linux or Windows Embedded Standard
- Utiliboot USB flash drive and Wind River Linux LiveUSB flash drive (For Wind River Linux)
- FreeDOS USB flash drive
- Catalyst FX Development Kit Quick Start (Eurotech document #110124-3013 or #110124-3015)

Catalyst FX Development Kit with LCD

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

Development Kit Components

The development kit includes the following components:

- Catalyst FX carrier board with Catalyst XL and Catalyst FX LVDS Expansion Board
- 10.4-inch SVGA TFT LCD with touch screen and backlight inverter
- Null modem cable (For Wind River Linux)
- GPS Antenna
- 12 VDC adapter and regional AC power cord
- CF card loaded with Wind River Linux or Windows Embedded Standard
- Utiliboot USB flash drive and Wind River Linux LiveUSB flash drive (For Wind River Linux)
- FreeDOS USB flash drive
- Catalyst FX Development Kit Quick Start (Eurotech document #110124-3014 or #110124-3016)

Please make sure you have received all the components before you begin your development. For details about getting started, refer to the quick start.

Appendix C – Maintenance Port

The serial port located on header J1, page 23 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 J1 on your Catalyst FX. Create a custom cable using the information given on page 23 or contact your local Eurotech technical support for availability of an adapter cable.

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
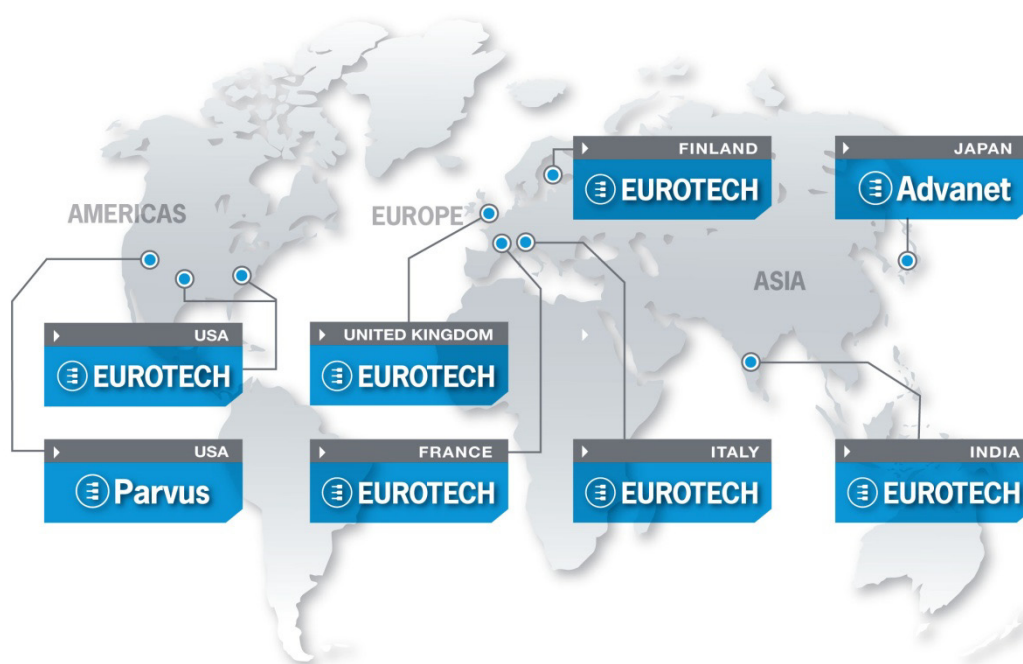- Flow control: none

Port Output

Connect power to the Catalyst FX. The following text is displayed on the terminal.

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

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