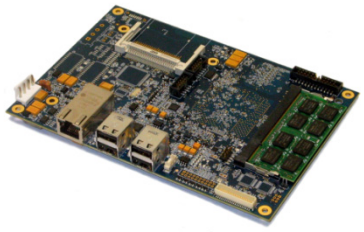
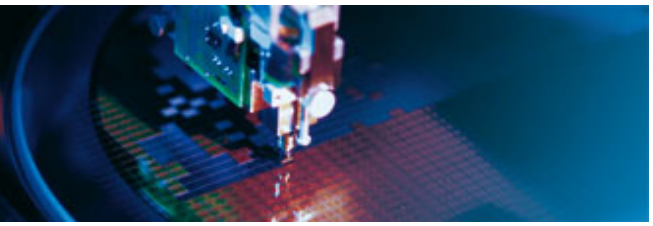
USER MANUAL





# Vector

## Single Board Computer

Rev A – January 2011 – 110124-7000A

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# Document Revision History

| REVISION | DESCRIPTION | DATE |
|---|---|---|
| **2** | For preliminary release only | May 2010 |
| **3** | Updated for revision A boards | November 2010 |
| **A** | Front cover photo added<br>Notes added or revised for SATA, USB Client, serial port, Mini PCIe, touch panel, and general-purpose LEDs<br>Mounting information added<br>Thermal Management section added<br>Revision history revised | January 2011 |

Unless specified otherwise, the information in this manual applies to the latest revision of the Vector, as described in Board Revision History, page 41. For information about previous board revisions, check the Eurotech support site (http://support.eurotech-inc.com/) or contact your local Eurotech technical support.

# 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 37. 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 44 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 44 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 Vector is a high-performance, low-cost single board computer based on the Intel® Atom™ Z5xxP/PT processor. It uses an integrated two-chip solution comprised of the Intel Atom processor and Intel® System Controller Hub US15WP/PT (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 Vector conforms to the EPIC form factor and implements several industry-standard interfaces supporting a broad spectrum of end-use applications. With the Vector, embedded users can gain higher performance at a lower cost.

The Vector 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 Vector. Dotted lines indicate volume production options. For additional information, contact your Eurotech local sales representative.

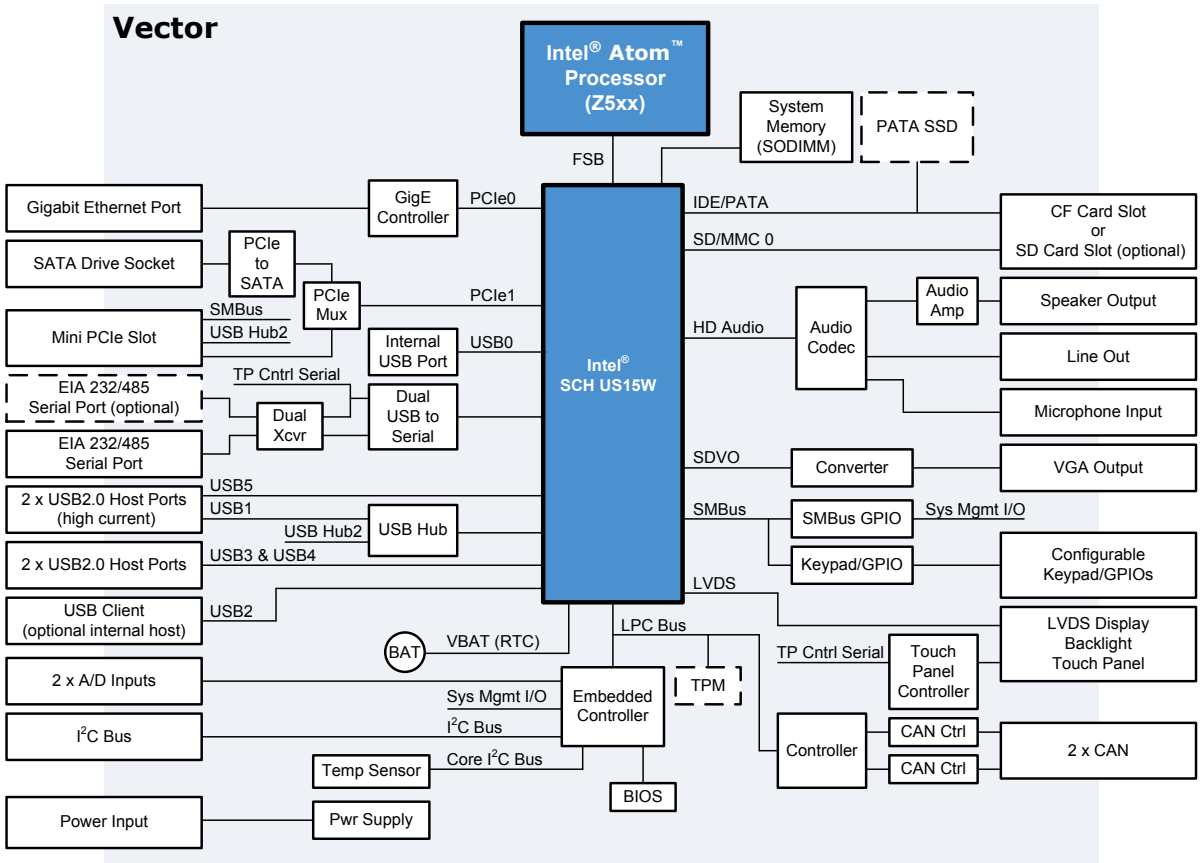


Figure 1. Vector Block Diagram

**Notes:**
Figure 1 represents the full feature set of the Vector as provided by the Vector Development Kit (VEC7000). Scaled-down feature configurations are available offering lower cost solutions for your specific application. For additional information about the various configurations of the Vector, contact your local Eurotech sales representative.

# Features

## *Processor*

- Intel® Atom™ Z5xxP/PT processor at 1.6 GHz (options for 1.1 GHz or 1.33 GHz)
- Intel® System Controller Hub US15WP/PT

## *Integrated System Functions*

- Embedded Controller
- Trusted Platform Management (option)

## *Memory*

- DDR-2 DRAM SODIMM (options up to 2 GB)
- Integrated system BIOS
- Battery-backed real-time clock
- PATA SSD (option)
- External memory support
  - CF card or SD card (option)
  - SATA drive or Mini PCI Express card
  - USB disk drive

## *Communications*

- Six USB 2.0 ports operating at low, full, and high speeds
  - Two general-purpose USB host ports
  - Two high current USB host ports for plug-in USB modules and additional storage
  - One internal USB host port
  - USB client port or internal USB host port
- Up to two EIA-232/485 serial ports
- Mini PCI Express slot or SATA drive
- Gigabit Ethernet port
- Two CAN2.0 busses
- $I^2C$ bus master

## *User Interface and Display*

- Two independent display outputs
  - LVDS display output
  - VGA output (options for S-Video or CBVS)
- Backlight interface with control signals for intensity and on/off
- Touch panel controller

## *Audio Interface*

- Intel® High Definition Audio compatible codec
  - Stereo speaker output
  - Stereo line output
  - Stereo microphone input

## *Inputs and Outputs*

- Eighteen configurable I/O
  - Up to 10x8 keypad
  - Up to 18 GPIO with interrupt capability
- Two A/D inputs

### *Power Supply*

- 12 V (nominal) DC power input

### *Mechanical*

- EPIC form factor (165 mm x 115 mm)

### *Environmental*

- Extended-operating temperature available

**Notes:**
The features listed in this section define the full capability of the Vector as provided by the Vector Development Kit (VEC7000). Eurotech also offers an industrial temperature configuration and a scaled-down feature configuration.

In the industrial configuration, the processor speed is 1.33 GHz and the VGA output is not populated.

In the scaled-down feature configuration, the processor speed is 1.1 GHz, the second serial port replaces the touch panel controller, and the following features are not populated:

- CAN
- SATA or Mini PCI Express
- Audio
- VGA

For additional information about the various configurations of the Vector, contact your local Eurotech sales representative.

# Related Documents

This document describes the Vector and is intended for software application developers and system integrators. For additional information about the Vector, including errata reports, user documents, and developer's forums, check the Eurotech support site (http://support.eurotech-inc.com/).

# 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 Vector. For additional details, contact your local Eurotech technical support.

## Operating System

The Vector is available with the following operating systems:

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

## BIOS

The Vector incorporates a custom system BIOS developed by Eurotech.

## Boot Options

The Vector has the capability to boot and install the operating system from four sources. The following are the boot options:

- CF card (standard) or SD card
- USB disk drive (standard)
- SATA drive
- PATA SSD

## 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 Vector.

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

# Hardware Specification

## Core Processor

The Vector bases its architecture on an integrated two-chip solution comprised of the Intel Atom Z5xxP/PT processor and Intel SCH US15W. In addition, the Vector fully integrates system functions that include system management and control implemented by an advanced chip-level solution, tightly integrated power management controls, system BIOS firmware memory, and an optional Trusted Platform Management (TPM) for industry-standard secure data encryption. This fully integrated and flexible feature set increases product readiness and compliance. The following sections describe the functionality and feature set of this processor technology as it relates to the Vector architecture.

### *Intel Atom Processor*

At the core of the Vector is the Intel Atom processor that incorporates the new low-power Intel micro architecture. The standard processor operating frequency is 1.6 GHz with 1.1 GHz and 1.33 GHz options available. For further details about the processor performance, see Processor, page 37.

### *Intel System Controller Hub US15W*

The Intel Atom processor operates in conjunction with the Intel SCH US15W. This companion device provides a wide range of capabilities that include a 2D/3D graphics controller, PCI Express x 1 buses, USB ports, an SD/MMC interface, Intel High Definition Audio support, an IDE/PATA interface, SMBus, LPC bus, and a real-time clock function. Subsequent sections describe how the Vector uses each capability.

### *Embedded Controller*

An embedded controller included on the Vector performs three main functions: standard firmware hub (FWH) logic emulation, ACPI power management, and system monitoring. For electrical specifications of the external I/O signals provided by the embedded controller, see Embedded Controller, page 37.

Combined with the system BIOS memory, the embedded controller provides logic emulation of standard FWH functions. It connects to the Intel SCH US15W using the LPC bus and to the system BIOS memory using a serial peripheral interface (SPI). For a description of the system BIOS memory, see BIOS and Configuration Data, page 14.

As a second function, the embedded controller supports ACPI power management. It ensures proper start-up, shutdown, and power saving transitions by sequencing the on-board voltages. For further details about power management, see Power and Power Management, page 22.

Lastly, the embedded controller provides hardware monitoring for temperature and voltage and general-purpose analog-to-digital (A/D) conversion. Temperature monitoring measures temperatures on the Intel Atom processor and near the memory chips, while voltage monitoring measures the input power and on-board voltage regulators. For general purpose A/D conversion, two analog inputs are available on header J23, page 34.

### *Trusted Platform Management (option)*

The optional TPM function is compliant with the Trusted Computer Group specification version 1.2. This function provides public key generation, public key storage encryption/decryption, storage of hashes, key endorsement, and TPM initialization. The TPM device connects to the LPC bus. If your application requires the TPM function, contact your local Eurotech sales representative for additional information.

# Memory

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

## *Synchronous DRAM*

A Double Data Rate Synchronous DRAM (DDR-2) small outline dual in-line memory module (SODIMM) is used on the Vector for system main memory and frame buffer memory. The module is installed in J32, page 35. Standard Vector boards include a 1 GB module. At boot, the BIOS reads a Serial Presence-Detect (SPD) flash memory device on the SODIMM through the SMBus to identify the installed module. Eurotech has pretested and approved several SODIMMs for use with the Vector. For the latest list of memory modules, contact your local Eurotech sales representative.

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. For performance specifications, see Processor, page 37.

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 Vector 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 Vector. Standard configuration is 1 MB. The flash device performs logically as a firmware hub (FWH) and connects to the on-board embedded controller using a serial peripheral interface (SPI).

### Real-Time Clock

The Vector 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 the board. To supply backup power, the Vector includes a long-life battery. For general specifications, see Real-Time Clock, page 40.

## *PATA Solid State Drive (option)*

A Parallel ATA (PATA) Solid State Drive (SSD) is available as a volume production option. Options of 2 Gb, 4 GB, and 8GB are available. The processor controls the write-protection and can reset the drive using the SMBus. For details about these control signals, see System Management I/O, page 21. 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 12.

## *External Memory Interfaces*

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

### CompactFlash® Card or Secure Digital Card

The Vector includes a CompactFlash (CF) card slot on J29, page 35. This slot supports a 3.3 V CF card operating in fixed mode only (true IDE mode). As a volume production option, a Secure Digital (SD) card slot on J31, page 35 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.

**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 Vector supports a single, 5 V, 2.5-inch form factor SATA drive on sockets J14, page 31 and J37, page 36. For SATA drive specifications, see SATA Drive, page 38.

**Notes:**
The on-board SATA controller and Mini PCIe expansion slot share a PCIe bus from the Intel SCH US15W through an on-board PCIe multiplexer. Therefore, these functions are mutually exclusive. The multiplexer is software-controlled using the SMBus GPIO13 signal. By default, SATA is enabled.

On the development kit, this default setting can be changed using the BIOS setup utility. For details about changing the BIOS settings, see the Vector Development Kit Quick Start (Eurotech document # 110124-7001).

### USB Disk Drive

A USB disk drive can connect to any of the four USB host ports on the dual USB sockets: J18 and J22. For a description of these ports, see Universal Serial Bus, page 15.

# Communications

A key capability of the Vector is its comprehensive system connectivity. It includes six USB ports, up to two EIA-232/485 serial ports, Mini PCIe expansion slot, a Gigabit Ethernet port, two CAN 2.0B buses, and an $I^2C$ bus. The following sections describe these interfaces.

## *Universal Serial Bus*

The Universal Serial Bus (USB) ports included on the Vector support connectivity with a wide range of available USB devices. The following table describes the six USB ports.

| Socket | | Description |
|---|---|---|
| **J18 (top)** | **USB Host 1** | High-current USB host |
| **J18 (bottom)** | **USB Host 5** | |
| **J22 (top)** | **USB Host 3** | General-purpose USB host |
| **J22 (bottom)** | **USB Host 4** | |
| **J26** | **USB Client** | USB client (optional USB host) |
| **J35** | **USB Host 0** | USB host (for internal system use) |

Table 1. USB Host Ports

The processor can individually enable the USB ports using the SMBus with the exception of the USB Host 0. For details about these control signals, see System Management I/O, page 21. For electrical specifications for the USB ports, see Universal Serial Bus, page 38.

### General-purpose USB Host

The Vector provides two general-purpose USB host ports supporting the USB 2.0 specification operating at high (480 Mbps), full (12 Mbps), or low (1.5 Mbps) speeds. These ports provide power management including power switch, current limiter circuit, common mode chokes, and over-current protection allowing these ports to connect to external devices. Connect client devices such as USB mouse, keyboard, and storage to USB Host 3 and USB Host 4 on J22, page 34. The USB protocol allows client devices to negotiate the power they need from 100 mA to 500 mA in 100 mA increments. The Vector supplies 5 V power to these USB host ports through a power switch with over-current detection. Make sure to account for power used through USB in your power budget.

### High-current USB Host

USB Host 1 and USB Host 5 on J18, page 33 are designed to support higher-current, plug-in USB modules. Similar to the two general-purpose USB host ports, these ports include on-board power management circuitry and support the USB 2.0 specification operating at high (480 Mbps), full (12 Mbps), or low (1.5 Mbps) speeds. However, the current rating is higher than the general-purpose ports allowing expanded capability.

### Internal USB Host

USB Host 0 supports the USB 2.0 specification operating at high (480 Mbps), full (12 Mbps), or low (1.5 Mbps) speeds; however, this port does not include power management. These USB signals route directly from the SCH US15W to header J35, page 36. Use this port to connect to devices internal to your system.

### USB Client (optional USB Host)

Header J26, page 35 supports a USB 2.0 client port. USB client devices are self-powered or can receive power from the host computer. Since the USB cable does not power the Vector, it does not need a power input. However, the USB input power is used to sense when a USB cable is connected.

**Notes:**
This port can function as an additional USB host port using an external adapter. If your application requires a USB host port in place of the USB client port, contact your local Eurotech sales representative for additional information.

On the development kit, the USB Client port is disabled by default and can be enabled using the BIOS setup utility. For details about changing the BIOS settings, see the Vector Development Kit Quick Start (Eurotech document # 110124-7001).

## *Serial Ports*

The Vector provides one serial port on header J27, page 35 and an optional second serial port on header J34, page 36. Each serial port supports baud rates from 300 bps to 1.2 Mbps. By default, these ports are configured as 5-wire, EIA-232 serial ports. As an alternate configuration, each serial port can operate in EIA-485 mode. This configuration requires software support for EIA-485 mode including control of the SMBus GPIO signals, GPIO00 and GPIO03, which select the mode of operation.

The serial port enable is also software-controlled using the SMBus GPIO04. This signal enables or disables both serial ports. For details about these control signals, see System Management I/O, page 21.

**Notes:**
The on-board touch panel controller and second serial port share a serial interface; therefore, these functions are mutually exclusive. Selection of the function is set at time of production. In the default configuration, the touch panel controller is selected and header J34 is not populated.

On the development kit, Serial Port 1 is disabled by default and can be enabled using the BIOS setup utility. The mode of operation for the serial port can also be changed using this utility. For details about changing the BIOS settings, see the Vector Development Kit Quick Start (Eurotech document # 110124-7001).

## *Mini PCIe Expansion Slot*

The Vector provides a Mini PCI Express (PCIe) expansion slot on J33, page 36, supporting off-the-shelf, third-party peripherals. This expansion slot includes a PCIe x 1 bus, USB host port, SMBus, control signals, and LED indicators.

**Notes:**
The Mini PCIe expansion slot and on-board SATA controller share a PCIe bus from the Intel SCH US15W through an on-board PCIe multiplexer; therefore, these functions are mutually exclusive. The multiplexer is software-controlled using the SMBus GPIO13 signal.

In the default setting, SATA is enabled and the PCIe bus is not available on J33. However, the USB host port and SMBus are available for use supporting USB-only cards.

On the development kit, this default setting can be changed using the BIOS setup utility. For details about changing the BIOS settings, see the Vector Development Kit Quick Start (Eurotech document # 110124-7001).

Eurotech has pretested and approved various peripherals for use with the Vector. For the latest list, check the Eurotech support site (http://support.eurotech-inc.com/) or contact your local Eurotech technical support.

## Ethernet

For direct network connectivity, the Vector includes a Gigabit Ethernet Controller and the RJ-45 socket J12, page 31. This RJ-45 socket includes two Ethernet LEDs, page 28 and built-in magnetics. The processor enables the Ethernet Controller using the SMBus GPIO02. For details about this control signal, see System Management I/O, page 21.

## CAN 2.0B

The Vector supports two CAN (Controller Area Network) buses on header J24, page 34 and header J25, page 34 that are compliant with the CAN 2.0B specification. Each CAN 2.0B bus includes a CAN controller, transceiver, common mode filter, and ESD protection. The CAN bus circuitry connects to the LPC bus through a CPLD. This CPLD acts as an encoder/decoder translating data between the LPC bus and the CAN controller and includes interrupt capability using the serial interrupt on the LPC bus.

## $I^2C$ 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 Vector embedded controller acts as bus master and uses this bus to communicate with external devices on header J9, page 30.

The following diagram illustrates the $I^2C$ bus architecture on the Vector. Notice that the Vector does not include termination on the $I^2C$ bus. Include external 10kΩ pull-up resistors to V3.3A.

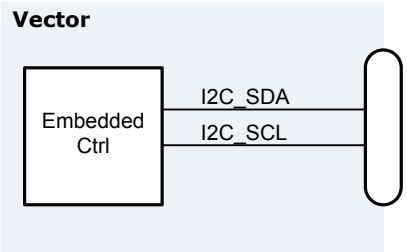


Figure 2. $I^2C$ Bus Architecture

## System Management Bus

System Management Bus (SMBus) is a serial interface allowing multiple devices to communicate with each other. The Intel SCH US15W acts as bus master and uses this bus to communicate with an on-board clock generator, the SODIMM SPD EEPROM, SMBus GPIO, and Keypad/GPIO. The bus is also available externally on the Mini PCIe expansion slot J33, page 36.

The following diagram illustrates the SMBus architecture on the Vector.

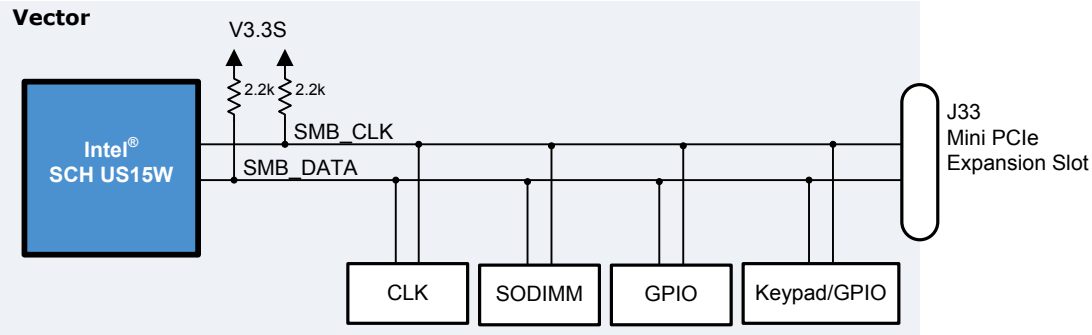


Figure 3. SMBus Architecture

The following table lists the addresses of the SMBus devices on the Vector.

| Device | Address | Function |
|---|---|---|
| **Clock Generator** | 1101 0010<br>1101 0011 | Write<br>Read |
| **SODIMM SPD EEPROM** | (note 1) | Write<br>Read |
| **SMBus GPIO 7:0** | 0100 0000<br>0100 0001 | Write<br>Read |
| **SMBus GPIO 15:8** | 0100 0100<br>0100 0101 | Write<br>Read |
| **Keypad/GPIO** | 0110 1000<br>0110 1001 | Write<br>Read |

Notes:
1. The SODIMM conforms to the General Standard Serial Presence-Detect Standard that is contained in the JEDEC Standard JESD21-C. On the Vector, SA1 and SA0 are a logic level low.

Table 2. SMBus Addresses

For details about the functions performed by the System Management I/O, see page 21.

# User Interface and Display

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

This section summarizes the Vector 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 Output*

The growing demand for higher resolution displays has been meet 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 Vector provides an LVDS output to drive a primary display on header J15, page 32. This display output consists of three or four LVDS data pairs, as well as an LVDS pixel clock, supporting 18-bit or 24-bit color. The default is 18-bit color.

**Notes:**
The LVDS signals are driven directly by the Intel SCH US15W; therefore, cable lengths should be kept to a minimum. Eurotech recommends that cables be less than eight inches in length. If your application requires cable lengths longer than eight inches, the Vector can include an on-board LVDS buffer/repeater with configurable pre-emphasis as a volume production option.

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 |
| **Configuration** | Extended Display Identification Data (EDID) and non-EDID |
| **Operation** | Extended desktop or clone mode |
| **Display parameter** | Centering, scaling, and rotation |

Table 3. LVDS Display Capabilities

Additional capabilities of the LVDS display output include software-controlled display power and display scan control. For electrical specifications, see LVDS Display Output, page 38.

## VGA Display Output (S-Video or CVBS option)

To support a standard VGA monitor, the Vector includes an on-board SDVO/RGB display converter that accepts the Serial Digital Video Output (SDVO) from the Intel SCH US15W, 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. Header J13, page 31 provides the analog RGB display output. For electrical specifications, see VGA Display Output, page 38.

In addition to the 8:8:8 RGB data, the display converter provides a Display Data Channel (DDC) interface on connector J13 for monitor “plug and play”.

**Notes:**
As a volume production option, the Vector can provide an S-Video or CVBS output supporting Standard Definition Television (SDTV) displays. With this option, a SDTV/HDTV encoder replaces the SDVO/RGB display converter providing either an S-Video or CVBS output on header J13.

## Backlight

Most LCDs include one or more cold-cathode fluorescent lamp (CCFL) tubes to backlight the display. 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. Applications can dim or turn off the backlighting to reduce power consumption.

The Vector supplies software-controlled backlight power and two backlight control signals on header J15, page 32. For electrical specifications, Backlight, page 39.

The following table describes the backlight signals.

| Signal | J15 | Description |
|---|---|---|
| **V_BACKLIGHT** | 2,4 | 5 V backlight power (VIN option) |
| **L_BKLTEN_B** | 10 | Turns backlight power on or off |
| **L_BKLTCTL_FIL** | 12 | Controls the intensity of the backlight |

Table 4. Backlight Control Signals

## Touch Panel Controller

An on-board touch panel controller drives 4-, 5-, and 8-wire resistive touch panels. Header J15, page 32 includes the touch panel signals, while jumper JP3, page 29 selects the number of wires. By default, the Vector supports for 4- or 8-wire touch panels. For electrical specifications, see Touch Panel Controller, page 38.

The following table describes the wiring for 4-, 5-, and 8-wire resistive touch panels on header J15.

| J15 Pin | Name | 4-Wire | 5-Wire | 8-Wire |
|---|---|---|---|---|
| **26** | SX- | | Wiper | Left sense |
| **28** | SY- | | | Bottom sense |
| **30** | SY+ | | | Top sense |
| **32** | R (X+) | Right | Lower right | Right |
| **34** | B (Y-) | Bottom | Lower left | Bottom |
| **36** | T (Y+) | Top | Upper right | Top |
| **38** | L (X-) | Left | Upper left | Left |
| **40** | SX+ | | | Right sense |

Table 5. Touch Panel Wiring

**Notes:**
The on-board touch panel controller and second serial port share a serial interface; therefore, these functions are mutually exclusive. Selection of these functions is set at time of production. In the default configuration, the touch panel controller is selected and the second serial port is not available.

# Audio Interface

For its audio interface, the Vector uses an Intel® High Definition Audio (Intel HD Audio) compatible codec providing high quality audio in an embedded environment. The following sections describe the audio inputs and audio outputs provided by this codec. For electrical specifications, see Audio Interface, page 39.

### *Audio Inputs: Microphone*

The Vector supports a stereo microphone input on header J6, page 30. This header includes a microphone plug in sense signal.

### *Audio Outputs: Stereo Speakers and Stereo Line Out*

The Vector drives an amplified speaker output on header J4, page 29 and a stereo line output on header J5, page 29. The stereo line out header includes a presence detect signal.

# A/D Inputs

The Vector embedded controller accepts two analog inputs from header J23, page 34 for general-purpose A/D conversion. The embedded controller performs the A/D conversion and the processor reads the result from the LPC bus. For electrical specifications, see Embedded Controller, page 37.

# Discrete I/O

The Vector provides various inputs and outputs (I/O) to support an external keypad, to provide general-purpose inputs and outputs, and to control on-board functionality. The SMBus controls these I/O devices. The following sections describe the discrete I/O on the Vector.

### *Keypad/GPIO*

A keypad scan device included on the Vector supports up to a 10x8 keypad or up to eighteen GPIOs. The default setting is eighteen GPIOs. Configuration is software-controlled using the SMBus. For the SMBus address of this device, see System Management Bus, page 17. The keypad/GPIO signals are available on header J21, page 33. For electrical specifications, see Keypad/GPIO, page 39.

### *System Management I/O*

The I/O port on the SMBus provides sixteen GPIO for control of on-board functionality. This port is implemented by two NXP PCA9554 devices with each device supplying eight bits of general-purpose I/O expansion. For the SMBus address of these devices, see System Management Bus, page 17.

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

| SMBus GPIO | Name | Type | Description |
|---|---|---|---|
| **0** | RS485/232_B | O | Serial port 2 mode select<br>(1 = EIA-485, 0 = EIA-232) |
| **1** | LVDS_PDWN# | O | Optional LVDS buffer shutdown<br>(1 = on, 0 = off) |
| **2** | LAN_ENABLE | O | Ethernet controller enable<br>(1 = enable, 0 = disable) |
| **3** | RS485/232_A | O | Serial port 1 mode select<br>(1 = EIA-485, 0 = EIA-232) |
| **4** | BUF_ON | O | Serial port buffer enable<br>(1 = enable, 0 = disable) |
| **5** | LED_GREEN | O | Green LED control (D58)<br>(0 = off, 1 = on) |
| **6** | LED_RED | O | Red LED control (D57)<br>(0 = off, 1 = on) |
| **7** | WIFI_PD# | O | Mini PCIe expansion slot WIFI power down<br>(1 = on, 0 = off) |
| **8** | USB5_EN# | O | USB host 5 power enable<br>(1 = off, 0 = on) |
| **9** | USB1_EN# | O | USB host 1 power enable<br>(1 = off, 0 = on) |
| **10** | USB2_EN | O | USB client enable<br>(1 = on, 0 = off) |
| **11** | USB3_EN | O | USB host 3 power enable<br>(1 = on, 0 = off) |
| **12** | USB4_EN | O | USB host 4 power enable<br>(1 = on, 0 = off) |
| **13** | CHAN_SEL | O | PCIe multiplexer select<br>(1 = SATA drive, 0 = Mini PCIe expansion slot) |
| **14** | ATA_FLASH_WP | O | PATA SSD write protect<br>(1 = write protect, 0 = write enable) |
| **15** | ATA_FLASH_POR | O | PATA SSD power on reset<br>(1 = reset, 0 = normal operation) |

Table 6. SMBus GPIO

# System Monitoring

The embedded controller provides hardware monitoring for temperature and voltage. Temperature monitoring measures temperatures on the Intel Atom processor and near the memory chips. Voltage monitoring measures the input power and on-board voltage regulators.

# 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 Vector includes advanced power management features, including the low-power Atom processor, Advanced Configuration and Power Interface (ACPI) power management, and the ability to operate in power-saving modes.

This section provides an overview of the power supply architecture and summarizes the Vector power management system.

## *Power Supply Architecture*

On-board voltage regulators accept the main input voltage from header J10, page 30, and generate all other voltages required by the Vector circuitry. The embedded controller controls proper sequencing of voltages to allow for proper start-up, shutdown, and power saving transitions. In addition, it monitors input power voltages and the on-module voltage regulators.

The following diagram illustrates the power supply architecture of the Vector. Notice that voltages ending with an “A” indicate supplies that are always on, while voltages ending with an “S” indicate supplies that are switchable. For power specifications, see Power, page 37.

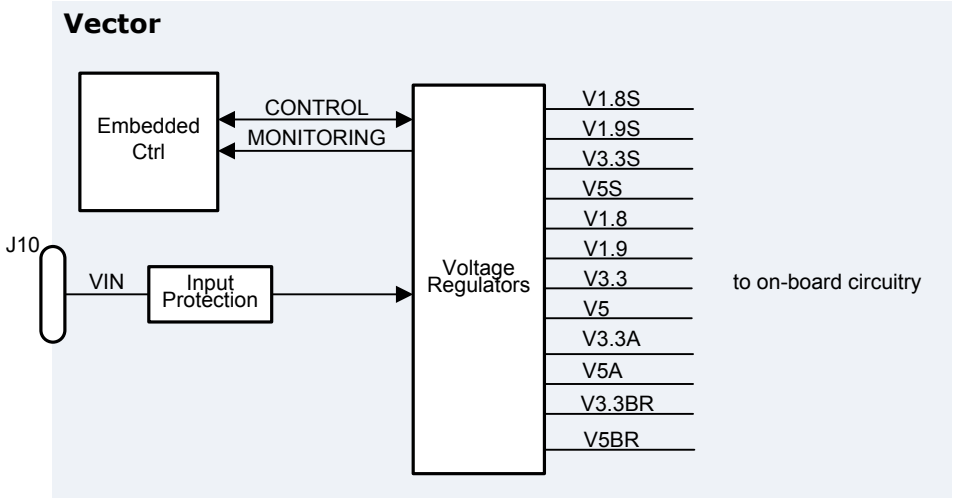


Figure 4. Power Supply Architecture

The Vector 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:

- LVDS display and backlight
- Ethernet
- Serial port
- USB ports
- Wireless module (Mini PCIe expansion slot)

### *ACPI Power Management States*

The Vector 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 Vector 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 Vector.

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

Table 7. Low Power States

The Vector can be "awakened" and returned to full operation by initiating a system wakeup. The following are some of the methods that can wake the system. The actual method implemented depends on your application.

- Sleep/Wake input (JP2 or J9 pin 3)
- Keypad/GPIO
- Ethernet
- USB

# Mechanical

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

### *Mounting Holes*

The Vector includes two sets of four mounting holes that enable the following mountings:

- SATA disk drive to Vector
- Vector to enclosure

The four mounting holes for the enclosure connect electrically to the ground plane using 0Ω resistors. For reliable ground connections, use locking washers and make sure that washers do not extend beyond the limits of the pads provided.

Per IPC-A-610D section 4.2.3, secure the board 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.

For applications in high shock and vibration environments, Eurotech recommends using all eight mounting holes to secure the Vector to an enclosure.

## *Mechanical Drawing*

The following mechanical drawings specify the dimensions of the Vector, as well as locations of key components on the board. All dimensions are in inches.

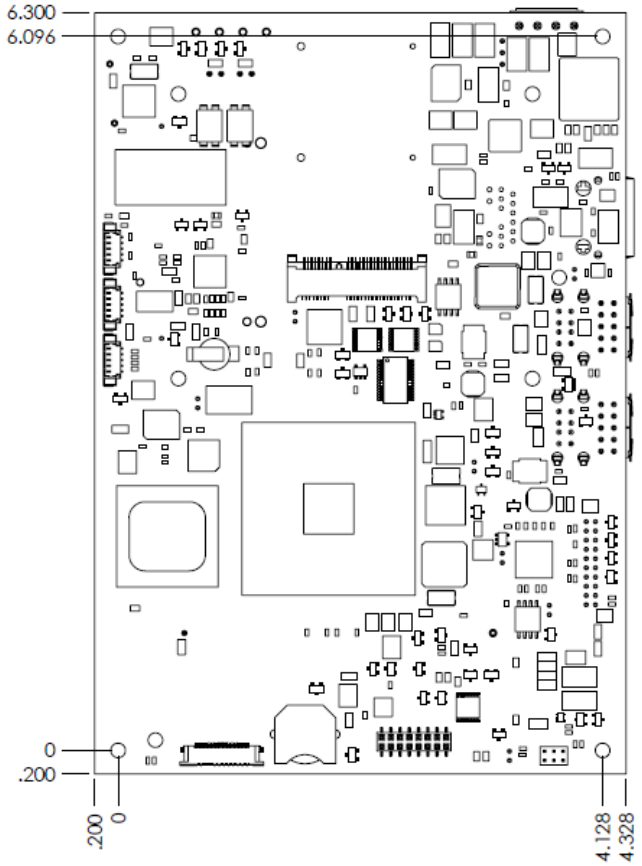


Figure 5. Vector, Top View

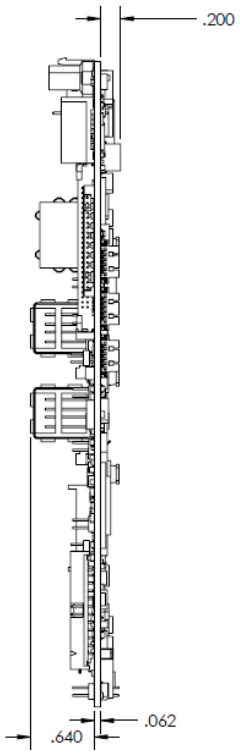


Figure 6. Vector, Side View

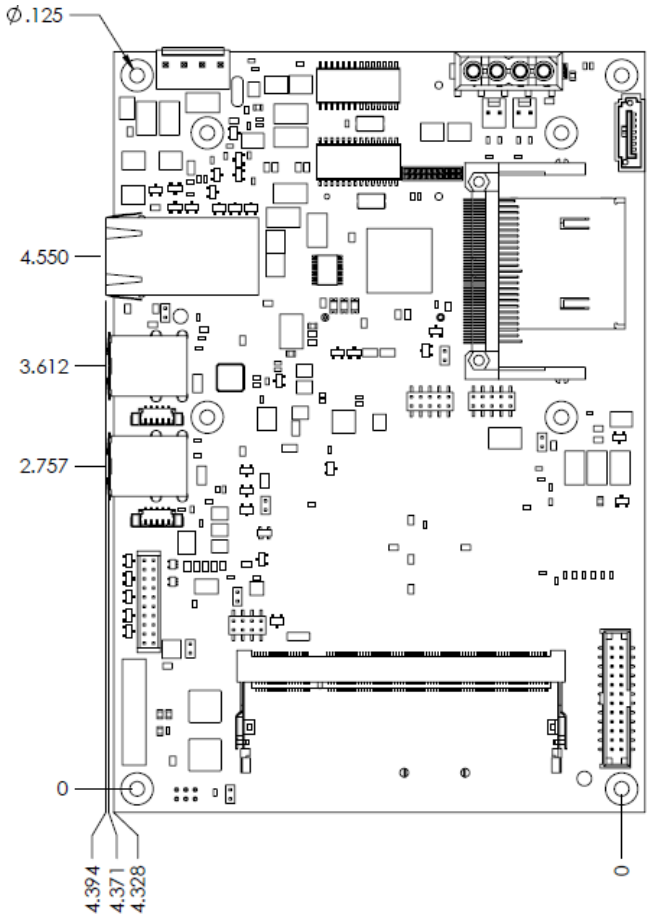


Figure 7. Vector, Bottom View

# Thermal Management

The following sections provide details about thermal management for the Vector.

## *Thermal Design Power*

When installed in an enclosure, the Vector may require convective cooling or heat spreading to dissipate the heat generated by the Intel Atom processor and Intel SCH US15W. The following table summarizes the power dissipation of these components. For additional information, refer to the Intel® Embedded Design Center at http://edc.intel.com/Platforms/Atom-Z5xx/#hthermmech.

| Component (note 1) | Thermal Design Power – Max Point | Typical (High End Application) | Units |
|---|---|---|---|
| **Intel Atom processor (1.6 GHz)** | 2.2 | 0.7 | W |
| **Intel SCH US15W** | 2.3 | 1.5 | W |

Notes:
1. The values for TDP are taken from the Intel Atom Processor Z5xx Series Datasheet, 319535-003US, June 2010 and Intel System Controller Hub Datasheet, 319537-003US, May 2010.

Table 8. Thermal Design Power

### Thermal Design Power – Max Point

Thermal Design Power – Max Point (TDP) is a representation of the expected peak power dissipation of each component or component group as viewed separately. The actual power consumption in real-world applications is not expected to reach this level for any given device and never in combination. However, the thermal management solution should accommodate proper control of temperature rise so as not to exceed the maximum thermal surface interface temperatures as identified for key components such as the Intel Atom processor and Intel SCH US15W.

**Typical (High End Application)**

Typical (High End Application) is a realistic typical application design point for a fully active system with advanced graphics/video processing and I/O simultaneous data transfers. Some applications may utilize more CPU versus I/O processing for example, and the respective power load will shift between sub-systems based on active processing and system state. Many applications will consume considerably less power.

## *Thermal Interface*

The following diagram illustrates the component side Vector thermal interface.

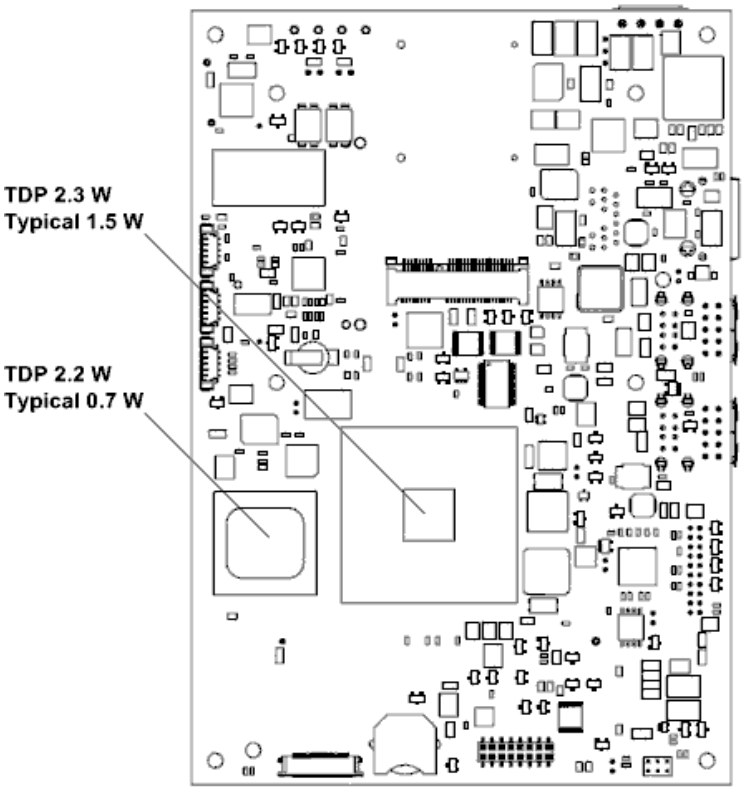


Figure 8. Thermal Interface, Component Side

For additional details about thermal management, contact your local Eurotech representative.

# Connectors, Switches, and Indicators

## Identifying Connectors

The following diagrams illustrate the location of key components on the Vector.

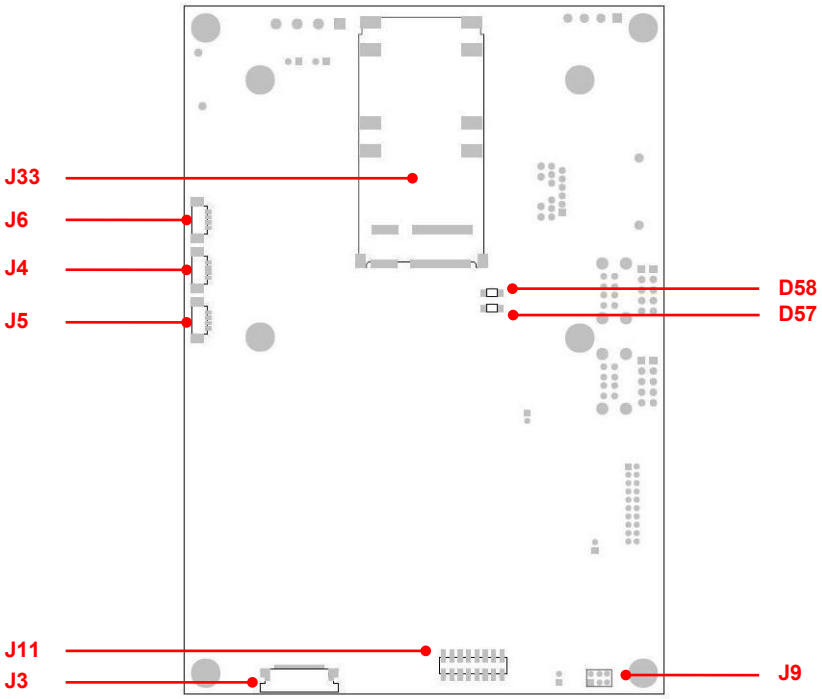


Figure 9. Connector Location, Top View

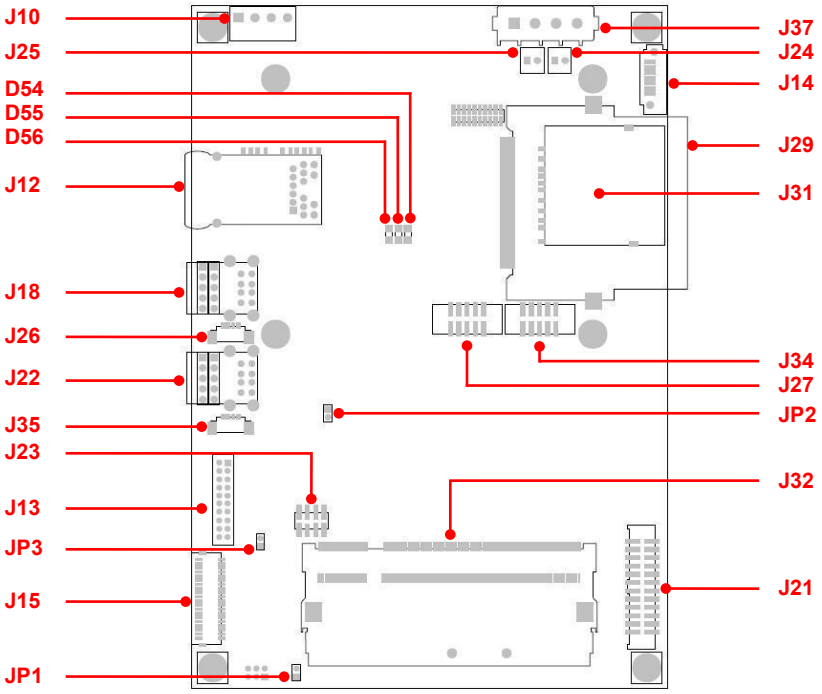


Figure 10. Connector Location, Bottom View

# Indicators and Jumpers

This section describes various indicators and jumpers on the Vector.

## *D54, D55, D56: Mini PCIe Expansion Slot LEDs*

The Mini PCIe expansion slot J33 includes three green LEDs that indicate wireless connectivity, as listed in the following table.

| LED | Description |
|---|---|
| **D54** | Indicates Wireless Wide Area Network (WWAN) |
| **D55** | Indicates Wireless Local Area Network (WLAN) |
| **D56** | Indicates Wireless Personal Area Network (WPAN) |

## *D57, D58: General-purpose LEDs*

The Vector includes two general-purpose LEDs that are controlled by the SMBus GPIOs. For details about these control signals, see System Management I/O, page 21.

| LED | Color | Control | Default |
|---|---|---|---|
| **D57** | Red | SMB_IO6 | On |
| **D58** | Green | SMB_IO5 | On |

**Notes:**
On the development kit, the general-purpose LEDs are always on and can be turned off using the BIOS setup utility. For details about changing the BIOS settings, see the Vector Development Kit Quick Start (Eurotech document # 110124-7001).

Your application can also control these LEDs dynamically. For example code, contact your local Eurotech representative.

## *Ethernet LEDs*

Ethernet socket J12 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 |

## *JP1: Reset*

Type: 2-post header, 2 mm

Jumper JP1 initiates a hardware reset of the Vector circuitry including the processor. Momentarily short the pins of JP1 to restart without cycling power.

| Setting | Description |
|---|---|
| **NC** | Normal operation |
| **1-2** | Reset |

### *JP2: Sleep/Wake*

Type: 2-post header, 2 mm

Jumper JP2 acts as a sleep/wake button. Momentarily short the pins of JP2 to transition to “sleep” or to “wake”. This jumper also connects to the discrete control signal BTN_ONOFF# on pin 3 of header J9, page 30.

| Setting | Description |
|---|---|
| **NC** | Normal operation |
| **1-2** | Transitions the Vector to or from sleep mode |

### *JP3: 4-, 5-, or 8-wire Touch Panel*

Type: 2-post header, 2 mm

Jumper JP3 configures the touch panel controller for 4-, 5- or 8-wire touch panels. For further details about the touch panel, see Touch Panel Controller, page 19.

| Setting | Description |
|---|---|
| **NC** | 4-wire or 8-wire (default) |
| **1-2** | 5-wire |

# Signal Headers

The following tables describe the electrical signals available on the connectors of the Vector. 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 27.

### *J3: ITP Debug Port*

Board connector: 24-pin FFC/FPC connector, 0.5 mm, Molex 52435-2472

Connector J3 provides an In-Target Probe (ITP) debug port for the Vector. This port is not supported for application use.

### *J4: Stereo Speaker Output*

Board connector: 1x4 shrouded header, 1.25 mm, Molex 53398-0471
Mating connector: housing, Molex 51021-0400

Header J4 provides a stereo speaker output. For further details, see Audio Interface, page 20.

| Pin | Name | Type | Description |
|---|---|---|---|
| **1** | SPKR2+ | O | Speaker 2 |
| **2** | SPKR2- | | |
| **3** | SPKR1+ | O | Speaker 1 |
| **4** | SPKR1- | | |

### *J5: Stereo Line Out*

Board connector: 1x4 shrouded header, 1.25 mm, Molex 53398-0471
Mating connector: housing, Molex 51021-0400

Header J5 provides a stereo line output. For further details, see Audio Interface, page 20.

| Pin | Name | Type | Description |
|---|---|---|---|
| **1** | LINEOUT_L | O | Line out – Left channel |
| **2** | LO_SENSE | I | Line out sense |
| **3** | LINEOUT_R | O | Line out – Right channel |
| **4** | GND_HDA | P | Analog ground |

### *J6: Microphone Input*

Board connector: 1x4 shrouded header, 1.25 mm, Molex 53398-0471
Mating connector: housing, Molex 51021-0400

Header J6 provides a stereo microphone input. For further details, see Audio Interface, page 20.

| Pin | Name | Type | Description |
|---|---|---|---|
| 1 | MIC_IN_L | I | Microphone– Left channel |
| 2 | MIC_SENSE | I | Microphone plug in sense |
| 3 | MIC_IN_R | I | Microphone– Right channel |
| 4 | GND_HDA | P | Analog ground |

### *J9: I²C Bus and On/Off*

Board connector: 2x3 header, 2 mm, Samtec TMM-103-03-T-D
Mating connector: Samtec TCSD series socket

Header J9 provides an external connection to the I²C bus of the Vector embedded controller. For electrical specifications, see Embedded Controller, page 37.

The signal BTN_ONOFF# connects to header J9 and to jumper JP2, page 29. This signal controls the sleep/wake feature. For electrical specifications, see Power Supply, page 37.

| Pin | Name | Type | Description |
|---|---|---|---|
| 1 | Reserved | | Use is reserved to Eurotech |
| 2 | Reserved | | Use is reserved to Eurotech |
| 3 | BTN_ONOFF# | I | Sleep/Wake |
| 4 | GND | P | Ground |
| 5 | I2C_DATA | IO | I²C data |
| 6 | I2C_CLK | O | I²C clock |

### *J10: 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 J10 accepts input power from an external supply. VIN is the main power input to the Vector. Voltage regulators on the board accept the main input voltage and generate all other voltages required by the on-board circuitry. For details about the power supply, see Power Supply Architecture, page 22.

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

### *J11: JTAG*

Board connector: 2x8 socket, 2 mm, Samtec SMM-108-02-S-D

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

### *J12: Ethernet*

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

Socket J12 provides a direct connection to a Gigabit Ethernet network. The socket includes two Ethernet LEDs, page 28 and built-in magnetics. For further details, see Ethernet, page 17.

### *J13: VGA Display Output*

Board connector: 2x10 shrouded header, 2 mm, Hirose DF11-20DP-2DSA
Mating connector: Hirose DF11 series socket

Header J13 provides an analog RGB output to support a standard VGA monitor. For further details, see VGA Display Output, page 19.

| Pin | Name | Type | Description |
|---|---|---|---|
| **1** | HSYNC_OUT | O | Horizontal sync |
| **2** | PTPB | O | |
| **3** | GND | P | Ground |
| **4** | GND | P | Ground |
| **5** | VSYNC_OUT | O | Vertical sync |
| **6** | CBVS_VIDEO | O | CBVS (option) |
| **7** | GND | P | Ground |
| **8** | GND | P | Ground |
| **9** | GREEN_OUT | O | Green data |
| **10** | SVIDEO_C | O | S Video C (option) |
| **11** | GND | P | Ground |
| **12** | GND | P | Ground |
| **13** | RED_OUT | O | Red data |
| **14** | SVIDEO_Y | O | S Video Y (option) |
| **15** | GND | P | Ground |
| **16** | GND | P | Ground |
| **17** | BLUE_OUT | O | Blue data |
| **18** | DDC_SDA | IO | DDC $I^2C$ data |
| **19** | GND | P | Ground |
| **20** | DDC_SCL | O | DDC $I^2C$ clock |

### *J14: SATA Drive*

Board connector: 7-pin SATA header, 0.050-inch, Molex 67800-5002
Mating device: 2.5-inch SATA disk drive

Header J14 supports a 2.5-inch SATA disk drive. For a description of the external memory interfaces available on the Vector, see External Memory Interfaces, page 14.

| Pin | Name | Type | Description |
|---|---|---|---|
| **1** | GND | P | Ground |
| **2** | SATA_TX+ | O | SATA Transmit |
| **3** | SATA_TX- | | |
| **4** | GND | P | Ground |
| **5** | SATA_RX- | I | SATA Receive |
| **6** | SATA_RX+ | | |
| **7** | GND | P | Ground |

## *J15: LVDS Display Output, Backlight, and Touch Panel*

Board connector: 2x20 shrouded header, 1 mm, JST BM40B-SRDS-G-TF
Mating connector: housing, JST SHDR-40V-S-B and contact, JST SSH-003GA-P0.2

Header J15 provides the primary display interface that includes LVDS data, display power, backlight control, backlight power, and touch panel signals. For further details, see LVDS Display Output, page 18, Backlight, page 19, and Touch Panel Controller, page 19.

| Pin | Name | Type | Description |
|---|---|---|---|
| **1** | GND | P | Ground |
| **2** | V_BACKLIGHT | PO | 5 V for the backlight inverter (option for VIN) |
| **3** | GND | P | Ground |
| **4** | V_BACKLIGHT | PO | 5 V for the backlight inverter (option for VIN) |
| **5** | DPSR | O | Scan select (default normal scan) |
| **6** | GND | | Ground |
| **7** | NC | | |
| **8** | GND | P | Ground |
| **9** | GND | P | Ground |
| **10** | L_BKLTEN_B | O | Backlight power on/off, buffered |
| **11** | LVDS_CLK+ | O-LVDS | LVDS clock+ |
| **12** | L_BKLTCTL_FIL | O-LVTTL | Backlight intensity control, filtered |
| **13** | LVDS_CLK- | O-LVDS | LVDS clock- |
| **14** | GND | P | Ground |
| **15** | GND | P | Ground |
| **16** | LVDS_DATA3+ | O-LVDS | LVDS data 3+ (option) |
| **17** | LVDS_DATA2+ | O-LVDS | LVDS data 2+ |
| **18** | LVDS_DATA3- | O-LVDS | LVDS data 3- (option) |
| **19** | LVDS_DATA2- | O-LVDS | LVDS data 2- |
| **20** | GND | P | Ground |
| **21** | GND | P | Ground |
| **22** | NC | | |
| **23** | LVDS_DATA1+ | O-LVDS | LVDS data 1+ |
| **24** | NC | | |
| **25** | LVDS_DATA1- | O-LVDS | LVDS data 1- |
| **26** | SX- | O | Touch panel |
| **27** | GND | P | Ground |
| **28** | SY- | O | Touch panel |
| **29** | LVDS_DATA0+ | O-LVDS | LVDS data 0+ |
| **30** | SY+ | O | Touch panel |
| **31** | LVDS_DATA0- | O-LVDS | LVDS data 0- |
| **32** | R | O | Touch panel |
| **33** | GND | P | Ground |
| **34** | B | O | Touch panel |
| **35** | GND | P | Ground |
| **36** | T | O | Touch panel |
| **37** | V3.3S_LCD | PO | 3.3 V for LCD |
| **38** | L | O | Touch panel |
| **39** | V3.3S_LCD | PO | 3.3 V for LCD |
| **40** | SX+ | O | Touch panel |

**Warning:**
The pinout of J15 on Revision A boards is different than on Revision 1 boards. The touch panel signals are swapped.

## *J18: USB Host 1 and USB Host 5*

Board connector: USB Type A dual receptacle, Kycon KUSBX-AS-2-N-B30
Mating connector: USB Type A plug

The dual USB socket J18 provides the USB Host 1 and USB Host 5 ports. These ports support high-current devices such as plug-in USB modules. For further details, see Universal Serial Bus, page 15.

| Pin | Name | Type | Description |
|---|---|---|---|
| **A1** | USB_HOST5_PWR | PO | 5 V DC power output |
| **A2** | USB_HOST5- | IO | USB Host 5 |
| **A3** | USB_HOST5+ | | |
| **A4** | GND | P | Ground |
| **B1** | USB_HOST1_PWR | PO | 5 V DC power output |
| **B2** | USB_HOST1- | IO | USB Host 1 |
| **B3** | USB_HOST1+ | | |
| **B4** | GND | P | Ground |

**Notes:**
As a volume production option, the Vector can provide USB Host 1 and USB Host 5 on headers in place of the dual USB Type A socket. For additional information, contact your local Eurotech sales representative.

## *J21: Keypad/GPIO*

Board connector: 2x12 shrouded header, 2 mm, Samtec STMM-112-02-G-D-SM
Mating device: Samtec TCSD series socket

The signals included on header J21 support up to a 10 x 8 keypad or eighteen GPIO controlled by the SMBus. For further details, see Keypad/GPIO, page 20.

| Pin | Name | Type | Description |
|---|---|---|---|
| **1** | GND | P | Ground |
| **2** | COL0 | IO | Keypad or GPIO |
| **3** | ROW0 | IO | Keypad or GPIO |
| **4** | COL1 | IO | Keypad or GPIO |
| **5** | ROW1 | IO | Keypad or GPIO |
| **6** | COL2 | IO | Keypad or GPIO |
| **7** | ROW2 | IO | Keypad or GPIO |
| **8** | COL3 | IO | Keypad or GPIO |
| **9** | ROW3 | IO | Keypad or GPIO |
| **10** | COL4 | IO | Keypad or GPIO |
| **11** | GND | P | Ground |
| **12** | GND | P | Ground |
| **13** | ROW4 | IO | Keypad or GPIO |
| **14** | COL5 | IO | Keypad or GPIO |
| **15** | ROW5 | IO | Keypad or GPIO |
| **16** | COL6 | IO | Keypad or GPIO |
| **17** | ROW6 | IO | Keypad or GPIO |
| **18** | COL7 | IO | Keypad or GPIO |
| **19** | ROW7 | IO | Keypad or GPIO |
| **20** | COL8 | IO | Keypad or GPIO |
| **21** | GND | P | Ground |
| **22** | COL9 | IO | Keypad or GPIO |
| **23** | V3.3S | PO | 3.3 V power output |
| **24** | V3.3S | PO | 3.3 V power output |

## J22: USB Host 3 and USB Host 4

Board connector: USB Type A dual receptacle, Kycon KUSBX-AS-2-N-B30
Mating connector: USB Type A plug

The dual USB socket J22 provides the general-purpose USB Host 3 and USB Host 4 ports. For further details, see Universal Serial Bus, page 15.

| Pin | Name | Type | Description |
|---|---|---|---|
| **A1** | USB_HOST3_PWR | PO | 5 V DC power output |
| **A2** | USB_HOST3- | IO | USB Host 3 |
| **A3** | USB_HOST3+ | | |
| **A4** | GND | P | Ground |
| **B1** | USB_HOST4_PWR | PO | 5 V DC power output |
| **B2** | USB_HOST4- | IO | USB Host 4 |
| **B3** | USB_HOST4+ | | |
| **B4** | GND | P | Ground |

**Notes:**
As a volume production option, the Vector can provide USB Host 3 and USB Host 4 on headers in place of the dual USB Type A socket. For additional information, contact your local Eurotech sales representative.

## J23: A/D Inputs

Board connector: 2x4 header, 2 mm, NSXD MXD2-4PBXX1X
Mating device:

Header J23 accepts two A/D inputs for general-purpose A/D conversion. For a description of A/D inputs, see A/D Inputs, page 20.

| Pin | Name | Type | Description |
|---|---|---|---|
| **1** | Reserved | | Use is reserved to Eurotech |
| **2** | ADC_1 | I | Analog input 1 |
| **3** | Reserved | | Use is reserved to Eurotech |
| **4** | GND | P | Ground |
| **5** | Reserved | | Use is reserved to Eurotech |
| **6** | ADC_0 | I | Analog input 0 |
| **7** | GND | P | Ground |
| **8** | GND | P | Ground |

## J24: CAN1

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

Header J24 supplies a CAN 2.0B bus. For further details, see CAN 2.0B, page 17.

| Pin | Name | Type | Description |
|---|---|---|---|
| **1** | CANHIGH_1 | IO | CAN 1 |
| **2** | CANLOW_1 | | |

## J25: CAN2

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

Header J25 supplies a CAN 2.0B bus. For further details, see CAN 2.0B, page 17.

| Pin | Name | Type | Description |
|---|---|---|---|
| **1** | CANHIGH_2 | IO | CAN 2 |
| **2** | CANLOW_2 | | |

### *J26: USB Client (optional USB Host)*

Board connector: 1x4 shrouded header, 1.25 mm, Molex 53398-0471
Mating connector: housing, Molex 51021-0400

Header J26 supports a USB client port. For further details, see Universal Serial Bus, page 15.

| Pin | Name | Type | Description |
|---|---|---|---|
| 1 | USBPWR_CLIENT | PI | DC Power Input |
| 2 | USB_CLIENT- | IO | USB Client |
| 3 | USB_CLIENT+ | | |
| 4 | GND | P | Ground |

### *J27: Serial Port 1*

Board connector: 2x5 shrouded header, 2 mm, Samtec STMM-105-02-S-D-SM
Mating connector: Samtec TCSD series socket

Header J27 provides an EIA-232/485 serial port. For further details, see Serial Port, page 16.

| Pin | EIA-232 Name | Type | Description (Default) | EIA-485 Name | Type | Description |
|---|---|---|---|---|---|---|
| 1 | NC | | | NC | | |
| 2 | NC | | | NC | | |
| 3 | RXD1 | I | Receive Data | RX1- | I | Receive Data - |
| 4 | RTS1 | O | Request To Send | TX1+ | O | Transmit Data + |
| 5 | TXD1 | O | Transmit Data | TX1- | O | Transmit Data - |
| 6 | CTS1 | I | Clear To Send | RX1+ | I | Receive Data + |
| 7 | NC | | | NC | | |
| 8 | NC | | | NC | | |
| 9 | GND | P | Ground | GND | P | Ground |
| 10 | NC | | | NC | | |

### *J29: CompactFlash Card Slot*

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

The Vector includes a CF card slot on socket J29. The 50-pin CF socket J29 conforms to the CompactFlash standard for Type I and II cards operating at 3.3 V. The CF card must be installed prior to applying power to the board. Hot plugging is not supported. For a description of the external memory interfaces available on the Vector, see External Memory Interfaces, page 14.

### *J31: 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 Vector includes an SD card slot on socket J31 in place of the CF card socket J29. Socket J22 supports both SD card and MMC card formats. For a description of the external memory interfaces available on the Vector, see External Memory Interfaces, page 14.

### *J32: SODIMM*

Board connector: 200-pin SODIMM socket, 0.6 mm, Tyco Electronics 1717833-4
Mating device: SODIMM

Socket J32 supports a 200-pin DDR2 SODIMM. For further details about the system memory, see Memory, page 14.

### *J33: Mini PCIe Expansion Slot*

Board connector: 52-pin Mini PCIe socket, Molex 67910-0001
Mating device: PCIe Mini Card

Socket J33 supports a Mini PCIe expansion slot. For further details, see Mini PCIe Expansion Slot, page 16.

### *J34: Serial Port 2 (optional)*

Board connector: 2x5 shrouded header, 2 mm, Samtec STMM-105-02-S-D-SM
Mating connector: Samtec TCSD series socket

Header J34 provides an optional EIA-232/485 serial port. For further details, see Serial Port, page 16.

| Pin | EIA-232 Name | Type | Description (Default) | EIA-485 Name | Type | Description |
|---|---|---|---|---|---|---|
| **1** | NC | | | NC | | |
| **2** | NC | | | NC | | |
| **3** | RXD2 | I | Receive Data | RX2- | I | Receive Data - |
| **4** | RTS2 | O | Request To Send | TX2+ | O | Transmit Data + |
| **5** | TXD2 | O | Transmit Data | TX2- | O | Transmit Data - |
| **6** | CTS2 | I | Clear To Send | RX2+ | I | Receive Data + |
| **7** | NC | | | NC | | |
| **8** | NC | | | NC | | |
| **9** | GND | P | Ground | GND | P | Ground |
| **10** | NC | | | NC | | |

### *J35: USB Host 0*

Board connector: 1x4 shrouded header, 1.25 mm, Molex 53398-0471
Mating connector: housing, Molex 51021-0400

Header J35 provide the USB Host 0 signals. This USB port does not include power management and is for internal system use only. For further details, see Universal Serial Bus, page 15.

| Pin | Name | Type | Description |
|---|---|---|---|
| **1** | 5VS | PO | 5 V DC power output |
| **2** | USB_HOST0- | IO | USB Host 0 |
| **3** | USB_HOST0+ | | |
| **4** | GND | P | Ground |

### *J37: SATA Power Output*

Board connector: 1x4 disk drive power socket, 0.2 inch, Tyco Electronics 794285-1
Mating device: crimp housing, Tyco Electronics 1-480426-0

Power connector J37 provides 5 V power to a SATA disk drive. For further details about the SATA disk drive, see External Memory Interfaces, page 14.

| Pin | Name | Type | Description |
|---|---|---|---|
| **1** | NC | | |
| **2** | GND | P | Ground |
| **3** | GND | P | Ground |
| **4** | 5VS_SATA | PO | 5V power for SATA disk drive |

**Warning:**
The pinout of J37 on Revision A boards is different than on Revision 1 boards. Pin 1 and pin 4 are swapped.

# System Specifications

## Processor

The following table specifies the Intel Atom Z5xxP/PT processor performance. For details about the processor, see Core Processor, page 13.

| Parameter (note 2) | Min | Typ. | Max | Units |
|---|---|---|---|---|
| **Processor operating frequency (commercial)** | 1.1 | | 1.6 | GHz |
| **Processor operating frequency (industrial)** | | | 1.33 | GHz |
| **Front side bus clock** | 400 | | 533 | MHz |
| **Front side bus width** | | 64 | | bit |

Notes:

2. The VEC7000 Development Kit operates at 1.6 GHz, commercial temperature.

## Power

### *Power Supply*

The Vector accepts the main power input on J10, page 30. For details about the power supply architecture, see Power Supply Architecture, page 22.

| Symbol | Parameter | Min | Typ. | Max | Units |
|---|---|---|---|---|---|
| **Input Voltage** | | | | | |
| **VIN** | Supply voltage | 7 | 12 | 25 | V |
| **Output Voltage** | | | | | |
| **V3.3S** | Normal operating power | 3.135 | 3.3 | 3.465 | V |
| **BTN_ONOFF#** | | | | | |
| $V_{IH}$ | High-level input voltage | 2.5 | 5 | | V |
| $V_{IL}$ | Low-level input voltage | | | 1.0 | V |
| $R_{PU}$ | Pull-up resistance (note 3) | | 10 | | kΩ |
| $V_{PU}$ | | | | 5 | V |

Notes:

3. BTN_ONOFF# includes a pull-up resistor to 5V “always on”.

### *Power Consumption*

The following table lists estimated power consumption for the Vector.

| Symbol | Parameter | Min | Typ. | Max | Units |
|---|---|---|---|---|---|
| $P_{Run}$ | Run mode power | | 7 | | W |

## Electrical

This section provides electrical specifications for the Vector.

### *Embedded Controller*

The embedded controller provides two A/D inputs on header J23, page 34. For descriptions of these signals, see A/D Inputs, page 20 and $I^2C$ Bus, page 17.

| Symbol | Parameter | Min | Typ. | Max | Units |
|---|---|---|---|---|---|
| **A/D Input** | | | | | |
| $V_{IN}$ | Analog input voltage | | | 5 | V |
| | A/D sample resolution | | 10 | | bit |

### SATA Drive

The following table lists the specification for the SATA disk drive. For additional information, see External Memory Interfaces, page 14.

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

### Universal Serial Bus

Four of the USB host ports include power management. These ports are provided on the dual sockets J18 and J22. For a description of the USB ports, see Universal Serial Bus, page 15.

| Symbol | Parameter | Min | Typ. | Max | Units |
|---|---|---|---|---|---|
| **USB Host (USB 3, USB 4)** | | | | | |
| $I_{USB}$ | USB current | | | 500 | mA |
| **USB Host (USB 0, USB 5)** | | | | | |
| $I_{USB}$ | USB current | | | 1 | A |

### LVDS Display Output

Header J15, page 32 provides signals to drive an LVDS display. These signals include LVDS data, software-controlled display power, and display scan control. For further details, see LVDS Display Output, page 18.

| Symbol | Parameter | Min | Typ. | Max | Units |
|---|---|---|---|---|---|
| **Display power (V3.3S_LCD)** | | | | | |
| $V_{V3.3S\_LCD}$ | Soft-start power | | 3.3 | | V |
| $I_{V3.3S\_LCD}$ | | | | 1 | A |
| **Scan direction (DPSR)** | | | | | |
| $R_{DPSR}$ | Pull-up/down resistance (note 4) | | 10 | | kΩ |
| $V_{DPSR}$ | | 0 | | 3.3 | V |

Notes:

4. DSPR is pulled high by R602 for reverse scan, while R603 pulls the signal low for normal scan. The default configuration is normal scan.

### VGA Display Output

The Vector drives a VGA display on header J13, page 31. In addition to the 8:8:8 RGB data, the display convertor provides a DDC interface for monitor “Plug and Play”. For a description of the VGA display output, see VGA Display Output, page 19.

| Symbol | Parameter | Min | Typ. | Max | Units |
|---|---|---|---|---|---|
| $R_{VGA}$ | Display cable impedance | | 75 | | Ω |
| **DDC_CLK, DDC_DATA** | | | | | |
| $R_{PU}$ | Pull-up resistance (note 5) | | 10 | | kΩ |
| $V_{PU}$ | | | 5 | | V |

Notes:

5. DDC_CLK and DDC_DATA include pull-up resistors to V5S.

### Touch Panel Controller

A Touch Screen Controller drives resistive touch panels on header J15, page 32. For further details, see Touch Panel Controller, page 19.

| Symbol | Parameter | Min | Typ. | Max | Units |
|---|---|---|---|---|---|
| **VDD** | Supply voltage | | 3.3 | | V |

## Backlight

Header J15, page 32 provides software-controlled power and two control signals to support a backlight inverter. For further details, see Backlight, page 19.

| Symbol | Parameter | Min | Typ. | Max | Units |
|---|---|---|---|---|---|
| **Backlight power (V_BACKLIGHT)** | | | | | |
| $V_{V\_BACKLIGHT}$ | Soft-start power (note 6) | | 5 | | V |
| $I_{V\_BACKLIGHT}$ | | | | 1 | A |
| **Backlight control (L_BKLTEN_B, L_BKLTCTL_FIL)** | | | | | |
| $V_{L\_BKLTEN\_B}$ | High-level output voltage (note 7) | | 5 | | V |
| $V_{L\_BKLTCTL\_FIL}$ | High-level output voltage | | 5 | | V |

Notes:

6. As a volume production option, the input power VIN routes directly to the backlight power signal V_BACKLIGHT.
7. Support for L_BKLTEN_B at VIN is available as a volume production option.

## Audio Interface

The 4-channel HD audio codec provides the audio interface for the Vector. This audio codec supports a stereo speaker output on header J4, page 29, a stereo line out on header J5, page 29, and a stereo microphone input on header J6, page 30. For a description of this interface, see Audio Interface, page 20.

| Symbol | Parameter | Min | Typ. | Max | Units |
|---|---|---|---|---|---|
| $D_{VDD}$ | Codec digital supply voltage | | 3.3 | | V |
| $A_{VDD}$ | Codec analog supply voltage | | 5 | | V |
| $f_S$ | Sample rate | | 192 | | kHz |
| --- | A/D sample resolution | | 24 | | bit |
| **Speaker Output (note 8)** | | | | | |
| $R_L$ | Speaker load | 4 | | 8 | Ω |
| $P_{OUT}$ | Output power, 4Ω load @ 4.75V | | | 2 | W |
| **Line Out (note 8)** | | | | | |
| $V_{OUT}$ | Full scale output voltage | 1.00 | | | $V_{rms}$ |
| $P_{OUT}$ | Output power, 32Ω load | 40 | 60 | | mW (peak) |
| **Microphone Input (note 8)** | | | | | |
| $V_{IN}$ | Full scale input voltage, 0dB boost @ 4.75V | 1.05 | | | $V_{rms}$ |
| $Gain_{IN}$ | Microphone boost | 0 | | 30 | dB |
| $R_{IN}$ | Input impedance | | 50 | | kΩ |
| $C_{IN}$ | Input capacitance | | 15 | | pF |

Notes:

8. Specifications are taken from the IDT 92HD81 Product Datasheet, V 0.987, 11/09.

## Keypad/GPIO

Header J21, page 33 support up to a 10 x 8 keypad or eighteen GPIO controlled by the SMBus. For further details, see Keypad/GPIO, page 20.

| Symbol | Parameter | Min | Typ. | Max | Units |
|---|---|---|---|---|---|
| **Keypad (note 9)** | | | | | |
| $V_{CC}$ | Supply voltage | | 3.3 | | V |
| $V_{IH}$ | High-level input voltage | 0.7*Vcc | | 3.6 | V |
| $V_{IL}$ | Low-level input voltage | -0.5 | | 0.3*Vcc | V |
| $V_{OH}$ | High-level output voltage $I_{OH}$ = -8 mA, $V_{CC}$ = 3 V | 2.6 | | | V |
| $V_{OL}$ | Low-level output voltage $I_{OL}$ = 8 mA, $V_{CC}$ = 3 V | | | 0.25 | V |

Notes:

9. Specifications are taken from the Texas Instrument TCA8418 Product Datasheet , SCPS215B – September 2009 – Revised March 2010.

# General

This section provides general specifications for the Vector.

## *Real-Time Clock*

The Vector 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. For details about the RTC, see Real-Time Clock, page 14. 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 |
| **Life Time** | 2 | Years |

## *Crystal Frequencies*

Agencies certifying the Vector 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 Vector.

| Crystals | Device | Typ. | Units |
|---|---|---|---|
| **X1** | RTC | 32.768 | kHz |
| **X2** | Clock Generator | 14.31818 | MHz |
| **X4** | Embedded Controller | 14.7456 | MHz |
| **X6, X7** | CAN Controller | 16 | MHz |
| **X8** | Ethernet | 25.000 | MHz |
| **X9** | SATA Controller | 25.000 | MHz |
| **X10** | USB Hub | 24.000 | MHz |
| **X11** | VGA Convertor | 27.000 | MHz |

# Environmental

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

| Parameter | Specification |
|---|---|
| **Commercial operating temperature** | 0°C to +70°C |
| **Industrial operating temperature (note 10)** | -40°C to +85°C |

Notes:

10. The processor operating frequency is 1.33GHz at the industrial temperature range.

# Board Revision History

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

## Identifying the Board Revision

The revision number is printed on the printed wiring board (PWB). That number is 170124-700Rx, where "x" is the revision level of the PWB.

## Board Revision History

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

### *Revision 1*

Initial Release

### *Revision A*

**New Features**

General-purpose LEDs D57 and D58 added.

Uses low-profile RTC battery socket.

**Changes**

Reset jumper JP1 and Sleep/Wake jumper JP2 moved to improve accessibility.

Line out sense input added on stereo line out header J5.

Microphone input header J6 changed from 2-pin to 4-pin.

Microphone plug in sense input added to header J6.

LVDS display header J15 changed from horizontal to vertical mount.

Touch panel signal pin assignments changed on header J15.

Spacing between USB sockets J18 and J22 increased to accommodate large USB devices.

GPIO header J21 moved to promote improved packaging.

CAN headers J24 and J25 moved to improve accessibility.

USB client port J26 changed from mini USB Type B socket to header.

Option added to reconfigure USB client port as USB host.

Serial 1 header J27 keyed, and pin assignment changed to accommodate standard ARM kit cables.

Serial port 2 added on header J34 when touch panel controller is not installed.

USB Host 0 port added on header J35.

J37 changed from header to socket and pin 1 swapped with pin 4 to allow use of standard SATA power cables.

Audio codec updated to component recommended for new designs.

Keypad/GPIO control changed from $I^2C$ bus to SMBus.

SMBus GPIO0 changed from amplifier shutdown control to optional serial port mode select.

Pull-ups on $I^2C$ bus removed.

# 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, and Intel High Definition Audio specification:
www.intel.com

**Trusted Computing Group**

Trusted Computer Group specifications:
www.trustedcomputinggroup.com

**ACPI Specification**

ACPI specification:
www.acpi.info

**PCI SIG**

PCI Express specifications:
www.pcisig.com

**USB**

Universal Serial Bus specification and product information:
www.usb.org

**SD Card**

SD Card Association and SDIO specification:
www.sdcard.org

**CompactFlash**

CompactFlash Association and specification:
www.compactflash.org

**$I^2C$ Bus**

$I^2C$ bus specification and information about the general-purpose I/O ports:
www.nxp.com

**IDT**

Information about the HD audio codec:
www.idt.com

**NXP**

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

# Appendix B – Development Kit

The Vector Development Kit is designed to get the developer up and running quickly. These kits allow you to become familiar with the Vector functionality and to develop applications prior to customization for your specific requirements.

## Development Kit Components

The Vector Development Kit (VEC7000) consists of the following components:

- Vector single board computer (1.6 GHz) with 1 GB SODIMM
- 10.4-inch SVGA TFT LCD
  with touch screen and backlight inverter
- 12 VDC adapter with power connector and AC cord
- Serial port adapter cable (for J27)
- VGA adapter cable (for J13)
- Three CompactFlash (CF) cards loaded with
  Windows® Embedded Standard (WES), Windows Embedded CE, and Wind River Linux.
- Stylus and screen cleaning cloth
- Vector Development Kit Quick Start (Eurotech document #110124-7001)

Please make sure you have received ***all*** the components before you begin your development.

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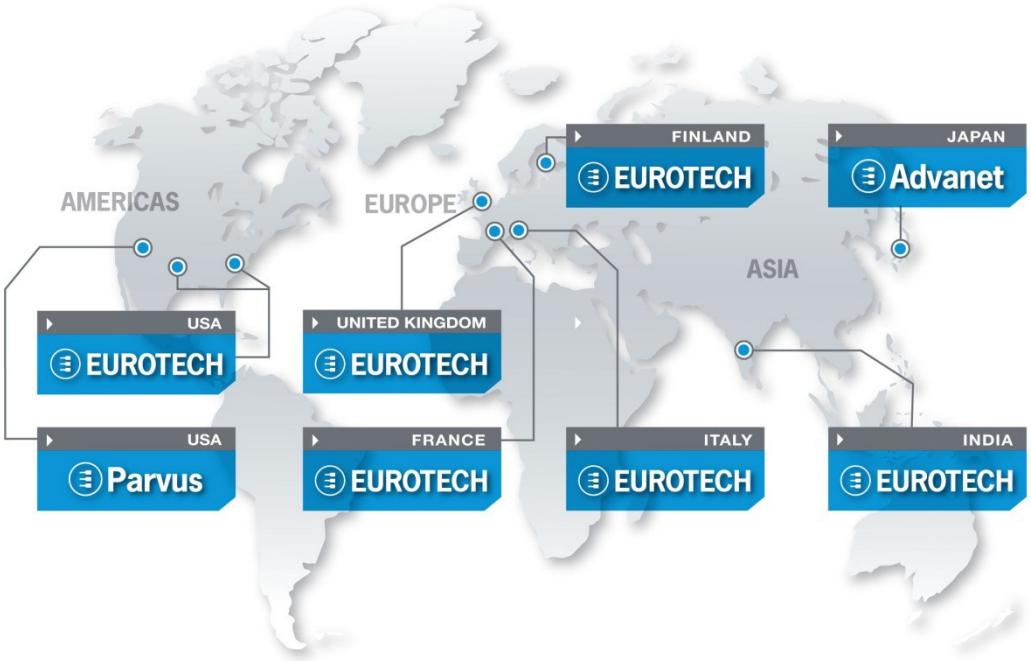


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