USER MANUAL
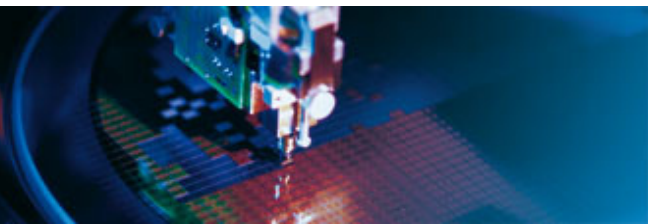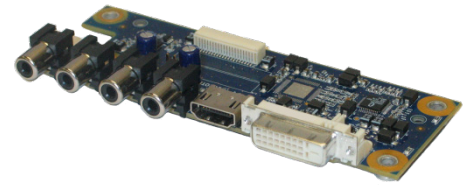
Catalyst FX DVI/HDMI Expansion Board
Display and Audio Subsystem

Rev 1 – December 2010 – 110124-34001

About the Cover Image

The cover image shows a board with the DVI and HDMI receptacles populated. The DVI Expansion Board only populates the DVI receptacle.   The HDMI option with HDMI receptacle populated is available as a volume production option.

Trademarks

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

Document Revision History

REVISION	DESCRIPTION	DATE
1	Initial release	December 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 13. 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 15 for full contact details.

CE Notice

The product, when used as described in this manual, is approved for use in Eurotech products marked with the CE label in accordance with the1999/5/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 its components, subassemblies and the consumable materials that are an integral part of the product, has been manufactured in compliance with the European directive 2002/95/EC known as the RoHS directive (Restrictions on the use of certain Hazardous Substances). This directive targets the reduction of certain hazardous substances previously used in electrical and electronic equipment (EEE).

Technical Assistance

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 15 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
NC	No Connection
Reserved	Use is reserved to Eurotech

Product Overview

The Catalyst FX DVI/HDMI Expansion Board expands the functionality of the Catalyst FX by providing display and audio capabilities. This add-in board mates with the Eurotech-specific expansion connector on the Catalyst FX carrier board and allows easy customization for your application. In this manual, this product is referred to as the DVI/HDMI Expansion Board.

The DVI/HDMI Expansion Board provides the following display and audio capabilities:

- Display Interface
    o Digital Visual Interface (DVI) output
    o High-Definition Multimedia Interface (HDMI) output (volume production option)
- Audio Interface
    o Stereo line input
    o Stereo line output
    o Sony/Philips Digital Interconnect Format (S/PDIF) output

Block Diagram

The following diagram illustrates the system organization of the DVI/HDMI Expansion Board. Dotted lines indicate the HDMI volume production option.
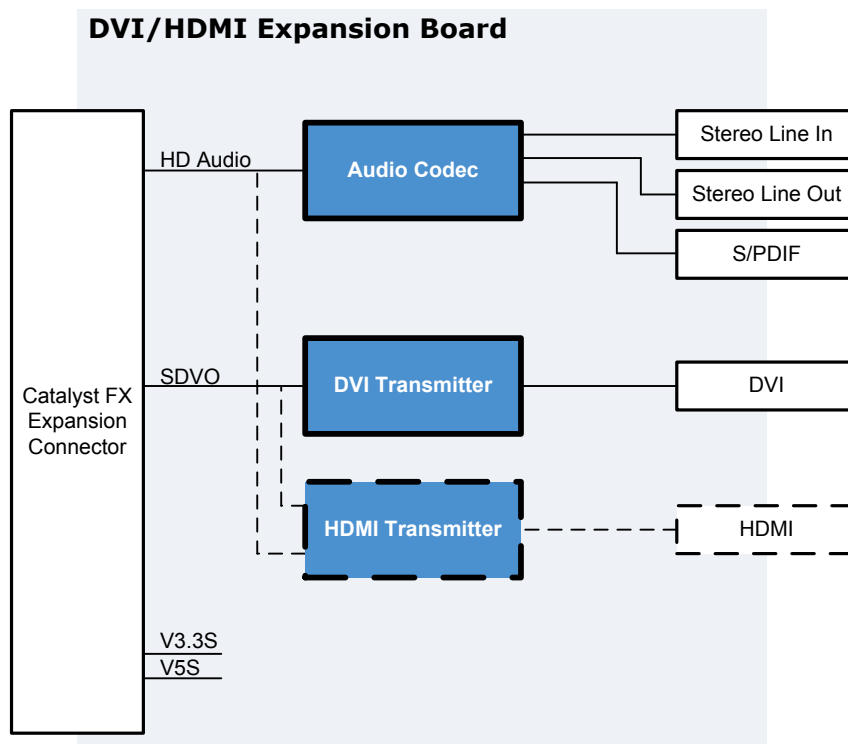

Figure 1.   DVI/HDMI Expansion Board Block Diagram

Hardware Specification

Display Interface

With the add-in DVI/HDMI Expansion Board, the Catalyst FX supports DVI or HDMI displays. A standard DVI/HDMI Expansion Board provides a DVI output, while support for HDMI is available as a volume production option. The following sections describe these capabilities.

DVI Output

To support digital display devices such as flat panel LCD displays, standard DVI/HDMI Expansion Boards provide a DVI output on connector J9, page 12. An on-board Chrontel CH7307C DVI Transmitter accepts the Serial Digital Video Output (SDVO) from the Catalyst FX, encodes the data, and transmits the data in DVI format.

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

HDMI Output (option)

As a volume production option, an HDMI output replaces the DVI output on the expansion board. With this option, circuitry including a CH7315B HDMI Transmitter is populated supporting HDMI version 1.1 and 1.2. The HDMI Transmitter accepts the SDVO and Intel® High Definition Audio (Intel HD Audio) from the Catalyst FX, combines the video and audio data into a single HDMI compliant bit stream, and transits this output on connector J8, page 12.

Audio Interface

For its audio interface, the DVI/HDMI Expansion Board 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 outputs provided by this codec. For electrical specifications, see Audio Interface, page 13.

Audio Inputs: Stereo Line In

The DVI/HDMI Expansion Board supports a stereo line in on RCA jacks J3, page 11 and J4, page 12.

Audio Outputs: Stereo Line Out and S/PDIF

The DVI/HDMI Expansion Board drives a stereo line out on RCA jacks J5, page 12 and J7, page 12.

In addition, the codec provides a Sony/Philips Digital Interconnect Format (S/PDIF) output on header J6, page 12 for connectivity to consumer electronic equipment.

Mechanical

The DVI/HDMI Expansion Board is an add-in board for the Catalyst FX. This section describes dimensions and mounting of the board.

Mechanical Drawing

The following mechanical drawings specify the dimensions of the DVI/HDMI Expansion Board, as well as locations of key components on the board. All dimensions are in inches.
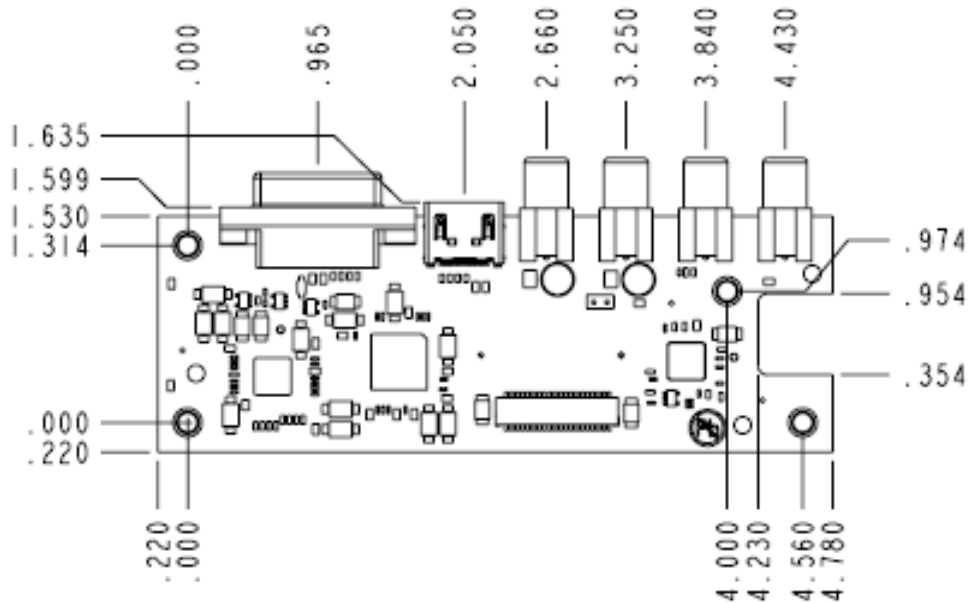

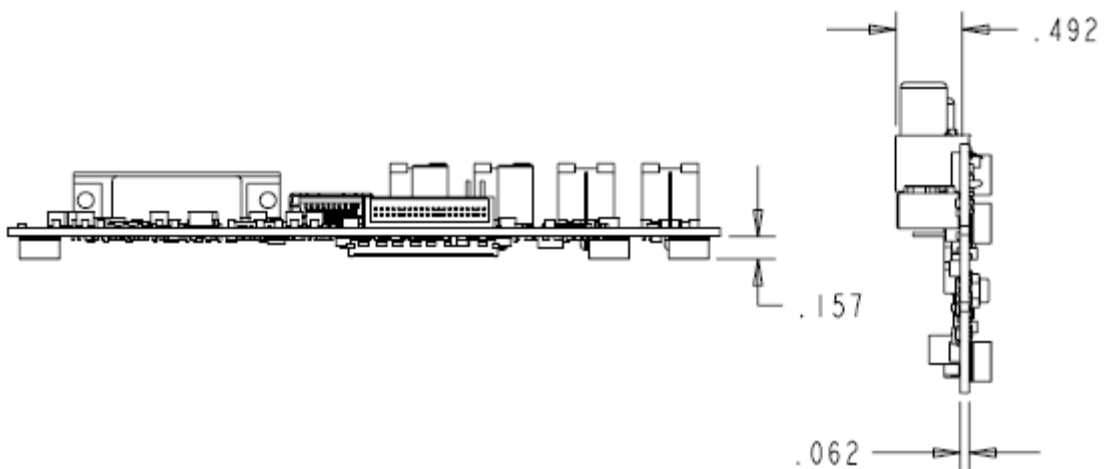Figure 2.   DVI/HDMI Expansion Board, Top View

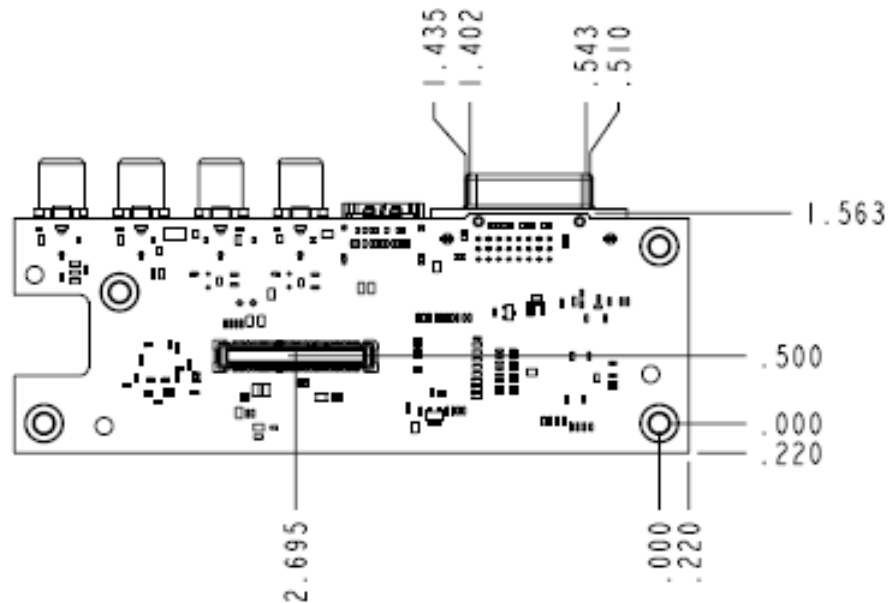Figure 3.   DVI/HDMI Expansion Board, Side Views

Figure 4.   DVI/HDMI Expansion Board, Bottom View

Mounting Holes

The DVI/HDMI Expansion Board includes four mounting holes that enable mounting to the Catalyst FX carrier board. The following table describes the electrical connectivity of these mounting holes. For the location of the mounting holes, see Identifying Connectors, page 11.

Mounting Hole	Connectivity (note 1)
1	Direct connection to chassis ground
2	Direct connection to chassis ground
3	Connection to chassis ground through 0Ω resistor
4	No connection

Notes:
1.   The ground plane connects to chassis ground through 0Ω resistors.

Table 1.   Mounting Hole Electrical Connectivity

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

Identifying Connectors

The following diagrams illustrate the location of key components on the DVI/HDMI Expansion Board.
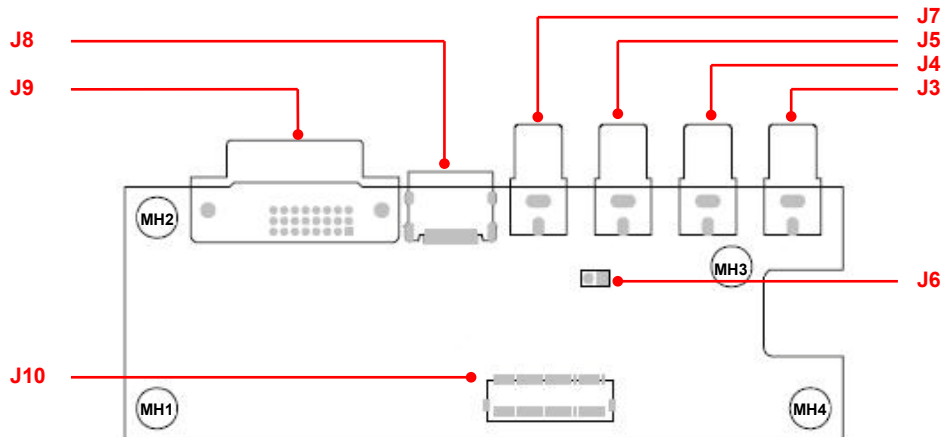

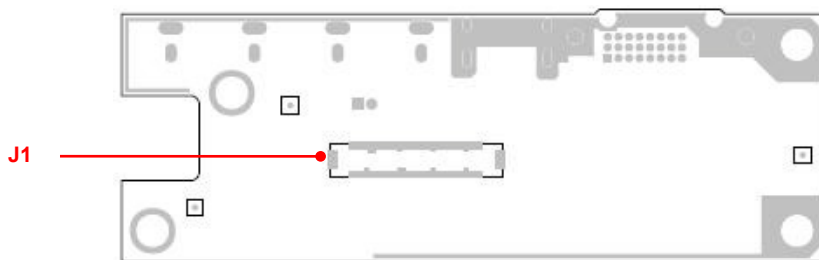
Figure 5.   Connector Location, Top View

Figure 6.   Connector Location, Bottom View

Signal Headers

The following sections describe the electrical signals available on the connectors of the DVI/HDMI Expansion 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 the previous section Identifying Connectors.

J1: Expansion Connector

The DVI/HDMI Expansion Board connector J1 mates to the Catalyst FX connector J19 providing all data and power signals. For additional information about this expansion connector, refer to the Catalyst FX User Manual (Eurotech document #110124-3010).

J3: Line In Left

Board connector: RCA jack, CUI RCJ-041
Mating connector: RCA plug

The DVI/HDMI Expansion Board supports a stereo line input with jack J3 accepting the left channel input and jack J4 accepting the right channel input. For further details, see Audio Interface, page 8.

J4: Line In Right

Board connector: RCA jack, CUI RCJ-041
Mating connector: RCA plug

The DVI/HDMI Expansion Board supports a stereo line input with jack J4 accepting the right channel input and jack J3 accepting the left channel input. For further details, see Audio Interface, page 8.

J5: Line Out Left

Board connector: RCA jack, CUI RCJ-041
Mating connector: RCA plug

The DVI/HDMI Expansion Board provides a stereo line output with jack J5 supplying the left channel output and jack J7 supplying the right channel output. For further details, see Audio Interface, page 8.

J6: S/PDIF Out

Board connector: 2-pin header, 0.1-inch, Samtec HMTSW-102-07-L-S-200
Mating connector: Samtec HCSS series socket

Header J6 provides an S/PDIF output. For further details, see Audio Interface, page 8.

Pin	Name	Type	Description
1	SPDIF	O	S/PDIF output
2	GND	P	Ground

J7: Line Out Right

Board connector: RCA jack, CUI RCJ-041
Mating connector: RCA plug

The DVI/HDMI Expansion Board provides a stereo line output with jack J7 supplying the right channel output and jack J5 supplying the left channel output. For further details, see Audio Interface, page 8.

J8: HDMI Output (option)

Board connector: HDMI Type A receptacle, Molex 47151-1001
Mating connector: HDMI cable assembly

Socket J8 complies with the industry-standard for a HDMI Type A receptacle. The connector shield is connected electrically to chassis ground. Data and clock shields are connected electrically to the ground plane through a ferrite bead. For further details about this option, see HDMI Output, page 8.

J9: DVI Output

Board connector: DVI-D receptacle, Molex 74320-4004
Mating connector: DVI cable assembly

Socket J9 complies with the industry-standard for a single link DVI-D connector. The connector shield is connected electrically to chassis ground. Data and clock shields are connected electrically to the ground plane through a ferrite bead. For further details, see DVI Output, page 8.

J10: Display and Backlight

Eurotech reserves header J10 for internal use only. This header includes ESD sensitive signals and must not be connected under normal use.

System Specifications

Power Supply

The DVI/HDMI Expansion Board accepts power from the Catalyst FX carrier board on header J1, page 11.

Symbol	Parameter	Min	Typ.	Max	Units
Input voltage					
V3.3S	Normal operating power	3.135	3.3	3.465	V
V5S	Normal operating power	4.75	5.0	5.25	V

Audio Interface

An IDT 92HD71B8 4-channel HD audio codec provides the audio interface for the DVI/HDMI Expansion Board. For further details, see Audio Interface, page 8.

Symbol	Parameter	Min	Typ.	Max	Units
D_{VDD}	Codec digital supply voltage		3.3		V
A_{VDD}	Codec analog supply voltage		3.3		V
f_S	Sample rate		192		kHz
---	A/D sample resolution		24		bit
Line In					
V_{IN}	Full scale input voltage	1.00	1.03		V_{rms}
$Gain_{IN}$	Microphone boost	0		30	dB
R_{IN}	Input impedance		50		kΩ
C_{IN}	Input capacitance		15		pF
Line Out					
V_{OUT}	Full scale output voltage, 10kΩ load	0.707	0.758		V_{rms}

ESD Protection

The DVI/HDMI Expansion Board incorporates electrostatic discharge (ESD) protection diodes on all external signals.

Environmental

The DVI/HDMI Expansion Board meets the environmental specifications listed in the following table.

Parameter	Specification
Commercial operating temperature	0°C to +70°C

Board Revision History

This manual applies to the current revision of the DVI/HDMI Expansion Board as given in the following sections.

Identifying the Board Revision

The revision number of the DVI/HDMI Expansion Board is printed on the printed wiring board (PWB). That number is 170124-340Rx, where "x" is the revision level of the PWB.
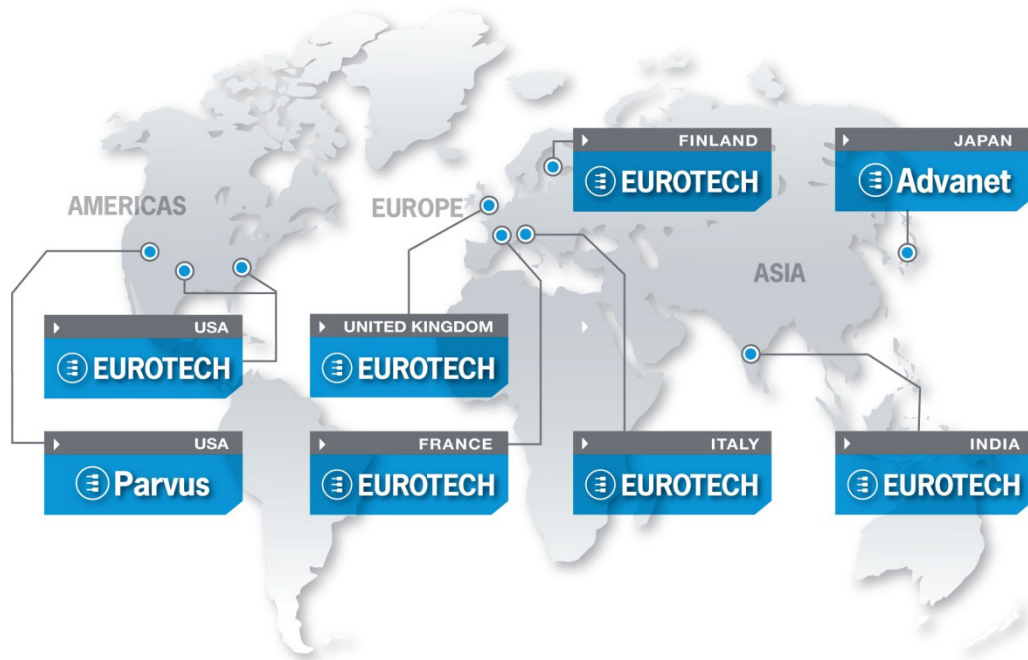
Board Revision History

The following is an overview of the revisions to the DVI/HDMI Expansion Board.

Revision 2

Initial release

Eurotech Worldwide Presence

AMERICAS	EUROPE	ASIA

USA

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

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

Italy

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

United Kingdom

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

France

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

Finland

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

Japan

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

India

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

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

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