IEEE-1394 PC Link to VXI, C-Size
HP E8491B

Technical Specifications

- C-size, 1-slot, message-based commander
- Industry standard PC-to-VXI interface
- High-performance data block transfers
- Ease of configuration with hot plug-in capability
- Supports multiple mainframes with one PC
- Timing and triggering to external devices/mainframes

Description

The HP E8491B IEEE-1394 PC Link to VXI is a C-size, 1-slot, message-based VXI module, providing a direct connection from your PC to a VXI mainframe via the industry standard IEEE-1394 bus (FireWire). The HP E8491B is a cost-effective choice for test applications when used with HP’s E84XX mainframe series. The HP E8491B is well suited for data acquisition applications moving large blocks of data.

The HP E8491B is a high-speed C-size device with Resource Manager and Slot 0 capability. Its logical address is 0, therefore it is always the mainframe’s Resource Manager and is typically installed in mainframe Slot 0. The high speed is accomplished, in part, through the use of small signals (200 mV) that are transmitted differentially over the twisted-pair wire set with controlled-impedance characteristics. The differential signal provides high-noise immunity.

The HP E8491B includes a C-size VXI Slot 0 module and a 4.5-meter cable. Ease of configuration is achieved with automatic recognition of a new IEEE-1394-based device without powering down the PC, known as “hot plug-in”.

The HP E8491B Option 001 is an OHCI-based IEEE-1394/PCI host adapter card. It is a PC plug-in card capable of transferring data at up to 400 Mbits/second. The card has three external 1394 ports. If required, the OHCI-based IEEE-1394/PCI card can supply 12V at up to 1.5A for IEEE-1394 devices that require power.
For multiple VXI mainframe systems, one HP E8491B is installed into each mainframe and these are interconnected via the cable in a daisy-chain, tree or star configuration. Up to 16 mainframes can be supported from one PC. This reduces the system cost further since an additional OHCI-based IEEE-1394/PCI card is not needed for each added mainframe.

The HP E8491B includes clock and triggering capabilities, plus complete SICL/VISA I/O library software for the Windows 95 and Windows NT 4.0 environments. The interface also supports 32-bit Interpreted SCPI (I-SCPI).

Refer to the HP Website (www.hp.com/go/vxi) for recent product updates, if applicable.

**What is IEEE-1394?**

“FireWire”, “IEEE-1394”, “IEC 1883”… These titles refer to a high-speed serial bus that is literally a new standard for transmitting data between PCs and consumer electronics. “FireWire”, as named by its inventors at Apple Computer Inc., was born out of the need for a low-cost, consumer oriented connection for applications where large amounts of digital audio and video data is recorded, edited, stored, and transferred between devices. The bus’ performance, flexibility, and ease-of-use resulted in an implementation as an I/O interconnect (HP E8491B) between external PCs and C-size VXI mainframes.

IEEE-1394’s reduction in cost is, in part, achieved through serial data transfer, which uses a simplified cable design. The IEEE-1394 cable medium allows up to 16 physical connections (cable hops) on one bus segment, each up to 4.5 meters in length. (The cable supplied with the HP E8491B is 4.5 meters.) This gives a system using IEEE-1394 a total cable distance of 72 meters. The data is transmitted over one of the cables’ twisted-pair sets, while the other twisted-pair set is used for the clock. The clock makes a transition when the data line does not, allowing a simple, exclusive-OR gate to be used for clock recovery.

IEEE-1394’s reduction in cost and ease of use are also attained through simplified electronics. Its transmitters and receivers, which are available as a standard chip set, handle addressing, initialization, arbitration and protocol. The plug-and-play nature of the IEEE-1394 bus is also achieved in this chip set. Node addresses, for example, are assigned to devices on the bus upon power-up.

Data transfer over the IEEE-1394 bus can be either Asynchronous or Isochronous. Both types can occur on the same bus. Isochronous data transfers broadcast variable amounts of data to multiple “channels” at a regular intervals with no acknowledgment. Asynchronous data transfers use a “fair arbitration” protocol to ensure each IEEE-1394 device has equal access to the bus. The HP E8491B supports asynchronous data transfers to secure equal access for each VXI mainframe.
Large Block (>64 Kbytes) Data Transfer Rate

<table>
<thead>
<tr>
<th></th>
<th>D16 Read Kbytes/s</th>
<th>D16 Write Kbytes/s</th>
<th>D32 Read Kbytes/s</th>
<th>D32 Write Kbytes/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>HP E8491B FireWire</td>
<td>8600</td>
<td>10200</td>
<td>12000</td>
<td>14000</td>
</tr>
<tr>
<td>HP E1406A GPIB</td>
<td>700</td>
<td>700</td>
<td>N/A (Not supported)</td>
<td>N/A (Not supported)</td>
</tr>
<tr>
<td>HP E6235A 200 MHz Embedded VXI PC</td>
<td>8500</td>
<td>1600</td>
<td>14000</td>
<td>3100</td>
</tr>
</tbody>
</table>

Product Specifications

Interface Characteristics
- Operating system: Win 95, Win NT 4.0
- Controllers: PC based
- I/O Library: SICL/VISA
- PC backplane: PCI 2.1 with latest BIOS
- Max. sustained data transfer:
  - 16 bit: 14 MB/sec
  - 32 bit: 14 MB/sec
- Max. backplane burst rate:
  - 16 bit: 13 MB/sec
  - 32 bit: 27 MB/sec
  - 64 bit: 53 MB/sec
- Languages: C/C++, Visual Basic, HP VEE, LabVIEW/VISA, LabWindows/VISA

General Characteristics
- Interface: IEEE-1394
- Slot 0 functions: Yes
- Resource manager: Yes
- Extended VXIbus resource manager: Yes
- CLK10: Yes

CLK10
- Input: TTL
- Output: TTL
- Stability: ± 100 ppm

Trigger Input
- Levels: TTL, ECL, CMOS, ± 30 V
- Input load: 55 kΩ, 50 pF
- Maximum rate: 2 MHz
- Minimum pulse width: 200 ns
- Maximum trigger delay: 300 ns

Trigger Output
- Max level: ± 30 V

Cable Length
- Maximum lengths: 4.5 m between devices
- Bus maximum length: 72 m total per system
- Maximum number of mainframes per system: 16

General Specifications

VXI Characteristics
- VXI device type: Message-based commander
- Data transfer bus: A16, A32, D16, D32, D64
- Size: C
- Slots: 1
- Connectors: P1/P2
- Shared memory: 128 kB
- VXI busses: TTL Trigger Bus, ECL Trigger Bus
- C-size compatibility: n/a

Module Current
<table>
<thead>
<tr>
<th>V</th>
<th>IR (A)</th>
<th>IS (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>+5 V</td>
<td>2.5</td>
<td>0.001</td>
</tr>
<tr>
<td>+12 V</td>
<td>0.35</td>
<td>0.050</td>
</tr>
<tr>
<td>−12 V</td>
<td>0.015</td>
<td>0.001</td>
</tr>
<tr>
<td>+24 V</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>−24 V</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>−5.2 V</td>
<td>0.180</td>
<td>0.001</td>
</tr>
<tr>
<td>−2 V</td>
<td>0.360</td>
<td>0.001</td>
</tr>
</tbody>
</table>

Cooling/Slot
- Watts/slot: 20
- ΔP mm H2O: 0.10
- Air flow liter/s: 2.0

Ordering Information
<table>
<thead>
<tr>
<th>Description</th>
<th>Product No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEEE-1394 PC Link to VXI C-Size</td>
<td>HP E8491B</td>
</tr>
<tr>
<td>OHCI-Based IEEE-1394/PCI Card</td>
<td>HP E8491B 001</td>
</tr>
<tr>
<td>Upgrade Kit HP E8491A to E8491B Performance</td>
<td>HP E8491B UP1</td>
</tr>
<tr>
<td>3 Yr. Rein, to HP to 1 Yr. OnSite Warr.</td>
<td>HP E8491B W01</td>
</tr>
<tr>
<td>FireWire Cable, 4.5 m (See Note 1)</td>
<td>HP E8491-61603</td>
</tr>
<tr>
<td>HP E8491B Front Panel (See Note 1)</td>
<td>HP E8491-00202</td>
</tr>
</tbody>
</table>

Note 1: Upgrade existing HP E8491A to E8491B performance with HP E8491B Opt. UP1 Upgrade Kit. This kit includes OHCI-based IEEE-1394/PCI card and HP E8491B software. To upgrade HP E8491A to E8491B physical appearance, install HP E8491B Front Panel (HP E8491-00202) and new 4.5 m FireWire Cable (HP E8491-61603). Original HP E8491A warranty remains in place after upgrade.

Note 2: FireWire cables are available in other lengths and can be ordered from:
Molex, Inc.,
Telephone: (800) 78-MOLEX
Related Literature
1998 Test System and VXI Products Data Book,
HP Pub. No. 5966-2812E

1999 Test System and VXI Products Catalog,
HP Pub. No. 5968-3698

Warranty
Standard Hewlett-Packard VXIbus hardware products are
certified against defects in materials and workmanship for a
period of three years unless otherwise noted. HP software
and firmware products that are designated by HP for use with
a hardware product, when properly installed on that
hardware product, are warranted to fail to operate their
programming instructions due to defects in materials and
workmanship.

For a complete and detailed warranty statement please see
the HP Test System and VXI Products Data Book or visit the

Website Directory
HP VXI Product Information
http://www.hp.com/go/vxi

HP VXI Channel Partners
http://www.hp.com/go/vxichanpart

HP VEE Application Website
http://www.hp.com/go/hpvee

Data Acquisition and Control Website
http://www.hp.com/go/data_acq

HP Instrument Driver Downloads
http://www.hp.com/go/inst_drivers

Electronics Manufacturing Test Solutions
http://www.hp.com/go/manufacturing

For more information about Hewlett-Packard test & measurement products,
aplications, services, and for a current sales office listing, visit our website,
http://www.hp.com/go/tmdir. You can also
contact one of the following centers and ask for a test & measurement sales
representative.

United States:
Hewlett-Packard Company
Test and Measurement Call Center
P.O. Box 4026
Englewood, CO 80155-4026
1 800 452 4844

Canada:
Hewlett-Packard Canada Ltd.
5150 Spectrum Way
Mississauga, Ontario L4W 5G1
(905) 206 4725

Europe:
Hewlett-Packard
European Marketing Centre
P.O. Box 999
1180 AZ Amstelveen
The Netherlands
(31 20) 547 9900

Japan:
Hewlett-Packard Japan Ltd.
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