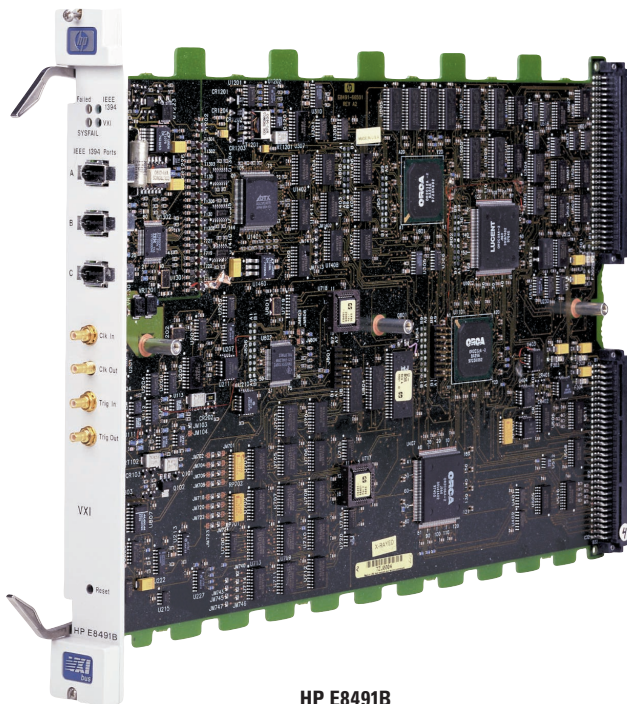# IEEE-1394 PC Link to VXI, C-Size HP E8491B

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**

HP E8491B

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

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

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

	I_{PM} (A)	I_{DM} (A)
+5 V:	2.5	0.001
+12 V:	0.35	0.050
−12 V:	0.015	0.001
+24 V:	0	0
−24 V:	0	0
−5.2 V:	0.180	0.001
−2 V:	0.360	0.001

Cooling/Slot
Watts/slot:	20
ΔP mm H_2O:	0.10
Air flow liter/s:	2.0

Ordering Information

Description	Product No.
IEEE-1394 PC Link to VXI, C-Size	HP E8491B
OHCI-Based IEEE-1394/PCI Card	HP E8491B 001
Upgrade Kit HP E8491A to E8491B Performance	HP E8491B UP1
3 Yr. Retn. to HP to 1 Yr. OnSite Warr.	HP E8491B W01
FireWire Cable, 4.5 m (See Note 1)	HP E8491-61603
HP E8491B Front Panel (See Note 1)	HP E8491-00202

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
http://www.molex.com.

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
warranted 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 not to fail to execute 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
HP Website at http://www.hp.com/go/vxi.

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,
applications, 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.
Measurement Assistance Center
9-1, Takakura-Cho, Hachioji-Shi,
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1 800 629 485

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Fax: (852) 2506 9285