

# E8491B IEEE-1394 PC Link to VXI

Slot Zero, Resource Manager, C-Size

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## Description

The Keysight Technologies 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 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 E8491B includes a C-size VXI Slot 0 module and a 4.5 m 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 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.

## Key Features

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

## IEEE-1394 Applications

The E8491B is well suited for data acquisition applications moving large blocks of data, and it is a cost-effective choice for test applications when used with Agilent's E84XX mainframe series. For multiple VXI mainframe systems, one 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 E8491B includes clock and triggering capabilities, plus complete SACL/VISA I/O library software for the Windows® 7 operating system. The interface also supports 32-bit Interpreted SCPI (I-SCPI).

## What is IEEE-1394?

The terms “FireWire”, “IEEE-1394”, and “IEC 1883” refer to a standard, high-speed serial bus used 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 (E8491B) between external PCs and C-size VXI mainframes.

IEEE-1394 can reduce cost through serial data transfer, using 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 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 further reduces costs by using 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 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 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)
E8491B Firewire	8600	10200	12000	14000
E1406A GP-IB	700	700	Not Supported	Not Supported

## Technical Specifications and Characteristics

Input Characteristics	
Operating system	Windows 7
Controllers	PC based
I/O Library	SICL/VISA
PCI backplane	PCI 2.1 with latest BIOS
PC languages	C/C++, Visual Basic, Keysight VEE, LabVIEW/VISA, and LabWindows/VISA
Maximum sustained data transfer	
16-bit	14 MB/s
32-bit	14 MB/s
Maximum backplane burst rate	
16-bit	13 MB/s
32-bit	27 MB/s
64-bit	53 MB/s

General Characteristics	
Interface	1 kSa/s per channel
Slot 0 functions	Yes
Resource manager	Yes
Extended VXIbus resource manager	Yes
CLK10	
Input	TTL
Output	TTL
Stability	$\pm 100$ ppm
Trigger input	
Levels	TTL, ECL, CMOS, $\pm 30$ V
Input load	55 k $\Omega$ , 50 pF
Maximum rate	2 MHz
Maximum pulse width	200 ns
Maximum trigger delay	300 ns
Trigger output	
Maximum level	+30 V

VXI Characteristics (nom)	
VXI device type	Message-based commander
Data Transfer	A16, A24, A32, D08, D16, D32, D64
Size	C
Slots	1
Connectors	P1/P2
Shared memory	128 kB
VXI buses	TTL trigger bus, ECL trigger bus

Module current (typ)	$I_{PM}$ (A)	$I_{DM}$ (A)
+5 V	2.5	0.001
+12 V	0.35	0.050
-12 V	0.15	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
$\Delta P$ mm H <sub>2</sub> O		0.10
Air flow liters/s		2.0

## Definitions and Conditions

Specification (spec)
The warranted performance of a calibrated instrument that has been stored for a minimum of 1 hour within the operating temperature range of 0 to 50 °C and after a 30-minute warm up period. All specifications account for the effects of measurement and calibration-source uncertainties and were created in compliance with ISO-17025 methods. In addition, a driver session must be opened to initialize the power supplies. This can be done programmatically or by opening SFP and connecting to the instrument. Data published in this document are specifications (spec) only where specifically indicated.
Typical (typ)
The characteristic performance, which 80% or more of manufactured instruments will meet. This data is not warranted, does not include measurement uncertainty or calibration-source, and is valid only at room temperature (approximately 25°C).
Nominal (nom)
The mean or average characteristic performance, or the value of an attribute that is determined by design such as a connector type, physical dimension, or operating speed. This data is not warranted and is measured at room temperature (approximately 25°C).
Measured (meas)
An attribute measured during the design phase for purposes of communicating expected performance, such as amplitude drift vs. time. This data is not warranted and is measured at room temperature (approximately 25°C).
Additional Information
All data are measured from multiple units at room temperature and are representative of product performance within the operating temperature range unless otherwise noted. The data contained in this document is subject to change.

## Ordering Information

Model	Description
E8491B	IEEE-1394 PC Link to VXI
E8491B-001	OHCI based IEEE-1394/PCI card
E8491B-ABA	English Documentation
E8491B-FRMK	Factory refurbished product
Related Products	
E8401A	13-slot, C-size, VXI Mainframe with 550W Power Supply and basic monitoring
E8403A	13-slot, C-size, VXI Mainframe with 1000W Power Supply and basic monitoring
E8404A	13-slot C-size VXI Mainframe, 1000W PS, Enhanced monitor, color graphic display
E1406A	VXI GPIB Command Module; C-size

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