

# LSI22910 SCSI Host Adapter

## KEY APPLICATIONS

- Servers with large arrays of high performance hard disks
- Ideal for cluster configurations for availability and scalability
- Supporting mixed single-ended and LVD SCSI devices system applications
- Improved cable lengths and connectivity over Ultra SCSI based systems

### Bus Interface:

3/5V PCI

### PCI Mode:

Bus Master

### Plug-and-Play:

Yes

### SCSI Rate:

80 Mbps synchronous  
14 MBps asynchronous

### SCSI Bus:

(2) 16-bit SE and LVD

### Bootable:

Yes

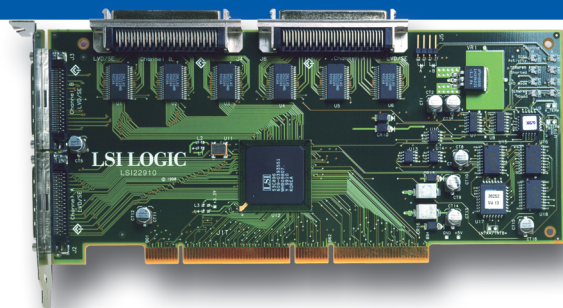
### No. of SCSI Devices:

15 - Ultra or Ultra2 per channel  
30 - Ultra or Ultra2 aggregate

### SCSI Connectors:

Internal: (2) 68-pin HD  
Univ. edge connector  
External: (2) 68-pin HD

*The LSI22910 is a 64-bit  
PCI-to-Ultra2 dual channel  
Ultra SCSI solution.*



## OVERVIEW

Breakthrough technology again sets new SCSI I/O standards with the LSI22910 PCI-to-Ultra2 SCSI dual channel host adapter. Using the LSI53C896 single-chip, PCI-to-Ultra2 SCSI dual controller, the LSI22910 host adapter offers superior performance, cost savings, enhanced scalability and connectivity advantages.

Matching the maximal performance of the 64-bit PCI bus to two independent Ultra2 SCSI channels, the LSI22910 host adapter provides up to 160 MBps aggregate SCSI throughput. Through LSI Logic's LVDlink (Low Voltage Differential) technology, the LSI22910 provides unmatched performance, device connectivity and signal reliability for Ultra/Ultra2 LVD operation. The LSI22910 provides a truly universal board able to support single-ended Fast/Ultra devices, or LVD Ultra/Ultra2 devices. The dual channels offer increased connectivity without utilizing an additional PCI slot or PCI load. Designing systems with the LSI22910 is easy because one or both channels can be dedicated to LVD devices. As an alternative, one channel can be used to support mixed performance single-ended devices. This board provides a powerful dual channel, scalable, multitasking interface for SCSI disk drives, JBOD and RAID system interconnect, and other single-ended or LVD SCSI devices.

The LSI22910 is a zero wait-state DMA bus master in legacy 32-bit or 64-bit PCI bus systems. The 64-bit host adapter also operates in existing 32-bit systems, providing greater flexibility with valuable system resources. While operating in a 32-bit PCI slot, the LSI22910 supports PCI 32-bit Dual Address Cycles.

The LSI22910 includes an on-board configuration utility, allowing the viewing and changing of default configuration settings for the host adapter and SCSI devices. It also provides advanced ease-of-use features such as automatic termination (depending on cable configuration) and on-board LEDs for termination power monitoring.

The advanced features of the LSI22910 64-bit PCI to Ultra2 Dual Channel host adapter make it the right choice for servers of all sizes.



# LSI22910 SCSI Host Adapter

## BENEFITS

- Complete host adapter solution for quicker time-to-market
- True multi-function, single-chip device provides better performance than PCI-to-PCI bridge solutions
- Improved reliability with single-chip solution
- Complete software support with BIOS and drivers
- Ultra2 SCSI provides increased connectivity (cable length and number of SCSI devices supported) over Ultra SCSI
- Automatic termination determined by cabling environment provides increased ease of use for the OEM and the end user
- Features Lsibios LVDlink™ universal LVD technology
- Termination power supplied through self-resetting current limiting device.
- Any drive in a disk array can be used as the boot device
- On-board BIOS supports greater than 8-GB disk drives

## SCSI DEVICE MANAGEMENT SOFTWARE (SDMS)

### SDMS Software Features

- Multiple host adapter support
- Scatter/gather
- Tagged command queuing for peak performance in multi-tasking environments
- Power Management for DSSPM support
- Shared interrupts and shared memory to allow multiple PCI devices in a single-interrupt system
- Autoscan for ease of SCSI configuration
- Multiple LUNs per SCSI ID for RAID and media changer capability
- Supports hard drives > 8 GBytes
- ASPI interface support
- Multi-initiator in most operating systems
- Disconnect/reselect support
- Target initiated negotiation
- On-board, field upgradeable BIOS in Flash ROM
- On-board serial EEPROM for SCSI bus configuration storage

Setting	Default	Global/Device
SCAM support	On	Global
Parity checking	Enabled	Global
Host adapter SCSI ID	7	Global
Scan order	Low to high (0 - max)	Global
Synchronous transfer rate	40 MB (Ultra2) 20 MB (Ultra)	Device
Data width	16	Device
Disconnect	On	Device
I/O time-out (secs)	10	Device
Scan for device at boot	Yes	Device
Scan for SCSI LUNs	Yes	Device
Queue tags	Enabled	Device

Table 1. SDMS software support

## SDMS Software Support

Operating systems supported are: DOS (with ASPI support), Windows 3.1, Windows for Workgroups 3.11, Windows 95, Windows NT 3.51 & 4.0, Novell NetWare 3.2 & 4.1X, SCO UNIX Open Server 5.0, UNIXWare, and OS/2 (including WARP). Utilities: Install, Flash utility (DOS only), SCSI format, SCSI configuration, verify.

The resident, menu-driven x86 BIOS configuration utility allows the user to view and change the default settings for the host adapter and attached SCSI devices. Table 2. below, lists the modifiable configuration settings. The global settings affect the host adapter and all SCSI devices connected to it. The user may change the host adapter scan order if more than one Lsibios SCSI host adapter is in the system.

Wide SCSI Performance	SE	LVD	Max Devices
Fast	6	–	16
Ultra SCSI	1.5	–	8
	3	–	4
	–	25	2
	–	12	16
Ultra2 SCSI	(1)	25	2
	(1)	12	16

(1) Single-ended configuration are not defined at Ultra2 speeds.

Table 2. Comparative specifications

## PCI FEATURES

- Direct (bus master) memory access for low overhead with 64-bit (or 32-bit) burst data transfers at 266 MBps (133 MBps for 32-bit) PCI data transfer rates
- 33-MHz bus master with zero wait-state PCI transfers
- Up to 64-byte PCI burst rate to maximize the data transfer rate
- Functions as one 64-bit or 32-bit PCI DMA bus master
- Two independent DMA channels with internal programmable arbitration
- 33-MHz PCI bus with zero wait-state operation
- Maximum burst transfer rate of 266 MBps
- Supports PCI write and invalidate, read line, and read multiple commands
- Operates in 32-bit and 64-bit PCI bus systems
- Supports dual address cycles (DAC) when in 32-bit systems

# LSI22910 SCSI Host Adapter

## SCSI FEATURES

- Ultra and Ultra2 SCSI (LVD only)
- Fast and Ultra SCSI (single-ended only)
- 16-bit, auto-selecting, single-ended or LVD SCSI design based on LSI53C895 PCI-Ultra2 SCSI dual controller IC for maximum performance
- Local memory bus for BIOS storage
- 128K FLASH EPROM allows easy field upgradability of BIOS
- Uses Ultra2 SCSI standard external VHDCI or 8 mm) SCSI connector per channel
- Uses LSI Logic's SCSI TolerANT™ active negation SCSI driver and receiver technology provide highest signal integrity in noisy cabling environments
- Available SCAM (SCSI Configured AutoMatically) Level 1 functionality for SCSI plug-and-play support

## SCSI TERMINATION

*Automatic and Manual Termination.* The LSI22910 PCI-Ultra2 SCSI host adapter automatically determines if cables are attached to any channel's SCSI connectors and then properly enables/disables that channel's SCSI terminators. Table 3. below, illustrates the available settings.

*Termination Power.* Each SCSI channel has two LEDs to indicate the terminator's power (TERMPWR) status. The TERMPWR Good (Channel A or B) LED indicates when the termination power is above 3.0 volts. The TERMPWR Shorted LED indicates when the termination power was subjected to an over current condition causing the self-resetting current limiting device (circuit breaker) to trip.

Internal Cable Attached	External Cable Attached	Jumper Term	Channel Termination
No	No	On	Enabled
Yes	No	On	Enabled
No	Yes	On	Enabled
Yes	Yes	On	Disabled
Either	Either	Off	Disabled

Table 3. SCSI terminating settings

## INTERRUPTS

The host adapter provides separate interrupts for each channel (channel A routed to INTA# pin and channel B routed to INTB# pin).



## **SUBSYSTEM ID**

The on-board LSI53C896 controller provides PCI configuration registers for Subsystem ID and Subsystem Vendor ID. As provided by LSI Logic, these indicate Lsibios Subsystem ID and Subsystem Vendor ID numbers. However, it is possible to allow the development of custom software and while using a standard board configuration.

## **HOST ADAPTER COMPATIBILITY AND QUALITY**

LSI Logic is a key developer and contributor to the original committees that defined today's SCSI and PCI standards. Our continuing work with other industry leaders of core chip sets, processors, system providers, SCSI device peripherals, BIOS, and operating systems enables us to provide users with the utmost compatibility and interoperability. Product compatibility and interoperability are rigorously tested and our ISO-9001 certified fabrication facilities assures users of the highest levels of product quality and reliability.

## **LSI21002 KIT CONTENTS**

- LSI21002 PCI-to-Ultra2 SCSI dual channel host adapter
- On-board SDMS BIOS with built-in, easy-to-use SCSI configuration utility
- SCSI Device Management System (SDMS) software with a full range of operating system support
- SCSI configuration utilities
- LSI21002 Users Guide
- SDMS Users Guide

# LSI22910 SCSI Host Adapter

## Technical Specifications

PCI Bus	64-bit or 32-bit, 3.3/5 V local bus (version 2.1)	
PCI Modes	Bus master DMA	
PCI Transfer Rate	up to 266 MBps per channel at 64-bit up to 133 MBps per channel at 32-bit	
SCSI Asynchronous	up to 14 MBps per channel	
	up to 28 MBps aggregate	
SCSI Synchronous SE	Fast: up to 20 MBps per channel	
	Ultra: up to 40 MBps per channel	
	up to 80 MBps aggregate	
SCSI Synchronous LVD	Ultra: up to 40 MBps per channel	
	up to 80 MBps aggregate	
	Ultra2: up to 80 MBps per channel up to 160 MBps aggregate	
PCI Voltage	+5V $\pm 5\%$ (3.0 A max), 12V $\pm 5\%$ (50 mA max)	
PCI Form Factor	7.5" x 4.2"	
Bracket	ISA/EISA	
Certification Level	PCI 2.1 compliant	
SCSI Bus	(2) 16-bit wide, SE or LVD	
SCSI Processor	LSI53C876	
Connectors	<b>External</b>	<b>Internal</b>
Per Channel	(2) 68-pin VHDCI	(2) 68-pin, right angle, HD latching Universal, 64-bit PCI edge connector
Termination	Automatic or manual	
Termination Power	Self-resetting	
LED Indicators	4-pin header for off-board LEDs	
Environments	<b>Operating</b>	<b>Storage</b>
Temperature	5°C to 55°C	-40°C to +85°C
Relative Humidity	5 to 90% non-condensing	5 to 90% non-condensing
Max Dew Point Temp	32°C	
MTBP	>400,000 hours	
Compliances	CE, VCCI, FCC and CISPR class B, UL 94VO	

## Software Support

<b>OS Support</b>	<b>Versions</b>
DOS	with ASPI support
Windows	3.1, Workgroups 3.11, 95, NT 3.52 & 4.0
NetWare	3.12 & 4.X
UnixWare	2.12 and 7.X
SCO Unix	Open Server 5.0
OS/2	including WARP
Utilities	Install, Flash (DOS only), SCSI format, SCSI configuration, verify

For more information please visit the LSI Logic web site at:

<http://storageio.lsillogic.com>

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