

Symbios SYM53C1010 Controller

PCI-Dual Channel Ultra160 SCSI Controller



Overview

The Symbios[®] SYM53C1010 is a highly integrated PCI-Dual Channel Ultra160 SCSI controller. The SYM53C1010 is 100 percent compatible with the Ultra160 SCSI initiative and provides additional features that ensure robust Ultra160 system operation. The SYM53C1010 provides a seamless migration path from the SYM53C896 PCI-Dual Channel Ultra2 SCSI controller with pin compatibility.

Benefits

- Provides complete end-to-end protection of the SCSI I/O with Cyclic Redundancy Check (CRC) and Asynchronous Information Protection (AIP)
- Provides robust performance with SureLINK[™] domain validation
- Migrates easily from Ultra2 SCSI
- Supports all major operating systems
- Protects SCSI investments
- Paves the way to Ultra320 SCSI

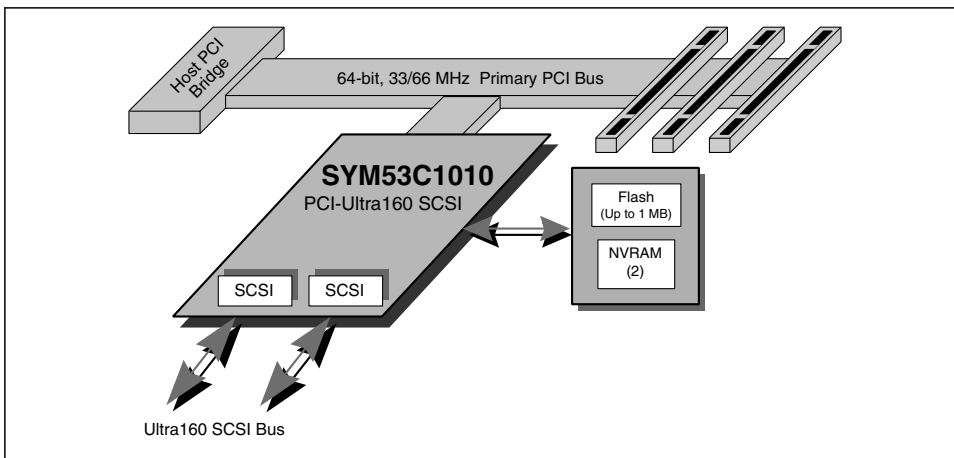


Figure 1. SCSI on the Motherboard

Applications

- Servers – Internet/Intranet network, video, e-mail, printing, database management, and financial applications
- Workstations – CAD/CAM, industrial simulation, etc.
- Host attach for RAID and JBOD mass storage subsystems – Anywhere data access is the bottleneck

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Features

- Pin compatible with SYM53C896 controller
 - Design board to accommodate either device in the same socket
 - Op code (software) compatible
- No external memory required
- 64-bit, 33/66 MHz PCI interface
 - Theoretical 528 MBps (on 66 MHz part) zero wait state transfer rate
 - 64-bit addressing supported through Dual Address Cycle (DAC)
 - Compliant with PCI 2.2, PCI Power Management 1.1 and PC99
- Supports Ultra160 SCSI
 - Double transition clocking for 160 MBps throughput on each channel
 - Cyclic Redundancy Check
 - Domain validation
- Asynchronous Information Protection
 - Covers all non-data, including command, status and messages
- High-performance PCI multifunction device
 - Presents one electrical load to PCI bus
 - Two independent wide Ultra160 SCSI channels
- SCSI Interrupt Steering Logic (SISL) alternate interrupt routing for RAID applications
- Supports Nextreme™ RAID

New Ultra160 SCSI Features

Double transition clocking enables throughput of up to 160 MBps on each channel for a total of 320 MBps, without increasing the interface clock rate.

Cyclic Redundancy Check (CRC) improves the reliability of SCSI data transmission through enhanced detection of communication errors. CRC provides extra data protection for marginal cable plants and external devices. CRC is the best way to ensure data protection during hot plugging. It uses the same proven CRC algorithm used by FDDI, Ethernet, and Fibre Channel, and detects all single bit errors, all double bit errors, all odd number of errors, and all burst errors up to 32 bits long. To provide complete end-to-end protection of the SCSI I/O, AIP protects all non-data phases, augmenting the CRC feature of Ultra160.

SureLINK domain validation technology detects the configuration of the SCSI bus and automatically tests and adjusts the SCSI transfer rate to optimize interoperability. The SYM53C1010 exceeds Ultra160 by providing not only Basic (Level 1) and Enhanced (Level 2) domain validation, but adds Margined (Level 3) domain validation. This enhancement margins LVD drive strength and clock signal timing characteristics to identify marginal Ultra160 systems.

Hardware/Software Overview

PCI Interface

The host PCI interface complies with PCI Local Bus Specification Revision 2.2, and implements a 64-bit/66 MHz PCI bus. It is backward compatible with 32-bit/33 MHz buses. Additionally, support for DAC is provided.

The SYM53C1010 is a true PCI multifunction device in that it presents one electrical load to the PCI bus. It uses one REQ/-GNT/pair to arbitrate for PCI bus mastership, and separate interrupt signals are generated for SCSI Function A and SCSI Function B for maximum performance.

The SYM53C1010 complies with PCI Power Management Interface Specification Revision 1.1 and PC 99, supporting power states D0, D1, D2, D3hot and D3cold, power management capabilities registers, and programmable values for PCI Subsystem Vendor ID and Subsystem ID. Extended access cycles (Memory Read Line, Memory Read Multiple, and Memory Write and Invalidate) are also supported.

SCSI Processors

The SYM53C1010 provides two independent Ultra160 SCSI controllers on a single chip. Each controller supports wide Ultra160 SCSI synchronous transfer rates up to 160 MBps on a LVD SCSI bus. Integrated LVDlink™ transceivers support both LVD and single-ended signals with no external transceivers

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required. Fast SCSI, Ultra SCSI, Ultra2 SCSI, and Ultra160 SCSI are all supported by the SYM53C1010.

An on-chip SCSI clock quadrupler allows the chip to achieve Ultra160 SCSI transfer rates with an input frequency of 40 MHz. The 8 KB of internal RAM per channel for SCRIPTS™ instruction storage allow all accesses to remain internal, reducing the time spent on the PCI bus. A 944-byte DMA FIFO on each channel allows the device to efficiently burst up to 512 bytes across the PCI bus. SCSI bus phase mismatches are handled in SCRIPTS, reducing CPU utilization.

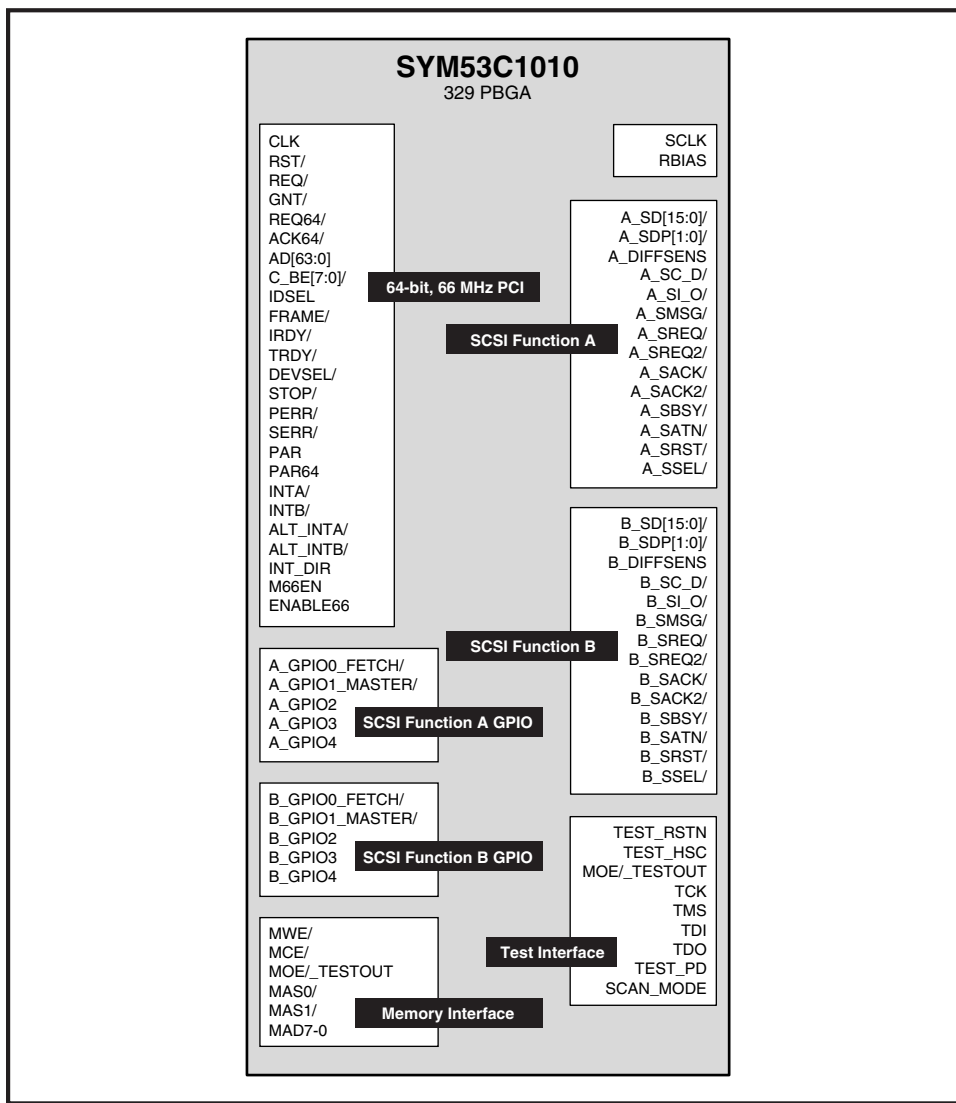


Figure 2. SYM53C1010 Functional Signal Grouping

Features (Continued)

- Proven integrated LVDlink transceivers for direct attach to either Low Voltage Differential (LVD) or single-ended (SE) SCSI buses
- Comprehensive SureLINK domain validation
 - Basic (Level 1) with inquiry command
 - Enhanced (Level 2) with read/write buffer
 - Margined (Level 3) with margining of LVD drive strength and programmable skew test
- IEEE 1149.1 JTAG boundary scan
- Flash and local memory interface
- Packaged in a 329 PBGA
- Supported in Symbios Storage Device Management System (SDMS™) software release 4.6
 - Full operating system support:
 - Windows® NT®/2000 and 95/98
 - Linux™
 - Solaris™
 - UnixWare™
 - Novell® NetWare®
 - OS/2
- Server Management CI (component instrumentation)

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Memory Interfaces

The SYM53C1010 supports up to 1 MB of external expansion ROM through a parallel interface, for add-in card designs. For ease of software development and field upgrades of the ROM, the interface supports local programming of FLASH memory. A serial 2-wire interface on each SCSI channel provides a connection to an external serial EEPROM for storing Subsystem Vendor ID and Subsystem ID.

Software

The SYM53C1010 is supported with the proven SDMS software. SDMS software enables the performance enhancements of Ultra160 data transfer speed increases and improved PCI bus utilization capabilities included in the SYM53C1010. The SYM53C1010 reliability capabilities of AIP and CRC are enabled and managed by the SDMS software. SDMS software implements the manageability improvements of the LSI Logic SureLINK domain validation technology. SureLINK technology extends standard domain validation with the addition of full cable plant margining. The cable plant margining capability, exclusive to LSI Logic's Ultra160 solution, includes end-to-end margining from the SYM53C1010 through LSI Logic's SYM53C180 SCSI bus expander to the target device. The domain validation capability of SDMS software is available as an independent application as well as integrated in the DMI 2.0 based system management solution for enterprise class implementations. SDMS software includes BIOS and OSV certified drivers for all major operating systems including DOS with ASPI support, Windows 95/98, Windows NT/2000, UnixWare, OS/2, NetWare, Solaris and Linux. A complete set of SCSI utilities rounds out the software solution, which includes a DMI 2.0 based system management software for Windows NT, NetWare, UnixWare, Solaris and Linux, and a stand-alone or snap-in DMI browser applet and SureLINK applet.

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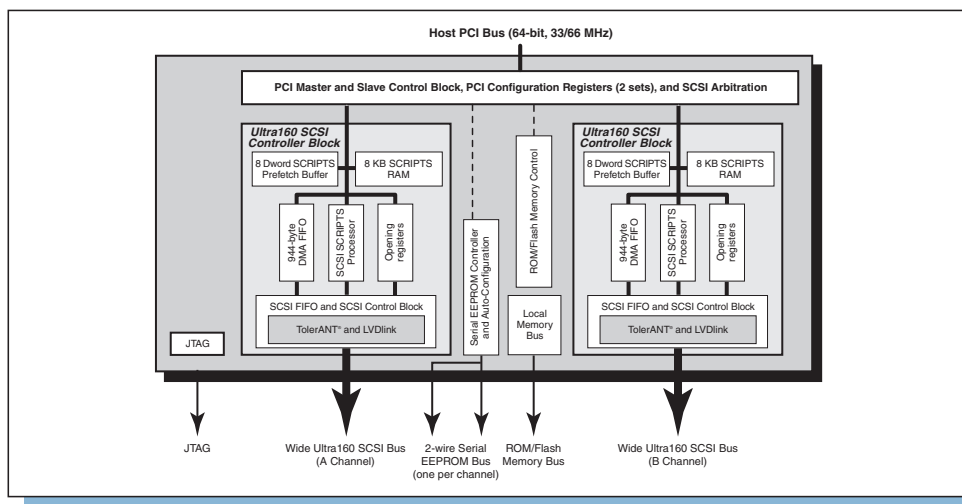


Figure 3. SYM53C1010 Functional Block Diagram

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