GPIB Interface Kit for Sun SPARCstations

GPIB-SPRC-B

TNT4882C ASIC
- *Completely IEEE 488.2 compatible*
- *FIFO buffers to decouple GPIB transfers from SBus transfers*
- *Byte-to-long word (32-bit) packing and unpacking in hardware to increase throughput and efficiency of SBus*
- *GPIB monitor port for board and bus-level diagnostics*
- *Complete in-system functional testing with loop-back mode*
- *Reduced software overhead*
- *Software and register compatible with NAT4882/Turbo488 chipset*

Maximum transfer rates
- *1.4 Mbytes/s using IEEE 488.1 handshake*
- *3.6 Mbytes/s using HS488*

SBus DVMA data transfers
- *No jumpers – software-controlled configuration*
- *Loadable NI-488.2M driver for simple installation*
- *Signal handling for immediate servicing of GPIB events*
- *Software compatible with all previous versions of SB-GPIB*

NI-488.2M Software
Solaris 1
Solaris 2

Application Software
LabVIEW
LabWindows/CVI

Kit Contents
SB-GPIB/TNT board and NI-488.2M software for Solaris

Overview

The GPIB-SPRC-B is a low-cost, high-performance IEEE 488 interface kit for Sun SPARCstation Series workstations equipped with SBus slots. The kit includes the SB-GPIB/TNT interface board and NI-488.2M software for Solaris. The National Instruments TNT4882C ASIC makes the SB-GPIB/TNT a maximum-performance IEEE 488.2 interface board. The TNT4882C chip performs the basic IEEE 488 Talker, Listener, and Controller functions required by the most recent GPIB standard, IEEE 488.2. With the TNT4882C and the SBus Direct Virtual Memory Access (DVMA) transfers, data transfers can reach 1.4 Mbytes/s using the IEEE 488.1 3-wire handshake. The TNT4882C can significantly increase the throughput of the associated multitasking Solaris driver software. The SB-GPIB/TNT also implements a high-speed GPIB protocol (HS488), so that you can have data transfers up to 3.6 Mbytes/s.

You can install the SB-GPIB/TNT in any single-width master SBus slot. Standard IEEE 488 cables connect the SB-GPIB/TNT to up to 14 instruments. If more than 14 instruments are required, you can add instruments to the system with National Instruments IEEE 488 extenders and expanders. You can install several SB-GPIB/TNT boards in a single computer. The special GPIB monitor and diagnostic circuitry can monitor the status of any GPIB lines, for applications such as testing the proper low-level functionality of an instrument's IEEE 488 port.

HS488

The SB-GPIB/TNT uses a new high-speed GPIB protocol (HS488). HS488 increases the maximum data transfer rate of ANSI/IEEE Standard 488.1-1987 up to 8 Mbytes/s. HS488 is a superset of the IEEE 488.1 protocol that will attempt to conduct transfers using the new high-speed protocol. If all active Listeners are not HS488 capable, it will automatically use the IEEE 488.1 3-wire handshake protocol. Maximum data transfer rates obtainable using HS488 depend on the host computer architecture and system configuration. With the SB-GPIB/TNT, you can attain transfer rates up to 3.6 Mbytes/s.

The TNT4882C completely and transparently handles the HS488 protocol without additional circuitry. Because HS488 is a superset of IEEE 488.1, you can mix existing GPIB devices with devices that have high-speed capability without changing your application programs. The TNT4882C can implement high-speed data transfers automatically. Thus, devices that have the TNT4882C chip can transparently communicate using HS488 if the corresponding Talker or Listener can also use HS488.

The TNT4882C provides the ability to enable or disable the HS488 handshake from software, and GPIB transceivers that meet the preferred specifications from IEEE Standard 488.1-1987.

Hardware

TNT4882C

The TNT4882C ASIC, the first single-chip IEEE 488.2 Talker, Listener, and Controller interface, combines the circuitry of the NAT4882 IEEE 488.2 Controller ASIC and Turbo488 performance-enhancing ASIC from National Instruments, along with built-in IEEE 488.1-compatible transceivers. The TNT4882C also implements the HS488 mode of operation for high-speed GPIB data transfers.

The TNT4882C implements Automatic Handshake Holdoff on the last byte of a GPIB read, DMA Transfer Synchronization with IEEE

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488 handshake, and Automatic END transmission on the last byte of a GPIB write. Because the SB-GPIB/TNT performs these functions in hardware, you save significant CPU time relative to performing the same functions in software.

DVMA Controller and SBus Interface

The DVMA controller and SBus interface functions are handled by the LSI 64853A ASIC. The DVMA controller packs and unpacks each byte of the GPIB to the 32-bit-wide data path on the SBus. Interrupts from the TNT4882C are routed through the SBus interface circuitry to the SBus interrupt request line INT2. SBus boards use SBus geographical addressing, so there are no user-configurable jumpers on the board.*

Because of the byte-to-longword packing and unpacking circuitry in the DVMA Controller, the SPARCstation can communicate across the SBus in full 32-bit mode rather than in single bytes.

The SBus DVMA controller also has a internal data buffer to handle four-word burst transfers. Additional registers that pipeline data transfers are also present, reducing the overhead between data transfers. This is possible because the address and the count of the next transfer can be loaded while the previous transfer is in progress.

FIFO

An 8-bit by 16-deep FIFO buffer on the SB-GPIB/TNT buffers data sent to or received from the GPIB. By buffering the data, the SBus and the GPIB can overlap their respective accesses to the FIFO, rather than one bus waiting for the other to complete a cycle. This increases the data transfer rate.

Data Transceivers

The data transceivers embedded in the TNT4882C also meet the current driver requirements of the SBus specification.

Transfer State Machine

The transfer state machine implements Automatic Handshake Holdoff on the last byte of a GPIB read, DMA Transfer Complete Synchronization with IEEE 488 handshake, and Automatic END transmission on the last byte of a GPIB write. Because the SB-GPIB/TNT performs these functions in hardware, you save significant CPU time relative to performing the same functions in software.

GPIB Monitor

You can monitor and control the IEEE 488 bus through a 16-bit read/write port independent of the IEEE 488 interface functions. The port outputs are disabled at system reset and do not interfere with normal IEEE 488 operations. The ability to read and write all 16 IEEE 488 lines gives a mechanism for stand-alone functional testing of the SB-GPIB/TNT or other instruments. The monitors are part of the TNT4882C circuitry.

GPIB Transceivers

Transceivers, which provide power-up/power-down bus protection (glitch-free) interface the SB-GPIB/TNT to the IEEE 488 bus. The transceivers are part of the TNT4882C circuitry.

Ordering Information

GPIB-SPRC-B and NI-488.2 Software *for Solaris 1 and Solaris 2.....776789-01*

GPIB Cables

X2 cable (double-shielded)

1 m.....763061-01
2 m.....763061-02
4 m.....763061-03

Specifications

IEEE 488 Compatibility

Compatible with IEEE 488.1 and IEEE 488.2

Capability Code	Description
SH1	Source Handshake
AH1	Acceptor Handshake
T5, TE5	Talker, Extender Talker
L3, LE3	Listener, Extender Listener
SR1	Service Request
PP1, PP2	Local/Remote Parallel Poll
RL1	Remote/Local
C1, C2, C3, C4, C5	Controller
E1, E2	Three-state bus drivers with automatic switch to open collector during parallel poll

IEEE 488 Bus Transfer Rates

Standard IEEE 488 handshake..... 1.4 Mbytes/s
HS488 handshake..... 3.6 Mbytes/s
(actual rates depend upon system configuration and instrument capabilities)

Power Requirement from SBus

+5 VDC..... 300 mA typical, 330 mA max

Physical

Dimensions..... 14.7 by 8.4 cm 5.8 by 3.3 in.) single-width
I/O connector..... IEEE 488 standard 24-pin

Operating Environment

Ambient temperature..... 0 to 55 ºC
Relative humidity..... 10% to 90%, noncondensing

Storage Environment

Ambient temperature..... -20 to 70 ºC
Relative humidity..... 5% to 90%, noncondensing

Electrostatic Discharge Protection (GPIB I/O pins)

By Mil 883C Section 3015C..... 1,500 V