High-Performance GPIB Interfaces for ISA

NI AT-GPIB/TNT (Plug and Play), NI AT-GPIB/TNT, NI AT-GPIB/TNT+

- TNT4882C ASIC
  - Completely IEEE 488.2 compatible
  - FIFO to decouple GPIB transfers from ISA bus transfers
  - 16-bit ISA bus interface with byte-to-word packing and unpacking
  - Reduced software overhead
- Maximum transfer rates (Windows)
  - 1.5 Mbytes/s using IEEE 488.1
  - 1.6 Mbytes/s using HS488
- 8-bit slot compatible with DMA disabled
- Software compatible with all previous versions of AT-GPIB

AT-GPIB/TNT (Plug and Play)

- Automatic software configuration of I/O base address, interrupt level, and DMA channel
- Choice of at least seven interrupt lines
- Choice of three 16-bit DMA channels

AT-GPIB/TNT

- Jumper-selectable hardware features
  - 11 interrupt lines
  - Three 16-bit DMA channels

AT-GPIB/TNT+

- GPIB controller and analyzer on a single board
- Premiere software and hardware solution for GPIB troubleshooting

Driver Software (included)

- NI-488.2
  - Windows 2000/NT/XP/Me/9x/3.1
  - OS/2
  - DOS

Overview

The National Instruments AT-GPIB/TNT is a high-performance IEEE 488 interface for PCs with ISA slots. The NI TNT4882C ASIC makes the AT-GPIB/TNT a maximum-performance IEEE 488.2 interface board. The TNT4882C performs the basic IEEE 488 Talker, Listener, and Controller functions required by the most recent GPIB specification, IEEE 488.2. The AT-GPIB/TNT can sustain data transfer rates greater than 1.5 Mbytes/s using the IEEE 488.1 3-wire handshake. The AT-GPIB/TNT also implements the high-speed GPIB protocol (HS488).

There are three versions of the NI AT-GPIB/TNT – the AT-GPIB/TNT (Plug and Play), which features a jumperless configuration; the legacy AT-GPIB/TNT, which uses DIP switches and jumpers to configure the interface; and the AT-GPIB/TNT+, a combination AT-GPIB/TNT (Plug and Play) and GPIB analyzer in one board. All three interfaces contain identical GPIB interface functionality.

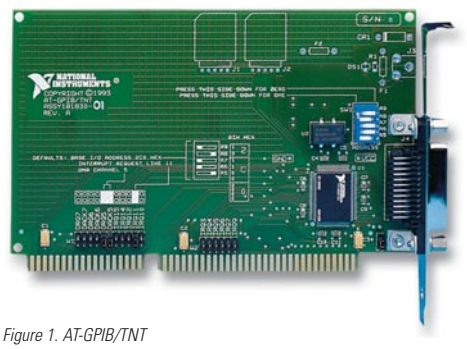

Figure 1. AT-GPIB/TNT

AT-GPIB/TNT (Plug and Play)

The AT-GPIB/TNT (Plug and Play) is jumperless and contains all circuitry needed for Plug and Play compatibility. Plug and Play systems automatically allocate the interface hardware resources (I/O address, DMA channel, and interrupt level) at startup. For non-Plug and Play systems running DOS or Windows, the National Instruments NI-PNP utility configures the hardware resources.

INFO CODES

For more information, or to order products online visit *ni.com/info* and enter:

atgpibtnt
atgpibtnt+

BUY ONLINE!

Legacy AT-GPIB/TNT

You can use the legacy AT-GPIB/TNT with Windows 2000/NT/XP/Me/9x/3.1, DOS, and OS/2. This version of the AT-GPIB/TNT uses DIP switches and jumpers to configure the interface hardware resources.

Analyzer Option

The AT-GPIB/TNT+ is a low-cost, high-speed alternative to separate GPIB controller and analyzer products. The GPIB analyzer portion of the AT-GPIB/TNT+ can capture and monitor GPIB activity up to 8 Mb/s, ideal for troubleshooting.

You can use the built-in GPIB analyzer for troubleshooting a variety of IEEE 488 software and hardware problems. It can alleviate many of the difficulties associated with GPIB communication, such as addressing inconsistencies, protocol violations, and simple bus timeout conditions.

In addition to including industry-standard NI-488.2 software, the AT-GPIB/TNT+ comes with an easy-to-use graphical analyzer

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application. You can use the AT-GPIB/TNT+ to monitor, capture, and participate in bus activity on the GPIB at high speeds. You can capture GPIB activity according to user-specified GPIB criteria. Furthermore, user-specified GPIB events can trigger the capture. You can view captured GPIB information in multiple windows in the analyzer application or save it for later viewing. The GPIB analyzer software displays the GPIB real-time status, including the 16 GPIB control and data lines.

See page 681 for more information on GPIB analyzer software.

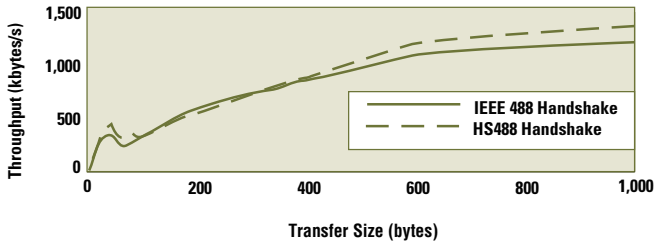

Figure 2. AT-GPIB/TNT Data Transfer Benchmarks (Small Data Blocks)

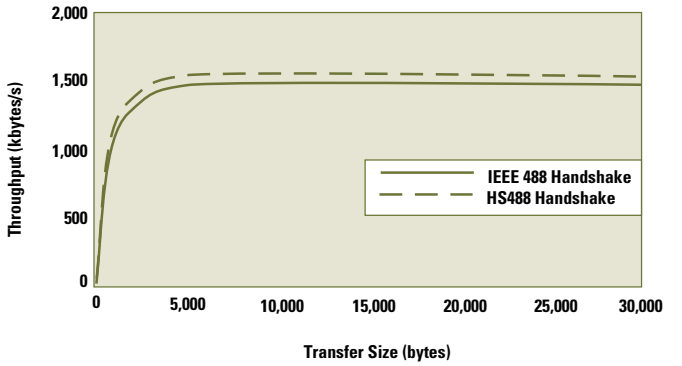

Figure 3. AT-GPIB/TNT Data Transfer Benchmarks

About Plug and Play ISA

The Plug and Play ISA specification simplifies PC ISA system configuration by automatically configuring each board address, interrupt, and DMA channel, without your intervention at system startup. Systems comprised entirely of Plug and Play ISA cards can take full advantage of the automatic configuration capability. With the Plug and Play ISA specification, existing (legacy) ISA cards can remain in the same system. For mixed systems, however, you might need to configure hardware components and resolve conflicts. Each Plug and Play hardware interface requires extra circuitry and software capability so that it implements resources for identification, configuration, and conflict detection and resolution. The AT-GPIB/TNT (Plug and Play) and AT-GPIB/TNT+ are compliant with the Plug and Play ISA specification.

HS488

The AT-GPIB/TNT can use a high-speed GPIB protocol (HS488). HS488, patented by National Instruments, 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 attempts to conduct data transfers with the new higher speed protocol. If any active listeners cannot conduct HS488 transfers, the protocol automatically uses the IEEE 488.1 3-wire handshake protocol. Maximum data transfer rates obtainable using HS488 depend on the host computer architecture and system configuration.

Transfer Rates

The AT-GPIB/TNT software and hardware provide maximum performance even when the data block is small. Figures 2 and 3 illustrate the maximum data transfer performance of the AT-GPIB/TNT.

Actual obtainable data transfer rates depend on host computer, system configuration, and device capability.

Common Features

TNT4882C

The TNT4882C ASIC is the first maximum-performance single-chip IEEE 488.2 Talker, Listener, and Controller interface with integrated IEEE 488.1-compliant transceivers. The TNT4882C also implements the patented HS488 protocol for high-speed GPIB data transfers. The TNT4882C implements automatic handshake holdoffs on the last byte of GPIB reads, DMA transfer complete synchronization with the IEEE 488 handshake, and automatic END transmission on the last byte of DMA writes. Because the AT-GPIB/TNT performs these functions in hardware, you save significant CPU time relative to performing the same functions in software.

ISA Bus Interface Logic

The ISA bus interface logic decodes the control signals of the ISA bus to provide access to the AT-GPIB/TNT internal registers. You can use the AT-GPIB/TNT with DMA disabled in an 8-bit PC/XT slot, if the board fits.

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FIFO-32 Byte

A 32-byte FIFO on the AT-GPIB/TNT buffers data sent to or received from the GPIB. By buffering the data, the ISA bus and the GPIB can overlap their respective accesses to the FIFO, rather than one bus waiting for the other to complete a cycle. This process increases the data transfer rate.

The FIFO also provides byte-to-word packing and unpacking. This byte packing requires only one bus cycle on the ISA bus for every two bytes transferred on the GPIB, thus using less ISA bus bandwidth.

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 system reset disables the port outputs, so that they do not interfere with normal IEEE 488 operations.

Ordering Information

Hardware and Software

AT-GPIB/TNT (Plug and Play) and NI-488.2
- Windows 2000/XP 778036-01
- Windows 2000/XP (with 2 m cable) 778036-51
- Windows NT 777542-01
- Windows NT (with 2 m cable) 777542-51
- Windows Me/9x 777154-01
- Windows Me/9x (with 2 m cable) 777154-51
- Windows 3.1/DOS 776943-01
- Windows 3.1/DOS (with 2 m cable) 776943-51

AT-GPIB/TNT and NI-488.2
- Windows 2000/XP 778037-01
- Windows 2000/XP (with 2 m cable) 778037-51
- Windows NT 776836-01
- Windows NT (with 2 m cable) 776836-51
- Windows Me/9x 777074-01
- Windows Me/9x (with 2 m cable) 777074-51
- Windows 3.1/DOS 776786-01
- Windows 3.1/DOS (with 2 m cable) 776786-51

AT-GPIB/TNT+, NI-488.2, and GPIB Analyzer Software
- Windows NT 777561-01
- Windows NT (with 2 m cable) 777561-51
- Windows Me/9*x* 777155-01
- Windows Me/9*x* (with 2 m cable) 777155-51
- Windows 3.1/DOS 776944-01
- Windows 3.1/DOS (with 2 m cable) 776944-51

Software Only

NI-488.2
- Windows 2000/NT/XP/Me/9*x* 777175-01
- OS/2 (for AT-GPIB/TNT only) 776763-01
- NI-488DDK (for AT-GPIB/TNT) 777430-01

GPIB Cables

X2 cable (double-shielded)
- 1 m 763061-01
- 2 m 763061-02
- 4 m 763061-03
- 8 m 763061-04

Specifications

IEEE 488 Compatibility
IEEE 488.1 and IEEE 488.2 compatible

Maximum IEEE 488 Bus Transfer Rates

Standard IEEE 488 handshake	1.5 Mbytes/s
HS488 handshake	1.6 Mbytes/s

Power Requirement from ISA I/O Channel
+5 VDC

AT-GPIB/TNT (Plug and Play)	120 mA typical, 240 mA maximum
AT-GPIB/TNT (legacy)	50 mA typical, 100 mA maximum
AT-GPIB/TNT+	445 mA typical, 845 mA maximum

Electrostatic Discharge Protection (GPIB I/O pins)

By Mil 883C Section 3015C	1,500 V

Physical

Dimensions	10.7 by 16.5 cm (4.2 by 6.5 in.)
I/O connector	IEEE 488 standard 24 pin

Operating Environment

Ambient temperature	0 to 55 °C
Relative humidity	10 to 90%, noncondensing

Storage Environment

Ambient temperature	-20 to 70 °C
Relative humidity	5 to 90%, noncondensing