High-Performance GPIB Interfaces for ISA

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

TNT4882C ASIC
Completely IEEE 488.2 compatible
FIFO buffers 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
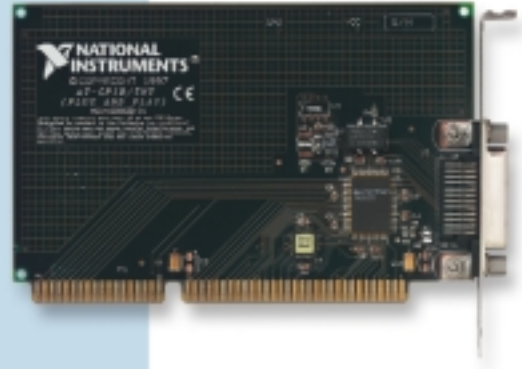
AT-GPIB/TNT
Jumper-selectable hardware features
11 interrupt lines
Three 16-bit DMA channels

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

Application Software
LabVIEW
Measurement Studio
Measure

Contact National Instruments for OEM pricing on AT-GPIB/TNT and other products.

Overview

The AT-GPIB/TNT is a low-cost, high-performance IEEE 488 interface for PCs equipped with ISA slots. The National Instruments TNT4882C ASIC makes the AT-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. The AT-GPIB/TNT can sustain data transfer rates over 1.5 Mbytes/s using the IEEE 488.1 3-wire handshake. The AT-GPIB/TNT also implements the high-speed GPIB protocol (HS488), so you can have data transfers over 1.6 Mbytes/s, or 2.9 Mbytes/s in an EISA computer.

There are two versions of the AT-GPIB/TNT: the AT-GPIB/TNT (Plug and Play), which features a jumperless configuration, and the legacy AT-GPIB/TNT, which uses traditional DIP switches and jumpers to configure the interface. Both 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 completely jumperless and contains all hardware circuitry needed for Plug and Play compatibility. Plug and Play systems automatically allocated the hardware resources of the interface (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.

Legacy AT-GPIB/TNT

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

About Plug and Play ISA

The Plug and Play ISA specification eases systems configuration of PC ISA systems 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, 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

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atgpibtnt

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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. With the AT-GPIB/TNT, you can attain transfer rates above 1.6 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 applications. 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 can enable or disable the HS488 handshake from software.

Transfer Rates

The AT-GPIB/TNT hardware and software provide maximum performance, even when the data block is small. Figure 2 illustrates the maximum data transfer performance of the AT-GPIB/TNT (Plug and Play). 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-compatible 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.
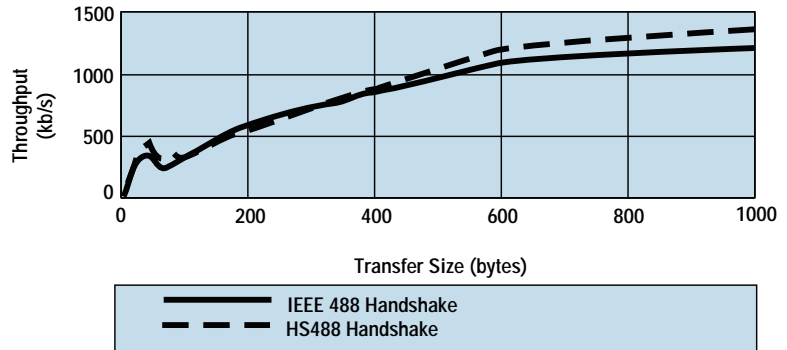

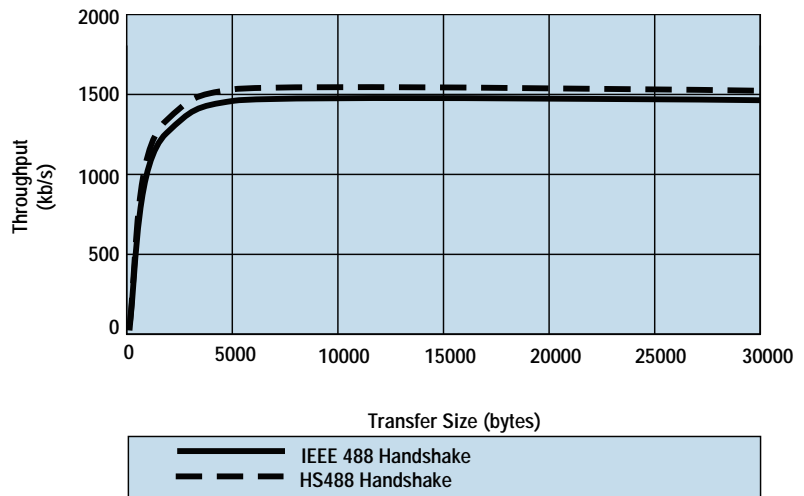Figure 2. AT-GPIB/TNT Data Transfer Benchmarks (Small Data Blocks)

Figure 3. AT-GPIB/TNT Data Transfer Benchmarks

ISA Bus Interface Logic

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

FIFO

A 16-bit by 16-deep FIFO buffer 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 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 port outputs are disabled at system reset and do not interfere with normal

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IEEE 488 operations. The NI-488.2 function `iblines` gives you direct access to this port from any programming language.

AT-GPIB/TNT (Plug and Play) Specific Features

I/O Address Decode

AT-GPIB/TNT (Plug and Play) occupies 32 bytes in the ISA I/O space. The Plug and Play software configures the AT-GPIB/TNT automatically.

DMA Channel and Interrupt Level Selection

The AT-GPIB/TNT (Plug and Play) can use one out of at least seven interrupt levels and one out of three DMA channels. In the AT-GPIB/TNT (Plug and Play), the Plug and Play software automatically configures the DMA channel and interrupt level.

Legacy AT-GPIB/TNT Specific Features

I/O Address Decode

The legacy AT-GPIB/TNT occupies 32 bytes in the ISA I/O space. You configure the AT-GPIB/TNT base address with a multiposition switch.

DMA Channel and Interrupt Level Selection

You can choose one out of 11 interrupt levels and one out of three DMA channels. In the legacy AT-GPIB/TNT, jumpers configure the DMA channel and interrupt level.

Analyzer Option

The National Instruments AT-GPIB/TNT+ combines a AT-GPIB/TNT PnP Controller and a complete GPIB Analyzer on a single board. 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 Mbytes/s, ideal for troubleshooting GPIB applications.

Ordering Information

Hardware and Software

AT-GPIB/TNT (Plug and Play) and NI-488.2

Windows 2000[1]	778036-01
Windows 2000[1] (2 m cable)	778036-51
Windows NT[1]	777542-01
Windows NT[1] (2 m cable)	777542-51
Windows Me/9x[1]	777154-01
Windows Me/9x[1] (2 m cable)	777154-51
Windows 3.1	776943-01
Windows 3.1 (2 m cable)	776943-51
DOS	776943-01
DOS (2 m cable)	776943-51

AT-GPIB/TNT and NI-488.2

Windows 2000[1]	778037-01
Windows 2000[1] (2 m cable)	778037-51
Windows NT[1]	776836-01
Windows NT[1] (2 m cable)	776836-51
Windows Me/9x[1]	777074-01
Windows Me/9x[1] (2 m cable)	777074-51
Windows 3.1	776786-01
Windows 3.1 (2 m cable)	776786-51
DOS	776786-01
DOS (2 m cable)	776786-51

Software

NI-488.2

Windows 2000/NT/Me/9x[1]	777175-01
OS/2 (for AT-GPIB/TNT only)	776763-01

Driver Development Kit

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

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

Electrostatic Discharge Protection (GPIB I/O pins)

By Mil 883C Section 3015C	1500 V