VME-GPIB Installation and User Guide

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Introduction

This section describes the VME-GPIB, lists the contents of your VME-GPIB kit, and explains how to unpack your VME-GPIB.

The VME-GPIB is a high-performance VMEbus to GPIB Controller. This interface enables a VMEbus-based computer to control GPIB instruments. The VME-GPIB has two GPIB interfaces and has the following features.

- 6U single width VMEbus card with ejector handles
- Interfaces to the VMEbus with the National Instruments MITE ASIC
  - High-performance DMA Transfers
  - Generates all VMEbus non-System Controller support signals

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    - VMEbus master
        - D08(EO), D16, D32, and D64 accesses
        - Release-on-Request bus requester
        - Programmable bus request level
    - VMEbus slave
        - D08(EO), D16, D32, and D64 accesses
    - VMEbus interrupter
        - Programmable interrupt level
        - Programmable interrupt vector
- Programmable configurable parameters
    - One out of four bus grant/request lines
    - One out of seven interrupt request lines
    - Supervisor or user access
    - Local Master Reset
- Two GPIB interfaces with complete IEEE 488.2 compatibility with the National Instruments TNT4882C ASIC
    - Maximum GPIB Transfer Rates
        - Over 2.0 Mbytes/s using IEEE 488.1
        - Over 6.4 Mbytes/s using HS488
- All program registers for basic operation located in 1 Kbytes of address space in A16 space
- A16 Base Address DIP Switch
- Front Panel Status LEDs
    - **SYSFAIL LED** indicates that the VMEbus SYSFAIL line is asserted.
    - **ACCESSED LED** indicates when the VME-GPIB is accessed from the VMEbus.
- NI-488DDK comprehensive source code package available for developing GPIB controller applications for any operating system

What Your Kit Should Contain

Your kit should contain the following components.

- ❑ One VME-GPIB Controller
- ❑ One *VME-GPIB Installation and User Guide* (this document)

Optional Equipment and Software Packages

GPIB X1 Cables, single-shielded, are available from National Instruments in 1-, 2-, and 4-meter lengths. GPIB X2 Cables, double-shielded, are also available in 1-, 2-, and 4-meter lengths.

The available software package includes the NI-488DDK for VME-GPIB software.

The NI-488DDK source code package can be used to develop a GPIB driver for the VME-GPIB for any operating system. The NI-488DDK provides example code for more than 20 board-level functions. The NI-488DDK is a subset of NI-488.2 and uses the same API, so that migration of applications between the NI-488DDK and NI-488.2 is straightforward.

Unpacking your VME-GPIB

Complete the following steps when unpacking your VME-GPIB.

1. Verify that the pieces contained in the package you received match the kit parts list given earlier in this section.
2. Your VME-GPIB board is shipped in an antistatic plastic bag to prevent electrostatic damage to the board. Several components on the board can be damaged by electrostatic discharge. To avoid such damage in handling the board, touch the plastic bag to a metal part of your VMEbus computer chassis before removing the board from the bag.
3. Remove the board from the bag and inspect the board for any signs of damage. Notify National Instruments if the board appears damaged in any way. Do not install a damaged board in your computer.

Functional Overview

The block diagram for the VME-GPIB is shown in Figure 1.

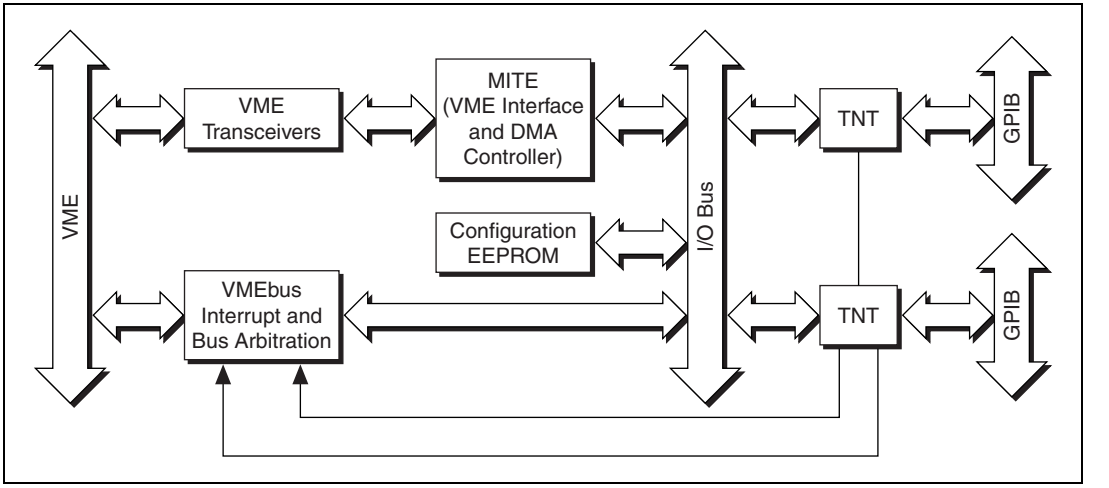


Figure 1. VME-GPIB Block Diagram

VMEbus Transceivers

The VMEbus transceivers ensure that the VME-GPIB meets the loading, driving, and timing requirements of the VMEbus specification for the various control signals.

MITE

The MITE is the National Instruments ASIC that implements the VMEbus interface. The MITE provides the VMEbus Master and Slave Functions, and two DMA channels.

The VMEbus master state machine generates VMEbus master data transfer cycles when instructed to do so by one of the DMA controllers. The VME-GPIB can generate D32, D16, and D08(EO) single, block, and RMW cycles on the VMEbus. The VME-GPIB will not generate unaligned VMEbus data transfers.

The VMEbus slave state machine monitors the output of the address decoders and responds to VMEbus cycles that are intended for the VME-GPIB. The VME-GPIB can accept D32, D16, and D08(EO) single and RMW VMEbus cycles. Unaligned VMEbus data transfers are treated as D32 data transfers. The only address modifier codes accepted by the VME-GPIB for A16 accesses are 0x2D and 0x29.

All of the program registers on the VME-GPIB are located in 1 Kbytes of A16 Address Space. The Base address for this address space is configured with the A16 Base Address DIP switch.

The VME-GPIB has two DMA controllers, which operate independently of each other. Each DMA controller can be programmed to move data from one of the GPIB ports to any destination on the VMEbus.

The DMA controllers direct the VMEbus master state machines to initiate data transfer cycles. The DMA controllers allow different cycle types and even different data widths between the source and destination during the DMA transfer.

The VME-GPIB does not have VMEbus system controller circuitry, so it should not be installed in Slot 1 of a VMEbus computer.

Interrupts and Bus Arbitration

The VME-GPIB can be configured to use two interrupt request lines, one for each GPIB port. Each interrupt also has a programmable interrupt vector that is returned during a VMEbus IACK cycle.

The VME-GPIB bus arbitration circuitry can be configured to use one of the four available bus request/grant pairs for VMEbus arbitration. When one of the DMA controllers is programmed to transfer data across the VMEbus, the bus arbitration circuitry will request the VMEbus and hold the VMEbus while the transfer takes place.

EEPROM

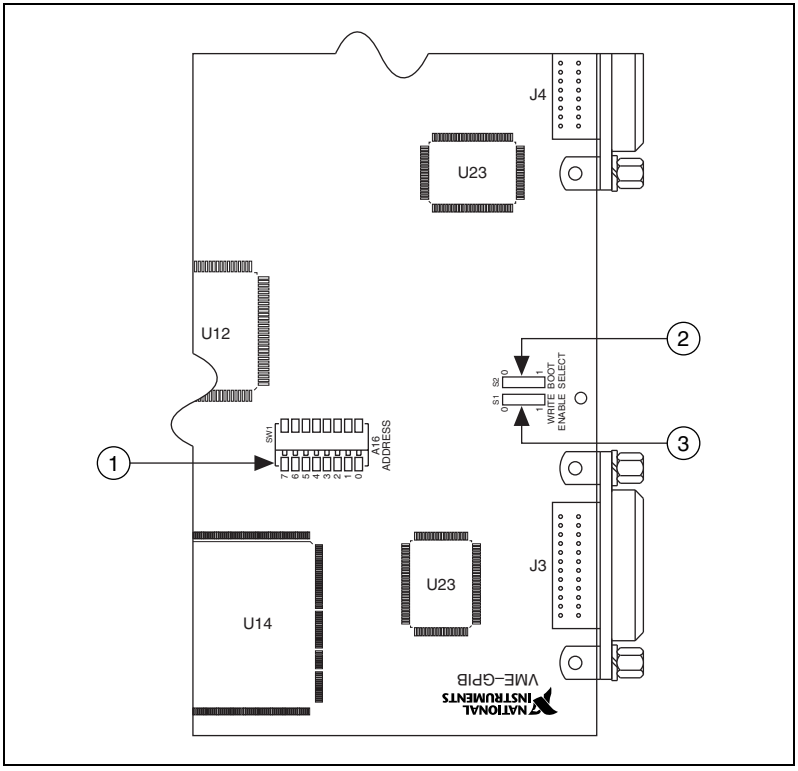
Several hardware settings are configured upon power-up by an onboard EEPROM rather than by onboard switches or jumpers. The configuration of the interrupt levels, and the VMEbus Request and Grant lines are loaded into the VME-GPIB registers after each power-up or hard reset. These settings can be changed later by software.

GPIB

Each of the two GPIB ports on the VME-GPIB is controlled by a National Instruments TNT4882C ASIC. The TNT4882C is a maximum performance IEEE 488.2 Talker, Listener, and Controller interface with integrated IEEE 488.1 transceivers. The TNT4882C also implements the HS488 mode of operation for high-speed GPIB data transfers.
The TNT4882C incorporates FIFO buffers that decouple the GPIB transfer from the VMEbus.

Each GPIB port is connected to a separate VMEbus interrupt line and on board DMA channel for independent operation.

Configuration switches on the VME-GPIB are shown in Figure 2. You can use them to select the VMEbus A16 base address of the VME-GPIB and the boot configuration.



1 A16 Base Address	3 Write Enable EEPROM
2 Boot Select EEPROM	

Figure 2. Switch Locator Diagram

VMEbus A16 Base Address

The VME-GPIB requires 1 Kbyte of A16 space for its configuration registers. You can change the A16 base address of the VME-GPIB by changing the setting of the 8-bit DIP switch which represents the most significant bits of the address. The 8 least significant bits will always be 00 hex. The ON position of the DIP switch corresponds to a logic value of 0, and the OFF position corresponds to a logic value of 1. Verify that no other devices in your system use the A16 address space for the VME-GPIB.

Figure 3 shows switch settings for A16 base address 2000 hex and 4000 hex.

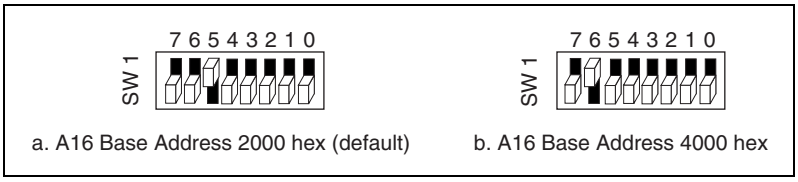


Figure 3. A16 Base Address Switch Settings

Configuration EEPROM

The VME-GPIB has an onboard EEPROM, which stores default register values that are loaded at power-up.

The WRITE ENABLE switch lets you change the factory-default configuration settings by permitting writes to the EEPROM. This switch serves as a safety measure and should not be needed under normal circumstances. The BOOT SELECT switch can be used to load an alternate boot configuration. Typically, configuration changes are done in software after the VME-GPIB is powered up. Figure 4 shows the default configuration settings for EEPROM operation.

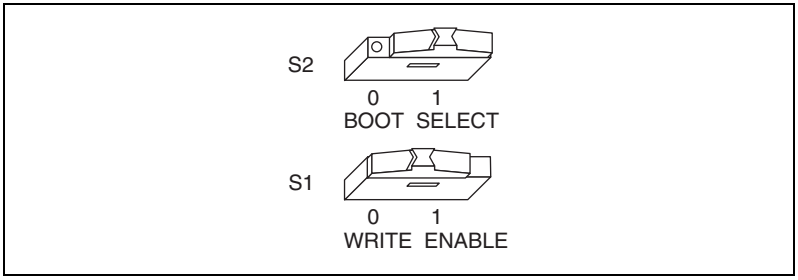


Figure 4. EEPROM Operation (Default)

Installation

After the A16 base address is configured, the VME-GPIB can be installed into the VMEbus computer.

1. Power off the VMEbus computer.
2. Remove any panels covering the empty VMEbus slot. The slot needs to be a 6U double height slot. The VME-GPIB does not have System Controller circuitry, so it should not be installed in Slot 1.
3. Install the VME-GPIB by carefully plugging in the empty slot.
4. Power up your VMEbus computer.

Specifications

Power Requirement

+5VDC.....800 mA typical

Maximum Transfer Rates

IEEE.1 Handshake

Read .....Up to 2.0 Mbytes/s

Write .....Up to 1.8 MBytes/s

HS488 Handshake

Read .....Up to 6.4 MBytes/s

Write .....Up to 5.8 MBytes/s

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 95%, noncondensing

Physical

Dimensions .....16 by 23.4 cm (6.3 by 9.2 in.)

I/O Connectors.....IEEE 488 standard 24-pin

Safety

This product is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 60950, EN 60950
- UL 1950
- CAN/CSA C22.2 No. 60950

Electromagnetic Compatibility

Emissions ..... EN 55011 Class A at 10 m
FCC Part 15A above 1 GHz

Immunity ..... EN 61326:1997 + A2:2000, Table 1

CE, C-Tick, and FCC Part 15 (Class A) Compliant

Note For EMC compliance, operate this device with shielded cabling.

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE Marking, as follows:

Low-Voltage Directive (safety) 73/23/EEC

Electromagnetic Compatibility
Directive (EMC) 89/336/EEC

Note Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, click **Declaration of Conformity** Information at `ni.com/hardref.nsf/`.

Technical Support Resources

NI Web Support

National Instruments Web support is your first stop for help in solving installation, configuration, and application problems and questions. Online problem-solving and diagnostic resources include frequently asked questions, knowledge bases, product-specific troubleshooting wizards, manuals, drivers, software updates, and more. Web support is available through the Technical Support section of `ni.com`.

Worldwide Support

National Instruments has offices located around the world to help address your support needs. You can access our branch office Web sites from the Worldwide Offices section of `ni.com`. Branch office Web sites provide up-to-date contact information, support phone numbers, email addresses, and current events.

If you have searched the technical support resources on our Web site and still cannot find the answers you need, contact your local office or National Instruments corporate. For telephone support in the United States, dial 512 795 8248. For telephone support outside the United States, contact your local branch office:

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Canada (Québec) 514 694 8521, Canada (Toronto) 905 785 0085,
Canada (Vancouver) 514 685 7530, China 86 21 6555 7838,
Czech Republic 420 2 2423 5774, Denmark 45 45 76 26 00,
Finland 385 0 9 725 725 11, France 33 0 1 48 14 24 24,
Germany 49 0 89 741 31 30, Greece 30 2 10 42 96 427, Hong Kong 2645 3186,
India 91 80 51190000, Israel 972 0 3 6393737, Italy 39 02 413091,
Japan 81 3 5472 2970, Korea 82 02 3451 3400, Malaysia 603 9059 6711,
Mexico 001 800 010 0793, Netherlands 31 0 348 433 466,
New Zealand 64 09 914 0488, Norway 47 0 32 27 73 00,
Poland 48 0 22 3390 150, Portugal 351 210 311 210, Russia 7 095 238 7139,
Singapore 65 6 226 5886, Slovenia 386 3 425 4200, South
Africa 27 0 11 805 8197, Spain 34 91 640 0085, Sweden 46 0 8 587 895 00,
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United Kingdom 44 0 1635 523545