VXIBUS PRODUCTS

VXI-5526

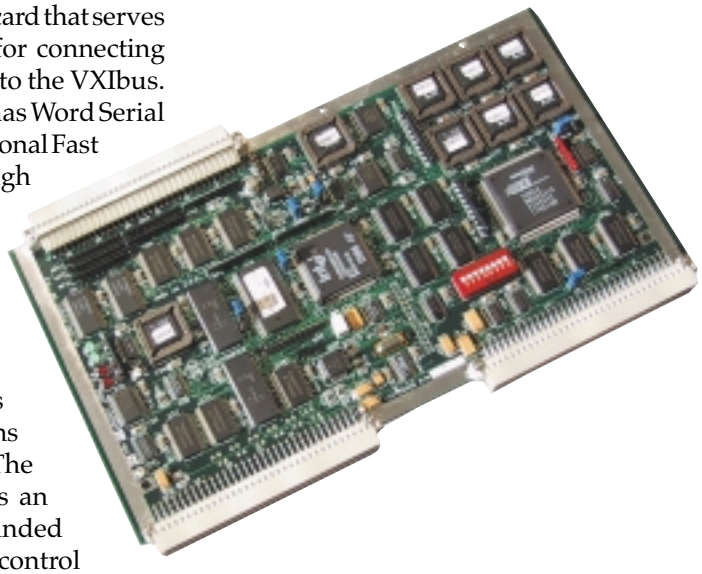
INTERFACE CARD

Converts any circuit into a VXI instrument.

- Mates with user's PCB to form a C or D-size module. *The quickest way to make a VXI Instrument.*
- Provides a complete message based VXI Revision 1.4 interface with an optional Fast Data Channel. *Easy programming with high speed data transfer capabilities.*
- User interface includes static signals, a computer expansion bus, serial signals and VXI Trigger. *Supports virtually any kind of user circuit or function.*
- SCPI parser includes hooks for adding user's commands. *Easy firmware customization for your application.*
- Firmware changed with the Firmware Development Kit or with custom commands from ICS. *Bring the power of the 386EX processor to yoiur instrument*
- Companion hardware kits provide a front panel, side shields and VXI hardware. *Complete hardware support for single and dual wide, C-size modules.*

DESCRIPTION

The VXI-5526 is an adapter card that serves as a complete VXI interface for connecting virtually any kind of a circuit to the VXIbus. The VXI-5526's VXI interface has Word Serial Message capability and an optional Fast Data Channel capability for high speed data transfer at rates up to 4 Mbytes per second. The VXI-5526 is designed around a 386EX processor that provides the user with 32 digital I/O signals, a processor expansion bus for data intensive applications and a full serial interface. The VXI-5526's firmware includes an SCPI parser that can be expanded with custom commands to control the user's circuits. The VXI-5526 and the user's circuit board plug together to form a C-size or a D-size VXIbus module.



VXI-5526 Interface Card

Packaging Concept

The VXI-5526 interface card occupies less than 1/3 of the available C-size VXI module space and is located at the VXI bus end of the module. The user places his components on a separate printed circuit board or wirewrap card in the front 2/3s of the module. The two cards mate together with a right angle DIN connector and are mechanically held together with a metal bracket. ICS's hardware kits provide a blank front panel, side shields and the hardware to assemble a complete 1, 2 or 3 slot wide, 'C' size VXI module.

User's Interface

The VXI-5526's user interface includes 32 digital lines, a 386EX expansion bus, a serial interface, and a VXIbus TTL trigger line. The digital interface is two groups of 16 lines that can be used as latched outputs or gated inputs to control the user's circuits. Handshake lines and a data strobe line may be used to coordinate the data transfer. The expansion bus is a buffered 16-bit wide bus driven by the VXI-5526's 386EX processor. The expansion bus addresses 64 registers, provides two interrupts and DMA data transfer capability. The serial interface is similar to a standard RS-232 DTE interface but with TTL signal levels for easy connection a serial device or RS-232/RS-485 transceivers. The VXI TTL Trigger line may be used to synchronize the user's circuits with other VXIbus activities.

Easy Configurability

All of the VXI-5526's configurable functions and VXI responses such as IDN message, manufacturer number, etc. are stored in nonvolatile flash memory. The stored values become the default values when the card is powered on. The user can set the model and manufacturer numbers to personalize the finished module as his product.

Fast Data Channel Advantages

Data transfer time over the VXI backplane can limit a module's performance regardless of how good the rest of the circuits are. Message based modules provide the intelligence and flexibility of a on board processor and the advantages of being an IEEE-488.2 instrument interface but are traditionally limited by the slow data transfer rate of the VXIbus message based protocol. Register based modules have fast data transfer rates but with limited on board intelligence. The new VXIbus Fast Data Channel specification overcomes this problem by

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specifying a group of protocols whose transfer rates approach the VME bus limits with one bus access per word. The VXI-5526 incorporates an optional D16/D32 data path and an extended command set with the capability to transfer up to 4 Mbytes per second directly to the VXI-5526's memory. This high data transfer rate reduces the VXIbus data transfer time and free's the processor so it has more time to operate the module.

VXI-5526 Block Diagram

A block diagram of the VXI-5526 is shown in Figure 1 on the right. The 386EX processor executes commands stored in the Flash or in DRAM. New programs are loaded into the Flash through the debugging Port. The VXI Interface accepts Word Serial Messages from the VXIbus and passes them to the 386EX processor. The 386EX interprets commands received over the VXIbus to set or read the static logic signals or to transfer data to the expansion bus. The selected VXIbus TTL trigger, VXI 16 MHz and 10 MHz clocks are passed directly to the user's interface. Responses from the user's circuits are transferred back to the VXIbus as Word Serial Messages.

Units with the optional Fast Data Channel have expanded memory and additional buffers for direct memory access to the VXIbus. The Fast Data Channel memory is organized as dual input and output buffers. While the Slot 0 Controller is transferring data to one of the buffers, data is transferred from the other buffer to the user's circuits. Data transfer is accomplished with interrupts or with the 386EX's DMA controller. Outgoing data is similarly transferred in the opposite direction.

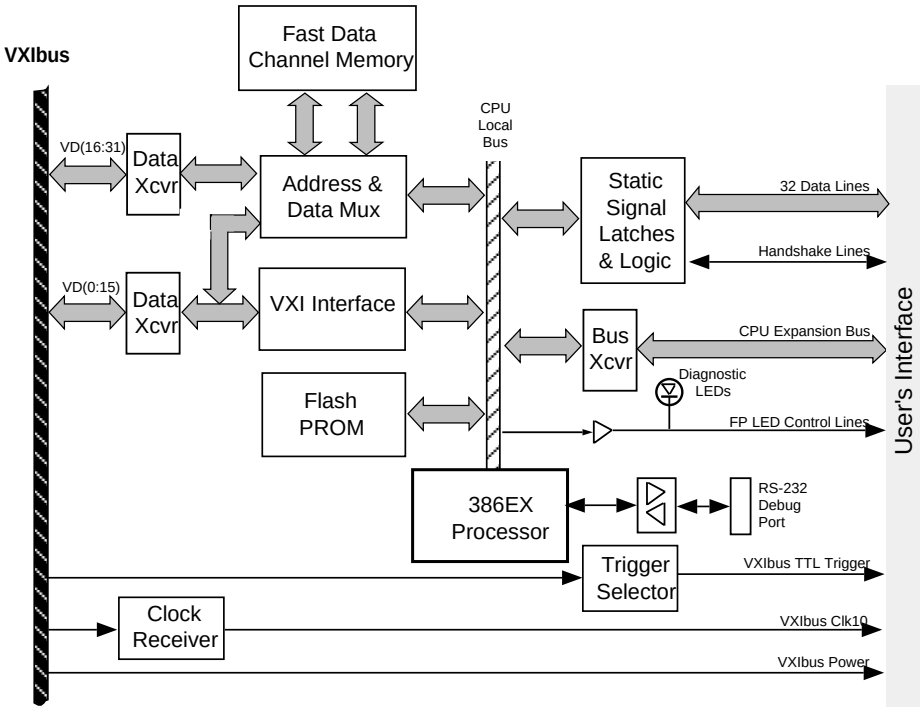


Figure 1 VXI-5526 Block Diagram

The Completed Module

The layout of a complete VXI module using the VXI-5526 Interface Card is shown in Figure 2 on the left. The two boards mate together to form a complete 'C' size PCB and can be enclosed with one of ICS's VXI Hardware Shield Kits. The user can layout his own board or use ICS's 'sea-of holes' type Prototyping Board to fabricate a complete module. Refer to the VXI-5506 data sheet for information about the Prototyping Board and a complete Prototype Kit.

PCB Layout Aids

An outline drawing and a preliminary bill of materials for the user's board is included as part of the VXI-5526 Instruction Manual. A complimentary disk with PCB design files in ORCAD and DXF file formats is available from ICS to jump start the design of the user's board. The PCB design files include the board outline, dimensions, parts library and a prototype schematic. The prototype schematic includes all of the signals on the user interface plus front panel LEDs and reset button. To complete the design, the user just has to add his components to the schematic and route the final design.

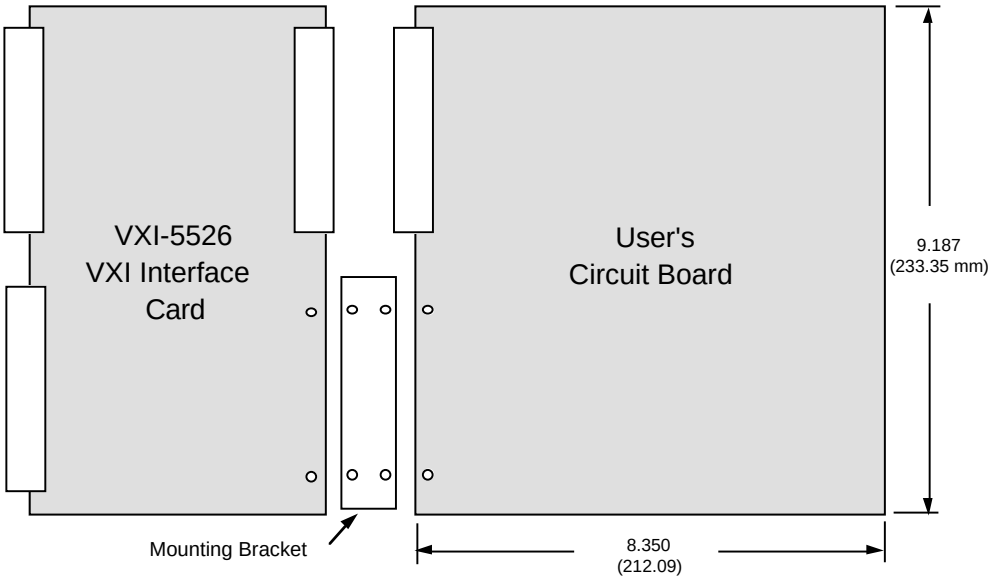


Figure 2 VXI-5526 and User Board Layout

VXI-5526 Firmware and Parser

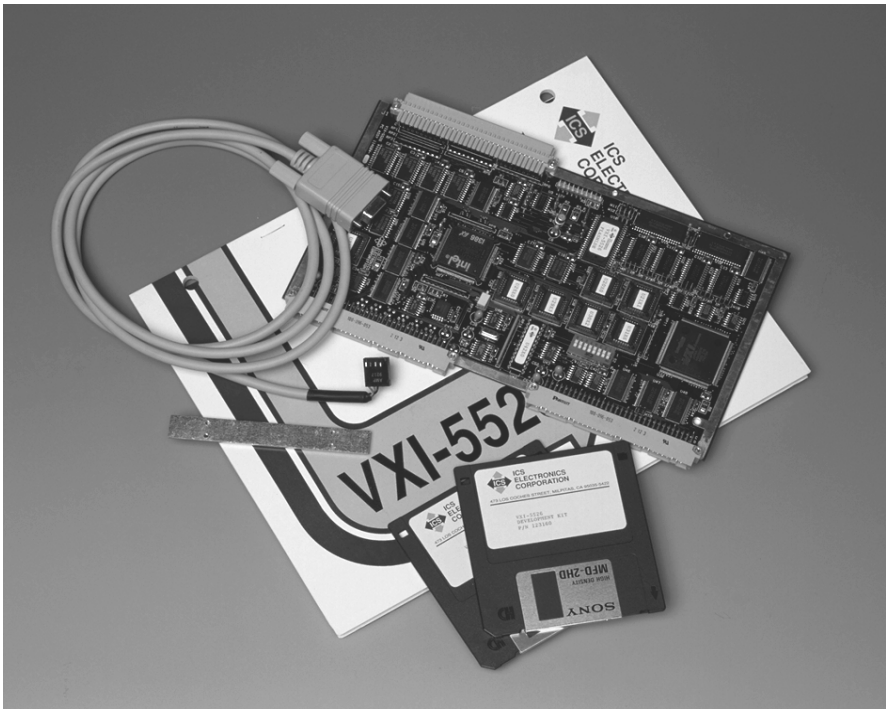
The VXI-5526's firmware includes a SCPI command parser that configures the static interface, reads or writes static data, and passes data over the expansion bus. Other parser commands allow the user to send or receive serial data and to set the VXI-5526's configurable parameters. The configurable parameters are saved in the VXI-5526's flash memory and include the manufacturer's VXI ID number, the model number and IDN message. The LOCK command protects the user's parameters from accidental change. Figure 1 shows the VXI-5526's SCPI command tree.

While the VXI-5526's standard command set is adequate for prototyping and for most quick response applications, some OEM applications may require custom commands, special functions or other changes to the VXI-5526's program. New commands and functions can be easily added to the VXI-5526's parser with the optional Firmware Development Kit or the user can specify the new functions and let ICS's programmers modify the VXI-5526's firmware. In either case, the VXI-5526 is the proven time effective way to develop a low volume VXIbus module

Firmware Development Kit

The VXI-5526's firmware is designed so the user can easily add custom commands and functions to the parser. The new functions are linked to the existing firmware and the compiled code is downloaded and stored in the VXI-5526's flash memory. The new VXI-5526 functions are compiled using Watcom's C/C++ language complier which runs on a PC. The necessary .mak file and the Systems & Software Inc. (SSI) Linker are included with the VXI-5526 Firmware Development Kit. Downloading and debugging are accomplished with the included Cyberquest Flash Loader and SSI 386EX Debugger.

The VXI-5526 Firmware Development Kit includes the necessary complier, mak files, linker, flash loader and debugger programs. The Firmware Development Kit also includes a serial cable for connecting the VXI-5526's debugging port to a PC COM port, a description of the parser's operation, instructions on how to add additional commands and functions to the VXI-5526's firmware and programming examples. All of the components of the Firmware Development Kit were selected and have been tested for their compatibility and ease of use.



VXI-5526 Firmware Development Kit and VXI-5526 Board (Complier and debuger software not shown)

5526 SCPI Command Tree

Keyword	Parameter
SYSTem	
:COMMunicate	
:SERial	
:DATA[?]	<string>
:BAUD	<numeric value>
:PARity	
[:TYPE]	EVEN | ODD | NONE
:CHECk	1 (ON) | 0 (OFF)
:BITS	7 | [8]
:SBITs	[1] | 2
:ERRor?	(0, "No error")
:VERSion?	(1995.0)
CONFigure	**Configure Static I/O**
[:DIGital]	
:INPut	<channel list> [(@1:2)]
:POLarity	0 | 1 [1]
:HANDshake	OFF | ON [ON]
:OUTPut	<channel list> [none]
:POLarity	0 | 1 [1]
:HANDshake	OFF | ON [OFF]
:CLEar	0 | 1 [0]
:STRobe	0 | 1 [0]
FORMat	**Format Strings**
[:DATA]	
:TALK	ASCii | [HEX] | HEXL
:LISTen	ASCii | [HEX] | HEXL
SENSe	**Input**
[:DIGital]	
:DATA	
[:VALue]?	
:PORT?	
:PORTn?	
:POLarity?	0- #hFFFF
:RESet	
:EDR	
:EXPansion?	addr (#h300-#h37E)
INITate	**Trigger control**
[:IMMediate]	
:CONTinuous	(ON) | 0 (OFF) [0]
ABORt	
[SOURce]	**Output**
[:DIGital]	
:DATA	
[:VALue]	
:PORTn	0-#hFFFF
:POLarity	0-#hFFFF
:STRobe	
:EXPansion	address, data
STATus	**SCPI Status Registers**
:OPERational	
:CONDitional?	
:ENABle	0-7FFF [0]
:PTRansistion	0-7FFF [All 1s]
:NTRansistion	0-7FFF [0]
:QUEStionable	
:CONDitional?	
:ENABle	0-7FFF [0]
:PTRansistion	0-7FFF [All 1s]
:NTRansistion	0-7FFF [0]
:PRESet	
CALibrate	**Calibrate**
:IDN	string
:MANufacturer	0-#h0FFF [#h0FE9]
:MODel	0-#h0FFF [526]
:DATe	mm/dd/yy
:DEFault	
:LOCK	1(On)| 0(Off) [0]

VXI-5526: SPECIFICATIONS

VXI Specifications

VXI Capabilities
Static and Dynamic address capability
Message based, 14 class instrument
Message based slave device
A16/A24/A32 address space
D16 data bus
Programmable interrupter for data ready, status line change or errors
Event generator for all protocol errors
Normal handshake data transfer
Fast Data Channel with programmable buffers per VXI-10 Specification.
Supports VXI instrument protocol, IEEE 488.2 common commands

Fast Data Channel (Optional)

Channel organization controllable by commands from the Slot 0 Controller.

Memory size:	1 or 4 Mbytes less program space
Buffers:	1 to 32
Data bus:	D32/D16
Access Time	300 ns typ, 500 ns max.

488.2 Common Commands

*CLS, *ESE, *ESE?, *ESR?, *IDN?, *OPC, *OPC?, *PSC, *PSC?,*RST, *SRE, *STB, *TST? and *WAI

Diagnostic Capability

Power-on self test, built-in diagnostic routines and four LEDs for VXI status and troubleshooting.

Internal Processor

Intel 386EX/33 MHz processor with 512 Kbytes of flash memory and 512 Kbytes of RAM expandable to 1 or 4 Mbytes with Fast Data Channel option. Includes RS-232 serial debugger port and a JTAG test port

User Interface

Parallel Data Lines
32 LSTTL/CMOS latched data lines with 33 Kohm pullups, 3 mA source and 48 mA sink capability. Control lines include input handshake lines and output data strobe. Data line direction and handshake assignments are set by user in 8 bit increments. Data lines are programmable from the VXIbus.

Expansion bus
386EX expansion bus: 16 data lines with 24 mA sink and source capability, 6 address lines, chip select and IOR/IOW lines. Includes DMA channel control lines for fast data transfers and two interrupt lines. I/O address range 300 to 380 HEX.

Serial Interface Signals
Standard PC COMM signals (TD, RD, RTS, CTS, and DSR) at TTL signal levels.

Other Signals
CLEAR#: low true pulse to reset user logic
CLK10: VXIbus 10 MHz clock
CLK16: 16 MHz clock
TTLTrigger: Selected VXI trigger line
LED drive signals for operating four front panel LEDs.
Reset Switch input

Firmware Development Kit

Includes a 386EX Flash Loader from Cyberquest, Watcom's C/C++ language complier, SSI's PC based Link & Locate/386 Debugger, VXI-5526 Developmental Library, .mak files, sample programs and serial cable to PC COM port. (The complier requires a 100 Mbytes of hard disk space and 8 Mbytes of RAM)

Physical

Size, W x H x D
C-sized 1-1/3 deep card with P1 and P2 VXI bus connectors
9.2 x 0.62 x 5.0 in
(23.3 x 1.4 x 12.7 cm)

Weight
.34 kg. (.75 lbs.)

Power Consumption
VXI interface logic uses 800 mA of +5 Vdc

User Interface
A 3 row x 32 pin DIN connector

VXI Interface
Standard P1 and P2 connectors.

Included Accessories

Instruction manual with PCB layout drawings and design rules for user's PCB

Programming guide and sample routines for user interface signals, serial and Fast Data Channel transfers.

Mounting bracket.

VXI Hardware Shield Kits

C-size module kits include the shields, blank front panels and all necessary hardware to make single, dual and triple width VXI 'C' size modules. For more information, refer to ICS's VXI-KIT data sheet.

VXI-5506 Prototyping Kit

Includes a VXI-5526 board, a prototyping board and a VXI Hardware Shield Kit. For more information, refer to the VXI-5506 data sheet.

ORDERING INFORMATION

	Part Number
VXIbus Interface Adapter Card with 512 Kbyte memory and mounting bracket	VXI-5526
VXIbus Interface Adapter Card with 1 MB memory, Fast Data Channel, and mounting bracket	VXI-5526-11
VXIbus Interface Adapter Card with 4 MB memory, Fast Data Channel, and mounting bracket	VXI-5526-14
VXI-5526 Firmware Development Kit	114598