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VXI MULTIFUNCTION MODULE

VXI-5535B

DESCRIPTION



The VXI-5535B is a multifunction VXI module that provides four separate interfaces in one VXI slot – one GPIB, two serial interfaces and 64 bits of digital I/O. All four interfaces are user configurable with non-volatile storage of all settings. Each interface has its own logical address and can be independently programmed to accept VXIbus triggers or to interrupt the VXIbus. A four character LED display on the front panel shows device activity, errors, SYSFAIL and interface diagnostic messages.

Serial Interfaces

The two Serial Interfaces each provide RS-232, RS-422 and RS-485 compatible signals. Baud rates, character formats and transmission mode are independently programmable for each channel. Baud rates are selectable in all of the standard rates up to 57.6 K baud. Serial messages are passed transparently through the serial interfaces or stored in buffers and transmitted upon receipt of a VXIbus trigger. Input and output buffering is provided to minimize VXIbus transfer time.

GPIB Interface

The GPIB Interface is a complete GPIB/HP-IB controller that accepts Rocky Mountain BASIC style commands to control any GPIB device. Bus control can be by direct VXIbus commands, or groups of commands stored in buffers. The stored commands can be run later by the VXI-5535B to off-load the VXIbus controller. In addition, the GPIB interface can be configured as an IEEE 488.2 device for testing bus controllers or for transferring data between the VXIbus and an external controller or computer.

Parallel Digital Interface

The Parallel Digital Interface contains 64 lines that are user programmable as inputs or outputs. The signals are TTL levels with 32 of the lines routed through a plug-in daughter board that can be used to add line drivers, level translators, pullup resisters, etc. to the standard unit. Data output is by direct VXIbus command, buffered until triggered or by a digital word generator that can be syncronized to a trigger. Digital data inputted directly to VXIbus or to an input buffer for later transfer over the VXIbus

4 FUNCTIONS IN ONE MODULE
- **TWO SERIAL INTERFACES**
- **GPIB CONTROLLER**
- **PARALLEL DIGITAL INTERFACE**

- Uses include direct UUT control, data transfer or signal generation.
  Easiest connection to the outside world from your VXI chassis.
- Internal processors off load the VXIbus controller by running stored programs or outputting buffered data.
  Speeds up tests.
- Daughter board provides space for adding drivers, pullups or other circuits to the parallel signals.
  Adapts easily to any need.
- Dual-mode IEEE-488.2 GPIB Interface.
  Provides both controller and device functions.
- VXI 1.4 and IEEE-488.2 Compliant.
  Meets the latest VXI specifications.
- Alpha numeric display on front panel.
  Shows device activity and interface diagnostics for program debugging.
- Software includes a VISA GPIB driver and optional Labview driver .
  Simplifies user's software effort.

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Versatile Trigger Capability

All of the VXI-5535B interfaces can store and output the data received from the VXIbus upon receipt of a trigger. (The GPIB interfaces stores commands and executes them when triggered). The trigger capabilities help synchronize test operations and eliminate the need to repeat sending common test sequences or messages over the VXIbus. The trigger can be either a VXIbus TTL trigger pulse, a Word Serial TRIGGER Command or a direct command to the interface. To arm the trigger function, the user sends the interface the Word Serial ARMTRIGGER command to specify the buffer to be used and the VXIbus TTL trigger line (if one is being used).

Front Panel Display

An easy-to-read four character alpha numeric display on the front panel provides module status, SYSFAIL display, error codes and device activity information to the user. At power turn-on, the display momentarily shows **SysF**, then steps through the module's self test sequence to display **Redy** at the start of normal operation. During normal operation the display shows the currently addressed logical device.

The display Mode Button changes the display mode to show an extended list of messages for debugging purposes, the module's VXI address switch setting, VXI Protocol status, or to run continuous self tests on the slave processors.

Digital Word Generator Operation

The Parallel Interface has a Digital Word Generator (DWG) function that generates digital waveforms. This function lets the VXI-5535B generate clock signals, simulate serial data or a series of digital events at preset time rates. The DWG function outputs data stored in a 4 K byte buffer in user set time steps - from 100 µsec/word to 6.5 sec/word. The output word can be 8 to 64 bits wide in 8 bit increments. The user stores the output data pattern in one of two 4 K byte buffers and can specify continuous or single shot operation. Any trigger can be used to start the data output.

Applications

There are numerous applications for a VXI-5535B in a VXIbus test system. The serial interfaces support communication with the UUT or serial devices as terminals, printers, plotters, etc. The parallel interface can input or output parallel signals to the UUT, generate test patterns or static digital signals. The GPIB Interface can be used to run non-VXIbus equipment or to operate the UUT and prevent a defective UUT from hanging up the GPIB-VXI link.

Software

Programming is made easier by the use of the optional Labview driver. The Labview driver provides virtual front panels for all four interfaces and includes all of the VXI-5535B commands and functions.

Digital Signal Transfer Modes

The Parallel Digital Interface consists of 64 CMOS/TTL compatible I/O lines that are user configurable by 8-bit byte increments into two data channels with handshake and status input lines. The data channels can be used as an input and an output channel or assigned to the same direction as shown in Figure 2. Output data can be put directly in the output latches and any input data is stored in the input buffer. The channel selection command is used to select the active channel. Alternately, an output channel can be driven by the Trigger Buffer and the second output channel by direct output commands. Byte input/Byte output commands can be used to read or write data directly to any byte, even those not assigned to a data channel.

Plug-in Digital Signal Conversion

32 digital I/O lines pass through a plug-in daughter board that can be used to insert level shifters, line drivers or other circuits between the Parallel Interface and the external connector. Vcc, ground and two user assignable VXI voltages are available on the daughter board. Standard units are shipped with plain pin-to-pin boards but custom boards are available. See Application Bulletin AB55-4 for the available daughter board configurations.

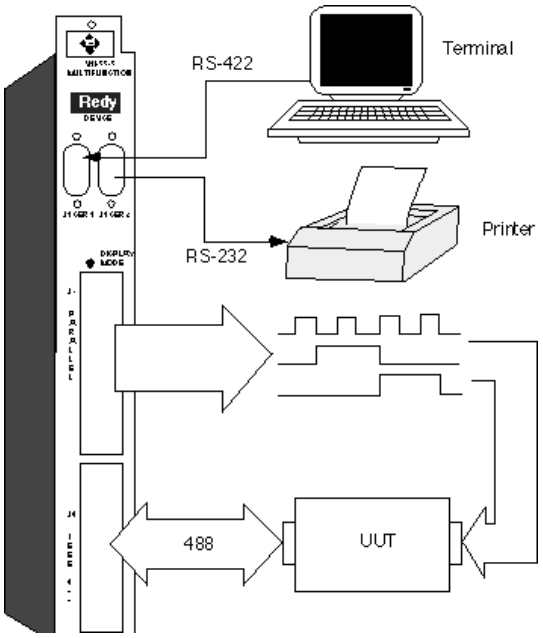
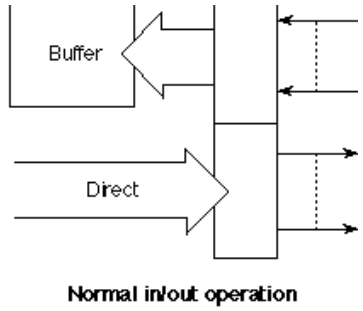


Figure 1 Typical VXI-5535B Uses



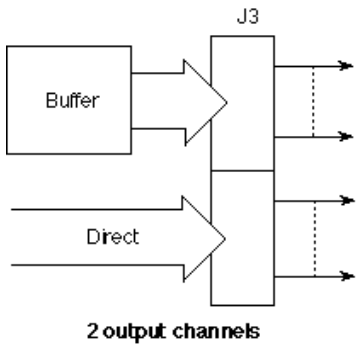


Figure 2 VXI-5535B Parallel Interface Operation

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Block Diagram

The VXI-5535B is partitioned into three sections, VXIbus Interface, GPIB Controller and Serial-Parallel Interface. Each section has its own microprocessor whose program is optimized for its specific task. Data and commands are passed from the VXIbus to the shared memory in the addressed interface. Each interface responds to its own commands and transfers data to its output port(s). Each interface also has buffers for storing the data for receipt of a trigger or output command. All data transfers to/from the VXIbus are via registers allocated in a dual port RAM in the VXIbus Interface logic section.

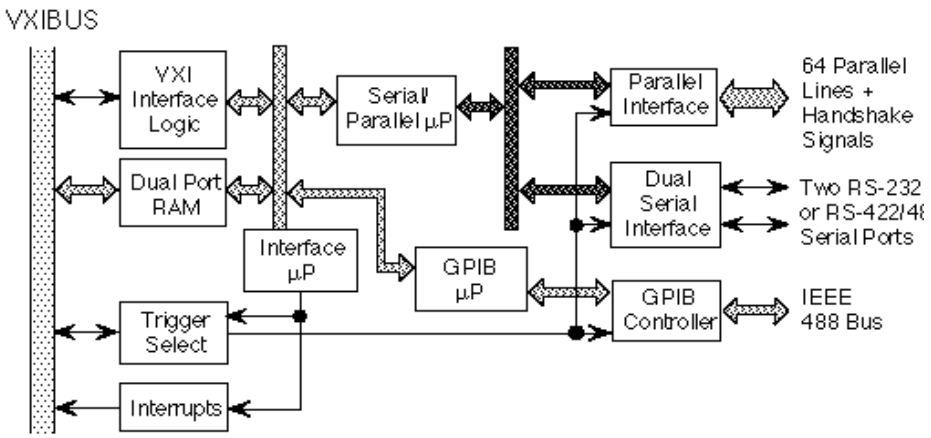


Figure 3 VXI-5535B Block Diagram

Programming and VISA Compatible Driver

Programming the VXI-5535B's four interfaces is simply a matter of writing commands to their logical address. The commands can be easily incorporated into any programming language. Serial data transfer is fully transparent and does not require extra data commands. A VISA compatible library of GPIB commands is available for user's who want to add GPIB control capability to any Slot 0 Controller with VISA drivers.

GPIB Controller Commands

Command	Function
ABORT <nl>	Send IFC, take control
CLEAR dev <nl>	Send SDC
CLEAR <nl>	Send DCL
CONFIG ADDR dev <nl>	Configure 5535B GPIB Address
CONFIG SYS-CNTL <nl>	Configure as system controller
CONFIG DEVICE <nl>	Configure as a device
CONFIG? <nl>	Report current address, CIC and controller/device status
DISABLE INTR <nl>	Disable interface interrupt (SRQ)
ENABLE INTR <nl>	Enable interface interrupt (SRQ)
ENTER dev <nl>	Read data from device
FORMAT <value> <nl>	Select <nl> character
LOCAL <nl>	Local all devices remove REN
LOCAL dev <nl>	Local device
LOCALLOCKOUT <nl>	Local lockout
OUTPUT dev, <string> <nl>	Output data to device
OUTPUT dev, #<binary data> <nl>	Output binary data to device
PASS CONTROL dev <nl>	Pass control to device
PPOLL <nl>	Parallel poll
PPOLL CONFIGURE dev, <configure code> <nl>	Parallel poll configure device
PPOLL UNCONFIGURE dev <nl>	Parallel poll unconfigure device
PPOLL UNCONFIGURE <nl>	Parallel poll unconfigure all devices
REMOTE dev <nl>	Remote device
REMOTE <nl>	Remote all devices (REN)
RUN n <nl>	Run stored program #n
SEND <mnemonics and control> <nl>	Send bus commands
SPOLL (dev) <nl>	Serial poll device
STORE n, <program> <nl>	Store program in buffer #n
TRIGGER <nl>	Trigger
TRIGGER dev <nl>	Trigger device

Serial Configuration Commands

Command	Function
BAUD n <nl>	Sets baud rate
BITS n <nl>	Sets number of data bits per character
CONFIG? <nl>	Requests current configuration message
LOOPBACK a <nl>	Selects data loopback ON/OFF for testing
PACE a <nl>	Enables X-on/X-off flow control
PARITY a <nl>	Sets parity generation and detection
PDEFAULT a <nl>	Sets the power on default mode (command or data)
SAVE <nl>	Stores the current configuration in EEPROM
SBITS n <nl>	Sets number of stop bits per character
SDEFAULTS <nl>	Sets all configuration parameters to defaults
SET EOM hh <nl>	Sets the End-OP-Message byte
SET MASK hh <nl>	Sets the received character mask byte
STORE n, <string> <nl>	Store data in buffers (n) for Trigger
TRIGGER n <nl>	Sends data from buffer (n).
TYPE a <nl>	Selects RS-232 or RS-422/485 interface

Parallel Configuration Commands

Command	Function
ASSIGN INPUT [pol] port <nl>	Assigns input ports to a channel
ASSIGN OUTPUT [pol] port <nl>	Assigns output ports to a channel
CONFIG? <nl>	Requests current configuration
CONVERSION <string> <nl>	Assigns channel conversion table
DATA <data> <nl>	Outputs data to selected channel
DATA? <nl>	Reads data from selected channel
DEFAULT <nl>	Restores factory defaults
FORMAT <type> <nl>	Selects channel's data format
HANDSHAKE ENABLE <nl>	Enables channel handshaking
PERIOD [time] <nl>	Sets the Word Generator time period
PORT INPUT [type] port <nl>	Reads a byte from the specified port
PORT OUTPUT [type] port <data> <nl>	Outputs a byte to the specified port
SAVE <nl>	Saves current configuration
SELECT CHANNEL n <nl>	Selects channel
STORE n <string> <nl>	Store data in buffer n
TRIGGER n <nl>	Trigger buffer n
WORD GEN [control] <nl>	Sets the Word Generator mode

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VXI-5535B: SPECIFICATIONS

VXI Capabilities

Static and Dynamic configuration capability. Sequential logical address for each interface:
- #1 - GPIB
- #2 - Parallel Interface
- #3 - Serial Interface #1
- #4 - Serial Interface #2

Message based, I4 class instrument
Programmable interrupter on each interface.
Supports VXI revision 1.4 instrument protocol and IEEE 488.2 common commands. Compatible with VXIPlug&Play VTL VISA2 drivers.

488.2 Common Commands

*CLS, *ESE, *ESE?, *ESR?, *IDN?, *OPC, *OPC?, *PCB, *SRE, *SRE?, *STB?, and *TST?

Serial Interface

RS-232 / RS-422 / RS-485 signals.
Baud rates from 50 to 57.6 K bits / second asynchronous.
Optional synchronous modes.
Programmable character format, baud rate and transmission mode.
2 Data transfer modes: Direct or held in buffer and outputted when triggered

Transmit	2 K bytes
Receive	2 K bytes
Trigger	3 at 512 bytes each

GPIB Controller

Full featured IEEE 488 Bus controller
Provides 27 BASIC (HP Rocky Mountain® BASIC style) commands.
Both controller and device operation.
Controller includes C1 through C4 and C9 capabilities.
Device capabilities are AH1, SH1, T6, L4, SR1, RL0, PP1, DC1, DT0, C0 and E1
Complies with IEEE-STD 488.1 and 488.2
2 Command execution modes:
Direct or Stored Program
Buffers:

Commands	2 K bytes
Program Storage	10 at 512 bytes ea
Response	2 K bytes

Parallel Interface

64 Programmable lines configurable as inputs or outputs in 8-bit bytes.
Signals sink / source 2 mA
2 Status inputs
2 General-purpose control outputs
4 Handshake lines
2 Power output lines
User configurable signal polarity, input / output channel sizes and handshaking.
3 Data Transfer modes: Direct, Triggered or Word Generator output.

Transfer period	60 to 192 µs / word for 1 to 8 bytes / word

Buffers:

Output	2 K bytes
Input	2 K bytes
Trigger / DWG	2 at 4 K bytes ea

Digital Word Generator:

Word size	8 - 64 bits
Step period	100 µs to 6.5 s
Mode	Single shot / repeat

Indicator

Four character alpha numeric LED display that shows device activity, errors, SYSFAIL and user selected diagnostics.
Default displays are:

Display	Meaning
SysF	SYSFAIL asserted, Self test in progress
Init	Initialized
Redy	VXI-5535B Ready (Begin Normal Operation received)
GPIB	GPIB Controller addressed
SER1	Serial Interface #1 addressed
SER2	Serial Interface #2 addressed
PARL	Parallel Interface addressed
FAIL	Failed Self Test
SRQ!	GPIB Service Request
ERnn	Error Code Number (nn)

Controls

Display Mode
Push button selects indicator display functions.

Address switch
Sets VXIbus logical address for GPIB interface 4 - 248 or selects dynamic addressing.

Physical

Size, W x H x D
C-size card, single slot module with P1 and P2 VXI bus connectors.
(3.05 x 233.5 x 353.00 mm)

Weight
3.7 kg. (8 lbs.)

Power Consumption
+5 Vdc @ 1.8 Amps
±12 Vdc @ 0.1 Amps

Connectors
2 ea. Serial - DE-9P connectors with female screw locks
1 ea. GPIB - 24 pin ribbon connector with metric lock studs
1 ea. Parallel - 78 pin 'D' style connector

Included Accessories

Instruction Manual
GPIB Connector Extender
Parallel mating connector with hood

ORDERING INFORMATION

	Part Number
VXI Multifunction Interface Module	VXI-5535B
VISA GPIB Driver Library Disk	123149
VXI-5535 Labview Driver	123152

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