4863

GPIB ⟷ PARALLEL DIGITAL INTERFACE

A flexible interface between the IEEE 488 Bus and devices with digital signals.

DESCRIPTION

The 4863 is an IEEE-488/GPIB/HP-IB to Digital Interface that provides 48 programmable digital lines that can be configured as inputs or outputs in eight bit bytes. Each data line has a pullup resistor for sensing contact closures or TTL/CMOS inputs. As outputs, each line is latched and can source 24 mA or sink up to 48 mA. The 4863 can also be configured to monitor up to 15 input lines for changes. Applications include interfacing devices with parallel digital signals to the GPIB bus, controlling discrete devices from the GPIB bus, monitoring digital signals for changes and outputting blocks of data.

The Model 4863 is a member of ICS's Minibox™ interface family. All Minibox™ interfaces are IEEE 488.2 compatible, use SCPI commands for ease of programming and are packaged in a CE compliant metal case that is less than 1.6 inches (39 mm) high. Rack mounting kits are available for mounting one or two Model 4863s in a single 1U high space.

4863 Parallel Interface

Versatile Digital Interface

The 4863's digital interface can be configured to match the user's application with commands from the GPIB Bus. The configuration commands permit the user to designate the data lines as inputs and/or outputs in 8-bit byte increments, to connect the bytes into strings, set data polarity, data format, handshake modes and data format. When done, the setup configuration is saved in the 4863's Flash memory and becomes the new power-on configuration.

Data Transfer Methods

Data transfer between the GPIB bus and the 4863's digital interface can be to or from specific bytes or as strings of values to or from one or more bytes. String transfers can be done with data transfer commands or transparently without commands. Binary output mode transfers data at rates > 50 Kbytes/sec. New bit operation commands set/reset specific bits in a byte and query a bit's status.

Output byte commands specify a specific byte and the output data value. Data strobes are manually generated if needed. When outputting data as strings with a command or transparently, the 4863 places the data in the configured output latches and generates a data strobe pulse to update the external device. The data strings can be a series of decimal values, ACSII HEX characters, or the 30-3F HEX characters used in the older Model 4833 series interfaces. Binary data transfers use the transparent output mode to transfer data GPIB bus data bytes directly to the configured output bytes.

Input byte commands read data from a specific byte. When inputting data as strings with a data transfer command or transparently, the 4863 reads the configured input bytes. converts the data to the selected Talk format, and outputs it as a string of characters. Data can be inputted with or without handshaking. The parallel input data can be formatted as decimal numbers, as ASCII HEX characters, or into a user selected character set.

New Bit Manipulation commands let the user directly set or reset an output bit and read an input bit.

- Provides a user-definable parallel interface with bit, byte, string and binary data transfer capabilities. *Fully configurable to the user's needs by bus commands.*

- Signal monitor feature allows the 4863 to detect signal changes on 15 inputs. *Relieves controller of time consuming polling function.*

- High-current drivers and input pullup resistors. *Drives more devices, longer lines and inputs CMOS signals or switch contacts.*

- Device configuration and bus address stored in Flash. *Stored setup eliminates program initialization statements.*

- IEEE-488.2 compatible unit uses SCPI commands and Short Form commands. *Includes latest GPIB program advances.*

- Packaged in small 1U high metal case. *Smaller size with EMI/RFI protection.*

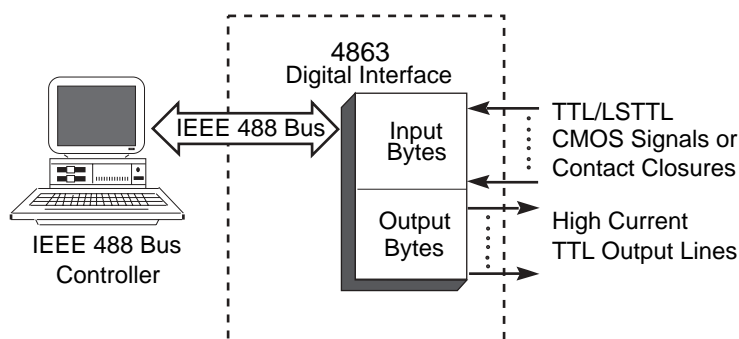- Includes a menu-driven configuration program. *Steps user through configuration choices.*

CE Approved

Figure 1   4863 Block Diagram

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Input Signal Monitoring

The 4863 can monitor up to fifteen of the digital inputs for signal changes and generate an SRQ to notify the Bus Controller when changes occur. Monitoring is done by setting the 4863's Questionable Transition register to detect positive and/or negative signal transitions and enabling bits in the Questionable Event register. When the enabled bit(s) are detected, the 4863 generates an SRQ to alert the Bus Controller to the event. The user can query the 4863's Questionable Condition Register to determine the input signal states and the Event Register to learn which signal changed state. Application Bulletin 48-18 describes how to configure the 4863's registers and includes a program example.

GPIB Address Modes

The 4863 has three GPIB address modes: a single primary address, dual primary addresses or a primary address with two secondary addresses. The single or lower GPIB address is used for all commands, queries and for transferring data to/from the digital interface with the data commands. The upper GPIB address disables the 4863's parser and is used to transparently transfer data between the GPIB bus and the 4863's digital interface.

Configuring the 4863

Figure 2 shows the 4863's SCPI Command Tree. Each SCPI command has a corresponding Short Form command for quick programming. Most of the settings can also be queried to verify the command setting. (i.e. N? reads back talk byte selection)

The SYSTem branch sets the unit's GPIB address and addressing mode. The external address is for OEM boards.

The CONFigure branch assigns the bytes for string data transfer and sets their data polarity and handshaking. The CONFigure branch also sets the control signal polarities.

The FORMat branch sets the data conversion method and the characters in the user's Talk conversion table.

The SENSe branch gives the user a way to read digital data from a single byte or from the configured input bytes. When reading data from a specific byte, input data polarity can be assigned on a bit-by-bit basis.

The SOURce branch provides a way to write values to a byte or to the configured output bytes. When data is output-ted to a specific byte, output data polarity can be assigned on a bit-by-bit basis.

The STATus branch (not shown) is used to setup and query the Operational and Questionable registers so that changes in the digital inputs or status inputs can be used to generate 488 Service Requests (SRQs). The Questionable registers can be used to monitor and query the first 15 digital I/O lines. The Operational registers can be used to examine or monitor the two external Status inputs.

4833 Compatibility

The 4863's transparent data transfer mode and short form configuration commands are similar to ICS's Model 4833 GPIB to Parallel Interfaces. Users familiar with the Model 4833 will be able to use many of the same commands and command syntax when configuring the 4863's interface.

4863 SCPI Command Tree

SCPI Commands		Short Form Commands
SYSTem		
:COMM		
:GPIB		
:ADDRESS	<numeric>	
:EXT		
:MODE	SINGle | DUAL | SEC	
:MONITOR	<boolean>	
:ERRor?		
:VERSion?		
CONFigure		
[:DIGital]		
:INPut	<channel list>	N
:POLarity	0 | 1	TPn
:HANDshake	<boolean>	TBn
:OUTput	<channel list>	LN
:POLarity	0 | 1	LPn
:HANDshake	<boolean>	LH
:CLEar	0 | 1	C
:EDR	0 | 1	E
:INHibit	0 | 1	I
:REMote	0 | 1	R
:RESet	0 | 1	X
:STRobe	0 | 1	S
:TRIGger	0 | 1	TR
:ASTATus	0 | 1	A
:BSTATus	0 | 1	B
FORmat		
:TALK	<ASCii | Hex | HEXL | Table>	
:TRANSlation	<16 char string>	V
:LISTen	<ASCii | Hex | HEXL | BIN | 4833>	
SENSe		**Input**
:BIT?	byte,bit	READ?
:READ?	byte	BREAD?
[:DIGital]		
:DATA		
[:VALue]?		PI?
:PORT?	number or <channel list>	BI?
:PORTn?		BIn?
:POLarity?		IPn
:RESet:EDR		ER
ROUTe		**Bit Comds**
:CLOSe	byte,bit	CLOSE
:OPEN	byte,bit	OPEN
:RESET	byte	BRESET
[SOURce]		**Port Output**
[:DIGital]		
:DATA		
[:VALue]	0-255	PO
:PORTn	0-255	BOn
:POLarity	0-255	OPn
:STRobe		SP

Figure 2   4863 SCPI Command Tree

The 4863 is available as a board version for OEM applications. Board versions are designed to be mounted in the host's chassis and are powered from the host's 12 to 32 volt power supply. The boards are available with GPIB and Serial interface configurations listed in Table 1. On the OEM boards, the interface headers are mounted vertically to minimize the board footprint. The Digital I/O connector is a right angle 62-pin connector with lock studs. Mating connector included with OEM board.

GPIB Address

Standard 4863's store their GPIB address in Flash memory and use a SCPI command to change it. On OEM boards, extra digital input lines are provided to input the GPIB address from an external address switch at power turn-on. The SCPI external address enable setting selects which address is used at power turn-on.

GPIB Header

On OEM boards, the 4863's GPIB connector is replaced with a 26-pin vertical header for remoting the GPIB bus and address switch signals to the rear panel. The 26 pin header mates with a flat ribbon cable from ICS's GPIB Connector/Address switch assemblies. These compact, business card size assemblies provide a convenient way to mount a GPIB Connector and an address switch on the rear panel.

RS-232/RS-485 Interfaces

OEM board versions can be equipped with an optional RS-232/RS-485 serial interface. The serial interface operates at rates up to 115,200 baud. The serial interface provides all of the functionality of the GPIB interface but allows for control of the 4863 by any PC's COM port or by an RS-485 network. Up to sixteen 4863s can be placed on a single RS-485 network. The 4863s are addressed by a two character address sequence that proceeds the actual command. When the OEM board has both interfaces, the unit defaults to the serial interface until the GPIB interface enters the Remote state.

LED Header

An 8 pin header on the OEM boards allows easy extension of the 4863's LEDs to the user's front panel.

OEM Customization

The 4863's firmware allows the user to store an IDN message and other setup parameters in the 4863's Flash memory. This effectively integrates the board into the user's system and makes the 4863 appear as part of the OEM's product. A lock function hides the setup variables from the end user and prevents accidental changes to the setup.

Starter Kit

The OEM Starter Kit provides the OEM designer with everything needed to install and test a 4863 OEM Board. The kit includes a 114515 OEM Board with GPIB and Serial interfaces, a GPIB Connector/Switch Board Assembly, a GPIB bus cable, a serial cable, a 488-PCIlt card, GPIB Drivers and software. The software package includes ICS's GPIBkybd program, a Visual Basic control program and 4803 sample LabView programs. Order the 4863 OEM Starter Kit as P/N 114499. Limit is one to a customer.
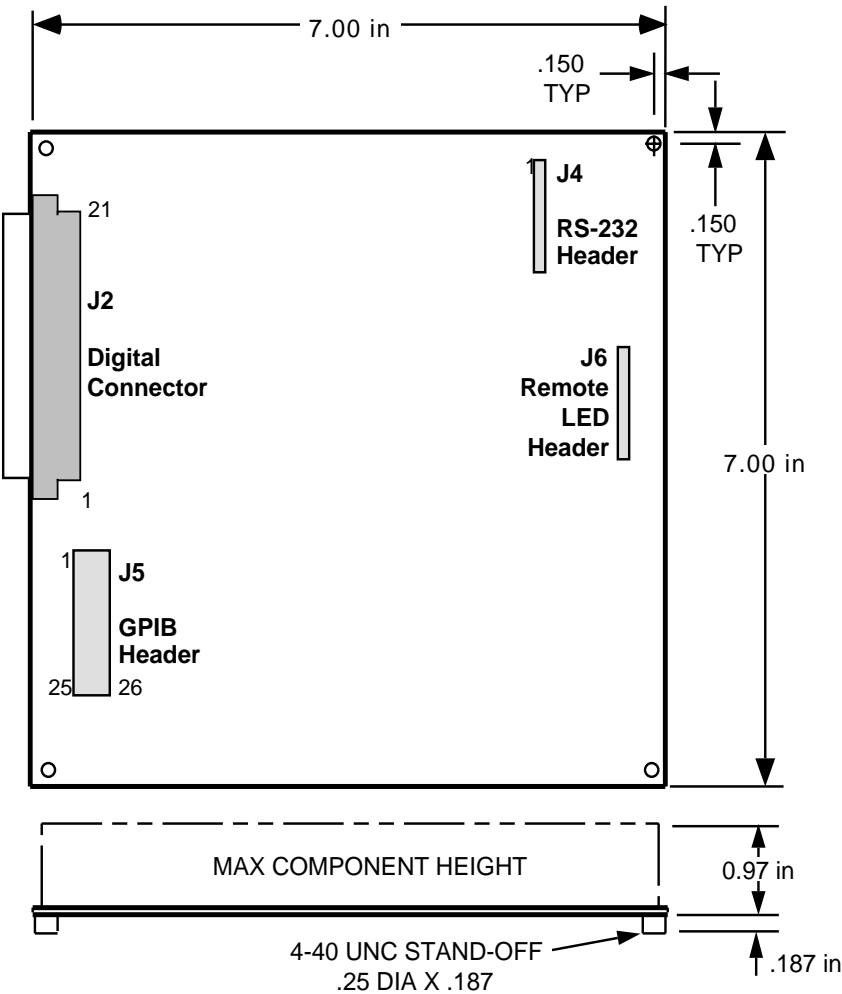

Figure 3   4863 OEM Board Dimensions

TABLE 1   OEM BOARD CONFIGURATIONS

Part Number	Interfaces		
	GPIB	RS-232	RS-485
114514	Yes	No	No
114515	Yes	Yes	Yes
114711	No	Yes	Yes

OEM 4863 Boards include Instruction Manual, Support CD, mating digital I/O connector and hood. GPIB Connector/Switch Assemblies and cables are ordered separately.

IEEE 488 Bus Interface

The 4863's 488 Bus interface meets IEEE STD 488.1-1987 and has the following capabilities:

SH1, AH1, T6, L4, SR1, PP0, DC1, RL0, DT1, C0 and E2 drivers.

Address Capability
Dual primary addresses or single primary with secondary addresses 00 and 01. Primary address range: 0-30.

SRQ Generation
SRQs are generated if the unit is not a talker, if SRQs are enabled and if an Enabled Event Status Register bit or an monitored digital input change occurs. Digital inputs monitored by the Questionable registers.

488.2 Common Commands
*CLS, *ESE, *ESE?, *ESR?, *IDN?, *OPC, *OPC?, *RCL, *RST, *SAV, *SRE, *SRE?, *STB, TST? and *WAI

SCPI Commands
Used to set and query all programmable functions. The 4863 conforms to SCPI 1995.0 Specification.

Table 2   Programmable Functions

GPIB Bus Address
Address mode
Number of Talk bytes
Input Signal polarity
Input Handshaking
Talk data format
Talk data conversion table
Number of Listen bytes
Output Polarity
Output Handshaking
Listen data format
Control line polarities
SENSe input polarities
SOURce output polarities
STATus register configurations

Signal Characteristics

The 4863's parallel I/O signals have the following electrical characteristics. All time delays listed here are maximums, all pulse widths are minimums.

Lines	48 Digital I/O plus 2 Status Inputs
Input Logic Levels	High = > +2.0 V @ ±10 μA Low = <0.8 V @ 250 μA with 33 Kohm pullup to +5 Vdc for sensing contacts. Max High = 5.5 V
Input Timing	External Data Inhibit line SETS within 1 μs of the active edge of the EDR Input signal and resets after data is loaded. Data loading time for 6 BCD/HEX characters is 0.15 ms (typ.) after the 4863 has been addressed as a Talker
Output Logic Levels	High = >3 V with 3 mA source High =>2 V with 24 mA source Low = 0.0 to +0.55 Vdc, 48 mA sink
Output Timing	Data is transferred to the output 0.6 to 5.3 ms after receipt of a terminator depending upon transfer method.
Data Stb	Output pulse width, 5 μs
Trigger	Output pulse width, 5 μs
Clear	Output pulse width, 5 μs
Reset	Output pulse width, 40 μs for *RST command and true during 4863 reset time (70 ms)

Controls and Indicators

POWER Front-panel switch

LEDs
PWR	Indicates power on
RDY	Unit has passed self test
TALK	Unit is addressed to talk
LSTN	Unit is addressed to listen
SRQ	Unit is asserting SRQ
ERR	Unit has detected a command error

Physical

Size   W x H x D
7.29 x 1.52 x 7.45 inches
(1185.2 x 38.6 x 189.2 mm)

Weight 3 lbs (1.4 kg)

Temperature
-10°C to +55°C Operating
-40°C to +70°C Storage

Humidity 0-90% RH no condensation

RFI/EMI CE Certified

Connectors and Headers
IEEE bus: Std 24-pin metal shell w/ metric studs
I/O: 62-pin female, metal DC shell connector with lock studs
Serial: 10-pin male header
LEDs: 8-pin male header

Power   9 to 32 Vdc @ 3 VA

Included Accessories

Instruction Manual
Mating 62-pin connector and hood, P/Ns 902270 and 902105
3.5 in Configuration Program Disk.
UL/CSA/VDE/CE approved AC power adapter provided for:
US - 115 ±10% Vac, 60 Hz (std)
Europe - 230 ±10% Vac, 50/60 Hz
UK - 230 ±10% Vac, 60 Hz
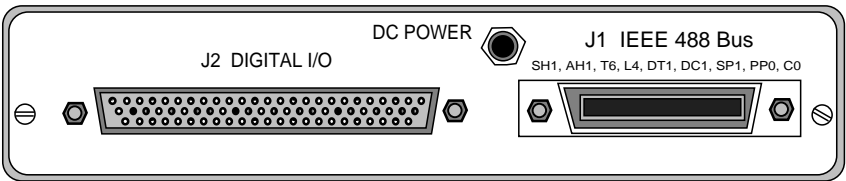Japan - 100 ±10% Vac, 50/60 Hz

Figure 4   4863 Rear Panel

ORDERING INFORMATION