

← GPIB BUS INTERFACES →

4867

GPIB DATA ACQUISITION AND CONTROL BOARD

DESCRIPTION

The Model 4867 GPIB Data Acquisition and Control Module provides analog and digital signals for controlling virtually any kind of a device and the capability to read back analog voltages, digital signals and temperatures. The 4867 is an IEEE-488.2 compatible device and has a SCPI command parser that accepts SCPI and short form commands for ease of programming. Applications include device control, GPIB interfacing and data logging.

The 4867 is housed in a small 7 in x 7 in Minibox that can either sit on a bench or be rack mounted in your test system. Analog, digital and thermocouple connections are made via a 62-pin metal-shell connector on the 4867. GPIB signals are on a standard GPIB connector. The 4867's GPIB address and its configuration settings are set with SCPI commands and saved internally in flash memory. The SCPI commands can also be used to query the current configuration.

Temperature Measurements

The 4867 has four thermocouple inputs for reading temperatures. The 4867's on card compensation circuit accepts J type thermocouples and provides calibrated readings from -100 to +400 °C with a resolution of 0.1 °C. Temperature readings are digitally filtered to reduce 60 Hz noise.



4867 Data Acquisition and Control Module

Analog Inputs

The 4867 has six single ended analog inputs with programmable unipolar and bipolar input ranges. The ranges are 0 to +5, 0 to +10, -5 to +5 and -10 to +10 Vdc. Resolution is 1 part in 12 bits. All analog inputs are continually read and digitally filtered to reduce measurement errors and signal noise. Each channel can be individually scaled so its reading matches the measured parameter.

Analog Outputs

The 4867 has four analog outputs which provide 0 to +5 Vdc signals. Resolution is 1 part in 10 bits. Outputs can be scaled and offset to match the controlled parameter.

Digital I/O

The 4867 has 32 digital I/O lines that can be configured as inputs or outputs in 8 bit byte increments. When used as outputs the lines are latched and can sink 48 mA or source 24 mA. As inputs the lines have pullup resistors so they can sense TTL, CMOS or contact closures.

- Combines Analog I/O, Digital I/O, Relay drivers and Temperature readings in a ICS Minibox™ Versatile GPIB module controls almost any device.
- 32-line Digital Interface configurable as gated inputs or latched outputs. User configurable to match the application.
- Six Analog Inputs with programmable ranges Measures up to ±10 Vdc
- Four 0 to 5 Vdc Analog Outputs. Controls analog devices
- High current Relay Drivers sink 300 mA. Drive external relays or use as a digital control line.
- Setup and IDN message saved in Flash memory. Save's your configuration.
- Support includes a menu driven configuration program, Visual Basic and LabView programs. Easy to use, easy to program.
- Companion Terminal Board simplifies test connections. Saves connection time.

CE Approved

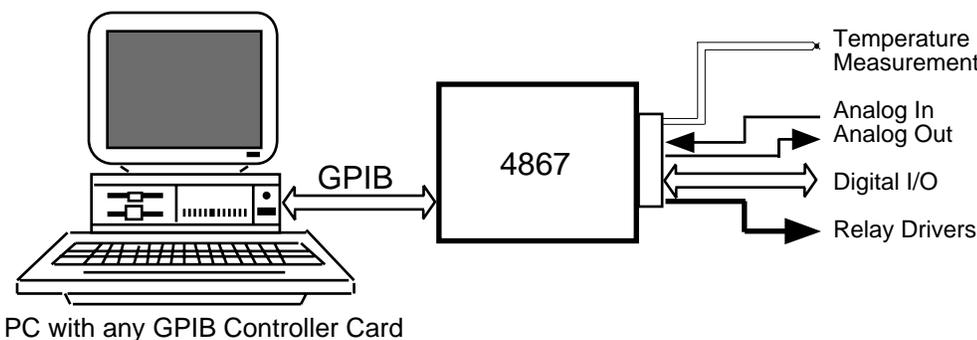


Figure 1 A Typical 4867 Application

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Relay Drivers

The 4867 has 6 relay driver outputs that can sink up to 300 mA. The open-collector relay driver outputs can be used to operate external relays, drive other heavy loads or function as additional digital output signals.

Signal Connections

The analog, digital and thermocouple signals are on a 62-pin, metal-shell connector with mechanical locking studs for trouble free connections in vibration prone installations. The 4867's rugged construction makes it suitable for ground, portable or airborne applications.

4867 Configuration Features

The user can set the 4867's IDN message to personalize the 4867 as part of the end system. The IDN message, the I/O signal configuration and other settings are saved in the 4867's nonvolatile Flash memory. The saved settings are recalled as the default settings at power turn-on. A lock command blocks the configuration settings from being accidentally changed by the end user while letting the user change the GPIB address. Removing the internal write enable jumper inhibits all writes to the 4867's Flash memory and blocks any changes to the board's configuration.

SCPI Command Parser

The Model 4867 includes a SCPI command parser, an IEEE-488.2 STD status structure and also responds to all of the required 488.2 common commands. The 4867's parser lets the user program the 4867 with the SCPI commands (Standard Commands for Programmable

SYSTem	Configuration
:COMM	
:GPIB	
:ADDRess	<numeric>
:EXT	boolean
:ERRor?	
:VERSion?	(1996.0)
STATus	
:OPERation	
:CONDition?	
:ENABle	<numeric>
:QUESTionable	Digital Inputs
:CONDition?	
:ENABle	<numeric>
:PTRansistion	<numeric>
:NTRansistion	<numeric>
CONFigure	Data Strings
[:DIGital]	
:INPut	<channel list>
:POLarity	boolean
:OUTput	<channel list>
:POLarity	boolean
FORMat	Data Format
[:DATA]	
:TALK	
:LISTen	
SOURce	Outputs
:VOLTage	Analog
[:LEVel]	
[:IMMediate]	
[:AMPLitude]	<numeric>
:TRIGgered	
[:AMPLitude]	<numeric>
:LIMit	
[:AMPLitude]	<numeric>
:OFFset	
[:AMPLitude]	<numeric>
:RANGe	<numeric>
:SLOPe	
[:AMPLitude]	<numeric>
[:DIGital]	Port Outputs
:DATA	
[:VALue]	0-255
:PORTn	0-255
:POLarity	0-255
ROUTe	Relay Driver Outputs
:CLOSe	<channel list>
:STATe?	
:OPEN	<channel list>
:ALL	

Instruments) shown in Table 1 or use short form commands.

Table 1 shows the 4867's SCPI command tree. The SYSTem command group sets the 4867's GPIB address and enables the external address switch.

MEASure	Analog Inputs
:VOLTage?	
[:DC]	<channel list>
:RANGe	<numeric>
:POLarity	<numeric>
:AVERage	<numeric>
:TEMPerature	<channel list>
SENSe	Digital inputs
[:DIGital]	
:DATA	
[:VALue]?	
:PORT	<channel list>
:PORTn?	
:POLarity	<numeric>
CALibrate	Calibrate
:MEASURE	
:GAIN	<numeric>
:NGAIN	<numeric>
:OFFset	<numeric>
:IDN	<string>
:FAULT	0 1

The STATus group can sense digital input changes through the Questionable Status Register.

The CONFigure commands group multiple bytes together as inputs or outputs so digital data can be passed as strings. Unconfigured bytes can be directly read or written to with the byte oriented commands.

The FORMat commands set the data format for transferring data as strings.

The SOURce command group controls the analog and digital output functions. The analog outputs can be set from 0 to 5 Vdc. The digital outputs can be set by direct writes to a specific port or by a data string written to the configured output ports.

The ROUTe commands set and clear the relay driver outputs.

The MEASure command group sets the analog input ranges, filter constants, reads the analog inputs and temperature input values.

The SENSe group controls the digital input functions. Digital inputs can be read directly from a specific port or as a data string from the configured input ports.

The CALibrate group saves the calibration values in Flash and has a default command to restore the factory settings.

GPIB Interface

The 4867 has a 26-pin header with GPIB and Address Switch input signals. When the external address functions are enabled, the 4867 reads the address switch inputs at power turn-on time. If the external address switch is not enabled, the 4867 uses the GPIB address saved in its Flash memory. The GPIB connector mates with ICS's GPIB Connector/ Address Switch Board Assemblies. The Connector/ Address Switch Assemblies are small business card size PC assemblies that mount a GPIB connector and a 8-bit Address rocker switch to the rear panel of the host chassis. They have a flat ribbon cable which plugs into the header. The assemblies are available in two layout styles and can be ordered with cable lengths up to 90 cm. Refer to the GPIB Connector/ Address Switch data sheet for assembly styles, mounting dimensions and cable length ordering information.

Sample Application

Figure 2 on the right shows a sample application for the 4867 that shows off its analog and digital interface capabilities. Byte 1 is read with a port command to sense contact closures. Bytes 2 and 3 are configured as inputs and read with a string command. Byte 4 is used to control a LED display. The Relay Drivers enable the display and operate a relay to power a motor. The D/A outputs control the motor. The A/D inputs sense the feedback potentiometer and supply voltages. The Thermocouple inputs read the motor's temperature.

Physical Description

The 4867 is packaged in one of ICS's small metal-enclosed Minibox case that is less than 1.6 inches high. It may be used as a standalone module or in a 19 inch rack mount kit. The rear panel contains a standard size GPIB connector, a power jack and the analog-digital signal connector. Mating connectors are available with solder eyelets, poke-in pins or with right-angle solder tails. Unregulated DC power is provided by an included power adapter.

OEM Board Only Versions

The 4867 is available as a board version for OEM applications. Board versions are designed to be mounted in the host's chas-

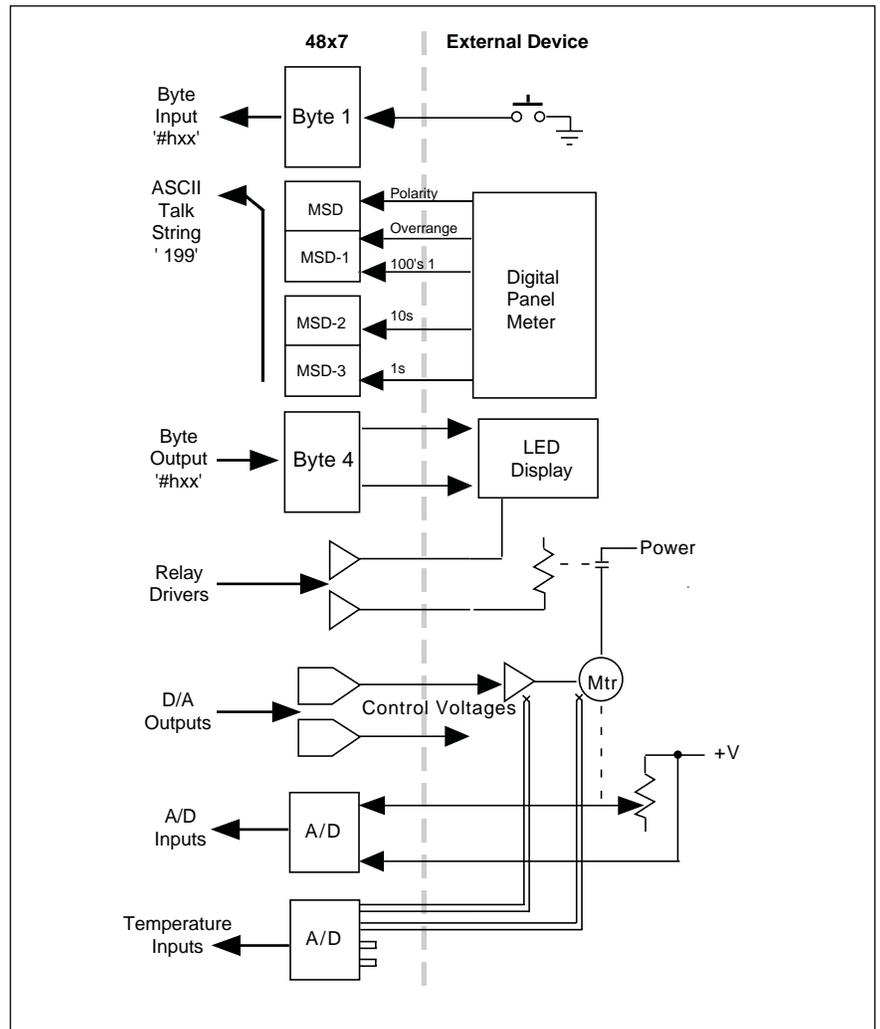


Figure 2 4867 Sample Application

sis and are powered from the host's 12 to 32 volt power supply. The boards are available with GPIB and Serial (RS-232 and RS-485) interface configurations listed in Table 3. On the OEM boards, the interface headers are mounted vertically to minimize the board footprint and the boards have 4-40 x 0.187 inch standoffs in each corner for ease of mounting.

GPIB Header

On board versions, the 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.

See the separate GPIB Connector/ Address data sheet for assembly details and outline dimensions. The user can either enable the external GPIB address switch or use the board's internal GPIB address which is stored in Flash memory.

LED Header

An 8 pin header on the OEM boards allows easy extension of the board's LED driver signals to the user's front panel. RS-232/ RS-485 Interfaces.

4867: SPECIFICATIONS

IEEE 488 Bus Interface

The 4867'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

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 change occurs.

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 4867 conforms to SCPI 1994.0 Specification.

Table 2 Programmable Functions

GPIB Address
 External GPIB Address enable
 Number of Input (talk) bytes
 Input data polarity
 Input data format
 Number of output (Listen) bytes
 Output data polarity
 Output data Format
 488.2 Status Enable Registers
 Analog output limits
 Analog output offsets and gains
 Analog outputs default values
 Byte out polarities
 Byte in polarities
 Output driver settings
 Analog inputs range and polarity
 Analog input & temperature filter constants
 IDN Message

Table 3 OEM Board Configurations

Part Number	Interfaces		
	GPIB	RS-232	RS-485
115097-01	Yes	No	No
115097-02	No	Yes	Yes
115097-03	Yes	Yes	Yes

Digital I/O

32 lines configurable as input or outputs in 8-bit byte increments.

Input High = > +2.4 V
 Logic Low = <0.5 V
 Levels 33 Kohm pullup to +5 Vdc for normally open contacts.

Output High = >3 V, 3 mA source
 Logic High = >2 V, 24 mA source
 Levels Low = 0.0 to +0.8 Vdc, 48 mA sink

Analog Inputs

6 single ended inputs with programmable ranges.

Ranges $\pm 10, \pm 5, 0$ to $+5, 0$ to $+10$ Vdc
 Resolution 1 part in 12 bits
 Accuracy 4 bits
 Offset 5 bits (Zero and endpoints)
 Scaling Offset and gain
 Scan Rate 50 samples/sec
 Averaging 1 to 100 samples
 Response 8.5 ms after terminator

Analog Outputs

4 outputs with common ground.

Vout 0 to 4.99 Vdc (Limited to Vcc-30 mV)
 Resolution 1 part in 10 bits (4.88 mV)
 Accuracy 2 bits (Non-linearity)
 Offset 4 bits (Zero and endpoint)
 Load 5 kohms maximum
 Scaling Offset and Gain
 Update 8 ms after terminator

Driver Outputs

6 open collector relay drivers

Imax 300 mA
 Vmax 48 Vdc
 Response 2 ms after terminator

Temperature Measurements

Four type J thermocouple inputs

Range: -100 to + 400 °C
 Resolution 0.1 °C
 Accuracy ± 2 °C exclusive of thermocouple error
 Filter 1 to 100 samples

Diagnostic Indicators

Six Front Panel LEDs:
 PWR, RDY, MTA, MLA, SRQ and ERR.

Physical

Size, L x W x H
 139.7 x 114.3 x 12.7 mm
 (5.5 x 4.5 x 0.5 inches)

Connectors and Headers

GPIB: 26-pin (2 row x 13 pin) header
 Data: 62-pin DC shell female connector
 Power: 2 screw terminals

Temperature

Operation -10° C to +70° C
 Storage -20° C to +85° C

Humidity

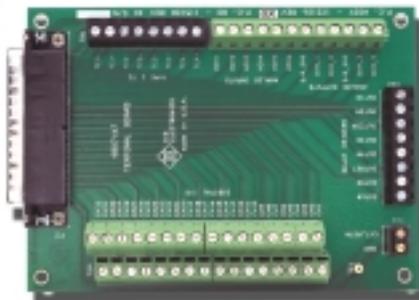
0-90% RH, no condensation

Power

9 to 32 Vdc at 2 VA

Included Accessories

Instruction Manual
 Configuration Disk with configuration programs and sample Visual Basic program.
 62-pin mating connector and hood
 UL/CSA/VDE/CE approved AC power adapter provided for:
 US - 115 $\pm 10\%$ Vac, 60 Hz (std)
 Europe - 230 $\pm 10\%$ Vac, 50/60 Hz
 UK - 230 $\pm 10\%$ Vac, 60 Hz
 Japan - 100 $\pm 10\%$ Vac, 50/60 Hz



Mating Terminal Board Assembly

ORDERING INFORMATION

Part Number

IEEE 488 Data Acquisition and Control Module with 115 VAC adapter

4867

IEEE 488 Data Acquisition and Control Module with 230 VAC adapter. Specify: -E (Europe), -B(UK), -A(Australia)

4807 / 2307 Terminal Board Assembly

115124