9006

MULTI-FUNCTION INTERFACE BOARD

DESCRIPTION

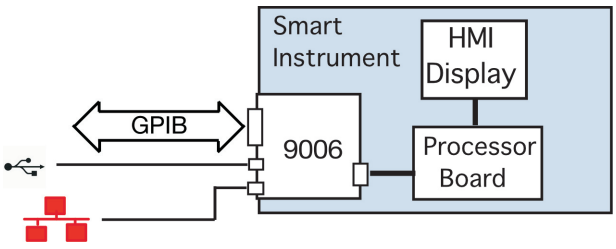
ICS's 9006 is a small, multi-interface board that adds an Ethernet, GPIB and USB interface to serial devices. The 9006 adds three smart, IEEE-488.2 compatible interfaces to any serial device and provides a bidirectional data communication path to the serial device. The 9006 responds to all of the 488.2 common commands and to its own SCPI setup commands while letting a user send messages to and receive responses from the connected serial device.

The 9006 has both RS-232 and RS-485 serial interfaces so it can be connected directly to a single RS-232 device or to multiple RS-485 devices on a 2 or 4-wire network with bit rates up to 115.2 kbaud. All configuration settings are user setable and saved in flash memory. The 9006 is designed to be mounted to the rear panel of the host chassis so its connectors can protrude through the rear panel. An on-card regulator lets the 9006 run on regulated or unregulated DC power.

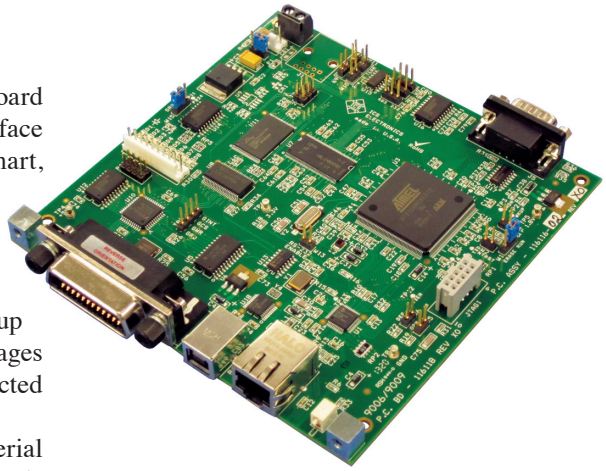
The 9006 is highly customizable so it responds as part of an instrument when used in an OEM application. Typical applications are updating older serial devices for use in modern test systems or for working with embedded processors to create a new instruments with proven GPIB and Ethernet firmware.

Multiple Operating Modes

In general, the 9006 provides the serial device with a IEEE-488.2 interface and passes all messages onto the serial device except for the IEEE-488.2 commands and messages for the 9006's own parser which are blocked from the serial device. Commands are accepted on the interface that is being used and responses are returned to that interface. Only one interface should be used at a time to avoid data conflicts.



Using a 9006 to build a smart instrument



9006 Multi-Interface Board

The ASYNC mode is for older serial devices that periodically output a serial message. In the ASYNC mode, the 9006 saves the last message and outputs it when next queried for the device message.

The STANDARD mode is for the majority of serial devices that receive serial messages from a controller and return responses when queried. In the STANDARD mode, the 9006 passes messages to the serial device and waits a user set time for the device response. The response window is closed when the 9006 receives a response or when the window times out. Any device response is saved and output when the 9006 is addressed to talk or sent a read command.

The SMART mode adds the ability for an embedded processor in a smart instrument to control the 9006's operation and to query its status. In the SMART mode, the 9006 passes messages to the serial device and always receives back a response message or an acknowledgment that the message was received. The 9006 saves the response and outputs it when addressed to talk or sent a read command. The 9006 passes a copy of all 488.2 Common Commands onto the smart device in case it needs to respond to the Common Command.

Using the Smart Device Commands, the smart device can set/reset bits in the 9006's Status Reporting Structure, query and change its network and GPIB addresses, change the IDN response message, get local/remote status and control the 9006's operation.

- Adapts older serial devices to newer test systems.
  Extends the use of your serial instrument.
- Adds three IEEE-488.2 compatible interfaces to an embedded computer board.
  Easy interfaces with proven 488.2 and VXI-11 firmware.
- VXI-11 and raw-socket Ethernet protocols.
  Compatible with most test system applications and operating systems.
- Serial port provides RS-232 and RS-485 signals.
  Control one or multiple serial devices from a single 9006.
- Easy configuration with a web browser.
  Eliminates the need for a configuration program.
- Easily customized for OEM applications.
  IDN message and user modifiable web pages give the 9006 your own identity.
- Mounts against the rear panel of your chassis.
  Eliminates cables and gives the end user access to all three interfaces.

☑ *RoHS Compliant*

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Ethernet Interface

The 9006's Ethernet Interface supports the VXI-11 and raw socket (Telnet) protocols. As a VXI-11.3 interface, the 9006 adapts serial devices or older instruments to Ethernet based test systems that incorporate other LXI or VXI-11 instruments. The VXI-11 protocol was designed to control instruments over a network and includes the more common GPIB control capabilities such as Device Clear, Local and Remote, and Read Status Byte. VXI-11 control is best done with VISA library calls in a Windows PC or with rpc calls from a Linux/Unix operating system.

The raw socket (Telnet) capability makes it easy to write your own communication program or scripts with or without a VISA library. The raw socket protocol has access to all of the 9006's SCPI and IEEE-488.2 Common Commands. Special SCPI commands allow raw socket clients to control the 9006's Remote-Local states.

GPIB Interface

The 9006's GPIB Interface is an IEEE-488.2 compatible interface that adapts serial devices to the GPIB bus. The 9006 responds to all of the IEEE-488.2 Common Commands. The GPIB address is set internally and can be changed with a SCPI command or with a web browser.

USB Interface

The 9006's USB Interface is a USB 2.0 compatible interface that allows serial devices to be controlled from the USB bus. The 9006 uses the Microsoft Virtual COM Driver to send messages and commands to the 9006. Microsoft's Virtual COM Driver assures continued support as Microsoft's Windows Systems evolve in the future. The USB interface has access to all of the 9006's SCPI and IEEE-488.2 Common Commands. Special SCPI commands allow raw socket clients to control the 9006's Remote-Local states. The USB configuration settings can be changed with a web browser or SCPI commands.

Serial Interface

The 9006's serial interface provides RS-232 signals and 2 or 4-wire RS-485 signals. The RS-485 interface can be configured to use an internal resistor termination network which eliminates the need for an external termination network. All serial settings are made with SCPI commands or a web browser.

Power

DC power is applied to the 9006 on a two screw terminal strip. The 9006 has an on-board linear regulator that can handle inputs up to 15 Vdc. The user can by-pass the regulator when regulated 5 Vdc is available or use the regulator for 5.5 to 15 volt power.

Smart Device Command Table

Cmd	Function
@@@ADDR value	Sets GPIB Address.
@@@ADDR?	Queries GPIB Address
@@@ERR value	Error-Set ESR Register
@@@ESR value	Sets ESR Register bits.
@@@OPER! value	ORs bits into the Operational Condition Register.
@@@OPER& value	ANDs compliment to clear Conditional Register bit.
@@@OPER?	Queries the Operational Condition Register.
@@@QUES! value	ORs bits into the Questionable Condition Register
@@@QUES& value	ANDs compliment to clear Conditional Register bit.
@@@QUES?	Queries the Questionable Condition Register.
@@@ID?	Queries 9006's model number.
@@@IDN string	Replaces the IDN string.
@@@IDN?	Queries the IDN string.
@@@IP string	Sets IP address.
@@@IP?	Queries IP address.
@@@GATE string	Sets Network Gateway.
@@@GATE?	Queries Network Gateway.
@@@MAC?	Queries MAC number.
@@@MASK string	Sets Network Mask.
@@@MASK?	Queries Network Mask.
@@@MODE value	Sets IP Static/DHCP-auto-fallback mode.
@@@MODE?	Reads IP mode setting.
@@@WIP?	Queries working IP address and enables auto IP change reporting.
@@@NOWIP	Disables auto IP reporting.
@@@WMODE?	Queries working IP mode.
@@@CLIENT?	Queries last command source and enables auto source reporting.
@@@NOCLIENT	Disables auto client reporting.
@@@REBOOT	Soft reset.
@@@REM?	Queries the Local/Remote state and enables automatic reporting of Local/Remote state changes (AutoRem on)
@@@LOC?	Go-to-Local request and sets AutoRem on
@@@NOREM	Disables automatic Local/Remote reporting.
@@@LF	Puts a linefeed character in the response buffer.
@@@TO nnnn	Extends response window time by nnn times.
@@@OK	Standard message reply. No response required
@@@SAV	Saves current configuration. Same as *SAV 0.

Ethernet Interface

Ethernet Interface

Type	IEEE 802.3 compliant Auto MDIX
Speeds	10BaseT (10 Mb/s) 100BaseT (100 Mb/s)
Connector	RJ45
IP Address	Static or DHCP with fall-back to an AutoIP
Factory setting	192.168.0.254 Static IP
Interface name	any [inst0]
Buffers	1 kbytes

VXI-11 Capabilities:

Fully VXI-11.3 compliant

VXI-11.3	Device Interface
Sockets	15 + 1 for UDP
Channel types	Data, Abort and Interrupt
Links	64
Interface Name	inst0 for general use

RPC Protocol

Conforms to ONC RPC Version 2, VXI-11

Raw Socket Conformance:

Access to 9006 parser for Setup and serial device control.

Sockets	1
Channel types	Data
Links	1

WebServer Capabilities

Provides the following HTML 4.01 compatible web pages:

- Welcome
- Configuration
- Confirmation
- Reboot
- 404, 500 and 501 Error pages

IEEE 488.2 Capabilities:

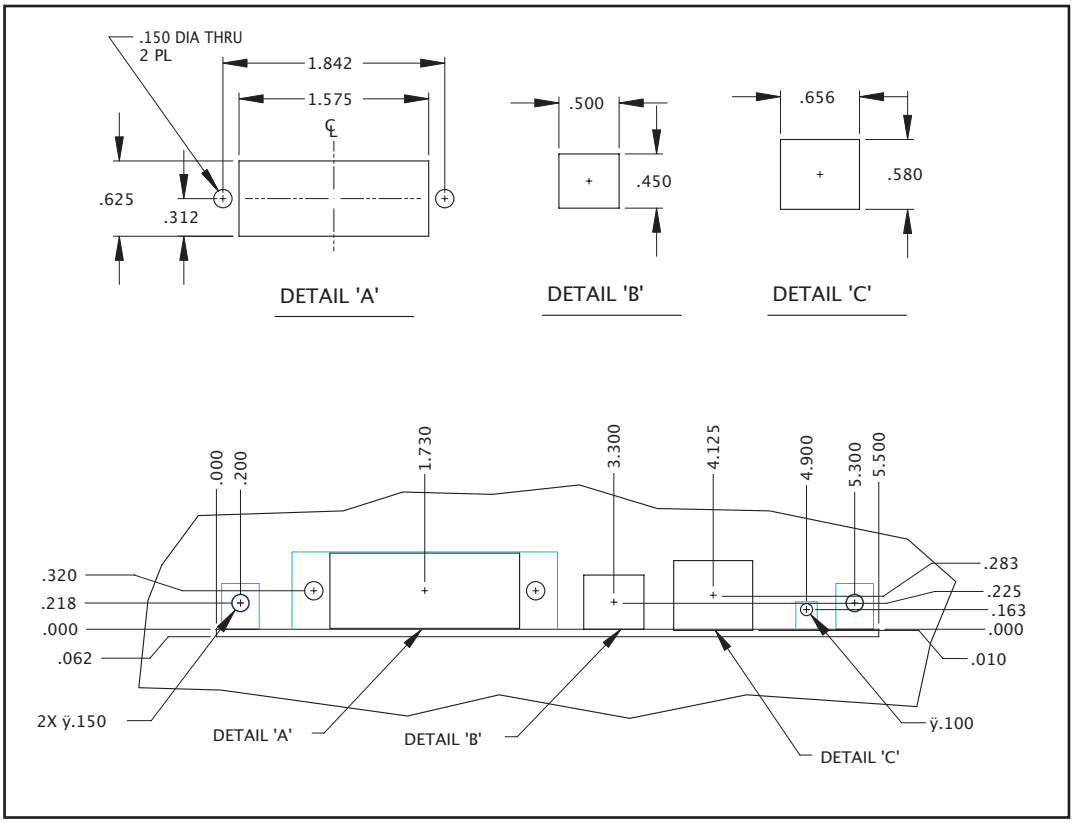
Same as GPIB Interface except SRQ is not generated.

SCPI Capabilities:

Same as GPIB Interface.

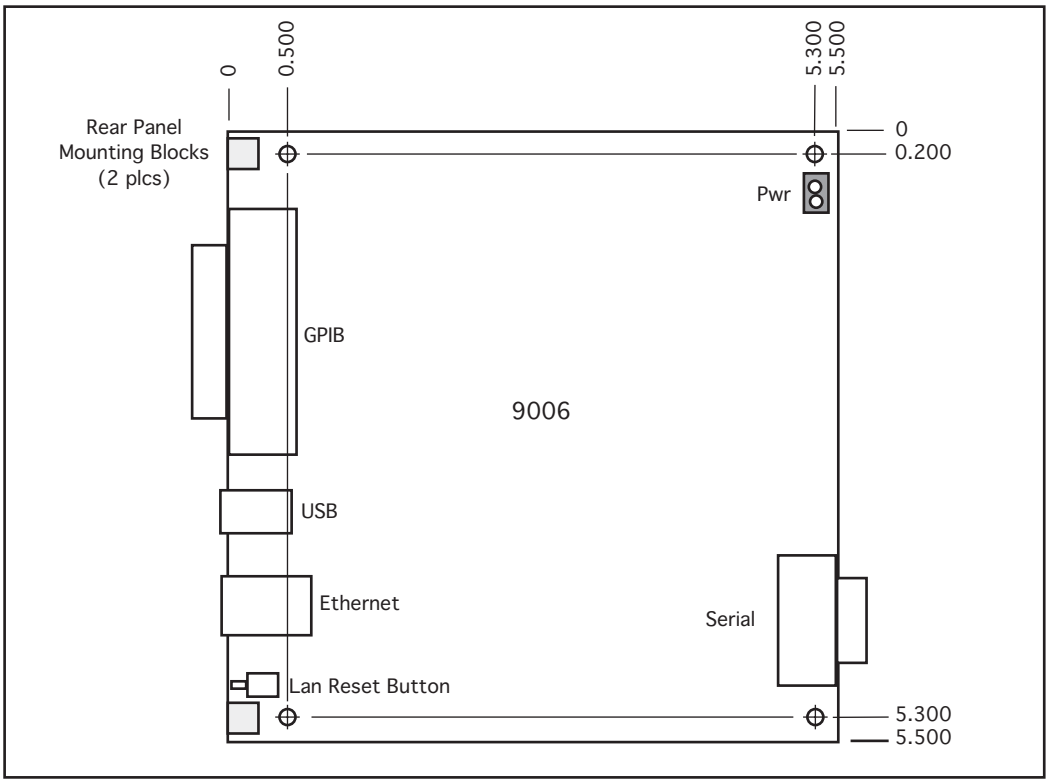
LXI Conformance:

The 9006's firmware generally conforms to the LXI 1.4 Specification for core instruments. The 9006's VXI-11.3 and IEEE-488.2 compliance exceeds the LXI requirements.



Note: Maximum panel thickness is 0.050.

9006 Rear Panel Cutouts



9006 Outline Dimensions

IEEE 488 Bus Interface

The 9006's 488 Bus Interface meets IEEE STD 488.2-1987 and has the following capabilities:
SH1, AH1, T6, L4, SR1, PP0, DC1
RL1, DT0, C0 and E1/E2 drivers
Bus drivers incorporate power up/down protection to prevent glitching the bus during power turn-on. Standard IEEE-488 connector with metric mounting studs.

Address Capability
Primary addresses 0-30.

Buffers

GPIB Input	1 kbytes
GPIB Input	1 kbytes

Status Reporting Structure
IEEE-488.2 and SCPI Status Byte, ESR, Questionable and Operational Registers.

SRQ Generation
SRQs are generated per the IEEE-488.2 specification if the unit is not addressed to talk, if SRQs are enabled and if an enabled register bit occurs.

488.2 Common Commands
*CLS, *ESE, *ESE?, *ESR?, *IDN?, *OPC, *OPC?, *PSC, *RST, *SAV, *SRE, *SRE?, *STB, *TST?, AND *WAI.

SCPI Commands
The 9006 conforms to the SCPI 1994.0 Specification.

USB Interface

Provides USB control through a virtual COM Port using the Microsoft's standard driver for Virtual COM Ports.

Supported Operating Systems
Windows XP (SP2) or later, Vista and Windows 7 and Windows 8.

Data Rates and Formats

Baud Rate:	115.2 Kbaud
Date bits	8
Parity	none
Stop bits	1

Buffers 1024 bytes

Serial Interface

DE-9P male connector with a full-duplex serial interface with single ended RS-232 and differential RS-485 signal pairs. Signal selection made by jumpers on the 9006. Internal termination network provided for the RS-485 receive pair.

RS-232 Signals	TxD,RxD,RTS,CTS, DSR and DTR
RS-485 Signals	Tx and Rx pairs or Tx/Rx pair.
Baud Rates:	1.2K, 2.4K, 4.8K, 9.6K, 19.2K, 38.4K, 57.6K, and 115.2K baud.
Data Bits	7 or 8 bits
Parity	Odd, even or none
Stop Bits	1 or 2
Buffers	1024 bytes
Asynchronous	100 ms min. between messages

Physical

Layout and rear panel mounting dimensions shown on previous page. PCB mounting blocks assure secure attachment to the rear panel.

Size, L x W x H
139.7 x 139.7 x 17.8 mm
(5.5 x 5.5 x 0.7 inches)

Connectors:

GPIB:	24-pin IEEE connector
Serial:	9-pin DE-9P male
Ethernet	RJ45
USB	B type

LAN Reset Button:
Accessible from rear panel.

LED Indicators:
PWR, LAN, ACT, RDY, TALK, LSTN, SRQ and ERR

Temperature:

Operation	-10° C to +55° C
Storage	-40° C to +85° C

Humidity:
0-90% RH without condensation

Power:
+5 to + 15 Vdc , 400 mA (typical)

Supplied Accessories

Instruction Manual
Support CD

ORDERING INFORMATION

	Part Number
Multi-function Serial Interface Board (includes Manual and Configuration Disk)	9006
Multi-function Serial Interface Board (Board only)	116116-01