

eICIS/ICON Power/Bus Module

Last updated: November 24, 2008

Introduction

This board is designed to provide the following functions:

1. Generate regulated +5V DC from an unregulated AC or DC source in the range of 9 to 35 volts.
2. Provide an isolated long distance RS485 Modbus fieldbus interface.
3. Provide a local short distance non-isolated RS485 Modbus fieldbus interface for local Modbus I/O.
4. Provide a Dallas Semiconductor 1-wire device bus interface.

The regulated +5V DC is used to power the board itself, an ICON controller, Modbus I/O devices on the local RS485 bus and 1-wire devices.

Features unique to this board:

- 1.5" tall.
- 6" long X 4.25" wide.
- Board maximum power draw (0.5A @ 5V).

Installation

Mounting:

If your board is not already mounted it must be attached to an appropriate mounting surface using 4-40 screws and 1/4" standoffs in four mounting holes. These mounting holes are electrically connected to the board's ground (GND) which is the 5 volt power supply negative.

Use the outer mounting holes at locations remote from the ICON controller. If located with an ICON controller, mount the controller first to the mounting plate. Then mount this power board over the controller using threaded standoffs in the inner holes.

Power input connection

Connect your power source to CON2. This can be any supply of AC or DC voltage in the range of nine to 35 volts. Connect the low, - or negative side to a GND pin. Connect the positive, + or high side to a VIN connection.

If you are connecting a center tapped transformer such as a Stancor P8662 connect the center tap (CT) of the secondary to GND, one of the other secondary leads to the first VIN and the second secondary lead to the second VIN terminal.

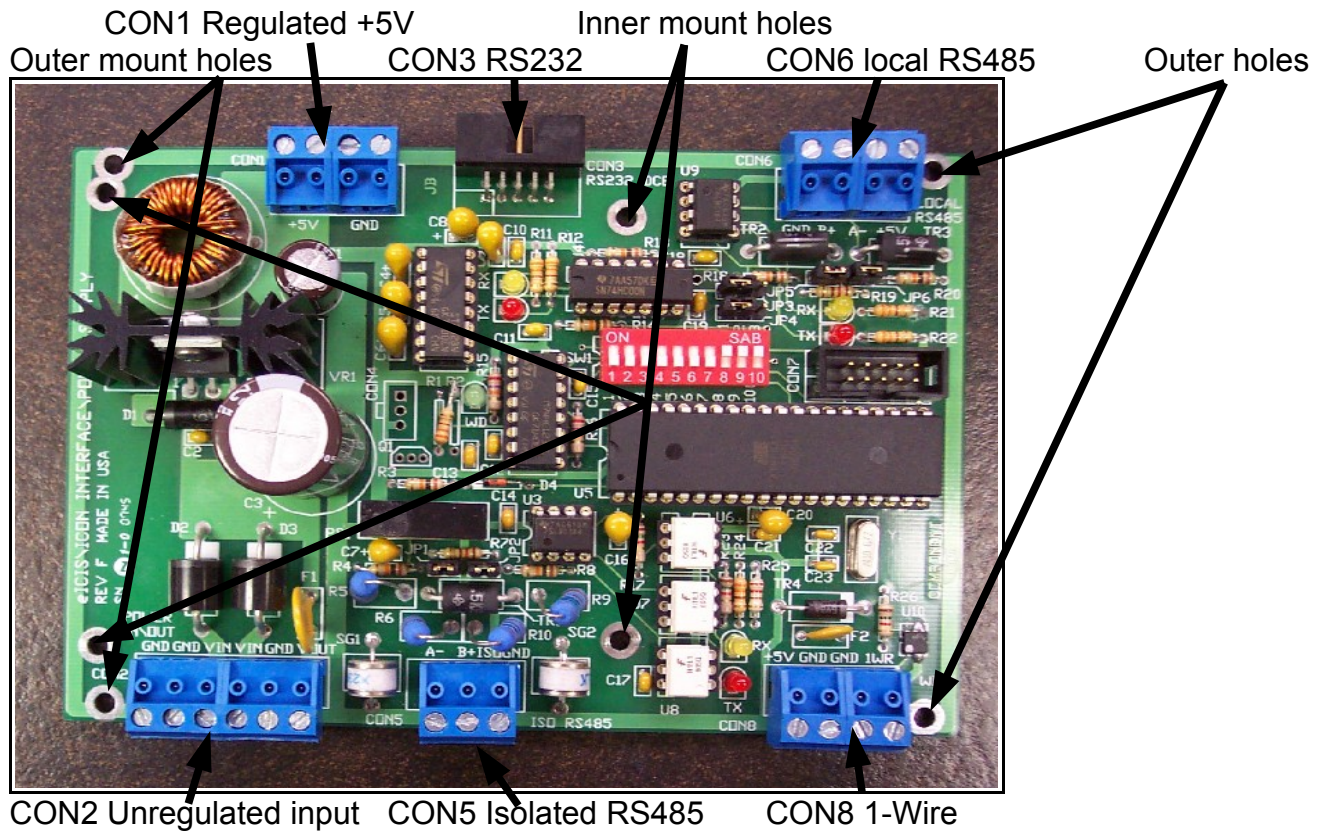


Figure 1

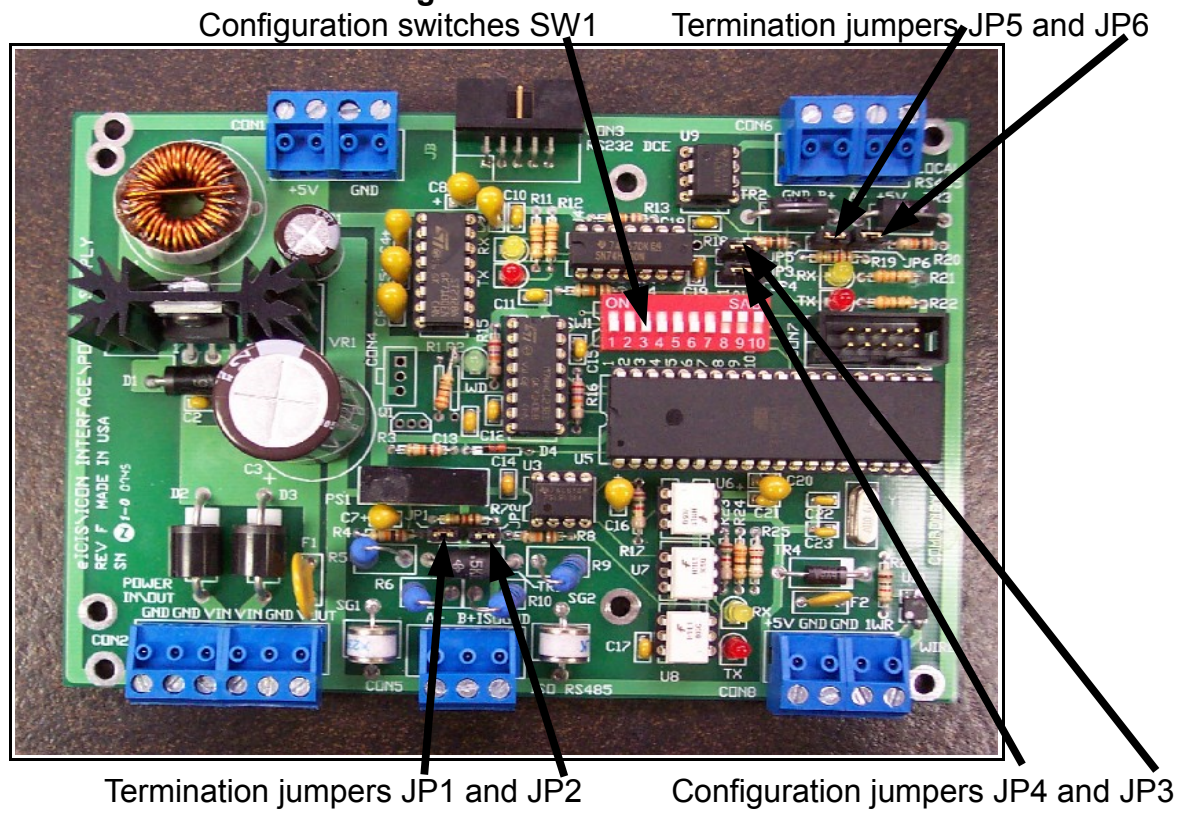


Figure 2

Power output connections

If you have other devices to power such as an eICIS/ICON controller, connect to CON1. Use a black wire to connect GND and a red wire for +5V.

There is also an unregulated but rectified DC output called VOUT on CON2. This voltage will be slightly lower than your unregulated AC or DC voltage that is connected to VIN on CON2.

RS485 bus terminator

This module has two RS485 bus connections. RS485 requires that modules on each end of an RS485 bus be terminated. To terminate the isolated RS485 bus (CON 5) install jumpers JP1 and JP2. To terminate the non-isolated RS485 bus (CON6) install jumpers JP5 and JP6. Otherwise leave the jumpers off to operate in non-terminated mode.

Configuration with a controller (Modbus master)

This configuration is used at the location of the eICIS/ICON or other Modbus master controller location. The configuration provides:

1. An RS232 Modbus master controller interface. The RS232 interface is used to drive both the isolated and non-isolated Modbus RS485 buses.
2. An isolated Modbus RS485 interface intended to connect to additional Power/Bus modules located remotely from this master Power/Bus module. The distance can be up to 4,000 feet with up to remote 31 nodes.
3. A non-isolated Modbus RS485 interface used to connect local Modbus devices such as our Modcombo board. The distance is limited to Modbus devices with a common ground and 31 Modbus I/O nodes.
4. A Dallas semiconductor 1-wire bus interface with Modbus address 255.

Configuration

1. SW1 switch 10 on.
2. SW1 switch 9 on for 19200 baud, off for 9600 baud.
3. SW1 switch 8 off for no parity and on for odd parity.
4. JP3 and JP4 jumpered in positions 1 and 2.

Switches SW1, 1 and 2 perform the following functions:

SW1-1	SW1-2	IP address and Port number
Off	Off	Gotten from icon.icn configuration
On	Off	Use DHCP to obtain an IP address. Port is 80.
Off	On	IP is 192.168.1.100 and Port is 80.
On	On	IP is 169.254.111.111 and Port is 80.

Switches SW1, 3-7 are used as follows:

SW1	Function
3	Off to enable programmer mode. On does not allow logging in as a programmer.

4	Normally off. On to cause ICON to go into Linux for specialized debugging and maintenance, not used by customers.
5	Switch 5 off enables the Nagle algorithm and is the normal setting. Switch 5 on turns Nagle off.
6	On selects the ICON to be a DHCP server.
7	Unused.

Configuration at a remote location

This configuration is used at locations remote from the controller. In this case the power/bus module provides:

1. An isolated RS485 to local non-isolated RS485 Modbus. This non-isolated bus is used to connect and optionally power (for instance Modcombo) the Modbus I/O devices.
2. A Dallas semiconductor 1-wire bus interface with selectable Modbus address.

Configuration

1. SW1 switch 10 off.
2. SW1 switch 9 on for 19200 baud, off for 9600 baud.
3. SW1 switch 8 off for no parity and on for odd parity.
4. SW1 switches 1 to 7 select the Modbus address in the range of 1 to 127.
5. JP3 and JP4 jumpered in positions 2 and 3.

Switches SW1, 1 to 7 select the Modbus address of the 1-wire system as follows:

Modbus Slave Address	1	2	3	4	5	6	7
1	On	Off	Off	Off	Off	Off	Off
2	Off	On	Off	Off	Off	Off	Off
3	On	On	Off	Off	Off	Off	Off
4	Off	Off	On	Off	Off	Off	Off
5	On	Off	On	Off	Off	Off	Off
6	Off	On	On	Off	Off	Off	Off
7	On	On	On	Off	Off	Off	Off
8	Off	Off	Off	On	Off	Off	Off
9	On	Off	Off	On	Off	Off	Off
10	Off	On	Off	On	Off	Off	Off
11 Etc.	-	-	-	-	-	-	-

Connecting Power/bus modules together and connecting Modbus devices

Interconnect all the Power/Bus modules with the isolated RS485 connectors (CON5). Use a twisted pair wire cable with 22 AWG stranded conductors for best performance. You only need to connect the two wires A- and B+. The ISOGND connection can be left unconnected. Therefore, connect A- of the first module to A- of the second. Run a second wire from A- on the second module to the third. Repeat this daisy chain scheme for all modules. In a like manner daisy chain the wires for B+.

Connect the actual Modbus devices such as our Modcombo module (on connectors CON8 or CON9) with the non-isolated RS485 bus on connector CON6 of this power/bus module. Use a cable with two twisted pairs. Each conductor should be 22 AWG (or larger) stranded for best performance. Use one pair to daisy chain A- and B+ as described in the previous paragraph. Use the second pair to daisy chain the GND and +5V power lines. If possible use black for GND and red for +5V.

Don't forget to install the terminating resistors on the Power/Bus and Modbus devices that are at the ends of the RS485 bus runs. Make sure all other devices not at the ends do not terminate the bus, otherwise there will be excessive current draw.

Connecting 1-wire devices

This power/bus module is the controller for the 1-wire bus. Ideally you should connect 1-wire modules with a cable with two twisted pairs. Each conductor should be 22 AWG (or larger) stranded for best performance. A Cat 5 cable can also be used but is prone to breaking because it uses small 26 AWG single solid conductors for each wire.

Connect the first 1-wire device (on connector CN1) to CON8 on the power/bus module. Use one twisted pair for GND and +5V. Use a second pair for GND and the 1-wire signal. From here a second cable connects the first 1-wire device to the second 1-wire device. The second connects to the third, etc. This daisy chained cable continues to the last device.

The bus has a maximum length of 1000 feet from end to end. The total number of devices can't exceed 64 and the total number of separate input readings and output controls can't exceed 127. Each 1-wire module must be connected to the 1-wire bus with it's connector CN1. Any combination of 1-wire devices can be interconnected on this bus.

Pin Number for CN1 on any of our 1-wire devices	Description
1	+5V
2	+5V common
3	1-wire common
4	1-wire signal