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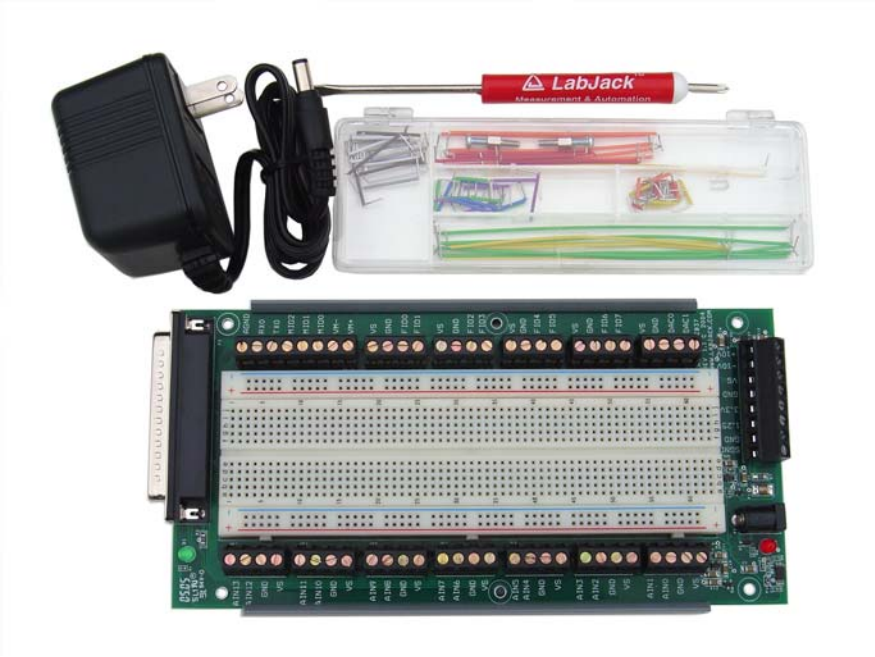
EB37 Datasheet

3/1/2007, Revision 1.03

The EB37 experiment board connects to the LabJack UE9's DB37 connector and provides convenient screw terminal access. Also provided is a solderless breadboard and useful power supplies. The EB37 is designed to connect directly to the LabJack, but can also connect via a 37-line 1:1 male-female cable (not included).



The solderless breadboard is provided for convenient prototyping, and does not have any electrical connections to the rest of the EB37. Looking at the picture above, the breadboard has 2 long rows of 5*10=50 sockets at the top, and two more rows of 50 at the bottom. In each of these 4 rows, all 50 sockets are connected, and thus these rows are generally used as power rails. The remainder of the breadboard is filled with 126 columns of 5 connected sockets each. The breadboard is attached to the EB37 with adhesive. The breadboard area is about 6.5" (165 mm) by 2.2" (56 mm), so if a replacement is needed one possibility is the UBS-100 (available from mouser.com), which can be mounted using screws/nuts rather than adhesive. Note that the UBS-100 (and many similar breadboards) separates the power rails in the middle, such that there are 8 rows of 25 sockets.

The green LED on the EB37 is directly powered by the 5-volt supply (Vs) from the LabJack, so it should be lit whenever the EB37 is connected to a powered LabJack. The red LED is powered directly by the external power supply (wall-wart included).

The EB37 can be powered from the LabJack or the external supply. If both the LabJack and external supply are connected at the same time (both green and red LEDs on), the external supply will provide power. If the external supply is not connected (red LED off), then +/- 10 volts, 3.3 volts, 1.25 volts, and all Vs terminals are powered by the LabJack. If the external supply is connected (red LED on), then it provides power for +/- 10 volts, 3.3 volts, 1.25 volts, and all Vs terminals.

The LabJack always provides power for the green LED, VM+, VM-, and any current sourced/sunk by I/O lines, even if the wall-wart is connected.

In most cases the EB37 can simply be powered by the LabJack, but there are various reasons why powering from the external supply, rather than the LabJack, might be desirable. One obvious reason is if more power is required on the EB37 than can be provided by the LabJack. Other reasons could be avoiding a ground offset between the LabJack and EB37 (as discussed below), avoiding any degradation of the LabJack power supply, or providing an EB37 power supply that is on even when the LabJack is off.

Power Terminals

SGND: This terminal has a self-resetting thermal fuse (0.75 amps) in series with GND. Often used when connecting a ground from another powered system to create a common ground.

GND: All GND terminals are the same.

1.25V: Output from a 1.25 reference. The reference maintains 0.2% accuracy while sourcing up to 25 mA.

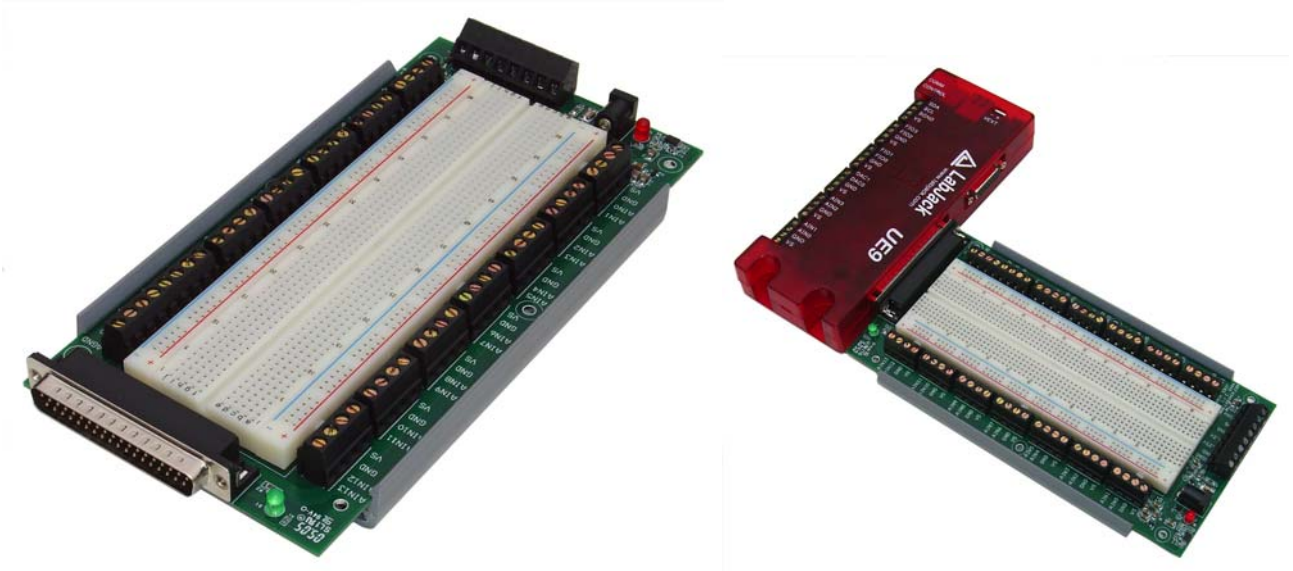
3.3V: Output from a 3.3 volt regulator. Provides up to 200 mA with 2% accuracy.

VS: All VS terminals are the same. These are outputs of the nominal 5 volt power supply provided by the LabJack or wall-wart.

+10V/-10V: Unregulated supply with a nominal output of 2*VS and –2*VS. This supply can provide up to 10 mA, but the output voltage decreases and output ripple increases with load.

When using the analog connections on the EB37, the effect of ground currents should be considered, particularly when a cable is used and substantial current is sourced/sunk through the EB37 terminals. For instance, a test was done with a 6 foot cable between the EB37 and a LabJack UE9, and a 100 ohm load placed from Vs to GND on the EB37 (~50 mA load). A measurement of EB37 GND compared to UE9 GND showed 5.9 mV. If a signal was connected to AIN0 on the EB37 and referred to GND on the EB37, the UE9 reading would be offset by 5.9 mV. The same test with the EB37 direct connected to the UE9 (no cable) resulted in an offset of only 0.2 mV. In both cases (cable or no cable), the voltage measured between EB37 AGND and UE9 GND was 0.0 mV.

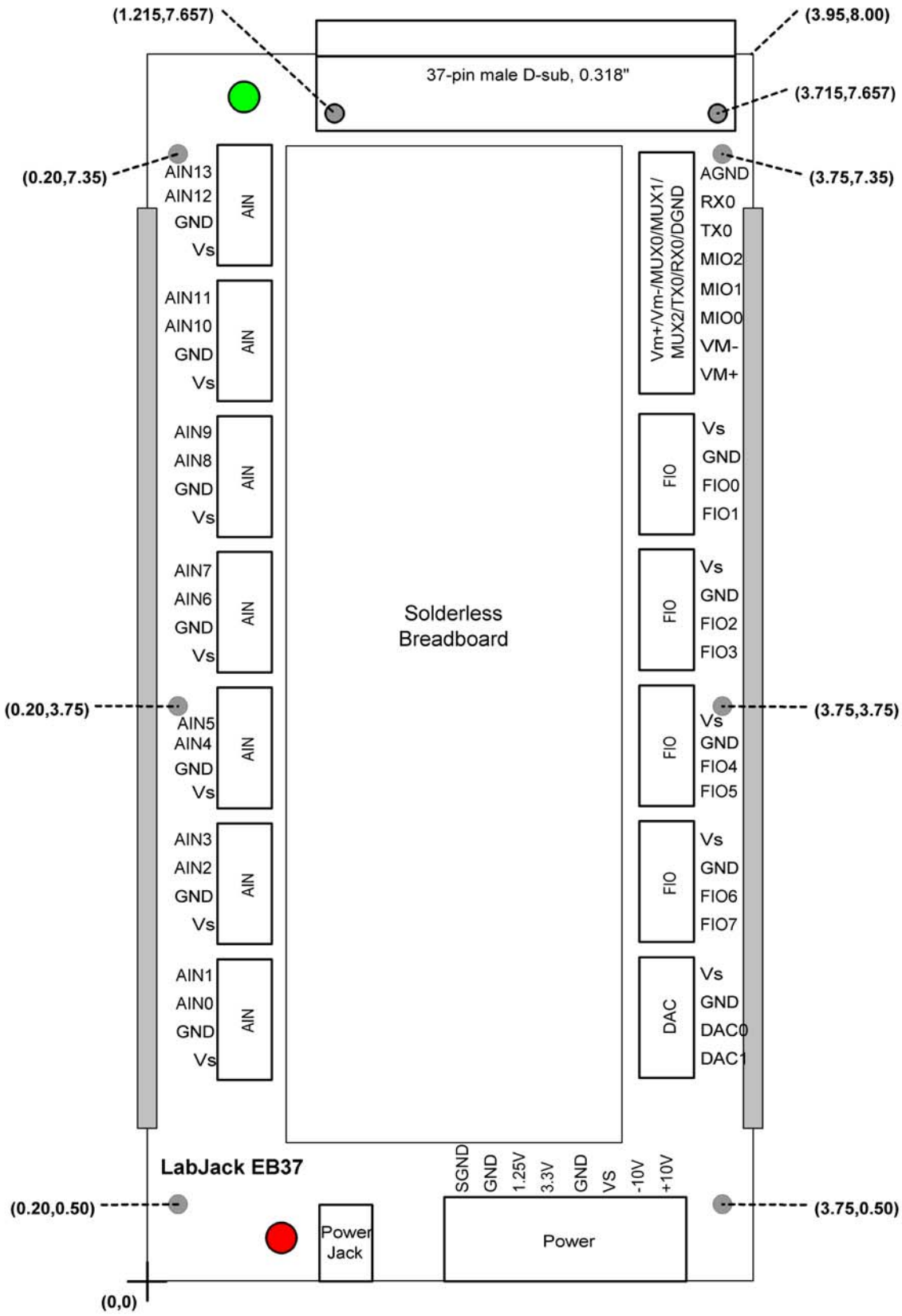
When any sizeable cable lengths are involved, a good practice is to separate current carrying ground from ADC reference ground. One way to do this on the EB37 is to use GND as the current source/sink, and use AGND as the reference ground. This works well for passive sensors (no power supply), such as a thermocouple, where the only ground current is the return of the input bias current of the analog input. Another option is to use a separate ground wire for loads requiring substantial current.



Specifications:

Parameter	Conditions	Min	Typical	Max	Units
General					
Supply Voltage		3.6	5	5.5	volts
Supply Current (1)	No Loads		5.2		mA
Operating Temperature		-40		85	°C
1.25V					
Output Voltage		1.2475	1.250	1.2525	volts
Maximum Current				25	mA
3.3V					
Output Voltage		3.234	3.30	3.366	volts
Maximum Current				200	mA
+10V/-10V					
Output Voltage	@ 200 uA		±9.5		volts
	@ 2 mA		±9.3		volts
	@ 10 mA		±8.8		volts
Output Voltage Ripple	@ 2 mA		±2		mV
	@ 10 mA		±20		mV
Maximum Current				10	mA

(1) This is the current that must be provided by the LabJack or wall-wart just to power the EB37 with no connections. About 5 mA of this current is for the green or red LED. So if either the LabJack or wall-wart only is connected, it will be providing about 5.2 mA. If both are connected, the LabJack will only be providing 5 mA for the green LED, while the wall-wart will be providing 5.2 mA plus any extra load demands. Additionally, 1 mA of supply current is required for each 1 mA of load current on Vs, 1.25V, and 3.3V, and about 4 mA of supply current is required for each 1 mA of load current on +10V/-10V.


(1.215,7.657)
(3.95,8.00)
37-pin male D-sub, 0.318"
(3.715,7.657)
(0.20,7.35)
(3.75,7.35)
AIN13
AIN12
GND
Vs
AIN
AIN11
AIN10
GND
Vs
AIN
AIN9
AIN8
GND
Vs
AIN
AIN7
AIN6
GND
Vs
AIN
AIN5
AIN4
GND
Vs
AIN
AIN3
AIN2
GND
Vs
AIN
AIN1
AIN0
GND
Vs
AIN
Solderless
Breadboard
AGND
RX0
TX0
MIO2
MIO1
MIO0
VM-
VM+
Vm+/Vm-/MUX0/MUX1/
MUX2/TX0/RX0/DGND
Vs
GND
FIO0
FIO1
FIO
Vs
GND
FIO2
FIO3
FIO
Vs
GND
FIO4
FIO5
FIO
Vs
GND
FIO6
FIO7
FIO
Vs
GND
DAC0
DAC1
DAC
(0.20,3.75)
(3.75,3.75)
(0.20,0.50)
(3.75,0.50)
LabJack EB37
SGND
GND
1.25V
3.3V
GND
VS
-10V
+10V
Power
Power
Jack
(0,0)