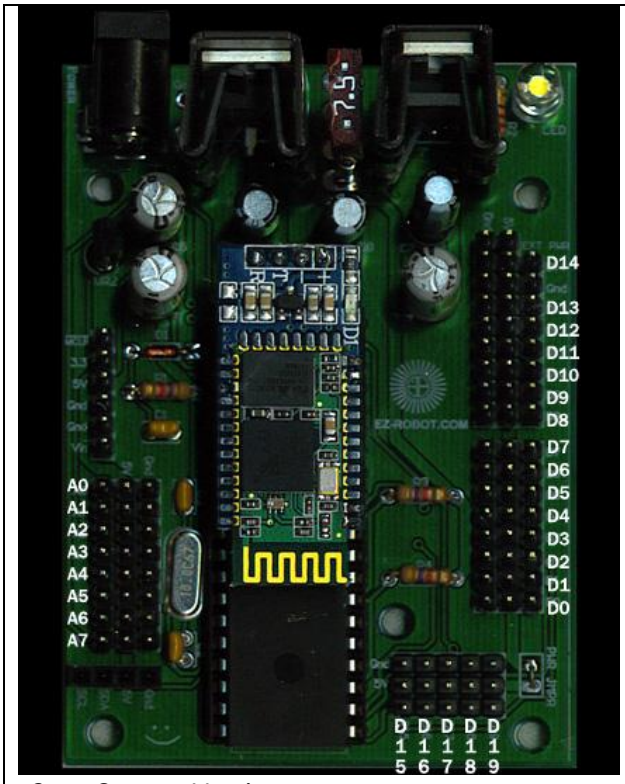
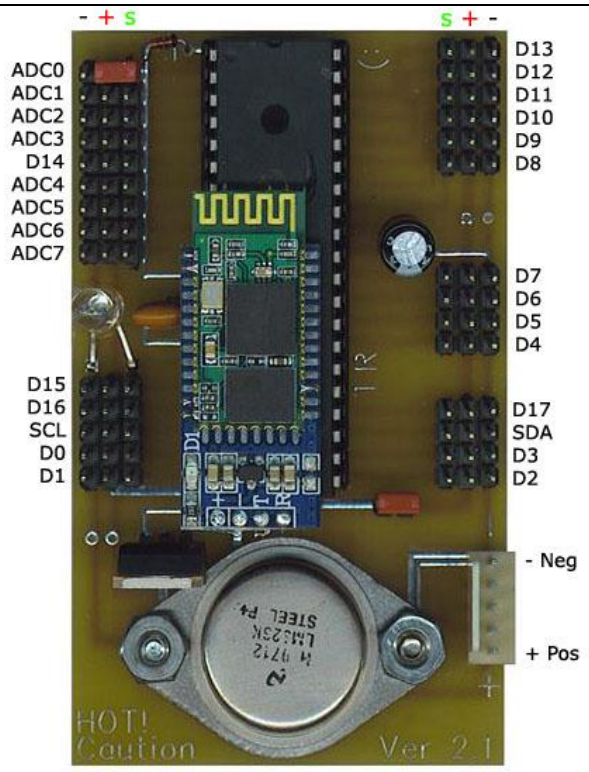
Contents

Board Outline

Before we begin, take a look at the board diagram and recognize the power and port functions. There is a larger image at the end of this document that you may print for your reference. You can hang the printed image on the wall, next to your work area.



v3.x – Current Version



v2.1 – Public Prototype (*Discontinued*)

Introduction

Welcome to the EZ-B v3! We introduce a new method of controlling your robot creations. The EZ-B is a robot controller circuit board that connects to your computer via Bluetooth technology. It is your computer that controls the EZ-B v3 and the peripherals (Servos, LEDs, Distance Sensors, etc.).

- No more low-level microcontroller programming!
- No more in-circuit debuggers!
- No more complicated microcontroller code!

History

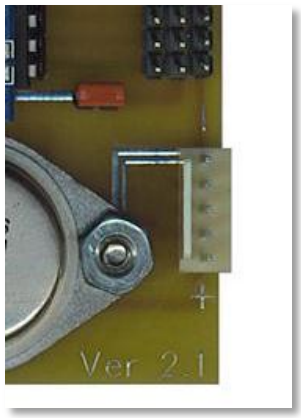
The EZ-B was designed by DJ Sures in response to inquiring emails regarding his robotics. Rather than explaining how his robots were controlled, he released his circuit board and software as the EZ Robot Project. The EZ-Robot Project is his contribution to the robotics community for both beginner and advanced builders.

Power

The v3.x board has a barrel jack that accepts negative on the outside, and positive on the inner pin. The EZ-B is shipped with a 5 x AA battery holder.

The v2.1 board had a 5 pin header connection and a single direction plug. Positive and Negative current are required to power the EZ-B. Your EZ-B package will contain a plug with a red and black wire. Use this plug to provide power to the EZ-B. Additional plugs are available by contacting us on the website @ www.ez-robot.com or at your local electronic parts supplier.

If you are driving many servos, you will notice the voltage regulators getting very hot. **Avoid touching the voltage regulators.**



V2.1

V3.0

Voltage

The EZ-B requires a minimum of 5 volts DC. The ideal voltage is 7.2 volts. Consult the end of this document for maximum voltage specifications. *Note: The higher the voltage, the hotter the regulators will get!

Amperage

The amperage provided to the EZ-B depends on the amount of load your hardware demands. An EZ-B with just a few LED's and some solid state electronics (i.e. distance sensors, temperature sensors, etc.) requires merely milliamps. A minimum of 300mha is recommended for a 100% solid state configuration.

A configuration with servos will require a supply with much more amperage. A minimum of 7.2 volt 2,000mha battery supply is suggested. Great sources for high amperage rechargeable batteries are hobby shops. Also, cordless drill batteries and charger make great power sources.

You may use a 9 Volt Battery to power the EZ-B without any servo hardware. Remember, 9 Volt Batteries are referred as "*Transistor Batteries*" due to their low amperage. They will not power the EZ-B for very long with servos and multiple peripherals. It is recommended to visit a hobby shop and purchase an R/C 7.2 volt high amperage battery pack.

Alternate Servo Power (v2.1 only)

The EZ-B v2.1 provides you with the ability to supply an alternate power source to the servo ports. This will only be necessary if you require more than 5 volts @ 3 amps; or, you may not feel comfortable with the large metal voltage regulator getting very hot. The ports on the right side of the board are controlled by the alternate servo power jumper. Before providing the servo ports with an alternate power, the jumper must be removed (Figure 1). Removing the jumper will separate the power between the right side ports from the rest of the EZ-B. If this jumper is not removed prior to connecting alternate power, you **will** damage the EZ-B.

Figure 1

Once the v2.1 jumper has been removed, you may provide the right side ports with your alternate power supply. You may now apply power to the alternate supply port. Remember, the outside edge of the board is always negative, the middle pins are positive supply, and the inner pins are signal. The alternate power supply pins follow that same polarity and are located to the right of the capacitor. Figure 2

Figure 2

Bluetooth

The EZ-B uses a Class 2 Bluetooth transceiver. The distance is approximately 10 Meters (30 Feet) in most configurations. The distance depends on the computer's Bluetooth module and the amount of shielding around the EZ-B.

Here are the steps to add the EZ-B to your PC's Bluetooth devices…

1) Provide power to the EZ-B
2) Within 90 seconds, select *Add A Device* from your Bluetooth Icon on the system tray of your taskbar
3) The EZ-B device should appear. It may appear as "Other", so please select it and press *Next*
4) When prompted for a Device Pairing Code, chose the option to enter one. The pairing code is *1234* and press *Next*
5) The EZ-B will be detected as two COM Port devices. The first COM Port device is the EZ-B data-channel (*Lower COM Number*). That will be the COM Port that you will connect EZ-SDK and EZ-Builder to. The second COM Port is unused at this time as it is reserved for future enhancements (*Higher COM Number*)

Control

There are two ways of controlling the EZ-B. The strategy behind this project was to build a flexible platform to support beginners and professionals. The EZ-B will support your growth and knowledge of robotics and programming. You will never need to purchase another robot controller again.

EZ-Builder

We know that not everyone is a programmer. We also know that programming is an important part of robotics. The question arises of where do I start? The answer is easy, EZ-Builder!

This is a free software application that provides you with a graphical interface to control the EZ-B. All of the components you add to the EZ-B can be represented with graphical controls. The software also includes a scripting module allowing custom control that makes your robots come to life!

EZ-Builder is available as a free download on the website, here: http://www.ez-robot.com/EZ-Builder

Visual Studio .Net

If you are a Visual Basic or C# programmer, the EZ-SDK is for you. The DLL contains methods that allow two-way communication to the EZ-B. Giving you control of the physical hardware without needing to write any complicated microcontroller code.

The SDK documentation is available on www.ez-robot.com/sdk

Open Framework

Whether you label yourself as a Hacker, Modder, Student or just plain interested... We know that some of you want to poke and modify the inner workings of the EZ-B. The SDK may have many peripheral wrappers and hardware classes, but we have left the raw Bluetooth connection object open for you. Also, there is a verbose debugging method that exposes the communication protocol for those curious minds.

We encourage any code you develop using the EZ-B to be released Open-Source and protected under any software license you choose. The code for DJ's EZ-B projects are released under the DIY section of this website and will always be open source.

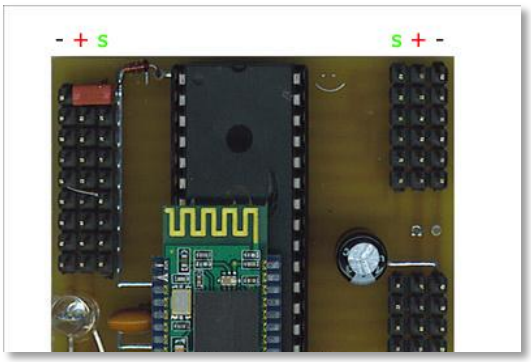
Ports

The ports for the EZ-B V2.1 are located on either side of the board and run horizontal, and both directions on the V3.0. The voltage supplied by each port is +5 DC. You can read a detailed description of ports and supported hardware on the website, here: http://www.ez-robot.com/Tutorials

***Warning:** *Do not attach high current peripherals to the signal of the EZ-B. For example, do not power DC motors from the signal wire. You will require an HBridge or Switching Transistor to power a DC Motor from the EZ-B. The signal wire from the microchip does cannot provide enough amperage for anything but solid-state devices. Visit our online store for additional peripherals at http://www.ez-robot.com/Shop*

Power

The ports have their own voltage regulator that is separate from the microchips power supply. This prevents the chip from resetting (brownout) when the hardware is under a high load. The each pin row has a Positive, Negative and Signal wire. This makes the ports natively compatible with servos, sensors and Arduino hardware. (Figure 6)



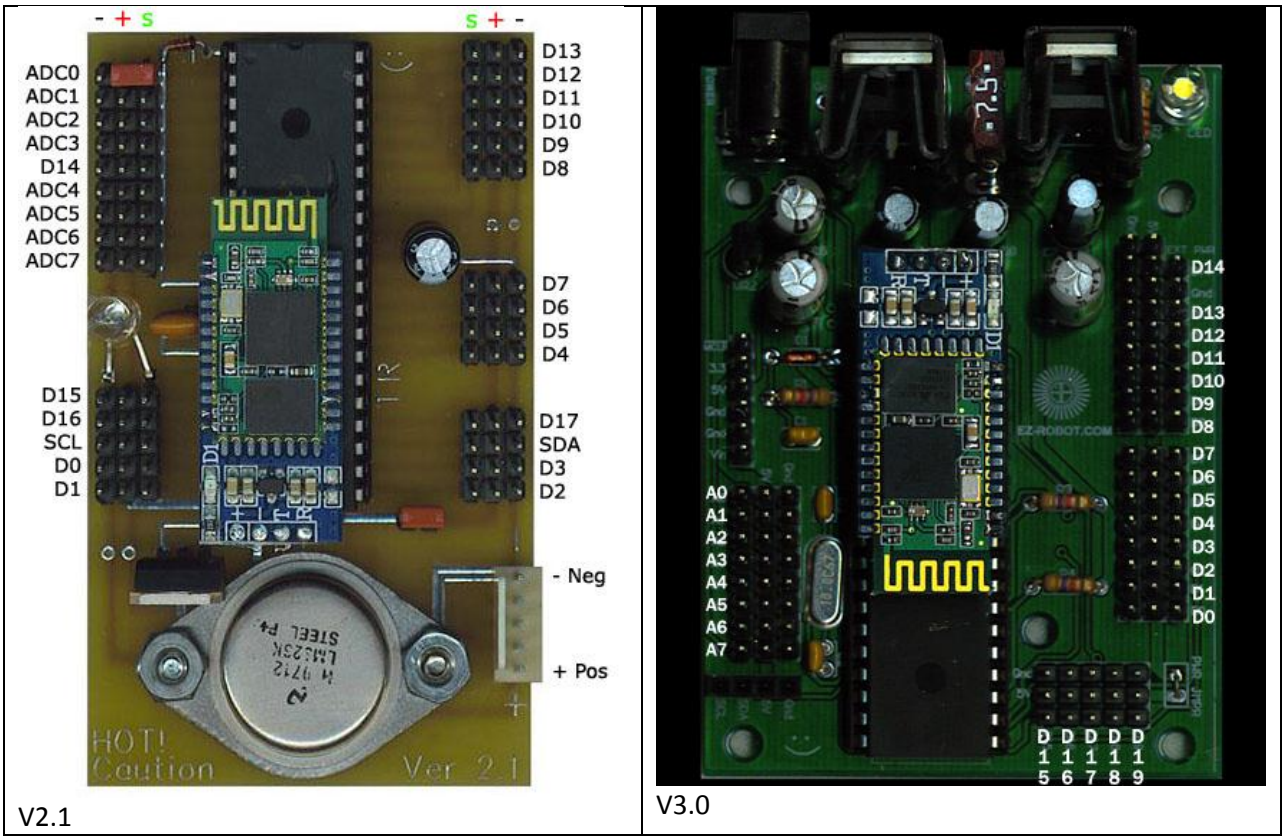
V2.1

V3.0

Figure 3

Servo Ports

The ports on the right side of the board are either Servo or Digital (input or output). You can reference the power section of this document to read about how to provide the servos an alternate power source.



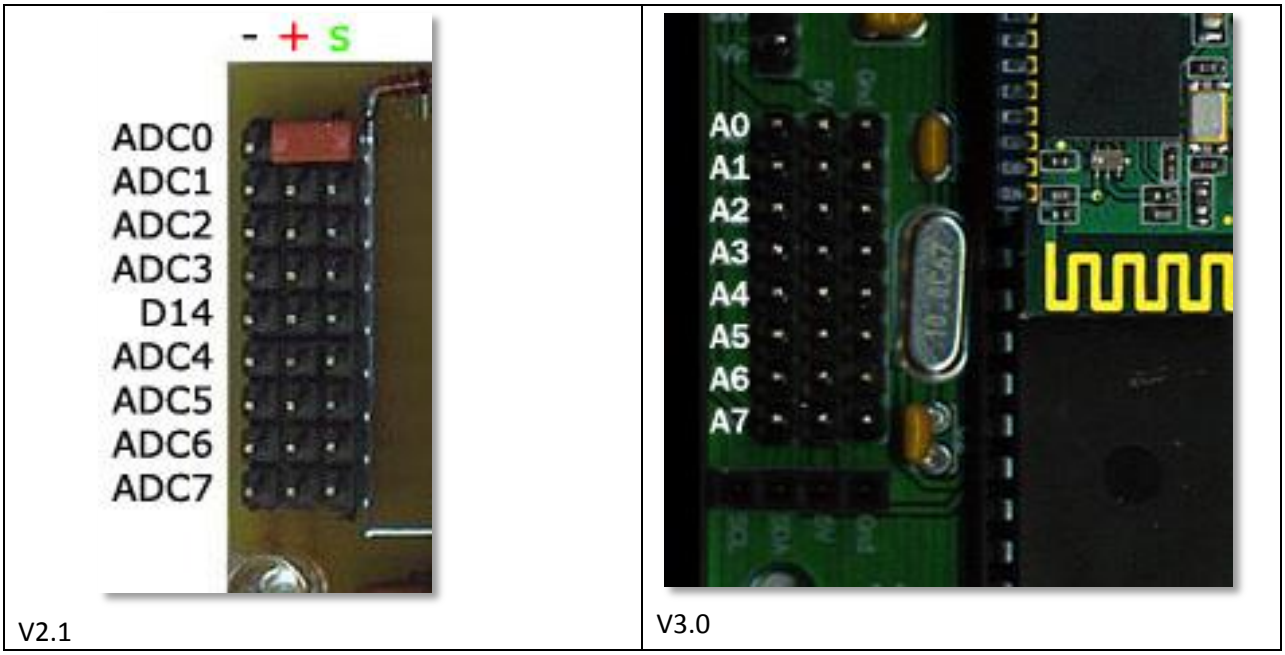
V2.1

V3.0

Figure 4

ADC (Analog Digital Conversion) Ports

The ADC ports are located on the top left of the EZ-B board. They are numbered from 0 to 7. The analog ports are prefixed with ADC. Analog ports can accept voltage between 0 and +5v DC.

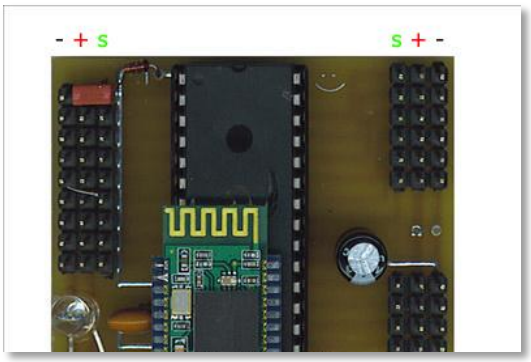


V2.1 V3.0

Figure 5

Digital Ports

Digital ports are every other port then an analog port. Even Servo ports are considered digital ports. The digital ports are prefixed with the letter D, then a number (0 to 19). Digital ports can output low current +5 or GND to power LED's or communicate with peripherals. They also read input voltage in the range of 0v to a maximum of +5v DC.



V2.1

V3.0

Figure 6

EZ-B Board Reference

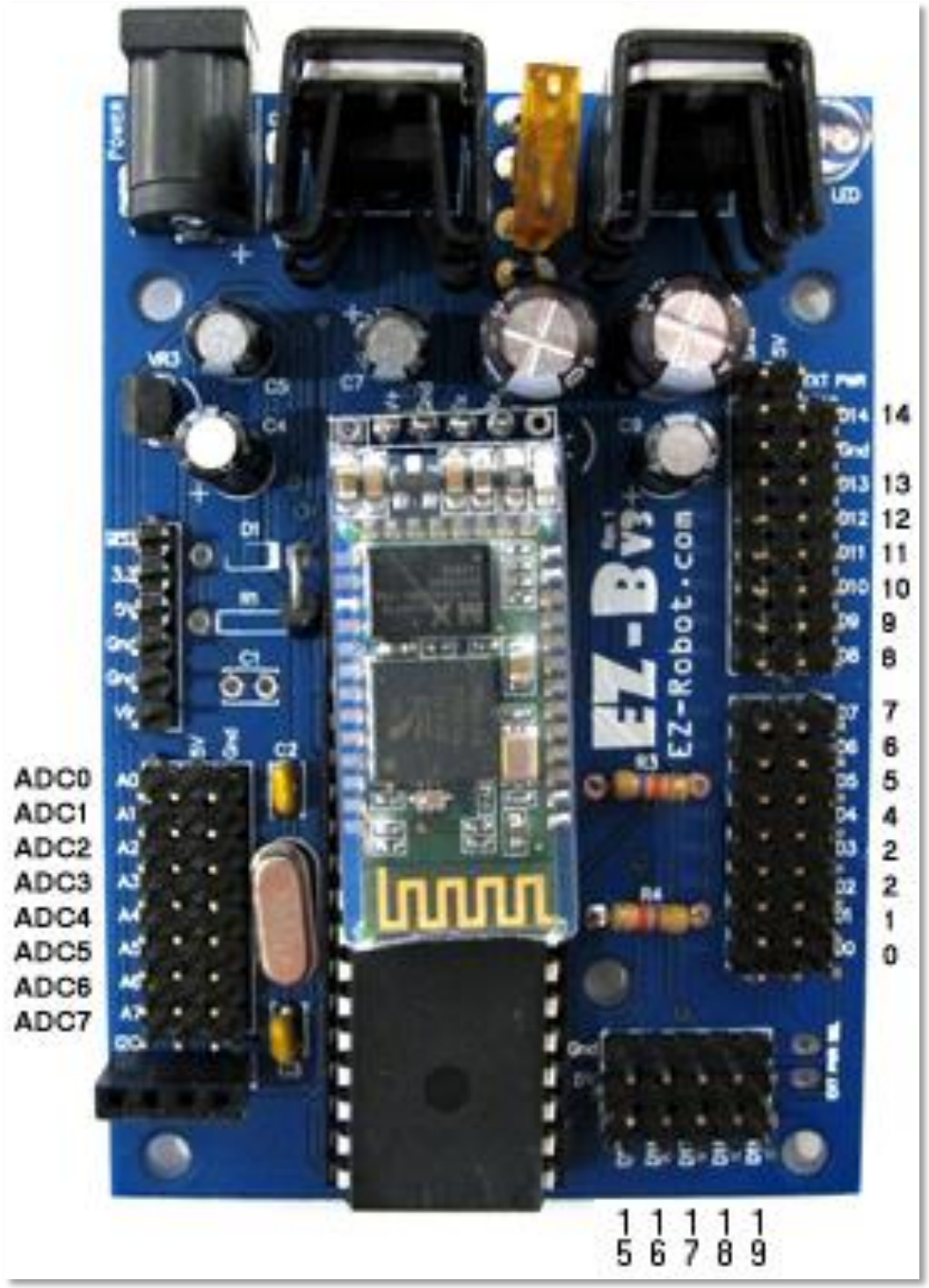


Figure 7 - EZ-B v3.0 & v3.1

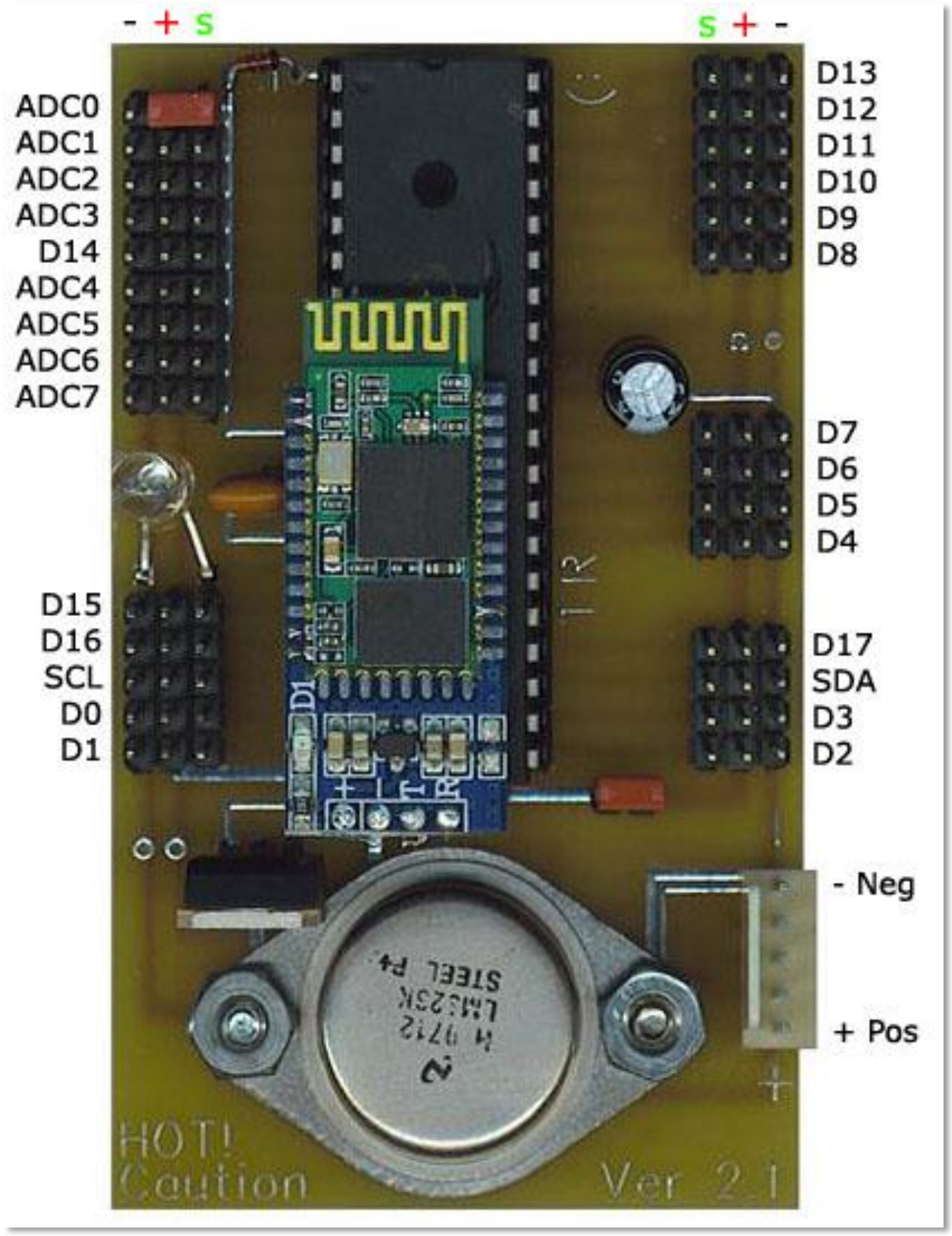


Figure 8 - EZ-B v2.1

Specifications 3.1

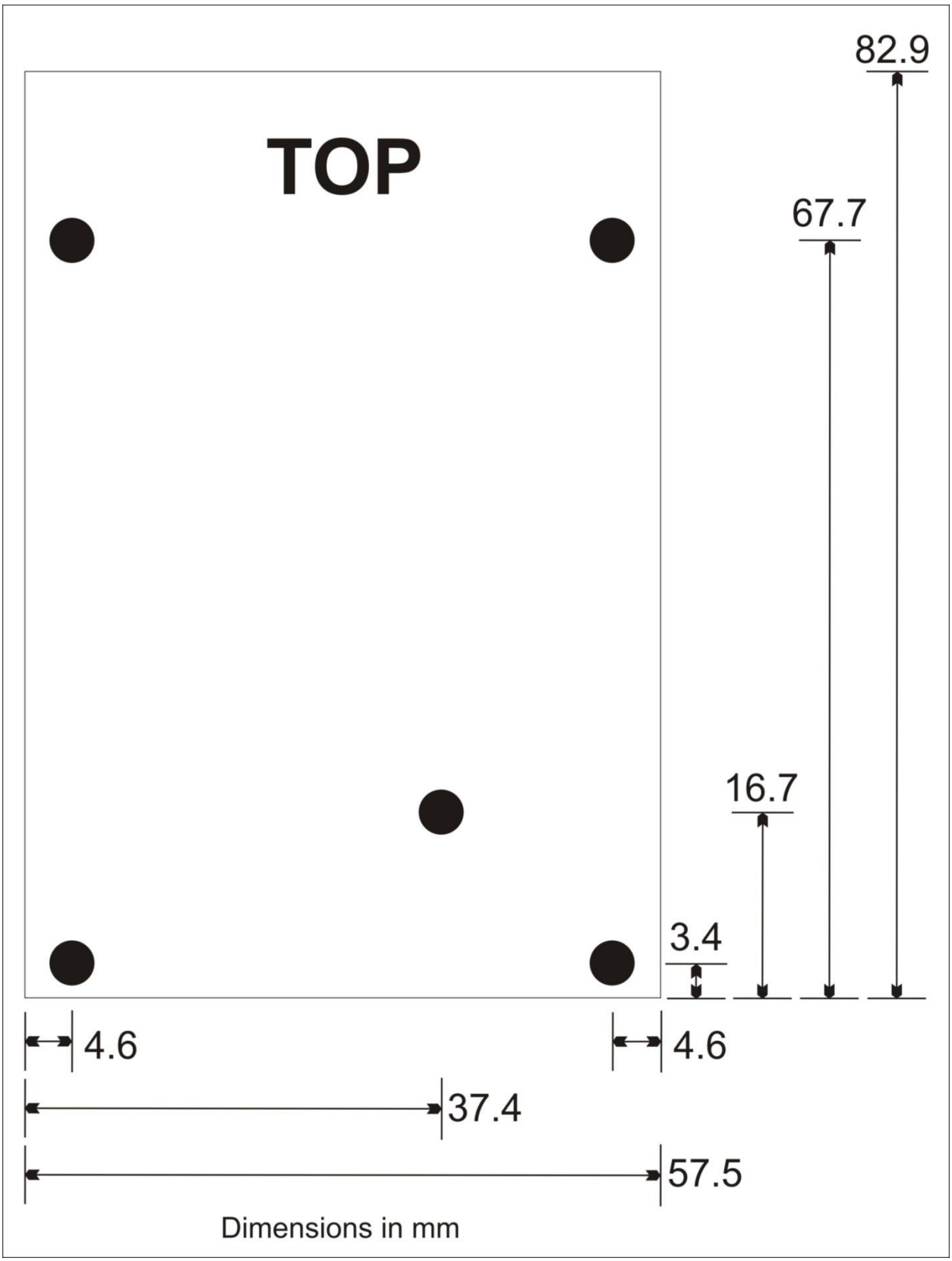
Input Voltage (min)	5 Volts DC
Input Voltage (max)	17 Volts DC
Input Voltage (recommended)	7.2 Volts DC @ 3 Amps
Microcontroller Voltage Regulator	MIC29300 (5 Volts DC, 3 Amps)
I/O Peripheral Voltage Regulator	LM1084 (5 Volts DC, 5 Amps)
I/O Voltage Dropout	-0.3 Volts
I/O Output Voltage	5 Volts DC (5 Amps max, 25 Watts)
Operating Temperature	-40C to +125C
Bluetooth Default Name	EZ-Robot
Bluetooth Default Passphrase	1234
ADC Ports	8 (adc0 – adc7)
ADC Input Voltage (min/max)	0v DC, 5v DC
Serial Ports	20 (d0-d19)
Digital I/O Ports	20 (d0-d19)
Digital I/O High-Current Sink	25 mA
Digital I/O High-Current Source	25 mA
Servo Ports	20 (d0-d19)
- Servo Low Pulse Width	0.61 ms
- Servo Mid Pulse Width	1.48 ms
- Servo High Pulse Width	2.38 ms
iRobot Roomba Port	d0
I2C	I2C Header Onboard with +5 and GND Pull-Up Resistor On-Board
Clock Speed	40 MHZ
Bluetooth Specifications	Class 2 (2.5 mW, 4 dBm) Approx. 10 Meters (30 feet) Range
I/O Fuse Protection	7.5 Amp Mini Blade Fuse

Specifications 3.0

Input Voltage (min)	5 Volts DC
Input Voltage (max)	17 Volts DC
Input Voltage (recommended)	7.2 Volts DC @ 3 Amps
Microcontroller Voltage Regulator	7805CV (5 Volts DC, 1 Amp)
I/O Peripheral Voltage Regulator	LM1084 (5 Volts DC, 5 Amps)
I/O Voltage Dropout	-2 Volts
I/O Output Voltage	5 Volts DC
Bluetooth Default Passphrase	1234
ADC Ports	8 (adc0 – adc7)
ADC Input Voltage (min/max)	0v DC, 5v DC
Serial Ports	20 (d0-d19)
Digital I/O Ports	20 (d0-d19)
Digital I/O High-Current Sink	25 mA
Digital I/O High-Current Source	25 mA
Servo Ports	20 (d0-d19)
iRobot Roomba Port	d0
I2C	I2C Header Onboard with +5 and GND Pull-Up Resistor On-Board
Clock Speed	40 MHZ
Bluetooth Specifications	Class 2 (2.5 mW, 4 dBm) Approx. 10 Meters (30 feet) Range
I/O Fuse Protection	7.5 Amp Mini Blade Fuse

Specifications 2.1 (discontinued beta)

Input Voltage (min)	5 Volts DC
Input Voltage (max)	14 Volts DC
Input Voltage (recommended)	7.2 Volts DC @ 3 Amps
Microcontroller Voltage Regulator	7805CV (5 Volts DC, 1 Amp)
I/O Peripheral Voltage Regulator	LM323K (5 Volts DC, 3 Amps)
I/O Output Voltage	5 Volts DC
Bluetooth Default Passphrase	1234
ADC Ports	8 (adc0 – adc7)
ADC Input Voltage (min/max)	0v DC, 5v DC
UART Ports	18
Digital I/O Ports	18
Servo Ports	18
I2C	I2C pins specified SDA/SCL *Requires Pull-Up Resistor to +5
Clock Speed	40 MHZ
Bluetooth Specifications	Class 2 (2.5 mW, 4 dBm) Approx. 10 Meters (30 feet) Range


TOP
82.9
67.7
16.7
3.4
4.6
4.6
37.4
57.5
Dimensions in mm

Warranty

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Contact

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Web: *http://www.ez-robot.com*

FAQ/Support: http://www.ez-robot.com/FAQ

YouTube: *http://www.youtube.com/aliencurv*

E-Mail: *support@ez-robot.com*

Forum: http://www.ez-robot.com/Community/Forum

DIY Projects: http://www.ez-robot.com/Projects

SDK Manual: http://www.ez-robot.com/SDK

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