Modtronix Engineering

NETCruzer

DB66DEV1

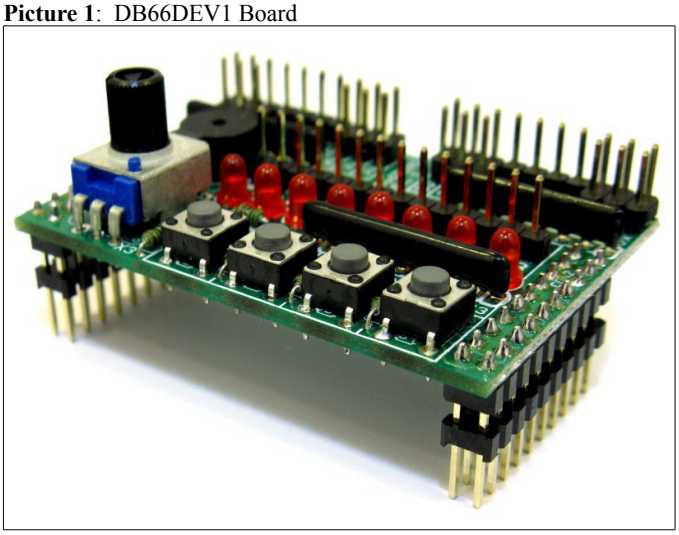
Development daughter board for SBC66 Netcruzer SBC Boards

----- Part of the Modtronix *Netcruzer* product range -----

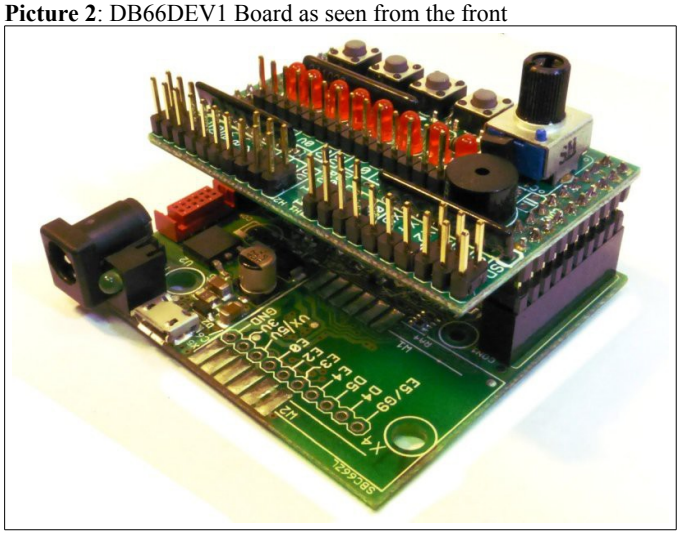
1 Description

The DB66DEV1 is a development daughter board for Netcruzer SBC66 SBC(Single Board Computers) boards. It plugs into the daughter board connector of the SBC66 board. It provides common inputs and outputs required for prototyping and development.

Picture 1: DB66DEV1 Board



Picture 2: DB66DEV1 Board as seen from the front

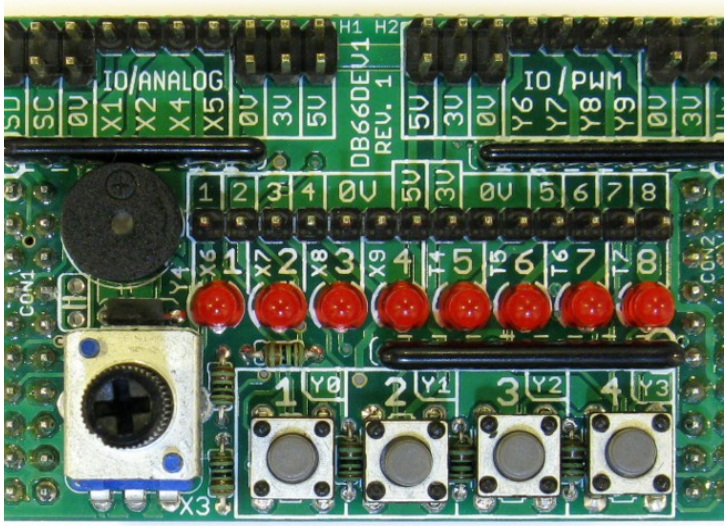


1.1 Features

- 4 Tactile buttons connected to SBC66 Ports Y0, Y1, Y2 and Y3.
- 8 Red LEDs connected to SBC66 Ports X6, X7, X8, X9, T4, T5, T6 and T7.
- A potentiometer connected to SBC66 Ports X3.
- A buzzer connected to SBC66 Ports Y4.
- Three 2x3 pin headers (standard 2.54mm) connected power
- One 2x3 pin header (standard 2.54mm) connected I2C port and power
- A 1x14 pin header (standard 2.54mm) connected to LED ports and power. Can be used as 8 digital input or output ports.
- A 1x4 pin header (standard 2.54mm) connected to SBC66 Ports X1, X2, X4 and X5. Can be used as Analog inputs, or general purpose I/Os.
- A 1x4 pin header (standard 2.54mm) connected to SBC66 Ports Y6, Y7, Y8 and Y9. Can be used as general purpose I/Os, or reconfigurable pins (PWM, SPI, UART...).

1.2 General

Picture 3 shows the DB66DEV1 board from the top. As can be seen, the SBC66 Ports of all LEDs, Buttons, Buzzer, Potentiometer and pin Headers are clearly marked on the PCB.



Picture 3: DB66DEV1 from the top

2 Getting Started

The easiest way getting started with the DB66DEV1 board is to modify one of our demo projects. For information and to download them, see DB66DEV1 section at netcruzer.com/examples. All demo projects are written in C, and can be build with the free MPLAB X IDE and XC16 C compiler.

A SBC66 board is of course also required to plug the DB66DEV1 board into. The firmware generated using the XC16 compiler can be uploaded to the SBC66 board via a PIC programmer, or via USB using the bootloader on the SBC66 board (or Ethernet for the SBC66EC or SBC66ECL). For details see netcruzer.com/nzdoc-program.

3 Daughter Board Connector

The DB66DEV1 has two 2x10 pin (2.54mm = 0.1" pitch) male headers. All Netcruzer SBC66 boards have two 2x10 pin female connectors, called the daughter board connector. The DB66DEV1 is plugged into this connector.

The signals on the daughter board connector of the SBC66 board are called Netcruzer Ports. These netcruzer ports can be addressed directly in the software. To see what Microcontroller port pins are connected to the Netcruzer Ports, go to netcruzer.com/nzdoc-sbc66-ports.

Table 1: Daughter Board Connector

CON1 Daughter Board Connector (mates with CON2 of SBC board!)			*CON2 Daughter Board Connector (mates with CON1 of SBC board!)*		
Pin	**Netcruzer Port**	**Description**	**Pin**	**Netcruzer Port**	**Description**
1	T5	**LED 6** *and* I/O on pin header *- RP port (1) – 3.3/5V (2)*	1	T1	
2	T4	**LED 5** *and* I/O on pin header *- 3.3/5V (2)*	2	T0	
3	T7	**LED 8** *and* I/O on pin header *- RP port (1) – 3.3/5V (2)*	3	T3	
4	T6	**LED 7** *and* I/O on pin header *- RP port (1) – 3.3/5V (2)*	4	T2	
5	GND	Ground or 0V	5	S1	
6	3.3V	Regulated 3.3V from SBC board	6	S0	
7	5V	Regulated 5V from SBC board	7	X1	**I/O** or **Analog** input available on **pin Header**
8	Vin	Unregulated voltage from SBC board	8	X0	
9	Y1	**Button 2** *- RP port (1)*	9	X3	**Potentiometer** input, has a voltage 0 to 3.3V
10	Y0	**Button 1** *- RP port (1)*	10	X2	**I/O** or **Analog** input available on **pin Header**
11	Y3	**Button 4**	11	X5	**I/O** or **Analog** input available on **pin Header**
12	Y2	**Button 3**	12	X4	**I/O** or **Analog** input available on **pin Header**
13	Y5	N.C.	13	X7	**LED 2** *and* I/O on pin header *- RP port (1)*
14	Y4	**Buzzer** *- RP port (1)*	14	X6	**LED 1** *and* I/O on pin header *- RP port (1)*
15	Y7	**I/O** on **pin Header** *- RP port (1) – 3.3/5V (2)*	15	X9	**LED 4** *and* I/O on pin header *- RP port (1)*
16	Y6	**I/O** on **pin Header** *- RP port (1) – 3.3/5V (2)*	16	X8	**LED 3** *and* I/O on pin header *- RP port (1)*
17	Y9	**I/O** on **pin Header** *- RP port (1) – 3.3/5V (2)*	17	X11	
18	Y8	**I/O** on **pin Header** *- RP port (1) – 3.3/5V (2)*	18	X10	
19	Y11		19	SC	**I²C Clock** available on pin header
20	Y10		20	SD	**I²C Data** available on pin header

(1) These pins are connected to Relocatable Pins of the CPU, and can be configured to be any of the CPU's peripherals, like UART, PWM, SPI, Capture input, Timer inputs...

(2) Pins Y6 to Y9, and T4 to T7 are 5V tolerant. They can be connected to 0 to 5V signals. In addition, 5V pull-up resistors can be enabled (solder jumpers on back of SBC board) for these ports to give them 0 to 5V outputs (normal is 0 to 3.3V for all ports)

4 LEDs

The board has 8 LEDs that are connected to SBC66 Ports X6, X7, X8, X9, T4, T5, T6 and T7. Controlling a LED is very easy, and requires the port to be configured as an output, after which it can be set to 1 to turn it on, or 0 to turn it of. The following code shows an example of turning LED 1 on:

```
DIR_X6 = OUTPUT_PIN;    //Configure port X6 (LED 1) as an output
LAT_X6 = 1;             //Turn LED 1 on
```

For many more examples, see netcruzer.com/examples-db66dev1.

5 Buttons

The board has 4 buttons that are connected to SBC66 Ports Y0, Y1, Y2 and Y3. The buttons don't have any pull-up or pull-down resistors, and the port pull-up resistors on the SBC66 ports have to be used. The following examples shows how to read the button connected to port Y0:

```
DIR_Y0 = INPUT_PIN;     //Configure port Y0 (Button 1) as an input
PULLUP_Y0 = 1;          //Enable Pull-Up resistor on port Y0

//Do something if button 1 is pressed (buttons are active low = 0 when pressed)
if (PIN_Y0 == 0) {
    .... Do Something ....
}
```

For many more examples, see netcruzer.com/examples-db66dev1.

6 Buzzer (PWM Output)

Port Y4 is connected to a buzzer via a driver circuit. Setting this port to 1 will activate the buzzer. Port Y4 is also connected to a relocatable port pin for all new SBC66 boards (not the case for the SBC66EC Revision 1 and SBC66ECL Revision 1). For these boards port Y4 can be configured to be a PWM output, and output a signal at a given frequency. The loudness of the buzzer can be controlled by varying the duty cycle of the PWM. See demo project for details on how to do this.

The following examples shows how to configure port Y4 as a PWM output, and activate the buzzer with a 1kHz tone:

```
//Configure Y4 (Buzzer on DB66DEV1) as PWM channel 3
pwm3OpenDefault(PPS_OUT_Y4, 0);

//Output a 1kHz tone at 0.1 duty cycle. (use 0.1 so buzzer is not too loud, 0.5 is maximum volume)
pwmSetFreqAndDutyCycle(3, 1000, 0.1);
```

For boards (SBC66EC Revision 1 and SBC66ECL Revion 1) where Y4 is not connected to a relocatable CPU port pins, a software PWM channel will have to be implemented to sound the buzzer. This can very easily be done using one of the available timers of the CPU, and configuring it to trigger an interrupt. The software PWM is implemented in the timer interrupt service routine.

7 Potentiometer (Analog Input)

Port X3 is connected to a potentiometer, which provides an output of 0 to 3.3V. This port can be configured as an analog input to read the value of the potentiometer. The following examples shows how to test if the analog input has a value of 2.0V or more.:

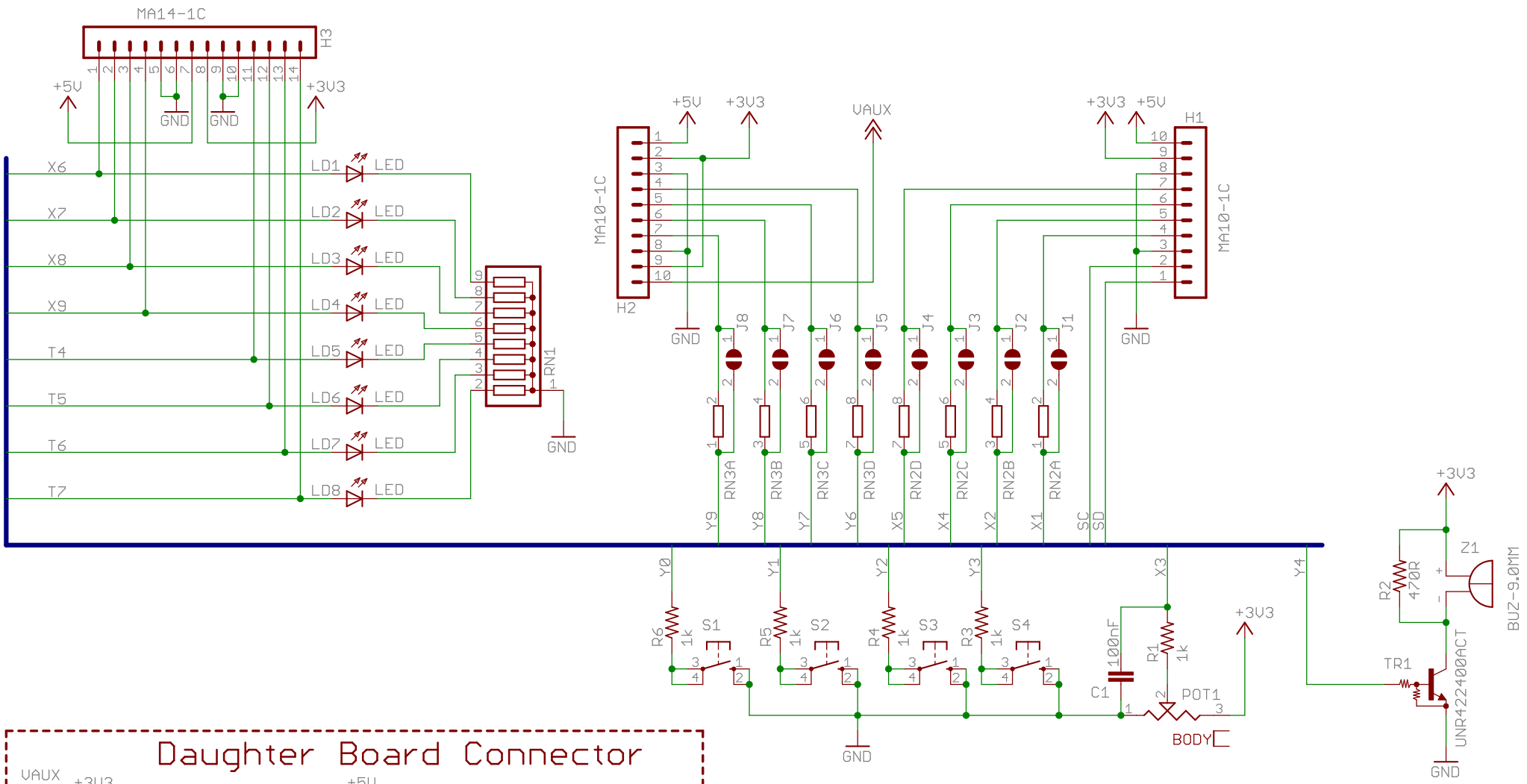
```
adcOpen(ADC_OPEN_X3);     //Configure X3 as ADC channel

//Test if analog input is above 2.0V (2000mV)
if (adcGetChanMv(ADC_CH_X3) > 2000) {
    .... Do Something ....
}
```

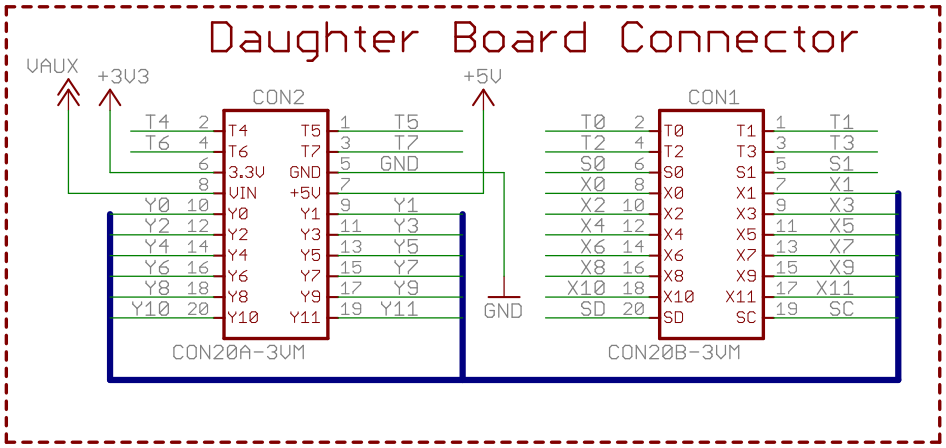
For many more examples, see netcruzer.com/examples-db66dev1.

8 Pin Headers

There are multiple pin headers with power, Analog Inputs, Relocatable Ports (PWM, timer, SPI, UART..) and an I2C port. They are all made available via standard 2.54mm pin headers. See Picture 3 and Schematics for details.

The Relocatable Ports can for example be configured to be PWM outputs, a SPI bus, a TTL serial port (UART) or many other possibilities.





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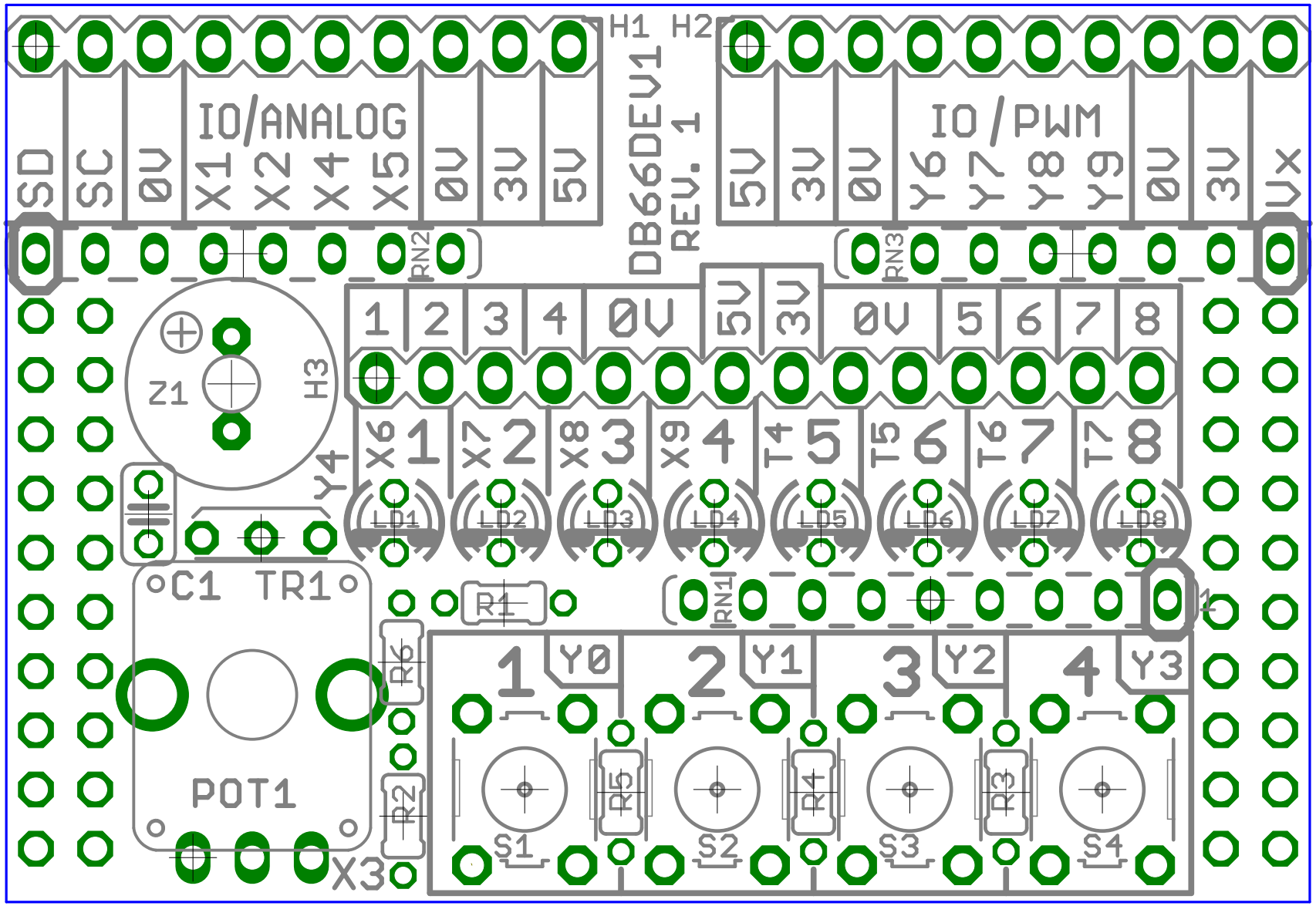
H1
H2
DB66DEV1
REV. 1
SD
SC
0V
IO/ANALOG
X1
X2
X4
X5
0V
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5V
5V
3V
0V
IO/PWM
Y6
Y7
Y8
Y9
0V
3V
Vx
RN2
RN3
1
2
3
4
0V
5V
3V
0V
5
6
7
8
Z1
H3
Y4
X6
X7
X8
X9
T4
T5
T6
T7
LD1
LD2
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LD4
LD5
LD6
LD7
LD8
RN1
C1
TR1
R1
R6
R2
POT1
X3
1
Y0
2
Y1
3
Y2
4
Y3
R5
R4
R3
S1
S2
S3
S4