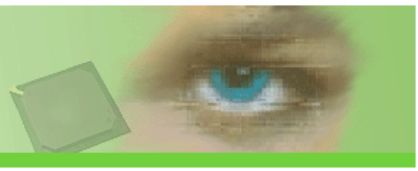

ALON1 – OC8 / DT8
USB automation card
8 x Open Collector (200mA) out
8 x Digital in

User's manual

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Table of content

Table of content 3
Revision History 3
Acknowledgment 4
The ALON1 family of USB interface boards 5
Hardware interface 5
  Relay output 6
  Opto-coupler input 9
Using the 5V connection 11
Hardware Schematics 11
PCB layout 18
Software programming 19

Revision History

Date	Details
17-MAR-2005	Original

Acknowledgment

Dear valued customer,

I would like to thank you for purchasing an ALON1 USB automation card. The card was designed to allow simple and efficient control for various real world applications with the ease and expendability of USB interface. I believe that you will find our boards to be reliable and easy to use.

The most important person in our company is our customer. Our products are as useful as what we know about customer needs, what his/her expectations are and how our products will better serve him/her. I will appreciate having any suggestion, feedback and ideas that will make your designs better. We are a small and agile company, and we fortunate to love what we do. You will be surprised by the short time that we take good idea into good products.

Regards

Dr. Gal Ben-David
gal@galium.co.il

The ALON1 family of USB interface boards

Please refer to the document ***Alon1 Documentation.PDF*** for technical information on the entire ALON1 family.

Hardware interface

The ALON1 OC8 / DT8 card has 8 Darlington open collector outputs and eight digital inputs.

External power supply

The OC8 / DT8 output stage switches loads that use an external power supply - VCOMMON. The power supply should be connected between ground and +VIN.
The power supply is limited to 39V by a Transient Voltage Suppressor (TVS) and a fuse. The TVS will also blow the fuse on reverse polarity.

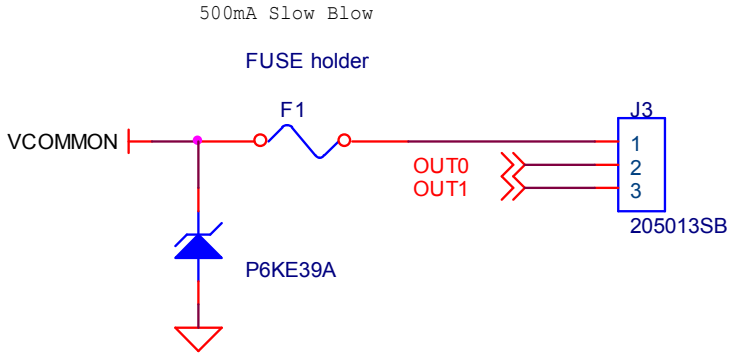


Figure 1 – Over voltage protection

Darlington output

A conceptual circuit diagram of the Darlington output stage (one of eight) is shown in figure 2.

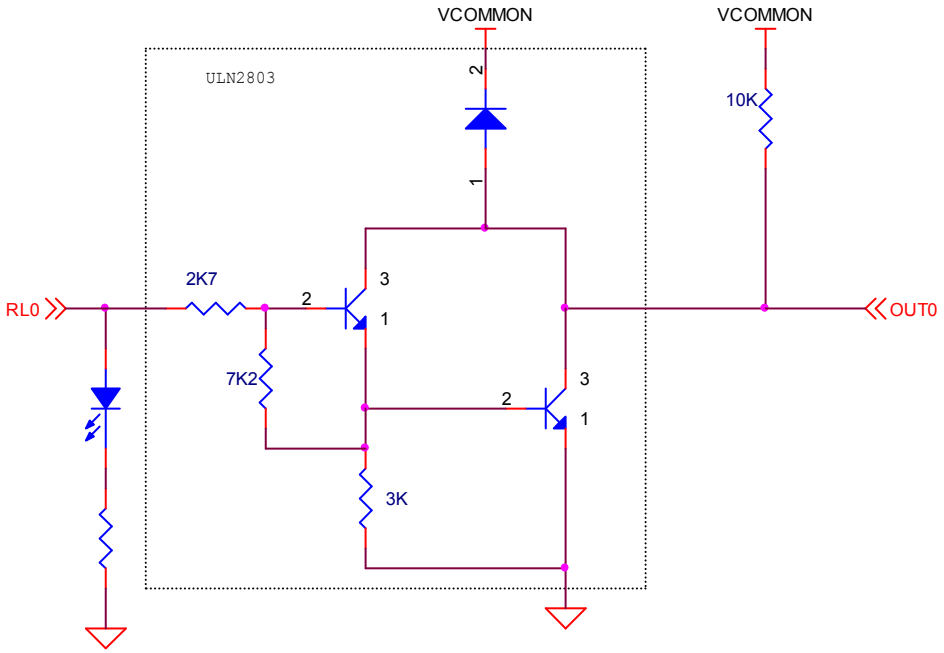


Figure 2 – Darlington output circuit

Each output is driven low by an NPN Darlington (embedded in a Toshiba ULN2803A). A LED is used for ON/OFF indication. The drive capabilities of the ULN2803A depend on number of active outputs and duty cycle. Please check with enclosed datasheet.

Loads should be connected between the positive pin of the external power supply and the corresponding output as seen in figure 3.

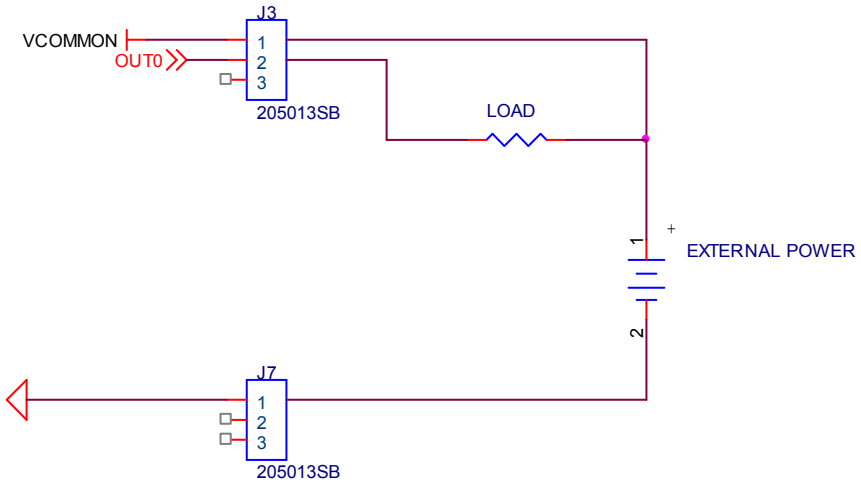


Figure 3 – External load

Logic output (low input current) may also use the 10K pull up for positive logic output as seen in figure 4. In this case the +5V may be connected as external +VIN.

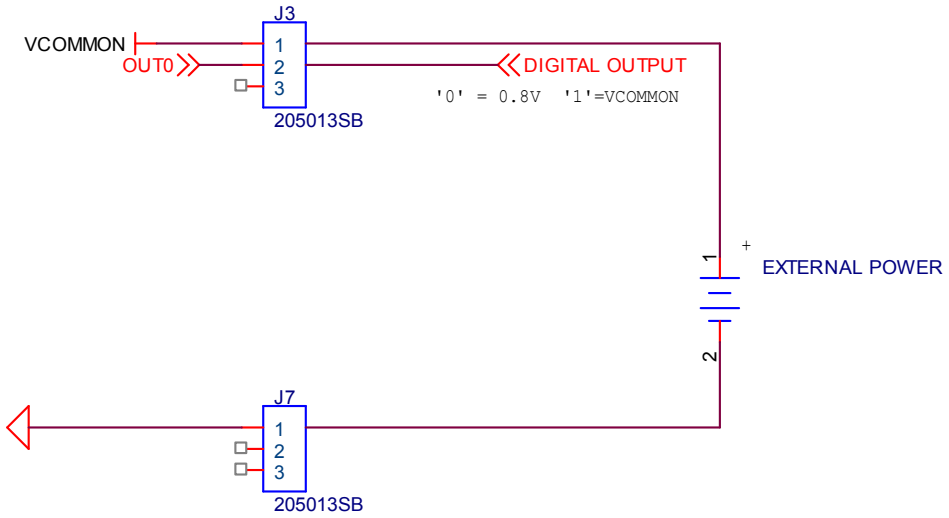


Figure 4 – Logic output (to low input current pin)

The output connections are shown in figure 5.

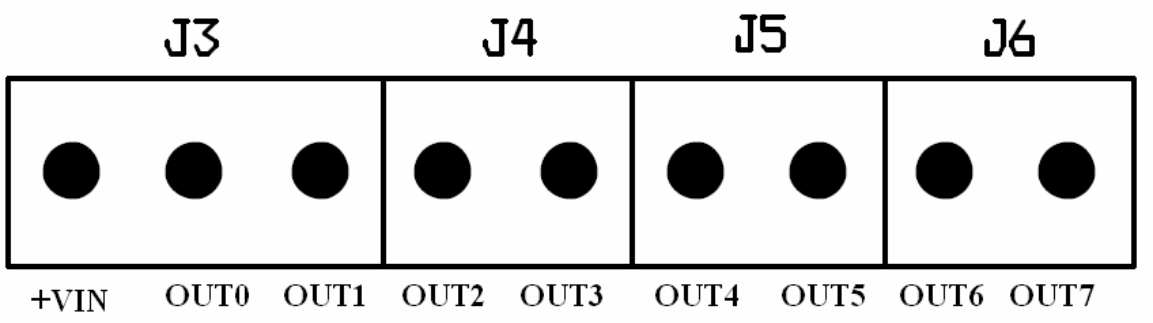


Figure 5 – Output layout

Digital input

A conceptual circuit diagram of the digital input stage (one of eight) is shown in figure 6.

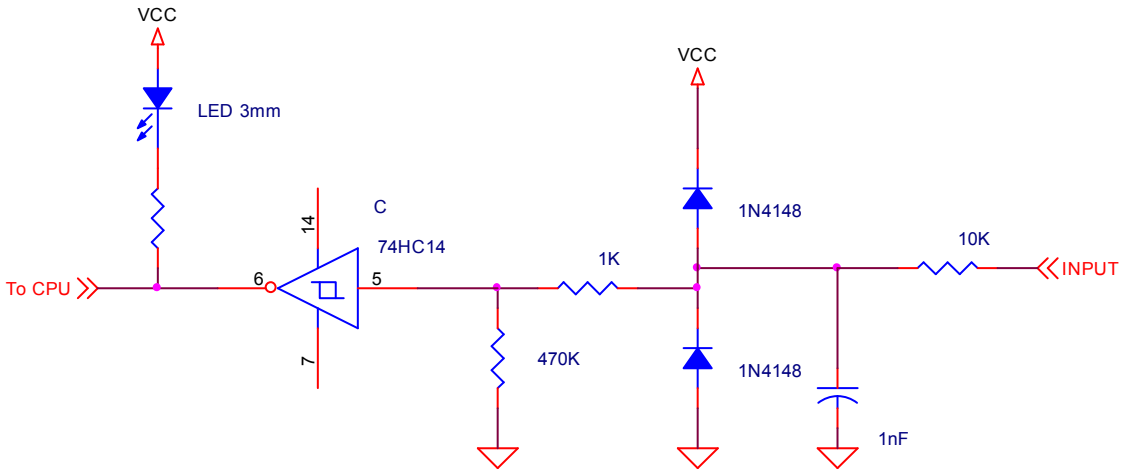


Figure 6 – Digital input circuit

When no signal is applied to the digital input, the 470K pull-down resistor keeps the input of the Schmitt trigger at a low state and the output of the Schmitt trigger then is high. This is interpreted as logic '0' by the CPU.

In order to change the state of the circuit, the digital input should go above 2.7V. The protections diodes enable levels of up to 48V to be connected as inputs.

A LED is used for ON/OFF indication.

Input connections are shown in figure 7.

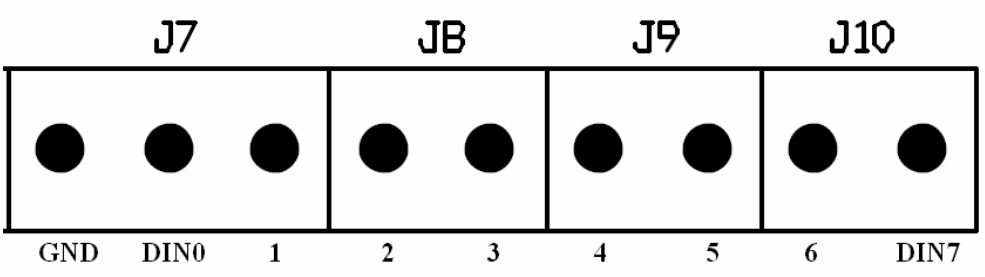


Figure 7 – Digital input connection

Note: Digital in and digital out share the same ground.

Few possible input configurations are suggested in figure 8.

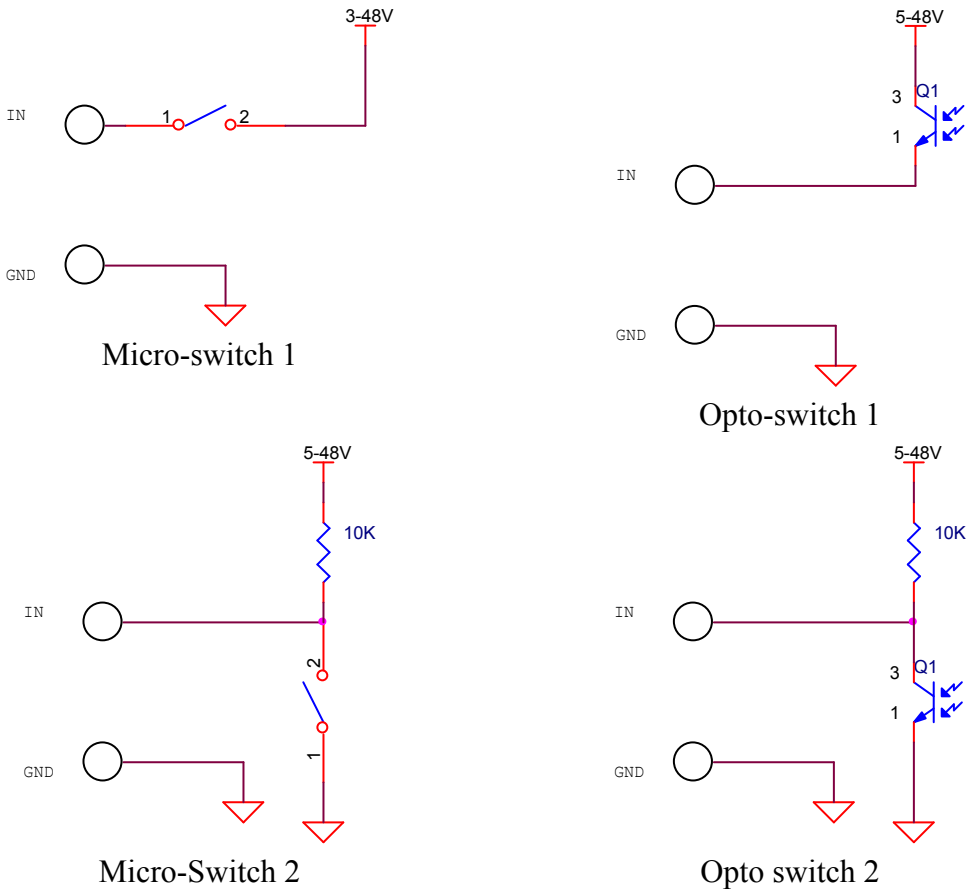


Figure 8 – Digital activation options

Using the 5V connection

The board has a 5V connection for custom use. Since USB device may use 500mA and the self consumption of the board is 150mA, the user circuit may consume no more than 350mA.

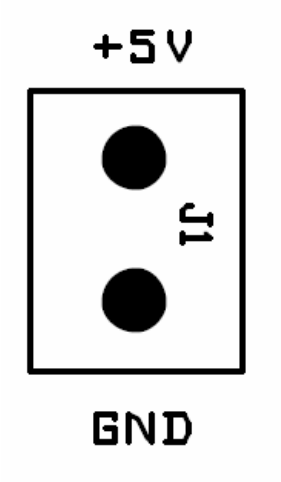
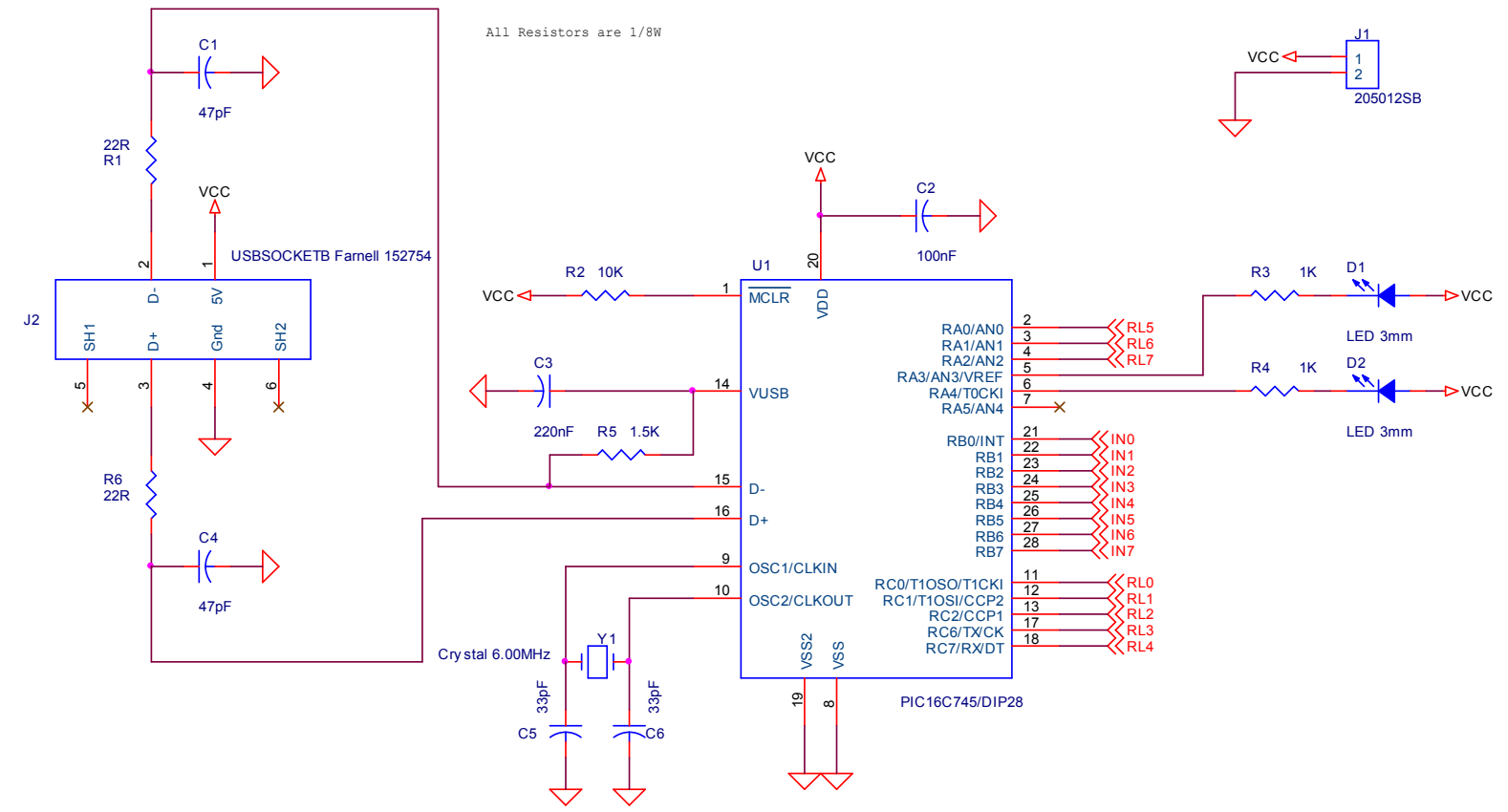
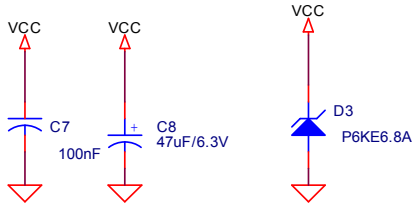


Figure 9 - 5V connector for custom use

Caution: The 5V supply is connected directly from the PC/Hub power supply. Care must be taken in order not to consume more power than a total of 500mA per card, including card's own function. High currents and short circuits may damage the PC/Hub. Do not make connections when the board is connected to the PC and PC is powered.

Hardware Schematics





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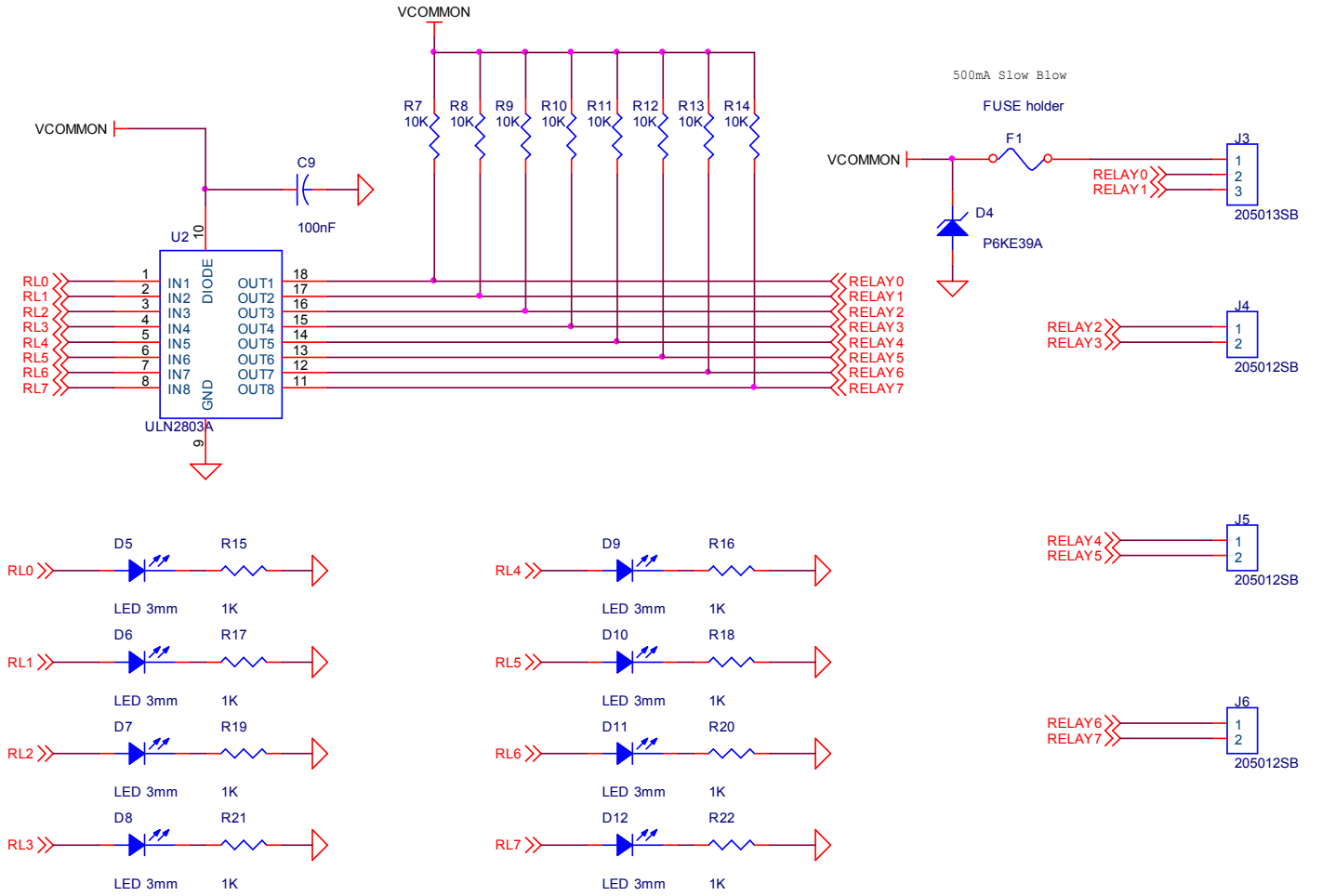
Date: Thursday, February 03, 2005	Sheet 1 of 6	



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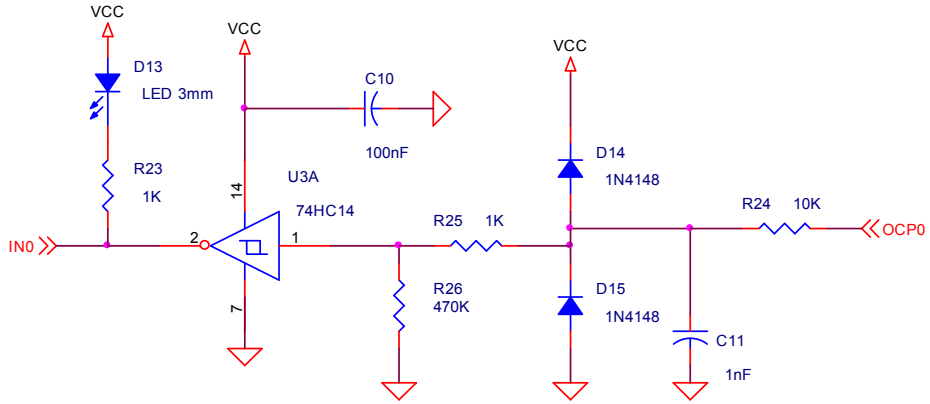

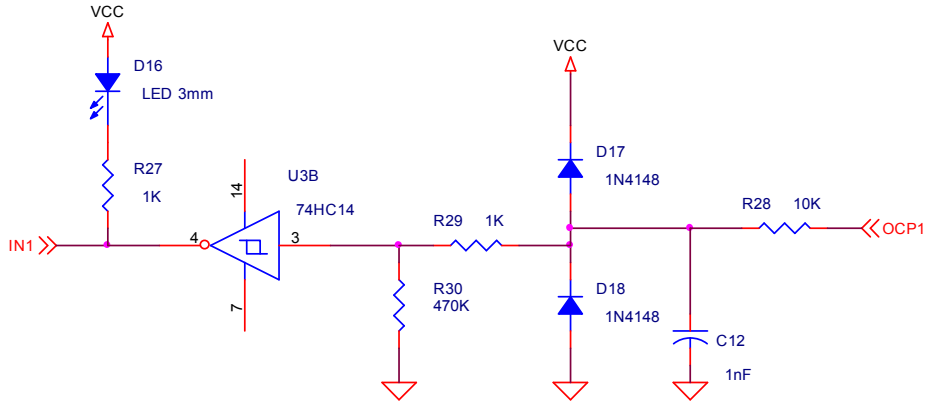

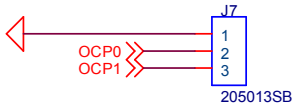

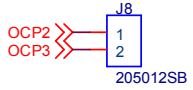

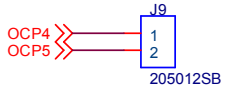

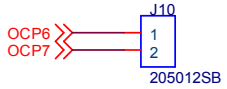

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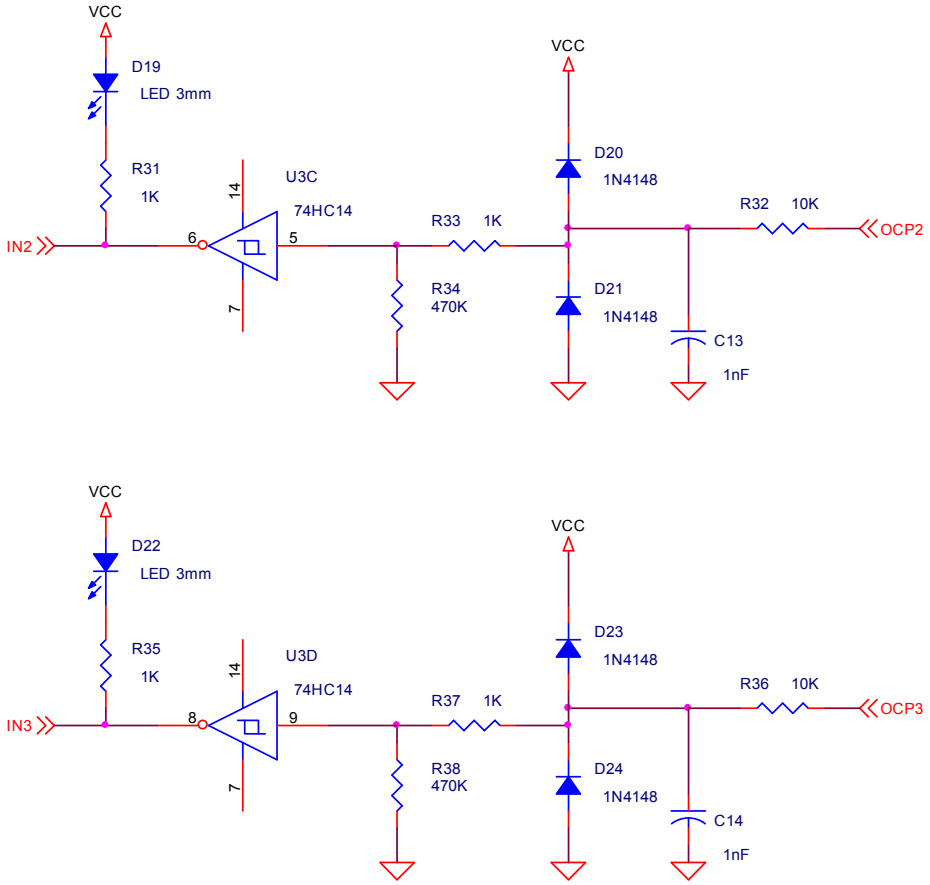

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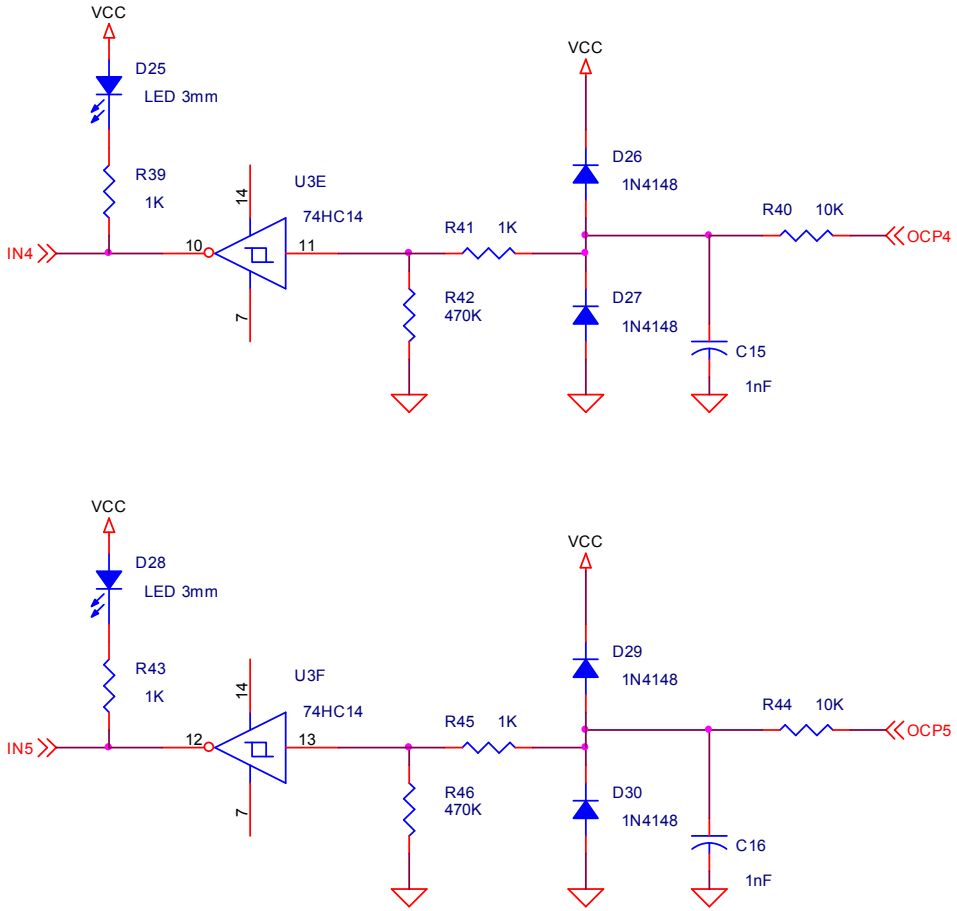

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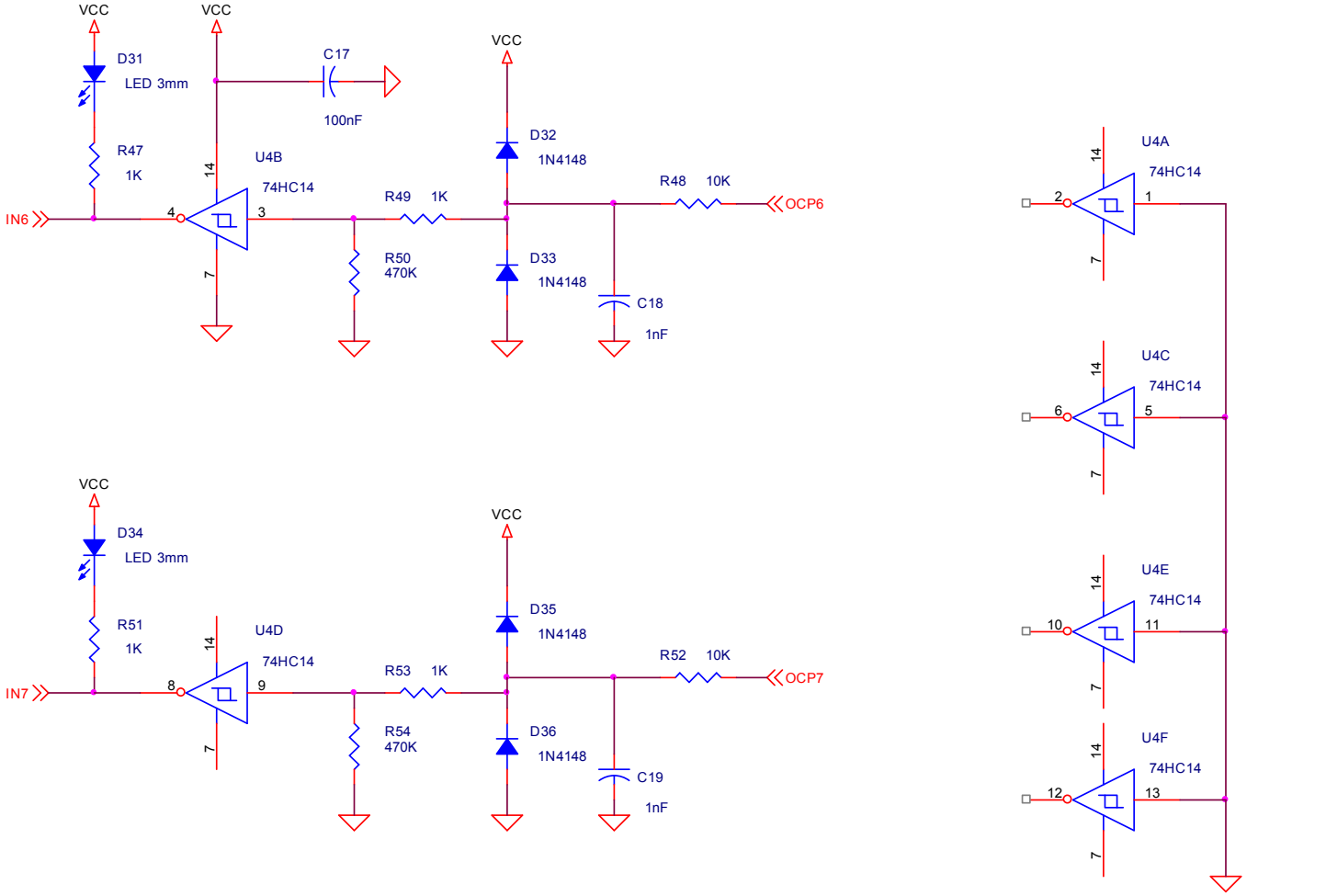
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VCC
VCC
D31
LED 3mm
C17
100nF
R47
1K
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74HC14
D32
1N4148
R48 10K
OCP6
IN6
R49 1K
R50
470K
D33
1N4148
C18
1nF
VCC
D34
LED 3mm
VCC
R51
1K
U4D
74HC14
D35
1N4148
R52 10K
OCP7
IN7
R53 1K
R54
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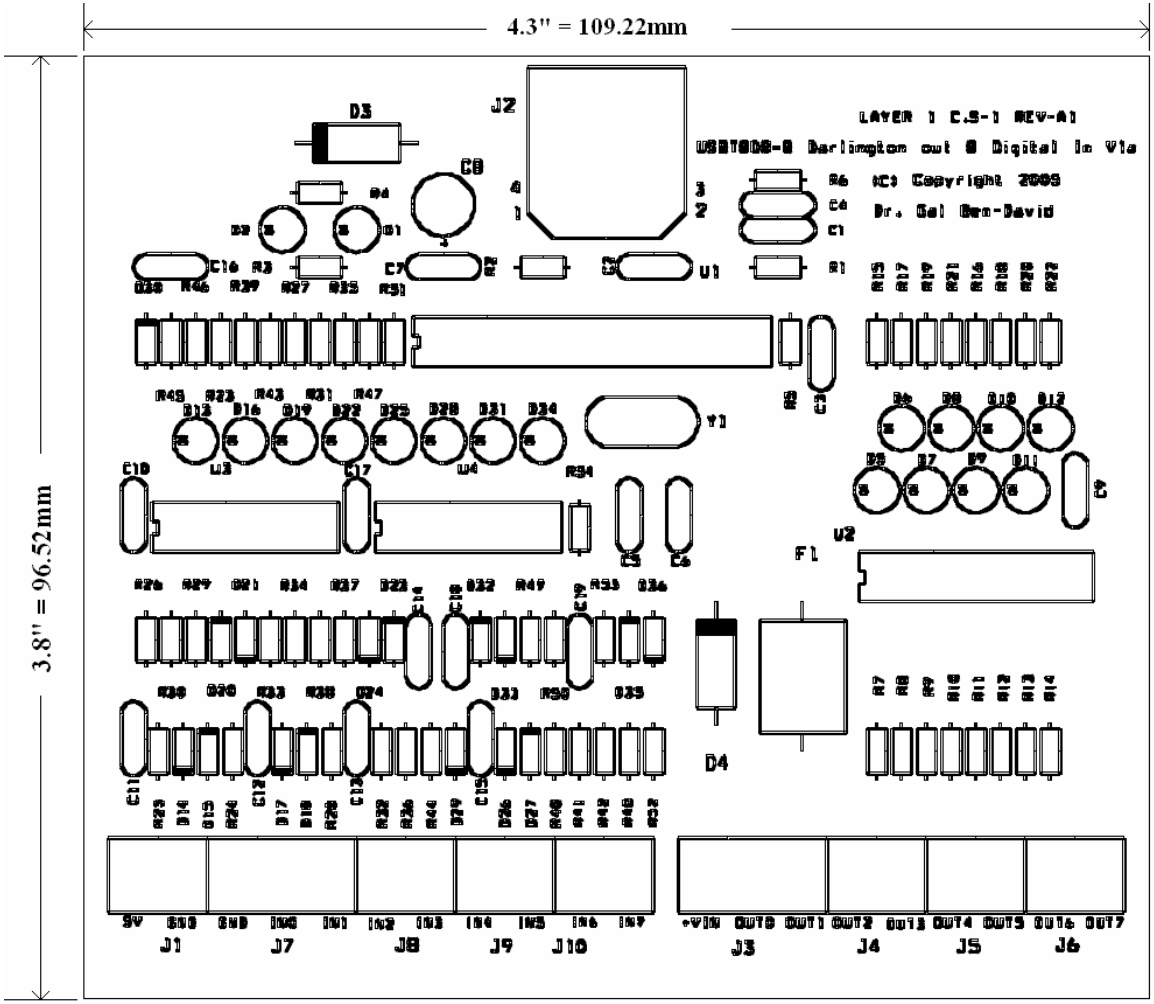
PCB layout


4.3" = 109.22mm
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(C) Copyright 2009
Dr. Gal Ben-David
J1
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Software programming

Please refer to the document ***Alon1 Documentation.PDF*** for general information on programming the entire ALON1 family. All board functions use an **ALON1BOARDSTRUCT** structure for communication. The structure is explained in the general document.

The product ID of the digital IO is 12.
The digital IO has 8 inputs and 8 outputs, each represented by a command/status byte.
In order to set output state use the following function

```
int ALON1_OC8DT8_SetOutput(
ALON1BOARDSTRUCT *, // Input: board structure
unsigned char NewState); // Input: new digital out state
// returns zero if OK, nonzero if board was not found
```

It is possible to read input state by

```
int ALON1_OC8DT8_GetInputs(
ALON1BOARDSTRUCT *, // Input: board structure
unsigned char *CurrentState); // Output : Digital In state
// returns zero if OK, nonzero if board was not found
```

The main callback function is notified in cased of device attachment, detachment and input change. Message is called once on board attachment (or power on), with **CardAttached=1** and once on board removal, **CardAttached=0;**
The message information is encapsulated in a single structure

```
struct
{
     unsigned char CardAttached;
     unsigned char InputState;
} ALON1_OC8DT8_MESSAGE;

int CALLBACK ALON1CallBackFunction
(ALON1BOARDSTRUCT *Alon1Boardtruct, CONST VOID *Param)
{
ALON1_ OC8DT8_MESSAGE *OC8DT8Message;
     switch (Alon1Boardtruct->ProductID)
     {
          case PRODUCT_ID_OC8DT8:
               OC8DT8Message=(ALON1_OC8DT8_MESSAGE)Param;
               // TODO: React according to new state
               // If card is detached,
               // do not use the boardsturct
          break;
     }
}
```