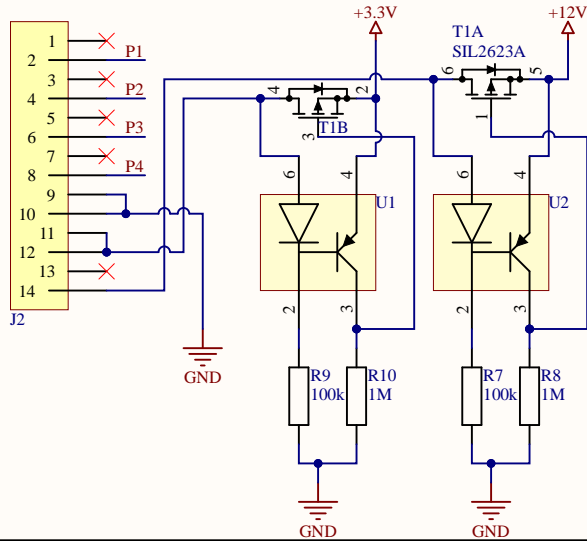
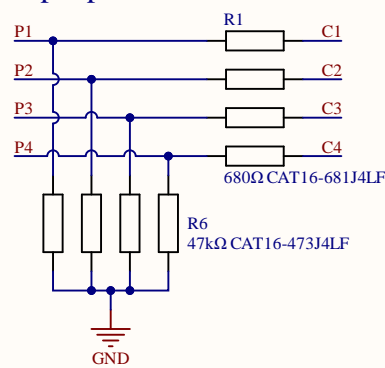


## Header PMOD + 12V



## Input protection



### Gate resistors

$I_{io} = 8 \text{ [mA]}$  (max),  $V = 3.3 \text{ [V]} \Rightarrow R_{g\_min} = 412 \text{ [\Omega]}$

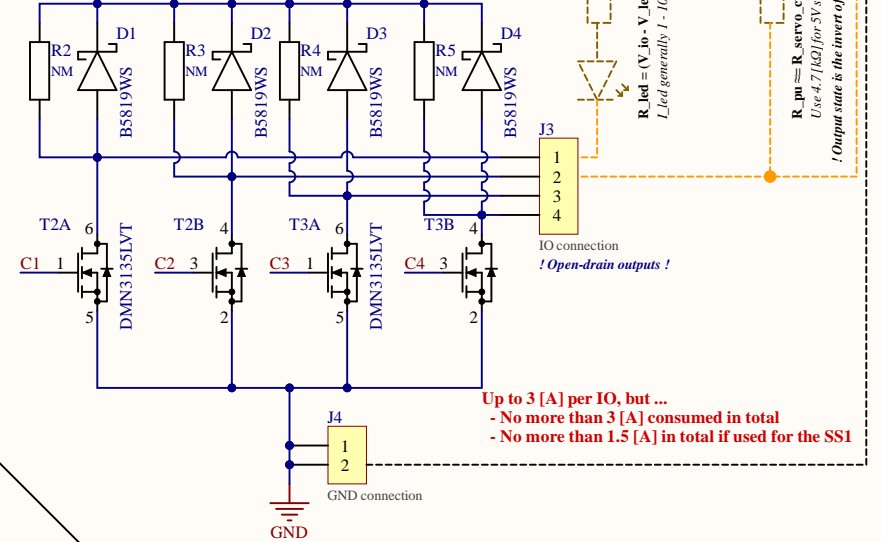
$t_{imax} = R * Q_{gate} * \ln(V_g / (V_g - V_{gs\_pl})) = 412 * 4.5n * \ln(3.3 / (3.3 - 1.9)) = 1.59 \text{ [us]}$   
 $\Rightarrow \text{max\_f} = 630 \text{ [kHz]}$

$\Rightarrow$  for  $R_g = 680 \text{ [\Omega]}$ ,  $I_{io} = 4.85 \text{ [mA]}$ ,  $t = 2.6 \text{ [us]} \Rightarrow f = 384 \text{ [kHz]}$

## Output

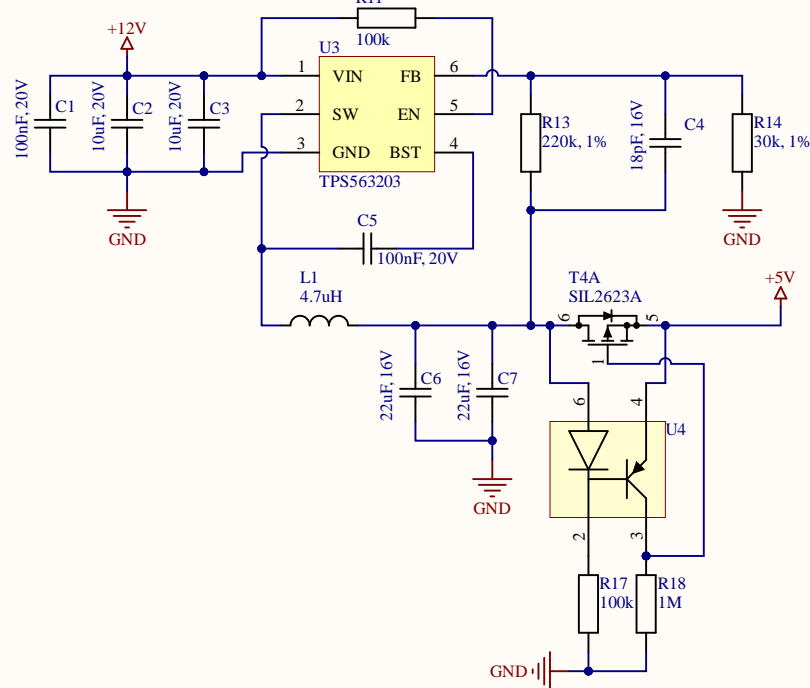
### Flyback diodes

$E_{cst} = 0.5 * L_{max} * I_{cst}^2$   
 $t_{dissip} = 5 * L_{max} / (R_{d\_conduction})$   
 $P_{dissip} = E_{cst} / t_{dissip}$   
 OR  
 $P_{dissip} = (L_{io} / 10) * I_{cst}^2 * R_{d\_conduction}$

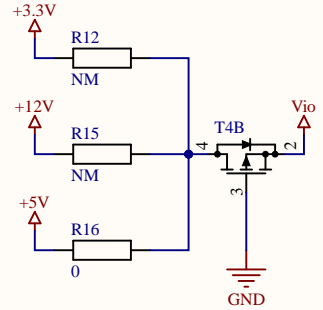


Up to 3 [A] per IO, but ...  
 - No more than 3 [A] consumed in total  
 - No more than 1.5 [A] in total if used for the SS1

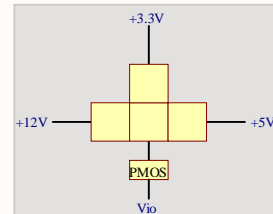
## +5V buck



## Voltage source



### Jumpers position



### Wiring outputs

#### LED, relay, small DC motor ...

If needed (e.g. LED), put a resistor in series with the load.  
 For inductive loads, the circuit is protected with flyback diodes.

Set the Vio jumper to the desired voltage, wire the positive side to J1 and the negative one to J3.  
 Ensure no resistor from R2 to R5 is soldered.  
 When Cx is '0', the output is left floating and there is no conduction.  
 When Cx is '1', the transistor is driven and the output conducts.

See the LED example drawn above.

#### Servo control, push-pull output

Basically, it is only possible to either close the transistor (output a '0') or left it open (output a 'Z').

But some loads require a well-defined '0' or '1'.  
 For such applications, add a resistor between J1 and the IO on J3 through an external resistor or by soldering one on the R2 to R5 pads.  
 Set the Vio jumper to the desired voltage.  
 Finally, use J3 as an output to control your circuit.

See the servo example drawn above.

PmodOD2.PrjPcb

OD2.SchDoc

Revision : 1.1

Sheet 1 of 1

Hes·SO VALAIS WALLIS

Date : 26.06.2024

Design by : AmA

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