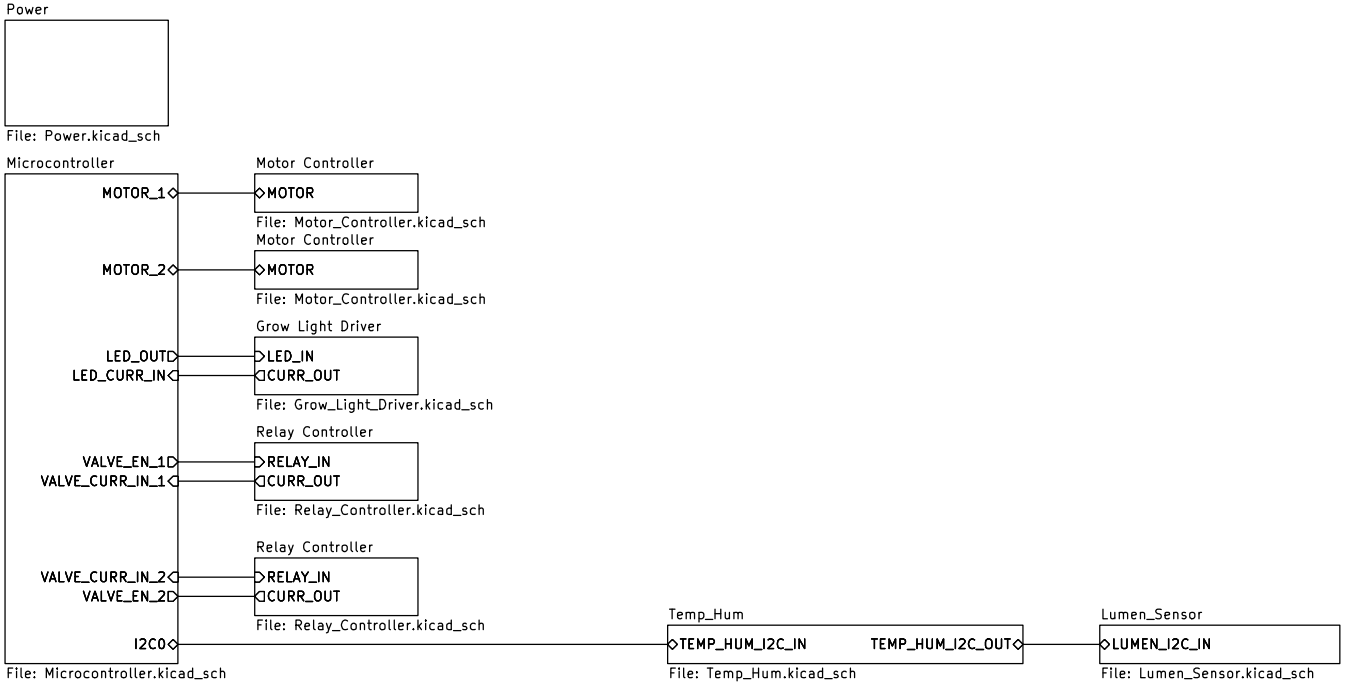
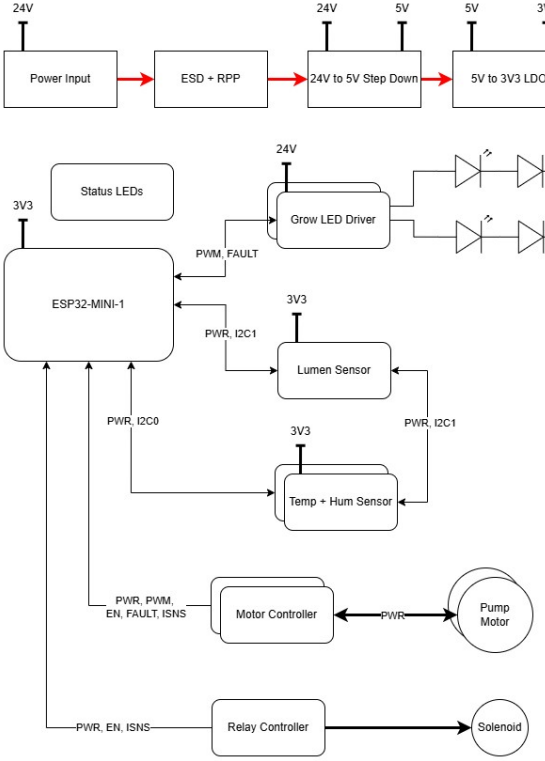


Title: Root

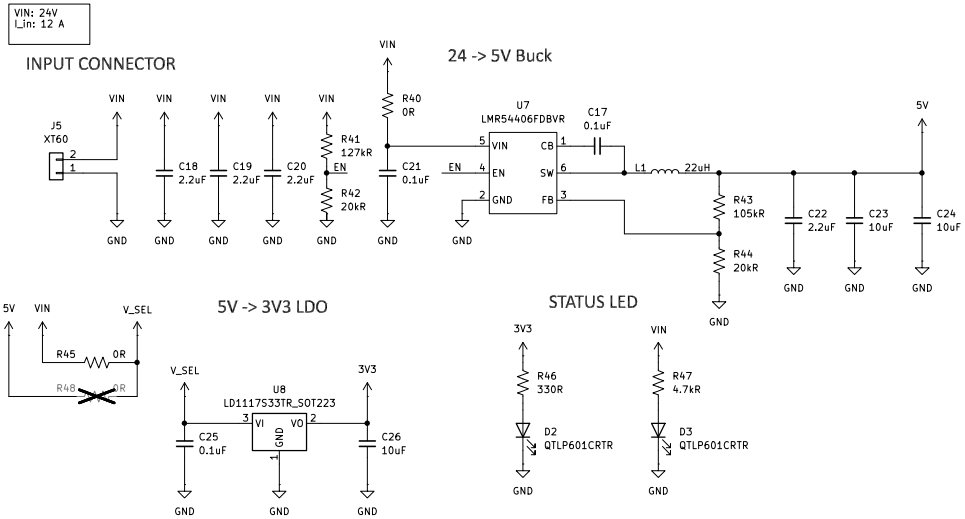
Designer: Akshat Doctor

Date: 2024-11-22 | Company: Demeter

Rev: 1.0.0 | Pg: 1/11

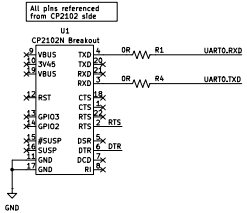


Title: Block Diagram	
Designer: Akshat Doctor	
Date: 2024-11-22	Company: Demeter
Rev: 1.0.0	Pg: 2/11

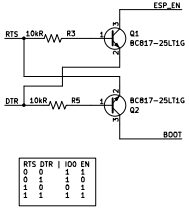


Title: Power	
Designer: Akshat Doctor	
Date: 2024-11-22	Company: Demeter
Rev: 1.0.0	Pg: 3/11

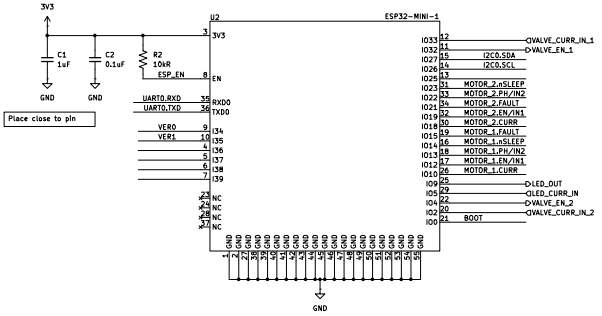
CP2102 Breakout



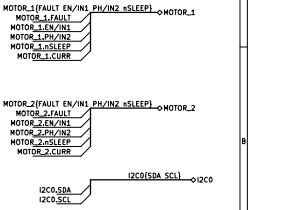
Auto-Programming Circuit



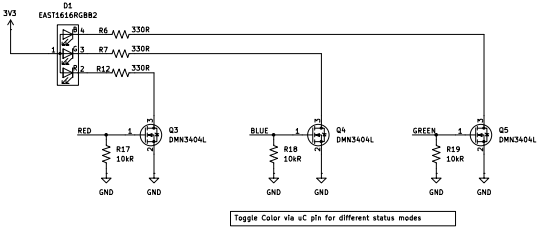
Microcontroller Module



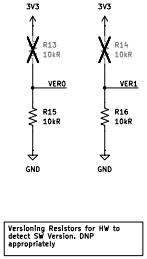
BUS DEFINITIONS



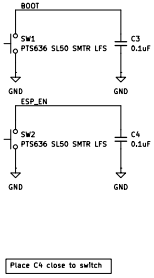
RGB STATUS LED



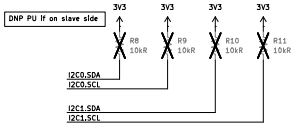
VERSIONING RESISTORS



BOOT/RESET



PULLUPS



Title: Microcontroller	
Designer: Akshat Doctor	
Date: 2024-11-22	Company: Demeter
Rev: 1.0.0	Pg: 4/11

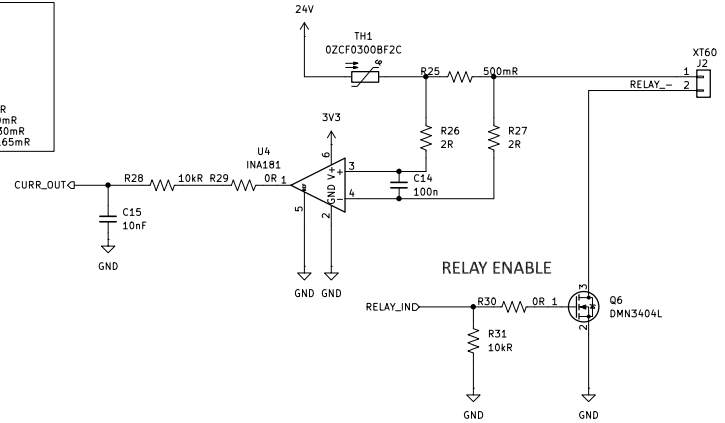
Current Sense

INA181 Amplification Ranges:
20, 50, 100, 200

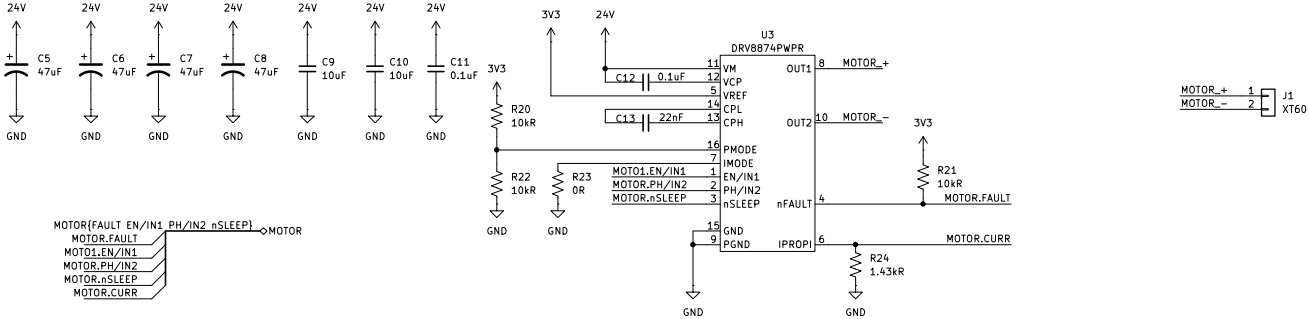
If:
V_SOLENOID = 24V
- I_out = 83mA
- I_max = 100mA
- V_out_max = 3.3V
- V_shunt_max = 100mA * R

@20: R_max = 3.3/(20*(100mA))= 1.65R
@50: R_max = 3.3/(50*(100mA)) = 660mR
@100: R_max = 3.3/(100*(100mA))= 330mR
@200: R_max = 3.3/(200*(100mA)) = 165mR

Cutoff Freq:
1/(2*pi*(2*R)*C) =
1/(2*pi*10*100e-9) = 398kHz



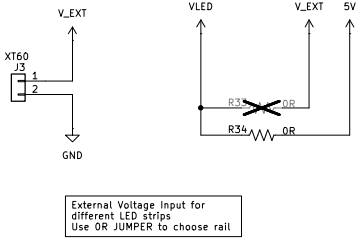
Title: Relay Controller	
Designer: Akshat Doctor	
Date: 2024-11-22	Company: Demeter
Rev: 1.0.0	Pg: 9/11



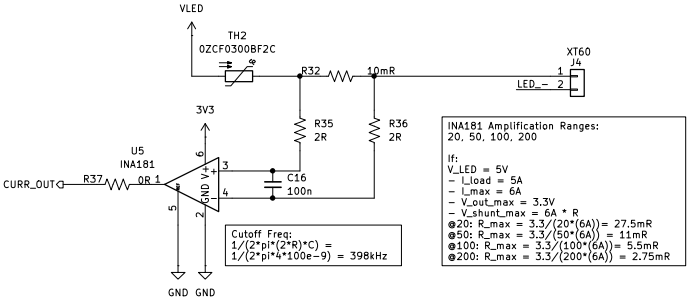

```
I_propi = (I_LS1 + I_LS2) * A_iprop
V_Ipropi = Ipropi * R_Ipropi
A_Ipropi = 450uA/A
I_trip = V_VREF/(R_Iprop * A_Iprop)
I_trip = 5A
V_VREF = 3.3V
R_Ipropi = 3.3/(5*450) = 0.00146667*1e6R
= 1.467kR ~= 1.43kR

Real I_trip = 3.3/(1.47e3 * 450) = 5.13A
```

Title: Motor Controller	
Designer: Akshat Doctor	
Date: 2024-11-22	Company: Demeter
Rev: 1.0.0	Pg: 8/11

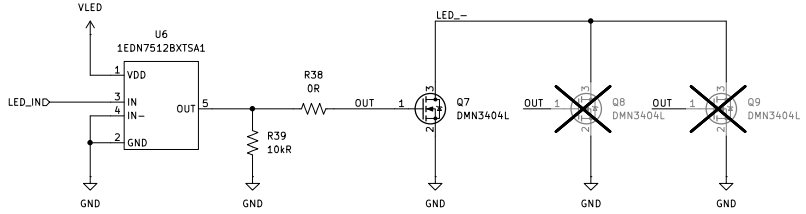
External Voltage



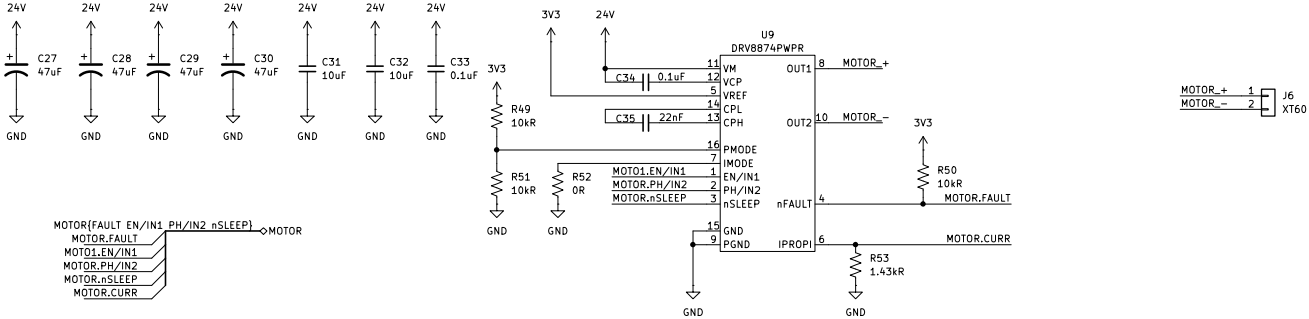
Current Sense



Low Side Driver



Title: Grow Light Driver	
Designer: Akshat Doctor	
Date: 2024-11-22	Company: Demeter
Rev: 1.0.0	Pg: 7/11




```
I_propi = (I_LS1 + I_LS2) * A_iprop
V_Ipropi = Ipropi * R_Ipropi
A_Ipropi = 450uA/A
I_trip = V_VREF/(R_Iprop * A_Iprop)
I_trip = 5A
V_VREF = 3.3V
R_Ipropi = 3.3/(5*450) = 0.00146667*1e6R
= 1.467kR ~= 1.43kR

Real I_trip = 3.3/(1.47e3 * 450) = 5.13A
```

Title: Motor Controller	
Designer: Akshat Doctor	
Date: 2024-11-22	Company: Demeter
Rev: 1.0.0	Pg: 6/11

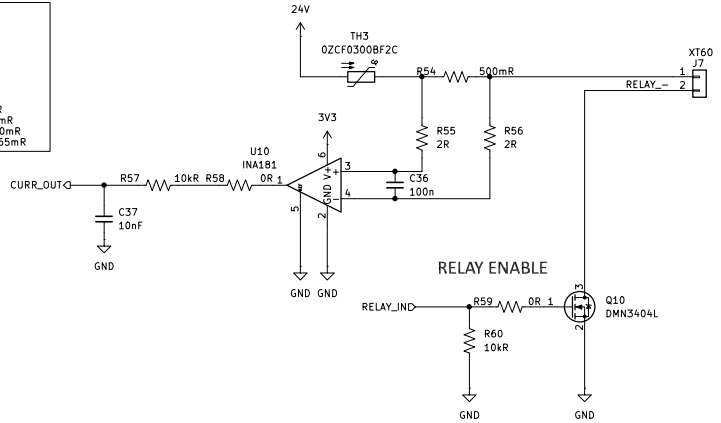
Current Sense

INA181 Amplification Ranges:
20, 50, 100, 200

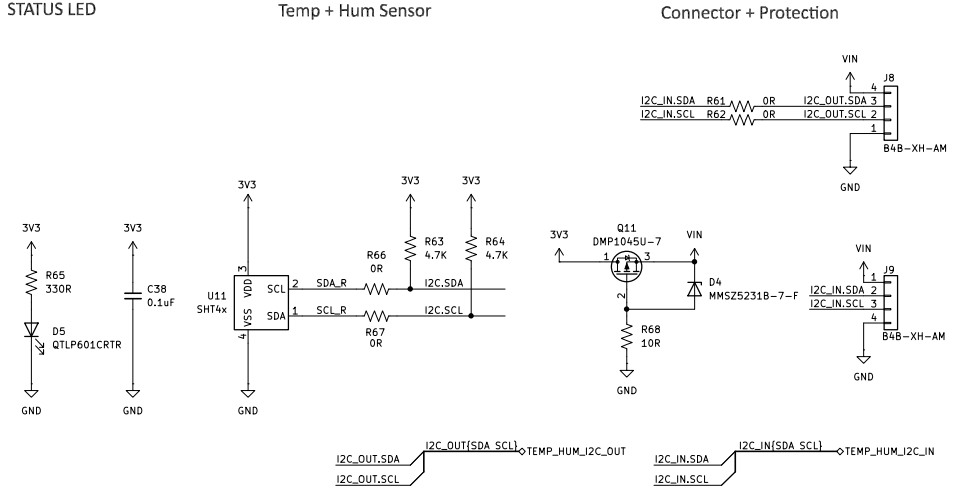
If:
V_SOLENOID = 24V
- I_out = 83mA
- I_max = 100mA
- V_out_max = 3.3V
- V_shunt_max = 100mA * R

@20: R_max = 3.3/(20*(100mA))= 1.65R
@50: R_max = 3.3/(50*(100mA)) = 660mR
@100: R_max = 3.3/(100*(100mA))= 330mR
@200: R_max = 3.3/(200*(100mA)) = 165mR

Cutoff Freq:
1/(2*pi*(2*R)*C) =
1/(2*pi*10*100e-9) = 398kHz

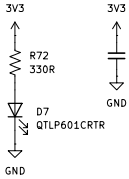


Title: Relay Controller	
Designer: Akshat Doctor	
Date: 2024-11-22	Company: Demeter
Rev: 1.0.0	Pg: 5/11

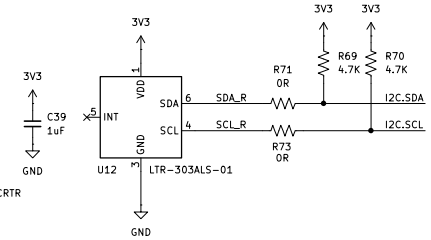


Title: Temp_Hum	
Designer: Akshat Doctor	
Date:	Company: Demeter
Rev: 1.0.0	Pg: 10/11

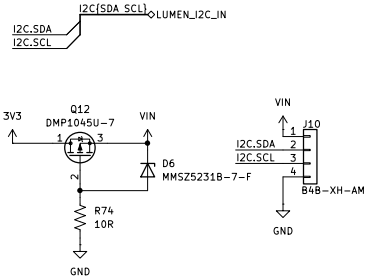
STATUS LED



Luminosity Sensor



Connector + Protection



Title: Lumen_Sensor	
Designer: Akshat Doctor	
Date:	Company: Demeter
Rev: 1.0.0	Pg: 11/11