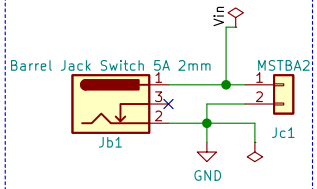
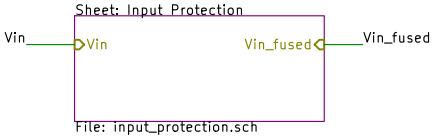
Input Connectors

Make sure to feed Vin with voltage that the LED strip can handle 5–30VDC.
Two connector options for power:
* Phoenix Contact MSTBA
* Barrel Jack 2x6.4mm



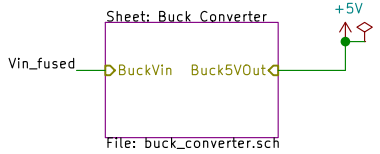
Input Protection

There is 2 options for input protection:
* A classic fuse
* Highside High Current Power Switch



5V Buck

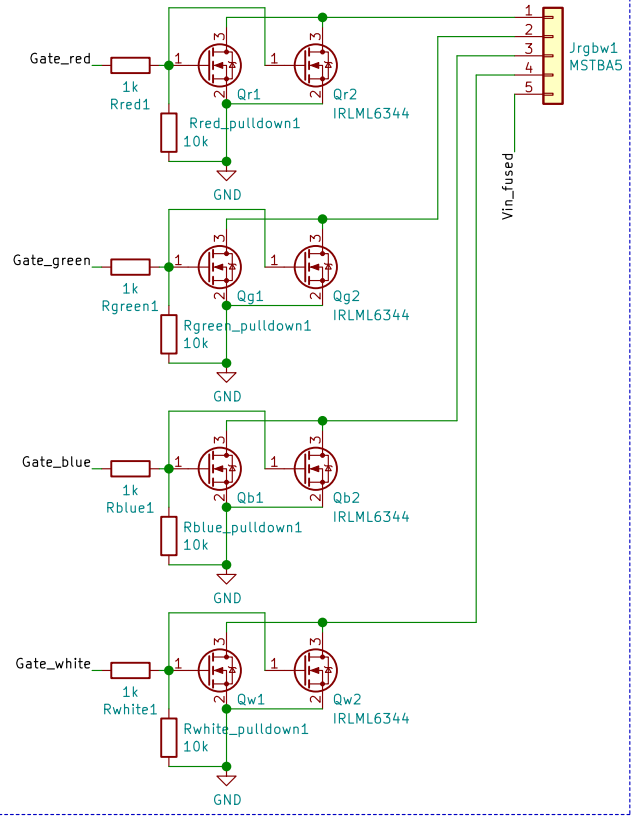
The 5V buck converter will feed the micro controller with 5V DC.
There is 2 options for 5V:
* Use buck to lower Vin to 5V
* Direct connection to 5V from Vin



RGBW LED Driver (CV–mode, Optional)

LED driver is made for LED strip that have red, green, blue and white channels that have a common positive rail like +12V.

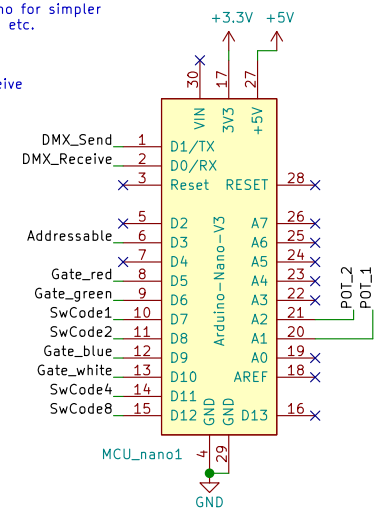
The LED driver can drive 4 output channels in constant voltage mode at 5A each.
The channel can drive up to 10A current if an optional IRLML6344 is mounted.
One color channel on a 5m LED strip consisting of 300 LED's will draw
6A (20mA x 300px) when fully lit. A full RGB strip 18A, and a RGBW strip 24A.



MCU Option Nano (Option 1)

Populate the Arduino Nano for simpler jobs like DMX controlling etc.

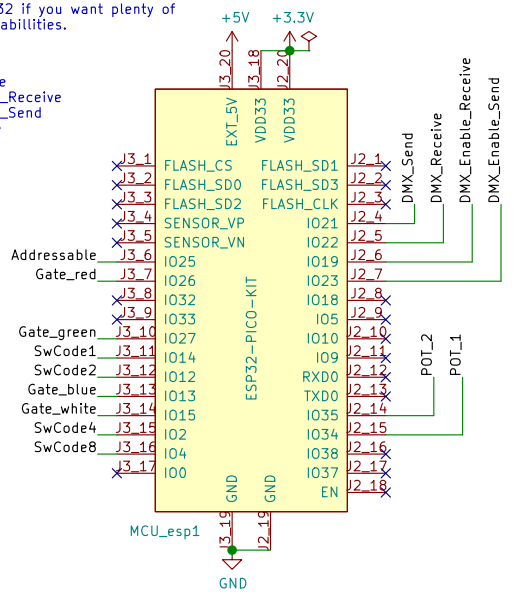
Ports:
D1 PD0 (TX) DMX_Send
D0 PD1 (RX) DMX_Receive
D3 PD3 addressable
D5 PD5 red
D6 PD6 green
D9 PB1 blue
D10 PB2 white
A1 PC1 POT_1
A2 PC2 POT_2
D7 PD7 SwCode1
D8 PB0 SwCode2
D11 PB3 SwCode4
D12 PB4 SwCode8



MCU Option ESP32 (Option 2)

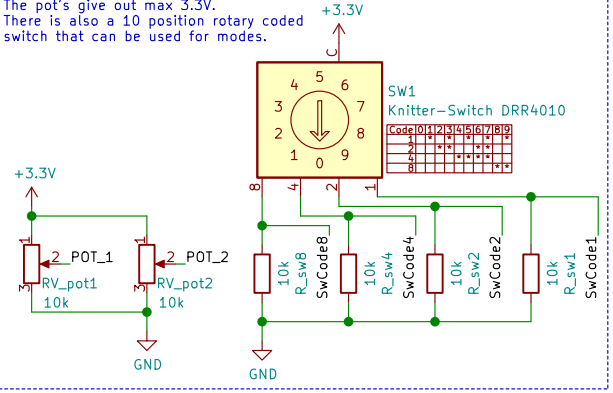
Populate the ESP32 if you want plenty of power or WiFi capabillities.

Ports:
IO21 DMX_Send
IO22 DMX_Receive
IO19 DMX_Enable_Receive
IO23 DMX_Enable_Send
IO25 addressable
IO26 red
IO27 green
IO13 blue
IO15 white
IO34 POT_1
IO35 POT_2
IO14 SwCode1
IO12 SwCode2
IO2 SwCode4
IO4 SwCode8



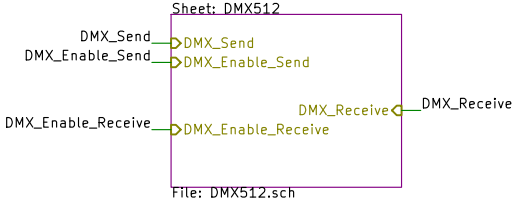
User Interface (Optional)

2 potentiometers can be utilized to hue and brightness for example.
The pot's give out max 3.3V.
There is also a 10 position rotary coded switch that can be used for modes.



DMX512 Isolated (Optional)

A RS–485 transceiver can optionally be mounted for sending and receiveing DMX512.
See sheet DMX512 for configuration.

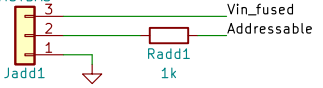


H1 MountingHole
H2 MountingHole
H3 MountingHole
H4 MountingHole

Addressable LED (Optional)

Make sure to feed Vin with the right voltage for the LED strip.
Usually 5V for addressable LED strip.
Place cennector close to Vin_fused.

Place ESD diodes on connector pins.



http://tim.gremalm.se/
https://github.com/TimGremalm/LightBoxNano

a generic PCB for controlling LED's both LED strip and WS2812

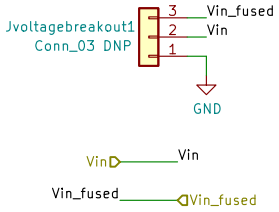
Tim Gremalm

Sheet: /
File: LightBoxNano.sch

Title: LightBoxNano – Main

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (5.1.5)–2		Id: 1/4

Connectors

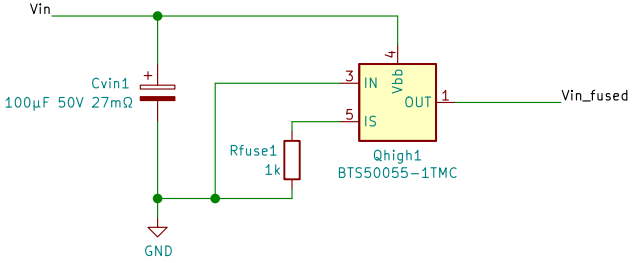


Classic Fuse (Option 1)

A much cheaper option then the high side switch, but one time use only.
Populate with a apropiate 1206 fast blow fuse.
Example: Fuse Fast Blow 10A 1206 MCCFB1206TFF/10

Highside Power Switch (Option 2)

The Infineon BTS50055-1TMC is a highside high current power switch with buildt in reverse polarity, temperature protection and current protection.



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Sheet: /Input Protection/
File: input_protection.sch

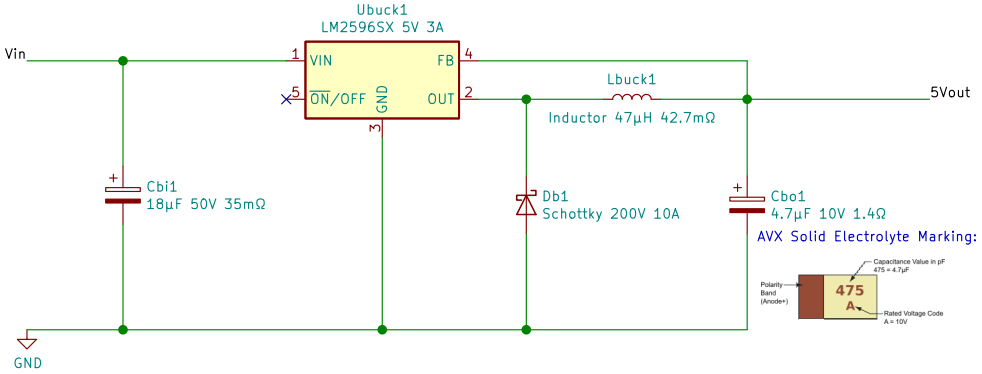
Title: LightBoxNano – Input Protection

Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (5.1.5)-2		Id: 2/4

Voltage input

Use 5V Buck (Option 1)

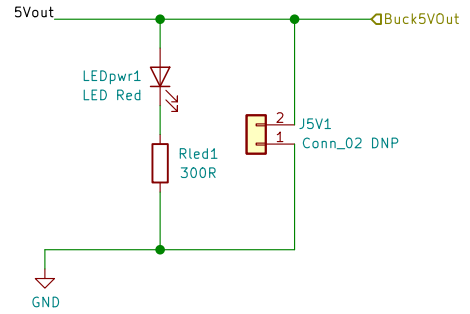
The buck option is used when Vin > 5.5V and needs to be lowered to 5.0V. The 5V is used for feeding the micro controller.
Example: When using 12V on Vin to feed a 12V LED strip.



Using TI's LM2596 guide:
Vin: 30V
Vout: 5V
Iout: 3A
Efficiency: 77.1%
Duty Cycle: 19.95%
Frequency: 150kHz
Vout p-p: 945.86mV
https://webench.ti.com/power-designer/switching-regulator/select
https://webench.ti.com/appinfo/webench/scripts/SDP.cgi?ID=572687AF787DDED1

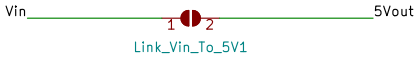
5V Output

5V Output feeds the micro controllers on this PCB.



Use direct 5V (Option 2)

The direct option is pnly used when Vin is 5V and we don't need to lower the voltage.
A typical use case is when using addressable LED strip like WS2812.



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Sheet: /Buck Converter/
File: buck_converter.sch

Title: LightBoxNano – Buck Converter

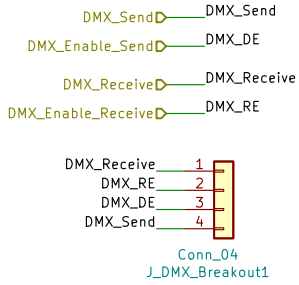
Size: A4	Date:	**Rev:**
KiCad E.D.A. kicad (5.1.5)-2		Id: 3/4

Micro controller side

DMX Side

Isolation Barrier

MCU Interface

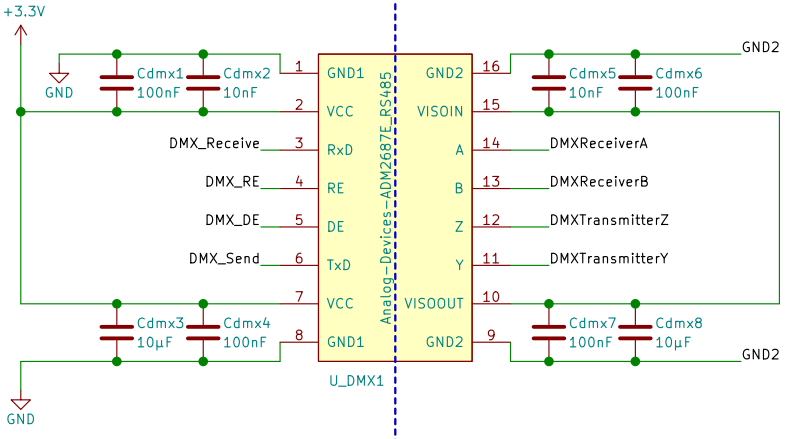


RS-485 Transceiver

For sending and receiving DMX512 a Analog Devices ADM268 is used which isolates the RS-485 bus from the low voltage micro controller side.

ADM2687E also isolates the power on the bus side by a buildt in DC to DC converter.

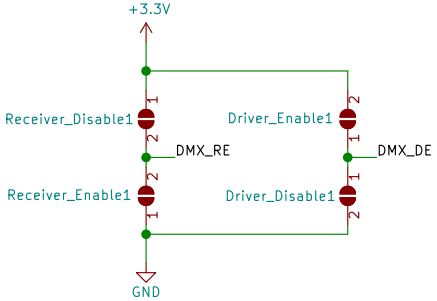
* Place capacitors as close to ADM2687E for noise suppression.
* Avoid sharp corners around the isolation barrier and ground plane.
See Analogs application notes for further tips:
https://www.analog.com/media/en/technical-documentation/application-notes/AN-0971.pdf



Configure Transceiver (Rx & Tx)

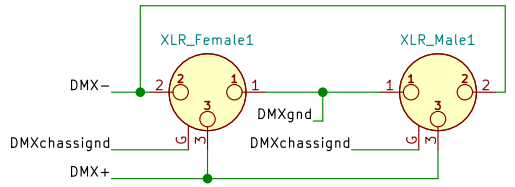
To receive data on the DMX bus; RE (Receiver Enable) must be pulled low, or high for disable.
For sending data; Tx to Rx link must be enabled, and DE (Driver Enable) must be pulled high, or low to disable.

RE and DE can be controlled from the MCU, or hard coded via these jumper links.



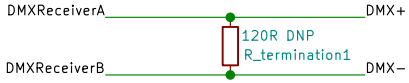
DMX Connectors

Neutrik female (NC3FAAH2) and male (NC3MAAH) 3 pin XLR connector is used for DMX512.



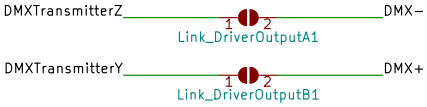
Terminator

A RS-485 bus is terminated by a 120 ohm resistor.
This can be mounted here if needed.



Link Tx to Rx (Optional)

For enabling sending on the DMX bus, these two jumper links must be soldered.



Link Ground (Optional)

Options for linking ground and shield of XLR connectors with RS-485 side of the transceiver.

Isolation Barrier

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Sheet: /DMX512/
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