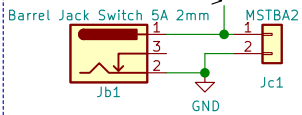


## Input Connectors

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

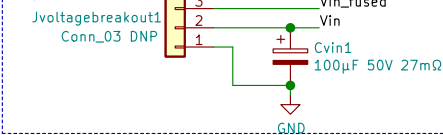


## Input Protection

Todo:

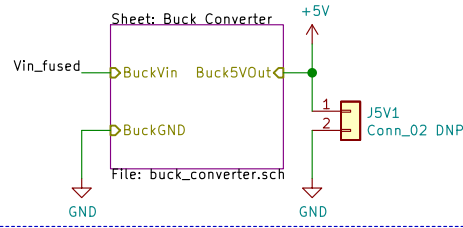
- Add current sense high side switch here (Fuse)
- Add polarity protection (built in high side switch?)
- Add Power LED
- Add test pads
- Place ESD diodes on connector pins
- Place mounting holes
- Shorten designators

<https://www.mouser.se/ProductDetail/Infineon-IR/AUIR3315STRG/>  
<https://www.mouser.se/datasheet/2/196/aui3315-1225292.pdf>



## 5V Buck

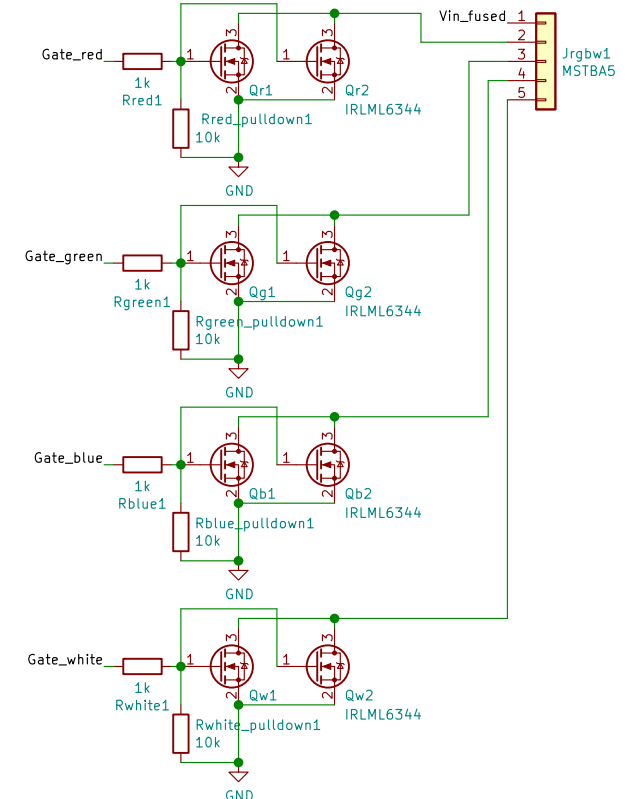
The 5V buck converter will feed the micro controllers with 5V DC.



## RGBW LED Driver (CV-mode)

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.

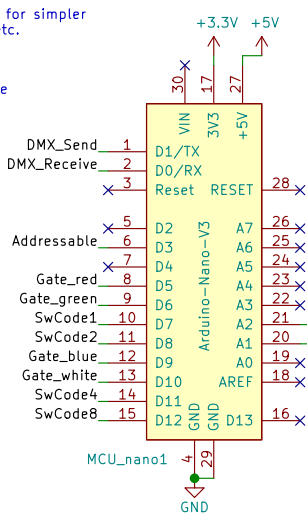


## MCU Option Nano

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 PD1 blue
- D10 PD2 white
- A1 PC1 POT\_1
- A2 PC2 POT\_2
- D7 PD7 SwCode1
- D8 PB0 SwCode2
- D11 PB3 SwCode4
- D12 PB4 SwCode8

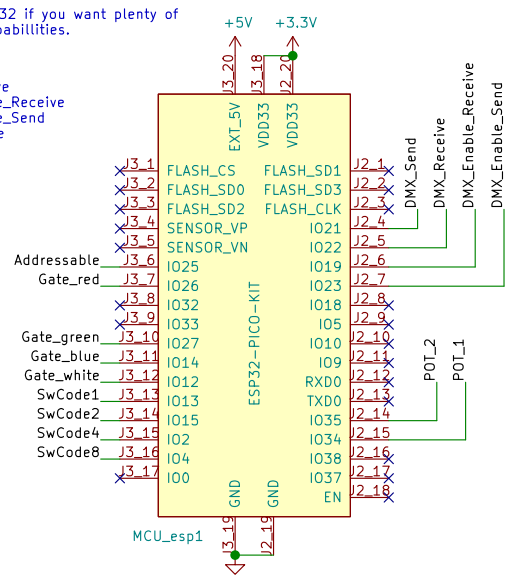


## MCU Option ESP32

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

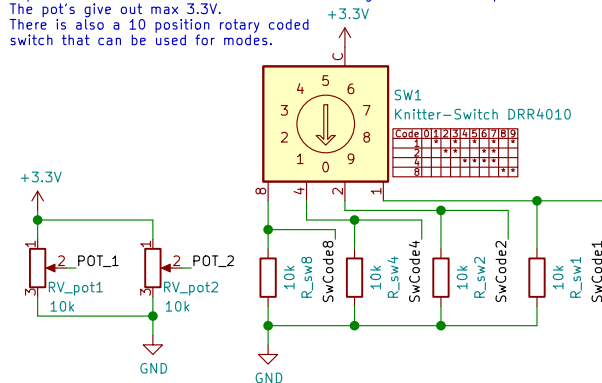
Ports:

- IO21 DMX\_Send
- IO22 DMX\_Receive
- IO19 DMX\_Enable\_Receive
- IO23 DMX\_Enable\_Send
- IO25 addressable
- IO26 red
- IO27 green
- IO14 blue
- IO12 white
- IO34 POT\_1
- IO35 POT\_2
- IO13 SwCode1
- IO15 SwCode2
- IO2 SwCode4
- IO4 SwCode8



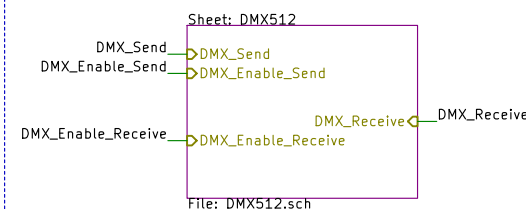
## User Interface

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

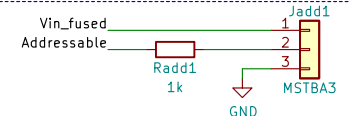
A RS-485 transceiver can optionally be mounted for sending and receiving DMX512. See sheet DMX512 for configuration.



## Addressable LED

Make sure to feed Vin with the right voltage for the LED strip. Usually 5V for addressable LED strip. Place connector 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**

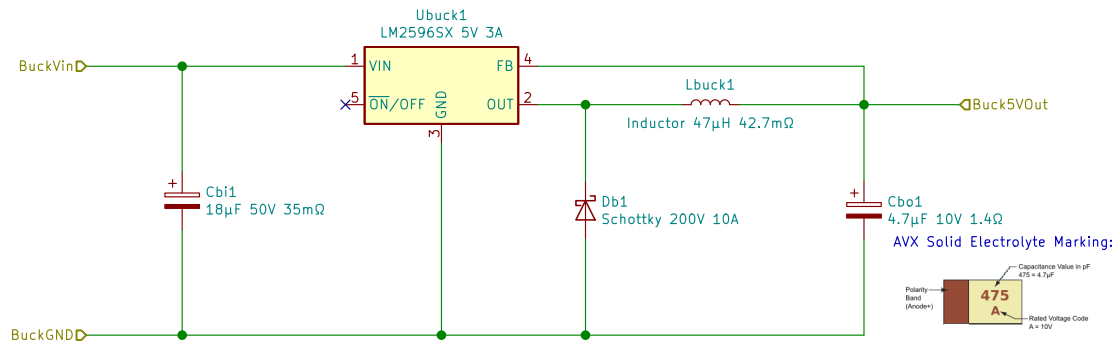
Size: A4

Date:

KiCad E.D.A. kicad (5.1.5)–2

Rev:

Id: 1/3



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>

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

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

**Tim Gremalm**

Sheet: /Buck Converter/

File: buck\_converter.sch

**Title: LightBoxNano – Buck Converter**

Size: A4

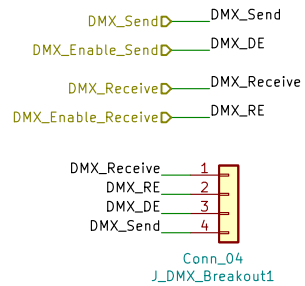
Date:

Rev:

KiCad E.D.A. kicad (5.1.5)–2

Id: 2/3

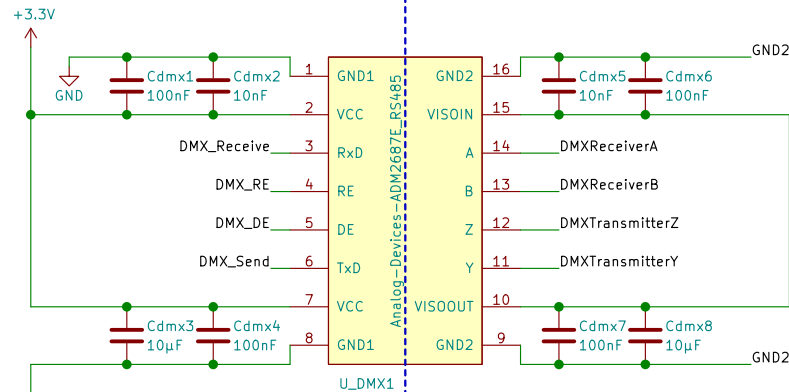
## MCU Interface



## RS-485 Transceiver

For sending and receiving DMX512 a Analog Devices ADM2687E is used which isolates the RS-485 bus from the low voltage micro controller side.

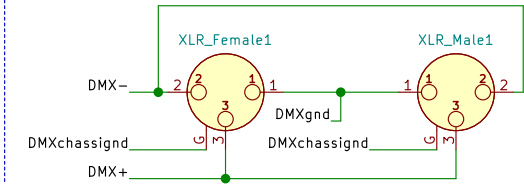
ADM2687E also isolates the power on the bus side by a built in DC to DC converter.



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

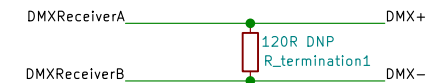
## DMX Connectors

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



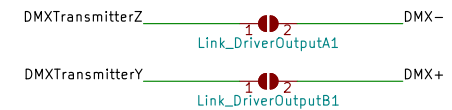
## Terminator

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



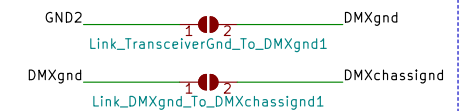
## Link Tx to Rx (Optional)

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



## Link Ground (Optional)

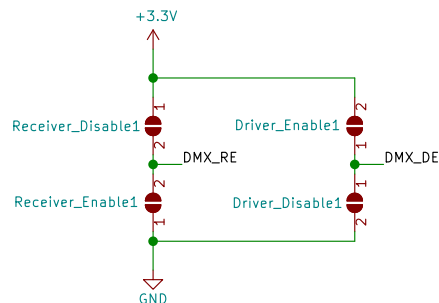
Options for linking ground and shield of XLR connectors with RS-485 side of the transceiver.



## 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.



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

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

**Tim Gremalm**

Sheet: /DMX512/

File: DMX512.sch

**Title: LightBoxNano - DMX512**

Size: A4

Date:

KiCad E.D.A. kicad (5.1.5)-2

Rev:

Id: 3/3