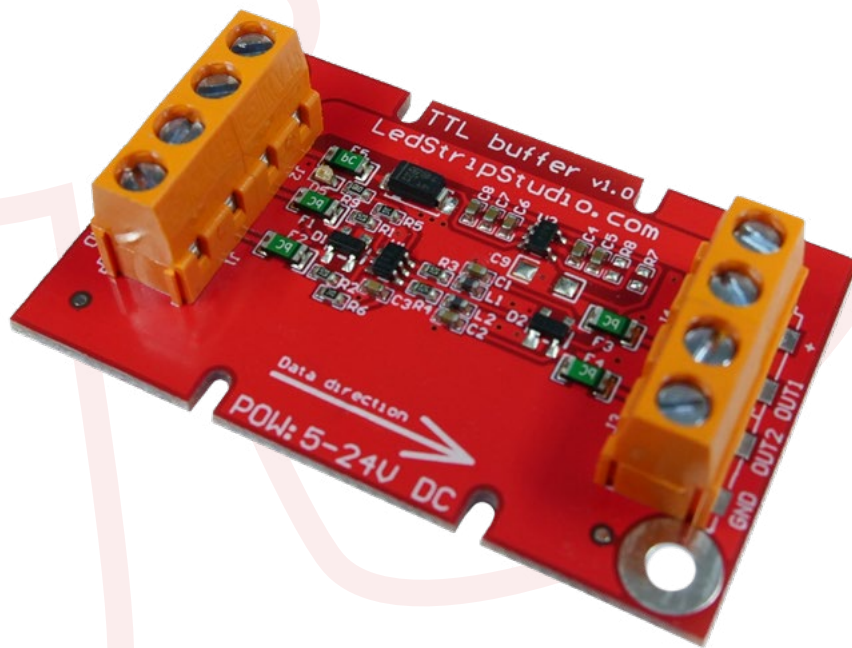




TTL BUFFER

User Manual

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SAFETY INSTRUCTIONS

Installation should be performed only by a competent person or professional electrician. Make sure that the installation complies with the standards and rules that apply in your country.

- **Do not use the device if it seems to be damaged.**
- **Use the device only as described in this user manual.**
Any other use or use under other operating conditions is improper and may result in personal injury or property damage.
- **No liability will be assumed for damages resulting from improper use.**
Never open the controller and do not attempt repairs yourself.
- **Do not place the device close to heat sources and always ensure enough ventilation.**
- **Do not place the unit on surfaces that are heat sensitive.**

This device has been designed for indoor use only. Do not expose the unit to direct sunlight. Do not allow this device to meet liquids. Electrical shock could result. Also, damage to the device, smoke, and overheating could result from contact with liquids. Clean the device components that are accessible from the outside regularly. The cleaning frequency depends on the operating environment: damp, smoky or particularly dirty environments can cause greater accumulation of dirt on the device components. Clean with a dry soft cloth. Stubborn dirt can be removed with a slightly dampened cloth.

- **Never use solvents or alcohol for cleaning.**
- **Establish all connections when the unit is switched off.**
Use the shortest possible high-quality cables for all connections.
Make sure that cables cannot cause a trip hazard.
- **Never touch the plug contacts with sharp or metal objects.**
- **Ensure that plastic bags, packaging, etc. are disposed of properly and are not within reach of babies and young children. Choking hazard!**
- **Ensure that children do not detach any small parts (e.g. screws, connectors or the like) from the unit. They could swallow the pieces and choke!**
- **Never let children unattended use electrical devices.**

DEVICE INTRODUCTION

When dealing with SPI signal on individually addressable LED strip or pixel installations, sometimes longer cable between pixels is needed. However, some LED pixels have very weak data output drive capability which causes a random flickering or non working pixels after longer cable is applied between pixels. To work around these issues, SPI signal buffer may help you by providing a buffered SPI signal with high output drive capability.

TTL BUFFER is a universal gadget designed to solve signal integrity issues especially on installations where individually addressable LED strip like WS2811, WS2812B, SK682, WS2815, SK6815, GS8208, APA102 are used. However it can be used on almost any SPI pixel installations where signal level is 5V TTL/CMOS. It uses 2 identical buffer channels so it can be used for individually addressable LED strip/pixels with single (Data) or dual (Data & Backup) asynchronous Data Lines, as well with synchronous Data Line (Data & Clock).

Please note, that TTL buffer is not solving voltage drop issues.

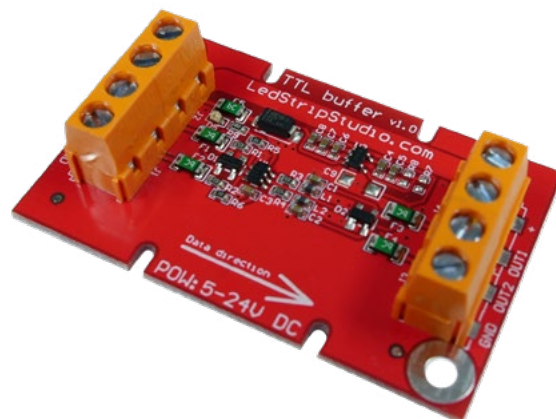
DEVICE SPECIFICATION

TTL BUFFER

Dual channel, uni directional signal buffer designed for 5-24V addressable (digital) LED strips/pixels

Applications

- General illumination
- Decoration illumination
- Events, lounges, clubs
- Scenography
- Theatre
- Light show
- Special effects
- Showcase



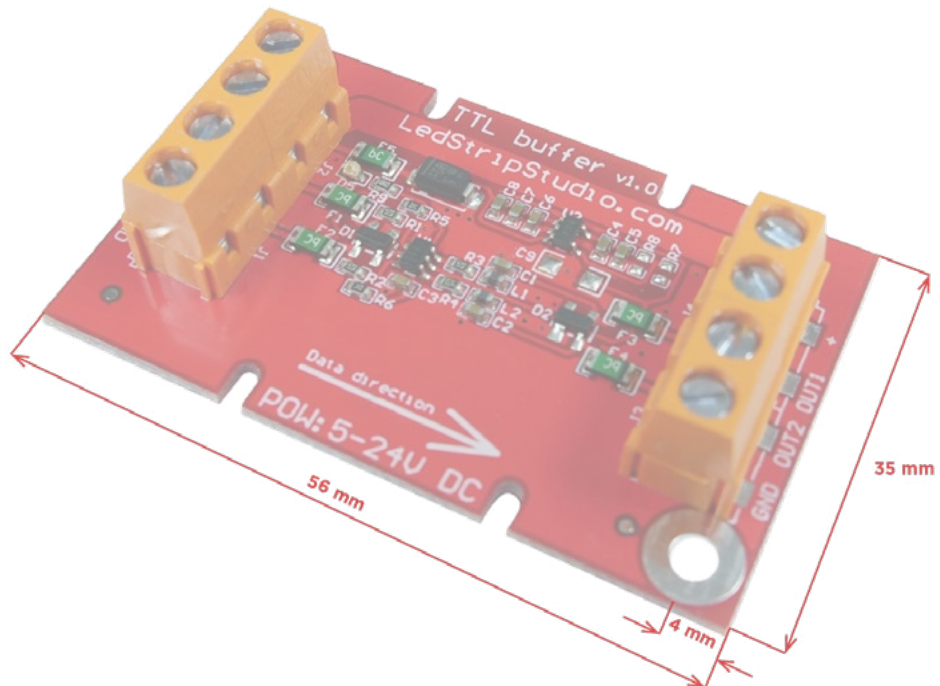
Technical specification

Operating voltage	5V to 24V DC
Operating current	0.05A
Rated power	<1.2W
Channel count	2
Ports	IN DATA&POWER port + OUT DATA&POWER port
Port pins	GND, DATA1, DATA2, +
Maximum pass-through current	5A
Port connection type	Screw terminal blocks pitch 5mm, wire max 1.5mm ²
Data input type	TTL like level. L range 0-1V, H range 3.5-5V
Data output type	TTL like level, L range 0-0.7V, H range 3.5-5V
Max frequency	800kHz
Input protection	YES
Output protection	YES
Output filter (slew limiting)	YES
Power indicator	YES
Dimension	56 × 35 × 15 mm, 2 × mounting hole d=3mm
Operating air temperature	-30°C to 65°C
Storage air temperature	-30°C to 85°C
Relative humidity	5% to 80% non-condensing
Weight	ca. 7g

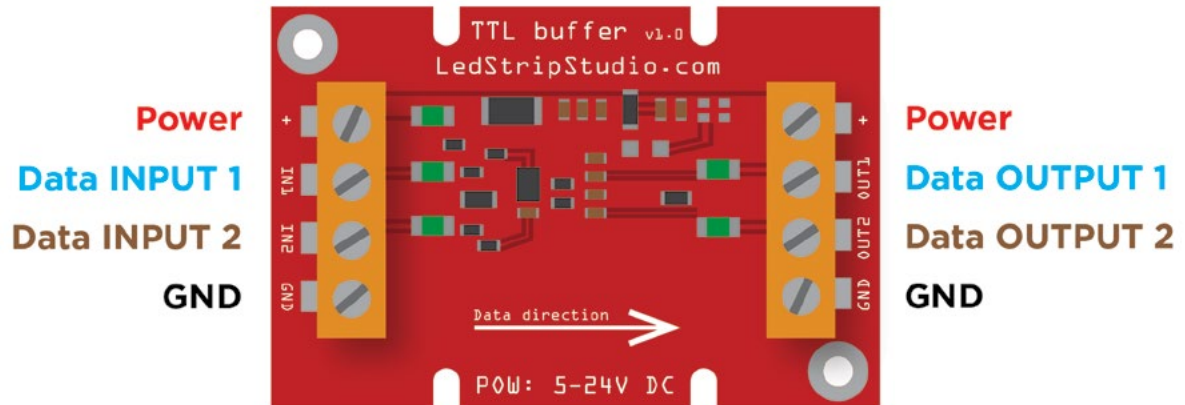
Default package content

- 10pcs TTL BUFFER

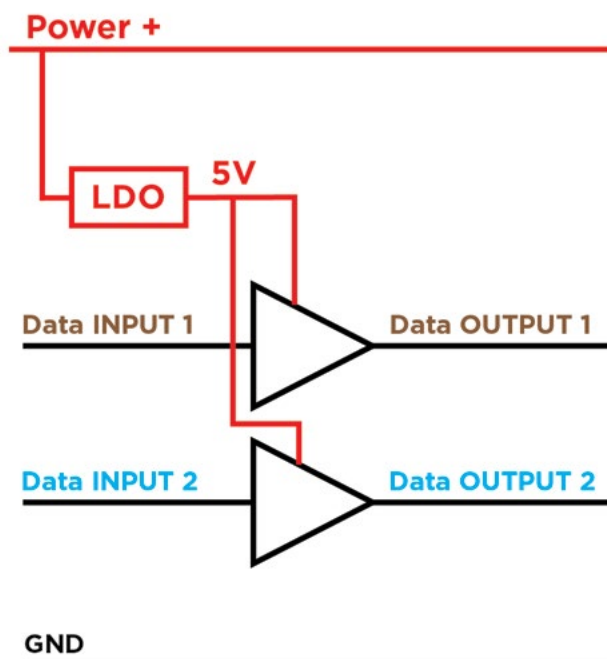
Dimensions



DEVICE OVERVIEW



DEVICE BLOCK DIAGRAM



DEVICE CONNECTION

A typical individually addressable LED strip, such as WS2815, SK6815, GS8208, APA102, and some others, has weak output drive capability. Therefore, it makes sense to use a TTL buffer **on the output from the pixel LED**.



PAY EXTREME ATTENTION TO CONNECT THE TTL BUFFER WITH THE RIGHT POLARITY, AS REVERSE POLARITY WILL DAMAGE IT!!! FOLLOW THE + AND GND MARKINGS ON THE LED STRIP AND TTL BUFFER. THEY MUST MATCH!

PAY ATTENTION TO CONNECT THE TTL BUFFER IN THE RIGHT DIRECTION (FOLLOW THE SIGNAL ARROW ON THE LED STRIP)

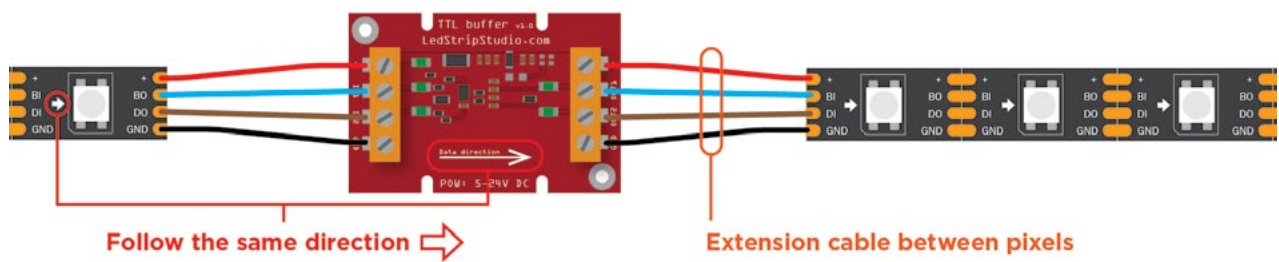


Don't forget to visually check connection before powering your system up.

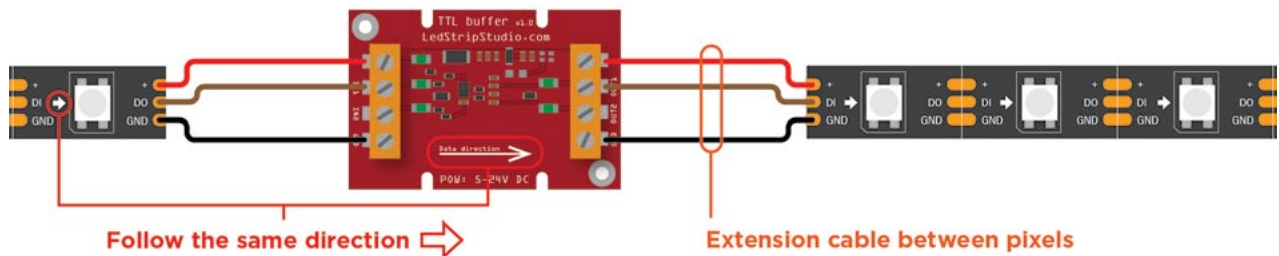
As the TTL BUFFER is a bare PCB module, avoid direct contact with electrical conductive objects, like metals. If needed, you can insulate and protect the TTL buffer using easily available electrical junction boxes like this one:



Usage example on LED strip with chipset like WS2815, SK6815, GS8208 (with Data & Backup)



Usage example on LED strip with chipset like WS2811 (with single Data line)



DEVICE SETTINGS

TTL BUFFER in Plug and Play device. There is nothing to set or adjust.

FAQ

WHAT CABLE LENGTH CAN BE USED BETWEEN PIXELS WHEN USING TTL BUFFER?

This is a difficult question to answer. Typically 5 to 10m works fine. Exact length depends on cable type, pixel chipset type, electro magnetic interference near cable etc.

WHAT IS THE PREFERRED CABLE TO USE FROM THE TTL BUFFER TO THE FAR LED STRIP/PIXELS?

There is no special requirement for cable. However shielded cable may provide better results and minimize radiated/conducted electromagnetic emissions. We recommend to use multi core cable, not single wires. Multi core cables where wires runs parallel one to another has better impedance consistency.

WHAT IF CABLE IS TOO LONG AND TTL BUFFER CAN'T HANDLE IT?

We suggest you to use [THE SYMMETRIZER](#).

CAN I USE 2 OR MORE TTL BUFFERS IN SERIES TO INCREASE CABLE LENGTH ?

Yes you can, but it is not recommended.

DO I HAVE TO CONNECT POWER FROM TTL BUFFER TO FAR END LED STRIP/PIXELS, IF MY FAR END LED STRIP/PIXELS HAS ITS OWN POWER PROVIDED ALREADY?

No you don't have to, but ALWAYS connect GND! General rule of thumb is to always route GND next to Data line, preferably in one cable.

DOES TTL BUFFER HELP TO SOLVE VOLTAGE DROP ISSUES?

Absolutely no. TTLbuffer only buffer data signal and has nothing to do with voltage drop.

MY LED STRIP/PIXELS HAVE DIFFERENT SUPPLY VOLTAGE THAN 5-24V. CAN I USE TTL BUFFER?

You can, but only with external power supply for TTLbuffer. TTLbuffer power input is 5V to 24V only.

CAN I USE TTL BUFFER ON INPUT OF FAR END LED STRIP/PIXELS ?

You can, but normally it makes more sense to use TTL BUFFER on output.

CAN I USE TTL BUFFER ON CONSTANT VOLTAGE LED STRIPS? (ALSO CALLED ANALOG, NORMALLY WITH PINS +12V, R, G, B, (W)) ?

Absolutely NO! TTL BUFFER can be used ONLY for buffering SPI data for 12V individually addressable LED strips/pixels with chipset like WS2815, SK6815, GS8208 and similar SPI chipsets.

TTL BUFFER IS QUITE BIG, IS THERE ANY SMALLER ALTERNATIVE?

Much smaller alternative to TTL BUFFER is a [MINI TTL BUFFER](#). But its operational voltage is 12V only, and due to limited size it has no protection and pullups on inputs/outputs.

WARRANTY

This device has been designed and made using high quality components with several quality checks and testings. Therefore we are proud to provide 1 year limited warranty for this device.

This limited warranty is valid for company or person (user) who purchased new device from us, or our authorized dealer/distributor and warranty period starts from date when user receive this device.

Limited warranty cover:

- **material defects**
- **assembly failures**
- **device malfunction**
- **this device only**

Limited warranty DO NOT cover and is void when this device:

- **has been used for different usage as specified in this manual**
- **has been opened without our permission**
- **has been modified or disassembled without our permission**
- **has been operated wrong way. E.g. over-voltage, over-current, exposed to high electromagnetic fields/discharges such as lighting strikes or ESD events with parameters way outside of HBM model**
- **has been stored or used outside of storage/operating temperature and humidity**
- **has been used in aggressive environment, corrosive environment, dusty environment or in environment with increased vibrations**
- **has been in contact with liquids**
- **has been connected wrong way. E.g. Short circuits, reverse polarity etc.**
- **has been mechanically damaged**
- **got unofficial attempts to firmware updates**

Limited warranty DO NOT cover:

- **shipping expenses to handle defective device.**
- **failures or damage of other equipments connected to this device**
- **user expenses caused by defective device**

For limited warranty claim process:

- **user must be able provide sufficient proof of purchase**
- **use email info@ledstripstudio.com with detailed description of device failure**
- **takes less than 30 days to resolve. This period starts from day we physically receive defective device (device return)**

DISPOSAL OF YOUR OLD DEVICE

This device is an electronic device, and can be categorized as hazardous waste in your country. Dispose of this device through an approved waste disposal firm or through your local waste facility. When discarding the device, comply with the rules and regulations that apply in your country. If in doubt, consult your local waste disposal facility.

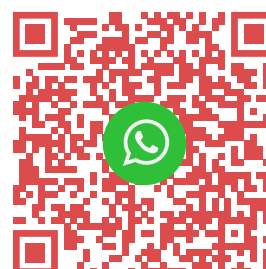
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