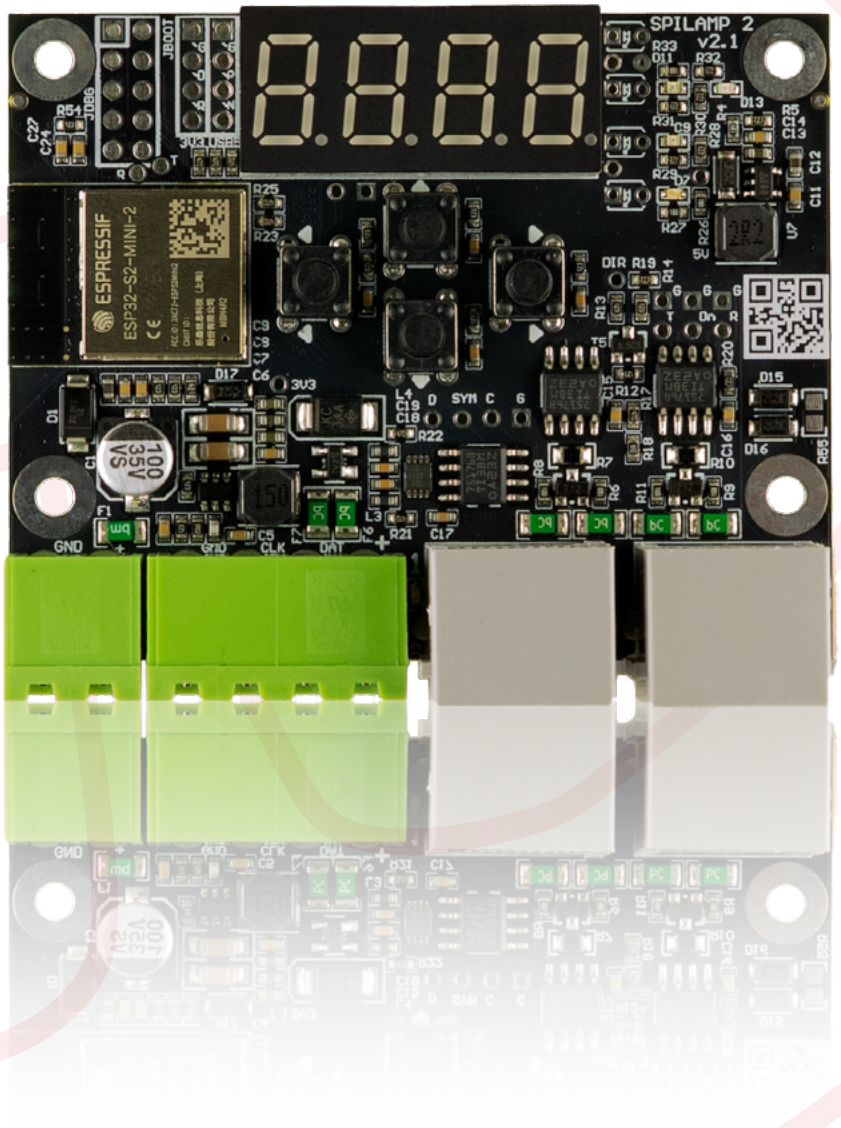


LED STRIP STUDIO

SPI LAMP 2

User Manual

www.ledstripstudio.com
info@ledstripstudio.com

TABLE OF CONTENTS

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

KWIBUKA 30
This LED Installation uses 300+ pcs of SPI LAMP devices

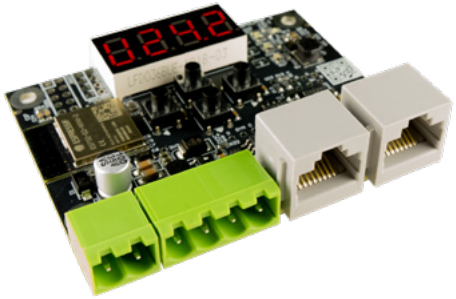
When you need to illuminate many objects using individually addressable SPI LED strips (or pixels), you often face the challenge of requiring multiple physical SPI outputs or having to route SPI data from one object to another. Multiple SPI outputs demand many controllers, while routing SPI data between objects frequently leads to signal integrity issues—even over just a few meters of cable. SPI LAMP 2 was developed to solve these SPI signal distribution challenges by extending the number of physical SPI outputs as needed. You can connect several SPI LAMP 2 units in a daisy-chain topology to a single SPI output of the LEC3 or SPI MATRIX controller and gain independent SPI outputs from each SPI LAMP 2.

SPI LAMP 2 uses a custom LSS-strip-2 protocol, which is highly resistant to interference and supports long-distance cabling between units. For convenience, standard RJ-45 connectors are used for SPI LAMP 2-to-SPI LAMP 2 connections. Its wide-range power input makes it compatible with nearly all SPI LED strip (or pixel) installations. Additionally, its form factor is designed to fit standard plastic electrical junction boxes widely available in electrical supply stores—or you can download a 3D print file and print your own custom enclosure.

DEVICE SPECIFICATION

SPI LAMP 2

Signal splitter for RGB/RGBW/WWA SPI LED strips/pixels



Applications

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

Technical specification

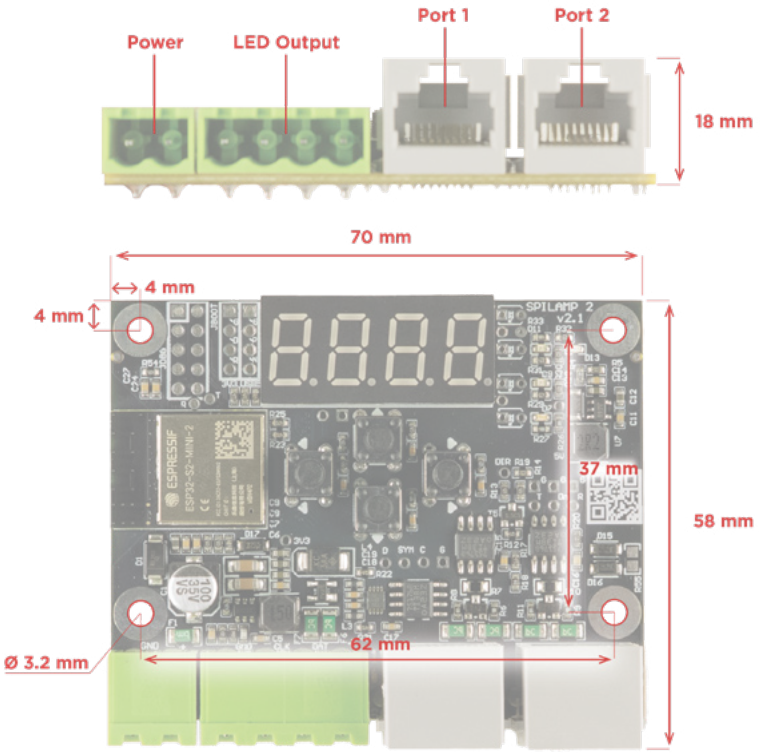
Controls over	**LSS strip 2 protocol**
Operating voltage	**5-24V DC**
Self power consumption	**1W**
Power input connector	**2 pole screw terminal block pitch 5mm for wires <2.5mm2**
Max. total pass thru current	**5A**
Display settings	**Set number of pixels, set IC type**
Display information	**Voltage, firmware version, number of pixels, IC type**
LSS I/O Port 1 & 2 connector type	**RJ-45 non-shielded**
LSS I/O Port 1 & 2 electrical type	**Differential**
LSS I/O Port 1 & 2 protection	**Yes, ESD**
LSS I/O Port 1 & 2 connector pins	**Data+ (A), Data- (B), GND**
LSS I/O Port 1 & 2 communication protocol	**Custom LSS strip 2 protocol. 2.5Mbps**
SPI LED Output port connector type	**4 pole screw terminal block pitch 5mm for wires <2.5mm2**
SPI LED Output port electrical type	**Single ended TTL 5-24V asynchronous / synchronous / differential**
SPI LED Output port contain power	**Yes**
SPI LED Output port protection	**No**
SPI LED Output connector pins	**GND (-), C/Data B (Dat-), D/Data A (Dat+), Power (+)**
SPI LED Output communication protocol	**LSS strip 2, WS2811, WS2812B, SK6812, TM1809, DMX and compatible RGB/WWA/RGBW**
Status LEDs	**Green: Power; Yellow 1, Yellow 2: Status Green at RJ45 : Input (Dir1, Dir2)**
Maximum controller count	**32pcs in one daisy chained string**
Maximum cable length for LSS strip protocol	**100m with Cat5e or better**

Minimum pixel count per SPI LED Output	**0**
Maximum pixel count per SPI LED Output	**1024 RGB / 768 RGBW**
Maximum pixels total	**1024 RGB / 768 RGBW in one daisy chained string**
Special features/options:	**Firmware updateable by user**
Works with controller	**LEC 3, SPI MATRIX or later**
Operating air temperature	**-10°C to 45°C**
Storage air temperature	**-30°C to 60°C**
Relative humidity	**5% to 80% non-condensing**
Waterproof	**No**
Ingress protection	**IP00**
Weight	**33g**
Dimensions	**70 x 58 x 18 mm**
Enclosure	**no, PCB only, designed to fit into standard plastic electrical surface mounted junc-tion-box or 3D printed box**
Mouting options	**4x mounting hole diameter 3.2mm**

Default package content

- SPI LAMP 2 PCB

Dimensions



DEVICE VARIANTS

SPILAMP 2 does not come in different hardware variants; however, the type of SPI protocol it outputs depends on its firmware and configuration. We continuously add support for new LED IC types, so it's highly recommended to keep the firmware up to date.

By default, SPILAMP 2 is shipped with firmware and a configuration compatible with the most common RGB SPI protocols such as WS2811, WS2812B, SK6812, TM1809, DMX, and many other SPI LED strips (or pixels) that use similar signaling.

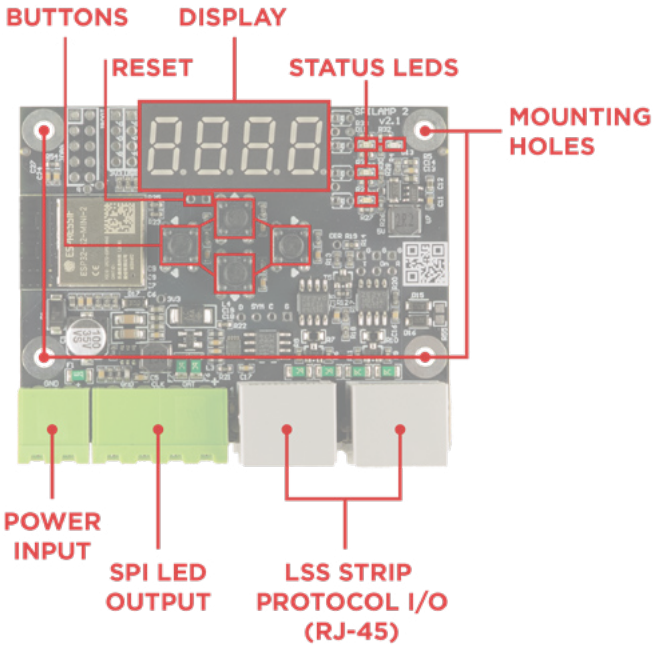
The maximum number of individually addressable LED pixels supported by SPILAMP 2 is 1024 for RGB strips. For RGBW LED pixels, the limit is 768.

DEVICE COMPATIBILITY

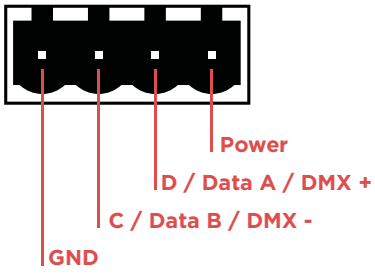
As SPI LAMP uses custom LSS strip protocol, the only compatible controllers are:

- **LEC3**
- **SPI MATRIX**

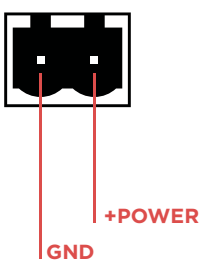
DEVICE OVERVIEW



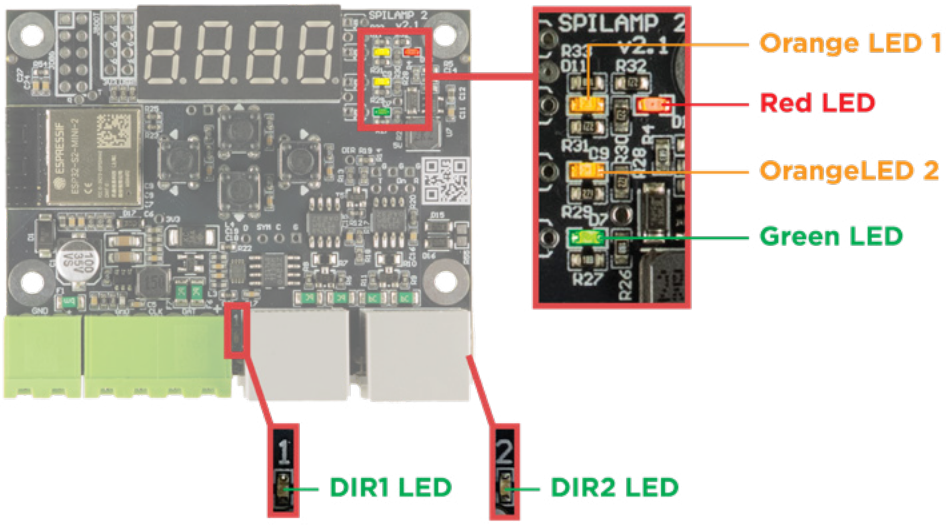
LED OUTPUT PINOUT



POWER INPUT PINOUT



STATUS INDICATORS



Green LED ON = Power is present
Green LED OFF = Power is not present

Orange LED 1 ON = Receiving Data
- When data is received through **PORT 1,**
  the **DISPLAY** shows an animation that moves **from left to right.**

- When data is received through **PORT 2,**
  the **DISPLAY** shows an animation that moves **from right to left.**

Orange LED 2 = Not in use yet

Red LED ON = Sending data into output of the device

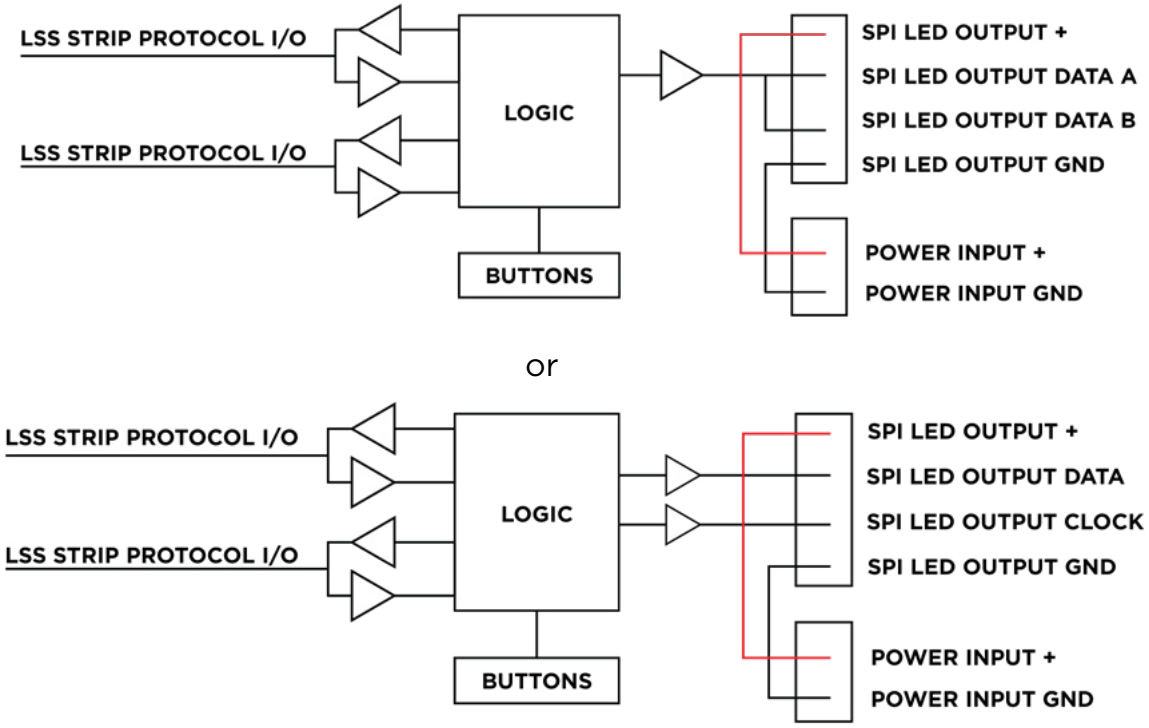
DIR1 LED ON = Receiving Data
- When data is received through **PORT 1**

DIR2 LED ON = Receiving Data
- When data is received through **PORT 2**

When no data is received **DIR1** & **DIR2 LEDs flash 1x per second,**
indicating they are searching for data

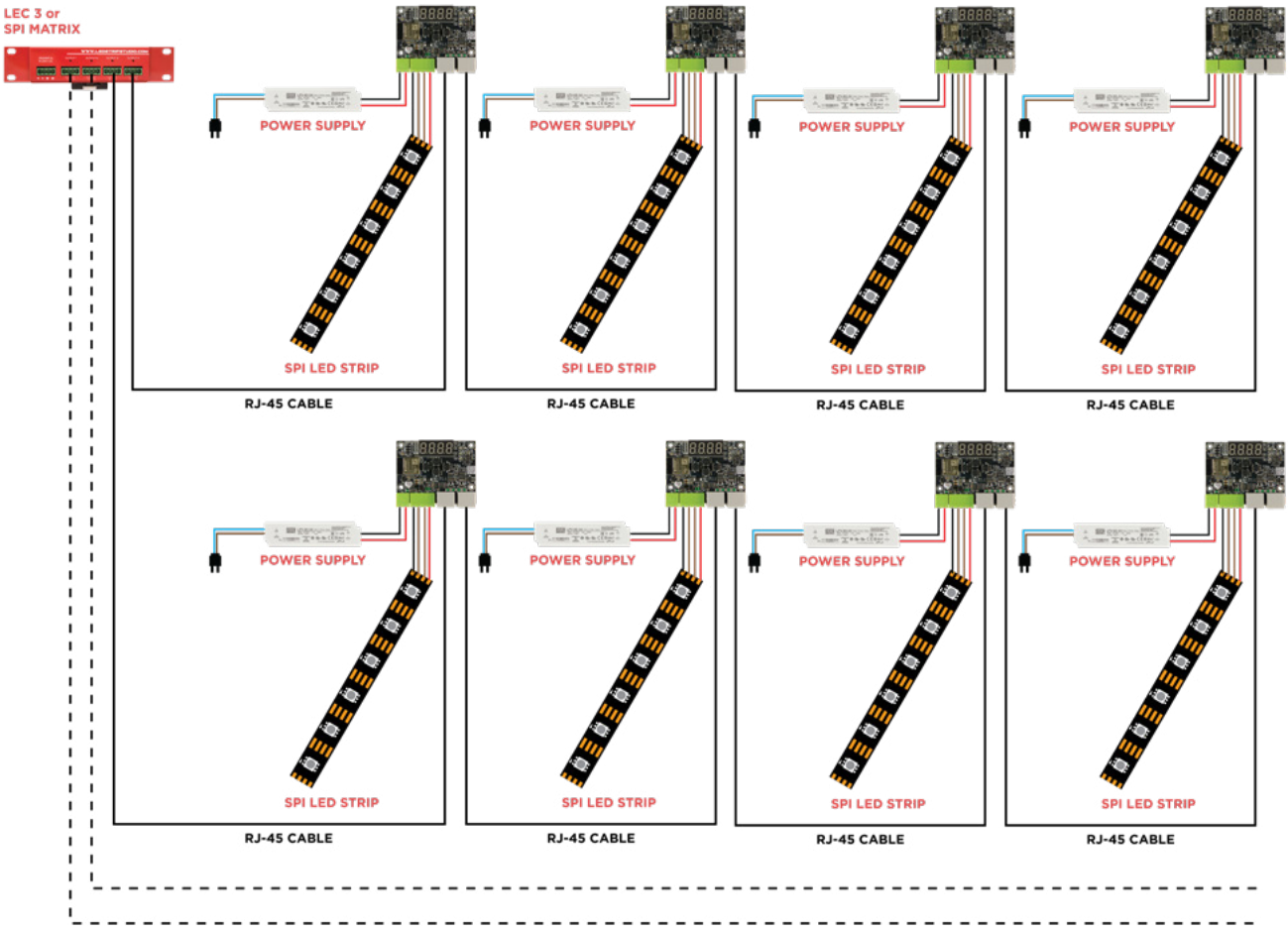
In case of invalid data coming to the input, **all LEDs flash 1x per second**

DEVICE BLOCK DIAGRAM

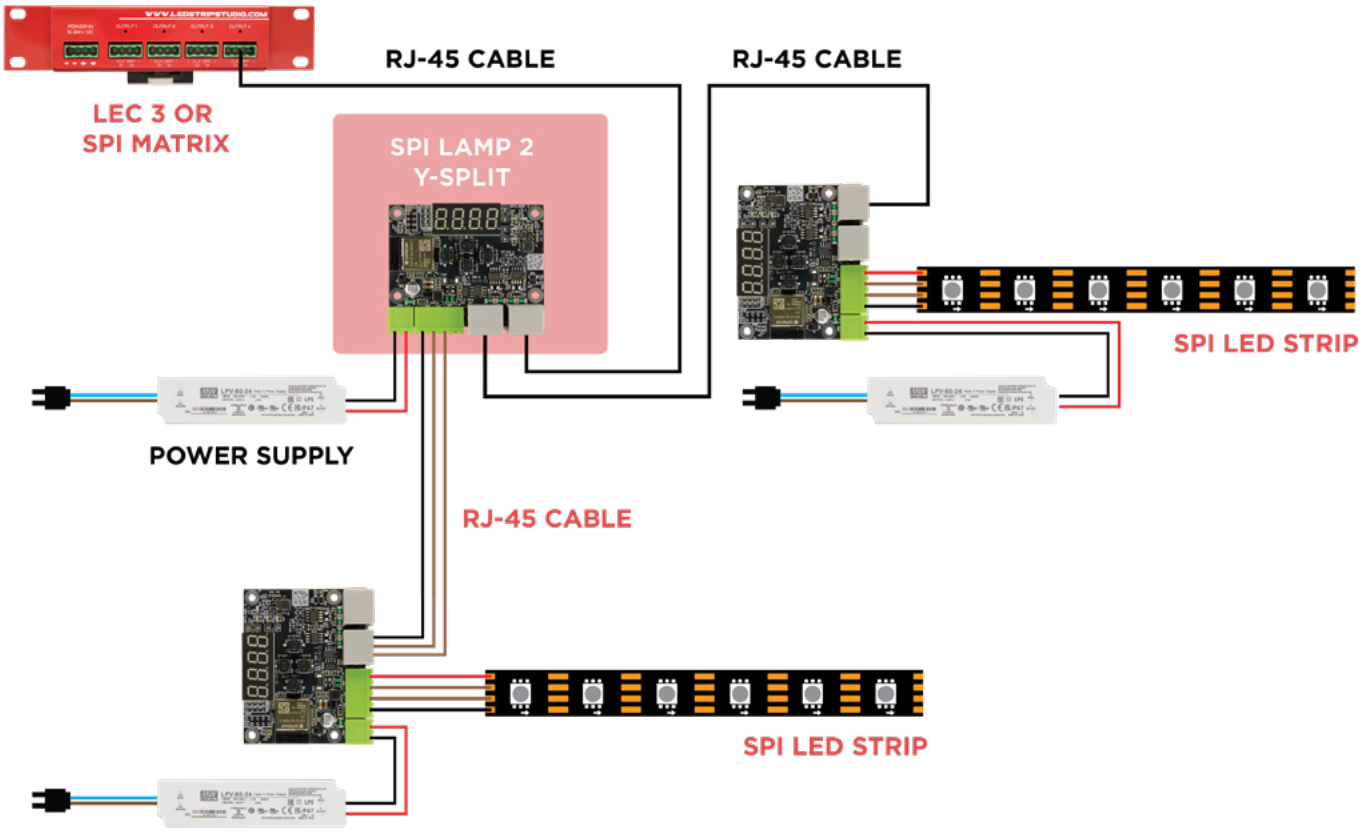


DEVICE CONNECTION

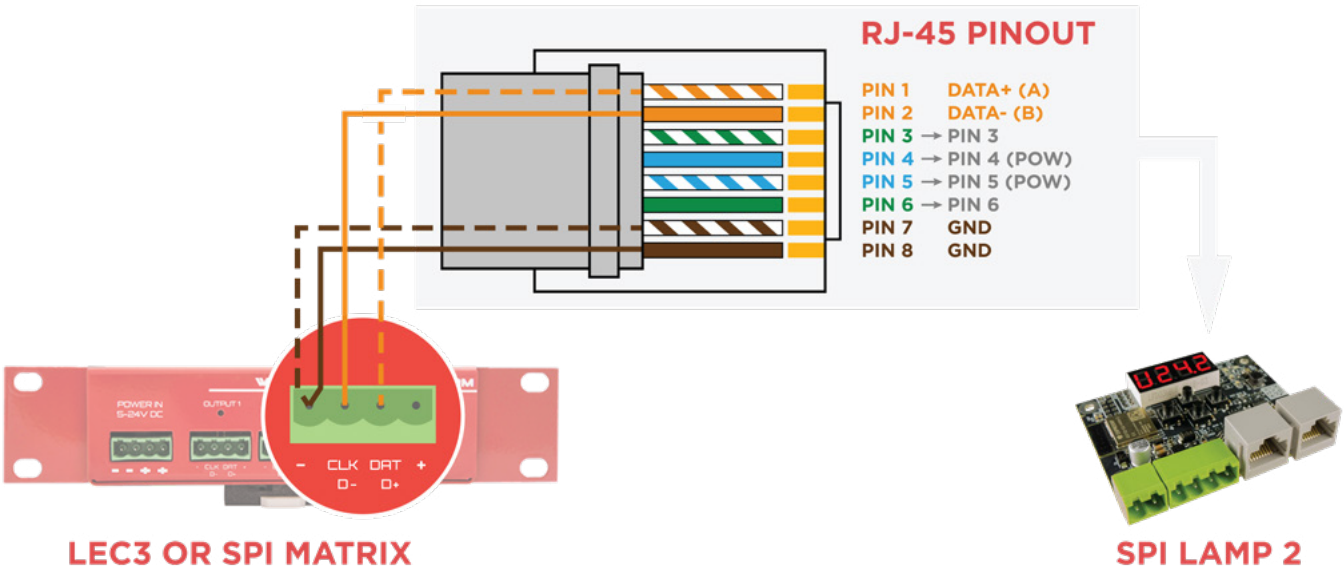
Principal SPI LAMP 2 connection diagram:



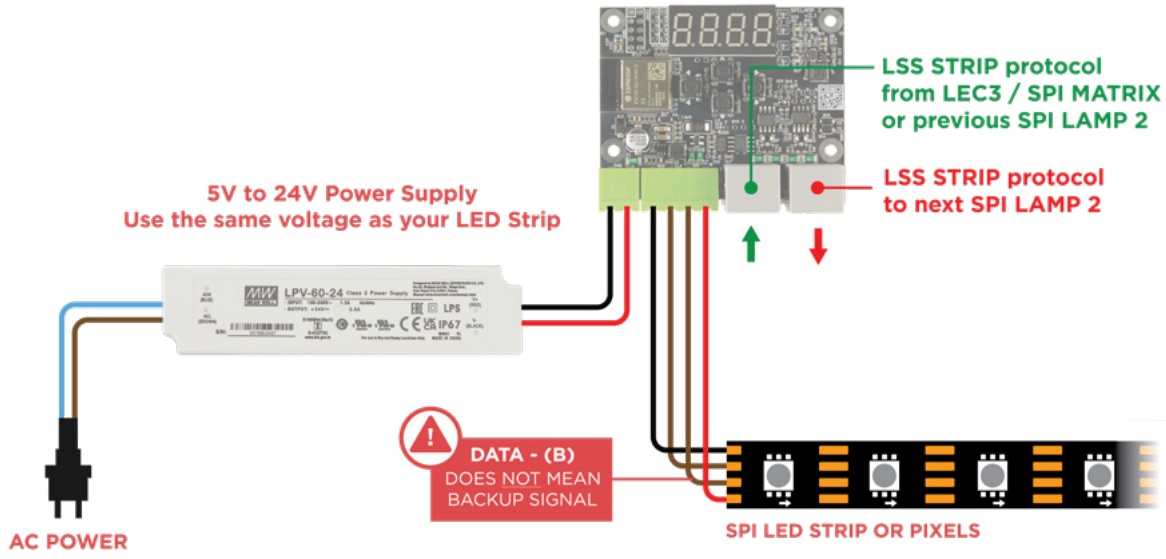
SPI LAMP 2 Y-Splitting diagram (secondary connection option):



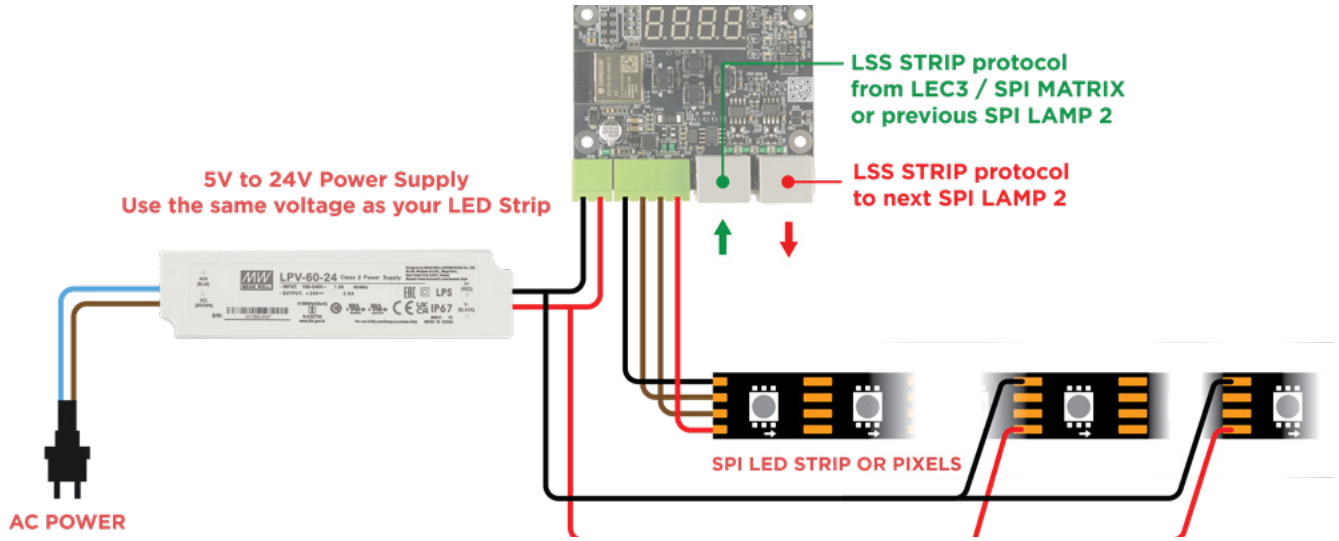
LEC 3 or SPI MATRIX to SPI LAMP 2 detail connection diagram:



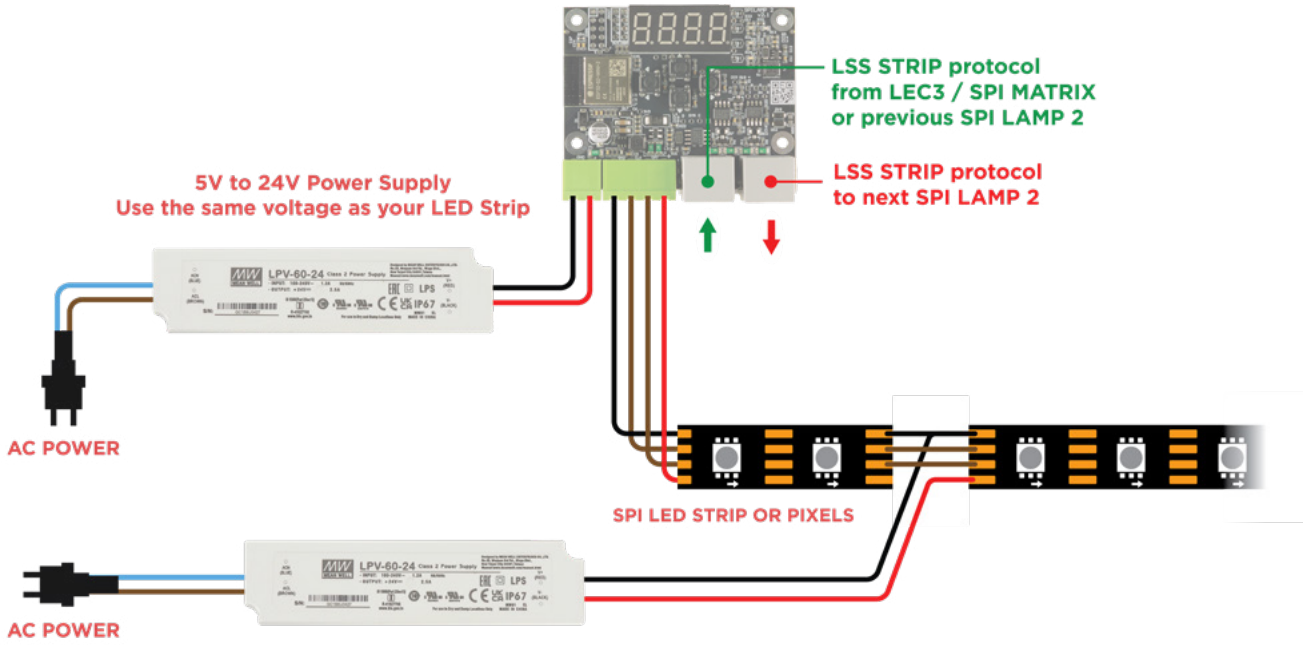
SPI LAMP 2 Power supply and SPI LED output connection diagram:



Power injection example diagram for longer LED strip runs:



Power distribution example diagram when more than one power supply is needed:

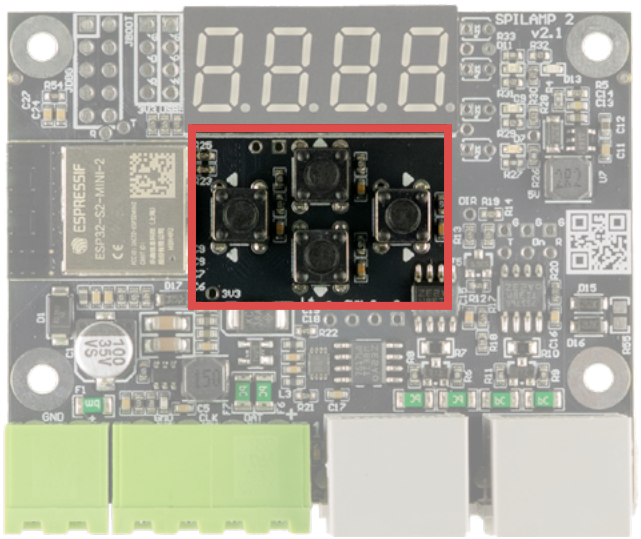


DEVICE SETTINGS

1. USING DEVICE BUTTONS

All device settings can be configured using the four control buttons and the built-in display.

Menu is controlled using four device (control) buttons:



Up, Down, Left (Back), Right (Enter)

When no menu item is selected, menu is in idle state. In idle state, when data are being received, receive animation is displayed. Menu behaviour in idle state can be changed in Settings (see below). If there is no device button activity within 30 seconds and any menu item is active, menu goes into idle state.

Menu structure (menu items):

- **IC** - Type of IC
- **LEd** - Number of LEDs consumed by SPI LAMP 2
- **SEtt** - Settings with 3 submenus
- **U xx.x** - Displays current Voltage
- **FPS** - Displays current frames per second (fps)
- **F** - Displays current firmware version
- **tESt** - Plays test patterns
- **rSt** - Configuration reset

IC

Press enter when selected and it is possible to select required IC using Up/Down buttons. Press Back button to return. Default is 2.

LEd

Press enter when selected and it is possible to select required number of LEDs consumed by SPI LAMP 2 using Up/Down buttons. Press Back button to return. Default is 1024.

SEtt

There are 3 submenus here. Press enter to select first submenu.
Press Up/Down buttons to select submenu. Press Enter on selected submenu to change current value. Values are again changed using Up/Down buttons. Press Back button to return.

FSY - force symmetry

On - symmetry is forced to be on
OFF - default value, symmetry is according selected IC
nA - if display show this, FSY is not applicable for current IC

POrt - select input RJ45 port

AUtO - default value, RJ45 input port is selected automatically when received data are detected if there are no data on RJ45 ports, RJ45 ports are checked every second.
P1 - received data are expected on RJ42 Port 1
P2 - received data are expected on RJ45 Port 2

IdL - menu behaviour in idle state

nOnE - default value, display is off when not receiving data when receiving data, receive animation is displayed
Uin - input voltage displayed, when not receiving data when receiving data also receive animation is displayed

U xx.x

Displays current Voltage, for example 11.9, or 5.2 etc.
No changes possible using Enter button.

FPS

There are 2 submenus here. Press enter to select first submenu.
Press Up/Down buttons to select submenu. Press Back button to return.

Upper small vertical bar on left most display digit
- incomming fps, fps of received data

Lower small vertical bar on left most display digit
- outgoing fps to current IC

Outgoing fps to current IC can be lower than incoming fps. This happens when current IC cannot display received data due its speed limitation.

F

Press enter to display current firmware version. Press Back button to return. Due to display limitations, only the last two digits of the firmware version are shown (e.g. 2.2.0 is displayed as 2.00)

tESt

Press enter to display current test patter. Press Up/Down buttons to change test pattern. If “t 0” is displayed, no test pattern is active. If any other number, e.g. “t 3” is displayed, test pattern is active and should be visible on IC. If test test pattern is active and Back button is pressed, it is possible to change IC type but not number of LEDs consumed by SPI LAMP 2. If menu goes to idle state using Back button any active test pattern is deactivated.

rSt

There are 2 submenus here. Press enter to select first submenu.
Press Up/Down buttons to select submenu. Press Back button to return.

nO - if button Back or button Enter is pressed, there will be return to previous menu item

YES - if button Back is pressed, there will be return to previous menu item
- if button Enter is presssed, current configuration is reset to defaults and device reboots

2. USING CARD CONFIGURATION FILE

You can also set the IC type and number of LED pixels using SD card file stored on LEC 3 / SPI MATRIX device. You need to create **SpiLamp2.cfg** file with following content:

SpiLamp2.cfg

```
[DeviceConfig]
appName=SpiLamp2
```

These two fields above are mandatory in file. Other acceptable fields in file are:

```
stripType=0 to 35, except 14 and 15
stripSize=0 to 1024
save=0 or 1
forceSymmetryOn=0 or 1
inputPort=0,1 or 2 (0=AUtO, 1=P1, 2=P2), see above.
menuIdle=0 or 1 (0=nOnE, 1=Uin), see above.
```

FIRMWARE UPDATE

1. Copy the file **SpiLamp2.bin** to microSD card.
2. Insert the card into the LEC 3/SPI MATRIX device.
3. Power on the device (or if it is already on, simply wait).

SUPPORTED IC TYPES

LIST OF SUPPORTED IC TYPES BY SPI LAMP 2

We frequently add support for new LED driver chips.

You can find the current list of supported ICs for SPI LAMP 2 at:

ledstripstudio.com/download/lss_supported-IC-types_clients.pdf.

IC number	List of chips	Note
0	D705 1000kHz, LPD6803 1000kHz	
1	APA102-65536 2600kHz	
2	WS2811 800kHz, WS2812, WS2813, SK6812, SK6822, LPD1886 8bit, UCS1903 800kHz, UCS2903, APA104 800kHz, P9883 800kHz, WS2815, GS8208, SM16703, FW1935, WS2818	
3	TM1809 400kHz, TM1803 400kHz, APA104 400kHz, WS2811 400kHz, UCS1903 400kHz, P9883 400kHz	
4	SM16716 1300kHz, SM16726 1300kHz 8Bit	*Not supported
5	WS2801 1000kHz, WS2803 1000kHz	*Not supported
6	APA102 1300kHz	
7	APA102_DOUBLE 1300kHz	Same as APA102, just one pixel is used twice on the output
8	UCS9812 1100kHz	
9	MBI6120 475kHz	*Not supported
10	LPD8806 2000kHz	
11	TM1829 1600kHz	
12	TM1829 800kHz	
13	WS2811_RGBW 800kHz, P9412_ RGBW, UCS2904, WS2814	
16	DMX RGBW	The device generates DMX signal containing RGBW pixels
17	DMX RGB	The device generates DMX signal containing RGB pixels
18	TM1914 800kHz	

24	PL9823 600kHz	
25	TM1814 800kHz	
26	SM16823 800kHz	
27	P9813 800kHz	
28	UCS8903 800kHz	
32	LSS-strip-2 RGBW	You can use SPI Lamp 2 device to split the signal into two separate SPI Lamp 2 signals, RGBW type
33	LSS-strip-2 RGB	You can use SPI Lamp 2 device to split the signal into two separate SPI Lamp 2 signals, RGB type

FAQ

IS RJ-45 INPUT/OUTPUT COMPATIBLE WITH REGULAR ETHERNET NETWORK ?

No. Do not attempt to connect SPI LAMP 2 directly to PC network interface card or network switches or routers. RJ-45 input/output of SPI LAMP 2 has different pinout, voltage levels, speed and protocol from standard 10/100/1000 Mbps Ethernet network.

WHAT IF LSS STRIP SIGNAL IS CONNECTED TO “OUTPUT” (PORT 2) INSTEAD TO “INPUT” (PORT 1)?

In case you connect the signal to PORT 2, data is used from the end of the signal. E.g. in case you send 300 LEDs to port 2 and the LED pixel count is 64, the device will send last 64 LEDs to LED output and remaining 300-64=234 will be sent to PORT 1.

IS THERE ANY OTHER CONTROLLER WORKING WITH SPI LAMP THAN LEC3 OR SPI MATRIX?

No. SPI LAMP 2 uses custom LSS strip protocol and it is **NOT compatible** with any other controller than LEC 3 or SPI MATRIX.

ARE SPI LAMP AND SPI LAMP 2 DEVICES COMPATIBLE?

No. SPI LAMP and SPI LAMP 2 are **NOT compatible** witch each other.

WARRANTY

This device has been designed and made using high quality components with several quality checks and testings. Therefore we are proud to provide 5 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 recieve 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.

CONTACTS

Showtacle Ltd.
Lubietovska 8,
851 01 Bratislava
Slovakia, Europe

info@ledstripstudio.com
www.ledstripstudio.com
Tel.: +421 948 280 393

facebook.com/ledstripstudio
linkedin.com/company/ledstripstudio
youtube.com/LEDStripStudio
instagram.com/ledstripworld/

LED STRIP STUDIO is a product of Showtacle Ltd. company.