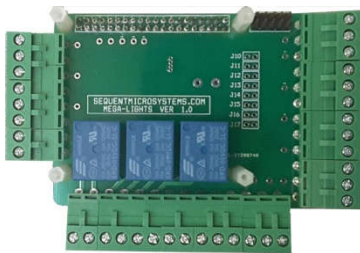


# RASPBERRY PI Mega-LIGHTS EXPANSION CARD

## USER'S GUIDE VERSION 1.0

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## GENERAL DESCRIPTION



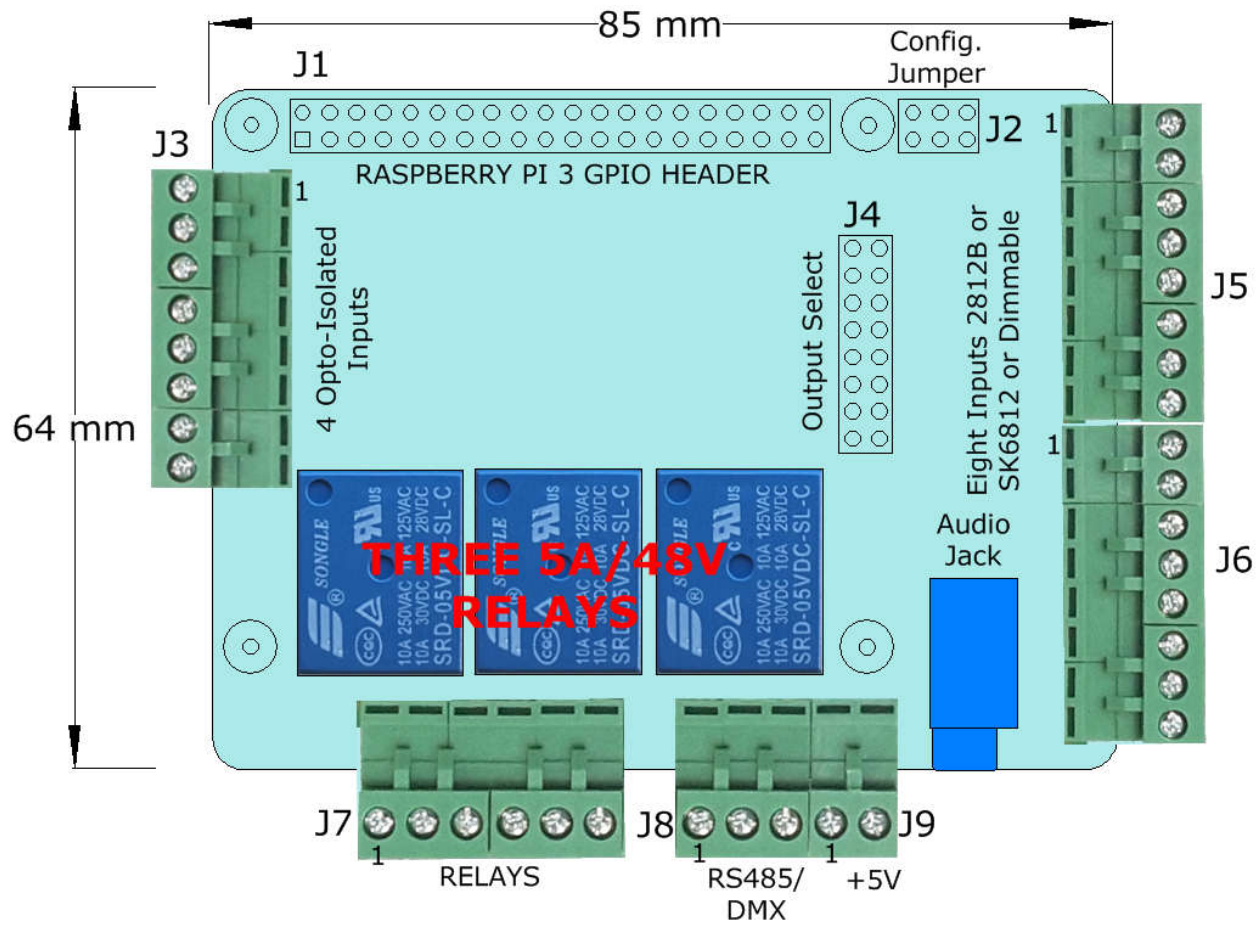
This board is a stackable expansion card for Raspberry Pi B+, 2, 3 and Zero. Two of the Raspberry Pi's GPIO pins are used for I2C communication (pins 3 and 5). Pin 11 is allocated for the interrupt handler, leaving 23 GPIO pins available for the user. Any input can be configured as an interrupt. Up to eight MEGA-LIGHTS cards can be stacked on top of a Raspberry Pi.

The card has eight LED-strips outputs which can be independently configured to drive either 2812B or SK6812 Neopixel strips. Each output has also a 12A driver and can be used as a general purpose dimmer for any dimmable LED light. In addition, one RS485 output can be used to drive DMX LED strips.

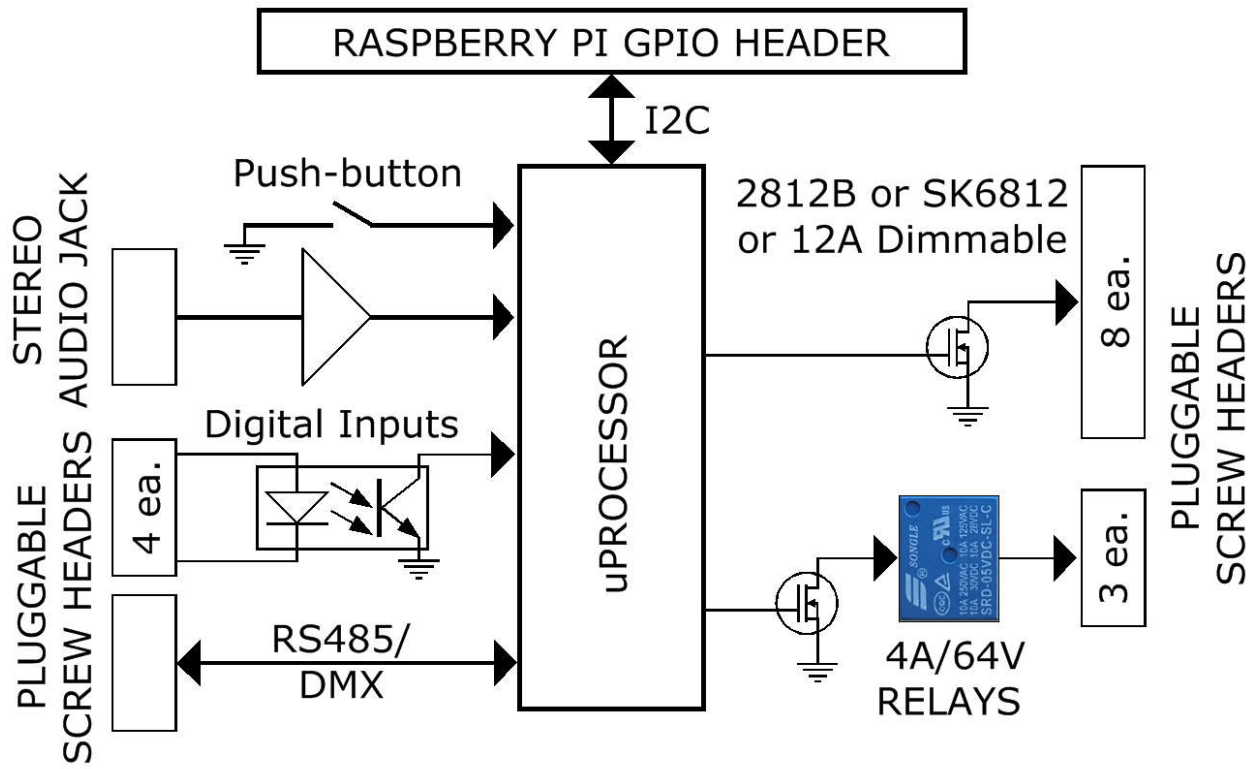
The card has also four optically isolated inputs that can be used to read external switches. Three 5A/48V on-board relays can be used to turn on other high power lights through outside relays.

A two-channel stereo audio input buffered with a preamplifier is connected to the powerful on-board DSP processor. The audio input can be digitally processed and separated in up to eight user-defined frequency bands which can be directed to the LED-strip outputs.

# BOARD LAYOUT




# BLOCK DIAGRAM




## I/O CONNECTORS PINOUT


### J3: OPTO-ISOLATED DIGITAL INPUTS

	1	INPUT1
	2	VEXT1
	3	INPUT2
	4	VEXT2
	5	INPUT3
	6	VEXT3
	7	INPUT4
	8	VEXT4


### J5: OUTPUTS 1-4

	1	OUTPUT1
	2	GND
	3	OUTPUT2
	4	GND
	5	OUTPUT3
	6	GND
	7	OUTPUT4
	8	GND


### J7: RELAYS 1-3

	1	COM1
	2	NO1
	3	COM2
	4	NO2
	5	COM3
	6	NO3


### J6: OUTPUTS 5-8

	1	OUTPUT5
	2	GND
	3	OUTPUT6
	4	GND
	5	OUTPUT7
	6	GND
	7	OUTPUT8
	8	GND

### J8: RS485/DMX

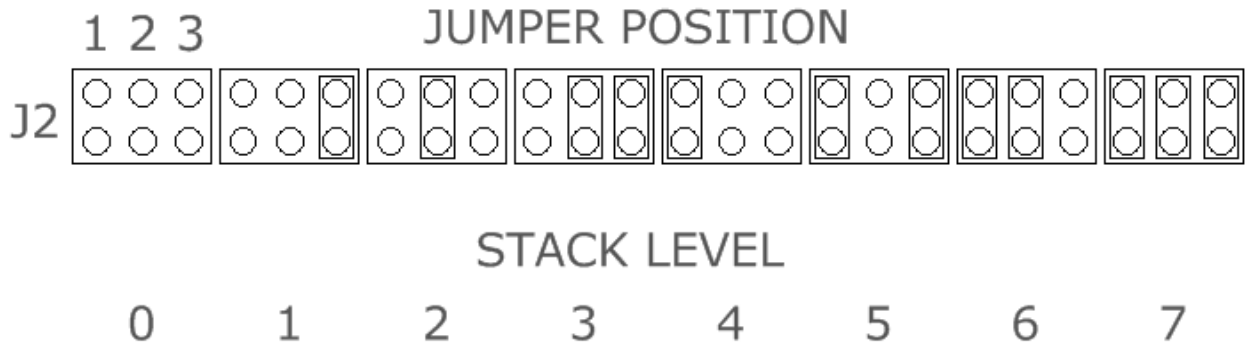
	1	GND
	2	RS485-A
	3	RS485-B

### J9: POWER CONNECTOR

	1	GND
	2	+5V

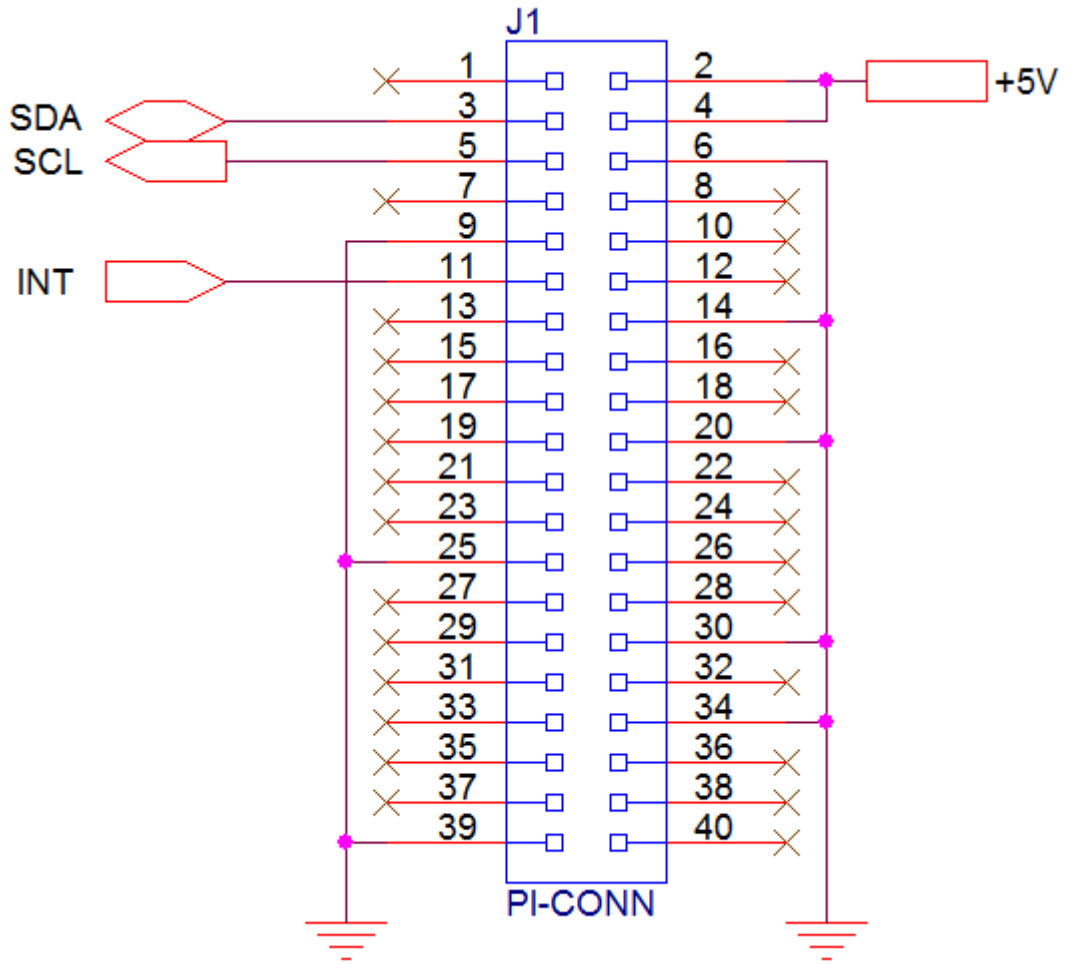
## CONFIGURATION JUMPERS

The 2x3 pin J7 jumper installed in the upper right corner of the MEGA-IO card determines the stack level. No jumpers need to be installed if only one card is present. Up to eight cards can be stacked on one Raspberry Pi.

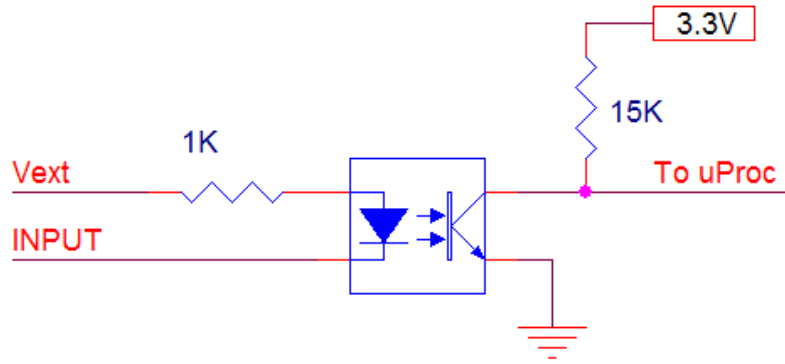


The 2x8 pin J8 jumper permits changing the configuration of the outputs. Install the jumper to use the corresponding output as dimmable. Do not install the jumper to use the output to drive either 2812B or SK6812 Neopixel strips.

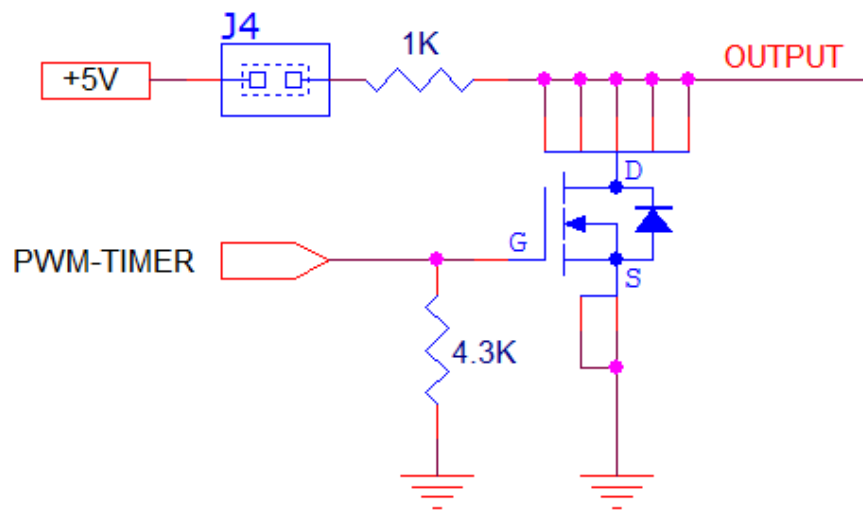
RASPBerry PI HEADER



## SCHEMATICS

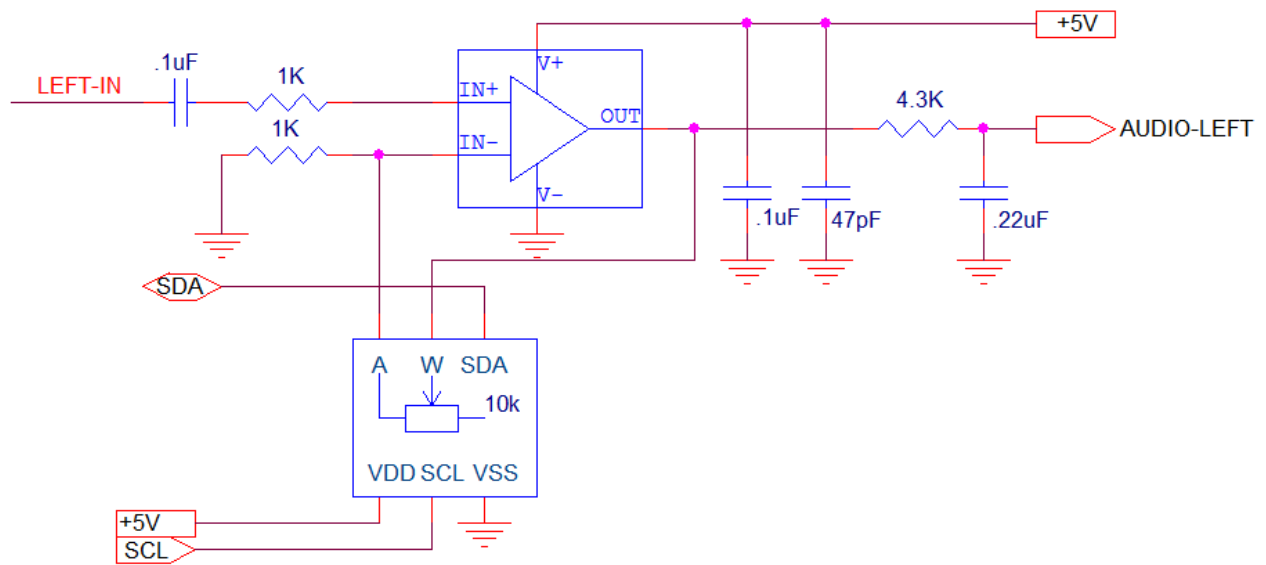


OPTICALLY ISOLATED INPUTS (1 of 4)

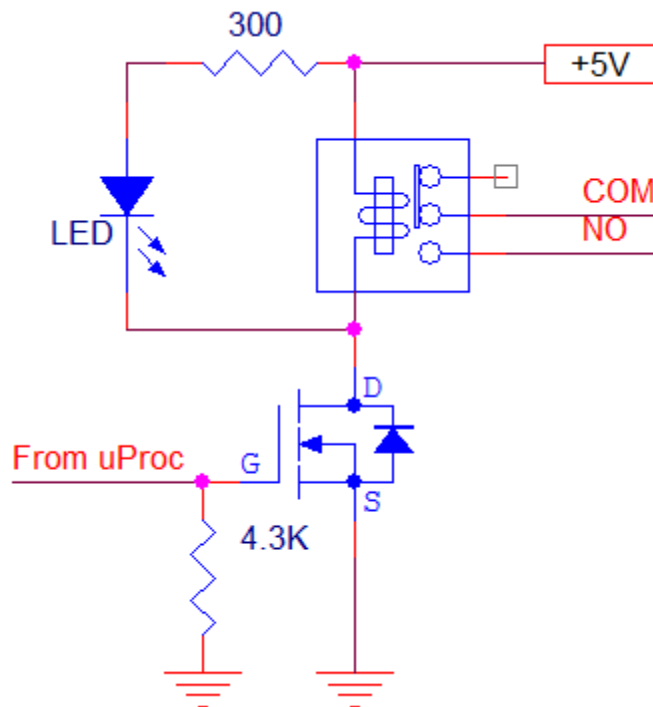


LED STRIP OUTPUTS (1 of 8)





**AUDIO INPUTS (1 of 2)**



**RELAY OUTPUTS (1 of 3)**

## HARDWARE SPECIFICATIONS

ON BOARD FUSE: 1A

MICROCONTROLLER: STM32F730R8T6

- 32-bit Cortex CPU
- Operating voltage: 3.3V
- CPU frequency: 16 MHz
- Touch sensing capability
- Max. input voltage on any pin: 3.6V
- Output Low Level Voltage on I/O pins: Max. 0.45V
- Output High Level Voltage on I/O pins: Min. 2.6V

### OPTO-ISOLATED INPUTS

- Transceiver: ELD207

### RELAYS: SRD-05VDC-SL-C

- Maximum current/voltage: 10A/250V

### POWER CONSUMPTION:

- 50 mA @ +5V (all relays OFF)
- 300 mA @ +5V (all relays ON)

## POWER REQUIREMENTS

The Mega-LIGHTS card requires an external 5V/1A regulated power supply.

**Only one +5V source can be used to power both the Raspberry Pi and the Mega-LIGHTS card.**

If multiple Mega-LIGHTS cards are stacked on top of each other, a single +5V power supply has to be used to power all the cards.

## SOFTWARE SETUP

1. Have your Raspberry Pi ready with the [latest OS](#).
2. Install the [Wiring Pi](#) library (many thanks to Gordon Henderson)
3. Enable I2C communication:

```
~$ sudo raspi-config
```

```
1 Change User Password Change password for the default user
2 Hostname             Set the visible name for this Pi on a
3 Boot Options         Configure options for start-up
4 Localisation Options Set up language and regional settings
5 Interfacing Options  Configure connections to peripherals
6 Overclock            Configure overclocking for your Pi
7 Advanced Options     Configure advanced settings
8 Update               Update this tool to the latest versio
9 About raspi-config   Information about this configuration

P1 Camera             Enable/Disable connection to the Raspberry Pi Camera
P2 SSH                Enable/Disable remote command line access to your Pi
P3 VNC                Enable/Disable graphical remote access to your Pi usin
P4 SPI                Enable/Disable automatic loading of SPI kernel module
P5 I2C                Enable/Disable automatic loading of I2C kernel module
P6 Serial             Enable/Disable shell and kernel messages on the serial
P7 1-Wire             Enable/Disable one-wire interface
P8 Remote GPIO        Enable/Disable remote access to GPIO pins
```

4. Install the megaio software from github.com:

```
~$ git clone https://github.com/SequentMicrosystems/mega-lights-rpi.git
```

5. 

```
~$ cd /home/pi/mega-lights-rpi
```
6. 

```
~/megaioind-rpi$ sudo make install
```
7. 

```
~/megaioind-rpi$ mega-lights
```

The program will respond with a list of available commands.

Type "`mega-lights -h`" for online help.

After installing the software, you can update it to the latest version with the commands:

1. 

```
~$ cd /home/pi/mega-lights-rpi
```
2. 

```
~/megaioind-rpi$ git pull
```
3. 

```
~/megaioind-rpi$ sudo make install
```

