8-MOSFETS EXPANSION CARD FOR RASPBERRY PI

USER'S GUIDE VERSION 1.0

- Preliminary -

GENERAL DESCRIPTION

The 8-MOSFETS card is a stackable expansion card for Raspberry Pi. The card is compatible with all Raspberry Pi versions from Zero to 4. It offers a compact and inexpensive solution for adding up to 64 MOSFETs to your Raspberry Pi project.

Pluggable connectors make the 8-MOSFETS card easy to use when multiple cards are stacked up. Four MOSFETS are optimized for current and can switch up to 10A and 48VDC. The other four MOSFETS are optimized for voltage and can switch up to 300VDC and 4A. Status LEDs show when MOSFETs are on or off.

SPECIFICATIONS

- Eight MOSFETs with Status LEDs
- Pluggable Connectors
- 4 High Current (HC) Loads @ 10A/24VDC
- 4 High Voltage (HV) Loads @ 2A/240VDC
- Software self-test
- Command Line and Python Drivers

Up to eight 8-MOSFETS cards can be stacked on top of one Raspberry Pi. The 8-MOSFETS cards share a serial I2C bus using only two of the Raspberry Pi's GPIO pins to manage all eight cards. This feature leaves the remaining 24 GPIOs available for the user.

SEQUENT MICROSYSTEMS POWER CARDS COMPARISON

CARD		4 RELAYS	8 RELAYS	4 TRIACS	8 MOSFETS	IO PLUS[1]	MEGA IND[2]
MAXIMUM LOAD VOLTAGE	AC	240V	120V	240V	--	48V	240V
	DC	24V	24V	--	4@48V 4@240V	24V	24V
MAXIMUM LOAD CURRENT	AC	10A	4@8A 4@4A	1A	--	2.5A	8A
	DC	10A	4@8A 4@4A	--	4@10A 4@2A	2.5A	8A
MAXIMUM SWITCHING TIME		10mS	10mS	100nS	100nS	10mS	10mS
ENDURANCE MINIMUM OPERATIONS		10^5	10^5	Unlimited	Unlimited	10^5	10^5
MAXIMUM POWER CONSUMPTION		80mA/ LOAD[3]	80mA/ LOAD[3]	10mA/ LOAD[4]	10mA/ LOAD[4]	80mA/ LOAD[3]	80mA/ LOAD[3]
VARIABLE LOAD		No	No	Yes	No	No	No
NUMBER OF LOADS		4	8	4	8	8	4
LOCAL PROCESSOR		No	No	Yes	No	Yes	Yes

Notes   [1]IO-PLUS Card has also four 2A/24VDC open drain MOSFET outputs

[2]MEGA-IO Card has also four 4A/24V open drain MOSFET outputs

[3]LOAD = Activated Relay

[4]LOAD = Activated Output

WHAT IS IN YOUR KIT

1. 8-MOSFETS add-on card for Raspberry Pi
2. Mounting hardware
   a. Four M2.5x18mm male-female nylon standoffs
   b. Four M2.5x5mm nylon screws
   c. Four M2.5 nylon nuts
3. Two jumpers. You do not need the jumpers when using only one card. See STACK LEVEL JUMPERS section if you plan to use multiple cards.
4. Eight 2-pin female mating connectors.

QUICK START-UP GUIDE

1. Plug your 8-MOSFETS card on top of your Raspberry Pi and power up the system using only one 5V/3A power supply.
2. Enable I2C communication on Raspberry Pi using raspi-config.
3. Install the 8-MOSFETS software from github.com:
   a. ~$ git clone https://github.com/SequentMicrosystems/8mosfet-rpi.git
   b. ~$ cd /home/pi/8mosfet-rpi
   c. ~/8mosfet-rpi$ sudo make install
4. ~/8mosfet-rpi$ 8mosfet

   The program will respond with a list of available commands.
5. Connect your load between pin 2 of any of the load connectors and the positive side of your external power supply.
6. Connect the negative side of your external power supply to pin 1 of the output connectors.
7. Turn on and off the load using the corresponding command.
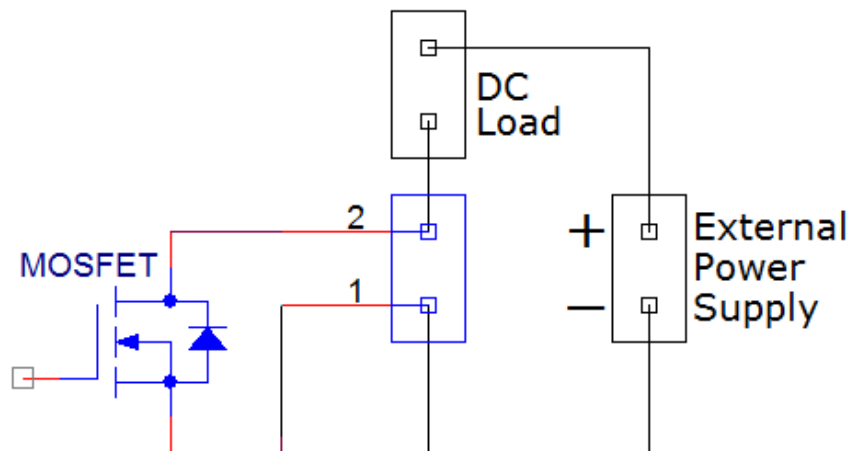
BOARD LAYOUT
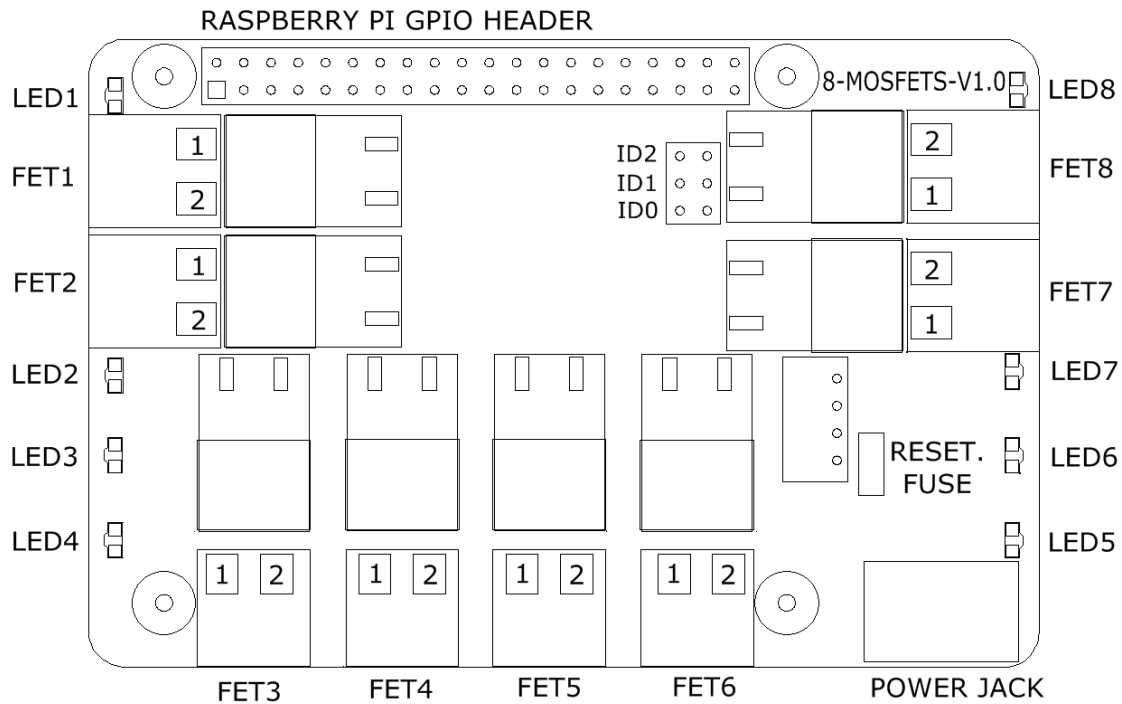
Your 8-MOSFETS card comes with appropriate mounting hardware. Up to eight 8-MOSFETS cards can be stacked on top of one Raspberry Pi.

Eight LEDs indicate the status of their respective MOSFET. An LED is lit when the corresponding MOSFET is energized.

STACK LEVEL JUMPERS

Up to eight 8-MOSFETS cards may be stacked on your Raspberry Pi module. Each card is identified by jumpers you install to indicate the level in the stack. Cards can be installed on Raspberry Pi in any order. The 3 position jumper is selecting the stack level of the card, as follows:
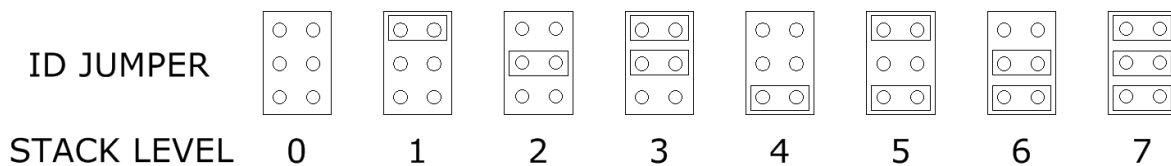
POWER REQUIREMENTS

The 8-MOSFETS card requires +5V power, supplied either from the Raspberry Pi expansion bus, or from its own 2.1mm power jack. The MOSFETS are triggered using an on-board 12V power supply galvanically isolated from the 5V power supply.

Raspberry Pi current consumption: 250 mA @ +5V (could be as high as 2A)

8-MOSFETS Card current consumption: 25 mA @ +5V

The jack which powers the 8-MOSFETS card can handle up to 3A and is protected by a 2A resettable fuse We recommend using this jack with a 5V regulated power supply rated at 3A or higher. The tip is +5V and the ring is ground. (see Schematics).

The 8-MOSFETS card can be stacked up to eight levels. A multi-stack configuration can be powered from any of the cards.

We recommend using a power supply rated 3A or higher.

MECHANICAL SPECIFICATIONS

88.5 mm

58.0 mm

49.0 mm

58.5 mm

8.5 mm

1.5 mm

14.0 mm
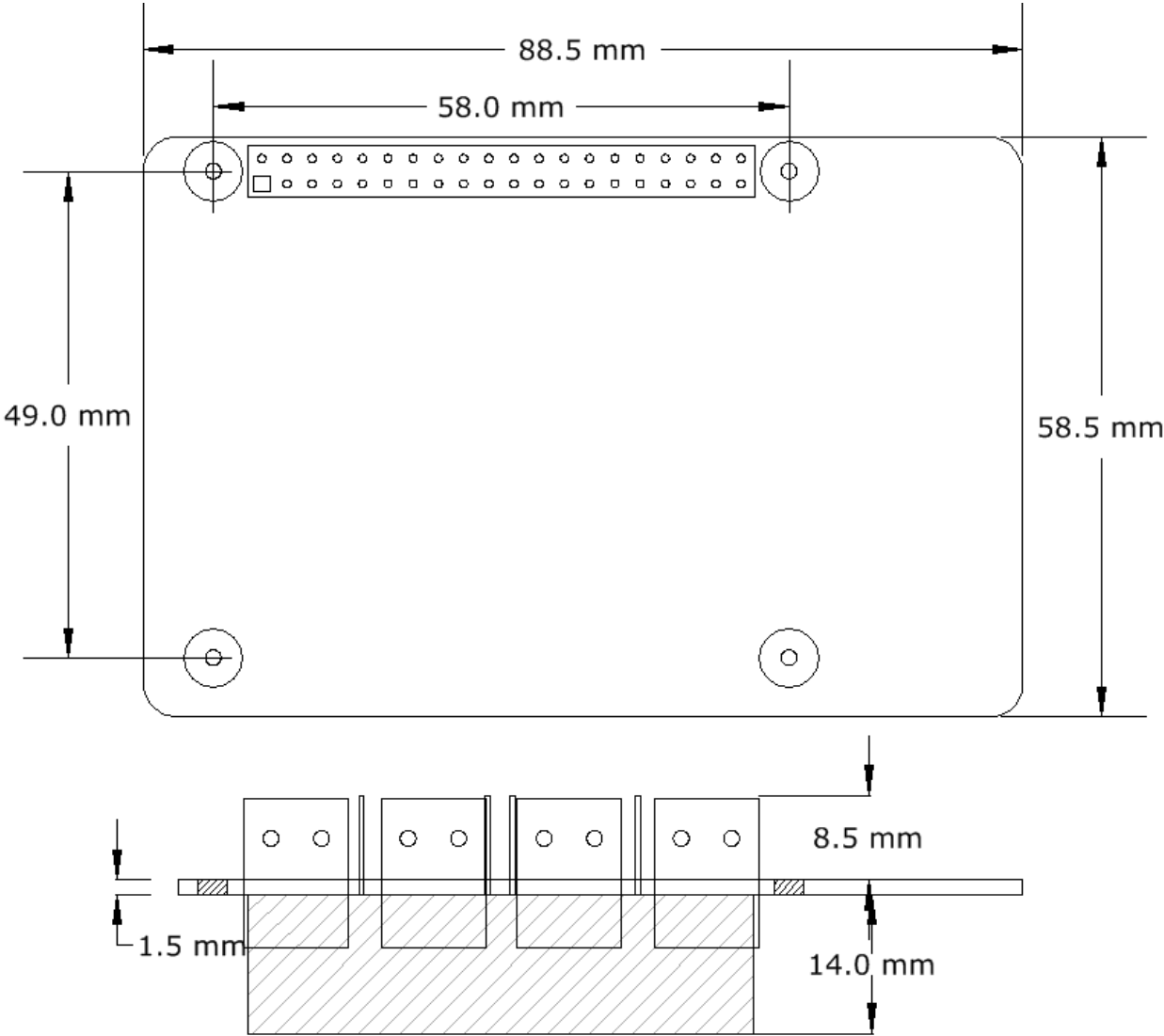
SOFTWARE SETUP

The 8-MOSFET board occupies the I2C addresses from 0x38 to 0x3F.

1. Have your Raspberry Pi ready with the latest OS.

2. Enable I2C communication:

~$ sudo raspi-config

1.	Change User Password	Change password for default user
2.	Network Options	Configure network settings
3.	Boot Options	Configure options for start-up
4.	Localisation Options	Set up language and regional settings to match..
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 version
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 using...
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 to the serial port
P7	1-Wire	Enable/Disable one-wire interface
P8	Remote GPIO	Enable/Disable remote access to GPIO pins

3. Install the 8mosfet software from github.com:

~$ git clone https://github.com/SequentMicrosystems/8mosfet-rpi.git

4.　　~$ cd /home/pi/8mosfet-rpi

5.　　~/8mosfet-rpi$ sudo make install

6.　　~/8mosfet-rpi$ 8mosfet

The program will respond with a list of available commands.

Type "8mosfet -h" for online help.

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

1.　　~$ cd /home/pi/8mosfet-rpi

2.　　~/8mosfet-rpi$ git pull

3.　　~/8mosfet-rpi$ sudo make install