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

<table>
<thead>
<tr>
<th>CARD</th>
<th>4 RELAYS</th>
<th>8 RELAYS</th>
<th>4 TRIACS</th>
<th>8 MOSFETS</th>
<th>IO PLUS(^{(1)})</th>
<th>MEGA IND(^{(2)})</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAXIMUM LOAD VOLTAGE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC</td>
<td>240V</td>
<td>120V</td>
<td>240V</td>
<td>--</td>
<td>48V</td>
<td>240V</td>
</tr>
<tr>
<td>DC</td>
<td>24V</td>
<td>24V</td>
<td>--</td>
<td>4@48V</td>
<td>24V</td>
<td>24V</td>
</tr>
<tr>
<td>MAXIMUM LOAD CURRENT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC</td>
<td>10A</td>
<td>4@8A</td>
<td>1A</td>
<td>--</td>
<td>2.5A</td>
<td>8A</td>
</tr>
<tr>
<td>DC</td>
<td>10A</td>
<td>4@8A</td>
<td>4@4A</td>
<td>4@10A</td>
<td>2.5A</td>
<td>8A</td>
</tr>
<tr>
<td>MAXIMUM SWITCHING TIME</td>
<td>10mS</td>
<td>10mS</td>
<td>100nS</td>
<td>100nS</td>
<td>10mS</td>
<td>10mS</td>
</tr>
<tr>
<td>ENDURANCE MINIMUM OPERATIONS</td>
<td>(10^5)</td>
<td>(10^5)</td>
<td>Unlimited</td>
<td>Unlimited</td>
<td>(10^5)</td>
<td>(10^5)</td>
</tr>
<tr>
<td>MAXIMUM POWER CONSUMPTION</td>
<td>80mA/LOAD(^{(3)})</td>
<td>80mA/LOAD(^{(3)})</td>
<td>10mA/LOAD(^{(4)})</td>
<td>10mA/LOAD(^{(4)})</td>
<td>80mA/LOAD(^{(3)})</td>
<td>80mA/LOAD(^{(3)})</td>
</tr>
<tr>
<td>VARIABLE LOAD</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>NUMBER OF LOADS</td>
<td>4</td>
<td>8</td>
<td>4</td>
<td>8</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>LOCAL PROCESSOR</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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:

<table>
<thead>
<tr>
<th>ID JUMPER</th>
<th>STACK LEVEL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>
**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

Dimensions:
- Width: 88.5 mm
- Height: 58.0 mm
- Depth: 49.0 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
    ```