MLT

MCP23017 I/O Expander HAT (Demo)

For Raspberry Pi
User's Guide

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Chapter1. Overview and Board Description

Introduction

    The MCP23017 I/O Expander HAT is a 16 channel digital expansion board based on the MCP23017 with 16 bit I/O Expander from Microchip Technology Inc. 16 Digital Input/Output (I/O 16 bit) control via the Raspberry Pi I2C port which can using I/O port is independent. Each pin on a port is independent by program as input or output pins. Included a DIP Switch to simplify address selection on the MCP23017 I/O Expander HAT. Stack up to 8 boards (MCP23017 I/O Expander HAT) on a single Raspberry Pi (on one bus) giving a maximum of 128 I/O ports. This board well designed for use on the Raspberry Pi board to compatible with Raspberry Pi model A+, Raspberry Pi model B+, Raspberry Pi 2 model B, Raspberry Pi 3 model B. More information you can download on website www.mlt-group.com
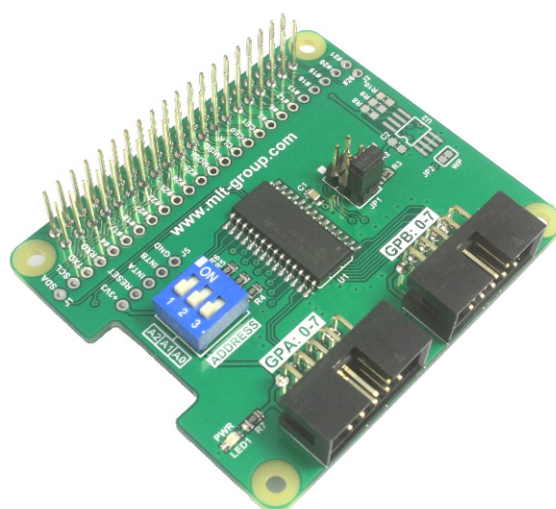

Figure 1. MCP23017 I/O Expander HAT

MCP23017 I/O Expander HAT Feature

1. Supply voltage VCC = 3.3VDC.
2. 16 Digital Input/Output (I/O 16 bit) control via the Raspberry Pi I2C port which there are two 8 bit I/O ports are GPA(0-7) and GPB(0-7).
3. Based on the MCP23017 with 16 bit I/O Expander from Microchip Technology Inc.
4. Can using I/O port is independent. Each pin on a port is independent by program as input or output pins.
5. Included a DIP Switch to simplify address selection on the MCP23017 I/O Expander HAT.
6. Stack up to 8 boards (MCP23017 I/O Expander HAT) on a single Raspberry Pi (on one bus) giving a maximum of 128 I/O ports.
7. Support Raspberry Pi board is Raspberry Pi model A+, Raspberry Pi model B+, Raspberry Pi 2 model B, Raspberry Pi 3 model B.
8. Board dimension is 5.60cm.(W) x 6.50cm.(L) x 2.30cm.(H).

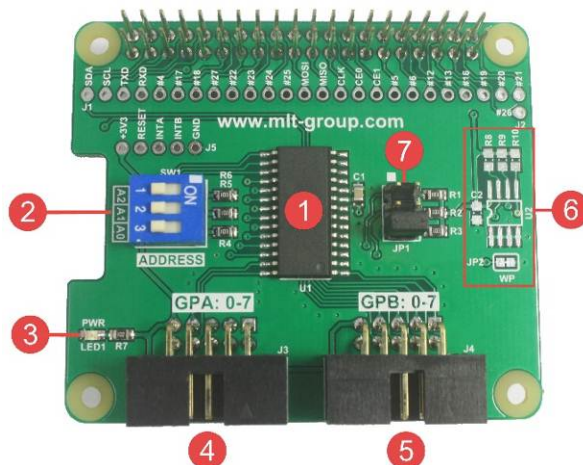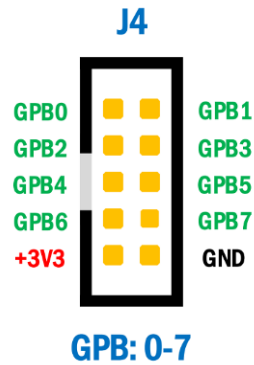# MCP23017 I/O Expander HAT Description

Figure 2. MCP23017 I/O Expander HAT description

No1. Microchip MCP23017.
No2. DIP Switch to select address of the MCP23017 I/O Expander HAT. You can set address 20-27 up to 8 boards.
No3. LED PWR to indicate the power status of the MCP23017 I/O Expander HAT.
No4. GPA Port: 0-7 is IDC10 socket (connector) which set the signal pins as the below figure.

No5. GPB Port: 0-7 is IDC10 socket (connector) which set the signal pins as the below figure.

J4

GPB0	GPB1
GPB2	GPB3
GPB4	GPB5
GPB6	GPB7
+3V3	GND

GPB: 0-7

No6. Additional Option to connect ID EEPROM which default connection does not include ID EEPROM on the MCP23017 I/O Expander HAT.

No7. Jumpers to connect R pull up to INTA pin, INTB pin and RESET pin. Default jumper (Enable) connect only RESET pin via pin position 5, 6.

Schematic

Demo

Chapter2. Getting Started

Set up the MCP23017 I/O Expander HAT Configuration

1. Connect the MCP23017 I/O Expander HAT to your Raspberry Pi board as figure 6. For this example set an address is "address 20" (DIP Switch A2-A0 in the "OFF" position).
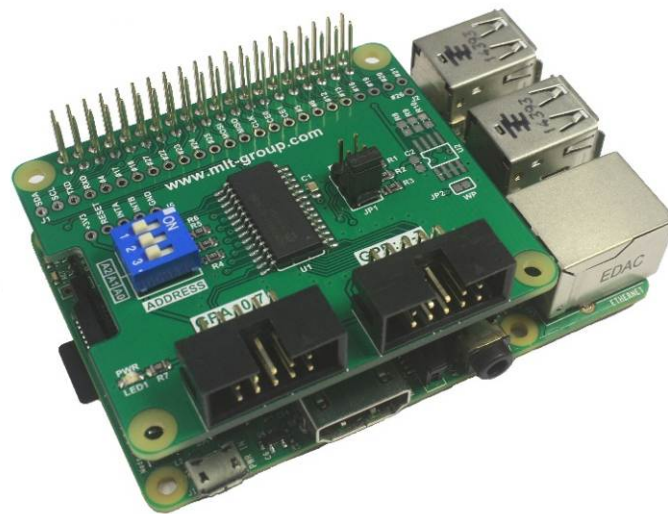

Figure 6. Connecting the MCP23017 I/O Expander HAT to Raspberry Pi board

2. Supply power into your Raspberry Pi board then connect to the internet for install modules. While you should see LED PWR light up on the MCP23017 I/O Expander HAT which means the MCP23017 I/O Expander HAT does operate.
3. Log In into Raspberry Pi board then you write command "sudo raspi-config" to start for using/enabling the I2C module as below figure.

4. Next, appear window "raspi-config" then choose "Advanced Options" as below figure.

Demo

Demo

Demo

17. If the MCP23017 I/O Expander HAT is successfully connected then appear the I2C device is Address "20" as the below figure.

```
pi@raspberrypi:- $ sudo i2cdetect -y 1
     0  1  2  3  4  5  6  7  8  9  a  b  c  d  e  f
00:          -- -- -- -- -- -- -- -- -- -- -- -- --
10: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
20: 20 -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
30: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
40: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
50: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
60: -- -- -- -- -- -- -- -- -- -- -- -- -- -- -- --
70: -- -- -- -- -- -- -- --
```

Starting the MCP23017 I/O Expander HAT to blink LEDs with Python Program

This is example of blink program with 1 second delay to control output GPA: 0-7 port is sending "0xFF" (hex) via GPA: 0-7 port around 1 second then sending "0x00" (hex) around 1 second which output loop. You should start write program with Python program as the following.

1. Begin by creating a file name is "mcp23017_GPA.py" with write command as follows.

```
sudo nano mcp23017_GPA.py
```

Demo

3. When you write program are done then save this file by press and hold button "Ctrl" then press button "X" simultaneously (Ctrl+X) to save and exit this program then appear text "Save modified buffer (ANSWERING "No" WILL DESTROY CHANGES)?" then you press button "Y" (Yes) to save this file.

4. You write command as the below command to test the blink program.

```
sudo python mcp23017_GPA.py
```

If you have soldered LEDs to GPA: 0-7 port that you should see LEDs blink with 1 second delay.

*** And if you want to stop running the blink program that you should press and hold button "Ctrl" then press button "C" simultaneously (Ctrl+C).

Note: This blink program test on "OS"
RASPBIAN JESSIE
Version: March 2016
Release date: 2016-03-18
Kernel version: 4.1

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Example:
- Blink Program

References:
- www.mlt-group.com
- www.mltelectronic.com
- www.raspberrypi.org

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