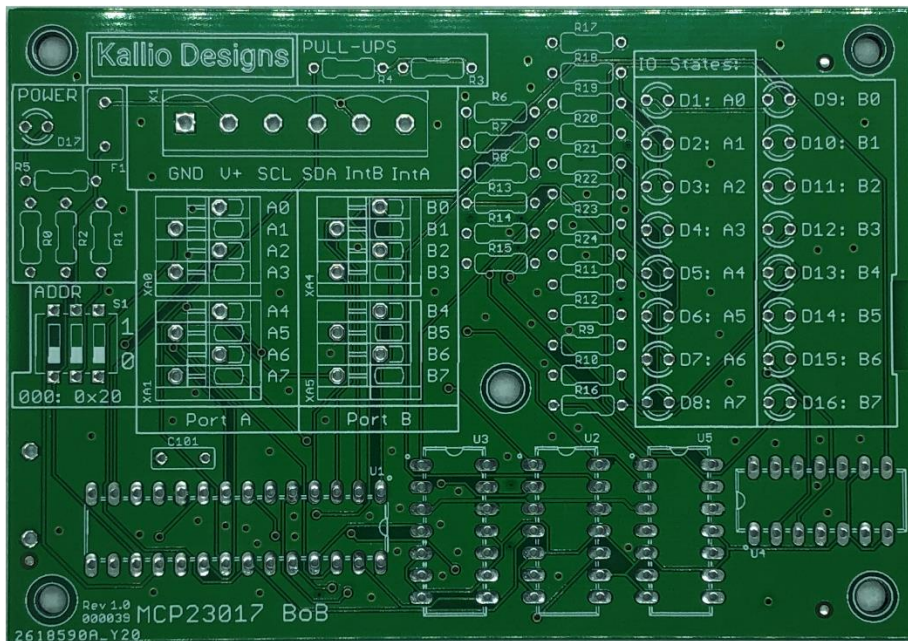


# MCP23017 GPIO BoB TH User Manual

220003-EN



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## 2. Introduction

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### 2.1. Product Summary

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Bare PCB to be used as breakout board for MCP23017 GPIO chip. Does not include the components. Components are available from most global suppliers.

GPIO BoB provides 16 inputs or outputs that have been routed to spring-cage PCB terminal blocks. The device has two interrupt outputs. GPIO states are indicated by on-board LEDs.

The product can be mounted by screws or by installing in a 35 mm DIN rail enclosure. Control interface for the inputs and outputs is I2C bus, commands according to MCP23017 specification.

### 2.2. Support

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Contact [sales@kalliodesigns.com](mailto:sales@kalliodesigns.com) for any question about installation, integration, technical specification.

## 3. Getting Started

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Order components from your chosen supplier. Visit [www.kalliodesigns.com](http://www.kalliodesigns.com) for pre-made shopping carts and BOMs in different format.

Assemble the board according to the board silk screen and BOM.

Connect power and I2C bus according to [pinout](#). Refer to MCP23017 for commands to be sent to control inputs and outputs.

### 3.1. I2C Pull Up Resistors

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Solder I2C pull up resistors if needed to positions R3 and R4. Recommended resistance is 4.7 kΩ.

## 4. Pinout

### 4.1. Input Connector

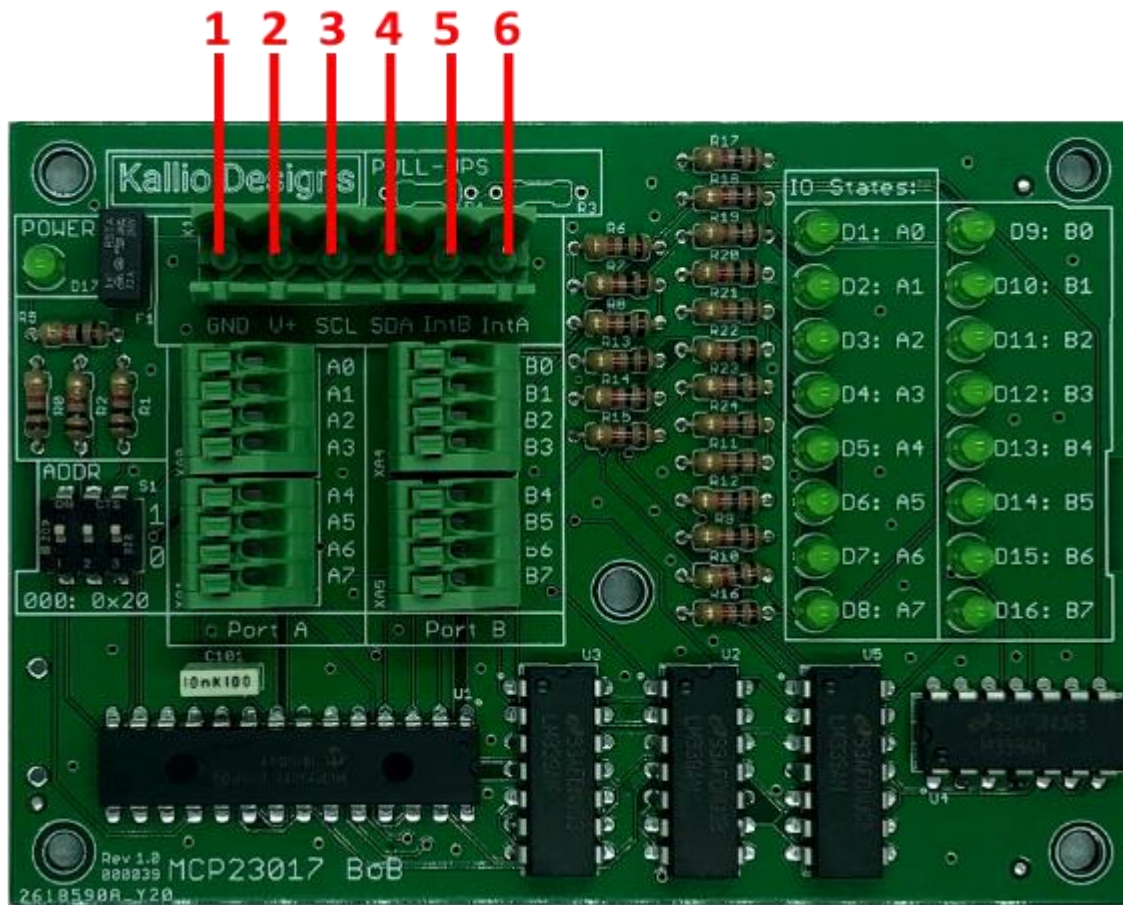


Image 1 (Illustrated as assembled board, ships as not assembled)

Pin no	Description
1	GND
2	5 V Input
3	I <sup>2</sup> C SCL
4	I <sup>2</sup> C SDA
5	External interrupt B
6	External interrupt A

Table 1

## 4.2. I/O Connector And Address Selector

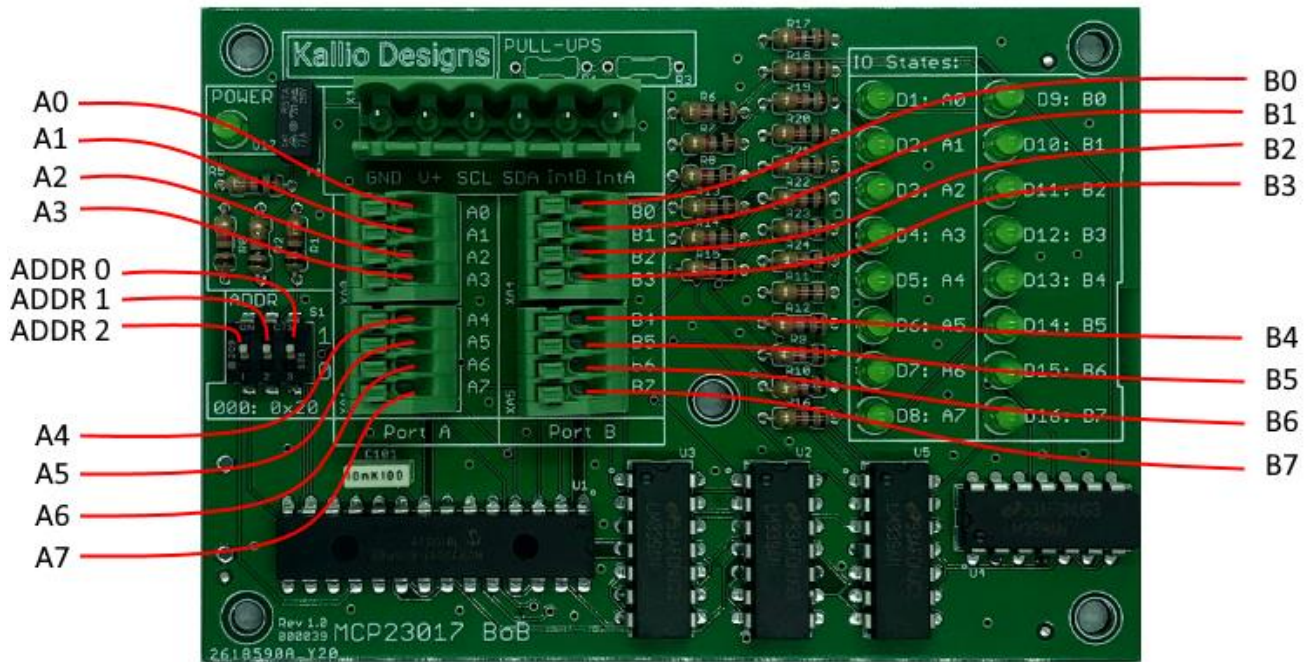


Image 2 (Illustrated as assembled board, ships as not assembled)

Pin no	Description
A0 - A7	MCP23017 GPIO PORT A
B0 - B7	MCP23017 GPIO PORT B
ADDR 0	Address selector LSB
ADDR 1	Address selector
ADDR 2	Address selector MSB

Table 2

## 5. Technical Specification

### 5.1. Schematic

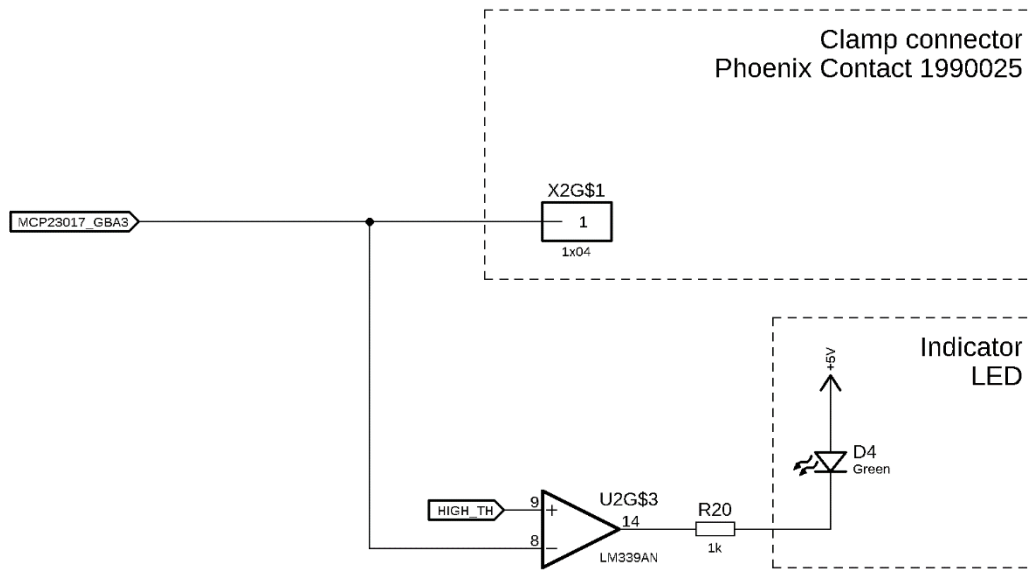


Image 3

Image 3 illustrates how each GPIO is connected directly to the wire connector and to a high impedance comparator for state indication. The comparator circuit will not affect the normal GPIO operation.

### 5.2. Mounting

Mounting holes are provided as in Image 3.

GPIO BoB can be mounted on standard 35 mm DIN rail using Degson Electronics DM72-100-14-00A(H) -enclosure.

### 5.3. Electrical Characteristics

Description	Conditions	Min	Typical	Max	Unit
Supply voltage		4.5		5.5	V
Operating current				100	mA
Operating temperature	non-condensing	0		60	°C
Storage temperature	non-condensing	-40		80	°C

Table 3

## 5.4. Dimensions

### 5.4.1. PCB

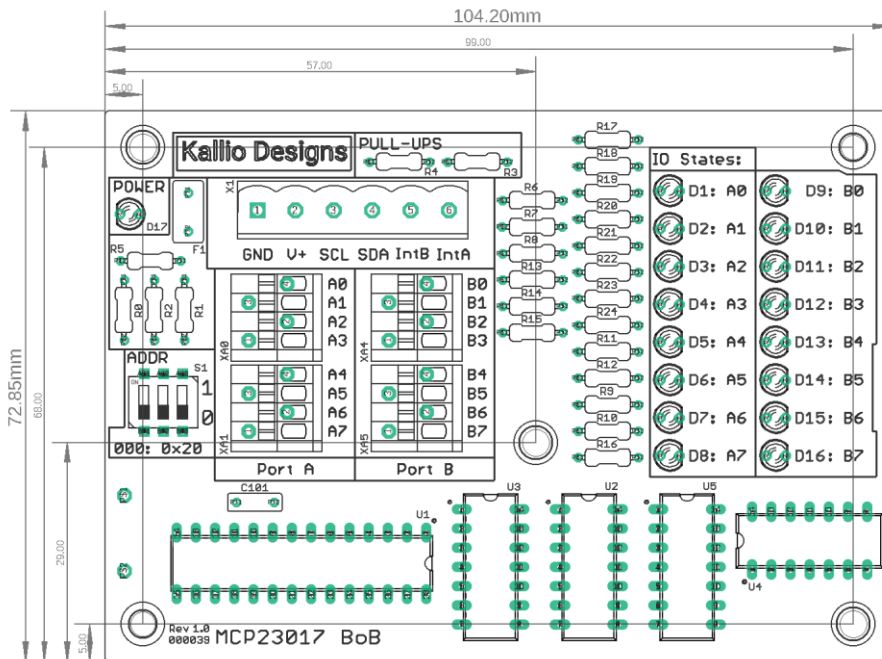


Image 4

## 6. Assembly

Compare Ref. Des. to silk screen markings on the PCB. Pay attention to placing the integrated circuits and LEDs to correct orientation. LED orientation is not clear on the silkscreen, so refer to the image below (image 4).

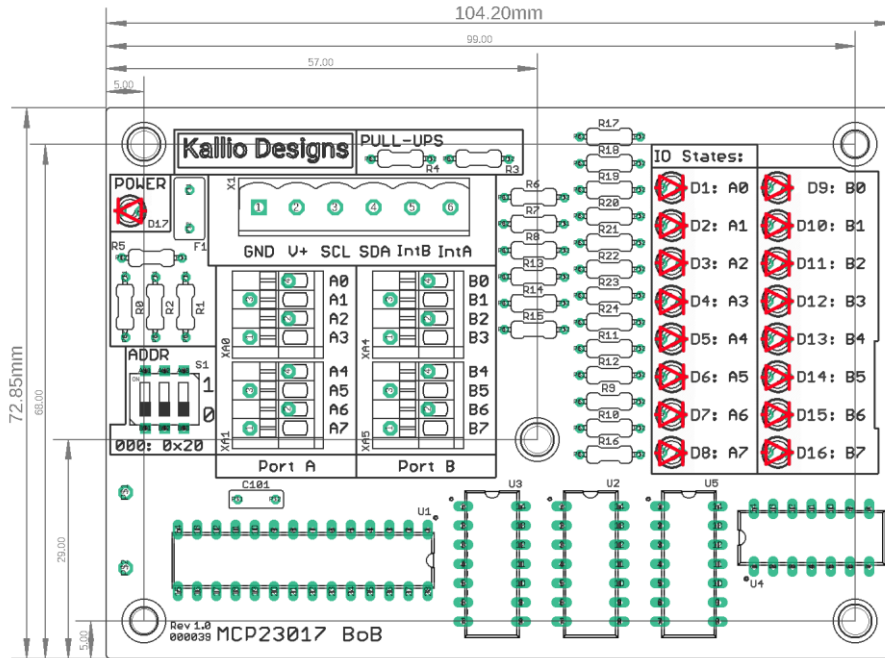


Image 5

LED cathodes are usually marked with a flat cut in the mold and a shorter lead.



## 6.1. BOM

Qty	Ref. Des.	Value	Manufacturer	MFG PN	Supplier	Supplier PN
4	XA0, XA1, XA4, XA5	1x04	Phoenix Contact	1990025	Digi-Key	277-1796-ND
1	X1	1758050	Phoenix Contact	1758050	Digi-Key	277-1132-ND
1	C101	10 nF	Kemet	R82EC2100AA50K	Digi-Key	399-5912-ND
1	F1	2 A Fuse	Bel Fuse Inc.	RSTA 2 BULK	Digi-Key	507-1859-ND
4	U2, U3, U4, U5	LM339AN	Texas Instruments	LM339AN	Digi-Key	296-6605-5-ND
1	U1	MCP23017	Microchip	MCP23017-E/SP	Digi-Key	MCP23017-E/SP-ND
17	D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12, D13, D14, D15, D16, D17	Green LED	Wurth Elektronik	151031VS06000	Digi-Key	732-5008-ND
23	R0, R1, R2, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24	1 kOhm	Stackpole Electronics Inc	CF14JT1K00	Digi-Key	CF14JT1K00CT-ND
2	R3, R4	Do not populate	DNP	DNP	DNP	DNP
1	S1	DIP Switch	CTS	209-3MS	Digi-Key	CT2093MS-ND

## 7. Example Arduino Code

All example codes are written using Adafruit Arduino library ([Adafruit-MCP23017-Arduino-Library](#)).

### 7.1. Simple Button input

```
#include <Wire.h>
#include "Adafruit_MCP23017.h"

// Basic pin reading and pullup test for the MCP23017 I/O expander

// Connect input connector terminal 3 (SCL) of the GBIO BoB to Arduino pin Analog 5 (i2c clock)
// Connect input connector terminal 4 (SDA) of the GBIO BoB to Arduino pin Analog 4 (i2c data)
// Connect all ADDR selector switches of GBIO BoB to 0 (address selection)
// Connect input connector terminal 2 (V+) of the GBIO BoB to 5V (power)
// Connect input connector terminal 1 (GND) of the GBIO to ground (common ground)

// Input #0 is on terminal A0 so connect a button or switch from there to ground

Adafruit_MCP23017 mcp;

void setup() {
  mcp.begin(); // use default address 0

  mcp.pinMode(0, INPUT);
  mcp.pullUp(0, HIGH); // turn on a 100K pullup internally

  pinMode(13, OUTPUT); // use the p13 LED as debugging
}

void loop() {
  // The LED will 'echo' the button
  digitalWrite(13, mcp.digitalRead(0));
}
```

Code block 1