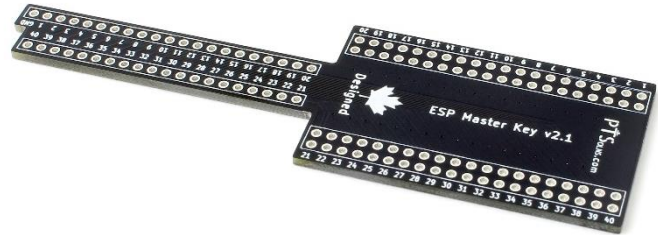


# ESP Master Key

## 1 DESCRIPTION

The PTSolns *ESP Master Key* v2.1 is a breakout board for a range of common ESP development boards. Prototyping with these types of development boards on a breadboard can be difficult. Many breadboard rows are covered by the development board that are needed to connect the rest of the circuit. This makes interfacing cumbersome as many wires must be routed under the development board to reach available rows on the breadboard. The *ESP Master Key* overcomes this common issue. The thin part of the *ESP Master Key* is placed over the center line breadboard division. In this way only a single row of pins on either side of the division is used to interface the development board. This frees up valuable breadboard space and makes prototyping more efficient.



## Table of Contents

1 DESCRIPTION.....	1
2 DOCUMENT REVISION HISTORY .....	2
3 PRODUCT FEATURES.....	2
3.1 Compatibility .....	2
3.3 Ground (GND).....	2
3.4 Silkscreen Printing .....	3
3.6 Mark of Authenticity.....	3
4 PHYSICAL PROPERTIES .....	3
5 ELECTRICAL PROPERTIES .....	4
6 USAGE AND APPLICATION.....	5
6.1 Typical Application.....	5
7 RECOMMENDED ACCESSORIES .....	5

## 2 DOCUMENT REVISION HISTORY

Current document revision is Rev 0.

## 3 PRODUCT FEATURES

This section highlights notable features of the *ESP Master Key v2.1*.

### 3.1 Compatibility

The *ESP Master Key* has two 2 X 20 Pin footprints, one on either side of the board. With the use of female header pins, these footprints allow for three different widths of microcontrollers to be interfaced. At the narrowest width, the *ESP Master Key* has a spacing of 8 times the standard pitch of 2.54 mm (0.1 in). At the intermediate width, the board has a spacing of 9 times the standard pitch. At the widest width, the board has a spacing of 10 times the standard pitch. All three width configurations are identified in Figure 1.

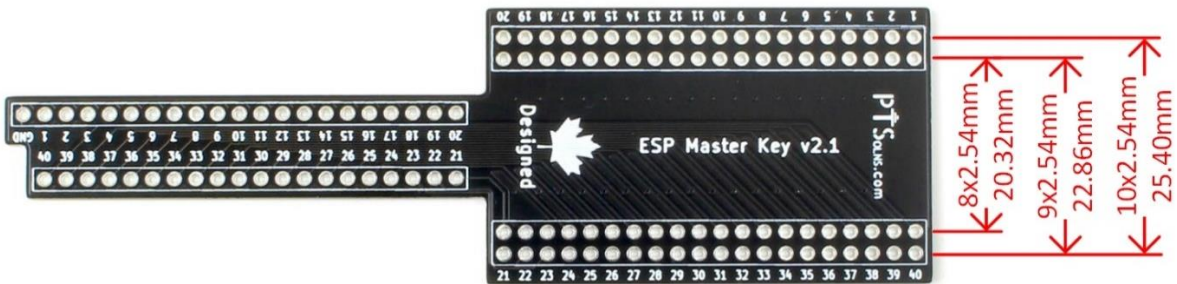


Figure 1: Compatibility of the ESP Master Key.

### 3.3 Ground (GND)

A ground (GND) pinout is located at the tip of the *ESP Master Key* as shown in Figure 2. This GND pinout is attached to ground planes covering large parts of the top and bottom layers of the board.

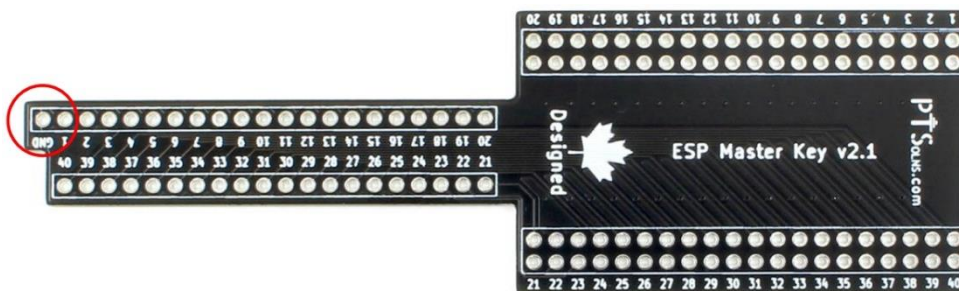


Figure 2: GND pinout of ESP Master Key.

### 3.4 Silkscreen Printing

Silkscreen printing exists on both sides of the board. This allows the user to easily identify matching pins. Components can be soldered on either side of the board.

### 3.6 Mark of Authenticity

Authentic PTSolns PCBs have a black solder mask color and are marked with the “PTSolns” logo in white silkscreen printing. The “Canadian Designed” symbol, consisting of the Canadian Maple Leaf with the word “Designed” underneath, can also be found on the PCB in white silkscreen printing. The “PTSolns” trademark and the “Canadian Designed” symbols are shown in Figure 3.

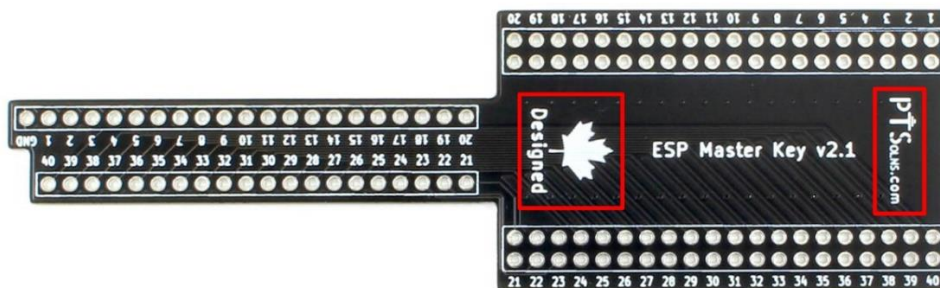


Figure 3: The “Canadian Designed” symbol found on authentic PTSolns PCBs.

## 4 PHYSICAL PROPERTIES

The physical properties of the *ESP Master Key* are outlined in Table 1.

Table 1: Physical Properties.

	Quantity	Value	Reference
<b>PCB</b>	Length (longest)	109.1 mm	Figure 4
	Width (longest)	32.7 mm	Figure 4
	Thickness	1.6 mm	Figure 4
	Weight	8 g	--
	Color	Black	--
	Silkscreen	White	--
<b>Tie-point</b>	Tie point spacing	2.54 mm/0.1 in	Figure 4
	Tie-point hole diameter	1.0 mm	Figure 5
	Tie-point copper pad diameter	1.7 mm	Figure 5
<b>Material</b>	Lead free HASL-RoHS surface finish		--
	FR-4 base		--

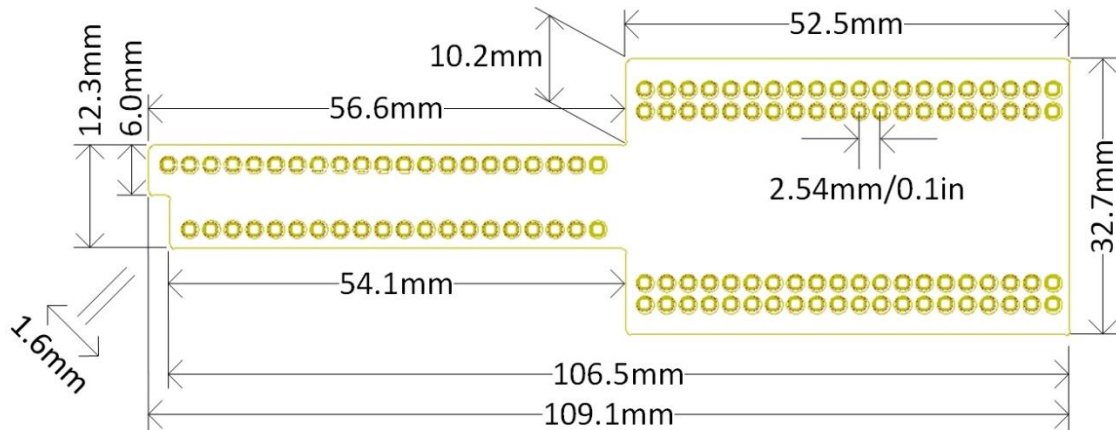


Figure 4: Dimensions of the ESP Master Key PCB.

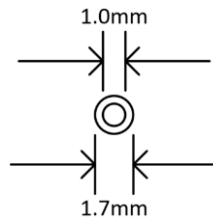


Figure 5: Dimensions of tie-point (left) and mounting hole (right).

## 5 ELECTRICAL PROPERTIES

The current rating of the *ESP Master Key* is outlined in Table 2. Electrical connections made by copper traces are shown in Figure 6. Copper traces have a weight of 1 oz/ft<sup>2</sup>.

Table 2: Current rating for *ESP Master Key*.

Type of trace	Current rating <sup>1</sup>
Any trace	0.5 A

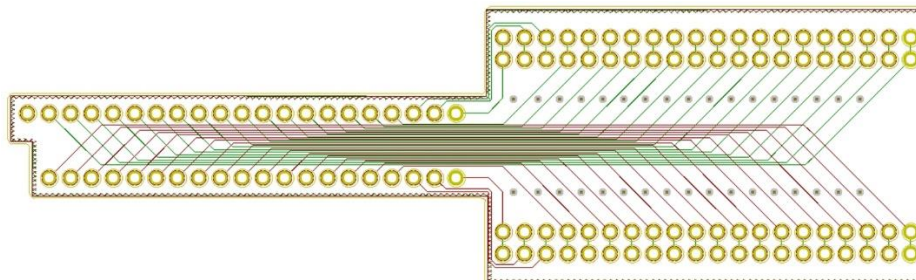


Figure 6: Electrical connections of the *ESP Master Key*.

<sup>1</sup> Current rating based on IPC-2221B and are in part determined assuming a maximum temperature rise of 20 °C.

## 6 USAGE AND APPLICATION

---

This section presents some usages and applications of the *ESP Master Key*.

### 6.1 Typical Application

This example shows a typical application of the *ESP Master Key*. Working with an ESP development board as one similar to the one depicted in Figure 7 can be difficult. The board is so wide that if placed directly onto a standard breadboard it would consume most of the available row space on the breadboard. This makes connecting the rest of the circuit to the development board challenging. This highlights the key feature of the *ESP Master Key*.

The image in Figure 7 shows a fully assembled *ESP Master Key* that has two 2 X 20 Pin female header pins soldered onto the top of the PCB. This is the recommended configuration for interfacing a range of microcontrollers. In the example shown in Figure 7 the microcontroller only requires the first 19 pins and hence the 20<sup>th</sup> pin on the female headers remains unused. With the *Key* in place, the breadboard is left with more available rows to connect the rest of the circuit to. The thin part of the *Key* only consumes a single row on either side of the breadboard centre division.

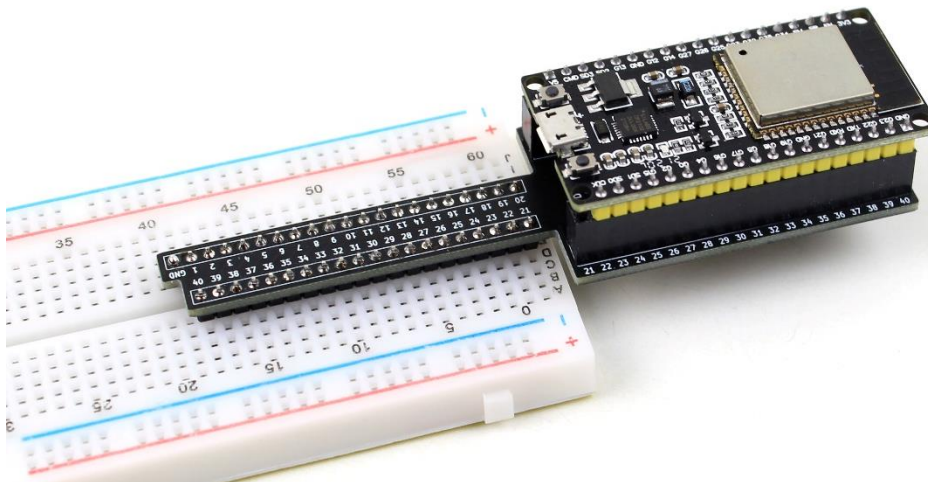


Figure 7: Typical application of ESP Master Key.

## 7 RECOMMENDED ACCESSORIES

---

The following is a list of recommended components and accessories to help the user best utilize the *ESP Master Key*.

- **Female header.** Pins: 1 X 20 Pin or 2 X 20 Pin; Pitch: 2.54 mm/0.1 in
- **Female header.** Pins: 1 X 21 Pin or 2 X 21 Pin; Pitch: 2.54 mm/0.1 in
- **Male header.** Pins: 1 X 20 Pin; Pitch: 2.54 mm/0.1 in
- **Male header.** Pins: 1 X 21 Pin; Pitch: 2.54 mm/0.1 in