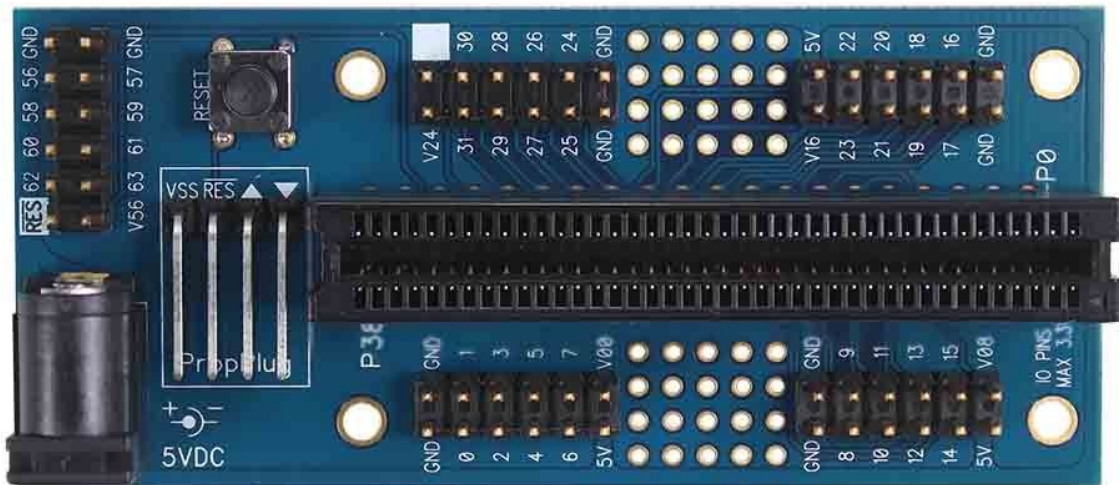# P2 Edge Mini Breakout Board (#64019)

The P2 Edge Mini Breakout Board provides a compact interface to the P2 Edge Module for experimenting and developing with the Propeller 2 microcontroller.

The board accepts the P2 Edge Module (#P2-EC) and includes a supply voltage DC Jack socket, Parallax Prop Plug (#32201) programming header, and reset button. Forty of the P2 Edge Smart I/O pins are available at five 0.1" pin header sockets, compatible with both single and dual header Propeller 2 accessories. Four accessory headers are arranged to accept single or dual P2 accessory boards, and the fifth single header breaks out the programming pins and is compatible with wireless programming using the P2 WX Adapter (#64007) with Parallax WX ESP8266 SIP module (#32420S).

Smart I/O pins P0–P31 and P56–P63 are available at pin headers. Pins P32–P55 may be accessed by adding jumper wires on the bottom side of the PCB to the mini prototyping sections. There are two 0.1" pitch 4x5 matrix prototyping sections on the board, positioned on either side of the edge connector.

Features

- Vertical socket for the Parallax P2 Edge Module (#P2-EC)
- Solder-free prototyping, header sockets for power, programming and I/O
- Center-positive 2.1 mm barrel jack for external 5 VDC power supply
- Convenient reset button
- 40 Smart I/O pins brought out to 0.1" 2x6 way P2 accessory headers
- Dedicated Parallax Prop Plug (#32201) header, for system programming and debugging

Key Specifications

- Voltage input requirements: 5 VDC, absolute maximum 5.5 VDC
- Input Current requirements:
    - Recommended minimum 100 mA
    - Maximum according to customer application
- VIO Power Supplies: 3.3 V up to 300 mA per 8 I/O pins; requires P2 Edge Module
- USB programming: Serial up to 2 MBaud; requires Prop Plug (#32201) programming adapter
- Wireless programming: (up to 2 MBaud); requires P2 WX WiFi Adapter (#64007) and WX WiFi SIP module (#32420S)
- Operating temperature: -40 to +185 °F (-40 to +85 °C)
- PCB Dimensions: 3.15 x 1.4 in (80 x 35.5 mm)

The P2 Edge Mini Breakout Board is compatible with a wide range of modules, adapters and accessories. See the Propeller 2 page at www.parallax.com.

Orientation

When connecting your P2 Edge Module to the P2 Edge Mini Breakout Board, ensure that the module is inserted with the P0 and P38 edge pads closest to the P0 and P38 labels which are marked on the breakout PCB, either side of the Edge Socket. Correct module orientation is shown in this image:

Compatible Products

See the Propeller 2 section of the Parallax web store for all of the products listed below.

Recommended Parts for Getting Started

- P2 Edge Module (#P2-EC)
- P2 Edge Mini Breakout Board (#64019)
- Cable, USB A to DC 2.1mm Jack (#805-00019)
- Breadboard (#700-32023)
- 200mm Jumper Wires, MF 40-piece Ribbon (#800-00064)
- 100mm Jumper Wires, MM 40-piece Ribbon (#800-00065)
- Prop Plug programming tool (#32201)
- USB A to Micro B Cable (#805-00016)

Add Wireless Programming & Serial Communication

- P2 to WX Adapter (#64007)
- Parallax WX ESP8266 WiFi Module - SIP (#32420S)

Add Click / mikroBUS development

The P2 to MicroBUS Click Adapter provides developers with connectivity to over 900 different mikroE Click modules for rapid development. Check out the Parallax webshop or your local distributor.

- P2 to MicroBUS Click Adapter (#64008)

Parallax Add-on Boards

These boards fit directly on the 2x6 accessory headers with no need for additional adapters.

- P2-ES Eval Board Accessory Set (#64006-ES). Set of eight, with pushbuttons, serial host, LED matrix, HDMI output, prototyping, serial device, Goertzel HID, and A/V breakout.
- HyperRAM & HyperFLASH Add-On
- Protoboard Add-on

Feature Descriptions

Read the full explanation of each labeled feature on the pages that follow this diagram.
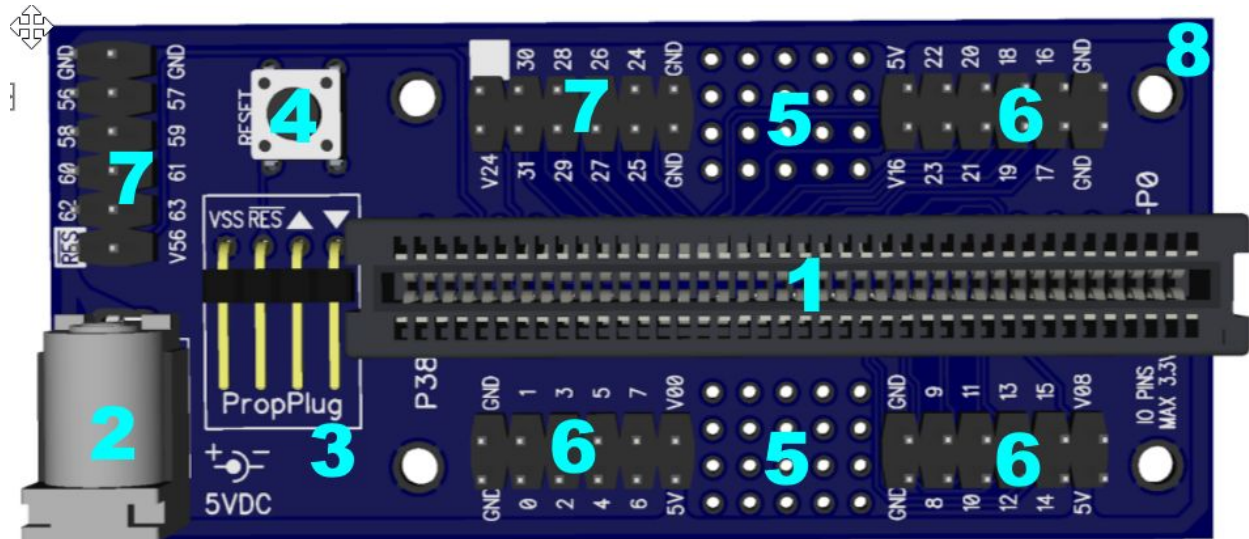
1. Parallax P2 Edge Module Socket

The P2 Edge Module socket is a 0.05 in (1.27 mm) pitch, 80-way vertical socket. Refer to Edge Connector Pin Assignments in the P2 Edge Module product guide for full details.

The P2 Edge Module must be inserted with the component side facing the RESET Button. There are silk-screen text markings beside the socket to indicate the positions of P0 and P38.

⚠️ **CAUTION! The P2 Edge Module power input pads have reverse polarity protection, but damage could occur from user circuits attached to the IO pins incorrectly, so care should always be taken to ensure correct orientation.**

2. Power Jack

The 2.1 mm center-positive DC power barrel jack socket accepts 5 VDC only. To provide power we recommend the Parallax USB A to DC-Jack cable (#805-00019) This will allow you to power the P2 Edge Breadboard from a computer USB port or hub. For higher current applications, connect the same cable to the Parallax USB Mains Adapter (#750-00001).

⚠️ **CAUTION! Always use a well-regulated power supply and do not exceed 5.5 VDC input!**

3. Prop Plug Programming Header

The P2 Edge Module is programmed by the Parallax Prop Plug programming tool (#32201). To accommodate the Prop Plug, there is a dedicated 4-pin programming and debugging header. The pins are marked ▽ △ RES VSS, and correspond to the pin labelling on the Prop Plug adapter.

Connect the Prop Plug to your computer with a suitable USB cable. Then, insert the Prop Plug onto the header pins with the Prop Plug components facing upward. The upward orientation allows you to see the RX and TX activity LEDs on the Prop Plug while programming or debugging data is being transmitted.

4. Reset Button

Use this button to restart the Propeller 2 microcontroller's program running on the P2 Edge Module. Press and hold to keep the microcontroller in reset. Press and release to reset, load and run the program in EEPROM.

5. Protoboard Matrix

The protoboard areas are unconnected 4 x 5 hole matrices arranged in 2 areas, for a total of 40 holes. The hole spacing is 0.1". Use these to add components and access additional Smart I/O pins directly from the Edge connector. Refer to the Edge Socket Pinout for details.

6. I/O Pin Accessory Headers (with 5V output)

With the P2 Edge Module plugged in, Each of the Propeller 2's 64 smart I/O pins connect to an accessory header, in specific groups of eight.

Each edge header provides two GND connections, a Vxx output pin supplying the voltage from the corresponding 3.3 V LDO voltage regulator (described here), and optionally a 5 V output, that is connected directly to the Power Jack.

⚠️ **DO NOT APPLY VOLTAGE TO THE Vxx Pin; it is a voltage output!** Be aware that some I/O pins are also connected to other peripheral circuits; see the Edge Connector Pin Assignments section.

7. I/O Pin Breakout Edge Headers (without 5V output)

There are two edge headers that do not have 5V routed to them, one for P24-–P31, and one for P56–P63.

The P24–P31 header is marked with a white silk square for the pin beside the Vxx pin. This unlabelled pin is unconnected, but may be used for connecting a user signal or voltage to a user accessory board or prototype board.

The P56–P63 header is marked with the RES pin label beside the V56 pin. The RES pin is active low, and is connected to the Propeller 2 microcontroller RESn circuit on the P2 Edge Module. Momentarily set this pin low to reset the Propeller 2.
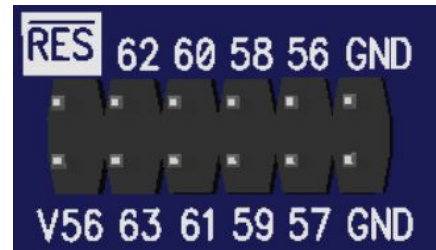
The P56–P63 header accepts the the Parallax P2 WX Adapter (#64007) with the Parallax ESP8266 SIP WiFi module (#32420S) in order to program the Propeller 2 wirelessly.

8. Mounting Holes

The four plated mounting holes are attached to the ground plane. See the PCB Dimensions section for mounting hole dimensions and spacing.

VIO 3.3V Power and Ground (GND) access

The positive 3.3 V supply sockets and ground sockets are positioned around the board at the 2x6 way P2 accessory headers. The headers are compatible with the Parallax P2 accessory boards, or use jumper wires to connect the header pins to an external circuit- for example, to a breadboard.

Each group of 8 smart I/O pins has its own 3.3 V low-noise regulator, with short-circuit and over-current protection. You may see this voltage referred to as VIO (Voltage for IO), and is labelled beside each group of I/O pins in the format Vxx.

The two digits after the V refer to the first of 8 I/O pins that the LDO provides power to. For example in the image, V48 would mean VIO voltage for I/O pins 48 to 55.

Warning: DO NOT join the Vxx pins together. The voltage output is intended to provide logic level and low current supply only to the corresponding group of 8 I/Os (Maximum 30mA per pin, 300 mA total). If a larger current or common supply is required, use an alternative power source such as the Parallax Power Pal (#32133)

Propeller 2 Physical Pins

The Propeller 2 physical pins are shown below. See the Propeller 2 documentation at www.parallax.com for more information about this device. Below, see the Edge Connector Pin Assignments section for details on how they are used on the P2 Edge Module.

Edge Connector Pin Assignments

Smart I/O pins P0–P55 are fully free; P56–P63 are routed to peripheral circuits and/or have special P2 boot sequence related functions.   See the Propeller 2 documentation at www.parallax.com for full details of P2 smart I/O pin capability.

I/O Pin	Description
P0-P7	Smart I/O pins, 3.3 V logic level, source or sink 30 mA per I/O pin. On-board LDO regulator supplies 300 mA total, shared by this I/O pin group and edge connector pin V00.
P8-P15	Smart I/O pins, 3.3 V logic level, source or sink 30 mA per I/O pin. On-board LDO regulator supplies 300 mA total, shared by this I/O pin group and edge connector pin V08.
P16-P23	Smart I/O pins, 3.3 V logic level, source or sink 30 mA per I/O pin. On-board LDO regulator supplies 300 mA total, shared by this I/O pin group and edge connector pin V16.
P24-P31	Smart I/O pins, 3.3 V logic level, source or sink 30 mA per I/O pin. On-board LDO regulator supplies 300 mA total, shared by this I/O pin group and edge connector pin V24.
P32-P39	Smart I/O pins, 3.3 V logic level, source or sink 30 mA per I/O pin. On-board LDO regulator supplies 300 mA total, shared by this I/O pin group and edge connector pin V32.
P40-P47	Smart I/O pins, 3.3 V logic level, source or sink 30 mA per I/O pin. On-board LDO regulator supplies 300 mA total, shared by this I/O pin group and edge connector pin V40.
P48-P55	Smart I/O pins, 3.3 V logic level, source or sink 30 mA per I/O pin. On-board LDO regulator supplies 300mA total, shared by this I/O pin group and edge connector pin V48.
P56-P63	Smart I/O pins, 3.3 V logic level, source or sink 30 mA per I/O pin. On-board LDO regulator supplies 300 mA total, shared by this I/O pin group and edge connector pin V56.
	Alternative functions for P56-P63
P56	Buffered LED
P57	Buffered LED
P58	Flash SPI DO (MISO)
P59	Flash SPI DI (MOSI)
P60	Flash SPI CLK
P61	Flash SPI CS
P62	Prop-Plug RXD (P2 TXD)
P63	Prop-Plug TXD (P2 RXD)
Other	**Description**
RESn	Internally pulled up to 3.3V with 10K resistor. P2 will reset when RESn driven low.
5V	Power input pins for the Edge Module. Connect both 5V edge connector pads to a good quality 5VDC supply. **The supply voltage MUST NOT exceed 5.5V!** Recommended minimum supply current 100mA, up to 3A for heavy load and multi-cog use.
GND	Provides common signal and supply voltage ground. Connection of all four edge connector GND pads to a solid ground plane on an external layer recommended.
NC	Not Connected, reserved for future use. Recommended "Do Not Connect" in designs.

Programming Software

Propeller Tool is our recommended tool for programming the P2 Edge Module in SPIN and PASM languages. Other programming languages are possible using third party tools, such as C, BASIC, Forth.

You can find links to the latest tools at the P2 Edge Module product page. Visit https://www.parallax.com and search for "P2-EC"

Resources and Downloads

Check for the latest version of this document, free software, and example programs from the P2 Edge Mini Breakout Board product page. Go to www.parallax.com and search 64019.

Recommend and Absolute Maximum Ratings

Symbol	Quantity	Recommended	Maximum	Units
5 VDC	DC Barrel Jack Supply Voltage †	5	5.5	V
P0 - P63	Any I/O Pin	3.3	3.6	V
RESn	Reset input, active low	3.3	3.6	V

P2 Edge Socket Pinout (PCB Bottom View)
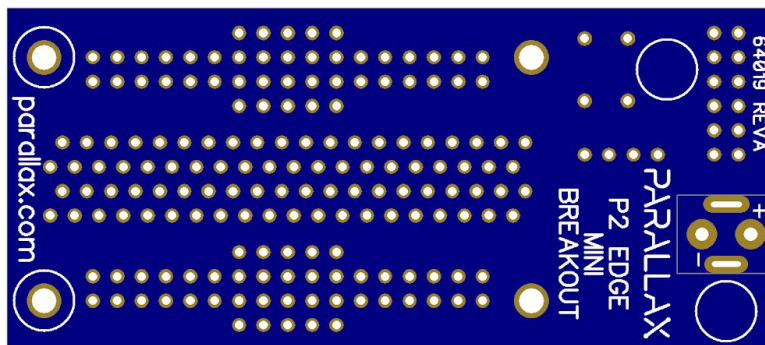
P1	P3	P5	P7	P9	P11	P13	P15	P17	P19	P21	P23	P25	P27	P29	P31	P33	P35	P37	NC
P0	P2	P4	P6	P8	P10	P12	P14	P16	P18	P20	P22	P24	P26	P28	P30	P32	P34	P36	NC
5V	GND	RESn	V08	P62	P60	P58	P56	V16	P54	P52	P50	P48	V24	P46	P44	P42	P40	V32	P38
5V	GND	GND	V00	P63	P61	P59	P57	V56	P55	P53	P51	P49	V48	P47	P45	P43	P41	V40	P39

Edge Socket Pinout – Bottom View

Board Dimensions
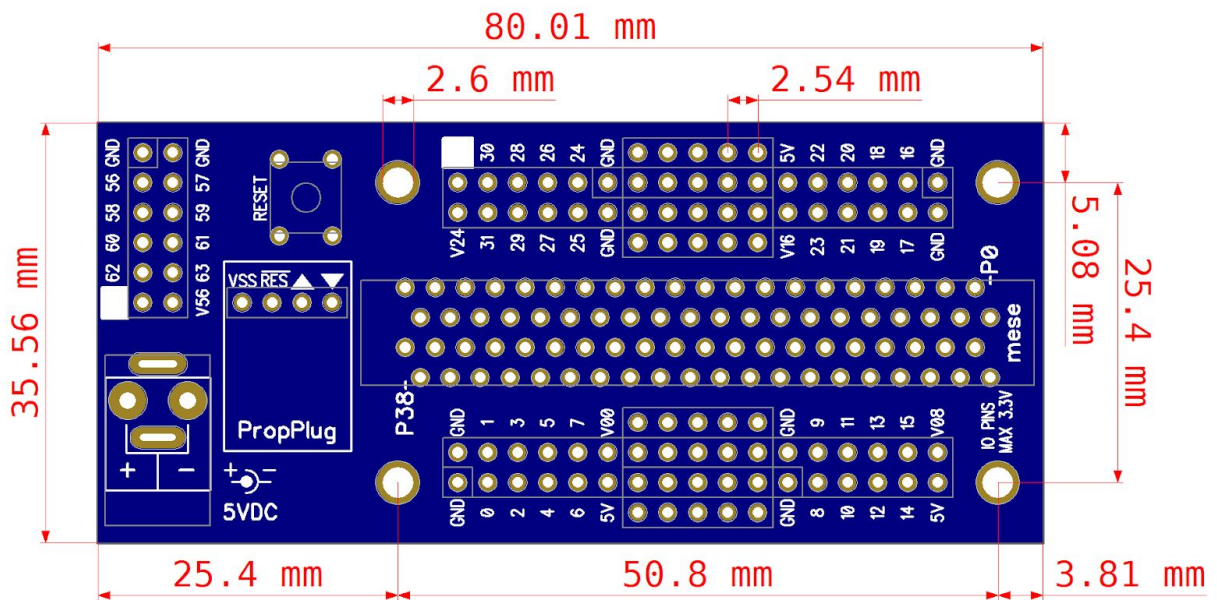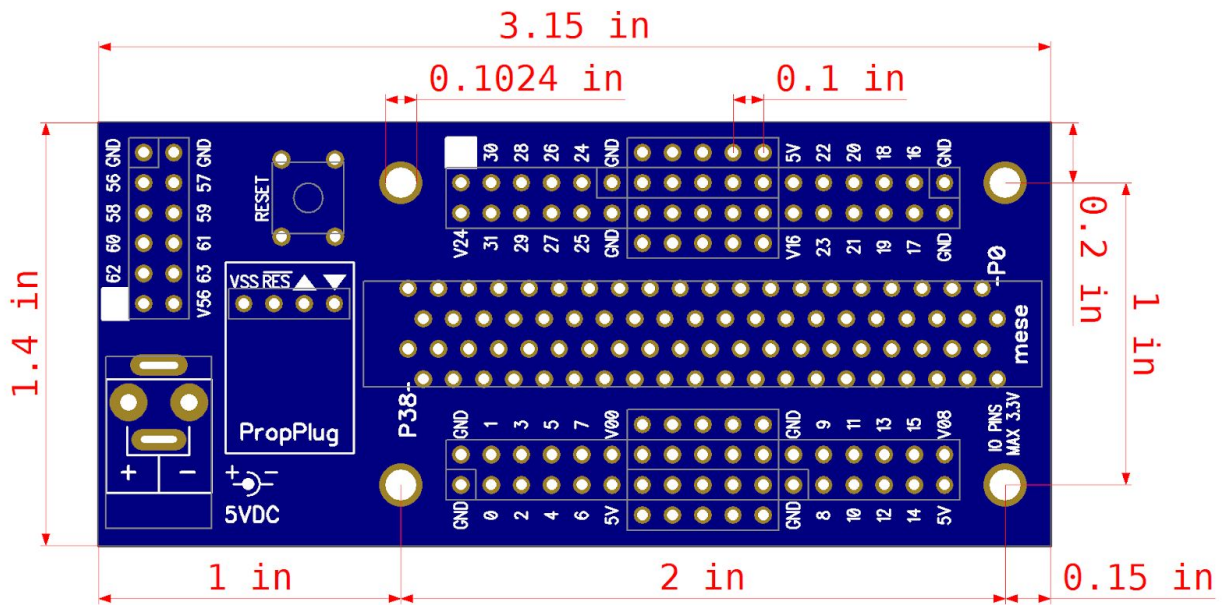
Revision History

Version 1.0: Original release. Version 1.1: Pinout images updated.