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Pre-release version 2022-03-14

This is an pre-release migration guide and the contents are subject to change.

The Particle P2 module is the next generation Wi-Fi module from Particle. It is footprint compatible with our prior module, the P1, but is built on an upgraded chipset, supporting advanced features such as 5 GHz Wi-Fi, a 200MHz CPU, and built-in Bluetooth BLE 5.0.

Feature	P2	P1	Argon
User application size	2048 KB (2 MB)	128 KB	256 KB
Flash file system[1]	2 MB		2 MB
MCU	RTL8721DM	STM32F205RGY6	nRF52840
	Realtek Semiconductor	ST Microelectronics	Nordic Semiconductor
CPU	Cortex M33 @ 200 MHz	Cortex M3 @ 120 MHz	Cortex M3 @ 64 MHz
	Cortex M23 @ 20 MHz		
RAM[2]	512 KB	128 KB	256 KB
Flash[3]	16 MB	1 MB	1 MB
Hardware FPU	✓		✓
Secure Boot	✓		
Trust Zone	✓		
Wi-Fi	802.11 a/b/g/n	802.11 b/g/n	802.11 b/g/n
2.4 GHz	✓	✓	✓
5 GHz	✓		
Bluetooth	BLE 5.0		BLE 5.0
NFC Tag			External antenna required
Antenna	Shared for Wi-Fi and BLE	Wi-Fi only	Separate Wi-Fi and BLE antennas
	Built-in PCB antenna (Wi-Fi & BLE)	Built-in PCB antenna (Wi-Fi)	Built-in chip antenna (BLE)
			Required external antenna (Wi-Fi)
	Optional external (Wi-Fi & BLE)[4]	Optional external (Wi-Fi)[4]	Optional external (BLE)[4]
Peripherals	USB 2.0	USB 1.1	USB 1.1
Digital GPIO	22	24	20
Analog (ADC)	6	13	6
Analog (DAC)		2	
UART	3	2	1
SPI	2	2	2
PWM	6	12	8
I2C	1	1	1
CAN		1	
I2S		1	1
JTAG		✓	

SWD	✓	✓	✓

[1]A small amount of the flash file system is used by Device OS, most is available for user data storage using the POSIX filesystem API. This is separate from the flash memory used for Device OS, user application, and OTA transfers.

[2] Total RAM; amount available to user applications is smaller.

[3] Total built-in flash; amount available to user applications is smaller. The Argon also has a 4 MB external flash, a portion of which is available to user applications as a flash file system.

[4] Onboard or external antenna is selectable in software.

Hardware

NO 5V TOLERANCE!

On Gen 2 devices (STM32F205), most pins are 5V tolerant. This is not the case for Gen 3 (nRF52840) and the P2 (RTL872x). You must not exceed 3.3V on any GPIO pin, including ports such as serial, I2C, and SPI.

PINS A3, A4, AND DAC (A6)

Pins A3 (module pin 22), A4 (module pin 21), DAC/A6 (module pin 24) do not exist on the P2 and are NC.

You will need to use different pins if you are currently using these pins.

SPI

Both the P1 and P2 have two SPI ports, however the pins are different for `SPI` (primary SPI).

	P1	P2
SPI SCK	A3	D20 / S2
SPI MISO	A4	D19 / S1
SPI MOSI	A5	D18 / S0

The following are all SPI-related pins on the P1 and P2:

Pin	P1 Pin Name	P1 SPI	P2 Pin Name	P2 SPI
21	A4	SPI (MISO)	NC	
22	A3	SPI (SCK)	NC	
23	A5	SPI (MOSI)	A5 / D14	
40	P1S0		S0 / D15	SPI (MOSI)
41	P1S1		S1 / D16	SPI (MISO)
42	P1S2		S2 / D17	SPI (SCK)
44	P1S3		S3 / D18	SPI (SS)
45	D2	SPI1 (MOSI)	D2	SPI1 (MOSI)
49	A2	SPI (SS)	A2 / D13	
51	D3	SPI1 (MISO)	D3	SPI1 (MISO)
52	D4	SPI1 (SCK)	D4	SPI1 (SCK)
53	D5	SPI1 (SS)	D5	SPI1 (SS)

SPI - Gen 2 devices (including P1)

	SPI	SPI1
Maximum rate	30 MHz	15 MHz
Default rate	15 MHz	15 MHz
Clock	60 MHz	30 MHz

- Available clock divisors: 2, 4, 8, 16, 32, 64, 128, 256

SPI - P2

	SPI	SPI1
Maximum rate	25 MHz	50 MHz
Hardware peripheral	RTL872x SPI1	RTL872x SPI0

I2C

The P2 supports one I2C (two-wire serial interface) port on the same pins as the P1:

Pin	P1 Pin Name	P1 I2C	P2 Pin Name	P2 I2C
35	D1	Wire (SCL)	D1 / A4	Wire (SCL)
36	D0	Wire (SDA)	D0 / A3	Wire (SDA)

- The P2 I2C port is not 5V tolerant
- The P1 includes internal 2.2K pull-up resistors on D0/D1, the P2 does not

SERIAL (UART)

The primary UART serial (`Serial1`) is on the TX and RX pins on both the P1 and P2. There is no hardware flow control on this port on the P1 or P2.

The secondary UART serial (`Serial2`) is on different pins, however it does not conflict with the RGB LED, and also supports CTS/RTS hardware flow control.

There is also a third UART serial (`Serial3`).

Pin	P1 Pin Name	P1 Serial	P2 Pin Name	P2 Serial
30	WKP / A7		D10 / WKP	Serial3 (CTS)
31	RGBB	Serial2 (RX)	RGBB	
32	RGBG	Serial2 (TX)	RGBG	
40	P1S0		S0 / D15	Serial3 (TX)
41	P1S1		S1 / D16	Serial3 (RX)
42	P1S2		S2 / D17	Serial3 (RTS)
45	D2		D2	Serial2 (RTS)
51	D3		D3	Serial2 (CTS)
52	D4		D4	Serial2 (TX)
53	D5		D5	Serial2 (RX)
63	RX	Serial1 (RX)	RX / D9	Serial1 (RX)
64	TX	Serial1 (TX)	TX / D8	Serial1 (TX)

	P1	P2
Buffer size	64 bytes	2048 bytes
7-bit mode	✓	✓
8-bit mode	✓	✓
9-bit mode	✓	
1 stop bit	✓	✓
2 stop bits	✓	✓
No parity	✓	✓
Even parity	✓	✓
Odd parity	✓	✓

Break detection	✓	
LIN bus support	✓	
Half duplex	✓	
CTS/RTS flow control		✓[1]

[1]CTS/RTS flow control only on Serial2. It is optional.

Supported Baud Rates:

Baud Rate	P1	P2
110		✓
300		✓
600		✓
1200	✓	✓
2400	✓	
4800	✓	
9600	✓	✓
14400		✓
19200	✓	✓
28800		✓
38400	✓	✓
57600	✓	✓
76800		✓
115200	✓	✓
128000		✓
153600		✓
230400	✓	✓
500000		✓
921600		✓
1000000		✓
1382400		✓
1444400		✓
1500000		✓
1843200		✓
2000000		✓
2100000		✓
2764800		✓
3000000		✓
3250000		✓
3692300		✓
3750000		✓
4000000		✓
6000000		✓

ANALOG INPUT (ADC)

For analog to digital conversion (ADC) using `analogRead()`, there are fewer ADC inputs on the P2:

Pin	P1 Pin Name	P1 ADC	P2 Pin Name	P2 ADC
21	A4	✓	NC	
22	A3	✓	NC	
23	A5	✓	A5 / D14	✓
24	DAC / A6	✓	NC	
30	WKP / A7	✓	D10 / WKP	
35	D1		D1 / A4	✓
36	D0		D0 / A3	✓
40	P1S0	✓	S0 / D15	
41	P1S1	✓	S1 / D16	
42	P1S2	✓	S2 / D17	
43	A1	✓	A1 / D12	✓
44	P1S3	✓	S3 / D18	
48	P1S5	✓	S5 / D20	
49	A2	✓	A2 / D13	✓
50	A0	✓	A0 / D11	✓

On the P2, there are no pins A3 (hardware pin 21) and A4 (hardware pin 22); these are NC (no connection). However, P2 pin D0 (hardware pin 36) can be used as an analog input and has the alias A3. The same is true for P2 pin D1 (hardware pin 35), which has the alias A4.

The `setADCSampleTime()` function is not supported on the P2.

PWM (PULSE-WIDTH MODULATION)

The pins that support PWM are different on the P1 and P2.

Pin	P1 Pin Name	P1 PWM	P2 Pin Name	P2 PWM
21	A4	✓	NC	
23	A5	✓	A5 / D14	✓
30	WKP / A7	✓	D10 / WKP	
33	P1S6	✓	S6 / D21	
35	D1	✓	D1 / A4	✓
36	D0	✓	D0 / A3	✓
40	P1S0	✓	S0 / D15	✓
41	P1S1	✓	S1 / D16	✓
45	D2	✓	D2	
49	A2		A2 / D13	✓
51	D3	✓	D3	
63	RX	✓	RX / D9	
64	TX	✓	TX / D8	

All available PWM pins on the P2 share a single timer. This means that they must all share a single frequency, but can have different duty cycles.

DIGITAL TO ANALOG CONVERTER (DAC)

The P1 supports DAC one A3 and A6 (DAC). There is no DAC on the P2 or Gen 3 devices.

If you need a DAC, it's easy to add one via I2C or SPI on your base board.

Pin	P1 Pin Name	P1 DAC	P2 Pin Name	P2 DAC
22	A3	✓	NC	
24	DAC / A6	✓	NC	

WKP (A7)

	P1	P2
Module Pin	30	30
Pin Name	WKP	WKP
	A7	D11
Analog Input	✓	
PWM	✓	

On Gen 2 devices (STM32), only the WKP pin can wake from HIBERNATE sleep mode.

This restriction does not exist on the P2 and Gen 3 devices; any pin can be used to wake from all sleep modes.

CAN (CONTROLLER AREA NETWORK)

The P1 supports CAN on pins D1 and D2. There is no CAN on the P2 or Gen 3 devices (except the Tracker).

- The Tracker SoM includes CAN via a MCP25625 CAN interface with integrated transceiver.
- Both the MCP2515 and MCP25625 work with the library used on the Tracker and can be used to add CAN to the P2.

Pin	P1 Pin Name	P1 CAN	P2 Pin Name	P2 CAN
35	D1	✓	D1 / A4	
45	D2	✓	D2	

I2S (SOUND)

The P1 theoretically had I2S sound available on pins D1 and D2, however there has never been support for it in Device OS.

There is no software support for I2S on the P2 either, and while the RTL872x hardware supports I2S, the pins that it requires are in use by other ports.

Pin	P1 Pin Name	P1 I2S	P2 Pin Name	P2 I2S
45	D2	I2S3_SD	D2	
46	MODE	I2S3_MCK	MODE	
52	D4	I2S3_SCK	D4	
53	D5	I2S3_WS	D5	

INTERRUPTS

There are many limitations for interrupts on the STM32F205. All pins can be used for interrupts on Gen 3 devices and the P2.

RETAINED MEMORY

Retained memory, also referred to as Backup RAM or SRAM, that is preserved across device reset, is not available on the P2. This also prevents system usage of retained memory, including session resumption on reset.

On Gen 2 and Gen 3 devices, retained memory is 3068 bytes.

The flash file system can be used for data storage on the P2, however care must be taken to avoid excessive wear of the flash for frequently changing data.

FLASH FILE SYSTEM

The P1 did not have a flash file system.

The P2 has a 2 MB flash file system using the same POSIX API as Gen 3 devices. A small amount of space is reserved for system use including configuration data. Most of the space is available for user application use.

EEPROM

The EEPROM emulation API is the same across the P1 and P2.

The P1 had 2047 bytes of emulated EEPROM. The P2 has 4096 bytes of emulated EEPROM. On the P2 and Gen 3 devices, the EEPROM is actually just a file on the flash file system.

PIN FUNCTIONS REMOVED

The following pins served P1-specific uses and are NC on the P2. You should not connect anything to these pins.

Pin	Pin Name	Description
7	WL_REG_ON	BCM43362 Debugging Pin.
16	WL_JTAG_TDI	BCM43362 Debugging Pin.
17	WL_JTAG_TCK	BCM43362 Debugging Pin.
18	WL_JTAG_TRSTN	BCM43362 Debugging Pin.
19	WL_JTAG_TMS	BCM43362 Debugging Pin.
20	WL_JTAG_TDO	BCM43362 Debugging Pin.
21	A4	A4 Analog in, GPIO, SPI.
22	A3	A3 True analog out, analog in, GPIO.
24	DAC / A6	DAC/A6 True analog out, analog in, GPIO.
38	VBAT	Battery for internal real-time clock, backup registers, and SRAM. Supply 1.65VDC to 3.6 VDC at 19 µA..
56	BTCX_STATUS	Coexistence signal: Bluetooth status and TX/RX direction.
57	BTCX_RF_ACTIVE	Coexistence signal: Bluetooth is active.
58	BTCX_TXCONF	Output giving Bluetooth permission to TX.
60	WL_SLEEP_CLK	BCM43362 Debugging Pin

PIN FUNCTIONS ADDED

The following pins were NC on the P1 but are used on the P2.

Pin	Pin Name	Description
12	VBAT_MEAS	Battery voltage measurement (optional).

FULL MODULE PIN COMPARISON

Module Pin 1 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Module Pin 2 (VBAT_WL / 3V3_RF)

	P1	P2
Pin Name	VBAT_WL	3V3_RF
Description	Battery for BCM43362.	3.3V power to RF module

Module Pin 3 (VBAT_WL / 3V3_RF)

	P1	P2
Pin Name	VBAT_WL	3V3_RF
Description	Battery for BCM43362.	3.3V power to RF module

Module Pin 4 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Module Pin 5 (VDDIO_3V3_WL / 3V3_IO)

	P1	P2
Pin Name	VDDIO_3V3_WL	3V3_IO
Description	Regulated 3.3V DC power input for BCM43362.	3.3V power to MCU IO.

Module Pin 6 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Module Pin 7 (WL_REG_ON / NC)

	P1	P2
Pin Name	WL_REG_ON	NC
Description	BCM43362 Debugging Pin.	No connection. Do not connect anything to this pin.

Module Pin 8 (NC)

	Unchanged between P1 and P2
Pin Name	NC

Description	No connection. Do not connect anything to this pin.

Module Pin 9 (NC)

	Unchanged between P1 and P2
Pin Name	NC
Description	No connection. Do not connect anything to this pin.

Module Pin 10 (NC)

	Unchanged between P1 and P2
Pin Name	NC
Description	No connection. Do not connect anything to this pin.

Module Pin 11 (NC)

	Unchanged between P1 and P2
Pin Name	NC
Description	No connection. Do not connect anything to this pin.

Module Pin 12 (NC / VBAT_MEAS)

	P1	P2
Pin Name	NC	VBAT_MEAS
Description	No connection. Do not connect anything to this pin.	Battery voltage measurement (optional).

Module Pin 13 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Module Pin 14 (NC)

	Unchanged between P1 and P2
Pin Name	NC
Description	No connection. Do not connect anything to this pin.

Module Pin 15 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Module Pin 16 (WL_JTAG_TDI / NC)

	P1	P2
Pin Name	WL_JTAG_TDI	NC
Description	BCM43362 Debugging Pin.	No connection. Do not connect anything to this pin.

Module Pin 17 (WL_JTAG_TCK / NC)

	P1	P2
Pin Name	WL_JTAG_TCK	NC

Description	BCM43362 Debugging Pin.	No connection. Do not connect anything to this pin.

Module Pin 18 (WL_JTAG_TRSTN / NC)

	P1	P2
Pin Name	WL_JTAG_TRSTN	NC
Description	BCM43362 Debugging Pin.	No connection. Do not connect anything to this pin.

Module Pin 19 (WL_JTAG_TMS / NC)

	P1	P2
Pin Name	WL_JTAG_TMS	NC
Description	BCM43362 Debugging Pin.	No connection. Do not connect anything to this pin.

Module Pin 20 (WL_JTAG_TDO / NC)

	P1	P2
Pin Name	WL_JTAG_TDO	NC
Description	BCM43362 Debugging Pin.	No connection. Do not connect anything to this pin.

Module Pin 21 (A4 / NC)

	P1	P2
Pin Name	A4	NC
Description	A4 Analog in, GPIO, SPI.	No connection. Do not connect anything to this pin.
Supports digitalRead	Yes	n/a
Supports digitalWrite	Yes	n/a
Supports analogRead	Yes	n/a
Supports analogWrite (PWM)	Yes. D3 and A4 share the same PWM channel and the PWM duty cycle is set for both.	n/a
Supports tone	Yes. D3 and A4 share the same PWM channel and only one frequency can be set for both.	n/a
SPI interface	MISO. Use SPI object.	n/a
Supports attachInterrupt	Yes. D1 and A4 share the same interrupt handler.	n/a
Input is 5V Tolerant	Yes	n/a

Module Pin 22 (A3 / NC)

	P1	P2
Pin Name	A3	NC
Description	A3 True analog out, analog in, GPIO.	No connection. Do not connect anything to this pin.
Supports digitalRead	Yes	n/a
Supports digitalWrite	Yes	n/a
Supports analogRead	Yes	n/a
Supports analogWrite (DAC)	Yes	n/a

SPI interface	SCK. Use SPI object.	n/a
Supports attachInterrupt	Yes. D2, A0, and A3 share the same interrupt handler.	n/a

Module Pin 23 (A5)

	P1	P2
Pin Name	A5	A5
Pin Alternate Name	n/a	D14
Description	A5 Analog in, GPIO, SPI.	A5 Analog in, GPIO, PWM.
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	Yes	Yes
Supports analogWrite (PWM)	Yes. D2 and A5 share the same PWM channel and the PWM duty cycle is set for both.	Yes
Supports tone	Yes. D2 and A5 share the same PWM channel and only one frequency can be set for both.	Yes
SPI interface	MOSI. Use SPI object.	n/a
Supports attachInterrupt	No	Yes
Input is 5V Tolerant	Yes	No

Module Pin 24 (DAC / NC)

	P1	P2
Pin Name	DAC	NC
Pin Alternate Name	A6	n/a
Description	DAC/A6 True analog out, analog in, GPIO.	No connection. Do not connect anything to this pin.
Supports digitalRead	Yes	n/a
Supports digitalWrite	Yes	n/a
Supports analogRead	Yes	n/a
Supports analogWrite (DAC)	Yes	n/a
Supports attachInterrupt	Yes. D3, DAC/A6, and P1S3 share the same interrupt handler.	n/a

Module Pin 25 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Module Pin 26 (3V3)

	Unchanged between P1 and P2
Pin Name	3V3
Description	3.3V power to MCU

Module Pin 27 (3V3)

	Unchanged between P1 and P2

Pin Name	3V3
Description	3.3V power to MCU

Module Pin 28 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Module Pin 29 (RGBR)

	P1	P2
Pin Name	RGBR	RGBR
Description	RGB LED Red	RGB LED Red
Supports attachInterrupt	n/a	Yes
Input is 5V Tolerant	No, if LED is connected.	No

Module Pin 30 (WKP / D10)

	P1	P2
Pin Name	WKP	D10
Pin Alternate Name	A7	WKP
Description	WKP/A7 Wakeup (active high), analog in, GPIO.	D10 GPIO, Serial 3 CTS. (Was WKP/A7 on P1.)
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	Yes	n/a
Supports analogWrite (PWM)	Yes	No
Supports tone	Yes	No
UART serial	n/a	CTS. Use Serial3 object. Flow control optional.
Supports attachInterrupt	Yes. WKP/A7, P1S0, and P1S2 share the same interrupt handler.	Yes
Input is 5V Tolerant	Yes	No

Module Pin 31 (RGBB)

	P1	P2
Pin Name	RGBB	RGBB
Description	RGB LED Blue	RGB LED Blue
UART serial	RX. Use Serial2 object.	n/a
Supports attachInterrupt	n/a	Yes
Input is 5V Tolerant	No, if LED is connected.	No

Module Pin 32 (RGBG)

	P1	P2
Pin Name	RGBG	RGBG
Description	RGB LED Green	RGB LED Green
UART serial	TX. Use Serial2 object.	n/a

Supports attachInterrupt	n/a	Yes
Input is 5V Tolerant	No, if LED is connected.	No

Module Pin 33 (P1S6 / S6)

	P1	P2
Pin Name	P1S6	S6
Pin Alternate Name	n/a	D21
Description	P1S6 GPIO	S6 GPIO. (Was P1S6/TESTMODE on P1.)
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogWrite (PWM)	Yes	No
Supports tone	Yes	No
Supports attachInterrupt	Yes	Yes

Module Pin 34 (RST)

	Unchanged between P1 and P2
Pin Name	RST
Description	Hardware reset. Pull low to reset; can leave unconnected in normal operation.

Module Pin 35 (D1)

	P1	P2
Pin Name	D1	D1
Pin Alternate Name	n/a	A4
Description	D1 GPIO, I2C, CAN	D1 GPIO, PWM, I2C SCL, A4 Analog In
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	No	Yes
Supports analogWrite (PWM)	Yes	Yes
Supports tone	Yes	Yes
I2C interface	SCL. Use Wire object. Use 1.5K to 10K external pull-up resistor. Is 5V tolerant.	SCL. Use Wire object. Use 1.5K to 10K external pull-up resistor.
Supports attachInterrupt	Yes. D1 and A4 share the same interrupt handler.	Yes
CAN interface	CAN2_TX	n/a
Input is 5V Tolerant	Yes	No

Module Pin 36 (D0)

	P1	P2
Pin Name	D0	D0
Pin Alternate Name	n/a	A3
Description	D0 GPIO, I2C	D0 GPIO, PWM, I2C SDA, A3 Analog In

Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	No	Yes
Supports analogWrite (PWM)	Yes	Yes
Supports tone	Yes	Yes
I2C interface	SDA. Use Wire object. Use 1.5K to 10K external pull-up resistor. Is 5V tolerant.	SDA. Use Wire object. Use 1.5K to 10K external pull-up resistor.
Supports attachInterrupt	No	Yes
Input is 5V Tolerant	Yes	No

Module Pin 37 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Module Pin 38 (VBAT / NC)

	P1	P2
Pin Name	VBAT	NC
Description	Battery for internal real-time clock, backup registers, and SRAM. Supply 1.65VDC to 3.6 VDC at 19 µA..	No connection. Do not connect anything to this pin.

Module Pin 39 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Module Pin 40 (P1S0 / S0)

	P1	P2
Pin Name	P1S0	S0
Pin Alternate Name	n/a	D15
Description	P1S0 Analog in, GPIO, PWM.	S0 GPIO, PWM, SPI MOSI, Serial3 TX. (Was P1S0 on P1.)
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	Yes	No
Supports analogWrite (PWM)	Yes	Yes
Supports tone	Yes.	Yes
UART serial	n/a	TX. Use Serial3 object.
SPI interface	n/a	MOSI. Use SPI object.
Supports attachInterrupt	Yes. WKP/A7, P1S0, and P1S2 share the same interrupt handler.	Yes

Input is 5V Tolerant	Yes	No

Module Pin 41 (P1S1 / S1)

	P1	P2
Pin Name	P1S1	S1
Pin Alternate Name	n/a	D16
Description	P1S1 Analog in, GPIO, PWM.	S1 GPIO, PWM, SPI MISO, Serail3 RX. (Was P1S1 on P1.)
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	Yes	No
Supports analogWrite (PWM)	Yes	Yes
Supports tone	Yes.	Yes
UART serial	n/a	RX. Use Serial3 object.
SPI interface	n/a	MISO. Use SPI object.
Supports attachInterrupt	Yes. P1S1 and P1S5 share the same interrupt handler.	Yes
Input is 5V Tolerant	Yes	No

Module Pin 42 (P1S2 / S2)

	P1	P2
Pin Name	P1S2	S2
Pin Alternate Name	n/a	D17
Description	P1S2 Analog in, GPIO	S2 GPIO, SPI SCK, Serial3 RTS. (Was P1S2 on P1.)
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	Yes	No
UART serial	n/a	RTS. Use Serial3 object. Flow control optional.
SPI interface	n/a	SCK. Use SPI object.
Supports attachInterrupt	Yes. WKP/A7, P1S0, and P1S2 share the same interrupt handler.	Yes
Input is 5V Tolerant	Yes	No

Module Pin 43 (A1)

	P1	P2
Pin Name	A1	A1
Pin Alternate Name	n/a	D12
Description	A1 Analog in, GPIO	A1 Analog in, GPIO
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	Yes	Yes
Supports attachInterrupt	Yes. D4 and A1 share the same interrupt handler.	Yes

Input is 5V Tolerant	Yes	No

Module Pin 44 (P1S3 / S3)

	P1	P2
Pin Name	P1S3	S3
Pin Alternate Name	n/a	D18
Description	P1S3 Analog in, GPIO	S3 GPIO. (Was P1S3 on P1.), SPI SS
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	Yes	No
SPI interface	n/a	Default SS for SPI.
Supports attachInterrupt	Yes. D3, DAC/A6, and P1S3 share the same interrupt handler.	Yes
Input is 5V Tolerant	Yes	No

Module Pin 45 (D2)

	P1	P2
Pin Name	D2	D2
Description	D2 GPIO, SPI1, CAN	D2 GPIO, Serial2 RTS, SPI1 MOSI
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogWrite (PWM)	Yes. D2 and A5 share the same PWM channel and the PWM duty cycle is set for both.	No
Supports tone	Yes. D2 and A5 share the same PWM channel and only one frequency can be set for both.	No
UART serial	n/a	RTS. Use Serial2 object. Flow control optional.
SPI interface	MOSI. Use SPI1 object.	MOSI. Use SPI1 object.
Supports attachInterrupt	Yes. D2, A0, and A3 share the same interrupt handler.	Yes
CAN interface	CAN2_RX	n/a
I2S interface	I2S3_SD	n/a
Input is 5V Tolerant	Yes	No

Module Pin 46 (MODE)

	P1	P2
Pin Name	MODE	MODE
Description	MODE button, has internal pull-up. Pin number constant is BTN.	MODE button, has internal pull-up. Pin number constant is BTN.
Supports attachInterrupt	n/a	Yes
I2S interface	I2S3_MCK	n/a

Module Pin 47 (P1S4 / S4)

	P1	P2
Pin Name	P1S4	S4
Pin Alternate Name	n/a	D19
Description	P1S4 GPIO	S4 GPIO. (Was P1S4 on P1.)
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports attachInterrupt	Yes. D7 and P1S4 share the same interrupt handler.	Yes
Input is 5V Tolerant	Yes	No

Module Pin 48 (P1S5 / S5)

	P1	P2
Pin Name	P1S5	S5
Pin Alternate Name	n/a	D20
Description	P1S5 Analog in, GPIO	S5 GPIO. (Was P1S5 on P1.)
Supports digitalRead	Yes	No
Supports digitalWrite	Yes	Yes
Supports analogRead	Yes	No
Supports attachInterrupt	Yes. P1S1 and P1S5 share the same interrupt handler.	Yes
Input is 5V Tolerant	Yes	No

Module Pin 49 (A2)

	P1	P2
Pin Name	A2	A2
Pin Alternate Name	n/a	D13
Description	A2 Analog in, GPIO, SPI SS	A2 Analog in, PWM, GPIO
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	Yes	Yes
Supports analogWrite (PWM)	No	Yes
Supports tone	No	Yes
SPI interface	SS. Use SPI object. This is only the default SS/CS pin, you can use any GPIO instead.	n/a
Supports attachInterrupt	Yes	Yes
Input is 5V Tolerant	Yes	No

Module Pin 50 (A0)

	P1	P2
Pin Name	A0	A0
Pin Alternate Name	n/a	D11
Description	A0 Analog in, GPIO	A0 Analog in, GPIO
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	Yes	Yes

Supports attachInterrupt	Yes. D2, A0, and A3 share the same interrupt handler.	Yes
Input is 5V Tolerant	Yes	No

Module Pin 51 (D3)

	P1	P2
Pin Name	D3	D3
Description	D3 GPIO, SPI1	D3 GPIO, Serial2 CTS, SPI1 MISO
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogWrite (PWM)	Yes. D3 and A4 share the same PWM channel and the PWM duty cycle is set for both.	No
Supports tone	Yes. D3 and A4 share the same PWM channel and only one frequency can be set for both.	No
UART serial	n/a	CTS. Use Serial2 object. Flow control optional.
SPI interface	MISO. Use SPI1 object.	MISO. Use SPI1 object.
Supports attachInterrupt	Yes. D3, DAC/A6, and P1S3 share the same interrupt handler.	Yes
Input is 5V Tolerant	Yes	No
JTAG interface	JTAG RST. 40K pull-up at boot.	n/a

Module Pin 52 (D4)

	P1	P2
Pin Name	D4	D4
Description	D4 GPIO, SPI1	D4 GPIO, Serial2 TX, SPI1 SCK
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
UART serial	n/a	TX. Use Serial2 object.
SPI interface	SCK. Use SPI1 object.	SCK. Use SPI1 object.
Supports attachInterrupt	Yes. D4 and A1 share the same interrupt handler.	Yes
I2S interface	I2S3_SCK	n/a
Input is 5V Tolerant	Yes	No
JTAG interface	JTAG TDO. Floating at boot.	n/a

Module Pin 53 (D5)

	P1	P2
Pin Name	D5	D5
Description	D5 GPIO, SPI1	D5 GPIO, Serial2 RX, SPI1 SS
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
UART serial	n/a	RX. Use Serial2 object.
SPI interface	SS. Use SPI1 object. Can use any pin for SPI1 SS/CS however.	SS. Use SPI1 object. Can use any pin for SPI1 SS/CS however.

Supports attachInterrupt	Yes	Yes
I2S interface	I2S3_WS	n/a
Input is 5V Tolerant	Yes	No
JTAG interface	JTAG TDI. 40K pull-up at boot.	n/a

Module Pin 54 (D7)

	P1	P2
Pin Name	D7	D7
Description	D7 GPIO	D7 GPIO, SWDIO
Supports digitalRead	Yes.	Yes.
Supports digitalWrite	Yes. On the Photon this is the blue D7 LED.	Yes. On the Photon this is the blue D7 LED.
Supports attachInterrupt	Yes. D7 and P1S4 share the same interrupt handler.	Yes
JTAG interface	JTAG TMS. 40K pull-up at boot.	n/a
SWD interface	SWDIO. 40K pull-up at boot.	SWDIO. 40K pull-up at boot.

Module Pin 55 (D6)

	P1	P2
Pin Name	D6	D6
Description	D6 GPIO	D6 GPIO, SWCLK
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports attachInterrupt	Yes	Yes
Input is 5V Tolerant	Yes	No
JTAG interface	JTAG TCK. 40K pull-down at boot.	n/a
SWD interface	SWCLK. 40K pull-down at boot.	SWCLK. 40K pull-down at boot.

Module Pin 56 (BTCX_STATUS / NC)

	P1	P2
Pin Name	BTCX_STATUS	NC
Description	Coexistence signal: Bluetooth status and TX/RX direction.	No connection. Do not connect anything to this pin.

Module Pin 57 (BTCX_RF_ACTIVE / NC)

	P1	P2
Pin Name	BTCX_RF_ACTIVE	NC
Description	Coexistence signal: Bluetooth is active.	No connection. Do not connect anything to this pin.

Module Pin 58 (BTCX_TXCONF / NC)

	P1	P2
Pin Name	BTCX_TXCONF	NC
Description	Output giving Bluetooth permission to TX.	No connection. Do not connect anything to this pin.

Module Pin 59 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Module Pin 60 (WL_SLEEP_CLK / NC)

	P1	P2
Pin Name	WL_SLEEP_CLK	NC
Description	BCM43362 Debugging Pin	No connection. Do not connect anything to this pin.

Module Pin 61 (USBDATA+)

	Unchanged between P1 and P2
Pin Name	USBDATA+
Description	USB Data+
Input is 5V Tolerant	Yes

Module Pin 62 (USBDATA-)

	Unchanged between P1 and P2
Pin Name	USBDATA-
Description	USB Data-
Input is 5V Tolerant	Yes

Module Pin 63 (RX)

	P1	P2
Pin Name	RX	RX
Pin Alternate Name	n/a	D9
Description	Serial1 RX (received data), GPIO, PWM.	Serial1 RX (received data), GPIO
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogWrite (PWM)	Yes	No
Supports tone	Yes	No
UART serial	RX. Use Serial1 object.	RX. Use Serial1 object.
Supports attachInterrupt	Yes	Yes
Input is 5V Tolerant	Yes	No

Module Pin 64 (TX)

	P1	P2
Pin Name	TX	TX
Pin Alternate Name	n/a	D8
Description	Serial1 TX (transmitted data), GPIO, PWM.	Serial1 TX (transmitted data), GPIO
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogWrite (PWM)	Yes	No
Supports tone	Yes	No
UART serial	TX. Use Serial1 object.	TX. Use Serial1 object.
Supports attachInterrupt	Yes	Yes

Input is 5V Tolerant	Yes	No

Module Pin 65 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Module Pin 66 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Module Pin 67 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Module Pin 68 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Module Pin 69 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Module Pin 70 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Module Pin 71 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Module Pin 72 (GND)

	Unchanged between P1 and P2
Pin Name	GND
Description	Ground. Be sure you connect all P1 ground pins.

Software

WI-FI CONFIGURATION

The P2 and Argon utilize BLE or USB for configuration of Wi-Fi rather than the SoftAP approach taken with the P1. Using BLE allow mobile apps to more easily set up the device Wi-Fi without having to modify the mobile device's network configuration.

Feature	P2	P1	Argon
Wi-Fi (SoftAP)		✓	
BLE	✓		✓

USER FIRMWARE BINARY SIZE

One major advantage of the P2 is that user firmware binaries can be up to 2048 Kbytes, instead of 128 Kbytes on Gen 2 devices including the P1.

FLASH FILE SYSTEM

On the P2 there is a flash file system (2 MB) for storing user data. This is not available on Gen 2 devices including the P1.

COMBINED AND RESUMABLE OTA

On the P2, over-the-air (OTA) updates have two features that can improve the speed and reliability of OTA updates:

- Combined OTA can combine Device OS and user firmware updates into a single binary that requires only one download and one reboot to install.
- Resumable OTA allows an update to resume from the point it stopped, instead of starting over from the beginning if interrupted.

INCREASED API FIELD LIMITS

The maximum size of a variable, function parameter, or publish is 1024 bytes on the P2 vs. 864 bytes on P1.

API Field	P1	P2
Variable Key	64	64
Variable Data	864	1024
Function Key	64	64
Function Argument	864	1024
Publish/Subscribe Event Name	64	64
Publish/Subscribe Event Data	864	1024

PLATFORM ID

The Platform ID of the P2 (32, `PLATFORM_P2`) is different from that of the P1 (8) because of the vastly different hardware.

If you have a product based on the P1, you will need to create a separate product for devices using

the P2. While you may be able to use the same source code to build your application, the firmware binaries uploaded to the console will be different, so they need to be separate products. This generally does not affect billing as only the number of devices, not the number of products, is counted toward your plan limits.

THIRD-PARTY LIBRARIES

Most third-party libraries are believed to be compatible. The exceptions include:

- Libraries that use peripherals that are not present (such as DAC)
- Libraries for MCU-specific features (such as ADC DMA)
- Libraries that are hardcoded to support only certain platforms by their PLATFORM_ID

Version History

Revision	Date	Author	Comments
pre	2021-11-04	RK	Pre-release
	2022-02-08	RK	Corrected D pin aliases for A5 and S0-S6
	2022-02-25	RK	Changed D pin aliases for D9 - D22, A5 is not SPI MOSI, Serial2 TX and RX were reversed
	2022-03-14	RK	Minor edits; no functional changes
	2022-03-23	RK	Add notes about flash file system and EEPROM
	2022-04-12	RK	Added serial baud rates