{{title}}

Pre-release version 2022-04-08

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	Photon	Argon
Style	SMD	SMD	Pin Module	Pin Module
Status LEDs	†	†	✓	✓
Reset and Mode Buttons	†	†	✓	✓
USB Connector	†	†	Micro B	Micro B
D7 Blue LED			✓	✓
LiPo Connector				✓
Battery Charger				✓
User application size	2048 KB (2 MB)	128 KB	128KB	256 KB
Flash file system[1]	2 MB			2 MB
MCU	RTL8721DM	STM32F205RGY6	STM32F205RGY6	nRF52840
	Realtek Semiconductor	ST Microelectronics	ST Microelectronics	Nordic Semiconductor
CPU	Cortex M33 @ 200 MHz	Cortex M3 @ 120 MHz	Cortex M3 @ 120 MHz	Cortex M3 @ 64 MHz
	Cortex M23 @ 20 MHz			
RAM[2]	512 KB	128KB	128 KB	256 KB

Flash[3]	16 MB	1 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	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	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 (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 (Wi-Fi)[4]	Optional external (BLE)[4]
Peripherals	USB 2.0	USB 1.1	USB 1.1	USB 1.1
Digital GPIO	22	24	18	20
Analog (ADC)	6	13	8	6
Analog (DAC)		2	2	
UART	1	2	2[6]	1
SPI	2	2	2	2
PWM	6	12	9	8
I2C	1	1	1	1
CAN		1	1	
I2S		1[5]	1[5]	1
JTAG		✓	✓	
SWD	✓	✓	✓	✓

† Optional but recommended. Add to your base board.

[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.

[5] The STM32 hardware supports I2S but there is no software support in Device OS or 3rd-party libraries.

[6] The second UART on the Photon shares pins with the status LED, and requires unsoldering it (or its current limiting resistors) and using pads on the bottom of the module, making it impractical to

use.

Hardware

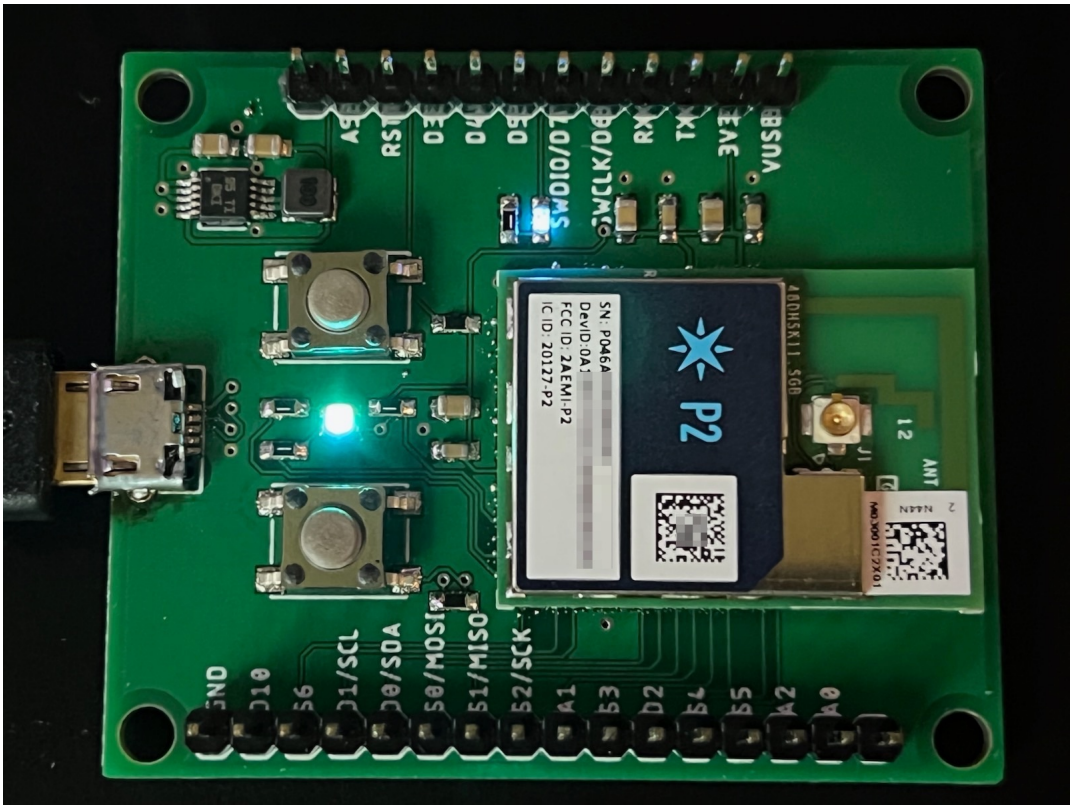
MODULE STYLE

The primary difference is that the Argon is a pin-based module that can be installed in solderless breadboard for prototyping, can be installed in a socket on your custom board, or soldered directly to your board.

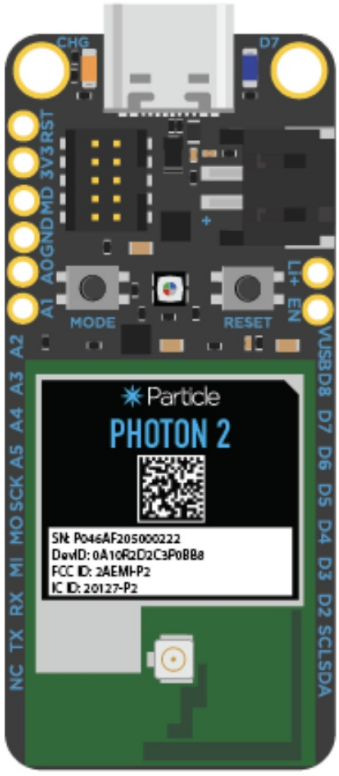
The P2 is only available as a SMD (surface mount device) that is typically reflow soldered to your base board. Your base board will need to be a custom printed circuit board, and cannot be a solderless breadboard or perforated prototyping board.

This can be done in small quantities by hand using a reflow oven or soldering hot plate. In quantity, it would be done by your PCBA (PCB with assembly) contractor.

This is a P2 custom board, not an actual product. Full instructions on how to build this board are included in the P2 First Board Tutorial.



The Photon 2 is a pin-based module that contains a P2, and may be appropriate in many cases. If you are planning on scaling, it may be advantageous to migrate from the Argon directly to the P2 as you may require base board changes as there are some differences between the Argon and Photon 2.



STATUS LED

The P2 does not include a status LED on the module. We recommend adding one to your base board.

Alternatively, if you have a separate hardware control panel, it provides the ability to put the RGB LED there and not duplicate it on the module or base board.

Device OS assumes a common anode RGB LED. One common LED that meets the requirements is the Cree CLMVC-FKA-CL1D1L71BB7C3C3 which is inexpensive and easily procured. You need to add three current limiting resistors. With this LED, we typically use 1K ohm current limiting resistors. These are much larger than necessary. They make the LED less blinding but still provide sufficient current to light the LEDs. If you want maximum brightness you should use the calculated values - 33 ohm on red, and 66 ohm on green and blue.

If you are using a different LED, you should limit current to 2mA per color.

A detailed explanation of different color codes of the RGB system LED can be found here.

RESET AND MODE BUTTONS

The P2 does not include buttons on module. We highly recommend including reset and mode buttons on your base board.

For example, you could use two-inexpensive SMD switches. The 4.5mm E-Switch TL3305AF160QG costs $0.20 in single quantities.

USB CONNECTOR

The P2 does not include a USB connector on the module. We recommend including one on your base board. This can be a USB Micro B, as on the Photon and Argon, or you could use USB C.

Since you choose the connector you have the option of using a right-angle USB connector. This is handy if your board will be an enclosure where the board is recessed into the case under a removable cover. This can allow the USB connector to be accessed without removing the board from the enclosure.

Part	Example	Price
USB micro B connector	Amphenol FCI 10118194-0001LF	$0.42
CONN RCPT USB2.0 MICRO B SMD R/A	Amphenol FCI 10118194-0001LF	$0.42

SWD/JTAG

The P2 does not include a SWD/JTAG debugging connector on the board. We recommend including the following pins available for debugging:

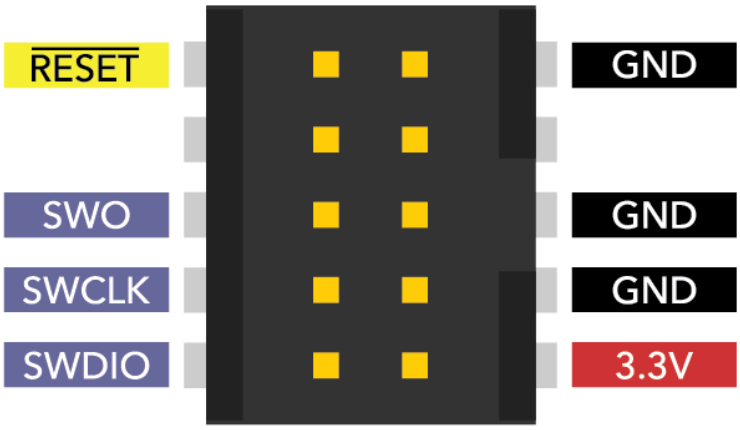
The Argon has dedicated pins for SWDIO and SWCLK and SWD remains running after your user firmware starts. On the Gen 2 and the P2, the SWD pins are shared with GPIO and by default SWD is disabled once the bootloader exits.

Pin	Pin Name	Description	Interface	MCU
1	GND	Ground. Be sure you connect all P1 ground pins.		
34	RST	Hardware reset. Pull low to reset; can leave unconnected in normal operation.		CHIP_EN
54	D7	D7 GPIO, SWDIO	SWDIO	PA[27]
55	D6	D6 GPIO, SWCLK	SWCLK	PB[3]

If you want to include the same 2x5 1.27mm connector as is on the Argon, this is one example of

the connector:

Description	Example	Price
CONN HEADER SMD 10POS 1.27MM	Samtec FTSH-105-01-F-DV-K	$3.91



TROUBLESHOOTING CONNECTOR

In some cases, you may want to omit the reset and mode buttons, status LED, USB connector, and SWD/JTAG pins from your board board. If you do, we highly recommend adding a debug connector to make these features available for troubleshooting. The debug connector could be an actual connector, header pins, socket, card-edge connector, or SMD pads that allow an adapter or daughter card with these features.

VOLTAGE REGULATOR

The P2 requires regulated 3.3VDC at 500 mA. An voltage regulator is required on your base board if powering by USB (5V), LiPo (3.7V), or an external power source.

As of the first half of 2022, supply chain constraints are affecting the availability of voltage regulator components. There is no Device OS software dependency on the voltage regulator so you can choose any model as long as it meets the voltage and current requirements.

- This is often a switching regulator to save space, but this is not required.
  - The Photon used a Richtek RT8008 (3.3V), which is hard to procure.
  - The Argon used a Torex XCL223, which is no longer available. The pin compatible XCL224 is also no longer available.
- If the voltage is close to 3.3V, such as 5V USB, a linear regulator can be used.

LIPO BATTERY AND LI+ PIN

The P2 does not include a LiPo battery connector or charging circuit on the module. If you want these features you will need to include them on your base board.

This is the LiPo battery connector used on the Argon:

Description	Example	Price
JST-PH battery connector	JST B2B-PH-K-S-LF-SN	$0.17

As of the first half of 2022, supply chain constraints are affecting the supply of PMICs and charge controllers. Because of this, we are not recommending a specific model to use with your board.

The Argon uses a Torex XC6208A42 LiPo charge controller, however there is no need use this part and it will be difficult to obtain.

The Boron uses a full PMIC (bq24195) and fuel gauge (MAX17043). By including these features on your base board you can provide more full-featured operation on battery power than the Argon does.

EN PIN

The Argon has the EN pin which can shut down the Torex XC9258 3.3V regulator to power down the 3.3V supply to the Argon nRF52840 MCU and the ESP32 Wi-Fi coprocessor.

This feature does not exist on the P2, however you could add equivalent circuitry on your base board. This could either be a regulator with power control like the Argon, or an external load switch like the Boron (Torex XC8107). The specific load switch is not important, as long as it meets the requirements of the nRF52840 MCU.

PINS A3, A4, AND DAC (A6)

Pins A3, A4, DAC/A6 do not exist on the P2 and are NC.

You will need to use different pins if you are currently using these pins. There are a large number of additional pins (S0 - S6), however.

SPI

Both the Argon and P2 have two SPI ports, however the pins are different for both SPI ports. Also note that while pins D2 - D4 are used for SPI1 on both, the actual functions (SCK, MOSI, MISO) are on different pins!

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

Argon Pin Name	Argon SPI	P2 Pin Name	P2 SPI
A5 / D14	SPI (SS)	A5 / D14	
MISO / D11	SPI (MISO)	A0 / D11	
MOSI / D12	SPI (MOSI)	A1 / D12	
SCK / D13	SPI (SCK)	A2 / D13	
A2 / D17		S2 / D17	SPI (SCK)
D2	SPI1 (SCK)	D2	SPI1 (MOSI)
D3	SPI1 (MOSI)	D3	SPI1 (MISO)
D4	SPI1 (MISO)	D4	SPI1 (SCK)
D5		D5	SPI1 (SS)
		S0 / D15	SPI (MOSI)
		S1 / D16	SPI (MISO)
		S3 / D18	SPI (SS)

SPI - Gen 3 devices (including Argon)

	SPI	SPI1
Maximum rate	32 MHz	32 MHz
Default rate	16 MHz	16 MHz
Clock	64 MHz	64 MHz

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

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 Argon (D0 and D1).

However on the P2, D0 is shared with A3 and D1 is shared with D4, so you cannot use A3 and A4 at the same time as I2C.

Also, the Argon supports a secondary I2C interface on D2 and D3; this is not supported on the P2.

Argon Pin Name	Argon I2C	P2 Pin Name	P2 I2C
A3 / D16		D0 / A3	Wire (SDA)
A4 / D15		D1 / A4	Wire (SCL)
D0	Wire (SDA)	D0 / A3	Wire (SDA)
D1	Wire (SCL)	D1 / A4	Wire (SCL)
D2	Wire1 (SDA)	D2	
D3	Wire1 (SCL)	D3	

SERIAL (UART)

The primary UART serial (`Serial1`) is on the TX and RX pins on both the Argon and P2. On the Argon, hardware flow control (RTS/CTS) is available for `Serial1` but this is not the case for the P2.

There is no secondary UART on the Argon, but there is one on the P2. The secondary UART `Serial2` on the P2 does support hardware flow control.

If you are using Argon Serial1 with hardware flow control, you should switch to using `Serial2` on the P2.

Argon Pin Name	Argon Serial	P2 Pin Name	P2 Serial
A2 / D17		S2 / D17	Serial3 (RTS)
D2	Serial1 RTS	D2	Serial2 (RTS)
D3	Serial1 CTS	D3	Serial2 (CTS)
D4		D4	Serial2 (TX)
D5		D5	Serial2 (RX)
RX / D10	Serial1 RX	D10 / WKP	Serial3 (CTS)
		RX / D9	Serial1 (RX)
		S0 / D15	Serial3 (TX)

		S1 / D16	Serial3 (RX)
TX / D09	Serial1 TX	TX / D8	Serial1 (TX)
D8 / WKP		D10 / WKP	Serial3 (CTS)

	Argon	P2
Buffer size	64 bytes[2]	2048 bytes
7-bit mode		✓
8-bit mode	✓	✓
1 stop bit	✓	✓
2 stop bits		✓
No parity	✓	✓
Even parity	✓	✓
Odd parity		✓
CTS/RTS flow control		✓[1]

Supported Baud Rates:

Baud Rate	Argon	P2
110		✓
300		✓
600		✓
1200	✓	✓
2400	✓	
4800	✓	
9600		✓
14400		✓
19200	✓	✓
28800	✓	✓
38400	✓	✓
57600	✓	✓
76800	✓	✓
115200	✓	✓
128000		✓
153600		✓
230400	✓	✓
250000	✓	
460800	✓	
500000		✓
921600	✓	✓
1000000	✓	✓
1382400		✓
1444400		✓
1500000		✓
1843200		✓
2000000		✓
2100000		✓

2764800	✓
3000000	✓
3250000	✓
3692300	✓
3750000	✓
4000000	✓
6000000	✓

[1]CTS/RTS flow control only on `Serial2` and `Serial3`. It is optional.

[2]On the Argon, the buffer be resized larger in Device OS 3.2.0 and later.

ANALOG INPUT (ADC)

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

Argon Pin Name	Argon ADC	P2 Pin Name	P2 ADC
A1 / D18	✓	A1 / D12	✓
A3 / D16	✓	D0 / A3	✓
A4 / D15	✓	D1 / A4	✓
A5 / D14	✓	A5 / D14	✓
D0		D0 / A3	✓
D1		D1 / A4	✓
MISO / D11		A0 / D11	✓
MOSI / D12		A1 / D12	✓
SCK / D13		A2 / D13	✓
A2 / D17	✓	S2 / D17	
A0 / D19	✓	S4 / D19	

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 Argon and P2.

Argon Pin Name	Argon PWM	P2 Pin Name	P2 PWM
A1 / D18	✓	A1 / D12	
A3 / D16	✓	D0 / A3	✓
A4 / D15	✓	D1 / A4	✓
A5 / D14	✓	A5 / D14	✓
D0		D0 / A3	✓
D1		D1 / A4	✓
SCK / D13		A2 / D13	✓
A2 / D17	✓	S2 / D17	

A0 / D19	✓	S4 / D19	
D2	✓	D2	
D3	✓	D3	
D4	✓	D4	
D5	✓	D5	
D6	✓	D6	
D7	PWM is shared with the RGB LED, you can specify a different duty cycle but should not change the frequency.	D7	
		S0 / D15	✓
		S1 / D16	✓
D8 / WKP	✓	D10 / WKP	

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.

I2S (SOUND)

The Argon can use I2S via a 3rd-party library, however there has never been support for it in Device OS.

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

INTERRUPTS

All pins can be used for interrupts on Gen 3 devices and the P2.

There is a limit of 8 pin interrupts on the Argon; this limitation does not exist on 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

Both the Argon and P2 have 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 Photon and P2.

Both the Argon and P2 have 4096 bytes of emulated EEPROM. On the P2 and Gen 3 devices, the

EEPROM is actually just a file on the flash file system.

NFC TAG

The Photon 2 does not have NFC Tag support. The Argon does.

PIN FUNCTIONS REMOVED

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

- Pins A3 and A4 on the P2 are shared with D0 and D1. You cannot use A3 and A4 at ths same time as I2C (`Wire`) on the P2.

Pin Name	Description
EN	Power supply enable. Connect to GND to power down. Has internal weak (100K) pull-up.
LI+	Connected to JST PH LiPo battery connector. 3.7V in or out.
VUSB	Power out (when powered by USB) 5 VDC at 1A maximum. Power in with limitations.

PIN FUNCTIONS ADDED

The following pins did not exist on the Argon but are available on the P2.

Pin	Pin Name	Description
5	3V3_IO	3.3V power to MCU IO.
2	3V3_RF	3.3V power to RF module
31	RGBB	RGB LED Blue
32	RGBG	RGB LED Green
29	RGBR	RGB LED Red
63	RX / D9	Serial1 RX (received data), GPIO
40	S0 / D15	S0 GPIO, PWM, SPI MOSI, Serial3 TX. (Was P1S0 on P1.)
41	S1 / D16	S1 GPIO, PWM, SPI MISO, Serail3 RX. (Was P1S1 on P1.)
44	S3 / D18	S3 GPIO. (Was P1S3 on P1.), SPI SS
48	S5 / D20	S5 GPIO. (Was P1S5 on P1.)
33	S6 / D21	S6 GPIO. (Was P1S6/TESTMODE on P1.)
62	USBDATA-	USB Data-
61	USBDATA+	USB Data+
12	VBAT_MEAS	Battery voltage measurement (optional).

RECOMMENDED PIN MAPPINGS

All-purpose mapping

This mapping is good for most situations. A3 and A4 cannot be used as ADC, but I2C, SPI, and Serial are mapped.

Argon Pin Name	Argon Description	P2 Pin Name	P2 Description	P2 Pin Number	MCU
A0 / D19	A0 Analog in, GPIO, PWM	A0 / D11	A0 Analog in, GPIO	50	PB[1]
A1 / D18	A1 Analog in, GPIO, PWM	A1 / D12	A1 Analog in, GPIO	43	PB[2]

A2 / D17	A2 Analog in, GPIO, PWM	A2 / D13	A2 Analog in, PWM, GPIO	49	PB[7]
A3 / D16	A3 Analog in, GPIO, PWM	S3 / D18	S3 GPIO. (Was P1S3 on P1.), SPI SS	44	PB[26]
A4 / D15	A4 Analog in, GPIO, PWM	S4 / D19	S4 GPIO. (Was P1S4 on P1.)	47	PA[0]
A5 / D14	A5 Analog in, GPIO, PWM, SPI SS	A5 / D14	A5 Analog in, GPIO, PWM.	23	PB[4]
D0	I2C SDA, GPIO	D0 / A3	D0 GPIO, PWM, I2C SDA, A3 Analog In	36	PB[6]
D1	I2C SCL, GPIO	D1 / A4	D1 GPIO, PWM, I2C SCL, A4 Analog In	35	PB[5]
D2	SPI1 SCK, Wire1 SDA, Serial1 RTS, PWM, GPIO	D2	D2 GPIO, Serial2 RTS, SPI1 MOSI	45	PA[16]
D3	SPI1 MOSI, Wire1 SCL, Serial1 CTS, PWM, GPIO	D3	D3 GPIO, Serial2 CTS, SPI1 MISO	51	PA[17]
D4	SPI1 MISO, PWM, GPIO	D4	D4 GPIO, Serial2 TX, SPI1 SCK	52	PA[18]
D5	PWM, GPIO	D5	D5 GPIO, Serial2 RX, SPI1 SS	53	PA[19]
D6	PWM, GPIO	D6	D6 GPIO, SWCLK	55	PB[3]
D7	PWM, GPIO	D7	D7 GPIO, SWDIO	54	PA[27]
MISO / D11	SPI MISO, GPIO	S1 / D16	S1 GPIO, PWM, SPI MISO, Serail3 RX. (Was P1S1 on P1.)	41	PA[13]
MOSI / D12	SPI MOSI, GPIO	S0 / D15	S0 GPIO, PWM, SPI MOSI, Serial3 TX. (Was P1S0 on P1.)	40	PA[12]
RX / D10	Serial RX, GPIO	RX / D9	Serial1 RX (received data), GPIO	63	PA[8]
SCK / D13	SPI SCK, GPIO	S2 / D17	S2 GPIO, SPI SCK, Serial3 RTS. (Was P1S2 on P1.)	42	PA[14]
TX / D09	Serial TX, GPIO	TX / D8	Serial1 TX (transmitted data), GPIO	64	PA[7]

SPI1 Preferred

If you need to use SPI1 on the D pins, this mapping is required. The D pins are ordered differently between the Argon and P2, and this affects SPI1.

Argon Pin Name	Argon Description	P2 Pin Name	P2 Description	P2 Pin Number	MCU
A0 / D19	A0 Analog in, GPIO, PWM	A0 / D11	A0 Analog in, GPIO	50	PB[1]
A1 / D18	A1 Analog in, GPIO, PWM	A1 / D12	A1 Analog in, GPIO	43	PB[2]
A2 / D17	A2 Analog in, GPIO, PWM	A2 / D13	A2 Analog in, PWM, GPIO	49	PB[7]
A3 / D16	A3 Analog in, GPIO, PWM	S3 / D18	S3 GPIO. (Was P1S3 on P1.), SPI SS	44	PB[26]
A4 / D15	A4 Analog in, GPIO, PWM	S4 / D19	S4 GPIO. (Was P1S4 on P1.)	47	PA[0]
A5 / D14	A5 Analog in, GPIO, PWM, SPI SS	A5 / D14	A5 Analog in, GPIO, PWM.	23	PB[4]
D0	I2C SDA, GPIO	D0 / A3	D0 GPIO, PWM, I2C SDA, A3 Analog In	36	PB[6]
D1	I2C SCL, GPIO	D1 / A4	D1 GPIO, PWM, I2C SCL, A4 Analog In	35	PB[5]
D2	SPI1 SCK, Wire1 SDA, Serial1 RTS, PWM, GPIO	D4	D4 GPIO, Serial2 TX, SPI1 SCK	52	PA[18]
D3	SPI1 MOSI, Wire1 SCL, Serial1 CTS, PWM, GPIO	D2	D2 GPIO, Serial2 RTS, SPI1 MOSI	45	PA[16]
D4	SPI1 MISO, PWM, GPIO	D3	D3 GPIO, Serial2 CTS, SPI1 MISO	51	PA[17]
D5	PWM, GPIO	D5	D5 GPIO, Serial2 RX, SPI1 SS	53	PA[19]
D6	PWM, GPIO	D6	D6 GPIO, SWCLK	55	PB[3]
D7	PWM, GPIO	D7	D7 GPIO, SWDIO	54	PA[27]

MISO / D11	SPI MISO, GPIO	S1 / D16	S1 GPIO, PWM, SPI MISO, Serail3 RX. (Was P1S1 on P1.)	41	PA[13]
MOSI / D12	SPI MOSI, GPIO	S0 / D15	S0 GPIO, PWM, SPI MOSI, Serial3 TX. (Was P1S0 on P1.)	40	PA[12]
RX / D10	Serial RX, GPIO	RX / D9	Serial1 RX (received data), GPIO	63	PA[8]
SCK / D13	SPI SCK, GPIO	S2 / D17	S2 GPIO, SPI SCK, Serial3 RTS. (Was P1S2 on P1.)	42	PA[14]
TX / D09	Serial TX, GPIO	TX / D8	Serial1 TX (transmitted data), GPIO	64	PA[7]

FULL MODULE PIN COMPARISON

3V3

	Argon	P2
Pin Number	2	26
Pin Name	3V3	3V3
Description	Regulated 3.3V DC output, maximum load 1000 mA	3.3V power to MCU

3V3_IO

	Added to P2
Pin Number	5
Pin Name	3V3_IO
Description	3.3V power to MCU IO.

3V3_RF

	Added to P2
Pin Number	2
Pin Name	3V3_RF
Description	3.3V power to RF module

A1

	Argon	P2
Pin Number	6	43
Pin Name	A1	A1
Pin Alternate Name	D18	D12
Description	A1 Analog in, GPIO, PWM	A1 Analog in, GPIO
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	Yes	Yes
Supports analogWrite (PWM)	Yes	No
Supports tone	A0, A1, A2, and A3 must have the same frequency.	No
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes

A3

	Argon	P2
Pin Number	8	36
Pin Name	A3	D0

Pin Alternate Name	D16	A3
Description	A3 Analog in, GPIO, PWM	D0 GPIO, PWM, I2C SDA, A3 Analog In
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	Yes	Yes
Supports analogWrite (PWM)	Yes	Yes
Supports tone	A0, A1, A2, and A3 must have the same frequency.	Yes
I2C interface	n/a	SDA. Use Wire object. Use 1.5K to 10K external pull-up resistor.
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes

A4

	Argon	**P2**
Pin Number	9	35
Pin Name	A4	D1
Pin Alternate Name	D15	A4
Description	A4 Analog in, GPIO, PWM	D1 GPIO, PWM, I2C SCL, A4 Analog In
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	Yes	Yes
Supports analogWrite (PWM)	Yes	Yes
Supports tone	A4, A5, D2, and D3 must have the same frequency.	Yes
I2C interface	n/a	SCL. Use Wire object. Use 1.5K to 10K external pull-up resistor.
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes

A5

	Argon	**P2**
Pin Number	10	23
Pin Name	A5	A5
Pin Alternate Name	D14	D14
Description	A5 Analog in, GPIO, PWM, SPI SS	A5 Analog in, GPIO, PWM.
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	Yes	Yes
Supports analogWrite (PWM)	Yes	Yes
Supports tone	A4, A5, D2, and D3 must have the same frequency.	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. You can only have 8 active interrupt pins.	Yes

D0

	Argon	P2
Pin Number	16	36
Pin Name	D0	D0
Pin Alternate Name	n/a	A3
Description	I2C SDA, GPIO	D0 GPIO, PWM, I2C SDA, A3 Analog In
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	No	Yes
Supports analogWrite (PWM)	No	Yes
Supports tone	No	Yes
I2C interface	SDA. Use Wire object.	SDA. Use Wire object. Use 1.5K to 10K external pull-up resistor.
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes

D1

	Argon	P2
Pin Number	17	35
Pin Name	D1	D1
Pin Alternate Name	n/a	A4
Description	I2C SCL, GPIO	D1 GPIO, PWM, I2C SCL, A4 Analog In
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	No	Yes
Supports analogWrite (PWM)	No	Yes
Supports tone	No	Yes
I2C interface	SCL. Use Wire object.	SCL. Use Wire object. Use 1.5K to 10K external pull-up resistor.
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes

D11

	Argon	P2
Pin Number	13	50
Pin Name	MISO	A0
Pin Alternate Name	D11	D11
Description	SPI MISO, GPIO	A0 Analog in, GPIO
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	No	Yes
SPI interface	MISO. Use SPI object.	n/a
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes

D12

	Argon	P2
Pin Number	12	43
Pin Name	MOSI	A1
Pin Alternate Name	D12	D12
Description	SPI MOSI, GPIO	A1 Analog in, GPIO
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	No	Yes
SPI interface	MOSI. Use SPI object.	n/a
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes

D13

	Argon	P2
Pin Number	11	49
Pin Name	SCK	A2
Pin Alternate Name	D13	D13
Description	SPI SCK, GPIO	A2 Analog in, PWM, GPIO
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	No	Yes
Supports analogWrite (PWM)	No	Yes
Supports tone	No	Yes
SPI interface	SCK. Use SPI object.	n/a
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes

D17

	Argon	P2
Pin Number	7	42
Pin Name	A2	S2
Pin Alternate Name	D17	D17
Description	A2 Analog in, GPIO, PWM	S2 GPIO, SPI SCK, Serial3 RTS. (Was P1S2 on P1.)
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	Yes	No
Supports analogWrite (PWM)	Yes	No
Supports tone	A0, A1, A2, and A3 must have the same frequency.	No
UART serial	n/a	RTS. Use Serial3 object. Flow control optional.
SPI interface	n/a	SCK. Use SPI object.
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes

D19

	Argon	P2

Pin Number	5	47
Pin Name	A0	S4
Pin Alternate Name	D19	D19
Description	A0 Analog in, GPIO, PWM	S4 GPIO. (Was P1S4 on P1.)
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogRead	Yes	No
Supports analogWrite (PWM)	Yes	No
Supports tone	A0, A1, A2, and A3 must have the same frequency.	No
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes

D2

	Argon	**P2**
Pin Number	18	45
Pin Name	D2	D2
Description	SPI1 SCK, Wire1 SDA, Serial1 RTS, PWM, GPIO	D2 GPIO, Serial2 RTS, SPI1 MOSI
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogWrite (PWM)	Yes	No
Supports tone	A4, A5, D2, and D3 must have the same frequency.	No
UART serial	Options RTS hardware flow control for Serial1	RTS. Use Serial2 object. Flow control optional.
SPI interface	SCK. Use SPI1 object.	MOSI. Use SPI1 object.
I2C interface	SDA. Use Wire1 object.	n/a
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes

D3

	Argon	**P2**
Pin Number	19	51
Pin Name	D3	D3
Description	SPI1 MOSI, Wire1 SCL, Serial1 CTS, PWM, GPIO	D3 GPIO, Serial2 CTS, SPI1 MISO
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogWrite (PWM)	Yes	No
Supports tone	A4, A5, D2, and D3 must have the same frequency.	No
UART serial	Options CTS hardware flow control for Serial1	CTS. Use Serial2 object. Flow control optional.
SPI interface	MOSI. Use SPI1 object.	MISO. Use SPI1 object.
I2C interface	SCL. Use Wire1 object.	n/a
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes

D4

	Argon	P2
Pin Number	20	52
Pin Name	D4	D4
Description	SPI1 MISO, PWM, GPIO	D4 GPIO, Serial2 TX, SPI1 SCK
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogWrite (PWM)	Yes	No
Supports tone	D4, D5, D6, and D7 must have the same frequency.	No
UART serial	n/a	TX. Use Serial2 object.
SPI interface	MISO. Use SPI1 object.	SCK. Use SPI1 object.
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes

D5

	Argon	P2
Pin Number	21	53
Pin Name	D5	D5
Description	PWM, GPIO	D5 GPIO, Serial2 RX, SPI1 SS
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogWrite (PWM)	Yes	No
Supports tone	D4, D5, D6, and D7 must have the same frequency.	No
UART serial	n/a	RX. Use Serial2 object.
SPI interface	n/a	SS. Use SPI1 object. Can use any pin for SPI1 SS/CS however.
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes

D6

	Argon	P2
Pin Number	22	55
Pin Name	D6	D6
Description	PWM, GPIO	D6 GPIO, SWCLK
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogWrite (PWM)	Yes	No
Supports tone	D4, D5, D6, and D7 must have the same frequency.	No
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
SWD interface	n/a	SWCLK. 40K pull-down at boot.

D7

	Argon	P2
Pin Number	23	54

Pin Name	D7	D7
Description	PWM, GPIO	D7 GPIO, SWDIO
Supports digitalRead	Yes	Yes.
Supports digitalWrite	Yes	Yes. On the Photon this is the blue D7 LED.
Supports analogWrite (PWM)	PWM is shared with the RGB LED, you can specify a different duty cycle but should not change the frequency.	No
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes
SWD interface	n/a	SWDIO. 40K pull-up at boot.

EN

	Removed from Argon
Pin Number	26
Pin Name	EN
Description	Power supply enable. Connect to GND to power down. Has internal weak (100K) pull-up.

GND

	Argon	**P2**
Pin Number	4	1
Pin Name	GND	GND
Description	Ground.	Ground. Be sure you connect all P1 ground pins.

LI+

	Removed from Argon
Pin Number	27
Pin Name	LI+
Description	Connected to JST PH LiPo battery connector. 3.7V in or out.

MODE

	Argon	**P2**
Pin Number	3	46
Pin Name	MODE	MODE
Pin Alternate Name	D20	n/a
Description	MODE button, has internal pull-up	MODE button, has internal pull-up. Pin number constant is BTN.
Supports attachInterrupt	n/a	Yes

NC

	Added to P2
Pin Number	7
Pin Name	NC
Description	No connection. Do not connect anything to this pin.

RGBB

	Added to P2
Pin Number	31
Pin Name	RGBB
Description	RGB LED Blue
Supports attachInterrupt	Yes

RGBG

	Added to P2
Pin Number	32
Pin Name	RGBG
Description	RGB LED Green
Supports attachInterrupt	Yes

RGBR

	Added to P2
Pin Number	29
Pin Name	RGBR
Description	RGB LED Red
Supports attachInterrupt	Yes

RST

	Argon	P2
Pin Number	1	34
Pin Name	RST	RST
Description	Hardware reset. Pull low to reset; can leave unconnected in normal operation.	Hardware reset. Pull low to reset; can leave unconnected in normal operation.

RX

	Argon	P2
Pin Number	14	30
Pin Name	RX	D10
Pin Alternate Name	D10	WKP
Description	Serial RX, GPIO	D10 GPIO, Serial 3 CTS. (Was WKP/A7 on P1.)
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
UART serial	RX Use Serial1 object.	CTS. Use Serial3 object. Flow control optional.
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes

RX

	Added to P2
Pin Number	63
Pin Name	RX

Pin Alternate Name	D9
Description	Serial1 RX (received data), GPIO
Supports digitalRead	Yes
Supports digitalWrite	Yes
UART serial	RX. Use Serial1 object.
Supports attachInterrupt	Yes

S0

	Added to P2
Pin Number	40
Pin Name	S0
Pin Alternate Name	D15
Description	S0 GPIO, PWM, SPI MOSI, Serial3 TX. (Was P1S0 on P1.)
Supports digitalRead	Yes
Supports digitalWrite	Yes
Supports analogWrite (PWM)	Yes
Supports tone	Yes
UART serial	TX. Use Serial3 object.
SPI interface	MOSI. Use SPI object.
Supports attachInterrupt	Yes

S1

	Added to P2
Pin Number	41
Pin Name	S1
Pin Alternate Name	D16
Description	S1 GPIO, PWM, SPI MISO, Serail3 RX. (Was P1S1 on P1.)
Supports digitalRead	Yes
Supports digitalWrite	Yes
Supports analogWrite (PWM)	Yes
Supports tone	Yes
UART serial	RX. Use Serial3 object.
SPI interface	MISO. Use SPI object.
Supports attachInterrupt	Yes

S3

	Added to P2
Pin Number	44
Pin Name	S3
Pin Alternate Name	D18
Description	S3 GPIO. (Was P1S3 on P1.), SPI SS
Supports digitalRead	Yes
Supports digitalWrite	Yes
SPI interface	Default SS for SPI.
Supports attachInterrupt	Yes

S5

	Added to P2
Pin Number	48
Pin Name	S5
Pin Alternate Name	D20
Description	S5 GPIO. (Was P1S5 on P1.)
Supports digitalWrite	Yes
Supports attachInterrupt	Yes

S6

	Added to P2
Pin Number	33
Pin Name	S6
Pin Alternate Name	D21
Description	S6 GPIO. (Was P1S6/TESTMODE on P1.)
Supports digitalRead	Yes
Supports digitalWrite	Yes
Supports attachInterrupt	Yes

TX

	Argon	P2
Pin Number	15	64
Pin Name	TX	TX
Pin Alternate Name	D09	D8
Description	Serial TX, GPIO	Serial1 TX (transmitted data), GPIO
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
UART serial	TX Use Serial1 object.	TX. Use Serial1 object.
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes

USBDATA-

	Added to P2
Pin Number	62
Pin Name	USBDATA-
Description	USB Data-
Input is 5V Tolerant	Yes

USBDATA+

	Added to P2
Pin Number	61
Pin Name	USBDATA+
Description	USB Data+
Input is 5V Tolerant	Yes

VBAT_MEAS

	Added to P2
Pin Number	12
Pin Name	VBAT_MEAS
Description	Battery voltage measurement (optional).

VUSB

	Removed from Argon
Pin Number	25
Pin Name	VUSB
Description	Power out (when powered by USB) 5 VDC at 1A maximum. Power in with limitations.
Input is 5V Tolerant	Yes

WKP

	Argon	P2
Pin Number	24	30
Pin Name	D8	D10
Pin Alternate Name	WKP	WKP
Description	GPIO, PWM	D10 GPIO, Serial 3 CTS. (Was WKP/A7 on P1.)
Supports digitalRead	Yes	Yes
Supports digitalWrite	Yes	Yes
Supports analogWrite (PWM)	Yes	No
Supports tone	D4, D5, D6, and D7 must have the same frequency.	No
UART serial	n/a	CTS. Use Serial3 object. Flow control optional.
Supports attachInterrupt	Yes. You can only have 8 active interrupt pins.	Yes

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. Wi-Fi setup for the P2 should be very similar to the Argon.

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.

On the Argon (Device OS 3.1 and later), it's 256 Kbytes, or 128 Kbytes for older version of Device OS.

PLATFORM ID

The Platform ID of the P2 (32, `PLATFORM_P2`) is different from that of the Argon (12) because of the vastly different hardware.

If you have a product based on the Argon, 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 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	2022-04-06	RK	Pre-release
	2022-04-08	RK	Added recommended pin mappings
	2022-04-12	RK	Added serial baud rates