



PRODUCT DATASHEET

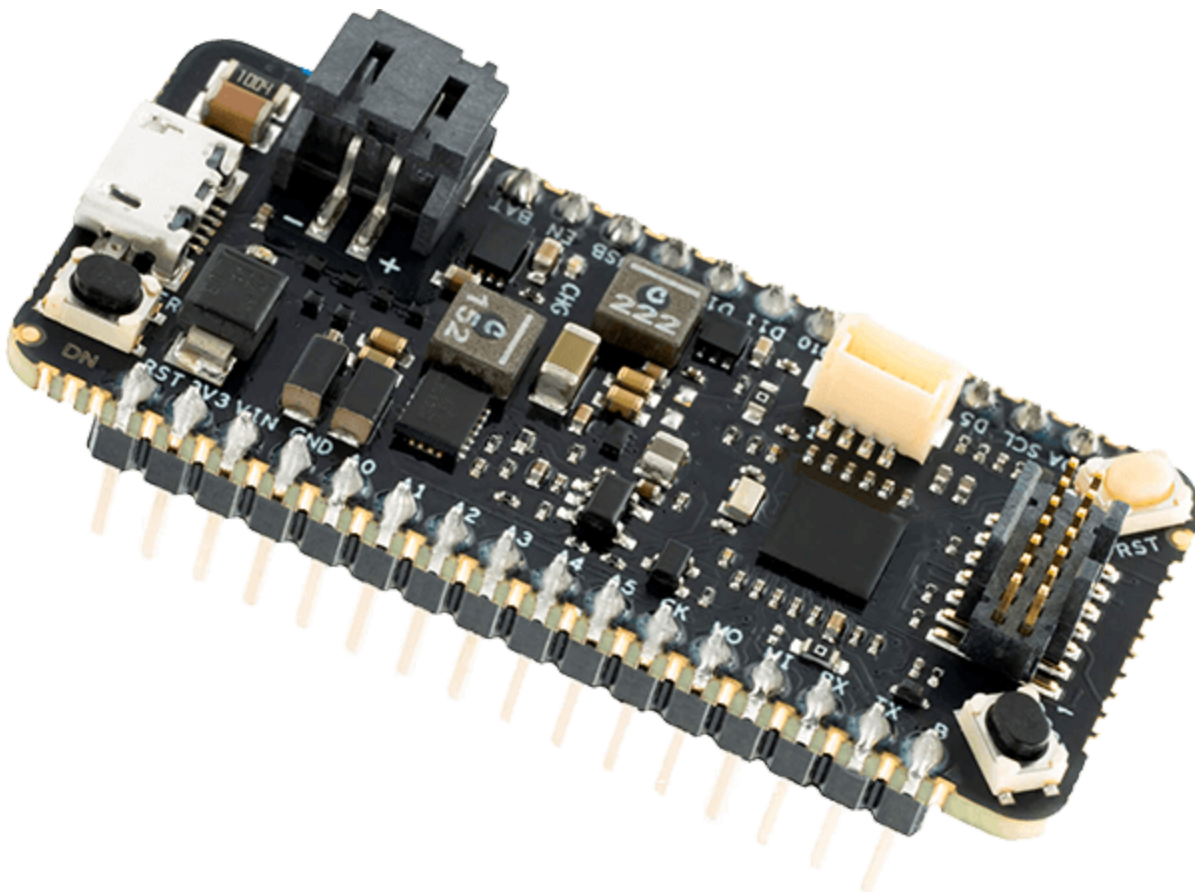
Swan Datasheet

Swan v3.0

Swan is a low-cost embeddable STM32L4+-based microcontroller board designed to accelerate the development and deployment of battery-powered IoT solutions.

Blues Swan™ Datasheet: Swan v3.0

Swan is a low-cost embeddable STM32L4+-based microcontroller board designed to accelerate the development and deployment of battery-powered IoT solutions.



It is especially useful for applications requiring large memory or a high degree of I/O expandability at an affordable cost, such as edge-based inferencing and remote monitoring. Acting in this role, Swan is designed to be the ideal companion to Blues's Notecard.

Functional Description

The Swan is a Feather-compatible MCU based on the STM32 from STMicroelectronics. The device was built after Blues worked directly with a customer to implement a complex industrial modernization solution based around the Notecard. It is designed to operate as a device that developers can get started with quickly as a Feather for a POC or Prototype. Once developers are ready to move into a Pilot,

or the complexity of the solution demands it, the Swan can leverage an additional 36 pins from the STM32 MCU through a set of castellated edges on the main PCB to utilize additional GPIOs or buses like I2C, UART, SPI, and CAN.

Features

- Features of the [ST STM32L4R5ZIY6 microcontroller](#)
 - 120MHz Clock speed
 - 2MB Flash, 2 banks read-while-write, proprietary code readout protection
 - 640KB of SRAM including 64KB with hardware parity check
 - Ultra-low-power with FlexPowerControl
 - 16x timers
 - 20x communication interfaces
 - 14-channel DMA controller
 - Rich analog peripherals (independent supply)
 - True random number generator
- Compliant with the [Adafruit Feather Specification](#)
 - includes a Micro-USB port for easy power and serial connectivity
 - includes a PMIC accessible via a JST PH connector, allowing you to either power the board via a LiPo battery and/or recharge the battery via USB.
- Access to 36 additional STM32 pins (beyond the Feather pins) via 0.05" castellated edge headers
- `USER_BTN` programmable button
- `LED_BUILTIN` programmable LED (red)
- JTAG (SWD capable) debug jack
- BOOT and RESET buttons

- Modular design supports Feather pins or an expansion PCB (to break pins out to 0.1" headers for easier wiring and debugging).
- 10k Ω pull-ups on the `SDA` and `SCL` pins
- Qwiic connector
- [Notecard Outboard Firmware Update](#) support

Warning

The performance of the STM32 microcontroller onboard the Swan may be affected in the presence of extremely bright light including, for example, direct sunlight. Bright light may interfere with the semiconductor's operation by generating unwelcome electrical currents, performance degradation, malfunction, or shutdown.

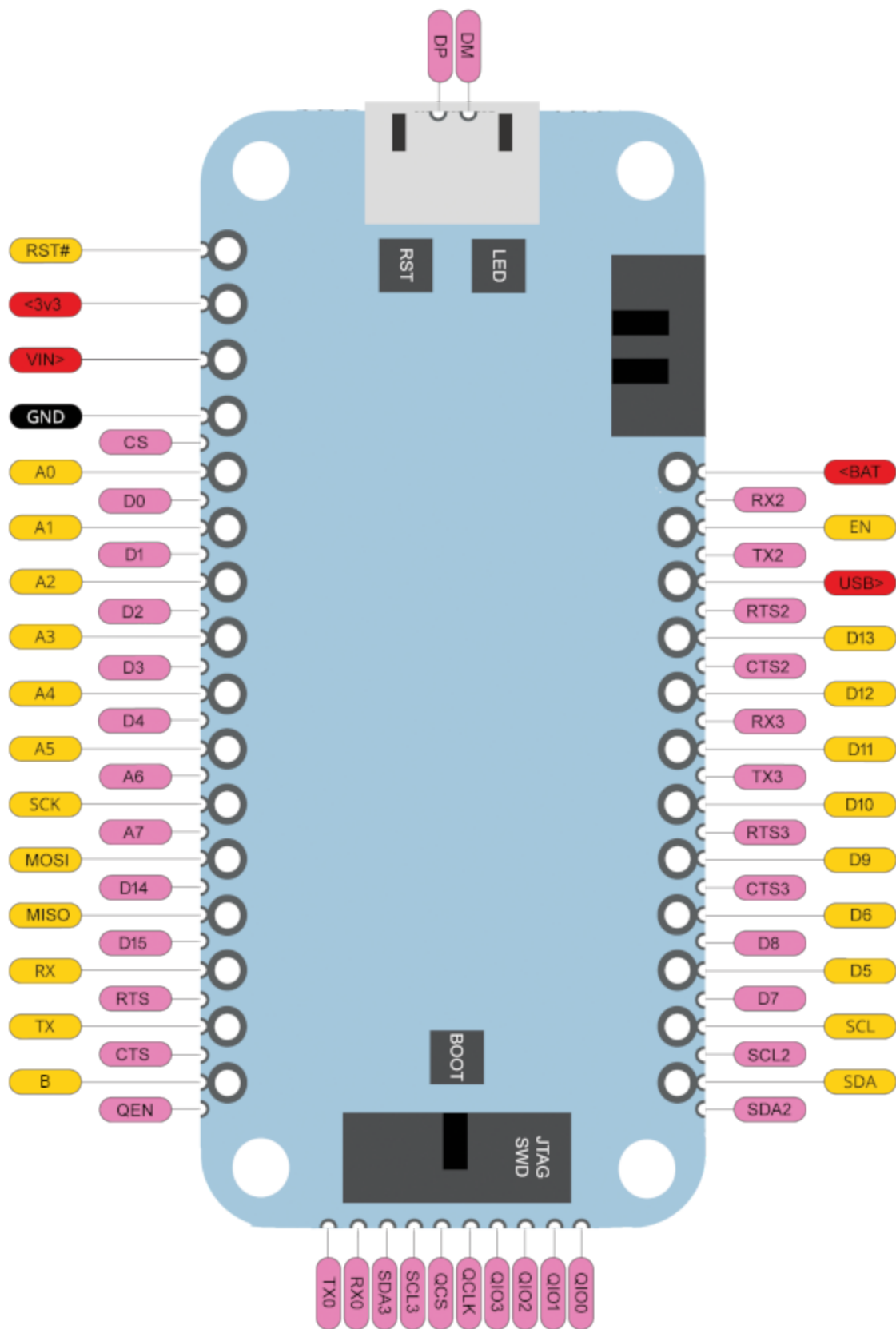
If you anticipate that bright light may shine on your device in its deployed setting, we recommend you mount the device in a shadow, or that you cover the STM32 microcontroller with an opaque tape to reduce light levels that may affect the semiconductor.

Package Configuration

The Swan can be used as a Feather-compatible board with soldered male headers, as a part of the Blues Notecard Feather dev kit, or as a headerless PCB with base carrier board for accessing 55 IO pins on the core STM32L4R5 MCU.

Swan Embedded

The Swan comes from the factory with no headers and a castellated edge, which allows it to be embedded directly in almost any project.

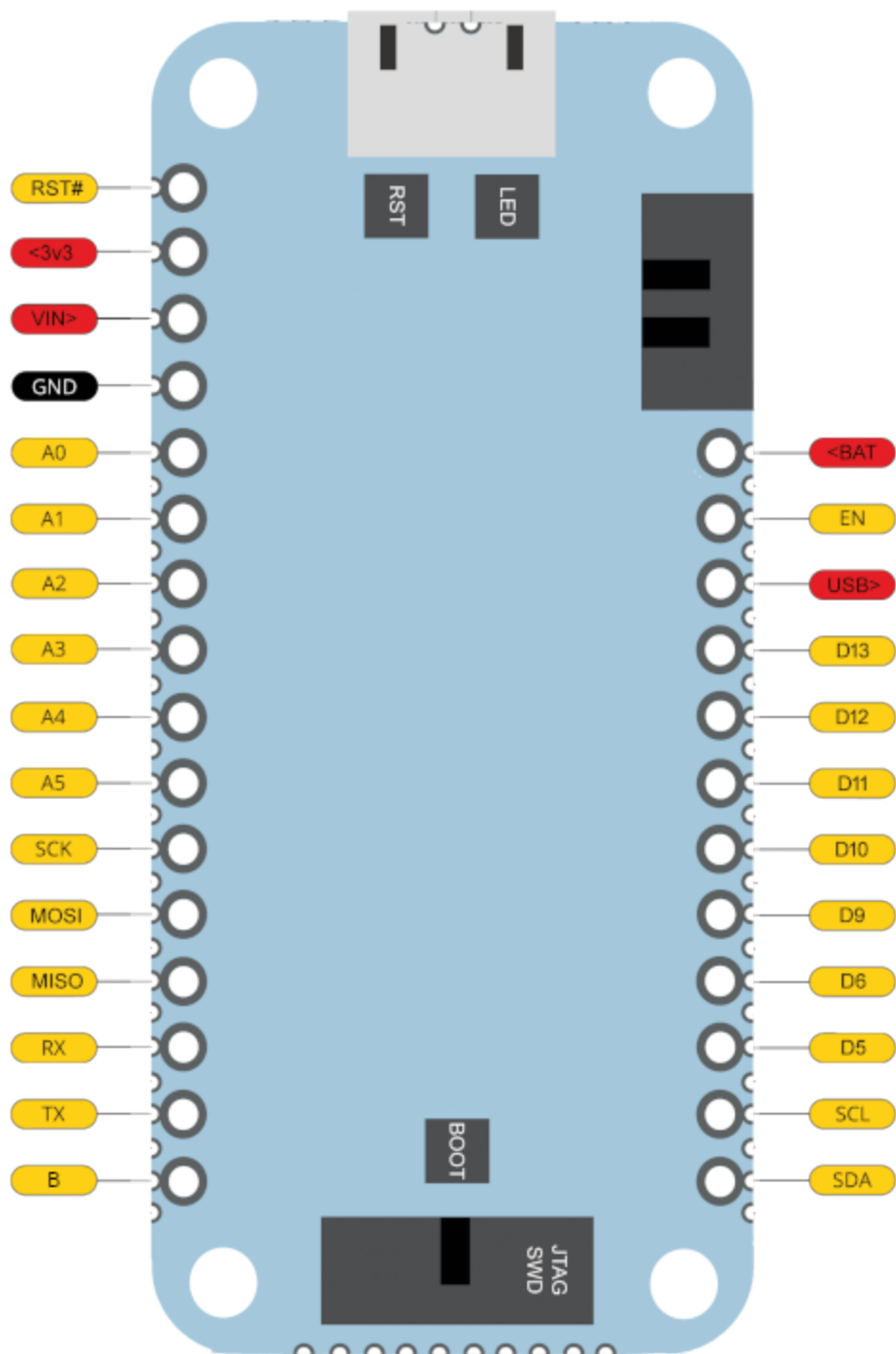


Unpopulated Headers with

0.5" Castellations

Feather-compatible Swan

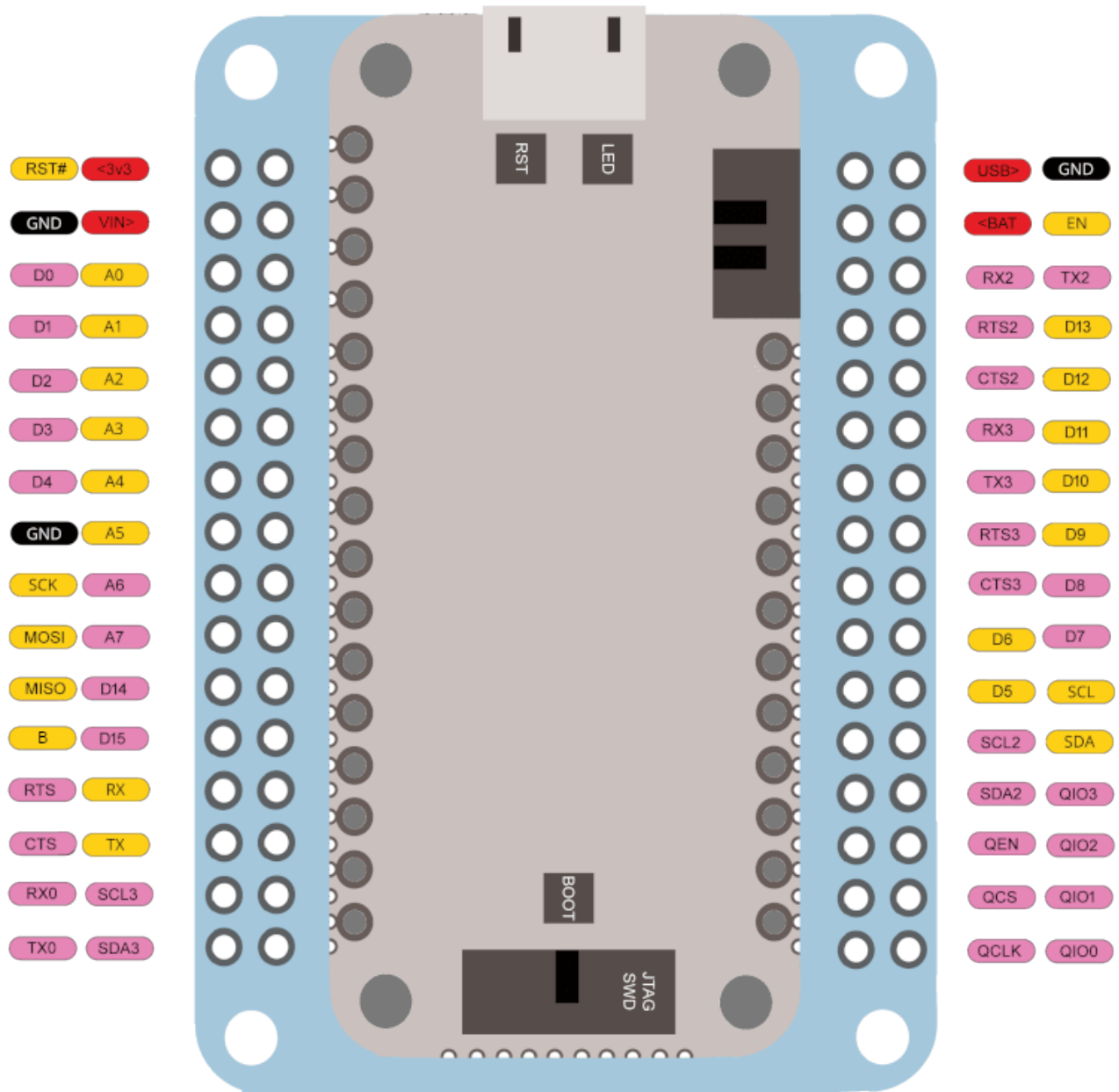
Use the included male Feather header pins to use the Swan as a [Feather-compatible device](#).



0.1" Feather Headers

Swan Carrier

The Swan Carrier board is designed to breakout the connections along the castellated edge of the Swan board. Once the Swan has been soldered directly to the carrier board, then additional dual row headers can be soldered



Swan Carrier Board with Swan Castellations Soldered-Down
Dual 16-pin RPI-like “Double Headers”

Pin Information

The following tables contain pin definition mappings between the Swan and Carrier pins to the STM32L4R5 core MCU.

Swan Feather to STM32 Mapping

Pin #	Pin Name		Pin #	Pin Name
RST	RST#			----
	3V3			----
	VIN			----
	GND			----
PA3	A0			BAT
PA1	A1		PE4	EN
PC3	A2		PC6	USB
PC1	A3		PA5	D13
PC4	A4		PA6	D12
PC5	A5		PA7	D11
PD1	SCK		PA4	D10
PB15	MOSI		PD15	D9
PB14	MISO		PE9	D6

Pin #	Pin Name		Pin #	Pin Name
PA10	RX		PE11	D5
PA9	TX		PB6	SCL
PH3	B		PB7	SDA
PC13	USER_BTN		PE2	LED_BUILTIN

Note

On Swan v3.0 the SPI chip-select signal **CS (PD0)** is exposed on a castellated pad on the long edge of the board, located between the **GND** and **A0** castellations. The final Feather header position that earlier Swan revisions used for **CS** is now the Boot pin (**B**). See the *Swan Embedded* pinout in [Package Configuration](#) for the castellation layout.

Swan Carrier Board to STM32 Mapping

Pin #	Pin Name		Pin #	Pin Name		Pin #	Pin Name		Pin #	Pin Name
RST	RST#			3V3		PC6	VUSB			GND
	GND			VIN			VBAT		PE4	EN
PD9	D0		PA3	A0		PD6	RX2		PA2	TX2
PD8	D1		PA1	A1		PD4	RTS2		PA5	D13
PF15	D2		PC3	A2		PD3	CTS2		PA6	D12
PE13	D3		PC1	A3		PB10	TX3		PA7	D11

Pin #	Pin Name		Pin #	Pin Name		Pin #	Pin Name		Pin #	Pin Name
PE3	D4		PC4	A4		PB11	RX3		PA4	D10
	GND		PC5	A5		PD2	RTS3		PD15	D9
PD1	SCK		PB1	A6		PB13	CTS3		PF12	D8
PB15	MOSI		PC2	A7		PE9	D6		PF13	D7
PB14	MISO		PB9	D14		PE11	D5		PB6	SCL
PD0	CS		PE1	D15		PF1	SCL2		PB7	SDA
PG12	RTS		PA10	RX		PF0	SDA2		PE15	QI03
PB4	CTS		PA9	TX		PD5	QEN		PE14	QI02
PG8	RX0		PC0	SCL3		PC11	QCS		PB0	QI01
PG7	TX0		PC9	SDA3		PE10	QCLK		PE12	QI00

Pin Description Table

Pin Name	Pin Description	Voltage Tolerance
A0	I/O - GPIO, PWM, ADC	3.6V
A1	I/O - GPIO, PWM, ADC	5V
A2	I/O - GPIO, ADC	5V
A3	I/O - GPIO, ADC	5V

Pin Name	Pin Description	Voltage Tolerance
A4	I/O - GPIO, ADC	5V
A5	I/O - GPIO, ADC	5V
A6	I/O - GPIO, PWM, ADC	5V
A7	I/O - GPIO, ADC	5V
D0	I/O - GPIO	5V
D1	I/O - GPIO	5V
D2	I/O - GPIO	5V
D3	I/O - GPIO, PWM	5V
D4	I/O - GPIO, PWM	5V
D5	I/O - GPIO, PWM	5V
D6	I/O - GPIO, PWM	5V
D7	I/O - GPIO	5V
D8	I/O - GPIO	5V
D9	I/O - GPIO, PWM	5V
D10	I/O - GPIO, ADC, DAC1	3.6V
D11	I/O - GPIO, PWM, ADC	5V
D12	I/O - GPIO, PWM, ADC	5V

Pin Name	Pin Description	Voltage Tolerance
D13	I/O - GPIO, PWM, ADC, DAC2	3.6V
D14	I/O - GPIO, PWM	5V
D15	I/O - GPIO, PWM(*)	5V
SCL	I ² C #1 - Serial Clock	5V
SDA	I ² C #1 - Serial Data	5V
SCL2	I ² C #2 - Serial Clock	5V
SDA2	I ² C #2 - Serial Data	5V
SCL3	I ² C #3 - Serial Clock	5V
SDA3	I ² C #3 - Serial Data	5V
3V3	Power - Constant 3.3V Supply	-
EN	Power - Chip Enable	5V
GND	Power - Ground	-
RST	Power - Reset	-
VBAT	Power - Battery Voltage Supply	-
VIN	Power - Input Voltage	-
VUSB	Power - USB Voltage Supply	-
RX0	Serial #0 - Receive	5V

Pin Name	Pin Description	Voltage Tolerance
TX0	Serial #0 - Transmit	5V
CTS	Serial #1 - Clear to Send	5V
RTS	Serial #1 - Request to Send	5V
RX	Serial #1 - Receive	5V
TX	Serial #1 - Transmit	5V
CTS2	Serial #2 - Clear to Send	5V
RTS2	Serial #2 - Request to Send	5V
RX2	Serial #2 - Receive	5V
TX2	Serial #2 - Transmit	5V
CTS3	Serial #3 - Clear to Send	5V
RTS3	Serial #3 - Request to Send	5V
RX3	Serial #3 - Receive	5V
TX3	Serial #3 - Transmit	5V
B	Boot0 - Boot into Bootloader	5V
CS	SPI - Chip Select	5V
MISO	SPI - Main In Secondary Out	5V
MOSI	SPI - Main Out Secondary In	5V

Pin Name	Pin Description	Voltage Tolerance
SCK	SPI - Serial Clock	5V
QCLK	Quad SPI - Serial Clock	5V
QCS	Quad SPI - Chip Select	5V
QEN	Quad SPI - Enable	5V
QIO0	Quad SPI - Bit 0	5V
QIO1	Quad SPI - Bit 1	3.6V
QIO2	Quad SPI - Bit 2	5V
QIO3	Quad SPI - Bit 3	5V
ENABLE_3V3	Enable External 3V3 Regulator	-
LED_BUILTIN	Built-in LED	-
USER_BTN	User Button	-

NOTE: All digital I/O pins are interrupt capable.

(*) Not supported on CircuitPython, since it relies on Timer 17, with 16 being the maximum supported.

Note

Swan's A0-A5 pins use different STM32 GPIO ports than the D-series pins. In particular, A4 and A5 map to **PC4** and **PC5** (not PA4/PA5). The two DAC outputs are on **D10** (PA4, DAC1) and **D13** (PA5, DAC2). When using Arduino, reference A0-A5 by their pin names (e.g. A4 , A5) and not by the underlying STM32 port names to ensure correct pin resolution.

Specifications

Electrical Characteristics

DC Characteristics

Description	Minimum	Maximum	Unit
VIN Supply Voltage	2.5	5.5	V
VBAT Supply Voltage	2.5	5.5	V
VUSB Supply Voltage	2.5	5.5	V
Supply Current	0.5	2.0	A
3V3 Output @ 5V	1.07	2.09	A

Absolute Maximum Ratings

Description	Minimum	Maximum	Unit
Storage temperature	-35	70	°C

Ordering Information

- Please visit the [Swan product page](#)  for ordering information.

Design Files

Open source hardware designs for the Swan and all Blues hardware are maintained in the [note-hardware](#) GitHub repository.

The design includes files for the Swan Feather board itself, along with a companion Swan Carrier board.

Swan Feather board:

- [Schematic \(.pdf\)](#) – the full circuit schematic. Use it to understand how the STM32, power, and I/O are wired together when designing a host or debugging a connection.
- [Schematic source \(.dsn\)](#) – the editable schematic. Open it in Cadence OrCAD Capture to view or modify the circuit.
- [Bill of materials \(.xlsx\)](#) – every component with its reference designator and manufacturer part number. Use it to source parts or build your own board.
- [PCB layout \(.brd\)](#) – the native Cadence Allegro board layout. Open it in Allegro/OrCAD PCB Editor to view or modify the copper, placement, and routing.
- [PCB drawing \(.pdf\)](#) – a printable drawing of the PCB layers, drill details, and board outline for reference and mechanical fit.
- [Gerber fabrication files \(.zip\)](#) – the Gerber and drill set. Send this package to a PCB manufacturer to have bare boards produced.
- [3D model \(.stp\)](#) – a STEP 3D model. Import it into mechanical CAD to check fit and design enclosures.

Swan Carrier board:

- [Schematic \(.pdf\)](#) – the full circuit schematic of the carrier board.
- [Schematic source \(.dsn\)](#) – the editable schematic. Open it in Cadence OrCAD Capture to view or modify the circuit.
- [Bill of materials \(.xlsx\)](#) – every component with its reference designator and manufacturer part number.
- [PCB layout \(.brd\)](#) – the native Cadence Allegro board layout. Open it in Allegro/OrCAD PCB Editor to view or modify the design.
- [PCB drawing \(.pdf\)](#) – a printable drawing of the PCB layers, drill details, and board outline.
- [Gerber fabrication files \(.zip\)](#) – the Gerber and drill set for having bare carrier boards produced.
- [3D model \(.stp\)](#) – a STEP 3D model. Import it into mechanical CAD to check fit and design enclosures.

Board Errata

Terms and Conditions

Visit [Blues Hardware Terms & Conditions](#)[↗].

Revision History

Author	Date	Summary
Zachary J. Fields	28 JUL 2021	Document drafted
Brandon Satrom	29 SEP 2021	Final Edits for publication
Zachary J. Fields	20 OCT 2022	Swan v3.0 Updates
Rob Lauer	2 FEB 2023	Warning re: STM32 light sensitivity

Contact Information

For other questions about the Swan, visit the [Blues Forum](#).

Blues Inc.

<https://blues.com>

50 Dunham Ridge Suite 1650

Beverly, MA 01915

support@blues.com