



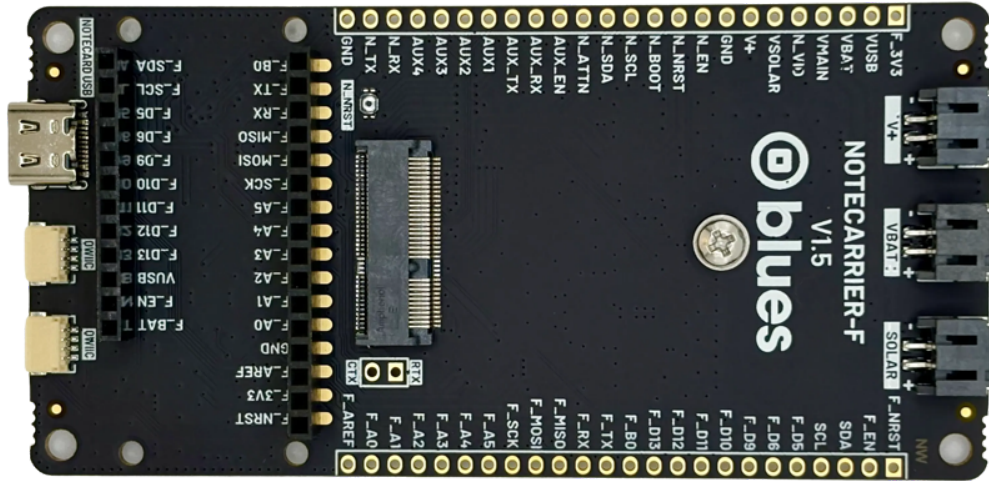
PRODUCT DATASHEET

Notecarrier Datasheet

Notecarrier F v1.5

Notecarrier F is designed for drop-in development with any Adafruit Feather or compatible microcontroller. It includes a Feather-compatible header socket, a USB-C port for power and USB Serial access to Notecard, Qwiic/STEMMA QT ports for I2C peripherals, JST connectors for LiPo battery, solar panel, and primary cell input, and support for Notecard Outboard Firmware Update, which updates host firmware without any cooperation from the host.

Blues Notecarrier® Datasheet: Notecarrier F v1.5



Functional Description

Notecarriers are available in multiple form factors to support rapid development across a range of use cases. Depending on the variant, a Notecarrier may prioritize direct host integration, compact size, integrated cellular/WiFi and GNSS antennas, or the ability to be soldered directly into a low-volume production design.

Notecarriers are explicitly designed to bridge the gap between early prototyping and a production-ready Notecard-based solution. In a final product, the Notecard is typically socketed directly onto a custom PCB via an edge connector, alongside the customer's MCU, sensors, and supporting circuitry. While this approach provides maximum flexibility and modularity, it can significantly increase the effort required during initial development and validation.

To simplify this process, Notecarriers expose the Notecard's interfaces through convenient breakout connections and integrate essential supporting circuitry, including power regulation, protection, and signal conditioning. This allows developers to focus on firmware, connectivity, and system behavior without first designing a complete custom carrier board.

Features

- **Simple.** Provides breadboard compatible pins or solderable mask for direct connections.
- **Compatible.** Level shifters ensure compatibility with 3.3V or 5V equipment.
- **Convenient.** Powered by a USB connector (requires 2A supply).

- **GPS Ready.** Models are either active GPS compatible, or feature a built-in antenna to enable GNSS connectivity.
- **Notecard Outboard Firmware Update.** Capable of updating host firmware without relying on the currently executing host firmware. Requires configuring the Notecard for Outboard Firmware Update before deployment. See [Notecard Outboard Firmware Update](#) for setup instructions.

Tested Notecard Outboard Firmware Update MCUs

The following is a list of Feather-compatible MCUs that we've tested and ensured are ready for [Notecard Outboard Firmware Update](#):

- Adafruit Feather nRF52840 Express
- Adafruit Feather STM32F405 Express
- Blues Swan (version 3 and greater)
- Blues Cygnet

Compatible Notecards

Due to differences in the physical size of Notecards, certain Notecarriers are only compatible with certain Notecards. However, the **Notecarrier F v1.5** is **compatible with all available Notecards**:

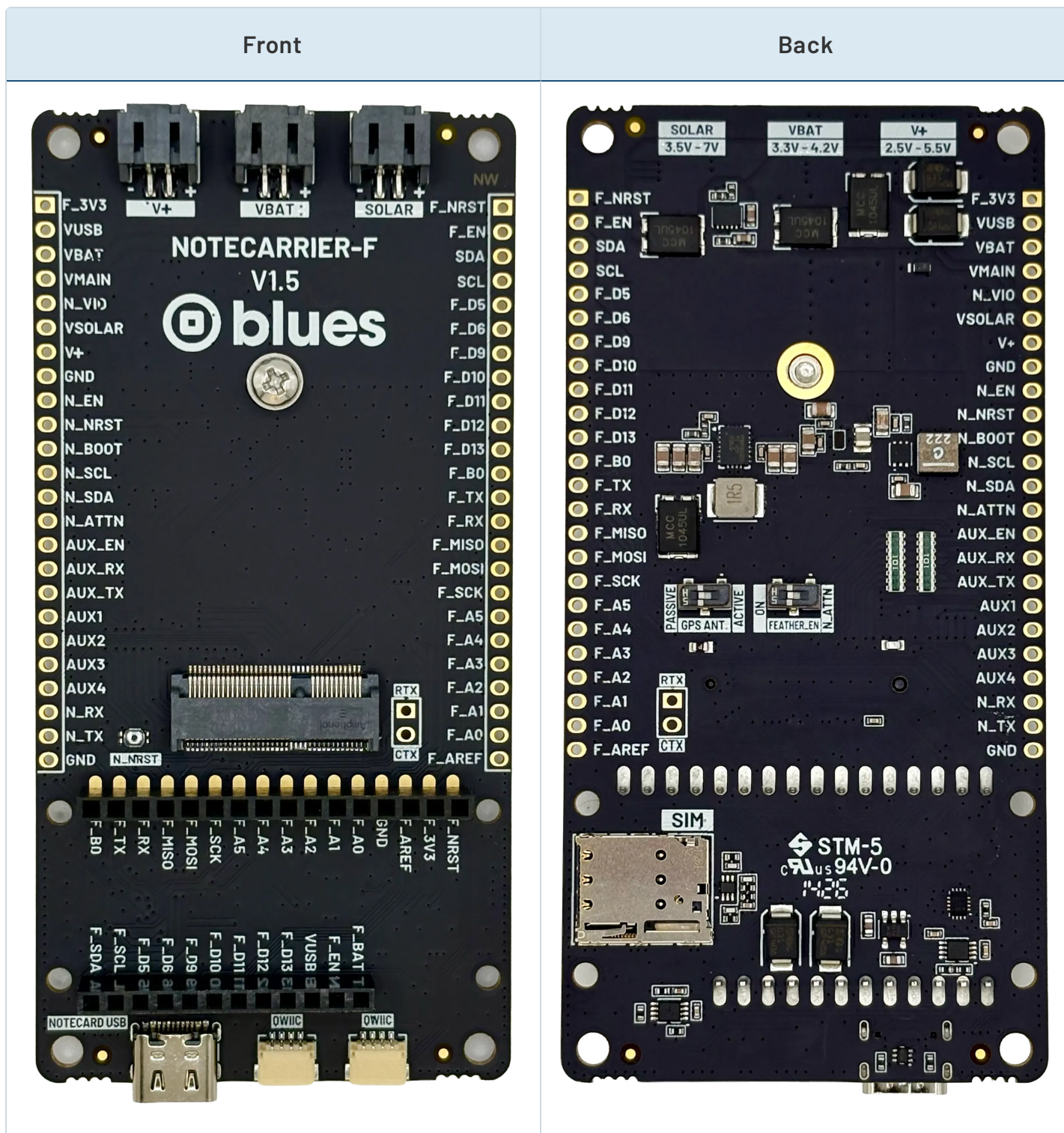
- [Notecard Cell+WiFi](#) 
- [Notecard Cellular](#) 
- [Notecard Cellular \(Legacy\)](#) 
- [Notecard WiFi](#) 
- [Notecard LoRa](#) 

Package Configuration

Notecarrier F (Adafruit Feather Socket) v1.5

Notecarrier F (CARR-F) is designed for drop-in development with any Adafruit Feather or compatible microcontroller. It includes two female pin headers (12-pin and 16-pin) for directly plugging in a Feather compatible board. It also includes Qwiic/Stemma QT I2C ports for attaching external peripherals to your project. This Notecarrier is also capable of supporting the Notecard's Outboard Firmware Update functionality, which allows you to update the firmware running on your host, without any cooperation of the host firmware.

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- Adafruit Feather compatible header socket.
- [Notecard edge connector socket](#) and [mounting screw receptacle](#).
- USB-C port to power Notecarrier and provide a USB Serial command interface to Notecard.
- Requires an external [LTE antenna](#) or [LTE + GPS antenna](#).
- External [Nano-SIM](#) slot for additional carrier connectivity.
- JST PH connector for a LiPo battery.

- JST PH connector for a solar panel.
- JST PH connector for Primary Cell Battery or DC input on V+
- 2x JST SH 3.3V I2C port (Adafruit STEMMA QT and Sparkfun Qwiic compatible).
- I2C Level shifter isolating Notecard power draw from Feather.
- Active/Passive GPS toggle switch
- Ultra low power `ATTN` / `F_EN` enable switch
- Automatic routing of the Feather's `F_RX`, `F_TX`, `F_B0`, and `F_NRST` pins to Notecard during a Notecard Outboard Firmware Update.
- LiPo charging circuit.
- PCB Dimensions: 103mm x 51mm
- Center of Mounting Holes (Notecarrier): 99mm x 47mm (measured from the edge of the PCB to the center of the furthest mounting hole)
- Center of Mounting Holes (Feather): 11mm x 49mm and 29mm x 49mm (measured from the edge of the PCB to the center of both sets of mounting holes)

Differences from Previous Version

Notecarrier F v1.5 differs from [Notecarrier F v1.3](#) in the following ways:

- The Micro-USB port is replaced by a USB-C port.
- Power applied to the Feather's own USB port now also feeds the Notecarrier's `VUSB` rail, so it powers Notecard and charges an attached LiPo battery exactly as the Notecarrier's USB-C port does.
- The `AUX` DIP switch is removed. The Feather's `F_RX`, `F_TX`, `F_B0`, and `F_NRST` pins are connected to the Notecarrier headers, and are switched over to Notecard automatically for the duration of a Notecard Outboard Firmware Update. See [DIP Switches](#).
- The `VSOLAR` header pin is now wired directly to the `SOLAR` JST connector, so USB power no longer appears on `VSOLAR`.
- The Feather's `SDA` and `SCL` lines have 10k Ω pull-ups to the Feather I/O voltage rail.
- The copper beneath the antenna end of the Notecard socket is removed on all layers to improve RF performance of Notecards with onboard antennas.

Pins Shared Between Feather and Notecarrier

Feather	Notecarrier	Dedicated	Reason
F_EN	ATTN	Y	Ultra low power
F_SDA	N_SDA	N	Notecard communication
F_SCL	N_SCL	N	Notecard communication
F_B0	AUX3	Y/N*	Notecard Outboard Firmware Update (boot)
F_NRST	AUX4	Y/N*	Notecard Outboard Firmware Update (reset)
F_RX	AUX_TX	Y/N*	Notecard Outboard Firmware Update (data)
F_TX	AUX_RX	Y/N*	Notecard Outboard Firmware Update (data)

*These Feather pins are connected to the F_B0 , F_NRST , F_RX , and F_TX pins of the Notecarrier F headers, and are switched over to Notecard automatically while a Notecard Outboard Firmware Update is in progress. During that time they are isolated from the headers.

Power Information

All Notecarriers can be powered by connecting directly to the USB port. However, most installations will not have USB power available, so several alternate power options are provided by the various Notecarrier models:

- Attaching a LiPo battery.

The LiPo battery must be a single-cell 3.7V battery with a 2-pin JST PH connector.

- Attaching a solar cell (must be accompanied by a LiPo).

The solar charging circuit accepts a 3.5-7V solar panel (the SOLAR connector is marked 3.5V - 7V on the board).

- Attaching USB power to the Feather's own USB port.

On Notecarrier F v1.5, USB power applied to the Feather's USB port also feeds the Notecarrier's VUSB rail, so it powers Notecard and charges an attached LiPo battery exactly as the Notecarrier's USB-C port does.

- Applying 2.5-5.5VDC to the V+ pin.

Commonly provided via DC power supply or non-rechargeable battery.

Warning

Typical USB ports may only be capable of supplying 500 mA of current, which might not be enough to power Notecard during a cellular connection to a GSM network (which can spike to 2A). In this situation, you're advised to supplement power to your Notecarrier with an external source (e.g. a LiPo battery).

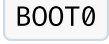
GPS (GNSS) Antenna Requirements

All Notecarrier models are designed to support active GPS, and several Notecarrier models provide built-in antennas ready to be connected to a Cellular Notecard using the included u.FL cables.

Header Descriptions

Notecarrier F Dual 24-Pin Headers

Pin Name	Direction	Usage		Usage	Direction	Pin Name
F_3V3	OUT	3.3V Feather Regulator		Active-high reset	IN	F_NRST
VUSB	IN/OUT	Direct connect to VBUS pin of the USB-C connector		Module enable	IN	F_EN
VBAT	IN/OUT	Direct connect to the + pin of the battery connector		I2C data request interface	IN/OUT	F_SDA
VMAIN	OUT	Diode union of VUSB, VBAT, and V+ sources		I2C clock request interface	IN/OUT	F_SCL
N_VIO	OUT	Digital I/O voltage source with 100mA available		Digital I/O pin 5	IN/OUT	F_D5
VSOLAR	IN	3.5-7V solar panel input to the LiPo charging circuit		Digital I/O pin 6	IN/OUT	F_D6
V+	IN	2.5-5.5V, < 8µA@5V idle, < 500mA typical, 2A surge max (GPRS)		Digital I/O pin 9	IN/OUT	F_D9
GND	IN	Ground		Digital I/O pin 10	IN/OUT	F_D10

Pin Name	Direction	Usage		Usage	Direction	Pin Name
N_EN	IN	For On/Off switching of customer product. Leave NC or connect to a physical switch or Open Drain output. Notecard will be OFF if pulled to GND. Never apply positive voltage to this pin.		Digital I/O pin 11	IN/OUT	F_D11
N_Nrst	IN	For development use only: MUST normally be NC or High Impedance and must never be pulled to GND. A VIO-level pulse of >250ms will reset the Notecard.		Digital I/O pin 12	IN/OUT	F_D12
N_BOOT	IN	Access to Notecard boot pin		Digital I/O pin 13	IN/OUT	F_D13
N_SCL	IN/OUT	I2C clock request interface (Notecard has onboard 10K pull-up resistors)		ST  button (Notecard Outboard Firmware Update)	IN	F_B0
N_SDA	IN/OUT	I2C data request interface (Notecard has onboard 10K pull-up resistors)		UART serial transmit request interface	OUT	F_TX

Pin Name	Direction	Usage		Usage	Direction	Pin Name
N_ATTEN	OUT	Configurable interrupt signal		UART serial receive request interface	IN	F_RX
AUX_EN	IN/OUT	API-selectable modes of operation		SPI Main In Secondary Out	IN	F_MISO
AUX_RX	IN/OUT	API-selectable modes of operation		SPI Main Out Secondary In	OUT	F_MOSI
AUX_TX	IN/OUT	API-selectable modes of operation		SPI clock	OUT	F_SCK
AUX1	IN/OUT	API-selectable modes of operation		Analog input pin 5	IN	F_A5
AUX2	IN/OUT	API-selectable modes of operation		Analog input pin 4	IN	F_A4
AUX3	IN/OUT	API-selectable modes of operation		Analog input pin 3	IN	F_A3
AUX4	IN/OUT	API-selectable modes of operation		Analog input pin 2	IN	F_A2
N_RX	IN	UART serial receive request interface (Notecard has onboard 10K pull-up resistors)		Analog input pin 1	IN	F_A1
N_TX	OUT	UART serial transmit request interface		Analog input pin 0	IN	F_A0

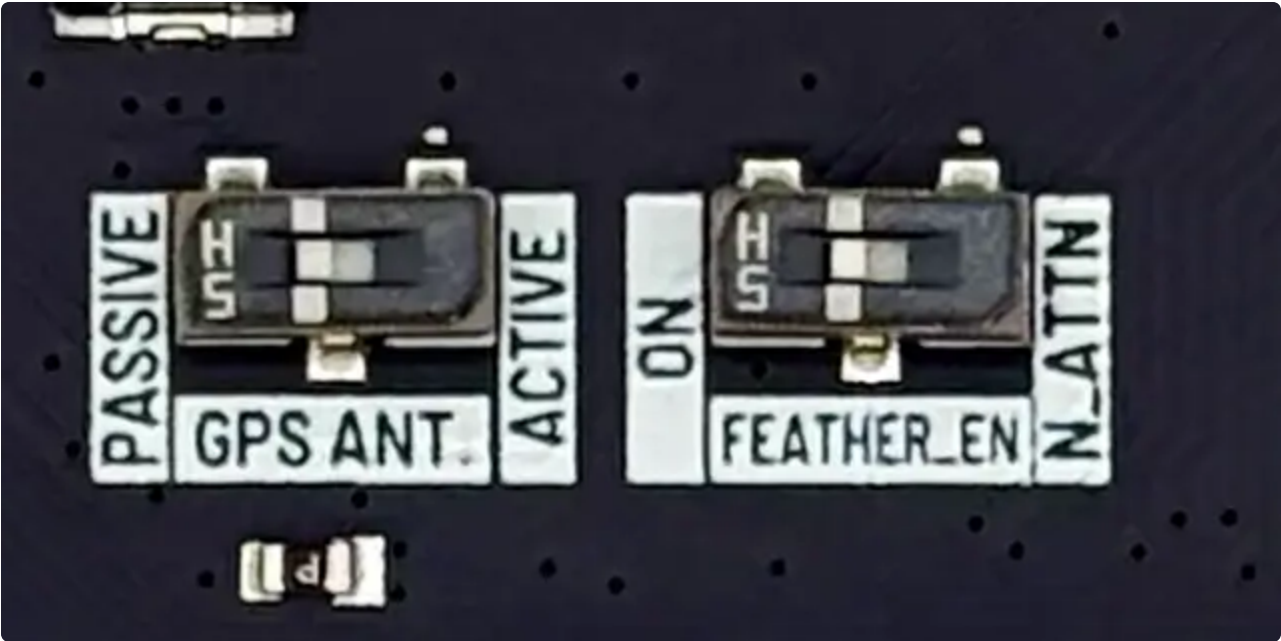
Pin Name	Direction	Usage		Usage	Direction	Pin Name
GND	IN	Ground		Analog REFerence voltage (max input voltage)	IN	F_AREF

Note

On Notecarrier F v1.5 the `F_NRST` , `F_B0` , `F_TX` , and `F_RX` header pins are connected to the corresponding Feather pins except while a Notecard Outboard Firmware Update is in progress. During an update, Notecard drives its `ALT_DFU_ACTIVE` signal low, and an onboard analog switch isolates these four Feather pins from the headers and connects them to Notecard's `AUX4` , `AUX3` , `AUX_RX` , and `AUX_TX` pins instead.

DIP Switches

There are two DIP switches located on the back of the board.



1. **GPS ANT** - When switched **ACTIVE**, applies 3.9VDC to the center conductor of the Notecard GPS antenna connector to power the low-noise amplifier (LNA) of an active GPS antenna. This switch must be **PASSIVE** (default) if Notecard is used with a closed-loop, passive GPS antenna! An active antenna is recommended for best performance.
2. **FEATHER_EN** - When switched **ON** (default), connects the **EN** pin of the 3.6V regulator to **N_VIO** to keep power all the time. When in the **N_ATTN** position connects the **EN** pin of the 3.6V regulator to the **ATTN** pin on the notecard for low power scenarios.

Note

Unlike Notecarrier F v1.3, there is no **AUX** (DFU) switch on Notecarrier F v1.5. Notecard Outboard Firmware Update is always enabled: the Feather's **F_RX**, **F_TX**, **F_B0**, and **F_NRST** pins are routed to Notecard automatically for the duration of an update, and are otherwise connected to the Notecarrier F headers.

Specifications

Electrical Characteristics

DC Characteristics

Description	Minimum	Maximum	Unit
Supply Voltage	2.5	5.5	V
Supply Current	500	2000	mA

Absolute Maximum Ratings

Description	Minimum	Maximum	Unit
Storage temperature	-35	70	°C

Note

Actual values may vary based on local conditions such as atmospheric conditions and distance to the cell tower.

Ordering Information

- [Notecarriers](#)[↗]
- [Development Kits](#)[↗]

Design Files

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

Here are the design files available for the **Notecarrier F v1.5**:

- [Schematic](#) ([.pdf](#)) – the full circuit schematic. Use it to understand how the Notecard, Feather host, power, and I/O are wired together.
- [Bill of materials](#) ([.xlsx](#)) – the fitted components with their reference designators and manufacturer part numbers. Note that this released spreadsheet omits the two outer 24-pin header sockets ([J9](#) and [J10](#) , 4UCON 12736), which are fitted on the board and present in the schematic and KiCad project. Use it to source parts or build your own board.
- [Assembly drawing](#) ([.pdf](#)) – shows component placement and reference designators. Use it to locate parts during assembly or rework.
- [Dimensional drawing](#) ([.pdf](#)) – board outline, mounting-hole locations, and connector positions for enclosure and mechanical fit.
- [Gerber fabrication files](#) ([.zip](#)) – the Gerber and drill set, plus the fabrication specification. Send this package to a PCB manufacturer to have bare boards produced.
- [Pick-and-place, top side](#) ([.pnp](#)) and [bottom side](#) ([.pnp](#)) – component centroid(X/Y/rotation) data used to program automated SMT assembly.
- [3D model](#) ([.step](#)) – a STEP 3D model. Import it into mechanical CAD to check fit and design enclosures.
- [3D view](#) ([.pdf](#)) – an interactive 3D view you can rotate and inspect in Adobe Acrobat, no CAD software required.
- [Altium project \(folder\)](#) [🔗] – the complete, editable Altium Designer design (schematic sheets and PCB layout). Open it in Altium to modify the design or generate your own outputs.
- [KiCad project \(folder\)](#) [🔗] – the complete, editable KiCad design (schematic sheets, PCB layout, and libraries), converted from the Altium project and validated against the released fabrication outputs. Open it in KiCad to modify the design or generate your own outputs.

Board Errata

Terms and Conditions

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

Revision History

Author	Date	Summary
Ray Ozzie	2019-2020	Document drafted
John Wiedey	2020	Various improvements
Sean Taylor	2020	Various improvements
Zachary J. Fields	01 OCT 2020	Updated information and translated to markdown
Brandon Satrom	04 JAN 2021	Added link to design resources
Greg Wolff	13 JAN 2021	Added BAT pin information to Notecarrier AF datasheet
Brandon Satrom	07 APR 2022	Added Notecarrier A information
Zachary J. Fields	20 JUL 2022	Added Notecarrier F information
Zachary J. Fields	24 OCT 2022	Added Notecarrier B v2 information
Rob Lauer	28 OCT 2022	Added versioning for Notecarrier B v1/v2
TJ VanToll	05 JAN 2023	Added Notecard Outboard Firmware Update information
Rob Lauer	28 FEB 2023	Re-labeling Notecarrier B as "Basic"

Author	Date	Summary
Rob Lauer	01 MAR 2023	Added PCB/Mounting Hole Dimensions
Rob Lauer	07 SEP 2023	Added Notecarrier F v1.3 information
Rob Lauer	16 NOV 2023	Added Notecarrier Pi v2.0 information
Rob Lauer	14 MAR 2024	Added Notecarrier B v3.1 and Notecarrier R v1.0 information
Rob Lauer	05 JUN 2024	Added Notecarrier XS v1.1 information
Rob Lauer	10 JUN 2024	Added KiCad schematics to A, B, F, and Pi Notecarriers
Rob Lauer	18 JUL 2024	Added Notecarrier XS v1.2 information
Rob Lauer	22 JUL 2024	Updated Notecarrier pin descriptions
TJ VanToll	19 AUG 2024	Added Notecarrier X v1.2, XM 1.2, and XP 3.1 information
Rob Lauer	14 JAN 2026	Added Notecarrier CX v1.3 information
Rob Lauer	11 FEB 2026	Added Notecarrier A v2.3 information
Rob Lauer	22 MAY 2026	Added Notecarrier CX v1.7 information

Author	Date	Summary
Rob Lauer	11 JUN 2026	Added Notecarrier XI v1.4 information
Rob Lauer	16 JUL 2026	Corrected Notecarrier XI DC specifications and Starnote for Iridium antenna details
Rob Lauer	03 AUG 2026	Add newly updated KiCad schematics
Rob Lauer	19 AUG 2026	Added Notecarrier XI v1.4 board errata
Rob Lauer	16 SEP 2026	Added Notecarrier F v1.5 information

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