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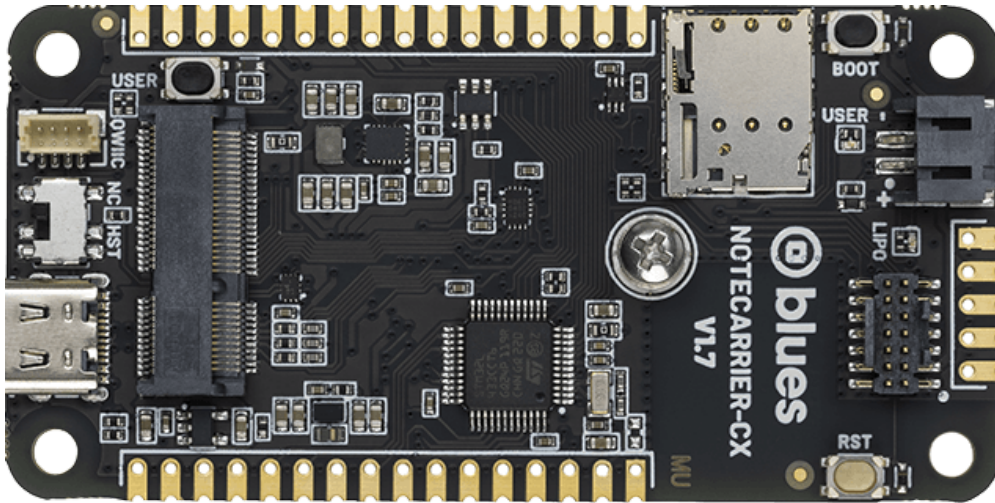
PRODUCT DATASHEET

# Notecarrier Datasheet

## Notecarrier CX v1.7

Notecarrier CX is a small form factor Notecarrier that pairs Notecard with a pre-soldered STM32L433 host MCU, the same part used on Blues Cygnet. It includes a JTAG debug jack, RST and BOOT buttons for bootloader access, a DIP switch toggling USB-C between Notecard and the STM32 host, LiPo battery support with onboard charging, and a Qwiic port for I2C peripherals.

# Blues Notecarrier® Datasheet: Notecarrier CX v1.7



## 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.

## Compatible Notecards

Due to differences in the physical size of Notecards, certain Notecarriers are only compatible with certain Notecards. However, the **Notecarrier CX v1.7** is **compatible with all available Notecards**:

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

# Package Configuration

## Notecarrier CX v1.7

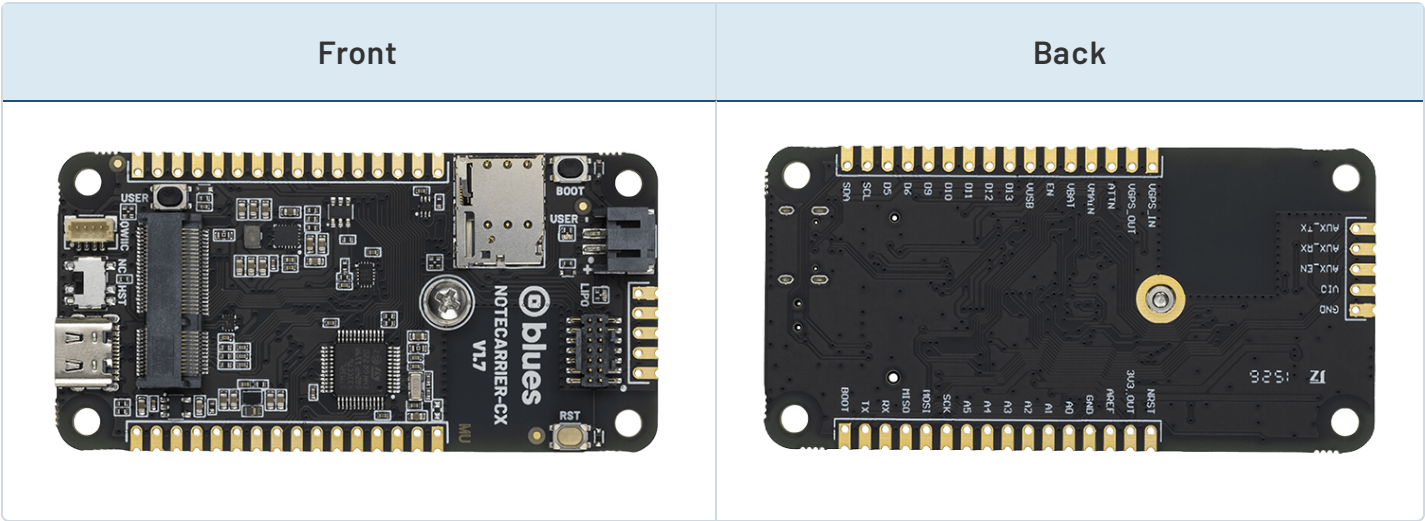
Notecarrier CX is a small form factor Notecarrier based on the Notecarrier X. However, Notecarrier CX also includes a pre-soldered and wired STM32L433 MCU (the same part used in [Blues Cygnet](#)) along with an onboard JTAG debug jack, a DIP switch for toggling USB-C between the Notecard and STM32 host, and **RST** and **BOOT** buttons for bootloader access.

Notecarrier CX also includes JST connectors for LiPo battery and charging support, as well as a Qwiic port for connecting to peripherals over I2C.

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Note

Consult the [Cygnet datasheet](#) for additional information about the STM32L433 included on the Notecarrier CX.



- [Notecard edge connector socket](#) and [mounting screw receptacle](#).
- Onboard STM32L433CCU6 Host MCU (80 MHz Clock, 256 KB Flash, 64KB of SRAM).
- USB-C port to power Notecarrier and provide a USB Serial command interface to Notecard or STM32 host (specified via onboard DIP switch).

- JST PH connector for a LiPo battery and a LiPo charging circuit.
- Qwiic connector for connecting I2C peripherals.
- `USER_BTN` programmable button.
- A yellow charging-status LED that lights when the onboard LiPo charger is actively charging a connected battery, and a red `LED_BUILTIN` LED tied to pin `PA8` of the onboard STM32L433 host MCU, controllable from host firmware (for example, with `digitalWrite(LED_BUILTIN, HIGH)` in Arduino). See the [Notecarrier CX Quickstart](#) for an example sketch that toggles this LED.
- Castellated Edges for easy pick-and-place installation in an end product.
- JTAG (SWD capable) debug jack.
- External Nano-SIM slot for use of an optional secondary SIM.
- PCB Dimensions: 76mm x 38mm
- Center of Mounting Holes: 73mm x 34mm (measured from the edge of the PCB to the center of the furthest mounting hole)

# 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.

- applying 2.5-5.5VDC to the `VBAT` or `VMAIN` pins.

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.

## Enabling Active GPS

If using Notecarrier CX v1.7 with an active GPS antenna, add a 0-Ohm 0603 jumper to the unpopulated spot next to the GPS bias pin (labeled `ACT_GPS_IN` on Notecarrier CX v1.3 and `VGPS_IN` on Notecarrier CX v1.7). This will power an active GPS LNA with a 3.8VDC bias voltage on the center conductor of its GPS u.FL connector.



# Header Descriptions

## Notecarrier CX Dual 16-pin Headers

| Pin Name | Direction | Usage                             |  | Usage                                                | Direction | Pin Name |
|----------|-----------|-----------------------------------|--|------------------------------------------------------|-----------|----------|
| NRST     | IN        | Active-low reset of onboard STM32 |  | Active antenna GPS bias voltage                      | IN        | VGPS_IN  |
| 3V3_OUT  | OUT       | Access to 3.3V supply voltage     |  | Active antenna GPS 3.8V from Notecard                | OUT       | VGPS_OUT |
| AREF     | IN        | Analog reference voltage input    |  | Configurable interrupt signal                        | OUT       | ATTN     |
| GND      | IN        | Ground                            |  | Diode union of VUSB and VBAT sources                 | OUT       | VMAIN    |
| A0       | IN        | Analog input pin 0                |  | Direct connect to the + pin of the battery connector | IN/OUT    | VBAT     |
| A1       | IN        | Analog input pin 1                |  | Input that gates the board's host 3.3V rail          | IN        | EN       |
| A2       | IN        | Analog input pin 2                |  | Direct connect to VUSB pin of the USB connector      | IN/OUT    | VUSB     |
| A3       | IN        | Analog input pin 3                |  | Digital I/O pin 13                                   | IN/OUT    | D13      |
|          |           |                                   |  |                                                      |           |          |

| Pin Name | Direction | Usage                                                        |  | Usage                                 | Direction | Pin Name |
|----------|-----------|--------------------------------------------------------------|--|---------------------------------------|-----------|----------|
| A4       | IN        | Analog input pin 4                                           |  | Digital I/O pin 12                    | IN/OUT    | D12      |
| A5       | IN        | Analog input pin 5                                           |  | Digital I/O pin 11                    | IN/OUT    | D11      |
| SCK      | OUT       | Serial Clock signal used by SPI bus                          |  | Digital I/O pin 10                    | IN/OUT    | D10      |
| MOSI     | OUT       | SPI data line used to send data from SPI master to SPI slave |  | Digital I/O pin 9                     | IN/OUT    | D9       |
| MISO     | IN        | SPI data line used to send data from SPI slave to SPI master |  | Digital I/O pin 6                     | IN/OUT    | D6       |
| RX       | IN        | UART serial receive request interface                        |  | Digital I/O pin 5                     | IN/OUT    | D5       |
| TX       | OUT       | UART serial transmit request interface                       |  | Serial Clock Line used by the I2C bus | IN/OUT    | SCL      |
| BOOT     | IN        | Boot into bootloader                                         |  | Serial Data Line used by the I2C bus  | IN/OUT    | SDA      |

# Notecarrier CX AUX Pin Headers

| Pin Name | Direction | Usage                                           |
|----------|-----------|-------------------------------------------------|
| GND      | IN        | Ground                                          |
| VIO      | OUT       | Digital I/O voltage source with 100mA available |
| AUX_EN   | IN        | Enable diagnostics                              |
| AUX_RX   | IN        | High-speed diagnostic interface                 |
| AUX_TX   | OUT       | High-speed diagnostic interface                 |

Note

The Notecard's `AUX1` , `AUX2` , `AUX3` , and `AUX4` pins are **not** broken out to the Notecarrier CX headers.

If your design requires direct access to `AUX1` – `AUX4` (for example, to wire buttons or external sensors directly to the Notecard via `card.aux` ), use a Notecarrier that exposes those pins, such as Notecarrier A, F, or X.

## DIP Switch

A single DIP switch is located on the front of the board. This switch selects which device is connected to the USB Serial interface: the Notecard( `NC` ) or the on-board STM32 host ( `HST` ). The Notecarrier CX must be fully powered off before changing the switch position.

# 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 CX v1.7**:

- [Schematic \(.pdf\)](#) – the full circuit schematic. Use it to understand how the Notecard, power, and I/O are wired together when designing a host or debugging a connection.
- [Bill of materials \(.xlsx\)](#) – every component with its reference designator and manufacturer part number. 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.
- [Fabrication drawing \(.pdf\)](#) – a dimensioned drawing with board outline, layer stack-up, and drill details for manufacturing and mechanical fit.
- [3D PDF \(.pdf\)](#) – an interactive 3D view of the assembled board you can rotate and inspect in Adobe Acrobat, no CAD software required.
- [3D model \(.step\)](#) – a STEP 3D model. Import it into mechanical CAD to check fit and design enclosures.
- [Pick-and-place \(.txt\)](#) – component centroid(X/Y/rotation) data used to program automated SMT assembly.
- [Fabrication package \(folder\)](#) – the complete manufacturing set: Gerbers, NC drill files, and an ODB++ export for sending to a PCB fabricator.
- [KiCad project \(folder\)](#) – the complete, editable KiCad design (schematic sheets, PCB layout, and libraries). Open it in KiCad to modify the design or generate your own outputs.

# Board Errata

# Terms and Conditions

Visit [Blues Hardware Terms & Conditions](#)<sup>↗</sup>.

# 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                                                  |

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