PRODUCT DATASHEET

Starnote Datasheet

Starnote for Skylo

Starnote for Skylo is an affordable satellite IoT backup device for NTN (Non-Terrestrial Networking) communications.

Blues Starnote® Datasheet: Starnote for Skylo

Starnote for Skylo is an affordable satellite IoT backup device for NTN (Non-Terrestrial Networking) communications.

Blues Starnote for Skylo is a low-cost, reliable, developer-accessible device that eliminates the complexity of adding satellite connectivity to any solution. As a cost-optimized "Notecard accessory", Starnote for Skylo only functions when used alongside a paired Notecard.

Starnote for Skylo is intended to disrupt the conventional wisdom that using satellite IoT requires a significant hardware investment and monthly device fees, even when devices aren't actively communicating with satellites.

Functional Description

As an accessory, Starnote for Skylo does not function like a standalone Notecard. Rather, Starnote for Skylo is paired with a Notecard and works alongside a Notecard Cellular, Notecard Cell+WiFi, or Notecard WiFi device (Notecard LoRa is not supported for use with Starnote for Skylo).

From a developer's point of view, Starnote for Skylo operates as an additional available RAT (Radio Access Technology) for Notecard. The developer uses the Notecard API to specify the Notecard's mode of operations for when to fallback to satellite, and Notecard handles all communications between itself and Starnote for Skylo.

Starnote for Skylo Variants

Starnote for Skylo is offered in two variants:

1. **Starnote for Skylo with Ignion Antennas** includes onboard LTE and GPS/GNSS antennas.
2. **Starnote for Skylo with u.FL Connectors** includes u.FL connectors for use with the included LTE and GPS/GNSS antennas.

Starnote for Skylo has a Notecard-like shape and it uses the same M.2 connector as Notecard. The Ignion antenna variant has two mounting holes, while the u.FL variant has a single mounting hole.

Despite using the same M.2 connector, Starnote for Skylo is only compatible with the Notecarrier XS and is not intended for use with any other Notecarrier. In addition to the M.2 connector, Starnote for Skylo can be connected to a Notecard via its 6-pin JST connector and a connector cable.

Satellite (NTN) Communications

Blues is partnering with Skylo to provide NTN (Non-Terrestrial Network) capabilities for Starnote for Skylo. The Skylo network operates a narrowband, high-latency, bi-directional, and reliable data-only NTN, using multiple existing GEO (Geosynchronous Equatorial Orbit) satellite networks.

Starnote for Skylo packets have a minimum size of 50 bytes and support a Maximum Transmission Unit (MTU) of up to 256 bytes. Packets can be sent up to 10 times/minute using the NB-IoT protocol. As Starnote for Skylo provides support for S-Band / L-Band frequencies on B23, B255, B256 bands, no satellite antennas are needed and no additional power is used. The Starnote for Skylo u.FL must be used with the LTE antenna provided with the device.

Features

- **Low-power.** Designed to operate on battery power and be "always-on" while typically drawing less than ~4µA@5V when idle.
- **Extensive coverage.** Provides blanket satellite coverage in supported regions.
- **Integrated.** M.2 Key E connector is provided for board-to-board usage and a six-pin JST for wire-to-board applications.
- **Built to minimize data usage.** Bundled with 10KB of satellite data from Skylo. Additional data is priced $0.00075/byte, with a minimum of 50 bytes per transmitted or received satellite data packet, billed monthly in arrears.
- **Simple.** Starnote for Skylo provides an NTN-capable satellite modem with zero-touch configuration. Starnote for Skylo uses Notecard's JSON command interface and communicates with a Notecard over UART.
- **Hassle-free.** No satellite provider subscriptions, fees, or monthly minimums apply.

Package Configuration

- Product Name: Starnote for Skylo
- NTN Module: Quectel CC660D-LS
- GPS/GNSS Module: Quectel L76L-M33
- Data Networks: 3GPP Rel-17 (IoT-NTN) at L-band (B255) and S-band (B256/23)
- Supported Regions: See Satellite Coverage
- Data included: 10KB

View in Store

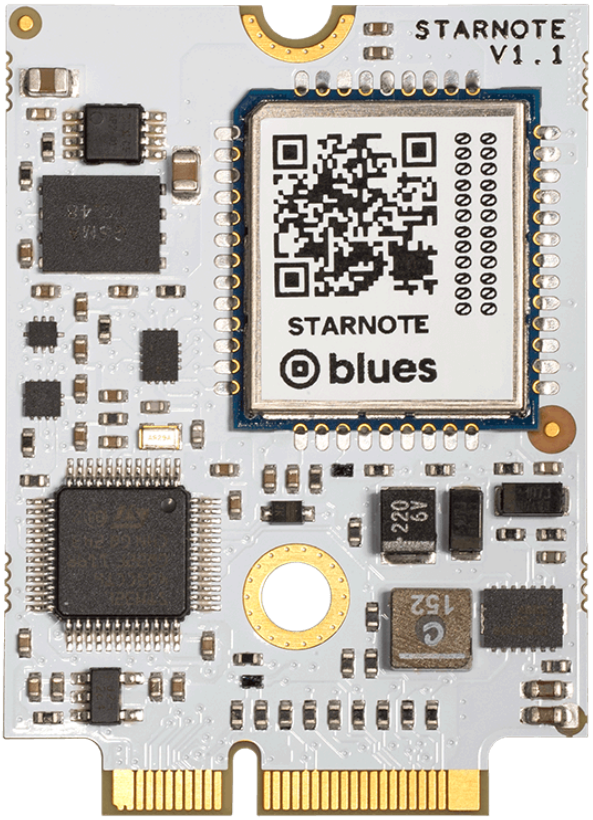
Module Datasheet

- Quectel CC660D-LS

Block Diagram

3D models for Starnote for Skylo are available on GitHub, making it a straightforward task to embed a Starnote for Skylo and its paired Notecard into a broad variety of host device designs.

Starnote for Skylo with u.FL Connectors

Front	Back
	

Starnote for Skylo with Ignion Antennas

Front	Back
	

Typical Application

Starnote for Skylo is meant to be used alongside a Cellular, Cell+WiFi, or WiFi Notecard in a fallback (failover) capability. The Starnote for Skylo's paired Notecard is programmed by the developer to facilitate efficient failover to satellite data utilizing the same Notecard API they are already using, while minimizing consumption of satellite data.

Key Features

Starnote for Skylo provides a new, expanded connectivity option for Notecard-powered solutions, enabling the following capabilities:

- **Extensive Coverage**

  Starnote for Skylo ensures connectivity across remote, rural, and near-shore maritime regions, offering a reach that terrestrial networks can't match. This is pivotal for applications in areas like maritime tracking, agricultural monitoring in remote locations, and global supply chain management.

- **Low Power Consumption**

  Built on the same STM32L4 MCU as Notecard and consuming ~4µA@5V when idle, Starnote for Skylo is a power-efficient satellite IoT option.

- **Interoperability**

  Since Starnote for Skylo requires a paired Notecard to function, developers continue using the same Notecard API while making only minor firmware changes to enable satellite connectivity.

- **Cost-Effectiveness**

Starnote for Skylo is a low-cost satellite IoT option that includes 10 KB of satellite data from Skylo. Additional data is billed at $0.00075 per byte. Each transmitted or received satellite data packet is billed as at least 50 bytes, regardless of actual payload size, and may not exceed 256 bytes. Usage is billed monthly in arrears.

Power Information

Starnote for Skylo's main supply voltage (`VMODEM_P`) powers the satellite modem (CC660D-LS) and associated circuitry via an on-board buck-boost regulator. Any voltage in the range of 2.5V to 5.5V may be provided.

When idle, the Starnote draws minimal current. However, when the satellite modem is active, the current draw on `VMODEM_P` increases significantly. As such, it's recommended that `VMODEM_P` be directly connected to a battery or other supply capable of sustaining 350mA or more. It is also recommended that PCB traces for `VMODEM_P` and `GND` be designed to handle such current.

The Starnote's logic voltage (`VIO_P`) is provided by the Notecarrier or host system for digital communication; it will be either 1.8V or 3.3V. This supply should be designed with a 150mA budget allocated to the Starnote.

Pin Name	Direction	Pin Numbers	Usage
GND	--	3,5,6,11,18,33,39,45,51,57,71,73	Ground
VIO_P	IN	2,4	1.8V or 3.3V @ 150mA (STM32L433 + level shifters + pull-ups)
VMODEM_P	IN	70,72,74	2.5V to 5.5V, capable of sustained 350mA draw (CC660D-LS + SIM mux + status LED)

Reset and Loss of Power

Warning

A power-loss event occurs whenever the Starnote loses power on `VIO_P` or `VMODEM_P`, or the Starnote's `RST` pin is pulled low. The satellite modem is designed to use best efforts to maintain integrity when recovering from a power-loss event. That said, there is a small chance that recovery will be impossible and the modem will be rendered permanently unusable.

It is the responsibility of every product designer to ensure that designs utilizing Starnote provide constant power to `VMODEM_P` and `VIO_P` so as to ensure that power-loss events do not occur as a matter of course.

Antenna Requirements

Starnote for Skylo with u.FL Connectors

Starnote for Skylo with u.FL Connectors includes two u.FL connectors for use with external antennas.

1. The `SAT` u.FL connector must be attached to the included Skylo-certified LTE-capable antenna that supports S-Band / L-Band frequencies on B23, B255, B256 bands.
2. The `GPS` u.FL connector must be attached to a passive GPS/GNSS antenna.

Both antennas must be placed outdoors and oriented towards the sky.

Warning

Starnote for Skylo with u.FL connectors is certified on Skylo's network exclusively with the antenna provided in the kit. If you replace or modify the antenna, Skylo classifies the device as uncertified and may block it.

Should you wish to pursue Skylo certification with a different antenna, you'll need to work with your test house to produce a report that demonstrates that the combination of device + antenna does not exceed an EIRP of 30dBM. This delta test lab report demonstrates that the transmission power of the device does not exceed regulatory limits and can be done by any lab that is authorized to do CTIA/OTA testing. If you don't have a test house that can perform this test, Blues can recommend one.

Regardless of antenna choice, we strongly advise comprehensive field testing in the final enclosure and deployment environment to ensure reliable connectivity.

Starnote for Skylo with Ignion Antennas

Starnote for Skylo with Ignion Antennas includes onboard antennas for both LTE and GPS/GNSS. Starnote for Skylo must be placed outdoors with a clear view of the sky.

Note

The "LTE" antenna on Starnote for Skylo is for the LTE-bands (B23, B255, B256) used by Skylo's NB-IoT NTN satellite link, not for terrestrial cellular LTE. Starnote for Skylo provides satellite (NTN) connectivity only; terrestrial cellular and WiFi connectivity come from the paired Notecard (Cellular, Cell+WiFi, or WiFi).

Antenna Performance

Actual RF performance of Starnote for Skylo depends on a variety of physical factors, including:

- The choice of antenna(s).
- The physical environment.
- The trace layout, dimensions, and/or PCB tolerance of the carrier board (e.g. Notecarrier) used.

Satellite Coverage

Satellite coverage for Starnote for Skylo is provided by Skylo. Please consult Skylo's map for more specific information on country- and region-specific satellite coverage.

Pin Information

Notecard communicates with Starnote for Skylo via Starnote for Skylo's M.2 or JST connectors. The core interface between a Notecard + Notecarrier and Starnote is:

- `GND`
- `VIO` - I/O-level supply (generally 3V3 or 1V8)
- `VMODEM` - supplying up to 1A at 2V5-5.5V
- `RX/TX` pair

The wire-to-board connector on Starnote for Skylo is a 6-pin JST SH (side-entry SM06B-SRSS-TB) connector, with the following pin assignments:

JST Pin	Signal	Description
1	GND	Ground
2	TX	UART transmit (the same signal as M.2 pin 64, `TX_P`)
3	VMODEM	Modem supply voltage
4	VIO	I/O-level supply voltage
5	RX	UART receive (the same signal as M.2 pin 62, `RX_P`)
6	GND	Ground

Note

As Starnote for Skylo must be connected to Notecard via UART, your host must interface with Notecard using I2C.

Pin Definitions

Pin #	Pin Name	Func. Interface	Func. Interface	Pin Name	Pin #
1	NC		Power	VIO_P	**2**
3	GND	Power	Power	VIO_P	**4**
5	GND	Power	Power	GND	**6**
7	NC			NC	**8**
9	NC			NC	**10**
11	GND	Power		NC	**12**
13	NC			NC	**14**
15	NC			NC	**16**
17	NC		Power	GND	**18**
19	NC			NC	**20**
21	NC			NC	**22**
23	NC		MODULE KEY	--	**24**
25	--	MODULE KEY	MODULE KEY	--	**26**
27	--	MODULE KEY	MODULE KEY	--	**28**
29	--	MODULE KEY	MODULE KEY	--	**30**

Pin #	Pin Name	Func. Interface	Func. Interface	Pin Name	Pin #
31	--	MODULE KEY		NC	**32**
33	GND	Power		NC	**34**
35	NC			NC	**36**
37	NC			NC	**38**
39	GND	Power		NC	**40**
41	NC			NC	**42**
43	NC			NC	**44**
45	GND	Power		NC	**46**
47	NC			NC	**48**
49	NC			NC	**50**
51	GND	Power		NC	**52**
53	NC			NC	**54**
55	NC			NC	**56**
57	GND	Power		NC	**58**
59	NC			NC	**60**
61	NC		UART Serial	RX_P	**62**
63	NC		UART Serial	TX_P	**64**

Pin #	Pin Name	Func. Interface	Func. Interface	Pin Name	Pin #
65	BOOT			NC	**66**
67	RST			NC	**68**
69	NC		Power	VMODEM_P	**70**
71	GND	Power	Power	VMODEM_P	**72**
73	GND	Power	Power	VMODEM_P	**74**
75	NC				

Note

All pins whose **Functional Interface** is marked "Power" must be connected.

All pins named `NC` MUST have no connection and be left open because they are reserved for future use. Furthermore, any pin not used in a design MUST also be left open.

Those pins ending with `_P` may be optionally protected from anomalous external conditions on some Notecarrier designs, depending upon use-case specific requirements.

Specifications

Starnote for Skylo with u.FL Connectors

Width	Height	Weight
30mm	42mm	5g

Starnote for Skylo with Ignion Antennas

Width	Height	Weight
30mm	60mm	6g

Electrical Characteristics

Absolute Maximum Ratings

Description	Minimum	Maximum	Unit
Storage temperature	-40	90	°C
Ambient operating temperature	-40	85	°C

DC Characteristics

Description	Minimum	Maximum	Unit
Supply Voltage	2.5	5.5	V

Ordering Information

Blues Shop

Certifications

Skylo

Starnote for Skylo is Skylo Certified. Starnote for Skylo has cleared Skylo's Non-Terrestrial Network (NTN) Certification Program, validating full compliance with 3GPP Release-17 NB-IoT-over-NTN and Skylo's own "Standards Plus" enhancements. This firmware-level approval guarantees seamless, resource-efficient hand-off to Skylo satellites the moment terrestrial coverage drops, so Starnote for Skylo keeps sending data as long as it can see the sky.

Certification	Date
Starnote for Skylo Certificate of Compliance	May 2025

CE

Pending

FCC

Pending

ISED

Pending

Terms and Conditions

Two versions of Starnote for Skylo have been certified for transmission to Skylo's satellite network: one version with an integrated PCB antenna, and the other version with an adhesive "flex" antenna included with the Starnote for Skylo product. Use of any other antenna risks unintended interference in adjacent bands, and thus is prohibited without prior testing and certification by Skylo.

Visit Blues Hardware Terms & Conditions

Security and Vulnerability Scanning

As a part of our regular audit and scanning process, Blues Inc. performs full vulnerability scanning every six months. Any identified vulnerabilities will be analyzed, reported, and patched in a timely fashion, where appropriate.

Revision History

Author	Date	Summary
Rob Lauer	11 APR 2024	Document drafted
Rob Lauer	03 JUN 2025	Added Skylo certification and updated antenna information
Rob Lauer	19 SEP 2025	Clarifying bundled satellite data
TJ VanToll	19 NOV 2025	Changes to consistently use "Starnote for Skylo" as the product name
Rob Lauer	15 DEC 2025	Added Starnote for Iridium information
Rob Lauer	16 JUL 2026	Added Starnote for Iridium power and pin information
Rob Lauer	23 JUL 2026	Accuracy review vs. hardware design files

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