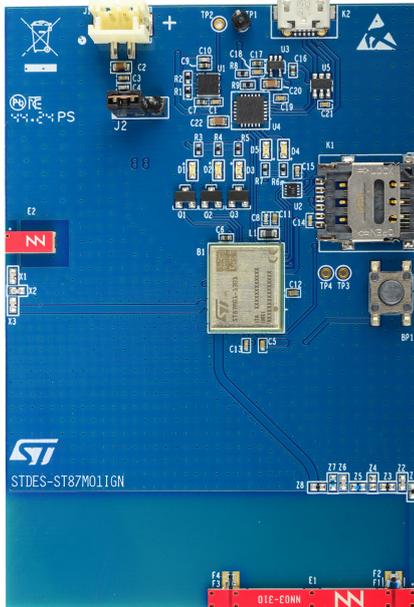


ST87M01 reference design with chip antennas



Fully assembled board developed for performance evaluation only, **not available for sale**

Features

- Integration of IGNION NN03-310 (NB-IoT) and NN03-320 (GNSS) chip antennas
- Three dedicated matching networks supporting multiple NB-IoT band combinations (700-960 MHz, 1.7-2.2 GHz)
- Layout optimized with antenna clearance and keepout areas to maximize efficiency and radiation performance
- On-board USB to UART converter for ST87M01 control via AT commands over USB
- Selectable USB or 3 V battery supply, with low-noise LDO regulator
- SIM holder, reset push button, status/activity LEDs, and test points for easy debug
- RF performance validated in passive mode (S11, efficiency, gain, 2D/3D radiation patterns) and active mode (TRP) across multiple bands
- The NN03 antenna also supports the 2.4 GHz Wi-Fi band, enabling the ST87M01's built-in Wi-Fi scanning

Description

The **STDES-ST87M01IGN** is a reference design for the **ST87M01** NB-IoT + GNSS module, implemented on a 2-layer FR4 PCB (90 mm x 60 mm, 1.6 mm).

It simplifies the development of NB-IoT/GNSS systems by using compact IGNION chip antennas and a layout already optimized for RF performance.

The **STDES-ST87M01IGN** integrates the **ST87M01** module, the NN03-310 chip antenna for NB-IoT and the NN03-320 chip antenna for GNSS, together with their dedicated RF matching networks optimized for different NB-IoT band groupings.

The layout has been carefully engineered to ensure signal integrity and robust RF behavior, thanks to a wide ground plane, 50 Ω CPWG transmission lines, antenna clearance zones and keepout areas, and close placement of matching components to the antenna feeds.

The **STDES-ST87M01IGN** includes all necessary functions for fast evaluation: USB or battery powering, low-noise voltage regulation, USB-to-UART interface, SIM holder, reset button, status LEDs, and accessible test points.

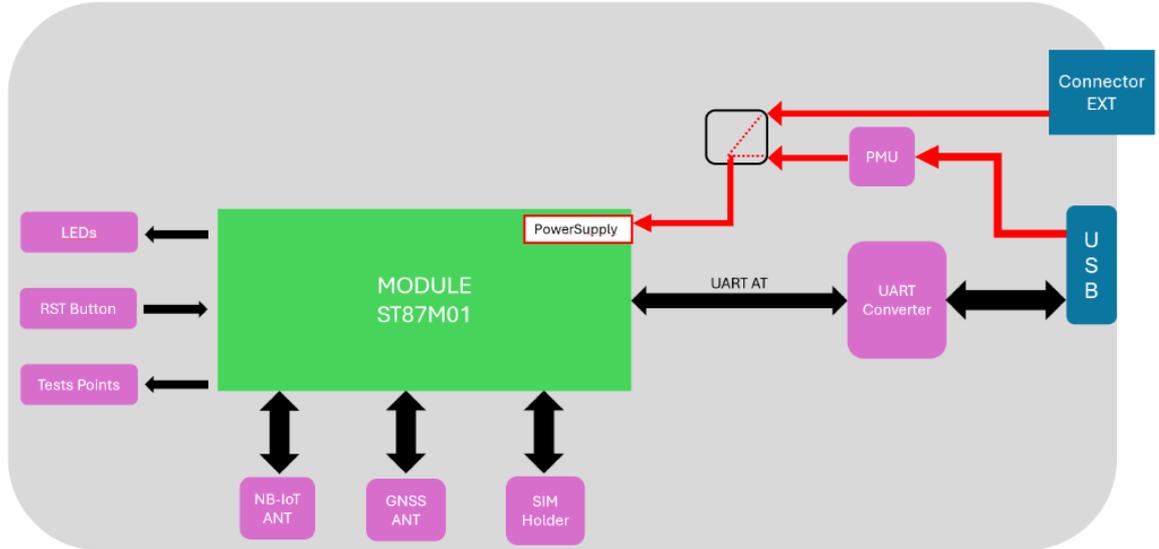
The RF behavior has been characterized both in passive mode (return loss, efficiency, maximum gain, 2D/3D radiation patterns) and in active mode through total radiated power (TRP) measurements, showing good alignment with expected values across supported bands.

The NN03-310 antenna enables operation in the 2.4 GHz Wi-Fi band for Wi-Fi scanning (a feature of the **ST87M01** module). This allows the board to detect nearby Wi-Fi access points and support coarse positioning (for example, when GNSS is unavailable), making the **STDES-ST87M01IGN** an ideal platform to accelerate the design of compact, multiband, high-efficiency IoT applications with integrated GNSS/Wi-Fi assisted positioning.

Product summary	
ST87M01 reference design with chip antennas	STDES-ST87M01IGN
Ultra-compact, low-power NB-IoT industrial module series with optional GNSS	ST87M01-1301
N-channel 20 V, 0.025 Ohm typ., 2.3 A STRipFET H5 Power MOSFET in SOT-23 package	STR2N2VH5
500 mA low quiescent current and low noise voltage regulator	LD39050PUR
ESD Protection for USB 2.0 High Speed	USBLC6-2SC6
Applications	Wireless connectivity

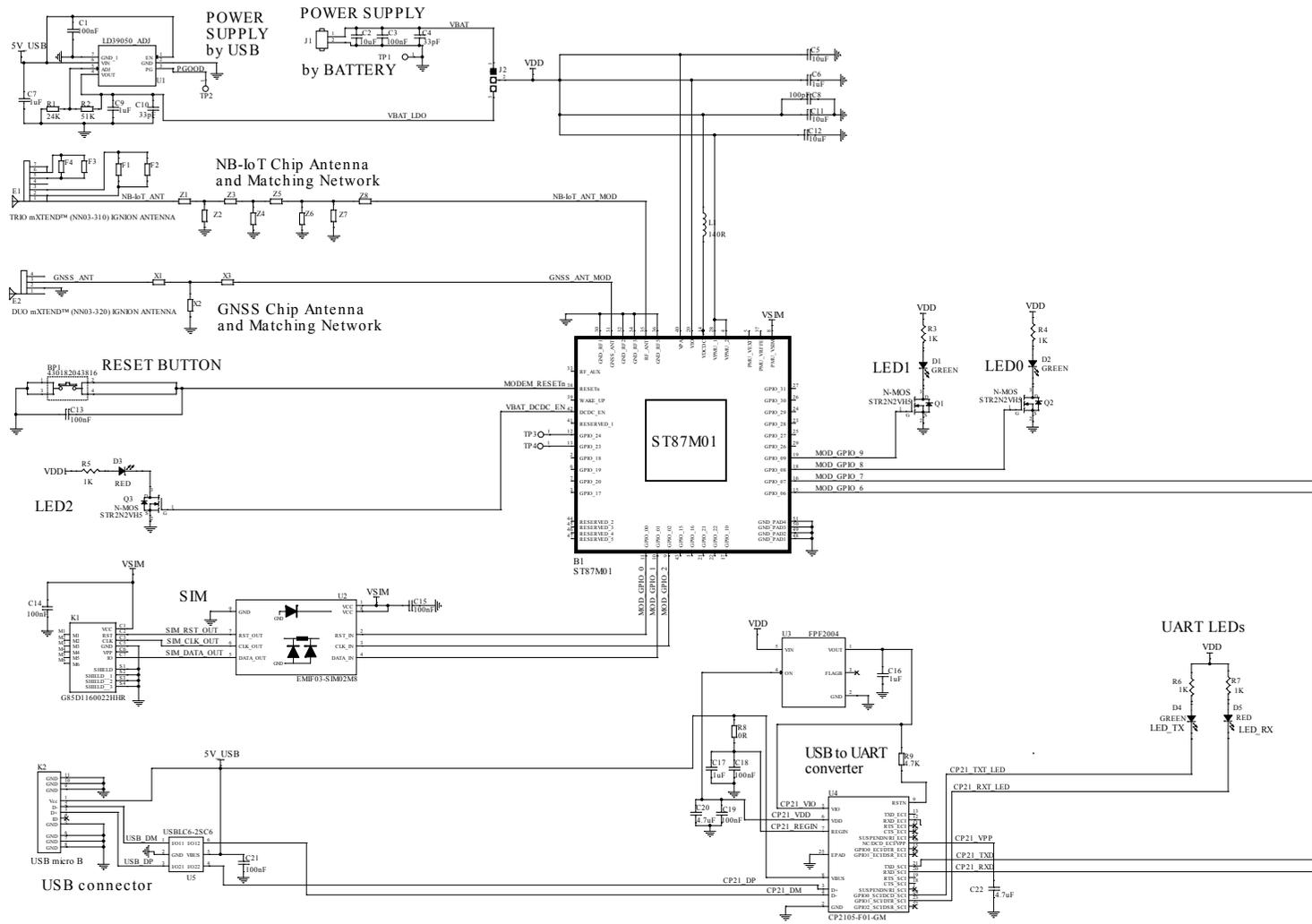
1 System overview

Figure 1. System overview



2 Schematic diagrams

Figure 2. STDES-ST87M01IGN circuit schematic



Revision history

Table 1. Document revision history

Date	Revision	Changes
17-Feb-2026	1	Initial release.

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