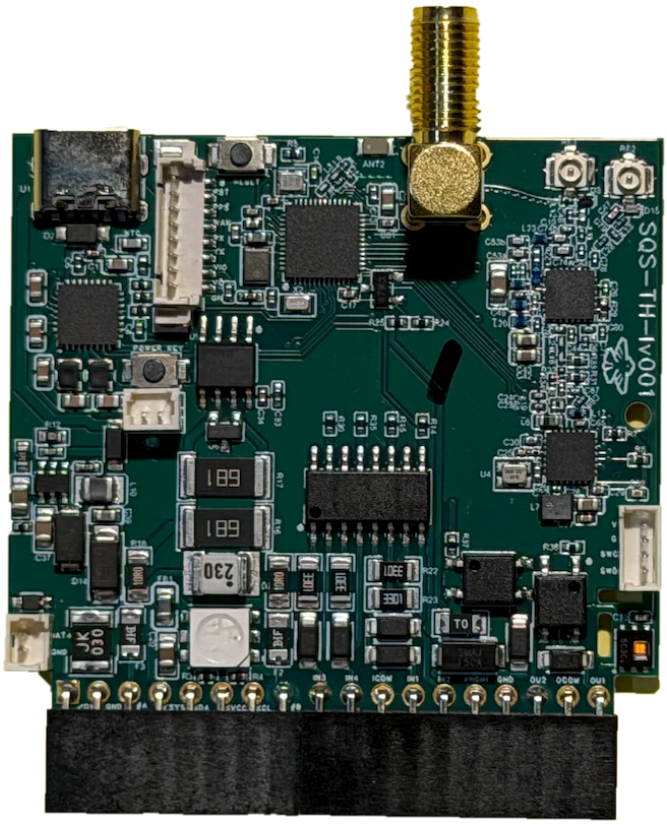
SQ-MB

LoRa® + BLE Main Board — nRF54L15, SX1262 with 1 W-class PA, nPM1300 PMIC



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Document	Rev	Date	Notice
SQ-MB Datasheet	Rev 0.1 (Preliminary)	Nov 2026	Guineatech © Limited standard files

Document Version

Version	Time	Description	Remark
Rev. 0.1	2026-11-10	Preliminary version (Rev A prototype measured, Rev B in production)	Living

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1. Description

1.1 Overview

The SQ-MB is the main board of the Siliqs nRF54L15 product family. It combines a Nordic nRF54L15 (Arm Cortex-M33, 128 MHz, Bluetooth LE) with a Semtech SX1262 LoRa transceiver and a Skyworks SE2435L power amplifier / LNA front end, and a Nordic nPM1300 power-management IC with Li-ion charging.

On one 54 × 44.5 mm board it carries everything a field node needs: high-power LoRa, BLE for phone set-up and firmware updates, a battery charger, USB-C and wide-range DC input, an RS485 transceiver, digital inputs and outputs, an analogue input, a temperature and humidity sensor and a GNSS header. Two edge connectors take a Siliqs daughter board (SQ-DB) for product-specific I/O.

The SQ-MB is planned to be offered on its own as a development board (coming soon). It is the same board used inside Siliqs products of the nRF54L15 family.

1.2 Siliqs product line

- Siliqs products built on the SQ-MB: SQS-TH-Iv2 (temperature and humidity node) and the other products of the same platform, which differ only in the parts fitted, the daughter board and the enclosure.
- Network: joins a LoRaWAN network through a Siliqs LD1001 gateway or any standard LoRaWAN gateway; Meshtastic firmware is also planned (section 4).

1.3 Product Features

- nRF54L15: Arm Cortex-M33 at 128 MHz, Bluetooth LE radio; external 32 MHz and 32.768 kHz crystals.
- SX1262 + SE2435L front end, 860 – 930 MHz part, matching tuned for 920 – 925 MHz; TX power set by firmware within the regional limit (+22 dBm conducted declared for Taiwan NCC certification).
- 32 MHz TCXO for the LoRa radio.
- BLE with an on-board chip antenna: phone set-up and over-the-air firmware updates (MCUboot pre-installed; BLE OTA).
- nPM1300 PMIC: single-cell Li-ion charging with NTC, two buck regulators, switchable sensor and GNSS supplies, ship mode, RGB LED driver.
- Inputs: USB Type-C 5 V (power only), wide-range DC input on the expansion connector, 1-cell Li-ion battery.
- RS485 transceiver with surge and over-voltage protection, 4 opto-isolated digital inputs (NPN / PNP), 2 PhotoMOS outputs, 1 analogue input.
- HDC2080 temperature and humidity sensor (fitted per product).
- GNSS header, SWD debug header, reset and power buttons.
- Deep-sleep current about 2 µA (System OFF, measured on Rev A).

2. Specifications

2.1 General specifications

Table 2.1: General specifications

Parameters	Description
MCU	Nordic nRF54L15 (QFN-48), Arm Cortex-M33, 128 MHz; internal non-volatile memory and RAM (no external flash)
LoRa	Semtech SX1262 + Skyworks SE2435L (PA, LNA, switch); 32 MHz TCXO
BLE	nRF54L15 radio, on-board chip antenna (1.5 dBi peak)

PMIC	Nordic nPM1300: charger, 2 × buck, 2 × load switch, LED driver, ship mode
On-board sensor	TI HDC2080 temperature and humidity (fitted per product); NTC for battery temperature
PCB	6 layers, 1.6 mm, all parts on the top side
Board size	54.0 × 44.5 mm; 54.0 × 50.2 mm including the connector tab
Operating temperature	On-board components rated −30 ~ +85 ° C (without battery; not verified at system level). With a Li-ion battery: discharge −20 ~ +60 ° C, charging 0 ~ +45 ° C (charging window set in the PMIC)
Hardware revision	Rev B (Rev A prototype characterised)

2.2 LoRa radio

Table 2.2: LoRa radio

Parameter	Value
Frequency	Front end 860 – 930 MHz; RF matching tuned for 920 – 925 MHz (AS923). For other bands, the user adjusts the matching and firmware and is responsible for local certification
TX power	+22 dBm conducted, declared for Taiwan NCC certification (in preparation); set by firmware within the regional limit. See 2.6 for hardware capability
Frequency accuracy	−0.06 to −0.16 ppm at 923.2 MHz (measured Rev A)
RX sensitivity	−137 dBm (SF12, 125 kHz) (design value)
Antenna	ANT1: U.FL for an FPC antenna, or SMA (footprint, optional fit); ANT2: U.FL spare port; selected by GPIO (P2.10, ANT1 default)
RF protection	ESD protection on each antenna port; 2nd-harmonic trap

> Set the output within the regional LoRaWAN Max EIRP. Set the output within the radio regulations of the country of deployment; type approval of the end product is the integrator's responsibility.

2.3 BLE

Table 2.3: BLE

Parameter	Value
Standard	Bluetooth LE (nRF54L15)
Antenna	On-board chip antenna, 1.5 dBi peak
TX power	Up to +8 dBm (declared)
Use	Phone set-up, over-the-air firmware update (MCUboot pre-installed; BLE OTA)
Advertising name	Set by the user's firmware

2.4 Power

Table 2.4: Power

Parameter	Value	Notes
USB Type-C	5 V (4.75 – 5.25 V), power only	No USB data (nRF54L15 has no USB); input current limit set by firmware (up to 1.5 A)
Li-ion battery	1 cell, 3.7 V nominal	1.25 mm 2-pin connector; NTC 10 kΩ; charge current and termination voltage set by firmware (default profile: 400 mA, 4.15 V; end-of-charge TBC)

DC input (expansion connector)	9 – 24 V nominal, 28 V max (Rev B design); minimum start-up voltage TBC	Buck regulator with surge (TVS) and reverse-polarity protection. Rev A measured: runs from 7.0 V; 9 / 12 / 18 V tested
System rails	VDD 3.3 V (measured 3.26 V), LoRa supply 3.3 V; PA supplied from VSYS	nPM1300 buck 1 / buck 2
Switched supplies	Sensor / daughter-board supply (load switch 1); GNSS supply (load switch 2)	
Low-battery behaviour	Handled by the user's firmware. A TX burst draws about 300 mA; on a nearly empty battery the voltage dip can trip the PMIC power-fail and reset the board. Check VBAT before transmitting and lower the TX power or skip the TX when the battery is low	
Ship mode	Power button (SW2) or VBUS wakes the board	

2.5 Current consumption

Measured on Rev A, no debugger connected; battery voltage as noted. Rev B values TBC.

Table 2.5: Current consumption

Mode	Current
Ship mode	0.42 µA
System OFF	2.00 µA
System ON idle, LoRa supply off	4.3 µA average
LoRa TX, PA setting +0 (lowest tested)	161 mA (3.7 V)
LoRa TX at product power (about +22 dBm, PA setting +5 / +6)	270 – 300 mA (3.7 V)
LoRa RX, continuous (SF7, 125 kHz)	12.5 mA (3.7 V)

2.6 Hardware capability (evaluation only)

The front end can deliver more than the product TX power. The figures below were measured on the Rev A prototype for evaluation; they are not product specifications. Output above the regional limit must not be used outside a test environment.

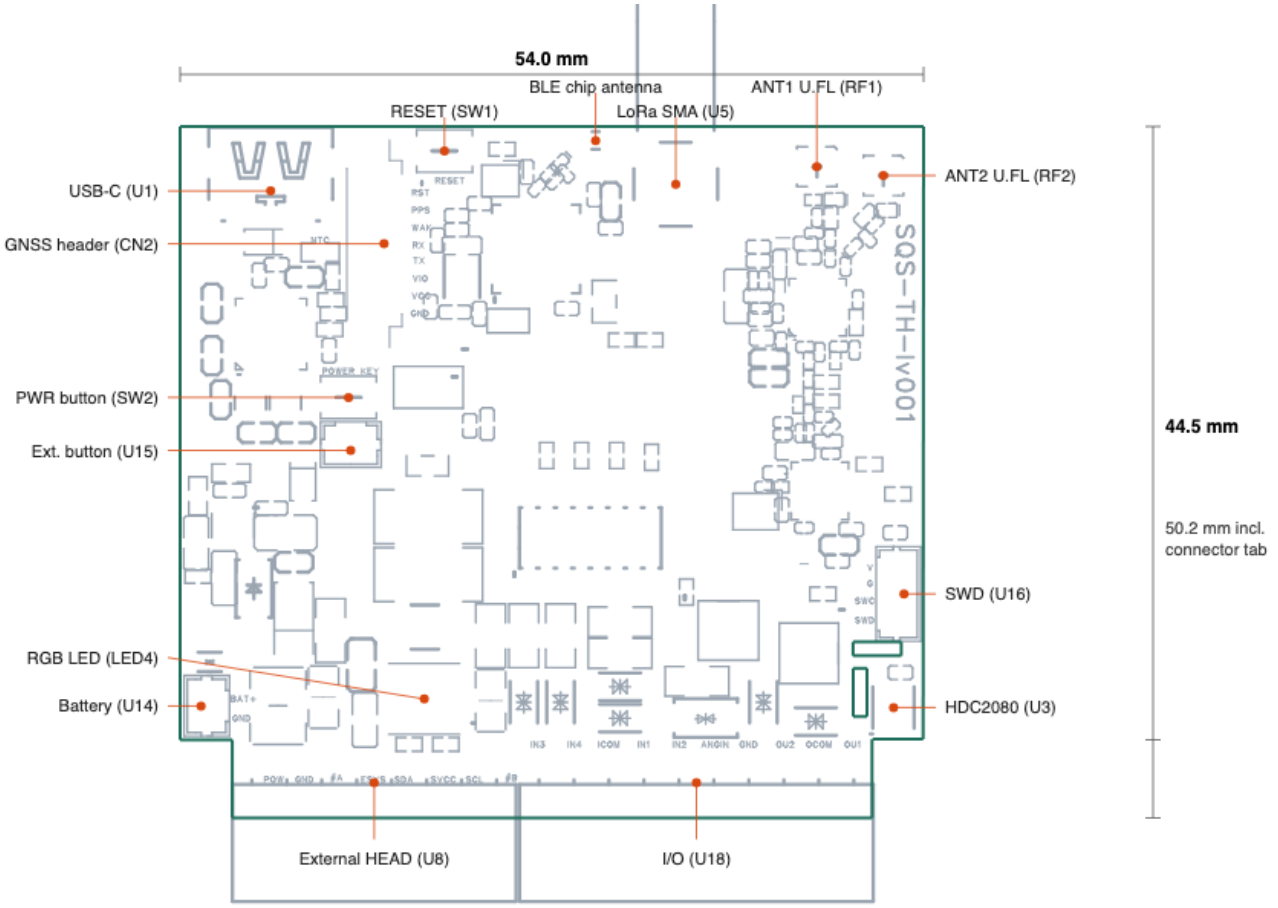
Table 2.6: Hardware capability (measured Rev A, evaluation only)

Parameter	Value
Max. conducted output	About +30 dBm at the antenna connector: 29.2 dBm (4.2 V battery), 29.8 dBm (USB), 29.7 – 30.0 dBm (9 – 18 V DC input); stable over 10 min continuous TX
TX current, PA setting +8 (output about +24.6 dBm at 4.2 V)	351 mA (3.7 V)
TX current, PA setting +16 (output about +29 – 30 dBm)	510 mA (3.7 V); 578 – 586 mA (4.2 V)

3. Hardware

3.1 Board layout

Figure 3.1: Board layout (top view)



SQ-MB board layout

Table 3.1: Main parts and controls

Item	Function
USB-C (U1)	5 V power input and battery charging (no data)
GNSS header (CN2)	1.25 mm 8-pin for an external GNSS module (UART, PPS, reset, wake, supply)
RESET (SW1)	MCU reset
PWR button (SW2) / Ext. button (U15)	nPM1300 power button: wake from ship mode, long press (about 10 s) power-cycles; U15 connects an external button in parallel
RGB LED (LED4)	Status, driven by the nPM1300
Battery (U14)	1.25 mm 2-pin, 1-cell Li-ion
SWD (U16)	1.25 mm 4-pin: SWDIO, SWDCLK, GND, VDD
HDC2080 (U3)	Temperature and humidity sensor
ANT1 U.FL (RF1) / LoRa SMA (U5)	LoRa antenna (one fitted at a time)
ANT2 U.FL (RF2)	Spare LoRa port
BLE chip antenna	2.4 GHz

3.2 Expansion connectors

Two 2.54 mm right-angle sockets on the bottom-edge tab take a Siliqs daughter board (SQ-DB). They are not keyed and not hot-pluggable.

Table 3.2a: External HEAD (U8, 8-pin)

Pin	Signal
1	POW_IN (DC input)
2	GND
3	RS485 A
4	EXT_SYS (VSYS through a ferrite bead)
5	I2C SDA
6	Sensor supply (switched)
7	I2C SCL
8	RS485 B

Table 3.2b: I/O (U18, 10-pin)

Pin	Signal	Pin	Signal
1	IN3	6	AIN
2	IN4	7	GND
3	ICOM	8	OUT2
4	IN1	9	OCOM
5	IN2	10	OUT1

Table 3.2c: I/O characteristics (Rev B design)

I/O	Description
RS485	Industrial half-duplex transceiver, GDT and TVS surge protection, PTC fuses; fixed 340 Ω termination (note 1)
Digital inputs	4 × opto-isolated (NPN / PNP selectable via ICOM); IN1 / IN2 support pulse counting
Digital outputs	2 × PhotoMOS relay outputs
Analogue input	1 × voltage input, about 0 – 16 V full scale, clamp-protected

> Note 1: The on-board 340 Ω termination is a soft termination, not the standard 120 Ω. It suits low-speed buses only. Do not add another terminator on the other devices of the same bus.

3.3 Other connectors

- GNSS (CN2): 1 RST, 2 PPS, 3 WAKE, 4 GPS RX, 5 GPS TX, 6 VDD, 7 GNSS supply (switched), 8 GND. Tested with a Quectel L76K module (NMEA and position fix, Rev A).
- SWD (U16): apply board power before connecting the probe; disconnect the probe before measuring sleep current (it back-powers VDD).

3.4 Dimensions

Parameter	Value
Board	54.0 × 44.5 mm
Connector tab	About 46.5 × 5.7 mm; 54.0 × 50.2 mm overall

Thickness	1.6 mm PCB; component height TBC
Mounting	1 × Ø2.0 mm locating hole; the board is held by posts in the enclosure

4. Software

Item	Description
SDK	nRF Connect SDK / Zephyr (nRF54L15)
Bootloader / update	MCUboot pre-installed; firmware can be updated from a phone over BLE (SMP) or flashed over SWD. OTA images are signed with MCUboot's public development key (ED25519, `root-ed25519.pem`), so users can sign their own firmware; replace it with your own key for a production product
Product firmware	LoRaWAN and Meshtastic firmware for the platform: TBC (in development)
Configuration	Phone app over BLE (planned); product type stored in a protected settings area
Programming	SWD (U16)

5. Resource

5.1 Relevant resource

- Siliqs product website: https://siliqs.net
- LD1001 Datasheet (LoRaWAN gateway)

5.2 Contact Information

Siliqs (Guineatech)

- Web: https://siliqs.net
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