MeshTower

Solar-Powered Outdoor Mesh Hub

Document Version

Version	Time	Description	Remark
Rev. 1.0	2025-6-16	Preliminary version	Richard

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Content

1 Description

1.1 Overview

MeshTower is a solar-powered outdoor communication system built on MeshSolar technology, featuring an integrated 18V solar panel and 3 × 3000mAh lithium battery for sustained operation. With Bluetooth + LoRa dual-mode connectivity and SMA antenna support, it ensures robust signal coverage. Housed in an IP66-rated waterproof metal enclosure and designed for -20 ° C to 60 ° C environments, it thrives in harsh conditions. Offering pole/wall-mount flexibility, it ' s ideal for remote monitoring and off-grid communication—delivering solar endurance and industrial resilience.

MeshTower is categorized into the following variants based on supported LoRa frequency bands:

HT-n5262G: Hardware Version Information

Module	Frequency	Battery
HT-n5262G-LF	470~510MHz	Li-ion
HT-n5262G-HF	863~928MHz	Li-ion

1.2 Features

- Developed based on the MeshSolar board, integrated with 3×2800mAh high-capacity lithium batteries.
- Professional BMS Performance, features comprehensive protection including overcharge/over-discharge/short-circuit/over-temperature safeguards etc.
- 18V solar input, adjustable panel angle.
- Supports DC 18-24V and USB-C PD3.0 input.
- Dual Support for LoRa & Bluetooth.
- External SMA antenna compatible.
- Excellent Low-Power Efficiency.
- Wide-Temperature Battery (-20°C to 60°C).
- IP65-rated metal enclosure, waterproof & flame-retardant.
- Easy installation, supports pole mounting and wall mounting.

1.3 Typical Applications

- Environmental Monitoring Systems
- Smart Agriculture & Livestock Farming
- Asset Management and Tracking
- Outdoor Emergency Solutions
- Solar Street Lighting Systems
- Industrial Infrastructure Monitoring
- Open-source projects like such as Meshtastic

3 Specifications

Table3.1: General specification

Parameters	Description
BMS chip	BQ4050, CN3795
RF chip	Nordic nRF52840(BLE), SX1262(LoRa)
Chip Memory	1M ROM; 256kB PSRAM
Wireless	BLE, LoRa
GNSS Module(Optional)	Quectel L76K
Battery Capacity	3*2800mAh
Battery Type	Li-ion Battery
Voltage Input	DC 18-24V(XT30), PD3.0 20V(USB-C)
Panel Voltage	18V/10W
LoRa TX Power	21±1dBm
Interface	SMA (RP-SMA) female jack antenna connector, USB-C, XT30 Panel Interface
Operating Temperature Range	-20~60℃
Protection Rating	IP66
Dimensions	Enclosure: 125 (+40) * 125 * 52 mm Solar Panel: 340*220 mm
Weight	1.52kg
Enclosure	Aluminum

4 Electrical Characteristics

4.1 Power Input

The Solar/DC input supports both solar panel and DC power sources, with a requirement that the **Voc**(open-circuit voltage) must exceed 18V not exceed 24V. The USB-C port only enables charging functionality when it detects a PD3.0 protocol with a 20V input voltage; a 5V input is solely for powering the MCU.

Table4.1: Voltage Input

Input Method	Parameter
Solar Panel	18V/10W
DC	18V-24V, ⩽1.5A
USB-C(Charging)	PD3.0, 20V
USB-C(MCU)	5V

4.2 Charging Current

Table4.2: Changing Current

Method	Current	Description
Solar Panel	0.55A	Depends on the solar panel's power and voltage. The minimum is >0, while the maximum = $\mathbf{P_{solar}}$/ $\mathbf{V_{solar}}$
DC@18V	1.5A	Constant-current charging at 1.5A, tapering down when battery voltage reaches 4.2V
USB-C(PD3.0)	1.5A	Constant-current charging at 1.5A, tapering down when battery voltage reaches 4V

5 RF Characteristics

5.1 RF module power consumption

The test data comes from the standalone test results of the HT-N5262M, using the sample code from the official Heltec nRF5240 library.

Table5.1: Transmit power

Mode	Condition	470MHz	868MHz	915MHz
LoRa_TX	5dBm	63mA	89mA	97mA
	10dBm	85mA	119mA	130mA
	15dBm	110mA	145mA	156mA
	20dBm	128mA	164mA	166mA
BT	UART	12mA		
	Scan	4mA		
Sleep		8uA		

5.2 LoRa Transmit Power

Table5.2: Transmit power

Operating frequency band(MHz)	Maximum power value/[dBm]
470~510	21 ± 1
863~870	21 ± 1
902~928	21 ± 1

5.3 LoRa Receiving Sensitivity

The following table gives typically sensitivity level.

Table5.3: Receiving sensitivity

Signal Bandwidth/[KHz]	Spreading Factor	Sensitivity/[dBm]
125	SF12	-135
125	SF10	-130
125	SF7	-124

5.4 LoRaWAN Operation Frequencies

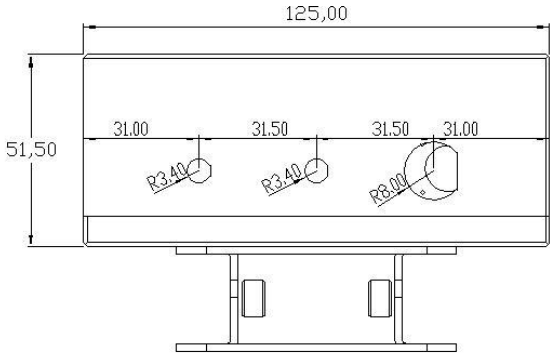
HT-n5262M supports LoRaWAN frequency channels and models corresponding table.

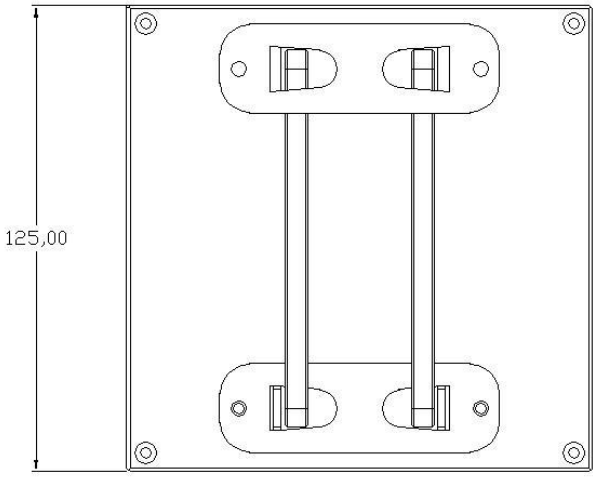
Table5.4: Operation Frequencies

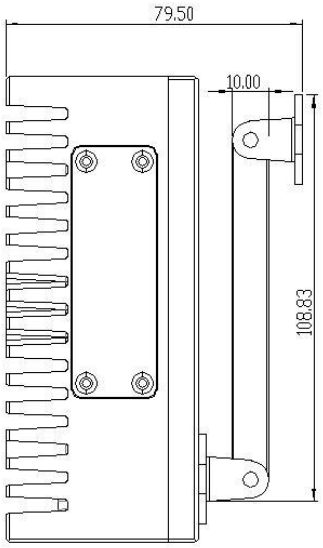
Region	Frequency (MHz)	Model
433	433	HT-N5262G-ULF
C470	470-510	HT-N5262G-LF
IN868	865~867	HT-N5262G-HF
EU868	863~870	HT-N5262G-HF
US915	902~928	HT-N5262G-HF
AU915	915~928	HT-N5262G-HF
KR920	920~923	HT-N5262G-HF
AS923	920~925	HT-N5262G-HF

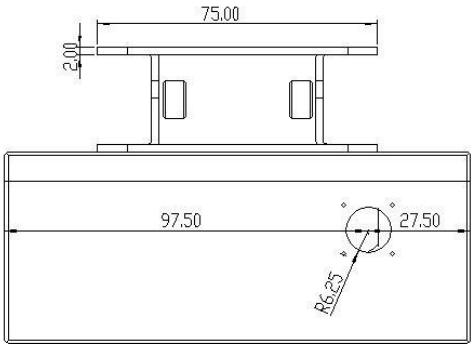
5 Physical Dimensions

5.1 Enclosure

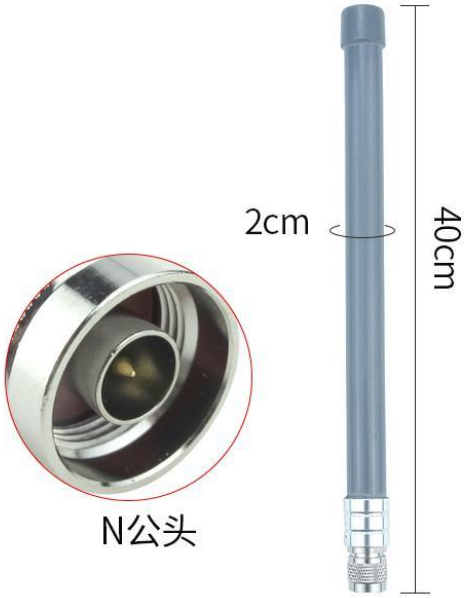




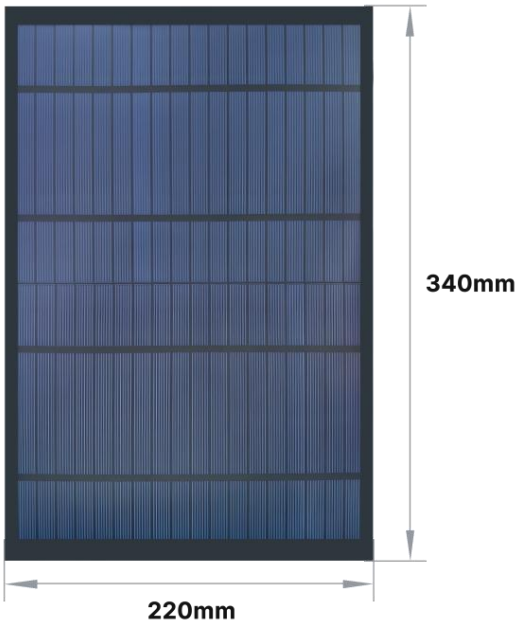




5.2 LoRa Antenna



5.3 Solar Panel



6 Resource

6.1HT-N5262M Schematic

6.2 MeshTower Resource Station

6.3 Heltec nRF52840 Framework

6.4 BMS Management and Fault Diagnosis

7 Heltec Contact Information

Heltec Automation Technology Co., Ltd

Chengdu, Sichuan, China

Email: support@heltec.cn

Phone: +86-028-62374838

https://heltec.org