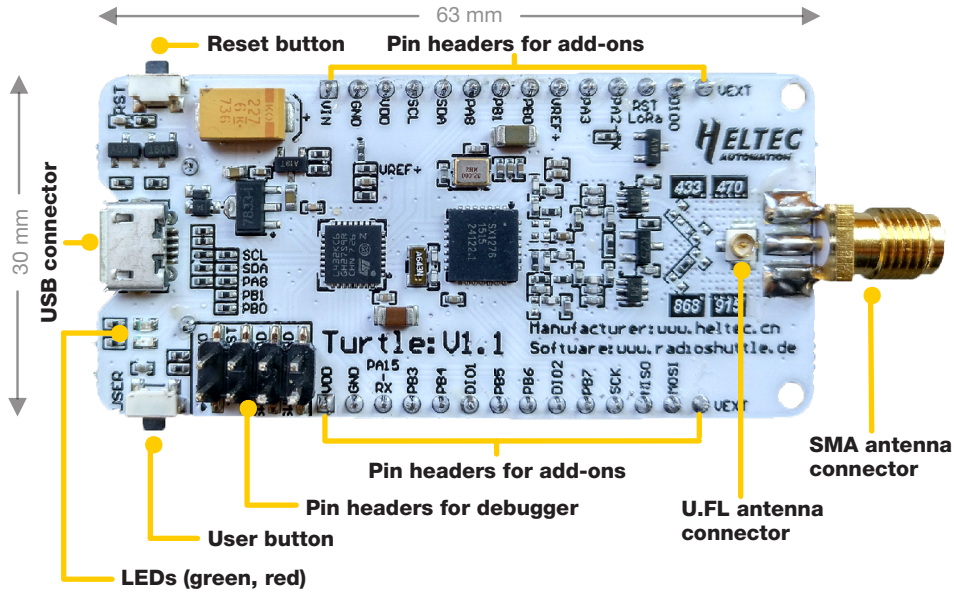
Turtle – LoRa Radio Solution

Runs 10 years on batteries, for industrial and IoT applications



SMA antenna (included)

AAA battery holder (back of PBC)

LoRa wireless technology
The LoRa wireless technology allows sensors to communicate in the free ISM band across great distances from 200 m to 20 km, suited for small data rates. The Turtle LoRa board by HelTec Automation can run 10 years on batteries using the "RadioShuttle" LoRa wireless low-energy protocol software.

The groundbreaking LoRa wireless solution is ideal for many application environments.

LoRa basics
LoRa utilizes spread-spectrum modulation, which is used by LoRa in the free 433/868/915 MHz ISM frequencies. LoRa offers a superior wireless experience.

Energy-optimized solution
The Turtle LoRa solution is highly optimized for battery operation and runs up to 10 years with regular AAA batteries. External power supply, e.g. USB, is also supported.

Peer-to-peer LoRa
The optimized LoRa wireless protocol software, called "RadioShuttle", allows fast and secure node-to-node communication between LoRa devices. It can be operated as a server or node. There is no need for additional routers or servers.

RadioShuttle software
The included software supports the Turtle board hardware with the RadioShuttle protocol.

Easy development IDE
The free Arm Mbed online and offline compiler allows everyone to get started quickly developing IoT solutions. Suitable for beginners and professionals. The "RadioShuttle" peer-to-peer LoRa wireless protocol compiles within seconds. There is no easier way to get started.

Standard extension headers allow custom hardware add-ons.

Features & Benefits

Energy optimized
- 10 years on batteries (AAA)
  - Standard or Lithium
  - Rechargeable NiMH
- External power supply (USB)

Wireless protocol
- RadioShuttle protocol
  - LoRa peer-to-peer
  - No concentrator required
  - Operation as server or node
- Range: 200 m … 20 km
- Free 433/868/915 MHz bands
- Security (AES 128-bit)

Hardware
- Extension headers
  - 2x14 pins for add-ons
  - Debugger interface (2x4)
- STM32L432 MCU (256 kB flash, 64 kB RAM)

Arm Mbed IDE
- Free online/offline compiler
- Windows, Mac, and Linux

Options
- MQTT gateway
- Push messages (iOS/Android)

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Hardware

- STM32L432 MCU 80 MHz
- 256 kB Flash, 64 kB RAM
- Integrated clock (RTC)
- 2 buttons (1 User, 1 Reset)
- 2 LEDs (green, red)
- USB virtual COM or UART console for logging
- Micro-USB for power supply, programming and console
- 2x14 pin add-on headers (pre soldered)
  - SPI, I^2C bus available
  - RX/TX programming pins
  - Software controlled power pin (battery voltage)
- Debugger interface (ST-Link)
- External power supply (3.4-5 V)
- Optimized for battery use
  - Deepsleep < 10 µA
  - Battery voltage reporting
  - Battery holder 2x AAA
  - 10 years battery operation with regular LoRa messages
- Automatic power selection between battery and USB
- Non-volatile properties for permanent settings

LoRa radio

- LoRa chip 168 dB link budget (Semtech SX1276 based)
- Optimized boards available for: 433, 470, 868, 915 MHz
- License-free operation
- Optimized antenna:
  - SMA and U.FL connector
  - SMA antenna included
  - Optional: wire antenna (ground plane on board)

Development environment

- Arm Mbed IDE for Windows, Mac, and Linux
- Board compatible with Nucleo-L432KC
- Drag & Drop programming via “STM32 Utility” app

Wireless protocol software “RadioShuttle”

- Reliable message transmission, receipt is confirmed, lost data is automatically repeated
- Simple message transmission (requires less time/energy), e.g. temperature data
- Parallel queueing and processing of different messages to one or more stations (energy efficient protocol processing in the background)
- Unique 32-bit device ID (device number) per LoRa participant, unique 16-bit app ID (program number for communication)

RadioShuttle data security

- AES 128-bit encryption
- SHA-256 encrypted passwords with random number per login
- Hackerproof
  Secure against replay attack

RadioShuttle operating mode

- As a node (node-offline)
- As a node (node-online)
- As a server (station-basic)

MQTT options

Software available free of charge for Turtle board customers:

- LoRa to MQTT gateway
- MQTT push notifications on phone (app for iOS, Android)

Hardware add-ons

Modules available from third parties, software drivers included with the Turtle board:

- Ethernet adapter
  W5500 Ethernet network module
- Si7021 sensor (temperature and humidity sensor)
- OLED display (SSD1306)
  128x64 pixels

Dimensions

- 63 mm x 30 mm x 17 mm (including battery holder and pin headers)

More information:
www.heltec.cn

Technical guide:
www.radioshuttle.de/en/turtle-en/turtle-board-en/

RadioShuttle protocol:
www.radioshuttle.de/en/turtle-en/turtle-board-en/

RadioShuttle MQTT information:
www.radioshuttle.de/mqtt-info/

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