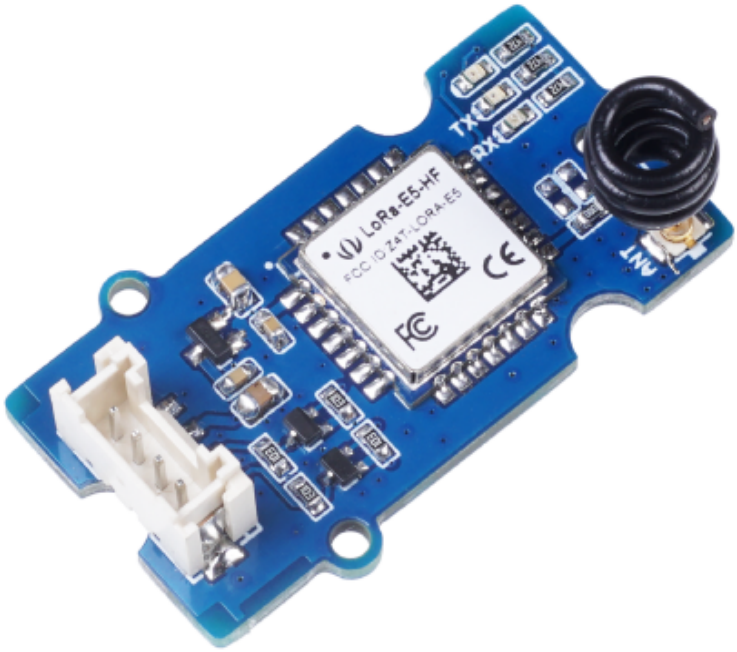
Grove - LoRa-E5 (STM32WLE5JC), EU868/US915, LoRaWAN protocol supported



Grove - LoRa-E5 (STM32WLE5JC), EU868/US915, LoRaWAN supported

SKU
113020091

Grove LoRa-E5 embedded with LoRa-E5 STM32WLE5JC, powered by ARM Cortex M4 ultra-low-power MCU core and LoRa SX126x, is an easy-to-use wireless radio module, supporting LoRaWAN protocol on the EU868 & US915 frequency and (G)FSK, BPSK, (G)MSK, LoRa modulations.

PRODUCT DETAILS

Features

- LoRa-E5 (STM32WLE5JC) embedded
- Support LoRaWAN protocol on EU868/US915 frequency band
- Ultra-long transmitting range up to 10km (Ideal value in open space)

- Easy control by AT command via UART connection
- Rapid prototyping with plug-and-play Grove interfaces
- Ultra-low power consumption and high performance

As an upgrade of our old version - Grove - LoRa Radio - powered by RFM95 ultra-long-range Transceiver Module, Grove LoRa-E5 embedded with LoRa-E5 STM32WLE5JC Module is a high-performance and easy-to-use wireless radio LoRa module supporting LoRaWAN protocol.

LoRa-E5 LoRaWAN STM32WLE5JC module is the major functional part integrated into Grove - LoRa-E5. It is a LoRaWAN module that embedded with ARM Cortex M4 ultra-low-power MCU core and LoRa SX126x, as the world-first combo of LoRa RF and MCU chip into one single tiny module, it supports (G)FSK, BPSK, (G)MSK, and LoRa modulations, and is FCC, CE certified. Grove - LoRa-E5 features extremely compacted size, ultra-low power consumption, low cost, and amazing performance. (Learn more about LoRa-E5)

More comparison between the LoRa-E5 and RFM95 chip:

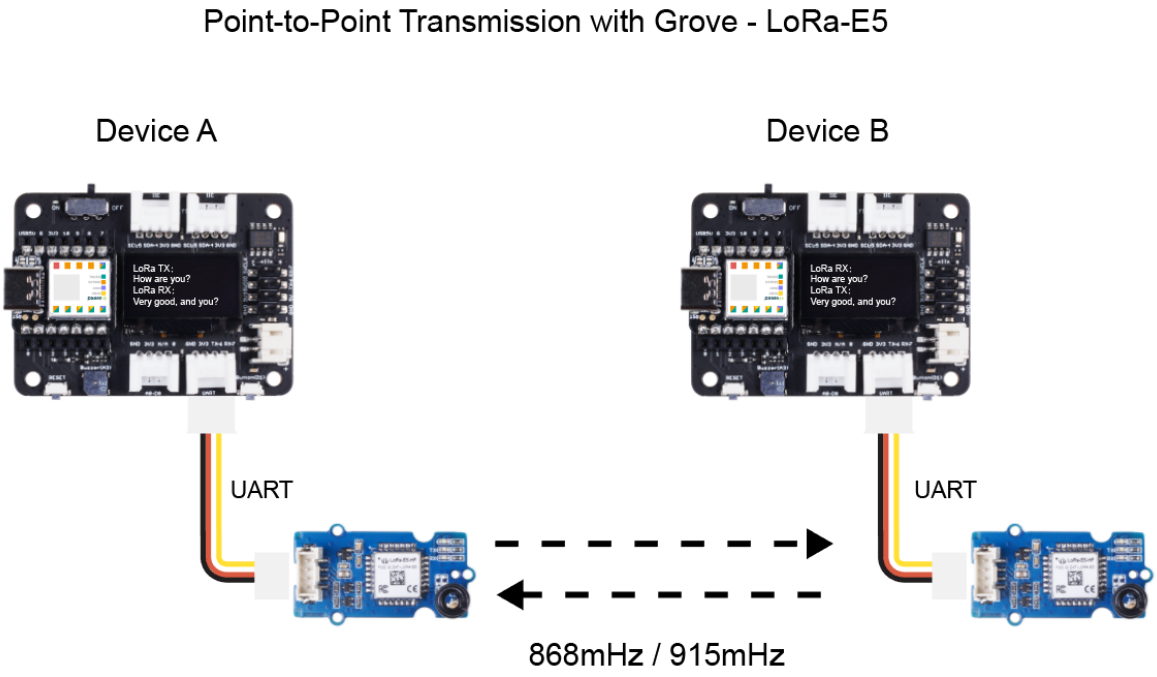
LoRa-E5 (STM32WLE5JC)

RFM95 and RFM95W

Core	32-bit Arm Cortex-M4 CPU, up to 48MHz	NONE
LoRaWAN stack	Built-in with AT Command Firmware; Program with STM32Cube MCU Package	NONE
Package	12*12mm, 28 pins SMD	16*16mm, 16 pins SMD
Interfaces	UART*3, I2C*1, ADC(12-bit)*1, SPI*1, GPIO*6	SPI*1, DIO*6
Sensitivity	-116.5dBm(SF5), -121.5dBm(SF7), -136dBm(SF12)	-111dBm ~ -148dBm
Modulation	LoRa, (G)FSK, (G)MSK and BPSK	LoRa, (G)FSK, (G)MSK and OOK
Certificate	FCC and CE (EU868/US915)	NONE
Power Supply	1.8V ~ 3.6V	1.8V ~ 3.7V
RF Output Power	up to +20.8 dBm at 3.3V	up to +20 dBm

Grove - LoRa-E5 can endow your development boards' strong features of ultra-long transmitting range, great performance, and high efficiency by easiliy plug and play with Grove connector on board. By connecting Grove - LoRa-E5 to your development boards, your devices is able to communicate with and control LoRa-E5 conveniently by AT command through UART connection.

With all the outstanding features listed above, Grove LoRa-E5 will be a superior choice for IoT device development, testing, and long-distance, ultra-low power consumption IoT



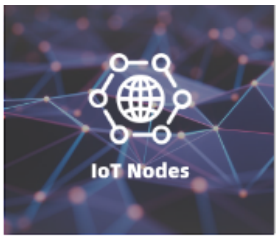
scenarios like smart agriculture, smart office, and smart industry. It is designed with industrial standards with a wide working temperature at -40℃ ~ 85℃, high sensitivity between -116.5 dBm and -136 dBm, and power output between 10 dBm and 22 dBm.

Hardware Overview

Please check out this article LoRapedia, which introduces LoRa and LoRaWAN to learn about LoRaWAN and LoRa technology in detail.

Applications

- Works for LoRaWAN sensor nodes and any wireless communication application.
- IoT device testing and development



Application Note

For more detailed information about how to use LoRa-E5, please visit LoRa-E5 (STM32WLE5JC) Module Wiki.

1. Factory AT Firmware

LoRa-E5 series has a built-in AT command firmware, which supports LoRaWAN Class A/B/C protocol and a wide frequency plan: EU868/US915/AU915/AS923/KR920/IN865. With this AT command firmware, users can easily and quickly build their prototype or application.

The AT command firmware contains a bootloader for DFU and the AT application. The "PB13/SPI_SCK/BOOT" pin is used to control LoRa-E5 to stay in the bootloader or jump to the AT application. When PB13 is HIGH, the module will jump to AT application after reset, with a default baud rate of 9600. When PB13 is LOW (press the "Boot" button on LoRa-E5 Dev Board or LoRa-E5 mini), the module will stay in the bootloader, and keep transmitting "C" character every 1S at baud rate 115200.

Attention

1. Factory AT Firmware is programmed with RDP(Read Protection) Level 1, developers need to remove RDP first with STM32Cube Programmer. Note that regression RDP to level 0 will cause a flash memory mass to erase and the Factory AT Firmware can't be restored again.

2. The "PB13/SPI_SCK/BOOT" pin on the LoRa-E5 module is just a normal GPIO, not the "BOOT0" pin of the MCU. This "PB13/SPI_SCK/BOOT" pin is used in the bootloader of the Factory AT firmware, to decide to jump to APP or stay in bootloader(for DFU). The

real "BOOT0" pin doesn't pinout to the module, so developers need to be careful when developing low-power applications.

2. Clock Configuration

2.1 HSE

- 32MHz TCXO
- TCXO power supply: PB0-VDD_TCXO

2.2 LSE

32.768KHz crystal oscillator

3. RF Switch

LoRa-E5 module ONLY transmits through RFO_HP:

- Receive: PA4=1, PB5=0
- Transmit(high output power, SMPS mode): PA4=0, PB5=1

Specifications

General Parameters	
Voltage Supply:	3.3V / 5V
Power Output:	Up to +20 dBm at 3.3V
Working Frequency	868MHz / 915MHz
Protocol	LoRaWAN
Sensitivity	-116.5dBm ~ -136dBm
Modulation	LoRa, (G)FSK, (G)MSK and BPSK
Current	Only 60uA in sleep mode
Size	20*40mm
Working Temperature	-40℃ ~ 85℃

Part List:

Grove - LoRa-E5 PCBA *1
Grove Universal Cable *1

ECCN/HTS

HSCODE	8517629900
UPC	

LEARN AND DOCUMENTS

Documentations

Datasheet:

Grove LoRa-E5 v1.0.brd

Grove LoRa-E5 v1.0.pdf

Grove LoRa-E5 v1.0.sch

LoRa-E5 datasheet and specifications

LoRa-E5 AT Command Specification

STM32WLE5JC Datasheet

Certifications:

LoRa-E5-HF Certification CE-VOC-RED

LoRa-E5-HF FCC Certification -DSS

LoRa-E5-HF FCC Certification -DTS

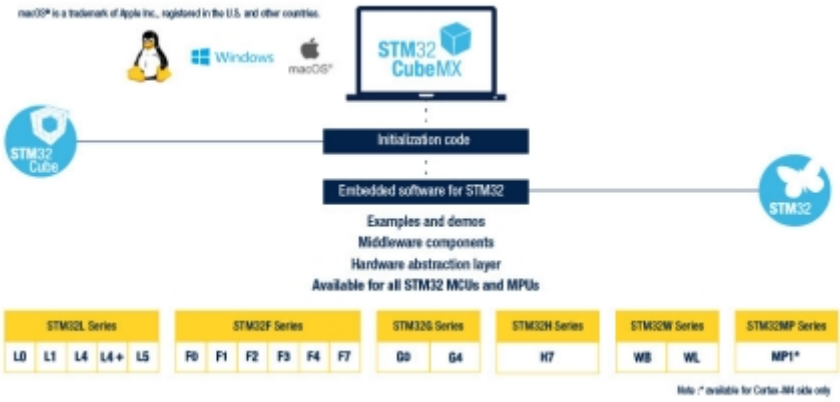
Relevant SDK:

STM32Cube MCU Package for STM32WL series

Learn

[Documentation] 【LoRa-E5 SDK】STM32Cube MCU Package for STM32WL series
HAL, Low-Layer APIs and CMSIS, File system, RTOS, KMS, Secure Engine, Sub-GHz Phy, LoRaWAN and Sigfox stacks - and examples running on ST boards

[Wiki] Grove - LoRa-E5 (STM32WLE5JC) Wiki
Here for you to find detailed info about the product, including its specifications, datasheet, and a demo showing you how to connect TTN (The Things Network) and Seeeduino XIAO module via Grove - LoRa-E5 module enabling wireless transmission function.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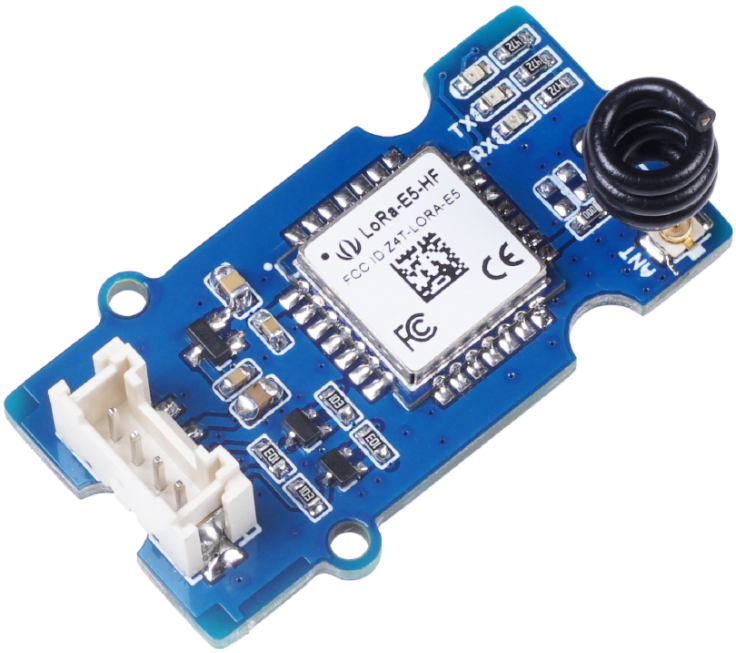
Windows
macOS®
STM32 CubeMX
STM32 Cube
Initialization code
Embedded software for STM32
STM32
Examples and demos
Middleware components
Hardware abstraction layer
Available for all STM32 MCUs and MPUs
STM32L Series
L0 L1 L4 L4+ L5
STM32F Series
F0 F1 F2 F3 F4 F7
STM32G Series
G0 G4
STM32H Series
H7
STM32W Series
WB WL
STM32MP Series
MP1*
Note: * available for Cortex-A64 side only


LoRa-E5-HF
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