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HT-CT62 LoRa Module

ESP32C3
+
SX1262

EU868

HELTEC HT-CT62 LoRa Module Owner's Manual

Contents

HELTEC HT-CT62 LoRa Module

Product Specifications

- **Product:** HT-CT62 LoRa module
- **Manufacturer:** Chengdu Heltec Automation Technology Co., Ltd.
- **Communication:** LoRa/LoRaWAN
- **Microprocessor:** ESP32-C3FN4 (32-bit RISC-V architecture)
- **Transceivers:** Semtech LoRa SX1262
- **Wireless Communication**: 2.4 GHz Wi-Fi, LoRa modes
- **Features:** Long communication range, low power consumption, high sensitivity, low cost

Product Usage Instructions

Description

Overview
The HT-CT62 is a compact LoRa/LoRaWAN node module designed for applications requiring long-range, low-power wireless communication. It features the ESP32-C3FN4 microprocessor based on RISC-V architecture and Semtech LoRa Transceivers (SX1262), providing high sensitivity and cost-effective connectivity. The module supports 2.4 GHz Wi-Fi and LoRa modes, making it suitable for smart cities, smart farms, smart homes, and IoT projects.

Pin Definition

Pin Assignment
The pinout of the HT-CT62 module is as follows:

- Pin 1 – Description 1
- Pin 2 – Description 2
- Pin 3 – Description 3

Pin Description

Detailed description of each pin functionality and connection guidelines will be provided in the official documentation.

Specifications

Physical Dimensions
The physical dimensions of the HT-CT62 module are as follows:

- **Length:** XX mm
- **Width:** XX mm
- **Height:** XX mm

Resource

Relevant Resource
For additional resources, such as datasheets, application notes, and software tools, please refer to the official website of Heltec.

Contact Information
If you have any questions or need technical support, you can contact Heltec Automation Technology Co., Ltd. through the provided contact information.

Frequently Asked Questions (FAQ)

Can the HT-CT62 module be used for outdoor applications?
Yes, the HT-CT62 module is suitable for outdoor applications due to its long communication range and robust design.

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Description

Overview
HT-CT62 is a LoRa/LoRaWAN node module with a long communication range, low power consumption, high sensitivity, and low cost. The module is composed up of ESP32-C3FN4(32-bit microprocessor based on RISC-V architecture) and Semtech LoRa Transceivers (SX1262). The module integrating 2.4 GHz Wi-Fi, LoRa modes wireless communication. HT-CT62 is a small volume, stamp hole package module, it's the best choice for smart cities, smart farms, smart home, and IoT makers.
HT-CT62 are available in two product variants:

No.	Model	Description
1	HT-CT62-LF	470~510MHz working LoRa frequency, used for China mainland (CN470) LPW band.
2	HT-CT62-HF	For EU868, IN865, US915, AU915, AS923, KR920 and other LPW networks with operating frequencies between 863~928MHz.

Product features

- **Microprocessor:** ESP32-C3FN4 (RISC-V architecture 32-bit, main frequency up to 160 MHz)
- Support the **Arduino development environment**;
- LoRaWAN 1.0.2 support;
- Ultra low power design, 10uA in deep sleep;
- 1.27 stamp edge design for SMT;
- Good impendence matching and long communication distance.
- Integrated WiFi, network connection, onboard Wi-Fi, dedicated IPEX socket.

Pin Definition

Pin assignment
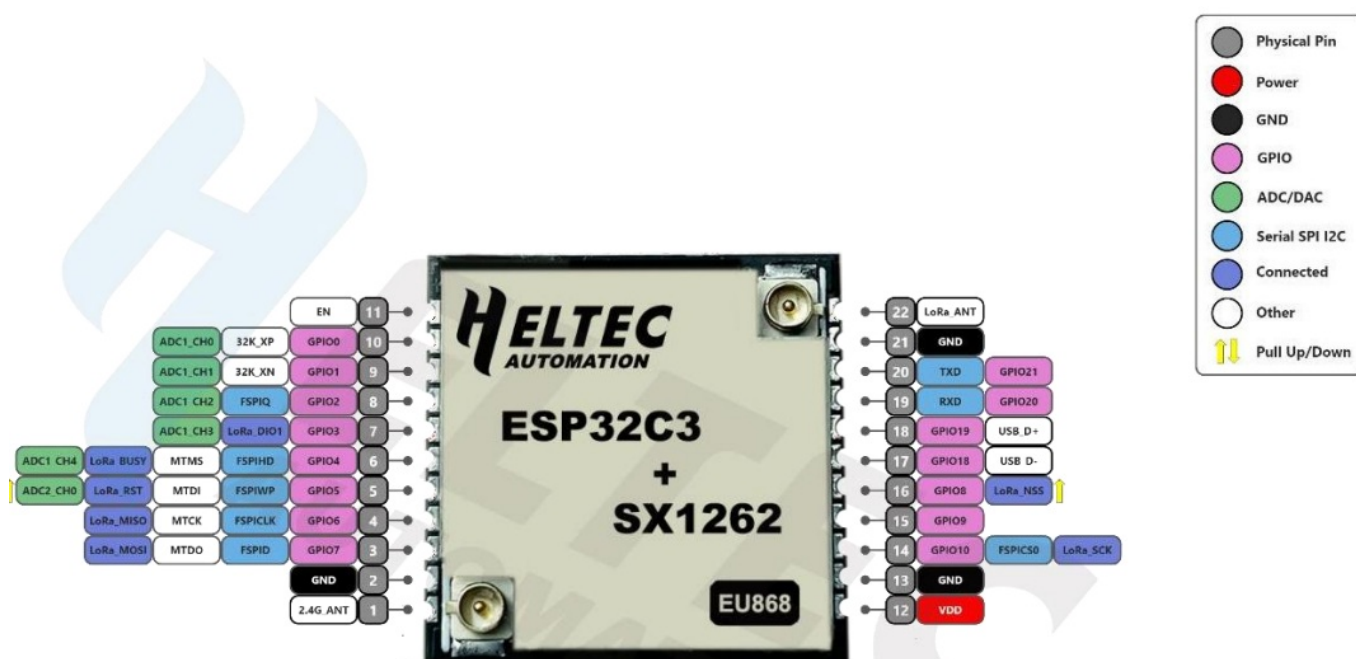
Pin description

No.	Name	Type	Function
1	2.4G ANT	O	2.4G ANT Output
2	GND	P	Ground
3	7	I/O	GPIO7, FSPID, MTDO, connected to SX1262_MOSI
4	6	I/O	GPIO6, FSPICLK, MTCK, connected to SX1262_MISO
5	5	I/O	GPIO5, ADC2_CH0, FSPIWP MTDI, connected to SX1262_RST
6	4	I/O	GPIO4, ADC1_CH4, FSPIHD, MTMS, connected to SX1262_BUSY
7	3	I/O	GPIO3, ADC1_CH3, connected to SX1262_DIO1
8	2	I/O	GPIO2, ADC1_CH2, FSPIQ
9	1	I/O	GPIO1, ADC1_CH1, 32K_XN
10	0	I/O	GPIO0, ADC1_CH0, 32K_XP
11	EN	I	CHIP_EN
12	VDD	P	3.3V Power Supply
13	GND	P	Ground
14	10	I/O	GPIO10, FSPICS0, connected to SX1262_SCK
15	9	I/O	GPIO9
16	8	I/O	GPIO8, connected to SX1262_NSS
17	18	I/O	GPIO18, USB_D-
18	19	I/O	GPIO19, USB_D+
19	RXD	I/O	U0RXD, GPIO20

No.	Name	Type	Function
20	TXD	I/O	U0TXD, GPIO21
21	GND	P	Ground
22	LoRa ANT	O	LoRa ANT Output.

Specifications

General specifications

Parameters	Description
Master Chip	ESP32-C3FN4(32-bit@RISC-V architecture)
WiFi	802.11 b/g/n, up to 150Mbps
LoRa Chipset	SX1262
Frequency	470~510MHz, 863~928MHz
Max. TX Power	21±1dBm
Max. Receiving sensitivity	-134dBm
Hardware Resource	5*ADC1+1*ADC2; 2*UART; 1*I2C; 3*SPI; 15*GPIO; etc.
Memory	384KB ROM; 400KB SRAM; 8KB RTC SRAM; 4MB SiP Flash
Interface	2.4G ANT (IPEX1.0); LoRa ANT(IPEX1.0); 2*11*1.27 spacing Stamp hole
Power consumption	Deep Sleep 10uA

Operating temperature	-40~85 ℃
Dimensions	17.78 * 17.78* 2.8mm
Package	Tape & Reel Packaging

Electrical characteristics

Power supply

Power supply mode	Minimum	Typical	Maximum	Company
3V3 pin (≥150mA)	2.7	3.3	3.5	V

Power characteristics

Mode	Condition	Min.	Typical	Max.	Company
WiFi Scan	3.3V Powered		80		mA
WiFi AP	3.3V Powered		120		mA
TX	470MHz, 3.3V Powered, 14dBm		120		mA
	470MHz, 3.3V Powered, 17dBm		140		mA
	470MHz, 3.3V Powered, 22dBm		170		mA
RX	470MHz, 3.3V Powered		40		mA
Sleep	3.3V powered		10		µA

RF characteristics

Transmit power

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

Receiving sensitivity
The following table gives typically sensitivity level of the HT-CT62.

Signal Bandwidth/[KHz]	Spreading Factor	Sensitivity/[dBm]
125	SF12	-134
125	SF10	-130
125	SF7	-122

Operation frequencies
HT-CT62 supports LoRaWAN frequency channels and models corresponding table.

Region	Frequency (MHz)	Model
EU433	433.175~434.665	HT-CT62-LF
CN470	470~510	HT-CT62-LF

IN868	865~867	HT-CT62-HF
EU868	863~870	HT-CT62-HF
US915	902~928	HT-CT62-HF
AU915	915~928	HT-CT62-HF
KR920	920~923	HT-CT62-HF
AS923	920~925	HT-CT62-HF

Specifications

Physical dimensions
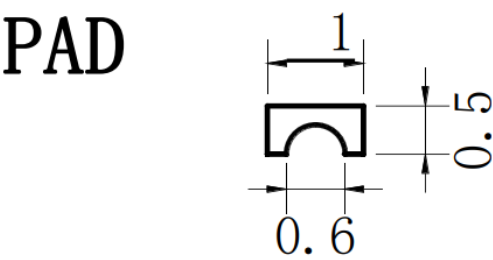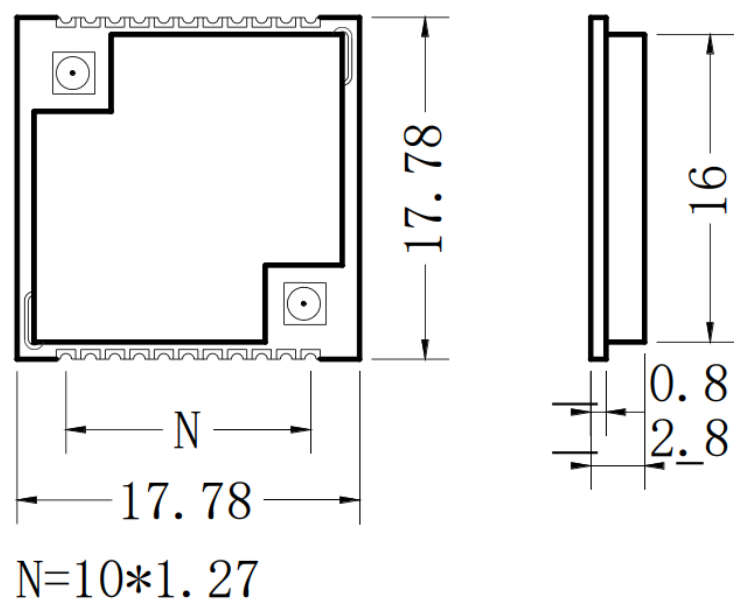
Resource

Relevant Resource

- **Recommend hardware design**
- **Pin map**
- **Downloadable resource**
- **Footprint**

Contact Information

- Heltec Automation Technology Co., Ltd Chengdu, Sichuan, China
- **Email:** support@heltec.cn
- **Phone:** +86-028-62374838
- https://heltec.org

FCC Statement

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

1. this device may not cause harmful interference
2. this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user' s authority to operate the equipment.
NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursua nt to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful inte rference in a residential installation. This equipment generates uses and can radiate radio frequency energy a nd, if not installed and used in accordance with the instructions, may cause harmful interference to radio com munications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turn ing the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help important announcement

Radiation Exposure Statement

- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.
- This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. Country Code selection feature to be disabled for products marketed to the US/Canada.
- This device is intended only for OEM integrators under the following conditions:
    1. The antenna must be installed such that 20 cm is maintained between the antenna and users, and
    2. The transmitter module may not be co-located with any other transmitter or antenna,
    3. For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding to Regulatory Domain change. (if modular only test Channel 1-11)
       As long as the three conditions above are met, further transmitter testing will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.
       Important Note:
       In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot

be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling
The final end product must be labeled in a visible area with the following"
Contains FCC ID: 2A2GJ-HT-CT62 "

Manual Information to the End User

- The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.
- The end user manual shall include all required regulatory information/warning as show in this manual.

List of applicable FCC rules
CFR 47 FCC PART 15 SUBPART C has been investigated. It is applicable to the modular transmitter

Specific operational use conditions
This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

Limited module procedures
Not applicable

Trace antenna designs
Not applicable

RF exposure considerations
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Antennas
This radio transmitter FCC ID:2A2GJ-HT-CT62 has been approved by Federal Communications Commission to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Antenna No.	Model No. of a ntenna:	Type of antenna:	Gain of the antenna (Max.)	Frequency range:
Bluetooth	/	Dipole Antenna	3.0	2402-2480MHz
2.4G Wi-Fi	/	Dipole Antenna	3.0	2412-2462MHz
LoRa DSS	/	Spring Antenna	1.1	902.3-914.9MHz
LoRa DTS	/	Spring Antenna	1.1	903-914.2MHz

Label and compliance information
The final end product must be labeled in a visible area with the following" Contains FCC ID:2A2GJ-HT-CT62″.

Information on test modes and additional testing requirements
Host manufacturer is strongly recommended to confirm compliance with FCC requirements for the transmitter when the module is installed in the host.

Additional testing, Part 15 Subpart B disclaimer
Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B.

Note EMI Considerations
Host manufacture is recommended to use D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties.

How to make changes
This module is stand-alone modular. If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system. According to the KDB 996369 D02 Q&A Q12, that a host manufacture only needs to do an evaluation (i.e., no C2PC required when no emission exceeds the limit of any individual device (including unintentional radiators) as a composite. The host manufacturer must fix any failure.

Documents / Resources

	HELTEC HT-CT62 LoRa Module [pdf] Owner's Manual HT-CT62 LoRa Module, HT-CT62, LoRa Module, Module

References

- ⁴⁄ **Heltec Automation –**
- **User Manual**