



**HT-CT62**

**LoRa module**



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Documents

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## Document version

Version	Time	Description	Remark
Rev. 1.0	2022-8-16	Preliminary version	肖鸿
Rev. 1.1	2022-9-17	Typographic modification	Aaron

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# 1. Description

## 1.1 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:

Table 1.1: Product model list

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.

## 1.2 Product features

- Microprocessor: ESP32-C3FN4 (RISC-V architecture 32-bit, main frequency up to 160 MHz)



- Support the [Arduino development environment](https://www.arduino.cc/);
- LoRaWAN 1.0.2 support;
- Ultra low power design, 10uA in deep sleep;
- 1.27 stamp edge design for SMT;
- Good impedance matching and long communication distance.
- Integrated WiFi, network connection, onboard Wi-Fi, dedicated IPEX socket.

## 2. Pin Definition

### 2.1 Pin assignment



HT-CT62\_V1 Pin map



## 2.2 Pin description

Table 2.2: 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



20	TXD	I/O	U0TXD, GPIO21
21	GND	P	Ground
22	LoRa ANT	O	LoRa ANT Output.

## 3. Specifications

### 3.1 General specifications

Table 3.1: 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



<b>Operating temperature</b>	-40~85 °C
<b>Dimensions</b>	17.78 * 17.78* 2.8mm
<b>Package</b>	Tape & Reel Packaging

### 3.2 Electrical characteristics

#### 3.2.1 Power supply

Table 3.2.1: Power supply

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

#### 3.2.2 Power characteristics

Table3.2.2: 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		μ A





### 3.3 RF characteristics

#### 3.3.1 Transmit power

Table3.3.1 Transmit power

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

#### 3.3.2 Receiving sensitivity

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

Table3.3.2 Receiving sensitivity

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

### 3.4 Operation frequencies

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

Table3.4: Operation frequencies

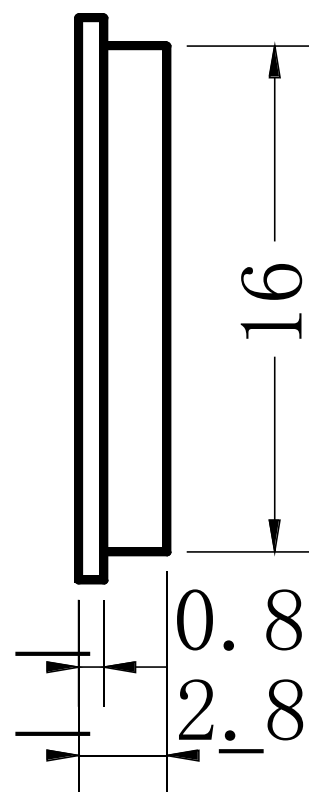
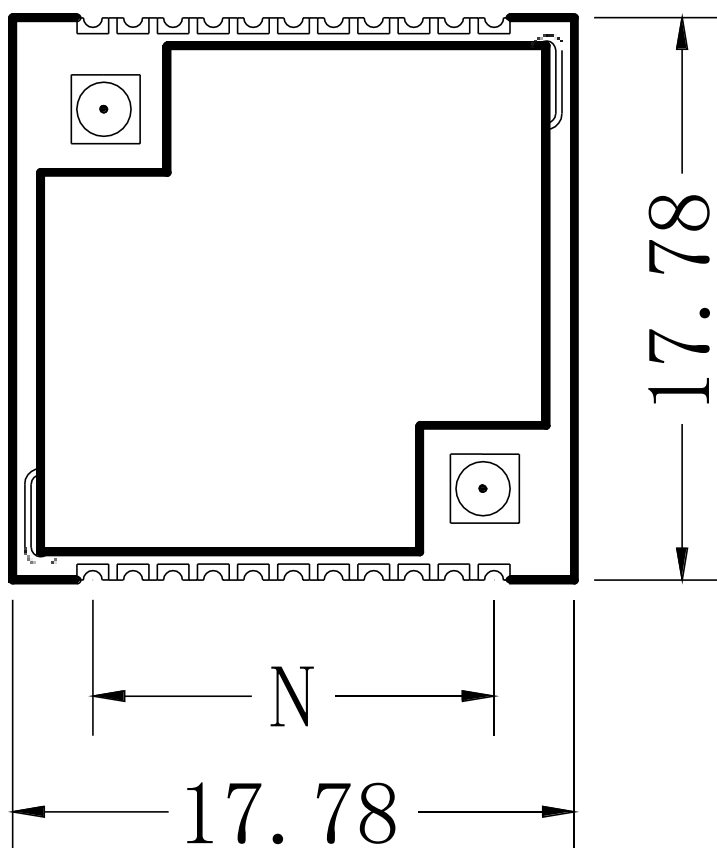
Region	Frequency (MHz)	Model
EU433	433.175~434.665	HT-CT62-LF
CN470	470~510	HT-CT62-LF



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

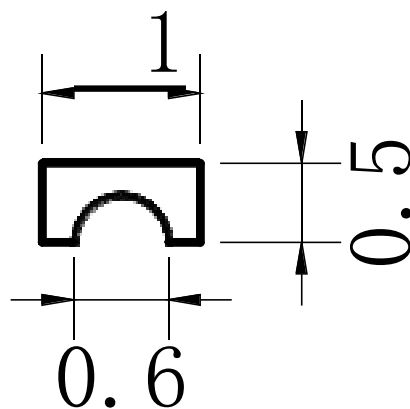
## 4. Specifications

### 4.1 Physical dimensions



$$N=10*1.27$$

PAD





## 5. Resource

### 5.1 Relevant Resource

- [Recommend hardware design](#)
- [Pin map](#)
- [Downloadable resource](#)
- [Footprint](#)

### 5.2 Contact Information

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**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, and (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, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. 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 turning 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

Important Note:

**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.



## Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01r01

### 2.2 List of applicable FCC rules

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

### 2.3 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.

### 2.4 Limited module procedures

Not applicable

### 2.5 Trace antenna designs

Not applicable

### 2.6 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.

### 2.7 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 antenna:	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

### 2.8 Label and compliance information

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

### 2.9 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.

### 2.10 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.

### 2.11 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.

### 2.12 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.