



# HT-VMT190

1.90 TFT-LCD Display

With ESP32 And LoRa



## Document Version

Version	Time	Description	Remark
Rev. 1.0	2024-5-16	Preliminary version	Richard

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# 1 Description

## 1.1 Overview

Vision Master T190 (HT-VMT190) is a development kit with ESP32-S3 and LoRa Module (optional). The onboard 1.9-inch TFT-LCD display contains 170 (RGB)X320 dots and can display up to 262k colors.

Working with the sample programs and development tools we provide, users can operate the display via Bluetooth, Wi-Fi and LoRa. It also supports daily entry-level programming, or runs open source projects like Meshtastic.

VM-T190 are available in 3 product variants:

Table 1.1: Product model list

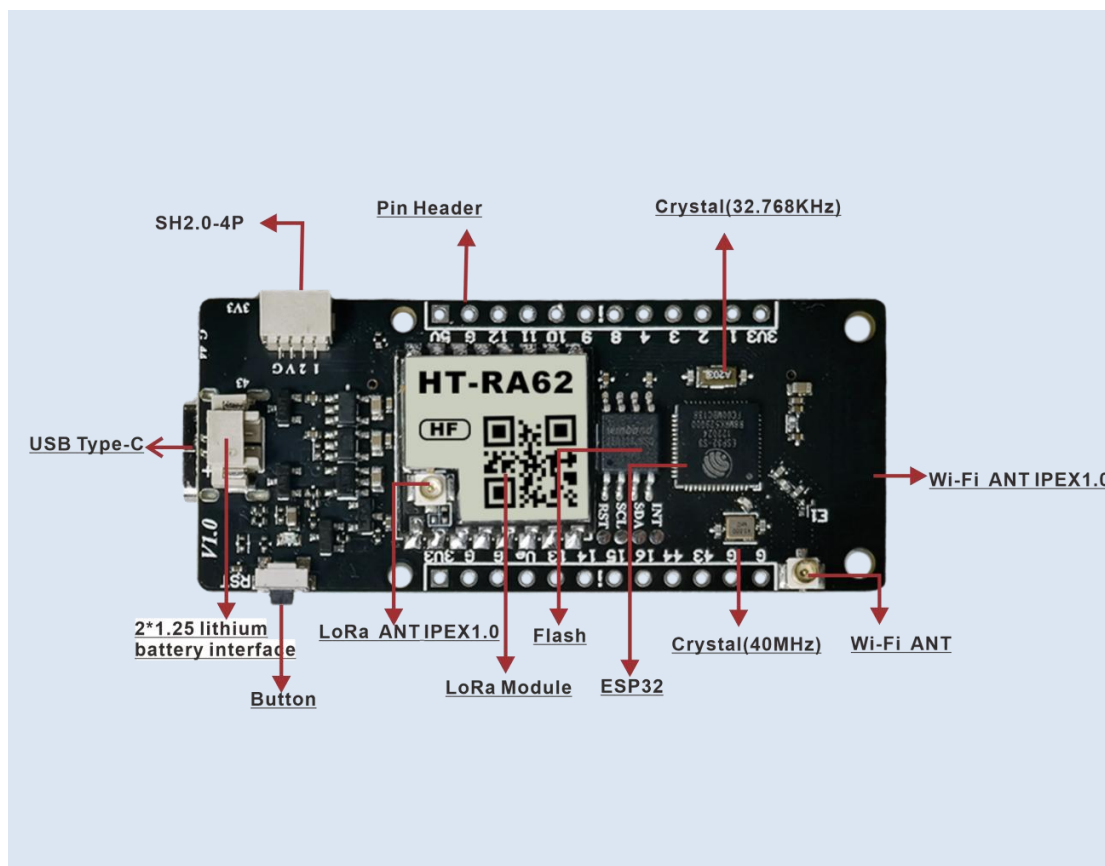
No.	Model	Description
1	HT-VMT190	Without LoRa module
2	HT-VMT190-LF	470~510MHz working LoRa frequency, used for China mainland (CN470) LPW band.
3	HT-VMT190-HF	For EU868, IN865, US915, AU915, AS923, KR920 and other LPW networks with operating frequencies between 863~928MHz.





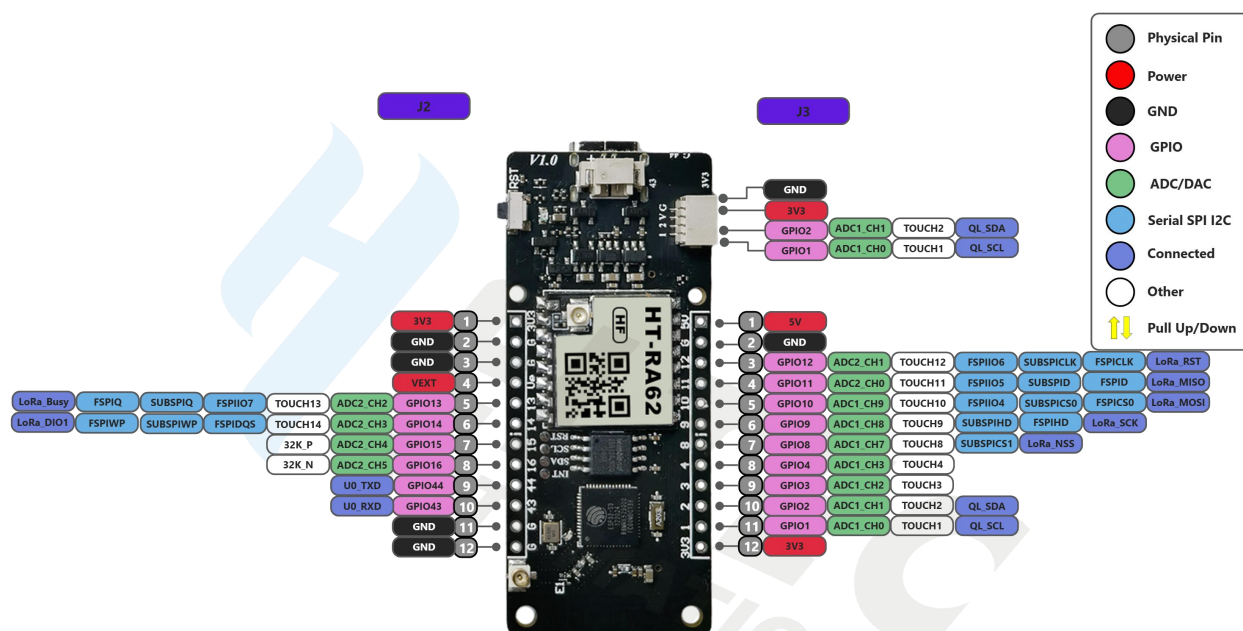
## 1.2 Product Features

- ESP32-S3R8 MCU, support Wi-Fi and BLE.
- LoRa module is optional, compatible with Mashtastic.
- Low power consumption, 18uA in deep sleep.
- Powerful display function, onboard 1.9-inch TFT-LCD display contains 170 (RGB)X320 dots and can display up to 262k colors.
- Type-C USB interface with a complete voltage regulator, ESD protection, short circuit protection, RF shielding, and other protection measures.
- Commercial temperature range: -30 ~ 70°C.
- SH2.0-4P sensor interface is perfectly compatible with [QuickLink](#) series sensors.
- Compatible with Arduino, PlatformIO, MicPython, we provide [Arduino development frameworks and libraries](#).



## 2 Pin Definition

### 2.1 Pin Map



HT-T190\_V1 Pin map



### 2.2 Pin Definition

#### Header J3

Name	Type	Description
5V	P	5V Power Supply.
GND	P	Ground.
12	I/O	GPIO12, ADC2_CH11, TOUCH12, LoRa_RST.
11	I/O	GPIO11, ADC2_CH10, TOUCH11, LoRa_MISO.
10	I/O	GPIO10, ADC1_CH9, TOUCH10, LoRa_MOSI.
9	I/O	GPIO9, ADC1_CH8, TOUCH9, LoRa_SCK.
8	I/O	GPIO8, ADC1_CH0, TOUCH8, LoRa_NSS.

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4	I/O	GPIO4, ADC1_CH3, TOUCH4.
3	I/O	GPIO3, ADC1_CH2, TOUCH3.
2	I/O	GPIO2, ADC1_CH1, TOUCH2, QL_SDA <sup>①</sup> .
1	P	GPIO1, ADC1_CH0, TOUCH1, QL_SCL <sup>②</sup> .
3V3	P	3V3 output.

### Header J3

Name	Type	Description
3V3	P	3V3 output.
GND	P	Ground.
GND	P	Ground.
VEXT	P	VEXT output.
13	I/O	GPIO13, ADC2_CH2, TOUCH13, LoRa_BUSY.
14	I/O	GPIO14, ADC2_CH3, TOUCH14, DIO1.
15	I/O	GPIO15, ADC2_CH4, 32K_P.
16	I/O	GPIO16, ADC2_CH5, 32K_N.
43	I/O	GPIO43, U0TXD.
44	I/O	GPIO44, U0RXD.
G	P	Ground.
G	P	Ground.

## 3 Specifications

### 3.1 General Specification

<sup>①</sup> QuickLink sensor interface.

<sup>②</sup> QuickLink sensor interface.



Table3.1: General specification

Parameters	Description
MCU	ESP32-S3R8
LoRa Chipset	RA62(SX1262)
Memory	384KB ROM; 512KB SRAM; 16KB RTC SRAM; 8MB SiP Flash
Wi-Fi	802.11 b/g/n
Bluetooth	Bluetooth LE: Bluetooth 5, Bluetooth mesh
LCD Type	$\alpha$ -Si TFT
Display Module	N190-1732TBWPG01-C30
Display Colors	262K.
Storage temperature	-30~70°C
Operating temperature	-20~60°C (Optimal operating temperature of E-Ink)
Operating Humidity	0~65%(Optimal operating humidity of E-Ink)
Power Supply	3~5V (USB), 3~4.2(Battery)
LCD Type	$\alpha$ -Si TFT
Display Module	N190-1732TBWPG01-C30
Screen Size	1.9 Inch
Display Resolution	170RGB x 320
Active Area	22.7 (H) $\times$ 42.72(V) mm <sup>2</sup>
Display Colors	262K.
Hardware Resource	7*ADC_1, 6*ADC_2, 11*Touch, 8M*PSRAM, 3*UART; 2*I2C; 2*SPI. Etc.
Interface	Type-C USB, 2*1.25 lithium battery interface, WiFi ANT (IPEX1.0), Sensor connector(SH2.0-4P), 2*13*2.54 Header Pin
Dimensions	60mm*25.4mm*10.2mm

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## 3.2 Power Consumption

Table 3.2: Working current

Mode	Condition	Consumption(Battery@3.8V)
LoRa	5dBm	150mA
	10dBm	175mA
	15dBm	200mA
	20dBm	220mA
Wi-Fi	Scan	105mA
	AP	140mA
BT		108mA
Sleep		18uA

## 3.3 LoRa RF Characteristics

### 3.3.1 Transmit Power

Table3.3.1: Transmit power

Operating frequency band	Maximum power value/[dBm]
470~510	21 ± 1
867~870	21 ± 1
902~928	21 ± 1

### 3.3.2 Receiving Sensitivity

The following table gives typically sensitivity level.

Table3.3.2: Receiving sensitivity

Signal Bandwidth/[KHz]	Spreading Factor	Sensitivity/[dBm]
125	SF12	-135



125	SF10	-130
125	SF7	-124

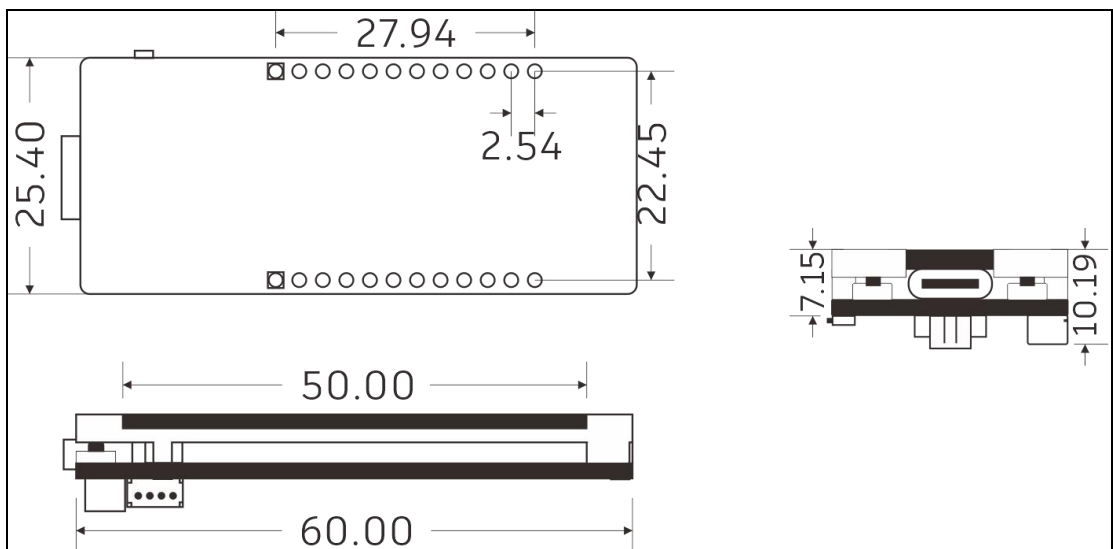
### 3.3.3 Operation Frequencies

HT-VMT190 supports LoRaWAN frequency channels and models corresponding table.

Table3.3.3: Operation Frequencies

Region	Frequency (MHz)	Model
EU433	433.175~434.665	HT-VMT190-LF
CN470	470~510	HT-VMT190-LF
IN868	865~867	HT-VMT190-HF
EU868	863~870	HT-VMT190-HF
US915	902~928	HT-VMT190-HF
AU915	915~928	HT-VMT190-HF
KR920	920~923	HT-VMT190-HF
AS923	920~925	HT-VMT190-HF

## 4 Physical Dimensions





## 5 Resource

### 5.1 Relevant Resource

- [Heltec ESP32 framework and Lib](#)
- [Heltec LoRaWAN test server based on TTS V3](#)
- [SnapEmu IoT Platform](#)
- [User Manual Document](#)
- [LCD Datasheet](#)
- [Schematic Diagram](#)

### 5.2 Heltec Contact Information

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