



HT-AM02

LoRa module





Document version

Version	Time	Description
Rev. 1.0	2020-04-30	Preliminary version
Rev. 1.1	2021-04-01	Typographic modification



Copyright Notice

All contents in the files are protected by copyright law, and all copyrights are reserved by Chengdu Heltec Automation Technology Co., Ltd. (hereinafter referred to as Heltec). Without written permission, all commercial use of the files from Heltec are forbidden, such as copy, distribute, reproduce the files, etc., but non-commercial purpose, downloaded or printed by individual are welcome.

Disclaimer

Chengdu Heltec Automation Technology Co., Ltd. reserves the right to change, modify or improve the document and product described herein. Its contents are subject to change without notice. These instructions are intended for you use.



Content

HT-AM02	1
<i>Document version</i>	2
<i>Copyright Notice</i>	3
<i>Disclaimer</i>	3
<i>Content</i>	4
1. <i>Description</i>	6
1.1 Overview	6
1.2 Product features	6
2. <i>Pin Definition</i>	7
2.1 Pin assignment	7
2.2 Pin description	8
3. <i>Specifications</i>	10
3.1 General specifications	10
3.2 Electrical characteristics	11
3.2.1 Power supply.....	11
3.2.2 Power characteristics	11
3.3 RF characteristics.....	11
3.3.1 Transmit power	11
3.3.2 Receiving sensitivity	12
3.4 Operation frequencies.....	12



- 4. *Hardware resource* 13
 - 4.1 Physical dimensions 13

- 5. *Resource* 14
 - 5.1 Relevant Resource 14
 - 5.2 Contact Information 14



1. Description

1.1 Overview

[CubeCell](#) (TM) is a new product series made by Heltec team, mainly for LoRa/LoRaWAN node applications.

CubeCell (TM) series is based on ASR605x (ASR6501, ASR6502), those chips are already integrated with the PSoC® 4000 series MCU (ARM® Cortex® M0+ Core) and SX1262. We have done a lot of migration and development, made it perfectly support Arduino®, can run the LoRaWAN protocol stably, and can easily connect lithium batteries and solar panels.

HTCC-AM02 is a Module. Supports AT transparent transmission commands, can be directly integrated into the application circuit.

HT-AM02 are available in two product variants:

Table 1.1 Product model list

No.	Model	Description
1	HT-AM02-LF	470~510MHz working LoRa frequency, used for China mainland (CN470) LPW band.
2	HT-AM02-HF	For EU868, IN865, US915, AU915, AS923, KR920 and other LPW networks with operating frequencies between 863~928MHz.

1.2 Product features

- Perfect [Arduino-Compatible!](#)
- CE and FCC certification;
- Based on ASR6502, this chip is already integrated the PSoC® 4000 series MCU

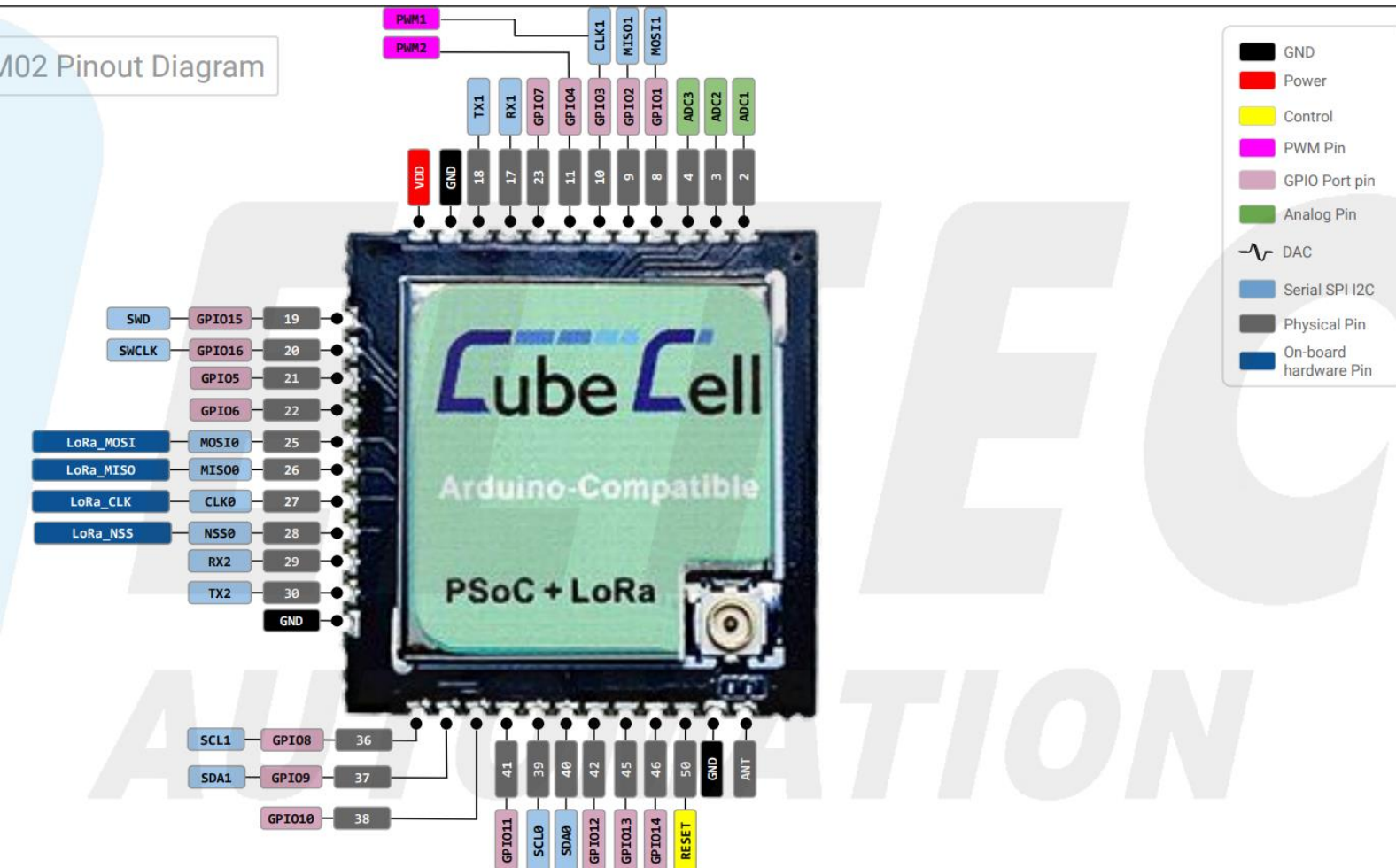
<https://heltec.org>

(ARM® Cortex® M0+ Core) and SX1262;

- LoRaWAN 1.0.2 support;
- Ultra low power design, 3.5uA in deep sleep;
- 1.27 stamp edge design for SMT;
- Good impedance matching and long communication distance.

2. Pin Definition

2.1 Pin assignment





2.2 Pin description

Table 2.2 Pin description

No.	Name	Type	Function
1	ADC1	I	ADC1.
2	ADC2	I	ADC2.
3	ADC3	I	ADC3.
4	GPIO1	I/O	GPIO3, SPI1_MOSI.
5	GPIO2	I/O	GPIO2, SPI1_MISO.
6	GPIO3	I/O	GPIO3, PWM1, SPI1_CLK.
7	GPIO4	I/O	GPIO4, PWM2.
8	GPIO7	I/O	GPIO7.
9	RX1	I/O	UART1_RX.
10	TX1	I/O	UART1_TX.
11	GND	P	Ground.
12	VDD	P	3.3V Input.
13	GPIO15	I/O	GPIO15, SWD.
14	GPIO16	I/O	GPIO16, SWCLK.
15	GPIO5	I/O	GPIO5.
16	GPIO6	I/O	GPIO6.
17	MOSI0	I/O	SPI0_MOSI, LoRa_MOSI.
18	MISO0	I/O	SPI0_MISO, LoRa_MISO.
19	CLK0	I/O	SPI0_CLK, LoRa_CLK.
20	NSS0	I/O	SPI0_NSS, LoRa_NSS.
21	RX2	I/O	UART2_RX.
22	TX2	I/O	UART2_TX.
23	GND	P	Ground.
24	GPIO8	I/O	GPIO8, SCL1.
25	GPIO9	I/O	GPIO9, SDA1.
26	GPIO10	I/O	GPIO10.
27	GPIO11	I/O	GPIO11.
28	SCL0	I/O	SCL0.
29	SDA0	I/O	SDA0.
30	GPIO12	I/O	GPIO12.

<https://heltec.org>



31	GPIO13	I/O	GPIO13.
32	GPIO14	I/O	GPIO14.
33	RESET	I	RESET.
34	GND	P	Ground.
35	ANT	I/O	IPEX antenna interface.



3. Specifications

3.1 General specifications

Table 3.1: General specifications

Parameters	Description
Master Chip	ASR6502 (48 MHz ARM® Cortex® M0+ MCU)
LoRa Node Chip	SX1262
Frequency	470~510 MHz, 863~923 MHz
Max. TX Power	21 ± 1 dBm
Max. Receiving sensitivity	-135 dBm
Hardware Resource	UART x 2; SPI x 2; I2C x 2; SWD x 1; 12-bit ADC input x 3; 8-channel DMA engine; general-purpose GPIO x 16
Memory	128KB internal FLASH; 16KB internal SRAM
Interface	LoRa Antenna Interface (IPEX) x 1; 12 x 1.27 Stamp Hole x 2 + 11 x 1.27 Stamp Hole x 1
Power consumption	3.5µA (deep sleep mode)
Operating temperature	-20 ~ 70 °C
Dimensions	20.4 x 20.4 x 3 mm
Package	Tape & Reel Packaging



3.2 Electrical characteristics

3.2.1 Power supply

Table 3.2 Power supply

Power supply mode	Minimum	Typical	Maximum	Company
3V3 pin ($\geq 150\text{mA}$)	2.7	3.3	3.5	V

3.2.2 Power characteristics

Table3.2 Power characteristics

Electrical Features	Condition	Min.	Typical	Max.	Company
Power Consumption(mA)	LoRa Rx Mode		10		mA
	LoRa 10dB output		70		mA
	LoRa 14dB output		90		mA
	LoRa 17dB output		100		mA
	LoRa 20dB output		105		mA
	Sleep Mode (3.3V header powered)		3.5		μA

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-AM02.

Table3.3.2 Receiving sensitivity

Signal Bandwidth/[KHz]	Spreading Factor	Sensitivity/[dBm]
125	SF12	-135
125	SF10	-130
125	SF7	-124

3.4 Operation frequencies

HT-AM02 supports LoRaWAN frequency channels and models corresponding table.

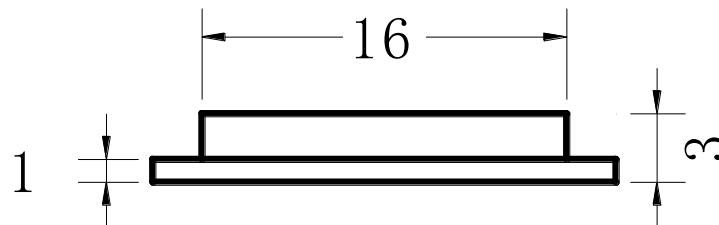
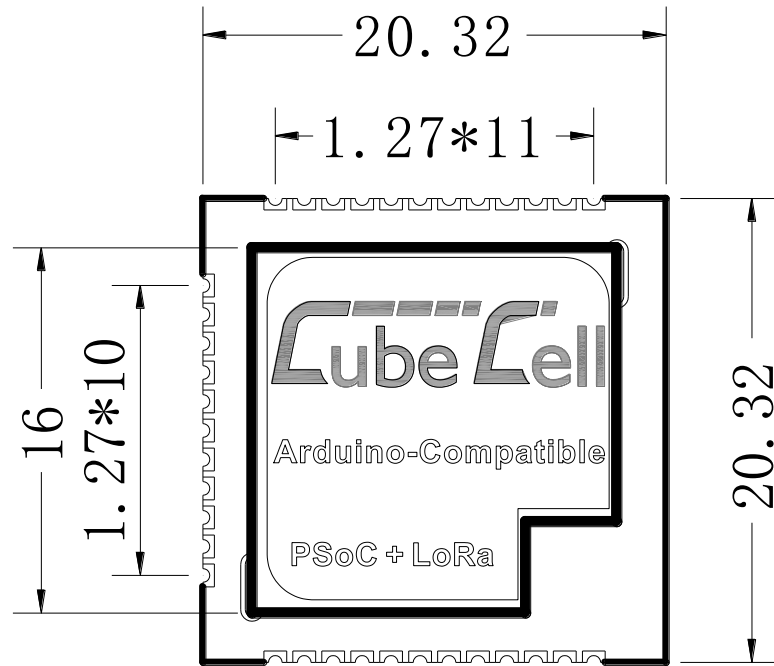
Table3.4 Operation frequencies

Region	Frequency (MHz)	Model
EU433	433.175~434.665	HT-AM02-LF
CN470	470~510	HT-AM02-LF
IN868	865~867	HT-AM02-HF
EU868	863~870	HT-AM02-HF
US915	902~928	HT-AM02-HF
AU915	915~928	HT-AM02-HF
KR920	920~923	HT-AM02-HF
AS923	920~925	HT-AM02-HF

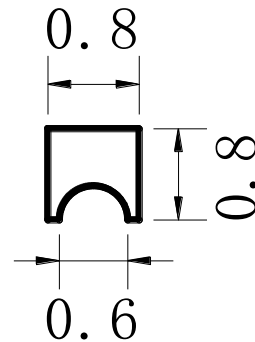


4. Hardware resource

4.1 Physical dimensions



PAD





5. Resource

5.1 Relevant Resource

- [Heltec CubeCell Module framework](#)
- [Pin map](#)
- [Downloadable resource](#)

5.2 Contact Information

Heltec Automation Technology Co., Ltd

Chengdu, Sichuan, China

Email: support@heltec.cn

Phone: +86-028-62374838

<https://heltec.org>