



AS10-SMD User Manual

433MHz, 100mW RF Transceiver of Spring Antenna Port Based on SI4463

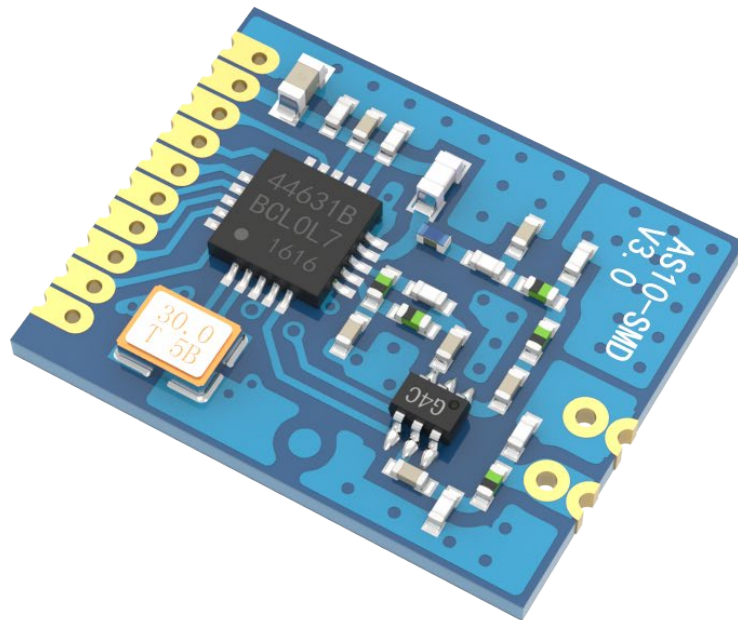


Table of Content

1. Product Overview	3
2. Product Features.....	3
3. Series Products	4
4. Electrical Parameters	4
5. Module Functions.....	5
5.1 Recommended Connection Diagram.....	5
5.2 Pin Definition	5
5.3 Pin Function.....	6
6. Package Information	9
6.1 Machine Size (unit: mm).....	9
6.2 Reference Pad Design (unit: mm)	9
7. Package Manner.....	10
7.1 Electrostatic Bag Package	10

1. Product Overview

AS10-SMD is a 100mW industrial wireless data transceiver with strong diffraction and penetration and high stability, operates at 433MHz. The module uses original SI4463 from American TI, high receiving sensitivity and strong anti-interference. It adopts Spring antenna, and the precise impedance matching network is designed strictly. It features enough power, good spectral properties, small harmonic wave, small cross talk, ultra-volume, high precision crystal vibration is adopted and inductance. Some of the devices meet military grade standard.

2. Product Features

- Comes with external spring antenna port, transmission distance up to 2km ^[1]
- Super low power consumption, the lowest power consumption is about 0.5uA
- Operation frequency 425-525MHz
 - Frequency adjustable, recommending 30M crystal oscillator
 - Support (G) FSK, 4(G) FSK, (G) MSK, OOK, and ASK modulation
- Data FIFO
 - Transmission length: 1-64 bytes each data packet
 - Receiving length: 1-64 bytes each data packet
- Communication interface
 - Hardware SPI interface of 4-Pin
 - 4Mbps data speed is recommended, Max speed is up to 10Mbps.
- Multiple levels of airspeed
 - Programmable control of air speed ranges from 0.123k to 1Mbps
 - Adjustable by software, recommend using low airspeed
- Transmission Power
 - Max transmit power can reach 20dBm
- 4 operation modes ^[4]
 - Fast wake
 - ultra-low current power down modes
 - Send
 - Receive
- supply voltage range
 - 1.8V-3.6VDC
- Transmitting current
 - When the transmitting power is 20dBm, the transmitting current is tested as 80mA
- Receiving sensibility
 - Receive sensitivity measured at 1k airspeed is better than -126dBm
- Ultra-small volume, in-line package
 - 18.5 * 15mm
 - Module weight is about 3.4g

Remarks:

- 1) Open, sunny, no obstacles; The max power, height 1.5m, data speed 1Kbps
- 2) The airspeed is higher, the distance is closer; The airspeed is lower, distance is longer
- 3) For transmitting power, please see chip manual of SI4463
- 4) For four operation modes, please see chip manual SI4463
- 5) Voltage higher than 3.6V will damage the module permanently

3. Series Products

Table 3-1 Brief Specification of AS10-SMD

Model Number	Carrier Frequency (Hz)	IC	Package	Size (mm)	Max Transmit Power (dBm)	Range (km)	Antenna type
AS10-SMD	433M	SI4463	SMD	18.5*15	20	2.0	Spring antenna/IPEX
AS10-M4463D-TH	433M	SI4463	DIP	24*16	20	2.0	Spring antenna
AS10-M4463D-SMA	433M	SI4463	DIP	24*16	20	2.0	SMA-KE
AS10-M4463D-915TH	915M	SI4463	DIP	24*16	20	2.0	Spring antenna/IPEX
AS10-M4463D-915SMA	915M	SI4463	DIP	24*16	20	2.0	SMA-K
★Above model numbers of the AS10 series can communicate★							

4. Electrical Parameters

Table 4-1 Electrical Parameters of AS10-SMD

Test Condition: Tc=25°C, VCC=3.3V

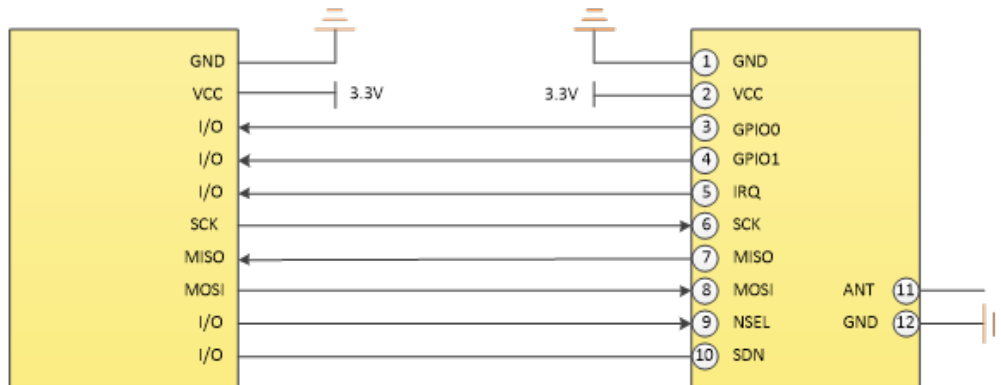
Parameter	Parameter Name	Description	Min Value	Typical Value	Max Value	Unit
Voltage	Supply voltage ^[1]		1.8		3.6	VDC
	Communication level	The communication level is generally smaller than the supply voltage, and VCC in 0.7*VCC refers to the supply voltage.	0.3*VCC		0.7*VCC	V
Current	Transmitting current ^[2]			110		mA
	Receiving current	Average value		22		mA
	Turn off current	The module set as power down mode		0.5		uA
RF Parameters	Operating frequency	adjustable, 425-525MHz	425		525	MHz
	Transmitting power	adjustable, Max 20dBm, about 100mW		20		dBm
	Receiving sensitivity	-126dBm@1kbps, receive sensitivity is detailed in the chip manual		-126		dBm
	Air speed	Programmable control (0.123Kbps-1Mbps)	0.123K		1M	bps
Operation Environment	Operating temperature	Industrial grade	-40		+85	°C
	Operating humidity	Relative humidity, no condensation	10%		90%	
	Storage temperature		-40		+125	°C

Remarks:

- 1) Voltage higher than 3.6V will damage the module. The lower the voltage, the lower the transmission power.
- 2) Power supply capability must be greater than 200mA.

5. Module Functions

5.1 Recommended Connection Diagram



0-1 Recommended Connection Diagram

Explanation:

1. GPIO0/GPIO1 is a general-purpose IO, can be configured into a variety of functions, as detailed in the SI4463 data manual, if not used, can be suspended.
2. It is recommended to use an external interrupt from the microcontroller. Alternatively, the SPI query mode can be used to obtain the interrupt status.
3. SPI communication rate should not be set too high, usually around 1M is ok
4. For the mode transition of SI4463, please refer to the "Operating Modes and Timing" section of the data manual. The mode transition between TX and RX must pass Ready and cannot be switched directly
5. Reinitializes register configuration when the chip is idle for greater stability.

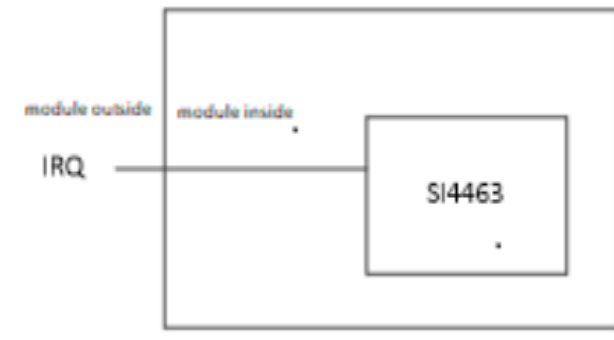
5.2 Pin Definition

Table 5-1 Pin Definition of AS10-SMD

Pin No.	Pin Name	Pin Direction	Pin Description
1	GND		Ground, connect to power reference ground
2	VCC		Power supply, range 1.8-3.6V. Recommend 3.3V, and to add ceramic filter capacitor externally.
3	GPIO0	output	Configurable general IO port (see SI4463 data manual for details)
4	GPIO1	output	Configurable general IO port (see SI4463 data manual for details)
5	IRQ	output	Module interrupt pins
6	SCK	input	Module SPI clock pin
7	MISO	output	Module information output Pin
8	MOSI	input	Module SPI Data input Pin
9	NSEL	input	Module chip select pin for starting a SPI communication
10	SDN		Module work enable control pin, working at low level (see SI4463 data manual for details)
11	ANT		Antenna
12	GND		Ground, connect to power reference ground
*See the SI4463 data sheet for pin definitions, software drivers, and communication protocols of the module. *			

5.3 Pin Function

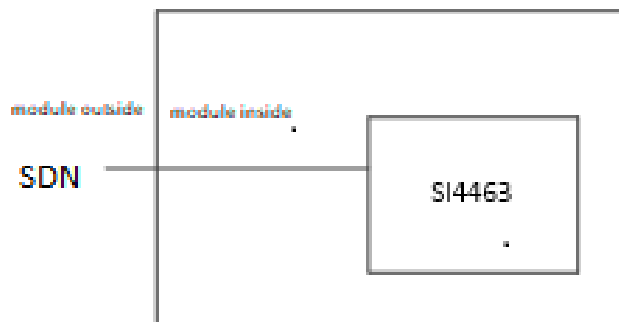
5.3.1 Function of IRQ Pin



Picture 0-2 IRQ Local Connection Diagram

Module interrupt control pin, see SI4463 chip manual for details.

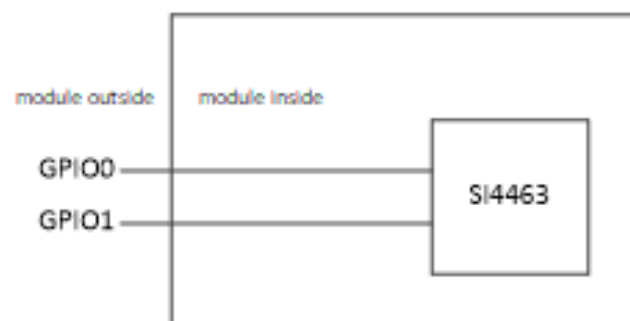
5.3.2 Function of SDN Pin



Picture 0-3 SDN Local Connection Diagram

Module work enable control pin, see SI4463 chip manual.

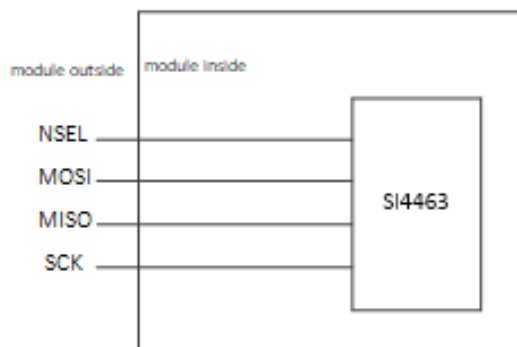
5.3.3 GPIO0、GPIO1 Pin Function



Picture 0-4 Local Pin Connections of GPIO0, GPIO1

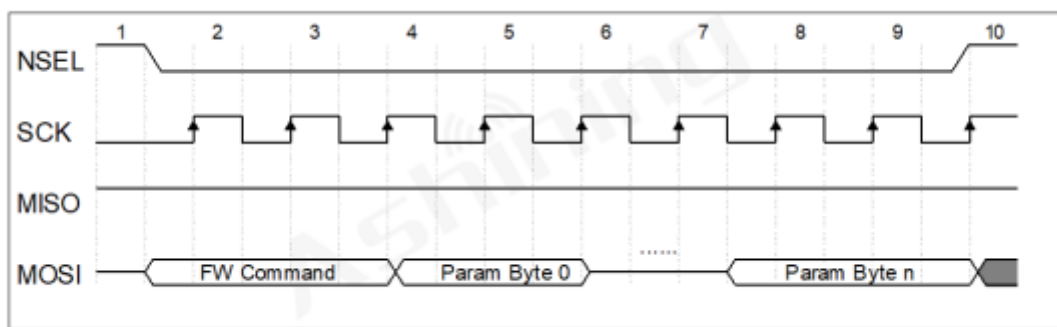
Module information output pin, see SI4463 chip manual for details.

5.3.4 Function of SPI Pin

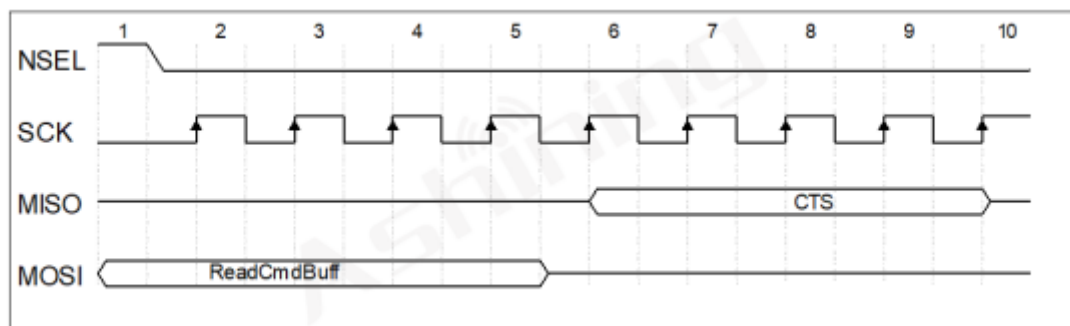
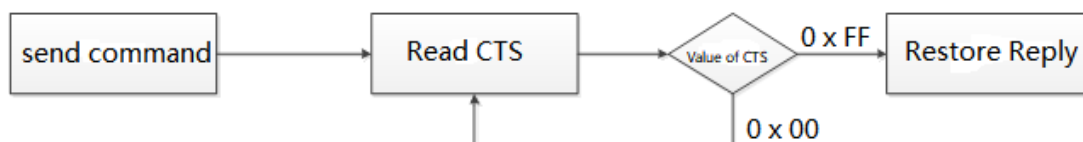


picture 0-5 SPI Pin Local Connection Diagram

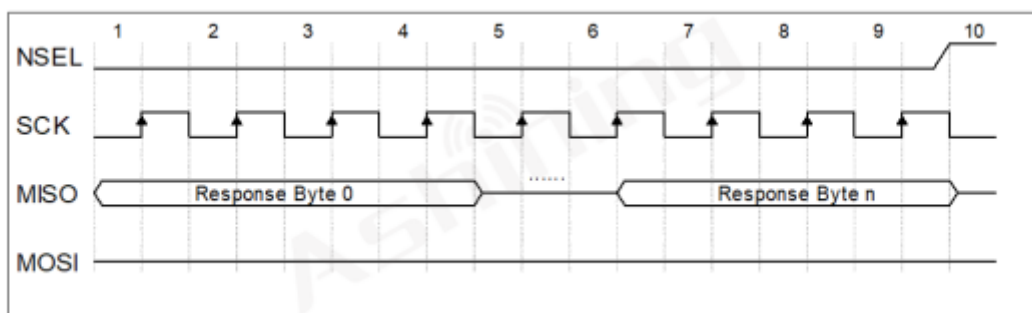
The SPI Sequence Diagram is as follows:



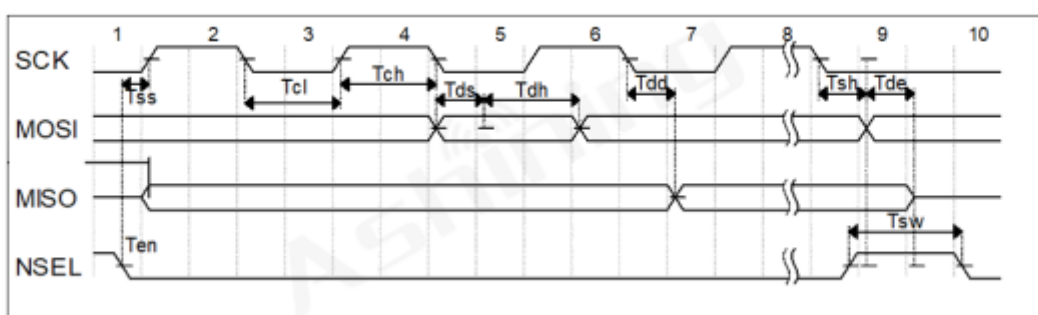
Picture 0-6 Sequence Diagram of SPI Write Operation



Picture 0-7 Sequence Diagram of SPI Read Operation



Picture 0-8 SPI Read Sequence Diagram - Read Data Timeout



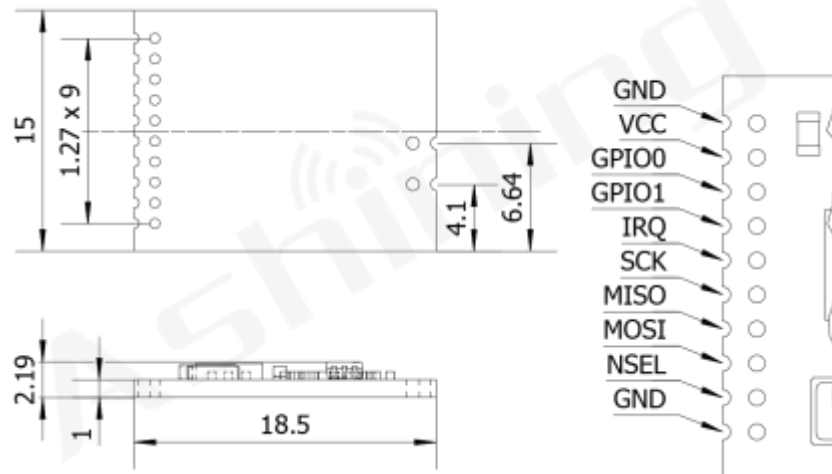
Picture 0-9 SPI Sequence Diagram of Parameters

Table 5-3

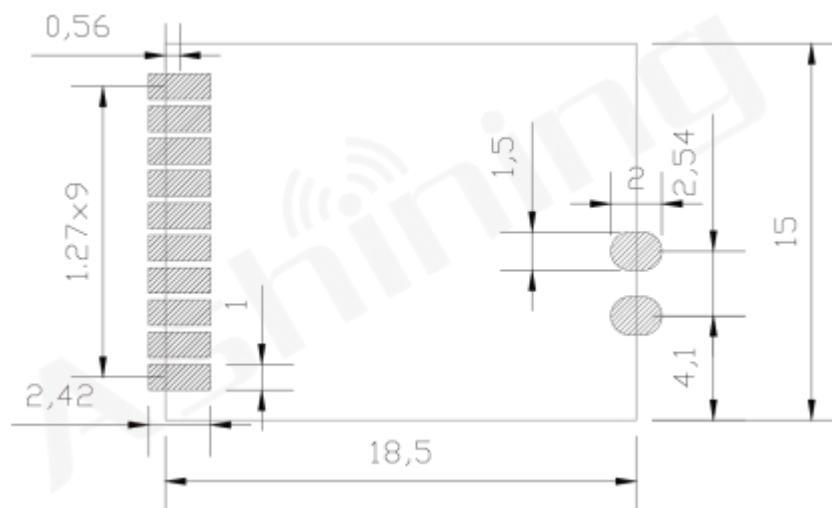
Parameters Symbols	Description	Min	Max	Unit
Tch	Clock high level time	40		ns
Tcl	Clock low level time	40		ns
Tds	Data establishment time	20		ns
Tdh	Data time lasts	20		ns
Tdd	Output data delay time	20		ns
Ten	Output enable time	20		ns
Tde	The output does not enable time	50		ns
Tss	Select setup time	20		ns
Tsh	Select duration	50		ns
Tsw	Select a high duration	80		ns

6. Package Information

6.1 Machine Size (unit: mm)

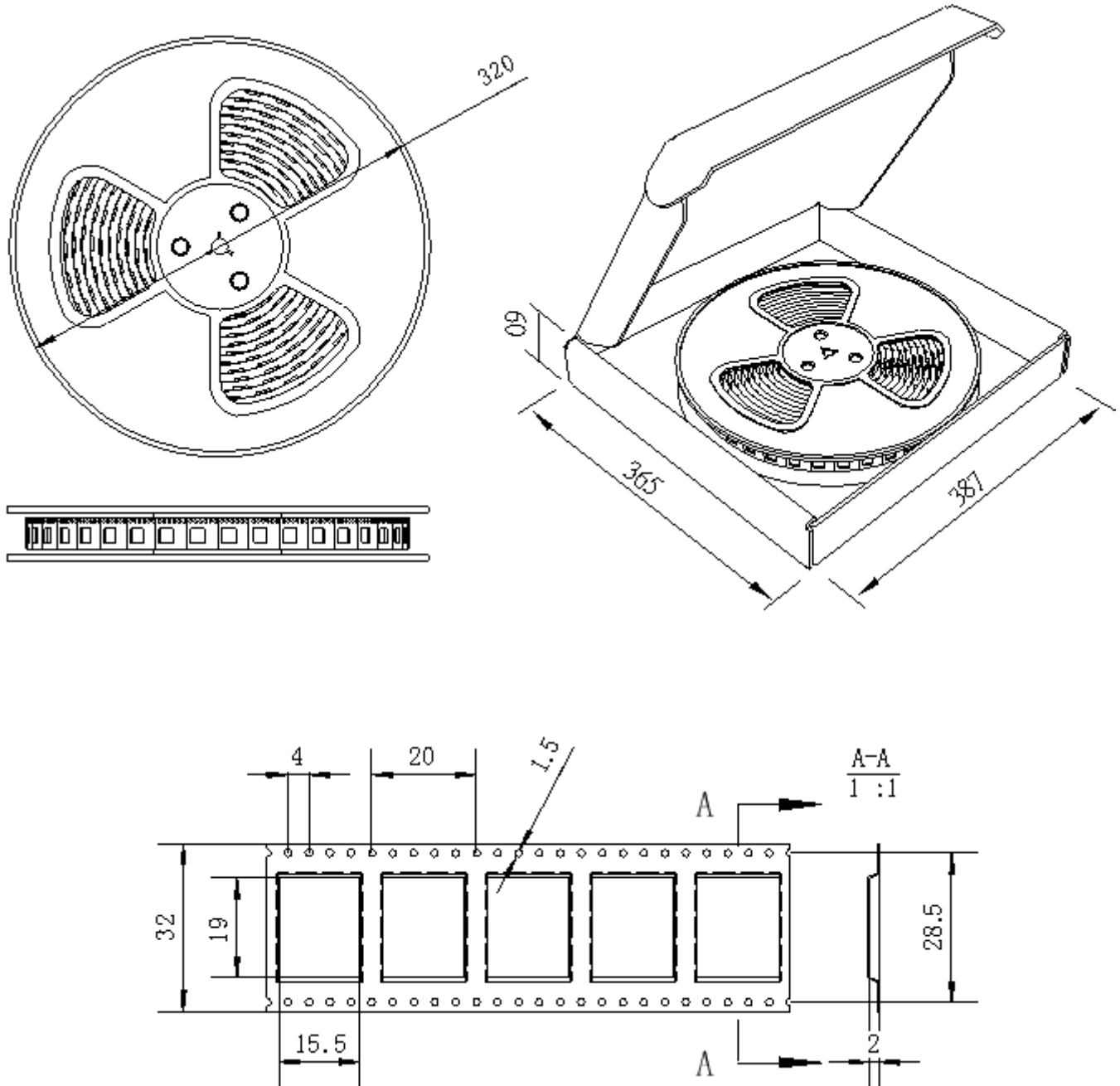


6.2 Reference Pad Design (unit: mm)



7. Package Manner

7.1 Electrostatic Bag Package



Important Remarks and Disclaimers

As the hardware and software of the product continue to improve, this manual may be subject to change, and the final version of the manual shall prevail.

Users of this product need to pay attention to the product dynamics on the official website, so that users can get the latest information of this product in time.

The pictures and diagrams used in this manual to explain the functions of this product are for reference only.

The measured data in this specification are all measured by our company at room temperature for reference only. Please refer to the actual measurement for details.

Chengdu Ashining Technology Co., Ltd. reserves the right of final interpretation and modification of all contents in this manual