

Lierda WB26 Series LoRa transparent transmission module hardware design manual

Version: Rev3.0

Date: 23/12/14

Status: Controlled version

Legal Statement

If you receive this document from Lierda Science & Technology Group Co., Ltd. (hereinafter referred to as "Lierda"), it means that you have agreed to the following terms. If you do not agree to the following terms, please stop using this document.

This document is owned by Lierda Science & Technology Group Co., Ltd. All rights not expressly granted in this document are reserved. The document contains proprietary information of Lierda. Without prior written permission from Lierda, no entity or individual may copy, transmit, distribute, use, or disclose this document and any images, tables, data, and other information contained in this document.

This product complies with the design requirements for environmental protection and personal safety. The storage, use, and disposal of the product should be carried out in accordance with the product manual, relevant contracts, or relevant laws and regulations.

The company reserves the right to modify and improve the products described in this manual without prior notice; it also reserves the right to revise or withdraw this manual at any time.

Revision History of the Document

Document Version	Change date	Reviser	Reviewer	Change content
Rev1.0	22-08-17	ZXY	LXY	Initial Version
Rev2.0	22-09-05	WRC	LXY	Modify the current data of 868MHz.
Rev3.0	23-12-18	WRC	LXY	Modify template Change the transmission parameters of the 76PN4 module and the receiving sensitivity of the 37PN4.

Lierda
利 尔 达

Safety Instructions

Users are responsible for complying with the relevant regulations of other countries regarding wireless communication modules and devices, as well as specific environmental regulations for use. By following the following safety principles, personal safety can be ensured and help protect products and work environments from potential damage. Our company is not responsible for any losses resulting from customers' failure to comply with these regulations.



Safety first on the road! Do not use handheld mobile devices while driving unless they have hands-free functionality. Please pull over before making a call!



Please turn off your mobile devices before boarding. The wireless function of mobile devices is prohibited on the plane to prevent interference with the aircraft communication system. Ignoring this prompt may compromise flight safety and even violate the law.



When in a hospital or healthcare facility, pay attention to any restrictions on the use of mobile terminal devices. RF interference can cause medical equipment to malfunction, so it may be necessary to turn off mobile terminal devices.



Mobile terminal devices do not guarantee effective connection in all situations, such as when there is no mobile phone balance or the SIM card is invalid. In case of emergency situations with the above conditions, please remember to use emergency calls, and make sure your device is turned on and in an area with sufficient signal strength.



Your mobile terminal device will receive and emit radio frequency signals when it is turned on, which may cause radio frequency interference when near a TV, radio, computer, or other electronic devices.



Please keep mobile terminal devices away from flammable gases. When you are near gas stations, oil depots, chemical plants, or explosive operation sites, please turn off your mobile terminal devices. Operating electronic devices in any potentially explosive environment poses a safety hazard.

Module selection

Serial number	Module model	Feature symbol	Support frequency band	Dimensions (mm)	Module Introduction
1	L-LRNWB26-37PN4	WB26-3P	430~435MHz	22×18×2.6	
2	L-LRNWB26-76PN4	WB26-7P	470~510MHz	22×18×2.6	
3	L-LRNWB26-97PN4	WB26-9P	860~930MHz	22×18×2.6	

Lierda
利 尔 达

Content

Legal Statement.....	1
Revision History of the Document.....	2
Safety Instructions.....	3
Module selection.....	4
Content.....	5
1 Introduction.....	7
2 Product Overview.....	8
2.1 Key Features.....	8
2.2 Function Block Diagram.....	9
2.3 Pinout diagram.....	9
2.4 Pin Description Table.....	10
2.4.1 Power interface.....	10
2.4.2 UART interface.....	10
2.4.3 SWD interface.....	10
2.4.4 Functional Interface.....	11
2.4.5 Antenna interface.....	11
2.4.6 Other interfaces.....	11
3 Specifications.....	12
4 Hardware design instructions.....	15
4.1 Power circuit.....	15
4.2 Antenna interface.....	15
4.3 Maximum transmission power and supply voltage.....	15
5 Mechanical dimensions.....	17
5.1 Dimensional drawing.....	17
6 Precautions.....	18
6.1 Disabled frequency point description.....	18

7 Production and packaging information	19
7.1 Steel mesh open design	19
7.2 Reflow soldering operation guidance	19
7.3 Packaging information	20



1 Introduction

This document mainly provides a detailed description of the hardware parameters, pin functions, interface definitions, mechanical dimensions, production process requirements, etc. of the WB26 series LoRa transparent transmission module. By reading this document, users can quickly familiarize themselves with the hardware design related content of the product.



2 Product Overview

The WB26 series LoRa transparent transmission module is a wireless communication module based on LoRa developed by Lierda IoT Technology Co., Ltd. The module is a node module developed based on ST's SOC chip, with many features such as wide transmission power range, low reception sensitivity, and strong anti-interference ability. It provides a communication solution for low-power IoT scenarios with ultra-long distance, high-speed concurrency, and stable collision-free communication.

2.1 Key Features

Product Features

- Working frequency band
- 430~435MHz
- 470~510MHz
- 860~930MHz

High link budget

- Received sensitivity (typical value): -124dBm @ SF7_BW125KHz
- Transmission power Max. 22 dBm

- **Communication mode**

- Half-duplex

- **Work power**

- Operating Voltage: DC3.3V (typical value)

- Launch current:

95mA @TX power_22dBm (430~435MHz)

110mA@TX power_22dBm (470~510MHz)

120mA@TX power_22dBm (860~930MHz)

- **Communication interface**

- UART

2.2 Function Block Diagram

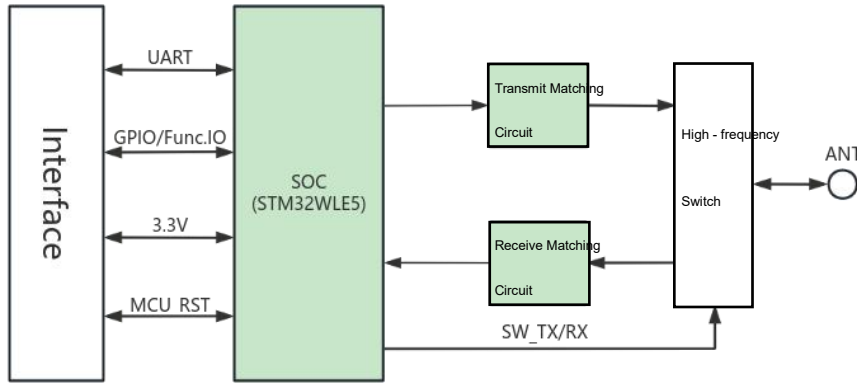


Figure 2.1 Functional Block Diagram

2.3 Pinout diagram

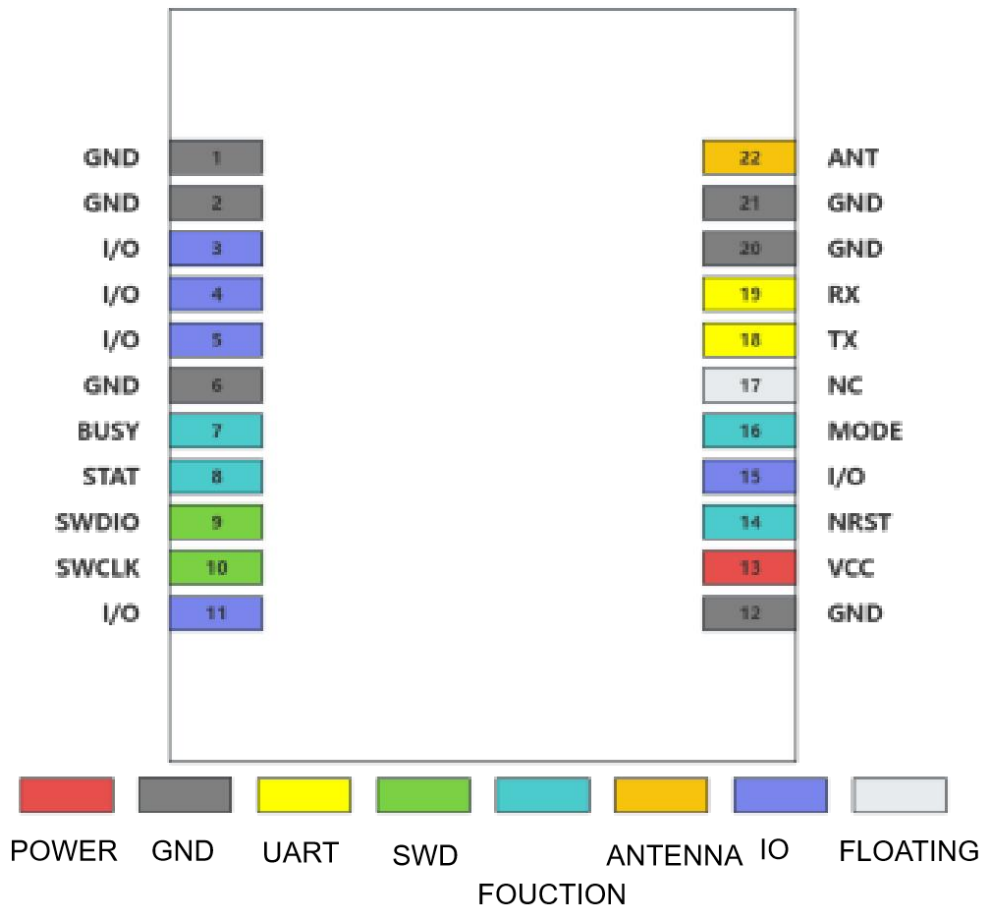


Figure 2.2 TOP-side pinout diagram

2.4 Pin Description Table

2.4.1 Power interface

Table 2-1 Power Interface Description

Pin number	Pin name	I/O Type	Default value	Description
1	GND	Power	-	Power supply ground
2	GND	Power	-	System power ground
6	GND	Power	-	Power system ground
12	GND	Power	-	Power system ground
13	VCC	Power	-	Power supply for the system, supply voltage range is 1.8~3.6V
20	GND	Power	-	System power ground
21	GND	Power	-	System power ground

2.4.2 UART interface

Table 2-2 UART Interface Description

Pin number	Pin names	I/O Type	Default Value	Description
18	TXD	Output	High	Serial port transmitter
19	RXD	Input	Float	Serial port receiver

2.4.3 SWD interface

Table 2-3 SWD Interface Description

Pin number	Pin name	I/O Type	Default Value	Describe
9	SWDIO	I/O	-	Module burning interface, recommended to be suspended
10	SWCLK	I/O	-	Module burning interface, recommend hanging.

2.4.4 Functional Interface

Table 2-4 Function Interface Description

Pin number	Pin names	I/O Type	Default value	Description
7	BUSY	Output	Low	System busy indication
8	STAT	Output	Low	ACK result indication
14	NRST	Input	High	Reset module, internal 40K weak pull-up resistor, low level effective
16	MODE	Input	Low	Mode switch

2.4.5 Antenna interface

Table 2-5 Antenna Interface Description

Pin number	Pin names	I/O type	Default value	Description
22	ANT	RF	-	Radio Frequency (RF) input/output interface, please use 50Ω impedance cable.

2.4.6 Other interfaces

Table 2-6 Other Interface Description

Pin number	Pin names	I/O Type	Default value	Description
3	Reserve	I/O	-	No actual function, suspended handling
4	Reserve	I/O	-	No actual function, suspended treatment
5	Reserve	I/O	-	No actual function, suspended processing.
11	Reserve	I/O	-	No actual function, suspended treatment.
15	Reserve	-	-	No actual function, suspended treatment
17	NC	-	-	No actual function, suspended treatment.

3 Specifications

Table 3-1 Module Maximum Ratings

Primary parameters	Performance		Note
	Minimum value	Maximum value	
Voltage (V)	-0.3	+3.7	
Maximum RF input power (dBm)	-	+10	
Operating Temperature (°C)	-40	+85	

Table 3-2 Module Operating Parameters

Main Parameters	Module model			Note
	L-LRNWB26-37PN 4	L-LRNWB26-76PN 4	L-LRNWB26-97PN 4	
Operating voltage (V)	1.8~3.6			
Operating temperature (°C)	-40~85			
Working frequency band (MHz)	430~435	470~510	860~930	
Frequency Offset (KHz)	-6.5~6.5		-2~2	Factory frequency deviation
Launch current (mA)	Vmin=85 Vtype=95 Vmax=105	Vmin=100 Vtype=110 Vmax=120	Vmin=110 Vtype=120 Vmax=130	The current at maximum power output
Receiving current (mA)	Vtype=5.5 Vmax=7		Vtype=7 Vmax=8	
Hibernate Current (uA)	Vtype=2.5			

Transmit Power (dBm)	Vmin=21 Vtype=22 Vmax=23		Maximum transmission power
Receive Sensitivity (dBm)	Vmin=-120 Vtype=-121 Vmax=-122	Vmin=-123 Vtype=-124 Vmax=-125	SF 7_BW 125KHz



Table 3-3 Digital I/O Specifications

Main parameters	Performance			VCC_IO	Note
	Minimum value	Typical value	Maximum value		
VIH(V)	0.7*VCC_IO	-	VCC_IO+0.3	3.3V	-
VIL(V)	-0.3	-	0.3*VCC_IO	3.3V	-
VOH(V)	VCC_IO-0.6	-	VCC_IO	3.3V	-
VOL(V)	0	-	0.4	3.3V	-

Table 3-4 Module Technical Parameters

Main Parameters	Content		Note
Interface Features	Serial port interface	2-line UART	Compatible with 3.3V TTL/CMOS.
	Serial port baud rate	115200	
	Main antenna interface	Stamp hole 50Ω output	
Mechanical properties	Encapsulation of interfaces	Stamp hole (2×11pin×1.27mm)	
	PCBA size	22(L) ×18(W) ×2.6(H)mm	(GB/T1804-c)

Note

(1) The test conditions are as follows: temperature: 25°C, center frequencies: 433/490/915MHz, operating voltage: 3.3V;

(2) Users should configure and use the working frequency bands according to the local regulations of the terminal market. Please make sure to comply with local regulations. If the frequency bands are not allowed to be used within the regulations, our company will not take any responsibility. For applications in the domestic terminal market, please refer to the "Catalog and Technical Requirements for Low-Power Short-Range Radio Transmitting Equipment."

4 Hardware design instructions

4.1 Power circuit

The module operates at a working voltage of 3.3V, with a typical current consumption of 120mA under the condition of maximum transmit power of 22dBm. To prevent voltage drop caused by load changes from leading to abnormal operation of the RF board, it is recommended that the external 3.3V power supply should have a maximum output current of at least 300mA, and the power supply lines should be kept as short as possible.

4.2 Antenna interface

Reserve a π -type circuit between the RF pins of the module and the antenna interface, mainly for matching the antenna input impedance in the later stage, please refer to the "Lierda WB26 Series LoRaWAN Node Module Hardware Reference Design Manual".

4.3 Maximum transmission power and supply voltage

The transmission power and voltage are linearly related to a certain extent. Within the operating voltage range, the higher the voltage, the higher the power value. When the operating voltage is greater than 3.3V, the module is at its maximum power output. (This data is for testing purposes only and is for reference only.)

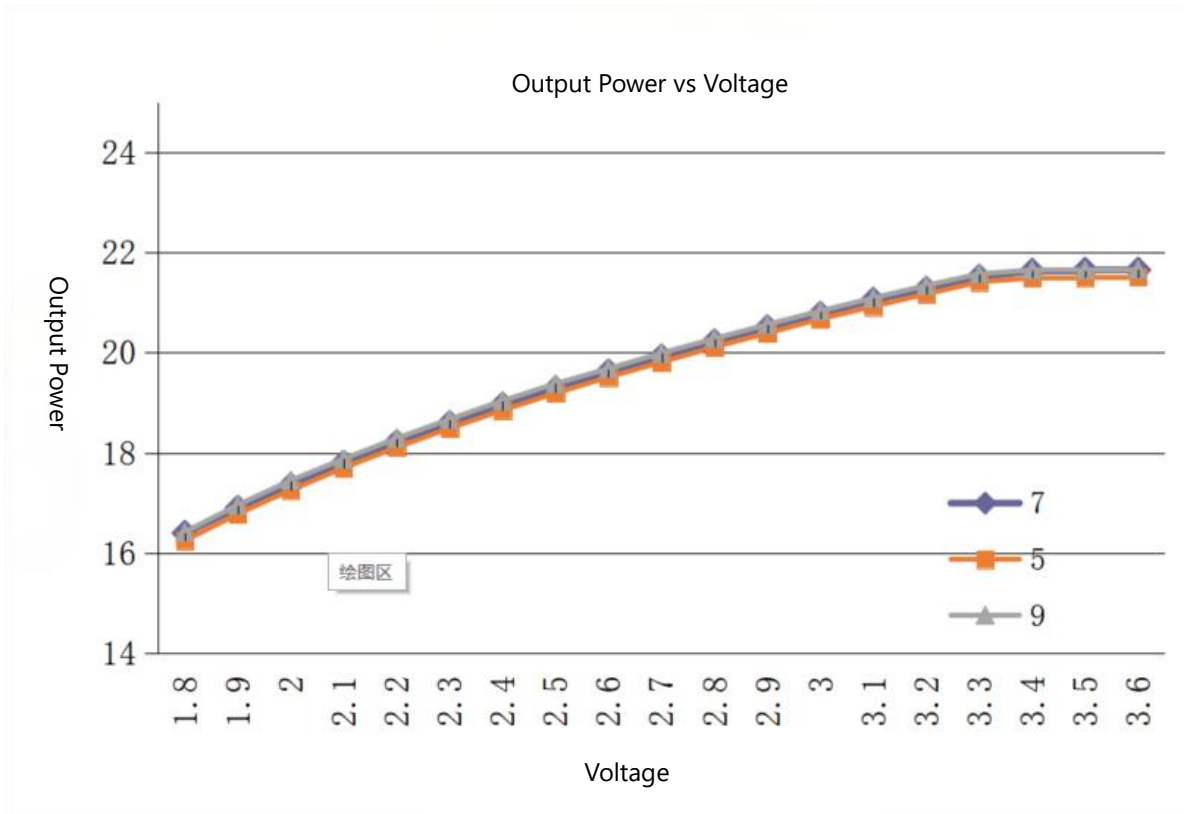
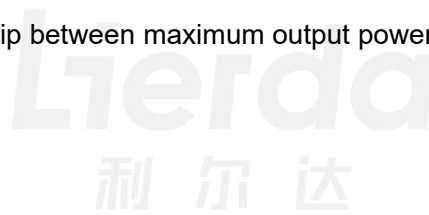


Figure 4.1 Relationship between maximum output power and operating voltage



5 Mechanical dimensions

5.1 Dimensional drawing

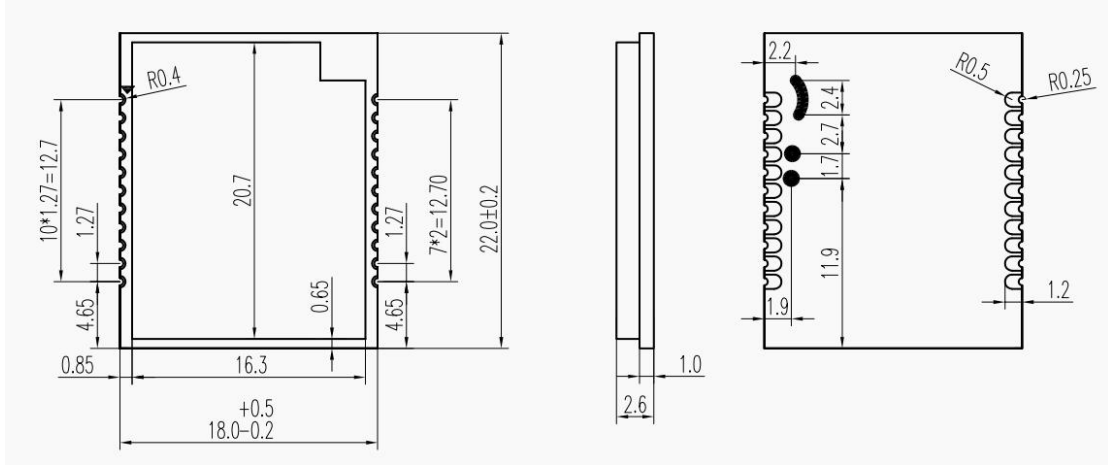


Figure 5.1 Module Dimension Diagram

Lierda
利尔达

6 Precautions

6.1 Disabled frequency point description

The disabled frequency point refers to the frequency point with very poor module performance, which is strictly prohibited from being used. The not recommended frequency point refers to the frequency point with relatively poor module performance, customers can use it at their discretion. It is recommended that the frequency points used in customer applications should be at least 1MHz away from the disabled frequency points.

Disabled frequencies: 496MHz, 880MHz, 912MHz.

Not recommended frequencies: 480MHz, 494MHz, 864MHz, 896MHz, 928MHz.



7 Production and packaging information

7.1 Steel mesh open design

The thickness selection principle of the steel mesh on the bottom plate is generally based on comprehensive consideration of the packaging type of components inside the board, and the following requirements need to be focused on:

The module solder pad position can be locally thickened to 0.15~0.20mm to avoid solder voids.

7.2 Reflow soldering operation guidance

Note: This assignment guide is only suitable for lead-free work and is for reference only.

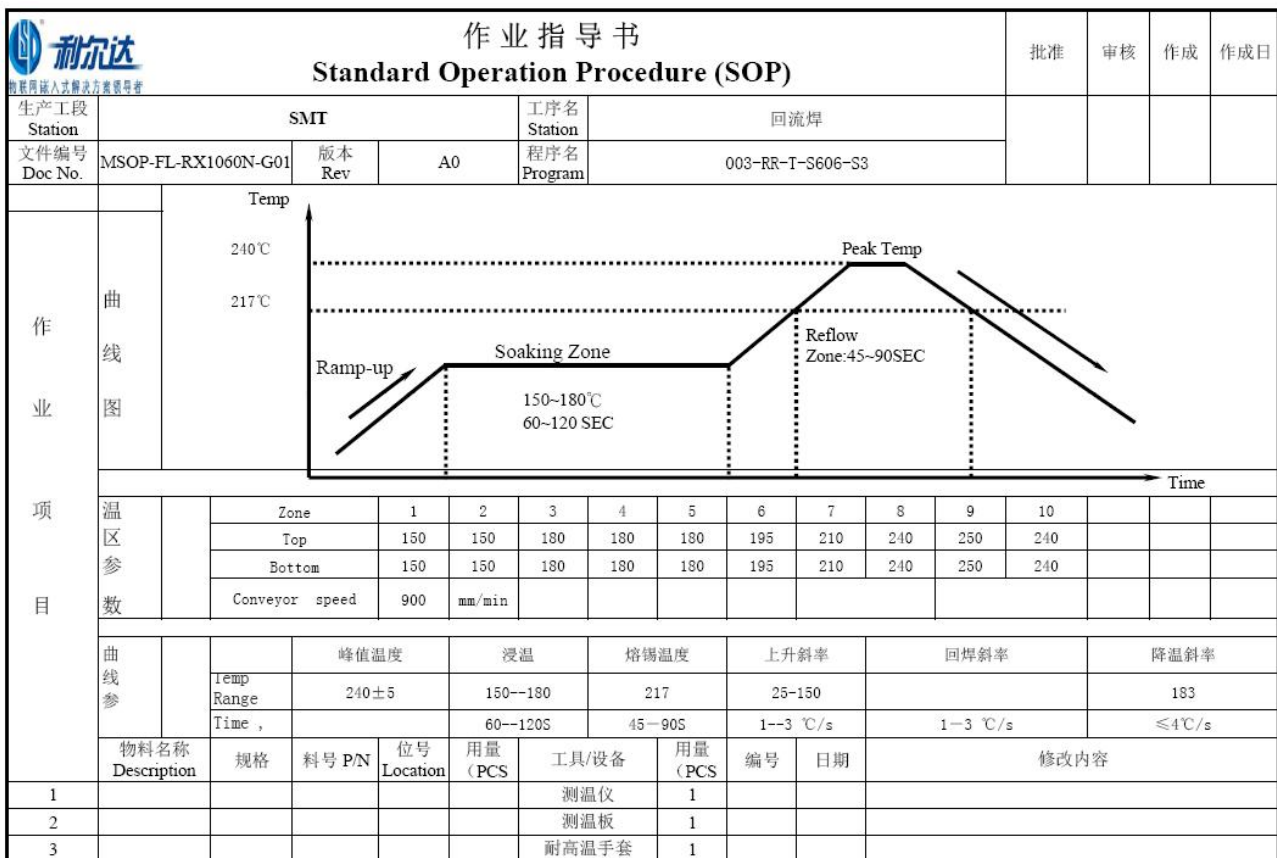


Figure 7.1 Soldering Operation Guidelines

7.3 Packaging information

This product is packaged using a roll tape packaging method, and the packaging diagram and instructions are as follows.

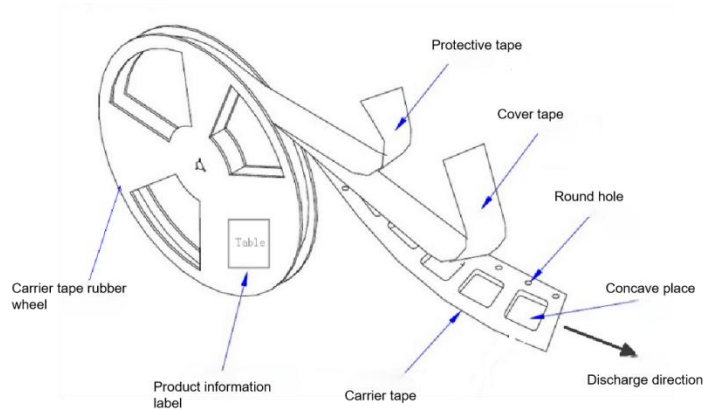


Figure 7.2 Product Packaging Schematic

