



HJ-126x_Nano_Hardware Design Manual

Based on SEMTECH SX1262 or SX1268、LLCC68

High-performance, high-power, low-cost wireless module

Version: V1.3

Date: 2026/06/29

Version:	V1.3
Date:	2026/06/29
State:	Published

Preface

Thank you for using the LoRa module provided by HJSIP.

HJ-126X_Nano-xxxx is a set of high-performance wireless transceiver modules based on SX1262 or SX1268, and LLCC68. The product features low power consumption, small size, and strong anti-interference ability, and is suitable for various application scenarios.

This module is mainly used for data communication, and the company does not assume responsibility for property losses or personal injuries caused by improper operations of users. Please develop the product according to the technical specifications and reference design in the manual. At the same time, pay attention to the general safety matters that should be concerned about when using mobile products.

Before the announcement, the company has the right to modify the content of this manual according to the needs of technological development.

Copyright Notice

The copyright of this manual belongs to HJSIP. Anyone who copies, references or modifies this manual without written consent of HJSIP will bear legal responsibility.

Contents

Version History	3
Applicable module selection	5
1 Introduction	6
2 Product overview	6
2.1 Key features	6
2.2 Application Scenarios	7
2.3 Functional block diagram	7
2.4 Pins distribution diagram	7
2.5 Pins description table	8
3 Electrical Parameters	8
3.1 Absolute Maximum Ratings	8
3.2 DC Characteristics	8
3.3 RF Features	9
4 Notices for Hardware Design	10
5 Dimension figure	10
6 SMT production	11
6.1 Precautions for ultrasonic welding	11
6.2 Soldering Recommendations	11
6.3 Humidity sensing properties	12
7 Packaging	12
7.1 Packaging method	12
7.2 Label information	13

Contact Information

Tangshan Hongjia Electronic Technology Co., Ltd.

Address: No. 203, Unit 1, Building 4, B46 Shop, Zhengtaili Chunxiao, Nvzhizhai Town, Lunan District, Tangshan City, Hebei Province (Opposite Building 204, Chunxiao Phase 1, 6-story building)

Technical Support: liyinfei@tshjdz.com or liujiahang@tshjdz.com

Version History

Version	Date	Change Description	Reviser	Reviewer
V1.0	2022/05/26	Initial Version	FJW	LMY
V1.1	2023/11/03	Format adjustment, addition of hardware design precautions	FJW	LMY
V1.2	2025/03/26	1) Standardize document format; 2) Update 5 mechanical dimension drawings; 3) Adjust 7.2 label information; 4) Table 2-2: The duration of module reset at low voltage is changed from 100us to 1s.	WYW	LMY
V1.3	2026/06/29	Added contact information.	WYW	LMY

Applicable module selection

No.	Model	Type	Description
1	HJ-126X_Nano-P400	410MHz-525MHz, passive 32MHz crystal oscillator	Based on LLCC68. The RF matching range is 410 - 525 MHz, passive crystal oscillator
2	HJ-126X_Nano-P800	800MHz-950MHz, passive 32MHz crystal oscillator	Based on LLCC68. The RF matching range is 800 - 950MHz, passive crystal oscillator
3	HJ-126X_Nano-A400	410MHz-525MHz, active TCXO temperature-compensated oscillator 32 MHz	Based on SX1268, the RF matching is within the frequency range of 410 - 525 MHz, active TCXO temperature-compensated oscillator.
4	HJ-126X_Nano-A800	800MHz-950MHz, Active TCXO temperature-compensated oscillator 32 MHz	Based on SX1262, the RF matching is within the frequency range of 800- 950 MHz, active TCXO temperature-compensated oscillator.

1 Introduction

HJ-126X_Nano is a wireless high-performance transceiver module based on SX1262 or SX1268, LLCC68, with operating frequencies supporting 410MHz -525MHz (recommended 434MHz) or 800MHz -950MHz (recommended 868MHz). When using SX1262 and SX1268, the TCXO temperature compensated crystal oscillator scheme is adopted, and the module using TCXO is more stable in low-speed and long-distance miniaturization design schemes. The maximum TX power is +22dBm, and the external interface is SPI. Users can achieve wireless data transmission and reception by connecting IO with MCU.

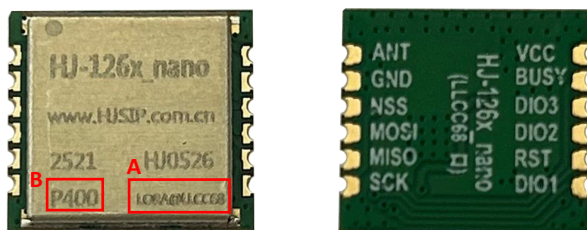


Figure 1.1: HJ-126x_Nano front and bottom views

Table 1-1: HJ-68LR(xx) identification Instructions

Model	ID	A (Core chip)	B (Frequency)	Note
HJ-126X_Nano-A800		SX1262	A800	Based on SX1262, active TCXO temperature compensated oscillator, frequency range 800-950MHz
HJ-126X_Nano-A400		SX1268	A400	Based on SX1268, active TCXO temperature compensated oscillator, frequency range of 410-525MHz
HJ-126X_Nano-P400		LLCC68	P400	Based on LLCC68, frequency range of 410-525MHz, passive crystal oscillator
HJ-126X_Nano-P800		LLCC68	P800	Based on LLCC68, frequency range 800-950MHz, passive crystal oscillator

Note

A (Core chip identification) : Core chip model;

B(Frequency identification) : The first letter A represents the TCXO oscillator used, the first letter P represents the passive ordinary crystal oscillator, and the number after the letter represents the frequency range.

2 Product overview

2.1 Key features

Table 2-1: HJ-126X_Nano key characteristics

Characteristic	Description
Frequency range	Support 410MHz - 525MHz or 800MHz - 950MHz free frequency bands without application

Max. TX power	+22dBm
Size	12mm * 11mm (L*W)
RX sensitivity	TYP.-129dBm(XTAL); -148dBm(TCXO)
RX peak current(DC-DC)	<4.6mA @ LoRa® 125kHz
TX peak current(20dBm)	TYP. 102mA @ 868/915MHz TYP. 90mA @ 434/490MHz
Interface method	stamp hole interface, pin spacing 1.27mm
Launch distance	BW500/SF11, the maximum range of the launch is 1500m
Supply voltage	1.8V-3.7V
Sleep current	1uA
Operating temperature	-40 ~ +85°C
Storage temperature	-55 ~ +125°C

2.2 Application Scenarios

- Wireless remote control and data transmission for smart homes;
- Wireless POS machine;
- Industrial control;
- Toys related to iPhones or Android devices;
- Other wireless and low-power applications.

2.3 Functional block diagram

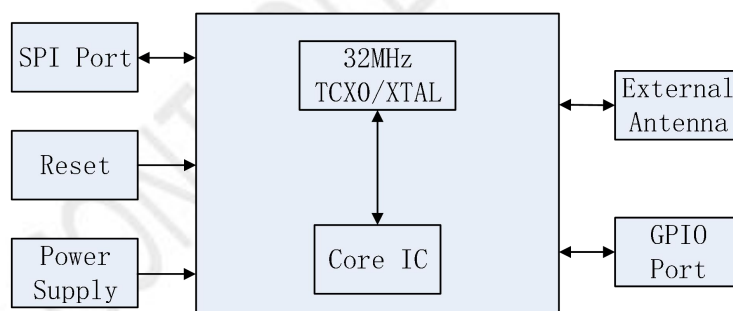


Figure 2.1: HJ-126X_Nano functional block diagram

2.4 Pins distribution diagram

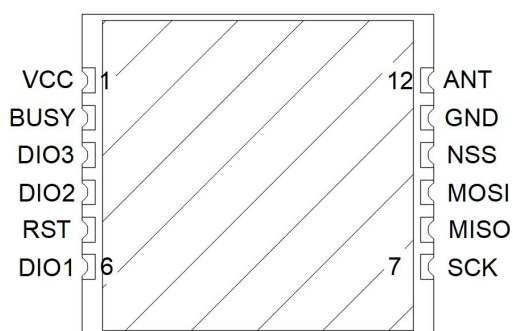


Figure 2.2: HJ-126X_Nano pins distribution diagram (top view)

2.5 Pins description table

Table 2-2: HJ-126X_Nano Pins definition table

PIN	Name	Type	Description	Remarks
1	VCC	Power	Power input	1.8V-3.7V
2	BUSY	O	RF_BUSY flag	When in low-power sleep mode, this pin will be pulled high.
3	DIO3/IRQ	I/O	User defined functions	The corresponding functions can be implemented through programming internal registers of the module.
4	DIO2/IRQ	I/O	User defined functions	The corresponding functions can be implemented through programming internal registers of the module.
5	RESET	I	Reset pin	Active low, the duration of low level should be at least 1s.
6	DIO1/IRQ	O	Transmission/reception interruption flag	Enable the corresponding function of IRQ, and when the corresponding function is triggered, IRQ will output the corresponding interrupt level.
7	SCK	I	SPI interface synchronous clock input port	/
8	MISO	O	For modules, it is the serial data output DOUT	connected to the MISO of MCU
9	MOSI	I	For modules, it is the serial data input DIN	connected to the MOSI of MCU
10	NSS	I	SPI chip selection port	When NSS is lowered, the module is locked and SPI data transmission can be performed; During the low-power sleep phase, pulling down the NSS will wake up the module.
11	GND	Ground	Power ground	/
12	ANT	RF out	RF output	External antenna interface

3 Electrical Parameters

3.1 Absolute Maximum Ratings

Table 3-1: Absolute Maximum Ratings

Parameter	MIN	MAX	Unit
supply voltage VCC	1.8	3.9	V
IO Supply Voltage	0	VCC	V
Operating Temperature	-40	+85	°C
Storage Temperature	-55	+125	°C

3.2 DC Characteristics

Table 3-2: Recommended Operating Conditions

Parameter	MIN	TYP	MAX	Unit
Supply voltage VCC	1.8	3.3	3.7	V
IO Supply Voltage	0	3.3	VCC	V
Dormant working current	/	<1	/	uA
Operating Temperature	-40	+25	+85	°C

3.3 RF Features

Table 3-3: RF features

Attribute	Value	Remarks
Wireless modulation mode	(G)FSK、LoRa®	/
Frequency range	410-525MHz or 800-950MHz	/
Air speed	-(G)FSK: 0.6-300 kb/s -LoRa®: 0.018-62.5 kb/s, SF5-SF12, BW = 7.8 - 500 kHz	/
TX Power	MAX . +22dBm	/
RX sensitivity	TYP.-129dBm(XTAL) -148dBm(TCXO)	/
RX peak current(DC-DC)	<4.6mA @ LoRa® 125kHz	/
TX peak current(20dBm)	TYP. 102mA @ 868/915MHz TYP. 90mA @ 434/490MHz	/
Antenna	External antenna	/

Table 3-4: RF Parameters Explanation

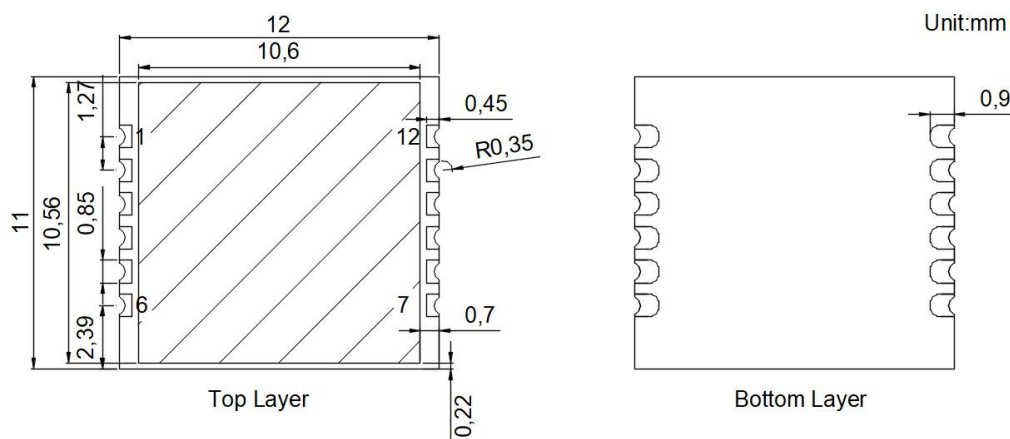
Model	Note
HJ-126x_Nano-A800	Based on SX1262, supporting RF parameters SF5- SF12; BW10 - BW500。 Internally using TCXO temperature compensated crystal oscillator. The use of TCXO modules is more stable in low-speed and long-distance miniaturization design schemes.
HJ-126x_Nano-A400	Based on SX1268, supporting RF parameters SF5- SF12; BW10 - BW500。 Internally using TCXO temperature compensated crystal oscillator. The use of TCXO modules is more stable in low-speed and long-distance miniaturization design schemes.
HJ-126x_Nano-P400 HJ-126x_Nano-P800	Based on LLCC68, it is a reduced version of SX1262, so it should be noted that the RF parameter settings of LLCC68 only support SF5- SF11; BW125, BW250, and BW500 . Other functions are basically the same.

4 Notices for Hardware Design

- Antennas are recommended to use dedicated antennas that match the specifications of the wireless frequency band, such as spring antennas, etc.
- Module antenna should be placed at the four edges of the circuit board. The antenna part should be close to the edge or corner of the main board. It is best to place the module in the corner of the circuit board.
- Vias need to be drilled throughout the copper-clad area of the entire circuit board, especially near the modules and antennas. As many vias as possible should be drilled.
- If space permits, it is best to reserve a π -type filter circuit between the module and the antenna.
- If there are high-power devices or high-voltage conversion circuits on the circuit board, the GND copper clad of the module should be isolated from the GND copper clad of other parts, connected in a single-point grounding manner, and as many vias as possible should be drilled to reduce interference to the RF signal.
- The module should not be placed in a metal housing. If a metal housing must be used, the antenna must be led out.
- In products that require the installation of this wireless module, some metal components such as screws, inductors, etc. should be kept as far away as possible from the radio frequency antenna part of the wireless module.
- The filter capacitor at the power supply should be placed as close as possible to the power input pin of the module. If it is powered by a capacitor or space is limited, the filter capacitor at the power input can be removed. The module already has 0.1uF+2.2uF filter capacitors inside.
- For non-battery-powered and mains power supply with reduced voltage, it is recommended to filter the input power with magnetic beads or inductors.
- Please pay attention to the pin diagram for all pins. Please pay attention to the IO mode and status of the IO connected to them. When the serial port is connected to the MCU, it is best to add a 100-ohm resistor if there is sufficient space.
- The pins that are not needed can be left in the air.

5 Dimension figure

Interface method: Stamp hole (half hole); Pad spacing: 1.27mm.



Attention

The size at the shielding cover is the value defined by the outer edge of the shielding cover's solder pad.

Figure 5.1: HJ-126X_Nano mechanical dimensions

6 SMT production

6.1 Precautions for ultrasonic welding

Please carefully consider using ultrasonic welding technology. If it is necessary to use ultrasonic welding technology, please use 40KHz high frequency ultrasound welding technology. Keep the module away from the ultrasonic soldering line and the fixing column during the design method to prevent damage to the module!

For specific ultrasonic welding matters, please contact our company for technical consultation.

6.2 Soldering Recommendations

HJ-126x-Nano module use high temperature resistant materials, manufacturing by Lead-free Process. The maximum temperature resistance is 265°C. Ten continuous reflow soldering has no effect on properties and strength. Specific parameters as shown in Table 7-1.

Table 6-1: Reflow soldering parameters

Parameter	Value
Features	Lead-free process
Average ramp up rate($T_{S_{MAX}}$ to T_p)	max3°C/sec. max
Temperature Min(T_{Smin})	150°C
Temperature Max(T_{Smax})	200°C
Preheat time (Min to Max) (tS)	80~100sec
Peak Temperature (T_p)	250±5°C
Ramp-down Rate	6°C/sec. max
Time 25°C to Peak Temp (T_p)	8 min. max

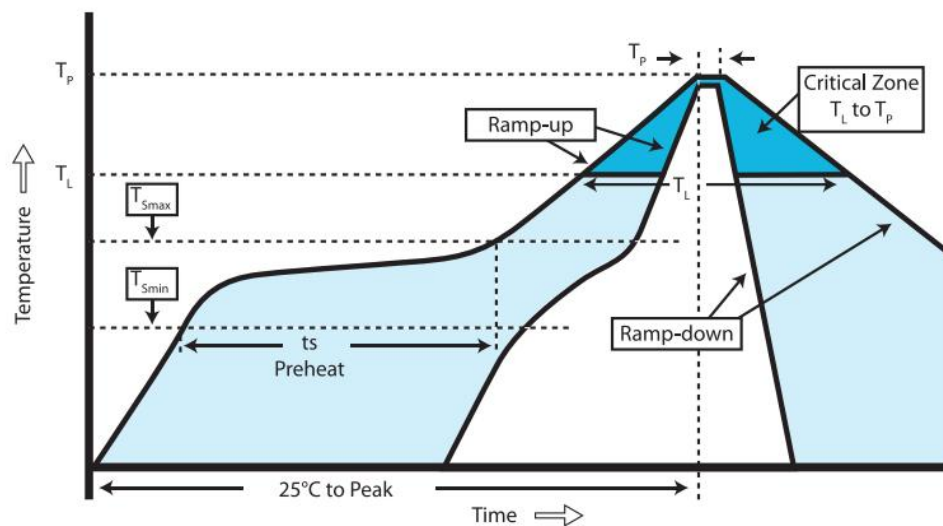


Figure 6.1: Temperature Curve of Reflow Welding

6.3 Humidity sensing properties

The HJ-126x_Nano module has a humidity sensitivity of level 3.

If any of the following two conditions are met, the HJ-126x_Nano module should be fully baked prior before reflow soldering, otherwise the module may cause permanent damage during reflow soldering.

- After unpacking or vacuum packaging is damaged and air leaks, the module needs to be SMT within 168 hours when the temperature is less than 30 degrees and the relative humidity is less than 60%. If the above conditions are not met, bake.
- Vacuum packaging is not opened, but beyond the shelf life, also need to be baked.

7 Packaging

7.1 Packaging method

Table 7-1: Packaging method

Model	Packaging method	Quantity (PCS)
HJ-126x_Nano-XX	Roll tape	1000

Use chip-grade anti-static aluminum foil bags to seal and pack with braid. Each bag is put in desiccant. Industrial grade vacuum pump ensures no air leakage, moisture, water and dust (IP65). The actual packaging effect is shown in Figure 8.1.



Figure 7.1:package figure

7.2 Label information

All packages are labeled with cargo information, ROHS label, anti-static label, etc.

【A】	Tangshan Hongjia electronic Technology Co., LTD
【B】	HJ-XXX-XXX
【C】	Pb Free Reflow(260°C)
【D】	Date Code:2508 HJ0218
【E】	Note: Must be stored in a vacuum Seal
【F】	Warning: Humidity sensitivity level MSL:XX
【G】	QTY:1500PCS SEAL DATE:20250218

Figure 7.2:Product label drawing

Table 7-2: Module information description

No.	Description
A	company name
B	product model
C	Lead-free reflow mark and reflow temperature setting value
D	Production date Example: 2508 HJ0218 represents the product produced in the 8th week of 2025, on February 18
E	Storage precautions
F	Humidity sensitivity level
G	Quantity of product + date of sale