

A01-S2G4A20S2a Manual

2.4G, 100mW, NRF24L01P-based
RF transceiver module for stamp port interface



Version: Spec_ A01-S2G4A20S2a _V1.0

Date: 2024-08-10

Status: Controlled status

2.4G, 100mW, NRF24L01P-based RF transceiver module

1. Product Overview

A01-S2G4A20S2a is a 2.4GHz, 100mW, high speed, high stability, industrial grade, integrated wireless transceiver RF module. The module adopts NORDIC original NRF24L01P RF chip design and development, working in 2.4GHz~2.525GHz ISM band. The module output interface for the stamp port, ultra-small size mount, convenient embedded in the product. The module has sufficient transmitting power, good RF characteristics, small harmonics, small channel crosstalk, and some devices reach military grade standard.

2. Product Features

- Stamp port interface, transmission distance up to 2km^[1]
 - Four levels of power adjustable, maximum 20dBm^[3]
- Ultra-low power processing with a minimum power consumption of approximately 2uA
- Four working modes^[4]
 - Power down mode (power down)
 - Standby mode (standby)
 - Sending mode (send)
 - Receive mode (receive)
- Operating band 2.4~2.525GHz, total 126 channels
 - Software adjustable frequency, 1MHz step
 - GFSK modulation
- Supply voltage range^[5]
 - 1.8V~3.6VDC
- Level 3 Data FIFO
 - Launch length: 1~32 bytes for a single data packet
 - Receive length: single packet 1~32 bytes
- Emission current
 - The measured emission current is about 140mA at an emission power of 20dbm
- Communication Interface
 - 4-Pin hardware SPI communication interface
 - Recommended rate 4Mbps, maximum rate up to 10Mbps
- Reception sensitivity
 - 92dbm (2Mbps)
 - 95dbm (1Mbps)
 - 104dbm (250kbps)
- Multi-level air speed
 - Three levels of air rates are available^[2] : 250Kbps, 1Mbps, 2Mbps
- Ultra-small size, SMD package
 - 12*12mm
- Transmitting power

2.4G, 1mW, NRF24L01P-based RF transceiver module

Remarks: [1] clear and open, no obstacle interference; maximum power, height 2m, air rate 250Kbps

[2] The higher the airspeed, the closer the transmission distance; the lower the airspeed, the longer the transmission distance.

[3] See NRF24L01P chip manual for transmit power details

[4] The four operating modes are detailed in the NRF24L01P chip manual

[5] Higher than 3.6V will cause permanent damage to the module

3. Series Products

Module Model	Carrier frequency (Hz)	Chip Solutions	Package	Size (mm)	Maximum transmit power (dBm)	Communication distance (km)	Antenna Form
AS01-ML01S	2.4G-2.525G	NRF24L041P	SMD	12 * 19	0	0.12	PCB antenna
AS01-ML01D	2.4G-2.525G	NRF24L041P	Direct plug	12.5 * 22	0	0.12	PCB antenna
AS01-ML01DC	2.4G-2.525G	NRF24L041P	Direct plug	13.2 * 30	0	0.12	PCB antenna
AS01-ML01IPX	2.4G-2.525G	NRF24L041P	SMD	12 * 19	0	0.12	IPEX
AS01-ML01DP2	2.4G-2.525G	NRF24L041P+PA	Direct plug	17 * 33.5	20	1.8	SMA-K
AS01-ML01DP3	2.4G-2.525G	NRF24L041P+PA	Direct plug	15 * 27	20	1.5	SMA-K
AS01-ML01DP5	2.4G-2.525G	NRF24L041P+PA	Direct plug	18 * 33.3	20	2.0	SMA-K
AS01-ML01DP6	2.4G-2.525G	NRF24L041P+PA	Direct plug	16.5 * 30	20	1.2	PCB antenna
AS01-SPIPX	2.4G-2.525G	NRF24L041P+PA	SMD	13 * 19	20	2.0	IPEX
AS01-SP2	2.4G-2.525G	NRF24L041P+PA	SMD	13 * 25	20	1.2	PCB/IPEX
A01-S2G4A20S2a	2.4G-2.525G	NRF24L041P	SMD	12 * 12	0	0.2	Stamp port
A01-S2G4A20S2a	2.4G-2.525G	NRF24L041P+PA	SMD	12 * 12	20	2.0	Stamp port
All models of the *A01 series of wireless modules can communicate with each other*							

4. Electrical parameters

Conditions: Tc = 25° C, VCC = 3.3V

Parameters	Parameter Name	Description	Minimum value	Typical values	Maximum value	Unit
Voltage	Supply voltage ^[1]		1.8	3.3	3.6	VDC
Configuration	Communication level	The communication level is generally less than the supply voltage, VCC in 0.7*VCC refers to the supply voltage	0.3*VCC		0.7*VCC	V
Current consumption	Emission current ^[2]			140		mA
	Receiving current	Module in receive state		21		mA
	Turn-off current	Module set to sleep mode		1.9		uA
RF parameters	Operating Frequency Band	Software adjustable, 2400~2525MHz	2400		2525	MHz
	Transmitting power	Software adjustable up to 0dbm		20		dBm
	Reception sensitivity	-94dBm@250kbps, see chip manual for reception sensitivity		-104		dBm
	airspeed	Three levels of airspeed available (250kbps, 1Mbps, 2Mbps)	250k	250k	2M	bps
Working Environment	Operating temperature	A01-S2G4A20S2a Industrial	-40		+85	°C
	Working humidity	Relative humidity, non-condensing	10%		90%	
	Storage temperature		-40		+125	°C

Note: [1] supply voltage higher than 3.6V will cause damage to the module; the lower the voltage, the lower the transmit power will also be

[2] The power supply capacity must be greater than 30mA

5. Module Function

5.1 Recommended connection diagram

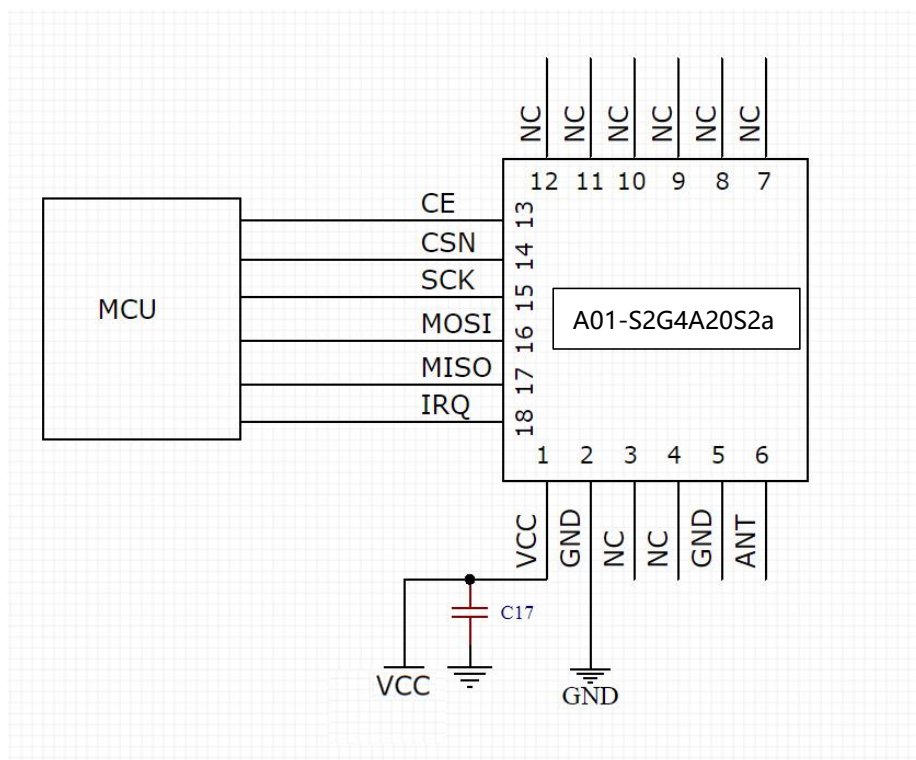


Figure 5-1 Recommended connection diagram

Description.

- 1, CE high active, the module write register first set to POWER DOWN power-down mode, it is recommended to connect to the microcontroller I/O port
- 2, IRQ recommended connection to use the microcontroller external interrupt, but also can not be used, using SPI query to obtain the interrupt status
- 3, NRF24L01P technical manual requires CE pin high time greater than 10us has started data transmission, but in order to make the same code compatible with our series of modules with PA and LNA, it is recommended to change: SPI operation, set high CE, until after the completion of the launch, continue to maintain a high level of 1ms, and then set low CE

5.2 Pin Definition

Pin Definition Table

Pin Serial Number	Pin Name	Pin Orientation	Pin Usage
1	VCC		Power supply, range 1.8~3.6V
2	GND		Power Ground
3	NC		Empty Foot
4	NC		Empty Foot
5	GND		Reference place
6	ANT	Output	Antenna Interface
7	NC		Empty Foot
8	NC		Empty Foot

9	NC		Empty Foot
10	NC		Empty Foot
11	NC		Empty Foot
12	NC		Empty Foot
13	CE	I	Module control pins, see NRF24L01P Datasheet for details
14	CSN	I	Module chip select pin to start an SPI communication
15	SCK	I	Module SPI clock pins
16	MOSI	I	Module SPI data input pins
17	MISO	O	Module SPI data output pins
18	IRQ	O	Module interrupt signal output, active low

For details on the module's pin definition, software driver and communication protocol, see the NRF24L01P datasheet

5.3 Pin Function

IRQ Pin Function

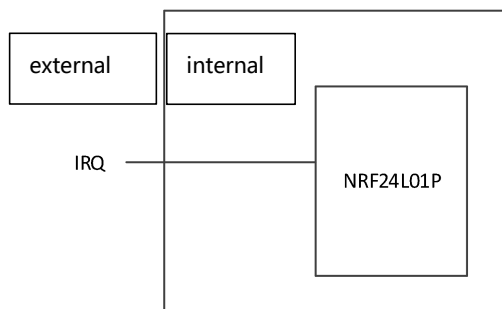


Figure 5-2 IRQ pin local connection diagram

IRQ is an interrupt pin, active low, which indicates the specific interrupt signal, see the NRF24L01P chip manual for details

CE Pin Function

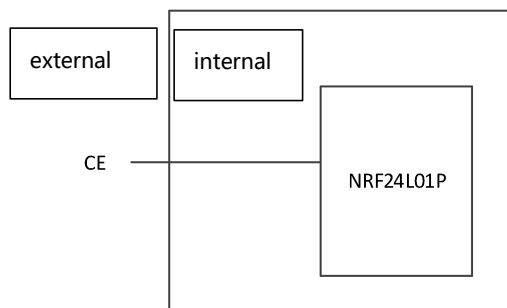


Figure 5-3 Schematic diagram of CE pin local connection

Module control pins, the module's transmit mode (TXD) and receive mode (RXD) are determined by this pin, see the NRF24L01P chip manual for details

SPI Pin Function

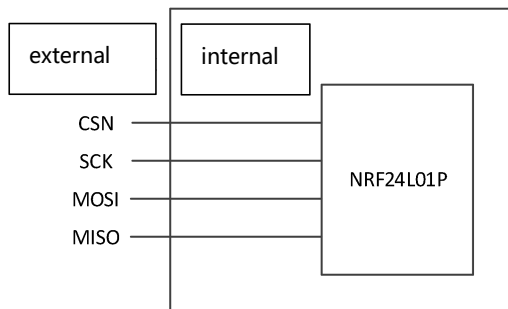


Figure 5-4 SPI pin local connection diagram

The SPI timing diagram is as follows.

Abbreviations	Description
Cn	SPI command bits
Sn	Status register bits
Dn	Data bits

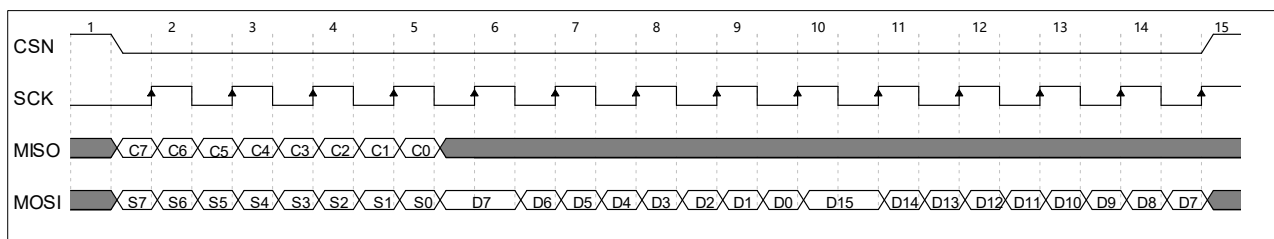


Figure 5-5 SPI Read Operation Timing Diagram

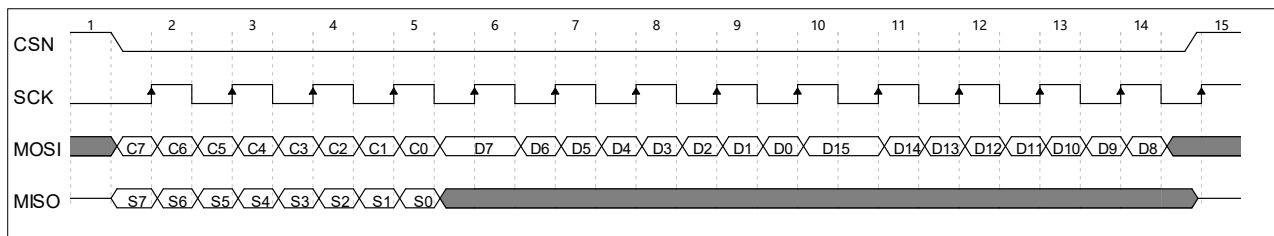


Figure 5-6 Timing diagram of SPI write operation

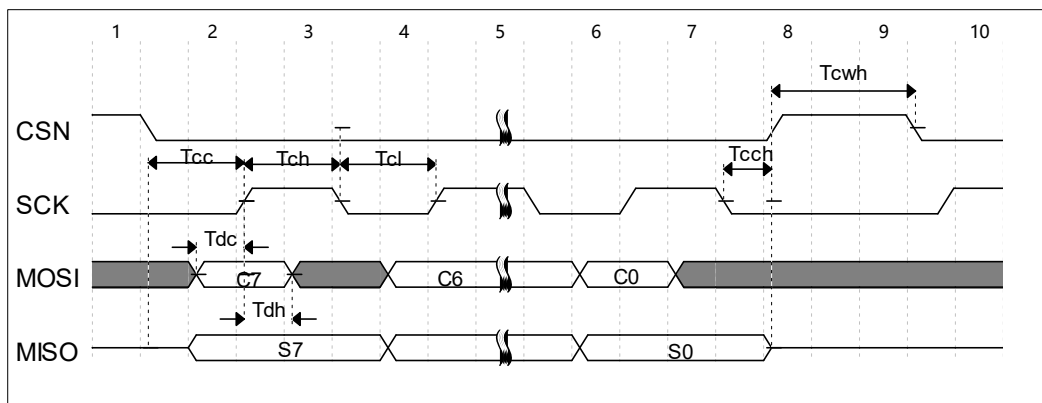
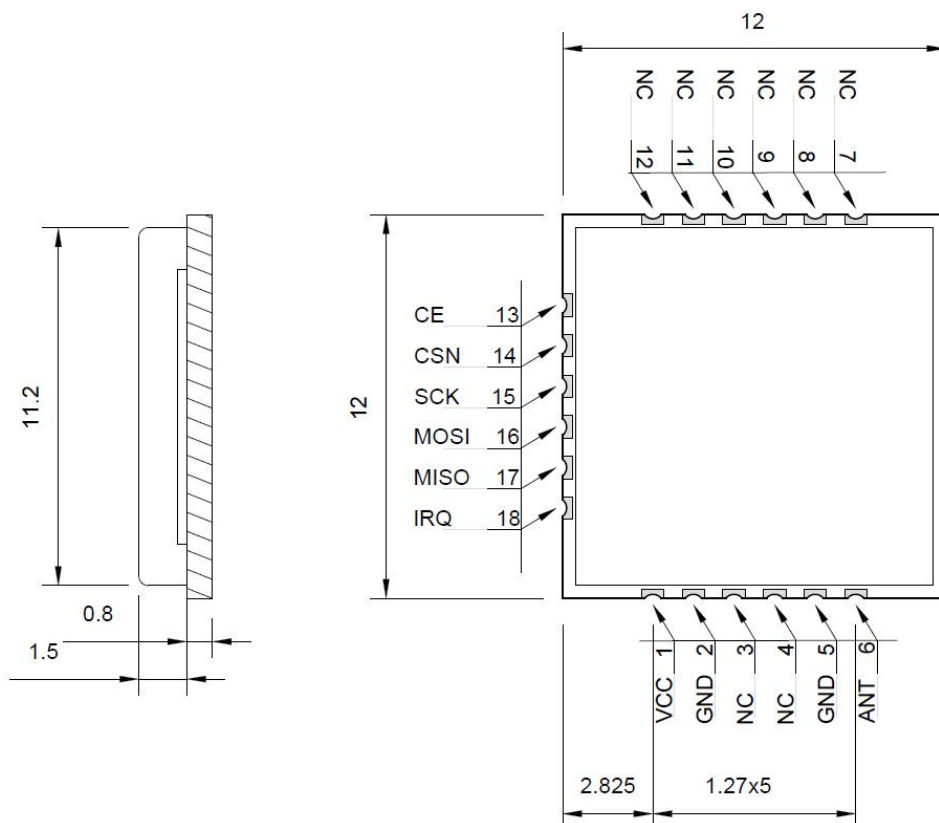


Figure 5-7 SPI Timing Reference Diagram

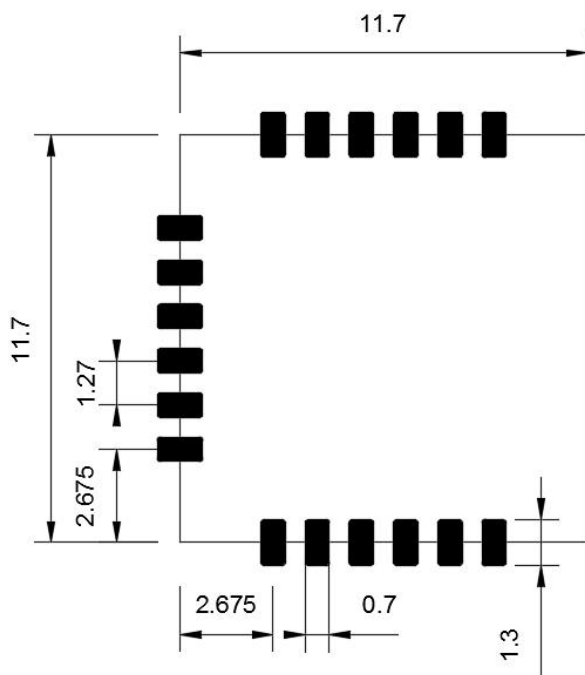
Parameter Symbols	Description	Minimum value	Maximum value	Unit
Tcc	Chip Select Clock Setting	2	ns	
Tch	Clock high level time	40	ns	
Tcl	Clock low time	40	ns	
Tcch	Film selection time duration	2	ns	
Tcwh	Slice selection idle time	50	ns	
Tdc	Data initialization clock	2	ns	
Tdh	Data Duration	2	ns	

6. Package Information

6.1 Mechanical size(unit:mm)

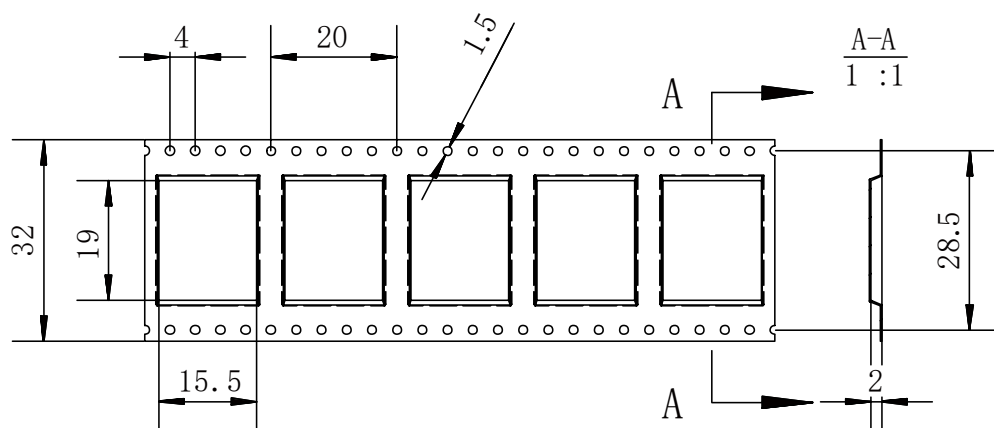
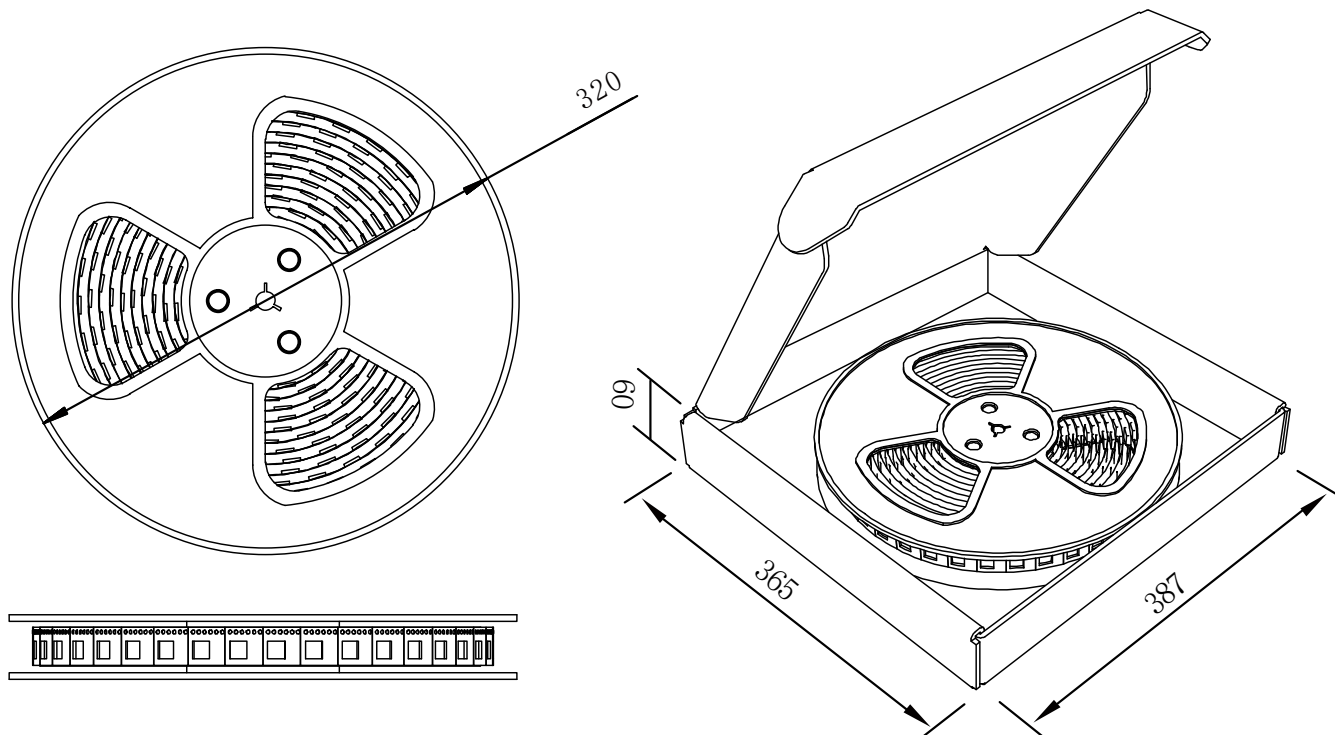


6.2 Reference pad design (unit: mm)



7. Packaging method

7.1 Disc packing(unit:mm)



Important Notes and Disclaimers

Due to the continuous improvement of hardware and software of the product, this specification is subject to change, and the latest version of the specification shall prevail in the end.

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

The pictures and diagrams used in this specification are for illustrating the functions of this product and are for reference only.

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

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