VG35S2S240N0M1 wireless module

Hardware specification

V1.0

Table of contents

I. Overview

VG35S2S240N0M1 series of wireless modules, is a product based on Si24R1 The wireless transceiver chip is designed with small size, low power consumption and high speed. 2. 4G None in both directions Line transceiver module. Si24R1 is a chip operating at 2.4GHz ISM band, Designed specifically for low-power wireless applications , Integrated embedded ARQ Wireless transceiver of baseband protocol engine device chip. The operating frequency range is 2400MHz-2525MHz, with a total of 126 1MHz bandwidth channel. Si24R1 adopts GFSK/FSK digital modulation and decoding adjustment technology. Data transfer rate and PA output power can be adjusted, Supports three data rates: 2Mbps, 1Mbps, and 250Kbps. High data rates can
The same data transmission and reception is completed in a shorter time, so it can have lower power consumption. The module integrates all radio frequency related functions and devices. Users can use this module to easily develop products without having an in-depth understanding of radio frequency circuit design.
Wireless solutions and wireless IoT devices with stable performance and high reliability.

Product main features:

- Works at 2.4GHz ISM frequency band
- Modulation: GFSK/FSK
- Data rate: 2Mbps/1Mbps/250Kbps
- Ultra-low shutdown power consumption: 0.7uA
- Ultra-low standby power consumption: 15uA
- Internally integrated high PSRR LDO
- Wide supply voltage range: 1.9-3.6V
- Receiving sensitivity: -96dBm @250Kbps
- Maximum transmit power: 7dBm

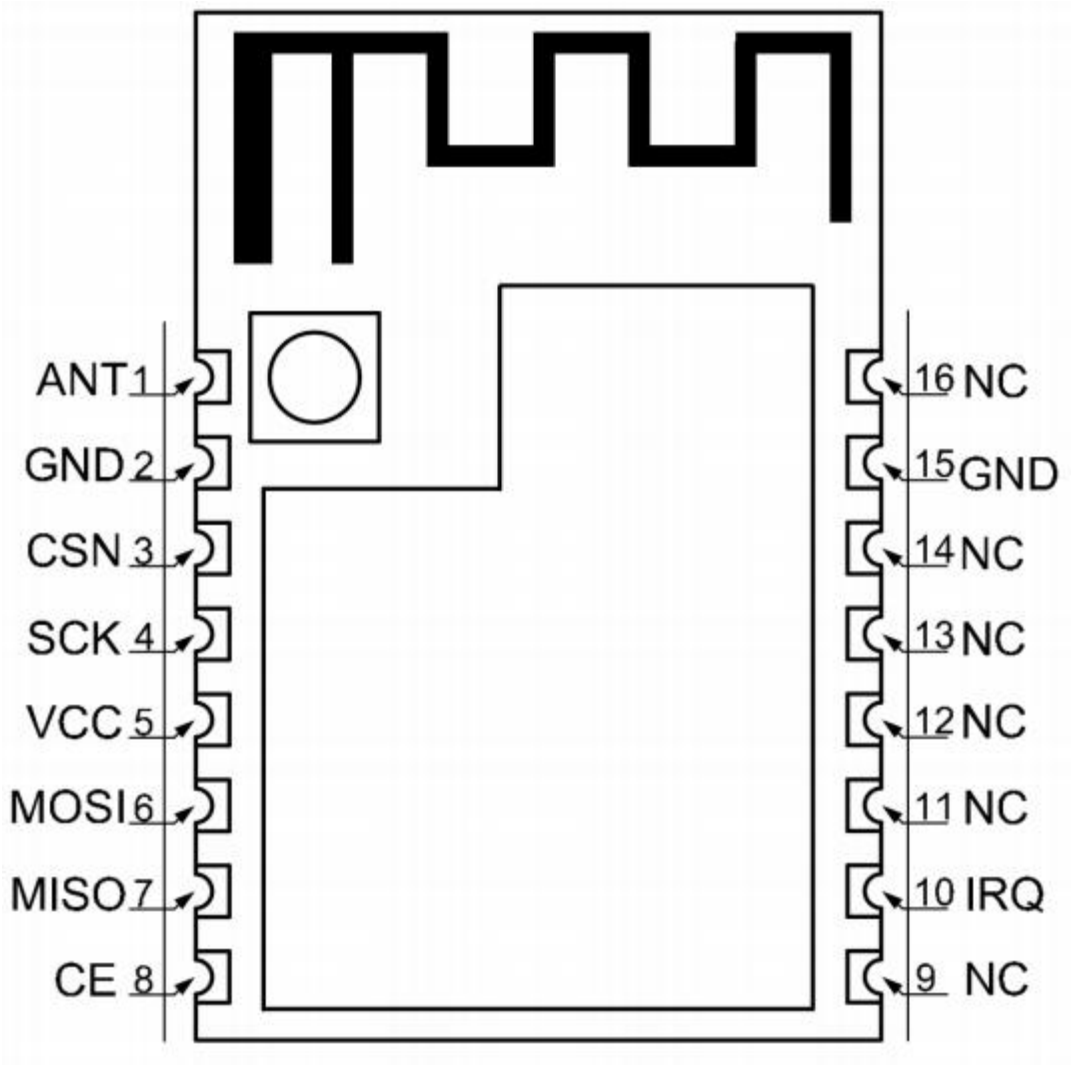
application:

1. Wireless mouse and keyboard
2. Wireless remote control and somatosensory equipment
3. Active RFID, NFC
4. Smart grid, smart home
5. Wireless audio
6. Wireless data transmission
7. Low-power ad hoc wireless sensor network

2. Main technical parameters

Technical index	parameter	Remark
voltage range	1.9～3.6V	generally 3.3V
Frequency Range	2.4 GHz	2400MHz - 2525MHz _
Output Power	-30dBm _ to +7 dBm	Programmable configuration
Wireless speed	250Kbps / 1Mbps / 2Mbps _	Programmable configuration
Modulation	GFSK/FSK	
Receive sensitivity	-96 dBm	@250 Kbps
channel spacing	1MHz	2Mbps _ at least 2 MHz when
Emission current	26mA _	Transmit power = 7dBm _
receive current	14mA	@250 Kbps
Sleep current	0.7 uA	shutdown mode
Driver interface	SPI	standard 4 Wire SPI, SPI Clock: <=10MHz
Antenna impedance	50 ohm	
Antenna connection method	IPEX -1 Seat or stamp half hole or plate mount PCB antenna	Default onboard PCB Antenna, if needed IPEX -1 Seat or mail The ticket is half-hole, Need to modify the selection resistor
storage temperature	-40℃~ +125℃	
Operating temperature	-40℃~ +85℃	Industrial grade
Size	16.0x 24.0 mm	

3. Pin location diagram



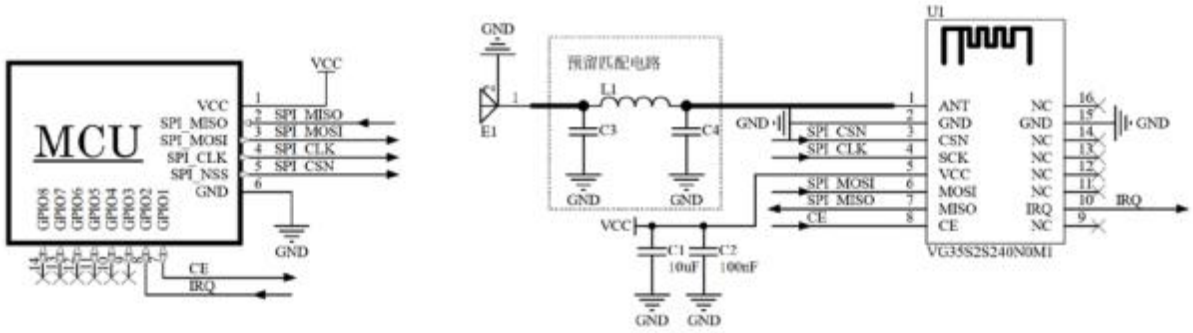
picture 3-1 top view

4. Pin description

number	pin	type	describe
1	ANT	I/O	Antenna external interface, match 50Ω, Need to adjust the module internal jump selection resistor
2	GND	power supply	land
3	CSN	I	SPI interface SPI Chip Select
4	SCK	I	SPI Interface clock input
5	VCC	power supply	Positive pole of power supply
6	MOSI	I	SPI interface MOSI data input
7	MISO	O	SPI interface MISO data output
8	CE	I	Chip start signal, activate RX or Tx model
9	NC	--	internal floating
10	IRQ	O	Interrupt signal, active low level
11	NC	--	internal floating
12	NC	--	internal floating
13	NC	--	internal floating
14	NC	--	internal floating
15	GND	power supply	land
16	NC	--	internal floating

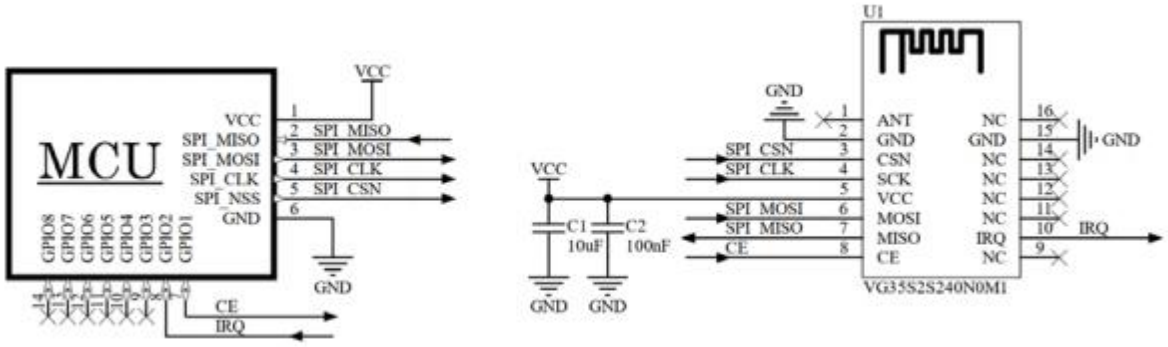
5. Hardware design guidance and precautions

5.1. Hardware connection diagram



picture 5-1 Programming and development of hardware connections (stamp hole external antenna)

picture 5-2 Programming development hardware connection (onboard PCB antenna)



5.2. Power supply design and related precautions

1. Please pay attention to the correct connection of the positive and negative poles of the power supply, and ensure that the power supply voltage is within the recommended supply voltage range. If it exceeds the maximum allowable power supply range of the module, it will cause Otherwise the module will be permanently damaged; the filter capacitor of the module power pin should be as close as possible to the module power pin.

2. In the module power supply system, Excessive ripple may be coupled to lines susceptible to interference through wires or ground planes. such as antennas, feeders, clocks lines and other sensitive signal lines, It is easy to cause the RF performance of the module to deteriorate, so we recommend using LDO as the power supply for the wireless module.

3. Select LDO When installing a voltage stabilizing chip, you need to pay attention to the heat dissipation of the power supply and LDO Stable output current driving capability; considering the long-term stable operation of the whole machine, it is recommended Recommended reservation More than 50% current output margin.

4. It is best to use one module separately LDO Stabilized power supply; if using DC-DC power supply chip, be sure to add one at the end LDO As isolation of the module power supply, Prevent the noise of the switching power supply chip from interfering with the working performance of the radio frequency.

5. MCU If the communication line between the module and the module is used 5V level, must be connected in series 1K-5.1K Resistor (not recommended, still risk of damage).

6. Keep the RF module as far away from high-voltage devices as possible, because the electromagnetic waves of high-voltage devices will also have a certain impact on RF signals.

7. High-frequency digital traces, high-frequency analog traces, and high-current power traces should be kept away from the bottom of the module. If they have to pass under the module, they need to be routed.

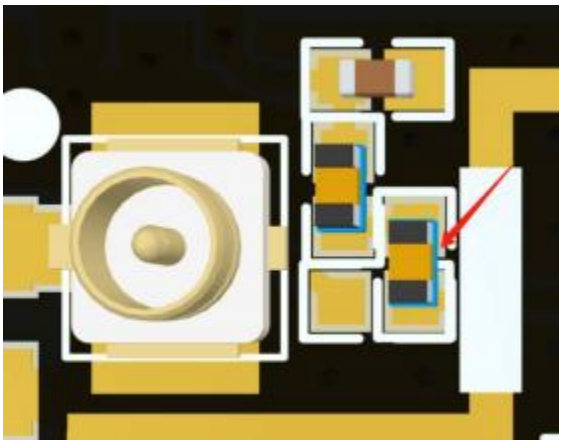
Put the module PCB Another layer of the bottom board, and ensure that the copper underneath the module is well grounded.

5.3. Antenna design and guidance

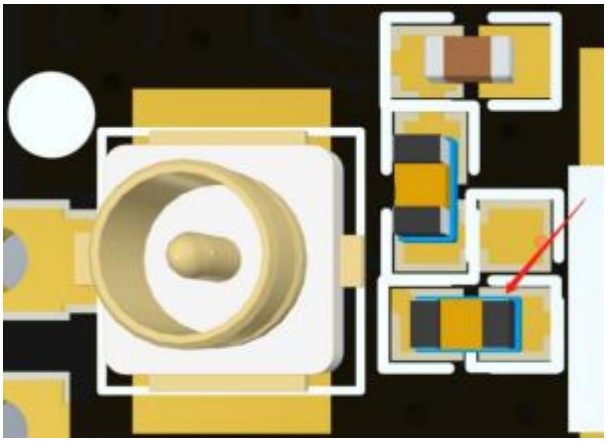
5.3.1. External antenna and PCB Antenna selection

The factory default of the module is to select onboard PCB antenna path, If you need to use an external antenna, you need to jump the transfer resistor to the external antenna path, as shown in the figure below.

Shown:



picture 5-3 Onboard PCB Antenna Jump Resistor Connection

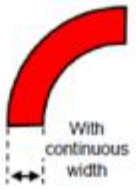


picture 5-4IPEX-1 Seat or Stamp Half Hole Jump Resistor Connection

5.3.2. Stamp hole interface RF design

When selecting the module RF output interface in the form of a stamp hole, use a 50ohm characteristic impedance trace to connect to the base plate during design. Antenna on PCB. requires attention

base plate PCB RF traces need to be as short as possible, 2.4G Signals are sensitive to trace length. It is recommended that the longest trace length does not exceed 10mm, and the trace width needs to be maintained Continuity; when you need to turn, try not to take sharp or right angles. It is recommended to take arcs.

The primary recommended turning method for RF cabling	
The second recommended RF wiring turning method	
A poor way to turn RF cables, not recommended	

In order to ensure that the RF wiring on the backplane is 50Ohm can be adjusted according to the following parameters according to different plate thicknesses. The following simulation values, for reference only.

RF wiring adopts 20mil Line width	The plate thickness is 1.0mm hour, The spacing between ground copper and traces is 5.3mil
	The plate thickness is 1.2mm hour, The spacing between ground copper and traces is 5.1mil
	The plate thickness is 1.6mm hour, The spacing between ground copper and traces is 5mil
RF wiring adopts 25mil Line width	The plate thickness is 1.0mm hour, The spacing between ground copper and traces is 6. 3mil
	The plate thickness is 1.2mm hour, The spacing between ground copper and traces is 6mil
	The plate thickness is 1.6mm hour, The spacing between ground copper and traces is 5.7mil
RF wiring adopts 30mil Line width	The plate thickness is 1.0mm hour, The spacing between ground copper and traces is 7.6mil
	The plate thickness is 1.2mm hour, The spacing between ground copper and traces is 7.1mil
	The plate thickness is 1.6mm hour, The spacing between ground copper and traces is 6. 6mil

5.3.3 external antenna

External antenna means the module passes IPEX Extension cord, Antennas with standard radio frequency interfaces such as SMA installed outside the product housing, including rod antennas,Suction cup antenna, fiberglass antenna, etc. External antennas are basically standard products. To better choose an antenna suitable for the module, In the process of antenna selection Selection of antenna parameters, The following should be noted:

1. The working frequency of the antenna and the working frequency of the corresponding module should be consistent.

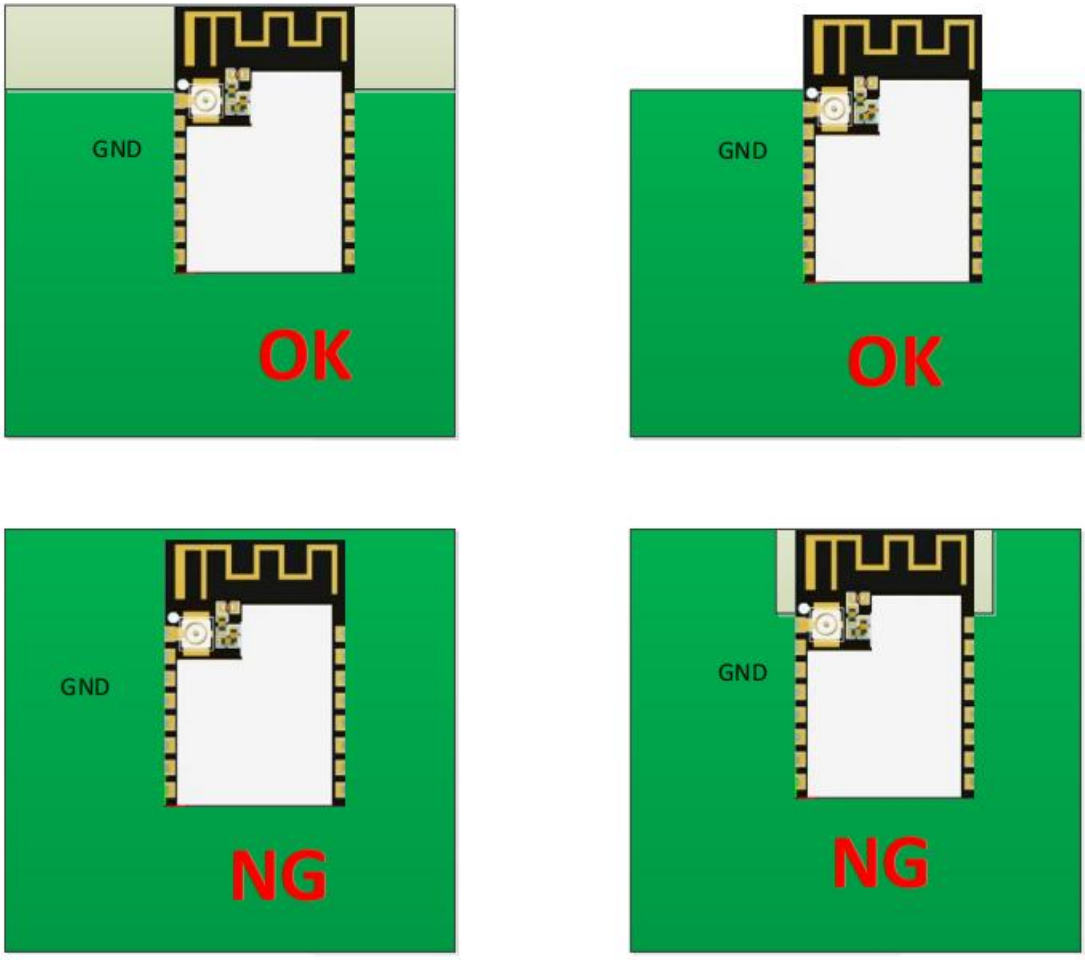
2. The input characteristic impedance of the antenna should be 50ohm.

3. The size of the antenna interface should match the size of the antenna interface of the module.

4. The standing wave ratio (VSWR) of the antenna is recommended to be less than 2, and the antenna should have a suitable frequency bandwidth (covering the frequencies used in the actual application of specific products).

5.4. Module placement and layout

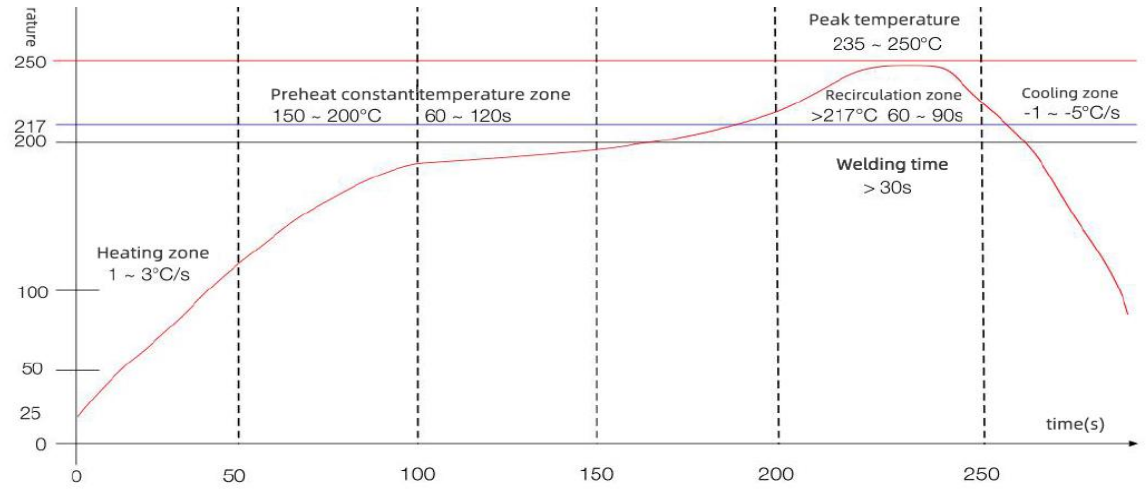
The radiation and reception of radio frequency signals are achieved through antennas. The grounded copper has a strong absorption effect on radio frequencies, so PCB The onboard antenna cannot be The copper sheet on the base plate covers and surrounds it, It cannot be covered or surrounded by batteries or other metal devices, otherwise the communication distance will be greatly reduced.



picture 5-5 Suggestions on module placement and layout

6. Precautions for programming development

7. Reflow soldering curve



Heating zone-temperature: 25-150℃ time: 60-90s Ramp rate: 1-3℃/s
Preheat constant temperature zone-temperature: 150-200℃ time: 60-120s
Reflow soldering area-temperature >217℃ time: 60-90s; Peak temperature: 235-250℃ time: 30-70s
Cooling zone-temperature:Peak temperature -25-150℃ Cooling slope -1--5℃/s
Solder-tin-silver-copper alloy lead-free solder(SAC305)

8. Static electricity damage warning

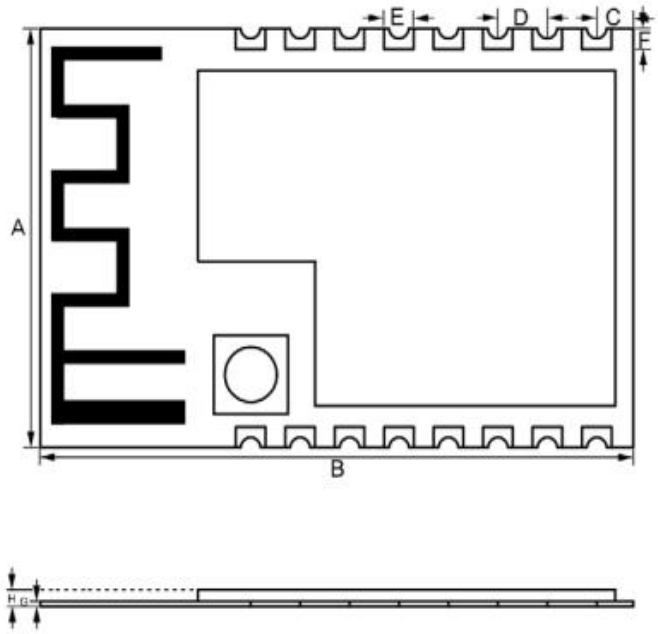
1,Anti-static measures are strictly followed, and bare hands are prohibited from touching the module during the production process .

2,Modules should be placed in a placement area that prevents static electricity.

3.The anti-static protection circuit at the high-voltage input should be considered during product design.

9. Packaging information

Mechanical dimensions (unit: mm)



serial number	Dimensions(mm)	Error(mm)
A	16.0	±0.5
B	24.0	±0.5
C	1.46	±0.1
D	2.0	±0.1
E	1.2	±0.1
F	0.6	±0.1
G	1.0	±0.1
H	2.6	±0.2

10. Version update instructions

Version	update content	Updated	principal
V1.0	initial version	2020 Year 12 moon 6th	Dying

11. Procurement selection table

Serial number	model	illustrate
1	VG35S2S240N0M1	Tape packaging\pallet packaging Factory default PCB Onboard antenna version

12. Statement

1. Due to product version upgrades or other reasons, the content of this document will be updated from time to time . Unless otherwise agreed, this document is only used as a guide.

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2. The company reserves the right of final interpretation and modification of all information provided, and any changes will be made without prior notice.

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