

VG43T240N0M1 Bluetooth/Wi-Fi module

Hardware specification

V1.0



Table of contents

I. Overview	2
2. Main technical parameters	2
2.1. Basic parameters	2
2.2. Wi - Fi RF	performance 3
2.3. BLE Bluetooth RF Performance	4
2.4. Power consumption parameters	5
3. Pin location diagram	6
4. Pin description	7
5. Hardware design guidance and precautions	9
5.1. Hardware connection diagram	9
5.2. Power supply design and related precautions	9
5.3. Antenna selection	10
5.4. Module placement and layout	11
6. Precautions for programming development	13
7. Reflow soldering curve	14
8. Static electricity damage warning	14
9. Packaging information	15
Mechanical dimensions (unit : mm)	15
10. Version update instructions	16
11. Procurement selection table	16
12. Statement	16
13. Contact us	17

I. Overview

VG43T240N0M1 series wireless module is a low-power Bluetooth and Wi-Fi Highly integrated IoT module. This module is equipped with ESP32-C3 series core. The chip is an MCU system-level chip with extremely low power consumption and high integration. (SoC), integrated 2.4 GHz Wi-Fi and Bluetooth® LE dual-mode Wireless communications designed for a variety of applications such as the Internet of Things (IoT), mobile devices, wearable electronics, smart homes, and more. The module provides rich peripheral interfaces, includes UART, SPI, I2S, I2C, ADC, temperature sensor and multiple GPIOs.

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:

- > Wi-Fi Support IEEE 802.11 b/g /n protocol
- > support 1T1R mode, data rate up to 150 Mbps
- > Bluetooth Low Energy (Bluetooth LE): Bluetooth 5, Bluetooth mesh
- > Bluetooth speed support 125 Kbps, 500 Kbps, 1 Mbps, 2Mbps
- > Wi-Fi and Bluetooth coexist, share the same antenna
- > RISC-V 32-bit single-core processor supports up to 160MHz clock frequency, boasting 400 KB SRAM, 384KB ROM, 8KB RTC SRAM
- > Rich peripheral interfaces UART/GPIO/ADC/ PWM/I2C/I2S
- > Supports multiple sleep modes, Deep sleep current is less than 5uA
- > General AT commands can help you get started quickly
- > Users can develop secondary

application:

1. smart home
2. automated industry
3. medical insurance
4. Consumer Electronics
5. Smart agriculture
6. Retail catering
7. Audio equipment
8. General purpose low power consumption IoT sensor hub

2. Main technical parameters

2.1. Basic parameters

Technical indicators	parameter	Remark
voltage range	3.0~3.6V	generally 3.3V
Antenna impedance	50 ohm	
Antenna connection method	IPEX-1 seat or onboard PCB antenna	Default onboard PCB antenna
storage temperature	-40℃~ +150℃	
Operating temperature	-40℃~ +105℃	
Size	25.5x18.0mm	

2.2. Wi-Fi RF performance

Working frequency(MHz)	
2412~2484	
Output Power	
rate	Typical value (dBm)
802. 11b	19±2
802. 11g	18±2
802. 11n, HT20	17±2
802. 11n, HT40	17±2

Receive sensitivity	
rate	Typical value (dBm)
802. 11b, 1Mbps	-98
802. 11g, 6Mbps	-93
802. 11n, HT20, MSCO	-93
802. 11n, HT40, MSCO	-90

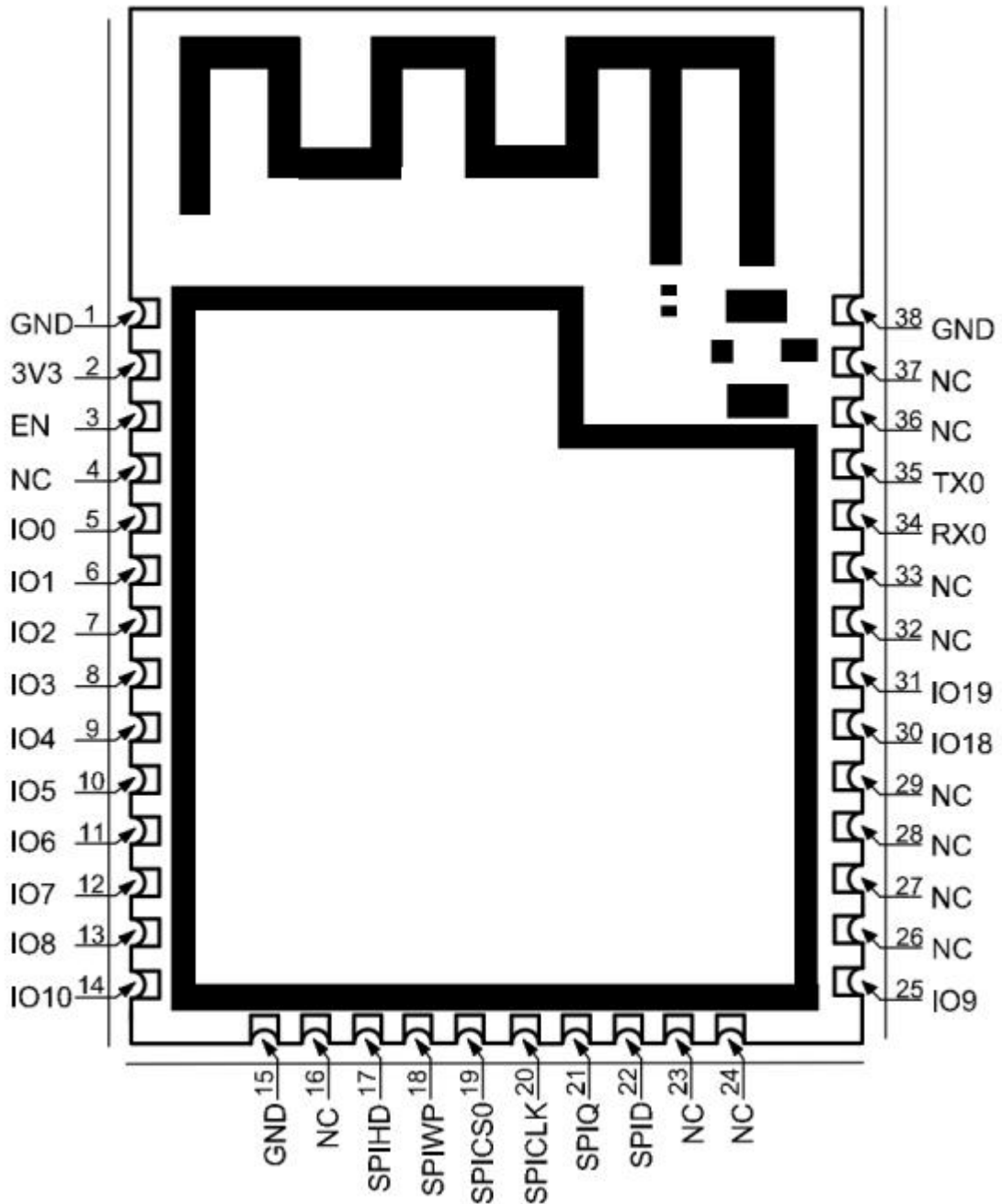
2. 3, BLE Bluetooth RF performance

Working frequency (MHz)		
2402~2480		
Output power (dBm)		
minimum value	Typical value	maximum value
-27	0	18
Receiving sensitivity (dBm)		
rate	Typical value (dBm)	
125Kbps	-105	
500Kbps	-100	
1Mbps	-97	
2Mbps	-93	

2.4. Power consumption parameters

Power consumption		
model	Typical value	unit
802.11b, 1Mbps, @20dBm, transmit	340	mA
802.11g, 54 Mbps, @19dBm, transmit	280	mA
802.11n, HT20, MCS7, @ 18dBm, transmit	276	mA
802.11b/g/n, HT20, receive	85	mA
802.11n, HT40, receive	90	mA
Modem-sleep, @160 MHz	20	mA
Light-sleep	130	uA
Deep-sleep	5	uA
Power off	1	1uA

3. Pin location diagram



picture 3-1 top view

4. Pin description

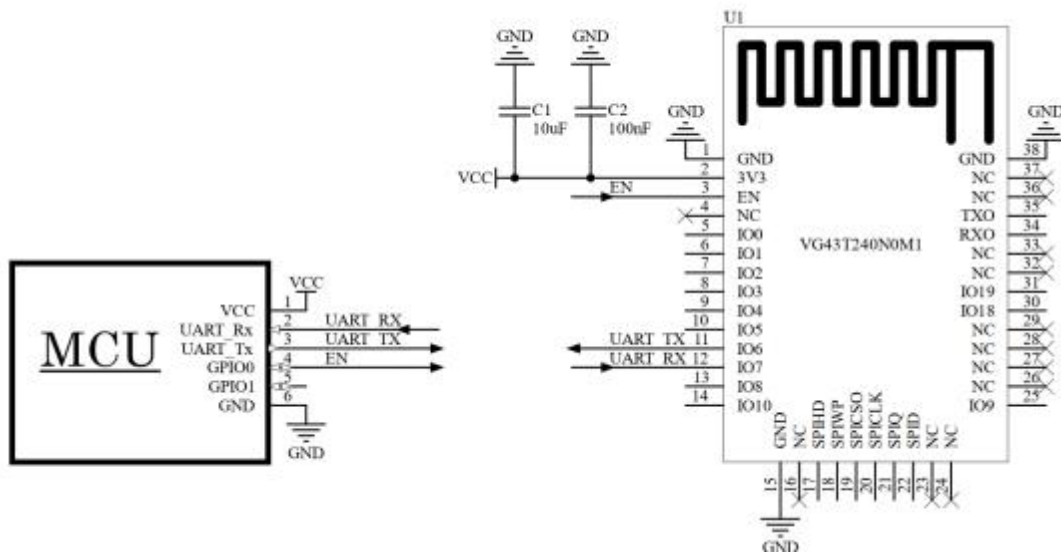
number	pin	type	describe
1	GND	power supply	power ground
2	3V3	power supply	Power input pin, usually connected to 3.3V
3	EN	I	High level: chip enable Low level: chip shuts down The module has been connected internally 10K Pull-up resistor
4	NC	—	The module is floating inside
5	I00	I/O	GPI00, ADC1_CH0, XTAL_32K_P
6	I01	I/O	GPI01, ADC1_CH1, XTAL_32K_N
7	I02	I/O	GPI02, ADC1_CH2, FSPIQ
8	I03	I/O	GPI003, ADC1_CH3
9	I04	I/O	GPI004, ADC1_CH4, FSPIHD , MTMS
10	I05	I/O	GPI005, ADC2_CH0, FSPIWP , MTDI
11	I06	I/O	GPI06, FSPICK, MTCK
12	I07	I/O	GPI07, FSPID, MTDO
13	I08	I/O	GPI08
14	I010	I/O	GPI010, FSPICS0
15	GND	power supply	power ground

16	NC	--	internal floating
17	SPIHD	I/O	SPIHD, GPIO12
18	SPIWP	I/O	SPIWP, GPIO13
19	SPICSO	I/O	SPICSO, GPIO14
20	SPICLK	I/O	SPICLK, GPIO15
21	SPIQ	I/O	SPIQ, GPIO17
22	SPID	I/O	SPID, GPIO16
23	NC	--	The module is floating inside
24	NC	--	The module is floating inside
25	I09	I/O	GPIO9
26	NC	--	The module is floating inside
27	NC	--	The module is floating inside
28	NC	--	The module is floating inside
29	NC	--	The module is floating inside
30	I018	I/O	GPIO18
31	I019	I/O	GPIO19
32	NC	--	The module is floating inside
33	NC	--	The module is floating inside
34	RX0	I/O	RX0, GPIO20

35	TX0	I/O	TX0, GPIO21
36	NC	---	The module is floating inside
37	NC	---	The module is floating inside
38	GND	power supply	power ground

5. Hardware design guidance and precautions

5.1. Hardware connection diagram



picture 5-1 Hardware connection AT Command control diagram

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 selection

The factory default of the module is onboard PCB antenna, No need to connect another antenna. In some applications where an external antenna needs to be connected, you can pre-install it through the module. Remain IPEX Buttons externally attached.

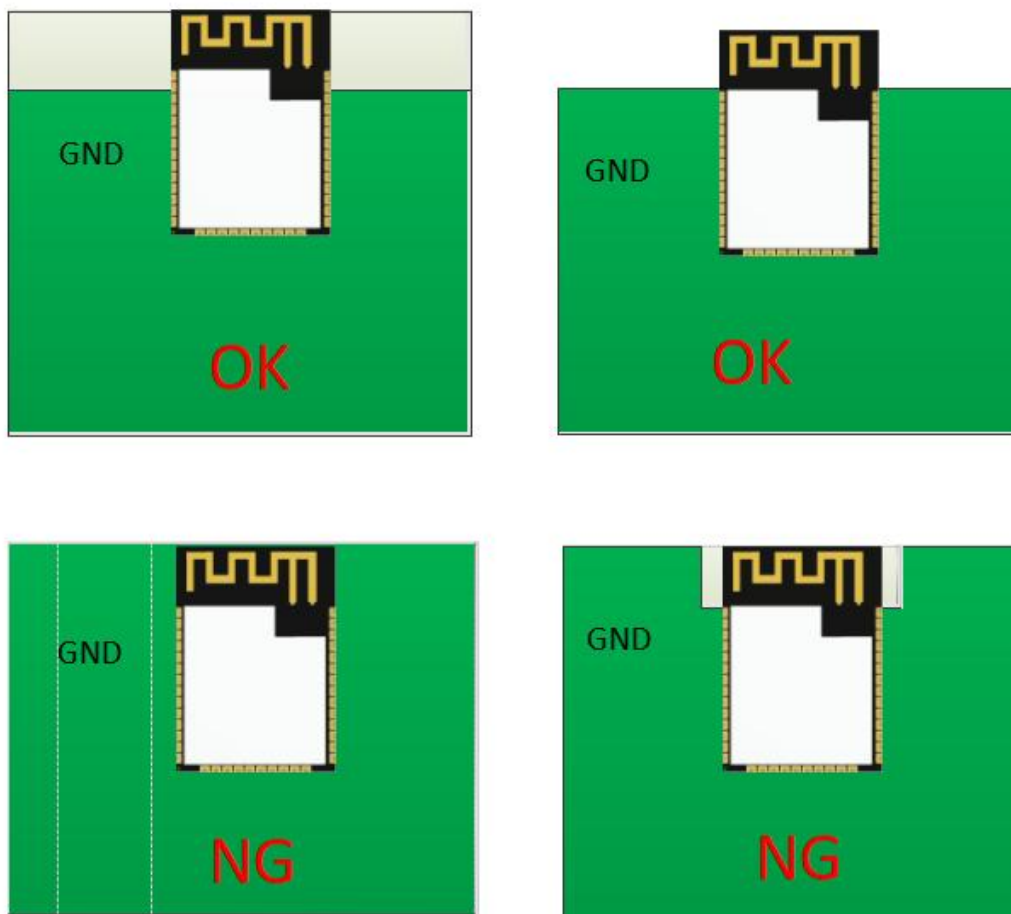
External antenna means the module passes IPEX Extension cord, Antennas with standard radio frequency interfaces such as SMA installed outside the product housing, Specifically include rod antenna,

absorber Dish antenna, fiberglass antenna, etc. External antennas are basically standard products. In order to better choose an antenna suitable for the module, during the antenna selection process, Line parameter selection, 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.



picture5-2 Module placement recommendations

6. Precautions for programming development

System startup mode

Pin	default	SPI startup mode	Download boot mode
IO8	none	irrelevant items	1
IO9	Internal weak pull-up	1	0

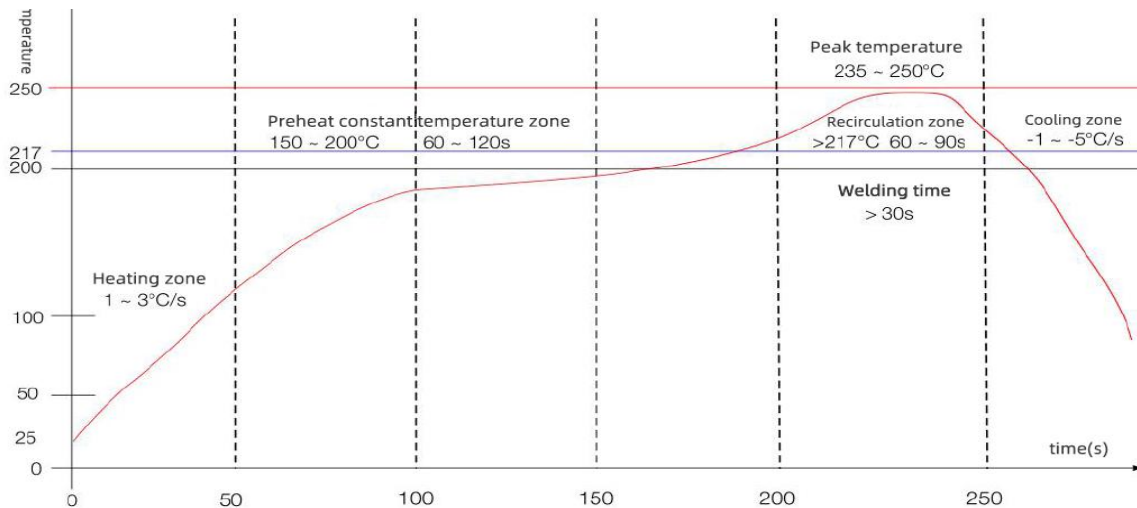
Note: IO8, ENThe foot module is internally connected 10KPull-up resistor

ESP32-C3 AT uses two UART Interface: UART0 is used to download firmware and output logs, UART 1 is used to send AT commands and receive ATresponse. By default, UART0 and UART1 Both communicate using a baud rate of 11 5200.

Function	chip pins
Download firmware/output log	UART0 <ul style="list-style-type: none"> • GPIO20(RX0) • GPIO21(TX0)
ATOrder	UART1 <ul style="list-style-type: none"> • GPIO6(RX1) • GPIO7(TX1) • GPIO5(CTS) • GPIO4(RTS)

Note: The CTS/RTS pins only need to be connected when using the hardware flow control function .

7. Reflow soldering curve



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

8. Static electricity damage warning

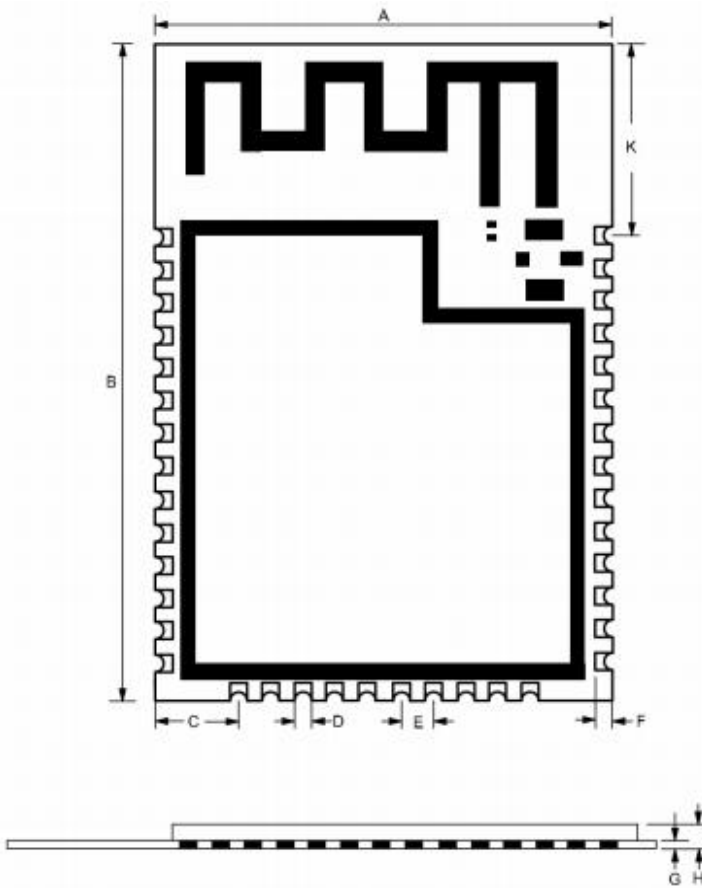
The RF module is a high-voltage electrostatic sensitive device. In order to prevent static electricity from damaging the module

- 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	18.0	±0.5
B	25.5	±0.5
C	3.2	±0.1
D	1.0	±0.1
E	1.27	±0.1
F	0.6	±0.1
K	7.5	±0.1
G	0.8	±0.1
H	3.1	±0.2

10. Version update instructions

Version	update content	Updated	Maintenance man
V1.0	initial version	2022Year4moon6th	Dying

11. Procurement selection table

number	model	illustrate
1	VG43T240N0M1	Tape packaging\pallet packaging Factory defaultPCBOnboard antenna

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.All statements, information and recommendations in do not constitute any express or implied warranty.

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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