

GOC-AG440

Bluetooth And WIFI Module Hardware Specification

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Be careful:

- 1. The module must use ladder steel net, and recommend ladder steel net thickness 0.16--0.20mm. The adaptability of the products is adjusted accordingly.**
- 2. Before the use of the module, bake at 60 degrees centigrade and bake for 12 hours.**

Release Record

Version Number	Release Date	Comments
V1.0	2021/7/26	Initial draft

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1. Introduction

GOC-AG440 module adopts a high-performance SOC, it's an industry's leading WIFI6 / BT5.0 dual-mode module. While supporting all the indicators of WIFI6, the power consumption is the lowest in the industry. GOC-AG440 integrates Cortex-M4F CPU at the same time, the main frequency can reach 400MHz. With the help of the internal integrated 992KB SRAM, 752KB ROM and up to 128Mbit on-chip SPI flash memory, it provides users with powerful hardware support and can be used for secondary development. GOC-AG440 has a wealth of peripheral interfaces that can be used for control and data transmission through SDIO / UART, and can be quickly applied to any microcontroller-based design.

GOC-AG440 module supports the standard IEEE802.11b/g/n/a/ac/ax protocol and the complete TCP/IP protocol stack. Users can use this module to add networking functions to existing equipment, or build an independent network controller.

GOC-AG440 module provides maximum practicability at the lowest cost, providing unlimited possibilities for WiFi function embedding in other systems.

1.1 Module Block Diagram

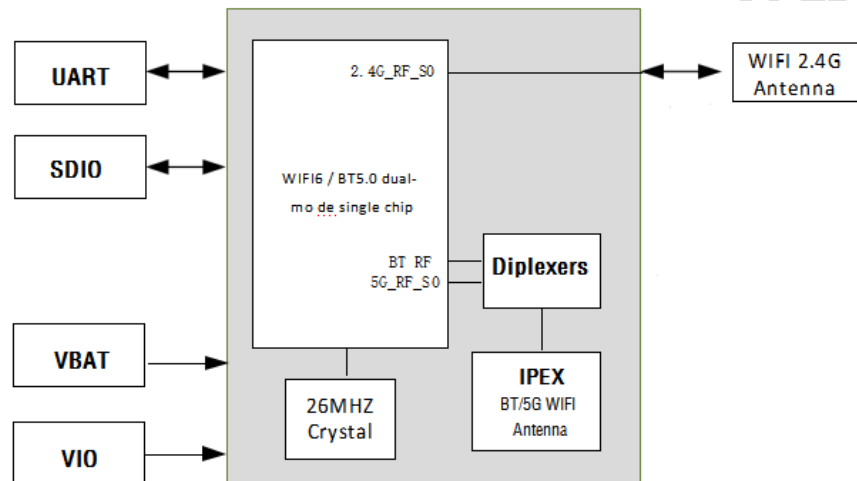


Figure 1: Module Block Diagram

2 Features

2.1 WIFI Features

- CMOS single-chip fully-integrated RF, Modem and MAC
- Wi-Fi6 support 2.4GHz/5GHz Frequency band The highest data rate is 286.8Mbps@TX and 229.4Mbps@RX, and the bandwidth is 20/40MHz RX sensitivity under 11b 1M mode -98dBm
- Tx power up to 20dBm in 11b mode, up to 18dBm in HT/VHT/HE40 MCS7 mode
- Support STA, AP, Wi-Fi Direct mode at the same time
- Support STBC, beamforming Support Wi-Fi6 TWT
- Support two NAVs, buffer report, space reuse, Multi-BSSID, power saving in PPDU
- Support LDPC
- Support MU-MIMO, OFDMA Support DCM, medium code, UORA
- Support WEP / WPA / WPA2 / WPA3-SAE Personal, MFP Frequency band

2.2 Bluetooth Features

- Supports all the mandatory and optional features of Bluetooth 2.1+EDR/3.0/4.x/5
- Supports advanced master and slave topologies

2.3 CPU Features

- Integrated Cortex-M4F CPU with MPU and FPU CPU speed up to 480Mhz
- On-chip memory includes 992KB SRAM and 752KB ROM
- Supports SDIO/ USB2.0/SDIO
- Integrated hardware crypto accelerator AES/RSA/HASH/ECC
- Integrated True Random Number Generator (TRNG)
- Support external OPI SDR/DDR PSRAM Integrated SPI flash in package, from 8Mbits to 128Mbits flash
- Support freeRTOS

2.4 Application

- IoT device
- Wireless device

3. Main Specification Instruction

Production	Bluetooth+WIFI Module
Module Type	GOC-AG440
IC	AIC8800
Bluetooth	
Bluetooth Standard	Bluetooth V5.0 LE & BR/EDR
Frequency Range	2402MHz~2480MHz
Interface	UART
WIFI	
WIFI Standard	802.11 a/b/g/n/ac/ax
Frequency Range	2412MHz~2484MHz /4900MHZ~5925MHz
Interface	SDIO
General	
Output impedance	50 ohms
Crystal Frequency	26MHz
Dimensions	17*17*2.4 mm
Power Voltage	3.3V supply voltage typically
Storage temperature	-20 ℃ to +80 ℃
Temperature Range	-55 ℃ to +125 ℃
Humidity Range	10%~90% Non-Condensing

Table 1: Main Specifications

4. Pin Diagram And Description

4.1 Pin Diagram

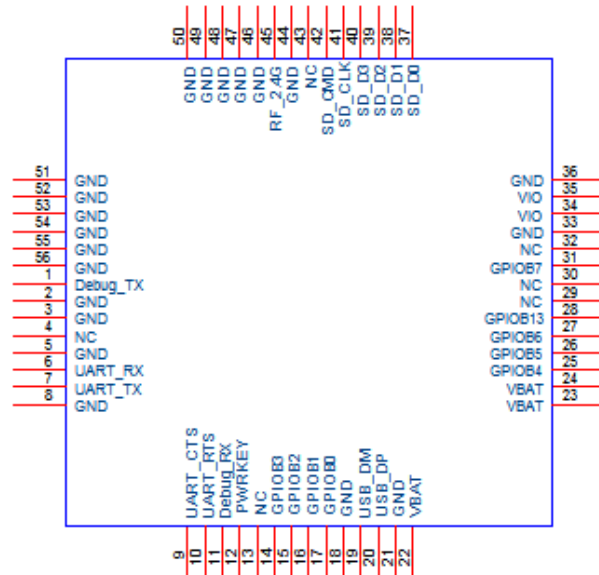


Figure 2: Pin Diagram

4.2 Pin Definition

Pin	Pin Name	Type	Description
1	Debug_TX	Input/Output	Debug serial port TX Hang in the air when not in use, no need to connect
2	GND	Ground	Ground
3	GND	Ground	Ground
4	NC	NC	NC
5	GND	Ground	Ground
6	UART_RX	Input	High-Speed UART Data In
7	UART_TX	Output	High-Speed UART Data Out
8	GND	Ground	Ground
9	UART_CTS	Input	High-Speed UART CTS
10	UART_RTS	Output	High-Speed UART RTS
11	Debug_RX	Input/Output	Debug serial port RX Hang in the air when not in use, no need to connect
12	PWRKEY	Input/Output	Module power-on pin, power-on = 1; power-off = 0; There is a 100K resistor inside the module, which is pulled up to VBAT
13	NC	NC	NC
14	GPIOB3	Input/Output	General Purpose Input/ Output Pin Hang in the air when not in use, no need to connect
15	GPIOB2	Input/Output	General Purpose Input/ Output Pin Hang in the air when not in use, no need to connect
16	GPIOB1	Input/Output	General Purpose Input/ Output Pin Hang in the air when not in use, no need to connect

17	GPIOB0	Input/Output	General Purpose Input/ Output Pin Hang in the air when not in use, no need to connect
18	GND	Ground	Ground
19	USB_DM	Input/Output	USB data D- Hang in the air when not in use, no need to connect
20	USB_DP	Input/Output	USB data D+ Hang in the air when not in use, no need to connect
21	GND	Ground	Ground
22	VBAT	POWER	3.3V Supply Voltage
23	VBAT	POWER	3.3V Supply Voltage
24	VBAT	POWER	3.3V Supply Voltage
25	GPIOB4	Input/Output	General Purpose Input/ Output Pin Hang in the air when not in use, no need to connect
26	GPIOB5	Input/Output	General Purpose Input/ Output Pin Hang in the air when not in use, no need to connect
27	GPIOB6	Input/Output	General Purpose Input/ Output Pin Hang in the air when not in use, no need to connect
28	GPIOB13	Input/Output	General Purpose Input/ Output Pin Hang in the air when not in use, no need to connect
29	NC	NC	NC
30	NC	NC	NC
31	GPIOB7	Input/Output	General Purpose Input/ Output Pin Hang in the air when not in use, no need to connect
32	NC	NC	NC
33	GND	Ground	Ground
34	VIO	POWER	1.8V~3.3V Supply Voltage
35	VIO	POWER	1.8V~3.3V Supply Voltage
36	GND	Ground	Ground
37	SD_D0	Input/Output	SDIO Data Line 0
38	SD_D1	Input/Output	SDIO Data Line 1
39	SD_D2	Input/Output	SDIO Data Line 2
40	SD_D3	Input/Output	SDIO Data Line 3
41	SD_CLK	Input	SDIO Clock Input
42	SD_CMD	Input/Output	SDIO Command
43	NC	NC	NC
44	GND	Ground	Ground
45	RF_2.4G	RF	WLAN 2.4G Antenna
46	GND	Ground	Ground
47	GND	Ground	Ground
48	GND	Ground	Ground
49	GND	Ground	Ground
50	GND	Ground	Ground
51	GND	Ground	Ground
52	GND	Ground	Ground

53	GND	Ground	Ground
54	GND	Ground	Ground
55	GND	Ground	Ground
56	GND	Ground	Ground

Table 2: Pin Description

4.3 PCB Layout Footprint

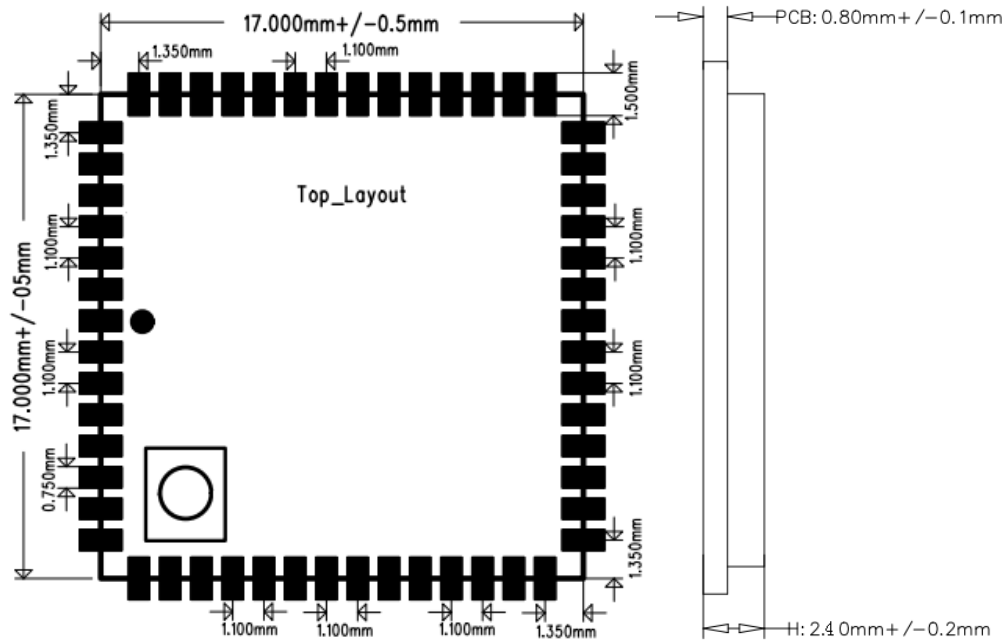


Figure 3: GOC-AG440 PCB Layout Footprint

5. Electrical Characteristics

5.1 Absolute Maximum Ratings

Rated Level	Min	Typical	Max
VBAT	3.16V	3.3V	3.346V
VIO	1.71V	1.8V	1.89V
	3.16V	3.3V	3.346V

Table 3: Absolute Maximum Ratings

5.2 Recommended Operating Conditions

Working Condition	Min	Typical	Max
Working Temperature	-20 °C	/	+80 °C
Storage Temperature	-55 °C	/	+125 °C
VBAT	3.16V	3.3V	3.346V
VIO	1.71V	1.8V	1.89V
	3.16V	3.3V	3.46V

Table 4: Recommended Operating Conditions

6. Recommended Reflow Profile

Referred to IPC/JEDEC standard.

Peak package body temperature : <math><260\text{ }^\circ\text{C}</math>.

Time of peak temperature for Pb-free assembly : 5~10sec.

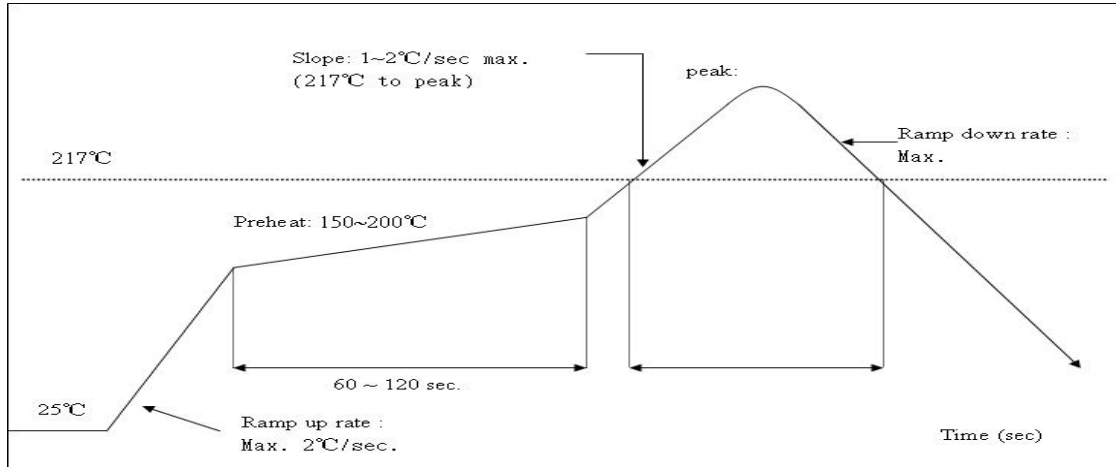


Figure 4: Recommended Reflow Profile

7. Hardware Interation Suggestions

7.1 Soldering Recommendations

GOC-AG440 is compatible with industrial standard reflow profile for Pb-free solders. The reflow profile used is dependent on the thermal mass of the entire populated PCB, heat transfer efficiency of the oven and particular type of solder paste used. Consult the datasheet of particular solder paste for profile configurations.

Goodocom will give following recommendations for soldering the module to ensure reliable solder joint and operation of the module after soldering. Since the profile used is process and layout dependent, the optimum profile should be studied case by case. Thus following recommendation should be taken as a starting point guide.

7.2 Layout Guidelines(External Antenna)

Placement and PCB layout are critical to optimize the performances of a module without on-board antenna designs. The trace from the antenna port of the module to an external antenna should be 50 and must be as short as possible to avoid any interference into the transceiver of the module.

The location of the external antenna and RF-IN port of the module should be kept away from any noise sources and digital traces. A matching network might be needed in between the external antenna and RF-IN port to better match the impedance to minimize the return loss.

As indicated in below, RF critical circuits of the module should be clearly separated from any digital circuits on the system board. All RF circuits in the module are close to the antenna port. The module, then, should be placed in this way that module digital part towards your digital section of the system PCB.

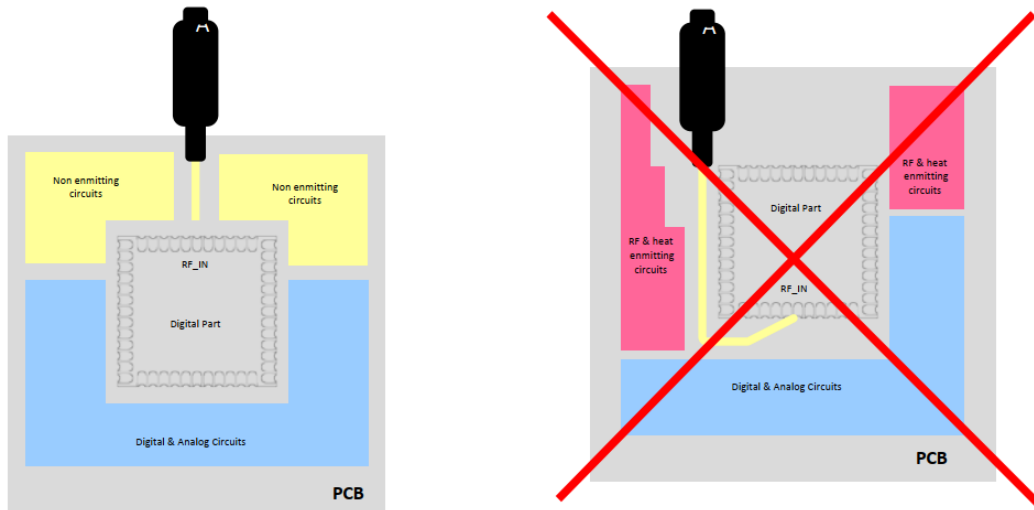


Figure 5: Placement the Module on a System Board

7.3 Antenna Connection and Grounding Plane Design

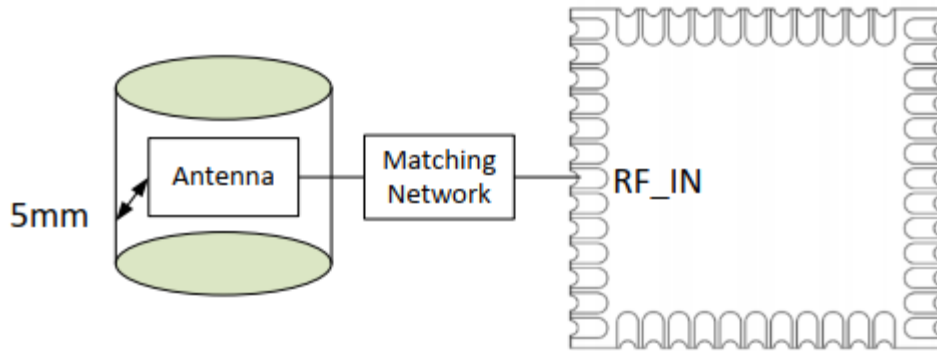


Figure 6: Leave 5mm Clearance Space from the Antenna

General design recommendations are:

- The length of the trace or connection line should be kept as short as possible.
- Distance between connection and ground area on the top layer should at least be as large as the dielectric thickness. Routing the RF close to digital sections of the system board should be avoided.
- To reduce signal reflections, sharp angles in the routing of the micro strip line should be avoided. Chamfers or fillets are preferred for rectangular routing; 45-degree routing is preferred over Manhattan style 90-degree routing.

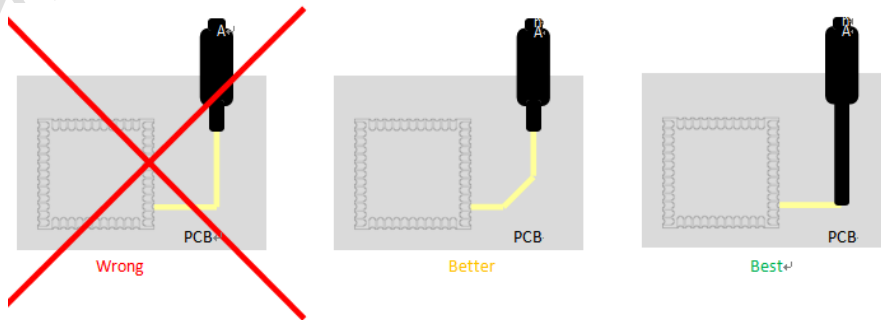


Figure 7: Recommended Trace Connects Antenna and the Module

Routing of the RF-connection underneath the module should be avoided. The distance of the micro strip line to the ground plane on the bottom side of the receiver is very small and has huge tolerances. Therefore, the impedance of this part of the trace cannot be controlled.

Use as many vias as possible to connect the ground planes.

7.4 SDIO Lines Layout Guideline

The following SDIO line routing must obey the following rule to prevent overshoot/undershoot, as these lines drive 8mA. SDIO_CMD

SDIO_CLK

SD_D0 ~ SD_D3

The route length of these signals be less than 15 cm and the line impedance be less than 50Ω

7.5 HCI Lines Layout Guideline

The following HCI line routing must obey the following rule to prevent overshoot/undershoot, as these lines drive 4 ~ 8mA

UART_RX UART_TX UART_CTS UART_RTS

The route length of these signals be less than 15 cm and the line impedance be less than 50Ω

7.6 Power Trace Lines Layout Guideline

VBAT Trace Width: 40mil

VIO Trace Width: 20mil

7.7 Ground Lines Layout Guideline

A Complete Ground in Ground Layer.

Add Ground Through Holes to GOC-AG440 Module Ground Pads

Decoupling Capacitors close to GOC-AG440 Module Power and Ground Pads

8. Module Part Number Description

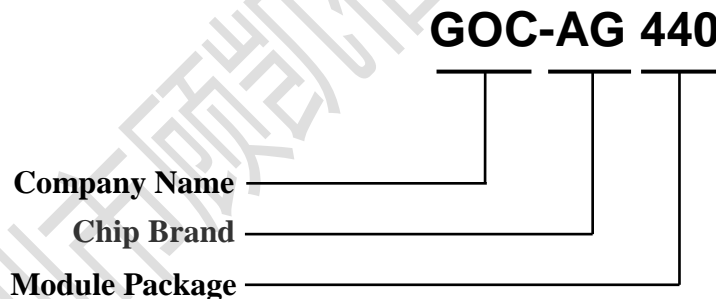


Figure 8: Module Part Number Description

For a list of available options (e.g. package, packing) and orderable part numbers or for further information on any aspect of this device, please go to www.goodocom.com or contact the Goodocom Sales Office nearest to you.

9. Ordering Information

Part Number	Description	Remark
GOC-AG440 V1.0	Bluetooth and WIFI module	

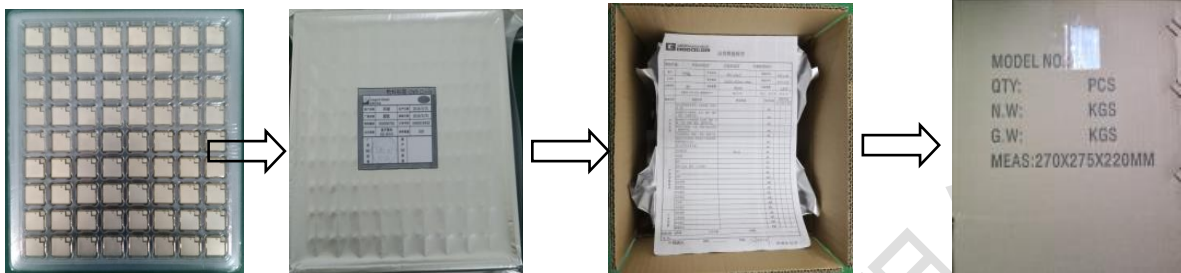
Table 5: Ordering Information

10. Packaging Information

10.1 Net Weight

The module net weight: $1.3g \pm 0.2g$

10.2 Package



72pcs module in one tray

2000pcs modules into one pack

4000pcs

Modules One Box

Carton size:270mm*275mm*220mm

Tray size:225mm*205mm*7mm

10.3 Storage Requirements

- 1) Temperature: 22~28 °C;
 - 2) Humidity: <70% (RH) ;
- Vacuum packed and sealed in good condition to ensure 12 months of welding.

10.4 Humidity Sensitive Characteristic

- 1) MSL: 3 level
- 2) Once opened, SMT within 168 hours in the condition of temperature: 22~28 °C and humidity<60%(RH).
- 3) Handling, storage, and processing should follow JEDEC J-STD-020