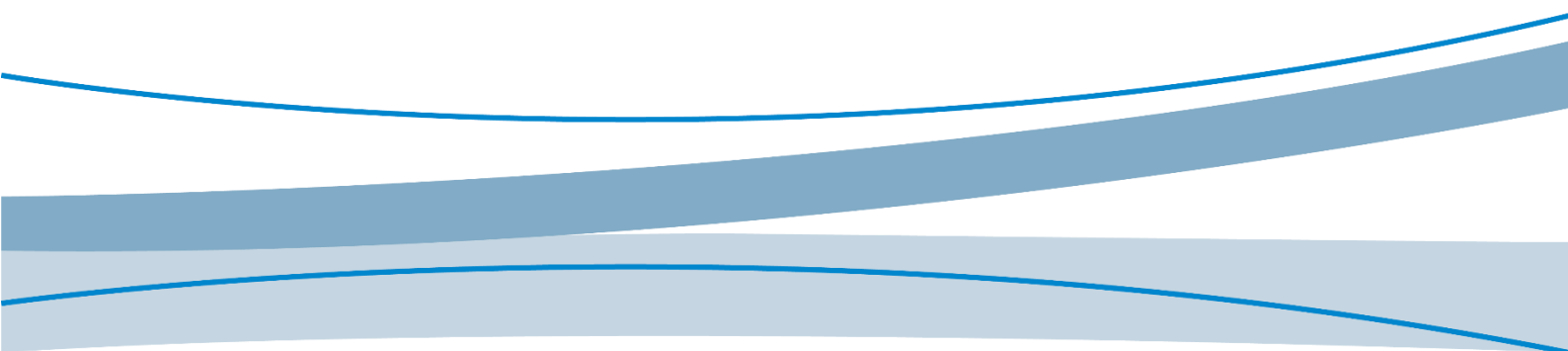




EVK-LGA-F01

User Guide

V1.9



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Applicable Models

No.	Applicable Model	Description
1	FG360 Series	5G WWAN module, LGA package, for eMBB and CPE application
2	FG160 Series	5G WWAN module, LGA package, for eMBB and CPE application
3	FG370 Series	5G WWAN module, LGA package, for eMBB and CPE application
4	FG650 Series	5G WWAN module, LGA package, for eMBB and CPE application
5	FG652 Series	5G WWAN module, LGA package, for eMBB and CPE application
6	FG101 Series	4G WWAN module, LGA package, for eMBB and CPE application
7	L716 Series	4G CAT4 module, LCC+LGA package, for IPC and CPE application
8	FG132 Series	5G Redcap module, LGA package, for IPC application
9	FG131 Series	5G Redcap module, LGA package, for eMBB and CPE application
10	NL668 Series	4G CAT4 module, LCC+LGA package, for IPC and CPE application
11	FG332 Series	5G Redcap module, LGA package, for eMBB and CPE application

Change History

V1.9 (2024-12-9)	Added ADP description of FG332 Series.
V1.8 (2024-09-21)	Added ADP and Sub board description of NL668 Series, such as Section 4.8.
V1.7 (2024-5-7)	Added ADP and Sub board description of FG131 Series.
V1.6 (2024-3-7)	Added FG132 CPB Series.
V1.5 (2023-12-21)	Added L716/FG132 Series.
V1.4 (2023-07-09)	Added FG650/FG652/FG101 Series, Import new format.
V1.3 (2023-04-03)	Added ADP and Sub board description of FG370 Series.
V1.2 (2022-06-15)	Added ADP and Sub board description of FG160 Series.
V1.1 (2022-03-10)	Added Wi-Fi antenna frequency band description.
V1.0.2 (2021-05-10)	Updated figures related to EVB V1.0.2. Added Wi-Fi module model description. Added tuner description. Added RF connector assembly.
V1.0.1(2021-04-06)	Updated document architecture and description. Added ADP board interface description. Added development environment building.
V1.0.0 (2021-02-07)	Initial version.

1.1 Overview

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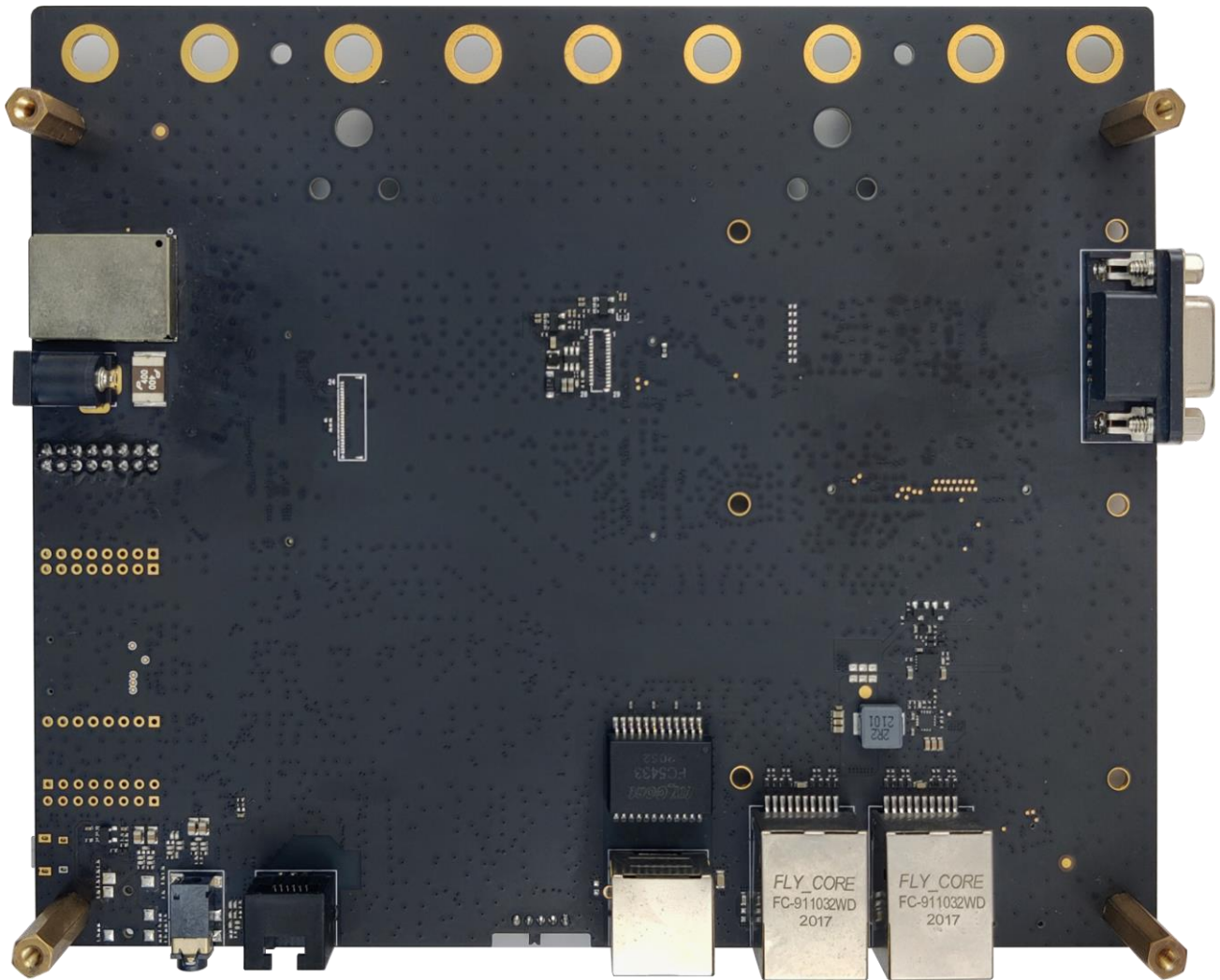


Figure 2. Bottom view of EVB

1.2 Key Features

Table 1. Key features

Key Features	Description
Power Supply	DC Jack: 12V/3A
Audio Interface	Supports NAU88C22, NUVOTON corporation One analog interface for earphone
SD Interface	Supports SD card.
USB Interface	On WWAN ADP board
SIM Interface	SIM2 card interface
UART Interface	One DB9 port One micro USB port for UART

Key Features	Description
Status Indication	5 LEDs for status indication
Button	RST (Restore factory setting), WPS
Switch	Power on

2 EVB Board Interface

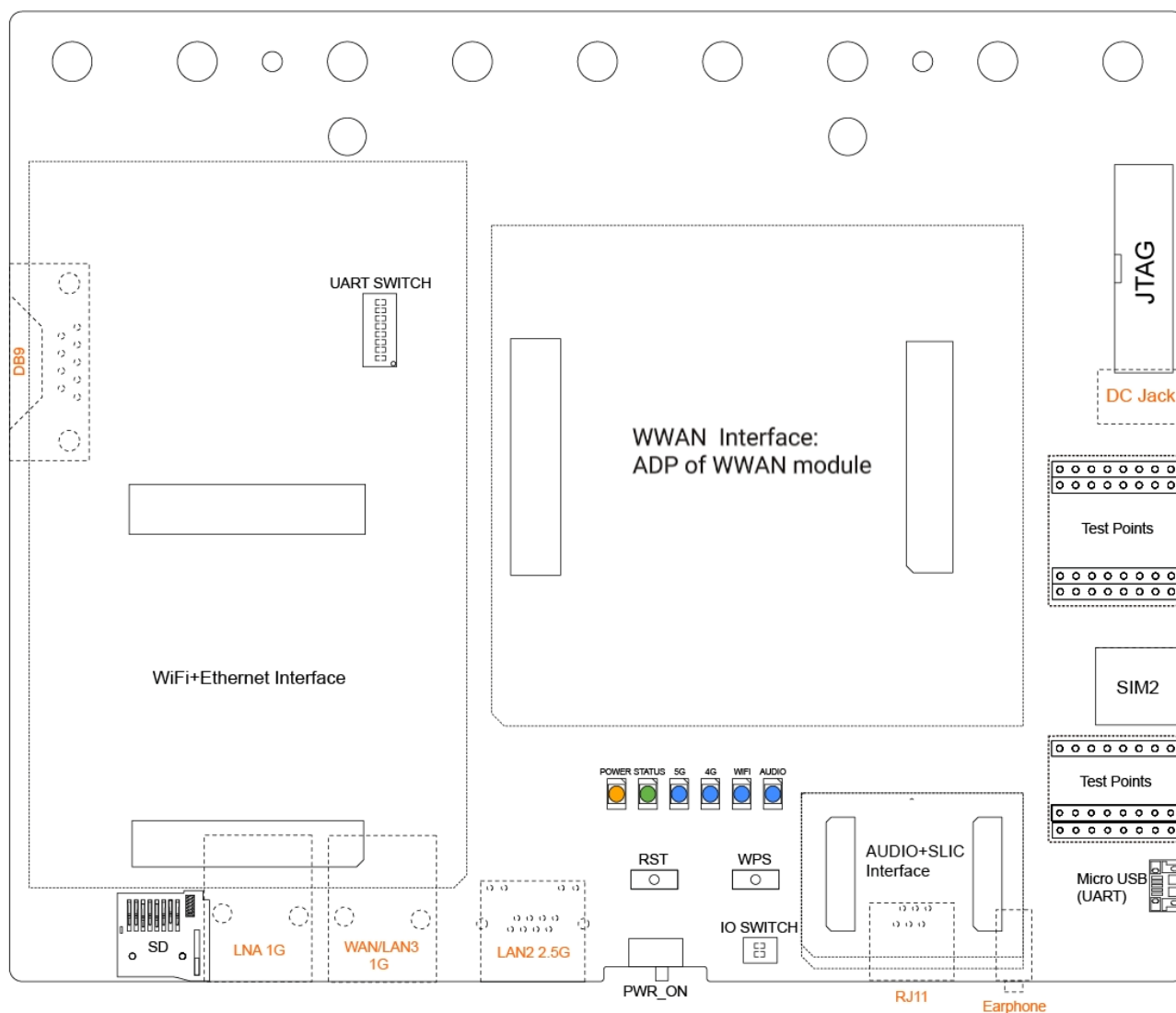


Figure 3. Interface overview



Dotted line components with orange identification are on the bottom side of EVB.

Table 2. EVB board interface description

Interface	Description
DC Jack	DC power supply: 12V/3A
WWAN Interfaces	Two BTB interfaces, connect ADP board of WWAN with EVB
Wi-Fi & Ethernet Interfaces	Two BTB interfaces, connect Wi-Fi & Ethernet board with EVB

Interface	Description
SIM2	SIM2 card socket. If on-board eSIM is enabled, the external SIM2 interface is disabled.
Ethernet Interfaces	LAN1: supports a maximum rate of 1 Gbps.
	LAN2: supports a maximum rate of 2.5 Gbps.
	WAN/LAN3: supports a maximum rate of 1 Gbps, supports both WAN and LAN.
Audio Interfaces	Two BTB interfaces, connect Audio board with EVB
Earphone	Analog audio interface for earphone
SD Card	SD card socket
DB9	8 line UART, reserved
Micro USB	Convert UART to Micro USB2.0, capture log for debugging
Button	RST: Restore factory setting
	WPS: Wi-Fi Protected Setup, for Wi-Fi simple configuration
SWITCH	PWR_ON: Power on
UART SWITCH	Switch the UART interface to the DB9 connector, reserved
IO SWITCH	WAKE: Hardware control module wake up
	W_DIS: Hardware control module flight mode
Status Indicator	Power: Orange LED, DC Jack power on indicator
	Status: Green LED, WWAN power on indicator (not available)
	5G: Blue LED, 5G mode indictor (not available)
	4G: Blue LED, LTE mode indictor (not available)
	Wi-Fi: Blue LED mode indictor (not available)
	Audio: Blue LED, Audio indictor (not available)
JTAG	Reserved
RJ11	RJ11 for phone voice, reserved
Test Points	Used for testing and debugging signals

2.1 Antenna Tuner

EVB has two antenna tuners. Tuner model and signal are shown in the following figure.

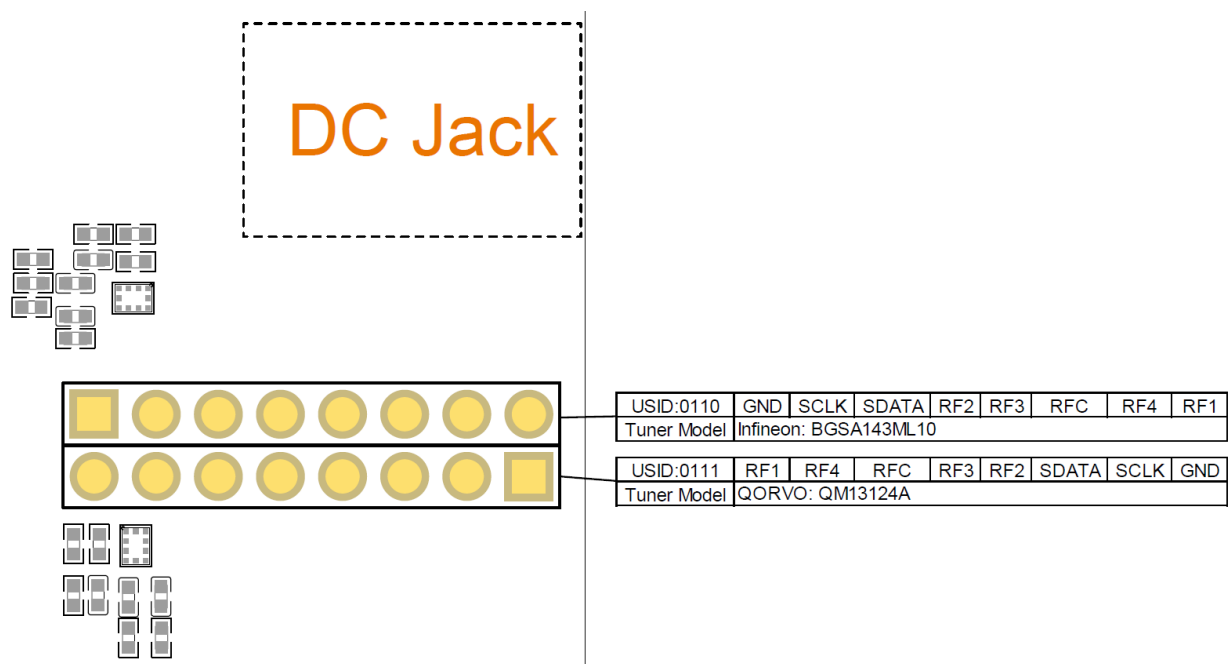


Figure 4. Antenna tuner

3 ADP Board Overview

The following figure shows the ADP board interfaces.

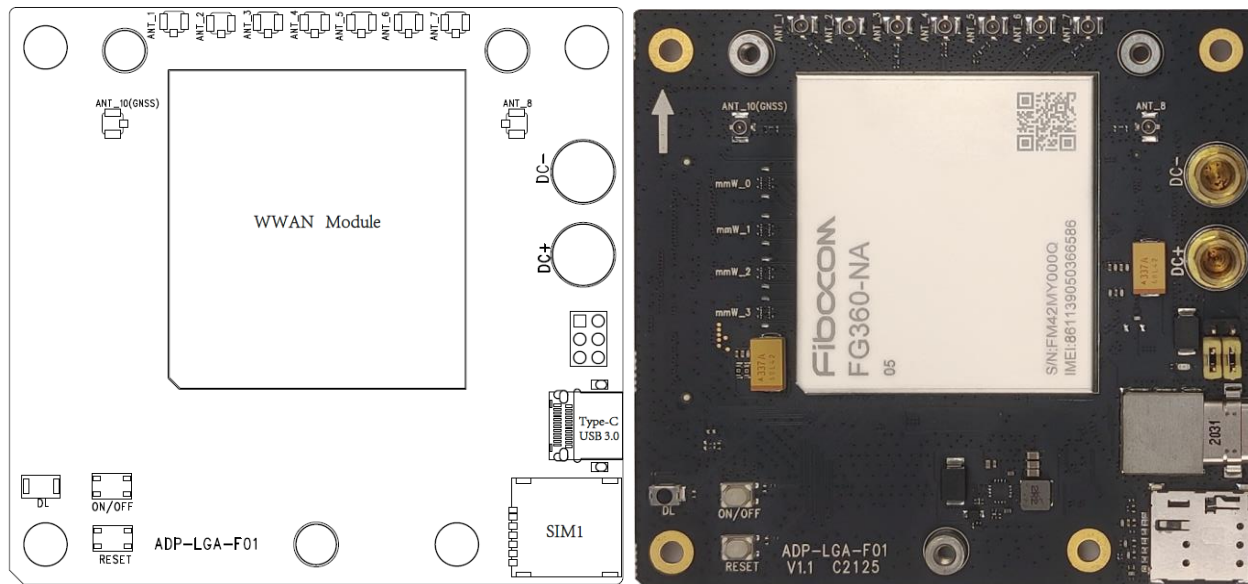


Figure 5. Top view of ADP-FG360-Series

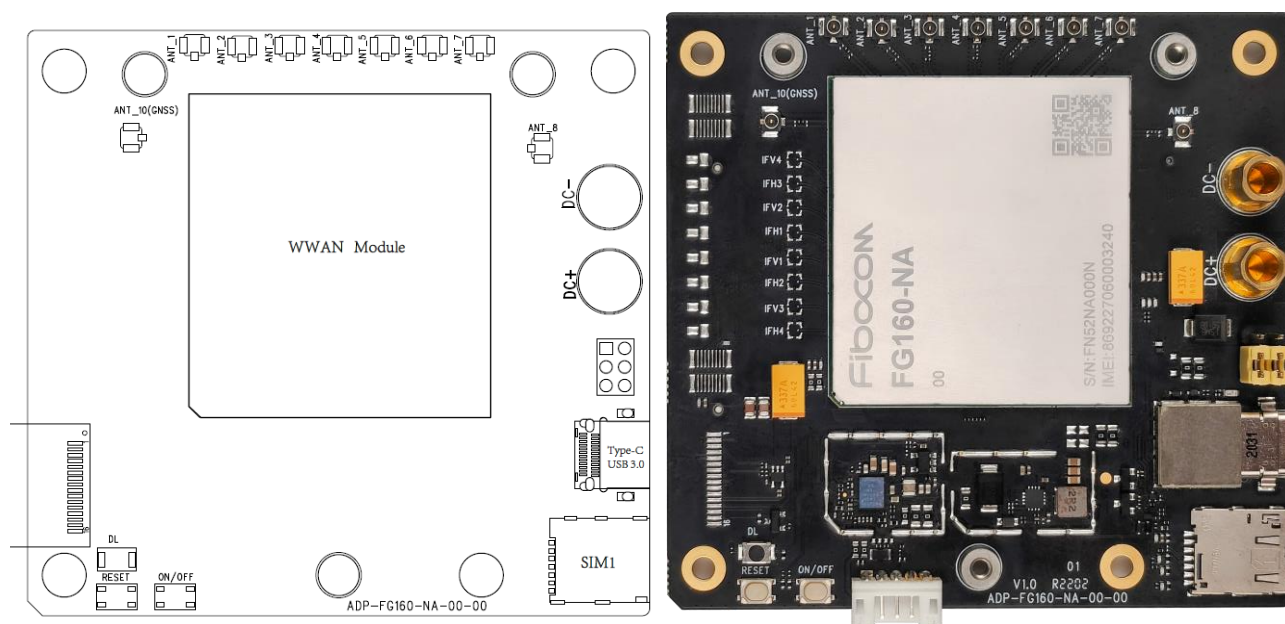


Figure 6. Top view of ADP-FG160-Series

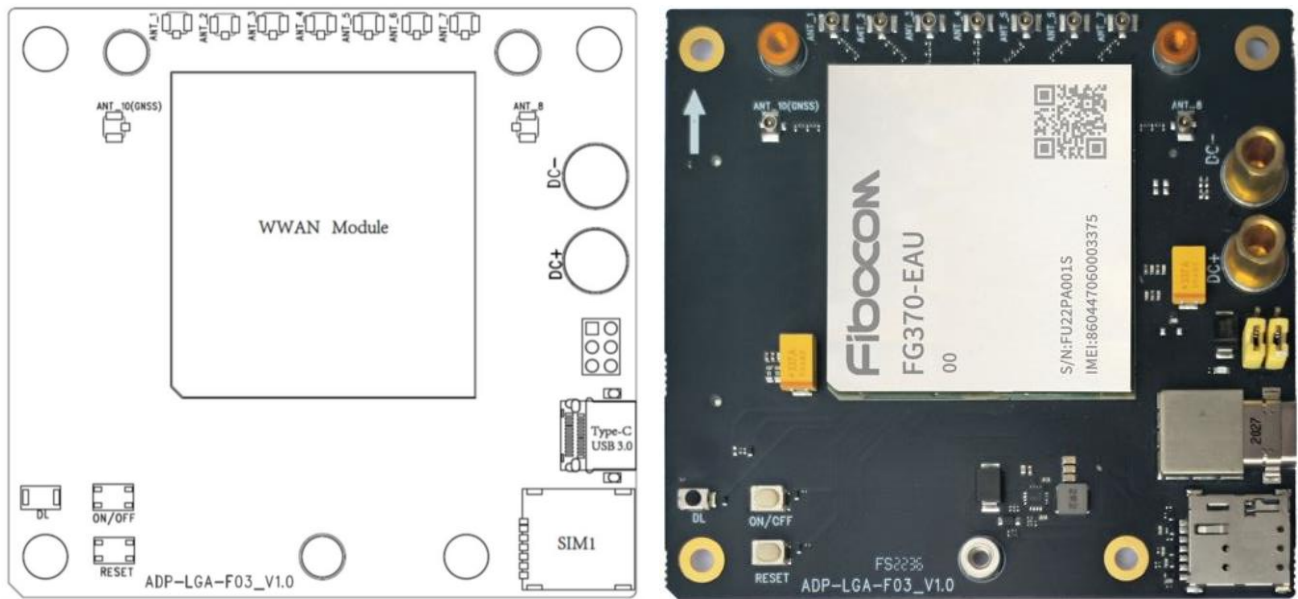


Figure 7. Top view of ADP-FG370-Series

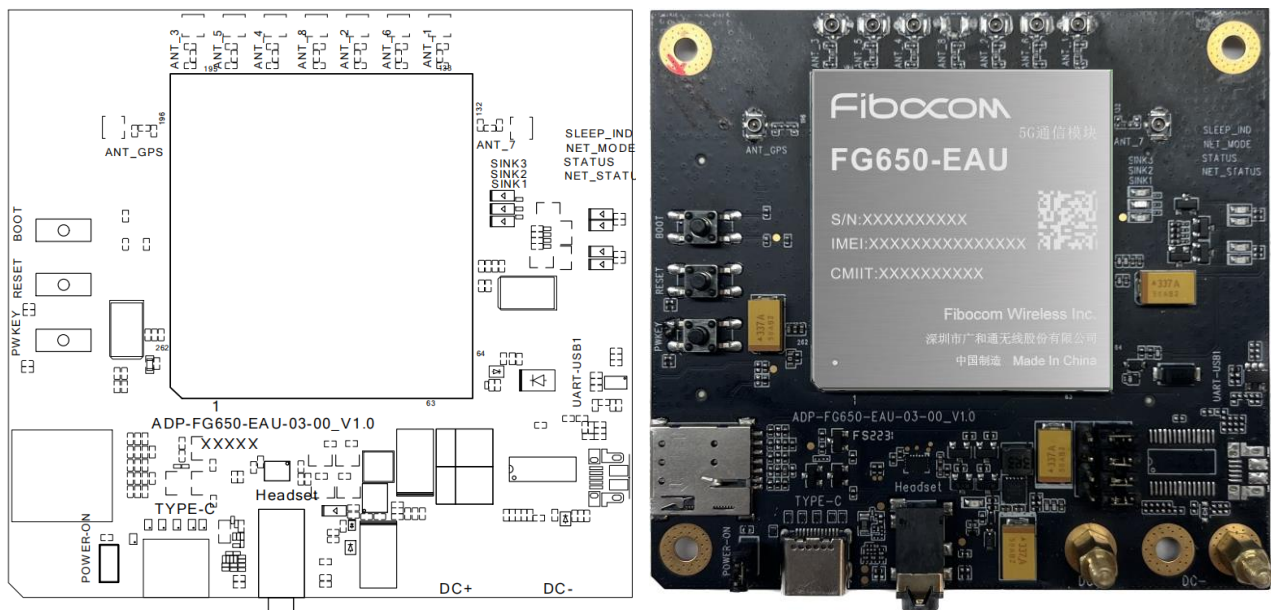
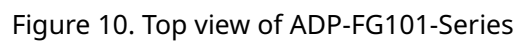
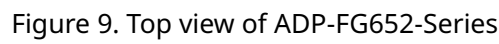


Figure 8. Top view of ADP-FG650-Series



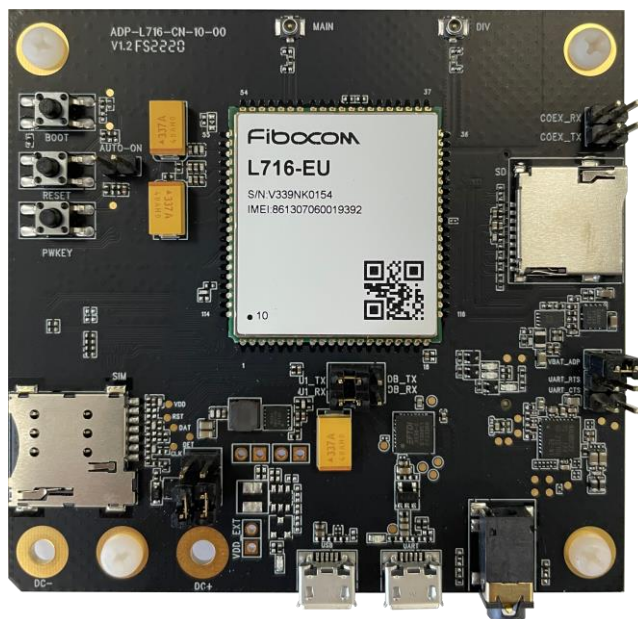
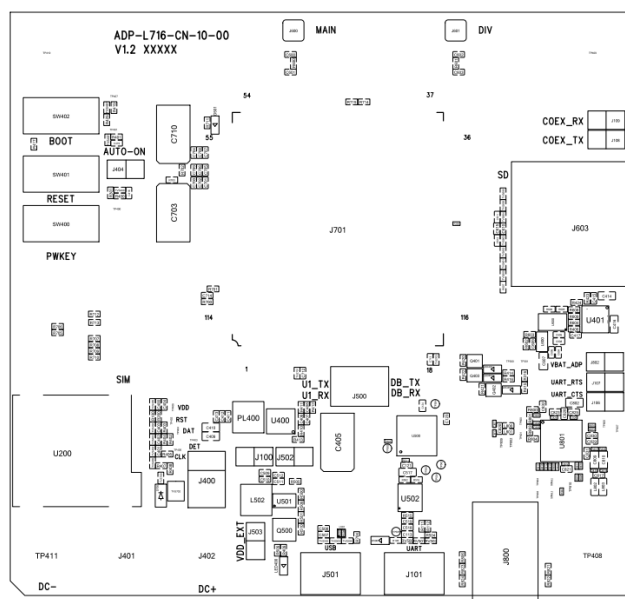


Figure 11. Top view of ADP-L716-Series

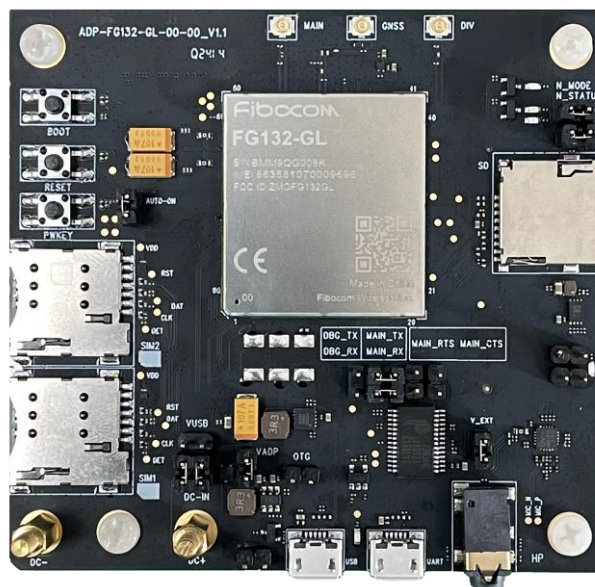
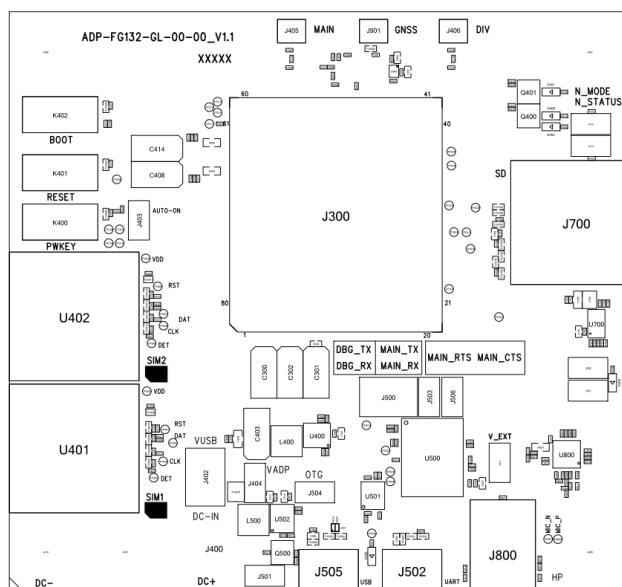
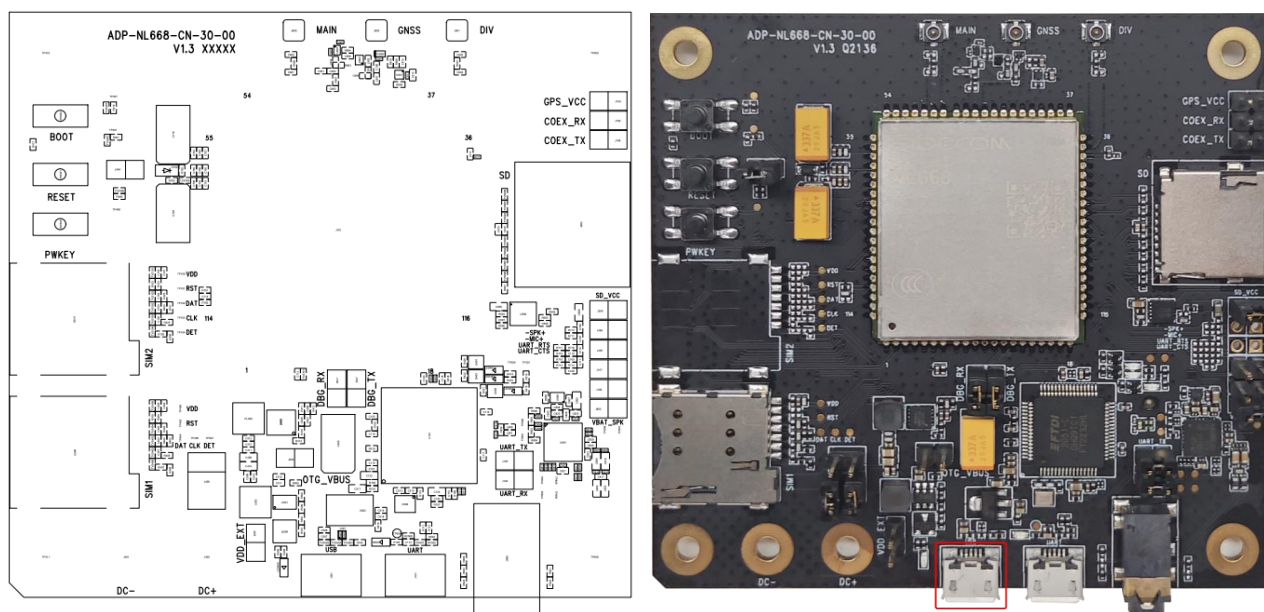
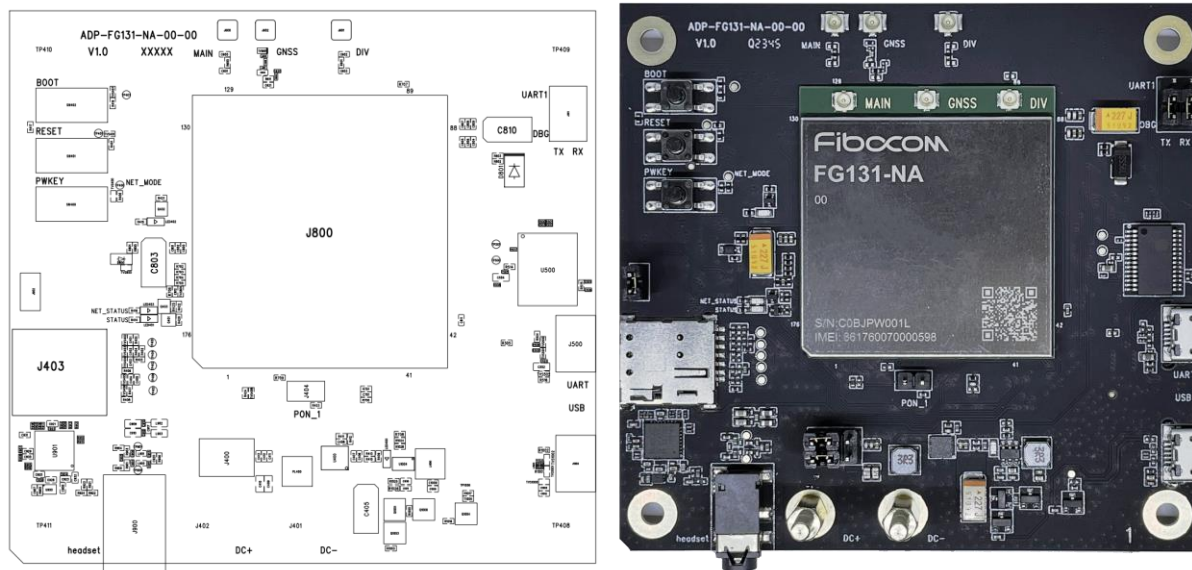


Figure 12. Top view of ADP-FG132-Series



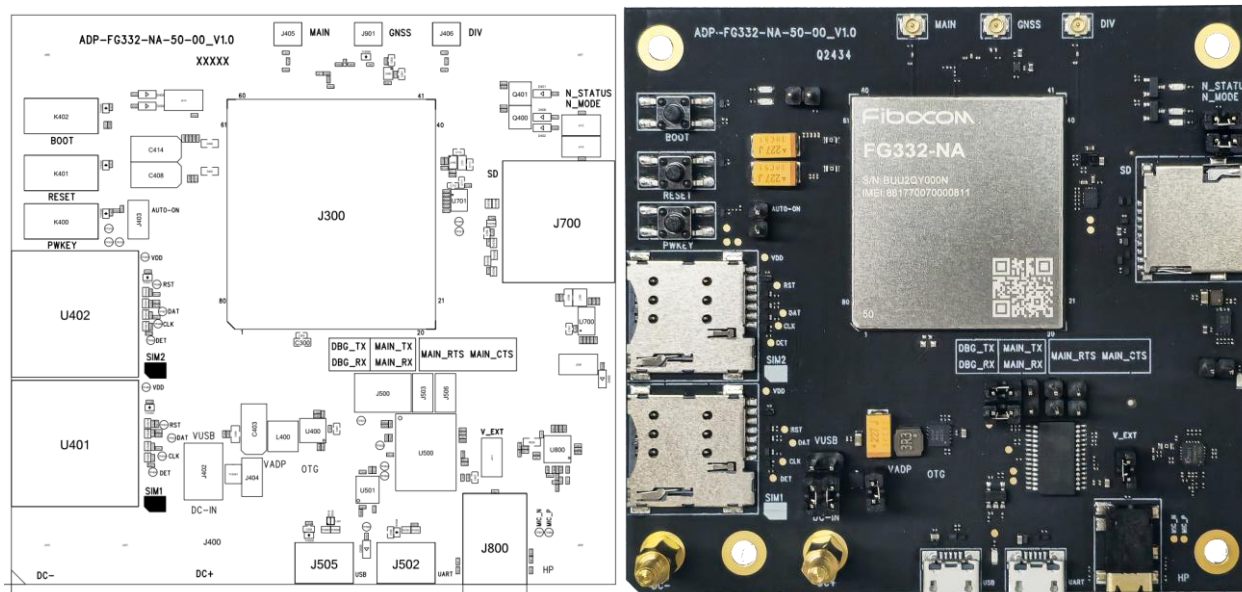


Figure 15. Top view of ADP-FG332-Series



Do not change the default jumper, otherwise it may cause power supply fail or module damage.

Table 3. ADP board interfaces description

Interface	Description
DC+/DC-	DC power supply: 3.8V. (Only for Fibocom internal R&D debug, customers can't use it as power supply)
Type-C USB3.0	Type-C USB3.0 port for WWAN development and data through-put test
Micro USB2.0	Micro USB2.0 port for AT and firmware download
SIM1	SIM1 card socket
Button	DL: forced FW download. Customers can't use forced download mode, because it will cause WWAN module RF NV parameters lost
	ON/OFF: Power ON/OFF control
	RESET: WWAN reset
Antenna	Refer to the hardware guide for the corresponding model

For more information, see the ADP User Guide.

4 Sub Board

The sub boards include Wi-Fi & Ethernet board, audio board, and WWAN ADP board. For WWAN ADP board, see the previous chapter.

4.1 Audio Sub Board

The following figure shows the audio sub board.

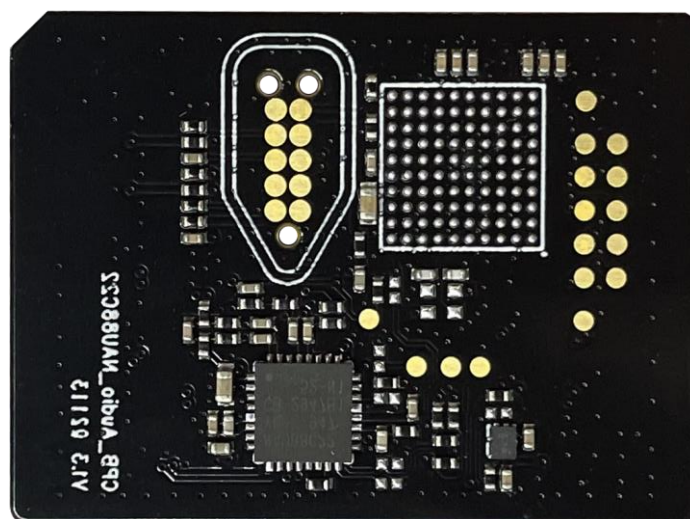


Figure 16. Audio sub board

4.2 FG360 Series Wi-Fi & Ethernet Sub Board

Table 4. Sub board model description

Model	Wi-Fi ANT	Ethernet PHY	Ethernet Interface
CPB-WLAN-MT-01	2.4G_4x4	RTL8221+RTL8211	LAN1+LAN2(WAN)
	5G_4x4		
CPB-WLAN-MT-02	2.4G_2X2	RTL8221+MT7531	LAN1+LAN2(WAN)+WAN/LAN3
	5GL_2X2		
	5GH_4X4		

4.2.1 CPB-WLAN-MT-01 WIFI ANT

Table 5. Wi-Fi ANT description

Wi-Fi ANT	Frequency Band
ANT1	2.4G 11b/g/n/ax+5G 11a/n/ac/ax
ANT2	2.4G 11b/g/n/ax+5G 11a/n/ac/ax
ANT3	2.4G 11b/g/n/ax+5G 11a/n/ac/ax

Wi-Fi ANT	Frequency Band
ANT4	2.4G 11b/g/n/ax+5G 11a/n/ac/ax

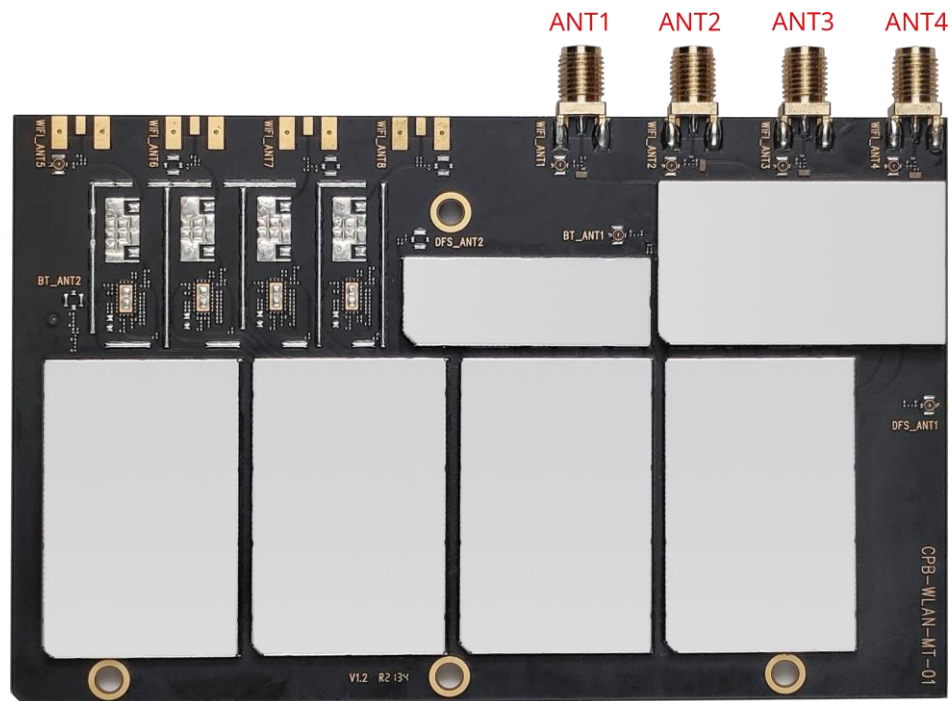


Figure 17. CPB-WLAN-MT-01 top view

4.2.2 CPB-WLAN-MT-02 WIFI ANT

Table 6. Wi-Fi ANT description

Wi-Fi ANT	Frequency Band
ANT1	2.4G 11b/g/n+5G 11a/n/ac/ax
ANT2	2.4G 11b/g/n+5G 11a/n/ac/ax
ANT3	5G 11a/n/ac/ax
ANT4	5G 11a/n/ac/ax
ANT5	5G 11a/n/ac/ax
ANT6	5G 11a/n/ac/ax

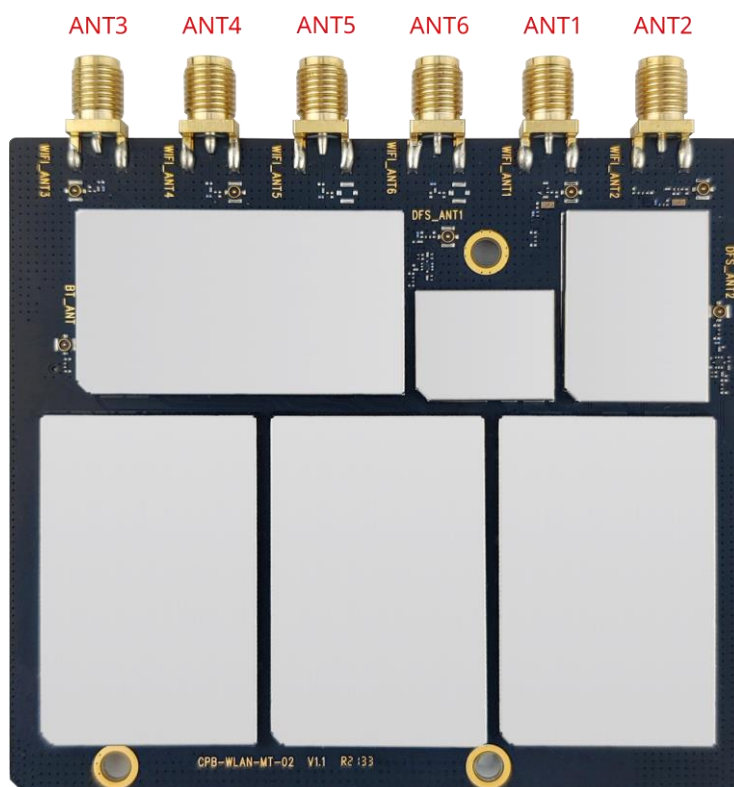


Figure 18. CPB-WLAN-MT-02 top view

4.3 FG160 Series Wi-Fi & Ethernet Sub Board

Table 7. Sub board description

Model	Wi-Fi ANT	Ethernet PHY	Ethernet Interface
CPB-ETH-00-00	N/A	RTL8125	LAN2
CPB-WLAN-01-00	2.4G 2X2 5G 2X2	RTL8211	LAN1

4.3.1 CPB-ETH-00-00

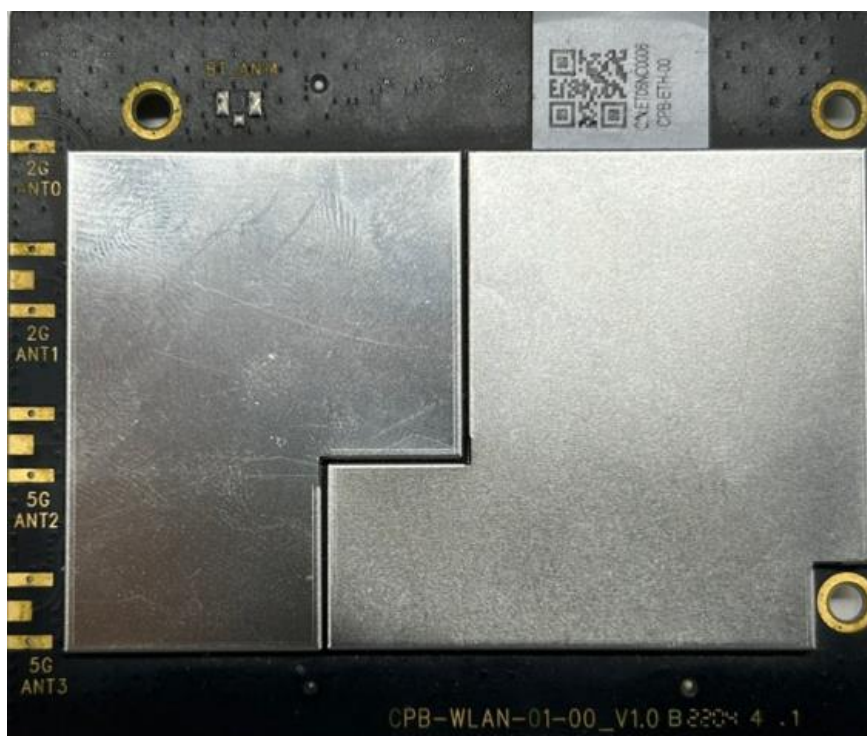


Figure 19. CPB-ETH-00-00 top view

4.3.2 CPB-WLAN-01-00

Table 8. Wi-Fi ANT description

Wi-Fi ANT	Frequency Band
ANT0	2.4G 11b/g/n/ax
ANT1	2.4G 11b/g/n/ax
ANT2	5G 11a/n/ac/ax
ANT3	5G 11a/n/ac/ax

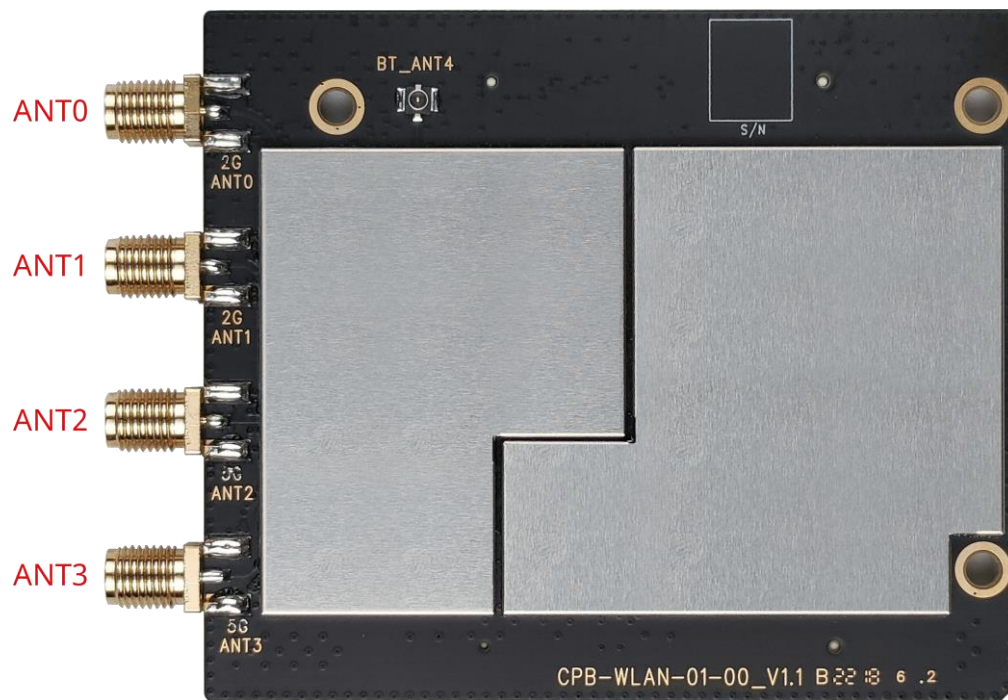


Figure 20. CPB-WLAN-01-00 top view

4.4 FG370 Series Wi-Fi & Ethernet Sub Board

Table 9. Sub board description

Model	Wi-Fi ANT	Ethernet PHY	Ethernet Interface
CPB-WETH-01-00 (WIFI6E)	2.4G 4X4	RTL8221&RTL8211	LAN1&2
	5G 4X4		
	6G 4X5		
CPB-WETH-02-00 (MIFI)	2.4G 2X2	RTL8211	LAN1
	5G 2X2		
CPB-WETH-03-00 (WIFI7)	2.4G 4X4	RTL8221&RTL8211	LAN1&2
	5G 4X4		
	6G 4X5		

4.4.1 CPB-WETH-Series

Table 10. Wi-Fi ANT description

Wi-Fi ANT	CPB-WETH-01-00 Frequency Band	CPB-WETH-02-00 Frequency Band	CPB-WETH-03-00 Frequency Band
ANT0	2G 11b/g/n/ax & 5G 11a/n/ac/ax		2G 11b/g/n/ax & 5G 11a/n/ac/ax
ANT1	2G 11b/g/n/ax & 5G	2G 11b/g/n/ax & 5G	2G 11b/g/n/ax & 5G

Wi-Fi ANT	CPB-WETH-01-00 Frequency Band	CPB-WETH-02-00 Frequency Band	CPB-WETH-03-00 Frequency Band
	11a/n/ac/ax	11a/n/ac/ax	11a/n/ac/ax
ANT2	2G 11b/g/n/ax & 5G 11a/n/ac/ax	2G 11b/g/n/ax & 5G 11a/n/ac/ax	2G 11b/g/n/ax & 5G 11a/n/ac/ax
ANT3	2G 11b/g/n/ax & 5G 11a/n/ac/ax		2G 11b/g/n/ax & 5G 11a/n/ac/ax
ANT5	6G 11ax		6G 11ax
ANT6	6G 11ax		6G 11ax
ANT7	6G 11ax		6G 11ax
ANT8	6G 11ax		6G 11ax

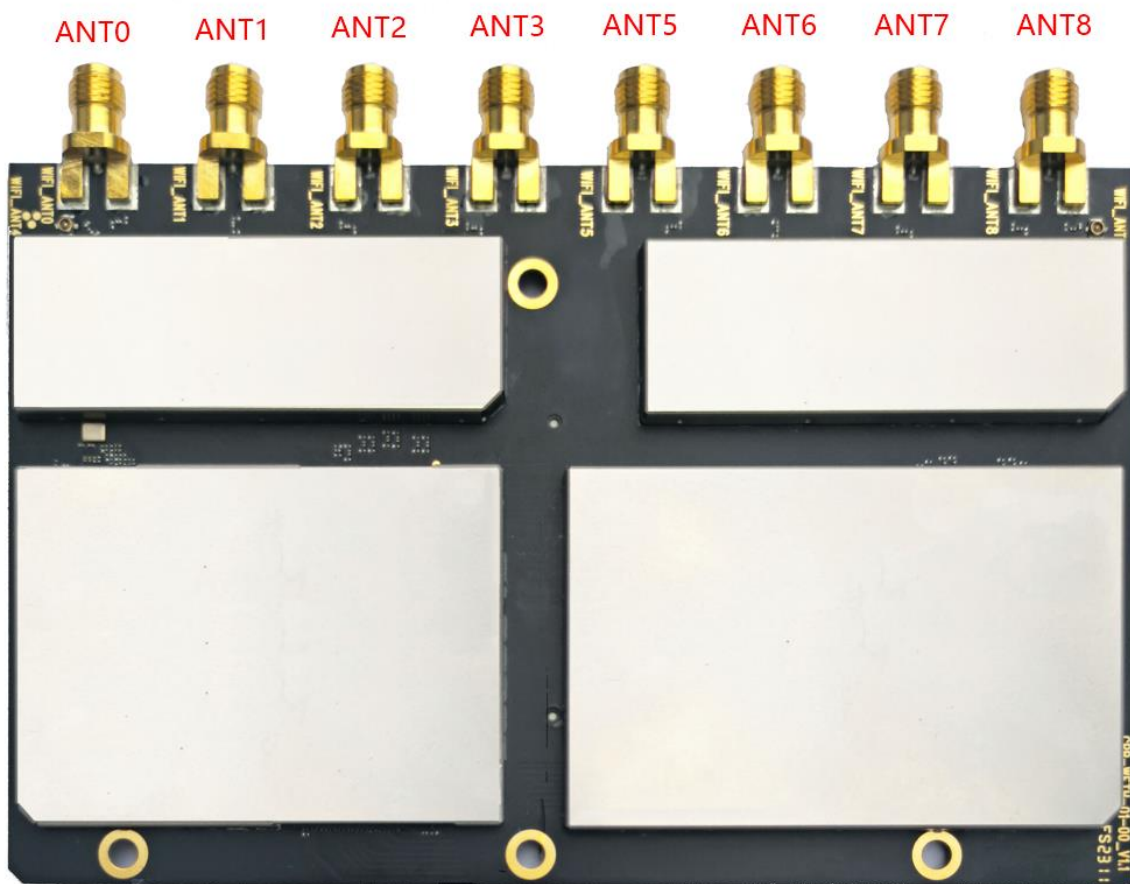


Figure 21. CPB-WETH-Series top view

4.5 FG65x & FG101 Series Wi-Fi & Ethernet Sub Board

Table 11. Sub board description

Model	Wi-Fi ANT	Ethernet PHY	Ethernet Interface
CPB-WIFI-10-00	2.4G 2X2 5G 2X2	RTL8111H	LAN1

4.5.1 CPB-WIFI-10-00

Table 12. Wi-Fi ANT description

Wi-Fi ANT	Frequency Band
ANT2	Bluetooth 5
ANT1	2.4G 11b/g/n/ax+5G 11a/n/ac/ax
ANT3	2.4G 11b/g/n/ax+5G 11a/n/ac/ax

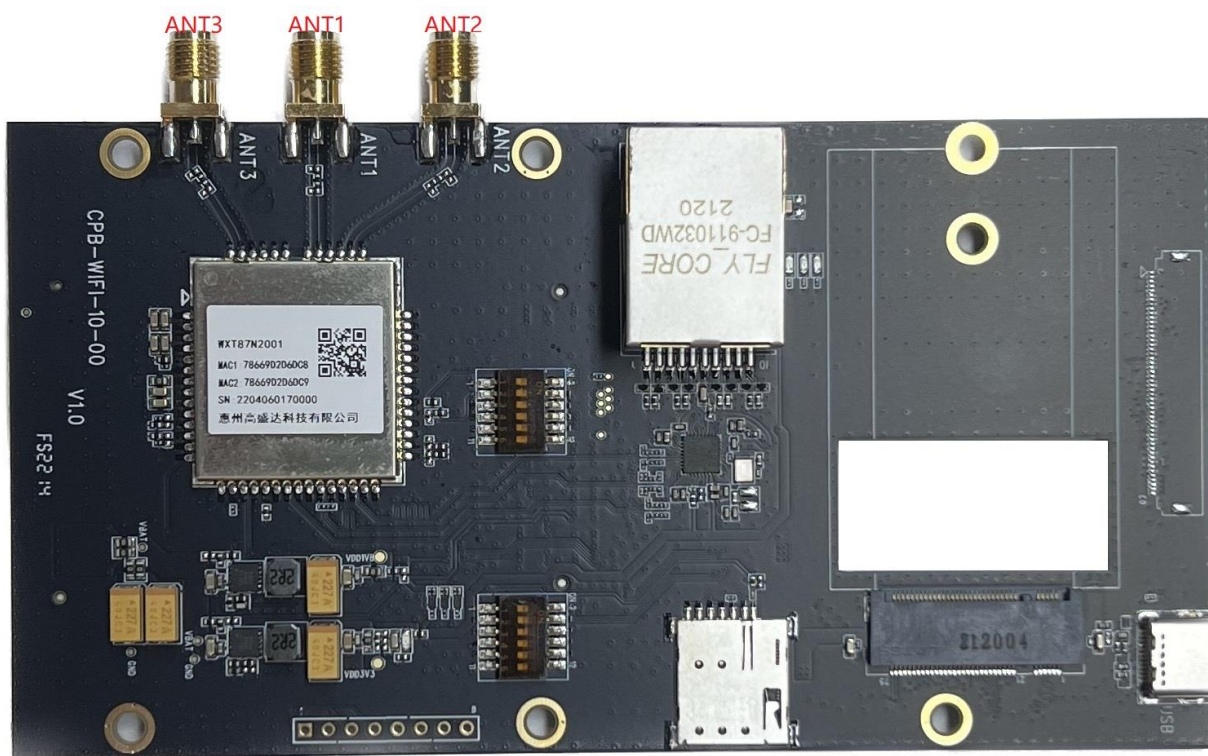


Figure 22. CPB-WIFI-10-00 top view

4.6 L716 Series Wi-Fi & Ethernet Sub Board

4.6.1 CPB-WETH-00-00

Table 13. Wi-Fi ANT description

Wi-Fi ANT	Frequency Band
ANT0	2.4G 11b/g/n+5G 11a/n/ac
ANT1	2.4G 11b/g/n+5G 11a/n/ac

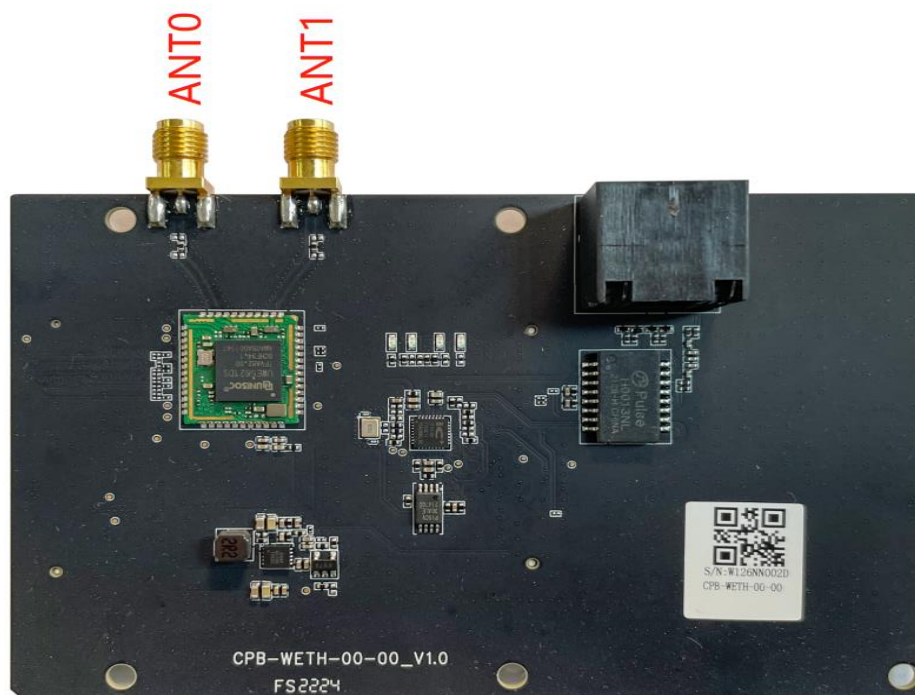


Figure 23. CPB-WETH-00-00 top view

4.6.2 CPB-WETH-10-00

Table 14. Wi-Fi ANT description

Wi-Fi ANT	Frequency Band
ANT0	2.4G 11b/g/n
ANT1	2.4G 11b/g/n

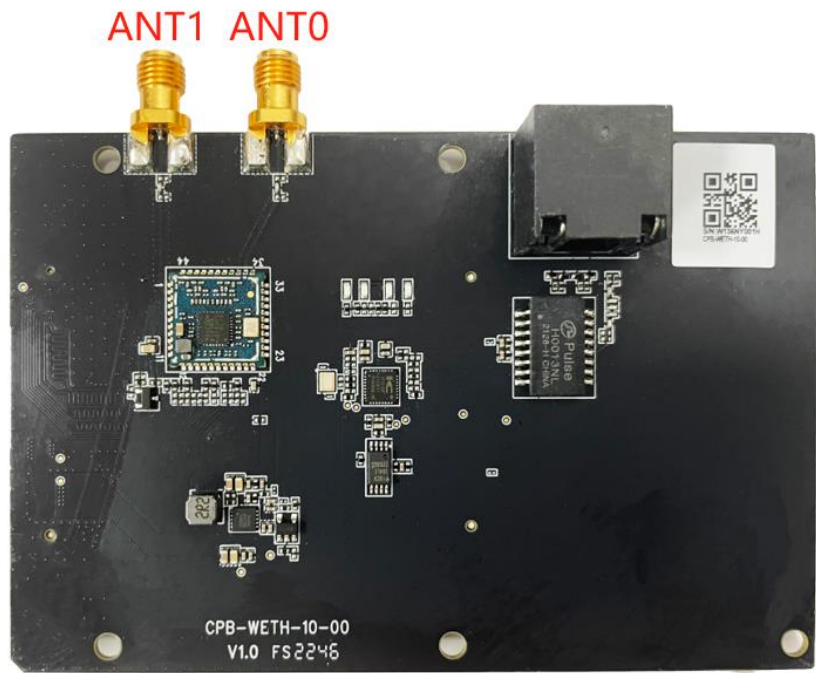


Figure 24. CPB-WETH-10-00 top view

4.7 FG132 & FG131 Series Wi-Fi & Ethernet Sub Board

4.7.1 CPB-WETH-00-10

Table 15. WiFi6 ANT description

Wi-Fi ANT	Frequency Band
ANT0	2.4G 11b/g/n/ac/ax+5G/6G 11a/n/ac/ax
ANT1	2.4G 11b/g/n/ac/ax+5G/6G 11a/n/ac/ax



2.4G 11ax is backward compatible with 11ac.

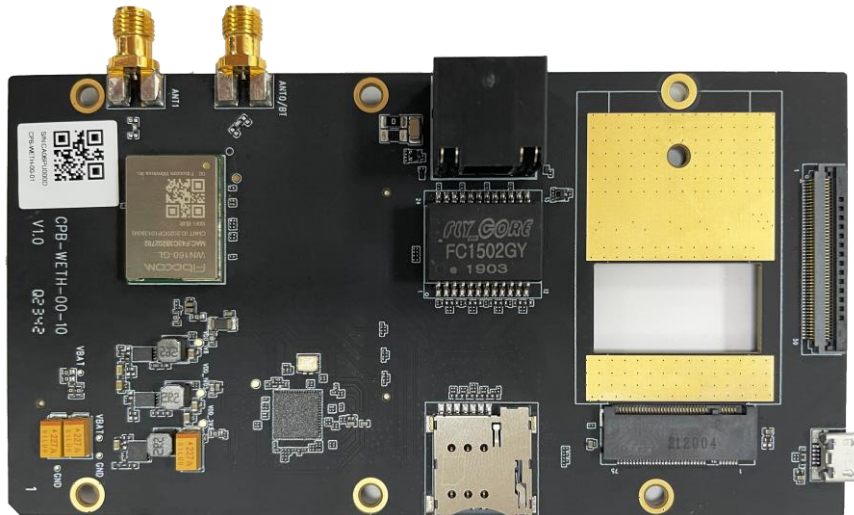


Figure 25. CPB-WETH-00-10 top view

4.7.2 CPB-WETH-00-11

Table 16. WiFi5 ANT description

Wi-Fi ANT	Frequency Band
WF_RF0	2.4G 11b/g/n + 5G 11a/n/ac
WF_RF1	2.4G 11b/g/n + 5G 11a/n/ac

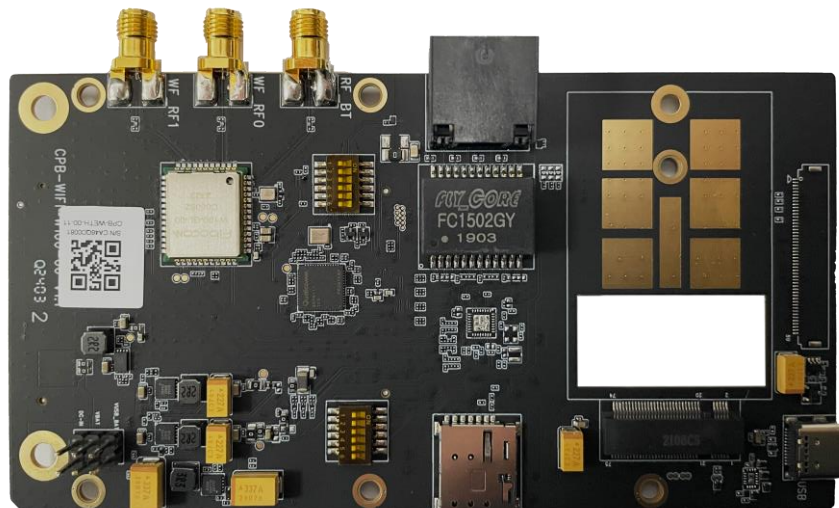


Figure 26. CPB-WETH-00-11 top view

4.8 NL668 Series Wi-Fi & Ethernet Sub Board

4.8.1 CPB-WETH-10-00

Table 17. Wi-Fi ANT description

Wi-Fi ANT	Frequency Band
ANT0	2.4G 11b/g/n
ANT1	2.4G 11b/g/n

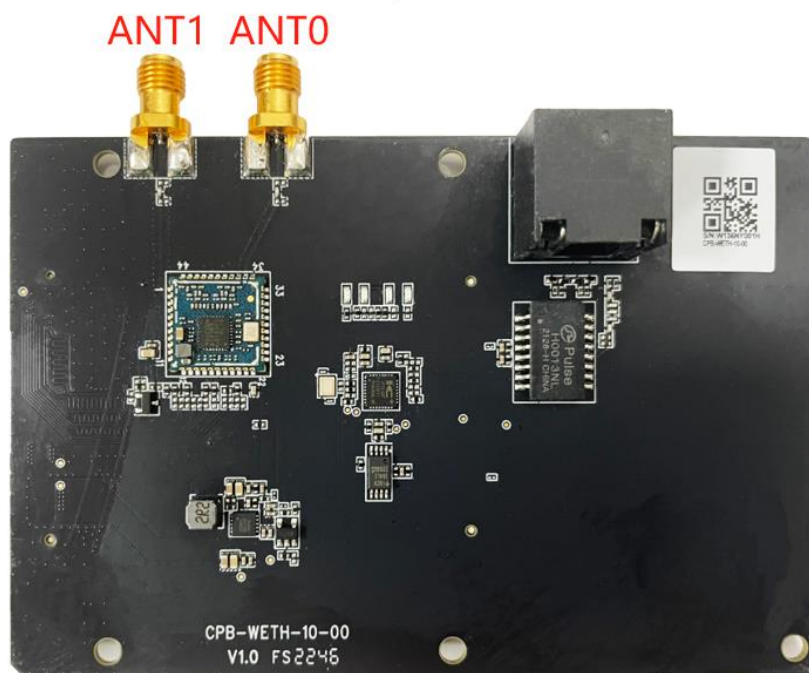


Figure 27. CPB-WETH-10-00 top view



NL668 only adjusts the Wi-Fi function on the CPB-WETH-10-00 board, which is for reference.

5 EVK Accessories

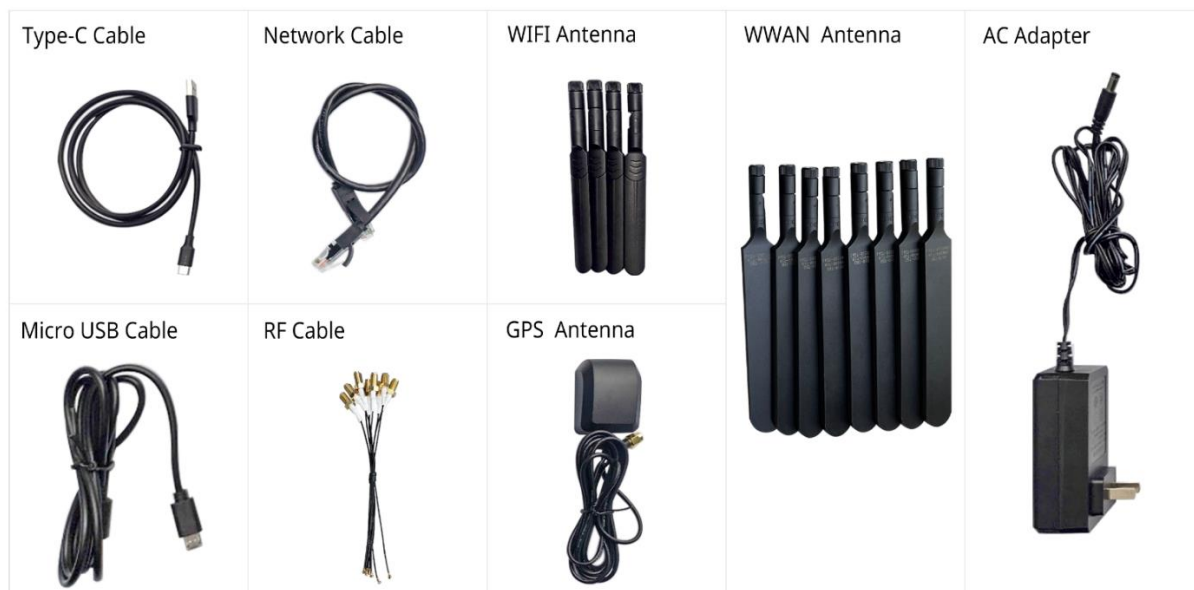


Figure 28. EVK accessories

6 Development Environment

The following figure shows the development environment.

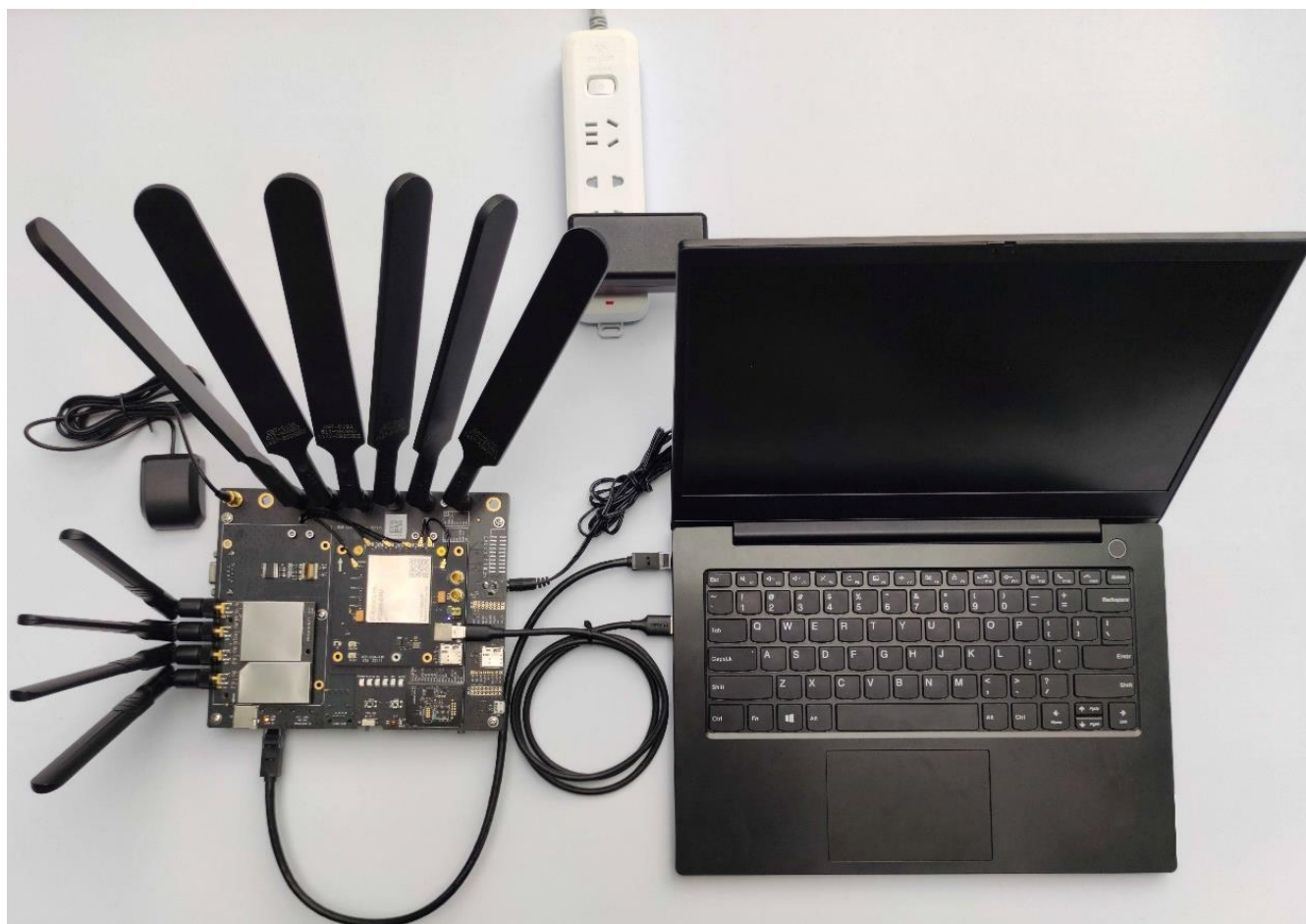


Figure 29. Development environment

The detailed environment building process is as below:

1. Assemble ADP, Wi-Fi & Ethernet, and Audio boards on EVB.
2. Connect RF cable with WWAN module, and connect RF and GNSS antennas on SMA port.
3. Connect Wi-Fi antennas on Wi-Fi & Ethernet board.
4. Connect Type C USB 3.0 cable to PC.
5. Connect ethernet cable on LAN1 port (LAN2 and WAN/LAN3 port can also be used).
6. Power on AC adapter on DC Jack.

Power on module by pressing the ON/OFF button on ADP board, then WWAN will power on. If USB 3.0 is connected, WWAN will power on automatically (this application is only used in FG360 Series).

When the development environment is ready, ADP and EVB boards LED will be on as below.

Table 18. LED indicator status

Board	EVb Board									ADP Board
LED	Power	Status	5G	4G	WIFI	Audio	LAN1	LAN2	WAN/LAN3	USB
Status	On	-	-	-	-	-	-	-	-	On

After that, developers can test and verify FG360 series CPE function and performance. For the details about Open Linux operations, see *Fibocom_FG360_OpenLinux Series User Guide*.