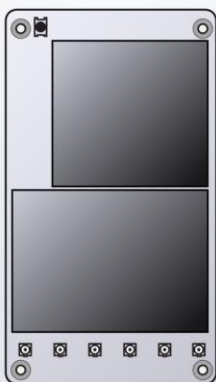


10km, 30km Wireless Module

User guide



wlstron

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First edition pre-release draft. Version: 0.8

Introduction

Mercury is a wireless module designed for use on unmanned aerial vehicles (UAV) or drones. The module has triband support (1/2.4/5GHz) with 4x4 MIMO, and operates on multiple radiofrequency bands (903~927, 2400~2483, 5150~5850MHz). It supports 30km maximum distance transmission.

Unpacking

Carefully unpack and remove the items from the packing carton, and make sure the following are present and in good condition:

- Mercury wireless module



- Carrier board and Antenna set (optional)

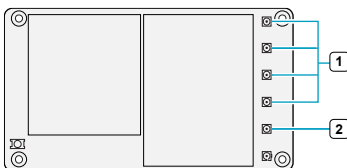


Contact your supplier if any item is missing or damaged. See appendix for more details on the carrier board and antenna set.

Product tour

Take a moment to familiarize yourself with the wireless module:

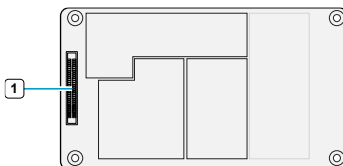
Top view



1 2.4/5GHz connectors

2 Sub 1G connector

Bottom view



1 Interface connector

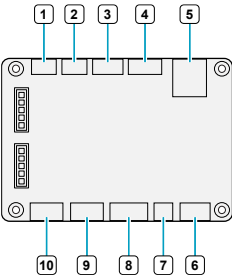
Using the wireless module

The following information helps you test and configure the wireless module to aid you in designing it into your UAV system.

Connecting the wireless module to the carrier board

You can connect the wireless module to an optional carrier board for testing and configuration. The carrier board has USB, Ethernet, audio in/out, GPIO and UART connectors. For more details on the carrier board, please see the Appendix.

Carrier board and pin definition



1	UART1	6	Microphone
2	UART5	7	Speaker
3	Ethernet	8	Power
4	USB 2	9	GPIO
5	USB 3	10	USB debug

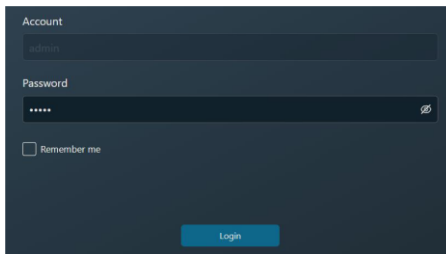
Do as follows:

1. Attach the wireless module to the carrier board through the interface connector.
2. Supply 12V power to the carrier board (CN400 power connector).
3. Connect the carrier board to the computer using a USB Type-C cable.

Interfacing with the wireless module

The wireless module settings can be accessed through a browser. Do as follows:

1. Launch a browser and go to:
<https://192.168.225.1:8443/>
2. At the login screen, enter the initial password “admin”; then click **Login**.



You are prompted to change your password if this is the first time you are logging into your account. Follow the onscreen instructions and tap Save Changes; then tap Return to Login Page, and log in using your new password.

Please change your password to continue. ⓘ

Account

admin

Password

Confirm Password

Save Changes

Password Setting Rules

- At least 6-64 characters
- Must include numbers, uppercase and lowercase letters, and special symbols (such as !@#%&*^"~)
- Should not have obvious meanings

You are greeted with the following home screen.

Status bar

User setting

Navigation items to enter the target page

Host Name	Product Name
gpc405-pine	Mercury
Hardware Version	Software Version
Mercury_2.0_SC	v002h1_20241105.0
Software Build	Temperature(°C)
20241105.0	69
Description	System Date
Mercury Long Range RF Module	20250811
System Uptime	Build Date
5:28	20241105

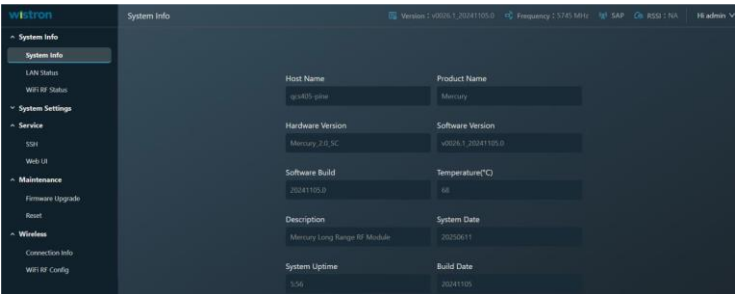
The status bar updates every 5 seconds. Press **F5** to manually refresh a page and update the data.

The web interface is divided into five sections:

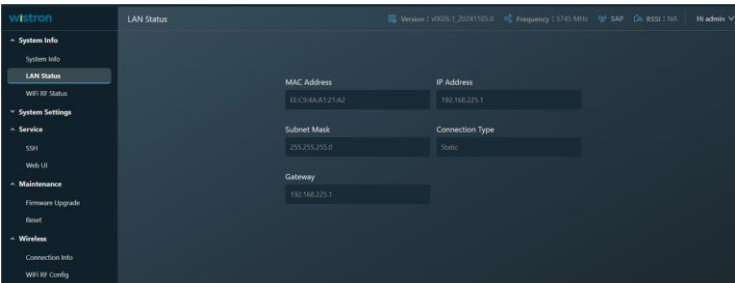
- System info
- System settings
- Service
- Maintenance
- Wireless

System info

The System info section is divided into the following pages: System info and RF status, which list the hardware information of the wireless module.



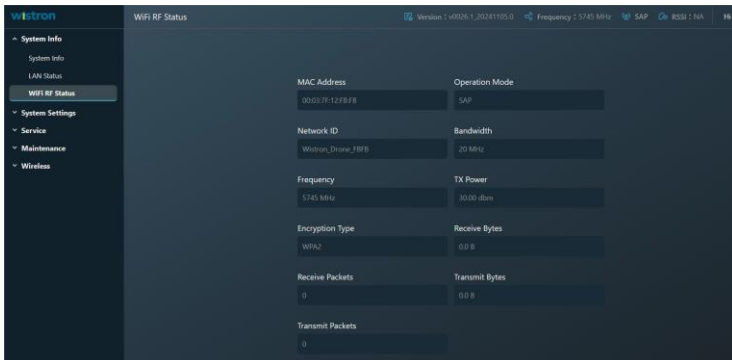
System Info	
Host Name	Product Name
g440-gsm	Mercury
Hardware Version	Software Version
Mercury 2.0 SC	v8026.1_20241105.0
Software Build	Temperature(°C)
20241105.0	68
Description	System Date
Mercury Long Range RF Module	20250611
System Uptime	Build Date
5:50	20241105



LAN Status	
MAC Address	IP Address
EE:C9:4A:A1:21:A2	192.168.225.1
Subnet Mask	Connection Type
255.255.255.0	Static
Gateway	
192.168.225.1	

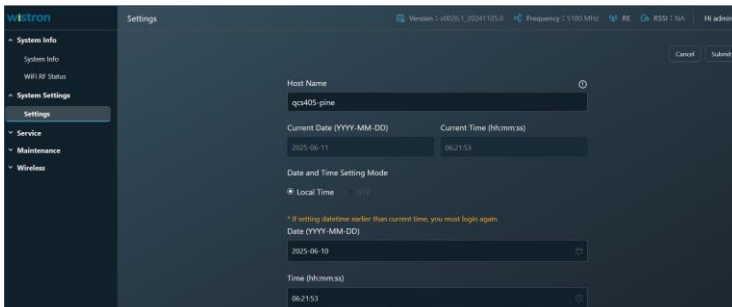


LAN Status page is not available on this model which does not have a physical Ethernet port.



System Settings

The System settings section has a single Settings page that lets you set a custom host name and the local date and time on the system.



If you set a date and time earlier than the current time, you must log in again.

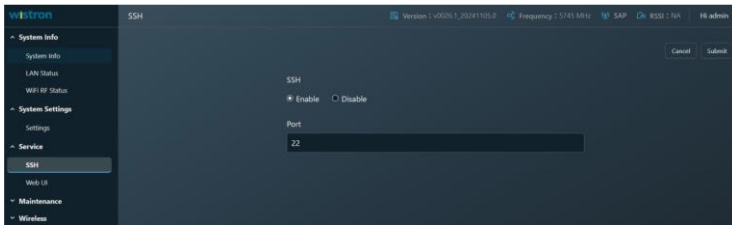
Service

The Service section is divided into two pages: SSH and Web UI, which specify the method and ports to connect to the wireless module.



The SSH port and the HTTP(s) port cannot be set to the same value.

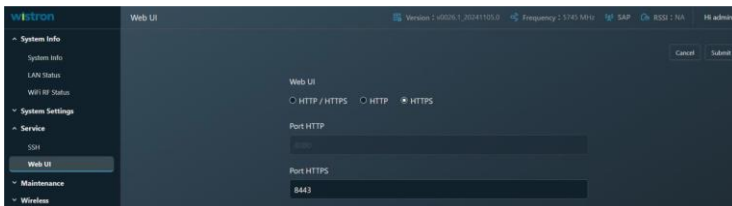
The ports allowed for SSH are 22 or between 10000 and 65535.



It can support both protocols (HTTP and HTTPS) or only HTTP(s).

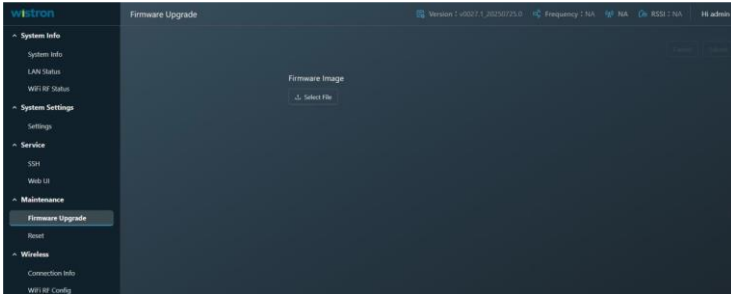
The ports allowed for HTTP are 8080 or between 10000 and 65535.

The ports allowed for HTTP(s) are 8443 or between 10000 and 65535.



Maintenance

The Maintenance section is divided into two pages: Firmware Upgrade and Reset. Firmware updates ensure your wireless module is operating at maximum operating efficiency with the latest features.

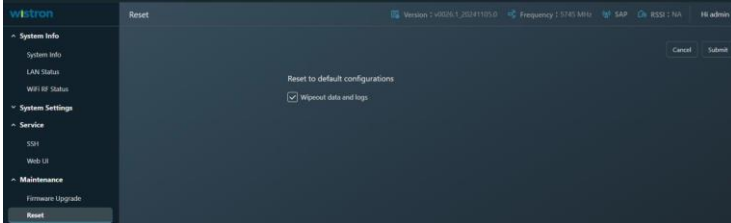


After downloading the latest firmware update file, click **Select File** and browse to locate the file.

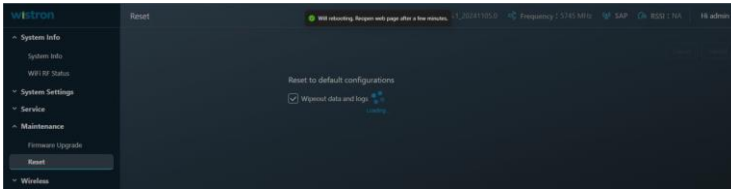


Click **Submit** to begin updating the firmware.

The Reset page allows you to reset the wireless module to its default configuration.



Click the Wipeout data and logs checkbox; then click **Submit**.



The system reboots. Reopen the web page after a few minutes. All information are restored to their default values when you log in again.

Wireless

The Wireless section is divided into two pages: Connection Info and WiFi RF Config, which allow you to view the connection info and configure the RF settings.

MAC Address	Tx Mode (MIMO)
1a:1b:c4:2d:8a:0a	41
Rx Mode (MIMO)	SNR (dB)
0	0
RSSI (dBm)	Signal Level
NA	NA

- SAP mode: displays the MAC address of the other party (may have multiple records)
- STA mode: displays the MAC address of the connected AP (only one record)
- RE mode: displays both of the above, if there is a connection



When SAP/RE mode is on, there may be multiple MAC address entries.

In the WiFi RF Config page, you can configure the desired settings and press **Submit**. The changes take effect after a few seconds, and are displayed on the status bar and on the WiFi RF Status page.

The screenshot shows the 'WiFi RF Config' page in a web interface. The left sidebar contains a menu with 'WiFi RF Config' highlighted. The main content area displays the following settings:

- Radio: ☒ On ☐ Off
- Radio Band: 5GHz
- Channel Bandwidth: 20 MHz
- Channel: 149
- TX Power: 24
- TX Antenna Chains: 2T

At the top right of the main area, there are links for 'Cancel' and 'Submit'.

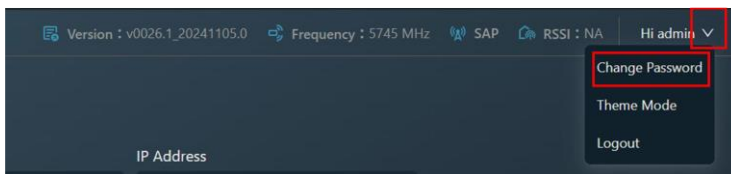
This screenshot shows the lower portion of the 'WiFi RF Config' page, displaying advanced settings:

- RX Antenna Chains: 4R
- Operation Mode: SAP
- TX Rate: Auto (Recommended)
- Network ID: Wistron_Drone_FBFB
- Encryption Type: WPA2
- Encryption Key: [masked]

Information icons (i) are present next to the 'Network ID' and 'Encryption Key' fields.

Changing user settings

Click **v** to change user settings such as the password and theme mode, and to log out.



To change the password, click **Change Password** and follow the onscreen instructions. Click **Submit** to save your changes.

Specifications

The table below lists the specifications.

Item	Details
Processor	Qualcomm® QCS405 Qualcomm® QCN9074
Wireless	Wi-Fi 6 1/2.4/5GHz band with 4x4 MIMO WPA/WPA2/WPA3/AES256 encryption
Hopping	2.4/5GHz (intraband hopping)
RF range	903~927, 2400~2483, 5150~5850MHz
Bandwidth	5/10MHz (narrow bandwidth for long-range application) 20/40/80/160MHz (standard bandwidth) 0.2~1.2MHz (sub g bandwidth)
Throughput data rate	150Mbps (2.4/5G) 2.4Mbps (sub 1G)
Transmission range	10km (Wi-Fi) 30km (Proprietary)
Operating mode	Point to point, Point to Multipoint, Mesh
Interface (carrier board)	USB 2.0 USB 3.0 UART

Item	Details
	GPIO Ethernet 10/100 Audio in/out
Power output	Wi-Fi 0.5W per chain (Total 2W) Sub 1G: 1W
Power requirements	12W, 3.3V
Dimensions	82.5 x 46 x 0.83mm
Weight	~25g
Temperature	-10° ~ 50°C
Regulatory	FCC/CE/NCC

Regulatory statements

Information on test modes and additional testing requirements and Part 15 Subpart B disclaimer:

The transmitter is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitter(s) or being used in a portable condition will need a separate reassessment through a class II permissive change application or new certification.

This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.

As long as all conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

FCC Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed

and operated with a minimum distance of 28 cm between the radiator and a human body.

If the identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module, Contains FCC ID: PU5-MERCURY.

Co-location of this module with other transmitters that operate simultaneously are required to be evaluated using the multi-transmitter procedures.

The host integrator must follow the integration instructions provided in this document and ensure that the composite-system end product complies with the requirements by a technical assessment or evaluation to the rules and to KDB Publication 996369.

The host integrator installing this module into their product must ensure that the final composite product complies with the requirements by a technical assessment or evaluation to the rules, including the transmitter operation and should refer to guidance in KDB 996369.

ISED Statement

This device contains licence-exempt transmitter(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

(1) this device may not cause interference,

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

(1) L'appareil ne doit pas produire de brouillage;

(2) L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 28 cm between the radiator and a human body.

Cet équipement est conforme aux limites d'exposition aux rayonnements ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec une distance minimale de 28 cm entre le radiateur et un corps humain.

If the identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module, Contains IC: 4182A- MERCURY

Si le numéro d'identification n'est pas visible lorsque le module est installé à l'intérieur d'un autre appareil, alors l'extérieur de l'appareil dans lequel le module est installé doit également afficher une étiquette faisant référence au module fourni, Contient IC : 4182A-MERCURY

NCC Statement:

「取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。」

For module:

此模組於取得認證後將依規定於模組本體標示審驗合格標籤，並要求平台廠商於平台上標示本產品內含發射器模組

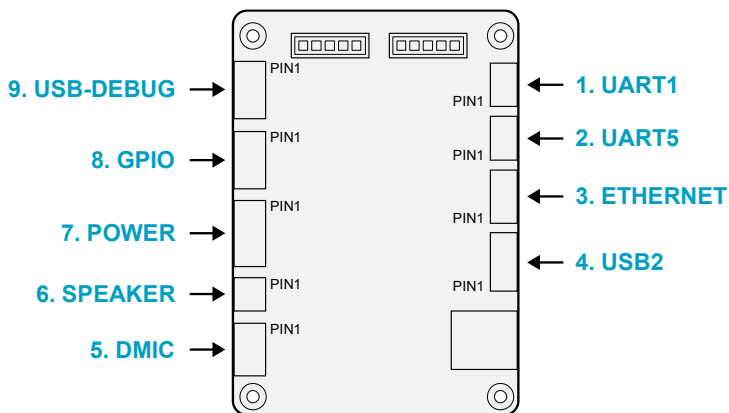


For WIFI 5G:

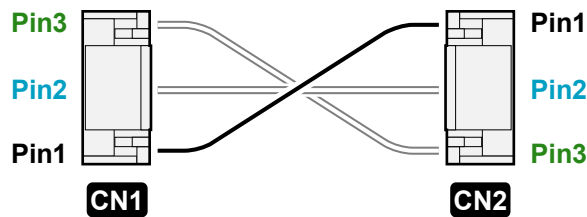
應避免影響附近雷達系統之操作。

高增益指向性天線只得應用於固定式點對點系統。

Appendix A Carrier Board



1. UART1

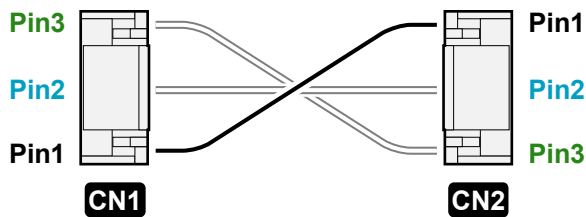


Pin Definition				
CN1	AWG	Color	Function	CN2
Pin1	30	Black	GND	Pin1
Pin2	30	White	TXS_UART5_TX	Pin2
Pin3	30	White	TXS_UART5_RX	Pin3



Pin2 and Pin3 connect by twisted wires.

2. UART5

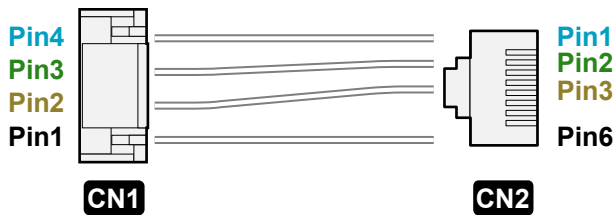


Pin Definition				
CN1	AWG	Color	Function	CN2
Pin1	30	Black	GND	Pin1
Pin2	30	White	TXS_UART5_TX	Pin2
Pin3	30	White	TXS_UART5_RX	Pin3



Pin2 and Pin3 connect by twisted wires.

3. Ethernet



Pin Definition					
CN1	AWG	Color	Function	CN2	
Pin1	28	White	PJ1-	Pin6	
Pin2	28	White	PJ1+	Pin3	
Pin3	28	White	PJ0-	Pin2	
Pin4	28	White	PJ0+	Pin1	



Pin1 and Pin2 connect by twisted wires. Pin3 and Pin4 connect by twisted wires.

4. USB2

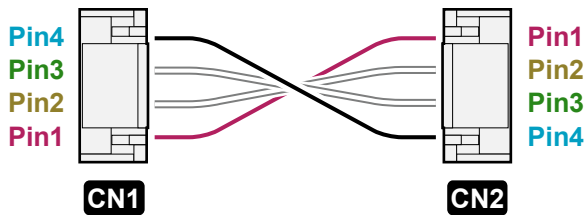


Pin Definition				
CN1	AWG	Color	Function	CN2
Pin1	26	Red	USB_VBUS	Pin1
Pin2	30	White	G_USB_HS_DM_CN	Pin2
Pin3	30	White	G_USB_HS_DP_CN	Pin3
Pin4	30	White	USB0_HS_ID	Pin4
Pin5	26	Black	GND	Pin5



Pin2 and Pin3 connect by twisted wires.

5. DMIC

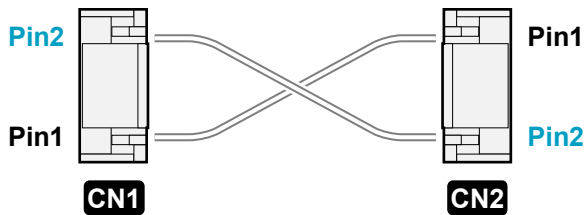


Pin Definition				
CN1	AWG	Color	Function	CN2
Pin1	28	Red	VCC_1V8	Pin1
Pin2	30	White	DMIC1_CLK	Pin2
Pin3	30	White	DMIC_DATA	Pin3
Pin4	28	Black	GND	Pin4



Pin2 and Pin3 connect by twisted wires.

6. SPEAKER

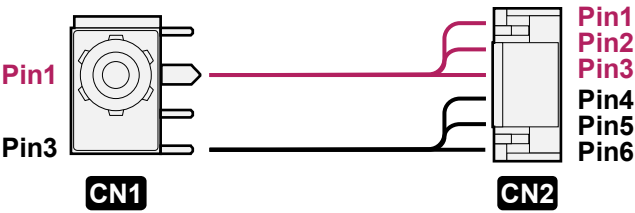


Pin Definition				
CN1	AWG	Color	Function	CN2
Pin1	28	White	SPKR_OUT_P_CON	Pin1
Pin2	28	White	SPKR_OUT_M_CON	Pin2



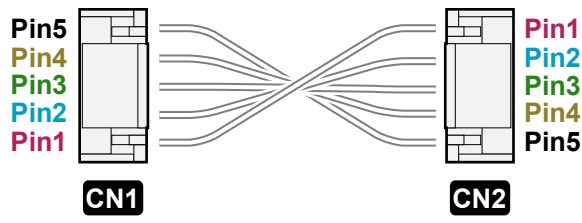
Pin1 and Pin2 connect by twisted wires.

7. Power



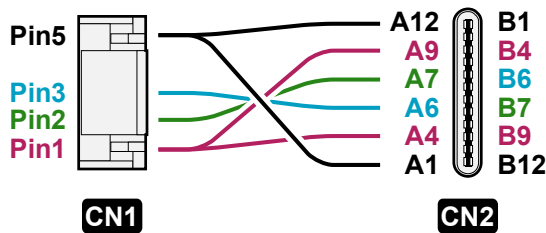
Pin Definition				
CN1	AWG	Color	Function	CN2
Pin1	26	Red	VBAT (12V)	Pin1
Pin1	26	Red	VBAT (12V)	Pin2
Pin1	26	Red	VBAT (12V)	Pin3
Pin3	26	Black	GND	Pin4
Pin3	26	Black	GND	Pin5
Pin3	26	Black	GND	Pin6

8. GPIO



Pin Definition				
CN1	AWG	Color	Function	CN2
Pin1	30	White	FCU_KPDPWR_N	Pin1
Pin2	30	White	GPIO4_C	Pin2
Pin3	30	White	GPIO3_C	Pin3
Pin4	30	White	GPIO2_C	Pin4
Pin5	30	White	GPIO1_C	Pin5

9. USB-DEBUG



Pin Definition				
CN1	AWG	Color	Function	CN2
Pin1	26	Red	USB_VBUS_DEBUG	A4.A9.B4.B9
Pin2	30	White	G_USB_HS_DM_DEBUG-CN	A7.B7
Pin3	30	White	G_USB_HS_DP_DEBUG_CN	A6.B6
Pin4				
Pin5	26	Black	GND	A1.A12.B1.B12



Pin2 and Pin3 connect by twisted wires.

Appendix B Antenna Specification

Brand	Model	SRD	Antenna Gain (dBi)				Antenna Type	
			WLAN 2.4G	WLAN 5G				
				B1	B2	B3		B4
HONGBO WIRELESS COMMUNICATION	260-29227	2.49						Dipole Antenna
	260-29228		2.71	3.28	3.67	3.59	3.59	Dipole Antenna
Auden Techno. Corp	B93640-30		2.37	3.11	3.47	3.36	3.33	Dipole Antenna
	B93641-30		2.4	3.04	3.02	3.43	3.3	Dipole Antenna

Notes