

User Manual

Model Name: AIOS 9.0
Brand Name : Bowers & Wilkins

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1. SPECIFICATION

1.1 Basic Specification

2. Item	Contents		
Manufacture	Arcadyan		
Product Name	wireless module		
Model Name	AIOS 9.0		
Chip	SOC	Vendor	Model name
	2.4GHz MAC/BB/RF	Mediatek	
	2.4GHz PA(Tx)	Mediatek	iPA
	2.4GHz LNA(Rx)	Mediatek	iPA
	2.4GHz BPF(Rx)	WALSIN	
	5GHz MAC/BB/RF	Qualcomm	
	5GHz PA(Tx)	SKYWORKS	
	5GHz LNA(Rx)	SKYWORKS	
	5GHz BPF(Rx)	J5240D CIROCOMM	
	6GHz MAC/BB/RF	Mediatek	
	6GHz PA(Tx)	Mediatek	iPA
	6GHz LNA(Rx)	Mediatek	iPA
	6GHz BPF(Rx)	WALSIN	
	PHY	WAN	None
		LAN	Qualcomm
FW	ODM	Arcadyan	
	FW spec	Kernel: Linux	
Driver/Utility	Driver	Utility	
Support Band	Refer wireless spec		
Interface	Item	Link Rate	Number of ports

Supply Voltage	5V		
Power consumption	18.33W (maximum)		
Weight	Under 78g		
Operating Environment	Temperature	-10~70	degC
	Humidity	10~85	%RH
Storage Environment	Temperature	-10~85	degC
	Humidity	10~85	%RH
Dimensions	97 x 71 x 1.2mm		
Design life time	5years at 25 degrees		

2. WLAN Specification

Item	Specification	Remark
Chip		
Interface	SDIO & PCIE	
Frequency	FCC: 2400~2483.5MHz 5150~5250MHz (U-NII-1, Band 1) 5.925 GHz to 7.125 GHz IC: 2400~2483.5MHz 5150~5250MHz (U-NII-1, Band 1) 5.925 GHz to 7.125 GHz CE: 2400~2483.5MHz 5150~5250MHz (U-NII-1, Band 1) 5.945 GHz to 6.425 GHz Japan: 2400~2484MHz 5150~5250MHz (U-NII-1, Band 1) 5.925 GHz to 6.425 GHz Australia and New Zealand: 2400~2483.5MHz 5150~5250MHz (U-NII-1, Band 1) 5.925 GHz to 6.425 GHz. SRRC: 2400~2483.5MHz 5150~5250MHz (U-NII-1, Band 1) Korea: 2400~2483.5MHz 5150~5250MHz (U-NII-1, Band 1) 5.925 GHz to 7.125 GHz NCC: 2400~2483.5MHz 5150~5250MHz (U-NII-1, Band 1) 5.945 GHz to 6.425 GHz	
Data Rate	2G: IEEE 802.11b 11, 5.5, 2, 1Mbps IEEE 802.11g 54, 48, 36, 24, 18, 12, 9, 6Mbps IEEE 802.11n HT20 Up to 144Mbps IEEE 802.11n HT40 Up to 300Mbps IEEE 802.11ac VHT20 Up to 173Mbps IEEE 802.11ac VT40	

	Up to 400Mbps IEEE 802.11ax HE20 Up to 287Mbps IEEE 802.11ax HE40 Up to 574 Mbps 5G: IEEE 802.11a: 54, 48, 36, 24, 18, 12, 9, 6Mbps IEEE 802.11n HT20 Up to 144Mbps IEEE 802.11n HT40 Up to 300Mbps 6G: IEEE 802.11a 54, 48, 36, 24, 18, 12, 9, 6Mbps IEEE 802.11ax HE20 Up to 287Mbps IEEE 802.11ax HE40 Up to 574 Mbps IEEE 802.11ax HE80 Up to 1200 Mbps	
MIMO	2T2R	
Antenna Port	U.FL compatible connector	

2.1 Bluetooth Specification

Item	Specification	Reark
Chip	MTK	
Interface	SDIO	
Operating Frequency	2.4 - 2.4835 GHz	
Modulation	GFSK DQPSK 8-DPSK BLE 1Mbps BLE 2Mbps BLR 500kbps BLR 125kbps	
Channel Spacing	1MHz & 2MHz	
Receive Sensitivity	-86dBm at 0.1% BER	
Antenna	External U.FL connector Impedance: 50 Ohm	

3. Normal Setup

3.1 1G Ethernet

- Input "root" then press "enter" button

```
Yocto aud Baseline 11.0.1 audiocast

audiocast login: root
Last login: Tue Mar 23 00:49:57 -0700 2021 on /dev/ttyS1.
root@audiocast:~#
```

- Module 1G ETH set the same IP domain with the test PC1

ifconfig br0 192.168.50.xx → setup 1G ETH IP

ifconfig br0 → check 1G ETH IP

```
root@audiocast:~# ifconfig br0 192.168.50.3
root@audiocast:~# <SM>[smProcessStandbyTimerMsg:1969]:ui4_standby_count = 48!
[ 150.894074] <2>-(2)[83:hang_detect][name:aed&][Hang_Detect] hang_detect threa
d counts down 2147483647:2147483647, status 0.
ifconfig br0
br0      Link encap:Ethernet  HWaddr 12:34:56:78:9a:bc
         inet addr:192.168.50.3  Bcast:192.168.50.255  Mask:255.255.255.0
         inet6 addr: fe80::1034:56ff:fe78:9abc/64 Scope: Link
         UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
         RX packets:122 errors:0 dropped:0 overruns:0 frame:0
         TX packets:324 errors:0 dropped:0 overruns:0 carrier:0
         collisions:0 txqueuelen:1000
         RX bytes:16082 TX bytes:28015
```

4.2 WiFi 5G setup

Prepare an AP device (with wi-fi 5G function) , Set SSID of 5G to "5G"

telnet command:

- **Connect to 5G device**

```
# python3 arc_wifi.py -m sta -i wlp1s0 -s 5G
```

- **Ping PC IP -I Module 5G IP**

```
# Ping 192.168.0.2 -I 192.168.0.4
```

```
root@audiocast:~# python3 arc_wifi.py -m sta -i wlp1s0 -s 5G
===== WIFI Connection test =====
[WIFI] INFO: Interface = wlp1s0
[WIFI] INFO: Debug = 1
[WIFI] INFO: SSID = 5G
[WIFI] INFO: PSK = (NONE)
[WIFI] INFO: IP = DHCP
[WIFI] INFO: MASK = 24
[WIFI] INFO: Encrypt = wpa/wpa2
<SM>[smProcessStandbyTimerMsg:1969]:ui4_standby_count = 28!
[0323/005055.418979:ERROR:cast_message_service_impl.cc(170)] CastMessageServiceImpl could not
[WIFI] INFO: Stop the c4a_init ...
```

Fig. connect to 5G device

```
/etc/udhcpd.d/50default: Adding DNS 192.168.0.1
[WIFI] INFO: Connect to the AP = 5G
[WIFI] INFO: IP = 192.168.0.4
[WIFI] INFO: MASK = 24
=====
```

Fig. Module gets the IP of 5G wifi

```
audiocast login: root
Last login: Tue Mar 23 00:58:13 -0700 2021 on /dev/pts/0.
root@audiocast:~#
root@audiocast:~#
root@audiocast:~#
root@audiocast:~#
root@audiocast:~# ping 192.168.0.2 -I 192.168.0.4
PING 192.168.0.2 (192.168.0.2) from 192.168.0.4 : 56(84) bytes of data.
^C
--- 192.168.0.2 ping statistics ---
14 packets transmitted, 0 received, 100% packet loss, time 13492ms
root@audiocast:~#
```

Fig. Ping the test PC from module
(Terminate: Ctrl+C)

4.3 WiFi 2G/6G setup

Prepare an AP device (with wi-fi 2G/6G function) , Set SSID of 2G to “2G” , no need to set password

telnet command:

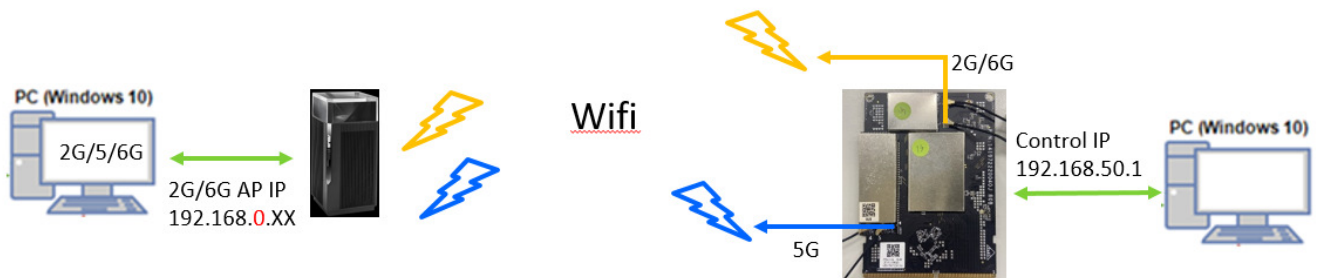
- **Connect to 2G device**
python3 arc_wifi.py -m sta -i wlan0 -s 2G
- **Ping PC IP -I Module 2G IP**
Ping 192.168.xx.xx -I 192.168.xx.xx

Prepare an AP device (with wi-fi 2G/6G function) , Set SSID of 2G to “6G” , password “1234567890”

telnet command:

- **Connect to 6G device**
python3 arc_wifi.py -m sta -i wlan0 -s 6G -p 1234567890 -e wpa3
- **Ping PC IP -I Module 6G IP**
Ping 192.168.xx.xx -I 192.168.xx.x

Setup – 5G/2G6G WiFi connection



FCC Statement

Federal Communication Commission Interference Statement

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 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.

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.

This device is restricted for indoor use.

Operation of transmitters in the 5.925-7.125 GHz band is prohibited for control of or Communications with unmanned aircraft systems.

Additional testing and certification is necessary when the lowest gain in WLAN operation 6GHz of antennas which may be used in the future that is less than the lowest gain of the original certified for Contention Based Protocol (CBP).

IMPORTANT NOTE:

This module is intended for OEM integrator. This module is only FCC authorized for the specific rule parts listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Additional testing and certification may be necessary when multiple modules are used. OEM integrators that they must use the equivalent antennas or C2PC will be required.

Since only Grantees are permitted to make permissive changes, the OEM integrator should contact the grantee via email "pat.sullivan@soundunited.com"

This equipment complies with FCC mobile radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. If the module is installed in a portable host, a separate SAR evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

The host manufacturer should reference KDB Publication 996369 D04 Module Integration Guide.

USERS MANUAL OF THE END PRODUCT:

In the users manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied.

The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

This device complies with Part 15 of 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.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains TX FCC ID: 2ACIX-AIOS9 ".

This device complies with Part 15 of 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.

IC Statement

This device contains licence-exempt transmitter(s)/receiver(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.

Cet appareil contient des émetteurs / récepteurs exempts de licence qui sont conformes au (x) RSS (s) exemptés de licence d'Innovation, Sciences et Développement économique Canada. L'opération est soumise aux deux conditions suivantes:

- (1) Cet appareil ne doit pas provoquer d'interférences.*
- (2) Cet appareil doit accepter toute interférence, y compris les interférences susceptibles de provoquer un fonctionnement indésirable de l'appareil.*

This radio transmitter [11946B-AIOS9] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Le présent émetteur radio (11946B-AIOS9) a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal d'antenne. Les types d'antennes non inclus dans cette liste qui ont un gain supérieur au gain maximal indiqué pour tout type listé sont strictement interdits pour une utilisation avec cet appareil.

The device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.

Devices shall not be used for control of or communications with unmanned aircraft systems.

Les appareils ne doivent pas être utilisés pour contrôler ou communiquer avec des systèmes d'aéronefs sans pilote.

Devices shall not be used on oil platforms.

Les appareils ne doivent pas être utilisés sur les plates-formes pétrolières.

Devices shall not be used on aircraft, except for the low-power indoor access points, indoor subordinate devices, low-power client devices, and very low-power devices operating in the 5925-6425 MHz band, that may be used on large aircraft as defined in the Canadian Aviation Regulations, while flying above 3,048 metres (10,000 feet).

Les appareils ne doivent pas être utilisés sur les avions, à l'exception des points d'accès intérieure à faible puissance, des dispositifs subordonnés intérieurs, des dispositifs clients de faible puissance et des dispositifs de très faible puissance fonctionnant dans la bande 5925-6425 MHz, qui peut être utilisée sur de grands avions tel que défini dans la réglementation de l'aviation canadienne, tout en volant au-dessus de 3 048 mètres (10 000 pieds).

Devices shall not be used on automobiles.

Les appareils ne doivent pas être utilisés sur les automobiles.

Devices shall not be used on trains.

Les appareils ne doivent pas être utilisés dans les trains.

Devices shall not be used on maritime vessels.

Les appareils ne doivent pas être utilisés sur les navires maritimes.

Operation shall be limited to indoor use only.

Le fonctionnement doit être limité à une utilisation en intérieur uniquement.

IMPORTANT NOTE:

This module is intended for OEM integrator. The OEM integrator is responsible for the compliance to all the rules that apply to the product into which this certified RF module is integrated.

Additional testing and certification may be necessary when multiple modules are used.

OEM integrators that they must use the equivalent antennas or C2PC will be required.

The distance greater than 20 cm has to be able to be maintained between the antenna and the users for the host this module is integrated into. Under such configuration, the IC RSS-102 radiation exposure limits set forth for a population/uncontrolled environment can be satisfied.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

USERS MANUAL OF THE END PRODUCT:

In the users manual of the end product, the end user has to be informed to keep greater than 20 cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the IC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied.

The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. Operation is subject to the following two conditions: (1) this device may not cause harmful interference (2) this device must accept any interference received, including interference that may cause undesired operation.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains IC: 11946B-AIOS9 ".

The Host Model Number (HMN) must be indicated at any location on the exterior of the end product or product packaging or product literature which shall be available with the end product or online.

CE

This equipment complies with EU radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

The frequency and the maximum transmitted power in EU are listed below:

2412-2472MHz: 20 dBm

2402-2480MHz (BR/EDR): 10 dBm

2402-2480MHz (LE): 10 dBm

5180-5240MHz: 23 dBm

5955-6415MHz: 23 dBm

The device is restricted to indoor use only when operating in the 5150 to 5350 MHz frequency range.

The device is restricted to indoor use only when operating in the 5945 to 6425MHz frequency range.

Hereby, [B&W Group Ltd] declares that the radio equipment type [AIOS 9.0] is in compliance with Directive 2014/53/EU.

Telec Statement

5GHz band (W52, W53): Indoor use only (except communicate to high power radio)
屋内使用限定

Antenna information:

<Set 1>

Ant.	Port			Brand Name	Model Name	Antenna Type	Connector	Gain (dBi)
	BT	WLAN 2.4/6GHz	WLAN 5GHz					
1	1	-	-	Radtenna Ltd.	ZZ40924	Dipole	IPEX	Note 1
2	-	1	-		ZZ44806			
3	-	2	-		ZZ44814			
4	-	-	2		ZZ44822			
5	-	-	1		ZZ44830			

Note 1:

Ant.	Max Peak Gain (dBi)				Cable Loss (dB)				Net Gain (dBi)			
	BT	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz	BT	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz	BT	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz
1	2.2	-	-	-	0.9	-	-	-	1.3	-	-	-
2	-	2.3	-	3	-	0.6	-	1	-	1.7	-	2
3	-	2.1	-	2.4	-	0.8	-	1.3	-	1.3	-	1.1
4	-	-	1.9	-	-	-	1.3	-	-	-	0.6	-
5	-	-	2.8	-	-	-	1	-	-	-	1.8	-

<Set 2>

Ant.	Port			Brand Name	Model Name	Antenna Type	Connector	Gain (dBi)
	BT	WLAN 2.4/6GHz	WLAN 5GHz					
1	1	-	-	Radtenna Ltd.	ZZ45640	Slot	IPEX	Note 2
2	-	1	-		ZZ45659	Dipole		
3	-	2	-		ZZ45667			
4	-	-	2		ZZ45675			
5	-	-	1		ZZ45683			

Note 2:

Ant.	Max Peak Gain (dBi)				Cable Loss (dB)				Net Gain (dBi)			
	BT	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz	BT	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz	BT	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz
1	1.8	-	-	-	0.4	-	-	-	1.4	-	-	-
2	-	2.3	-	3	-	0.3	-	0.4	-	2	-	2.6
3	-	2.1	-	2.4	-	0.3	-	0.4	-	1.8	-	2
4	-	-	1.9	-	-	-	0.4	-	-	-	1.5	-
5	-	-	1.9	-	-	-	0.5	-	-	-	1.4	-

<Set 3>

Ant.	Port			Brand Name	Model Name	Antenna Type	Connector	Cable	Gain (dBi)
	BT	WLAN 2.4/6GHz	WLAN 5GHz						
1	1	-	-	Radtenna Ltd.	ZZ44563	Dipole	IPEX	Note 3	Note 4
2	-	1	-		ZZ44571				
3	-	2	-		ZZ44598				
4	-	-	2		ZZ44601				
5	-	-	1		ZZ44601				

Note 3: The antennas in Set 3 do not originally contain cable. The information of antenna cables combined with them are listed below:

Combined Ant.	Brand Name	Model Name
1	ShenYu	ZX38008
2		ZX38016
3		ZX38024
4		ZX38032
5		ZX38040

Note 4:

Ant.	Max Peak Gain (dBi)				Cable Loss (dB)				Net Gain (dBi)			
	BT	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz	BT	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz	BT	WLAN 2.4GHz	WLAN 5GHz	WLAN 6GHz
1	2.9	-	-	-	1.79	-	-	-	1.11	-	-	-
2	-	2.4	-	3.9	-	0.62	-	1.1	-	1.78	-	2.8
3	-	1.4	-	3.6	-	1.26	-	2.22	-	0.14	-	1.38
4	-	-	2	-	-	-	1.22	-	-	-	0.78	-
5	-	-	2	-	-	-	2.12	-	-	-	-0.12	-