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1. Product Overview

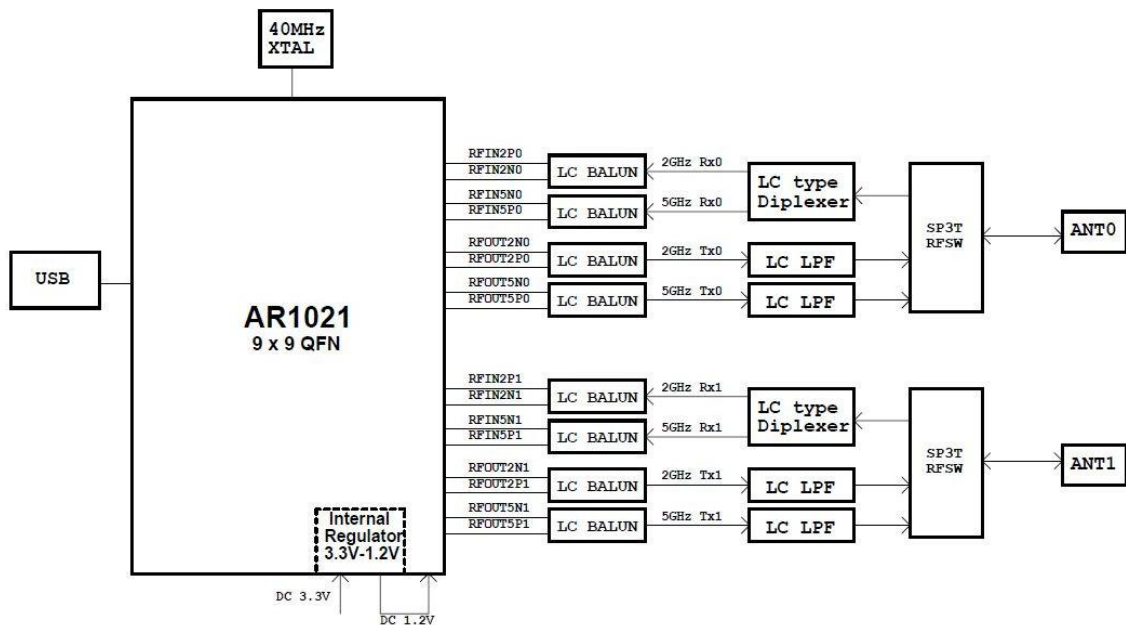
The module AR1021XNV5 provides wireless modem functionality for CE applications utilizing direct sequence spread spectrum and OFDM/CCK technology. The module supports IEEE 802.11a/b/g/n protocol. Data rate of up to 54Mbps for 802.11a/g and 144.4Mbps for 802.11n HT20,300Mbps for HT40. The module integrates all wifi functionality in a package friendly to low-cost PCB design, requiring only a external 3.3V power supply and connection to antenna.

The module is based on Qualcomm Atheros AR1021X which is highly integrated, system-on-a-chip solution for 2.4/5GHz IEEE 802.11n 2x2 MIMO WLAN with internal PA and LNA.

2. Module Hardware Overview

2.1 Block Diagram

The general Hardware architecture is shown below Figure:



Module Block Diagram

2.2 Features

- ◆ IEEE802.11a/ b/g/n (2X2) based on Qualcomm Atheros AR1021X solution
- ◆ USB 2.0 Interface, High and Full Speeds supported
- ◆ Module is powered by the host with a 3.3V +/- 10% supply.
- ◆ Internal OTP memory for calibration data
- ◆ Advanced power management to minimize standby, sleep and active power
- ◆ Security support for WPS, WPA2, WPA, WEP and protected management frames
- ◆ Full 802.11e QoS support including WMM and U-APSD
- ◆ Support for the IEEE 802.11e, h, i, j
- ◆ WEP, TKIP, and AES hardware encryption
- ◆ Support Ad hoc and infrastructure mode

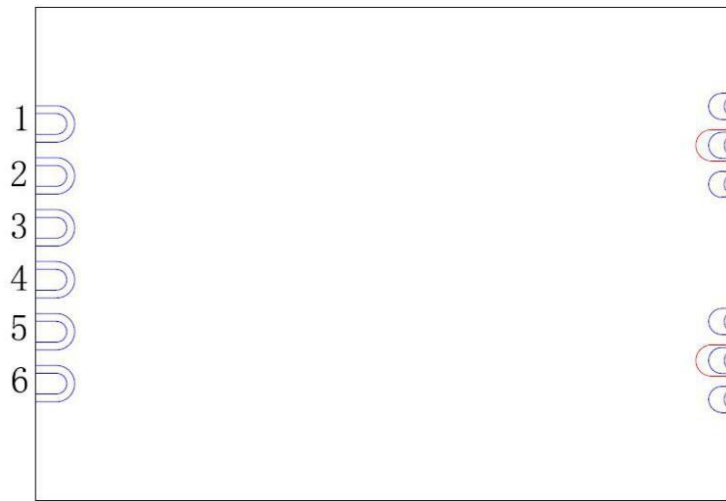
2.3 Interface

◆ Interface

■ Interface: Half Hole

■ Antenna: IPEX connector

◆ Pin definition



From Module TOP View

Pin Number	Symbol Name	Status	Pin Description
1	LED	O	LED indication
2	GND	P	Ground pad
3	USB_DP	I/O	USB D+ signal
4	USB_DN	I/O	USB D- signal
5	3.3V	P	Analog 3.3V power supply
6	CHIP_PWD_L	I	Reset, low active

Note:

✧ Blue pin--On all layer

✧ Red pin--On the bottom side

3. Electrical Specification

3.1 Recommended operating rating

Element	Symbol	Min	Typ	Max	Unit
DC supply voltage	UV+	3.0	3.3	3.6	(V)

3.2 DC Characteristics

Symb ol	Parameter	Min	Typ	Max	Unit
STBY 3.3V	Supply voltage	3.0	3.3	3.6	(V)
	Power Saving	--	450	--	(uA)
	Standby	--	112	--	(mA)
	Continuous Tx Current 2.4GHz(Dual Chain)	--	310	--	(mA)
	Continuous Rx Current 2.4GHz(Dual Chain)	--	56	--	(mA)
	Continuous Tx Current 5GHz(Dual Chain)	--	480	--	(mA)
	Continuous Rx Current 5GHz(Dual Chain)	--	60	--	(mA)

3.3 Environment Storage Condition

Environment condition	
Temperature	Operating Temperature: -10 deg.C ~70 deg.C
	Storage Temperature: -40 deg.C ~80 deg.C
Humidity	Operating Humidity: 5% ~95% (Non-condensing)
	Storage Humidity: 5% ~95% (Non-condensing)

4. RF Specification

4.1 IEEE 802.11b

Items	Contents			
Specification	IEEE 802.11b			
Modulation technique	DSSS/CCK			
Channel	CH1 ~ CH13			
Data rate	1,2,5.5,11Mbps			
TX Characteristics	Min.	Typ.	Max.	Unit
1. Power Levels(SISO)				
1)Target Power@1Mbps	15	17	19	dBm
2)Target Power@2Mbps	15	17	19	dBm
3)Target Power@5.5Mbps	15	17	19	dBm
4)Target Power@11Mbps	15	17	19	dBm
2. Spectrum Mask@Target Power				
1) $f_c - 33\text{MHz} < f < f_c - 22\text{MHz}$	-	-	-50	dBr
2) $f_c - 22\text{MHz} < f < f_c - 11\text{MHz}$	-	-	-30	dBr
3) $f_c + 11\text{MHz} < f < f_c + 22\text{MHz}$	-	-	-30	dBr
4) $f_c + 22\text{MHz} < f < f_c + 33\text{MHz}$	-	-	-50	dBr
3. Frequency Error	-20	-	+20	ppm
4. Modulation Accuracy(EVM)@Target Power				
1) 1Mbps	-		-10	dB
2) 2Mbps	-		-10	dB
3) 5.5Mbps	-		-10	dB
4) 11Mbps	-		-10	dB
RX Characteristics	Min.	Typ.	Max.	Unit
5. Minimum Input Level Sensitivity				
1) 1Mbps(PER ≤ 8%)	-	-97	-94	dBm
2) 2Mbps(PER ≤ 8%)	-	-94	-90	dBm
3) 5.5Mbps(PER ≤ 8%)	-	-92	-89	dBm
4) 11Mbps(PER ≤ 8%)	-	-90	-87	dBm
6. Maximum Input Level (PER ≤ 8%)	-10	-	-	dBm

4.2 IEEE 802.11g

Items	Contents			
Specification	IEEE 802.11g			
Modulation technique	OFDM			
Channel	CH1 ~ CH13			
Data rate	6,9,12,18,24,36,48,54Mbps			
TX Characteristics	Min.	Typ.	Max.	Unit
1. Power Levels(SISO)				
1)Target Power@6Mbps	15	17	19	dBm
2)Target Power@9Mbps	15	17	19	dBm
3)Target Power@12Mbps	15	17	19	dBm
4)Target Power@18Mbps	15	17	19	dBm
5)Target Power@24Mbps	15	17	19	dBm
6)Target Power@36Mbps	14	16	18	dBm
7)Target Power@48Mbps	13	15	17	dBm
8)Target Power@54Mbps	12	14	16	dBm
2. Spectrum Mask@Target Power				
1) at $f_c \pm 11\text{MHz}$	-	-	-20	dBr
2) at $f_c \pm 20\text{MHz}$	-	-	-28	dBr
3) at $f_c > \pm 30\text{MHz}$	-	-	-40	dBr
3. Frequency Error	-20	-	+20	ppm
4. Modulation Accuracy(EVM)@Target Power				
1) 6Mbps	-	-	-5	dB
2) 9Mbps	-	-	-8	dB
3) 12Mbps	-	-	-10	dB
4) 18Mbps	-	-	-13	dB
5) 24Mbps	-	-	-16	dB
6) 36Mbps	-	-	-19	dB
7) 48Mbps	-	-	-22	dB
8) 54Mbps	-	-33	-25	dB
RX Characteristics	Min.	Typ.	Max.	Unit
5. Minimum Input Level Sensitivity				
1) 6Mbps(PER < 10%)	-	-94	-90	dBm
2) 9Mbps(PER < 10%)	-	-93	-89	dBm
3) 12Mbps(PER < 10%)	-	-92	-88	dBm
4) 18Mbps(PER < 10%)	-	-90	-86	dBm
5) 24Mbps(PER < 10%)	-	-86	-82	dBm
6) 36Mbps(PER < 10%)	-	-83	-79	dBm
7) 48Mbps(PER < 10%)	-	-78	-75	dBm
8) 54Mbps(PER < 10%)	-	-75	-72	dBm
6. Maximum Input Level (PER < 10%)	-20	-	-	dBm

4.3 IEEE 802.11n HT20(2.4G)

Items	Contents			
Specification	IEEE 802.11n HT20			
Modulation technique	OFDM			
Channel	CH1 ~ CH13			
Data rate	MCS0 ~ MCS15			
TX Characteristics	Min.	Typ.	Max.	Unit
1. Power Levels				
1)Target Power@MCS0	15	19	23	dBm
2)Target Power@MCS1	15	19	23	dBm
3)Target Power@MCS2	15	19	23	dBm
4)Target Power@MCS3	15	19	23	dBm
5)Target Power@MCS4	14	17	20	dBm
6)Target Power@MCS5	13	16	19	dBm
7)Target Power@MCS6	12	15	18	dBm
8)Target Power@MCS7	11	13	16	dBm
2. Spectrum Mask@14dBm				
1) at $f_c \pm 11\text{MHz}$	-	-	-20	dB
2) at $f_c \pm 20\text{MHz}$	-	-	-28	dB
3) at $f_c > \pm 30\text{MHz}$	-	-	-45	dB
3. Frequency Error	-20	-	+20	ppm
4. Modulation Accuracy(EVM)@Target Power				
1) MCS0	-		-5	dB
2) MCS1	-		-10	dB
3) MCS2	-		-13	dB
4) MCS3	-		-16	dB
5) MCS4	-		-19	dB
6) MCS5	-		-22	dB
7) MCS6	-		-25	dB
8) MCS7	-	-31	-28	dB
RX Characteristics	Min.	Typ.	Max.	Unit
5. Minimum Input Level Sensitivity				
1) MCS0(PER < 10%)	-	-94	-90	dBm
2) MCS1(PER < 10%)	-	-91	-87	dBm
3) MCS2(PER < 10%)	-	-89	-85	dBm
4) MCS3(PER < 10%)	-	-85	-82	dBm
5) MCS4(PER < 10%)	-	-81	-77	dBm
6) MCS5(PER < 10%)	-	-77	-73	dBm
7) MCS6(PER < 10%)	-	-75	-70	dBm
8) MCS7(PER < 10%)	-	-73	-67	dBm
6. Maximum Input Level (PER < 10%)	-20	-	-	dBm

4. 4 IEEE 802.11n HT40(2.4G)

Items	Contents			
Specification	IEEE 802.11n HT40			
Modulation technique	OFDM			
Channel	CH3 ~ CH;			
Data rate	MCS0 ~ MCS15			
TX Characteristics	Min.	Typ.	Max.	Unit
1. Power Levels				
1)Target Power@MCS0	14	18	22	dBm
2)Target Power@MCS1	14	18	22	dBm
3)Target Power@MCS2	14	18	22	dBm
4)Target Power@MCS3	14	18	22	dBm
5)Target Power@MCS4	13	16	19	dBm
6)Target Power@MCS5	12	15	18	dBm
7)Target Power@MCS6	11	14	17	dBm
8)Target Power@MCS7	10	13	16	dBm
2. Spectrum Mask@14dBm				
1) at $f_c \pm 1$ MHz	-	-	-20	dBr
2) at $f_c \pm 20$ MHz	-	-	-28	dBr
3) at $f_c > \pm 30$ MHz	-	-	-45	dBr
3. Frequency Error	-20	-	+20	ppm
4. Modulation Accuracy(EVM)@Target Power				
1) MCS0	-		-5	dB
2) MCS1	-		-10	dB
3) MCS2	-		-13	dB
4) MCS3	-		-16	dB
5) MCS4	-		-19	dB
6) MCS5	-		-22	dB
7) MCS6	-		-25	dB
8) MCS7	-	-32	-28	dB
RX Characteristics	Min.	Typ.	Max.	Unit
5. Minimum Input Level Sensitivity				
1) MCS0(PER < 10%)	-	-91	-87	dBm
2) MCS1(PER < 10%)	-	-88	-84	dBm
3) MCS2(PER < 10%)	-	-86	-82	dBm
4) MCS3(PER < 10%)	-	-82	-79	dBm
5) MCS4(PER < 10%)	-	-79	-74	dBm
6) MCS5(PER < 10%)	-	-74	-70	dBm
7) MCS6(PER < 10%)	-	-72	-69	dBm
8) MCS7(PER < 10%)	-	-70	-65	dBm
6. Maximum Input Level (PER < 10%)	-20	-	-	dBm

4.5 IEEE 802.11a

Items	Contents			
Specification	IEEE 802.11a			
Modulation technique	OFDM			
Channel	5180" 5462MHz07967/7: 470J			
Data rate	6,9,12,18,24,36,48,54Mbps			
TX Characteristics	Min.	Typ.	Max.	Unit
1. Power Levels(SISO)				
1)Target Power@6Mbps	14	16	18	dBm
2)Target Power@9Mbps	14	16	18	dBm
3)Target Power@12Mbps	14	16	18	dBm
4)Target Power@18Mbps	14	16	18	dBm
5)Target Power@24Mbps	14	16	18	dBm
6)Target Power@36Mbps	12	14	16	dBm
7)Target Power@48Mbps	10	12	14	dBm
8)Target Power@54Mbps	9	11	13	dBm
2. Spectrum Mask@Target Power				
1) at $f_c \pm 11\text{MHz}$	-	-	-20	dBr
2) at $f_c \pm 20\text{MHz}$	-	-	-28	dBr
3) at $f_c > \pm 30\text{MHz}$	-	-	-40	dBr
3. Frequency Error	-20	-	+20	ppm
4. Modulation Accuracy(EVM)@Target Power				
1) 6Mbps	-		-5	dB
2) 9Mbps	-		-8	dB
3) 12Mbps	-		-10	dB
4) 18Mbps	-		-13	dB
5) 24Mbps	-		-16	dB
6) 36Mbps	-		-19	dB
7) 48Mbps	-		-22	dB
8) 54Mbps	-	-30	-25	dB
RX Characteristics	Min.	Typ.	Max.	Unit
5. Minimum Input Level Sensitivity				
1) 6Mbps(PER < 10%)	-	-94	-90	dBm
2) 9Mbps(PER < 10%)	-	-93	-89	dBm
3) 12Mbps(PER < 10%)	-	-92	-88	dBm
4) 18Mbps(PER < 10%)	-	-89	-85	dBm
5) 24Mbps(PER < 10%)	-	-86	-82	dBm
6) 36Mbps(PER < 10%)	-	-82	-78	dBm
7) 48Mbps(PER < 10%)	-	-78	-74	dBm
8) 54Mbps(PER < 10%)	-	-77	-71	dBm
6. Maximum Input Level (PER < 10%)	-30	-	-	dBm

4.6 IEEE 802.11n HT20(5G)

Items	Contents			
Specification	IEEE 802.11a/n HT20			
Modulation technique	OFDM			
Channel	5180/ 5462MHz/7: 470J			
Data rate	MCS0 ~ MCS15			
TX Characteristics	Min.	Typ.	Max.	Unit
1. Power Levels				
1)Target Power@MCS0	14	18	22	dBm
2)Target Power@MCS1	13	16	20	dBm
3)Target Power@MCS2	13	16	20	dBm
4)Target Power@MCS3	13	16	20	dBm
5)Target Power@MCS4	12	15	18	dBm
6)Target Power@MCS5	11	14	17	dBm
7)Target Power@MCS6	10	13	16	dBm
8)Target Power@MCS7	8	11	14	dBm
2. Spectrum Mask@14dBm				
1) at $f_c \pm 11\text{MHz}$	-	-	-20	dB
2) at $f_c \pm 20\text{MHz}$	-	-	-28	dB
3) at $f_c > \pm 30\text{MHz}$	-	-	-45	dB
3. Frequency Error	-20	-	+20	ppm
4. Modulation Accuracy(EVM)@Target Power				
1) MCS0	-		-5	dB
2) MCS1	-		-10	dB
3) MCS2	-		-13	dB
4) MCS3	-		-16	dB
5) MCS4	-		-19	dB
6) MCS5	-		-22	dB
7) MCS6	-		-25	dB
8) MCS7	-	-30	-28	dB
RX Characteristics	Min.	Typ.	Max.	Unit
5. Minimum Input Level Sensitivity				
1) MCS0(PER < 10%)	-	-93	-89	dBm
2) MCS1(PER < 10%)	-	-91	-87	dBm
3) MCS2(PER < 10%)	-	-88	-84	dBm
4) MCS3(PER < 10%)	-	-83	-79	dBm
5) MCS4(PER < 10%)	-	-80	-76	dBm
6) MCS5(PER < 10%)	-	-76	-72	dBm
7) MCS6(PER < 10%)	-	-75	-70	dBm
8) MCS7(PER < 10%)	-	-73	-67	dBm
6. Maximum Input Level (PER < 10%)	-30	-	-	dBm

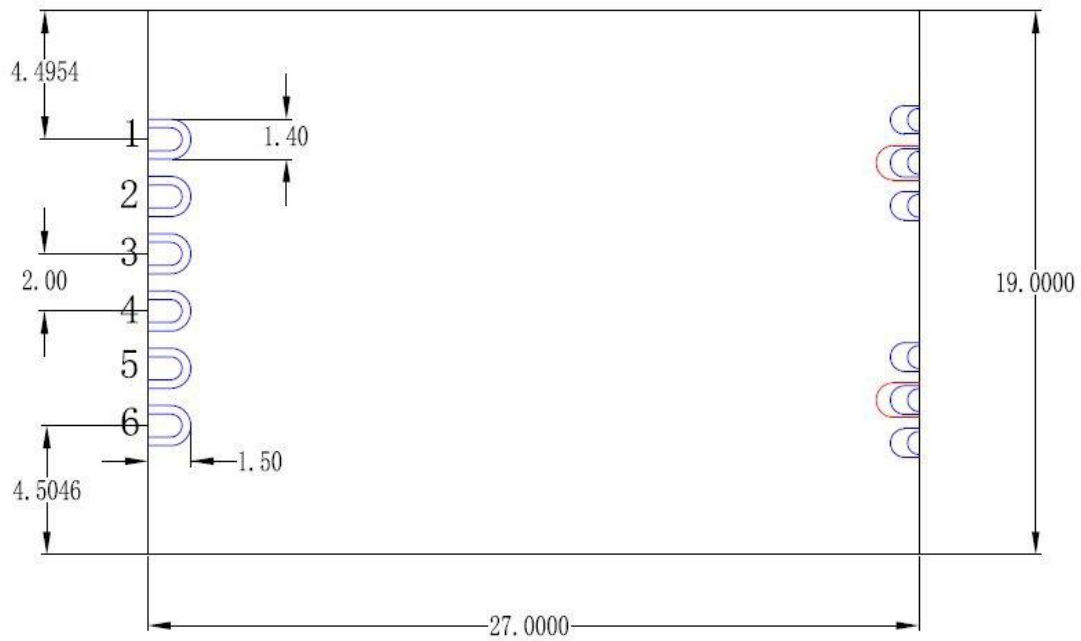
4.7 IEEE 802.11n HT40(5G)

Items	Contents			
Specification	IEEE 802.11a/n HT40			
Modulation technique	OFDM			
Channel	5190% 5452MHz"7977/79; 70J			
Data rate	MCS0 ~ MCS15			
TX Characteristics	Min.	Typ.	Max.	Unit
1. Power Levels				
1)Target Power@MCS0	14	18	22	dBm
2)Target Power@MCS1	12	15	18	dBm
3)Target Power@MCS2	12	15	18	dBm
4)Target Power@MCS3	12	15	18	dBm
5)Target Power@MCS4	12	15	18	dBm
6)Target Power@MCS5	11	13	16	dBm
7)Target Power@MCS6	10	12	14	dBm
8)Target Power@MCS7	9	11	13	dBm
2. Spectrum Mask@14dBm				
1) at $f_c \pm 1$ MHz	-	-	-20	dBr
2) at $f_c \pm 20$ MHz	-	-	-28	dBr
3) at $f_c > \pm 30$ MHz	-	-	-45	dBr
3. Frequency Error	-20	-	+20	ppm
4. Modulation Accuracy(EVM)@Target Power				
1) MCS0	-		-5	dB
2) MCS1	-		-10	dB
3) MCS2	-		-13	dB
4) MCS3	-		-16	dB
5) MCS4	-		-19	dB
6) MCS5	-		-22	dB
7) MCS6	-		-25	dB
8) MCS7	-	-31	-28	dB
RX Characteristics	Min.	Typ.	Max.	Unit
5. Minimum Input Level Sensitivity				
1) MCS0(PER < 10%)	-	-89	-85	dBm
2) MCS1(PER < 10%)	-	-87	-83	dBm
3) MCS2(PER < 10%)	-	-84	-80	dBm
4) MCS3(PER < 10%)	-	-80	-76	dBm
5) MCS4(PER < 10%)	-	-77	-73	dBm
6) MCS5(PER < 10%)	-	-73	-69	dBm
7) MCS6(PER < 10%)	-	-71	-67	dBm
8) MCS7(PER < 10%)	-	-70	-64	dBm
6. Maximum Input Level (PER < 10%)	-30	-	-	dBm

5. Mechanical Specifications

PCB Assembly Dimension:

◆ Dimension (L x W x H): L:19.0mm* W:27.0mm * H:2.3 mm



Approved antenna

Manufacturer:	TOPLINKST TECHNOLOGY COMPANY LIMITED
Antenna type:	7n# Antenna : 2*TX 2*RX
Antenna gain:	3dBi

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.

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

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.

FCC Radiation Exposure Statement

The modular can be installed or integrated in mobile or fix devices only. This modular cannot be installed in any portable device, for example, USB dongle like transmitters is forbidden.

This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter. This modular must be installed and operated with a minimum distance of 20 cm between the radiator and user body.

If the FCC 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. This exterior label can use wording such as the following:
"Contains Transmitter Module FCC ID: ZLJ-AR1021X-NV5-NV5 Or Contains FCC ID: ZLJ-AR1021X-NV5-NV5"

when the module is installed inside another device, the user manual of this device must contain below warning statements;

1. 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.
 - (2) This device must accept any interference received, including interference that may cause undesired operation.
2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product

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. The end user manual shall include all required regulatory information/warning as shown in this manual, include:
This product must be installed and operated with a minimum distance of 20 cm between the radiator and user body.