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# USER MANUAL

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**Version :**

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**Date : 2022.8.31**

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**MODEL NAME:** ZK-7921,ZK-7921AU-TV,ZK-7921US,  
ZK-7921-M2AE,ZK-7921-DG,ZK-7921-DGX,  
ZK-7921-PC

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**PRODUCT NAME : WiFi 6 communication module**

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DESIGN: Diao Pengjun

CHECK: \_\_\_\_\_

APPROVAL: \_\_\_\_\_

		DOCUMENT No :
REG.DATE :2022.8.31	SPECIFICATION MODEL NAME: <b>ZK-7921</b>	REV.NO :
REV.DATE :2022.8.31		PAGE :

version	Modify a record	Date of update

# 1. Features

**ZK-7921** is the small size and low power module for IEEE 802.11a/b/g/n/ac/ax wireless LAN. **ZK-7921** is based on MT7921AUN solution. IEEE 802.11a/b/g/n/ac/ax Dual Band WLAN infrastructure Size : 100.3mmx 50.5mmx 11.5mm

2.4GHz&5GHz & BT5.2

Support 1024QAM

Support 2\*2\_MU-MIMO, OFDMA

Rate up to 1774.5Mbps

Operation mode STA, AP, P2P

USB2.0\*1

Supports drivers for Windows/Linux/Android

Security: WPA3, WPA2, WPS2.0, WAPI, WEP, T

KIP, CKIP, AES, GCMP, SMS4

- Application: DTV, DVR, HD DVD Player, Blue-ray Disk Player, STB

This equipment could be used on a laptop device, computer, TV and set-top box, but it needs to be installed and operated with minimum distance 20cm between the radiator & your body.

# 2. Ordering Information

Model	Description
<b>ZK-7921</b>	Wi-Fi6 , 2T2R

### 3. Absolute Maximum Ratings

Caution : The specifications in Table 1 define levels at which permanent damage to the device can occur. Function operation is not guaranteed under these conditions. Operating at absolute maximum conditions for extend periods can adversely affect the long-term reliability of the device.

Parameter	Min	Max	Unit
Storage Temperature	-10	+70°C	°C
Storage Humidity (40°C)	-	90	%

< Table 1 Absolute Maximum Ratings > . Other conditions

- 1) Do not use or store modules in the corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are contained. Also, avoid exposure to moisture.
- 2) Store the modules where the temperature and relative humidity do not exceed 5 to 40°C and 20 to 60%.
- 3) Assemble the modules within 6 months.  
Check the soldering ability in case of 6 months over.

		DOCUMENT No :
REG.DATE 2022.8.31	S P E C I F I C A T I O N MODEL NAME : <b>ZK-7921</b>	REV.NO :
REV.DATE :2022.8.31		PAGE :

## 4. Operating Conditions

Parameter		Min	Typ	Max	Unit
Operating Temperature		-10	-	70	℃
Operating Humidity		-	-	90	%
Supply Voltage1	VDD		5.0		V

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## 5. Standard Test Conditions

The Test for electrical specification shall be performed under the following condition unless otherwise specified.

1). Ambient condition

Temperature :  $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$

. Humidity:  $65\% \pm 5\%$  R.H.

2). Power supply voltages

3.3V ( $\pm 5\%$ ) input power at the Module

3). Current consumption over recommended range of supply voltage and operating

conditions is like below.

When it's tested, it must be supplied more than 2 times of maximal current.

DOCUMENT No :

REG.DATE :2022.8.31

**SPECIFICATION**  
**MODEL NAME : ZK-7921**

REV.NO :

REV.DATE :2022.8.31

PAGE :

## 6. Electrical Specifications

### 1) DC Characteristics

Current Consumption	Min.	Typ.	Max.	Unit
peak	-	1A	-	
TX Mode ( MCS7)	-	340	-	mA
Idle and Associated state	-	160	-	
Radio disabled state	-	20	-	

### 2) RF Characteristics for IEEE802.11b ( 11Mbps mode unless otherwise specified)

Items	Contents			
Specification	IEEE802.11b			
Mode	DSSS/CCK			
Channel frequency	2400 ~ 2483 MHz			
Data rate	1,2,5.5,11Mbps			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level	15	17	19	dBm
Spectrum Mask				
1 <sup>st</sup> side lobes ( to fc ±11MHz)	-	-43	-30	dBr
2 <sup>nd</sup> side lobes ( to fc ±22MHz)	-	-58	-50	dBr
Modulation Accuracy (EVM)	-	30	30	%
Power On/Off ramp	-	0.5	2.0	Usec
Freq. Tolerance	-15	-	15	ppm
Chip Clock Freq. Tolerance	-15	-	15	ppm
RX Characteristics	Min.	Typ.	Max.	Unit
Minimum Input Level Sens (FER ≤ 8%)	-	-86	-76	dBm
Maximum Input Level (FER ≤ 8%)	-10	-	-	dBm

\* Normal Condition : 25℃, VDD=3.3.

DOCUMENT No :

REG.DATE :2022.8.31

S P E C I F I C A T I O N  
MODEL NAME : **ZK-7921**

REV.NO :

REV.DATE :2022.8.31

PAGE :

**3) RF Characteristics for IEEE802.11g** ( 54Mbps mode unless otherwise specified)

Items	Contents			
Specification	IEEE802.11g			
Mode	OFDM			
Channel frequency	2400 ~ 2483 MHz			
Data rate	6,9,12,18,24,36,48,54Mbps			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level	13	15	17	dBm
Spectrum Mask				
at fc $\pm 11$ MHz	-	-32	-20	dBr
at fc $\pm 20$ MHz	-	-43	-28	dBr
at fc $\geq \pm 30$ MHz	-	-48	-40	dBr
Constellation Error (EVM)	-	-34	-28	dB
Freq. Tolerance	-15	-	15	ppm
Chip Clock Freq. Tolerance	-15	-	15	ppm
RX Characteristics	Min.	Typ.	Max.	Unit
Minimum Input Level Sens. (PER $\leq 10\%$ )	-	-75	-	dBm
Maximum Input Level (PER $\leq 10\%$ )	-20	-	-	dBm

\*Normal Condition : 25°C, VDD=3.3



REG.DATE :2022.8.31	S P E C I F I C A T I O N MODEL NAME : <b>ZK-7921</b>	REV.NO :
REV.DATE :2022.8.31		PAGE :

#### 4) RF Characteristics for IEEE802.11n ( MCS7 mode unless otherwise specified)

Items	Contents			
Specification	IEEE802.11n			
Mode	HT20/40			
Channel frequency	2400 ~ 2483 MHz			
Data rate	6.5,13,19.5,26,39,52,58.5,65,13.5,27,40.5,54,81,108,121.5,135Mbps			
<b>TX Characteristics</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>
Power Level	12	14	16	dBm
Spectrum Mask				
at fc ±11MHz	-	-32	-20	dBr
at fc ±20MHz	-	-43	-28	dBr
at fc ≥ ± 30MHz	-	-48	-40	dBr
Constellation Error (EVM)	-	-35	-29	dB
Freq. Tolerance	-15	-	15	ppm
Chip Clock Freq. Tolerance	-15	-	15	ppm
<b>RX Characteristics</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>
Minimum Input Level Sens.(HT20,PER ≤ 10%)	-	-73	-66	dBm
Minimum Input Level Sens.(HT40,PER ≤ 10%)	-	-70	-63	dBm
Maximum Input Level (PER ≤ 10%)	-20	-	-	dBm

DOCUMENT No :

REG.DATE :2022.8.31

S P E C I F I C A T I O N  
MODEL NAME : **ZK-7921**

REV.NO :

REV.DATE :2022.8.31

PAGE :

**5) RF Characteristics for IEEE802.11a ( 54Mbps mode unless otherwise specified)**

Items	Contents			
Specification	IEEE802.11a - 5GHz			
Mode	OFDM			
Channel frequency	5150~5650MHz, 5725 ~ 5850 MHz			
Data rate	6,9,12,18,24,36,48,54Mbps			
<b>TX Characteristics</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>
Power Level	13	15	17	dBm
Spectrum Mask				
at fc ±11MHz	-	-32	-20	dBr
at fc ±20MHz	-	-35	-28	dBr
at fc ≥ ± 30MHz	-	-45	-40	dBr
Constellation Error (EVM)	-	-35	-28	dB
Freq. Tolerance	-15	-	15	ppm
Chip Clock Freq. Tolerance	-15	-	15	ppm
<b>RX Characteristics</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>
Minimum Input Level Sens. (PER ≤ 10%)	-	-75	-68	dBm
Maximum Input Level (PER ≤ 10%)	-30	-	-	dBm

DOCUMENT No :

REG.DATE :2022.8.31

S P E C I F I C A T I O N  
MODEL NAME : **ZK-7921**

REV.NO :

REV.DATE :2022.8.31

PAGE :

**6) RF Characteristics for IEEE802.11n** ( MCS7 mode unless otherwise specified)

Items	Contents			
Specification	IEEE802.11n - 5GHz			
Mode	11N HT20/40			
Channel frequency	5150~5650MHz, 5725 ~ 5850 MHz			
Data rate	MCS0~MCS7			
<b>TX Characteristics</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>
Power Level	12	14	16	dBm
Spectrum Mask				
at $f_c \pm 11\text{MHz}$	-	-32	-20	dBr
at $f_c \pm 20\text{MHz}$	-	-35	-28	dBr
at $f_c \geq \pm 30\text{MHz}$	-	-45	-40	dBr
Constellation Error (EVM)	-	-35	-29	dB
Freq. Tolerance	-15	-	15	ppm
Chip Clock Freq. Tolerance	-15	-	15	ppm
<b>RX Characteristics</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>
Minimum Input Level Sens.(HT20,PER ≤ 10%)	-	-76	-64	dBm
Minimum Input Level Sens.(HT40,PER ≤ 10%)	-	-73	-61	dBm
Maximum Input Level (PER ≤ 10%)	-30	-	-	dBm

DOCUMENT No :

REG.DATE :2022.8.31

S P E C I F I C A T I O N  
MODEL NAME : **ZK-7921**

REV.NO :

REV.DATE :2022.8.31

PAGE :

**7) RF Characteristics for IEEE802.11ac**

Items	Contents			
Specification	IEEE802.11ac - 5GHz			
Mode	HT80			
Channel frequency	5150~5650MHz,5180~5825 MHz,5725 ~ 5850 MHz			
Data rate	MCS0~MCS11			
<b>TX Characteristics</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>
Power Level	11	13	15	dBm
Spectrum Mask				
at fc ±11MHz	-	-32	-20	dBr
at fc ±20MHz	-	-35	-28	dBr
at fc ≥ ± 30MHz	-	-45	-40	dBr
Constellation Error (EVM)	-	-35	-29	dB
Freq. Tolerance	-15	-	15	ppm
Chip Clock Freq. Tolerance	-15	-	15	ppm
<b>RX Characteristics</b>	<b>Min.</b>	<b>Typ.</b>	<b>Max.</b>	<b>Unit</b>
Minimum Input Level Sens.(HT80,PER ≤ 10%)	-	-68	-61	dBm
Maximum Input Level (PER ≤ 10%)	-30	-	-	dBm

DOCUMENT No :

REG.DATE :2022.8.31

S P E C I F I C A T I O N  
MODEL NAME : **ZK-7921**

REV.NO :

REV.DATE :2022.8.31

PAGE :

**8) RF Characteristics for IEEE802.11ax**

Items	Contents			
Specification	IEEE802.11ax - 5GHz			
Mode	HT80			
Channel frequency	5150~5650MHz,5180~5825 MHz,5725 ~ 5850 MHz			
Data rate	MCS0~MCS11			
TX Characteristics	Min.	Typ.	Max.	Unit
Power Level	11	13	15	dBm
Spectrum Mask				
at fc ±11MHz	-	-32	-20	dBr
at fc ±20MHz	-	-35	-28	dBr
at fc ≥ ± 30MHz	-	-45	-40	dBr
Constellation Error (EVM)	-	-35	-29	dB
Freq. Tolerance	-15	-	15	ppm
Chip Clock Freq. Tolerance	-15	-	15	ppm
RX Characteristics	Min.	Typ.	Max.	Unit
Minimum Input Level Sens.(HT80,PER ≤ 10%)	-	-67	-61	dBm
Maximum Input Level (PER ≤ 10%)	-30	-	-	dBm

DOCUMENT No :

REG.DATE :2022.8.31

SPECIFICATION  
MODEL NAME : **ZK-7921**

REV.NO :

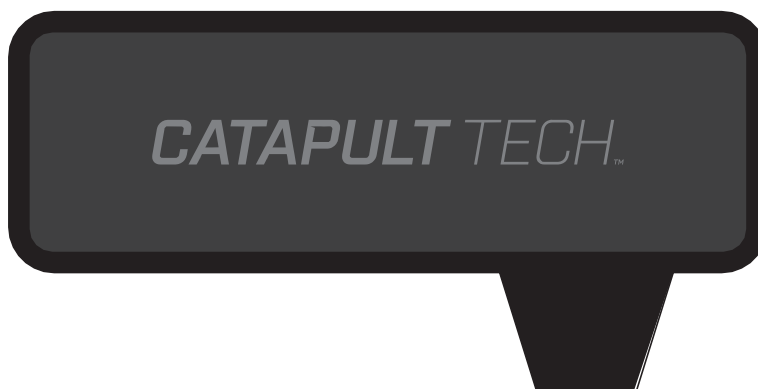
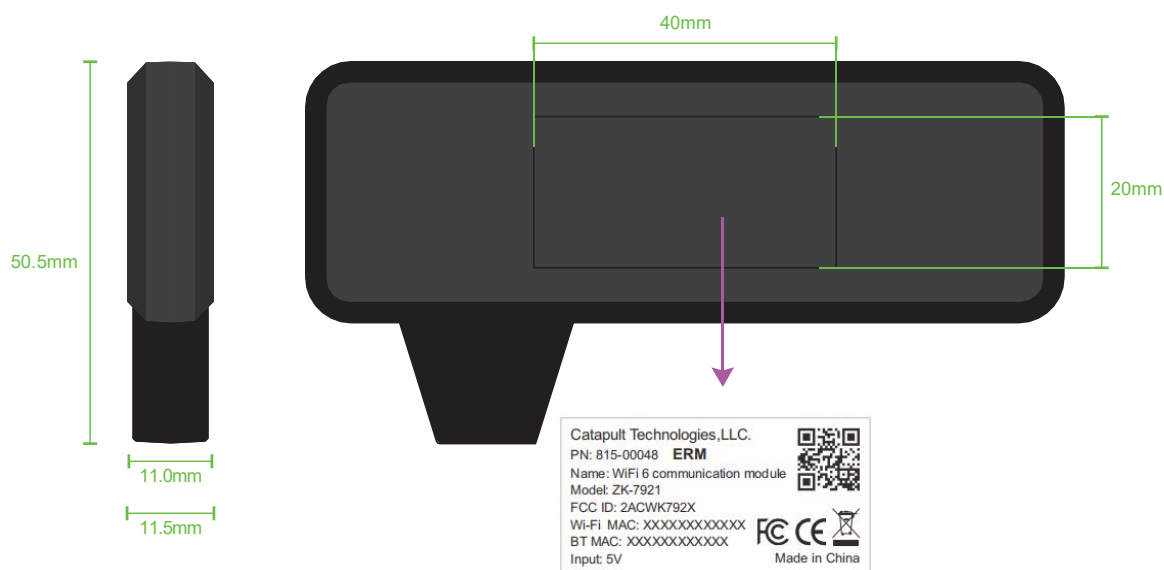
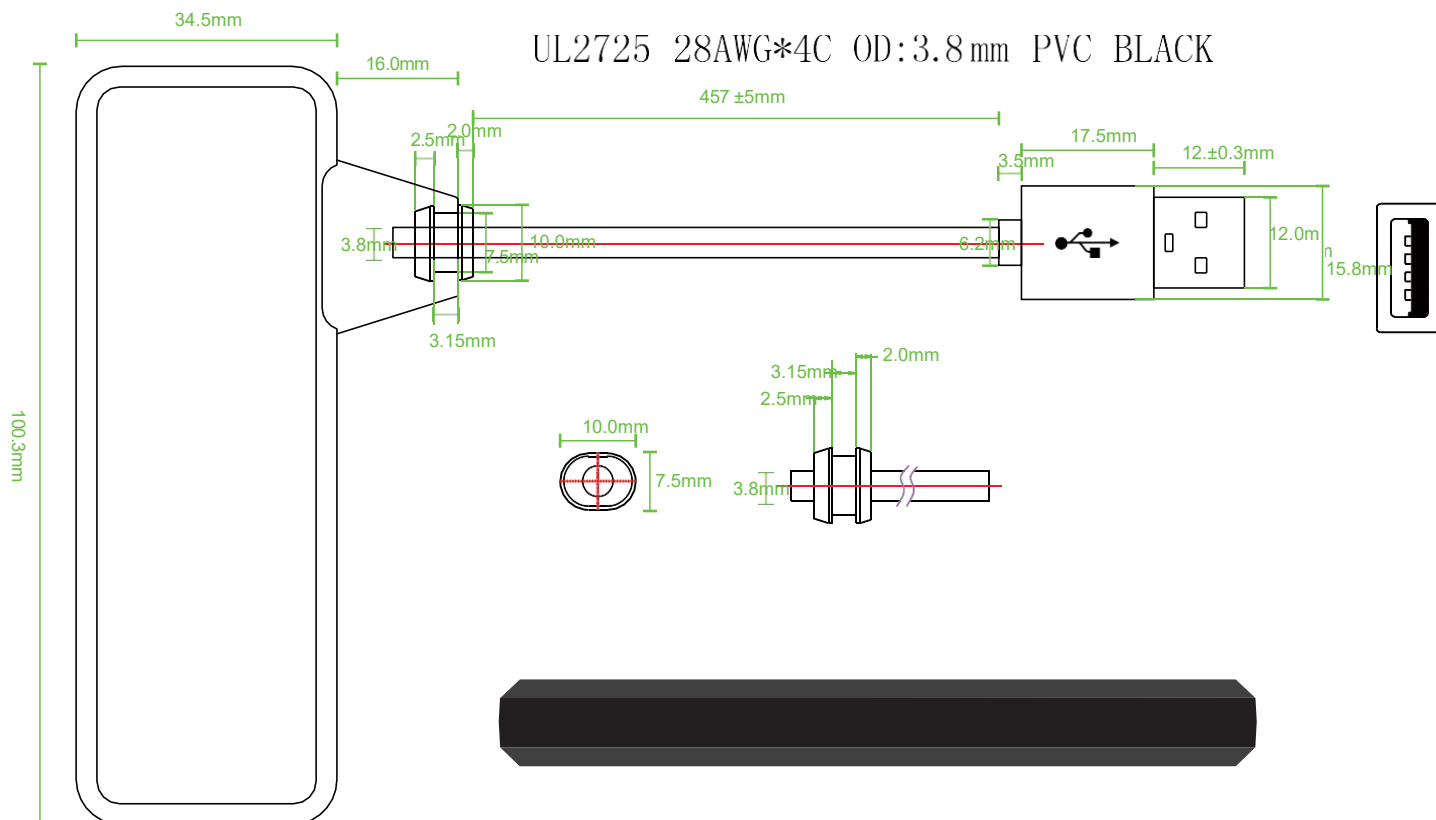
REV.DATE :2022.8.31

PAGE :

## 7. Bluetooth Specification

Bluetooth Specification Conditions : VBAT=3.3V ; Temp:25°C

Feature	Description		
General Specification			
Bluetooth Standard	Bluetooth 5.2 BLE		
Host Interface	USB /SDIO/UART		
Antenna Reference	Small antennas with 0~2 dBi peak gain		
Frequency Band	2.400 GHz ~ 2483.5 GHz		
Number of Channels	80 channels		
Modulation	FHSS, GFSK, DPSK, DQPSK		
RF Specification			
	Min.	Typical.	Max.
Output Power (Class 1.5)		10	
Output Power (Class 2)		2	
Sensitivity @ BER=0.1% for GFSK (1Mbps)		-86	
Sensitivity @ BER=0.01% for π/4-DQPSK (2Mbps)		-86	
Sensitivity @ BER=0.01% for 8DPSK (3Mbps)		-80	
Maximum Input Level	GFSK (1Mbps):-20dBm		
	π/4-DQPSK (2Mbps) :-20dBm		
	8DPSK (3Mbps) :-20dBm		



The device supports BT and WIFI functions. It is in conformity with the relevant Union harmonization legislation: Radio Equipment directive: 2014/53/EU.

5G Wifi alerts and restricted country codes

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

	AT	BE	BG	HR	CY	CZ	DK
	EE	FI	FR	DE	EL	HU	IE
	IT	LV	LT	LU	MT	NL	PL
	PT	RO	SK	SI	ES	SE	UK(NI)

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

CE mark



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

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.

This equipment complies with FCC 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.