

# FCC ID : 2ACWK792X

## 1. RF EXPOSURE EVALUATION

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) Radiation as specified in §1.1307(b).

Limits for Maximum Permissible Exposure (MPE).

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density(mW/cm <sup>2</sup> )	Average Time
<b>(A) Limits for Occupational/Control Exposures</b>				
300-1500	--	--	F/300	6
1500-100000	--	--	5	6
<b>(B) Limits for General Population/Uncontrol Exposures</b>				
300-1500	--	--	F/1500	6
1500-100000	--	--	1	30

**Friis transmission formula:  $P_d = (P_{out} * G) / (4 * \pi * R^2)$**

Where

$P_d$  = Power density in mW/cm<sup>2</sup>.

$P_{out}$  = output power to antenna in mW.

$G$  = Numeric gain of the antenna relative to isotropic antenna.

$\pi$  = 3.1416.

$R$  = distance between observation point and center of the radiator in 20cm.

$P_d$  the limit of MPE, 1mW/cm<sup>2</sup>. If we know the maximum gain of the nd total.

power input to the antenna, through the calculation, we will know the distance

where the MPE limit is reached.

## 2. EUT TECHNICAL DESCRIPTION

Characteristics	Description
<b>Product</b>	WiFi 6 communication module
<b>Model Number</b>	ZK-7921, ZK-7921AU-TV, ZK-7921US, ZK-7921-M2AE, ZK-7921-DG, ZK-7921-DGX, ZK-7921-PC (Note: The only difference in models is the model's name, all other information is the same. The main test model applied for this report is ZK-7921)

<b>Device Type</b>	Bluetooth V5.2
<b>Data Rate</b>	1Mbps for GFSK modulation 2Mbps for pi/4-DQPSK modulation 3Mbps for 8DPSK modulation
<b>Modulation:</b>	GFSK, pi/4-DQPSK, 8DPSK
<b>Operating Frequency Range(s)</b>	2402-2480MHz
<b>Number of Channels</b>	79 channels
<b>Antenna Type</b>	PCB Antenna
<b>Antenna Gain</b>	ANT1: 4.2dBi , ANT2: 4.2dBi

<b>Device Type</b>	Bluetooth with BLE mode
<b>Data Rate</b>	1Mbps/2Mbps for GFSK modulation
<b>Modulation</b>	GFSK
<b>Operating Frequency Range</b>	2402-2480MHz
<b>Number of Channels</b>	40 Channels
<b>Antenna Type</b>	PCB Antenna
<b>Antenna Gain</b>	ANT1: 4.2dBi , ANT2: 4.2dBi

<b>IEEE 802.11 WLAN Mode Supported</b>	<input checked="" type="checkbox"/> 802.11b <input checked="" type="checkbox"/> 802.11g <input checked="" type="checkbox"/> 802.11n(20MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11n(40MHz channel bandwidth)
<b>Modulation</b>	DSSS with DBPSK/DQPSK/CCK for 802.11b OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n
<b>Operating Frequency Range</b>	2412-2462MHz for 802.11b/g/n(HT20) 2422-2452MHz for 802.11b/g/n(HT40)
<b>Number of Channels</b>	11 channels for 802.11b/g/n(HT20) 7 Channels for 802.11n(HT40)
<b>Antenna Type</b>	PCB Antenna
<b>Antenna Gain</b>	Ant 1: 4.2dBi , ANT2: 4.2dBi

<b>WLAN Supported</b>	<input checked="" type="checkbox"/> 802.11a <input checked="" type="checkbox"/> 802.11n(20MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11n(40MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11ac(20MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11ac(40MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11ac(80MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11ac(160MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11ax(20MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11ax(40MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11ax(80MHz channel bandwidth)
<b>Data Rate</b>	802.11a:54/48/36/24/18/12/9/6Mbps 802.11n:up to 600 Mbps 802.11ac/ax:up to 1.733Gbps
<b>Modulation</b>	<input checked="" type="checkbox"/> OFDM with BPSK/QPSK/16QAM/64QAM for 802.11a/n <input checked="" type="checkbox"/> OFDM with BPSK/QPSK/16QAM/64QAM/256QAM for 802.11ac/ax
<b>Frequency Range</b>	5150MHz-5250MHz Band
	<input checked="" type="checkbox"/> 5180-5240MHz for 802.11a <input checked="" type="checkbox"/> 5180-5240MHz for 802.11n(HT20) <input checked="" type="checkbox"/> 5190-5230MHz for 802.11n(HT40) <input checked="" type="checkbox"/> 5180-5240MHz for 802.11ac(HT20) <input checked="" type="checkbox"/> 5190-5230MHz for 802.11ac(HT40) <input checked="" type="checkbox"/> 5210MHz for 802.11ac(HT80) <input checked="" type="checkbox"/> 5250MHz for 802.11ac(HT160) <input checked="" type="checkbox"/> 5180-5240MHz for 802.11ax(HT20) <input checked="" type="checkbox"/> 5190-5230MHz for 802.11ax(HT40) <input checked="" type="checkbox"/> 5210MHz for 802.11ax(HT80)
	5250MHz-5350MHz Band
	<input checked="" type="checkbox"/> 5260-5320MHz for 802.11a <input checked="" type="checkbox"/> 5260-5320MHz for 802.11n(HT20) <input checked="" type="checkbox"/> 5270-5310MHz for 802.11n(HT40) <input checked="" type="checkbox"/> 5260-5320MHz for 802.11ac(HT20) <input checked="" type="checkbox"/> 5270-5310MHz for 802.11ac(HT40) <input checked="" type="checkbox"/> 5290MHz for 802.11ac(HT80) <input checked="" type="checkbox"/> 5250MHz for 802.11ac(HT160)

	<input checked="" type="checkbox"/> 5260-5320MHz for 802.11ax(HT20) <input checked="" type="checkbox"/> 5270-5310MHz for 802.11ax(HT40) <input checked="" type="checkbox"/> 5290MHz for 802.11ax(HT80)	
	5470MHz-5725MHz Band	
	<input checked="" type="checkbox"/> 5500-5700MHz for 802.11a <input checked="" type="checkbox"/> 5500-5700MHz for 802.11n(HT20) <input checked="" type="checkbox"/> 5510-5670MHz for 802.11n(HT40) <input checked="" type="checkbox"/> 5500-5700MHz for 802.11ac(HT20) <input checked="" type="checkbox"/> 5510-5670MHz for 802.11ac(HT40) <input checked="" type="checkbox"/> 5530-5610MHz for 802.11ac(HT80) <input checked="" type="checkbox"/> 5570MHz for 802.11ac(HT160) <input checked="" type="checkbox"/> 5500-5700MHz for 802.11ax(HT20) <input checked="" type="checkbox"/> 5510-5670MHz for 802.11ax(HT40) <input checked="" type="checkbox"/> 5530-5610MHz for 802.11ax(HT80)	
	<input checked="" type="checkbox"/> UNII-3 with 5725MHz-5850MHz Band	
	<input checked="" type="checkbox"/> 5745-5825MHz for 802.11a <input checked="" type="checkbox"/> 5745-5825MHz for 802.11n(HT20) <input checked="" type="checkbox"/> 5755-5795MHz for 802.11n(HT40) <input checked="" type="checkbox"/> 5745-5825MHz for 802.11ac(HT20) <input checked="" type="checkbox"/> 5755-5795MHz for 802.11ac(HT40) <input checked="" type="checkbox"/> 5775MHz for 802.11ac(HT80) <input checked="" type="checkbox"/> 5745-5825MHz for 802.11ax(HT20) <input checked="" type="checkbox"/> 5755-5795MHz for 802.11ax(HT40) <input checked="" type="checkbox"/> 5775MHz for 802.11ax(HT80)	
<b>TPC Function</b>	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> Not Applicable
<b>Antenna Type</b>	PCB Antenna	
<b>Antenna Gain</b>	ANT1: 3.92dBi , ANT2: 3.92dBi	

### 3. Measurement Result

Mode	Max Conducted Power (dBm)	Antenna gain (dBi)	Antenna Gain Numeric	R (cm)	Evaluation result (mW/cm <sup>2</sup> )	Power density Limits (mW/cm <sup>2</sup> )
BT	4.85	4.2	2.630	20	0.0016	1
2.4G WIFI	19.6	4.2	2.630	20	0.0477	1
5G WIFI	15.84	3.92	2.466	20	0.0188	1

**Note:** All the modes are tested, only the worst data are described in the table.

----- The End -----