

1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 General Information

Client Information

Applicant: SHENZHEN ZK TECHNOLOGY CO., LTD
Address of applicant: SHENZHEN CITY LONGGANG DISTRICT STREETS QINGLIN ROAD SHENZHEN CITY STUDENTS (LONGGANG) BUSINESS PA... CHINA 518172

Manufacturer: HUIZHOU MTN WEIYE TECHNOLOGY DEVELOPMENT CO.,LTD.
Address of manufacturer: NO.2 Huitai Road,Huinan High-tech Industrial Park,Huiiao Avenue, Huizhou City,Guangdong Province,China

General Description of EUT:

Product Name: Wireless Router
Trade Name: HNK
Model No.: RAX1801
Adding Model(s): /
Rated Voltage: DC12V
MODEL: RD1201500-C55-153MG
Power Adapter Model: INPUT: AC100-240V, 50/60Hz, 0.6A
OUTPUT: DC12V,1.5A
FCC ID: 2AUZB-RAX1801
Equipment Type: Mobile

Technical Characteristics of EUT:	
Wi-Fi (2.4G)	
Support Standards:	802.11b, 802.11g, 802.11n-HT20, 802.11ax-HE20, 802.11n-HT40, 802.11ax-HE40
Frequency Range:	2412-2462MHz for 802.11b/g/n(HT20) 2422-2452MHz for 802.11n(HT40)
RF Output Power:	15.72dBm (Conducted)
Type of Modulation:	DBPSK, BPSK, DQPSK, QPSK,16QAM, 64QAM, 256QAM, 1024QAM
Data Rate:	1-11Mbps, 6-54Mbps, up to 574Mbps
Quantity of Channels:	11 for 802.11b/g/n(HT20)/AX(EH20) 7 for 802.11n(HT40)/AX(HE40)
Channel Separation:	5MHz
Type of Antenna:	External Antenna
Antenna Gain:	5.0dBi
Wi-Fi (5G)	
Support Standards:	802.11a, 802.11n(HT20) , 802.11n-HT40, 802.11ax-HE20,

	802.11ax-HE40, 802.11ac-VH80, 802.11ax-HE80
Frequency Range:	5150-5250MHz, 5725-5850MHz
RF Output Power:	5150-5250MHz: 19.61dBm (Conducted) 5725-5850MHz: 19.48dBm (Conducted)
Type of Modulation:	BPSK, QPSK,16QAM,64QAM, 256QAM, 1024QAM
Data Rate:	6-54Mbps, up to 1201Mbps
Type of Antenna:	External Antenna
Antenna Gain:	5dBi

1.2 Standard Applicable

According to § 1.1307(b)(1) and KDB 447498 D01 General RF Exposure Guidance v06, system operating under the provisions of this section shall be operating in a manner that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure.

(a) Limits for Occupational / Controlled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	F/300	6
1500-100000	/	/	5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	F/1500	30
1500-100000	/	/	1	30

Note: f = frequency in MHz; * = Plane-wave equivalent power density

1.3 MPE Calculation Method

$$S = (30 * P * G) / (377 * R^2)$$

S = power density (in appropriate units, e.g., mw/cm²)

P = power input to the antenna (in appropriate units, e.g., mw)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator,

the power gain factor is normally numeric gain.

R = distance to the center of radiation of the antenna (in appropriate units, e.g., cm)

1.4 MPE Calculation Result

For Wi-Fi (2.4G):

Maximum Tune-Up output power: 16(dBm)

Maximum peak output power at antenna input terminal: 39.81 (mW)

Prediction distance: >20(cm)

Prediction frequency: 2412 (MHz)

Antenna gain: 5.0(dBi)

Directional gain (numeric gain): 3.16

The worst case is power density at prediction frequency at 20cm: 0.0250(mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

For Wi-Fi (5G):

Maximum Tune-Up output power: 20(dBm)

Maximum peak output power at antenna input terminal: 100.00(mW)

Prediction distance: >20(cm)

Prediction frequency: 5200 (MHz)

Antenna gain: 5.0(dBi)

Directional gain (numeric gain): 3.16

The worst case is power density at prediction frequency at 20cm: 0.0629 (mw/cm²)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

Mode for Simultaneous Multi-band Transmission

Wi-Fi (2.4G) + Wi-Fi (5G)

The worst case is power density at prediction frequency at 20cm: $0.0250+0.0629 = 0.0879(\text{mw}/\text{cm}^2)$

MPE limit for general population exposure at prediction frequency: 1 (mw/cm²)

Result: Pass