

1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Client Information

Applicant: ShenZhen HaiLingKe Electronic co.,Ltd
Address of applicant: 3F Caiyue Mansion, No.24 Liuxian blvd, LongHua District, Shenzhen, Guangdong, China

Manufacturer: ShenZhen HaiLingKe Electronic co.,Ltd
Address of manufacturer: 3F Caiyue Mansion, No.24 Liuxian blvd, LongHua District, Shenzhen, Guangdong, China

General Description of EUT

Product Name: WIFI module
Trade Name: HI-LINK
Model No.: HLK-B30
FCC ID: 2AD56HLK-B30
Rated Voltage: DC 3.3V
Equipment Type: Mobile or Fixed

Technical Characteristics of EUT

Wi-Fi

Support Standards: 802.11b, 802.11g, 802.11n
Frequency Range: 2412-2462MHz for 802.11b/g/n-HT20
2422-2452MHz for 802.11n-HT40
RF Output Power: 16.53dBm (Conducted)
Type of Modulation: DBPSK, BPSK, DQPSK, QPSK, 16QAM, 64QAM
Data Rate: 1-11Mbps, 6-54Mbps, up to 150Mbps
Quantity of Channels: 11 for 802.11b/g/n-HT20
7 for 802.11n-HT40
Channel Separation: 5MHz
Type of Antenna: PCB Antenna
Antenna Gain: 1dBi

Bluetooth

Bluetooth Version: V4.2 (BLE mode)
Frequency Range: 2402-2480MHz
RF Output Power: 4.563dBm (Conducted)
Data Rate: 1Mbps
Modulation: GFSK
Quantity of Channels: 40
Channel Separation: 2MHz
Type of Antenna: PCB Antenna
Antenna Gain: 1dBi

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

Wi-Fi:

Maximum Tune-Up output power: 17 (dBm)

Maximum peak output power at antenna input terminal: 50.12(mW)

Prediction distance: >20(cm)

Prediction frequency: 2437(MHz)

Antenna gain: 1.0(dBi)

Directional gain (numeric gain): 1.26

The worst case is power density at prediction frequency at 20cm: 0.0126 (mw/cm²)

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

Bluetooth:

Maximum Tune-Up output power: 5(dBm)

Maximum peak output power at antenna input terminal: 3.16(mW)

Prediction distance: >20(cm)

Prediction frequency: 2402(MHz)

Antenna gain: 1.0(dBi)

Directional gain (numeric gain): 1.26

The worst case is power density at prediction frequency at 20cm: 0.0008 (mw/cm²)

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

Mode for Simultaneous Multi-band Transmission

Wi-Fi+ Bluetooth

The worst case is power density at prediction frequency at 20cm: $0.0126+0.0008=0.0134(\text{mw}/\text{cm}^2)$

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

Result: Pass