

1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 General Information

Client Information

Applicant: Hangzhou BroadLink Technology Co., Ltd.
Address of applicant: Unit C,Building 1,No.57 Jiang'er Road,Changhe Street, Binjiang District, Hangzhou,Zhejiang,P.R.China

Manufacturer: Hangzhou BroadLink Technology Co., Ltd.
Address of manufacturer: Unit C,Building 1,No.57 Jiang'er Road,Changhe Street, Binjiang District, Hangzhou,Zhejiang,P.R.China

General Description of EUT:

Product Name: WiFi Module
Trade Name: BroadLink
Model No.: BL3357-P
Adding Model(s): /
Rated Voltage: DC 3.3V
Power Adapter: /
FCC ID: 2ATEV-BL3357-P

Technical Characteristics of EUT:

Wi-Fi

Support Standards: 802.11b, 802.11g, 802.11n
Frequency Range: 2412-2462MHz for 802.11b/g/n(HT20)
RF Output Power: 16.95dBm (Conducted)
Type of Modulation: DBPSK,BPSK,DQPSK,QPSK,16QAM,64QAM
Quantity of Channels: 11 for 802.11b/g/n(HT20)
Channel Separation: 5MHz
Type of Antenna: PCB Antenna
Antenna Gain: 0.45dBi

Bluetooth

Bluetooth Version: V4.2 (BLE mode)
Frequency Range: 2402-2480MHz
RF Output Power: 3.095dBm (Conducted)
Data Rate: 1Mbps
Modulation: GFSK
Quantity of Channels: 40
Channel Separation: 2MHz
Type of Antenna: PCB Antenna
Antenna Gain: 0.45dBi

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 equivalents power density

1.3 MPE Calculation Method

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

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

Maximum Tune-Up output power: 17(dBm)

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

Prediction distance: >20(cm)

Prediction frequency: 2462 (MHz)

Antenna gain: 0.45 (dBi)

Directional gain (numeric gain): 1.11

The worst case is power density at prediction frequency at 20cm: 0.0111(mw/cm²)

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

For Bluetooth

Maximum Tune-Up output power: 4(dBm)

Maximum peak output power at antenna input terminal: 2.51(mW)

Prediction distance: >20(cm)

Prediction frequency: 2440(MHz)

Antenna gain: 0.45 (dBi)

Directional gain (numeric gain): 1.11

The worst case is power density at prediction frequency at 20cm: 0.0006(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: 0.0111+0.0006=0.0117(mw/cm²)

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

Result: Pass