

1. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 General Information

Client Information

Applicant: Shenzhen Ceres Technology Co., Ltd.
Address of applicant: Room 601, Floor 6, Building F, Songbai Road 1008, Sunshine Community, Xili Street, Nanshan District, Shenzhen

Manufacturer: Shenzhen C-DATA Technology Co.,Ltd Baoan Branch
Address of manufacturer: F11, Bldg B, Wentao Industrial zone, Yingrenshiyongxin Village, Shiyan Street, Baoan district, Shenzhen, Guangdong, China

General Description of EUT:

Product Name: Wireless Router
Trade Name: /
Model No.: WR525G
Adding Model(s): /
Rated Voltage: DC12V
Power Adapter 1: MODEL:Model:DCT12W120100US-A0
INPUT: AC100-240~50/60Hz, 0.3A max.
OUTPUT:DC12V, 1.0A
MODEL:Model:TS-A012-120010AW
Power Adapter 2: INPUT:AC100-240~50/60Hz, 0.4A
OUTPUT:DC12V, 1.0A
FCC ID: 2A24ZWR525G
Equipment Type: Mobile device

Technical Characteristics of EUT:

WiFi (2.4G)

Support Standards: 802.11b, 802.11g, 802.11n, 802.11ax
Frequency Range: 2412-2462MHz for 802.11b/g/n(HT20)/ax(HE20)
2422-2452MHz for 802.11n(HT40) /ax(HE40)
RF Output Power: Antenna 1:15.37dBm (Conducted)
Antenna 2:15.33dBm (Conducted)
Type of Modulation: DBPSK,BPSK,DQPSK,QPSK,16QAM,64QAM, 256QAM,
1024QAM
Quantity of Channels: 11 for 802.11b/g/n(HT20)/ AX(HE20)
7 for 802.11n(HT40)/ AX(HE40)
Channel Separation: 5MHz
Type of Antenna: External Antenna
Antenna Gain: 6.68dBi

WiFi (5G)

Support Standards:	802.11a, 802.11n(HT20) , 802.11n-HT40, 802.11ac-VHT80 802.11ax-HE20, 802.11ax-HE40, 802.11ax-HE80
Frequency Range:	5150-5250MHz, 5725-5850MHz 5150-5250MHz ANT 0:16.74dBm (Conducted) ANT 1:16.37dBm (Conducted)
RF Output Power:	5725-5850MHz ANT 0:15.42dBm (Conducted) ANT 1:16.88dBm (Conducted)
Type of Modulation:	BPSK, QPSK,16QAM,64QAM, 256QAM, 1024QAM
Type of Antenna:	External Antenna
Antenna Gain:	6.35dBi

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/cm^2)

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 WiFi (2.4G)

Maximum Tune-Up output power: 17(dBm)

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

Prediction distance: >20(cm)

Prediction frequency: 2412 (MHz)

Antenna gain: 6.68(dBi)

Directional gain (numeric gain): 4.66

The worst case is power density at prediction frequency at 20cm: 0.0464 (mw/cm^2)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm^2)

For WiFi (5.2G)

Maximum Tune-Up output power: 20 (dBm)

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

Prediction distance: >20(cm)

Prediction frequency: 5180 (MHz)

Antenna gain: 6.35 (dBi)

Directional gain (numeric gain): 4.32

The worst case is power density at prediction frequency at 20cm: 0.0858 (mw/cm^2)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm^2)

For WiFi (5.8G)

Maximum Tune-Up output power: 20 (dBm)

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

Prediction distance: >20(cm)

Prediction frequency: 5745 (MHz)

Antenna gain: 6.35 (dBi)

Directional gain (numeric gain): 4.32

The worst case is power density at prediction frequency at 20cm: 0.0858 (mw/cm^2)

MPE limit for general population exposure at prediction frequency: 1 (mw/cm^2)

Mode for Simultaneous Multi-band Transmission

WiFi (2.4G) + WiFi (5G)

The worst case is power density at prediction frequency at 20cm: 0.0858/1+0.0464/1=0.1322<1

Result: Pass