

## FCC RF Exposure Evaluation

### 1. Product Information

FCC ID	2AW5W-CPW-1
Product Name	Wireless CarPlay adapter
Test Model	CPW-1, CPW-1a, CPW-1b, CPW-1c, CPW-1t, CPW-1w
Power Supply	Input: 5V Input: 100-240V~, 50/60Hz, 1.0A
Modulation Type	Bluetooth LE: GFSK 5G WIFI : IEEE 802.11a/ac/n: OFDM
Antenna Type	PIFA Antenna
Antenna Gain	Bluetooth: -7.03dBi 5G WIFI : 1.29dBi
Frequency Range	2402 – 2480MHz / 5180 – 5240MHz
Exposure Category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Mobile Device

### 2. Evaluation Method and Limit

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is  $\leq 1.0$ . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

### 3. Limit

#### 3.1 Refer Evaluation Method

[ANSI C95.1-1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

[FCC KDB publication 447498 D01 General RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1091](#): Radiofrequency radiation exposure evaluation: mobile devices

**3. 2 Limit**

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	(900/f <sup>2</sup> )*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100,000	/	/	1.0	30

F=frequency in MHz

\*=Plane-wave equivalent power density

**4. MPE Calculation Method**

Predication of MPE limit at a given distance  
Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S=PG/4\pi R^2$$

Where: S=power density

P=power input to antenna

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

R=distance to the center of radiation of the antenna

**5. Antenna Information**

CPW-1 can only use antennas certificated as follows provided by manufacturer;

Antenna type and antenna number	Operate frequency band	Maximum antenna gain	Note
Internal Antenna	2402 MHz – 2480 MHz 5180MHz - 5240MHz	Bluetooth: -7.03dBi 5G WIFI : 1.29dBi	Bluetooth & WLAN Antenna

**6. Conducted Power Results**

**[BLE]**

Mode	Channel	Frequency (MHz)	Peak Conducted Output Power (dBm)
1M	0	2402	3.15
	19	2440	3.97
	39	2480	4.09
2M	0	2402	3.19
	19	2440	4.02
	39	2480	4.12

**[5.2GWIFI Max Conducted Power]**

Mode	Channel	Frequency (MHz)	Max Conducted Power(dBm)
11A	36	5180	12.31
	40	5200	11.66
	48	5240	10.63
11N20 SISO	36	5180	12.40
	40	5200	11.39
	48	5240	10.54
11N40 SISO	38	5190	11.38
	46	5230	10.73
11AC20 SISO	36	5180	11.79
	40	5200	11.40
	48	5240	10.53
11AC40 SISO	38	5190	11.40
	46	5230	10.68

**7. Manufacturing Tolerance**

**<BLE-1M>**

GFSK (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	3.0	4.0	4.0
Tolerance ±(dB)	1.0	1.0	1.0

**<BLE-2M>**

GFSK (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	3.0	4.0	4.0
Tolerance ±(dB)	1.0	1.0	1.0

<5.2GWLAN >

11A (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	12.0	12.0	11.0
Tolerance ±(dB)	1.0	1.0	1.0
11N20 (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	12.0	11.0	10.0
Tolerance ±(dB)	1.0	1.0	1.0
11N40 (Average)			
Channel	Channel 38	Channel 46	
Target (dBm)	11.0	11.0	
Tolerance ±(dB)	1.0	1.0	
11AC20 (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	12.0	11.0	10.0
Tolerance ±(dB)	1.0	1.0	1.0
11AC40 (Average)			
Channel	Channel 38	Channel 46	
Target (dBm)	11.0	11.0	
Tolerance ±(dB)	1.0	1.0	

8. Evaluation Results

8.1 Standalone MPE

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, r =20cm, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

BLE

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm <sup>2</sup> )	MPE Limits (mW/cm <sup>2</sup> )
	dBm	mW					
GFSK	5.0	3.1623	-7.03	0.1982	100%	0.0001	1.0000
GFSK	5.0	3.1623	-7.03	0.1982	100%	0.0001	1.0000

5.2G

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm <sup>2</sup> )	MPE Limits (mW/cm <sup>2</sup> )
	dBm	mW					
IEEE 802.11a	13.0	19.9526	1.29	1.3459	100%	0.0053	1.0000
IEEE 802.11 n HT20	13.0	19.9526	1.29	1.3459	100%	0.0053	1.0000
IEEE 802.11 n HT40	12.0	15.8489	1.29	1.3459	100%	0.0042	1.0000
IEEE 802.11 ac20	13.0	19.9526	1.29	1.3459	100%	0.0053	1.0000
IEEE 802.11 Ac40	12.0	15.8489	1.29	1.3459	100%	0.0042	1.0000

*Emark:*

- 1. Output power including tune-up tolerance;*
- 2. MPE evaluate distance is 20cm from user manual provide by manufacturer;*

**8.2 Simultaneous Transmission MPE**

The sample supports a modular, 1 antennas. This means they don't transmit at the same time, and MIMO mode is not supported. No need to consider simultaneous transmission;

**9. Conclusion**

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

.....THE END OF REPORT.....