

Maximum Permissible Exposure Report

1. Product Information

FCC ID	2AMBW-A129
Product name	Car Dash Camera
Model number	A129, A129 Duo, A129 Pro
Model Declaration	PCB board, structure and internal of these model(s) are the same, so no additional models were tested.
Test Model	A129
Power supply	DC 12V
WLAN Modulation Type	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Type	FPC antenna
Antenna Gain	5.0dBi (Max.)
Hardware version	V04
Software version	V1.0
WLAN FCC Operation frequency	IEEE 802.11a: 5180 – 5240 MHz / 5745 – 5825 MHz IEEE 802.11b: 2412 – 2462 MHz IEEE 802.11g: 2412 – 2462 MHz IEEE 802.11n HT20: 2412 – 2462 MHz / 5180 – 5240 MHz / 5745 – 5825 MHz IEEE 802.11n HT40: 5190 – 5230 MHz / 5755 – 5795 MHz IEEE 802.11ac VHT20: 5180 – 5240 MHz / 5745 – 5825 MHz IEEE 802.11ac VHT40: 5190 – 5230 MHz / 5755 – 5795 MHz IEEE 802.11ac VHT80: 5190 – 5190 MHz / 5775 – 5775 MHz
Exposure category	General population/uncontrolled environment
EUT Type	Production Unit
Device Type	Mobile Device

2. Evaluation Method

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 ≤ 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 1 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 ²)	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 ²)*	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 ²)	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 ²)*	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

The EUT can only use antennas certificated as follows provided by manufacturer;

Internal Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain
Antenna 0	FPC Antenna	2000 MHz – 6000 MHz	5.0dBi

6. Conducted Power

BT LE

Test Mode	Channel	Frequency (MHz)	Measured Peak Output Power (dBm)
BT LE	0	2402	-7.066
	19	2440	-7.553
	39	2480	-7.896

2.4GWLAN

Test Mode	Channel	Frequency (MHz)	Measured Peak Output Power (dBm)
IEEE 802.11b	1	2412	17.62
	6	2437	17.42
	11	2462	17.14
IEEE 802.11g	1	2412	16.45
	6	2437	16.95
	11	2462	16.56
IEEE 802.11n HT20	1	2412	15.45
	6	2437	15.71
	11	2462	15.34

5.2GWLAN

Test Mode	Channel	Frequency (MHz)	Measured Average Output Power (dBm)
IEEE 802.11a	36	5180	13.53
	40	5200	13.55
	48	5240	14.67
IEEE 802.11n HT20	36	5180	13.02
	40	5200	13.89
	48	5240	13.82
IEEE 802.11n HT40	38	5190	13.19
	46	5230	13.53
IEEE 802.11ac VHT20	36	5180	13.31
	40	5200	13.42
	48	5240	13.76
IEEE 802.11ac VHT40	38	5190	13.31
	46	5230	13.76
IEEE 802.11ac VHT80	42	5210	13.57

5.8GWLAN

Test Mode	Channel	Frequency (MHz)	Measured Average Output Power (dBm)
IEEE 802.11a	149	5745	12.14
	157	5785	11.47
	165	5825	12.21
IEEE 802.11n HT20	149	5745	12.36
	157	5785	11.46
	165	5825	12.25
IEEE 802.11n HT40	151	5755	12.15
	159	5795	11.38
IEEE 802.11ac VHT20	149	5745	13.31
	157	5785	13.42
	165	5825	13.76
IEEE 802.11ac VHT40	151	5755	13.31
	159	5795	13.76
IEEE 802.11ac VHT80	155	5775	10.51

7. Manufacturing Tolerance

BT LE

IEEE 802.11b (Peak)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	-7.0	-7.0	-7.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

2.4G WLAN

IEEE 802.11b (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	17.0	17.0	17.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11g (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	16.0	16.0	16.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	15.0	15.0	15.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

5.2G WLAN

IEEE 802.11a (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	14.0	14.0	14.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	13.0	13.0	13.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Average)			
Channel	Channel 38	Channel 46	/
Target (dBm)	13.0	13.0	/
Tolerance $\pm$ (dB)	1.0	1.0	/
IEEE 802.11ac VHT20 (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	13.0	13.0	13.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11ac VHT40 (Average)			
Channel	Channel 38	Channel 46	/
Target (dBm)	13.0	13.0	/
Tolerance $\pm$ (dB)	1.0	1.0	/
IEEE 802.11ac VHT80 (Average)			
Channel	Channel 42	/	/
Target (dBm)	13.0	/	/
Tolerance $\pm$ (dB)	1.0	/	/

5.8G WLAN

IEEE 802.11a (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	12.0	12.0	12.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	12.0	12.0	12.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Average)			
Channel	Channel 151	Channel 159	/
Target (dBm)	12.0	12.0	/
Tolerance $\pm$ (dB)	1.0	1.0	/
IEEE 802.11ac VHT20 (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	13.0	13.0	13.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11ac VHT40 (Average)			
Channel	Channel 151	Channel 159	/
Target (dBm)	13.0	13.0	/
Tolerance $\pm$ (dB)	1.0	1.0	/
IEEE 802.11ac VHT80 (Average)			
Channel	Channel 155	/	/
Target (dBm)	10.0	/	/
Tolerance $\pm$ (dB)	1.0	/	/

8. Measurement 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, $r=20\text{cm}$, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

Modulation Type		Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
		dBm	mW					
BT LE	GFSK	-6.00	0.2512	5.0000	3.1623	100%	0.0002	1.0000
2.4G WLAN	IEEE 802.11b	18.00	63.0957	5.0000	3.1623	100%	0.0397	1.0000
	IEEE 802.11g	17.00	50.1187	5.0000	3.1623	100%	0.0315	1.0000
	IEEE 802.11n HT20	16.00	39.8107	5.0000	3.1623	100%	0.0250	1.0000
5.2G WLAN	IEEE 802.11a	15.00	31.6228	5.0000	3.1623	100%	0.0199	1.0000
	IEEE 802.11n HT20	14.00	25.1189	5.0000	3.1623	100%	0.0158	1.0000
	IEEE 802.11n HT40	14.00	25.1189	5.0000	3.1623	100%	0.0158	1.0000
	IEEE 802.11ac VHT20	14.00	25.1189	5.0000	3.1623	100%	0.0158	1.0000
	IEEE 802.11ac VHT40	14.00	25.1189	5.0000	3.1623	100%	0.0158	1.0000
	IEEE 802.11ac VHT80	14.00	25.1189	5.0000	3.1623	100%	0.0158	1.0000
5.8G WLAN	IEEE 802.11a	13.00	19.9526	5.0000	3.1623	100%	0.0126	1.0000
	IEEE 802.11n HT20	13.00	19.9526	5.0000	3.1623	100%	0.0126	1.0000
	IEEE 802.11n HT40	13.00	19.9526	5.0000	3.1623	100%	0.0126	1.0000
	IEEE 802.11ac VHT20	14.00	25.1189	5.0000	3.1623	100%	0.0158	1.0000
	IEEE 802.11ac VHT40	14.00	25.1189	5.0000	3.1623	100%	0.0158	1.0000
	IEEE 802.11ac VHT80	11.00	12.5893	5.0000	3.1623	100%	0.0079	1.0000

Remark:

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 support one BT/WLAN modular and share same antenna, 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-----