# **Maximum Permissible Exposure Report**

# **1. Product Information**

FCC ID	2AI3L-EC4			
Product name	Dash Cam			
Test Model	EC4			
Additional Model No.	34146, 37840, RVE40			
Model declaration	PCB board, structure and internal of these model(s) are the same, So no additional models were tested.			
Power supply	DC 3.7V by Li-ion battery(300mA) DC 5V by Car charger			
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)			
Antenna Type	Internal Antenna			
Antenna Gain	2dBi (Max.)			
Hardware version	EC4_NT96670_MAIN_V1.1			
Software version	EC4V_20191231			
WLAN FCC Operation Frequency	IEEE 802.11b: 2412 – 2462 MHz IEEE 802.11g: 2412 – 2462 MHz IEEE 802.11n HT20: 2412 – 2462 MHz IEEE 802.11n HT40: 2422 – 2452 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  $\leq$  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 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

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### 3.2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure							
Frequency	Electric Field	Magnetic Field	Power Density	Averaging Time			
Range(MHz)	Strength(V/m)	Strength(A/m)	(mW/cm²)	(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	Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure						
Frequency	Electric Field	Magnetic Field	Power Density	Averaging Time			
Range(MHz)	Strength(V/m)	Strength(A/m)	(mW/cm²)	(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			

/

f/1500

1.0

30

30

F=frequency in MHz

300 - 1500

1500 - 100,000

\*=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

EC4 can only use antennas certificated as follows provided by manufacturer;

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Internal	Antenna type and	Operate frequency	Maximum antenna	Note
Identification	antenna number	band	gain	
Antenna	Internal Antenna	2000 MHz – 2500 MHz	2.0dBi	WLAN Antenna

### 6. Conducted Power

[2.4GWLAN]					
Mode	Channel	Frequency(MHz)	Peak Conducted Output Power (dBm)		
	1	2412	10.53		
IEEE 802.11b	6	2437	9.03		
	11	2462	9.17		
	1	2412	13.44		
IEEE 802.11g	6	2437	10.8		
	11	2462	11.02		
IEEE 802.11n HT20	1	2412	10.63		
	6	2437	10.82		
	11	2462	10.94		
IEEE 802.11n HT40	3	2422	10.94		
	6	2437	11.03		
	9	2452	11.14		

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# 7. Manufacturing Tolerance

[2.4GWLAN]					
IEEE 802.11b (Peak)					
Channel	Channel 1	Channel 6	Channel 11		
Target (dBm)	10.00	9.00	9.00		
Tolerance ±(dB)	1.0	1.0	1.0		
	IEEE 802	2.11g (Peak)			
Channel	Channel 1	Channel 6	Channel 11		
Target (dBm)	13.00	10.00	11.00		
Tolerance ±(dB)	1.0	1.0	1.0		
IEEE 802.11n HT20 (Peak)					
Channel	Channel 1	Channel 6	Channel 11		
Target (dBm)	10.00	10.00	10.00		
Tolerance ±(dB)	1.0	1.0	1.0		
IEEE 802.11n HT40 (Peak)					
Channel	Channel 1	Channel 6	Channel 11		
Target (dBm)	10.00	11.00	11.00		
Tolerance ±(dB)	1.0	1.0	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 = 20cm, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

[Antenna]

	Output power		Antenna	Antenna	Duty	MPE	MPE
Modulation Type	dBm	mW	Gain (dBi)	Gain (linear)	Cycle	(mW/cm <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
IEEE 802.11b	11.00	12.5893	2.00	1.5849	100%	0.003971	1.0000
IEEE 802.11g	14.00	25.1189	2.00	1.5849	100%	0.007924	1.0000
IEEE 802.11n HT20	11.00	12.5893	2.00	1.5849	100%	0.003971	1.0000
IEEE 802.11n HT40	12.00	15.8489	2.00	1.5849	100%	0.005000	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 WLAN modular and one antenna, no need 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------