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RF Exposure Evaluation Report

Report No. :	CQASZ20210300011EX-02
Applicant:	UPH Electronics (Shenzhen) CO.,LTD.
Address of Applicant:	Floor 3, Building A8, Jufufufa Industrial Park, No. 5 Fuyuan 1 Road, Fuyong Street ,Baoan District, Shenzhen City, Guangdong Province
Manufacturer:	UPH Electronics (Shenzhen) CO.,LTD.
Address of Manufacturer:	Floor 3, Building A8, Jufufufa Industrial Park, No. 5 Fuyuan 1 Road, Fuyong Street ,Baoan District, Shenzhen City, Guangdong Province
Equipment Under Test (EUT):	
Product:	Smart Driving Recorder
Test Model No.:	A16, A5, A11, A15, A17, A18, A19, A20
Test Model No.:	A16
Brand Name:	钛马星 TAIMAXING
FCC ID:	2AZF2-A15
Standards:	47 CFR Part 1.1307 47 CFR Part 1.1310 KDB447498D01 General RF Exposure Guidance v06
Date of Test:	Mar. 06, 2021 -- Apr. 15, 2021
Date of Issue:	Apr. 15, 2021
Test Result :	**PASS**

Tested By: lewis zhou

(Lewis Zhou)

Reviewed By: Timo Lei

(Timo Lei)

Approved By:

(Jack Ai)

1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20210300011EX-02	Rev.01	Initial report	Apr. 15, 2021

2 Contents

3 General Information

3.1 Client Information

Applicant:	UPH Electronics (Shenzhen) CO.,LTD.
Address of Applicant:	Floor 3, Building A8, Jufufufa Industrial Park, No. 5 Fuyuan 1 Road, Fuyong Street ,Baoan District, Shenzhen City, Guangdong Province
Manufacturer:	UPH Electronics (Shenzhen) CO.,LTD.
Address of Manufacturer:	Floor 3, Building A8, Jufufufa Industrial Park, No. 5 Fuyuan 1 Road, Fuyong Street ,Baoan District, Shenzhen City, Guangdong Province

3.2 General Description of EUT

Product Name:	Smart Driving Recorder
Test Model No.:	A16
Trade Mark:	钛马星 TAIMAXING
Hardware Version:	V2
Software Version:	V1.25
Product Type:	☐ Mobile ☐ Portable ☒ Fix Location
Power Supply:	DC12V from battery(Car 12V power supply)

3.3 General Description of 2.4G WIFI

Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(H40): 2422MHz~2452MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels IEEE 802.11n HT40: 7
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM IEEE for 802.11n(HT20): OFDM IEEE for 802.11n(HT40): OFDM
Antenna Type	FPC Antenna
Antenna Gain	2dBi Max

4 RF Exposure Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
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
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	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
Friis Formula
Friis transmission formula: Pd = (Pout*G)/(4* Pi * R 2)
Where
Pd = power density in mW/cm2
Pout = output power to antenna in mW
G = gain of antenna in linear scale
Pi = 3.1416
R = distance between observation point and center of the radiator in cm
Pd id the limit of MPE, 1 mW/cm2 . If we know the maximum gain of the antenna and the total power input to

the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.1.3 EUT RF Exposure Evaluation standalone operations

1)For WIFI:

Antenna Gain: 2dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.0 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

802.11b mode					
Test channel	Antenna	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
				(dBm)	(mW)
Lowest(2412MHz)	ANT1	17.07	17±1	18	63.096
Middle(2437MHz)	ANT1	17.03	17±1	18	63.096
Highest(2462MHz)	ANT1	15.38	15±1	16	39.811
802.11g mode					
Test channel	Antenna	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
				(dBm)	(mW)
Lowest(2412MHz)	ANT1	12.48	13±1	14	25.119
Middle(2437MHz)	ANT1	12.91	13±1	14	25.119
Highest(2462MHz)	ANT1	13.86	13±1	14	25.119
802.11n(HT20) SISO mode					
Test channel	Antenna	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
				(dBm)	(mW)
Lowest(2412MHz)	ANT1	10.89	11±1	12	15.849
Middle(2437MHz)	ANT1	11.22	12±1	13	19.953
Highest(2462MHz)	ANT1	12.17	12±1	13	19.953
802.11n(HT40) SISO mode					
Test channel	Antenna	Average Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
				(dBm)	(mW)
Lowest(2422MHz)	ANT1	10.75	10±1	11	12.589
Middle(2437MHz)	ANT1	10.72	10±1	11	12.589
Highest(2452MHz)	ANT1	8.98	9±1	10	10.000

Test worst case

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm2)	Limit	Result
63.096	1.585	0.0199	1.0	PASS

Note: 1) Refer to report No. : CQASZ20210300011EX-01 for EUT test Max Conducted average Output Power value.

2) Pd = (Pout*G)/(4* Pi * R2)=(63.096 *1.585)/(4*3.1416*20^2)=0.0199 mW/cm2

3) EUT wifi2.4G module is more than 20cm away from the human body