

RF Exposure Evaluation Report

Report Reference No......: **MTEB22120172-H**

FCC ID.....: **2A3IW-R2-4KPRO**

Compiled by

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Supervised by

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Date of issue.....: January 09,2023

Representative Laboratory Name.: **Shenzhen Most Technology Service Co., Ltd.**

Address: No.5, 2nd Langshan Road, North District, Hi-tech Industrial Park, Nanshan, Shenzhen, Guangdong, China.

Applicant's name.....: **Aarna Sales Corporation**

Address: 1940 N Municipal Way, UNIT 2020, Round Lake, IL 60073

Test specification/ Standard: **47 CFR Part 1.1307**

47 CFR Part 1.1310

KDB447498D01 General RF Exposure Guidance v06

TRF Originator.....: Shenzhen Most Technology Service Co., Ltd.

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Test item description: Car Dash Camera

Trade Mark: ROVE

Manufacturer: Shenzhen Samoon Technology Co.,Ltd

Model/Type reference.....: R2-4K PRO

Listed Models: N/A

Modulation Type: CCK/DSSS/ OFDM

Operation Frequency.....: From 2412 - 2462MHz for wifi 2.4G
From 5180-5240MHz for wifi 5.2G

Hardware Version.....: CHF43-MAN-A1 2020-08-011

Software Version: V1

Rating: DC 5.5V(by Super Capacitor)
DC 5V (by Car charger)

Result.....: **PASS**

TEST REPORT

Equipment under Test : Car Dash Camera

Model /Type : R2-4K PRO

Listed Models : N/A

Remark : N/A

Applicant : **Aarna Sales Corporation**

Address : 1940 N Municipal Way, UNIT 2020, Round Lake, IL 60073

Manufacturer : **Shenzhen Samoon Technology Co.,Ltd**

Address : Floor 6, Building 7, Zhongyuntai Science and Technology Industrial
Factory, Songbai Road, Shiyan Street, Baoan District, Shenzhen
China

Test Result:	PASS
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

1. Revision History

Revision	Issue Date	Revisions	Revised By
00	2023.01.09	Initial Issue	Alisa Luo

2. SAR Evaluation

2.1 RF Exposure Compliance Requirement

2.1.1 Standard Requirement

According to §1.1307(e)(1), systems operating under the provisions of this 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.

According to §1.1310 and §2.1091 RF exposure is calculated.

KDB447498 D01: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

2.1.2 Limits

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: $P_d = (P_{out} * G) / (4 * \pi * R^2)$ Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is 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.

2.1.3 EUT RF Exposure

WIFI 2.4G

Antenna Gain: 3.1dBi

IEEE for 802.11b mode			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2412MHz)	11.523	11.523 ± 1	12.523
Middle(2437MHz)	11.856	11.856 ± 1	12.856
Highest(2462MHz)	10.523	10.523 ± 1	11.523

IEEE for 802.11g mode			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2412MHz)	8.892	8.892 ± 1	9.892
Middle(2437MHz)	9.255	9.255 ± 1	10.255
Highest(2462MHz)	8.220	8.220 ± 1	9.220

IEEE for 802.11n(HT20) mode			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2412MHz)	8.824	8.824 ± 1	9.824
Middle(2437MHz)	8.562	8.562 ± 1	9.562
Highest(2462MHz)	8.998	8.998 ± 1	9.998

IEEE for 802.11n(HT40) mode			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
Lowest(2412MHz)	5.882	5.882 ± 1	6.882
Middle(2437MHz)	5.843	5.843 ± 1	6.843
Highest(2462MHz)	4.162	4.162 ± 1	5.162

WIFI 5G

Antenna Gain: 3.8dBi

IEEE for 802.11a			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
36	12.55	12.55 ± 1	13.55
40	12.22	12.22 ± 1	13.22
48	13.31	13.31 ± 1	14.31

IEEE for 802.11n(HT20)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
36	11.21	11.21 ± 1	12.21
40	11.20	11.20 ± 1	12.20
48	11.52	11.52 ± 1	12.52

IEEE for 802.11n(HT40)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
38	10.94	10.94 ± 1	11.94
46	10.85	10.85 ± 1	11.85

IEEE for 802.11ac(HT20)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
36	10.51	10.51 ± 1	11.51
40	10.13	10.13 ± 1	11.13
48	9.85	9.85 ± 1	10.85

IEEE for 802.11ac(HT40)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
38	9.87	9.87 ± 1	10.87
46	9.64	9.64 ± 1	10.64

IEEE for 802.11ac(HT80)			
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power
			(dBm)
42	9.52	9.52 ± 1	10.52

Worst case: IEEE for 802.11b mode						
Channel	Maximum Peak Conducted Output Power	Maximum Peak Conducted Output Power	Antenna Gain	Power Density at R = 20 cm	Limit	Result
	(dBm)	(MW)	(dBi)	(mW/cm ²)		
Lowest (2437MHz)	12.856	19.3	3.1	0.0078	1.0	Pass

Note: 1) Refer to report MTEB22120172-R1 for EUT test Max Conducted average Output Power value.

Note: 2) $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2) = (19.3 \cdot 2.04) / (4 \cdot 3.1416 \cdot 20^2) = 0.0078$

Worst case: IEEE for 802.11a						
Channel	Maximum Peak Conducted Output Power	Maximum Peak Conducted Output Power	Antenna Gain	Power Density at R = 20 cm	Limit	Result
	(dBm)	(MW)	(dBi)	(mW/cm ²)		
Lowest (5180MHz)	12.52	17.87	3.8	0.0084	1.0	Pass

Note: 1) Refer to report MTEB22120172-R1 for EUT test Max Conducted average Output Power value.

Note: 2) $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2) = (17.87 \cdot 2.39) / (4 \cdot 3.1416 \cdot 20^2) = 0.0084$

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