

RF Exposure Evaluation Report

APPLICANT : Nauto
EQUIPMENT : In-vehicle camera
BRAND NAME : Nauto
MODEL NAME : N4
FCC ID : 2AKJ5-N4
STANDARD : 47 CFR Part 2.1091
FCC KDB 447498 D01 v06

The product evaluation date was started from Apr. 22, 2024 and completed on Apr. 22, 2024. We, Sporton International Inc. (Kunshan), would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and pass the limit. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.



Approved by: Si Zhang

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People's Republic of China



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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA3D2618	Rev. 01	Initial issue of report.	May 14, 2024



1. Administration Data

1.1. Testing Laboratory

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory			
Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR01-KS	CN1257	314309

Applicant	
Company Name	Nauto
Address	1259 Reamwood Ave, Sunnyvale, CA 94089, USA

Manufacturer	
Company Name	Nauto
Address	1259 Reamwood Ave, Sunnyvale, CA 94089, USA

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	In-vehicle camera
Brand Name	Nauto
Model Name	N4
FCC ID	2AKJ5-N4
Wireless Technology and Frequency Range	LTE Band 2 : 1850 MHz ~ 1910 MHz LTE Band 4 : 1710 MHz ~ 1755 MHz LTE Band 5 : 824 MHz ~ 849 MHz LTE Band 12 : 699 MHz ~ 716 MHz LTE Band 13 : 777 MHz ~ 787 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.3GHz Band: 5260 MHz ~ 5320 MHz WLAN 5.5GHz Band: 5500 MHz ~ 5720 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	LTE: QPSK, 16QAM WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 2.4GHz 802.11ax HE20/HE40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80/VHT160 WLAN 5GHz 802.11ax HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE
Antenna Gain	LTE Band 2 : -1.2 dBi LTE Band 4 : -1.2 dBi LTE Band 5 : -2.7 dBi LTE Band 12 : -1.0 dBi LTE Band 13 : -1.1 dBi WLAN2.4GHz/Bluetooth: -0.4 dBi WLAN5.2GHz: -0.1 dBi WLAN5.3GHz: -1.0 dBi WLAN5.5GHz: -1.2 dBi WLAN5.8GHz: -1.0 dBi
Antenna Type	WWAN: monopole Antenna WLAN/Bluetooth: monopole Antenna
HW Version	V4
SW Version	NautoN4
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

Comments and Explanations:

1. The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.
2. The maximum RF output tune up power, antenna gain also the safe distance used for evaluate RF exposure were declared by manufacturer.

**3. Maximum RF average output tune up power among production units****<LTE>**

Mode		Maximum Average power(dBm)
LTE	Band 2	24.0
	Band 4	24.0
	Band 5	24.0
	Band 12	24.0
	Band 13	24.0

<2.4GHz WLAN >

Mode		Maximum Average Power (dBm)
2.4GHz	802.11b	18.0
	802.11g	18.0
	802.11n-HT20	17.0
	802.11n-HT40	17.0
	802.11ax-HE20	17.0
	802.11ax-HE40	17.0

<Bluetooth>

Mode		Maximum Average power(dBm)
Bluetooth	BR/EDR	15.0
	LE	7.0

<5GHz WLAN >

Mode		Maximum Average Power (dBm)
5.2GHz	802.11a	14.0
	802.11n-HT20	14.0
	802.11n-HT40	14.0
	802.11ac-VHT20	14.0
	802.11ac-VHT40	14.0
	802.11ac-VHT80	14.0
	802.11ax-HE20	14.0
	802.11ax-HE40	14.0
	802.11ax-HE80	14.0
5.3GHz	802.11a	17.0
	802.11n-HT20	17.0
	802.11n-HT40	16.0
	802.11ac-VHT20	17.0
	802.11ac-VHT40	16.0
	802.11ac-VHT80	15.0
	802.11ac-VHT160	13.0



	802.11ax-HE20	17.0
	802.11ax-HE40	16.0
	802.11ax-HE80	15.0
	802.11ax-HE160	13.0
5.5GHz	802.11a	17.0
	802.11n-HT20	17.0
	802.11n-HT40	16.0
	802.11ac-VHT20	17.0
	802.11ac-VHT40	16.0
	802.11ac-VHT80	15.0
	802.11ac-VHT160	12.0
	802.11ax-HE20	17.0
	802.11ax-HE40	16.0
	802.11ax-HE80	15.0
	802.11ax-HE160	12.0
5.8GHz	802.11a	18.0
	802.11n-HT20	17.0
	802.11n-HT40	17.0
	802.11ac-VHT20	17.0
	802.11ac-VHT40	17.0
	802.11ac-VHT80	16.0
	802.11ax-HE20	17.0
	802.11ax-HE40	17.0
	802.11ax-HE80	16.0

4. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

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

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna



5. Radio Frequency Radiation Exposure Evaluation

5.1. Standalone Power Density Calculation

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
LTE Band 2	1850.7	-1.20	24.00	22.800	190.546	0.038	1.000	0.038
LTE Band 4	1710.7	-1.20	24.00	22.800	190.546	0.038	1.000	0.038
LTE Band 5	824.7	-2.70	24.00	21.300	134.896	0.027	0.550	0.049
LTE Band 12	699.7	-1.00	24.00	23.000	199.526	0.040	0.466	0.085
LTE Band 13	779.5	-1.10	24.00	22.900	194.984	0.039	0.520	0.075
Bluetooth	2402.0	-0.40	15.00	14.600	28.840	0.006	1.000	0.006
2.4GHz WLAN	2412.0	-0.40	18.00	17.600	57.544	0.011	1.000	0.011
5.2GHz WLAN	5180.0	-0.10	14.00	13.900	24.547	0.005	1.000	0.005
5.3GHz WLAN	5260.0	-1.00	17.00	16.000	39.811	0.008	1.000	0.008
5.5GHz WLAN	5500.0	-1.20	17.00	15.800	38.019	0.008	1.000	0.008
5.8GHz WLAN	5745.0	-1.00	18.00	17.000	50.119	0.010	1.000	0.010

Note:

1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. Chose the maximum power to do MPE analysis.

**5.2. Collocated Power Density Calculation**

WWAN Power Density / Limit	WLAN 2.4GHz Power Density / Limit	Σ (Power Density / Limit) of WWAN + WLAN 2.4GHz
0.085	0.011	0.096

WWAN Power Density / Limit	WLAN 5GHzPower Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit) of WWAN + WLAN 5GHz+ Bluetooth
0.085	0.010	0.006	0.101

Note:

1. According to the EUT characteristic, WLAN 2.4GHz and WLAN 5GHz cannot transmit simultaneously.
2. Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WWAN + WLAN 2.4GHz, WWAN + WLAN 5GHz + Bluetooth.
3. Considering all transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1.

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.

-----THE END-----