

FCC MPE Report

Applicant : Lantronix, Inc.
Product Name : Wireless Module
Trade Name : LANTRONIX
Model Number : Open-Q 4200 SIP
Applicable Standard : 47 CFR § 2.1091
Received Date : Mar. 29, 2023
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Taiwan Accreditation Foundation accreditation number: 1330

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Approved By :



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Revision History

<i>Rev.</i>	<i>Issued Date</i>	<i>Description</i>	<i>Revised by</i>
00	Nov. 15, 2023	Initial Issue	Rowan Hsieh

1. General Information

1.1 Reference Applicable Standard

Standard	Description	Version
IEEE C95.1	American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300 KHz to 100 GHz, New York.	1992
47 CFR § 2.1091	Radiofrequency radiation exposure evaluation: mobile devices.	-
47 CFR § 1.1310	Radiofrequency radiation exposure limits.	-

1.2 Testing Location

Test Facilities

Company Name: Eurofins E&E Wireless Taiwan Co., Ltd.
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Test Site Location

- No. 140-1, Changan Street, Bade District, Taoyuan City 334025, Taiwan
- No. 2, Wuquan 5th Rd. Wugu Dist., New Taipei City, Taiwan

Laboratory Accreditation

Location	TAF	FCC	ISED
No. 140-1, Changan Street, Bade District, Taoyuan City 334025, Taiwan	Accreditation No.: 1330	Designation No.: TW0010	Company No.: 7381A CAB ID: TW1330
No. 2, Wuquan 5th Rd. Wugu Dist., New Taipei City, Taiwan	Accreditation No.: 1330	Designation No.: TW0034	Company No.: 28922 CAB ID: TW1330

2. Description of Equipment under Test (EUT)

Applicant	Lantronix, Inc. 48 Discovery, Suite 250, Irvine, CA 92618 USA				
Product Name	Wireless Module				
Trade Name	LANTRONIX				
Model Number	Open-Q 4200 SIP				
FCC ID	R68OQ4200S				
Use Distance	20 cm				
Antenna Information	Trade Name	Model No.	Type	Gain	
	TAOGLAS	FXP830.07.0100C	Dipole Antenna	2.4 GHz	3.32 dBi
				5 GHz	6.11 dBi

Note:

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

2.1 RF Specification

Wi-Fi 2.4G				
Support type:	<input checked="" type="checkbox"/> 802.11b	<input checked="" type="checkbox"/> 802.11g	<input checked="" type="checkbox"/> 802.11n	<input type="checkbox"/> 802.11ax
Support bandwidth:	<input checked="" type="checkbox"/> 20 MHz	<input checked="" type="checkbox"/> 40 MHz		
Wi-Fi 5G				
Operation Band:	<input checked="" type="checkbox"/> U-NII-1	<input checked="" type="checkbox"/> U-NII-2A	<input checked="" type="checkbox"/> U-NII-2C	<input checked="" type="checkbox"/> U-NII-3
	<input type="checkbox"/> U-NII-5			
Support type:	<input checked="" type="checkbox"/> 802.11a	<input checked="" type="checkbox"/> 802.11n	<input checked="" type="checkbox"/> 802.11ac	<input type="checkbox"/> 802.11ax
Support bandwidth:	<input checked="" type="checkbox"/> 20 MHz	<input checked="" type="checkbox"/> 40 MHz	<input checked="" type="checkbox"/> 80 MHz	<input type="checkbox"/> 160 MHz
Bluetooth				
Support type:	<input checked="" type="checkbox"/> BR	<input checked="" type="checkbox"/> EDR	<input checked="" type="checkbox"/> BLE-1 Mbps	<input checked="" type="checkbox"/> BLE-2 Mbps

3. RF Exposure Limit

For devices that operate at larger distances from persons, where there are minimal RF coupling interactions between a device and the user or nearby persons, RF exposure compliance using maximum permissible exposure (MPE) limits is applied. The limits for MPE is listed as below:

Limits for General Population / Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
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 / 1,500	30
1,500-100,000	-	-	1.0	30
Limits for Occupational / Controlled Exposure				
Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1,842 / f	4.89 / f	(900 / f ²)*	6
30-300	61.4	0.163	1.0	6
300-1,500	-	-	F / 300	6
1,500-100,000	-	-	5	6

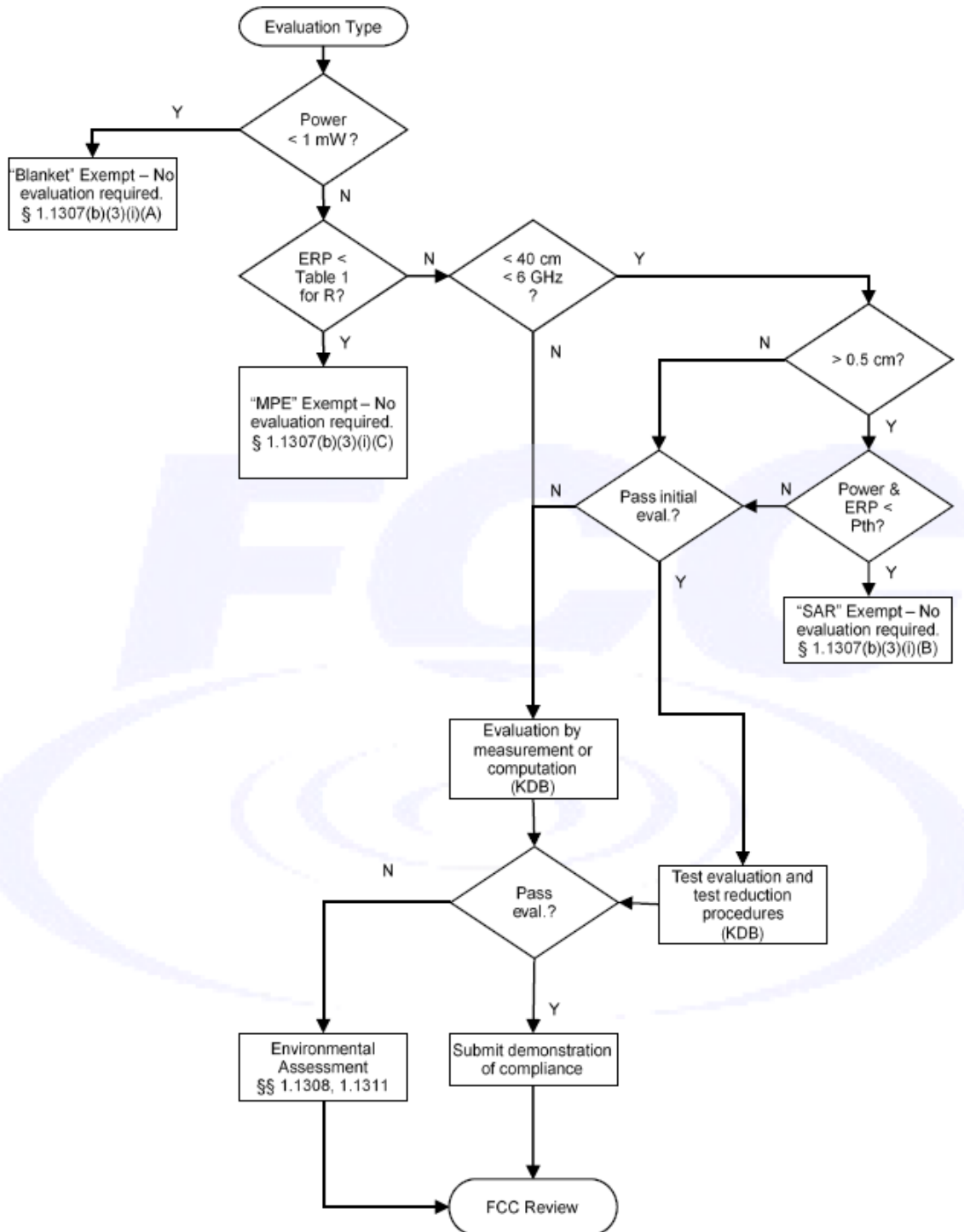
f = frequency in MHz. * = Plane-wave equivalent power density.

4. RF Exposure Assessment

4.1 Exemption Evaluation

Exemption evaluation was performed according to the appendix A and B in KDB447498 D04.

The General Sequence for Determination of Procedure demonstrated in Figure A.1 of KDB447498 D04 was applied.



4.2 Human Exposure Assessment

Due to the design and installation of this product, it is not possible to conduct SAR evaluation. This is because client either manufactures or supplies the antenna(s) that will be used in the installation of this product. Therefore, this product will be evaluated as a mobile device per 47 CFR § 1.1310 titled "Radiofrequency radiation exposure limits", generally referred to as MPE limits.

In 47 CFR § 2.1091, paragraph (b) defines a mobile device as "a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 cm is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons."

Exposure evaluation

$$S_{eip} = \frac{EIRP}{4\pi d^2} = \frac{PG}{4\pi d^2} (W / m^2)$$

Where

S: is the input power (W);

G: is the antenna gain;

d : is the distance between antennas and evaluation point (m).

5. Maximum Transmitting Mode Evaluation

Antenna transmission description
WLAN 2.4 GHz : 1TX (Diversity) WLAN 5 GHz : 1TX (Diversity) Bluetooth : 1TX (Diversity)

6. Result

Band	Frequency (MHz)	Conducted Power (dBm) [P]	ANT Gain (dBi)	Numeric Gain [G]	Power with Duty cycle (mW) [P]x[G]	Power Density (mW/cm ²) [S]	Standalone Limit (mW/cm ²)	Evaluated / Exposure Limit
WLAN 2.4 GHz	2412 - 2472	17.71	3.32	2.15	126.89	0.03	1.00	0.03
WLAN 5.2 GHz	5150 - 5250	15.91	6.11	4.08	159.10	0.03	1.00	0.03
WLAN 5.3 GHz	5250 - 5350	16.46	6.11	4.08	180.58	0.04	1.00	0.04
WLAN 5.6 GHz	5470 - 5725	16.38	6.11	4.08	177.28	0.04	1.00	0.04
WLAN 5.8 GHz	5725 - 5850	16.47	6.11	4.08	180.99	0.04	1.00	0.04
Bluetooth	2402 - 2480	11.82	3.32	2.15	32.69	0.01	1.00	0.01

Note:

1. The calculation uses the minimum distance defined by the regulations of 20 cm, which is more conservative than the actual use distance of the product.
2. The maximum power and gain were applied to evaluate MPE.

MAX MPE: 0.04 mW/cm²

7. Conclusion

The result shows that this device is compliance with the exposure limits in 47 CFR §1.1310.

***** End of Report *****