MPE Report

Applicant	:	OpenPath Security, Inc.
Product Type	:	Single Door Controller
Trade Name	:	openpath
Model Number	:	OP-2ESH-POE
Applicable Standard	:	IEEE Std.C95.1
		47 CFR § 2.1091 / 47 CFR § 1.1310
Received Date	:	Dec. 27, 2019
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Issued by

Approved By : (Mark Duan) Tested By : (Kris Pan)

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Taiwan Accreditation Foundation accreditation number: 1330
Test Firm MRA designation number: TW0010

Note:

1.The test results are valid only for samples provided by customers and under the test conditions described in this report.
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Revision History

Rev.	Issued Date	Revisions	Revised By
00	Feb. 15, 2020	Initial Issue	Jennifer Liu

Contents

1. Reference Applicable Standard

Standard	Description	Version
ANSI/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 Part §2.1091	Radiofrequency radiation exposure evaluation: mobile devices.	-
47 CFR Part §1.1310	Radiofrequency radiation exposure limits.	-

2. Description of Equipment under Test (EUT)

Applicant	OpenPath Security, Inc. 13428 Maxella Ave, #866, Marina Del Rey, CA 90292			
Manufacturer	OpenPath Security, Inc. 13428 Maxella Ave, #866, Marina Del Rey, CA 90292			
Product Type	Single Door Controller			
Trade Name	openpath			
Model Number	OP-2ESH-POE			
FCC ID	2APJV2ESH			
Frequency Range	Operate Band			Frequency Range (MHz)
	IEEE 802.11b / 802.11g / 802.11n 2.4 GHz 20 MHz			2412 - 2462
	IEEE 802.11a U-NII Band I			5180 - 5240
	IEEE 802.11a U-NII Band II-A			5260 - 5320
	IEEE 802.11a U-NII Band II-C			5500 - 5700
	IEEE 802.11a U-NII Band III			5745 - 5825
	IEEE 802.11n 5 GHz / 802.11ac 20 MHz U-NII Band I			5180 - 5240
	IEEE 802.11n 5 GHz / 802.11ac 20 MHz U-NII Band II-A			5260 - 5320
	IEEE 802.11n 5 GHz / 802.11ac 20 MHz U-NII Band II-C			5500 - 5700
	IEEE 802.11n 5 GHz / 802.11ac 20 MHz U-NII Band III			5745 - 5825
	Bluetooth BR/EDR			2402 - 2480
	Bluetooth LE			2402 - 2480
Antenna Information	Model	Type	Frequency (MHz)	Max. Gain (dBi)
	ALX19P-222AA3-00	Embedded Antenna	2412 - 2480	2.7
			5150 - 5250	3.8
			5250 - 5350	3.8
			5470 - 5725	3.8
			5725 - 5850	3.8
Antenna Delivery	1TX			
RF Evaluation	0.117 mW/cm^2			
Operate Temp. Range	0 ~ 50°C			

The above equipment was tested by A Test Lab Techno Corp. For compliance with the requirements set forth in 47 CFR § 2.1091 / 47 CFR § 1.1310. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

3. 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. ” This product is intended to be installed into a vehicle such that the unit is physically secured at one location. In the installation guide supplied with the product,

Client has made the following statement: “IMPORTANT: To meet the FCC’s RF Exposure Guidelines, the antenna should be installed so there is at least 20 cm of separation between the body of the user and nearby persons and the antenna”. Based on the installation of the transceiver and the antenna, the transmitters radiating structure is more than 20 cm from the user. Thus, this product is a “mobile device” as defined in section § 2.1091 paragraph (b).

Exposure evaluation
$$S_{eirp} = \frac{EIRP}{4\pi d^2} = \frac{PG}{4\pi d^2}\left(W/m^2\right)$$

Where

S: is the input power (W);

G: is the antenna gain;

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

4. Power Density Limit – RF Exposure Evaluation

Thv In 47 CFR § 1.1310, use of the device as based upon the user's awareness and ability to exercise control over human exposure. The two categories defined are Occupational / Controlled Exposure and General Population / Uncontrolled. These two categories are defined as follow:

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

4.1 *Conducted Power*

Band	Data Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)
IEEE 802.11b	1	2412.0	20.49
	6	2437.0	**24.45**
	11	2462.0	19.28
IEEE 802.11g	1	2412.0	18.55
	6	2437.0	21.43
	11	2462.0	18.66
IEEE 802.11n 2.4 GHz 20 MHz	1	2412.0	16.96
	6	2437.0	21.42
	11	2462.0	16.81

Band	Frequency (MHz)	Packet Type	Average Conducted power (dBm)
Bluetooth BR GFSK	2402.0	DH1	9.43
		DH3	9.44
		DH5	9.47
	2441.0	DH1	9.40
		DH3	9.42
		DH5	9.52
	2480.0	DH1	9.66
		DH3	9.67
		DH5	**9.70**
Bluetooth EDR π/4-DQPSK	2402.0	DH1	5.01
		DH3	5.12
		DH5	5.20
	2441.0	DH1	5.12
		DH3	5.26
		DH5	**5.33**
	2480.0	DH1	5.03
		DH3	5.06
		DH5	5.21
Bluetooth EDR 8DPSK	2402.0	DH1	5.05
		DH3	5.18
		DH5	5.24
	2441.0	DH1	5.19
		DH3	5.33
		DH5	**5.39**
	2480.0	DH1	5.09
		DH3	5.13
		DH5	5.26
Bluetooth LE	2402.0	---	**5.65**
	2440.0		5.34
	2480.0		4.35

Band	Data Rate (Mbps)	Frequency (MHz)	Average Power (dBm)
IEEE 802.11a	6	5180.0	19.35
		5200.0	**22.28**
		5220.0	22.22
		5240.0	22.19
		5260.0	**22.08**
		5280.0	22.07
		5300.0	22.03
		5320.0	18.94
		5500.0	17.77
		5520.0	20.42
		5540.0	20.49
		5560.0	20.52
		5580.0	20.45
		5660.0	**20.57**
		5680.0	20.44
		5700.0	19.33
		5745.0	**22.25**
		5765.0	22.11
		5785.0	22.07
		5805.0	21.93
		5825.0	21.88
IEEE 802.11ac 20 MHz	6.5	5180.0	18.06
		5200.0	22.05
		5220.0	22.08
		5240.0	**22.11**
		5260.0	21.80
		5280.0	21.74
		5300.0	21.77
		5320.0	**21.81**
		5500.0	19.56
		5520.0	**20.94**
		5540.0	20.86
		5560.0	20.90
		5580.0	20.85
		5660.0	20.73
		5680.0	20.81
		5700.0	20.77
		5745.0	**22.03**
		5765.0	21.88
		5785.0	21.81
		5805.0	21.77
		5825.0	21.56

5. Test Result

Antenna	Band	Frequency (MHz)	Limit (w)/m^2	Distance (m) [d]	Max Tune-up Power [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	Power with Duty cycle [TP] (W)	Power Density [S] (w)/m^2
Bluetooth Antenna	Bluetooth LE	2402-2480	1	20	10.00	2.70	1.86	1	18.60	0.004
Wi-Fi Antenna	2.4 GHz	2412-2462	1	20	25.00	2.70	1.86	1	588.18	0.117
	5 GHz	5150-5250	1	20	22.50	3.80	2.40	1	426.79	0.085
		5250-5350	1	20	22.50	3.80	2.40	1	426.79	0.085
		5470-5725	1	20	21.00	3.80	2.40	1	302.14	0.060
		5725-5850	1	20	22.50	3.80	2.40	1	426.79	0.085

Note:

1. Mobile or fixed location transmitters, minimum separation distance is 20 cm, even if calculations indicate MPE distance is less.
2. We used the maximum power and gain to provide MPE results.
3. The Numeric Gain calculated by 10^(ant. Gain(dBi) /10).
4. The MPE results are evaluated by lowest data rate for WLAN.

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