

RF Exposure Evaluation Report

Equipment : 802.11ac Tri Band PoE Access Point
Brand Name : LITE-ON, MOJO, WatchGuard
Model No. : WP8333V1, C-110, AP225
FCC ID : PPQ-WP8333V1
Standard : 47 CFR Part 2.1091
Applicant : LITE-ON Technology Corp.
Bldg. C, 90, Chien 1 Rd., Chung-Ho, New Taipei City,
23585 Taiwan
Manufacturer : Lite-On Network Communication (Dongguan)
Limited
30#Keji Rd., Yin Hu Industrial Area, Qingxi
Town, DongGuan City, Guangdong, China

The product sample received on Apr. 17, 2017 and completely tested on Aug. 24, 2017. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with 47 CFR Part 2.1091 and pass the limit.

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Cliff Chang
SPORTON INTERNATIONAL INC.





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PHOTOGRAPHS OF EUT V02



1 General Description

1.1 EUT General Information

RF General Information			
Evaluation Mode	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
2.4GHz WLAN	2400-2483.5	2412-2462	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5240 5260-5320 5500-5720 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Bluetooth	2400-2483.5	2402-2480	BR / EDR: FHSS (GFSK / $\pi/4$ -DQPSK / 8DPSK) LE: DSSS (GFSK)

Note: The EUT contain Radio 3 (2.4G)/(5G) RF module (Model Name: WM862FEMD

FCC ID: PPQ-WM862FEMD)

1.2 Table for Multiple Listing

The brand/model names in the following table are all refer to the identical product.

Brand Name	Model Name	Description
LITE-ON	WP8333V1	All the models are identical, the difference model name for difference brand served as marketing strategy.
MOJO	C-110	
WatchGuard	AP225, C-110	

From the above models, model: WP8333V1 was selected as representative model for the test and its data was recorded in this report.



1.3 Table for Class II Change

This product is an extension of original one reported under Sporton project number: FA741722-02

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. Changing the location of the EUT radio 2 antenna.	Maximum Permissible Exposure.
2. Removing the EUT copper foil.	Do not effect the test results.

Note: The radio 1 2.4GHz and 5GHz (Band 1, Band 4), radio 4 bluetooth MPE test results are based on original report: FA741722. The radio 2 5GHz (Band 1, Band 4) MPE test results are based on original report: FA741722-03.

1.4 Table for Operating Mode

Operating Mode	
1	EUT 2 - R1 (2.4G) + R2 (5G) + R3 (2.4G) + R4 (BT)
2	EUT 2 - R1 (2.4G) + R2 (5G) + R3 (5G) + R4 (BT)
3	EUT 2 - R1 (5G) + R2 (5G) + R3 (2.4G) + R4 (BT)
4	EUT 2 - R1 (5G) + R2 (5G) + R3 (5G) + R4 (BT)

1.5 Table for Explanation of Flash

EUT No.	Brand name	Model name	Flash
1	winbond	25Q256JVFQ	32M+32M
2	MXIC	MX25L51245GMI-08G	64M

1.6 Testing Location

Testing Location		
☐	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-327-0973
☒	JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C. TEL : 886-3-656-9065 FAX : 886-3-656-9085

2 Maximum Permissible Exposure

2.1 Limit of Maximum Permissible Exposure

(A) 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	1842 / f	4.89 / f	(900 / f)*	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

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)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Method

The MPE was calculated at 28 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$



2.3 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

For Radio 1

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;G1D	6.50	27.17	33.67	2.32809	28	0.23642	1.00000
5.8G;D1D	6.10	29.65	35.75	3.75837	28	0.38167	1.00000

For Radio 2

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
5.2G;D1D	5.60	26.04	31.64	1.45881	28	0.14807	1.00000
5.3G;D1D	6.00	23.80	29.80	0.95499	28	0.09693	1.00000
5.6G;D1D	6.10	23.87	29.97	0.99312	28	0.10080	1.00000
5.8G;D1D	5.90	27.34	33.24	2.10863	28	0.21403	1.00000

For Radio 3

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;G1D	6.50	24.89	31.39	1.37721	28	0.13986	1.00000
5.2G;D1D	4.80	22.01	26.81	0.47973	28	0.04871	1.00000
5.3G;D1D	5.40	22.87	28.27	0.67143	28	0.06818	1.00000
5.6G;D1D	5.80	22.42	28.22	0.66374	28	0.06740	1.00000
5.8G;D1D	6.00	22.23	28.23	0.66527	28	0.06756	1.00000

For Radio 4

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;BT-BR	2.10	9.96	12.06	0.01607	28	0.00163	1.00000

**Simultaneous Transmission Analysis Mode 1: EUT 2 - R1 (2.4G) + R2 (5G) + R3 (2.4G) + R4 (BT)**

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Ratio (S/Limit)
2.4G;G1D (Radio 1)	6.5	27.17	33.67	2.32809	28	0.23642	1	0.23642
5.8G;D1D (Radio 2)	5.9	27.34	33.24	2.10863	28	0.21403	1	0.21403
2.4G;G1D (Radio 3)	6.5	24.89	31.39	1.37721	28	0.13986	1	0.13986
2.4G;BT-BR (Radio 4)	2.1	9.96	12.06	0.01607	28	0.00163	1	0.00163
							Sum Ratio	0.59194
							Ratio Limit	1

Simultaneous Transmission Analysis Mode 2: EUT 2 - R1 (2.4G) + R2 (5G) + R3 (5G) + R4 (BT)

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Ratio (S/Limit)
2.4G;G1D (Radio 1)	6.5	27.17	33.67	2.32809	28	0.23642	1	0.23642
5.8G;D1D (Radio 2)	5.9	27.34	33.24	2.10863	28	0.21403	1	0.21403
5.3G;D1D (Radio 3)	5.4	22.87	28.27	0.67143	28	0.06818	1	0.06818
2.4G;BT-BR (Radio 4)	2.1	9.96	12.06	0.01607	28	0.00163	1	0.00163
							Sum Ratio	0.52026
							Ratio Limit	1

**Simultaneous Transmission Analysis Mode 3: EUT 2 - R1 (5G) + R2 (5G) + R3 (2.4G) + R4 (BT)**

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Ratio (S/Limit)
5.8G;D1D (Radio 1)	6.1	29.65	35.75	3.75837	28	0.38167	1	0.38167
5.8G;D1D (Radio 2)	5.9	27.34	33.24	2.10863	28	0.21403	1	0.21403
2.4G;G1D (Radio 3)	6.5	24.89	31.39	1.37721	28	0.13986	1	0.13986
2.4G;BT-BR (Radio 4)	2.1	9.96	12.06	0.01607	28	0.00163	1	0.00163
							Sum Ratio	0.73719
							Ratio Limit	1

Simultaneous Transmission Analysis Mode 4: EUT 2 - R1 (5G) + R2 (5G) + R3 (5G) + R4 (BT)

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Ratio (S/Limit)
5.8G;D1D (Radio 1)	6.1	29.65	35.75	3.75837	28	0.38167	1	0.38167
5.8G;D1D (Radio 2)	5.9	27.34	33.24	2.10863	28	0.21403	1	0.21403
5.3G;D1D (Radio 3)	5.4	22.87	28.27	0.67143	28	0.06818	1	0.06818
2.4G;BT-BR (Radio 4)	2.1	9.96	12.06	0.01607	28	0.00163	1	0.00163
							Sum Ratio	0.66551
							Ratio Limit	1