

Radio Exposure Evaluation Report

FCC ID : PPQ-WP9333

Equipment : 802.11 a/n/ac + b/g/n Access Point

Brand Name : LITE-ON, MOJO, ARISTA, WatchGuard

Model Name : WP9333, WP9331, O-105, WP9331-FM, O-105E, AP327X

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

Standard : 47 CFR Part 2.1091

The product was received on Jan. 30, 2019, and testing was started from Feb. 01, 2019 and completed on Feb. 01, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of United States government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.


Approved by: Allen Lin

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

None.

Reviewed by: Sam Tsai

Report Producer: Amber Chiu

1 General Description

1.1 EUT General Information

RF General Information			
Evaluation Mode	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
5GHz WLAN	5150-5250 5250-5350 5470-5725 5725-5850	5180-5240 5260-5320 5500-5700 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)

1.2 Table for Multiple Listing

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

SKU#	Brand Name	Model Name	CPU	CPU Brand	DDR	DDR Brand	Flash	Flash Brand/Model	NAND	NAND Brand/Model
1	LITE-ON	WP9333	IPQ4029	Qualcomm Atheros	256	Micron	64	1x64 MX25L51245GMI-08G MXIC	-	-
							32X2	2x32 25Q256JVFQ WINBOND	-	-
2		WP9333	IPQ4019	Qualcomm Atheros	256	Micron	64	1x64 MX25L51245GMI-08G MXIC	-	-
							32X2	2x32 25Q256JVFQ WINBOND	-	-
3		WP9331	IPQ4029	Qualcomm Atheros	256	Micron	64	1x64 MX25L51245GMI-08G MXIC	-	-
							32X2	2x32 25Q256JVFQ WINBOND	-	-
4		WP9331	IPQ4019	Qualcomm Atheros	256	Micron	64	1x64 MX25L51245GMI-08G MXIC	-	-
							32X2	2x32 25Q256JVFQ WINBOND	-	-
5		WP9331-FM	IPQ4029	Qualcomm Atheros	512	Micron	64	1x64 MX25L51245GMI-08G MXIC	-	-
							32X2	2x32 25Q256JVFQ WINBOND	-	-



6	MOJO	O-105	IPQ4029	Qualcomm Atheros	256	Micron	64	1x64 MX25L51245GMI-08G MXIC	-	-
							32X2	2x32 25Q256JVFQ WINBOND	-	-
7			IPQ4019	Qualcomm Atheros	256	Micron	64	1x64 MX25L51245GMI-08G MXIC	-	-
							32X2	2x32 25Q256JVFQ WINBOND	-	-
8	ARISTA	O-105	IPQ4029 (I-TEMP)	Qualcomm Atheros	512	Micron	32	2x32 25Q256JVFQ WINBOND	128	MT29F1G08AB AEAWP-IT
9	ARISTA	O-105E	IPQ4029 (I-TEMP)	Qualcomm Atheros	512	Micron	32	2x32 25Q256JVFQ WINBOND	128	MT29F1G08AB AEAWP-IT
10	WatchGuard	O-105E	IPQ4029 (I-TEMP)	Qualcomm Atheros	512	Micron	32	2x32 25Q256JVFQ WINBOND	128	MT29F1G08AB AEAWP-IT
		AP327X								

SKU#	Brand Name	Model Name	Radio 1	Radio 2	Radio 3	Radio 4	SFP	EUT Power Type
1~2	LITE-ON	WP9333	V	V	V	V	V	AC main / PoE
3~4	LITE-ON	WP9331	V	V	X	V	V	PoE
5	LITE-ON	WP9331-FM	V	V	X	V	V	PoE
6~7	MOJO	O-105	V	V	X	V	V	PoE
8	ARISTA	O-105	V	V	X	V	X	PoE
9	ARISTA	O-105E	V	V	X	V	X	PoE
10	WatchGuard	O-105E	V	V	X	V	X	PoE
		AP327X						

Note:

Radio 1: 802.11ac 2.4G only

Radio 2: 802.11ac 5GHz on board

Radio 3: 802.11agnac PCIe card, 2.4G+5GB1/B4

Radio 4: Bluetooth (BT LE and BR/EDR) on board

The models O-105E & AP327X for Brand Name WatchGuard are identical. All the models are identical, the difference models served as marketing strategy.

1.3 Table for Permissive Change

This product is an extension of original one reported under Sporton project number: FA790613-04

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

Modifications	Performance Checking
Frequency bands U-NII-2A and U-NII-2C was added	MPE was evaluated.

1.4 Testing Location

Testing Location					
☒	HWA YA	ADD	:	No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)	
		TEL	:	886-3-327-3456	FAX : 886-3-327-0973
Test site Designation No. TW1190 with FCC.					
☐	JHUBEI	ADD	:	No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County, 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 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

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/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 20 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 2.4GHz WLAN

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;G1D	5.90	27.97	33.87	0.50	34.37	2.73527	20	0.54416	1.00000
2.4G;D1D	5.90	29.90	35.80	0.19	35.99	3.97192	20	0.79019	1.00000

For 5GHz WLAN

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	Tolerance (dB)	Tune-up EIRP (dBm)	Tune-up EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
5.2G;D1D	6.20	26.21	32.41	0.00	32.41	1.74181	20	0.34652	1.00000
5.3G;D1D	6.50	22.98	29.48	0.50	29.98	0.99541	20	0.19803	1.00000
5.6G;D1D	6.50	23.48	29.98	0.01	29.99	0.99770	20	0.19849	1.00000
5.8G;D1D	6.40	27.64	34.04	0.00	34.04	2.53513	20	0.50435	1.00000

For Bluetooth

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;BT-LE	8.60	7.17	15.77	0.03776	32	0.00293	1.00000
2.4G;BT-BR	8.60	8.28	16.88	0.04875	32	0.00379	1.00000
2.4G;BT-EDR	8.60	5.48	14.08	0.02559	32	0.00199	1.00000

Radio 1 (2.4G) + Radio 2 (5G) + Radio 3 (2.4G) + Radio 4 (BT)

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	T-EIRP (dBm)	T-EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Ratio (S/Limit)
2.4G;D1D	5.90	29.94	35.84	35.84	3.83707	32	0.29819	1.00000	0.29819
5.8G;D1D	6.40	27.79	34.19	34.19	2.62422	32	0.20393	1.00000	0.20393
2.4G;G1D	6.50	24.89	31.39	31.39	1.377221	32	0.10703	1.00000	0.10703
2.4G;BT-BR	8.60	8.28	16.88	16.88	0.04875	32	0.00379	1.00000	0.00379
-	-	-	-	-	-	-	-	Sum Ratio	0.61294
-	-	-	-	-	-	-	-	Ratio Limit	1

T-EIRP(dBm) = Tune-up power(dB) + EIRP Power(dBm)

Radio 1 (2.4G) + Radio 2 (5G) + Radio 3 (5G) + Radio 4 (BT)

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	T-EIRP (dBm)	T-EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Ratio (S/Limit)
2.4G;D1D	5.90	29.94	35.84	35.84	3.83707	32	0.29819	1.00000	0.29819
5.8G;D1D	6.40	27.79	34.19	34.19	2.62422	32	0.20393	1.00000	0.20393
5.3G;D1D	5.40	22.87	28.27	28.27	0.67143	32	0.05218	1.00000	0.05218
2.4G;BT-BR	8.60	8.28	16.88	16.88	0.04875	32	0.00379	1.00000	0.00379
-	-	-	-	-	-	-	-	Sum Ratio	0.55809
-	-	-	-	-	-	-	-	Ratio Limit	1

T-EIRP(dBm) = Tune-up power(dB) + EIRP Power(dBm)

—THE END—