

RF Exposure Report

Report No.: SA180108C15D

FCC ID: Q6G-AP225W

Test Model: W-118

Received Date: Jan. 08, 2018

Test Date: Oct. 25 ~ Nov. 04, 2019

Issued Date: Nov. 11, 2019

Applicant: WatchGuard Technologies, Inc.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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FCC Registration / 788550 / TW0003
Designation Number:



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Release Control Record

Issue No.	Description	Date Issued
SA180108C15D	Original release.	Nov. 11, 2019

1 Certificate of Conformity

Product: AP225W

Brand: WatchGuard

Test Model: W-118

Sample Status: Engineering sample

Applicant: WatchGuard Technologies, Inc.

Test Date: Oct. 25 ~ Nov. 04, 2019

Standards: FCC Part 2 (Section 2.1091)

KDB 447498 D01 General RF Exposure Guidance v06

IEEE C95.1

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Pettie Chen, **Date:** Nov. 11, 2019
Pettie Chen / Senior Specialist

Approved by : Bruce Chen, **Date:** Nov. 11, 2019
Bruce Chen / Senior Project Engineer

2 RF Exposure

2.1 Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
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

f = Frequency in MHz; *Plane-wave equivalent power density

2.2 MPE Calculation Formula

$$Pd = (P_{out} * G) / (4 * \pi * r^2)$$

where

Pd = power density in mW/cm²

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 22cm away from the body of the user. So, this device is classified as Mobile Device.

3 Calculation Result of Maximum Conducted Power

Frequency Band (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
Radio 1					
WLAN 2412~2462 (CDD mode)	25.84	7.32	22	0.340	1
WLAN 2412~2462 (Beamforming mode)	21.46	7.32	22	0.124	1
Radio 2					
WLAN 5180~5240 (CDD mode)	24.23	9	22	0.346	1
WLAN 5745~5825 (CDD mode)	26.58	9	22	0.594	1
WLAN 5180~5240 (Beamforming mode)	21.13	9	22	0.169	1
WLAN 5745~5825 (Beamforming mode)	23.57	9	22	0.297	1
Radio 3					
WLAN 2412~2462 (CDD mode)	18.60	5.79	22	0.045	1
WLAN 5180~5240 (CDD mode)	17.20	7.84	22	0.052	1
WLAN 5745~5825 (CDD mode)	16.85	7.84	22	0.048	1
BT LE/Zigbee					
BT LE 2402~2480	2.15	2.76	22	0.001	1
Zigbee	2.12	2.76	22	0.001	1

Note:

2.4GHz:

Radio 1: Directional gain = 4.31dBi +10log(2) = 7.32dBi

Radio 3: Directional gain = 2.78dBi +10log(2) = 5.79dBi

5.0GHz:

Radio 2: Directional gain = 5.99dBi+10log(2) = 9dBi

Radio 3: Directional gain = 4.83dBi+10log(2) = 7.84dBi

Frequency Band	Max. Power (dBm)				Total Power (dBm)	Power Limit (dBm)
	Radio 1	Radio 3 (WLAN 2.4GHz)	BT LE	Zigbee		
2.4GHz	25.84	18.60	2.15	-	26.61	30
2.4GHz	25.84	18.60	-	2.12	26.61	30

Conclusion:

The formula of calculated the MPE is:

$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

The simultaneous operation mode was determined by client.

No	Mode
1	Radio 1 + Radio 2 + Radio 3(2.4GHz) + BT LE
2	Radio 1 + Radio 3(5GHz) + BT LE
3	Radio 1 + Radio 2 + Radio 3(2.4GHz)+ Zigbee
4	Radio 1 + Radio 3(5GHz) + Zigbee

*The Radio 2 and Radio 3(5GHz) cannot transmit simultaneously.

Radio 1 + Radio 2 + Radio 3(2.4GHz) + BT LE = $0.340 + 0.594 + 0.045 + 0.001 = 0.98$

Radio 1 + Radio 3(5GHz) + BT LE = $0.340 + 0.052 + 0.001 = 0.393$

Radio 1 + Radio 2 + Radio 3(2.4GHz) + Zigbee = $0.340 + 0.594 + 0.045 + 0.001 = 0.98$

Radio 1 + Radio 3(5GHz) + Zigbee = $0.340 + 0.052 + 0.001 = 0.393$

Therefore the maximum calculations of above situations are less than the "1" limit.

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