

## RF Exposure Report

**Report No.:** SA170417C09C

**FCC ID:** 2AKCZ-0C1

**Test Model:** APL42-0C1

**Received Date:** Sep. 29, 2017

**Test Date:** Oct. 11 ~ Nov. 17, 2017

**Issued Date:** Dec. 01, 2017

**Applicant:** SonicWall Inc.

**Address:** 5455 Great America Parkway, Santa Clara, CA 95054 USA

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan, R.O.C.

**Test Location:** No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

## Table of Contents

<b>Release Control Record</b> .....	<b>3</b>
<b>1 Certificate of Conformity</b> .....	<b>4</b>
<b>2 RF Exposure</b> .....	<b>5</b>
2.1 Limits for Maximum Permissible Exposure (MPE).....	5
2.2 MPE Calculation Formula .....	5
2.3 Classification .....	5
<b>3 Calculation Result of Maximum Conducted Power</b> .....	<b>6</b>

### Release Control Record

Issue No.	Description	Date Issued
SA170417C09C	Original release.	Dec. 01, 2017

## 1 Certificate of Conformity

**Product:** Wireless Access Point

**Brand:** SONICWALL

**Test Model:** APL42-0C1

**Sample Status:** Engineering sample

**Applicant:** SonicWall Inc.

**Test Date:** Oct. 11 ~ Nov. 17, 2017

**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 EMC characteristics under the conditions specified in this report.


**Prepared by :**

  
Pettie Chen / Senior Specialist

**Date:**

Dec. 01, 2017

**Approved by :**

  
Ken Liu / Senior Manager

**Date:**

Dec. 01, 2017

## 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 <sup>2</sup> )	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
300-1500	...	...	F/1500	30
1500-100,000	...	...	1.0	30

F = Frequency in MHz

### 2.2 MPE Calculation Formula

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

where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = 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 58cm away from the body of the user. So, this device is classified as Mobile Device.

### 3 Calculation Result of Maximum Conducted Power

Ant. Type	Frequency Band (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
Radio 1						
Dipole	WLAN 2412~2462 (CDD mode)	28.14	10.52	58	0.174	1
	WLAN 2412~2462 (Beamforming mode)	21.16	10.52	58	0.035	1
Sector	WLAN 2412~2462 (CDD mode)	23.31	18.27	58	0.340	1
	WLAN 2412~2462 (Beamforming mode)	17.29	18.27	58	0.085	1
Panel (Model: P254-07)	WLAN 2412~2462 (CDD mode)	27.16	13.87	58	0.300	1
	WLAN 2412~2462 (Beamforming mode)	20.77	13.87	58	0.069	1
Panel (Model: P254-13)	WLAN 2412~2462 (CDD mode)	22.85	18.37	58	0.313	1
	WLAN 2412~2462 (Beamforming mode)	16.83	18.37	58	0.078	1
Panel (Model: P254-09)	WLAN 2412~2462 (CDD mode)	26.28	15.17	58	0.330	1
	WLAN 2412~2462 (Beamforming mode)	19.21	15.17	58	0.065	1
Panel (Model: P124-10)	WLAN 2412~2462 (CDD mode)	26.28	15.67	58	0.371	1
	WLAN 2412~2462 (Beamforming mode)	19.74	15.67	58	0.082	1

Ant. Type	Frequency Band (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
Radio 2						
Dipole	WLAN 5180~5240 (CDD mode)	24.79	12.32	58	0.122	1
	WLAN 5260~5320 (CDD mode)	18.71	12.32	58	0.030	1
	WLAN 5500~5700 (CDD mode)	18.65	12.32	58	0.030	1
	WLAN 5745~5825 (CDD mode)	27.75	12.32	58	0.240	1
	WLAN 5180~5240 (Beamforming mode)	18.52	12.32	58	0.029	1
	WLAN 5260~5320 (Beamforming mode)	12.69	12.32	58	0.007	1
	WLAN 5500~5700 (Beamforming mode)	12.63	12.32	58	0.007	1
	WLAN 5745~5825 (Beamforming mode)	21.69	12.32	58	0.060	1
Sector	WLAN 5180~5240 (CDD mode)	13.90	19.97	58	0.058	1
	WLAN 5260~5320 (CDD mode)	14.45	19.97	58	0.065	1
	WLAN 5500~5700 (CDD mode)	15.34	19.97	58	0.080	1
	WLAN 5745~5825 (CDD mode)	21.37	19.97	58	0.322	1
	WLAN 5180~5240 (Beamforming mode)	7.87	19.97	58	0.014	1
	WLAN 5260~5320 (Beamforming mode)	8.43	19.97	58	0.016	1
	WLAN 5500~5700 (Beamforming mode)	9.32	19.97	58	0.020	1
	WLAN 5745~5825 (Beamforming mode)	15.35	19.97	58	0.081	1
Panel (Model: P254-07)	WLAN 5180~5240 (CDD mode)	11.37	16.17	58	0.013	1
	WLAN 5260~5320 (CDD mode)	19.06	16.17	58	0.079	1
	WLAN 5500~5700 (CDD mode)	17.05	16.17	58	0.050	1
	WLAN 5745~5825 (CDD mode)	25.30	16.17	58	0.332	1
	WLAN 5180~5240 (Beamforming mode)	5.29	16.17	58	0.003	1
	WLAN 5260~5320 (Beamforming mode)	13.04	16.17	58	0.020	1
	WLAN 5500~5700 (Beamforming mode)	11.03	16.17	58	0.012	1
	WLAN 5745~5825 (Beamforming mode)	19.28	16.17	58	0.083	1

Ant. Type	Frequency Band (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
Panel (Model: P254-13)	WLAN 5180~5240 (CDD mode)	8.44	19.97	58	0.016	1
	WLAN 5260~5320 (CDD mode)	15.25	19.97	58	0.079	1
	WLAN 5500~5700 (CDD mode)	15.08	19.97	58	0.076	1
	WLAN 5745~5825 (CDD mode)	21.37	19.97	58	0.322	1
	WLAN 5180~5240 (Beamforming mode)	2.42	19.97	58	0.004	1
	WLAN 5260~5320 (Beamforming mode)	9.23	19.97	58	0.020	1
	WLAN 5500~5700 (Beamforming mode)	9.06	19.97	58	0.019	1
	WLAN 5745~5825 (Beamforming mode)	15.35	19.97	58	0.081	1
Panel (Model: P254-09)	WLAN 5180~5240 (CDD mode)	15.11	16.08	58	0.031	1
	WLAN 5260~5320 (CDD mode)	18.91	16.08	58	0.075	1
	WLAN 5500~5700 (CDD mode)	17.53	16.08	58	0.054	1
	WLAN 5745~5825 (CDD mode)	25.59	16.08	58	0.347	1
	WLAN 5180~5240 (Beamforming mode)	9.00	16.08	58	0.008	1
	WLAN 5260~5320 (Beamforming mode)	12.89	16.08	58	0.019	1
	WLAN 5500~5700 (Beamforming mode)	11.51	16.08	58	0.014	1
	WLAN 5745~5825 (Beamforming mode)	19.37	16.08	58	0.083	1
Panel (Model: P154-12)	WLAN 5180~5240 (CDD mode)	18.63	18.80	58	0.131	1
	WLAN 5260~5320 (CDD mode)	15.32	18.80	58	0.061	1
	WLAN 5500~5700 (CDD mode)	15.34	18.80	58	0.061	1
	WLAN 5745~5825 (CDD mode)	23.18	18.80	58	0.373	1
	WLAN 5180~5240 (Beamforming mode)	12.61	18.80	58	0.033	1
	WLAN 5260~5320 (Beamforming mode)	9.30	18.80	58	0.015	1
	WLAN 5500~5700 (Beamforming mode)	9.32	18.80	58	0.015	1
	WLAN 5745~5825 (Beamforming mode)	16.99	18.80	58	0.090	1
Radio 3						
Scanning Antenna	WLAN 2412~2462	21.12	3.15	58	0.006	1
Radio 4						
BLE Antenna	BT LE 2402~2480	4.81	3.37	58	0.0002	1



Note:

2.4GHz:

Dipole antenna, Directional gain =  $4.5\text{dBi} + 10\log(4) = 10.52\text{dBi}$

Sector antenna, Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 18.27\text{dBi}$

Panel antenna (Model: P254-07), Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 13.87\text{dBi}$

Panel antenna (Model: P254-13), Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 18.37\text{dBi}$

Panel antenna (Model: P254-09), Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 15.17\text{dBi}$

Panel antenna (Model: P124-10), Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 15.67\text{dBi}$

5.0GHz:

Dipole antenna, Directional gain =  $6.3\text{dBi} + 10\log(4) = 12.32\text{dBi}$

Sector antenna, Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 19.97\text{dBi}$

Panel antenna (Model: P254-07), Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 16.17\text{dBi}$

Panel antenna (Model: P254-13), Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 19.97\text{dBi}$

Panel antenna (Model: P254-09), Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2/4] = 16.08\text{dBi}$

Panel antenna (Model: P124-10), Directional gain =  $12.78\text{dBi} + 10\log(4) = 18.80\text{dBi}$

Dipole					
Frequency Band	Max. Power (dBm)			Total Power (dBm)	Power Limit (dBm)
	Radio 1	Radio 3	Radio 4		
2.4GHz	28.14	21.12	4.81	28.94	30

Sector					
Frequency Band	Max. Power (dBm)			Total Power (dBm)	Power Limit (dBm)
	Radio 1	Radio 3	Radio 4		
2.4GHz	23.31	21.12	4.81	25.40	30

Panel (Model: P254-07)					
Frequency Band	Max. Power (dBm)			Total Power (dBm)	Power Limit (dBm)
	Radio 1	Radio 3	Radio 4		
2.4GHz	27.16	21.12	4.81	28.15	30

Panel (Model: P254-13)					
Frequency Band	Max. Power (dBm)			Total Power (dBm)	Power Limit (dBm)
	Radio 1	Radio 3	Radio 4		
2.4GHz	22.85	21.12	4.81	25.12	30

Panel (Model: P254-09)					
Frequency Band	Max. Power (dBm)			Total Power (dBm)	Power Limit (dBm)
	Radio 1	Radio 3	Radio 4		
2.4GHz	26.28	21.12	4.81	27.46	30

Panel (Model: P124-10)					
Frequency Band	Max. Power (dBm)			Total Power (dBm)	Power Limit (dBm)
	Radio 1	Radio 3	Radio 4		
2.4GHz	26.28	21.12	4.81	27.46	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

Radio 1 (Dipole) + Radio 2 (Dipole) + Radio 3 + Radio 4  
 $= 0.174 + 0.240 + 0.006 + 0.0002 = 0.420 < 1$

Radio 1 (Sector) + Radio 2 (Sector) + Radio 3 + Radio 4  
 $= 0.340 + 0.322 + 0.006 + 0.0002 = 0.668 < 1$

Radio 1 (Panel (Model: P254-07)) + Radio 2 (Panel (Model: P254-07)) + Radio 3 + Radio 4  
 $= 0.300 + 0.332 + 0.006 + 0.0002 = 0.638 < 1$

Radio 1 (Panel (Model: P254-13)) + Radio 2 (Panel (Model: P254-13)) + Radio 3 + Radio 4  
 $= 0.313 + 0.322 + 0.006 + 0.0002 = 0.641 < 1$

Radio 1 (Panel (Model: P254-09)) + Radio 2 (Panel (Model: P254-09)) + Radio 3 + Radio 4  
 $= 0.330 + 0.347 + 0.006 + 0.0002 = 0.683 < 1$

Radio 1 (Panel (Model: P124-10)) + Radio 2 (Panel (Model: P154-12)) + Radio 3 + Radio 4  
 $= 0.371 + 0.373 + 0.006 + 0.0002 = 0.750 < 1$

**---END---**