

RF Exposure Report

Report No.: SA160809C28A

FCC ID: PY316200339

Test Model: R9000

Series Model: R8900

Received Date: Aug. 09, 2016

Test Date: Sep. 22 ~ Oct. 12, 2016

Issued Date: Oct. 26, 2016

Applicant: NETGEAR, INC.

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

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Release Control Record

Issue No.	Description	Date Issued
SA160809C28A	Original release.	Oct. 26, 2016

1 Certificate of Conformity

Product: AD7200 Smart WiFi Router

Brand: NETGEAR

Test Model: R9000

Series Model: R8900

Sample Status: Engineering sample

Applicant: NETGEAR, INC.

Test Date: Sep. 22 ~ Oct. 12, 2016

Standards: FCC Part 2 (Section 2.1091)
KDB 447498 D01 (October 23, 2015)
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 : Polly Chien, **Date:** Oct. 26, 2016
Polly Chien / Specialist

Approved by : Ken Liu, **Date:** Oct. 26, 2016
Ken Liu / Senior Manager

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				
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/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 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 28cm away from the body of the user. So, this device is classified as **Mobile Device**.

3 Calculation Result of Maximum Conducted Power

Band	Modulation type	Frequency Channel (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
CDD Mode							
2.4GHz	802.11b	2412	28.83	6.457	28	0.343	1
		2437	28.86	7.058	28	0.397	1
		2462	28.91	6.619	28	0.363	1
	802.11g	2412	25.65	6.457	28	0.165	1
		2437	29.55	7.058	28	0.465	1
		2462	26.25	6.619	28	0.197	1
	802.11n (HT20)	2412	25.31	6.457	28	0.152	1
		2437	29.38	7.058	28	0.447	1
		2462	25.84	6.619	28	0.179	1
	802.11n (HT40)	2422	22.13	6.785	28	0.079	1
		2437	26.06	7.058	28	0.208	1
		2452	24.08	6.783	28	0.124	1
5GHz (U-NII-1)	802.11a	5180	26.66	5.868	28	0.182	1
		5200	29.54	5.763	28	0.344	1
		5240	29.51	5.487	28	0.321	1
	802.11ac (VHT20)	5180	26.34	5.868	28	0.169	1
		5200	29.54	5.763	28	0.344	1
		5240	29.45	5.487	28	0.316	1
	802.11ac (VHT40)	5190	26.23	5.918	28	0.166	1
		5230	29.21	5.472	28	0.298	1
	802.11ac (VHT80)	5210	24.27	5.826	28	0.104	1
5GHz (U-NII-2A)	802.11a	5260	23.12	5.55	28	0.075	1
		5300	23.14	5.37	28	0.072	1
		5320	23.14	5.346	28	0.072	1
	802.11ac (VHT20)	5260	23.12	5.55	28	0.075	1
		5300	23.35	5.37	28	0.076	1
		5320	23.31	5.346	28	0.074	1
	802.11ac (VHT40)	5270	23.84	5.488	28	0.087	1
		5310	23.78	5.352	28	0.083	1
	802.11ac (VHT80)	5290	20.49	5.414	28	0.040	1

Band	Modulation type	Frequency Channel (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
CDD Mode							
5GHz (U-NII-2C)	802.11a	5500	23.13	5.318	28	0.071	1
		5580	23.12	5.239	28	0.070	1
		5700	23.13	5.772	28	0.079	1
	802.11ac (VHT20)	5500	23.33	5.318	28	0.074	1
		5580	23.32	5.239	28	0.073	1
		5700	23.33	5.772	28	0.083	1
	802.11ac (VHT40)	5510	23.97	5.12	28	0.082	1
		5550	23.74	5.627	28	0.088	1
		5670	23.66	4.975	28	0.074	1
	802.11ac (VHT80)	5530	23.87	5.234	28	0.083	1
		5610	23.85	5.239	28	0.082	1
5GHz (U-NII-3)	802.11a	5745	29.64	5.649	28	0.343	1
		5785	29.50	5.634	28	0.331	1
		5825	29.68	5.516	28	0.336	1
	802.11ac (VHT20)	5745	29.39	5.649	28	0.324	1
		5785	29.47	5.634	28	0.329	1
		5825	29.67	5.516	28	0.335	1
	802.11ac (VHT40)	5755	29.34	5.788	28	0.331	1
		5795	29.43	5.693	28	0.330	1
	802.11ac (VHT80)	5775	27.75	5.713	28	0.225	1

Band	Modulation type	Frequency Channel (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
Beamforming Mode							
2.4GHz	802.11n (HT20)	2412	25.31	6.457	28	0.152	1
		2437	28.85	7.058	28	0.396	1
		2462	24.92	6.619	28	0.145	1
	802.11n (HT40)	2422	22.13	6.785	28	0.079	1
		2437	26.06	7.058	28	0.208	1
		2452	24.08	6.783	28	0.124	1
5GHz (U-NII-1)	802.11ac (VHT20)	5180	26.34	5.868	28	0.169	1
		5200	29.54	5.763	28	0.344	1
		5240	29.45	5.487	28	0.316	1
	802.11ac (VHT40)	5190	25.20	5.918	28	0.131	1
		5230	29.21	5.472	28	0.298	1
	802.11ac (VHT80)	5210	24.27	5.826	28	0.104	1
5GHz (U-NII-2A)	802.11ac (VHT20)	5260	23.12	5.55	28	0.075	1
		5300	23.35	5.37	28	0.076	1
		5320	23.31	5.346	28	0.074	1
	802.11ac (VHT40)	5270	23.84	5.488	28	0.087	1
		5310	23.78	5.352	28	0.083	1
	802.11ac (VHT80)	5290	20.49	5.414	28	0.039	1
5GHz (U-NII-2C)	802.11ac (VHT20)	5500	23.33	5.318	28	0.074	1
		5580	23.32	5.239	28	0.073	1
		5700	23.33	5.772	28	0.083	1
	802.11ac (VHT40)	5510	23.97	5.12	28	0.082	1
		5550	23.74	5.627	28	0.088	1
		5670	23.66	4.975	28	0.074	1
	802.11ac (VHT80)	5530	23.87	5.234	28	0.083	1
		5610	23.85	5.239	28	0.082	1
5GHz (U-NII-3)	802.11ac (VHT20)	5745	29.39	5.649	28	0.324	1
		5785	29.47	5.634	28	0.329	1
		5825	29.67	5.516	28	0.335	1
	802.11ac (VHT40)	5755	29.34	5.788	28	0.331	1
		5795	29.43	5.693	28	0.330	1
	802.11ac (VHT80)	5775	27.75	5.713	28	0.225	1

Note:

2412MHz: Directional gain = 6.457dBi
2422MHz: Directional gain = 6.785dBi
2437MHz: Directional gain = 7.058dBi
2452MHz: Directional gain = 6.783dBi
2462MHz: Directional gain = 6.619dBi
5180MHz: Directional gain = 5.868dBi
5190MHz: Directional gain = 5.918dBi
5200MHz: Directional gain = 5.763dBi
5210MHz: Directional gain = 5.826dBi
5230MHz: Directional gain = 5.472dBi
5240MHz: Directional gain = 5.487dBi
5260MHz: Directional gain = 5.55dBi
5270MHz: Directional gain = 5.488dBi
5290MHz: Directional gain = 5.414dBi
5300MHz: Directional gain = 5.37dBi
5310MHz: Directional gain = 5.352dBi
5320MHz: Directional gain = 5.346dBi
5500MHz: Directional gain = 5.318dBi
5510MHz: Directional gain = 5.12dBi
5530MHz: Directional gain = 5.234dBi
5550MHz: Directional gain = 5.627dBi
5580MHz: Directional gain = 5.239dBi
5610MHz: Directional gain = 5.239dBi
5670MHz: Directional gain = 4.975dBi
5700MHz: Directional gain = 5.772dBi
5745MHz: Directional gain = 5.649dBi
5755MHz: Directional gain = 5.788dBi
5775MHz: Directional gain = 5.713dBi
5785MHz: Directional gain = 5.634dBi
5795MHz: Directional gain = 5.693dBi
5825MHz: Directional gain = 5.516dBi

Band	Modulation type	Frequency Channel	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2.4GHz	BT LE	2402 MHz	8.76	3.180	28	0.002	1
		2440 MHz	10.12	3.180	28	0.002	1
		2480 MHz	11.04	3.180	28	0.003	1
WLAN 60GHz 802.11ad		60.48 GHz	15.80	14.000	28	0.097	1

Note:

1. BT LE: Directional gain = 3.180 dBi
2. WLAN 60GHz 802.11ad uses following antenna:

Ant. Type	Connector Type	Antenna Gain (dBi)
phased-array	I-PEX	14.000

Modulation type	Frequency Channel (MHz)	Max. Power (dBm)		Total Power (dBm)	Power Limit (dBm)
		WLAN 2.4GHz	BT LE		
CDD Mode					
802.11g +BT LE	2437 + 2480	29.55	11.04	29.61	30
Beamforming Mode					
802.11n (HT20) +BT LE	2437 + 2480	28.85	11.04	28.92	28.942

Note:

Beamforming Mode: Directional gain = 7.058dBi > 6dBi, so the power limit shall be reduced to 30-(7.058-6) = 28.942dBm.

CONCLUSION:

Both of the WLAN 2.4G & WLAN 5G can transmit simultaneously, the formula of calculated the MPE is:

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

CPD = Calculation power density

LPD = Limit of power density

WLAN 2.4G + WLAN 5.0G + BT LE + WLAN 60GHz 802.11ad = 0.465 + 0.344 + 0.003 + 0.097 = 0.936

Therefore, the maximum calculation of this situation is 0.936, which is less than the "1" limit.

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