

RF Exposure Report

Report No.: SA150826C05A

FCC ID: PY315100319

Test Model: R7800

Received Date: Aug. 21, 2015

Test Date: Dec. 23, 2015 ~ May 26, 2016

Issued Date: Jun. 04, 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
SA150826C05A	Original release.	Jun. 04, 2016

1 Certificate of Conformity

Product: Nighthawk X4S AC2600 Smart WiFi Router

Brand: NETGEAR

Test Model: R7800

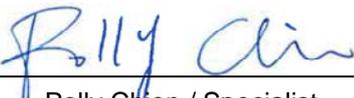
Sample Status: Engineering sample

Applicant: NETGEAR INC.

Test Date: Dec. 23, 2015 ~ May 26, 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 :  , **Date:** Jun. 04, 2016
Polly Chien / Specialist

Approved by :  , **Date:** Jun. 04, 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

$$Pd = (Pout * G) / (4 * pi * r^2)$$

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 29cm 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	29.89	6.23	29	0.387	1
		2422	29.84	6.43	29	0.401	1
		2437	29.84	6.13	29	0.374	1
	802.11g	2412	27.35	6.23	29	0.216	1
		2422	29.84	6.43	29	0.401	1
		2437	27.13	6.13	29	0.200	1
	802.11n (HT20)	2412	27.35	6.23	29	0.216	1
		2437	29.84	6.43	29	0.401	1
		2462	27.35	6.13	29	0.211	1
	802.11n (HT40)	2422	23.79	6.43	29	0.100	1
		2437	26.76	6.43	29	0.197	1
		2452	25.51	6.23	29	0.141	1
5GHz (U-NII-2A)	802.11a	5260	22.83	6.93	29	0.090	1
		5300	22.85	7.13	29	0.094	1
		5320	22.77	7.13	29	0.092	1
	802.11n (HT20)	5260	22.68	6.93	29	0.086	1
		5300	22.70	7.13	29	0.091	1
		5320	22.74	7.13	29	0.092	1
	802.11n (HT40)	5270	23.60	7.03	29	0.109	1
		5310	23.85	7.13	29	0.119	1
	802.11ac (VHT80)	5290	20.46	7.13	29	0.054	1
	5GHz (U-NII-2C)	802.11a	5500	22.86	7.53	29	0.104
5580			22.72	7.53	29	0.100	1
5700			22.73	7.53	29	0.100	1
802.11n (HT20)		5500	22.97	7.53	29	0.106	1
		5580	22.65	7.53	29	0.099	1
		5700	22.68	7.53	29	0.099	1
802.11n (HT40)		5510	23.86	7.63	29	0.133	1
		5550	23.80	7.53	29	0.129	1
		5670	23.81	7.63	29	0.132	1
802.11ac (VHT80)		5530	22.37	7.63	29	0.095	1
		5610	23.71	7.53	29	0.126	1

Band	Modulation type	Frequency Channel (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Total Power Density (mW/cm ²)	Limit (mW/cm ²)
5GHz (U-NII-1 & U-NII-2A)	802.11ac (VHT80+VHT80)	5210	22.79	3.82	29	0.043	0.090	1
		5290	22.82	4.12		0.047		
5GHz (U-NII-2A & U-NII-2C)		5530	20.59	4.62	29	0.031	0.031	1
		5610	20.56	4.52	29	0.030		
5GHz (U-NII-2C & U-NII-3)	802.11ac (VHT80+VHT80)	5690	17.58	4.52	29	0.015	0.015	1
		5690	4.84	4.52		0.001	0.031	
		5775	20.49	4.52		0.030		

Note:

- 2412MHz: Directional gain = 0.21dBi + 10log(4) = 6.23dBi
- 2422MHz: Directional gain = 0.41dBi + 10log(4) = 6.43dBi
- 2437MHz: Directional gain = 0.41dBi + 10log(4) = 6.43dBi
- 2452MHz: Directional gain = 0.21dBi + 10log(4) = 6.23dBi
- 2462MHz: Directional gain = 0.11dBi + 10log(4) = 6.13dBi
- 5210MHz: Directional gain = 1.11dBi + 10log(4) = 7.13dBi
- 5260MHz: Directional gain = 0.91dBi + 10log(4) = 6.93dBi
- 5270MHz: Directional gain = 1.01dBi + 10log(4) = 7.03dBi
- 5290MHz: Directional gain = 1.11dBi + 10log(4) = 7.13dBi
- 5300MHz: Directional gain = 1.11dBi + 10log(4) = 7.13dBi
- 5310MHz: Directional gain = 1.11dBi + 10log(4) = 7.13dBi
- 5320MHz: Directional gain = 1.11dBi + 10log(4) = 7.13dBi
- 5500MHz: Directional gain = 1.51dBi + 10log(4) = 7.53dBi
- 5510MHz: Directional gain = 1.61dBi + 10log(4) = 7.63dBi
- 5530MHz: Directional gain = 1.61dBi + 10log(4) = 7.63dBi
- 5550MHz: Directional gain = 1.61dBi + 10log(4) = 7.63dBi
- 5580MHz: Directional gain = 1.51dBi + 10log(4) = 7.53dBi
- 5610MHz: Directional gain = 1.51dBi + 10log(4) = 7.53dBi
- 5670MHz: Directional gain = 1.61dBi + 10log(4) = 7.63dBi
- 5700MHz: Directional gain = 1.51dBi + 10log(4) = 7.53dBi

***802.11ac (VHT80+VHT80):**

- 5210MHz: Directional gain = 0.81dBi + 10log(4/2) = 3.82dBi
- 5290MHz: Directional gain = 1.11dBi + 10log(4/2) = 4.12dBi
- 5530MHz: Directional gain = 1.61dBi + 10log(4/2) = 4.62dBi
- 5610MHz: Directional gain = 1.51dBi + 10log(4/2) = 4.52dBi
- 5690MHz: Directional gain = 1.51dBi + 10log(4/2) = 4.52dBi
- 5575MHz: Directional gain = 1.51dBi + 10log(4/2) = 4.52dBi

Band	Modulation type	Frequency Channel (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
Beamforming_NSS1 Mode							
2.4GHz	802.11n (HT20)	2412	27.29	6.23	29	0.213	1
		2437	29.56	6.43	29	0.376	1
		2462	28.42	6.13	29	0.270	1
	802.11n (HT40)	2422	23.85	6.43	29	0.101	1
		2437	26.72	6.43	29	0.195	1
		2452	24.36	6.23	29	0.108	1
5GHz (U-NII-2A)	802.11n (HT20)	5260	23.07	6.93	29	0.095	1
		5300	22.87	7.13	29	0.095	1
		5320	22.87	7.13	29	0.095	1
	802.11n (HT40)	5270	22.66	7.03	29	0.088	1
		5310	22.85	7.13	29	0.094	1
	802.11ac (VHT80)	5290	20.46	7.13	29	0.054	1
5GHz (U-NII-2C)	802.11n (HT20)	5500	22.47	7.53	29	0.095	1
		5580	22.47	7.53	29	0.095	1
		5700	22.47	7.53	29	0.095	1
	802.11n (HT40)	5510	22.34	7.63	29	0.094	1
		5550	22.31	7.53	29	0.091	1
		5670	22.34	7.63	29	0.094	1
	802.11ac (VHT80)	5530	22.31	7.63	29	0.093	1
		5610	22.22	7.53	29	0.089	1

Band	Modulation type	Frequency Channel (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Total Power Density (mW/cm ²)	Limit (mW/cm ²)
5GHz (U-NII-1 & U-NII-2A)	802.11ac (VHT80+VHT80)	5210	22.82	3.82	29	0.044	0.091	1
		5290	22.81	4.12		0.047		
5GHz (U-NII-2A & U-NII-2C)		5530	19.24	4.62	29	0.023	0.045	1
		5610	19.23	4.52	29	0.022		
5GHz (U-NII-2C & U-NII-3)	802.11ac (VHT80+VHT80)	5690	17.64	4.52	29	0.016	0.016	1
		5690	4.73	4.52		0.001	0.029	
		5775	20.23	4.52		0.028		

Note:

- 2412MHz: Directional gain = $0.21\text{dBi} + 10\log(4) = 6.23\text{dBi}$
- 2422MHz: Directional gain = $0.41\text{dBi} + 10\log(4) = 6.43\text{dBi}$
- 2437MHz: Directional gain = $0.41\text{dBi} + 10\log(4) = 6.43\text{dBi}$
- 2452MHz: Directional gain = $0.21\text{dBi} + 10\log(4) = 6.23\text{dBi}$
- 2462MHz: Directional gain = $0.11\text{dBi} + 10\log(4) = 6.13\text{dBi}$
- 5260MHz: Directional gain = $0.91\text{dBi} + 10\log(4) = 6.93\text{dBi}$
- 5270MHz: Directional gain = $1.01\text{dBi} + 10\log(4) = 7.03\text{dBi}$
- 5290MHz: Directional gain = $1.11\text{dBi} + 10\log(4) = 7.13\text{dBi}$
- 5300MHz: Directional gain = $1.11\text{dBi} + 10\log(4) = 7.13\text{dBi}$
- 5310MHz: Directional gain = $1.11\text{dBi} + 10\log(4) = 7.13\text{dBi}$
- 5320MHz: Directional gain = $1.11\text{dBi} + 10\log(4) = 7.13\text{dBi}$
- 5500MHz: Directional gain = $1.51\text{dBi} + 10\log(4) = 7.53\text{dBi}$
- 5510MHz: Directional gain = $1.61\text{dBi} + 10\log(4) = 7.63\text{dBi}$
- 5530MHz: Directional gain = $1.61\text{dBi} + 10\log(4) = 7.63\text{dBi}$
- 5550MHz: Directional gain = $1.61\text{dBi} + 10\log(4) = 7.63\text{dBi}$
- 5580MHz: Directional gain = $1.51\text{dBi} + 10\log(4) = 7.53\text{dBi}$
- 5610MHz: Directional gain = $1.51\text{dBi} + 10\log(4) = 7.53\text{dBi}$
- 5670MHz: Directional gain = $1.61\text{dBi} + 10\log(4) = 7.63\text{dBi}$
- 5700MHz: Directional gain = $1.51\text{dBi} + 10\log(4) = 7.53\text{dBi}$

***802.11ac (VHT80+VHT80):**

- 5210MHz: Directional gain = $0.81\text{dBi} + 10\log(4/2) = 3.82\text{dBi}$
- 5290MHz: Directional gain = $1.11\text{dBi} + 10\log(4/2) = 4.12\text{dBi}$
- 5530MHz: Directional gain = $1.61\text{dBi} + 10\log(4/2) = 4.62\text{dBi}$
- 5610MHz: Directional gain = $1.51\text{dBi} + 10\log(4/2) = 4.52\text{dBi}$
- 5690MHz: Directional gain = $1.51\text{dBi} + 10\log(4/2) = 4.52\text{dBi}$
- 5775MHz: Directional gain = $1.51\text{dBi} + 10\log(4/2) = 4.52\text{dBi}$

Band	Modulation type	Frequency Channel (MHz)	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
Beamforming_NSS2 Mode							
2.4GHz	802.11n (HT20)	2412	27.35	3.22	29	0.108	1
		2437	29.59	3.42	29	0.189	1
		2462	28.44	3.12	29	0.136	1
	802.11n (HT40)	2422	23.66	3.42	29	0.048	1
		2437	26.75	3.42	29	0.098	1
		2452	24.36	3.22	29	0.054	1
5GHz (U-NII-2A)	802.11n (HT20)	5260	22.67	3.92	29	0.043	1
		5300	22.70	4.12	29	0.045	1
		5320	22.73	4.12	29	0.046	1
	802.11n (HT40)	5270	23.66	4.02	29	0.055	1
		5310	23.84	4.12	29	0.059	1
	802.11ac (VHT80)	5290	20.45	4.12	29	0.027	1
5GHz (U-NII-2C)	802.11n (HT20)	5500	22.85	4.52	29	0.052	1
		5580	22.67	4.52	29	0.050	1
		5700	22.85	4.52	29	0.052	1
	802.11n (HT40)	5510	23.87	4.62	29	0.067	1
		5550	23.78	4.62	29	0.065	1
		5670	23.81	4.62	29	0.066	1
	802.11ac (VHT80)	5530	22.38	4.62	29	0.047	1
		5610	23.69	4.52	29	0.063	1

Note:

2412MHz: Directional gain = $0.21\text{dBi} + 10\log(4/2) = 3.22\text{dBi}$
 2422MHz: Directional gain = $0.41\text{dBi} + 10\log(4/2) = 3.42\text{dBi}$
 2437MHz: Directional gain = $0.41\text{dBi} + 10\log(4/2) = 3.42\text{dBi}$
 2452MHz: Directional gain = $0.21\text{dBi} + 10\log(4/2) = 3.22\text{dBi}$
 2462MHz: Directional gain = $0.11\text{dBi} + 10\log(4/2) = 3.12\text{dBi}$
 5260MHz: Directional gain = $0.91\text{dBi} + 10\log(4/2) = 3.92\text{dBi}$
 5270MHz: Directional gain = $1.01\text{dBi} + 10\log(4/2) = 4.02\text{dBi}$
 5290MHz: Directional gain = $1.11\text{dBi} + 10\log(4/2) = 4.12\text{dBi}$
 5300MHz: Directional gain = $1.11\text{dBi} + 10\log(4/2) = 4.12\text{dBi}$
 5310MHz: Directional gain = $1.11\text{dBi} + 10\log(4/2) = 4.12\text{dBi}$
 5320MHz: Directional gain = $1.11\text{dBi} + 10\log(4/2) = 4.12\text{dBi}$
 5500MHz: Directional gain = $1.51\text{dBi} + 10\log(4/2) = 4.52\text{dBi}$
 5510MHz: Directional gain = $1.61\text{dBi} + 10\log(4/2) = 4.62\text{dBi}$
 5550MHz: Directional gain = $1.61\text{dBi} + 10\log(4/2) = 4.62\text{dBi}$
 5530MHz: Directional gain = $1.61\text{dBi} + 10\log(4/2) = 4.62\text{dBi}$
 5580MHz: Directional gain = $1.51\text{dBi} + 10\log(4/2) = 4.52\text{dBi}$
 5610MHz: Directional gain = $1.51\text{dBi} + 10\log(4/2) = 4.52\text{dBi}$
 5670MHz: Directional gain = $1.61\text{dBi} + 10\log(4/2) = 4.62\text{dBi}$
 5700MHz: Directional gain = $1.51\text{dBi} + 10\log(4/2) = 4.52\text{dBi}$

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

$$\text{WLAN 2.4G} + \text{WLAN 5.0G} = 0.401 + 0.133 = 0.534$$

Therefore, the maximum calculation of this situation is 0.534, which is less than the "1" limit.

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