

# RF EXPOSURE REPORT

## CERTIFICATE OF CONFORMITY

**FCC Rule Part:** FCC Part 2 (Section 2.1091)

**Report No.:** MFBBQZ-WTW-P22100778

**FCC ID:** PY323100585

**Product:** Quad-band WiFi 7 Orbi 9 Router & Quad-band WiFi 7 Orbi 9 Satellite

**Brand:** NETGEAR

**Model No.:** RBE971

**Series Model:** RBE970

**Received Date:** 2022/11/2

**Test Date:** 2023/4/19

**Issued Date:** 2023/5/31

**Applicant and** NETGEAR, Inc.

**Manufacturer:**

**Address:** 350 East Plumeria Drive San Jose, CA 95134

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

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

**Test Location:** No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kewi Shan Dist., Taoyuan City 33383, Taiwan

**FCC Registration /** 788550 / TW0003

**Designation Number:**

**Approved by:**

*Jeremy Lin*

**Date:**

**2023/5/31**

Jeremy Lin / Project Engineer

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Prepared by : Gina Liu / Specialist



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## Release Control Record

Issue No.	Description	Date Issued
MFBBQZ-WTW-P22100778	Original release.	2023/5/31

## 1 Certificate

**Product:** Quad-band WiFi 7 Orbi 9 Router & Quad-band WiFi 7 Orbi 9 Satellite

**Brand:** NETGEAR

**Test Model:** RBE971

**Series Model:** RBE970

**Sample Status:** Engineering sample

**Applicant:** NETGEAR, Inc.

**Test Date:** 2023/4/19

**FCC Rule Part:** FCC Part 2 (Section 2.1091)

**Standard:** KDB 447498 D04 Interim General RF Exposure Guidance v01

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.

## 2 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT.

Measurement	Specification	Expanded Uncertainty (k=2) (±)
RF Exposure	1 GHz ~ 2.5 GHz	1.2 dB
	2.5 GHz ~ 8 GHz	1.3 dB

## 3 Applicable RF Exposure Limit

§ 1.1310 Radiofrequency radiation exposure limits.

(a) Specific absorption rate (SAR) shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in § 1.1307(b) of this part within the frequency range of 100 kHz to 6 GHz (inclusive).

(b) The SAR limits for occupational/controlled exposure are 0.4 W/kg, as averaged over the whole body, and a peak spatial-average SAR of 8 W/kg, averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the parts of the human body treated as extremities, such as hands, wrists, feet, ankles, and pinnae, where the peak spatial-average SAR limit for occupational/controlled exposure is 20 W/kg, averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). Exposure may be averaged over a time period not to exceed 6 minutes to determine compliance with occupational/controlled SAR limits.

(c) The SAR limits for general population/uncontrolled exposure are 0.08 W/kg, as averaged over the whole body, and a peak spatial-average SAR of 1.6 W/kg, averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the parts of the human body treated as extremities, such as hands, wrists, feet, ankles, and pinnae, where the peak spatial-average SAR limit is 4 W/kg, averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). Exposure may be averaged over a time period not to exceed 30 minutes to determine compliance with general population/uncontrolled SAR limits.

### (e) Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields

#### ➤ Limits for General Population/Uncontrolled Exposure

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				
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	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.

#### ➤ Limits for Occupational/Controlled Exposure

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				
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	<6
30-300	61.4	0.163	1.0	<6
300-1,500			f/300	<6
1,500-100,000			5	<6

f = frequency in MHz. \* = Plane-wave equivalent power density.

### MPE-based Exemption – §1.1307(b)(3)(i)(C)

- The minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. The MPE-based test exemption condition is in terms of ERP, defined as the product of the maximum antenna gain and the delivered maximum time-averaged power.
- Table applies to any RF source (i.e. single fixed, mobile, and portable transmitters) and specifies power and distance criteria for each of the five frequency ranges used for the MPE limits.

RF Source frequency (MHz)	Minimum Distance		Threshold ERP (watts)
	$\lambda_L / 2\pi$	$\lambda_H / 2\pi$	
0.3-1.34	159 m–35.6 m		$1,920 R^2$ .
1.34-30	35.6 m–1.6 m		$3,450 R^2/f^2$ .
30-300	1.6 m–159 mm		$3.83 R^2$ .
300-1,500	159 mm–31.8 mm		$0.0128 R^2f$ .
1,500-100,000	31.8 mm–0.5 mm		$19.2 R^2$ .
R must be at least $\lambda/2\pi$ , where $\lambda$ is the free-space operating wavelength in meters.			

### MPE-based Exemption – §1.1307(b)(3)(i)(B)

- For mobile devices that are not exempt per Table 1 of §1.1307(b)(1)(i)(C) and device at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz. The MPE-based test exemption condition is in terms of ERP, defined as the product of the maximum antenna gain and the delivered maximum time-averaged power.

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

## Routine Evaluation

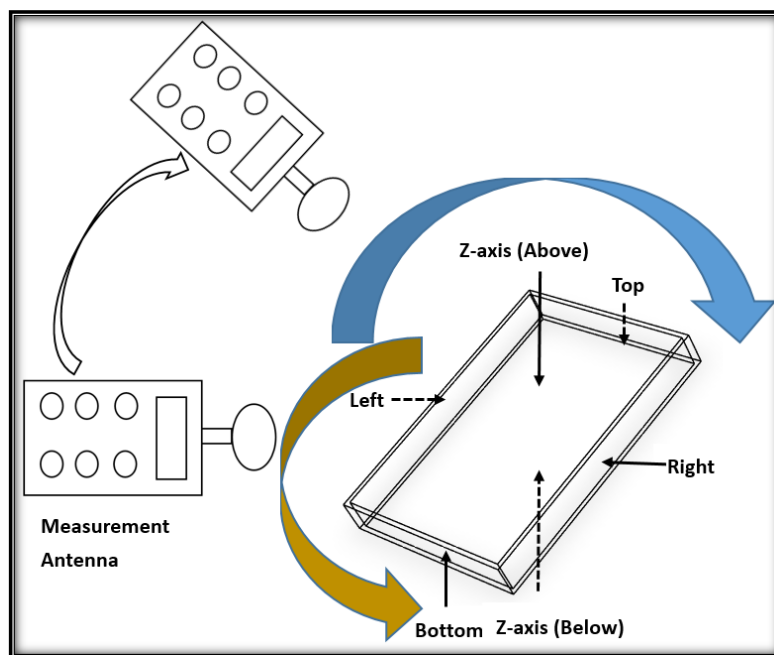
### Routine Evaluation Procedure - Single and/or Multiple RF Sources

- MPE compliance are measurement in all directions surrounding the antenna and radiating structures of the device.

For non-directional antennas, MPE evaluation points shall be along radials extending from the antenna (axis) that are no more than 30° apart. The direction of maximum exposure shall be aligned with one of the radials.

For each specific exposure condition, the evaluation points along the longest dimension (e.g., vertical) shall use a spatial resolution of 10 cm or less, and shall extend at least 10 cm beyond the exposed portions of a person's body or until the evaluated results are less than 10% of the MPE limit. For exposures occurring next to the ground or next to a ground plane, the evaluation points shall be no closer than 10 cm from the ground.

### Test Setup



#### Note:

1. The measurement antenna are moving and surrounding the EUT when performed the test, the test results recorded the highest values for each sides of the EUT (left/right/top/bottom/z-axis)
2. The worst condition: Top Side.

### Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
EM Field Meter SHG	SMP2 Dual	22SN1914	2022/4/21	2023/4/20
Probe SHG	WPF60	22SN1914	2022/4/21	2023/4/20

#### Notes:

1. The test was performed in Oven room.
2. Tested Date: 2023/4/19

### Fixed RF sources operating in the same time-averaging period – §1.1307(b)(3)(ii)(B)

- Either SAR-based or MPE-based exemption may be considered for test exemption for fixed, mobile, or portable device exposure conditions; therefore, the contributions from each exemption in conjunction with the measured SAR (Evaluated<sub>k</sub> term) should be used to determine exemption for simultaneous transmission according to Formula below,

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^c \frac{Evaluated_k}{Exposure Limit_k} \leq 1$$

The sum of the ratios of the applicable terms for SAR-based, MPE-based and measured SAR or MPE should be less than 1, to determine simultaneous transmission exposure compliance.

Where:

$a$  = number of fixed, mobile, or portable RF sources claiming exemption using [paragraph \(b\)\(3\)\(i\)\(B\)](#) of this section for  $P_{th}$ , including existing exempt transmitters and those being added.

$c$  = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

$P_{th,i}$  = the exemption threshold power ( $P_{th}$ ) according to [paragraph \(b\)\(3\)\(i\)\(B\)](#) of this section for fixed, mobile, or portable RF source  $i$ .

$ERP_{th,j}$  = exemption threshold ERP for fixed, mobile, or portable RF source  $j$ , at a distance of at least  $\lambda/2\pi$  according to the applicable formula of [paragraph \(b\)\(3\)\(i\)\(C\)](#) of this section.

$Exposure Limit_k$  = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source  $k$ , as applicable from [§ 1.1310 of this chapter](#).

$b$  = number of fixed, mobile, or portable RF sources claiming exemption using [paragraph \(b\)\(3\)\(i\)\(C\)](#) of this section for Threshold ERP, including existing exempt transmitters and those being added.

$P_i$  = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source  $i$  at a distance between 0.5 cm and 40 cm (inclusive).

$ERP_j$  = the ERP of fixed, mobile, or portable RF source  $j$ .

$Evaluated_k$  = the maximum reported SAR or MPE of fixed, mobile, or portable RF source  $k$  either in the device or at the transmitter site from an existing evaluation at the location of exposure.



## 4 Test Results

### 4.1 RF Exposure

Environmental Conditions:	25°C, 60% RH	Tested By:	Wayne Lin
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#### For Single RF Source

MPE-based Exemption §1.1307(b)(3)(i)(C)					
Operation Mode	Frequency Band (MHz)	Maximum ERP (mW)	Distance (cm)	Limit Threshold (mW)	Test Result
WLAN 6 GHz_CDD	6115-7115	24.774	20	768	Pass

Note: Calculate the ERP of WLAN 6 GHz\_CDD from the radiated field strength:

$$\text{ERP (dBm)} = \text{Radiated field strength (dBuV/m)} + 20 \times \text{Log(d)} - 104.77 - 2.15$$

d is the measurement distance, in 3 m.

$$\text{ERP} = 111.32 + 20 \times \text{Log}(3) - 104.77 - 2.15 = 13.94 \text{ dBm (24.774 mW)}$$

MPE-based Exemption §1.1307(b)(3)(i)(B)							
Operation Mode	Frequency Band (MHz)	Average Power (mW)	Antenna Gain (dBi)	Maximum ERP (mW)	Distance (cm)	Limit Threshold (mW)	Test Result
WLAN 2.4 GHz_CDD	2412-2462	865.056	1.14	685.558	20	3060	Pass
WLAN 5 GHz_CDD	5500-5825	942.781	2.96	1136.085	20	3060	Pass
WLAN 5.9 GHz_CDD	5815-5885	-	-	629.506	20	3060	Pass
WLAN 5 GHz_CDD	5180-5320	924.334	2.49	999.606	20	3060	Pass
WLAN 5 GHz_BF	5180-5320	915.863	6.33	2397.897	20	3060	Pass

Note: Calculate the ERP of WLAN 5.9 GHz\_CDD from the radiated field strength:

$$\text{ERP (dBm)} = \text{Radiated field strength (dBuV/m)} + 20 \times \text{Log(d)} - 104.77 - 2.15$$

d is the measurement distance, in 3 m.

$$\text{ERP} = 125.37 + 20 \times \text{Log}(3) - 104.77 - 2.15 = 27.99 \text{ dBm (629.506 mW)}$$

Routine Evaluation (General Population)					
Operation Mode	Frequency Band (MHz)	Power Density (mW/cm <sup>2</sup> )	Test Distance (cm)	Limit (mW/cm <sup>2</sup> )	Test Result
WLAN 2.4 GHz_BF	2412-2462	0.041	20	1	Pass
WLAN 5 GHz_BF	5500-5825	0.034	20	1	Pass
WLAN 5.9 GHz_BF	5815-5885	0.041	20	1	Pass
WLAN 6 GHz_BF	6115-7115	0.024	20	1	Pass

### For Multiple RF Sources (Simultaneous Operations Condition 1)

Multiple RF Sources (Simultaneous Operations)							
Exemption Evaluation					Sum of Ratios	Limit of Ratios	Test Result
Operation Mode	Frequency Band (MHz)	Maximum ERP (mW)	Limit Threshold (mW)	Ratio			
WLAN 5 GHz_BF	5180-5320	2397.897	3060	0.784	0.883	1	Pass
Routine Evaluation (General Population)							
Operation Mode	Operation Mode	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Ratio			
WLAN 2.4 GHz_BF	2412-2462	0.041	1	0.041			
WLAN 5 GHz_BF	5500-5825	0.034	1	0.034			
WLAN 6 GHz_BF	6115-7115	0.024	1	0.024			

### For Multiple RF Sources (Simultaneous Operations Condition 2)

Multiple RF Sources (Simultaneous Operations)							
Exemption Evaluation					Sum of Ratios	Limit of Ratios	Test Result
Operation Mode	Frequency Band (MHz)	Maximum ERP (mW)	Limit Threshold (mW)	Ratio			
WLAN 5 GHz_BF	5180-5320	2397.897	3060	0.784	0.89	1	Pass
Routine Evaluation (General Population)							
Operation Mode	Operation Mode	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Ratio			
WLAN 2.4 GHz_BF	2412-2462	0.041	1	0.041			
WLAN 5.9 GHz_BF	5815-5885	0.041	1	0.041			
WLAN 6 GHz_BF	6115-7115	0.024	1	0.024			

## 5 Conclusion

Source-base time average power is below Exemption Criteria and/or Routine Evaluation MPE thresholds, therefore the device is compliant FCC RF exposure requirement.

## 6 Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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