FCC RF EXPOSURE REPORT

FCC ID: 2ACFN-HORA301W

Project No.	:	2002H016
Equipment	:	New Generation WiFi 6 and Dual 10GbE SD-WAN Router
Brand Name	:	QNAP
Test Model	:	QHora-301W
Series Model	:	N/A
Applicant	:	QNAP System, Inc.
Address	:	2F, No.22, Zhongxing Road, Xizhi District, New Taipei City, 221,Taiwan
Manufacturer	:	QNAP System, Inc.
Address	:	2F, No.22, Zhongxing Road, Xizhi District, New Taipei City, 221,Taiwan
Factory	:	CIG Shanghai Co., Ltd., Shanghai Branch.
Address	:	F/2, 3 Building 1, No. 505 Jiangyue Road, Minhang District, Shanghai, P.R. China
Date of Receipt	:	Feb. 27, 2020
Date of Test	:	Feb. 27, 2020~Jun. 15, 2020
Issued Date	:	Sep. 15, 2020
Report Version	:	R02
Test Sample	:	Engineering Sample No.: SH2020021330, SH2020021330-1
Standard(s)	:	FCC Guidelines for Human Exposure IEEE C95.1 & FCC Part 2.1091 FCC Title 47 Part 2.1091, OET Bulletin 65 Supplement C

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

Allen Wei

Prepared by : Allen Wei

Ryan. Wang

Approved by : Ryan Wang

Certificate # 5123.03

Add: No. 29, Jintang Road, Tangzhen Industry Park, Pudong New Area, Shanghai 201210,China
TEL: +86-021-61765666
Web: www.newbtl.com

REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue	Jun. 24, 2020
R01	Revised report to address TCB's comments.	Jul. 29, 2020
R02	Added a description in page 5.	Sep. 15, 2020

1. MPE CALCULATION METHOD

Calculation Method of RF Safety Distance:

$$S = \frac{PG}{4\pi r^2} = \frac{EIRP}{4\pi r^2}$$

where:
S = power density
P = power input to the antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Table for Filed Antenna

For 2.4G

Ant.	Brand	Model Name	Antenna Type	Connector	Gain(dBi)	Note
1	GALTRONICS	N/A	PCB	N/A	2.89	N/A
2	GALTRONICS	N/A	PCB	N/A	4.17	N/A
3	GALTRONICS	N/A	PCB	N/A	3.95	N/A
4	GALTRONICS	N/A	PCB	N/A	3.38	N/A

Note:

This EUT supports Beamforming and CDD, all antennas have the same gain, any transmit signals are correlated with each other, so

1) Beamforming:

Directional gain = $10\log[(10^{G1/20}+10^{G2/20+....+}10^{GN/20})^2/N_{ANT}]$dBi,

that is Directional gain=$10\log[(10^{G1/20}+10^{G2/20+....+}10^{GN/20})^2/N_{ANT}]$dBi =9.63;

So output power limit is 30-9.63+6=26.37, the power spectral density limit is 8-9.63+6=4.37.

2) CDD:

For power spectral density measurements,

Directional gain = $10\log[(10^{G1/20}+10^{G2/20+....+}10^{GN/20})^2/N_{ANT}]$dBi,

that is Directional gain=$10\log[(10^{G1/20}+10^{G2/20+....+}10^{GN/20})^2/N_{ANT}]$dBi =9.63;

So power spectral density limit is 8-9.63+6=4.37.

For power meansurements, Directional gain =$G_{ANT\ MAX.}$+Array Gain, Array Gain=0dB($N_{ANT}\leq 4$),

so the Directional gain=4.17.

Operating Mode / TX Mode	Ant. 1	Ant. 2	Ant. 3	Ant. 4	Ant. 1+2+3+4
IEEE 802.11b	✓	✓	✓	✓	✓
IEEE 802.11g	✓	✓	✓	✓	✓
IEEE 802.11n (HT20)	✓	✓	✓	✓	✓
IEEE 802.11n (HT40)	✓	✓	✓	✓	✓
IEEE 802.11ax (HE20)	✓	✓	✓	✓	✓
IEEE 802.11ax (HE40)	✓	✓	✓	✓	✓

For 5G

Ant.	Brand	Model Name	Antenna Type	Connector	Gain(dBi)	Note
1	GALTRONICS	N/A	PCB	N/A	2.40	N/A
2	GALTRONICS	N/A	PCB	N/A	4.96	N/A
3	GALTRONICS	N/A	PCB	N/A	4.48	N/A
4	GALTRONICS	N/A	PCB	N/A	4.21	N/A

Note:

This EUT supports Beamforming and CDD, all antennas have unequal gains, any transmit signals are correlated with each other, so

1）Beamforming:

Directional gain = $10\log[(10^{G1/20}+10^{G2/20+....+}10^{GN/20})^2/N_{ANT}]$dBi,

that is Directional gain=$10\log[(10^{G1/20}+10^{G2/20+....+}10^{GN/20})^2/N_{ANT}]$dBi =10.09;

Then, the UNII-1, UNII-3 output power limit is 30-10.09+6=25.91, the UNII-2A,UNII-2C output power limit is 24-10.09+6=19.91. The UNII-1 power spectral density limit is 17-10.09+6=12.91,UNII-2A,UNII-2C power spectral density limit is 11-10.09+6=6.91, the UNII-3 power spectral density limit is 30-10.09+6=25.91.

2） CDD:

For power spectral density measurements, the Directional gain=$10\log[(10^{G1/20}+10^{G2/20+....+}10^{GN/20})^2/N_{ANT}]$dBi,

that is Directional gain=$10\log[(10^{G1/20}+10^{G2/20+....+}10^{GN/20})^2/N_{ANT}]$dBi =10.09;

Then, the UNII-1 power spectral density limited is 17-10.09+6=12.91, UNII-2A,UNII-2C power spectral density limit is 11-10.09+6=6.91, the UNII-3 power spectral density limit is 30-10.09+6=25.91.

For power meansurements, Directional gain= $G_{ANT\ MAX.}$+Array Gain.Array Gain=0dB($N_{ANT}\leq 4$), so the Directional gain=4.96.

Operating Mode / TX Mode	Ant. 1	Ant. 2	Ant. 3	Ant. 4	Ant. 1+2+3+4
IEEE 802.11a	✓	✓	✓	✓	✓
IEEE 802.11n (HT20)	✓	✓	✓	✓	✓
IEEE 802.11n (HT40)	✓	✓	✓	✓	✓
IEEE 802.11ac (VHT20)	✓	✓	✓	✓	✓
IEEE 802.11ac (VHT40)	✓	✓	✓	✓	✓
IEEE 802.11ac (VHT80)	✓	✓	✓	✓	✓
IEEE 802.11ax (HE20)	✓	✓	✓	✓	✓
IEEE 802.11ax (HE40)	✓	✓	✓	✓	✓
IEEE 802.11ax (HE80)	✓	✓	✓	✓	✓

2. TEST RESULTS

For 2.4GHz:

Beamforming

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. tune up Power (dBm)	Max. tune up Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
9.63	9.18330	27	501.1872	0.50240	1	Complies

CDD：

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. tune up Power (dBm)	Max. tune up Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
4.17	2.6122	29	794.3282	0.22650	1	Complies

For 5GHz :

Beamforming

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. tune up Power (dBm)	Max. tune up Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
10.09	10.2094	26	398.1072	0.44370	1	Complies

CDD：

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. tune up Power (dBm)	Max. tune up Power Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
4.96	3.1333	29	794.3282	0.27170	1	Complies

For the max simultaneous transmission MPE:

2.4G+5G

Power Density (S) (mW/cm^2) 2.4GHz	Power Density (S) (mW/cm^2) 5GHz	Total	Limit of Power Density (S) (mW/cm^2)	Test Result
0.50240	0.44370	0.9461	1	Complies

Note: The calculated distance is 27 cm.
Output power including tune up tolerance.
While multi-user establish the connection with the AP, the antenna gain will not increase.

End of Test Report