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# RF EXPOSURE REPORT

**REPORT NO.:** SA140527E05

**MODEL NO.:** QLivebox

**FCC ID:** 2ACFN-QLIVEBOX

**RECEIVED:** May 27, 2014

**TESTED:** June 19, 2014

**ISSUED:** Nov. 17, 2014

**APPLICANT:** QNAP Systems, Inc.

**ADDRESS:** 2F., No. 22, Zhongxing Rd., Xizhi Dist., New Taipei City, 221 Taiwan

**ISSUED BY:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory

**LAB ADDRESS:** No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
SA140527E05	Original release	Nov. 17, 2014



## 1. CERTIFICATION

**PRODUCT:** QLivebox

**BRAND NAME:** QNAP

**MODEL NO.:** QLivebox

**TEST SAMPLE:** MASS-PRODUCTION

**APPLICANT:** QNAP Systems, Inc.

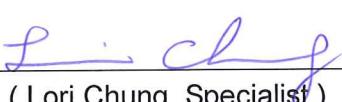
**TESTED DATE:** June 19, 2014

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

KDB 447498 D03

IEEE C95.1

The above equipment (Model: QLivebox) 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:** Nov. 17, 2014  
( Lori Chung, Specialist )

**Approved By :**  , **Date:** Nov. 17, 2014  
( May Chen, Manager )



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## 2. RF EXPOSURE LIMIT

### 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

## 3. MPE CALCULATION FORMULA

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

where

Pd = power density in mW/cm<sup>2</sup>

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

## 4. CLASSIFICATION

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. So, this device is classified as **Mobile Device**.



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## 5. ANTENNA GAIN

The antennas provided to the EUT, please refer to the following table:

For WLAN							
Ant. No.	Transmitter Circuit	Brand	Model	Antenna Type	Antenna Gain (dBi)	Connector type	Frequency range (GHz to GHz)
1	CHAIN (0)	Unictron	AA077	CHIP	1.4	NA	2.4~2.5
	CHAIN (1)				2.3		5.15~5.85
For Zigbee							
Ant. No.	Brand	Model	Antenna Type	Antenna Gain (dBi)	Connector type	Frequency range (GHz to GHz)	
3	Unictron	AA055	CHIP	2.5	NA	2.4~2.5	



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## 6. CALCULATION RESULT OF MAXIMUM CONDUCTED POWER

### For WLAN (2.4GHz)

#### 802.11b

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
2412 - 2462	132.05	4.41	20	0.07252	1.00

NOTE: Directional gain = 1.4dBi + 10log(2) = 4.41dBi.

#### 802.11g

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
2412 - 2462	496.964	4.41	20	0.27293	1.00

NOTE: Directional gain = 1.4dBi + 10log(2) = 4.41dBi.

#### 802.11n (HT20)

FREQUENCY BAND (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
2412 - 2462	462.538	4.41	20	0.25403	1.00

NOTE: Directional gain = 1.4dBi + 10log(2) = 4.41dBi.

#### 802.11n (HT40)

FREQUENCY BAND (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
2422-2452	150.356	4.41	20	0.08258	1.00

NOTE: Directional gain = 1.4dBi + 10log(2) = 4.41dBi.



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## For WLAN (5GHz)

### 802.11a

FREQUENCY BAND (MHz)	MAX POWER AVG. (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5180 - 5240	44.486	5.31	20	0.03006	1.00

NOTE: Directional gain =  $2.3\text{dBi} + 10\log(2) = 5.31\text{dBi}$ .

### 802.11n (HT20)

FREQUENCY BAND (MHz)	MAX POWER AVG. (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5180 - 5240	44.674	5.31	20	0.03018	1.00

NOTE: Directional gain =  $2.3\text{dBi} + 10\log(2) = 5.31\text{dBi}$ .

### 802.11n (HT40)

FREQUENCY BAND (MHz)	MAX POWER AVG. (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5190-5230	42.125	5.31	20	0.02846	1.00

NOTE: Directional gain =  $2.3\text{dBi} + 10\log(2) = 5.31\text{dBi}$ .

## For Zigbee

FREQUENCY BAND (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
2425 - 2475	0.6109	2.5	20	0.00022	1.00

## CONCLUSION:

Both of the WLAN and Zigbee can transmit simultaneously, the formula of calculated the MPE is:

$$\text{CPD}_1 / \text{LPD}_1 + \text{CPD}_2 / \text{LPD}_2 + \dots \text{etc.} < 1$$

**CPD = Calculation power density**

**LPD = Limit of power density**

Therefore, the worst-case situation is  $0.27293 / 1 + 0.00022 / 1 = 0.273$ , which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.

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