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Report Template Version: V03  
Report Template Revision Date: Mar.1st, 2017

# RF Exposure Evaluation Report

**Report No. :** CQASZ20180800077E-02

**Applicant:** ShenZhen Annidigital Technology Co., Ltd

**Address of Applicant:** 3rd Floor, Hasee Bldg, NO.1, Banlan Road, Bantian, Buji Town, Longgang,, Shenzhen, China

**Manufacturer:** ShenZhen Annidigital Technology Co., Ltd

**Address of Manufacturer:** 3rd Floor, Hasee Bldg, NO.1, Banlan Road, Bantian, Buji Town, Longgang,, Shenzhen, China

**Equipment Under Test (EUT):**

**Product:** Gateway

**Model No.:** GW1

**Brand Name:** 

**FCC ID:** 2ANNW-GW1

**Standards:** 47 CFR Part 1.1307  
47 CFR Part 1.1310  
KDB447498D01 General RF Exposure Guidance v06

**Date of Test:** 2018-08-20 to 2018-09-12

**Date of Issue:** 2018-09-12

**Test Result :** PASS\*

**Tested By:**

*Tiny You*

( Tiny You)

**Reviewed By:**

*Aaron Ma*

( Aaron Ma)

**Approved By:**

*Jack Ai*

( Jack Ai)



\* In the configuration tested, the EUT complied with the standards specified above.

The test report is effective only with both signature and specialized stamp, The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CQA, this report can't be reproduced except in full.

## 1 Version

### Revision History Of Report

| Report No.           | Version | Description    | Issue Date |
|----------------------|---------|----------------|------------|
| CQASZ20180800077E-02 | Rev.01  | Initial report | 2018-09-12 |

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### 3 General Information

#### 3.1 Client Information

|                          |                                                                                          |
|--------------------------|------------------------------------------------------------------------------------------|
| Applicant:               | ShenZhen Annidigital Technology Co., Ltd                                                 |
| Address of Applicant:    | 3rd Floor, Hasee Bldg, NO.1, Banlan Road, Bantian, Buji Town, Longgang,, Shenzhen, China |
| Manufacturer:            | ShenZhen Annidigital Technology Co., Ltd                                                 |
| Address of Manufacturer: | 3rd Floor, Hasee Bldg, NO.1, Banlan Road, Bantian, Buji Town, Longgang,, Shenzhen, China |

#### 3.2 General Description of EUT

|                   |                                                                                                                    |
|-------------------|--------------------------------------------------------------------------------------------------------------------|
| Product Name:     | Gateway                                                                                                            |
| Model No.:        | GW1                                                                                                                |
| Trade Mark:       |                                   |
| Hardware Version: | V21                                                                                                                |
| Software Version: | V1.0                                                                                                               |
| Sample Type:      | <input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable <input type="checkbox"/> Fix Location |
| Power Supply:     | Adapter: Input AC 100-240V<br>Output DC 5V 1A                                                                      |

#### 3.3 General Description of WIFI

|                       |                                                                                                                                                          |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operation Frequency:  | IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz<br>IEEE 802.11n(HT40): 2422MHz to 2452MHz                                                                     |
| Channel Numbers:      | IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels<br>IEEE 802.11n HT40: 7 Channels                                                                          |
| Channel Separation:   | 5MHz                                                                                                                                                     |
| Type of Modulation:   | IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK)<br>IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK)<br>IEEE for 802.11n(HT20/40): OFDM (64QAM, 16QAM,QPSK,BPSK) |
| Test Software of EUT: | RF test (manufacturer declare )                                                                                                                          |
| Antenna Type:         | integral antenna                                                                                                                                         |
| Antenna Gain:         | 0dBi                                                                                                                                                     |

## 4 RF Exposure Evaluation

### 4.1 RF Exposure Compliance Requirement

#### 4.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—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> ) | Averaging time (minutes) |
|----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposures</b>        |                               |                               |                                     |                          |
| 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                        |
| 300–1500 .....                                                 | .....                         | .....                         | f/300                               | 6                        |
| 1500–100,000 .....                                             | .....                         | .....                         | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 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

Friis Formula

Friis transmission formula:  $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = 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

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance  $r$  where the MPE limit is reached.

#### 4.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

## 4.2 1.1.3 EUT RF Exposure Evaluation

### 1) For WIFI

Antenna Gain: 0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

### Measurement Data

| 802.11b mode      |                            |
|-------------------|----------------------------|
| Test channel      | Average Output Power (dBm) |
| Lowest(2412MHz)   | 10.1                       |
| Middle(2437MHz)   | 10.43                      |
| Highest(2462MHz)  | 10.65                      |
| 802.11g mode      |                            |
| Test channel      | Average Output Power (dBm) |
| Lowest(2412MHz)   | 9.5                        |
| Middle(2437MHz)   | 9.86                       |
| Highest(2462MHz)  | 9.91                       |
| 802.11n(HT20)mode |                            |
| Test channel      | Average Output Power (dBm) |
| Lowest(2412MHz)   | 9.3                        |
| Middle(2437MHz)   | 9.65                       |
| Highest(2462MHz)  | 9.69                       |
| 802.11n(HT40)mode |                            |
| Test channel      | Average Output Power (dBm) |
| Lowest(2422MHz)   | 9.21                       |
| Middle(2437MHz)   | 9.42                       |
| Highest(2452MHz)  | 9.4                        |

### 802.11b(worst case)

| Channel | Frequency (MHz) | Max Conducted average Output Power (dBm) | Output Power to Antenna (mW) | Antenna Gain (dBi) | Power Density at R = 20 cm (mW/cm <sup>2</sup> ) | Limit | Result |
|---------|-----------------|------------------------------------------|------------------------------|--------------------|--------------------------------------------------|-------|--------|
| Highest | 2462            | 10.65                                    | 11.614                       | 0                  | 0.00231                                          | 1.0   | PASS   |

Note: 1) Refer to report No. CQASZ20180800077E-01 for EUT test Max Conducted average Output Power value.

$$2) Pd = (P_{out} * G) / (4 * \pi * R^2) = (11.614 * 1) / (4 * 3.1416 * 20^2) = 0.00231$$