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# RF Exposure Evaluation Report

**Report No. :** CQASZ20181000013E-04

**Applicant:** Shenzhen Geniatech INC.,LTD.

**Address of Applicant:** 18th F, GDC Building, No 9th, Gaoxin Middle 3rd Rd. Nanshan District, Shenzhen, China

**Manufacturer:** Shenzhen Geniatech INC.,LTD.

**Address of Manufacturer:** 18th F, GDC Building, No 9th, Gaoxin Middle 3rd Rd. Nanshan District, Shenzhen, China

**Equipment Under Test (EUT):**

**Product:** Enjoy TV

**Model No.:** Please see page 5

**Test Model No.:** ATV495X

**Brand Name:** N/A

**FCC ID:** ZJU-E18DA5

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

**Date of Test:** 2018-10-15 to 2018-10-22

**Date of Issue:** 2018-10-29

**Test Result :** **PASS\***

**Tested By:**

(Daisy Qin)

**Reviewed By:**

(Aaron Ma)

**Approved By:**

(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 |
|----------------------|---------|----------------|------------|
| CQASZ20181000013E-04 | Rev.01  | Initial report | 2018-10-29 |

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### 3 General Information

#### 3.1 Client Information

|                          |   |
|--------------------------|---|
| Applicant:               | Shenzhen Geniatech INC.,LTD.  |
| Address of Applicant:    | 18th F, GDC Building, No 9th, Gaoxin Middle 3rd Rd. Nanshan District, Shenzhen, China |
| Manufacturer:            | Shenzhen Geniatech INC.,LTD.  |
| Address of Manufacturer: | 18th F, GDC Building, No 9th, Gaoxin Middle 3rd Rd. Nanshan District, Shenzhen, China |

#### 3.2 General Description of EUT

|                   |   |
|-------------------|---|
| Product Name:     | Enjoy TV  |
| Model No.:        | Please see page 5                                 |
| Test Model No.:   | ATV495X   |
| Trade Mark:       | N/A   |
| Hardware Version: | V1.0  |
| Software Version: | V1.0  |
| Sample Type:      | Internal antenna                                  |
| Power Supply:     | Adapter :INPUT:100-240~50/60Hz 2.0A OUTPUT:15V 4A |

#### 3.3 General Description of 2.4G 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:         | Internal antenna   |
| Antenna Gain:         | 2dBi   |

#### 3.4 General Description of 5G WIFI

|                      |  |
|----------------------|--|
| Operation Frequency: | 5180 ~ 5240 MHz, 5745 ~ 5825 MHz   |
| Channel Numbers:     | 5180 ~ 5240 MHz: 4 for 802.11a, 802.11ac (VHT20)<br>2 for 802.11ac (VHT40)<br>1 for 802.11ac (VHT80)<br>5745 ~ 5825 MHz: 5 for 802.11a, 802.11ac (VHT20)<br>2 for 802.11ac (VHT40)<br>1 for 802.11ac (VHT80) |
| Channel Separation:  | IEEE 802.11a/n-HT20/ac-VHT20: 20 MHz<br>IEEE 802.11n-HT40/ac-VHT40: 40 MHz   |

|                       |   |
|-----------------------|---|
|                       | IEEE 802.11ac-VHT80/: 80 MHz  |
| Type of Modulation:   | IEEE 802.11a: OFDM(64QAM, 16QAM, QPSK, BPSK)<br>IEEE 802.11n: OFDM(64QAM, 16QAM, QPSK, BPSK)<br>IEEE 802.11ac: OFDM(256QAM, 64QAM, 16QAM, QPSK, BPSK) |
| Test Software of EUT: | RF test (manufacturer declare )   |
| Antenna Type:         | Internal antenna  |
| Antenna Gain:         | 2dBi  |

### 3.5 General Description of BT

|                       |   |
|-----------------------|---|
| Operation Frequency:  | 2402MHz~2480MHz                         |
| Bluetooth Version:    | V4.0                                    |
| Modulation Technique: | Frequency Hopping Spread Spectrum(FHSS) |
| Modulation Type:      | GFSK, $\pi/4$ DQPSK, 8DPSK              |
| Number of Channel:    | 79                                      |
| Hopping Channel Type: | Adaptive Frequency Hopping systems      |
| Test Software of EUT: | Blue test (manufacturer declare )       |
| Antenna Type:         | Integral antenna                        |
| Antenna Gain:         | 2dBi                                    |

#### Note:

All model: ATV495X, APC390R, ATV390R, ATV495MAX, ATV598MAX, ATV599MAX, APC395X, ATV395X, APC1295, APC1967, ATV1660K, ATV135MAX, ATV195MAX, ATV168R, ATV195X, ATV315MAX, ATV315K, ATV329Q, ATV329A, ATV387, ATV315K, ATV1960, ATV1950A/T2/I, ATV1962A/T2/I, ATV1965A/T2/I/S2, ATV595X, ATV598E, ATV360, DB8, DB7, DB9, DB4Hub, TPC1010Q, TPC1560K, TPC1850T, TPC2150K, TPC3200K, TPC5500K, GTW350,GTW410, GTW389, GTW360, Flyfish, APC3399, DB4 IOT, ATV596X, ATV595X, ATV597E

Only the model ATV495X was tested, since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being color of appearance and model name.

## 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 BT

Antenna Gain: 2dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.58 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

### Measurement Data

| GFSK mode        |                            |                            |                       |       |
|------------------|----------------------------|----------------------------|-----------------------|-------|
| Test channel     | Peak Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |       |
|                  |                            |                            | (dBm)                 | (mW)  |
| Lowest(2402MHz)  | 4.380                      | 4±1                        | 5                     | 3.162 |
| Middle(2441MHz)  | 4.560                      | 4±1                        | 5                     | 3.162 |
| Highest(2480MHz) | 3.820                      | 4±1                        | 5                     | 3.162 |
| π/4DQPSK mode    |                            |                            |                       |       |
| Test channel     | Peak Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |       |
|                  |                            |                            | (dBm)                 | (mW)  |
| Lowest(2402MHz)  | 0.560                      | 0±1                        | 1                     | 1.259 |
| Middle(2441MHz)  | 0.190                      | 0±1                        | 1                     | 1.259 |
| Highest(2480MHz) | -0.650                     | 0±1                        | 1                     | 1.259 |
| 8DPSK mode       |                            |                            |                       |       |
| Test channel     | Peak Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |       |
|                  |                            |                            | (dBm)                 | (mW)  |
| Lowest(2402MHz)  | -0.340                     | -1±1                       | 0                     | 1.000 |
| Middle(2441MHz)  | -0.210                     | -1±1                       | 0                     | 1.000 |
| Highest(2480MHz) | -2.060                     | -1.5±1                     | -0.5                  | 0.891 |

The worst case:

| Maximum tune-up Power<br>(mW) | Antenna Gain<br>(dBi) | Power Density<br>at R = 20 cm<br>(mW/cm <sup>2</sup> ) | Limit | Result |
|-------------------------------|-----------------------|--|-------|--------|
| 3.162                         | 2                     | 0.000997   | 1.0   | PASS   |

Note: 1) Refer to report No. CQASZ20181000013E-02 for EUT test Max Conducted Peak Output Power value.

$$2) P_d = (P_{out} * G) / (4 * \pi * R^2) = (3.162 * 1.58) / (4 * 3.1416 * 20^2) = 0.000997$$

## 2) For 2.4G WIFI

Antenna Gain: 2dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.58 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

### Measurement Data

| 802.11b mode      |                            |                            |                       |        |
|-------------------|----------------------------|----------------------------|-----------------------|--------|
| Test channel      | Peak Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |        |
|                   |                            |                            | (dBm)                 | (mW)   |
| Lowest(2412MHz)   | 11.13                      | 11.5±0.5                   | 12                    | 15.849 |
| Middle(2437MHz)   | 11.69                      | 11.5±0.5                   | 12                    | 15.849 |
| Highest(2462MHz)  | 11.91                      | 11.5±0.5                   | 12                    | 15.849 |
| 802.11g mode      |                            |                            |                       |        |
| Test channel      | Peak Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |        |
|                   |                            |                            | (dBm)                 | (mW)   |
| Lowest(2412MHz)   | 10.44                      | 11±1.0                     | 12                    | 15.849 |
| Middle(2437MHz)   | 11.1                       | 11±1.0                     | 12                    | 15.849 |
| Highest(2462MHz)  | 11.25                      | 11±1.0                     | 12                    | 15.849 |
| 802.11n(HT20)mode |                            |                            |                       |        |
| Test channel      | Peak Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |        |
|                   |                            |                            | (dBm)                 | (mW)   |
| Lowest(2412MHz)   | 10.44                      | 11±1.0                     | 12                    | 15.849 |
| Middle(2437MHz)   | 11.1                       | 11±1.0                     | 12                    | 15.849 |
| Highest(2462MHz)  | 11.25                      | 11±1.0                     | 12                    | 15.849 |
| 802.11n(HT40)mode |                            |                            |                       |        |
| Test channel      | Peak Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |        |
|                   |                            |                            | (dBm)                 | (mW)   |
| Lowest(2422MHz)   | 11.92                      | 12±0.5                     | 12.5                  | 17.783 |
| Middle(2437MHz)   | 12.24                      | 12±0.5                     | 12.5                  | 17.783 |
| Highest(2452MHz)  | 12.46                      | 12±0.5                     | 12.5                  | 17.783 |



The worst case:

| Maximum tune-up Power (mW) | Antenna Gain (dBi) | Power Density at R = 20 cm (mW/cm <sup>2</sup> ) | Limit | Result |
|----------------------------|--------------------|--|-------|--------|
| 17.783                     | 2                  | 0.00561  | 1.0   | PASS   |

Note: 1) Refer to report No. CQASZ170601302E-02 for EUT test Max Conducted average Output Power value.

$$2) P_d = (P_{out} * G) / (4 * \pi * R^2) = (17.783 * 1.58) / (4 * 3.1416 * 20^2) = 0.00561$$

### 3) For 5G WIFI

Antenna Gain: 2dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.58 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

### Measurement Data

#### 4.2.1.1 802.11a mode

| Test channel       | Average Output Power (dBm) | Tune up tolerance (dBm) | Maximum tune-up Power |        |
|--------------------|----------------------------|-------------------------|-----------------------|--------|
|                    |                            |                         | (dBm)                 | (mW)   |
| 5180               | 10.94                      | 11±1.0                  | 12                    | 15.849 |
| 5200               | 11.11                      | 11±1.0                  | 12                    | 15.849 |
| 5240               | 11.89                      | 11±1.0                  | 12                    | 15.849 |
| 5745               | 10.27                      | 11±1.0                  | 12                    | 15.849 |
| 5785               | 10.23                      | 11±1.0                  | 12                    | 15.849 |
| 5825               | 10.12                      | 11±1.0                  | 12                    | 15.849 |
| 802.11n(HT20) mode |                            |                         |                       |        |
| Test channel       | Average Output Power (dBm) | Tune up tolerance (dBm) | Maximum tune-up Power |        |
|                    |                            |                         | (dBm)                 | (mW)   |
| 5180               | 11.01                      | 10.5±1.5                | 12                    | 15.849 |
| 5200               | 11.24                      | 10.5±1.5                | 12                    | 15.849 |
| 5240               | 11.95                      | 10.5±1.5                | 12                    | 15.849 |
| 5745               | 10.42                      | 10.5±1.5                | 12                    | 15.849 |
| 5785               | 9.3                        | 10.5±1.5                | 12                    | 15.849 |
| 5825               | 9.87                       | 10.5±1.5                | 12                    | 15.849 |
| 802.11n(HT40)mode  |                            |                         |                       |        |
| Test channel       | Average Output Power (dBm) | Tune up tolerance (dBm) | Maximum tune-up Power |        |
|                    |                            |                         | (dBm)                 | (mW)   |

| 5190                | 9.5                           | 10±1.0                     | 11                    | 12.589 |
|---------------------|-------------------------------|----------------------------|-----------------------|--------|
| 5230                | 10.88                         | 10±1.0                     | 11                    | 12.589 |
| 5755                | 9.42                          | 10±1.0                     | 11                    | 12.589 |
| 5795                | 9.54                          | 10±1.0                     | 11                    | 12.589 |
| 5190                | 9.5                           | 10±1.0                     | 11                    | 12.589 |
| 802.11ac(VHT20)mode |                               |                            |                       |        |
| Test channel        | Average Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |        |
|                     |                               |                            | (dBm)                 | (mW)   |
| 5180                | 10.42                         | 11±1.0                     | 12                    | 15.849 |
| 5200                | 10.98                         | 11±1.0                     | 12                    | 15.849 |
| 5240                | 11.78                         | 11±1.0                     | 12                    | 15.849 |
| 5745                | 10.43                         | 11±1.0                     | 12                    | 15.849 |
| 5785                | 10.31                         | 11±1.0                     | 12                    | 15.849 |
| 5825                | 10.34                         | 11±1.0                     | 12                    | 15.849 |
| 802.11ac(VHT40)mode |                               |                            |                       |        |
| Test channel        | Average Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |        |
|                     |                               |                            | (dBm)                 | (mW)   |
| 5190                | 10.49                         | 10.5±1.0                   | 11.5                  | 14.125 |
| 5230                | 11.1                          | 10.5±1.0                   | 11.5                  | 14.125 |
| 5755                | 10.3                          | 10.5±1.0                   | 11.5                  | 14.125 |
| 5795                | 10.2                          | 10.5±1.0                   | 11.5                  | 14.125 |
| 5190                | 10.49                         | 10.5±1.0                   | 11.5                  | 14.125 |
| 802.11acV(HT80)mode |                               |                            |                       |        |
| Test channel        | Average Output Power<br>(dBm) | Tune up tolerance<br>(dBm) | Maximum tune-up Power |        |
|                     |                               |                            | (dBm)                 | (mW)   |
| 5210                | 11.09                         | 10.5±1.0                   | 11.5                  | 14.125 |
| 5775                | 10.51                         | 10.5±1.0                   | 11.5                  | 14.125 |

The worst case:

| Maximum tune-up Power<br>(mW) | Antenna Gain<br>(dBi) | Power Density<br>at R = 20 cm<br>(mW/cm <sup>2</sup> ) | Limit | Result |
|-------------------------------|-----------------------|--|-------|--------|
| 15.849                        | 2                     | 0.005  | 1.0   | PASS   |

Note: 1) Refer to report No. CQASZ170601302E-03 for EUT test Max Conducted average Output Power value.

$$2) P_d = (P_{out} * G) / (4 * \pi * R^2) = (15.849 * 1.58) / (4 * 3.1416 * 20^2) = 0.005$$