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Report Template Version: V03

Report Template Revision Date: Mar.1st, 2017

RF Exposure Evaluation Report

Report No. : CQSZ20180500205EW-02

Applicant: Hangzhou Great Star Industrial Co., Ltd.

Address of Applicant: No.35, Jiuahuan Road, Jiubao Town, Jianggan District, Hangzhou 310019, China


Manufacturer: Hangzhou Great Star Industrial Co., Ltd.

Address of Manufacturer: No.35, Jiuahuan Road, Jiubao Town, Jianggan District, Hangzhou 310019, China

Equipment Under Test (EUT):

Product: Smart Plug

Model No.: iL03_1

Brand Name: 

FCC ID: 2AMI2IL03

IC: 22853-IL03

Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
KDB447498D01 General RF Exposure Guidance v06
RSS 102 Issue 5 March 2015

Date of Test: 2018-06-01 to 2018-06-21

Date of Issue: 2018-06-21

Test Result : **PASS***

Tested By:

(Aaron Ma)

Reviewed By:

(Owen Zhou)

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.

2 Version

Revision History Of Report

| Report No. | Version | Description | Issue Date |
|----------------------|---------|----------------|------------|
| CQSZ20180500205EW-02 | Rev.01 | Initial report | 2018-06-21 |

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4 General Information

4.1 Client Information

| | |
|--------------------------|---|
| Applicant: | Hangzhou Great Star Industrial Co., Ltd. |
| Address of Applicant: | No.35, Jiuhuan Road, Jiubao Town, Jianggan District, Hangzhou 310019, China |
| Manufacturer: | Hangzhou Great Star Industrial Co., Ltd. |
| Address of Manufacturer: | No.35, Jiuhuan Road, Jiubao Town, Jianggan District, Hangzhou 310019, China |

4.2 General Description of EUT

| | |
|-----------------------|---|
| Product Name: | Smart Plug |
| Model No.: | iL03_1 |
| Trade Mark: |  |
| Hardware Version: | 100 |
| Software Version: | 268460592(hex:0x10006230) |
| Operation Frequency: | Zigbee: 2405~2480MHz |
| Modulation Type: | Zigbee: O-QPSK |
| Number of Channel: | Zigbee: 16 Channels |
| Sample Type: | Mobile production |
| Test Software of EUT: | Secure CRT (manufacturer declare) |
| Antenna Type: | PCB antenna for Zigbee |
| Antenna Gain: | Zigbee: 0.3dBi |
| Power Supply: | Input:100-240V~50/60Hz |

5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement for FCC

5.1.1 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 ²) | Averaging time (minutes) |
|--|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| (A) Limits for Occupational/Controlled Exposures | | | | |
| 0.3–3.0 | 614 | 1.63 | *(100) | 6 |
| 3.0–30 | 1842/f | 4.89/f | *(900/f ²) | 6 |
| 30–300 | 61.4 | 0.163 | 1.0 | 6 |
| 300–1500 | | | f/300 | 6 |
| 1500–100,000 | | | 5 | 6 |
| (B) 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 ²) | 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/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². 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.

5.1.2 Test Procedure

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

5.1.3 EUT RF Exposure Evaluation standalone operations

1) For Zigbee

Antenna Gain: 0.3dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.07 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

| O-QPSK mode | |
|------------------|----------------------------|
| Test channel | Average Output Power (dBm) |
| Lowest(2405MHz) | 16.78 |
| Middle(2440MHz) | 16.81 |
| Highest(2480MHz) | 16.95 |

O-QPSK mode

| 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 ²) | Limit | Result |
|---------|-----------------|--|------------------------------|--------------------|--|-------|--------|
| Highest | 2480 | 16.95 | 49.55 | 0.3 | 0.01 | 1.0 | PASS |

5.2 RF Exposure Compliance Requirement for IC

5.2.1 Exemption from Routine Evaluation Limits – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;

RF exposure evaluation exempted power for Zigbee: 2.73W

The Max. e.i.r.p. for Zigbee: 17.25 dBm = 0.053 W

The Zigbee e.i.r.p. is less than the RF exposure evaluation exempted power. So RF exposure evaluation is not required.