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RF Exposure Evaluation Report

Report No. : CQASZ20190100018E-02

Applicant: Guangzhou Vensi Intelligent Technology Co., Ltd.

Address of Applicant: No.19 Huangqi Shan Road, Yonghe Development Zone, Whampoa District, Guangzhou, China

Manufacturer: Guangzhou Vensi Intelligent Technology Co., Ltd.

Address of Manufacturer: No.19 Huangqi Shan Road, Yonghe Development Zone, Whampoa District, Guangzhou, China

Equipment Under Test (EUT):

Product: LMIOT-zigbee-module

Model No.: LMZ-E321VX-SN

Brand Name:  威士丹利 智能
Vensi Intelligent

FCC ID: 2AR6I-ZE321VX

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

Date of Test: 2018-12-21 to 2019-01-04

Date of Issue: 2019-01-08

Test Result : **PASS***

Tested By:

Martin Lee

(Martin Lee)

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.

2 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20190100018E-02	Rev.01	Initial report	2019-01-08

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4 General Information

4.1 Client Information

Applicant:	Guangzhou Vensi Intelligent Technology Co., Ltd.
Address of Applicant:	No. 19 Huangqi Shan Road, Yonghe Development Zone, Whampoa District, Guangzhou, China
Manufacturer:	Guangzhou Vensi Intelligent Technology Co., Ltd.
Address of Manufacturer:	No. 19 Huangqi Shan Road, Yonghe Development Zone, Whampoa District, Guangzhou, China

4.2 General Description of EUT

Product Name:	LMIOT-zigbee-module
Model No.:	LMZ-E321VX-SN
Trade Mark:	 Vensi 威士丹利 智能 Vensi Intelligent
Operation Frequency:	2405MHz~2480MHz
Channel Numbers:	16
Channel Separation:	5MHz
Type of Modulation:	O-QPSK(DSSS)
Antenna Type:	Ceramic antenna
Antenna Gain:	0dB
Power Supply:	DC 2.85V ~3.6V

5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

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.

5.2 1.1.3 EUT RF Exposure Evaluation

Antenna Gain: 0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.0 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

O-QPSK mode				
Test channel	Peak Output Power (dBm)	Tune up tolerance (dBm)	Maximum tune-up Power	
			(dBm)	(mW)
Lowest(2405MHz)	8.47	8.0±1	9.0	7.943
Middle(2440MHz)	8.27	8.0±1	9.0	7.943
Highest(2480MHz)	7.78	8.0±1	9.0	7.943

The worst case:

Maximum tune-up Power (mW)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
7.943	0	0.0016	1.0	PASS

Note: 1) Refer to report No. CQASZ20190100018E-01 for EUT test Max Conducted Peak Output Power value.

2) $P_d = (P_{out} * G) / (4 * \pi * R^2) = (7.943 * 1.0) / (4 * 3.1416 * 20^2) = 0.0016$