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Report No.: SZEM160500405203
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RF Exposure Evaluation Report

Application No.: SZEM1605004052CR
Applicant: ZMOD0 Technology Shenzhen Corp., Ltd.
Manufacturer: ZMOD0 Technology Shenzhen Corp., Ltd.
Factory: ZMOD0 Technology Shenzhen Corp., Ltd.
Product Name: Beam
Model No.(EUT): ZM-SHRZ01W
Add Model No.: ZM-SHRXXXX(1stx=0 to 9 or A to Z; 2ndx=0 to 9; 3rdx=1 to 9;
4thx=A TO Z)
FCC ID: ZK8-SHRZ01W
Standards: 47 CFR Part 1.1307 (2015)
47 CFR Part 1.1310 (2015)
Date of Receipt: 2016-06-30
Date of Test: 2016-07-12 to 2016-07-13
Date of Issue: 2016-07-19

Test Result :	PASS*
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* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Jack Zhang
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2016-07-19		Original

Authorized for issue by:				
Tested By		 <hr/>		2016-07-13
				Date
Prepared By		 <hr/>		2016-07-19
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				Date



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4 General Information

4.1 Client Information

Applicant:	ZMODO Technology Shenzhen Corp., Ltd.
Address of Applicant:	25/F, Office Tower A, Financial Technology Building, 11 Keyuan Road, Nanshan District, Shenzhen, China
Manufacturer:	ZMODO Technology Shenzhen Corp., Ltd.
Address of Manufacturer:	25/F, Office Tower A, Financial Technology Building, 11 Keyuan Road, Nanshan District, Shenzhen, China
Factory:	ZMODO Technology Shenzhen Corp., Ltd.
Address of Factory:	25/F, Office Tower A, Financial Technology Building, 11 Keyuan Road, Nanshan District, Shenzhen, China

4.2 General Description of EUT

Product Name:	Beam
Model No.:	ZM-SHRZ01W
Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n HT20: 11 Channels IEEE 802.11n HT40: 7 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(T20 and T40) : OFDM (64QAM, 16QAM, QPSK,BPSK)
Sample Type:	Mobile Device
Antenna Type and Gain:	PIFA: 2dBi MIMO: 2x2
Power Supply:	AC 120V/60Hz

Remark:

Model No.: ZM-SHRZ01W, ZM-SHRXXXX(1stx=0 to 9 or A to Z; 2ndx=0 to 9; 3rdx=1 to 9; 4thx=A TO Z)

Only the model ZM-SHRZ01W was tested, since the electrical circuit design, layout, components used and internal wiring were identical for all above models, only different on color of appearance and the size.



4.3 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

4.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

- **FCC – Registration No.: 556682**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 556682.

- **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.

4.5 Deviation from Standards

None.

4.6 Abnormalities from Standard Conditions

None.

4.7 Other Information Requested by the Customer

None.

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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.



4.1.3 EUT RF Exposure Evaluation

Antenna Gain: 2dBi for SISO mode (802.11b/802.11g); 5.01dBi for MIMO mode (802.11n)

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.585 and 3.17 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

For 802.11b and 802.11g mode:

Antenna 1

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
Lowest	2412	20.09	102.093	0.032	1.0	PASS

Antenna 2

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
Middle	2437	15.36	34.356	0.011	1.0	PASS

For 802.11n mode:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	Result
Lowest	2422	20.99	125.603	0.079	1.0	PASS

Note: Refer to report No. SZEM160500405202 for EUT test Max Conducted Peak Output Power value.

The distance r (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.