

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Nanshan

District Shenzhen, China 518057

Telephone: +86 (0) 755 2601 2053 Report No.: SZEM160100035101

1

FCC REPORT

Application No.: SZEM1601000351CR

Applicant: ZMODO Technology Shenzhen Corp. Ltd.

Manufacturer: ZMODO Technology Shenzhen Corp. Ltd.

Factory: ZMODO Technology Shenzhen Corp. Ltd.

Product Name: Door Sensor Model No.(EUT): ZH-CJCFT

Add Model No.: ZH-CJXXX (The X is variables, X=A-Z)

Trade Mark: ZMODO

FCC ID: ZK8-CJCFT

Standards: 47 CFR Part 15, Subpart C (2015)

Date of Receipt: 2016-01-19

Date of Test: 2016-01-22 to 2016-03-01

Date of Issue: 2016-03-03

Test Result: PASS *

. * 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.



Report No.: SZEM160100035101

Page: 2 of 23

2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00		2016-03-03		Original

Authorized for issue by:		
Tested By	Martin Li	2016-03-01
	(Martin Li) /Project Engineer	Date
Prepared By	Iris Zhou	2016-03-03
	(Iris Zhou) /Clerk	Date
Checked By	Eric Fu	2016-03-03
	(Eric Fu) /Reviewer	Date



Report No.: SZEM160100035101

Page: 3 of 23

3 Test Summary

Test Item	Test Requirement	Test method	Result	
Antenna Requirement	47 CFR Part 15, Subpart C Section	ANSI C62 10/2012)	PASS	
Antenna nequirement	15.203	ANSI C63.10(2013)	PASS	
Field Strength of the	47 CFR Part 15, Subpart C Section	ANCI Cea 10/2012)	DACC	
Fundamental Signal	15.231 (b)	ANSI C63.10(2013)	PASS	
Spurious Emissions	47 CFR Part 15, Subpart C Section	ANSI C62 10/2012)	PASS	
Spurious Emissions	15.231 (b)/15.209	ANSI C63.10(2013)		
20dB Bandwidth	47 CFR Part 15, Subpart C Section	ANSI C63.10(2013)	DACC	
2006 Ballowidtii	15.231 (c)	ANSI C63.10(2013)	PASS	
Dwell Time	47 CFR Part 15, Subpart C Section	ANSI C62 10/2012)	PASS	
Dwell Tille	15.231 (a)	ANSI C63.10(2013)	rass	

Remark:

Model No.: ZH-CJCFT, ZH-CJXXX (The X is variables, X=A-Z)

Only the model ZH-CJCFT 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.





Report No.: SZEM160100035101

Page: 4 of 23

4 Contents

			Page
1	CO	OVER PAGE	1
2	VE	RSION	2
3	TE	ST SUMMARY	
4	CO	ONTENTS	4
5	GE	NERAL INFORMATION	5
	5.1 5.2 5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10	CLIENT INFORMATION GENERAL DESCRIPTION OF EUT TEST ENVIRONMENT AND MODE DESCRIPTION OF SUPPORT UNITS TEST LOCATION TEST FACILITY DEVIATION FROM STANDARDS ABNORMALITIES FROM STANDARD CONDITIONS OTHER INFORMATION REQUESTED BY THE CUSTOMER EQUIPMENT LIST	
6	TE	ST RESULTS AND MEASUREMENT DATA	10
	6.1 6.2 6.2 6.3 6.4	ANTENNA REQUIREMENT SPURIOUS EMISSIONS	11 11 18
7	PH	IOTOGRAPHS - EUT TEST SETUP	22
	7.1	RADIATED SPURIOUS EMISSION	22
8	PH	IOTOGRAPHS- EUT CONSTRUCTIONAL DETAILS	23



Report No.: SZEM160100035101

Page: 5 of 23

5 General Information

5.1 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		

5.2 General Description of EUT

Name:	Door Sensor
Model No.:	ZH-CJCFT
Trade Mark:	ZMODO
Sample Type:	Fixed production
Operation Frequency:	915MHz
Channel Numbers:	1
Modulation Type:	FSK
Antenna Type:	Integral
Antenna Gain:	2.15dBi
Power Supply:	Battery: DC 3V (1* "CR2032" Button cell)



Report No.: SZEM160100035101

Page: 6 of 23

5.3 Test Environment and Mode

Operating Environment:	Operating Environment:				
Temperature:	25.0 °C				
Humidity:	55 % RH				
Atmospheric Pressure:	1025 mbar				
Test mode:					
Transmitting mode: Keep the EUT in transmitting mode with modulation.					

5.4 Description of Support Units

The EUT has been tested independent unit.

5.5 Test Location

All tests were performed at:

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

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

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.



Report No.: SZEM160100035101

Page: 7 of 23

5.6 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)

The 3m Semi-anechoic chambers and the 10m Semi-anechoic chambers 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-2, 4620C-3.

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

5.9 Other Information Requested by the Customer

None.



Report No.: SZEM160100035101

Page: 8 of 23

5.10 Equipment List

	RE in Chamber					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Due date (yyyy-mm-dd)	
1	3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEL0017	2016-05-13	
2	EMI Test Receiver	Agilent Technologies	N9038A	SEL0312	2016-09-16	
3	EMI Test software	AUDIX	E3	SEL0050	N/A	
4	Coaxial cable	SGS	N/A	SEL0027	2016-05-13	
5	Coaxial cable	SGS	N/A	SEL0189	2016-05-13	
6	Coaxial cable	SGS	N/A	SEL0121	2016-05-13	
7	Coaxial cable	SGS	N/A	SEL0178	2016-05-13	
8	BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEL0015	2017-11-15	
9	Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEL0006	2018-10-17	
10	Pre-amplifier (0.1-1300MHz)	Agilent Technologies	8447D	SEL0053	2016-05-13	
11	Pre-Amplifier (0.1-26.5GHz)	Compliance Directions Systems Inc.	PAP-0126	SEL0168	2016-10-17	
12	Barometer	ChangChun	DYM3	SEL0088	2016-05-13	
13	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2016-10-09	
14	Humidity/ Temperature Indicator	Shanhai Qixiang	ZJ1-2B	SEL0103	2016-10-24	
15	Signal Generator (10M-27GHz)	Rohde & Schwarz SMR27		SEL0067	2016-05-13	
16	Loop Antenna	Beijing Daze ZN30401 S		SEL0203	2016-05-13	
17	Biconical Antenna (Tx)	Rohde & Schwarz	HK116	100641	2017-12-03	
18	Log-Perd. Dipole Antenna (Rx)	Rohde & Schwarz	HL223	HL223	2017-12-03	



Report No.: SZEM160100035101

Page: 9 of 23

	RF connected test					
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal. date (yyyy-mm-dd)	Cal.Due date (yyyy-mm-dd)
1	DC Power Supply	Zhao Xin	RXN-305D	SEL0117	2015-10-09	2016-10-09
2	Humidity/ Temperature Indicator	HYGRO	ZJ1-2B	SEL0033	2015-10-24	2016-10-24
3	Spectrum Analyzer	Rohde & Schwarz	FSP	SEL0154	2015-10-17	2016-10-17
4	Coaxial cable	SGS	N/A	SEL0178	2015-05-13	2016-05-13
5	Coaxial cable	SGS	N/A	SEL0179	2015-05-13	2016-05-13
6	Barometer	ChangChun	DYM3	SEL0088	2015-05-13	2016-05-13
7	Signal Generator	Rohde & Schwarz	SML03	SEL0068	2015-04-25	2016-04-25
8	POWER METER	R & S	NRVS	SEL0144	2015-10-09	2016-10-09
9	Attenuator	Beijin feihang taida	TST-2-6dB	SEL0205	2015-04-25	2016-04-25



Report No.: SZEM160100035101

Page: 10 of 23

6 Test results and Measurement Data

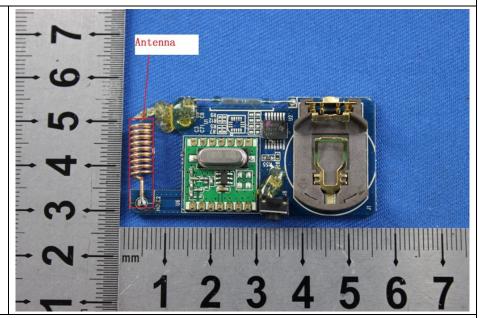
6.1 Antenna Requirement

Standard requirement: | 47 CFR Part 15C Section 15.203

15.203 Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:



The antenna is integrated on the main PCB and no consideration of replacement. The best case gain of the antenna is 2.15dBi.



Report No.: SZEM160100035101

Page: 11 of 23

6.2 Spurious Emissions

6.2.1 Spurious Emissions

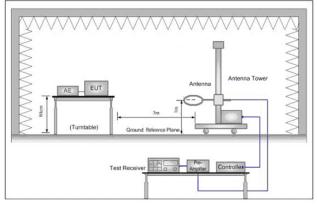
Test Requirement:	47 CFR Part 15C Section 15.231(b) and 15.209					
Test Method:	ANSI C63.10: 2013					
Test Site:	Measurement Distance: 3m (Semi-Anechoic Chamber)					
Receiver Setup:	Frequency	Detector	RBW	VBW	Remark	
	0.009MHz-0.090MHz	Peak	10kHz	30kHz	Peak	
	0.009MHz-0.090MHz	Average	10kHz	30kHz	Average	
	0.090MHz-0.110MHz	Quasi-peak	10kHz	30kHz	Quasi-pea	ak
	0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak	
	0.110MHz-0.490MHz	Average	10kHz	30kHz	Average	
	0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-pea	ak
	30MHz-1GHz	Quasi-peak	100kHz	300kHz	Quasi-pea	ak
	Above 1GHz	Peak	1MHz	3MHz	Peak	
	Above Tariz	Peak	1MHz	10Hz	Average	
Limit: (Spurious Emissions)	Frequency Field streng (microvolt/me		Limit (dBuV/m)	Remar	Measur distant	
	0.009MHz-0.490MHz	2400/F(kHz)	-	-	30	0
	0.490MHz-1.705MHz	24000/F(kHz)	-	-	30)
	1.705MHz-30MHz	30	-	•	30)
	30MHz-88MHz	100	40.0	Quasi-pe	ak	3
	88MHz-216MHz	150	43.5	Quasi-pe	ak	3
	216MHz-960MHz	200	46.0	Quasi-pe	eak	3
	960MHz-1GHz	500	54.0	Quasi-pe	ak	3
	Above 1GHz	500	54.0	Average	e :	3
	Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequence emissions is 20dB above the maximum permitted average emission I applicable to the equipment under test. This peak limit applies to the peak emission level radiated by the device.			mit		
Limit:	Frequency Limit (dBuV			Rer	mark	
(Field strength of the		74	` '		Average Value	
fundamental signal)	915MHz		94		Peak Value	



Report No.: SZEM160100035101

Page: 12 of 23

Test Procedure:	 a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic camber. The table was rotated 360 degrees to determine the position of the highest radiation. c. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. d. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. e. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading. f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet. h. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.
Test Setup:	



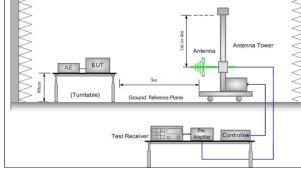


Figure 1. Below 30MHz

Figure 2. 30MHz to 1GHz



Report No.: SZEM160100035101

Page: 13 of 23

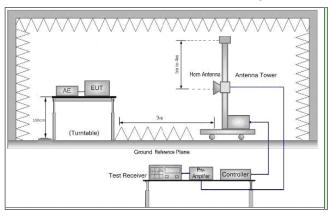


Figure 3. Above 1 GHz

Test mode:	Transmitting mode	
Instruments Used:	Refer to section 5.10 for details	
Test Results:	Pass	





Report No.: SZEM160100035101

Page: 14 of 23

Measurement Data

6.2.1.1 Field Strength Of The Fundamental Signal

QP value:								
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
915	5.32	23.23	25.40	77.93	81.08	94	-12.92	Horizontal
915	5.32	23.23	25.40	87.73	90.88	94	-3.12	Vertical



Report No.: SZEM160100035101

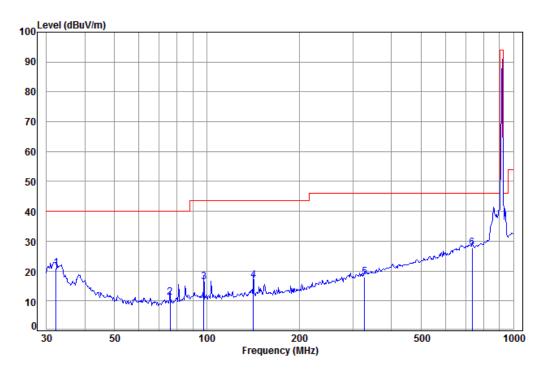
Page: 15 of 23

6.2.1.2 Spurious Emissions

Below 1GHz	
------------	--

QP value:

Test mode: Transmitting Vertical



Condition: 3m Vertical Job No: : 0351CR Mode: : TX mode

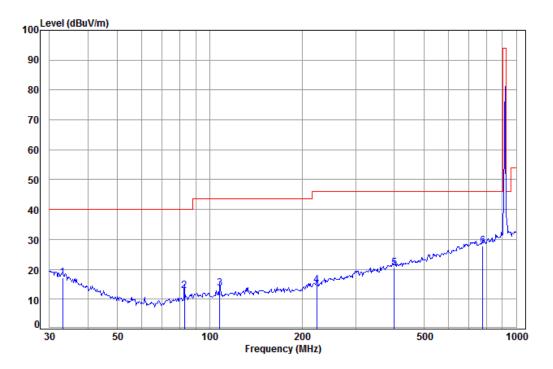
oue.	: IA	lloue							
		Cable	Ant	Preamp	Read		Limit	0ver	
	Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
	- MII-					-ID- 3//	ID-A//-		
	MHz	dB	aB/m	dB	abuv	aBuv/m	aBuv/m	dB	
1	32.18	0.68	17.33	25.69	28.64	20.96	40.00	-19.04	QP
2	75.98	1.23	7.39	25.38	27.95	11.19	40.00	-28.81	QP
3	97.80	1.42	9.02	25.47	31.49	16.46	43.50	-27.04	QP
4	141.83	1.76	9.01	25.09	31.15	16.83	43.50	-26.67	QP
5	326.74	2.92	14.73	25.13	25.41	17.93	46.00	-28.07	QP
6 pp	734.49	4.77	21.67	26.33	27.61	27.72	46.00	-18.28	QP



Report No.: SZEM160100035101

Page: 16 of 23





Condition: 3m Horizontal

Job No: : 0351CR Mode: : TX mode

. 17	illoue							
	Cable	Ant	Preamp	Read		Limit	0ver	
Freq	Loss	Factor	Factor	Level	Level	Line	Limit	Remark
MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB	
33.09	0.69	16.79	25.71	25.27	17.04	40.00	-22.96	QP
82.65	1.30	7.98	25.14	28.76	12.90	40.00	-27.10	QP
107.89	1.51	9.08	25.50	28.63	13.72	43.50	-29.78	QP
223.73	2.33	11.16	24.88	26.22	14.83	46.00	-31.17	QP
400.43	3.29	16.31	25.60	26.51	20.51	46.00	-25.49	QP
776.88	4.84	21.92	26.30	27.35	27.81	46.00	-18.19	QP
	MHz 33.09 82.65 107.89 223.73 400.43	Freq Loss MHz dB 33.09 0.69 82.65 1.30 107.89 1.51 223.73 2.33 400.43 3.29	Cable Ant Loss Factor MHz dB dB/m 33.09 0.69 16.79 82.65 1.30 7.98 107.89 1.51 9.08 223.73 2.33 11.16 400.43 3.29 16.31	Cable Ant Preamp Loss Factor Factor MHz dB dB/m dB 33.09 0.69 16.79 25.71 82.65 1.30 7.98 25.14 107.89 1.51 9.08 25.50 223.73 2.33 11.16 24.88 400.43 3.29 16.31 25.60	Cable Ant Preamp Read Level MHz dB dB/m dB dBuV 33.09 0.69 16.79 25.71 25.27 82.65 1.30 7.98 25.14 28.76 107.89 1.51 9.08 25.50 28.63 223.73 2.33 11.16 24.88 26.22 400.43 3.29 16.31 25.60 26.51	Cable Ant Preamp Read Level Level	Cable Ant Preamp Read Limit	Cable Ant Preamp Read Limit Over Freq Loss Factor Factor Level Level Line Limit MHz dB dB/m dB dBuV dBuV/m dBuV/m dB



Report No.: SZEM160100035101

Page: 17 of 23

Above 1GHz

Peak value:

I can value.								
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1253.141	4.16	24.37	37.98	46.27	36.82	74	-37.18	Vertical
1830.000	4.84	26.95	38.07	47.34	41.06	74	-32.94	Vertical
2745.000	5.68	29.57	38.13	53.56	50.68	74	-23.32	Vertical
3660.000	6.43	32.34	38.43	46.66	47.00	74	-27.00	Vertical
4575.000	7.39	33.54	38.70	45.82	48.05	74	-25.95	Vertical
1406.047	4.36	24.85	38.01	45.44	36.64	74	-37.36	Horizontal
1830.000	4.84	26.95	38.07	44.46	38.18	74	-35.82	Horizontal
2745.000	5.68	29.57	38.13	45.06	42.18	74	-31.82	Horizontal
3660.000	6.43	32.34	38.43	45.80	46.14	74	-27.86	Horizontal
5490.000	8.25	34.35	38.88	46.21	49.93	74	-24.07	Horizontal

Remark:

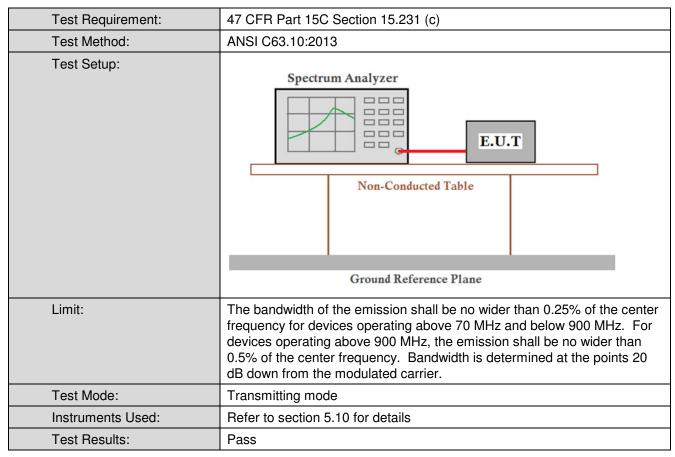
- 1) The field strength is calculated by adding the Antenna Factor, Cable Factor & Preamplifier. The basic equation with a sample calculation is as follows:
 - Final Test Level = Receiver Reading + Antenna Factor + Cable Factor Preamplifier Factor
- 2) The disturbance above 6GHz and below 30MHz was at least 25dB margin, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.



Report No.: SZEM160100035101

Page: 18 of 23

6.3 20dB Bandwidth



Measurement Data

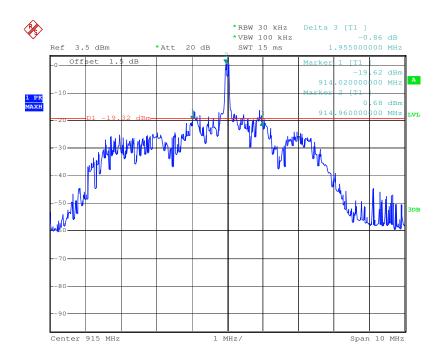
20dB bandwidth (MHz)	Limit (MHz)	Results
1.955	4.575	PASS



Report No.: SZEM160100035101

Page: 19 of 23

Test plot as follows:

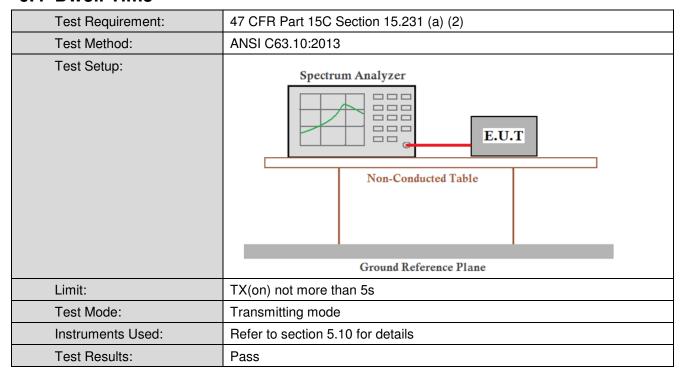




Report No.: SZEM160100035101

Page: 20 of 23

6.4 Dwell Time



Measurement Data

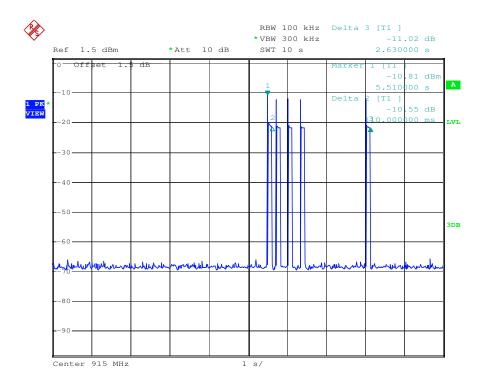
Test item	Limit	Results
TX(on)	<5s	PASS



Report No.: SZEM160100035101

Page: 21 of 23

Test plot as follows:





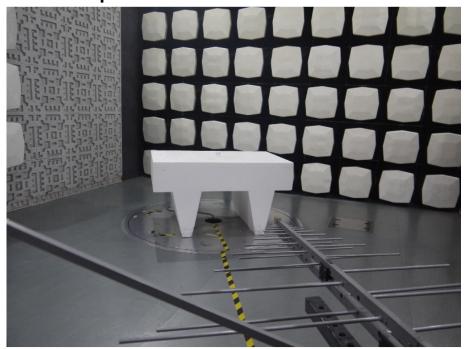
Report No.: SZEM160100035101

Page: 22 of 23

7 Photographs - EUT Test Setup

Test Model No.: ZH-CJCFT

7.1 Radiated Spurious Emission

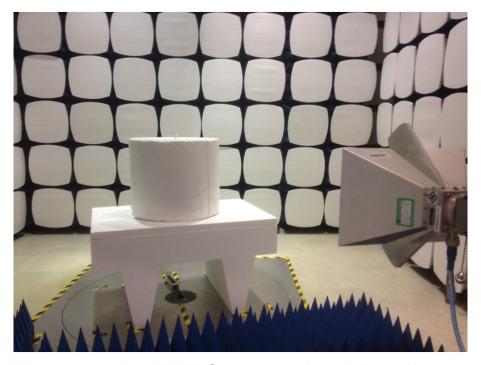






Report No.: SZEM160100035101

Page: 23 of 23



8 Photographs- EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for SZEM1601000351CR.

