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

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FCC REPORT

Application No.:	SZEM1701000622CR
Applicant:	Alpheus Digital Co., Limited
Manufacturer:	Alpheus Digital Co., Limited
Factory:	Alpheus Digital Co., Limited
Product Name:	Door Windows Sensor
Model No.(EUT):	DW3-101
Trade Mark:	BDS
FCC ID:	OC7DW3-101
Standards:	47 CFR Part 15, Subpart C (2016)
Date of Receipt:	2017-02-22
Date of Test:	2017-02-23 to 2017-03-08
Date of Issue:	2017-03-14
Test Result:	**PASS ***

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Jack Zhang
EMC Laboratory Manager

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2017-03-14		Original

Authorized for issue by:				
Tested By		Bill Chen **Bill Chen /Project Engineer**		2017-03-14 **Date**
Checked By		Eric Fu **Eric Fu /Reviewer**		2017-03-14 **Date**

3 Test Summary

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

4 Contents

5 General Information

5.1 Client Information

Applicant:	Alpheus Digital Co., Limited
Address of Applicant:	Unit B, 23/F., Phase I, Kingsford Industrial Bldg., 26-32 Kwai Hei Street, Kwai Chung, Hong Kong.
Manufacturer:	Alpheus Digital Co., Limited
Address of Manufacturer:	Unit B, 23/F., Phase I, Kingsford Industrial Bldg., 26-32 Kwai Hei Street, Kwai Chung, Hong Kong.
Factory:	Alpheus Digital Co., Limited
Address of Factory:	Unit B, 23/F., Phase I, Kingsford Industrial Bldg., 26-32 Kwai Hei Street, Kwai Chung, Hong Kong.

5.2 General Description of EUT

Name:	Door Windows Sensor
Mode No.:	DW3-101
Trade Mark:	BDS
Sample Type:	Portable production
Operation Frequency:	345MHz
Channel Numbers:	1
Modulation Type:	FSK
Antenna Type:	Integral
Antenna Gain:	-2dBi
Power Supply:	6.0V DC(3.0V x 2 "CR2025" Size Batteries)

5.3 Test Environment and Mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	52 % RH
Atmospheric Pressure:	1008 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

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.

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)

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.

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

5.9 Other Information Requested by the Customer

None.

5.10 Equipment List

Field Strength of the Fundamental Signal					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
3m Semi-Anechoic Chamber	ETS-LINDGREN	N/A	SEM001-01	2016-05-13	2017-05-13
EMI Test Receiver	Agilent Technologies	N9038A	SEM004-05	2016-10-09	2017-10-09
BiConiLog Antenna (26-3000MHz)	ETS-LINDGREN	3142C	SEM003-01	2014-11-01	2017-11-01
Double-ridged horn (1-18GHz)	ETS-LINDGREN	3117	SEM003-11	2015-10-17	2018-10-17
Horn Antenna (18-26GHz)	ETS-LINDGREN	3160	SEM003-12	2014-11-24	2017-11-24

Dwell Time					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2016-10-09	2017-10-09
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2016-10-09	2017-10-09
Signal Generator	Rohde & Schwarz	SML03	SEM006-02	2016-04-25	2017-04-25
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2016-10-09	2017-10-09

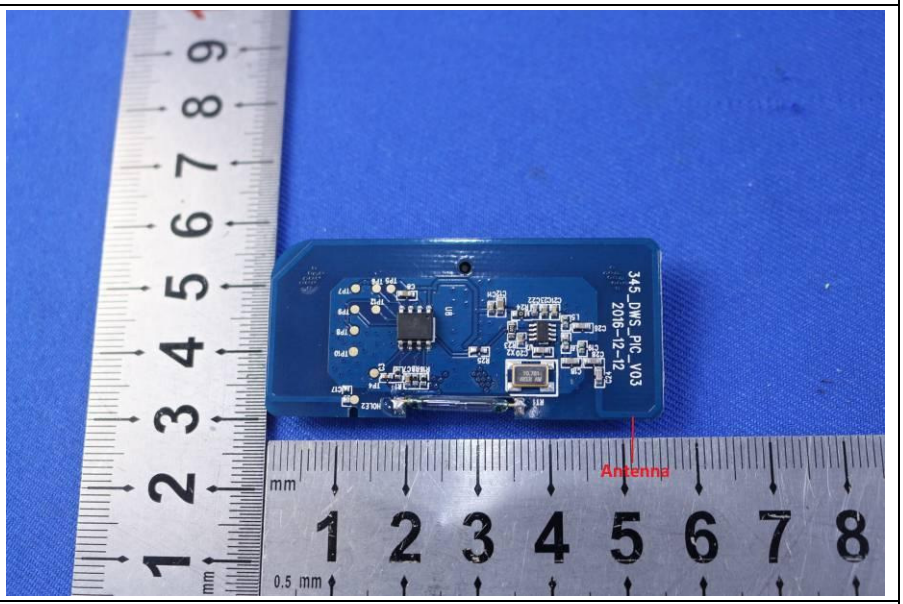
20dB Bandwidth					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
DC Power Supply	ZhaoXin	RXN-305D	SEM011-02	2016-10-09	2017-10-09
Spectrum Analyzer	Rohde & Schwarz	FSP	SEM004-06	2016-10-09	2017-10-09
Signal Generator	Rohde & Schwarz	SML03	SEM006-02	2016-04-25	2017-04-25
Power Meter	Rohde & Schwarz	NRVS	SEM014-02	2016-10-09	2017-10-09

RE in Chamber						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal. Date (yyyy-mm-dd)**	**Cal. Due date (yyyy-mm-dd)**
1	3m Semi-Anechoic Chamber	AUDIX	N/A	SEM001-02	2016-05-13	2017-05-13
2	EXA Spectrum Analyzer	Agilent Technologies Inc	N9010A	SEM004-09	2016-07-19	2017-07-19
3	BiConiLog Antenna (26-3000MHz)	ETS-Lindgren	3142C	SEM003-02	2014-11-15	2017-11-15
4	Amplifier (0.1-1300MHz)	HP	8447D	SEM005-02	2016-10-09	2017-10-09
5	Horn Antenna (1-18GHz)	Rohde & Schwarz	HF907	SEM003-07	2015-06-14	2018-06-14
6	Horn Antenna (18-26GHz)	ETS-Lindgren	3160	SEM003-12	2014-11-24	2017-11-24
7	Horn Antenna(26GHz-40GHz)	A.H.Systems, inc.	SAS-573	SEM003-13	2015-02-12	2018-02-12
8	Low Noise Amplifier	Black Diamond Series	BDLNA-0118-352810	SEM005-05	2016-10-09	2017-10-09
9	Band filter	Amindeon	Asi 3314	SEM023-01	N/A	N/A

General used equipment					
Equipment	**Manufacturer**	**Model No**	**Inventory No**	**Cal Date**	**Cal Due Date**
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2016-10-12	2017-10-12
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-04	2016-10-12	2017-10-12
Humidity/ Temperature Indicator	Mingle	N/A	SEM002-08	2016-10-12	2017-10-12
Barometer	Changchun Meteorological Industry Factory	DYM3	SEM002-01	2016-05-18	2017-05-18

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 -2dBi.	

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-peak
0.110MHz-0.490MHz	Peak	10kHz	30kHz	Peak
0.110MHz-0.490MHz	Average	10kHz	30kHz	Average
0.490MHz -30MHz	Quasi-peak	10kHz	30kHz	Quasi-peak
30MHz-1GHz	Quasi-peak	100 kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:
(Spurious Emissions)

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
0.009MHz-0.490MHz	2400/F(kHz)	-	-	300
0.490MHz-1.705MHz	24000/F(kHz)	-	-	30
1.705MHz-30MHz	30	-	-	30
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3
Above 1GHz	500	54.0	Average	3

Note: 15.35(b), Unless otherwise specified, the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test. This peak limit applies to the total peak emission level radiated by the device.

Limit:
(Field strength of the fundamental signal)

Frequency	Limit (dBuV/m @3m)	Remark
345MHz	77.25	Average Value
	97.25	Peak Value

Limit:
(Harmonic)

Frequency	Limit (dBuV/m @3m)	Remark
Harmonics which not fall into the restriction band	57.25	Average Value
	77.25	Peak Value

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 fully-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:	

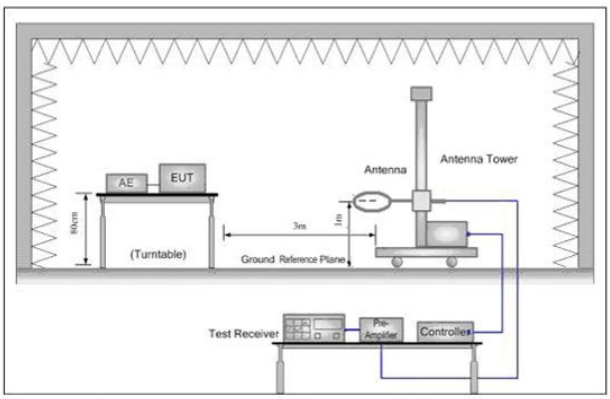


Figure 1. Below 30MHz

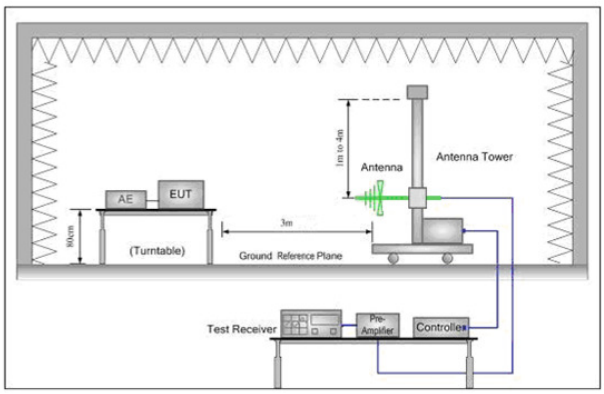


Figure 2. 30MHz to 1GHz

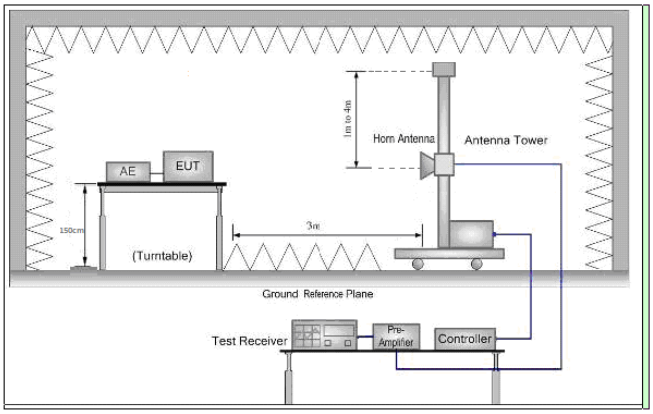


Figure 3. Above 1 GHz

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

Measurement Data

6.2.1.1 Field Strength Of The Fundamental Signal

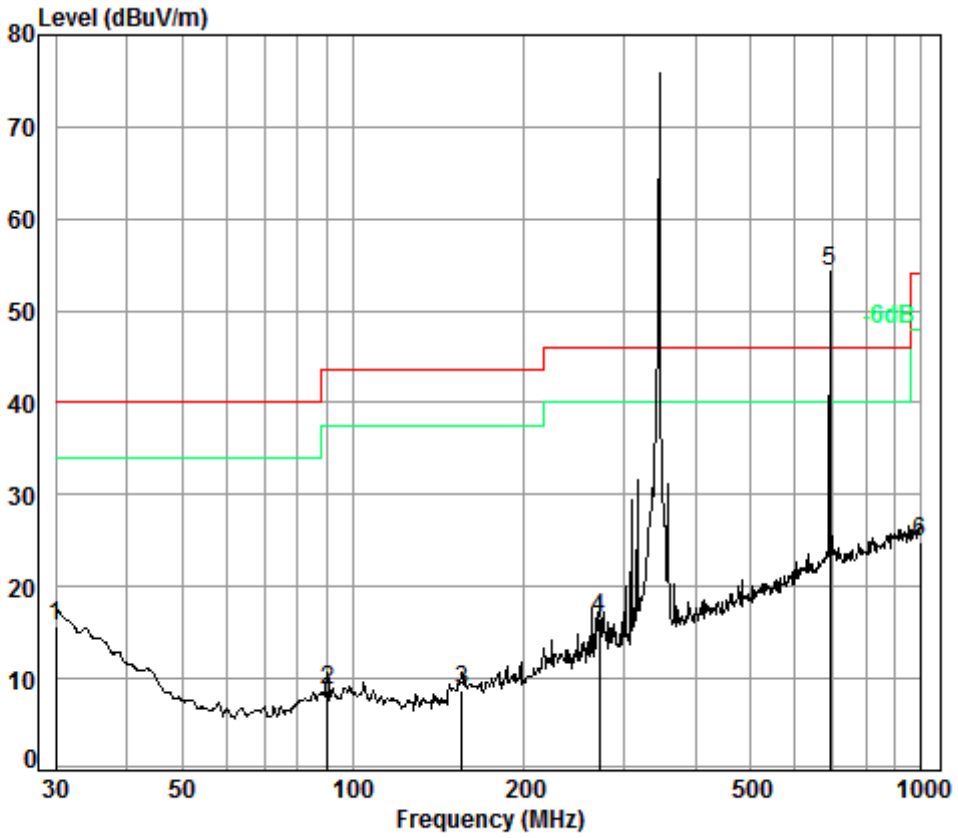
Peak value:								
Frequency (MHz)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
345	2.05	14.08	26.75	86.52	75.90	97.25	-21.35	Horizontal
345	2.05	14.08	26.75	82.21	71.59	97.25	-25.66	Vertical

6.2.1.2Spurious Emissions

Below 1GHz

QP value:

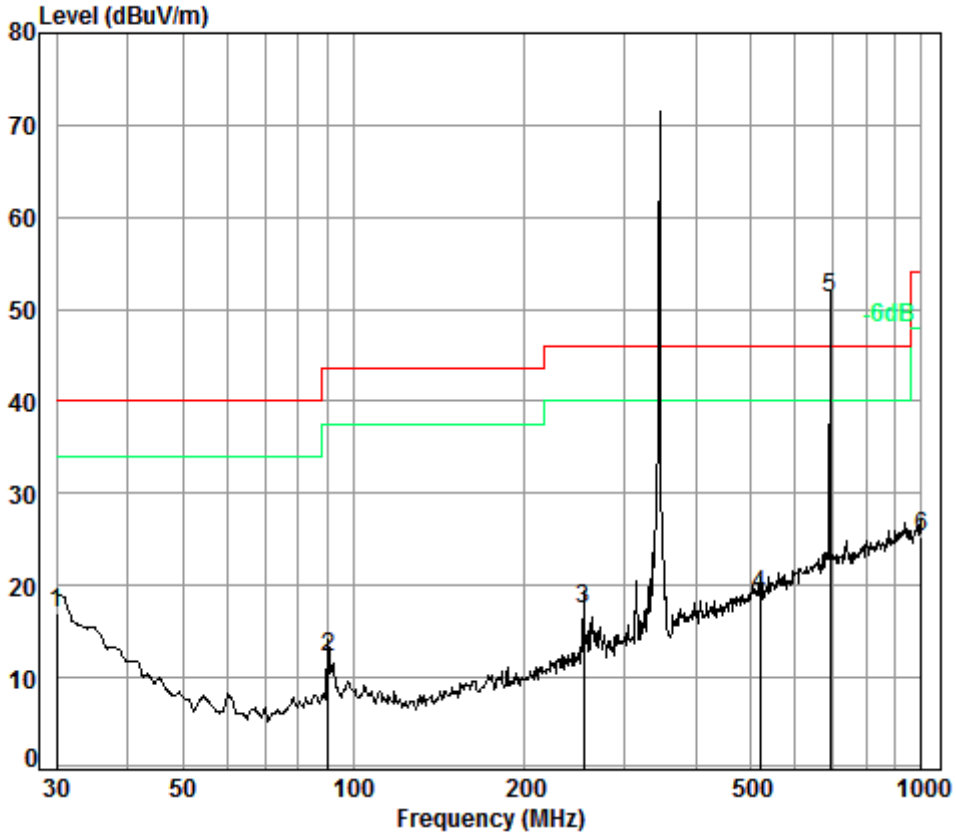
Horizontal



Condition: 3m Horizontal
Job No. : 00622CR
Test mode: TX

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1	30.00	0.60	18.70	27.36	23.85	15.79	40.00	-24.21
2	90.22	1.10	8.71	27.21	26.02	8.62	43.50	-34.88
3	155.36	1.33	9.32	26.88	24.99	8.76	43.50	-34.74
4	271.32	1.77	12.73	26.47	28.61	16.64	46.00	-29.36
5 pp	690.00	2.88	21.52	27.43	57.42	54.39	77.25	-22.86
6	996.50	3.70	24.16	26.33	23.34	24.87	54.00	-29.13

Vertical



Condition: 3m VERTICAL
Job No. : 00622CR
Test mode: TX

	Freq	Cable Loss	Ant Factor	Preamp Factor	Read Level	Level	Limit Line	Over Limit
	MHz	dB	dB/m	dB	dBuV	dBuV/m	dBuV/m	dB
1 pp	30.00	0.60	18.70	27.36	25.14	17.08	40.00	-22.92
2	90.22	1.10	8.71	27.21	29.59	12.19	43.50	-31.31
3	253.84	1.69	12.38	26.53	29.95	17.49	46.00	-28.51
4	519.06	2.62	18.33	27.67	25.62	18.90	46.00	-27.10
5	690.00	2.88	21.52	27.43	54.17	51.14	77.25	-26.11
6	1000.00	3.70	24.30	26.30	23.53	25.23	54.00	-28.77

Above 1GHz

Peak value:

Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1724.082	26.77	4.73	38.08	66.29	59.71	74	-14.29	Vertical
2069.805	28.05	5.07	38.11	64.03	59.04	74	-14.96	Vertical
2414.629	29.15	5.36	38.15	67.05	63.41	74	-10.59	Vertical
2761.924	30.44	5.70	38.18	65.57	63.53	74	-10.47	Vertical
3103.070	31.50	6.01	38.26	56.41	55.66	74	-18.34	Vertical
3449.074	32.11	6.26	38.44	55.04	54.97	74	-19.03	Vertical
2069.805	28.05	5.07	38.11	74.73	69.74	74	-4.26	Horizontal
2414.629	29.15	5.36	38.15	70.44	66.80	74	-7.20	Horizontal
2761.924	30.44	5.70	38.18	69.88	67.84	74	-6.16	Horizontal
3103.070	31.50	6.01	38.26	67.17	66.42	74	-7.58	Horizontal
3449.074	32.11	6.26	38.44	61.93	61.86	74	-12.14	Horizontal
3792.666	33.04	6.54	38.61	56.37	57.34	74	-16.66	Horizontal

Average value:

Frequency (MHz)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Read Level (dBuV)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
1724.082	26.77	4.73	38.08	48.91	42.33	54	-11.67	Vertical
2069.805	28.05	5.07	38.11	46.64	41.65	54	-12.35	Vertical
2414.629	29.15	5.36	38.15	49.69	46.05	54	-7.95	Vertical
2761.924	30.44	5.70	38.18	47.75	45.71	54	-8.29	Vertical
3103.070	31.50	6.01	38.26	38.83	38.08	54	-15.92	Vertical
3449.074	32.11	6.26	38.44	38.78	38.71	54	-15.29	Vertical
2069.805	28.05	5.07	38.11	55.51	50.52	54	-3.48	Horizontal
2414.629	29.15	5.36	38.15	50.69	47.05	54	-6.95	Horizontal
2761.924	30.44	5.70	38.18	50.52	48.48	54	-5.52	Horizontal
3103.070	31.50	6.01	38.26	47.97	47.22	54	-6.78	Horizontal
3449.074	32.11	6.26	38.44	44.62	44.55	54	-9.45	Horizontal
3792.666	33.04	6.54	38.61	40.76	41.73	54	-12.27	Horizontal

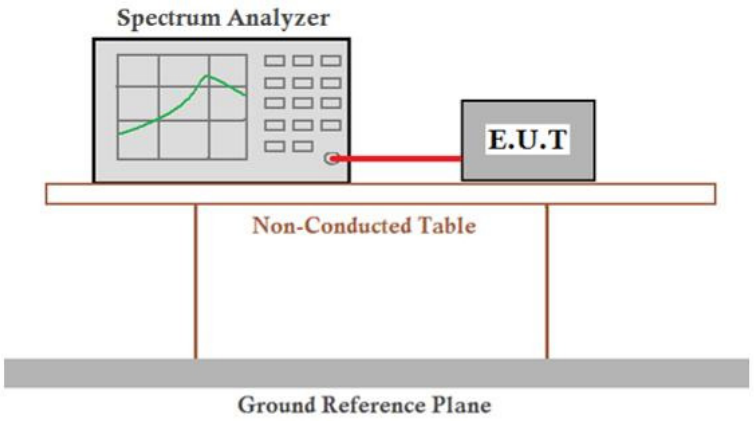
Remark:

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 13GHz and below 30MHz was very low, and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

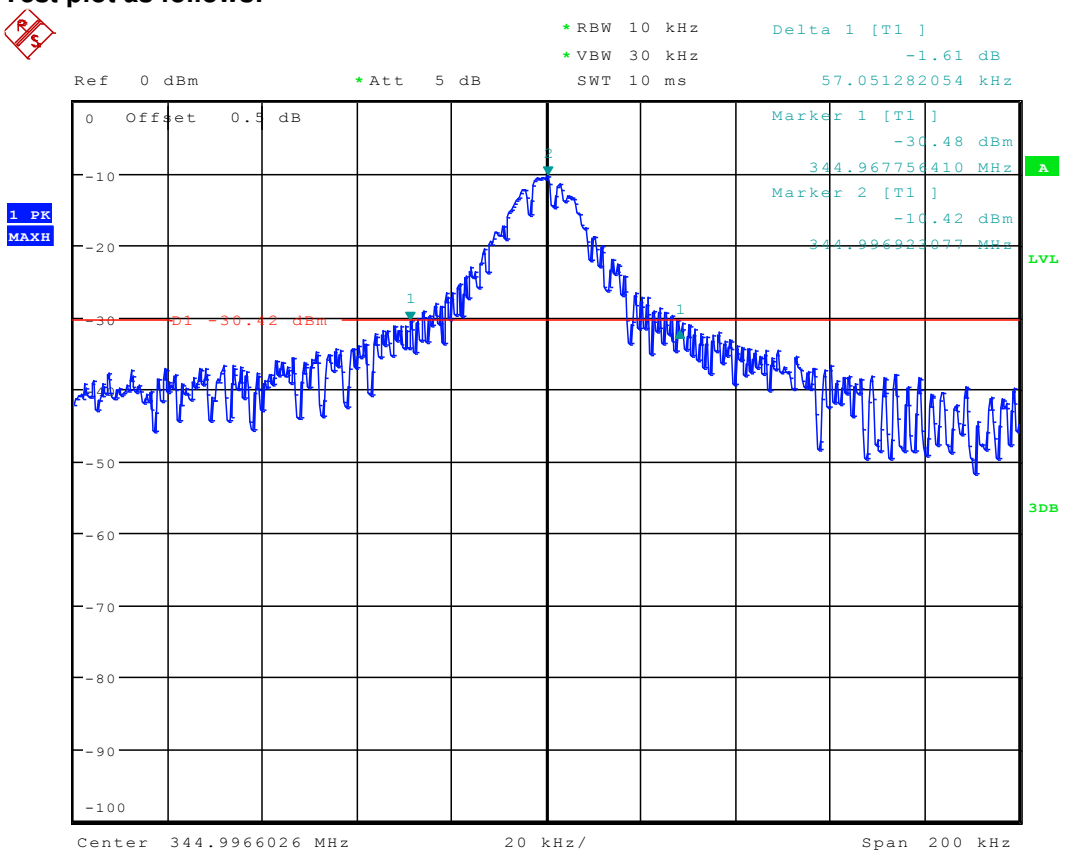
6.3 20dB Bandwidth

Test Requirement:	47 CFR Part 15C Section 15.231 (c)
Test Method:	ANSI C63.10:2013
Test Setup:	
Limit:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.
Test Mode:	Transmitting mode
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

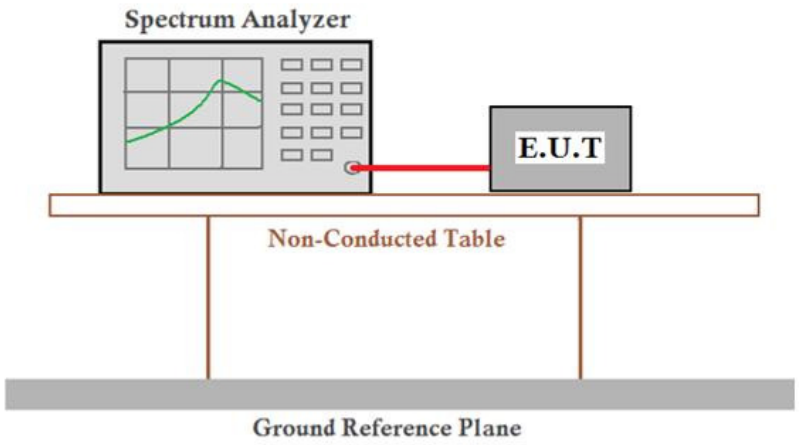
Measurement Data

20dB bandwidth (MHz)	Limit (MHz)	Results
0.057	0.10875	Pass

Test plot as follows:



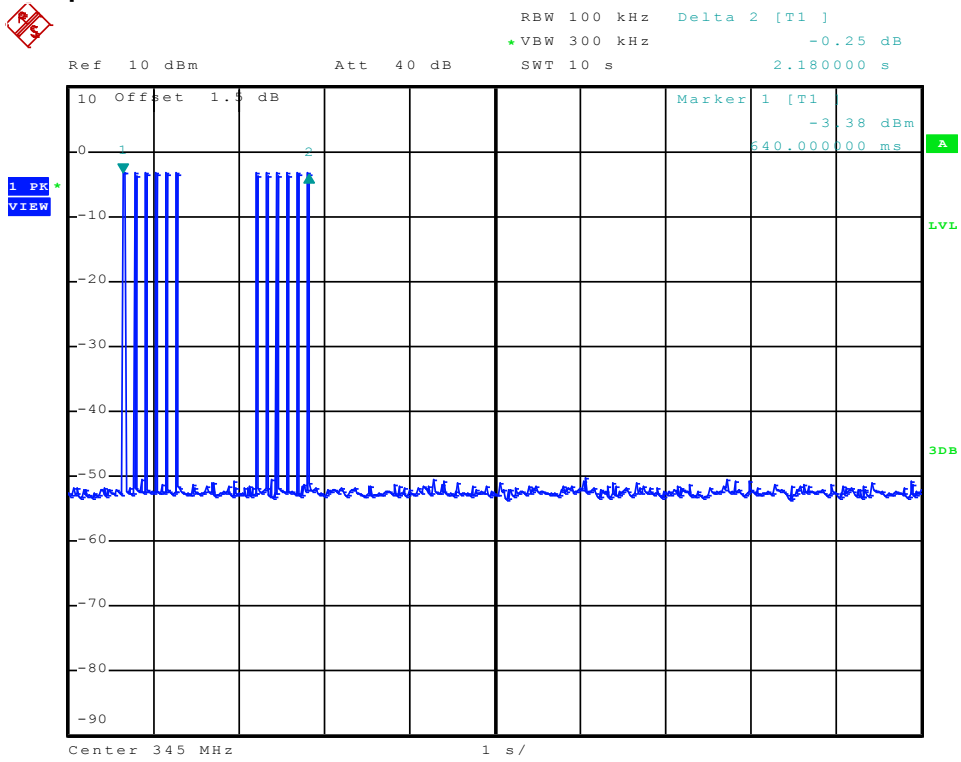
6.4 Dwell Time

Test Requirement:	47 CFR Part 15C Section 15.231 (a) (1)
Test Method:	ANSI C63.10:2013
Test Setup:	
Limit:	Not more than 5 seconds
Test Mode:	Transmitting mode
Instruments Used:	Refer to section 5.10 for details
Test Results:	Pass

Measurement Data

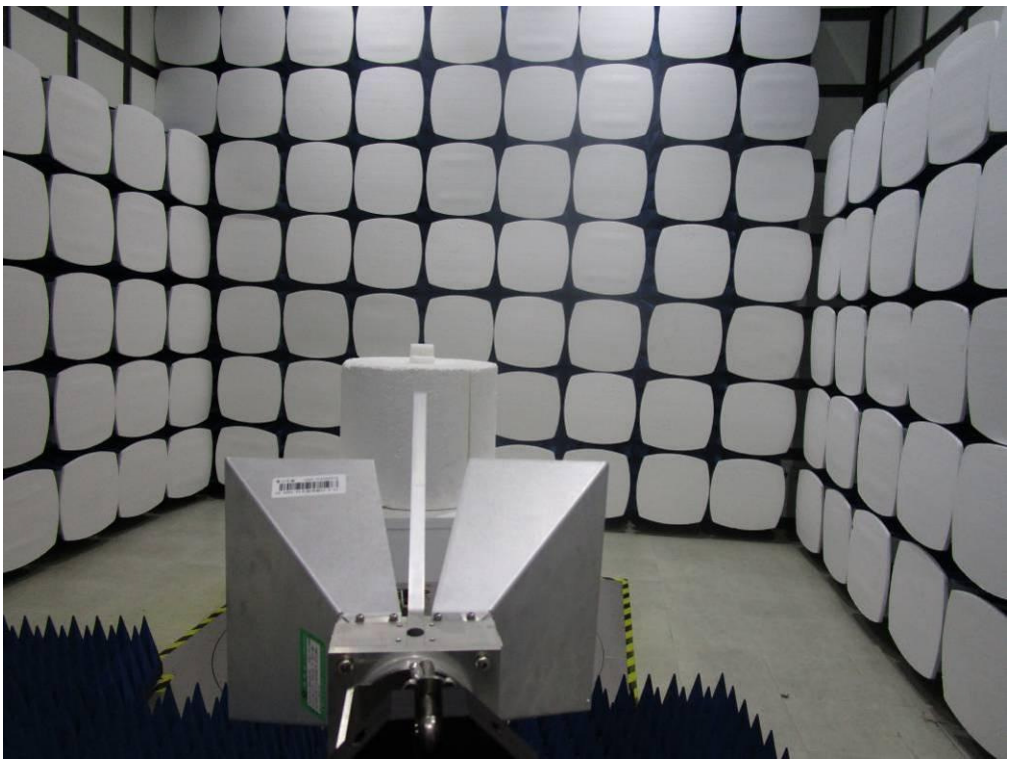
Test item	Limit	Results
Transmitting time	≤5S	Pass

Test plot as follows:



7 Photographs - Test setup

7.1 Radiated Emission



8 Photographs - EUT Constructional Details

Refer to Appendix A - Photographs of EUT Constructional Details for SZEM1701000622CR.