Test Report

Applicant:	TEST RITE INT'L CO.,LTD
Address of Applicant:	3F, No.1-2 HuangDu Square, No.3008, Yitian Road, Futian District, Shenzhen, China
Manufacturer/Factory:	Ningbo Fiercer Leopard Electrical Appliance Co.,Ltd
Address of Manufacturer/Factory:	No.1&2 Wanghai Road(Wanghai Industrial Area) Xidian town 315611 Ninghai,Ningbo, China

Equipment Under Test (EUT)

Product Name:	Intelligent 3-Pk Solar Wall Lights
Model No.:	ELI0980G-Security light
FCC ID:	2AVF3-ELI0980G-2
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.231
Date of sample receipt:	December 19, 2019
Date of Test:	December 20-30, 2019
Date of report issued:	December 30, 2019
Test Result :	PASS *

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

Authorized Signature:

Robinson Lo
Laboratory Manager

This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

2 Version

Version No.	Date	Description
00	*December 30, 2019*	*Original*

Prepared By:	Tiger. Chen	***Date:***	*December 30, 2019*
	Project Engineer		
Check By:	Robinson Lo	***Date:***	*December 30, 2019*
	Reviewer		

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
Conduction Emission	15.207	N/A
Field strength of the fundamental signal	15.231(e)	Pass
Spurious emissions	15.231(e) &15.209	Pass
20dB Bandwidth	15.231(c)	Pass
Dwell time	15.231(e)	Pass

Pass: The EUT complies with the essential requirements in the standard.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
Radiated Emission	18GHz-40GHz	3.30dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)
Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.			

5 General Information

5.1 General Description of EUT

Product Name:	Intelligent 3-Pk Solar Wall Lights
Model No.:	ELI0980G-Security light
Serial No.:	5DB6
Hardware Version:	V03
Software Version:	V02
Test sample(s) ID:	GTS201912000191-1
Sample(s) Status:	Engineer sample
Operation Frequency:	433.86MHz
Modulation technology:	ASK
Antenna Type:	Integral Antenna
Antenna gain:	0dBi (declare by Manufacturer)
Power supply:	Li-ion Battery DC 3.7V, 1800mAh, 6.66Wh

5.2 Test mode

Transmitting mode	Keep the EUT in transmitting mode.
Remark: During the test, the full battery was used.	

Per-test mode.

We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. Only worse case is reported:

	Axis	X	Y	Z
433.86MHz	Field Strength(dBuV/m)	70.41	71.67	69.36

Final Test Mode:

According to ANSI C63.10 standards, the test results are both the “worst case” and “worst setup”:

Y axis (see the test setup photo)

5.3 Test Facility

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

● **FCC —Registration No.: 381383**

Global United Technology 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 files. Registration 381383.

● **IC —Registration No.: 9079A**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A

● **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). LAB CODE:600179-0

5.4 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone,
Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102
Tel: 0755-27798480
Fax: 0755-27798960

5.5 Other Information Requested by the Customer

None.

5.6 Description of Support Units

None.

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

6 Test Instruments list

Radiated Emission:

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	July. 03 2015	July. 02 2020
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	June. 26 2019	June. 25 2020
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 26 2019	June. 25 2020
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 26 2019	June. 25 2020
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 26 2019	June. 25 2020
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 26 2019	June. 25 2020
9	Coaxial Cable	GTS	N/A	GTS211	June. 26 2019	June. 25 2020
10	Coaxial cable	GTS	N/A	GTS210	June. 26 2019	June. 25 2020
11	Coaxial Cable	GTS	N/A	GTS212	June. 26 2019	June. 25 2020
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 26 2019	June. 25 2020
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 26 2019	June. 25 2020
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 26 2019	June. 25 2020
15	Band filter	Amindeon	82346	GTS219	June. 26 2019	June. 25 2020
16	Power Meter	Anritsu	ML2495A	GTS540	June. 26 2019	June. 25 2020
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 26 2019	June. 25 2020
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 26 2019	June. 25 2020
19	Splitter	Agilent	11636B	GTS237	June. 26 2019	June. 25 2020
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 26 2019	June. 25 2020
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 19 2019	Oct. 18 2020
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 19 2019	Oct. 18 2020
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 19 2019	Oct. 18 2020
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 26 2019	June. 25 2020

General used equipment:

Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	June. 26 2019	June. 25 2020
2	Barometer	ChangChun	DYM3	GTS255	June. 26 2019	June. 25 2020

7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement:	FCC Part15 C 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 integral antenna, the best case gain of the antenna is 0dBi, reference to the EUT construct details.	

7.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.231 (b)& Section 15.209
Test Method:	ANSI C63.10:2013
Test Frequency Range:	9kHz to 6000MHz
Test site:	Measurement Distance: 3m

Receiver setup:

Frequency	Detector	RBW	VBW	Value
9KHz-150KHz	Quasi-peak	200Hz	600Hz	Quasi-peak
150KHz-30MHz	Quasi-peak	9KHz	30KHz	Quasi-peak
30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10Hz	Average

Limit:
(Field strength of the fundamental signal)

Frequency	Limit (dBuV/m @3m)	Remark
433.86MHz	92.87	Peak Value
	72.87	Average Value

Limit:
(Spurious Emissions)

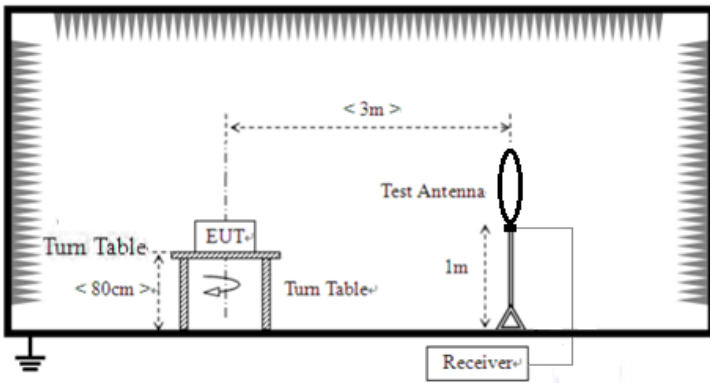
Fundamental Frequency (MHz)	Field Strength of fundamental (microvolts/meter)	Field Strength of Unwanted Emissions (microvolts/meter)
40.66-40.70	1,000	100
70-130	500	50
130-174	500 to 1,500**	50 to 1,50**
174-260	1,500	1,50
260-470	1,500 to 5,000**	1,50 to 5,00**
Above 470	5,000	5,00

Frequency (MHz)	Class B(dBuV/m @3m)	
	Peak	Average
Above 1000	74	54

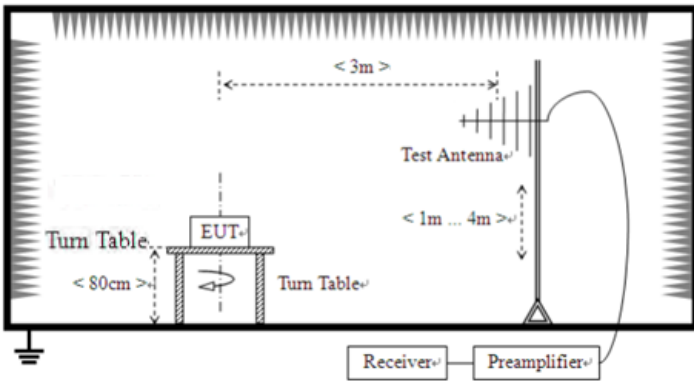
Or The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level whichever limit permits higher field strength.

Test setup:

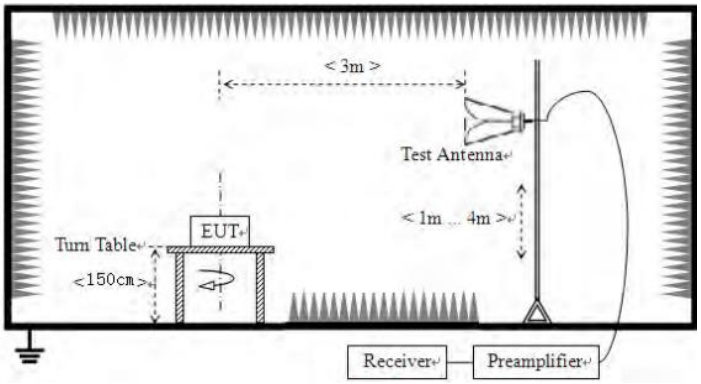
Below 30MHz



Below 1GHz



Above 1GHz



Test Procedure:	1. The EUT was placed on the top of a rotating table (0.8 meters for below 1GHz and 1.5 meters for above 1GHz) above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation. 2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 3. 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. 4. 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 and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 6. 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.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test environment:	Temp.: 25 °C Humid.: 50% Press.: 1 010mbar
Test results:	Pass

Measurement data:

7.2.1 Field Strength of The Fundamental Signal

Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
433.86	90.14	16.03	3.02	37.52	71.67	80.8	-9.13	Horizontal
433.86	87.52	16.03	3.02	37.52	69.05	80.8	-11.75	Vertical

Remarks:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *PK Value shall apply to average limit,*

7.2.2 Spurious emissions

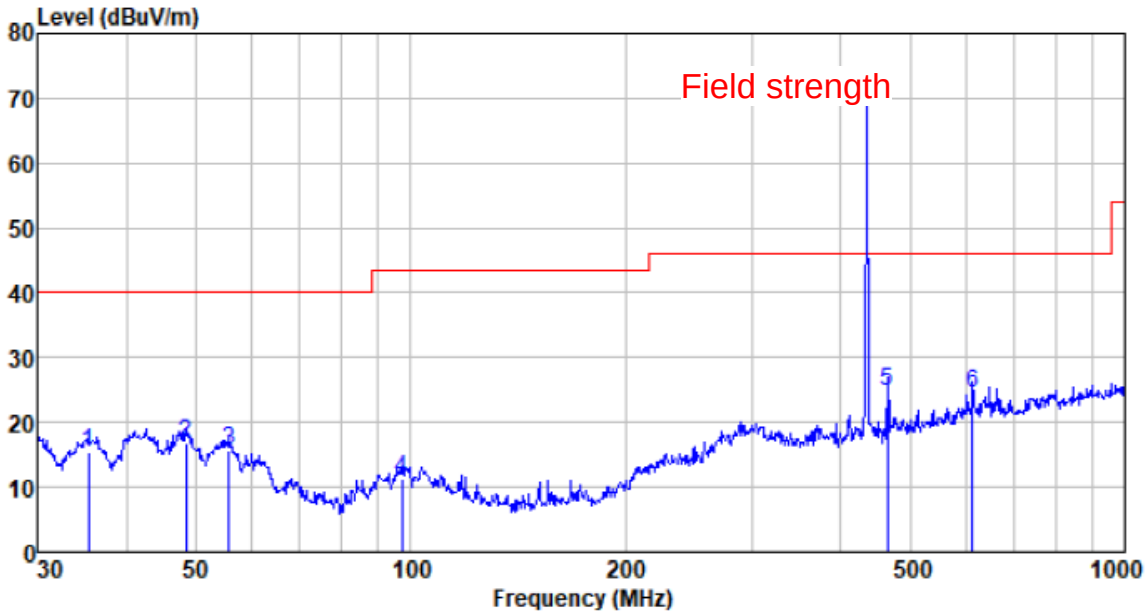
Measurement data:

9 kHz ~ 30 MHz

The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.

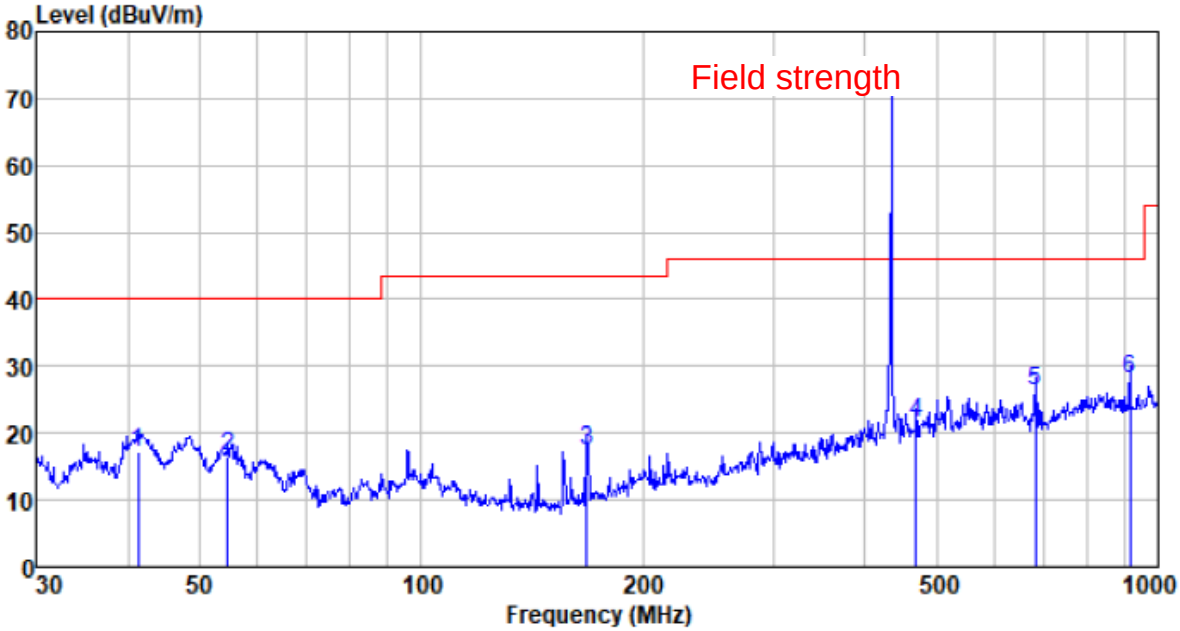
Below 1GHz:

Mode:	**Transmitting mode**	**Polarization:**	**Horizontal**



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
35.375	38.63	11.39	0.61	35.38	15.25	40.00	-24.75	QP
48.502	40.02	12.29	0.76	36.11	16.96	40.00	-23.04	QP
55.609	39.29	11.73	0.82	36.26	15.58	40.00	-24.42	QP
97.115	34.90	11.79	1.17	36.70	11.16	43.50	-32.34	QP
465.599	42.61	16.65	3.16	37.51	24.91	46.00	-21.09	QP
612.064	38.68	19.51	3.76	37.55	24.40	46.00	-21.60	QP

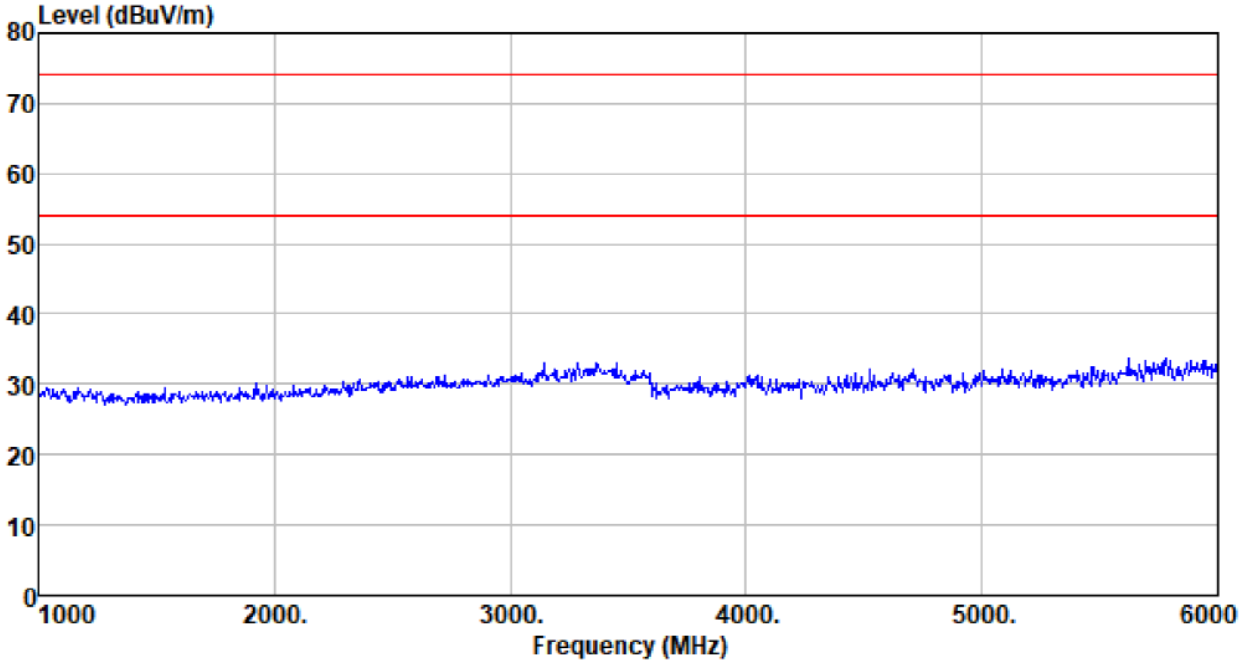
Mode:	Transmitting mode	Polarization:	Vertical



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV	Limit level dBuV/m	Over limit dB	Remark
41.277	39.95	12.21	0.68	35.74	17.10	40.00	-22.90	QP
54.643	40.29	11.82	0.81	36.25	16.67	40.00	-23.33	QP
167.824	44.56	8.46	1.67	37.18	17.51	43.50	-25.99	QP
468.876	39.26	16.73	3.18	37.51	21.66	46.00	-24.34	QP
682.348	40.34	19.58	4.02	37.62	26.32	46.00	-19.68	QP
916.069	38.29	22.35	4.91	37.58	27.97	46.00	-18.03	QP

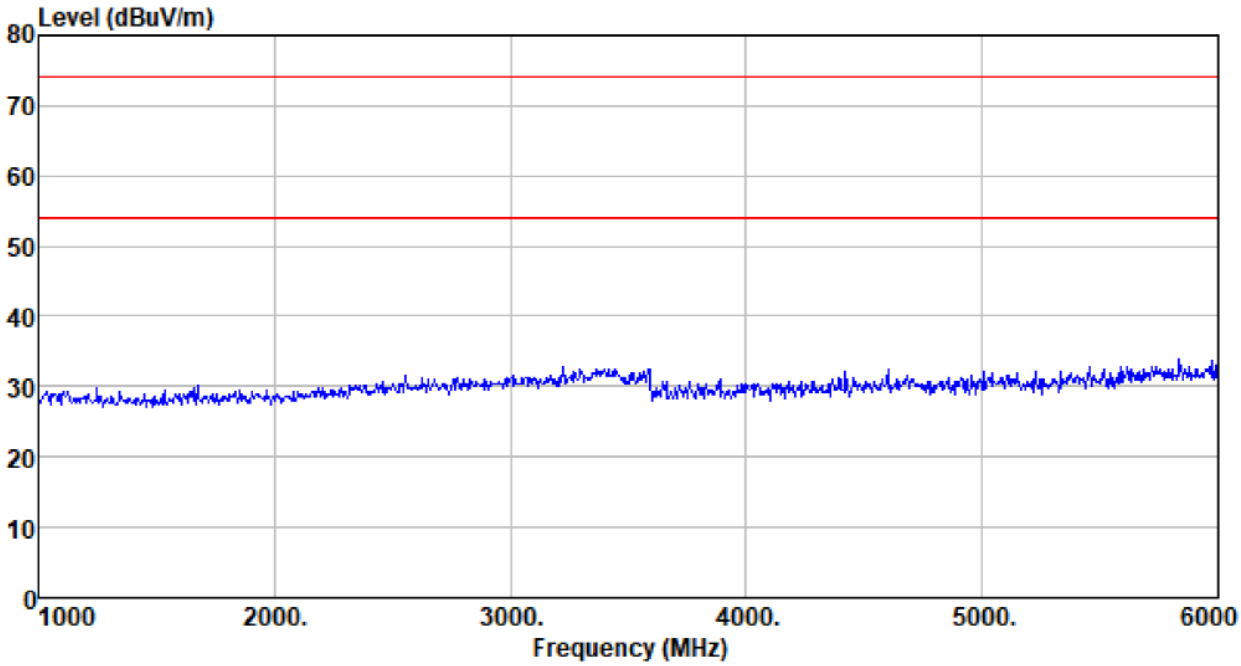
Above 1G:

Mode:	**Transmitting mode**	**Polarization:**	**Horizontal**



Note: PK curve is lower than AV limit

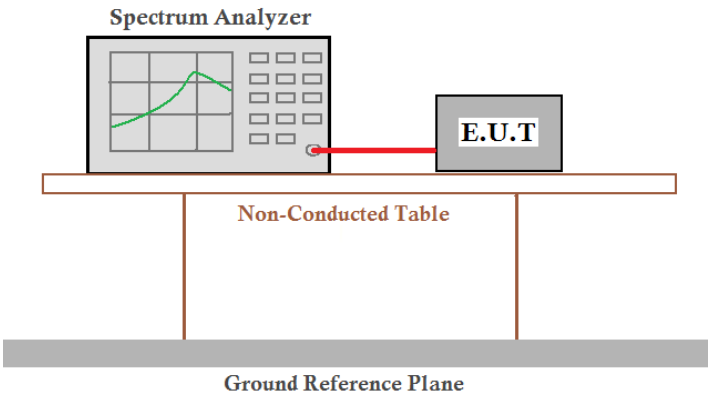
Mode:	Transmitting mode	Polarization:	Vertical



Remark:

3. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
4. *Average value=Peak value + Duty cycle factor*
5. *PK curve is lower than AV limit*

7.3 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.231 (c)
Test Method:	ANSI C63.10:2013
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 900MHz. 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 setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

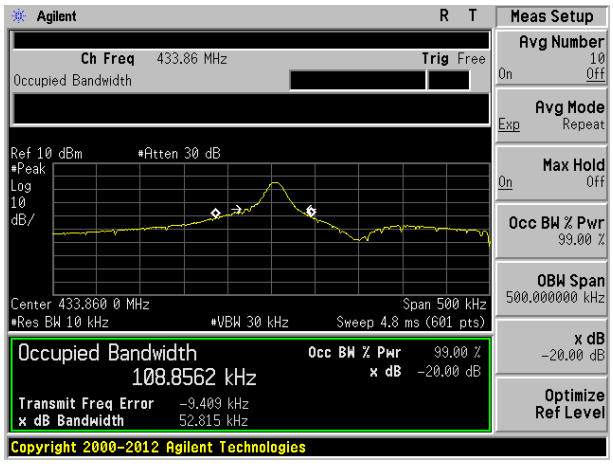
Measurement Data

Test Frequency (MHz)	20dB bandwidth (kHz)	Limit (MHz)	Result
433.86	52.815	1.085	Pass

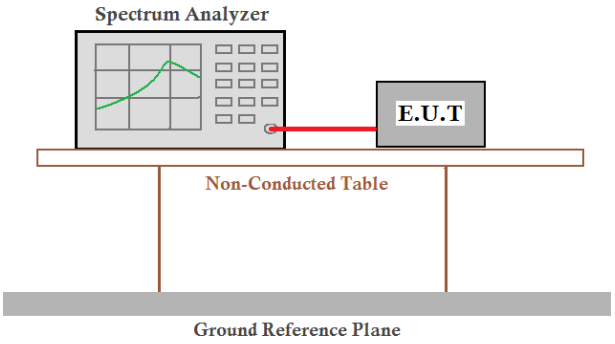
Note: Limit= Fundamental frequency×0.25%

433.86×0.25%=1.085MHz

Test plot as follows:



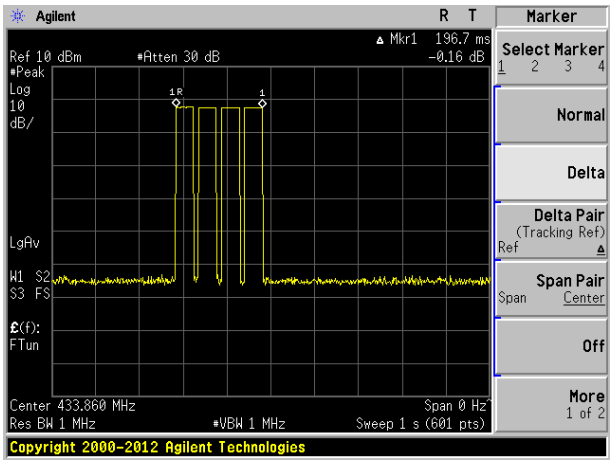
7.4 Dwell time

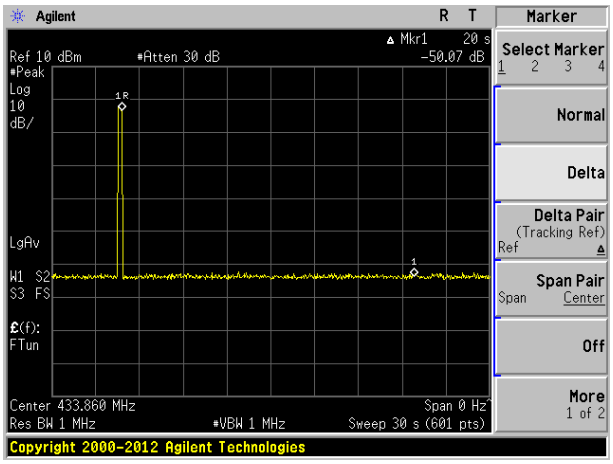
Test Requirement:	FCC Part15 C Section 15.231 (a2)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=1000KHz, VBW=1000KHz, span=0Hz, detector: Peak
Limit:	Not more than 5 seconds
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement data:

Frequency (MHz)	Duration of each TX (second)	Limit (second)	Result
433.86	0.197	<5.0	Pass

Test plot as follows:





8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

------ End ------