FCC REPORT

Applicant:	INTERNATIONAL DEVELOPMENT COMPANY
Address of Applicant:	899 Henrietta Creek Road, Roanoke, Texas 76262, United States
Manufacturer/Factory:	ZhongshanQuanxin Lighting Electrical Co., Ltd.
Address of Manufacturer/Factory:	Hong Ji Street, Shalang, Long Ping Cun, West District, ZHONGSHAN Guangdong 528411 China

Equipment Under Test (EUT)

Product Name:	Dimming switch
Model No.:	ST-ILDIM-1
FCC ID:	2AP35ST-ILDIM
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.231
Date of sample receipt:	December 21, 2018
Date of Test:	December 24, 2018-March 06, 2019
Date of report issued:	March 07, 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	*March 07, 2019*	*Original*

Prepared By: ***Date:*** *March 07, 2019*

Project Engineer

Check By: ***Date:*** *March 07, 2019*

Reviewer

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
Restricted bands of operation.	15.205	Pass
Conduction Emission	15.207	Not applicable
Spurious Emissions	15.231(b) &15.209	Pass
20dB Bandwidth	15.231(c)	Pass
Deactivation Testing	15.231(a)(1)	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	9kHz ~ 30MHz	± 4.34dB	(1)
Radiated Emission	30MHz ~ 1000MHz	± 4.24dB	(1)
Radiated Emission	1GHz ~ 26.5GHz	± 4.68dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	± 3.45dB	(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:	Dimming switch
Model No.:	ST-ILDIM-1
Serial No.:	QXST-ILDIM
Hardware version:	V1.4
Software version:	V1.0
Test sample(s) ID:	GTS201812000177-1
Sample(s) Status:	Engineer sample
Operation Frequency:	433.92MHz
Channel numbers:	1
Modulation technology:	ASK
Antenna Type:	PCB Antenna
Antenna gain:	0.5 dBi (declare by Manufacturer)
Power supply:	DC 12.0V (1 x 12V“A23” Size battery)

5.2 Test mode

Transmitting mode	Keep the EUT in transmitting mode. （new battery is used during all test）

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. which was shown in this test report and defined as follows:

Axis	X	Y	Z
Field Strength(dBuV/m)	58.50	62.22	56.23

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.

● **Industry Canada (IC) —Registration No.: 9079A-2**

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-2.

● **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

● **CNAS (No. CNAS L5775)**

CNAS has accredited Global United Technology Services Co., Ltd., to ISO/IEC 17025:2017 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.

5.4 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.
No. 301-309, 3/F., Jinyuan Business Building, No.2, Laodong Industrial Zone,
Xixiang Road, Baoan District, Shenzhen, Guangdong, China
Tel: 0755-27798480
Fax: 0755-27798960

5.5 Other Information Requested by the Customer

None.

5.6 Additional instructions

Software (Used for test) from client

The test software was built-in by manufacturer, it can be continuously transmitting once power on, and the transmitting power setting as default.

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. 27 2018	June. 26 2019
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 27 2018	June. 26 2019
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 27 2018	June. 26 2019
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 27 2018	June. 26 2019
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 27 2018	June. 26 2019
9	Coaxial Cable	GTS	N/A	GTS211	June. 27 2018	June. 26 2019
10	Coaxial cable	GTS	N/A	GTS210	June. 27 2018	June. 26 2019
11	Coaxial Cable	GTS	N/A	GTS212	June. 27 2018	June. 26 2019
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 27 2018	June. 26 2019
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 27 2018	June. 26 2019
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 27 2018	June. 26 2019
15	Band filter	Amindeon	82346	GTS219	June. 27 2018	June. 26 2019
16	Power Meter	Anritsu	ML2495A	GTS540	June. 27 2018	June. 26 2019
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 27 2018	June. 26 2019
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 27 2018	June. 26 2019
19	Splitter	Agilent	11636B	GTS237	June. 27 2018	June. 26 2019
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 27 2018	June. 26 2019
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	GTS579	Oct. 20 2018	Oct. 19 2019
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 20 2018	Oct. 19 2019
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 20 2018	Oct. 19 2019
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June. 27 2018	June. 26 2019

General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Barometer	ChangChun	DYM3	GTS257	June 28 2017	June 27 2018

7 Test results and Measurement Data

7.1 Antenna requirement

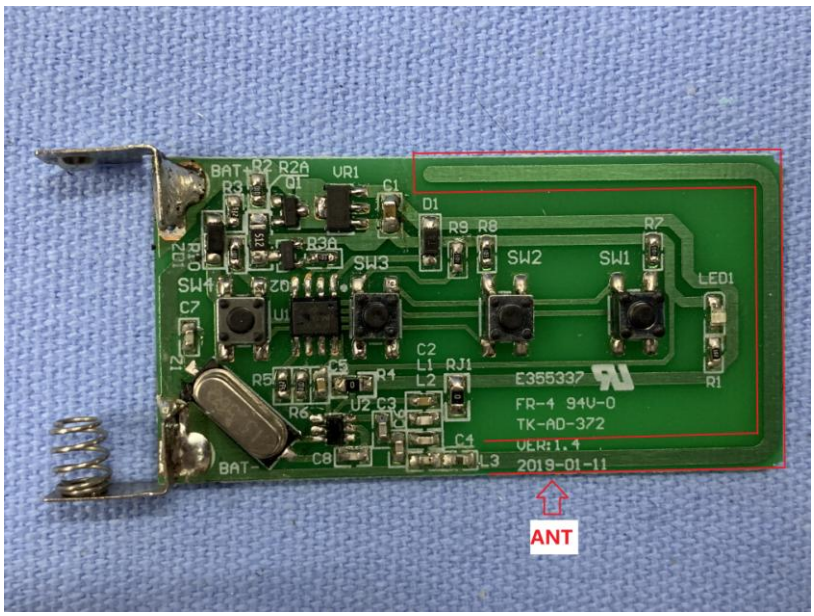
Standard requirement:	FCC Part15 C Section 15.203

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 PCB antenna, the best case gain of the antenna is 0.5 dBi



7.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.205, 15.209 & 15.231(b)
Test Method:	ANSI C63.10:2013
Test Frequency Range:	9kHz to 5000MHz
Test site:	Measur ement Distance: 3m

Receiver setup:

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

Limit:
(Transmitter Field Strength of Emissions)

Frequency	Limit (dBuV/m @3m)	Remark
433.92MHz	80.83	Average Value
	100.83	Peak Value

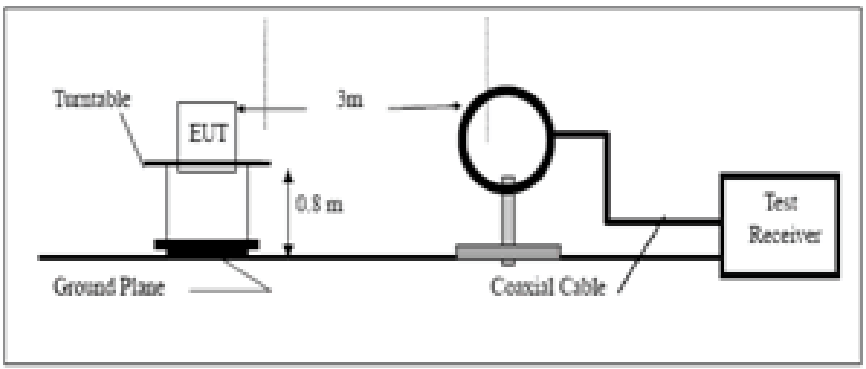
Limit:
(Spurious Emissions)

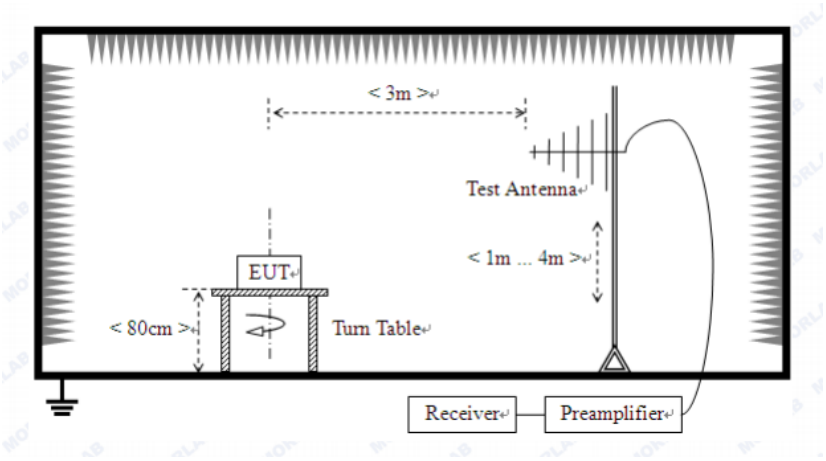
Frequency	Limit (uV/m)	Remark
0.009MHz-0.490MHz	2400/F(kHz) @300m	PK AV QP
0.490MHz-1.705MHz	24000/F(kHz) @30m	Quasi-peak Value
1.705MHz-30.0MHz	30 @30m	Quasi-peak Value
30MHz-88MHz	100 @3m	Quasi-peak Value
88MHz-216MHz	150 @3m	Quasi-peak Value
216MHz-960MHz	200 @3m	Quasi-peak Value
960MHz-1GHz	500 @3m	Quasi-peak Value
Above 1GHz	500 @3m	Average Value
	5000 @3m	Peak Value

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

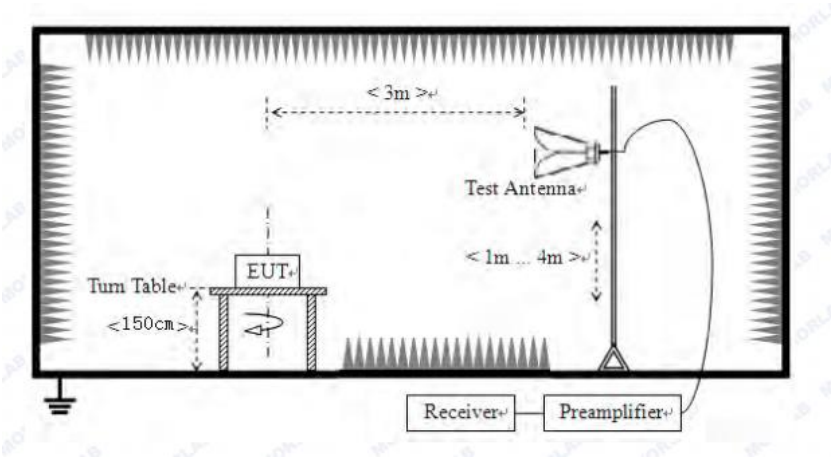
Test setup:

Below 1GHz





Above 1GHz



Test Procedure:	1. During the test, the New Battery was used. 2. 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. 3. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. 4. 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. 5. 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. 6. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 7. 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 results:	Pass

Measurement data:

7.2.1 Transmitter Field Strength of Emissions

Peak value:

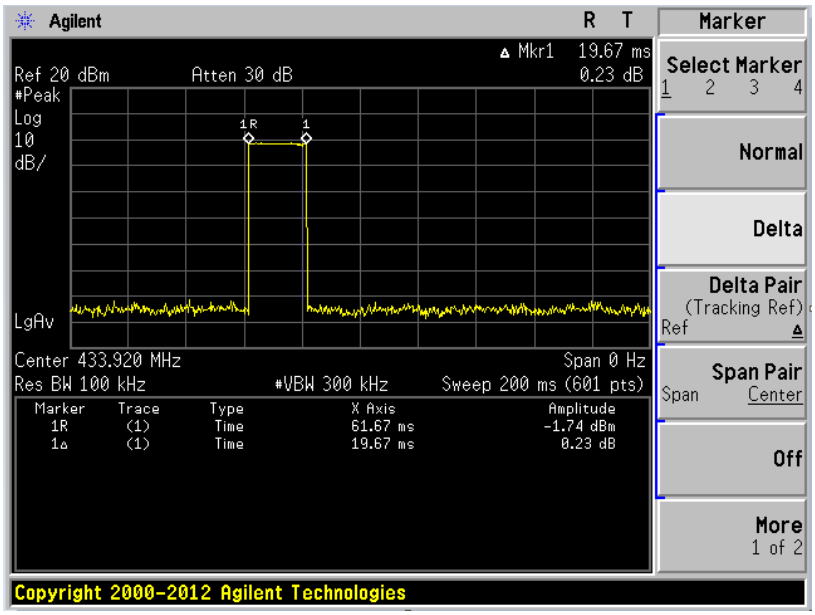
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
433.92	74.61	16.03	3.02	37.52	56.14	100.83	-44.69	Horizontal
433.92	80.69	16.03	3.02	37.52	62.22	100.83	-38.61	Vertical

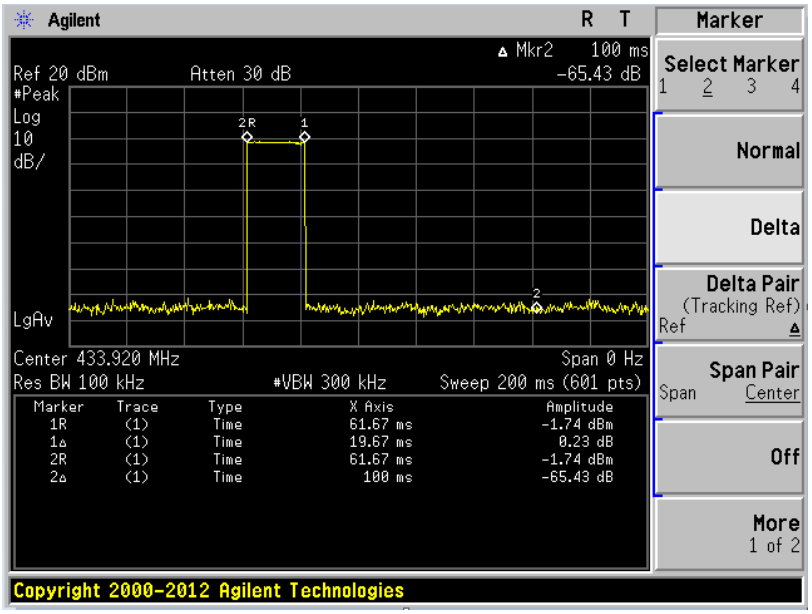
Average value:

Frequency (MHz)	Peak Value (dBuV/m)	Duty cycle factor	Average value (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
433.92	56.14	-14.12	42.02	80.83	-38.81	Horizontal
433.92	62.22	-14.12	48.10	80.83	-32.73	Vertical

Average value:	
Calculate Formula:	Average value=Peak value + Duty Cycle Factor
	Duty cycle factor=20 log(Duty cycle)
	Duty cycle=on time/100 milliseconds or period, whichever is less
Test data:	T on time =19.67(ms)
	T period 100(ms)
	Duty cycle=0.1967
	duty cycle factor=-14.12

Test plot as follows:





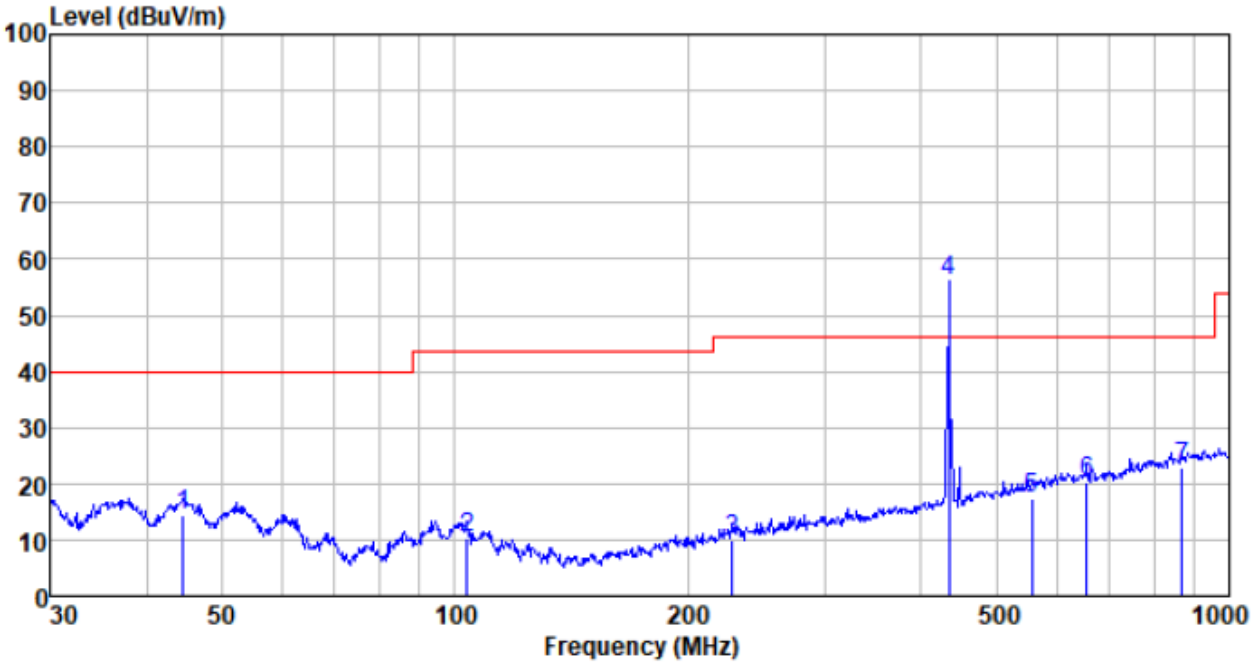
7.2.2 Spurious emissions

- Below 30MHz

  The emission from 9 kHz to 30MHz was pre-tested and found the result was 20dB lower than the limit, and according to 15.31(o), the test result no need to reported.

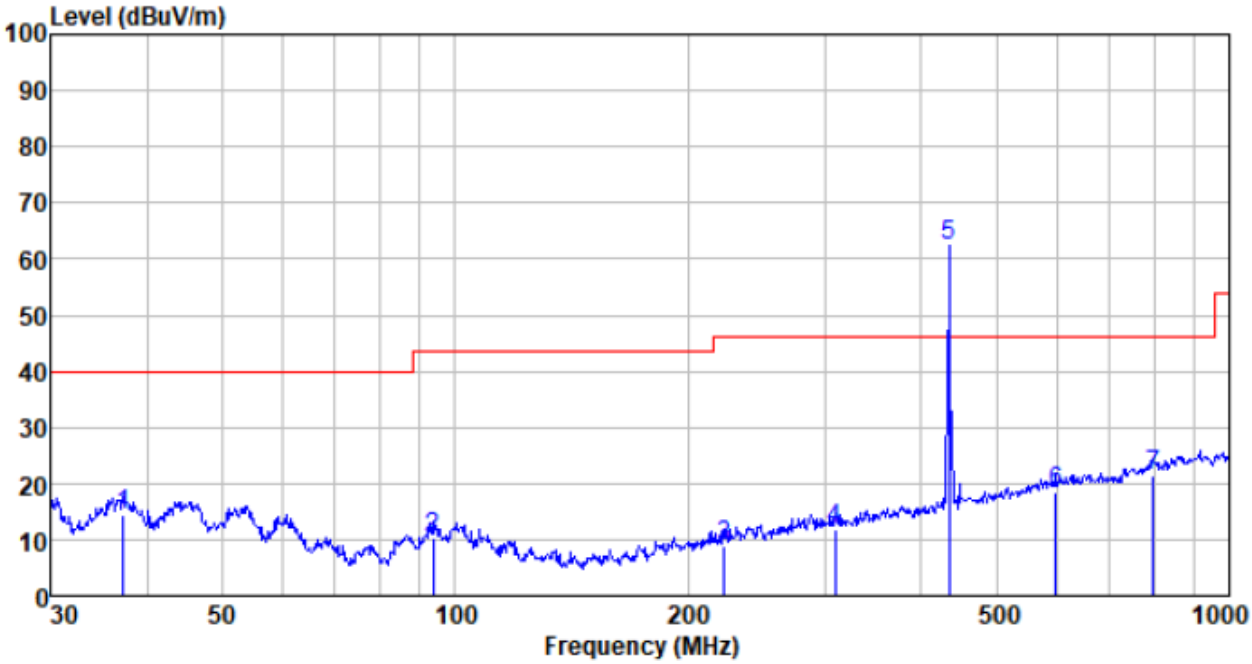
- Below 1GHz

  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
44.587	37.47	12.25	0.72	35.92	14.52	40.00	-25.48	QP
103.806	34.20	11.73	1.22	36.75	10.40	43.50	-33.10	QP
228.490	33.87	11.45	2.01	37.36	9.97	46.00	-36.03	QP
433.920	74.61	16.03	3.02	37.52	56.14	46.00	10.14	Peak
556.774	32.73	18.57	3.55	37.53	17.32	46.00	-28.68	QP
654.232	34.46	19.55	3.93	37.59	20.35	46.00	-25.65	QP
869.130	33.55	22.02	4.74	37.61	22.70	46.00	-23.30	QP

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
37.285	37.67	11.73	0.63	35.50	14.53	40.00	-25.47	QP
93.768	34.74	11.25	1.14	36.67	10.46	43.50	-33.04	QP
222.950	33.08	11.27	1.98	37.35	8.98	46.00	-37.02	QP
309.998	32.94	13.79	2.42	37.43	11.72	46.00	-34.28	QP
433.920	80.69	16.03	3.02	37.52	62.22	46.00	16.22	Peak
597.223	32.75	19.44	3.71	37.54	18.36	46.00	-27.64	QP
796.183	33.25	21.34	4.45	37.62	21.42	46.00	-24.58	QP

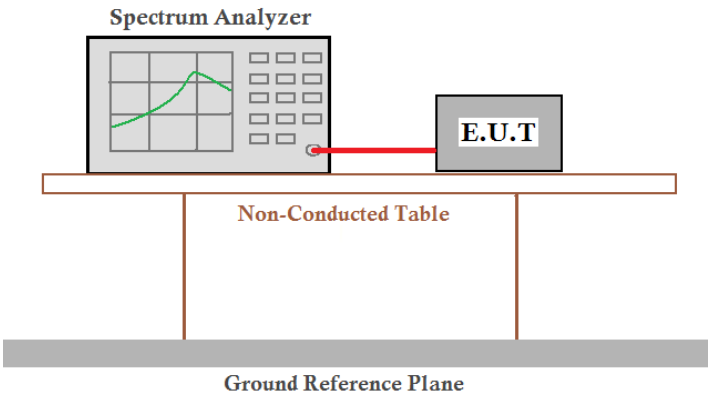
■ Above 1GHz

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
1205.00	35.63	24.79	4.47	35.92	28.97	74.00	-45.03	Vertical
1920.00	31.88	26.26	4.92	36.45	26.61	74.00	-47.39	Vertical
2245.00	32.25	27.04	5.23	36.73	27.79	74.00	-46.21	Vertical
2960.00	31.14	28.53	5.89	37.27	28.29	74.00	-45.71	Vertical
3635.00	26.82	28.65	7.23	37.37	25.33	74.00	-48.67	Vertical
4345.00	28.22	30.43	8.19	37.55	29.29	74.00	-44.71	Vertical
1120.00	36.75	24.59	4.40	35.83	29.91	74.00	-44.09	Horizontal
1500.00	34.10	25.50	4.68	36.17	28.11	74.00	-45.89	Horizontal
1875.00	32.60	26.17	4.90	36.42	27.25	74.00	-46.75	Horizontal
2290.00	31.72	27.15	5.28	36.77	27.38	74.00	-46.62	Horizontal
3095.00	31.12	28.54	6.13	37.31	28.48	74.00	-45.52	Horizontal
4355.00	26.18	30.45	8.21	37.55	27.29	74.00	-46.71	Horizontal

Remark:

1. Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor

7.3 20dB Occupy Bandwidth

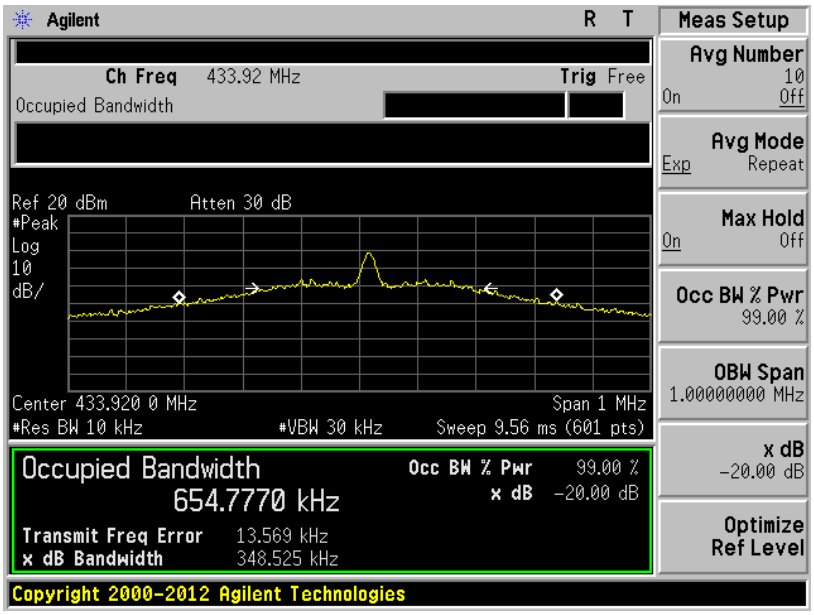
Test Requirement:	FCC Part15 C Section 15.231 (c)
Test Method:	ANSI C63.10:2013
Limit:	The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% 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 5.2 for details
Test results:	Pass

Measurement Data

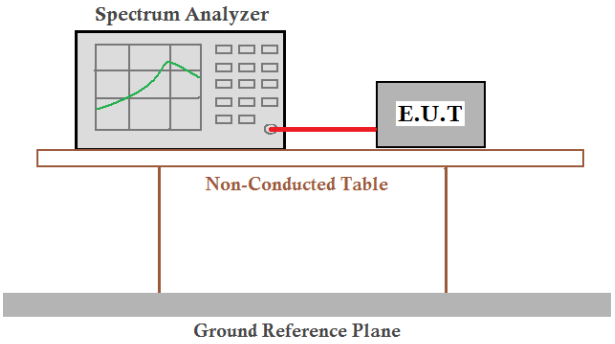
Test Frequency (MHz)	20dB bandwidth (MHz)	Limit (MHz)	Result
433.92	0.348525	1.0848	Pass

Note: Limit (433.92MHz) = Fundamental frequency×0.25%=433.92×0.25%=1.0848MHz

Test plot as follows:



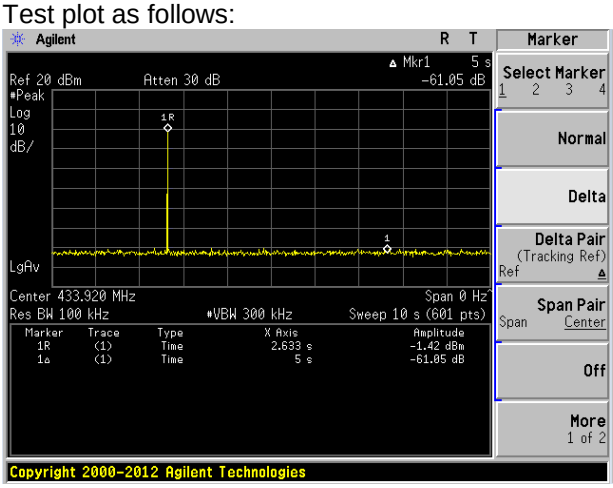
7.4 Deactivation Testing

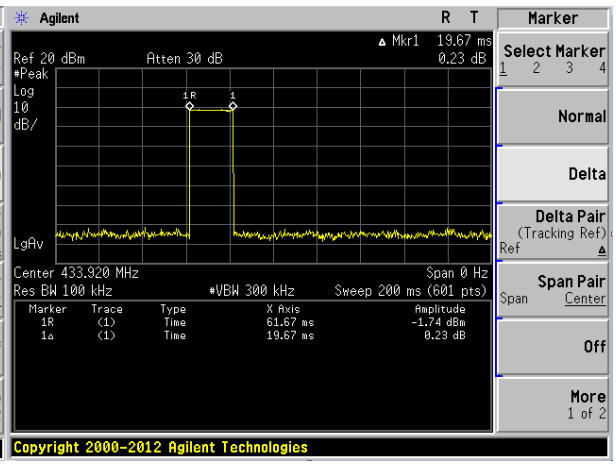
Test Requirement:	FCC Part15 C Section 15.231 (a1)
Test Method:	ANSI C63.10:2013
Receiver setup:	RBW=100KHz, VBW=300KHz, span=0Hz, detector: Peak
Limit:	Not more than 5 seconds
Test setup:	
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement data:

Test Frequency (MHz)	Activation Time (second)	Limit (second)	Result
433.92	0.01967	<5.0	Pass

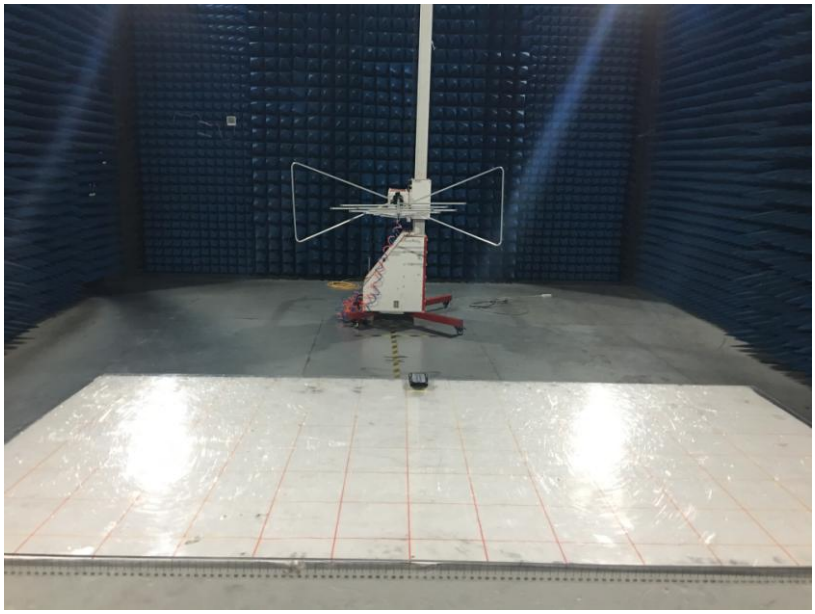
Test plot as follows:





8 Test Setup Photo

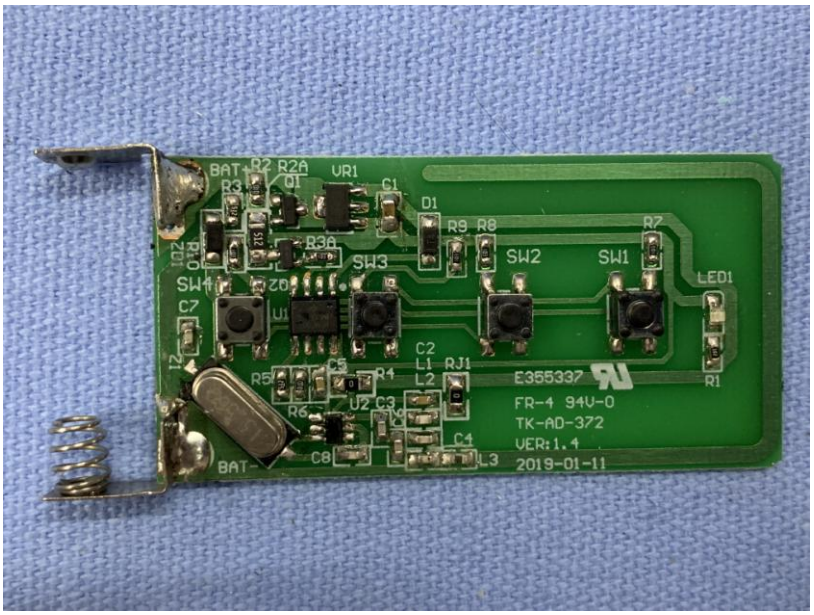
Radiated Emission



9 EUT Constructional Details

DIGITAL REMOTE
CONTROLLER

DIGITAL REMOTE
CONTROLLER


BAT+
R2
R2A
VR1
C1
D1
R9
R8
R7
SW2
SW1
LED1
SW3
SW4
C7
U1
C2
L1
RJ1
L2
R5
C5
R4
R6
U2
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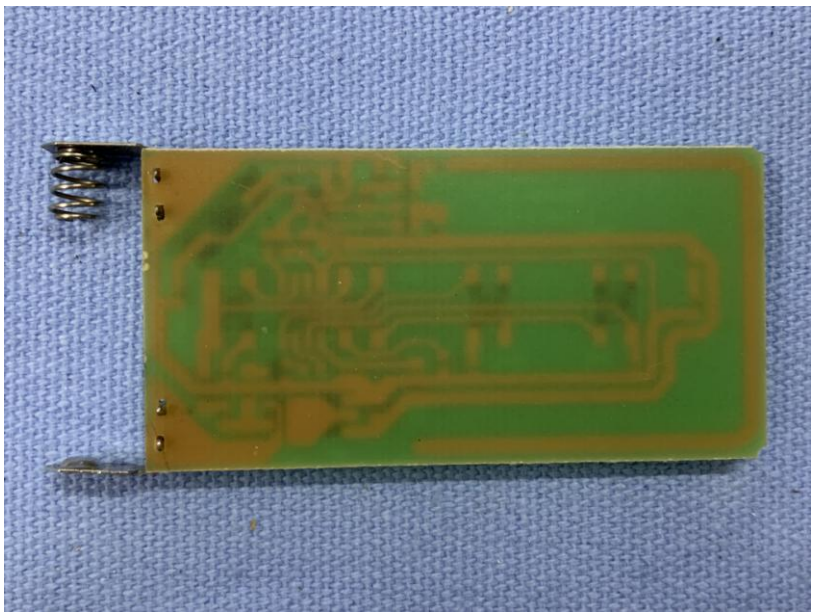
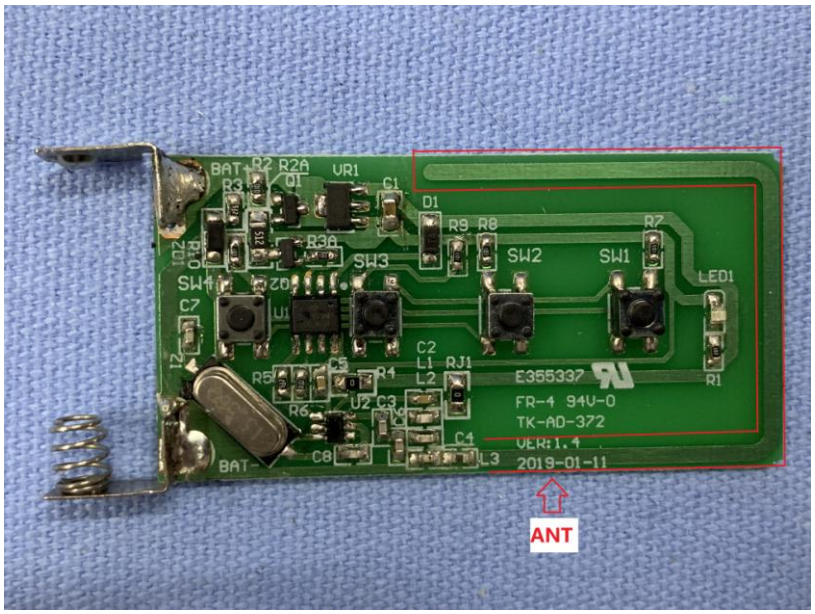
2019-01-11

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C2
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R1
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