TEST REPORT

Applicant:	Rev-A-Shelf
Address of Applicant:	12400 Earl Jones Way Louisville, Kentucky 40299, United States
Manufacturer/Factory:	Rev-A-Shelf
Address of Manufacturer/Factory:	12400 Earl Jones Way Louisville, Kentucky 40299, United States

Equipment Under Test (EUT)

Product Name:	RF Wall Switch
Model No.:	WLD-RGB-WH, WLD-CCT-WH
FCC ID:	2AHCYRGBCCT
Applicable standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.249
Date of sample receipt:	September 04, 2020
Date of Test:	September 04-08, 2020
Date of report issued:	September 08, 2020
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	*September 08, 2020*	*Original*

Prepared By:	Tiger. Chen	***Date:***	*September 08, 2020*
	Project Engineer		
Check By:	Robinson Lo	***Date:***	*September 08, 2020*
	Reviewer		

3 Contents

Page

1 COVER PAGE 1

2 VERSION 2

3 CONTENTS 3

4 TEST SUMMARY 4

4.1 MEASUREMENT UNCERTAINTY 4

5 GENERAL INFORMATION 5

5.1 GENERAL DESCRIPTION OF EUT 5
5.2 TEST MODE 6
5.3 DESCRIPTION OF SUPPORT UNITS 6
5.4 DEVIATION FROM STANDARDS 6
5.5 ABNORMALITIES FROM STANDARD CONDITIONS 6
5.6 TEST FACILITY 6
5.7 TEST LOCATION 6
5.8 ADDITIONAL INSTRUCTIONS 6

6 TEST INSTRUMENTS LIST 7

7 TEST RESULTS AND MEASUREMENT DATA 9

7.1 RADIATED EMISSION METHOD 9
7.1.1 Field Strength of The Fundamental Signal and spurious emissions 12
7.1.2 Spurious emissions 13
7.2 20DB OCCUPY BANDWIDTH 17

8 TEST SETUP PHOTO 18

9 EUT CONSTRUCTIONAL DETAILS 18

4 Test Summary

Test Item	Section	Result
AC Power Line Conducted Emission	15.207	N/A
Field strength of the fundamental signal	15.249 (a)	Pass
Spurious emissions	15.249 (a) (d)/15.209	Pass
Band edge	15.249 (d)/15.205	Pass
20dB Occupied Bandwidth	15.215 (c)	Pass

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

Remark: Test according to ANSI C63.10: 2013 and ANSI C63.4: 2014.

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:	RF Wall Switch
Model No.:	WLD-RGB-WH, WLD-CCT-WH
Serial No.:	N/A
Hardware Version:	V1.0
Software Version:	V1.0
Test sample(s) ID:	GTS202009000039-1
Sample(s) Status:	Engineer sample
Operation Frequency:	916.5MHz
Modulation type:	FSK
Antenna Type:	PCB antenna
Antenna gain:	2dBi(declare by manufacturer)
Power supply:	DC 3.0V Lithium Cell CR1602

Test using a new battery.

5.2 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode.

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)	88.31	89.19	87.24

5.3 Description of Support Units

None

5.4 Deviation from Standards

None.

5.5 Abnormalities from Standard Conditions

None.

5.6 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.

5.7 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

5.8 Additional Instructions

EUT Software Settings:

Mode	Special test firmware pre built in by manufacturer

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. 02 2020	July. 01 2025
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. 25 2020	June. 24 2021
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	June. 25 2020	June. 24 2021
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June. 25 2020	June. 24 2021
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June. 25 2020	June. 24 2021
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	June. 25 2020	June. 24 2021
9	Coaxial Cable	GTS	N/A	GTS211	June. 25 2020	June. 24 2021
10	Coaxial cable	GTS	N/A	GTS210	June. 25 2020	June. 24 2021
11	Coaxial Cable	GTS	N/A	GTS212	June. 25 2020	June. 24 2021
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	June. 25 2020	June. 24 2021
13	Amplifier(2GHz-20GHz)	HP	84722A	GTS206	June. 25 2020	June. 24 2021
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June. 25 2020	June. 24 2021
15	Band filter	Amindeon	82346	GTS219	June. 25 2020	June. 24 2021
16	Power Meter	Anritsu	ML2495A	GTS540	June. 25 2020	June. 24 2021
17	Power Sensor	Anritsu	MA2411B	GTS541	June. 25 2020	June. 24 2021
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	June. 25 2020	June. 24 2021
19	Splitter	Agilent	11636B	GTS237	June. 25 2020	June. 24 2021
20	Loop Antenna	ZHINAN	ZN30900A	GTS534	June. 25 2020	June. 24 2021
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. 25 2020	June. 24 2021

RF Conducted Test:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	June. 25 2020	June. 24 2021
2	EMI Test Receiver	R&S	ESCI 7	GTS552	June. 25 2020	June. 24 2021
3	Spectrum Analyzer	Agilent	E4440A	GTS533	June. 25 2020	June. 24 2021
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	June. 25 2020	June. 24 2021
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	June. 25 2020	June. 24 2021
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	June. 25 2020	June. 24 2021
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	June. 25 2020	June. 24 2021
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	June. 25 2020	June. 24 2021

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. 25 2020	June. 24 2021
2	Barometer	ChangChun	DYM3	GTS255	June. 25 2020	June. 24 2021

7 Test results and Measurement Data

7.1 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209
Test Method:	ANSI C63.10:2013
Test Frequency Range:	9kHz to 10GHz
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
902-928MHz	94.00	Average Value
	114.00	Peak Value

Limit:
(Spurious Emissions)

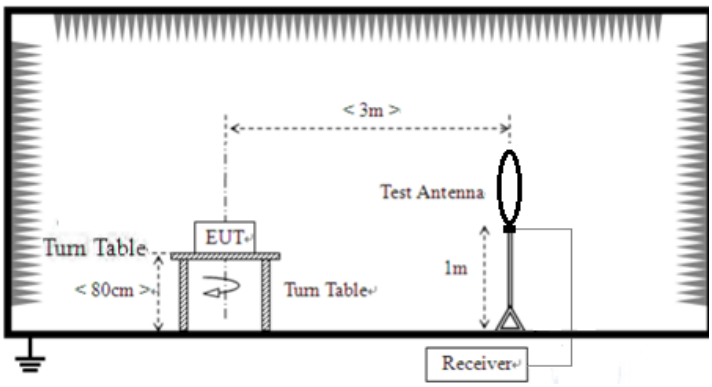
Frequency	Limit (uV/m)	Value	Measurement Distance
0.009MHz-0.490MHz	2400/F(KHz)	QP	300m
0.490MHz-1.705MHz	24000/F(KHz)	QP	30m
1.705MHz-30MHz	30	QP	30m
30MHz-88MHz	100	QP	3m
88MHz-216MHz	150	QP	
216MHz-960MHz	200	QP	
960MHz-1GHz	500	QP	
Above 1GHz	500	Average	
	5000	Peak	

Limit:
(band edge)

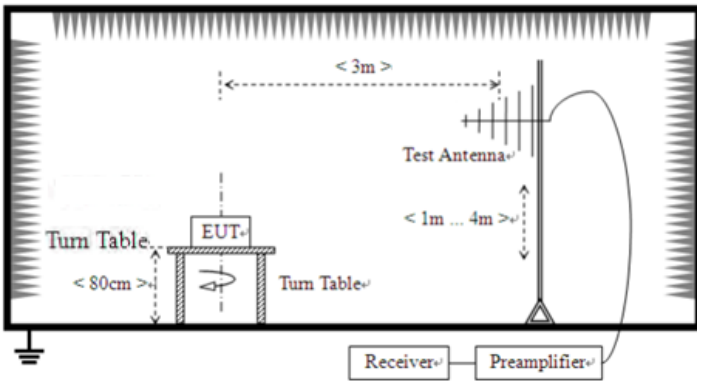
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

Test setup:

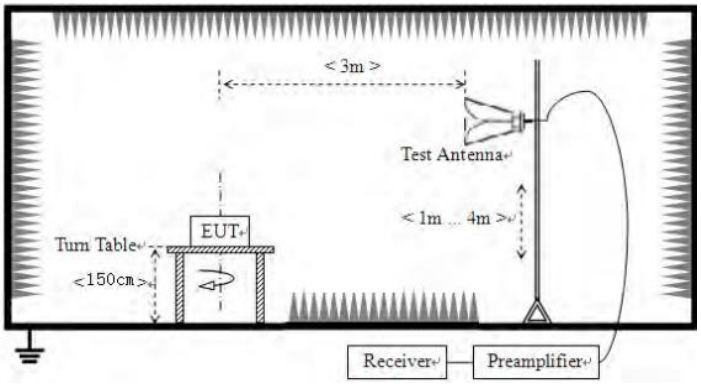
Below 30MHz



Below 1GHz



Above 1GHz



Test Procedure:

1. The EUT was placed on the top of a rotating table (0.8m 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 environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1 012mbar
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					

Test results:	Pass

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.

7.1.1 Field Strength of The Fundamental Signal and spurious 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
916.50	90.45	22.37	4.93	37.58	80.17	114.00	-33.83	Vertical
916.50	85.00	22.37	4.93	37.58	74.72	114.00	-39.28	Horizontal

Average 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
916.50	81.42	22.37	4.93	37.58	71.14	94.00	-22.86	Vertical
916.50	76.63	22.37	4.93	37.58	66.35	94.00	-27.65	Horizontal

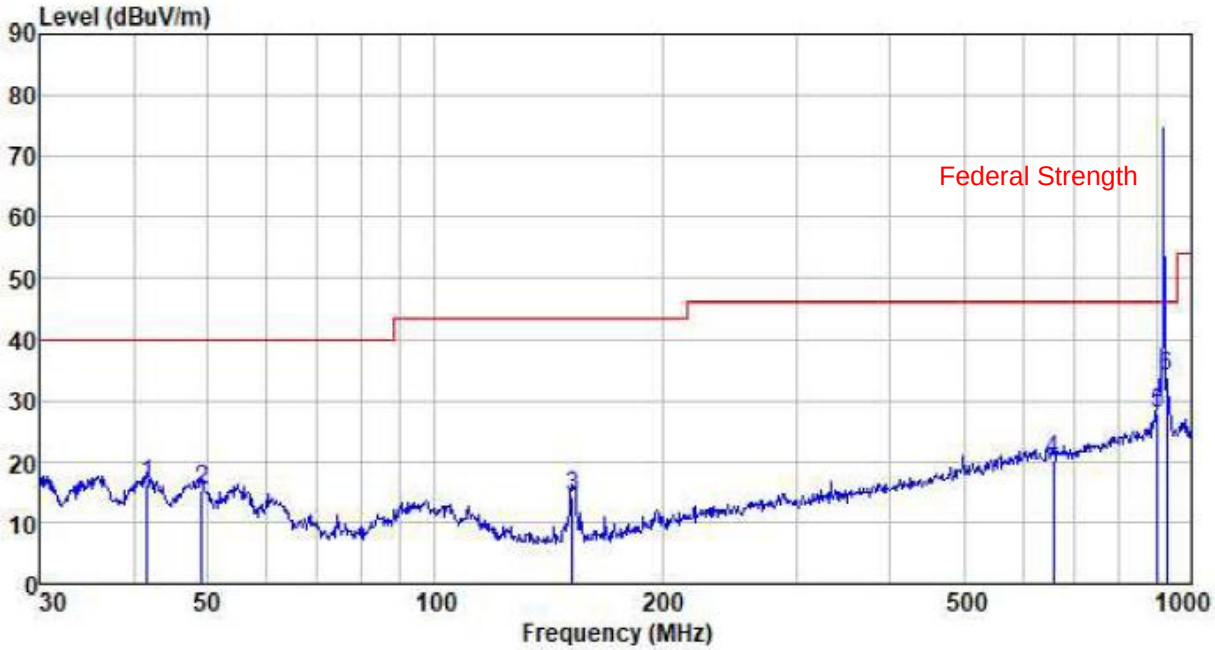
7.1.2 Spurious emissions

- 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.

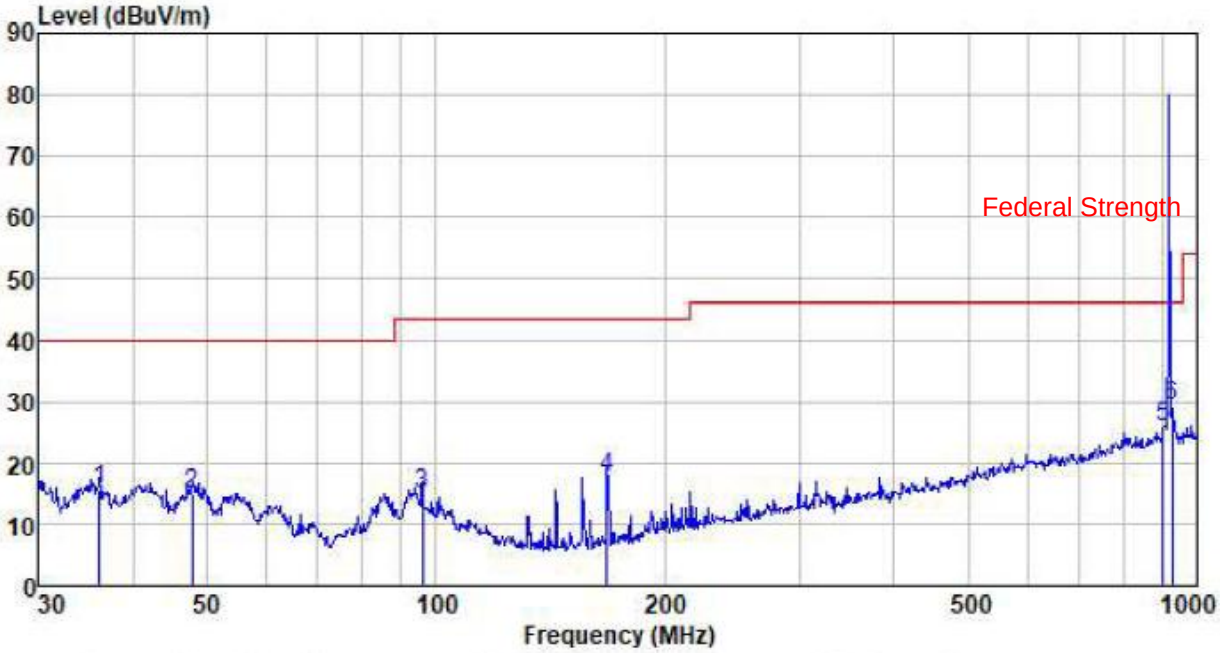
- Below 1GHz

Test mode:	transmitting mode	Antenna Polarity:	Horizontal



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
41.713	39.15	12.22	0.68	35.76	16.29	40.00	-23.71	QP
49.187	38.20	12.29	0.76	36.14	15.11	40.00	-24.89	QP
152.130	42.07	7.80	1.58	37.09	14.36	43.50	-29.14	QP
656.530	34.41	19.56	3.94	37.59	20.32	46.00	-25.68	QP
902.000	38.47	22.30	4.87	37.60	28.04	46.00	-17.96	QP
928.000	43.91	22.41	4.96	37.57	33.71	46.00	-12.29	QP

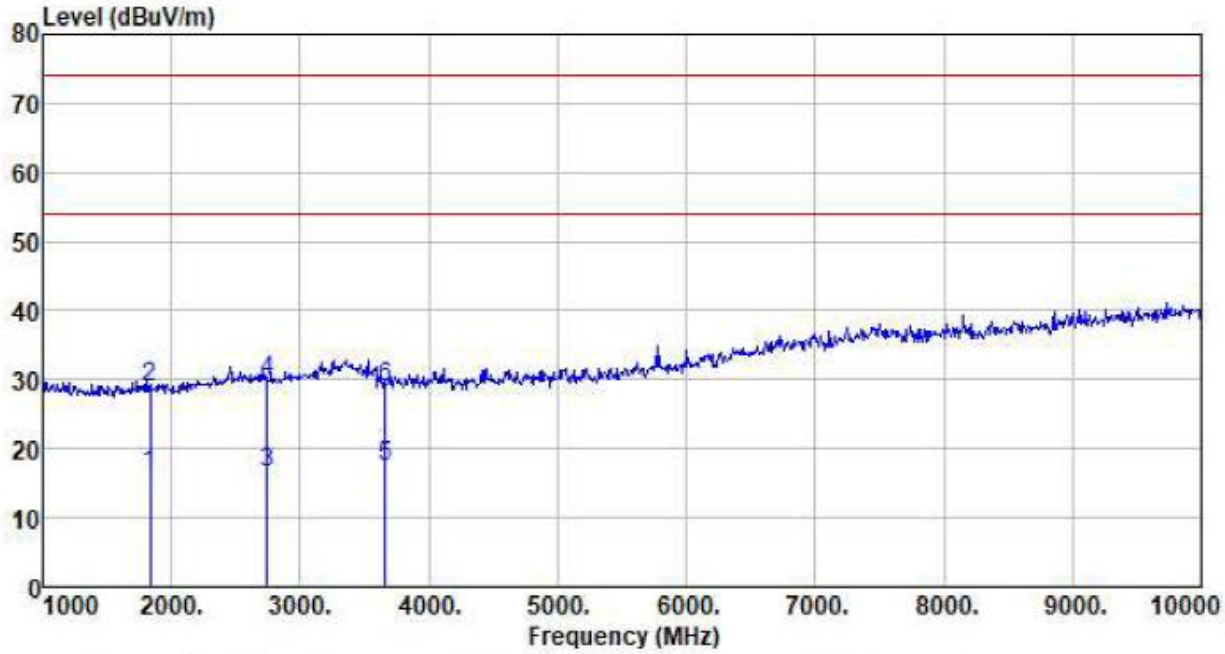
Test mode:	transmitting mode	Antenna Polarity:	Vertical



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
36.127	38.86	11.52	0.62	35.43	15.57	40.00	-24.43	QP
47.826	37.92	12.28	0.75	36.08	14.87	40.00	-25.13	QP
96.099	38.66	11.65	1.16	36.69	14.78	43.50	-28.72	QP
167.824	44.74	8.46	1.67	37.18	17.69	43.50	-25.81	QP
902.000	36.23	22.30	4.87	37.60	25.80	46.00	-20.20	QP
928.000	39.44	22.41	4.96	37.57	29.24	46.00	-16.76	QP

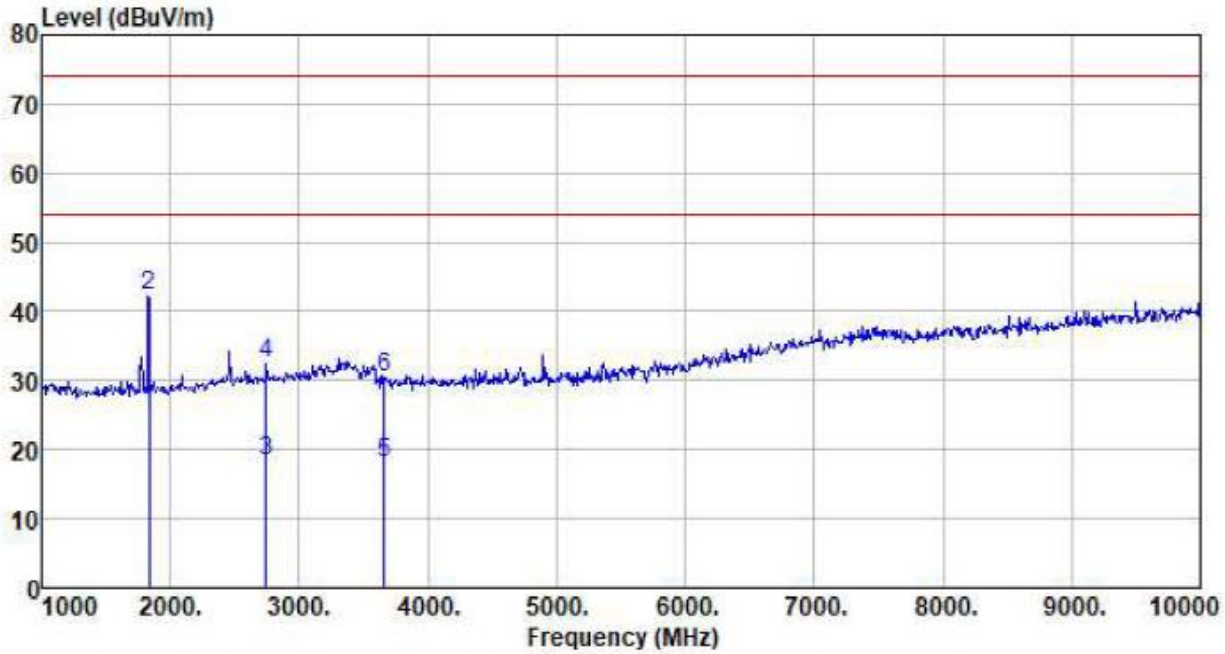
■ Above 1GHz

Test mode:	transmitting mode	Antenna Polarity:	Horizontal



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
1832.000	24.16	25.85	2.49	36.40	16.10	54.00	-37.90	Average
1832.000	37.07	25.85	2.49	36.40	29.01	74.00	-44.99	Peak
2746.000	22.42	28.06	3.18	37.12	16.54	54.00	-37.46	Average
2746.000	35.62	28.06	3.18	37.12	29.74	74.00	-44.26	Peak
3664.000	21.90	28.88	3.87	37.37	17.28	54.00	-36.72	Average
3664.000	33.65	28.88	3.87	37.37	29.03	74.00	-44.97	Peak

Test mode:	transmitting mode	Antenna Polarity:	Vertical

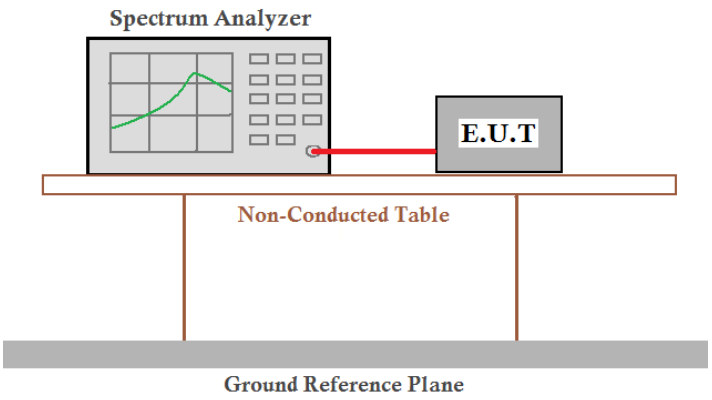


Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
1832.000	33.30	25.85	2.49	36.40	25.24	54.00	-28.76	Average
1832.000	50.40	25.85	2.49	36.40	42.34	74.00	-31.66	Peak
2746.000	24.13	28.06	3.18	37.12	18.25	54.00	-35.75	Average
2746.000	38.48	28.06	3.18	37.12	32.60	74.00	-41.40	Peak
3664.000	22.72	28.88	3.87	37.37	18.10	54.00	-35.90	Average
3664.000	35.10	28.88	3.87	37.37	30.48	74.00	-43.52	Peak

Remark:

1. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*
2. *"*", means this data is the too weak instrument of signal is unable to test.*

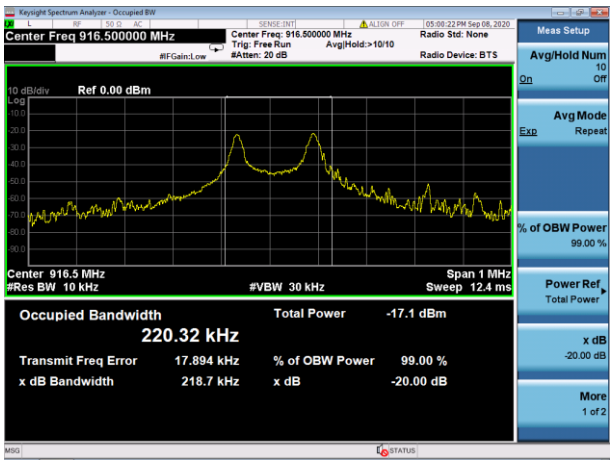
7.2 20dB Occupy Bandwidth

Test Requirement:	FCC Part15 C Section 15.249/15.215
Test Method:	ANSI C63.10:2013
Limit:	Operation Frequency range 902MHz~928MHz
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

Operation Frequency	20dB bandwidth(kHz)	Result
916.5MHz	218.7	Pass

Test plot as follows:



916.5MHz

8 Test Setup Photo

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

9 EUT Constructional Details

Reference to the **appendix II** for details

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