

TEST REPORT

Product : Waterdrop Water Detector
Trade mark : Waterdrop
Model/Type reference : WD-WHMD-1
Serial Number : S/N
Report Number : EED32P81980401
FCC ID : 2BD3GWD-WHMD-1
Date of Issue : Dec. 26, 2023
Test Standards : 47 CFR Part 15 Subpart C
Test result : PASS

Prepared for:

Qingdao Ecopure Filter Co., Ltd.

**No. 13, Yishengbai Road Environmental Protection Industry Zone Jimo,
Qingdao 266201, China**

Prepared by:

**Centre Testing International Group Co., Ltd.
Hongwei Industrial Zone, Bao'an 70 District,
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Date:

Dec. 26, 2023



Check No.: 7527061223

1 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
AC Power Line Conducted Emission	47 CFR Part 15 Subpart C Section 15.207	ANSI C63.10-2013	N/A
Field Strength of the Fundamental Signal	47 CFR Part 15 Subpart C Section 15.249 (a)	ANSI C63.10-2013	PASS
Spurious Emissions	47 CFR Part 15 Subpart C Section 15.249 (a)/15.209	ANSI C63.10-2013	PASS
Restricted bands around fundamental frequency (Radiated Emission)	47 CFR Part 15 Subpart C Section 15.249(a)/15.205	ANSI C63.10-2013	PASS
20dB Occupied Bandwidth	47 CFR Part 15 Subpart C Section 15.215 (c)	ANSI C63.10-2013	PASS

Remark:

N/A:The product is powered by battery.

Company Name and Address shown on Report, the sample(s) and sample Information were provided by the applicant who should be responsible for the authenticity which CTI hasn't verified.

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3 General Information

3.1 Client Information

Applicant:	Qingdao Ecopure Filter Co., Ltd.
Address of Applicant:	No. 13, Yishengbai Road Environmental Protection Industry Zone Jimo, Qingdao 266201, China
Manufacturer:	Qingdao Ecopure Filter Co., Ltd.
Address of Manufacturer:	No. 13, Yishengbai Road Environmental Protection Industry Zone Jimo, Qingdao 266201, China
Factory	Qingdao Ecopure Filter Co., Ltd.
Address of Factory:	No. 13, Yishengbai Road Environmental Protection Industry Zone Jimo, Qingdao 266201, China

3.2 General Description of EUT

Product Name:	Waterdrop Water Detector
Model No.:	WD-WHMD-1
Trade mark:	Waterdrop
Product Type:	<input type="checkbox"/> Mobile <input type="checkbox"/> Portable <input checked="" type="checkbox"/> Fix Location
Operation Frequency:	915MHz
Number of Channel:	1
Modulation type:	OOK
Antenna Type:	PCB Antenna
Test Software of EUT:	RF Test
Test Power Grade:	Default
Power Supply:	DC 3V
Test Voltage:	DC 3V
Sample Received Date:	Dec. 06, 2023
Sample tested Date:	Dec. 06, 2023 to Dec. 18, 2023

Operation Frequency each of channel :	
Channel	Frequency(MHz)
CH1	915

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency(MHz)
The Middle channel(CH1)	915

3.3 Test Environment and Mode

Operating Environment:	
Temperature:	22~25.0 °C
Humidity:	50~55 % RH
Atmospheric Pressure:	1010mbar
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with modulation.

3.4 Description of Support Units

The EUT has been tested independently.

3.5 Test Location

All tests were performed at:

Centre Testing International Group Co., Ltd

Building C, Hongwei Industrial Park Block 70, Bao'an District, Shenzhen, China

Telephone: +86 (0) 755 33683668 Fax: +86 (0) 755 33683385

No tests were sub-contracted.

FCC Designation No.: CN1164

3.6 Deviation from Standards

None.

3.7 Abnormalities from Standard Conditions

None.

3.8 Other Information Requested by the Customer

None.

3.9 Measurement Uncertainty (95% confidence levels, k=2)

No.	Item	Measurement Uncertainty
1	Radio Frequency	7.9×10^{-8}
2	RF power, conducted	0.46dB (30MHz-1GHz)
		0.55dB (1GHz-18GHz)
3	Radiated Spurious emission test	3.3dB (9kHz-30MHz)
		4.3dB (30MHz-1GHz)
		4.5dB (1GHz-18GHz)
		3.4dB (18GHz-40GHz)
4	Conduction emission	3.5dB (9kHz to 150kHz)
		3.1dB (150kHz to 30MHz)
5	Temperature test	0.64°C
6	Humidity test	3.8%
7	DC power voltages	0.026%

4 Equipment List

RF test system					
Equipment	Manufacturer	Model No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Communication test set	R&S	CMW500	107929	06-28-2023	06-27-2024
Signal Generator	R&S	SMBV100A	1407.6004K02- 262149-CV	09-05-2023	09-04-2024
Spectrum Analyzer	R&S	FSV40	101200	07-25-2023	07-24-2024
RF control unit(power unit)	MWRF-test	MW100-RFCB	MW220620CTI-42	06-28-2023	06-27-2024
high-low temperature test chamber	Dong Guang Qin Zhuo	LK-80GA	QZ20150611879	12-19-2022 12-11-2023	12-18-2023 12-10-2024
Temperature/ Humidity Indicator	biaozhi	HM10	1804186	06-01-2023	05-31-2024
BT&WI-FI Automatic test software	MWRF-test	MTS 8310	2.0.0.0	---	---

3M Semi-anechoic Chamber (2)- Radiated disturbance Test					
Equipment	Manufacturer	Model	Serial No.	Cal. Date	Due Date
3M Chamber & Accessory Equipment	TDK	SAC-3	---	05/22/2022	05/21/2025
Receiver	R&S	ESCI7	100938-003	09-22-2023	09-21-2024
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	9163-618	05/22/2022	05/21/2025
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-076	04/15/2021	04/14/2024
Microwave Preamplifier	Tonscend	EMC051845SE	980380	12/23/2022	12/23/2023
Multi device Controller	maturo	NCD/070/10711112	---	---	---
Horn Antenna	ETS-LINGREN	BBHA 9120D	9120D-1869	04/15/2021	04/14/2024
Microwave Preamplifier	Agilent	8449B	3008A02425	06/20/2023	06/19/2024
Test software	Fara	EZ-EMC	EMEC-3A1-Pre	---	---

3M full-anechoic Chamber					
Equipment	Manufacturer	Model No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
RSE Automatic test software	JS Tonscend	JS36-RSE	10166	---	---
Receiver	Keysight	N9038A	MY57290136	02-27-2023	02-26-2024
Spectrum Analyzer	Keysight	N9020B	MY57111112	02-21-2023	02-20-2024
Spectrum Analyzer	Keysight	N9030B	MY57140871	02-21-2023	02-20-2024
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	9163-1148	04-28-2021	04-27-2024
Horn Antenna	Schwarzbeck	BBHA 9170	9170-832	04-15-2021	04-14-2024
Horn Antenna	ETS-LINDGREN	3117	57407	07-04-2021	07-03-2024
Preamplifier	EMCI	EMC184055SE	980597	04-13-2023	04-12-2024
Preamplifier	EMCI	EMC001330	980563	03-28-2023	03-27-2024
Preamplifier	JS Tonscend	TAP-011858	AP21B806112	07-25-2023	07-24-2024
Communication test set	R&S	CMW500	102898	12-23-2022	12-22-2023
Temperature/Humidity Indicator	biaozhi	GM1360	EE1186631	04-11-2023	04-10-2024
Fully Anechoic Chamber	TDK	FAC-3	---	01-09-2021	01-08-2024
Cable line	Times	SFT205-NMSM-2.50M	394812-0001	---	---
Cable line	Times	SFT205-NMSM-2.50M	394812-0002	---	---
Cable line	Times	SFT205-NMSM-2.50M	394812-0003	---	---
Cable line	Times	SFT205-NMSM-2.50M	393495-0001	---	---
Cable line	Times	EMC104-NMNM-1000	SN160710	---	---
Cable line	Times	SFT205-NMSM-3.00M	394813-0001	---	---
Cable line	Times	SFT205-NMNM-1.50M	381964-0001	---	---
Cable line	Times	SFT205-NMSM-7.00M	394815-0001	---	---
Cable line	Times	HF160-KMKM-3.00M	393493-0001	---	---

5 Test results and Measurement Data

5.1 Antenna Requirement

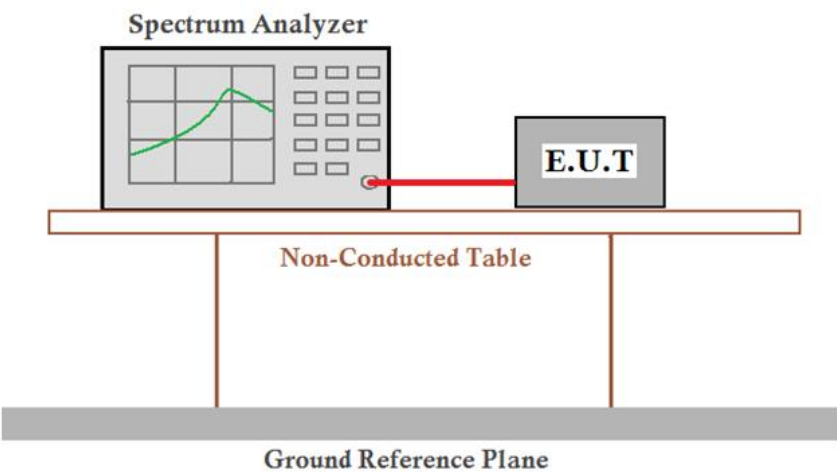
Standard requirement:	47 CFR Part 15C Section 15.203
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique 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:	Please see Internal photos
The antenna is integrated on the main PCB and no consideration of replacement.	

5.2 Radiated Spurious Emissions

5.2.1 Duty Cycle

Test Requirement: 47 CFR Part 15C Section 15.35 (c)
Test Method: ANSI C63.10:2013

Test Setup:



Limit: N/A
Test Mode: Transmitting mode
Test Results: Pass

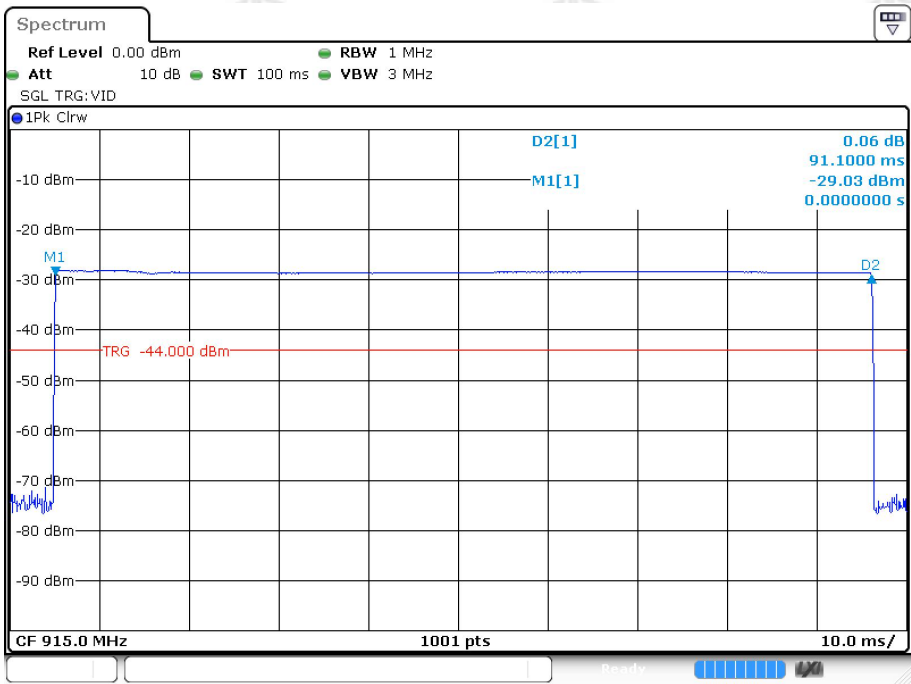
The number of pulses of duration /100ms	T on time (ms)/100ms	T period (ms)	Duty cycle
1	91.10	100	0.911

Note:

The number of pulses of duration/100ms=1;
T on time(ms)/100ms=91.1ms*1=91.1ms;
Duty cycle=T on time / T period=91.10/100=0.911;

Test plot as follows:

The number of pulses of duration/100ms: number is 1



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5.2.2 Radiated Spurious Emissions

Test Requirement: 47 CFR Part 15C Section 15.249 and 15.209 and 15.205

Test Method: ANSI C63.10

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	120kHz	300kHz	Quasi-peak
Above 1GHz	Peak	1MHz	3MHz	Peak
	Peak	1MHz	10kHz	Average

Limit:
(Spurious Emissions)

Frequency	Field strength (microvolt/meter)	Limit (dBμV/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 (dBμV/m @3m)	Remark
911MHz-919MHz	94.0	Average Value
	114.0	Peak Value

Test Setup:

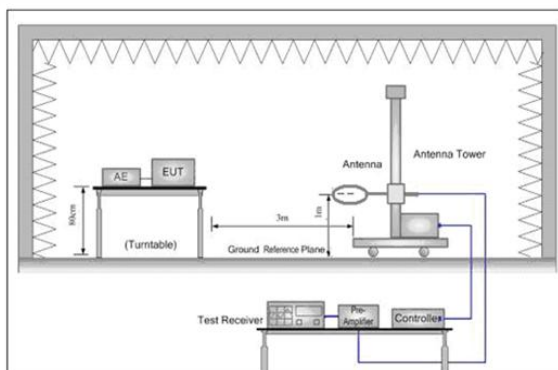


Figure 1. Below 30MHz

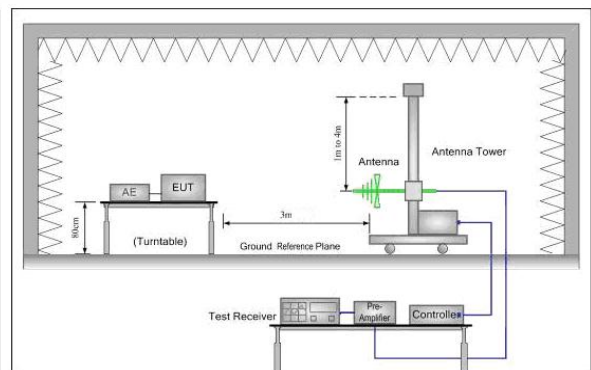


Figure 2. 30MHz to 1GHz

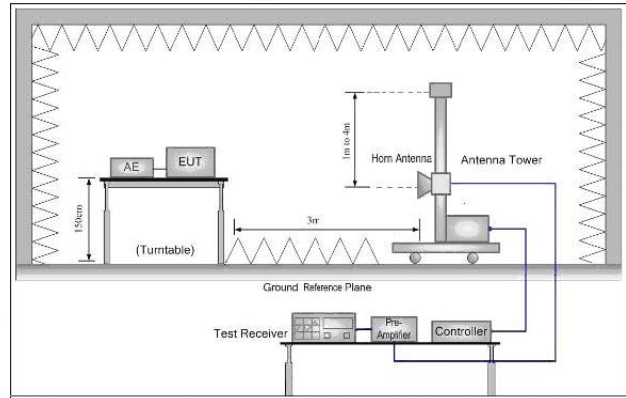


Figure 3. Above 1GHz

Test Procedure:

Below 1GHz test procedure as below:

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.

The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

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.

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 rota table table was turned from 0 degrees to 360 degrees to find the maximum reading.

The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

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.

Above 1GHz test procedure as below:

Different between above is the test site, change from Semi- Anechoic Chamber to fully Anechoic Chamber and change form table 0.8 metre to 1.5 metre(Above 18GHz the distance is 1 meter and table is 1.5 metre).

Test the EUT in the lowest channel ,middle channel, the Highest channel .

The radiation measurements are performed in X, Y, Z axis positioning for Transmitting mode, and found the X axis positioning which it is worse case.

Repeat above procedures until all frequencies measured was complete.

Transmitting mode

Test Mode:

Test Results:

Pass

Test data:

Field Strength of the Fundamental Signal:

Average value:	
Calculate Formula:	Average value=Peak value + PDCF
	PDCF=20 log(Duty cycle)
	Duty cycle= T on time / T period
Test data:	T on time =91.1ms
	T period =100ms
	PDCF=-0.81

Test channel:	CH1
---------------	-----

Antenna polarization: Horizontal

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
915	64.22	27.50	91.72	114.00	-22.28	Peak
915	-	-	90.91	94.00	-3.09	Average

Antenna polarization: Vertical

Frequency (MHz)	Read Level (dBuV)	Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
915	60.66	27.50	88.16	114.00	25.84	Peak
915	-	-	87.35	94.00	-6.65	Average

Remark:

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

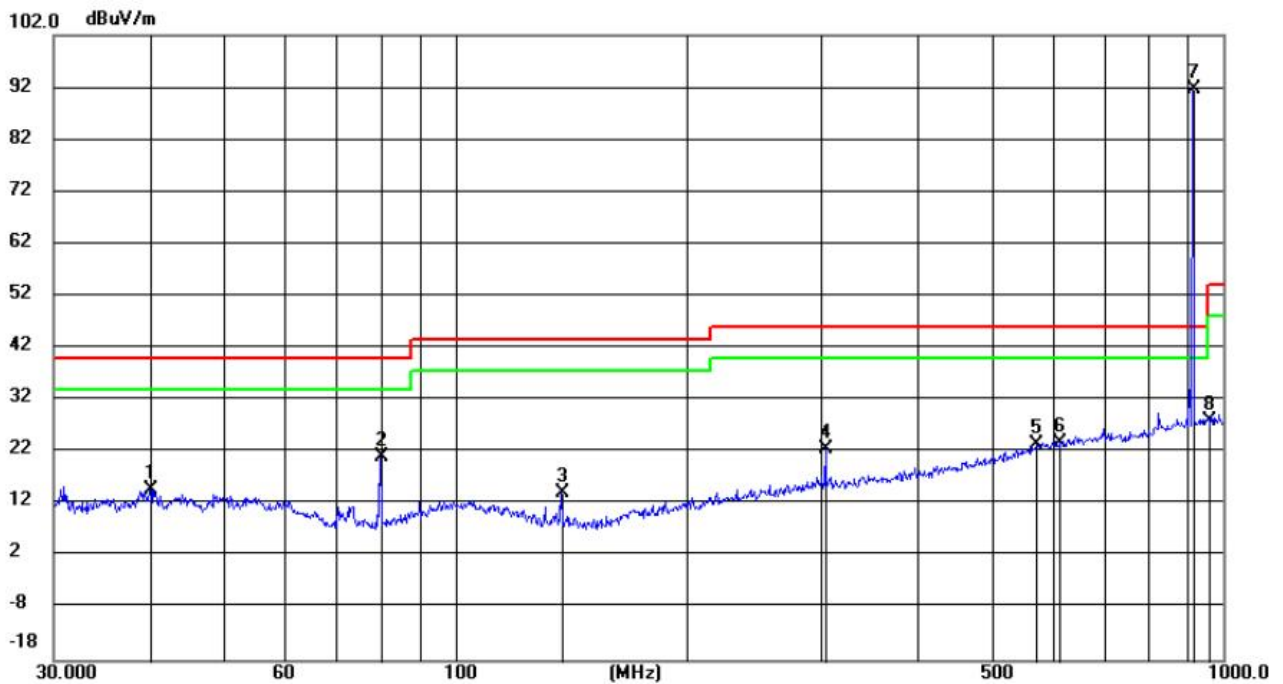
Spurious Emissions**9KHz-30MHz:**

9 kHz~30 MHz Field Strength of Unwanted Emissions. Quasi-Peak Measurement

The measurements with active loop antenna were greater than 20dB below the limit, so the test data were not recorded in the test report.

30MHz-1GHz & Restricted bands:

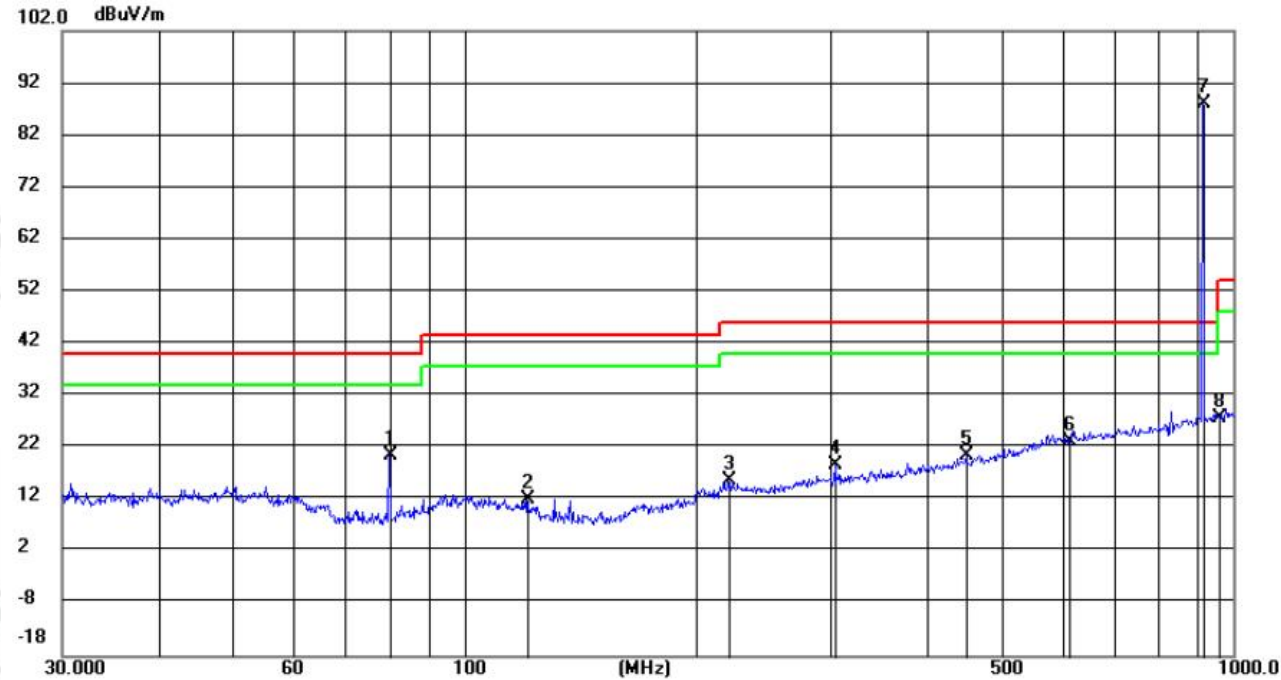
Horizontal:



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Margin	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		40.0854	0.81	14.09	14.90	40.00	-25.10	peak	199	228
2		80.0104	11.49	9.55	21.04	40.00	-18.96	peak	199	0
3		137.4924	4.70	9.64	14.34	43.50	-29.16	peak	100	48
4		304.2363	5.86	16.65	22.51	46.00	-23.49	peak	100	345
5		572.1126	0.67	22.74	23.41	46.00	-22.59	peak	199	280
6		614.0000	0.27	23.61	23.88	46.00	-22.12	peak	199	254
7	*	915.1055	64.22	27.50	91.72	46.00	45.72	peak	199	352
8		960.0000	0.27	27.77	28.04	46.00	-17.96	peak	199	125

Note: No.7 is the main frequency point of product operation.

Vertical:



No.	Mk.	Freq.	Reading	Correct	Measure-	Limit	Margin	Antenna	Table	
		MHz	Level	Factor	ment			Height	Degree	
			dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		80.0104	10.94	9.55	20.49	40.00	-19.51	peak	100	263
2		121.0170	0.59	11.70	12.29	43.50	-31.21	peak	199	167
3		220.8881	2.07	13.60	15.67	46.00	-30.33	peak	100	304
4		304.1830	2.20	16.65	18.85	46.00	-27.15	peak	199	136
5		450.6607	0.82	19.60	20.42	46.00	-25.58	peak	199	352
6		614.0000	-0.32	23.61	23.29	46.00	-22.71	peak	199	251
7	*	915.1055	60.66	27.50	88.16	46.00	42.16	peak	199	54
8		960.0000	0.05	27.77	27.82	46.00	-18.18	peak	199	125

Note: No.7 is the main frequency point of product operation.

Above 1GHz:

Test mode:					Transmitting (CH1)				
NO	Freq. [MHz]	Factor [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	1830.78	-24.54	56.84	32.30	74.00	41.70	PASS	Horizontal	PK
2	2745.27	-22.09	57.12	35.03	74.00	38.97	PASS	Horizontal	PK
3	3659.76	-20.33	54.36	34.03	74.00	39.97	PASS	Horizontal	PK
4	5489.64	-14.37	53.72	39.35	74.00	34.65	PASS	Horizontal	PK
5	7624.66	-11.20	50.60	39.40	74.00	34.60	PASS	Horizontal	PK
6	10065.6	-7.37	60.06	52.69	74.00	21.31	PASS	Horizontal	PK
7	1830.78	-24.54	59.51	34.97	74.00	39.03	PASS	Vertical	PK
8	2710.17	-22.22	56.72	34.50	74.00	39.50	PASS	Vertical	PK
9	3659.76	-20.33	61.96	41.63	74.00	32.37	PASS	Vertical	PK
10	4575.15	-16.87	57.42	40.55	74.00	33.45	PASS	Vertical	PK
11	7674.16	-11.01	50.70	39.69	74.00	34.31	PASS	Vertical	PK
12	9147.61	-8.17	49.88	41.71	74.00	32.29	PASS	Vertical	PK

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:

$$\text{Final Test Level} = \text{Receiver Reading} + \text{Correct Factor}$$

$$\text{Correct Factor} = \text{Antenna Factor} + \text{Cable Factor} - \text{Preamplifier Factor}$$
- 2) Scan from 9kHz to 18GHz, 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. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported .

5.3 20dB Bandwidth

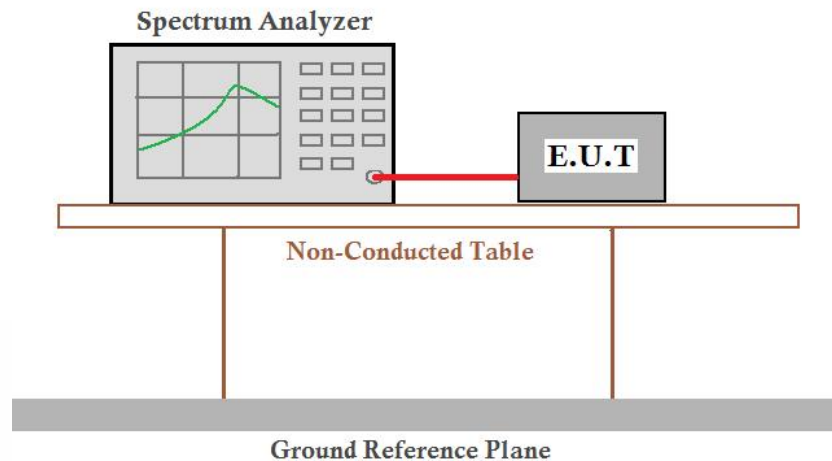
Test Requirement:

47 CFR Part 15C Section 15.215

Test Method:

ANSI C63.10: 2013

Test Setup:



Test Procedure:

Remark: Offset=Cable loss+ attenuation factor.

1) The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

2) Set to the maximum power setting and enable the EUT transmit continuously.

3) Use the following spectrum analyzer settings for 20dB Bandwidth measurement.

Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a test channel; $1\% \leq \text{RBW} \leq 5\%$ of the 20 dB bandwidth; $\text{VBW} \geq 3\text{RBW}$;

Sweep = auto; Detector function = peak; Trace = max hold.

4) Measure and record the results in the test report.

Limit:

N/A

Test Mode:

Transmitter mode

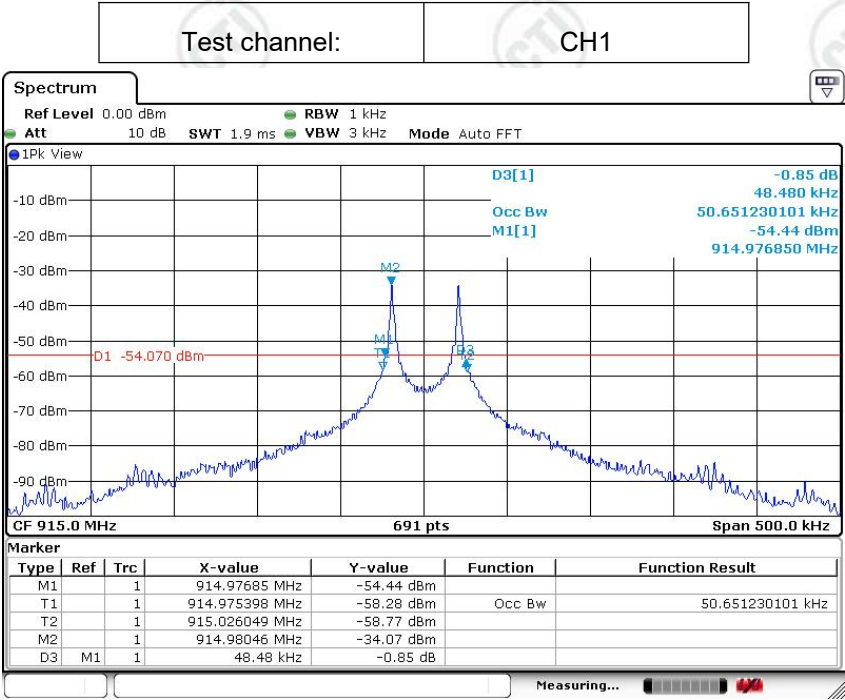
Test Results:

Pass

Measurement Data

Test Channel	20dB bandwidth (kHz)	Limit (kHz)	Results
CH1	48.80	N/A	Pass

Test plot as follows:



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