

FCC TEST REPORT

Product : Good Night Light Remote
Trade mark : Novostella
Model/Type reference : BNL-01
Serial Number : N/A
Report Number : EED32M00164301
FCC ID : 2AWONBNL-01
Date of Issue : Aug. 04, 2020
Test Standards : 47 CFR Part 15, Subpart C
Test result : PASS

Prepared for:

Shenzhen Ustellar Technology Ltd.
Rm.201, A Bldg., No. A Qianhai 1st Rd., Shen' gang
Cooperation Zone, Qianhai, Shenzhen, CHINA 518000

Prepared by:

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Date:

Aug. 04, 2020

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Check No.:2447683068



2 Version

Version No.	Date	Description
00	Aug. 04, 2020	Original

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

Remark:

The tested sample(s) and the sample information are provided by the client.

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5 General Information

5.1 Client Information

Applicant:	Shenzhen Ustellar Technology Ltd.
Address of Applicant:	Rm.201, A Bldg., No. A Qianhai 1st Rd., Shen' gang Cooperation Zone, Qianhai, Shenzhen, CHINA 518000
Manufacturer:	Shenzhen Ustellar Technology Ltd.
Address of Manufacturer:	Rm.201, A Bldg., No. A Qianhai 1st Rd., Shen' gang Cooperation Zone, Qianhai, Shenzhen, CHINA 518000
Factory:	Shenzhen Ustellar Technology Ltd.
Address of Factory:	Rm.201, A Bldg., No. A Qianhai 1st Rd., Shen' gang Cooperation Zone, Qianhai, Shenzhen, CHINA 518000

5.2 General Description of EUT

Product Name:	Good Night Light Remote	
Model No.(EUT):	BNL-01	
Trade Mark:	Novostella	
EUT Supports Radios application	433.92MHz	
Power Supply:	Battery	AAA 1.5V*2

5.3 Product Specification subjective to this standard

Frequency Range:	433.92MHz
Modulation Type:	ASK
Number of Channels:	1 (declared by the client)
Test Power Grade:	Default
Test Software of EUT:	Default
Antenna Type:	PCB antenna
Antenna Gain:	3dBi
Test voltage:	Battery 3.0V
Sample Received Date:	Jun. 10, 2020
Sample tested Date:	Jun. 10, 2020 to Jul. 17, 2020

5.4 Test Environment and Mode

Operating Environment:	
Temperature:	24.0 °C
Humidity:	54 % RH
Atmospheric Pressure:	1010 mbar
Test mode:	
Transmitting mode:	Keep the EUT in transmitting mode with modulation.

5.5 Description of Support Units

The EUT has been tested independently

5.6 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

5.7 Deviation from Standards

None.

5.8 Abnormalities from Standard Conditions

None.

5.9 Other Information Requested by the Customer

None.

5.10 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	4.3dB (30MHz-1GHz)
		4.5dB (1GHz-12.75GHz)
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%

6 Equipment List

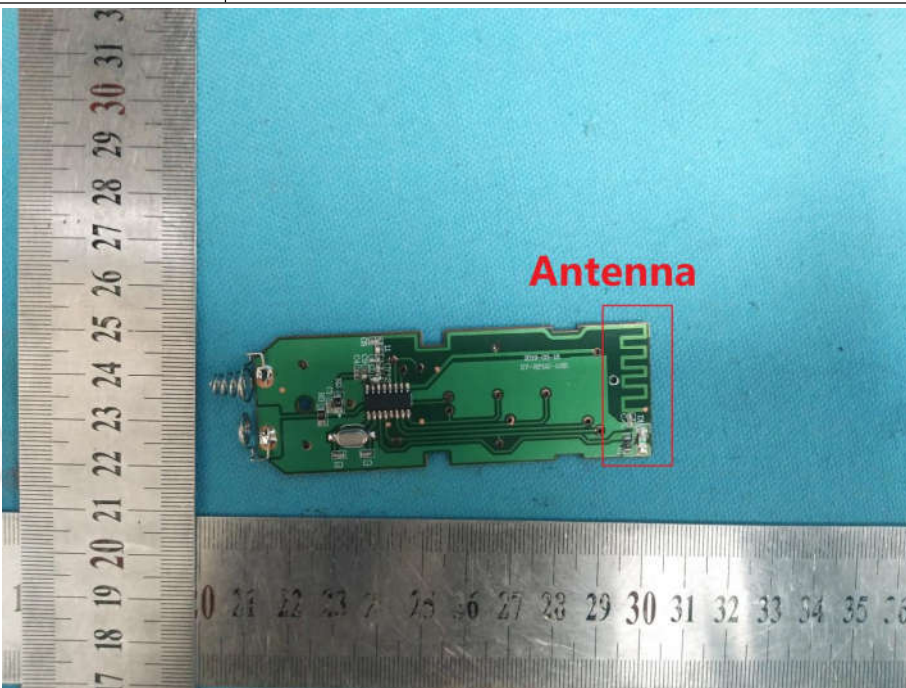
RF test system					
Equipment	Manufacturer	Model No.	Serial Number	Cal. Date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
Spectrum Analyzer	R&S	FSP40	100416	04-22-2020	04-21-2021
Signal Generator	Keysight	N5181A	MY46240094	02-17-2020	02-16-2021
Signal Generator	Keysight	N5182B	MY53051549	02-17-2020	02-16-2021
Temperature/ Humidity Indicator	biaozhi	HM10	1804186	07-26-2019 06-29-2020	07-25-2020 06-28-2021
High-pass filter	Sinoscite	FL3CX03WG18N M12-0398-002	---	---	---
High-pass filter	MICRO- TRONICS	SPA-F-63029-4	---	---	---
band rejection filter	Sinoscite	FL5CX01CA09C L12-0395-001	---	---	---
band rejection filter	Sinoscite	FL5CX01CA08C L12-0393-001	---	---	---
band rejection filter	Sinoscite	FL5CX02CA04C L12-0396-002	---	---	---
band rejection filter	Sinoscite	FL5CX02CA03C L12-0394-001	---	---	---
Communicatio n test set	R&S	CMW500	107929	04-26-2020	04-25-2021
DC Power	Keysight	E3642A	MY54426072	02-17-2020	02-16-2021
PC-1	Lenovo	R4960d	---	---	---
BT&WI-FI Automatic control	R&S	OSP120	101374	02-17-2020	02-16-2021
RF control unit	JS Tonscend	JS0806-2	15860006	02-17-2020	02-16-2021
BT&WI-FI Automatic test software	JS Tonscend	JS1120-2	---	---	---
high-low temperature test chamber	DongGuangQin Zhuo	LK-80GA	QZ201506118 79	02-19-2020	02-18-2021

3M Semi/full-anechoic Chamber					
Equipment	Manufacturer	Model No.	Serial Number	Cal. date (mm-dd-yyyy)	Cal. Due date (mm-dd-yyyy)
3M Chamber & Accessory Equipment	TDK	SAC-3	---	05-24-2019	05-23-2022
TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-618	05-16-2020	05-15-2021
Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-076	04-25-2018	04-24-2021
Receiver	R&S	ESCI7	100938-003	10-21-2019	10-20-2020
Multi device Controller	matur	NCD/070/107 11112	---	---	---
Temperature/ Humidity Indicator	Shanghai qixiang	HM10	1804298	07-26-2019 06-29-2020	07-25-2020 06-28-2021
Cable line	Fulai(7M)	SF106	5219/6A	---	---
Cable line	Fulai(6M)	SF106	5220/6A	---	---
Cable line	Fulai(3M)	SF106	5216/6A	---	---
Cable line	Fulai(3M)	SF106	5217/6A	---	---

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	03-05-2020	03-04-2021
Spectrum Analyzer	Keysight	N9020B	MY57111112	03-05-2020	03-04-2021
Spectrum Analyzer	Keysight	N9030B	MY57140871	03-05-2020	03-04-2021
TRILOG Broadband Antenna	Schwarzbeck	VULB 9163	9163-1148	04-25-2018	04-24-2021
Horn Antenna	Schwarzbeck	BBHA 9170	9170-832	04-25-2018	04-24-2021
Horn Antenna	ETS-LINDGREN	3117	00057407	07-10-2018	07-09-2021
Preamplifier	EMCI	EMC184055SE	980596	05-20-2020	05-19-2021
Preamplifier	EMCI	EMC001330	980563	04-22-2020	04-21-2021
Preamplifier	JS Tonscend	980380	EMC051845 SE	01-09-2020	01-08-2021
Temperature/ Humidity Indicator	biaozhi	GM1360	EE1186631	04-27-2020	04-26-2021
Fully Anechoic Chamber	TDK	FAC-3	---	01-17-2018	01-16-2021
Filter bank	JS Tonscend	JS0806-F	188060094	04-10-2018	04-09-2021
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	---	---

7 Test results and Measurement Data

7.1 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 3dBi.	

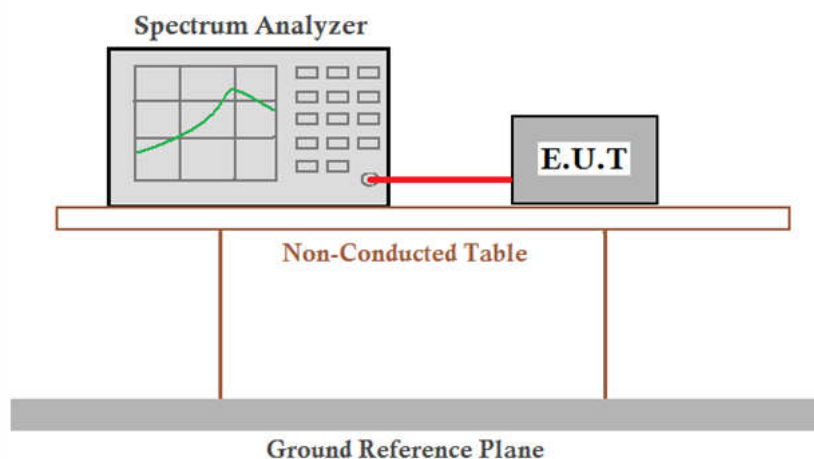
7.2 Spurious Emissions

7.2.1 Duty Cycle

Test Requirement: 47 CFR Part 15C Section 15.35 (c)

Test Method: ANSI C63.10

Test Setup:



Limit: N/A

Test Mode: Transmitting mode

Instruments Used: Refer to section 6 for details

Test Results: Pass

Product: Good Night Light

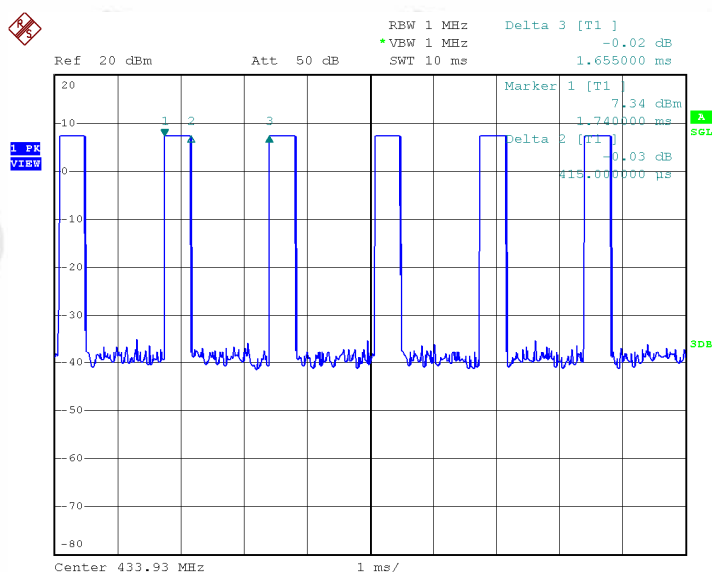
Model/Type reference: BNL-01

Temperature: 24°C

Humidity: 54%

Channel (Frequency)	Duty Cycle	Requirement	Conclusion
433.92MHz	25.15%	N/A	Pass

Test plot as follows:



Date: 7.JUN.2020 10:12:26

7.2.2 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	
	433.92MHz	80.8		Average Value	
		100.8		Peak Value	

Test Procedure:	a. 1) Below 1G: The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. 2) Above 1G: The EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation. Note: For the radiated emission test above 1GHz: Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower. c. 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. d. 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. e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. f. 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. g. The radiation measurements are performed in X, Y, Z axis positioning. And found the Z axis positioning which it is worse case, Only the test worst case mode is recorded in the report.
Test Setup:	

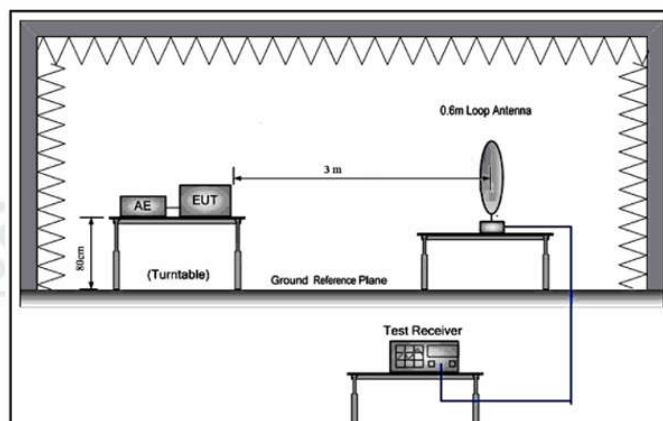


Figure 1. Below 30MHz

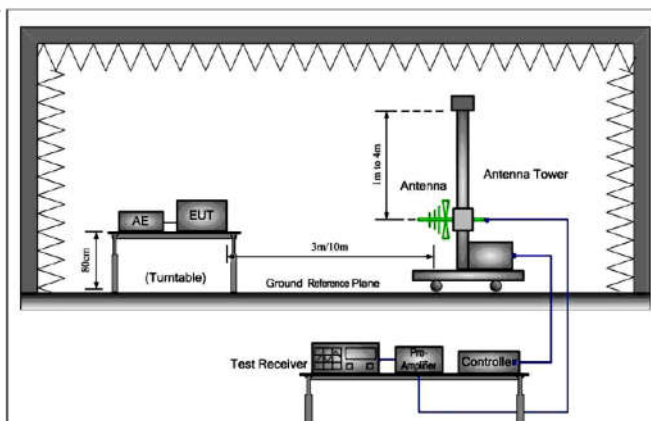


Figure 2. 30MHz to 1GHz

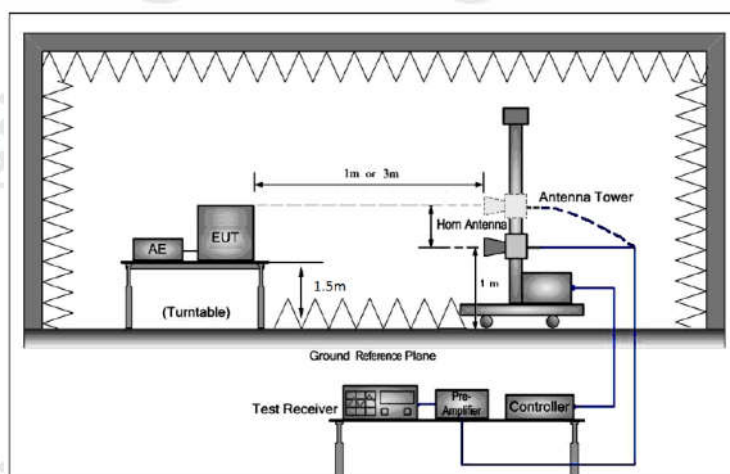


Figure 3. Above 1 GHz

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

Test data

Field Strength of the Fundamental Signal

Frequency (MHz)	Factor (dB)	Read Level (dBuV)	Peak Value (dBμV/m)	PDCF (dB)	Average value (dBuV/m)	Average Limit (dBμV/m)	Over Limit (dB)	Polarization
433.943	15.94	82.20	68.76	-12.01	56.75	80.8	-24.05	H
433.943	15.94	62.80	49.36	-12.01	37.35	80.8	-43.45	V

Average value:

Calculate Formula:	Average value=Peak value + PDCF
	PDCF=20 log(Duty cycle)
	Duty cycle= T on time / T period
Test data:	Ton time =0.415ms
	T period =1.655ms
	PDCF= 20 log(Duty cycle)=20 log(0.415/1.655)= -12.01dB

Spurious Emissions
below 1GHz

Channel:			433								
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	130.0170	7.70	1.33	-32.02	40.16	17.17	43.50	26.33	Pass	H	PK
2	240.0260	11.94	1.84	-31.90	41.36	23.24	46.00	22.76	Pass	H	PK
3	379.7200	14.95	2.32	-31.89	48.12	33.50	46.00	12.50	Pass	H	PK
4	600.0290	19.00	2.96	-31.50	44.31	34.77	46.00	11.23	Pass	H	PK
5	759.3189	20.45	3.31	-32.05	48.00	39.71	46.00	6.29	Pass	H	PK
6	867.8728	21.71	3.54	-31.75	48.63	42.13	46.00	3.87	Pass	H	PK
7	53.0883	12.71	0.82	-32.02	41.48	22.99	40.00	17.01	Pass	V	PK
8	150.0010	7.55	1.45	-32.01	48.55	25.54	43.50	17.96	Pass	V	PK
9	240.0260	11.94	1.84	-31.90	43.15	25.03	46.00	20.97	Pass	V	PK
10	299.9780	13.20	2.06	-31.40	42.01	25.87	46.00	20.13	Pass	V	PK
11	600.0290	19.00	2.96	-31.50	42.90	33.36	46.00	12.64	Pass	V	PK
12	875.0515	21.80	3.55	-31.70	38.39	32.04	46.00	13.96	Pass	V	PK

Above 1GHz

Channel:			433								
NO	Freq. [MHz]	Ant Factor [dB]	Cable loss [dB]	Pream gain [dB]	Reading [dBμV]	Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Result	Polarity	Remark
1	1301.8521	28.20	2.97	-42.78	72.13	60.52	74.00	13.48	Pass	H	PK
2	2169.8868	31.94	3.26	-43.17	74.61	66.64	74.00	7.36	Pass	H	PK
3	2603.3441	32.57	3.53	-43.11	72.49	65.48	74.00	8.52	Pass	H	PK
4	4339.4136	34.28	4.26	-42.87	55.80	51.47	74.00	22.53	Pass	H	PK
5	5009.7604	34.51	4.75	-42.80	50.62	47.08	74.00	26.92	Pass	H	PK
6	6943.5177	36.08	5.77	-42.24	51.26	50.87	74.00	23.13	Pass	H	PK
7	1301.8521	28.20	2.97	-42.78	55.66	44.05	54.00	9.95	Pass	H	AV
8	2169.8868	31.94	3.26	-43.17	55.54	47.57	54.00	6.43	Pass	H	AV
9	2603.3441	32.57	3.53	-43.10	54.42	47.42	54.00	6.58	Pass	H	AV
10	1301.8521	28.20	2.97	-42.78	57.93	46.32	74.00	27.68	Pass	V	PK
11	2169.3268	31.94	3.26	-43.17	55.13	47.16	74.00	26.84	Pass	V	PK
12	2603.3441	32.57	3.53	-43.11	55.38	48.37	74.00	25.63	Pass	V	PK
13	5018.7207	34.52	4.76	-42.80	51.74	48.22	74.00	25.78	Pass	V	PK
14	6992.7997	36.10	5.67	-42.20	49.63	49.20	74.00	24.80	Pass	V	PK
15	9786.1914	37.71	6.77	-42.09	49.62	52.01	74.00	21.99	Pass	V	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:

Final Test Level = Receiver Reading - Correct Factor

Correct Factor = Preamplifier Factor - Antenna Factor - Cable Factor

- 2) Scan from 9kHz to 25GHz, 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. The amplitude of spurious emissions from the radiator which are attenuated more than 20dB below the limit need not be reported.

7.3 20dB Bandwidth

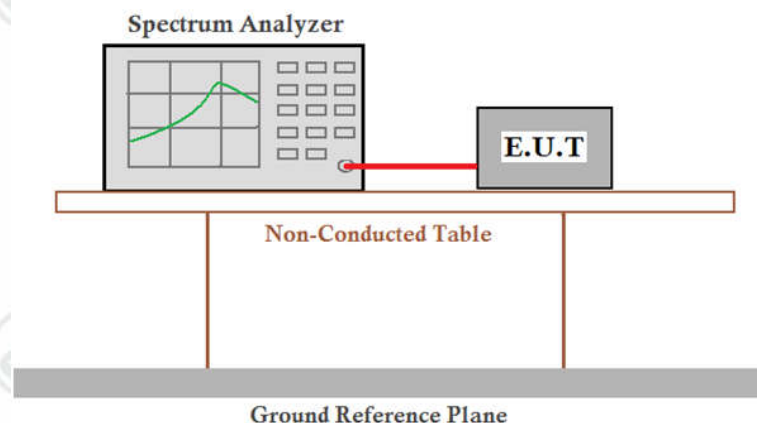
Test Requirement: 47 CFR Part 15C Section 15.231 (c)

Test Method: ANSI C63.10

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 Setup:



Test Mode: Transmitting mode

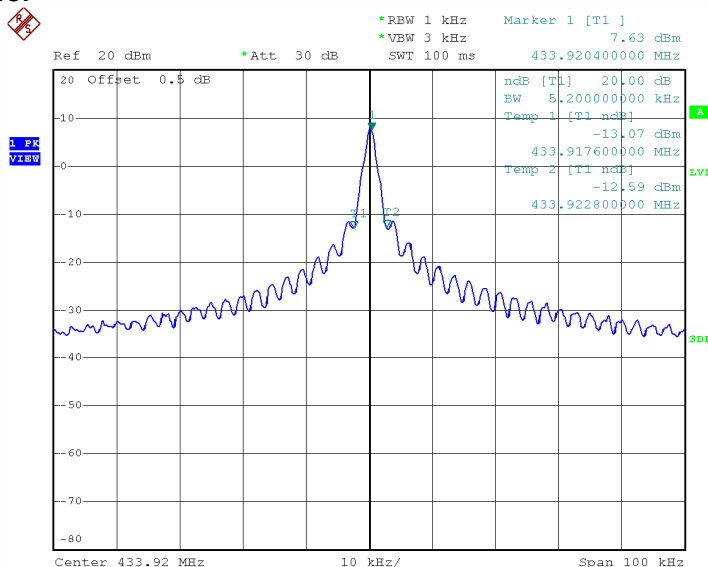
Instruments Used: Refer to section 6 for details

Test Results: Pass

Measurement Data

20dB bandwidth (MHz)	Limit (MHz)	Results
0.0052	1.0849	PASS

Test plot as follows:



Date: 22.JUN.2020 15:41:42

7.4 Dwell time

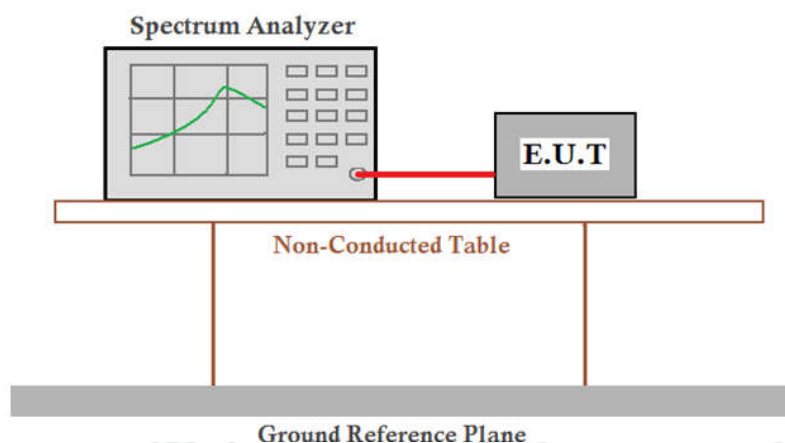
Test Requirement:

47 CFR Part 15C Section 15.231 (a) (3)

Test Method:

ANSI C63.10

Test Setup:



Limit:

There is no limit on the number of individual transmitter, total transmitter time does not exceed two seconds per hour

Test Mode:

Transmitting mode

Instruments Used:

Refer to section 6 for details

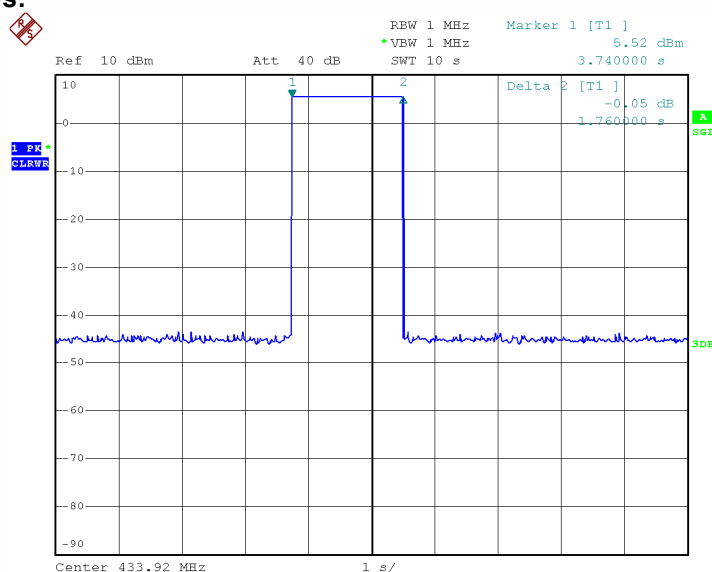
Test Results:

Pass

Measurement Data

Test item	Limit (MHz)	Results
Transmitting time	≤5S	1.760000S

Test plot as follows:



Date: 10.JUL.2020 18:37:29