FCC TEST REPORT

FCC ID: 2BNOYMAX-RC031213

Report No.	:	SSP25010079-1E
Applicant	:	MAXILLUM SCIEN-TECH LIGHTING CO., LTD.
Product Name	:	Remote Control
Model Name	:	W4011-S441RGBR15
Test Standard	:	FCC Part 15.231
Date of Issue	:	2025-02-08

Shenzhen CCUT Quality Technology Co., Ltd.
1F, Building 35, Changxing Technology Industrial Park, Yutang Street, Guangming District, Shenzhen, Guangdong, China; (Tel.:+86-755-23406590 website: www.ccuttest.com)

Test Report Basic Information

Applicant.....:	MAXILLUM SCIEN-TECH LIGHTING CO., LTD.
Address of Applicant.....:	No.9, Xiang'an Road, Anzhen Town, Xishan District, WUXI Jiangsu China 214105
Manufacturer.....:	MAXILLUM SCIEN-TECH LIGHTING CO., LTD.
Address of Manufacturer.....:	No.9, Xiang'an Road, Anzhen Town, Xishan District, WUXI Jiangsu China 214105
Product Name.....:	Remote Control
Brand Name.....:	-
Main Model.....:	W4011-S441RGBR15
Series Models.....:	-
Test Standard.....:	FCC Part 15 Subpart C ANSI C63.4-2014 ANSI C63.10-2013
Date of Test .....:	2025-01-22 to 2025-02-07
Test Result.....:	PASS

Tested By .....: Colin Chen (Colin Chen)

Reviewed By.....: Lieber Ouyang (Lieber Ouyang)

Authorized Signatory.....: Lahm Peng (Lahm Peng)

Shenzhen CCUT Quality Technology Co., Ltd. APPROVED

Note : This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen CCUT Quality Technology Co., Ltd.. All test data presented in this test report is only applicable to presented test sample.

CONTENTS

Revision History

Revision	Issue Date	Description	Revised By
V1.0	2025-02-08	Initial Release	Lahm Peng

1. General Information

1.1 Product Information

Product Name:	Remote Control
Trade Name:	-
Main Model:	W4011-S441RGBR15
Series Models:	-
Rated Voltage:	DC 12V by battery
Test Sample No:	SSP25010079-1
Hardware Version:	1.0
Software Version:	1.0
Note 1: The test data is gathered from a production sample, provided by the manufacturer.	

Wireless Specification	
Operating Frequency:	433.92MHz
Max. Field Strength:	75.83dBuV/m
Modulation:	FSK
Antenna Gain:	-0.58dBi
Type of Antenna:	Integral antenna
Type of Device:	☒ Portable Device ☐ Mobile Device ☐ Modular Device

1.2 Test Setup Information

List of Test Modes			
Test Mode	Description	Remark	
TM1	Transmitting	433.92MHz	
List and Details of Auxiliary Cable			
Description	Length (cm)	Shielded/Unshielded	With/Without Ferrite
-	-	-	-
List and Details of Auxiliary Equipment			
Description	Manufacturer	Model	Serial Number
-	-	-	-

1.3 Compliance Standards

Compliance Standards	
FCC Part 15 Subpart C	FEDERAL COMMUNICATIONS COMMISSION, RADIO FREQUENCY DEVICES, Intentional Radiators
All measurements contained in this report were conducted with all above standards	
According to standards for test methodology	
FCC Part 15 Subpart C	FEDERAL COMMUNICATIONS COMMISSION, RADIO FREQUENCY DEVICES, Intentional Radiators
ANSI C63.4-2014	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Maintenance of compliance is the responsibility of the manufacturer or applicant. Any modification of the product, which result is lowering the emission, should be checked to ensure compliance has been maintained.	

1.4 Test Facilities

Laboratory Name:	**Shenzhen CCUT Quality Technology Co., Ltd.** 1F, Building 35, Changxing Technology Industrial Park, Yutang Street, Guangming District, Shenzhen, Guangdong, China
CNAS Laboratory No.:	L18863
A2LA Certificate No.:	6893.01
FCC Registration No:	583813
ISED Registration No.:	CN0164
All measurement facilities used to collect the measurement data are located at 1F, Building 35, Changxing Technology Industrial Park, Yutang Street, Guangming District, Shenzhen, Guangdong, China.	

1.5 List of Measurement Instruments

Description	Manufacturer	Model	Serial Number	Cal. Date	Due. Date
Conducted Emissions					
AMN	ROHDE&SCHWARZ	ENV216	101097	2024-08-07	2025-08-06
EMI Test Receiver	ROHDE&SCHWARZ	ESPI	100242	2024-08-07	2025-08-06
Test Cable	N/A	Cable 5	N/A	2024-08-07	2025-08-06
EMI Test Software	FARA	EZ-EMC	EMEC-3A1+	N/A	N/A
Radiated Emissions					
EMI Test Receiver	ROHDE&SCHWARZ	ESPI	100154	2024-08-07	2025-08-06
Spectrum Analyzer	KEYSIGHT	N9020A	MY48030972	2024-08-07	2025-08-06
Amplifier	SCHWARZBECK	BBV 9743B	00251	2024-08-07	2025-08-06
Amplifier	HUABO	YXL0518-2.5-45	--	2024-08-07	2025-08-06
Attenuator	QUANJUDA	6dB	220731	2024-08-07	2025-08-06
Loop Antenna	DAZE	ZN30900C	21104	2024-08-03	2025-08-02
Broadband Antenna	SCHWARZBECK	VULB 9168	01320	2024-08-03	2025-08-02
Horn Antenna	SCHWARZBECK	BBHA 9120D	02553	2024-08-03	2025-08-02
Test Cable	N/A	Cable 1	N/A	2024-08-07	2025-08-06
Test Cable	N/A	Cable 2	N/A	2024-08-07	2025-08-06
Test Cable	N/A	Cable 3	N/A	2024-08-07	2025-08-06
Test Cable	N/A	Cable 4	N/A	2024-08-07	2025-08-06
EMI Test Software	FARA	EZ-EMC	FA-03A2 RE+	N/A	N/A
Conducted RF Testing					
RF Test System	MWRFTest	MW100-RFCB	220418SQS-37	2024-08-07	2025-08-06
Spectrum Analyzer	KEYSIGHT	N9020A	ATO-90521	2024-08-07	2025-08-06

1.6 Measurement Uncertainty

Test Item	Conditions	Uncertainty
Conducted Emissions	9kHz ~ 30MHz	±1.64 dB
Radiated Emissions	9kHz ~ 30MHz	±2.88 dB
	30MHz ~ 1GHz	±3.32 dB
	1GHz ~ 18GHz	±3.50 dB
Transmission Time	9kHz ~ 26GHz	±1.0 %
Occupied Bandwidth	9kHz ~ 26GHz	±4.0 %

2. Summary of Test Results

FCC Rule	Description of Test Item	Result
FCC Part 15.203	Antenna Requirement	Passed
FCC Part 15.207	Conducted Emissions	N/A
FCC Part 15.209, 15.231(b)	Radiated Emissions	Passed
FCC Part 15.231(c)	Occupied Bandwidth	Passed
FCC Part 15.231(a)	Transmission Time	Passed
FCC Part 15.231(b)(2), 15.35(c)	Duty Cycle	Passed
Passed: The EUT complies with the essential requirements in the standard Failed: The EUT does not comply with the essential requirements in the standard N/A: Not applicable		

3. Antenna Requirement

3.1 Standard and Limit

According to FCC Part 15.203, 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 shall be considered sufficient to comply with the provisions of this section.

3.2 Test Result

This product has an Integral antenna, fulfill the requirement of this section.

4. Conducted Emissions

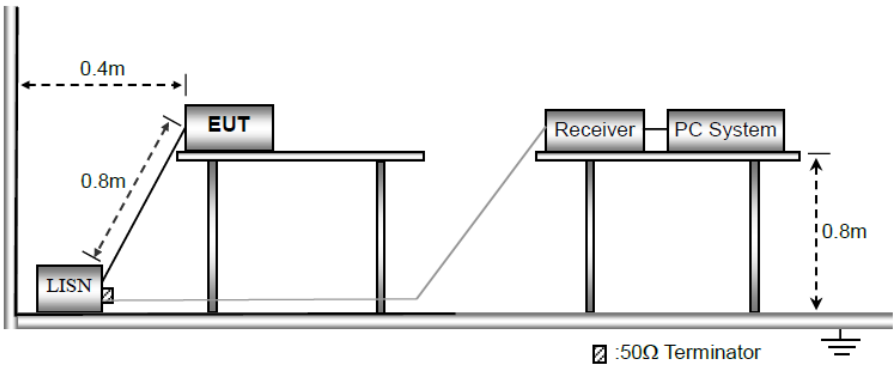
4.1 Standard and Limit

According to the rule FCC Part 15.207, Conducted emissions limit, the limit for a wireless device as below:

Frequency of Emission (MHz)	Conducted emissions (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56	56 to 46
0.5-5	56	46
5-30	60	50
Note 1: Decreases with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz Note 2: The lower limit applies at the band edges		

4.2 Test Procedure

Test is conducting under the description of ANSI C63.10 - 2013 section 6.2.



Test Setup Block Diagram

a) The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

b) The following is the setting of the receiver
Attenuation: 10dB
Start Frequency: 0.15MHz
Stop Frequency: 30MHz
IF Bandwidth: 9kHz

c) The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

d) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
e) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

f) LISN is at least 80 cm from nearest part of EUT chassis.

g) For the actual test configuration, please refer to the related Item - photographs of the test setup.

4.3 Test Data and Results

Because the product power is supply through DC 12V by Alkaline battery, so not applicable.

5. Radiated Emissions

5.1 Standard and Limit

According to §15.231(b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following.

Fundamental Frequency (MHz)	Field Strength of Fundamental (micorvolts/meter)	Field Strength of Spurious Emissions (micorvolts/meter)
40.66 - 40.70	2250	225
70 – 130	1250	125
130 – 174	1250 to 3750	125 to 375
174 – 260	3750	375
260 – 470	3750 to 12500	375 to 1250
Above 470	12500	1250
Note: Linear interpolations		

According to the rule FCC Part 15.209, Radiated emission limit for a wireless device as below:

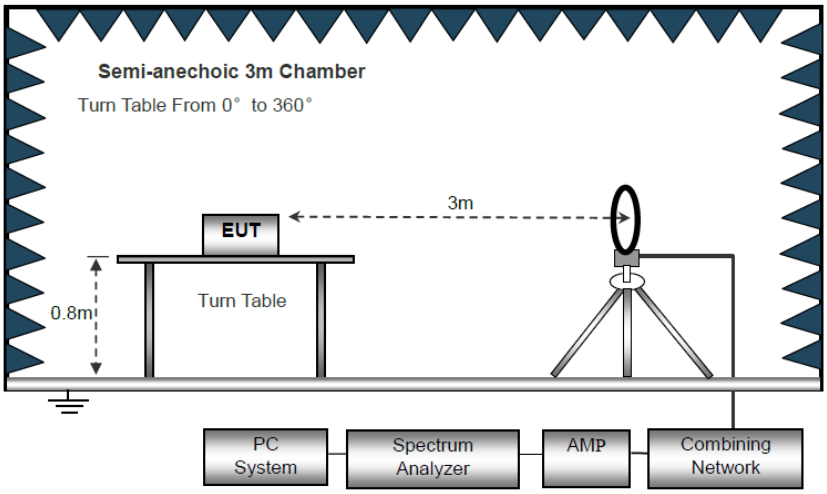
Frequency of Emission (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3
Note: The more stringent limit applies at transition frequencies.		

The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

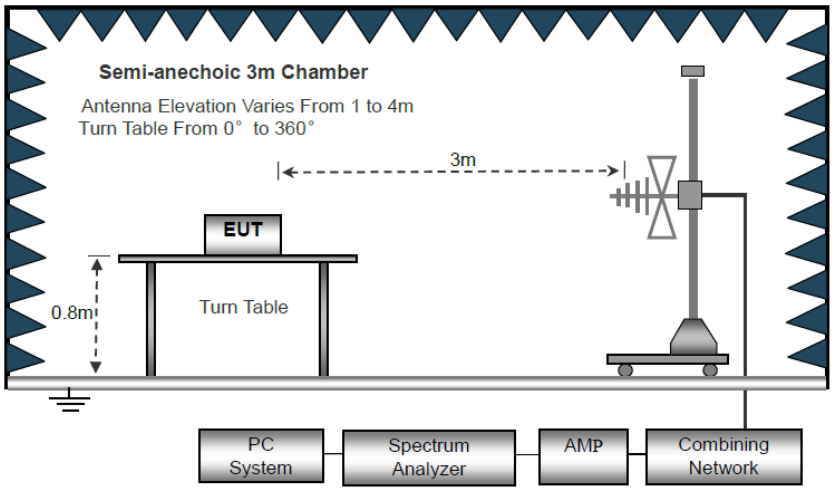
The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.
Note: Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

5.2 Test Procedure

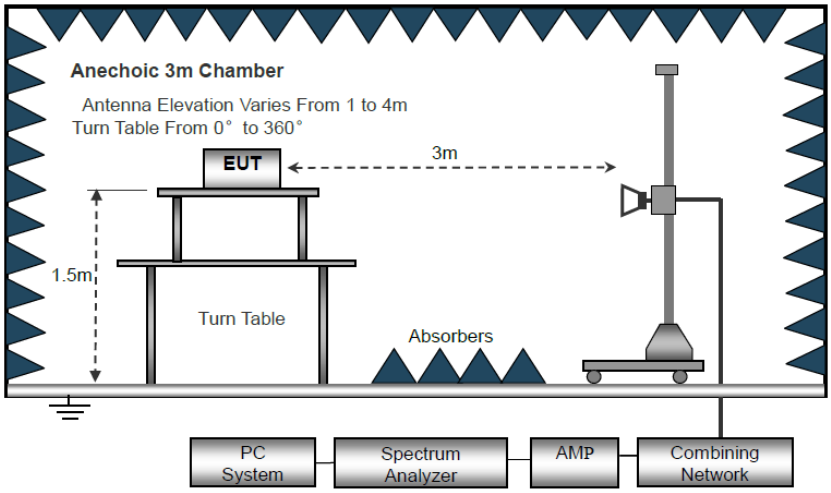
Test is conducting under the description of ANSI C63.10 - 2013 section 6.3 to 6.6.



Block Diagram of Radiated Emission Below 30MHz



Block Diagram of Radiated Emission From 30MHz to 1GHz



Block Diagram of Radiated Emission Above 1GHz

a) The EUT is placed on a turntable, which is 0.8m above ground plane for test frequency range blew 1GHz, and 1.5m above ground plane for test frequency range above 1GHz.

b) EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.

c) Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1GHz, 100 kHz for f < 1 GHz, 10kHz for f < 30MHz
VBW ≥ RBW, Sweep = auto
Detector function = peak
Trace = max hold

d) Follow the guidelines in ANSI C63.4-2014 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

e) The peak level, once corrected, must comply with the limit specified in Section 15.209. Set the RBW = 1MHz, VBW = 10Hz, Detector = PK for AV value, while maintaining all of the other instrument settings.

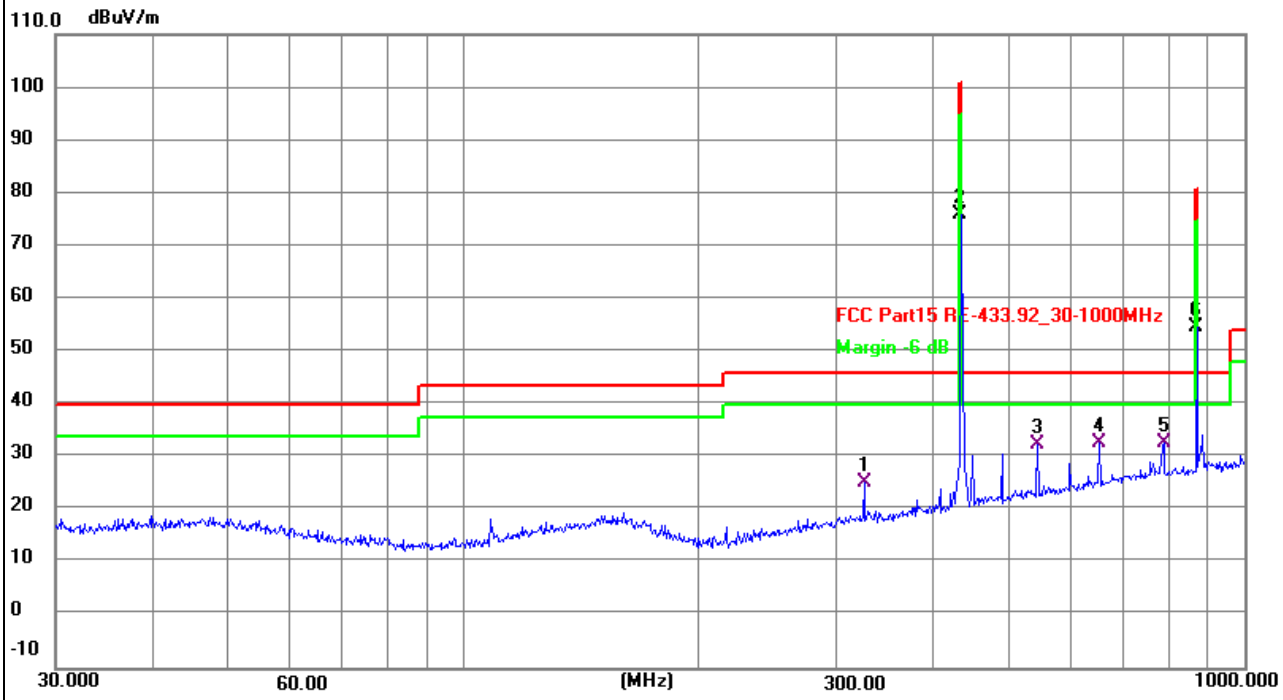
f) For the actual test configuration, please refer to the related item - EUT test photos.

5.3 Test Data and Results

Based on all tested data, the EUT complied with the FCC Part 15.231 and 15.209 standard limit for a wireless device, and with the worst case as below:

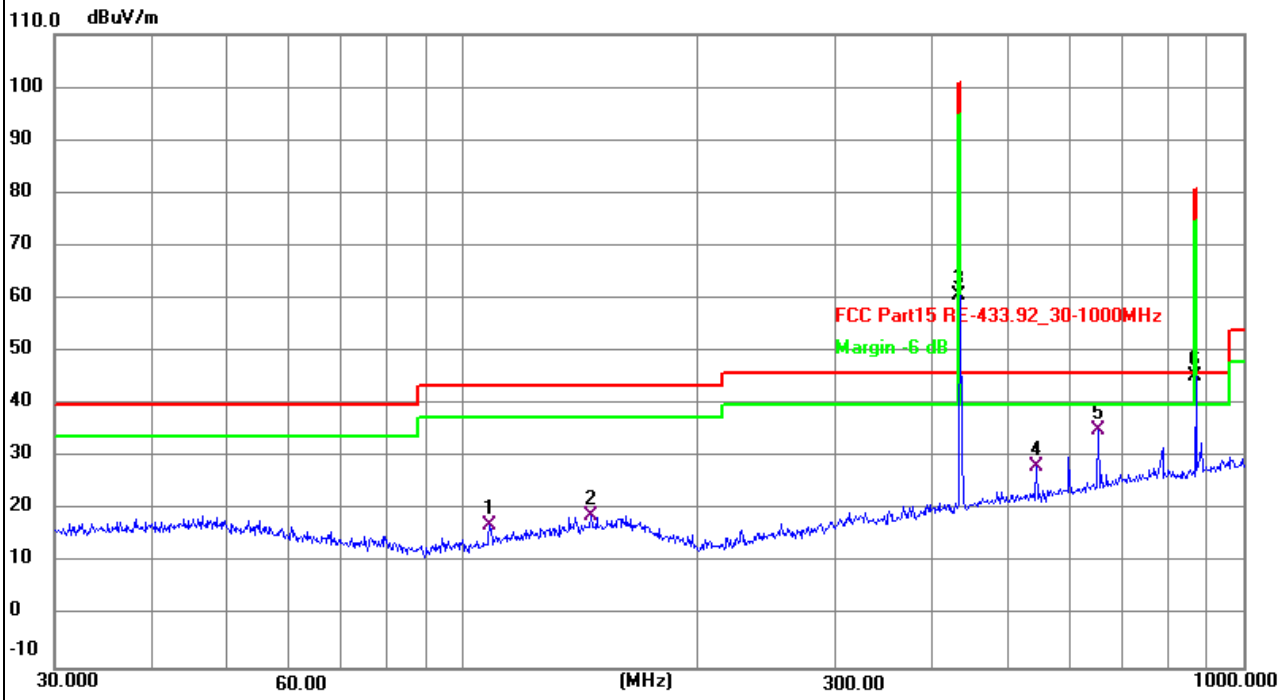
Remark: Level = Reading + Factor, Margin = Level - Limit

Radiated Emission Test Data (30MHz to 1GHz)	
Tested Mode:	TM1
Test Antenna Polarization:	Horizontal
Remark:	



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	325.5958	32.25	-7.09	25.16	46.00	-20.84	QP	100	184	P	
2	433.9200	80.68	-4.85	75.83	100.80	-24.97	peak	100	236	P	
3	543.2742	35.42	-2.83	32.59	46.00	-13.41	QP	100	162	P	
4 *	651.9417	33.42	-0.80	32.62	46.00	-13.38	QP	199	11	P	
5	787.8512	31.26	1.36	32.62	46.00	-13.38	QP	100	225	P	
6	867.8400	52.75	1.92	54.67	80.80	-26.13	peak	100	89	P	

Radiated Emission Test Data (30MHz to 1GHz)	
Tested Mode:	TM1
Test Antenna Polarization:	Vertical
Remark:	



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Azimuth (deg.)	P/F	Remark
1	108.2665	28.43	-11.15	17.28	43.50	-26.22	QP	100	32	P	
2	145.8610	26.89	-7.94	18.95	43.50	-24.55	QP	100	188	P	
3	433.9200	65.46	-4.85	60.61	100.80	-40.19	peak	100	158	P	
4	543.2741	30.94	-2.83	28.11	46.00	-17.89	QP	100	32	P	
5 *	651.9416	36.03	-0.80	35.23	46.00	-10.77	QP	100	84	P	
6	867.8400	43.30	1.92	45.22	80.80	-35.58	peak	100	325	P	

Radiated Emission Test Data (Below 1GHz)							
Frequency	PEAK result	Duty Cycle Factor	AV result	Limit	Margin	Polar	Detector
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	H/V	PK/AV
433.92	75.83	-7.49	68.34	80.8	-12.46	H	AV
867.84	54.67	-7.49	47.18	60.8	-13.62	H	AV
433.92	60.61	-7.49	53.12	80.8	-27.68	V	AV
867.84	45.22	-7.49	37.73	60.8	-23.07	V	AV

Radiated Emission Test Data (Above 1GHz)							
Frequency	Reading	Correct	Result	Limit	Margin	Polar	Detector
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	H/V	PK
1301.76	78.55	-24.55	54	74	-20	H	PK
1735.68	75.17	-23.71	51.46	80.8	-29.34	H	PK
1301.76	82.13	-24.55	57.58	74	-16.42	V	PK
1735.68	75.27	-23.71	51.56	80.8	-29.24	V	PK

Radiated Emission Test Data (Above 1GHz)							
Frequency	Reading	Duty Cycle Factor	Result	Limit	Margin	Polar	Detector
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	H/V	AV
1301.76	54	-7.49	46.51	54	-7.49	H	AV
1735.68	51.46	-7.49	43.97	60.8	-16.83	H	AV
1301.76	57.58	-7.49	50.09	54	-3.91	V	AV
1735.68	51.56	-7.49	44.07	60.8	-16.73	V	AV

Note 1: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

Note 2: Testing is carried out with frequency rang 9kHz to the tenth harmonics. The measurements greater than 20dB below the limit from 9kHz to 30MHz.

Note 3: Other emissions are attenuated 20dB below the limits from 9kHz to 30MHz, so it does not recorded report, above 1GHz not recorded for no spurious point have a margin of less than 6 dB with respect to the limits.

Note 4: Avg Emission Level=Peak Emission Level + Duty Cycle Factor, Duty Cycle Factor =-7.49.(refer to section 8 of this report)

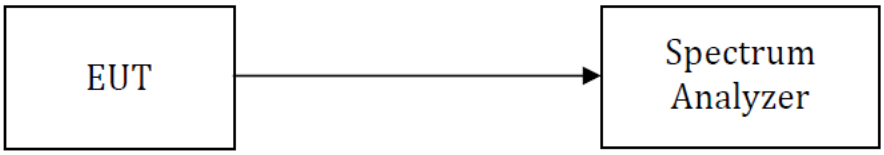
6. Occupied Bandwidth

6.1 Standard and Limit

According to FCC Part 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

6.2 Test Procedure

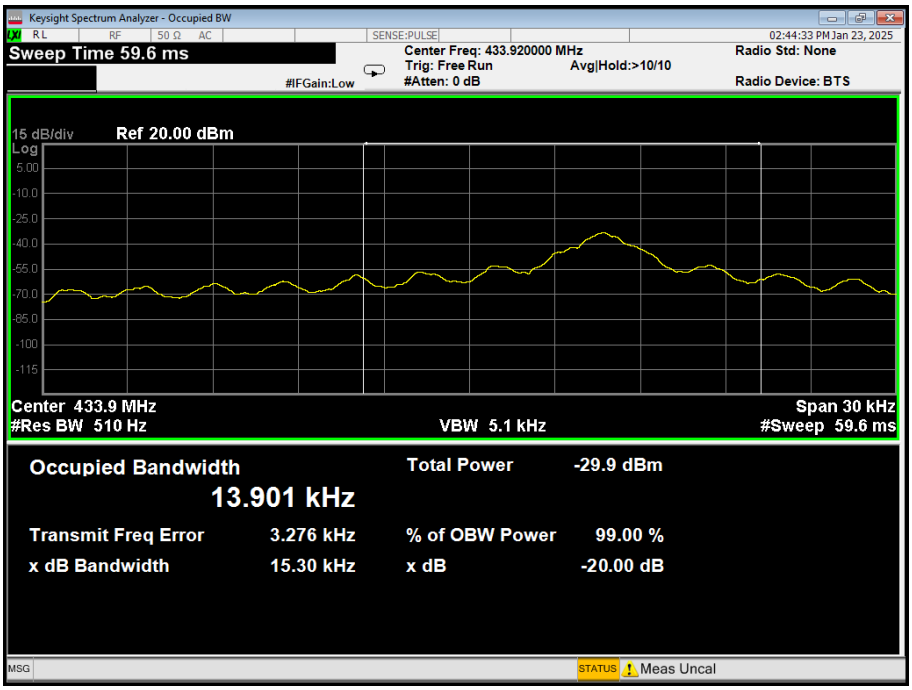
According to the ANSI 63.10-2013, section 6.9, the emission bandwidth test method as follows.
1) Remove the antenna from the EUT and connect to the spectrum analyzer via a low loss RF cable.
2) Set the spectrum analyzer to any one measured frequency within its operating range.
3) Set RBW to 1%~5% of bandwidth, VBW = 3RBW, Sweep = Auto.
4) Set a reference level on the measuring instrument equal to the highest peak value.
5) Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
All the trace to stabilize, use the marker-to-peak function to set the marker to the peak of the emission, use the marker-delta function to measure and record the 20dB down and 99% bandwidth of the emission.



Test Setup Block Diagram

6.3 Test Data and Results

Test Channel (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)	Limit (kHz)	Test Result
433.92MHz	15.30	13.901	1084.8	Pass

Test Plots of 20dB Bandwidth


7. Transmission Time

7.1 Standard and Limit

According to FCC Part 15.231 (a), the transmitter shall be complied the following requirements:
1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

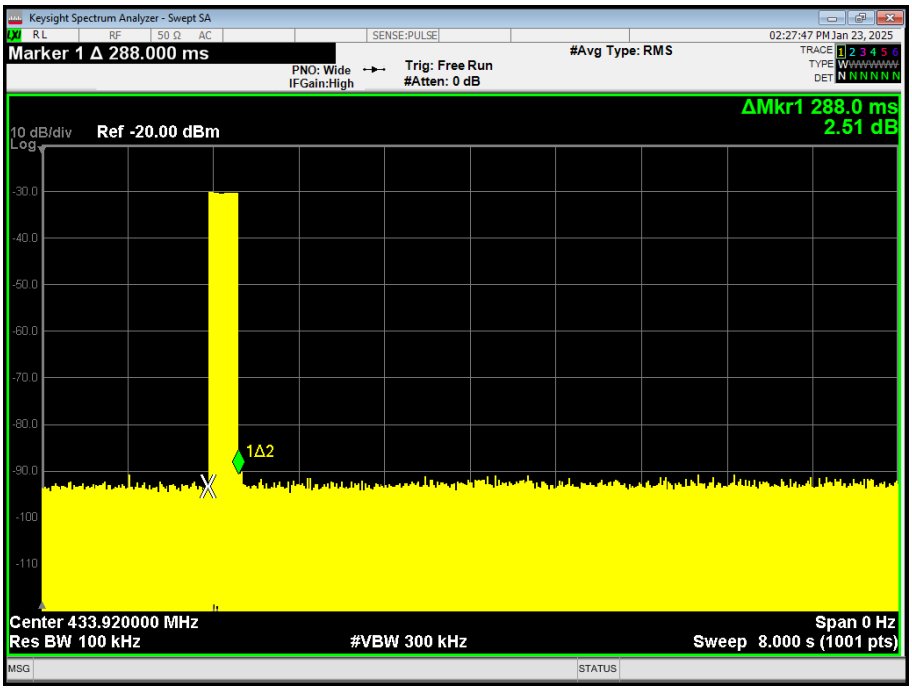
7.2 Test Procedure

1) Remove the antenna from the EUT and connect to the spectrum analyzer via a low loss RF cable.
2) Set the center frequency of the spectrum analyzer to the transmitter's operating frequency.
3) Set RBW = 1MHz, VBW = 3MHz, Detector = RMS.
4) Set the spectrum analyzer to Zero Span and adjust sweep time for the release time reading.
5) During the testing, the switch was released then the EUT automatically deactivated.

Test Setup Block Diagram

7.3 Test Data and Results

Transmission Type	Test Frequency MHz	Transmission Time s	Limit s	Result
Manually	433.92	0.288	5	Pass

Test Plots of Transmission Time


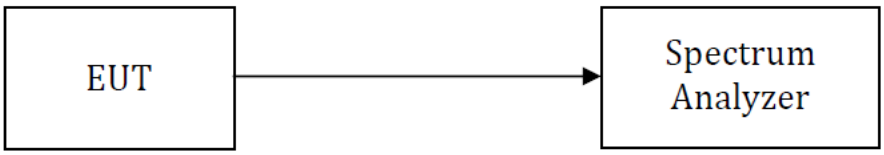
8. Duty Cycle

8.1 Standard and Limit

According to FCC Part 15.231 (b)(2) and 15.35 (c), For pulse operation transmitter, the averaging pulsed emissions are calculated by peak value of measured emission plus duty cycle factor.

8.2 Test Procedure

1) Remove the antenna from the EUT and connect to the spectrum analyzer via a low loss RF cable.
2) Set the center frequency of the spectrum analyzer to the transmitter's operating frequency.
3) Set RBW = 1MHz, VBW = 3MHz, Detector = RMS.
4) Set the spectrum analyzer to Zero Span and adjust sweep time for the release time reading.
5) During the testing, the switch was released then the EUT automatically deactivated.



Test Setup Block Diagram

8.3 Test Data and Results

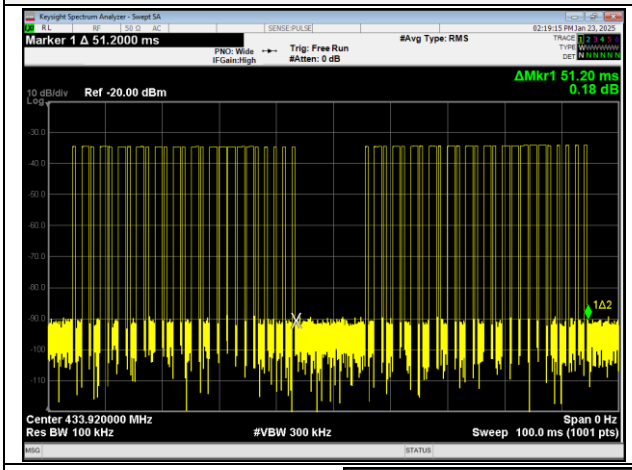
Type of Pulse	Width of Pulse ms	Quantity of Pulse	Transmission Time ms	Total Time(T_{on}) ms
Pulse 1	1.3	12	15.6	21.6
Pulse 2	0.5	12	6	

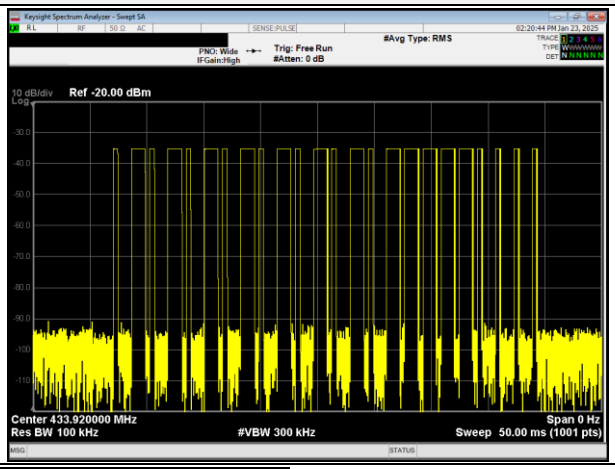
Total Time (Ton) ms	Test Period (Tp) ms	Duty Cycle %	Duty Cycle Factor dB
21.6	51.2	42.2	-7.49

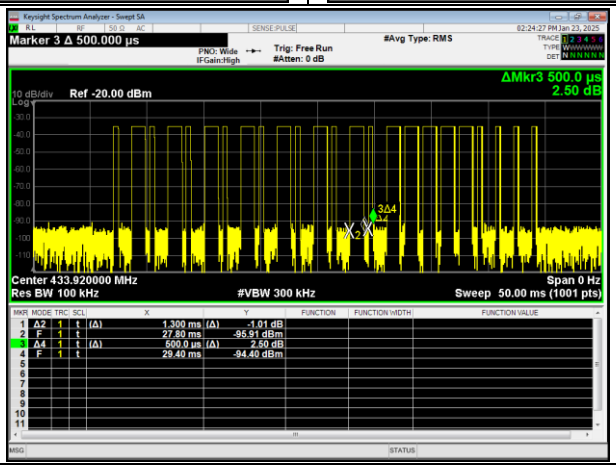
Note:

1. T_{on} = Pulse 1* Quantity of Pulse + Pulse 2* Quantity of Pulse+…Pulse N* Quantity of Pulse
2. Duty Cycle = (T_{on}/ T_p)*100%
3. Duty Cycle Factor = 20log(Duty Cycle)

Test Plots of Duty Cycle







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