

TEST REPORT

Reference No...... : WTX22X0803457W-1
FCC ID : 2A8VJB-2
Applicant : CM-GLO LLC
Address..... : 1201 N 4th Street, Watertown, WI 53098, USA
Product Name : Remote Control
Test Model. : Remote B -2
Standards : FCC Part 15.231
Date of Receipt sample : September 23, 2022
Date of Test..... : September 23, 2022 to October 8, 2022
Date of Issue : October 8, 2022
Test Result..... : **Pass**

Remarks:

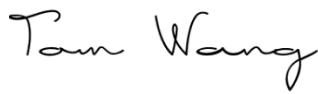
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Prepared By:

Waltek Testing Group (Shenzhen) Co., Ltd.

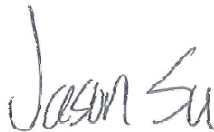
Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road,
Block 70 Bao'an District, Shenzhen, Guangdong, China

Tested by:



Tom Wang / Project Engineer

Reviewed By:



Jason Su / RF Manager

Approved & Authorized By:



Silin Chen / Manager

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: CM-GLO LLC
Address of applicant: 1201 N 4th Street, Watertown, WI 53098, USA

Manufacturer: CM-GLO LLC
Address of manufacturer: 1201 N 4th Street, Watertown, WI 53098, USA

General Description of EUT	
Product Name:	Remote Control
Trade Name:	/
Model No.:	Remote B-2
Adding Model(s):	Remote B-3
Rated Voltage:	Input: DC 18V, 3A
Serial Number:	S059S1
<i>Note: The test data is gathered from a production sample, provided by the manufacturer. The appearance of others models listed in the report is different from main-test model Remote B-2, but the circuit and the electronic construction do not change, declared by the manufacturer.</i>	

Technical Characteristics of EUT	
Frequency Range:	315MHz
Modulation:	FSK
Antenna Type:	Integral
Antenna Gain:	0dBi

1.2 Test Standards

FCC Part 15.231: Periodic operation in the band 40.66-40.70 MHz and above 70 MHz.

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission/immunity, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard for Testing Unlicensed Wireless Devices.

1.4 Test Facility

Address of the test laboratory

Laboratory: Waltek Testing Group (Shenzhen) Co., Ltd.

Address: 1/F., Room 101, Building 1, Hongwei Industrial Park, Liuxian 2nd Road, Block 70 Bao'an District, Shenzhen, Guangdong, China

FCC – Registration No.: 125990

Waltek Testing Group (Shenzhen) Co., Ltd. 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 our files. The Designation Number is CN5010, and Test Firm Registration Number is 125990.

1.5 EUT Setup and Test Mode

The EUT was operated at continuous transmitting mode that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	Transmitting	With modulation
TM2		
TM3		

Special Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
/	/	/	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
Occupied Bandwidth	Conducted	$\pm 1.5\%$
Conducted Spurious Emission	Conducted	$\pm 2.17\text{dB}$
Transmission Time	Conducted	$\pm 5\%$
Conducted Emissions	Conducted	$\pm 2.88\text{dB}$
Transmitter Spurious Emissions	Radiated	$\pm 5.1\text{dB}$

1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
SEMT-1075	Communication Tester	Rohde & Schwarz	CMW500	148650	2022-03-27	2023-03-26
SEMT-1063	GSM Tester	Rohde & Schwarz	CMU200	114403	2022-03-27	2023-03-26
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2022-03-27	2023-03-26
SEMT-1079	Spectrum Analyzer	Agilent	N9020A	US47140102	2022-03-27	2023-03-26
SEMT-1080	Signal Generator	Agilent	83752A	3610A01453	2022-03-27	2023-03-26
SEMT-1081	Vector Signal Generator	Agilent	N5182A	MY47070202	2022-03-27	2023-03-26
SEMT-1028	Power Divider	Weinschel	1506A	PM204	2022-03-27	2023-03-26
SEMT-1082	Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2022-03-27	2023-03-26
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2022-03-27	2023-03-26
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2022-03-27	2023-03-26
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2022-04-12	2023-04-11
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2022-04-12	2023-04-11
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2021-03-19	2023-03-18
SEMT-1068	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2021-03-19	2023-03-18
SEMT-1042	Horn Antenna	ETS	3117	00086197	2021-03-19	2023-03-18
SEMT-1121	Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170582	2021-04-27	2023-04-26
SEMT-1169	Pre-amplifier	Direction Systems Inc.	PAP-2640	14145-14153	2022-04-27	2023-04-26
SEMT-1163	Spectrum Analyzer	Rohde & Schwarz	FSP40	100612	2022-03-27	2023-03-26
SEMT-1166	Power Limiter	Agilent	N9356B	MY45450376	2022-03-27	2023-03-26
SEMT-1076	RF Switcher	Top Precision	RCS03-A2	/	2021-03-19	2023-03-18
SEMT-1096	Power Sensor	Agilent	U2021XA	MY54250019	2022-03-27	2023-03-26
SEMT-C001	Cable	Zheng DI	LL142-07-07-10M(A)	/	/	/
SEMT-C002	Cable	Zheng DI	ZT40-2.92J-2.92J-6M	/	/	/
SEMT-C003	Cable	Zheng DI	ZT40-2.92J-2.92J-2.5M	/	/	/
SEMT-C004	Cable	Zheng DI	2M0RFC	/	/	/
SEMT-C005	Cable	Zheng DI	1M0RFC	/	/	/
SEMT-C006	Cable	Zheng DI	1M0RFC	/	/	/

Software List

Description	Manufacturer	Model	Version
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EMI Test Software (Radiated Emission)*	Farad	EZ-EMC	RA-03A1
EMI Test Software (Conducted Emission)*	Farad	EZ-EMC	RA-03A1

*Remark: indicates software version used in the compliance certification testing.

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 15.203	Antenna Requirement	Compliant
§15.205	Restricted Band of Operation	Compliant
§ 15.207(a)	Conducted Emission	N/A
§ 15.209	Radiated Spurious Emissions	Compliant
§15.231(a)	Deactivation Testing	Compliant
§15.231(b)	Radiated Emissions	Compliant
§15.231(c)	20dB Bandwidth Testing	Compliant

N/A: Not applicable.

3. Antenna Requirement

3.1 Standard Applicable

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 a permanent antenna, fulfill the requirement of this section.

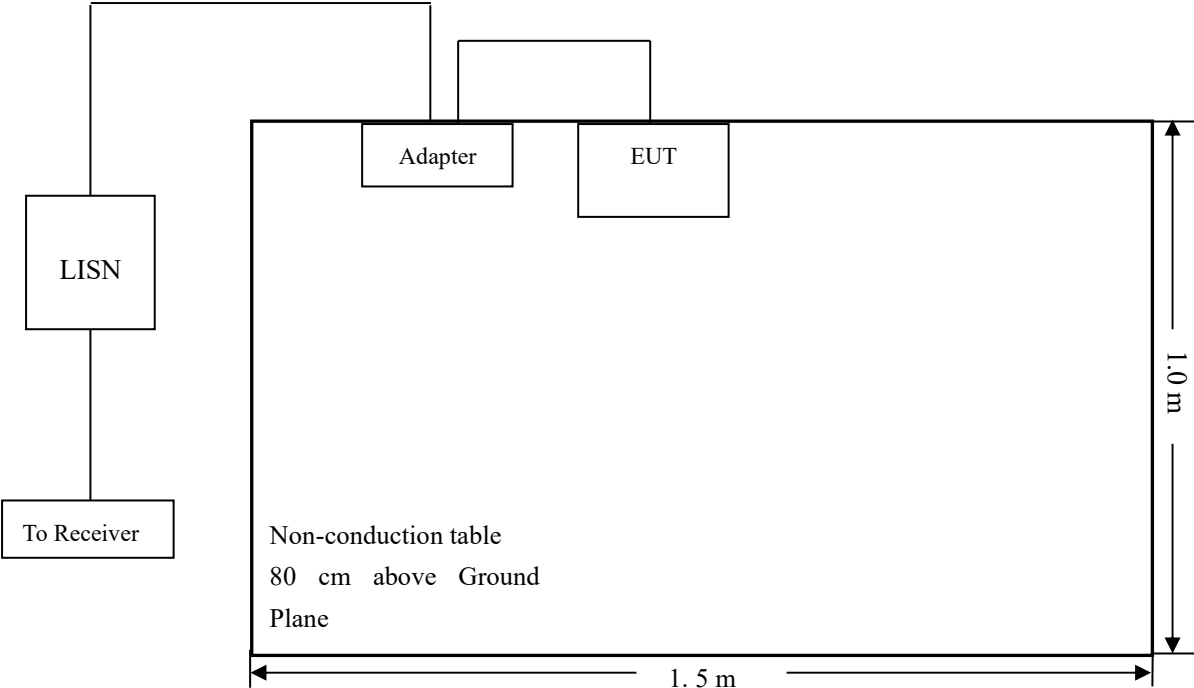
4. Conducted Emissions

4.1 Test Procedure

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.207 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle. The spacing between the peripherals was 10 cm.

4.2 Basic Test Setup Block Diagram



4.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

4.4 Test Receiver Setup

During the conducted emission test, the test receiver was set with the following configurations:

- Start Frequency 150 kHz
- Stop Frequency 30 MHz
- Sweep Speed Auto
- IF Bandwidth..... 10 kHz

Quasi-Peak Adapter Bandwidth 9 kHz
Quasi-Peak Adapter Mode Normal

4.5 Summary of Test Results/Plots

According to the data in section 4.7, the EUT complied with the FCC Part 15.207 Conducted margin for a Class B device, with the *worst* margin reading of:

-15.90 dB at 18.078 MHz in the **Neutral** mode, **Average** detector, 0.15-30MHz

4.6 Conducted Emissions Test Data

Note: The EUT is DC supply, So this item is not applicable.

5. Radiated Emissions

5.1 Standard Applicable

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 (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 - 40.70	2,250	225
70 - 130	1,250	125
130 - 174	1,250 to 3,750 **	125 to 375 **
174 - 260	3,750	375
260 - 470	3,750 to 12,500 **	375 to 1,250 **
Above 470	12,500	1,250

** linear interpolations

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.

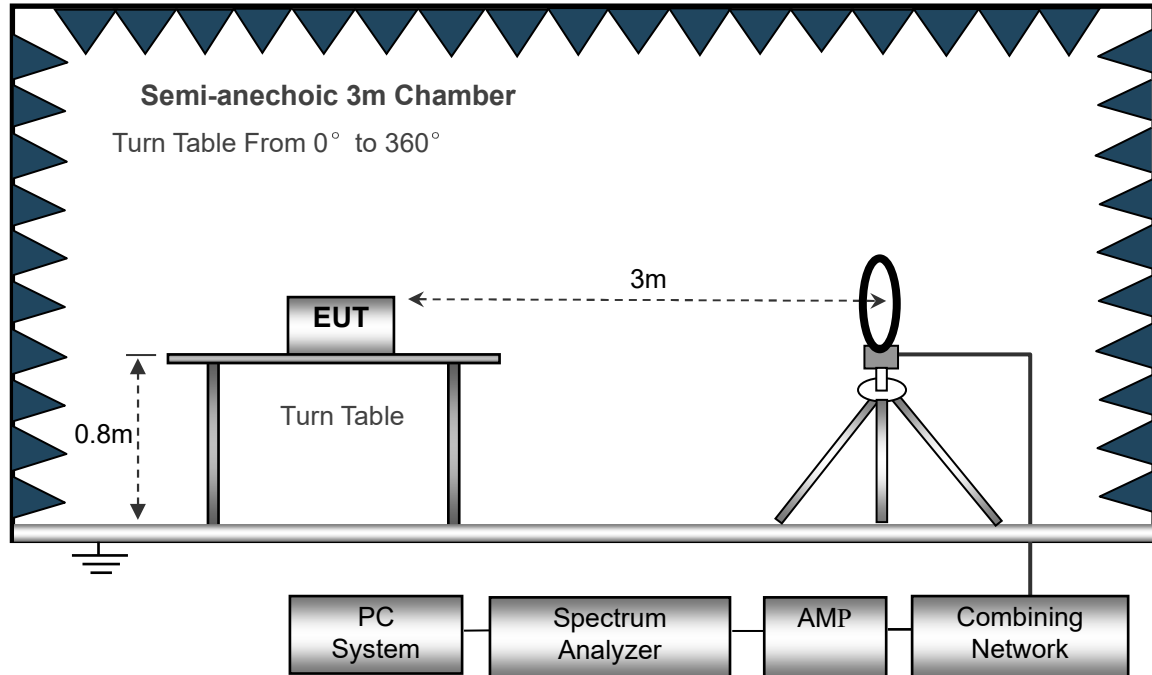
The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

Compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

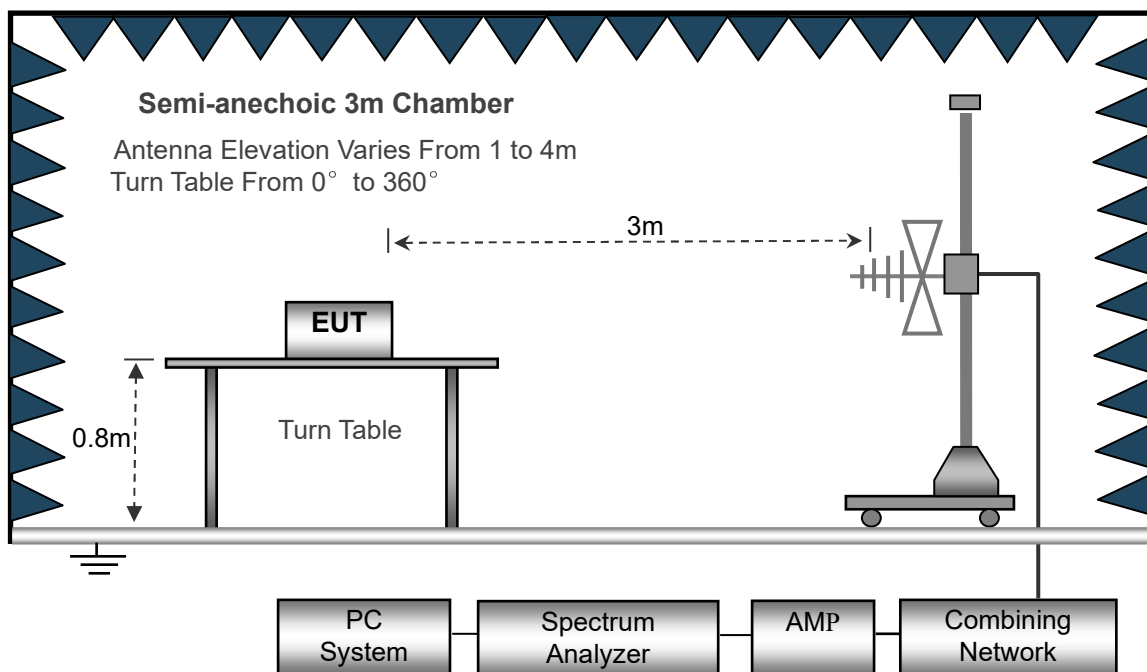
5.2 Test Procedure

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.205 15.231(b) and FCC Part 15.209 Limit.

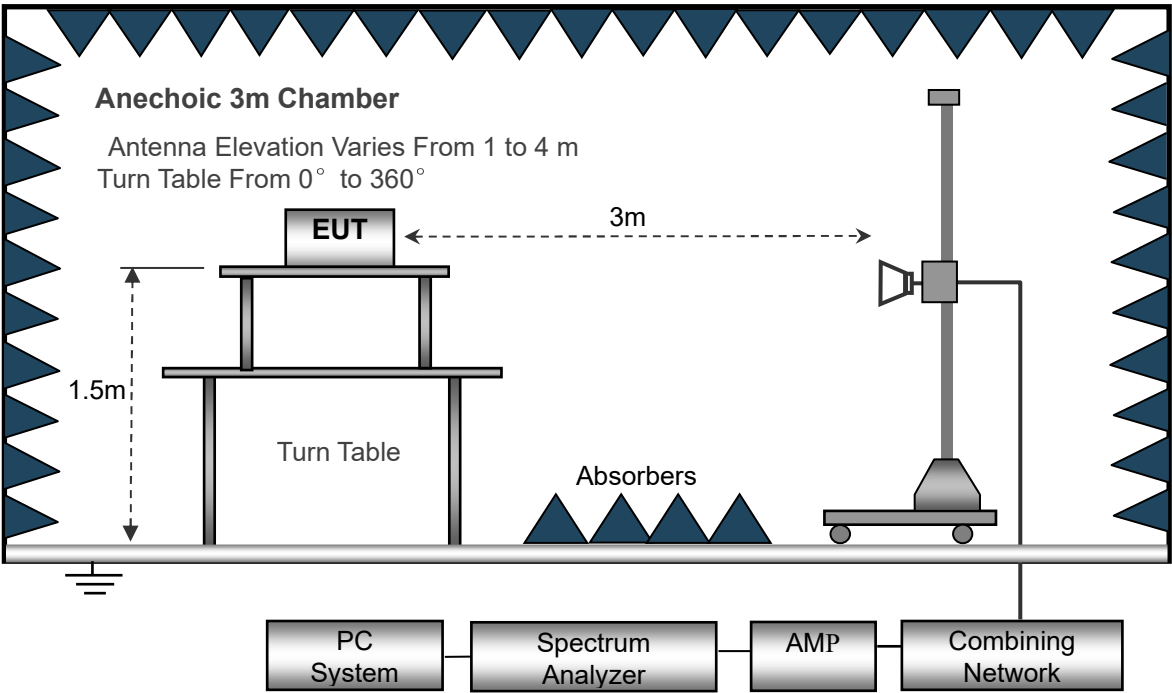
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30MHz to 1GHz.



The test setup for emission measurement above 1GHz.



5.3 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\begin{aligned} \text{Result} &= \text{Indicated Reading} + \text{Correct} \\ \text{Correct} &= \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain} \end{aligned}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15C Limit}$$

5.4 Environmental Conditions

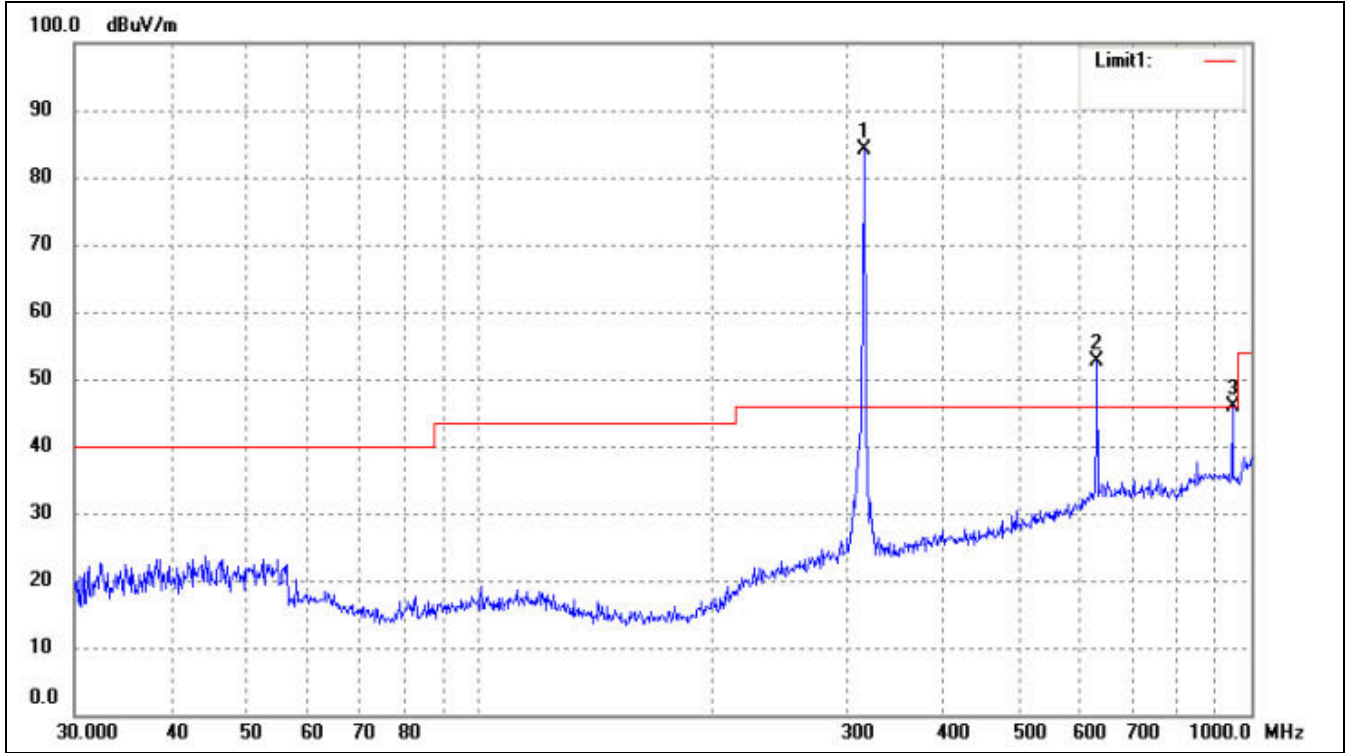
Temperature:	21° C
Relative Humidity:	50%
ATM Pressure:	1011 mbar

5.5 Summary of Test Results/Plots

- Note: 1. this EUT was tested in 3 orthogonal positions and the worst case position data was reported.*
- 2. Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 5th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.*
- 3. The measurements greater than 20dB below the limit from 9kHz to 30MHz..*
- 4. The fundamental frequency is 315MHz, so the fundamental and spurious emissions radiated limit base on the the operating frequency 315MHz.*

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Test Frequency	315MHz	Polarity:	Horizontal
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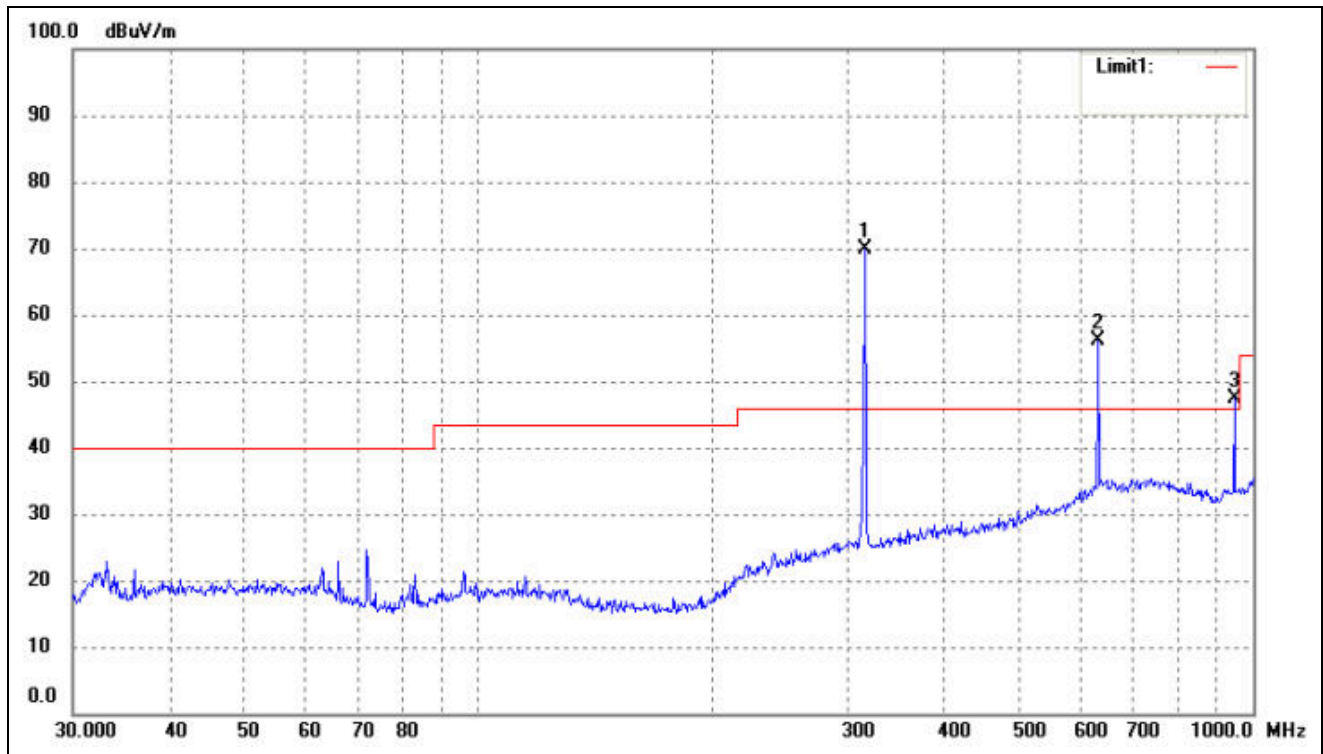


No.	Frequency	Reading	Corr.	Dutycycle	Result	Limit	Margin	Deg.	Height	Remark
	MHz	dBuV/m	Factor(dB)	Factor (dB)	dBuV/m	dBuV/m	(dB)	(°)	(cm)	
1	315.0000	93.53	-9.4	/	84.13	95.62	-11.49	360	100	peak
	315.0000	/	/	-9.21	74.92	75.62	-0.7	/	/	Ave
2	630.0000	53.81	-1.29	/	52.52	75.62	-23.10	183	100	peak
	630.0000	/	/	-9.21	43.31	75.62	-32.31	/	/	Ave
3	945.0000	49.57	-3.72	/	45.85	75.62	-29.77	231	100	peak
	945.0000	/	/	-9.21	36.64	75.62	-38.98	/	/	Ave

Above 1GHz

No.	Frequency	Reading	Corr.	Dutycycle	Result	Limit	Margin	Deg.	Height	Remark
	MHz	dBuV/m	Factor (dB)	Factor (dB)	dBuV/m	dBuV/m	dB	(°)	(cm)	
1	1260.00	27.31	26.95	/	54.26	74.00	-19.74	45	100	Peak
	1260.00	/	/	-9.21	45.05	75.62	-30.57	/	/	Ave
2	1575.00	27.64	27.77	/	55.41	74.00	-18.59	310	100	Peak
	1575.00	/	/	-9.21	46.2	75.62	-29.42	/	/	Ave

Test Frequency	315MHz	Polarity:	Vertical
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No.	Frequency MHz	Reading dBuV/m	Corr. Factor(dB)	Dutycycle Factor (dB)	Result dBuV/m	Limit dBuV/m	Margin (dB)	Deg. (°)	Height (cm)	Remark
1	315	79.37	-9.4	/	69.87	95.62	-25.72	261	100	peak
	315	/	/	-9.21	60.66	75.62	-14.96	/	/	Ave
2	630	57.44	-1.29	/	56.15	75.62	-19.47	183	100	peak
	630	/	/	-9.21	46.94	55.62	-8.68	/	/	Ave
3	945	51.02	-3.72	/	47.3	75.62	-28.32	225	100	peak
	945	/	/	-9.21	38.09	55.62	-17.53	/	/	Ave

Above 1GHz

No.	Frequency MHz	Reading dBuV/m	Corr. Factor (dB)	Dutycycle Factor (dB)	Result dBuV/m	Limit dBuV/m	Margin dB	Deg. (°)	Height (cm)	Remark
1	1260.00	27.54	26.95	/	54.49	74	-19.51	45	100	Peak
	1260.00	/	/	-9.21	45.28	75.62	-30.34	/	/	Ave
2	1575.00	27.3	27.77	/	55.07	74	-18.93	273	100	Peak
	1575.00	/	/	-9.21	45.86	55.62	-9.76	/	/	Ave

6. 20dB Bandwidth

6.1 Standard Applicable

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 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

6.1 Test Procedure

With the EUT's antenna attached, the EUT's 20dB Bandwidth power was received by the test antenna, which was connected to the spectrum analyzer with the START, and STOP frequencies set to the EUT's operation band.

6.2 Environmental Conditions

Temperature:	21° C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

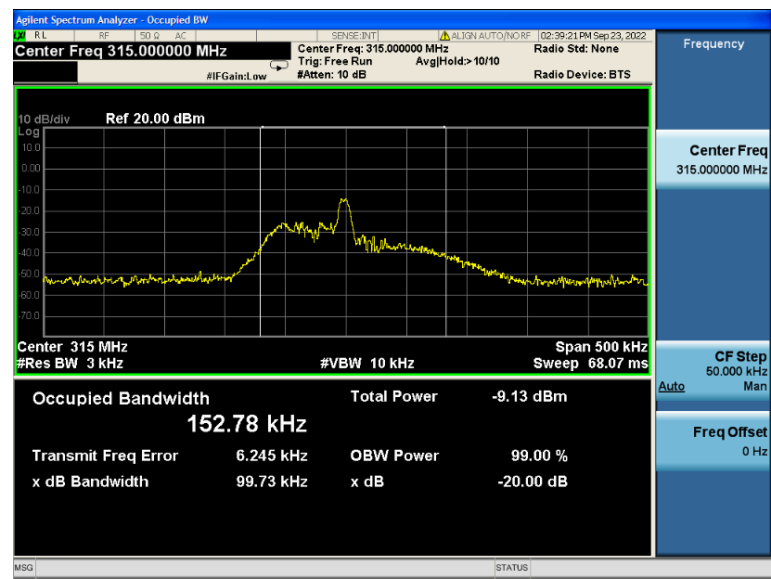
6.3 Summary of Test Results/Plots

Test Frequency MHz	20dB Bandwidth kHz	Limit kHz	Result
315	99.73	787.50	Pass

Limit = Fundamental Frequency X 0.25% = 315 MHz X 0.25% = 787.5 kHz

Please refer to the attached plots.

20dB Bandwidth Test Plot



7. Transmission Time

7.1 Standard Applicable

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

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 433.92MHz, than set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

7.3 Environmental Conditions

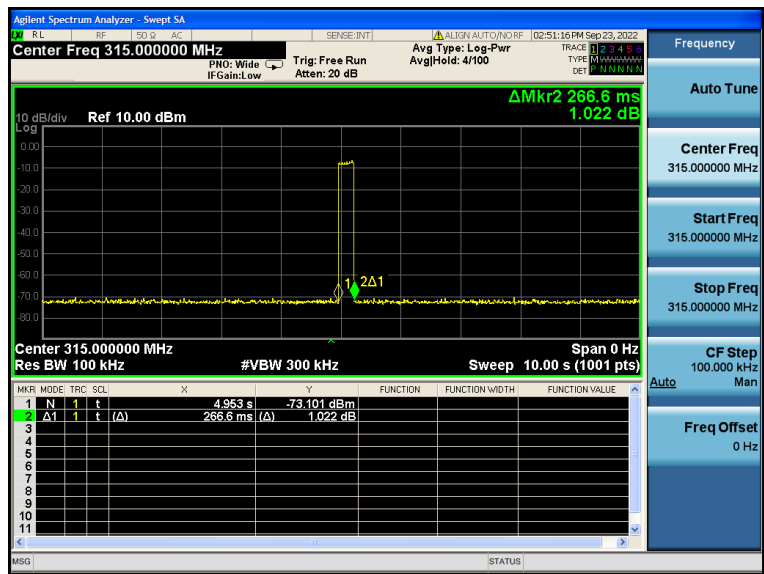
Temperature:	20° C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

7.4 Summary of Test Results/Plots

Transmission Type	Test Frequency MHz	Transmission Time seconds	Limit s	Result
Manually	315	0.2666	5	Pass

Please refer to the attached plots.

Transmission Time



8. Duty Cycle

8.1 Standard Applicable

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

With the EUT's antenna attached, the EUT's output signal was received by the test antenna, which was connected to the spectrum analyzer. Set the center frequency to 433.92MHz, than set the spectrum analyzer to Zero Span for the release time reading. During the testing, the switch was released then the EUT automatically deactivated.

8.3 Environmental Conditions

Temperature:	20° C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

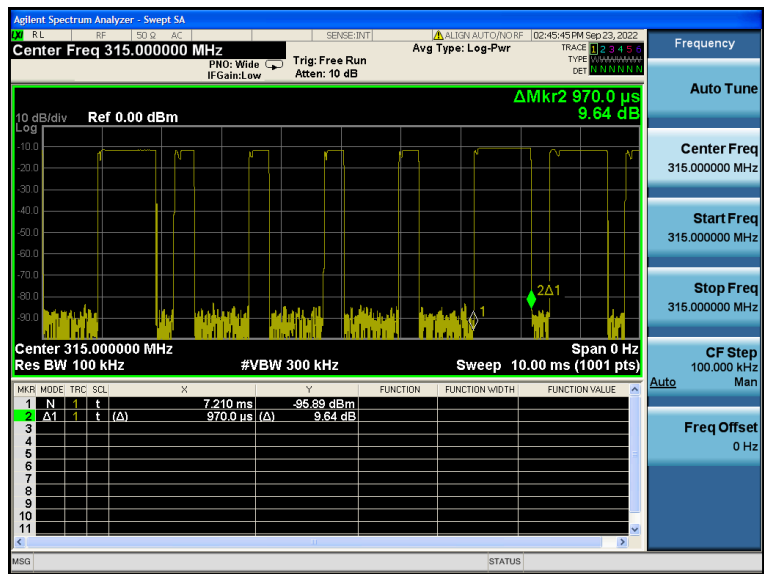
8.4 Summary of Test Results/Plots

Type of Pulse	Width of Pulse ms	Quantity of Pulse	Transmission Time ms	Total Time (T _{on}) ms
Pulse 1 (Wide)	0.97	8	7.76	13.88
Pulse 2 (Narrow)	0.36	17	6.12	

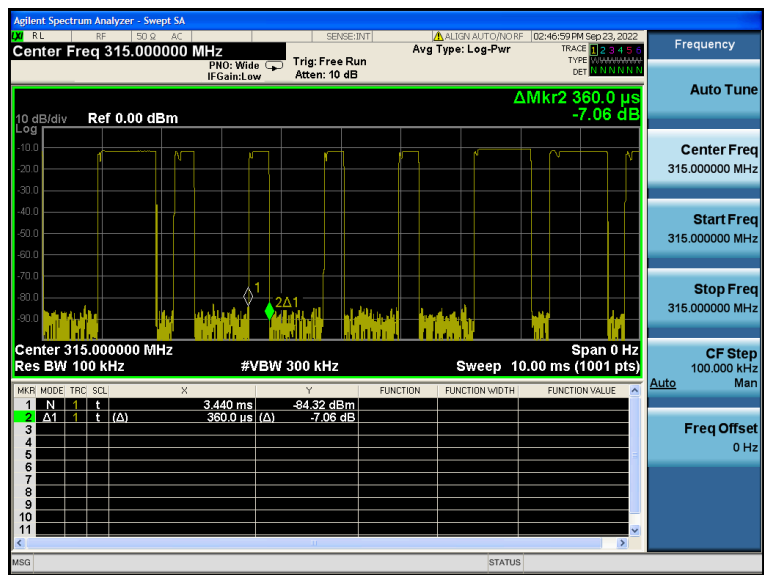
Test Period (T _p) ms	Total Time (T _{on}) ms	Duty Cycle %	Duty Cycle Factor dB
40.08	13.88	34.63	-9.21

Please refer to the attached test plots

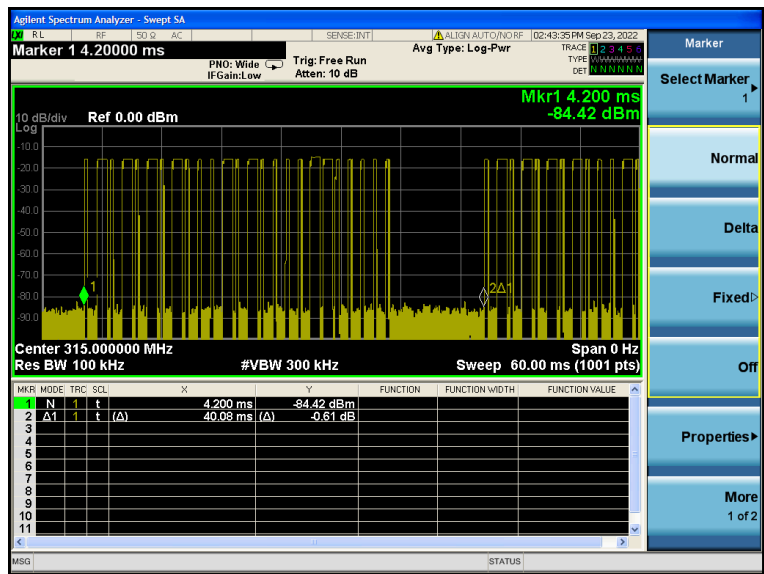
Width of Pulse 1



Width of Pulse 2



Test Period time and Quantity of Pulse



***** END OF REPORT *****