

FCC Part 15C Measurement and Test Report

For

SILVER BEAUTY ELECTRONIC AND LIGHTING CO., LTD

Xiesheng Building, Fiver Stars Village, Heshan City, GuangDong China

FCC ID: 2AISHYLM-M2

FCC Rule(s):	<u>FCC Part 15.231</u>
Product Description:	<u>LED CONTROLLER</u>
Tested Model:	<u>YLM-M2</u>
Report No.:	<u>STR16068026I</u>
Tested Date:	<u>2016-05-31 to 2016-06-15</u>
Issued Date:	<u>2016-06-15</u>
Tested By:	<u>Rode Liu / Engineer</u>
Reviewed By:	<u>Silin Chen / EMC Manager</u>
Approved & Authorized By:	<u>Jandy so / PSQ Manager</u>
Prepared By:	

Rode Liu

Silin chen

Jandyso

Shenzhen SEM.Test Technology Co., Ltd.

1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road,
Bao'an District, Shenzhen, P.R.C. (518101)

Tel.: +86-755-33663308 Fax.: +86-755-33663309 Website: www.semtest.com.cn

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 SEM.Test Technology Co., Ltd.

TABLE OF CONTENTS

1. GENERAL INFORMATION.....	3
1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....	3
1.2 TEST STANDARDS.....	4
1.3 TEST METHODOLOGY	4
1.4 TEST FACILITY	4
1.5 EUT SETUP AND TEST MODE	5
1.6 MEASUREMENT UNCERTAINTY	5
1.7 TEST EQUIPMENT LIST AND DETAILS	5
2. SUMMARY OF TEST RESULTS	6
3. ANTENNA REQUIREMENT	7
3.1 STANDARD APPLICABLE.....	7
3.2 TEST RESULT.....	7
4. RADIATED EMISSIONS.....	8
4.1 STANDARD APPLICABLE.....	8
4.2 TEST PROCEDURE.....	9
4.3 CORRECTED AMPLITUDE & MARGIN CALCULATION.....	10
4.4 ENVIRONMENTAL CONDITIONS	10
4.5 SUMMARY OF TEST RESULTS/PLOTS	10
5. 20DB BANDWIDTH	15
5.1 STANDARD APPLICABLE.....	15
5.2 TEST PROCEDURE.....	15
5.3 ENVIRONMENTAL CONDITIONS	15
5.4 SUMMARY OF TEST RESULTS/PLOTS	15
6. TRANSMISSION TIME.....	17
6.1 STANDARD APPLICABLE.....	17
6.2 TEST PROCEDURE.....	17
6.3 ENVIRONMENTAL CONDITIONS	17
6.4 SUMMARY OF TEST RESULTS/PLOTS	17
7. DUTY CYCLE	19
7.1 STANDARD APPLICABLE.....	19
7.2 TEST PROCEDURE.....	19
7.3 ENVIRONMENTAL CONDITIONS	19
7.4 SUMMARY OF TEST RESULTS/PLOTS	19

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: SILVER BEAUTY ELECTRONIC AND LIGHTING CO., LTD
Address of applicant: Xiesheng Building, Fiver Stars Village, Heshan City,
GuangDong China
Manufacturer: SILVER BEAUTY ELECTRONIC AND LIGHTING CO., LTD
Address of manufacturer: Xiesheng Building, Fiver Stars Village, Heshan City,
GuangDong China

General Description of EUT	
Product Name:	LED CONTROLLER
Trade Name:	/
Model No.:	YLM-M2
Adding Model(s):	YLM-M1, YLM-M3, YLM-M4, YLM-M5, YLM-M6, YLM-M7
Rated Voltage:	Battery DC 3.0V
Power Adapter Model:	/
<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 YLM-M2, but the circuit and the electronic construction do not change, declared by the manufacturer.</i>	

Technical Characteristics of EUT	
Frequency Range:	433.92 MHz
Max. Field Strength:	83.74dBuV/m (at 3m distance)
Data Rate:	/
Modulation:	ASK
Antenna Type:	PCB Antenna
Antenna Gain:	0dBi
Lowest Internal Frequency of EUT:	13.56MHz
Device Category:	Portable Device

1.2 Test Standards

The following report is prepared on behalf of the SILVER BEAUTY ELECTRONIC AND LIGHTING CO., LTD in accordance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.231, 15.203, 15.205 and 15.209 of the Federal Communication Commissions rules.

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, and 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.

1.4 Test Facility

FCC – Registration No.: 934118

Shenzhen SEM.Test Technology 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 and the Registration is 934118.

Industry Canada (IC) Registration No.: 11464A

The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

CNAS Registration No.: L4062

Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101).

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

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

Description	Manufacturer	Model	Serial Number	Cal Date	Due Date
Spectrum Analyzer	Agilent	E4407B	MY41440400	2015-06-17	2016-06-16
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2015-06-17	2016-06-16
Amplifier	Agilent	8447F	3113A06717	2015-06-17	2016-06-16
Amplifier	C&D	PAP-1G18	2002	2015-06-17	2016-06-16
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2015-06-17	2016-06-16
Horn Antenna	ETS	3117	00086197	2015-06-17	2016-06-16
Loop Antenna	Schwarz beck	FMZB 1516	9773	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESPI	101611	2015-06-17	2016-06-16
L.I.S.N	Schwarz beck	NSLK8126	8126-224	2015-06-17	2016-06-16
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100911	2015-06-17	2016-06-16

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	Compliant
§ 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

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. Radiated Emissions

4.1 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

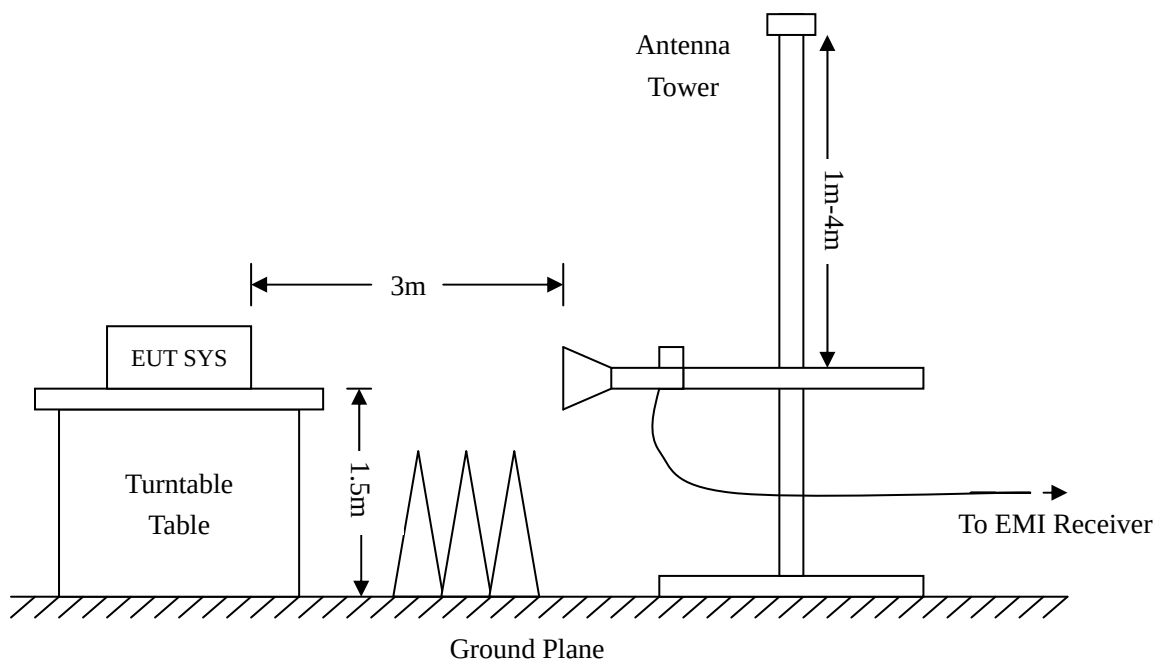
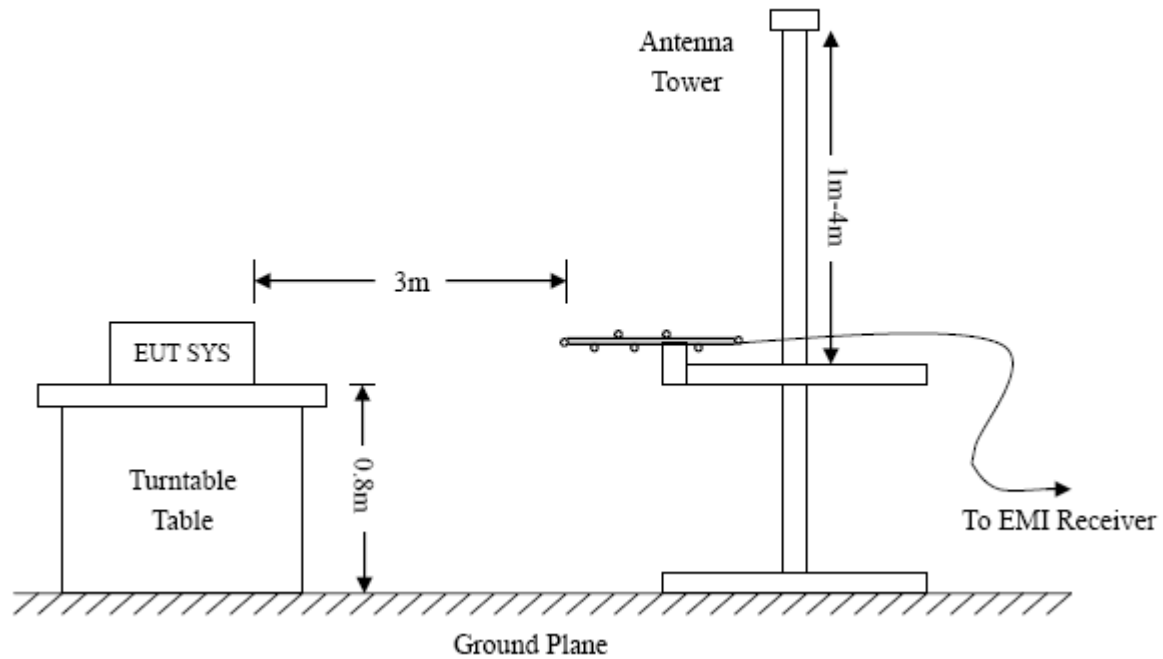
The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209,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

4.2 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.



4.3 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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Loss} + \text{Cab. Loss} - \text{Ampl. Gain}$$

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

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

4.4 Environmental Conditions

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

4.5 Summary of Test Results/Plots

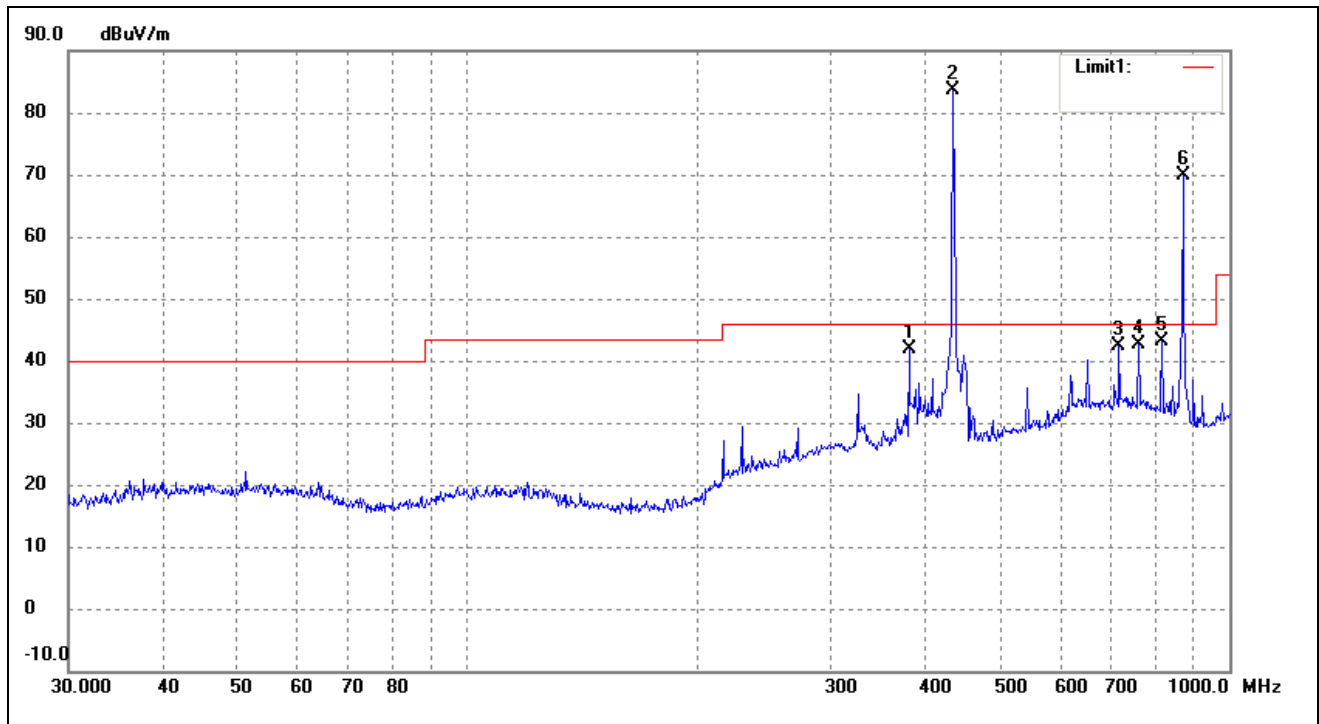
According to the data below, the FCC Part 15.205, 15.209 and 15.231 standards, and had the worst margin of:

-3.10 dB at 867.8400 MHz in the Horizontal polarization, Ave Detector, 9 kHz to 5 GHz, 3 Meters

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

Plot of Radiated Emissions Test Data

EUT: LED CONTROLLER
 Tested Model: YLM-M2
 Operating Condition: Transmitting
 Comment: Battery DC3.0V
 Test Specification: Horizontal

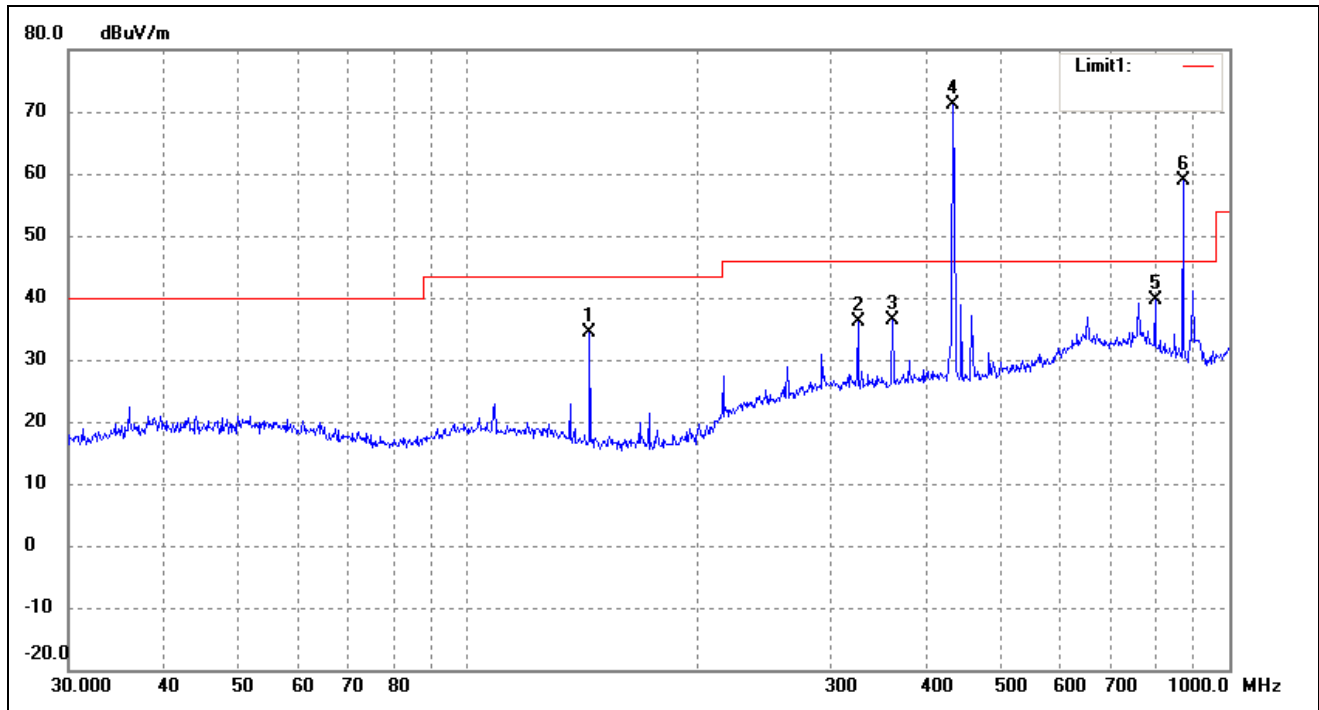


No.	Frequency MHz	Reading dBuV/m	Corr. (dB)	Dutycycle Factor (dB)	Result dBuV/m	Limit dBuV/m	Margin (dB)	Deg. (°)	Height (cm)	Remark
1	379.9141	29.98	11.79	N/A	41.77	46.00	-4.23	175	100	peak
4	433.9200	73.83	-3.09	N/A	83.74	100.83	-17.09	145	100	peak
	433.9200	/	/	-12.18	71.56	80.83	-9.37	300	100	Ave
3	716.6820	24.77	17.70	N/A	42.47	46.00	-3.53	200	100	peak
4	760.7036	24.47	18.10	N/A	42.57	46.00	-3.43	310	100	peak
5	815.9678	27.42	15.80	N/A	43.22	46.00	-2.78	205	100	peak
6	867.8400	53.97	15.94	N/A	69.91	80.83	-8.08	212	100	peak
	867.8400	/	/	-12.18	57.73	60.83	-3.10	227	100	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	1301.7600	71.49	-13.14	N/A	58.35	80.83	-22.48	210	150	Peak
2	1735.6800	65.25	-9.34	N/A	52.66	80.83	--28.17	180	150	Peak
3	2169.6000	64.16	-2.86	N/A	61.30	80.83	-19.53	210	150	Peak
	1301.7600	/	/	-12.18	46.17	60.83	-14.66	123	150	Ave
	1735.6800	/	/	-12.18	40.48	60.83	-20.35	228	150	Ave
	2169.6000	/	/	-12.18	49.12	60.83	-11.71	159	150	Ave

Test Specification: Vertical



No.	Frequency MHz	Reading dBuV/m	Corr. (dB)	Dutycycle Factor (dB)	Result dBuV/m	Limit dBuV/m	Margin (dB)	Deg. (°)	Height (cm)	Remark
1	144.8418	31.40	2.96	N/A	34.36	43.50	-9.14	310	100	peak
2	325.5958	24.42	11.77	N/A	36.19	46.00	-9.81	172	100	peak
3	361.7139	24.37	11.90	N/A	36.27	46.00	-9.73	190	100	peak
4	434.0651	58.83	12.31	N/A	71.14	100.83	-29.69	256	100	peak
	433.9200	/	/	-12.18	58.96	80.83	-21.93	321	100	Ave
5	798.9796	23.22	16.34	N/A	39.56	46.00	-6.44	241	100	peak
6	867.8400	43.03	15.94	N/A	58.97	80.83	-21.94	89	100	peak
	867.8400	/	/	-12.18	46.79	60.83	-14.04	178	100	Ave

Above 1GHz

No.	Frequency	Reading	Corr.	Dutycycle	Result	Limit	Margin	Deg.	Height	Remark
	MHz	dBuV/m	(dB)	Factor (dB)	dBuV/m	dBuV/m	dB	(°)	(cm)	
1	1301.7600	71.53	-13.14	N/A	58.39	80.83	-22.44	211	150	Peak
2	1735.6800	62.01	-9.35	N/A	52.66	80.83	-28.17	123	150	Peak
3	2169.6000	61.34	-2.79	N/A	58.55	80.83	-22.28	256	150	Peak
	1301.7600	/	/	-12.18	46.21	60.83	-14.62	143	150	Ave
	1735.6800	/	/	-12.18	40.48	60.83	-20.35	258	150	Ave
	2169.6000	/	/	-12.18	46.37	60.83	-14.46	149	150	Ave

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, other than listed in the table above are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

The fundamental frequency is 433.92MHz, so the fundamental and spurious emissions radiated limit base on the the operating frequency 433.92MHz.

5. 20dB Bandwidth

5.1 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.

5.2 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.

5.3 Environmental Conditions

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

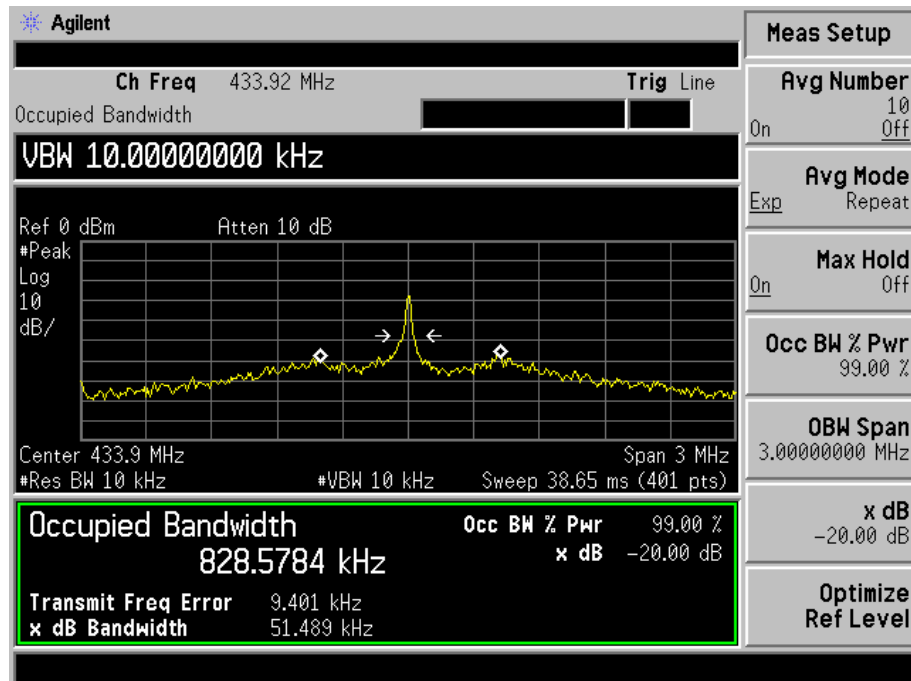
5.4 Summary of Test Results/Plots

Test Frequency MHz	20dB Bandwidth kHz	Limit kHz	Result
433.92	51.489	1084	Pass

Limit = Fundamental Frequency X 0.25% = 433.92 MHz X 0.25% = 1084 kHz

Please refer to the attached plots.

20dB Bandwidth Test Plot



6. Transmission Time

6.1 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.

6.2 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.

6.3 Environmental Conditions

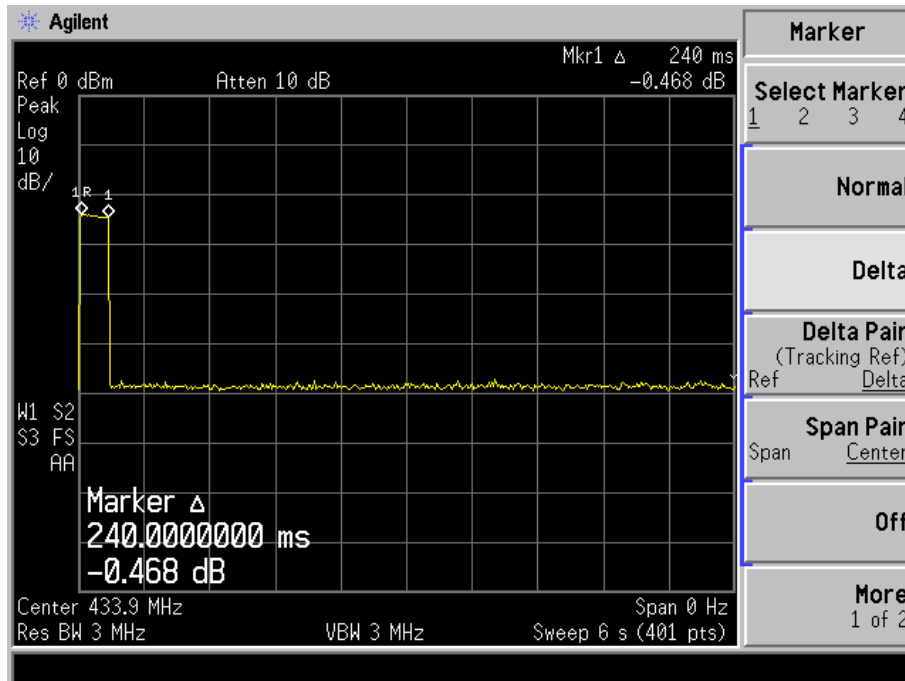
Temperature:	20° C
Relative Humidity:	52%
ATM Pressure:	1011 mbar

6.4 Summary of Test Results/Plots

Transmission Type	Test Frequency MHz	Transmission Time seconds	Limit s	Result
Manually	433.92	0.240	5	Pass

Please refer to the attached plots.

Transmission Time



7. Duty Cycle

7.1 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.

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

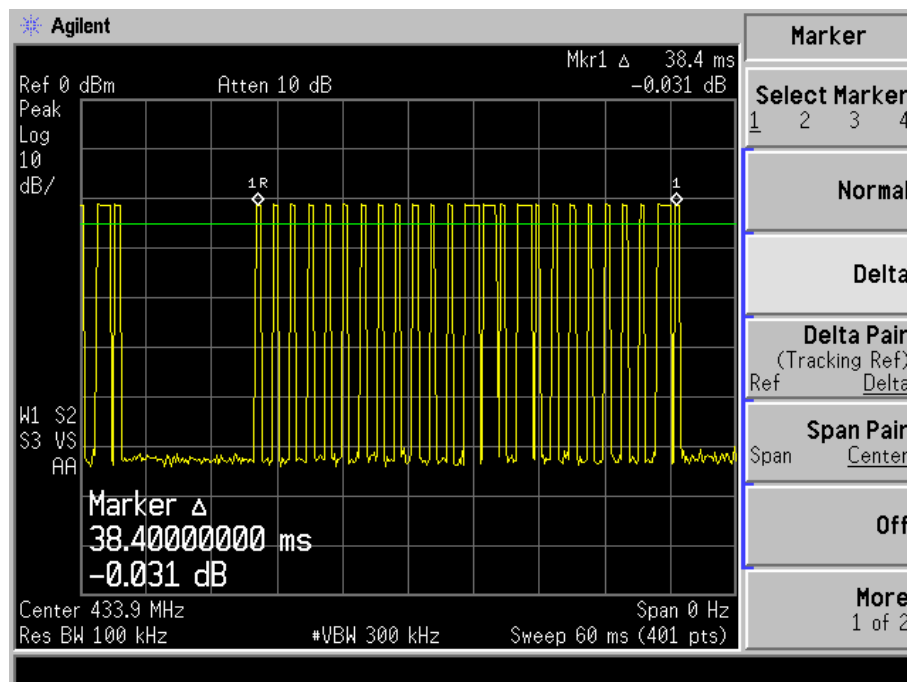
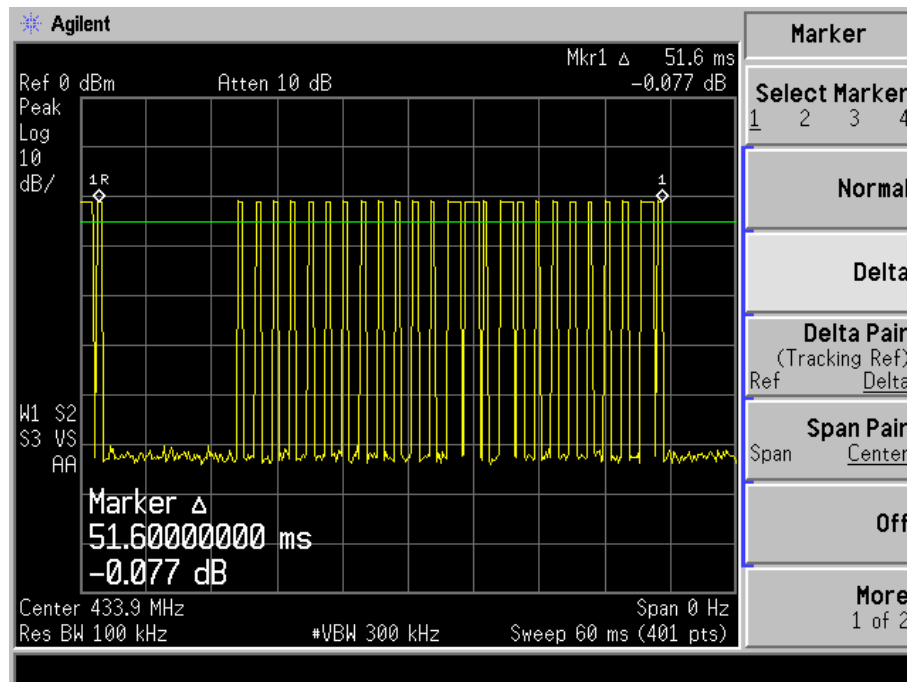
7.4 Summary of Test Results/Plots

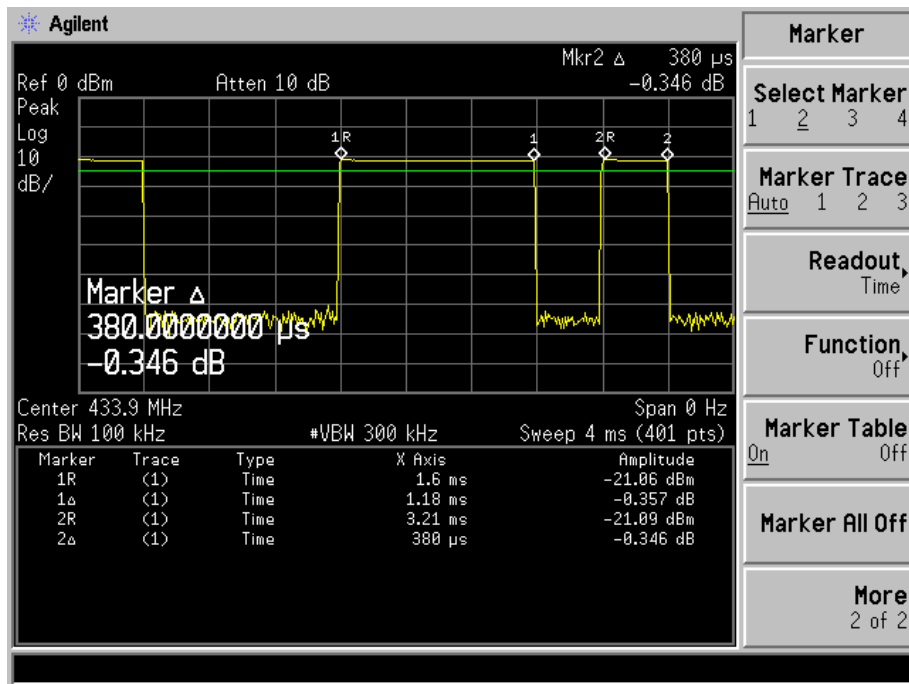
Type of Pulse	Width of Pulse ms	Quantity of Pulse	Transmission Time ms	Total Time (T _{on}) ms
Pulse 1 (Wide)	1.18	4	4.72	12.70
Pulse 2 (Narrow)	0.38	21	7.98	

Test Period (T _p) ms	Total Time (T _{on}) ms	Duty Cycle %	Duty Cycle Factor dB
51.60	12.70	24.61	-12.18

Please refer to the attached test plots

Width of Pulse





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