FCC TEST REPORT

FOR

Lyman Products Corporation

Auto scroll targets

Model No.: 4320051

Prepared for	:	Lyman Products Corporation
Address	:	475 Smith Street Middletown, CT 06457, USA
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Tel	:	(+86)755-82591330
Fax	:	(+86)755-82591332
Web	:	www.LCS-cert.com
Mail	:	webmaster@LCS-cert.com
Date of receipt of test sample	:	December 25, 2015
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	December 25, 2015~April 12, 2016
Date of Report	:	April 12, 2016

FCC TEST REPORT

FCC CFR 47 PART 15 Subpart B: 2015

Report Reference No.	**: LCS1512252567E**
Date Of Issue	: April 12, 2016
Testing Laboratory Name.....	**: Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	: 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure.....	: Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name	**: Lyman Products Corporation**
Address	: 475 Smith Street Middletown, CT 06457, USA
Test Specification	
Standard.....	: FCC CFR 47 PART 15 Subpart B: 2015, ANSI C63.4-2014
Test Report Form No.....	: LCSEMC-1.0
TRF Originator	: Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF.....	: Dated 2011-03

Test Item Description.	**: Auto scroll targets**
Trade Mark	: LYMAN
Model/Type Reference	: 4320051
Ratings.....	: DC 12.0V by battery
Result	**: Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Jacky Li		
Jacky Li/ File administrators	Glin Lu/ Technique principal	Gavin Liang/ Manager

FCC -- TEST REPORT

Test Report No. : LCS1512252567E	April 12, 2016 Date of issue

Type / Model.....	: 4320051
EUT.....	: Auto scroll targets
Applicant.....	**: Lyman Products Corporation**
Address.....	: 475 Smith Street Middletown, CT 06457, USA
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: NANJING ROCKWAY TRADE CORPORATION**
Address.....	: #2302 Sports building No.42 Gong yuan Road , Qin huai District ,Nanjing, China
Telephone.....	: /
Fax.....	: /
Factory.....	: **NANJING ROCKWAY TRADE CORPORATION**
Address.....	: #2302 Sports building No.42 Gong yuan Road , Qin huai District ,Nanjing, China
Telephone.....	: /
Fax.....	: /

Test Result according to the standards on page 5: **Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
00	2016-04-18	Initial Issue	Gavin Liang

TABLE OF CONTENTS

Test Report Description Page

1. SUMMARY OF STANDARDS AND RESULTS

1.1.Description of Standards and Results

The EUT have been tested according to the applicable standards as referenced below.

EMISSION			
Description of Test Item	**Standard**	**Limits**	**Results**
Conducted disturbance at mains terminals	FCC CFR 47 PART 15 Subpart B: 2015	Class B	N/A
Radiated disturbance	FCC CFR 47 PART 15 Subpart B: 2015	Class B	PASS
N/A is an abbreviation for Not Applicable.(Battery supply, so need not conducted emission)			

2. GENERAL INFORMATION

2.1.Description of Device (EUT)

EUT : Auto scroll targets

Model Number : 4320051

Power Supply : DC 12.0V by battery

Frequency Range : 433.87MHz

Modulation Technology : ASK

Antenna Type and Gain : Telescopic Antenna, 0dBi(Max.)

2.2.Description of Test Facility

EMC Lab. : CNAS Registration Number. is L4595.
FCC Registration Number. is 899208.
Industry Canada Registration Number. is 9642A-1.
VCCI Registration Number. is C-4260 and R-3804.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001

2.3.Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

2.4.Measurement Uncertainty

Test Item	Frequency Range	Expanded uncertainty (Ulab)	Expanded uncertainty (Ucispr)
Conducted Emission	(9kHz to 150kHz)	2.63 dB	4.0 dB
	(150kHz to 30MHz)	2.35 dB	3.6 dB
Radiated Emission	(9kHz to 30MHz)	3.68 dB	N/A
Radiated Emission	(30MHz to 1000MHz)	3.48 dB	5.2 dB
Radiated Emission	(above 1000MHz)	3.90 dB	N/A

(1) Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.

(2) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%.

3. RADIATED EMISSION MEASUREMENT

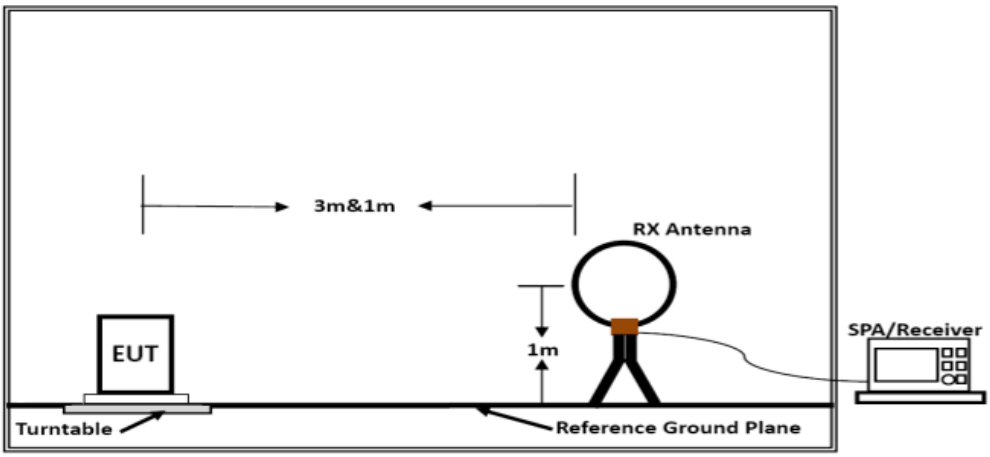
3.1. Test Equipment

The following test equipments are used during the radiated emission measurement:

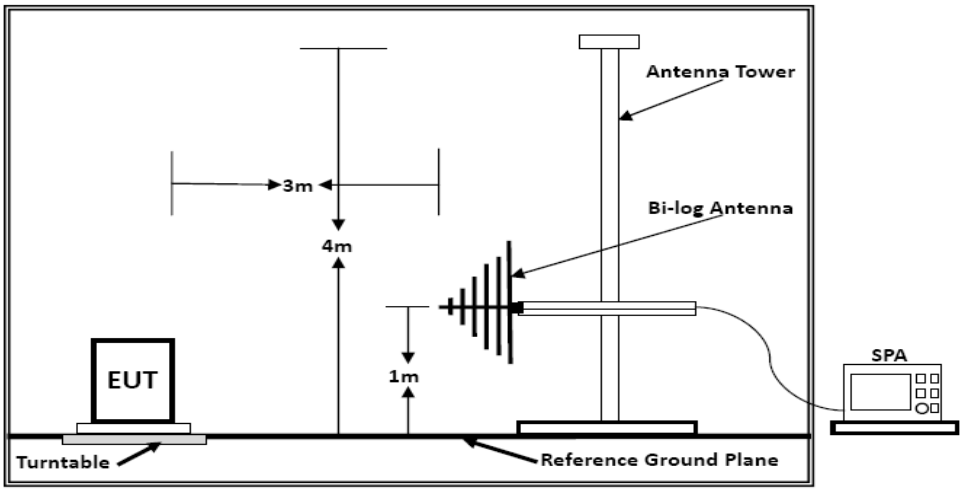
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.
1	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2016/02/03
2	EMI Test Receiver	ROHDE & SCHWARZ	ESPI	101840	2015/06/18
3	Log per Antenna	SCHWARZBECK	VULB9163	9163-470	2015/06/18
4	Loop Antenna	SCHWARZBECK	FMZB 1519B	00005	2015/06/18
5	EMI Test Software	AUDIX	E3	N/A	2015/06/18
6	Positioning Controller	MF	MF-7082	/	2015/06/18

3

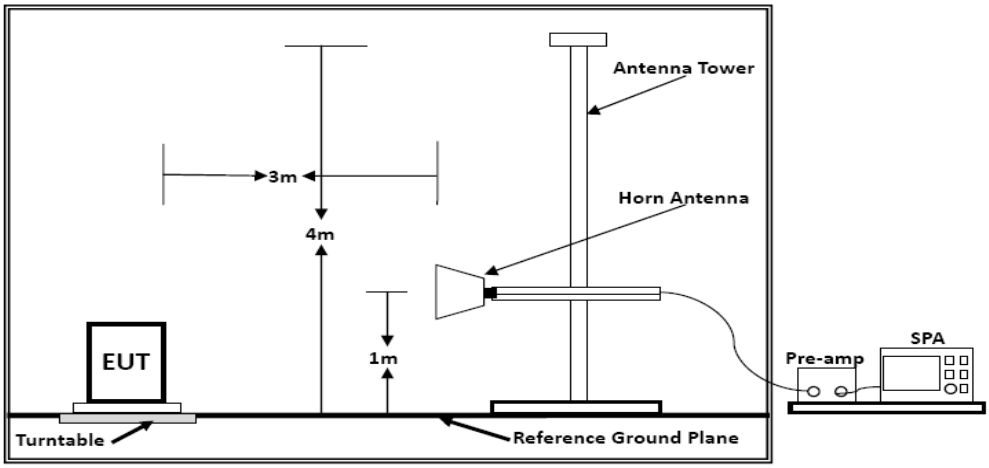
.2. Block Diagram of Test Setup



Below 30MHz



Below 1GHz



Above 1GHz

1) **Sequence of testing 9 kHz to 30 MHz**

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both(0.1m).

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0 °to 315 °using 45 °steps.

--- The antenna height is 1.5 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

Final measurement:

--- Identified emissions during the premeasurement the software maximizes by rotating the turntable position (0 °to 360 °) and by rotating the elevation axes (0 °to 360 °).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

2) **Sequence of testing 30 MHz to 1 GHz**

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both(0.1m) .

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0 °to 315 °using 45 °steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position (±45 °) and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

3) **Sequence of testing 1 GHz to 18 GHz**

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both(0.1m).

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

Premeasurement:

--- The turntable rotates from 0 °to 315 °using 45 °steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height is 1.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

Final measurement:

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum found antenna polarization and turntable position of the premeasurement the software maximizes the peaks by rotating the turntable position (0 ° to 360 °). This measurement is repeated for different EUT-table positions (0 °to 150 °in 30 °-steps). This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and RMS detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

4) **Sequence of testing above 18 GHz**

Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both(0.1m).

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 1 meter.

--- The EUT was set into operation.

Premeasurement:

--- The antenna is moved spherical over the EUT in different polarizations of the antenna.

Final measurement:

--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and RMS detector.

--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

3.3. Radiated Emission Limit (Class B)

Limits for radiated disturbance Blow 1GHz

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		μV/m	dB(μV)/m
30 ~ 88	3	100	40
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46
960 ~ 1000	3	500	54

Remark：(1) Emission level (dB)μV = 20 log Emission level μV/m

(2) The smaller limit shall apply at the cross point between two frequency bands.

(3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

3.4. EUT Configuration on Measurement

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

3.5. Operating Condition of EUT

4.5.1.Setup the EUT as shown in Section 4.2.

4.5.2.Let the EUT work in test mode (on) and measure it.

3.6. Test Procedure

EUT and its simulators are placed on a turntable, which is 0.1 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on a antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated by-log antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4-2014 on radiated emission measurement. 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.

Below 1G:

The bandwidth of the EMI test receiver is set at 120 kHz, 1000 kHz.

The frequency range from 30MHz to 1000MHz is checked.

Above 1G:
The bandwidth of the EMI test receiver is set at 1MHz, 3MHz for Peak detector.

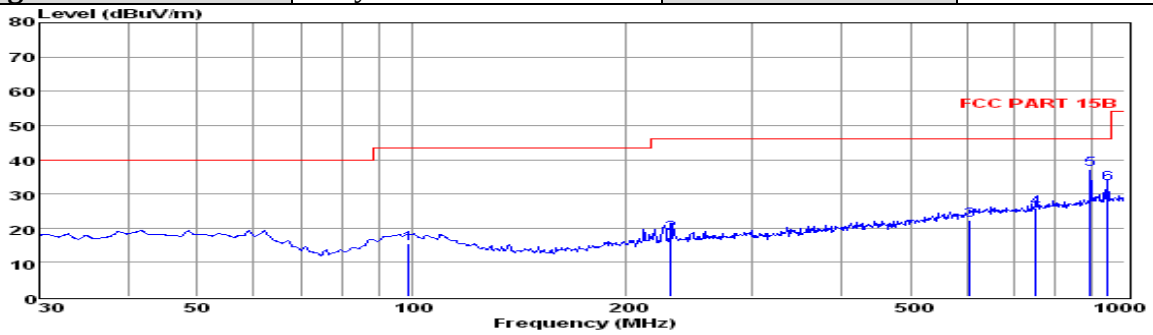
The bandwidth of the EMI test receiver is set at 1MHz, 10Hz for Average detector

The frequency range from 1GHz to 6 GHz is checked.

4.7. Radiated Emission Noise Measurement Result

PASS.

Model No.	Auto scroll targets	Test Mode	RX
Environmental Conditions	24℃/ 56% RH	Detector Function	Quasi-peak
Pol	Vertical	Distance	3m
Test Engineer	Gary Chen		

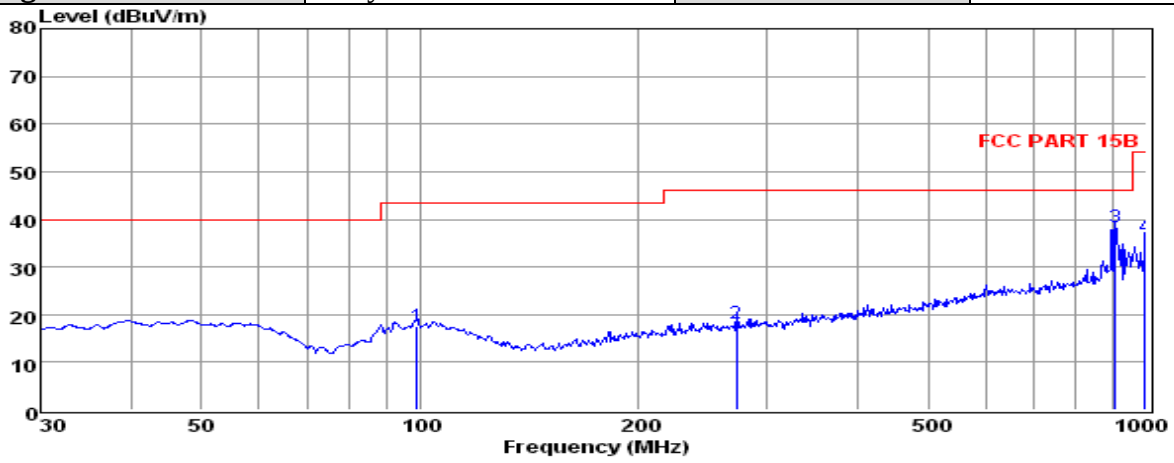


Env./Ins: 24℃/56%
pol: VERTICAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	98.83	1.67	0.61	13.09	15.37	43.50	-28.13	QP
2	230.91	5.89	0.98	11.69	18.56	46.00	-27.44	QP
3	605.66	2.20	1.57	18.47	22.24	46.00	-23.76	QP
4	750.11	4.76	1.65	19.44	25.85	46.00	-20.15	QP
5	893.86	14.25	1.84	21.03	37.12	46.00	-8.88	QP
6	945.44	9.66	1.95	21.39	33.00	46.00	-13.00	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Model No.	Auto scroll targets	Test Mode	RX
Environmental Conditions	24℃/ 56% RH	Detector Function	Quasi-peak
Pol	Horizontal	Distance	3m
Test Engineer	Gary Chen		



Env./Ins: 24℃/56%
pol: HORIZONTAL

	Freq	Reading	CabLos	Antfac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB/m	dBuV/m	dBuV/m	dB	
1	98.83	3.80	0.61	13.09	17.50	43.50	-26.00	QP
2	272.28	4.64	1.04	12.43	18.11	46.00	-27.89	QP
3	906.48	15.29	2.03	21.13	38.45	46.00	-7.55	QP
4	996.50	12.51	1.98	21.72	36.21	54.00	-17.79	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

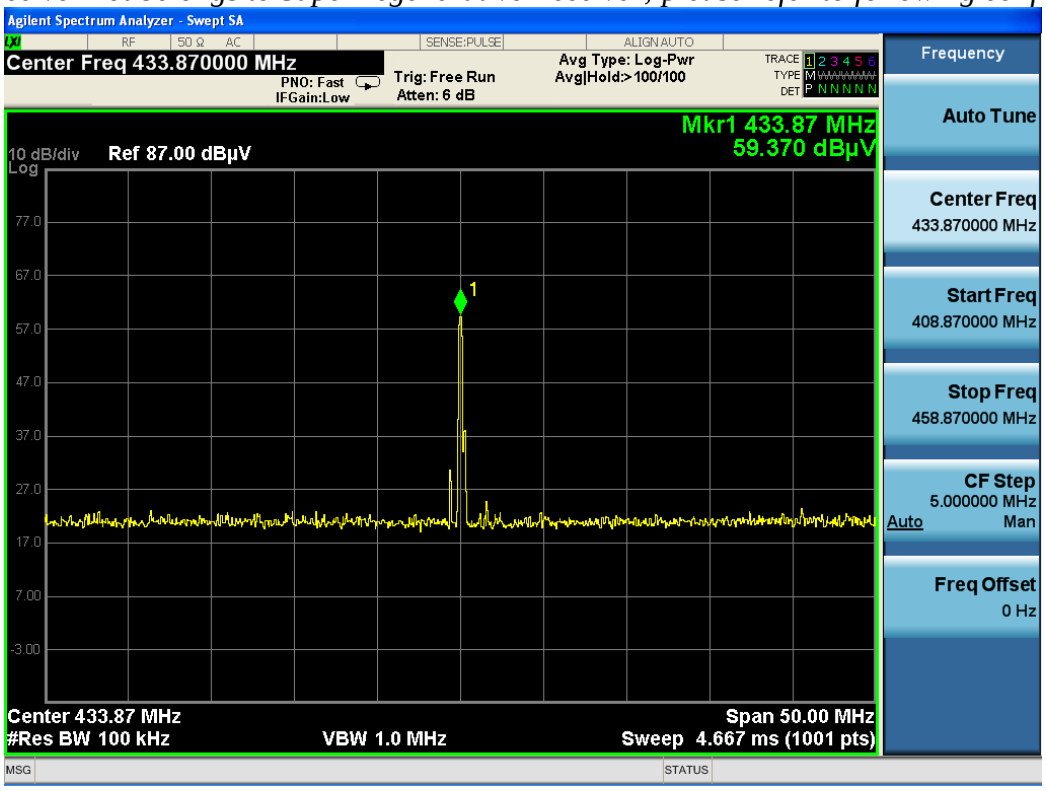
Model No.		Auto scroll targets		**Test Mode**		RX	
Environmental Conditions		24℃/ 56% RH		**Detector Function**		Quasi-peak	
Test Engineer		Gary Chen		**Distance**		3m	
Pol.	Frequency (MHz)	Emission Level dBμV/m		Limits dBμV/m		Margin dBμV/m	
		Peak	AVG	Peak	AVG	Peak	AVG
H	1364.15	57.25	40.36	74.00	54.00	-16.75	-13.64
	2279.52	59.78	42.04	74.00	54.00	-14.22	-11.96
	4654.71	61.01	44.78	74.00	54.00	-12.99	-9.22
V	1546.23	57.98	41.25	74.00	54.00	-16.02	-12.75
	2697.47	60.34	43.10	74.00	54.00	-13.66	-10.90
	3852.02	59.76	42.44	74.00	54.00	-14.24	-11.56

Notes:

1. *Measuring frequencies from 9k~6 GHz , No emission found between lowest internal used/generated frequency to 30MHz.*
2. *Radiated emissions measured in frequency range from 9k~6 GHz were made with an instrument using Peak detector mode.*
3. *Data of measurement within this frequency range shown " --- " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measure*

Receiver Type:

The receiver not belongs to Super regenerative Receiver; please refer to following confirm plots.



----------THE END OF REPORT----------