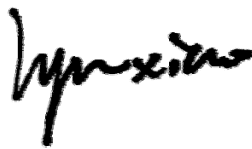


TEST REPORT

Report No.:	EM201500406-1	Application No.:	ZJ20150005-E-1
Client:	CHAUVET & SONS,INC.		
Address:	5200 NW 108TH AVENUE SUNRISE,FLORIDA,33351, USA		
Sample Description:	Wireless Module		
Model:	CC2500MPATR		
FCC ID:	XAO-CC2500MPATR		
Test Specification:	FCC 15.249:2015		
Test Date:	2015-05-15 to 2015-07-07		
Issue Date:	2015-07-07		
Test Result:	Pass.		
Prepared By:	Reviewed By:	Approved By:	
Bruce Li / Test Engineer	Lynn Xiao /Technical Manager	Yong Dai /Technical Manager	
			
Date:2015-07-07	Date:2015-07-07	Date:2015-07-07	
Other Aspects:			
None			
Abbreviations: ok / P = passed; fail / F = failed; n.a. / N = not applicable			
The test result in this test report refers exclusively to the presented test sample. This report shall not be reproduced except in full, without the written approval of GRGT.			

DIRECTIONS OF TEST

- 1. This station carries out test task according to the national regulation of verifications which can be traced to National Primary Standards and BIPM.**
- 2. 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.**
- 3. If there is any objection concerning the test, the client should inform the laboratory within 15 days from the date of receiving the test report.**

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1. TEST RESULT SUMMARY

FCC 15.249:2015			
Standard	Item	Limit / Severity	Result
FCC 15.249:2015	Antenna Requirement	FCC Part 15.203	PASS
	Intentional radiators Field Strength	FCC Part 15.249(a)	PASS
	Radiated Electromagnetic Disturbance	FCC Part 15.249 (d)	PASS
	Conduction Emissions	/	PASS
	Out of Band Emissions	FCC Part 15.249(d)	PASS

2. GENERAL DESCRIPTION OF EUT

2.1 APPLICANT

Name: CHAUVET & SONS,INC.
Address: 5200 NW 108TH AVENUE SUNRISE,FLORIDA,33351, USA

2.2 MANUFACTURER

Name: CHAUVET & SONS,INC.
Address: 5200 NW 108TH AVENUE SUNRISE,FLORIDA,33351, USA

2.3 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: Wireless Module
Model No.: CC2500MPATR
Trade Name: CHAUVET
EUT power supply: DC 1.8V-3.6V
Host: Model:2402E
Power supply:DC USB 5V
Frequency Range: 2409.3MHz~2457.3MHz
Type of Modulation: MSK
Channels: 16 Channels with 3.2MHz step
Antenna Type: Spring antenna on the host
Note: /

2.4 TEST OPERATION MODES

Test mode: Mode 1:continuous transmission

2.5 LOCAL SUPPORTIVE INSTRUMENTS

Name of Equipment	Manufacturer	Model	Factor
Adapter	JBL	F5V-1C-1U	Input: AC 100-240V~50/60Hz Output: DC 5V

3. LABORATORY AND ACCREDITATIONS

3.1 LABORATORY

The tests and measurements refer to this report were performed by EMC Laboratory of Guangzhou GRG Metrology and Test Co., Ltd.

Add. : 163 Pingyun Rd, West of Huangpu Ave, Guangzhou, 510656, P. R. China

Telephone: +86-20-38699959, 38699960, 38699961

Fax : +86-20-38695185

3.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA	FCC Listed Lab No. 688188
Canada	Registration No.:8355A-1

3.3 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement		Frequency	Uncertainty
Radiated Emission	Horizontal	30MHz~1000MHz	4.2dB
	Horizontal	1GHz~18GHz	4.2dB
	Vertical	30MHz~1000MHz	4.4dB
	Vertical	1GHz~18GHz	4.4dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

3.4 LIST OF USED TEST EQUIPMENT AT GRGT

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Conducted Emissions				
EMI Receiver	R&S	ESU26	100526	2016-03-08
L.I.S.N	SCHWARZBECK	NSLK 8127	8127450	2015-08-18
Occupied Bandwidth / carrier frequencies separated/ hopping channel number/ dwell time/ maximum peak output power/100kHz bandwidth of frequency band edge/ Spurious Emissions at Antenna Port/ Restricted Bands				
Spectrum analyzer	R&S	FSV30	001	2016-05-08
Spurious Emissions				
Receiver	R&S	ESU26	100526	2016-03-08
Loop antenna	R&S	HFH2-Z2	881058/28	2016-04-17
Biconical Log-periodic Antenna	ETS.LINDGREN	3142C	00075971	2016-04-17
Signal Generator	Agilent	N5183A-540	50142096	2015-09-28
Biconical antenna	ELECTRO-METRICS	BIA-30S	166	2016-04-17
log-periodical antenna	ELECTRO-METRICS	LPA-30	383	2016-04-17
Horn antenna	ETS.LINDGREN	3117C	00075824	2015-08-02
Horn antenna	SCHWARZBECK	BBHA9120D	752	2016-04-17
Per-Amplifier (0.1-26.5GHz)	Compliance Directions systems Inc.	PAP-0126	25002	2016-01-02
Semi-anechoic chamber	ETS	966(RFD-F/A-100)	3730	2016-02-25

NOTE: The calibration interval of the above test instruments is 12 months.

4. TEST REQUIREMENT

4.1 E.U.T. TEST CONDITIONS

Type of antenna: spring antenna

Temperature: 21.0 °C

Humidity: 54 % RH

Atmospheric Pressure: 1011 mbar

Test frequencies: According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

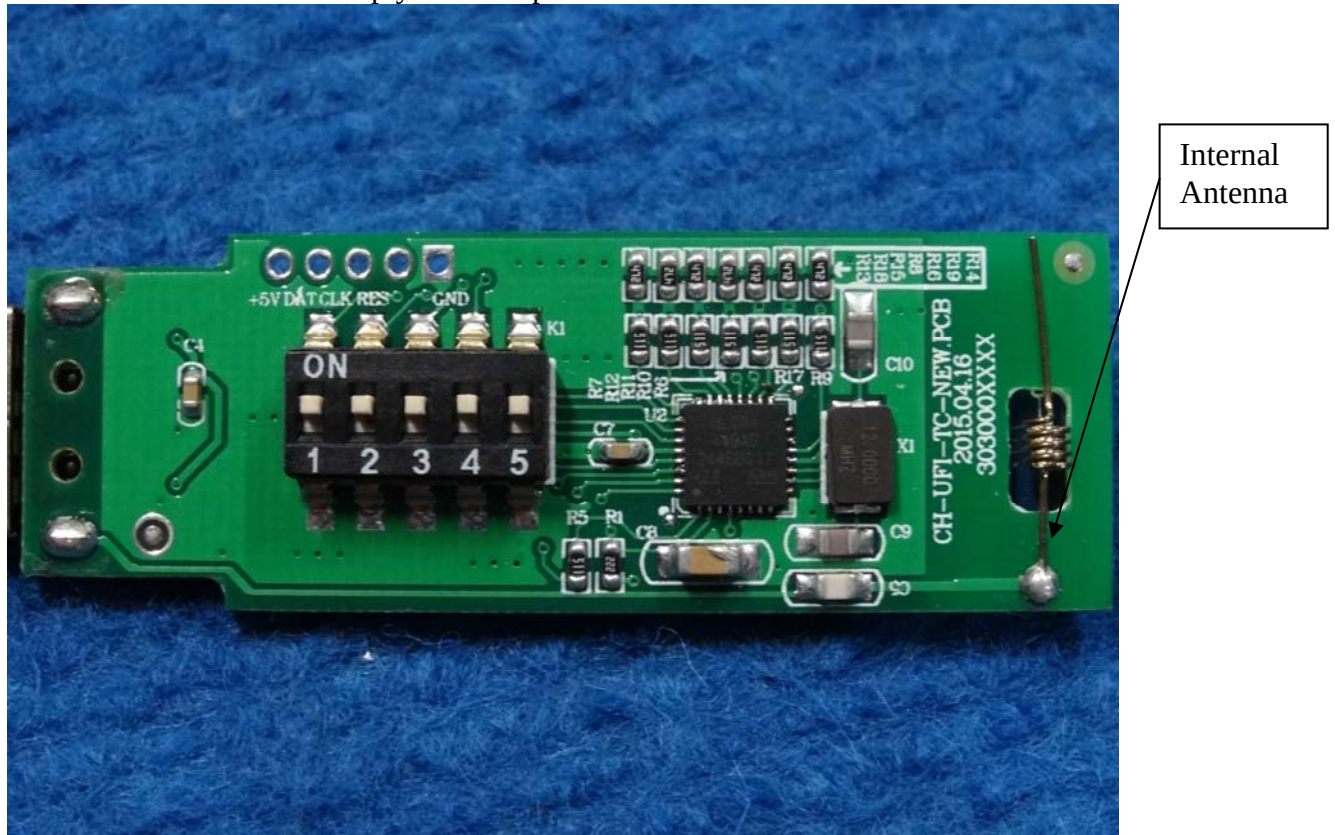
EUT channels and frequencies list:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2409.3	8	2434.9
1	2412.5	9	2438.1
2	2415.7	10	2441.3
3	2418.9	11	2444.5
4	2422.1	12	2447.7
5	2425.3	13	2450.9
6	2428.5	14	2454.1
7	2431.7	15	2457.3

Test frequency is the lowest channel: 0 channel(2409.3MHz), middle channel: 8 channel(2434.9MHz) and highest channel: 15 channel(2457.3MHz)

4.2 ANTENNA REQUIREMENT

The EUT use spring antenna on the host. Antenna gain is 2.0dBi .which accordance 15.203.is considered sufficient to comply with the provisions of this section.



FCC ID: XAO-CC2500MPATR

5. EMISSION TEST

5.1 OCCUPIED BANDWIDTH

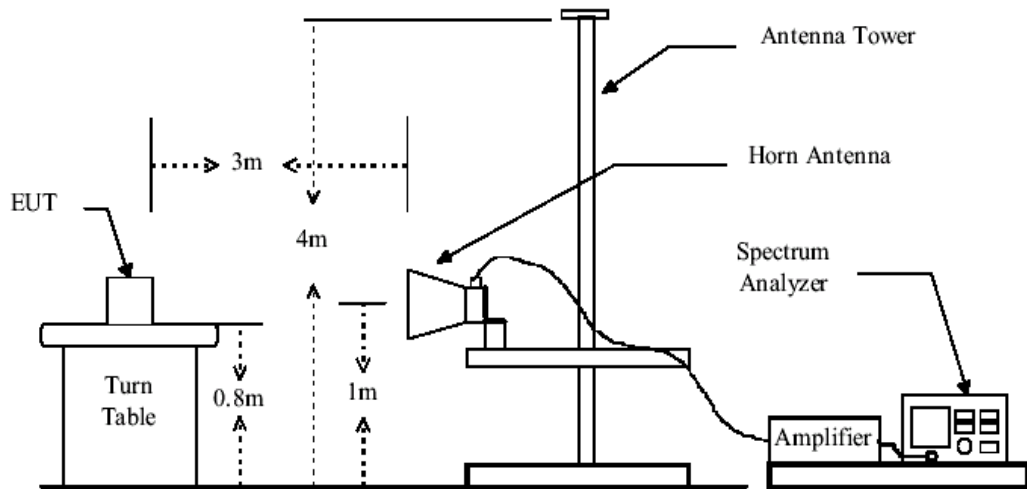
5.1.1 LIMITS

/

5.1.2 TEST PROCEDURES

1. Make the equipment in test mode.
2. Set the spectrum analyzer: Span = approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel;
3. Set the spectrum analyzer: RBW $\geq$ 1% of the 20dB bandwidth (set 10kHz). VBW $\geq$ RBW. Sweep = auto; Detector Function = Peak. Trace = Max Hold.
4. Mark the peak frequency and -20dB points bandwidth.
5. Bandwidth value is OBW value.

5.1.3 TEST SETUP

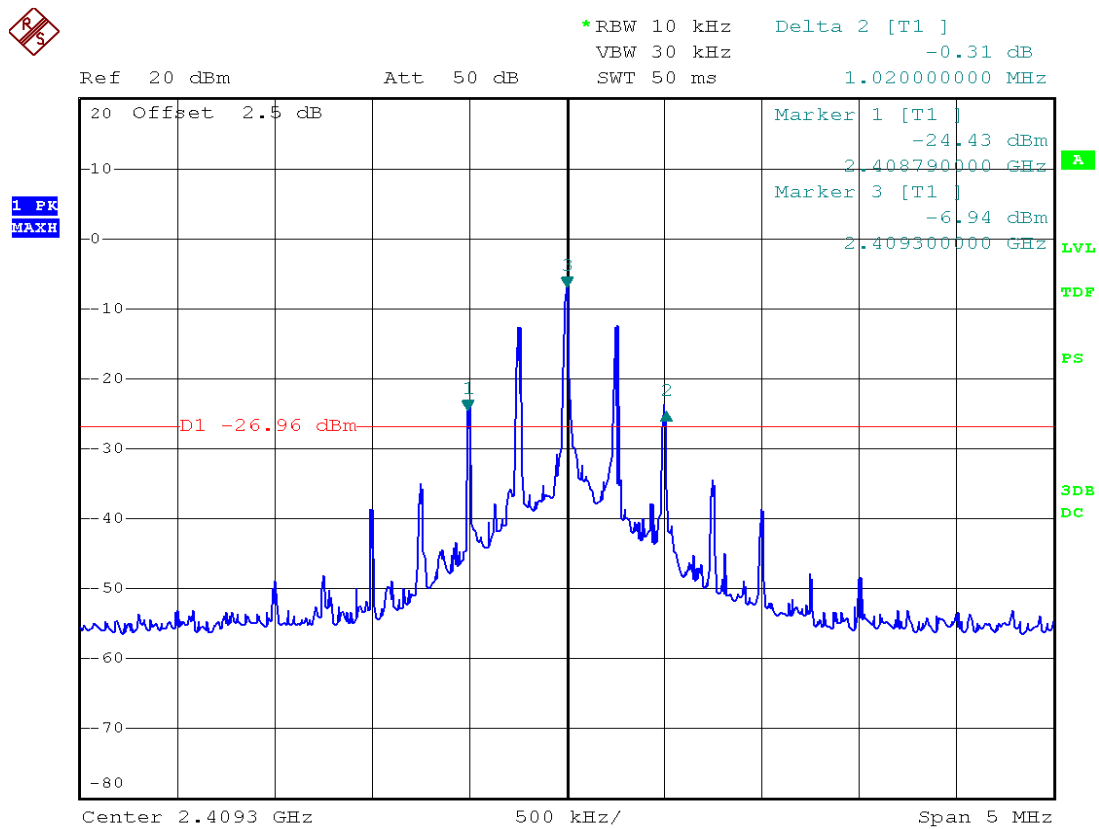


5.1.4 TEST RESULTS

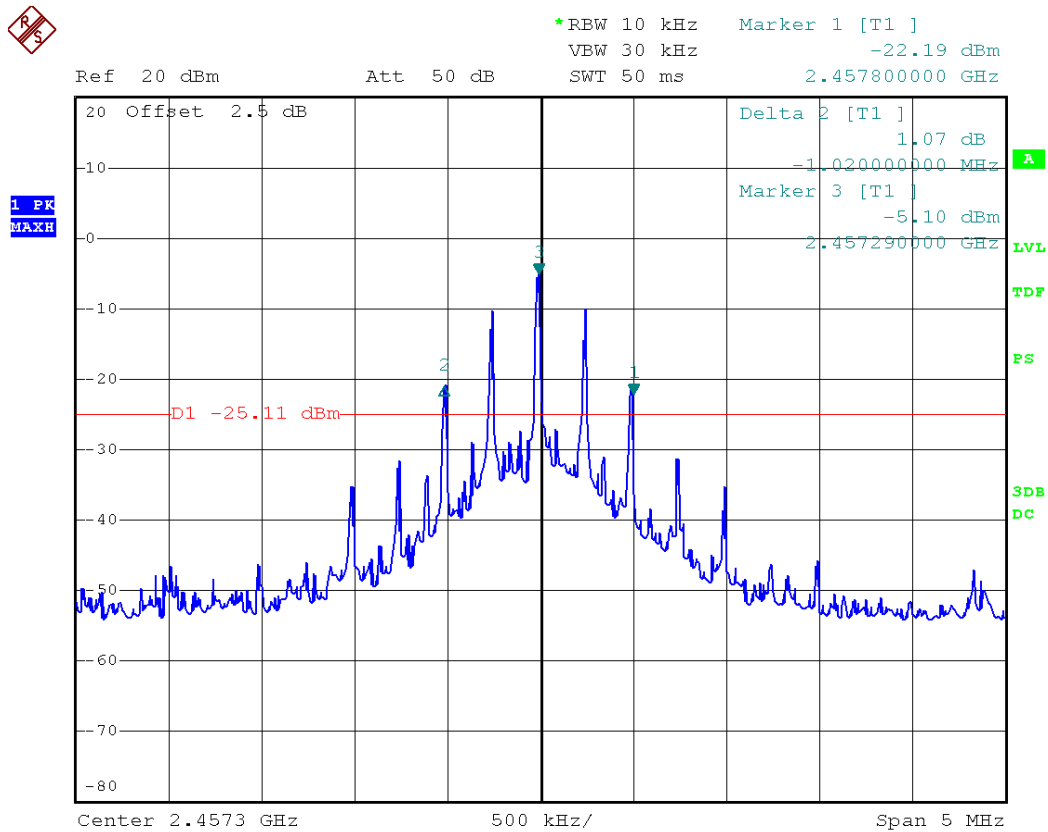
Frequency (MHz)	20dB Bandwidth Emission (kHz)	Low Frequency at 20dB OBW (MHz)	High Frequency at 20dB OBW (MHz)
2409.3	1020	2408.79	/
2457.3	1020	/	2457.29
LIMIT		FL>2400.0	FH< 2483.5

FCC ID: XAO-CC2500MPATR

Refer to attached plots:
Channel 2409.3MHz



Channel 2457.3MHz



FCC ID: XAO-CC2500MPATR

5.2 INTENTIONAL RADIATORS FIELD STRENGTH

5.2.1 LIMITS

Frequency (MHz)	Field Strength
2400-2483.5 MHz	50(millivolts/meter)/93.98dBuV/m
Field Strength of Harmonics	500(microvolts/meter) /53.98dBuV/m

5.2.2 TEST PROCEDURE

Procedure of Test

Radiated emission tests shall be made with the receive or transmit antenna located at a horizontal distance of 3 m plus half of the maximum width of the EUT being tested, measured from the centre of the EUT. The tests shall be performed with the equipment configured as closely as possible to its typical, practical operation. Unless stated otherwise, cables and wiring shall be as specified by the manufacturer and the equipment shall be in its housing (or cabinet) with all covers and access panels in place. Any deviation from normal EUT operating conditions shall be included in the test report.

The EUT (on a non-conductive support structure, where applicable) shall be placed on a remotely operated turntable, to allow the EUT to be rotated. The height of the EUT above the ground plane shall be according to the following requirements.

- Table-top equipment is placed on a non-conductive set-up table with height $0,8\text{ m} \pm 0,01\text{ m}$, ANSI C63.10:2009 specifies the method to determine the impact of the non-conductive set-up table on test results.
- Floor-standing equipment is placed on a non-conductive support, as specified in the applicable product standard. If there are no EUT height placement requirements in the product standard, the EUT shall be placed on a non-conductive support at a height of 5 cm to 15 cm above the ground plane.

Interface cables, loads, and devices should be connected to at least one of each type of the interface ports of the EUT and, where practical, each cable shall be terminated in a device typical for its actual use. Where there are multiple interface ports of the same type, a typical number of these devices shall be connected to devices or loads. It is sufficient to connect only one of the loads, provided that it can be shown, for example by preliminary testing, that the connection of further ports would not significantly increase the level of disturbance (that is, more than 2 dB) or significantly degrade the immunity level.

The test mode(s) described in Item 2.4 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.4 producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the test.

Note: 1. RF Field Strength (dBuV) = $20 \log \text{RF Voltage (uV)}$

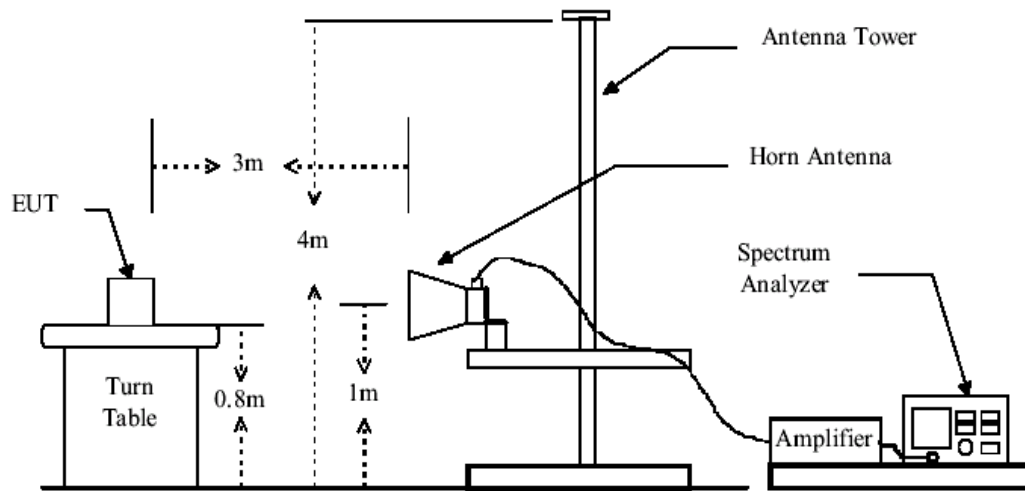
2.Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Set 1MHz RBW/VBW for peak detector at a distance of 3m.

3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

FCC ID: XAO-CC2500MPATR

5.2.3 TEST SETUP



FCC ID: XAO-CC2500MPATR

5.2.4 TEST RESULTS

Average factor measurement

$T_p = 1000\text{ms}$

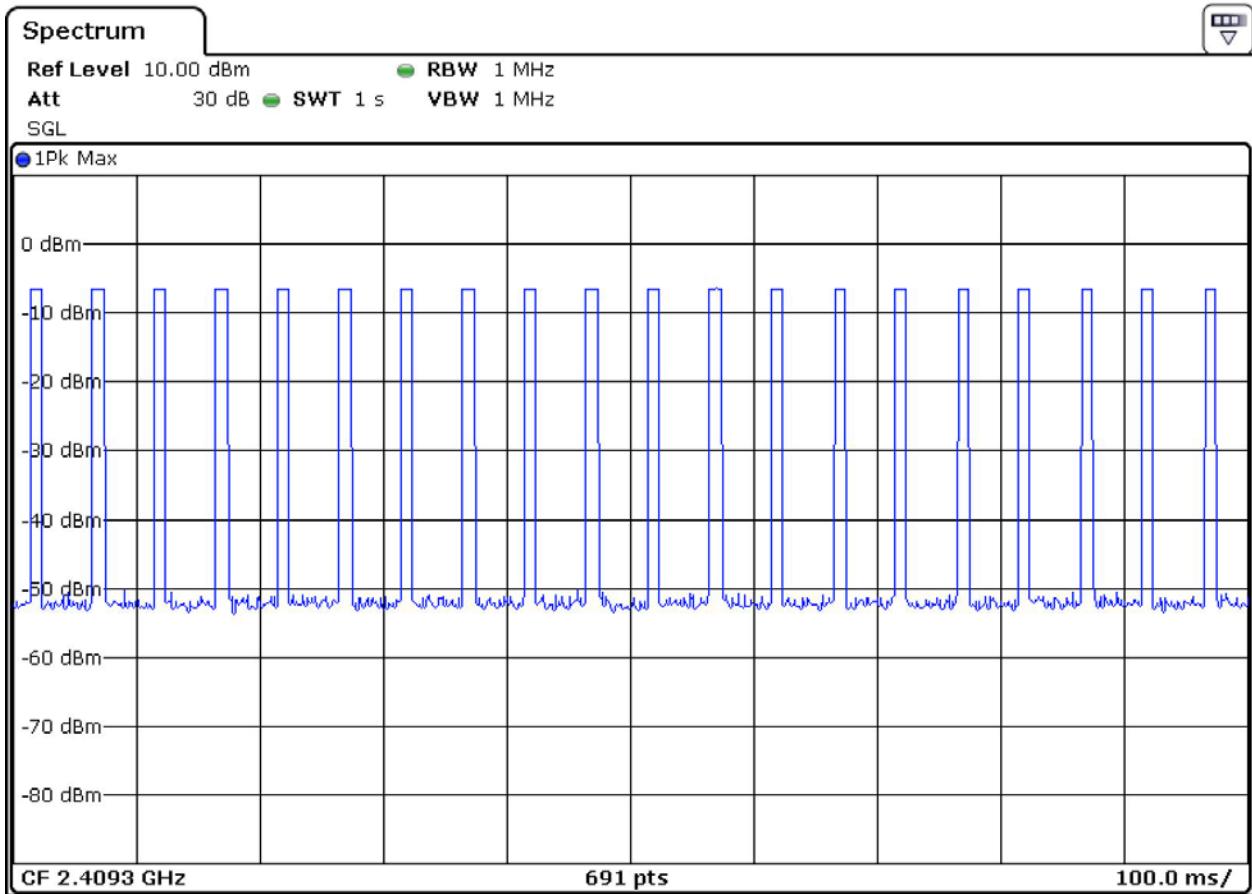
$T_{on1} = 9.13\text{ms}$

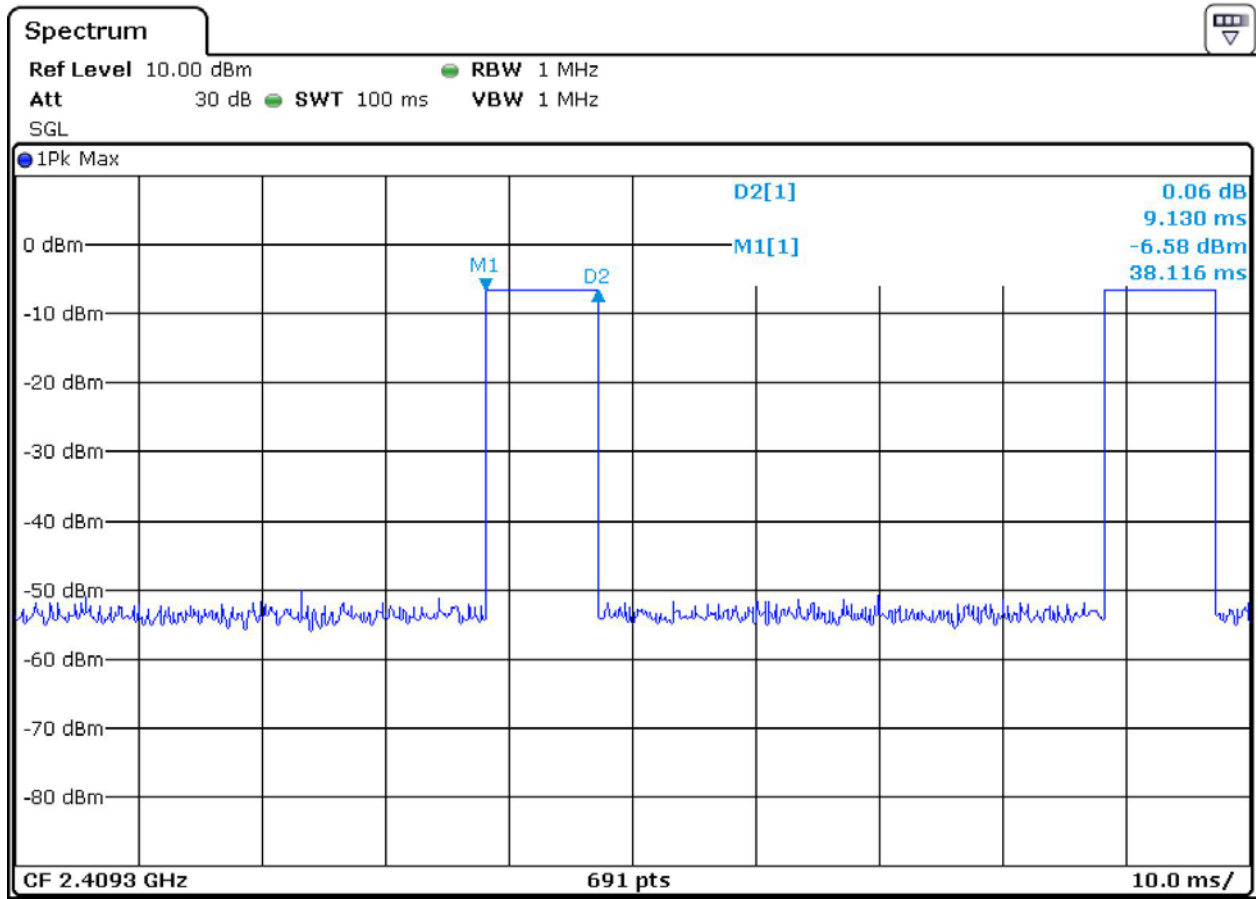
Average Factor = $20\log(T_{on}/T_p) = 20\log[(9.13 \times 20)/1000] = -14.77$

Average = Peak(dBuV/m) + Average Factor (dB)

Refer to attached plots for detail:

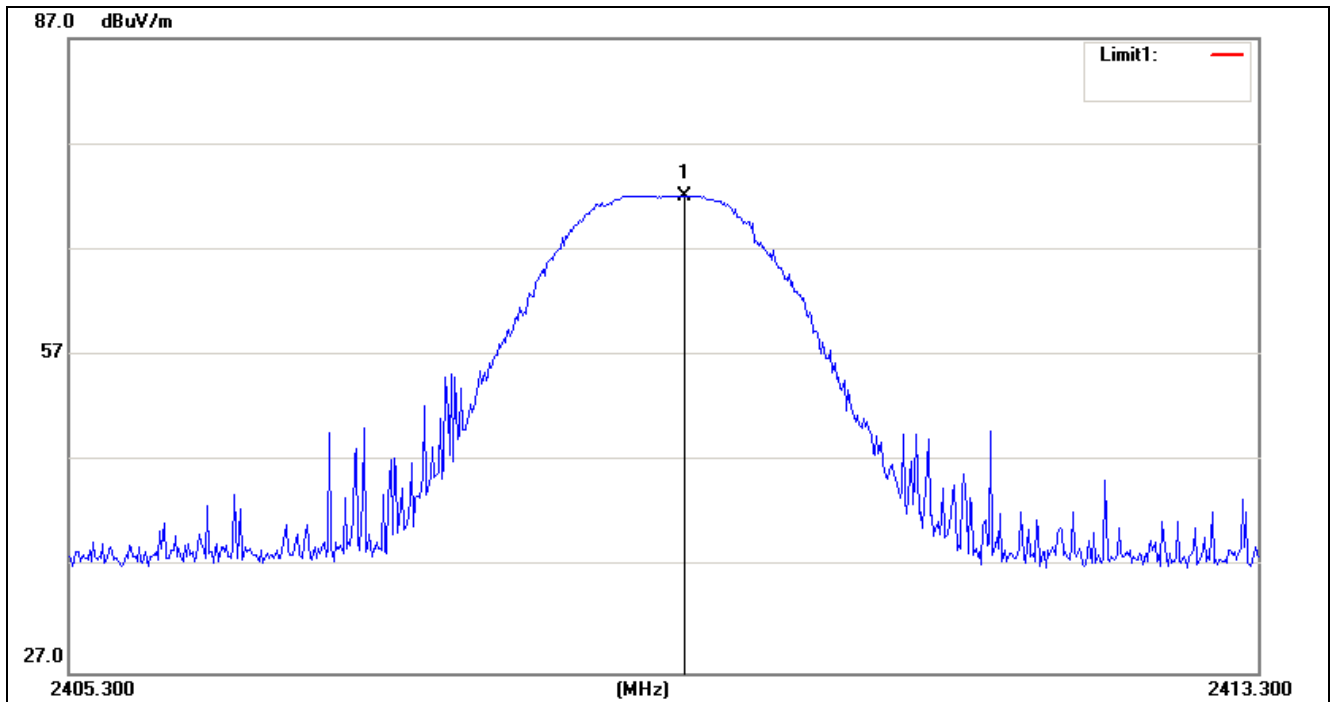
Channel 2409.3MHz:





Channel 2409.3MHz:

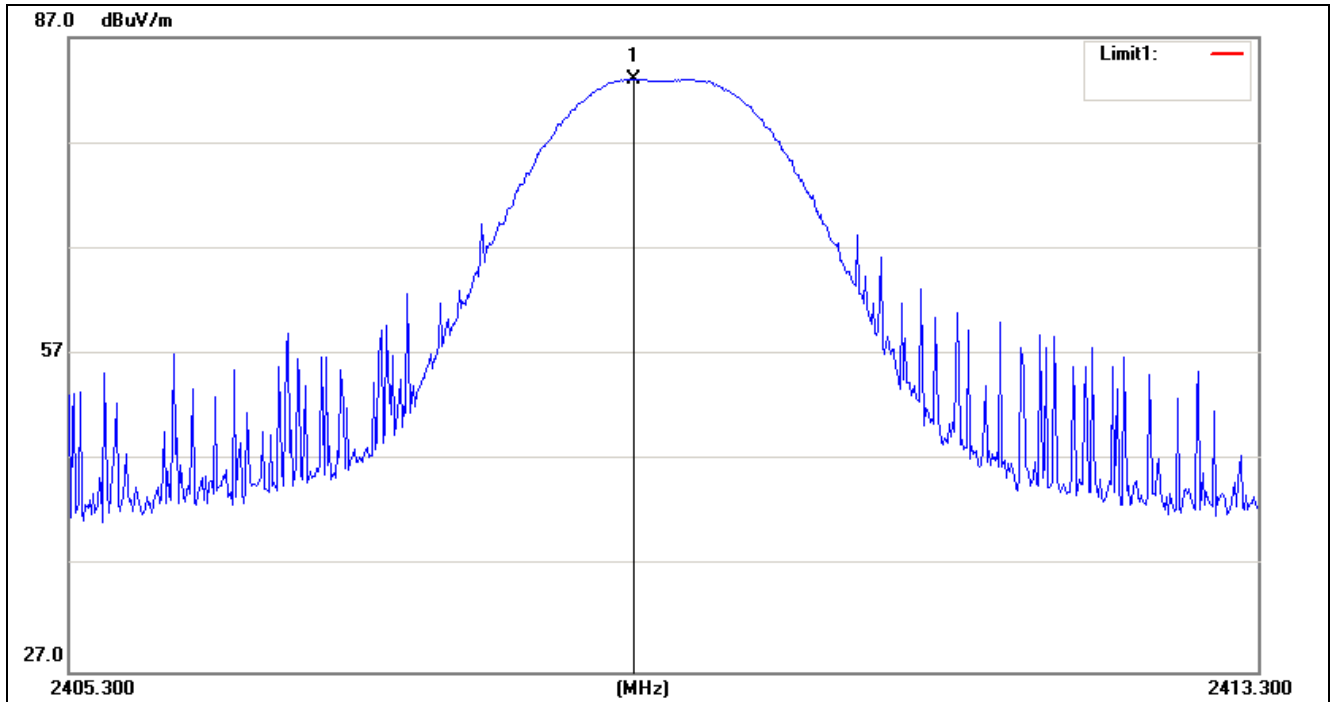
Project No.:	ZJ20150005-E-1	Polarization:	Vertical
Standard:	FCC Part15.249	Power Source:	DC 5V
Test item:	Radiation Test	Date:	2015-6-25
Temp./Hum.(%RH):	21.5/54%RH	Time:	9:41:30
EUT:	Wireless Module	Distance:	3m
Model:	CC2500MPATR	Test Result:	Pass
Note:			



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2409.441	61.56	10.57	72.13	113.98	-41.85	peak

No.	Frequency (MHz)	Average Factor	Peak dBuV/m	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2409.441	-14.77	72.13	57.36	93.98	-36.62	AVG

Project No.:	ZJ20150005-E-1	Polarization:	Horizontal
Standard:	FCC Part15.249	Power Source:	DC 5V
Test item:	Radiation Test	Date:	2015-6-25
Temp./Hum.(%RH):	21.5/54%RH	Time:	9:42:42
EUT:	Wireless Module	Distance:	3m
Model:	CC2500MPATR	Test Result:	Pass
Note:			

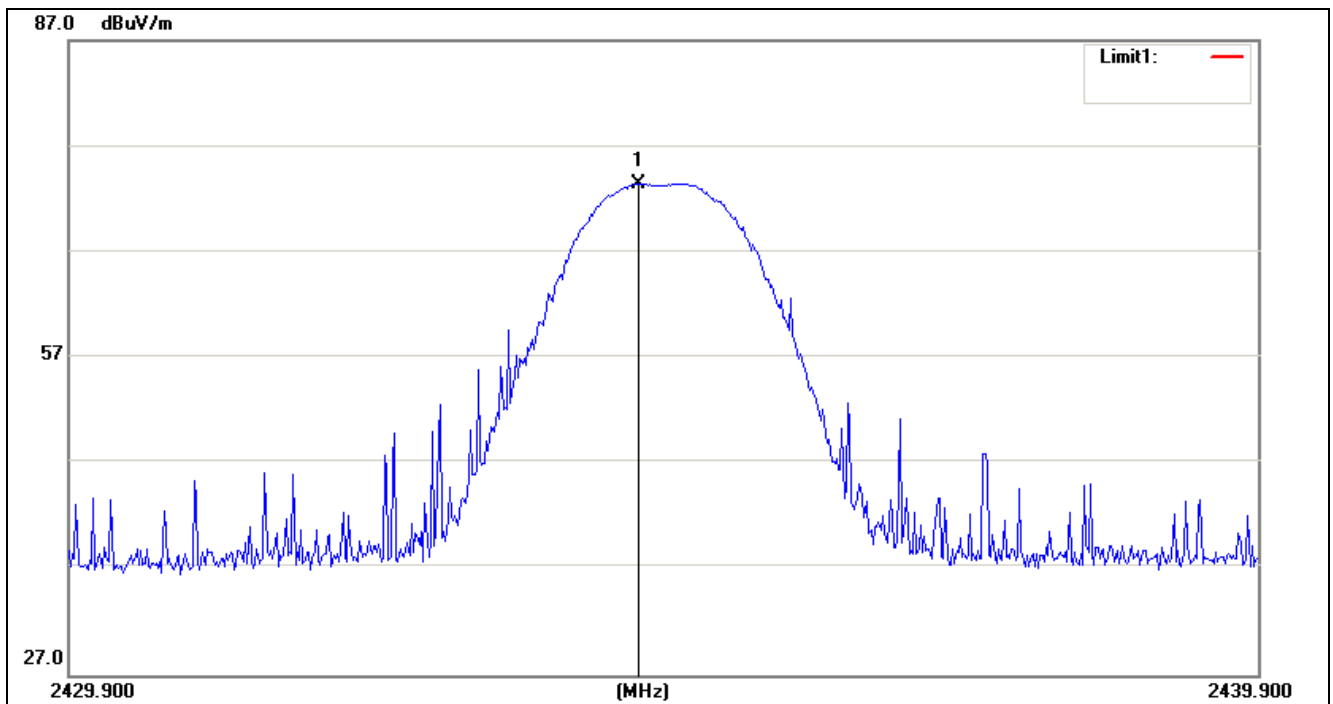


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2409.108	72.44	10.57	83.01	113.98	-30.97	peak

No.	Frequency (MHz)	Average Factor	Peak dBuV/m	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2409.108	-14.77	83.01	68.24	93.98	-25.74	AVG

Channel 2434.9MHz:

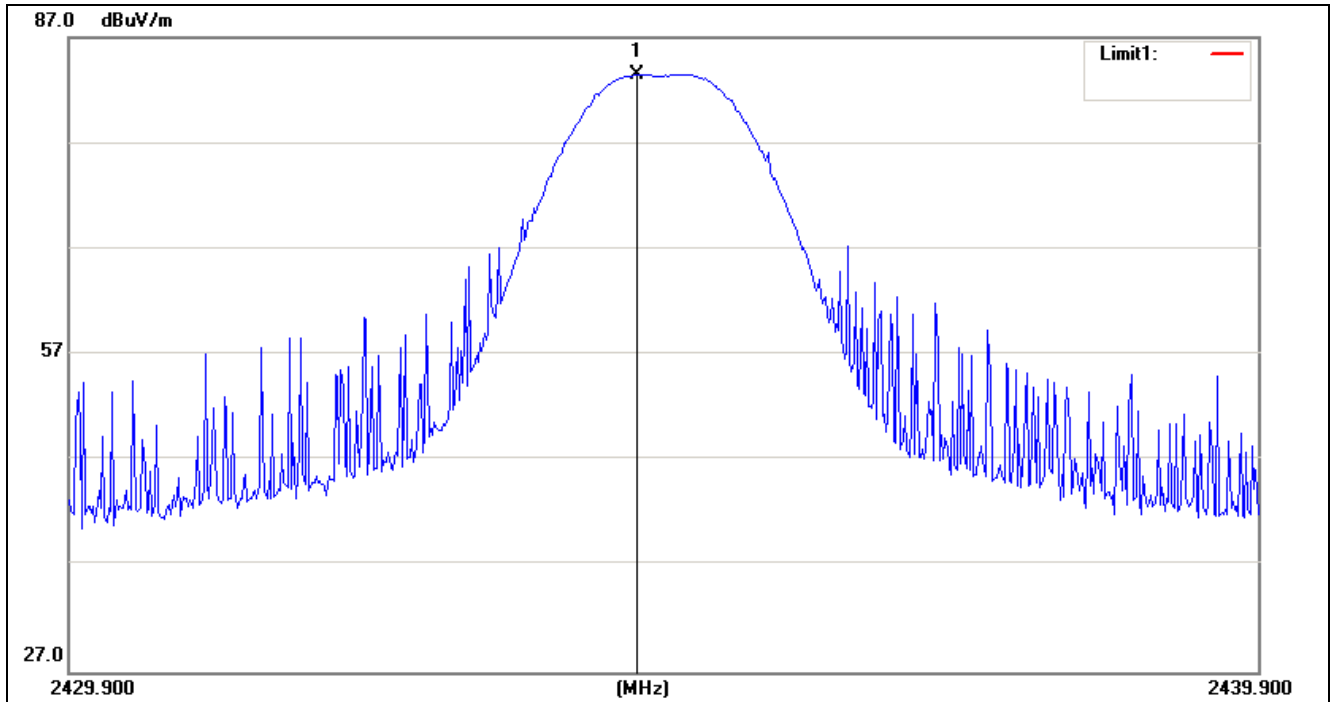
Project No.:	ZJ20150005-E-1	Polarization:	Vertical
Standard:	FCC Part15.249	Power Source:	DC 5V
Test item:	Radiation Test	Date:	2015-6-25
Temp./Hum.(%RH):	21.5/54%RH	Time:	10:06:47
EUT:	Wireless Module	Distance:	3m
Model:	CC2500MPATR	Test Result:	Pass
Note:			



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2434.692	62.91	10.58	73.49	113.98	-40.49	peak

No.	Frequency (MHz)	Average Factor	Peak dBuV/m	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2434.692	-14.77	73.49	58.72	93.98	-35.26	AVG

Project No.:	ZJ20150005-E-1	Polarization:	Horizontal
Standard:	FCC Part15.249	Power Source:	DC 5V
Test item:	Radiation Test	Date:	2015-6-25
Temp./Hum.(%RH):	21.5/54%RH	Time:	10:05:58
EUT:	Wireless Module	Distance:	3m
Model:	CC2500MPATR	Test Result:	Pass
Note:			

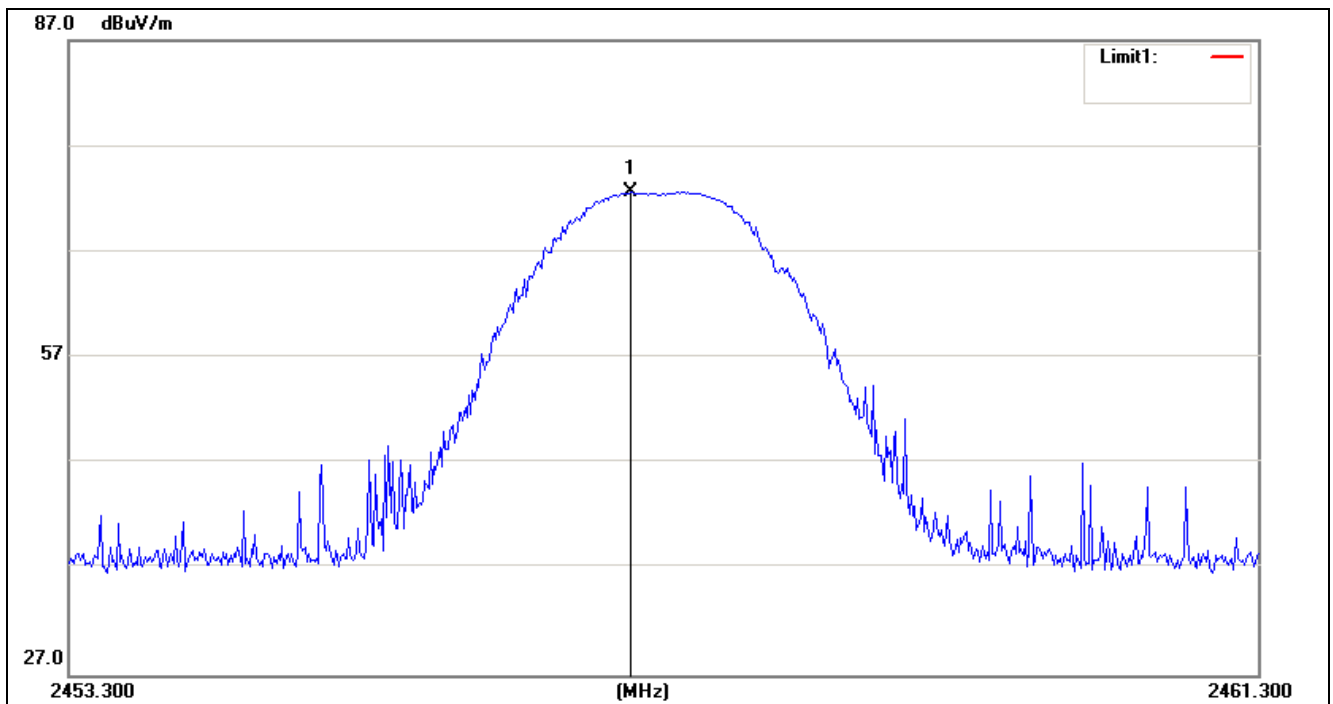


No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2434.676	72.9	10.58	83.48	113.98	-30.5	peak

No.	Frequency (MHz)	Average Factor	Peak dBuV/m	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2434.676	-14.77	83.48	68.71	93.98	-25.27	AVG

Channel 2457.3MHz:

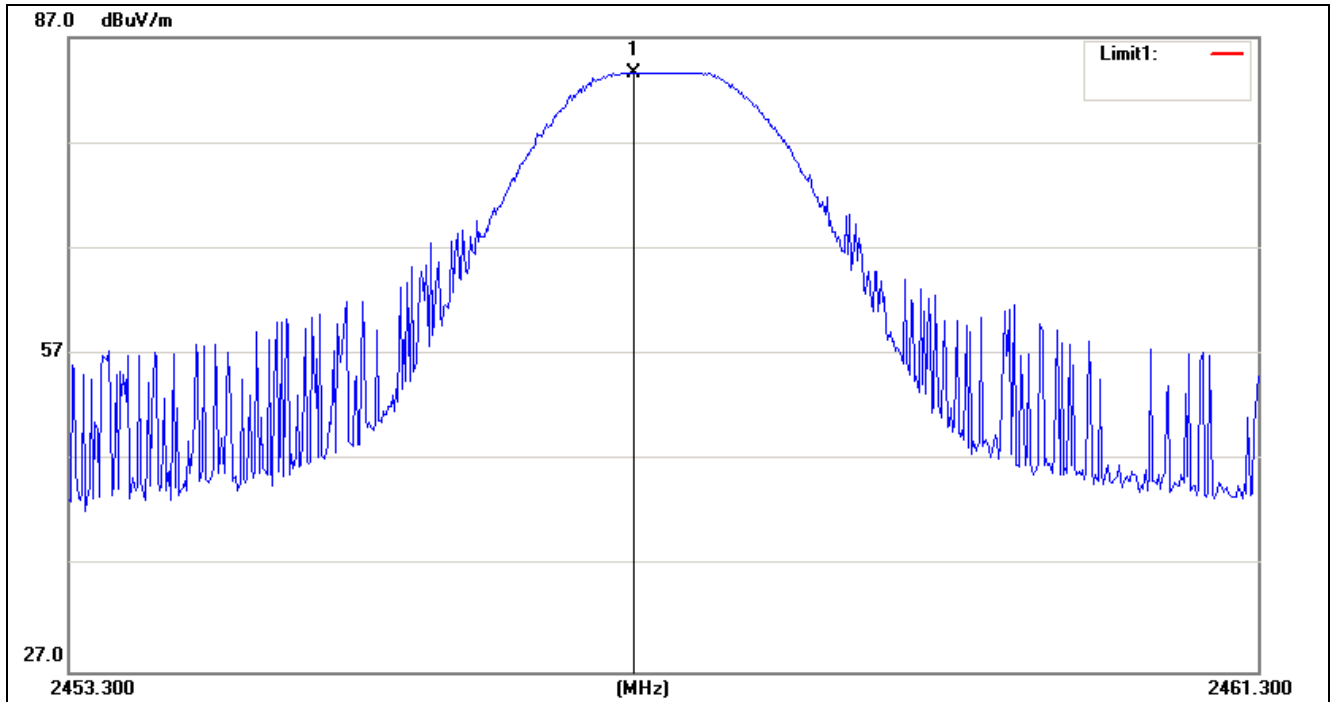
Project No.:	ZJ20150005-E-1	Polarization:	Vertical
Standard:	FCC Part15.249	Power Source:	DC 5V
Test item:	Radiation Test	Date:	2015-6-25
Temp./Hum.(%RH):	21.5/54%RH	Time:	9:58:11
EUT:	Wireless Module	Distance:	3m
Model:	CC2500MPATR	Test Result:	Pass
Note:			



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2457.082	62.07	10.6	72.67	113.98	-41.31	peak

No.	Frequency (MHz)	Average Factor	Peak dBuV/m	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2457.082	-14.77	72.67	57.9	93.98	-36.08	AVG

Project No.:	ZJ20150005-E-1	Polarization:	Horizontal
Standard:	FCC Part15.249	Power Source:	DC 5V
Test item:	Radiation Test	Date:	2015-6-25
Temp./Hum.(%RH):	21.5/54%RH	Time:	9:57:04
EUT:	Wireless Module	Distance:	3m
Model:	CC2500MPATR	Test Result:	Pass
Note:			



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2457.104	73.07	10.6	83.67	113.98	-30.31	peak

No.	Frequency (MHz)	Average Factor	Peak dBuV/m	Average (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2457.104	-14.77	83.67	68.9	93.98	-25.08	AVG

5.3 RADIATED ELECTROMAGNETIC DISTURBANCE

5.3.1 LIMITS

Frequency (MHz)	Quasi-peak(dB μ V/m)
30 ~ 88	40
88~216	43.5
216 ~ 960	46
Above 960	54

NOTE: (1) The lower limit shall apply at the transition frequencies.

Frequency (GHz)	PEAK and AVG(dB μ V/m)
Above 1G	74 PEAK
Above 1G	54 AVG

5.3.2 TEST PROCEDURES

Procedure of Preliminary Test

Radiated emission tests shall be made with the receive or transmit antenna located at a horizontal distance of 3 m plus half of the maximum width of the EUT being tested, measured from the centre of the EUT. The tests shall be performed with the equipment configured as closely as possible to its typical, practical operation. Unless stated otherwise, cables and wiring shall be as specified by the manufacturer and the equipment shall be in its housing (or cabinet) with all covers and access panels in place. Any deviation from normal EUT operating conditions shall be included in the test report.

The EUT (on a non-conductive support structure, where applicable) shall be placed on a remotely operated turntable, to allow the EUT to be rotated. The height of the EUT above the ground plane shall be according to the following requirements.

- Table-top equipment is placed on a non-conductive set-up table with height 0,8 m $\pm$ 0,01 m, ANSI C63.10:2009 specifies the method to determine the impact of the non-conductive set-up table on test results.
- Floor-standing equipment is placed on a non-conductive support, as specified in the applicable product standard. If there are no EUT height placement requirements in the product standard, the EUT shall be placed on a non-conductive support at a height of 5 cm to 15 cm above the ground plane.

Interface cables, loads, and devices should be connected to at least one of each type of the interface ports of the EUT and, where practical, each cable shall be terminated in a device typical for its actual use. Where there are multiple interface ports of the same type, a typical number of these devices shall be connected to devices or loads. It is sufficient to connect only one of the loads, provided that it can be shown, for example by preliminary testing, that the connection of further ports would not significantly increase the level of disturbance (that is, more than 2 dB) or significantly degrade the immunity level.

The test mode(s) described in Item 2.4 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.4 producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the final test.

Procedure of Final Test

EUT and support equipment were set up on the turntable as per the configuration with highest emission level in the preliminary test. The Analyzer / Receiver scanned from 30MHz to 1000MHz. Emissions were scanned and measured rotating the EUT to 360 degrees, varying cable placement and positioning the antenna 1 to 4 meters above the ground plane, in both the vertical and the horizontal polarization, to maximize the emission reading level. Record at least six highest emissions. Emission frequency, amplitude, antenna position, polarization and turntable position were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit and only QP reading is presented. The test data of the worst-case condition(s) was recorded.

Procedure of Final Test

EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test. A scan was taken on both power lines, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. The test data of the worst-case condition(s) was recorded.

Below 1GHz Set the spectrum analyzer: RBW =100KHz VBW $\geq$ RBW , Span = enough to catch the trace. Sweep = auto; Detector Function = Peak. Trace = Max,hold.

Above 1GHz Set the spectrum analyzer: RBW =1MHz VBW $\geq$ RBW , Span = enough to catch the trace. Sweep = auto; Detector Function = Peak. Trace = Max,hold.

The worst case emissions were reported.

5.3.3 TEST SETUP

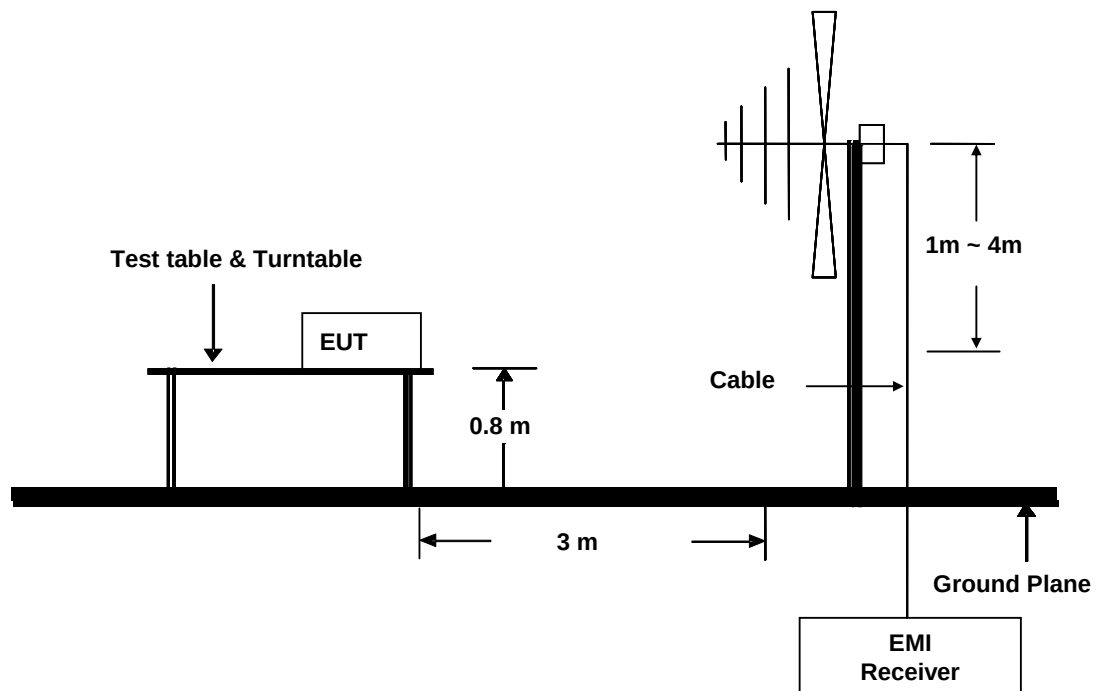


Figure 1. 30MHz to 1GHz radiated emissions test configuration

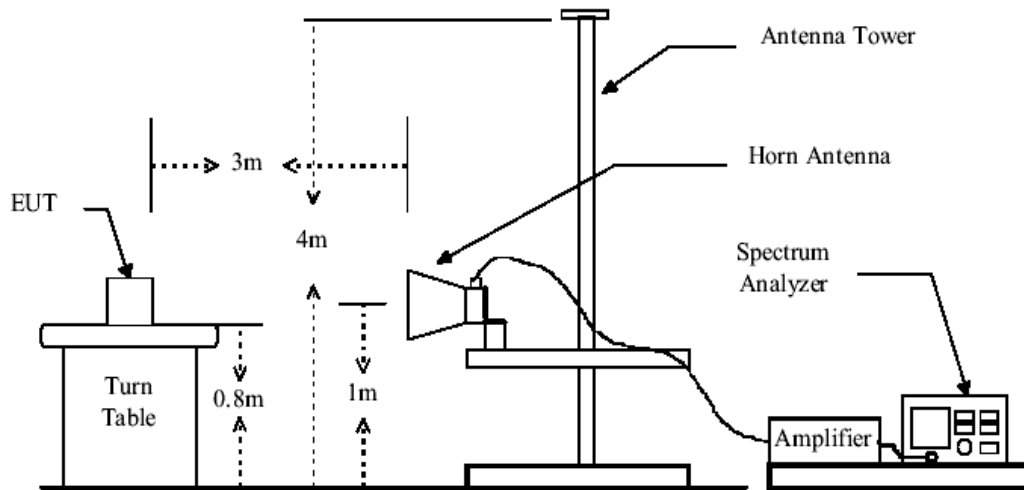


Figure 2 Above 1GHz radiated emissions test configuration

5.3.4 TEST RESULTS

1. Low Frequency 2409.3MHz

30MHz~1GHz Spurious Emissions .Quasi-Peak Measurement

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	115.5696	6.04	9.16	15.20	43.50	-28.30	Vertical
2	139.9011	14.51	9.19	23.70	43.50	-19.80	Vertical
3	168.4062	12.86	10.54	23.40	43.50	-20.10	Vertical
4	193.8076	7.37	11.43	18.80	43.50	-24.70	Vertical
5	231.9889	4.51	12.99	17.50	46.00	-28.50	Vertical
6	406.9286	5.26	18.24	23.50	46.00	-22.50	Vertical
7	117.5344	10.35	9.05	19.40	43.50	-24.10	Horizontal
8	145.5140	16.80	9.70	26.50	43.50	-17.00	Horizontal
9	170.3095	18.06	10.54	28.60	43.50	-14.90	Horizontal
10	184.2495	19.56	11.24	30.80	43.50	-12.70	Horizontal
11	259.5837	6.78	13.92	20.70	46.00	-25.30	Horizontal
12	363.6705	7.00	17.50	24.50	46.00	-21.50	Horizontal

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Vertical:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Remark:
1	1326.511	31.99	10.58	42.57	74.00	-31.43	peak
2	1326.511	18.79	10.58	29.37	54.00	-24.63	AVG
3	1711.402	40.45	9.84	50.29	74.00	-23.71	peak
4	1711.402	24.37	9.84	34.21	54.00	-19.79	AVG
5	1912.633	39.36	9.96	49.32	74.00	-24.68	peak
6	1912.633	17.38	9.96	27.34	54.00	-26.66	AVG
7	6804.951	26.25	20.10	46.35	74.00	-27.65	peak
8	6804.951	13.13	20.10	33.23	54.00	-20.77	AVG
9	11538.614	25.77	29.87	55.64	74.00	-18.36	peak
10	11538.614	13.06	29.87	42.93	54.00	-11.07	AVG
11	14212.750	25.32	31.59	56.91	74.00	-17.09	peak
12	14212.750	13.45	31.59	45.04	54.00	-8.96	AVG

Horizontal:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Remark:
1	1711.401	40.28	9.84	50.12	74.00	-23.88	peak
2	1711.401	16.53	9.84	26.37	54.00	-27.63	AVG
3	1912.633	36.04	9.96	46.00	74.00	-28.00	peak
4	1912.633	16.32	9.96	26.28	54.00	-27.72	AVG
5	2147.450	33.06	10.21	43.27	74.00	-30.73	peak
6	2147.450	16.47	10.21	26.68	54.00	-27.32	AVG
7	7892.198	24.58	23.40	47.98	74.00	-26.02	peak
8	7892.198	13.52	23.40	36.92	54.00	-17.08	AVG
9	11118.864	24.97	29.93	54.90	74.00	-19.10	peak
10	11118.864	13.38	29.93	43.31	54.00	-10.69	AVG
11	13887.365	26.18	31.47	57.65	74.00	-16.35	peak
12	13887.365	13.64	31.47	45.11	54.00	-8.89	AVG

The field strength is calculated by adding the Antenna Factor. Correct Factor.

The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Correct Factor

2. Middle Frequency 2434.9MHz

30MHz~1GHz Spurious Emissions .Quasi-Peak Measurement

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	89.2442	4.36	9.54	13.90	43.50	-29.60	Vertical
2	103.2840	4.87	9.83	14.70	43.50	-28.80	Vertical
3	136.0250	13.32	8.98	22.30	43.50	-21.20	Vertical
4	143.8876	15.15	9.55	24.70	43.50	-18.80	Vertical
5	161.9103	12.84	10.66	23.50	43.50	-20.00	Vertical
6	400.1259	6.01	18.19	24.20	46.00	-21.80	Vertical
7	117.5344	10.35	9.05	19.40	43.50	-24.10	Horizontal
8	139.9011	17.31	9.19	26.50	43.50	-17.00	Horizontal
9	176.1497	19.86	10.84	30.70	43.50	-12.80	Horizontal
10	184.2495	19.96	11.24	31.20	43.50	-12.30	Horizontal
11	259.5837	6.68	13.92	20.60	46.00	-25.40	Horizontal
12	363.6705	7.30	17.50	24.80	46.00	-21.20	Horizontal

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Vertical:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Remark:
1	1102.160	43.20	9.38	52.58	74.00	-21.42	peak
2	1102.160	18.60	9.38	27.98	54.00	-26.02	AVG
3	1719.347	41.41	9.85	51.26	74.00	-22.74	peak
4	1719.347	25.41	9.85	35.26	54.00	-18.74	AVG
5	1912.633	40.01	9.96	49.97	74.00	-24.03	peak
6	1912.633	17.27	9.96	27.23	54.00	-26.77	AVG
7	8618.256	25.14	25.22	50.36	74.00	-23.64	peak
8	8618.256	12.66	25.22	37.88	54.00	-16.12	AVG
9	11067.480	26.03	29.94	55.97	74.00	-18.03	peak
10	11067.480	13.34	29.94	43.28	54.00	-10.72	AVG
11	14147.069	26.43	31.61	58.04	74.00	-15.96	peak
12	14147.069	13.49	31.61	45.10	54.00	-8.90	AVG

Horizontal:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Remark:
1	1626.386	31.58	9.78	41.36	74.00	-32.64	peak
2	1626.386	16.70	9.78	26.48	54.00	-27.52	AVG
3	2147.450	34.36	10.21	44.57	74.00	-29.43	peak
4	2147.450	18.18	10.21	28.39	54.00	-25.61	AVG
5	3541.455	29.79	11.14	40.93	74.00	-33.07	peak
6	3541.455	17.16	11.14	28.30	54.00	-25.70	AVG
7	6557.402	25.48	19.77	45.25	74.00	-28.75	peak
8	6557.402	13.72	19.77	33.49	54.00	-20.51	AVG
9	10864.310	24.87	29.61	54.48	74.00	-19.52	peak
10	10864.310	12.88	29.61	42.49	54.00	-11.51	AVG
11	13887.365	26.71	31.47	58.18	74.00	-15.82	peak
12	13887.365	13.46	31.47	44.93	54.00	-9.07	AVG

The field strength is calculated by adding the Antenna Factor. Correct Factor.

The basic equation with a sample calculation is as follows:

Final Test Level = Receiver Reading + Correct Factor

3. High Frequency 2457.3MHz

30MHz~1GHz Spurious Emissions .Quasi-Peak Measurement

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Antenna polarization
1	131.5150	11.05	8.75	19.80	43.50	-23.70	Vertical
2	137.5622	15.24	9.06	24.30	43.50	-19.20	Vertical
3	149.6605	14.70	10.10	24.80	43.50	-18.70	Vertical
4	170.3095	13.16	10.54	23.70	43.50	-19.80	Vertical
5	186.3318	10.78	11.32	22.10	43.50	-21.40	Vertical
6	367.7807	3.92	17.58	21.50	46.00	-24.50	Vertical
7	117.5345	9.55	9.05	18.60	43.50	-24.90	Horizontal
8	145.5140	17.10	9.70	26.80	43.50	-16.70	Horizontal
9	168.4062	19.56	10.54	30.10	43.50	-13.40	Horizontal
10	178.1407	20.43	10.97	31.40	43.50	-12.10	Horizontal
11	190.5677	18.74	11.46	30.20	43.50	-13.30	Horizontal
12	363.6705	6.60	17.50	24.10	46.00	-21.90	Horizontal

1~25 GHz Harmonics & Spurious Emissions. Peak & Average Measurement

Vertical:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Remark:
1	1912.633	40.41	9.96	50.37	74.00	-23.63	peak
2	1912.633	17.00	9.96	26.96	54.00	-27.04	AVG
3	2050.248	37.31	10.09	47.40	74.00	-26.60	peak
4	2050.248	15.36	10.09	25.45	54.00	-28.55	AVG
5	2942.494	29.41	10.39	39.80	74.00	-34.20	peak
6	2942.494	15.69	10.39	26.08	54.00	-27.92	AVG
7	4852.597	26.74	15.15	41.89	74.00	-32.11	peak
8	4852.597	15.34	15.15	30.49	54.00	-23.51	AVG
9	11274.451	25.20	29.93	55.13	74.00	-18.87	peak
10	11274.451	13.39	29.93	43.32	54.00	-10.68	AVG
11	14147.069	25.05	31.61	56.66	74.00	-17.34	peak
12	14147.069	13.41	31.61	45.02	54.00	-8.98	AVG

Horizontal:

No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Remark:
1	1695.620	33.79	9.83	43.62	74.00	-30.38	peak
2	1695.620	16.64	9.83	26.47	54.00	-27.53	AVG
3	1903.794	35.87	9.97	45.84	74.00	-28.16	peak
4	1903.794	16.39	9.97	26.36	54.00	-27.64	AVG
5	3867.258	28.46	12.82	41.28	74.00	-32.72	peak
6	3867.258	17.25	12.82	30.07	54.00	-23.93	AVG
7	6964.394	24.56	20.32	44.88	74.00	-29.12	peak
8	6964.394	13.65	20.32	33.97	54.00	-20.03	AVG
9	11222.348	24.75	29.92	54.67	74.00	-19.33	peak
10	11222.348	13.29	29.92	43.21	54.00	-10.79	AVG
11	14081.691	26.37	31.62	57.99	74.00	-16.01	peak
12	14081.691	13.45	31.62	45.07	54.00	-8.93	AVG

Remark:

- 1). No any other emissions level which are attenuated less than 20dB below the limit.
According to 15.31(o), The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this Part.
Hence there no other emissions have been reported.
- 2). As shown in Section, for frequencies above 1000 MHz. the above field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.
- 3). The test only perform the EUT in transmitting status since the test frequencies were over 1GHz only required transmitting status.

Test result: The unit does meet the FCC requirements.

FCC ID: XAO-CC2500MPATR

5.4 OUT OF BAND EMISSIONS

5.4.1 LIMITS

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Section 15.209, whichever is the lesser attenuation.

5.4.2 TEST PROCEDURES

Procedure of Test

Radiated emission tests shall be made with the receive or transmit antenna located at a horizontal distance of 3 m plus half of the maximum width of the EUT being tested, measured from the centre of the EUT. The tests shall be performed with the equipment configured as closely as possible to its typical, practical operation. Unless stated otherwise, cables and wiring shall be as specified by the manufacturer and the equipment shall be in its housing (or cabinet) with all covers and access panels in place. Any deviation from normal EUT operating conditions shall be included in the test report.

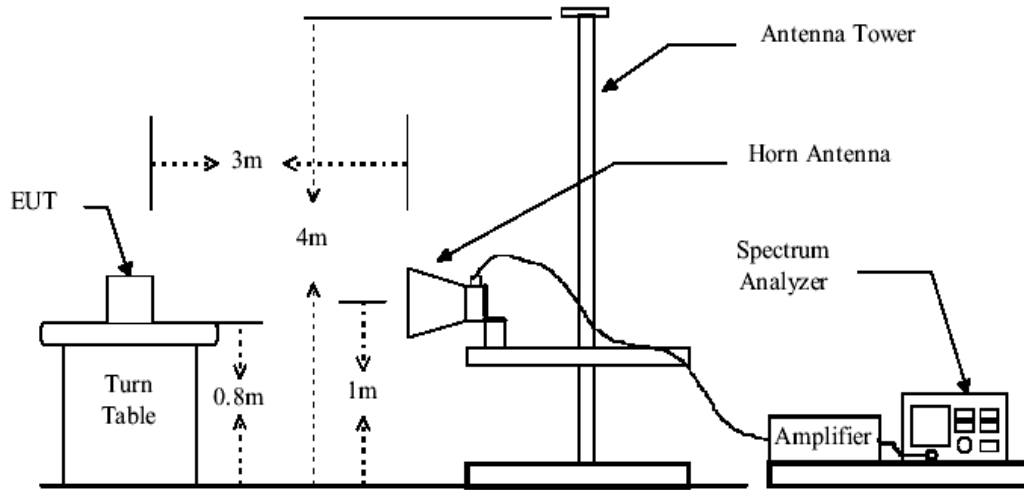
The EUT (on a non-conductive support structure, where applicable) shall be placed on a remotely operated turntable, to allow the EUT to be rotated. The height of the EUT above the ground plane shall be according to the following requirements.

- Table-top equipment is placed on a non-conductive set-up table with height $0,8\text{ m} \pm 0,01\text{ m}$, ANSI C63.10:2009 specifies the method to determine the impact of the non-conductive set-up table on test results.
- Floor-standing equipment is placed on a non-conductive support, as specified in the applicable product standard. If there are no EUT height placement requirements in the product standard, the EUT shall be placed on a non-conductive support at a height of 5 cm to 15 cm above the ground plane.

Interface cables, loads, and devices should be connected to at least one of each type of the interface ports of the EUT and, where practical, each cable shall be terminated in a device typical for its actual use. Where there are multiple interface ports of the same type, a typical number of these devices shall be connected to devices or loads. It is sufficient to connect only one of the loads, provided that it can be shown, for example by preliminary testing, that the connection of further ports would not significantly increase the level of disturbance (that is, more than 2 dB) or significantly degrade the immunity level.

The test mode(s) described in Item 2.4 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.4 producing the highest emission level. The EUT and cable configuration, antenna position, polarization and turntable position of the above highest emission level were recorded for the test.

5.4.3 TEST SETUP

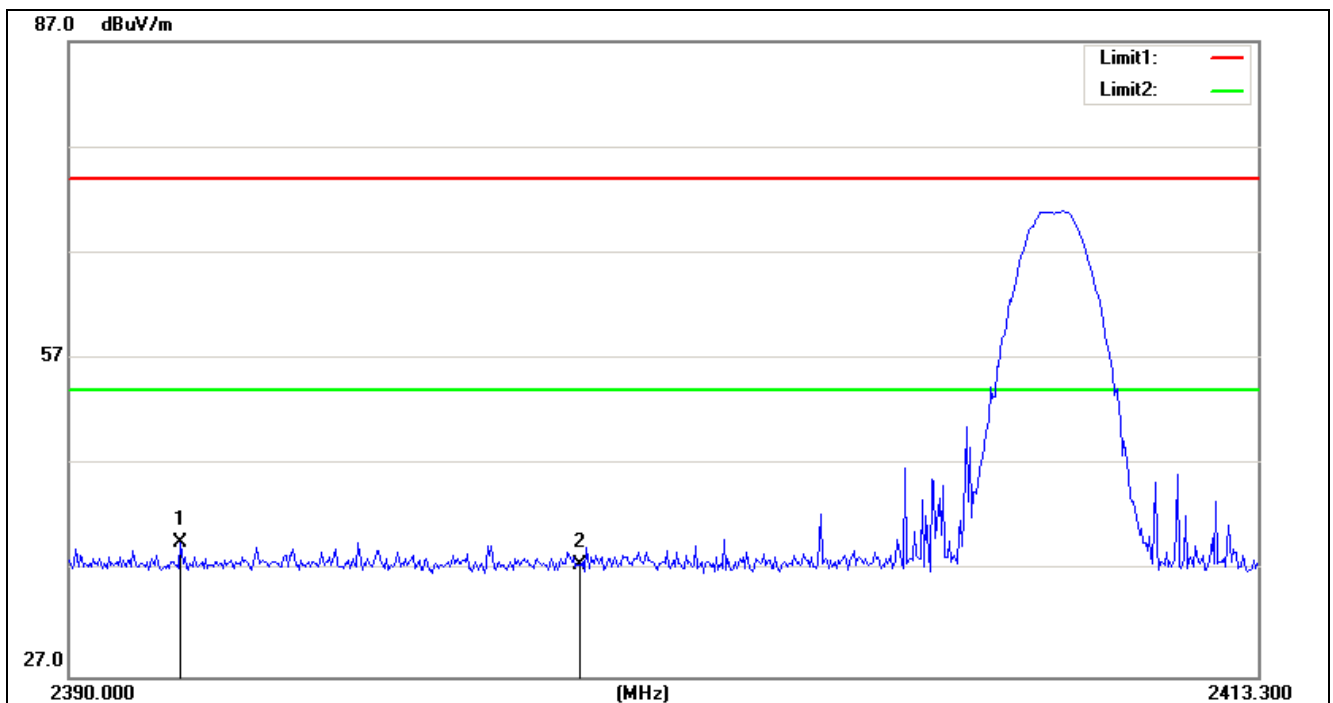


5.4.4 TEST RESULTS

The field strength was measured with an EMI measuring receiver and 1 MHz RBW / VBW for peak and with 1MHz RBW / 10Hz VBW for average at a distance of 3m.

The lowest channel Measurement:

Project No.:	ZJ20150005-E-1	Polarziation:	Vertical
Standard:	(RE)FCC PART 15 class B	Power Source:	DC 5V
Test item:	3m_PEAK		
Temp./Hum.(%RH):	Radiation Test	Date:	2015-6-25
EUT:	21.5/54%RH	Time:	9:44:26
Model:	Wireless Module	Distance:	3m
	CC2500MPATR	Test Result:	Pass
Note:			



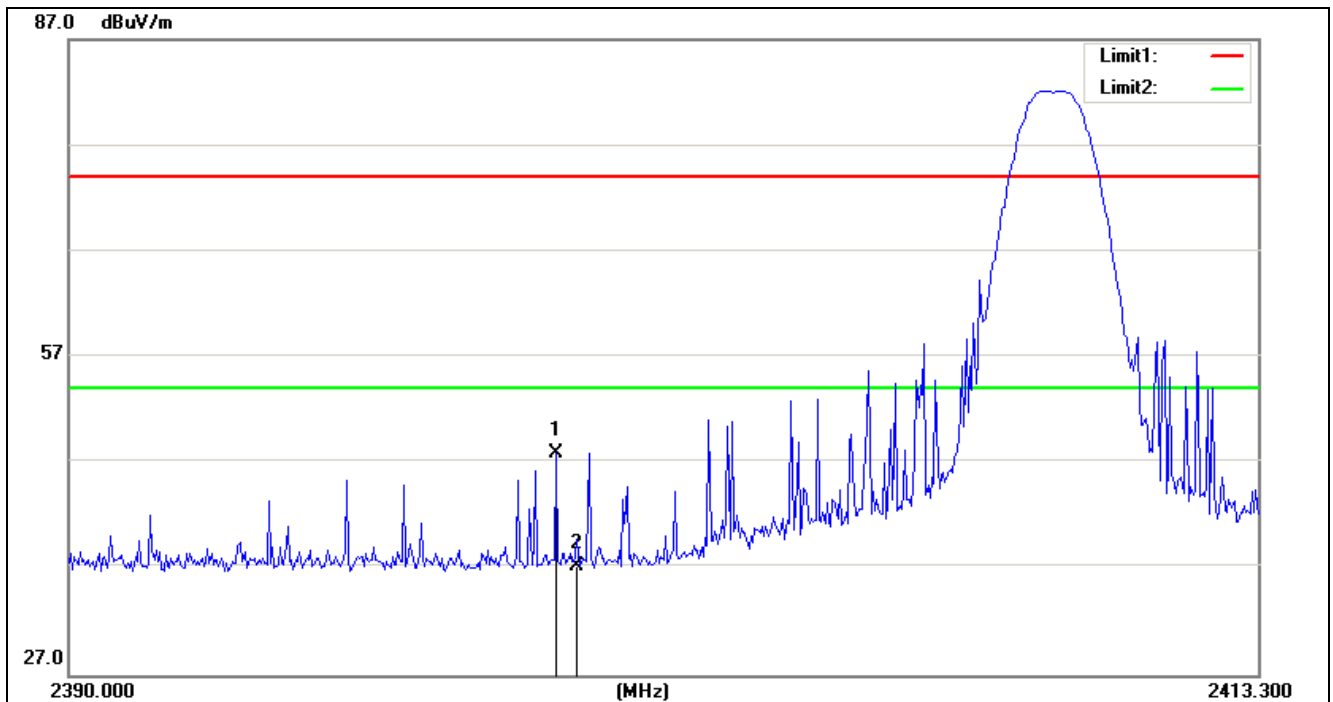
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2392.203	29.12	10.55	39.67	74.00	-34.33	peak
2	2400.000	27.07	10.56	37.63	74.00	-36.37	peak

Note:

1. The field strength is calculated by adding the Correct Factor.
2. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Correct Factor
3. The peak level is lower than AVG limit, no need to test the AVG level.

FCC ID: XAO-CC2500MPATR

Project No.:	ZJ20150005-E-1	Polarization:	Horizontal
Standard:	(RE)FCC PART 15 class B	Power Source:	DC 5V
Test item:	3m_PEAK		
Temp./Hum.(%RH):	Radiation Test	Date:	2015-6-25
EUT:	21.5/54%RH	Time:	9:45:09
Model:	Wireless Module	Distance:	3m
	CC2500MPATR	Test Result:	Pass
Note:			



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2399.559	37.41	10.56	47.97	74.00	-26.03	peak
2	2400.000	26.70	10.56	37.26	74.00	-36.74	peak

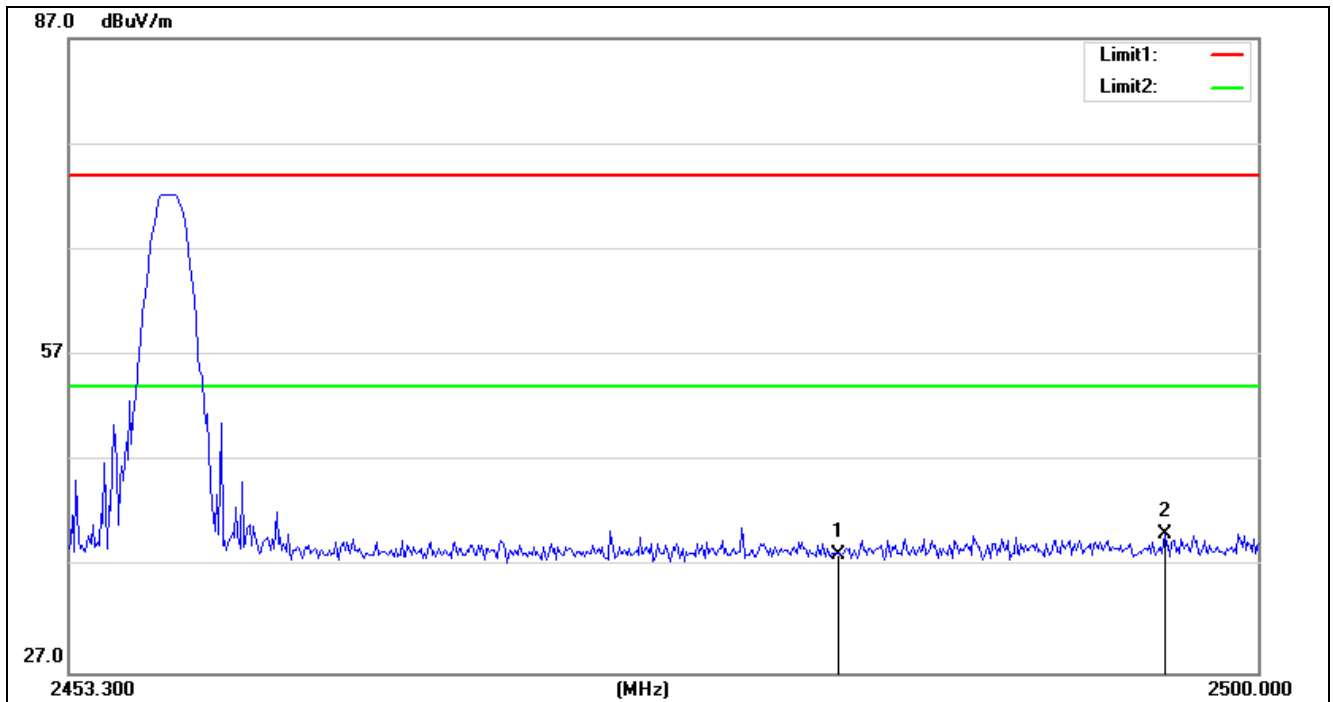
Note:

1. The field strength is calculated by adding the Correct Factor.
2. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Correct Factor
3. The peak level is lower than AVG limit, no need to test the AVG level.

FCC ID: XAO-CC2500MPATR

The highest channel Measurement:

Project No.:	ZJ20150005-E-1	Polarization:	Vertical
Standard:	(RE)FCC PART 15 class B	Power Source:	DC 5V
	3m PEAK		
Test item:	Radiation Test	Date:	2015-6-25
Temp./Hum.(%RH):	21.5/54%RH	Time:	9:52:36
EUT:	Wireless Module	Distance:	3m
Model:	CC2500MPATR	Test Result:	Pass
Note:			



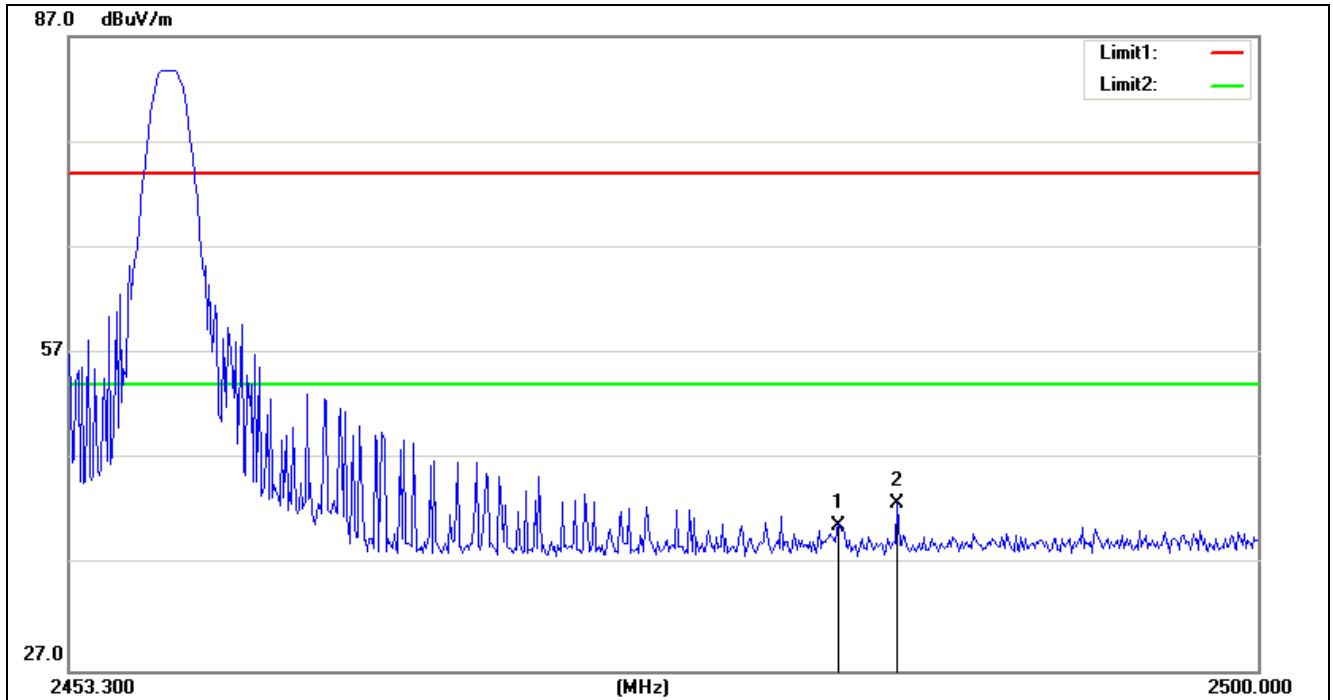
No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	27.64	10.61	38.25	74.00	-35.75	peak
2	2496.333	29.55	10.62	40.17	74.00	-33.83	peak

Note:

1. The field strength is calculated by adding the Correct Factor.
2. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Correct Factor
3. The peak level is lower than AVG limit, no need to test the AVG level.

FCC ID: JAC-CC2500MPATR

Project No.:	ZJ20150005-E-1	Polarization:	Horizontal
Standard:	(RE)FCC PART 15 class B 3m_PEAK	Power Source:	DC 5V
Test item:	Radiation Test	Date:	2015-6-25
Temp./Hum.(%RH):	21.5/54%RH	Time:	9:53:27
EUT:	Wireless Module	Distance:	3m
Model:	CC2500MPATR	Test Result:	Pass
Note:			



No.	Frequency (MHz)	Reading (dBuV/m)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	2483.500	30.19	10.61	40.80	74.00	-33.20	peak
2	2485.780	32.19	10.62	42.81	74.00	-31.19	peak

Note:

1. The field strength is calculated by adding the Correct Factor.
2. The basic equation with a sample calculation is as follows:
Final Test Level = Receiver Reading + Correct Factor
3. The peak level is lower than AVG limit, no need to test the AVG level.

5.5 CONDUCTED EMISSION MEASUREMENT

5.5.1 LIMITS

Frequency range	Limits (dB μ V)	
	Quasi-peak	Average
150kHz $\sim$ 0.5MHz	66 $\sim$ 56	56 $\sim$ 46
0.5 MHz $\sim$ 5 MHz	56	46
5 MHz $\sim$ 30 MHz	60	50

NOTE: (1) The lower limit shall apply at the transition frequencies.

(2) The limit decreases in line with the logarithm of the frequency in the range of 150kHz to 0.5MHz.

5.5.2 TEST PROCEDURES

Procedure of Preliminary Test

For measurement of the disturbance voltage the equipment under test (EUT) is connected to the power supply mains and any other extended network via one or more artificial network(s). An EUT, whether intended to be grounded or not, and which is to be used on a table is configured as follows:

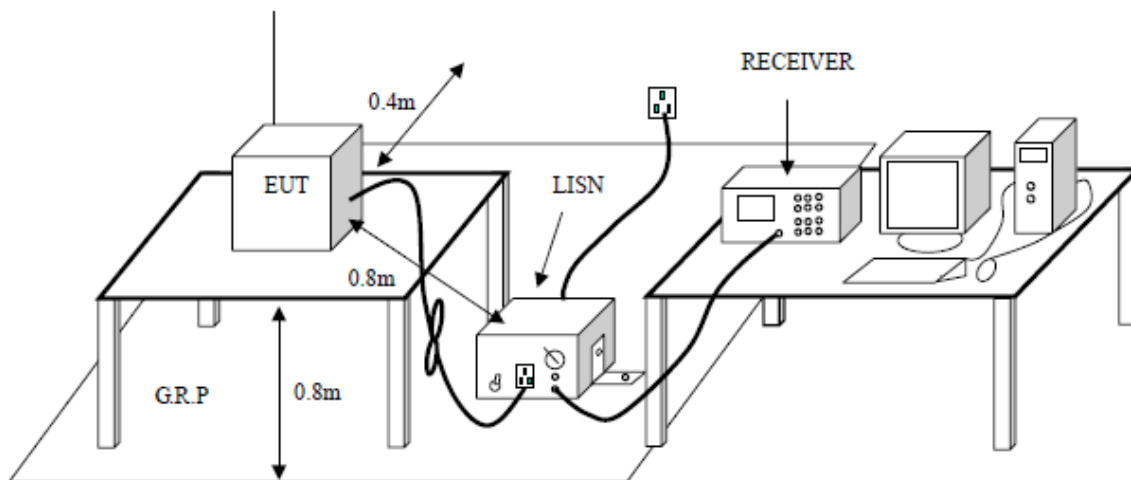
- Either the bottom or the rear of the EUT shall be at a controlled distance of 40 cm from a reference ground plane. This ground plane is normally the wall or floor of a shielded room. It may also be a grounded metal plane of at least 2 m by 2 m. This is physically accomplished as follows:
 - 1) place the EUT on a table of non-conducting material which is at least 80 cm high. Place the EUT so that it is 40 cm from the wall of the shielded room, or
 - 2) place the EUT on a table of non-conducting material which is 40 cm high so that the bottom of the EUT is 40 cm above the ground plane;
- All other conductive surfaces of the EUT shall be at least 80 cm from the reference ground plane;
- The EUT are placed on the floor that one side of the housings is 40 cm from the vertical reference ground plane and other metallic parts;
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth forming a bundle 30 cm to 40 cm long, hanging approximately in the middle between the ground plane and the table.
- I/O cables that are connected to a peripheral shall be bundled in the centre. The end of the cable may be terminated if required using correct terminating impedance. The total length shall not exceed 1 m.

The test mode(s) described in Item 2.4 were scanned during the preliminary test. After the preliminary scan, we found the test mode described in Item 2.4 producing the highest emission level. The EUT configuration and cable configuration of the above highest emission levels were recorded for reference of the final test.

Procedure of Final Test

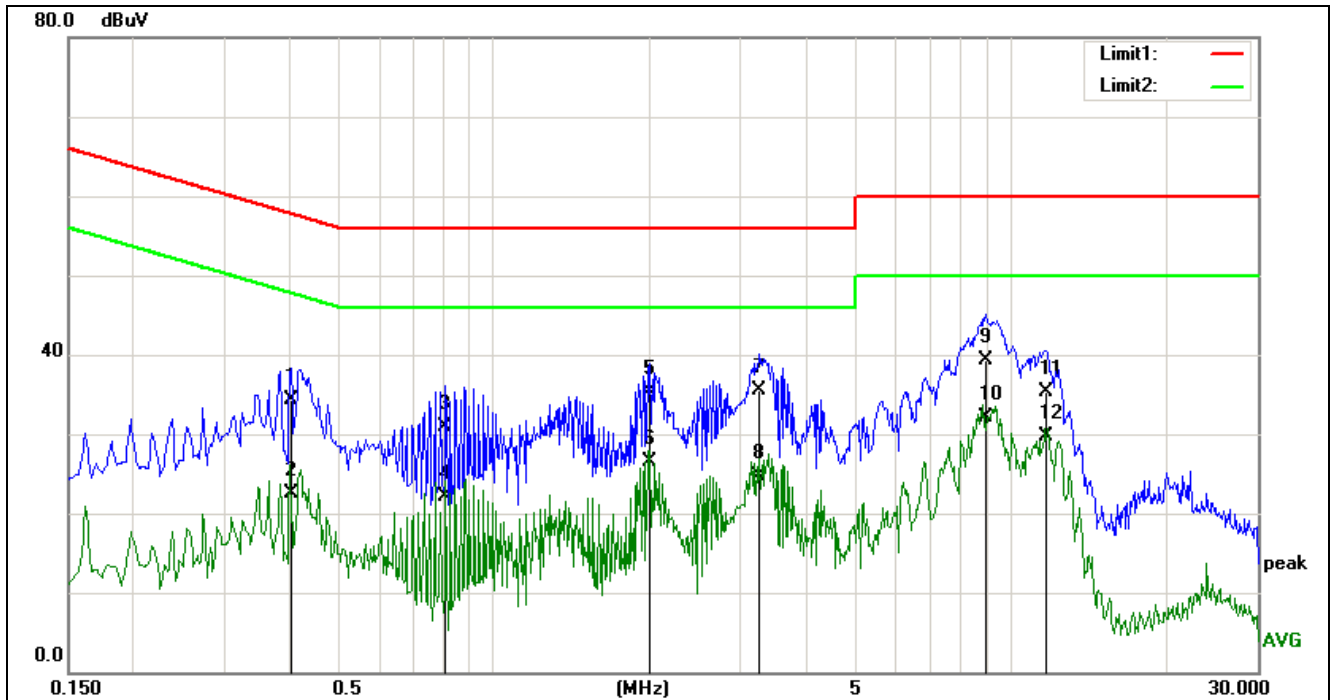
EUT and support equipment were set up on the test bench as per the configuration with highest emission level in the preliminary test. A scan was taken on both power lines, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. The test data of the worst-case condition(s) was recorded.

5.5.3 TEST SETUP



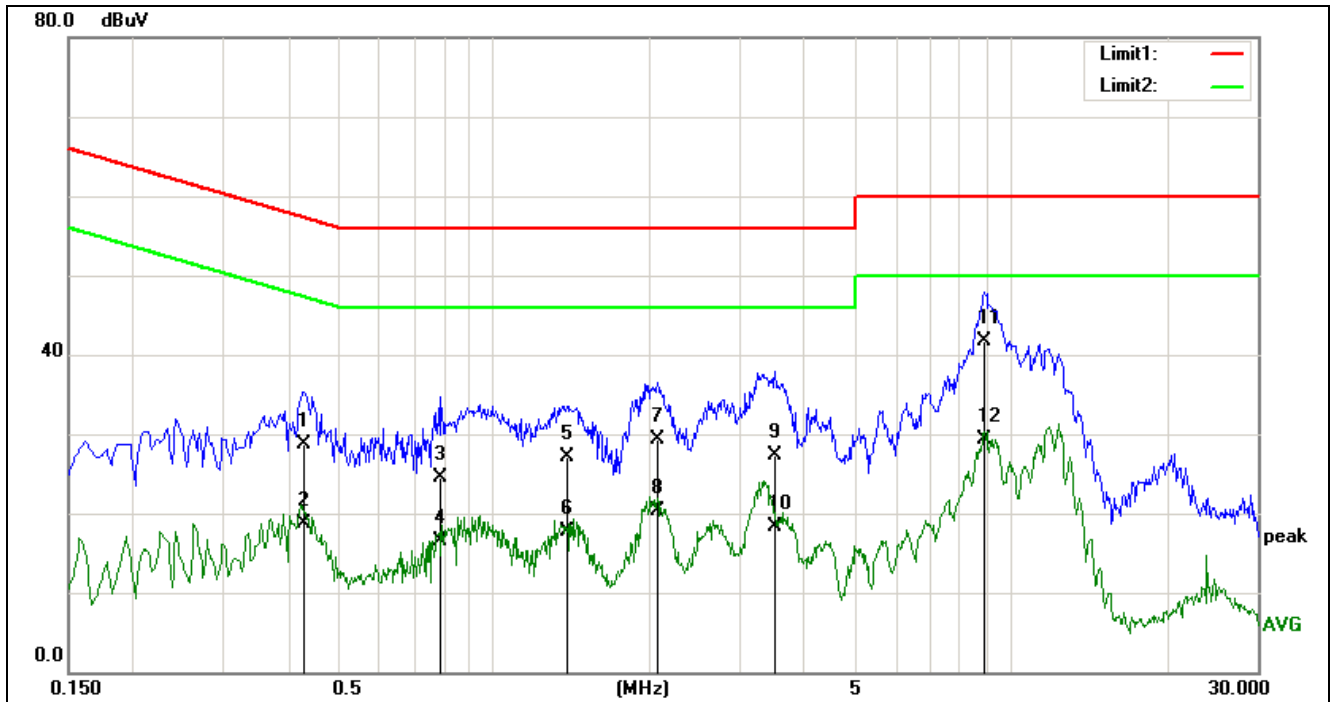
5.5.4 TEST RESULTS

Project No.:	ZJ20150005-E-1	Probe:	L1
Standard:	(CE)EN55022 class B_QP	Power Source:	DC 5V
Test item:	Conduction Test	Date:	2015-7-7
Temp./Hum.(%RH):	22.8/63.2%RH	Time:	14:09:07
EUT:	Wireless Module		
Model:	CC2500MPATR	Test Result:	Pass
Note:			



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.4060	28.18	6.12	34.30	57.73	-23.43	QP
2	0.4060	16.38	6.12	22.50	47.73	-25.23	AVG
3	0.8059	24.77	6.13	30.90	56.00	-25.10	QP
4	0.8059	16.07	6.13	22.20	46.00	-23.80	AVG
5	2.0100	29.05	6.25	35.30	56.00	-20.70	QP
6	2.0100	20.35	6.25	26.60	46.00	-19.40	AVG
7	3.2659	29.28	6.32	35.60	56.00	-20.40	QP
8	3.2659	18.48	6.32	24.80	46.00	-21.20	AVG
9	8.9459	32.79	6.61	39.40	60.00	-20.60	QP
10	8.9459	25.59	6.61	32.20	50.00	-17.80	AVG
11	11.7099	28.55	6.75	35.30	60.00	-24.70	QP
12	11.7099	22.95	6.75	29.70	50.00	-20.30	AVG

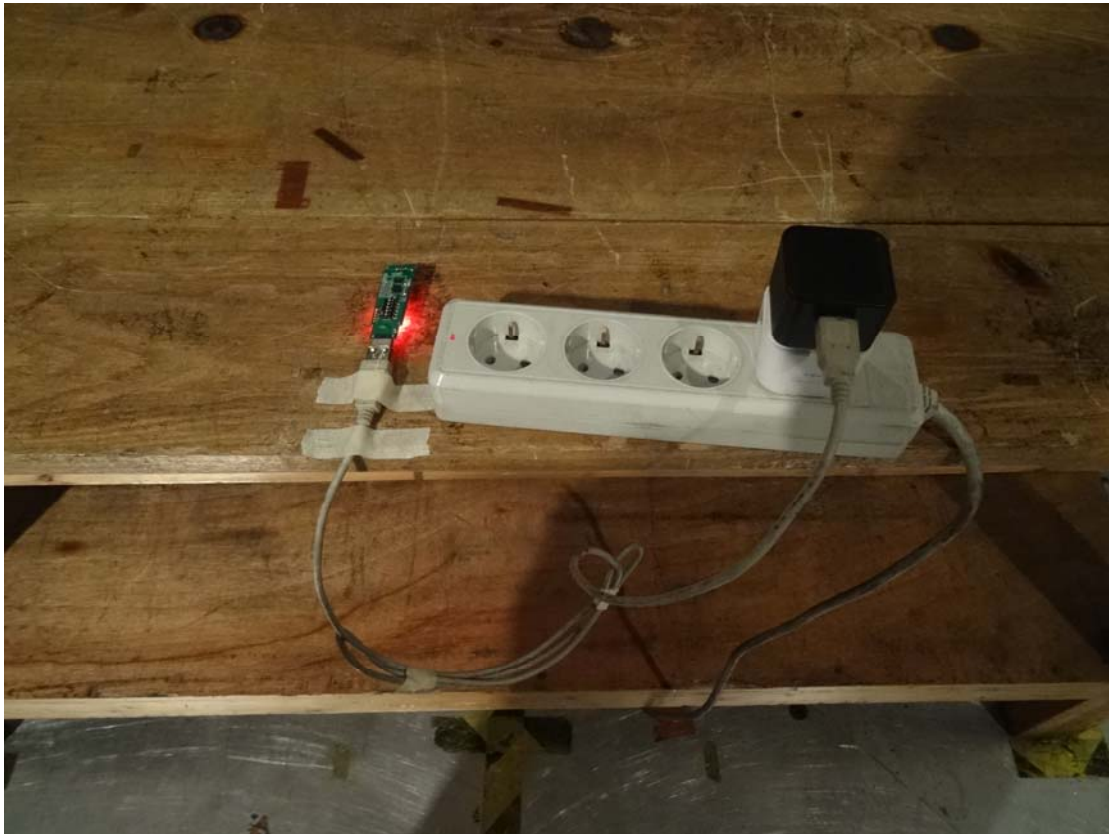
Project No.:	ZJ20150005-E-1	Probe:	N
Standard:	(CE)EN55022 class B_QP	Power Source:	DC 5V
Test item:	Conduction Test	Date:	2015-7-7
Temp./Hum.(%RH):	22.8/63.2%RH	Time:	14:03:52
EUT:	Wireless Module	Test Result:	Pass
Model:	CC2500MPATR		
Note:			



No.	Frequency (MHz)	Reading (dBuV)	Correct Factor(dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.4300	22.58	6.12	28.70	57.25	-28.55	QP
2	0.4300	12.68	6.12	18.80	47.25	-28.45	AVG
3	0.7860	18.37	6.13	24.50	56.00	-31.50	QP
4	0.7860	10.47	6.13	16.60	46.00	-29.40	AVG
5	1.3820	20.94	6.16	27.10	56.00	-28.90	QP
6	1.3820	11.64	6.16	17.80	46.00	-28.20	AVG
7	2.0740	23.05	6.25	29.30	56.00	-26.70	QP
8	2.0740	14.05	6.25	20.30	46.00	-25.70	AVG
9	3.4980	21.10	6.30	27.40	56.00	-28.60	QP
10	3.4980	12.00	6.30	18.30	46.00	-27.70	AVG
11	8.8860	35.19	6.61	41.80	60.00	-18.20	QP
12	8.8860	22.69	6.61	29.30	50.00	-20.70	AVG

APPENDIX A: PHOTOGRAPH OF THE TEST ARRANGEMENT

RSE (Below 1GHz)



FCC ID: XAO-CC2500MPATR

RSE (Above 1GHz)



CE

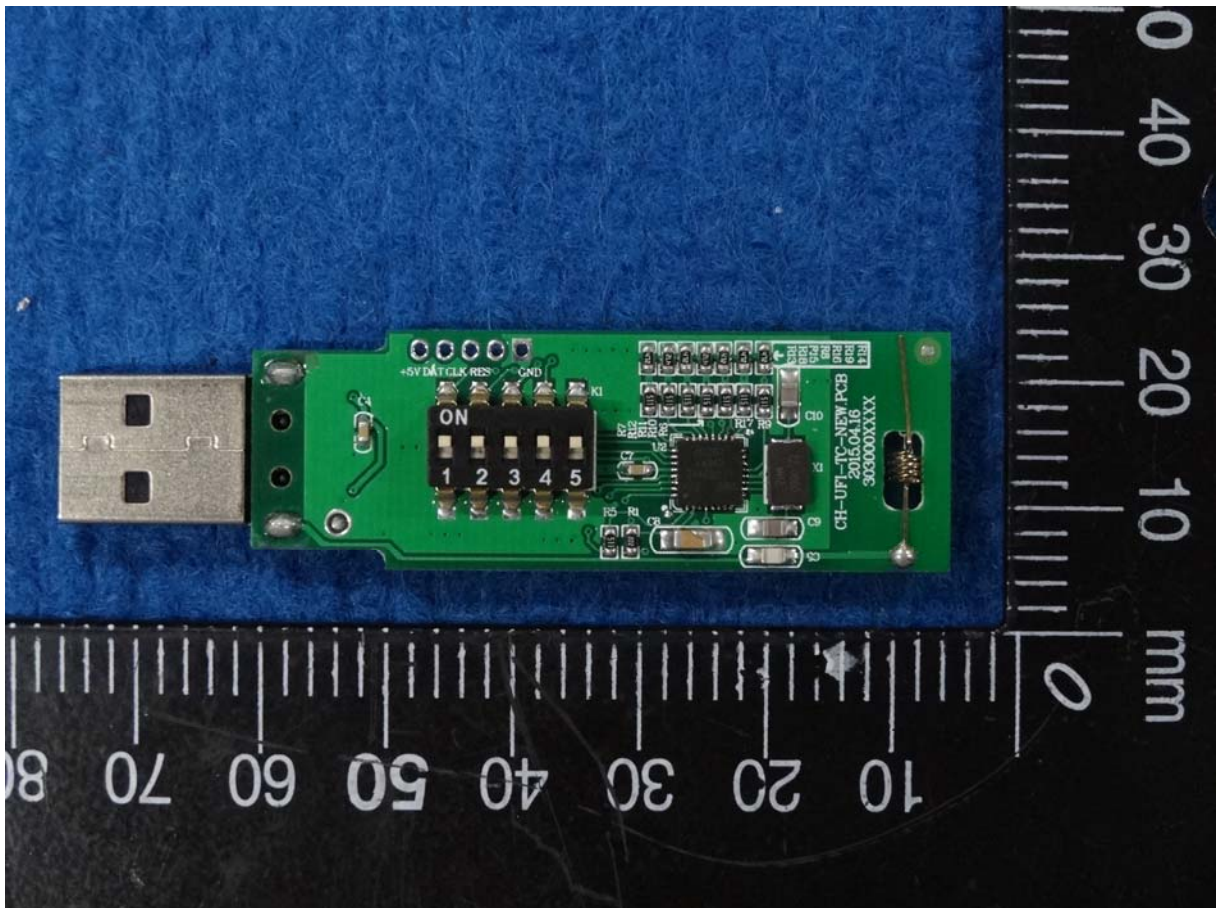


FCC ID: XAO-CC2500MPATR

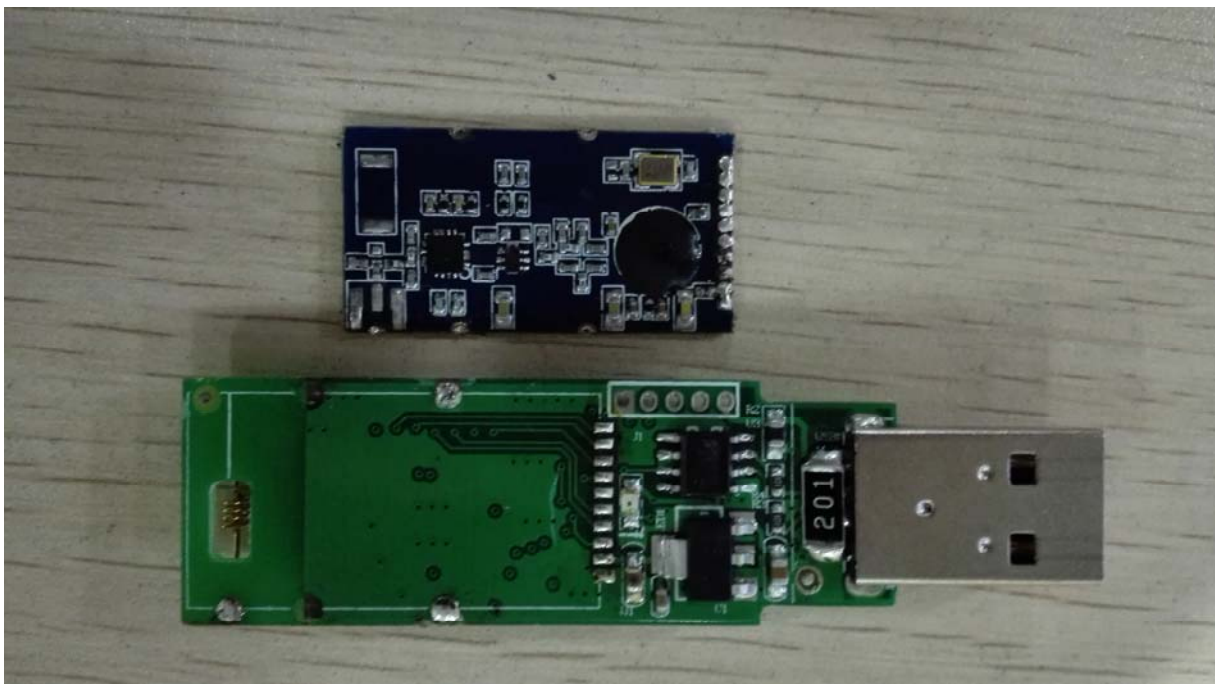
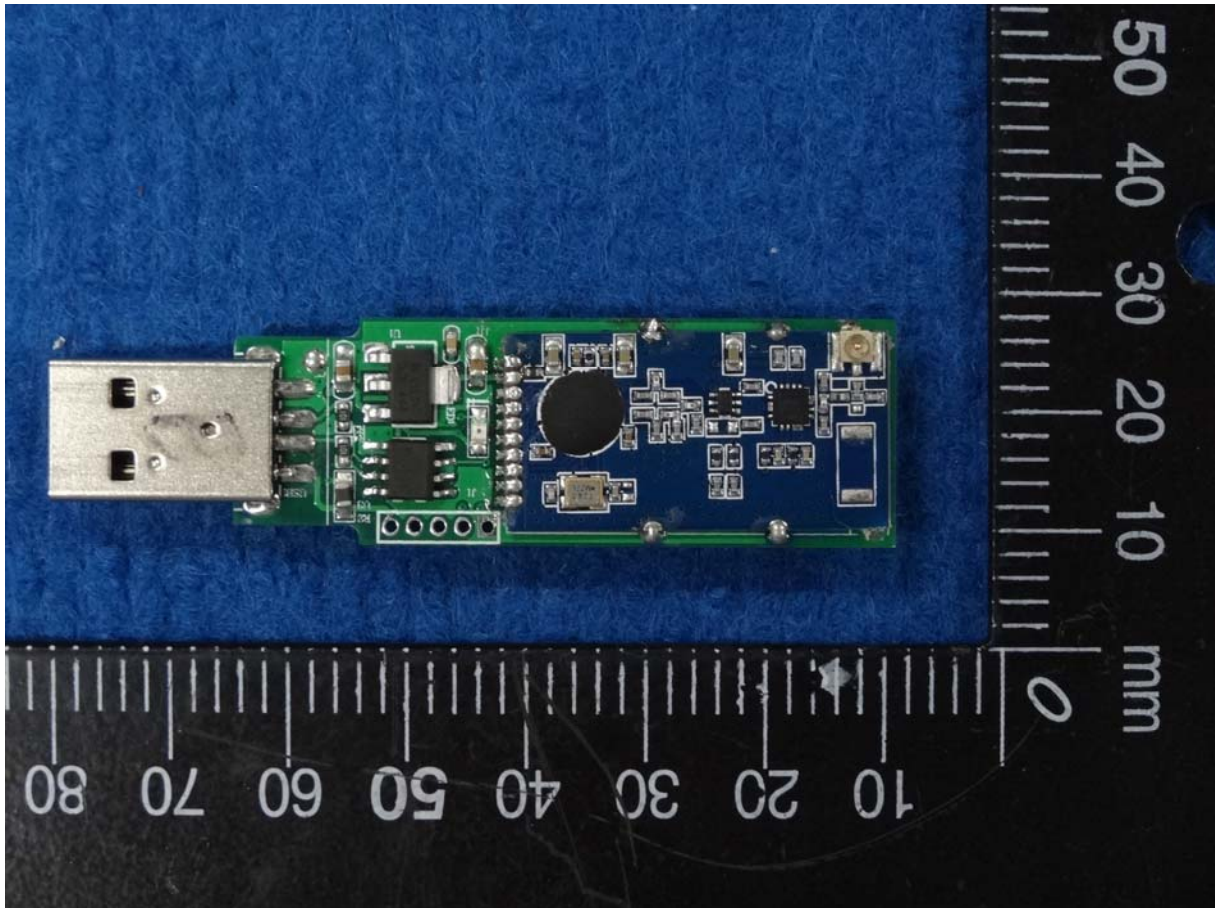
APPENDIX B: PHOTOGRAPH OF THE EUT



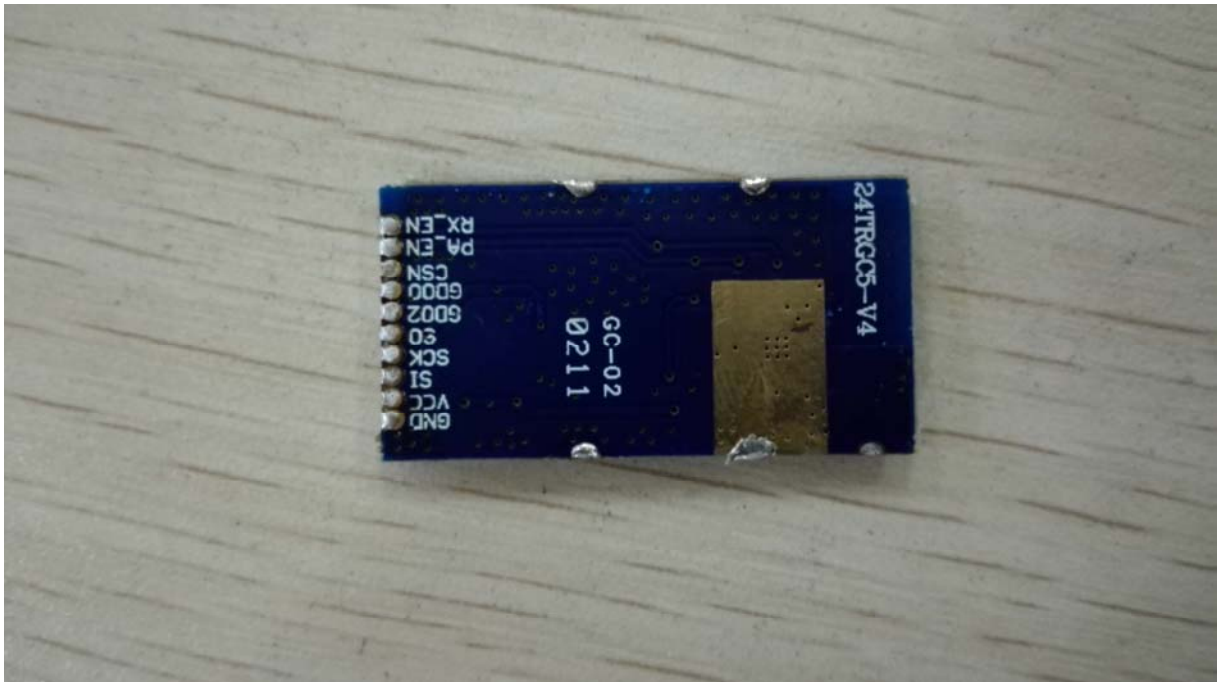
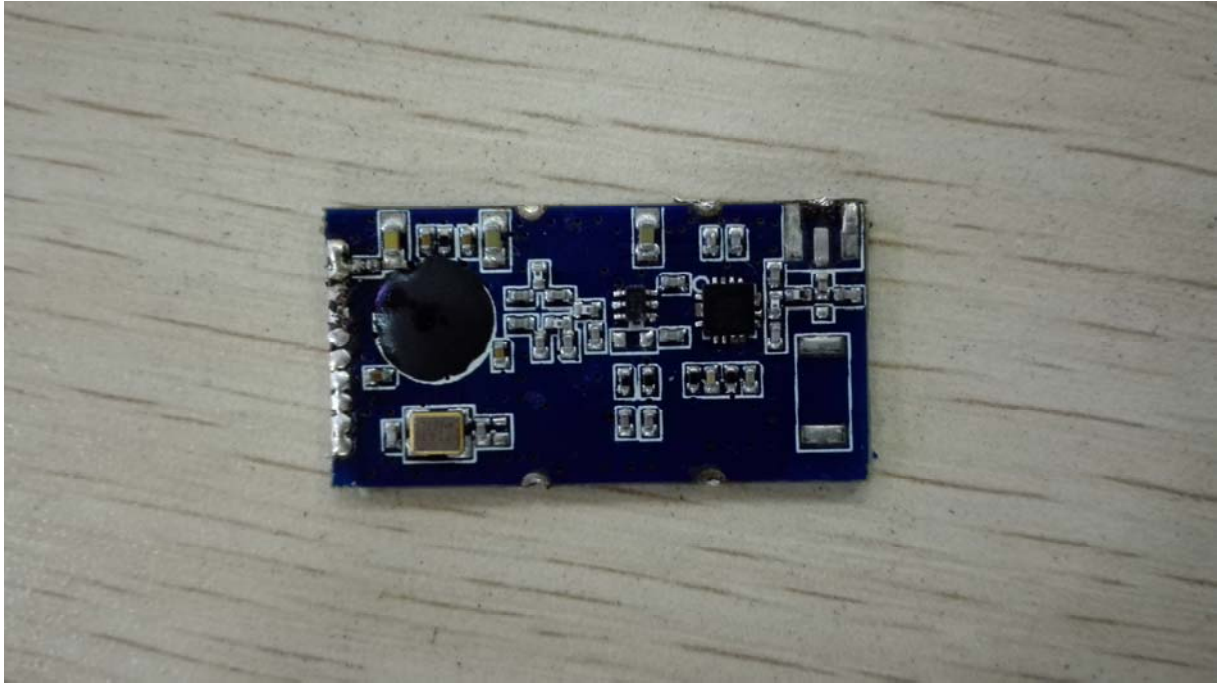
FCC ID: XAO-CC2500MPATR



FCC ID: XAO-CC2500MPATR



FCC ID: XAO-CC2500MPATR



-----This is the last page of the report. -----

FCC ID: XAO-CC2500MPATR