

# FCC Report

**Applicant:** Atoms Labs LLC

**Address of Applicant:** 2670 Firewheel Dr. Suite D Flower Mound, TX 75028  
United States

**Equipment Under Test (EUT)**

Product Name: Digital Wireless Weather Proof Camera

Model No.: AWSC36

**FCC ID:** 2ACMYAWSC36

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C Section 15.247:2013

**Date of sample receipt:** June 24, 2014

**Date of Test:** July 03-08, 2014

**Date of report issued:** July 08, 2014

**Test Result :** PASS \*

\* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

A circular blue stamp with the text "GLOBAL UNITED TECHNOLOGY SERVICES CO., LTD." around the perimeter and "GTS" in the center. A handwritten signature in black ink is written over the stamp.

**Robinson Lo**

**Laboratory Manager**

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the GTS product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

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## 2 Version

Version No.	Date	Description
00	July 08, 2014	Original

Prepared By:

*Edward. Pan*

Date:

July 08, 2014

Project Engineer

Check By:

*Hank. Yan*

Date:

July 08, 2014

Reviewer

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## 4 Test Summary

Test Item	Section in CFR 47	Result
Antenna Requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.247 (b)(1)	Pass
20dB Occupied Bandwidth	15.247 (a)(1)	Pass
Carrier Frequencies Separation	15.247 (a)(1)	Pass
Hopping Channel Number	15.247 (a)(1)	Pass
Dwell Time	15.247 (a)(1)	Pass
Pseudorandom Frequency Hopping Sequence	15.247(b)(4)	Pass
Radiated Emission	15.205/15.209	Pass
Band Edge	15.247(d)	Pass

*Pass: The EUT complies with the essential requirements in the standard.*

## 5 General Information

### 5.1 Client Information

Applicant:	Atoms Labs LLC
Address of Applicant:	2670 Firewheel Dr. Suite D Flower Mound, TX 75028 United States
Manufacturer/Factory:	Atoms Labs LLC
Address of Manufacturer/ Factory:	2670 Firewheel Dr. Suite D Flower Mound, TX 75028 United States

### 5.2 General Description of EUT

Product Name:	Digital Wireless Weather Proof Camera
Model No.:	AWSC36
Operation Frequency:	2414.25MHz~2461.5MHz
Channel numbers:	15
Channel separation:	3.375MHz
Modulation type:	GFSK
Antenna Type:	unique coupling antenna(RP-SMA connector)
Antenna gain:	3dBi (declare by Applicant)
Power supply:	Adapter 1: Model No.: KSAS0050500100VUD Input: AC 100-240V, 50/60Hz, 0.18A Output: DC 5V, 1.0A Adapter 2: Model No.: CS6D050100FU Input: AC 100-240V, 50/60Hz, 200mA Output: DC 5V, 1.0A
Remark:	All adapter were tested, only the worse adapter's (Adapter 1) data was exhibited in the report.

Operation Frequency each of channel					
Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2414.250MHz	6	2431.125MHz	11	2448.000MHz
2	2417.625MHz	7	2434.500MHz	12	2451.375MHz
3	2421.000MHz	8	2437.875MHz	13	2454.750MHz
4	2424.375MHz	9	2441.250MHz	14	2458.125MHz
5	2427.750MHz	10	2444.625MHz	15	2461.500MHz

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2414.250MHz
The middle channel	2437.875MHz
The Highest channel	2461.500MHz

### 5.3 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode (for Peak power, 20dB Bandwidth, Band edge and Spurious Emissions test )
Hopping on mode	Keep the EUT in hopping on mode (for Frequencies Separation, Hopping channel number, Dwell time test)

### 5.4 Test Facility

<p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none"> <li>● <b>CNAS —Registration No.: CNAS L5775</b> CNAS has accredited Global United Technology Services Co., Ltd. To ISO/IEC 17025 General Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.</li> <li>● <b>FCC —Registration No.: 600491</b> Global United Technology Services Co., Ltd., Shenzhen 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 files. Registration 600491, June 28, 2013.</li> <li>● <b>Industry Canada (IC) —Registration No.: 9079A-2</b> The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-2, June 26, 2013.</li> </ul>
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### 5.5 Test Location

All tests were performed at:
<p>Global United Technology Services Co., Ltd. Address: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China Tel: 0755-27798480 Fax: 0755-27798960</p>

### 5.6 Other Information Requested by the Customer

None.
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### 5.7 Description of Support Units

None.
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## 6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	Mar. 28 2014	Mar. 27 2015
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	Spectrum Analyzer	Agilent	E4440A	GTS533	Dec. 5, 2013	Dec. 4 2014
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Jul. 01 2014	Jun. 30, 2015
5	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	Jul. 01 2014	Jun. 30, 2015
6	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 27 2014	June 26 2015
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	June 27 2014	June 26 2015
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial Cable	GTS	N/A	GTS213	Mar. 29 2014	Mar. 28 2015
10	Coaxial Cable	GTS	N/A	GTS211	Mar. 29 2014	Mar. 28 2015
11	Coaxial cable	GTS	N/A	GTS210	Mar. 29 2014	Mar. 28 2015
12	Coaxial Cable	GTS	N/A	GTS212	Mar. 29 2014	Mar. 28 2015
13	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	Jul. 01 2014	Jun. 30, 2015
14	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	Jul. 01 2014	Jun. 30, 2015
15	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 27 2014	June 26 2015
16	Band filter	Amindeon	82346	GTS219	Mar. 29 2014	Mar. 28 2015


Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.0(L)x3.0(W)x3.0(H)	GTS264	Sep. 07 2013	Sep. 06 2015
2	EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS223	Jul. 01 2014	Jun. 30, 2015
3	10dB Pulse Limita	Rohde & Schwarz	N/A	GTS224	Jul. 01 2014	Jun. 30, 2015
4	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	Jul. 01 2014	Jun. 30, 2015
5	LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS226	Jul. 01 2014	Jun. 30, 2015
6	Coaxial Cable	GTS	N/A	GTS227	Jul. 01 2014	Jun. 30, 2015
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Barometer	ChangChun	DYM3	GTS257	July 10 2013	July 09 2014

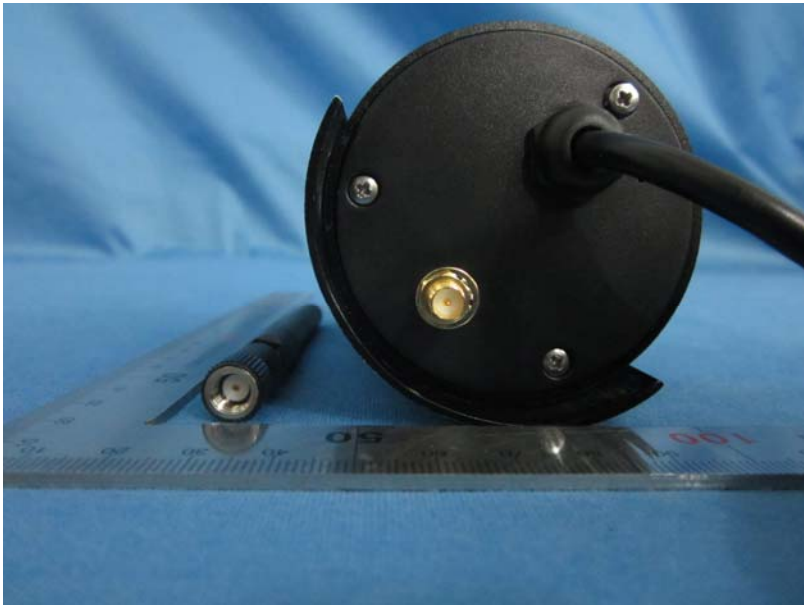


## 7 Test results and Measurement Data

### 7.1 Antenna requirement

<b>Standard requirement:</b>	FCC Part15 C Section 15.203 /247(c)
<p><b>15.203 requirement:</b></p> <p>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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p> <p><b>15.247(c) (1)(i) requirement:</b></p> <p>(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.</p>	
<b>E.U.T Antenna:</b>	
<p><i>The antenna is unique coupling antenna(RP-SMA connector), the best case gain of the antenna is 3dBi. Two Antenna have the same material and Gain. Antenna 2 is waterproof, but Antenna 1 is not.</i></p>	
	

*Antenna Connector:*

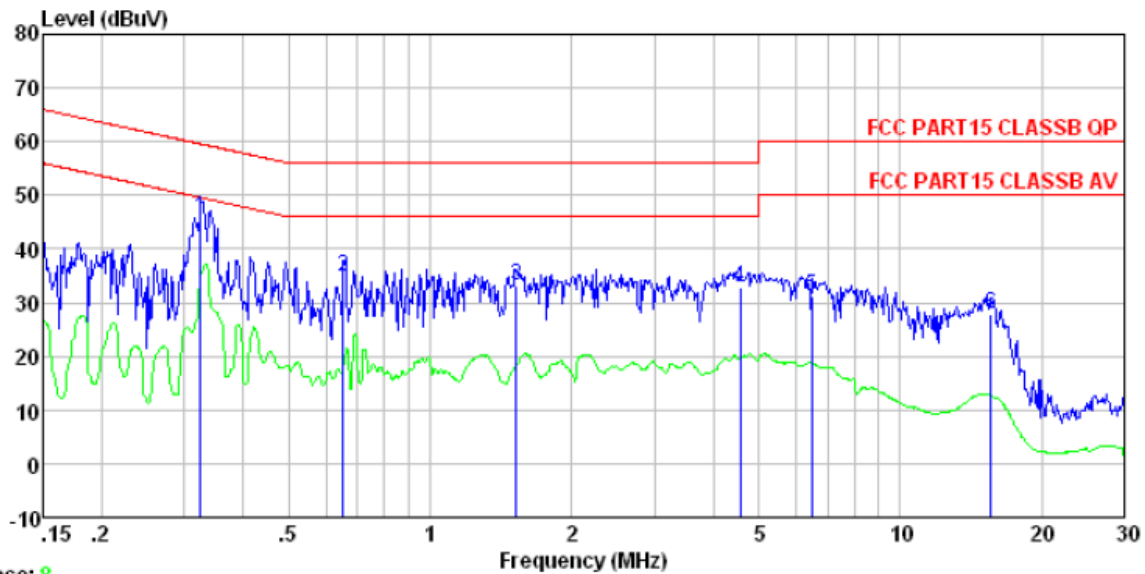


## 7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207														
Test Method:	ANSI C63.4:2003														
Test Frequency Range:	150KHz to 30MHz														
Class / Severity:	Class B														
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto														
Limit:	<table border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBuV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <tr> <td>0.15-0.5</td> <td>66 to 56*</td> <td>56 to 46*</td> </tr> <tr> <td>0.5-5</td> <td>56</td> <td>46</td> </tr> <tr> <td>5-30</td> <td>60</td> <td>50</td> </tr> </tbody> </table> <p>* Decreases with the logarithm of the frequency.</p>	Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)														
	Quasi-peak	Average													
0.15-0.5	66 to 56*	56 to 46*													
0.5-5	56	46													
5-30	60	50													
Test setup:	<p><i>Remark</i>  E.U.T: Equipment Under Test  LISN: Line Impedance Stabilization Network  Test table height=0.8m</p>														
Test procedure:	<ol style="list-style-type: none"> <li>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li> <li>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li> <li>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.</li> </ol>														
Test Instruments:	Refer to section 6.0 for details														
Test mode:	Refer to section 5.3 for details														
Test results:	Pass														

### Measurement data:

Line:

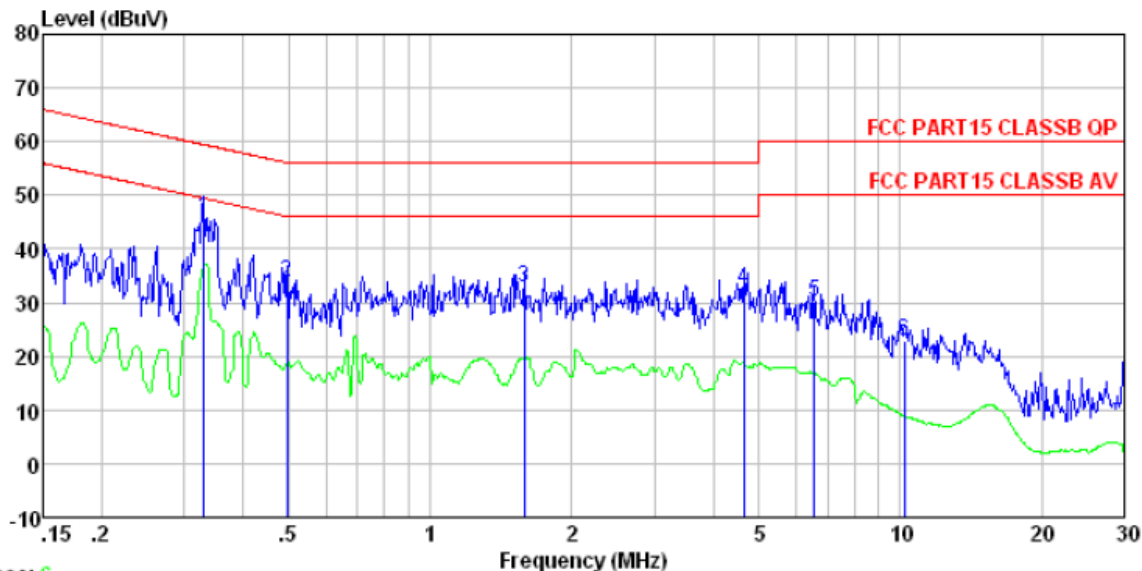


Trace: 8

Condition : FCC PART15 CLASSB QP LISN-2013 LINE  
 Job No. : 1059RF  
 Test mode : Keeping TX mode  
 Test Engineer: Qing

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.325	45.72	0.11	0.10	45.93	59.57	-13.64	QP
2	0.654	34.70	0.13	0.13	34.96	56.00	-21.04	QP
3	1.527	33.00	0.12	0.14	33.26	56.00	-22.74	QP
4	4.574	32.32	0.21	0.15	32.68	56.00	-23.32	QP
5	6.488	30.95	0.23	0.16	31.34	60.00	-28.66	QP
6	15.635	27.22	0.31	0.22	27.75	60.00	-32.25	QP

**Neutral:**



**Trace: 6**

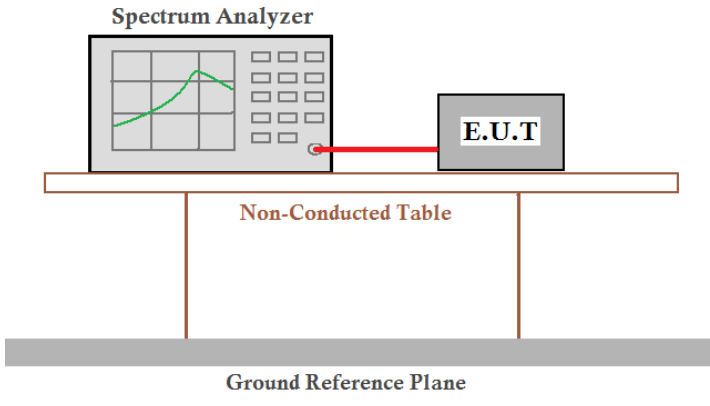
Condition : FCC PART15 CLASSB QP LISN-2013 NEUTRAL  
 Job No. : 1059RF  
 Test mode : Keeping TX mode  
 Test Engineer: Qing

	Read Freq	LISN Level Factor	Cable Loss	Limit Level	Over Line	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB
1	0.330	45.62	0.06	0.10	45.78	59.44 -13.66 QP
2	0.497	33.71	0.06	0.11	33.88	56.05 -22.17 QP
3	1.585	32.56	0.09	0.14	32.79	56.00 -23.21 QP
4	4.647	32.15	0.15	0.15	32.45	56.00 -23.55 QP
5	6.557	29.85	0.18	0.16	30.19	60.00 -29.81 QP
6	10.233	22.42	0.25	0.19	22.86	60.00 -37.14 QP

**Notes:**

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

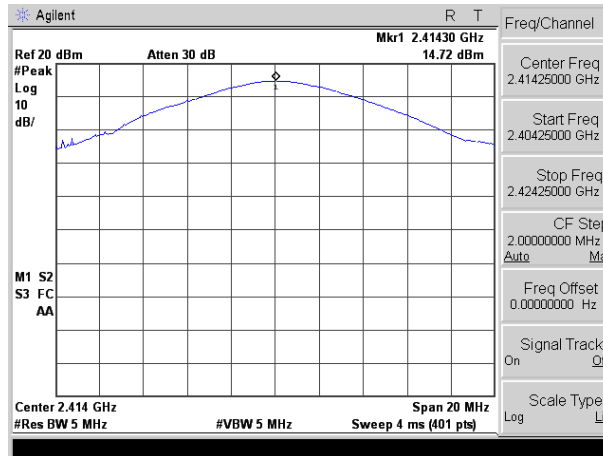
### 7.3 Conducted Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.4:2003
Limit:	20.96dBm
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

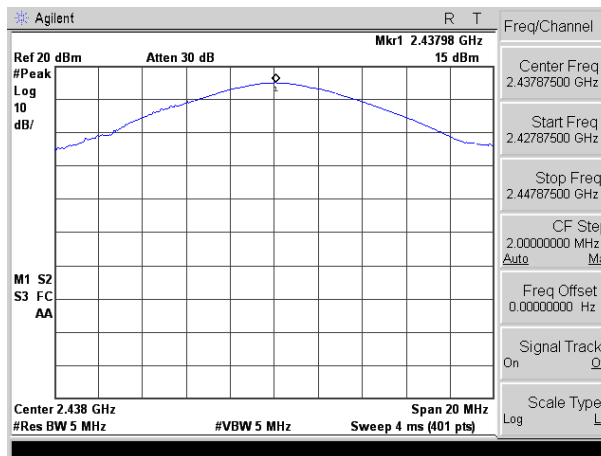
#### Measurement Data

Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	14.72	20.96	Pass
Middle	15.00		
Highest	14.98		

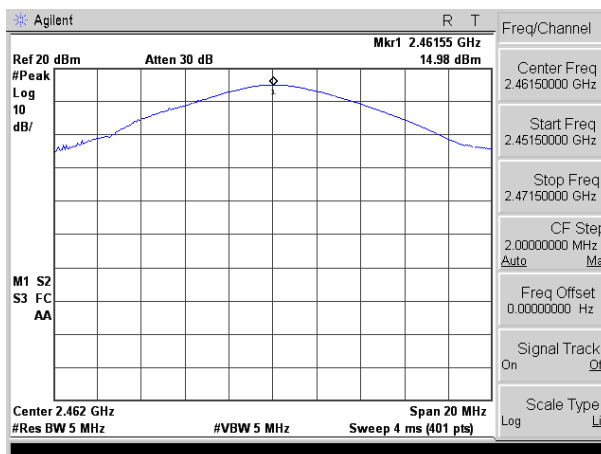
Test plot as follows:



Lowest channel

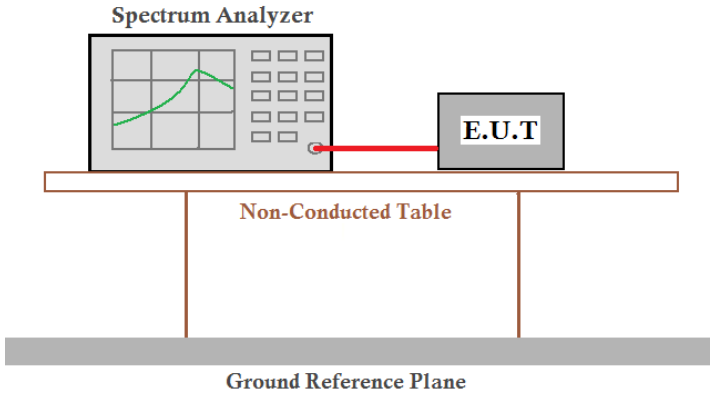


Middle channel



Highest channel

## 7.4 20dB Emission Bandwidth

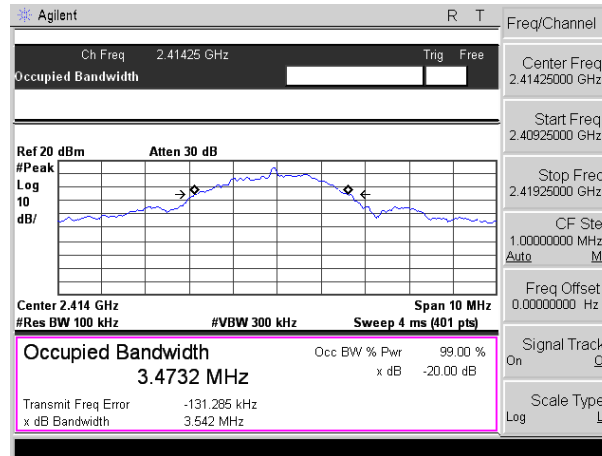
Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.4:2003
Limit:	N/A
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

### Measurement Data

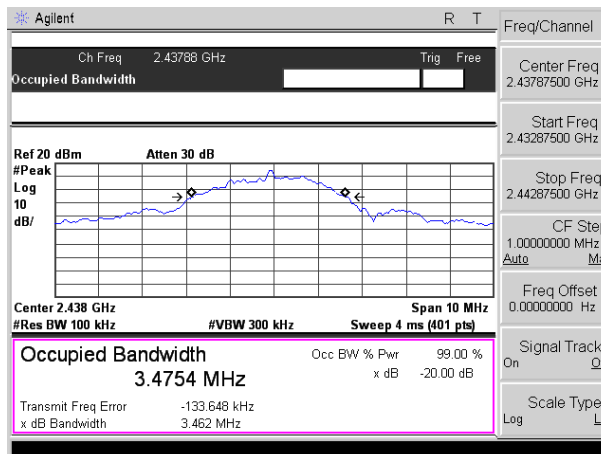
Test channel	20dB Emission Bandwidth (MHz)	Result
Lowest	3.542	Pass
Middle	3.462	
Highest	3.460	



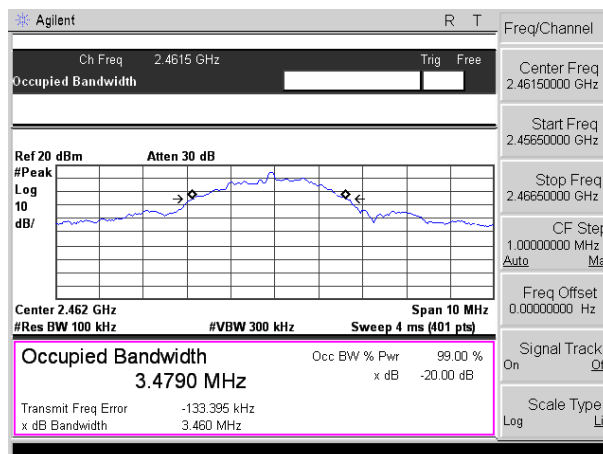
**Test plot as follows:**



Lowest channel

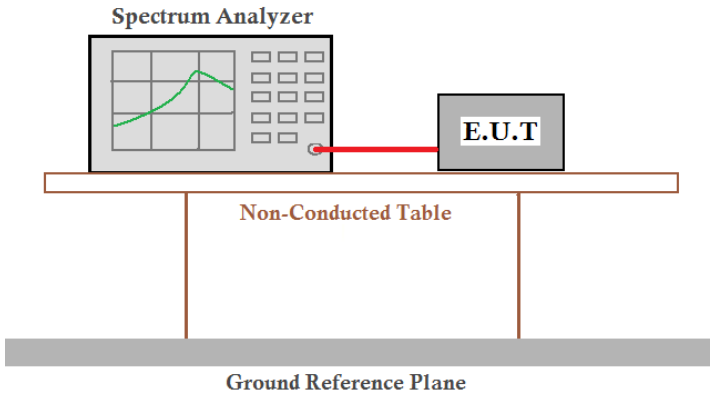


Middle channel



Highest channel

## 7.5 Carrier Frequencies Separation

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=100KHz, VBW=300KHz, detector=Peak
Limit:	0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

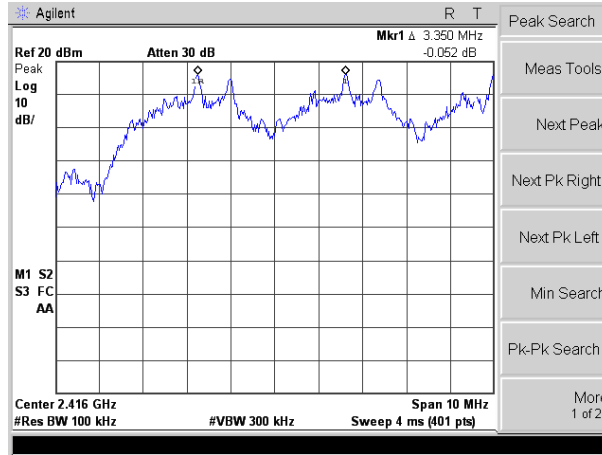
### Measurement Data

Test channel	Carrier Frequencies Separation (MHz)	Limit (MHz)	Result
Lowest	3.350	2.36	Pass
Middle	3.375	2.36	Pass
Highest	3.375	2.36	Pass

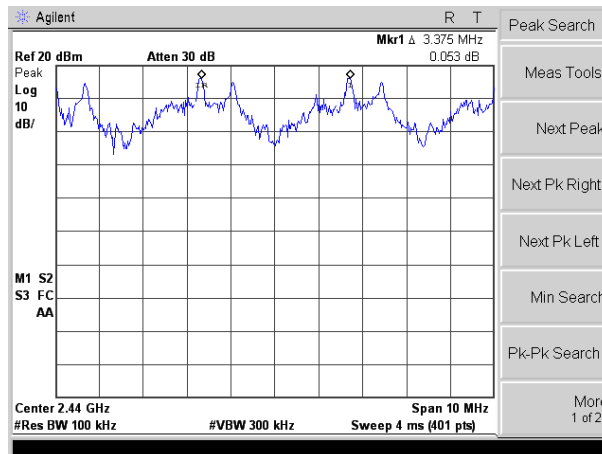
Note: According to section 7.4

20dB bandwidth (MHz) (worse case)	Limit (MHz) (Carrier Frequencies Separation)
3.542	2.36

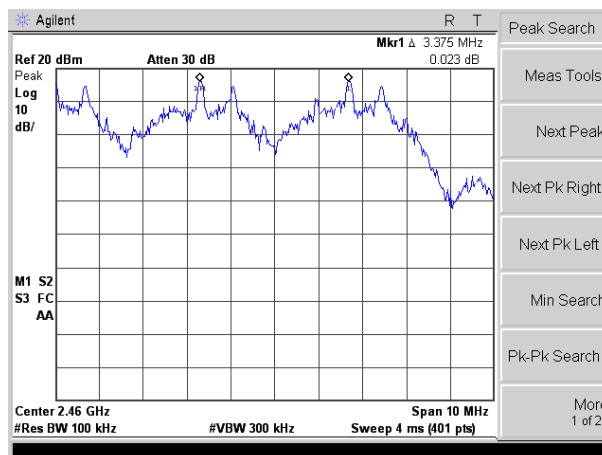
Test plot as follows:



Lowest channel

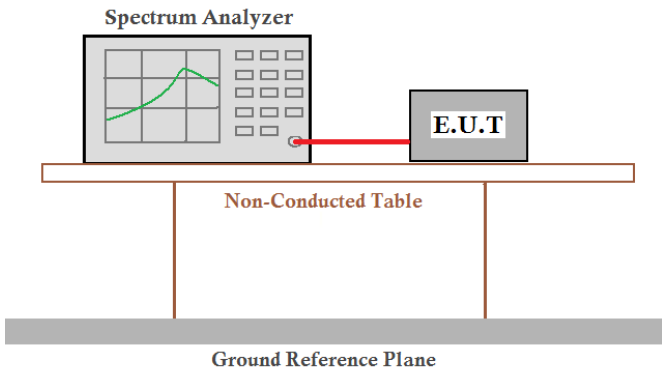


Middle channel



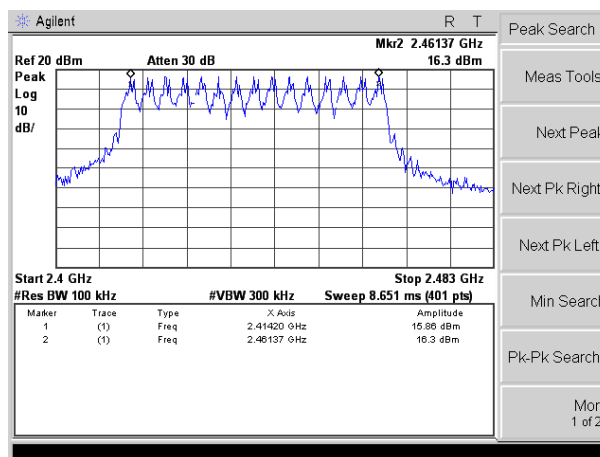
Highest channel

## 7.6 Hopping Channel Number

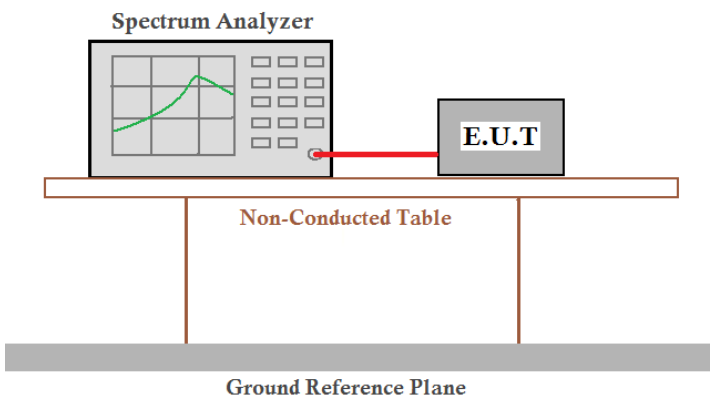
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

### Measurement Data:

Hopping channel numbers	Limit	Result
15	15	Pass



## 7.7 Dwell Time

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=1MHz, VBW=1MHz, Span=0Hz, Detector=Peak
Limit:	0.4 Second
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

### Measurement Data

Frequency	Dwell time(ms)	Limit(ms)	Result
2414.250MHz	325.08	400	Pass
2437.875MHz	278.64	400	Pass
2461.500MHz	313.20	400	Pass

Dwell time = Ton \* Np \* Test period

Test period: T= 0.4 Second/Channel x 15 Channel = 6 s

Ton: Duration Time of single pulse

Np: Number of the pulse in 1 second

Thus, the Dwell time at each channel is blow:

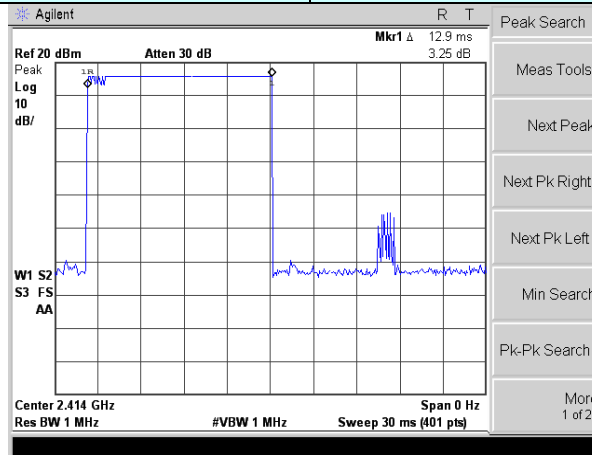
Lowest:  $12.9\text{ms} * 21 / 5 * 6 = 325.08\text{ms}$

Middle:  $12.9\text{ms} * 18 / 5 * 6 = 278.64\text{ms}$

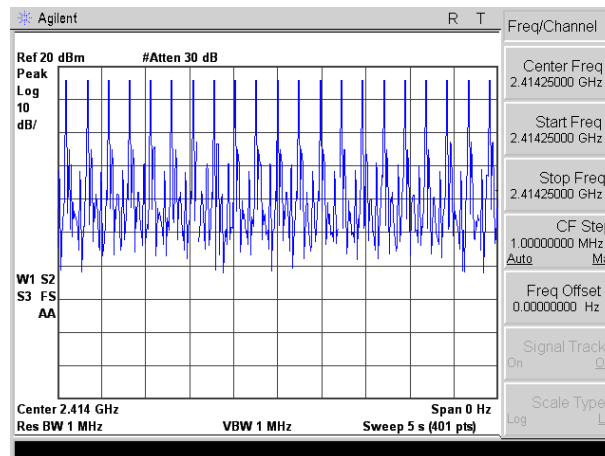
Highest:  $13.05\text{ms} * 20 / 5 * 6 = 313.20\text{ms}$

**Test plot as follows:**

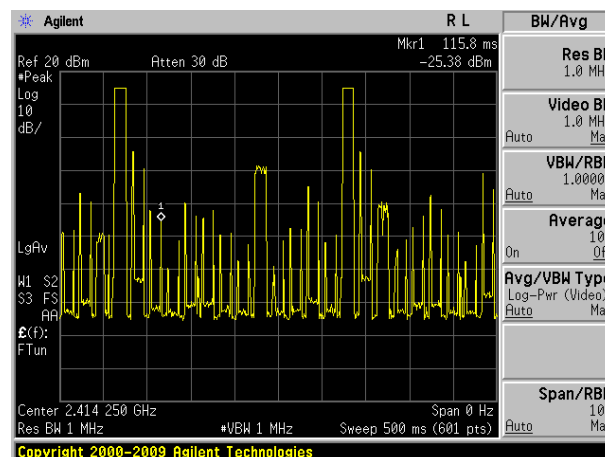
Test Channel: Lowest Channel



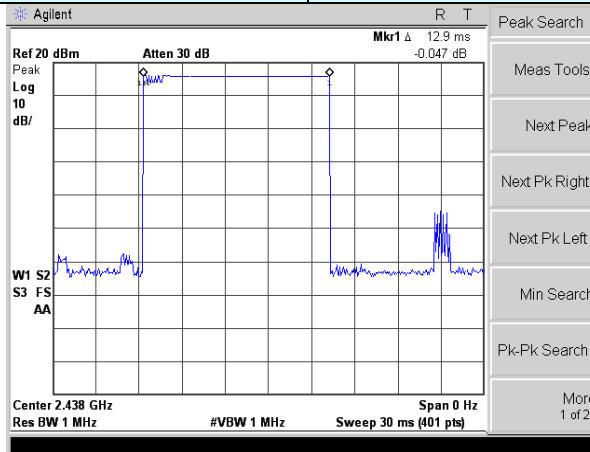
Ton



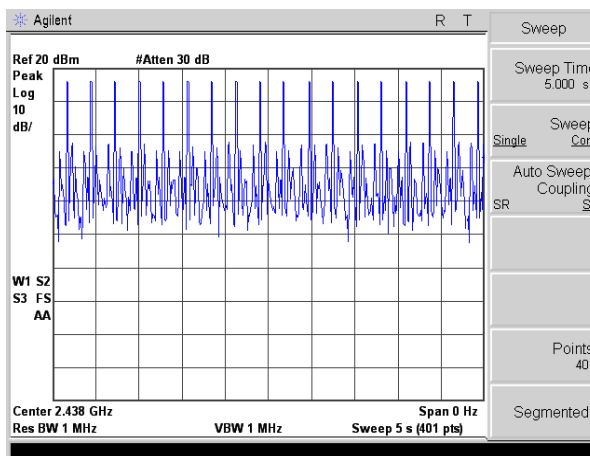
Np



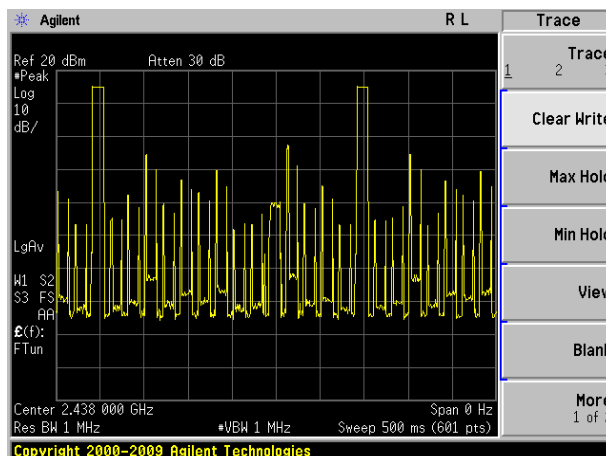
Test Channel: Middle Channel



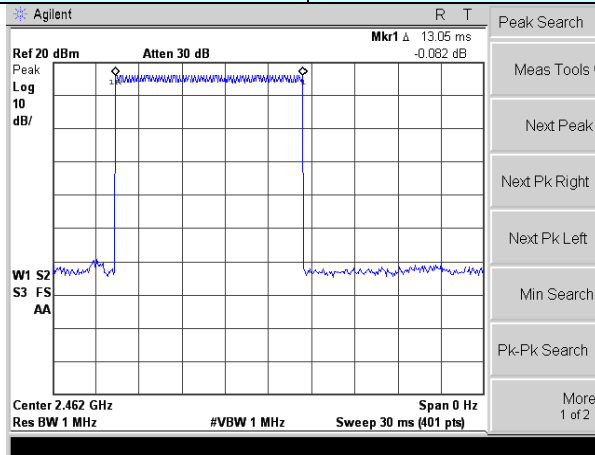
Ton



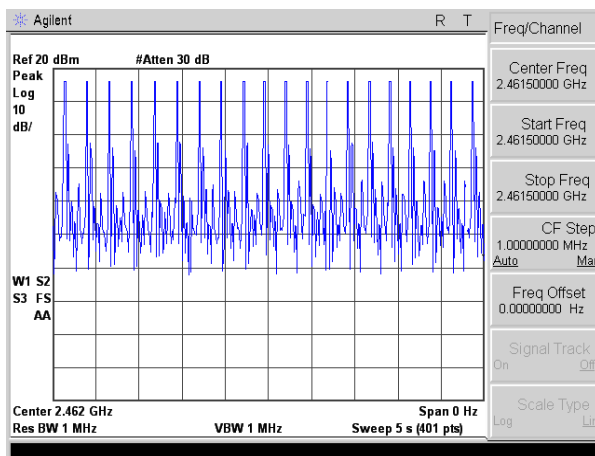
Np



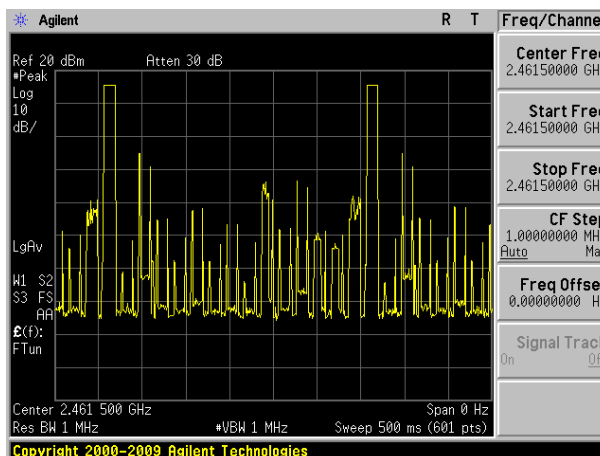
Test Channel:	Highest Channel
---------------	-----------------



Ton



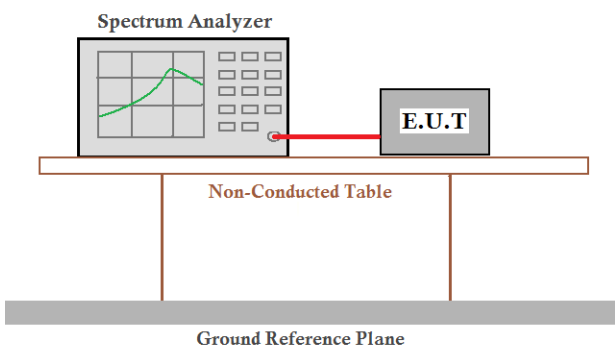
Np



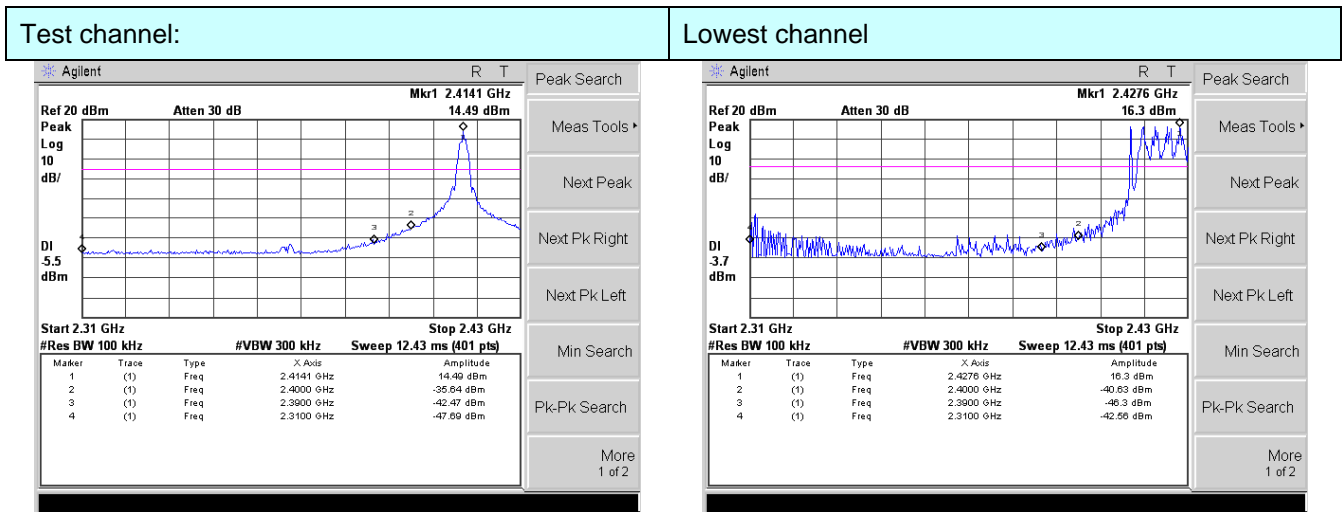


## 7.8 Band Edge

### 7.8.1 Conducted Emission Method

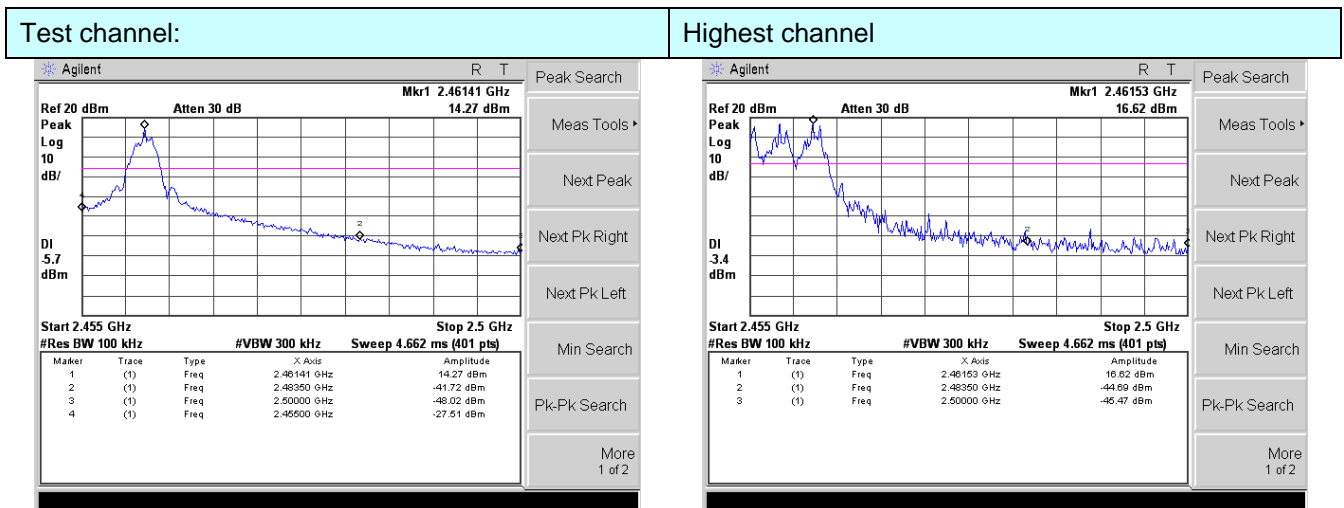
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=100kHz, VBW=300kHz, Detector=Peak
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by two legs. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Test plot as follows:



No-hopping mode

Hopping mode



No-hopping mode

Hopping mode

## 7.8.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.4: 2003				
Test Frequency Range:	All restriction band have been tested, and 2.3GHz to 2.5GHz band is the worse case				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		Peak	1MHz	10Hz	Average Value
Limit:	Frequency		Limit (dBuV/m @3m)		Remark
	Above 1GHz		54.00		Average Value
			74.00		Peak Value
Test setup:					
Test Procedure:	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. 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.</li> </ol>				
Test Instruments:	Refer to section 6.0 for details				
Test mode:	Refer to section 5.3 for details				
Test results:	Pass				

**Remark:**

1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

Test channel:	Lowest
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	53.67	27.59	5.38	30.18	56.46	74.00	-17.54	Horizontal
2400.00	63.00	27.58	5.39	30.18	65.79	74.00	-8.21	Horizontal
2390.00	56.33	27.59	5.38	30.18	59.12	74.00	-14.88	Vertical
2400.00	67.22	27.58	5.39	30.18	70.01	74.00	-3.99	Vertical

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	35.05	27.59	5.38	30.18	37.84	54.00	-16.16	Horizontal
2400.00	39.54	27.58	5.39	30.18	42.33	54.00	-11.67	Horizontal
2390.00	37.34	27.59	5.38	30.18	40.13	54.00	-13.87	Vertical
2400.00	43.86	27.58	5.39	30.18	46.65	54.00	-7.35	Vertical

Test channel:	Highest
---------------	---------

**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	57.08	27.53	5.47	29.93	60.15	74.00	-13.85	Horizontal
2500.00	45.57	27.55	5.49	29.93	48.68	74.00	-25.32	Horizontal
2483.50	62.01	27.53	5.47	29.93	65.08	74.00	-8.92	Vertical
2500.00	47.05	27.55	5.49	29.93	50.16	74.00	-23.84	Vertical

**Average value:**

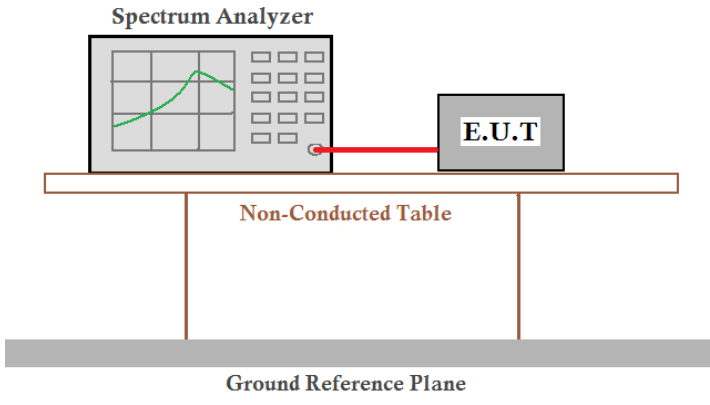
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	36.64	27.53	5.47	29.93	39.71	54.00	-14.29	Horizontal
2500.00	34.24	27.55	5.49	29.93	37.35	54.00	-16.65	Horizontal
2483.50	39.45	27.53	5.47	29.93	42.52	54.00	-11.48	Vertical
2500.00	34.74	27.55	5.49	29.93	37.85	54.00	-16.15	Vertical

**Remark:**

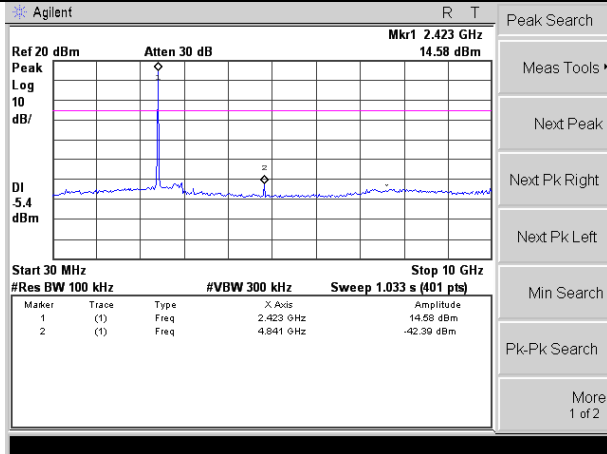
1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. The emission levels of other frequencies are very lower than the limit and not show in test report.

## 7.9 Spurious Emission

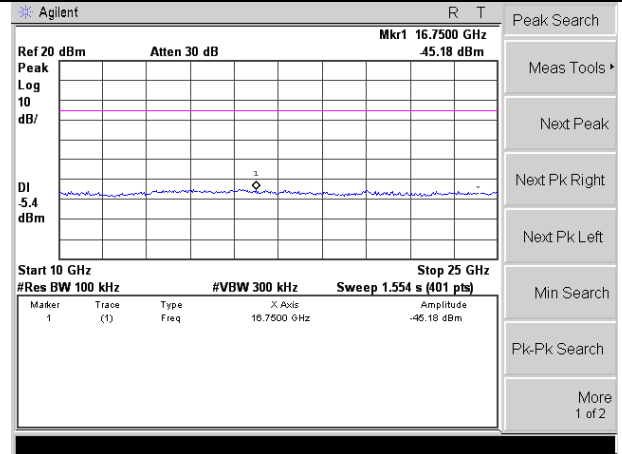
### 7.9.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2003 and D01 Meas Guidance
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

**Test channel:** **Lowest channel**

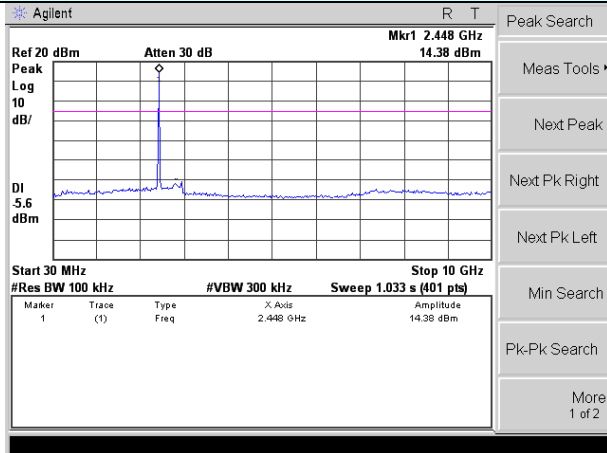


30MHz~10GHz

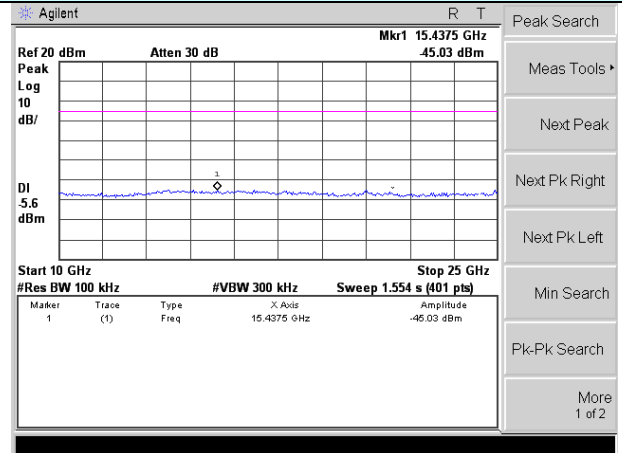


10GHz~25GHz

**Test channel:** **Middle channel**

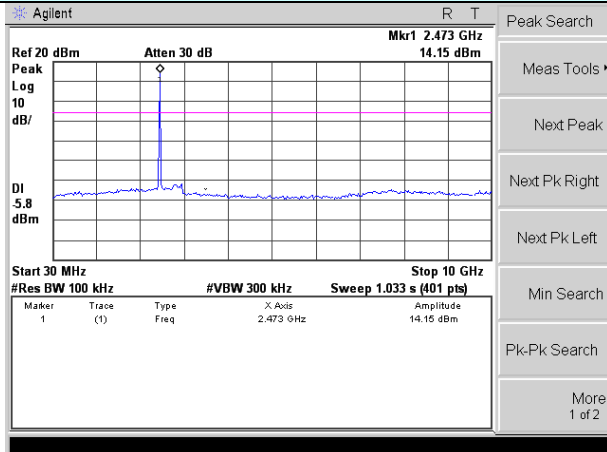


30MHz~10GHz

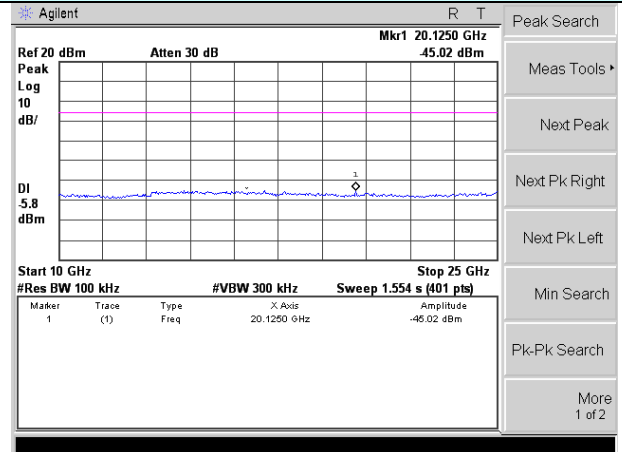


10GHz~25GHz

**Test channel:** **Highest channel**



30MHz~10GHz



10GHz~25GHz

## 7.9.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.4: 2003				
Test Frequency Range:	30MHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
Peak		1MHz	10Hz	Average Value	
Limit:	Frequency	Limit (dBuV/m @3m)		Remark	
	30MHz-88MHz	40.0		Quasi-peak Value	
	88MHz-216MHz	43.5		Quasi-peak Value	
	216MHz-960MHz	46.0		Quasi-peak Value	
	960MHz-1GHz	54.0		Quasi-peak Value	
	Above 1GHz	54.0		Average Value	
74.0		Peak Value			
Test setup:	Below 1GHz				
Test setup:	Above 1GHz				

<p>Test Procedure:</p>	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. 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.</li> </ol>
<p>Test Instruments:</p>	<p>Refer to section 6.0 for details</p>
<p>Test mode:</p>	<p>Refer to section 5.3 for details</p>
<p>Test results:</p>	<p>Pass</p>

*Remark:*

1. Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.



**Measurement data:**■ **Below 1GHz**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
46.34	46.61	15.46	0.73	31.99	30.81	40.00	-9.19	Vertical
408.95	54.53	17.26	2.90	31.86	42.83	46.00	-3.17	Vertical
455.91	52.21	17.58	3.11	31.70	41.20	46.00	-4.80	Vertical
890.73	46.29	23.00	4.82	31.19	42.92	46.00	-3.08	Vertical
962.16	48.97	23.49	5.09	31.22	46.33	54.00	-7.67	Vertical
986.07	48.13	23.65	5.17	31.23	45.72	54.00	-8.28	Vertical
204.24	46.77	12.70	1.86	32.14	29.19	43.50	-14.31	Horizontal
287.99	51.37	14.84	2.31	32.18	36.34	46.00	-9.66	Horizontal
408.95	50.25	17.26	2.90	31.86	38.55	46.00	-7.45	Horizontal
649.66	46.59	20.64	3.91	31.12	40.02	46.00	-5.98	Horizontal
768.75	43.15	21.68	4.35	31.28	37.90	46.00	-8.10	Horizontal
962.16	46.82	23.49	5.09	31.22	44.18	54.00	-9.82	Horizontal

■ Above 1GHz

Test channel:	Lowest
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4828.50	41.15	31.79	8.62	32.10	49.46	74.00	-24.54	Vertical
7242.75	30.06	36.24	11.68	31.97	46.01	74.00	-27.99	Vertical
9657.00	28.25	38.07	14.18	31.56	48.94	74.00	-25.06	Vertical
12071.25	*					74.00		Vertical
14485.50	*					74.00		Vertical
4828.50	32.32	31.79	8.62	32.10	40.63	74.00	-33.37	Horizontal
7242.75	30.86	36.24	11.68	31.97	46.81	74.00	-27.19	Horizontal
9657.00	27.75	38.07	14.18	31.56	48.44	74.00	-25.56	Horizontal
12071.25	*					74.00		Horizontal
14485.50	*					74.00		Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4828.50	30.87	31.79	8.62	32.10	39.18	54.00	-14.82	Vertical
7242.75	19.24	36.24	11.68	31.97	35.19	54.00	-18.81	Vertical
9657.00	17.53	38.07	14.18	31.56	38.22	54.00	-15.78	Vertical
12071.25	*					54.00		Vertical
14485.50	*					54.00		Vertical
4828.50	21.79	31.79	8.62	32.10	30.10	54.00	-23.90	Horizontal
7242.75	20.98	36.24	11.68	31.97	36.93	54.00	-17.07	Horizontal
9657.00	18.65	38.07	14.18	31.56	39.34	54.00	-14.66	Horizontal
12071.25	*					54.00		Horizontal
14485.50	*					54.00		Horizontal

*Remark:*

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor*
2. *“\*”*, means this data is too weak instrument of signal is unable to test.
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Test channel:	Middle
---------------	--------

**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4875.75	39.92	31.85	8.66	32.12	48.31	74.00	-25.69	Vertical
7313.63	28.85	36.37	11.72	31.89	45.05	74.00	-28.95	Vertical
9751.50	28.26	38.27	14.25	31.59	49.19	74.00	-24.81	Vertical
12189.38	*					74.00		Vertical
14627.25	*					74.00		Vertical
4875.75	32.81	31.85	8.66	32.12	41.20	74.00	-32.80	Horizontal
7313.63	28.73	36.37	11.72	31.89	44.93	74.00	-29.07	Horizontal
9751.50	28.71	38.27	14.25	31.59	49.64	74.00	-24.36	Horizontal
12189.38	*					74.00		Horizontal
14627.25	*					74.00		Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4875.75	31.38	31.85	8.66	32.12	39.77	54.00	-14.23	Vertical
7313.63	19.59	36.37	11.72	31.89	35.79	54.00	-18.21	Vertical
9751.50	17.84	38.27	14.25	31.59	38.77	54.00	-15.23	Vertical
12189.38	*					54.00		Vertical
14627.25	*					54.00		Vertical
4875.75	22.37	31.85	8.66	32.12	30.76	54.00	-23.24	Horizontal
7313.63	21.37	36.37	11.72	31.89	37.57	54.00	-16.43	Horizontal
9751.50	19.01	38.27	14.25	31.59	39.94	54.00	-14.06	Horizontal
12189.38	*					54.00		Horizontal
14627.25	*					54.00		Horizontal

*Remark:*

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor*
2. *“\*”*, means this data is the too weak instrument of signal is unable to test.
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

Test channel:	Highest
---------------	---------

**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4923.00	40.24	31.89	8.70	32.15	48.68	74.00	-25.32	Vertical
7384.50	29.36	36.49	11.76	31.84	45.77	74.00	-28.23	Vertical
9846.00	29.19	38.62	14.31	31.74	50.38	74.00	-23.62	Vertical
12307.50	*					74.00		Vertical
14769.00	*					74.00		Vertical
4923.00	36.77	31.89	8.70	32.15	45.21	74.00	-28.79	Horizontal
7384.50	32.46	36.49	11.76	31.84	48.87	74.00	-25.13	Horizontal
9846.00	28.69	38.62	14.31	31.74	49.88	74.00	-24.12	Horizontal
12307.50	*					74.00		Horizontal
14769.00	*					74.00		Horizontal

**Average value:**

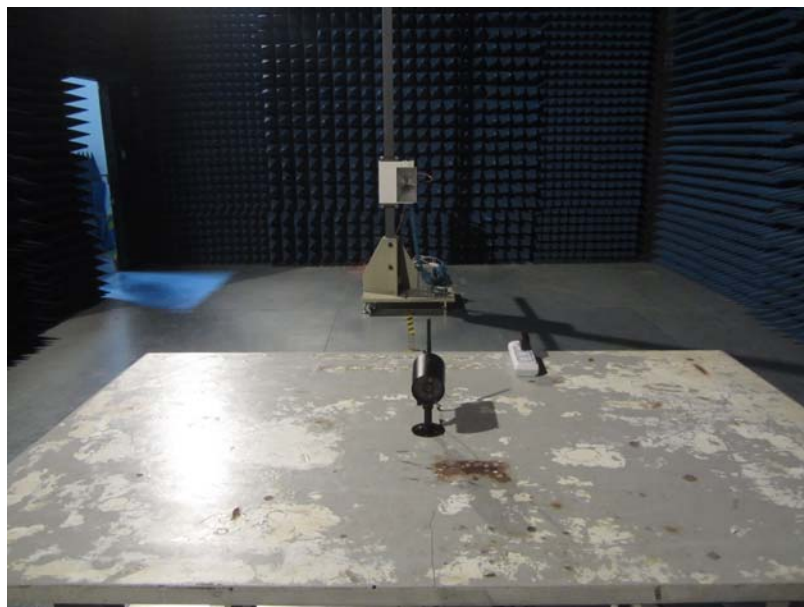
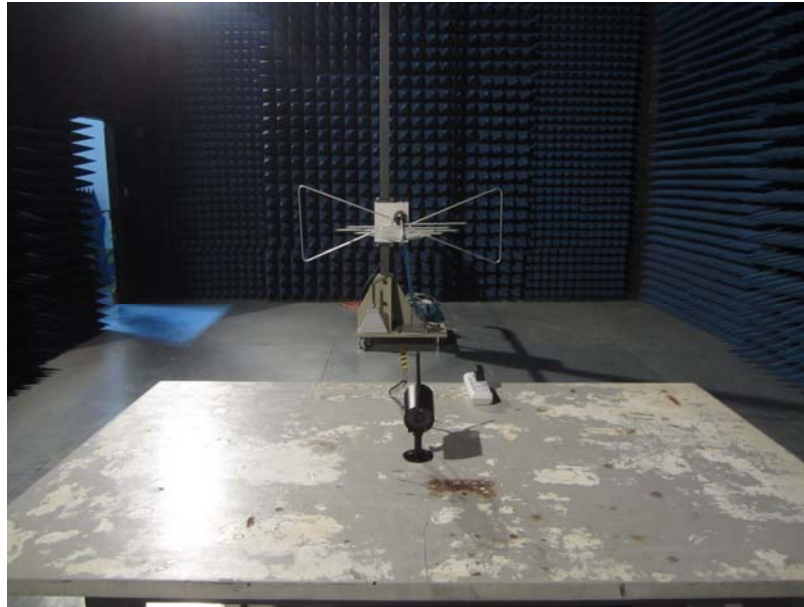
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4923.00	31.87	31.89	8.70	32.15	40.31	54.00	-13.69	Vertical
7384.50	19.92	36.49	11.76	31.84	36.33	54.00	-17.67	Vertical
9846.00	18.13	38.62	14.31	31.74	39.32	54.00	-14.68	Vertical
12307.50	*					54.00		Vertical
14769.00	*					54.00		Vertical
4923.00	22.93	31.89	8.70	32.15	31.37	54.00	-22.63	Horizontal
7384.50	21.74	36.49	11.76	31.84	38.15	54.00	-15.85	Horizontal
9846.00	19.36	38.62	14.31	31.74	40.55	54.00	-13.45	Horizontal
12307.50	*					54.00		Horizontal
14769.00	*					54.00		Horizontal

*Remark:*

1. *Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor*
2. *“\*”, means this data is too weak instrument of signal is unable to test.*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*

## 8 Test Setup Photo

Radiated Emission



## Conducted Emission



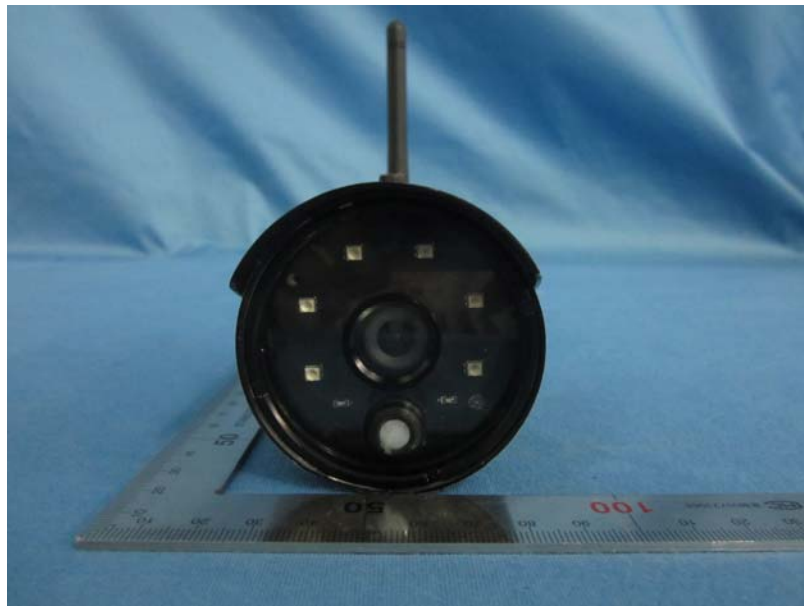
## 9 EUT Constructional Details

Adapter1



Adapter2



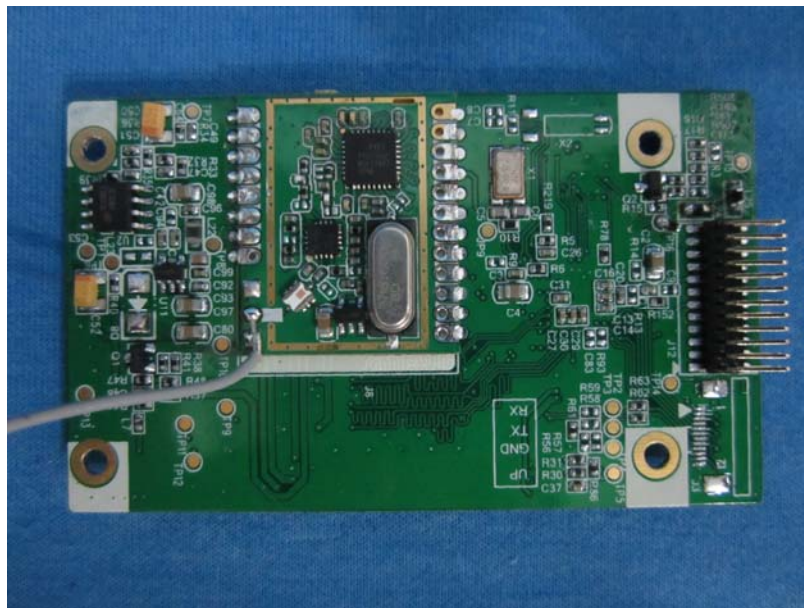
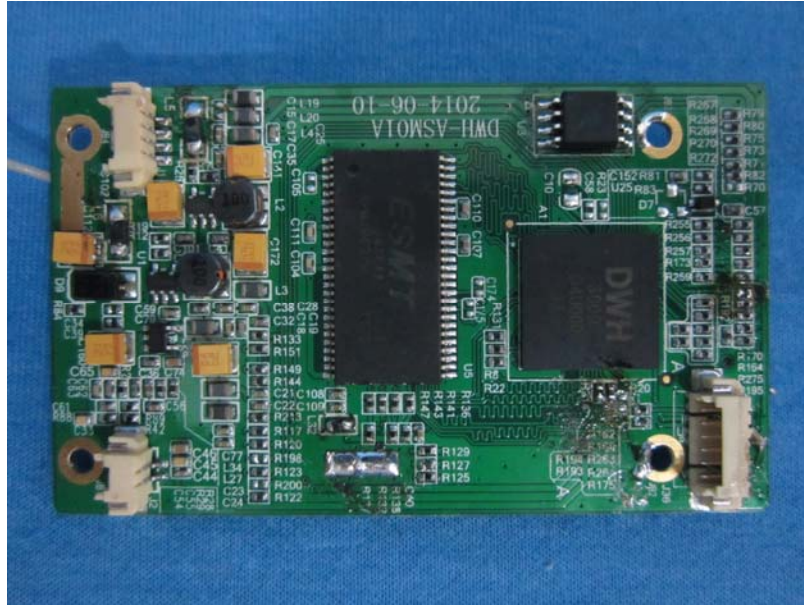


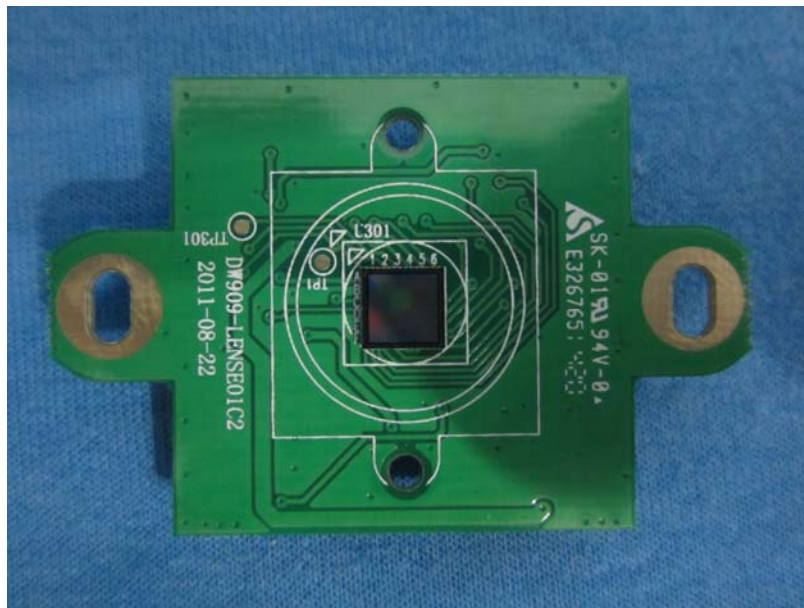
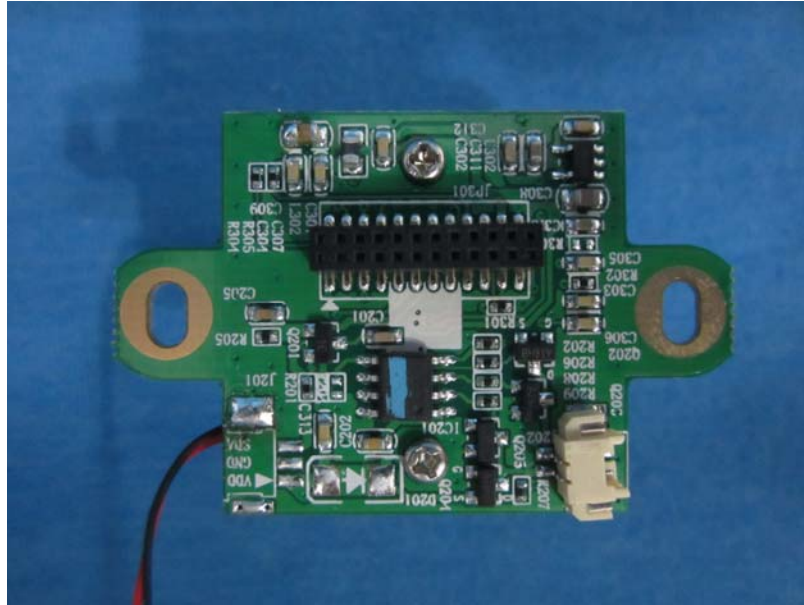














Adapter1



Adapter2



-----end-----