



**World Standardization Certification & Testing CO., LTD**  
**World Standardization Safety and EMC Testing Centre**

## **FCC ID TEST REPORT**

for

**WIFI Module**

**MODEL: RA-WN110212A, RA-WN110209A, RA-WN11021A,  
RA-WN110205A, RA-WN110211A**

**Trade Mark: N/A**

**Integrated circuit Factory: REALINK**

**Integrated circuit Model: RT3070**

**FCC ID: AQF-RA-WN110212A**

**Test Report Number: WSCT12080586E**

**Issued Date: August 27, 2012**

Issued for

**Forcelink Electronic Co., Ltd**

**6 Floor, B Block, RunChang Industrial park, Bantian Town, Shenzhen  
City, China**

Issued By:

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**Revision History Of Report**

Rev.	Issue No.	Revisions	Effect Page	Revised By
00	WSCT12080586E	Initial Issue	ALL	Kallen Wang



## TABLE OF CONTENTS

<b>1 TEST CERTIFICATION .....</b>	<b>4</b>
<b>2 TEST RESULT SUMMARY .....</b>	<b>5</b>
<b>3 EUT DESCRIPTION .....</b>	<b>6</b>
<b>4 SETUP OF EQUIPMENT UNDER TEST AND TEST EQUIPMENTS USED .....</b>	<b>7</b>
4.1. DESCRIPTION OF SUPPORT UNITS .....	8
4.2. CONFIGURATION OF SYSTEM UNDER TEST .....	9
<b>5 FACILITIES AND ACCREDITATIONS .....</b>	<b>10</b>
5.1. FACILITIES .....	10
5.2. ACCREDITATIONS .....	10
5.3. MEASUREMENT UNCERTAINTY .....	11
<b>§15.203 - ANTENNA REQUIREMENT .....</b>	<b>12</b>
Standard Applicable .....	12
Antenna Connector Construction .....	12
<b>§15.207 - CONDUCTED EMISSIONS .....</b>	<b>13</b>
Applicable Standard .....	13
Test Procedure .....	13
Plot(s) of Test Data .....	13
<b>§15.209, §15.205, §15.247(d) - SPURIOUS EMISSIONS .....</b>	<b>16</b>
Test Equipment .....	16
Test Procedure .....	16
Radiated Test Setup .....	16
Radiated Emission Limit .....	17
Radiated Emission Test Result .....	17
<b>§15.247(a) (2) – 6dB BANDWIDTH TESTING .....</b>	<b>28</b>
Test Equipment .....	28
Test Procedure .....	28
Applicable Standard .....	28
Test Result: Pass .....	28
<b>§15.247(b) (3) - MAXIMUM PEAK OUTPUT POWER .....</b>	<b>32</b>
Test Equipment .....	32
Test Procedure .....	32
Applicable Standard .....	32
Test Result .....	33
<b>§15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE .....</b>	<b>34</b>
Test Equipment .....	34
Test Procedure .....	34
Applicable Standard .....	34
Test Result .....	34
<b>§15.247(e) - POWER SPECTRAL DENSITY .....</b>	<b>39</b>
Test Equipment .....	39
Test Procedure .....	39
Applicable Standard .....	39
Test Result .....	40
<b>PHOTOGRAPHS OF THE TEST CONFIGURATION .....</b>	<b>44</b>
<b>PHOTOGRAPHS OF EUT .....</b>	<b>48</b>



Report reference No.: WSCT12080586E  
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## 1 TEST CERTIFICATION

<b>Product:</b>	WIFI Module
<b>Model:</b>	RA-WN110212A, RA-WN110209A, RA-WN11021A, RA-WN110205A, RA-WN110211A
<b>Trade Mark</b>	N/A
<b>Integrated Circuit Factory</b>	REALINK
<b>Integrated Circuit Model:</b>	RT3070
<b>Applicant:</b>	<b>Forcelink Electronic Co., Ltd</b> 6 Floor, B Block, RunChang Industrial park, Bantian Town, Shenzhen City, China
<b>Factory:</b>	<b>Forcelink Electronic Co., Ltd</b> 6 Floor, B Block, RunChang Industrial park, Bantian Town, Shenzhen City, China
<b>Tested:</b>	August 20, 2012 ~ August 27, 2012
<b>Test Voltage:</b>	DC 5V(PC Input AC 120V/60Hz)
<b>Applicable Standards:</b>	FCC Part 15 Subpart C: 2011 ANSI C63.4:2003

### Deviation from Applicable Standard

None

The above equipment has been tested by World Standardization Certification & Testing Co., Ltd., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

*Jack Ma*

Tested By: \_\_\_\_\_

(Jack Ma)

Date: August 27, 2012

*Kallen Wang*

Approved By: \_\_\_\_\_

(Kallen Wang)

Date: August 27, 2012



Report reference No.: WSCT12080586E  
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Revised: None

## 2 TEST RESULT SUMMARY

### FCC 15 Subpart C, Paragraph 15.247

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.203	Antenna Requirement	Pass
§15.207 (a)	Conducted Emissions	Pass
§15.247(d)	Spurious Emissions at Antenna Port	Pass
§15.205	Restricted Bands	Pass
§15.209, §15.205, 1§15.247(d)	Spurious Emissions	Pass
§15.247 (a)(2)	6 dB Bandwidth	Pass
§15.247(b)(3)	Maximum Peak Output Power	Pass
§15.247(d)	100kHz Bandwidth of Frequency Band Edge	Pass
§15.247(e)	Power Spectral Density	Pass

#### Modifications:

No modification was made to the unit tested.



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### 3 EUT DESCRIPTION

Product	WIFI Module
Trade Mark	N/A
Model	RA-WN110212A, RA-WN110209A, RA-WN11021A, RA-WN110205A, RA-WN110211A
Applicant	Forcelink Electronic Co., Ltd
Integrated Circuit Factory	REALINK
Integrated Circuit Model	RT3070
EUT Type	<input checked="" type="checkbox"/> Engineering Sample. <input type="checkbox"/> Product Sample, <input type="checkbox"/> Mass Product Sample.
Serial Number	N/A
Antenna Type	PIFA Antenna
EUT Power Rating	DC 5V/3.3V 0.125A
Temperature Range(Operating)	-10 ~50°C
Type of the Equipment	Combined Equipment
Operating Frequency (WIFI)	2412MHz - 2462MHz
Number of Channels	11 Channels
Modulation type	DSSS And OFDM for IEEE 802.11b/g

Note: N/A stand for no applicable.

#### Model Differences

No.	Model Number	Voltage	Tested With
1	RA-WN110212A	DC 5V/3.3V	<input checked="" type="checkbox"/>
2	RA-WN110209A	DC 5V/3.3V	<input type="checkbox"/>
3	RA-WN11021A	DC 5V/3.3V	<input type="checkbox"/>
4	RA-WN110205A	DC 5V/3.3V	<input type="checkbox"/>
5	RA-WN110211A	DC 5V/3.3V	<input type="checkbox"/>

NOTE: RA-WN110212A is tested model, other models are derivative models, The models are identical in circuit and PCB layout, only different on the model names, So the test data of RA-WN110212A can represent the remaining models.



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## 4 SETUP OF EQUIPMENT UNDER TEST AND TEST EQUIPMENTS USED

EQUIPMENT/FACILITIES	MANUFACTURER	MODEL #	SERIAL NO.	DATE OF CAL.	CAL. INTERVAL
Cable	Resenberger	N/A	NO.1	Mar 10, 2013	1 Year
Cable	SCHWARZBECK	N/A	NO.2	Mar 10, 2013	1 Year
Cable	SCHWARZBECK	N/A	NO.3	Mar 10, 2013	1 Year
LISN	Rohde & Schwarz	ESH3-Z5	100305	Mar 10, 2013	1 Year
50 $\Omega$ Coaxial Switch	ANRITSU CORP	MP59B	6200283933	Mar 10, 2013	1 Year
EMI Test Receiver	Rohde & Schwarz	ESP13	100180	Oct.18,2012	1 Year
Spectrum Analyzer	Rohde & Schwarz	FSP40	100273	Sep.10,2012	1 Year
3m Semi-Anechoic Chamber	Albatross Projects	9m×6m×6m	N/A	Feb.20,2013	1 Year
Signal Generator	FLUKE	PM5418 + Y/C	LO747012	Feb.20,2013	1 Year
Signal Generator	FLUKE	PM5418TX	LO738007	Feb.20,2013	1 Year
Loop Antenna	SCHWARZBECK	FMZB1516	113	Jan.30,2013	1 Year
Trilog-Super Broadband Antenna	SCHWARZBECK	VULB9161	9161-4079	Sep.22,2012	1 Year
Broad-Band Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-564	Sep.22,2012	1 Year
Ultra Broadband Antenna	Rohde & Schwarz	HL-562	100110	June.15,2013	1 Year
AMN	Rohde & Schwarz	ESH3-Z5	100196	Oct.11,2012	1 Year
AMN	Rohde & Schwarz	ESH3-Z5	100197	Oct.11,2012	1 Year
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	N/A	N/A	N/A
Power Meter	Rohde & Schwarz	NRVD	100041	Feb.20,2013	1 Year
EMI Test Receiver	Rohde & Schwarz	ESCS30	100003	Feb.20,2013	1 Year
Coaxial Cable with N-connectors	SCHWARZBECK	AK9515H	95549	Sep.22,2012	1 Year
Radio Communication Test Set	Rohde & Schwarz	CMS 54	846621/024	Feb.20,2013	1 Year
Modulation Analyzer	Hewlett-Packard	8901B	2303A00362	Feb.20,2013	1 Year
Absorbing clamp	Rohde & Schwarz	MDS-21	N/A	Oct.29,2012	1 Year



#### 4.1. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Equipment	Model No.	Serial No.	FCC ID	Trade Name	Data Cable	Power Cord
1	Monitor	HPL1706V	CND74535YZ	N/A	HP	N/A	N/A
2	Keyboard	SK-2880	435302-AA1	N/A	HP	N/A	N/A
3	Mouse	M-F105	N/A	N/A	HP	N/A	N/A
4	PC	HPD005	CHT5701	N/A	HP	N/A	N/A
5	Printer	LBP2900	N/A	N/A	Canon	N/A	N/A
6	Router	SmartAX MT800	N/A	DOC	Dlink	N/A	N/A

**Note:**

- 1) All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
- 2) Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

#### 4.2. Description of Test Configuration

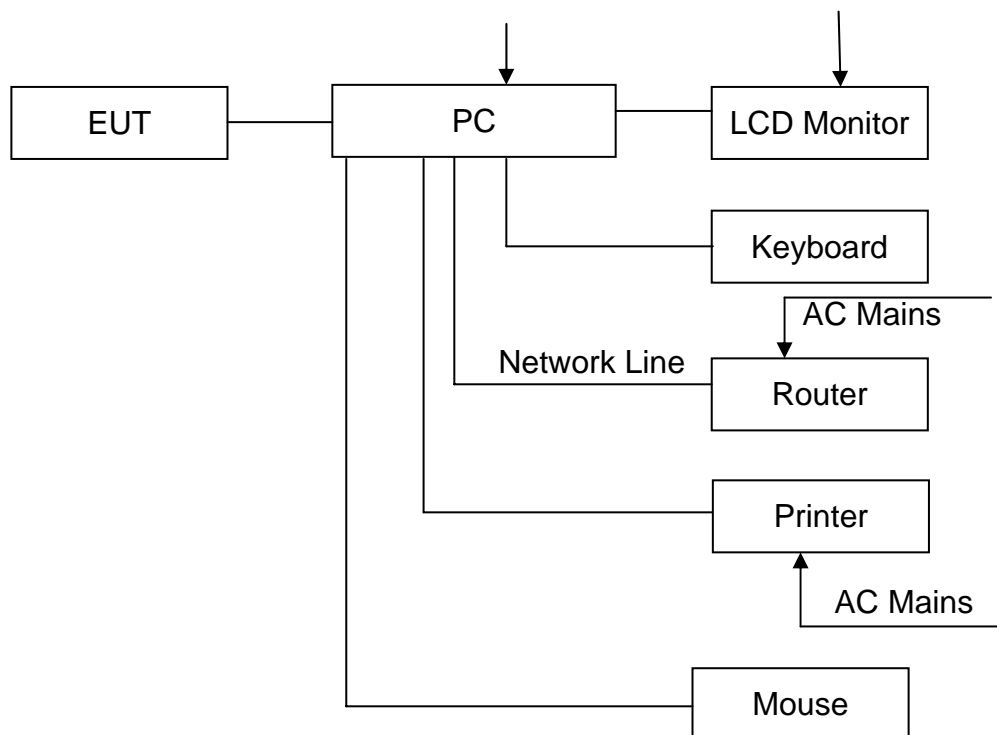
For 802.11b and 802.11g mode, 11 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437	/	/

EUT was tested with Channel 1, 6 and 11.



### 4.3. CONFIGURATION OF SYSTEM UNDER TEST



(EUT: WIFI Module)

### 4.4. Justification

1. Set up EUT with the relative support equipments.
  2. Make sure the test software control the EUT working state.
- (according to the standard measurement).

## 5 FACILITIES AND ACCREDITATIONS

### 5.1. FACILITIES

All measurement facilities used to collect the measurement data are located at World Standardization Certification & Testing CO., LTD.

Building A, Baoshi Road, Baoshi Science & Technology Park, Bao'an District, Shenzhen, Guangdong, China

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

### 5.2. ACCREDITATIONS

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

<b>USA</b>	<b>FCC</b> (The certificate registration number is 131628)
	<b>TIMCO</b> (The certificate registration number is Q2012033001)
<b>Japan</b>	<b>VCCI</b> (The certificate registration number is C-4128, R-2662)
<b>Canada</b>	<b>INDUSTRY CANADA</b> (The certificated registration number is 7700A-1)
<b>Germany</b>	<b>TUV</b> (The certificate registration number is UA50138086-0001,UA50138086-0002)
	<b>EMCC</b> (The certificated registration number is #080380)
	<b>PHOENIX</b> (The certificated registration number is 702777a)
	<b>Eurofins</b>
<b>China</b>	<b>CNAS</b> (The certificated registration number is L3732)
<b>Switzerland</b>	<b>SGS</b> (The certificated registration number is SZE0005409, SZE0005408)

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.wsct-cert.org>

### 5.3. 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
Conducted emissions	150kHz~30MHz		+/- 3.59dB
Radiated emissions	Horizontal	30MHz ~ 200MHz	+/- 4.77dB
		200MHz ~1000MHz	+/- 4.93dB
		1000MHz~25000 MHz	+/- 5.01dB
	Vertical	30MHz ~ 200MHz	+/- 5.04dB
		200MHz ~1000MHz	+/- 4.93dB
		1000MHz~25000 MHz	+/- 5.01dB

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

## **§15.203 - ANTENNA REQUIREMENT**

### **Standard Applicable**

According to § 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the user of a standard antenna jack or electrical connector is prohibited. The structure and application of the EUT were analyzed to determine compliance with section §15.203 of the rules. §15.203 state that the subject device must meet the following criteria:

- a. Antenna must be permanently attached to the unit.
- b. Antenna must use a unique type of connector to attach to the EUT.

Unit must be professionally installed, and installer shall be responsible for verifying that the correct antenna is employed with the unit.

And according to FCC 47 CFR section 15.247 (b), if the transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### **Antenna Connector Construction**

The EUT uses a inside jointing PIFA antenna, The Antenna is unique coupling antenna. The Antenna gain is 0dBi. please refer to the EUT internal photos.



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## §15.207 - CONDUCTED EMISSIONS

### Applicable Standard

The specification used was with the FCC Part 15.207 limits.

### Test Procedure

During the conducted emission test, the EUT was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

### Test Result

PASS

Test Mode: Operating

### Environmental Conditions

Temperature:	26 °C
Relative Humidity:	60%
ATM Pressure:	100.0kPa

### Plot(s) of Test Data

Plot(s) of Test Data is presented hereinafter as reference.

## Conducted Emission Measurement

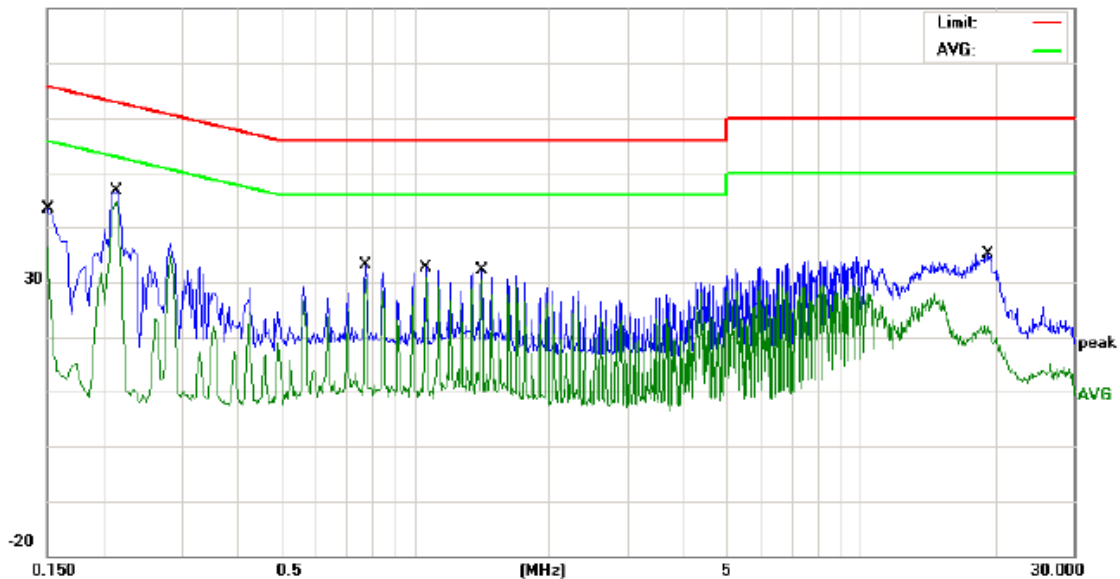
File :Forcelink

Data :#89

Date: 12/08/24/

Time: 11/27/49

80.0 dBuV



Site 843 Shielded Room

Phase: **L1**

Temperature: 26

Limit: FCC Part 15B Conduction(QP)

Power:

Humidity: 60 %

EUT: WIFI Module

M/N: RA-WN110212A

Mode: Running

Note: DC5V(PC Input AC120V/60Hz)

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1		0.1500	32.80	10.45	43.25	65.99	-22.74	QP	
2		0.1500	25.97	10.45	36.42	55.99	-19.57	AVG	
3		0.2128	36.12	10.34	46.46	63.09	-16.63	QP	
4	*	0.2128	33.84	10.34	44.18	53.09	-8.91	AVG	
5		0.7780	22.43	10.59	33.02	56.00	-22.98	QP	
6		0.7780	20.04	10.59	30.63	46.00	-15.37	AVG	
7		1.0620	21.92	10.75	32.67	56.00	-23.33	QP	
8		1.0620	20.02	10.75	30.77	46.00	-15.23	AVG	
9		1.4140	21.48	10.73	32.21	56.00	-23.79	QP	
10		1.4140	19.77	10.73	30.50	46.00	-15.50	AVG	
11		19.3819	24.61	10.49	35.10	60.00	-24.90	QP	
12		19.3819	11.34	10.49	21.83	50.00	-28.17	AVG	

\*:Maximum data x:Over limit l:over margin

(Reference Only)

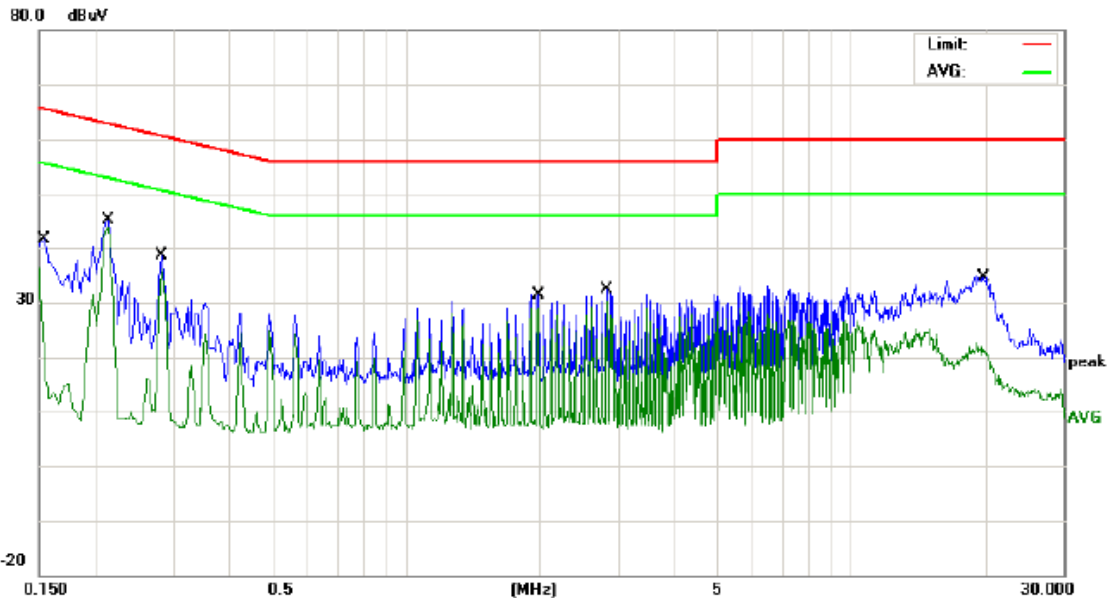
## Conducted Emission Measurement

File :Forcelink

Data :#90

Date: 12/08/24/

Time: 11/32/45



Site 843 Shielded Room

Phase: *N*

Temperature: 26

Limit: FCC Part 15B Conduction(QP)

Power:

Humidity: 60 %

EUT: WIFI Module

M/N: RA-WN110212A

Mode: Running

Note: DC5V( PC Input AC120V/60Hz)

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector	Comment
		MHz	dBuV	dB	dBuV	dBuV	dB		
1		0.1500	29.97	10.45	40.42	65.99	-25.57	QP	
2		0.1500	25.88	10.45	36.33	55.99	-19.66	AVG	
3		0.2128	34.51	10.34	44.85	63.09	-18.24	QP	
4	*	0.2128	33.13	10.34	43.47	53.09	-9.62	AVG	
5		0.2819	28.12	10.59	38.71	60.76	-22.05	QP	
6		0.2819	25.47	10.59	36.06	50.76	-14.70	AVG	
7		1.9820	20.74	10.71	31.45	56.00	-24.55	QP	
8		1.9820	18.10	10.71	28.81	46.00	-17.19	AVG	
9		2.8300	21.64	10.68	32.32	56.00	-23.68	QP	
10		2.8300	19.41	10.68	30.09	46.00	-15.91	AVG	
11		19.7460	24.23	10.50	34.73	60.00	-25.27	QP	
12		19.7460	9.85	10.50	20.35	50.00	-29.65	AVG	

\*:Maximum data    x:Over limit    !:over margin

< Reference Only

**§15.209, §15.205, §15.247(d) - SPURIOUS EMISSIONS****Test Equipment**

Please refer to section 4 this report.

**Test Procedure**

The out of band emission tests were performed in the 3-meter chamber test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part Subpart C limits.

**Environmental Conditions**

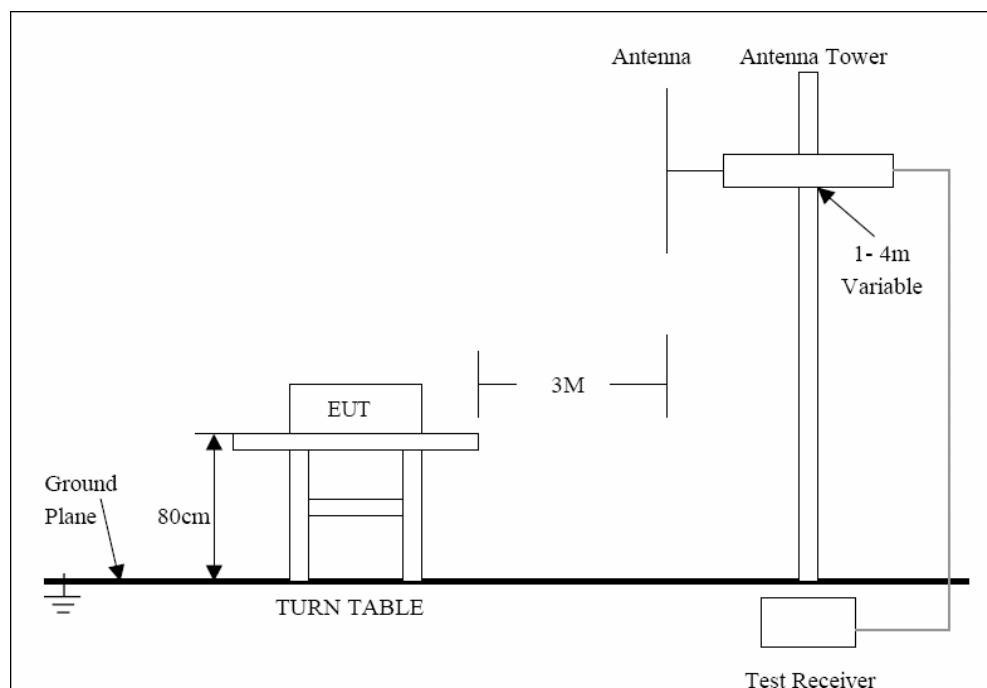
Temperature:	26 °C
Relative Humidity:	55%
ATM Pressure:	100.0kPa

**Radiated Test Setup**

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	Detector
9KHz-30MHz	10 kHz	30 kHz	QP
30 MHz – 1000 MHz	100 kHz	300 kHz	QP
1000 MHz – 25 GHz	1 MHz	3 MHz	PK
1000 MHz – 25 GHz	1 MHz	10 Hz	Ave







Report reference No.: WSCT12080586E  
Issued: August 27, 2012  
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For the accrual test configuration, please refer to the related items-photos of Testing.

## Radiated Emission Limit

Applicable Standard

FCC §15.247 (d); §15.209; §15.205;

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100**	3
88–216	150**	3
216–960	200**	3
Above 960	500	3

## Radiated Emission Test Result

*Test Mode:* Transmitting

NOTE:9KHz-30MHz the measurements were greater than 20dB below the limit.

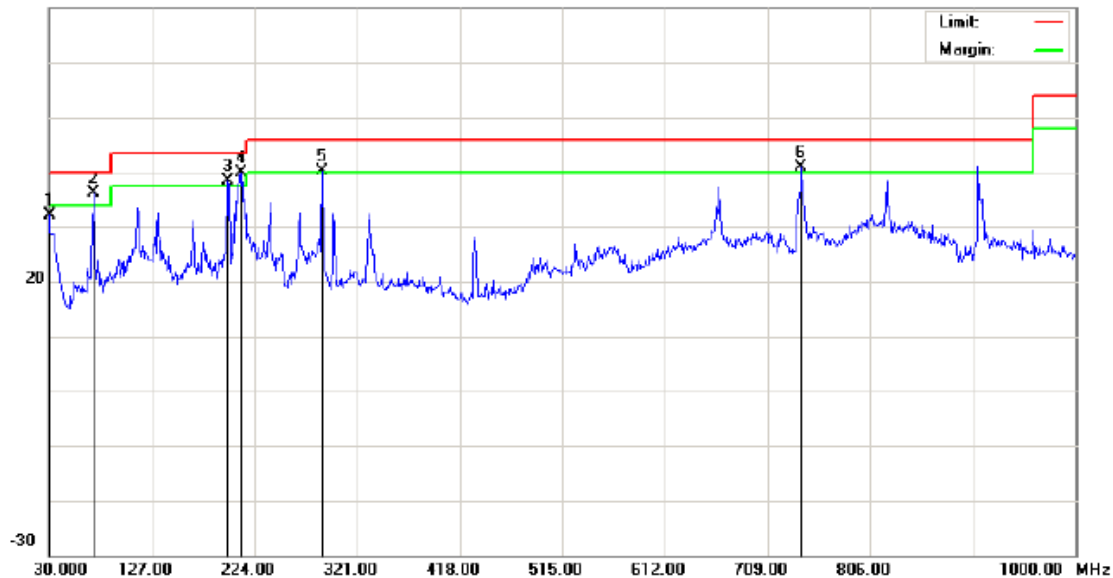
## Radiated Emission Measurement

File: Forcelink  
 70.0 dBuV/m

Data: #14

Date: 2012-8-25

Time: 17:09:52



Site 966  
 Limit: FCC Part15B \_ RE 3M  
 EUT: WIFI Module  
 M/N: RA-WN110212A  
 Mode: Running  
 Note: DC 5V ( PC Input AC 120V/60Hz)

Polarization: *Horizontal*  
 Power:  
 Distance:

Temperature: 26  
 Humidity: 55 %

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1		30.0000	31.10	0.96	32.06	40.00	-7.94	QP			
2	!	71.7099	50.01	-13.88	36.13	40.00	-3.87	QP			
3	!	198.7800	46.87	-8.50	38.37	43.50	-5.13	QP			
4	*	211.3899	48.52	-8.66	39.86	43.50	-3.64	QP			
5	!	288.0199	44.99	-4.84	40.15	46.00	-5.85	QP			
6	!	741.0099	38.63	2.16	40.79	46.00	-5.21	QP			

\*:Maximum data    x:Over limit    !:over margin

(Reference Only)

## Radiated Emission Measurement

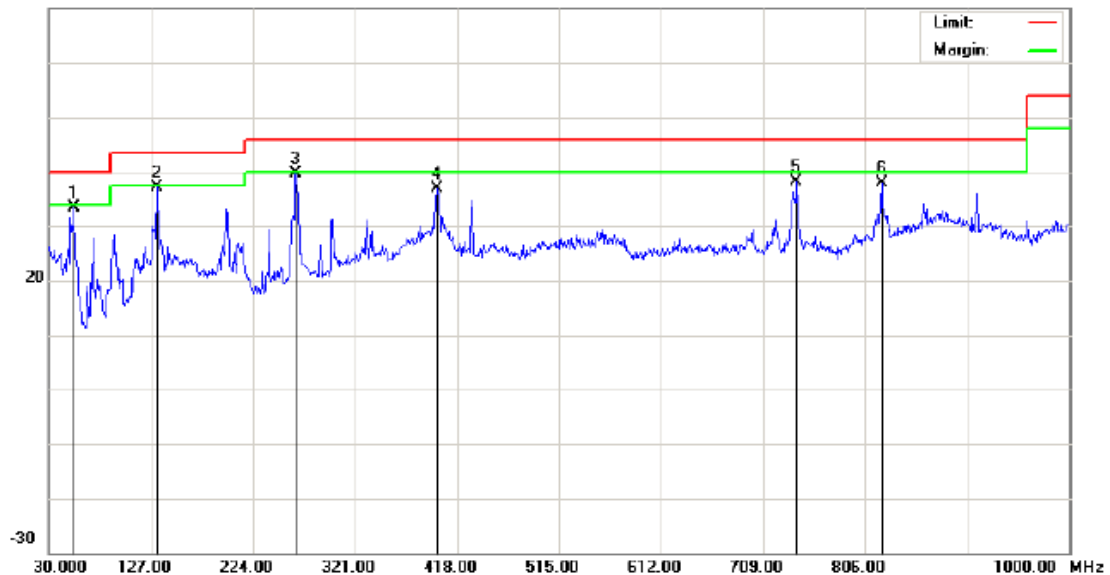
File : Forcelink

Data : #13

Date: 2012-8-25

Time: 16:57:32

70.0 dBuV/m



Site 966

Polarization: **Vertical**

Temperature: 26

Limit: FCC Part15B \_ RE 3M

Power:

Humidity: 55 %

EUT: WIFI Module

Distance:

M/N: RA-WN110212A

Mode: Running

Note: DC 5V ( PC Input AC 120V/60Hz )

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		54.2500	47.72	-14.44	33.28	40.00	-6.72	QP		
2		132.8199	44.56	-7.55	37.01	43.50	-6.49	QP		
3	*	264.7400	44.49	-4.93	39.56	46.00	-6.44	QP		
4		399.5699	37.30	-0.33	36.97	46.00	-9.03	QP		
5		741.0099	36.39	1.86	38.25	46.00	-7.75	QP		
6		821.5199	32.48	5.31	37.79	46.00	-8.21	QP		

\*:Maximum data    x:Over limit    !:over margin

(Reference Only)



Report reference No.: WSCT12080586E  
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Above 1GHz:  
 802.11b

Indicated		Detector (PK/AV)	Table Angle Degree	Antenna		Correction Factor			FCC Part 15.247		
Frequency (MHz)	Receiver Reading (dBμV/m)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low Channel (2412MHz)											
7236	37.5	AV	360	1.5	V	35.4	4.51	33.7	43.71	54	10.29
4824	39.3	AV	250	1.2	V	31.3	4.64	33.4	41.84	54	12.16
7236	35.2	AV	45	1.4	H	35.4	4.51	33.7	41.41	54	12.59
4824	38.6	AV	60	1.6	H	31.3	4.64	33.4	41.14	54	12.86
4824	53.6	PK	180	1.3	V	31.3	4.64	33.4	56.14	74	17.86
7236	48.6	PK	300	1.5	V	35.4	4.51	33.7	54.81	74	19.19
7236	47.7	PK	100	1.5	H	35.4	4.51	33.7	53.91	74	20.09
4824	49.9	PK	210	1.1	H	31.3	4.64	33.4	52.44	74	21.56
Middle Channel (2437MHz)											
7311	40.6	AV	180	1.5	V	35.4	4.75	33.7	47.05	54	6.95
7311	39.1	AV	185	1.3	H	35.4	4.75	33.7	45.55	54	8.45
4874	41.7	AV	200	1.5	V	31.3	4.64	33.4	44.24	54	9.76
4874	40.5	AV	360	1.5	H	31.3	4.64	33.4	43.04	54	10.96
7311	53.8	PK	120	1.2	V	35.4	4.75	33.7	60.25	74	13.75
4874	55.6	PK	75	1.5	V	31.3	4.64	33.4	58.14	74	15.86
7311	50.4	PK	220	1.4	H	35.4	4.75	33.7	56.85	74	17.15
4874	52.6	PK	0	1.1	H	31.3	4.64	33.4	55.14	74	18.86
High Channel (2462MHz)											
7386	42.0	AV	160	1.3	V	35.3	4.75	33.7	48.35	54	5.65
7386	41.9	AV	245	1.4	H	35.3	4.75	33.7	48.25	54	5.75
4924	43.8	AV	360	1.5	V	32.0	4.64	33.4	47.04	54	6.96
4924	42.4	AV	45	1.5	H	32.0	4.64	33.4	45.64	54	8.36
7386	52.2	PK	90	1.2	V	35.3	4.75	33.7	58.55	74	15.45
4924	55.1	PK	0	1.4	V	32.0	4.64	33.4	58.34	74	15.66
4924	54.6	PK	200	1.4	H	32.0	4.64	33.4	57.84	74	16.16
7386	51.3	PK	180	1.2	H	35.3	4.75	33.7	57.65	74	16.35



Report reference No.: WSCT12080586E  
 Issued: August 27, 2012  
 Revised: None

802.11g

Indicated		Detector (PK/AV)	Table Angle Degree	Antenna		Correction Factor			FCC Part 15.247		
Frequency (MHz)	Receiver Reading (dBμV/m)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Low Channel (2412MHz)											
7236	38.6	AV	1.24	1.3	V	35.4	4.51	33.7	44.81	54	9.19
7236	37.8	AV	200	1.4	H	35.4	4.51	33.7	44.01	54	9.99
4824	40.7	AV	90	1.5	V	31.3	4.64	33.4	43.24	54	10.76
4824	39.1	AV	45	1.5	H	31.3	4.64	33.4	41.64	54	12.36
7236	46.5	PK	165	1.4	V	35.4	4.51	33.7	52.71	74	21.29
4824	49.8	PK	320	1.2	V	31.3	4.64	33.4	52.34	74	21.66
4824	47.5	PK	0	1.5	H	31.3	4.64	33.4	50.04	74	23.96
7236	42.7	PK	120	1.2	H	35.4	4.51	33.7	48.91	74	25.09
Middle Channel (2437MHz)											
7311	38.6	AV	200	1.5	H	35.4	4.75	33.7	45.05	54	8.95
4874	40.5	AV	120	1.4	H	31.3	4.64	33.4	43.04	54	10.96
7311	35.9	AV	320	1.3	V	35.4	4.75	33.7	42.35	54	11.65
4874	36.7	AV	190	1.3	V	31.3	4.64	33.4	39.24	54	14.76
7311	44.2	PK	45	1.5	H	35.4	4.75	33.7	50.65	74	23.35
7311	43.2	PK	360	1.4	V	35.4	4.75	33.7	49.65	74	24.35
4874	46.8	PK	0	1.4	V	31.3	4.64	33.4	49.34	74	24.66
4874	45.3	PK	60	1.2	H	31.3	4.64	33.4	47.84	74	26.16
High Channel (2462MHz)											
7386	38.2	AV	160	1.3	V	35.3	4.75	33.7	44.55	54	9.45
4924	41.3	AV	360	1.5	V	32.0	4.55	33.4	44.45	54	9.55
4924	40.5	AV	45	1.5	H	32.0	4.55	33.4	43.65	54	10.35
7386	37.1	AV	245	1.4	H	35.3	4.75	33.7	43.45	54	10.55
4924	54.7	PK	0	1.4	V	32.0	4.55	33.4	57.85	74	16.15
7386	50.6	PK	90	1.2	V	35.3	4.75	33.7	56.95	74	17.05
7386	47.6	PK	180	1.2	H	35.3	4.75	33.7	53.95	74	20.05
4924	49.4	PK	200	1.4	H	32.0	4.55	33.4	52.55	74	21.45

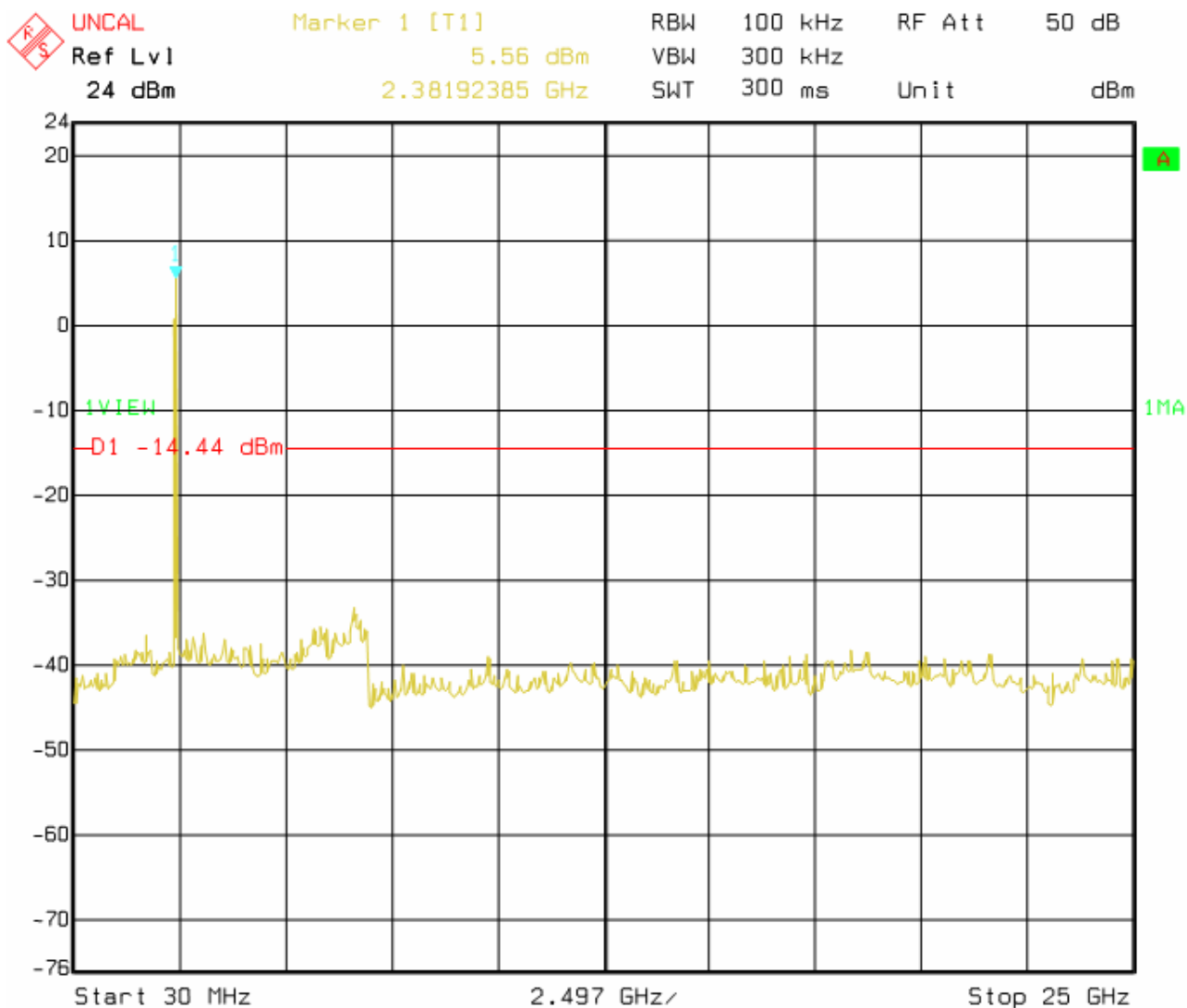


Report reference No.: WSCT12080586E  
Issued: August 27, 2012  
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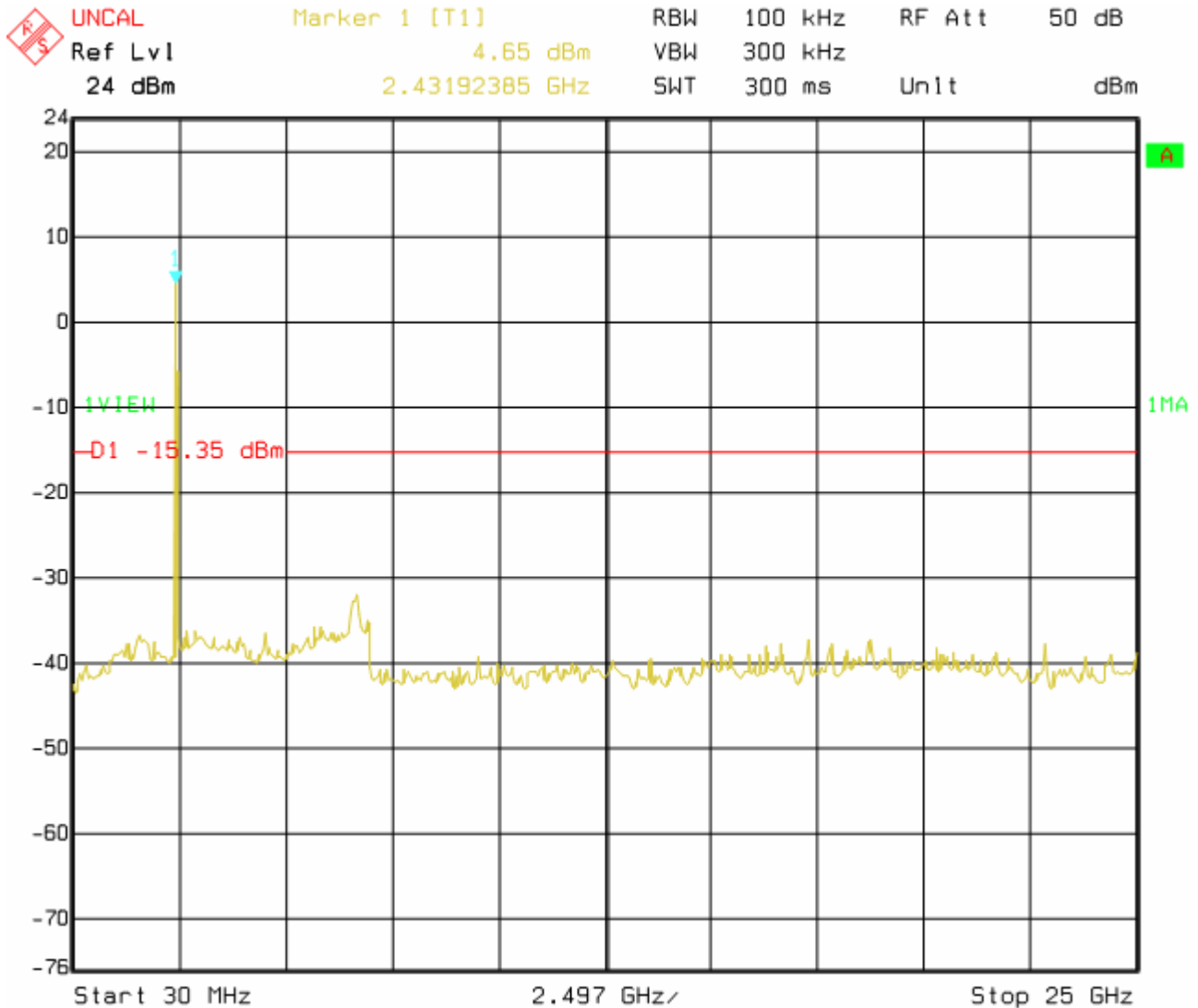
## Antenna port conducted spurious emissions

802.11b mode:

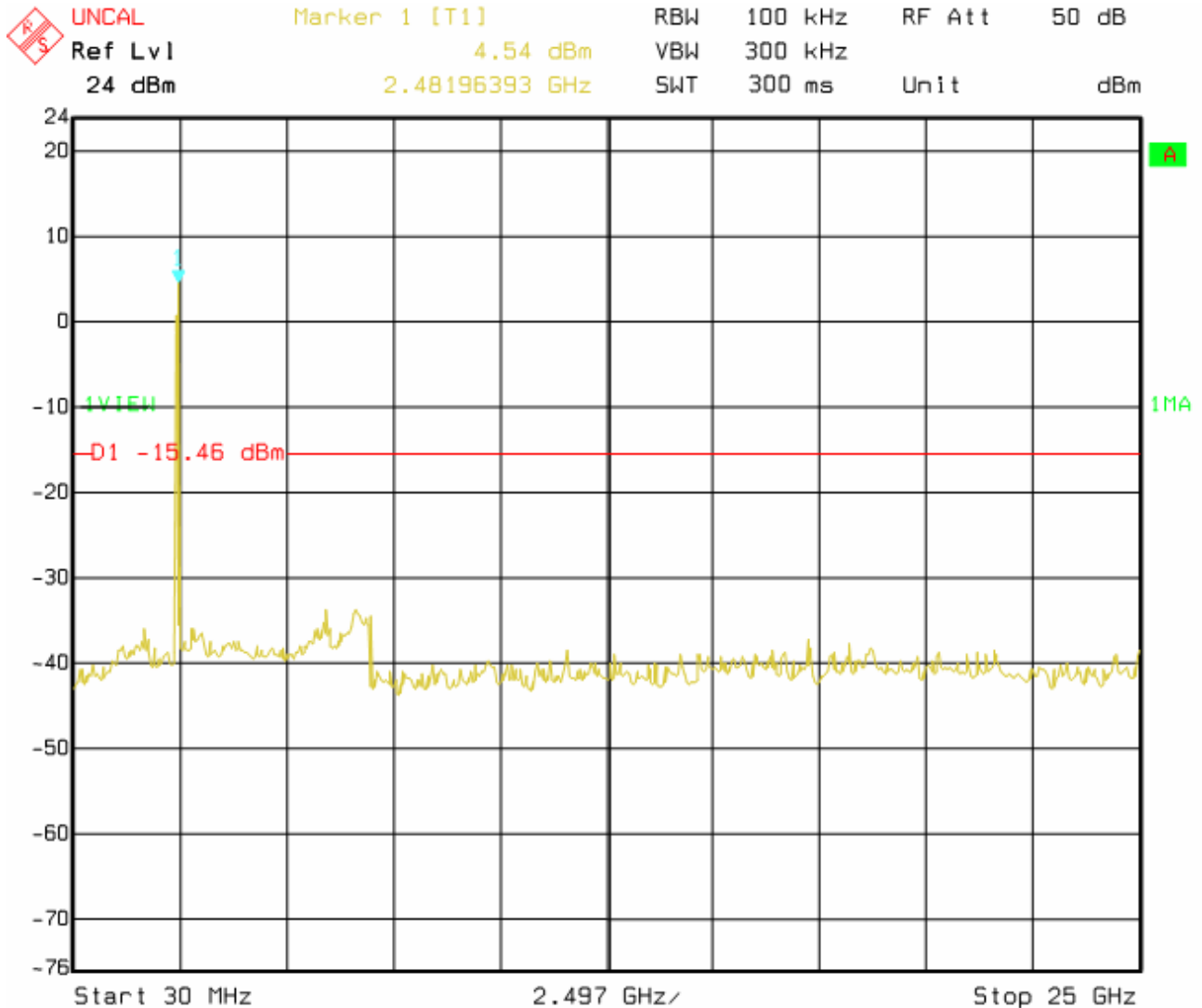
### Low channel



## Middle channel



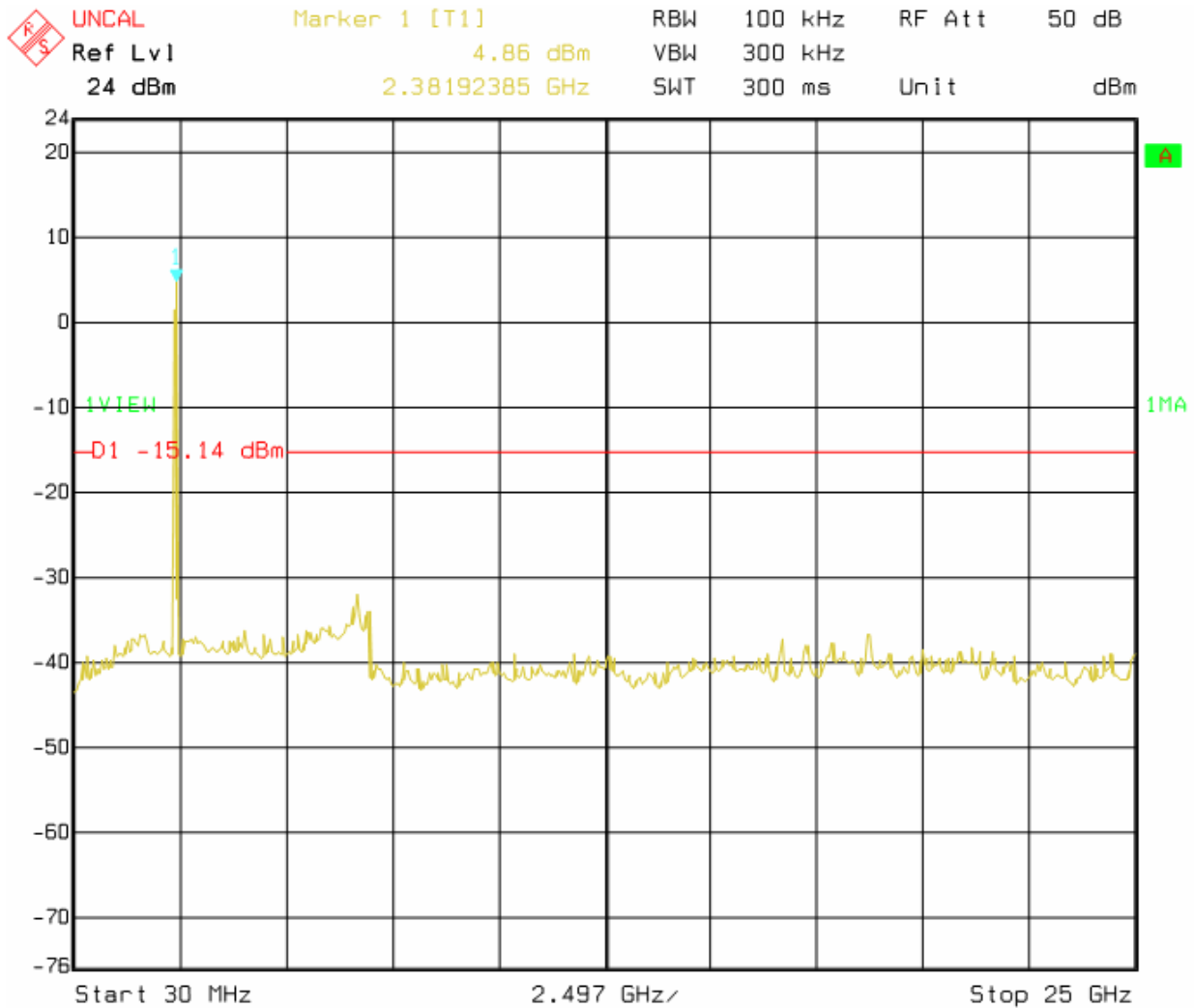
## High channel





802.11g mode:

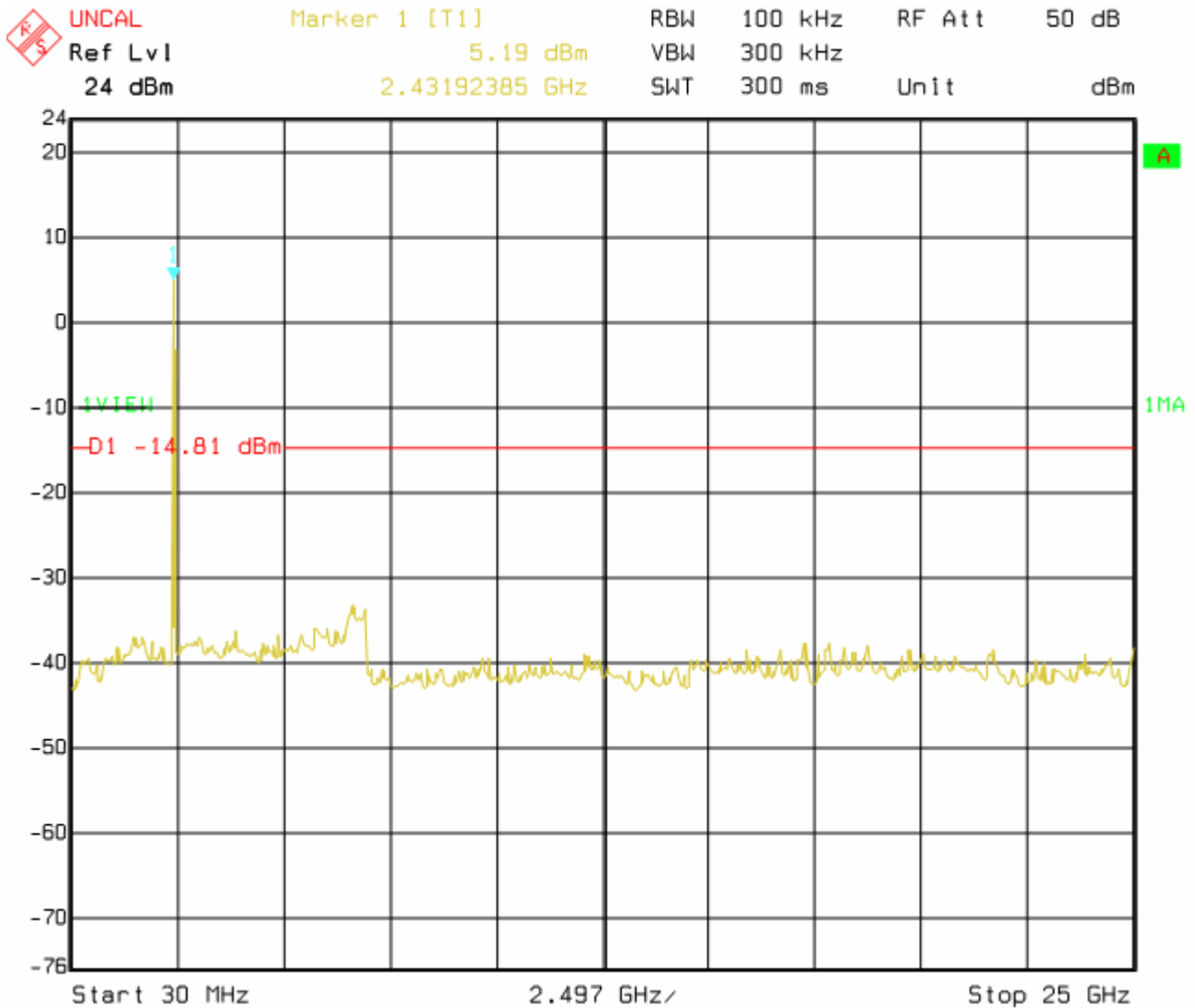
## Low channel



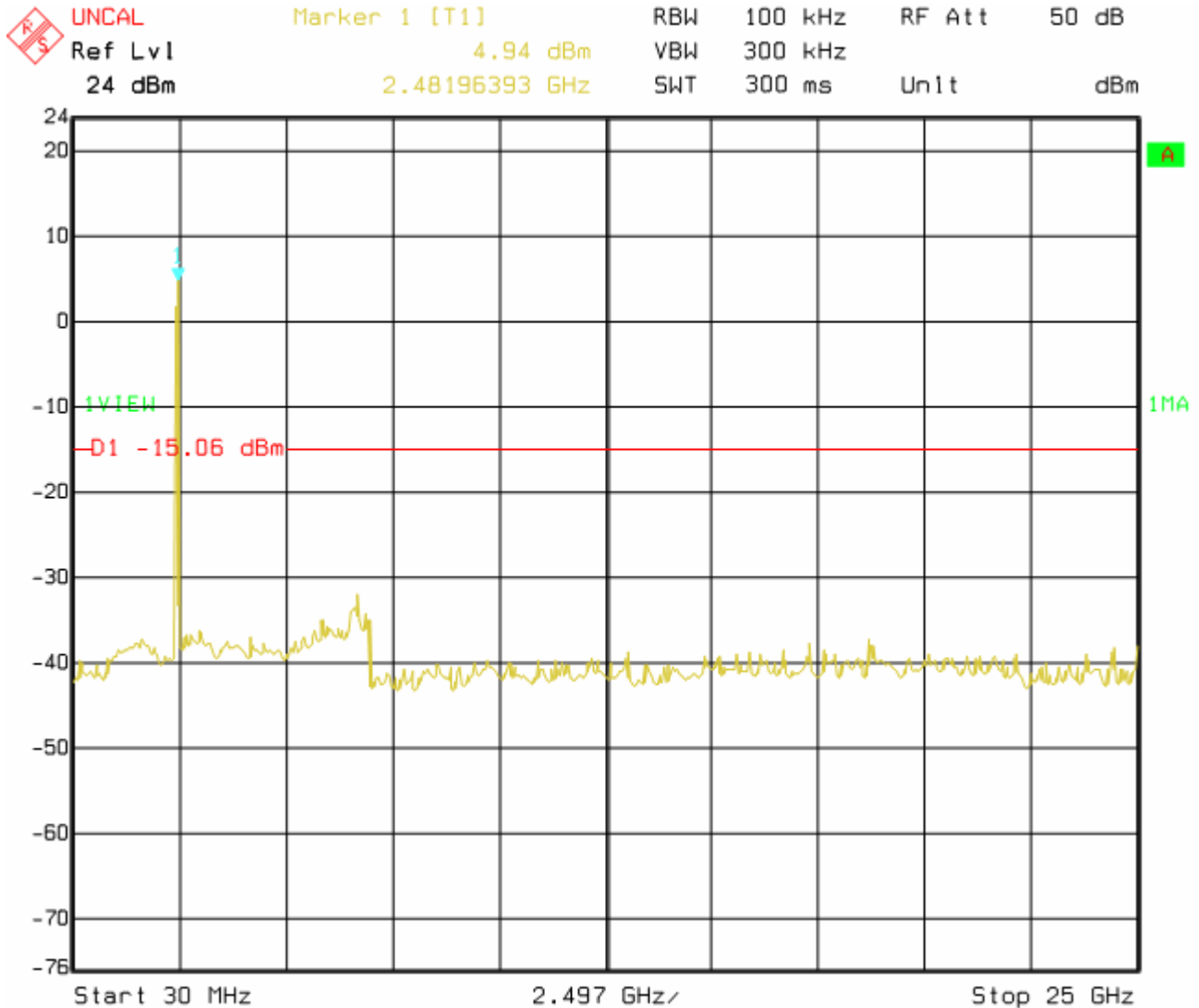


Report reference No.: WSCT12080586E  
Issued: August 27, 2012  
Revised: None

### Middle channel



## High channel



## §15.247(a) (2) – 6dB BANDWIDTH TESTING

### Test Equipment

Please refer to Section 4 this report.

### Test Procedure

1. Set EUT in the transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
3. Set the spectrum analyzer as RBW=100KHz, VBW $\geq$ RBW, Span=40MHz, Sweep=auto.
4. Mark the peak frequency and -6dB(upper and lower)frequency.
5. Repeat until all the rest channels are investigated.

### Environmental Conditions

Temperature:	26 °C
Relative Humidity:	55%
ATM Pressure:	100.0kPa

### Applicable Standard

Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

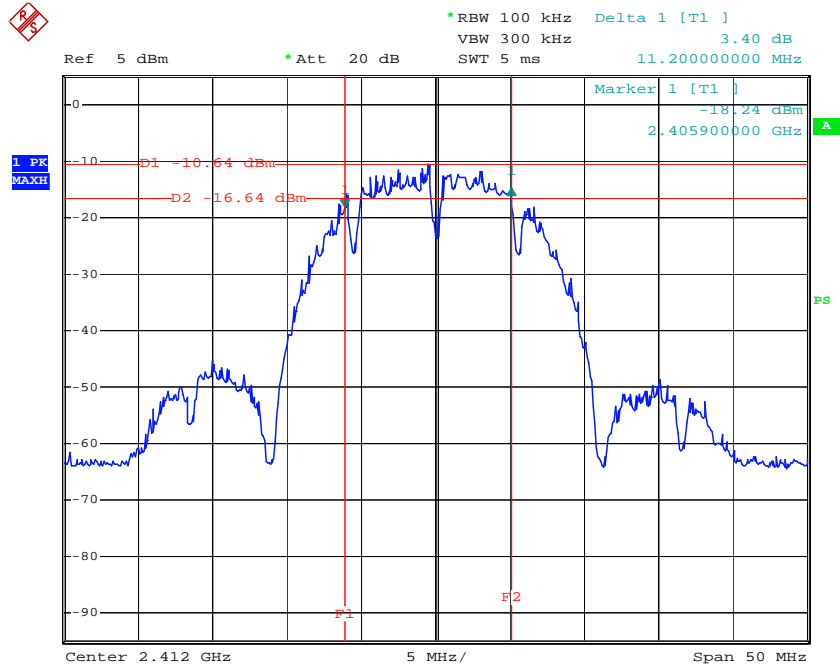
### Test Result: Pass.

Please refer to the following tables

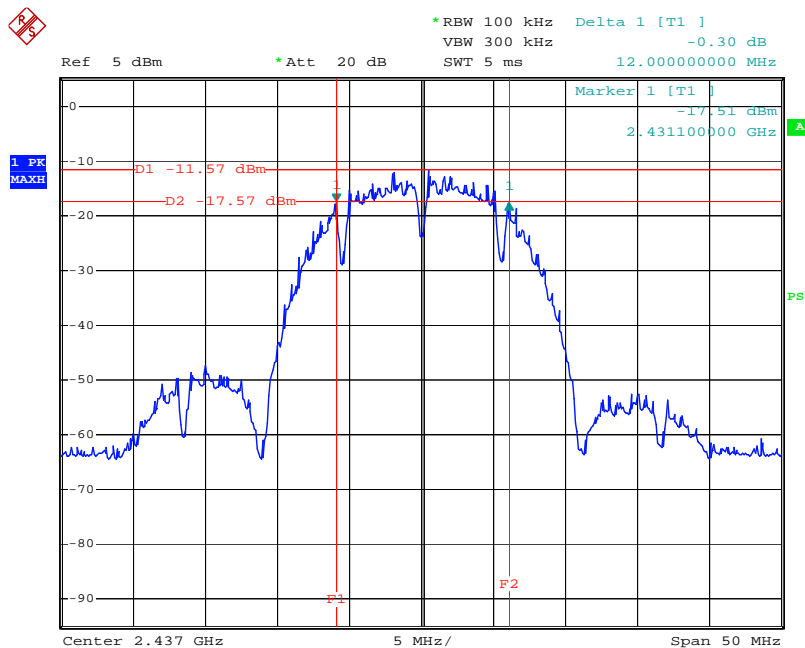
Channel Frequency (MHz)	Data Rate (Mbps)	6dB Bandwidth (kHz)	Limit (kHz)	Ref. Plot
<b>802.11b Mode</b>				
2412	1	11200	> 500	PLOT 1
2437	1	12000	> 500	PLOT 2
2462	1	11900	> 500	PLOT 3
<b>802.11g Mode</b>				
2412	6	16400	> 500	PLOT 4
2437	6	16500	> 500	PLOT 5
2462	6	16400	> 500	PLOT 6

## 802.11b Mode:

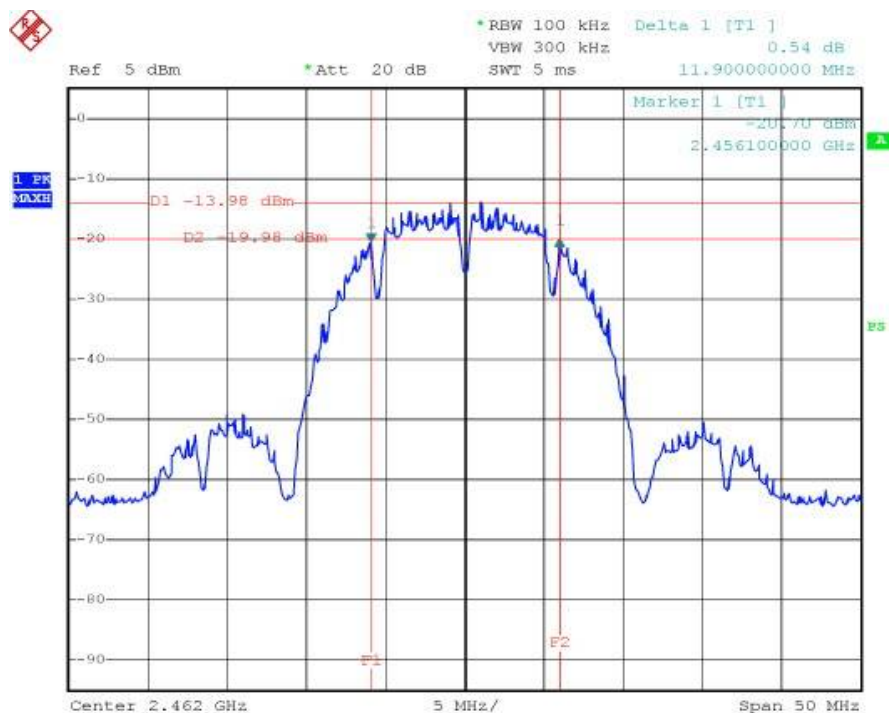
### Low Channel



### Middle Channel

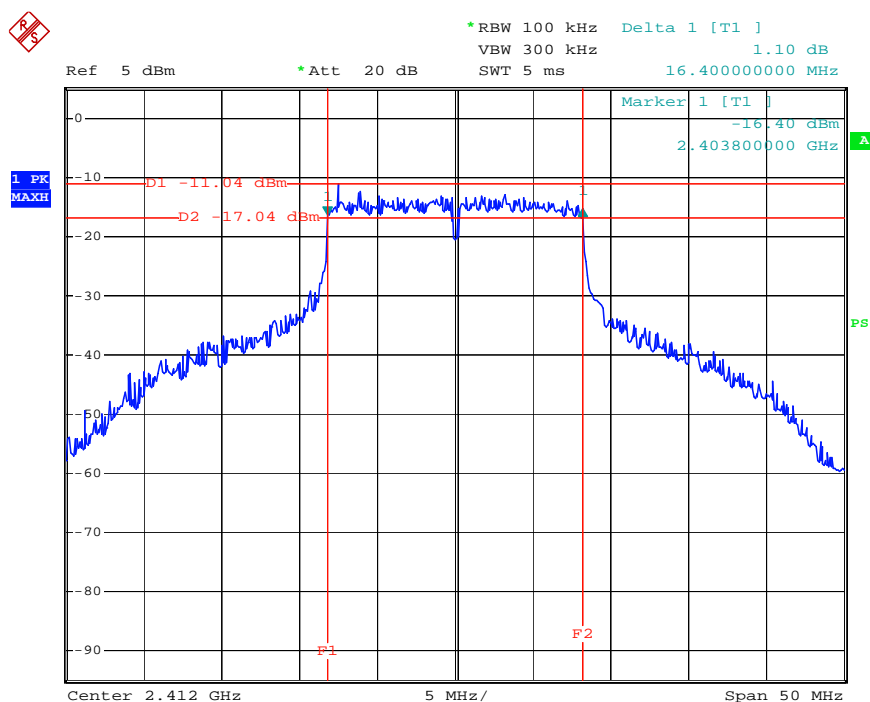


## High Channel

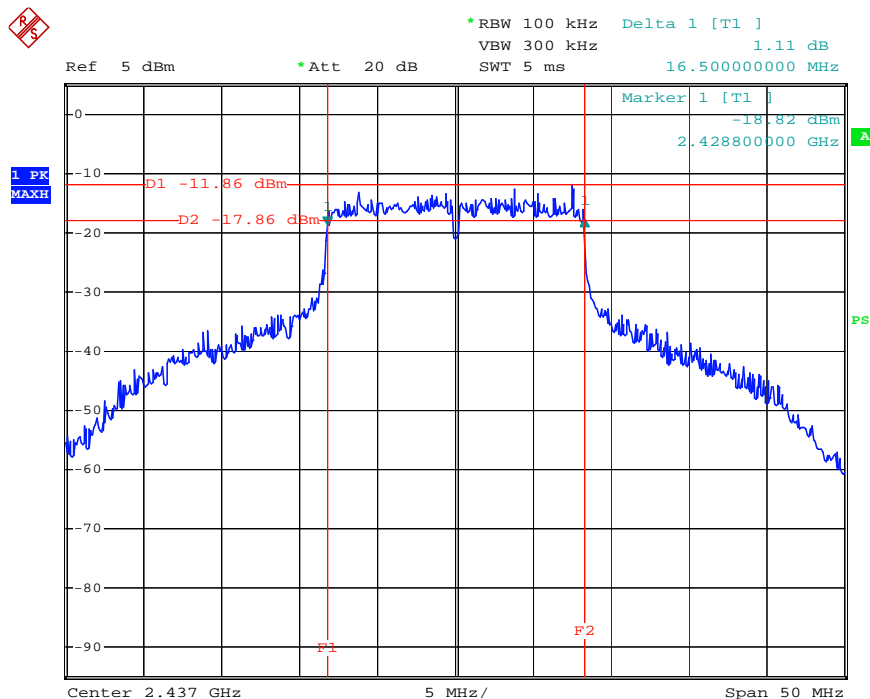


## 802.11g Mode:

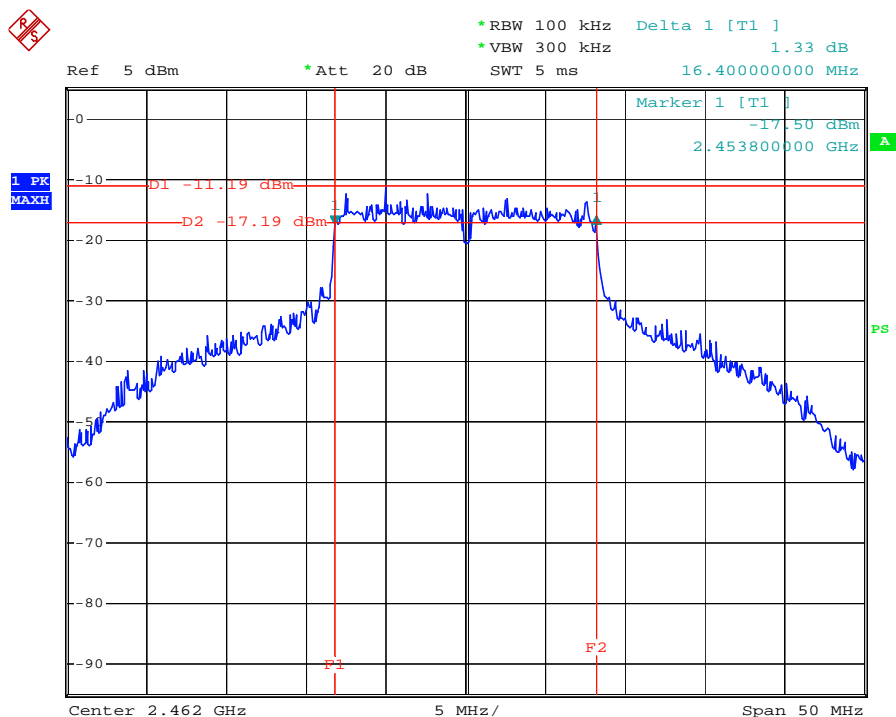
## Low Channel



## Middle Channel



## High Channel



## §15.247(b) (3) - MAXIMUM PEAK OUTPUT POWER

### Test Equipment

Please refer to Section 4 this report.

### Test Procedure

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz.
3. Set VBW  $\geq$  3 MHz.
4. Use sample detector mode if bin width (i.e., span/number of points in spectrum display)  $<$  0.5 RBW. Otherwise use peak detector mode.
5. Use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at full control power for entire sweep of every sweep. If the device transmits continuously, with no off intervals or reduced power intervals, the trigger may be set to “free run”.
6. Trace average 100 traces in power averaging mode.
7. Compute power by integrating the spectrum across the 26 dB EBW of the signal. The integration can be performed using the spectrum analyzer’s band power measurement function with band limits set equal to the EBW band edges or by summing power levels in each 1 MHz band in linear power terms. The 1 MHz band power levels to be summed can be obtained by averaging, in linear power terms, power levels in each frequency bin across the 1 MHz.

### Environmental Conditions

Temperature:	26 °C
Relative Humidity:	55%
ATM Pressure:	100.0kPa

### Applicable Standard

According to §15.247(b) (3), for systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.





Report reference No.: WSCT12080586E  
Issued: August 27, 2012  
Revised: None

## Test Result

Pass

### 802.11b Mode:

Channel	Frequency (MHz)	Data Rate (Mbps)	Conducted Power (dBm)	Limit (dBm)
Low	2412	1	11.96	30
Mid	2437	1	11.14	30
High	2462	1	12.10	30

### 802.11g Mode:

Channel	Frequency (MHz)	Data Rate (Mbps)	Conducted Power (dBm)	Limit (dBm)
Low	2412	6	12.24	30
Mid	2437	6	11.43	30
High	2462	6	12.10	30

## §15.247(d) – 100 kHz BANDWIDTH OF FREQUENCY BAND EDGE

### Test Equipment

Please refer to Section 4 this report.

### Test Procedure

The out of band emission tests were performed in the 3-meter chamber test site, using the setup accordance with the ANSI C63.4-2003. The specification used was the FCC Part Subpart C limits.

### Environmental Conditions

Temperature:	26 °C
Relative Humidity:	55%
ATM Pressure:	100.0kPa

### Applicable Standard

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### Test Result

PASS



Report reference No.: WSCT12080586E  
Issued: August 27, 2012  
Revised: None

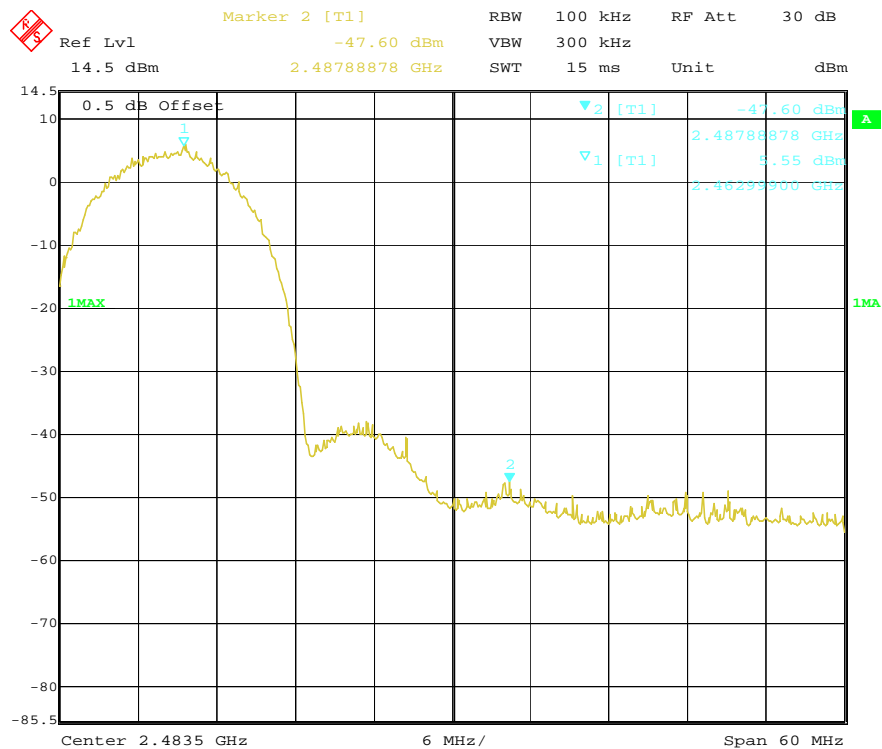
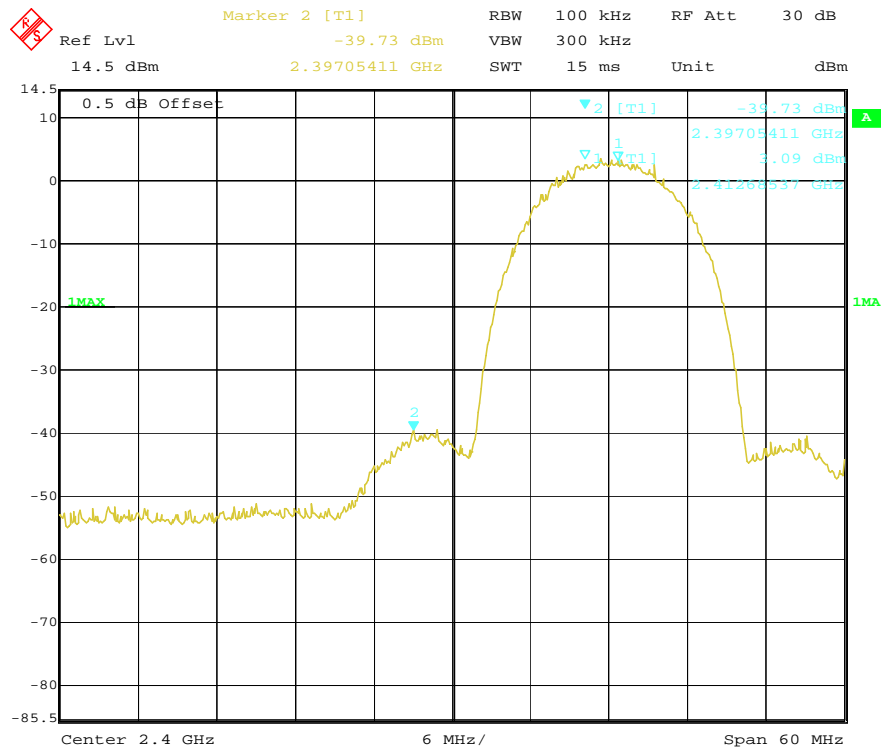
Above 1GHz:

802.11b

Remark: Emissions were searched from 30MHz to 2400MHz and from 2483.5MHz to 25000MHz. the 2389.54MHz and 2483.69MHz RESTRICTED BANDS is the worst case.

Indicated		result (PK/AV)	Table Angle Degree	Antenna		Correction Factor			FCC Part 15.247		
Frequency (MHz)	Receiver Reading (dBμV/m)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBμV/m)	Limit dBμV/m)	Margin (dB)
Low Channel (2412MHz)											
2389.54	31.4	AV	250	1.2	V	30.3	4.1	33.1	32.7	54	21.3
2389.54	31.3	AV	60	1.6	H	30.3	4.1	33.1	32.6	54	31.4
2389.54	42.6	PK	180	1.3	V	30.3	4.1	33.1	43.9	74	30.1
2389.54	41.9	PK	210	1.1	H	30.3	4.1	33.1	43.2	74	30.8
HighChannel (2462MHz)											
2483.69	30.9	AV	360	1.5	V	31	4.4	32.7	33.6	54	20.4
2483.69	30.8	AV	45	1.5	H	31	4.4	32.7	33.5	54	20.5
2483.69	40.9	PK	0	1.4	V	31	4.4	32.7	43.6	74	30.4
2483.69	39.8	PK	200	1.4	H	31	4.4	32.7	42.5	74	31.5

Note: the BAND EDGE RESTRICTED BANDS emission is too low at least 20dB to the Fundamental.





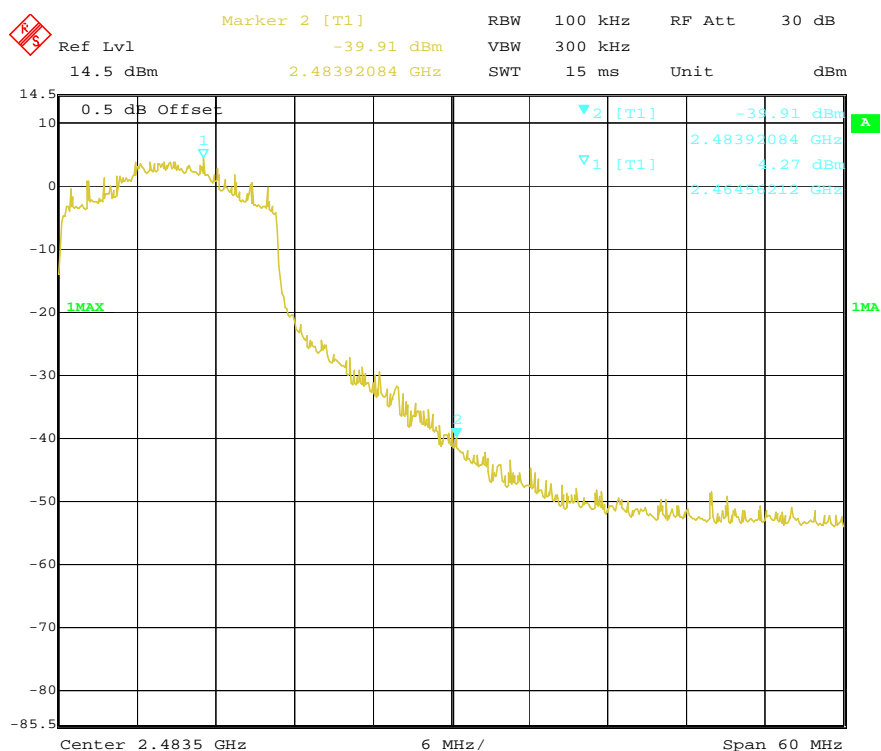
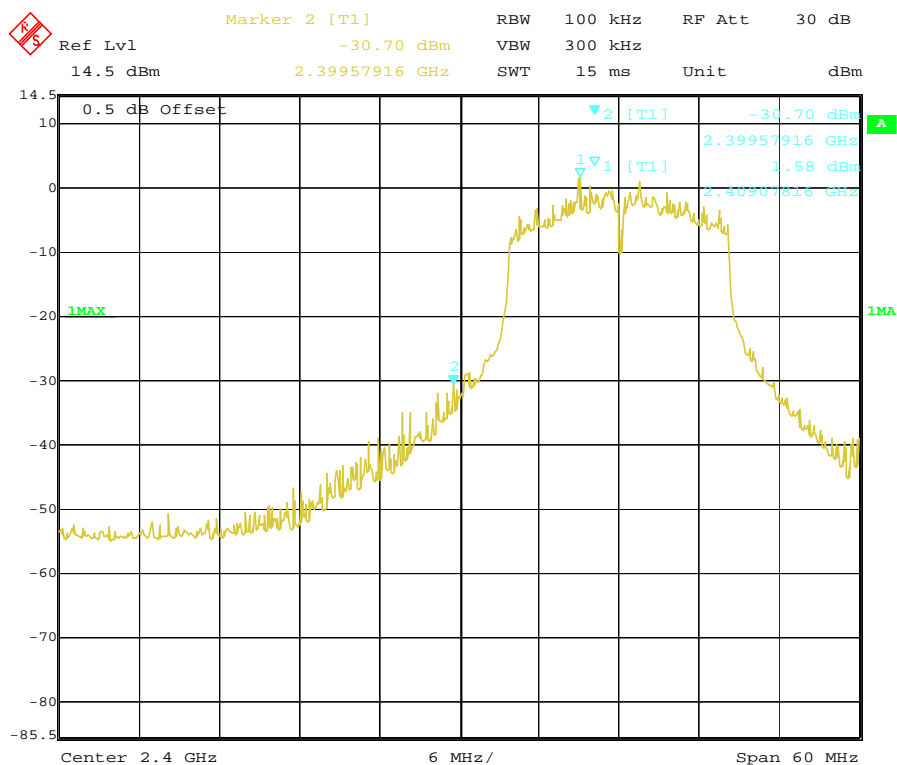
Report reference No.: WSCT12080586E  
Issued: August 27, 2012  
Revised: None

802.11g

Remark: Emissions were searched from 30MHz to 2400MHz and from 2483.5MHz to 25000MHz. the 2389.54MHz and 2483.69MHz RESTRICTED BANDS is the worst case.

Indicated		result (PK/AV)	Table Angle Degree	Antenna		Correction Factor			FCC Part 15.247		
Frequency (MHz)	Receiver Reading (dBµV/m)			Height (m)	Polar (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Low Channel (2412MHz)											
2389.54	31.2	AV	250	1.2	V	30.3	4.1	33.1	32.5	54	21.5
2389.54	31.1	AV	60	1.6	H	30.3	4.1	33.1	32.4	54	21.6
2389.54	419	PK	180	1.3	V	30.3	4.1	33.1	43.2	74	30.8
2389.54	41.6	PK	210	1.1	H	30.3	4.1	33.1	42.9	74	31.1
HighChannel (2462MHz)											
2483.69	29.9	AV	360	1.5	V	31	4.4	32.7	32.6	54	21.4
2483.69	29.8	AV	45	1.5	H	31	4.4	32.7	32.5	54	21.5
2483.69	39.9	PK	0	1.4	V	31	4.4	32.7	42.6	74	31.4
2483.69	39.4	PK	200	1.4	H	31	4.4	32.7	42.1	74	31.9

Note: the BAND EDGE RESTRICTED BANDS emission is too low at least 20dB to the Fundamental.



## §15.247(e) - POWER SPECTRAL DENSITY

### Test Equipment

Please refer to Section 4 this report.

### Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT was set without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set the RBW = 100 kHz, VBW  $\geq$  300 kHz, set the span to 5-30 % greater than the EBW.
4. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
5. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where  $BWCF = 10\log(3\text{ kHz}/100\text{ kHz}) = -15.2\text{ dB}$ .

### Environmental Conditions

Temperature:	25 °C
Relative Humidity:	55%
ATM Pressure:	100.0kPa

### Applicable Standard

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.



Report reference No.: WSCT12080586E  
Issued: August 27, 2012  
Revised: None

## Test Result

PASS

Channel	Frequency (MHz)	Data Rate	Reading Level (dBm/100kHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Result
802.11b mode						
Low	2412	1	1.64	-13.56	8	Pass
Middle	2437	1	2.20	-13.00	8	Pass
High	2462	1	1.07	-14.13	8	Pass
802.11g mode						
Low	2412	6	-7.31	-22.51	8	Pass
Middle	2437	6	-5.58	-20.78	8	Pass
High	2462	6	-4.27	-19.47	8	Pass

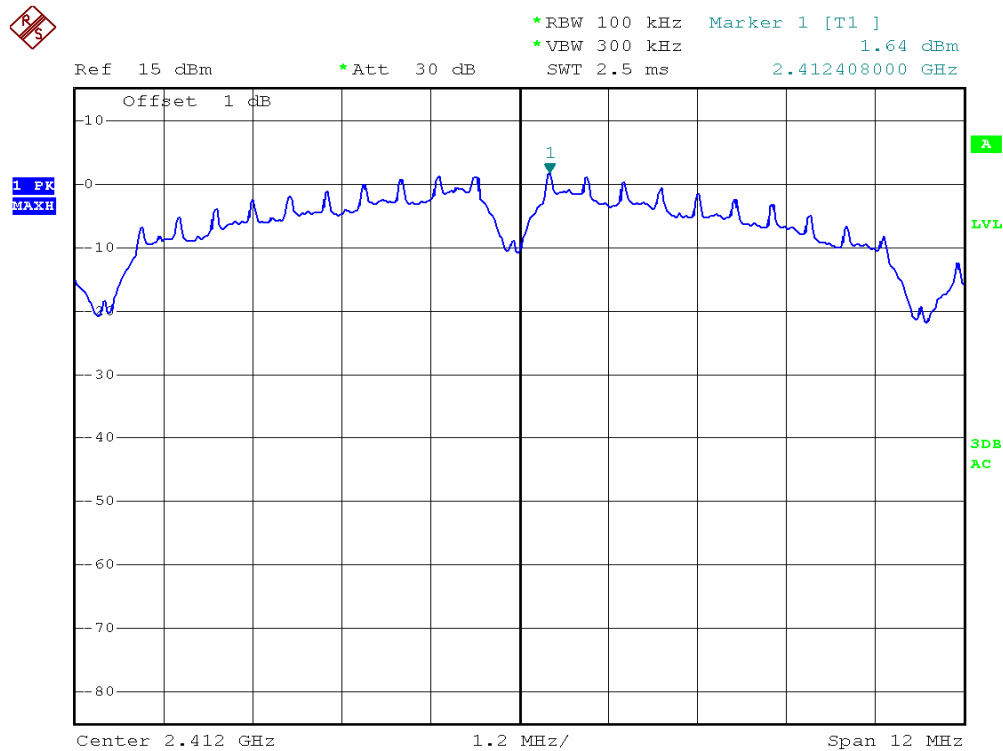
**Note:** the antenna gain is 0 dBi.

Please refer to the following plots

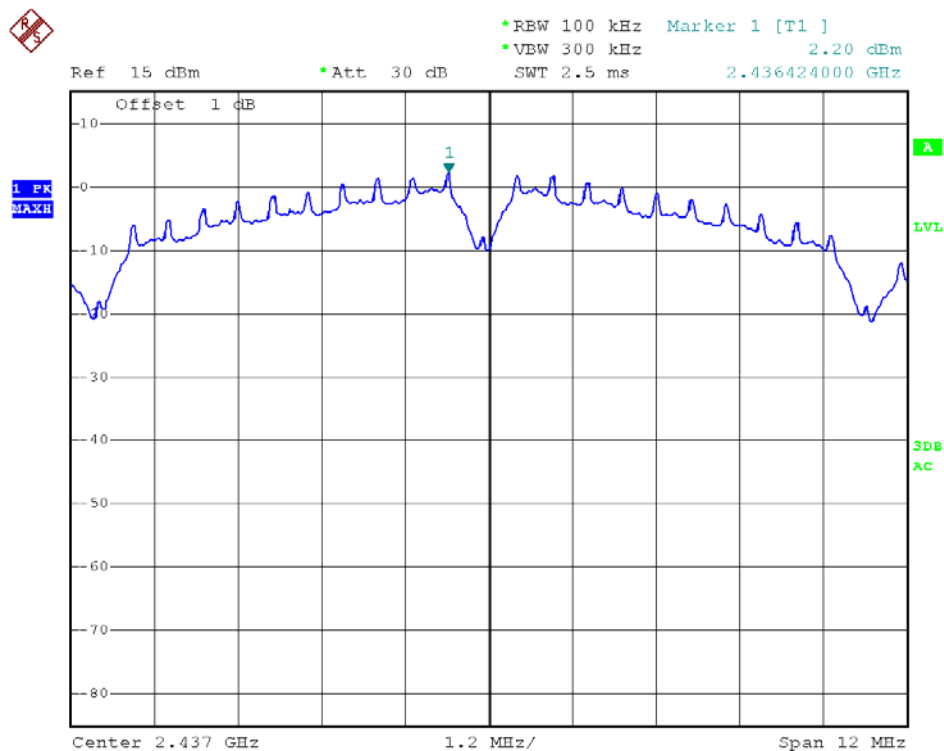


802.11b Mode:

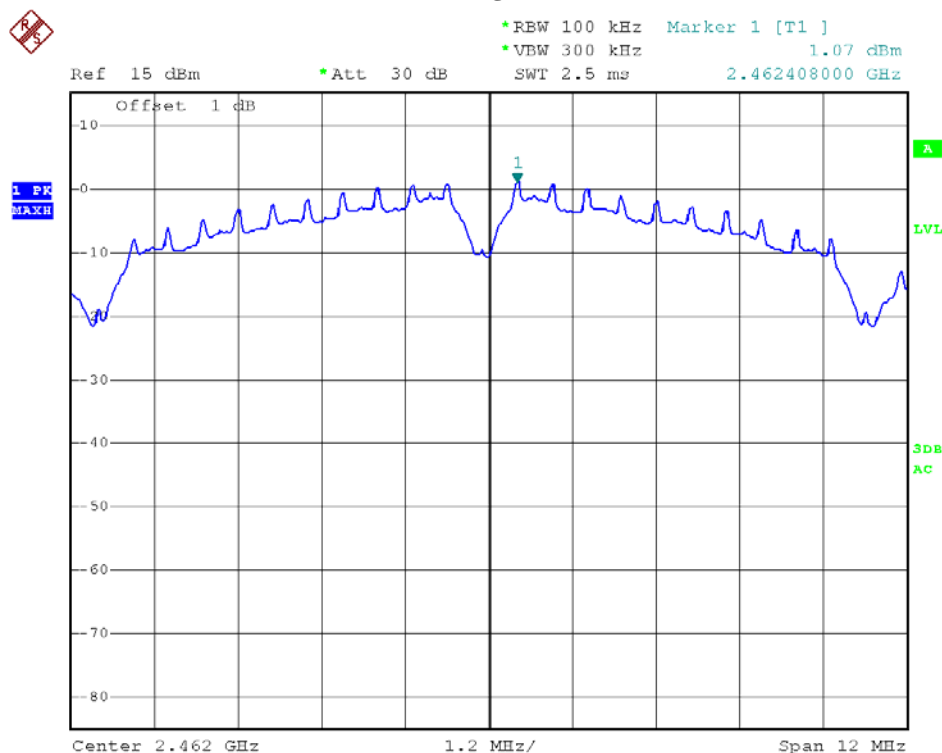
## Low Channel



## Middle Channel

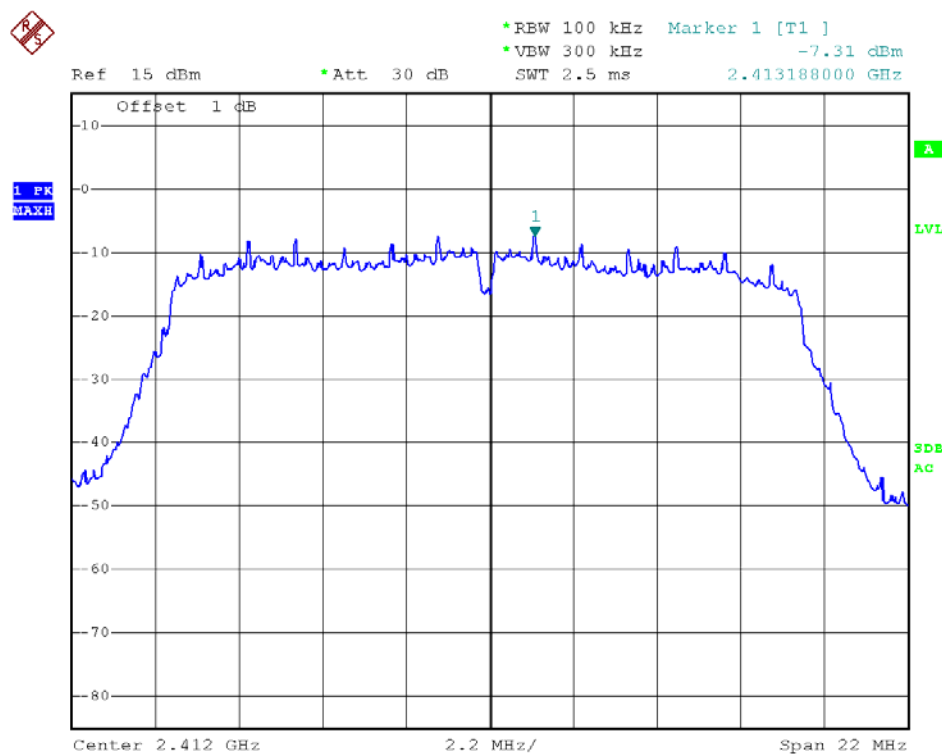


## High Channel

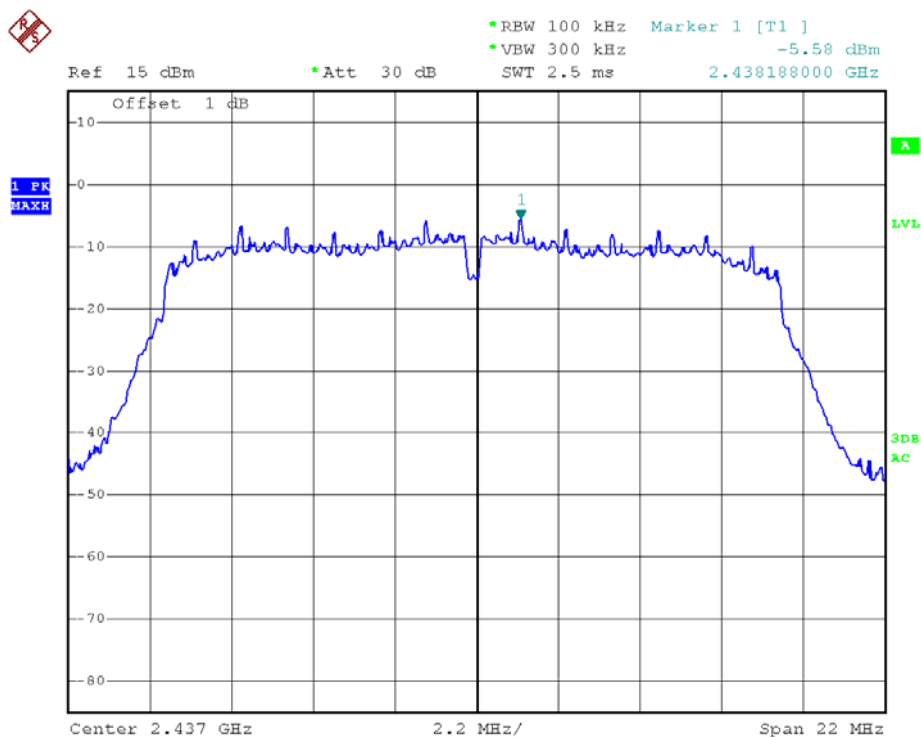


802.11g Mode:

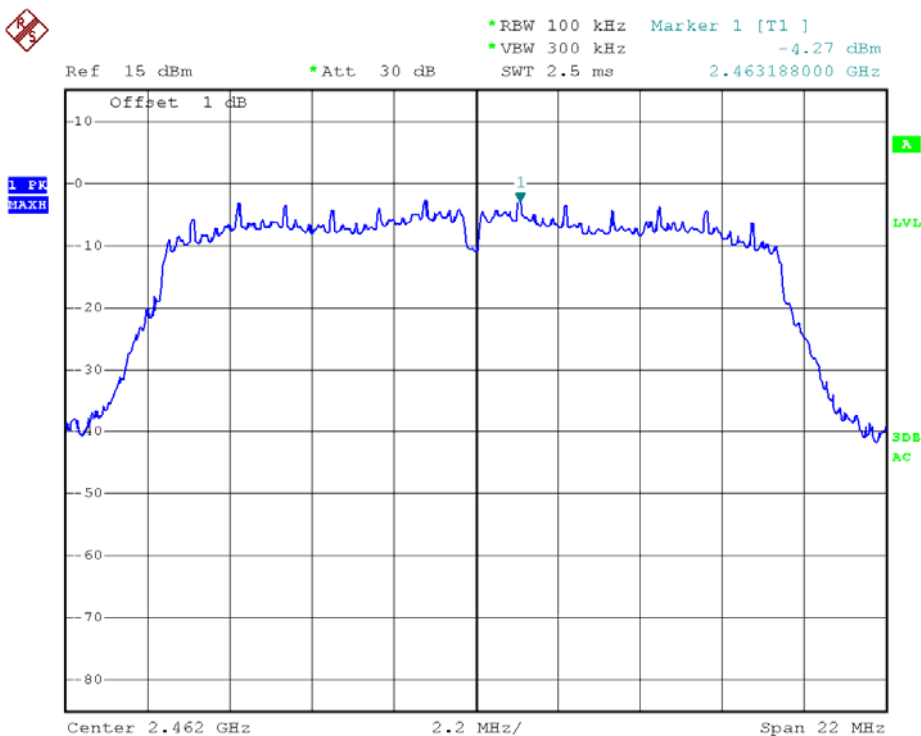
## Low Channel



## Middle Channel



## High Channel



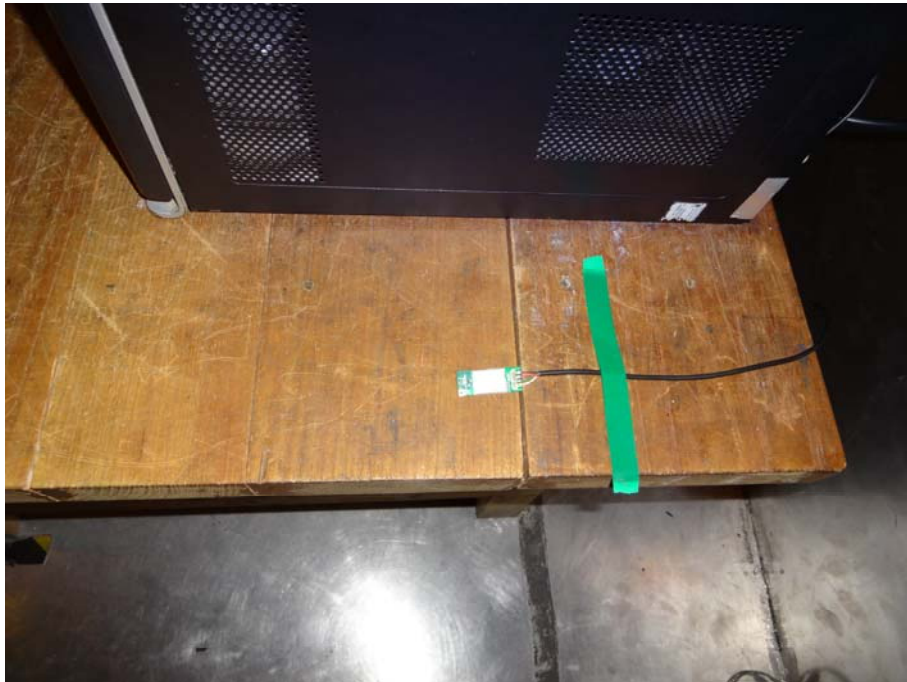
## PHOTOGRAPHS OF THE TEST CONFIGURATION

### CONDUCTED EMISSION TEST



### CONDUCTED EMISSION TEST





#### **RADIATED EMISSION TEST BELOW 1GHz**

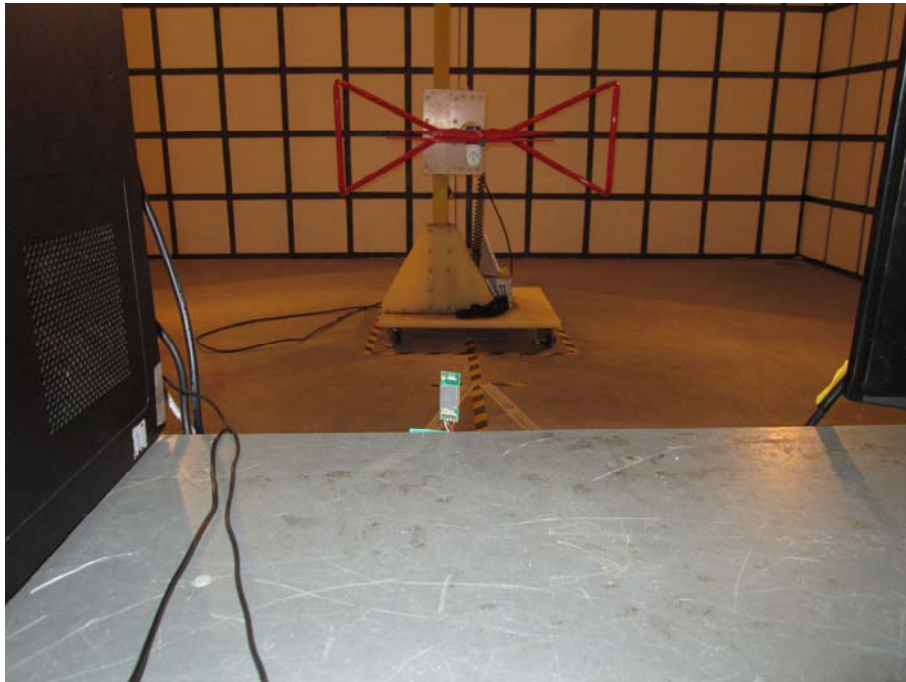






#### **RADIATED EMISSION TEST ABOVE 1GHz**

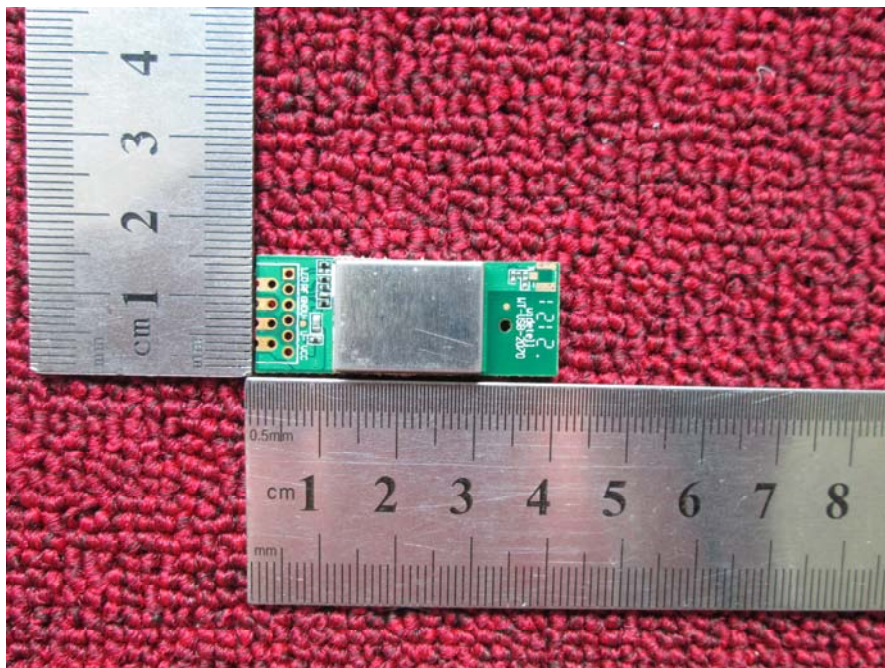




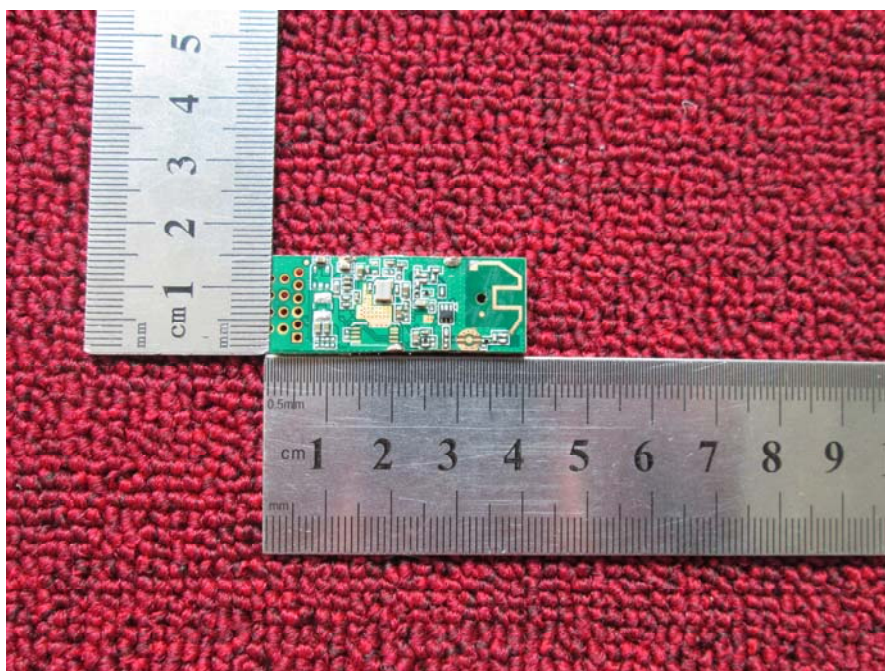


## PHOTOGRAPHS OF EUT

Appearance photograph of EUT



Appearance photograph of EUT





Internal photograph of EUT

