FCC TEST REPORT

FCC ID : VU5N4CO-005R

Applicant : Storm Electronics Co. Ltd
Address **:** 22/F., Com Web Plaza, 12 Cheung Yue Street, Lai Ch,Kowloon, Hong Kong

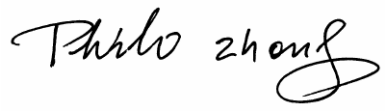
Equipment Under Test (EUT) :

Product description : Wireless Mini Controller
Model No. : N4CO-005

Standards : FCC 15 Paragraph 15.247

Date of Test : Dec. 11, 2009

Test Engineer : Olic huang

Reviewed By **:** 

PERPARED BY:
Waltek Services (Shenzhen) Co., Ltd.
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2 Contents

3 Test Summary

Test Items	Test Requirement	Test Method	Limit / Severity	Result
Maximum peak output power	FCC Part 15:2007	ANSI C63.4: 2003	30dBm	PASS
Restricted Band	FCC Part 15:2007	ANSI C63.4: 2003	Note	PASS
Dwell time	FCC Part 15:2007	ANSI C63.4: 2003	Maximum:0.4 s	PASS
Channel separation	FCC Part 15:2007	ANSI C63.4: 2003	Channel separation at least 1MHz	PASS
Hopping channel No.	FCC Part 15:2007	ANSI C63.4: 2003	Total 76 channels	PASS
20-dB Bandwidth	FCC Part 15:2007	ANSI C63.4: 2003	Note	PASS
RF Exposure Test	FCC Part 15:2007	ANSI C63.4: 2003	Note	PASS
Mains Terminal Disturbance Voltage, 150kHz to 30MHz	FCC Part 15:2007	ANSI C63.4: 2003	N/A	N/A
Radiation Emission, 30MHz to 25GHz	FCC Part 15:2007	ANSI C63.4: 2003	N/A	PASS

Note : denote that for more details of the EUT , please refer to the relating test items as below .

Remark : the methods of measurement in all the test items were according to the FCC Public Notice DA 00-705 .

4 General Information

4.1Client Information

Applicant:	Storm Electronics Co. Ltd
Address of Applicant:	22/F., Com Web Plaza, 12 Cheung Yue Street, Lai Ch,Kowloon, Hong Kong
Manufacturer:	Asoka Electronic (Shenzhen) Company Limited
Address:	Da Yang Industrial Park, Lou Gang Road, Song Gang Town, Bao An District, Shen Zhen City,China.

4.2General Description of E.U.T.

Product description:	Wireless Mini Controller
Model No.:	N4CO-005

4.3Details of E.U.T.

Power Supply: DC 3.0V
Note:the model have three brand names: Storm / Logic3 / SpeedLink.

4.4Description of Support Units

The EUT has been tested as an independent unit.

4.5Standards Applicable for Testing

The customer requested FCC tests for a Wireless Mini Controller. The standards used were FCC 15 Paragraph 15.247,Paragraph 15.205, Paragraph 15.207,Paragraph 15.209, Paragraph 15.31,Paragraph 15.33, Paragraph 15.35.

4.6 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC – Registration No.: 880581**

  Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581,June 24，2008.

- **IC – Registration No.: 7760A**

  Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration IC7760,July 24，2008.

4.7 Test Location

All Emissions testswere performed at:-
1/F, Fukangtai Building,West Baima Rd.,Songgang Street, Baoan District, Shenzhen 518105, Guangdong,China.

Remark : All the test results of the peripherals were conformed to the Fcc Verification requirements.

4.8 Equipment Used during Test

Equipment Name	Manufacturer Model	Equipment No	Internal No	Specification	Cal. Date	Due Date	Cert. No	Uncertainty
EMC Analyzer	Agilent/ E7405A	MY45114943	W2008001	9k-26.5GHz	Aug-09	Aug-10	Wws20081596	±1dB
Trilog Broadband Antenne 30-3000 MHz	SCHWARZBECK MESS-ELEKTROM / VULB9163	336	W2008002	30-3000 MHz	Aug-09	Aug-10		±1dB
Broad-band Horn Antenna	SCHWARZBECK MESS-ELEKTROM / VULB9163	667	W2008003		Aug-09	Aug-10		f＜10 GHz：±1dB 10GHz＜f＜18 GHz：±1.5dB
Broadband Preamplifier	SCHWARZBECK MESS-ELEKTROM / BBV 9718	9718-148	W2008004		Aug-09	Aug-10		±1.2dB
10m Coaxial Cable with N-male Connectors usable up to 25GHz,	SCHWARZBECK MESS-ELEKTROM / AK 9515 H	-	-	-	Aug-09	Aug-10		-
10m 50 Ohm Coaxial Cable with N-plug,individual length,usable up to 3(5)GHz, Connector	SCHWARZBECK MESS-ELEKTROM / AK 9513				Aug-09	Aug-10		
Positioning Controller	C&C LAB/ CC-C-IF				N/A	N/A		
Color Monitor	SUNSPO/ SP-14C				N/A	N/A		
Test Receiver	ROHDE&SCHWARZ/ ESPI	101155	W2005001	9k-3GHz	Aug-09	Aug-10	Wws20080942	±1dB
EMI Receiver	Beijingkehuan	KH3931		9k-1GHz	Aug-09	Aug-10		
Two-Line V-Network	ROHDE&SCHWARZ/ ENV216	100115	W2005002	50Ω/50μH	Aug-09	Aug-10	Wws20080941	±10%

Equipment Name	Manufacturer Model	Equipment No	Internal No	Specification	Cal. Date	Due Date	Cert. No	Uncertainty
Absorbing Clamp	ROHDE&SCHWARZ/ MDS-21	100205	W2005003	impandance50 Ω loss ： 17 dB	Aug-09	Aug-10	Wws20080943	±1dB
10m 50 Ohm Coaxial Cable with N-plug,individual length,usable up to 3(5)GHz, Connectors	SCHWARZBECK MESS-ELEKTROM / AK 9514				Aug-09	Aug-10		
Digital Power Analyzer	Em Test AG/Switzerland/ DPA 500	V0745103095	W2008012	Power：2000VA Vol-range：0-300V Freq_range：10-80Hz	Aug-09	Aug-10	Wwd20081185	Voltage distinguish:0.025% Power_freq distinguish:0.02Hz
Power Source	Em Test AG/Switzerland/ ACS 500	V0745103096	W2008013	Vol-range：0-300V Power_freq：10-80Hz				
Electrostatic Discharge Simulator	Em Test AG/Switzerland/DITO	V0745103094	W2008005	Contact discharge：500V-10KV Air diacharge：500V-16.5KV	Aug-09	Aug-10	Wwc20082400	7.5A current will be changed in V_m=1.5V
RF Generator	TESEQ GmbH/ NSG4070	25781	W2008008	Fraq-range：9K-1GHz RF voltage：-60 dBm-+10dBm	Aug-09	Aug-10	Wws20081890	Power_freq distinguish0.1Hz RFeletricity distinguish 0.1 B
CDN M-Type	TESEQ GmbH/ CDN M016	25112	W2008009	Voltage correct factor 9.5 dB	Aug-09	Aug-10	Wwc20082396	150K-80MHz：±1dB 80-230MHz:-2-+3dB
EM-Clamp	TESEQ GmbH/ KEMZ 801	25453	W2008010	Freq_range：0.15-1000 MHz	Aug-09	Aug-10	Wwc20082397	0.3-400 MHz：±4dB Other freq：±5dB
Attenuator 6dB	TESEQ GmbH/ ATN6050	25365			Aug-09	Aug-10	Wws20081597	

Equipment Name	Manufacturer Model	Equipment No	Internal No	Specification	Cal. Date	Due Date	Cert. No	Uncertainty
All Modules Generator	SCHAFFNER/6150	34579	W2008006	voltage:200V-4.4KV Pulse current：100A-2.2KA	Aug-09	Aug-10	Wwc20082401	voltage: ±10% Pulse current：±10%
Capacitive Coupling Clamp	SCHAFFNER/ CDN 8014	25311			Aug-09	Aug-10	Wwc20082398	-
Signal and Data Line Coupling Network	SCHAFFNER/ CDN 117	25627	W2008011	1.2/50μS	Aug-09	Aug-10	Wwc20082399	-
AC Power Supply	TONGYUN/ DTDGC-4				Aug-09	Aug-10	Wws20080944	-
Bandpass filter	Sunhenry	SH170		50ohm	Aug-09	Aug-10	Wwc20082397	--
Active Loop Antenna Charger 9kHz-30MHz	Beijing Dazhi / ZN30900A	-	-	10kHz-30MHz	Aug-09	Aug-10		±1dB
PC	Lenovo	---	w2008028		Aug-09	Aug-10		
TV	Changhong	CHD21388	w2008033	--	Aug-09	Aug-10	Wwd20081187	--
WII	Jap	J235780	w2008023	-	Aug-09	Aug-10	Wwd20081199	-

5 Conducted Emission Test

Test Requirement:	FCC Part15 Paragraph 15.207
Test Method:	Based on FCC Part15 Paragraph 15.207
Test Date:	------
Frequency Range:	150kHz to 30MHz
Class:	Class B
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

5.1Test Equipment

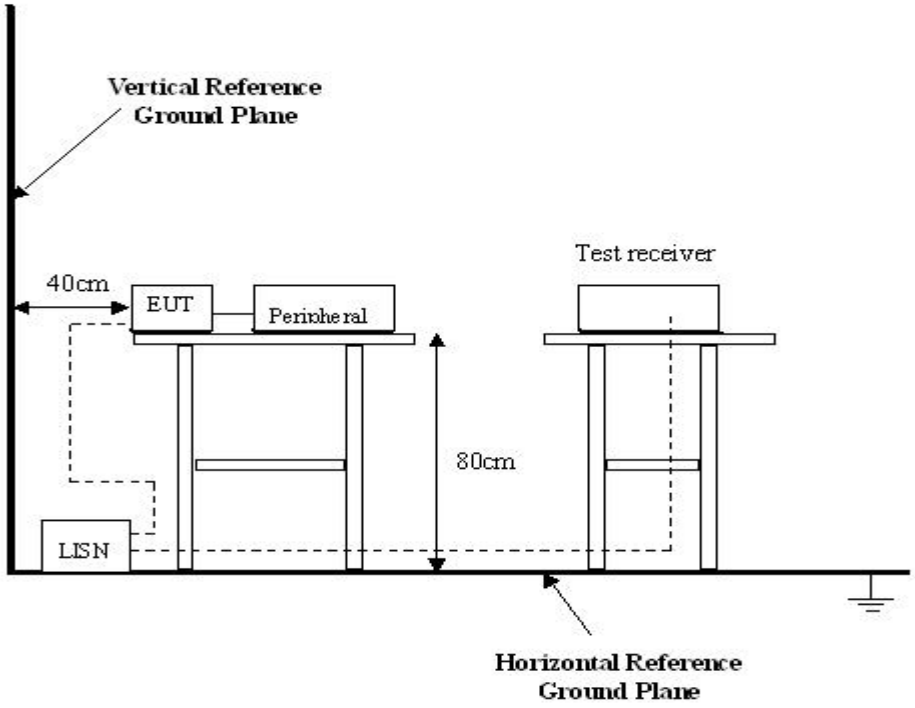
Please refer to Section 5 this report.

5.2Test Procedure

1. The EUT was connected with signal generator and placed on a table.
2. The EUT was tested according to ANSI C63.4:2003. The frequency spectrum from 150kHz to 30MHz was investigated.
3. The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

5.3 Conducted Test Setup

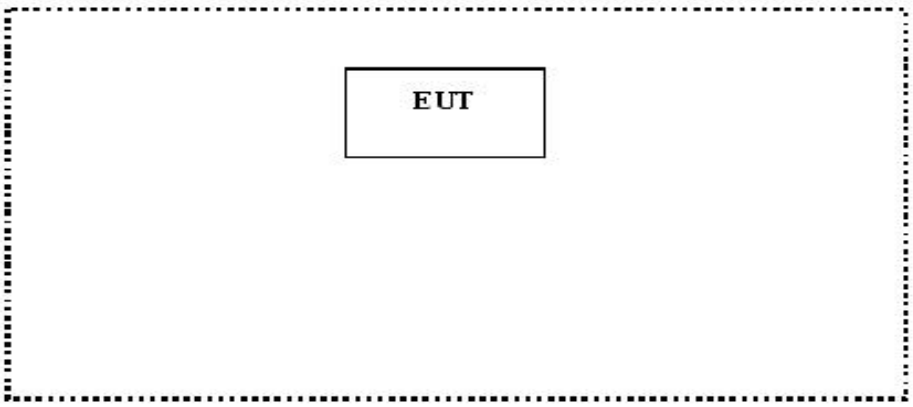
The conducted emission tests were performed using the setup accordance with the ANSI C63.4:2003, The specification used in this report was the FCC Part15 Paragraph 15.207 limits.



5.4EUT Operating Condition

Operating condition is according to ANSI C63.4:2003.

A. Setup the EUT and simulators as shown on follow.
B. Enable RF signal and confirm EUT active.
C. Modulate output capacity of EUT up to specification.



5.5Conducted Emission Limits

66-56 dBμV between 0.15MHz & 0.5MHz
56 dBμV between 0.5MHz & 5MHz
60 dBμV between 5MHz & 30MHz

Note: In the above limits, the tighter limit applies at the band edges.

5.6 Conducted Emission Test Data

Owing to the EUT uses batteries , so this test was not performed.

6 Radiation Emission Test

Test Requirement:	FCC Part15 Paragraph 15.247
Test Method:	Based on ANSI 63.4:2003
Test Date:	Dec.11,2009
Frequency Range:	30MHz to 25GHz
Measurement Distance:	3m
Detector:	Peak for pre-scan (120kHz resolution bandwidth)
	Quasi-Peak if maximised peak within 6dB of limit

6.1Test Equipment

Please refer to Section 5 this report.

6.2Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

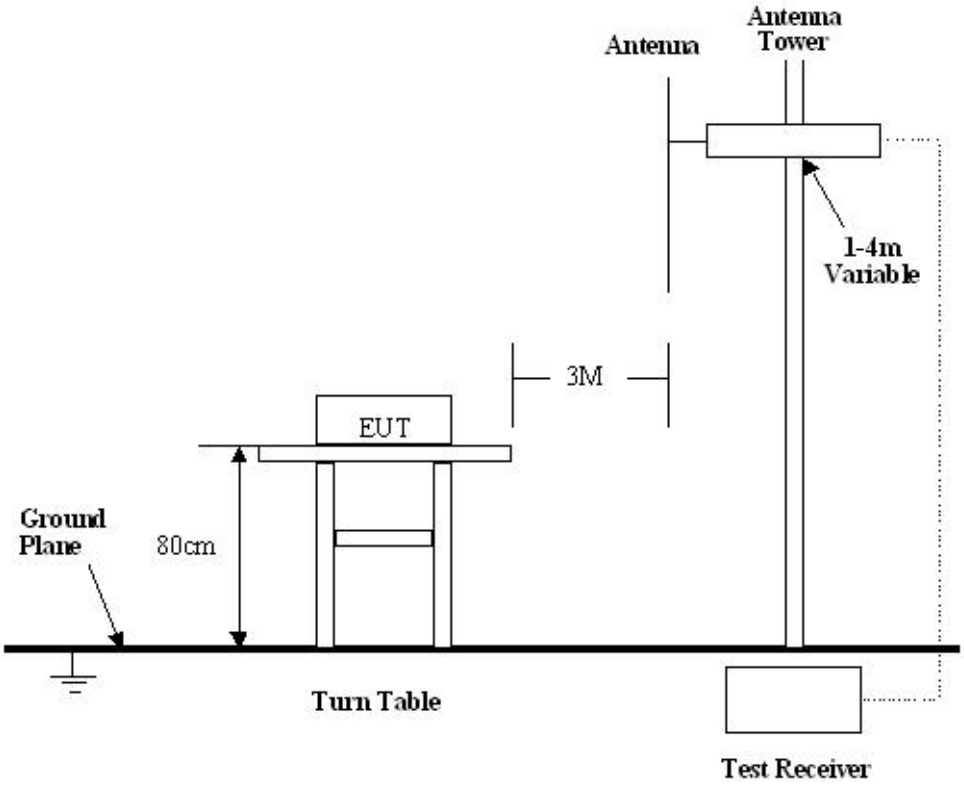
Based on ANSI C63.4:2003, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at WALTEK SERVICES EMC Lab is +5.03 dB.

6.3Test Procedure

1. New batteries were installed in the equipment under test for radiated emissions test.
2. This is a handhold device,The radiation emission should be tested under 3-axes(X,Y,Z) position(X denotes lying on the table,Y denotes side stand and Z denotes vertical stand),After pre-test,It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.
3. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.
4. All data was recorded in the peak and average detection mode.
5. The EUT was under working mode during the final qualification test and the configuration was used to represent the worst case results.

6.4Radiated Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4:2003, The specification used in this report was the FCC Part15 Paragraph 15.209 limits and Paragraph 15.247 limits.



6.5 Spectrum Analyzer Setup

According to FCC Part15 Paragraph 15.247 Rules, the system was tested to 25000 MHz.
Below 1GHz

Start Frequency.....30 MHz
Stop Frequency .....1000 MHz
Sweep Speed Auto
IF Bandwidth.....120 kHz
Video Bandwidth 100KHz
Quasi-Peak Adapter Bandwidth .....120 kHz
Quasi-Peak Adapter Mode.....Normal
Resolution Bandwidth 100KHz

Above 1GHz

Start Frequency.....1000 MHz
Stop Frequency 25000MHz
Sweep Speed Auto
IF Bandwidth.....120 kHz
Video Bandwidth.....1MHz
Quasi-Peak Adapter Bandwidth .....120 kHz
Quasi-Peak Adapter Mode.....Normal
Resolution Bandwidth 1MHz

6.6Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor – Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dBμV means the emission is 7dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Class B Limit

6.7 Summary of Test Results

According to the data in section 7.11, the EUT complied with the FCC Part15 Paragraph 15.247 standards.

6.8 EUT Operating Condition

The same as section 6.4 of this report.

Let the EUT work in test mode and test it.

6.9 Radiated Emissions Limit on Paragraph 15.209

Frequency(MHZ)	Distance(m)	Field strength(dBuV/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note: (1) RF Voltage(dBuV)=20 log RF Voltage(uV)

(2) In the Above Table,the tighter limit applies at the band edges.

(3) Distance refers to the distance in meters between the measuring instrument antenna.

(4)The emission limit in this paragraph is based on measurement instrumentaion employing an average detector.Measurement using instrumentation with a peak detector function,corresponding to 20dB above the maximum permitted average limit.

(5)Above 1GHz, mark a Peak and average measurements for all emissions,Limit for peak is 74dBuvV/m,According to Part15.35(b) and average is 54BuvV/m.

6.10 Radiated Emissions Test Result

Formula of conversion factors:the field strength at 3m was egtablished by adding
The meter reading of the spectrum analyzer (which is set to read in units of dBuV/m)
To the antenna correction factor supplied by the antenna manufacturer. The antenna
Correction factors are stared in terms of dB.The gain of the pressletor was accounted
For in the spectrum analyser meter reading.

Example:

Freq(MHz) Meter Reading +ACF=FS

33 20dBuV+10.36dB=30.36dBuV/m @3m

6.11 Radiated Emission Data

A. Test Item: Radiated Emission Data

Test Voltage: Battery input 3.0V

Test Mode: TX On

Temperature: 24 °C

Humidity: 52%RH

Test Result: PASS

Remarks: 30-1000MHz radiation test no significant emissions above the equipment noise floor were detected.

And the below is the Fundamental and Harmonic .

Frequency (MHz)	Detector	Antenna Polarization	Emission Level (dBuV/m)	FCC Part15 Subpart C Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
Low frequency							
2402	AV	Vertical	90.03		(Fund.)	1.2	0
4804	AV	Vertical	41.03	54.00	12.97	1.2	10
7206	AV	Vertical	41.41	54.00	12.59	1.2	20
9608	AV	Vertical	40.04	54.00	13.96	1.1	60
12010	AV	Vertical	39.75	54.00	14.25	1.1	90
14412	AV	Vertical	38.74	54.00	15.26	1.4	20
16814	AV	Vertical	38.68	54.00	15.32	1.1	120
19216	AV	Vertical	36.42	54.00	17.58	1.1	100
21618	AV	Vertical	37.40	54.00	16.60	1.2	120
24020	AV	Vertical	37.37	54.00	16.63	1.2	45
2402	AV	Horizontal	87.96		(Fund.)	1.2	10

4804	AV	Horizontal	38.96	54.00	15.04	1.2	110
7206	AV	Horizontal	35.27	54.00	18.73	1.1	120
9608	AV	Horizontal	35.38	54.00	18.62	1.2	110
12010	AV	Horizontal	33.42	54.00	20.58	1.1	135
14412	AV	Horizonta	32.42	54.00	21.58	1.2	120
16814	AV	Horizontal	33.38	54.00	20.62	1.2	110
19216	AV	Horizontal	32.09	54.00	21.91	1.1	60
21618	AV	Horizontal	31.27	54.00	22.73	1.2	20
24020	AV	Horizontal	30.02	54.00	23.98	1.1	100
2402	PK	Vertical	104.63		(Fund.)	1.1	110
4804	PK	Vertical	60.32	74.00	13.68	1.1	30
7206	PK	Vertical	50.35	74.00	23.65	1.1	110
9608	PK	Vertical	48.98	74.00	25.02	1.1	100
12010	PK	Vertical	48.69	74.00	25.31	1.2	90
14412	PK	Vertical	47.68	74.00	26.32	1.2	60
16814	PK	Vertical	47.62	74.00	26.38	1.4	90
19216	PK	Vertical	45.36	74.00	28.64	1.2	120
21618	PK	Vertical	46.34	74.00	27.66	1.1	0
24020	PK	Vertical	46.31	74.00	27.69	1.4	45
2402	PK	Horizontal	100.01		(Fund.)	1.1	100
4804	PK	Horizontal	53.63	74.00	20.34	1.1	60
7206	PK	Horizontal	44.21	74.00	29.79	1.1	110
9608	PK	Horizontal	44.32	74.00	29.68	1.2	110
12010	PK	Horizontal	42.36	74.00	31.64	1.2	10
14412	PK	Horizontal	41.36	74.00	32.64	1.5	90
16814	PK	Horizontal	42.32	74.00	31.68	1.1	120
19216	PK	Horizontal	41.03	74.00	32.97	1.5	110
21618	PK	Horizontal	40.21	74.00	33.79	1.2	250
24020	PK	Horizontal	38.96	74.00	35.04	1.2	230
Middle frequency							
2440	AV	Vertical	89.65		(Fund.)	1.1	10
4880	AV	Vertical	41.01	54.00	12.99	1.2	10
7320	AV	Vertical	40.30	54.00	13.70	1.0	50
9760	AV	Vertical	40.18	54.00	13.82	1.2	20

12200	AV	Vertical	39.42	54.00	14.58	1.2	20
14640	AV	Vertical	38.75	54.00	15.25	1.2	110
17080	AV	Vertical	39.40	54.00	14.60	1.5	30
19520	AV	Vertical	37.44	54.00	16.56	1.5	10
21960	AV	Vertical	38.04	54.00	15.96	1.8	0
24400	AV	Vertical	38.32	54.00	15.68	1.2	90
2440	AV	Horizontal	86.95		(Fund.)	1.0	120
4880	AV	Horizontal	40.32	54.00	13.68	1.0	90
7320	AV	Horizontal	34.70	54.00	19.30	1.5	20
9760	AV	Horizontal	36.70	54.00	17.30	1.2	10
12200	AV	Horizontal	35.90	54.00	18.10	1.2	150
14640	AV	Horizontal	34.75	54.00	19.25	1.4	0
17080	AV	Horizontal	35.75	54.00	18.25	1.6	135
19520	AV	Horizontal	35.32	54.00	18.68	1.4	90
21960	AV	Horizontal	33.43	54.00	20.57	1.2	20
24400	AV	Horizontal	30.62	54.00	23.38	1.7	120
2440	PK	Vertical	104.65		(Fund.)	1.0	10
4880	PK	Vertical	53.25	74.00	20.75	1.1	90
7320	PK	Vertical	49.24	74.00	24.76	1.4	100
9760	PK	Vertical	49.12	74.00	24.88	1.3	120
12200	PK	Vertical	48.36	74.00	25.64	1.7	180
14640	PK	Vertical	47.69	74.00	26.31	1.2	0
17080	PK	Vertical	48.34	74.00	25.66	1.4	0
19520	PK	Vertical	46.38	74.00	27.62	1.5	120
21960	PK	Vertical	46.98	74.00	27.02	1.5	124
24400	PK	Vertical	47.26	74.00	26.74	1.2	120
2440	PK	Horizontal	103.64		(Fund.)	1.0	10
4880	PK	Horizontal	50.36	74.00	23.64	1.1	45
7320	PK	Horizontal	43.64	74.00	30.36	1.1	90
9760	PK	Horizontal	45.64	74.00	28.36	1.5	60
12200	PK	Horizontal	44.84	74.00	29.16	1.4	10
14640	PK	Horizontal	43.69	74.00	30.31	1.2	150
17080	PK	Horizontal	44.69	74.00	29.31	1.1	10
19520	PK	Horizontal	44.26	74.00	29.74	1.5	260

21960	PK	Horizontal	42.37	74.00	31.63	1.1	00
24400	PK	Horizontal	39.56	74.00	34.44	1.6	45
High frequency							
2476	AV	Vertical	86.98		(Fund.)	1.0	0
4952	AV	Vertical	42.01	54.00	11.99	1.2	120
7428	AV	Vertical	41.20	54.00	12.80	1.2	10
9904	AV	Vertical	41.40	54.00	12.60	1.4	45
12380	AV	Vertical	40.95	54.00	13.05	1.5	90
14856	AV	Vertical	40.69	54.00	13.31	1.8	60
17332	AV	Vertical	40.74	54.00	13.26	1.1	10
19808	AV	Vertical	39.04	54.00	14.96	1.1	120
22284	AV	Vertical	39.65	54.00	14.35	1.4	10
24760	AV	Vertical	38.42	54.00	15.58	1.5	60
2476	AV	Horizontal	82.63		(Fund.)	1.0	0
4952	AV	Horizontal	40.11	54.00	13.89	1.2	120
7428	AV	Horizontal	37.54	54.00	16.46	1.2	60
9904	AV	Horizontal	37.42	54.00	16.58	1.5	100
12380	AV	Horizontal	36.70	54.00	17.30	1.2	60
14856	AV	Horizontal	38.91	54.00	15.09	1.2	120
17332	AV	Horizontal	36.71	54.00	17.29	1.4	120
19808	AV	Horizontal	34.75	54.00	19.25	1.8	10
22284	AV	Horizontal	34.32	54.00	19.68	1.3	45
24760	AV	Horizontal	32.31	54.00	21.69	1.7	90
2476	PK	Vertical	102.69		(Fund.)	1.0	60
4952	PK	Vertical	51.25	74.00	22.75	1.2	10
7428	PK	Vertical	50.14	74.00	23.86	1.8	120
9904	PK	Vertical	50.34	74.00	23.66	1.5	10
12380	PK	Vertical	49.89	74.00	24.11	1.4	45
14856	PK	Vertical	49.63	74.00	24.37	1.2	90
17332	PK	Vertical	49.68	74.00	24.32	1.2	60
19808	PK	Vertical	47.98	74.00	26.02	1.2	120
22284	PK	Vertical	48.59	74.00	25.41	1.6	60
24760	PK	Vertical	47.36	74.00	26.64	1.4	90
2476	PK	Horizontal	103.67		(Fund.)	1.1	120

4952	PK	Horizontal	52.36	74.00	21.64	1.4	10
7428	PK	Horizontal	46.48	74.00	27.52	1.5	45
9904	PK	Horizontal	46.36	74.00	27.64	1.3	90
12380	PK	Horizontal	45.64	74.00	28.36	1.2	60
14856	PK	Horizontal	47.85	74.00	26.15	1.7	10
17332	PK	Horizontal	45.65	74.00	28.35	1.8	120
19808	PK	Horizontal	43.69	74.00	30.31	1.5	10
22284	PK	Horizontal	43.26	74.00	30.74	1.8	45
24760	PK	Horizontal	41.25	74.00	32.75	1.0	90

7 Maximum Peak Output Power

Test Requirement: FCC Part15 Paragraph 15.247

Test Method: Based on ANSI 63.4:2003

Test Date: Dec.11,2009

Test mode: Compliance test in the worse case: Tx Lower/Tx Middle/Tx Upper

Requirements: Regulation 15.247(b) The limit of Maximum Peak Output Power Measurement is 1W(30dBm)

Test procedure:

The following test procedure as below:

The transmitter output (antenna port) was connected to the spectrum analyzer.EUT and its simulators are placed on a table, let EUT working in test mode,then test it.

The bandwidth of the fundamental frequency was measured with the spectrum analyser using 100kHz RBW and 100kHz VBW.

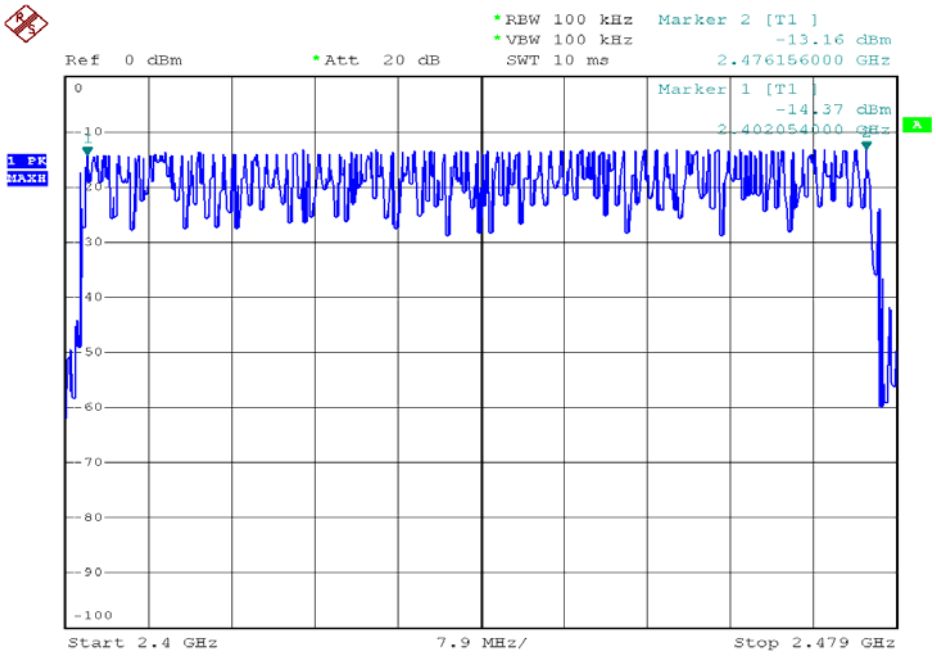
Test Result: The unit does meet the FCC requirements.

Test Channel	Fundamental Frequency(MHz)	Output Power (mW)	Limit (W)	Power output level
Lower	2402	0.54	1	conducted
Middle	2440	0.59	1	conducted
Upper	2476	0.59	1	conducted

8 Hopping Channel Number

Test Requirement:	FCC Part15 C
Test Method:	Based on FCC Part15 Paragraph 15.247
Test Date:	Dec.11,2009
Test mode:	The EUT work in test mode(Tx) and test it
Requirements:	Regulation 15.247(b) For frequency hopping systems operating In the 2400-2483.5MHz band employing at least 15 hopping channels.
Test result:	The total number of channels would be 76 channels. The unit does meet the FCC requirements.

Please refer the graph as below:



9 Frequency Separated

The requirements in this clause are only applicable to equipment using frequency hopping spread spectrum (FHSS) modulation.

Channel Separated

Definition: A hopping channel is any of the centre frequencies defined within the hopping sequence of a FHSS system.

Limit: Non-adaptive frequency hopping system shall make use of non-overlapping channels separated by the channel bandwidth as measured at 20dB below peak power.

The hopping channels defined within a hopping sequence shall be at least 1MHz apart(channel separation)

Operating Environment:

Temperature: 25.50 °C

Humidity: 51 % RH

Barometric Pressure: 1012 mbar

EUT Operation Condition:

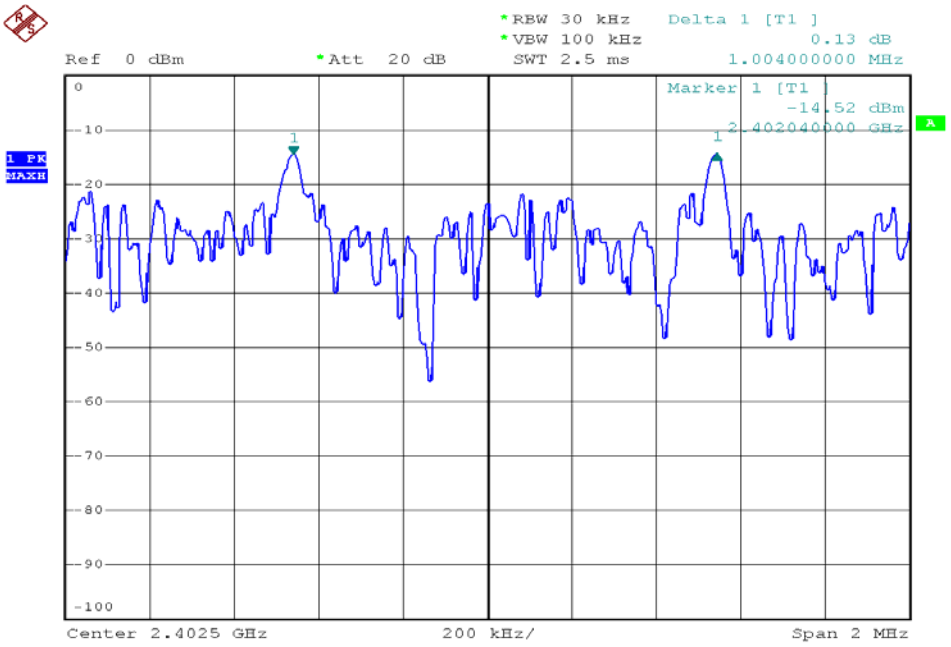
The EUT was programmed to be in continuously transmitting mode.

Test Result: PASS

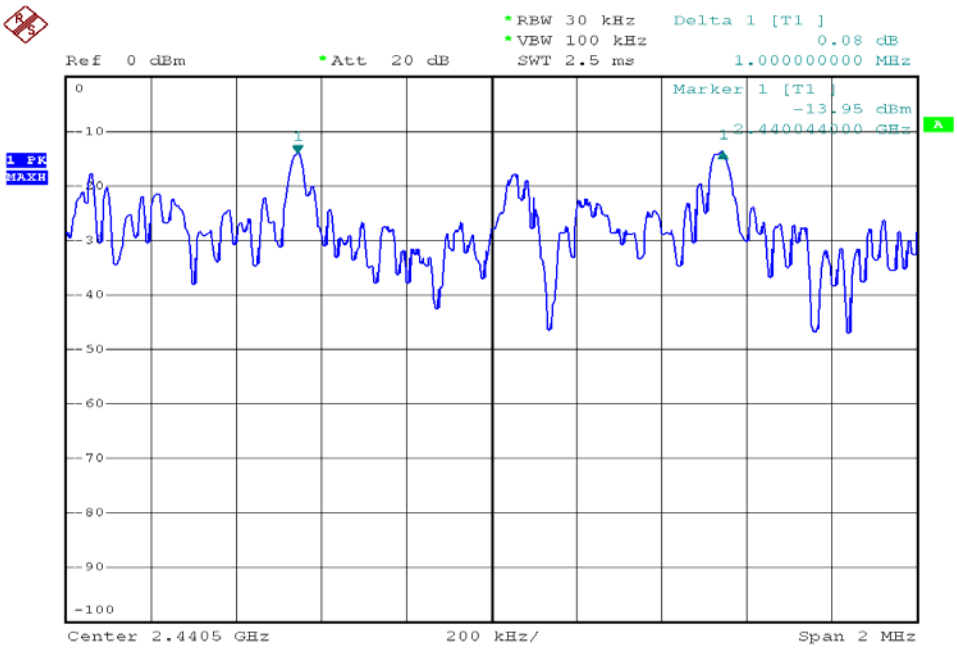
Test Channel	Channel Separation	PASS/FAIL
Lower Channels	1MHz	Pass
Middle Channels	1MHz	Pass
Upper Channels	1MHz	Pass

Please refer to the below photos for more details

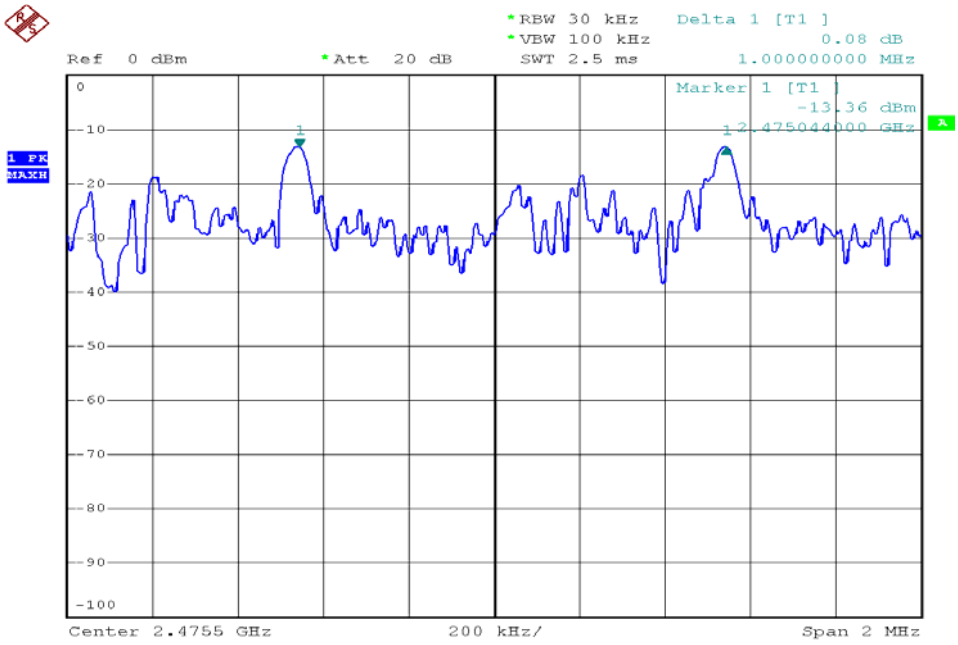
Lower Channel



Middle Channel



Upper Channel



10 Dwell time

The dwell time is the time spent at a particular frequency during any single hop.

Limit: the maximum dwell time shall be less than 0.4s.

Operating Environment:

Temperature: 25.5 °C

Humidity: 51 % RH

Barometric Pressure: 1012 mbar

EUT Operation Condition:

The EUT was programmed to be in continuously transmitting mode.

Test Procedure

The EUT output antenna port was connected to the spectrum analyzer. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz,and the frequency span to 0 Hz,measure the maximum time duration of one single pulse. So, the Dwell Time can be calculated as follows:

T=Ton-time*Ntimes(client declaration)/1S*0.4*76≤0. 4S.

Ton-time:one pulse of the hopping time.

Ntimes:the number of hopping in one second

Test Result: PASS

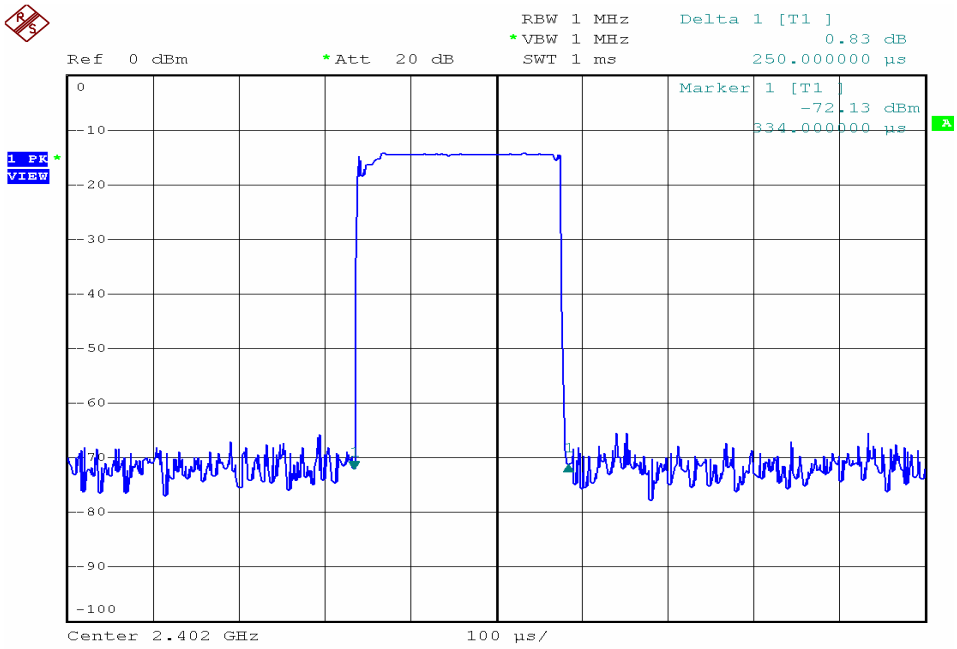
Please refer to the below photos for more details.

Lower Channel

Dwell time of each occupation in this channel as follows:
0.00025*40/1S*0.4*76=0.304<0.4S

Test Result: PASS

The Results are not be greater than 0.4 seconds.

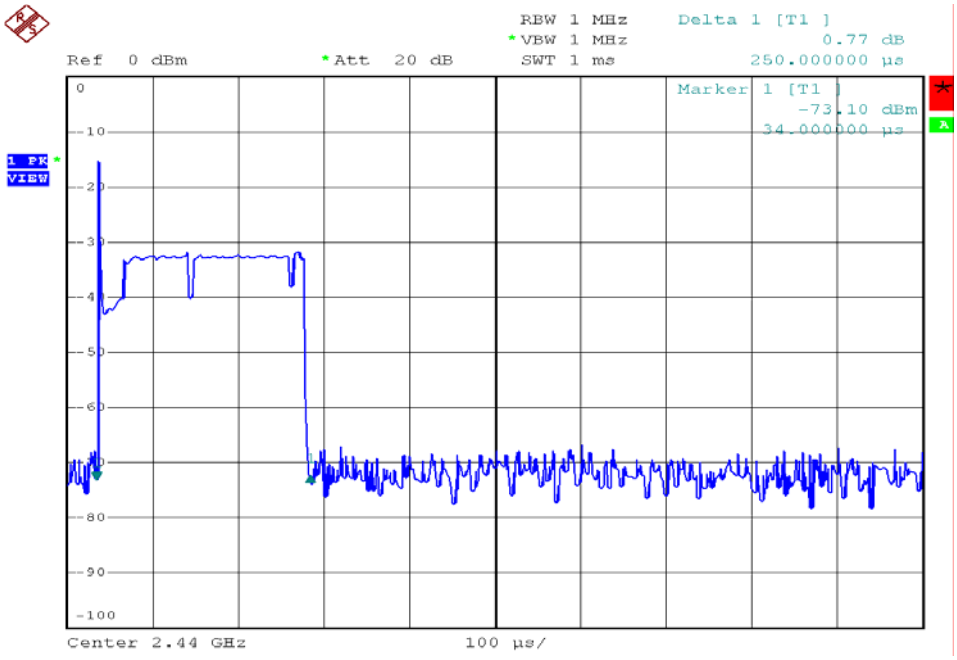


Middle Channel

Dwell time of each occupation in this channel as follows:
0.00025*40/1S*0.4*76=0.304<0.4S

Test Result: PASS

The Results are not be greater than 0.4 seconds.

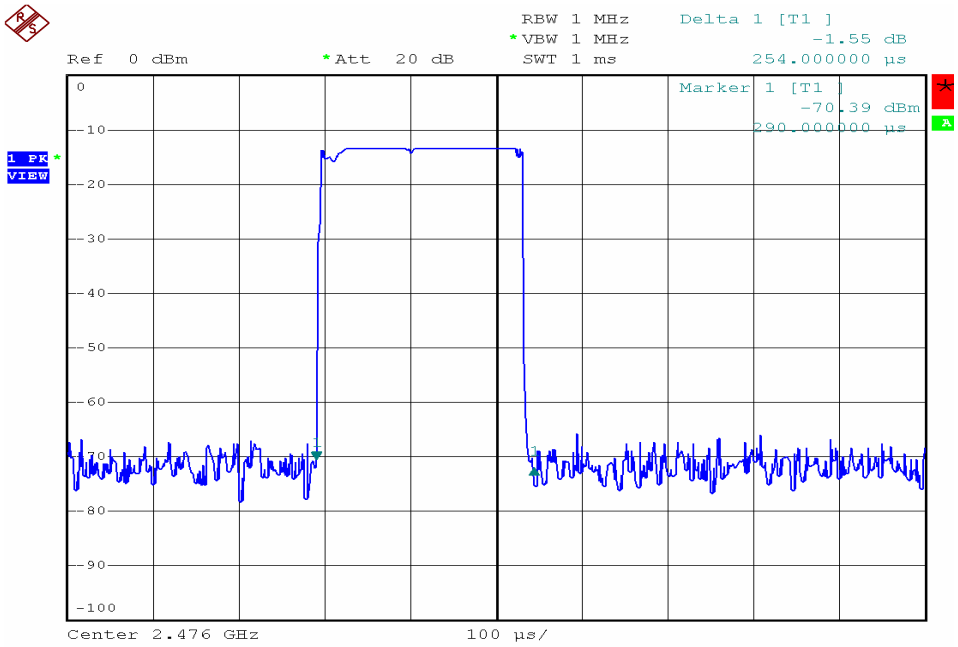


Upper Channel

Dwell time of each occupation in this channel as follows:
0.00025*40/1S*0.4*76=0.304<0.4S

Test Result: PASS

The Results are not be greater than 0.4 seconds.



11 20-dB Bandwidth

Test Requirement:	FCC Part15 C
Test Method:	Based on FCC Part15 Paragraph 15.247
Test Date:	Dec.11,2009
Test mode:	The EUT work in test mode(Tx) and test it

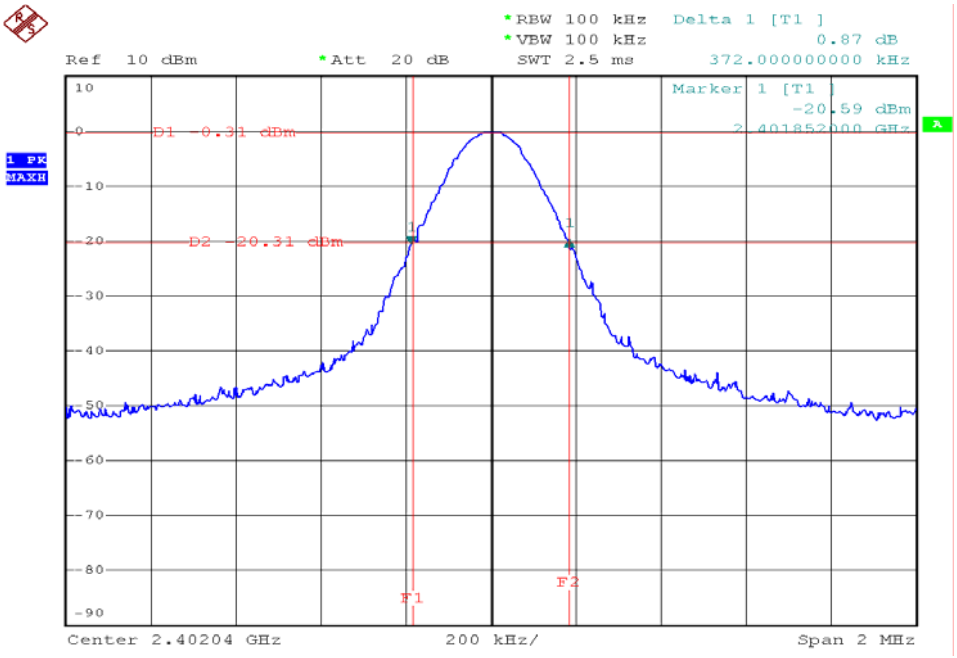
Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. The bandwidth of the fundamental frequency was measure by spectrum analyser with 100KHz RBW and 100KHz VBW.The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power 20dB.

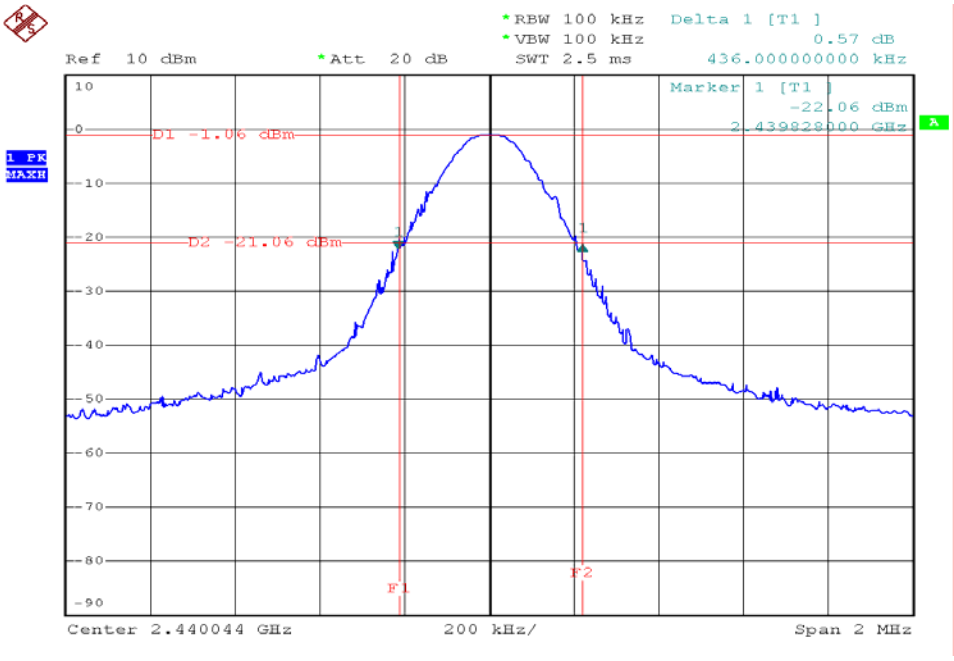
Test Result

Please refer the graph as below:

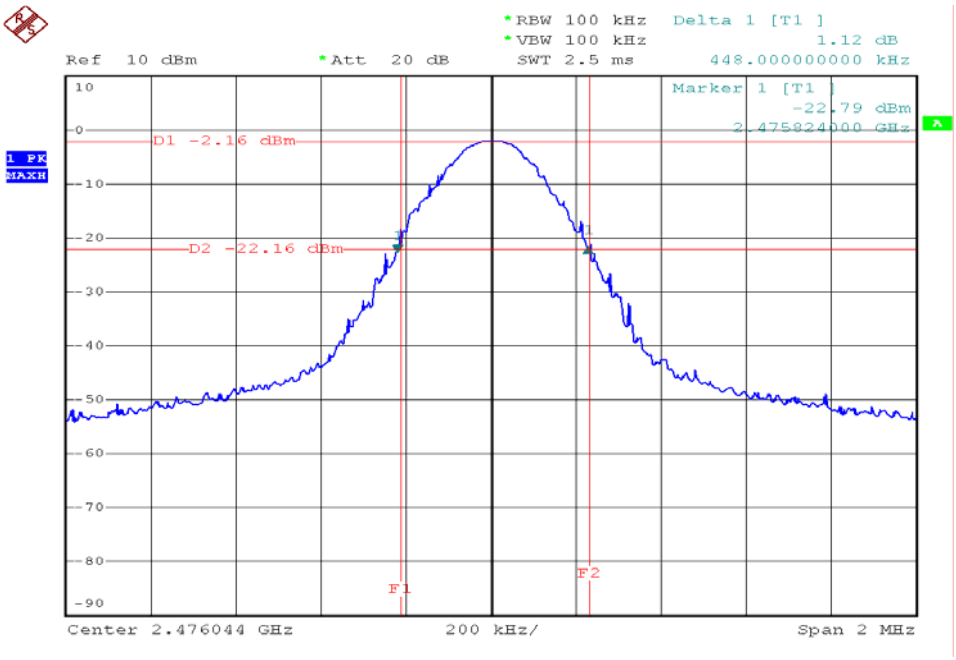
Lower Channel 2402MHz



Middle Channel 2440MHz



Upper Channel 2476MHz



12 Radiated spurious emissions into adjacent restricted band

Test Requirement:	FCC Part15 Paragraph 15.205
Test Method:	Based on FCC Part 15 Paragraph 15.247
Test Date:	Dec.11,2009
Requirements:	The EUT work in test mode(Tx) and test it

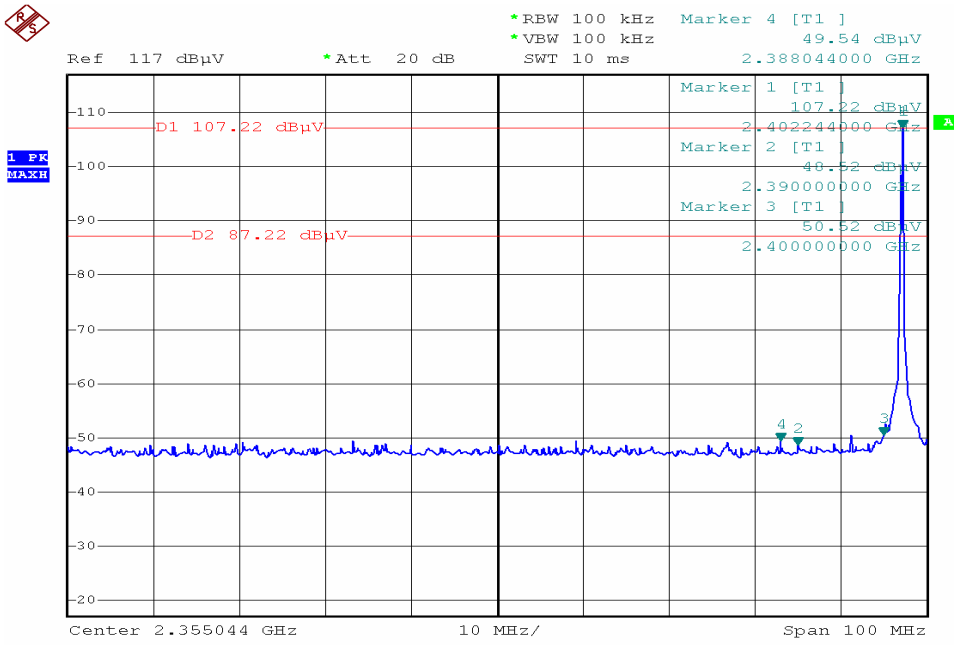
Requiments:

emissions that fall in the restricted bands(15.205).Above 1000MHz, compliance with the emissions limits in section 15.209 shall be demonstrated based on the average value of the measured emissions,The provisions in section 15.35 apply to these measurements.

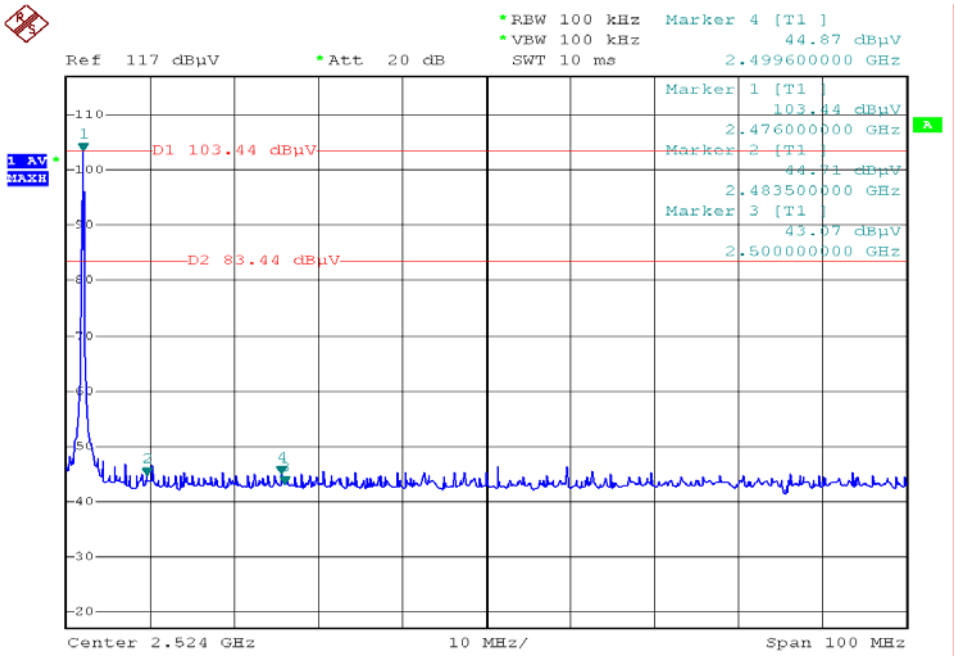
Test procedure:

An in band field strength measurement of the fundamental emission using the RBW and detector function required by C63.4-2003 and FCC Rules.The procedure was repeated with an average detector and a plot made.The calculated field strength in the adjacent restricted band is presented below.

Lower bandedge/ restricted band (AV Value)



Upper Bandedge/ Restricted Band (AV Value)



13 RF Exposure Test

Test Requirement:	FCC Part 2 Subpart J
Test Method:	Based on FCC Part 15 Paragraph 15.247
Test Date:	Dec.11,2009
Requirements:	The EUT work in test mode(Tx) and test it

Requiments:

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

The procedures / limit

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

MPE Calculation Method

$$E\ (V/m) = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd\ (W/m^2) = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Peak RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

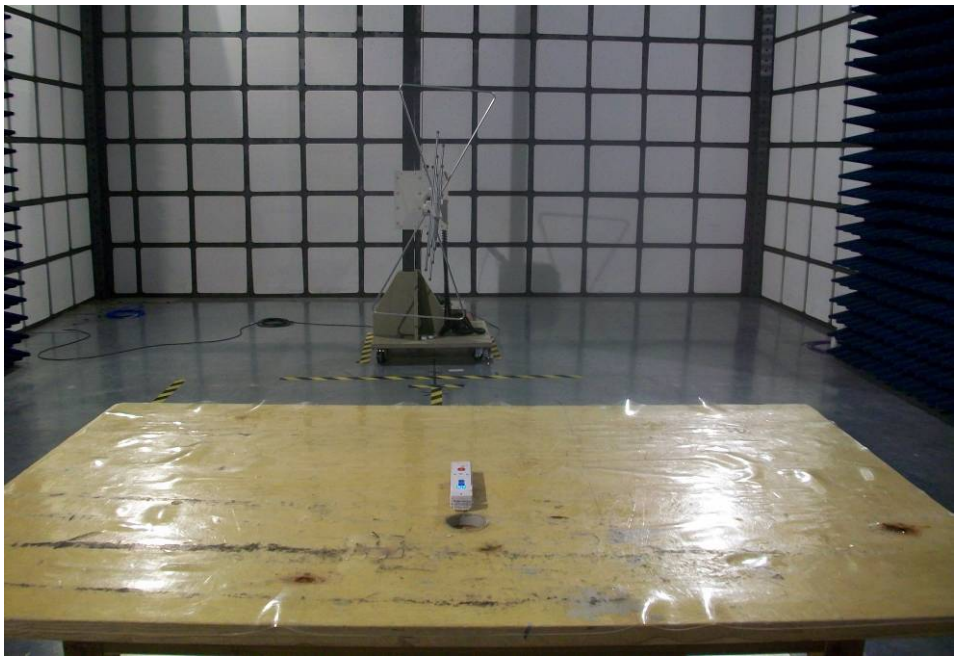
$$\boldsymbol{Pd} = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

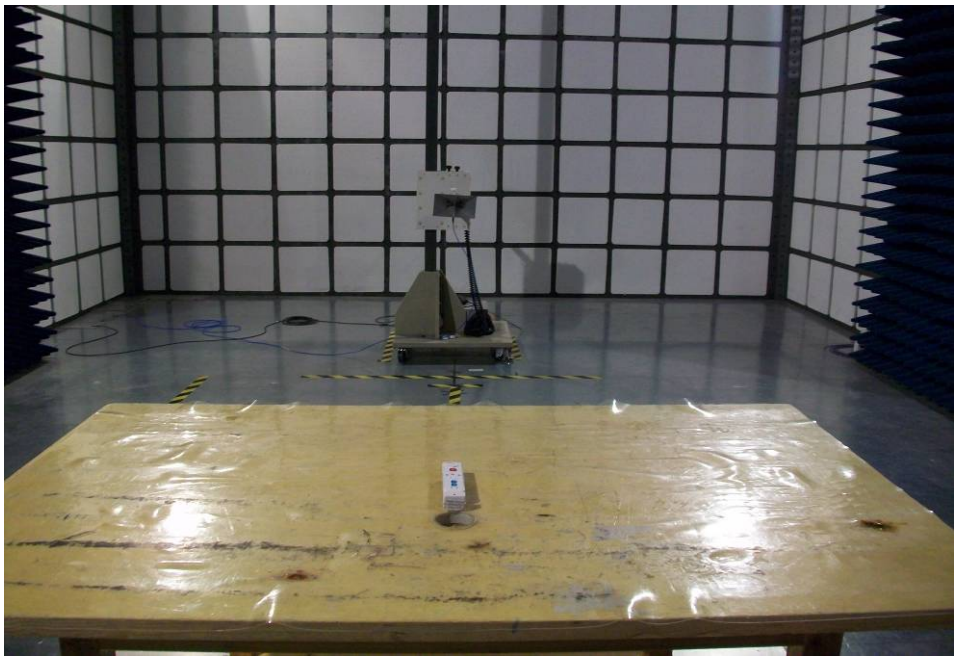
Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm2)	Limit of Power Density (S) (mW/cm2)	Test Result
-2.21	0.601	-2.676	0.54	0.00065	1	Complies
-2.21	0.601	-2.292	0.59	0.00071	1	Complies
-2.21	0.601	-2.292	0.59	0.00071	1	Complies

14 Photographs of Testing

Radiation Emission Test View For 30MHz-1000MHz

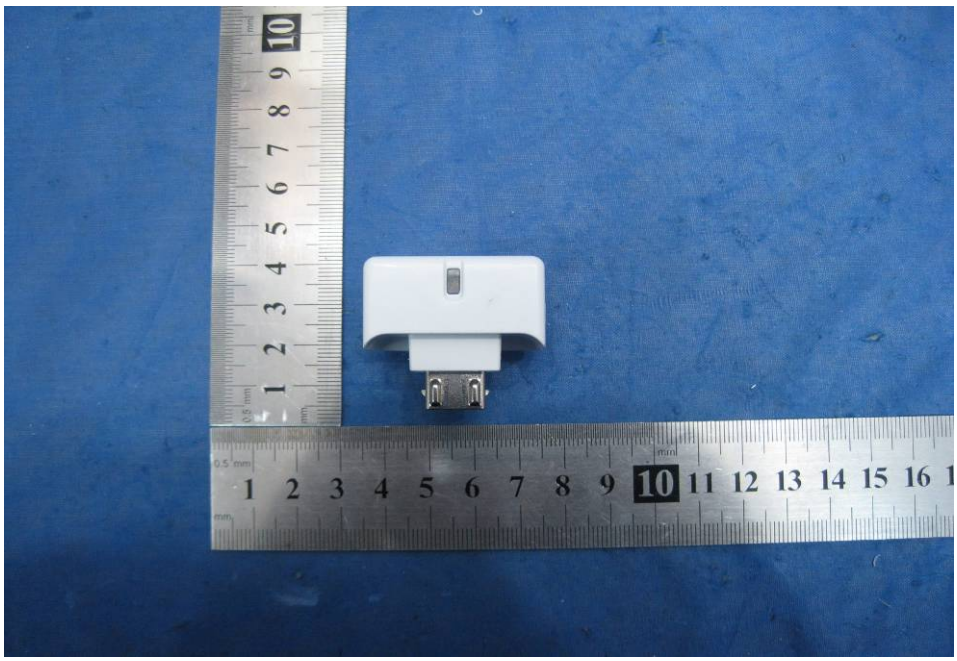


Radiation Emission Test View For 1GHz-25GHz



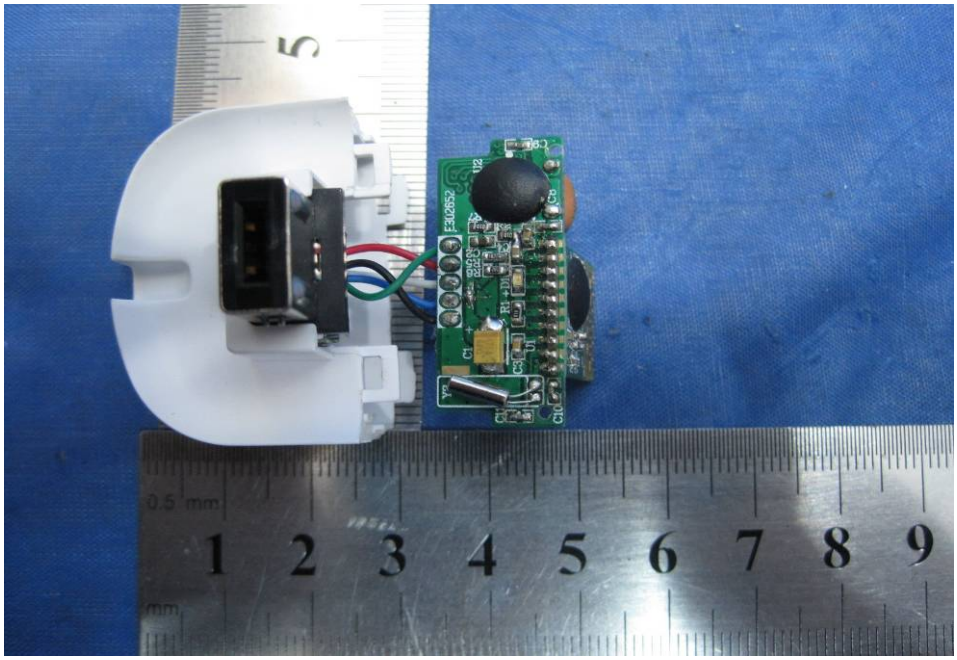
15 Photographs - Constructional Details

15.1 EUT-Front View

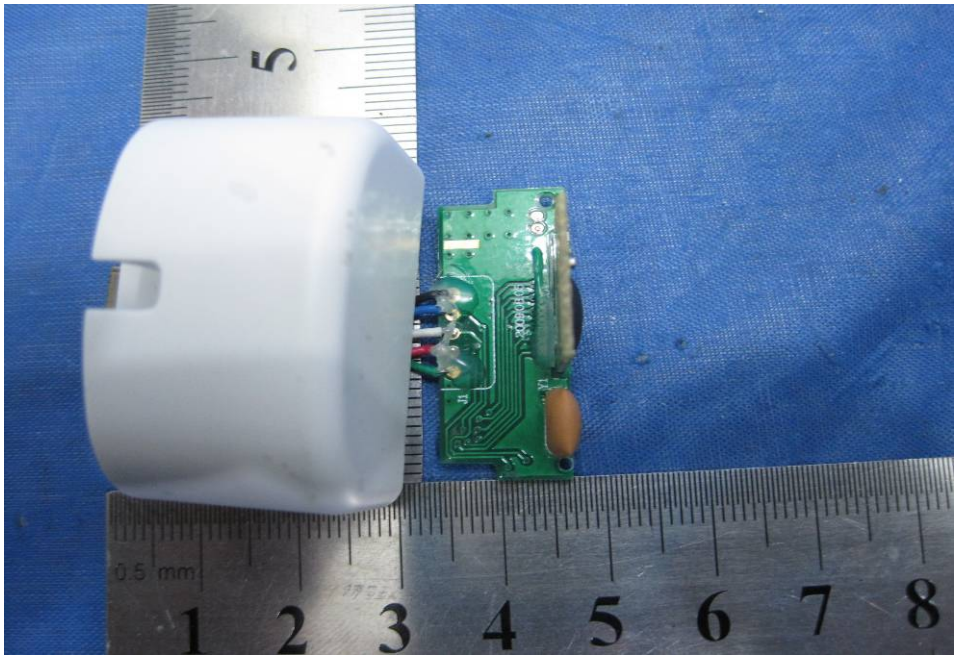


15.2 EUT-Back View

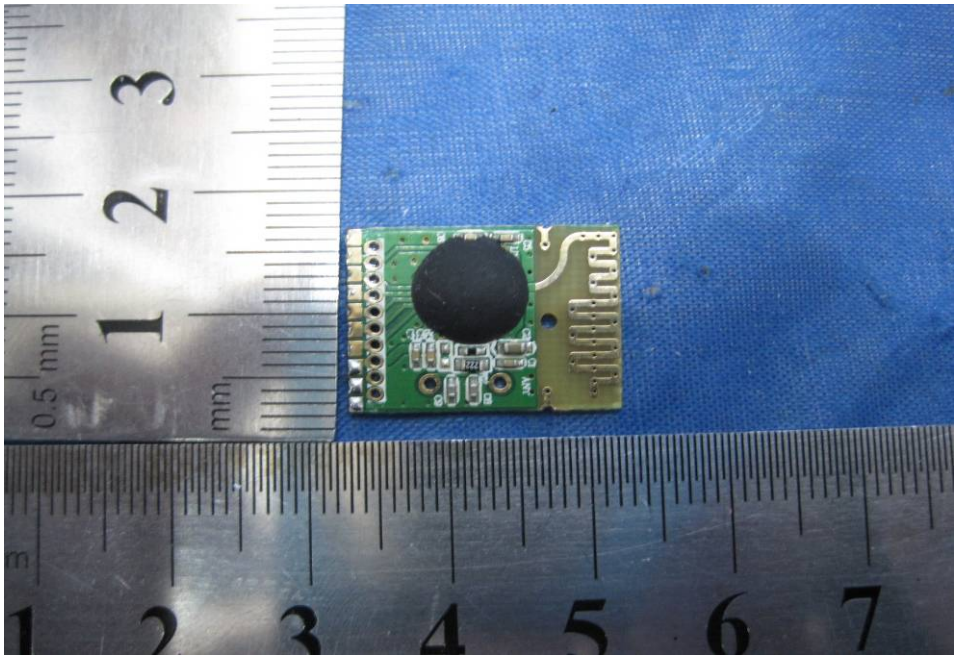
15.3 EUT-PCB1-Front View



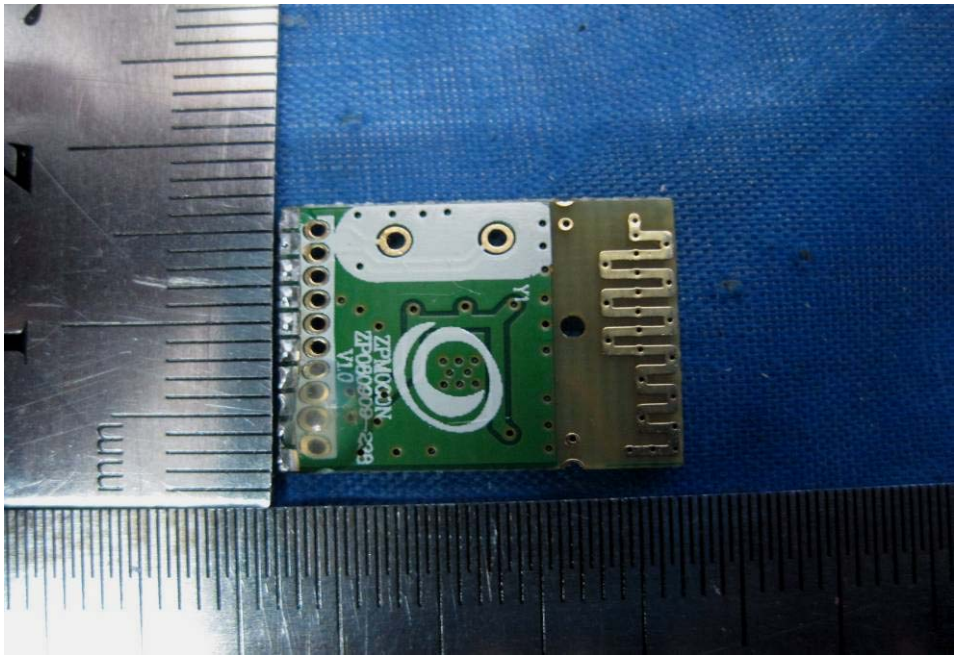
15.4 EUT-PCB1-Back View



15.5 EUT-PCB2-Front View



15.6 EUT-PCB2-Back View



16 FCC ID Label

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:(1)this device may not cause harmful interference,and (2) this device must accept any interference received, including interference that may cause undesired operation.

The Label must not be a stick-on paper. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Proposed Label Location on EUT

EUT Bottom View/proposed FCC Mark Location