

FCC TEST REPORT

FCC ID :WGBXL4432TB

Applicant : **Logic Gear (HK) Ltd.**
1430, Floor 14, Sing Win Factory Building 15-17 Shing Yip Street Kwun
Tong Kowloon Hong Kong

Equipment Under Test (EUT) :

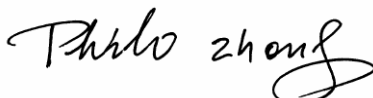
Product description : Pocketable GPS

Model No : XL4431,XL4432,XL4431B,XL4432B,XL4431T,
XL4432T,XL4431TB,XL4432TB

Standards : FCC 15 Paragraph 15.247

Date of Test : July 3, 2008

Test Engineer : Nunu.Deng

Reviewed By : 

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3 Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Radiated Emission (30MHz to 25GHz)	FCC PART 15: 2003	ANSI C63.4: 2003	N/A	PASS
Conducted Emission (150KHz to 30MHz)	FCC PART 15: 2003	ANSI C63.4: 2003	N/A	PASS

4 General Information

4.1 Client Information

Applicant: **Logic Gear (HK) Ltd.**
Address of Applicant: 1430, Floor 14, Sing Win Factory Building 15-17 Shing Yip Street Kwun Tong Kowloon Hong Kong

4.2 General Description of E.U.T.

Product description: Pocketable GPS
Model No.: XL4431,XL4432,XL4431B,XL4432B,XL4431T, XL4432T,XL4431TB,XL4432TB

4.3 Details of E.U.T.

Power Supply: Adapter input:100~240V AC 50/60Hz
Adapter output: DC 6V
Car Charger Input:DC 12V
Battery Input DC 3.7V

4.4 Description of Support Units

The EUT has been tested as an independent unit.

4.5 Standards Applicable for Testing

The customer requested FCC tests for a Pocketable GPS. 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.

4.7 Test Location

All Emissions tests were performed at:-

1/F, Fukangtai Building, West Baima Rd., Songgang Street,
Baoan District, Shenzhen 518105, China

5 Equipment Used during Test

Equipment	Brand Name	Model	Related standards	Cal.Intal Months	Last Cal. Date	Serial No
3m Anechoic chamber						
EMC Analyzer	Agilent	E7405A	ISO9001:2000	12	Jan-08	MY4511494 3
Trilog Broadband Antenne 30-3000 MHz	SCHWARZB ECK MESS- ELEKTROM	VULB9163	EN/ISO/IEC 17025 DIN EN ISO9001	12	Jan-08	336
Broad-band Horn Antenna	SCHWARZB ECK MESS- ELEKTROM	BBHA 9120 D	EN/ISO/IEC 17025 DIN EN ISO9001	12	Jan-08	667
Broadband Preamplifier	SCHWARZB ECK MESS- ELEKTROM	BBV 9718	EN/ISO/IEC 17025 DIN EN ISO9001	12	Jan-08	9718-148
10m Coaxial Cable with N-male Connectors	SCHWARZB ECK MESS- ELEKTROM	AK 9515 H	EN/ISO/IEC 17025 DIN EN ISO9001	12	Jan-08	-
10m 50 Ohm Coaxial Cable with N- plug,individual length,usable up to 3(5)GHz, Connectors	SCHWARZB ECK MESS- ELEKTROM	AK 9513	EN/ISO/IEC 17025 DIN EN ISO9001	12	Jan-08	-
Positioning Controller	C&C LAB	CC-C-IF	ISO9001	12	Jan-08	MF7802108
Color Monitor	SUNSPO	SP-14C	ISO9001	12	Jan-08	-
EMI Shielded Room						
Test Receiver	ROHDE&SC HWARZ	ESPI	ISO9001	12	Jan-08	101155
Two-Line V-Network	ROHDE&SC HWARZ	ENV216	ISO9001 EN/ISO/IEC 17025	12	Jan-08	100115
Absorbing Clamp	ROHDE&SC HWARZ	MDS-21	ISO9001 EN/ISO/IEC 17025	12	Jan-08	100205
10m 50 Ohm Coaxial	SCHWARZB	AK 9514	EN/ISO/IEC	12	Jan-08	-

Cable with N-plug,individual length,usable up to 3(5)GHz, Connectors	ECK MESS-ELEKTROM		17025 DIN EN ISO9001			
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6 Conducted Emission Test

Test Requirement:	FCC Part15 Paragraph 15.207
Test Method:	Based on FCC Part15 Paragraph 15.207
Test Date:	July 3, 2008
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

6.1 Test Equipment

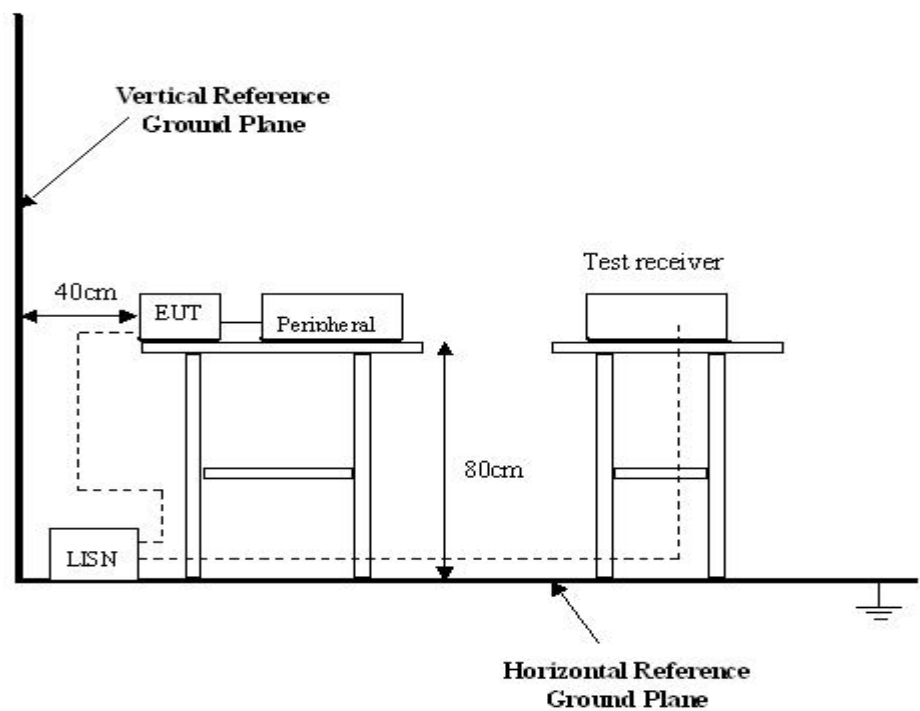
Please refer to Section 5 this report.

6.2 Test 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.

6.3 Conducted Test Setup

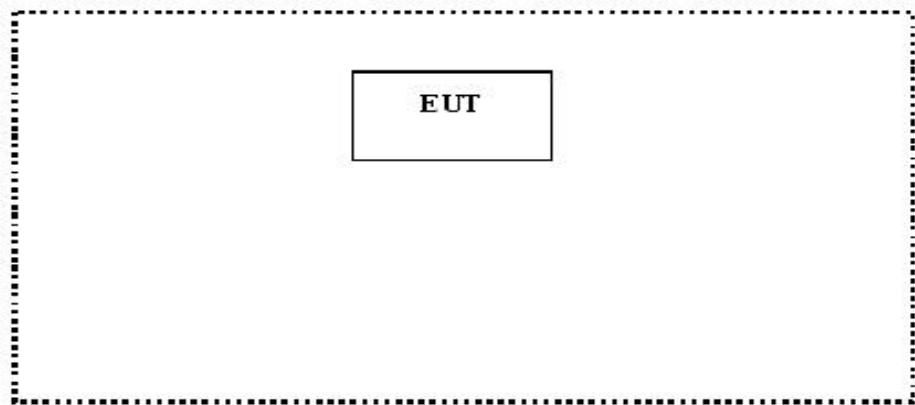
The conducted emission tests were performed using the setup accordance with the ANSI C63.4:2003, The specification used in this report was the FCC Part15 Paragraph 15.207 limits.



6.4 EUT 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.



6.5 Conducted Emission Limits

66-56 dB μ V/m between 0.15MHz & 0.5MHz

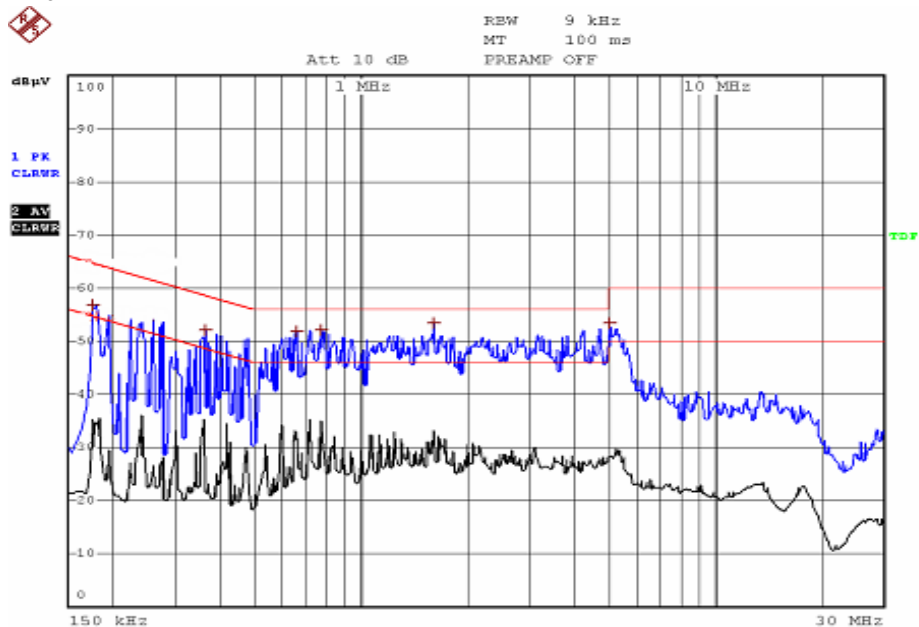
56 dB μ V/m between 0.5MHz & 5MHz

60 dB μ V/m between 5MHz & 30MHz

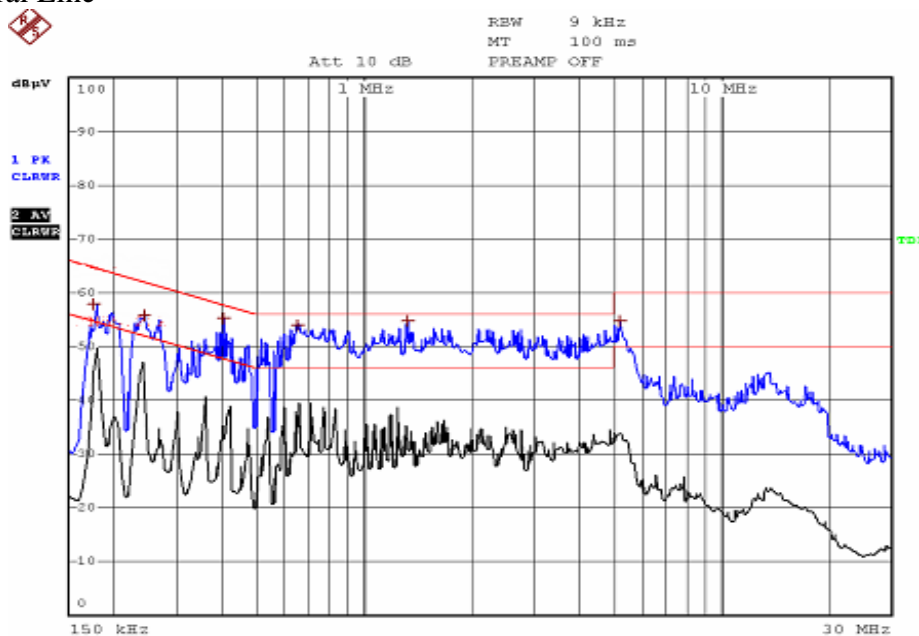
Note: In the above limits, the tighter limit applies at the band edges.

6.6 Conduction Radiation Test Result

Live Line



Neutral Line



6.6.1 Conducted Emissions Test Data

Freq. MHz	Line	QP Level dBuV	Limit dBuV	Margin dB	AV Level dBuV	Limit dBuV	Margin dB
0.178	Live	54.15	64.59	10.44	36.92	57.15	20.23
0.362	Live	48.76	58.73	9.97	31.74	49.49	17.75
0.658	Live	49.13	56.00	6.87	34.28	46.00	11.72
0.77	Live	47.82	56.00	8.18	33.67	46.00	12.33
1.62	Live	46.52	56.00	9.48	31.67	46.00	14.33
5.05	Live	41.42	60.00	18.58	26.37	50.00	23.63
0.178	Neutra	54.82	64.59	9.77	49.11	57.15	8.04
0.242	Neutra	52.37	62.05	9.68	43.16	53.84	10.68
0.402	Neutral	50.15	57.87	7.72	34.35	48.36	14.01
0.65	Neutral	52.13	56.00	3.87	40.08	46.00	5.92
1.32	Neutral	45.75	56.00	10.25	31.29	46.00	14.71
5.19	Neutral	45.58	60.00	14.42	31.55	50.00	18.45

7 Radiation Emission Test

Test Requirement:	FCC Part15 Paragraph 15.247
Test Method:	Based on ANSI 63.4:2003
Test Date:	July 3, 2008
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

7.1 Test Equipment

Please refer to Section 5 this report.

7.2 Measurement 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.

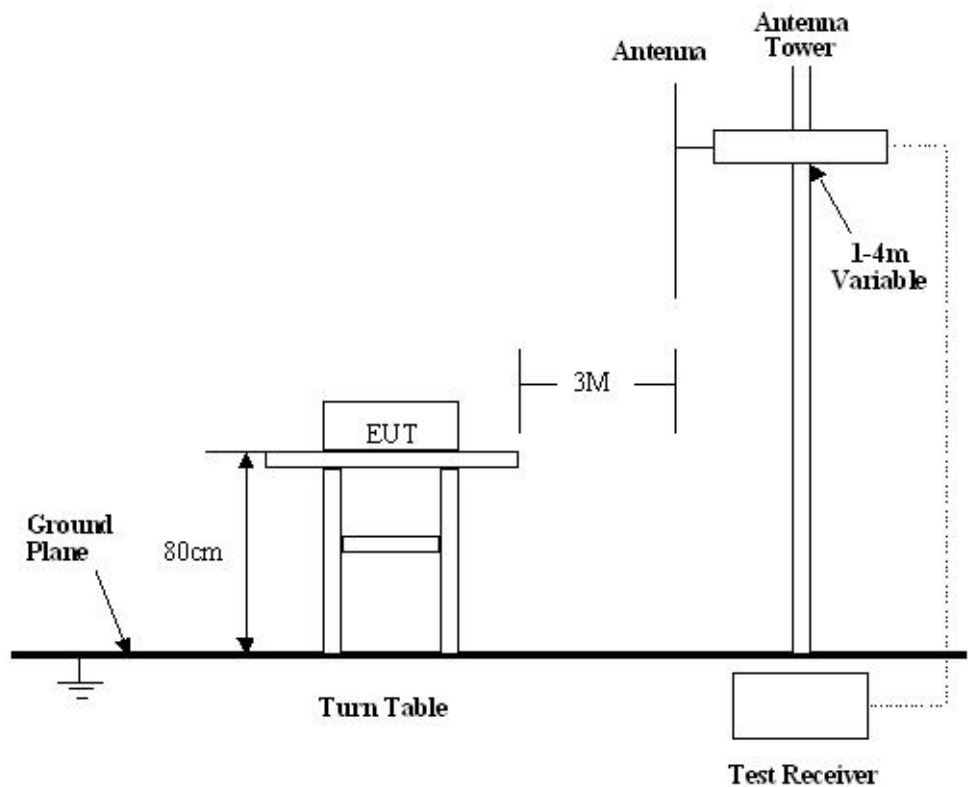
Based on ANSI C63.4:2003, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at , Waltek EMC Lab is +4.0 dB.

7.3 Test Procedure

1. The EUT was connected with signal generator and placed on a table.
2. Maximizing procedure was performed on the six (6) highest emissions to ensure EUT is compliant with all installation combinations.
3. All data was recorded in the peak and average detection mode.
4. The EUT was under normal mode during the final qualification test and the configuration was used to represent the worst case results.

7.4 Radiated 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.



7.5 Spectrum Analyzer Setup

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

- Start Frequency30 MHz
- Stop Frequency25000 MHz
- Sweep Speed Auto
- IF Bandwidth100 kHz
- Video Bandwidth1 MHz
- Quasi-Peak Adapter Bandwidth120 kHz
- Quasi-Peak Adapter Mode.....Normal
- Resolution Bandwidth1MHz

7.6 Corrected 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:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

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

$$\text{Margin} = \text{Corr. Ampl.} - \text{Class B Limit}$$

7.7 Summary of Test Results

According to the data in section 7.10, the EUT complied with the FCC Part15 Paragraph 15.247 standards.

7.8 EUT Operating Condition

Same as section 6.4 of this report.

Let the EUT work in test mode and test it.

7.9 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) $\text{RF Voltage(dBuV)} = 20 \log \text{RF Voltage(uV)}$
 - (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 instrumentation employing an average detector. Measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit.
 - (5) Above 1GHz, do a Peak and average measurements for all emissions, Limit for peak is 74dBuV/m, According to Part 15.35(b) and average is 54BuV/m.

7.10 Radiated Emissions Test Result

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

Example:

Freq(MHz) Meter Reading +ACF=FS

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

7.11 Radiated Emission Data

A. Test Item: Radiated Emission Data
Test Voltage: 120VAC
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.

Frequency (MHz)	Detector	Antenna Polarization	Emission Level (dBuV/m)	FCC 15 Subpart C Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
Low frequency							
2402.00	AV	Vertical	91.57		(Fund.)	1.5	90
4804.00	AV	Vertical	30.74	54.00	23.26	1.5	120
7206.00	AV	Vertical	30.33	54.00	23.67	1.8	100
9608.00	AV	Vertical	30.47	54.00	23.53	1.5	90
12010.00	AV	Vertical	30.21	54.00	23.79	1.0	60
14412.00	AV	Vertical	30.49	54.00	23.51	1.5	60
16814.00	AV	Vertical	30.28	54.00	23.72	1.8	100
19216.00	AV	Vertical	30.67	54.00	23.33	1.8	180
21618.00	AV	Vertical	30.59	54.00	23.41	1.5	100
24020.00	AV	Vertical	30.73	54.00	23.27	1.0	45

2402.00	AV	Horizontal	97.36		(Fund.)	1.5	45
4804.00	AV	Horizontal	32.45	54.00	21.55	1.6	180
7206.00	AV	Horizontal	32.16	54.00	21.84	1.5	60
9608.00	AV	Horizontal	32.03	54.00	21.97	1.0	90
12010.00	AV	Horizontal	34.21	54.00	19.79	1.8	45
14412.00	AV	Horizontal	30.36	54.00	23.64	1.0	120
16814.00	AV	Horizontal	30.74	54.00	23.26	1.8	180
19216.00	AV	Horizontal	31.22	54.00	22.78	1.5	90
21618.00	AV	Horizontal	32.53	54.00	21.47	1.5	60
24020.00	AV	Horizontal	30.36	54.00	23.64	1.0	60
2402.00	PK	Vertical	102.68		(Fund.)	1.5	90
4804.00	PK	Vertical	43.64	74.00	30.36	1.5	100
7206.00	PK	Vertical	37.88	74.00	36.12	1.8	120
9608.00	PK	Vertical	37.42	74.00	36.58	1.8	100
12010.00	PK	Vertical	35.63	74.00	38.37	1.0	90
14412.00	PK	Vertical	37.77	74.00	36.23	1.8	90
16814.00	PK	Vertical	35.89	74.00	38.11	1.0	60
19216.00	PK	Vertical	38.67	74.00	35.33	1.8	100
21618.00	PK	Vertical	38.78	74.00	35.22	1.5	120
24020.00	PK	Vertical	34.31	74.00	39.69	1.5	45
2402.00	PK	Horizontal	102.79		(Fund.)	1.5	45
4804.00	PK	Horizontal	40.21	74.00	39.79	1.6	60
7206.00	PK	Horizontal	35.76	74.00	38.24	1.5	100
9608.00	PK	Horizontal	37.33	74.00	36.67	1.0	90
12010.00	PK	Horizontal	33.19	74.00	40.81	1.0	60
14412.00	PK	Horizontal	33.62	74.00	40.38	1.5	60
16814.00	PK	Horizontal	30.73	74.00	43.27	1.8	100
19216.00	PK	Horizontal	33.57	74.00	40.43	1.8	120
21618.00	PK	Horizontal	33.39	74.00	40.61	1.8	180
24020.00	PK	Horizontal	35.68	74.00	38.32	1.0	120
Middle frequency							
2441.00	AV	Vertical	85.37		(Fund.)	1.5	90
4882.00	AV	Vertical	30.91	54.00	23.09	1.5	45
7323.00	AV	Vertical	30.42	54.00	23.58	1.6	60

9764.00	AV	Vertical	30.33	54.00	22.67	1.0	100
12205.00	AV	Vertical	30.23	54.00	22.77	1.8	180
14646.00	AV	Vertical	30.37	54.00	23.63	1.0	120
17087.00	AV	Vertical	30.26	54.00	23.74	1.6	100
19528.00	AV	Vertical	30.17	54.00	23.83	1.6	180
21969.00	AV	Vertical	33.65	54.00	20.35	1.5	90
24410.00	AV	Vertical	33.86	54.00	20.14	1.0	45
2441.00	AV	Horizontal	86.25		(Fund.)	1.5	100
4882.00	AV	Horizontal	32.94	54.00	21.06	1.5	180
7323.00	AV	Horizontal	31.33	54.00	22.67	1.8	90
9764.00	AV	Horizontal	32.52	54.00	21.48	1.0	100
12205.00	AV	Horizontal	31.50	54.00	22.50	1.8	120
14646.00	AV	Horizontal	30.67	54.00	23.33	1.6	90
17087.00	AV	Horizontal	30.24	54.00	23.76	1.5	45
19528.00	AV	Horizontal	31.86	54.00	22.14	1.8	180
21969.00	AV	Horizontal	30.59	54.00	23.41	1.6	120
24410.00	AV	Horizontal	30.71	54.00	23.29	1.0	120
2441.00	PK	Vertical	101.87		(Fund.)	1.5	120
4882.00	PK	Vertical	40.37	74.00	33.63	1.5	60
7323.00	PK	Vertical	37.28	74.00	36.72	1.5	90
9764.00	PK	Vertical	36.94	74.00	37.06	1.6	100
12205.00	PK	Vertical	37.87	74.00	36.13	1.5	120
14646.00	PK	Vertical	38.36	74.00	35.64	1.8	90
17087.00	PK	Vertical	39.47	74.00	34.53	1.0	180
19528.00	PK	Vertical	39.85	74.00	34.15	1.5	120
21969.00	PK	Vertical	40.22	74.00	33.78	1.6	45
24410.00	PK	Vertical	45.61	74.00	28.39	1.8	90
2441.00	PK	Horizontal	101.89		(Fund.)	1.5	100
4882.00	PK	Horizontal	44.68	74.00	29.32	1.8	45
7323.00	PK	Horizontal	41.41	74.00	32.59	1.5	60
9764.00	PK	Horizontal	40.24	74.00	33.76	1.5	90
12205.00	PK	Horizontal	39.36	74.00	34.64	1.6	100
14646.00	PK	Horizontal	38.74	74.00	35.26	1.0	120
17087.00	PK	Horizontal	36.82	74.00	37.18	1.8	180

19528.00	PK	Horizontal	38.86	74.00	35.14	1.5	120
21969.00	PK	Horizontal	40.22	74.00	33.78	1.5	100
24410.00	PK	Horizontal	41.67	74.00	32.33	1.6	45
High frequency							
2480.00	AV	Vertical	86.73		(Fund.)	1.5	100
4960.00	AV	Vertical	31.26	54.00	22.74	1.5	45
7440.00	AV	Vertical	31.73	54.00	22.27	1.5	120
9920.00	AV	Vertical	31.26	54.00	22.74	1.6	90
12400.00	AV	Vertical	30.45	54.00	23.55	1.8	45
14880.00	AV	Vertical	30.44	54.00	23.56	1.5	100
17360.00	AV	Vertical	31.62	54.00	22.38	1.6	120
19840.00	AV	Vertical	30.13	54.00	23.87	1.8	90
22320.00	AV	Vertical	30.27	54.00	23.73	1.5	90
24800.00	AV	Vertical	30.84	54.00	23.16	1.5	60
2480.00	AV	Horizontal	87.74		(Fund.)	1.5	180
4960.00	AV	Horizontal	31.95	54.00	22.05	1.5	100
7440.00	AV	Horizontal	31.35	54.00	22.65	1.5	90
9920.00	AV	Horizontal	31.57	54.00	22.43	1.0	60
12400.00	AV	Horizontal	31.79	54.00	22.21	1.6	90
14880.00	AV	Horizontal	32.42	54.00	21.58	1.0	100
17360.00	AV	Horizontal	31.17	54.00	22.83	1.8	120
19840.00	AV	Horizontal	30.55	54.00	23.45	1.5	180
22320.00	AV	Horizontal	32.86	54.00	21.14	1.0	100
24800.00	AV	Horizontal	33.25	54.00	20.75	1.6	60
2480.00	PK	Vertical	101.42		(Fund.)	1.5	60
4960.00	PK	Vertical	39.75	74.00	34.25	1.5	100
7440.00	PK	Vertical	37.83	74.00	36.17	1.5	180
9920.00	PK	Vertical	36.39	74.00	37.61	1.8	90
12400.00	PK	Vertical	35.56	74.00	38.44	1.0	90
14880.00	PK	Vertical	34.72	74.00	39.28	1.6	60
17360.00	PK	Vertical	36.87	74.00	37.13	1.8	45
19840.00	PK	Vertical	36.26	74.00	37.74	1.5	100
22320.00	PK	Vertical	36.73	74.00	37.27	1.5	90
24800.00	PK	Vertical	36.33	74.00	37.67	1.6	60

2480.00	PK	Vertical	101.05		(Fund.)	1.5	60
4960.00	PK	Vertical	40.57	74.00	33.43	1.5	90
7440.00	PK	Vertical	38.64	74.00	35.36	1.5	90
9920.00	PK	Vertical	35.37	74.00	38.63	1.6	90
12400.00	PK	Vertical	35.52	74.00	38.48	1.6	45
14880.00	PK	Vertical	35.26	74.00	38.74	1.5	60
17360.00	PK	Vertical	37.41	74.00	36.59	1.8	100
19840.00	PK	Vertical	38.25	74.00	35.75	1.8	120
22320.00	PK	Vertical	40.11	74.00	33.89	1.0	180
24800.00	PK	Vertical	40.62	74.00	33.38	1.6	60

8 Antenna Requirement.

According to the FCC Part 15 Paragraph 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 to the intentional radiator shall be considered sufficient to comply with the provisions of this section. This product has a permanent antenna, fulfill the requirement of this section

9 Maximum Peak Output Power

Test Requirement:	FCC Part15 Paragraph 15.247
Test Method:	Based on ANSI 63.4:2003
Test Date:	July 3, 2008
Test mode:	Compliance test in the worse case: Tx Low/Tx Middle/Tx High
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.

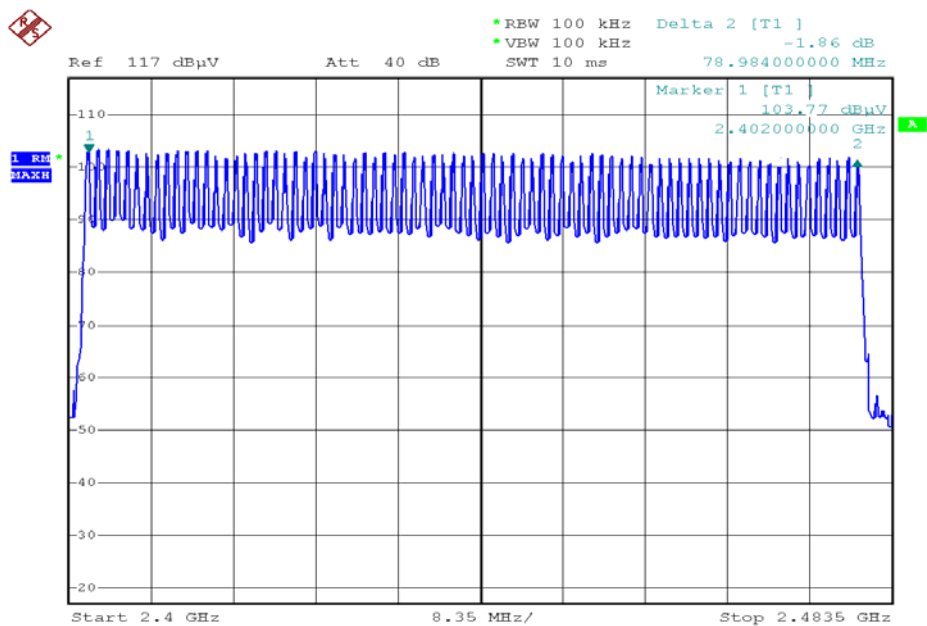
Test Result: The unit does meet the FCC requirements.

Test Channel	Fundamental Frequency(GHz)	Output Power (mW)	Limit (W)	Power output level
low	2.402	0.37	1	ERP
middle	2.441	0.32	1	ERP
high	2.480	0.28	1	ERP

10 Hopping Channel Number

Test Requirement:	FCC Part15 C
Test Method:	Based on FCC Part15 Paragraph 15.247
Test Date:	July 3, 2008
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 75 hopping channels.
Test result:	The total number of channels would be 79 channels. The unit does meet the FCC requirements.

Please refer the graph as below:



11 Carrier Frequencies Separated

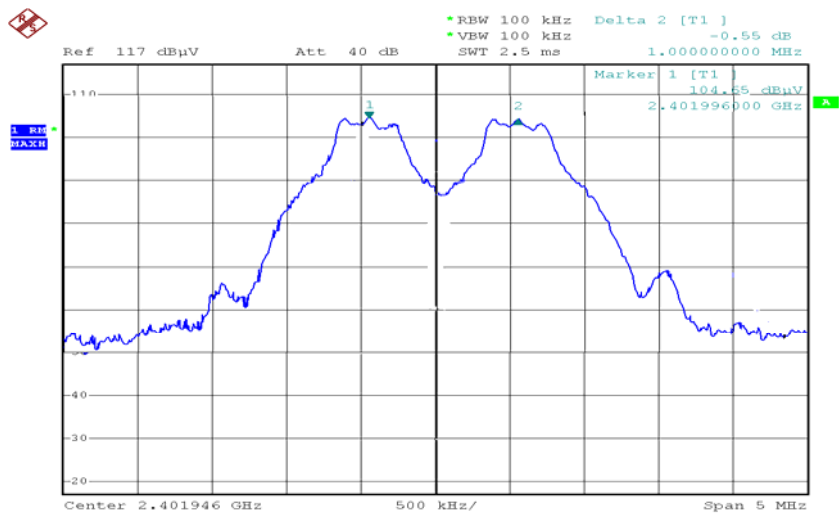
Test Requirement: FCC Part15 C
 Test Method: Based on FCC Part15 Paragraph 15.247
 Test Date: July 3, 2008
 Test mode: The EUT work in test mode(Tx) and test it
 Requirements: The bandwidth of the fundamental frequency was measur by spectrum analyser with 100kHz RBW and 100kHz VBW.The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.
 Test result: PASS

Channel Carrier Frequency Separated

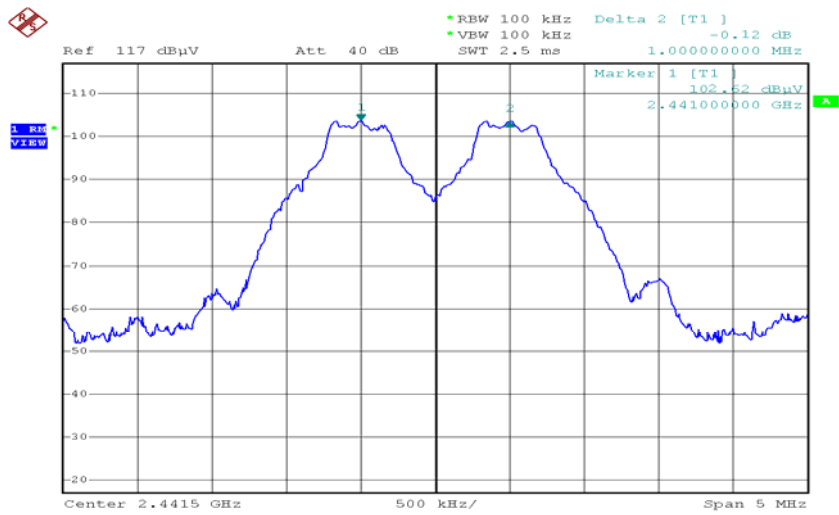
Test Channel	Carrier Frequencies Separated	PASS/FAIL
Lower Channels (channel 2402MHZ and channel 2403MHZ)	1MHz	Pass
Lower Channels (channel 2441MHZ and channel 2442MHZ)	1MHz	Pass
Lower Channels (channel 2479MHZ and channel 2480MHZ)	1MHz	Pass

The unit does meet the FCC requirements.

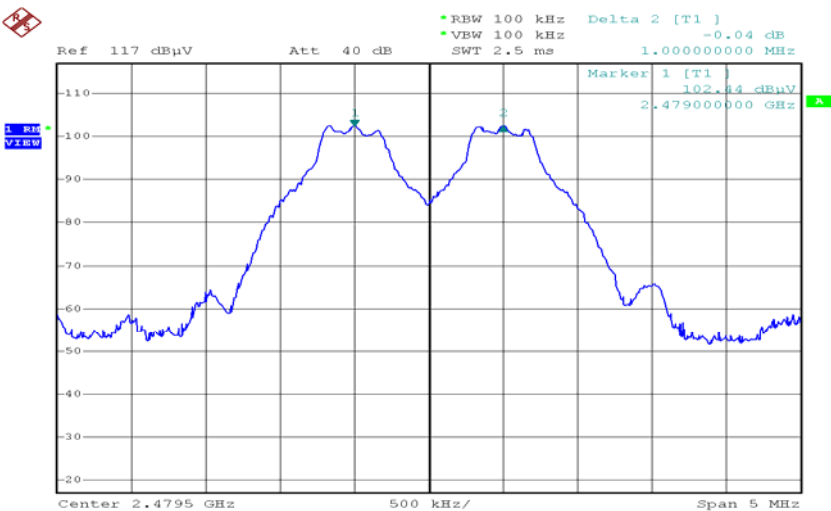
11.1 Lower Channel: Carrier Frequencies Separated



11.2 Middle Channel: Carrier Frequencies Separated



11.3 Upper Channel: Carrier Frequencies Separated



1
Date: 3.JUL.2008 19:42:28

12 Dwell Time

Test Requirement:	FCC Part15 C
Test Method:	Based on FCC Part15 Paragraph 15.247
Test Date:	July 3, 2008
Test mode:	The EUT work in test mode(Tx) and test it

Requirements: 15.247 a(1)(iii)Frequency hopping systems in the 2400-2483.5MHz band shall use at least 15 non-overlapping channels.The average time of occupancy on any channel shall not greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

12.1 Test procedure

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,set sweep time:10 ms.Span:0Hz.

12.2 Test Results : PASS

Number of hopping channels is 79.

A channel was used 107 times within $0.4 \times 79 = 31.6S$.

Dwell time of each occupation in this channel a follows:

1.Low Channel: $1.55 \text{ mS} \times 107 = 0.1659S < 0.4 \text{ s}$

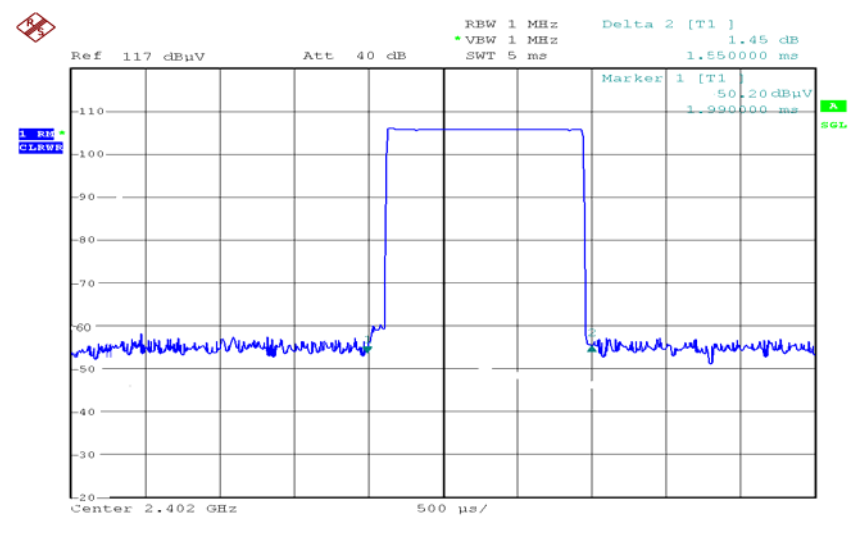
2.Middle Channel: $1.95 \text{ mS} \times 107 = 0.2087S < 0.4 \text{ s}$

3.High Channel: $1.775 \text{ mS} \times 107 = 0.1899S < 0.4 \text{ s}$

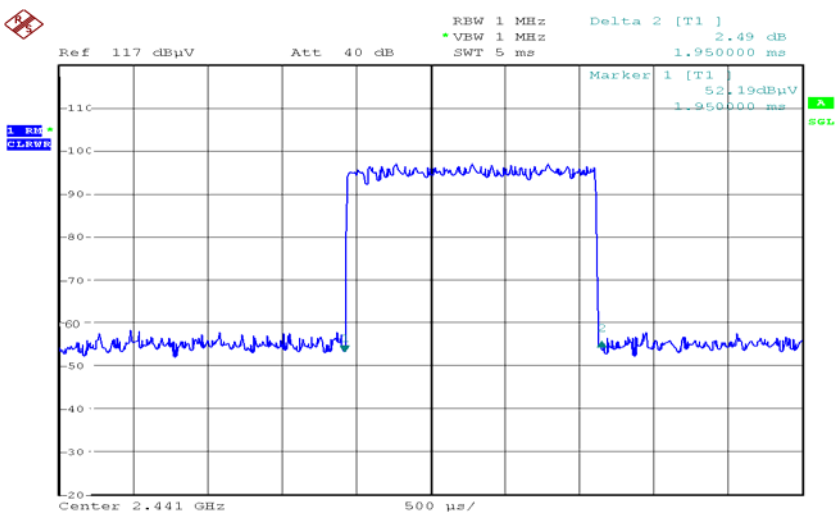
The Results are not be greater than 0.4 seconds.

Please refer the graph as below:

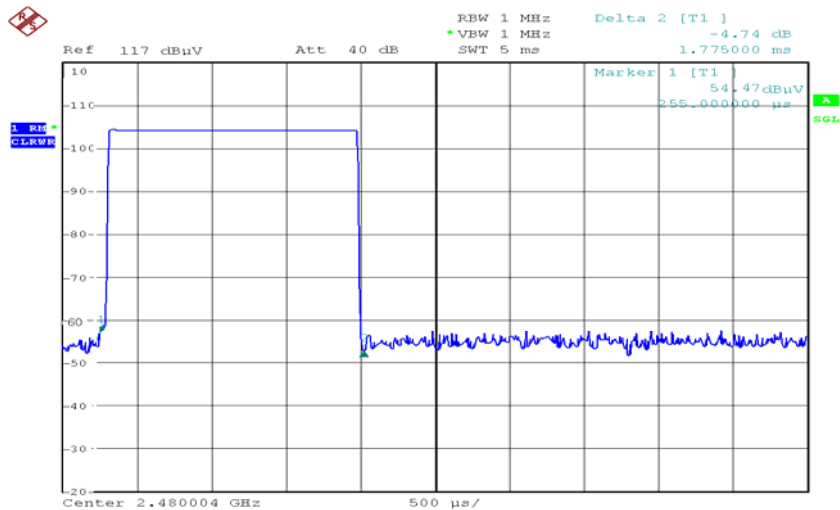
Channel 0: 2.402GHz



Channel 27: 2.441GHz



Channel 55: 2.480GHz



13 20-dB Bandwidth

Test Requirement:	FCC Part15 C
Test Method:	Based on FCC Part15 Paragraph 15.247
Test Date:	July 3, 2008
Test mode:	The EUT work in test mode(Tx) and test it

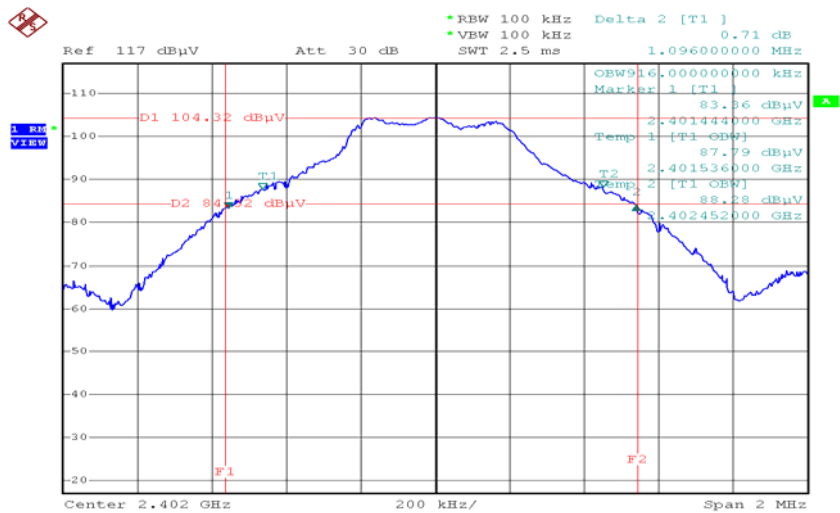
13.1 Test Procedure

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.

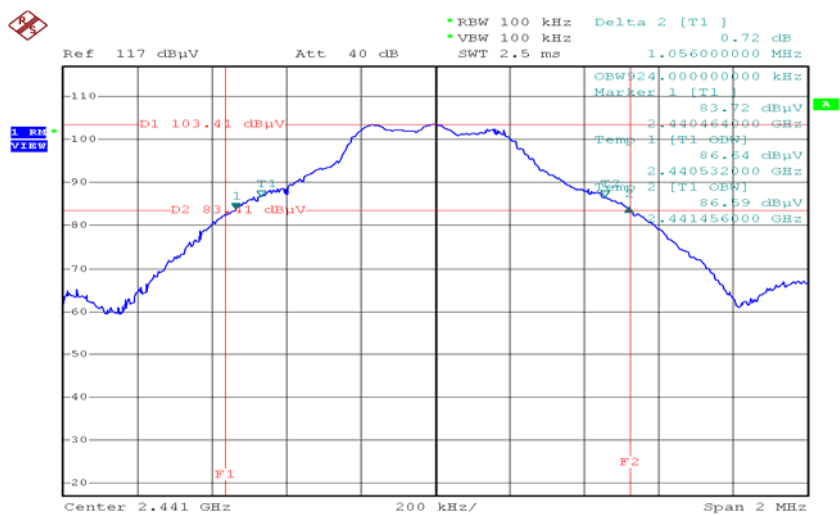
13.2 Test Result

Please refer the graph as below

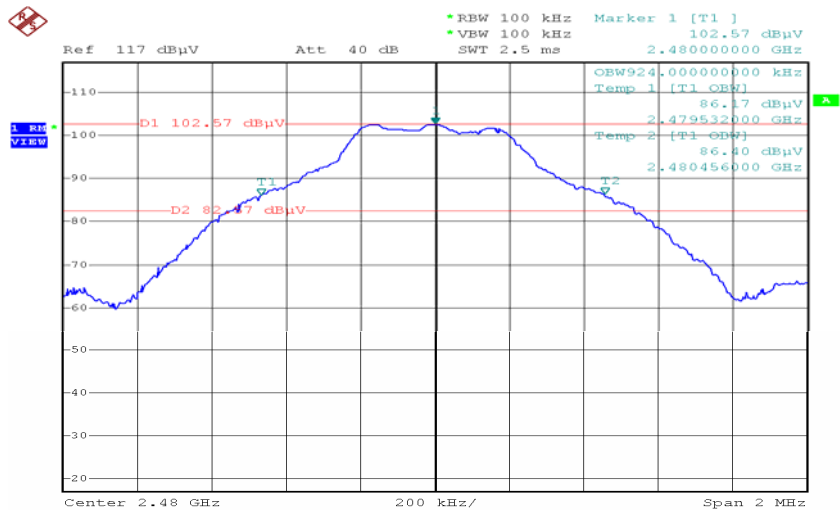
Low



Middle



High



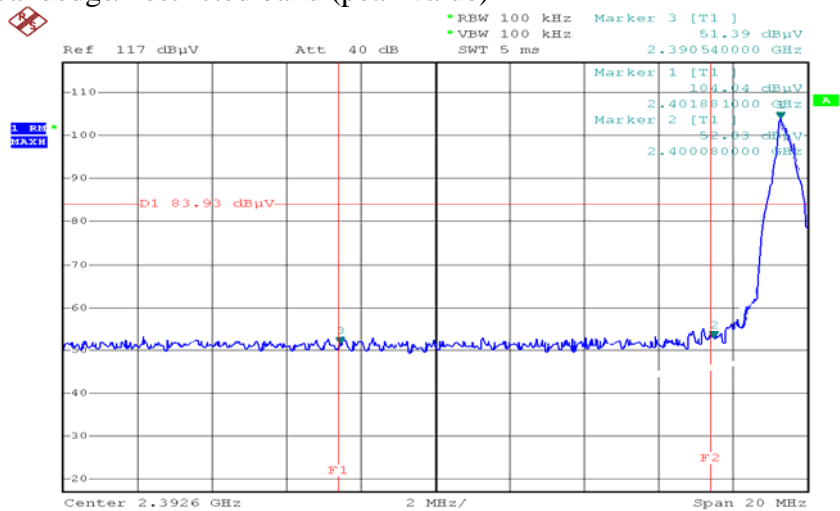
14 Radiated spurious emissions into adjacent restricted band

Test Requirement:	FCC Part15 Paragraph 15.205
Test Method:	Based on FCC Part 15 Paragraph 15.247
Test Date:	July 3, 2008
Requirements:	The EUT work in test mode(Tx) and test it

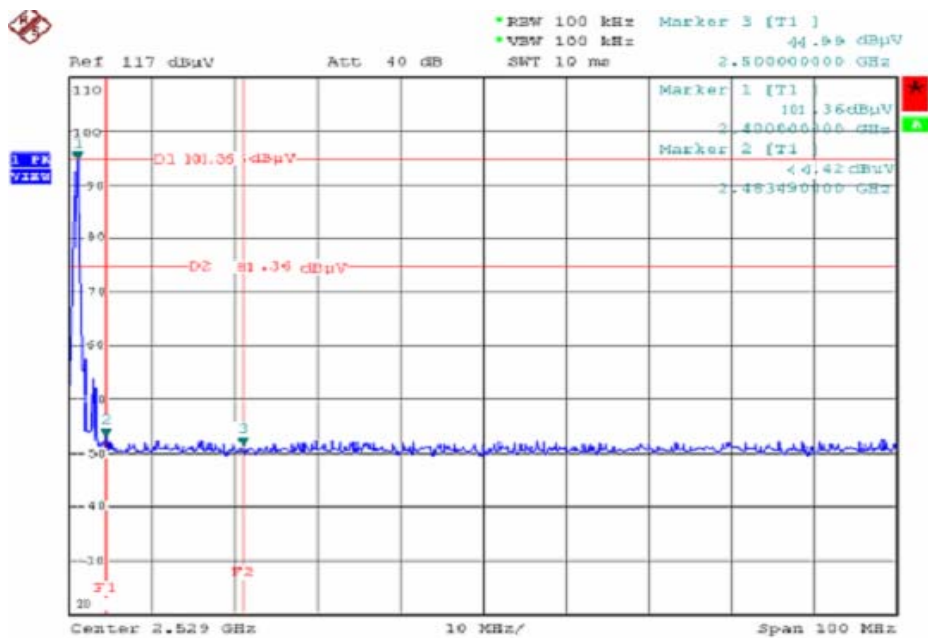
Requiments:emissions that fall in the restricted bands(15.205).Above 1000MHz, compliance with the emissions limits in section 15.209 shall be demonstrated based on the average value of the measured emissions,The provisions in section 15.35apply to these measurements.

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 (peak value)



upper bandedge/ restricted band (peak value)



15 RF Exposure Test

Test Requirement:	FCC Part 2 Subpart J
Test Method:	Based on FCC Part 15 Paragraph 15.247
Test Date:	July.3 , 2008
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

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d}$$

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

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

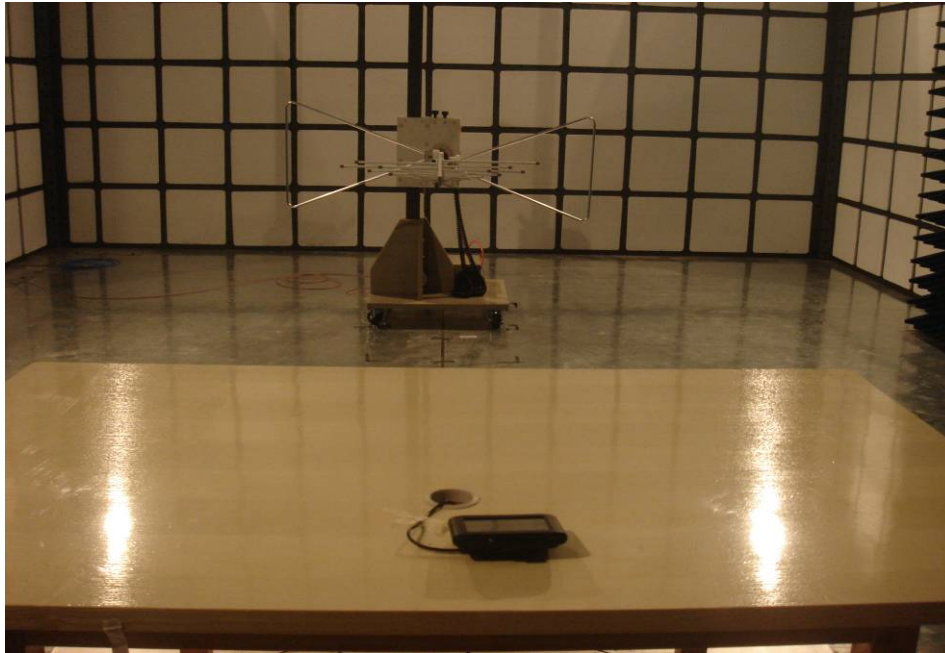
$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

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

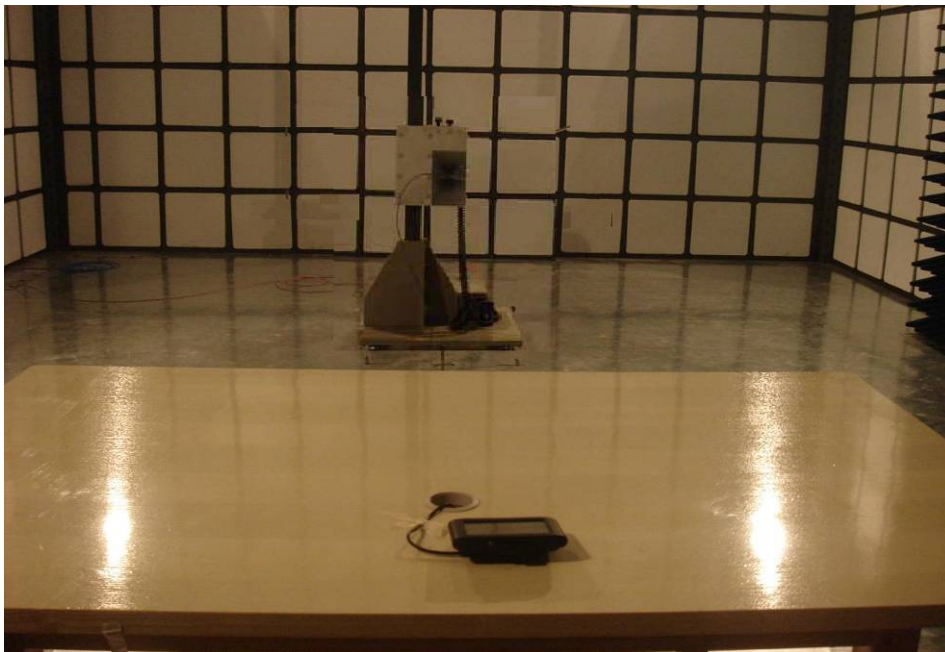
Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
1.52	1.4191	-4.32	0.37	0.001474	1	Complies
1.52	1.4191	-4.94	0.32	0.001324	1	Complies
1.52	1.4191	-5.53	0.28	0.00137	1	Complies

16 Photographs of Testing

16.1 Radiation Emission Test View For 30MHz-1000MHz



16.2 Radiation Emission Test View For 1GHz-25GHz



16.3 Photographs - Conduction Radiation Test Setup



17 Photographs - Constructional Details

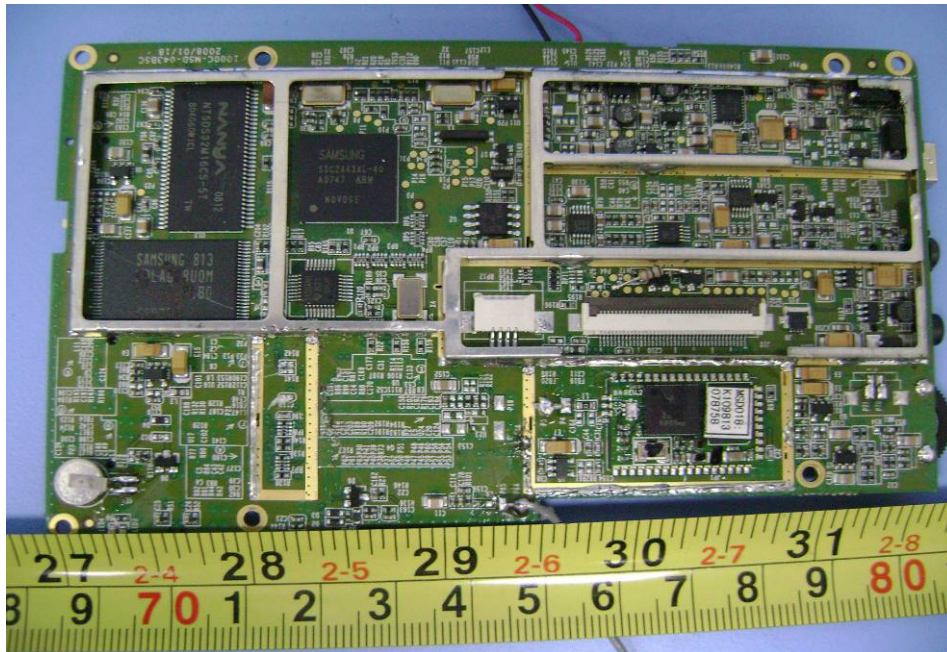
17.1 EUT– Front View



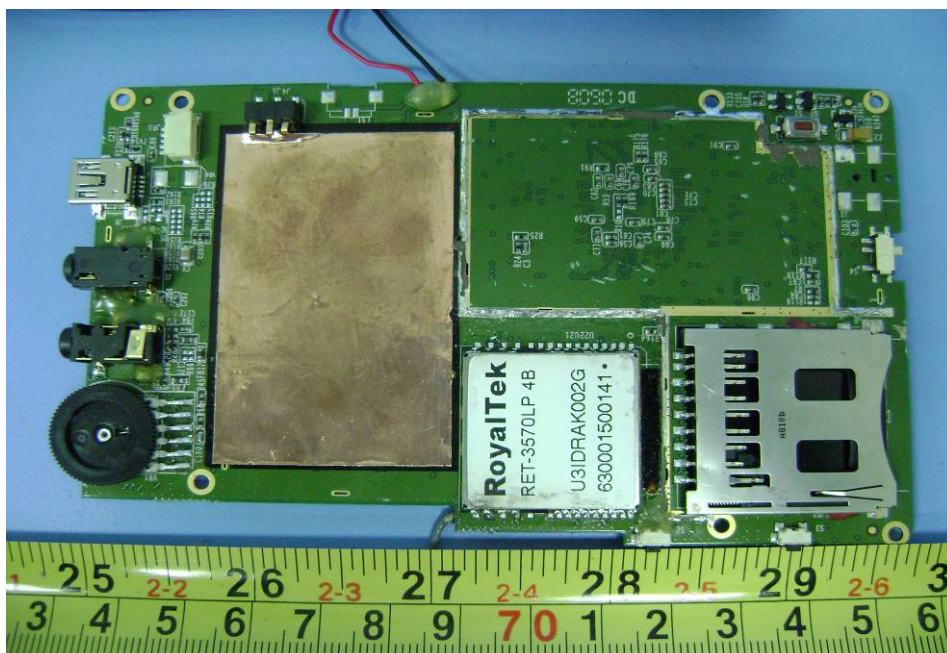
17.2 EUT– Back View



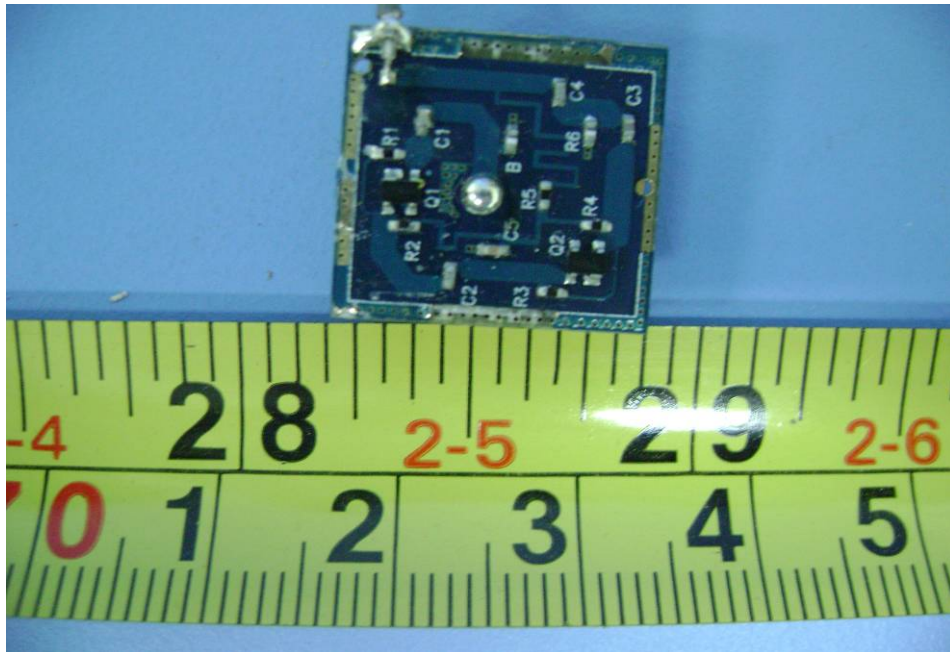
17.3 EUT PCB –Front View



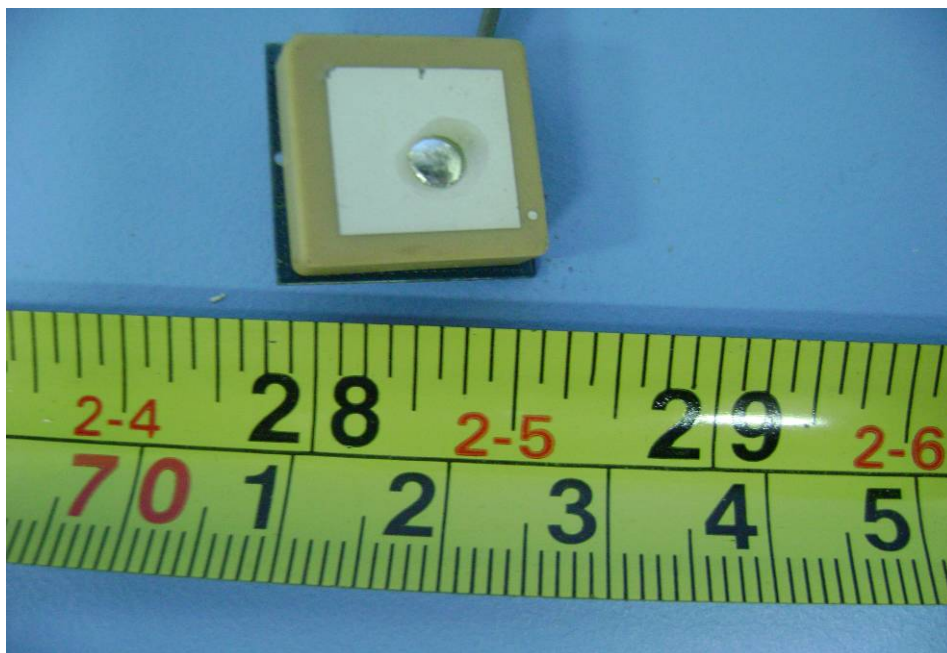
17.4 EUT PCB –Back View



17.5 EUT PCB –Front View



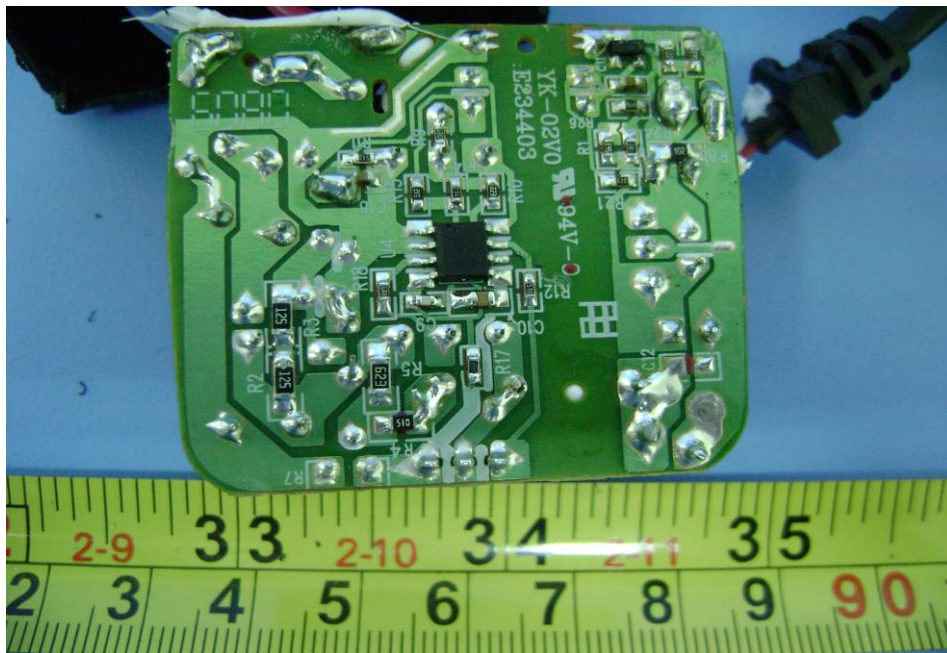
17.6 EUT PCB –Back View



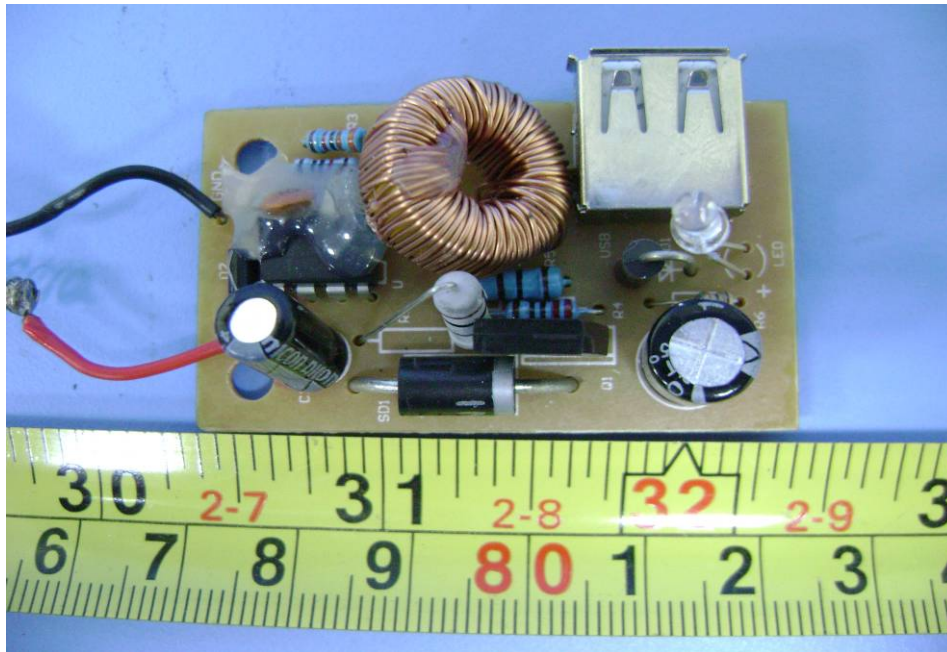
17.7 Adapter PCB– Front View



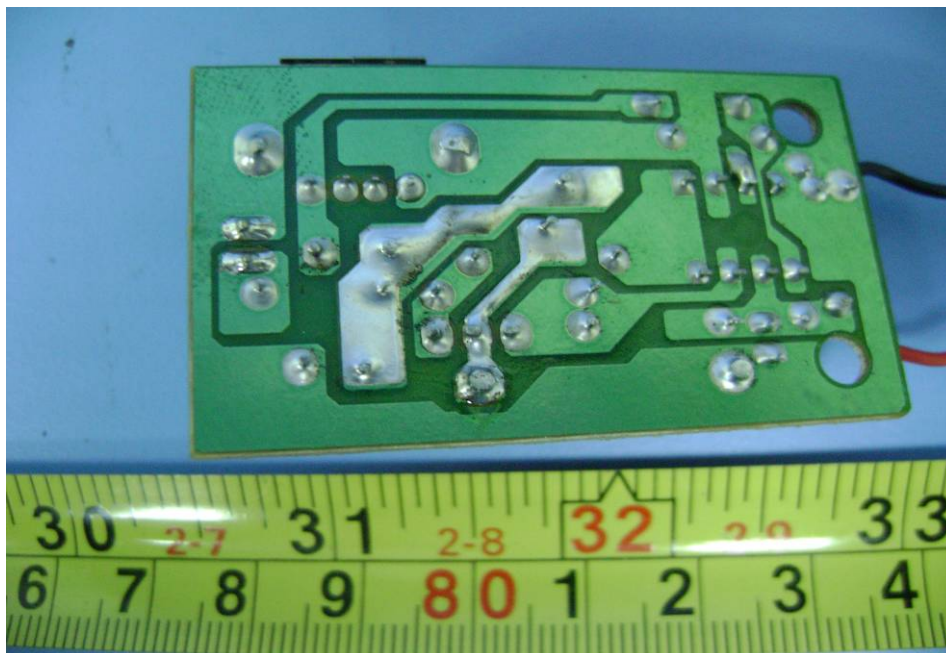
17.8 Adapter PCB– Back View



17.9 Car Charger Adapter PCB –Front View



17.10 Car Charger Adapter PCB–Back View



18 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

