



Test Report

Applicant: Adec & Partner AG
Address of Applicant: Staldenbachstrasse 30 CH-8808, Pfaffikon, Switzerland
Equipment Under Test (EUT):
EUT Name: 2.4G Wireless Headphone
Model No.: Swing Digital
Trade Mark: NA
Serial No.: Not supplied by client
Standards: FCC PART15 SUBPART C: 2013
Date of Receipt: May 21, 2013
Date of Test: May 22 to Jun. 28, 2013
Date of Issue: Jun. 30, 2013
Test Result : **PASS***

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

Tested by:

Sandy Yu

Sandy Yu / EMC Engineer

Authorized Signature:

Henly

Henly Xie / Manager, Representative of the Lab

This report refers to the General Conditions for Inspection and Testing Services, printed overleaf

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

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

All test results in this report can be traceable to National or International Standards.

The test report prepared by:

Guangzhou Huesent Testing Service Co., Ltd.

Self-ordained 68# courtyard, No.91, Dongguanzhuang Road, Guangzhou, China.

Tel: 86-20-28263298 Fax: 86-20-28263237

<http://www.hst.org.cn> E-mail: hst@hst.org.cn



1 Test Summary

Test	Test Requirement	Test Method	Class / Severity	Result
Radiated Emission (9kHz to 25GHz)	FCC PART 15.249	ANSI C63.4:2003	In FCC PART 15.249	PASS
Occupied Bandwidth	FCC PART 15.215	ANSI C63.4:2003	In FCC PART 15.215	PASS
Conducted Emissions at Mains Terminals	FCC PART 15.207	ANSI C63.10: Clause 6.2 & DA 00-705	In FCC PART 15.207	PASS
Frequency Stability	FCC PART 15.249	FCC CFR 47 Part 2.1055	In FCC PART 15.249.b)2)	N/A

Remark:



Channel	Frequency/ MHz
Lowest	2404.0
Mid	2442.0
Highest	2479.0

The tests were carried out on the 3 samples with the typical frequency listed above.

N/A: Not applicable, since the EUT is not power supplied by batteries. The tests of occupied bandwidth and frequency stability were carried out for the headphones (FCC id: **U94SWING1212R**).

The wireless microphone system with an associated receiver for transmitting voice. They include a base with an adapter(FCC id: **U94SWING1212**), two headphones (FCC id: **U94SWING1212R**). This report is used for the base.

2 Contents

1	TEST SUMMARY	2
2	CONTENTS.....	3
3	GENERAL INFORMATION.....	4
4.1.	CLIENT INFORMATION	4
4.2.	GENERAL DESCRIPTION OF E.U.T.....	4
4.3.	DETAILS OF E.U.T.	4
4.4.	DESCRIPTION OF SUPPORT UNITS.....	4
4.5.	STANDARDS APPLICABLE FOR TESTING	4
4.6.	TEST LOCATION	5
4.7.	DEVIATION FROM STANDARDS	5
4.8.	ABNORMALITIES FROM STANDARD CONDITIONS	5
5.	EQUIPMENTS USED DURING TEST	6
6.	TEST RESULTS.....	8
6.1.	RADIATION INTERFERENCE	8
6.1.1	<i>E.U.T. Operation</i>	8
6.1.2	<i>Test Setup</i>	8
6.1.3	<i>Test Procedure</i>	8
6.1.4	<i>Measurement Data</i>	9
6.1.5	<i>Radiated outside of the specified frequency bands</i>	9
6.1.6	<i>Measurement Data for 15.249.d</i>	9
6.2.	OCCUPIED BANDWIDTH	9
6.2.1	<i>E.U.T. Operation</i>	9
6.2.2	<i>Test Setup</i>	9
6.2.3	<i>Test Procedure</i>	9
6.2.4	<i>Measurement Data</i>	9
6.3.	CONDUCTED EMISSIONS AT MAINS TERMINALS 150 KHZ TO 30 MHZ.....	9
6.3.1	<i>EUT Operation</i>	9
6.3.2	<i>Test Configuration</i>	9
6.3.3	<i>Test Procedure</i>	9
6.3.4	<i>Measurement Data</i>	9
7.	PHOTOGRAPHS	9
7.1.	RADIATED EMISSION TEST SETUP	9
7.2.	CONDUCTED EMISSION TEST SETUP	9
7.3.	EUT CONSTRUCTIONAL DETAILS	9
7.4.	ANTENNA PHOTO	9

3 General Information

4.1. Client Information

Applicant: Adec & Partner AG
Address of Applicant: Staldenbachstrasse 30 CH-8808, Pfaffikon, Switzerland

4.2. General Description of E.U.T.

EUT Name: 2.4G Wireless Headphone
Item No.: Swing Digital
Serial No.: Not supplied by client

4.3. Details of E.U.T.

Power Supply: 12Vdc, by AC/DC adapter, model: HS06-1200500US, input: 100-240VAC, 50/60Hz, output: 12.0VDC500mA

Main Function: Wireless microphone system with an associated receiver for transmitting voice. They include a base, two headphones for and an adapter.
And the base has an USB input port.
One headphone is called the headset with two earphones. It's built-in touch the power switch, and earphone connecting rod by a switching of power supply.
The other we called the neck set without headphones, and it's added a headphone output block and an audio induction coil, a power switch to toggle switch.

Oscillating Frequency: Base's RF module IC (model: CC8520), crystal frequency: 48.0MHz, location: X1; Audio codec IC (model: CM102S+) for USB's crystal frequency: 12.0MHz, location: X2.

Frequency Range: 2404.000 MHz to 2479.000 MHz for all the models listed in the cover. 76 channels with 1MHz step for each microphone.

Modulation: 8FSK.

Antenna Type: Fixed; Gained: 2 dBi; Antenna length: 70mm of the base.

4.4. Description of Support Units

Test the EUT with audio signal generator.

4.5. Standards Applicable for Testing

The standard used was FCC PART 15, SUBPART C, PART 15.249.

The EUT belongs to low power communication device transmitter, and it's an unlicensed low power auxiliary device.

4.6. Test Location

GuangZhou Huesent Testing Service Co., Ltd.

No.91, Dongguanzhuang Road, Guangzhou, China.

Tel: 86-20-87221905, Fax: 86-20-87223892

CNAS- Accreditation No.: L2885.

CMA- Authorisation Certificate No.: 2008191614Z

ERP & Spurious Emission tests were subcontracted to the laboratory following-

Guangdong Environment Radiation Monitoring Center.

860, South Guangzhou Avenue, Guangzhou, P.R. China

Tel: 86-20-84281721 Fax: N/A Email: Kevin.ma@nemko.com

FCC- Registration No: 667318 on on Sep. 29, 2009

CNAS- Accreditation No: L5539.

4.7. Deviation from Standards

None.

4.8. Abnormalities from Standard Conditions

None.

5. Equipments Used during Test

Test Equipment	Manufactory	Model No.	Serial No.	Cal Date	Cal Due to Date
			Equipment No.		
3m Semi-anechoic Chamber	Albatross Projecets Gm	SAC-3M	/	2012-10-9	2014-10-9
			1.001		
Spectrum Analyzer	R&S	FSP30	101230	2012-7-30	2013-7-30
			1.003		
Spectrum Analyzer	R&S	FSP30	100207	2013-3-30	2014-3-30
			EMC0001		
EMI Receiver	R & S	ESCI	100849	2012-7-30	2013-7-30
			1.002		
EMI Receiver	R & S	ESCI	100336	2013-3-4	2014-3-4
			EMC1002		
LISN	AFJ	LS16C	16010643209	2013-2-28	2014-2-28
			EMC1003		
Two-Line V-Network	R & S	ENV216	100101	2012-7-30	2013-7-30
			1.004		
Shielding Room	DG ZongZhou	ZW-391 7x3.9x3 m	/	2011-5-25	2014-5-25
			EMC1001		
RF Signal Generator	R & S	SMB100A-B106	118622	2013-3-22	2014-3-22
			1.031		
Anechoic Chamber	ETS•Lindgren	RFSD-F-100	/	2012-4-10	2014-4-10
			ITL-100		
Power Meter	R & S	NRP2	101859	2013-3-22	2014-3-22
			1.033		
RF Power Amplifier	BONN	BLWA 0830-160/100/ 60D	118622	2013-3-22	2014-3-22
			1.032		
18G RF Pre-amplifier	MITEQ	AFS44	1381096	2013-6-8	2014-6-8
			1.01.1		
Power Meter	Rohde & Schwarz	URV35	100193	2013-6-8	2014-6-8
			EMC1506		
Audio Analyzer	Hewlett Packard	8903B	0467331	2013-2-27	2014-2-27
			EMC0011		
Power Sensor	Rohde & Schwarz	URV5-Z7	100287	2013-6-8	2014-6-8
			EMC1507		
Low Loss Coaxial Cable	HST	2 m	/	2012-12-6	2013-12-6
			EMC1008		
Noise Generator	Ningbo Zhongce	DF1681	6006867	2013-5-30	2014-5-30
			EMC0009		



Monopole Antenna	HST	N/A	EMC6002	2013-6-8	2014-6-8
1G-18GHz Double Ridged Guide Antenna	R & S	HF906	100685	2013-5-22	2014-5-22
			1.01		
15G-26.5(40)GHz Double Ridged Guide Antenna	Schwarzbeck	BBHA 9170	/	2013-6-8	2014-6-8
			EMC7001		
9k-30MHz Loop Antenna	BJ 2nd Factory	ZN30900A	B2-005;	2012-9-24	2013-9-24
			EMC6001		
Biconilog Antenna	Schwarzbeck	VULB9163	9163-378	2013-5-22	2015-5-22
			1.011		

6. Test Results

6.1. RADIATION INTERFERENCE

Test Requirement: FCC Part15.249, a) & FCC Part15.209

Test Method: ANSI C63.4:2003

Detector: Peak for pre-scan (The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz.)

Average detector if maximised peak within 6dB of limit

Test Date: Jun. 3, 2013

6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25°C

Humidity: 45% RH

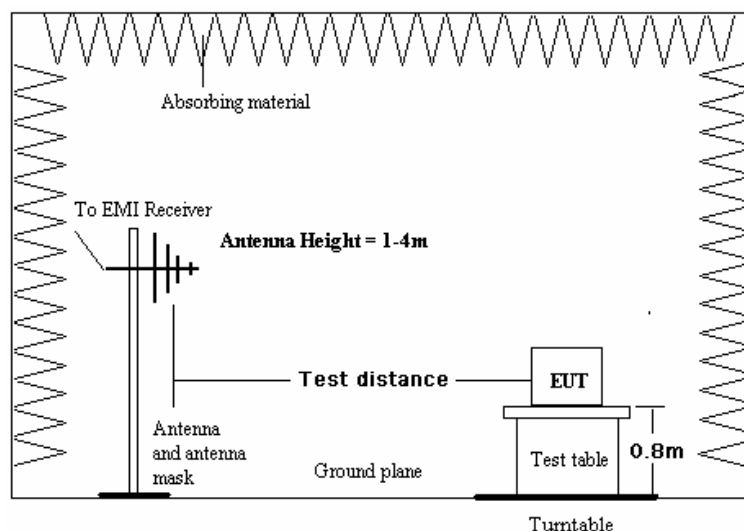
Atmospheric Pressure: 1020mBar

EUT Operation:

In the fundamental test, an Apple's Ipad supplied a sinusoidal signal at 1 kHz as input in worst case (within 1kHz to 20kHz input for pre-testing), connecting with the EUT to peripheral devices.

Test the EUT work normally in on mode during the whole test.

6.1.2 Test Setup



6.1.3 Test Procedure

ANSI STANDARD C63.4-2003 10.1.7 MEASUREMENT PROCEDURES:

An initial pre-scan was performed in the 3m chamber using the spectrum analyser in peak detection mode. Average measurements were conducted based on the peak sweep graph. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical polarities.

6.1.4 Measurement Data

Copy from FCC Part 15.249.a)

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental	Field Strength	
Frequency	Fundamental	Harmonics
MHz	millivolts/meter(mV/m)	microvolts/meter(uV/m)
902 - 928	50	500
2400 - 2483.5	50	500
5725 - 5875	50	500
24000 - 24250	250	2500

Peak measurement of carrier						
Frequency	Level		Transducer	Limit	Margin	
MHz	dBuV/m		dB	dBuV/m	dB	
	V	H			V	H
2404.0 (L)	92.2	96.5	-13.8	114	21.8	17.5
2442.0 (M)	92.1	96.3	-11.9		21.9	17.7
2479.0 (H)	92.0	96.1	-10.6		22.0	17.9
Note: 50mV/m (94dBuV/m) for AVG limit, and Peak limit= AVG limit + 20dB.						
Average measurement of carrier						
Frequency	Level		Transducer	Limit	Margin	
MHz	dBuV/m		dB	dBuV/m	dB	
	V	H			V	H
2404.0 (L)	63.3	69.3	-13.8	94	30.7	24.7
2442.0 (M)	63.5	69.5	-11.9		30.5	24.5
2479.0 (H)	63.7	69.8	-10.6		30.3	24.2
Note: 50mV/m (94dBuV/m) for AVG limit, and Peak limit= AVG limit + 20dB. The transducer factor = antenna factor + cable loss - preamplifier. The Level = Read level + transducer factor. H: Antenna polarization horizontal direction. V: Antenna polarization vertical direction.						

Peak measurement of harmonics and spurious emission at lowest channel 2404MHz							
Frequency		Level		Transducer	Limit	Min. Margin	
MHz		dBuV/m		dB	dBuV/m	dB	
		V	H			V	H
2 nd	4808.0	43.2	43.3	-11.8	74dB	30.8	30.7
3 rd	7212.0	46.2	46.5	-7.9		27.8	27.5
4 th	9616.0	46.5	47.2	-4.6		27.5	26.8
5 th	12020.0	46.6	47.1	-3.6		27.4	26.9
6 th	14424.0	47.1	47.5	-2.0		26.9	26.5
7 th	16828.0	47.2	47.5	-0.7		26.8	26.5
8 th	19232.0	47	47.8	-1.0		27.0	26.2
9 th	21636.0	47.6	48.2	-0.8		26.4	25.8
10 th	24040.0	47.7	48.3	-0.6		26.3	25.7

Average measurement of harmonics and spurious emission at lowest channel 2404MHz							
Frequency		Level		Transducer	Limit	Min. Margin	
MHz		dBuV/m		dB	dBuV/m	dB	
		V	H			V	H
2 nd	4808.0	35.2	36.3	-11.8	54dB	18.8	17.7
3 rd	7212.0	34.2	36.2	-7.9		19.8	17.8
4 th	9616.0	35.3	37.2	-4.6		18.7	16.8
5 th	12020.0	36.3	37.3	-3.6		17.7	16.7
6 th	14424.0	36.1	37.7	-2.0		17.9	16.3
7 th	16828.0	37.0	37.4	-0.7		17.0	16.6
8 th	19232.0	37.2	37.8	-1.0		16.8	16.2
9 th	21636.0	37.5	38.2	-0.8		16.5	15.8
10 th	24040.0	37.7	38.8	-0.6		16.3	15.2

Note:

500 μ V/m (54dBuV/m) for AVG limit, and Peak limit= AVG limit + 20dB.

The transducer factor = antenna factor + cable loss - preamplifier.

The Level = Read level + transducer factor.

H: Antenna polarization horizontal direction. V: Antenna polarization vertical direction.

Peak measurement of harmonics and spurious emission at middle channel 2442MHz

Frequency		Level		Transducer	Limit	Min. Margin	
MHz		dBuV/m		dB	dBuV/m	dB	
		V	H			V	H
2 nd	4884.0	43.1	43.2	-11.8	74dB	30.9	30.8
3 rd	7326.0	46.3	46.4	-7.9		27.7	27.6
4 th	9768.0	46.3	46.7	-4.6		27.7	27.3
5 th	12210.0	46.5	47.2	-3.6		27.5	26.8
6 th	14652.0	46.8	47.7	-2.0		27.2	26.3
7 th	17094.0	47.4	47.2	-0.7		26.6	26.8
8 th	19536.0	47.1	47.5	-1.0		26.9	26.5
9 th	21978.0	47.2	48.6	-0.8		26.8	25.4
10 th	24420.0	47.7	48.4	-0.6		26.3	25.6

Average measurement of harmonics and spurious emission at middle channel 2442MHz

Frequency		Level		Transducer	Limit	Min. Margin	
MHz		dBuV/m		dB	dBuV/m	dB	
		V	H			V	H
2 nd	4884.0	35.3	36.4	-11.8	54dB	18.7	17.6
3 rd	7326.0	34.6	36.5	-7.9		19.4	17.5
4 th	9768.0	35.2	37.7	-4.6		18.8	16.3
5 th	12210.0	36.2	37.4	-3.6		17.8	16.6
6 th	14652.0	36.5	37.6	-2.0		17.5	16.4
7 th	17094.0	37.1	37.2	-0.7		16.9	16.8
8 th	19536.0	37.3	37.8	-1.0		16.7	16.2
9 th	21978.0	37.5	38.8	-0.8		16.5	15.2
10 th	24420.0	37.6	38.9	-0.6		16.4	15.1

Note:

500 μ V/m (54dBuV/m) for AVG limit, and Peak limit= AVG limit + 20dB.

The transducer factor = antenna factor + cable loss - preamplifier.

The Level = Read level + transducer factor.

H: Antenna polarization horizontal direction. V: Antenna polarization vertical direction.

Peak measurement of harmonics and spurious emission at highest channel 2479MHz							
Frequency		Level		Transducer	Limit	Min. Margin	
MHz		dBuV/m		dB	dBuV/m	dB	
		V	H			V	H
2 nd	4958.0	43.6	43.5	-11.8	74dB	30.4	30.5
3 rd	7437.0	46.1	46.7	-7.9		27.9	27.3
4 th	9916.0	46.4	47.8	-4.6		27.6	26.2
5 th	12395.0	46.2	47.8	-3.6		27.8	26.2
6 th	14874.0	47.3	47.7	-2.0		26.7	26.3
7 th	17353.0	47.4	47.7	-0.7		26.6	26.3
8 th	19832.0	47.1	47.6	-1.0		26.9	26.4
9 th	22311.0	47.2	48.1	-0.8		26.8	25.9
10 th	24790.0	47.7	48.8	-0.6		26.3	25.2

Average measurement of harmonics and spurious emission at highest channel 2479MHz							
Frequency		Level		Transducer	Limit	Min. Margin	
MHz		dBuV/m		dB	dBuV/m	dB	
		V	H			V	H
2 nd	4958.0	35.3	36.6	-11.8	54dB	18.7	17.4
3 rd	7437.0	34.1	36.6	-7.9		19.9	17.4
4 th	9916.0	35.3	37.2	-4.6		18.7	16.8
5 th	12395.0	36.3	37.6	-3.6		17.7	16.4
6 th	14874.0	36.2	37.9	-2.0		17.8	16.1
7 th	17353.0	37.1	37.6	-0.7		16.9	16.4
8 th	19832.0	37.3	37.7	-1.0		16.7	16.3
9 th	22311.0	37.4	38.7	-0.8		16.6	15.3
10 th	24790.0	37.8	38.6	-0.6		16.2	15.4

Note:

500μV/m (54dBuV/m) for AVG limit, and Peak limit= AVG limit + 20dB.

The transducer factor = antenna factor + cable loss - preamplifier.

The Level = Read level + transducer factor.

H: Antenna polarization horizontal direction. V: Antenna polarization vertical direction.

Note:

The EUT's transmitting frequency range is 2404-2479MHz, and it is complied with the requirements of FCC Part 15.249.a).

6.1.5 Radiated outside of the specified frequency bands

Copy from FCC Part 15.249.d)

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

Copy from FCC Part 15.209: Radiated emission limits, general requirements

(a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency	Field Strength	Measurement Distance
MHz	microvolts/meter(uV/m)	(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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

(d) The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

Note:

Since the fundamental emissions peak and average values are shown on section 6.1.4 of this report, the general radiated emission limits in Section 15.209 is the lesser attenuation.

Limits for the frequency bands of 2400 M - 2483.5 MHz

Frequency	15.209 General Radiated limits	
MHz	dBuV/m@3m	
	QP	AVG
30 - 88	40	/
88 - 216	43.5	/
216 - 960	46	/
960 - 1000	54	/
Above 1000	74(PK)	54

Frequency	15.249.d) limits	
MHz	dBuV/m@3m	
	QP	AVG
30 - 88	40	/
88 - 216	43.5	/
216 - 960	46	/
960 - 1000	54	/
1000-2400, 2483.5-25000 & except for harmonics	74(PK)	54

Remark:

1. RF line voltage (dBuV)= 20 log RF line 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 and the closed point of any part of the device or system.

6.1.6 Measurement Data for 15.249.d

Test the EUT on transmitting mode with an adapter in mains.

1) 9kHz~30MHz Test result

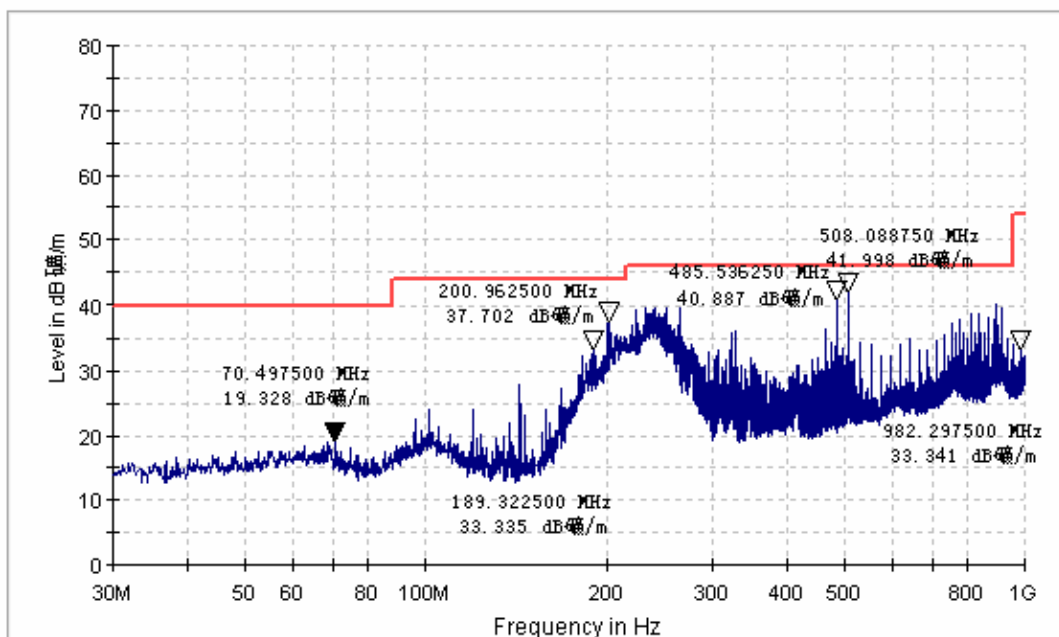
The Low frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not report.

2) 30 MHz~1 GHz Spurious Emissions .Quasi-Peak Measurement

Test curves (with the Quasi-peak measurement and QP limit), 30M-1GHz, Horizontal & Vertical:

1#: lowest channel 2404MHz, Horizontal

FCC PART15 Rad. EM VULB9163 PRE

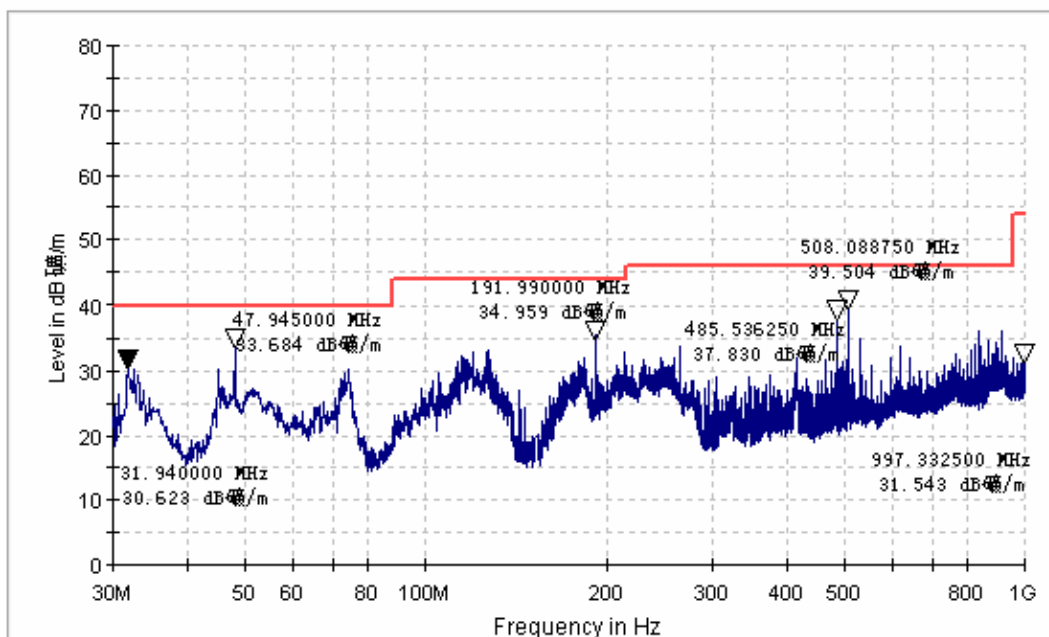


Quasi-peak measurement

Frequency	Level	Transducer	Limit	Margin
MHz	dBuV/m	dB	dBuV/m	dB
70.5	19.3	12.3	40	20.7
189.3	33.3	12.6	43.5	10.2
201.0	37.7	12.7	43.5	5.8
485.5	40.9	20.1	46	5.1
508.1	42.0	20.3	46	4.0
980.3	33.3	14.5	54	20.7
Note: The transducer factor includes antenna factor and cable loss.				

1#: lowest channel 2404MHz, Vertical

FCC PART15 Rad. EM VULB9163 PRE



Quasi-peak measurement

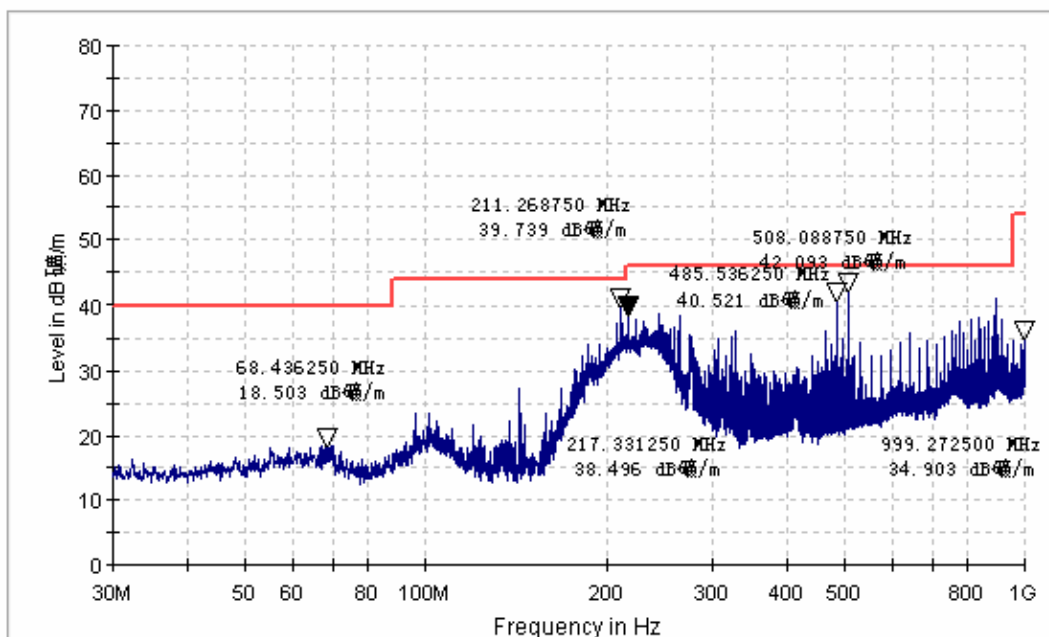
Frequency	Level	Transducer	Limit	Margin
MHz	dBuV/m	dB	dBuV/m	dB
31.9	30.6	16.5	40	9.4
47.9	33.7	12.5	40	6.3
192.0	35.0	12.6	43.5	8.5
485.5	37.8	20.1	46	8.2
508.1	39.5	20.3	46	6.5
997.3	31.5	14.5	54	22.5

Note:

The transducer factor includes antenna factor and cable loss.

2#: middle channel 2442MHz, Horizontal

FCC PART15 Rad. EM VULB9163 PRE



Quasi-peak measurement

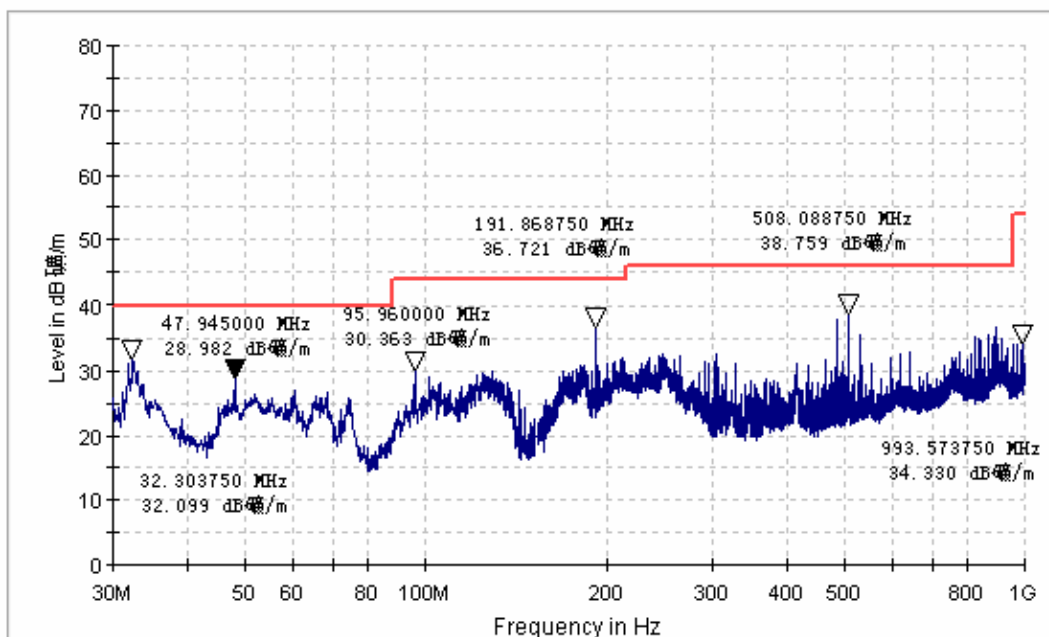
Frequency	Level	Transducer	Limit	Margin
MHz	dBuV/m	dB	dBuV/m	dB
68.4	18.5	12.3	40	21.5
211.3	39.7	12.6	43.5	3.8
217.3	38.5	12.7	46	7.5
485.5	40.5	20.1	46	5.5
508.1	42.1	20.3	46	3.9
999.3	34.9	14.5	54	19.1

Note:

The transducer factor includes antenna factor and cable loss.

2#: middle channel 2442MHz, Vertical

FCC PART15 Rad. EM VULB9163 PRE



Quasi-peak measurement

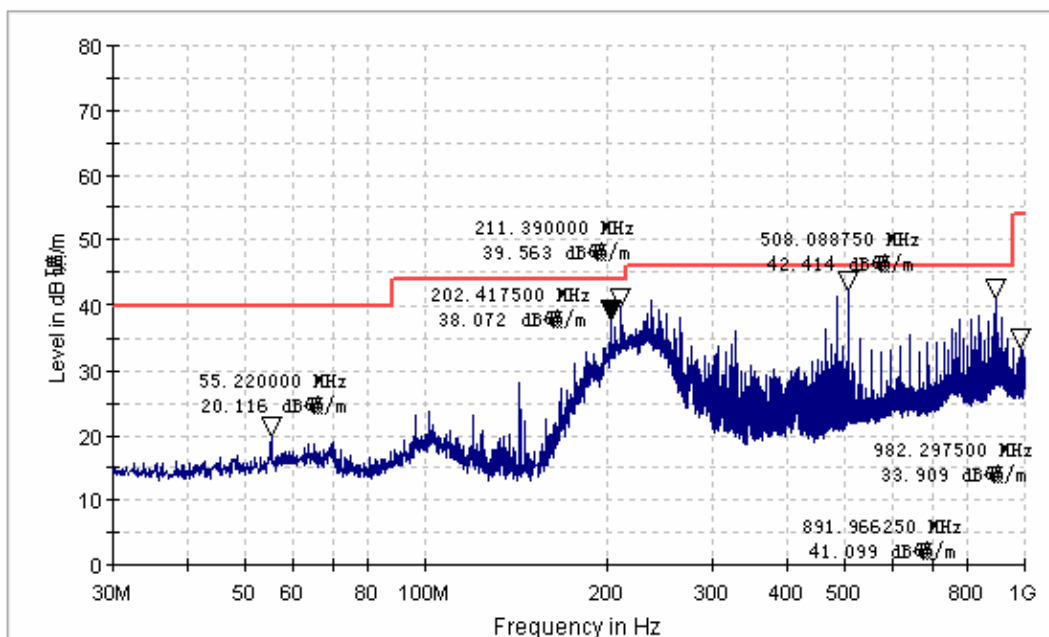
Frequency	Level	Transducer	Limit	Margin
MHz	dBuV/m	dB	dBuV/m	dB
32.3	32.1	16.5	40	7.9
47.9	29.0	12.5	40	11.0
96.0	30.4	11.2	43.5	13.1
192.0	36.7	12.6	43.5	6.8
508.1	38.8	20.3	46	7.2
993.6	34.3	14.5	54	19.7

Note:

The transducer factor includes antenna factor and cable loss.

3#: highest channel 2479MHz, Horizontal

FCC PART15 Rad. EM VULB9163 PRE



Quasi-peak measurement

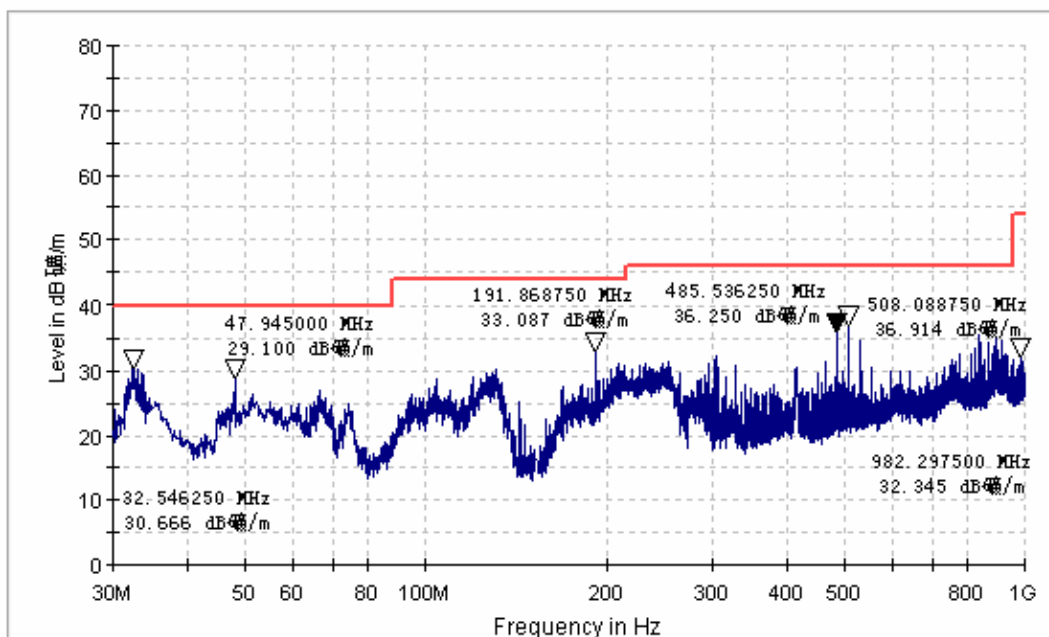
Frequency	Level	Transducer	Limit	Margin
MHz	dBuV/m	dB	dBuV/m	dB
55.2	20.1	12.5	40	19.9
202.4	38.1	12.7	43.5	5.4
211.4	39.6	12.7	43.5	3.9
508.1	42.4	20.3	46	3.6
892.0	41.1	15.0	46	4.9
982.3	33.9	14.5	54	20.1

Note:

The transducer factor includes antenna factor and cable loss.

3#: highest channel 2479MHz, Vertical

FCC PART15 Rad. EM VULB9163 PRE



Quasi-peak measurement

Frequency	Level	Transducer	Limit	Margin
MHz	dBuV/m	dB	dBuV/m	dB
32.5	30.7	16.5	40	9.3
47.9	29.1	12.6	40	10.9
191.9	33.1	12.6	43.5	10.4
485.6	36.3	20.1	46	9.7
508.1	36.9	20.3	46	9.1
982.3	32.3	14.5	54	21.7

Note:

The transducer factor includes antenna factor and cable loss.

3) 1 GHz~25 GHz Spurious Emissions .Average & PK Measurement

Average measurement at lowest channel 2404MHz

Average measurement at lowest channel 2 to 10 MHz						
Frequency	Level		Transducer	Limit	Margin	
GHz	dBuV/m		dB	dBuV/m	dB	
	Horizontal	Vertical			Horizontal	Vertical
1.202	40.5	39.1	-12.8	54	13.5	14.9
2.394*	42.3	40.9	-12.2		11.7	13.1
2.554	40.6	39.9	-12.1		13.4	14.1
5.264	40.2	39.7	-11.9		13.8	14.3
7.452	40.9	39.4	-8.0		13.1	14.6
10.252	40.6	40.5	-4.6		13.4	13.5
12.782	39.7	39.5	-3.6		14.3	14.5
22.657	39.4	39.8	-0.8		14.6	14.2
Note: The transducer factor includes antenna factor and cable loss. * means the max average value for band-edge (frequency range of 2300MHz to 2400MHz, except for harmonics) is the plot measurement at 2.394GHz.						

Peak measurement at lowest channel 2404MHz

Peak measurement at lowest channel 210 MHz						
Frequency	Level		Transducer	Limit	Margin	
GHz	dBuV/m		dB	dBuV/m	dB	
	Horizontal	Vertical			Horizontal	Vertical
1.202	50.1	50.2	-12.8	74	23.9	23.8
2.394*	51.0	50.3	-12.2		23.0	23.7
2.554	50.3	49.4	-12.1		23.7	24.6
5.264	50.2	49.9	-11.9		23.8	24.1
7.452	49.7	50.7	-8.0		24.3	23.3
10.252	50.4	50.2	-4.5		23.6	23.8
12.782	50.8	50.3	-3.6		23.2	23.7
22.657	49.8	50.6	-0.8		24.2	23.4
Note: The transducer factor includes antenna factor and cable loss. * means the max peak value for band-edge (frequency range of 2300MHz to 2400MHz, except for harmonics) is the plot measurement at 2.394GHz.						

Average measurement at middle channel 2442MHz

Average measurement at middle channel 2.142MHz						
Frequency	Level		Transducer	Limit	Margin	
GHz	dBuV/m		dB	dBuV/m	dB	
	Horizontal	Vertical			Horizontal	Vertical
1.226	40.6	40.2	-12.8	54	13.4	13.8
2.385	40.7	40.4	-12.2		13.3	13.6
2.592	40.6	40.4	-12.1		13.4	13.6
5.342	40.2	39.8	-11.9		13.8	14.2
7.555	40.7	40.3	-8.0		13.3	13.7
10.374	40.3	39.8	-4.6		13.7	14.2
12.648	40.2	40.2	-3.6		13.8	13.8
23.420	40.3	40.9	-0.8		13.7	13.1
Note: The transducer factor includes antenna factor and cable loss.						

Peak measurement at middle channel 2442MHz

Peak measurement at middle channel 2442MHz						
Frequency	Level		Transducer	Limit	Margin	
GHz	dBuV/m		dB	dBuV/m	dB	
	Horizontal	Vertical			Horizontal	Vertical
1.226	50.2	50.3	-12.8	74	23.8	23.7
2.385	50.6	50.6	-12.2		23.4	23.4
2.592	50.2	50.6	-12.1		23.8	23.4
5.342	50.3	50.5	-11.9		23.7	23.5
7.555	50.6	50.2	-8.0		23.4	23.8
10.374	50.4	50.2	-4.5		23.6	23.8
12.648	50.2	50.4	-3.6		23.8	23.6
23.420	50.5	50.2	-0.8		23.5	23.8
Note: The transducer factor includes antenna factor and cable loss.						

Average measurement at highest channel 2479MHz

Frequency	Level		Transducer	Limit	Margin	
GHz	dBuV/m		dB	dBuV/m	dB	
	Horizontal	Vertical			Horizontal	Vertical
1.240	40.7	40.2	-12.8	54	13.3	13.8
2.384	40.2	40.8	-12.2		13.8	13.2
2.489*	50.9	47.8	-12.1		3.1	6.2
5.334	40.6	40.4	-11.9		13.4	13.6
7.492	40.4	40.2	-8.0		13.6	13.8
10.322	40.3	39.7	-4.6		13.7	14.3
13.931	40.4	40.5	-3.5		13.6	13.5
23.423	40.4	40.2	-0.8		13.6	13.8

Note:

The transducer factor includes antenna factor and cable loss.

* means the max average value for band-edge (frequency range of 2483.5MHz to 2583.5MHz, except for harmonics) is the plot measurement at 2.489GHz.

Peak measurement at highest channel 2479MHz

Frequency	Level		Transducer	Limit	Margin	
GHz	dBuV/m		dB	dBuV/m	dB	
	Horizontal	Vertical			Horizontal	Vertical
1.240	50.4	50.1	-12.8	74	23.6	23.9
2.384	50.4	50.2	-12.2		23.6	23.8
2.489*	54.6	51.7	-12.1		19.4	22.3
5.334	50.5	50.1	-11.9		23.5	23.9
7.492	50.5	50.7	-8.0		23.5	23.3
10.322	50.5	50.3	-4.5		23.5	23.7
13.931	50.2	49.9	-3.6		23.8	24.1
23.423	49.8	50.2	-0.8		24.2	23.8

Note:

The transducer factor includes antenna factor and cable loss.

* means the max peak value for band-edge (frequency range of 2483.5MHz to 2583.5MHz, except for harmonics) is the plot measurement at 2.489GHz.

6.2. Occupied Bandwidth

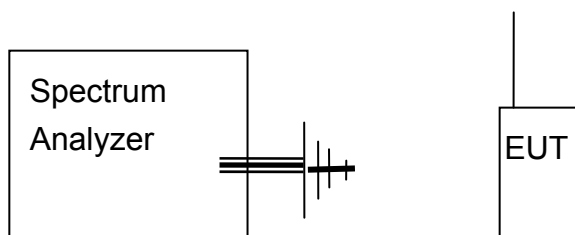
Test Requirement: FCC Part15.215
Test Method: ANSI C63.4: 2003
Detector: Peak for scan (The resolution bandwidth was 1MHz and the video bandwidth was 1MHz, span was 20MHz)
maximised peak hold
Test Date: Jun. 28, 2013

6.2.1 E.U.T. Operation

Operating Environment:
Temperature: 25°C Humidity:45% RH Atmospheric Pressure: 1020mBar
EUT Operation:

Test the EUT work normally in on mode during the whole test.

6.2.2 Test Setup



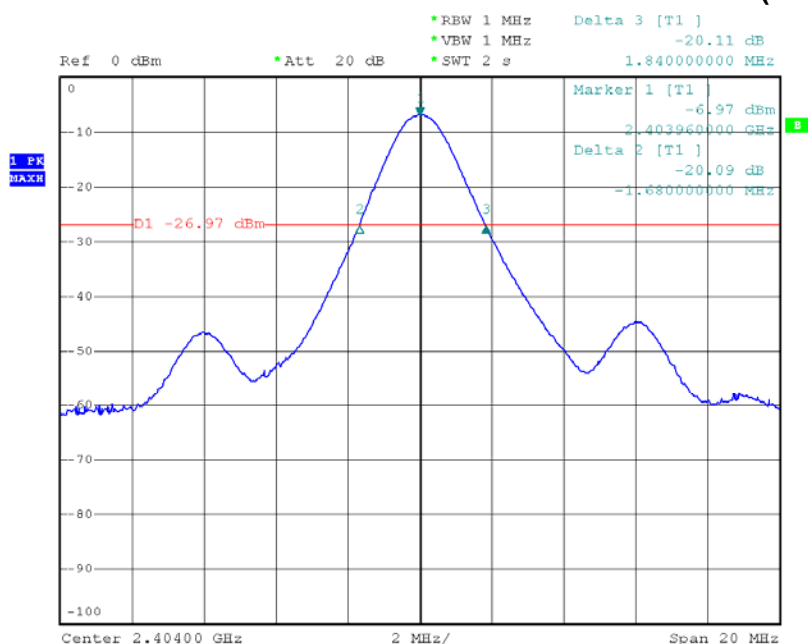
6.2.3 Test Procedure

ANSI STANDARD C63.4-2003 10.1.7 MEASUREMENT PROCEDURES:

An initial pre-scan was performed in the 3m chamber using the spectrum analyzer in peak detection mode. Average measurements were conducted based on the peak sweep graph. When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical polarities.

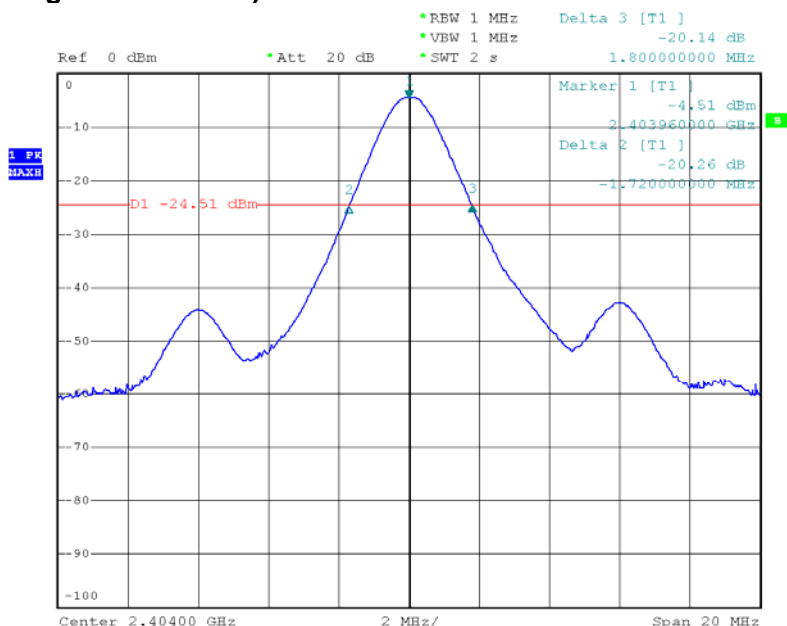
6.2.4 Measurement Data

Maximum Peak hold measurement for lowest channel 2404.0MHz (without modulated)



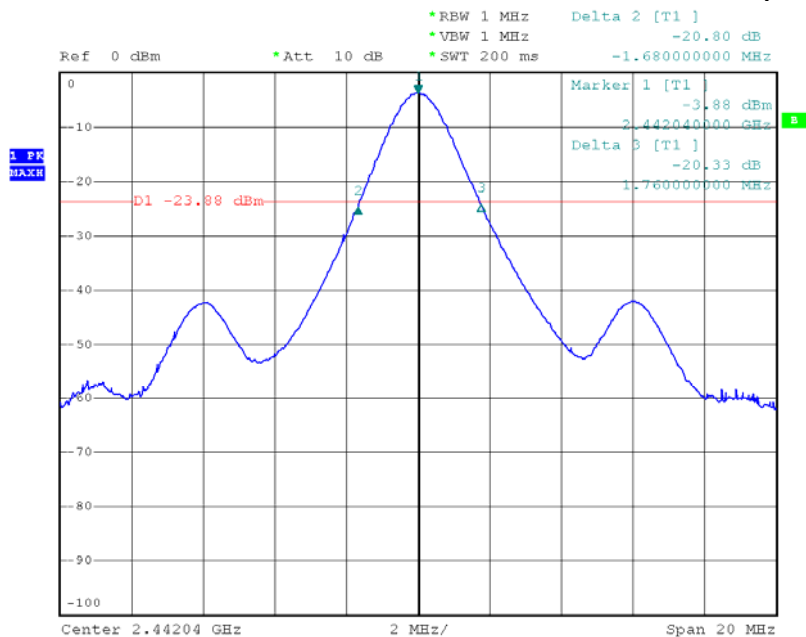
Date: 27.JUN.2013 08:26:12

Maximum Peak hold measurement for lowest channel 2404.0MHz (with 20kHz sinusoidal signal modulated)



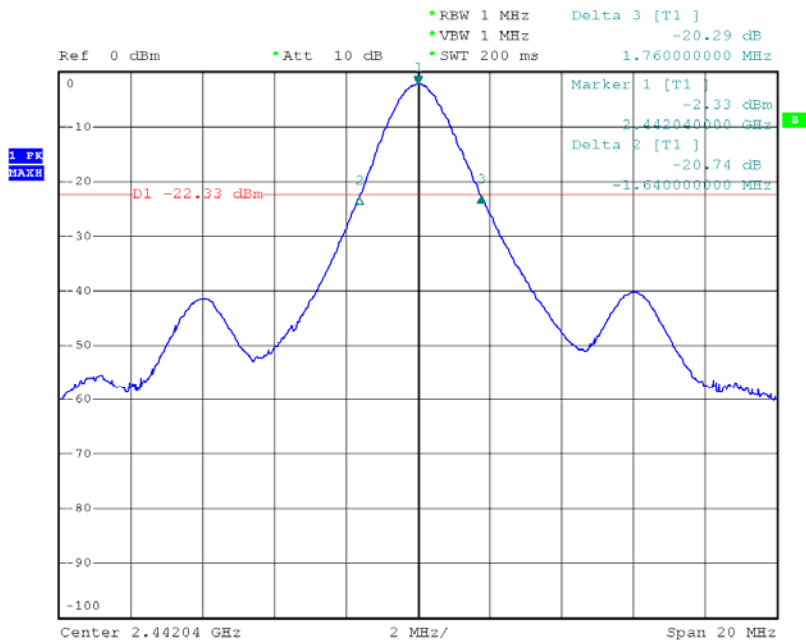
Date: 27.JUN.2013 08:27:46

Maximum Peak hold measurement for middle channel 2442.0MHz (without modulated)



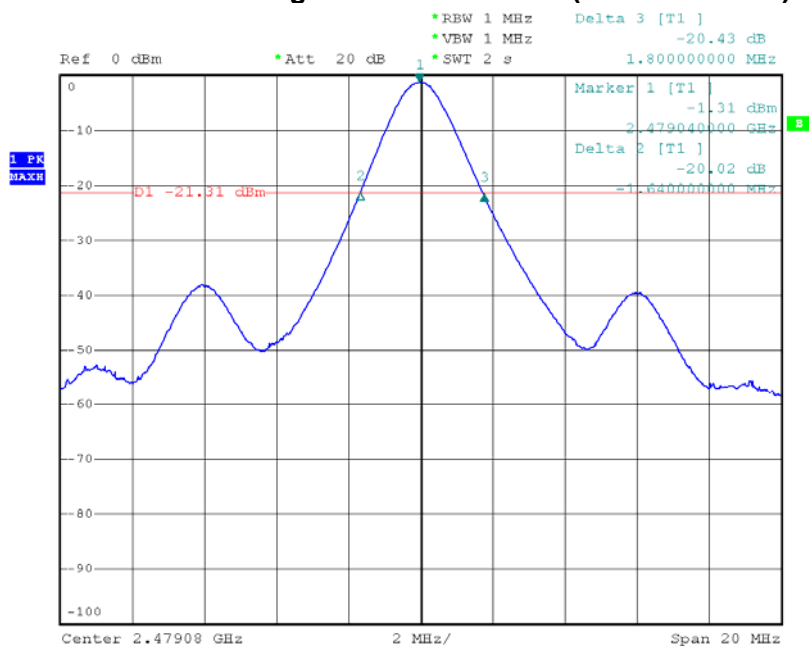
Date: 29.JUN.2013 09:03:05

Maximum Peak hold measurement for middle channel 2442.0MHz (with 20kHz sinusoidal signal modulated)



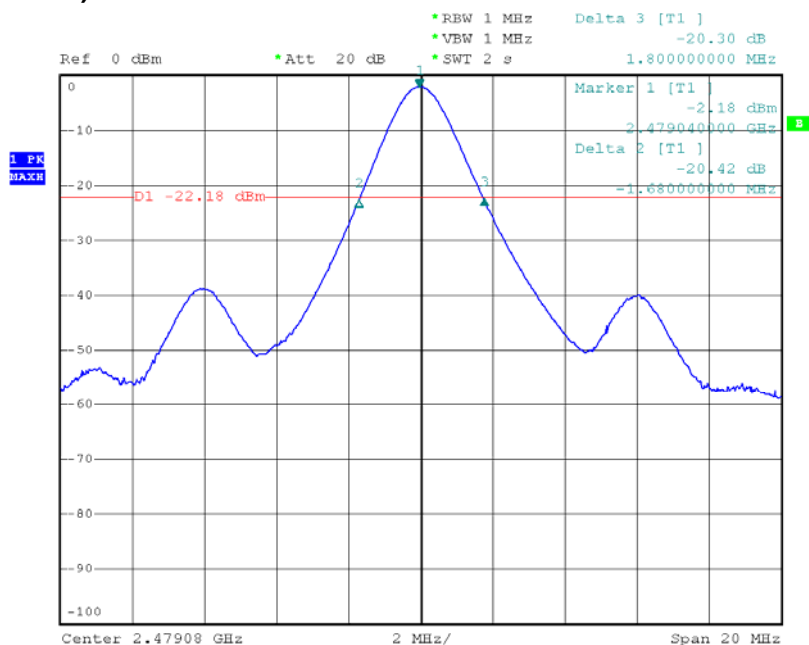
Date: 29.JUN.2013 09:05:44

Maximum Peak hold measurement for highest channel 2479.0MHz (without modulated)



Date: 27.JUN.2013 08:19:05

Maximum Peak hold measurement for highest channel 2479.0MHz (with 20kHz sinusoidal signal modulated)



Date: 27.JUN.2013 08:17:24

Note: An Apple's Ipod supplied a sinusoidal signal at 20 kHz as input in worst case (within 1kHz to 20kHz input for pre-testing).

The -20dB Bandwidth:

Lowest Ch.: 2404MHz	$\Delta FL-$ / MHz	$\Delta FL+$ / MHz	-20dB Bandwidth/ MHz
Without modulated	-1.68	1.84	3.52
Modulated with 20kHz sinusoidal signal	-1.72	1.80	3.52

Middle Ch.: 2442MHz	$\Delta FM-$ / MHz	$\Delta FM+$ / MHz	-20dB Bandwidth/ MHz
Without modulated	-1.68	1.76	3.44
Modulated with 20kHz sinusoidal signal	-1.64	1.76	3.40

Highest Ch.: 2479MHz	$\Delta FH-$ / MHz	$\Delta FH+$ / MHz	-20dB Bandwidth/ MHz
Without modulated	-1.64	1.80	3.44
Modulated with 20kHz sinusoidal signal	-1.68	1.80	3.48

6.3. Conducted Emissions at Mains Terminals 150 kHz to 30 MHz

Test Requirement: FCC Part 15 C section 15.207

Test Method: ANSI C63.10: Clause 6.2 & DA 00-705

Frequency Range: 150 kHz to 30 MHz

Detector: Peak for pre-scan (9 kHz Resolution Bandwidth)

Test Limit

Limits for conducted disturbance at the mains ports of class B

Frequency Range	Class B Limit dB(μV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
NOTE 1 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.		

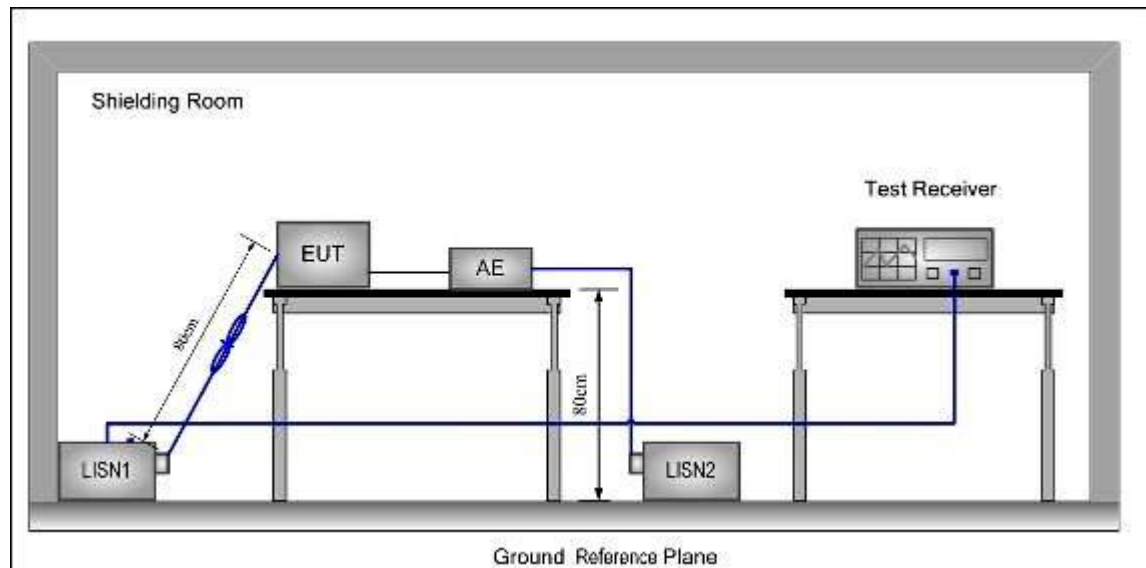
6.3.1 EUT Operation

Test in normal operating mode. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Test the EUT on transmitting mode with an adapter in mains.

6.3.2 Test Configuration



6.3.3 Test Procedure

1. The mains terminal disturbance voltage test was conducted in a shielded room.
2. The EUT was connected to AC power source through a LISN 1 (Line Impedance Stabilization Network) which provides a $50\Omega/50\mu\text{H} + 5\Omega$ linear impedance. The power cables of all other units of the EUT were connected to a second LISN 2, which was bonded to the ground reference plane in the same way as the LISN 1 for the unit being measured. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.
3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.
4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0,4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN 1 was placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT. All other units of the EUT and associated equipment was at least 0,8 m from the LISN 2.

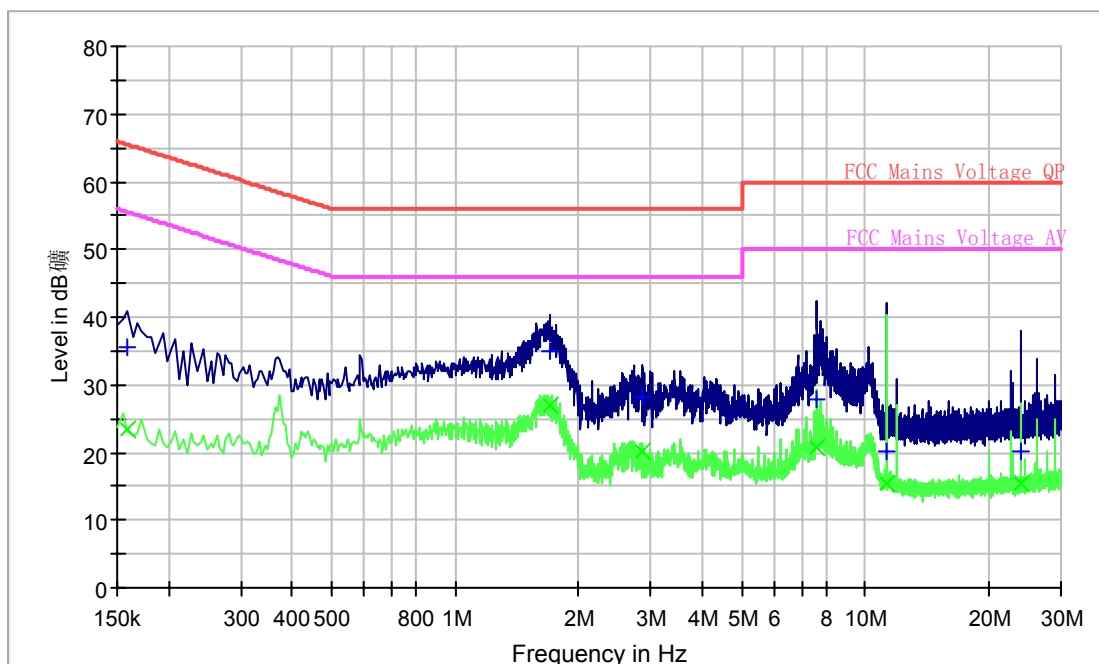
6.3.4 Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected. For EUT the communicating was worst case mode.

The following Quasi-Peak and Average measurements were performed on the EUT:

Voltage ENV216 PRE



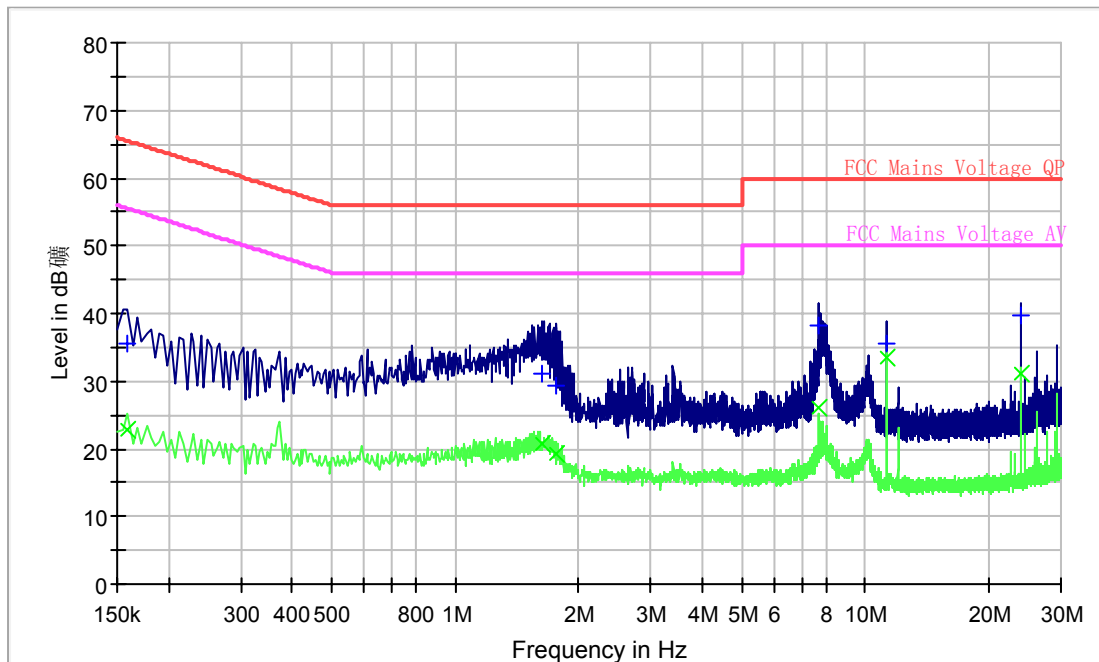
QP

Frequency (MHz)	QuasiPeak (dBuV/m)	Average (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV/m)	Comment
0.159000	35.6	23.3	1000.000	9.000	Off	L1	19.9	29.9	65.5	
1.702500	35.0	26.8	1000.000	9.000	Off	L1	19.9	21.0	56.0	
2.850000	28.0	20.1	1000.000	9.000	Off	L1	20.0	28.0	56.0	
7.642500	27.8	20.9	1000.000	9.000	Off	L1	20.1	32.2	60.0	
11.256000	20.2	15.5	1000.000	9.000	Off	L1	20.1	39.8	60.0	
23.968500	20.1	15.3	1000.000	9.000	Off	L1	20.3	39.9	60.0	

AVE

Frequency (MHz)	QuasiPeak (dBuV/m)	Average (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV/m)	Comment
0.159000	35.6	23.3	1000.000	9.000	Off	L1	19.9	32.2	55.5	
1.702500	35.0	26.8	1000.000	9.000	Off	L1	19.9	19.2	46.0	
2.850000	28.0	20.1	1000.000	9.000	Off	L1	20.0	25.9	46.0	
7.642500	27.8	20.9	1000.000	9.000	Off	L1	20.1	29.1	50.0	
11.256000	20.2	15.5	1000.000	9.000	Off	L1	20.1	34.5	50.0	
23.968500	20.1	15.3	1000.000	9.000	Off	L1	20.3	34.7	50.0	

Voltage ENV216 PRE



QP

Frequency (MHz)	QuasiPeak (dBuV/m)	Average (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV/m)	Comment
0.159000	35.5	23.0	1000.000	9.000	Off	N	19.9	30.0	65.5	
1.626000	31.2	20.7	1000.000	9.000	Off	N	20.0	24.8	56.0	
1.770000	29.2	19.4	1000.000	9.000	Off	N	20.0	26.8	56.0	
7.678500	38.3	26.0	1000.000	9.000	Off	N	20.1	21.7	60.0	
11.292000	35.5	33.6	1000.000	9.000	Off	N	20.2	24.5	60.0	
24.000000	39.7	31.2	1000.000	9.000	Off	N	20.3	20.3	60.0	

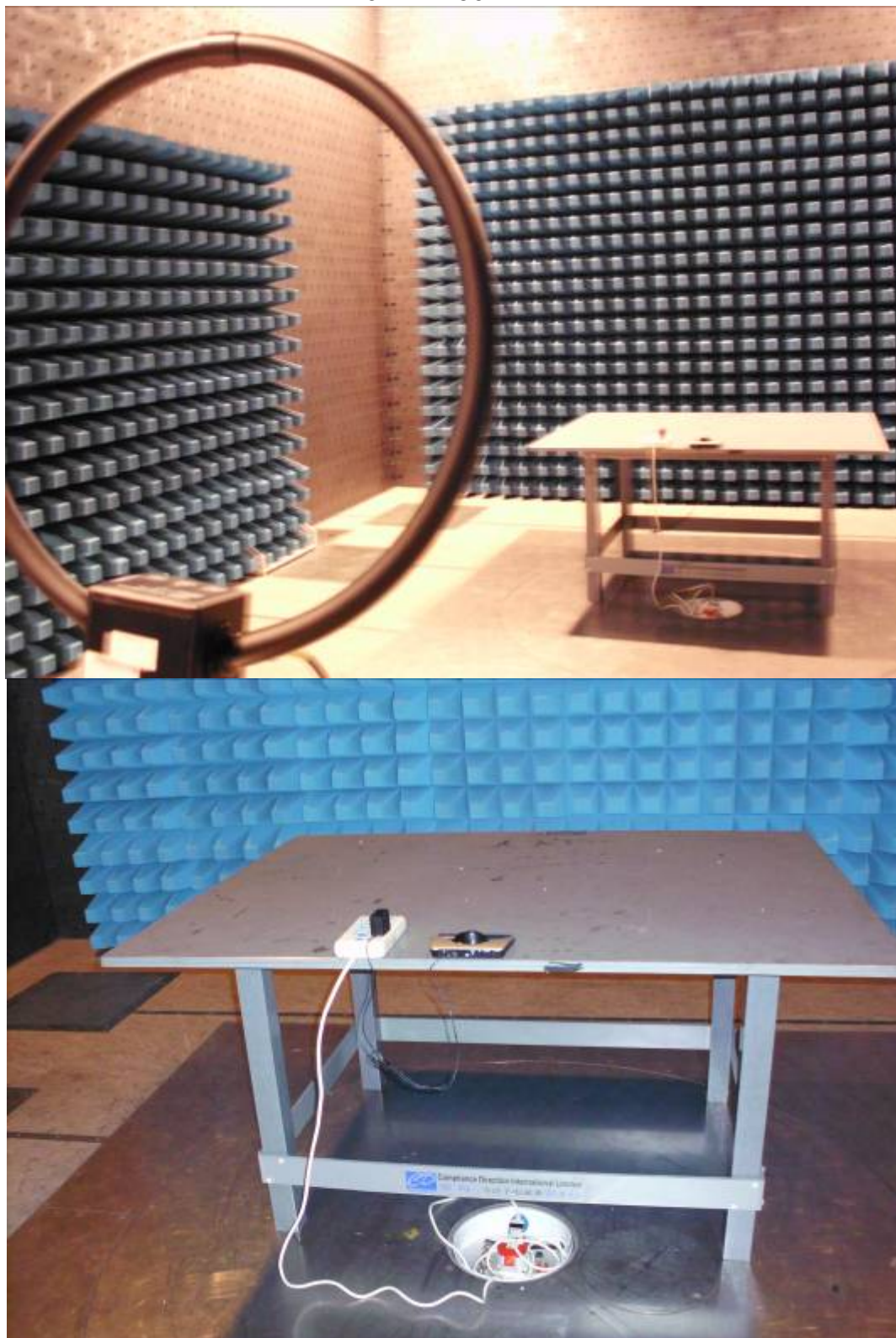
AVE

Frequency (MHz)	QuasiPeak (dBuV/m)	Average (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV/m)	Comment
0.159000	35.5	23.0	1000.000	9.000	Off	N	19.9	32.5	55.5	
1.626000	31.2	20.7	1000.000	9.000	Off	N	20.0	25.3	46.0	
1.770000	29.2	19.4	1000.000	9.000	Off	N	20.0	26.6	46.0	
7.678500	38.3	26.0	1000.000	9.000	Off	N	20.1	24.0	50.0	
11.292000	35.5	33.6	1000.000	9.000	Off	N	20.2	16.4	50.0	
24.000000	39.7	31.2	1000.000	9.000	Off	N	20.3	18.8	50.0	

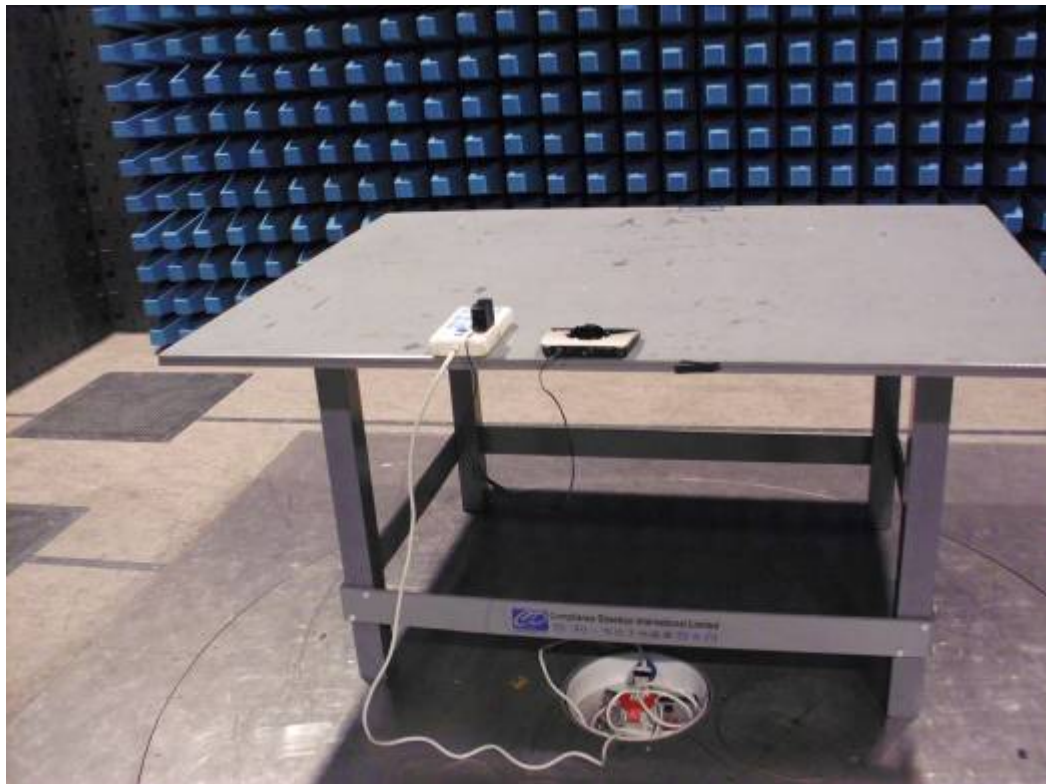
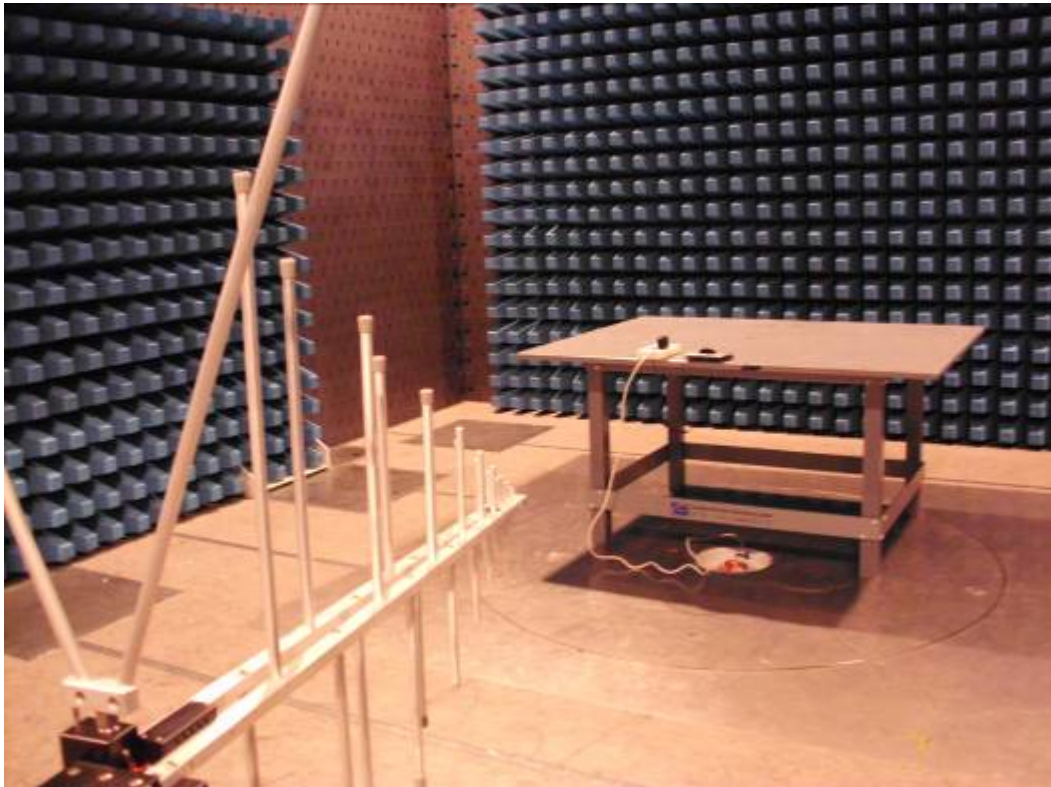
7. Photographs

7.1. Radiated Emission Test Setup

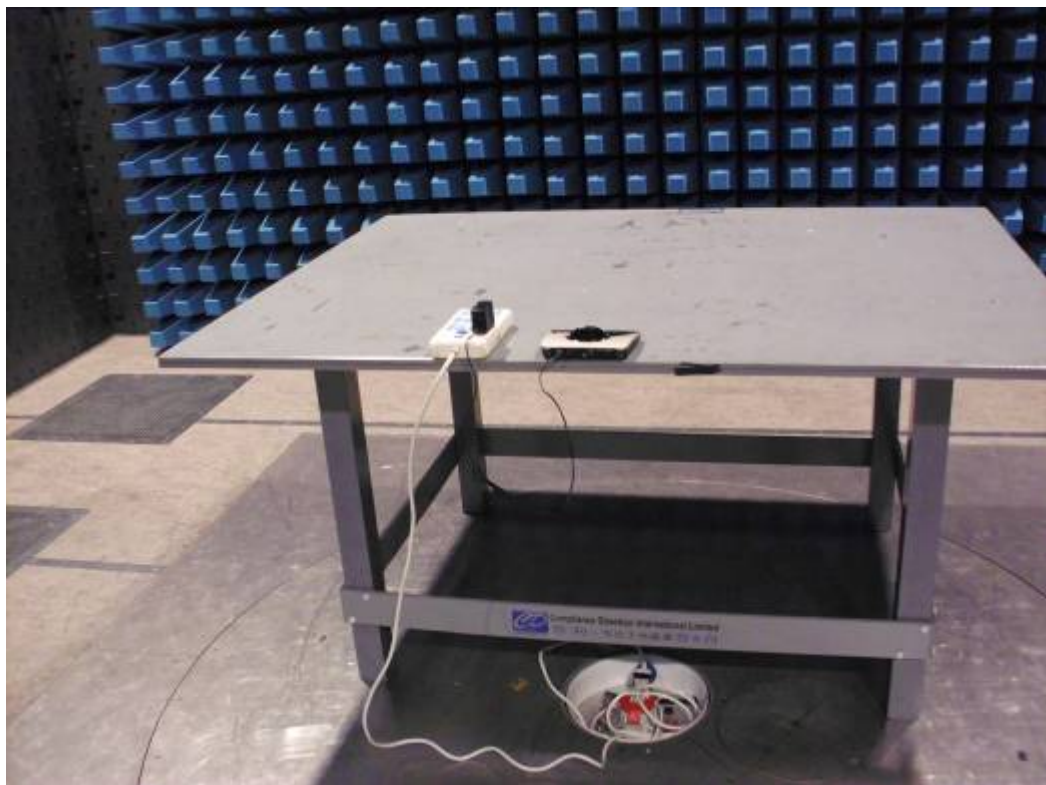
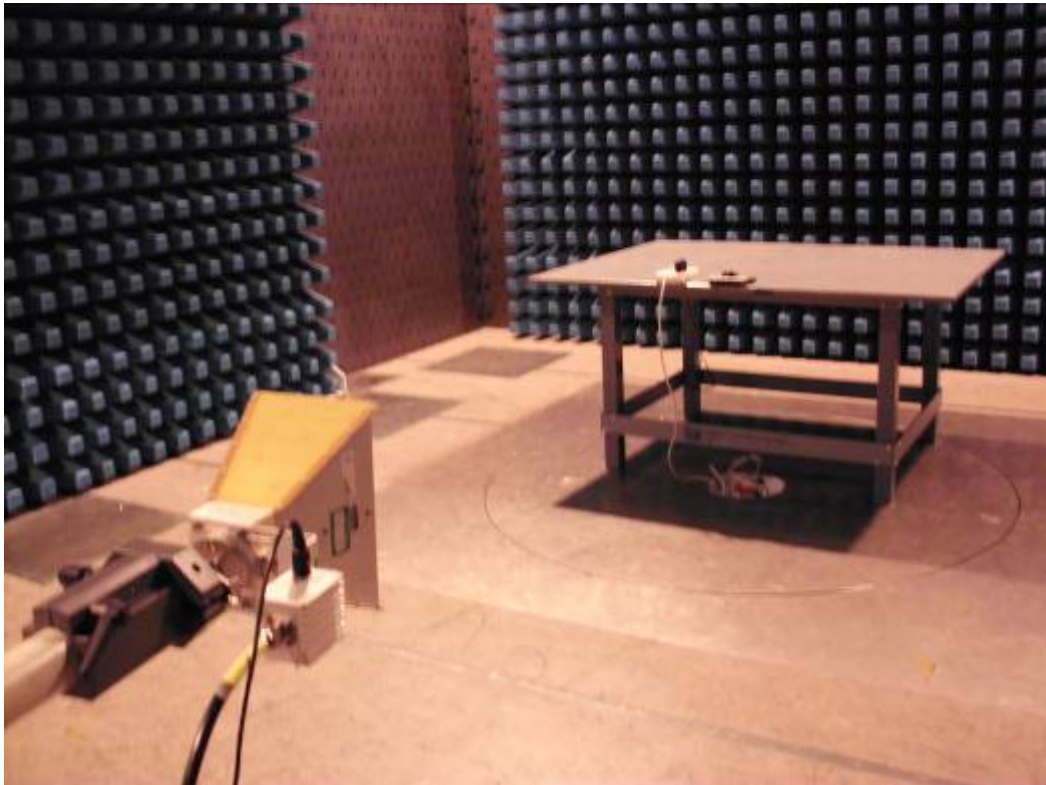
9kHz – 30MHz



30MHz - 1GHz



1GHz – 25GHz



7.2. Conducted Emission Test Setup



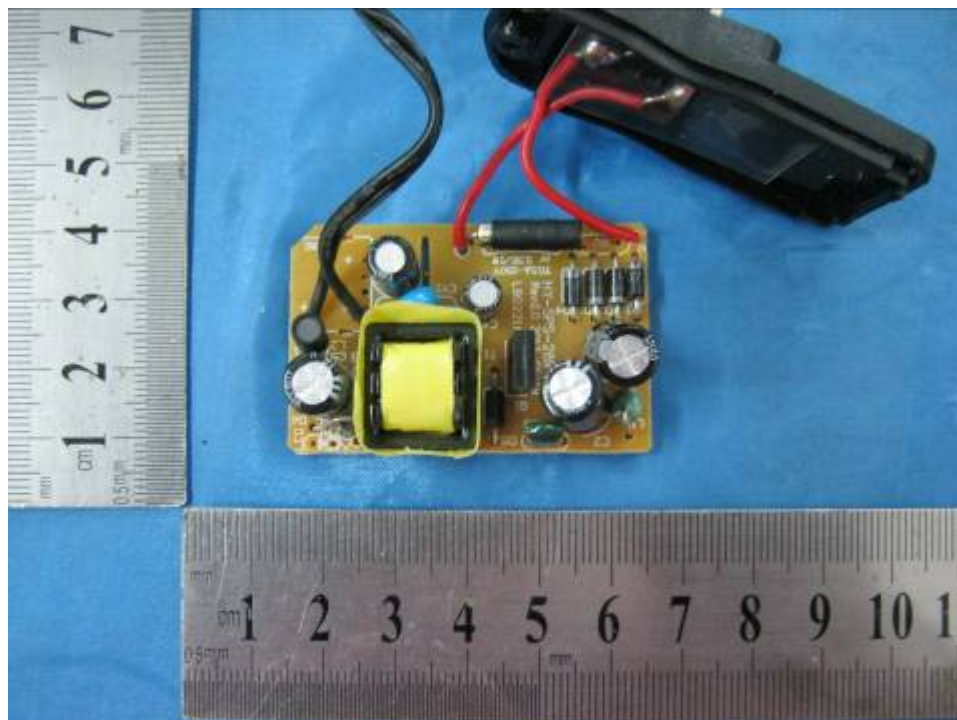
7.3. EUT Constructional Details

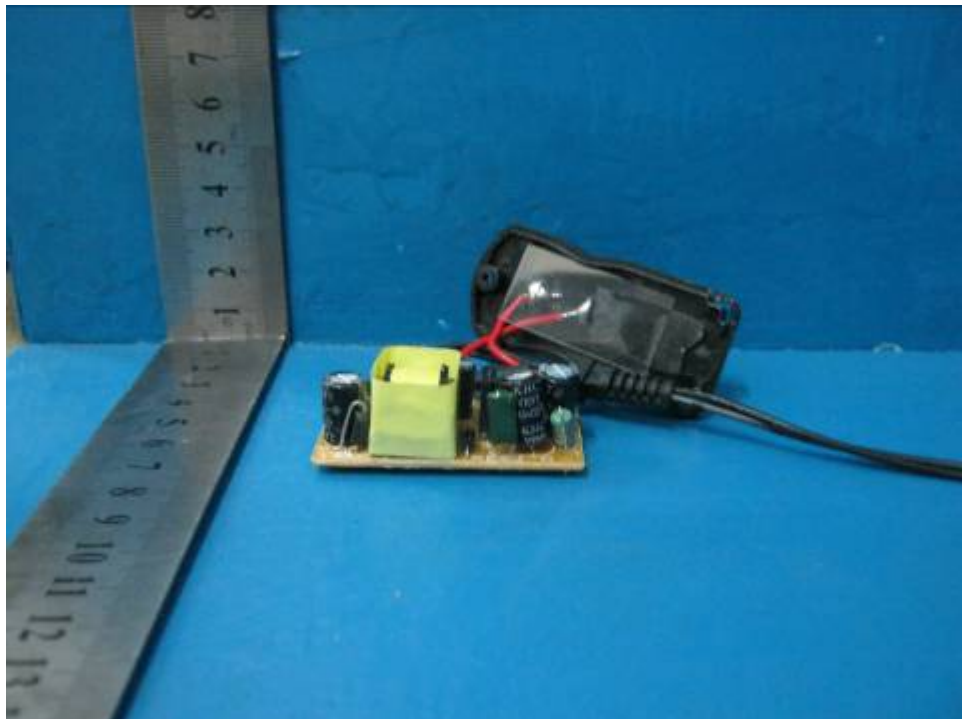
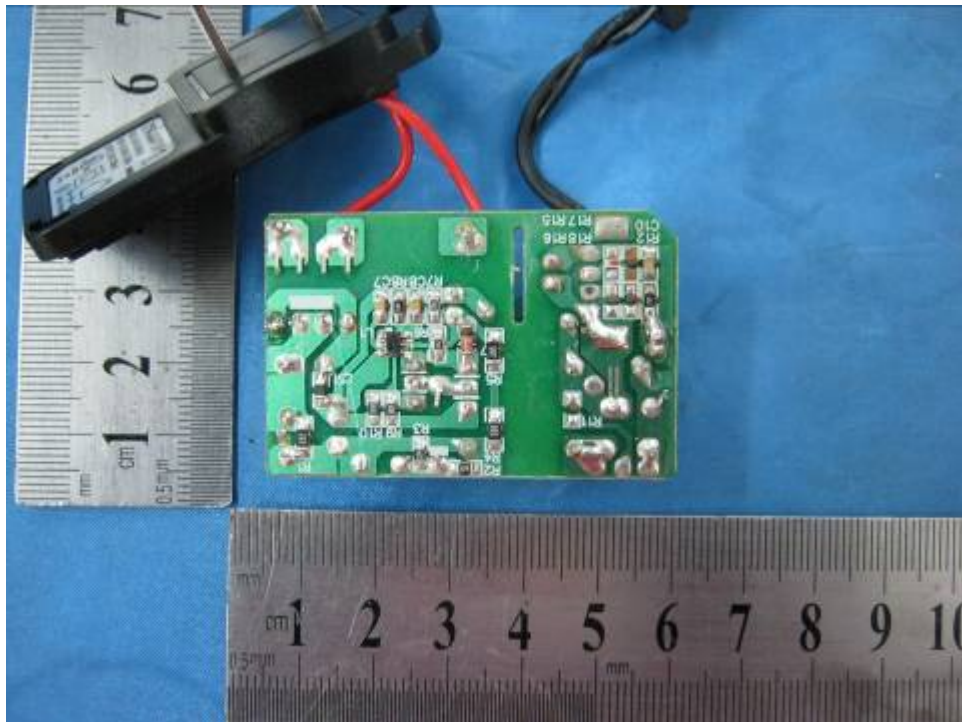
Adapter



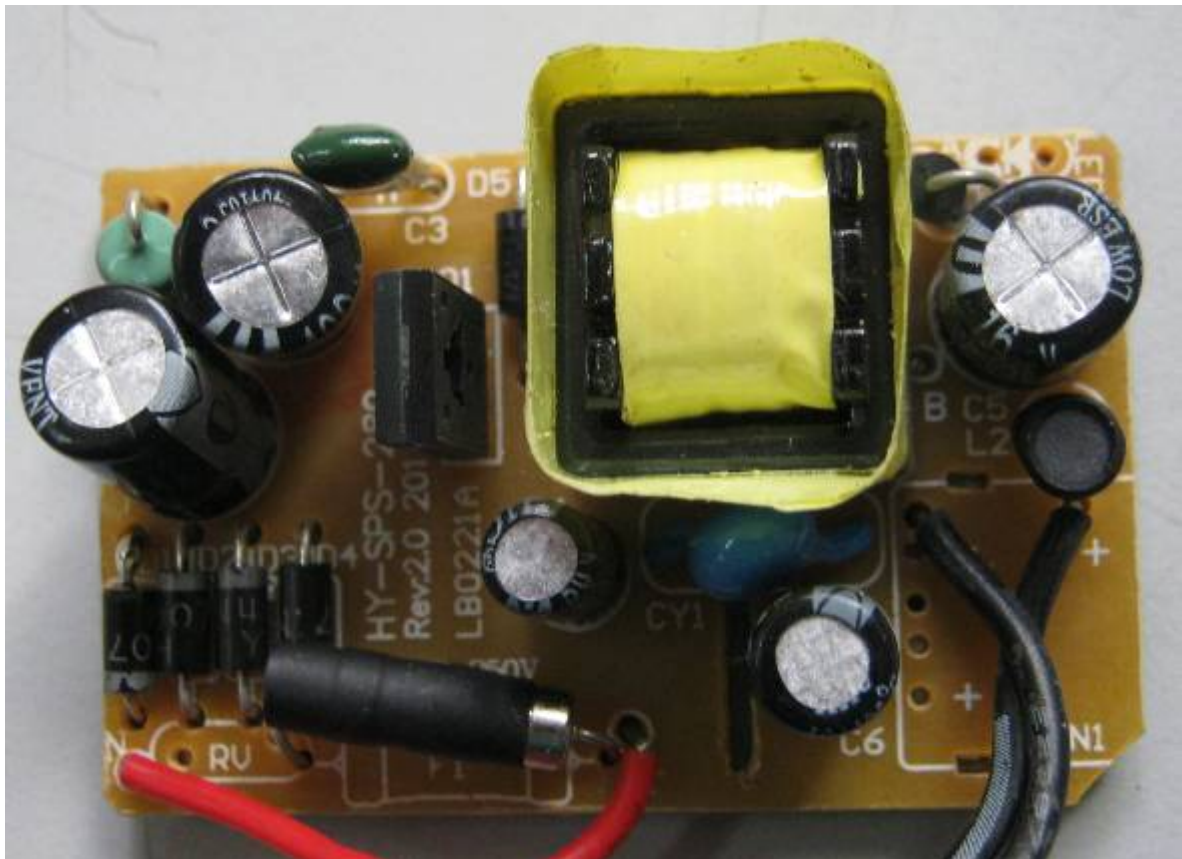


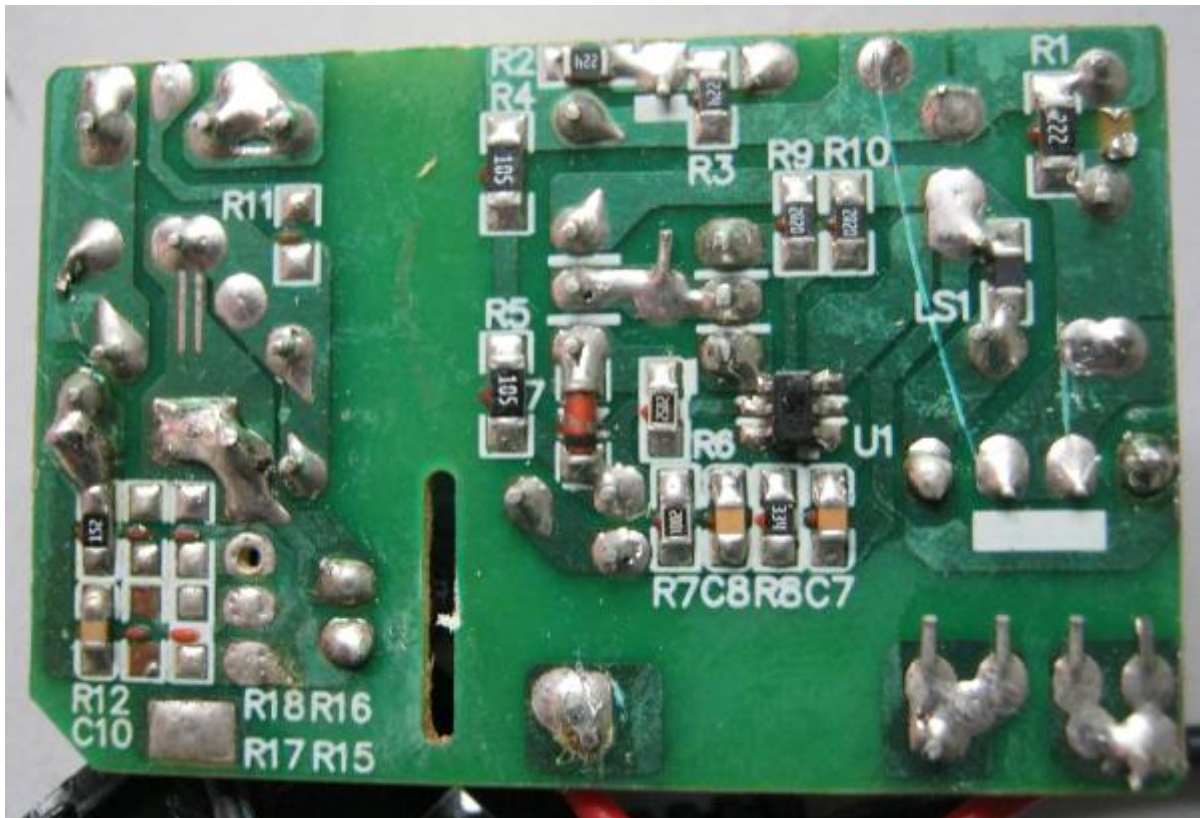












Base

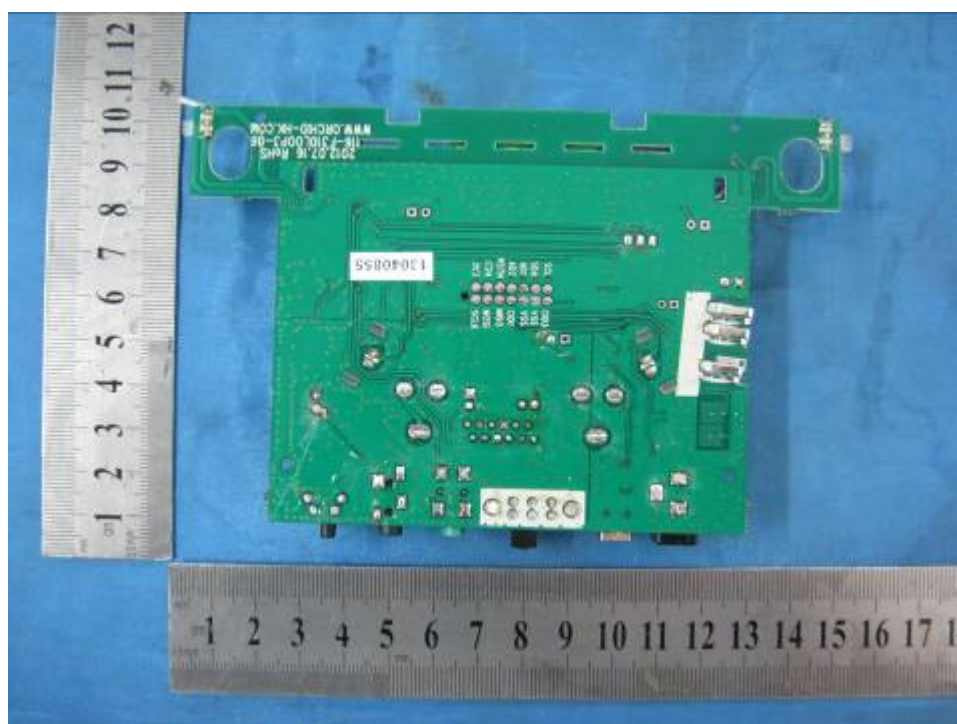


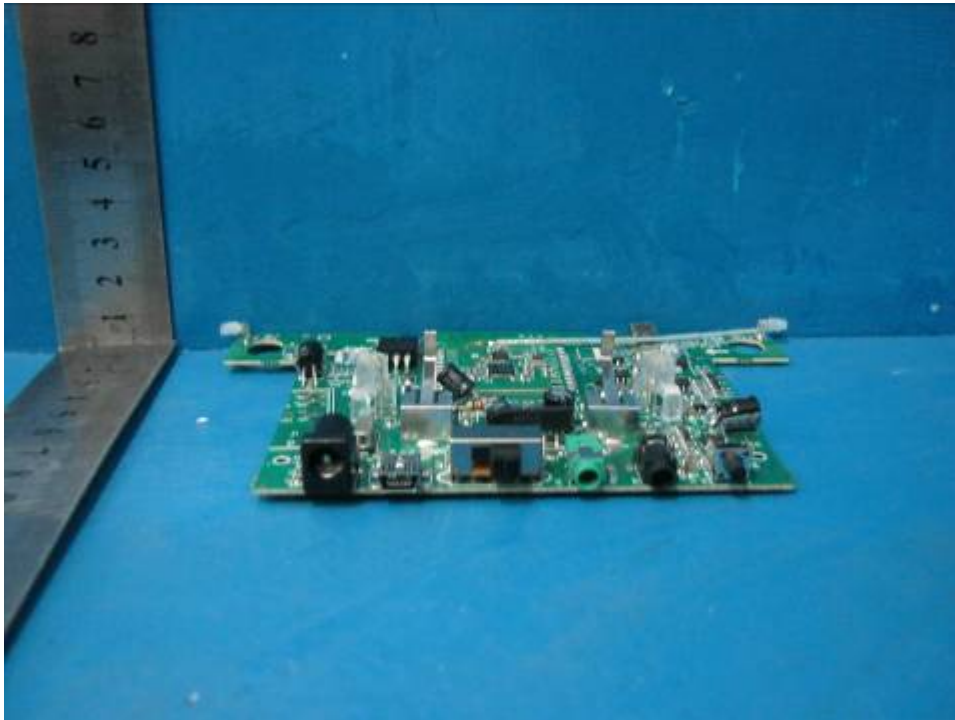


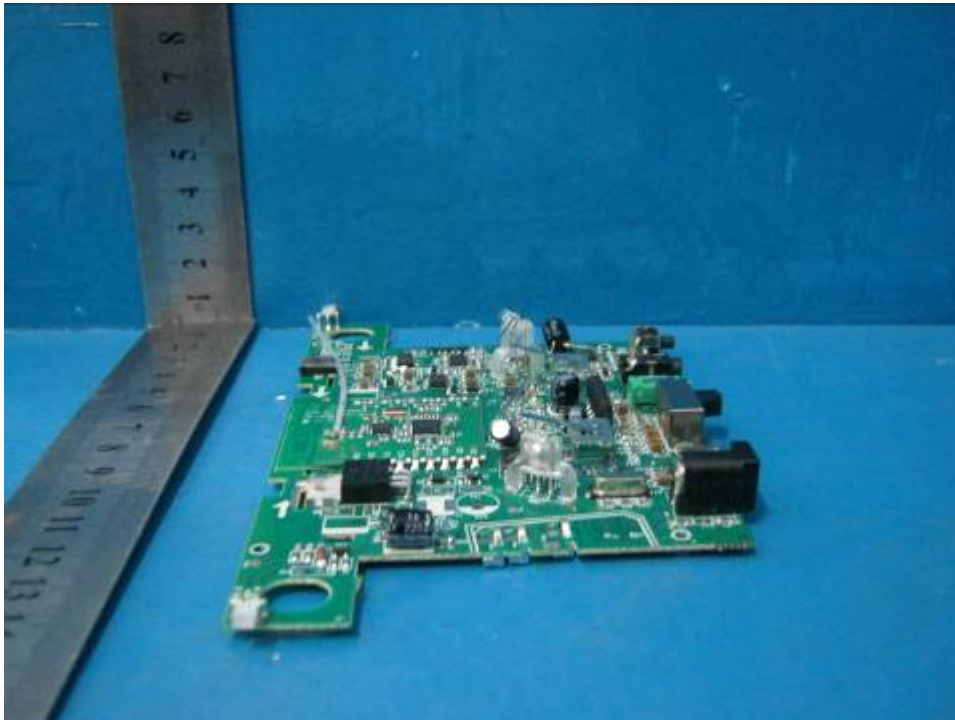


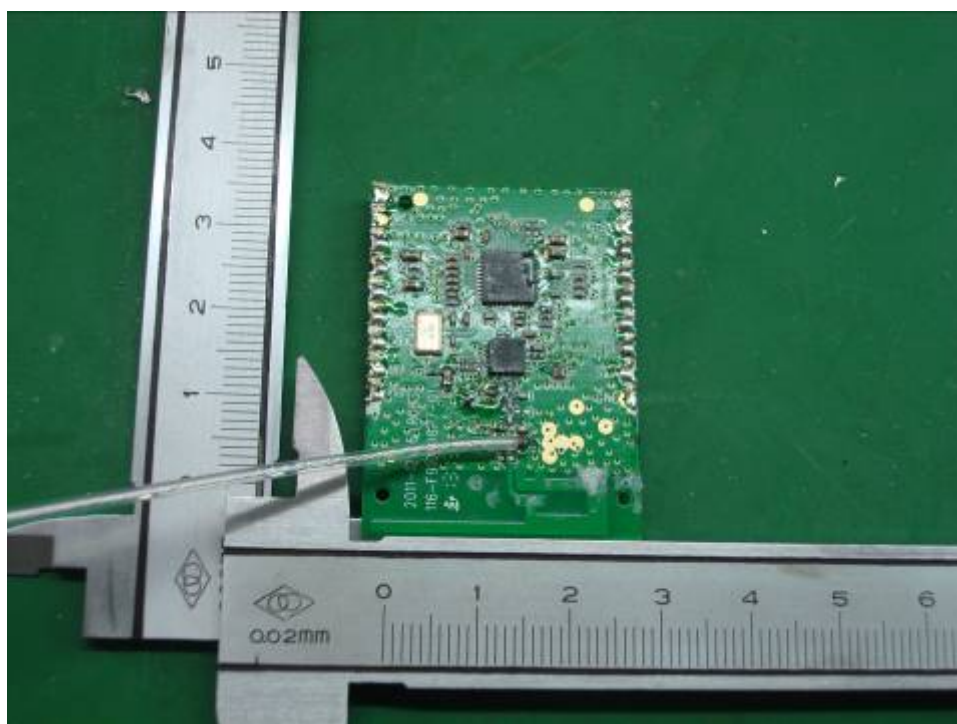
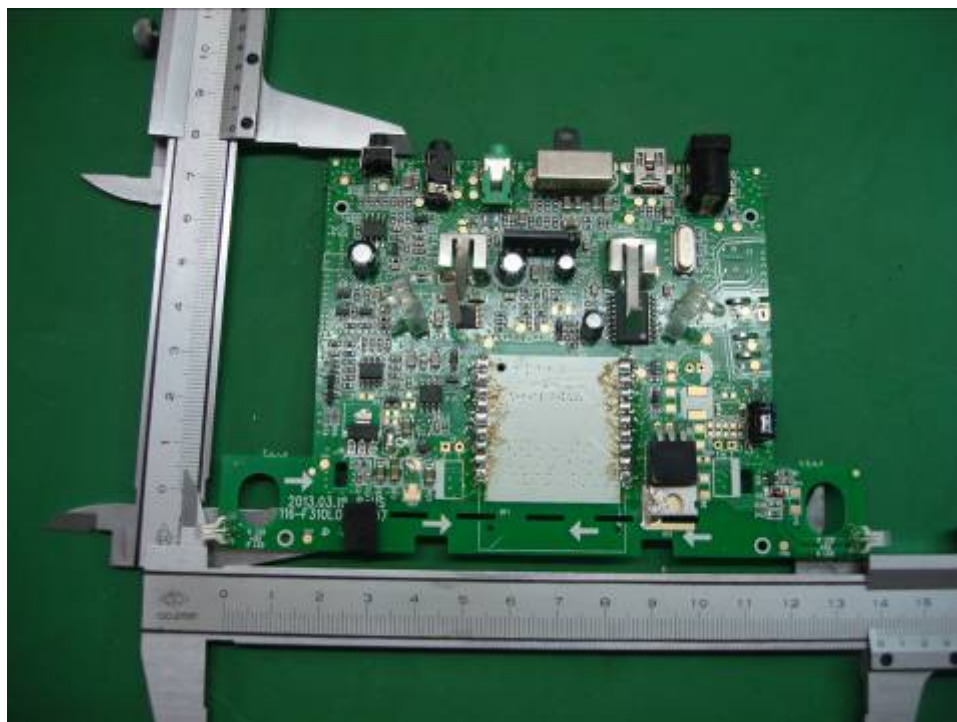


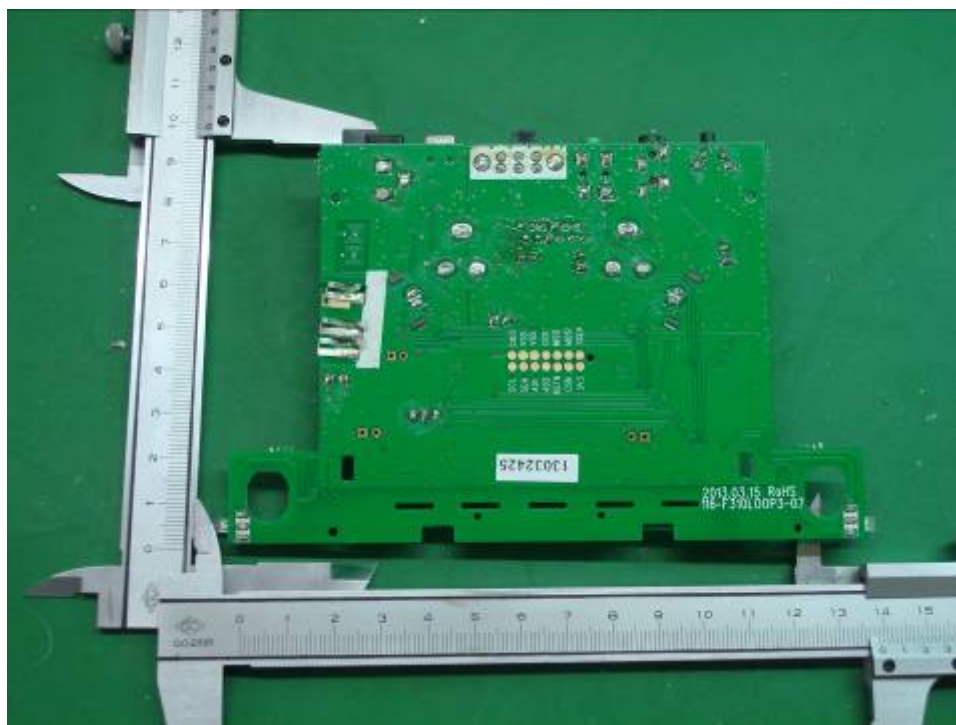
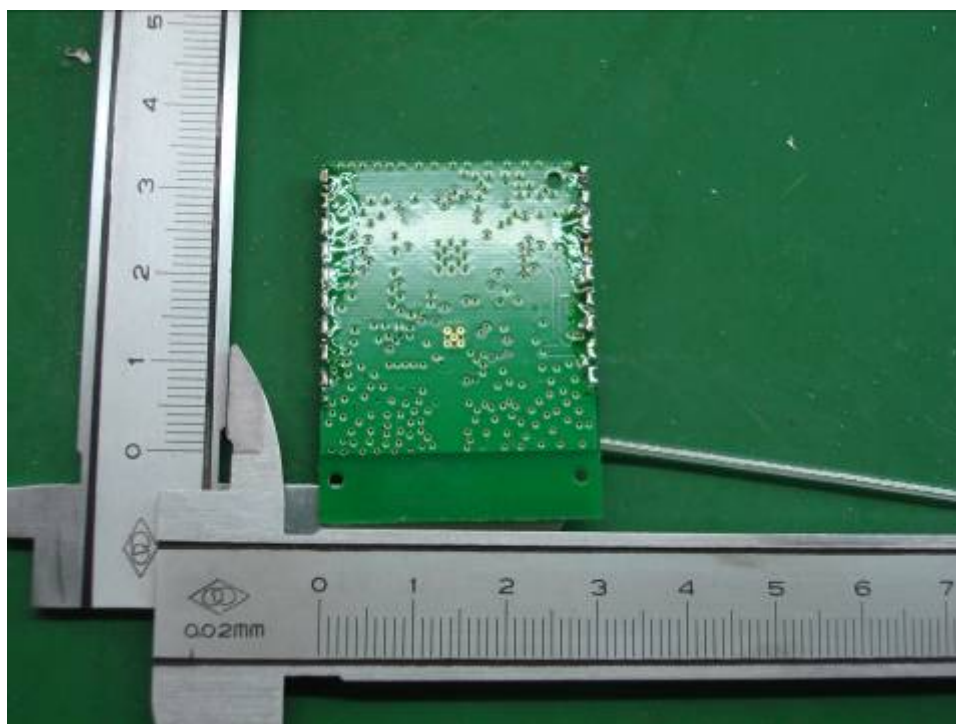


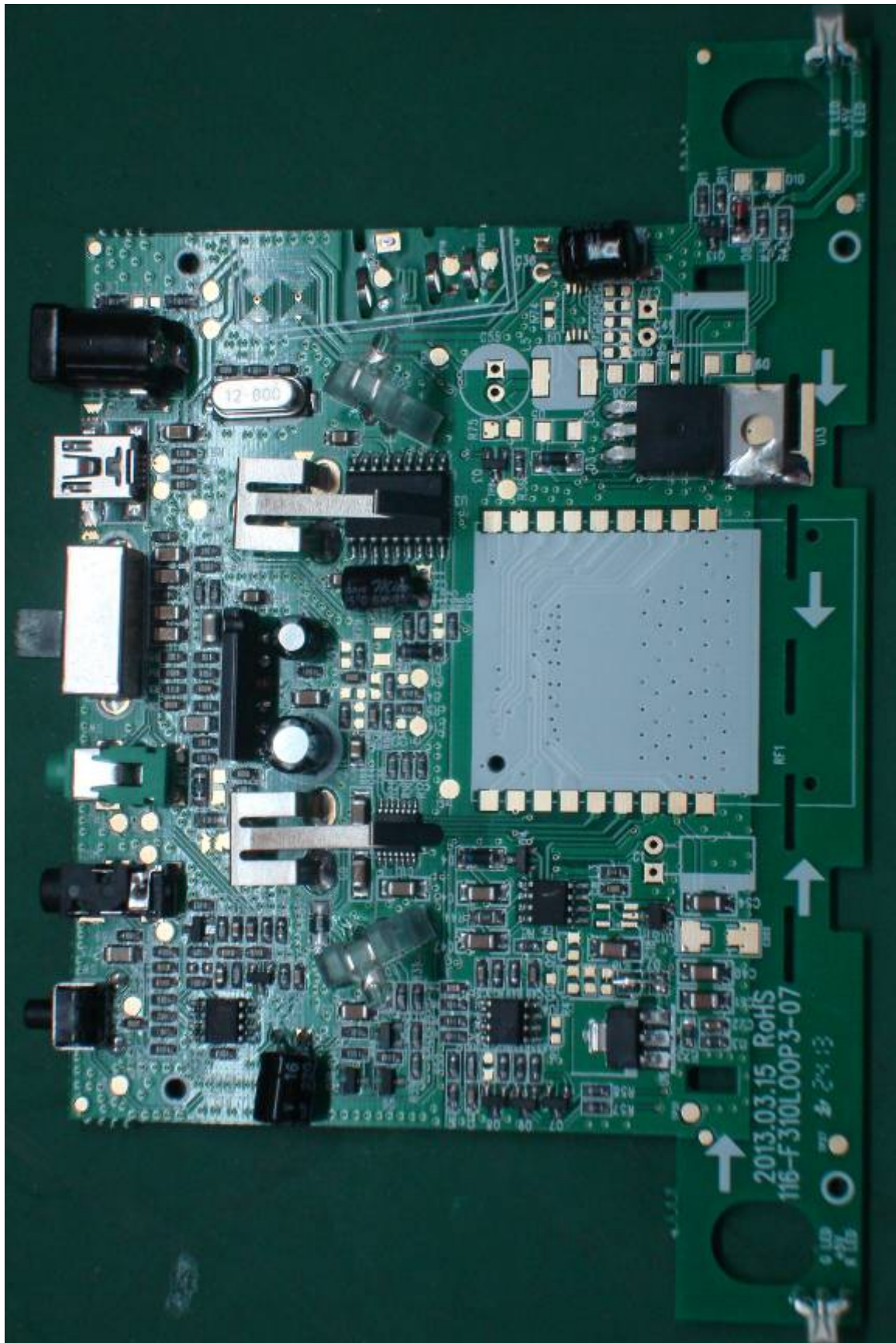


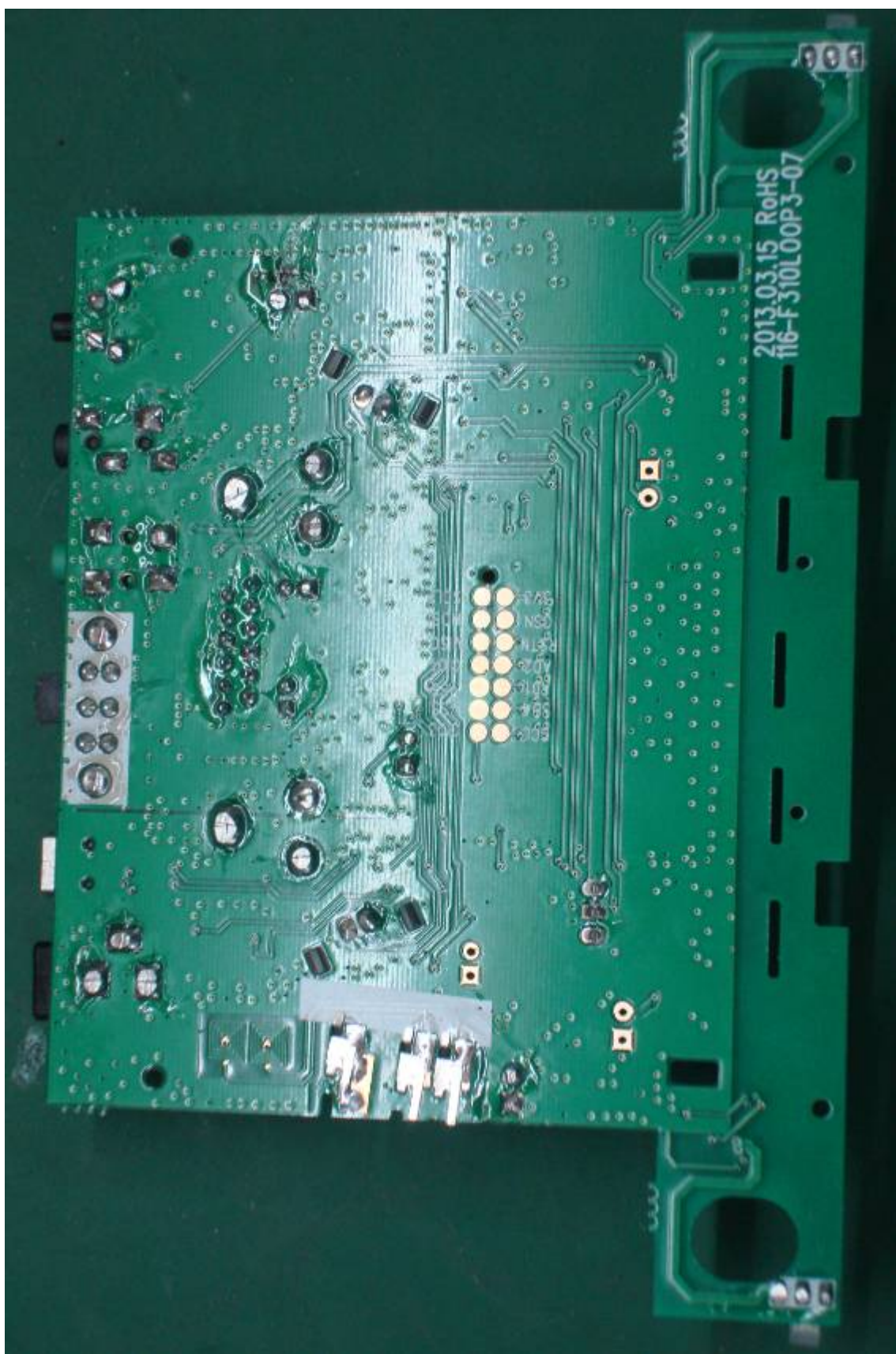


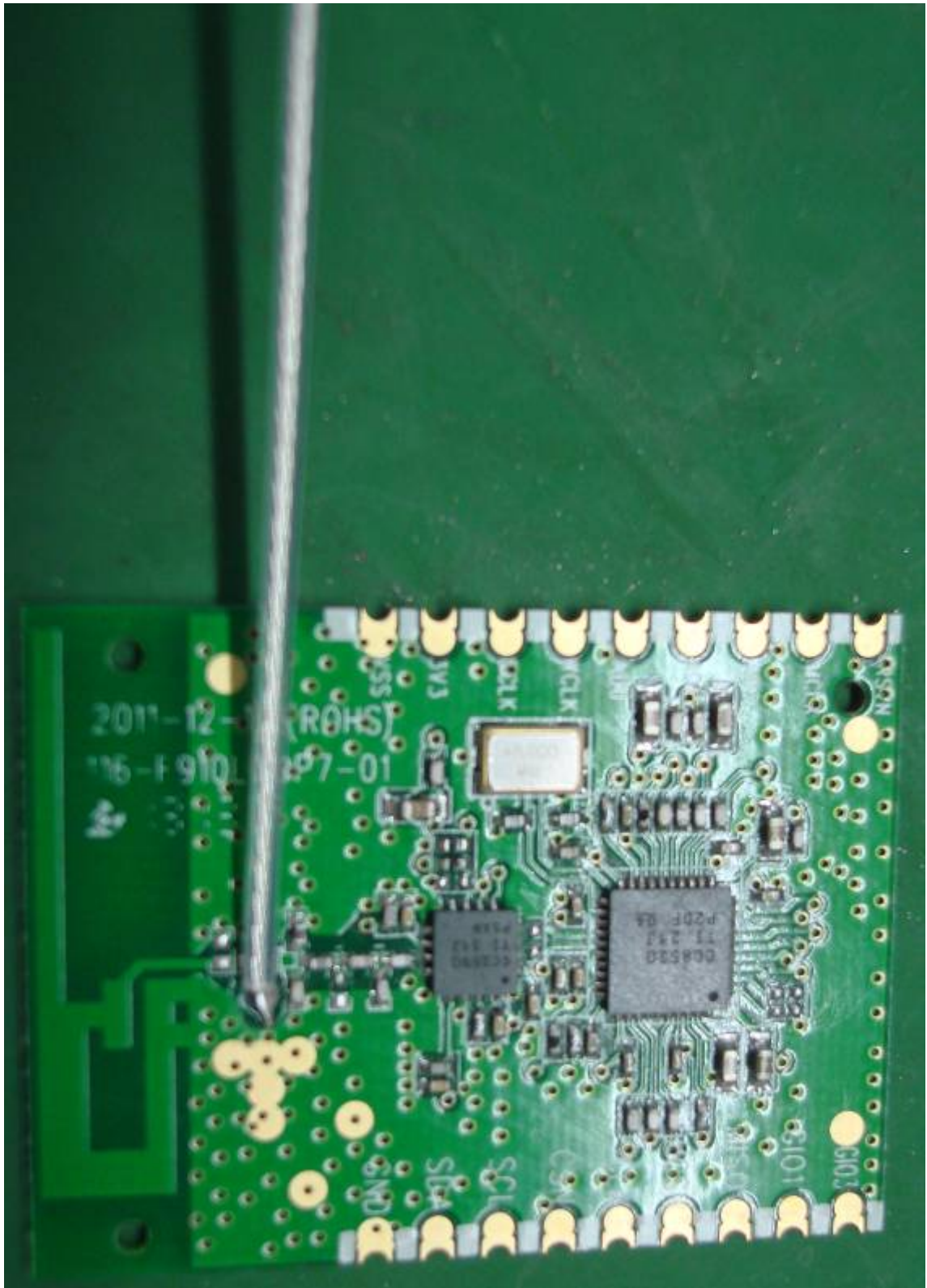


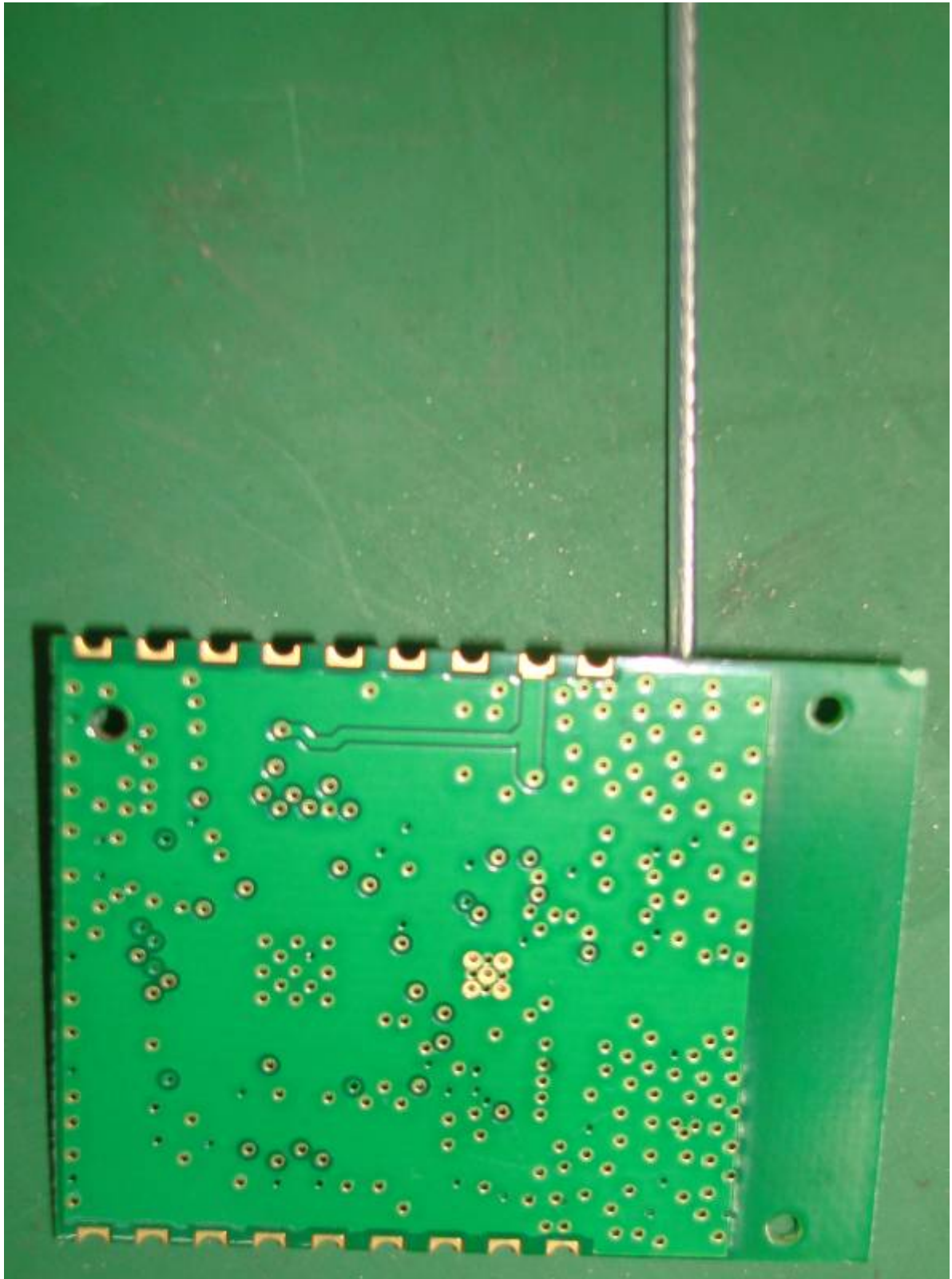






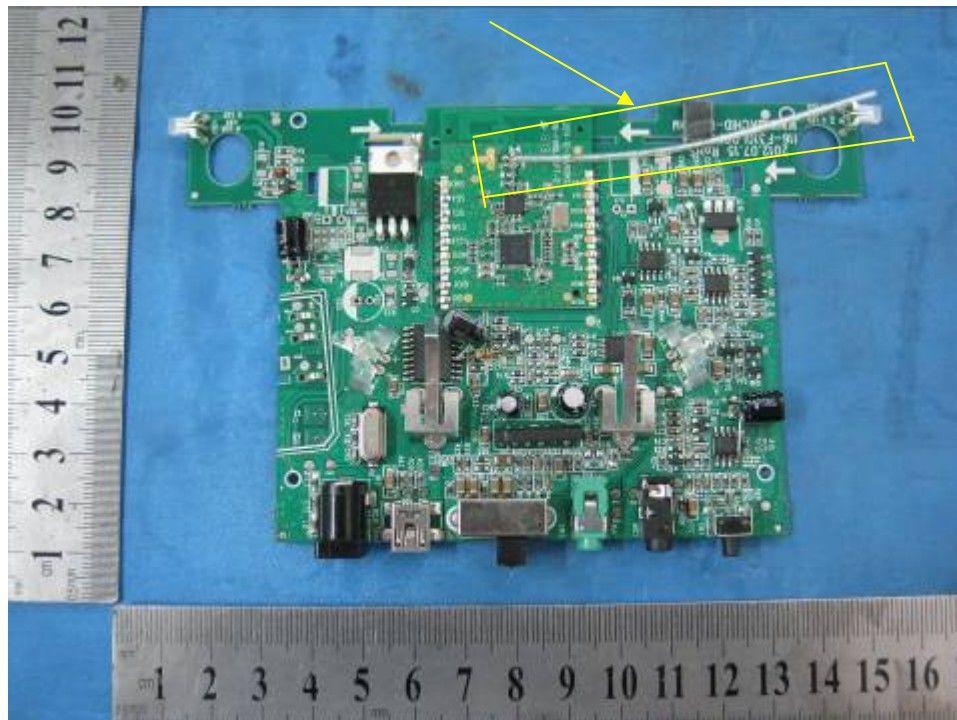




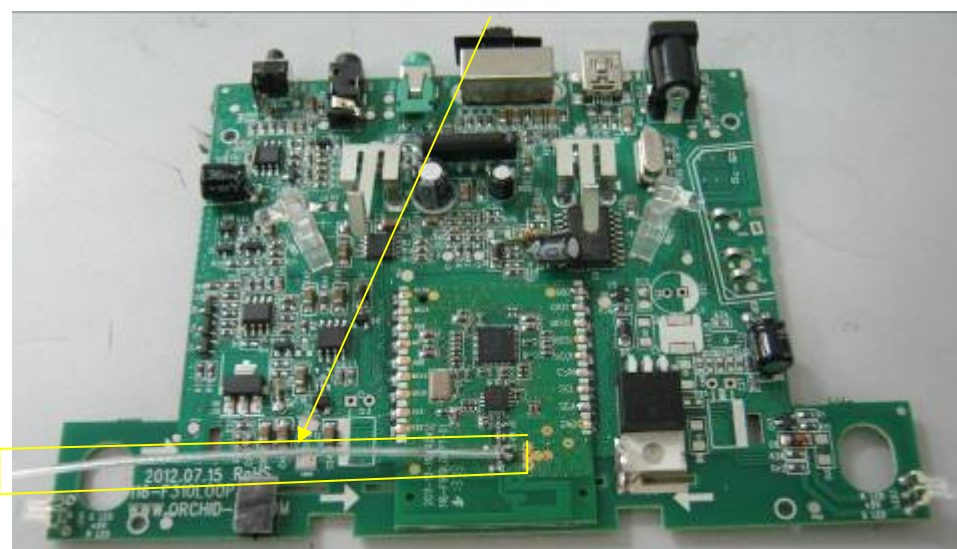


7.4. Antenna Photo

Base
Antenna



Antenna



Note:

The EUT was used permanently attached antenna, and it's complied with the requirements of section 15.203: antenna requirement.

*****End of Report*****