

# FCC REPORT

**Applicant:** Zylux Acoustic Corporation

**Address of Applicant:** 3F, 22, Lane 35, Jihu Road, NeiHu Technology Park, Taipei  
11492, Taiwan

**Equipment Under Test (EUT)**

Product Name: E sound bar(2.1) Audio/Optical System

Model No.: SB4021E-A0

**FCC ID:** XN6-SB4021E

**Applicable standards:** FCC CFR Title 47 Part 15 Subpart C Section 15.247: 2010

**Date of sample receipt:** Aug. 02, 2012

**Date of Test:** Aug. 02-16, 2012

**Date of report issued:** Sept. 24, 2012

**Test Result :** PASS \*

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

Authorized Signature:



Robinson Lo  
Laboratory Manager

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

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## 2 Version

Version No.	Date	Description
00	Sept. 24, 2012	Original

**Prepared By:**

*hank. yan.*

**Date:**

*Sept. 24, 2012*

**Project Engineer**

**Check By:**

*Hans. Hu*

**Date:**

*Sept. 24, 2012*

**Reviewer**

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## 4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	Pass
Conducted Peak Output Power	15.247 (b)(3)	Pass
Emission Bandwidth	15.247 (a)(2)	Pass
Power Spectral Density	15.247 (e)	Pass
Band Edge	15.247(d)	Pass
Spurious Emission	15.205/15.209	Pass

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

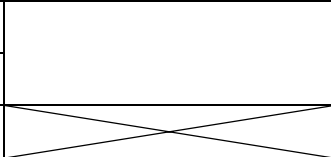
## 5 General Information

### 5.1 Client Information

Applicant:	Zylux Acoustic Corporation
Address of Applicant:	3F, 22, Lane 35, Jihu Road, NeiHu Technology Park, Taipei 11492, Taiwan
Manufacturer:	ZHAO YANG ELEC.(SHENZHEN) CO., LTD
Address of Manufacturer:	Section A, 4 <sup>th</sup> Floor, Building 1 & Building 2, De Yong Jia Industrial Park, Guang Qiao Road, Yu Lv Community, Gong Ming Street, Guang Ming New District, Shenzhen

### 5.2 General Description of E.U.T.

Product Name:	E sound bar(2.1) Audio/Optical System
Model No.:	SB4021E-A0
Operation Frequency:	2405.376 MHz - 2466.816 MHz
Channel numbers:	8
Modulation technology:	DSSS
Antenna Type:	PIFA
Antenna gain:	2.0dBi (declare by Applicant)
Power Supply:	Model:S065BP2400250 Input:100 – 240VAC, 50/60Hz, 1800Ma Output:24VDC, 2500mA

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2405.376MHz	4	2433.024MHz	7	2460.672MHz		
2	2414.592MHz	5	2442.240MHz	8	2466.816MHz		
3	2423.808MHz	6	2451.456MHz				

Note:

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

Channel	Frequency
The lowest channel	2405.376MHz
The middle channel	2442.240MHz
The Highest channel	2466.816MHz

### 5.3 Test mode

Operation mode	Keep the EUT in operation mode.
Transmitting mode	Keep the EUT in transmitting mode

### 5.4 Test Facility

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

- **FCC —Registration No.: 600491**

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission.

The acceptance letter from the FCC is maintained in our files. Registration 600491, July 20, 2010.

- **Industry Canada (IC)**

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. Has been

Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 9079A-1.

### 5.5 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: 2nd Floor, Block No.2, Laodong Industrial Zone, Xixiang Road Baoan District, Shenzhen, China

Tel: 0755-27798480

Fax: 0755-27798960

### 5.6 Other Information Requested by the Customer

None.

## 5.7 Test Instruments list

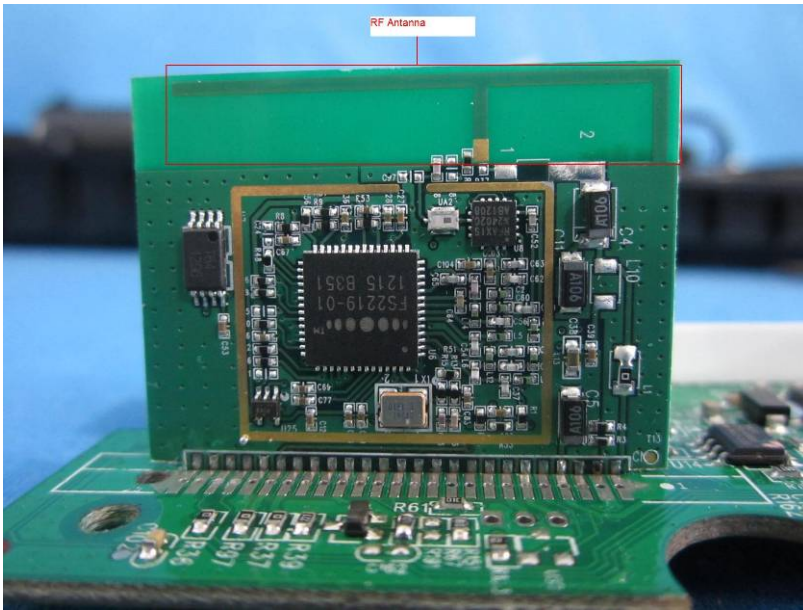
Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	Mar. 30 2011	Mar. 29 2013
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Jul. 03 2012	Jul. 02 2013
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	Feb. 25 2012	Feb. 24 2013
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 29 2012	June 28 2013
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	Mar. 30 2011	Mar. 29 2013
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	Mar. 31 2012	Mar. 30 2013
9	Coaxial Cable	GTS	N/A	GTS211	Mar. 31 2012	Mar. 30 2013
10	Coaxial cable	GTS	N/A	GTS210	Mar. 31 2012	Mar. 30 2013
11	Coaxial Cable	GTS	N/A	GTS212	Mar. 31 2012	Mar. 30 2013
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	Jul. 03 2012	Jul. 02 2013
13	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	Jul. 03 2012	Jul. 02 2013
14	Pre-amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 29 2012	June 28 2013
15	Band filter	Amindeon	82346	GTS219	Mar. 31 2012	Mar. 30 2013
16	Universal radio communication tester	Rohde & Schwarz	CMU200	GTS235	May 11 2012	May 10 2013
17	Signal Generator	Rohde & Schwarz	SML03	GTS236	May 11 2012	May 10 2013
18	Temp. Humidity/ Barometer	Oregon Scientific	BA-888	GTS248	May 11 2012	May 10 2013
19	D.C. Power Supply	Instek	PS-3030	GTS232	NA	NA
20	Splitter	Agilent	11636B	GTS237	May 11 2012	May 10 2013

Conducted Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.0(L)x3.0(W)x3.0(H)	GTS252	Jul. 03 2012	Jul. 02 2013
2	EMI Test Receiver	Rohde & Schwarz	ESCS30	GTS223	Jul. 03 2012	Jul. 02 2013
3	10dB Pulse Limita	Rohde & Schwarz	N/A	GTS224	Jul. 03 2012	Jul. 02 2013
4	LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS226	Jul. 03 2012	Jul. 02 2013
5	Coaxial Cable	GTS	N/A	GTS227	Mar. 31 2012	Mar. 30 2013
6	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

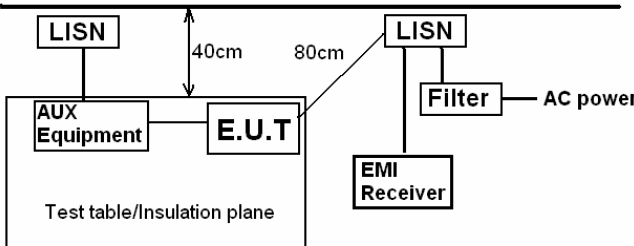


## 6 Test results and Measurement Data

### 6.1 Antenna requirement:

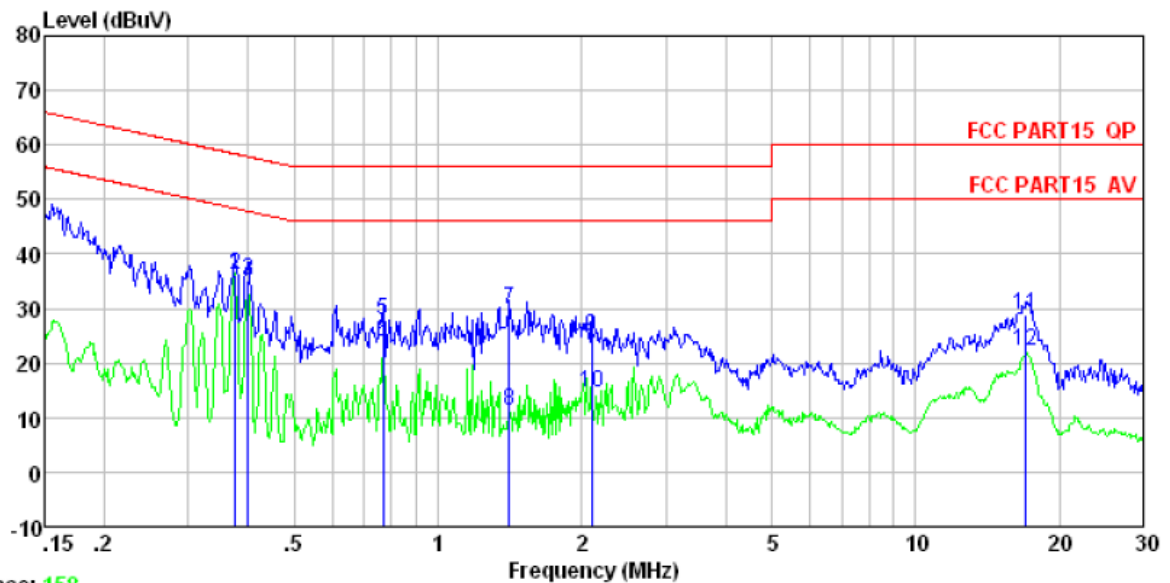
<b>Standard requirement:</b>	FCC Part15 C Section 15.203 /247(c)
<p><b>15.203 requirement:</b></p> <p>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.</p> <p><b>15.247(c) (1)(i) requirement:</b></p> <p>(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.</p>	
<b>E.U.T Antenna:</b>	
<p><i>The antenna is PIFA antenna. The best case gain of the antenna is 2dBi.</i></p> 	

## 6.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207																
Test Method:	ANSI C63.4:2003																
Test Frequency Range:	150KHz to 30MHz																
Class / Severity:	Class B																
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto																
Limit:	<table><tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">Limit (dBuV)</th></tr><tr><th>Quasi-peak</th><th>Average</th></tr><tr><td>0.15-0.5</td><td>66 to 56*</td><td>56 to 46*</td></tr><tr><td>0.5-5</td><td>56</td><td>46</td></tr><tr><td>5-30</td><td>60</td><td>50</td></tr></table> <p>* Decreases with the logarithm of the frequency.</p>			Frequency range (MHz)	Limit (dBuV)		Quasi-peak	Average	0.15-0.5	66 to 56*	56 to 46*	0.5-5	56	46	5-30	60	50
Frequency range (MHz)	Limit (dBuV)																
	Quasi-peak	Average															
0.15-0.5	66 to 56*	56 to 46*															
0.5-5	56	46															
5-30	60	50															
Test setup:	<div><p style="text-align: center;"><b>Reference Plane</b></p><p>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p></div>																
Test procedure:	<div><div></div><div><ol style="list-style-type: none"><li>1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment.</li><li>2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs).</li><li>3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.</li></ol></div></div>																
Test Instruments:	Refer to section 5.7 for details																
Test mode:	Refer to section 5.3 for details																
Test results:	Pass																

### Measurement data:

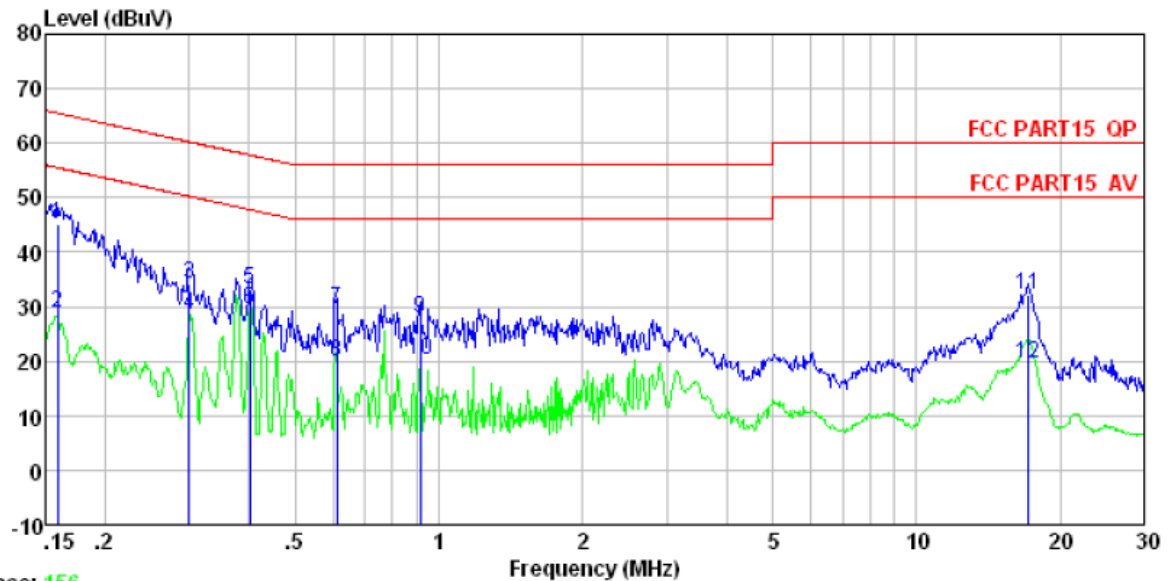
Line:



Condition : FCC PART15 QP LISN-2012 LINE  
 Job No. : 1117RF  
 Test Mode : Operation mode  
 Test Engineer: Blue

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.377	36.24	-0.22	0.10	36.12	58.34	-22.22	QP
2	0.377	36.20	-0.22	0.10	36.08	48.34	-12.26	Average
3	0.400	35.24	-0.22	0.10	35.12	57.86	-22.74	QP
4	0.400	34.50	-0.22	0.10	34.38	47.86	-13.48	Average
5	0.767	28.01	-0.20	0.10	27.91	56.00	-28.09	QP
6	0.767	23.87	-0.20	0.10	23.77	46.00	-22.23	Average
7	1.411	30.01	-0.22	0.10	29.89	56.00	-26.11	QP
8	1.411	11.51	-0.22	0.10	11.39	46.00	-34.61	Average
9	2.099	25.14	-0.24	0.10	25.00	56.00	-31.00	QP
10	2.099	14.88	-0.24	0.10	14.74	46.00	-31.26	Average
11	17.018	29.36	-0.55	0.20	29.01	60.00	-30.99	QP
12	17.018	22.59	-0.55	0.20	22.24	50.00	-27.76	Average

**Neutral:**



Trace: 156

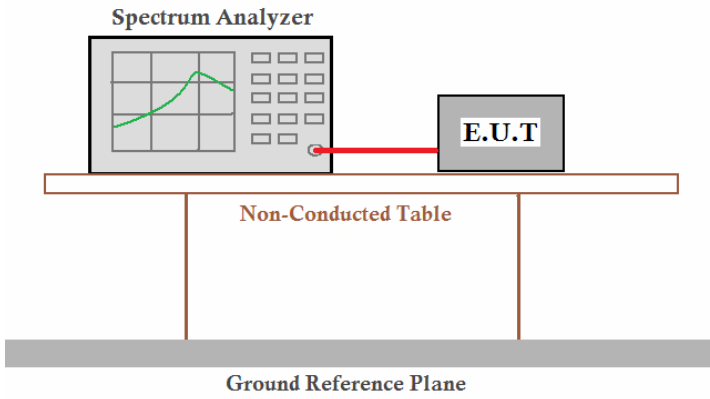
Condition : FCC PART15 QP LISN-2012 NEUTRAL  
 Job No. : 1117RF  
 Test Mode : Operation mode  
 Test Engineer: Blue

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.159	45.11	-0.13	0.10	45.08	65.52	-20.44	QP
2	0.159	29.00	-0.13	0.10	28.97	55.52	-26.55	Average
3	0.300	34.30	-0.09	0.10	34.31	60.24	-25.93	QP
4	0.300	28.36	-0.09	0.10	28.37	50.24	-21.87	Average
5	0.402	33.27	-0.08	0.10	33.29	57.81	-24.52	QP
6	0.402	29.65	-0.08	0.10	29.67	47.81	-18.14	Average
7	0.611	29.48	-0.08	0.10	29.50	56.00	-26.50	QP
8	0.611	20.02	-0.08	0.10	20.04	46.00	-25.96	Average
9	0.914	27.86	-0.09	0.10	27.87	56.00	-28.13	QP
10	0.914	20.36	-0.09	0.10	20.37	46.00	-25.63	Average
11	17.199	32.32	-0.45	0.20	32.07	60.00	-27.93	QP
12	17.199	19.68	-0.45	0.20	19.43	50.00	-30.57	Average

**Notes:**

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss

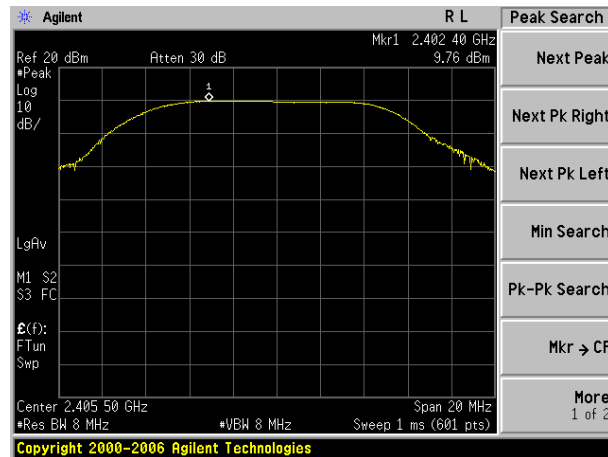
## 6.3 Conducted Peak Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.4:2003 and KDB558074 D01 Meas Guidance
Limit:	30dBm
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

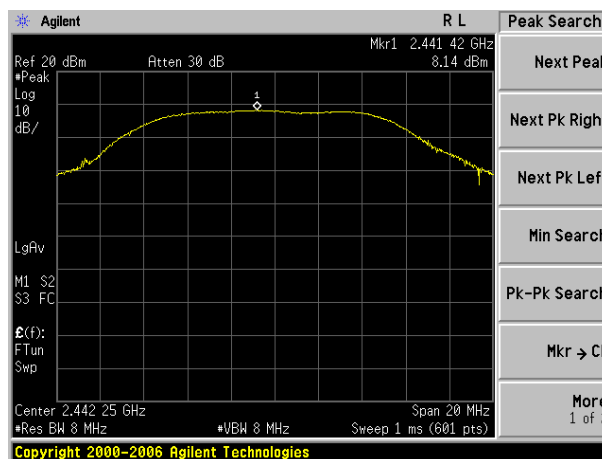
### Measurement Data

Test CH	Peak Output Power (dBm)	Limit(dBm)	Result
Lowest	9.76	30.00	Pass
Middle	8.14		
Highest	10.15		

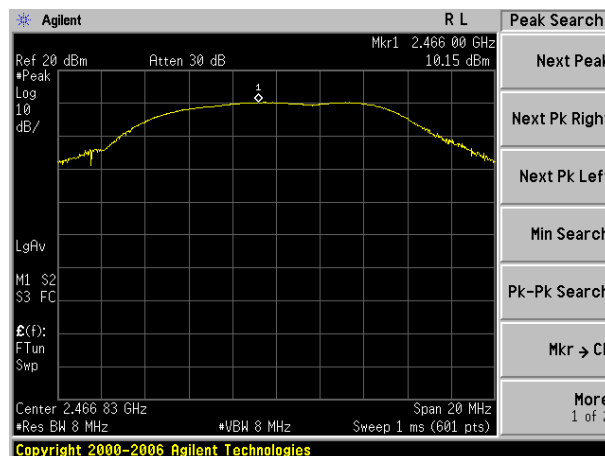
Test plot as follows:



Lowest channel

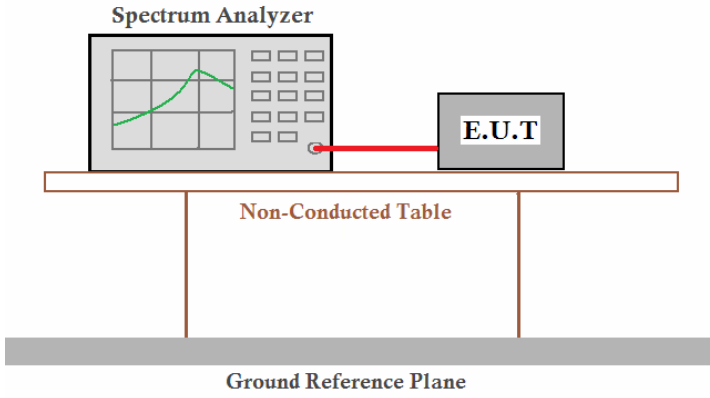


Middle channel



Highest channel

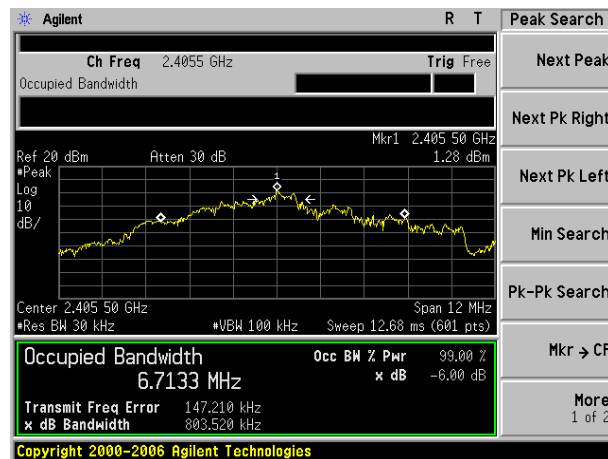
## 6.4 Emission Bandwidth

Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.4:2003 and KDB558074 D01 Meas Guidance
Limit:	>500KHz
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

## Measurement Data

Test CH	Emission Bandwidth (MHz)	Limit(KMHz)	Result
Lowest	0.804	>500	Pass
Middle	0.735		
Highest	0.805		

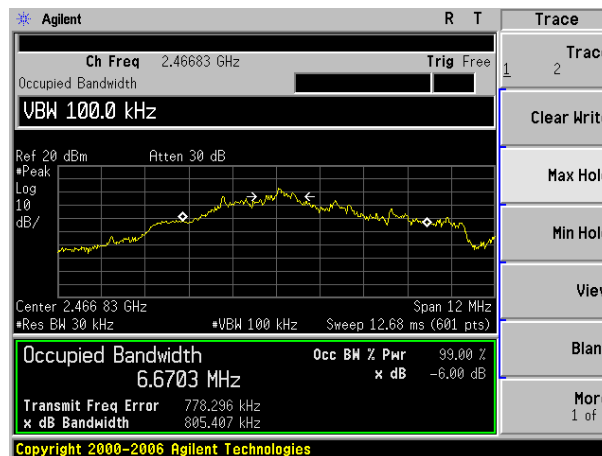
Test plot as follows:



Lowest channel



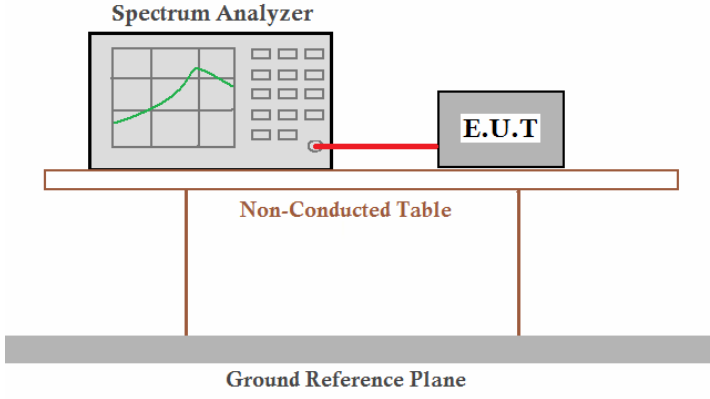
Middle channel



Highest channel



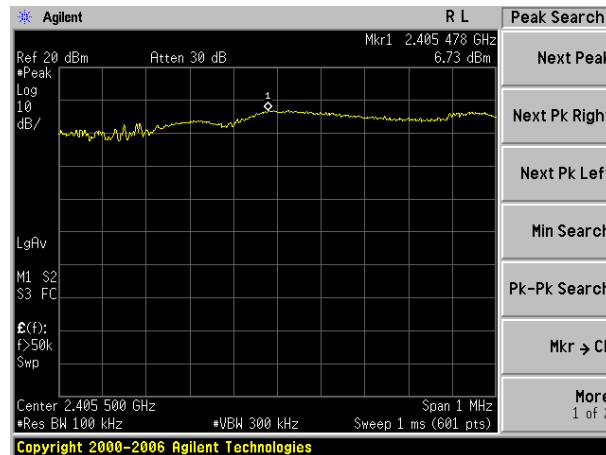
## 6.5 Power Spectral Density

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	ANSI C63.4:2003 and KDB558074 D01 Meas Guidance
Limit:	8dBm
Test setup:	
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

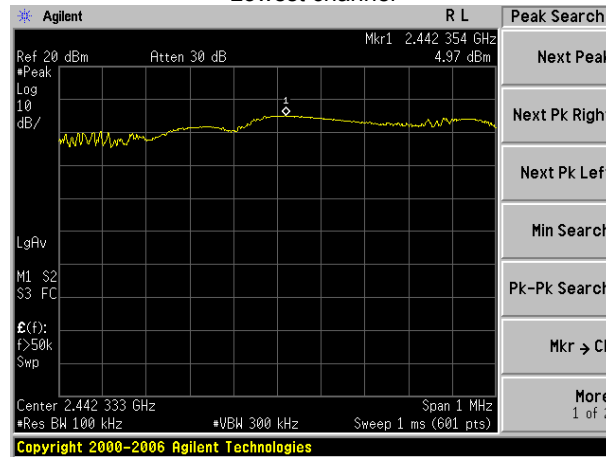
### Measurement Data

Test CH	Power Spectral Density (dBm/100KHz)	BWCF	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
Lowest	6.73	-15.20	-8.47	8.00	Pass
Middle	4.97	-15.20	-10.23		
Highest	7.17	-15.20	-8.03		
Remark: BWCF = 10log(3 kHz/100 kHz)= -15.20dB					

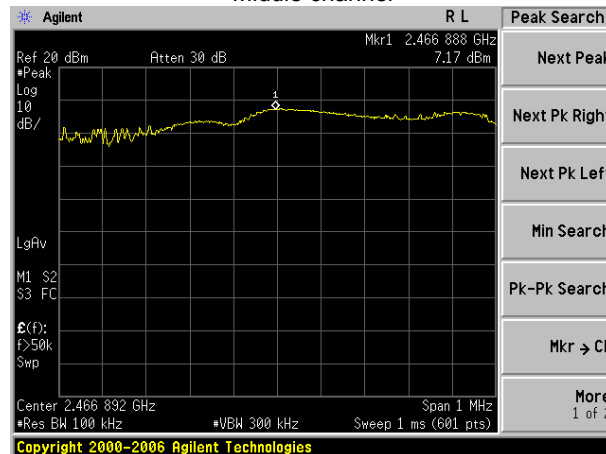
Test plot as follows:



Lowest channel



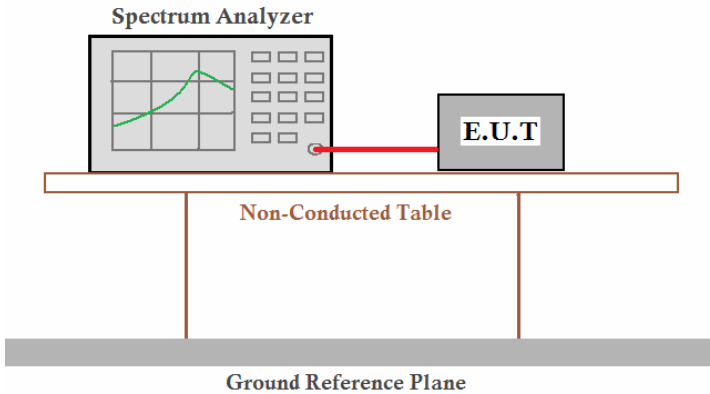
Middle channel



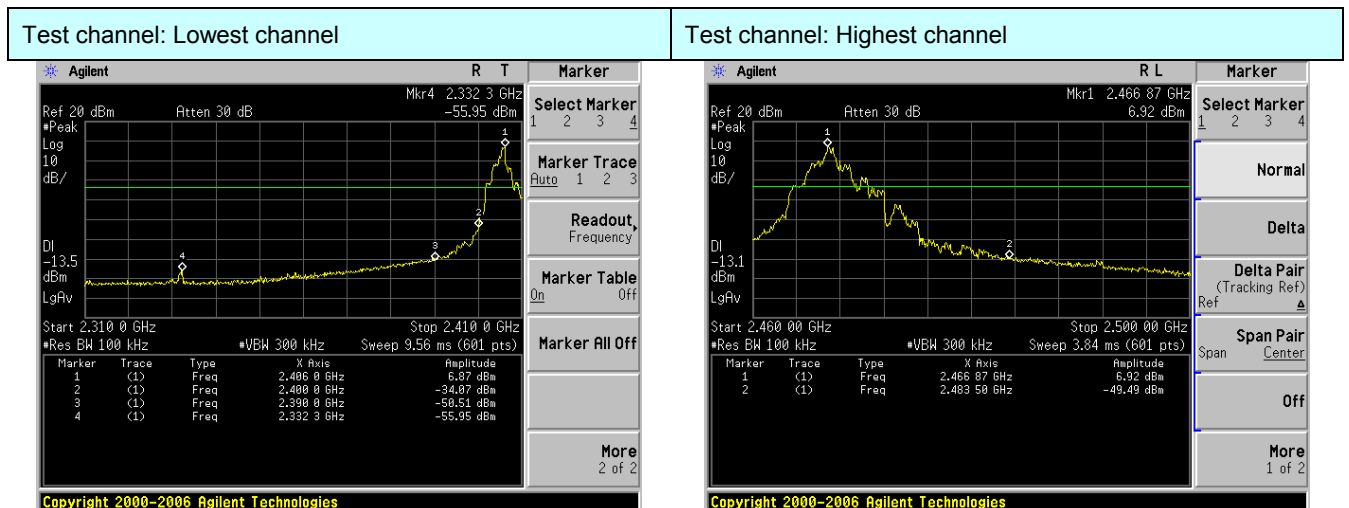
Highest channel

## 6.6 Band edges

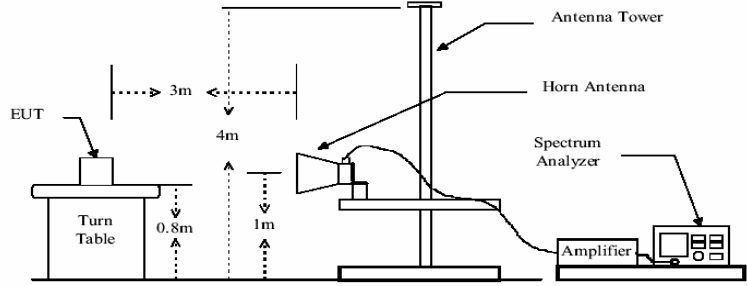
### 6.6.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2003 and KDB558074 D01 Meas Guidance
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. The E.U.T. is placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Test plot as follows:



## 6.6.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.4: 2003				
Test Frequency Range:	30MHz to 25GHz, only worse case is reported				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		AV	1MHz	10Hz	Average Value
Limit:	Frequency		Limit (dBuV/m @3m)		Remark
	Above 1GHz		54.00		Average Value
			74.00		Peak Value
Test setup:					
Test Procedure:	<div>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</div> <div>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</div> <div>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</div> <div>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</div> <div>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</div> <div>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</div>				
Test Instruments:	Refer to section 5.7 for details				
Test mode:	Refer to section 5.3 for details				
Test results:	Pass				

Remark:

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

**Measurement data:**

Test channel:	Lowest
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	46.26	27.59	5.38	30.18	49.05	74.00	-24.95	Horizontal
2400.00	53.37	27.58	5.39	30.18	56.16	74.00	-17.84	Horizontal
2390.00	47.35	27.59	5.38	30.18	50.14	74.00	-23.86	Vertical
2400.00	54.81	27.58	5.39	30.18	57.60	74.00	-16.40	Vertical

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2390.00	32.67	27.59	5.38	30.18	35.46	54.00	-18.54	Horizontal
2400.00	41.82	27.58	5.39	30.18	44.61	54.00	-9.39	Horizontal
2390.00	34.12	27.59	5.38	30.18	36.91	54.00	-17.09	Vertical
2400.00	43.06	27.58	5.39	30.18	45.85	54.00	-8.15	Vertical

Test channel:	Highest
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	51.67	27.53	5.47	29.93	54.74	74.00	-19.26	Horizontal
2500.00	44.75	27.55	5.49	29.93	47.86	74.00	-26.14	Horizontal
2483.50	53.85	27.53	5.47	29.93	56.92	74.00	-17.08	Vertical
2500.00	45.24	27.55	5.49	29.93	48.35	74.00	-25.65	Vertical

**Average value:**

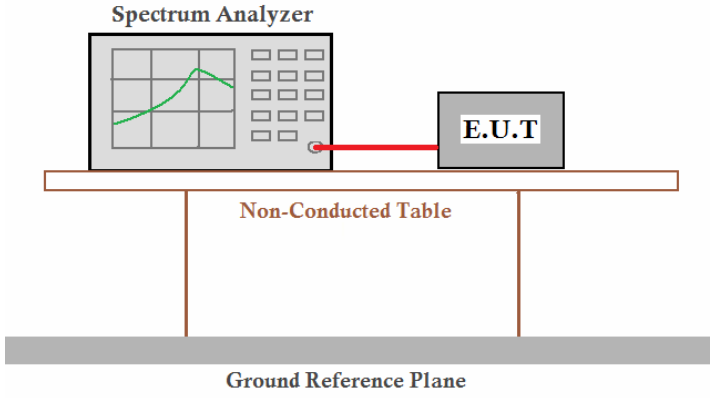
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	39.58	27.53	5.47	29.93	42.65	54.00	-11.35	Horizontal
2500.00	32.87	27.55	5.49	29.93	35.98	54.00	-18.02	Horizontal
2483.50	42.67	27.53	5.47	29.93	45.74	54.00	-8.26	Vertical
2500.00	33.64	27.55	5.49	29.93	36.75	54.00	-17.25	Vertical

**Remark:**

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

## 6.7 Spurious Emission

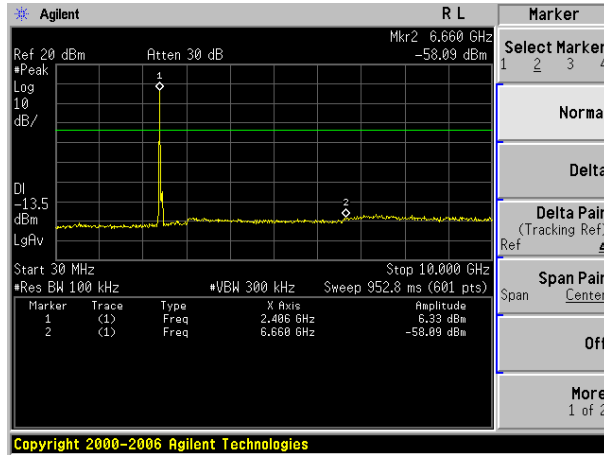
### 6.7.1 Conducted Emission Method

Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2003 and KDB558074 D01 Meas Guidance
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

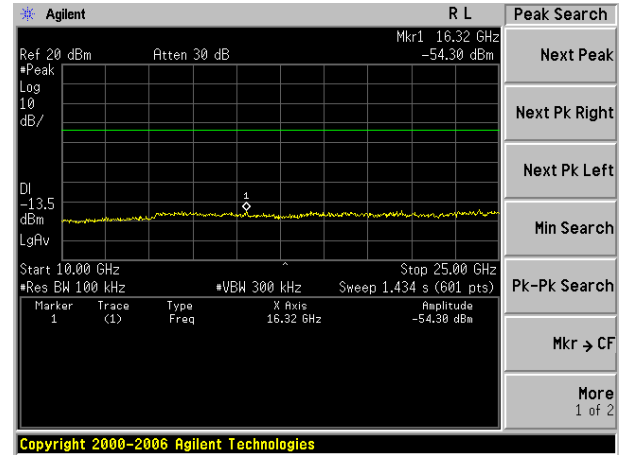
Test plot as follows:

Test channel:

Lowest channel



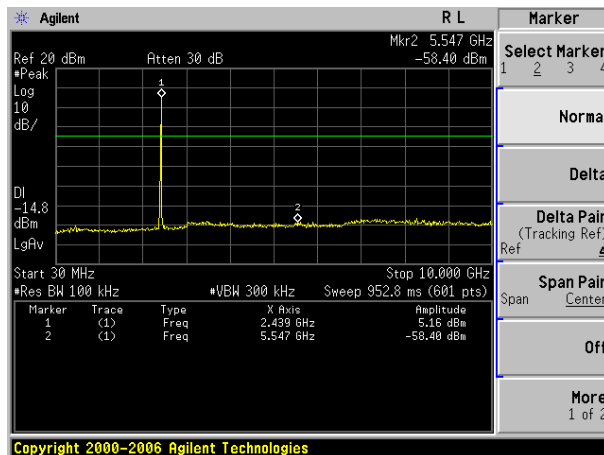
30MHz~10GHz



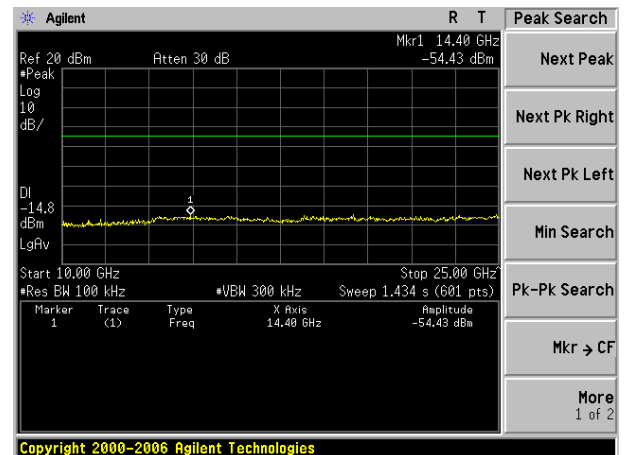
10GHz~25GHz

Test channel:

Middle channel

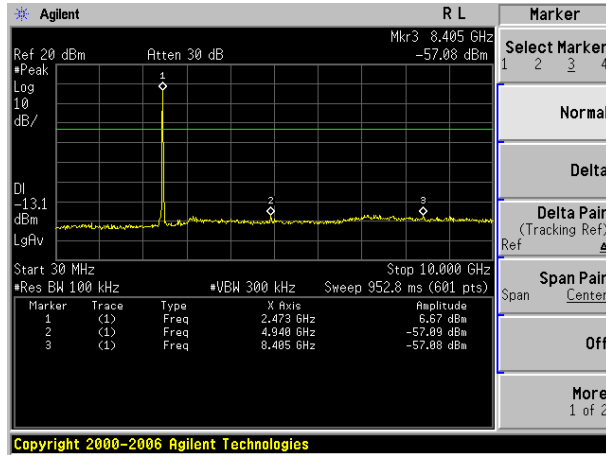


30MHz~10GHz

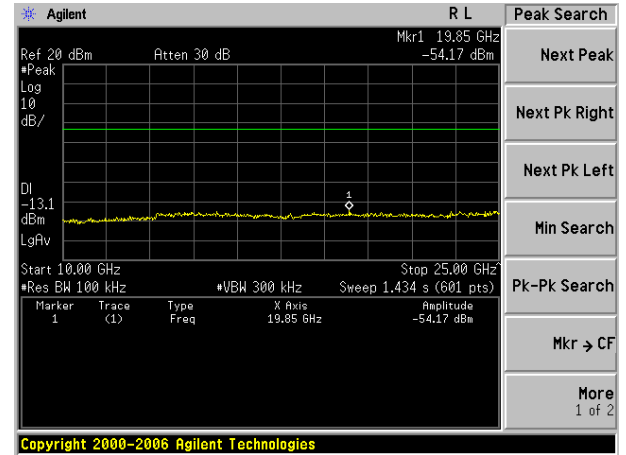


10GHz~25GHz

Test channel:	Highest channel
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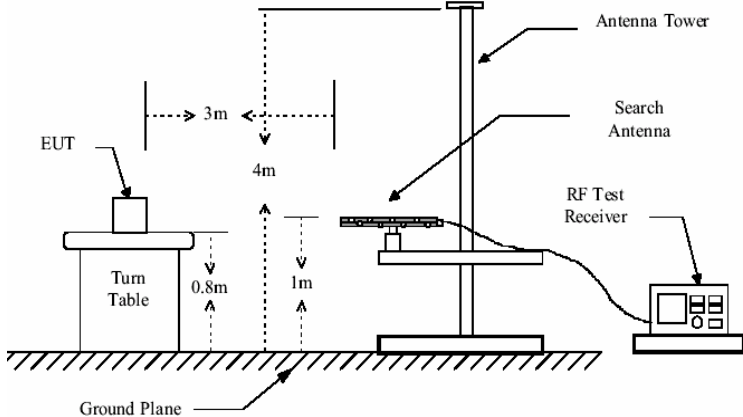
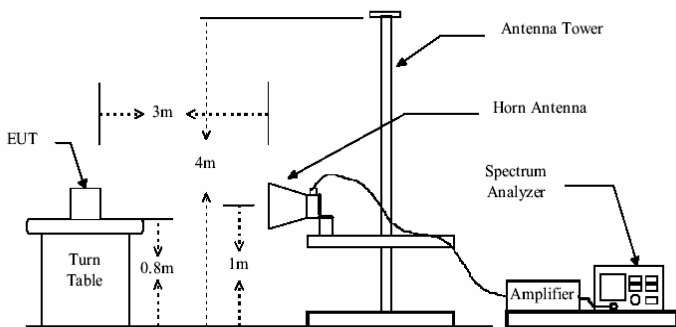
30MHz~10GHz



10GHz~25GHz



## 6.7.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209				
Test Method:	ANSI C63.4: 2003				
Test Frequency Range:	30MHz to 25GHz				
Test site:	Measurement Distance: 3m				
Receiver setup:	Frequency	Detector	RBW	VBW	Remark
	30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value
	Above 1GHz	Peak	1MHz	3MHz	Peak Value
		AV	1MHz	10Hz	Average Value
Limit:	Frequency		Limit (dBuV/m @3m)		Remark
	30MHz-88MHz		40.0		Quasi-peak Value
	88MHz-216MHz		43.5		Quasi-peak Value
	216MHz-960MHz		46.0		Quasi-peak Value
	960MHz-1GHz		54.0		Quasi-peak Value
	Above 1GHz		54.0		Average Value
			74.0		Peak Value
Test setup:	Below 1GHz				
					
Test setup:	Above 1GHz				
					

Test Procedure:	<ol style="list-style-type: none"> <li>1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter camber. The table was rotated 360 degrees to determine the position of the highest radiation.</li> <li>2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.</li> <li>3. The antenna height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.</li> <li>4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rota table was turned from 0 degrees to 360 degrees to find the maximum reading.</li> <li>5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.</li> <li>6. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.</li> </ol>
Test Instruments:	Refer to section 5.7 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Remark:

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

### ■ Below 1GHz

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	polarization
45.86	46.92	16.56	0.73	32.00	32.21	40.00	-7.79	Vertical
151.07	49.61	11.35	1.58	31.99	30.55	43.50	-12.95	Vertical
261.98	49.24	15.17	2.18	32.17	34.42	46.00	-11.58	Vertical
361.71	49.13	16.43	2.68	31.99	36.25	46.00	-9.75	Vertical
593.05	45.51	20.35	3.70	31.07	38.49	46.00	-7.51	Vertical
836.24	43.75	23.49	4.60	31.27	40.57	46.00	-5.43	Vertical
70.58	52.02	12.86	0.94	31.87	33.95	40.00	-6.05	Horizontal
283.98	55.78	15.78	2.29	32.17	41.68	46.00	-4.32	Horizontal
372.01	50.15	16.53	2.72	31.96	37.44	46.00	-8.56	Horizontal
590.97	43.88	20.29	3.69	31.09	36.77	46.00	-9.23	Horizontal
689.57	43.45	21.72	4.05	31.17	38.05	46.00	-7.95	Horizontal
836.24	41.83	23.49	4.60	31.27	38.65	46.00	-7.35	Horizontal

■ Above 1GHz

Test channel:	Lowest
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Peak value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4810.76	22.54	31.78	8.60	24.17	38.75	74.00	-35.25	Vertical
7216.14	21.71	36.15	11.66	26.46	43.06	74.00	-30.94	Vertical
9621.52	18.38	38.01	14.14	25.45	45.08	74.00	-28.92	Vertical
12026.90	*					74.00		Vertical
14432.28	*					74.00		Vertical
4810.76	22.01	31.78	8.60	24.17	38.22	74.00	-35.78	Horizontal
7216.14	22.87	36.15	11.66	26.46	44.22	74.00	-29.78	Horizontal
9621.52	19.20	38.01	14.14	25.45	45.90	74.00	-28.10	Horizontal
12026.90	*					74.00		Horizontal
14432.28	*					74.00		Horizontal

Average value:

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4810.76	13.87	31.78	8.60	24.17	30.08	54.00	-23.92	Vertical
7216.14	13.43	36.15	11.66	26.46	34.78	54.00	-19.22	Vertical
9621.52	10.44	38.01	14.14	25.45	37.14	54.00	-16.86	Vertical
12026.90	*					54		Vertical
14432.28	*					54		Vertical
4810.76	13.53	31.78	8.60	24.17	29.74	54.00	-24.26	Horizontal
7216.14	14.37	36.15	11.66	26.46	35.72	54.00	-18.28	Horizontal
9621.52	11.10	38.01	14.14	25.45	37.80	54.00	-16.20	Horizontal
12026.90	*					54		Horizontal
14432.28	*					54		Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. “\*”, means this data is the too weak instrument of signal is unable to test.

Test channel:	Middle
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4884.50	21.88	31.86	8.67	24.10	38.31	74.00	-35.69	Vertical
7326.75	24.62	36.41	11.72	26.78	45.97	74.00	-28.03	Vertical
9769.00	20.07	38.35	14.25	25.36	47.31	74.00	-26.69	Vertical
12211.25	*					74.00		Vertical
14653.50	*					74.00		Vertical
4884.50	22.86	31.86	8.67	24.10	39.29	74.00	-34.71	Horizontal
7326.75	24.29	36.41	11.72	26.78	45.64	74.00	-28.36	Horizontal
9769.00	19.21	38.35	14.25	25.36	46.45	74.00	-27.55	Horizontal
12211.25	*					74.00		Horizontal
14653.50	*					74.00		Horizontal

**Average value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4884.50	12.66	31.86	8.67	24.10	29.09	54.00	-24.91	Vertical
7326.75	15.35	36.41	11.72	26.78	36.70	54.00	-17.30	Vertical
9769.00	11.68	38.35	14.25	25.36	38.92	54.00	-15.08	Vertical
12211.25	*					54		Vertical
14653.50	*					54		Vertical
4884.50	13.66	31.86	8.67	24.10	30.09	54.00	-23.91	Horizontal
7326.75	15.87	36.41	11.72	26.78	37.22	54.00	-16.78	Horizontal
9769.00	10.23	38.35	14.25	25.36	37.47	54.00	-16.53	Horizontal
12211.25	*					54		Horizontal
14653.50	*					54		Horizontal

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. “\*”, means this data is the too weak instrument of signal is unable to test.

Test channel:	Highest
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**Peak value:**

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4933.64	28.59	31.90	8.70	24.05	45.14	74.00	-28.86	Vertical
7400.46	23.54	36.52	11.76	26.97	44.85	74.00	-29.15	Vertical
9867.28	20.21	38.72	14.33	25.29	47.97	74.00	-26.03	Vertical
12334.10	*					74.00		Vertical
14800.92	*					74.00		Vertical
4933.64	23.28	31.90	8.70	24.05	39.83	74.00	-34.17	Horizontal
7400.46	23.61	36.52	11.76	26.97	44.92	74.00	-29.08	Horizontal
9867.28	19.39	38.72	14.33	25.29	47.15	74.00	-26.85	Horizontal
12334.10	*					74.00		Horizontal
14800.92	*					74.00		Horizontal

**Average value:**

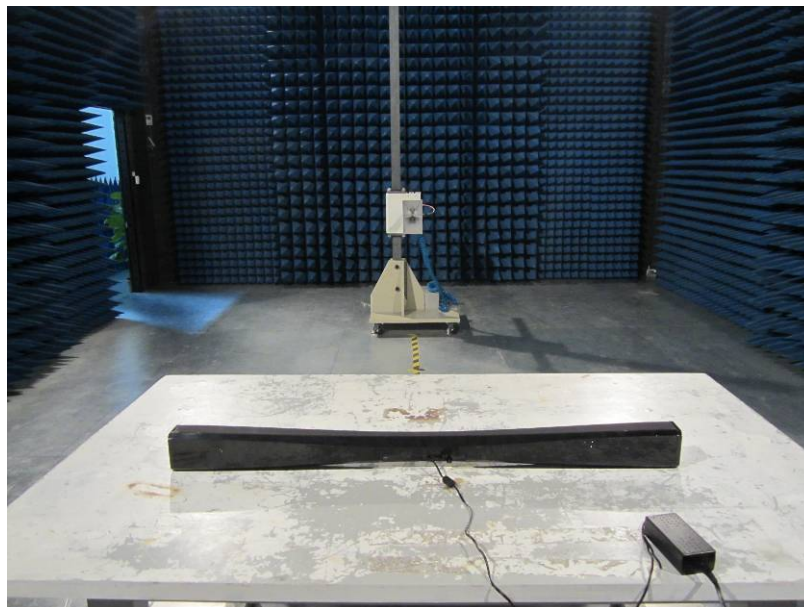
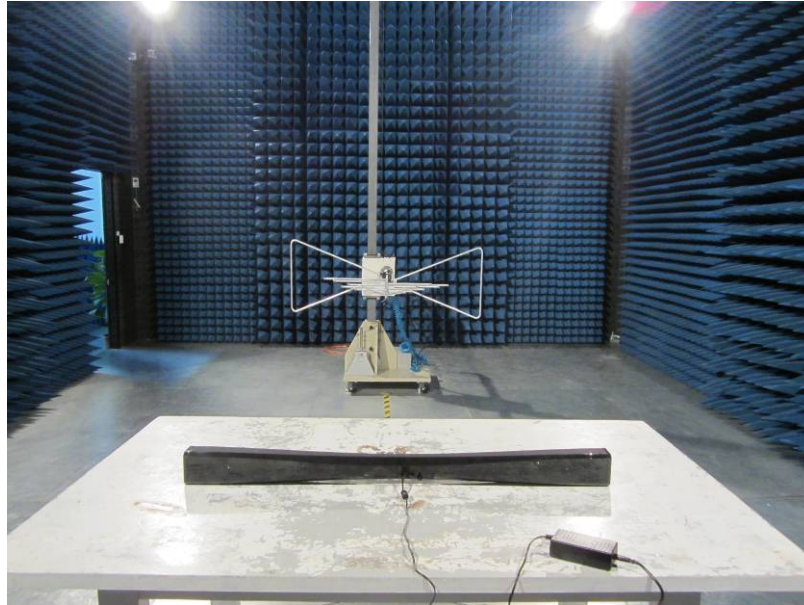
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4933.64	18.21	31.90	8.70	24.05	34.76	54.00	-19.24	Vertical
7400.46	14.00	36.52	11.76	26.97	35.31	54.00	-18.69	Vertical
9867.28	11.09	38.72	14.33	25.29	38.85	54.00	-15.15	Vertical
12334.10	*					54.00		Vertical
14800.92	*					54.00		Vertical
4933.64	14.84	31.90	8.70	24.05	31.39	54.00	-22.61	Horizontal
7400.46	14.33	36.52	11.76	26.97	35.64	54.00	-18.36	Horizontal
9867.28	10.48	38.72	14.33	25.29	38.24	54.00	-15.76	Horizontal
12334.10	*					54.00		Horizontal
14800.92	*					54.00		Horizontal

**Remark:**

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. “\*”, means this data is the too weak instrument of signal is unable to test.

## 7 Test Setup Photo

Radiated Emission



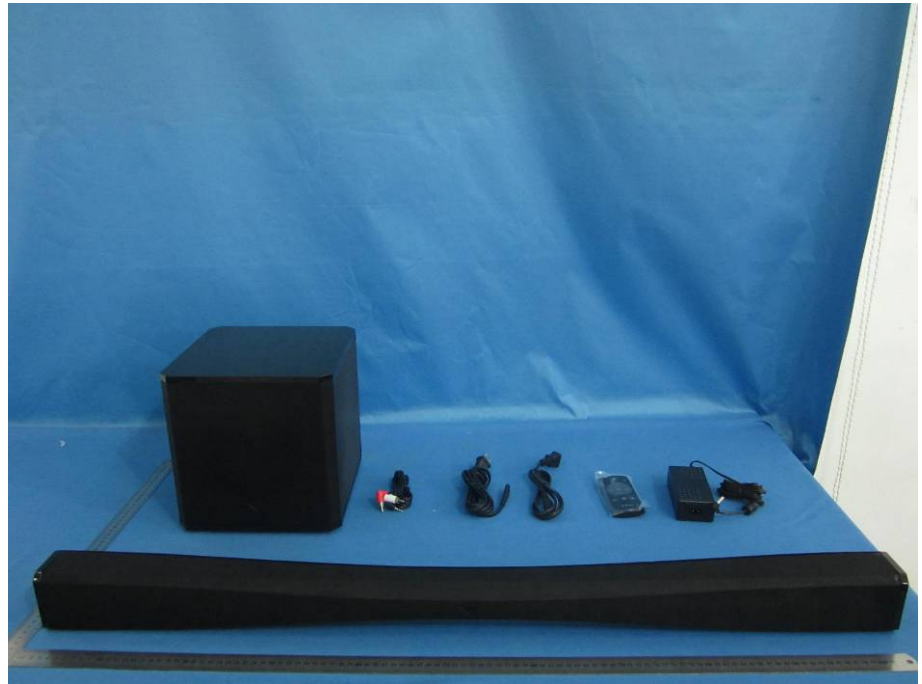
## Conducted Emission



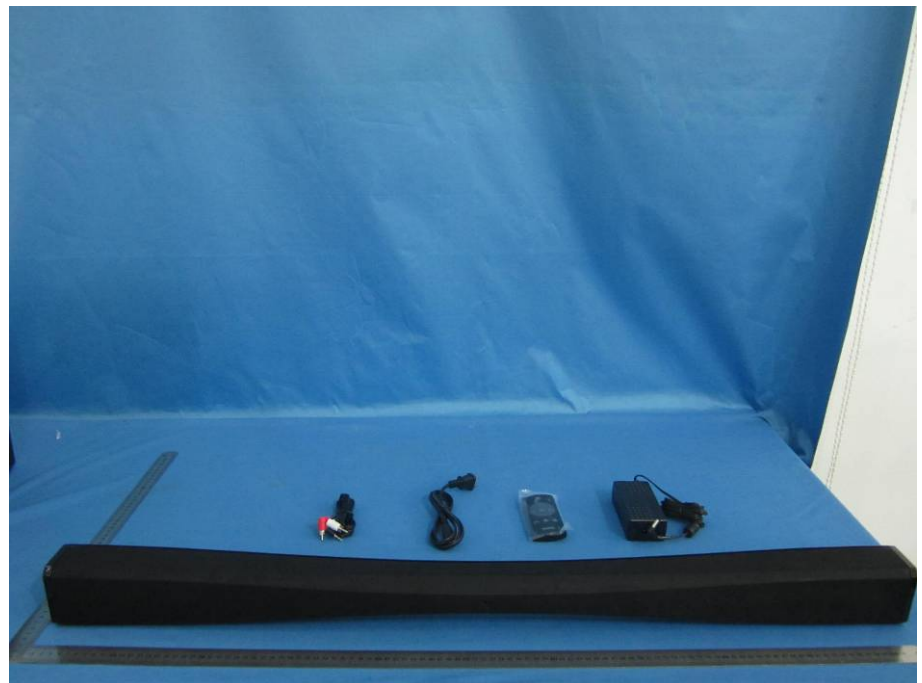


## 8 EUT Constructional Details

Product View

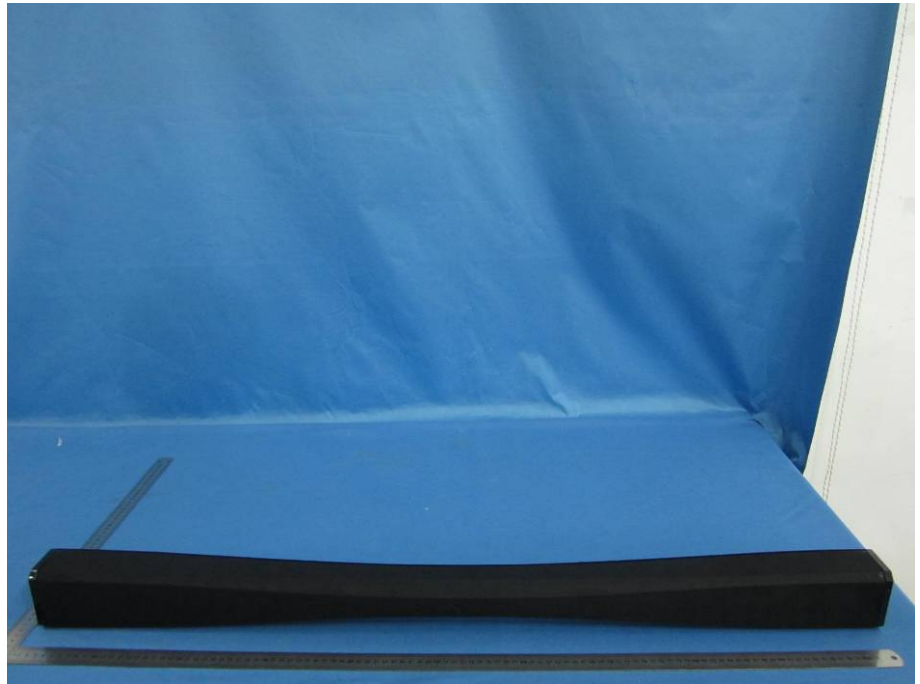


Product View





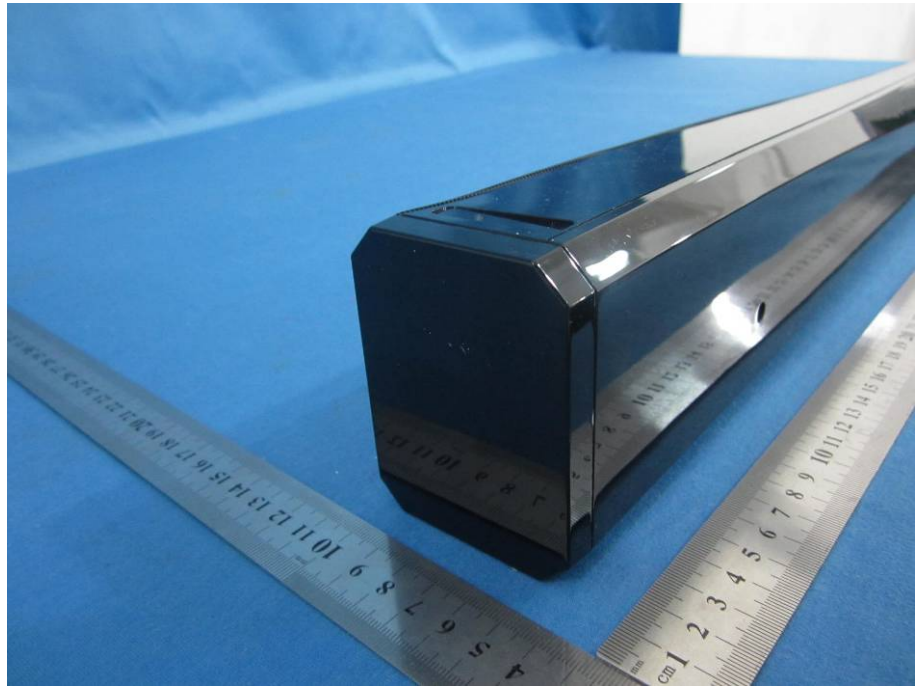
Front & Top



Back & Bottom



Left Side



Right Side



Interface

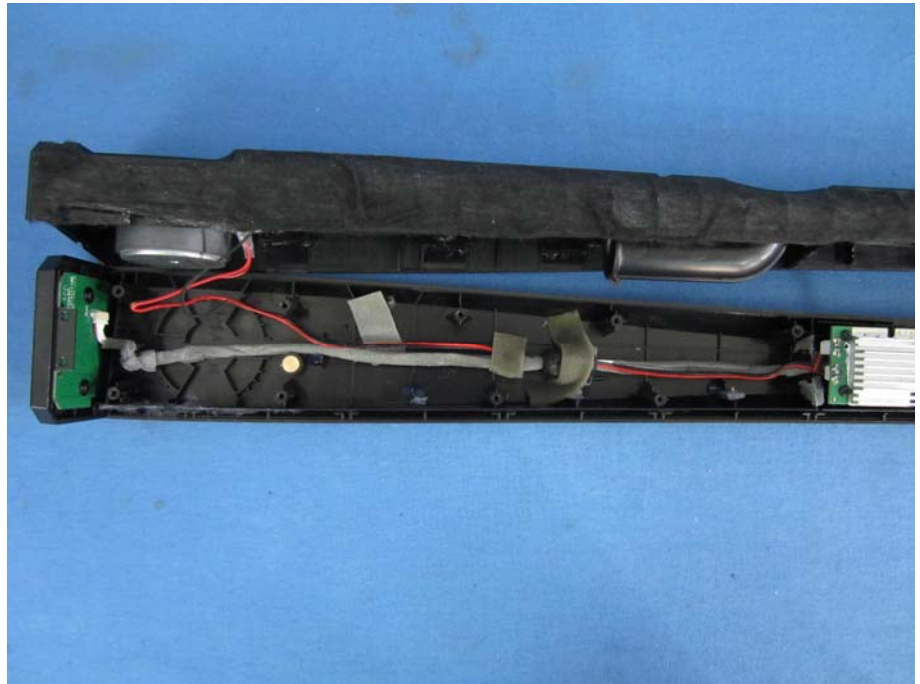


Open-1

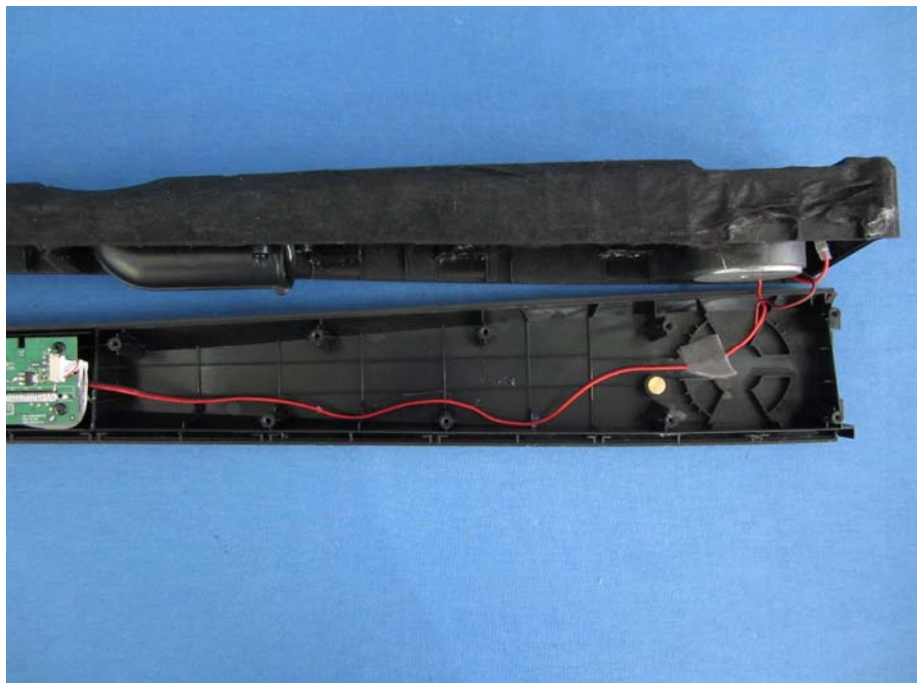




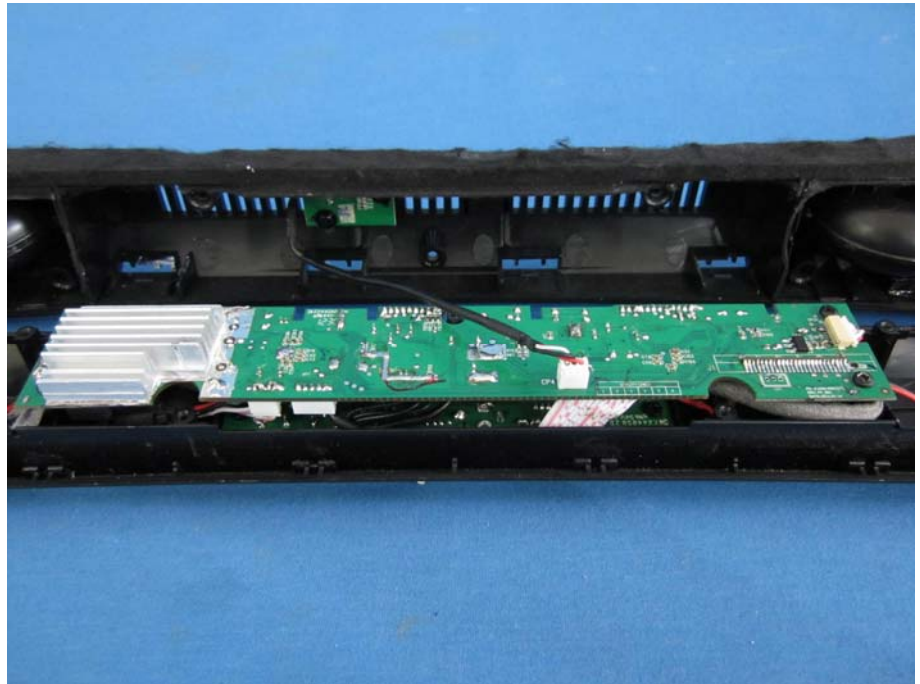
Open-2



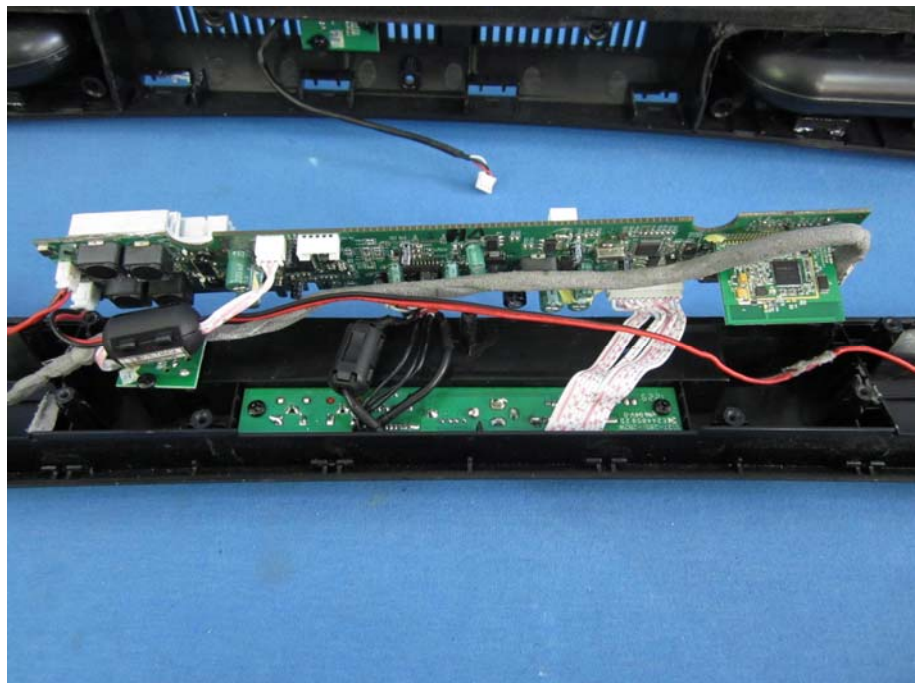
Open-3



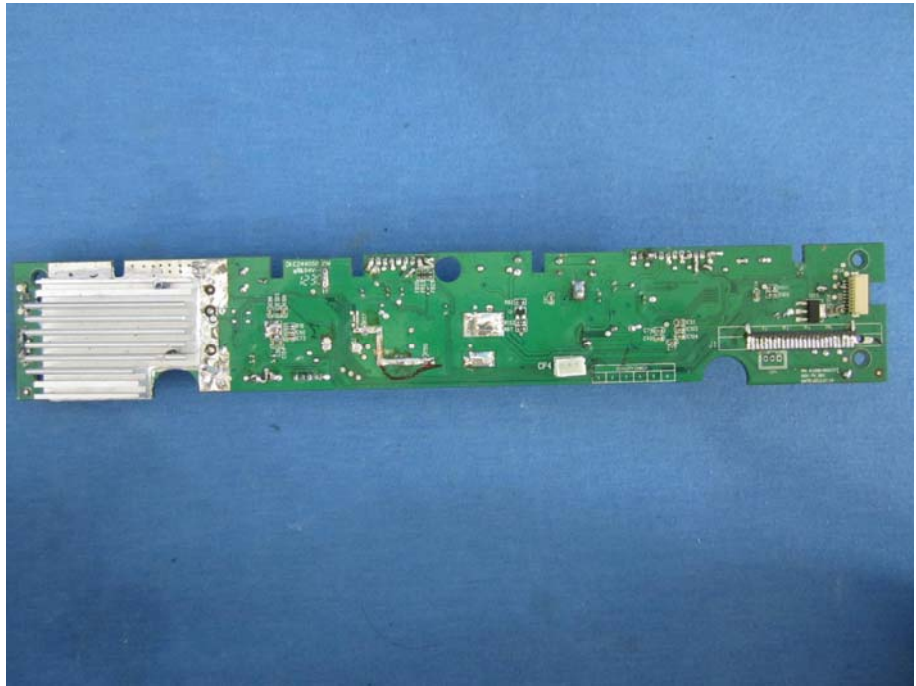
Open-4



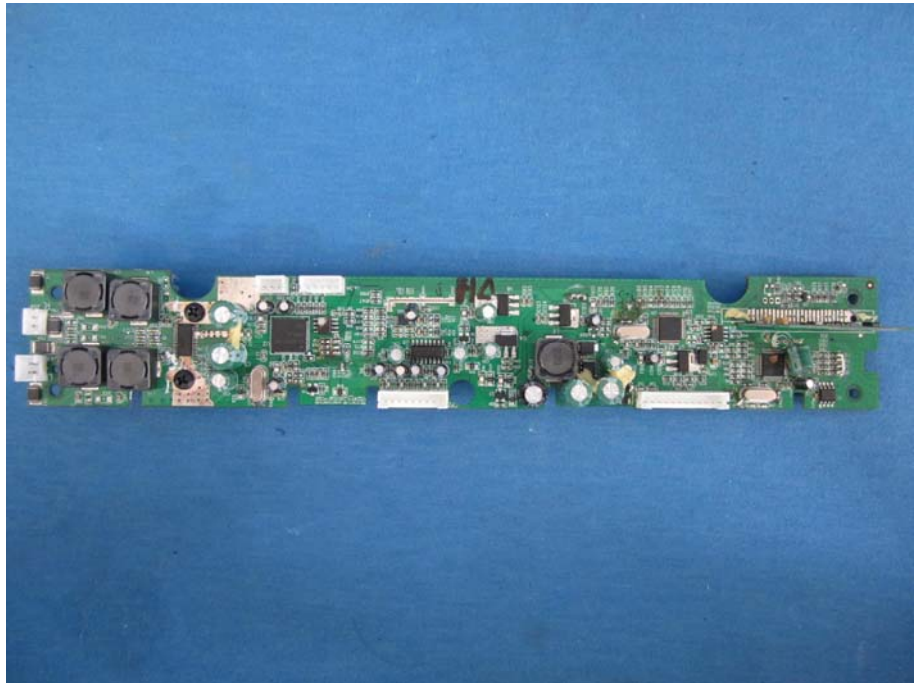
Open-5



Mainboard-1

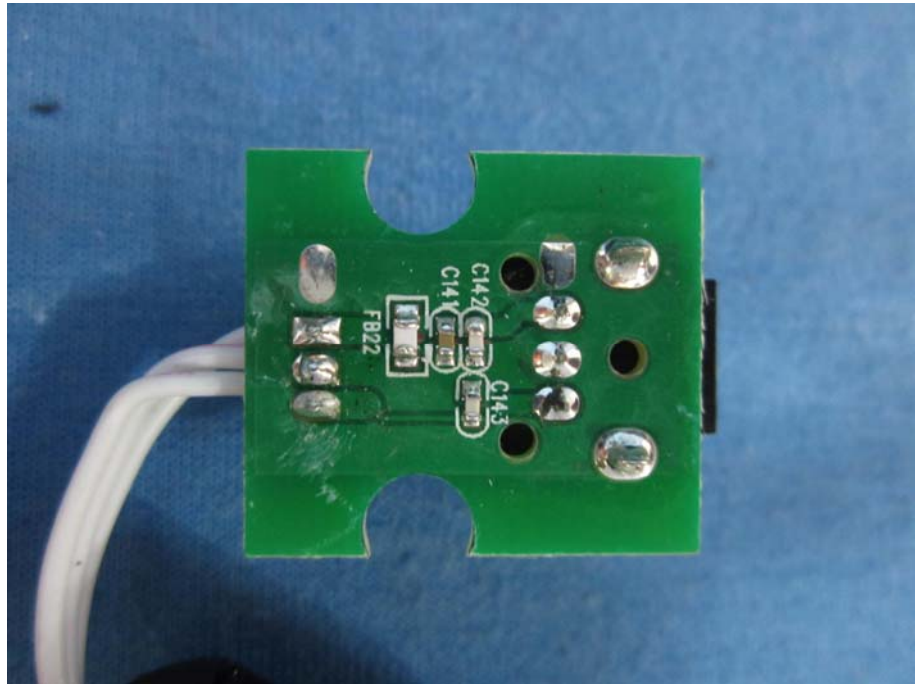


Mainboard-2





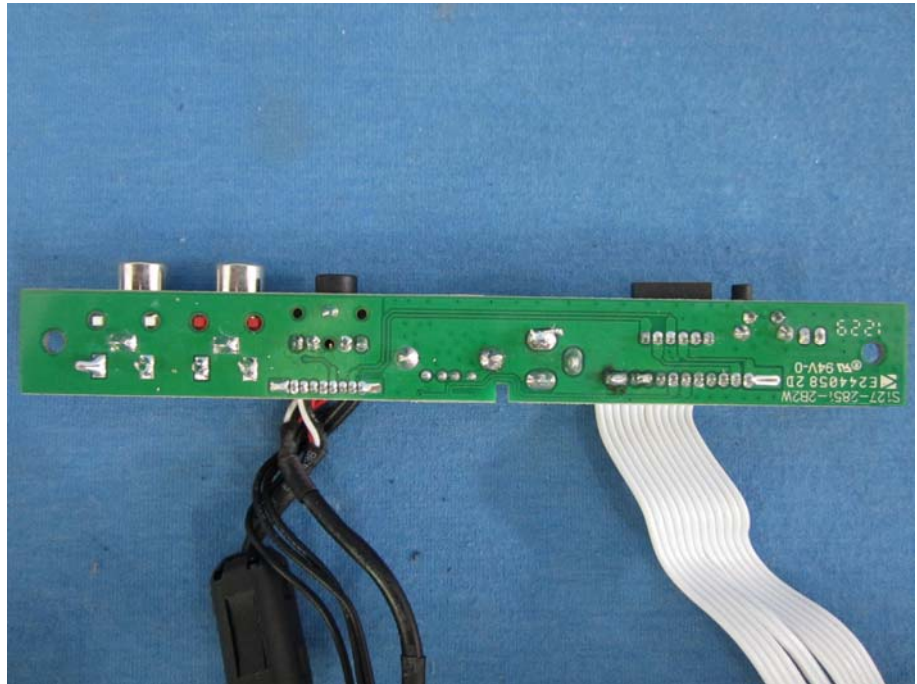
Optical Interface



Optical Interface



Interface Board

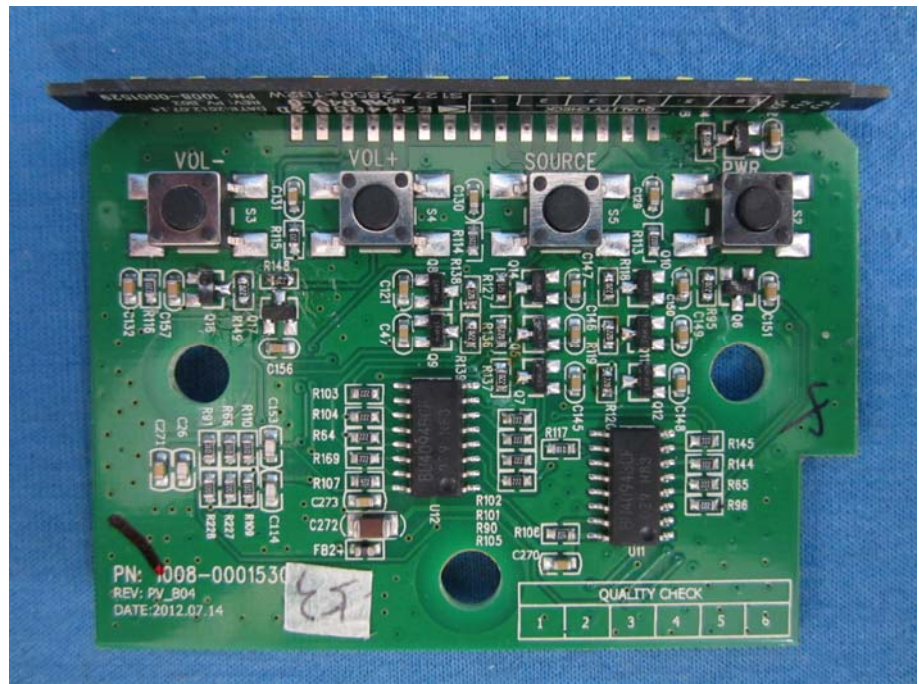


Interface Board

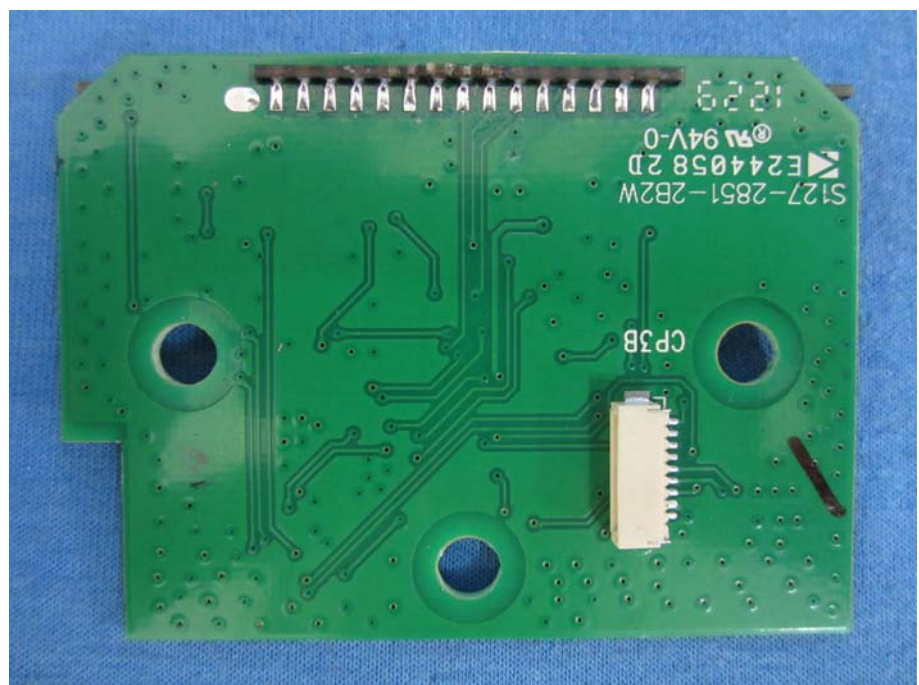




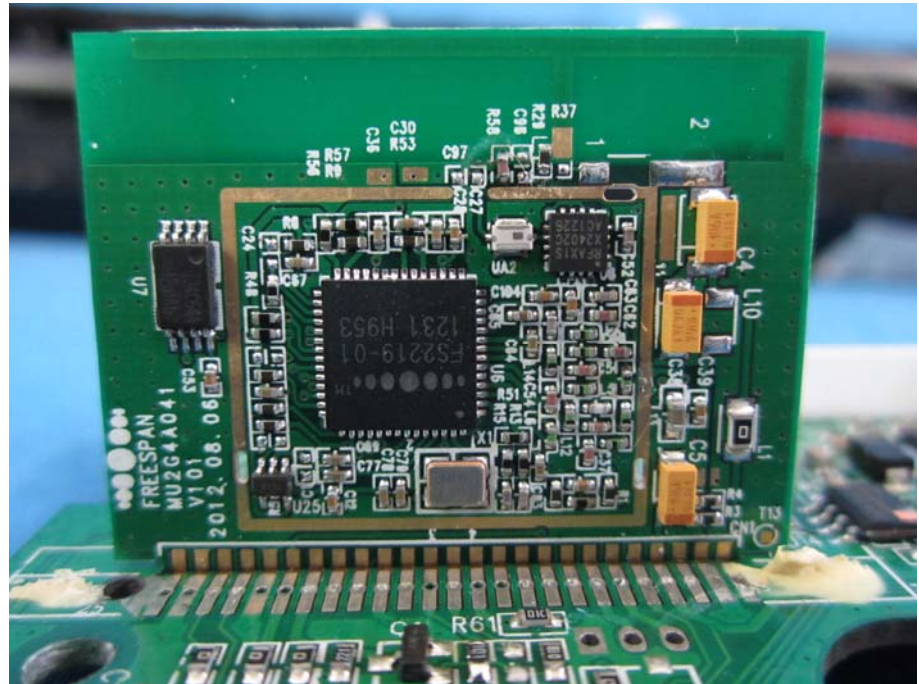
Control & Display  
Board



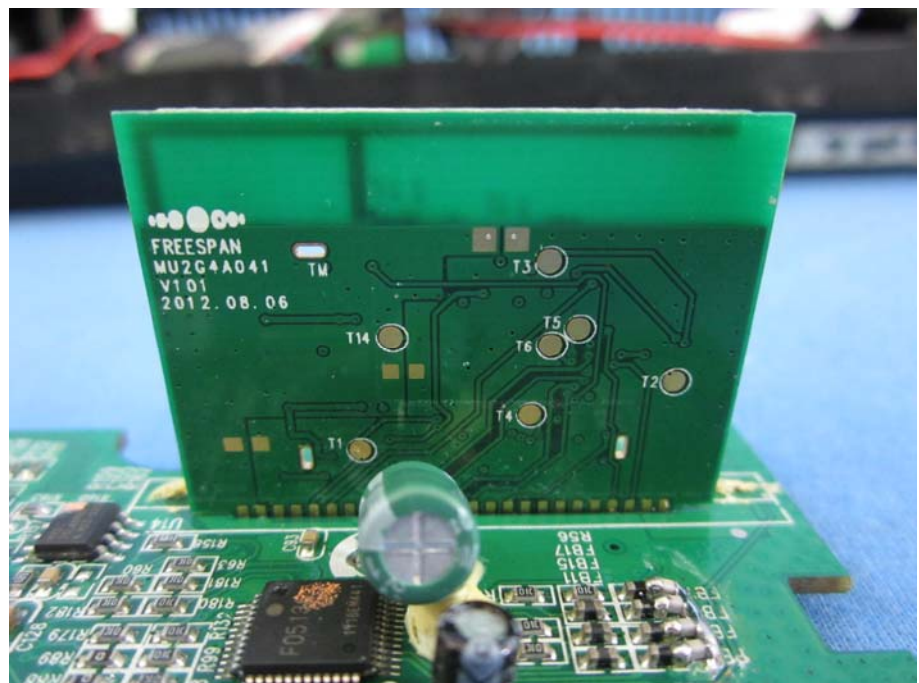
Control & Display  
Board



RF Module



RF Module



Adapter



-----end-----