

FCC Report

Applicant: Polk Audio

Address of Applicant: 5601 Metro Drive Baltimore, MD 21215

Equipment Under Test (EUT)

Product Name: Surroundbar 5000 Instant Home Theater

Model No.: Surroundbar 5000 Speaker

Trade Mark: 

FCC ID: WLQSB5000IHTTX

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

Date of sample receipt: July 04, 2012

Date of Test: Aug. 03-08, 2012

Date of report issued: Aug. 14, 2012

Test Result : PASS *

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

Authorized Signature:



A circular blue stamp with 'GTS' in the center, 'GLOBAL TESTING' around it, and 'LABORATORY' at the bottom. A signature is written over the stamp.

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	Aug. 14, 2012	Original

Prepared By:

hank. yan.

Date:

Aug. 14, 2012

Project Engineer

Check By:

Hans. Hu

Date:

Aug. 14, 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)(1)	Pass
Emission Bandwidth	15.247 (a)(1)	Pass
Carrier Frequencies Separation	15.247 (a)(1)	Pass
Hopping Channel Number	15.247 (a)(1)	Pass
Dwell Time	15.247 (a)(1)	Pass
Pseudorandom Frequency Hopping Sequence	15.247(b)(4)&TCB Exclusion List (7 July 2002)	Pass
Radiated Emission	15.205/15.209	Pass
Band Edge	15.247(d)	Pass

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

5 General Information

5.1 Client Information

Applicant:	Polk Audio
Address of Applicant:	5601 Metro Drive Baltimore, MD 21215
Manufacturer/Factory:	ZHAO YANG ELEC.(SHENZHEN) CO., LTD.
Address of Manufacturer/Factory:	Section A, 4th 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:	Surroundbar 5000 Instant Home Theater
Model No.:	Surroundbar 5000 Speaker
Operation Frequency:	2403.5MHz~2477.3MHz
Channel numbers:	49
Modulation type:	FSK
Antenna Type:	Integral
Antenna gain:	2dBi
Power supply:	Input: 100V-240VAC, 50/60Hz, 1800mA Output: 20VDC, 2.2A

Operation Frequency each of channel							
Channel	Frequency(MHz)	Channel	Frequency(MHz)	Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	2403.5	14	2423.5	27	2443.5	40	2463.5
2	2405.1	15	2425.1	28	2445.0	41	2465.0
3	2406.6	16	2426.6	29	2446.6	42	2466.6
4	2408.1	17	2428.1	30	2448.1	43	2468.4
5	2409.7	18	2429.7	31	2449.6	44	2469.6
6	2411.2	19	2431.2	32	2451.2	45	2471.2
7	2412.8	20	2432.7	33	2452.7	46	2472.7
8	2414.3	21	2434.3	34	2454.3	47	2474.2
9	2415.8	22	2435.8	35	2455.8	48	2475.8
10	2417.4	23	2437.4	36	2457.3	49	2477.3
11	2418.9	24	2438.9	37	2458.9		
12	2420.4	25	2440.4	38	2460.4		
13	2422.0	26	2442.0	39	2461.9		

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	2403.5MHz
The middle channel	2438.9MHz
The Highest channel	2477.3MHz

5.3 Test mode

Transmitting mode	Keep the EUT in transmitting mode
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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 Description of Support Units

Manufacturer	Description	Model	Serial Number	FCC ID/DoC
APPLE	Mobile Phone	MD235ZP	C35HCKSUDTCO	Doc

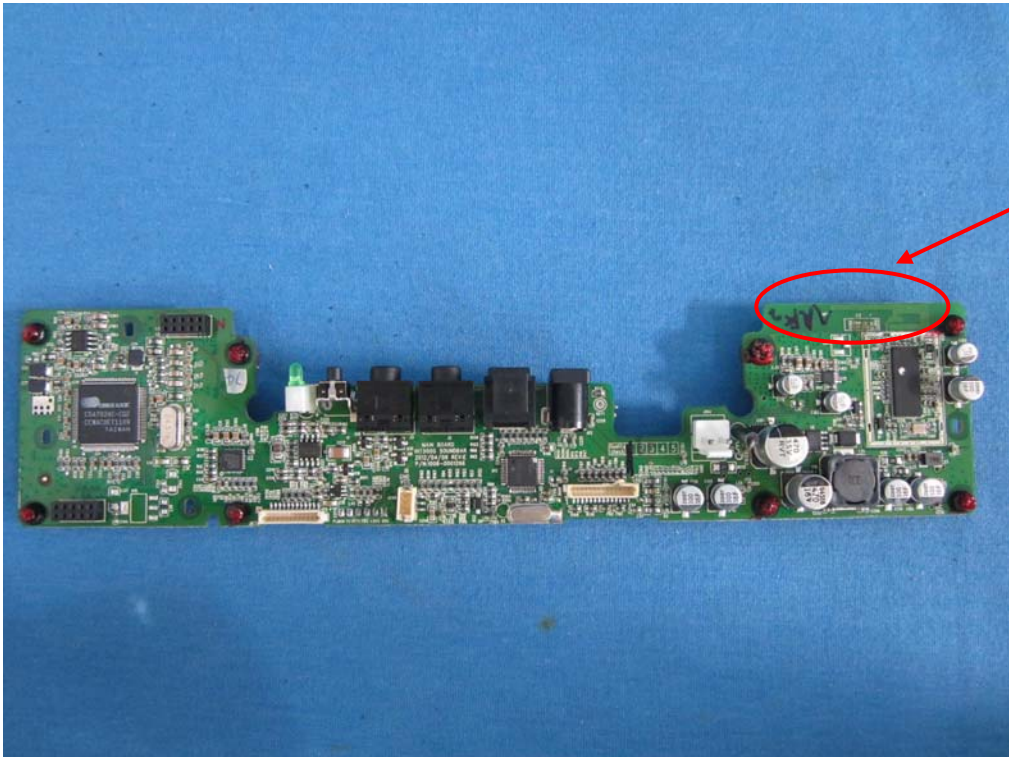
5.8 Test Instruments list

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	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

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)	GTS264	Sep. 08 2011	Sep. 07 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	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	Jul. 03 2012	Jul. 02 2013
5	LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS226	Jul. 03 2012	Jul. 02 2013
6	Coaxial Cable	GTS	N/A	GTS227	Jul. 03 2012	Jul. 02 2013
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

6 Test results and Measurement Data

6.1 Antenna requirement:

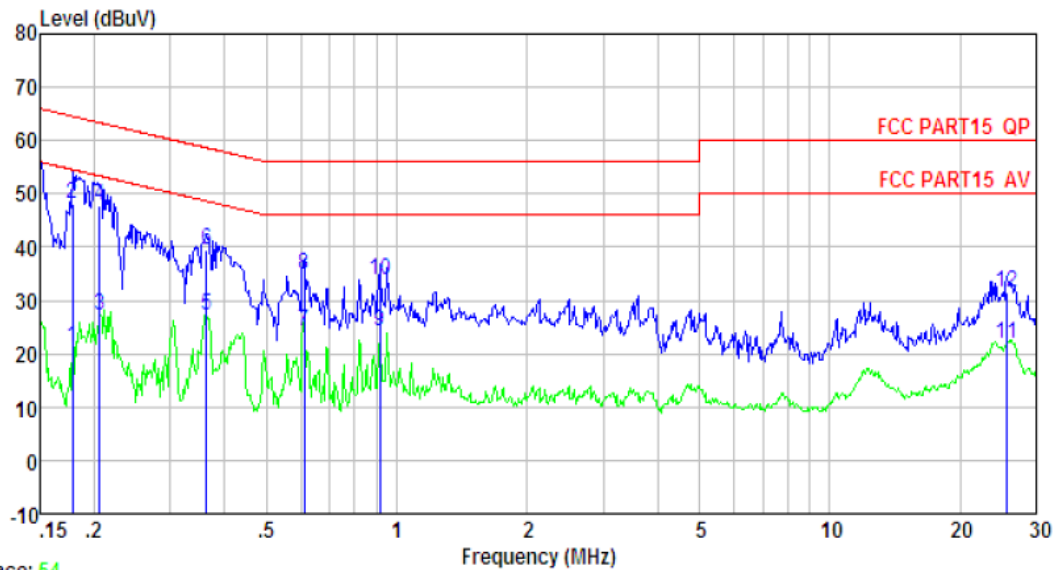
Standard requirement:	FCC Part15 C Section 15.203 /247(c)
15.203 requirement: <p>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a 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>	
15.247(c) (1)(i) requirement: <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>	
E.U.T Antenna: <p><i>The antenna is integral 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;">Reference Plane</p><p><i>Remark: E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</i></p></div>																
Test procedure:	<ol style="list-style-type: none">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.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).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.																
Test Instruments:	Refer to section 5.8 for details																
Test mode:	Refer to section 5.3 for details																
Test results:	Pass																

Measurement data:

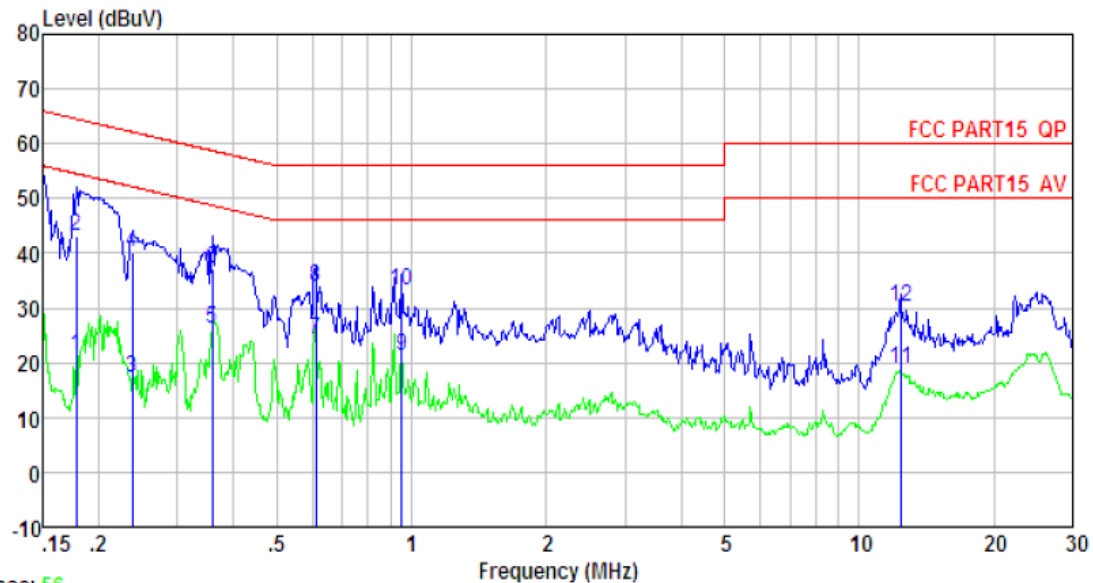
Line:



Condition : FCC PART15 QP LISN-2012 LINE
 Job No. : 722RF
 Test Mode : Operation mode
 Test Engineer: Hank

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.179	21.23	-0.05	0.10	21.28	54.55	-33.27	Average
2	0.179	47.99	-0.05	0.10	48.04	64.55	-16.51	QP
3	0.206	27.30	-0.05	0.10	27.35	53.36	-26.01	Average
4	0.206	47.61	-0.05	0.10	47.66	63.36	-15.70	QP
5	0.363	27.23	-0.05	0.10	27.28	48.65	-21.37	Average
6	0.363	39.28	-0.05	0.10	39.33	58.65	-19.32	QP
7	0.611	24.26	-0.05	0.10	24.31	46.00	-21.69	Average
8	0.611	34.64	-0.05	0.10	34.69	56.00	-21.31	QP
9	0.914	24.32	-0.06	0.10	24.36	46.00	-21.64	Average
10	0.914	33.87	-0.06	0.10	33.91	56.00	-22.09	QP
11	25.591	22.25	-0.47	0.21	21.99	50.00	-28.01	Average
12	25.591	31.73	-0.47	0.21	31.47	60.00	-28.53	QP

Neutral:



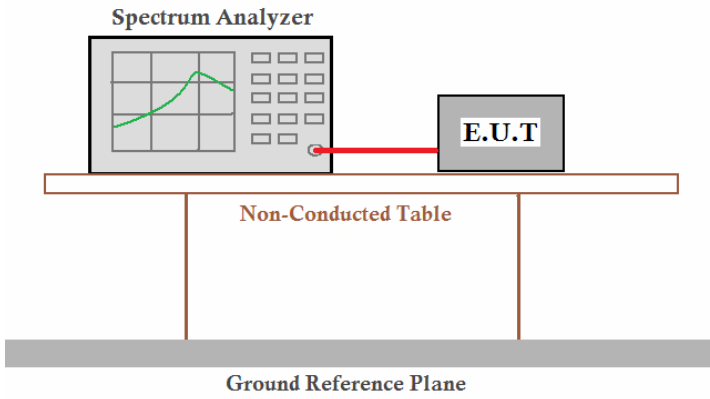
Trace: 56
 Condition : FCC PART15 QP LISN-2012 NEUTRAL
 Job No. : 722RF
 Test Mode : Operation mode
 Test Engineer: Hank

	Freq	Read Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.179	21.21	-0.05	0.00	21.16	54.55	-33.39	Average
2	0.179	43.07	-0.05	0.00	43.02	64.55	-21.53	QP
3	0.238	17.32	-0.05	0.00	17.27	52.17	-34.90	Average
4	0.238	40.17	-0.05	0.00	40.12	62.17	-22.05	QP
5	0.360	26.28	-0.05	0.00	26.23	48.74	-22.51	Average
6	0.360	37.10	-0.05	0.00	37.05	58.74	-21.69	QP
7	0.611	24.29	-0.05	0.00	24.24	46.00	-21.76	Average
8	0.611	33.86	-0.05	0.00	33.81	56.00	-22.19	QP
9	0.953	21.36	-0.06	0.00	21.30	46.00	-24.70	Average
10	0.953	33.31	-0.06	0.00	33.25	56.00	-22.75	QP
11	12.384	19.20	-0.21	0.00	18.99	50.00	-31.01	Average
12	12.384	30.26	-0.21	0.00	30.05	60.00	-29.95	QP

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

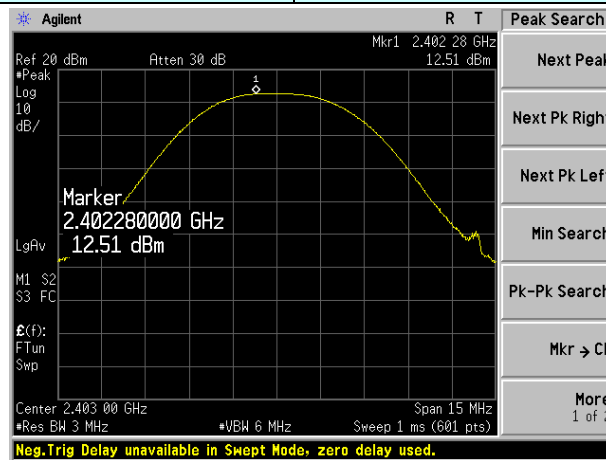
Test Requirement:	FCC Part15 C Section 15.247 (b)(3)
Test Method:	ANSI C63.4:2003
Limit:	30dBm
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are placed on a Non-Conducted Table. The table is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

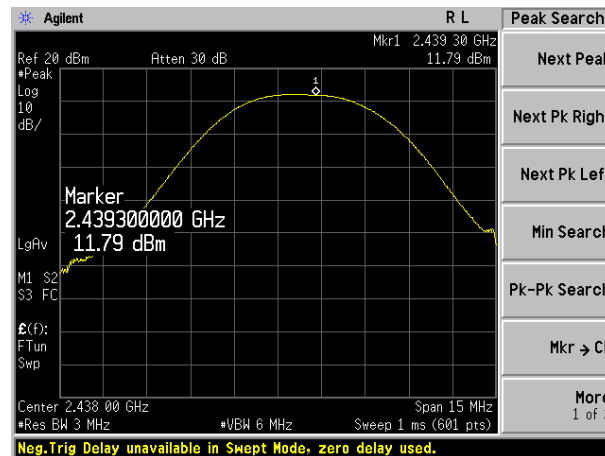
FSK mode			
Test channel	Peak Output Power (dBm)	Limit (dBm)	Result
Lowest	12.51	30.00	Pass
Middle	11.79		
Highest	10.71		

Test plot as follows:

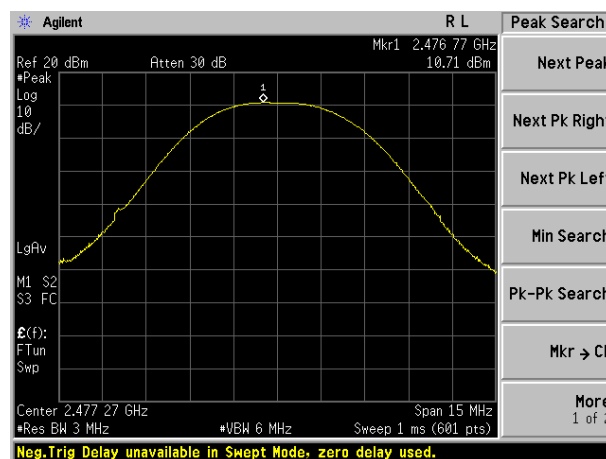
Test mode:	FSK mode
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Lowest channel

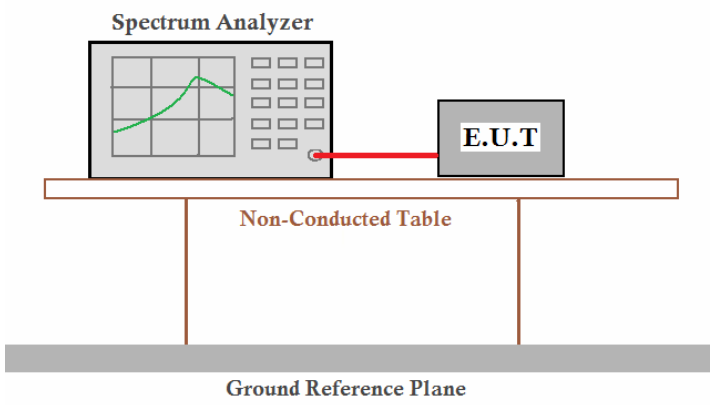


Middle channel



Highest channel

6.4 Emission Bandwidth

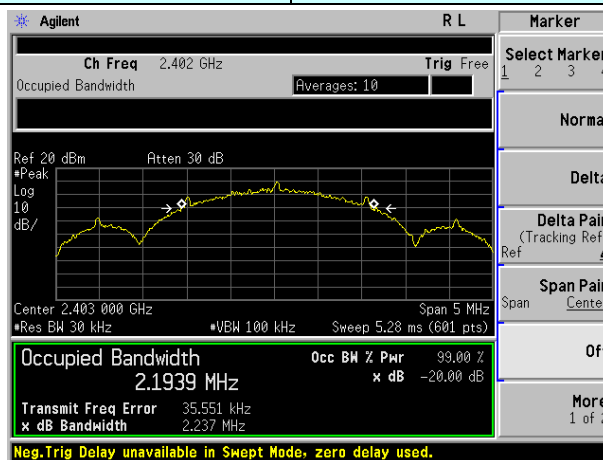
Test Requirement:	FCC Part15 C Section 15.247 (a)(2)
Test Method:	ANSI C63.4:2003
Limit:	N/A
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

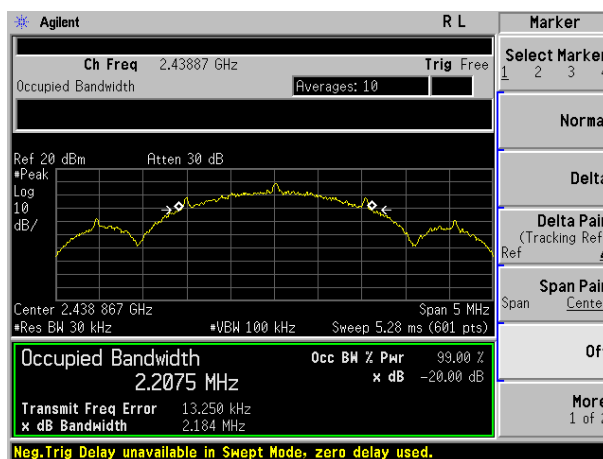
Test channel	Emission Bandwidth (MHz)	Result
Lowest	2.237	Pass
Middle	2.184	
Highest	2.264	

Test plot as follows:

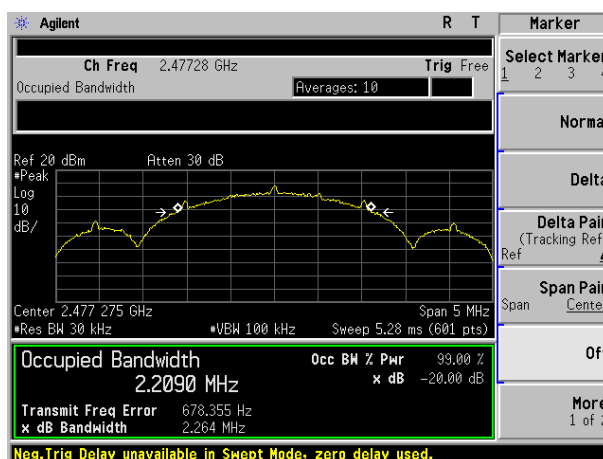
Test mode:	FSK mode
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Lowest channel

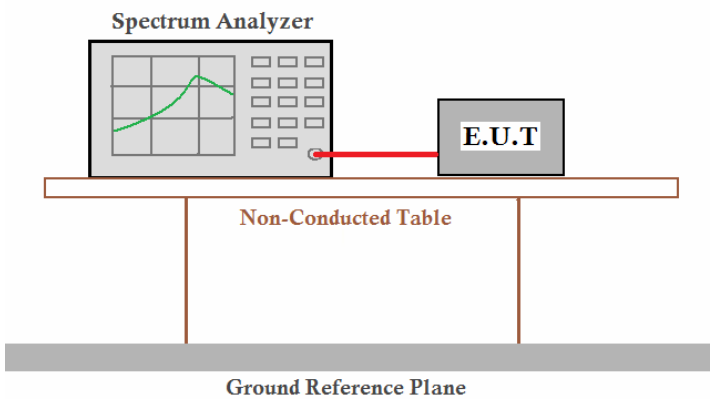


Middle channel



Highest channel

6.5 Carrier Frequencies Separation

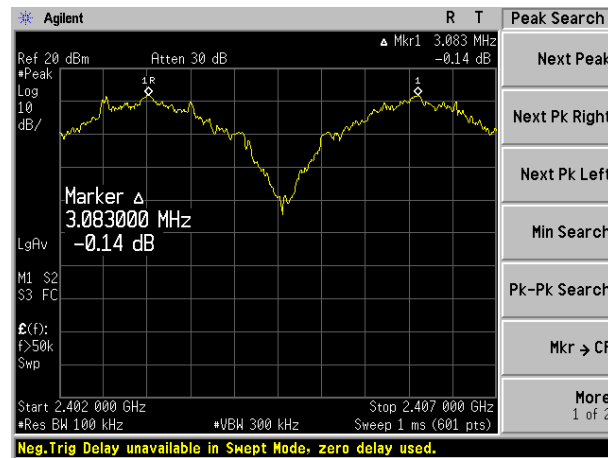
Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=100KHz, VBW=300KHz, detector=Peak
Limit:	0.025MHz or 2/3 of the 20dB bandwidth (whichever is greater)
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both are placed on a Non-Conducted Table, which is supported by a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

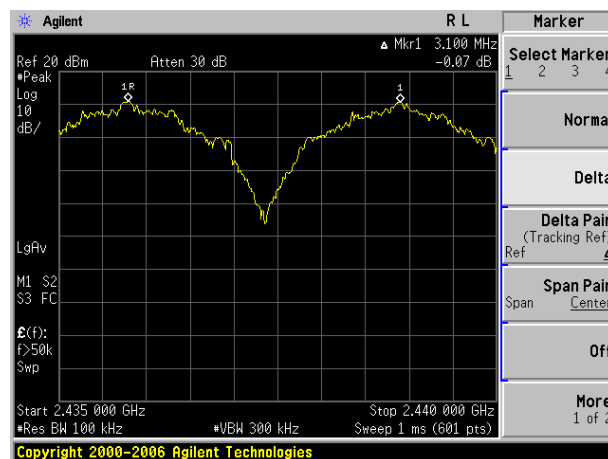
FSK mode			
Test channel	Carrier Frequencies Separation (kHz)	Limit (kHz)	Result
Lowest	3083	1509	Pass
Middle	3100	1509	Pass
Highest	1550	1509	Pass

Test plot as follows:

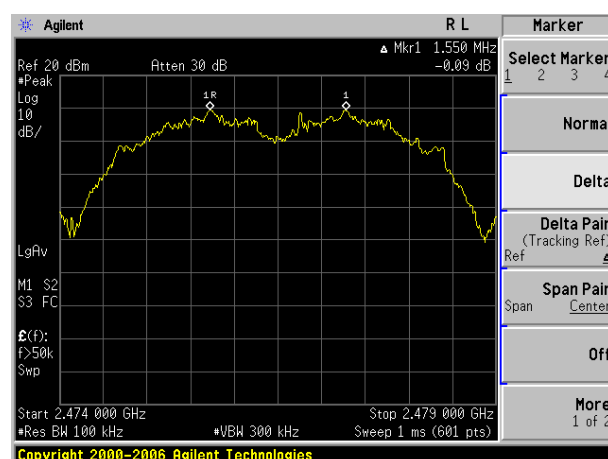
Modulation mode:	FSK
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Lowest channel

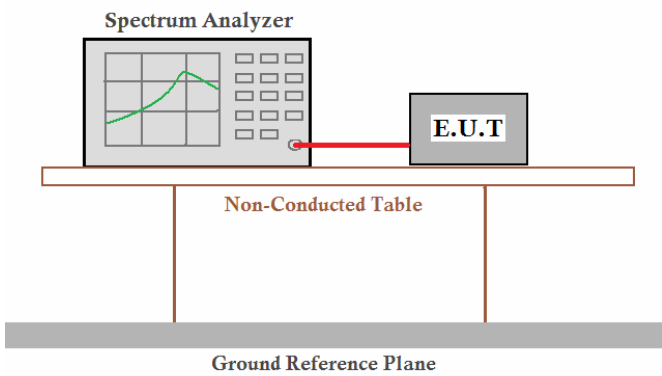


Middle channel



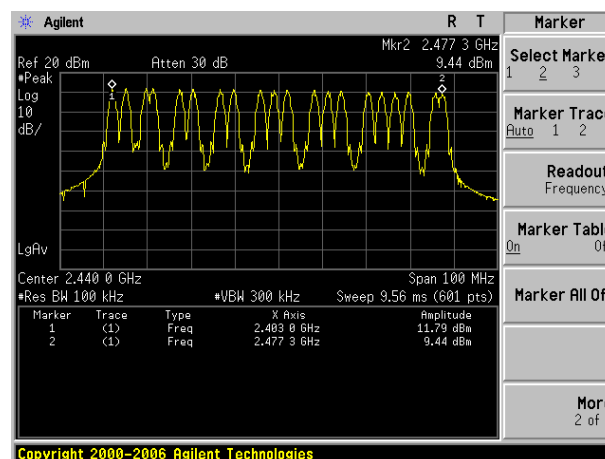
Highest channel

6.6 Hopping Channel Number

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=100kHz, VBW=300kHz, Frequency range=2400MHz-2483.5MHz, Detector=Peak
Limit:	15 channels
Test setup:	
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data:

Hopping channel numbers	Limit	Result
20	15	Pass

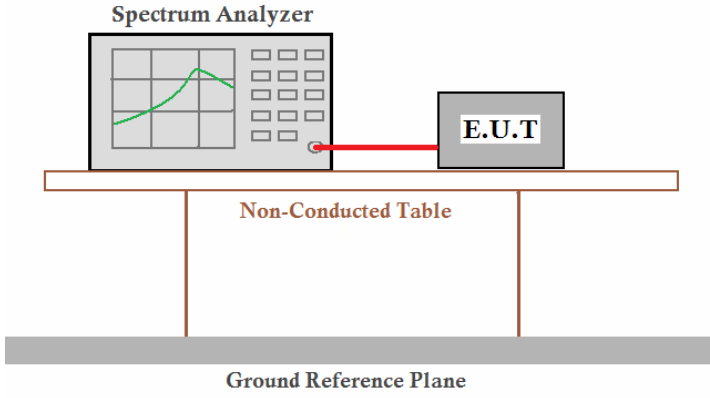


Remark: The RF Module has channel palette of 49 channels which are spaced every 1.537 MHz starting at 2403.5MHz.

From this palette, 20 channels are used by the system at any given moment.

Please refer to operational description for more information

6.7 Dwell Time

Test Requirement:	FCC Part15 C Section 15.247 (a)(1)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=1MHz, VBW=1MHz, Span=0Hz, Detector=Peak
Limit:	0.4 Second
Test setup:	 <p>The diagram illustrates the test setup. A Spectrum Analyzer is connected via a red cable to an E.U.T. (Equipment Under Test). Both are placed on a Non-Conducted Table. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

Channel	Dwell time (second)	Limit (second)	Result
lowest	0.27872	0.4	Pass
middle	0.28000		
highest	0.27872		

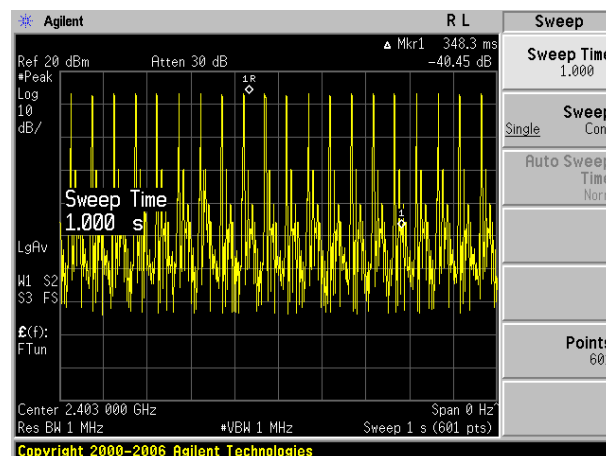
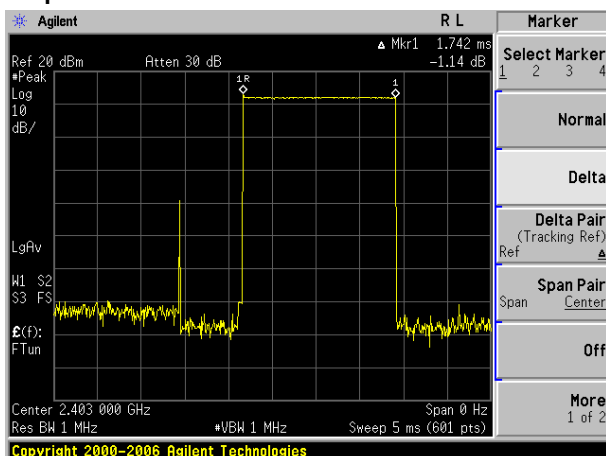
The formula of Dwell Time is below:

$$T = T_{on} * N * 0.4 * \text{Hopping Channel Numbers}$$

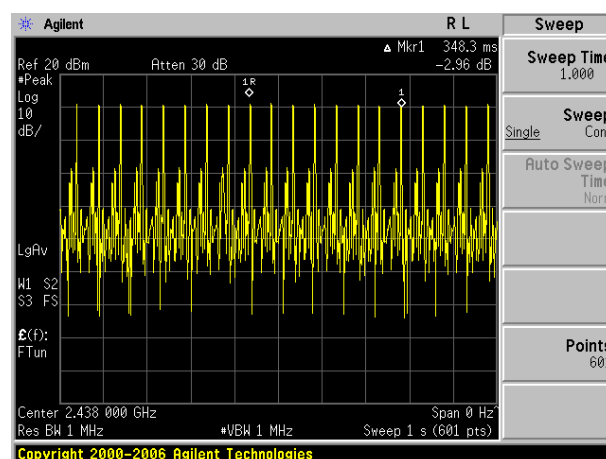
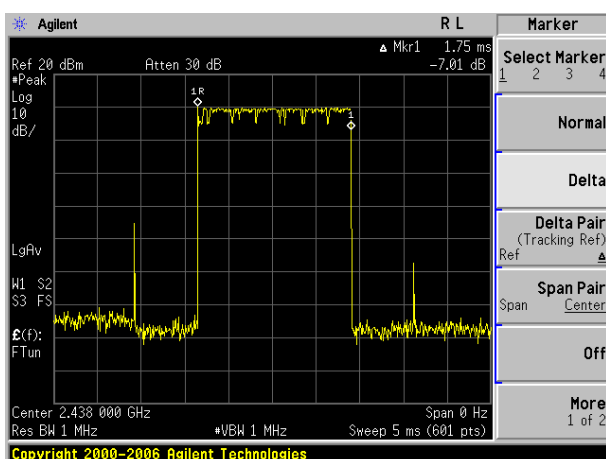
Remark:

N: Number of this channel is used in 1 second.

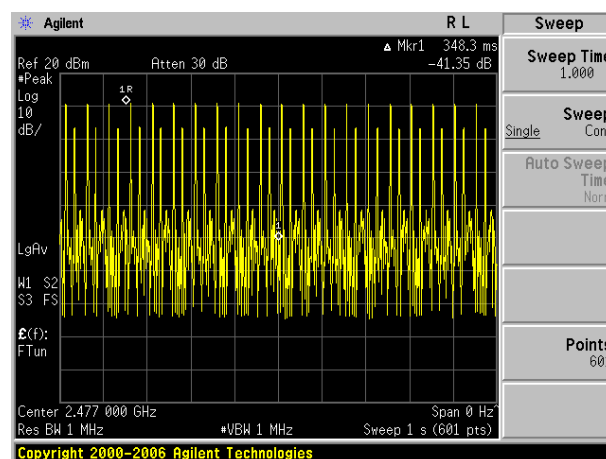
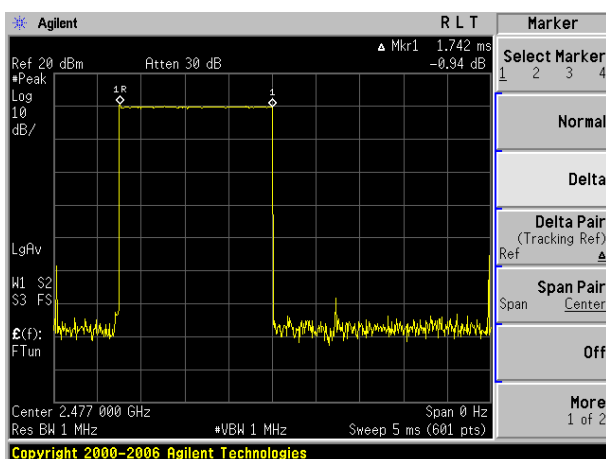
Test plot as follows:



Lowest channel



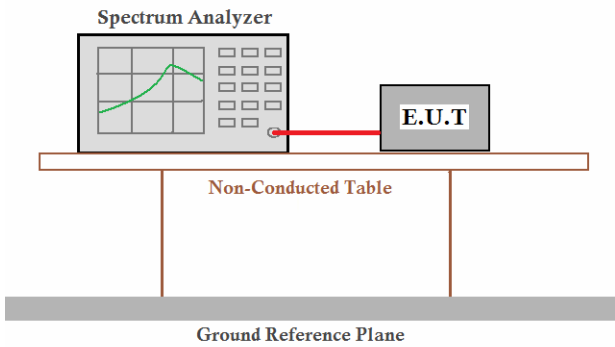
Middle channel



Highest channel

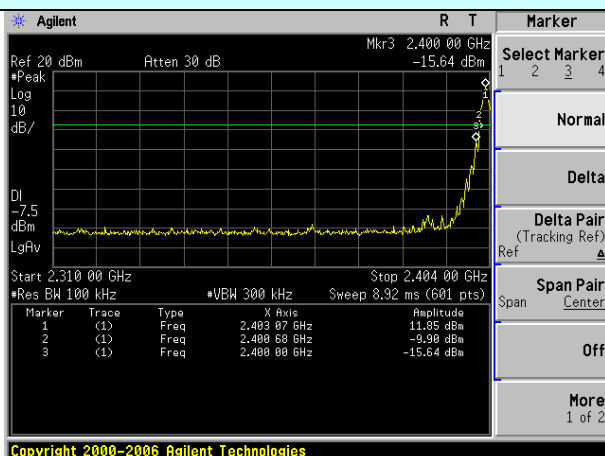
6.8 Band Edge

6.8.1 Conducted Emission Method

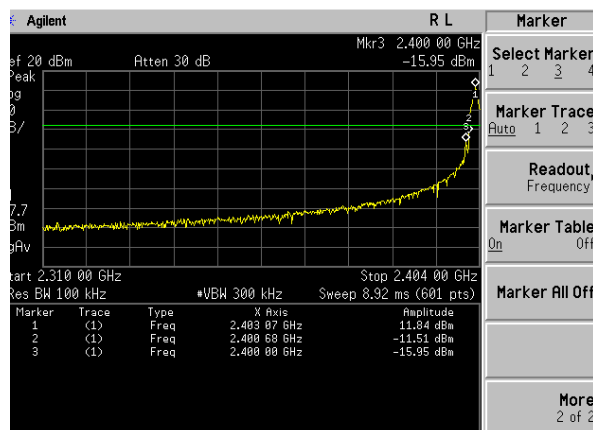
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2003
Receiver setup:	RBW=100kHz, VBW=300kHz, Detector=Peak
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by 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. The table is supported by two vertical legs. Below the table is a Ground Reference Plane.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Test plot as follows:

Test channel:	Lowest channel
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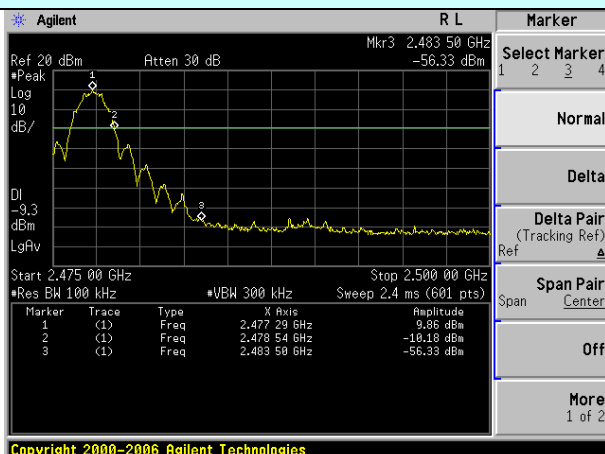


No-hopping mode

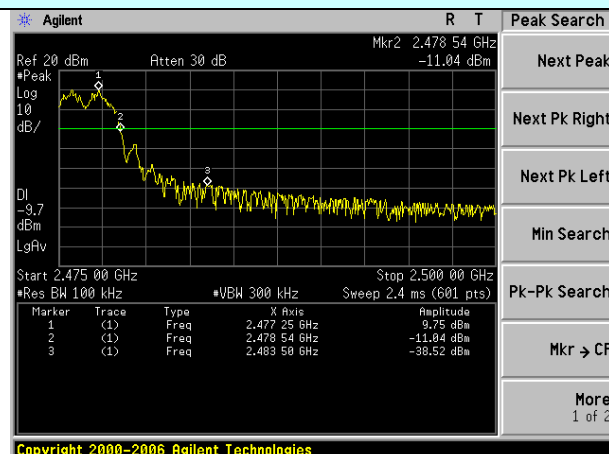


Hopping mode

Test channel:	Highest channel
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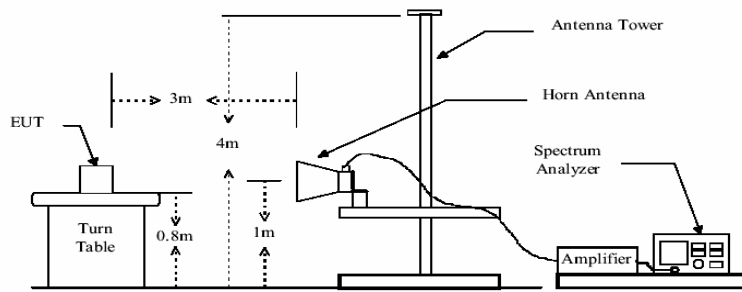


No-hopping mode



Hopping mode

6.8.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section 15.209 and 15.205				
Test Method:	ANSI C63.4: 2003				
Test Frequency Range:	All restriction band have been tested, and 2.3GHz to 2.5GHz band is the worse case				
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 5.8 for details				
Test mode:	Refer to section 5.3 for details				
Test results:	Pass				

Remark:

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

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	45.00	27.59	5.38	30.18	47.79	74.00	-26.21	Horizontal
2400.00	59.89	27.58	5.39	30.18	62.68	74.00	-11.32	Horizontal
2390.00	46.20	27.59	5.38	30.18	48.99	74.00	-25.01	Vertical
2400.00	62.47	27.58	5.39	30.18	65.26	74.00	-8.74	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	32.61	27.59	5.38	30.18	35.40	54.00	-18.60	Horizontal
2400.00	46.36	27.58	5.39	30.18	49.15	54.00	-4.85	Horizontal
2390.00	33.94	27.59	5.38	30.18	36.73	54.00	-17.27	Vertical
2400.00	48.96	27.58	5.39	30.18	51.75	54.00	-2.25	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	53.39	27.53	5.47	29.93	56.46	74.00	-17.54	Horizontal
2500.00	45.24	27.55	5.49	29.93	48.35	74.00	-25.65	Horizontal
2483.50	55.93	27.53	5.47	29.93	59.00	74.00	-15.00	Vertical
2500.00	44.05	27.55	5.49	29.93	47.16	74.00	-26.84	Vertical

Average value:

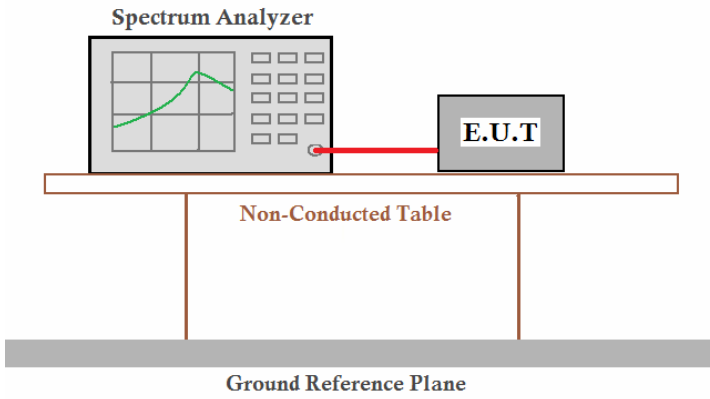
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
2483.50	44.98	27.53	5.47	29.93	48.05	54.00	-5.95	Horizontal
2500.00	31.65	27.55	5.49	29.93	34.76	54.00	-19.24	Horizontal
2483.50	47.47	27.53	5.47	29.93	50.54	54.00	-3.46	Vertical
2500.00	31.45	27.55	5.49	29.93	34.56	54.00	-19.44	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.

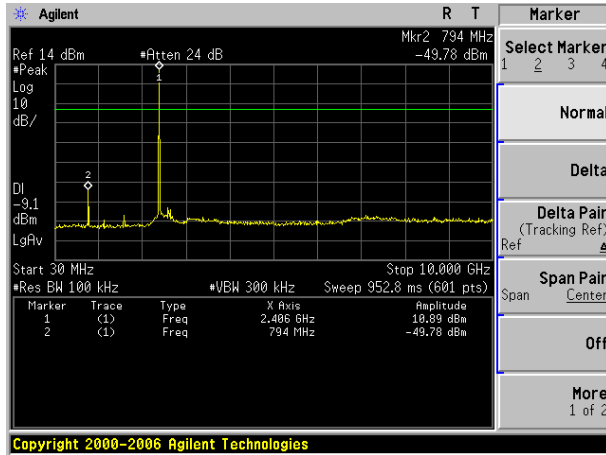
6.9 Spurious Emission

6.9.1 Conducted Emission Method

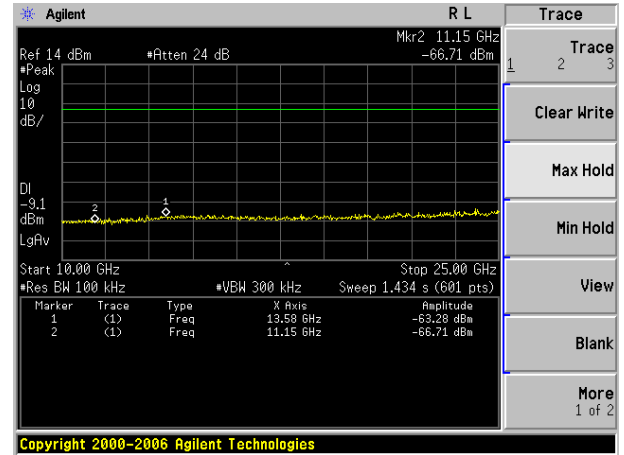
Test Requirement:	FCC Part15 C Section 15.247 (d)
Test Method:	ANSI C63.4:2003 and KDB558074 D01 Meas Guidance
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator 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 for conducted emission measurement. A Spectrum Analyzer, shown with a green trace on its screen, is connected to an Equipment Under Test (E.U.T) via a red cable. Both the Spectrum Analyzer and the E.U.T are placed on a Non-Conducted Table. This table is supported by two vertical legs and sits on a Ground Reference Plane, which is represented by a thick grey bar at the bottom of the setup.</p>
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Test channel:

Lowest channel



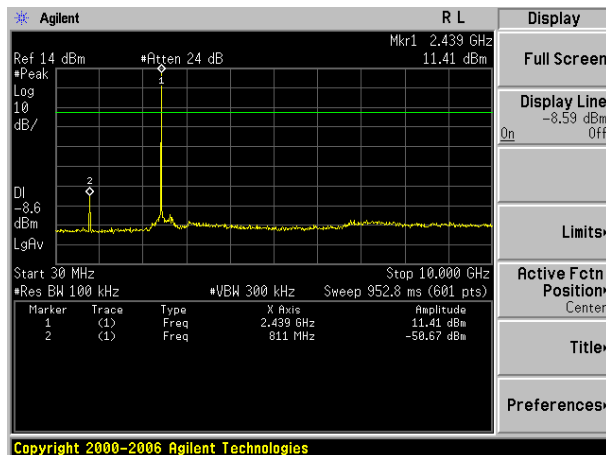
30MHz~10GHz



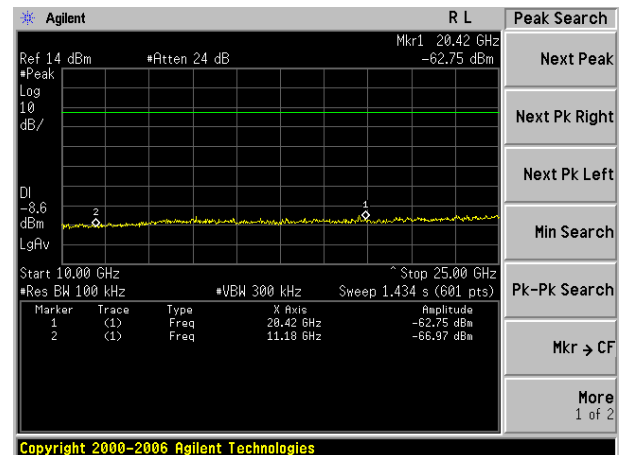
10GHz~25GHz

Test channel:

Middle channel

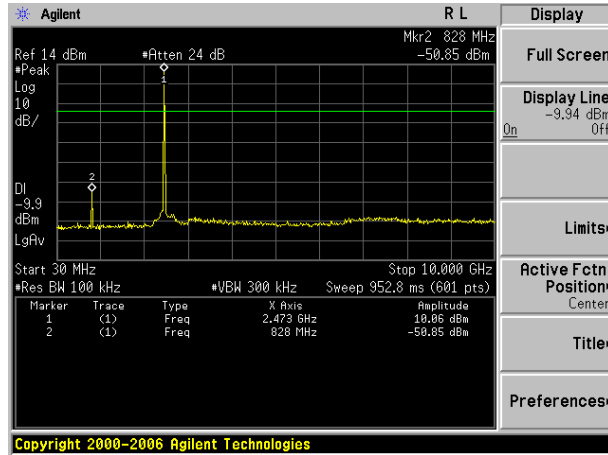


30MHz~10GHz

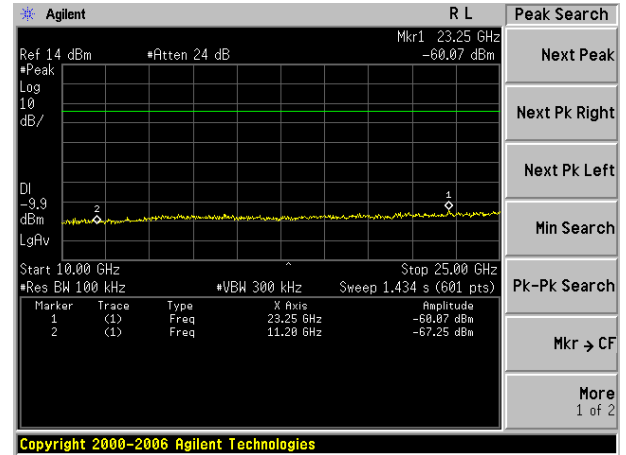


10GHz~25GHz

Test channel:	Highest channel
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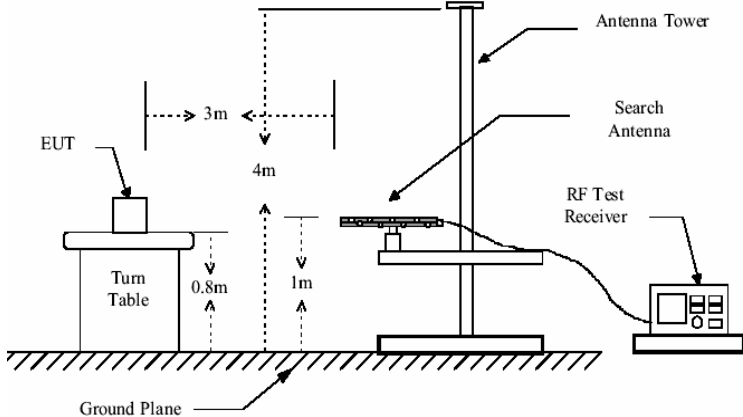
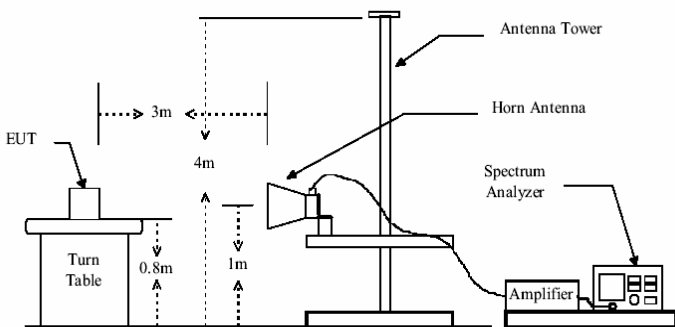


30MHz~10GHz



10GHz~25GHz

6.9.2 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	120KHz	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"> 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. 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. 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. 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. 5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. 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.
Test Instruments:	Refer to section 5.8 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Remark:

1. 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:

■ 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
49.36	49.17	16.40	0.77	31.97	34.37	40.00	-5.63	Vertical
71.83	50.13	12.66	0.96	31.85	31.90	40.00	-8.10	Vertical
143.83	47.90	11.23	1.53	31.96	28.70	43.50	-14.80	Vertical
215.27	43.65	14.09	1.93	32.15	27.52	43.50	-15.98	Vertical
327.89	43.46	16.25	2.51	32.09	30.13	46.00	-15.87	Vertical
431.03	44.20	17.53	3.00	31.78	32.95	46.00	-13.05	Vertical
55.61	43.54	16.06	0.82	31.95	28.47	40.00	-11.53	Horizontal
71.83	47.07	12.66	0.96	31.85	28.84	40.00	-11.16	Horizontal
88.34	44.99	14.74	1.10	31.73	29.10	43.50	-14.40	Horizontal
216.02	51.66	14.12	1.93	32.15	35.56	46.00	-10.44	Horizontal
301.42	54.12	16.11	2.37	32.17	40.43	46.00	-5.57	Horizontal
381.25	52.79	16.68	2.77	31.94	40.30	46.00	-5.70	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
4807.00	32.36	31.78	8.60	24.17	48.57	74.00	-25.43	Vertical
7210.50	33.41	36.15	11.66	26.46	54.76	74.00	-19.24	Vertical
9614.00	31.68	38.01	14.14	25.45	58.38	74.00	-15.62	Vertical
12017.50	*					74.00		Vertical
14421.00	*					74.00		Vertical
4807.00	32.55	31.78	8.60	24.17	48.76	74.00	-25.24	Horizontal
7210.50	35.65	36.15	11.66	26.46	57.00	74.00	-17.00	Horizontal
9614.00	31.69	38.01	14.14	25.45	58.39	74.00	-15.61	Horizontal
12017.50	*					74.00		Horizontal
14421.00	*					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
4807.00	22.79	31.78	8.60	24.17	39.00	54.00	-15.00	Vertical
7210.50	22.67	36.15	11.66	26.46	44.02	54.00	-9.98	Vertical
9614.00	20.45	38.01	14.14	25.45	47.15	54.00	-6.85	Vertical
12017.50	*					54.00		Vertical
14421.00	*					54.00		Vertical
4807.00	22.61	31.78	8.60	24.17	38.82	54.00	-15.18	Horizontal
7210.50	24.80	36.15	11.66	26.46	46.15	54.00	-7.85	Horizontal
9614.00	20.35	38.01	14.14	25.45	47.05	54.00	-6.95	Horizontal
12017.50	*					54.00		Horizontal
14421.00	*					54.00		Horizontal

Remark:

1. Final Level = Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor
2. “*” means this data is too weak instrument of signal is unable to test.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

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
4877.8	30.98	31.85	8.66	24.10	47.39	74.00	-26.61	Vertical
7316.7	32.56	36.37	11.72	26.71	53.94	74.00	-20.06	Vertical
9755.6	31.30	38.35	14.25	25.36	58.54	74.00	-15.46	Vertical
12194.5	*					74.00		Vertical
14633.4	*					74.00		Vertical
4877.8	30.39	31.85	8.66	24.10	46.80	74.00	-27.20	Horizontal
7316.7	31.84	36.37	11.72	26.71	53.22	74.00	-20.78	Horizontal
9755.6	30.60	38.35	14.25	25.36	57.84	74.00	-16.16	Horizontal
12194.5	*					74.00		Horizontal
14633.4	*					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
4877.8	21.41	31.85	8.66	24.10	37.82	54.00	-16.18	Vertical
7316.7	21.82	36.37	11.72	26.71	43.20	54.00	-10.80	Vertical
9755.6	20.07	38.35	14.25	25.36	47.31	54.00	-6.69	Vertical
12194.5	*					54.00		Vertical
14633.4	*					54.00		Vertical
4877.8	20.45	31.85	8.66	24.10	36.86	54.00	-17.14	Horizontal
7316.7	20.99	36.37	11.72	26.71	42.37	54.00	-11.63	Horizontal
9755.6	19.26	38.35	14.25	25.36	46.5	54.00	-7.50	Horizontal
12194.5	*					54.00		Horizontal
14633.4	*					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.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

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
4954.60	32.18	31.93	8.73	24.03	48.81	74.00	-25.19	Vertical
7431.90	33.45	36.56	11.79	27.03	54.77	74.00	-19.23	Vertical
9909.20	29.18	38.81	14.35	25.27	57.07	74.00	-16.93	Vertical
12386.5	*					74.00		Vertical
14863.8	*					74.00		Vertical
4954.60	31.12	31.93	8.73	24.03	47.75	74.00	-26.25	Horizontal
7431.90	33.99	36.56	11.79	27.03	55.31	74.00	-18.69	Horizontal
9909.20	29.37	38.81	14.35	25.27	57.26	74.00	-16.74	Horizontal
12386.5	*					74.00		Horizontal
14863.8	*					74.00		Horizontal

Average value:

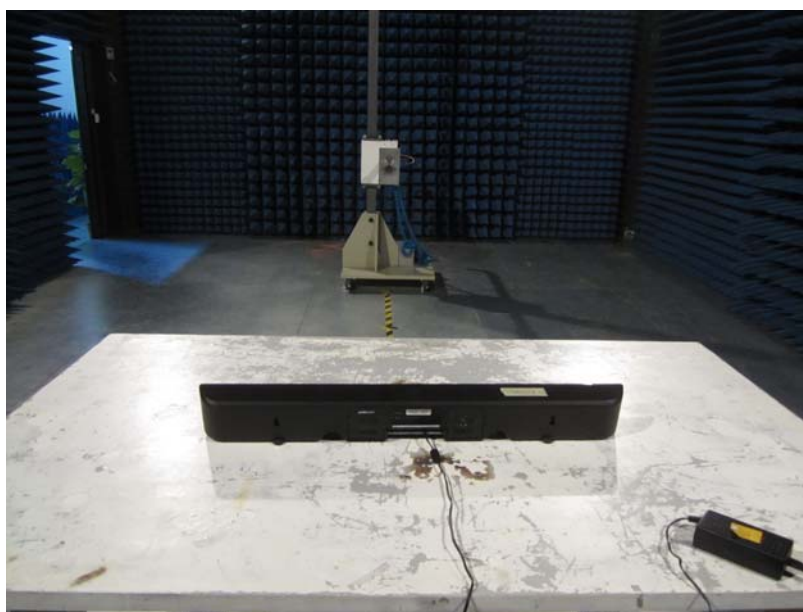
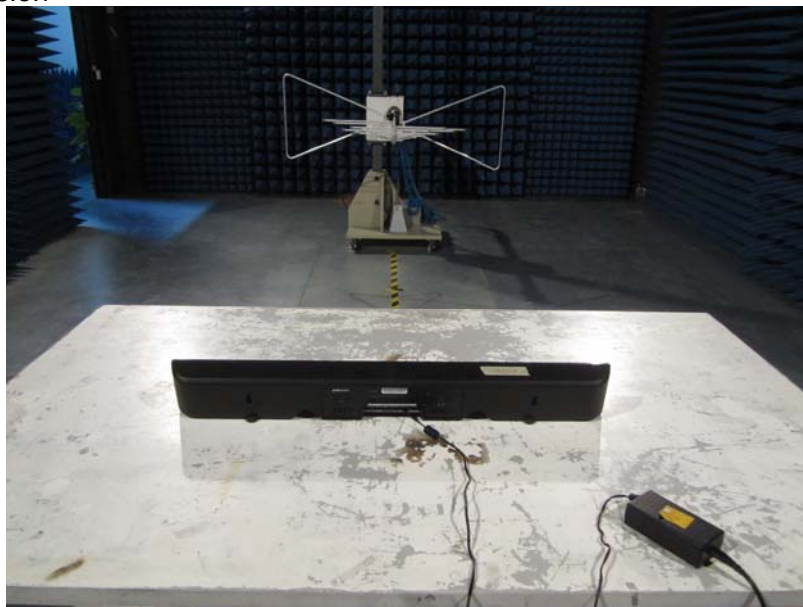
Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarization
4954.60	22.61	31.93	8.73	24.03	39.24	54.00	-14.76	Vertical
7431.90	22.71	36.56	11.79	27.03	44.03	54.00	-9.97	Vertical
9909.20	17.95	38.81	14.35	25.27	45.84	54.00	-8.16	Vertical
12386.5	*					54.00		Vertical
14863.8	*					54.00		Vertical
4954.60	21.18	31.93	8.73	24.03	37.81	54.00	-16.19	Horizontal
7431.90	23.14	36.56	11.79	27.03	44.46	54.00	-9.54	Horizontal
9909.20	18.03	38.81	14.35	25.27	45.92	54.00	-8.08	Horizontal
12386.5	*					54.00		Horizontal
14863.8	*					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.
3. The emission levels of other frequencies are very lower than the limit and not show in test report.

7 Test Setup Photo

Radiated Emission



Conducted Emission



8 EUT Constructional Details

Product View



Front



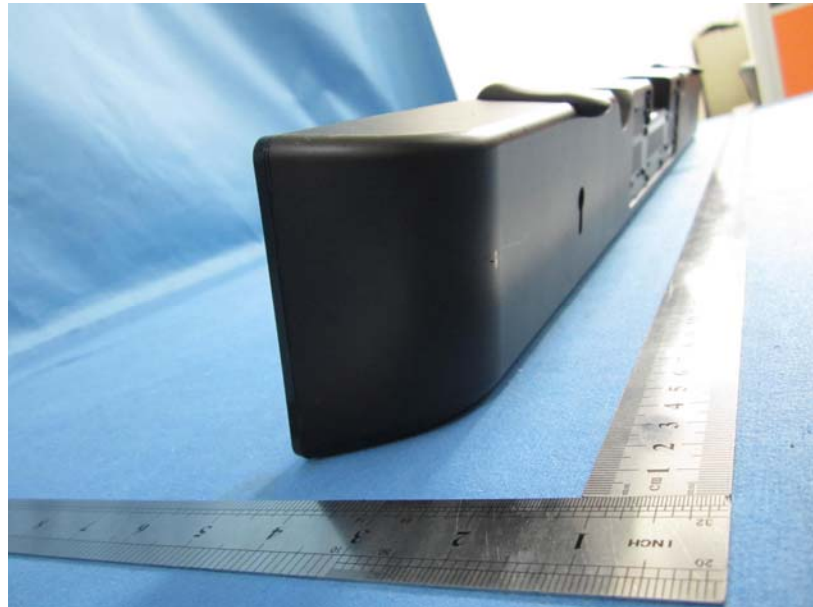
Back & Top



Bottom



Left Side



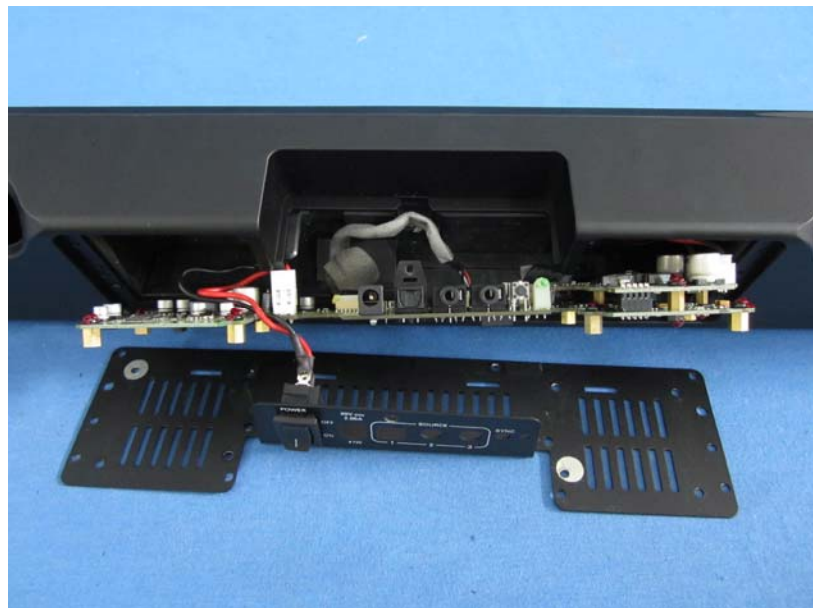
Right Side



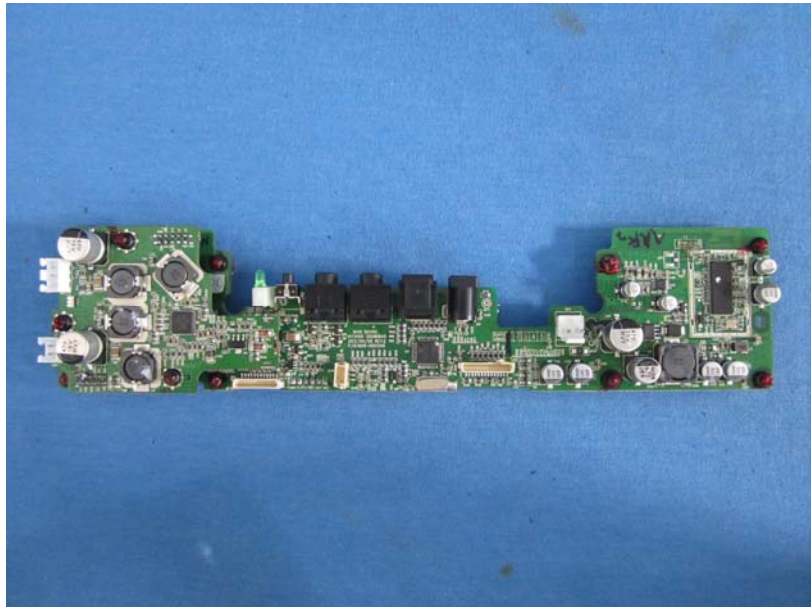
Interface



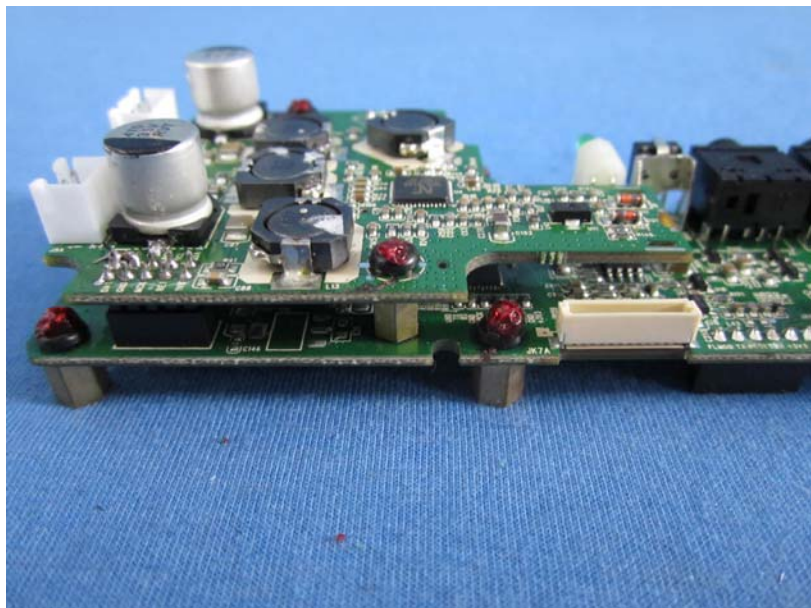
Open-1



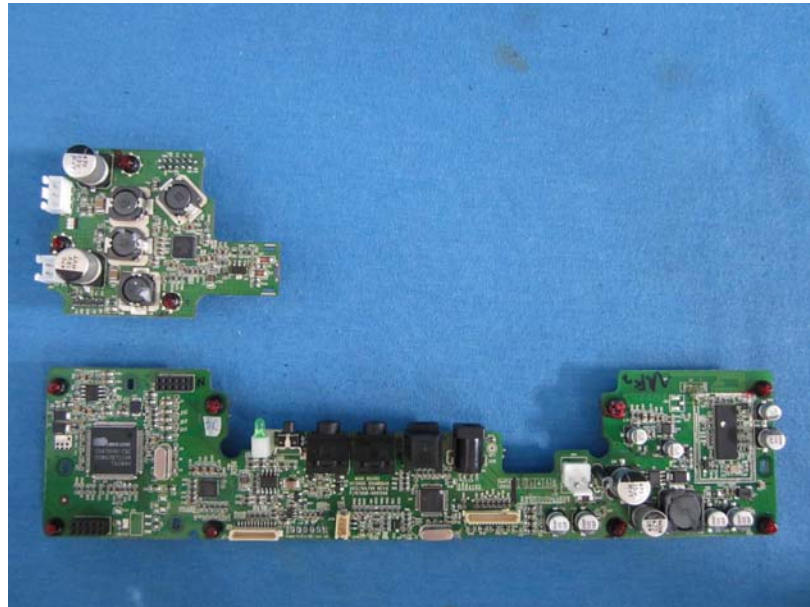
Mainboard-1



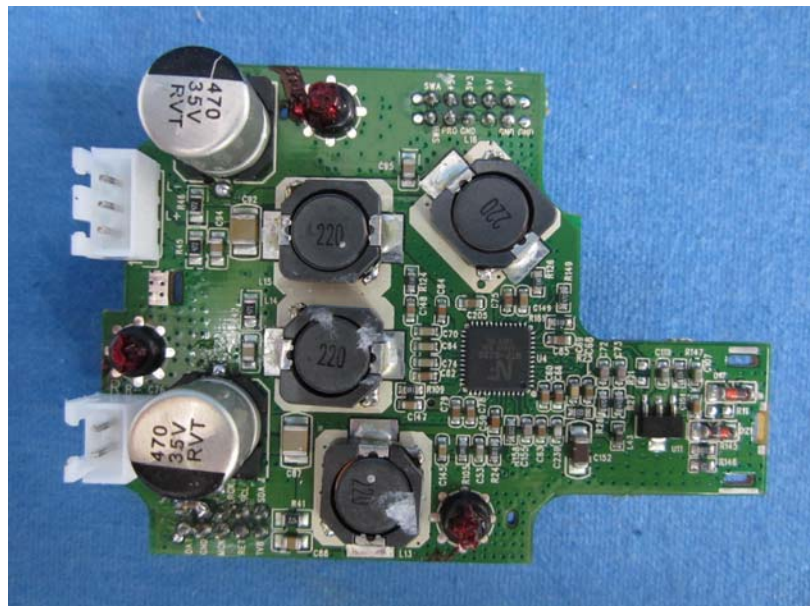
Mainboard-2



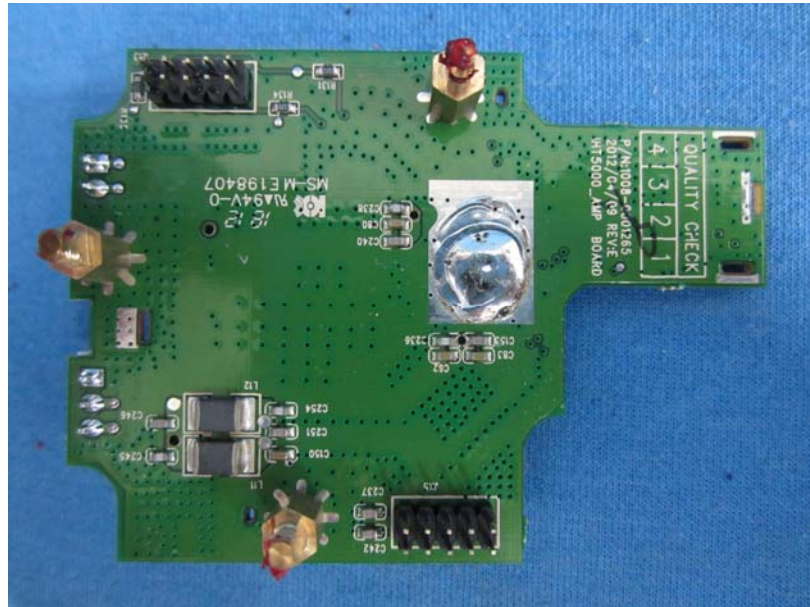
Mainboard-3



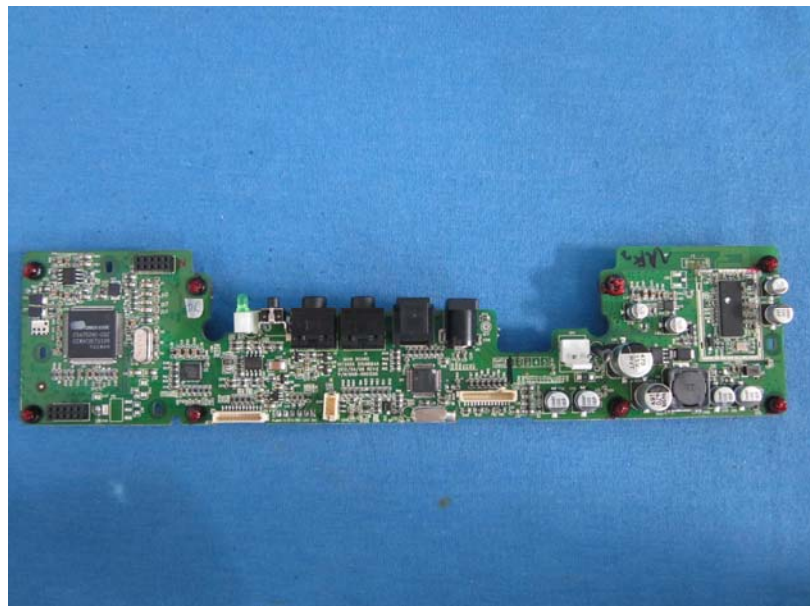
Mainboard-4



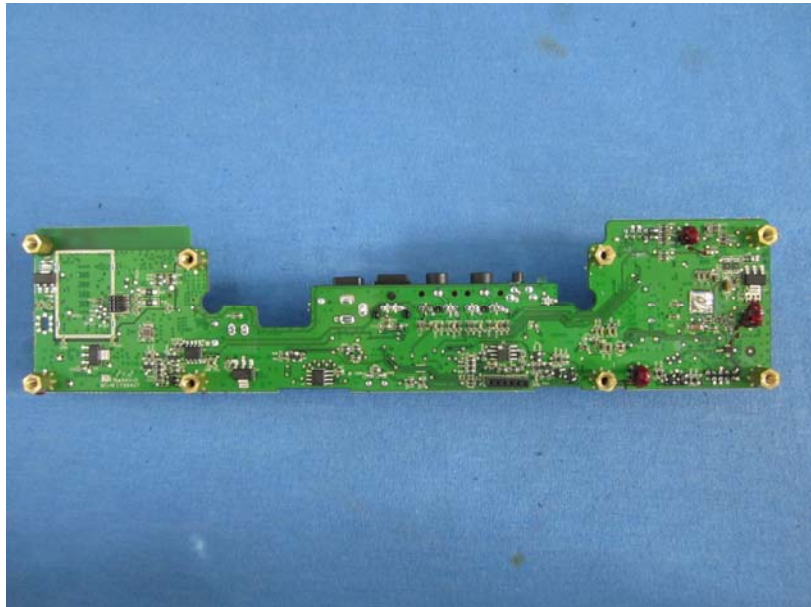
Mainboard-5



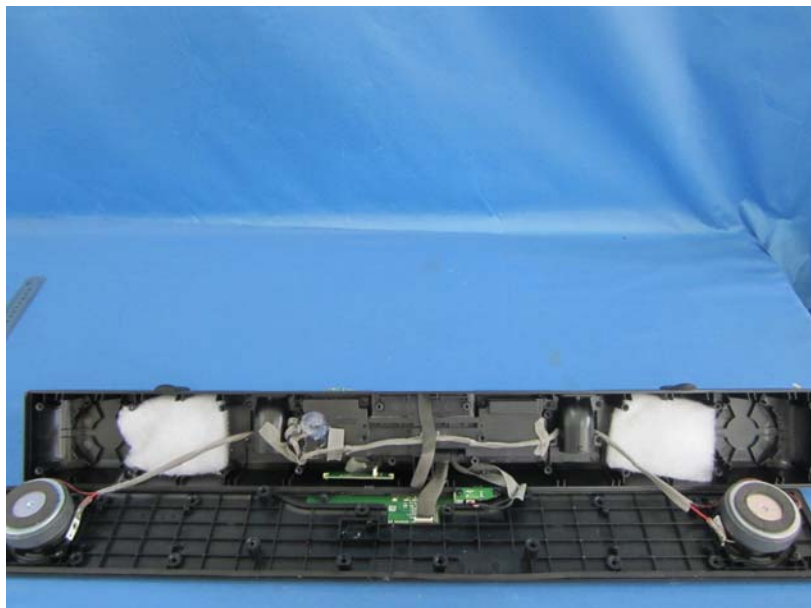
Mainboard-6



Mainboard-7



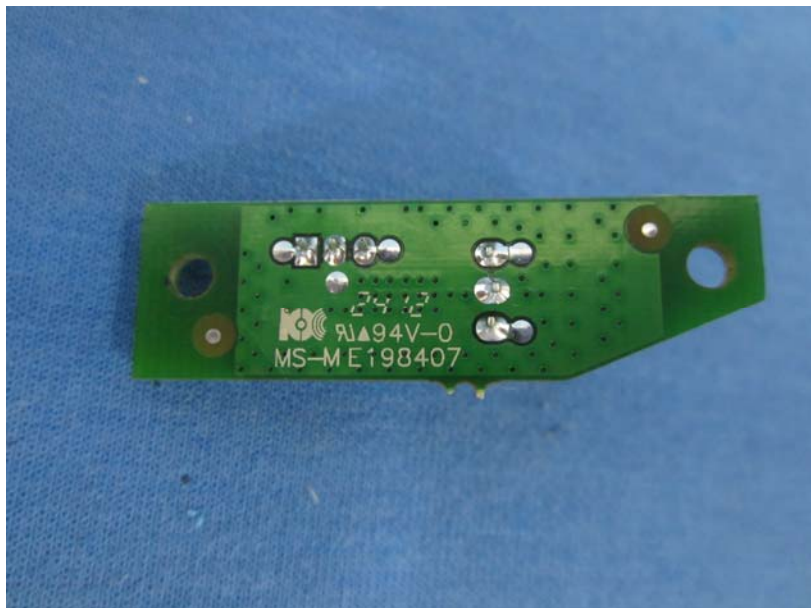
Open-2



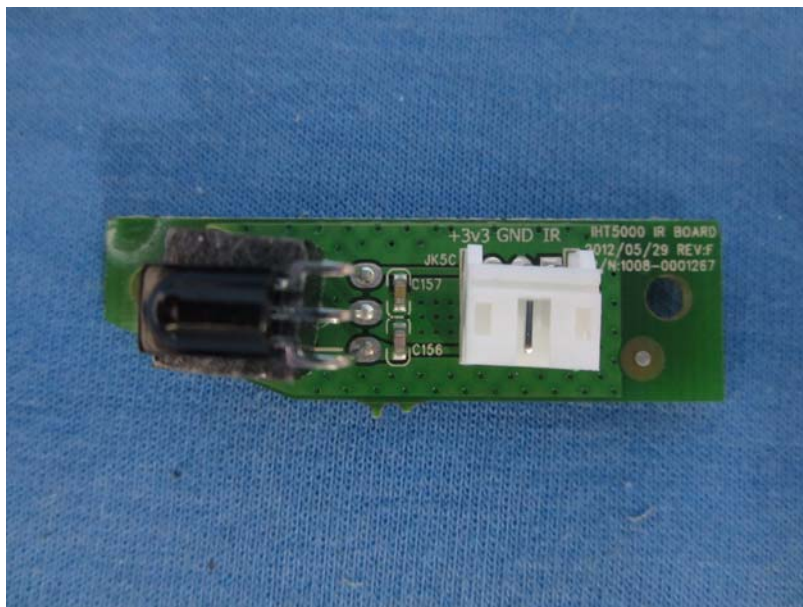
Open-3



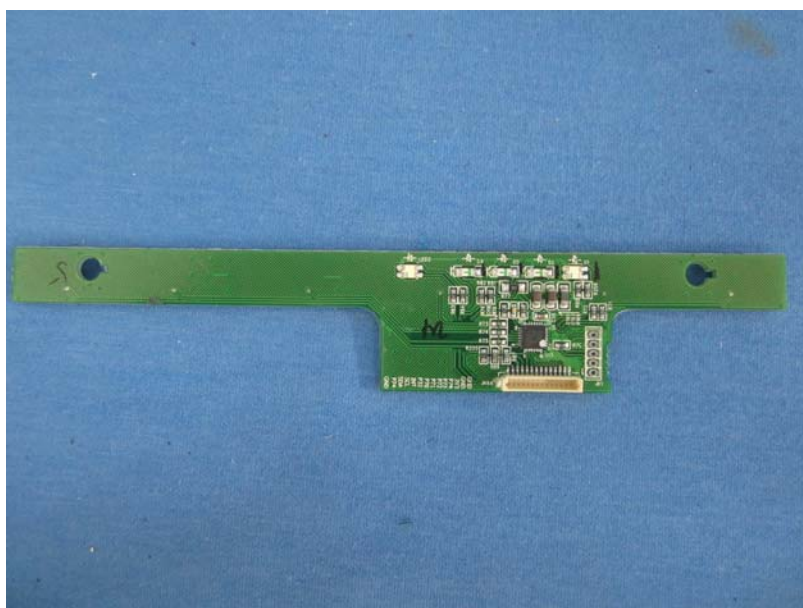
IR Board



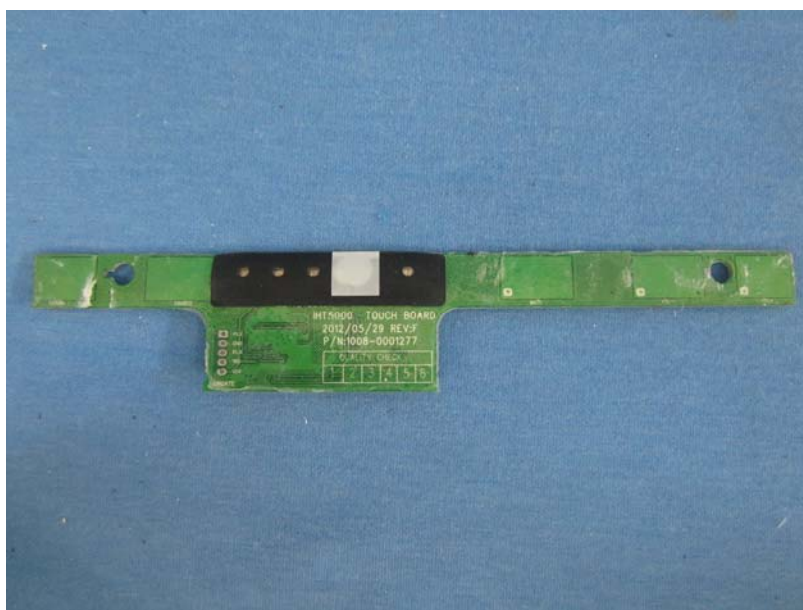
IR Board



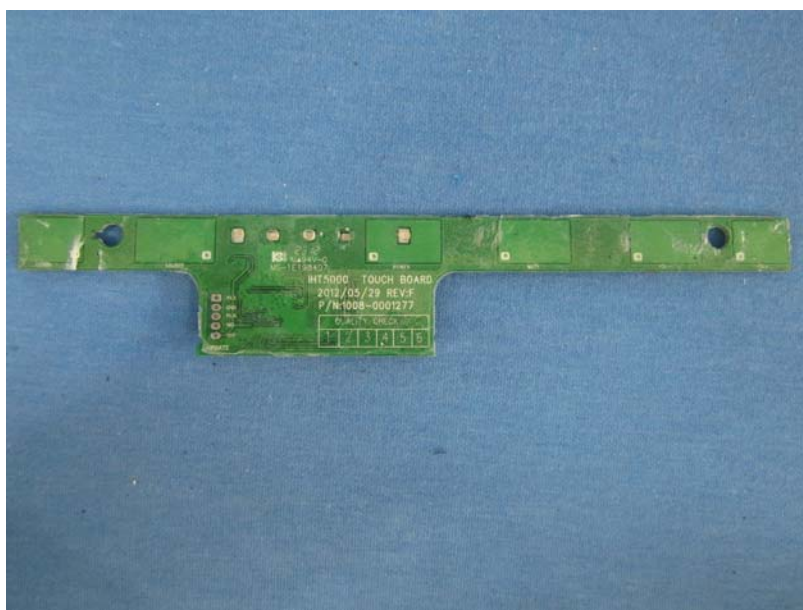
TouchPad



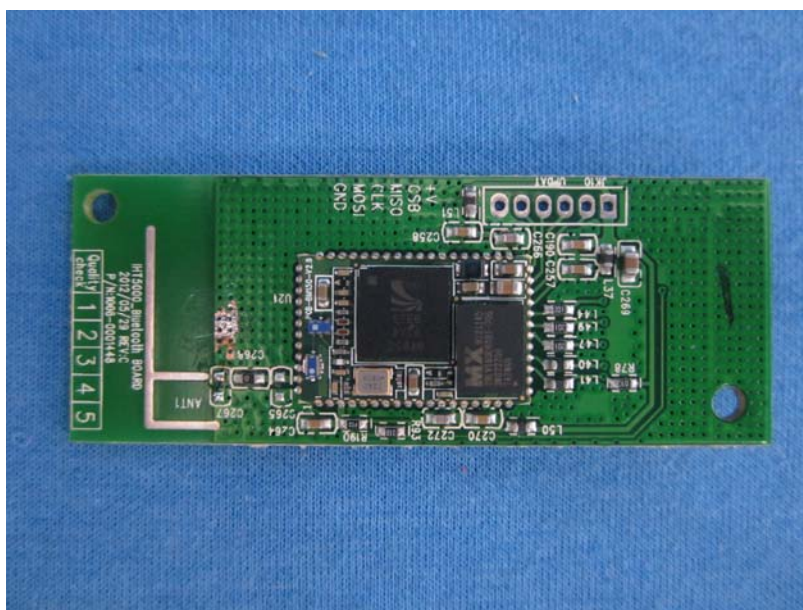
TouchPad



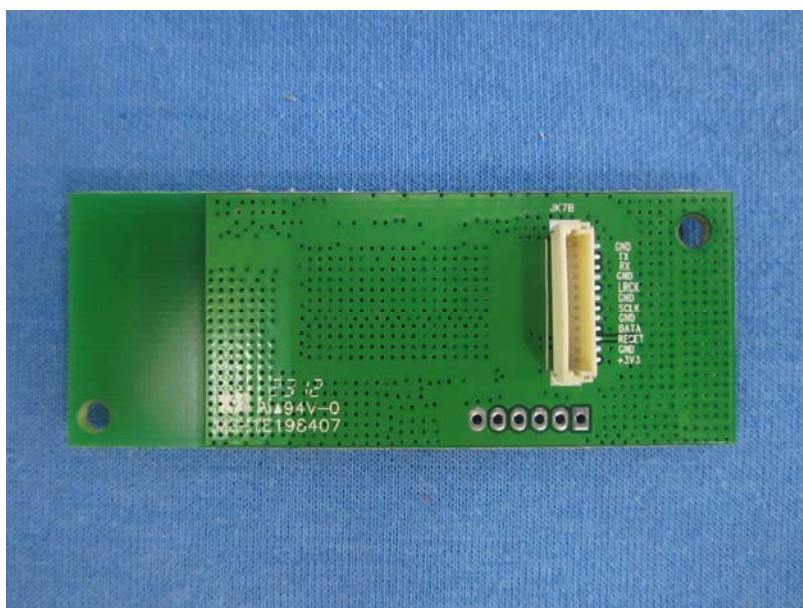
TouchPad



Bluetooth Board



Bluetooth Board



Adapter



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