

FCC REPORT

Applicant: Shenzhen Junlan Electronic Ltd

Address of Applicant: District 2 type A plant in the second layer 1-4, NO.2 Industrial Fuyuan Tangwei Fuyong Baoan Shenzhen China

Equipment Under Test (EUT)

Product Name: BLUETOOTH TOWER SPEAKER WITH PLL FM RADIO

Model No.: TSB-981J2, TSB-981J3, ITB133B, ITB123B

Trade Mark: ILIVE

FCC ID: OKUITB133B

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.249:2012

Date of sample receipt: June 27, 2013

Date of Test: June 27-July 08, 2013

Date of report issued: July 08, 2013

Test Result : PASS *

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

Authorized Signature:

A circular logo for GTS Global Testing Services Co., Ltd. with the text 'GTS GLOBAL TESTING' in the center. A handwritten signature in black ink is written over the logo.

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	July 08, 2013	Original

Prepared By: hank. yan **Date:** July 08, 2013
Project Engineer

Check By: Hans. Hu **Date:** July 08, 2013
Reviewer

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	Pass
Field strength of the fundamental signal	15.249 (a)	Pass
Spurious emissions	15.249 (a) (d)/15.209	Pass
Band edge	15.249 (d)/15.205	Pass
20dB Occupied Bandwidth	15.215 (c)	Pass

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

5 General Information

5.1 Client Information

Applicant:	Shenzhen Junlan Electronic Ltd
Address of Applicant:	District 2 type A plant in the second layer 1-4, NO.2 Industrial Fuyuan Tangwei Fuyong Baoan Shenzhen China
Manufacturer/Factory:	Shenzhen Junlan Electronic Ltd
Address of Manufacturer/Factory:	District 2 type A plant in the second layer 1-4, NO.2 Industrial Fuyuan Tangwei Fuyong Baoan Shenzhen China

5.2 General Description of EUT

Product Name:	BLUETOOTH TOWER SPEAKER WITH PLL FM RADIO
Model No.:	TSB-981J2, TSB-981J3, ITB133B, ITB123B
Test Model No.:	ITB133B
Remark:	TSB-981J2, TSB-981J3, ITB133B and ITB123B are identical in the same interior structure, electrical circuits, components and appearance. The only difference is the model name for the marketing requirement.
Operation Frequency:	2402MHz~2480MHz
Channel numbers:	79
Channel separation:	1MHz
Modulation type:	GFSK, Pi/4QPSK, 8DPSK
Antenna Type:	PCB Antenna
Antenna gain:	2dBi
Power supply:	Adapter: Model: ZFXPA02000120 Input: 100-240V, 50/60Hz, 0.5A Output: 12V, 2.0A

Operation Frequency each of channel							
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2402MHz	21	2422MHz	41	2442MHz	61	2462MHz
2	2403MHz	22	2423MHz	42	2443MHz	62	2463MHz
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
19	2420MHz	39	2440MHz	59	2460MHz	79	2480MHz
20	2421MHz	40	2441MHz	60	2461MHz		

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	2402MHz
The middle channel	2441MHz
The Highest channel	2480MHz

5.3 Test mode

Transmitting mode	Keep the EUT in continuously transmitting mode with GFSK modulation.
<i>Remark: During the test, the test voltage was tuned from 85% to 115% of the nominal rated supply voltage, and found that the worst case was under the nominal rated supply condition. So the report just shows that condition's data.</i>	

Per-test mode.			
We have verified the construction and function in typical operation, The EUT was placed on three different polar directions; i.e. X axis, Y axis, Z axis. which was shown in this test report and defined as follows:			
Axis	X	Y	Z
Field Strength(dBuV/m)	90.53	91.35	89.24
Final Test Mode:			
The EUT was tested in GFSK, Pi/4QPSK, 8DPSK modulation, and found the GFSK modulation is the worst case.			
According to ANSI C63.4 standards, the test results are both the “worst case” and “worst setup”: Y axis (see the test setup photo)			

5.4 Description of Support Units

N/A

5.5 Test Facility

<p>The test facility is recognized, certified, or accredited by the following organizations:</p> <ul style="list-style-type: none"> ● CNAS —Registration No.: CNAS L5775 CNAS has accredited Global United Technology Services Co., Ltd. To ISO/IEC 17025 General Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing. ● 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 files. Registration 600491, June 28, 2013. ● Industry Canada (IC) —Registration No.: 9079A-2 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-2, June 26, 2013.

5.6 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

5.7 Other Information Requested by the Customer

None.

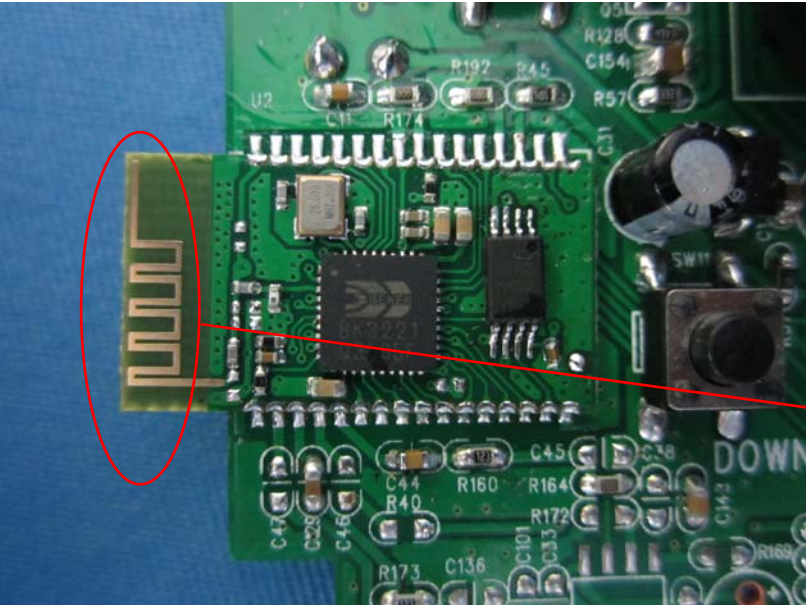
6 Test Instruments list

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. 29 2013	Mar. 28 2014
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	Spectrum Analyzer	Agilent	E4440A	GTS533	Dec. 6, 2012	Dec. 05 2013
4	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Jul. 02 2013	Jul. 01 2014
5	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	GTS214	Feb. 24 2013	Feb. 23 2014
6	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	9120D-829	GTS208	June 28 2013	June 27 2014
7	Horn Antenna	ETS-LINDGREN	3160	GTS217	Mar. 29 2013	Mar. 28 2014
8	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
9	Coaxial Cable	GTS	N/A	GTS213	Mar. 30 2013	Mar. 29 2014
10	Coaxial Cable	GTS	N/A	GTS211	Mar. 30 2013	Mar. 29 2014
11	Coaxial cable	GTS	N/A	GTS210	Mar. 30 2013	Mar. 29 2014
12	Coaxial Cable	GTS	N/A	GTS212	Mar. 30 2013	Mar. 29 2014
13	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	Jul. 02 2013	Jul. 01 2014
14	Amplifier(2GHz-20GHz)	HP	8349B	GTS206	Jul. 02 2013	Jul. 01 2014
15	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 28 2013	June 27 2014
16	Band filter	Amindeon	82346	GTS219	Mar. 30 2013	Mar. 29 2014

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. 02 2013	Jul. 01 2014
3	10dB Pulse Limita	Rohde & Schwarz	N/A	GTS224	Jul. 02 2013	Jul. 01 2014
4	Coaxial Switch	ANRITSU CORP	MP59B	GTS225	Jul. 02 2013	Jul. 01 2014
5	LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	GTS226	Jul. 02 2013	Jul. 01 2014
6	Coaxial Cable	GTS	N/A	GTS227	Jul. 02 2013	Jul. 01 2014
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A

7 Test results and Measurement Data

7.1 Antenna requirement:

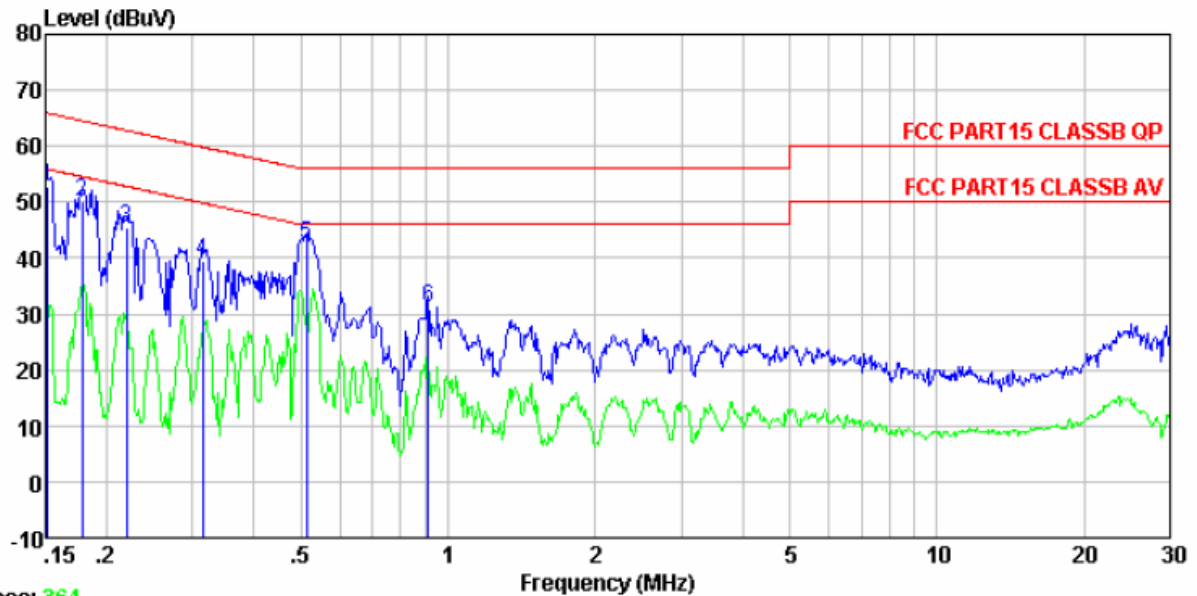
Standard requirement:	FCC Part15 C Section 15.203
<p>15.203 requirement:</p> <p>An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a 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>E.U.T Antenna:</p> <p><i>The antenna is PCB Antenna, the best case gain of the antenna is 2dBi</i></p>	
	

7.2 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 border="1"> <thead> <tr> <th rowspan="2">Frequency range (MHz)</th> <th colspan="2">Limit (dBuV)</th> </tr> <tr> <th>Quasi-peak</th> <th>Average</th> </tr> </thead> <tbody> <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> </tbody> </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:	<p><i>Remark</i> E.U.T: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m</p>														
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 6.0 for details														
Test mode:	Refer to section 5.3 for details														
Test results:	Pass														

Measurement data:

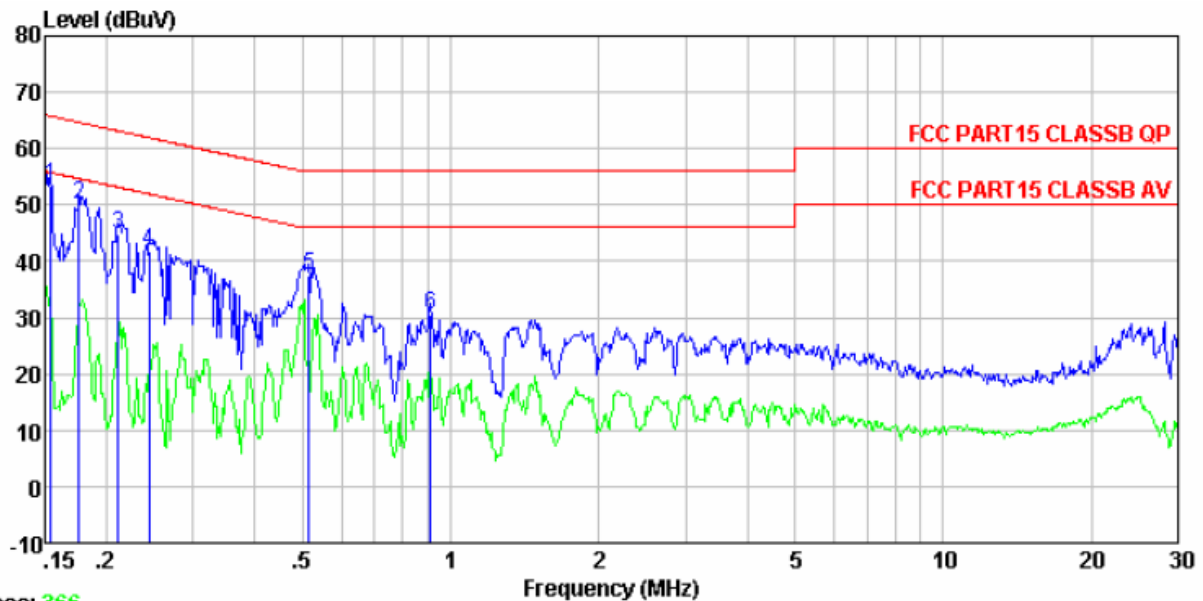
Line:



Trace: 364
 Condition : FCC PART15 CLASSB QP LISN-2012 LINE
 Job No. : 0970RF
 Test mode : Bluetooth Mode
 Test Engineer: Yang

	Read Freq	Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.152	52.94	-0.26	0.10	52.78	65.91	-13.13	QP
2	0.179	50.35	-0.23	0.10	50.22	64.55	-14.33	QP
3	0.220	45.57	-0.23	0.10	45.44	62.83	-17.39	QP
4	0.315	39.59	-0.22	0.10	39.47	59.84	-20.37	QP
5	0.513	42.43	-0.21	0.10	42.32	56.00	-13.68	QP
6	0.909	31.43	-0.21	0.10	31.32	56.00	-24.68	QP

Neutral:



Trace: 366

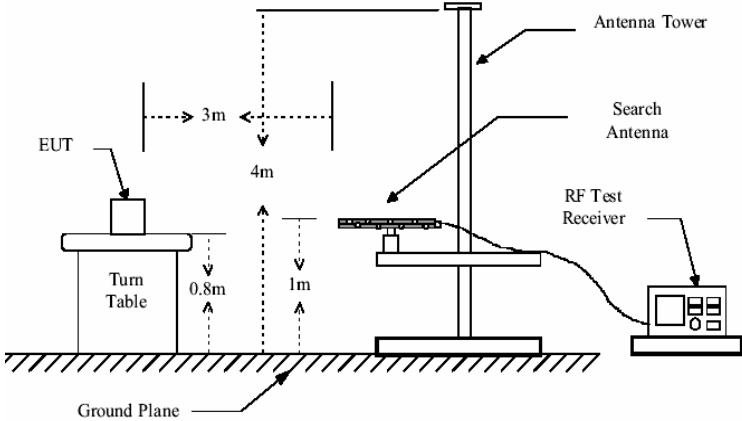
Condition : FCC PART15 CLASSB QP LISN-2012 NEUTRAL
 Job No. : 0970RF
 Test mode : Bluetooth Mode
 Test Engineer: Yang

	Read Freq	Level	LISN Factor	Cable Loss	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dB	dBuV	dBuV	dB	
1	0.154	53.60	-0.13	0.10	53.57	65.78	-12.21	QP
2	0.176	49.98	-0.09	0.10	49.99	64.68	-14.69	QP
3	0.212	44.93	-0.09	0.10	44.94	63.14	-18.20	QP
4	0.244	41.75	-0.09	0.10	41.76	61.95	-20.19	QP
5	0.516	37.43	-0.08	0.10	37.45	56.00	-18.55	QP
6	0.909	30.65	-0.09	0.10	30.66	56.00	-25.34	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
4. If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

7.3 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
		Peak	1MHz	10Hz	Average Value
Limit: (Field strength of the fundamental signal)	Frequency	Limit (dBuV/m @3m)		Remark	
	2400MHz-2483.5MHz	94.00		Average Value	
		114.00		Peak Value	
Limit: (Spurious Emissions)	Frequency	Limit (dBuV/m @3m)		Remark	
	30MHz-88MHz	40.00		Quasi-peak Value	
	88MHz-216MHz	43.50		Quasi-peak Value	
	216MHz-960MHz	46.00		Quasi-peak Value	
	960MHz-1GHz	54.00		Quasi-peak Value	
	Above 1GHz	54.00		Average Value	
		74.00		Peak Value	
Limit: (band edge)	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.				
Test setup:	<p>Below 1GHz</p>  <p>Above 1GHz</p>				

	<p>The diagram illustrates the test setup. An EUT (Equipment Under Test) is placed on a turn table that is 0.8 meters above the ground. The turn table is rotated 360 degrees. The EUT is positioned 3 meters away from the antenna tower. The antenna tower is a variable-height structure with a horn antenna mounted on top. The antenna height is varied from 1 meter to 4 meters above the ground. The antenna is connected to a spectrum analyzer via an amplifier. The spectrum analyzer is used to measure the field strength of the EUT.</p>
<p>Test Procedure:</p>	<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.
<p>Test Instruments:</p>	<p>Refer to section 6.0 for details</p>
<p>Test mode:</p>	<p>Refer to section 5.3 for details</p>
<p>Test results:</p>	<p>Pass</p>

Measurement data:

7.3.1 Field Strength of The Fundamental Signal

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
2402.00	85.99	27.58	5.39	30.18	88.78	114.00	-25.22	Horizontal
2402.00	83.33	27.58	5.39	30.18	86.12	114.00	-27.88	Vertical
2441.00	88.43	27.55	5.43	30.06	91.35	114.00	-22.65	Horizontal
2441.00	83.79	27.55	5.43	30.06	86.71	114.00	-27.29	Vertical
2480.00	84.89	27.52	5.47	29.93	87.95	114.00	-26.05	Horizontal
2480.00	83.04	27.52	5.47	29.93	86.10	114.00	-27.90	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
2402.00	75.11	27.58	5.39	30.18	77.90	94.00	-16.10	Horizontal
2402.00	71.81	27.58	5.39	30.18	74.60	94.00	-19.40	Vertical
2441.00	78.02	27.55	5.43	30.06	80.94	94.00	-13.06	Horizontal
2441.00	73.63	27.55	5.43	30.06	76.55	94.00	-17.45	Vertical
2480.00	74.52	27.52	5.47	29.93	77.58	94.00	-16.42	Horizontal
2480.00	71.40	27.52	5.47	29.93	74.46	94.00	-19.54	Vertical

According to the follow transmitter output power (P_t) formula:

$$P_t = (E \times d)^2 / (30 \times g_t)$$

P_t =transmitter output power in watts

g_t =numeric gain of the transmitting antenna (unitless)

E=electric field strength in V/m

d= measurement distance in meters (m).

According to the above test data, $E_{max} = 91.35 \text{ dBuV/m} = 0.0369 \text{ V/m}$, $d = 3 \text{ m}$, $g_t = 1.58$

$$P_t = (E \times d)^2 / (30 \times g_t) = (0.0369 \times 3)^2 / (30 \times 1.58) = 0.000259 \text{ W} = 0.259 \text{ mW}$$

7.3.2 Spurious emissions

■ Below 1GHz

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
33.10	51.76	14.31	0.59	32.06	34.60	40.00	-5.40	Vertical
40.42	48.87	15.58	0.66	32.05	33.06	40.00	-6.94	Vertical
83.82	48.20	11.87	1.06	31.74	29.39	40.00	-10.61	Vertical
155.91	44.67	10.51	1.60	32.00	24.78	43.50	-18.72	Vertical
368.11	37.11	16.49	2.71	31.98	24.33	46.00	-21.67	Vertical
848.06	36.98	22.55	4.65	31.25	32.93	46.00	-13.07	Vertical
41.42	37.11	15.57	0.68	32.04	21.32	40.00	-18.68	Horizontal
85.00	40.84	12.31	1.07	31.74	22.48	40.00	-17.52	Horizontal
155.91	41.27	10.51	1.60	32.00	21.38	43.50	-22.12	Horizontal
366.82	36.70	16.48	2.70	31.98	23.90	46.00	-22.10	Horizontal
576.64	36.80	20.03	3.63	31.15	29.31	46.00	-16.69	Horizontal
938.83	34.57	23.34	4.99	31.20	31.70	46.00	-14.30	Horizontal

■ Above 1GHz

Test channel:	Lowest channel
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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
4804.00	35.09	31.78	8.60	24.17	51.30	74.00	-22.70	Vertical
7206.00	33.85	36.15	11.65	26.39	55.26	74.00	-18.74	Vertical
9608.00	32.41	38.01	14.14	25.45	59.11	74.00	-14.89	Vertical
12010.00	*					74.00		Vertical
14412.00	*					74.00		Vertical
4804.00	31.09	31.78	8.60	24.17	47.30	74.00	-26.70	Horizontal
7206.00	31.64	36.15	11.65	26.39	53.05	74.00	-20.95	Horizontal
9608.00	28.97	38.01	14.14	25.45	55.67	74.00	-18.33	Horizontal
12010.00	*					74.00		Horizontal
14412.00	*					74.00		Horizontal

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
4804.00	23.10	31.78	8.60	24.17	39.31	54.00	-14.69	Vertical
7206.00	22.19	36.15	11.65	26.39	43.60	54.00	-10.40	Vertical
9608.00	17.34	38.01	14.14	25.45	44.04	54.00	-9.96	Vertical
12010.00	*					54.00		Vertical
14412.00	*					54.00		Vertical
4804.00	18.94	31.78	8.60	24.17	35.15	54.00	-18.85	Horizontal
7206.00	19.08	36.15	11.65	26.39	40.49	54.00	-13.51	Horizontal
9608.00	14.70	38.01	14.14	25.45	41.40	54.00	-12.60	Horizontal
12010.00	*					54.00		Horizontal
14412.00	*					54.00		Horizontal

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.
3. “*”, means this data is the too weak instrument of signal is unable to test.

Test channel:	Middle channel
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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
4882.00	35.54	31.85	8.66	24.10	51.95	74.00	-22.05	Vertical
7323.00	35.03	36.37	11.72	26.71	56.41	74.00	-17.59	Vertical
9764.00	31.83	38.35	14.25	25.36	59.07	74.00	-14.93	Vertical
12205.00	*					74.00		Vertical
14646.00	*					74.00		Vertical
4882.00	31.73	31.85	8.66	24.10	48.14	74.00	-25.86	Horizontal
7323.00	30.74	36.37	11.72	26.71	52.12	74.00	-21.88	Horizontal
9764.00	27.99	38.35	14.25	25.36	55.23	74.00	-18.77	Horizontal
12205.00	*					74.00		Horizontal
14646.00	*					74.00		Horizontal

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
4882.00	23.55	31.85	8.66	24.10	39.96	54.00	-14.04	Vertical
7323.00	22.26	36.37	11.72	26.71	43.64	54.00	-10.36	Vertical
9764.00	16.42	38.35	14.25	25.36	43.66	54.00	-10.34	Vertical
12205.00	*					54.00		Vertical
14646.00	*					54.00		Vertical
4882.00	19.58	31.85	8.66	24.10	35.99	54.00	-18.01	Horizontal
7323.00	19.15	36.37	11.72	26.71	40.53	54.00	-13.47	Horizontal
9764.00	14.49	38.35	14.25	25.36	41.73	54.00	-12.27	Horizontal
12205.00	*					54.00		Horizontal
14646.00	*					54.00		Horizontal

Remark:

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

Test channel:	Highest channel
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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
4960.00	34.35	31.93	8.73	24.03	50.98	74.00	-23.02	Vertical
7440.00	34.05	36.59	11.79	27.03	55.40	74.00	-18.60	Vertical
9920.00	29.36	38.81	14.38	25.26	57.29	74.00	-16.71	Vertical
12400.00	*					74.00		Vertical
14880.00	*					74.00		Vertical
4960.00	31.33	31.93	8.73	24.03	47.96	74.00	-26.04	Horizontal
7440.00	30.95	36.59	11.79	27.03	52.30	74.00	-21.70	Horizontal
9920.00	26.53	38.81	14.38	25.26	54.46	74.00	-19.54	Horizontal
12400.00	*					74.00		Horizontal
14880.00	*					74.00		Horizontal

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
4960.00	22.36	31.93	8.73	24.03	38.99	54.00	-15.01	Vertical
7440.00	22.81	36.59	11.79	27.03	44.16	54.00	-9.84	Vertical
9920.00	14.27	38.81	14.38	25.26	42.20	54.00	-11.80	Vertical
12400.00	*					54.00		Vertical
14880.00	*					54.00		Vertical
4960.00	19.18	31.93	8.73	24.03	35.81	54.00	-18.19	Horizontal
7440.00	19.76	36.59	11.79	27.03	41.11	54.00	-12.89	Horizontal
9920.00	13.81	38.81	14.38	25.26	41.74	54.00	-12.26	Horizontal
12400.00	*					54.00		Horizontal
14880.00	*					54.00		Horizontal

Remark:

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

7.3.3 Bandedge emissions

All of the restriction bands were tested, and only the data of worst case was exhibited.

Test channel:	Lowest channel
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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	48.74	27.59	5.38	30.18	51.53	74.00	-22.47	Horizontal
2400.00	50.95	27.58	5.39	30.18	53.74	74.00	-20.26	Horizontal
2390.00	50.93	27.59	5.38	30.18	53.72	74.00	-20.28	Vertical
2400.00	48.23	27.58	5.39	30.18	51.02	74.00	-22.98	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	38.81	27.59	5.38	30.18	41.60	54.00	-12.40	Horizontal
2400.00	41.37	27.58	5.39	30.18	44.16	54.00	-9.84	Horizontal
2390.00	41.32	27.59	5.38	30.18	44.11	54.00	-9.89	Vertical
2400.00	38.54	27.58	5.39	30.18	41.33	54.00	-12.67	Vertical

Test channel:	Highest channel
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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	46.90	27.53	5.47	29.93	49.97	74.00	-24.03	Horizontal
2500.00	45.90	27.55	5.49	29.93	49.01	74.00	-24.99	Horizontal
2483.50	47.86	27.53	5.47	29.93	50.93	74.00	-23.07	Vertical
2500.00	46.60	27.55	5.49	29.93	49.71	74.00	-24.29	Vertical

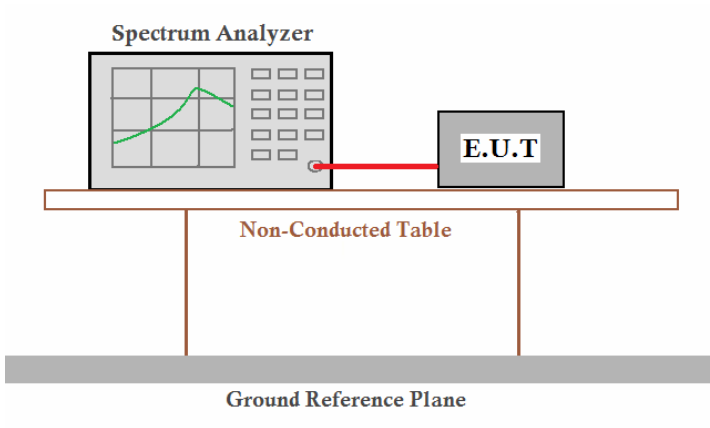
Average value:

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	36.09	27.53	5.47	29.93	39.16	54.00	-14.84	Horizontal
2500.00	34.99	27.55	5.49	29.93	38.10	54.00	-15.90	Horizontal
2483.50	38.02	27.53	5.47	29.93	41.09	54.00	-12.91	Vertical
2500.00	36.68	27.55	5.49	29.93	39.79	54.00	-14.21	Vertical

Remark:

- Final Level = Receiver Read level + Antenna Factor + Cable Loss – Pre-amplifier Factor

7.4 20dB Occupy Bandwidth

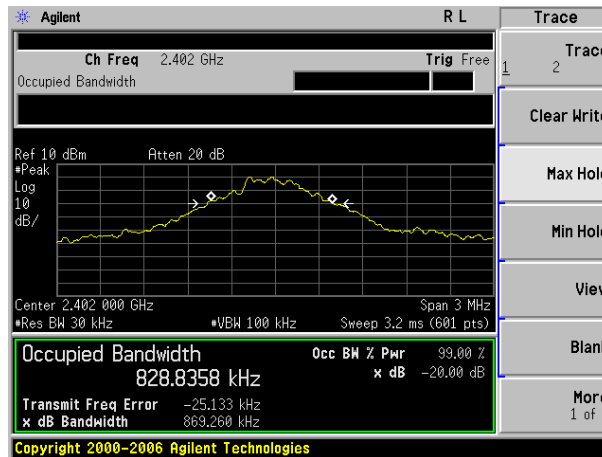
Test Requirement:	FCC Part15 C Section 15.249/15.215
Test Method:	ANSI C63.4:2003
Limit:	Operation Frequency range 2400MHz~2483.5MHz
Test setup:	 <p>The diagram shows a Spectrum Analyzer on the left and an E.U.T. on the right, connected by a red cable. They are both on a table labeled 'Non-Conducted Table'. Below the table is a 'Ground Reference Plane'.</p>
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.3 for details
Test results:	Pass

Measurement Data

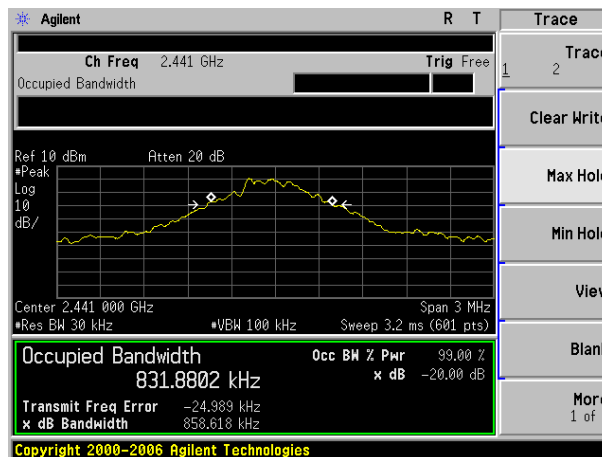
Worst case GFSK modulation

Test channel	20dB bandwidth(MHz)	Result
Lowest	0.869	Pass
Middle	0.859	Pass
Highest	0.869	Pass

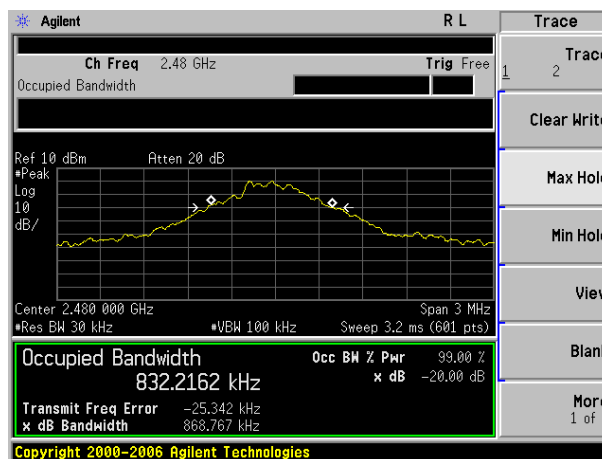
Test plot as follows:



Lowest channel



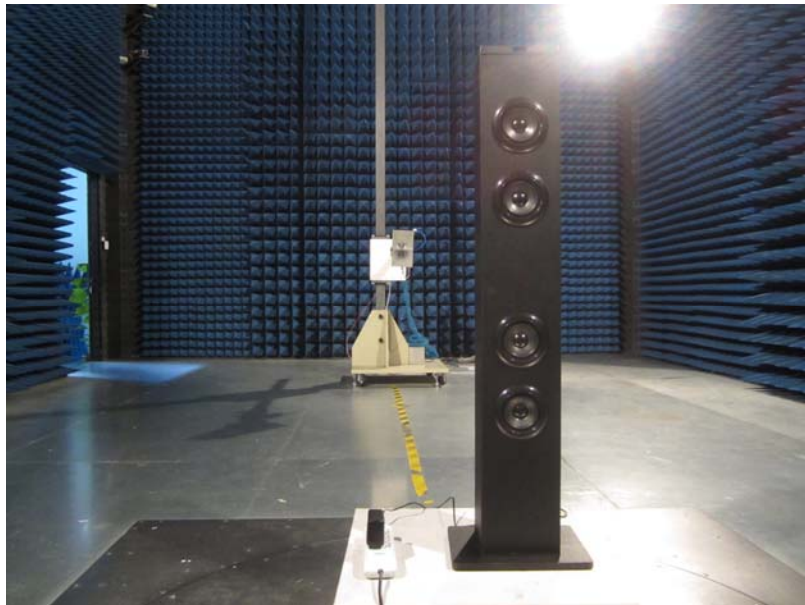
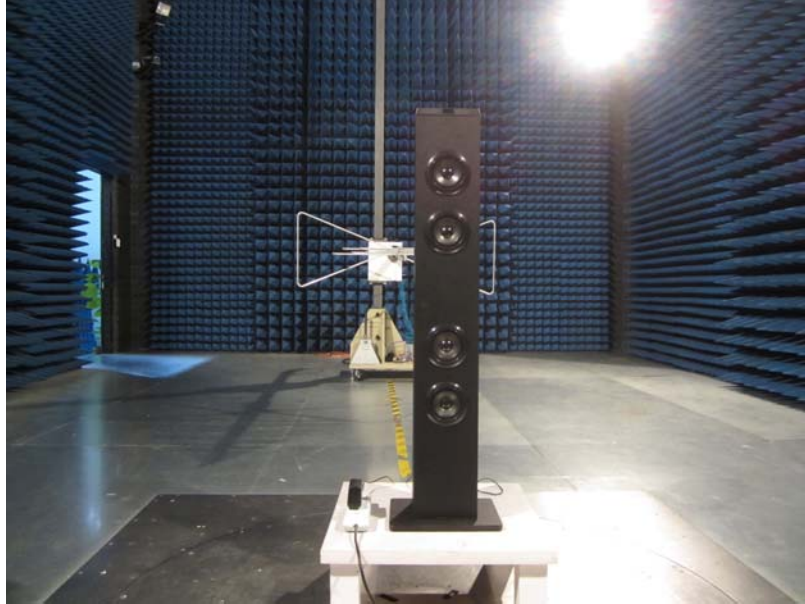
Middle channel



Highest channel

8 Test Setup Photo

Radiated Emission



Conducted Emission

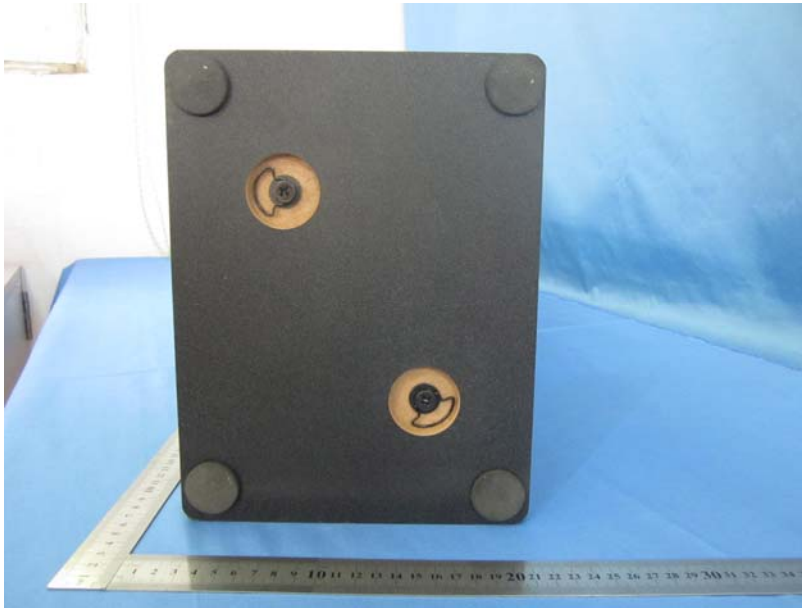


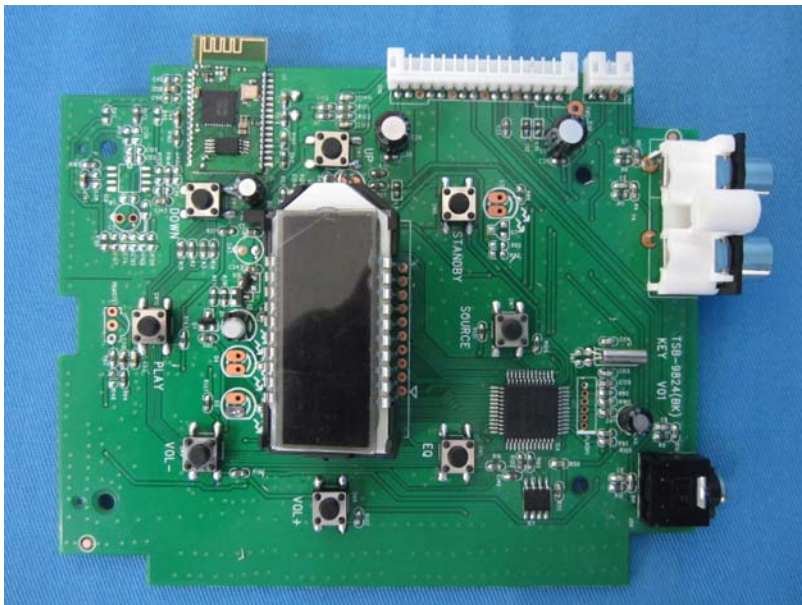
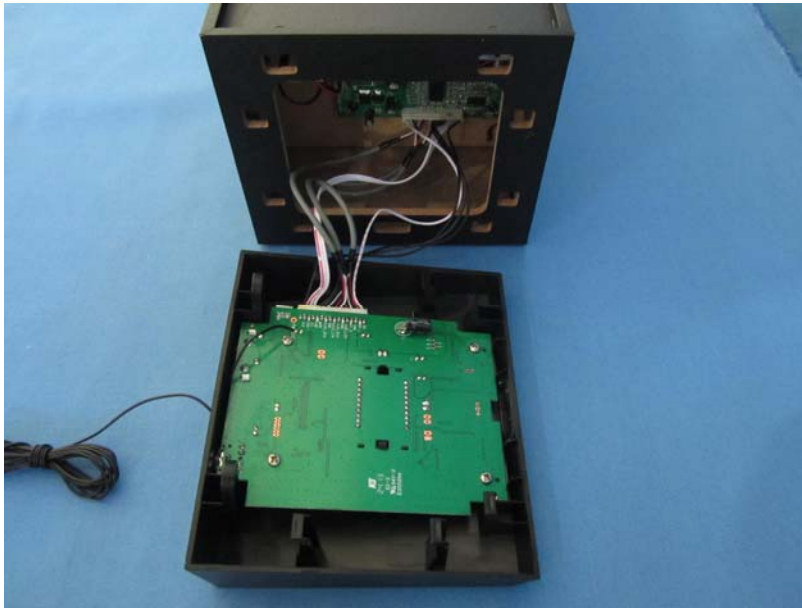
9 EUT Constructional Details

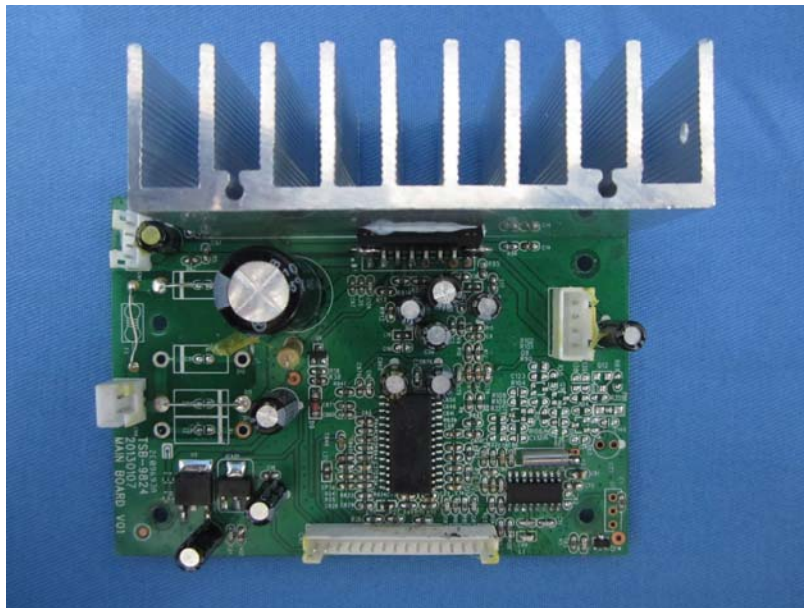
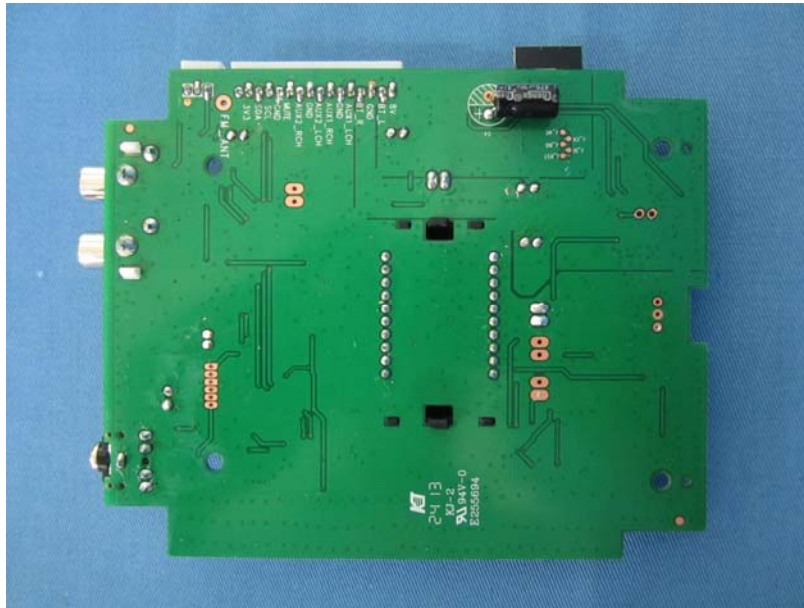


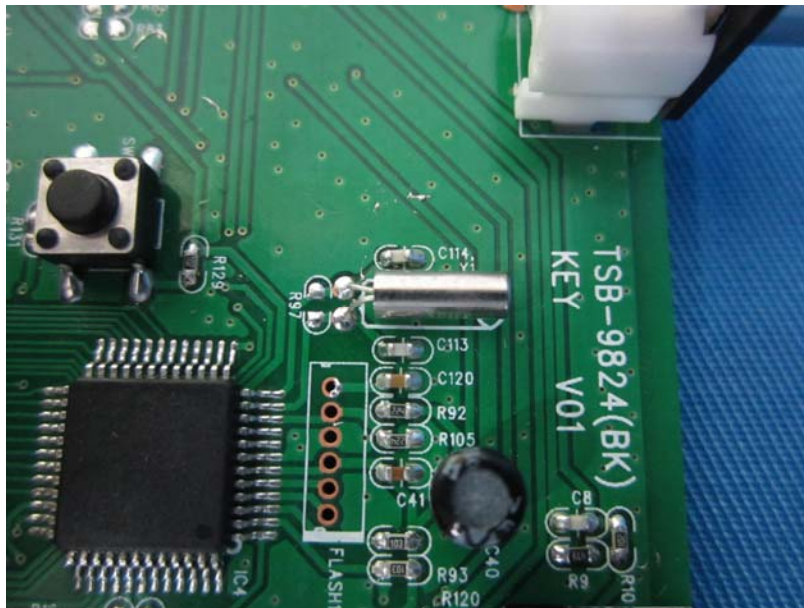
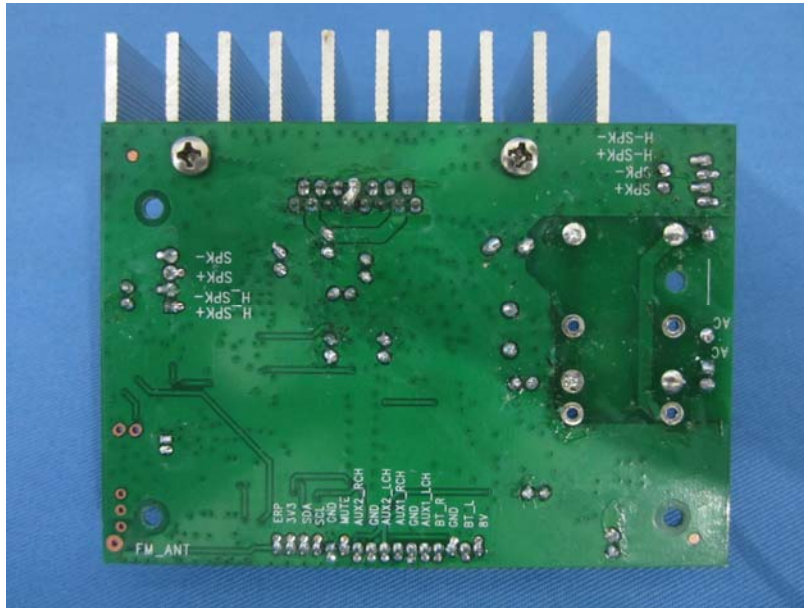


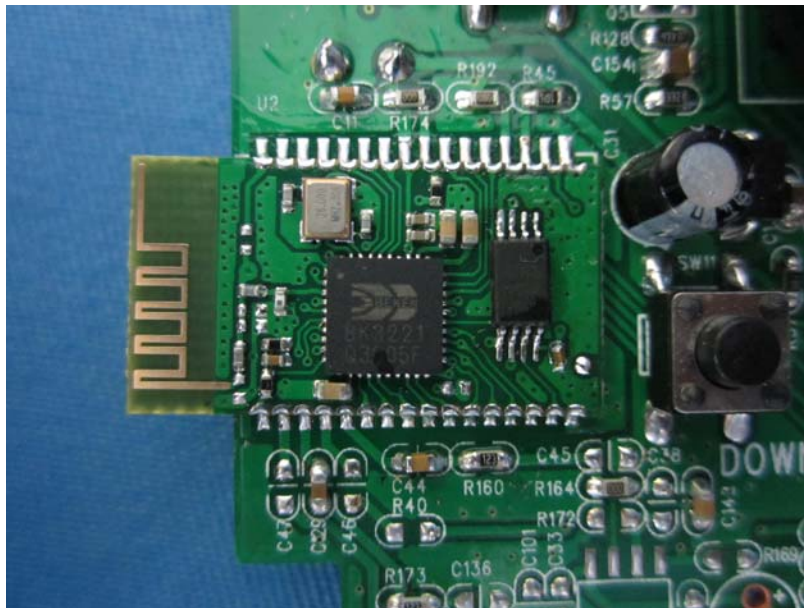
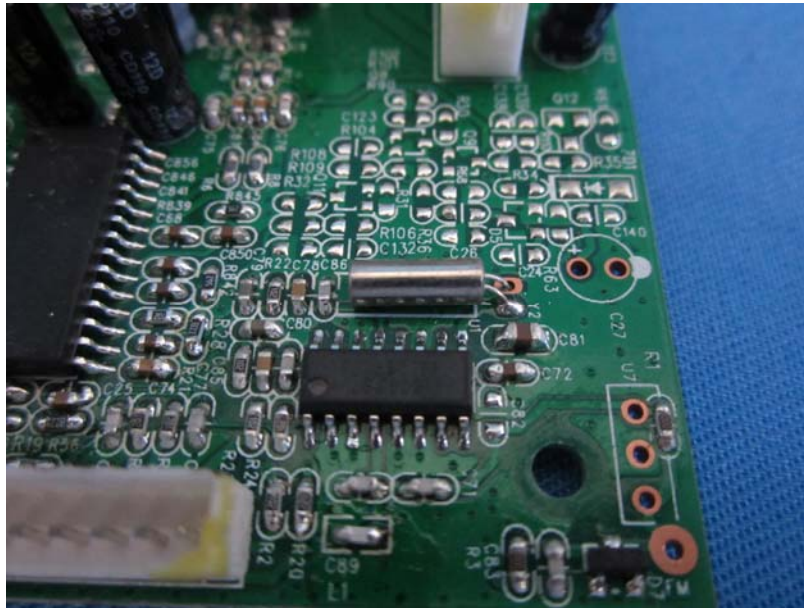














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