FCC TEST REPORT

FCC ID	: PB4-TDKQ35
Applicant	: Imation Corp.
Address	: 1 Imation Way, Oakdale, MN 55128 USA

Equipment Under Test (EUT) :

Product Name	: Wireless Speaker
Model No.	: USB-360,MW360,TW360

Standards	: FCC CFR47 Part 15 Section 15.247:2010
Date of Test	: Aug.02, 2012 ~ Aug.25, 2012
Date of Issue	: Aug.25, 2012
Date of Revise and Issue	: Jan. 06, 2013
Tested By	: Olic huang / Engineer
Reviewed By	: Philo zhong / Manager

Test Result	**: PASS**

Prepared By:
Waltek Services (Shenzhen) Co., Ltd.
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✧ The sample detailed above has been tested to the requirements of Council Directives ANSI C63.4:2003. The test results have been reviewed against the Directives above and found to meet their essential requirements.

2 Test Summary

Test Items	Test Requirement	Result
Conducted Emissions	15.207	PASS
Radiated Spurious Emissions	15.205(a) 15.209 15.247(d)	PASS
20dB Bandwidth	15.247(a)(1)	PASS
Maximum Peak Output Power	15.247(b)(1)	PASS
Frequency Separation	15.247(a)(1)	PASS
Number of Hopping Frequency	15.247(a)(1)(iii)	PASS
Dwell time	15.247(a)(1)(iii)	PASS
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	PASS

3 Revise History

The EUT was changed the FB11 and FB12,the original is 1K5 ohm,and now change to 1K8 ohm,it maybe make the radiation difference from the original test data,so it's change the data on page 17/55 and Page 18/55 only,the others data uses the original in this report. And the original FCC ID:PB4-TDKQ35,Issued date was 08/28/2012,which issued by Timco Engineering,Inc.

4 Contents

5 General Information

5.1 Client Information

Applicant	: Imation Corp.
Address of Applicant	: 1 Imation Way, Oakdale, MN 55128 USA
Manufacturer	: Imation Corp.
Address of Manufacturer	: 1 Imation Way, Oakdale, MN 55128 USA

5.2 General Description of E.U.T.

Product Name	: Wireless Speaker
Model No.	: USB-360,MW360,TW360
Trademark	: XtremeMac for USB-360, Memorex for MW360, TDK Life on Record for TW360
Difference Description	: All models are same, except model No. and trademarks are different.

5.3 Details of E.U.T.

Technical Data	: Internal Battery: 7.2V DC Adapter Input:100-240V AC,50-60Hz,1.2A. Output:DC19.0V,2000mA.
Adapter model	: Y48DE-190-2000
Operation Frequency	: 2402MHz ~ 2480MHz
Crystal Frequency	: 16.0MHz
Antenna Gain	: -2.76dBi（Max. Peak）

5.4 Description of Support Units

The EUT has been tested as an independent unit.

5.5 Standards Applicable for Testing

The customer requested FCC tests for a Wireless Speaker. The standards used were FCC CFR47 Part 15 Section 15.203, Section 15.207, Section 15.209 and Section 15.247.

5.6 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: IC7760A**

  Waltek Services(Shenzhen) Co., Ltd. has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files. Registration 7760A, July 12, 2012.

- **FCC – Registration No.: 880581**

  Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, May 26, 2011.

5.7 Test Location

All the tests were performed at:
Waltek Services(Shenzhen) Co., Ltd. at 1/F, Fukangtai Building, West Baima Rd.,Songgang Street, Baoan District, Shenzhen, China

6 Equipment Used during Test

Equipment Name	Manufacturer Model	Equipment No	Internal No	Specification	Cal. Date	Due Date	Uncertainty
EMC Analyzer	Agilent/ E7405A	MY45114943	W2008001	9k-26.5GHz	July 12,2012	July 11,2013	±1dB
Trilog Broadband Antenne	SCHWARZBECK MESS-ELEKTROM / VULB9163	336	W2008002	25-3000 MHz	July 12,2012	July 11,2013	±1dB
Broad-band Horn Antenna	SCHWARZBECK MESS-ELEKTROM / BBHA 9120D(1201)	667	W2008003	1-18GHz	July 12,2012	July 11,2013	f < 10 GHz : ±1dB 10GHz < f < 18 GHz : ±1.5dB
Active Loop Antenna	Beijing Dazhi / ZN30900A	-	-	0.009-30MHz	July 12,2012	July 11,2013	±1Db
Broadband Preamplifier	SCHWARZBECK MESS-ELEKTROM / BBV 9718	9718-148	W2008004	0.5-18GHz	July 12,2012	July 11,2013	±1.2dB
10m Coaxial Cable with N-male Connectors	SCHWARZBECK MESS-ELEKTROM / AK 9515 H	-	-	-	July 12,2012	July 11,2013	-
10m 50 Ohm Coaxial Cable	SCHWARZBECK MESS-ELEKTROM / AK 9513	-	-	-	July 12,2012	July 11,2013	-
Positioning Controller	C&C LAB/ CC-C-IF	-	-	-	July 12,2012	July 11,2013	-
Color Monitor	SUNSPO/ SP-14C	-	-	-	July 12,2012	July 11,2013	-
Test Receiver	ROHDE&SCHWARZ/ ESPI	101155	W2005001	9k-3GHz	July 12,2012	July 11,2013	±1dB
Two-Line V-Network	ROHDE&SCHWARZ/ ENV216	100115	W2005002	50Ω/50μH	July 12,2012	July 11,2013	±10%
RF Generator	TESEQ GmbH/ NSG4070	25781	W2008008	Fraq-range : 9K-1GHz RF voltage : -60 dBm-+10dBm	July 12,2012	July 11,2013	Power_freq distinguish0.1Hz RFeletricity distinguish 0.1B
MP3 Player	Ipod Player/A1285	5K85004U3R0	-	-	July 12,2012	July 11,2013	±0.5dB

7 Conducted Emission

Test Requirement:	FCC CFR 47 Part 15 Section 15.207
Test Method:	ANSI C63.4:2003
Test Result:	PASS
Frequency Range:	150kHz to 30MHz
Class:	Class B
Limit:	66-56 dBμV between 0.15MHz & 0.5MHz 56 dBμV between 0.5MHz & 5MHz 60 dBμV between 5MHz & 30MHz
Detector:	Peak for pre-scan (9kHz Resolution Bandwidth) Quasi-Peak & Average if maximised peak within 6dB of Average Limit

7.1 E.U.T. Operation

Operating Environment:

Temperature: 25.5 °C

Humidity: 51 % RH

Atmospheric Pressure: 1012 mbar

EUT Operation:

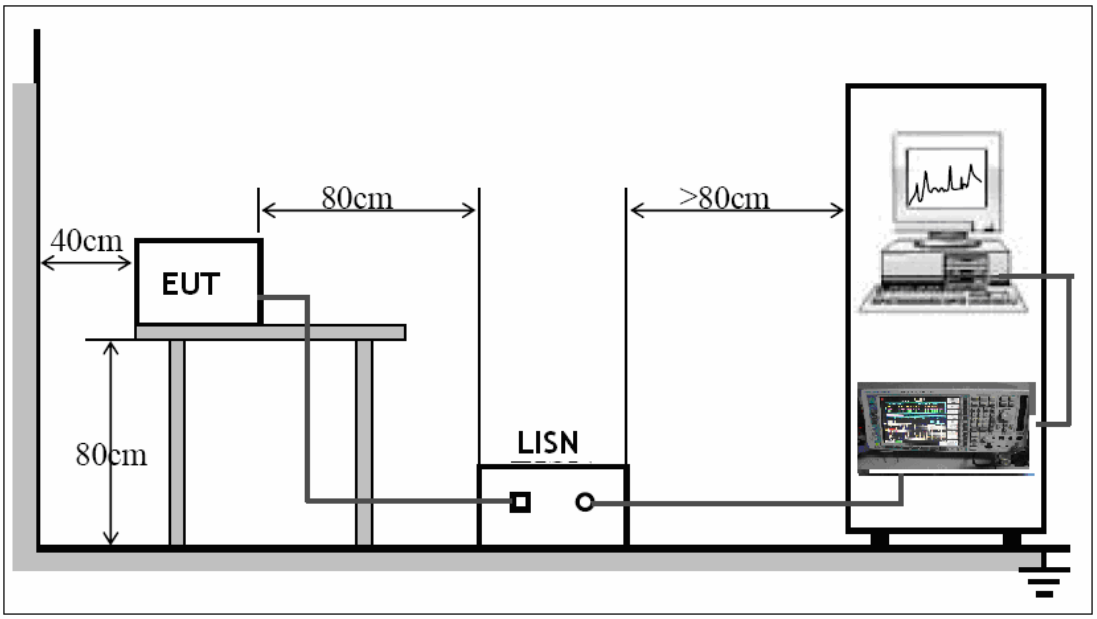
The EUT was tested in charging mode and 1KHz audio playing by BT linked.

The EUT was tested according to ANSI C63.4:2003. The frequency spectrum from 150kHz to 30MHz was investigated.

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

7.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.4:2003, The specification used in this report was the FCC Part15.207 limits.

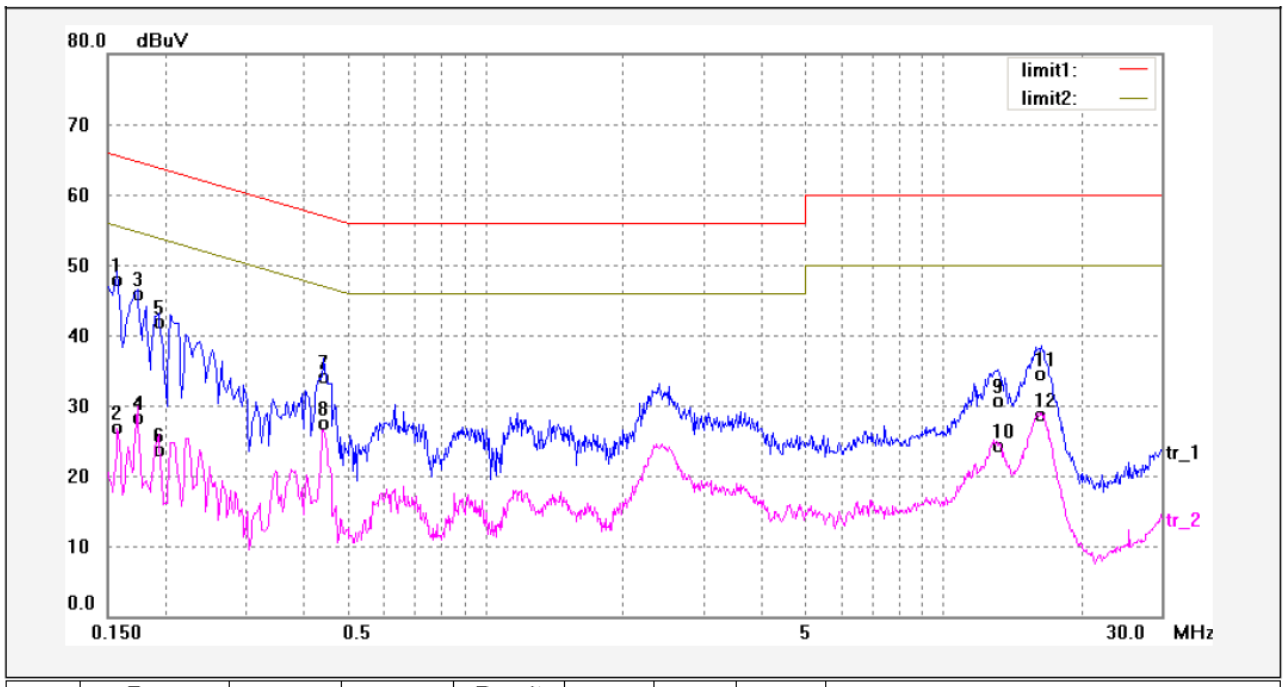


The EUT was placed on the test table in shielding room

7.3 Conducted Emission Test Result

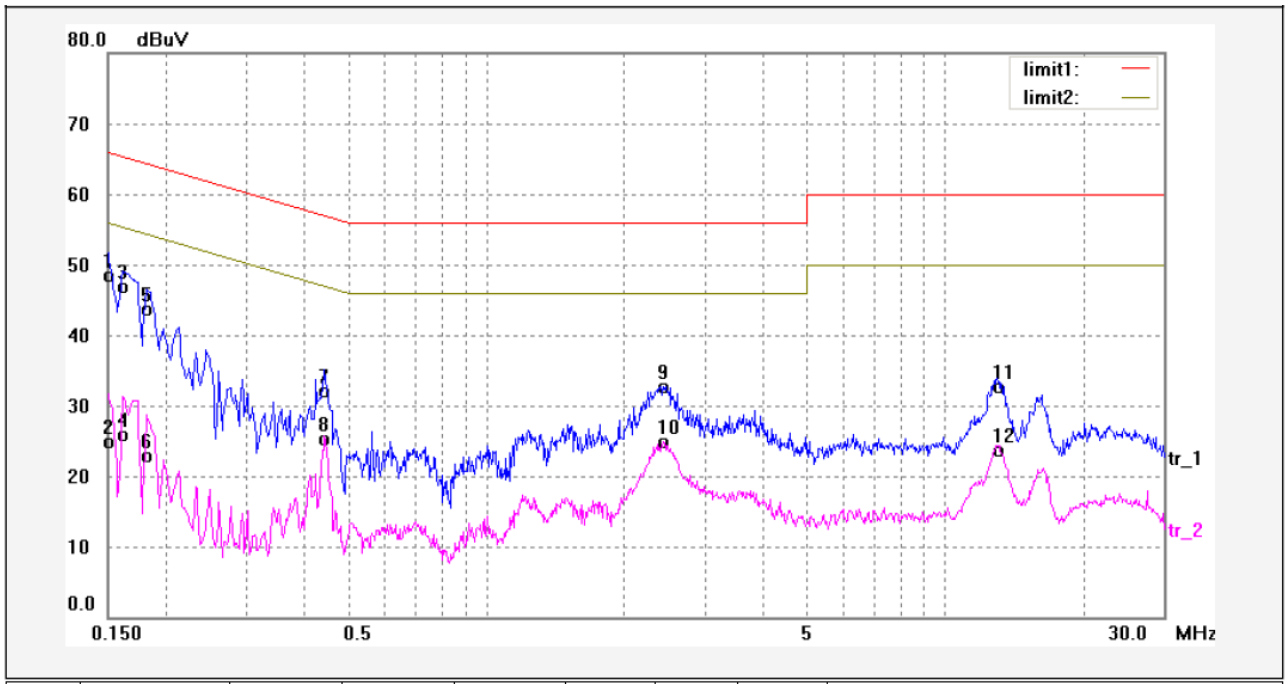
An initial pre-scan was performed on the live and neutral lines.

Live line:



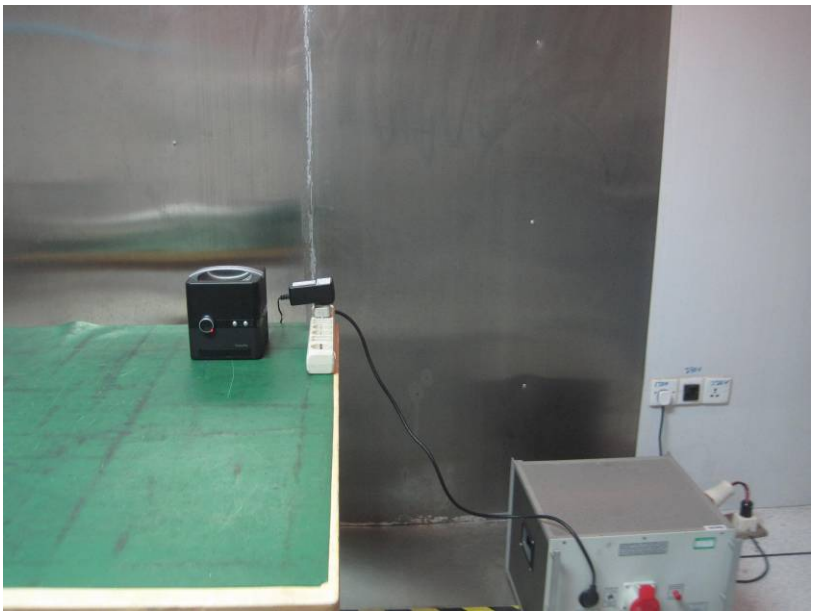
No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1580	36.68	10.35	47.03	65.56	-18.53	QP	
2	0.1580	15.84	10.35	26.19	55.56	-29.37	AVG	
3	0.1740	34.69	10.35	45.04	64.76	-19.72	QP	
4	0.1740	17.16	10.35	27.51	54.76	-27.25	AVG	
5	0.1940	30.80	10.35	41.15	63.86	-22.71	QP	
6	0.1940	12.49	10.35	22.84	53.86	-31.02	AVG	
7	0.4460	22.97	10.35	33.32	56.95	-23.63	QP	
8	0.4460	16.31	10.35	26.66	46.95	-20.29	AVG	
9	13.2420	19.42	10.46	29.88	60.00	-30.12	QP	
10	13.2420	13.02	10.46	23.48	50.00	-26.52	AVG	
11	16.4300	23.27	10.45	33.72	60.00	-26.28	QP	
12	16.4300	17.44	10.45	27.89	50.00	-22.11	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1500	37.41	10.35	47.76	65.99	-18.23	QP	
2	0.1500	13.77	10.35	24.12	55.99	-31.87	AVG	
3	0.1620	35.81	10.35	46.16	65.36	-19.20	QP	
4	0.1620	14.78	10.35	25.13	55.36	-30.23	AVG	
5	0.1844	32.56	10.35	42.91	64.28	-21.37	QP	
6	0.1844	11.72	10.35	22.07	54.28	-32.21	AVG	
7	0.4460	20.97	10.35	31.32	56.95	-25.63	QP	
8	0.4460	14.16	10.35	24.51	46.95	-22.44	AVG	
9	2.4380	21.44	10.38	31.82	56.00	-24.18	QP	
10	2.4380	13.76	10.38	24.14	46.00	-21.86	AVG	
11	13.0219	21.36	10.46	31.82	60.00	-28.18	QP	
12	13.0219	12.53	10.46	22.99	50.00	-27.01	AVG	

7.4 Photograph – Conducted Emission Test Setup



8 Radiated Spurious Emissions

Test Requirement:	FCC CFR47 Part 15 Section 15.209 & 15.247
Test Method:	Based on DA 00-705
Test Result:	PASS
Frequency Range:	12MHz to 25GHz
Measurement Distance:	3m
15.209 Limit:	40.0 dBuV/m between 30MHz & 88MHz 43.5 dBuV/m between 88MHz & 216MHz 46.0 dBuV/m between 216MHz & 960MHz 54.0 dBuV/m above 960MHz
15.247 (d) Limit:	(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated 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, provided the transmitter demonstrates compliance with the peak conducted power limits.
Test mode:	The EUT was tested in continuously Transmit mode.

8.1 EUT Operation :

Operating Environment:

Temperature: 25.5 °C
Humidity: 51 % RH
Atmospheric Pressure: 1012 mbar

8.2 Measurement Uncertainty

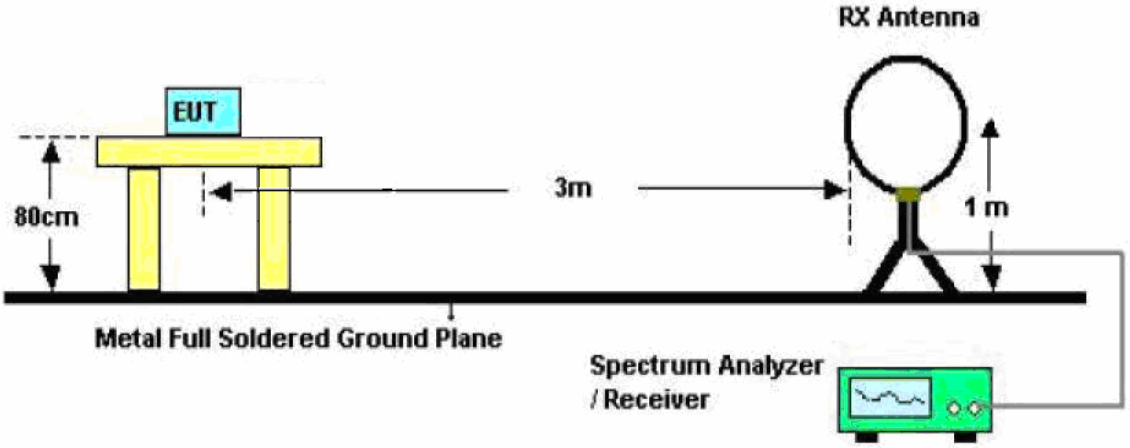
All measurements involve certain levels of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at Waltek EMC Lab is $\pm$5.03dB.

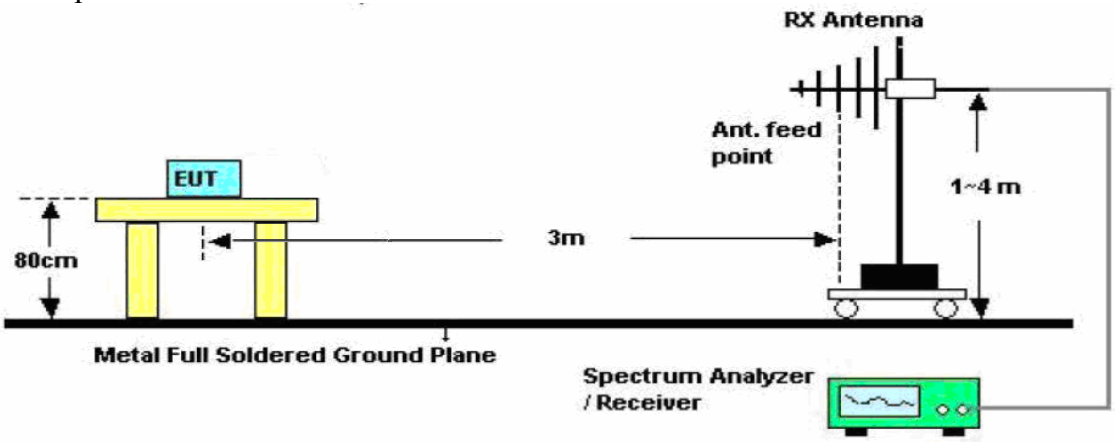
8.3 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.4:2003.

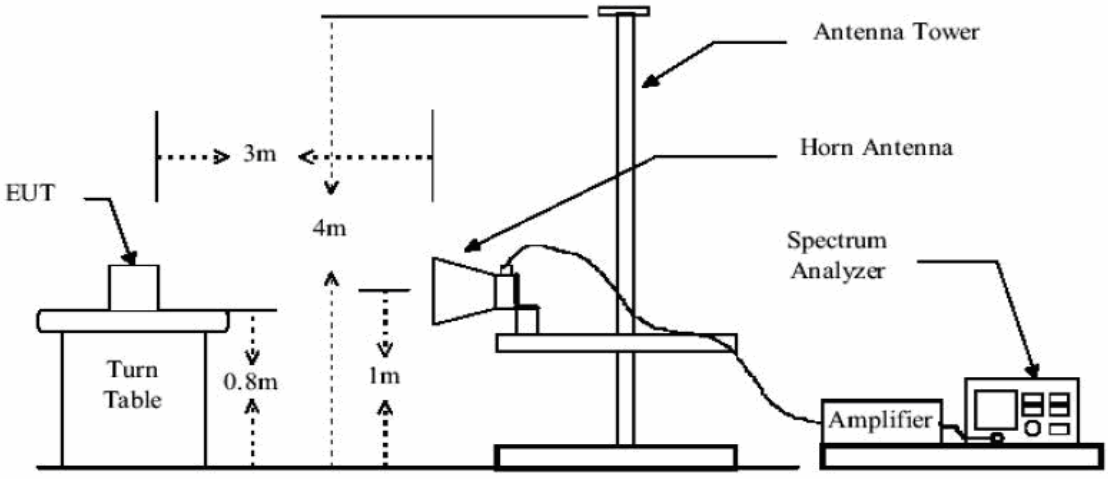
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



8.4 Spectrum Analyzer Setup

According to FCC Part 15 Rules, the system was tested to 25000MHz.

Below 30MHz

Start Frequency	32.768KHz
Stop Frequency	30MHz
Sweep Speed	Auto
IF Bandwidth	10KHz
Video Bandwidth	10KHz
Resolution Bandwidth	10KHz

30MHz ~ 1GHz

Start Frequency	30 MHz
Stop Frequency	1000MHz
Sweep Speed	Auto
IF Bandwidth	120 KHz
Video Bandwidth	100KHz
Quasi-Peak Adapter Bandwidth	120 KHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth	100KHz

Above 1GHz

Start Frequency	1000 MHz
Stop Frequency	25000MHz
Sweep Speed	Auto
IF Bandwidth	120 KHz
Video Bandwidth	3MHz
Quasi-Peak Adapter Bandwidth	120 KHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth	1MHz

8.5 Test Procedure

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.

8.6 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

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

Margin = Corr. Ampl. – Limit

8.7 Summary of Test Results

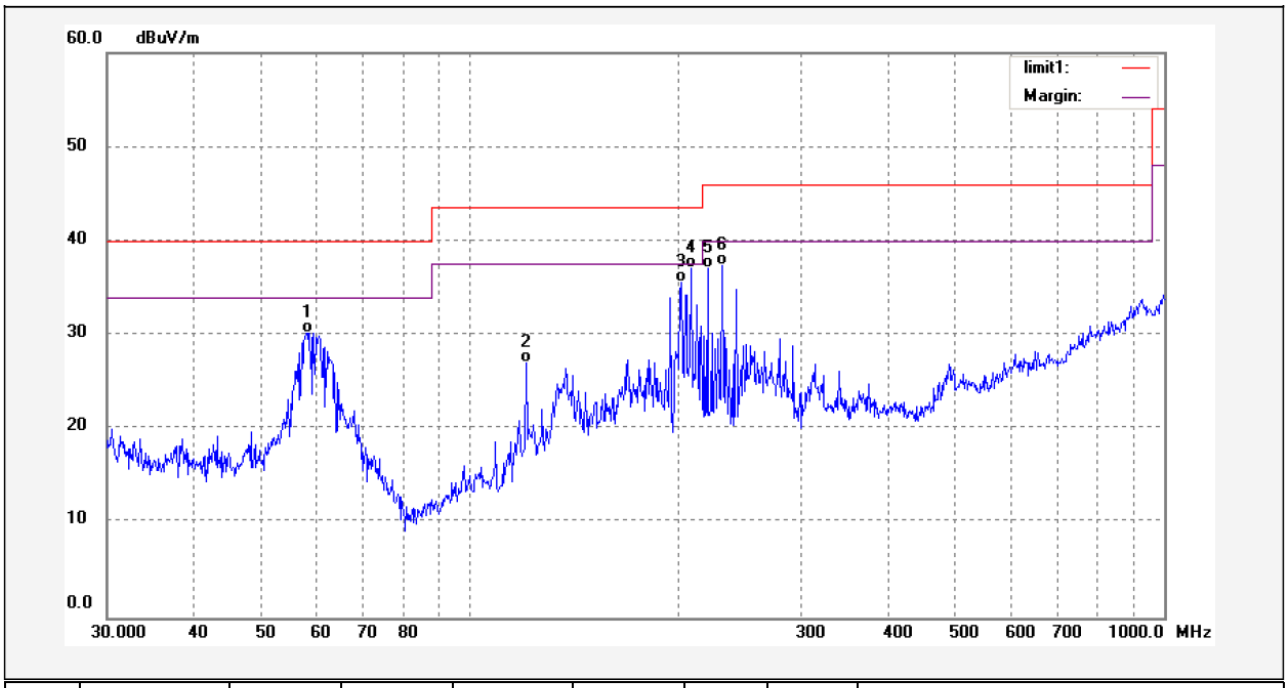
According to the data in this section, the EUT complied with the FCC CFR47 Part 15 Section 15.209 & 15.247 standards. The EUT was tested in charging mode and 1KHz audio playing by BT linked mode.

Test mode : BT continuously recevie mode

Remark: the EUT was pretested at the high, middle and low channel, and the worse case was the middle Channel, so the data show was the low channel only. Because the emissions below 30MHz are more than 20dB below the limit, the data is not show in the report.

Test Frequency : 30MHz ~ 1000MHz

Antenna polarization: Vertical

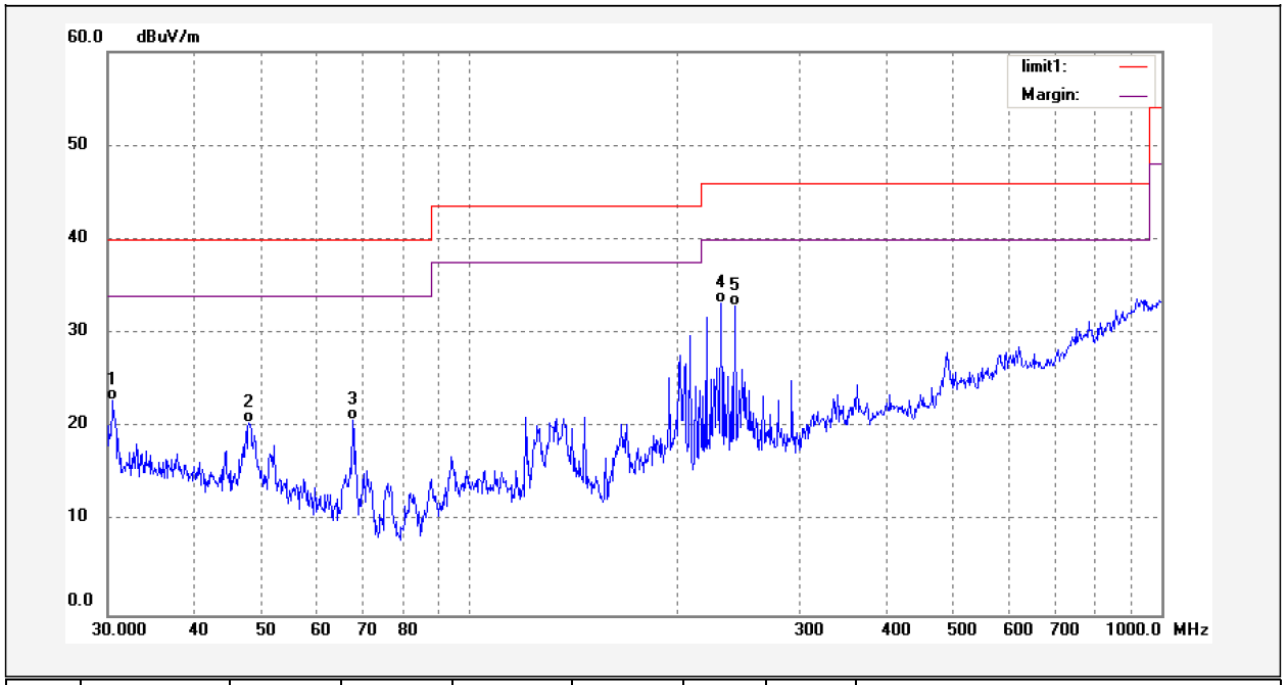


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	58.2803	17.34	12.92	30.26	40.00	-9.74	QP	
2	120.6117	15.16	11.87	27.03	43.50	-16.47	QP	
3	201.4538	20.38	15.24	35.62	43.50	-7.88	QP	
4	207.9261	22.24	14.82	37.06	43.50	-6.44	QP	
5	219.9499	21.02	16.13	37.15	46.00	-8.85	QP	
6	231.0398	21.24	16.12	37.36	46.00	-8.64	QP	

Remark:

Date of test: Jan.06,2013

Antenna polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	30.5316	6.62	16.27	22.89	40.00	-17.11	QP	
2	48.0392	5.84	14.65	20.49	40.00	-19.51	QP	
3	67.7854	10.38	10.41	20.79	40.00	-19.21	QP	
4	231.0398	17.06	16.12	33.18	46.00	-12.82	QP	
5	241.8377	17.60	15.33	32.93	46.00	-13.07	QP	

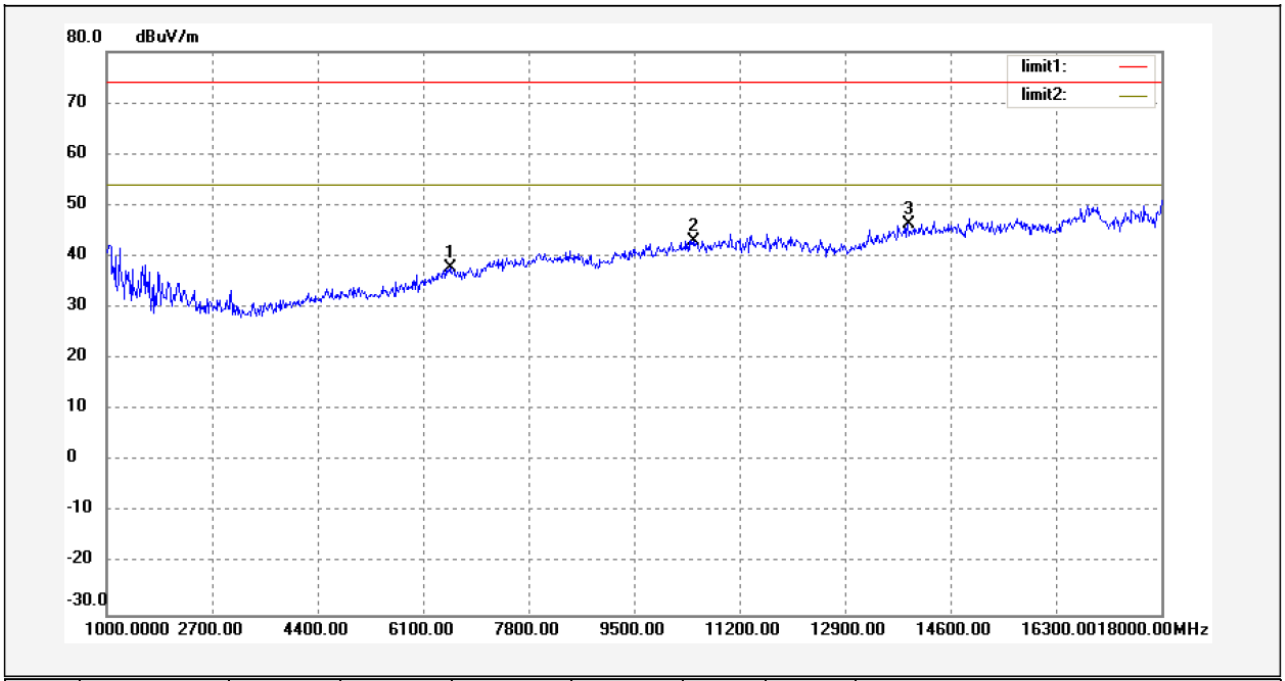
Remark:

Date of test: Jan.06,2013

Test Frequency: Above 1GHz radiation test data:

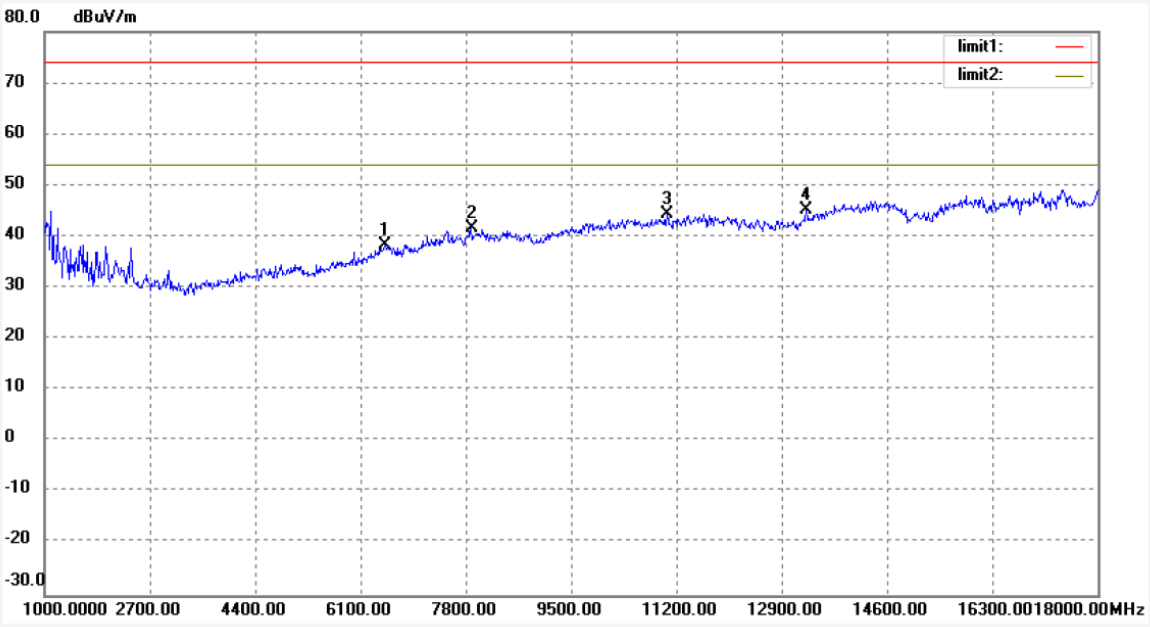
Remark: No any emissions were found from 18GHz to 25 GHz, So the radiated emissions from 18GHz to 25GHz were not record.

Antenna polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	6553.106	46.17	-8.33	37.84	74.00	-36.16	peak	
2	10453.908	47.40	-4.28	43.12	74.00	-30.88	peak	
3	13911.824	47.48	-1.08	46.40	74.00	-27.60	peak	

Antenna polarization: Horizontal



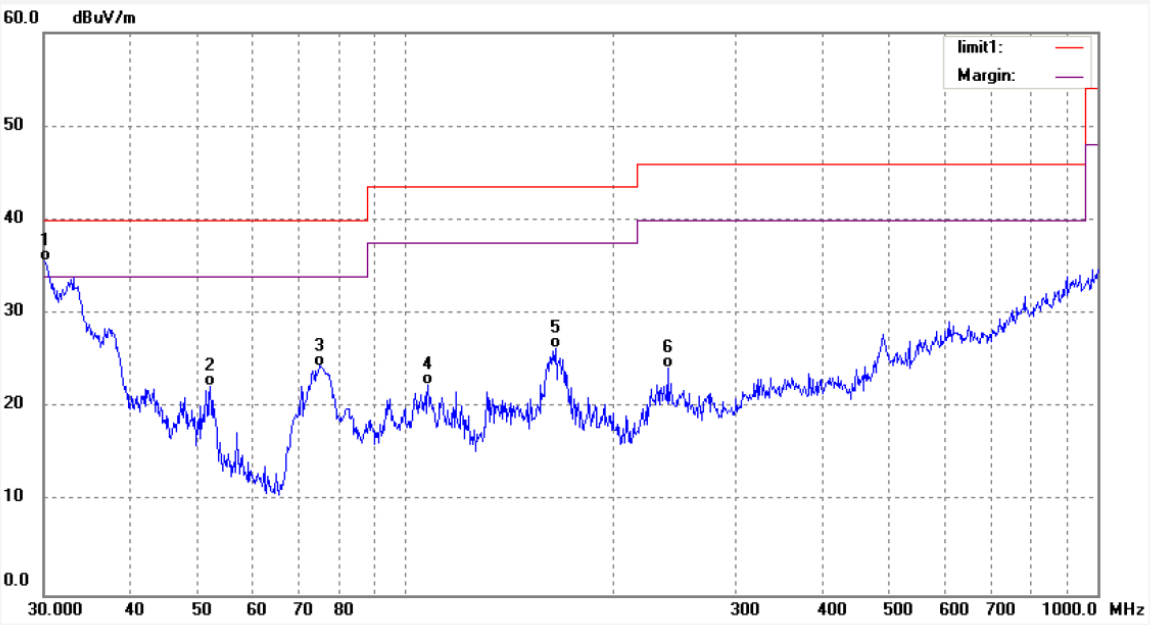
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	6502.004	46.61	-8.34	38.27	74.00	-35.73	peak	
2	7881.764	47.99	-6.40	41.59	74.00	-32.41	peak	
3	11050.100	48.11	-3.65	44.46	74.00	-29.54	peak	
4	13298.597	47.91	-2.81	45.10	74.00	-28.90	peak	

Test mode : BT continuously transmit mode

Remark: The pre-test was performaned in continuously transmit mode and normal link mode, and the continuously transmit mode was pretested at the high, middle and low channel. The worst mode is normal link mode, so the data show was that mode's only. Because the emissions below 30MHz are more than 20dB below the limit, the data is not show in the report.

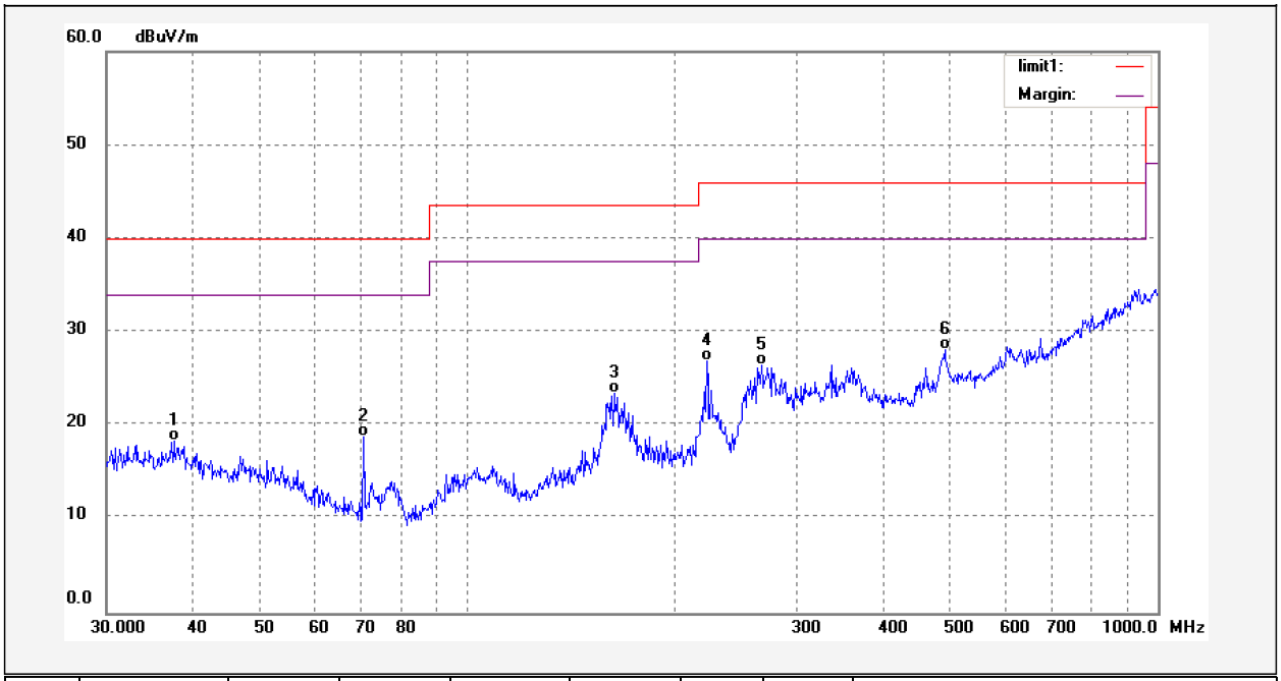
Test Frequency : 30MHz ~ 1000MHz

Antenna polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	30.1056	19.51	16.17	35.68	40.00	-4.32	QP	
2	52.2659	7.90	14.43	22.33	40.00	-17.67	QP	
3	75.0566	15.27	9.18	24.45	40.00	-15.55	QP	
4	107.7854	8.53	13.97	22.50	43.50	-21.00	QP	
5	164.8912	14.37	11.94	26.31	43.50	-17.19	QP	
6	239.3020	8.68	15.53	24.21	46.00	-21.79	QP	

Antenna polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	37.5648	1.69	16.61	18.30	40.00	-21.70	QP	
2	70.7047	9.04	9.81	18.85	40.00	-21.15	QP	
3	163.1623	11.76	11.71	23.47	43.50	-20.03	QP	
4	222.2807	10.63	16.23	26.86	46.00	-19.14	QP	
5	266.8395	9.95	16.50	26.45	46.00	-19.55	QP	
6	491.7700	2.81	25.29	28.10	46.00	-17.90	QP	

Test Frequency: 1GHz ~ 25GHz radiation test data

And the below is the Fundamental and Harmonic

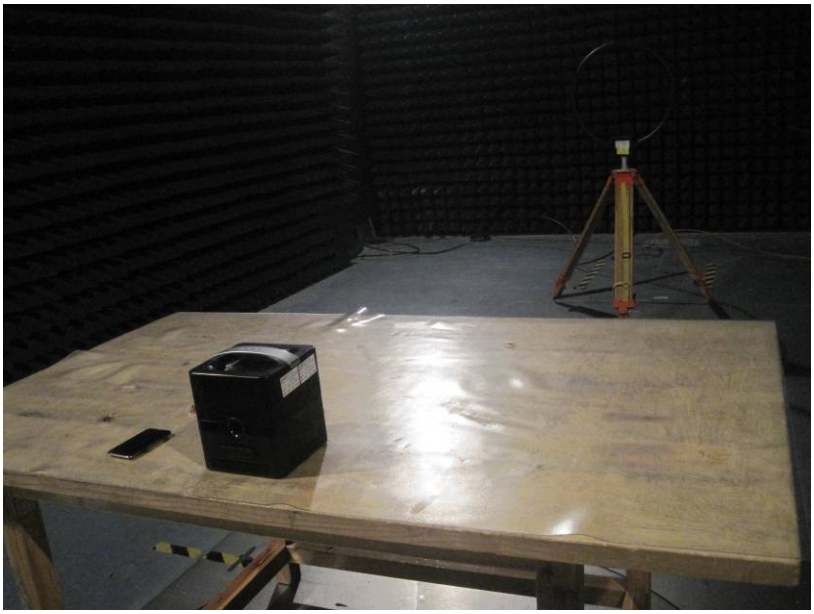
Frequency (MHz)	Detector	Antenna Polarization	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Turntable Angle (°)
Low frequency							
2402.00	AV	Vertical	96.12		(Fund.)	1.0	10
4804.00	AV	Vertical	42.35	54.00	-11.65	1.1	45
7206.00	AV	Vertical	39.41	54.00	-14.59	1.0	180
9608.00	AV	Vertical	35.78	54.00	-18.22	1.1	110
12010.00	AV	Vertical	33.50	54.00	-20.50	1.2	135
14412.00	AV	Vertical	35.36	54.00	-18.64	1.2	150
16814.00	AV	Vertical	34.67	54.00	-19.33	1.1	110
19216.00	AV	Vertical	29.67	54.00	-24.33	1.0	140
21618.00	AV	Vertical	26.79	54.00	-27.21	1.0	120
24020.00	AV	Vertical	32.00	54.00	-22.00	1.1	190
2402.00	AV	Horizontal	90.12		(Fund.)	1.1	150
4804.00	AV	Horizontal	41.05	54.00	-12.95	1.2	120
7206.00	AV	Horizontal	38.36	54.00	-15.64	1.1	100
9608.00	AV	Horizontal	36.34	54.00	-17.66	1.2	190
12010.00	AV	Horizontal	34.71	54.00	-19.29	1.1	110
14412.00	AV	Horizonta	31.41	54.00	-22.59	1.2	190
16814.00	AV	Horizontal	34.28	54.00	-19.72	1.1	150
19216.00	AV	Horizontal	26.87	54.00	-27.13	1.1	120
21618.00	AV	Horizontal	27.69	54.00	-26.31	1.4	160
24020.00	AV	Horizontal	26.44	54.00	-27.56	1.2	190
2402.00	PK	Vertical	107.85		(Fund.)	1.3	150
4804.00	PK	Vertical	58.63	74.00	-15.37	1.1	120
7206.00	PK	Vertical	58.48	74.00	-15.52	1.2	190
9608.00	PK	Vertical	55.09	74.00	-18.91	1.2	240
12010.00	PK	Vertical	51.58	74.00	-22.42	1.1	120
14412.00	PK	Vertical	52.72	74.00	-21.28	1.1	100
16814.00	PK	Vertical	49.59	74.00	-24.41	1.0	190
19216.00	PK	Vertical	47.95	74.00	-26.05	1.1	120
21618.00	PK	Vertical	45.61	74.00	-28.39	1.1	100
24020.00	PK	Vertical	46.89	74.00	-27.11	1.2	190
2402.00	PK	Horizontal	102.34		(Fund.)	1.0	110
4804.00	PK	Horizontal	57.32	74.00	-16.68	1.1	190
7206.00	PK	Horizontal	53.60	74.00	-20.40	1.0	120
9608.00	PK	Horizontal	50.59	74.00	-23.41	1.1	100
12010.00	PK	Horizontal	52.70	74.00	-21.30	1.1	120
14412.00	PK	Horizontal	47.46	74.00	-26.54	1.0	60
16814.00	PK	Horizontal	53.62	74.00	-20.38	1.1	120

19216.00	PK	Horizontal	45.55	74.00	-28.45	1.0	100
21618.00	PK	Horizontal	46.76	74.00	-27.24	1.3	190
24020.00	PK	Horizontal	45.23	74.00	-28.77	1.0	110
Middle frequency							
2441.00	AV	Vertical	95.32		(Fund.)	1.1	20
4882.00	AV	Vertical	42.36	54.00	-11.64	1.0	120
7323.00	AV	Vertical	39.42	54.00	-14.58	1.1	100
9764.00	AV	Vertical	35.21	54.00	-18.79	1.0	110
12205.00	AV	Vertical	39.93	54.00	-14.07	1.1	190
14646.00	AV	Vertical	33.60	54.00	-20.40	1.2	150
17087.00	AV	Vertical	35.46	54.00	-18.54	1.1	310
19528.00	AV	Vertical	32.33	54.00	-21.67	1.1	100
21969.00	AV	Vertical	30.34	54.00	-23.66	1.2	190
24410.00	AV	Vertical	34.56	54.00	-19.44	1.1	110
2441.00	AV	Horizontal	92.23		(Fund.)	1.0	190
4882.00	AV	Horizontal	40.32	54.00	-13.68	1.2	150
7323.00	AV	Horizontal	38.89	54.00	-15.11	1.1	310
9764.00	AV	Horizontal	33.68	54.00	-20.32	1.0	20
12205.00	AV	Horizontal	31.50	54.00	-22.50	1.2	200
14646.00	AV	Horizontal	35.25	54.00	-18.75	1.1	110
17087.00	AV	Horizontal	34.54	54.00	-19.46	1.1	190
19528.00	AV	Horizontal	29.30	54.00	-24.70	1.3	150
21969.00	AV	Horizontal	30.23	54.00	-23.77	1.3	310
24410.00	AV	Horizontal	28.54	54.00	-25.46	1.1	110
2441.00	PK	Vertical	106.31		(Fund.)	1.1	20
4882.00	PK	Vertical	61.21	74.00	-12.79	1.1	30
7323.00	PK	Vertical	60.55	74.00	-13.45	1.0	130
9764.00	PK	Vertical	56.29	74.00	-17.71	1.3	180
12205.00	PK	Vertical	59.66	74.00	-14.34	1.1	220
14646.00	PK	Vertical	52.18	74.00	-21.82	1.1	20
17087.00	PK	Vertical	55.49	74.00	-18.51	1.1	50
19528.00	PK	Vertical	50.38	74.00	-23.62	1.2	190
21969.00	PK	Vertical	54.25	74.00	-19.75	1.1	120
24410.00	PK	Vertical	47.44	74.00	-26.56	1.4	120
2441.00	PK	Horizontal	102.32		(Fund.)	1.1	110
4882.00	PK	Horizontal	57.43	74.00	-16.57	1.1	190
7323.00	PK	Horizontal	55.24	74.00	-18.76	1.2	150
9764.00	PK	Horizontal	53.23	74.00	-20.77	1.1	310
12205.00	PK	Horizontal	56.11	74.00	-17.89	1.1	110
14646.00	PK	Horizontal	51.36	74.00	-22.64	1.1	210
17087.00	PK	Horizontal	48.61	74.00	-25.39	1.2	160
19528.00	PK	Horizontal	46.32	74.00	-27.68	1.3	120
21969.00	PK	Horizontal	52.49	74.00	-21.51	1.1	50
24410.00	PK	Horizontal	47.32	74.00	-26.68	1.2	20

High frequency							
2480.00	AV	Vertical	94.63		(Fund.)	1.1	110
4960.00	AV	Vertical	42.32	54.00	-11.68	1.1	190
7440.00	AV	Vertical	40.44	54.00	-13.56	1.1	150
9920.00	AV	Vertical	38.80	54.00	-15.20	1.0	310
12400.00	AV	Vertical	37.49	54.00	-16.51	1.3	110
14880.00	AV	Vertical	40.88	54.00	-13.12	1.2	160
17360.00	AV	Vertical	34.33	54.00	-19.67	1.2	120
19840.00	AV	Vertical	31.70	54.00	-22.30	1.1	180
22320.00	AV	Vertical	38.35	54.00	-15.65	1.1	190
24800.00	AV	Vertical	30.44	54.00	-23.56	1.0	160
2480.00	AV	Horizontal	92.35		(Fund.)	1.1	190
4960.00	AV	Horizontal	39.69	54.00	-14.31	1.0	210
7440.00	AV	Horizontal	35.14	54.00	-18.86	1.3	160
9920.00	AV	Horizontal	35.59	54.00	-18.41	1.1	120
12400.00	AV	Horizontal	36.99	54.00	-17.01	1.1	180
14880.00	AV	Horizontal	33.39	54.00	-20.61	1.1	190
17360.00	AV	Horizontal	30.61	54.00	-23.39	1.0	160
19840.00	AV	Horizontal	33.32	54.00	-20.68	1.3	160
22320.00	AV	Horizontal	28.46	54.00	-25.54	1.4	120
24800.00	AV	Horizontal	29.44	54.00	-24.56	1.2	180
2480.00	PK	Vertical	106.32		(Fund.)	1.1	190
4960.00	PK	Vertical	62.36	74.00	-11.64	1.0	160
7440.00	PK	Vertical	57.44	74.00	-16.56	1.3	120
9920.00	PK	Vertical	55.78	74.00	-18.22	1.1	160
12400.00	PK	Vertical	55.01	74.00	-18.99	1.1	130
14880.00	PK	Vertical	56.36	74.00	-17.64	1.1	120
17360.00	PK	Vertical	55.50	74.00	-18.50	1.0	140
19840.00	PK	Vertical	56.45	74.00	-17.55	1.3	190
22320.00	PK	Vertical	54.65	74.00	-19.35	1.1	170
24800.00	PK	Vertical	48.40	74.00	-25.60	1.1	120
2480.00	PK	Horizontal	102.32		(Fund.)	1.1	160
4960.00	PK	Horizontal	57.32	74.00	-16.68	1.4	130
7440.00	PK	Horizontal	55.71	74.00	-18.29	1.2	120
9920.00	PK	Horizontal	56.41	74.00	-17.59	1.1	140
12400.00	PK	Horizontal	54.40	74.00	-19.60	1.1	160
14880.00	PK	Horizontal	48.44	74.00	-25.56	1.0	150
17360.00	PK	Horizontal	52.71	74.00	-21.29	1.3	190
19840.00	PK	Horizontal	47.46	74.00	-26.54	1.2	110
22320.00	PK	Horizontal	49.36	74.00	-24.64	1.1	170
24800.00	PK	Horizontal	45.21	74.00	-28.79	1.1	220

8.8 Photograph – Radiation Spurious Emission Test Setup

Below 30MHz



From 30-1000MHz

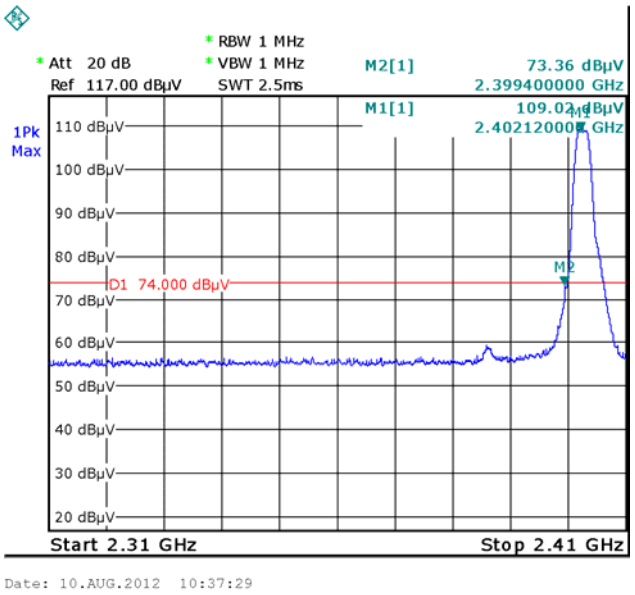
Above 1GHz

9 Band Edge Measurements

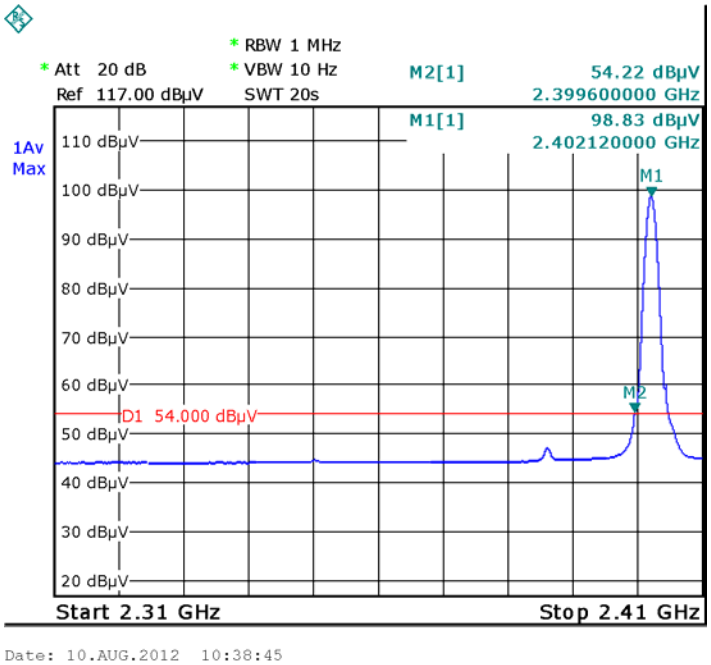
Test Requirement:	Section 15.247(d) In addition, radiated emissions which fall in the restricted bands. as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).
Test Method:	DA 00-705
Measurement Distance:	3m
Limit:	40.0 dBuV/m between 30MHz & 88MHz; 43.5 dBuV/m between 88MHz & 216MHz; 46.0 dBuV/m between 216MHz & 960MHz; 54.0 dBuV/m above 960MHz. 74.0 dBuV/m for peak above 1GHz 54.0 dBuV/m for AVG above 1GHz
Detector:	For Peak value: RBW = 1 MHz for f ≥ 1 GHz VBW ≥ RBW; Sweep = auto Detector function = peak Trace = max hold For AVG value: RBW = 1 MHz for f ≥ 1 GHz VBW = 10Hz; Sweep = auto Detector function = AVG Trace = max hold

Test Result:

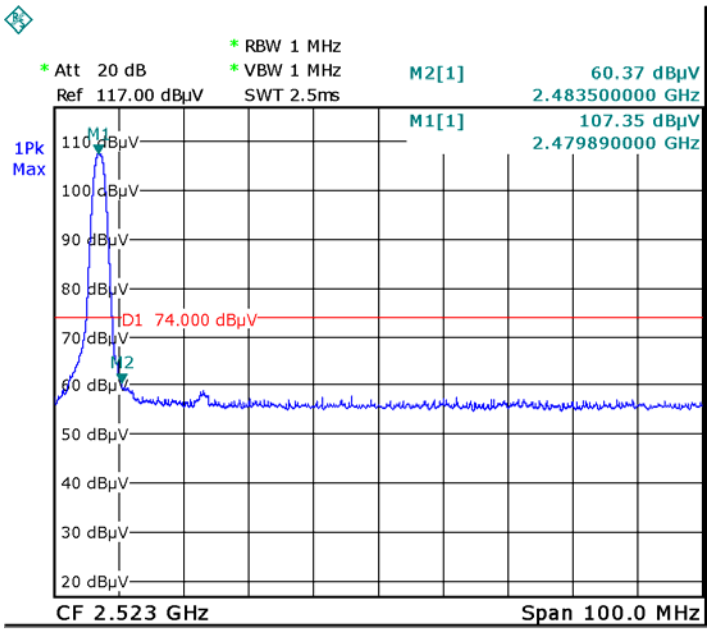
Low Channel – Peak



Low Channel – AV

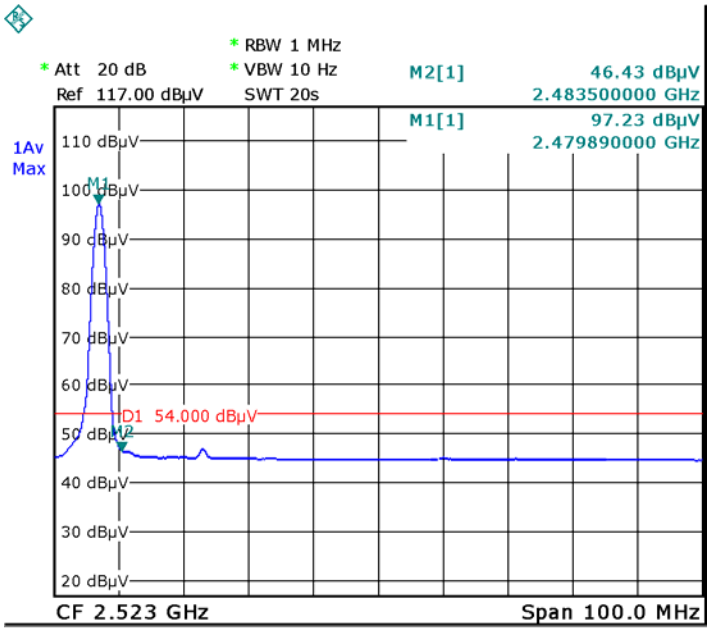


High Channel – Peak



Date: 10.AUG.2012 14:13:44

High Channel – AV



Date: 10.AUG.2012 14:14:28

10 20 dB Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: DA 00-705

Test Mode: Test in fixing operating frequency at low, Middle, high channel.

10.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum;

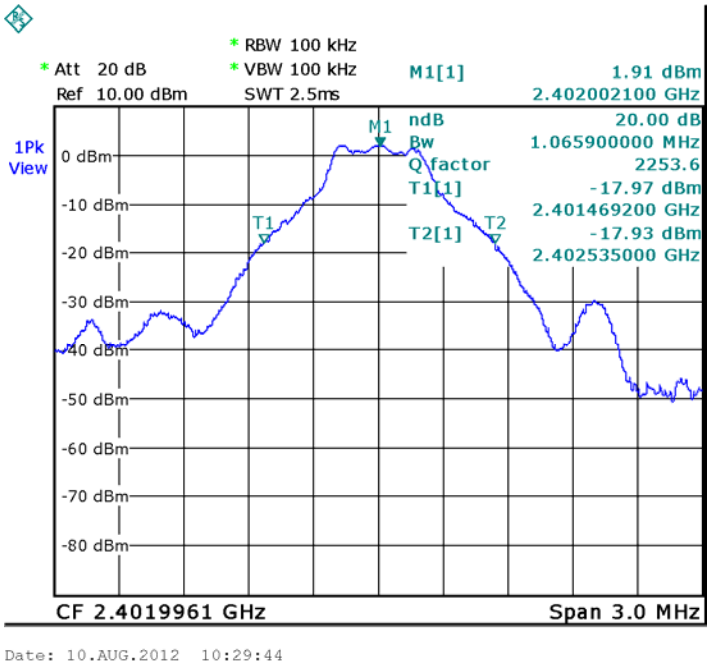
2. Set the spectrum analyzer: Span = 4MHz, RBW = 100kHz, VBW = 100kHz.

10.2 Test Result:

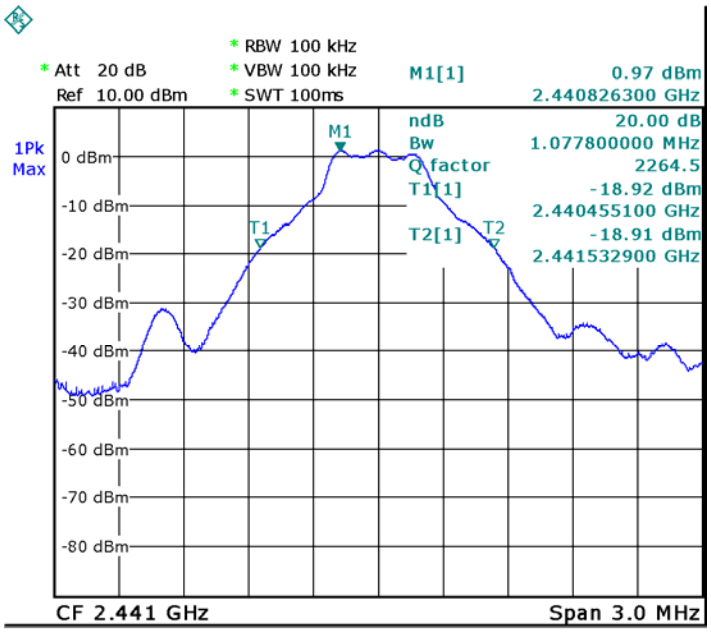
Test Channel	Bandwidth
Low	1.066MHz
Middle	1.078MHz
High	1.078MHz

Test result plot as follows:

Low Channel

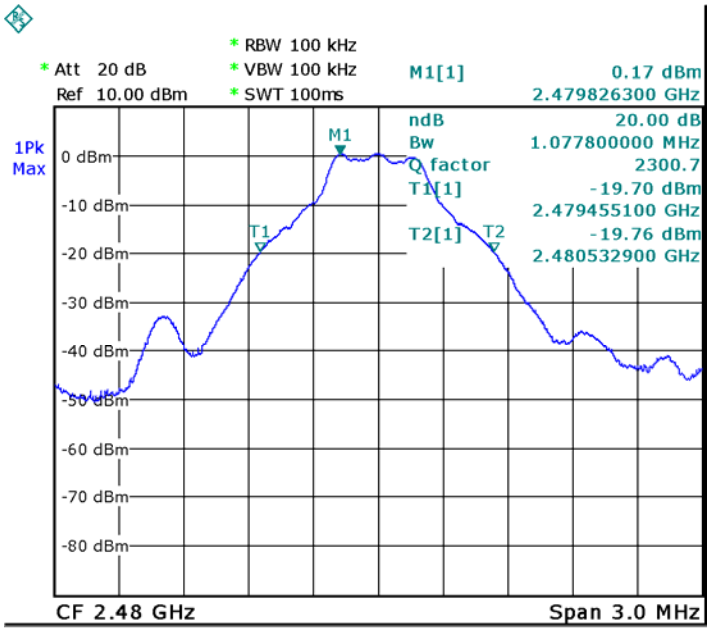


Middle Channel



Date: 10.AUG.2012 13:53:08

High Channel



Date: 10.AUG.2012 14:05:00

11 Maximum Peak Output Power

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	DA 00-705
Test Limit:	Regulation 15.247 (b)(1)For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts. Refer to the result "Number of Hopping Frequency" of this document. The 1watts (30 dBm) limit applies.
Test mode:	Test in fixing frequency transmitting mode.

11.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set the spectrum analyzer: RBW = 3 MHz. VBW = 10 MHz. Sweep = auto; Detector Function = Peak.

3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

11.2 Test Result:

Test Channel	Output Power (dBm)	Limit (dBm)
Low	0.34	30
Middle	0.32	30
High	0.32	30

12 Hopping Channel Separation

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	DA 00-705
Test Limit:	Regulation 15.247(a)(1) Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
Test Mode:	Test in hopping transmitting operating mode.

12.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set the spectrum analyzer: RBW = 30kHz. VBW = 100kHz , Span = 2MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

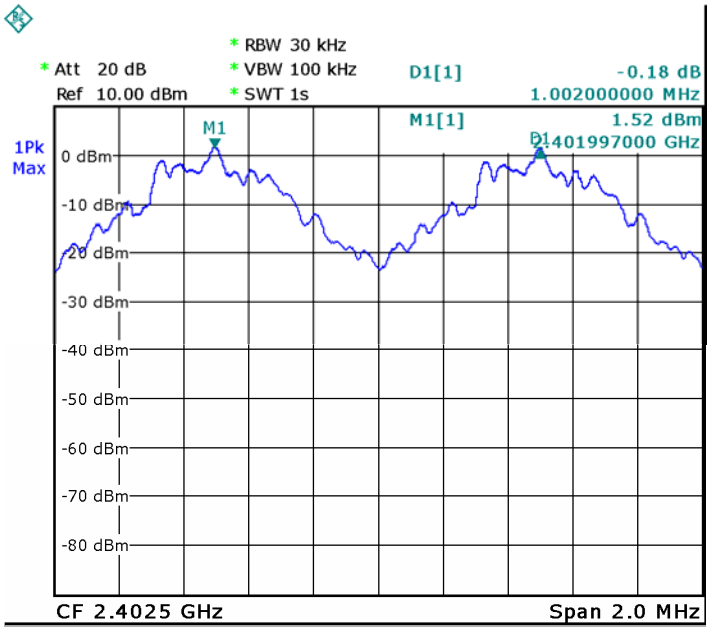
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

12.2 Test Result:

Test Channel	Separation (MHz)	Result
Low	1.000	PASS
Middle	1.000	PASS
High	1.004	PASS

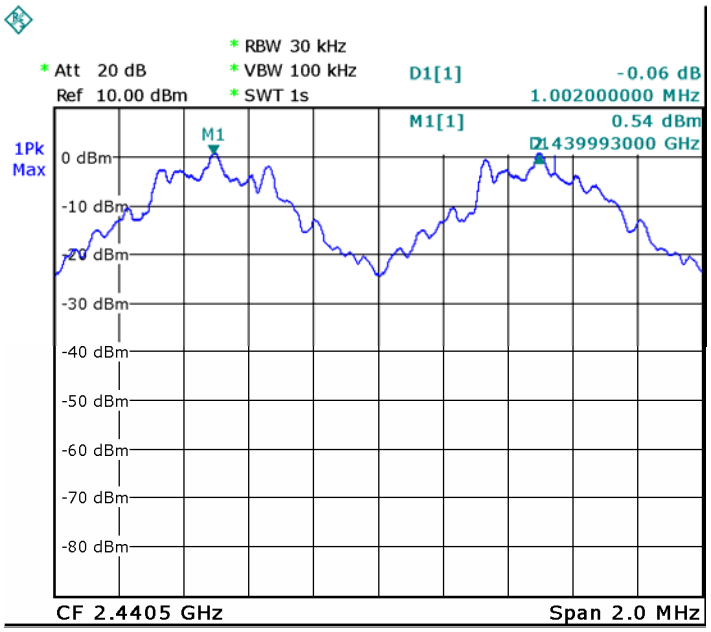
Test result plot as follows:

Low Channel:



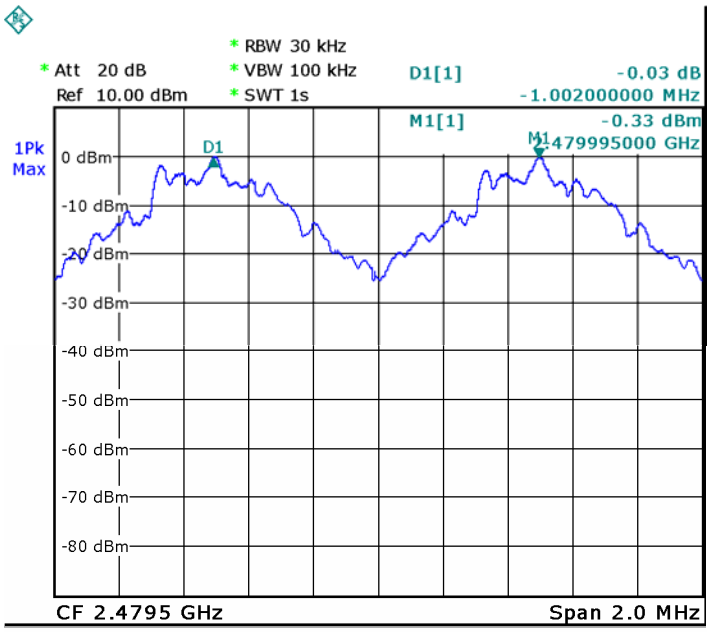
Date: 10.AUG.2012 15:17:46

Middle Channel



Date: 10.AUG.2012 15:27:47

High Channel



13 Number of Hopping Frequency

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	DA 00-705
Test Limit:	Regulation 15.247 (a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.
Test Mode:	Test in hopping transmitting operating mode.

13.1 Test Procedure:

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

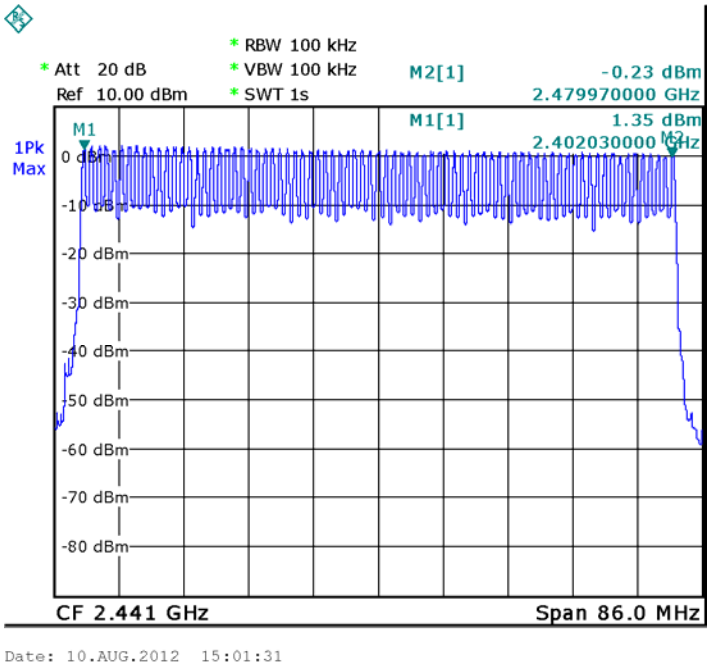
2. Set the spectrum analyzer: RBW = 100 kHz. VBW = 100 kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

3. Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.

4. Set the spectrum analyzer: Center Frequency = 2441MHz, Span = 86MHz. Submit the test result graph.

13.2 Test Result:

Total Channel is 79 Channels



14 Dwell Time

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	DA 00-705
Test Limit:	Regulation 15.247(a)(1)(iii) Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.
Test Mode:	Test in hopping transmitting operating mode.

14.1 Test Procedure:

1.Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2.Set spectrum analyzer span = 0. centered on a hopping channel;

3.Set RBW = 1MHz and VBW = 1MHz.Sweep = as necessary to capture the entire dwell time per hopping channel.

4.Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g.. data rate. modulation format. etc.). repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

14.2 Test Result:

Dwell time = Pulse wide x (Hopping rate / Number of channels) x Period

The test period: T= 0.4(s) * 79 = 31.6 (s)

DH5 Packet permit maximum 1600 / 79 / 6 hops per second in each channel (5 time slots RX, 1 time slot TX).

DH3 Packet permit maximum 1600 / 79 / 4 hops per second in each channel (3 time slots RX, 1 time slot TX).

DH1 Packet permit maximum 1600 / 79 /2 hops per second in each channel (1 time slot RX, 1 time slot TX). So,the Dwell Time can be calculated as follows:

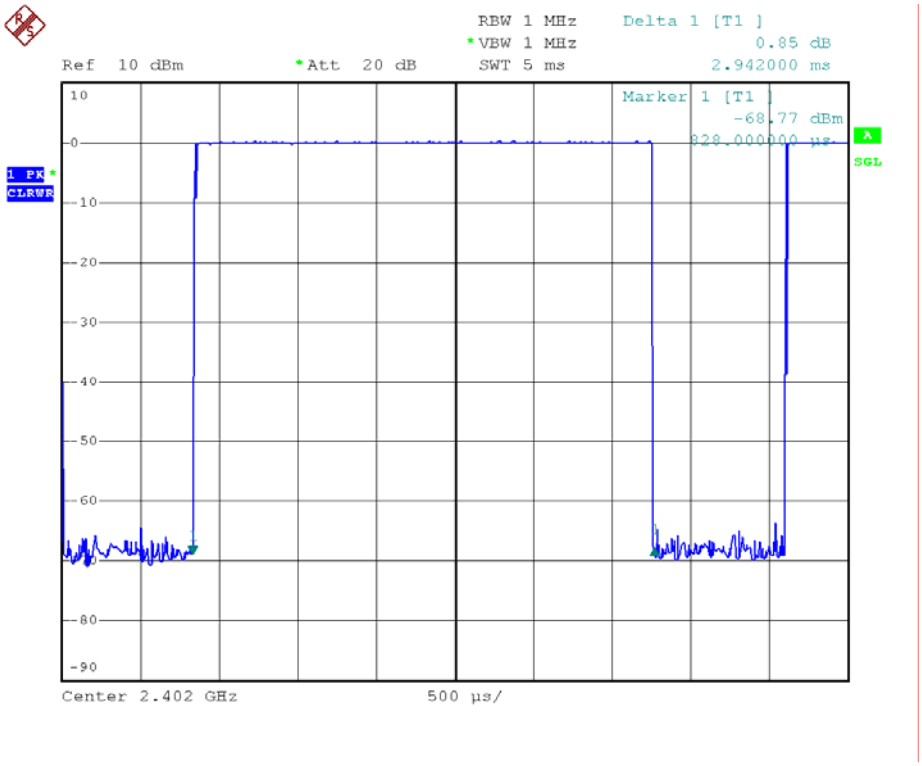
Data Packet	Dwell Time(s)
DH5	1600/79/6*31.6*(MkrDelta)/1000
DH3	1600/79/4*31.6*(MkrDelta)/1000
DH1	1600/79/2*31.6*(MkrDelta)/1000

Note : Mkr Delta is once pulse time .

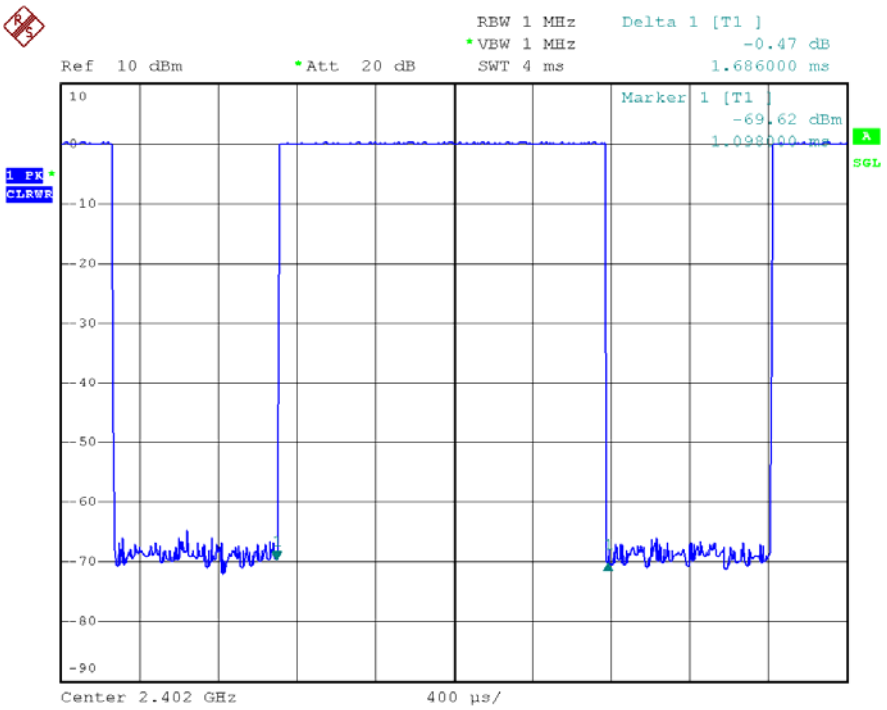
Low Channel: 2402MHz

Dwell time of each occupation in this channel as follows:

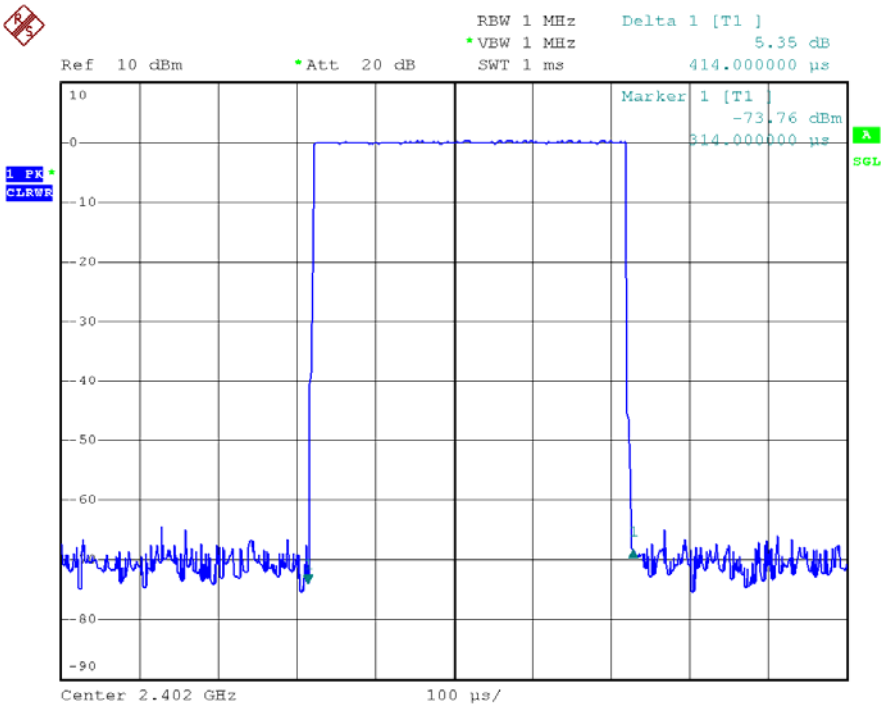
Data Packet	Frequency	Mkr Delta(ms)	Dwell Time(s)	Limits(s)	Result
DH5	2402 MHz	2.942	0.314	0.400	Pass
DH3	2402 MHz	1.686	0.270	0.400	Pass
DH1	2402 MHz	0.414	0.132	0.400	Pass



(DH5)



(DH3)

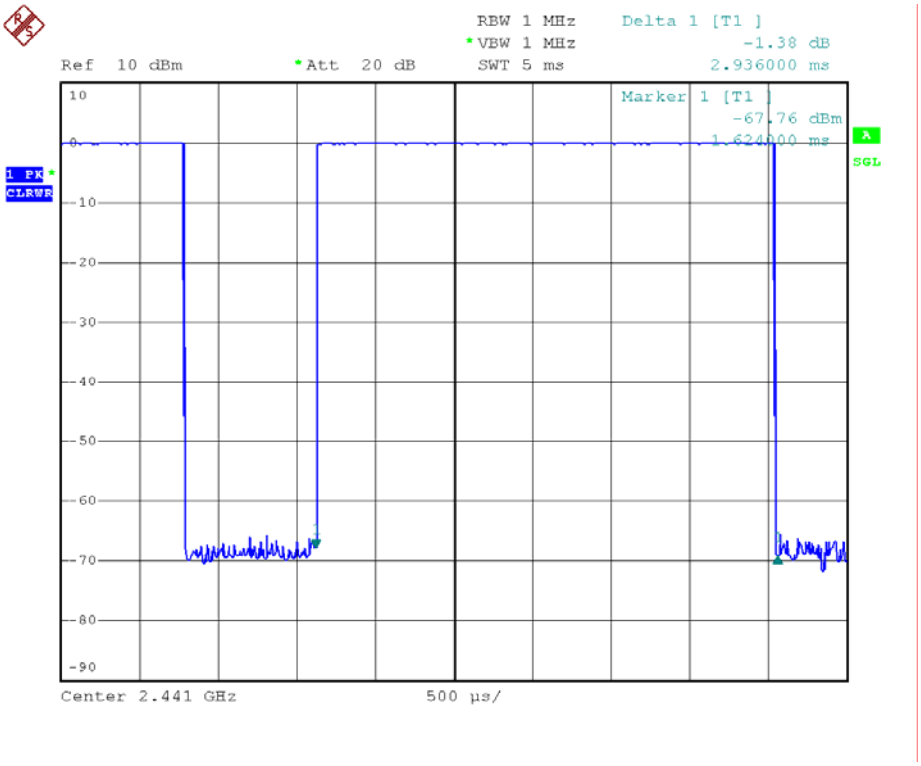


(DH1)

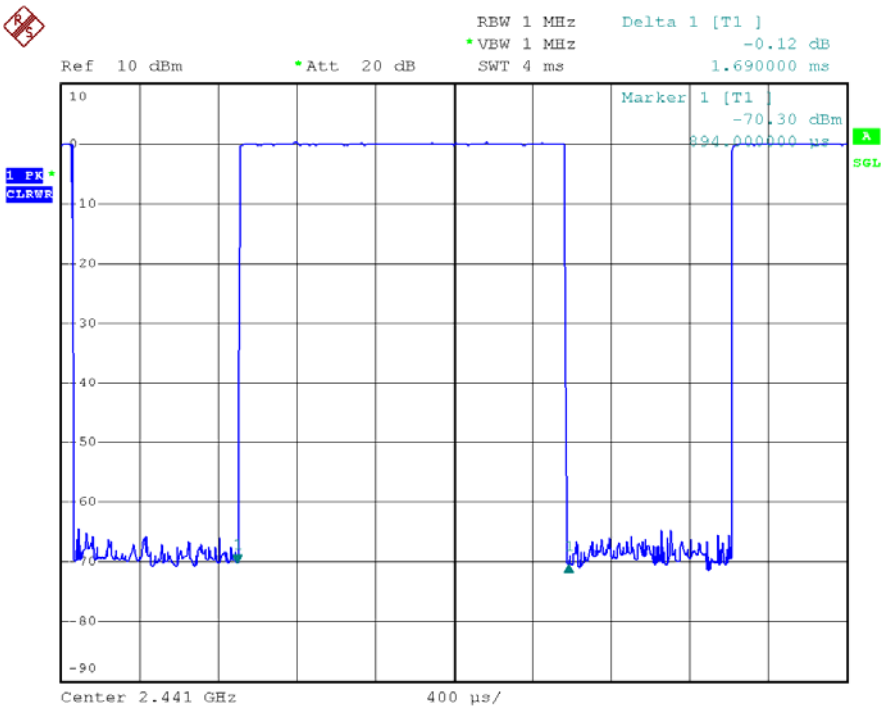
Middle Channel: 2441MHz

Dwell time of each occupation in this channel as follows:

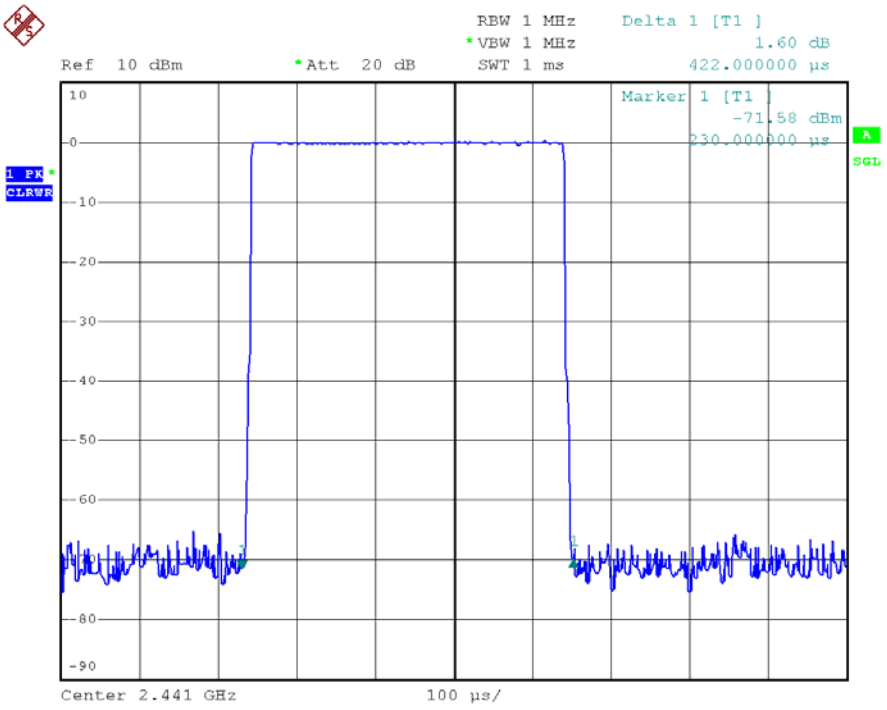
Data Packet	Frequency	Mkr Delta(ms)	Dwell Time(s)	Limits(s)	Result
DH5	2441 MHz	2.936	0.313	0.400	Pass
DH3	2441 MHz	1.690	0.270	0.400	Pass
DH1	2441 MHz	0.422	0.135	0.400	Pass



(DH5)



(DH3)

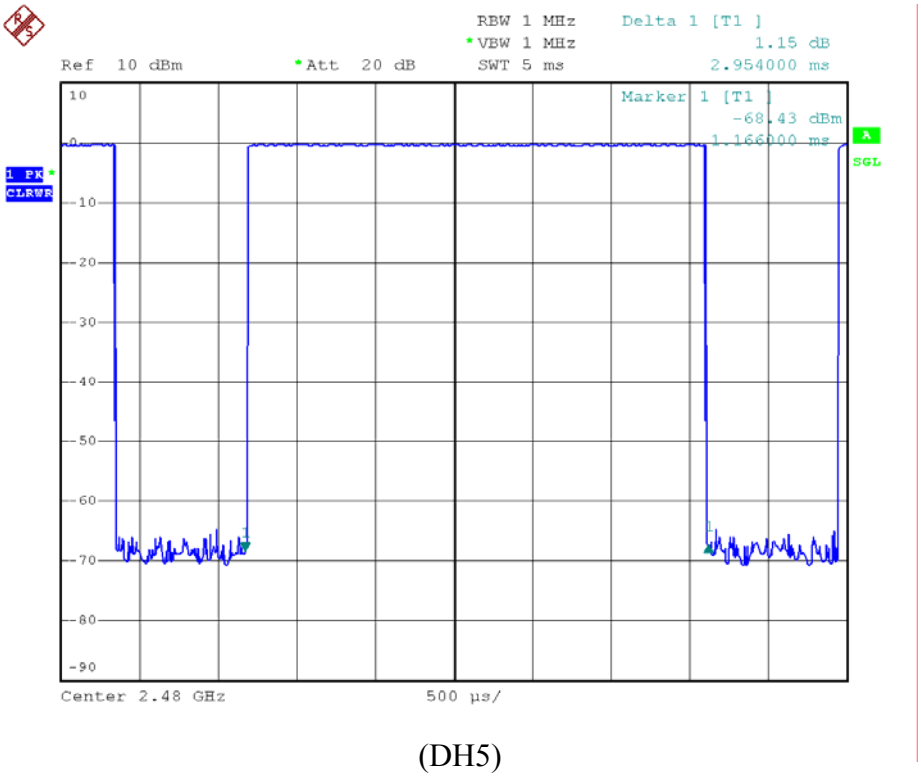


(DH1)

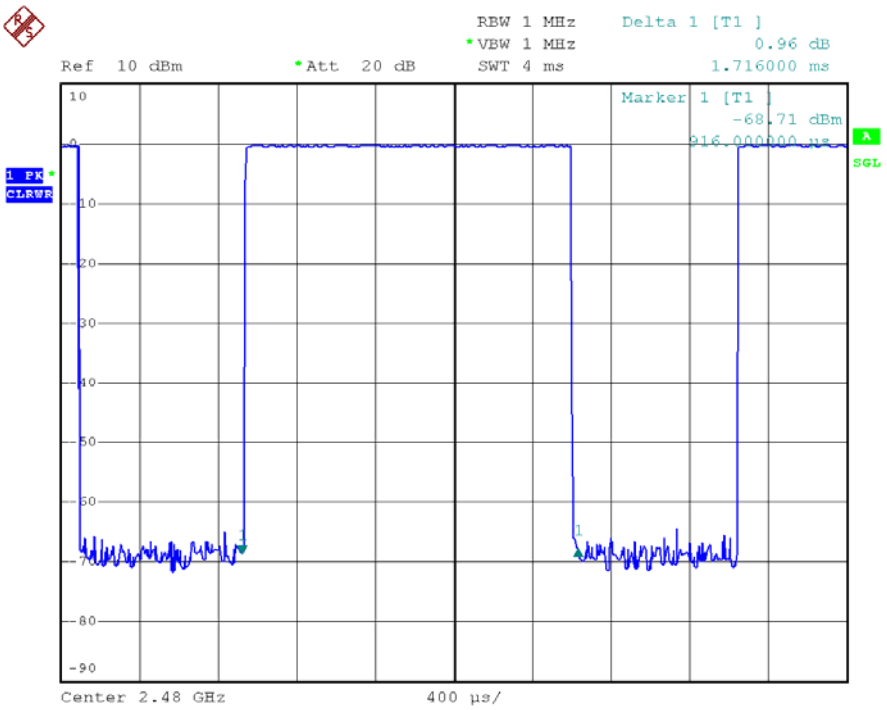
High Channel: 2480MHz

Dwell time of each occupation in this channel as follows:

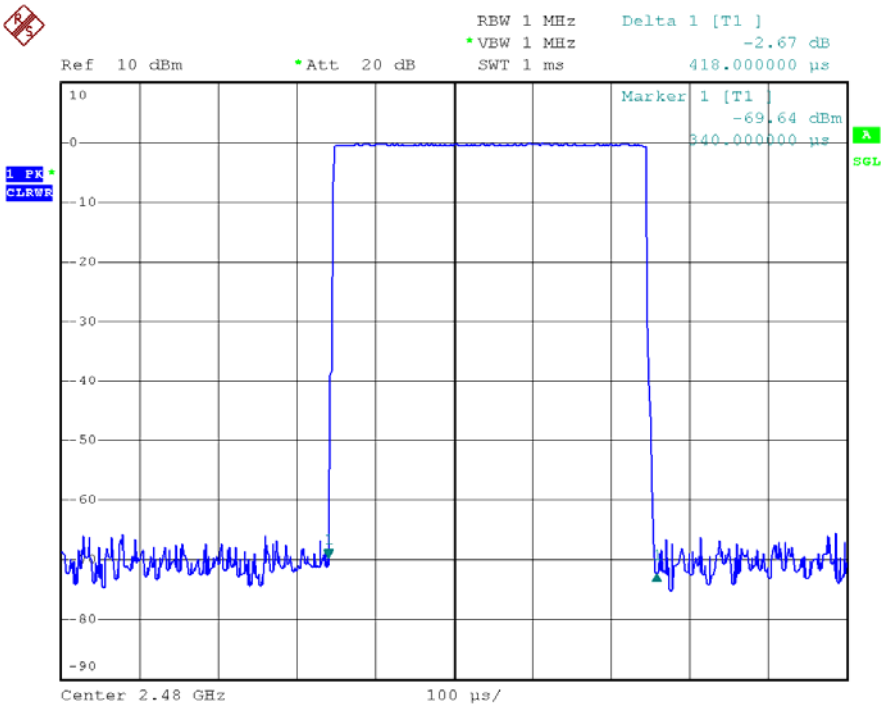
Data Packet	Frequency	Mkr Delta(ms)	Dwell Time(s)	Limits(s)	Result
DH5	2480 MHz	2.954	0.315	DH5	Pass
DH3	2480 MHz	1.716	0.275	DH3	Pass
DH1	2480 MHz	0.418	0.134	DH1	Pass



(DH5)


RBW 1 MHz
VBW 1 MHz
SWT 4 ms
Delta 1 [T1]
0.96 dB
1.716000 ms
Ref 10 dBm
Att 20 dB
Marker 1 [T1]
-68.71 dBm
916.000000 µs
1 PK
CLRWR
SGL
Center 2.48 GHz
400 µs/

(DH3)


RBW 1 MHz
VBW 1 MHz
SWT 1 ms
Delta 1 [T1]
-2.67 dB
418.000000 µs
Ref 10 dBm
Att 20 dB
Marker 1 [T1]
-69.64 dBm
340.000000 µs
1 PK
CLRWR
SGL
Center 2.48 GHz
100 µs/

(DH1)

15 Antenna Requirement

According to the FCC Part 15 Paragraph 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. This product has a permanent PCB antenna, fulfill the requirement of this section.

16 RF Exposure

16.1 Requiments:

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a portable device.

16.2 Measurement Result:

Antenna Gain (dBi)	Antenna Gain (numeric)	Conducted Power (dBm)	Conducted Power (mW)	Radiated Power (e.i.r.p) (mW)
-2.76	0.53	0.34	1.081	0.849
-2.76	0.53	0.32	1.076	0.846
-2.76	0.53	0.32	1.076	0.846

The EUT works on the 2.4G ISM band, and the max output power (conducted) of which is 1.081 mW lower than low threshold 60/f (GHz) mW (24.48mW), d < 2.5cm in general population category.

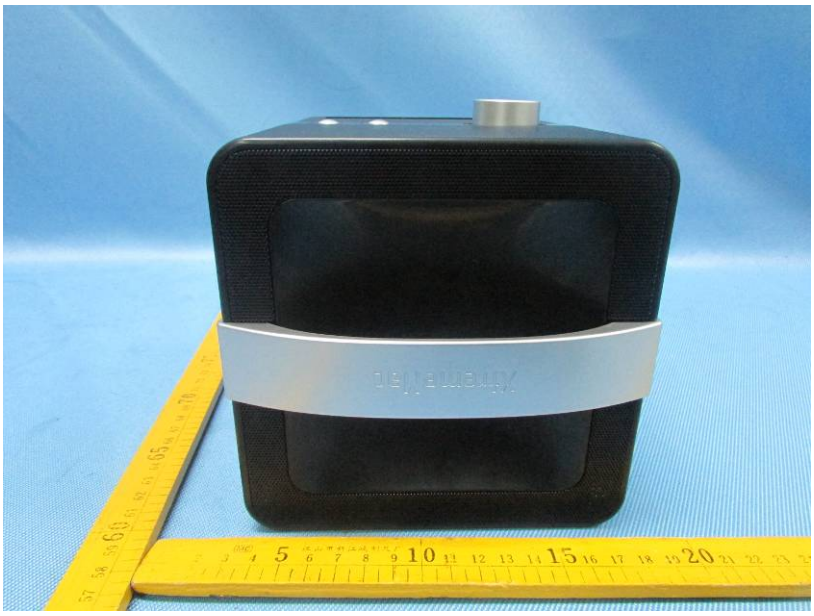
The SAR evaluation is not required.

17 Photographs - Constructional Details

17.1 EUT – Appearance View(1)

17.2 EUT – Appearance View(2)

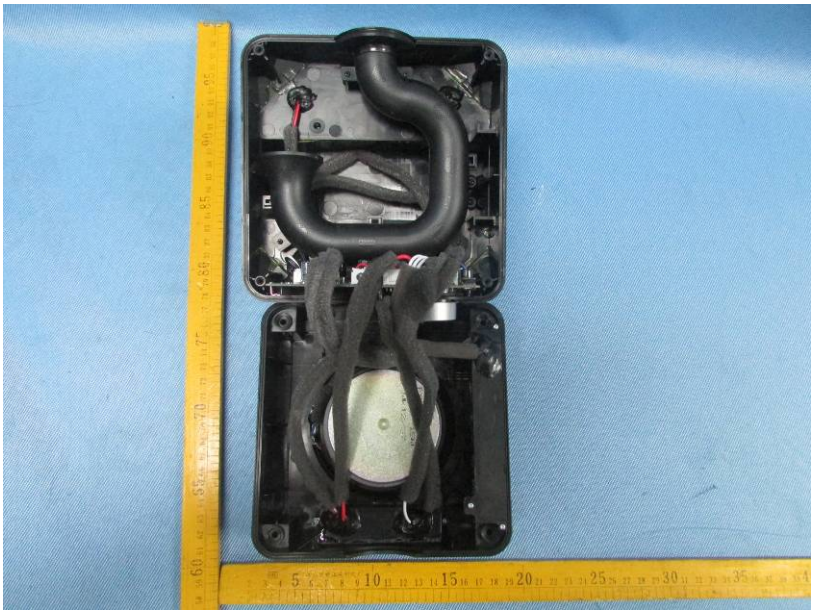
17.3 EUT – Appearance View(3)



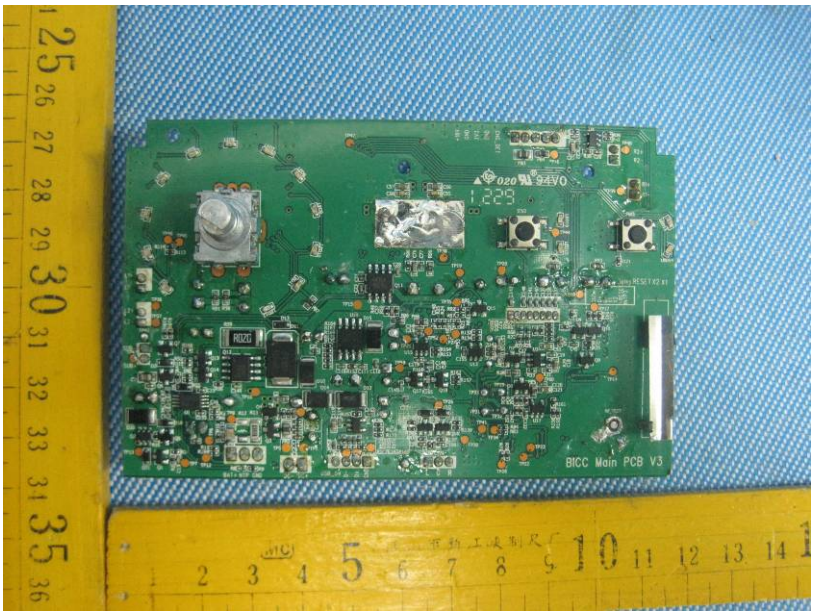
17.4 EUT – Appearance View(4)

17.5 EUT – Appearance View(4)

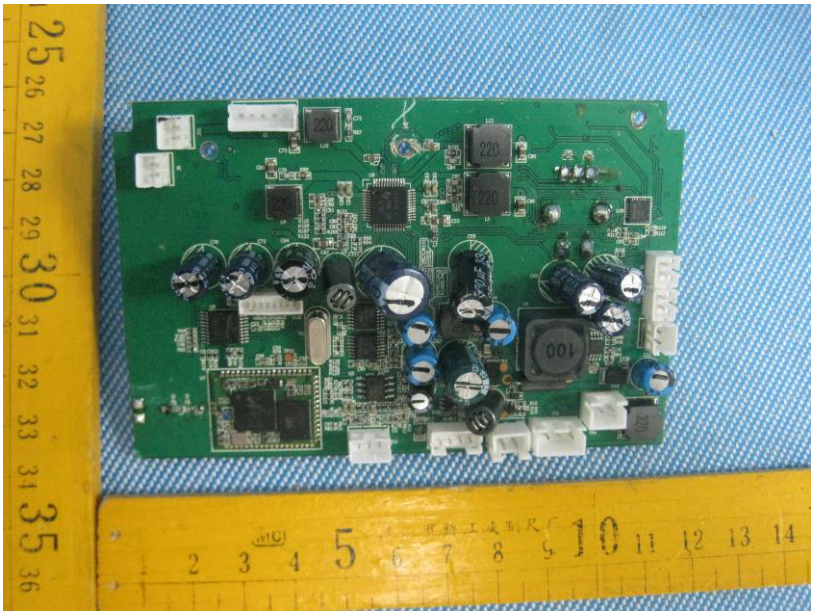
17.6 EUT – Open View



17.7 EUT – PCB(1) Front View

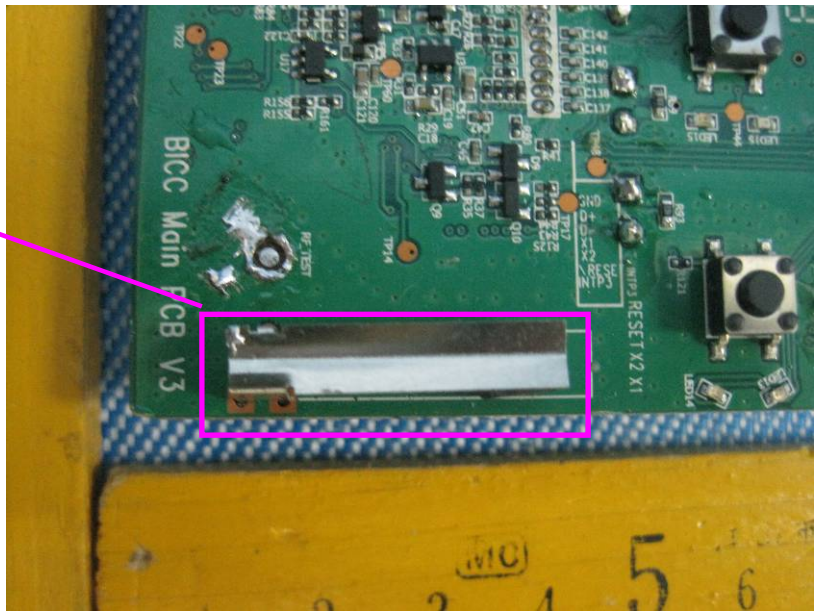


17.8 EUT –PCB(1) Back View

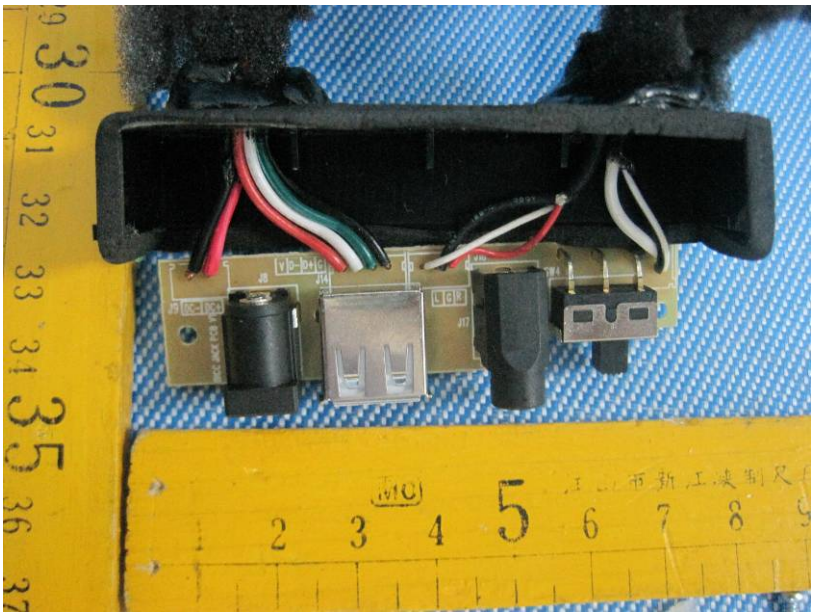


17.9 EUT –Antenna View

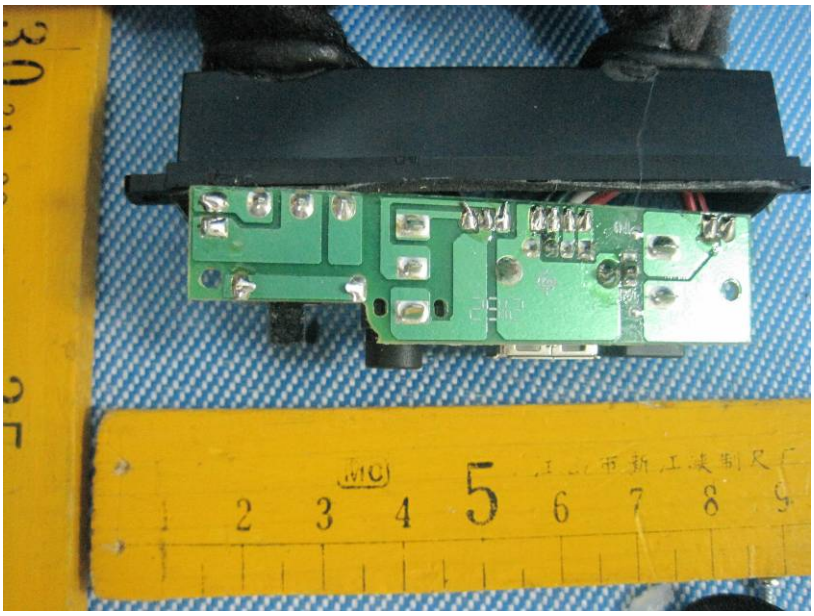
ANT.



17.10 EUT – PCB(2) Front View

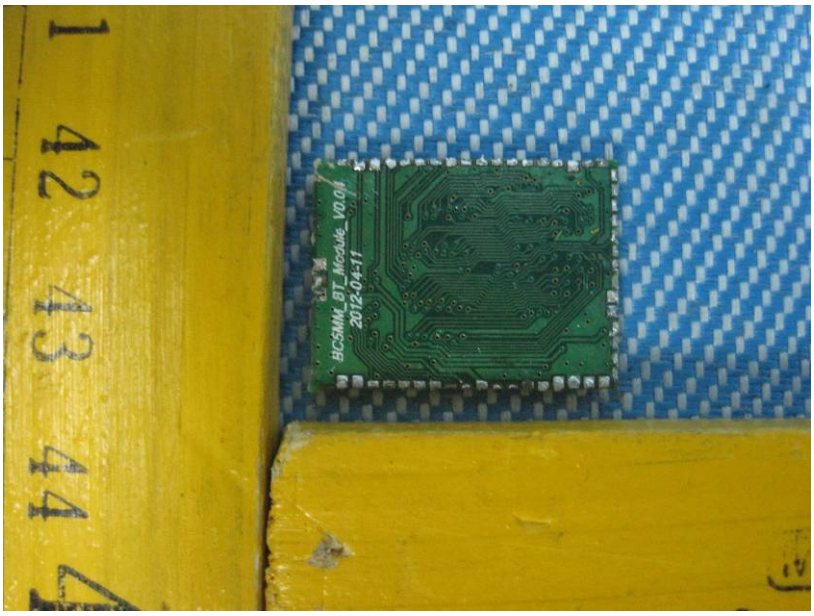


17.11 EUT –PCB(2) Back View



17.12 EUT – PCB(3) Front View

17.13 EUT –PCB(3) Back View



17.14 Adapter View

17.15 Adapter Label View

18 FCC Label

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:(1)this device may not cause harmful interference,and (2) this device must accept any interference received, including interference that may cause undesired operation.

The Label must not be a stick-on paper. The Label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Proposed Label Location on EUT

EUT Back View/ proposed FCC Label Location