

FCC TEST REPORT

for
Avanti Toys Inc.

Avanti Toys Bluetooth Series

Model No.: BTEL0275, BTMN0289, BTPL4809, BTEL0275M, BTMN0289M,
BTPL4809M, BTAV0275, BTAV0289, BTAV4809

Prepared for : Avanti Toys Inc.
Address : 4809 Pond Mill Way, Glen Allen, Virginia 23060, U.S.A

Prepared By : Shenzhen Anbotek Compliance Laboratory Limited
Address : 1/F., Building 1, SEC Industrial Park, No.0409 Qianhai Road,
Nanshan District, Shenzhen, Guangdong, China
Tel: (86) 755-26066544
Fax: (86) 755-26014772

Report Number : 201306902F
Date of Test : Jul. 01~ 19, 2013
Date of Report : Jul. 22, 2013

TABLE OF CONTENTS

Description

Page

Test Report

1. GENERAL INFORMATION	5
1.1. Description of Device (EUT).....	5
1.2. Auxiliary Equipment Used during Test.....	6
1.3. Description of Test Facility	6
1.4. Measurement Uncertainty.....	6
2. TEST PROCEDURE	7
3. CONDUCTED LIMITS	8
3.1. Block Diagram of Test Setup	8
3.2. Power Line Conducted Emission Measurement Limits (15.207).....	8
3.3. Configuration of EUT on Measurement	8
3.4. Operating Condition of EUT	9
3.5. Test Procedure	9
3.6. Power Line Conducted Emission Measurement Results	9
4. RADIATION INTERFERENCE.....	12
4.1. Requirements (15.247, 15.209):	12
4.2 Test Procedure	12
4.3 Test Results.....	12
5. CHANNEL SEPARATION TEST	16
5.1 Measurement Procedure	16
5.2 Test SET-UP	16
5.3 Test Equipment.....	16
5.4 Test Results.....	16
6. 20DB BANDWIDTH TEST	20
6.1 Measurement Procedure	20
6.2 Test SET-UP	20
6.3 Test Equipment.....	20
6.4 Test Results.....	20
7. QUANTITY OF HOPPING CHANNEL TEST.....	24
7.1 Measurement Procedure	24
7.2 Test SET-UP	24
7.3 Test Equipment.....	24
7.4 Test Results.....	24
8. DWELL TIME TEST	26
8.1 Measurement Procedure	26
8.2 Test SET-UP	26
8.3 Test Equipment.....	26
8.4 Test Results.....	26
9. MAXIMUM PEAK OUTPUT POWER TEST	29
9.1 Measurement Procedure	29

9.2 Test SET-UP	29
9.3 Test Equipment.....	29
9.4 Test Results.....	30
10. BAND EDGE TEST.....	34
10.1 Measurement Procedure	34
10.2 Test SET-UP	34
10.3 Test Equipment.....	34
10.4 Test Results.....	34
11. ANTENNA APPLICATION	36
11.1 Antenna requirement	36
11.2 Result.....	36
12. PHOTOGRAPH.....	37
12.1. Photo of Power Line Conducted Emission Measurement	37
12.2. Photo of Radiation Emission Test	37

APPENDIX I (External Photos) (1 Pages)

APPENDIX II(Internal Photos) (2 Pages)

TEST REPORT

Applicant : Avanti Toys Inc.
Manufacturer : Avanti Toys Inc.
EUT : Avanti Toys Bluetooth Series
Model No. : BTEL0275, BTMN0289, BTPL4809, BTEL0275M, BTMN0289M,
BTPL4809M, BTAV0275, BTAV0289, BTAV4809
Serial No. : N/A
Bluetooth Version : Bluetooth V3.0+EDR
Rating : DC 3.7V, 300mA Battery or DC 5V Via USB Port
Trade Mark : N/A

Measurement Procedure Used:

FCC Part15 Subpart C, Paragraph 15.207, 15.247 & 15.209

The device described above is tested by Shenzhen Anbotek Compliance Laboratory Limited to determine the maximum emission levels emanating from the device and the severe levels of the device can endure and its performance criterion. The measurement results are contained in this test report and Shenzhen Anbotek Compliance Laboratory Limited is assumed full of responsibility for the accuracy and completeness of these measurements. Also, this report shows that the EUT (Equipment Under Test) is technically compliant with the FCC Part 15 Subpart C requirements.

This report applies to above tested sample only and shall not be reproduced in part without written approval of Shenzhen Anbotek Compliance Laboratory Limited.

Date of Test : Jul. 01~ 19, 2013

Prepared by :



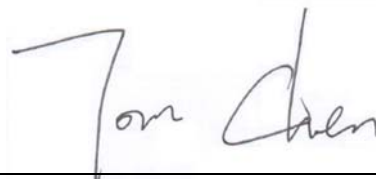
(Tested Engineer / Rock Zeng)

Reviewer :



(Project Manager / Sally Zhang)

Approved & Authorized Signer :



(Manager / Tom Chen)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	: Avanti Toys Bluetooth Series
Model Number	: BTEL0275, BTMN0289, BTPL4809, BTEL0275M, BTMN0289M, BTPL4809M, BTAV0275, BTAV0289, BTAV4809 (Note: The above samples are same except the model number, so we prepare “BTEL0275” for FCC test only.)
Test Power Supply	: AC 120V/60Hz with DC 3.7V battery inside
Frequency	: 2402~2480MHz
Antenna Specification	: Printed Antenna:0dBi
Modulation	: GFSK, $\pi/4$ DQPSK, 8DPSK
Applicant Address	: Avanti Toys Inc. 4809 Pond Mill Way, Glen Allen, Virginia 23060, U.S.A
Manufacturer Address	: Avanti Toys Inc. Section 2, Guanghua Rd., Electromechanical Industrial Park, Huaying Industrial Zone, Guang'an City, Sichuan Province, China
Factory Address	: B&W ELECTRONICS DEVELOPMENT LIMITED 4/F, No. 2 Building, Guangxi Industrial Park, West of Jianshe Road, Longhua Town, Shenzhen, P.R. China
Date of receiver	: Jul. 01, 2013
Date of Test	: Jul. 01~ 19, 2013
Remark	: The Bluetooth host will be placed into plush toys whose schematics are the same except the appearance and style of toys.

1.2. Auxiliary Equipment Used during Test

Adapter : Model: CW0502000
Input: 100-240V~, 50-60Hz, 0.4A Max
Output: DC 5V

1.3. Description of Test Facility

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

CNAS - LAB Code: L3503

Shenzhen Anbotek Compliance Laboratory Limited., Laboratory has been assessed and in compliance with CNAS/CL01: 2006 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of Testing Laboratories.

FCC-Registration No.: 752021

Shenzhen Anbotek Compliance Laboratory Limited, 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 752021, July 10, 2013.

IC-Registration No.: 8058A-1

Shenzhen Anbotek Compliance Laboratory Limited., EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration 8058A-1, February 22, 2013.

Test Location

All Emissions tests were performed at
Shenzhen Anbotek Compliance Laboratory Limited. at 1/F., Building 1, SEC
Industrial Park, No.0409 Qianhai Road, Nanshan District, Shenzhen, Guangdong,
China

1.4. Measurement Uncertainty

Radiation Uncertainty : Ur = 4.3dB
Conduction Uncertainty : Uc = 3.4dB

2. Test Procedure

GENERAL: This report shall NOT be reproduced except in full without the written approval of Shenzhen Anbotek Compliance Laboratory Limited. The EUT was transmitting a test signal during the testing.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-2009 using a spectrum analyzer with a pre-selector. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100KHz and the video bandwidth was 300KHz up to 1.0GHz and 1.0MHz with a video BW of 3.0MHz above 1.0GHz. The ambient temperature of the EUT was 74.3oF with a humidity of 69%.

FORMULA OF CONVERSION FACTORS: The Field Strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the Preselector was accounted for in the Spectrum Analyzer Meter Reading.

Example:

Freq (MHz) METER READING + ACF = FS
20 dBuV + 10.36 dB = 30.36 dBuV/m @ 3m

ANSI STANDARD C63.4-2009 10.1.7 MEASUREMENT PROCEDURES: The EUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The EUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes.

3. Conducted Limits

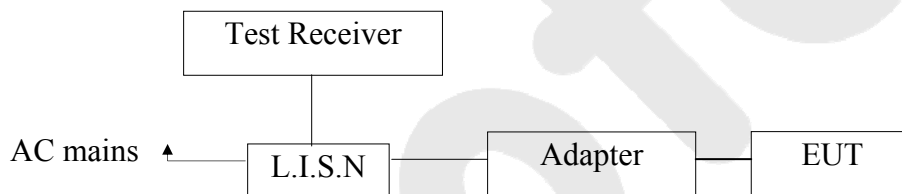
Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	Two-Line V-network	Rohde & Schwarz	ENV216	10055	Apr. 23, 2013	1 Year
2.	EMI Test Receiver	Rohde & Schwarz	ESCI	100627	Apr. 23, 2013	1 Year
3.	RF Switching Unit	Compliance Direction	RSU-M2	38303	Apr. 23, 2013	1 Year

Conduction Uncertainty : $U_c = 3.4\text{dB}$

3.1. Block Diagram of Test Setup

3.1.1. Block diagram of connection between the EUT and simulators



(EUT: Avanti Toys Bluetooth Series)

3.2. Power Line Conducted Emission Measurement Limits (15.207)

Frequency MHz	Limits dB(μV)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66 ~ 56*	56 ~ 46*
0.50 ~ 5.00	56	46
5.00 ~ 30.00	60	50

Notes: 1. *Decreasing linearly with logarithm of frequency.
2. The lower limit shall apply at the transition frequencies.

3.3. Configuration of EUT on Measurement

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner which tends to maximize its emission characteristics in a normal application.

EUT : Avanti Toys Bluetooth Series
Model Number : BTEL0275
Applicant : Avanti Toys Inc.

3.4. Operating Condition of EUT

- 3.4.1. Setup the EUT and simulator as shown as Section 3.1.
- 3.4.2. Turn on the power of all equipment.
- 3.4.3. Let the EUT work in test mode (Charging) and measure it.

3.5. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC ANSI C63.4-2003 on Conducted Emission Measurement.

The bandwidth of test receiver (ESCI) set at 9KHz.

The frequency range from 150KHz to 30MHz is checked.

The test results are reported on Section 3.6.

3.6. Power Line Conducted Emission Measurement Results

PASS.

The frequency range from 150KHz to 30 MHz is investigated.

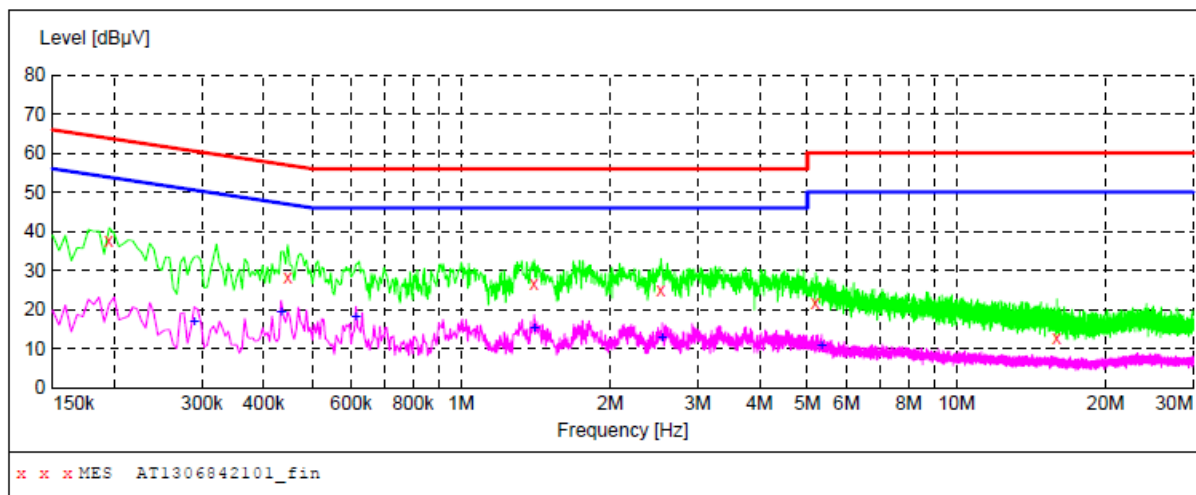
Please refer the following pages.

CONDUCTED EMISSION TEST DATA

EUT: Avanti Toys Bluetooth Series M/N: BTEL0275
Operating Condition: Charging
Test Site: 1# Shielded Room
Operator: Finley Li
Test Specification: AC 120V/60Hz
Comment: Live Line
Tem:25°C Hum:50%

SCAN TABLE: "Voltage(150K~30M)FIN"

Short Description: 150K-30M Disturbance Voltages



MEASUREMENT RESULT: "AT1306842101_fin"

7/1/2013 2:13PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.195000	37.50	20.1	64	26.3	QP	L1	GND
0.447000	28.30	20.1	57	28.6	QP	L1	GND
1.405500	26.40	20.2	56	29.6	QP	L1	GND
2.530500	24.90	20.4	56	31.1	QP	L1	GND
5.194500	21.80	20.5	60	38.2	QP	L1	GND
15.936000	12.90	20.7	60	47.1	QP	L1	GND

MEASUREMENT RESULT: "AT1306842101_fin2"

7/1/2013 2:13PM

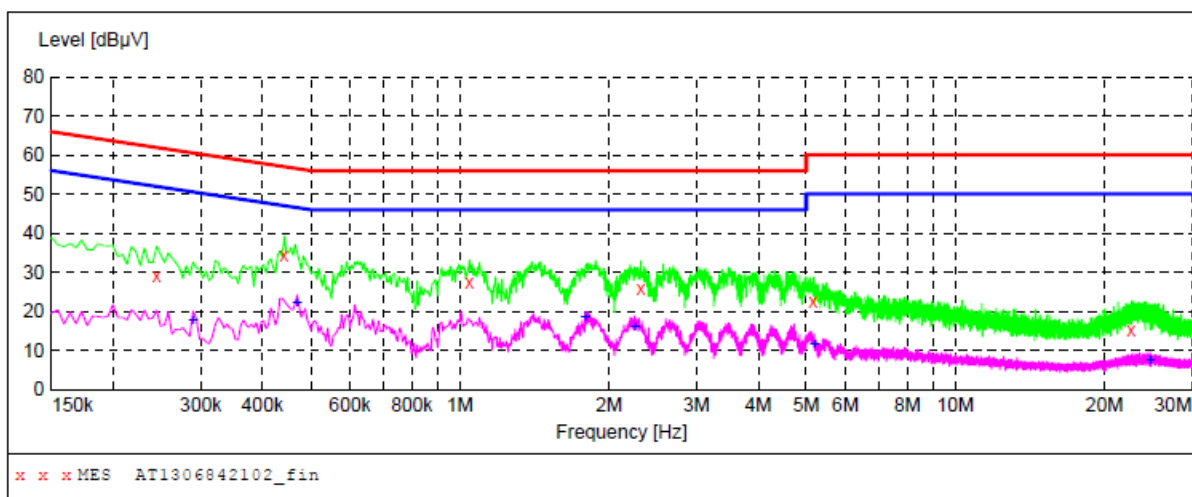
Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.289500	16.90	20.1	51	33.6	AV	L1	GND
0.433500	19.20	20.1	47	28.0	AV	L1	GND
0.613500	18.20	20.1	46	27.8	AV	L1	GND
1.405500	15.20	20.2	46	30.8	AV	L1	GND
2.544000	12.90	20.4	46	33.1	AV	L1	GND
5.334000	10.70	20.5	50	39.3	AV	L1	GND

CONDUCTED EMISSION TEST DATA

EUT: Avanti Toys Bluetooth Series M/N: BTEL0275
Operating Condition: Charging
Test Site: 1# Shielded Room
Operator: Finley Li
Test Specification: AC 120V/60Hz
Comment: Neutral Line
Tem:25°C Hum:50%

SCAN TABLE: "Voltage (150K~30M) FIN"

Short Description: 150K-30M Disturbance Voltages



MEASUREMENT RESULT: "AT1306842102_fin"

7/1/2013 2:16PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.244500	29.00	20.1	62	32.9	QP	N	GND
0.442500	34.40	20.1	57	22.6	QP	N	GND
1.045500	27.40	20.2	56	28.6	QP	N	GND
2.319000	25.70	20.3	56	30.3	QP	N	GND
5.167500	22.70	20.5	60	37.3	QP	N	GND
22.659000	15.30	20.8	60	44.7	QP	N	GND

MEASUREMENT RESULT: "AT1306842102_fin2"

7/1/2013 2:16PM

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line	PE
0.289500	17.50	20.1	51	33.0	AV	N	GND
0.469500	22.20	20.1	47	24.3	AV	N	GND
1.792500	18.50	20.3	46	27.5	AV	N	GND
2.251500	16.10	20.3	46	29.9	AV	N	GND
5.194500	11.70	20.5	50	38.3	AV	N	GND
24.702000	7.30	20.9	50	42.7	AV	N	GND

4. Radiation Interference

4.1. Requirements (15.247, 15.209):

FIELD STRENGTH of Fundamental: @3M 902-928 MHz 2.4-2.4835 GHz 94 dBμV/m @3m	FIELD STRENGTH of Harmonics 54 dBμV/m @3m	S15.209 30 - 88 MHz 88 - 216 MHz 216 - 960 MHz ABOVE 960 MHz	40 dBuV/m 43.5 46 54dBuV/m
--	---	--	---

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 15.209, whichever is the lesser attenuation.

4.2 Test Procedure

The EUT is placed on a turn table which is 0.8 meter high above the ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The EUT is set 3 meters away from the receiving antenna which is mounted on a antenna tower. The antenna can be moved up and down from 1 to 4 meters to find out the maximum emission level. Both horizontal and vertical polarization of the antenna are set on test.

All readings from 30MHz to 1GHz are quasi-peak values with a resolution bandwidth of 120kHz. All reading are above 1GHz, peak & average values with a resolution bandwidth of 1MHz. The EUT is tested in 9*6*6 Chamber.

The test results are listed in Section 4.3.

Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESCI	101604	Apr. 23, 2013	1 Year
2.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 23, 2013	1 Year
3.	Pre-amplifier	SONOMA	310N	186860	Apr. 23, 2013	1 Year

Radiation Uncertainty : Ur = 4.3dB

4.3 Test Results

PASS.

Please refer the following pages.

Data:

Horizontal CH Low (2402MHz)								
Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dBμV	Level dBμV/m	Limit dBμV/m	Over Limit dB	Remark
374.22	1.58	13.50	38.90	57.54	33.72	46.00	-12.28	QP
2402.00	2.17	31.21	35.30	86.29	84.37	114.0	-29.63	Peak
2402.00	2.17	31.21	35.30	84.74	82.82	94.0	-11.18	AV
4804.04	2.56	34.01	34.71	45.19	47.05	74.0	-26.95	Peak
4804.04	2.56	34.01	34.71	38.22	40.08	54.0	-13.92	AV
7207.98	2.98	36.16	35.15	41.22	45.21	74.0	-28.79	Peak
7207.98	2.98	36.16	35.15	28.94	32.93	54.0	-21.07	AV
9608.00	---	---	---	---	---	---	---	---
12010.00	---	---	---	---	---	---	---	---
14412.00	---	---	---	---	---	---	---	---
16814.00	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---

Vertical CH Low (2402MHz)								
Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dBμV	Level dBμV/m	Limit dBμV/m	Over Limit dB	Remark
77.25	1.43	12.13	38.45	53.91	29.02	40.00	-10.98	QP
2402.00	2.17	31.21	35.30	86.07	84.15	114.0	-29.85	Peak
2402.00	2.17	31.21	35.30	81.21	79.29	94.0	-14.71	AV
4804.10	2.56	34.01	34.71	47.45	49.31	74.0	-24.69	Peak
4804.10	2.56	34.01	34.71	38.22	40.08	54.0	-13.92	AV
7207.93	2.98	36.16	35.15	48.12	52.11	74.0	-21.89	Peak
7207.93	2.98	36.16	35.15	35.96	39.95	54.0	-14.05	AV
9608.00	---	---	---	---	---	---	---	---
12010.00	---	---	---	---	---	---	---	---
14412.00	---	---	---	---	---	---	---	---
16814.00	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---

Horizontal CH Middle (2441MHz)								
Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dBμV	Level dBμV/m	Limit dBμV/m	Over Limit dB	Remark
295.11	1.60	13.52	38.82	56.25	32.55	46.00	-13.45	QP
2441.00	2.19	31.22	34.60	85.33	84.14	114.0	-29.86	Peak
2441.00	2.19	31.22	34.60	79.67	78.48	94.0	-15.52	AV
4882.08	2.57	35.00	34.58	46.51	49.5	74.0	-24.5	Peak
4882.08	2.57	35.00	34.58	37.09	40.08	54.0	-13.92	AV
7323.05	3.00	36.17	35.14	44.76	48.79	74.0	-25.21	Peak
7323.05	3.00	36.17	35.14	34.86	38.89	54.0	-15.11	AV
9764.00	---	---	---	---	---	---	---	---
12205.00	---	---	---	---	---	---	---	---
14646.00	---	---	---	---	---	---	---	---
17087.00	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---

Vertical CH Middle (2441MHz)								
Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dBμV	Level dBμV/m	Limit dBμV/m	Over Limit dB	Remark
138.41	1.50	13.40	38.89	53.09	29.10	43.50	-14.40	QP
2441.01	2.19	31.22	34.60	84.37	83.18	114.0	-30.82	Peak
2441.01	2.19	31.22	34.60	77.65	76.46	94.0	-17.54	AV
4882.11	2.57	35.00	34.58	49.12	52.11	74.0	-21.89	Peak
4882.11	2.57	35.00	34.58	35.07	38.06	54.0	-15.94	AV
7323.02	3.00	36.17	35.14	45.96	49.99	74.0	-24.01	Peak
7323.02	3.00	36.17	35.14	38.44	42.47	54.0	-11.53	AV
9764.00	---	---	---	---	---	---	---	---
12205.00	---	---	---	---	---	---	---	---
14646.00	---	---	---	---	---	---	---	---
17087.00	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---

Horizontal CH High (2480MHz)								
Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dBμV	Level dBμV/m	Limit dBμV/m	Over Limit dB	Remark
405.76	1.60	13.52	38.82	57.05	33.35	46.00	-12.65	QP
2480.00	2.20	31.65	36.00	97.12	94.97	114.0	-19.03	Peak
2480.00	2.20	31.65	36.00	83.51	81.36	94.0	-12.64	AV
4960.05	2.58	35.06	34.79	49.59	52.44	74.0	-21.56	Peak
4960.05	2.58	35.06	34.79	37.66	40.51	54.0	-13.49	AV
7439.99	3.02	36.19	34.90	46.72	51.03	74.0	-22.97	Peak
7439.99	3.02	36.20	35.20	37.35	41.37	54.0	-12.63	AV
9920.00	---	---	---	---	---	---	---	---
12400.00	---	---	---	---	---	---	---	---
14880.00	---	---	---	---	---	---	---	---
17360.00	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---

Vertical CH High (2480MHz)								
Frequency MHz	Cable Loss dB	Ant Factor dB/m	Preamp Factor dB	Read Level dBμV	Level dBμV/m	Limit dBμV/m	Over Limit dB	Remark
319.88	1.62	13.54	38.45	53.77	30.48	46.00	-15.52	QP
2480.00	2.20	31.65	36.00	85.19	83.04	114.0	-30.96	Peak
2480.00	2.20	31.65	36.00	78.65	76.50	94.0	-17.50	AV
4960.10	2.58	35.06	34.79	40.23	43.08	74.0	-30.92	Peak
4960.10	2.58	35.06	34.79	38.58	41.43	54.0	-12.57	AV
7439.96	3.02	36.19	34.90	47.12	51.43	74.0	-22.57	Peak
7439.96	3.02	36.20	35.20	36.70	40.72	54.0	-13.28	AV
9920.00	---	---	---	---	---	---	---	---
12400.00	---	---	---	---	---	---	---	---
14880.00	---	---	---	---	---	---	---	---
17360.00	---	---	---	---	---	---	---	---
---	---	---	---	---	---	---	---	---

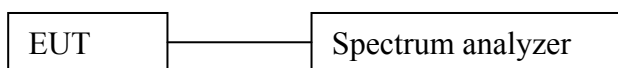
**NOTE: “ --- ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
The results of different modulations are the same.**

4. CHANNEL SEPARATION TEST

5.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

5.2 Test SET-UP



5.3 Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESCI	101604	Apr. 23, 2013	1 Year
2.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 23, 2013	1 Year
3.	Pre-amplifier	SONOMA	310N	186860	Apr. 23, 2013	1 Year
4.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

5.4 Test Results

Product : Avanti Toys Bluetooth Series Test Mode : CH Low ~ CH High
Test Item : Frequency Separation Temperature : 24°C
Test Voltage : DC 3.7V Humidity : 55%RH
Test Result : PASS

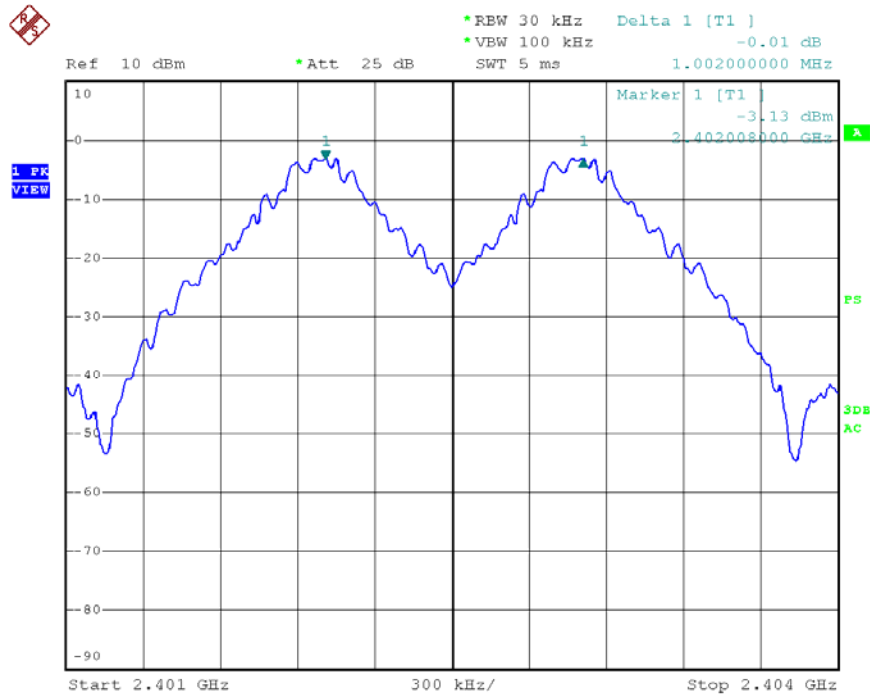
Channel	Frequency (MHz)	Separation Read Value (kHz)	Limit (kHz)	Modulation Mode
Low	2401	1002	960	GFSK
Mid	2441	1002	966	GFSK
High	2480	1008	966	GFSK
Low	2401	996	900	π /4DQPSK
Mid	2441	1002	912	π /4DQPSK
High	2480	1002	912	π /4DQPSK
Low	2401	996	900	8DPSK
Mid	2441	1002	912	8DPSK
High	2480	1002	912	8DPSK

Remark:

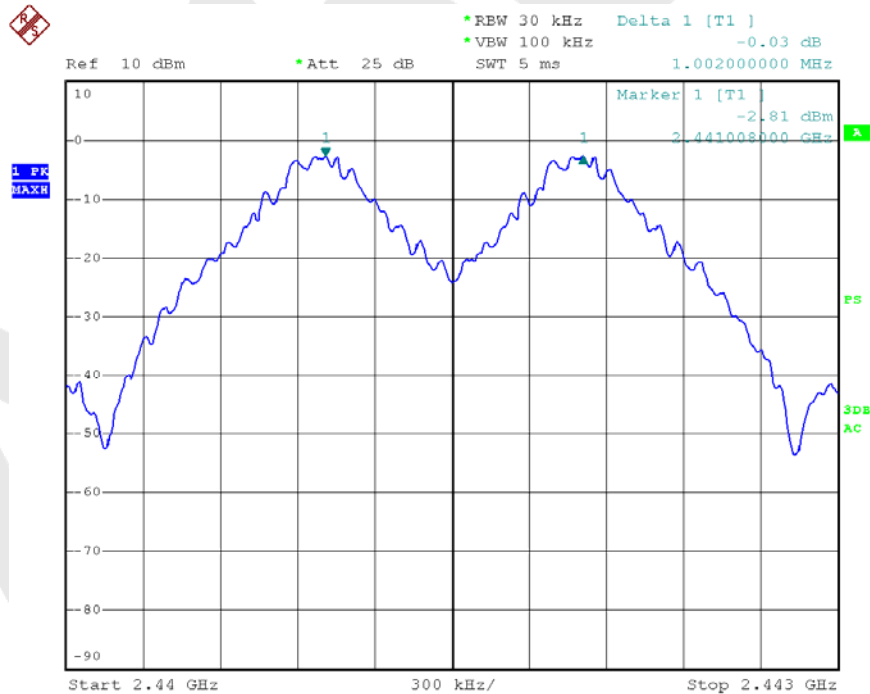
1. The limit of modulation (π /4DQPSK, 8DPSK) is 2/3 of 20dB BW;

Modulation Mode: GFSK

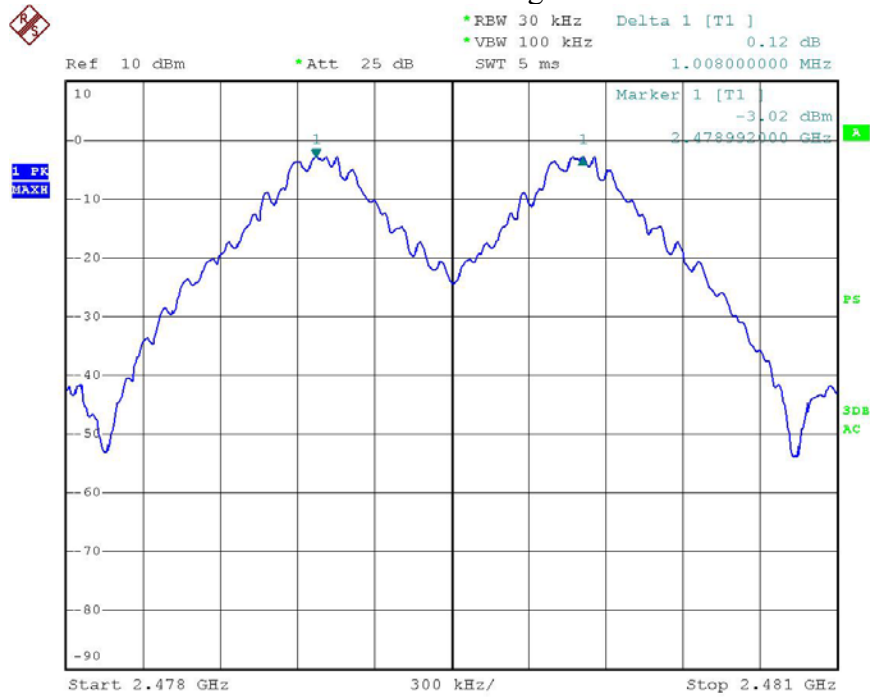
CH Low



CH Mid

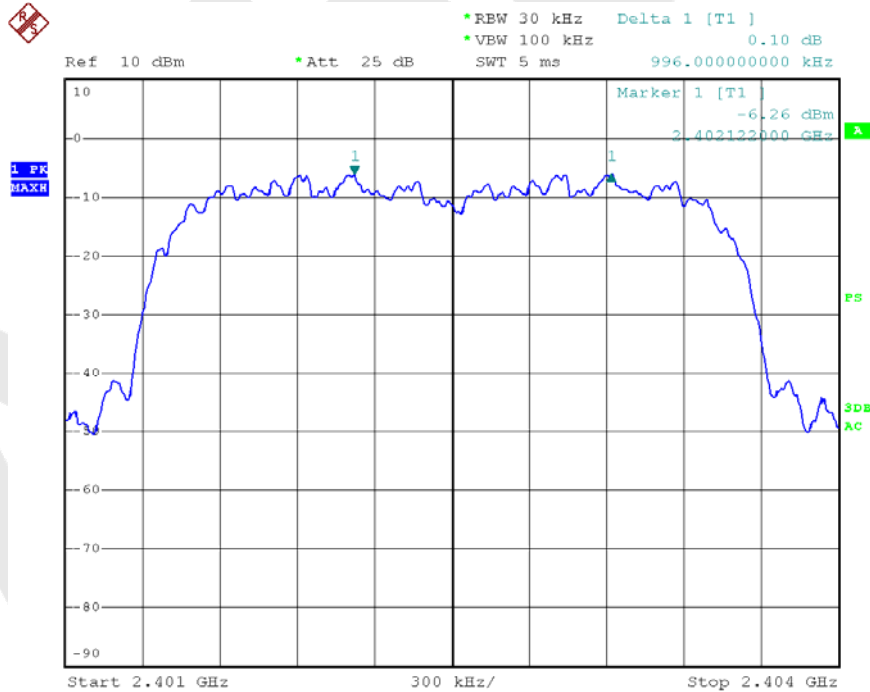


CH High

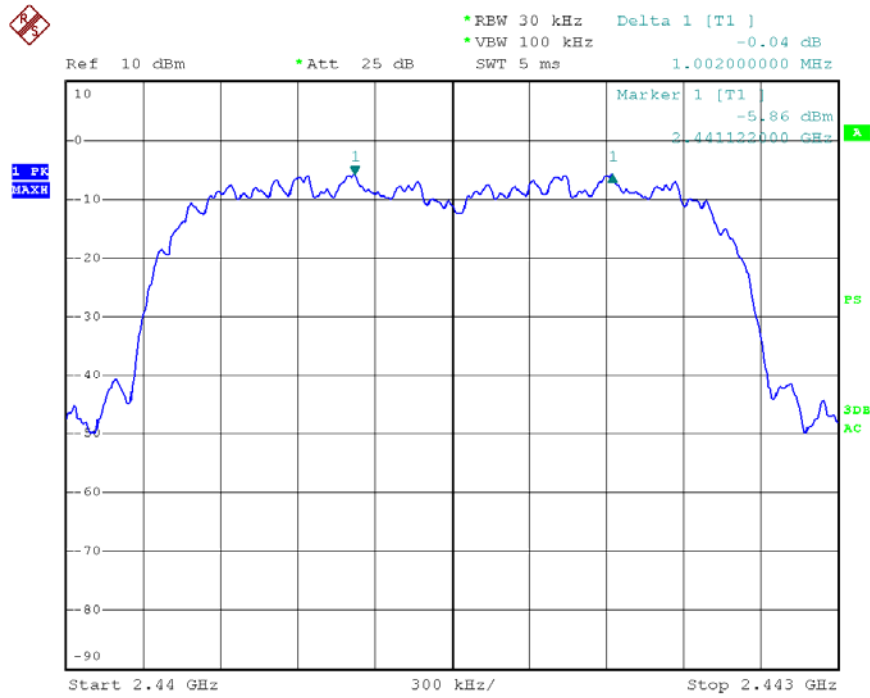


Modulation Mode: $\pi/4$ DQPSK & 8DPSK

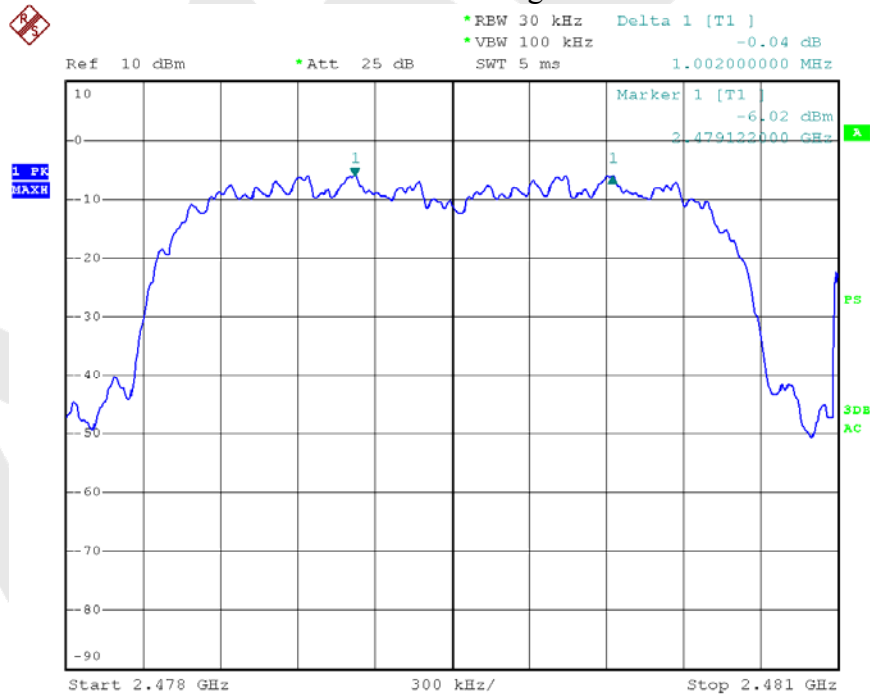
CH Low



CH Mid



CH High

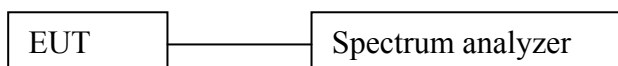


5. 20DB BANDWIDTH TEST

6.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

6.2 Test SET-UP



6.3 Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESCI	101604	Apr. 23, 2013	1 Year
2.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 23, 2013	1 Year
3.	Pre-amplifier	SONOMA	310N	186860	Apr. 23, 2013	1 Year
4.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

6.4 Test Results

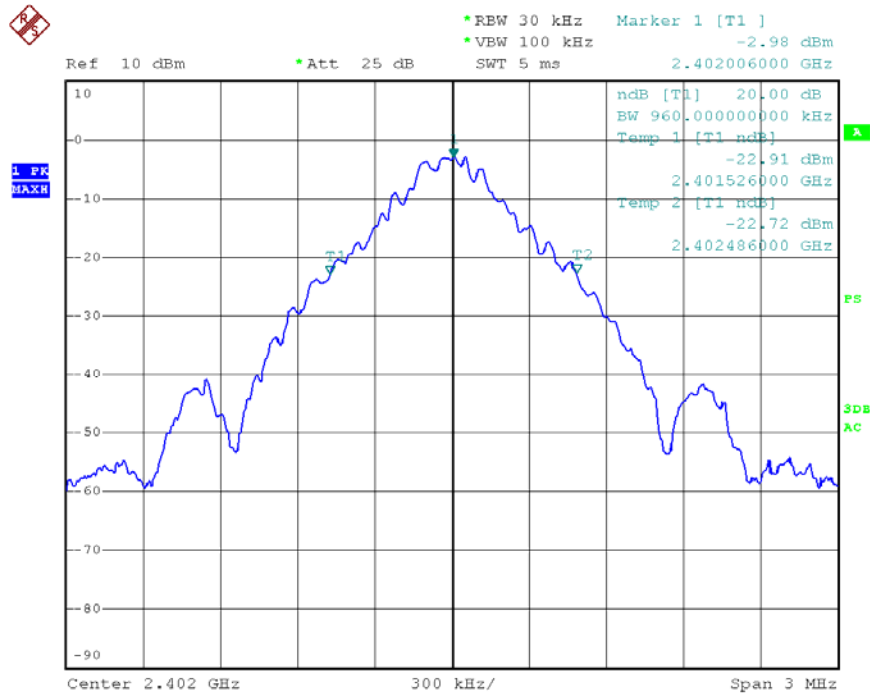
Product : Avanti Toys Bluetooth Series Test Mode : CH Low ~ CH High
Test Item : 20dB BW Temperature : 24℃
Test Voltage : DC 3.7V Humidity : 55%RH
Test Result : PASS

Channel	Frequency (MHz)	20dB Down BW(kHz)	Modulation Mode
Low	2401	960	GFSK
Mid	2441	966	GFSK
High	2480	966	GFSK
Low	2401	1350	π /4DQPSK
Mid	2441	1368	π /4DQPSK
High	2480	1368	π /4DQPSK
Low	2401	1350	8DPSK
Mid	2441	1368	8DPSK
High	2480	1368	8DPSK

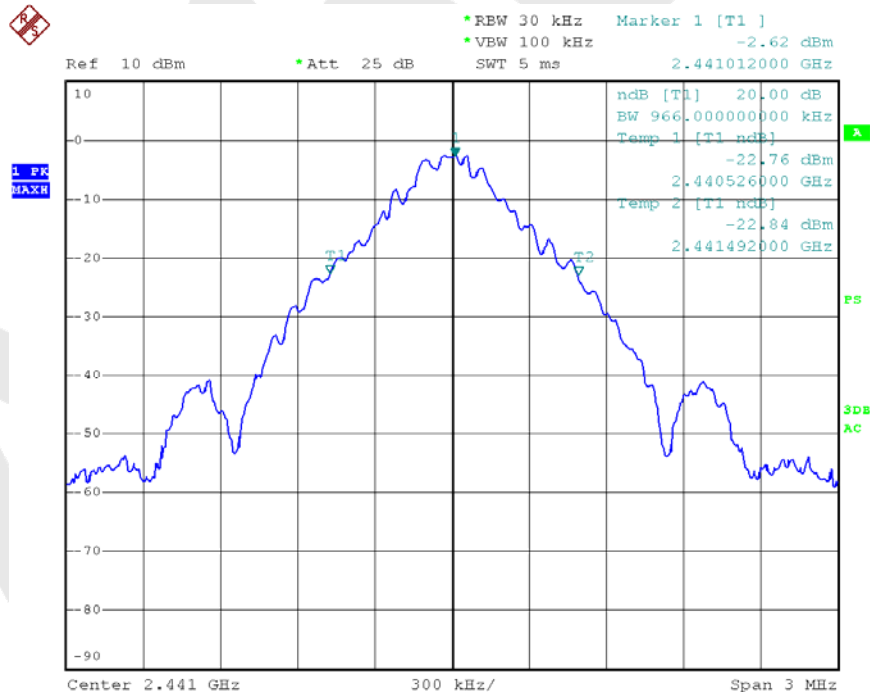
Remark: The results of modulations π /4DQPSK and 8DPSK are the same.

Modulation Mode: GFSK

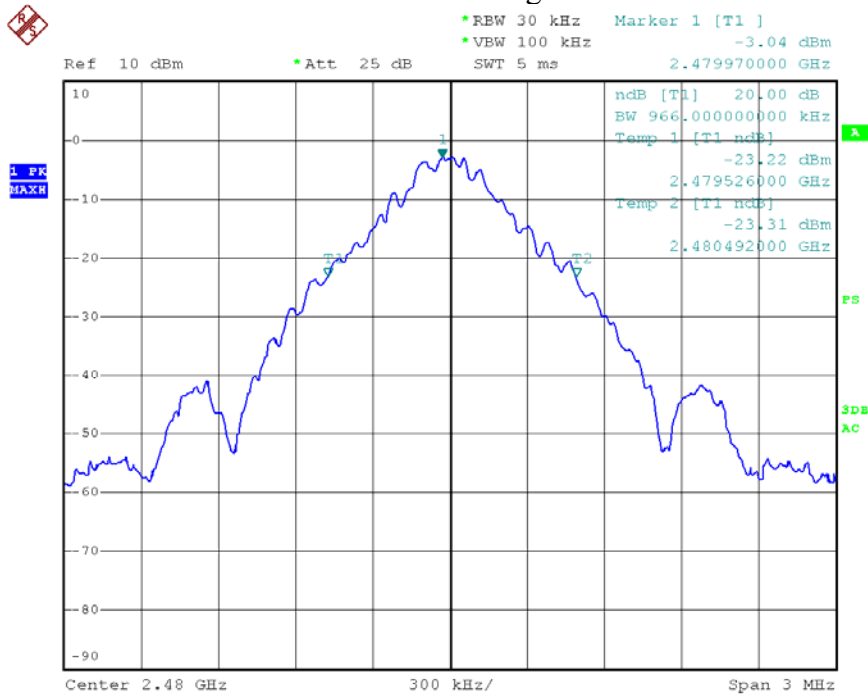
CH Low



CH Mid

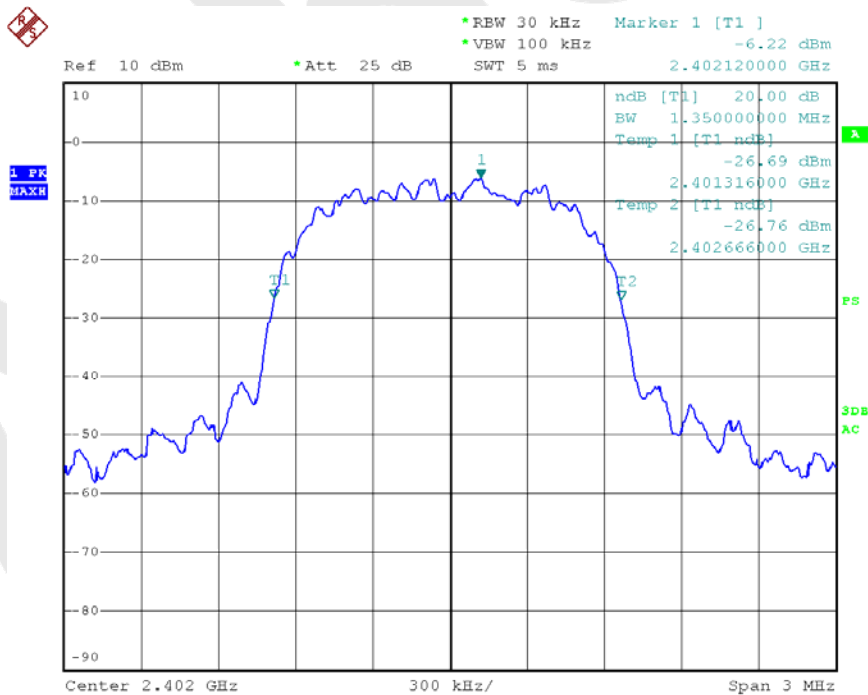


CH High

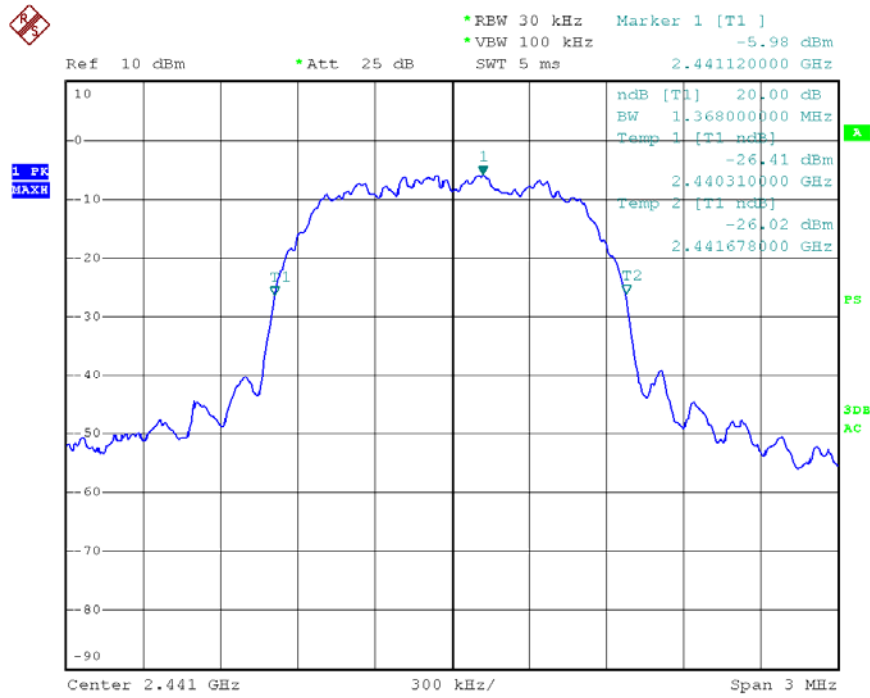


Modulation Mode: $\pi/4$ DQPSK & 8DPSK

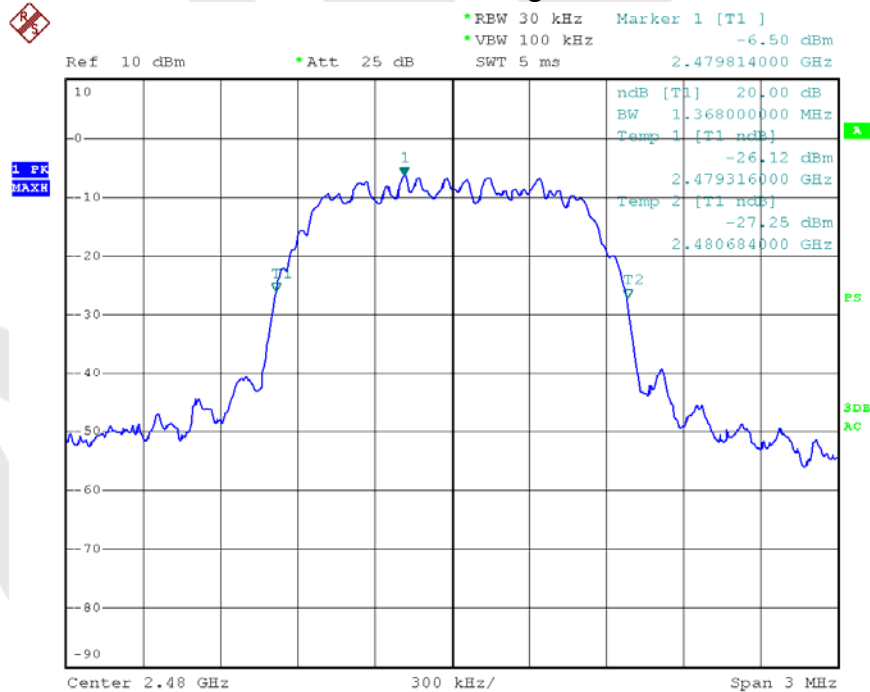
CH Low



CH Mid



CH High

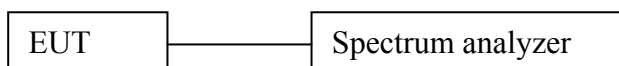


6. QUANTITY OF HOPPING CHANNEL TEST

7.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

7.2 Test SET-UP



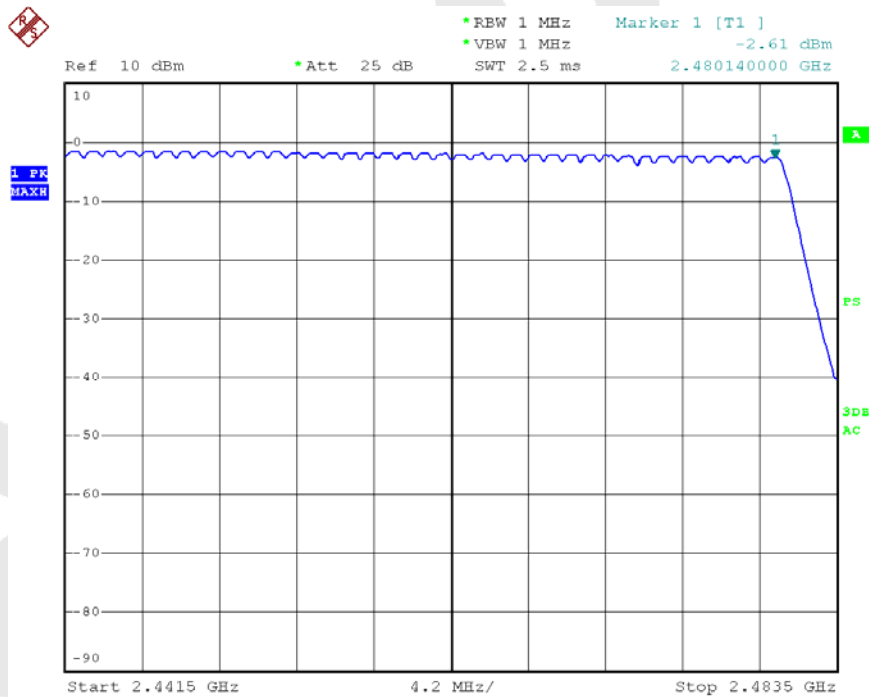
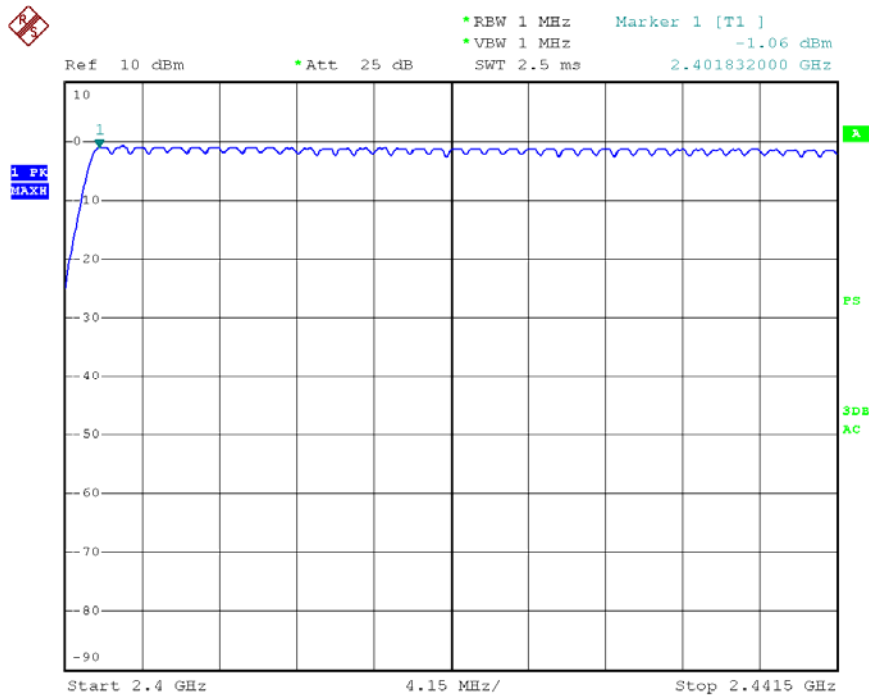
7.3 Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESCI	101604	Apr. 23, 2013	1 Year
2.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 23, 2013	1 Year
3.	Pre-amplifier	SONOMA	310N	186860	Apr. 23, 2013	1 Year
4.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

7.4 Test Results

Product : Avanti Toys Bluetooth Series Test Mode : CH Low ~ CH High
Test Item : Number of Hopping Frequency Temperature : 24°C
Test Voltage : DC 3.7V Humidity : 55%RH
Test Result : PASS

Hopping Channel Frequency Range	Quantity of Hopping Channel	Quantity of Hopping Channel
2402-2480	79	> 15

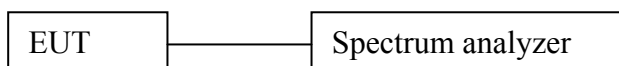


7. DWELL TIME TEST

8.1 Measurement Procedure

The EUT was operating in hopping mode or could be controlled its channel. Printed out the test result from the spectrum by hard copy function.

8.2 Test SET-UP



8.3 Test Equipment

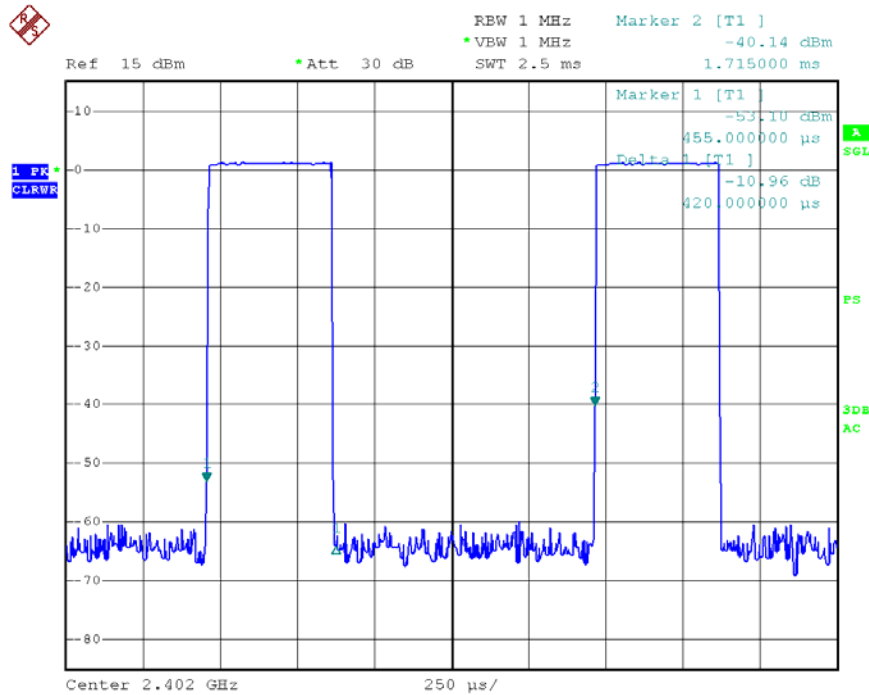
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Receiver	Rohde & Schwarz	ESCI	100627	Nov. 12, 2012	1 Year
2.	Preamplifier	Instruments corporation	EMC011830	980100	July 03, 2012	1 Year
3.	Double Ridged Horn Antenna	Instruments corporation	GTH-0118	351600	Apr. 07, 2013	1 Year
4.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

8.4 Test Results

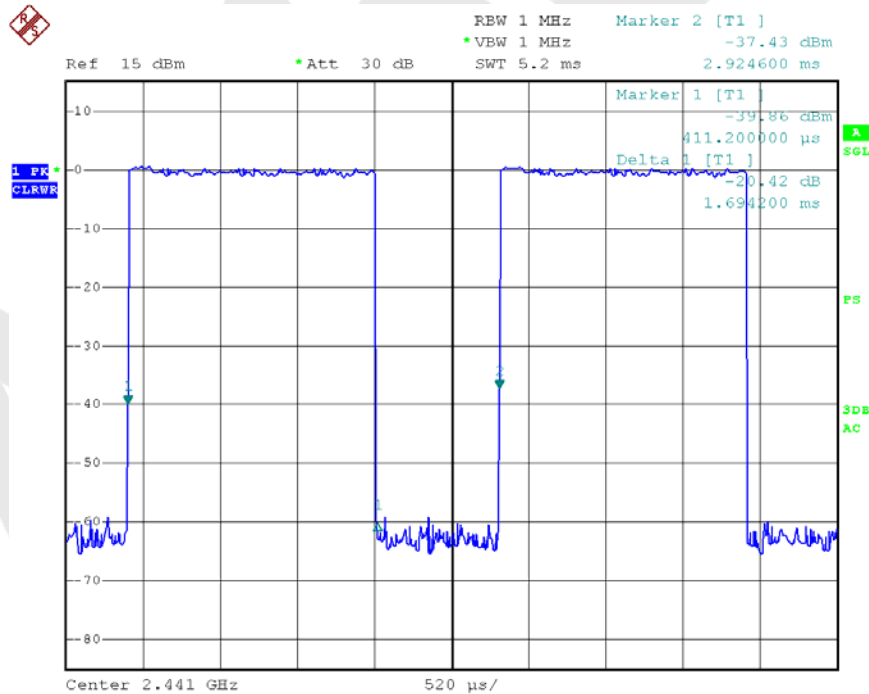
Product : Avanti Toys Bluetooth Series Test Mode : CH Low ~ CH High
Test Item : Time of Occupancy Temperature : 24°C
Test Voltage : DC 3.7V Humidity : 55%RH
Test Result : PASS

Channel	Pulse width (ms)	Time slot length(ms)	Dwell time (ms)	Limit (s)
Low Channel	0.4200	time slot length *1600/2 /79 * 31.6	134.40	0.4
Mid Channel	1.6942	time slot length *1600/4 /79 * 31.6	271.08	0.4
High Channel	2.9556	time slot length *1600/6 /79 * 31.6	315.27	0.4

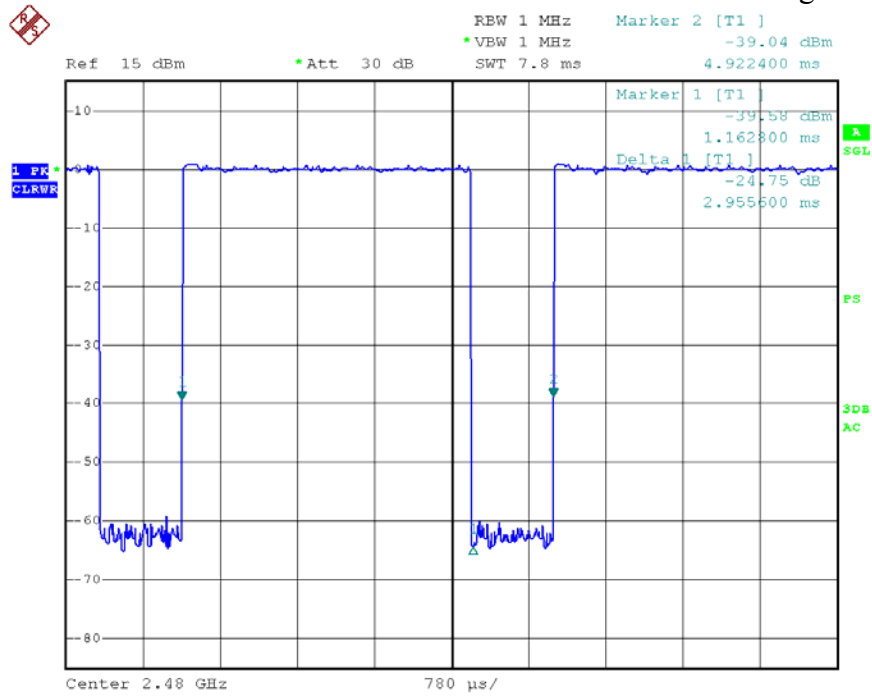
Low Channel



Mid Channel



High Channel

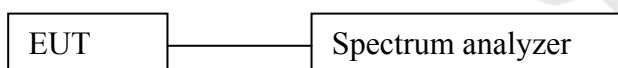


8. MAXIMUM PEAK OUTPUT POWER TEST

9.1 Measurement Procedure

- Check the calibration of the measuring instrument(SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- The center frequency of the spectrum analyzer is set to the fundamental frequency and using proper RBW and VBW setting.
- Measure the captured power within the band and recording the plot.
- Repeat above procedures until all frequencies required were complete.

9.2 Test SET-UP



9.3 Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESCI	101604	Apr. 23, 2013	1 Year
2.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 23, 2013	1 Year
3.	Pre-amplifier	SONOMA	310N	186860	Apr. 23, 2013	1 Year
4.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

9.4 Test Results

Product : Avanti Toys Bluetooth Series
Test Item : Max. peak output power
Test Voltage : DC 3.7V
Test Result : PASS

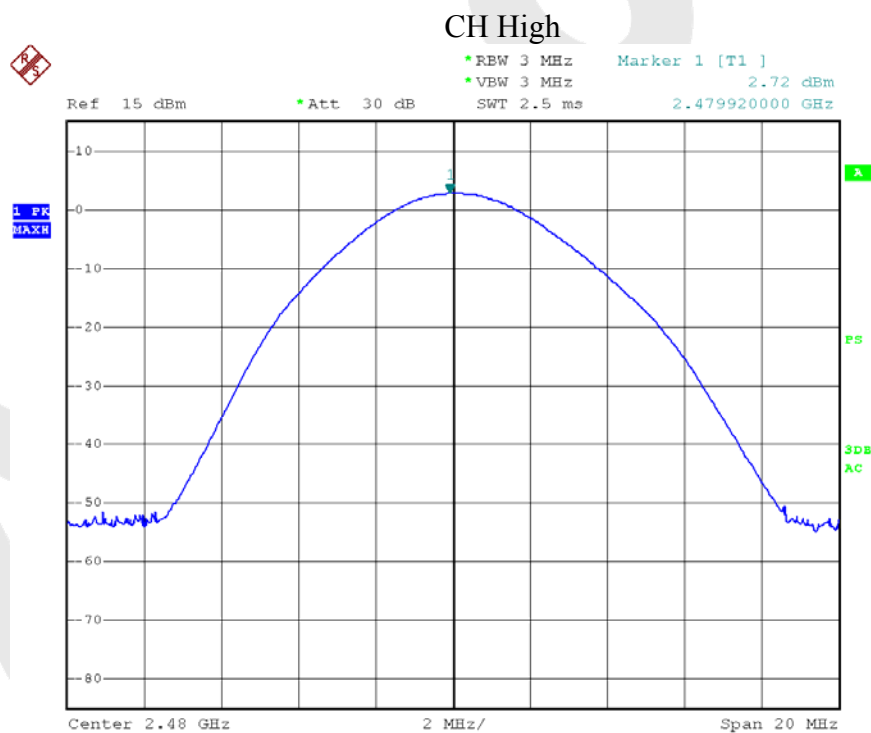
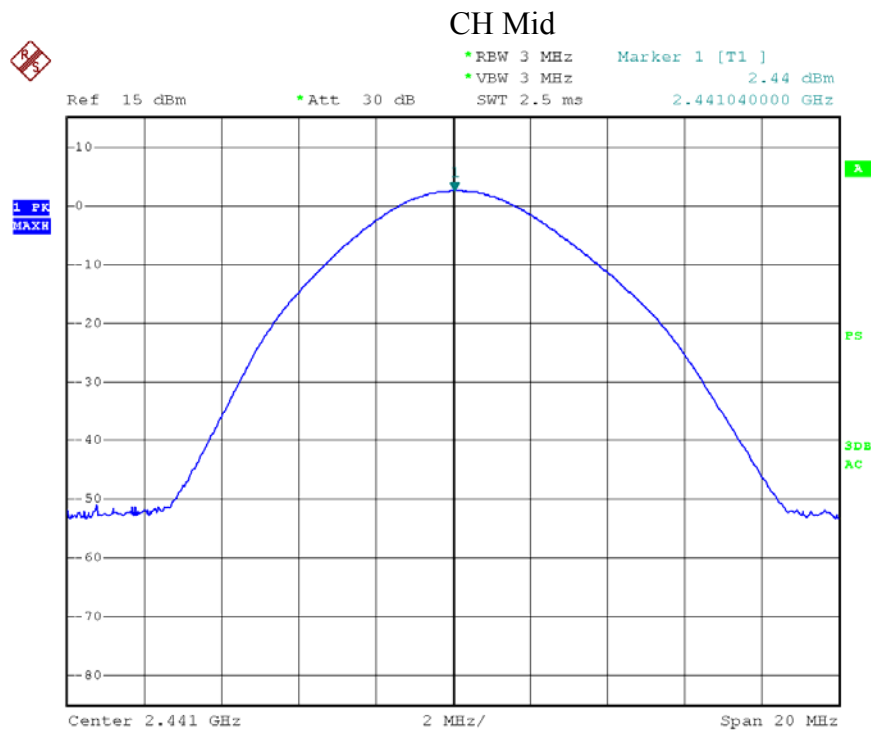
Test Mode : CH Low ~ CH High
Temperature : 24°C
Humidity : 55%RH

Channel Frequency (MHz)	Peak Power output(mW)	Peak Power output(dBm)	Peak Power Limit(mW)	Results	Modulation
2402	1.46	1.63	125	PASS	GFSK
2441	1.75	2.44	125	PASS	GFSK
2480	1.87	2.72	125	PASS	GFSK
2402	1.05	0.19	125	PASS	$\pi/4$ DQPSK
2441	1.23	1.10	125	PASS	$\pi/4$ DQPSK
2480	1.40	1.45	125	PASS	$\pi/4$ DQPSK
2402	1.05	0.19	125	PASS	8DPSK
2441	1.23	1.10	125	PASS	8DPSK
2480	1.40	1.45	125	PASS	8DPSK

Remark: The results of modulations $\pi/4$ DQPSK and 8DPSK are the same.

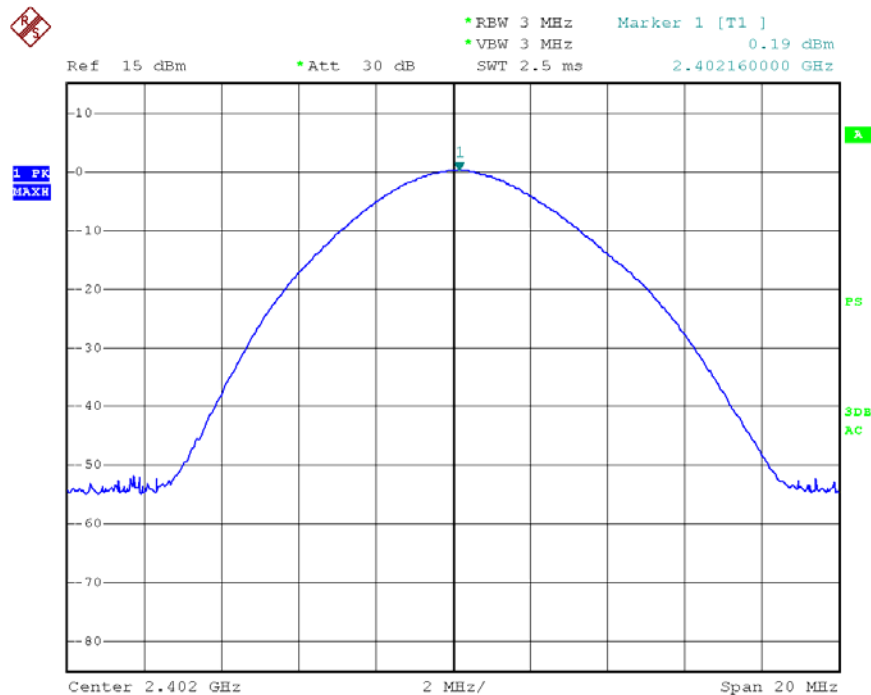
Modulation Mode: GFSK



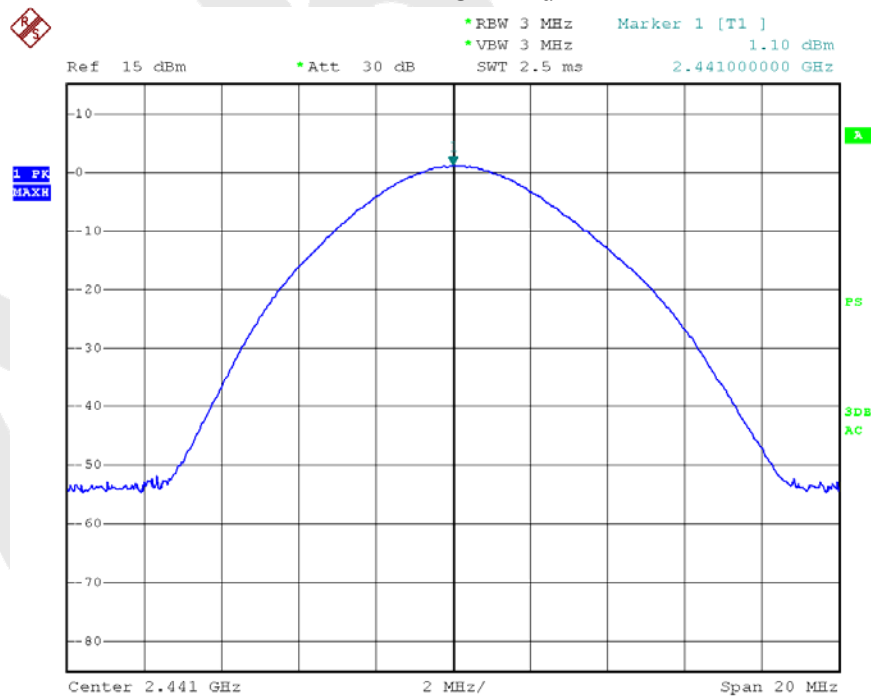


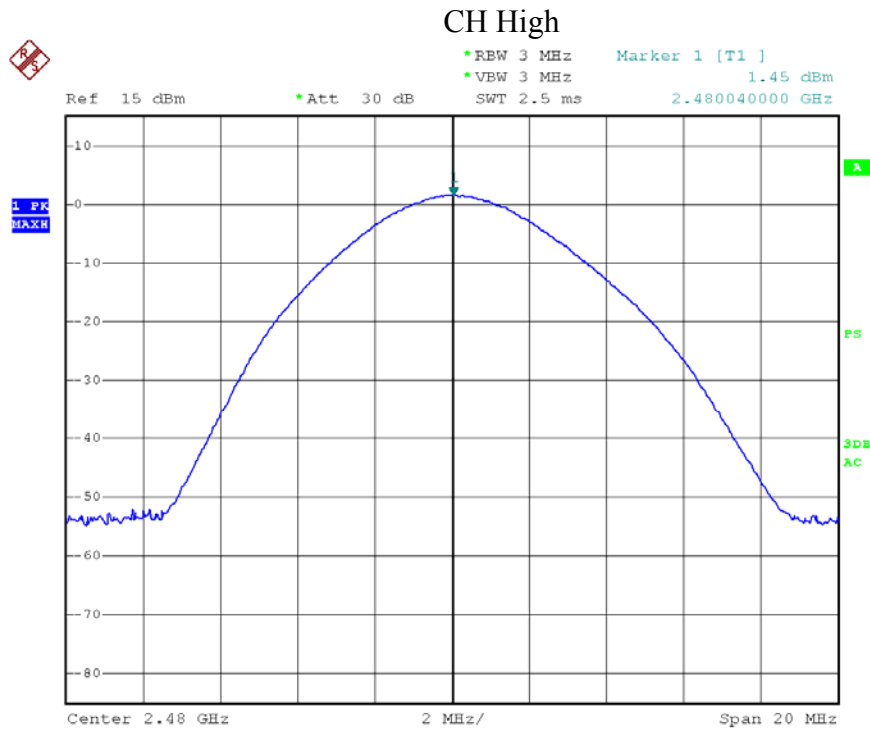
Modulation Mode: $\pi/4$ DQPSK & 8DPSK

CH Low



CH Mid





9. BAND EDGE TEST

10.1 Measurement Procedure

1. The EUT was Operating in hopping mode or could be controlled its channel. Printed out test result from the spectrum by hard copy function.
2. The EUT was placed on a turn table which is 0.8m above ground plane.
3. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Repeat above procedures until all frequency measured were complete.

10.2 Test SET-UP

Same as the radiated emission test.

10.3 Test Equipment

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Interval
1.	EMI Test Receiver	Rohde & Schwarz	ESCI	101604	Apr. 23, 2013	1 Year
2.	Bilog Broadband Antenna	Schwarzbeck	VULB9163	VULB 9163-289	Apr. 23, 2013	1 Year
3.	Pre-amplifier	SONOMA	310N	186860	Apr. 23, 2013	1 Year
4.	EMI Test Software EZ-EMC	SHURPLE	N/A	N/A	N/A	N/A

10.4 Test Results

Pass.

Please refer the following data.

Product : Avanti Toys Bluetooth Series Test Mode : CH Low ~ CH High
Test Item : Band edge Temperature : 24℃
Test Voltage : DC 3.7V Humidity : 55%RH
Test Result : PASS

1. Conducted Test

Frequency (MHz)	Peak Power Output(dBm)	Emission read Value(dBm)	Result of Band edge(dBc)	Band edge Limit(dBc)	Modulation
<2400	-50.61	1.14	51.75	>20dBc	GFSK
	-53.33	-0.82	52.51	>20dBc	$\pi/4$ DQPSK
	-53.33	-0.82	52.51	>20dBc	8DPSK
>2483.5	-51.09	2.32	53.41	>20dBc	GFSK
	-55.17	0.48	55.65	>20dBc	$\pi/4$ DQPSK
	-55.17	0.48	55.65	>20dBc	8DPSK

2. Radiated emission Test

Frequency (MHz)	Antenna polarization (H/V)	Emission (dBuV/m)		Band edge Limit (dBuV/m)		Modulation
		PK	AV	PK	AV	
<2400	V	53.08	38.07	74.00	54.00	GFSK
	V	52.75	41.58	74.00	54.00	$\pi/4$ DQPSK
	V	49.04	37.54	74.00	54.00	8DPSK
>2483.5	V	53.11	40.78	74.00	54.00	GFSK
	V	48.45	36.15	74.00	54.00	$\pi/4$ DQPSK
	V	49.58	37.22	74.00	54.00	8DPSK

10.ANTENNA APPLICATION

11.1 Antenna requirement

The EUT'S antenna is met the requirement of FCC part 15C section 15.203 and 15.247.

FCC part 15C section 15.247 requirements:

Systems operating in the 2402-2480MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

11.2 Result

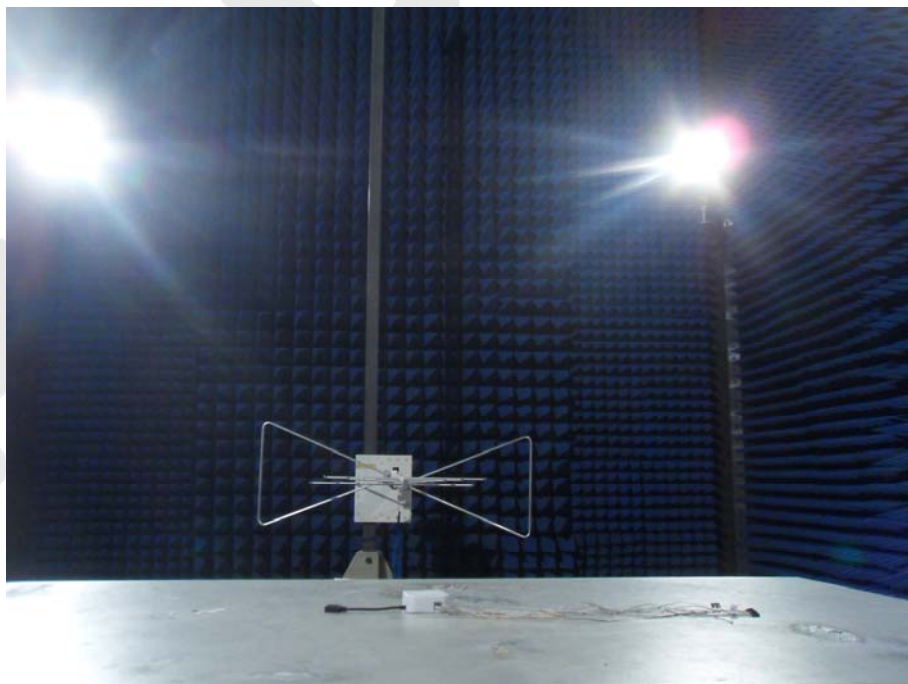
The EUT's antenna used a chip antenna and integrated on PCB, The antenna's gain is 0dBi and meets the requirement.

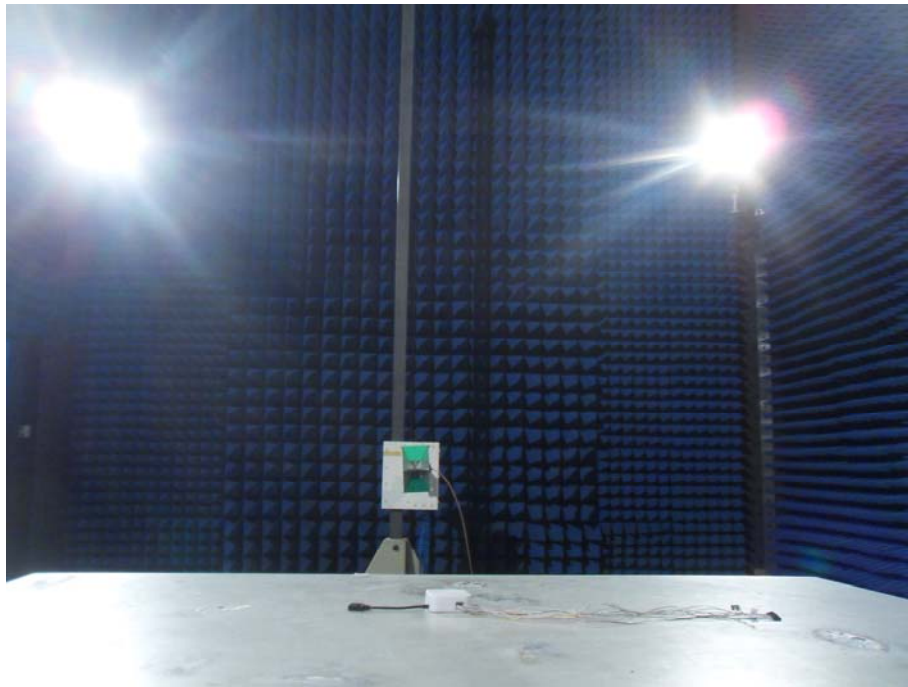
12. PHOTOGRAPH

12.1. Photo of Power Line Conducted Emission Measurement



12.2. Photo of Radiation Emission Test





APPENDIX I (External Photos)

Figure 1

The EUT-Front View



Figure 2

The EUT-Back View



APPENDIX II (Internal Photos)

Figure 3

The EUT-Battery View



Figure 4

The EUT-Inside View

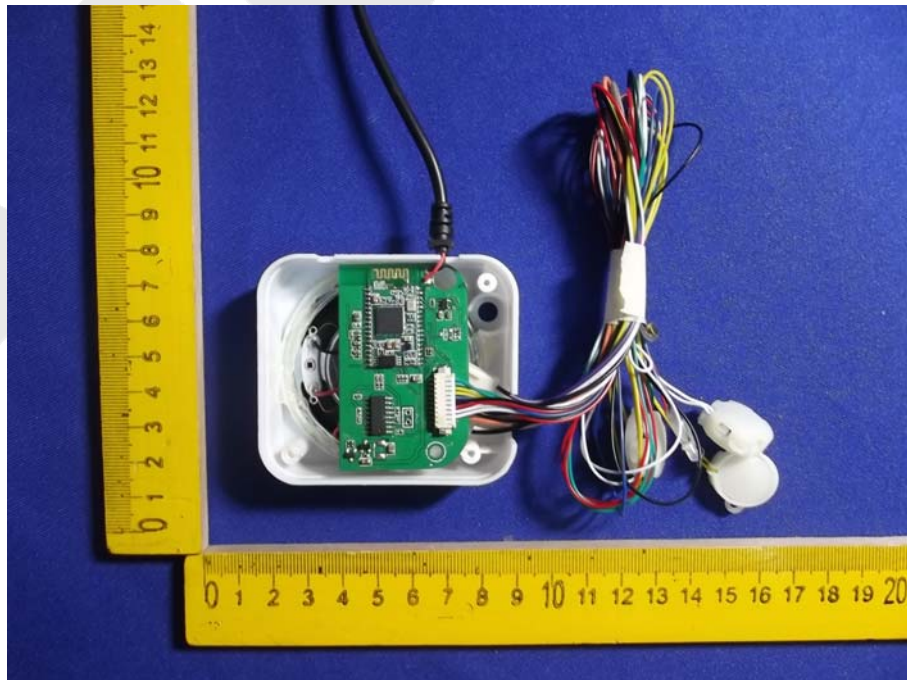


Figure 5
PCB of the EUT View



Figure 6
PCB of the EUT View

