

APPLICATION CERTIFICATION  
On Behalf of  
Microlab Electronics Co.,Ltd.

MULTIMEDIA SPEAKER  
Model No.: MD212

FCC ID: OR8-MD212

Prepared for : Microlab Electronics Co., Ltd.  
Address : South Baozi Rd.,Shenzhen MicrolabIndustrial Park,  
518122, ShenZhen, China  
Prepared by : ACCURATE TECHNOLOGY CO. LTD  
Address : F1, Bldg. A, Changyuan New Material Port, Keyuan Rd.  
Science & Industry Park, Nanshan, Shenzhen, Guangdong  
P.R. China

Tel: (0755) 26503290  
Fax: (0755) 26503396

Report Number : ATE20122628  
Date of Test : Nov 17-Nov 30, 2012  
Date of Report : Nov 30, 2012

## TABLE OF CONTENTS

Description	Page
Test Report Certification	
<b>1. GENERAL INFORMATION .....</b>	<b>5</b>
1.1. Description of Device (EUT).....	5
1.2. Description of Test Facility .....	6
1.3. Measurement Uncertainty .....	6
<b>2. MEASURING DEVICE AND TEST EQUIPMENT .....</b>	<b>7</b>
<b>3. OPERATION OF EUT DURING TESTING .....</b>	<b>8</b>
3.1. Operating Mode .....	8
3.2. Configuration and peripherals .....	8
<b>4. TEST PROCEDURES AND RESULTS .....</b>	<b>9</b>
<b>5. 20DB BANDWIDTH TEST.....</b>	<b>10</b>
5.1. Block Diagram of Test Setup.....	10
5.2. The Requirement For Section 15.247(a)(1).....	10
5.3. EUT Configuration on Measurement .....	10
5.4. Operating Condition of EUT .....	10
5.5. Test Procedure .....	11
5.6. Test Result .....	11
<b>6. CARRIER FREQUENCY SEPARATION TEST.....</b>	<b>15</b>
6.1. Block Diagram of Test Setup.....	15
6.2. The Requirement For Section 15.247(a)(1).....	15
6.3. EUT Configuration on Measurement .....	15
6.4. Operating Condition of EUT .....	15
6.5. Test Procedure .....	16
6.6. Test Result .....	16
<b>7. NUMBER OF HOPPING FREQUENCY TEST .....</b>	<b>20</b>
7.1. Block Diagram of Test Setup.....	20
7.2. The Requirement For Section 15.247(a)(1)(iii).....	20
7.3. EUT Configuration on Measurement .....	20
7.4. Operating Condition of EUT .....	20
7.5. Test Procedure .....	21
7.6. Test Result .....	21
<b>8. DWELL TIME TEST .....</b>	<b>23</b>
8.1. Block Diagram of Test Setup.....	23
8.2. The Requirement For Section 15.247(a)(1)(iii).....	23
8.3. EUT Configuration on Measurement .....	23
8.4. Operating Condition of EUT .....	23
8.5. Test Procedure .....	24
8.6. Test Result .....	24
<b>9. MAXIMUM PEAK OUTPUT POWER TEST .....</b>	<b>35</b>
9.1. Block Diagram of Test Setup.....	35
9.2. The Requirement For Section 15.247(b)(1).....	35
9.3. EUT Configuration on Measurement .....	35
9.4. Operating Condition of EUT .....	35
9.5. Test Procedure .....	36

9.6. Test Result .....36

**10. RADIATED EMISSION TEST .....40**

10.1. Block Diagram of Test Setup.....40

10.2. The Limit For Section 15.247(d) .....40

10.3. Restricted bands of operation .....41

10.4. Configuration of EUT on Measurement .....41

10.5. Test Procedure .....42

10.6. The Field Strength of Radiation Emission Measurement Results .....43

**11. BAND EDGE COMPLIANCE TEST .....64**

11.1. Block Diagram of Test Setup.....64

11.2. The Requirement For Section 15.247(d) .....64

11.3. EUT Configuration on Measurement .....64

11.4. Operating Condition of EUT .....65

11.5. Test Procedure .....65

11.6. Test Result .....66

**12. AC POWER LINE CONDUCTED EMISSION FOR FCC PART 15 SECTION 15.207(A) ..75**

12.1. Block Diagram of Test Setup.....75

12.2. The Emission Limit .....75

12.3. Configuration of EUT on Measurement .....76

12.4. Operating Condition of EUT .....76

12.5. Test Procedure .....76

12.6. Power Line Conducted Emission Measurement Results .....77

**13. ANTENNA REQUIREMENT.....80**

13.1. The Requirement .....80

13.2. Antenna Construction .....80

## Test Report Certification

Applicant : Microlab Electronics Co., Ltd.  
Manufacturer : Microlab Electronics Co., Ltd.  
EUT Description : MULTIMEDIA SPEAKER  
(A) MODEL NO.: MD212  
(B) SERIAL NO.: N/A  
(C) POWER SUPPLY: DC 3.7V (Li-polymer battery) & DC 5V (PC input)

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247  
ANSI C63.4: 2009  
ANSI C63.10: 2009

The device described above is tested by ACCURATE TECHNOLOGY CO. LTD to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.247 limits. The measurement results are contained in this test report and ACCURATE TECHNOLOGY CO. LTD is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of ACCURATE TECHNOLOGY CO. LTD.

Date of Test : Nov 17-0ov 30, 2012

Prepared by : Terry. Yang  
(Engineer)

Approved & Authorized Signer : Seam  
(Manager)

# 1. GENERAL INFORMATION

## 1.1. Description of Device (EUT)

EUT	:	MULTIMEDIA SPEAKER
Model Number	:	MD212
Frequency Band	:	2402MHz-2480MHz
Number of Channels	:	79
Antenna Gain	:	2.5dBi
Power Supply	:	DC 3.7V (Li-polymer battery) & DC 5V (PC input)
Applicant	:	Microlab Electronics Co., Ltd.
Address	:	South Baozi Rd.,Shenzhen MicrolabIndustrial Park, 518122, ShenZhen, China
Manufacturer	:	Microlab Electronics Co., Ltd.
Address	:	South Baozi Rd.,Shenzhen MicrolabIndustrial Park, 518122, ShenZhen, China
Date of sample received	:	Nov 17, 2012
Date of Test	:	Nov 17-Nov 30, 2012

## 1.2. Description of Test Facility

EMC Lab : Accredited by TUV Rheinland Shenzhen

Listed by FCC  
The Registration Number is 752051

Listed by Industry Canada  
The Registration Number is 5077A-2

Accredited by China National Accreditation Committee  
for Laboratories  
The Certificate Registration Number is L3193

Name of Firm : ACCURATE TECHNOLOGY CO. LTD

Site Location : F1, Bldg. A, Changyuan New Material Port, Keyuan Rd.  
Science & Industry Park, Nanshan, Shenzhen, Guangdong  
P.R. China

## 1.3. Measurement Uncertainty

Conducted Emission Expanded Uncertainty = 2.23dB, k=2

Radiated emission expanded uncertainty = 3.08dB, k=2  
(9kHz-30MHz)

Radiated emission expanded uncertainty = 4.42dB, k=2  
(30MHz-1000MHz)

Radiated emission expanded uncertainty = 4.06dB, k=2  
(Above 1GHz)

## 2. MEASURING DEVICE AND TEST EQUIPMENT

**Table 1: List of Test and Measurement Equipment**

Kind of equipment	Manufacturer	Type	S/N	Calibrated date	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 7, 2012	Jan. 7, 2013
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 7, 2012	Jan. 7, 2013
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 7, 2012	Jan. 7, 2013
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 7, 2012	Jan. 7, 2013
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 7, 2012	Jan. 7, 2013
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 7, 2012	Jan. 7, 2013
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 7, 2012	Jan. 7, 2013
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 7, 2012	Jan. 7, 2013
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 7, 2012	Jan. 7, 2013
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 7, 2012	Jan. 7, 2013

### 3. OPERATION OF EUT DURING TESTING

#### 3.1. Operating Mode

The mode is used: Transmitting mode

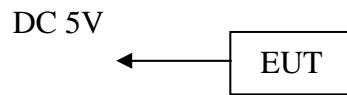
Low Channel: 2402MHz

Middle Channel: 2441MHz

High Channel: 2480MHz

Hopping

#### 3.2. Configuration and peripherals



(EUT: MULTIMEDIA SPEAKER)

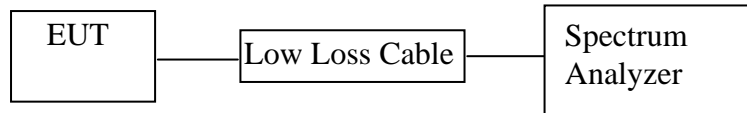


#### 4. TEST PROCEDURES AND RESULTS

<b>FCC Rules</b>	<b>Description of Test</b>	<b>Result</b>
Section 15.207	Conducted Emission Test	Compliant
Section 15.247(a)(1)	20dB Bandwidth Test	Compliant
Section 15.247(a)(1)	Carrier Frequency Separation Test	Compliant
Section 15.247(a)(1)(iii)	Number Of Hopping Frequency Test	Compliant
Section 15.247(a)(1)(iii)	Dwell Time Test	Compliant
Section 15.247(b)(1)	Maximum Peak Output Power Test	Compliant
Section 15.247(d) Section 15.209	Radiated Emission Test	Compliant
Section 15.247(d)	Band Edge Compliance Test	Compliant
Section 15.203	Antenna Requirement	Compliant

## 5. 20DB BANDWIDTH TEST

### 5.1. Block Diagram of Test Setup



(EUT: MULTIMEDIA SPEAKER)

### 5.2. The Requirement For Section 15.247(a)(1)

Section 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.

### 5.3. EUT Configuration on Measurement

The following equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

#### 5.3.1. MULTIMEDIA SPEAKER (EUT)

Model Number : MD212  
 Serial Number : N/A  
 Manufacturer : Microlab Electronics Co., Ltd.

### 5.4. Operating Condition of EUT

5.4.1. Setup the EUT and simulator as shown as Section 5.1.

5.4.2. Turn on the power of all equipment.

5.4.3. Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

## 5.5. Test Procedure

5.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

5.5.2. Set RBW of spectrum analyzer to 30 kHz and VBW to 100 kHz.

5.5.3. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

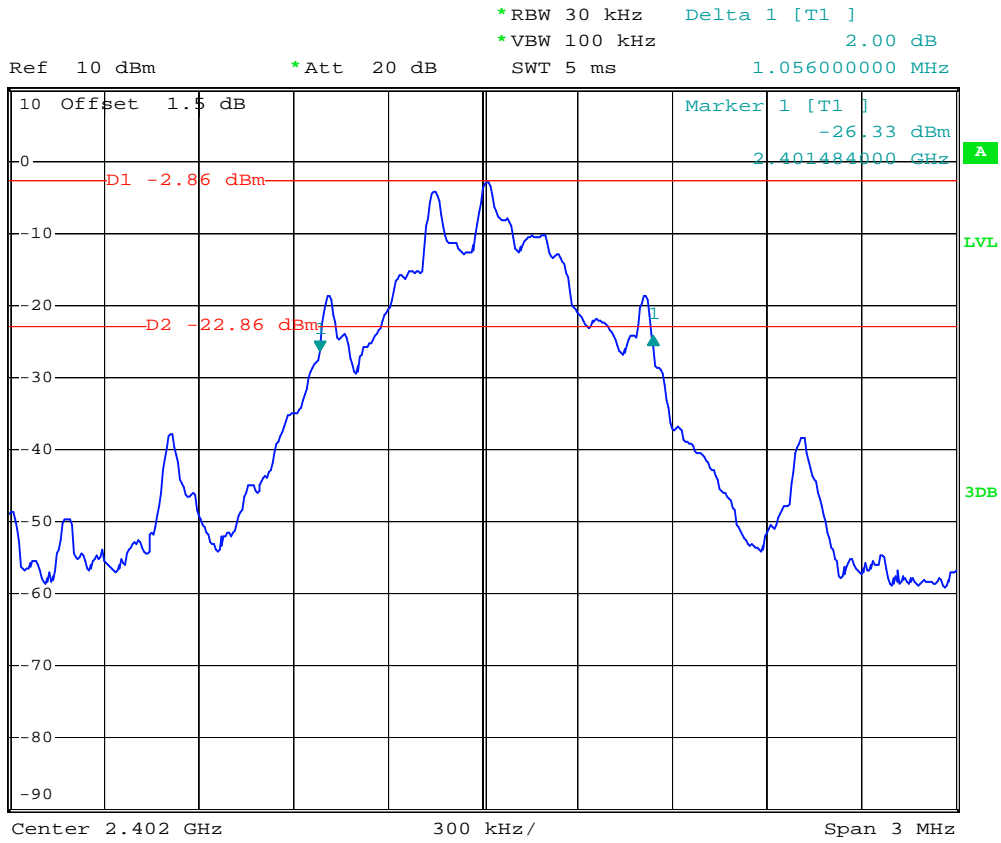
## 5.6. Test Result

**PASS.**

Date of Test:	<u>Nov 27, 2012</u>	Temperature:	<u>25°C</u>
EUT:	<u>MULTIMEDIA SPEAKER</u>	Humidity:	<u>50%</u>
Model No.:	<u>MD212</u>	Power Supply:	<u>DC 5V</u>
Test Mode:	<u>TX</u>	Test Engineer:	<u>Alen</u>

Channel	Frequency (MHz)	20dB Bandwidth (MHz)	Limit (MHz)
Low	2402	1.056	---
Middle	2441	1.050	---
High	2480	1.056	---

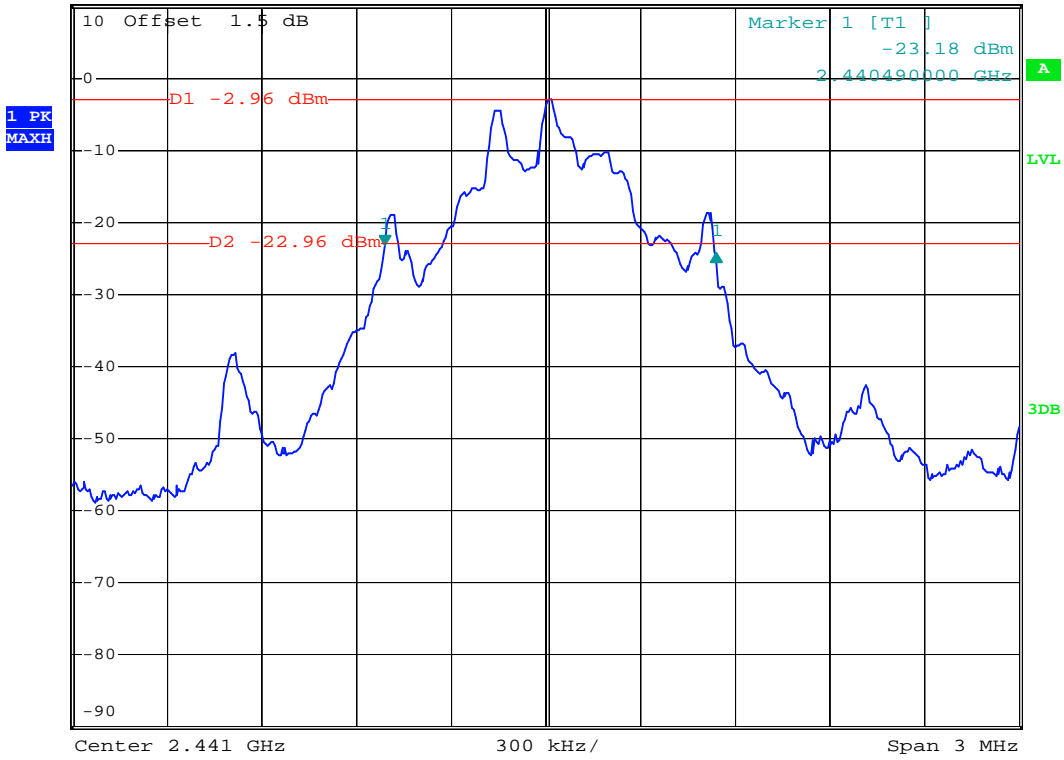
The spectrum analyzer plots are attached as below.



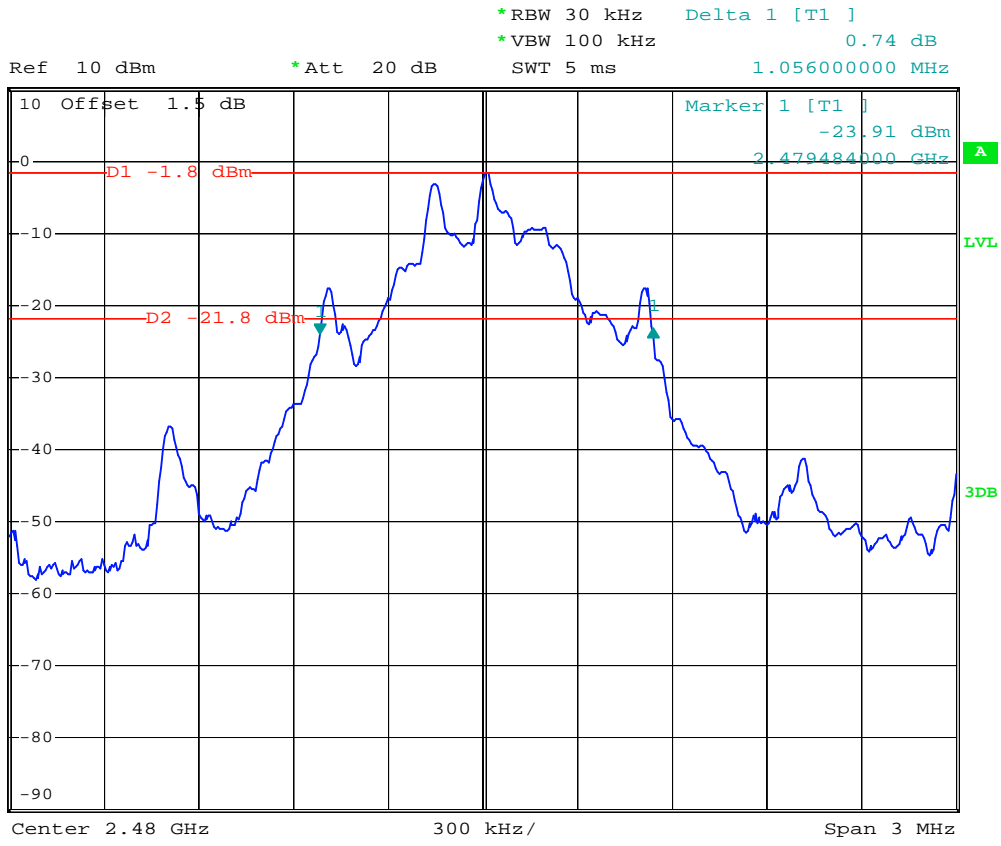
Date: 27.NOV.2012 16:30:33



\*RBW 30 kHz Delta 1 [T1 ]  
\*VBW 100 kHz -1.09 dB  
Ref 10 dBm \*Att 20 dB SWT 5 ms 1.050000000 MHz



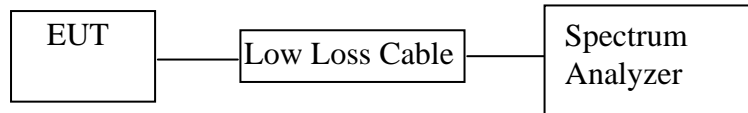
Date: 27.NOV.2012 16:37:35



Date: 27.NOV.2012 16:44:13

## 6. CARRIER FREQUENCY SEPARATION TEST

### 6.1. Block Diagram of Test Setup



(EUT: MULTIMEDIA SPEAKER)

### 6.2. The Requirement For Section 15.247(a)(1)

Section 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. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

### 6.3. EUT Configuration on Measurement

The following equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

#### 6.3.1. MULTIMEDIA SPEAKER (EUT)

Model Number : MD212  
 Serial Number : N/A  
 Manufacturer : Microlab Electronics Co., Ltd.

### 6.4. Operating Condition of EUT

6.4.1. Setup the EUT and simulator as shown as Section 6.1.

6.4.2. Turn on the power of all equipment.

6.4.3. Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

## 6.5. Test Procedure

6.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

6.5.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz. Adjust Span to 3 MHz.

6.5.3. Set the adjacent channel of the EUT maxhold another trace.

6.5.4. Measurement the channel separation

## 6.6. Test Result

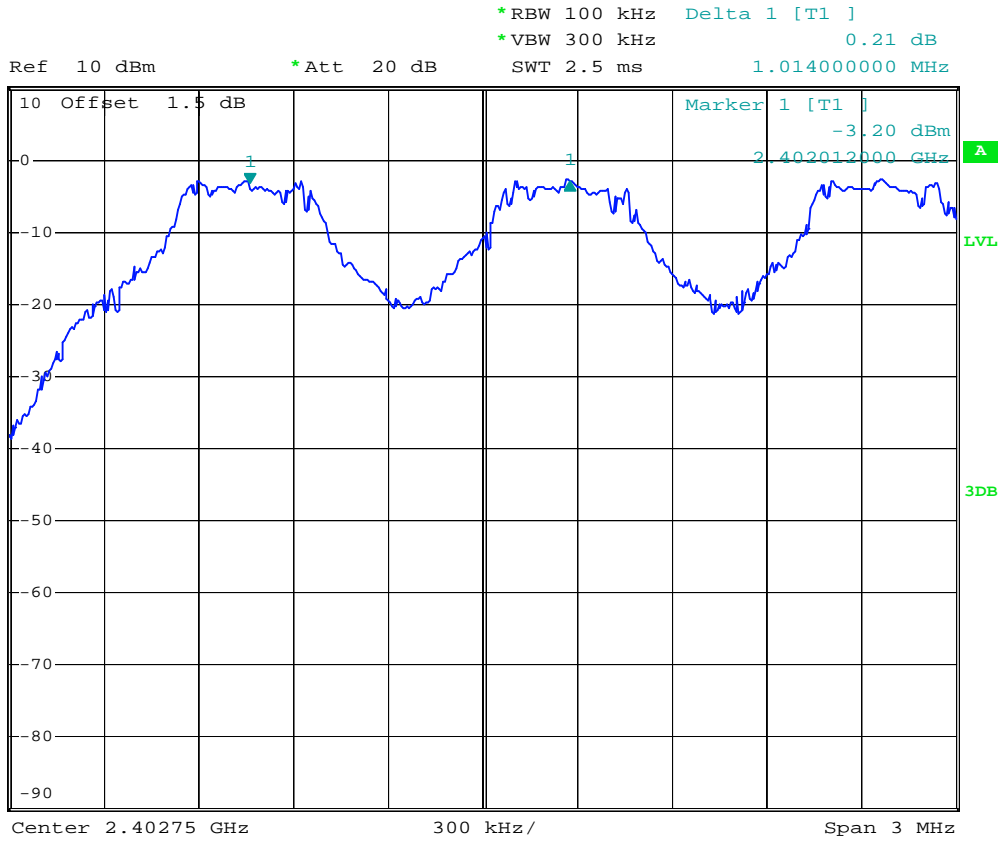
**PASS.**

Date of Test:	<u>Nov 27, 2012</u>	Temperature:	<u>25°C</u>
EUT:	<u>MULTIMEDIA SPEAKER</u>	Humidity:	<u>50%</u>
Model No.:	<u>MD212</u>	Power Supply:	<u>DC 5V</u>
Test Mode:	<u>TX</u>	Test Engineer:	<u>Alen</u>

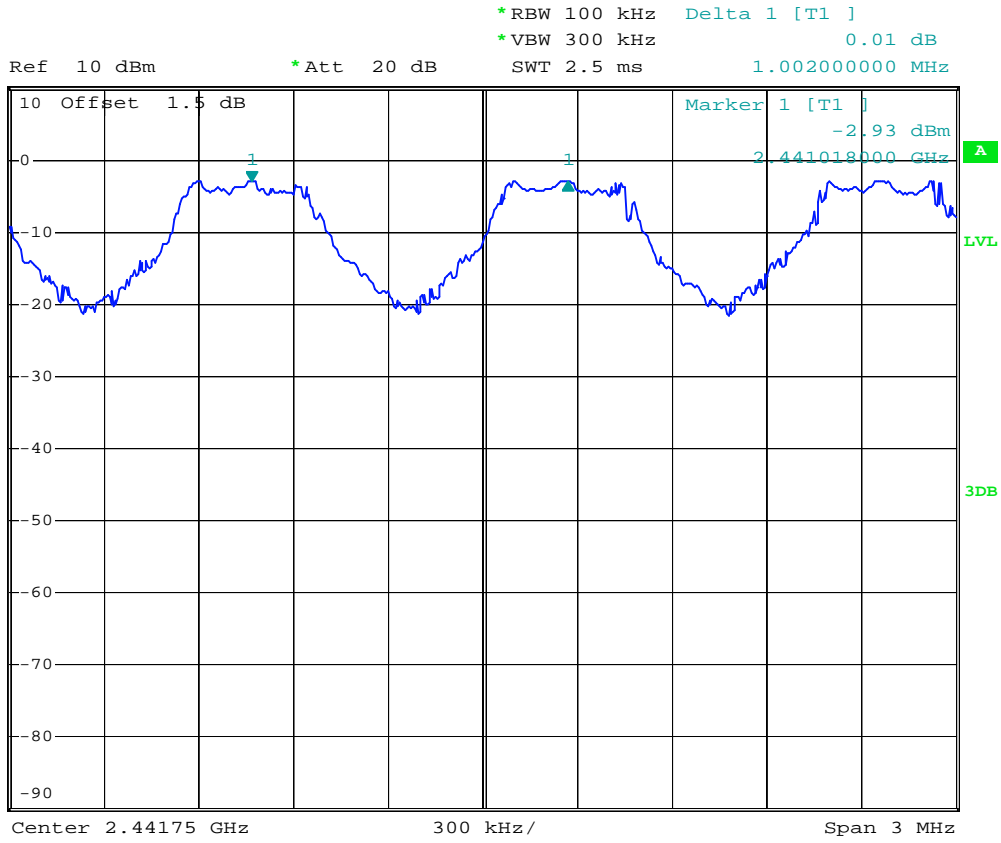
Channel	Channel Frequency (MHz)	Channel separation (MHz)	Limit (MHz)
Low	2402	1.014	0.704
Middle	2441	1.002	0.700
High	2480	1.008	0.704

The spectrum analyzer plots are attached as below.

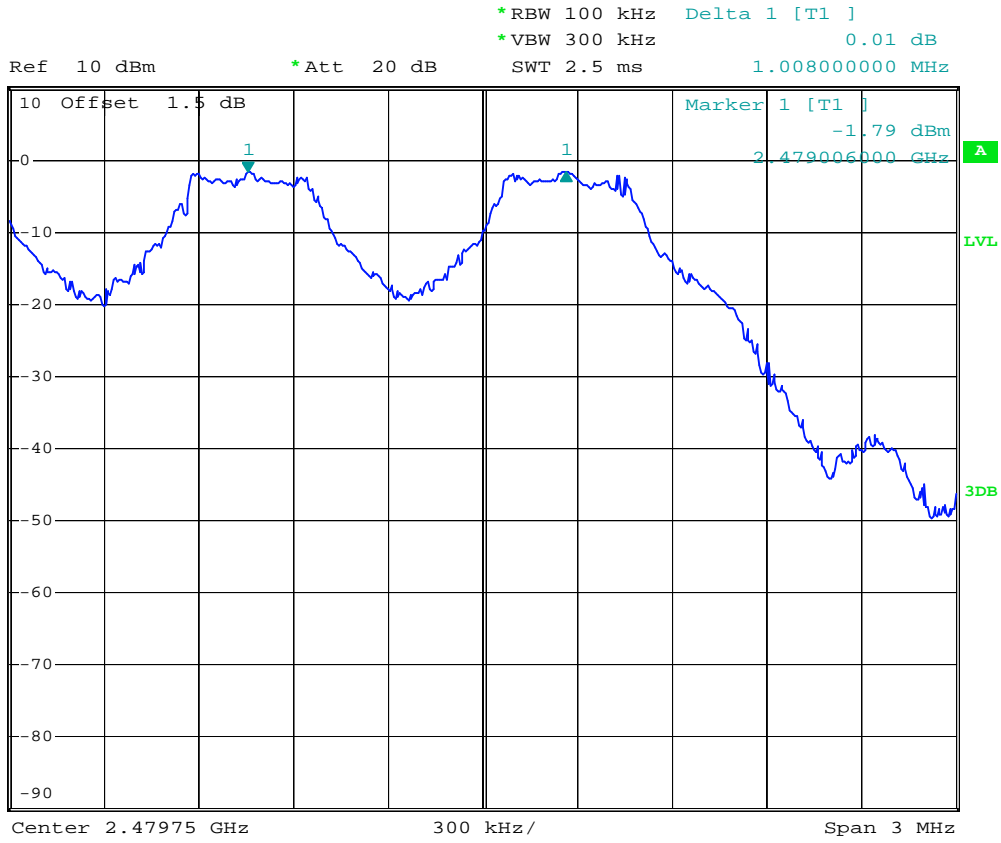




Date: 27.NOV.2012 16:26:01



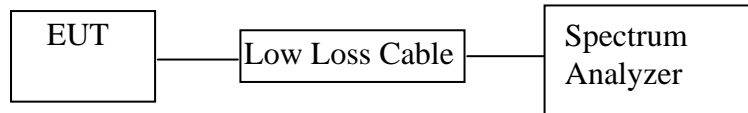
Date: 27.NOV.2012 16:22:13



Date: 27.NOV.2012 16:28:19

## 7. NUMBER OF HOPPING FREQUENCY TEST

### 7.1. Block Diagram of Test Setup



(EUT: MULTIMEDIA SPEAKER)

### 7.2. The Requirement For Section 15.247(a)(1)(iii)

Section 15.247(a)(1)(iii): Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

### 7.3. EUT Configuration on Measurement

The following equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

#### 7.3.1. MULTIMEDIA SPEAKER (EUT)

Model Number : MD212  
 Serial Number : N/A  
 Manufacturer : Microlab Electronics Co., Ltd.

### 7.4. Operating Condition of EUT

7.4.1. Setup the EUT and simulator as shown as Section 7.1.

7.4.2. Turn on the power of all equipment.

7.4.3. Let the EUT work in TX (Hopping on) modes measure it.

## 7.5. Test Procedure

7.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

7.5.2. Set the spectrum analyzer as Span=83.5MHz, RBW=100 kHz, VBW=300 kHz.

7.5.3. Max hold, view and count how many channel in the band.

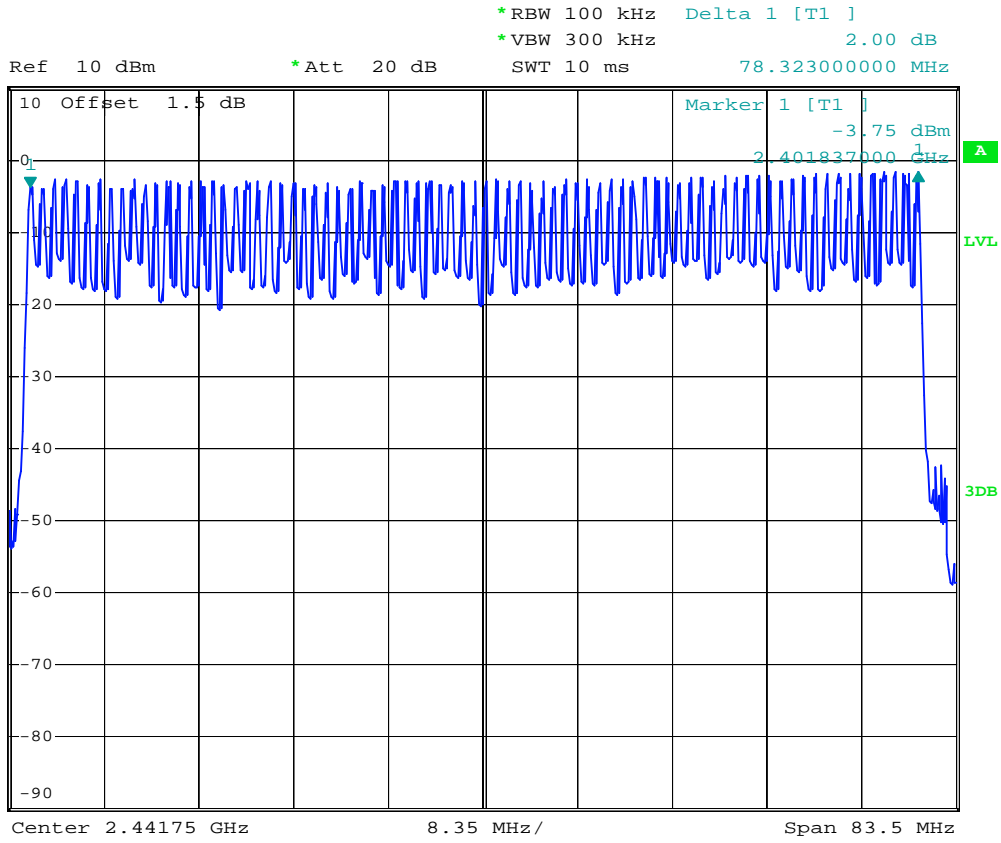
## 7.6. Test Result

**PASS.**

Date of Test:	<u>Nov 27, 2012</u>	Temperature:	<u>25°C</u>
EUT:	<u>MULTIMEDIA SPEAKER</u>	Humidity:	<u>50%</u>
Model No.:	<u>MD212</u>	Power Supply:	<u>DC 5V</u>
Test Mode:	<u>Hopping</u>	Test Engineer:	<u>Alen</u>

Total number of hopping channel	Measurement result (CH)	Limit (CH)
	79	>15

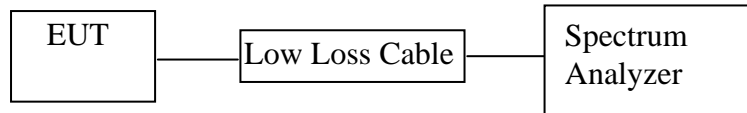
The spectrum analyzer plots are attached as below.



Date: 27.NOV.2012 16:19:08

## 8. DWELL TIME TEST

### 8.1. Block Diagram of Test Setup



(EUT: MULTIMEDIA SPEAKER)

### 8.2. The Requirement For Section 15.247(a)(1)(iii)

Section 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

### 8.3. EUT Configuration on Measurement

The following equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

#### 8.3.1. MULTIMEDIA SPEAKER (EUT)

Model Number	:	MD212
Serial Number	:	N/A
Manufacturer	:	Microlab Electronics Co., Ltd.

### 8.4. Operating Condition of EUT

8.4.1. Setup the EUT and simulator as shown as Section 8.1.

8.4.2. Turn on the power of all equipment.

8.4.3. Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

8.5. Test Procedure

- 8.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.
- 8.5.2. Set center frequency of spectrum analyzer = operating frequency.
- 8.5.3. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz, Span=0Hz, Adjust Sweep=1s. Get the burst (in 1 sec.).
- 8.5.4. Set the spectrum analyzer as RBW=1MHz, VBW=3MHz, Span=0Hz, Adjust Sweep=2ms. Get the pulse time.
- 8.5.5. Repeat above procedures until all frequency measured were complete.

8.6. Test Result

**PASS.**

Date of Test:	<u>Nov 27, 2012</u>	Temperature:	<u>25°C</u>
EUT:	<u>MULTIMEDIA SPEAKER</u>	Humidity:	<u>50%</u>
Model No.:	<u>MD212</u>	Power Supply:	<u>DC 5V</u>
Test Mode:	<u>TX</u>	Test Engineer:	<u>Alen</u>

DH1:

A period transmit time = $0.4 \times 79 = 31.6$				
Dwell time = pulse time $\times (1600/(2*79)) \times 31.6$				
Channel	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
Low	2402	0.534	170.88	400
Middle	2441	0.540	172.80	400
High	2480	0.534	170.88	400



DH3:

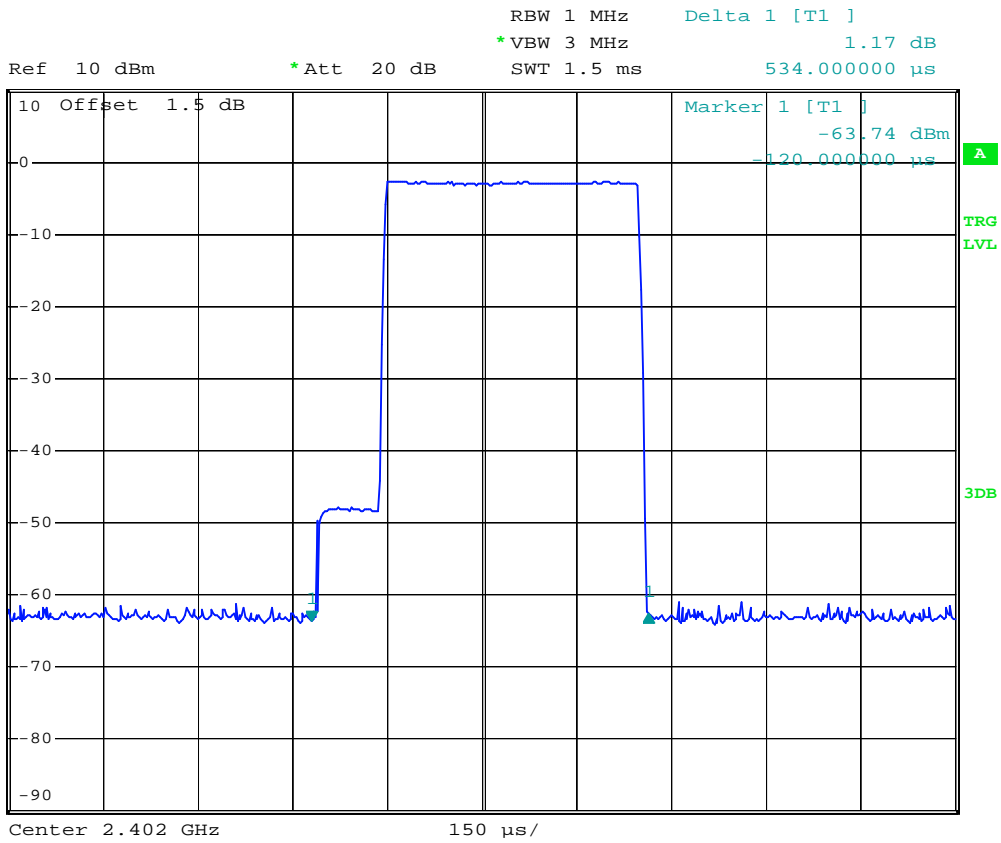
A period transmit time = $0.4 \times 79 = 31.6$				
Dwell time = pulse time $\times (1600/(4*79)) \times 31.6$				
Channel	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
Low	2402	1.797875	287.66	400
Middle	2441	1.815875	290.54	400
High	2480	1.815875	290.54	400

DH5:

A period transmit time = $0.4 \times 79 = 31.6$				
Dwell time = pulse time $\times (1600/(6*79)) \times 31.6$				
Channel	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
Low	2402	3.073	327.7867	400
Middle	2441	3.097	330.3467	400
High	2480	3.081	328.6400	400

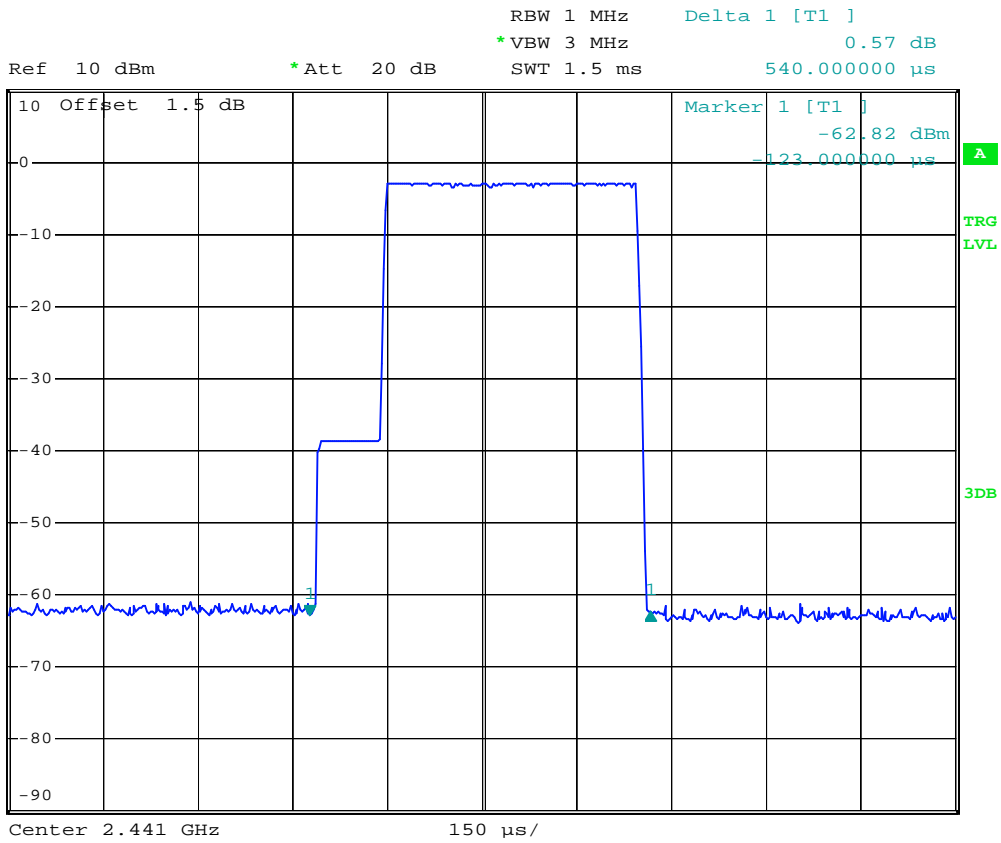
The spectrum analyzer plots are attached as below.

DH1:



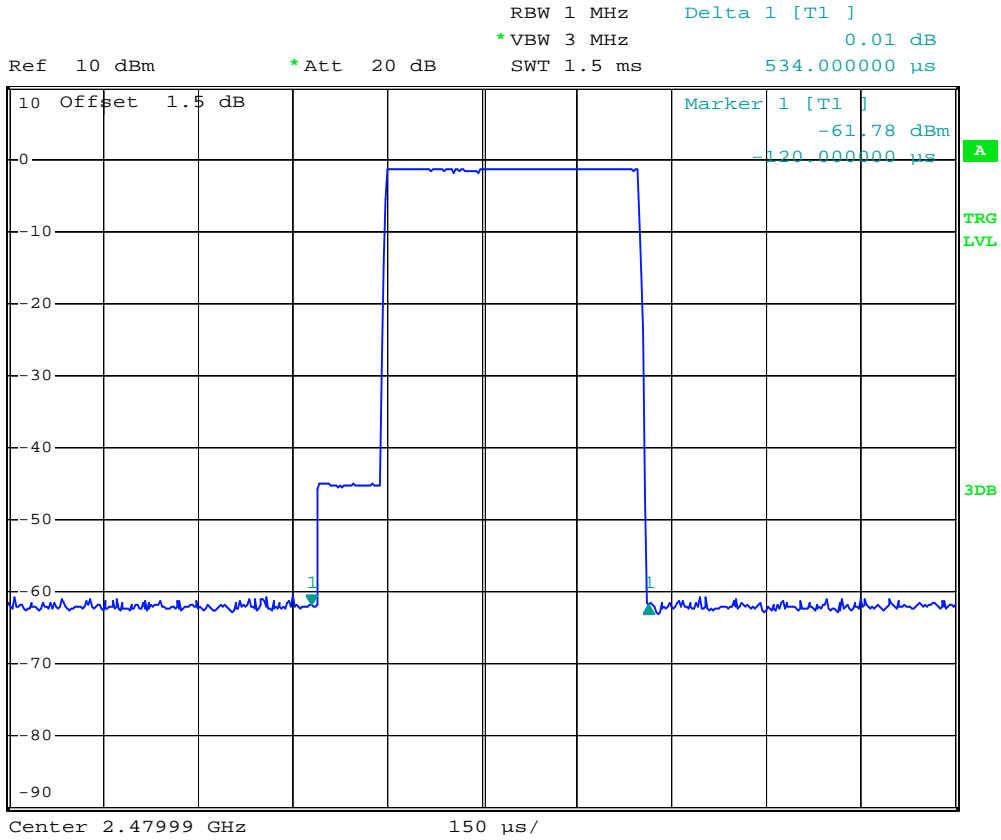
Date: 27.NOV.2012 16:53:15

DH1:



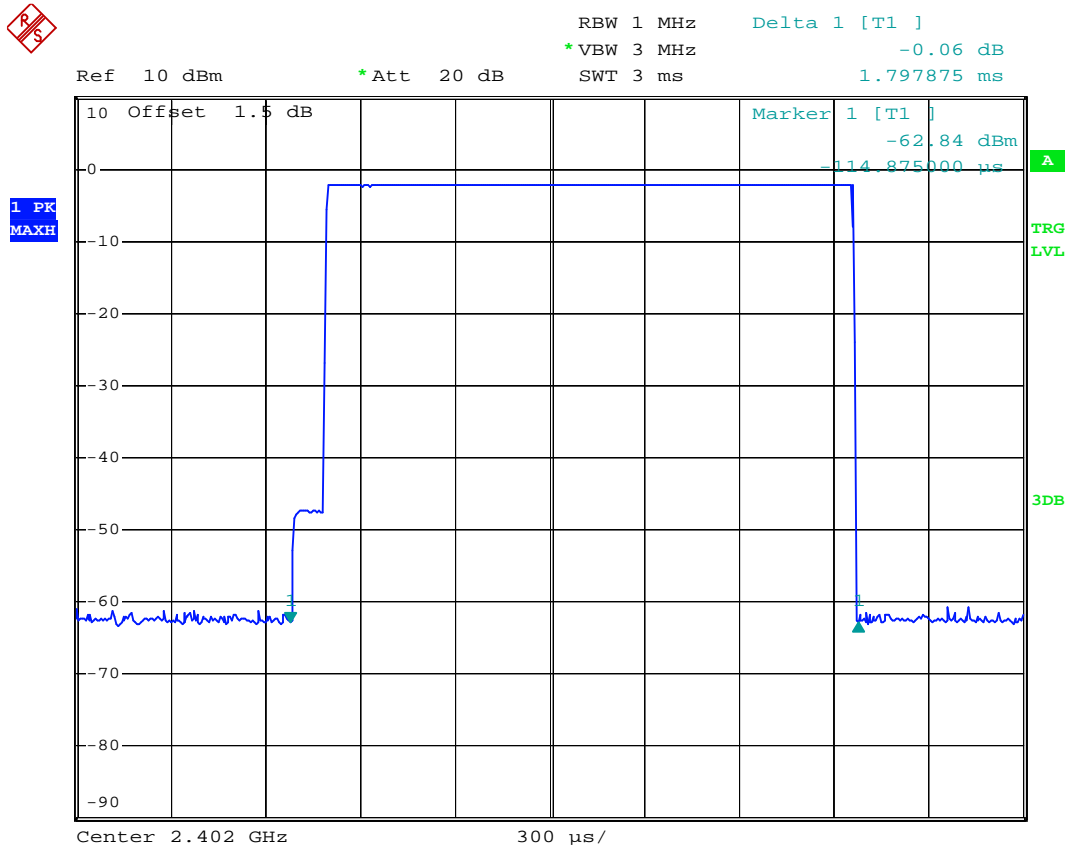
Date: 27.NOV.2012 16:55:22

DH1:



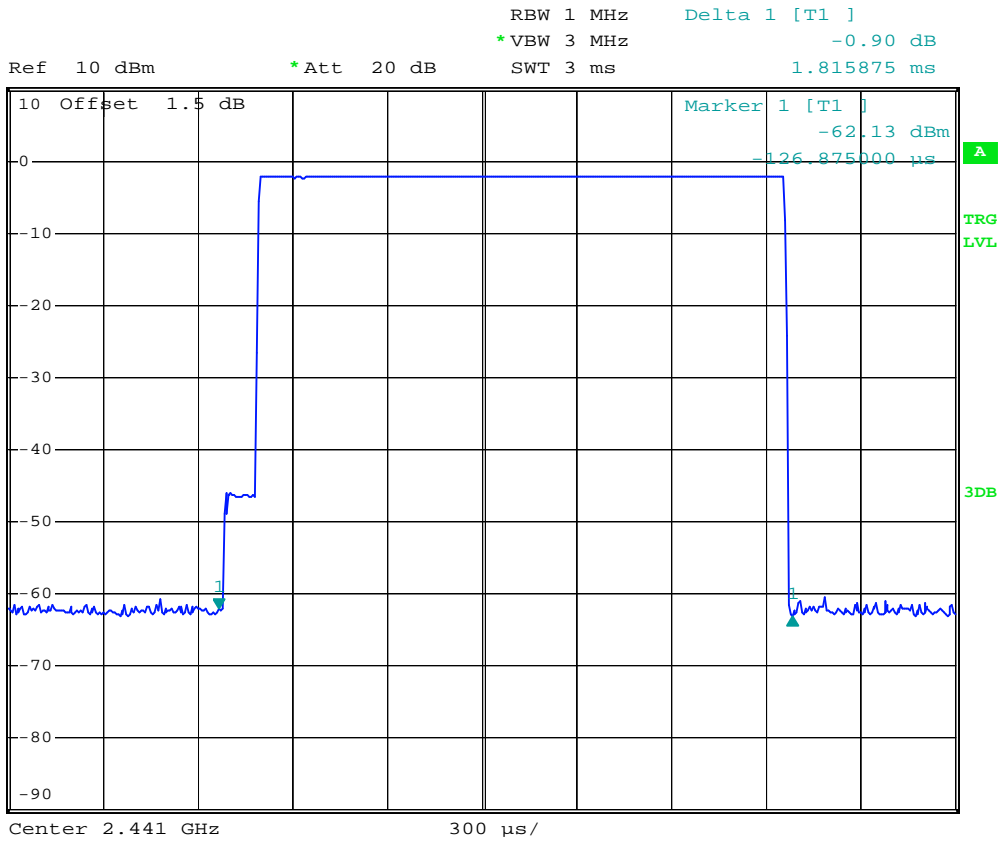
Date: 27.NOV.2012 17:06:05

DH3:



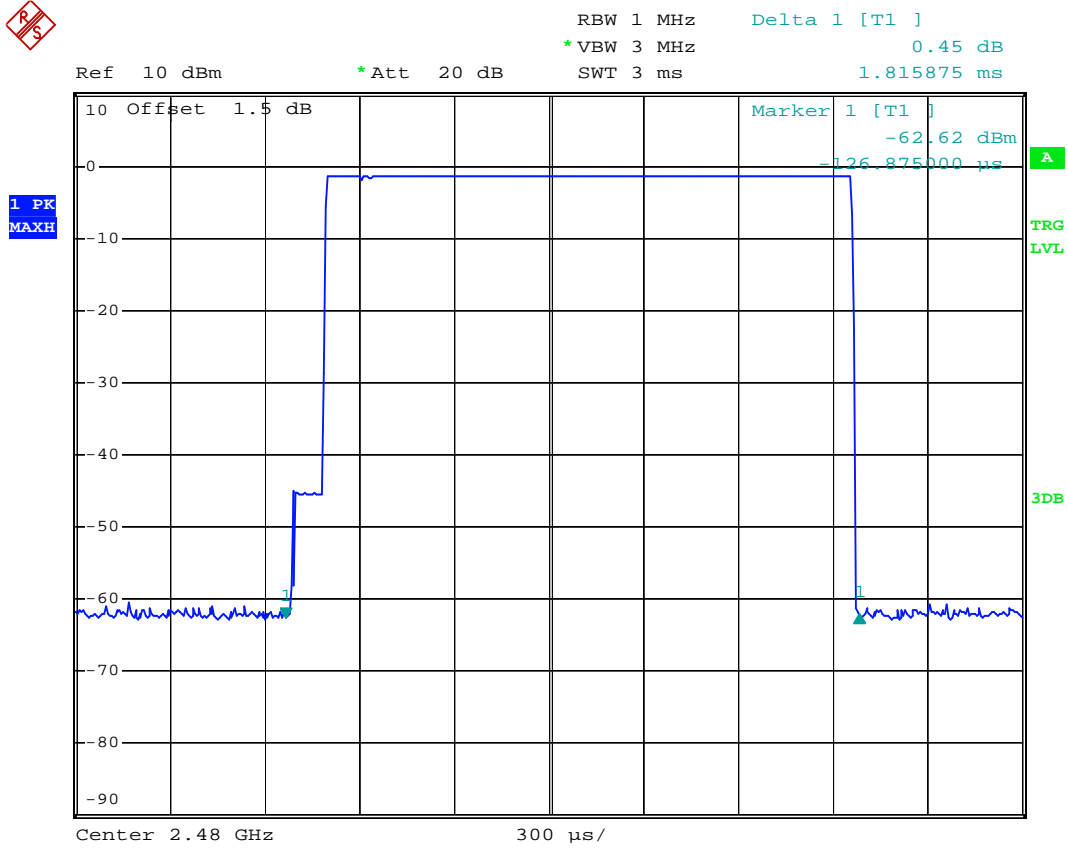
Date: 27.NOV.2012 17:17:30

DH3:



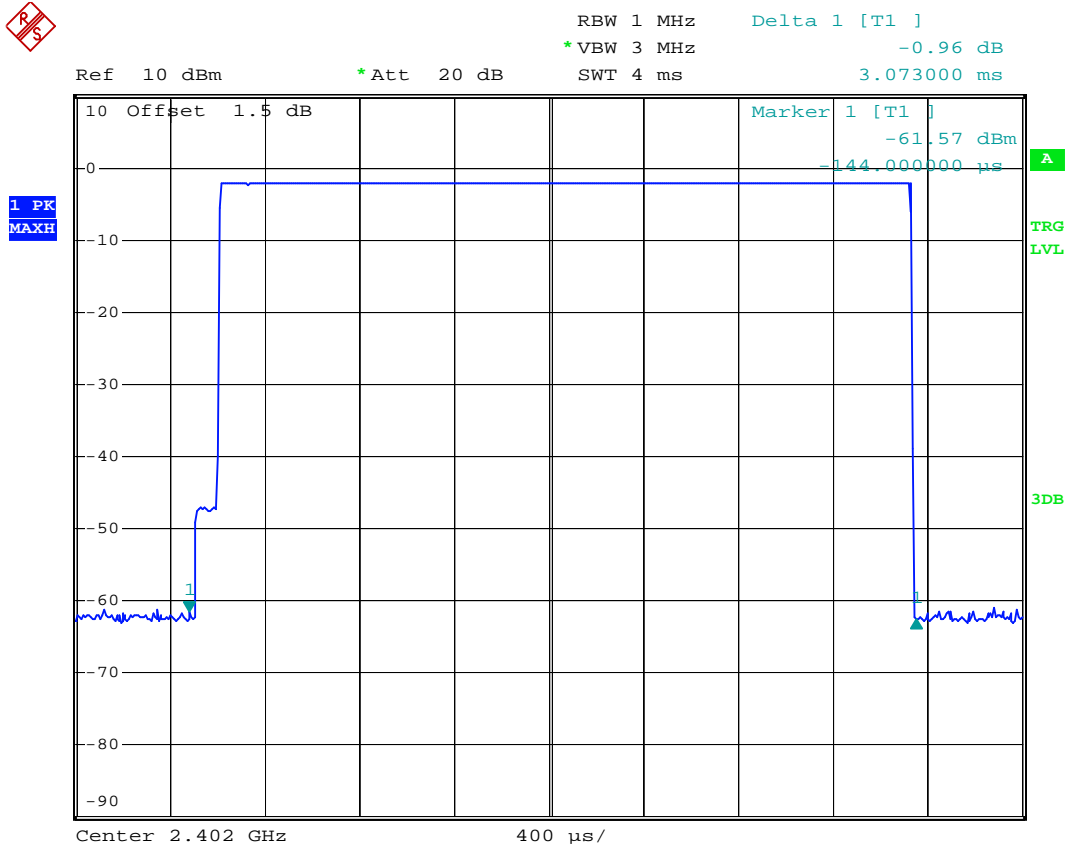
Date: 27.NOV.2012 17:16:40

DH3:



Date: 27.NOV.2012 17:15:54

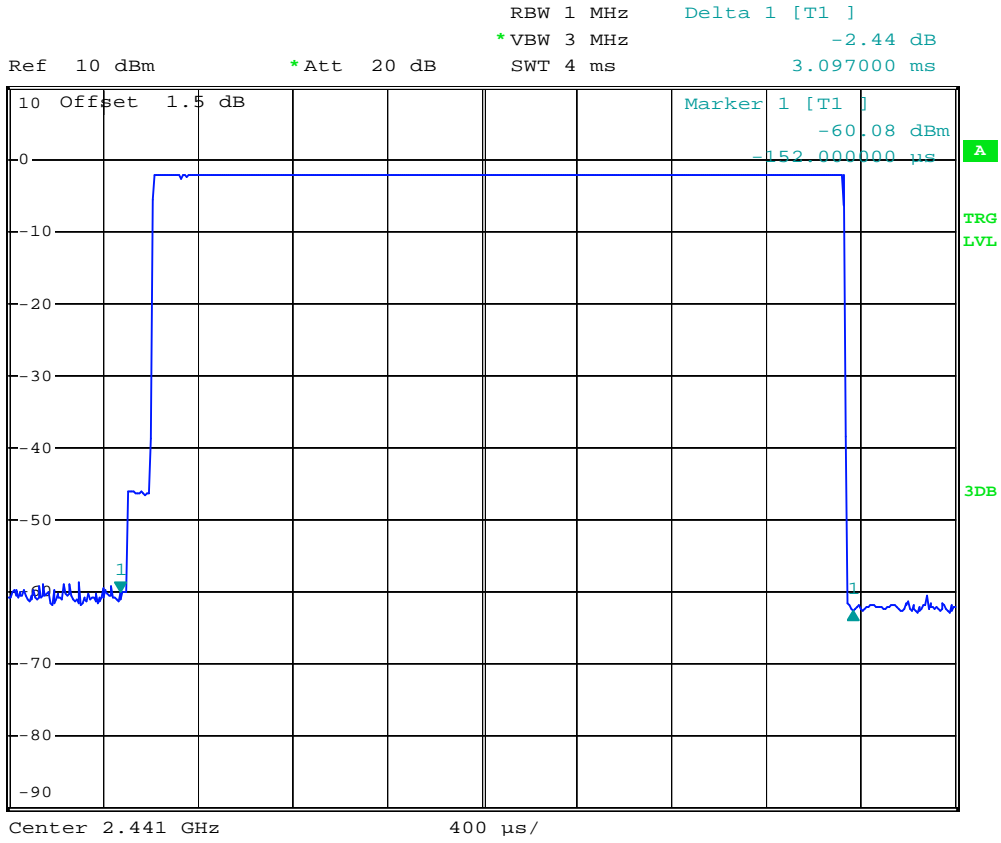
DH5:



Date: 27.NOV.2012 17:20:42

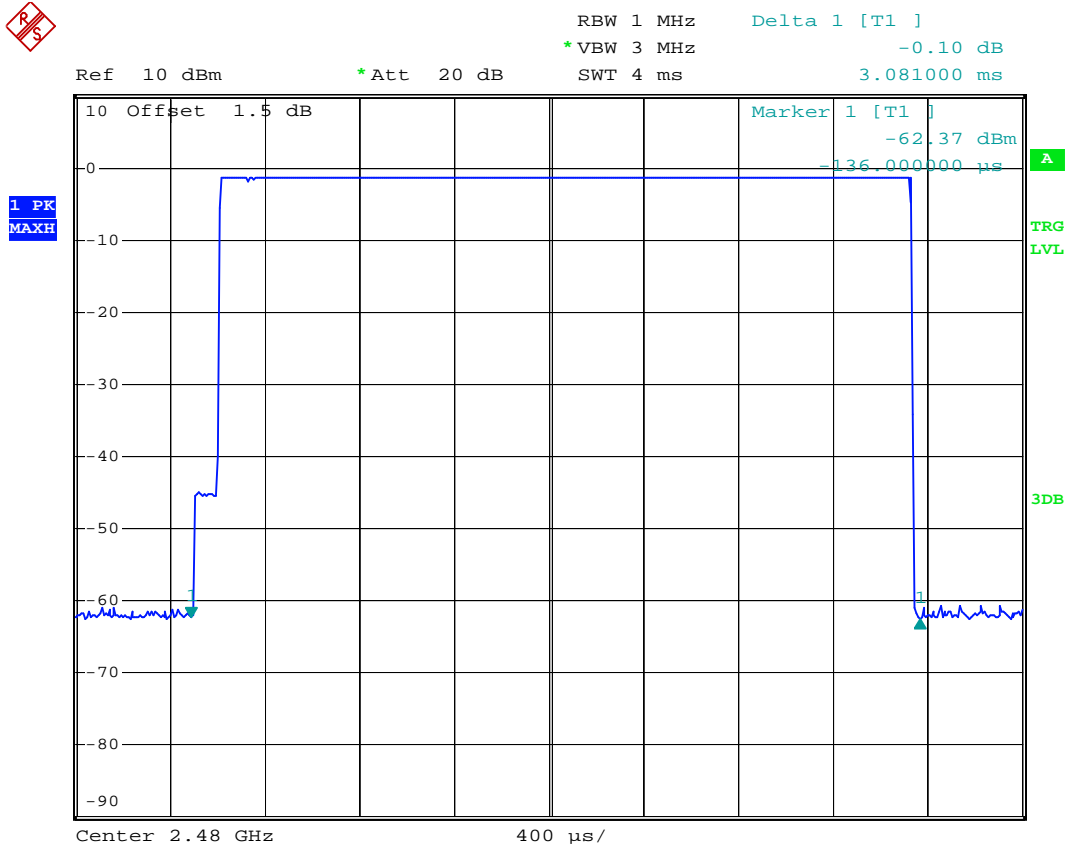


DH5:



Date: 27.NOV.2012 17:21:41

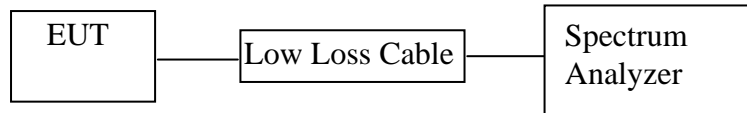
DH5:



Date: 27.NOV.2012 17:23:14

## 9. MAXIMUM PEAK OUTPUT POWER TEST

### 9.1. Block Diagram of Test Setup



(EUT: MULTIMEDIA SPEAKER)

### 9.2. The Requirement For Section 15.247(b)(1)

Section 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.

### 9.3. EUT Configuration on Measurement

The following equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

#### 9.3.1. MULTIMEDIA SPEAKER (EUT)

Model Number : MD212  
 Serial Number : N/A  
 Manufacturer : Microlab Electronics Co., Ltd.

### 9.4. Operating Condition of EUT

9.4.1. Setup the EUT and simulator as shown as Section 9.1.

9.4.2. Turn on the power of all equipment.

9.4.3. Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

## 9.5. Test Procedure

9.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

9.5.2. Set RBW of spectrum analyzer to 3MHz and VBW to 3MHz.

9.5.3. Measurement the maximum peak output power.

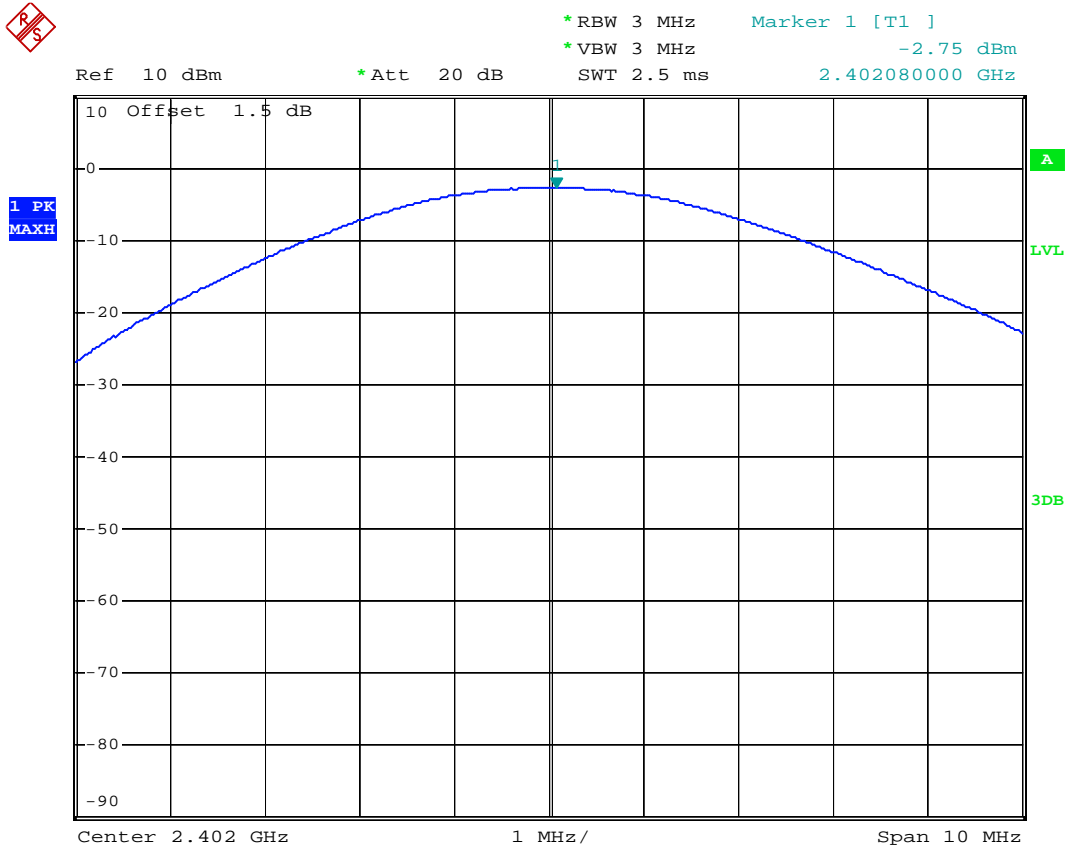
## 9.6. Test Result

**PASS.**

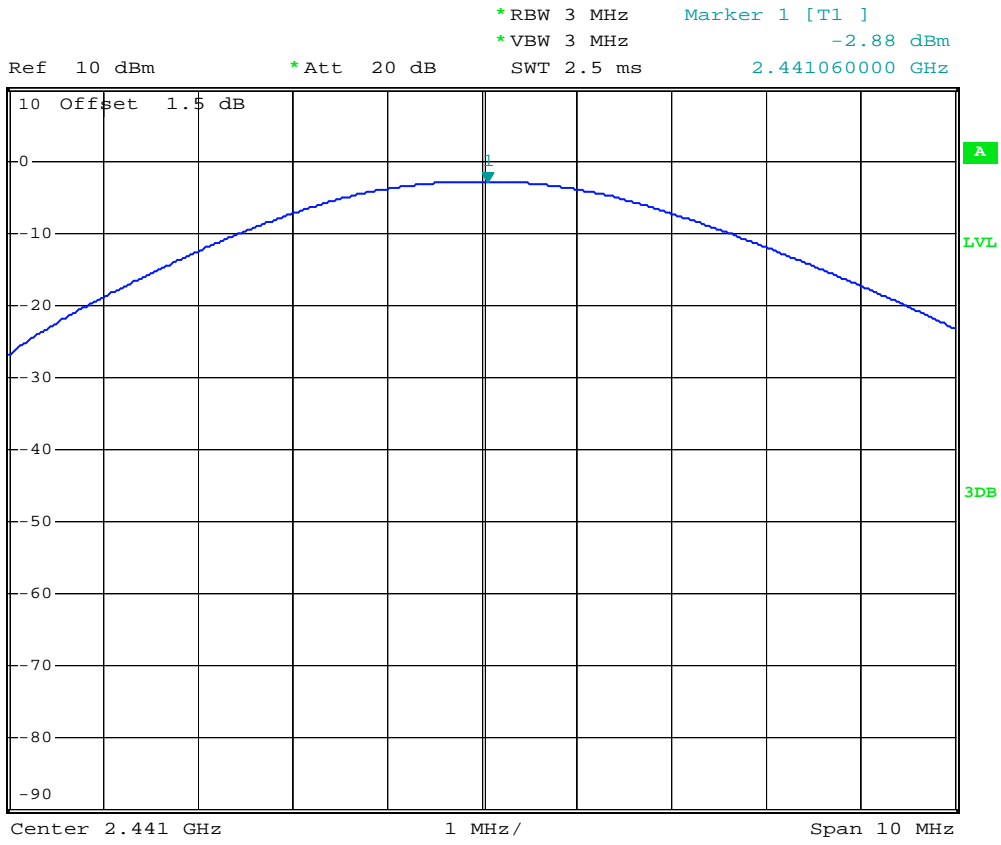
Date of Test:	<u>Nov 27, 2012</u>	Temperature:	<u>25°C</u>
EUT:	<u>MULTIMEDIA SPEAKER</u>	Humidity:	<u>50%</u>
Model No.:	<u>MD212</u>	Power Supply:	<u>DC 5V</u>
Test Mode:	<u>TX</u>	Test Engineer:	<u>Alen</u>

Channel	Frequency (MHz)	Peak Output Power (dBm)	Peak Output Power (mW)	Limits dBm / W
Low	2402	-2.75	0.531	21 / 0.125
Middle	2441	-2.88	0.515	21 / 0.125
High	2480	-1.71	0.675	21 / 0.125

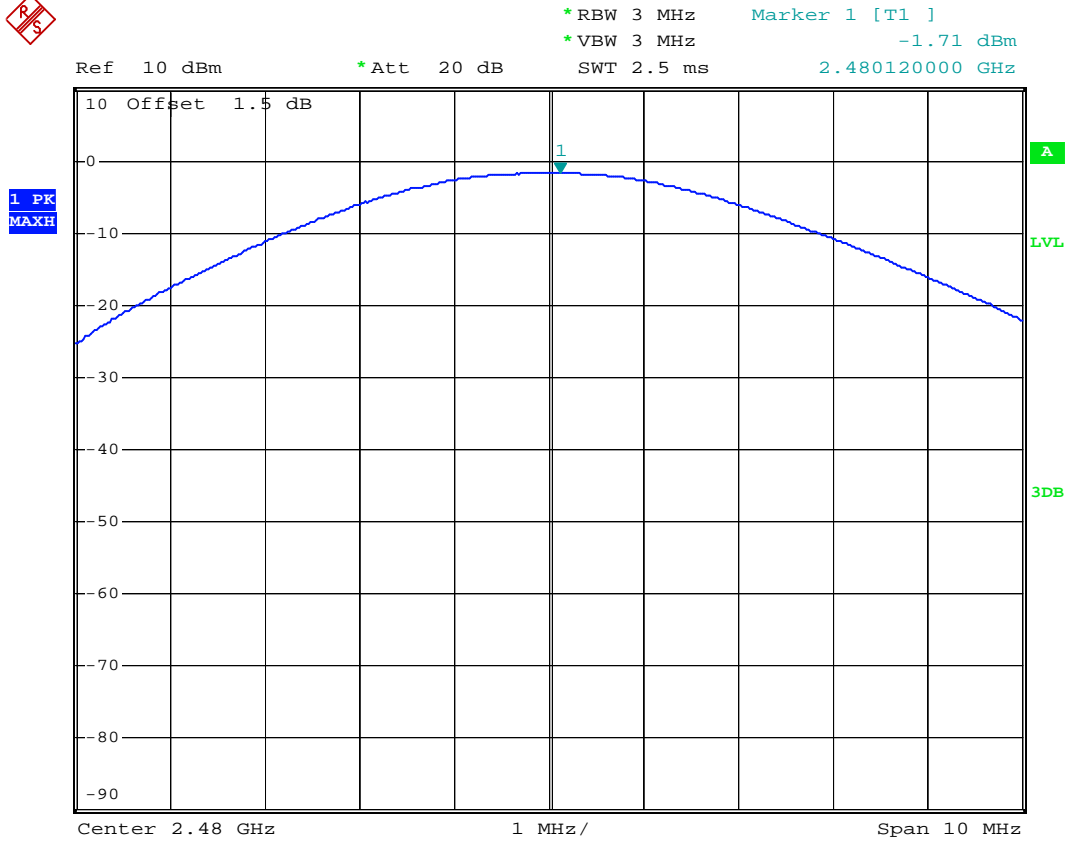
The spectrum analyzer plots are attached as below.



Date: 27.NOV.2012 16:31:31



Date: 27.NOV.2012 16:39:24

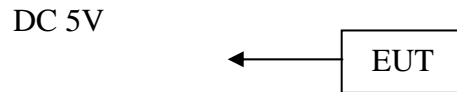


Date: 27.NOV.2012 16:41:32

## 10. RADIATED EMISSION TEST

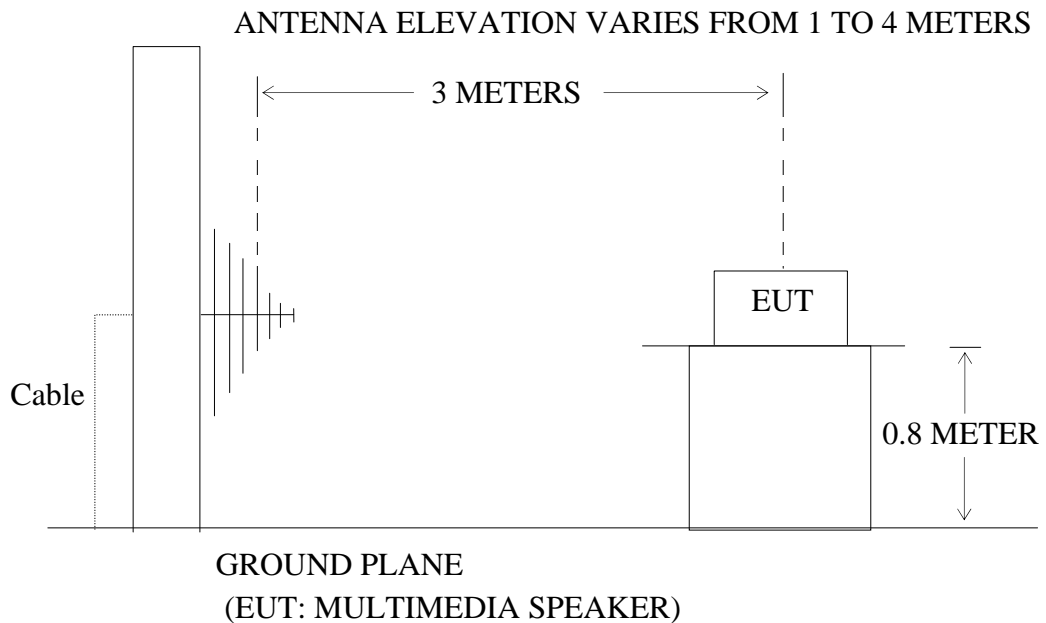
### 10.1. Block Diagram of Test Setup

#### 10.1.1. Block diagram of connection between the EUT and simulators



(EUT: MULTIMEDIA SPEAKER)

#### 10.1.2. Anechoic Chamber Test Setup Diagram



(EUT: MULTIMEDIA SPEAKER)

### 10.2. The Limit For Section 15.247(d)

Section 15.247(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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. 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).



### 10.3.Restricted bands of operation

#### 10.3.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
<sup>1</sup> 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	( <sup>2</sup> )
13.36-13.41			

<sup>1</sup>Until February 1, 1999, this restricted band shall be 0.490-0.510

<sup>2</sup>Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

### 10.4.Configuration of EUT on Measurement

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

#### 10.4.1.MULTIMEDIA SPEAKER (EUT)

Model Number : MD212  
 Serial Number : N/A  
 Manufacturer : Microlab Electronics Co., Ltd.

## 10.5. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bilog antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4: 2009 on radiated emission measurement.

The bandwidth of test receiver (R&S ESI26) is set at 120 KHz in 30-1000MHz. and set at 1MHz in above 1000MHz.

The frequency range from 30MHz to 25000MHz is checked.

The final measurement in band 9-90 kHz, 110-490 kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

The field strength is calculated by adding the antenna factor, and cable loss, and subtracting the amplifier gain from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

Where Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

## 10.6. The Field Strength of Radiation Emission Measurement Results

**PASS.**

Date of Test:	Nov 23, 2012	Temperature:	25°C
EUT:	MULTIMEDIA SPEAKER	Humidity:	50%
Model No.:	MD212	Power Supply:	DC 5V
Test Mode:	TX (2402MHz)	Test Engineer:	Alen

### For 30MHz-1000MHz

Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

Frequency (MHz)	Reading (dBμV/m)	Factor Corr. (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
	QP		QP	QP	QP	
218.4098	17.63	14.63	32.26	46.00	-13.74	Horizontal

### For 1GHz-25GHz

Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

Frequency (MHz)	Reading(dBμV/m)		Factor Corr. (dB)	Result(dBμV/m)		Limit(dBμV/m)		Margin(dBμV/m)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
4804.000	48.07	53.32	-0.71	47.36	52.61	54.00	74.00	-6.64	-21.39	Vertical
4804.000	48.69	56.90	-0.71	47.98	56.19	54.00	74.00	-6.02	-17.81	Horizontal

**Note: 1. The emission emitted by the EUT is too low to be measured except the emission listed above.**

**2. \*: Denotes restricted band of operation.**

**3. The fundamental radiated emissions were reduced by 2.4G Band Reject Filter in the attached plots.**

Date of Test:	<u>Nov 23, 2012</u>	Temperature:	<u>25°C</u>
EUT:	<u>MULTIMEDIA SPEAKER</u>	Humidity:	<u>50%</u>
Model No.:	<u>MD212</u>	Power Supply:	<u>DC 5V</u>
Test Mode:	<u>TX (2441MHz)</u>	Test Engineer:	<u>Alen</u>

**For 30MHz-1000MHz**

Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

Frequency (MHz)	Reading (dBμV/m)	Factor Corr. (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Polarization
	QP		QP	QP	QP	
218.4098	18.41	14.63	33.04	46.00	-12.96	Horizontal

**For 1GHz-25GHz**

Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

Frequency (MHz)	Reading(dBμV/m)		Factor Corr. (dB)	Result(dBμV/m)		Limit(dBμV/m)		Margin(dBμV/m)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
4882.000	50.21	56.27	-0.23	49.98	56.04	54.00	74.00	-4.02	-17.96	Vertical
4882.000	50.04	55.35	-0.23	49.81	55.12	54.00	74.00	-4.19	-18.88	Horizontal

**Note: 1.** The emission emitted by the EUT is too low to be measured except the emission listed above.

**2. \*** Denotes restricted band of operation.

**3.** The fundamental radiated emissions were reduced by 2.4G Band Reject Filter in the attached plots.

Date of Test:	<u>Nov 23, 2012</u>	Temperature:	<u>25°C</u>
EUT:	<u>MULTIMEDIA SPEAKER</u>	Humidity:	<u>50%</u>
Model No.:	<u>MD212</u>	Power Supply:	<u>DC 5V</u>
Test Mode:	<u>TX (2480MHz)</u>	Test Engineer:	<u>Alen</u>

**For 30MHz-1000MHz**

Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

Frequency (MHz)	Reading (dB $\mu$ V/m)	Factor Corr. (dB)	Result (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Polarization
	QP		QP	QP	QP	
217.6437	18.32	14.61	32.93	46.00	-13.07	Horizontal

**For 1GHz-25GHz**

Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

Frequency (MHz)	Reading(dB $\mu$ V/m)		Factor Corr. (dB)	Result(dB $\mu$ V/m)		Limit(dB $\mu$ V/m)		Margin(dB $\mu$ V/m)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
4960.000	47.36	51.73	0.24	47.66	52.03	54.00	74.00	-6.34	-21.97	Vertical
4960.000	46.98	52.06	0.24	47.22	52.30	54.00	74.00	-6.78	-21.70	Horizontal

**Note: 1.** The emission emitted by the EUT is too low to be measured except the emission listed above.

**2. \*** Denotes restricted band of operation.

**3.** The fundamental radiated emissions were reduced by 2.4G Band Reject Filter in the attached plots.



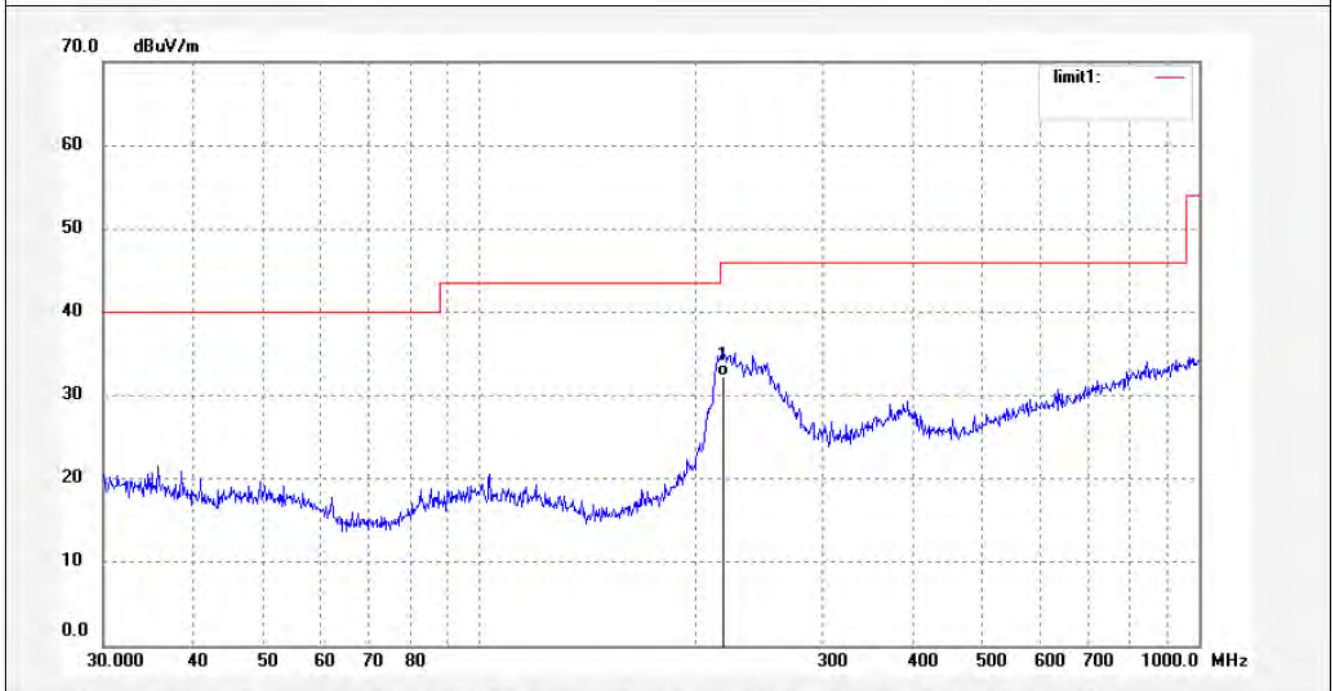
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg.A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: alen #545	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/23/
Temp.( C)/Hum.(%) 23 C / 49 %	Time: 8/44/45
EUT: MULTIMEDIA SPEAKER	Engineer Signature:
Mode: TX 2402MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	218.4098	17.63	14.63	32.26	46.00	-13.74	QP			



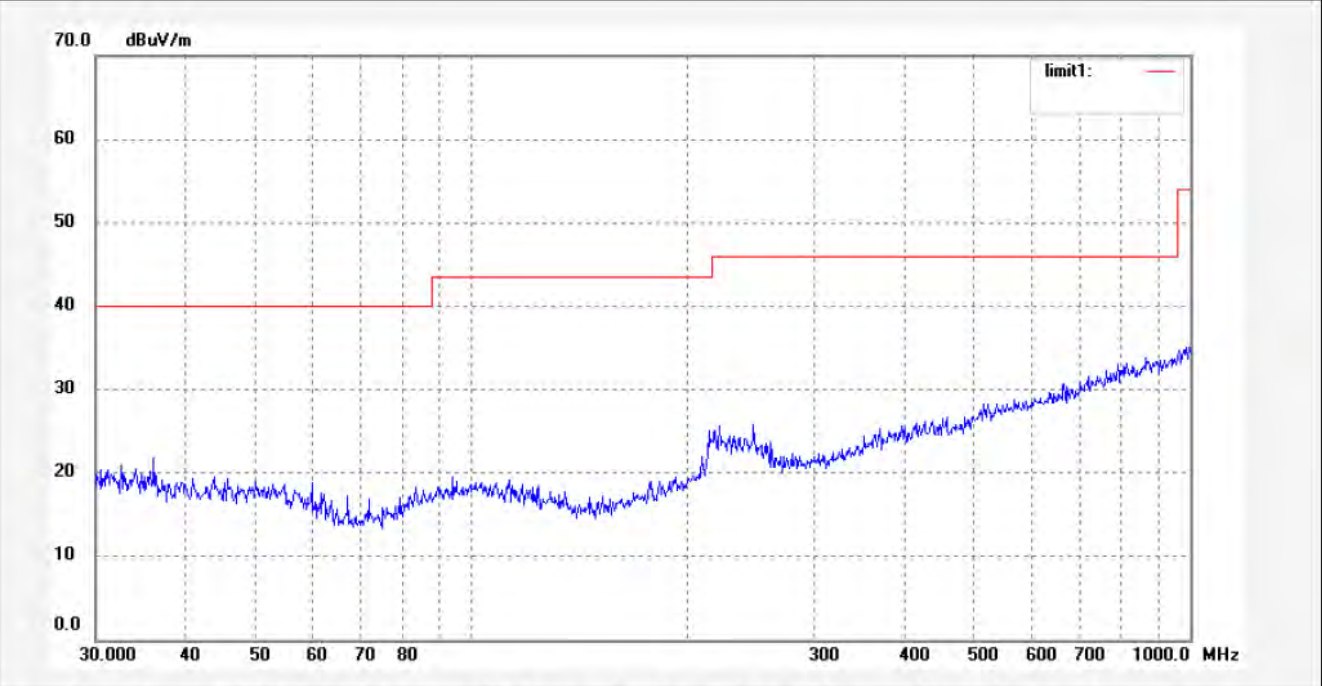
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: alen #546	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/23/
Temp.( C)/Hum.(%) 23 C / 49 %	Time: 8/45/54
EUT: MULTIMEDIA SPEAKER	Engineer Signature:
Mode: TX 2402MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
-----	-------------	------------------	-------------	-----------------	----------------	-------------	----------	-------------	---------------	--------



**ACCURATE TECHNOLOGY CO., LTD.**

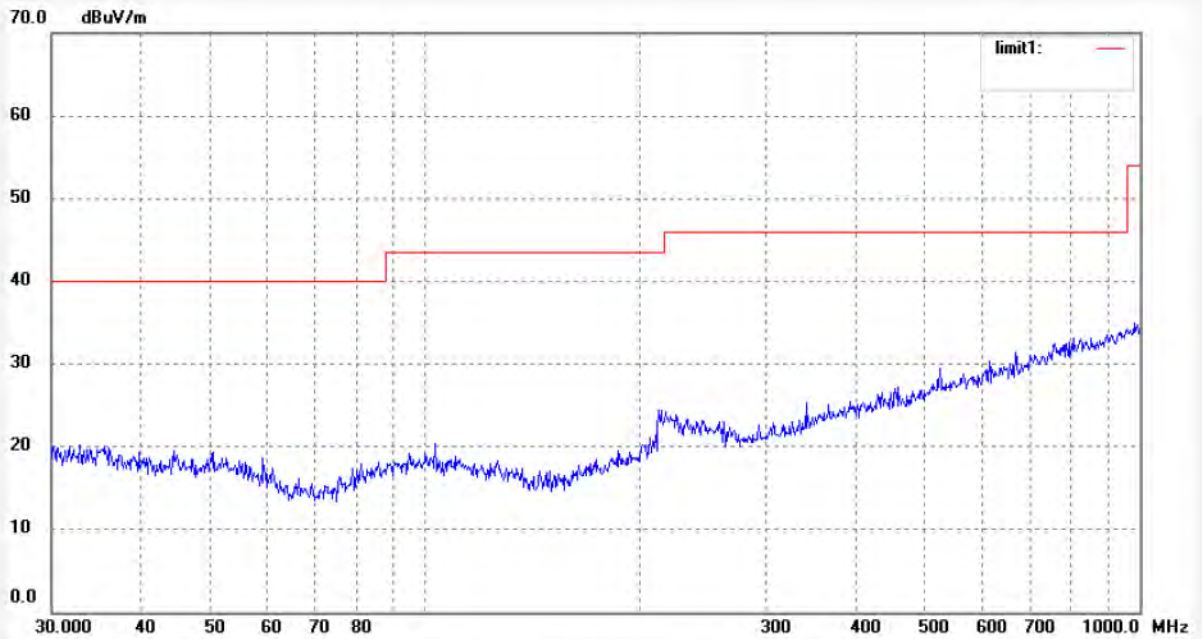
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: alen #547  
Standard: FCC Class B 3M Radiated  
Test item: Radiation Test  
Temp.( C)/Hum.(%) 23 C / 49 %  
EUT: MULTIMEDIA SPEAKER  
Mode: TX 2441MHz  
Model: MD212  
Manufacturer: MICROLAB

Polarization: Vertical  
Power Source: DC 5V  
Date: 12/11/23/  
Time: 8/46/50  
Engineer Signature:  
Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark





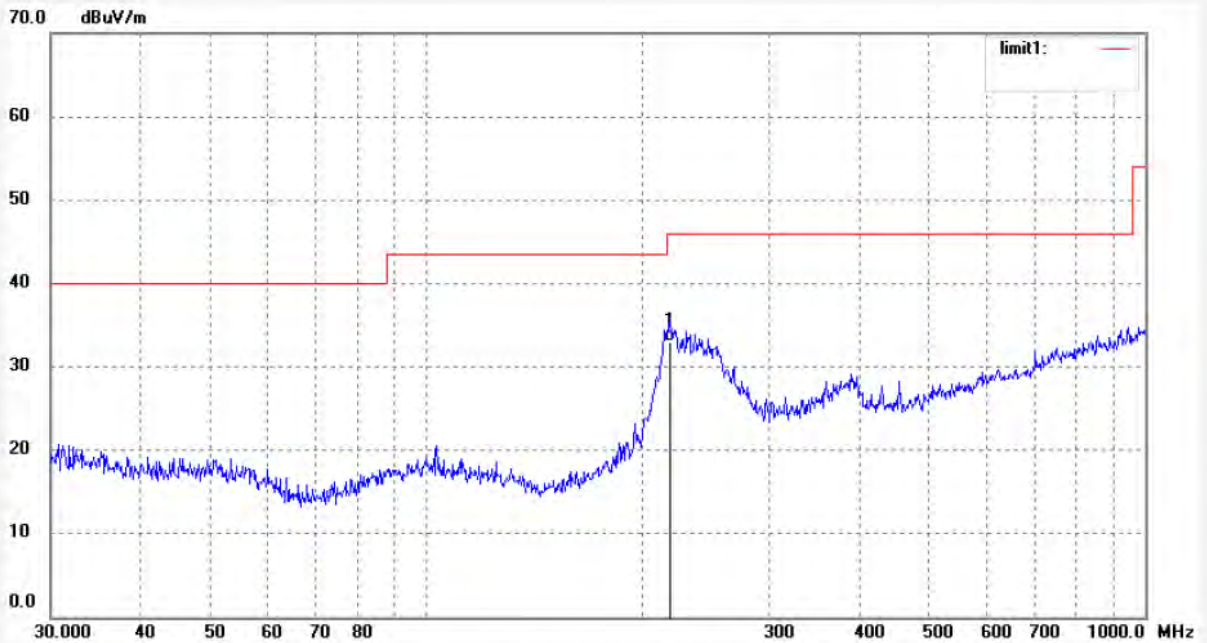
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: alen #548	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/23/
Temp.( C)/Hum.(%) 23 C / 49 %	Time: 8/47/49
EUT: MULTIMEDIA SPEAKER	Engineer Signature:
Mode: TX 2441MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	218.4098	18.41	14.63	33.04	46.00	-12.96	QP			



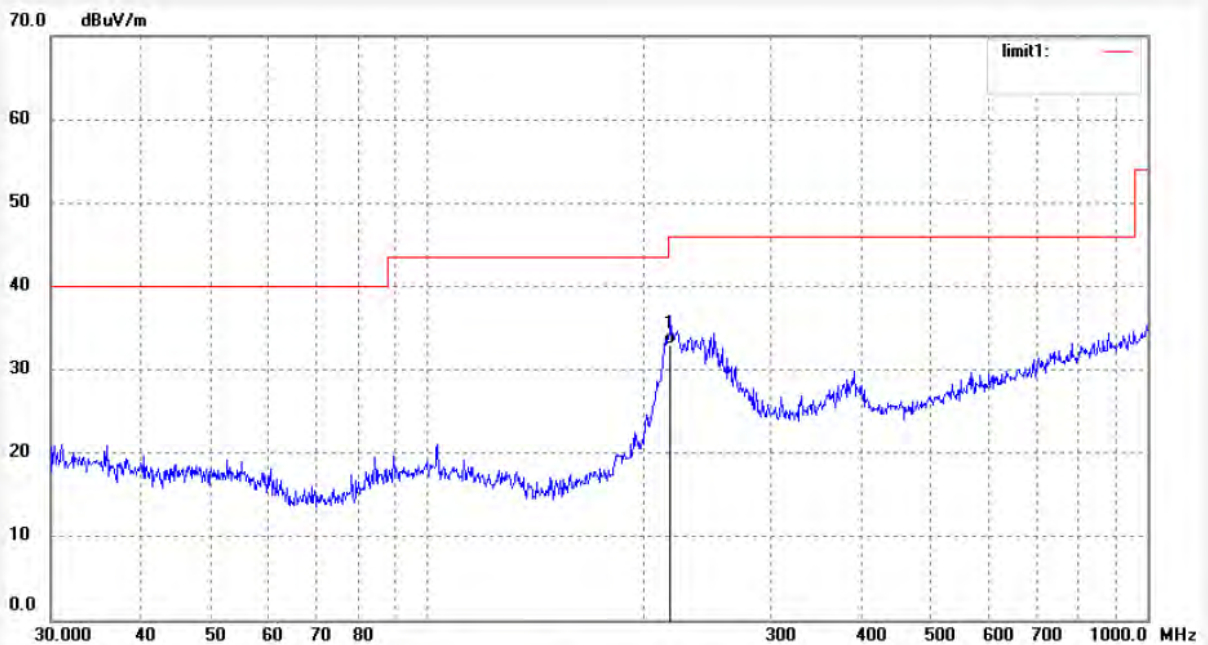
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: alen #549	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/23/
Temp.( C)/Hum.(%) 23 C / 49 %	Time: 8/48/48
EUT: MULTIMEDIA SPEAKER	Engineer Signature:
Mode: TX 2480MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	217.6437	18.32	14.61	32.93	46.00	-13.07	QP			



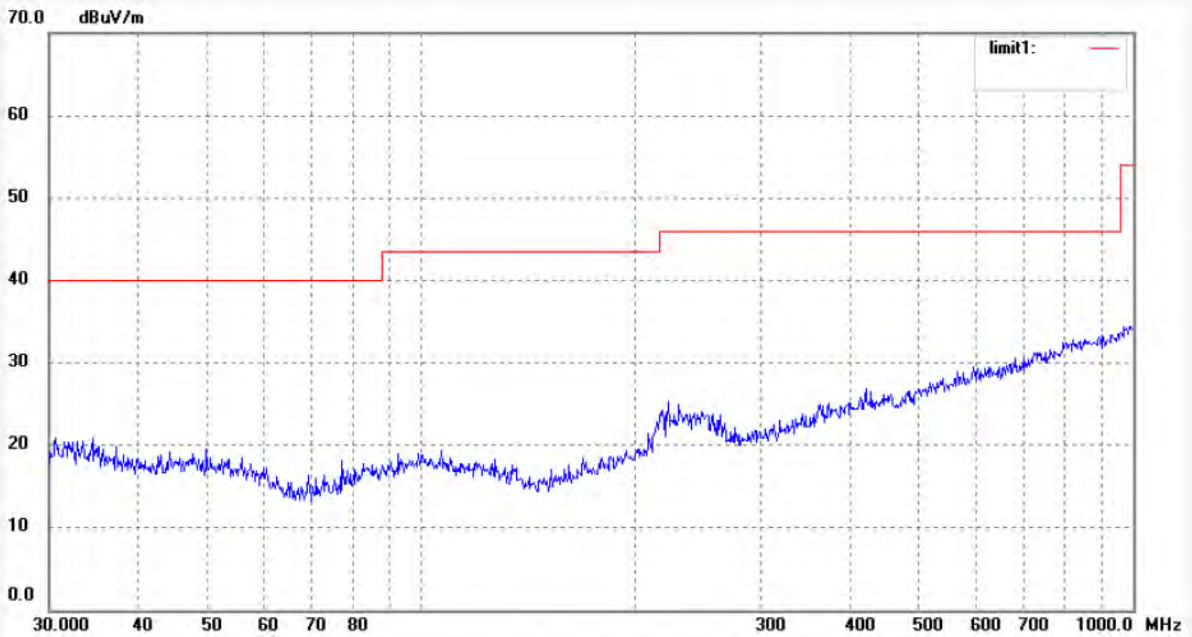
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: alen #550	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/23/
Temp.( C)/Hum.(%) 23 C / 49 %	Time: 8/50/08
EUT: MULTIMEDIA SPEAKER	Engineer Signature:
Mode: TX 2480MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
-----	-------------	------------------	-------------	-----------------	----------------	-------------	----------	-------------	---------------	--------



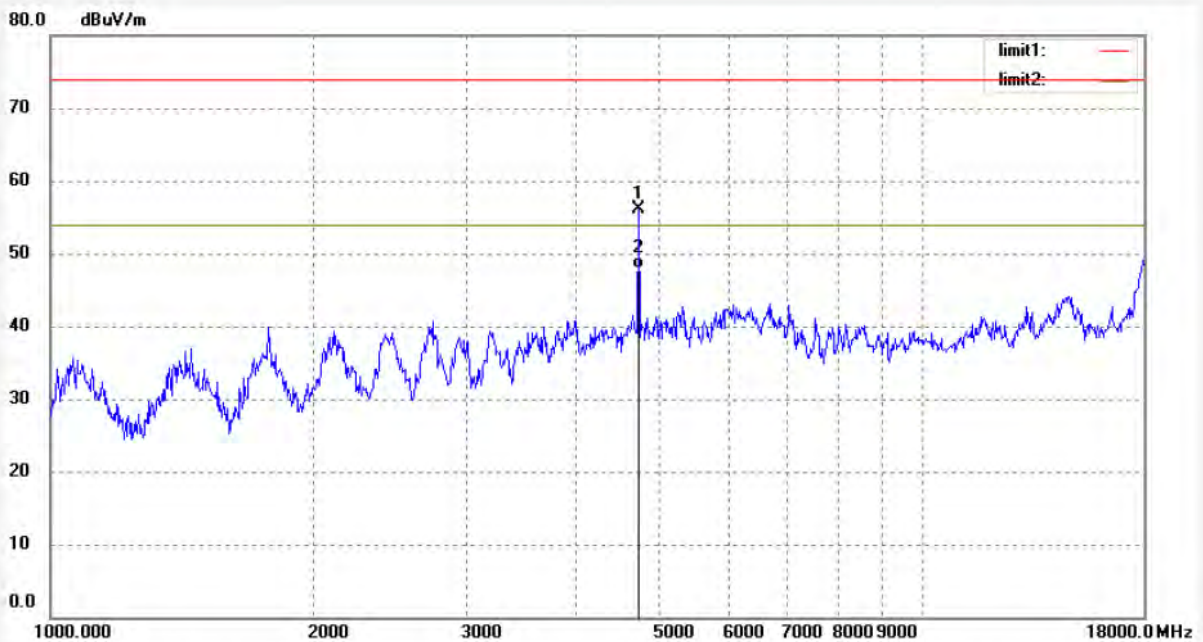
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: ALEN #578	Polarization: Vertical
Standard: FCC 15C PK	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/26/
Temp.( C)/Hum.(%) 23 C / 49 %	Time: 9/18/31
EUT: MULTIMEDIA SPEAKER	Engineer Signature:
Mode: TX 2402MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	4804.000	56.90	-0.71	56.19	74.00	-17.81	peak			
2	4804.000	48.69	-0.71	47.98	54.00	-6.02	AVG			



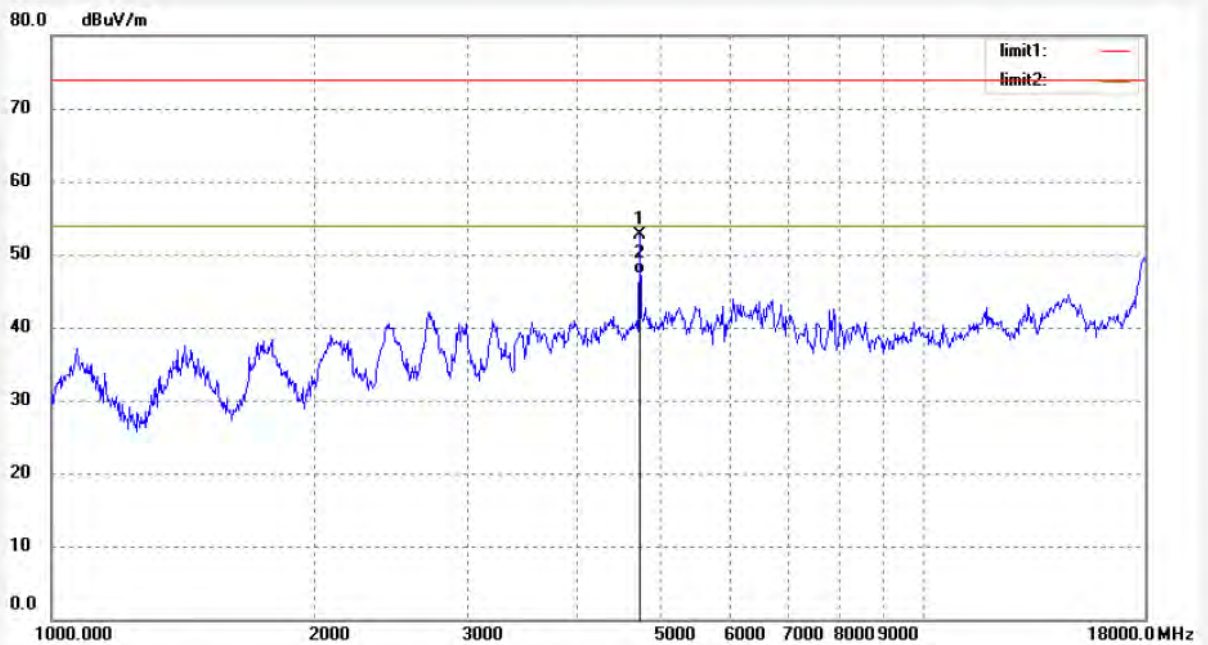
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: ALEN #579	Polarization: Horizontal
Standard: FCC 15C PK	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/26/
Temp.( C)/Hum.(%) 23 C / 49 %	Time: 9/21/32
EUT: MULTIMEDIA SPEAKER	Engineer Signature:
Mode: TX 2402MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	4804.000	53.32	-0.71	52.61	74.00	-21.39	peak			
2	4804.000	48.07	-0.71	47.36	54.00	-6.64	AVG			



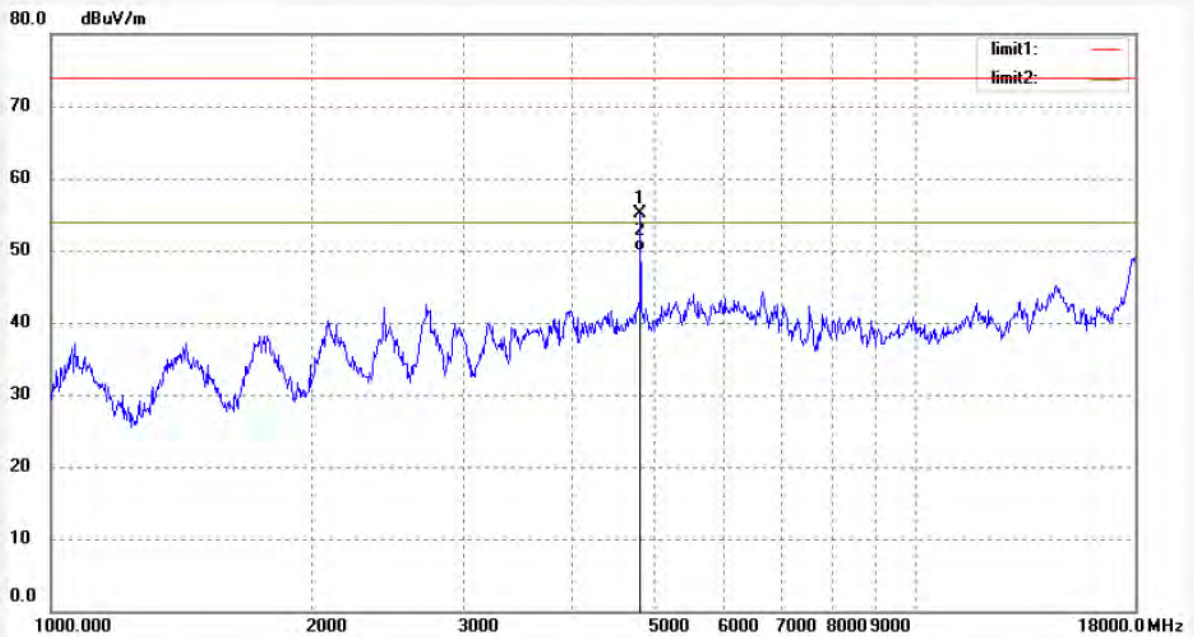
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: ALEN #580	Polarization: Horizontal
Standard: FCC 15C PK	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/26/
Temp.( C)/Hum.(%) 23 C / 49 %	Time: 9/23/10
EUT: MULTIMEDIA SPEAKER	Engineer Signature:
Mode: TX 2441MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	4882.000	55.35	-0.23	55.12	74.00	-18.88	peak			
2	4882.000	50.04	-0.23	49.81	54.00	-4.19	AVG			



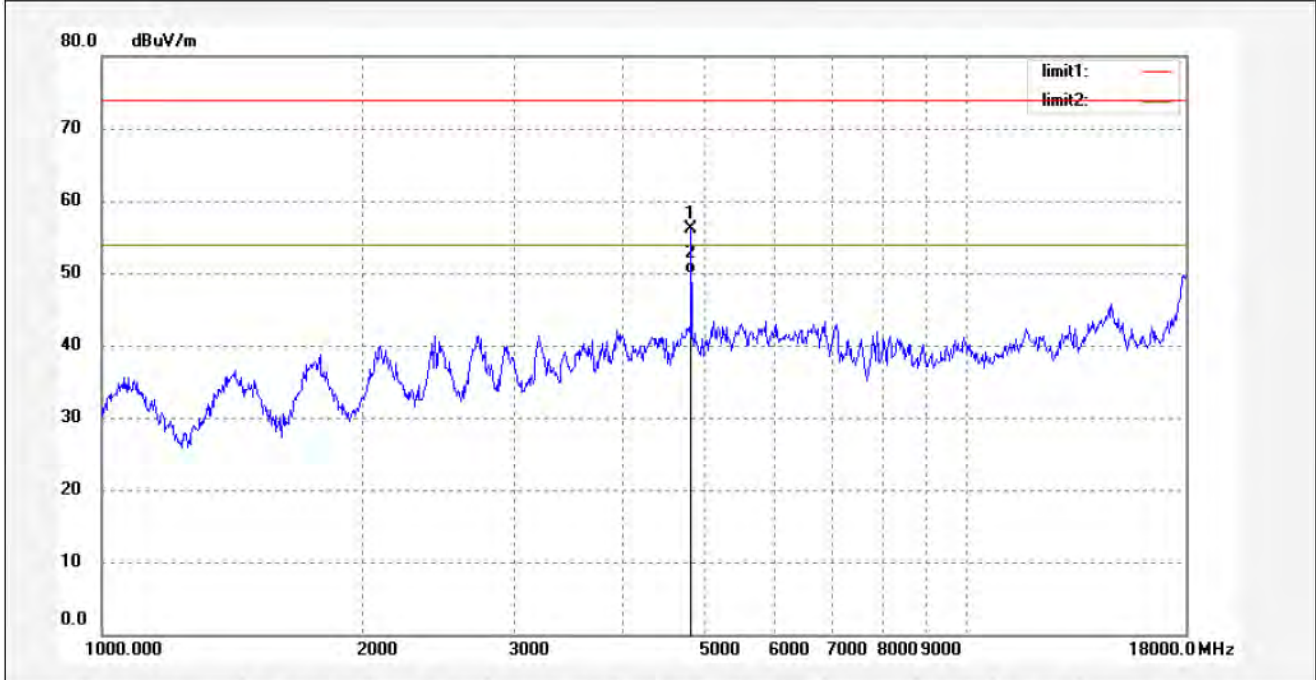
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: ALEN #581	Polarization: Vertical
Standard: FCC 15C PK	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/26/
Temp.( C)/Hum.(%) 23 C / 49 %	Time: 9/24/31
EUT: MULTIMEDIA SPEAKER	Engineer Signature:
Mode: TX 2441MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	4882.000	56.27	-0.23	56.04	74.00	-17.96	peak			
2	4882.000	50.21	-0.23	49.98	54.00	-4.02	AVG			



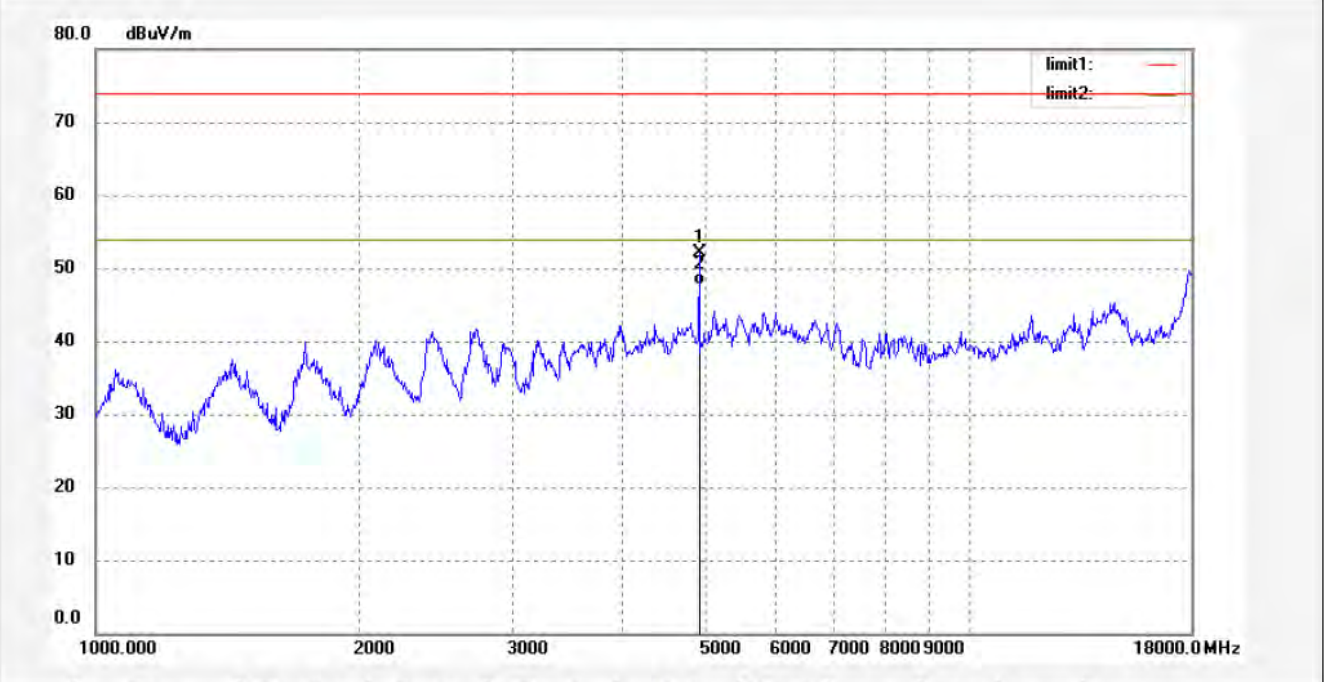
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: ALEN #582	Polarization: Vertical
Standard: FCC 15C PK	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/26/
Temp.( C)/Hum.(%) 23 C / 49 %	Time: 9/26/13
EUT: MULTIMEDIA SPEAKER	Engineer Signature:
Mode: TX 2480MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	4960.000	51.73	0.30	52.03	74.00	-21.97	peak			
2	4960.000	47.36	0.30	47.66	54.00	-6.34	AVG			





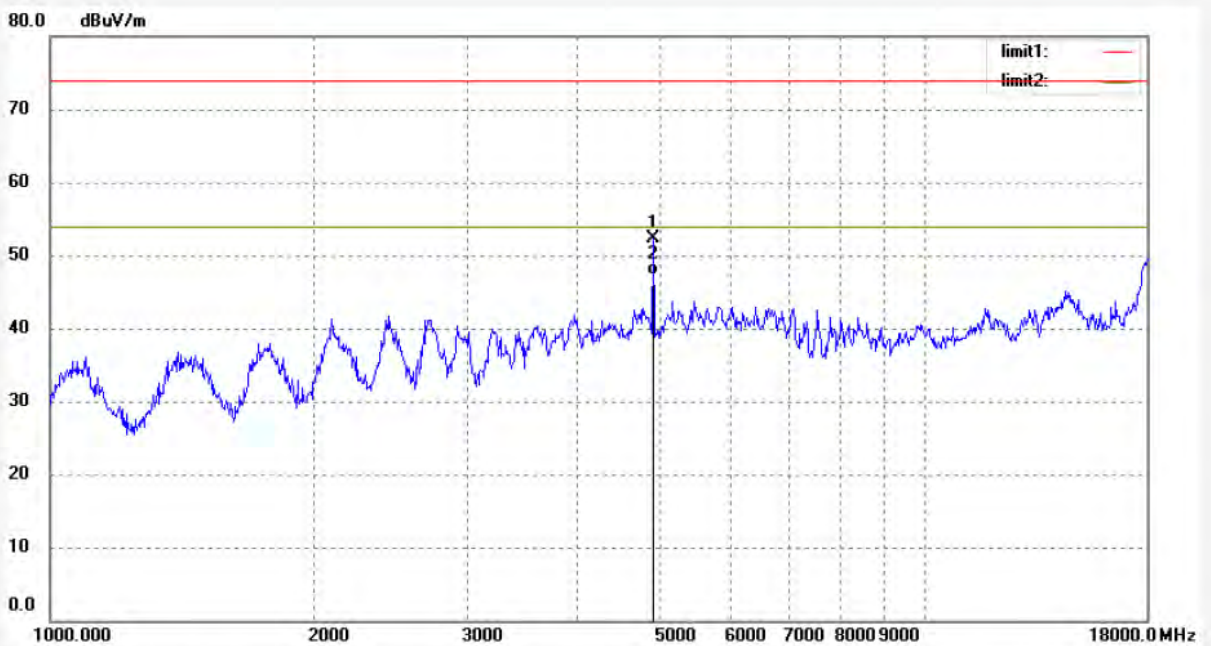
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: ALEN #583	Polarization: Horizontal
Standard: FCC 15C PK	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/26/
Temp.( C)/Hum.(%) 23 C / 49 %	Time: 9/27/11
EUT: MULTIMEDIA SPEAKER	Engineer Signature:
Mode: TX 2480MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	4960.000	52.06	0.24	52.30	74.00	-21.70	peak			
2	4960.000	46.98	0.24	47.22	54.00	-6.78	AVG			



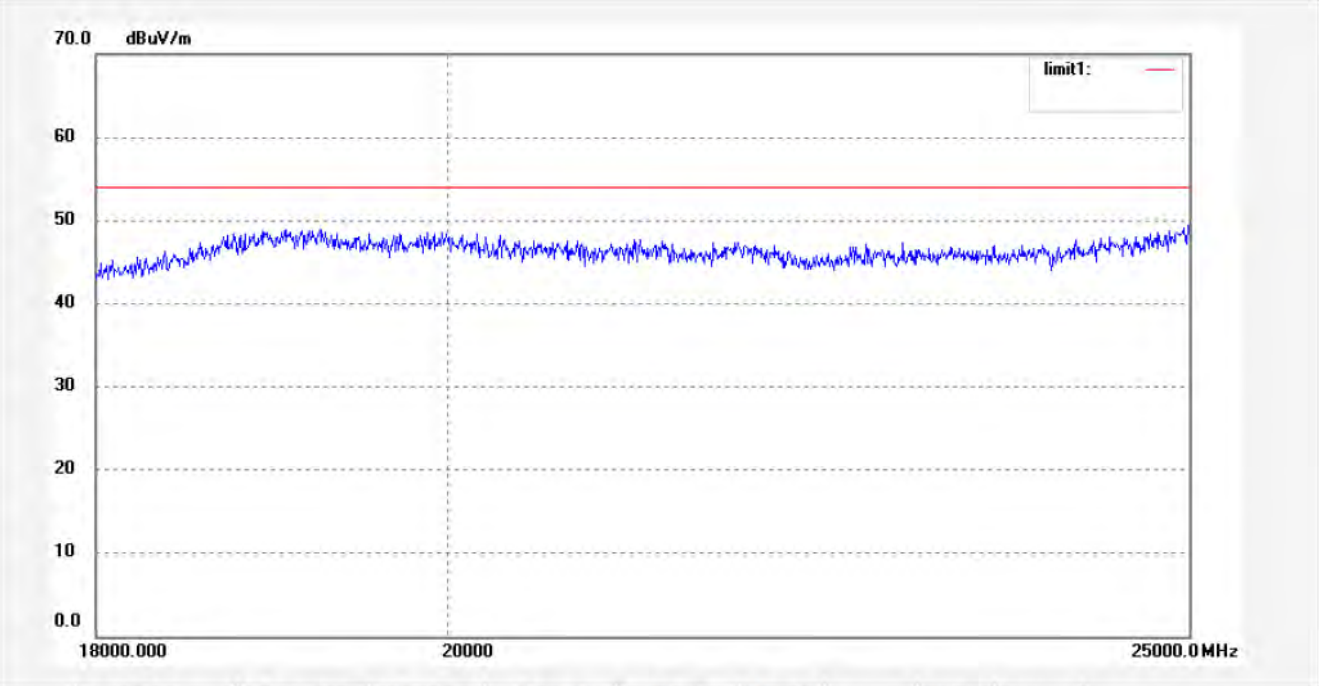
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: Alen #648	Polarization: Vertical
Standard: FCC 15C	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/27/
Temp.( C)/Hum.(%) 25 C / 50 %	Time: 10:32:05
EUT: MULTIMEDIA SPEAKER	Engineer Signature: Alen
Mode: TX 2402MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
-----	-------------	------------------	-------------	-----------------	----------------	-------------	----------	-------------	---------------	--------



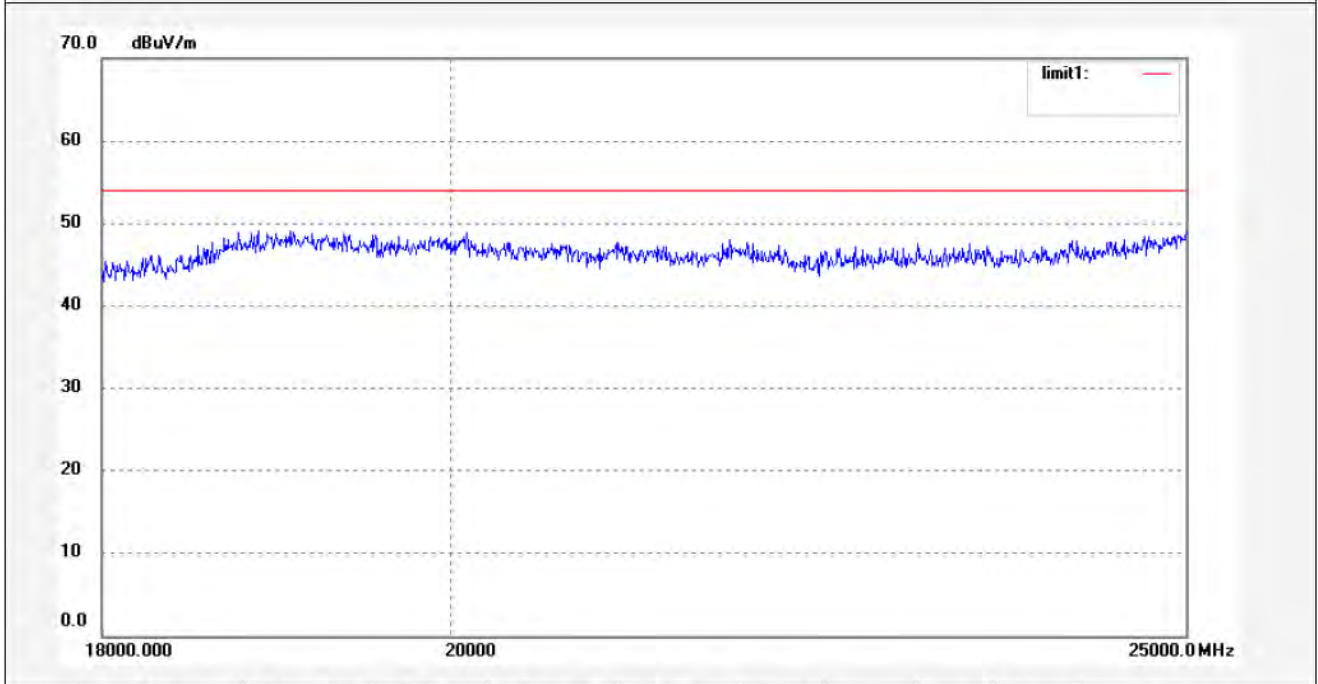
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: Alen #649	Polarization: Horizontal
Standard: FCC 15C	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/27/
Temp.( C)/Hum.(%) 25 C / 50 %	Time: 10:37:56
EUT: MULTIMEDIA SPEAKER	Engineer Signature: Alen
Mode: TX 2402MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
-----	-------------	------------------	-------------	-----------------	----------------	-------------	----------	-------------	---------------	--------



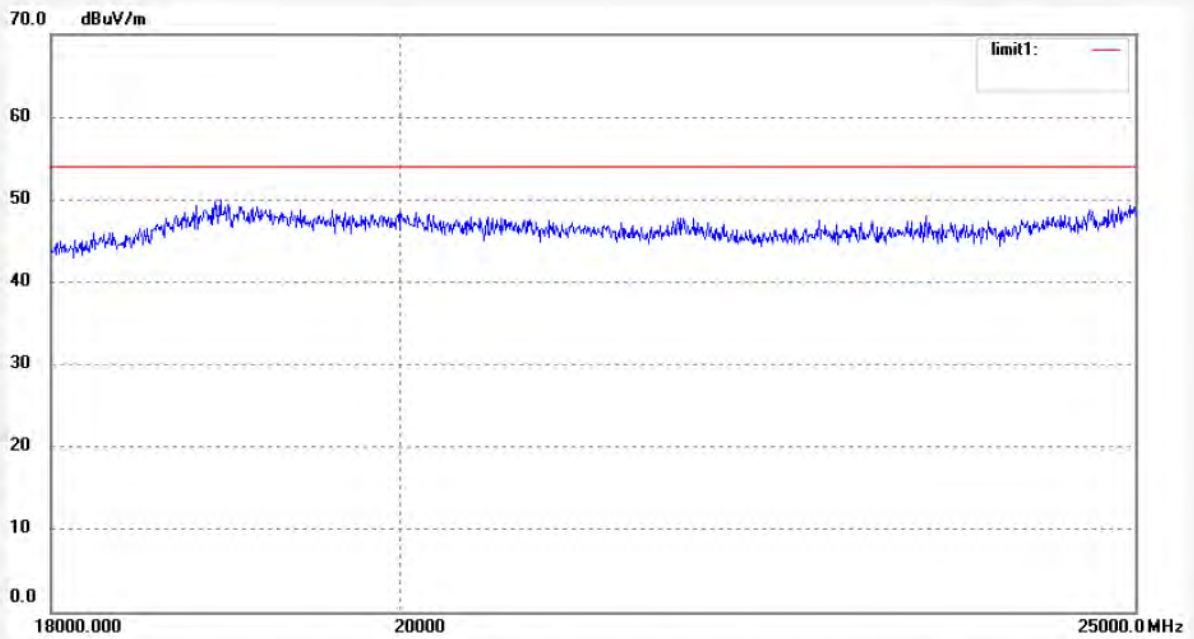
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: Alen #650	Polarization: Horizontal
Standard: FCC 15C	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/27/
Temp.( C)/Hum.(%) 25 C / 50 %	Time: 10:40:38
EUT: MULTIMEDIA SPEAKER	Engineer Signature: Alen
Mode: TX 2441MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
-----	-------------	------------------	-------------	-----------------	----------------	-------------	----------	-------------	---------------	--------



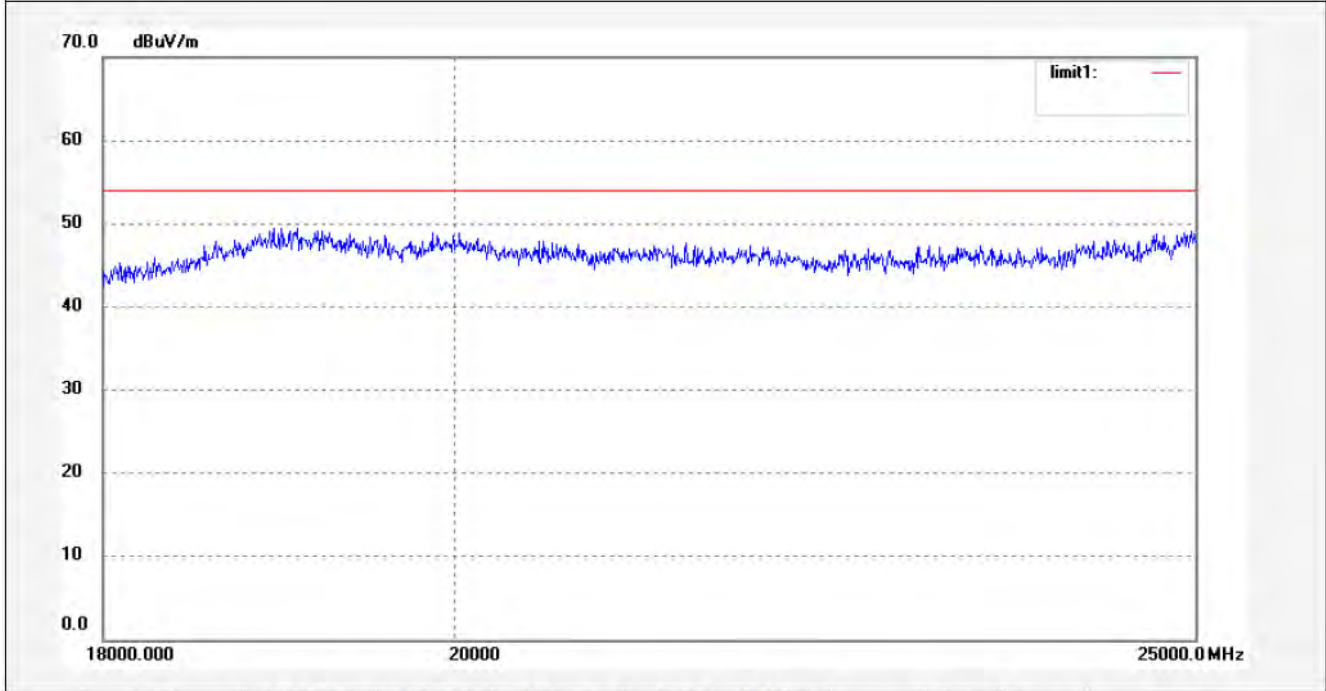
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: Alen #651	Polarization: Vertical
Standard: FCC 15C	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/27/
Temp.( C)/Hum.(%) 25 C / 50 %	Time: 10:44:42
EUT: MULTIMEDIA SPEAKER	Engineer Signature: Alen
Mode: TX 2441MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
-----	-------------	------------------	-------------	-----------------	----------------	-------------	----------	-------------	---------------	--------



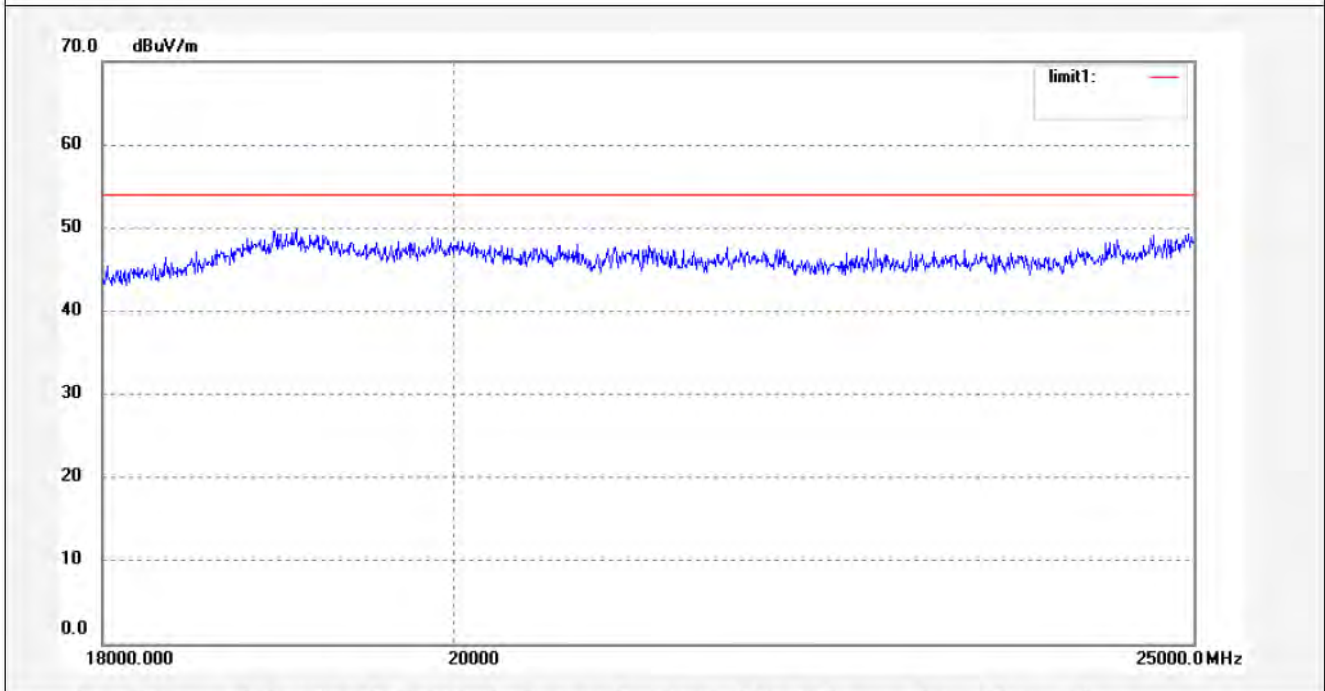
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: Alen #652	Polarization: Vertical
Standard: FCC 15C	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/27/
Temp.( C)/Hum.(%) 25 C / 50 %	Time: 10:48:59
EUT: MULTIMEDIA SPEAKER	Engineer Signature: Alen
Mode: TX 2480MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
-----	-------------	------------------	-------------	-----------------	----------------	-------------	----------	-------------	---------------	--------



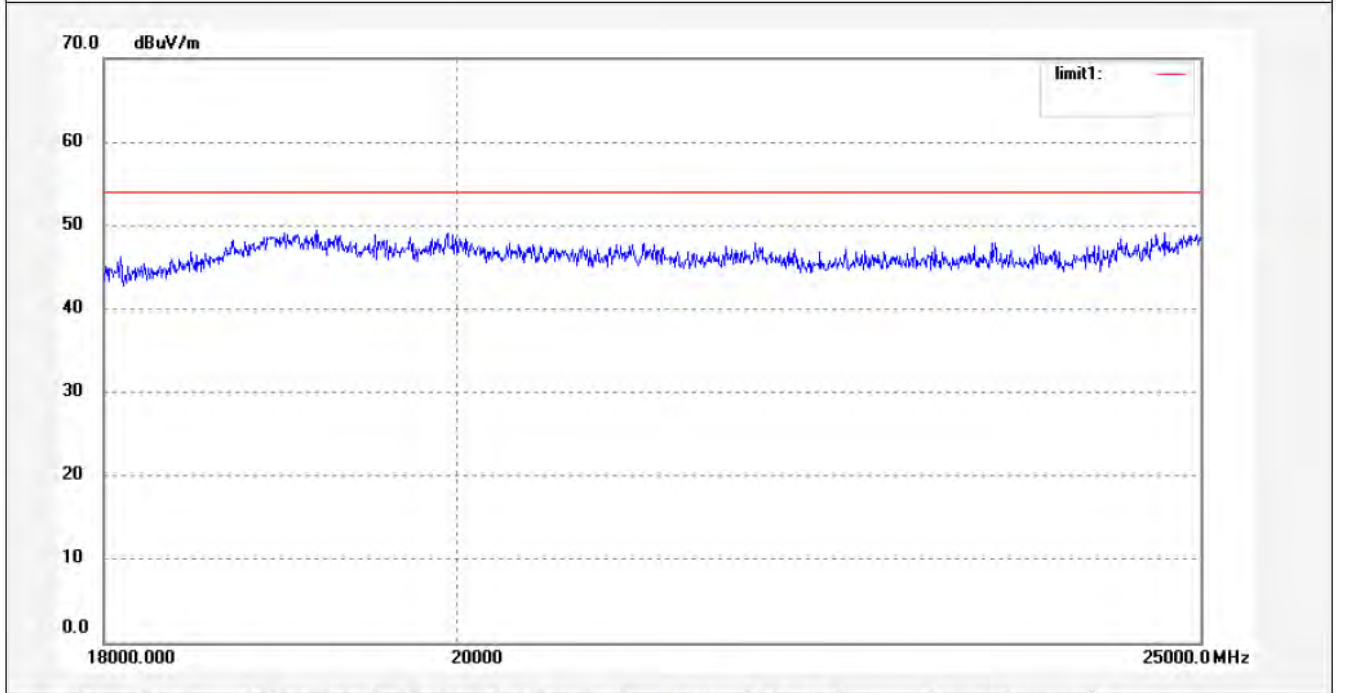
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: Alen #653	Polarization: Horizontal
Standard: FCC 15C	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/27/
Temp.( C)/Hum.(%) 25 C / 50 %	Time: 10:52:35
EUT: MULTIMEDIA SPEAKER	Engineer Signature: Alen
Mode: TX 2480MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

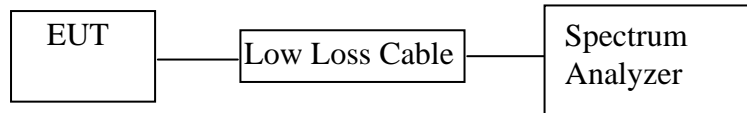
Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
-----	-------------	------------------	-------------	-----------------	----------------	-------------	----------	-------------	---------------	--------

## 11.BAND EDGE COMPLIANCE TEST

### 11.1.Block Diagram of Test Setup



(EUT: MULTIMEDIA SPEAKER)

### 11.2.The Requirement For Section 15.247(d)

Section 15.247(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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. 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).

### 11.3.EUT Configuration on Measurement

The following equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

#### 11.3.1.MULTIMEDIA SPEAKER (EUT)

Model Number	:	MD212
Serial Number	:	N/A
Manufacturer	:	Microlab Electronics Co., Ltd.



## 11.4. Operating Condition of EUT

11.4.1. Setup the EUT and simulator as shown as Section 11.1.

11.4.2. Turn on the power of all equipment.

11.4.3. Let the EUT work in TX (Hopping off, Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2480MHz TX frequency to transmit.

## 11.5. Test Procedure

11.5.1. The transmitter output was connected to the spectrum analyzer via a low loss cable.

11.5.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz with convenient frequency span including 100 kHz bandwidth from band edge.

11.5.3. The band edges was measured and recorded.

## 11.6. Test Result

**Pass**

Date of Test:	<u>Nov 27, 2012</u>	Temperature:	<u>25°C</u>
EUT:	<u>MULTIMEDIA SPEAKER</u>	Humidity:	<u>50%</u>
Model No.:	<u>MD212</u>	Power Supply:	<u>DC 5V</u>
Test Mode:	<u>TX 2402MHz</u>	Test Engineer:	<u>Alen</u>

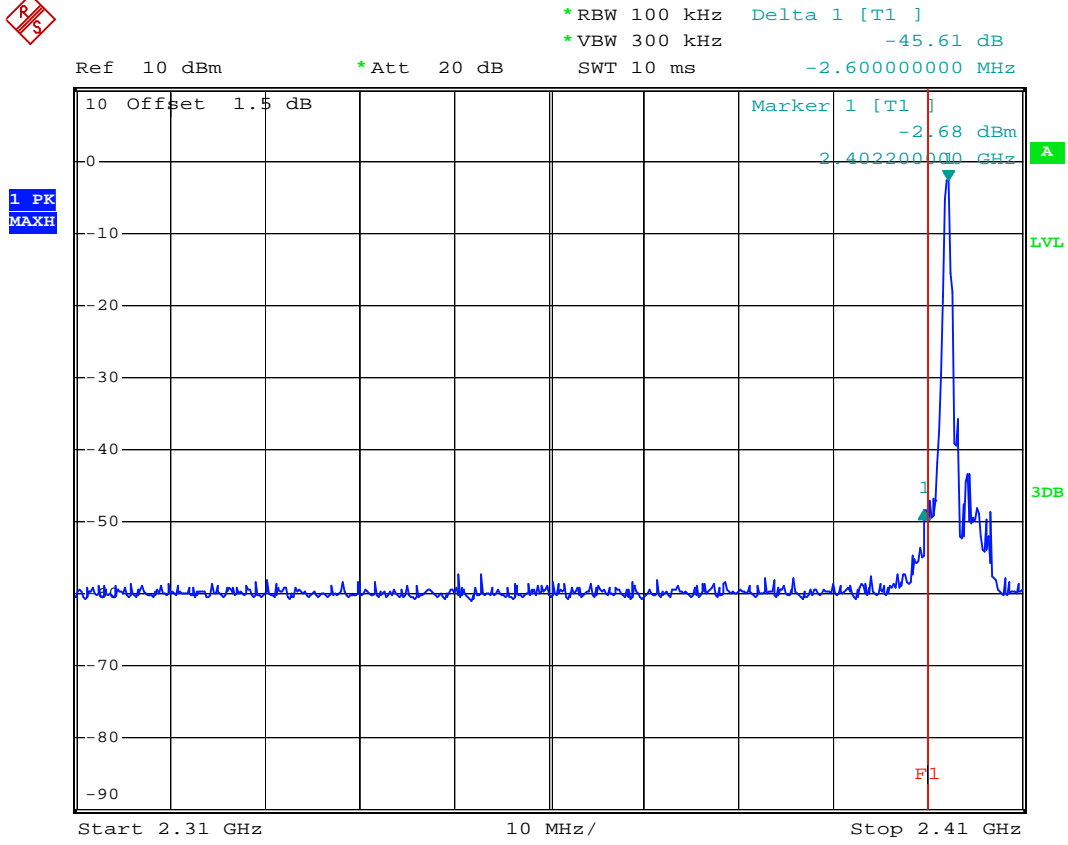
## Conducted test

Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
2399.600	45.61	> 20dBc

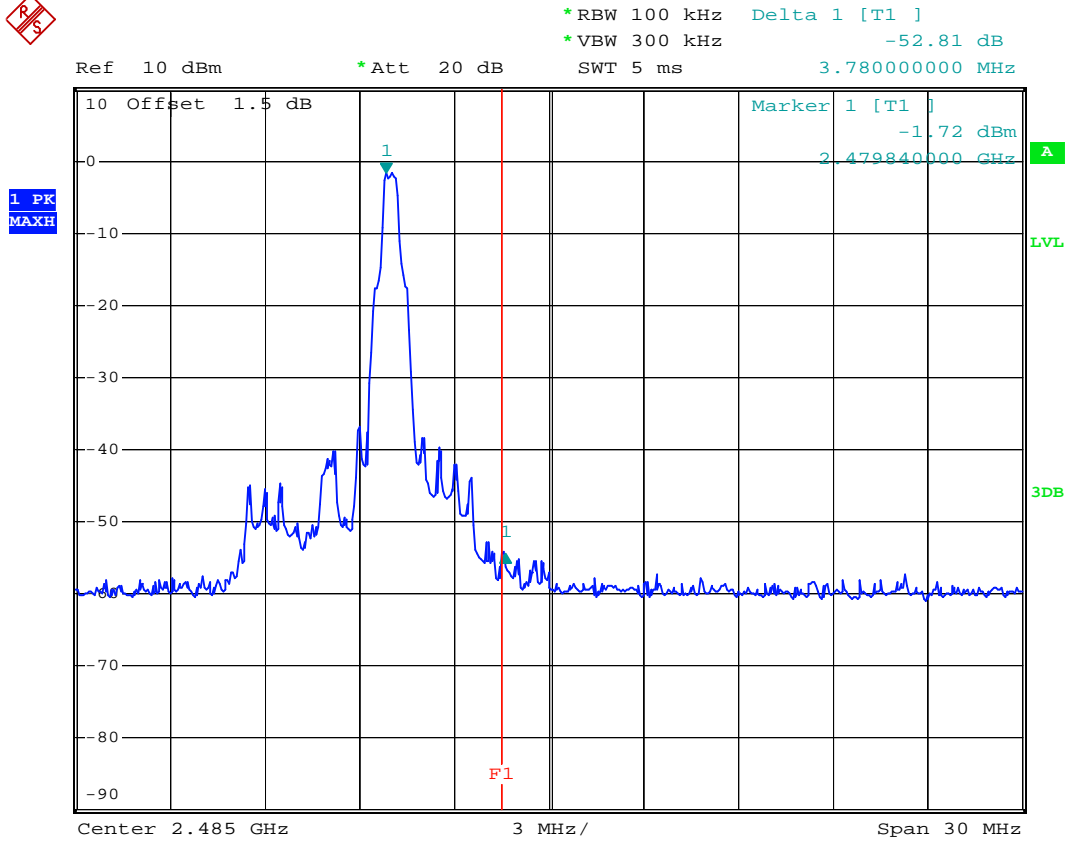
Date of Test:	<u>Nov 27, 2012</u>	Temperature:	<u>25°C</u>
EUT:	<u>MULTIMEDIA SPEAKER</u>	Humidity:	<u>50%</u>
Model No.:	<u>MD212</u>	Power Supply:	<u>DC 5V</u>
Test Mode:	<u>TX 2480MHz</u>	Test Engineer:	<u>Ricky</u>

## Conducted test

Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
2483.620	52.81	> 20dBc



Date: 27.NOV.2012 16:33:00



Date: 27.NOV.2012 16:46:01

**Radiated Band Edge Result**

Date of Test:	<u>Oct 10, 2012</u>	Temperature:	<u>25°C</u>
EUT:	<u>MULTIMEDIA SPEAKER</u>	Humidity:	<u>50%</u>
Model No.:	<u>MD212</u>	Power Supply:	<u>DC 5V</u>
Test Mode:	<u>TX (2402MHz)</u>	Test Engineer:	<u>Alen</u>

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
2400.000	60.24	69.45	-7.46	52.78	61.99	54.00	74.00	-1.22	-12.01	Vertical
2400.000	60.07	70.32	-7.46	52.61	62.86	54.00	74.00	-1.39	-11.14	Horizontal

## Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:  

$$\text{Result} = \text{Reading} + \text{Corrected Factor}$$
3. Display the measurement of peak values.

Date of Test:	<u>Oct 10, 2012</u>	Temperature:	<u>25°C</u>
EUT:	<u>MULTIMEDIA SPEAKER</u>	Humidity:	<u>50%</u>
Model No.:	<u>MD212</u>	Power Supply:	<u>DC 5V</u>
Test Mode:	<u>TX (2480MHz)</u>	Test Engineer:	<u>Alen</u>

Frequency (MHz)	Reading(dBμV/m)		Factor(dB) Corr.	Result(dBμV/m)		Limit(dBμV/m)		Margin(dB)		Polarization
	AV	PEAK		AV	PEAK	AV	PEAK	AV	PEAK	
2483.529	50.10	56.20	-7.37	42.73	48.83	54.00	74.00	-11.27	-25.17	Vertical
2483.529	53.89	59.03	-7.37	46.52	51.66	54.00	74.00	-7.48	-22.34	Horizontal

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:  
Result = Reading + Corrected Factor
3. Display the measurement of peak values.



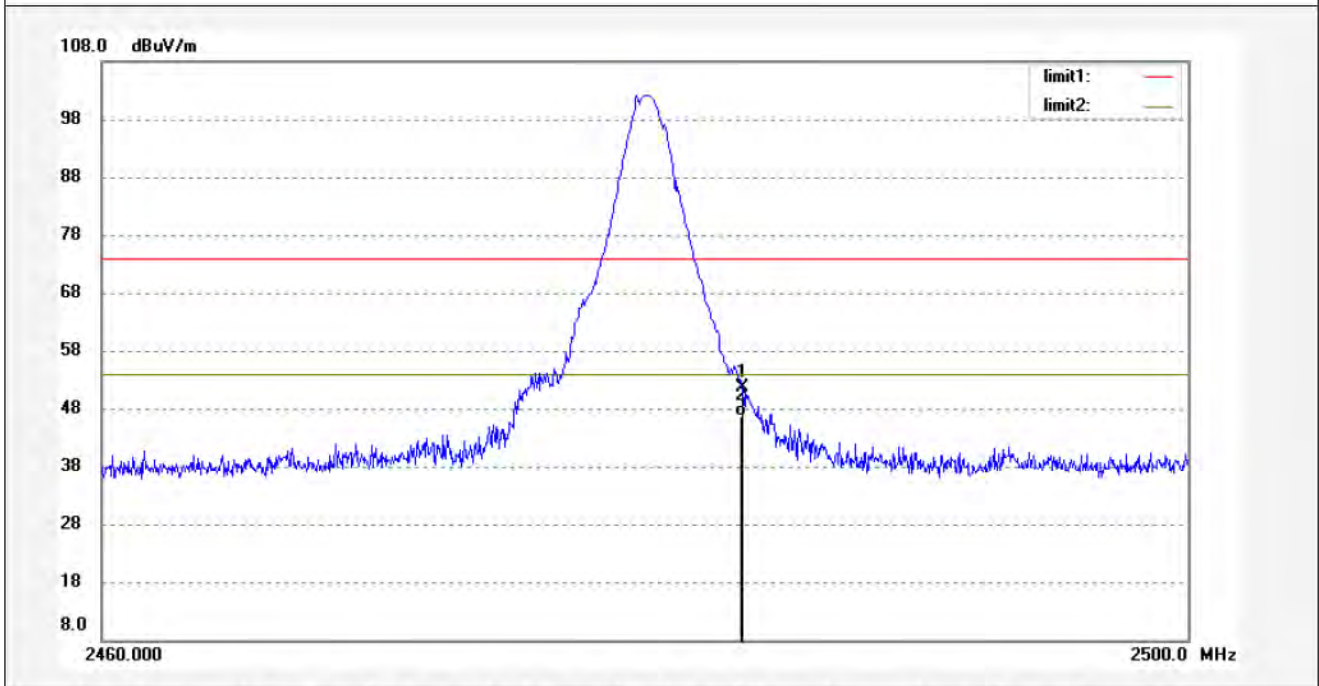
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: ALEN #600	Polarization: Horizontal
Standard: FCC 15C PK	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/26/
Temp.( C)/Hum.(%) 23 C / 49 %	Time: 10/09/00
EUT: MULTIMEDIA SPEAKER	Engineer Signature:
Mode: TX 2480MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.529	59.03	-7.37	51.66	74.00	-22.34	peak			
2	2483.529	53.89	-7.37	46.52	54.00	-7.48	AVG			



**ACCURATE TECHNOLOGY CO., LTD.**

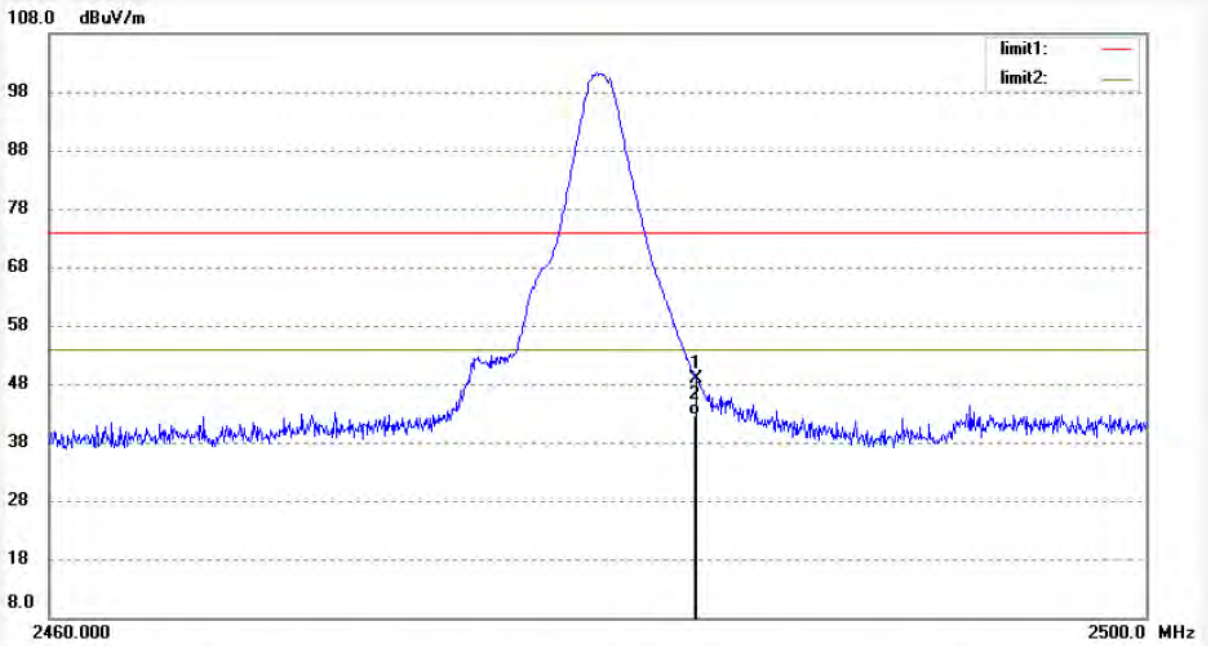
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: ALEN #601  
Standard: FCC 15C PK  
Test item: Radiation Test  
Temp.( C)/Hum.(%) 23 C / 49 %  
EUT: MULTIMEDIA SPEAKER  
Mode: TX 2480MHz  
Model: MD212  
Manufacturer: MICROLAB

Polarization: Vertical  
Power Source: DC 5V  
Date: 12/11/26/  
Time: 10/09/50  
Engineer Signature:  
Distance: 3m

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.529	56.20	-7.37	48.83	74.00	-25.17	peak			
2	2483.529	50.10	-7.37	42.73	54.00	-11.27	AVG			





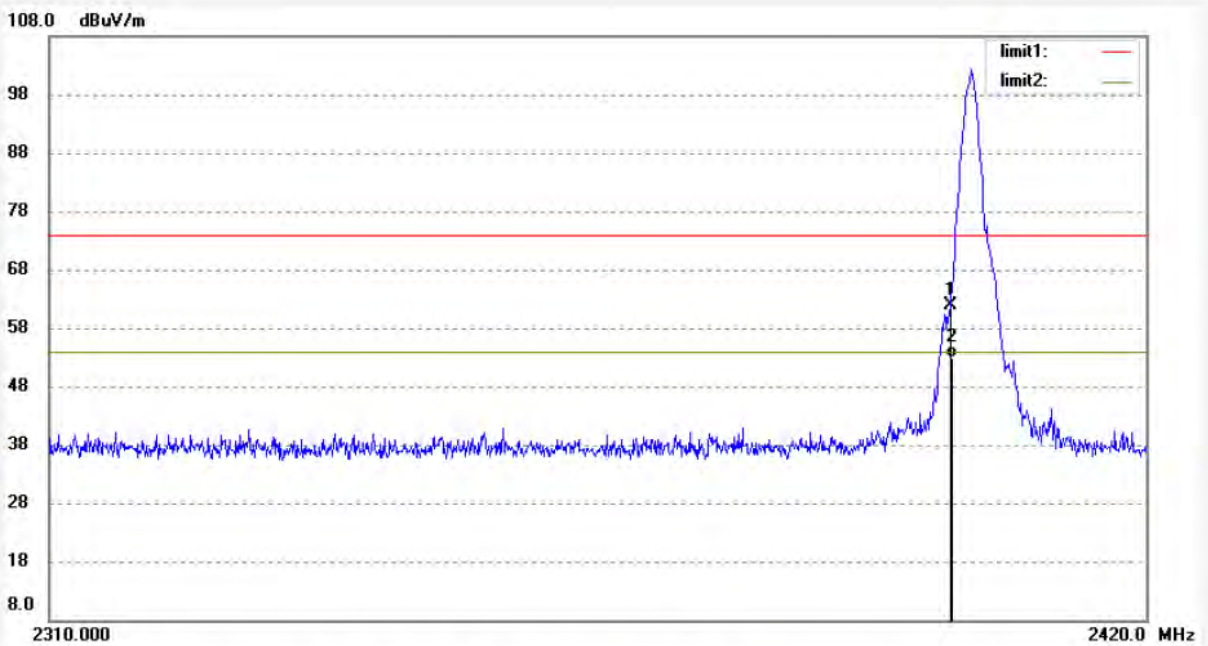
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: ALEN #602	Polarization: Vertical
Standard: FCC 15C PK	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/26/
Temp.( C)/Hum.(%) 23 C / 49 %	Time: 10/11/31
EUT: MULTIMEDIA SPEAKER	Engineer Signature:
Mode: TX 2402MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2400.000	69.45	-7.46	61.99	74.00	-12.01	peak			
2	2400.000	60.24	-7.46	52.78	54.00	-1.22	AVG			



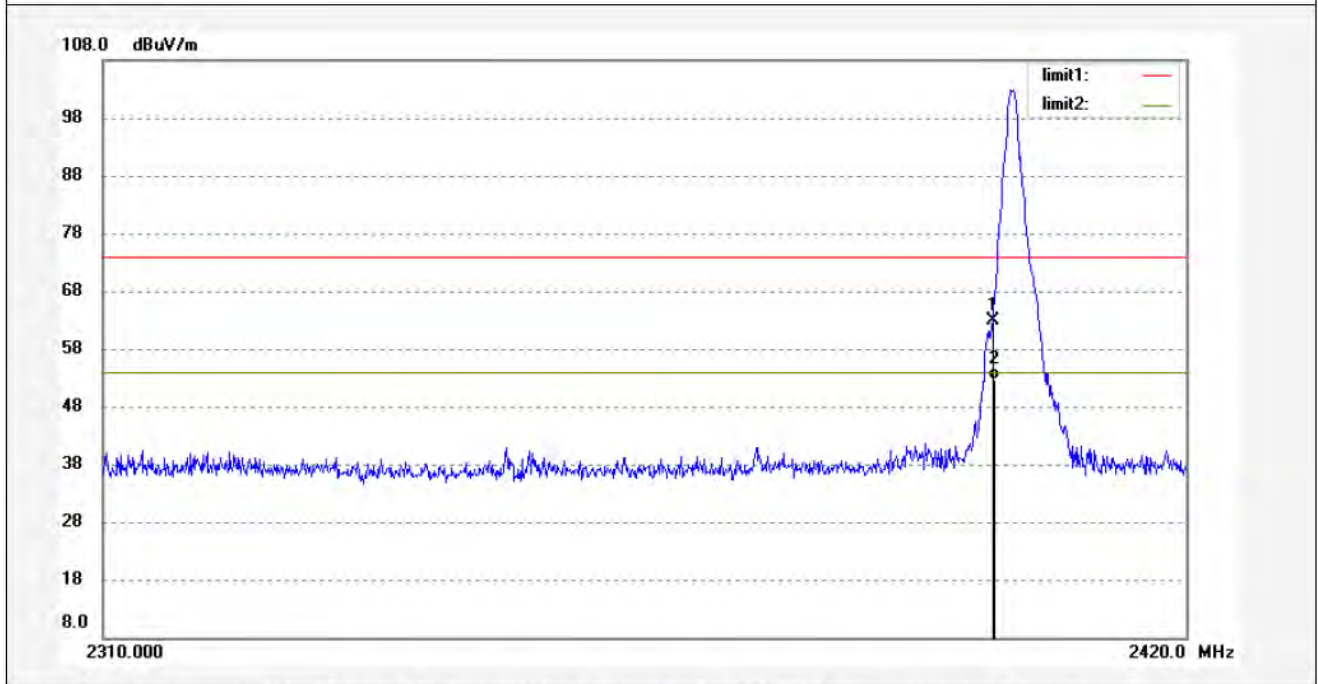
**ACCURATE TECHNOLOGY CO., LTD.**

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,  
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 966 chamber  
Tel:+86-0755-26503290  
Fax:+86-0755-26503396

Job No.: ALEN #603	Polarization: Horizontal
Standard: FCC 15C PK	Power Source: DC 5V
Test item: Radiation Test	Date: 12/11/26/
Temp.( C)/Hum.(%) 23 C / 49 %	Time: 10/12/20
EUT: MULTIMEDIA SPEAKER	Engineer Signature:
Mode: TX 2402MHz	Distance: 3m
Model: MD212	
Manufacturer: MICROLAB	

Note:



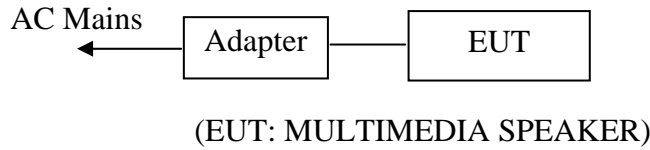
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2400.000	70.32	-7.46	62.86	74.00	-11.14	peak			
2	2400.000	60.07	-7.46	52.61	54.00	-1.39	AVG			

## 12.AC POWER LINE CONDUCTED EMISSION FOR FCC PART

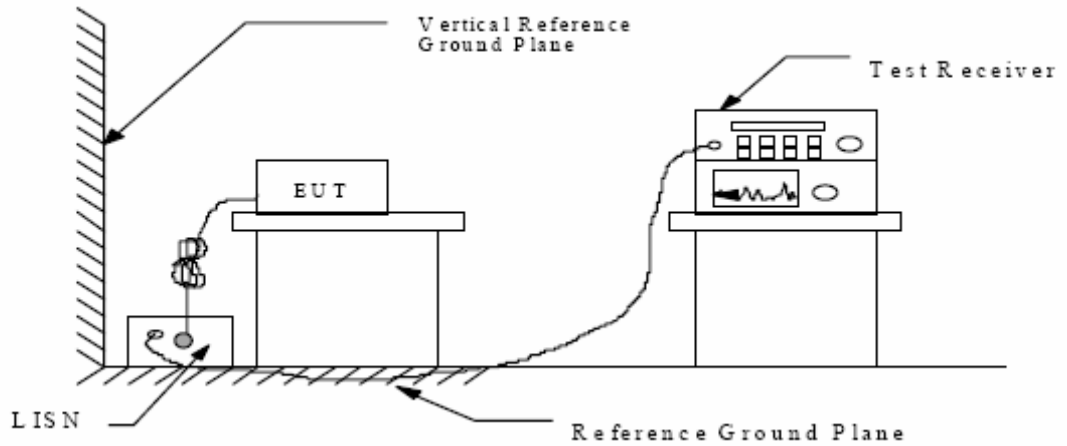
### 15 SECTION 15.207(A)

#### 12.1.Block Diagram of Test Setup

12.1.1.Block diagram of connection between the EUT and simulators



12.1.2.Shielding Room Test Setup Diagram



(EUT: MULTIMEDIA SPEAKER)

#### 12.2.The Emission Limit

12.2.1.Conducted Emission Measurement Limits According to Section 15.207(a)

Frequency (MHz)	Limit dB(μV)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 - 56.0 *	56.0 - 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0

\* Decreases with the logarithm of the frequency.

### 12.3. Configuration of EUT on Measurement

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

#### 12.3.1. MULTIMEDIA SPEAKER (EUT)

Model Number : MD212  
Serial Number : N/A  
Manufacturer : Microlab Electronics Co., Ltd.

### 12.4. Operating Condition of EUT

12.4.1. Setup the EUT and simulator as shown as Section 11.1.

12.4.2. Turn on the power of all equipment.

12.4.3. Let the EUT work in TX (Operation) mode measure it.

### 12.5. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and 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 lines 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 ANSI C63.4: 2009 on Conducted Emission Measurement.

The bandwidth of test receiver (R & S ESCS30) is set at 9 kHz.

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

## 12.6. Power Line Conducted Emission Measurement Results

**PASS.**

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

Date of Test:	<u>Oct 20, 2012</u>	Temperature:	<u>25°C</u>
EUT:	<u>MULTIMEDIA SPEAKER</u>	Humidity:	<u>50%</u>
Model No.:	<u>MD212</u>	Power Supply:	<u>DC 5V</u>
Test Mode:	<u>operation</u>	Test Engineer:	<u>Alen</u>

Frequency (MHz)	Result (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Detector	Line
0.168410	56.30	65	8.7	QP	Neutral
0.183137	52.90	64	11.4	QP	
0.523291	44.80	56	11.2	QP	
0.167071	45.10	55	10.0	AV	
0.31714	36.00	46	10.0	AV	
2.099304	33.90	46	12.1	AV	
0.174571	51.80	65	12.9	QP	Live
0.521206	44.70	56	11.3	QP	
2.593954	38.60	56	17.4	QP	
0.167071	44.60	55	10.5	AV	
0.529596	35.00	46	11.0	AV	
2.472622	34.40	46	11.6	AV	

Emissions attenuated more than 20 dB below the permissible value are not reported.  
The spectral diagrams are attached as below.

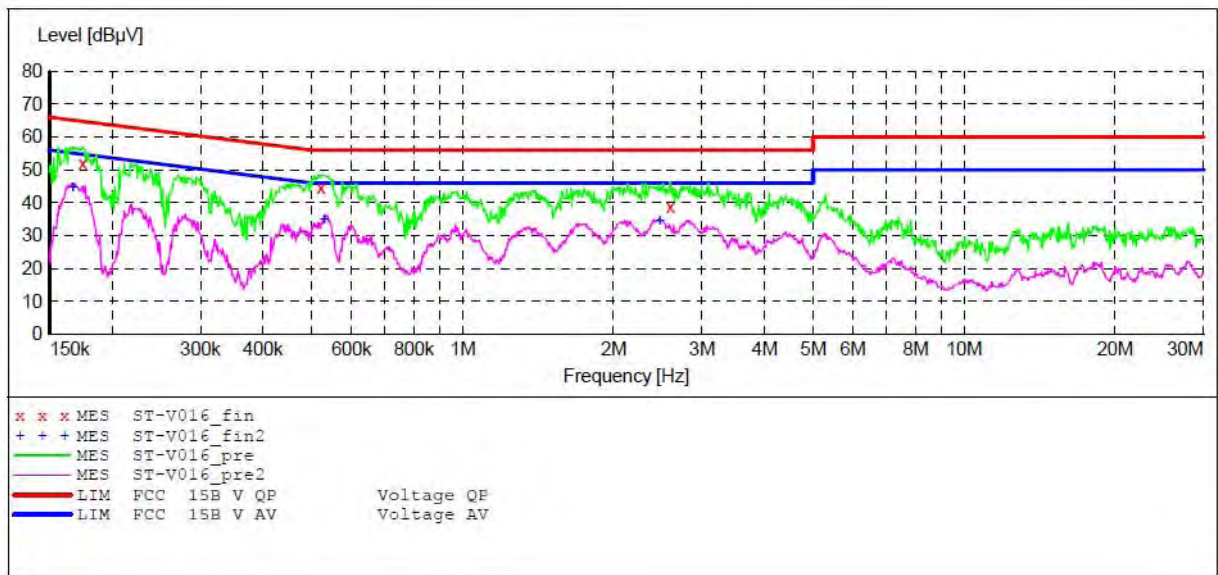
**ACCURATE TECHNOLOGY CO., LTD**

**CONDUCTED EMISSION STANDARD FCC PART 15B**

EUT: MULTIMEDIA SPEAKER M/N:MD212  
 Manufacturer: MICROLAB  
 Operating Condition: Connect to pc  
 Test Site: 1#Shielding Room  
 Operator: Alen  
 Test Specification: L 120V/60Hz  
 Comment: Mains Port  
 Start of Test: 11/25/2012 / 7:58:15PM

**SCAN TABLE: "V 150K-30MHz fin"**

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	0.8 %	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008
Average						



**MEASUREMENT RESULT: "ST-V016\_fin"**

11/25/2012 8:00PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.174571	51.80	11.1	65	12.9	QP	L1	GND
0.521206	44.70	12.0	56	11.3	QP	L1	GND
2.593954	38.60	11.6	56	17.4	QP	L1	GND

**MEASUREMENT RESULT: "ST-V016\_fin2"**

11/25/2012 8:00PM

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.167071	44.60	11.1	55	10.5	AV	L1	GND
0.529596	35.00	12.0	46	11.0	AV	L1	GND
2.472622	34.40	11.6	46	11.6	AV	L1	GND

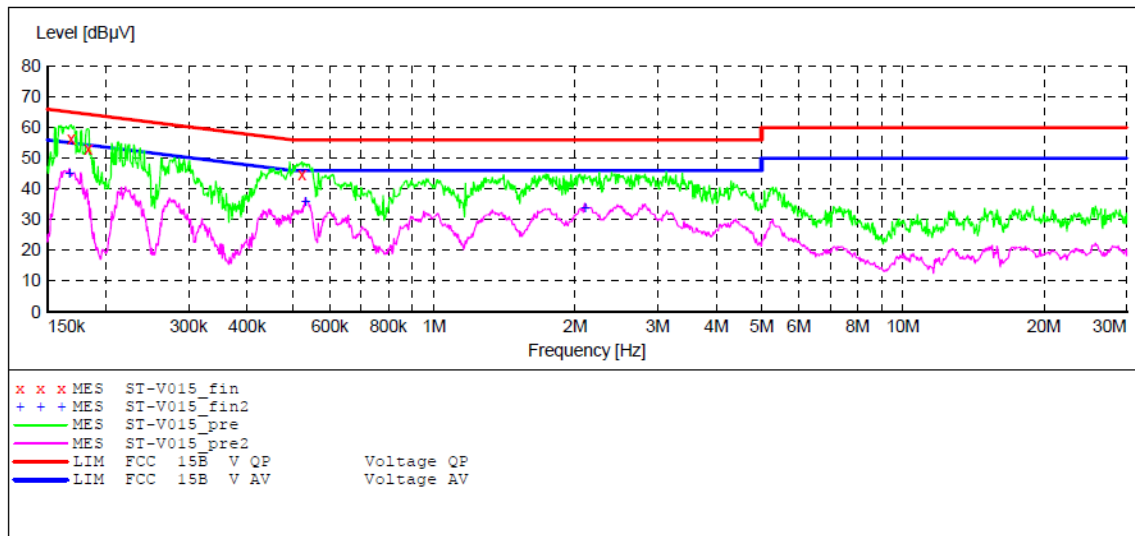
**ACCURATE TECHNOLOGY CO., LTD**

**CONDUCTED EMISSION STANDARD FCC PART 15B**

EUT: MULTIMEDIA SPEAKER M/N:MD212  
 Manufacturer: MICROLAB  
 Operating Condition: Connect to pc  
 Test Site: 1#Shielding Room  
 Operator: Alen  
 Test Specification: N 120V/60Hz  
 Comment: Mains Port  
 Start of Test: 11/25/2012 / 7:55:18PM

**SCAN TABLE: "V 150K-30MHz fin"**

Short Description: SUB STD VTERM2 1.70  
 Start Stop Step Detector Meas. IF Transducer  
 Frequency Frequency Width Time Bandw.  
 150.0 kHz 30.0 MHz 0.8 % QuasiPeak 1.0 s 9 kHz NSLK8126 2008  
 Average



**MEASUREMENT RESULT: "ST-V015\_fin"**

11/25/2012 7:57PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.168410	56.30	11.1	65	8.7	QP	N	GND
0.183137	52.90	11.2	64	11.4	QP	N	GND
0.523291	44.80	12.0	56	11.2	QP	N	GND

**MEASUREMENT RESULT: "ST-V015\_fin2"**

11/25/2012 7:57PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.167071	45.10	11.1	55	10.0	AV	N	GND
0.531714	36.00	12.0	46	10.0	AV	N	GND
2.099304	33.90	11.6	46	12.1	AV	N	GND

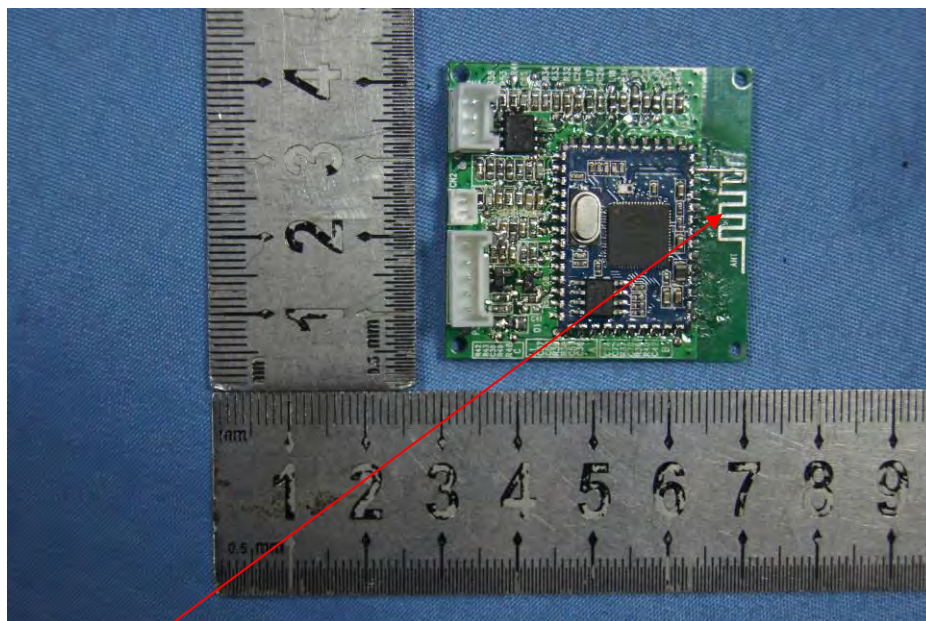
## 13.ANTENNA REQUIREMENT

### 13.1.The Requirement

According to Section 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.

### 13.2.Antenna Construction

The antenna is PCB Layout antenna, no consideration of replacement. Therefore, the equipment complies with the antenna requirement of Section 15.203.



Antenna