# APPLICATION CERTIFICATION
On Behalf of
SHENZHEN AOB ELECTRONICS CO., LTD

SOUNDBOX XL
Model No.: ES-53028

FCC ID: COMES53028

| | | |
|---|---|---|
| Prepared for | : | SHENZHEN AOB ELECTRONICS CO., LTD |
| Address | : | Bldg A4, Third Industry Area, Huang Ma Bu Village, Xixiang Town, Bao An District, 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<br>Fax: (0755) 26503396 |

| | | |
|---|---|---|
| Report Number | : | ATE20120729 |
| Date of Test | : | April 19-27, 2012 |
| Date of Report | : | April 27, 2012 |

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Description Page

# Test Report Certification

Applicant **:** SHENZHEN AOB ELECTRONICS CO., LTD

Manufacturer **:** SHENZHEN AOB ELECTRONICS CO., LTD

EUT Description **:** SOUNDBOX XL

(A) MODEL NO.: ES-53028

(B) SERIAL NO.: N/A

(C) POWER SUPPLY: DC 5V

Measurement Procedure Used:

**FCC Rules and Regulations Part 15 Subpart C Section 15.247**
**ANSI C63.4: 2003**

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 : April 19-27, 2012

Prepared by : Apple

(Engineer)

Approved & Authorized Signer :

(Manager)

# 1. GENERAL INFORMATION

## 1.1.Description of Device (EUT)

| | | |
|---|---|---|
| EUT | : | SOUNDBOX XL |
| Model Number | : | ES-53028 |
| Frequency Band | : | 2402MHz-2480MHz |
| Number of Channels | : | 79 |
| Antenna Gain | | 0dBi |
| Power Supply | : | DC 5V |
| Applicant | : | SHENZHEN AOB ELECTRONICS CO., LTD |
| Address | : | Bldg A4, Third Industry Area, Huang Ma Bu Village, Xixiang Town, Bao An District, Shenzhen, China |
| Manufacturer | : | SHENZHEN AOB ELECTRONICS CO., LTD |
| Address | : | Bldg A4, Third Industry Area, Huang Ma Bu Village, Xixiang Town, Bao An District, Shenzhen, China |
| Date of sample received | : | April 19, 2012 |
| Date of Test | : | April 19-27, 2012 |

## 1.2.Special Accessory and Auxiliary Equipment

| | | |
|---|---|---|
| Notebook PC | : | Manufacturer: LENOVO |
| | | M/N: 4290-RT8 |
| | | S/N: R9-FW93G 11/08 |

## 1.3.Description of Test Facility

| | | |
|---|---|---|
| EMC Lab | : | Accredited by TUV Rheinland Shenzhen<br><br>Listed by FCC<br>The Registration Number is 752051<br><br>Listed by Industry Canada<br>The Registration Number is 5077A-2<br><br>Accredited by China National Accreditation Committee for Laboratories<br>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 |

## 1.4.Measurement Uncertainty

| | | |
|---|---|---|
| Conducted Emission Expanded Uncertainty | = | 2.23dB, k=2 |
| Radiated emission expanded uncertainty (9kHz-30MHz) | = | 3.08dB, k=2 |
| Radiated emission expanded uncertainty (30MHz-1000MHz) | = | 4.42dB, k=2 |
| Radiated emission expanded uncertainty (Above 1GHz) | = | 4.06dB, k=2 |

# 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. 8, 2012 | Jan. 7, 2013 |
| EMI Test Receiver | Rohde&Schwarz | ESPI3 | 101526/003 | Jan. 8, 2012 | Jan. 7, 2013 |
| Spectrum Analyzer | Agilent | E7405A | MY45115511 | Jan. 8, 2012 | Jan. 7, 2013 |
| Pre-Amplifier | Rohde&Schwarz | CBLU1183540-01 | 3791 | Jan. 8, 2012 | Jan. 7, 2013 |
| Loop Antenna | Schwarzbeck | FMZB1516 | 1516131 | Jan. 8, 2012 | Jan. 7, 2013 |
| Bilog Antenna | Schwarzbeck | VULB9163 | 9163-323 | Jan. 8, 2012 | Jan. 7, 2013 |
| Horn Antenna | Schwarzbeck | BBHA9120D | 9120D-655 | Jan. 8, 2012 | Jan. 7, 2013 |
| Horn Antenna | Schwarzbeck | BBHA9170 | 9170-359 | Jan. 8, 2012 | Jan. 7, 2013 |
| LISN | Rohde&Schwarz | ESH3-Z5 | 100305 | Jan. 8, 2012 | Jan. 7, 2013 |
| LISN | Schwarzbeck | NSLK8126 | 8126431 | Jan. 8, 2012 | Jan. 7, 2013 |

# 3. OPERATION OF EUT DURING TESTING

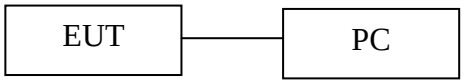
## 3.1.Operating Mode

The mode is used: Transmitting mode
Low Channel: 2402MHz
Middle Channel: 2441MHz
High Channel: 2480MHz
Hopping
Charging

## 3.2.Configuration and peripherals


Setup: Transmitting mode

(EUT: SOUNDBOX XL)




Setup: Charging mode

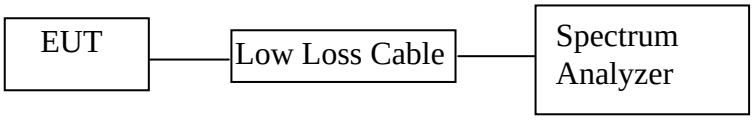
(EUT: SOUNDBOX XL)

# 4. TEST PROCEDURES AND RESULTS

| FCC Rules | Description of Test | Result |
|---|---|---|
| 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) | Band Edge Compliance Test | Compliant |
| Section 15.247(d)<br>Section 15.209 | Radiated Spurious Emission Test | Compliant |
| Section 15.247(d) | Conducted Spurious Emission Test | Compliant |
| Section 15.207 | AC Power Line Conducted Emission Test | Compliant |
| Section 15.203 | Antenna Requirement | Compliant |

# 5. 20DB BANDWIDTH TEST

## 5.1.Block Diagram of Test Setup




(EUT: SOUNDBOX XL)

## 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.SOUNDBOX XL (EUT)

| | | |
|---|---|---|
| Model Number | **:** | ES-53028 |
| Serial Number | **:** | N/A |
| Manufacturer | **:** | SHENZHEN AOB 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, 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 30kHz and VBW to 100kHz.

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: | April 21, 2012 | Temperature: | 25°C |
| EUT: | SOUNDBOX XL | Humidity: | 50% |
| Model No.: | ES-53028 | Power Supply: | DC 5V |
| Test Mode: | TX | Test Engineer: | Apple |

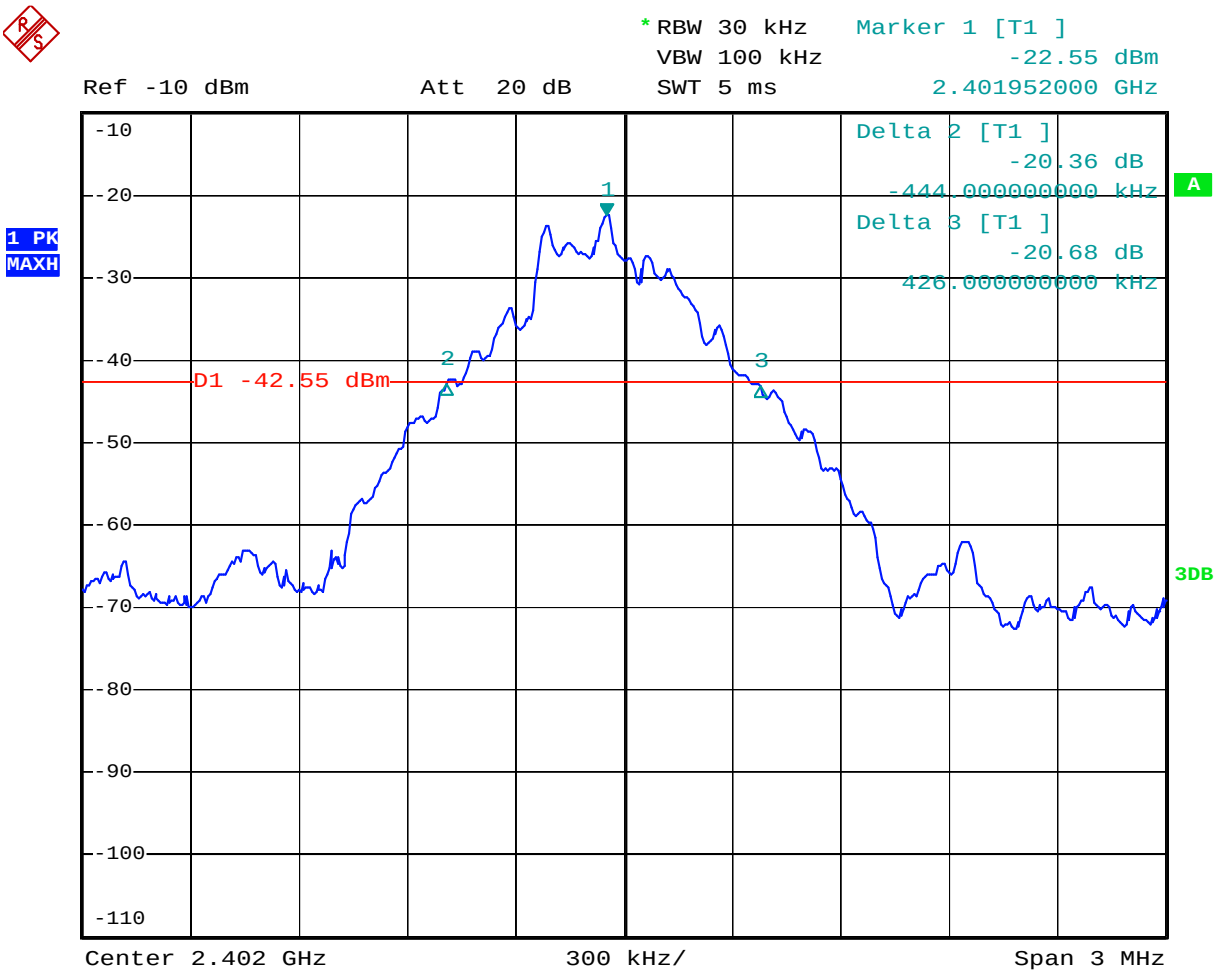
| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) | Limit (MHz) |
|---|---|---|---|
| Low | 2402 | 0.870 | N/A |
| Middle | 2441 | 0.870 | N/A |
| High | 2480 | 0.864 | N/A |

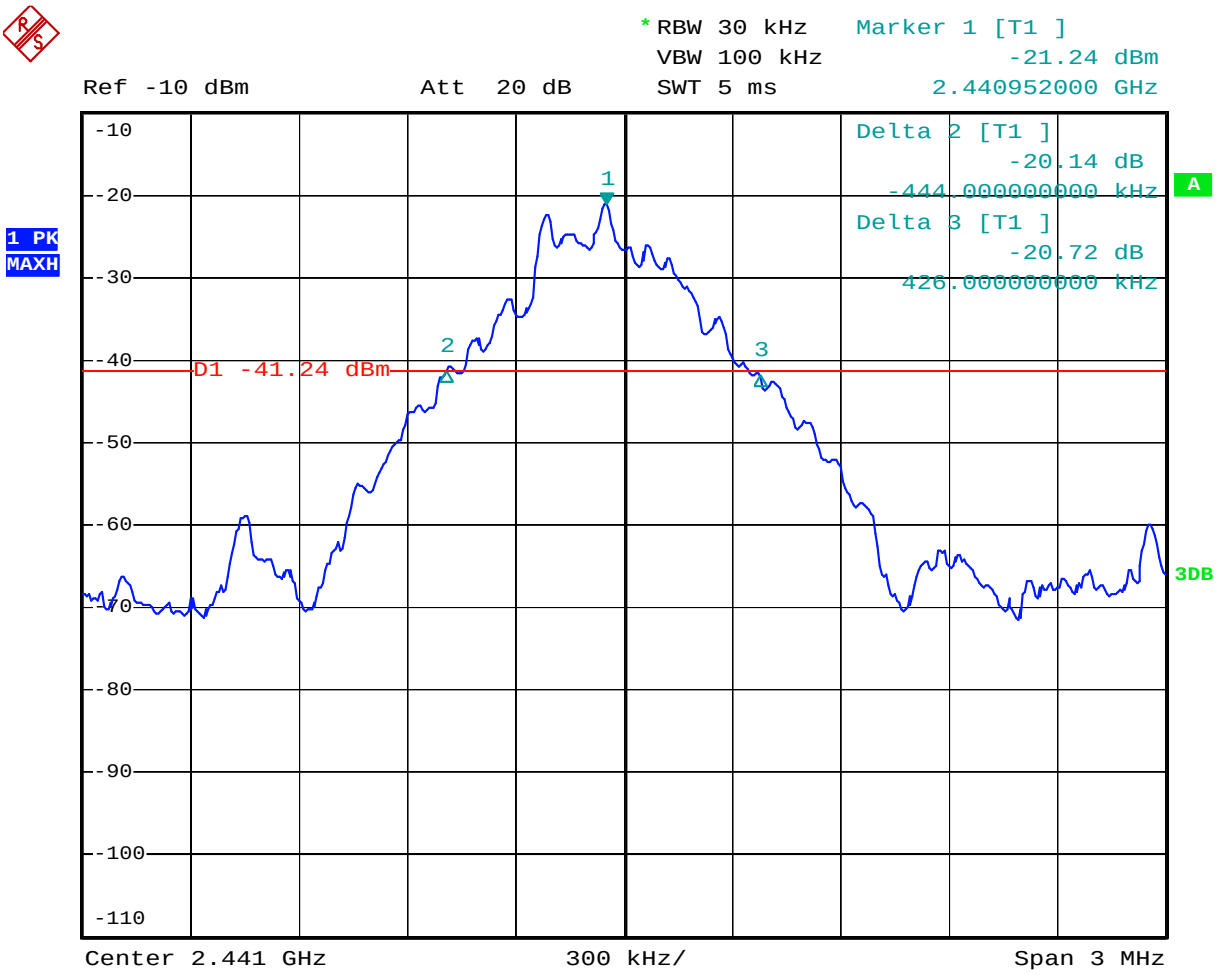
Note: N/A: 1) The 20 dB bandwidth of the hopping channel is not limit.

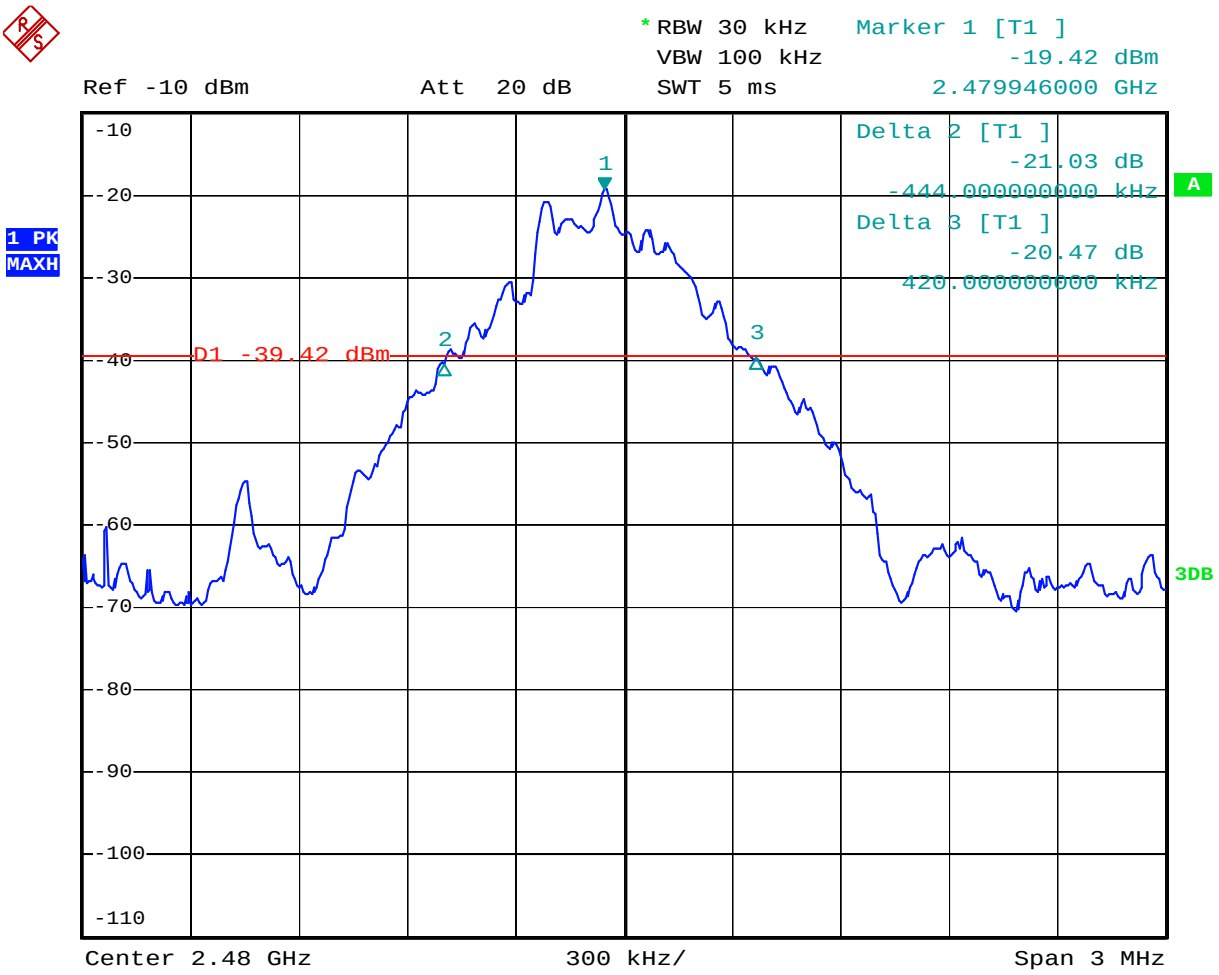
2) The data of 20 dB bandwidth of the hopping channel is limit of carrier frequencies separated

The spectrum analyzer plots are attached as below.

Spectrum Analyzer is RS

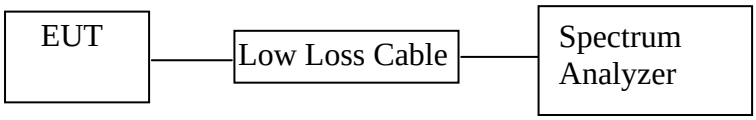



RBW 30 kHz
VBW 100 kHz
SWT 5 ms
Marker 1 [T1 ]
-21.24 dBm
2.440952000 GHz
Ref -10 dBm
Att 20 dB
Delta 2 [T1 ]
-20.14 dB
-444.000000000 kHz
Delta 3 [T1 ]
-20.72 dB
426.000000000 kHz
1 PK
MAXH
A
3DB
D1 -41.24 dBm
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 2.441 GHz
300 kHz/
Span 3 MHz


*RBW 30 kHz
VBW 100 kHz
SWT 5 ms
Marker 1 [T1 ]
-19.42 dBm
2.479946000 GHz
Ref -10 dBm
Att 20 dB
Delta 2 [T1 ]
-21.03 dB
-444.000000000 kHz
Delta 3 [T1 ]
-20.47 dB
420.000000000 kHz
1 PK
MAXH
A
3DB
D1 -39.42 dBm
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 2.48 GHz
300 kHz/
Span 3 MHz

# 6. CARRIER FREQUENCY SEPARATION TEST

## 6.1.Block Diagram of Test Setup




(EUT: SOUNDBOX XL)

## 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.SOUNDBOX XL (EUT)

| | | |
|---|---|---|
| Model Number | : | ES-53028 |
| Serial Number | : | N/A |
| Manufacturer | : | SHENZHEN AOB 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, 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 100kHz and VBW to 300kHz. 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

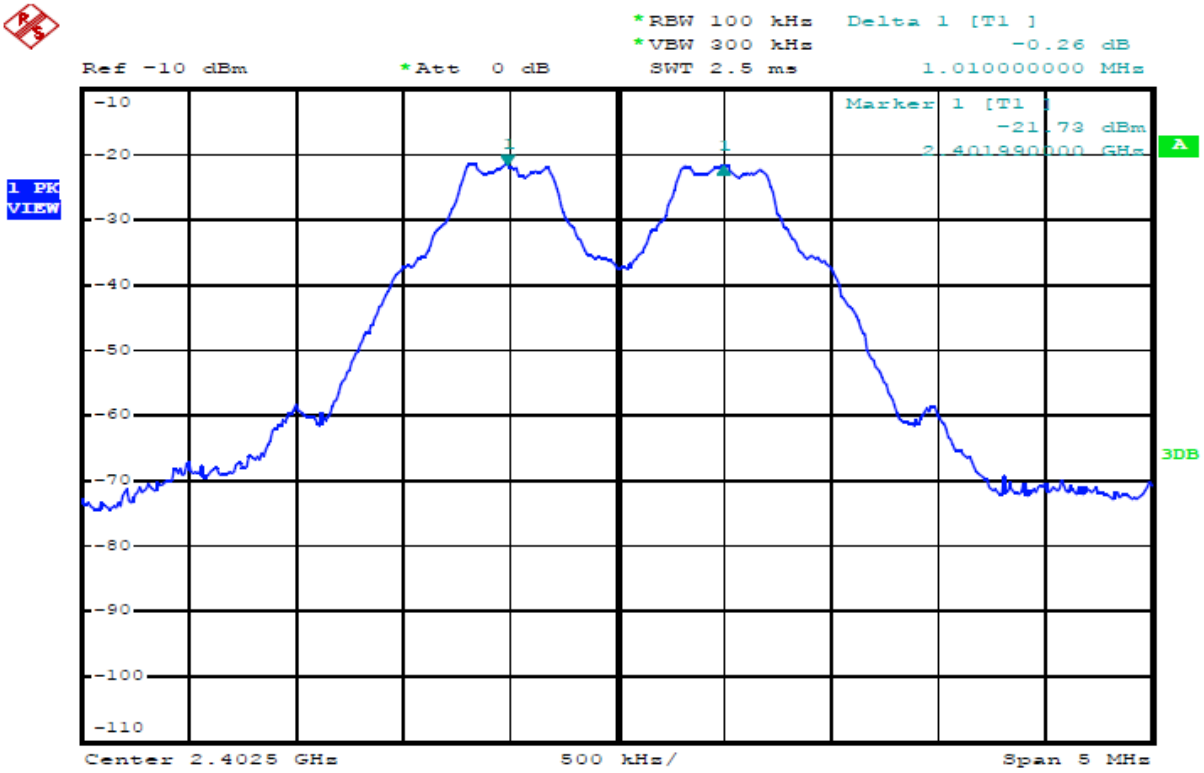
**PASS.**

| | | | |
|---|---|---|---|
| Date of Test: | April 21, 2012 | Temperature: | 25°C |
| EUT: | SOUNDBOX XL | Humidity: | 50% |
| Model No.: | ES-53028 | Power Supply: | DC 5V |
| Test Mode: | Hopping | Test Engineer: | Apple |

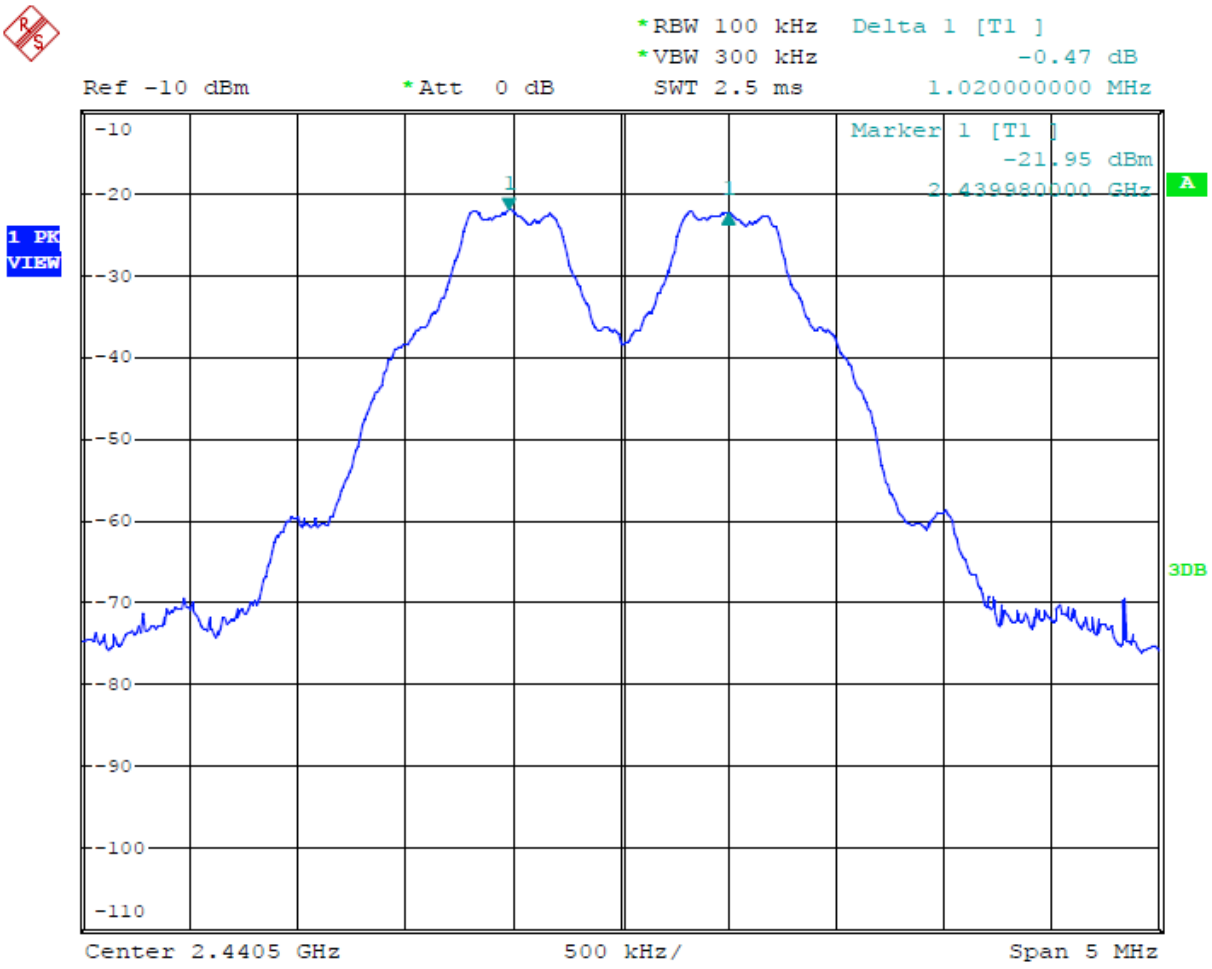
| Channel | Channel Frequency (MHz) | Channel separation (MHz) | Limit |
|---|---|---|---|
| Low | 2402 | 1.010 | > 25 kHz or two-thirds of the 20 dB bandwidth (whichever is greater) |
| Middle | 2441 | 1.020 | > 25 kHz or two-thirds of the 20 dB bandwidth (whichever is greater) |
| High | 2480 | 1.000 | > 25 kHz or two-thirds of the 20 dB bandwidth (whichever is greater) |

The spectrum analyzer plots are attached as below.

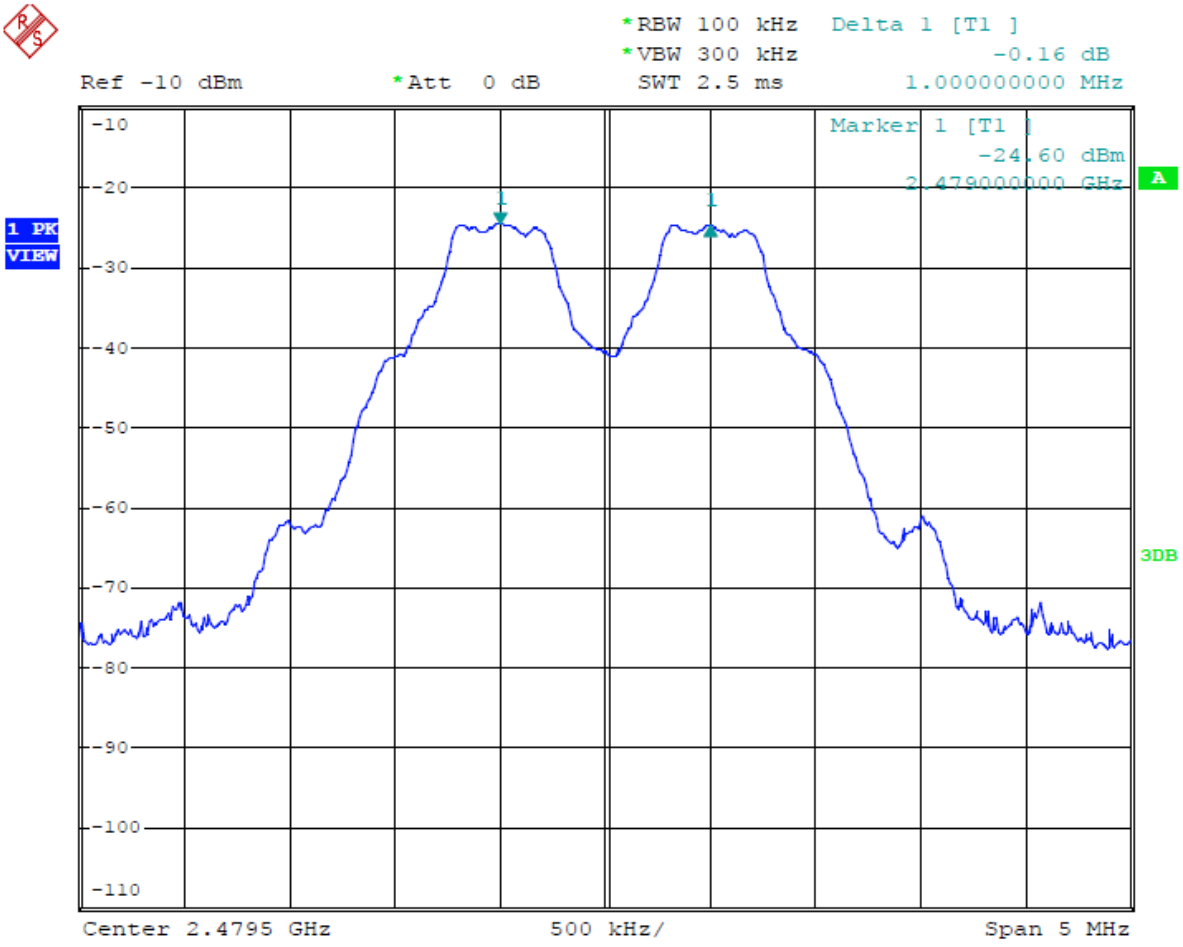
Low channel: 2402MHz



Middle Channel: 2441MHz

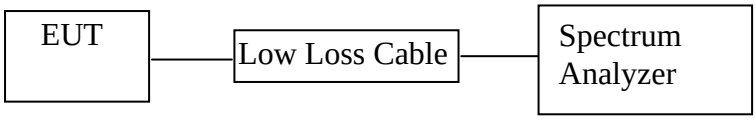


High channel: 2480MHz



# 7. NUMBER OF HOPPING FREQUENCY TEST

## 7.1.Block Diagram of Test Setup




(EUT: SOUNDBOX XL)

## 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.SOUNDBOX XL (EUT)

| | | |
|---|---|---|
| Model Number | : | ES-53028 |
| Serial Number | : | N/A |
| Manufacturer | : | SHENZHEN AOB 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=100MHz, RBW=100kHz, VBW=300kHz.

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

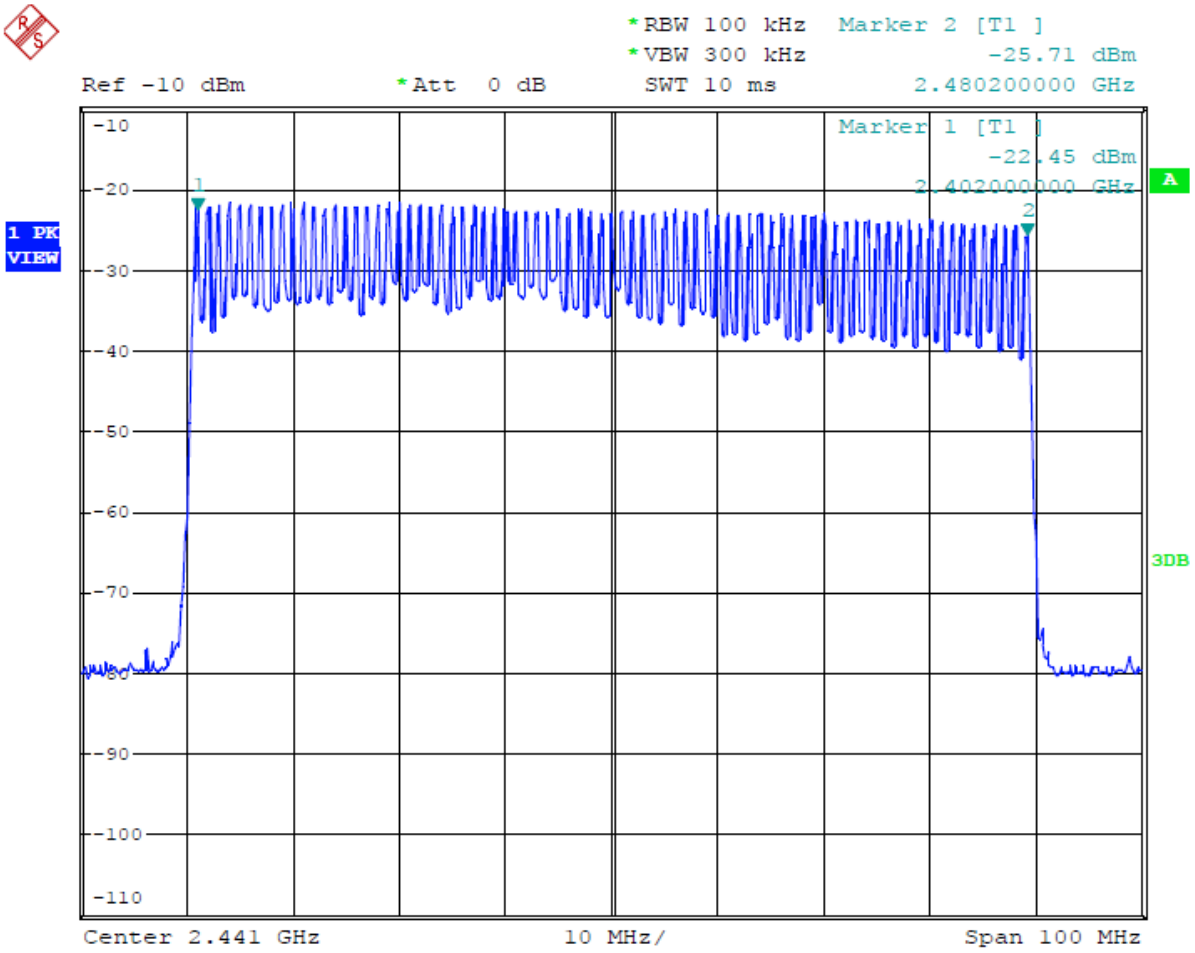
## 7.6.Test Result

**PASS.**

| | | | |
|---|---|---|---|
| Date of Test: | April 21, 2012 | Temperature: | 25°C |
| EUT: | SOUNDBOX XL | Humidity: | 50% |
| Model No.: | ES-53028 | Power Supply: | DC 5V |
| Test Mode: | Hopping | Test Engineer: | Apple |

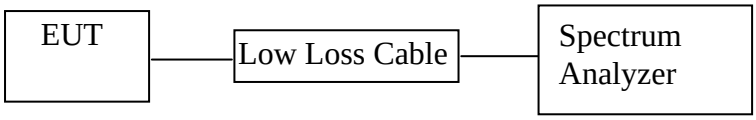
| | Measurement result (CH) | Limit (CH) |
|---|---|---|
| Total number of hopping channel | 79 | >15 |

The spectrum analyzer plots are attached as below.


*RBW 100 kHz
*VBW 300 kHz
Marker 2 [T1 ]
-25.71 dBm
2.480200000 GHz
Ref -10 dBm
*Att 0 dB
SWT 10 ms
Marker 1 [T1 ]
-22.45 dBm
2.402000000 GHz
1 PK
VIEW
A
3DB
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 2.441 GHz
10 MHz/
Span 100 MHz

# 8. DWELL TIME TEST

## 8.1.Block Diagram of Test Setup




(EUT: SOUNDBOX XL)

## 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.SOUNDBOX XL (EUT)

| | | |
|---|---|---|
| Model Number | : | ES-53028 |
| Serial Number | : | N/A |
| Manufacturer | : | SHENZHEN AOB 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, 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=100kHz, VBW=300kHz, Span=0Hz, Adjust Sweep=1s. Get the burst (in 1s.).

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.**

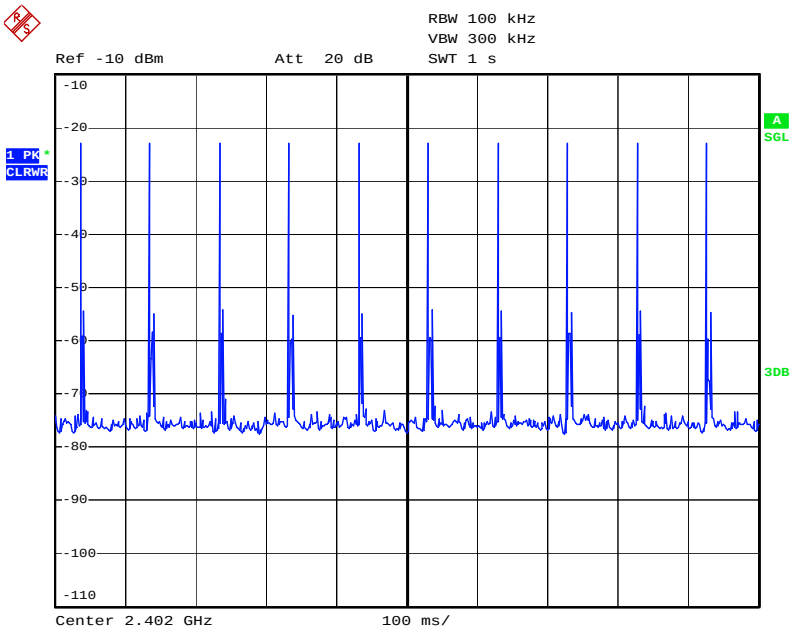
| | | | |
|---|---|---|---|
| Date of Test: | April 21, 2012 | Temperature: | 25°C |
| EUT: | SOUNDBOX XL | Humidity: | 50% |
| Model No.: | ES-53028 | Power Supply: | DC 5V |
| Test Mode: | Hopping | Test Engineer: | Apple |

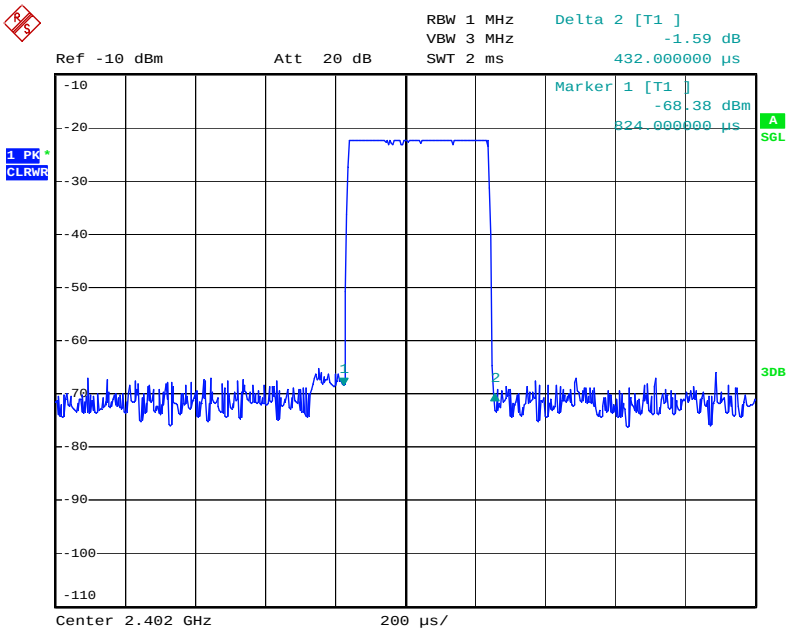
A period transmit time = 0.4 × 79 = 31.6

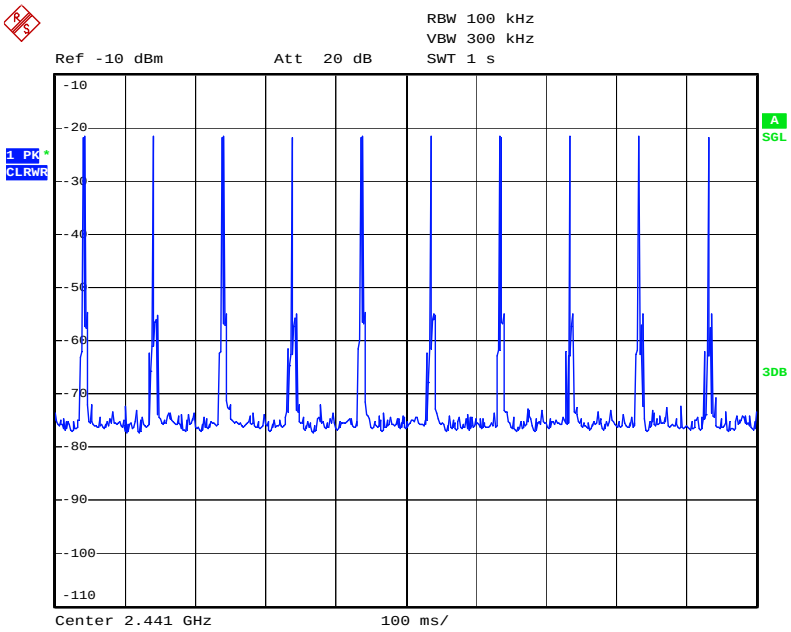
Dwell time = pulse time × burst (in 1S)×31.6S

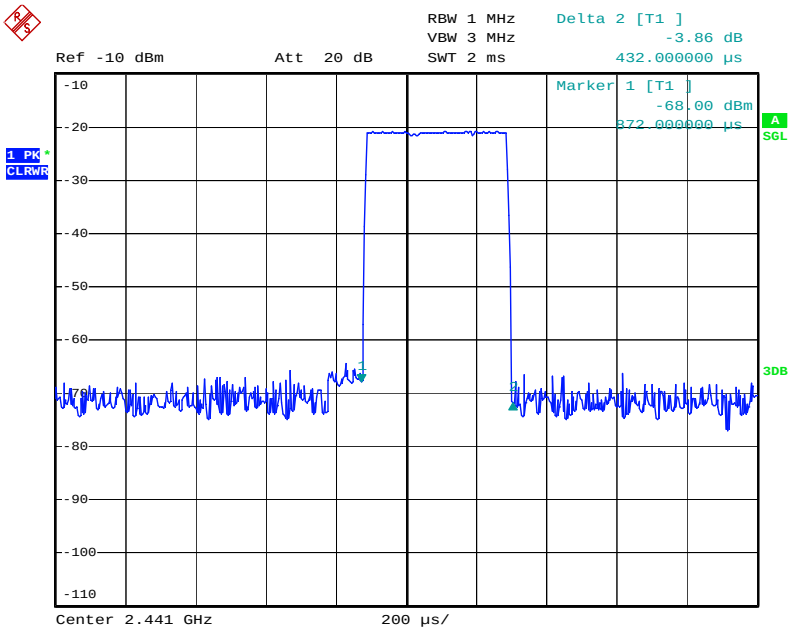
| Channel | Channel Frequency (MHz) | Pulse Time (ms) | Burst (in 1s.) | Dwell Time (ms) | Limit (ms) |
|---|---|---|---|---|---|
| Low | 2402 | 0.432 | 10 | 136.5 | 400 |
| Middle | 2441 | 0.432 | 10 | 136.5 | 400 |
| High | 2480 | 0.432 | 10 | 136.5 | 400 |

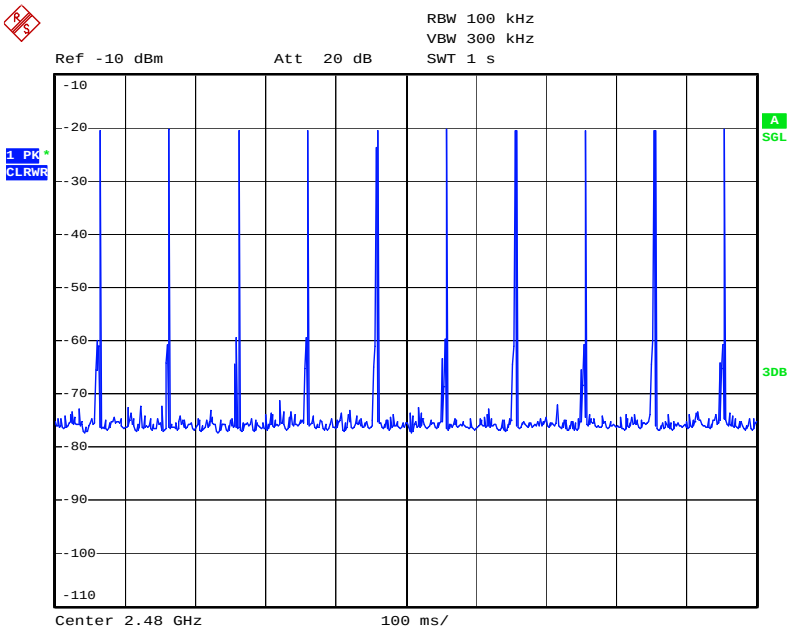
The spectrum analyzer plots are attached as below.

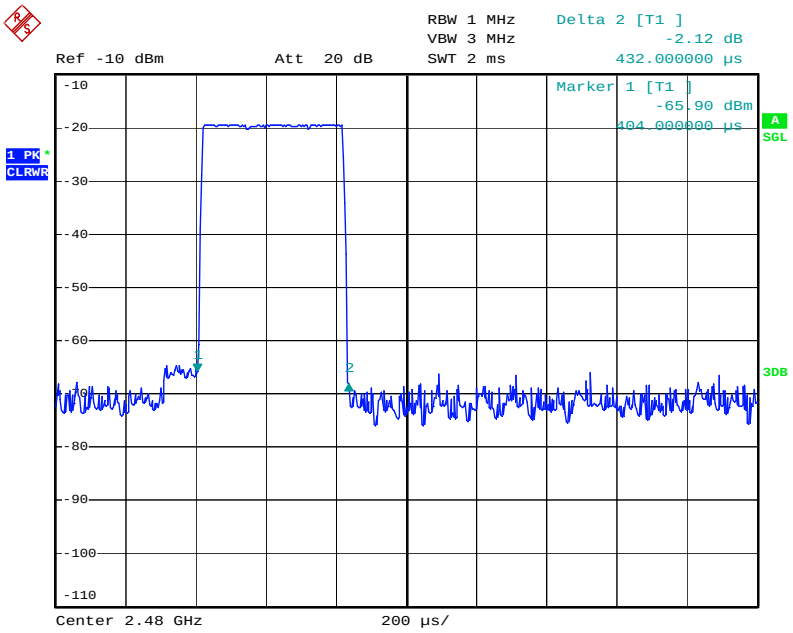

RBW 100 kHz
VBW 300 kHz
Ref -10 dBm
Att 20 dB
SWT 1 s
1 PK
CLRWR
A
SGL
3DB
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 2.402 GHz
100 ms/


RBW 1 MHz
VBW 3 MHz
SWT 2 ms
Delta 2 [T1 ]
-1.59 dB
432.000000 µs
Marker 1 [T1 ]
-68.38 dBm
324.000000 µs
Ref -10 dBm
Att 20 dB
1 PK
CLRWR
A
SGL
3DB
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 2.402 GHz
200 µs/


RBW 100 kHz
VBW 300 kHz
Ref -10 dBm
Att 20 dB
SWT 1 s
1 PK
CLRWR
A
SGL
3DB
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 2.441 GHz
100 ms/

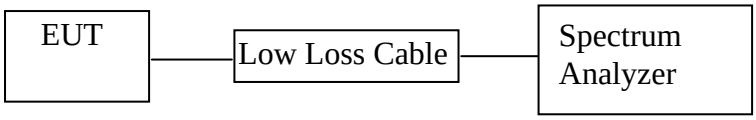

RBW 1 MHz
VBW 3 MHz
SWT 2 ms
Delta 2 [T1 ]
-3.86 dB
432.000000 µs
Marker 1 [T1 ]
-68.00 dBm
872.000000 µs
Ref -10 dBm
Att 20 dB
1 PK
CLRWR
A
SGL
3DB
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 2.441 GHz
200 µs/


RBW 100 kHz
VBW 300 kHz
Ref -10 dBm
Att 20 dB
SWT 1 s
1 PK
CLRWR
A
SGL
3DB
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 2.48 GHz
100 ms/


RBW 1 MHz
VBW 3 MHz
SWT 2 ms
Delta 2 [T1 ]
-2.12 dB
432.000000 µs
Marker 1 [T1 ]
-65.90 dBm
404.000000 µs
Ref -10 dBm
Att 20 dB
1 PK
CLRWR
A
SGL
3DB
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 2.48 GHz
200 µs/

# 9. MAXIMUM PEAK OUTPUT POWER TEST

## 9.1.Block Diagram of Test Setup




(EUT: SOUNDBOX XL)

## 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.SOUNDBOX XL (EUT)

| | | |
|---|---|---|
| Model Number | **:** | ES-53028 |
| Serial Number | **:** | N/A |
| Manufacturer | **:** | SHENZHEN AOB 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, 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.

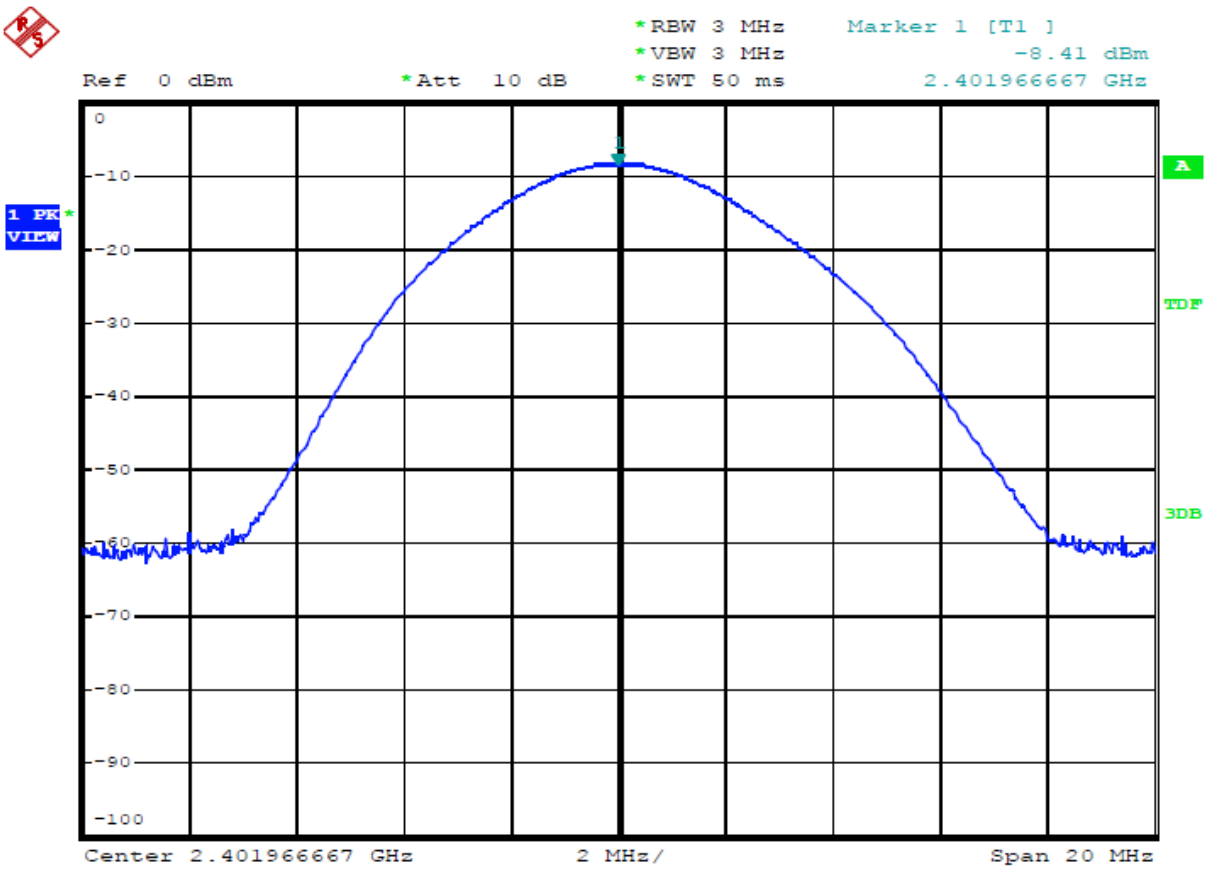
## 9.6. Test Result

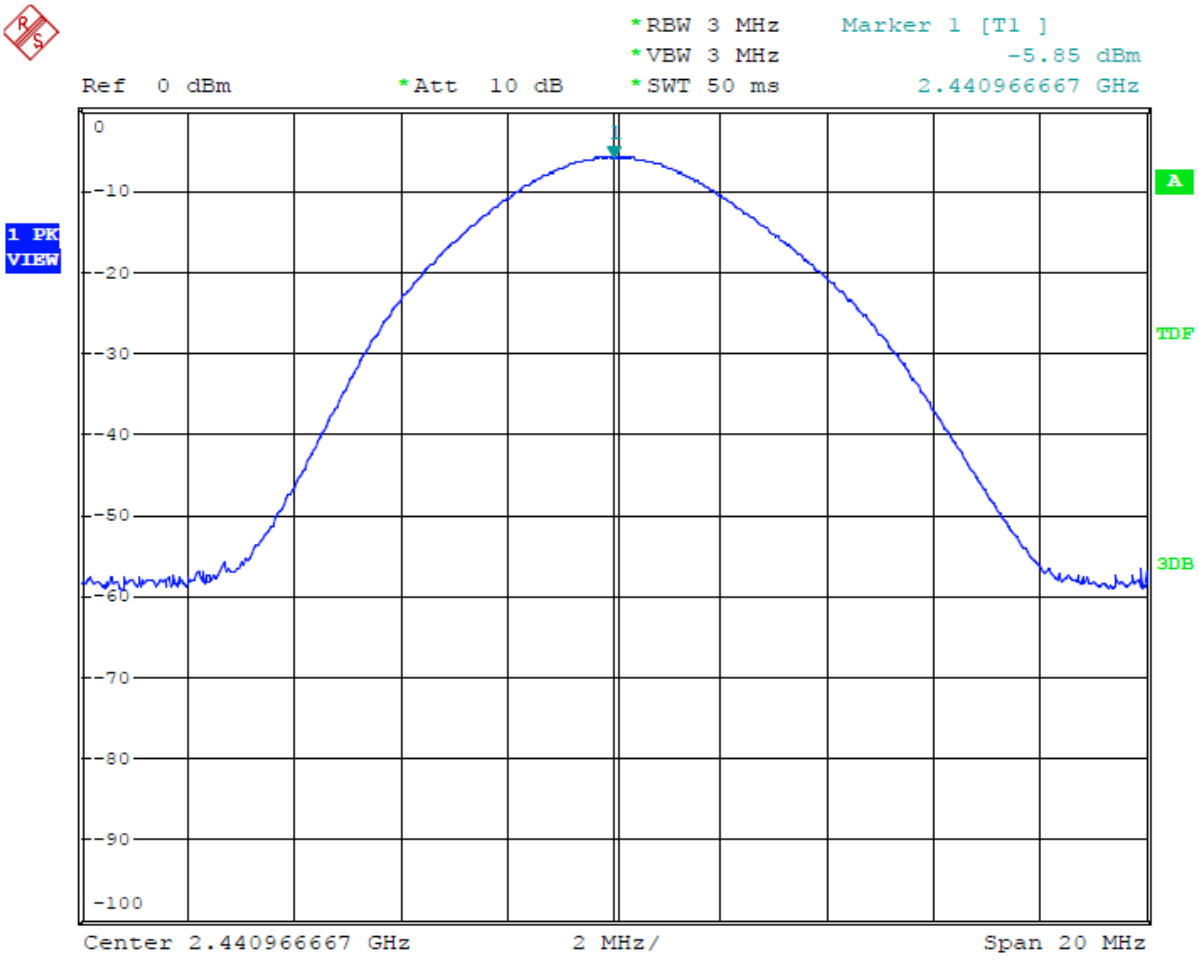
**PASS.**

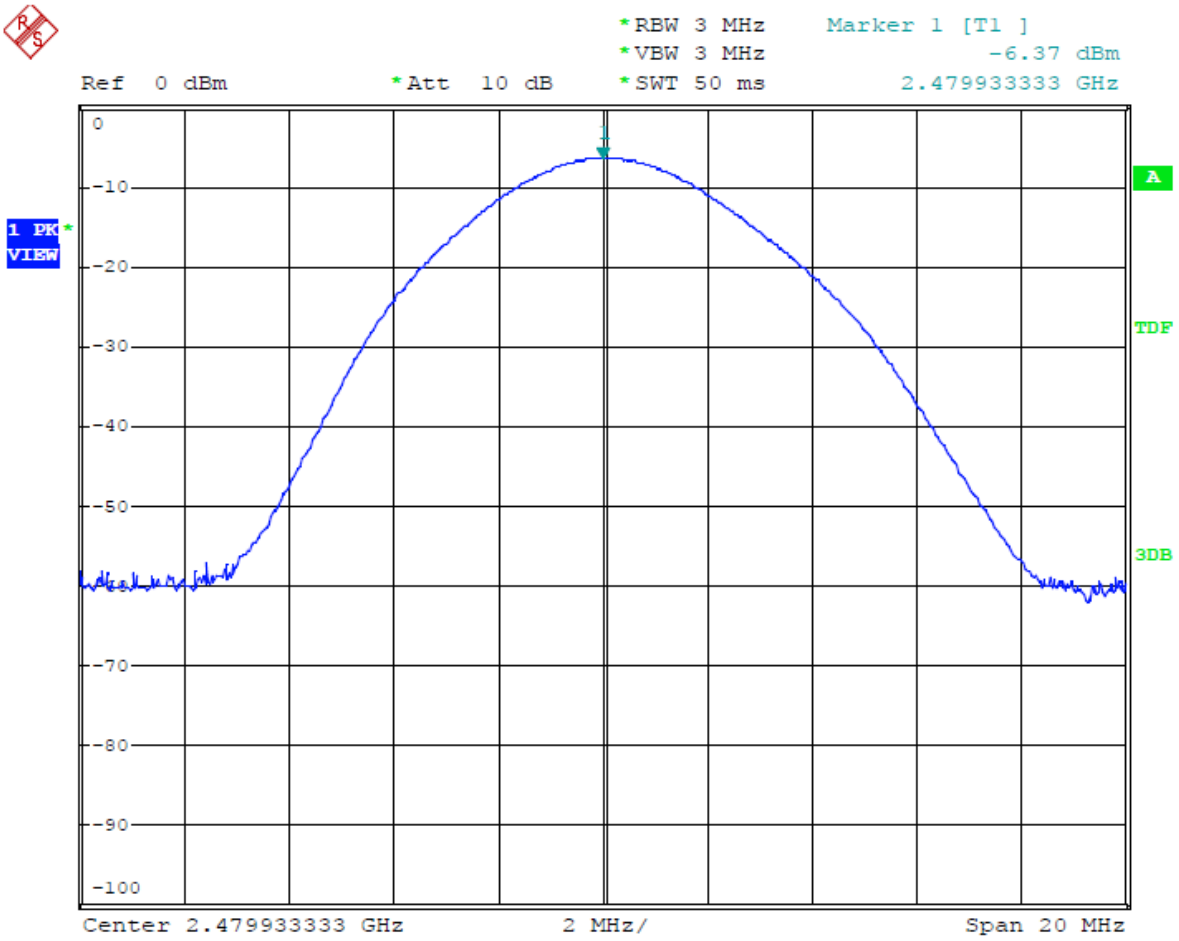
| | | | |
|---|---|---|---|
| Date of Test: | April 21, 2012 | Temperature: | 25°C |
| EUT: | SOUNDBOX XL | Humidity: | 50% |
| Model No.: | ES-53028 | Power Supply: | DC 5V |
| Test Mode: | TX | Test Engineer: | Apple |

| Channel | Frequency (MHz) | Peak Output Power (dBm) | Peak Output Power (mW) | Limits dBm / W |
|---|---|---|---|---|
| Low | 2402 | -8.41 | 0.144 | 30 dBm / 1 W |
| Middle | 2441 | -5.85 | 0.260 | 30 dBm / 1 W |
| High | 2480 | -6.37 | 0.231 | 30 dBm / 1 W |

The spectrum analyzer plots are attached as below.

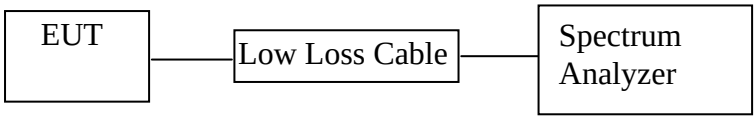

*RBW 3 MHz
*VBW 3 MHz
*SWT 50 ms
Marker 1 [T1 ]
-8.41 dBm
2.401966667 GHz
Ref 0 dBm
*Att 10 dB
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
1 PR*
VIEW
A
TDF
3DB
Center 2.401966667 GHz
2 MHz/
Span 20 MHz


*RBW 3 MHz
*VBW 3 MHz
*SWT 50 ms
Marker 1 [T1 ]
-5.85 dBm
2.440966667 GHz
Ref 0 dBm
*Att 10 dB
1 PK
VIEW
A
TDF
3DB
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
Center 2.440966667 GHz
2 MHz/
Span 20 MHz


*RBW 3 MHz
*VBW 3 MHz
*SWT 50 ms
Marker 1 [T1 ]
-6.37 dBm
2.479933333 GHz
Ref 0 dBm
*Att 10 dB
1 PK
VIEW
A
TDF
3DB
0
-10
-20
-30
-40
-50
-70
-80
-90
-100
Center 2.479933333 GHz
2 MHz/
Span 20 MHz

# 10.BAND EDGE COMPLIANCE TEST

## 10.1.Block Diagram of Test Setup




(EUT: SOUNDBOX XL)

## 10.2.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).

## 10.3.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.

### 10.3.1.SOUNDBOX XL (EUT)

| | | |
|---|---|---|
| Model Number | : | ES-53028 |
| Serial Number | : | N/A |
| Manufacturer | : | SHENZHEN AOB ELECTRONICS CO., LTD |

## 10.4.Operating Condition of EUT

10.4.1.Setup the EUT and simulator as shown as Section 10.1.

10.4.2.Turn on the power of all equipment.

10.4.3.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.

## 10.5.Test Procedure

Conducted Band Edge:

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

10.5.2.Set RBW of spectrum analyzer to 100kHz and VBW to 300kHz.

Radiate Band Edge:

10.5.3.The EUT is placed on a turntable, which is 0.8m above the ground plane and worked at highest radiated power.

10.5.4.The turntable was rotated for 360 degrees to determine the position of maximum emission level.

10.5.5.EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.

10.5.6.Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

RBW=1MHz, VBW=1MHz

10.5.7.The band edges was measured and recorded.

## 10.6.Test Result

**Pass**

| | | | |
|---|---|---|---|
| Date of Test: | April 21, 2012 | Temperature: | 25°C |
| EUT: | SOUNDBOX XL | Humidity: | 50% |
| Model No.: | ES-53028 | Power Supply: | DC 5V |
| Test Mode: | TX (Hopping off) | Test Engineer: | Apple |

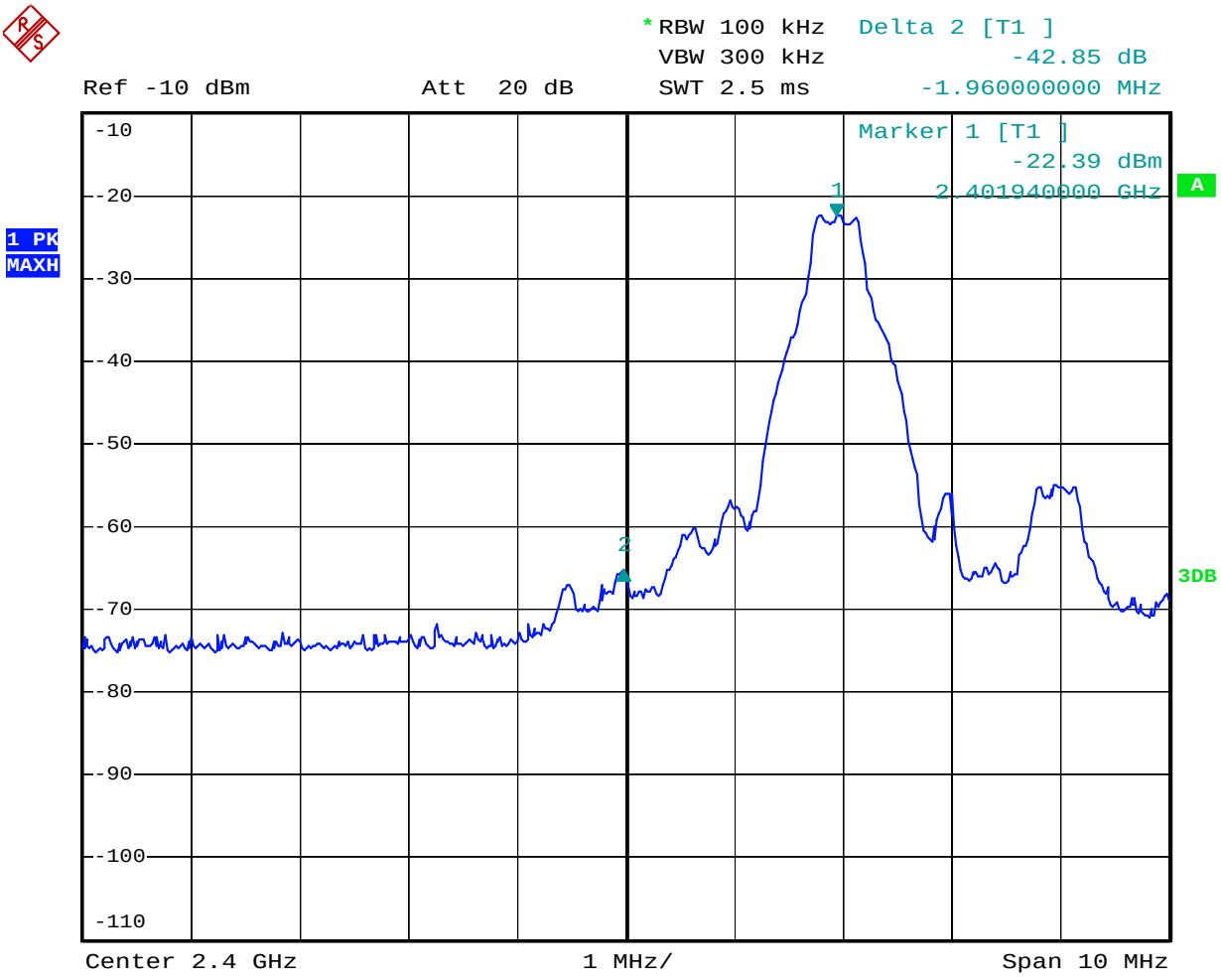
Conducted test

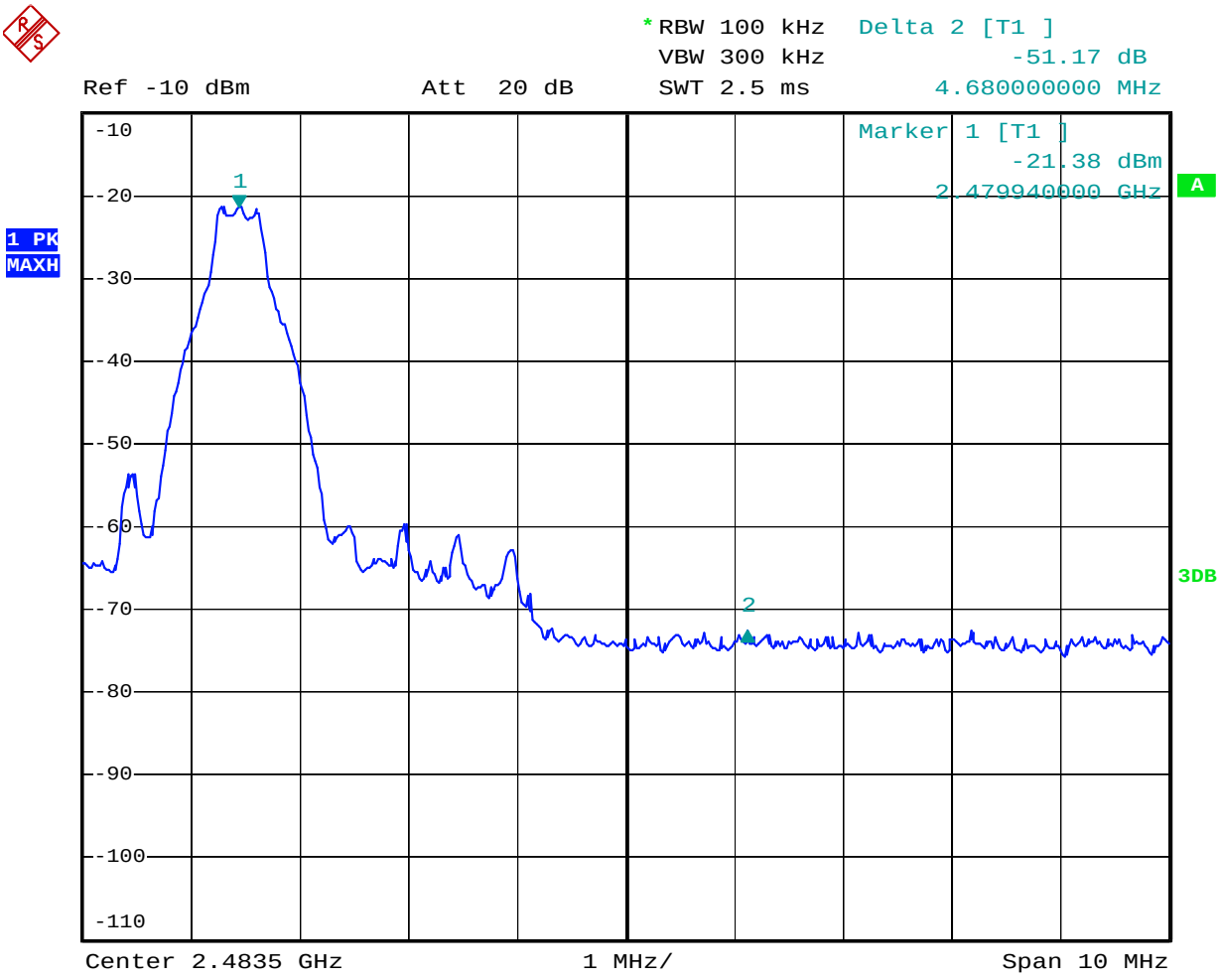
| Frequency (MHz) | Result of Band Edge (dBc) | Limit of Band Edge (dBc) |
|---|---|---|
| 2402 | 42.85 | > 20dBc |
| 2480 | 51.17 | > 20dBc |

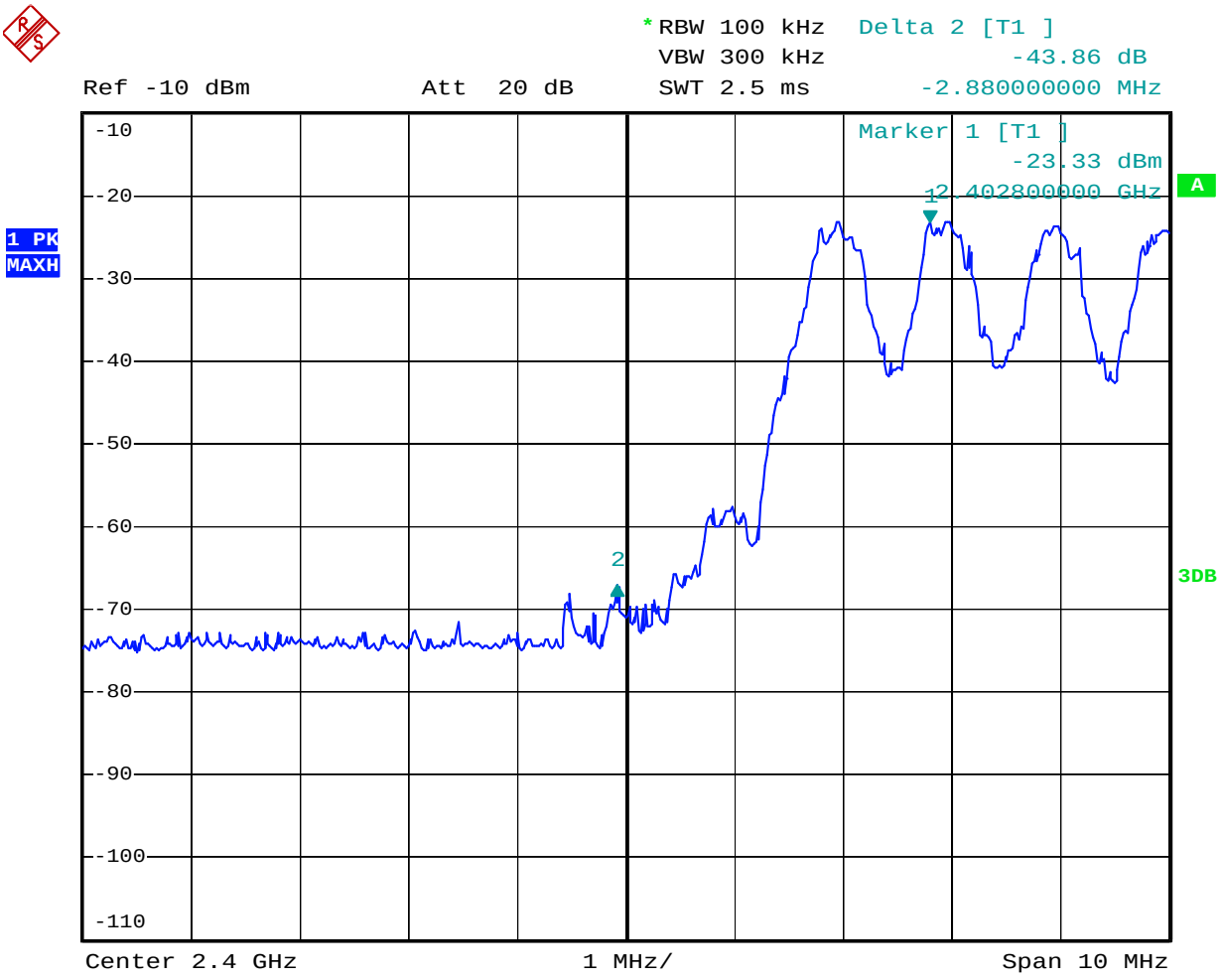
| | | | |
|---|---|---|---|
| Date of Test: | April 21, 2012 | Temperature: | 25°C |
| EUT: | SOUNDBOX XL | Humidity: | 50% |
| Model No.: | ES-53028 | Power Supply: | DC 5V |
| Test Mode: | TX (Hopping on) | Test Engineer: | Apple |

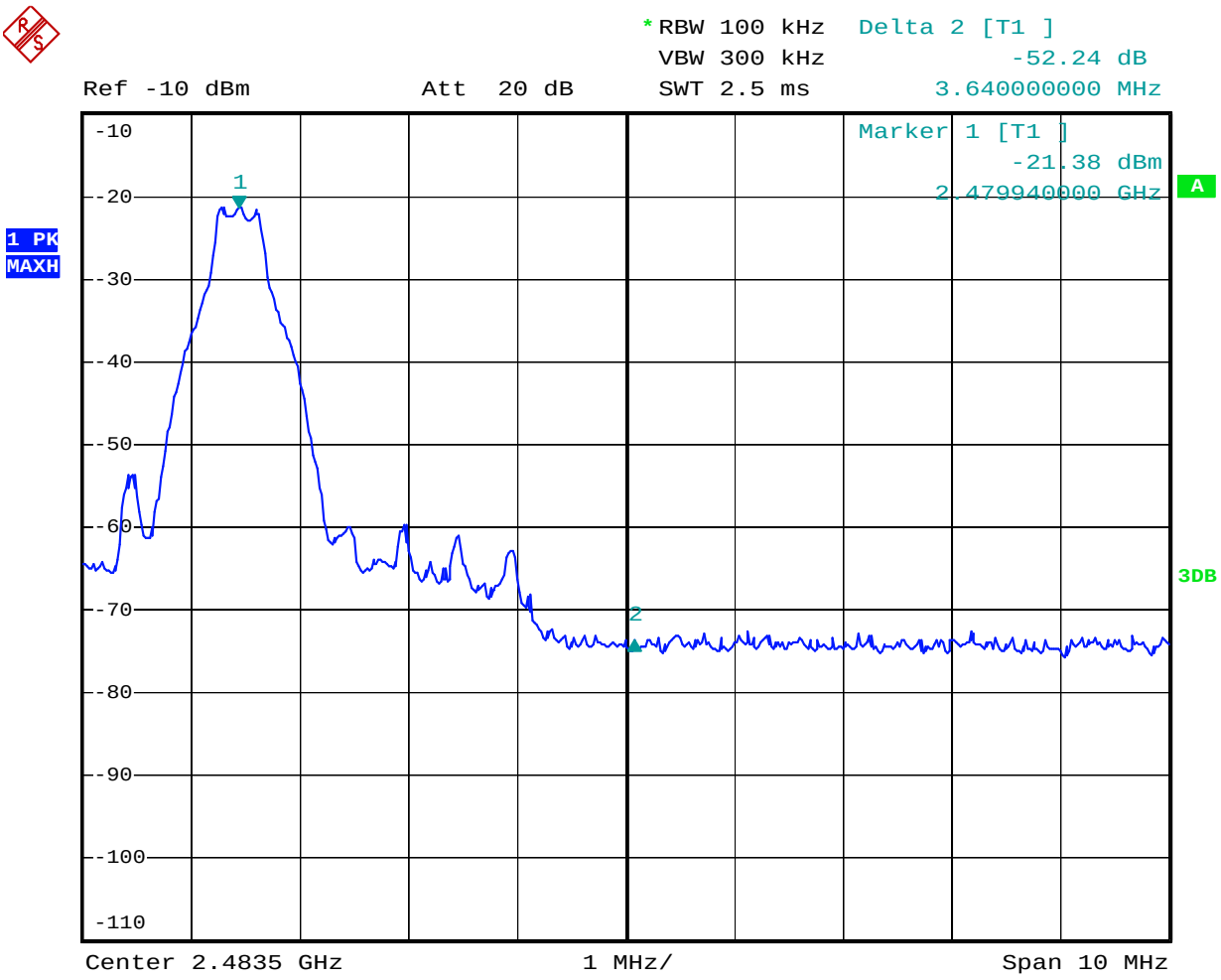
Conducted test

| Frequency (MHz) | Result of Band Edge (dBc) | Limit of Band Edge (dBc) |
|---|---|---|
| 2402 | 43.86 | > 20dBc |
| 2480 | 52.24 | > 20dBc |


*RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
Delta 2 [T1 ]
-42.85 dB
-1.960000000 MHz
Ref -10 dBm
Att 20 dB
Marker 1 [T1 ]
-22.39 dBm
2.401940000 GHz
1 PK
MAXH
A
3DB
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 2.4 GHz
1 MHz/
Span 10 MHz


*RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
Delta 2 [T1 ]
-51.17 dB
4.680000000 MHz
Ref -10 dBm
Att 20 dB
Marker 1 [T1 ]
-21.38 dBm
2.479940000 GHz
1 PK
MAXH
A
3DB
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 2.4835 GHz
1 MHz/
Span 10 MHz


*RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
Delta 2 [T1 ]
-43.86 dB
-2.880000000 MHz
Ref -10 dBm
Att 20 dB
Marker 1 [T1 ]
-23.33 dBm
2.402800000 GHz
1 PK
MAXH
A
3DB
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 2.4 GHz
1 MHz/
Span 10 MHz


*RBW 100 kHz
VBW 300 kHz
SWT 2.5 ms
Delta 2 [T1 ]
-52.24 dB
3.640000000 MHz
Ref -10 dBm
Att 20 dB
Marker 1 [T1 ]
-21.38 dBm
2.479940000 GHz
1 PK
MAXH
A
3DB
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
-110
Center 2.4835 GHz
1 MHz/
Span 10 MHz

**Radiated Band Edge Result**

| | | | |
|---|---|---|---|
| Date of Test: | April 22, 2012 | Temperature: | 25°C |
| EUT: | SOUNDBOX XL | Humidity: | 50% |
| Model No.: | ES-53028 | Power Supply: | DC 5V |
| Test Mode: | TX (2402MHz) | Test Engineer: | Kai |

| 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 | |
| - | - | - | - | - | - | - | - | - | - | Vertical |
| - | - | - | - | - | - | - | - | - | - | 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.

| | | | |
|---|---|---|---|
| Date of Test: | April 22, 2012 | Temperature: | 25°C |
| EUT: | SOUNDBOX XL | Humidity: | 50% |
| Model No.: | ES-53028 | Power Supply: | DC 5V |
| Test Mode: | TX (2480MHz) | Test Engineer: | Kai |

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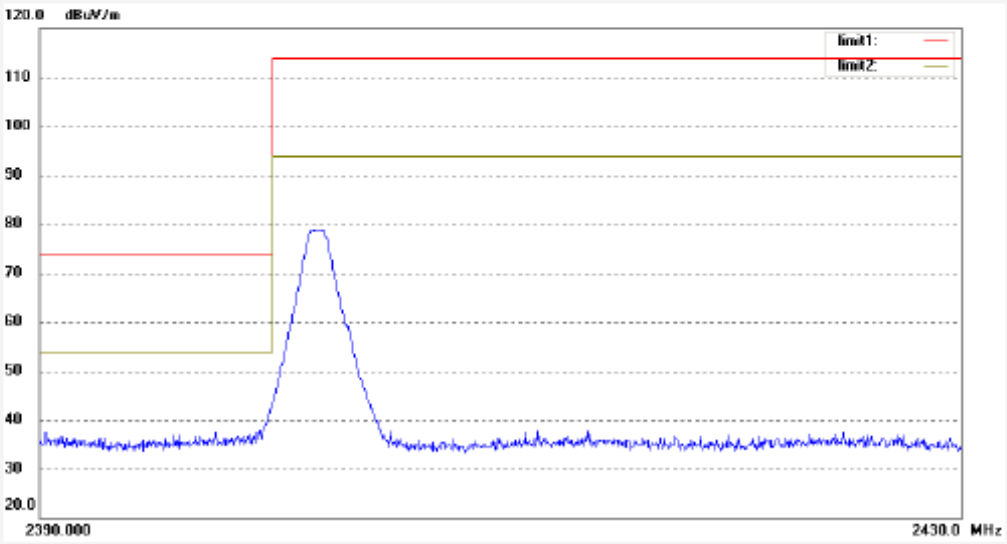
Site: 966 chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

| | |
|---|---|
| Job No.: Kai #1208 | Polarization: Horizontal |
| Standard: FCC Part 15 PEAK 2.4G | Power Source: DC5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 14:12:52 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2402 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




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

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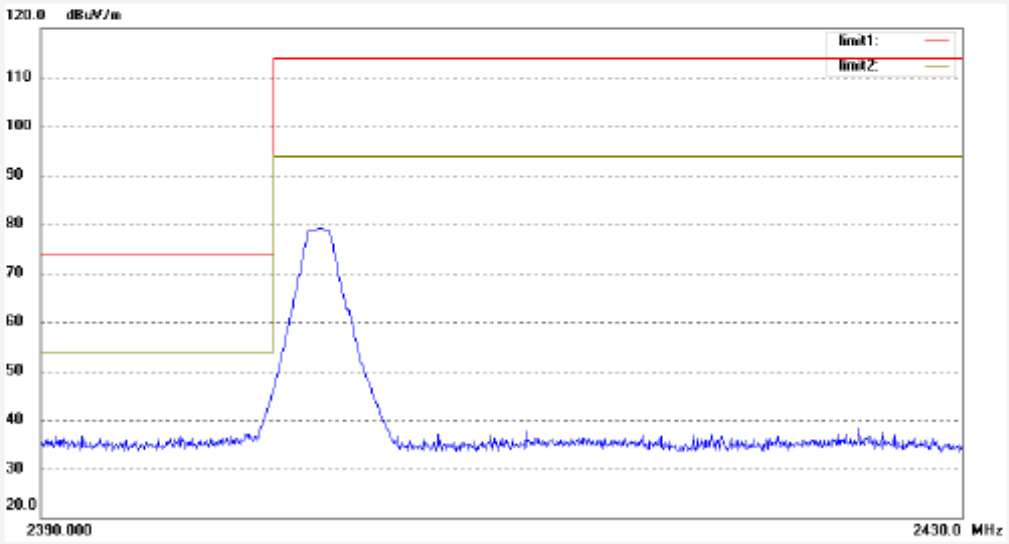
Fax:+86-0755-26503396

| | |
|---|---|
| Job No.: Kai #1209 | Polarization: Vertical |
| Standard: FCC Part 15 PEAK 2.4G | Power Source: DC 5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 14:14:18 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2402 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




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

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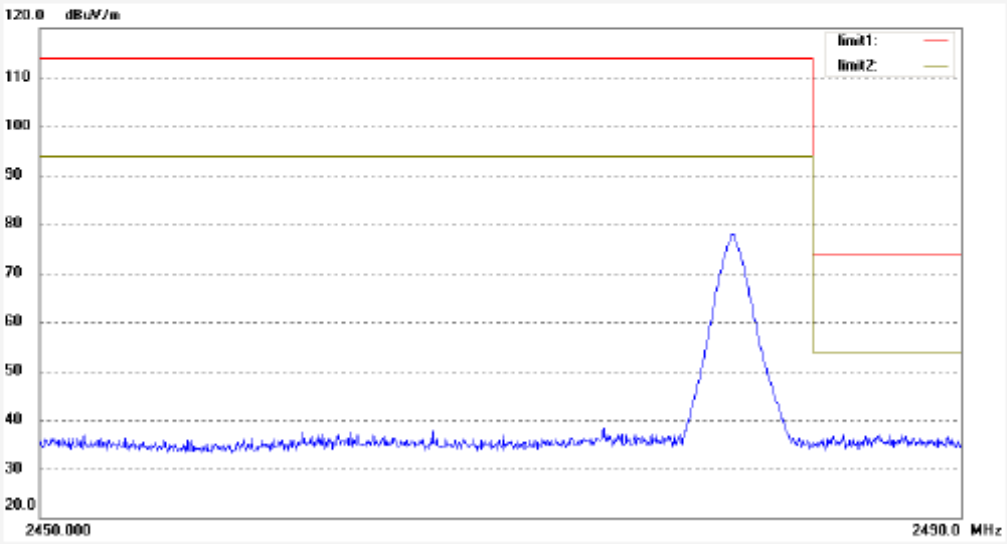
Fax:+86-0755-26503396

| | |
|---|---|
| Job No.: Kai #1211 | Polarization: Horizontal |
| Standard: FCC Part 15 PEAK 2.4G | Power Source: DC 5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 14:23:04 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2480 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




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

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Science & Industry Park,Nanshan Shenzhen,P.R.China
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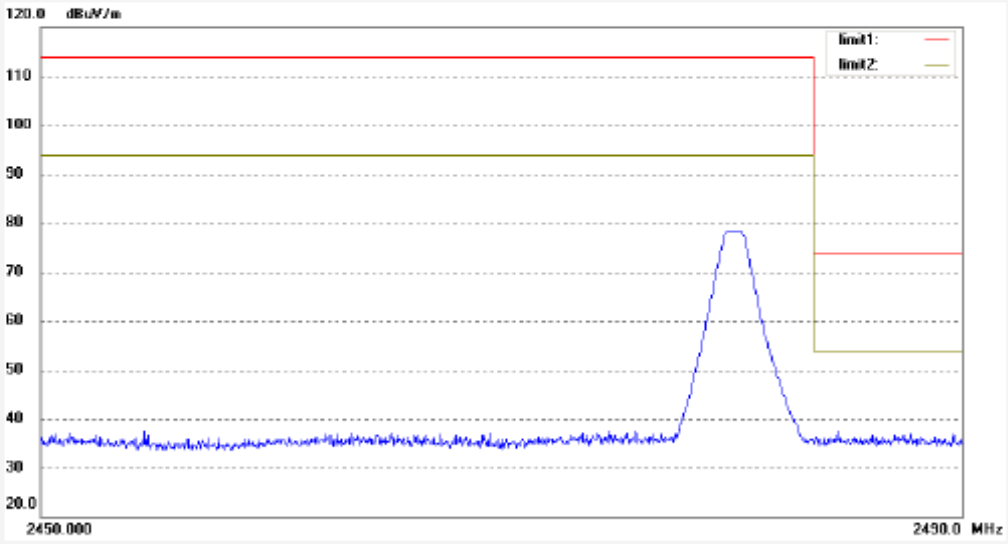
Tel:+86-0755-26503290
Fax:+86-0755-26503396

| | |
|---|---|
| Job No.: Kai #1210 | Polarization: Vertical |
| Standard: FCC Part 15 PEAK 2.4G | Power Source: DC 5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 14:17:40 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2480 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




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

# 11.RADIATED SPURIOUS EMISSION TEST

## 11.1.Block Diagram of Test Setup

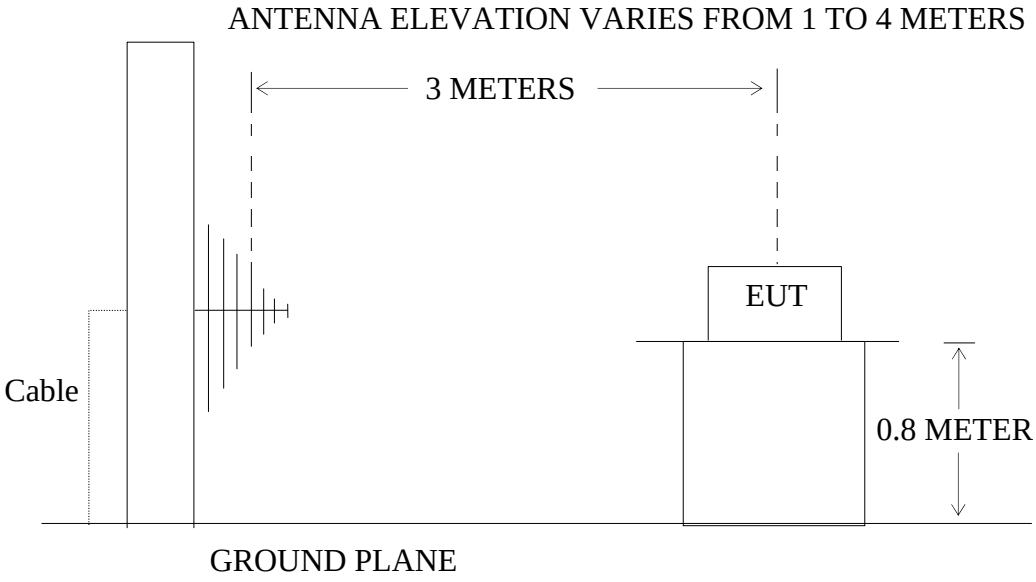
### 11.1.1.Block diagram of connection between the EUT and simulators

EUT

Setup: Transmitting mode

(EUT: SOUNDBOX XL)

### 11.1.2.Semi-Anechoic Chamber Test Setup Diagram




(EUT: SOUNDBOX XL)

## 11.2.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).

## 11.3.Restricted bands of operation

### 11.3.1.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 |
| [1]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 | ([2]) |
| 13.36-13.41 | | | |

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510

[2]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 Section15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

## 11.4.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.

### 11.4.1.SOUNDBOX XL (EUT)

| | | |
|---|---|---|
| Model Number | **:** | ES-53028 |
| Serial Number | **:** | N/A |
| Manufacturer | **:** | SHENZHEN AOB ELECTRONICS CO., LTD |

## 11.5.Operating Condition of EUT

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

11.5.2.Turn on the power of all equipment.

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

## 11.6.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: 2003 on radiated emission measurement. The EUT was tested in 3 orthogonal planes.

The bandwidth of test receiver is set at 9kHz in below 30MHz. and set at 120kHz in 30-1000MHz, and 1MHz in above 1000MHz.

The frequency range from 9kHz to 25GHz is checked.

The final measurement in band 9-90kHz, 110-490kHz 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

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

**PASS.**

| | | | |
|---|---|---|---|
| Date of Test: | April 22, 2012 | Temperature: | 25°C |
| EUT: | SOUNDBOX XL | Humidity: | 50% |
| Model No.: | ES-53028 | Power Supply: | DC 5V |
| Test Mode: | TX (2402MHz) | Test Engineer: | Apple |

Below 30MHz

| Frequency (MHz) | Reading (dBμV/m) QP | Factor(dB) Corr. | Result (dBμV/m) QP | Limit (dBμV/m) QP | Margin (dB) QP | Polarization |
|---|---|---|---|---|---|---|
| - | - | - | - | - | - | X |
| - | - | - | - | - | - | Y |
| - | - | - | - | - | - | Z |

**For 30MHz-1000MHz**

Corrected Factor = Antenna Factor + Cable Loss – Amplifier Gain

| Frequency (MHz) | Reading (dBμV/m) QP | Factor Corr. (dB) | Result (dBμV/m) QP | Limit (dBμV/m) QP | Margin (dB) QP | Polarization |
|---|---|---|---|---|---|---|
| - | - | - | - | - | - | Vertical |
| - | - | - | - | - | - | 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 | |
| 2402.000 | 82.57 | 83.82 | -7.45 | 75.12 | 76.37 | - | - | - | - | Vertical |
| *4804.000 | 50.67 | 51.52 | -0.30 | 50.37 | 51.22 | 54 | 74 | -3.63 | -22.78 | Vertical |
| 2402.000 | 82.39 | 83.56 | -7.45 | 74.94 | 76.11 | - | - | - | - | Horizontal |
| *4804.009 | 47.48 | 48.26 | -0.30 | 47.18 | 47.96 | 54 | 74 | -6.82 | -26.04 | Horizontal |

**Note: 1. Emissions attenuated more than 20 dB below the permissible value are not reported.**

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

| | | | |
|---|---|---|---|
| Date of Test: | April 22, 2012 | Temperature: | 25°C |
| EUT: | SOUNDBOX XL | Humidity: | 50% |
| Model No.: | ES-53028 | Power Supply: | DC 5V |
| Test Mode: | TX (2441MHz) | Test Engineer: | Apple |

Below 30MHz

| Frequency (MHz) | Reading (dBμV/m) | Factor(dB) Corr. | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|
| | QP | | QP | QP | QP | |
| - | - | - | - | - | - | X |
| - | - | - | - | - | - | Y |
| - | - | - | - | - | - | Z |

**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 | |
| - | - | - | - | - | - | Vertical |
| - | - | - | - | - | - | 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 | |
| 2441.000 | 82.44 | 83.82 | -7.35 | 75.09 | 76.47 | - | - | - | - | Vertical |
| *4882.049 | 45.37 | 46.25 | 0.14 | 45.51 | 46.39 | 54 | 74 | -8.49 | -27.61 | Vertical |
| 2441.000 | 82.67 | 83.50 | -7.35 | 75.32 | 76.15 | - | - | - | - | Horizontal |
| *4882.049 | 45.82 | 46.79 | 0.14 | 45.96 | 46.93 | 54 | 74 | -8.04 | -27.07 | Horizontal |

**Note: 1. Emissions attenuated more than 20 dB below the permissible value are not reported.**

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

| | | | |
|---|---|---|---|
| Date of Test: | April 22, 2012 | Temperature: | 25°C |
| EUT: | SOUNDBOX XL | Humidity: | 50% |
| Model No.: | ES-53028 | Power Supply: | DC 5V |
| Test Mode: | TX (2480MHz) | Test Engineer: | Apple |

Below 30MHz

| Frequency (MHz) | Reading (dBμV/m) | Factor(dB) Corr. | Result (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Polarization |
|---|---|---|---|---|---|---|
| | QP | | QP | QP | QP | |
| - | - | - | - | - | - | X |
| - | - | - | - | - | - | Y |
| - | - | - | - | - | - | Z |

**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 | |
| - | - | - | - | - | - | Vertical |
| - | - | - | - | - | - | 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 | |
| 2480.000 | 83.35 | 84.91 | -7.37 | 75.98 | 77.54 | - | - | - | - | Vertical |
| *4960.009 | 47.49 | 48.01 | 0.52 | 48.01 | 48.53 | 54 | 74 | -5.99 | -25.47 | |
| 2480.000 | 82.48 | 83.94 | -7.37 | 75.11 | 76.57 | - | - | - | - | Horizontal |
| *4960.009 | 45.66 | 46.17 | 0.52 | 46.18 | 46.69 | 54 | 74 | -7.82 | -27.31 | |

**Note: 1. Emissions attenuated more than 20 dB below the permissible value are not reported.**

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

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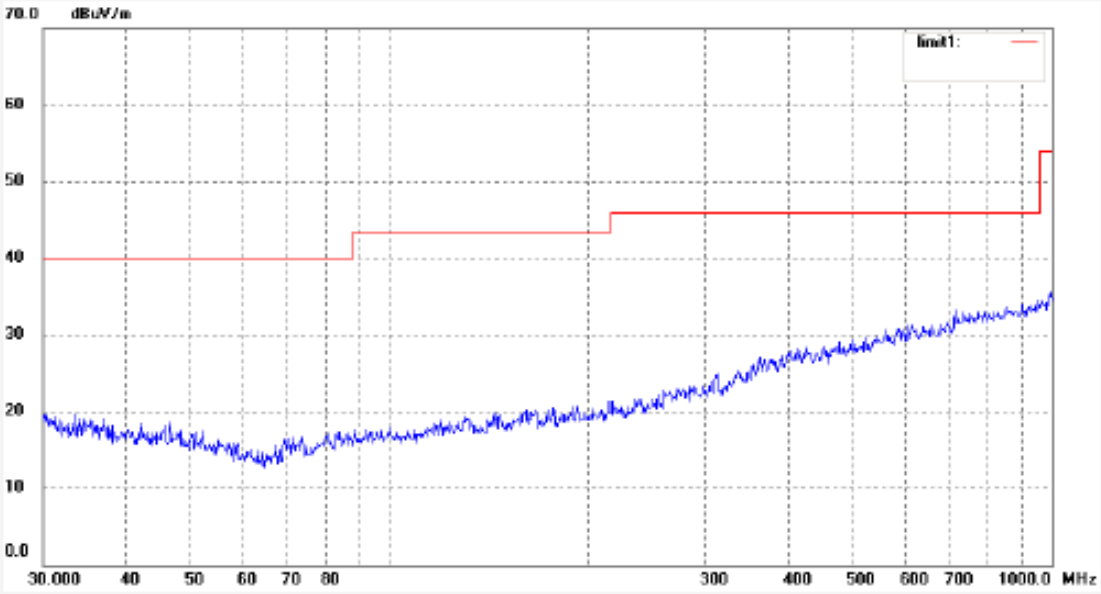
| | |
|---|---|
| Job No.: Kai #1191 | Polarization: Horizontal |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 12:39:18 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2402 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.ATE20120729:




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

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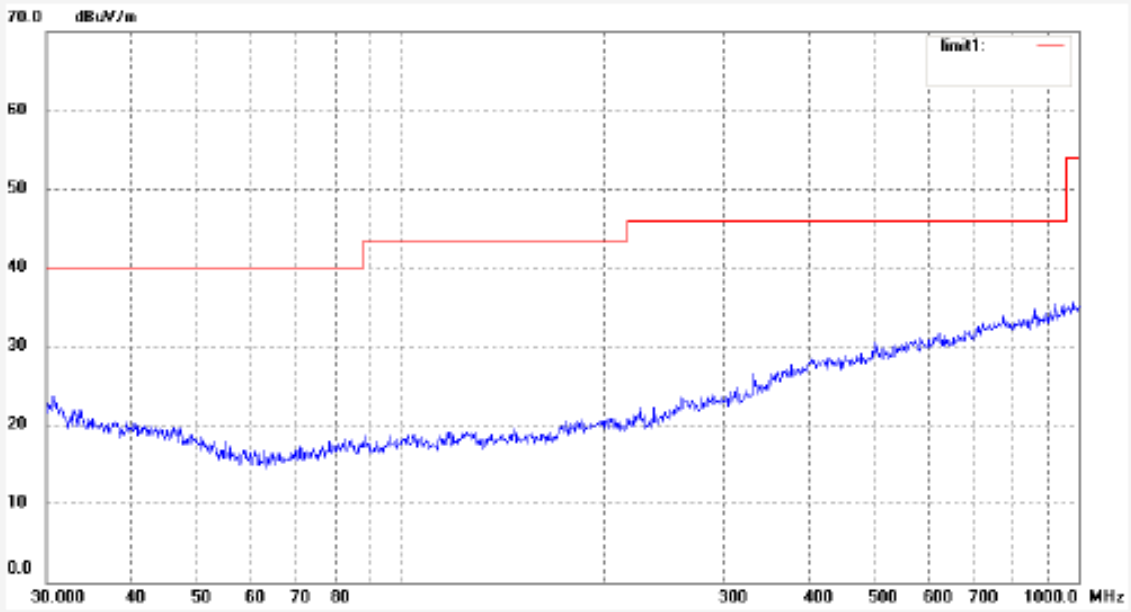
| | |
|---|---|
| Job No.: Kai #1190 | Polarization: Vertical |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 12:38:19 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2402 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




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

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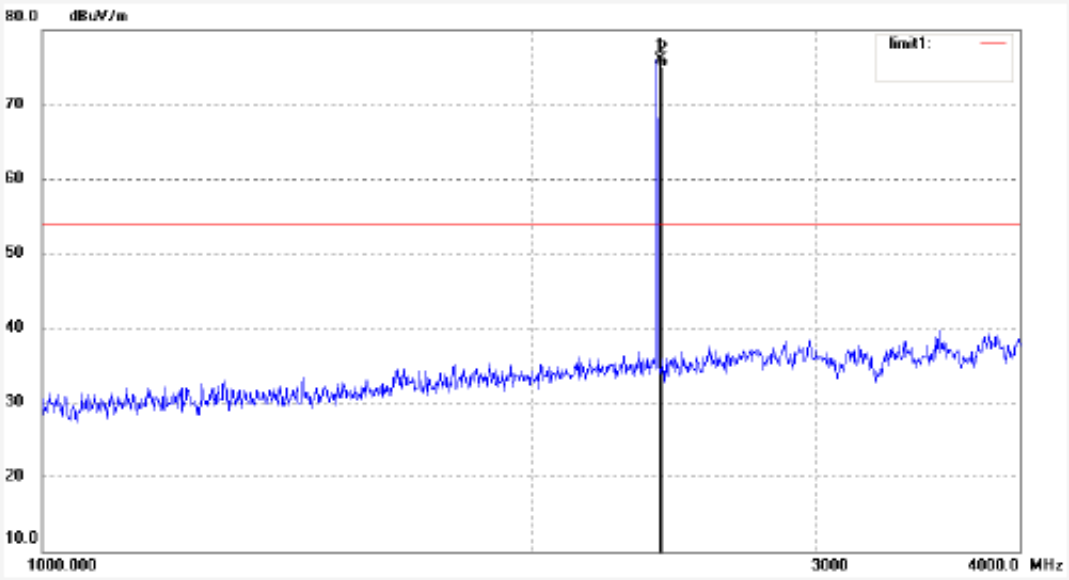
Job No.: Kai #1196
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.( C)/Hum.(%) 24 C / 48 %
EUT: SOUNDBOX XL
Mode: TX 2402
Model: ES-53028
Manufacturer: AOB

Polarization: Horizontal
Power Source: DC 5V
Date: 2012/04/22
Time: 12:47:44
Engineer Signature: Kai
Distance: 3m

Note: Report No.:ATE20120729




| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2402.000 | 83.56 | -7.45 | 76.11 | 114.00 | -37.89 | peak | | | |
| 2 | 2402.000 | 82.39 | -7.45 | 74.94 | 94.00 | -19.06 | AVG | | | |

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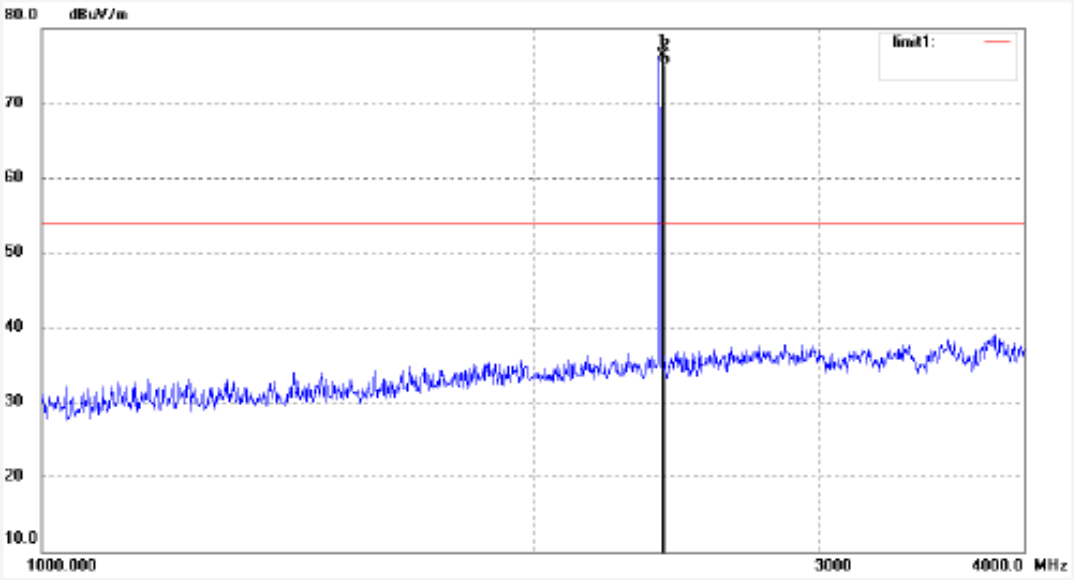
| | |
|---|---|
| Job No.: Kai #1197 | Polarization: Vertical |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 12:49:32 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2402 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2402.000 | 83.82 | -7.45 | 76.37 | 114.00 | -37.63 | peak | | | |
| 2 | 2402.000 | 82.57 | -7.45 | 75.12 | 94.00 | -18.18 | AVG | | | |

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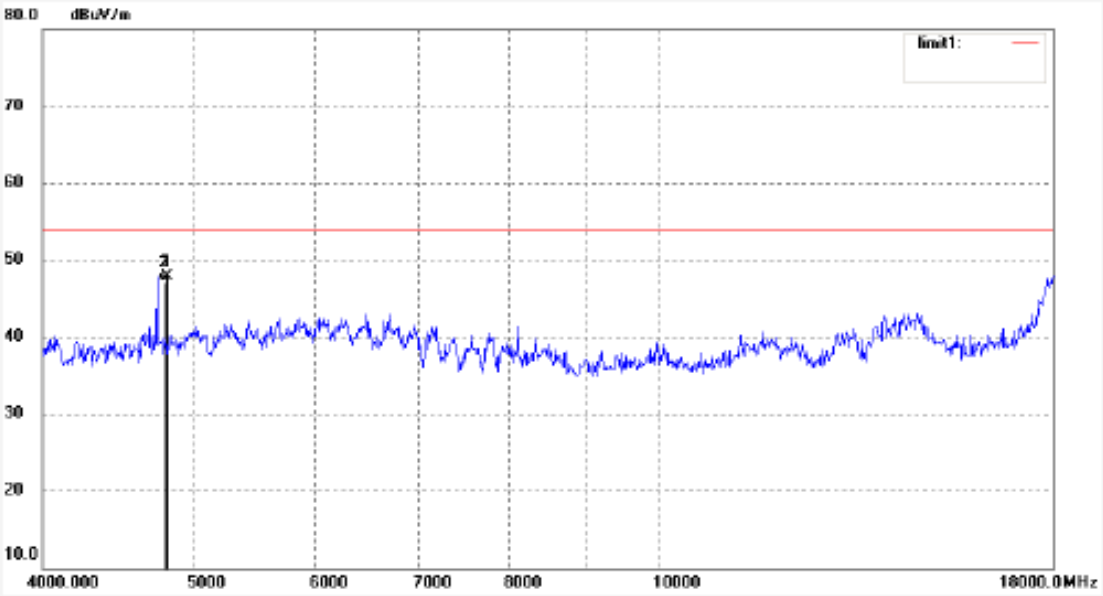
| | |
|---|---|
| Job No.: Kai #1203 | Polarization: Horizontal |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 13:54:18 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2402 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4804.009 | 48.26 | -0.30 | 47.96 | 74.00 | -26.04 | peak | | | |
| 2 | 4804.009 | 47.48 | -0.30 | 47.18 | 54.00 | -6.82 | AVG | | | |

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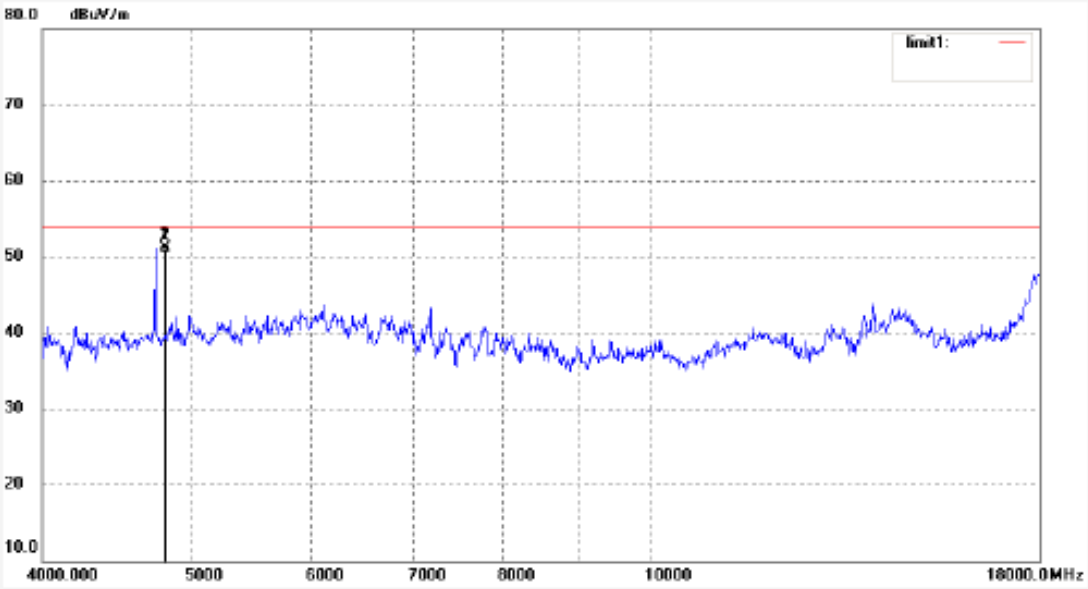
Job No.: Kai #1202
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.( C)/Hum.(%) 24 C / 48 %
EUT: SOUNDBOX XL
Mode: TX 2402
Model: ES-53028
Manufacturer: AOB

Polarization: Vertical
Power Source: DC 5V
Date: 2012/04/22
Time: 13:51:13
Engineer Signature: Kai
Distance: 3m

Note: Report No.:ATE20120729




| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4804.009 | 51.52 | -0.30 | 51.22 | 74.00 | -22.78 | peak | | | |
| 2 | 4804.009 | 50.67 | -0.30 | 50.37 | 54.00 | -3.63 | AVG | | | |

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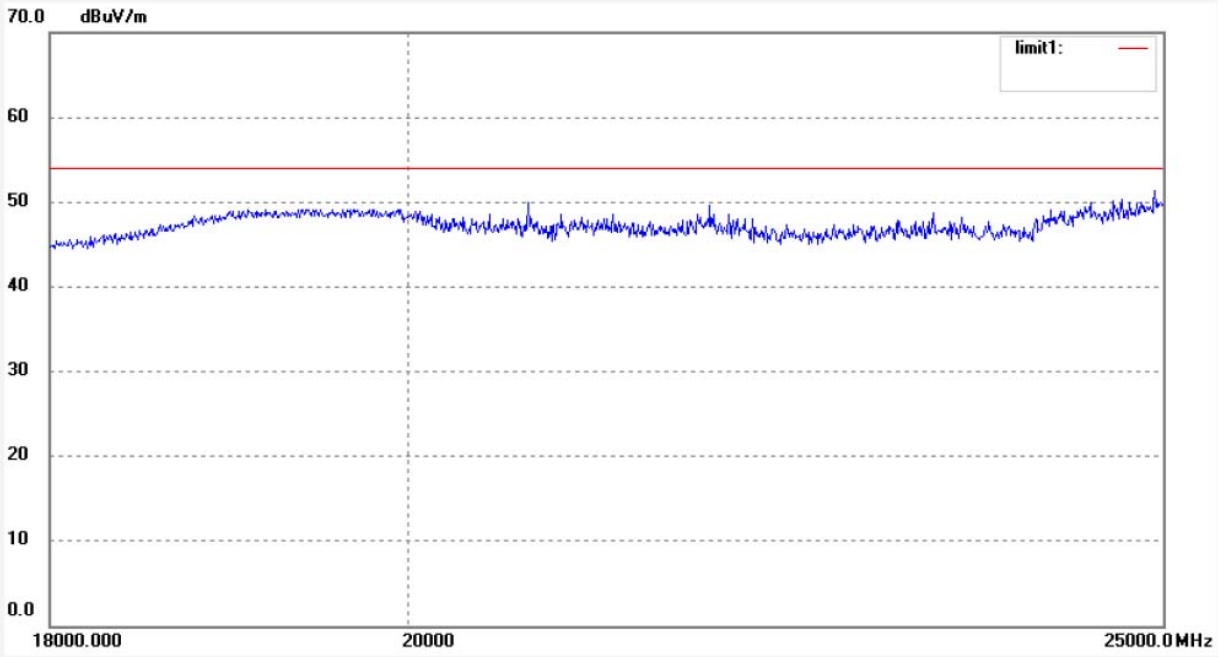
| | |
|---|---|
| Job No.: Kai #1238 | Polarization: Horizontal |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 12/4/22/ |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 5/47/15 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2402MHz | Distance: |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




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

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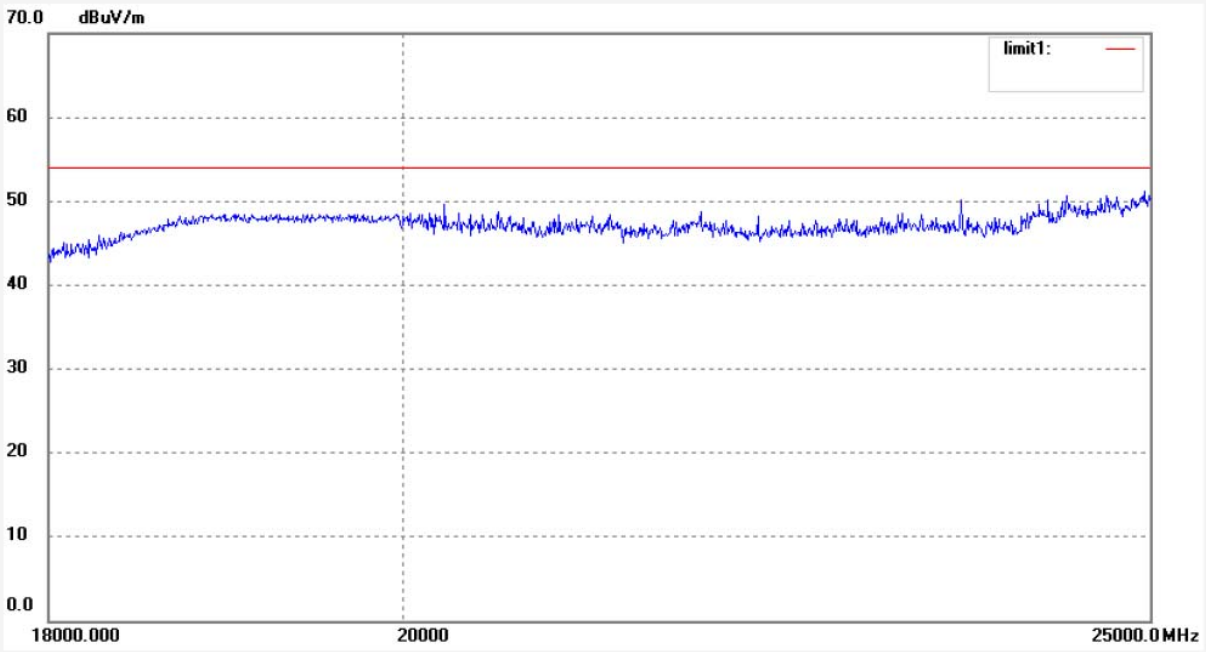
| | |
|---|---|
| Job No.: Kai #1239 | Polarization: Vertical |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 12/4/22/ |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 5/49/05 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2402MHz | Distance: |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




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

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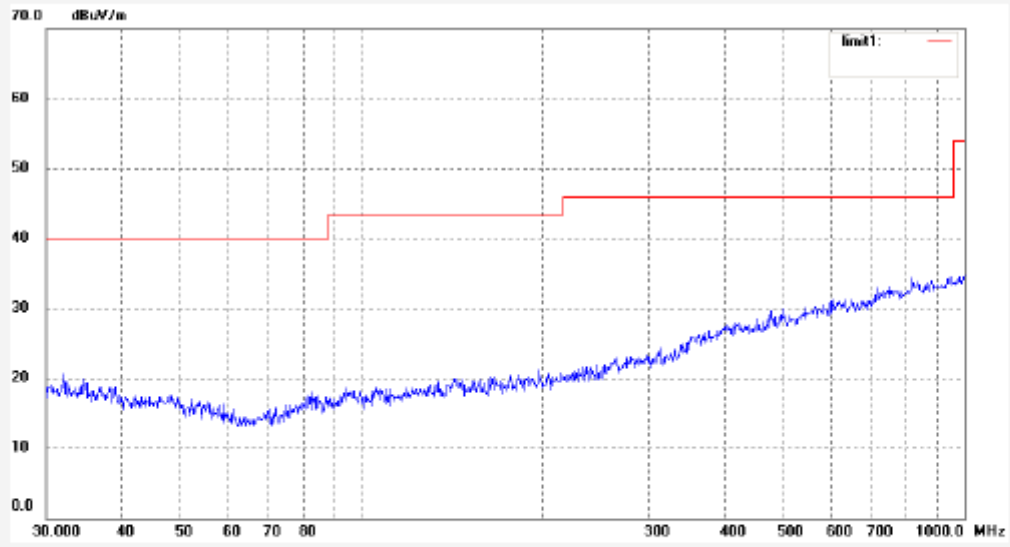
| | |
|---|---|
| Job No.: Kai #1192 | Polarization: Horizontal |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 12:40:08 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2441 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




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

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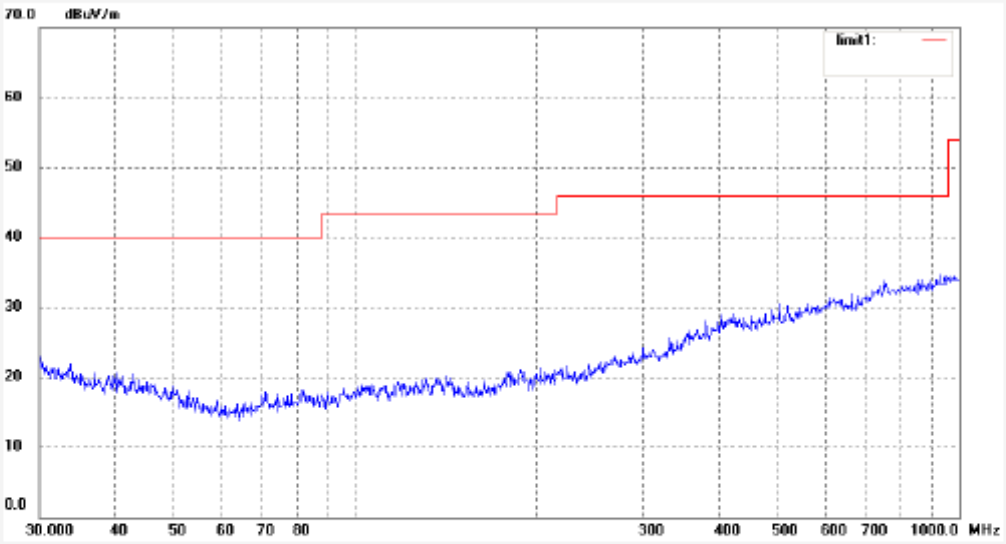
| | |
|---|---|
| Job No.: Kai #1193 | Polarization: Vertical |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 12:41:26 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2441 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




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

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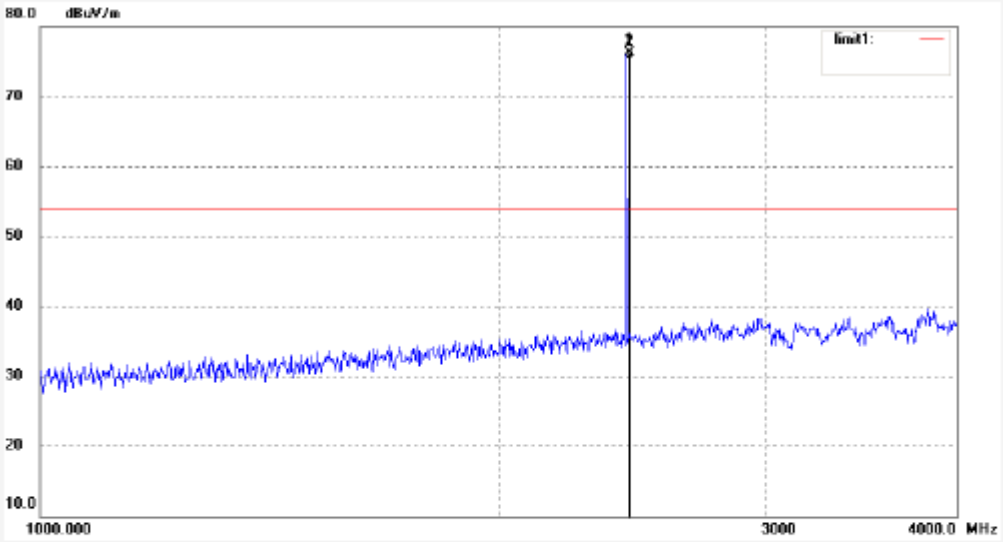
| | |
|---|---|
| Job No.: Kai #1199 | Polarization: Horizontal |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 12:58:33 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2441 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2441.000 | 83.50 | -7.35 | 76.15 | 114.00 | -37.85 | peak | | | |
| 2 | 2441.000 | 82.67 | -7.35 | 75.32 | 94.00 | -18.68 | AVG | | | |

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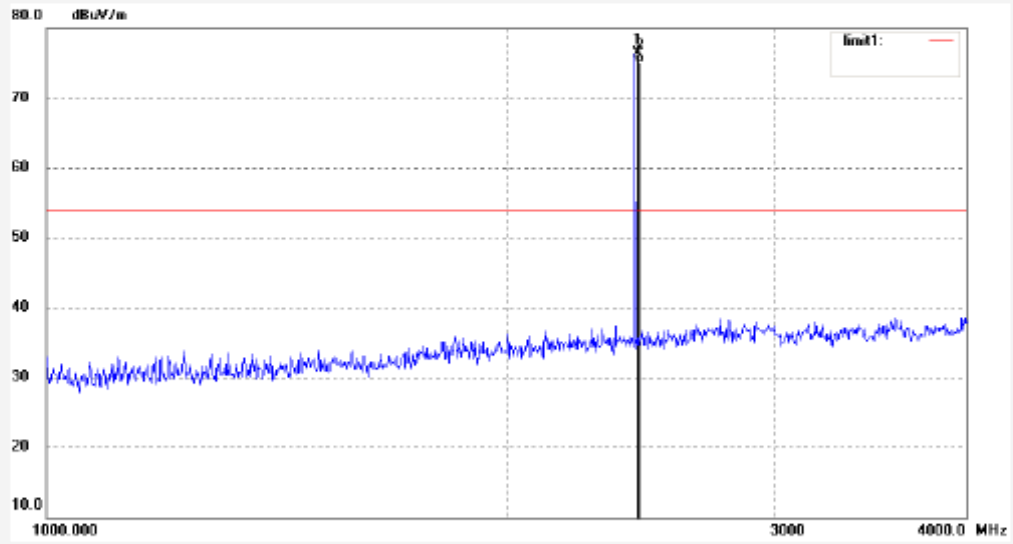
| | |
|---|---|
| Job No.: Kai #1198 | Polarization: Vertical |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 12:56:15 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2441 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2441.000 | 83.82 | -7.35 | 76.47 | 114.00 | -37.53 | peak | | | |
| 2 | 2441.000 | 82.44 | -7.35 | 75.09 | 94.00 | -18.91 | AVG | | | |

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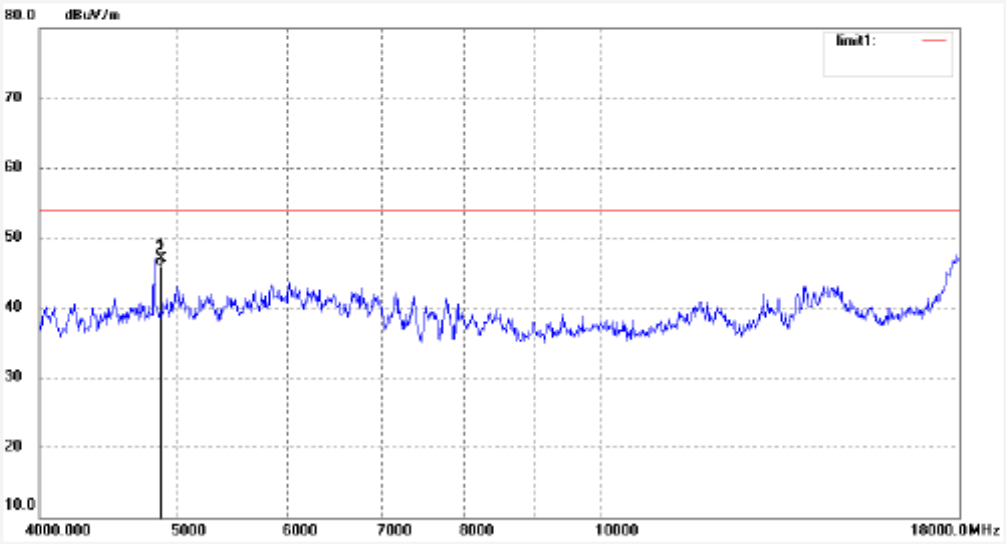
Fax:+86-0755-26503396

| | |
|---|---|
| Job No.: Kai #1204 | Polarization: Horizontal |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 13:57:46 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2441 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4882.049 | 46.79 | 0.14 | 46.93 | 74.00 | -27.07 | peak | | | |
| 2 | 4882.049 | 45.82 | 0.14 | 45.96 | 54.00 | -8.04 | AVG | | | |

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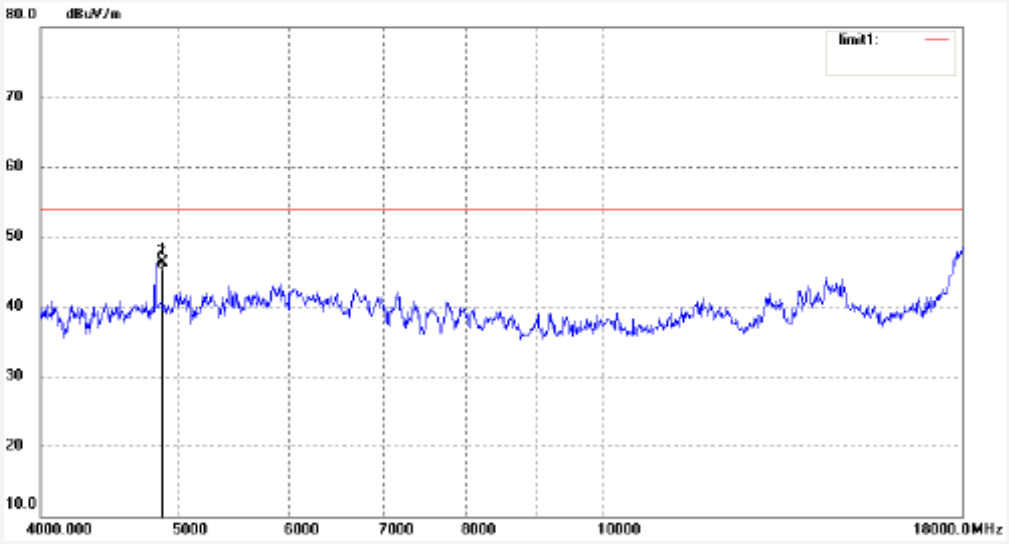
Job No.: Kai #1205
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.( C)/Hum.(%) 24 C / 48 %
EUT: SOUNDBOX XL
Mode: TX 2441
Model: ES-53028
Manufacturer: AOB

Polarization: Vertical
Power Source: DC 5V
Date: 2012/04/22
Time: 14:00:52
Engineer Signature: Kai
Distance: 3m

Note: Report No.:ATE20120729




| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4882.049 | 46.25 | 0.14 | 46.39 | 74.00 | -27.61 | peak | | | |
| 2 | 4882.049 | 45.37 | 0.14 | 45.51 | 54.00 | -8.49 | AVG | | | |

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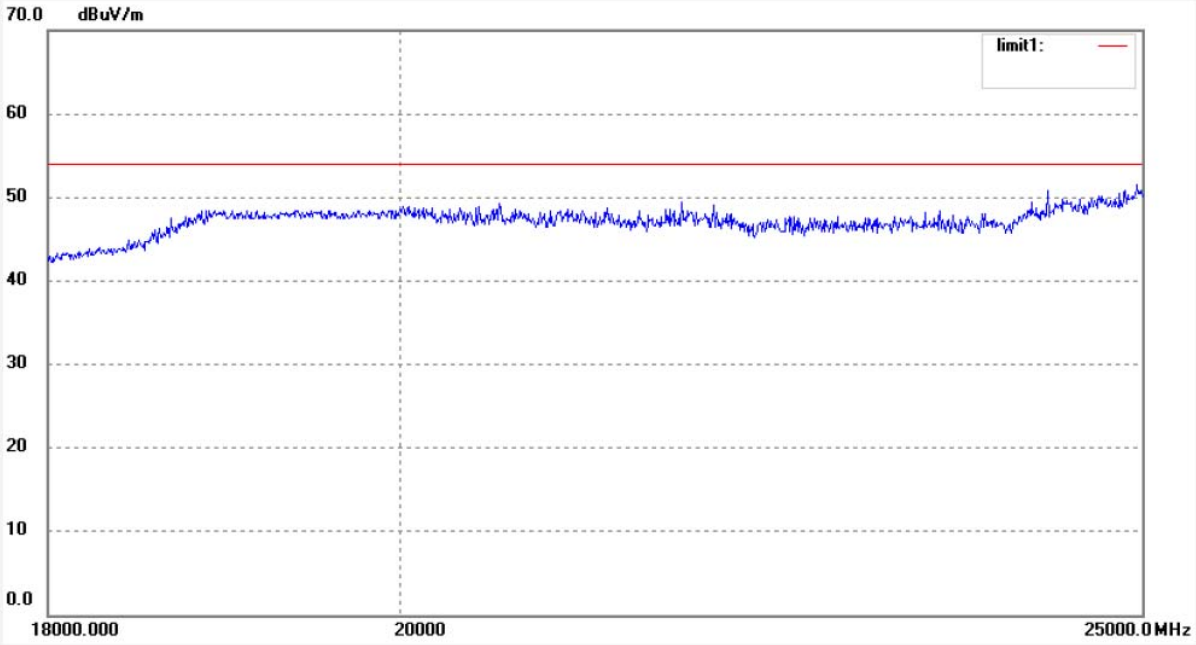
| | |
|---|---|
| Job No.: Kai #1241 | Polarization: Horizontal |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 12/4/22/ |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 5/53/01 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2441MHz | Distance: |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




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

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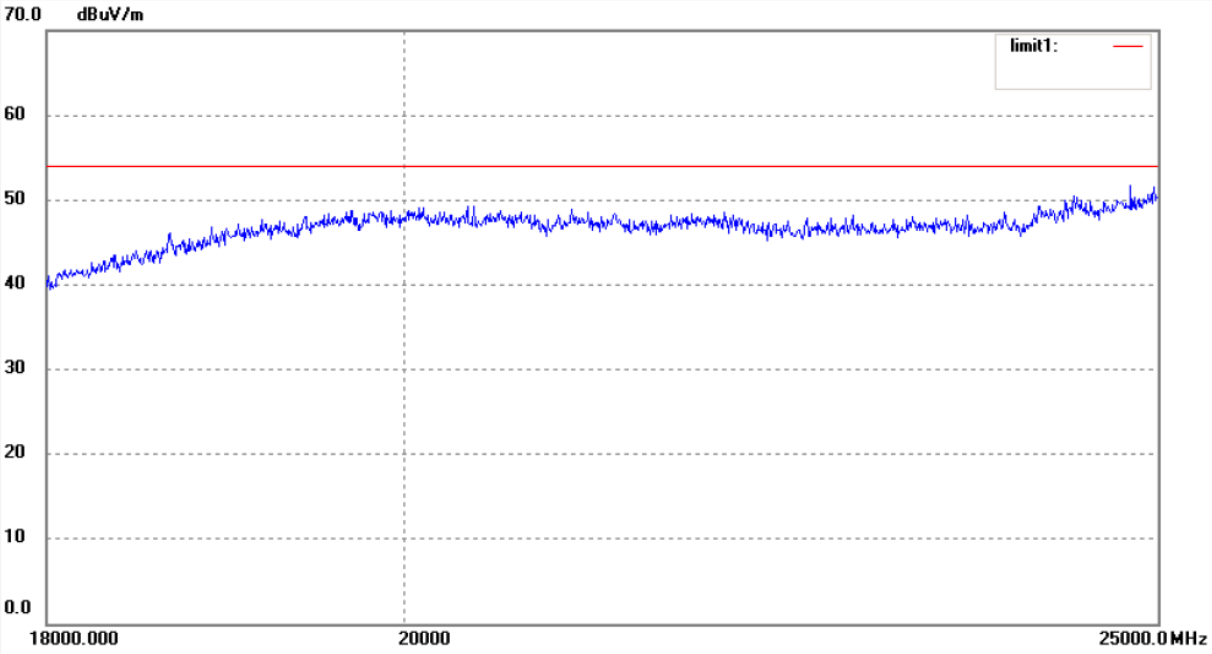
| | |
|---|---|
| Job No.: Kai #1240 | Polarization: Vertical |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 12/4/22/ |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 5/51/02 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2441MHz | Distance: |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




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

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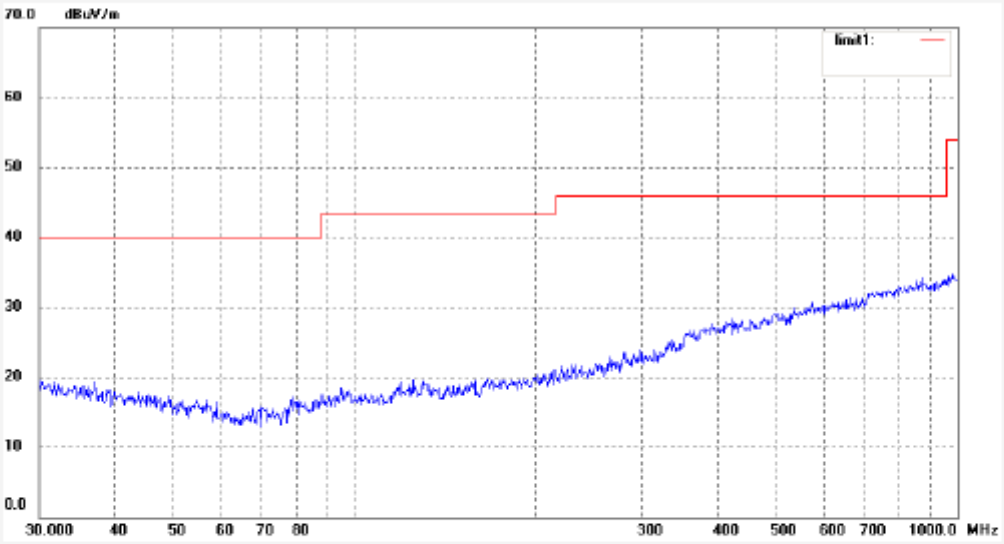
| | |
|---|---|
| Job No.: Kai #1195 | Polarization: Horizontal |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 12:43:29 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2480 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




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

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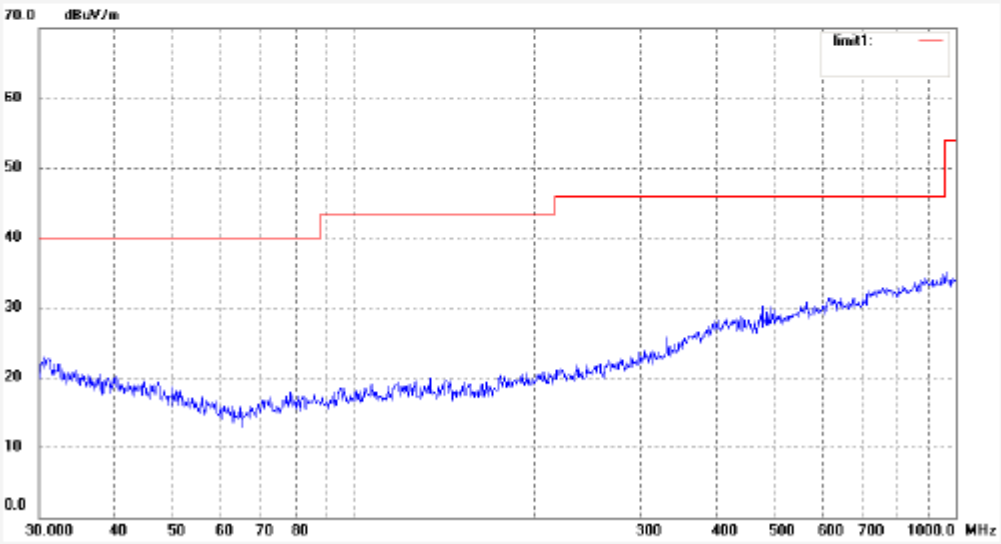
| | |
|---|---|
| Job No.: Kai #1194 | Polarization: Vertical |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 12:42:33 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2480 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




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

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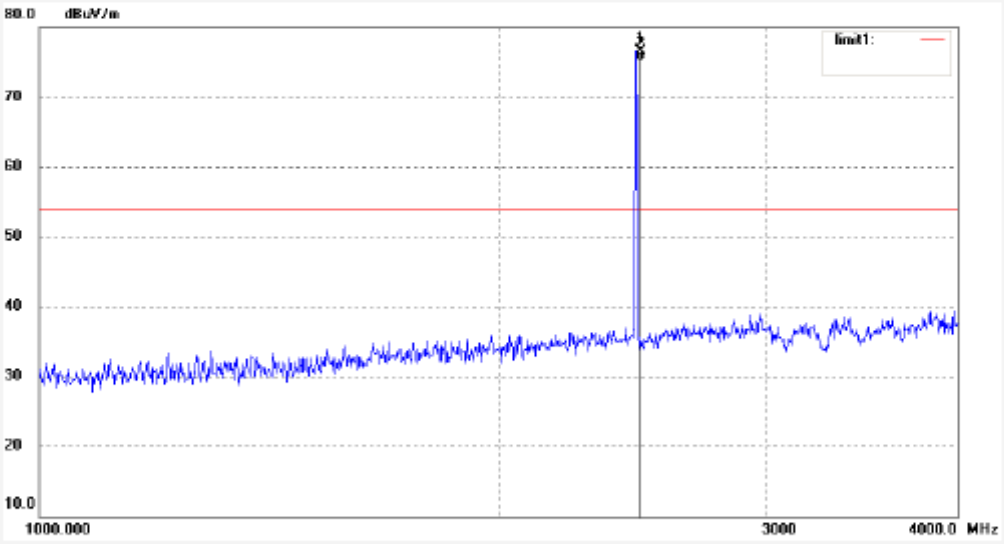
| | |
|---|---|
| Job No.: Kai #1200 | Polarization: Horizontal |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 13:03:03 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2480 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2480.000 | 83.94 | -7.37 | 76.57 | 114.00 | -37.43 | peak | | | |
| 2 | 2480.000 | 82.48 | -7.37 | 75.11 | 94.00 | -18.89 | AVG | | | |

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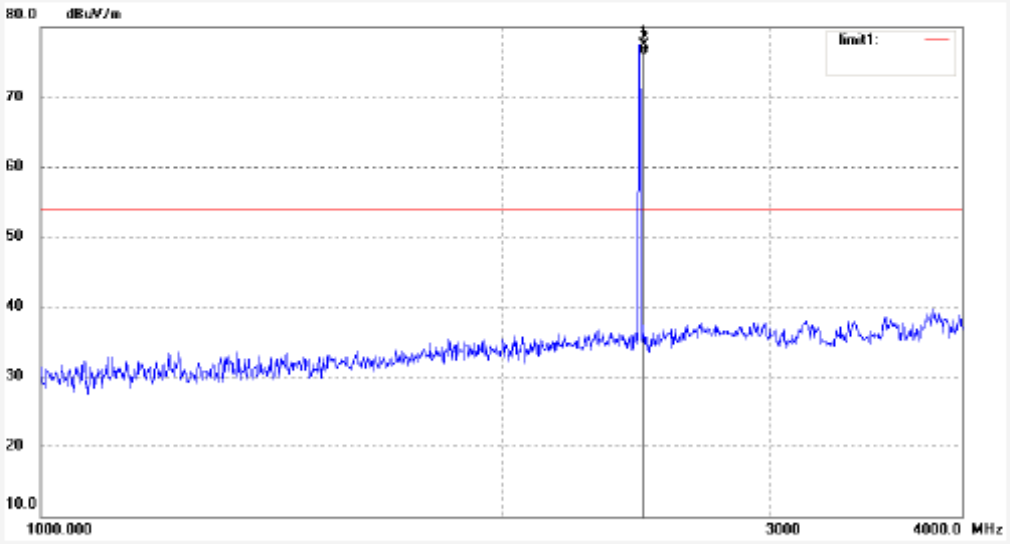
Job No.: Kai #1201
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.( C)/Hum.(%) 24 C / 48 %
EUT: SOUNDBOX XL
Mode: TX 2480
Model: ES-53028
Manufacturer: AOB

Polarization: Vertical
Power Source: DC 5V
Date: 2012/04/22
Time: 13:05:08
Engineer Signature: Kai
Distance: 3m

Note: Report No.:ATE20120729




| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2480.000 | 84.91 | -7.37 | 77.54 | 114.00 | -36.46 | peak | | | |
| 2 | 2480.000 | 83.35 | -7.37 | 75.98 | 94.00 | -18.02 | AVG | | | |

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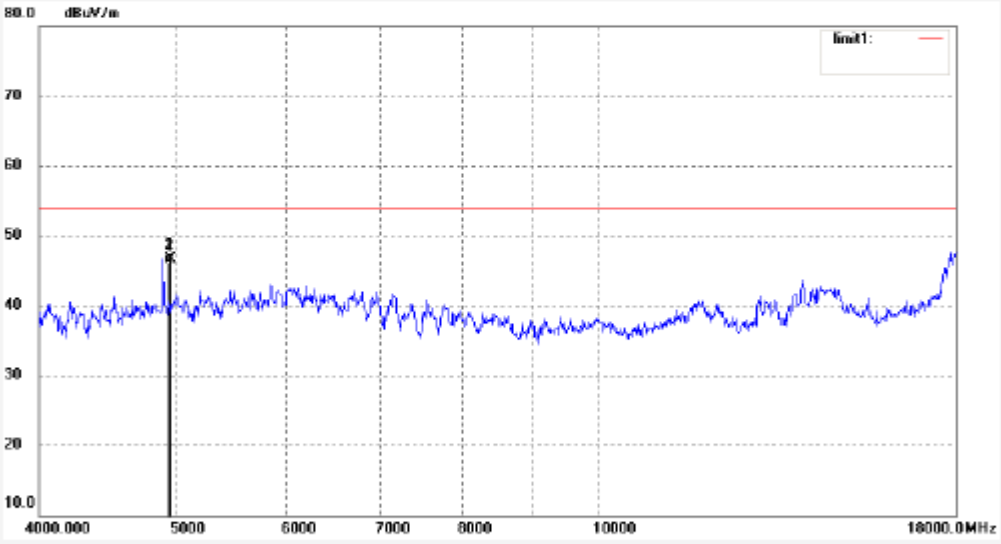
| | |
|---|---|
| Job No.: Kai #1207 | Polarization: Horizontal |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 14:05:39 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2480 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4960.009 | 46.17 | 0.52 | 46.69 | 74.00 | -27.31 | peak | | | |
| 2 | 4960.009 | 45.66 | 0.52 | 46.18 | 54.00 | -7.82 | AVG | | | |

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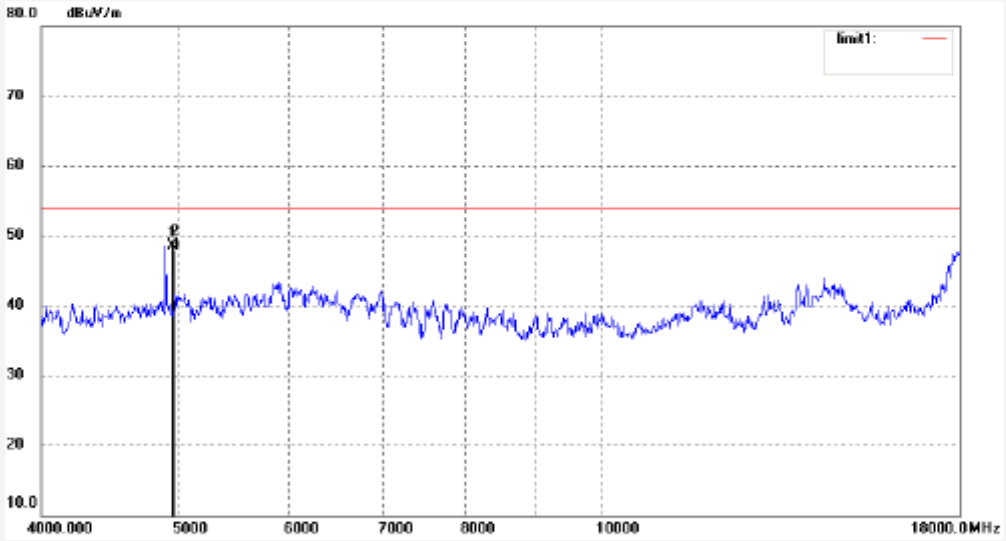
| | |
|---|---|
| Job No.: Kai #1206 | Polarization: Vertical |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 2012/04/22 |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 14:03:03 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2480 | Distance: 3m |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




| No. | Freq. (MHz) | Reading (dBuV/m) | Factor (dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector | Height (cm) | Degree (deg.) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 4960.009 | 48.01 | 0.52 | 48.53 | 74.00 | -25.47 | peak | | | |
| 2 | 4960.009 | 47.49 | 0.52 | 48.01 | 54.00 | -5.99 | AVG | | | |

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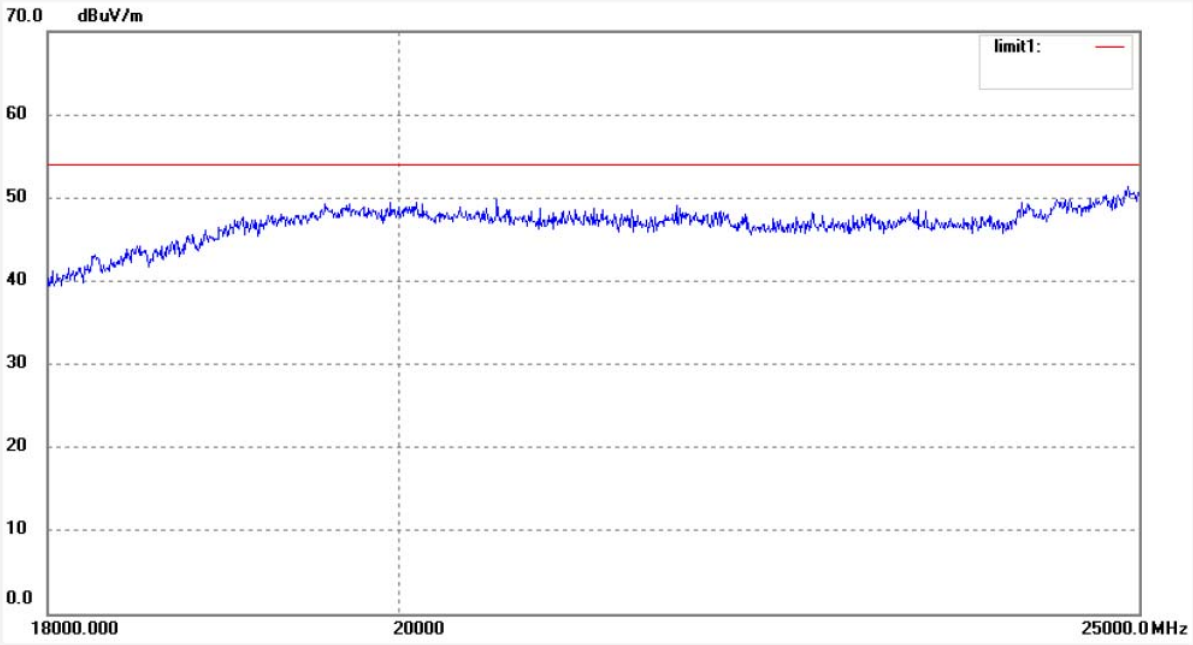
| | |
|---|---|
| Job No.: Kai #1242 | Polarization: Horizontal |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 12/4/22/ |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 5/55/57 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2480MHz | Distance: |
| Model: ES-53028 | |
| Manufacturer: AOB | |

Note: Report No.:ATE20120729




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

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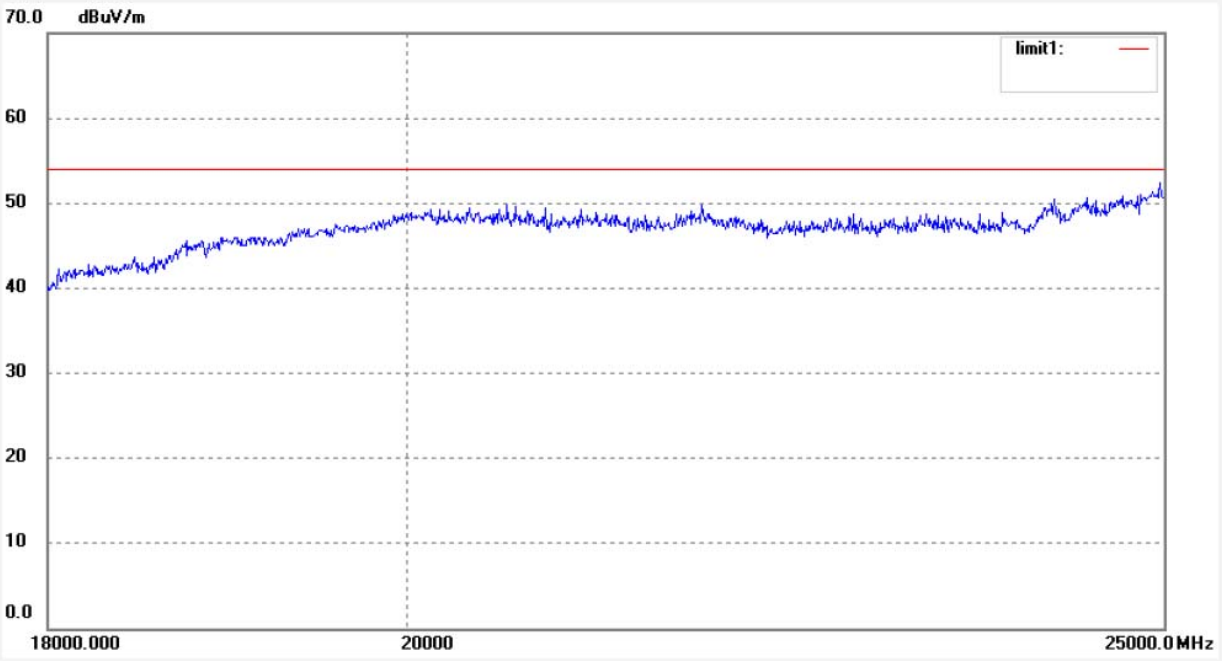
| | |
|---|---|
| Job No.: Kai #1243 | Polarization: Vertical |
| Standard: FCC Class B 3M Radiated | Power Source: DC 5V |
| Test item: Radiation Test | Date: 12/4/22/ |
| Temp.( C)/Hum.(%) 24 C / 48 % | Time: 5/57/43 |
| EUT: SOUNDBOX XL | Engineer Signature: Kai |
| Mode: TX 2480MHz | Distance: |
| Model: ES-53028 | |
| Manufacturer: AOB | |

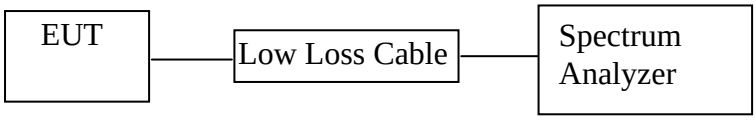
Note: Report No.:ATE20120729




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

# 12. CONDUCTED SPURIOUS EMISSION COMPLIANCE TEST

## 12.1. Block Diagram of Test Setup




(EUT: SOUNDBOX XL)

## 12.2. 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).

## 12.3. 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.

### 12.3.1. SOUNDBOX XL (EUT)

| | | |
|---|---|---|
| Model Number | : | ES-53028 |
| Serial Number | : | N/A |
| Manufacturer | : | SHENZHEN AOB ELECTRONICS CO., LTD |

## 12.4.Operating Condition of EUT

12.4.1.Setup the EUT and simulator as shown as Section 12.1.

12.4.2.Turn on the power of all equipment.

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

## 12.5.Test Procedure

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

12.5.2.Set RBW of spectrum analyzer to 100kHz and VBW to 300kHz (below 1GHz).

Set RBW of spectrum analyzer to 1MHz and VBW to 3MHz (above 1GHz).

12.5.3.The Conducted Spurious Emission was measured and recorded.

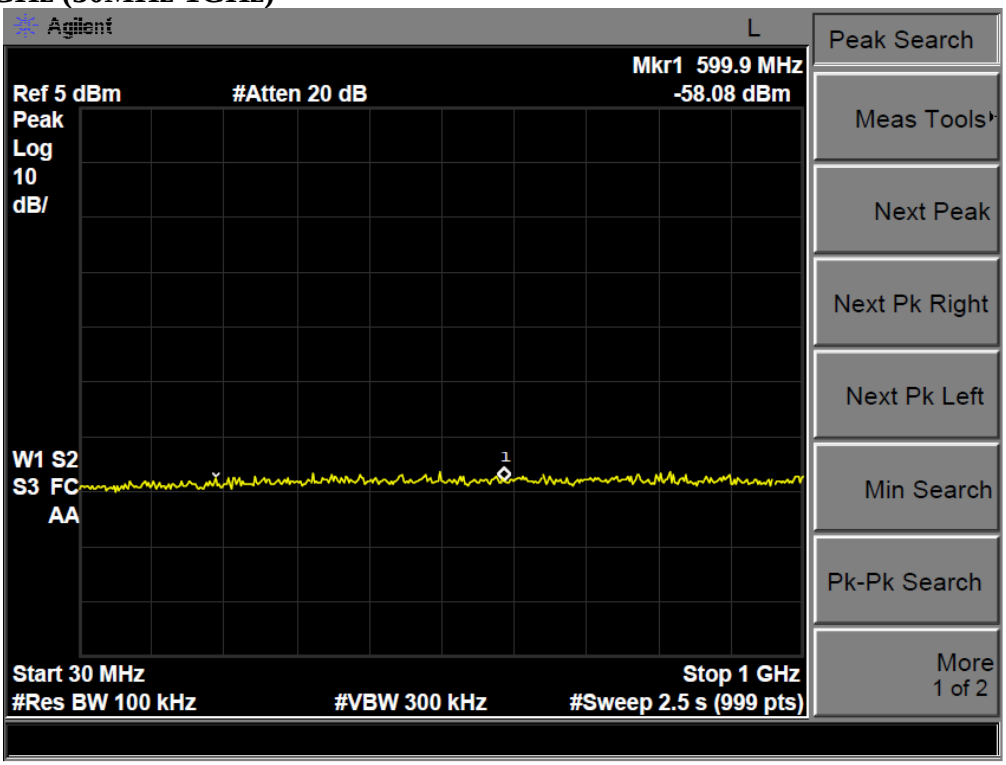
## 12.6.Test Result

**Pass.**

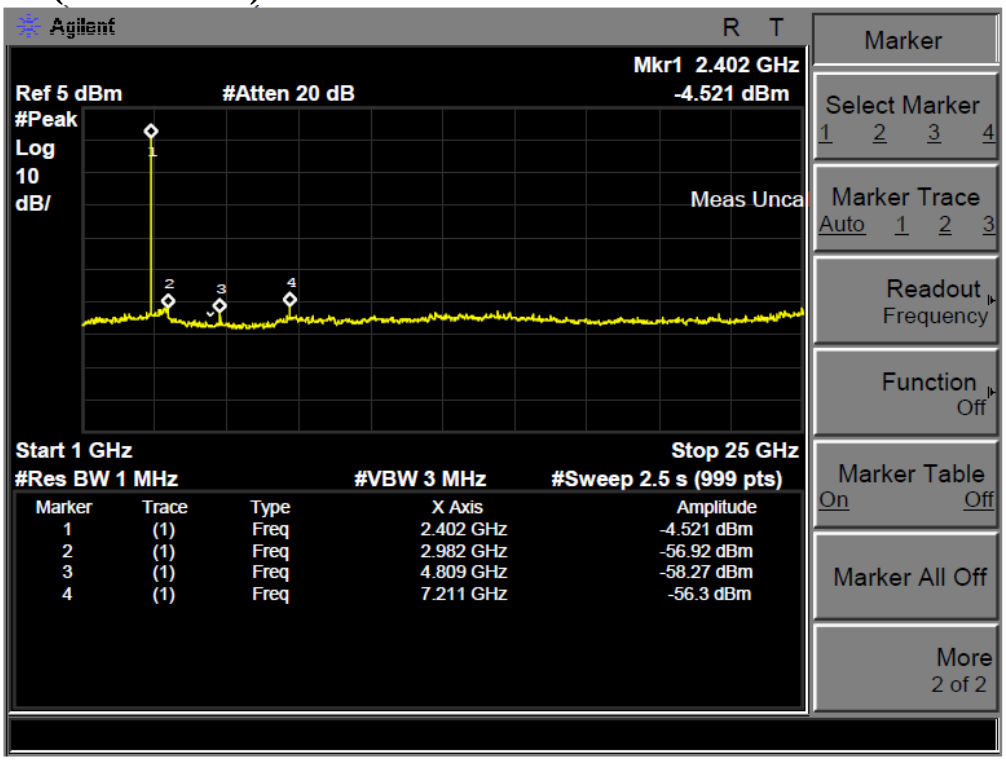
The spectrum analyzer plots are attached as below.

"Spectrum analyzer" is Agilent

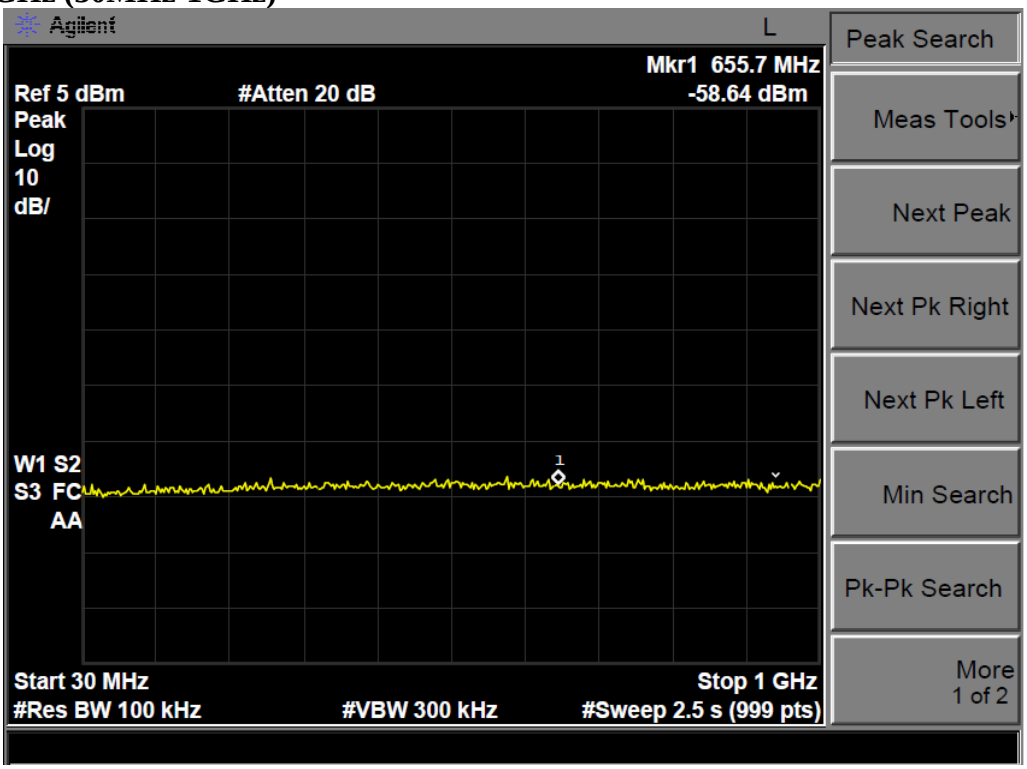
**TX 2402GHz (30MHz-1GHz)**



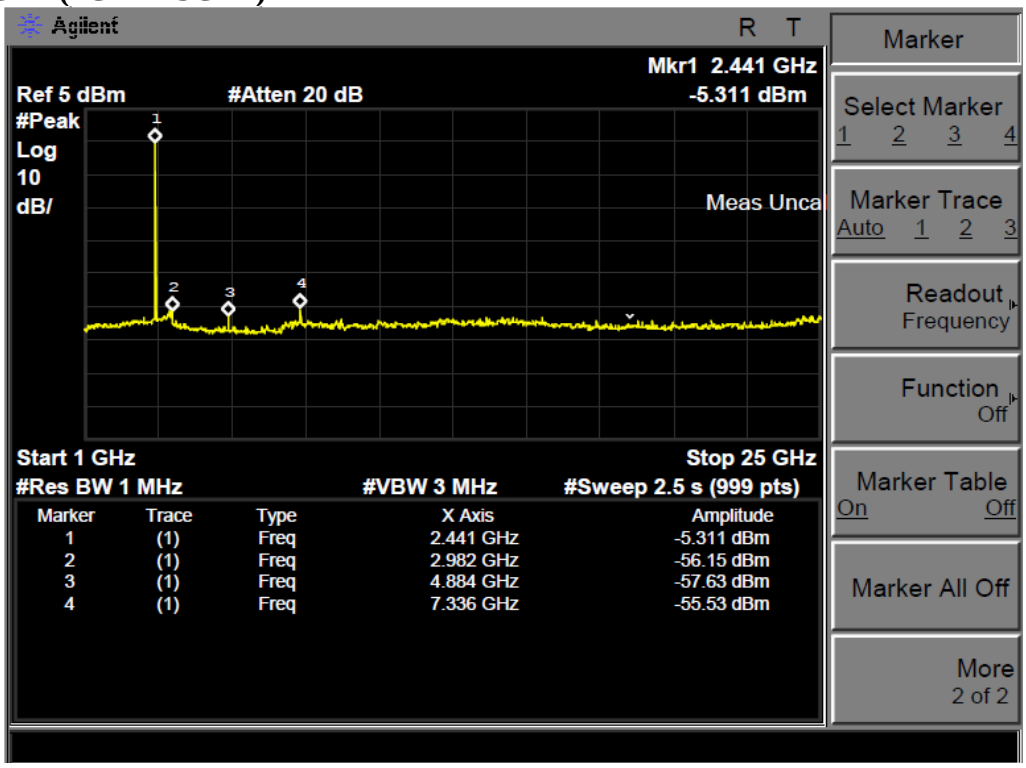

**TX 2402GHz (1GHz-25GHz)**



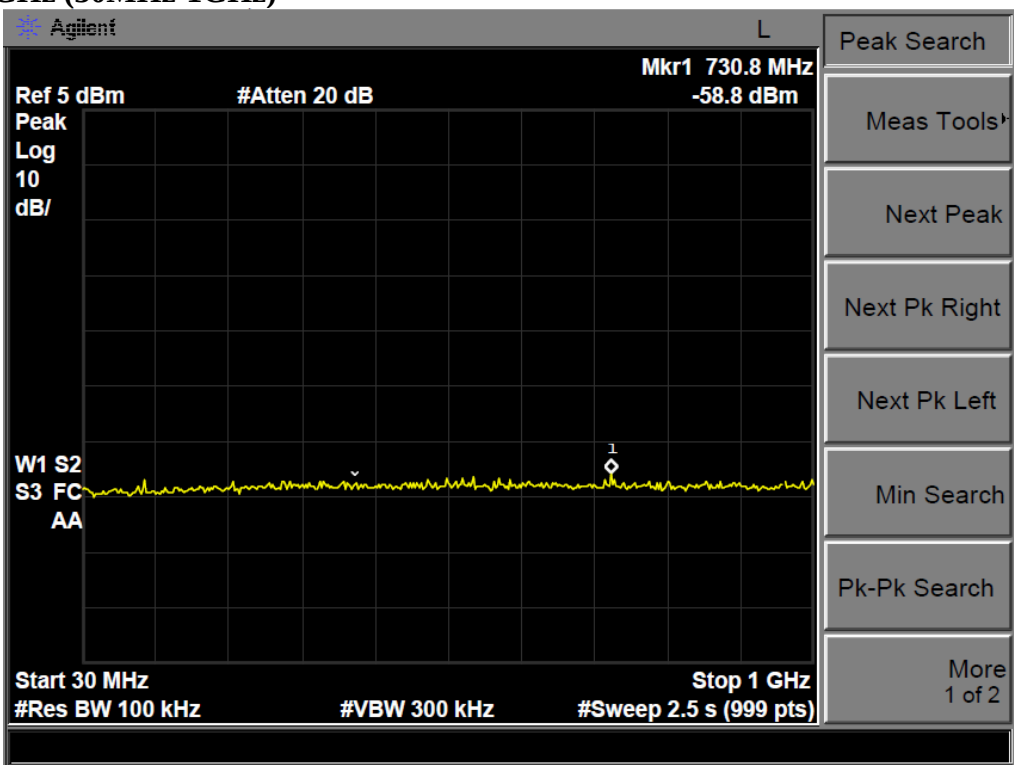
**TX 2441GHz (30MHz-1GHz)**



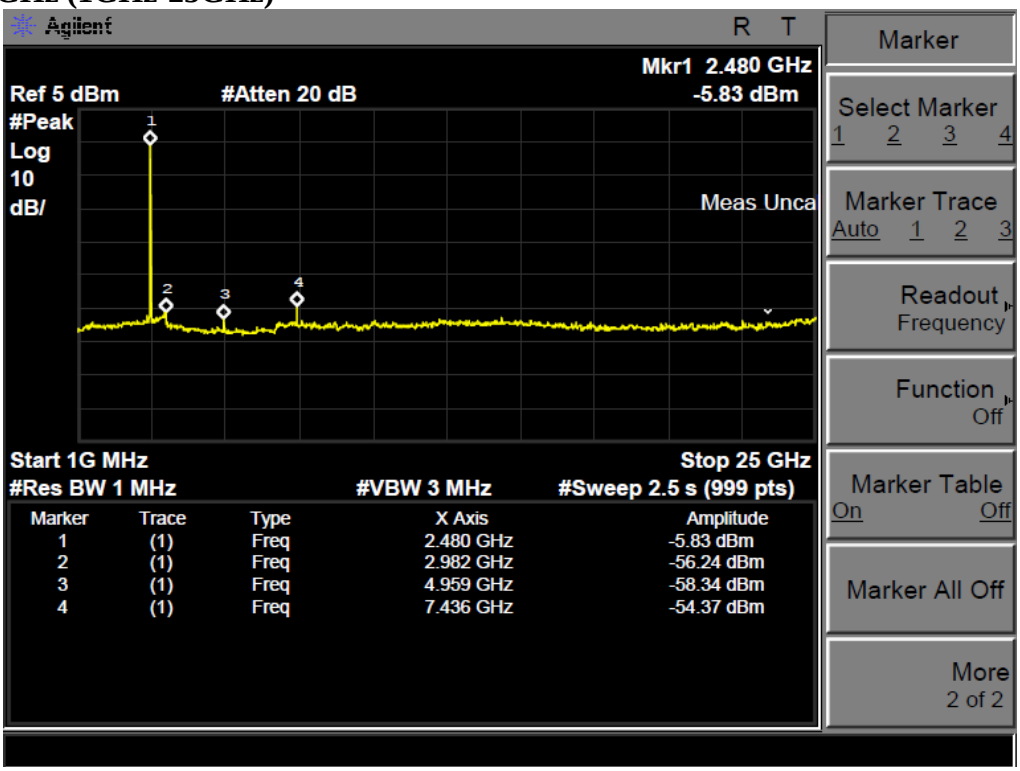

**TX 2441GHz (1GHz-25GHz)**



**TX 2480GHz (30MHz-1GHz)**



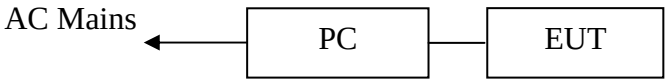

**TX 2480GHz (1GHz-25GHz)**



# 13. AC POWER LINE CONDUCTED EMISSION FOR FCC PART 15 SECTION 15.207(A)

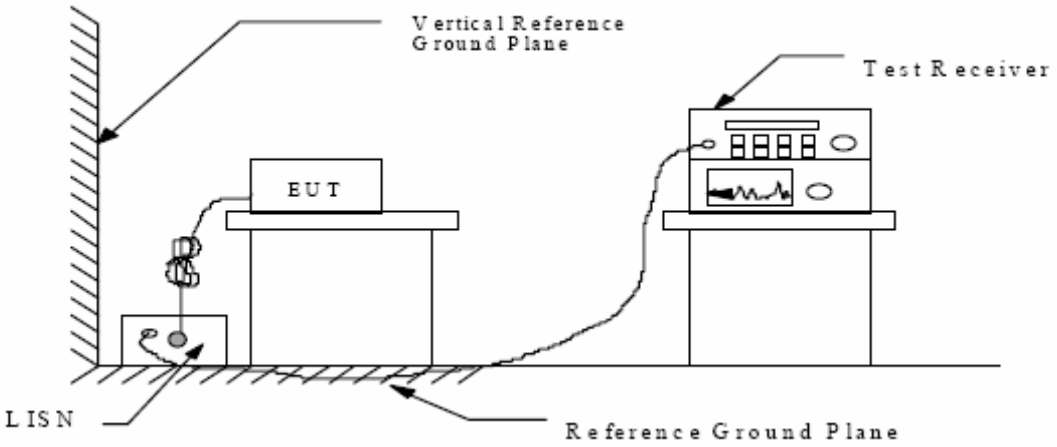
## 13.1. Block Diagram of Test Setup

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




(EUT: SOUNDBOX XL)

### 13.1.2. Shielding Room Test Setup Diagram




(EUT: SOUNDBOX XL)

## 13.2. The Emission Limit

### 13.2.1. 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.

## 13.3.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.

13.3.1.SOUNDBOX XL (EUT)

| | | |
|---|---|---|
| Model Number | **:** | ES-53028 |
| Serial Number | **:** | N/A |
| Manufacturer | **:** | SHENZHEN AOB ELECTRONICS CO., LTD |

## 13.4.Operating Condition of EUT

13.4.1.Setup the EUT and simulator as shown as Section 13.1.

13.4.2.Turn on the power of all equipment.

13.4.3.Let the EUT work in (Charging) mode measure it.

## 13.5.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: 2003 on Conducted Emission Measurement.

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

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

## 13.6.Power Line Conducted Emission Measurement Results

**PASS.**

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

| | | | |
|---|---|---|---|
| Date of Test: | April 23, 2012 | Temperature: | 25°C |
| EUT: | SOUNDBOX XL | Humidity: | 50% |
| Model No.: | ES-53028 | Power Supply: | AC 120V/ 60Hz |
| Test Mode: | Charging | Test Engineer: | Apple |

| Frequency (MHz) | Result (dBμV) | Limit (dBμV) | Margin (dB) | Detector | Line |
|---|---|---|---|---|---|
| 0.154868 | 49.70 | 65.7 | -16.0 | QP | Neutral |
| 0.195997 | 46.60 | 63.8 | -17.2 | QP | |
| 0.451436 | 41.40 | 56.8 | -15.4 | QP | |
| 0.154868 | 33.30 | 55.7 | -22.4 | AV | |
| 0.196781 | 29.40 | 53.7 | -24.3 | AV | |
| 0.438995 | 23.60 | 47.1 | -23.5 | AV | |
| 0.157990 | 48.10 | 65.6 | -17.5 | QP | Live |
| 0.194439 | 45.40 | 63.8 | -18.4 | QP | |
| 0.423503 | 38.50 | 57.4 | -18.9 | QP | |
| 0.156109 | 31.70 | 55.7 | -24.0 | AV | |
| 0.195216 | 29.60 | 53.8 | -24.2 | AV | |
| 0.432041 | 24.20 | 47.2 | -23.0 | 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***

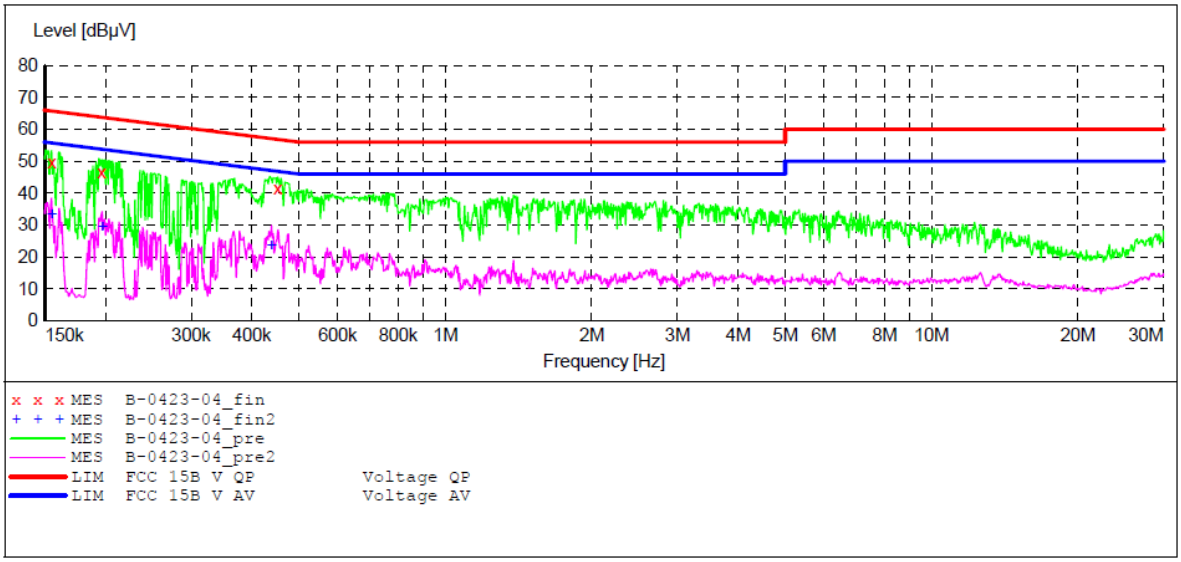
***CONDUCTED EMISSION STANDARD FCC PART 15B***

EUT: SOUNDBOX XLK M/N:ES-53028
Manufacturer: AOB
Operating Condition: Charging
Test Site: 1#Shielding Room
Operator: Apple
Test Specification: N AC 120V/60Hz
Comment: Mains port
Reprot NO.:ATE20120729

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

Short Description: _SUB_STD_VTERM2 1.70

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




***MEASUREMENT RESULT: "B-0423-04_fin"***

4/23/2012 10:56AM

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.154868 | 49.70 | 11.0 | 65.7 | 16.0 | QP | N | GND |
| 0.195997 | 46.60 | 11.2 | 63.8 | 17.2 | QP | N | GND |
| 0.451436 | 41.40 | 11.9 | 56.8 | 15.4 | QP | N | GND |

***MEASUREMENT RESULT: "B-0203-04_fin2"***

4/23/2012 10:56AM

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.154868 | 33.30 | 11.0 | 55.7 | 22.4 | AV | N | GND |
| 0.196781 | 29.40 | 11.2 | 53.7 | 24.3 | AV | N | GND |
| 0.438995 | 23.60 | 11.9 | 47.1 | 23.5 | AV | N | GND |

***ACCURATE TECHNOLOGY CO.,LTD***

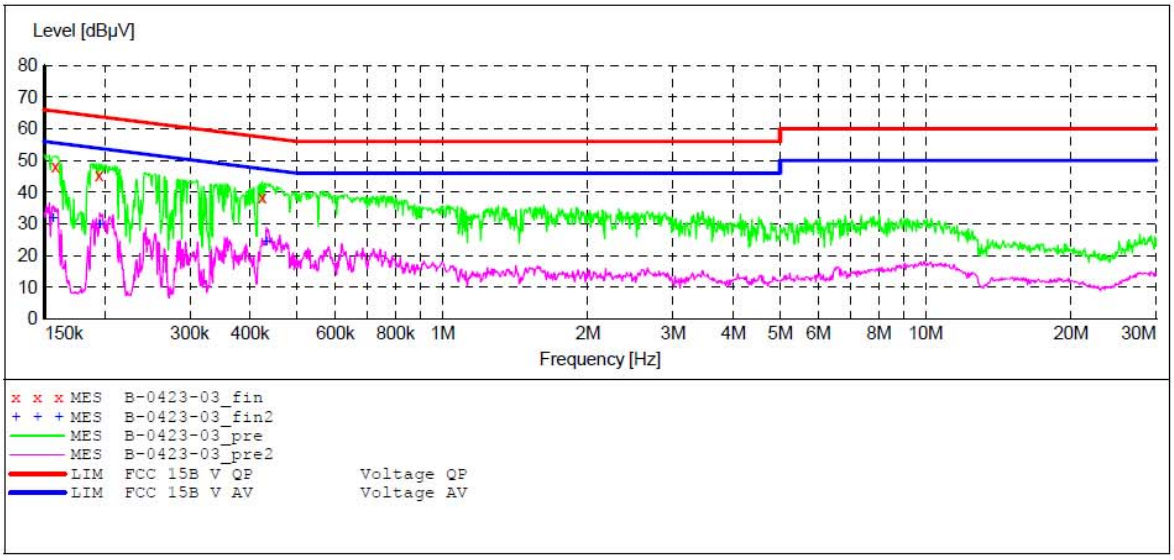
***CONDUCTED EMISSION STANDARD FCC PART 15B***

EUT: SOUNDBOX XLK M/N:ES-53028
Manufacturer: AOB
Operating Condition: Charging
Test Site: 1#Shielding Room
Operator: Apple
Test Specification: L AC 120V/60Hz
Comment: Mains port
Reprot NO.:ATE20120729

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

Short Description: _SUB_STD_VTERM2 1.70

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




***MEASUREMENT RESULT: "B-0423-03_fin"***

4/23/2012 10:52AM

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.157990 | 48.10 | 11.0 | 65.6 | 17.5 | QP | L1 | GND |
| 0.194439 | 45.40 | 11.2 | 63.8 | 18.4 | QP | L1 | GND |
| 0.423503 | 38.50 | 11.9 | 57.4 | 18.9 | QP | L1 | GND |

***MEASUREMENT RESULT: "B-0423-03_fin2"***

4/23/2012 10:52AM

| Frequency MHz | Level dBµV | Transd dB | Limit dBµV | Margin dB | Detector | Line | PE |
|---|---|---|---|---|---|---|---|
| 0.156109 | 31.70 | 11.0 | 55.7 | 24.0 | AV | L1 | GND |
| 0.195216 | 29.60 | 11.2 | 53.8 | 24.2 | AV | L1 | GND |
| 0.432041 | 24.20 | 11.9 | 47.2 | 23.0 | AV | L1 | GND |

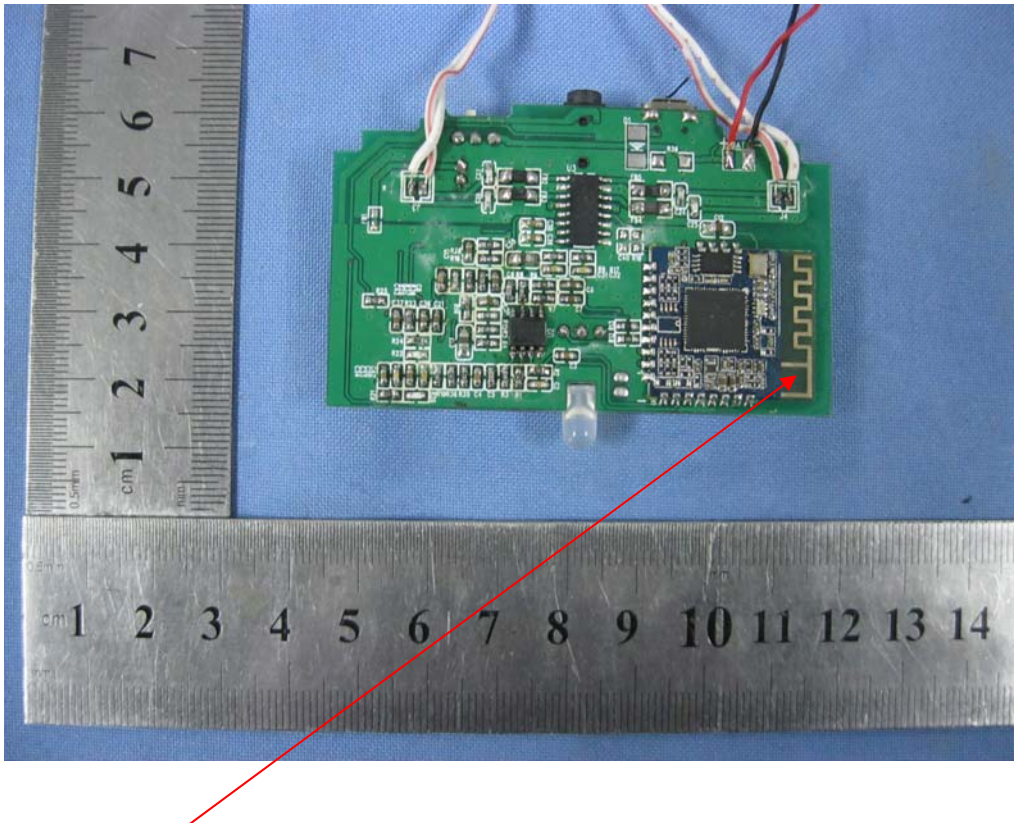
# 14. ANTENNA REQUIREMENT

## 14.1. 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.

## 14.2. Antenna Construction

Device is equipped with unique antenna, which isn't displaced by other antenna. Therefore, the equipment complies with the antenna requirement of Section 15.203.




Antenna