



# 低功率射頻電機測試報告

申請廠商：中景科技股份有限公司  
地址：臺中市西區臺灣大道二段573號6樓  
器材名稱：藍牙多功能音箱  
廠牌：E-books  
型號：HE-D17



財團法人台灣電子檢驗中心電磁相容試驗二部

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報告號碼: 17-09-RBF-046-01

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## 低功率射頻電機測試報告



受理日期 : 106 年 09 月 22 日  
 完成日期 : 106 年 11 月 09 日  
 報告號碼 : 17-09-RBF-046-01  
 實驗室名稱 : 財團法人台灣電子檢驗中心電磁相容試驗二部  
 實驗室地址 : 新北市林口區頂福里 5 鄰 34 號  
 實驗室電話 : 02-26023052  
 認可編號及範圍 : 2628 (9KHz- 40GHz)  
 認可證書有效期限 : 107 年 10 月 08 日  
 申請廠商 : 中景科技股份有限公司  
 申請廠商地址 : 臺中市西區臺灣大道二段 573 號 6 樓  
 製造廠商 : 深圳市百焱科技有限公司  
 器材名稱 : 藍牙多功能音箱  
 廠牌 : E-books  
 型號 : HE-D17  
 發射功率(電場強度) : BR: 93.73 dB $\mu$ V/m @3m Peak(電場強度) / EDR: 93.75 dB $\mu$ V/m @3m Peak(電場強度)  
 工作頻率及調變方式 : 2402 – 2480 MHz ; 79CH ; FHSS  
 天線規格 : 固定式 PCB 天線  
 備註 : 1. 本測試報告僅對受測之樣品負責。  
 2. 非經本中心同意，測試報告不得摘錄複印使用。(全部複製除外)  
 3. 本產品所適用之規範修訂日期 105 年 08 月 23 日。

| 項次 | 測試項目          | 適用規範                          | 測試結果    | 量測設備    | 備註 |
|----|---------------|-------------------------------|---------|---------|----|
| 1  | 場強輻射          | 低功率射頻電機技術規範<br>3.10.2.2節、2.8節 | 請參閱4.5節 | 請參閱4.3節 | 合格 |
| 2  | 電源線傳導干擾       | 低功率射頻電機技術規範2.3<br>節           | 請參閱5.4節 | 請參閱5.3節 | 合格 |
| 3  | 天線之要求         | 低功率射頻電機技術規範2.2<br>節           | 請參閱6.2節 | ----    | 合格 |
| 4  | 開放頻帶邊緣之<br>發射 | 低功率射頻電機技術規範<br>3.10.2.4、2.8節  | 請參閱7.4節 | 請參閱7.3節 | 合格 |
|    | 以下空白          |                               |         |         |    |
|    |               |                               |         |         |    |
|    |               |                               |         |         |    |
|    |               |                               |         |         |    |

報告簽署人：

張子娟

量測員：

何仁逸



## 1 一般資料

### 1.1 產品描述

- a) 產品型態 : 藍牙多功能音箱
- b) 廠 牌 : E-books
- c) 產品型號 : HE-D17
- d) 供應電源 : DC 3.7V Battery (DC 5V USB for Charging)

### 1.2 產品特性

本產品為藍牙多功能音箱，為藍牙無線裝置，額定發射頻率為2402 – 2480 MHz，共使用79個頻道。

### 1.3 測試方法之依據

本測試報告之所有項目皆依據低功率射頻電機技術規範以及參考EIA 603、ANSI、FCC/47 CFR/2.1046、2.1047、2.1049、2.1051、2.1053及2.1055之檢驗法。

## 2 適用規範

### 2.1 規範要求

#### (1) 傳導之規定

依據國家通訊傳播委員會低功率射頻電機技術規範2.3節之規定，以市電為電源之低功率射頻電機，其傳導回電源線上頻率自150 kHz~30百萬赫(MHz)之射頻電壓(在電源端子每一電源線對接地點)應小於或等於下表所列之限制值。測量時應經過50微亨利(uH)及50歐姆( $\Omega$ )之電源線阻抗穩定網路(Line Impedance Stabilization Network；LISN)。頻率重疊處，以較低限制值為準。電源傳導干擾之限制要求如下：

| 頻率(MHz)  | 傳導限制值(dB $\mu$ V)      |                        |
|----------|------------------------|------------------------|
|          | 準峰值(Quasi-peak)        | 平均值(Average)           |
| 0.15-0.5 | 66 – 56 <sub>(註)</sub> | 56 – 46 <sub>(註)</sub> |
| 0.5-5    | 56                     | 46                     |
| 5-30     | 60                     | 50                     |

註：隨頻率之對數遞減。

#### (2) 輻射之規定

依據低功率射頻電機技術規範3.10.2.2節之要求，主波與諧波發射：除3.10.2.3 外，發射之電場強度應小於或等於下表限制值：

| 主波頻率<br>(MHz) | 主波電場強度<br>(mV/m) | 諧波電場強度<br>(uV/m) |
|---------------|------------------|------------------|
| 2400-2483.5   | 50               | 500              |
| 5725-5875     | 50               | 500              |
| 24000-24250   | 250              | 2500             |

3.10.2.4 除諧波外，指定頻帶外之發射應比主波低50 dB以上或依2.8 之發射限制，兩者取其較鬆者。

接收機依據低功率射頻電機技術規範之要求，其任何輻射場強需符合2.8節之一般限制要求：

| 頻率<br>MHz     | 測試距離<br>m | 限制值<br>dB $\mu$ V/m | 限制值<br>$\mu$ V/m |
|---------------|-----------|---------------------|------------------|
| 0.009 - 0.490 | 300       | 67.6/kHz            | 2400/kHz         |
| 0.490 - 1.705 | 30        | 87.6/kHz            | 24000/kHz        |
| 1.705 - 30    | 30        | 29.5                | 30               |
| 30 - 88       | 3         | 40.0                | 100              |
| 88 - 216      | 3         | 43.5                | 150              |
| 216 - 960     | 3         | 46.0                | 200              |
| 960以上         | 3         | 54.0                | 500              |

### (3) 天線之要求

依據低功率射頻電機技術規範2.2節之規定，低功率射頻電機之發射機或收發信機所使用之天線，除本規範章節中另有規定外，應為全固定、半固定式或以獨特之耦合(unique coupling)方式連接機體。製造者可設計供使用者因損壞而替換之天線，但不得設計或使用原認證以外之天線或可供引接各類電纜之標準天線插座或電氣連接頭，如：BNC、F type、N type、M type、UG type、RCA、SMA、SMB...等及其他各類工業或通訊標準接頭。

## 2.2 限制使用之頻帶

| 頻率(MHz)       | 頻率(MHz)       |
|---------------|---------------|
| 0.090~0.110   | 1660.0~1770.0 |
| 0.490~0.510   | 1805.0~1865.0 |
| 2.172~2.198   | 1885.0~1900.0 |
| 3.013~3.033   | 1905.0~1985.0 |
| 4.115~4.198   | 2015.0~2025.0 |
| 5.670~5.690   | 2125.0~2165.0 |
| 6.200~6.300   | 2200.0~2300.0 |
| 8.230~8.400   | 2310.0~2390.0 |
| 12.265~12.600 | 2483.5~2900.0 |
| 13.340~13.430 | 3260.0~3267.0 |
| 14.965~15.020 | 3332.0~3339.0 |
| 16.700~16.755 | 3345.8~3358.0 |
| 19.965~20.020 | 3500.0~4400.0 |
| 25.500~25.700 | 4500.0~5250.0 |
| 37.475~38.275 | 5350.0~5460.0 |
| 73.500~75.400 | 7250.0~7750.0 |
| 108.00~138.00 | 8025.0~8500.0 |
| 149.90~150.05 | 9000.0~9200.0 |
| 156.70~156.90 | 9300.0~9500.0 |
| 162.01~167.17 | 10600~12700   |
| 167.72~173.20 | 13250~13400   |
| 240.00~285.00 | 14470~14500   |
| 322.00~335.40 | 15350~16200   |
| 399.90~410.00 | 17700~21400   |
| 485.00~510.00 | 22010~23120   |
| 608.00~614.00 | 23600~24000   |
| 703.00~748.00 | 31200~31800   |
| 758.00~803.00 | 36430~36500   |
| 825.00~915.00 | 38600 以上      |
| 930.00~1240.0 |               |
| 1300.0~1427.0 |               |
| 1435.0~1626.5 |               |

### 3 受測裝置之系統說明

| 裝置名稱     | 製造者/代理者                     | 型 號    | 纜線說明                         |
|----------|-----------------------------|--------|------------------------------|
| 藍牙多功能音箱* | 深圳市百焱科技有限公司 /<br>中景科技股份有限公司 | HE-D17 | 1.0m Unshielded USB<br>Cable |
| Notebook | Lenovo/R400                 | R33B65 | 1.0m Shielded USB Cable      |

標記“\*”表欲申請之受測物。

## 4 場強輻射之量測

### 4.1 適用標準

依據低功率射頻電機技術規範3.10.2.2節之要求，主波與諧波發射：除3.10.2.3 外，發射之電場強度應小於或等於下表限制值：

| 主波頻率<br>(MHz) | 主波電場強度<br>(mV/m) | 諧波電場強度<br>(uV/m) |
|---------------|------------------|------------------|
| 2400-2483.5   | 50               | 500              |
| 5725-5875     | 50               | 500              |
| 24000-24250   | 250              | 2500             |

3.10.2.4 除諧波外，指定頻帶外之發射應比主波低50 dB以上或依2.8 之發射限制，兩者取其較鬆者。

### 4.2 量測方法

將待測物置於0.8米高的非金屬桌面，使其在工作狀態，接收天線置於3米外相同的高度。待測物分別要垂直或水平放置，而且桌面要360度旋轉，另外接收天線也要從4米至4米升降變化，以找出最大的輻射電場強度，接收天線置於水平、垂直極向各執行測試一次。

### 4.3 量測場強輻射之儀器

| 儀器名稱                 | 製造者             | 型號        | 本次校驗日期     | 下次校驗日期     |
|----------------------|-----------------|-----------|------------|------------|
| Test Receiver        | Rohde & Schwarz | ESCI      | 2017/09/19 | 2018/09/18 |
| Bi-Log Antenna       | ETC             | MCTD 2786 | 2017/07/12 | 2018/07/11 |
| Log-periodic Antenna | EMCO            | 3146      | 2017/08/10 | 2018/08/09 |
| Horn Antenna         | EMCO            | 3115      | 2017/10/11 | 2018/10/10 |
| Horn Antenna         | EMCO            | 3116      | 2017/10/05 | 2018/10/04 |
| Spectrum             | R&S             | FSP3      | 2017/01/04 | 2018/01/03 |
| Amplifier            | HP              | 8447D     | 2016/12/05 | 2017/12/04 |
| EMI Test Receiver    | Rohde & Schwarz | ESU 40    | 2016/11/10 | 2017/11/09 |
| Attenuator           | MINI-CIRCUITS   | BW-S10W2+ | 2017/10/06 | 2018/10/05 |
| Attenuator           | MINI-CIRCUITS   | BW-S20W2+ | 2017/10/06 | 2018/10/05 |
| Attenuator           | MINI-CIRCUITS   | BW-S30W2+ | 2017/10/06 | 2018/10/05 |
| Amplifier            | HP              | 83051A    | 2017/08/25 | 2018/08/24 |

### 4.4 場強度之計算

場強之計算公式如下

$$\text{結果值} = \text{讀值} + \text{校正因子} + \text{週期因子}$$

其中校正因子為：

$$\text{天線因子} + \text{饋線損失} + \text{濾波器損失 (若有使用)} - \text{放大器增益 (若有使用)}$$

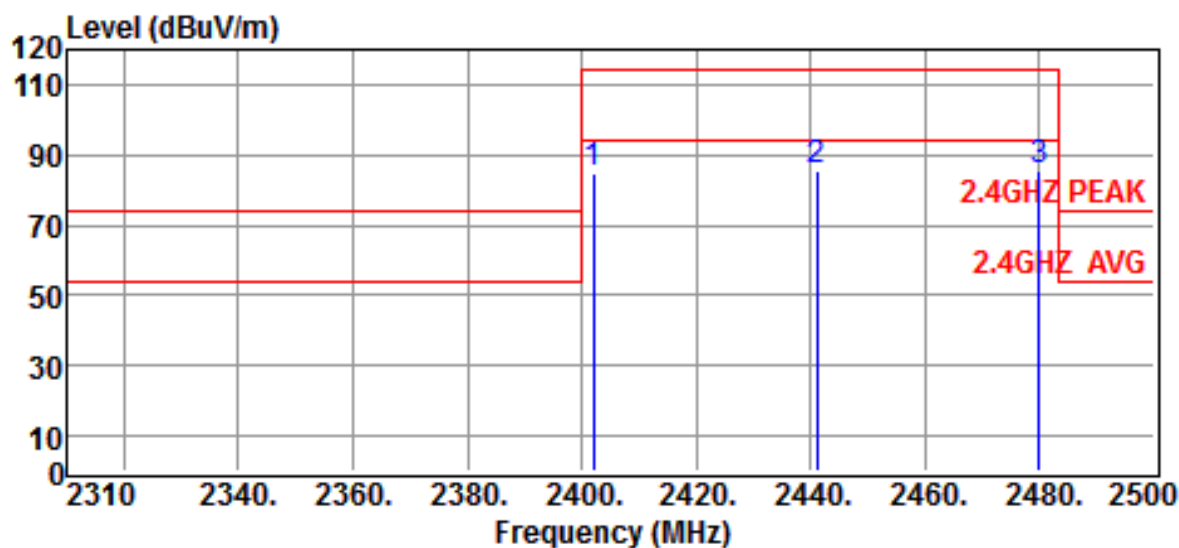
## 4.5 場強輻射之量測結果

### 4.5.1 發射主波、諧波及本地震盪

操作模式 : 發射接收(發射主波)

測試結果 : 合格

測試者 : 何仁逸



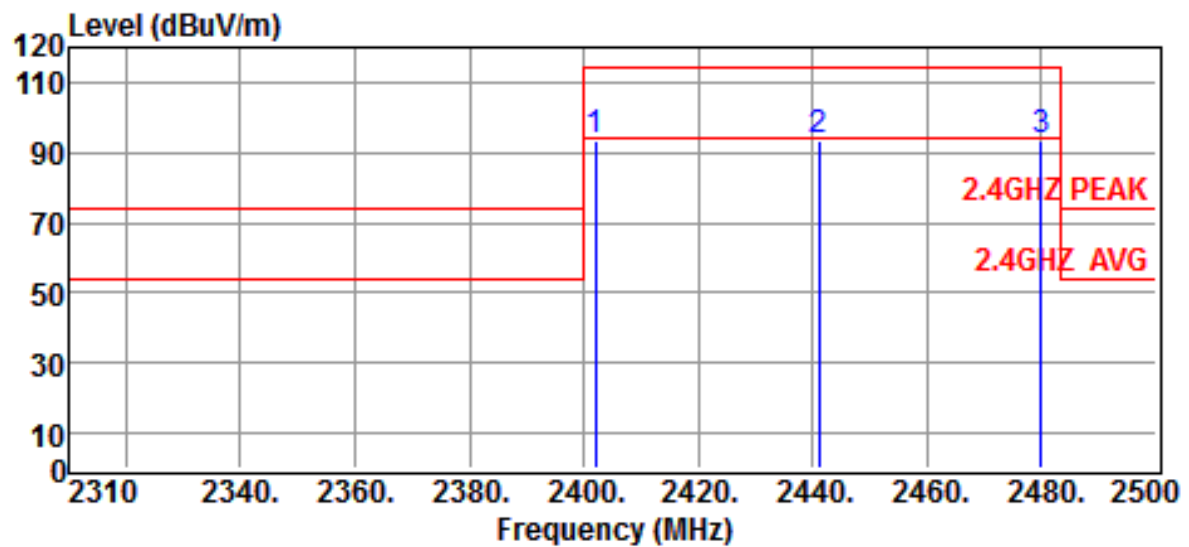
Site : CHAMBER #2  
 Limit : 2.4GHZ PEAK  
 EUT : 藍牙多功能音箱  
 Power Rating : DC5V(Power from PC)  
 Engineer : Kazuma Ho  
 Test Mode : BR

Date : 2017-11-07  
 Ant. Pol. : HORIZONTAL  
 Model : HE-D17  
 Temp. : 26 °C  
 Humi. : 52 %

| Freq<br>MHz | Reading<br>dBuV | Correction<br>Factor<br>dB | Result<br>dBuV/m | Limits<br>dBuV/m | Over limit<br>dB | Detector |
|-------------|-----------------|----------------------------|------------------|------------------|------------------|----------|
| 2402.0000   | 90.80           | -5.68                      | 85.12            | 114.00           | -28.88           | Peak     |
| 2441.0000   | 90.75           | -5.55                      | 85.20            | 114.00           | -28.80           | Peak     |
| 2480.0000   | 90.78           | -5.47                      | 85.31            | 114.00           | -28.69           | Peak     |

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result
4. Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.

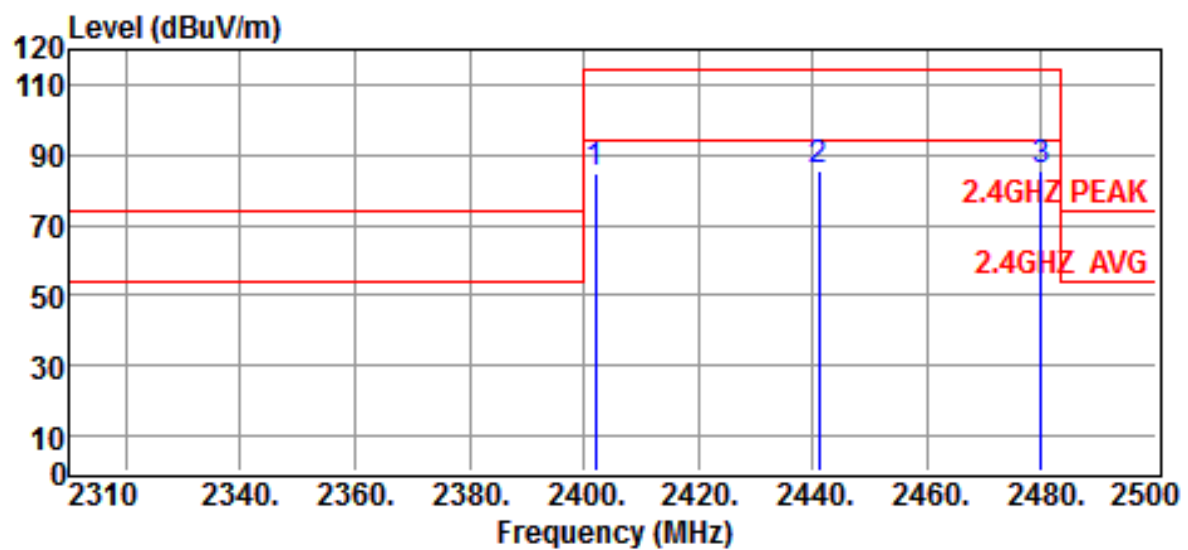


|              |                       |           |             |
|--------------|-----------------------|-----------|-------------|
| Site         | :CHAMBER #2           | Date      | :2017-11-07 |
| Limit        | :2.4GHZ PEAK          | Ant. Pol. | :VERTICAL   |
| EUT          | :藍牙多功能音箱              | Model     | :HE-D17     |
| Power Rating | : DC5V(Power from PC) | Temp.     | :26 °C      |
| Engineer     | : Kazuma Ho           | Humi.     | :52 %       |
| Test Mode    | :BR                   |           |             |

| Freq<br>MHz | Reading<br>dBuV | Correction<br>Factor<br>dB | Result<br>dBuV/m | Limits<br>dBuV/m | Over limit<br>dB | Detector |
|-------------|-----------------|----------------------------|------------------|------------------|------------------|----------|
| 2402.0000   | 99.21           | -5.68                      | 93.53            | 114.00           | -20.47           | Peak     |
| 2441.0000   | 99.16           | -5.55                      | 93.61            | 114.00           | -20.39           | Peak     |
| 2480.0000   | 99.20           | -5.47                      | 93.73            | 114.00           | -20.27           | Peak     |

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result
4. Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.

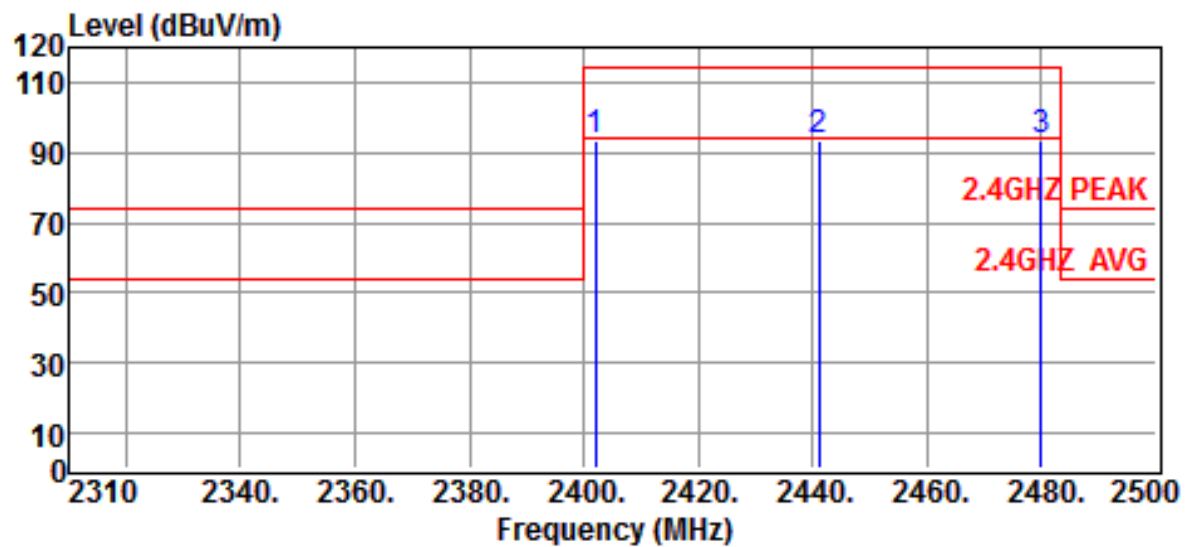


|              |                       |           |             |
|--------------|-----------------------|-----------|-------------|
| Site         | :CHAMBER #2           | Date      | :2017-11-07 |
| Limit        | :2.4GHZ PEAK          | Ant. Pol. | :HORIZONTAL |
| EUT          | :藍牙多功能音箱              | Model     | :HE-D17     |
| Power Rating | : DC5V(Power from PC) | Temp.     | :26 °C      |
| Engineer     | : Kazuma Ho           | Humi.     | :52 %       |
| Test Mode    | :EDR                  |           |             |

| Freq<br>MHz | Reading<br>dBuV | Correction<br>Factor<br>dB | Result<br>dBuV/m | Limits<br>dBuV/m | Over limit<br>dB | Detector |
|-------------|-----------------|----------------------------|------------------|------------------|------------------|----------|
| 2402.0000   | 90.82           | -5.68                      | 85.14            | 114.00           | -28.86           | Peak     |
| 2441.0000   | 90.78           | -5.55                      | 85.23            | 114.00           | -28.77           | Peak     |
| 2480.0000   | 90.81           | -5.47                      | 85.34            | 114.00           | -28.66           | Peak     |

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result
4. Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.



|              |                       |           |             |
|--------------|-----------------------|-----------|-------------|
| Site         | :CHAMBER #2           | Date      | :2017-11-07 |
| Limit        | :2.4GHZ PEAK          | Ant. Pol. | :VERTICAL   |
| EUT          | :藍牙多功能音箱              | Model     | :HE-D17     |
| Power Rating | : DC5V(Power from PC) | Temp.     | :26 °C      |
| Engineer     | : Kazuma Ho           | Humi.     | :52 %       |
| Test Mode    | :EDR                  |           |             |

| Freq<br>MHz | Reading<br>dBuV | Correction<br>Factor<br>dB | Result<br>dBuV/m | Limits<br>dBuV/m | Over limit<br>dB | Detector |
|-------------|-----------------|----------------------------|------------------|------------------|------------------|----------|
| 2402.0000   | 99.24           | -5.68                      | 93.56            | 114.00           | -20.44           | Peak     |
| 2441.0000   | 99.17           | -5.55                      | 93.62            | 114.00           | -20.38           | Peak     |
| 2480.0000   | 99.22           | -5.47                      | 93.75            | 114.00           | -20.25           | Peak     |

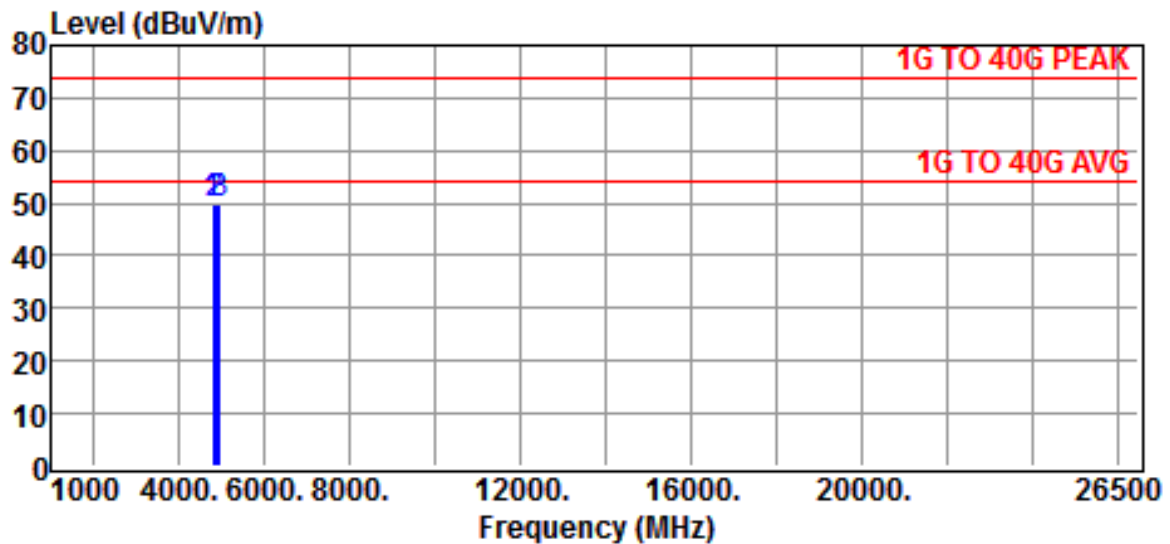
Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result
4. Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.

操作模式 : 發射接收(諧波及本地震盪)

測試結果 : 合格

測試者 : 何仁逸



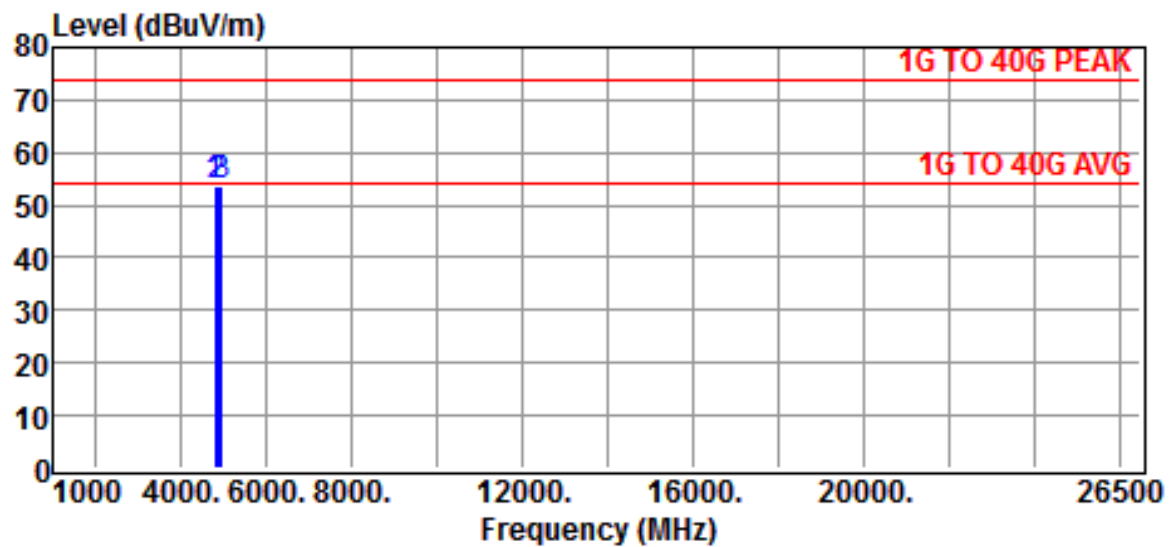
Site : CHAMBER #2  
 Limit : 1G TO 40G PEAK  
 EUT : 藍牙多功能音箱  
 Power Rating : DC5V(Power from PC)  
 Engineer : Kazuma Ho  
 Test Mode : BR

Date : 2017-11-07  
 Ant. Pol. : HORIZONTAL  
 Model : HE-D17  
 Temp. : 26 °C  
 Humi. : 52 %

| Freq<br>MHz | Reading<br>dBuV | Correction<br>Factor<br>dB | Result<br>dBuV/m | Limits<br>dBuV/m | Over limit<br>dB | Detector |
|-------------|-----------------|----------------------------|------------------|------------------|------------------|----------|
| 4804.0000   | 48.41           | 1.18                       | 49.59            | 74.00            | -24.41           | Peak     |
| 4882.0000   | 48.25           | 1.40                       | 49.65            | 74.00            | -24.35           | Peak     |
| 4960.0000   | 48.05           | 1.67                       | 49.72            | 74.00            | -24.28           | Peak     |

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit - Result
4. Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.

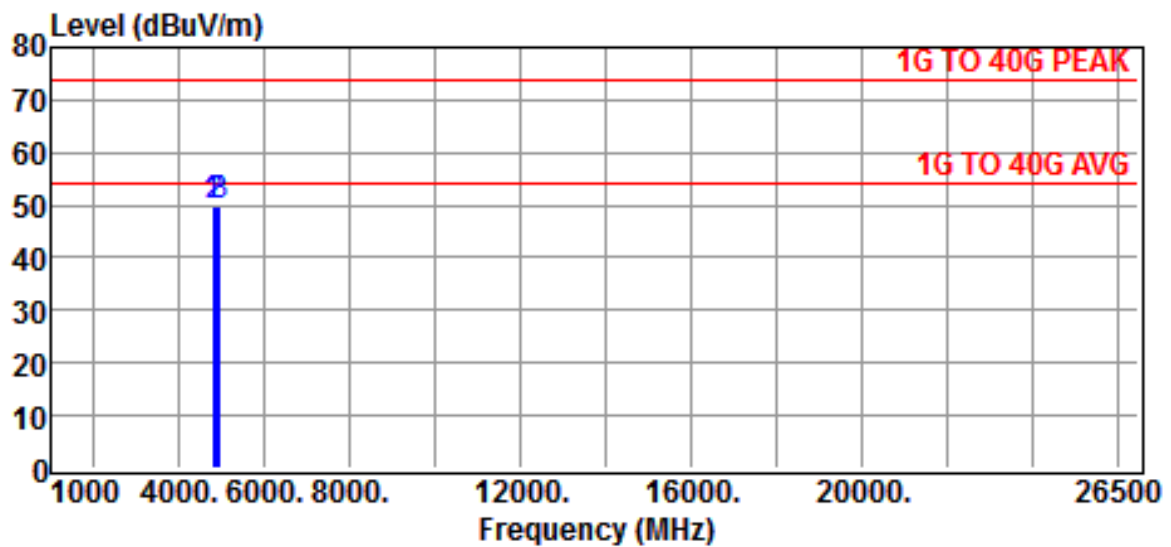


|              |                       |           |             |
|--------------|-----------------------|-----------|-------------|
| Site         | :CHAMBER #2           | Date      | :2017-11-07 |
| Limit        | :1G TO 40G PEAK       | Ant. Pol. | :VERTICAL   |
| EUT          | :藍牙多功能音箱              | Model     | :HE-D17     |
| Power Rating | : DC5V(Power from PC) | Temp.     | :26 °C      |
| Engineer     | : Kazuma Ho           | Humi.     | :52 %       |
| Test Mode    | :BR                   |           |             |

| Freq<br>MHz | Reading<br>dBuV | Correction<br>Factor<br>dB | Result<br>dBuV/m | Limits<br>dBuV/m | Over limit<br>dB | Detector |
|-------------|-----------------|----------------------------|------------------|------------------|------------------|----------|
| 4804.0000   | 52.27           | 1.18                       | 53.45            | 74.00            | -20.55           | Peak     |
| 4882.0000   | 52.13           | 1.40                       | 53.53            | 74.00            | -20.47           | Peak     |
| 4960.0000   | 51.95           | 1.67                       | 53.62            | 74.00            | -20.38           | Peak     |

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit - Result
4. Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.

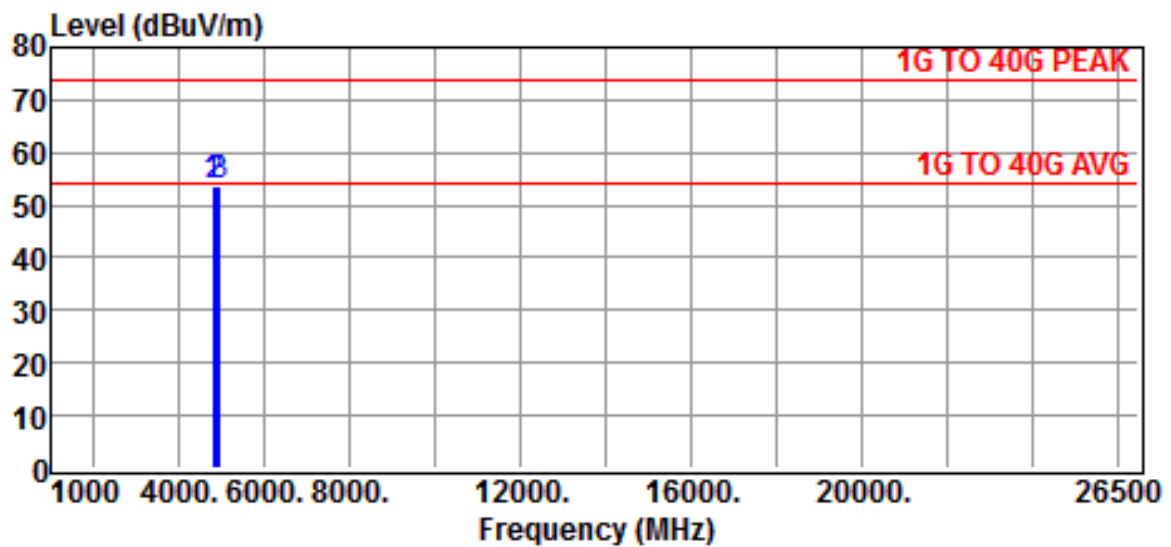


|           |                       |           |              |
|-----------|-----------------------|-----------|--------------|
| Site      | :CHAMBER #2           | Date      | :2017-11-07  |
| Limit     | :1G TO 40G PEAK       | Ant. Pol. | :HORIZONTAL  |
| EUT       | :藍牙多功能音箱              | Model     | :HE-D17Power |
| Rating    | : DC5V(Power from PC) | Temp.     | :26 °C       |
| Engineer  | : Kazuma Ho           | Humi.     | :52 %        |
| Test Mode | :EDR                  |           |              |

| Freq<br>MHz | Reading<br>dBuV | Correction<br>Factor<br>dB | Result<br>dBuV/m | Limits<br>dBuV/m | Over limit<br>dB | Detector |
|-------------|-----------------|----------------------------|------------------|------------------|------------------|----------|
| 4804.0000   | 48.44           | 1.18                       | 49.62            | 74.00            | -24.38           | Peak     |
| 4882.0000   | 48.28           | 1.40                       | 49.68            | 74.00            | -24.32           | Peak     |
| 4960.0000   | 48.07           | 1.67                       | 49.74            | 74.00            | -24.26           | Peak     |

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit - Result
4. Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.



|              |                       |           |             |
|--------------|-----------------------|-----------|-------------|
| Site         | :CHAMBER #2           | Date      | :2017-11-07 |
| Limit        | :1G TO 40G PEAK       | Ant. Pol. | :VERTICAL   |
| EUT          | :藍牙多功能音箱              | Model     | :HE-D17     |
| Power Rating | : DC5V(Power from PC) | Temp.     | :26 °C      |
| Engineer     | : Kazuma Ho           | Humi.     | :52 %       |
| Test Mode    | :EDR                  |           |             |

| Freq<br>MHz | Reading<br>dBuV | Correction<br>Factor<br>dB | Result<br>dBuV/m | Limits<br>dBuV/m | Over limit<br>dB | Detector |
|-------------|-----------------|----------------------------|------------------|------------------|------------------|----------|
| 4804.0000   | 52.28           | 1.18                       | 53.46            | 74.00            | -20.54           | Peak     |
| 4882.0000   | 52.15           | 1.40                       | 53.55            | 74.00            | -20.45           | Peak     |
| 4960.0000   | 51.96           | 1.67                       | 53.63            | 74.00            | -20.37           | Peak     |

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit - Result
4. Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.

## 4.5.2 其它不必要之訊號

## A. 1GHz以下

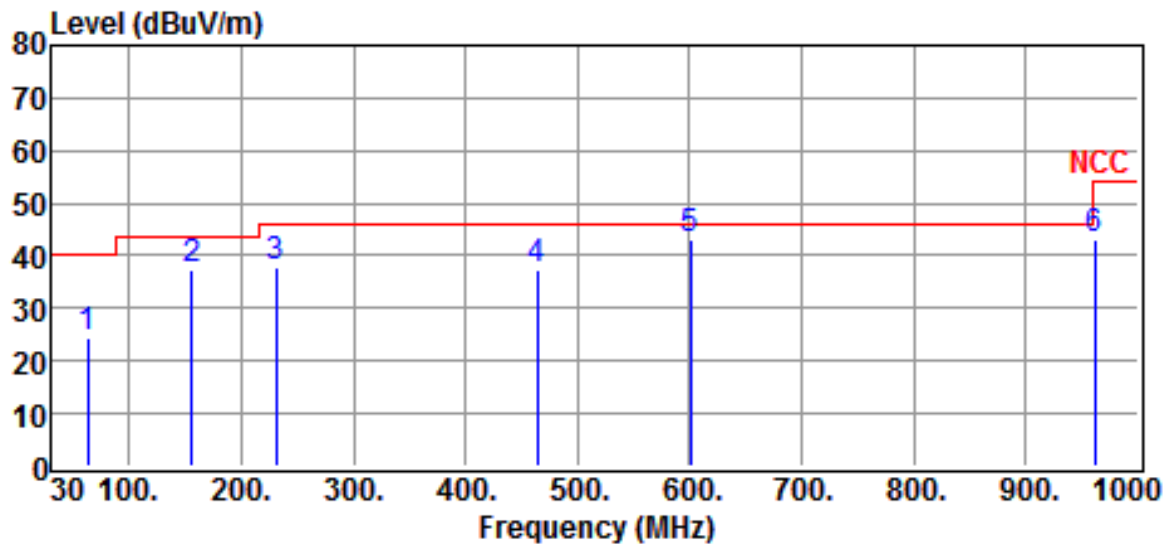
操作模式 : Bluetooth+Charging Mode

測試日期 : Oct. 12, 2017 環境溫度 : 26°C

環境濕度 : 59 %

測試結果 : 合格

測試者 : 何仁逸



Site : CHAMBER #2

Date : 2017-10-12

Limit : NCC

Ant. Pol. : HORIZONTAL

EUT : 藍牙多功能音箱

Model : HE-D17

Power Rating : DC5V(Power from PC)

Temp. : 26°C

Engineer : Kazuma Ho

Humi. : 59 %

Test Mode : Bluetooth+Charging Mode

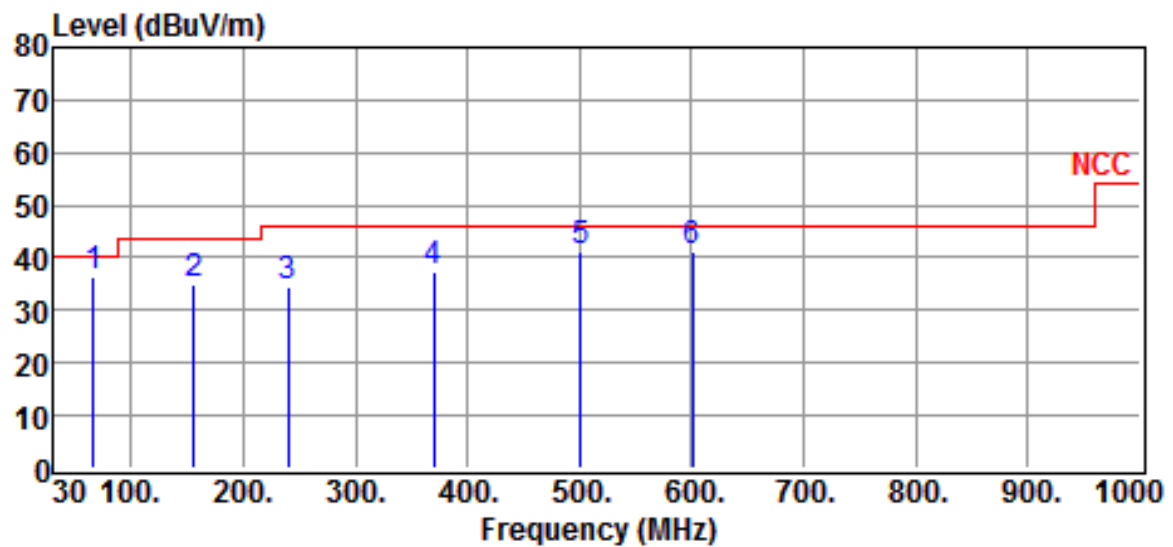
| Freq<br>MHz | Reading<br>dBuV | Correction<br>Factor<br>dB | Result<br>dBuV/m | Limits<br>dBuV/m | Over limit<br>dB | Detector |
|-------------|-----------------|----------------------------|------------------|------------------|------------------|----------|
| 62.9800     | 39.13           | -14.72                     | 24.41            | 40.00            | -15.59           | QP       |
| 156.1000    | 45.10           | -7.66                      | 37.44            | 43.50            | -6.06            | QP       |
| 230.7900    | 44.92           | -6.97                      | 37.95            | 46.00            | -8.05            | QP       |
| 463.5900    | 37.43           | -0.12                      | 37.31            | 46.00            | -8.69            | QP       |
| 600.3600    | 41.35           | 1.63                       | 42.98            | 46.00            | -3.02            | QP       |
| 961.2000    | 34.22           | 8.75                       | 42.97            | 54.00            | -11.03           | QP       |

Note :

1. Result = Reading + Corrected Factor

2. Corrected Factor = Antenna Factor + Cable Loss

3. The margin value=Limit – Result



|              |                          |           |             |
|--------------|--------------------------|-----------|-------------|
| Site         | :CHAMBER #2              | Date      | :2017-10-12 |
| Limit        | :NCC                     | Ant. Pol. | :VERTICAL   |
| EUT          | :藍牙多功能音箱                 | Model     | :HE-D17     |
| Power Rating | :DC5V(Power from PC)     | Temp.     | :26°C       |
| Engineer     | : Kazuma Ho              | Humi.     | :59 %       |
| Test Mode    | :Bluetooth+Charging Mode |           |             |

| Freq<br>MHz | Reading<br>dBuV | Correction<br>Factor<br>dB | Result<br>dBuV/m | Limits<br>dBuV/m | Over limit<br>dB | Detector |
|-------------|-----------------|----------------------------|------------------|------------------|------------------|----------|
| 65.8900     | 50.80           | -14.53                     | 36.27            | 40.00            | -3.73            | QP       |
| 156.1000    | 42.45           | -7.66                      | 34.79            | 43.50            | -8.71            | QP       |
| 239.5200    | 41.25           | -6.62                      | 34.63            | 46.00            | -11.37           | QP       |
| 370.4700    | 38.83           | -1.65                      | 37.18            | 46.00            | -8.82            | QP       |
| 501.4200    | 40.94           | 0.22                       | 41.16            | 46.00            | -4.84            | QP       |
| 600.3600    | 39.55           | 1.63                       | 41.18            | 46.00            | -4.82            | QP       |

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss
3. The margin value=Limit – Result

**b. 1GHz以上**

操作模式 : Bluetooth+Charging Mode

測試日期 : Oct. 12, 2017      環境溫度 : 26°C

環境濕度 : 59 %

測試結果 : 合格

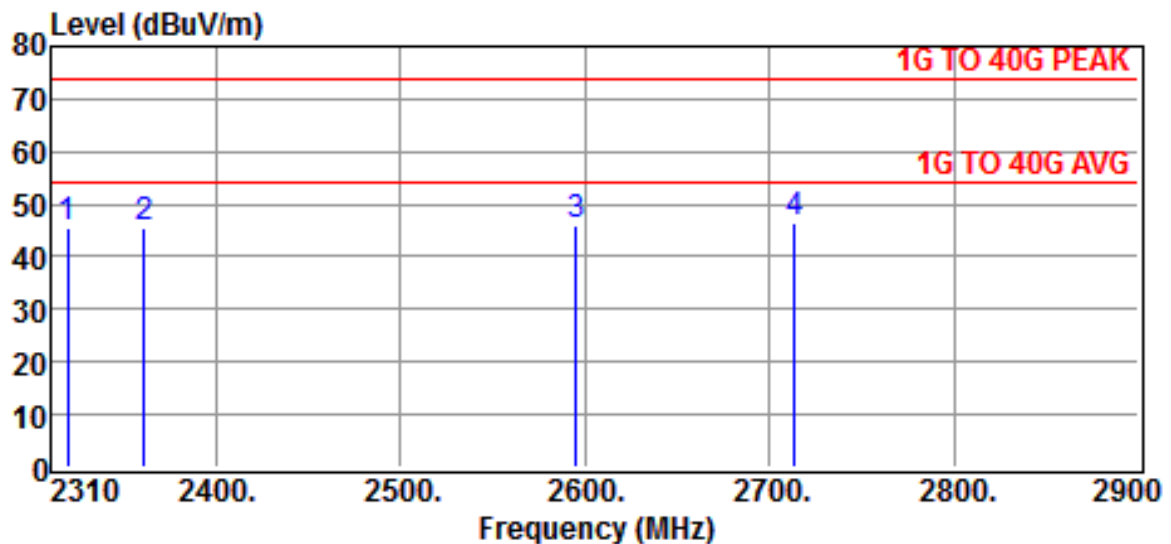
測試者 : 何仁逸

註：

1. 1GHz 以上輻射信號太弱，掃描圖請參考 4.5.1 節。

## 4.5.3 限制頻帶之場強輻射測量

測試日期 : Nov. 07, 2017    環境溫度 : 26 °C    環境溼度 : 52 %  
 測試結果 : 合格    測試者 : 何仁逸

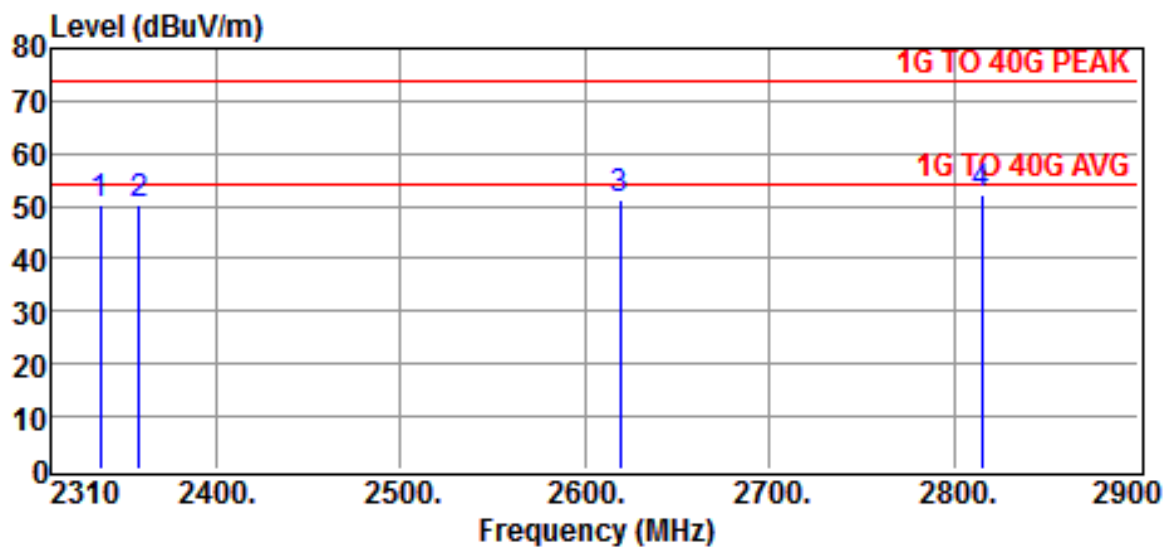


|              |                       |           |             |
|--------------|-----------------------|-----------|-------------|
| Site         | :CHAMBER #2           | Date      | :2017-11-07 |
| Limit        | :1G TO 40G PEAK       | Ant. Pol. | :HORIZONTAL |
| EUT          | :藍牙多功能音箱              | Model     | :HE-D17     |
| Power Rating | : DC5V(Power from PC) | Temp.     | :26 °C      |
| Engineer     | : Kazuma Ho           | Humi.     | :52 %       |
| Test Mode    | :BR                   |           |             |

| Freq<br>MHz | Reading<br>dBuV | Correction<br>Factor<br>dB | Result<br>dBuV/m | Limits<br>dBuV/m | Over limit<br>dB | Detector |
|-------------|-----------------|----------------------------|------------------|------------------|------------------|----------|
| 2319.0000   | 51.19           | -5.84                      | 45.35            | 74.00            | -28.65           | Peak     |
| 2361.0000   | 51.17           | -5.75                      | 45.42            | 74.00            | -28.58           | Peak     |
| 2595.0000   | 51.14           | -5.04                      | 46.10            | 74.00            | -27.90           | Peak     |
| 2714.0000   | 50.85           | -4.59                      | 46.26            | 74.00            | -27.74           | Peak     |

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit - Result
4. Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.

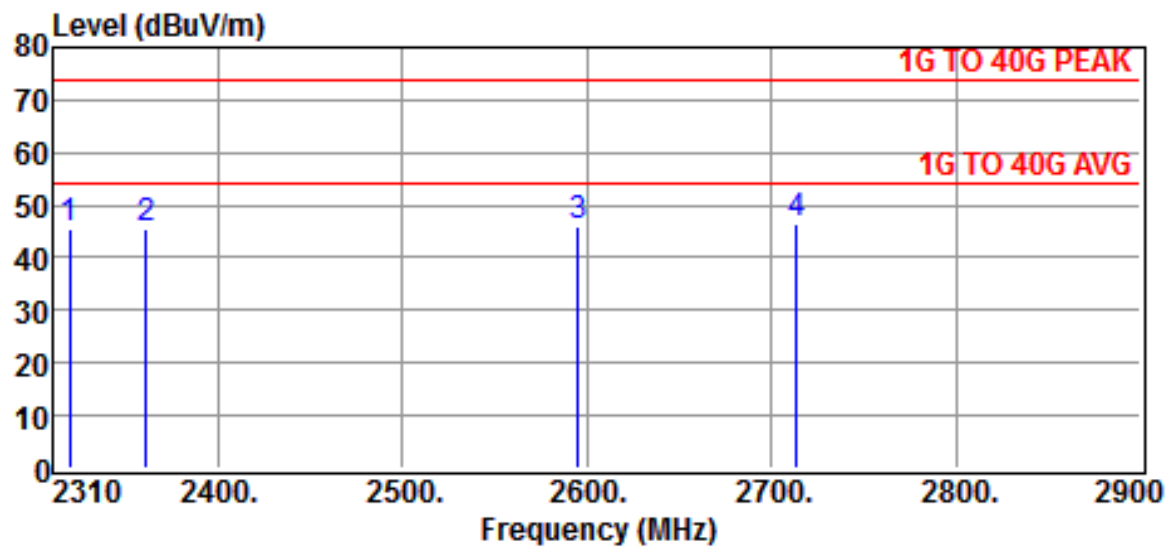


|              |                       |           |             |
|--------------|-----------------------|-----------|-------------|
| Site         | :CHAMBER #2           | Date      | :2017-11-07 |
| Limit        | :1G TO 40G PEAK       | Ant. Pol. | :VERTICAL   |
| EUT          | :藍牙多功能音箱              | Model     | :HE-D17     |
| Power Rating | : DC5V(Power from PC) | Temp.     | :26 °C      |
| Engineer     | : Kazuma Ho           | Humi.     | :52 %       |
| Test Mode    | :BR                   |           |             |

| Freq<br>MHz | Reading<br>dBuV | Correction<br>Factor<br>dB | Result<br>dBuV/m | Limits<br>dBuV/m | Over limit<br>dB | Detector |
|-------------|-----------------|----------------------------|------------------|------------------|------------------|----------|
| 2337.0000   | 55.90           | -5.79                      | 50.11            | 74.00            | -23.89           | Peak     |
| 2358.0000   | 55.88           | -5.75                      | 50.13            | 74.00            | -23.87           | Peak     |
| 2619.0000   | 56.19           | -4.98                      | 51.21            | 74.00            | -22.79           | Peak     |
| 2815.0000   | 56.57           | -4.20                      | 52.37            | 74.00            | -21.63           | Peak     |

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit - Result
4. Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.

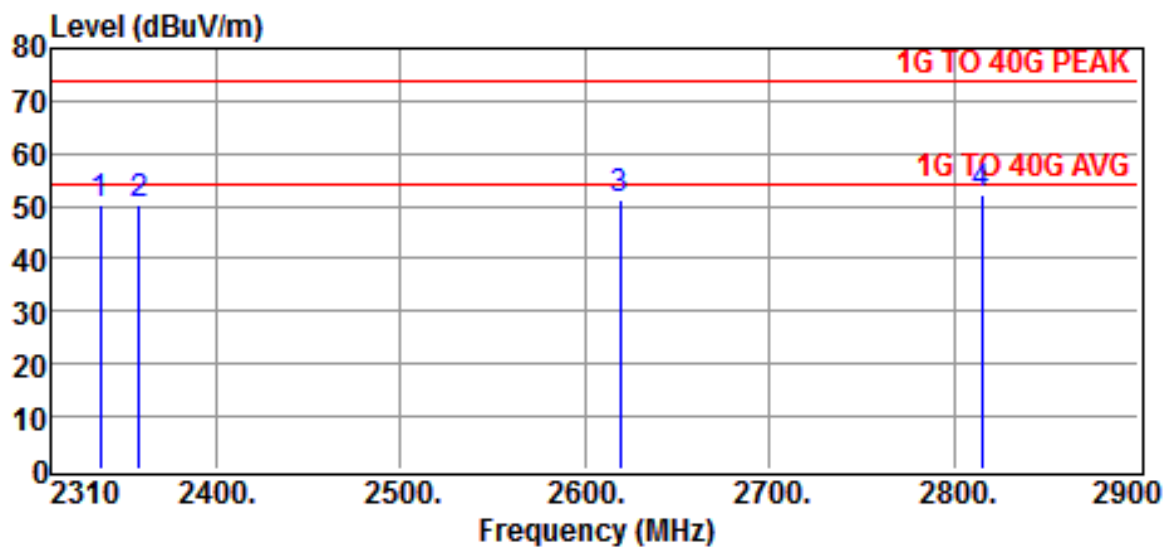


|              |                       |           |             |
|--------------|-----------------------|-----------|-------------|
| Site         | :CHAMBER #2           | Date      | :2017-11-07 |
| Limit        | :1G TO 40G PEAK       | Ant. Pol. | :HORIZONTAL |
| EUT          | :藍牙多功能音箱              | Model     | :HE-D17     |
| Power Rating | : DC5V(Power from PC) | Temp.     | :26 °C      |
| Engineer     | : Kazuma Ho           | Humi.     | :52 %       |
| Test Mode    | :EDR                  |           |             |

| Freq<br>MHz | Reading<br>dBuV | Correction<br>Factor<br>dB | Result<br>dBuV/m | Limits<br>dBuV/m | Over limit<br>dB | Detector |
|-------------|-----------------|----------------------------|------------------|------------------|------------------|----------|
| 2319.0000   | 51.20           | -5.84                      | 45.36            | 74.00            | -28.64           | Peak     |
| 2361.0000   | 51.19           | -5.75                      | 45.44            | 74.00            | -28.56           | Peak     |
| 2595.0000   | 51.17           | -5.04                      | 46.13            | 74.00            | -27.87           | Peak     |
| 2714.0000   | 50.88           | -4.59                      | 46.29            | 74.00            | -27.71           | Peak     |

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit - Result
4. Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.



|              |                       |           |             |
|--------------|-----------------------|-----------|-------------|
| Site         | :CHAMBER #2           | Date      | :2017-11-07 |
| Limit        | :1G TO 40G PEAK       | Ant. Pol. | :VERTICAL   |
| EUT          | :藍牙多功能音箱              | Model     | :HE-D17     |
| Power Rating | : DC5V(Power from PC) | Temp.     | :26 °C      |
| Engineer     | : Kazuma Ho           | Humi.     | :52 %       |
| Test Mode    | :EDR                  |           |             |

| Freq<br>MHz | Reading<br>dBuV | Correction<br>Factor<br>dB | Result<br>dBuV/m | Limits<br>dBuV/m | Over limit<br>dB | Detector |
|-------------|-----------------|----------------------------|------------------|------------------|------------------|----------|
| 2337.0000   | 55.91           | -5.79                      | 50.12            | 74.00            | -23.88           | Peak     |
| 2358.0000   | 55.90           | -5.75                      | 50.15            | 74.00            | -23.85           | Peak     |
| 2619.0000   | 56.21           | -4.98                      | 51.23            | 74.00            | -22.77           | Peak     |
| 2815.0000   | 56.60           | -4.20                      | 52.40            | 74.00            | -21.60           | Peak     |

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit - Result
4. Peak measurements are compared to the average limit - as peak measurements are below the average limit, they also comply with the peak limit.

#### 4.6 輻射之測試配置

圖 1：量測頻率低於1GHz之測試配置

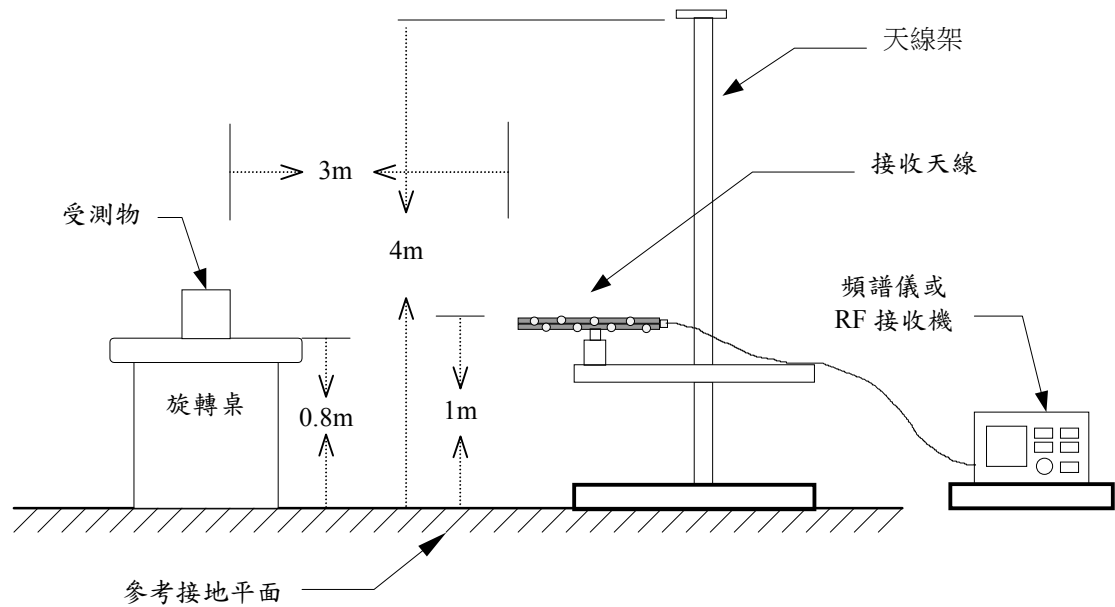
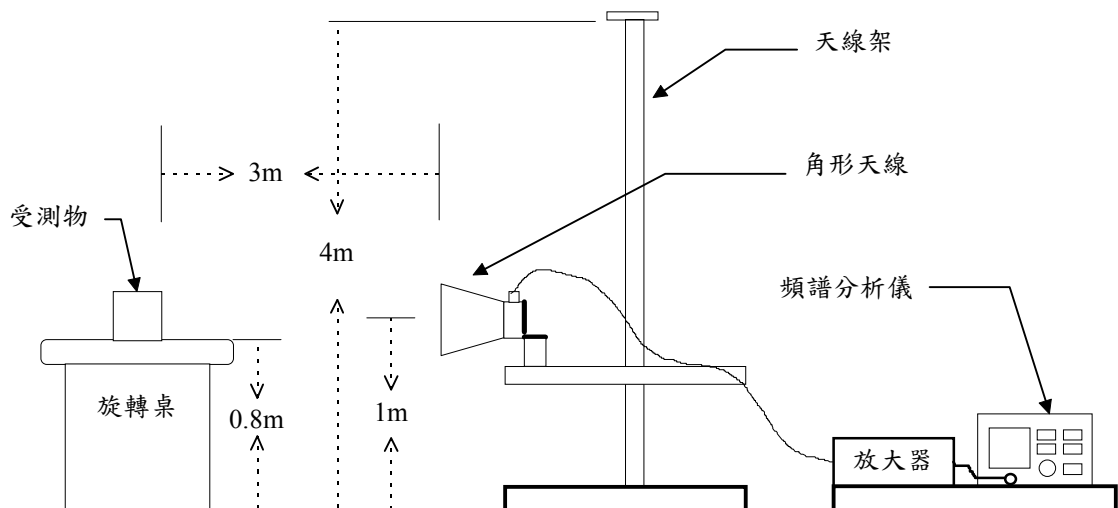


圖 2：量測頻率高於1GHz之測試配置



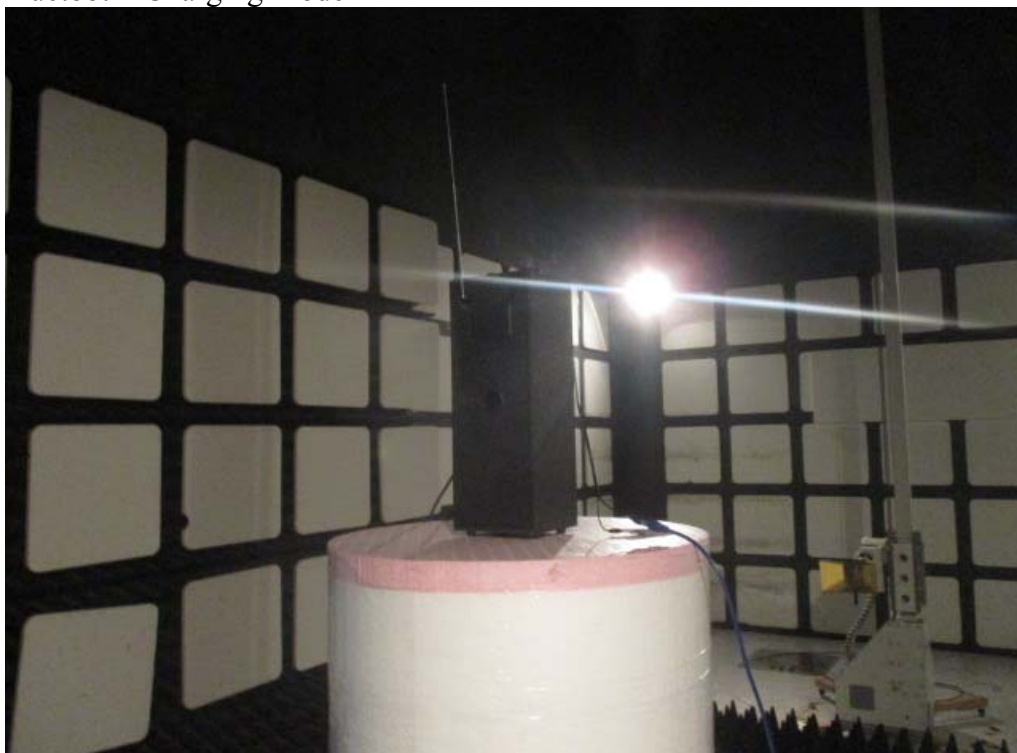
#### 4.7 輻射量測之配置照片

(30MHz~1000MHz)

Bluetooth+Charging Mode



**(Above 1GHz)**  
Bluetooth+Charging Mode



## 5 電源線傳導干擾之量測

### 5.1 適用標準

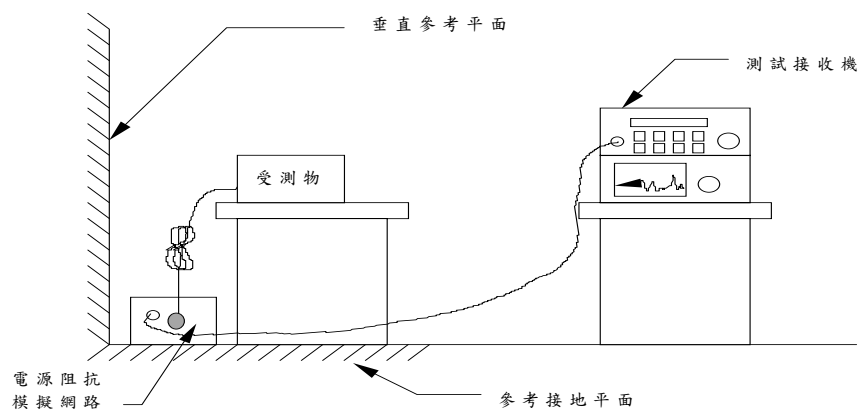
依據低功率射頻電機技術規範2.3節之要求。

### 5.2 測試方法

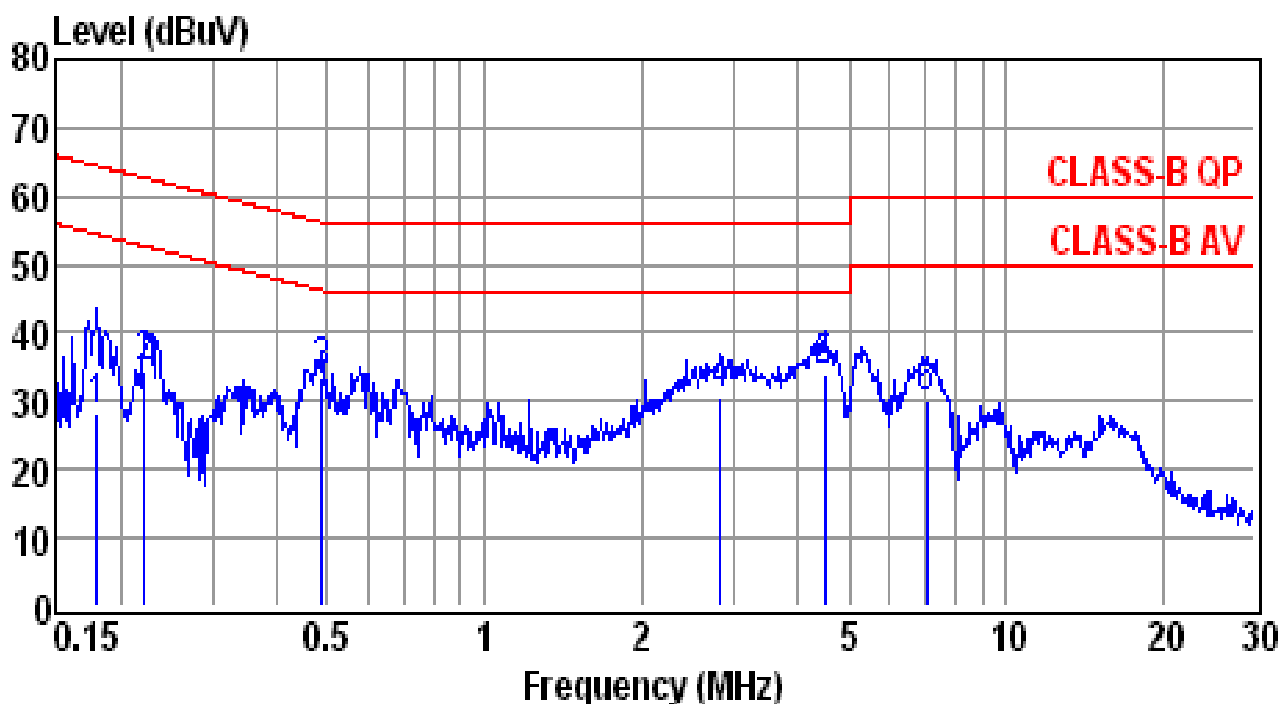
將待測物置於0.8米高的非金屬桌面，使其在工作狀態，待測物電源線接至電源線阻抗穩定網路上，從測試接收機記錄頻率由 0.15MHz 至 30MHz 之間之電源線傳導放射強度。

### 5.3 測試配置

圖 3：傳導干擾之量測配置



## 5.4 傳導干擾之量測結果

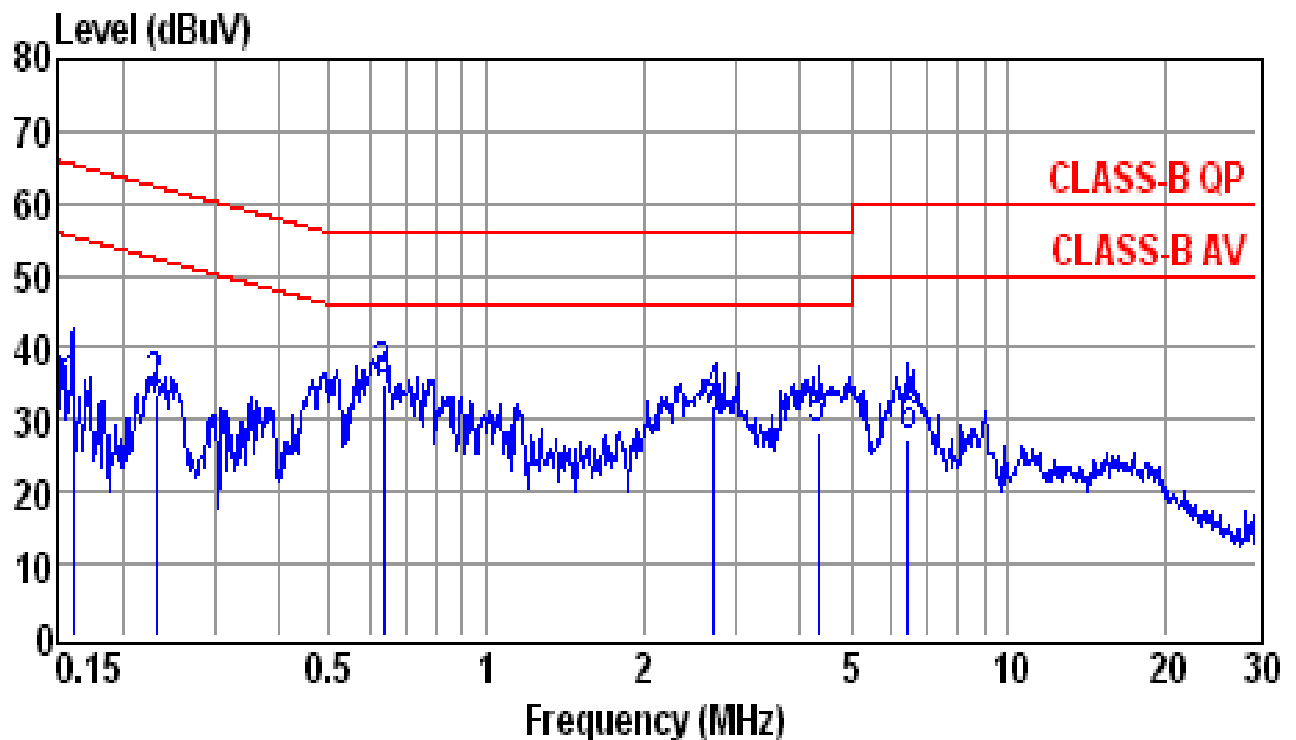


Site : conducted #1 Date : 10-17-2017  
 Condition : CLASS-B QP LISN : NEUTRAL  
 Tem / Hum : 24 °C / 59%  
 Test Mode : BT+ Charging Mode  
 EUT : 藍牙多功能音箱  
 Power Rating : DC5V(Power from PC)

| Freq (MHz) | Reading (dBuV) | Factor (dB) | Emission Level (dBuV) | Limit Line (dBuV) | Over Limit (dB) | Remark |
|------------|----------------|-------------|-----------------------|-------------------|-----------------|--------|
| 0.1806     | 18.02          | 10.18       | 28.20                 | 64.46             | -36.26          | QP     |
| 0.2220     | 24.21          | 10.18       | 34.39                 | 62.74             | -28.35          | QP     |
| 0.4863     | 23.20          | 10.21       | 33.41                 | 56.23             | -22.82          | QP     |
| 2.8390     | 20.50          | 10.35       | 30.85                 | 56.00             | -25.15          | QP     |
| 4.4780     | 23.78          | 10.43       | 34.21                 | 56.00             | -21.79          | QP     |
| 7.0620     | 19.73          | 10.55       | 30.28                 | 60.00             | -29.72          | QP     |

Note :

1. Result = Reading + Factor
2. Factor = LISN Factor + Cable Loss



Site : conducted #1

Date : 10-17-2017

Condition : CLASS-B QP

LISN : LINE

Tem / Hum : 24 °C / 59%

Test Mode : BT+ Charging Mode

EUT : 藍牙多功能音箱

Power Rating : DC5V(Power from PC)

| Freq<br>(MHz) | Reading<br>(dBuV) | Factor<br>(dB) | Emission<br>Level<br>(dBuV) | Limit<br>Line<br>(dBuV) | Over<br>Limit<br>(dB) | Remark |
|---------------|-------------------|----------------|-----------------------------|-------------------------|-----------------------|--------|
| 0.1607        | 23.13             | 10.18          | 33.31                       | 65.43                   | -32.12                | QP     |
| 0.2316        | 23.33             | 10.19          | 33.52                       | 62.39                   | -28.87                | QP     |
| 0.6338        | 24.83             | 10.21          | 35.04                       | 56.00                   | -20.96                | QP     |
| 2.7360        | 21.82             | 10.35          | 32.17                       | 56.00                   | -23.83                | QP     |
| 4.3380        | 17.63             | 10.43          | 28.06                       | 56.00                   | -27.94                | QP     |
| 6.4540        | 16.79             | 10.55          | 27.34                       | 60.00                   | -32.66                | QP     |

Note :

1. Result = Reading + Factor

2. Factor = LISN Factor + Cable Loss

## 5.5 干擾值之計算

電源傳導干擾電壓之計算公式如下

$$\text{結果值} = \text{儀器讀值} + \text{校正因子}$$

其中校正因子為：

$$\text{饋線損失} + \text{電源阻抗模擬網路損失}$$

## 5.6 傳導干擾之量測儀器

| 儀器名稱              | 製造者             | 型號            | 本次校驗日期     | 下次校驗日期     |
|-------------------|-----------------|---------------|------------|------------|
| EMI Test Receiver | Rohde & Schwarz | ESCI          | 2016/12/05 | 2017/12/04 |
| LISN              | EMCO            | 3825/2        | 2017/04/26 | 2018/04/25 |
| LISN              | Rohde & Schwarz | ESH2-Z5       | 2017/04/01 | 2018/03/31 |
| Monitor           | IBM             | E54           | N.C.R.     | N.C.R.     |
| Printer           | HP              | LaserJet 1000 | N.C.R.     | N.C.R.     |
| Shielded Room     | Riken           | ---           | N.C.R.     | N.C.R.     |
| Computer          | Acer            | Veriton       | N.C.R.     | N.C.R.     |

## 5.7 傳導量測之配置照片



## 6 天線之要求

### 6.1 適用標準

依據低功率射頻電機技術規範2.2節之規定，低功率射頻電機之發射機或收發信機所使用之天線，除本規範章節中另有規定外，應為全固定、半固定式或以獨特之耦合(unique coupling)方式連接機體。製造者可設計供使用者因損壞而替換之天線，但不得設計或使用原認證以外之天線或可供引接各類電纜之標準天線插座或電氣連接頭，如：BNC、F type、N type、M type、UG type、RCA、SMA、SMB...等及其他各類工業或通訊標準接頭。

### 6.2 天線增益

此裝置使用固定式P C B天線，其天線增益未超過6dBi之規定值，不需降低峰值發射功率以及峰值功率頻譜密度。

## 7 開放頻帶邊緣之量測

### 7.1 適用標準

3.10.2.4 除諧波外，指定頻帶外之發射應比主波低50 dB以上或依2.8 之發射限制，兩者取其較鬆者。

### 7.2 開放頻帶邊緣之測試配置

如圖2所示。

### 7.3 量測開放頻帶邊緣之儀器

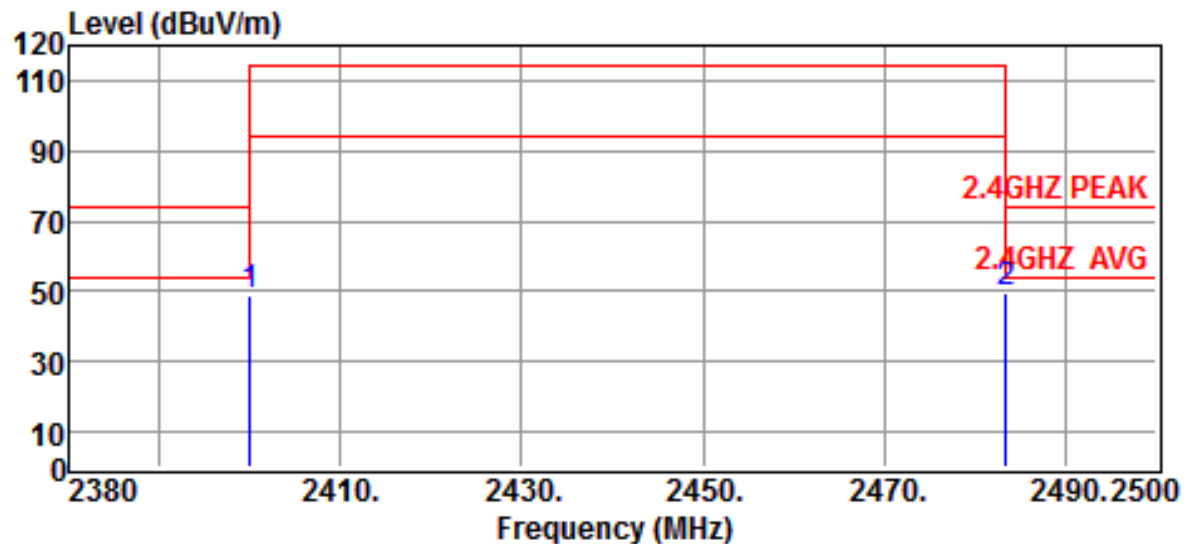
| 儀器名稱                 | 製造者             | 型號        | 本次校驗日期     | 下次校驗日期     |
|----------------------|-----------------|-----------|------------|------------|
| Test Receiver        | Rohde & Schwarz | ESCI      | 2017/09/19 | 2018/09/18 |
| Bi-Log Antenna       | ETC             | MCTD 2786 | 2017/07/12 | 2018/07/11 |
| Log-periodic Antenna | EMCO            | 3146      | 2017/08/10 | 2018/08/09 |
| Horn Antenna         | EMCO            | 3115      | 2017/10/11 | 2018/10/10 |
| Horn Antenna         | EMCO            | 3116      | 2017/10/05 | 2018/10/04 |
| Spectrum             | R&S             | FSP3      | 2017/01/04 | 2018/01/03 |
| Amplifier            | HP              | 8447D     | 2016/12/05 | 2017/12/04 |
| EMI Test Receiver    | Rohde & Schwarz | ESU 40    | 2016/11/10 | 2017/11/09 |
| Attenuator           | MINI-CIRCUITS   | BW-S10W2+ | 2017/10/06 | 2018/10/05 |
| Attenuator           | MINI-CIRCUITS   | BW-S20W2+ | 2017/10/06 | 2018/10/05 |
| Attenuator           | MINI-CIRCUITS   | BW-S30W2+ | 2017/10/06 | 2018/10/05 |
| Amplifier            | HP              | 83051A    | 2017/08/25 | 2018/08/24 |

## 7.4 開放頻帶邊緣之量測結果

操作模式 : 發射接收(帶外發射)

測試結果 : 合格

測試者 : 何仁逸



Site : CHAMBER #2

Date : 2017-11-07

Limit : 2.4GHZ PEAK

Ant. Pol. : HORIZONTAL

EUT : 藍牙多功能音箱

Model : HE-D17

Power Rating : DC5V(Power from PC)

Temp. : 26 °C

Engineer : Kazuma Ho

Humi. : 52 %

Test Mode : BR

| Freq      | Reading | Correction | Result | Limits | Over limit | Detector |
|-----------|---------|------------|--------|--------|------------|----------|
| MHz       | dBuV    | Factor     | dBuV/m | dBuV/m | dB         |          |
| 2400.0000 | 54.89   | -5.68      | 49.21  | 74.00  | -24.79     | Peak     |
| 2483.5000 | 54.82   | -5.47      | 49.35  | 74.00  | -24.65     | Peak     |

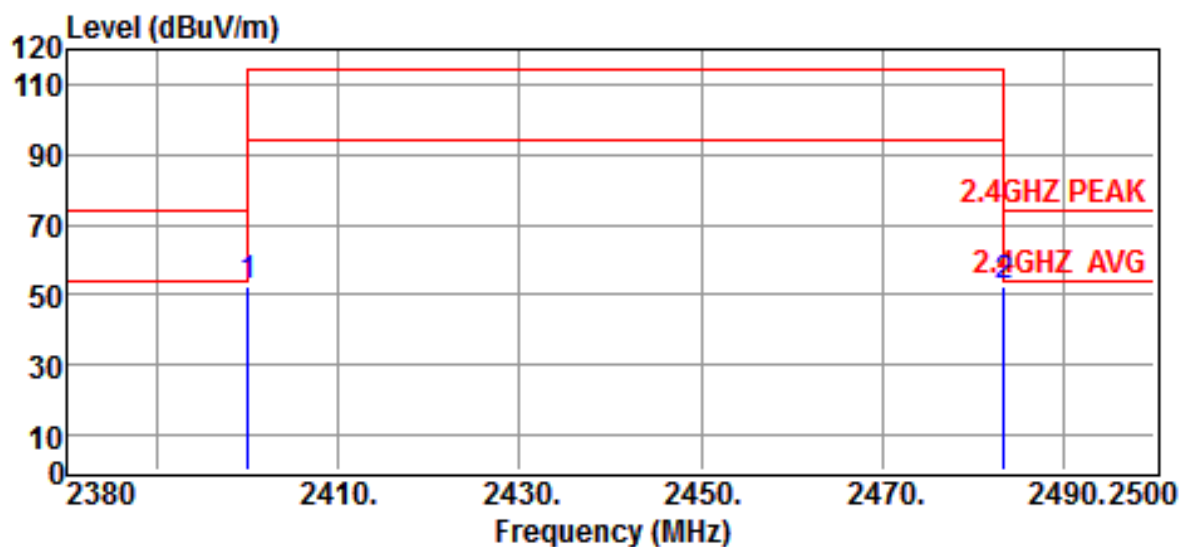
Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit – Result

操作模式 : 發射接收(帶外發射)

測試結果 : 合格

測試者 : 何仁逸



Site : CHAMBER #2

Date : 2017-11-07

Limit : 2.4GHZ PEAK

Ant. Pol. : VERTICAL

EUT : 藍牙多功能音箱

Model : HE-D17

Power Rating : DC5V(Power from PC)

Temp. : 26°C

Engineer : Kazuma Ho

Humi. : 52 %

Test Mode : BR

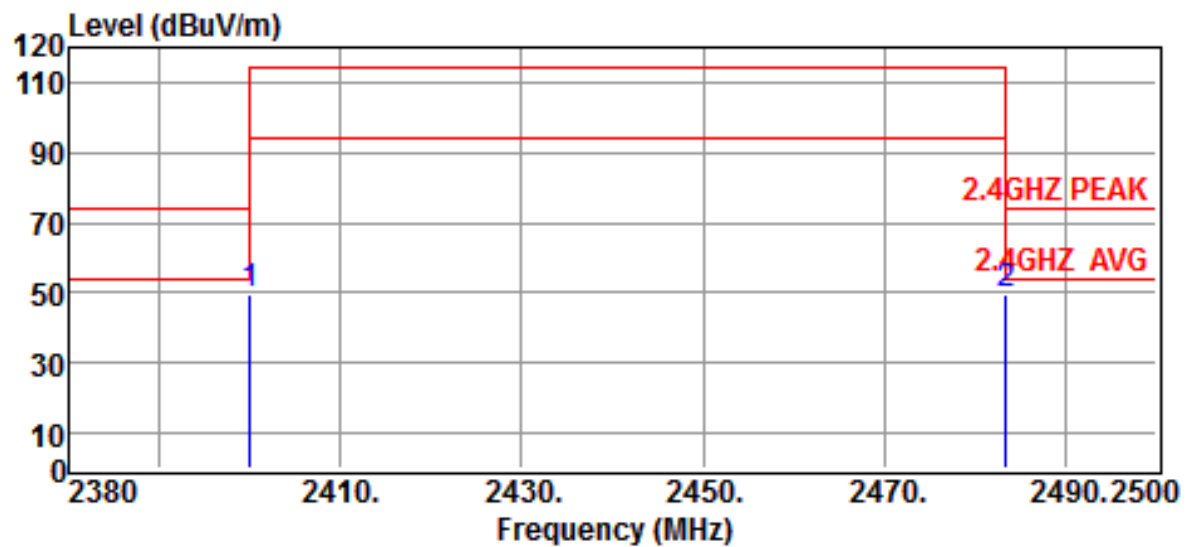
| Freq      | Reading | Correction | Result | Limits | Over limit | Detector |
|-----------|---------|------------|--------|--------|------------|----------|
| MHz       | dBuV    | Factor     | dBuV/m | dBuV/m | dB         |          |
| 2400.0000 | 58.29   | -5.68      | 52.61  | 74.00  | -21.39     | Peak     |
| 2483.5000 | 58.21   | -5.47      | 52.74  | 74.00  | -21.26     | Peak     |

Note :

1. Result = Reading + Corrected Factor

2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)

3. The margin value=Limit – Result

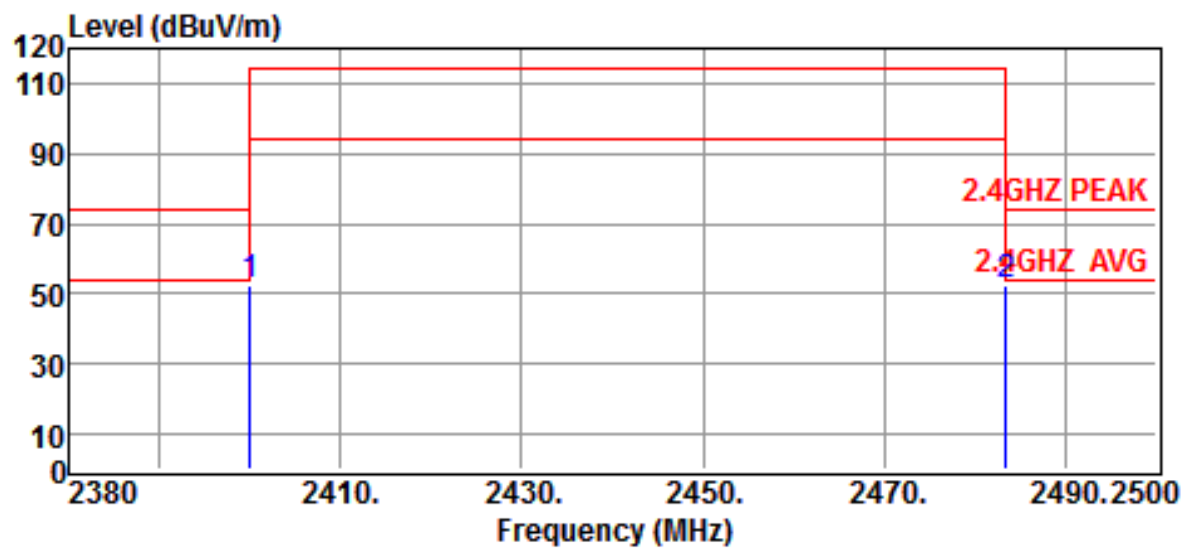


|              |                      |           |             |
|--------------|----------------------|-----------|-------------|
| Site         | :CHAMBER #2          | Date      | :2017-11-07 |
| Limit        | :2.4GHZ PEAK         | Ant. Pol. | :HORIZONTAL |
| EUT          | :藍牙多功能音箱             | Model     | :HE-D17     |
| Power Rating | :DC5V(Power from PC) | Temp.     | :26 °C      |
| Engineer     | : Kazuma Ho          | Humi.     | :52 %       |
| Test Mode    | :EDR                 |           |             |

| Freq<br>MHz | Reading<br>dBuV | Correction<br>Factor<br>dB | Result<br>dBuV/m | Limits<br>dBuV/m | Over limit<br>dB | Detector |
|-------------|-----------------|----------------------------|------------------|------------------|------------------|----------|
| 2400.0000   | 54.91           | -5.68                      | 49.23            | 74.00            | -24.77           | Peak     |
| 2483.5000   | 54.83           | -5.47                      | 49.36            | 74.00            | -24.64           | Peak     |

Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit - Result



|              |                       |           |             |
|--------------|-----------------------|-----------|-------------|
| Site         | :CHAMBER #2           | Date      | :2017-11-07 |
| Limit        | :2.4GHZ PEAK          | Ant. Pol. | :VERTICAL   |
| EUT          | :藍牙多功能音箱              | Model     | :HE-D17     |
| Power Rating | : DC5V(Power from PC) | Temp.     | :26 °C      |
| Engineer     | : Kazuma Ho           | Humi.     | :52 %       |
| Test Mode    | :EDR                  |           |             |

| Freq      | Reading | Correction | Result | Limits | Over limit | Detector |
|-----------|---------|------------|--------|--------|------------|----------|
| MHz       | dBuV    | Factor     | dBuV/m | dBuV/m | dB         |          |
| 2400.0000 | 58.31   | -5.68      | 52.63  | 74.00  | -21.37     | Peak     |
| 2483.5000 | 58.22   | -5.47      | 52.75  | 74.00  | -21.25     | Peak     |

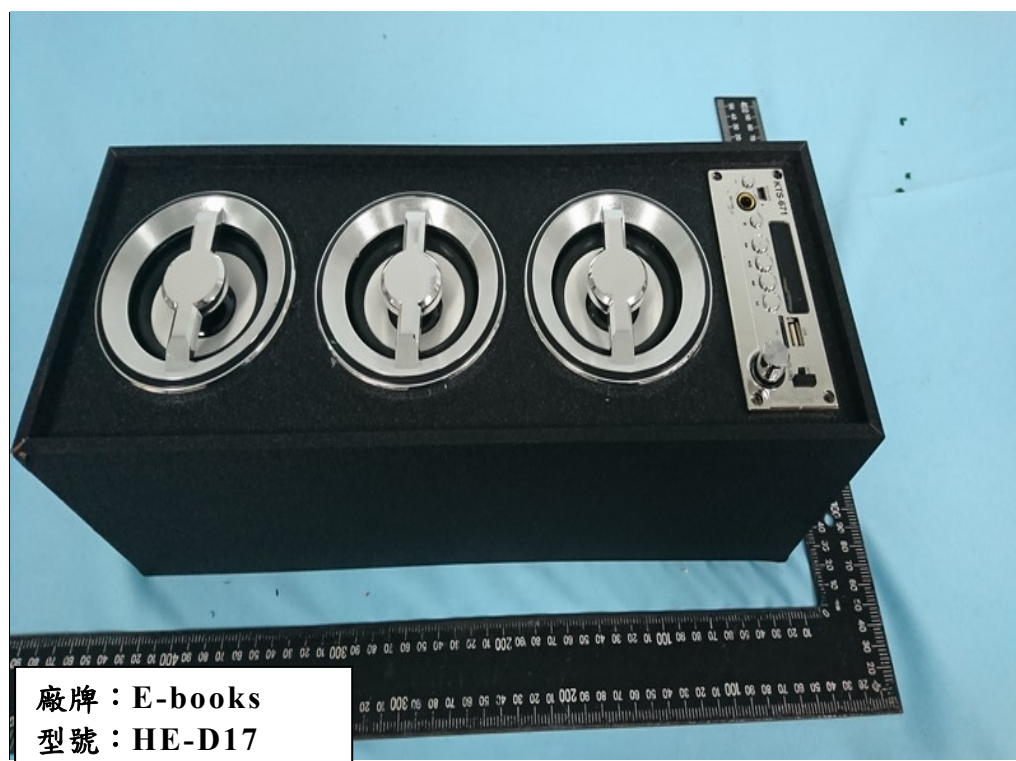
Note :

1. Result = Reading + Corrected Factor
2. Corrected Factor = Antenna Factor + Cable Loss - Amplifier Gain (if any)
3. The margin value=Limit - Result

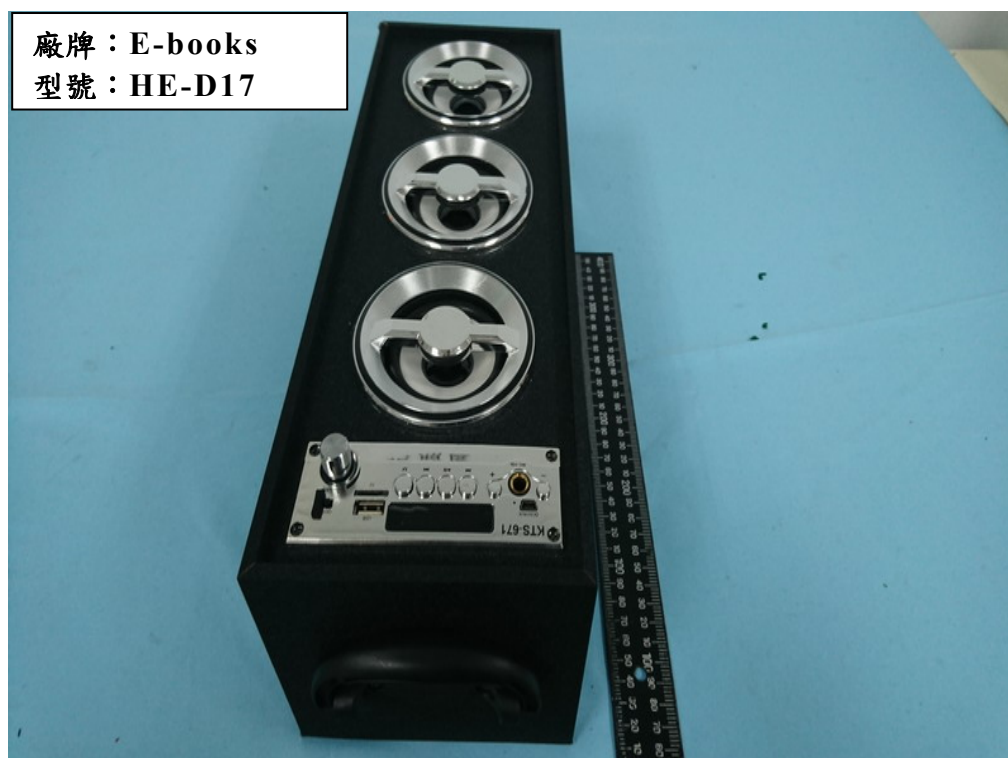
廠牌：E-books

型號：HE-D17

產品外觀照



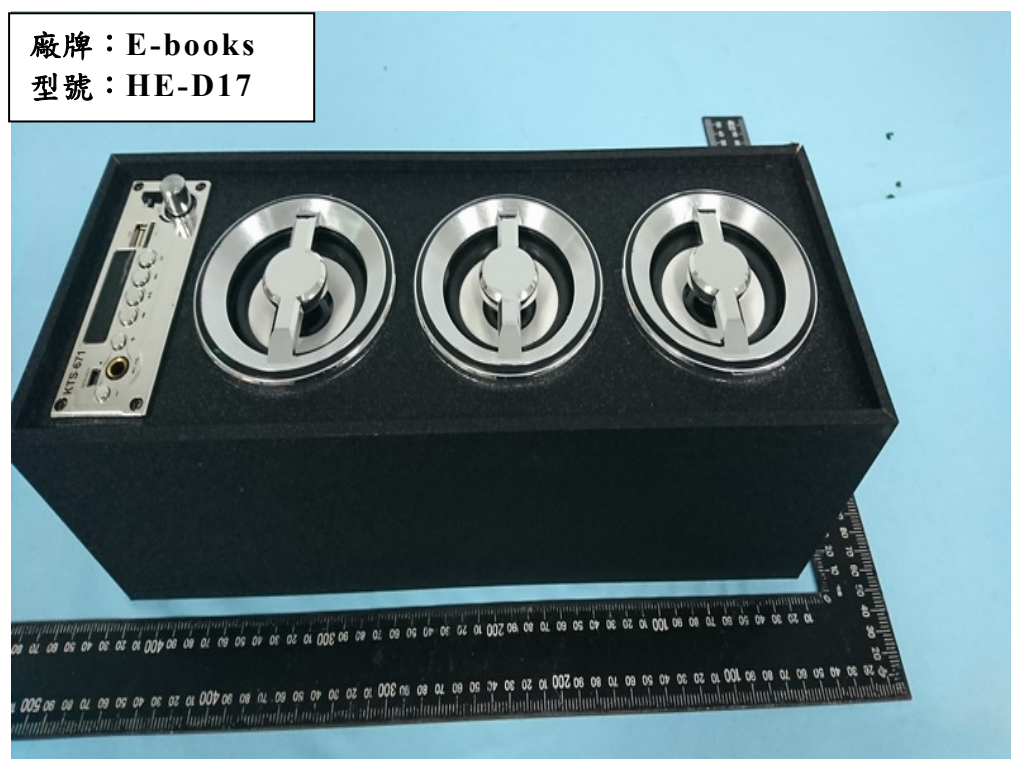
產品合格標籤照



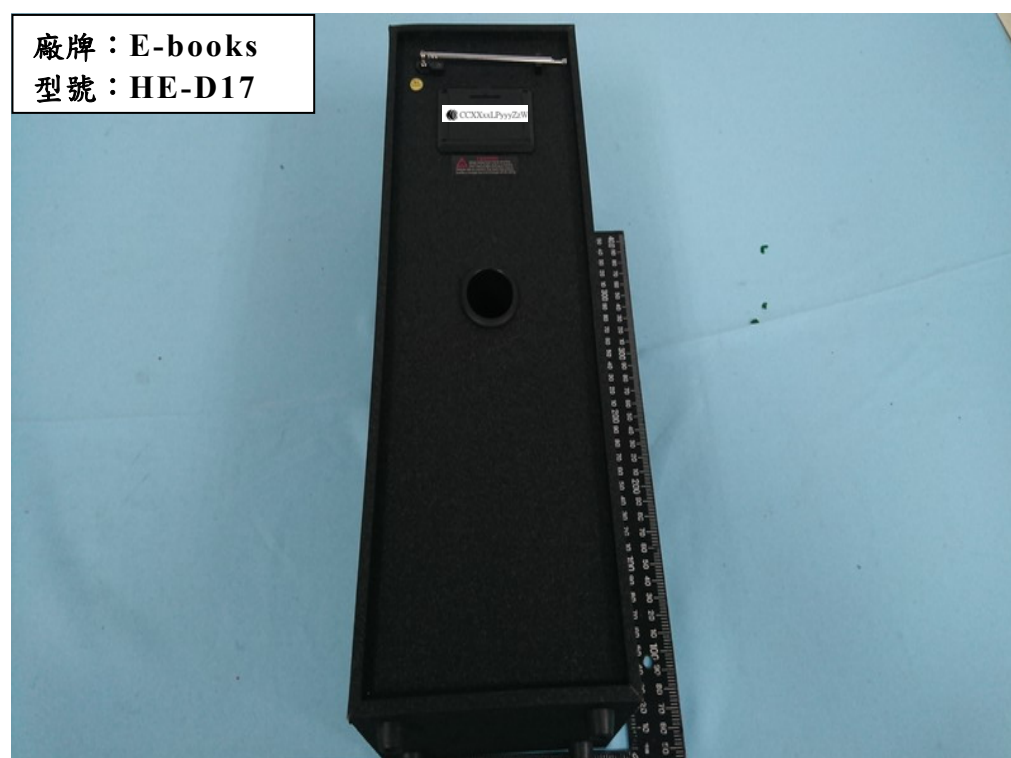
廠牌：E-books

型號：HE-D17

產品外觀照



產品外觀照

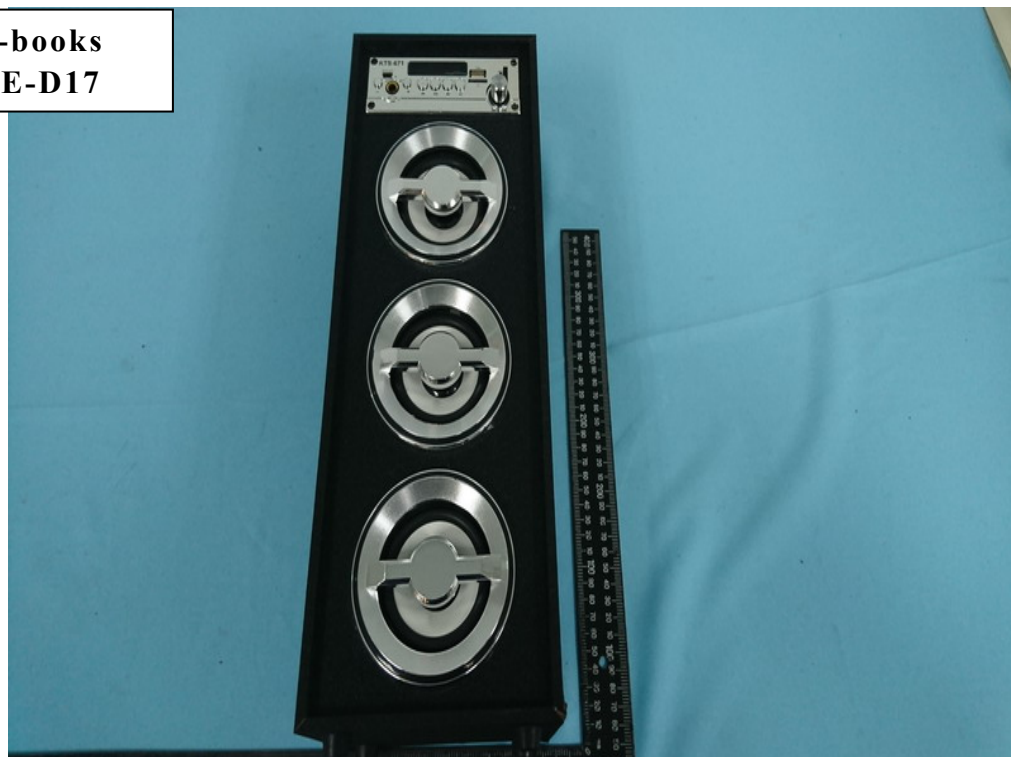


廠牌：E-books

型號：HE-D17

產品外觀照

廠牌：E-books  
型號：HE-D17



產品外觀照

廠牌：E-books  
型號：HE-D17

